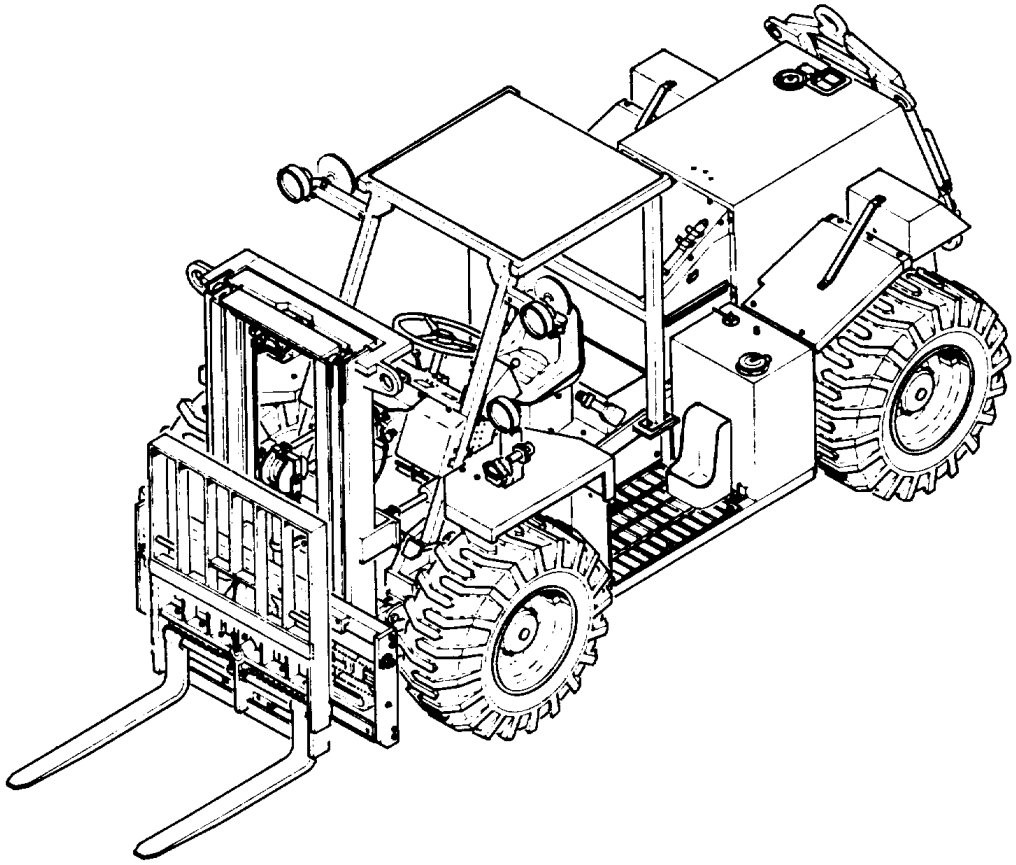
TECHNICAL MANUAL
UNIT, DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE INSTRUCTIONS



TRUCK, FORKLIFT, 4000 LB CAPACITY
ROUGH TERRAIN, DED, PNEUMATIC TIRE

MODEL MHE-271 (WITH CAB)
NSN 3930-01-330-8906

MODEL MHE-270 (WITHOUT CAB)
NSN 3930-01-330-8907

HEADQUARTER'S DEPARTMENT OF THE ARMY

JULY 1994

WARNING

Personnel performing operations, procedures, and practices which are included in this technical manual shall observe the following warnings. Disregard of these warnings and precautionary information can cause serious injury or death.

Warnings are used to emphasize important and critical operating procedures, practices, etc., which, if not correctly followed, could result in personal injury or loss of life.

HIGH VOLTAGE

is used in the operation of this equipment.

DANGEROUS GASES

are generated as a result of operating this equipment.

HIGH TEMPERATURES

are generated during equipment operation.

WARNING

CARBON MONOXIDE POISONING IS 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 produces symptoms of headache, loss of muscular control, apparent drowsiness, and 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. It becomes dangerously concentrated under conditions of inadequate ventilation. The following precautions must be observed to insure the safety of personnel whenever the 4K RTFL is operated.

1. Do not operate engine 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 the 4K RTFL 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

FOR ARTIFICIAL RESPIRATION, REFER TO FM21-11.

WARNING

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

Compressed air used for cleaning purposes shall not exceed 30 psi. Use only with effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc.). Do not direct airstream towards self or other personnel.

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

- Keep fuel away from open flame or any spark (ignition source).
- Keep at least a B-C fire extinguisher within easy reach when working with fuel or on a fuel system.
- Do not work on fuel system when engine is hot; fuel can be ignited by a hot engine.
- Clean fuel tank to purge any flammable liquid or vapors before welding, grinding or using any heat producing device near the fuel tank.
- Post signs that read "NO SMOKING WITHIN 50 FEET" when working with open fuel, fuel lines or fuel tanks.

When refueling, stop the vehicle, shut down the engine, and apply the parking brake. Make sure no flame is near the area. Never smoke. Never add fuel with engine running. Do not have driver seated when adding fuel. After fuel is added, securely close the reservoir cap; a loose cap can cause a fuel leak or be a fire hazard. Before starting the vehicle, check that no fuel is spilled on or around the vehicle.

Do not fill the fuel tank with the engine running, while smoking, or when near an open flame. Never overfill the tank or spill fuel. If fuel is spilled, clean it up immediately. Be sure to use the correct type and grade of fuel. Ground the fuel funnel or nozzle against the filler neck to prevent sparks and be sure to replace the fuel tank cap.

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

Always disconnect battery ground cable or power source before working on electrical components. Discharge capacitors as noted. If you receive an electrical shock, get medical help immediately.

Isopropyl alcohol is flammable. Inhalation of vapors can cause dizziness and headache. Contact with skin may cause irritation. To avoid injury, observe the following precautions:

- Keep isopropyl alcohol away from open flame or any spark (ignition source).
- Keep at least a B-C fire extinguisher within easy reach when working with isopropyl alcohol.
- Post signs that read "NO SMOKING WITHIN 50 FEET" when working with isopropyl alcohol.
- Ensure adequate ventilation. If vapors cause drowsiness, go to fresh air.
- If liquid contacts skin or eyes, immediately flush affected areas thoroughly with water.

Loctite sealing compound can damage your eyes. Wear safety goggles/glasses when using; avoid contact with eyes. If compound contacts eyes, flush eyes with water and get medical help.

Heated engine parts or hot engine oil can burn you. When changing oil on a hot engine, wear gloves to protect against hot oil. Take care not to touch exhaust manifold or muffler while replacing oil drain plug and oil filter.

Do not drain oil while engine is hot. Severe injury will result.

Batteries produce explosive gases and contain sulfuric acid that can cause severe burns.

- Keep sparks, flame and smoking away from batteries.
- Ventilate when charging or using in an enclosed space.
- Wear safety goggles and acid-proof gloves when battery cover must be removed or when adding electrolyte.
- Avoid electrolyte contact with skin, eyes or clothing. If battery electrolyte spills, take immediate action to stop burning effects:

  External: Immediately flush with cold running water to remove all acid.

  Eyes: Flush with a lot of cold water for at lease 15 minutes. Seek medical aid immediately.

  Internal: Drink large amounts of water or milk. Follow with milk of magnesia, beaten egg, or vegetable oil. Seek medical aid immediately.

  Clothing or Vehicle: Wash at once with cold water. Neutralize with baking soda or household ammonia solution.

Don't remove the radiator cap when the engine is hot; hot steaming gases can escape and burn you. Use a clean thick waste cloth or like to remove the cap. Avoid using gloves, because you could be burned if hot water soaked through them. Use extreme care when removing the radiator pressure cap. The sudden release of pressure can cause a steam flash which could seriously injure you. Slowly loosen cap to the first stop to relieve pressure before removing cap completely. After use, tighten cap securely.

BURN HAZARD

Allow engine to cool before you perform maintenance on the muffler, exhaust pipe, exhaust manifold or turbocharger. If necessary, use insulated pads and gloves. Do not touch hot exhaust system with bare hands; injury will result.

Keep hands and arms away from fan blade and drive while engine is running, or serious injury will result.

When adjustment or service requires a running engine, two soldiers must be used; one at controls and one at service point. This helps prevent accidental movement of controls.

To avoid personal injury, use a hoist or get help when lifting components that weight more than 50 lbs (23 kg). Be sure all chains, hooks, slings, etc. are in good condition and are of correct capacity. Be sure hooks are positioned correctly. Always use a spreader bar when necessary. The lifting hooks must not be side loaded.

Sharp edges can cut hands. Use rags or brush to lubricate.

When working on a running engine, provide shielding for exposed rotating parts. Tools, clothing or hands can get caught and cause serious injury.

Unit, Direct Support and General
Support Maintenance Manual

HEADQUARTERS
DEPARTMET OF THE ARMY
Washington D.C., *19 July 1994*

TRUCK, FORKLIFT, 4000 LB CAPACITY ROUGH TERRAIN, DED, PNEUMATIC TIRE

MODEL MHE-271 (3930-01-330--8906)
MODEL MHE-270 (3930-01-330-8907)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes, or if you know a way to Improve the procedures, please let us know. Mail your letter or DA Form 2028 (recommended changes to publications and blank forms) directly to: Commander, U.S. Army Tank-Automotive Command, ATNN: AMSTA-MMAA, Warren, MI. 48397-5000 A reply will be sent directly to you.

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Approved for public release; distribution Is unlimited

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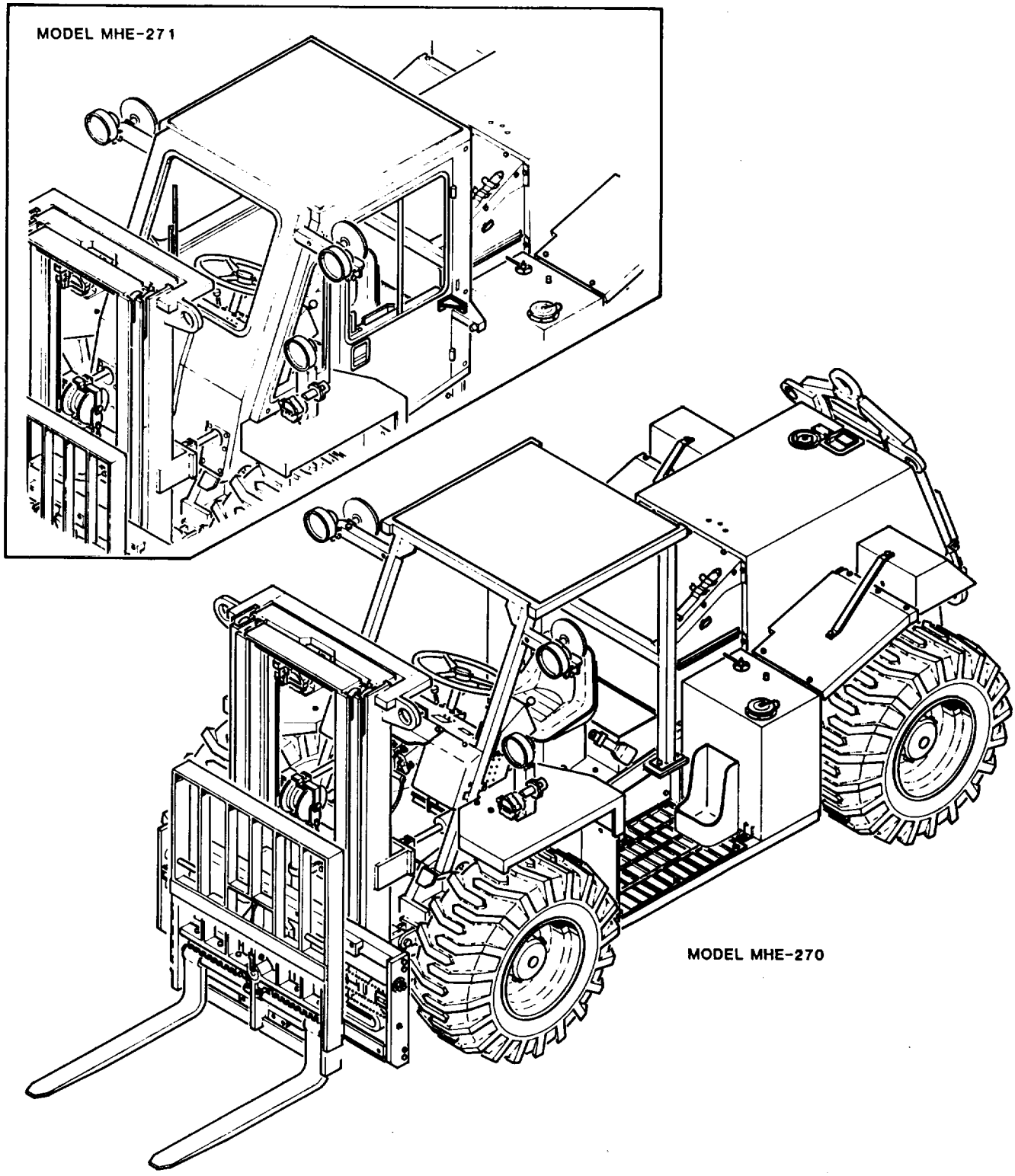

Figure 1-1. 4000 Pound Capacity Rough Terrain Forklift Truck, Models MHE-270 and MHE-271

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE.

a. This manual is combined Unit, Direct Support, and General Support maintenance manual for the 4000 Pound Capacity Rough Terrain Forklift Truck, 4K RTFL, Models MHE-270 and MHE-271, Figure 1-1 (hereafter referred to as forklift).

b. Information is provided on principles of operation, service upon receipt, inspection and installation, repair parts and special tools, preventive maintenance checks and services, troubleshooting, Unit, Direct Support and General Support maintenance, and preparation for shipment and storage.

c. Appendix A contains a list of reference publications applicable to this manual.

1-2. MAINTENANCE FORMS AND RECORDS.

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

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

For destruction of the forklift and related equipment to prevent enemy use, refer to TM 750-244-6, Procedures for the Destruction of Tank-Automotive Equipment to Prevent Enemy Use.

1-4. PREPARATION FOR STORAGE OR SHIPMENT.

a. **General**. The procedures defined below are necessary to maintain the forklift in storage in such a way as to achieve the maximum Readiness Condition (REDCON). Equipment that is placed in storage should be capable of being readied to perform its mission within a 24-hour period or as otherwise may be prescribed by the approving authority.

b. Before the forklift is placed in storage, current maintenance services and equipment serviceability criteria (ESC) evaluations should be completed, shortcomings and deficiencies should be corrected, and all modification work orders (MWO's) should be applied.

c. Report equipment in storage in Material Readiness and Unit Readiness reports as prescribed for all reportable equipment. Refer to AR 220-1.

d. During the storage period appropriate maintenance records must be kept. Perform inspections, maintenance services, and lubrications in accordance with the Lubrication Order and Preventive Maintenance Checks and Services (PMCS) tables. Ten percent variance is acceptable on the time used to determine maintenance actions required.

e. Records and reports to be maintained for equipment in storage are those prescribed by TM 38-750, for equipment in use.

f. **Storage Site Selection**. Select the best available site for storage. Separate stored forklift from equipment in use. Covered storage space is preferred. Open sites should be improved hardstand. Unimproved sites should be firm, well drained, and kept free of excessive vegetation.

g. **Storage Plan**. Store the forklift so as to provide maximum protection from the elements and to provide access for inspection, maintenance, and exercise. Anticipate removal or deployment problems and take suitable precautions.

h. Take into account environmental conditions, such as extreme heat or cold; high humidity; blowing sand, dust, or loose debris; soft ground; mud; heavy snows; earthquakes; or combinations thereof and take adequate precautions.

i. **Maintenance Prior To Storage**.

(1) Maintenance Services.

(a) Prior to storage, perform the next scheduled major preventive maintenance service (monthly, quarterly, or semiannually).

(b) Fill fuel tank to maximum allowable level. Ventilate by releasing filler cap. If local fire regulations prohibit storing equipment with fuel in system, completely drain the fuel tank.

(c) Remove battery from forklift and store in a cool, well-ventilated area. Recharge and clean before reinstalling.

(2) Inspection. Inspect and approve the forklift prior to storage. When applicable, perform an ESC evaluation. Do not place the forklift in storage in RED condition unless RED condition is due only to over age.

(3) Cleaning. Clean the forklift of dirt, grease, or other contaminants in accordance with paragraph 1-23.

(4) Preservation. After cleaning and drying, immediately coat unpainted metal surfaces with an oil or grease, as appropriate. Ensure the following components are properly preserved:

(a) Mast assembly
(b) Rail assemblies
(c) Rotate carriage assembly
(d) Sideshift carrier assembly
(e) Freelift chain assembly
(f) Drive chain assembly
(g) Sideshift chain assemblies
(h) Cylinder rod ends

(5) Weatherproofing. Sunlight, heat, moisture (humidity), and dirt tend to accelerate deterioration. Install all covers authorized for the forklift. Close and secure all openings except those required for ventilation and draining. Seal openings to prevent the entry of rain, snow, or dust. Insert desiccant (item 32, App. C) when complete seal is required. Place forklift at storage site and provide blocking or framing to allow for ventilation and water drainage.

NOTE

Air recirculation under draped covers reduces deterioration from moisture and heat.

CAUTION

Place a piece of barrier material (item 31, App. C) between desiccant bags and metal surfaces. Desiccant may leak and deteriorate or corrode adjacent metal.

j. **Inspection During Storage.** Inspection will be visual and consist of a walk-around examination of the entire forklift to observe any deficiencies that may have occurred. Inspect forklifts in open storage weekly and those in covered storage monthly. Immediately after any severe storm or environmental change inspect all equipment. Conduct the following checks during visual inspection:

(1) Inspect for leaks: fuel, oil, or hydraulic fluid. Inspect all hoses, tubing, connections, fittings, seals, and gaskets for evidence of leakage.

(2) Inspect for low or flat tires. Mark reinflated and repaired tires with a crayon and ensure they are thoroughly checked at next inspection interval.

(3) Inspect for corrosion or other deterioration.

(4) Inspect for missing or damaged parts.

(5) Check for water in compartments.

(6) Look for any other recognizable shortcomings or deficiencies.

k. **Repair During Storage.** Keep the forklift in an optimum state of readiness. Accomplish required services and repairs as expeditiously as possible. Whenever possible, perform maintenance "on-site".

l. **Exercising During Storage**. Exercise the forklift in accordance with the schedule outlined in Table 1-1. Limit depreservation to removal of materials that will restrict exercising. Perform all Before, During, and After PMCS procedures (Chapter 2). Conduct applicable ESC inspections.

m. Immediately take actions to correct shortcomings and deficiencies noted. Record inspection and exercise results on DA Form 2404. Record and report maintenance actions on DA Form 2407. After exercising, restore the preservation to the original condition.

n. Replenish fuel and oil used during exercising and note the amount on DA Form 2408-1.

o. **Removal From Storage**. Restore forklift to normal operating condition. Resume the maintenance service schedule in effect at the commencement of storage or service the forklift before the scheduled dates in order to produce a staggered maintenance workload.

Table 1-1. Forklift Exercising During Storage

INFORMATION TO BE SUPPLIED
BY U.S. ARMY TACOM

1-5. NOMENCLATURE CROSS-REFERENCE LIST.

Refer to Table 1-2 for a listing of simplified and common item names used in this manual.

Table 1-2. Nomenclature Cross-Reference List

Common Name	Official Nomenclature
Forklift or 4K RTFL	Truck, Forklift, 4000 Lb Capacity, Rough Terrain, DED, Pneumatic Tire

1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR's).

If your forklift 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. Put it on an SF 368 (Quality Deficiency Report). Mail it to: Commander, US Army Tank-Automotive Command, Attn: AMSTA-QRT, Warren, MI 48397. We'll send you a reply.

1-7. WARRANTY INFORMATION.

Refer to the Warranty Technical Bulletin TB 10-3930-664-14 for information on warranty policies and coverage.

1-8. USE OF METRIC UNITS.

The equipment described herein contains metric components and requires metric common and special tools; therefore metric units in addition to English units will be used throughout this publication.

1-9. CORROSION PREVENTION AND CONTROL (CPC).

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

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

c. If a corrosion problem is identified, it can be reported using Standard Form 368, Product Quality Deficiency Report. Use of key words such as "corrosion", "rust", "deterioration", or "cracking" will ensure that the information is identified as a CPC problem.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-10. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

a. The following description pertains to the Diesel-Engine-Driven, Pneumatic Tired, 4000 Pound Capacity Rough Terrain Forklift Truck, Models MHE-270 (NSN 3930-01-330-8907) and MHE-271 (NSN 3930-01-330-8906), hereafter referred to as the forklift. The forklift includes the following features:

- Designed for use as a material handling forklift
- Capable of loading and unloading the eight foot wide by eight foot high family of ANSI/ISO cargo containers
- Handle, transport, and stack containers, boxes, and palletized loads weighing up
- to the rated capacity of 4000 pounds
- Good mobility to operate on various types of terrain including work areas where high flotation and traction characteristics are required.
- Can lift a load (within rated capacity) to a 120 inches (maximum)
- Can move load laterally (left or right) 22 inches (maximum)
-

b. The forklift is composed of the ten major systems and assemblies listed below. Refer to Operator's Manual, TM 10-3930-664-10, for a complete description of characteristics, capabilities, and features of these assemblies.

- Powertrain Assembly
- Fuel System
- Exhaust System
- Cooling System
- Electrical System
- Brake System
- Steering System
- Chassis Assembly
- Hydraulic System
- Mast Assembly

1-11. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

a. Refer to Operator's Manual, TM 10-3930-664-10, for basic information pertaining to the major components of the forklift. See Figures 1-2 and 1-3 in this manual for locations of major assemblies, subassemblies, and system components.

b. Refer to Figures 1-4 and 1-5 for the location and content of each stencil, identification plate, and instruction plate mounted to the forklift. Details are provided for fabrication of damaged or illegible plates or markings.

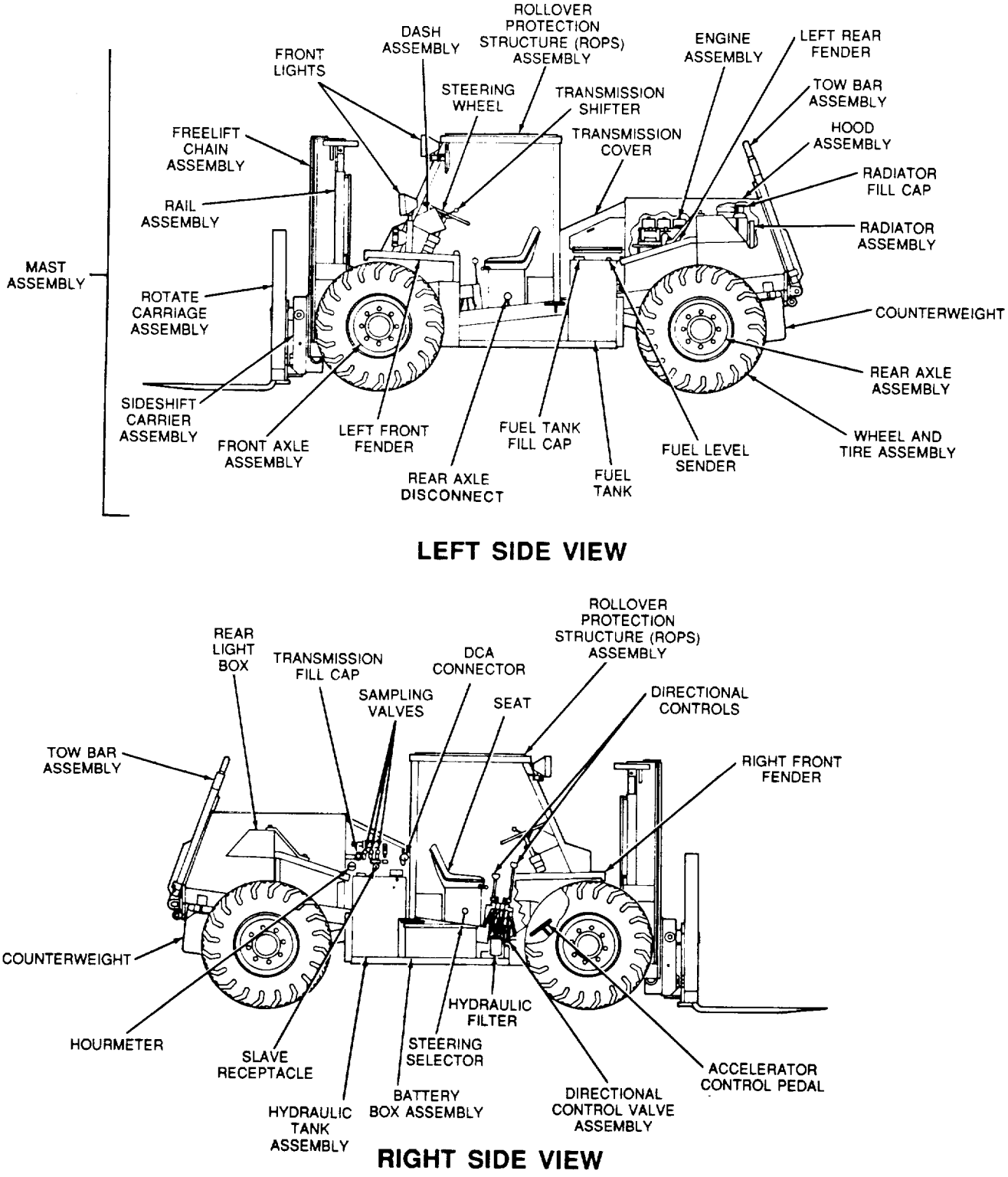

Figure 1-2. Forklift Assemblies and Major Components

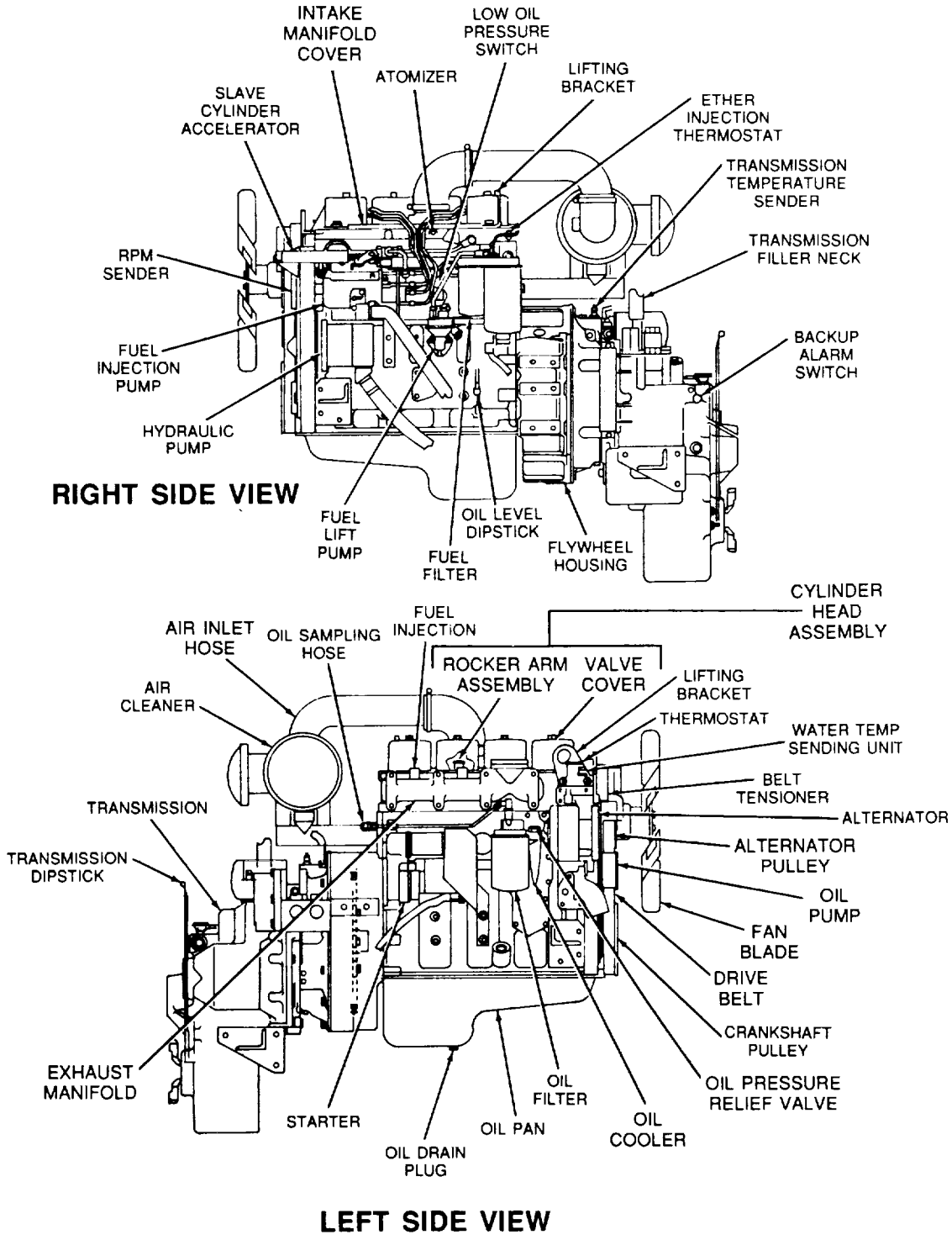

Figure 1-3. Powertrain Assemblies and Major Components

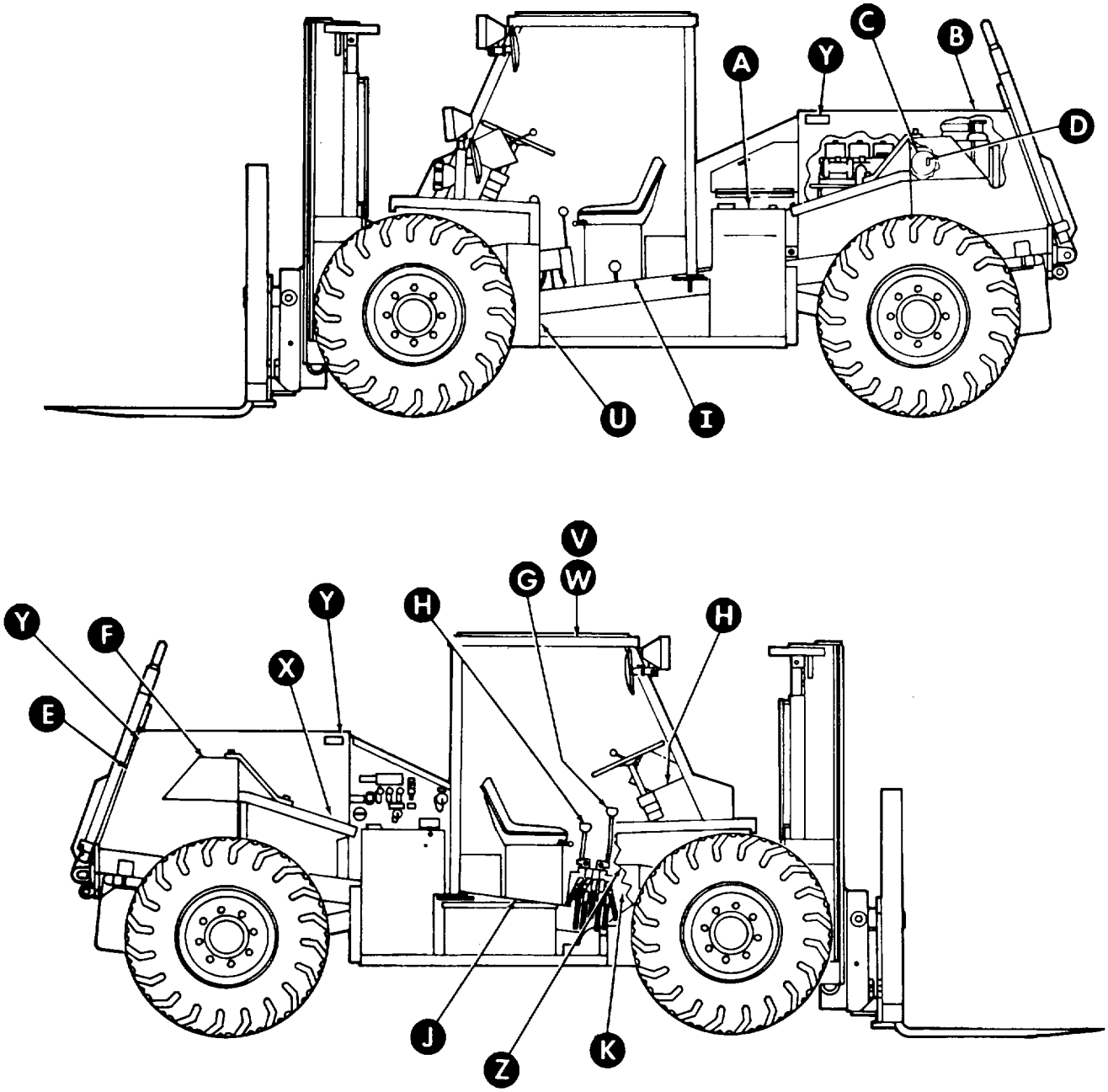

Figure 1-4. Forklift Truck Information Plates and Stencils
(Sheet 1 of 8)

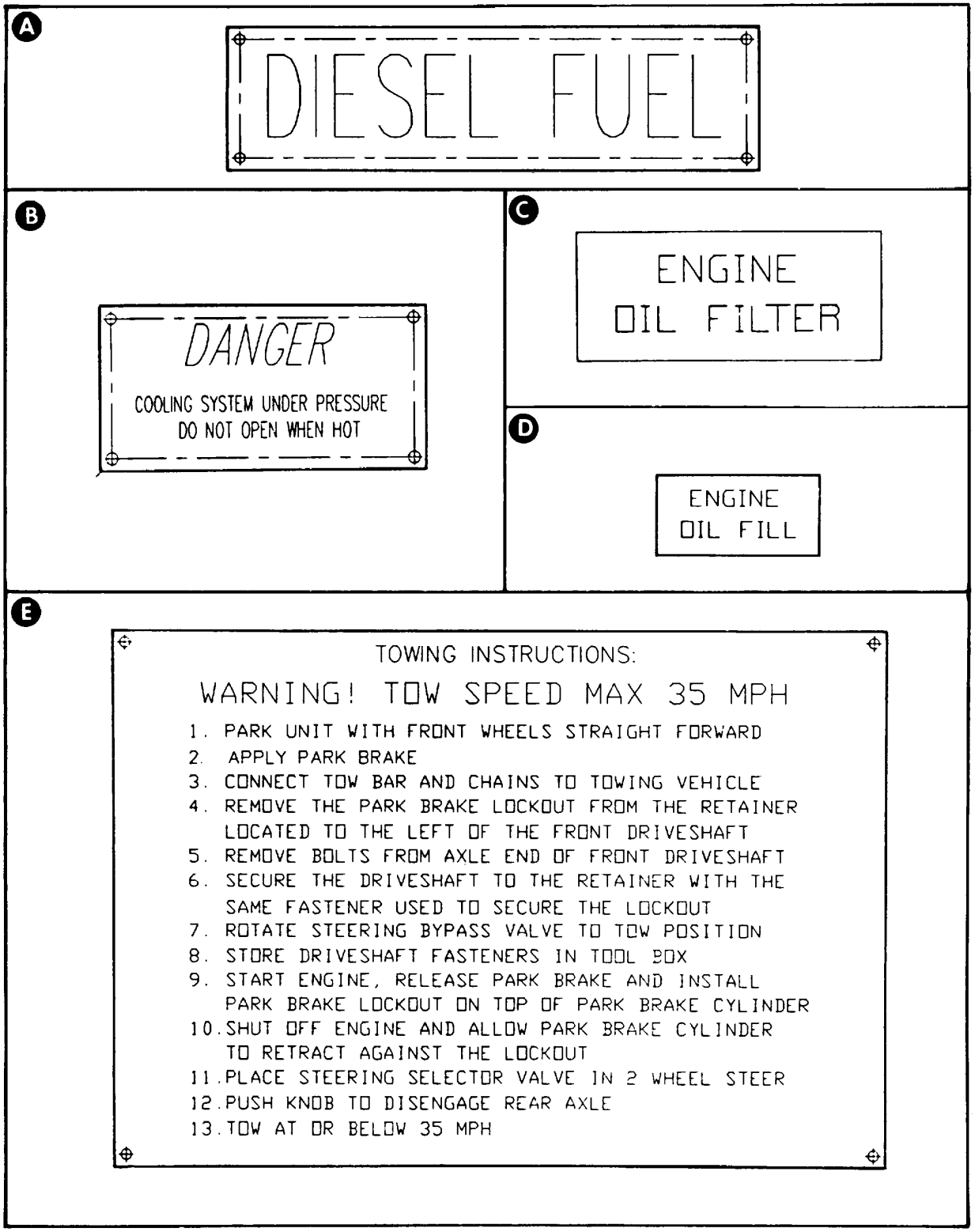

Figure 1-4. Forklift Truck Information Plates and Stencils (Sheet 2)

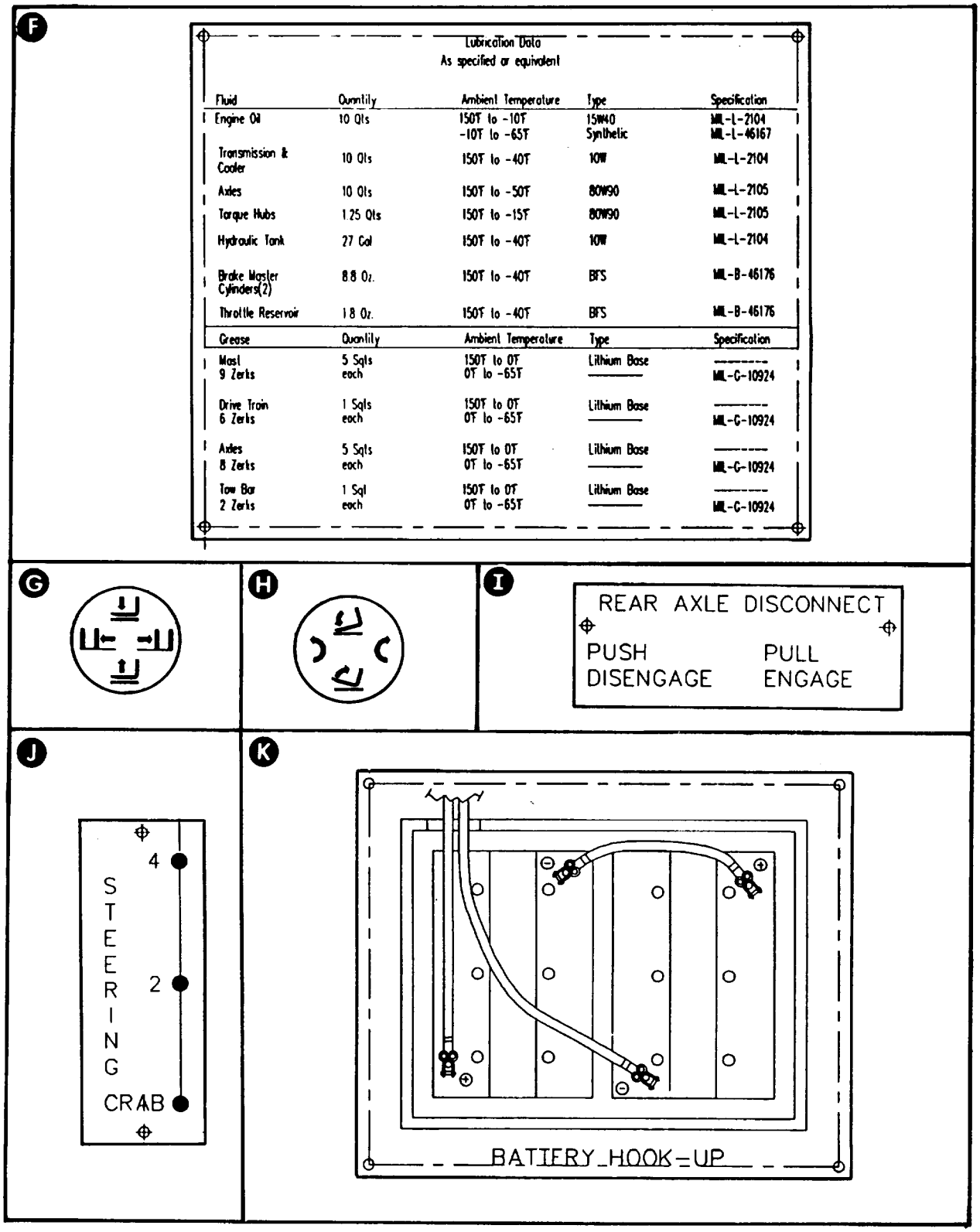

Figure 1-4. Forklift Truck Information Plates and Stencils (Sheet 3)

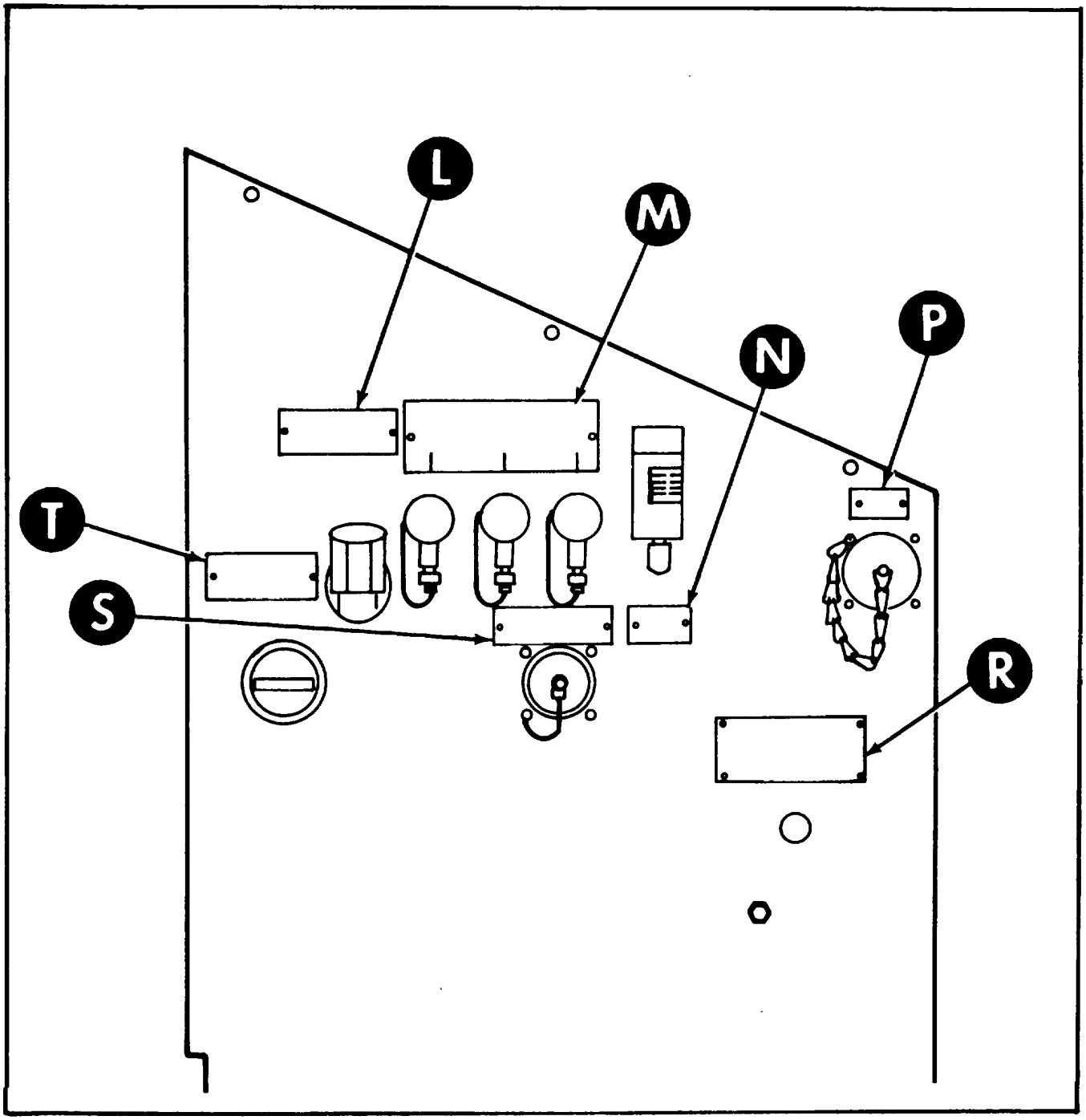

Figure 1-4. Forklift Truck Information Plates and Stencils
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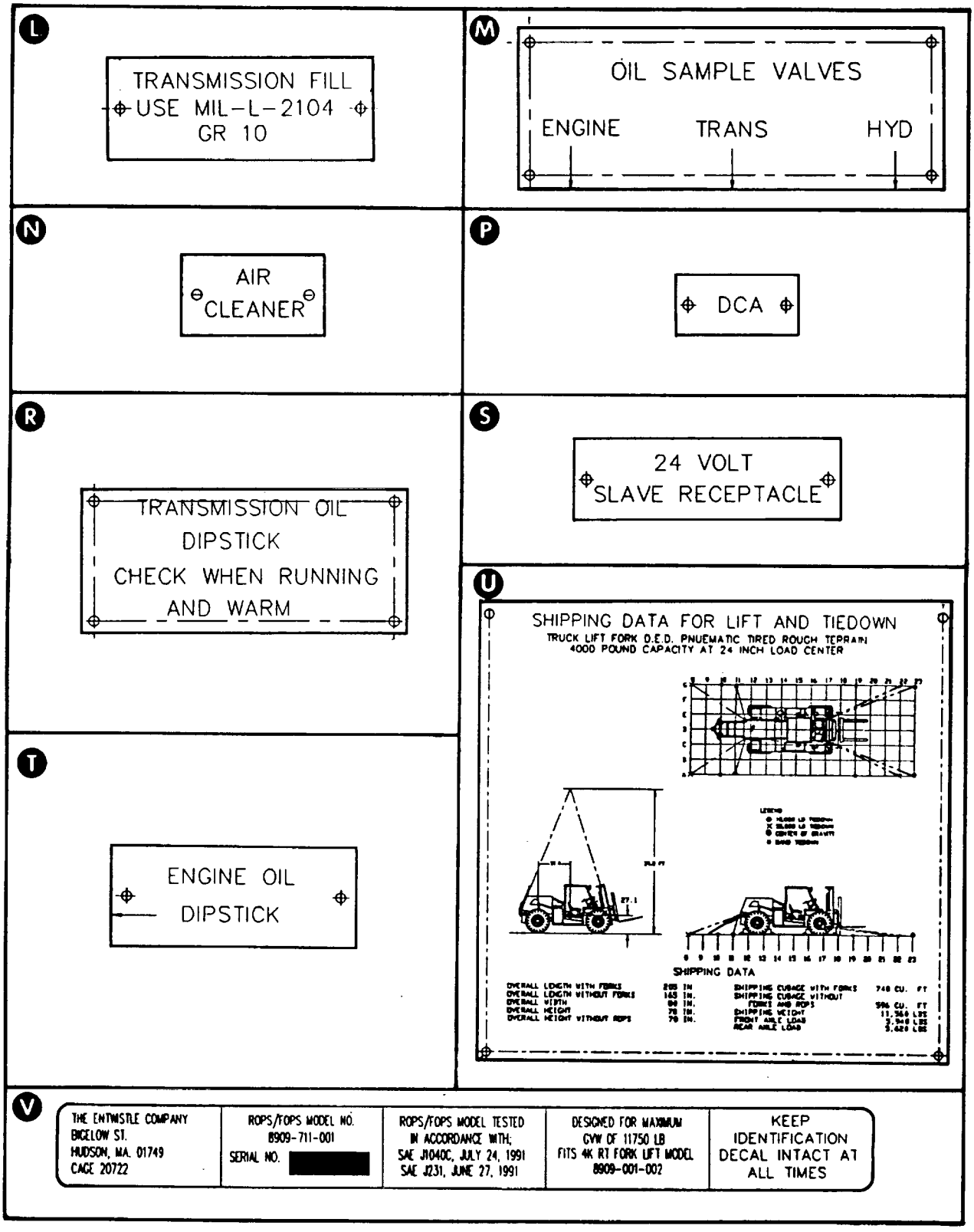

Figure 1-4. Forklift Truck Information Plates and Stencils
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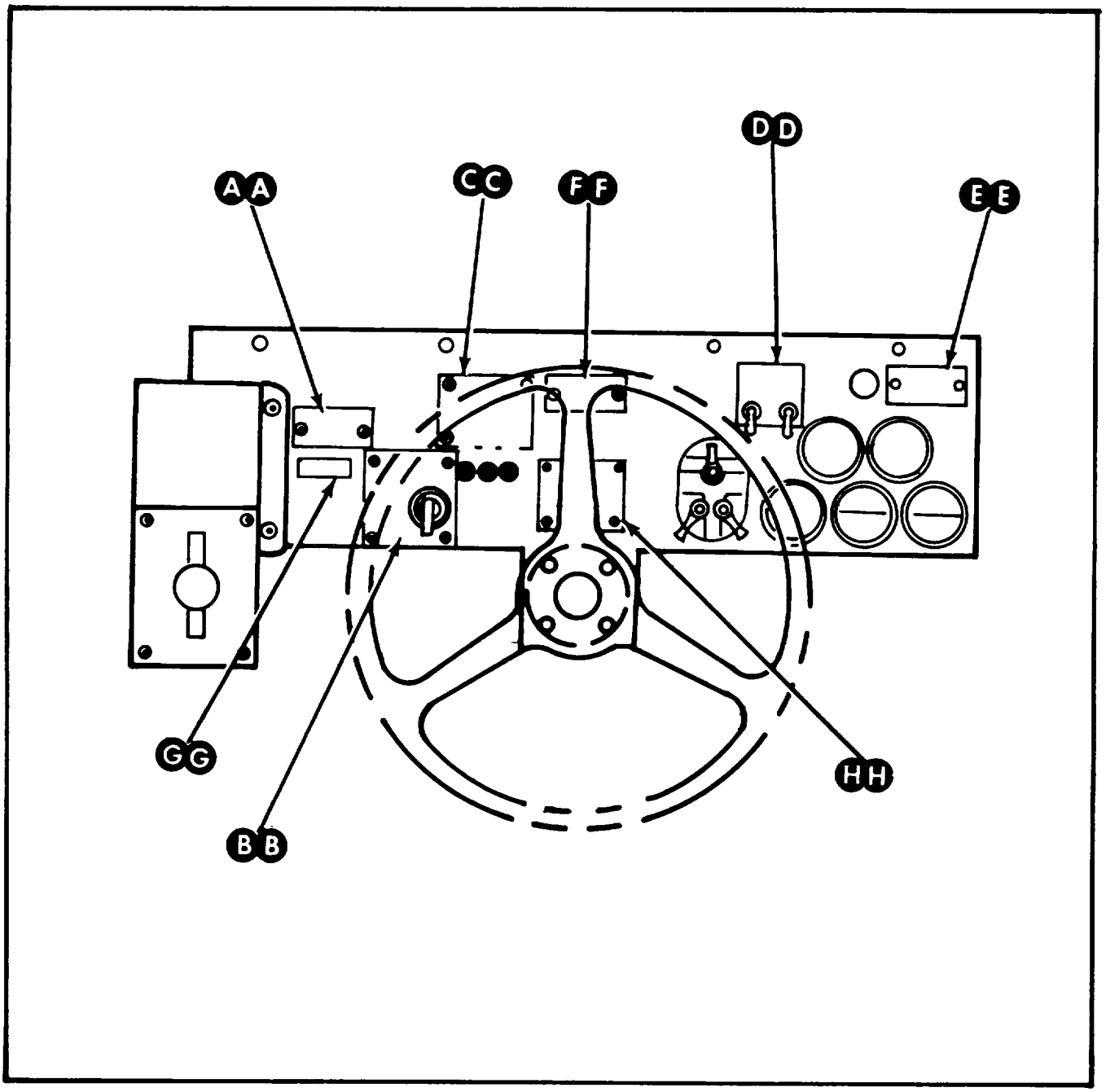

Figure 1-4. Forklift Truck Information Plates and Stencils
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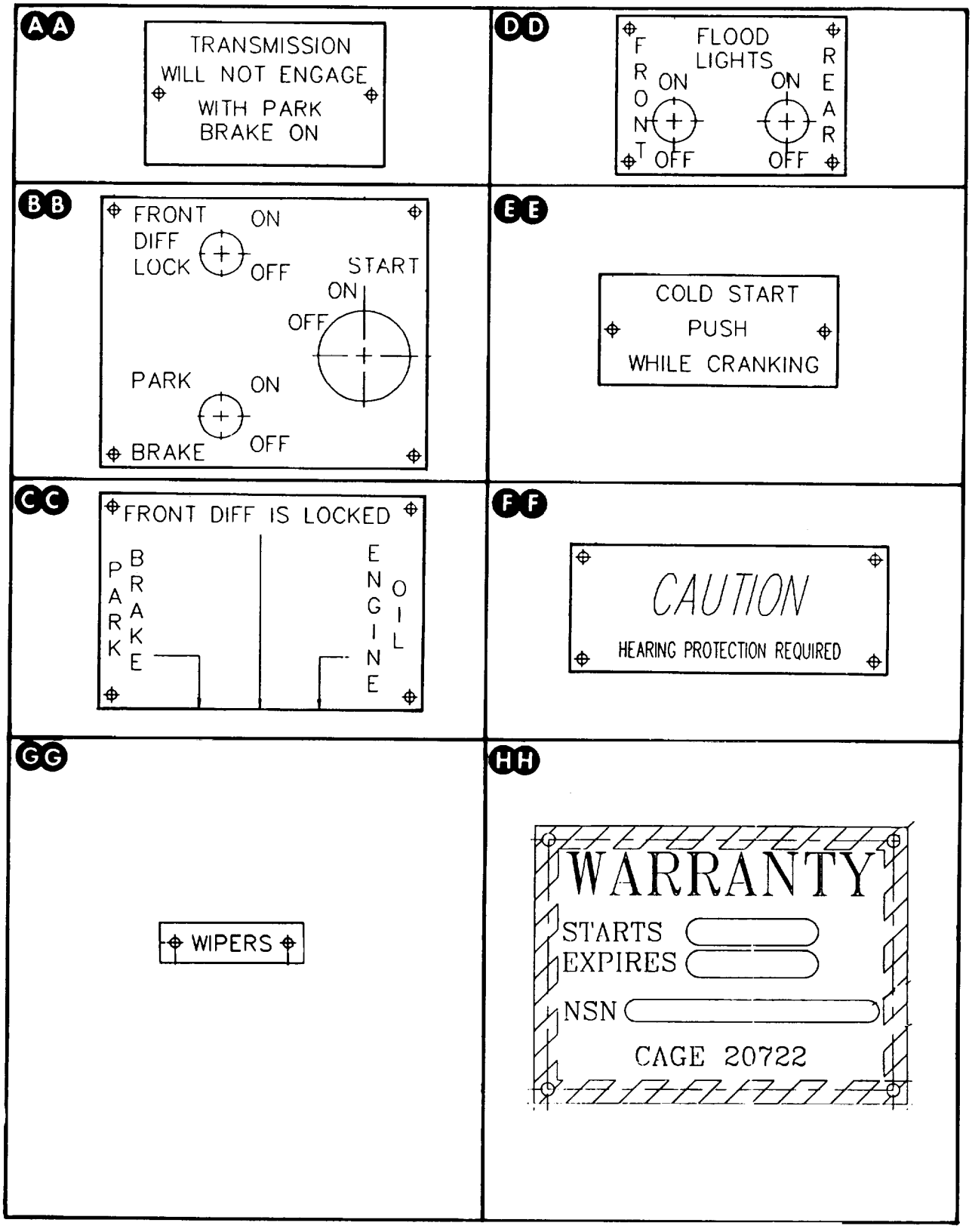


Figure 1-4. Forklift Truck Information Plates and Stencils
(Sheet 7)

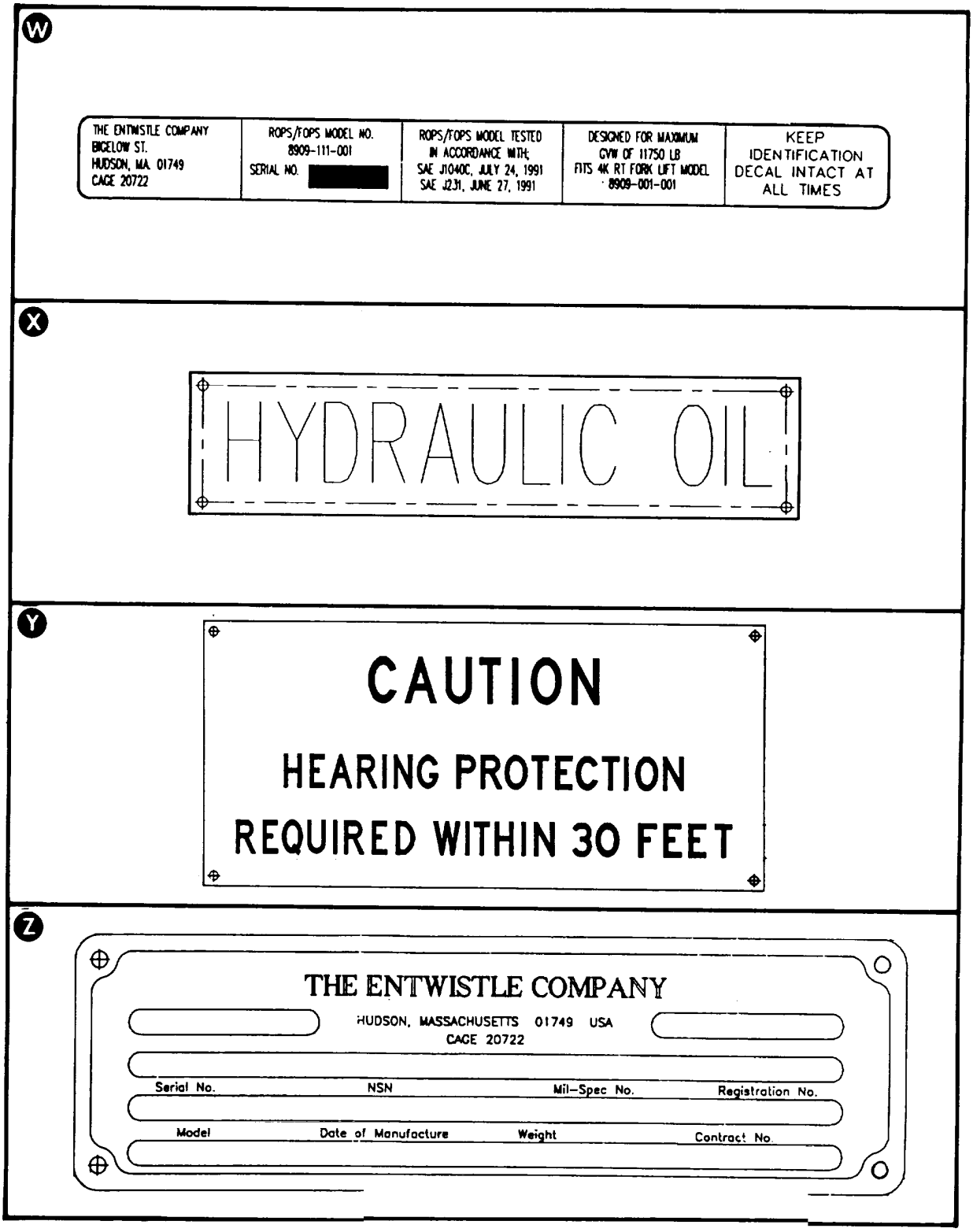


Figure 1-4. Forklift Truck Information Plates and Stencils (Sheet 8)

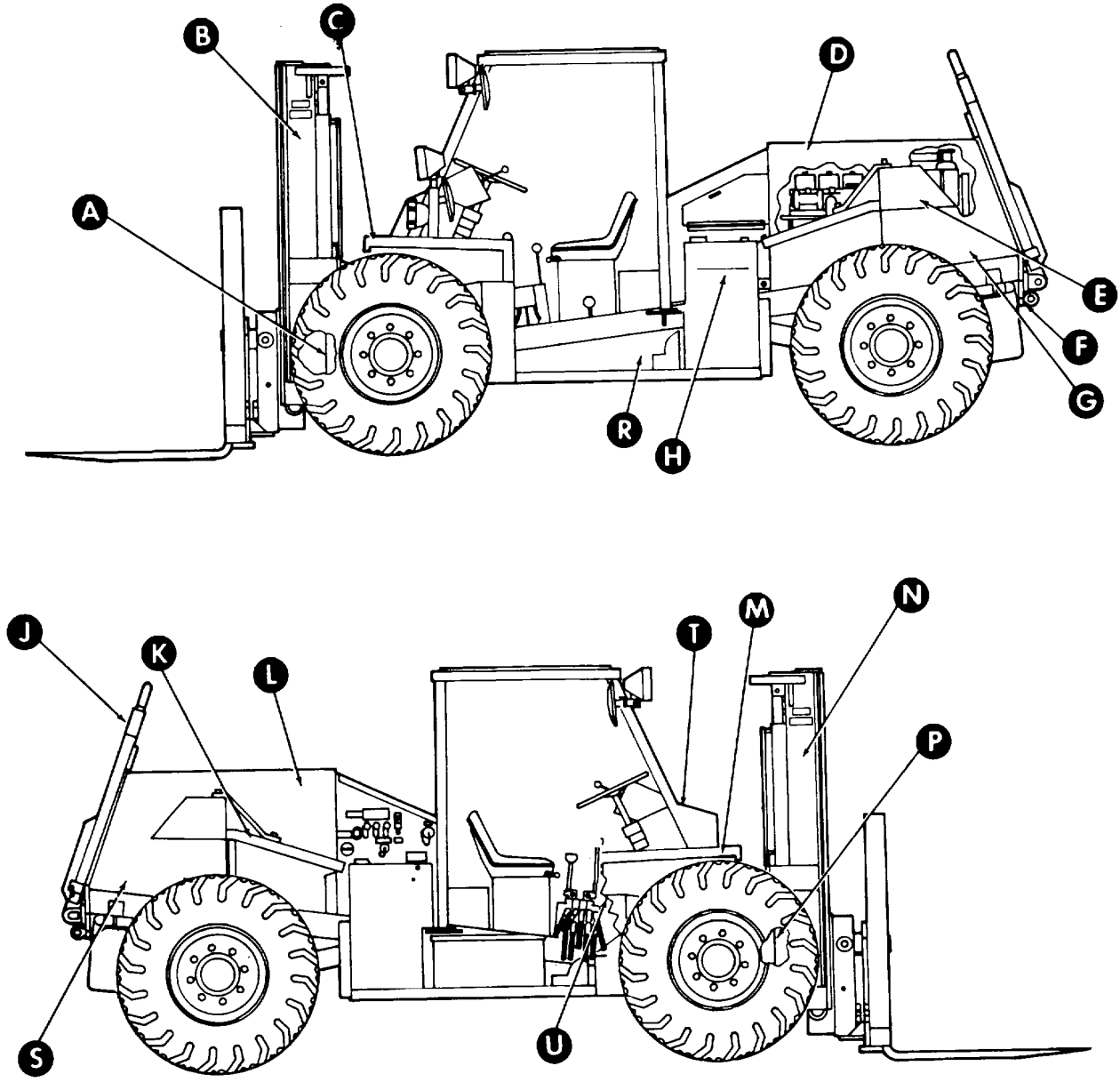


Figure 1-5. Forklift Truck Stencils
(Sheet 1 of 2)

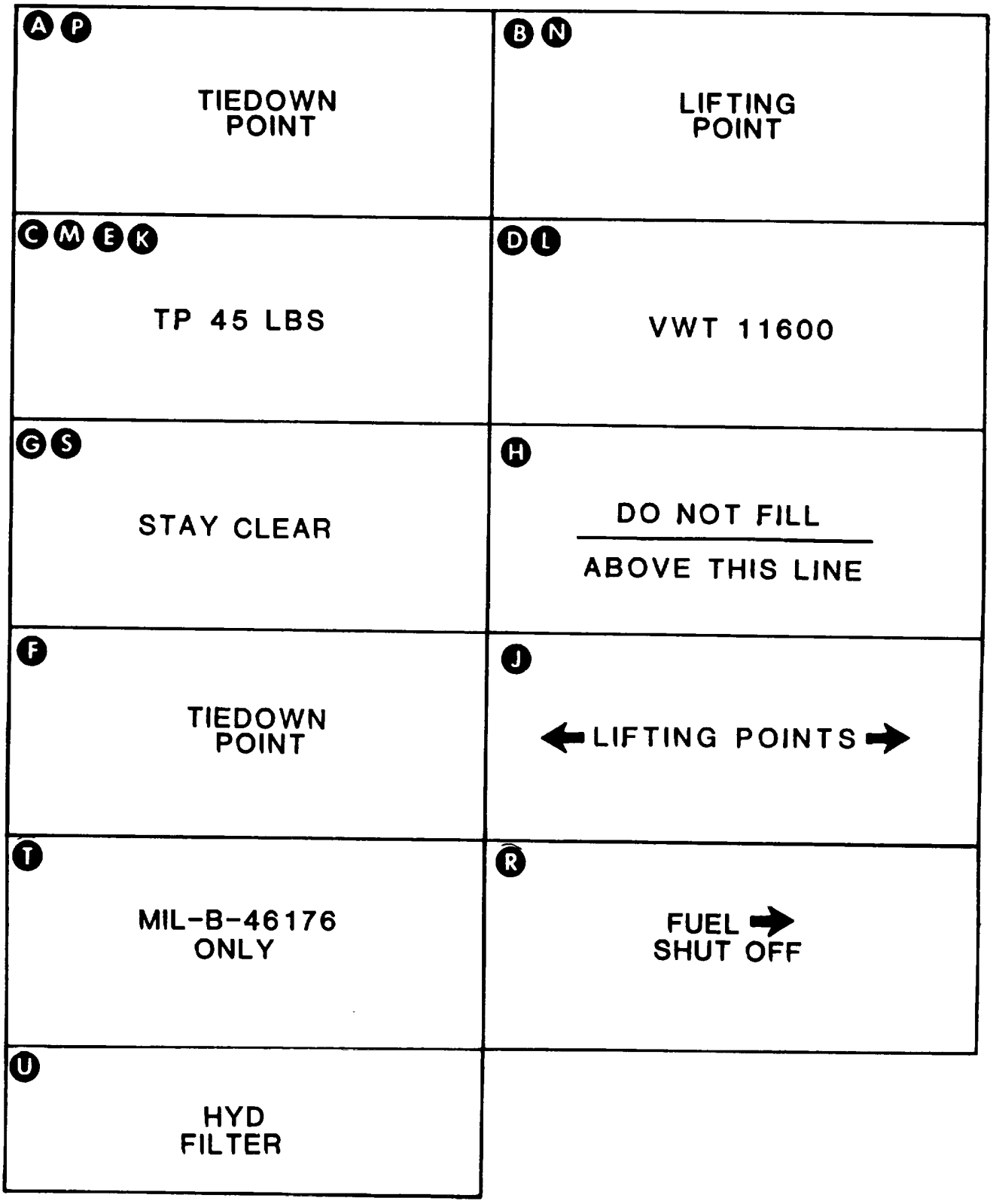


Figure 1-5. Forklift Truck Stencils (Sheet 2)

1-12. DIFFERENCES BETWEEN MODELS.

a. Forklift model MHE-271 is equipped with an enclosed cab for operator protection during non-ambient operating conditions. The cab consists of the following components which are unique to model MHE-271:

- Front and side panel assemblies
- Window assemblies
- Driver side door
- Front and rear window windshield wipers
- Defroster fans (2)
- Heater assembly
- Windshield wiper operational switch

b. The switch used to control windshield wiper operation is located on the instrument panel. There are no other differences between forklift models MHE-270 and MHE-271.

1-13. EQUIPMENT DATA.

Table 1-3 lists performance data, capabilities, and parameters required for maintenance of the forklift.

Table 1-3. Equipment Data

FORKLIFT DIMENSIONS	
Length (overall, mast vertical)	205 in (520.2 cm)
Length (overall, forks removed)	155 in (419.1 cm)
Height (to top of ROPS/FOPS)	70 in (200.7 cm)
Width	79 in (203.2 cm)
Wheelbase	100 in (254 cm)
Tire Track	79.25 in (201.8 cm)
FORKLIFT WEIGHT	
No Load or Operator, Full Fuel Tank	
Model MHE-270 (overall)	11,560 lbs (5254.5 kg)
Front Axle	5,940 lbs (2700.0 kg)
Rear Axle	5,620 lbs (2554.5 kg)
No Load or Operator, Full Fuel Tank	
Model MHE-271 (overall)	11,840 lbs (5381.8 kg)
Front Axle	6,140 lbs (2790.9 kg)
Rear Axle	5,700 lbs (2590.9 kg)
4000 lb Load, No Operator, Full Fuel Tank	
Model MHE-270 (overall)	15,560 lbs (7072.8 kg)
Front Axle	12,020 lbs (5463.6 kg)
Rear Axle	3,540 lbs (1609.1 kg)
4000 lb Load, No Operator, Full Fuel Tank	
Model MHE-271 (overall)	15,840 lbs (7200.0 kg)
Front Axle	12,240 lbs (5563.6 kg)
Rear Axle	3,600 lbs (1636.4 kg)

Table 1-3. Equipment Data - continued

FORKLIFT PERFORMANCE	
Speed	
First	4 MPH
Second	8 MPH
Third	20 MPH
Lift Capacity Rated (at 24 inch center)	4,000 lbs (1816 kg)
Maximum Lift Height (bottom of forks empty)	120 in (304.8 cm)
Drop Below Ground (bottom of forks empty)	4 in (10.1 cm)
Minimum Lateral Fork Adjustment (on centers)	8 in (20.2 cm)
Maximum Lateral For; Adjustment	30 in (76.2 cm)
Mast Tilt	
Forward	10 degrees
Rearward	20 degrees
Mast Sideshift (right or left of center)	22 in (55.4 cm)
Rotation (CW or CCW,	10 degrees
Maximum Towing Speed	35 MPH
CAPACITIES	
Engine Crankcase	10 quarts (3.5 liters)
Fuel Tank	27 gallons (102.2 liters)
Cooling System	5 gallons (18.8 liters)
Transmission	8 quarts (7.5 liters)
Hydraulic System	30 gallons (113.6 liters)
Axles	
Differential (each)	10 quarts (7.6 liters)
Hubs (each)	1 pint (0.47 liters)
ENGINE	
Make and Model	Cummins 4B3.9
Fuel Type	W-F-800 (#2 Diesel)
Number of Cylinders	Four
Cylinder Arrangement	In-Line
Weight	680 lbs (308.72 kg)
Performance:	
Piston Displacement	239.3 cubic in
Bore	4.02 in (10.2 cm)
Stroke	4.72 in (12.0 cm)
Compression Ratio	17.3:1
Brake Mean Effective Pressure	94.6 psi (652.7 kPa)
Low Idle Speed	800 RPM
Governed Speed (max at no-load)	3100 RPM
Maximum Gross Horsepower	80 HP at 2800 RPM
Net Horsepower at Engine Governed Speed	68 HP
Total Accessory Horsepower at Engine	12 HP
Governed Speed	
Maximum Gross T3rque	184 ft-lbs at 1200 RPM
Maximum Net Torque	154 ft-lbs at 1200 RPM
Heat Rejection Rate (max)	2361 BTU/minute

Table 1-3. Equipment Data - continued

Lubrication System:	11.5 quarts total system,
Lube Oil Capacity	10.0 quarts in oil pan
Lubrication Type	API Class CE/SF or CE/SG
Oil Pump Type	Geroter
Oil Filter Type	Full flow, 20-30 microns - 95%,
Oil Pressure at Idle (max)	40 microns and above - 100%
Oil Pressure at Rated Speed (min)	10 PSI (69 kPa)
Regulating Valve Opening Pressure	30 PSI (207 kPa)
Differential Pressure to Open Bypass Valve	60 PSI (414 kPa)
	20 PSI (138 kPa)
Fuel System:	
Hours of Operation on Full Tank at	8.6 hours
Governed Speed	24 GPM (90.8 1pm)
Fuel Acceptance Rate	Closed nozzle
Fuel Injector Type	9 mm dia (tip: 4 hole x 0.28 mm)
Injector Size	CAV, DPA series
Fuel Injection Pump Type	7,350 psi max output to injectors
Pump Maximum Operating Pressure	Mechanically driven, diaphragm
Fuel Transfer Pump Type	0.3 GPM (1.1 1pm)
Maximum Transfer Capacity (flow)	Fleetguard spin-on
Fuel Filters (two)	0-8 GPM (0-30.3 1pm)
Maximum Filter Flow Capacity	10 micron nominal - 90%,
Filtration Range	15 micron nominal - 98%
	25 micron and above - 100%
Cooling System:	
Type	Closed water
Cooling System Capacity	16.0 quarts (15.1 liters)
Radiator Capacity	9.7 quarts (9.2 liters)
Surge Tank Capacity (integral)	1.3 quarts (1.2 liters)
Coolant	MIL-A-46153
Ratio of Coolant o Water	50-50
Water Pump Type	Centrifugal
Thermostat	Modulating, starts to open at 176-181 degrees F (80-83 C), fully stroked at 203 F (95 C)
Governor:	
Type	Mechanical, all-speed
Engine Speed Setting	2800 RPM

ALTERNATOR

	Bosch 0-120-489-480
Make and Model	28 volts
Voltage	45 amps
Maximum Current	

Table 1-3. Equipment Data - continued

TRANSMISSION	
Make and Model	Clark 12000-1102FT1236X
Type	Power shift with modulation
Number of Speeds	3 forward, 3 reverse
Gear Ratios (all forward and reverse gears)	4.86 / 2.22 / 0.87
Lubricant	Dexron ATF
Lubricant Capacity	8 quarts (7.5 liters)
Weight	385 lbs (174.79 kg)
Performance:	
Rated Input Horsepower	90 HP
Rated Input Torque Capacity	150 ft-lbs
Maximum Output Torque	660 ft-lbs
TORQUE CONVERTER	
Make	Clark
Stall Ratio	1.8
Stall Speed	2,376 RPM
Lubricant	Dexron ATF
Lubricant Capacity	11 quarts (10.4 liters)
TIRES	
Type and Size	Tubeless, wide base, loader type, bias 6 ply, L2 loader lug tread design, 15 x 19.5
Air Pressure	27-45 PSI
WHEELS	
Type	15 degree drop center, single piece design
Rim Size	19.5 / 11.75
Offset	1.18 in (3.0 cm) inboard
AXLES	
Front Axle Make and Model	Hurth 275, Model 65
Rear Axle Make and Model	Hurth 275, Model 66
Type	Outboard planetary, steerable, enclosed multi-disc brakes
Off-Road Load Rating	14,724 lbs (6,684 kg)
Beam Loading Rating	22,309 lbs (10,128 kg)
Torque	5,900 ft-lbs at 10 rpm
Traction Lock-Up Differential Type	Operator controlled, hydraulic actuator sliding collar
Front Axle Steering Angles	30 degrees left and right
Lubricant	MIL-L-2104
Lubricant Capacity	7 quarts (6.6 liters)
Weight	970 lbs (440.38 kg) - front 945 lbs (429.03 kg) - rear

1-14. SAFETY, CARE, AND HANDLING.

a. **General Safety Precautions**. Observe normal safety precautions when handling or transporting the forklift.

b. **Care**. Perform Preventive Maintenance Checks and Services (PMCS) in accordance with the procedures in paragraph 2-5. Lubricate the forklift in accordance with Lubrication Order LO 10-3930-664-12.

c. **Slinging Procedures**. Lifting eyes are welded to the forklift mast (front eyes) and towbar (rear eyes) (see Figure 1-2). Eyes are used when slinging the forklift for helicopter transport or unloading / loading by crane. Slinging cables must have a 10,000 pound lift capacity (minimum). Sling as follows:

(1) Attach 18.50 foot slinging cables to front lifting eyes. Attach 19.75 foot cables to rear lifting eyes.
(2) Tilt mast back as far as it will go.
(3) Unlatch two pins that hold towbar in upright position. Towbar is now free to rotate.
(4) Place hook point over forklift center of gravity and 24 feet above ground level.
(5) Take up slack and sling.

d. Tiedown Procedures. Tiedown eyes are provided for securing the forklift to the carrier vehicle (trailer, truck, railcar, etc.) (see Figure 1-2). Front tiedown eyes restrain only aft movement of the forklift. Front tiedown cables must have a 12,000 pound restraint capacity (minimum). Rear tiedown eyes restrain both forward and aft movement. Rear tiedown cables must have a 24,000 pound restraint capacity (minimum). Tiedown as follows:

(1) Raise forks to enable easy access to front tiedown eyes.
(2) Attach tiedown cables to front and rear tiedown eyes as required.
(3) Lower forks.
(4) Secure tiedown cables to carrier tiedown provisions. If tiedown provisions are located at front of forklift, run tiedown cables through open areas of mast and secure to provisions.

(5) If location of carrier tiedown provisions results in interference between cables and mast, sideshift carrier may be blocked in raised position. Place 2x4 inch blocks or equivalent between lower crossmembers of rails and sideshift carriers on both left and right sides. Secure blocks to rails to prevent them from dislodging during transport.

Section III. PRINCIPLES OF OPERATION

1-15. GENERAL.

The theory behind the operation of the forklift is described in the following paragraphs. Each system is dependent upon the other for efficient operation of the forklift. The information contained herein will assist maintenance personnel in understanding how the forklift functions. This knowledge will assist in isolating components which have failed.

1-16. POWERTRAIN ASSEMBLY.

a. The powertrain assembly supplies the power required to move the forklift and operate the hydraulic system pump. It converts the energy from burning fuel to rotary motion to drive both the transmission and hydraulic pump. The powertrain assembly consists of the following components:

- Four-cylinder, diesel fueled, water cooled engine
- Six speed transmission (3 forward speeds, 3 reverse)
- Front and rear driveshafts
- Front and rear axles
- Speed range and direction selector
- Service brake and inching pedal
- Differential lock system
- Oil pressure gauge
- Coolant temperature gauge
- Transmission oil temperature gauge

b. Engine Fuel System. The function of the engine fuel system (Figure 1-6 and 1-7) is to inject clean, atomized fuel into engine cylinders at a precise time near the end of the compression stroke of each piston. Components of the system contribute to the delivery of fuel to the cylinders.

c. The engine is equipped with a cam-actuated lift transfer pump. Fuel flow begins as the lift pump pulls fuel from the supply tank. The pump supplies low-pressure fuel (21-35 kPa, (3-5 psi)) to the fuel filter head, through the fuel water filter/separator and fuel filter, and to the injection pump.

d. The injection pump builds the high injection pressure required for combustion, and routes fuel through individual high-pressure fuel lines to each of the four fuel injectors. When high-pressure fuel reaches an injector, pressure lifts an injector needle valve against spring tension to let fuel enter the combustion chamber.

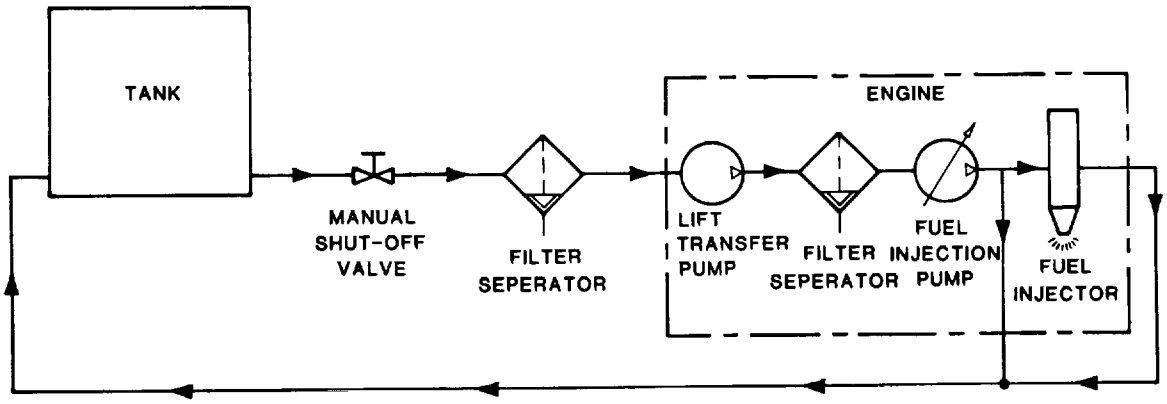


Figure 1-6. Fuel System Schematic

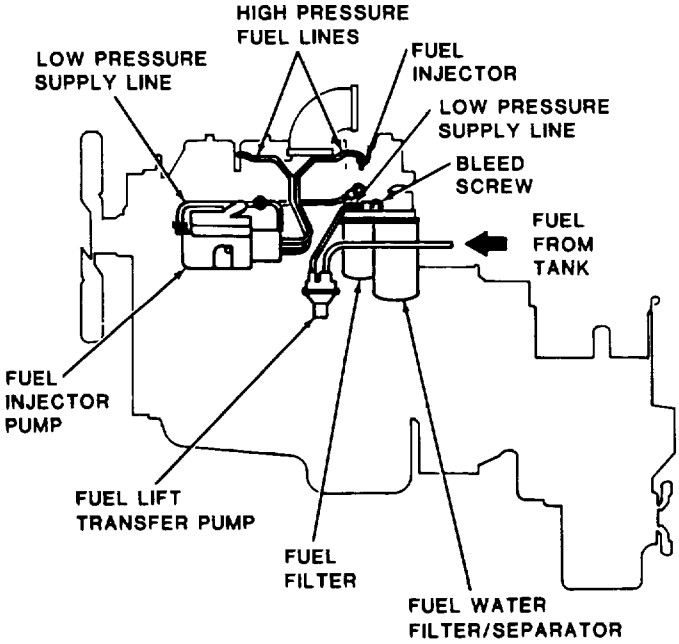


Figure 1-7. Engine Fuel System Components

e. The fuel system is designed to use fuel to cool and lubricate the injection pump and injectors. Fuel is continually vented from the injection pump and a small amount of fuel leaks by the injector needle valve during injection. Any leakage past the needle valve enters the fuel drain manifold, which routes fuel back into the fuel tank.

f. The fuel/water separator is equipped with a valve which can be opened regularly to drain collected water. Regular maintenance, including draining moisture from the fuel/water separator and supply tanks, is essential to keep water out of the fuel.

g. The Lucas CAV DPA fuel injection pump is a rotary distributor pump. The pump uses a coded spring connection to change the governor setting. The amount of fuel injected and subsequently the speed and power from the engine is controlled by the fuel control lever.

h. The injection pump idle adjustment screw provides a stop for the lever at low speed. The screw can be used to increase idle speed for accessory loading or, if required, to lower idle speed. The pump is equipped with a mechanical shut down lever. This lever is spring-loaded in the run position.

i. **Engine Cooling System**. The function of the engine cooling system (Figure 1-8) is to maintain a specified operating temperature for the engine. Heat generated by the engine is absorbed by coolant flowing through passages in the cylinder block and cylinder head.

j. Heat is removed from the coolant as it flows through the radiator. The high temperature engine coolant circulates through tubes in the radiator, while cool air is blown across the tubes by the cooling fan. The resulting lower temperature coolant is drawn from the radiator to the engine by an integrally mounted water pump.

k. The water pump empties coolant into the coil cooler cavity of the cylinder block. The coolant circulates around each cylinder and crosses the block to the fuel pump side of the engine. The coolant flows up into the cylinder head and crosses over the valve bridges. As the coolant flows across the head it provides cooling for injector nozzles. The coolant passes down the exhaust manifold side of the engine to the integral thermostat housing.

l. When the engine is below operating temperature, the thermostat is closed, and the coolant flow bypasses the radiator and goes to the water pump inlet via internal drillings in the block and cylinder head. When operating temperature is reached, the thermostat opens, blocking the bypass passage to the water pump and opening the outlet to the radiator.

m. The water pump is belt driven from the crankshaft pulley. An automatic belt tensioner is used to prevent the belt from slipping on the pump pulley.

n. **Air System**. The engine air system consists of two air cleaners/filters, air inlet hose, intake manifold, and exhaust manifold (refer to Figure 1-2 for component location).

o. Intake air flows directly from the air cleaner to the intake manifold. From the intake manifold, air is pulled into the cylinder and used for combustion. After combustion it is forced out of the cylinders through the exhaust manifold.

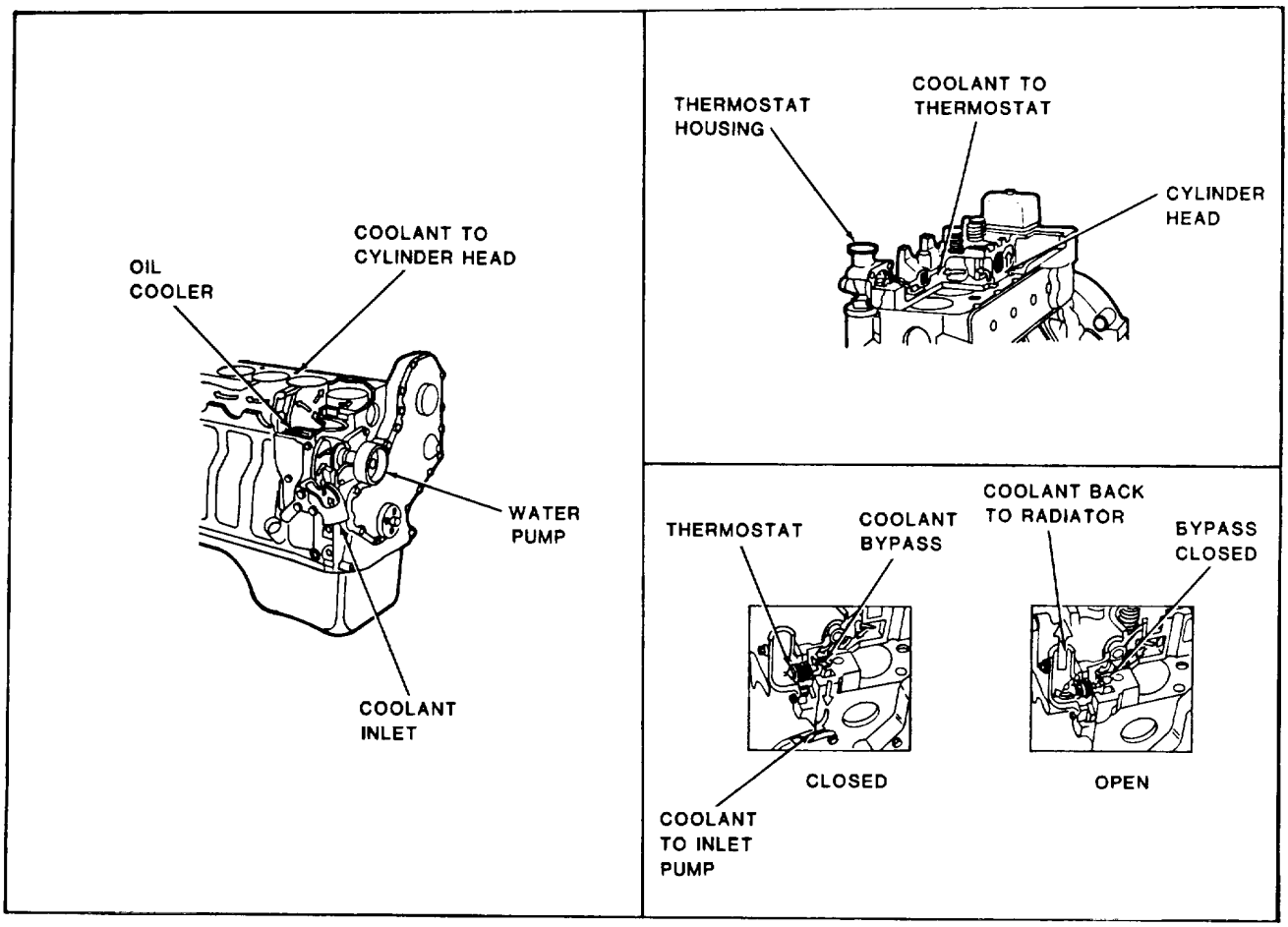


Figure 1-8. Engine Coolant System Components

p. Lubricating System. The engine lubricating system (Figure 1-9) is designed to provide adequate lubrication to engine components to ensure smooth operation. The engine uses a gerotor type oil pump to draw oil from the oil pan, through an oil suction connection, and onto the oil cooler.

q. The forklift engine uses a full flow, plate type oil cooler. Oil flows through a cast passage in the cooler cover and through an element. The oil is cooled by engine coolant flowing past the plates of the element. The four cylinder engine uses an element with five plates.

r. After oil is cooled, it flows through a full flow oil filter. The oil cooler contains a bypass valve that will let oil flow bypass a plugged filter. The valve is designed to open when pressure drop across the filter is more than 138 kPa (20 PSI), as with a plugged filter. When a filter becomes plugged, an oil pressure decrease of 60 kPa (10 PSI) or less from the normal operating pressure can be observed on the vehicle oil pressure gauge.

s. A pressure relief valve is designed to keep oil pressure from exceeding 414 kPa (60 PSI). When oil pressure from the pump is greater than 414 kPa (60 SPI), the relief valve opens uncovering the dump port so part of the oil is routed back to the oil pan.

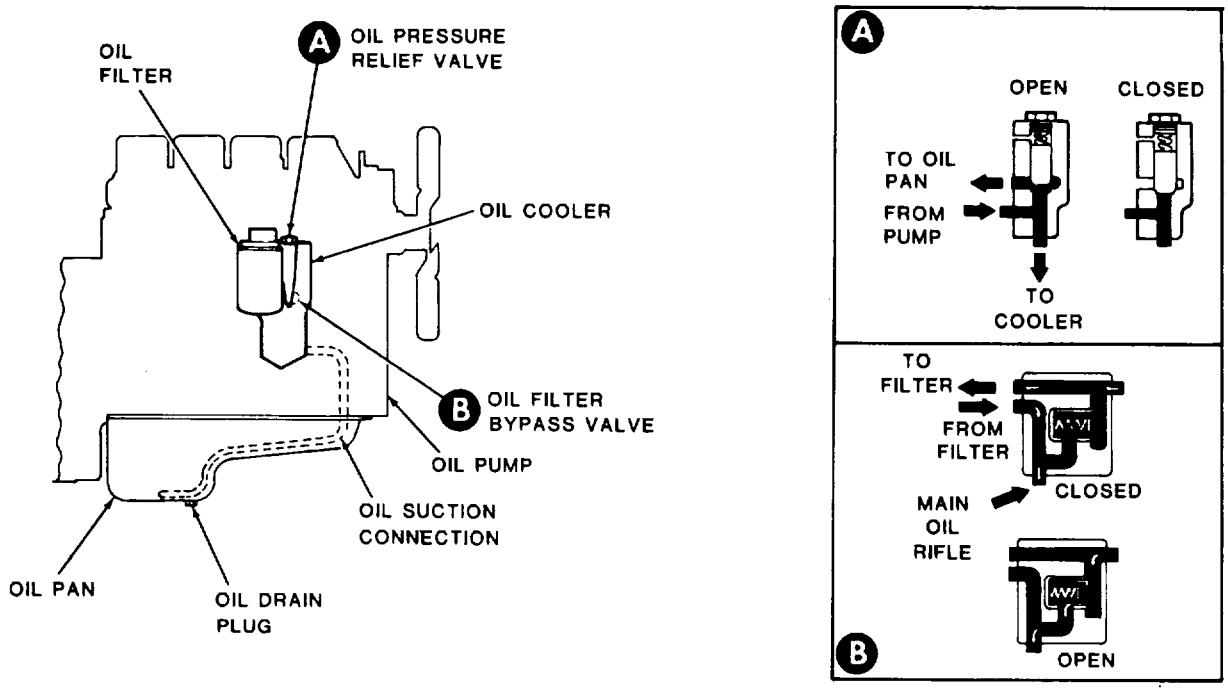


Figure 1-9. Engine Lubricating System Components

t. The engine's main bearings and valve train are lubricated by pressurized oil directly from the main oil rifle (Figure 1-10). Other power components, connecting rods, pistons, and camshaft receive pressurized oil indirectly from the main oil rifle.

u. Drillings in the crankshaft supply oil to the connecting rod bearings. Oil is supplied to the camshaft journals through drillings in the main bearing saddle. Smaller drillings in the main bearing saddle supply oil to the piston cooling nozzles. The spray from the nozzles also provides lubrication for the piston pins.

v. Lubrication for the valve train is supplied through separate drillings in the cylinder block. Oil flows through the drillings and across the oil transfer slot in the cylinder head gasket. From the transfer slot, the oil flows around the outside diameter at the cylinder head capscrew, across a slot in the bottom of the rocker lever support, and up a vertical drilling in the support. From these drillings, oil flows through drillings in the rocker lever shaft to lubricate the rocker levers. Oil flows through a drilling in the rocker levers to fill a channel cast into the top of the levers. The oil from the channel lubricates the valve stems, push rods and tappets.

w. **Transmission**. The forklift transmission (Figure 1-11) is driven directly by the engine. It multiplies the power from the engine and, through internal clutches and gears, provides power to drive the wheels.

x. Operation of the transmission is controlled by a Speed Range and Direction Selector mounted in the driver's compartment. The selector allows the operator to choose travel in either the forward of reverse direction. Three speeds are available in each direction.

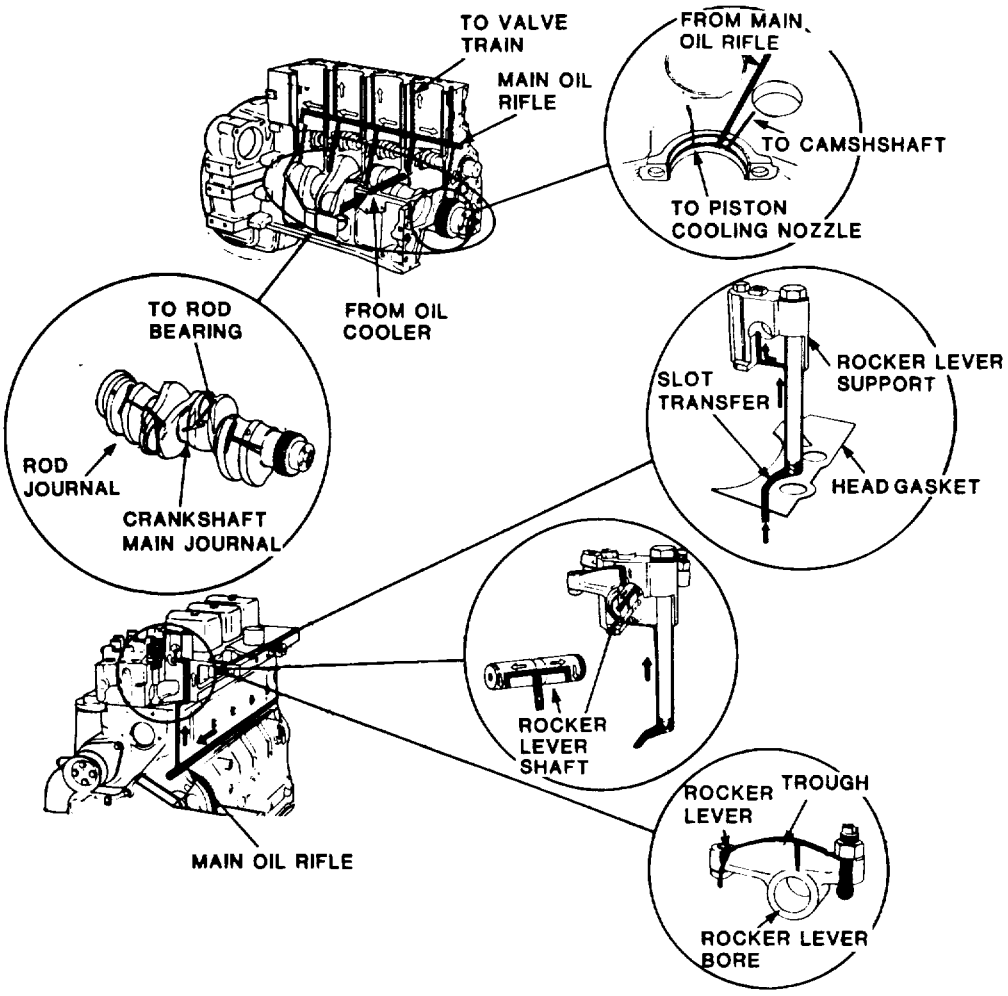


Figure 1-10. Power Component Lubrication

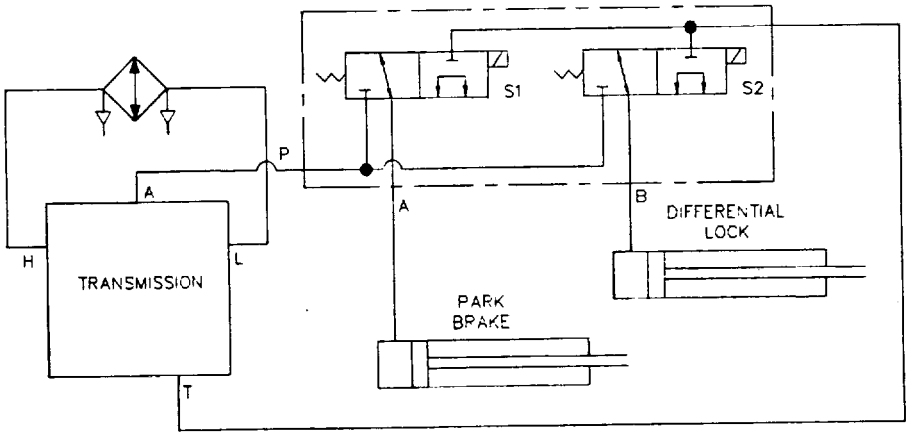


Figure 1-11. Transmission Schematic

1-17. HYDRAULIC SYSTEM. (Figure FO-1)

a. The hydraulic system controls forklift steering and provides the force for operation of the mast assembly. Hydraulic oil is supplied from a common tank and pressurized by an engine-driven rotary pump. The hydraulic system consists of the following components:

- 27 gallon hydraulic tank
- Hydraulic fluid filter
- Engine-driven rotary pump
- Priority valve
- Orbital steering valve
- Steering selector valve
- Directional control valve
- Sideshift cylinder
- Tilt cylinders (2)
- Roll cylinder
- Mainlift cylinders (2)
- Freelift cylinder

b. The hydraulic system is equipped with a filter. This filter is designed to remove any fluids or solids suspended in the oil and prevent contamination of the system. The filter is equipped with a restriction indicator that indicates decreased flow through the filter due to clogging. Should clogging occur, the filter's bypass valve will actuate (25 psi) and allow oil to bypass the filter and continue on to system components.

c. Oil is drawn from the systems hydraulic tank and pressurized by the hydraulic pump. Pressurized oil is distributed to the steering and mast components by an external pilot-operated priority valve. The priority valve's rated flow is 16 gpm with a relief pressure of 1500 psi.

c. **Steering System.** The steering system is pressurized by the hydraulic pump and controlled by a power-assisted steering wheel. Hydraulic oil is drawn from the tank by the pump, passes through the system priority valve, and onto an orbital steering valve. The steering valve controls the flow of oil to the steering cylinders in response to the movement of the steering wheel.

d. A three-position steering selector valve allows the operator to select the steering mode. Forward position directs hydraulic oil to both the front and rear axles for four-wheel steering. Center position directs oil to only the front axle for traditional two-wheel steering. Rear position directs oil to both axles for crab steering (allowing movement at an angle left or right).

e. Steering cylinders in the front and rear axles control wheel movement. Cylinder rod ends are attached to the left and right wheel hubs. Cylinder rods turn the wheels left or right in response to steering wheel movement. The selection of two-wheel steering actuates only the front axle cylinder. Four wheel steering actuates both the front and rear axle cylinders, directing the rear wheels to turn opposite the direction of the front wheels. Four-wheel crab steering actuates both cylinders, directing all wheels to turn in the same position.

f. **Mast Assembly**. The mast assembly control components are pressurized by the same system hydraulic pump. The Directional Control Valve located in the driver's compartment controls the flow of hydraulic oil to the cylinders.

1-18. BRAKING SYSTEM. (Figure 1-12)

a. **Service brake.** Fully depressing the brake and inching pedal applies four hydraulic disc brake assemblies located inside the front and rear axles. Separate disc brake assemblies are associated with each wheel. Releasing the pedal relieves the hydraulic pressure and allow the wheel to spin freely. When the pedal is depressed the service lights or blackout light will illuminated depending on the position for the vehicular lights switch. Hydraulic pressure to the brake assemblies is produced in the master cylinder. Two separate hydraulic circuits, each with a master cylinder, are used for front and rear breaks. Should one of the hydraulic circuit develop a leak the other will remain functional to stop the vehicle. This safety feature will reduce the risk of a total brake failure.

b. **Parking Brake**. The parking brake is controlled by a two-position toggle switch. Placing switch in ON position causes a spring actuated cylinder to apply the two front axle disc brake assemblies. This prevents the front wheels form turning. Along with applying the brake assemblies, the transmission speed range and directional selector are disabled preventing the vehicle from engaging in drive. Placing the switch in the OFF position releases the parking brake.

1-19. ELECTRICAL SYSTEM. (Figure FO-2)

a. The electrical system operates on 24 VDC and is charged by the engine driven alternator. Placing the ignition switch in the START position will power the engine starter to crank the engine. Once the engine is running the ignition switch is released and remains in the ON position. The hourmeter operates only when the engine is running. When the ignition switch is in the ON position, the ammeter, engine oil pressure gauge, engine temperature gauge, transmission temperature gauge, and fuel level gauge are operational. Forklift lights and wind shield wiper will also functional. If the engine fails to start when air temperature is below 32°F, the COLD START push button may be utilized to inject ether as a starting aid.

b. Front and rear flood lights are controlled by two-position toggle switches. The flood lights provide work area illumination during non-blackout operations. The vehicle lights switch assembly provides control of the forklift lighting functions. Warning indicators are provided to assist the operator in isolating forklift malfunctions. All the warning lights will illuminate when the ignition switch is placed in the ON position without the engine running. The front differential lock is operated using the FRONT DIFF LOCK switch. Placing the FRONT DIFF LOCK switch in the on position engages the front differential mechanism while the OFF position disengages. The engine and all forklift power is shut down by placing the ignition switch in the OFF position.

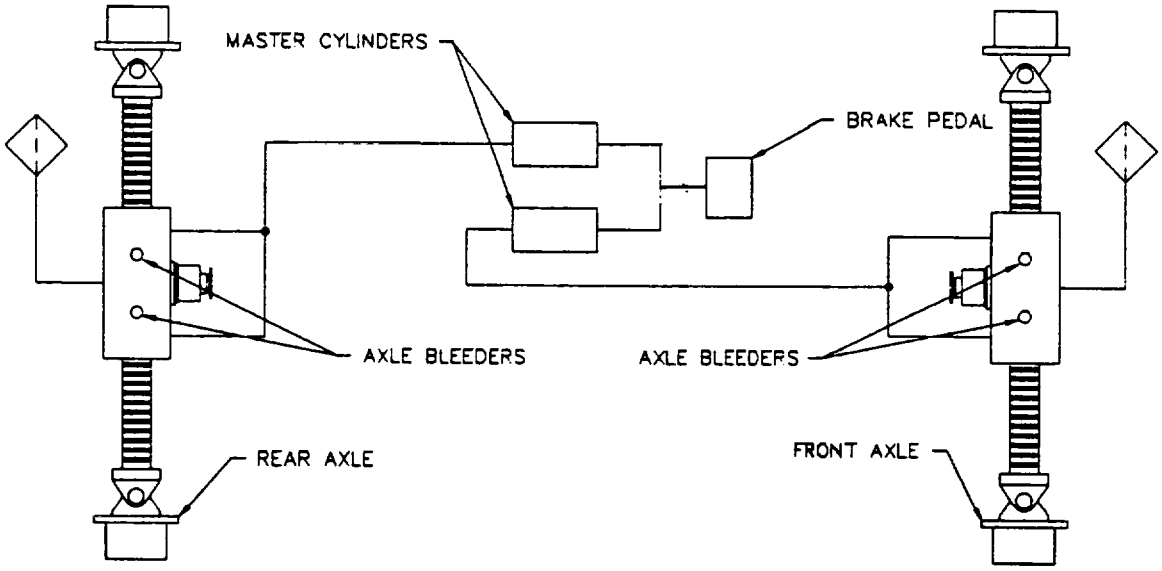


Figure 1-12. Brake System Schematic

Section IV. GENERAL MAINTENANCE PROCEDURES

1-21. INTRODUCTION. This section describes the general maintenance procedures that should be applied during performance of all forklift maintenance tasks.

1-22. SAFETY PROCEDURES.

a. **Remedies of Injuries**. Refer to FM 21-11, First Aid for Soldiers, for first aid treatments of injured personnel. For any injury, always seek medical attention immediately. The following first aid procedure should be done to prevent further injury until medical attention is available.

(1) OVERCOME BY EXHAUST GASES OR TOXIC FUMES. Expose victim to fresh air. If necessary, administer artificial respiration. Keep victim warm. Do not permit physical exertion. Seek medical attention immediately.

(2) CHEMICAL BURNS.

(a) Eyes. Flush with cold water for 15 minutes. Seek medical attention immediately.
(b) Internal. Drink large amounts of milk or water. Follow with milk of magnesia, beaten egg or vegetable oil.
(c) External. Flush with cold water until all acid has been removed.
(d) Clothing or Vehicle. Wash with cold water at once. Neutralize battery acid with baking soda or household ammonia, refer to TM 9-6140-200-14.

(3) FOREIGN OBJECT IN EYE. Do not attempt to remove object. Object may cause cuts and abrasions. Close eye and seek medical attention immediately.

b. **Personnel Precautions**. Observe all warnings listed in this manual. Basic safety precautions are listed before the procedures to which they apply. WARNING labels have also been put on the forklift to provide instructions and identify specific hazards, which if not heeded, could cause bodily injury or death. The word WARNING appears in this technical manual to alert you to situations that could cause you injury. Other general safety precautions to follow are:

(1) USE PERSONAL PROTECTIVE EQUIPMENT. Protect your eyes against acid burns and foreign objects. Operate forklift only when necessary to keep sound levels down and prevent hearing loss. Guard your skin from burns, rashes and toxic substances that are absorbed through the skin.

(2) STAY CLEAR OF MOVING PARTS. Remove watches, rings and other jewelry that could catch in moving parts and cause injury. Keep hands, feet and clothing away from all machinery in motion.

(3) USE CARE IN THE HANDLING OF FLAMMABLE MATERIALS. Notify others in the area that you are handling flammables. Know emergency procedures in case of accident or fire.

(4) USE SPECIAL CARE WHEN HANDLING FUEL OR WORKING ON FUEL SYSTEM. Fuel is very flammable and can explode easily. To avoid serious injury or death, observe the following precautions:
   (a) Keep fuel away from open flame or any spark (ignition source).
   (b) Keep at least a B-C fire extinguisher within easy reach when working with fuel or on a fuel system.
   (c) Do not work on fuel system when engine is hot; fuel can be ignited by a hot engine.
   (d) Clean fuel tank to purge any flammable liquid or vapors before welding, grinding or using any heat producing device near the fuel tank.
   (e) Post signs that read "NO SMOKING WITHIN 50 FEET" when working with open fuel, fuel lines or fuel tanks.

(5) VENTILATE. Carbon monoxide is a colorless, odorless, deadly poisonous gas, which, when breathed, deprives the body of oxygen and causes suffocation. Carbon monoxide becomes dangerously concentrated under conditions of inadequate ventilation. To avoid serious injury or death, observe the following precautions:
   (a) Do not operate engine in an enclosed area unless it is adequately ventilated.

   (b) Do not idle engine for long periods without maintaining adequate ventilation in personnel compartments.
   (c) Be alert at all times during vehicle operation for exhaust odors and exposure symptoms. If either are present, immediately ventilate personnel compartments.

(6) USE CARE WHEN PERFORMING MAINTENANCE PROCEDURES ON ELECTRICAL COMPONENTS. Always disconnect battery ground cable or power source before working on electrical components. Discharge capacitors as noted. If you receive an electrical shock, get medical help immediately.

(7) USE CARE WHEN HANDLING HEAVY ITEMS. Properly support heavy items before removing. To avoid serious injury or death, observe the following precautions:

   (a) Keep clear of suspended items.
   (b) Use sufficient number of personnel to maintain control of items.
   (c) Use a hoist or get help when lifting components that weigh more than 50 lbs (23 kg).
   (d) If an item begins to fall; let it fall.

(e) Make sure that hoist or hydraulic floor jack has sufficient capacity to do the job and provide an ample safety margin. Be sure all chains, hooks, slings, etc. are in good condition and are of correct capacity. Be sure hooks are positioned correctly. Always use a spreader bar when necessary. The lifting hooks must not be side loaded.

(8) PREVENT ACCIDENTAL MOVEMENT. Never leave forklift unattended while the engine is running. Observe all pre-conditions before performing maintenance.

(9) USE STURDY SUPPORTS. Do not climb on tires. Use mounted steps and ladders when climbing onto forklift. If needed, use a sturdy stepladder to perform maintenance on equipment not safely within reach.

c. **Vehicle Precautions**. Observe all cautions listed in this manual. The word CAUTION appears in this manual to alert you to conditions that could cause damage to the forklift and its components. Cautions are listed before the procedure to which they apply. Other general vehicle precautions include:

(1) During service maintenance turn master disconnect switch off to prevent damage to the electrical system.
(2) Disconnect battery ground when required.
(3) Use a hoist or hydraulic floor jack of sufficient capacity to remove and support heavy items.

1-23. DISASSEMBLY AND ASSEMBLY PROCEDURES.

a. **Condition of Vehicle**. Before performing any maintenance task make sure that the following conditions have been observed, unless otherwise specified.

(1) Forks must be lowered to the ground.
(2) Forklift must be parked on level ground.
(3) Parking brake must be applied.
(4) Transmission must be in neutral and locked.
(5) Engine must be shut off.
(6) Master disconnect switch must be off.
(7) Components must be at operating temperature to be tested.
(8) Air system must be vented.

b. **Disassembly and Assembly Procedures.** Follow these general practices when performing disassembly and assembly procedures:

(1) Read the procedure and thoroughly understand it before performing maintenance or repair. Be alert during procedure.

(2) Keep major components and assemblies together whenever possible and practical.
(3) Tag hoses, electrical wires, cables and harnesses to identify them and aid in installation.
(4) Have all the necessary parts, tools, material and personnel before starting procedure.
(5) Keep related parts together for identification purposes.
(6) To prevent loss, temporarily reinstall attaching hardware such as screws, bolts, washers and nuts.
(7) Cap all hydraulic or other fluid lines and fittings when disconnected.
(8) Only disassemble to point of problem.
(9) Make sure parts are clean and lubricated before assembly.

1-24. GENERAL REPAIR PRACTICES.

a. Replacement of Parts. Only replace unserviceable parts or parts which must be discarded. Always discard the following: cotter pins, lockwire, lockwashers, locknuts, preformed packings, rubber seals and gaskets.

b. Cleaning. Cleaning is a necessary part of most tasks. Use the following guidelines when cleaning:

WARNING

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

(1) Use dry cleaning solvent P-D-680 for cleaning metal parts only.
(2) Use a mild detergent solution for cleaning rubber, plastic and nylon parts.

WARNING

Isopropyl alcohol is flammable. Inhalation of vapors can cause dizziness and headache. Contact with skin may cause irritation. Keep isopropyl alcohol away from open flame or any spark (ignition source). Keep at least a B-C fire extinguisher within easy reach when working with isopropyl alcohol. Post signs that read "NO SMOKING WITHIN 50 FEET" when working with isopropyl alcohol. Ensure adequate ventilation. If vapors cause drowsiness, go to fresh air. If liquid contacts skin or eyes, immediately flush affected areas thoroughly with water.

(3) Use isopropyl alcohol for cleaning electrical connector pins, wire end leads, and switch contacts.

(4) Always clean parts before inspecting them. Ensure all dirt, grit, grease, and other accumulations are removed from parts to enable a proper inspection.

WARNING

Compressed air used for cleaning purposes shall not exceed 30 psi. Use only with effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc.). Do not direct airstream towards self or other personnel.

(5) Dry parts with lint free cloths. Use compressed air when specified.
(6) Use a wire brush, tap or die to clean rust, accumulated dirt, sealant and paint form bolts, screws, nuts and threaded holes.
(7) After cleaning, protect all parts from dust and dirt.
(8) Keep work area floors and workbenches clean and dry. Clean as you go to prevent accidents.
(9) Dispose of oily rags in specified containers to prevent fire hazard.
(10) Keep the vehicle clean. Oil, grease and debris may hide a serious problem.
(11) Clean all new parts before installation.

c. **Inspection Criteria**. Proper inspection of parts and operating equipment prevents small problems from becoming major problems. Equipment defects can be discovered by performing PMCS at both crew and organizational levels. Perform detailed inspection any time a component is disassembled.

(1) Visually check for any of the following problems: broken welds, loose fasteners, damaged threads, bending, cracking, deformity, nicks, cuts, scratches, gouges, distortion, blockage or inoperability.
(2) Check for evidence of excessive or uneven wear.
(3) Inspect all new parts for defects before installation.
(4) Routinely check hoses, lines and fittings for leaks.

d. **General Repair Practices**. The following are general repair practices to follow. To prevent further damage to components, take corrective action promptly. Be sure to follow all warnings, cautions and notes.

(1) Discard broken and non-reusable parts.
(2) Paint exposed metal to protect from rust. Do not paint electrical harnesses, wiring, hoses or finished machine parts.
(3) Perform all lubrication and PMCS on schedule.

(4) Remove burrs, scratches or raised metal. Use a fine file, stone or crocus cloth dipped in oil.

e. **Lubrication**. Refer to LO 10-3930-643-12 for detailed, illustrated instructions on proper lubrication. Some general practices to remember include:

(1) Use the correct lubricant.
(2) Keep lubricants clean.
(3) Clean all fittings prior to lubrication.
(4) Lubricate clean disassembled and new parts to prevent rust.

f. Application of Adhesives. Liquid gasket, silicone rubber adhesive and Loctite retaining and sealing compounds are recommended in some tasks to ensure and strengthen seals. The following procedures describe their correct use and application:

(1) Liquid Gasket. Can be used on machined surfaces (where no gasket is specified), ground joints and threaded connections. It can also be used with all types of gaskets. Liquid gasket is heat and cold resistant, unaffected by low pressure gases, gasoline, oil or other liquids, and prevents seizure. Liquid gasket is applied as follows:

WARNING

TOXIC/FLAMMABLE

Liquid gasket is toxic and flammable. Use only in well ventilated areas. Avoid contact with eyes or skin. If injured, seek medical attention immediately. Do not allow near open flame, heat or sparks. Do no smoke when working the liquid gasket.

(a) Thoroughly clean the mating surfaces. Surfaces must be free of grease, paint, rust or any other foreign substance.

(b) Brush each mating surface with a thin, even coat of liquid gasket.

(c) Allow 10-20 minutes to dry until tacky. Temperature and humidity will affect drying time. Adhesive is correct consistency when it does not transfer to finger when touched.

(d) Press surfaces together. Ensure full contact between surfaces. Do not pull or pry either surface after mating.

(2) Silicone Rubber Adhesive. Except for the instrument panel which is sprayed with anti-corrosive varnish, all electrical connections are sealed against moisture with a room temperature vulcanizer silicone rubber sealant, MIL-A-46146A Type 1. If you must break into this seal for repair work, you must remove the switch involved completely from the machine. Silcone rubber adhesive is applied as follows:

(a) Thoroughly clean all existing sealant and dirt that may remain on switch. Replace the switch if corroded. The sealant must have a clean surface to adhere to or there will not be an effective seal.
(b) After switch is cleaned and reassembled or replaced, apply sealant. Cover the switch and terminals completely with sealant. Press sealant into and around the terminals to ensure complete coverage.
(c) Sealant will set in 15-30 minutes depending on temperature and humidity.

(3) Loctite Retaining and Sealing Compounds. These compounds will resist solvents, heat, shock and vibration. They provide a positive seal against leakage and sheer strength resistance to loosening when used in the assembly of threaded, slipfit or press fitted parts. Use the grade of Loctite specified. Once cured, these compounds have an operating temperature range of -65 to 300 degrees F (-54 to 149 degrees C), and will resist attack by oils, chemicals, hydraulic fluids and solvents. Do not use Loctite where other retaining means are provided, such as lock wires, lock washers, lockplates and fasteners. Do not substitute grades or usage unless specified. Do not use Loctite on items that need frequent servicing, brass fittings or plugs, or when operating temperatures exceed 300 degrees F (149 degrees C). (Example: Engine exhaust systems.) Loctite is applied as follows:
(a) Threadlock Adhesives. Primers are not required with threadlock adhesives, but if used will speed up the cure and act as a cleaner. Surface preparation depends on type of metal and purpose of application. In general, most surfaces must be cleaned thoroughly.
(b) Apply Loctite to bolts and studs by filling full length of thread with one strip in diameters up to 1 inch, two strips, 180 degrees apart, on diameters up to 2 inches, and three strips, 120 degrees apart, on diameters over 2 inches. Apply one strip into tapped holes. For blind hole applications, apply enough Loctite to fill the bottom 2 to 3 threads of engagement, then insert stud. If engagement length exceeds one diameter, use proportionally more Loctite. For non-seated studs (studs that to deeper in hole than required) turn stud one turn deeper than required. After bubbling stops, apply a ring of Loctite around stud at top of hole, then back stud to required height. Loctite will set in 10 minutes to 2 hours. Temperature and humidity affect drying time.
(c) Plastic Gasket. Plastic gasket is used as a seal on large close fitting metal parts. Mating surfaces must be clean and degreased. Spread an even coat (0.061 cubic inch per 40 square inches) on one of the mating surfaces. Assemble and tighten bolts. Plastic gasket will dry in approximately 12-24 hours. Temperature and humidity affect drying time.

1-25. STANDARD TOOL REQUIREMENTS.

a. To prevent personal injury and damage to tools, always use the proper tool for the task being performed.
b. Be sure to keep tools clean and lubricated. Following this practice will reduce wear and prevent rust.
c. Keep track of your tools. Do not be careless with them.
d. Return tools to tool box when you are finished with repair or maintenance.
e. Return tool boxes to tool storage when not in use.
f. Inventory tools before and after each use.
g. Use the tool kit specified in the procedure. It contains the tools you will need to complete the maintenance task. Tool kits authorized for maintenance of the forklift are listed in Appendix B.
h. Some maintenance tasks require special of manufactured tools. The initial page of the task will name any special or fabricated tool needed for that procedure. Use these special tools only for the maintenance tasks for which they are designed or called out. Personnel should be carefully instructed in the use of these tools.

CHAPTER 2
UNIT MAINTENANCE INSTRUCTIONS

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

2-1. COMMON TOOLS AND EQUIPMENT.

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

2-2. SPECIAL TOOLS AND EQUIPMENT.

Refer to the Maintenance Allocation Chart (Appendix B) and TM 10-3930-664- 24P for identity and authorization of any special tools or equipment required for unit maintenance.

2-3. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list, TM 10-3930-664-24P, covering unit, direct support, and general support maintenance of the forklift.

Section II. SERVICE UPON RECEIPT

2-4. SERVICE UPON RECEIPT.

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

WARNING

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

b. Clean any exposed metal parts coated with rust preventive compound. Remove compound with cleaning solvent (P-D-680).

c. Inspect the forklift for damage incurred during shipping. If the unit has been damaged, report the damage on DD Form 6, Packaging Improvement Report.

d. Check the forklift against the packing slip to ensure that the shipment is complete. Report all discrepancies in accordance with the instructions of DA PAM 738-750.

e. Check all tags and forms accompanying the forklift for special instructions. Do not remove any forms or tags until unit is installed and ready for operation. When installed, remove forms and tags and forward to Quality Control (QC) section office.

f. Clean all exterior surfaces. Touch-up any paint scratches.

2-5. PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT.

a. Perform the operator Preventive Maintenance Checks and Services (PMCS) contained in TO 10-3930-660-10.
b. Perform the unit PMCS contained in Table 2-1.
c. Lubricate all points as shown in the Lubrication Order (LO10-3930-664-12) regardless of interval.
d. Schedule the next PMCS on DD Form 314, Preventive Maintenance Schedule and Record.
e. Report all deficiencies on DA Form 2407 it the deficiencies appear to involve unsatisfactory design.
f. Check that all decals and plates are on forklift.
g. Make sure forklift is ready for operation; remove all warning tags.

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

2-6. SCOPE.

a. This section lists preventive maintenance checks and services (PMCS) required for the forklift and authorized for unit maintenance. The purpose of PMCS is to ensure that the forklift is properly inspected for defects before serious damage, equipment failure, or injury to personnel occurs.

b. The contents of the PMCS tables are based upon the principles of reliability centered maintenance (RCM). All deficiencies shall be recorded along with the corrective action taken on the applicable form at the earliest opportunity.

2-7. GENERAL.

a. To make sure that the forklift is ready for operation at all times, inspect it systematically so that you can discover any defects and have them corrected before they result in serious damage or failure. Table 2-1 contains unit PMCS. The item numbers indicate the sequence of minimum inspection requirements. Shutdown the forklift if a malfunction should occur to prevent further damage of the equipment.

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

c. The item number of the table indicates the sequence of PMCS. Perform at intervals shown below:

(1) Do (Q) PREVENTIVE MAINTENANCE quarterly (every three months).

(2) Do (S) PREVENTIVE MAINTENANCE semiannually (every six months).

(3) Do (A) PREVENTIVE MAINTENANCE annually (once every year).

d. If a component does not work, troubleshoot in accordance with the instructions in this manual or notify a supervisor.

e. Always do preventive maintenance in the same order to establish a regular routine for spotting defects.

f. Items requiring repair beyond the ability of the unit level must be reported on DA Form 2404.

WARNING

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

WARNING

Compressed air used for cleaning purposes shall not exceed 30 psi. Use only with effective chip guarding and personnel protective equipment (goggles/shield, gloves, etc.). Do not direct airstream towards self or other personnel.

(1) Keep it clean: dirt, grease, oil, and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent (P-D-680) to clean metal surfaces. Use soap and water when cleaning rubber or plastic materials.
(2) Bolts, nuts, and screws: Check that they are not loose, missing bent or broken. You can't try them all with a tool, of course, but look for chipped paint, bare metal or rust around bolt heads. Tighten any bolt, nut, or screw that you find loose.
(3) Welds: look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to Direct Support.
(4) Electrical wires and Connectors: look for cracked or broken insulation, bare wires and loose or broken connectors. Tighten loose connections and make sure wires are in good condition.
(5) Hoses and fluid lines: look for wear, damage, and leaks. Make sure clamps and fittings are tight. Wet spots show leaks, of course, but a stain around a fitting or connector can mean a leak. If a leak comes from a loose fitting or connector, tighten the fitting or connector. If something is broken or worn out, either correct it or report it to Direct Support Maintenance (see Maintenance Allocation Chart, Appendix B).

2-8. LEAKAGE DEFINITIONS FOR UNIT PMCS.

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

LEAKAGE DEFINITIONS FOR UNIT PMCS

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

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

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

CAUTION

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

NOTE

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

2-9. PMCS COLUMN DESCRIPTION.

a. **Item No. Column**. The number used to identify sequence of checks and services. This column shall be used as a source of item numbers for the TM Number Column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, when recording results of PMCS.

b. **Interval Column**. Indicates the time interval upon which the checks and services must be performed.

c. **Item to Be Checked or Serviced Column**. Indicates item and components to be inspected.

d. **Procedure Column**. Indicates the procedure by which the check or service is to be performed. Tolerances, adjustment limits, and instrument readings are included as applicable. When replacement or repair of a component is required, the procedures column will direct personnel to the appropriate task.

e. **Not Fully Mission Capable If Column**. Explains when the forklift is not capable of safe operation.

2-10. GENERAL PMCS PROCEDURES.

a. When performing PMCS procedures, ensure that all components are correctly assembled, secured, serviceable, adequately lubricated, and free from excessive wear or leaks.

b. When the PMCS procedure calls for cleaning, use the guidelines found in the appropriate task. Even if a procedure does not specify cleaning, be aware of any buildup of dirt, grease, oil, or debris. Clean any such buildup before returning the component to service.

Section IV. SPECIAL LUBRICATION INSTRUCTIONS

2-11. SPECIAL LUBRICATION INSTRUCTIONS.

There are no requirements for special lubrication at the unit level. All lubrication instructions and procedures are contained in the Lubrication Order, LO 10-3930-664-12.

Table 2-1. Unit Preventive Maintenance Checks and Services

Item No.	Interval		Item to Check/ Service	Procedure	Not Fully Mission Capable If:
1			ENGINE		
	250 Hours	a	Oil Filter	Change engine oil filter (para 2-20)	Filter shows signs of engine damage, ie; metal shavings, rust deposits.
	Quarterly	b	Air Filter	Check intake air filter. Change filter if damaged or beyond cleaning (para 2-28). Check air restriction indicator for proper operation.	
	Quarterly	c	Engine Fuel Lines	Check fuel lines for cracks, kinks, dents, or bends Inspect fittings for signs of leakage. Replace damaged lines (para 2-27).	Fuel line is damaged or fitting loose.
	Quarterly	d	Belt	Check engine alternator belt for wear / proper tension damaged. Replace if worn (para 2-54).	Belt is
	Quarterly	e	Fuel/ Water Strainer	Inspect fuel / water strainer for contamination Drain in accordance with TM 10-3930-664-10 Replace as required (para 3-9).	Fuel shows signs of severe contamination.
	Quarterly	f	Ether Cylinder	Check ether cylinder if empty (para 2-40).	Replace
	Annually	g	Radiator replace coolant	Flush cooling system and (para 2-46).	
	Annually	h	Cylinder Head / Rocker Arms	Perform cylinder head valve clearance adjustment (para 2-15).	

Table 2-1. Unit Preventive Maintenance Checks and Services (cont)

Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
2		FUEL SYSTEM		
	Quarterly	a Fuel Lines	Check fuel lines for cracks, kinks, dents, or bends Inspect fittings for signs of leakage. Replace damaged lines (para 2-27).	Fuel line is damaged or fitting loose.
	Quarterly	b Fuel Tank	Inspect fuel tank for leaks or contamination service (para 2-34) Replace fuel filter as required (para 2-36).	Fuel shows Drain and signs of severe contamination.
3	Quarterly	BATTERIES	Service batteries (para 2-77). Inspect batteries for damage, corrosion, or evidence of leakage. Clean cable lugs (para 2-77). Replace battery if damaged (para 2-78).	Battery is damaged or leaking.
4	Quarterly	BATTERY CABLES	Inspect battery cables for damage, corrosion, or Cuts. Clean cable (para. 2-79). Replace cable if damaged (para 2-80).	Battery cable is damaged.
4		BRAKE SYSTEM		
	Quarterly	a Fluid Lines	Check fluid lines for cracks, kinks, dents, or bends Inspect fittings for signs fitting loose. of leakage Replace damaged lines (para 2-112).	Fluid line is damaged or
	100 Hours	b Master Cylinders	Service master cylinders (para 2-113). Inspect for damage or evidence of leakage. Replace as required (para 2-111).	Cylinder is damaged.
	Sem-annually	c Disc Brake Assembly	Inspect and adjust disc brakes (para 2-107).	

Table 2-1. Unit Preventive Maintenance Checks and Services (cont)

Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
5		**MAST ASSY**		
	50 Hours	a Carriage Tilt Cylinder	Service carriage tilt cylinder (para 2-152) Inspect for damaged. damage or evidence of leakage. Replace as required (para 2-153).	Cylinder is
	50 Hours	b Carriage Assembly	Service carriage assembly (para 2-154).	
	50 Hours	c Mast Assy	Service mast assembly (para. 2-156).	
	Quarterly	d Wear Pads	Inspect wear pads for uneven or excessive wear. Check for small semi-circle on face of pad. Replace as required (para 4-41).	Semi-circle is worn away.
6	Semi-annually	**DRIVE SHAFTS**	Service drive shafts (para 2-98) Inspect and repair as required (para 2-100).	Drive shaft is damaged.
7	Semi-annually	**AXLES**	Service front and rear axles (para 2-102, 2-104) Inspect for damage or evidence of leakage (para 2-101, 2-103).	Axle is damaged.
8	250 Hours	**TRANSMISSION**	Check condition of transmission fluid. If color is dark and smells burned, change fluid (para 2-93) and replace filter (para 2-96).	Filter shows signs of transmission damage, ie; rust or metal chips.
	Annually		Test transmission operation (para 2-94)	Transmission fails tests.

Section V. UNIT TROUBLESHOOTING

2-12. GENERAL.

a. This section contains unit maintenance level troubleshooting information for identifying and correcting malfunctions which may develop during forklift operation. Each malfunction or trouble symptom is addressed and is followed by a series of inspections or tests necessary to determine the probable cause and corrective action.

b. The Unit Troubleshooting Symptom Index, Table 2-2, lists the common malfunctions which may occur. It refers you to the proper page for troubleshooting procedures.

c. This manual cannot list all possible malfunctions that may occur, all tests or inspections that must be performed, or all corrective actions for each malfunction. If a malfunction is not listed, or is not remedied by corrective actions, notify personnel at next highest maintenance level.

d. Prior to using troubleshooting diagrams, be sure you have performed all normal operational checks. Refer to the electrical schematic (Figure FO-2) and hydraulic flow diagram (Figure FO-1) to assist in troubleshooting.

e. Never overlook the chance that the problem could be of simple origin. The problem may be corrected with minor adjustments.

f. Use all senses to observe and locate troubles. Use test instruments or gauges to help isolate problems. Always isolate the system where the trouble occurs, then locate the defective component.

g. When troubleshooting a malfunction:

(1) Question the operator to obtain any information that might help determine the cause of the malfunction. Before continuing, ensure that all applicable operator troubleshooting has been performed.

(2) Locate the symptom or symptoms in Table 2-2 that best describe the malfunction. If the appropriate symptom is not listed, notify your supervisor.

(3) Turn to the page where the troubleshooting procedures for that malfunction are described.

(4) Perform each step in order until the malfunction is corrected. Do not perform any maintenance task unless the table directs you to do so.

Table 2-2. Unit Troubleshooting Symptom Index

Table 2-2. Unit Troubleshooting Symptom Index - continued

2-13. STE/ICE VEHICLE SYSTEM DIAGNOSTIC CHECK.

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

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

c. Description and Operation. STE/ICE (Figure 2-1) is portable and operates off of the vehicles 24 volt system. Refer to STE/ICE manual for detailed operating instructions. The STE/ICE kit consists of the following major components:

(1) Vehicle Test Meter (VTM). The VTM is a tool for testing electrical and mechanical components. Readings are either pass/fail or digital display (PSI, RPM, volts, etc.). The VTM interfaces with the vehicle being tested by either a transducer from the Transducer Kit (TK) or by the Diagnostic Connector Assembly (DCA). Power from the VTM is drawn from the vehicle batteries or from an alternate power source.

(2) Transducer Kit (TK). The TK is a covered tray inside the transit case that contains transducers, fittings, and connectors which are used during testing.

(3) Electrical Cable Assemblies'. The cable assemblies are included for power and testing. Test procedures refer to the cable assemblies by number for quick identification. Each cable also has a name which describes its use. A quick reference to W1, for example, would indicated the DCA cable. Connectors on the cable are identified by a number proceeded by either a P or E, such as P1 or E2. Cable assembly numbers and names are listed below.

(a) W1 DCA Cable
(b) W2 Test Probe Cable
(c) W3 Ignition Adapter Cable
(d) W4 Transducer Cable (2 each)
(e) W5 Power Cable

NOTE

When cables are connected, large key noted by white stripe on cable connector mates with large keyway of connector on VTM transducer.

d. Vehicle Diagnostic Connector Assembly (DCA). The DCA connector of the vehicle is located on the transmission right side panel (Figure 2-2).

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

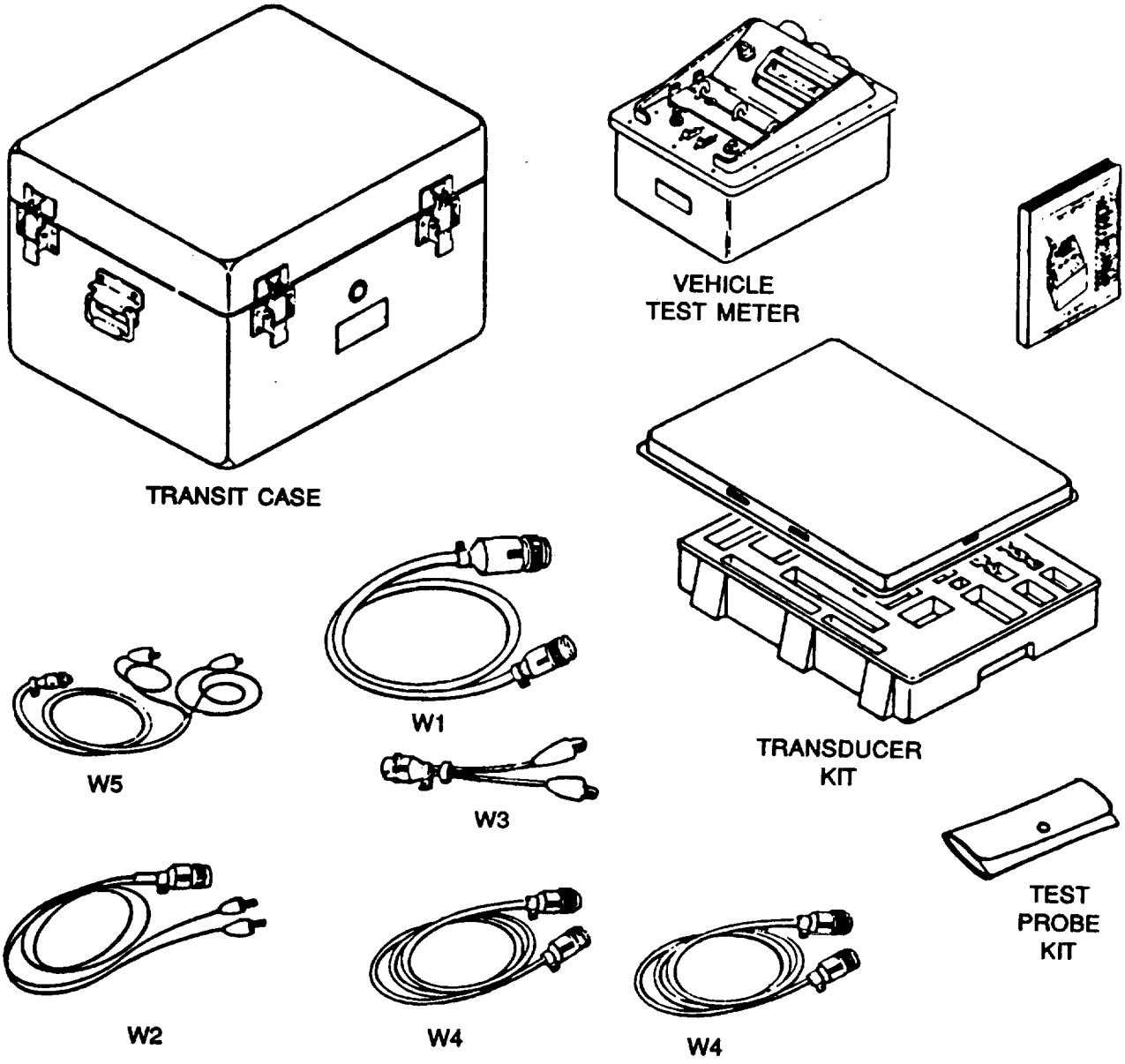


Figure 2-1. STE/ICE Kit Components

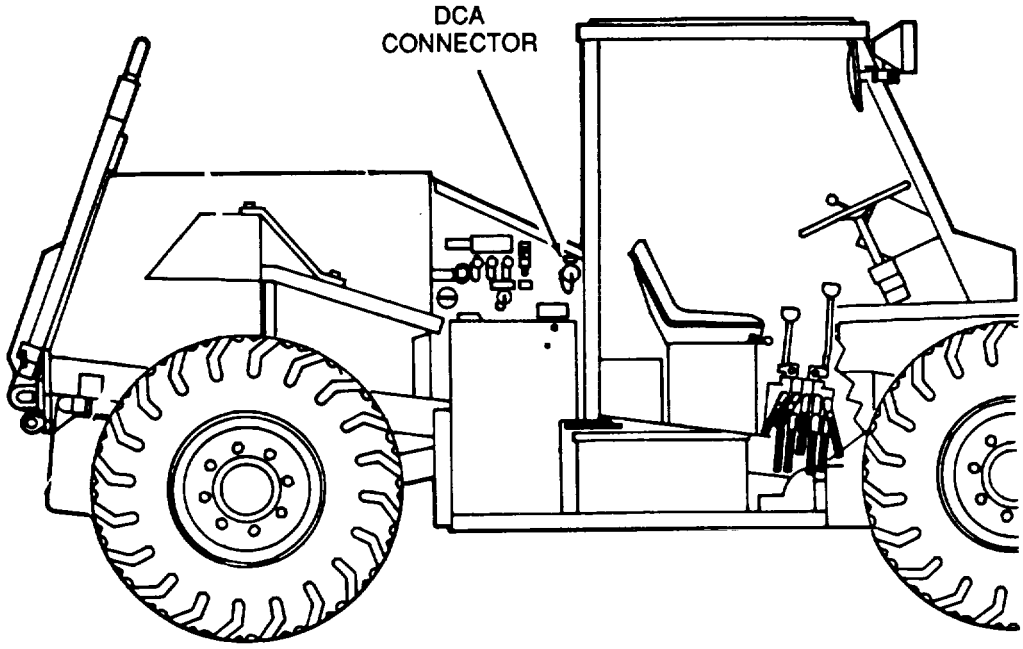


Figure 2-2. Vehicle DCA Connector

f. The GO and NO-GO-Chain sequences are presented as illustrated flow charts with test branching controlled by YES and NO decisions. Generally, a YES determination leads to the next test; a NO determination leads to NO-GO testing and corrective action.

g. When the VTM interfaces with the vehicle through the DCA connector the test is titled DCA Mode Testing. If the VTM interfaces with the vehicle through the use of the Transducer Kit (TK), the test is titled TK Mode Testing. The DCA and TK testing modes can be used at the same time.

h. Rules For Following GO-Chain Test Sequence.

(1) Always start at GO1. Never enter the middle of a GO or NO-GO testing sequence unless directed by the flow chart.

(2) Follow each instruction in a GO-Chain Test Sequence. Do not skip any instructions or procedures.

(3) If a particular test has failed in a GO-Chain test sequence, proceed to the indicated NO-GO-Chain test sequence or to a higher level of maintenance.

(4) After correcting a vehicle problem, repeat the testing beginning at GO1.

(5) Each GO Chain testing sequence depends upon the completion of the previous test. Do not skip any tests.

i. Use the GO, NO-GO flowcharts for testing. As you become more familiar with the test procedures, you can use the flip cards on the VTM. Prior to testing, make the following pre-test inspections:

(1) Check fan belt for proper tension. Replace cracked or frayed belts.
(2) Check for proper engine oil level. Add oil as necessary.
(3) Check that the fuel tank has enough fuel for testing.
(4) Check for proper engine coolant level. Add coolant as necessary.
(5) Check that the battery is in good condition. Check for low electrolyte level and add distilled water as required.
(6) Check that emergency steering pump is turned off when required by testing.

j. VTM Confidence Test. This procedure provides an overall check of the VTM and should be run before and after each use to assure accuracy of results.

NOTE

If VTM fails to display correct readouts, refer to STE/ICE manual for fault isolation.

(1) Run confidence test as follows:
  (a) Set TEST SELECTOR switches to 66.
  (b) Press and release TEST button.
  (c) Wait for display to show 0066.
  (d) Set TEST SELECT switches to 99.
  (e) Press and release TEST button.
(2) Observe the following display readouts:
  (a) Display shows 0099.
  (b) Display blank.

NOTE

When performing step (c), observe display and verify that all segments of display are on.

  (c) Display shows 8.8.8.8. If any segment of display is not working, refer to STE/ICE manual for repair instructions for Digital Display Modules.
  (d) Display blank.

NOTE

Intermediate test results are displayed indicating test in progress. The end result will alternately show the software revision number and PASS message.

The display software revision number has a month (one digit), a year (two digits), and the revision number which is always zero.

(e) Wait for the alternate display of the revision number and the PASS message.

NOTE

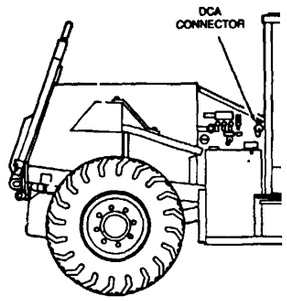
The software revision number flashing on the display should match the portion of the label on the side of the VTM.

(f) Compare the revision number displayed with the revision number on the VTM label. If they are different, return the STE/ICE-R set to DS maintenance.

k. STE/ICE GO-Chain Tests. The STE/ICE GO-Chain tests listed in Figure 2-3 may be utilized in testing the forklift. Tests should be preformed sequentially. Refer to the STE/ICE Technical Manual for test procedures.

PRE-TEST INSPECTION

1. Drive Belt
2. Oil Level
3. Coolant Level
4. Fuel Level
5. Batteries



STE/ICE-R MEASUREMENTS (DCA MODE) - VID 35

VEHICLE PARAMETER	TEST #	OFFSET LIMITS	OPERATING CONDITION	LIMITS	UNITS
Battery Voltage	67	---	Engine Off	24-27	Volts
Starter Current First Peak	72	± 225	Crank on Go	1000-1200	Amps
Battery Internal Resistance	73	± 225	Crank on Go	3-14	Milliohms
Starter Circuit Resistance	74	± 225	Crank on Go	10-30	Milliohms
Battery Resistance Change	75	± 225	Crank on Go	25-50	Milliohms/Sec
Starter Voltage	68	---	Engine Off	25-27	Volts
Alternator Output Voltage	82	---	Engine Running, Electrical Accessories On	27-29	Volts
Alternator Field Voltage	83	---	Engine Running, Electrical Accessories On	25-29	Volts
Alternator Return Voltage Drop	84	---	Engine Running, Electrical Accessories On	0-10	Volts
Fuel Solenoid Voltage	27	---	Engine Running	24-27	Volts
Fuel Supply Pressure	24	± 15	Engine Running	4-10	PSI
Fuel Filter ΔP	26	---	Engine Running	Pass	---
Engine RPM	10	---	Engine Running - Idle High Idle Cranking	750-850 2600 250-310	RPM RPM RPM
Engine Power (RPM/Sec) NOTE 1	12	---	Engine Warm	2000-4000	RPM/Sec
Compression Unbalance NOTE 2	14	---	Engine Warm	100-180	---

1. ENGINE POWER TEST VALUE. PO-3: 02
2. COMPRESSION UNBALANCE TEST VALUES. CU-1: 04, CU-2: 67, CU-3: 81, CU-4: 08, CU-5: 41

POWERING UP VTM

1. Connect VTM to W1 cable
2. Connect W1 cable to DCA connector (see Figure 1)
3. Enter VID 35 into VTM using test #60
4. Perform confidence test, test #66 (second entry 99)

OPERATOR MESSAGES

PASS	Test successfully completed
CAL	Offset test complete, release TEST button
CIP	Apply full throttle for CI power test
CU-( )	Enter compression unbalance values
CYL	Enter number of cylinders
FAIL	Test failed
GO	Crank engine
OFF	If cranking stop, if CI power release accelerator
PO-3	Enter power test value
UEH	Enter vehicle identification number
----	VTM accepting data or initial turn-on
66	Dial 99, push TEST button
.8.8.8.8	Display working properly

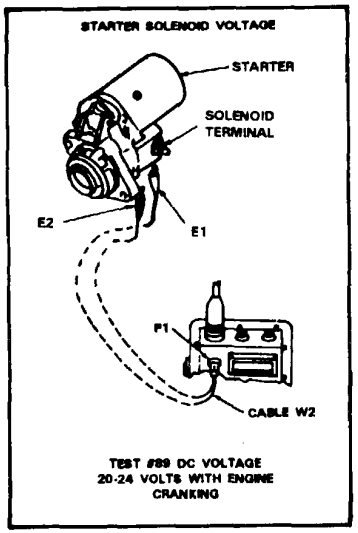
ERROR MESSAGES

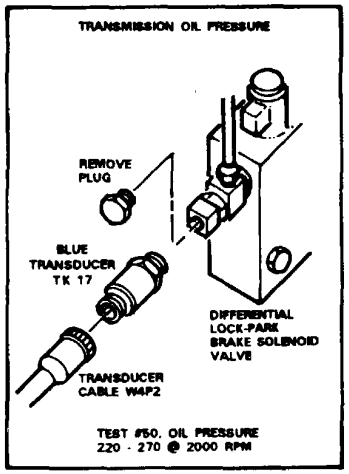
E000	Information not available
E001	Test non-existent
E002	Transducer not connected
E003	Test not valid
E005	CAL not performed
E008	No battery voltage
E009	No engine speed
E011	Bad accelerator operation
E013	Bad data received
E014	Bad number of cylinders
E018	Test discontinued, excessive time
E020	No first peak data
E027	Bad CU constants
E032	Cranking speed varies too much
E033	Bad power constant
.9.9.9.9	Overload or number exceeds display capability

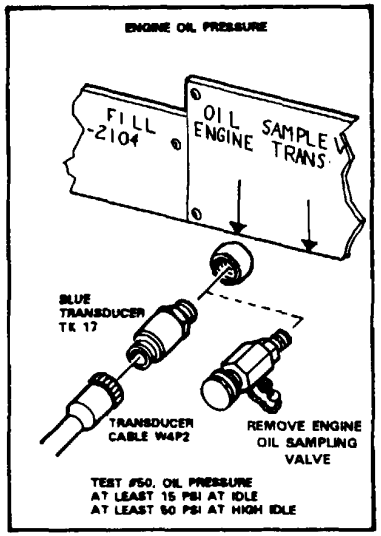
Figure 2-3. STE/ICE Test Card (Sheet 1 of 2)

STE/ICE-R MEASUREMENTS (TK MODE) - VID 35

VEHICLE PARAMETER	TEST #	TK ITEM(S)	OFFSET LIMITS	OPERATING CONDITION	LIMITS	UNITS
Starter Solenoid Voltage	89	Cable W2	± 6.8	Engine Cranking	20-24	Volts
Engine Oil Pressure	50	Transducer, Pressure (Blue Stripe)(TK17) Adapter, 1/8 MPT to 1/4 FPT (TK 20)	± 150	Engine Warm - Idle High Idle	Min 15 Min 50	PSI PSI
Transmission Oil Pressure	01,50	Transducer, Pressure (Blue Stripe)(TK17)	± 150	Engine Running, 2000 RPM	220-270	PSI







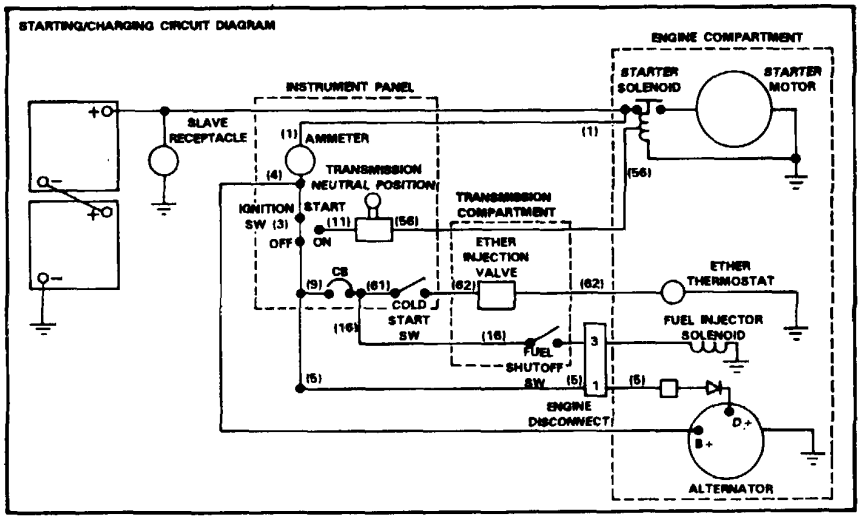
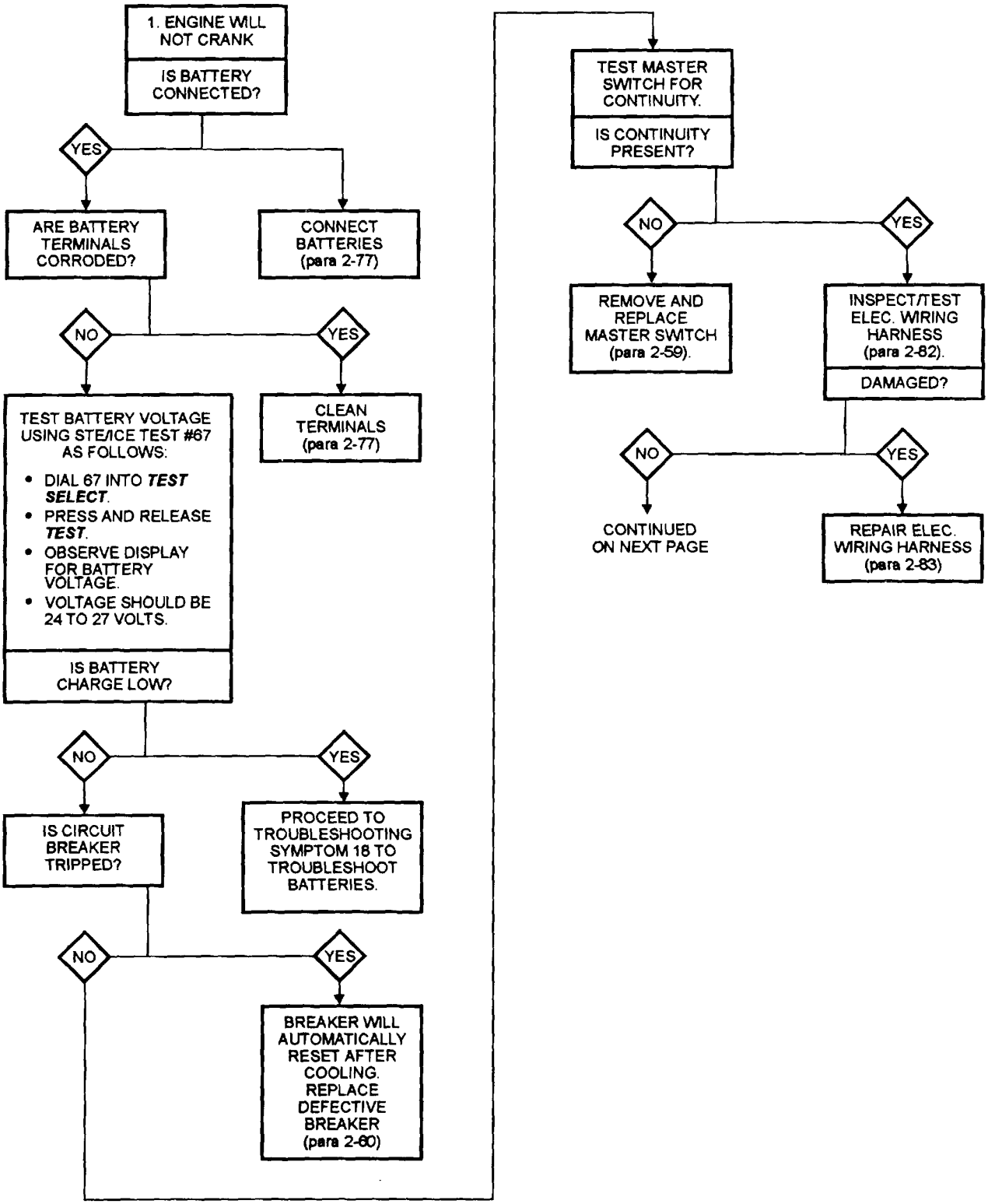


Figure 2-3. STE/ICE Test Card (Sheet 2)

Trouble Symptom 1. Engine Will Not Crank



Trouble Symptom 1. Engine Will Not Crank - continued

1. ENGINE WILL NOT CRANK

CONTINUED

NO

TEST STARTER VOLTAGE USING STE/ICE TEST #68 AS FOLLOWS:

- DIAL 68 INTO ***TEST SELECT***.
- PRESS AND RELEASE ***TEST***.
- OBSERVE DISPLAY FOR BATTERY VOLTAGE.
- VOLTAGE SHOULD BE 25 TO 27 VOLTS.

IS VOLTAGE LOW?

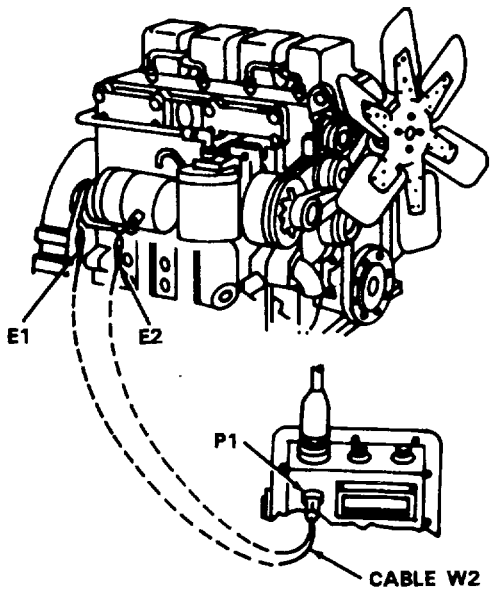
TEST SOLENOID VOLTAGE USING STE/ICE TEST #89 AS FOLLOWS:

- ATTACH CONNECTOR P1 OF CABLE W2 TO J4 ON VTM.
- ATTACH RED CLIP E1 OF CABLE W2 TO BLACK CLIP E2 OF CABLE W2.
- DIAL 89 INTO ***TEST SELECT***.
- PRESS AND HOLD ***TEST*** UNTIL ***CAL*** APPEARS ON DISPLAY.
- RELEASE ***TEST*** AND OBSERVE DISPLAY FOR OFFSET VALUE.
- OFFSET VALUE SHOULD BE BETWEEN -6.8 TO +6.8. IF NOT, REFER TO STE/ICE MANUAL TO FAULT ISOLATE OFFSET PROBLEM.
- ATTACH RED CLIP E1 TO STARTER SOLENOID POSITIVE TERMINAL. ATTACH BLACK CLIP E2 TO STARTER GROUND.
- PRESS AND RELEASE ***TEST***.
- CRANK ENGINE UNTIL VALUE APPEARS ON DISPLAY. IF ***.9.9.9.9*** APPEARS ON DISPLAY VTM CANNOT MEASURE VOLTAGE.
- STARTER SOLENOID VOLTAGE SHOULD BE 20 TO 24 VOLTS.

REMOVE AND REPLACE FAULTY STARTER (para 2-57).

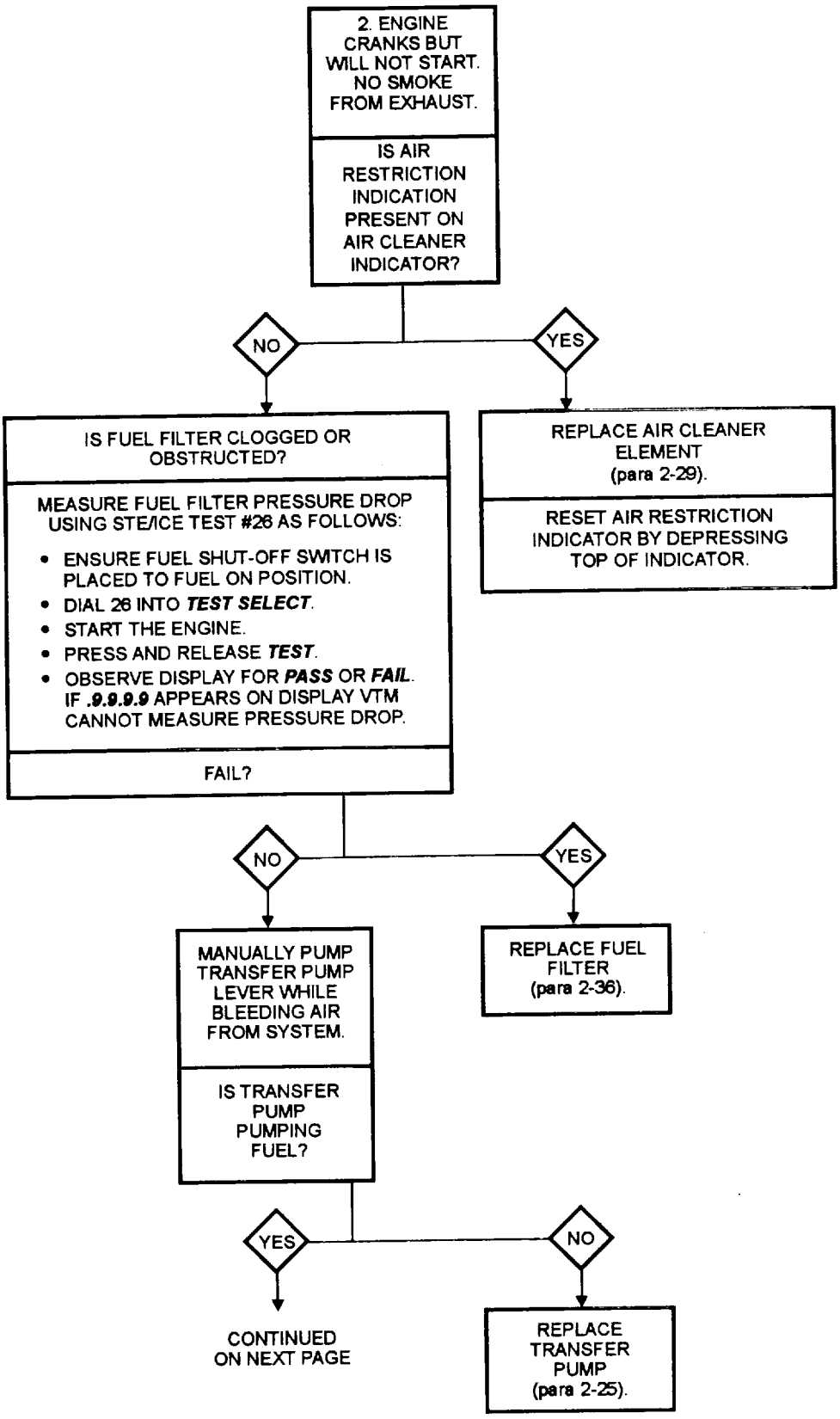
SEND FAULTY STARTER TO DS MAINTENANCE FOR REPAIR

STARTER SOLENOID VOLTAGE

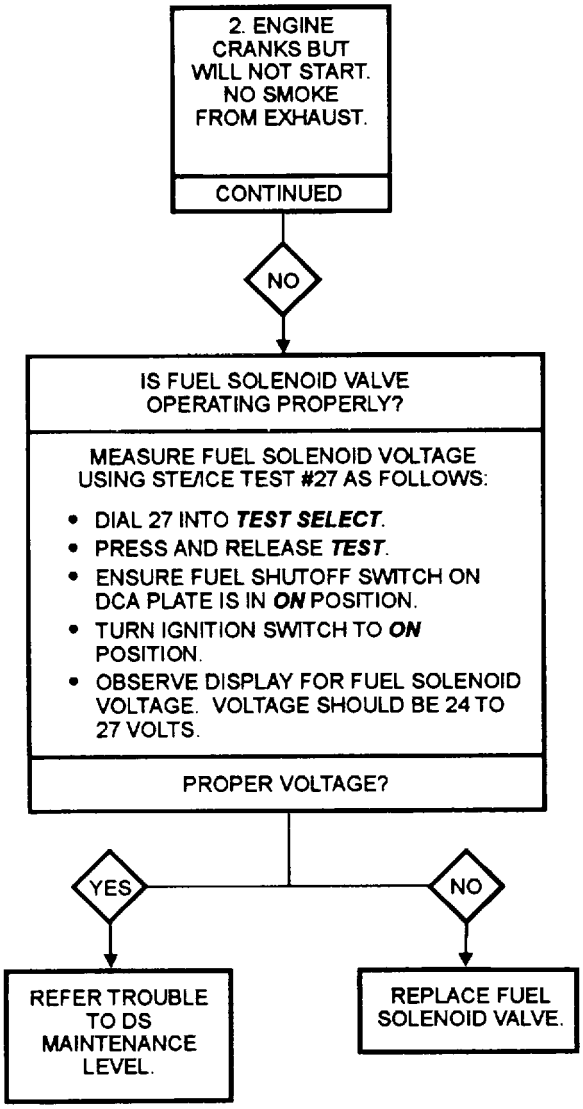


TEST #89 DC VOLTAGE 20-24 VOLTS WITH ENGINE CRANKING

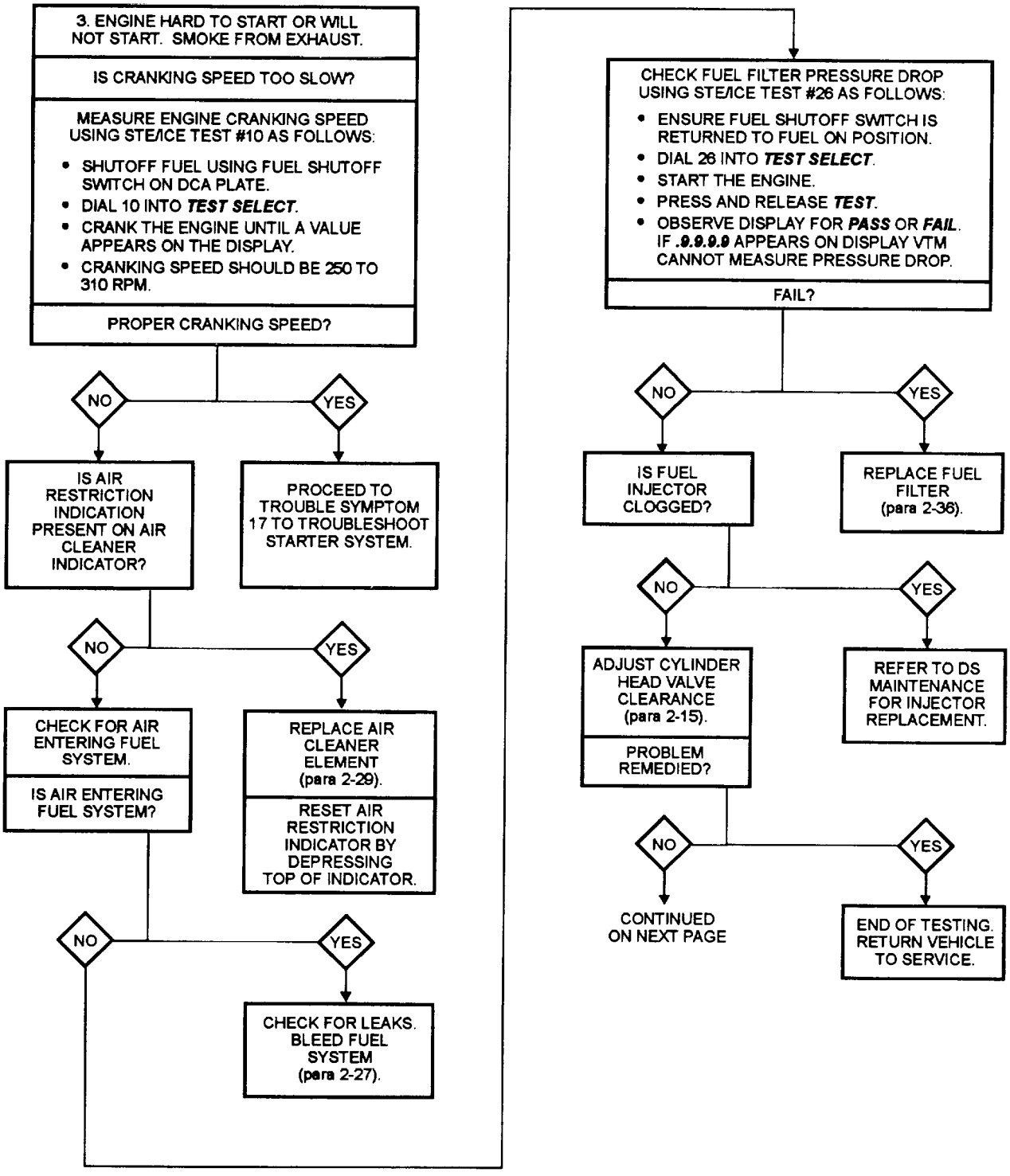
Trouble Symptom 2. Engine Cranks But Will Not Start, No Smoke From Exhaust



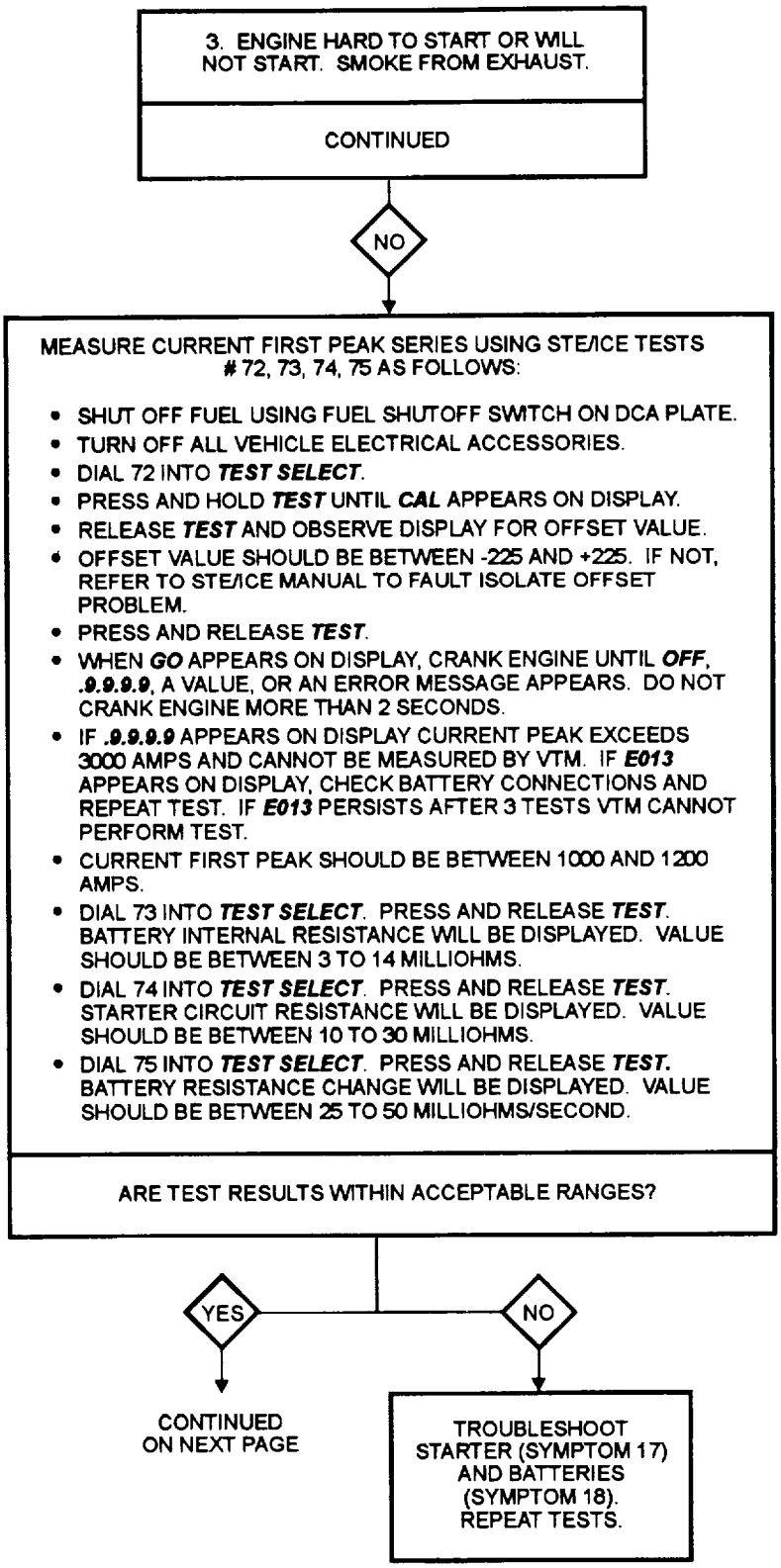
Trouble Symptom 2. Engine Cranks But Will Not Start, No Smoke From Exhaust - continued



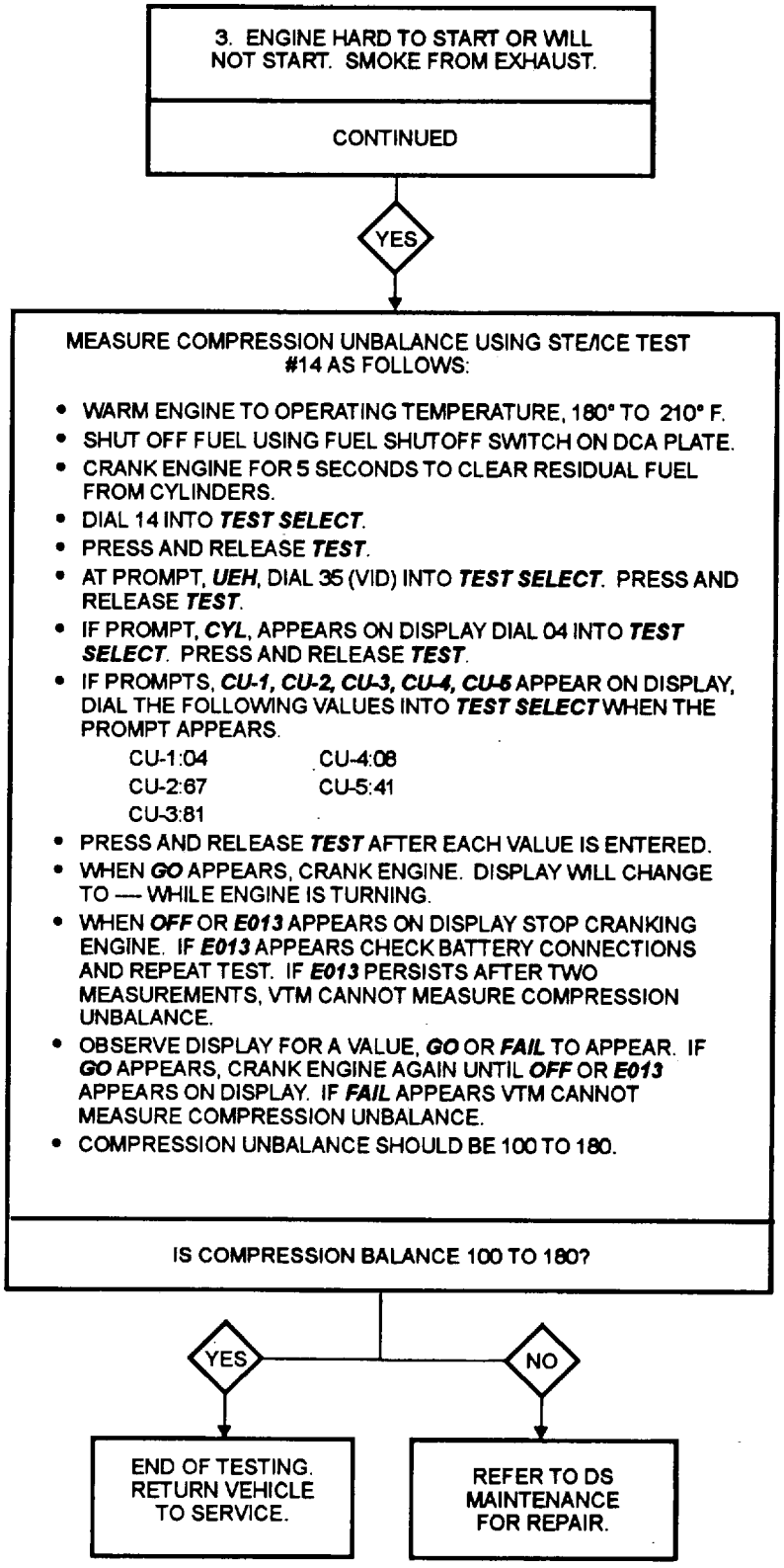
Trouble Symptom 3. Engine Cranks But Will Not Start, Smoke From Exhaust



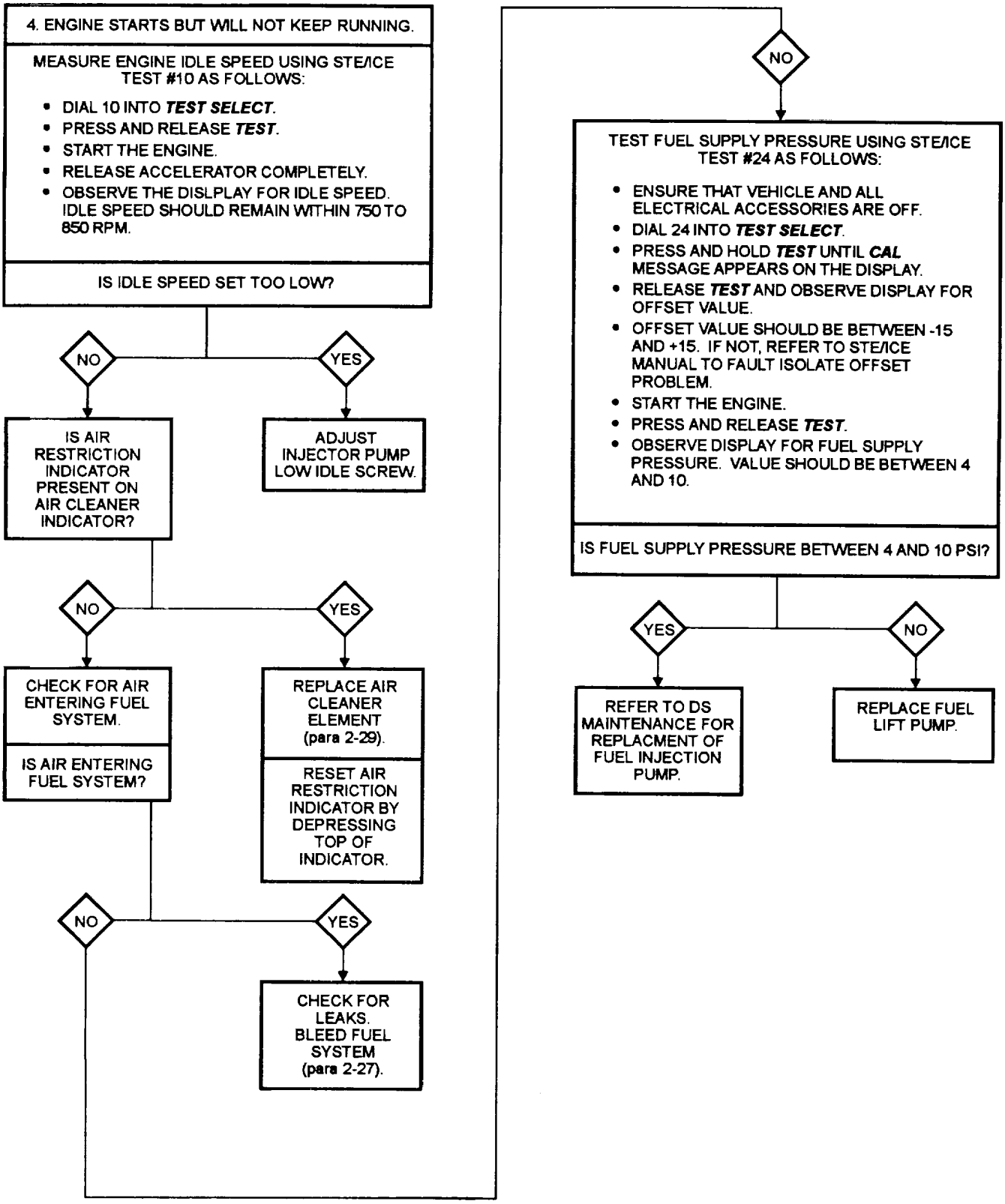
Trouble Symptom 3. Engine Cranks But Will Not Start, Smoke From Exhaust - continued



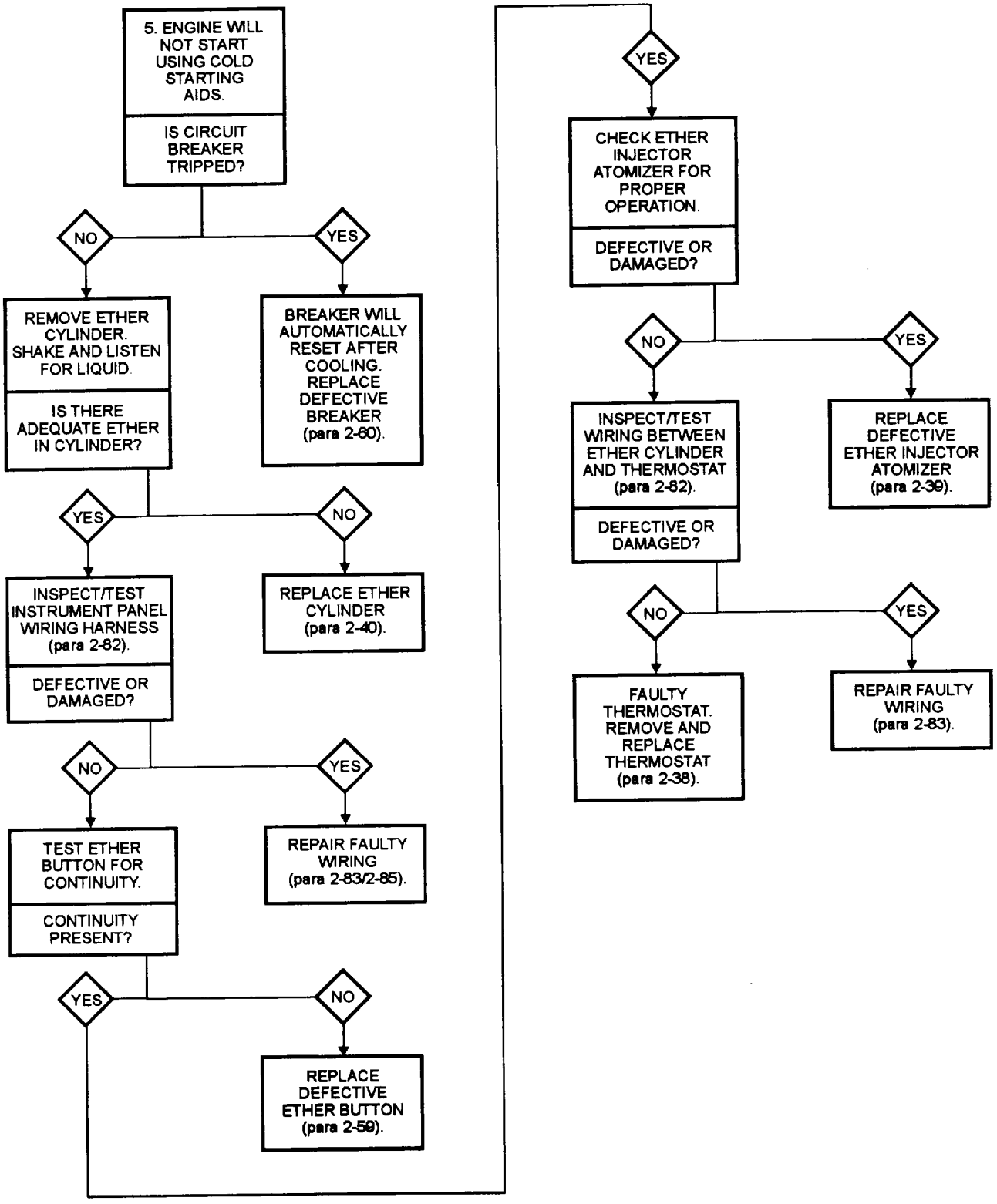
Trouble Symptom 3. Engine Cranks But Will Not Start, Smoke From Exhaust - continued



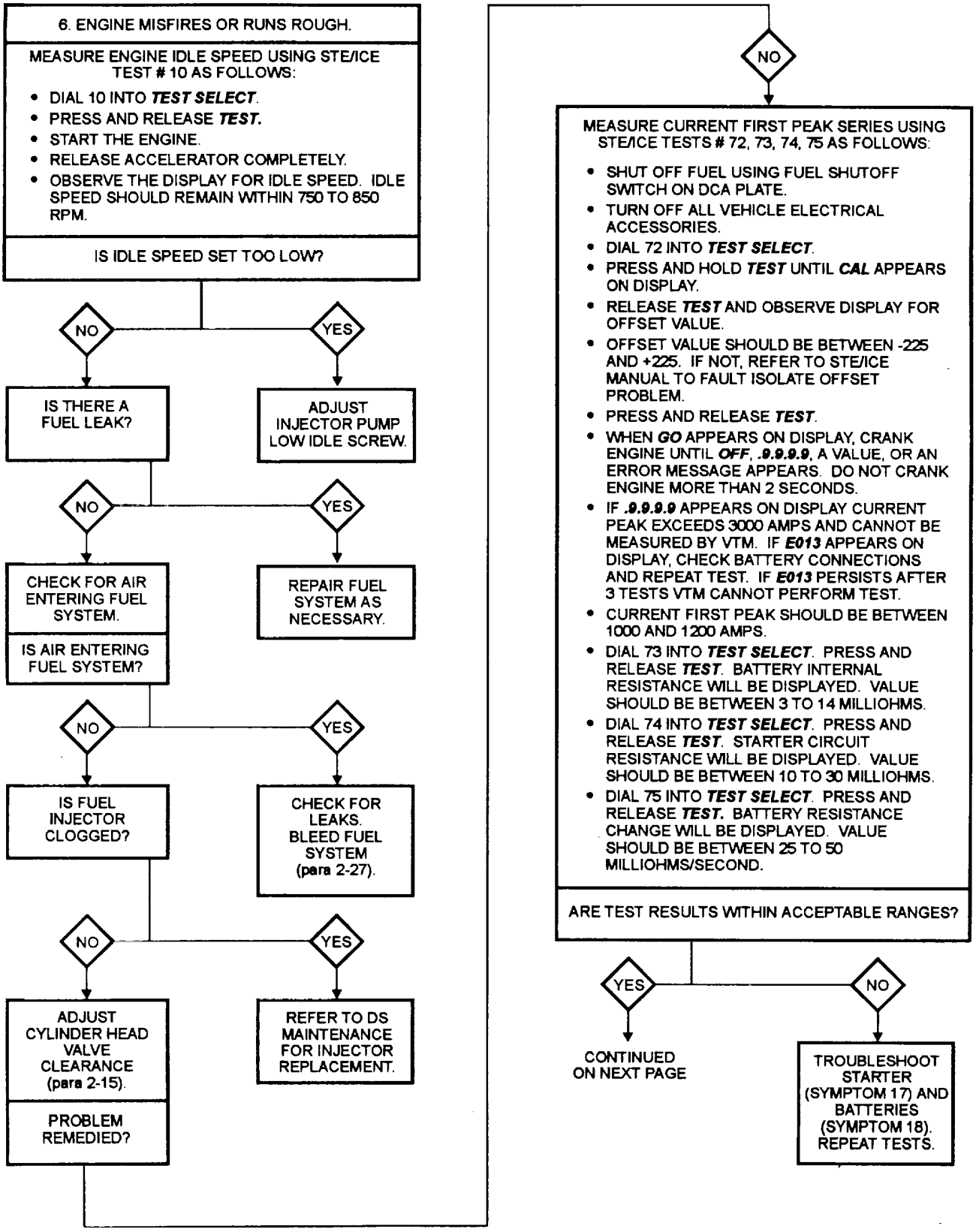
Trouble Symptom 4. Engine Starts But Will Not Keep Running



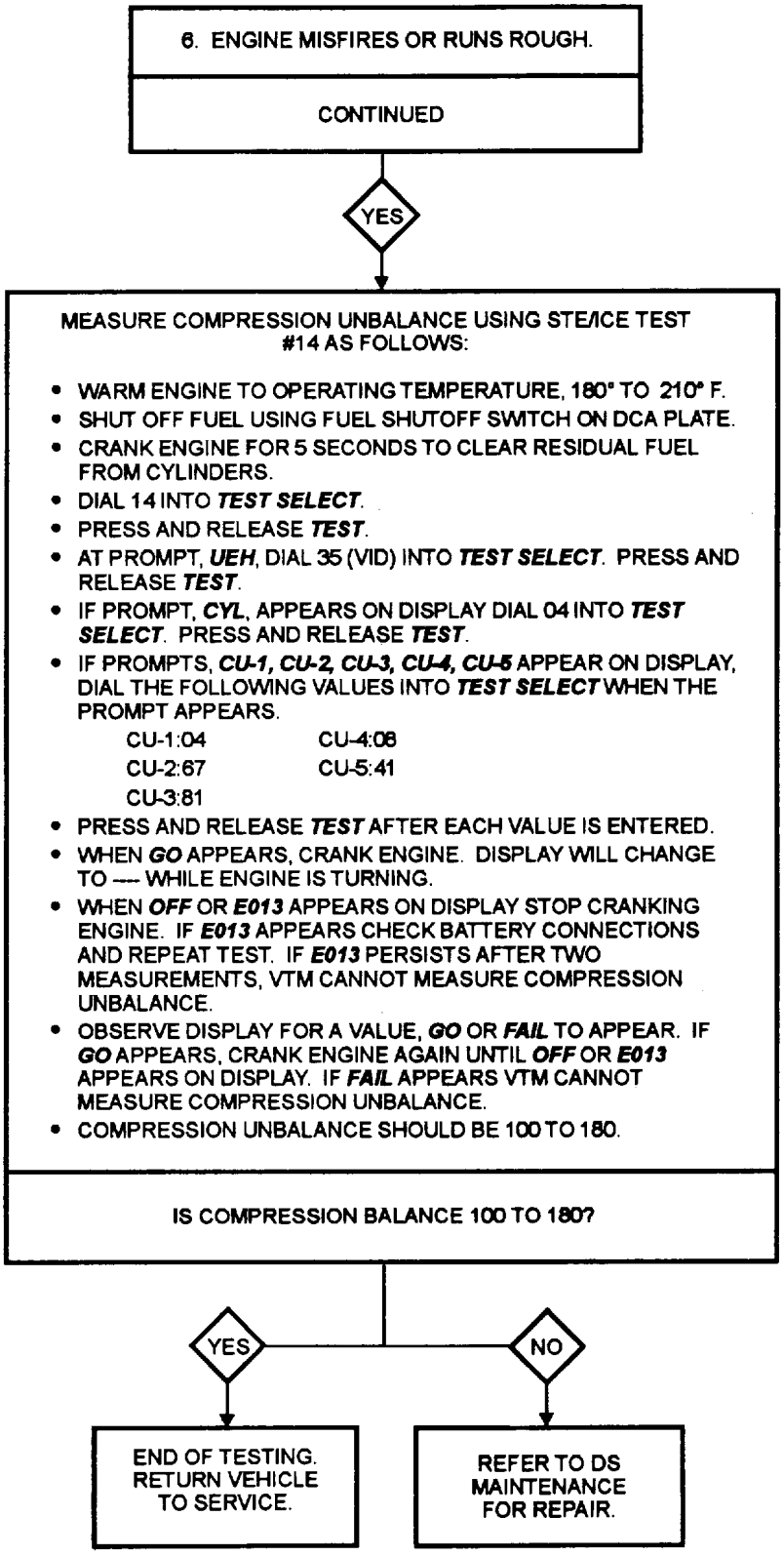
Trouble Symptom 5. Engine Will Not Start Using Cold Starting Aids



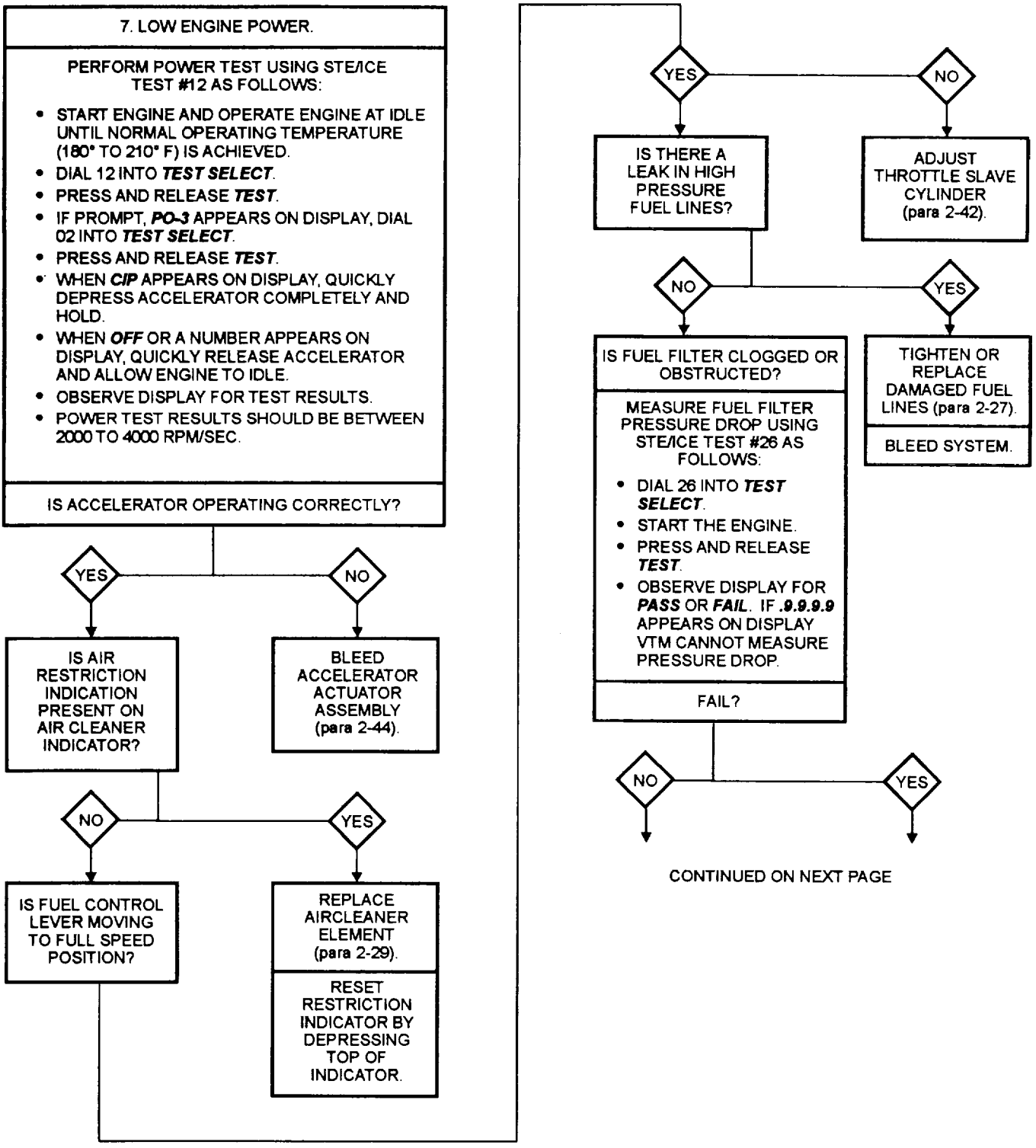
Trouble Symptom 6. Engine Misfires or Runs Rough



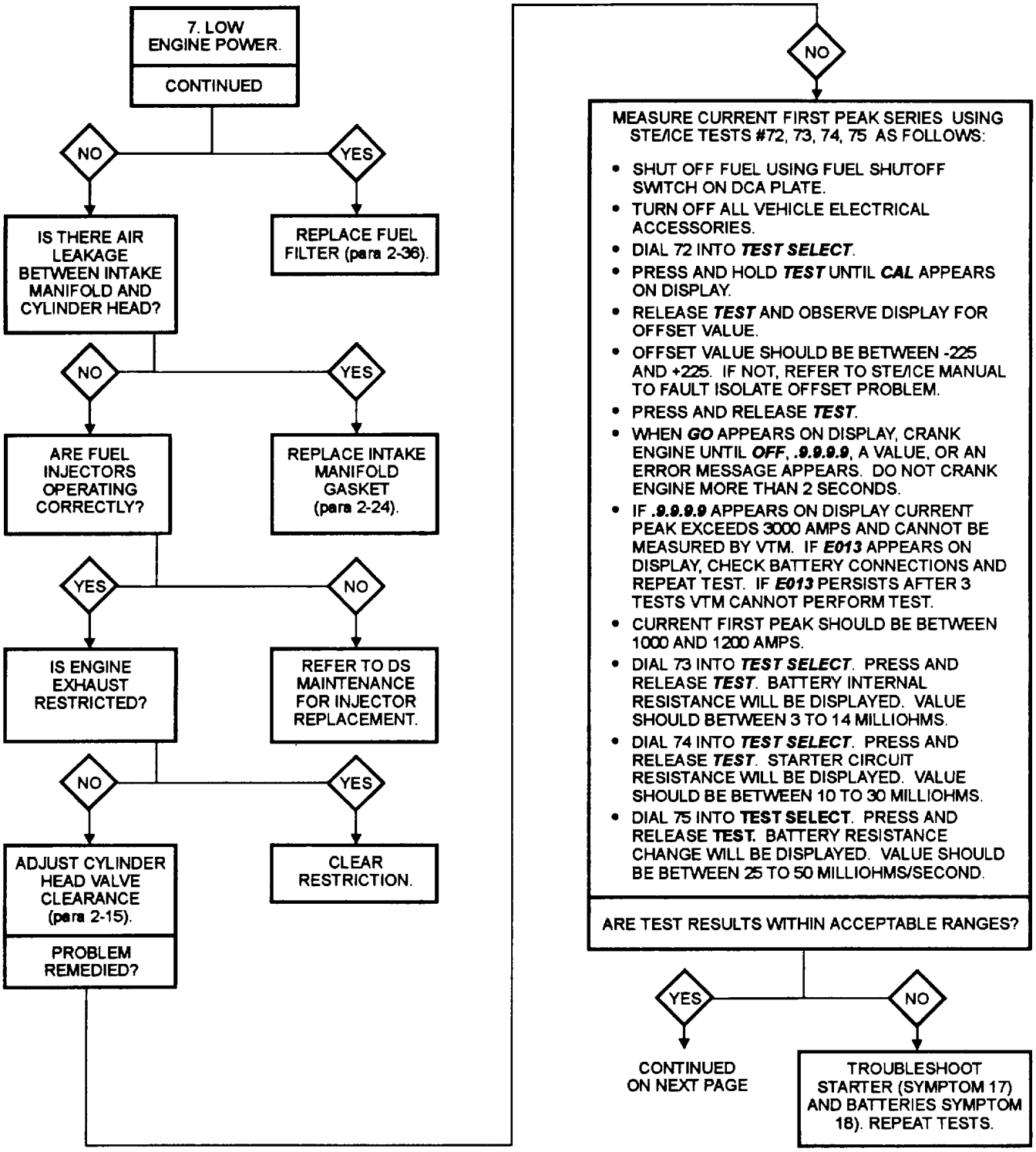
Trouble Symptom 6. Engine Misfires or Runs Rough - continued



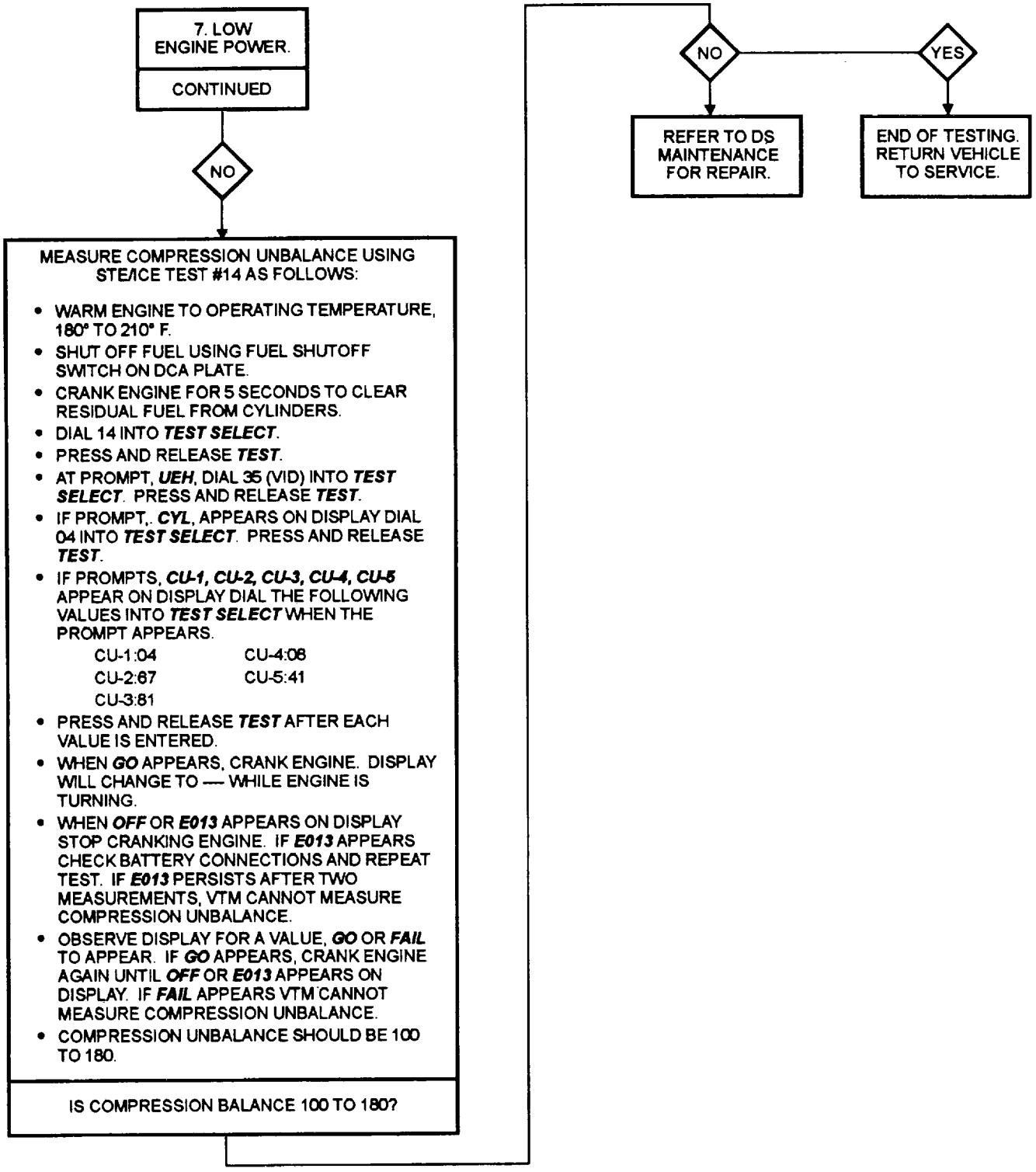
Trouble Symptom 7. Low Engine Power



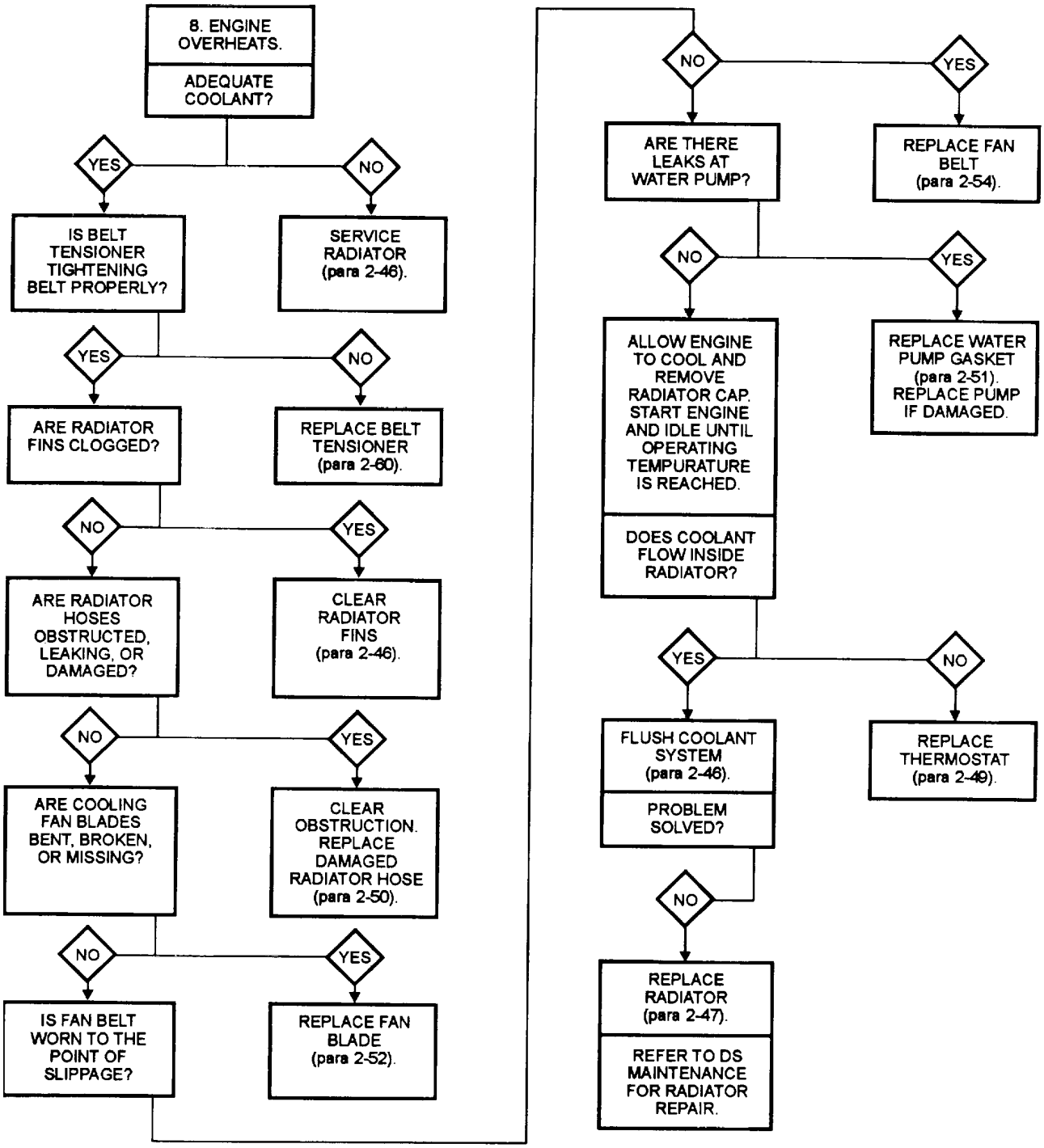
Trouble Symptom 7. Low Engine Power - continued



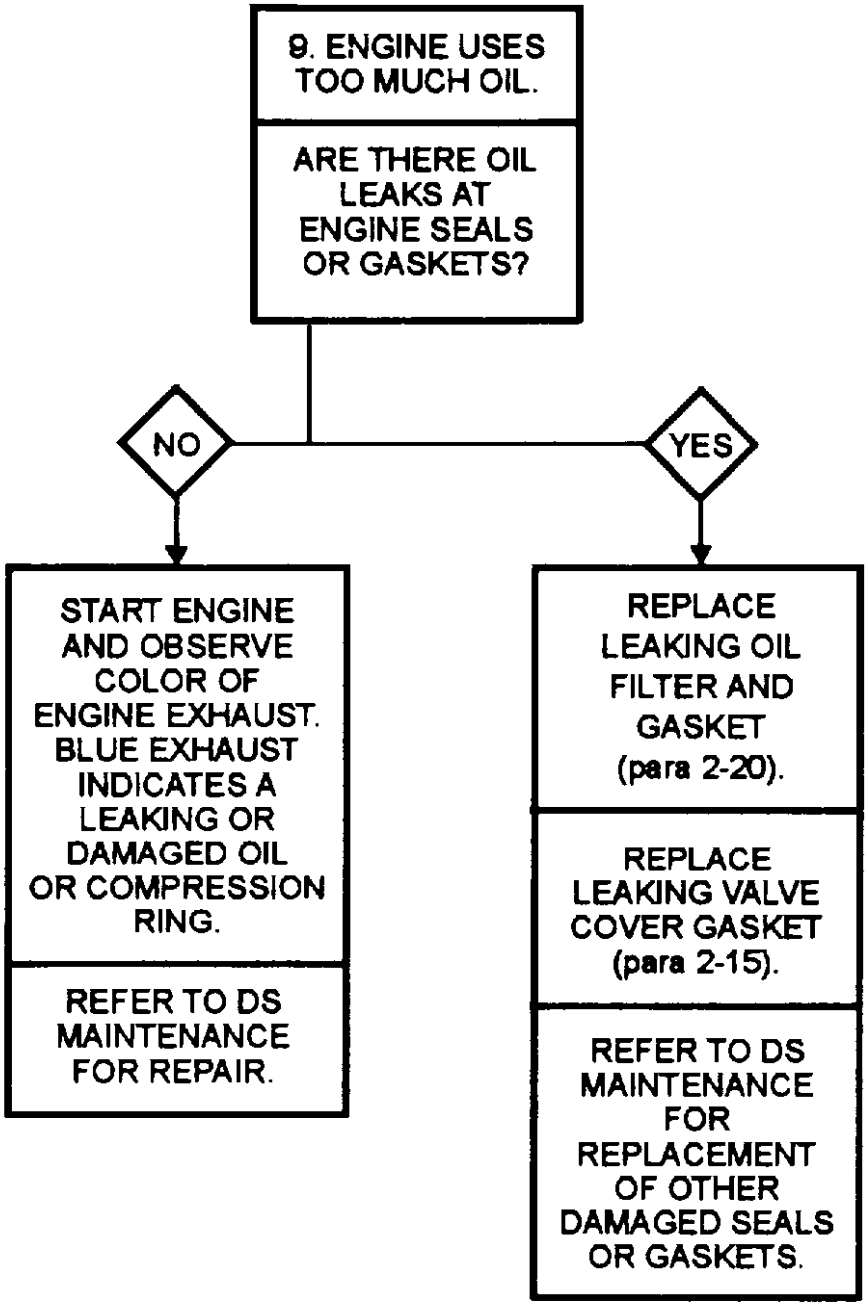
Trouble Symptom 7. Low Engine Power - continued



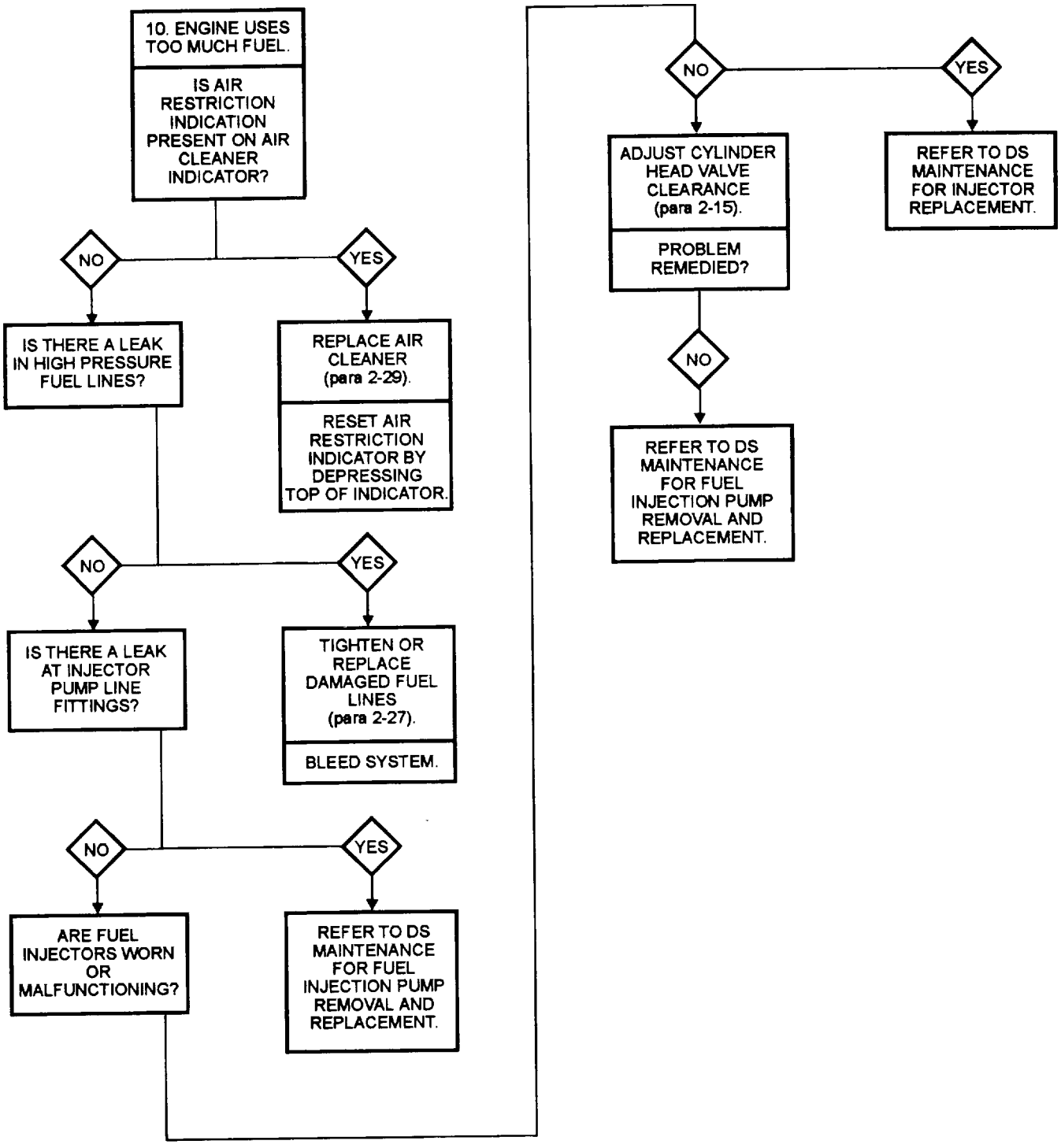
Trouble Symptom 8. Engine Overheats



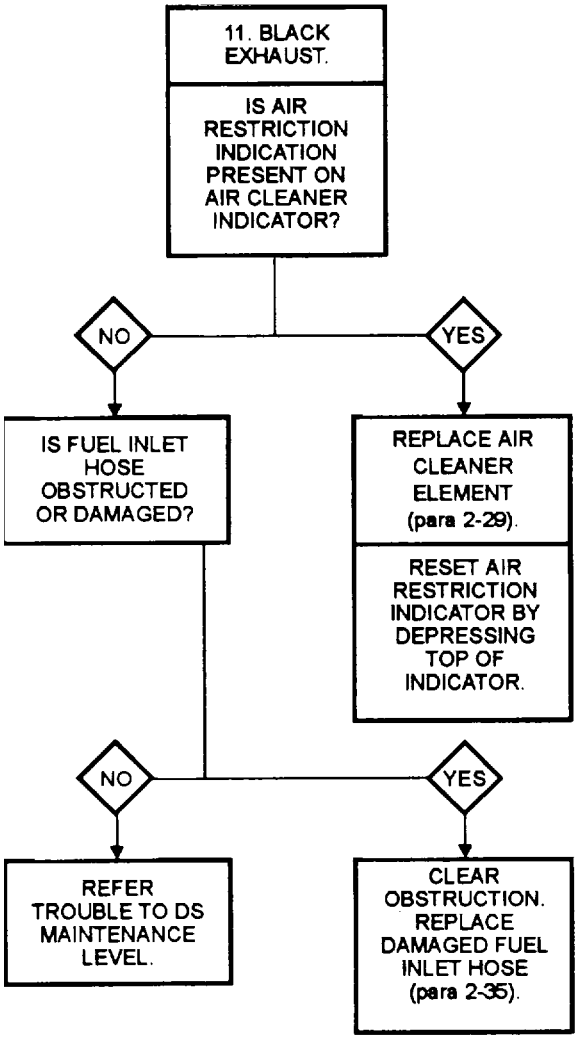
Trouble Symptom 9. Engine Uses Too Much Oil



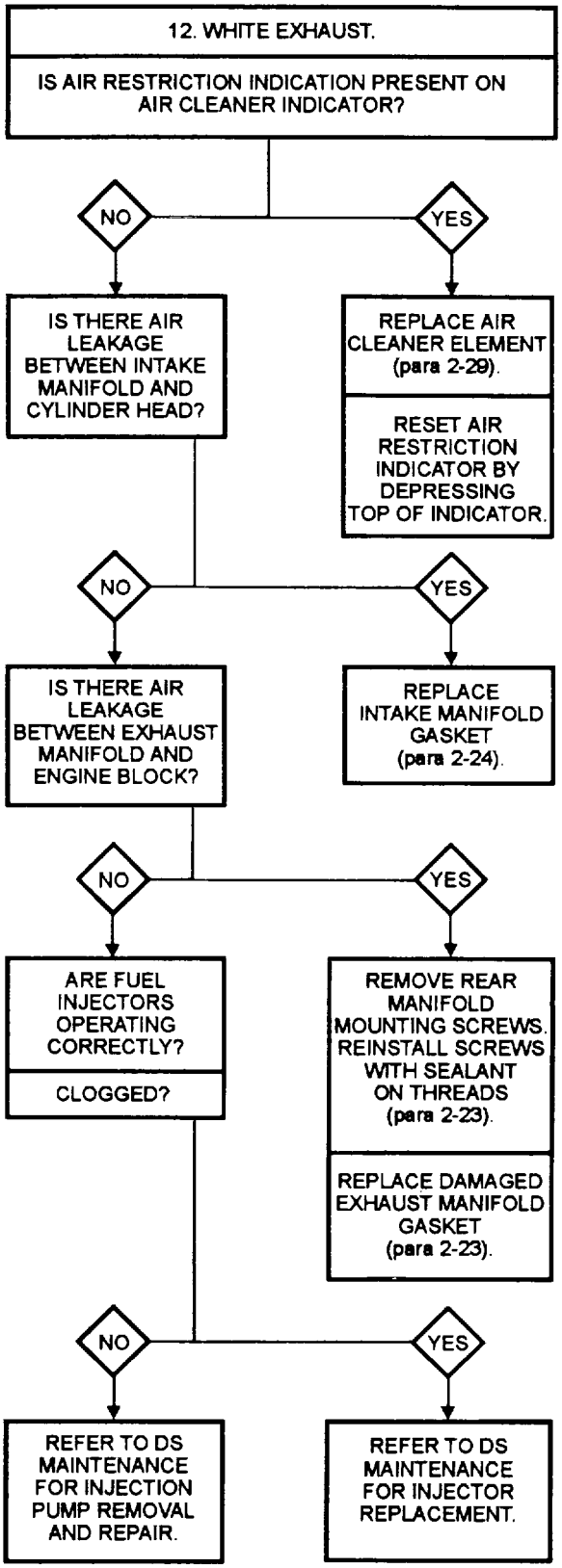
Trouble Symptom 10. Engine Uses Too Much Fuel



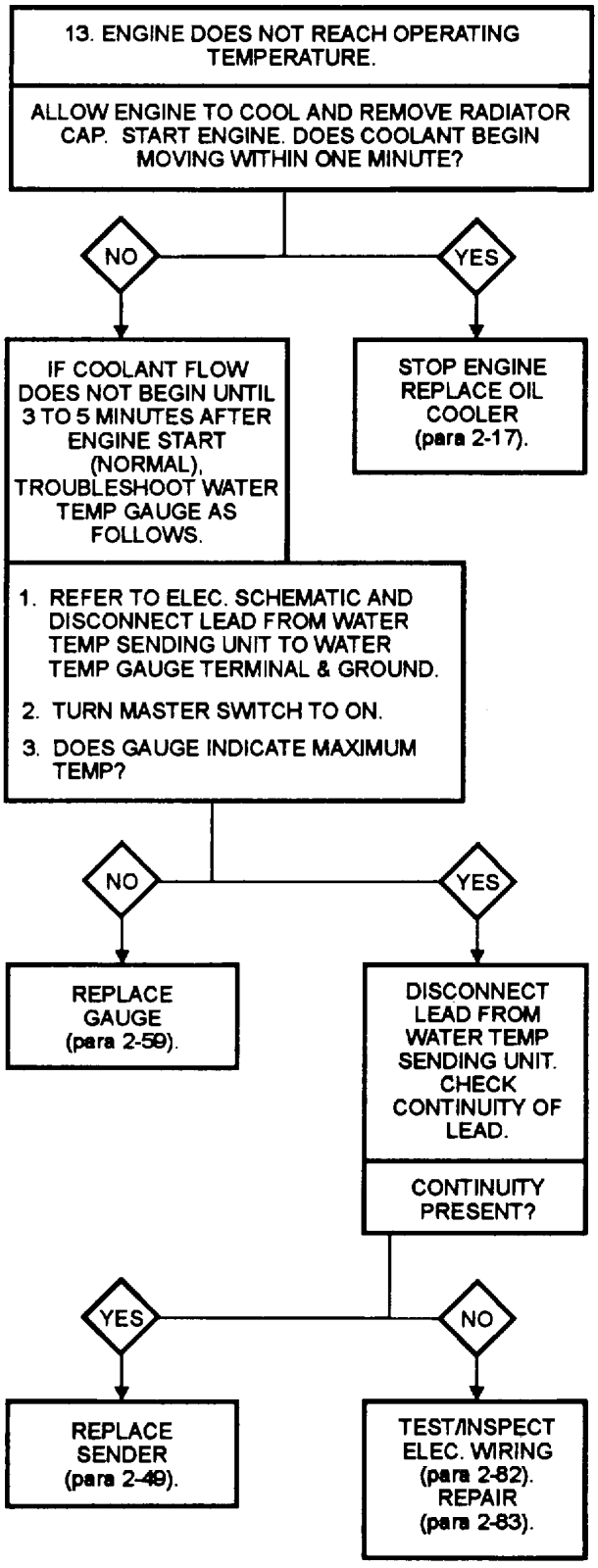
Trouble Symptom 11. Black Exhaust



Trouble Symptom 12. White Exhaust



Trouble Symptom 13. Engine Does Not Reach Operating Temperature



Trouble Symptom 14. Low Engine Oil Pressure

14. LOW ENGINE OIL PRESSURE.

MEASURE ENGINE OIL PRESSURE USING STE/ICE TEST # 50 AS FOLLOWS:

- REMOVE ENGINE OIL SAMPLING VALVE FROM TEE ON RIGHT TRANSMISSION SIDE COVER.
- INSTALL PRESSURE TRANSDUCER (TK 17, BLUE STRIPE) INTO PORT ON SIDE COVER.
- CONNECT P1 OF TRANSDUCER CABLE W4 TO J2 OR J3 ON VTM.
- CONNECT P2 OF TRANSDUCER CABLE W4 TO CONNECTOR ON PRESSURE TRANSDUCER.
- DIAL 50 INTO ***TEST SELECT.***
- PRESS AND HOLD ***TEST*** UNTIL ***CAL*** APPEARS ON DISPLAY.
- RELEASE ***TEST*** AND OBSERVE DISPLAY FOR OFFSET VALUE.
- OFFSET VALUE SHOULD BE BETWEEN -150 TO +150. IF NOT REFER TO STE/ICE MANUAL TO FAULT ISOLATE OFFSET PROBLEM.
- START THE ENGINE AND ALLOW ENGINE TO IDLE UNTIL WARM.
- PRESS AND RELEASE ***TEST***.
- OBSERVE DISPLAY FOR OIL PRESSURE. OIL PRESSURE SHOULD BE 15 PSI OR HIGHER.
- OPERATE ENGINE AT HIGH IDLE (2550 TO 2600 RPM).
- PRESS AND RELEASE ***TEST***.
- OBSERVE DISPLAY FOR OIL PRESSURE. OIL PRESSURE SHOULD BE 50 TO 65 PSI.

IS OIL PRESSURE 50 TO 65 PSI?

NO → IS OIL PRESSURE RELIEF VALVE STUCK OPEN?

NO → ARE THERE OIL LEAKS AT ENGINE SEALS OR GASKETS?

NO → TROUBLESHOOT ENGINE OIL PRESSURE GAUGE AND ENGINE OIL PRESSURE SENDER (TROUBLE 27).

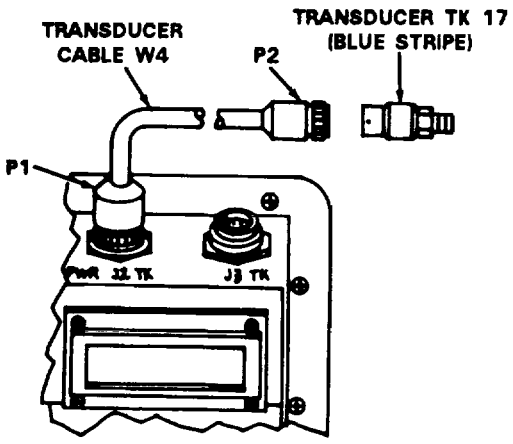
PROBLEM REMEDIED?

NO → REFER TROUBLE TO DS MAINTENANCE LEVEL.

YES → REFER TO TROUBLESHOOTING CHART 15 FOR REMEDY.

YES → REPLACE OIL FILTER (para 2-20).

YES → REPLACE OIL PRESSURE RELIEF VALVE (para 2-19).



Trouble Symptom 15. Excessive Engine Oil Pressure

15. EXCESSIVE ENGINE OIL PRESSURE.

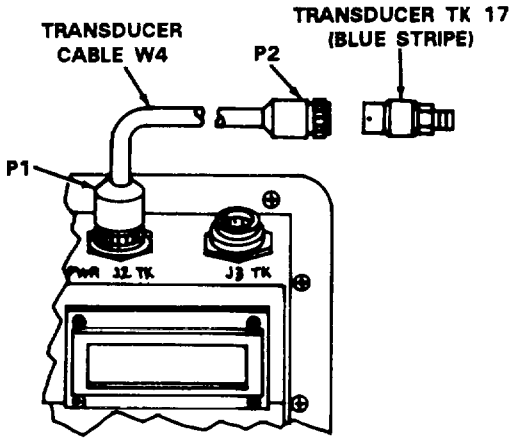
MEASURE ENGINE OIL PRESSURE USING STE/ICE TEST #50 AS FOLLOWS:

- REMOVE ENGINE OIL SAMPLING VALVE FROM TEE ON RIGHT TRANSMISSION SIDE COVER.
- INSTALL PRESSURE TRANSDUCER (TK 17, BLUE STRIPE) INTO PORT ON SIDE COVER.
- CONNECT P1 OF TRANSDUCER CABLE W4 TO J2 OR J3 ON VTM.
- CONNECT P2 OF TRANSDUCER CABLE W4 TO CONNECTOR ON PRESSURE TRANSDUCER.
- DIAL 50 INTO ***TEST SELECT***.
- PRESS AND HOLD ***TEST*** UNTIL ***CAL*** APPEARS ON DISPLAY.
- RELEASE ***TEST*** AND OBSERVE DISPLAY FOR OFFSET VALUE.
- OFFSET VALUE SHOULD BE BETWEEN -150 TO +150. IF NOT REFER TO STE/ICE MANUAL TO FAULT ISOLATE OFFSET PROBLEM.
- START THE ENGINE AND ALLOW ENGINE TO IDLE UNTIL WARM.
- PRESS AND RELEASE ***TEST***.
- OBSERVE DISPLAY FOR OIL PRESSURE. OIL PRESSURE SHOULD BE 15 PSI OR HIGHER.
- OPERATE ENGINE AT HIGH IDLE (2550 TO 2600 RPM).
- PRESS AND RELEASE ***TEST***.
- OBSERVE DISPLAY FOR OIL PRESSURE. OIL PRESSURE SHOULD BE 50 TO 65 PSI.

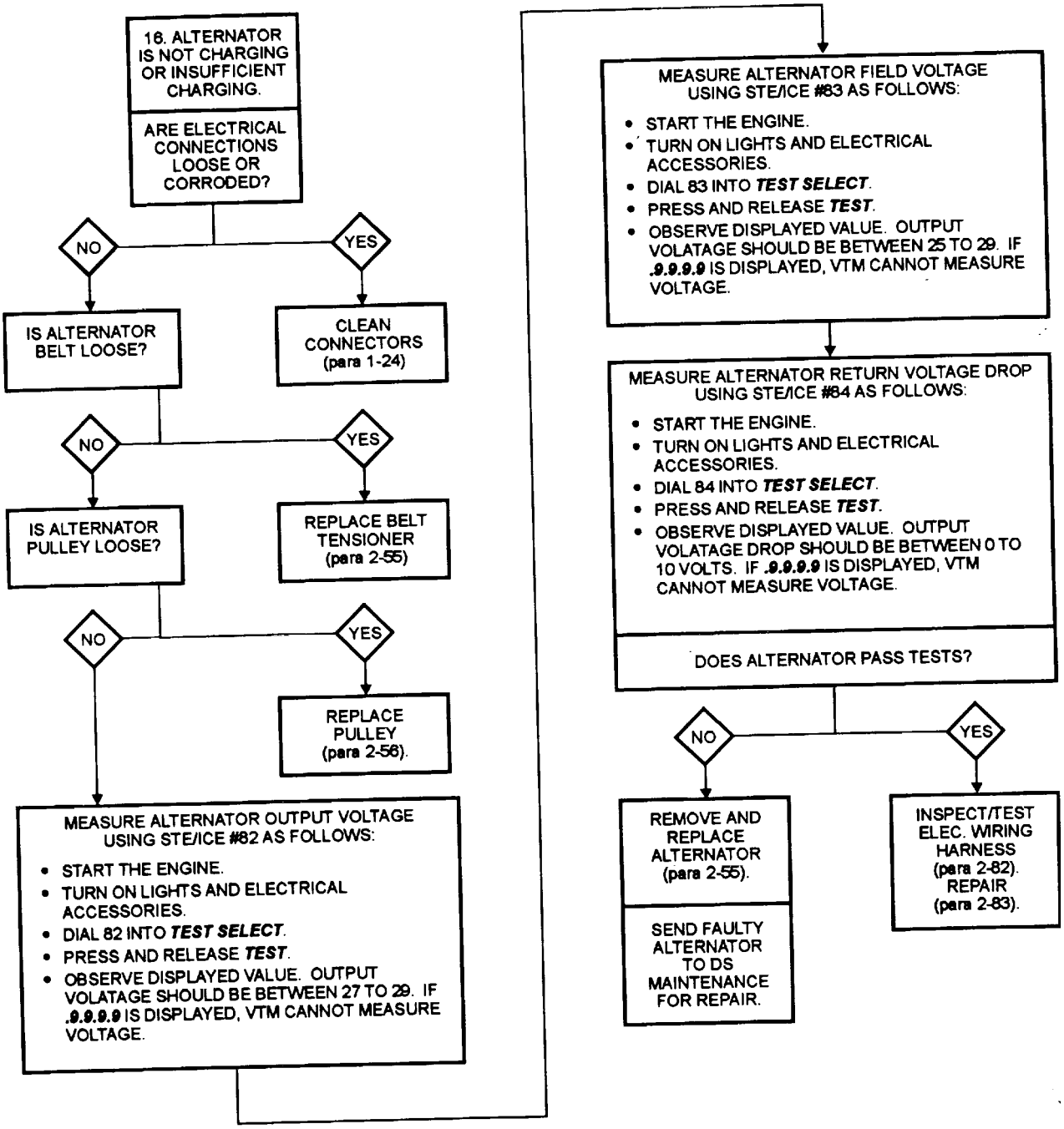
IS OIL PRESSURE RELIEF VALVE STUCK CLOSED?

NO → TROUBLESHOOT ENGINE OIL PRESSURE GAUGE AND ENGINE OIL PRESSURE SENDER (TROUBLE 27).

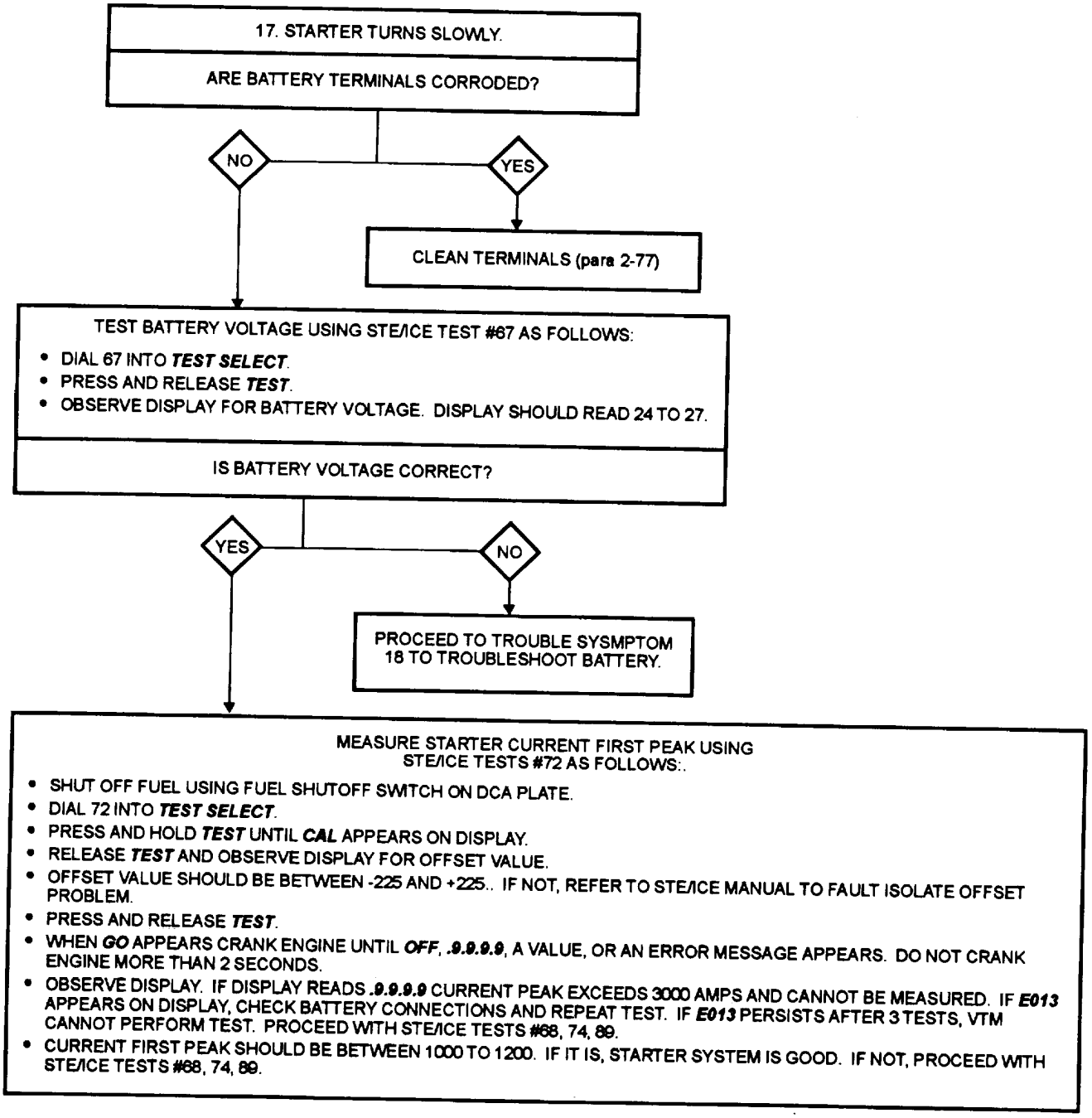
YES → REPLACE OIL PRESSURE RELIEF VALVE (para 2-19).



Trouble Symptom 16. Alternator Is Not Charging Or Insufficient Charging



Trouble Symptom 17. Starter Turns Slowly



CONTINUED ON NEXT PAGE

Trouble Symptom 17. Starter Turns Slowly - continued

17. STARTER TURNS SLOWLY.

CONTINUED

MEASURE STARTER CIRCUIT RESISTANCE USING STE/ICE TEST #74 AS FOLLOWS:

- SHUT OFF FUEL USING FUEL SHUTOFF SWITCH ON DCA PLATE.
- DIAL 74 INTO ***TEST SELECT***.
- PRESS AND RELEASE ***TEST***.
- WHEN ***GO*** APPEARS, CRANK ENGINE UNTIL ***OFF***, ***.9.9.9.9***, A VALUE, OR AN ERROR MESSAGE APPEARS ON DISPLAY. DO NOT CRANK ENGINE MORE THAN 2 SECONDS.
- IF ***.9.9.9.9*** APPEARS ON DISPLAY, VTM CANNOT MEASURE RESISTANCE. IF ***E013*** APPEARS, CHECK BATTERY CONNECTIONS AND REPEAT TEST. IF ***E013*** PERSISTS AFTER 3 TESTS, CHECK WIRING TO STARTER AND REPAIR IF NECCESSARY.
- STARTER CIRCUIT RESISTANCE SHOULD BE BETWEEN 10 TO 30 MILLIOHMS.

MEASURE STARTER MOTOR VOLTAGE USING STE/ICE TESTS #68 AS FOLLOWS:.

- DIAL 68 INTO ***TEST SELECT***.
- PRESS AND RELEASE ***TEST***.
- OBSERVE DISPLAY FOR STARTER MOTOR VOLTAGE.
- STARTER MOTOR VOLTAGE SHOULD BE 25 TO 27 VOLTS.

MEASURE STARTER SOLENOID VOLTAGE USING STE/ICE TEST #89 AS FOLLOWS:

- ATTACH CONNECTOR P1 OF CABLE W2 TO 34 ON VTM.
- ATTACH RED CLIP E2 OF CABLE W2 TO BLACK CLIP E2 OF CABLE W2.
- DIAL 89 INTO ***TEST SELECT***.
- PRESS AND HOLD ***TEST*** UNTIL ***CAL*** APPEARS ON DISPLAY.
- RELEASE ***TEST*** AND OBSERVE DISPLAY FOR OFFSET VALUE.
- OFFSET VALUE SHOULD BE BETWEEN -6.8 TO +6.8. IF NOT, REFER TO STE/ICE MANUAL TO FAULT ISOLATE OFFSET PROBLEM.
- ATTACH RED CLIP E1 TO STARTER SOLENOID POSITIVE TERMINAL. ATTACH BLACK CLIP E2 TO STARTER GROUND.
- PRESS AND RELEASE ***TEST***.
- CRANK ENGINE UNTIL VALUE APPEARS ON DISPLAY. IF ***.9.9.9.9*** APPEARS ON DISPLAY VTM CANNOT MEASURE VOLTAGE.
- STARTER SOLENOID VOLTAGE SHOULD BE 20 TO 24 VOLTS.

DOES STARTER PASS TESTS?

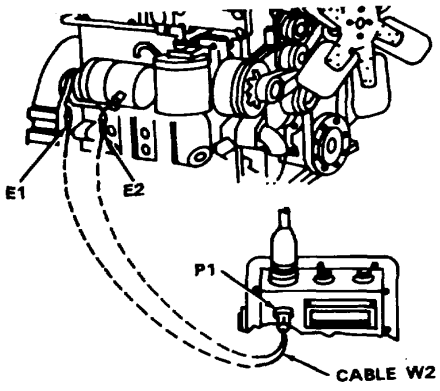
YES

REFER TO DS MAINTENANCE FOR ENGINE SERVICING.

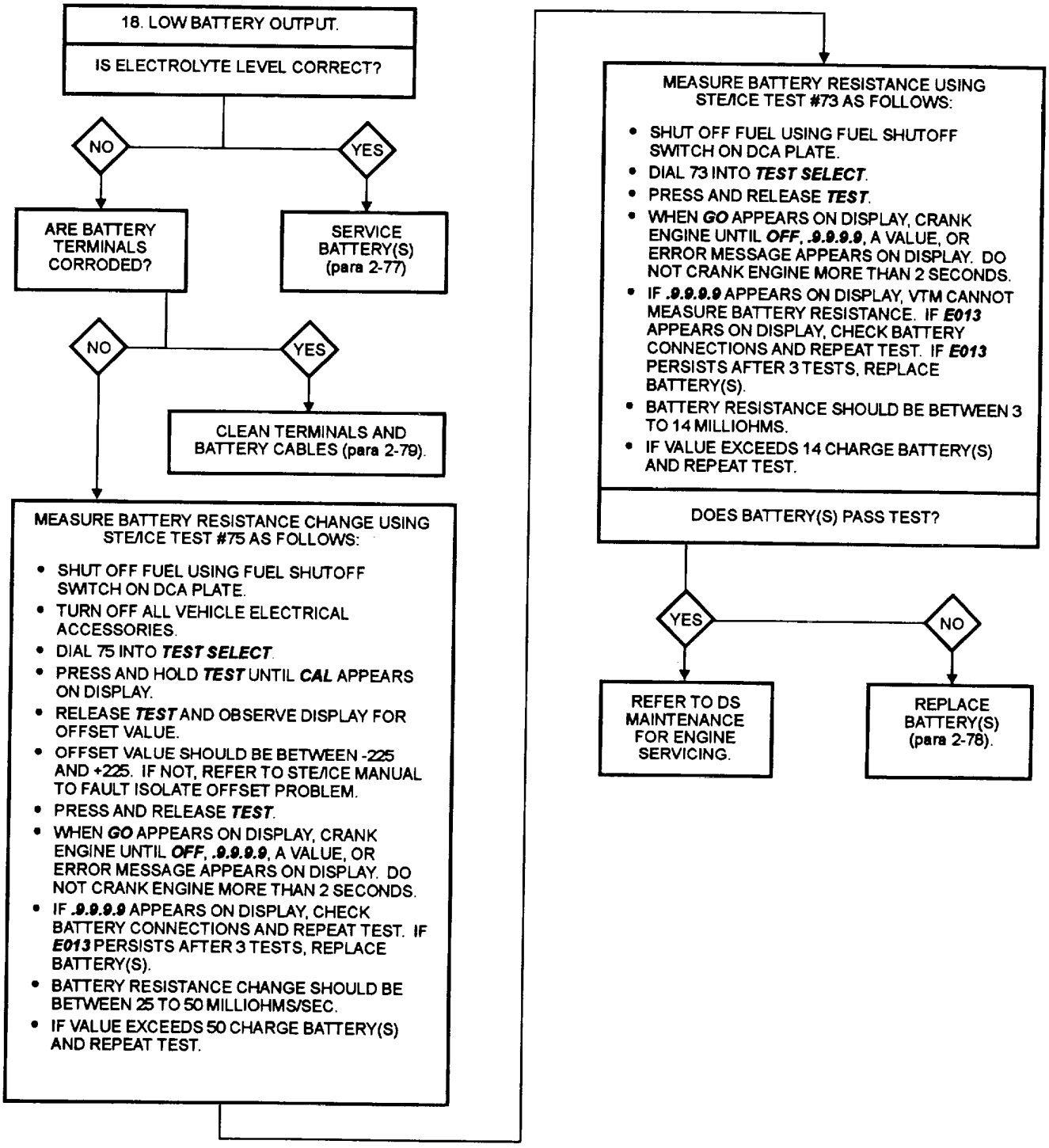
NO

REMOVE AND REPLACE STARTER (para 2-57).

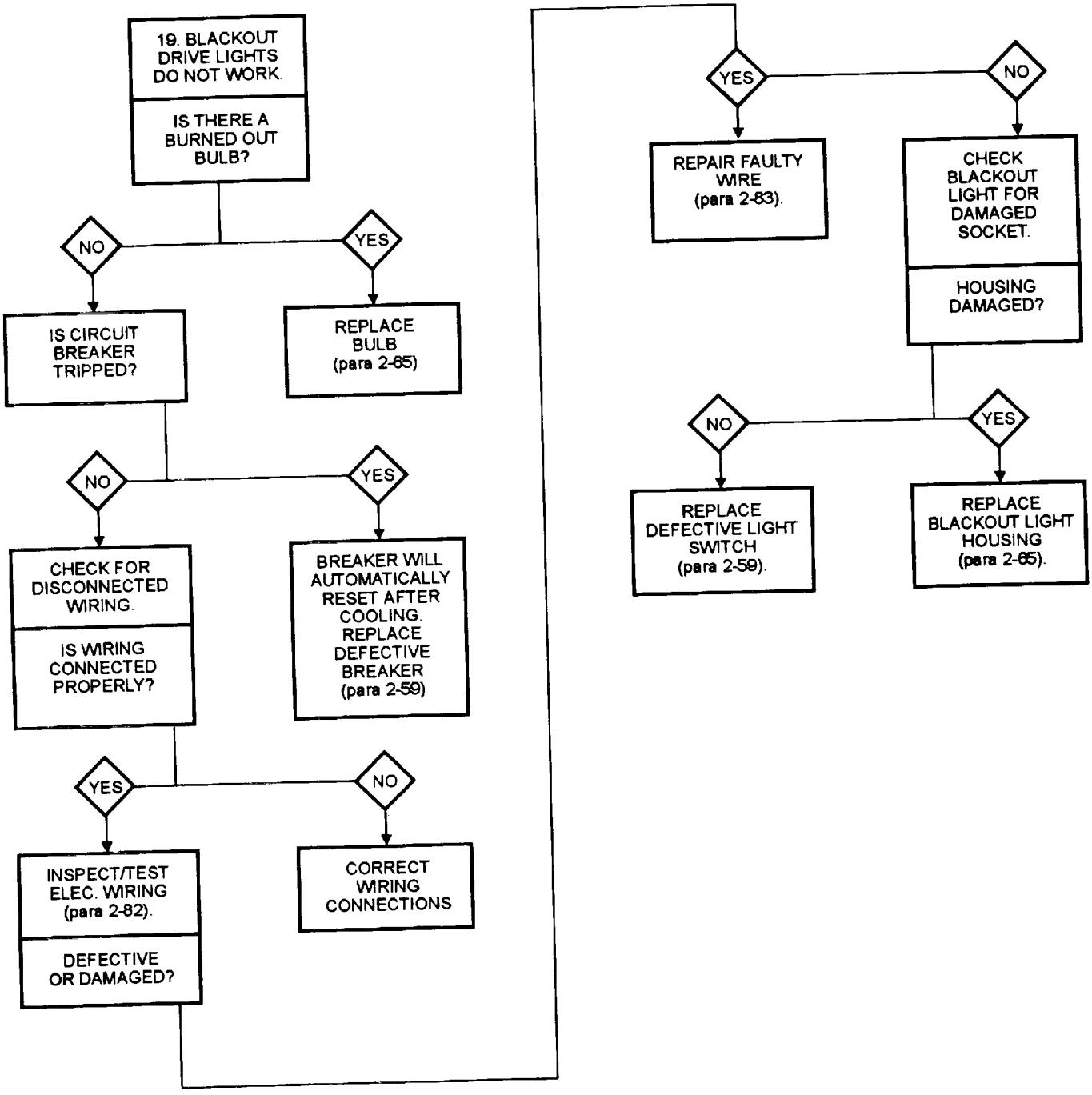
SEND FAULTY STARTER TO DS MAINTENANCE FOR REPAIR.



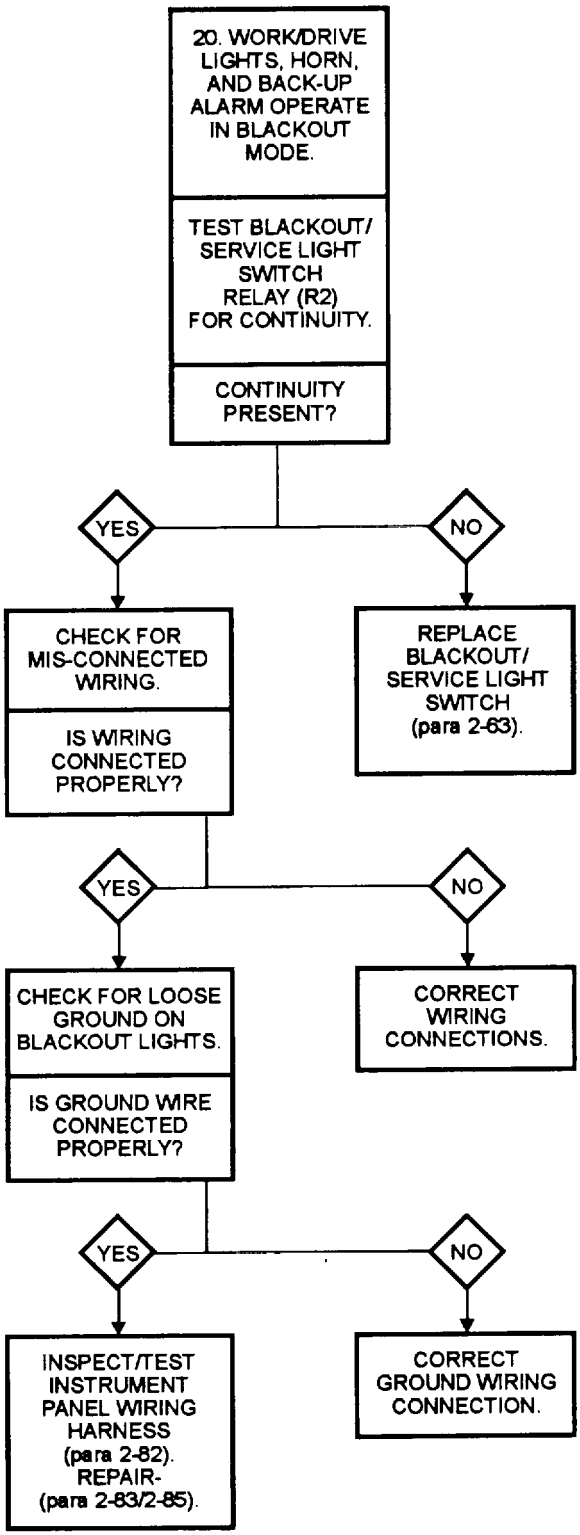
Trouble Symptom 18. Low Battery Output

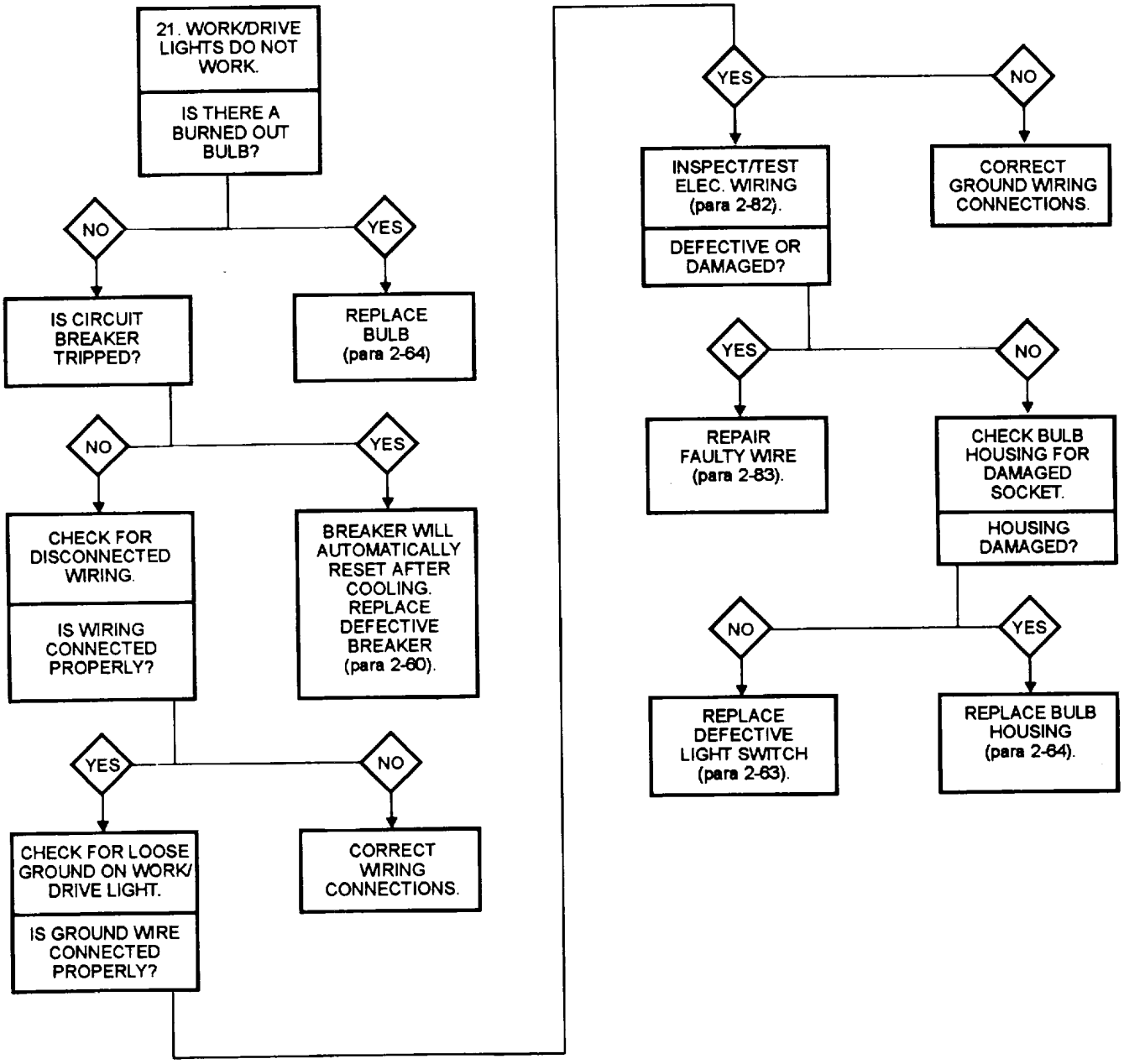


Trouble Symptom 19. Blackout Drive Lights Do Not Work

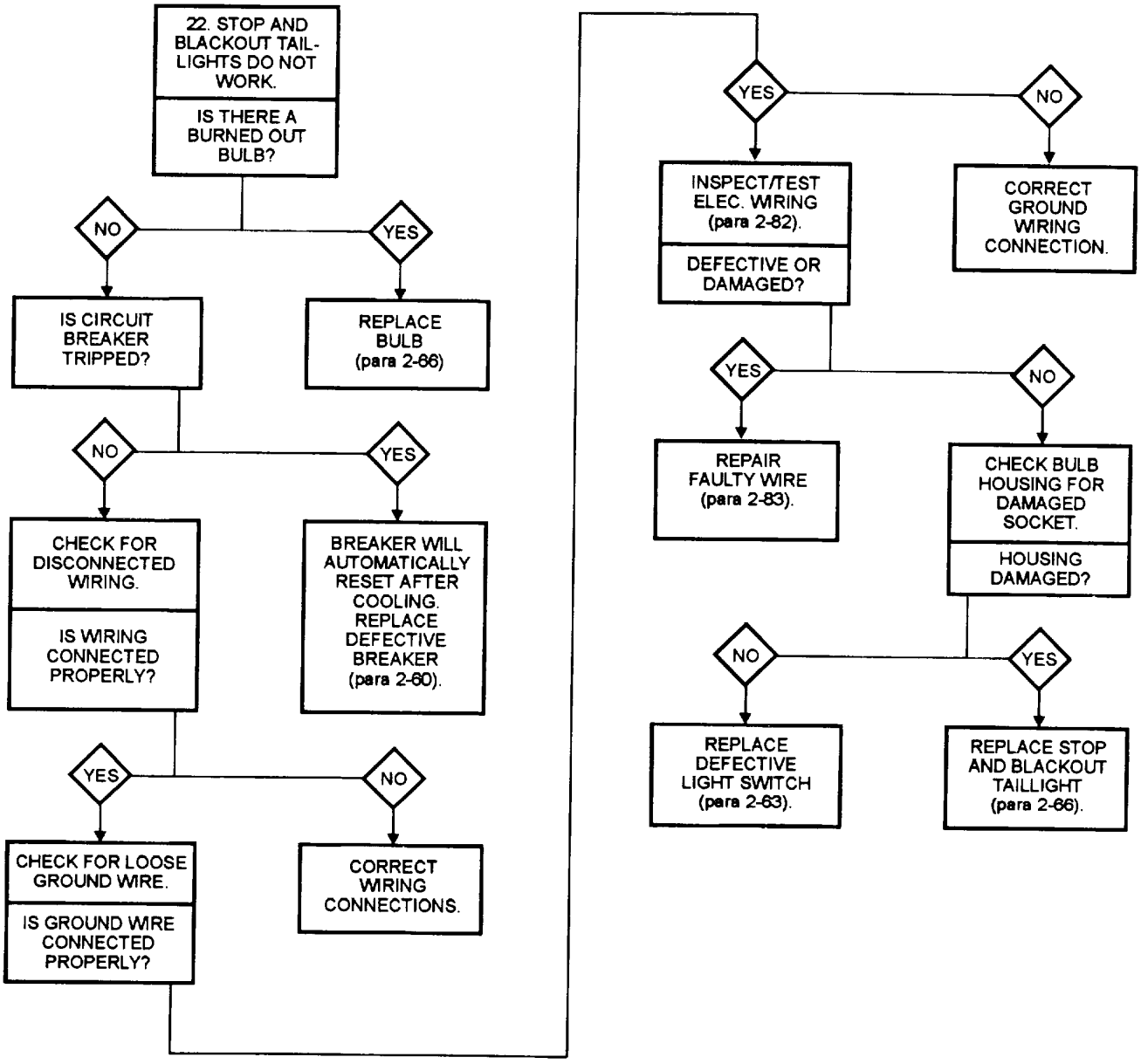


Trouble Symptom 20. Work/Drive Lights, Horn, And Back-u p Alarm Operate In Blackout Mode

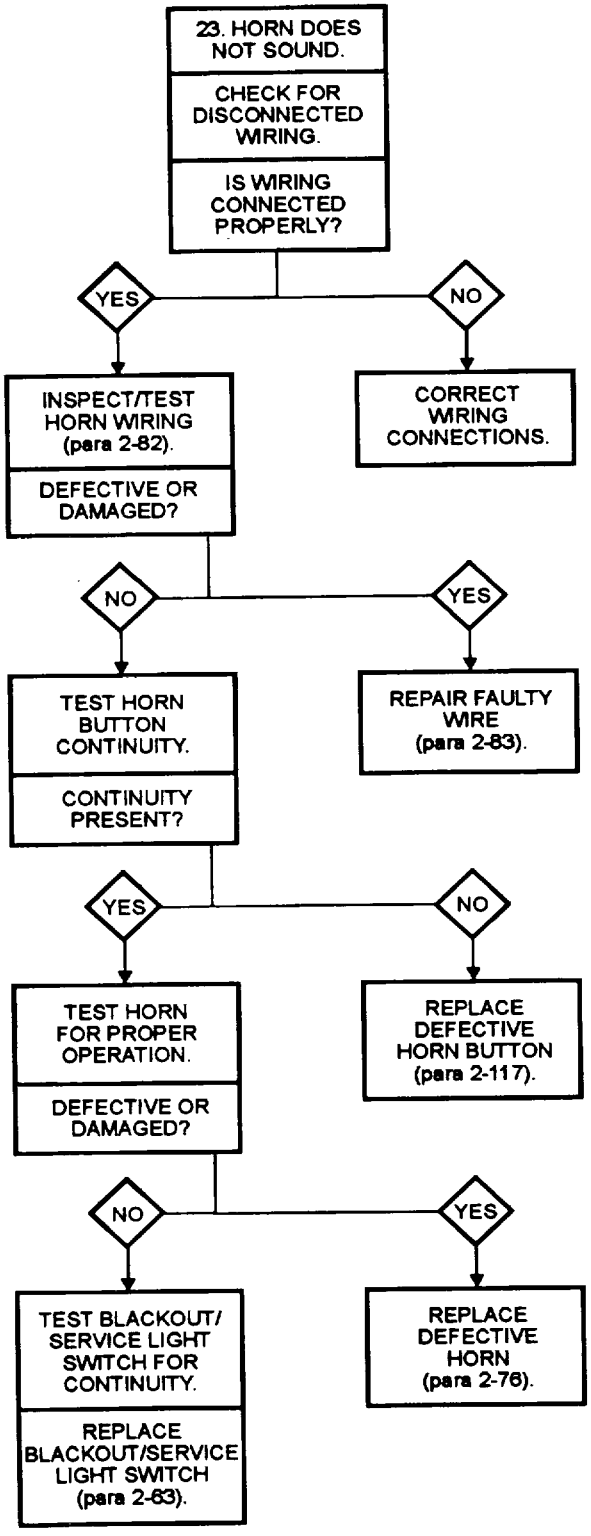



21. WORK/DRIVE LIGHTS DO NOT WORK.
IS THERE A BURNED OUT BULB?
NO
YES
IS CIRCUIT BREAKER TRIPPED?
REPLACE BULB (para 2-64)
NO
YES
CHECK FOR DISCONNECTED WIRING.
IS WIRING CONNECTED PROPERLY?
BREAKER WILL AUTOMATICALLY RESET AFTER COOLING. REPLACE DEFECTIVE BREAKER (para 2-60).
YES
NO
CHECK FOR LOOSE GROUND ON WORK/ DRIVE LIGHT.
IS GROUND WIRE CONNECTED PROPERLY?
CORRECT WIRING CONNECTIONS.
YES
NO
INSPECT/TEST ELEC. WIRING (para 2-82).
DEFECTIVE OR DAMAGED?
CORRECT GROUND WIRING CONNECTIONS.
YES
NO
REPAIR FAULTY WIRE (para 2-83).
CHECK BULB HOUSING FOR DAMAGED SOCKET.
HOUSING DAMAGED?
NO
YES
REPLACE DEFECTIVE LIGHT SWITCH (para 2-63).
REPLACE BULB HOUSING (para 2-64).

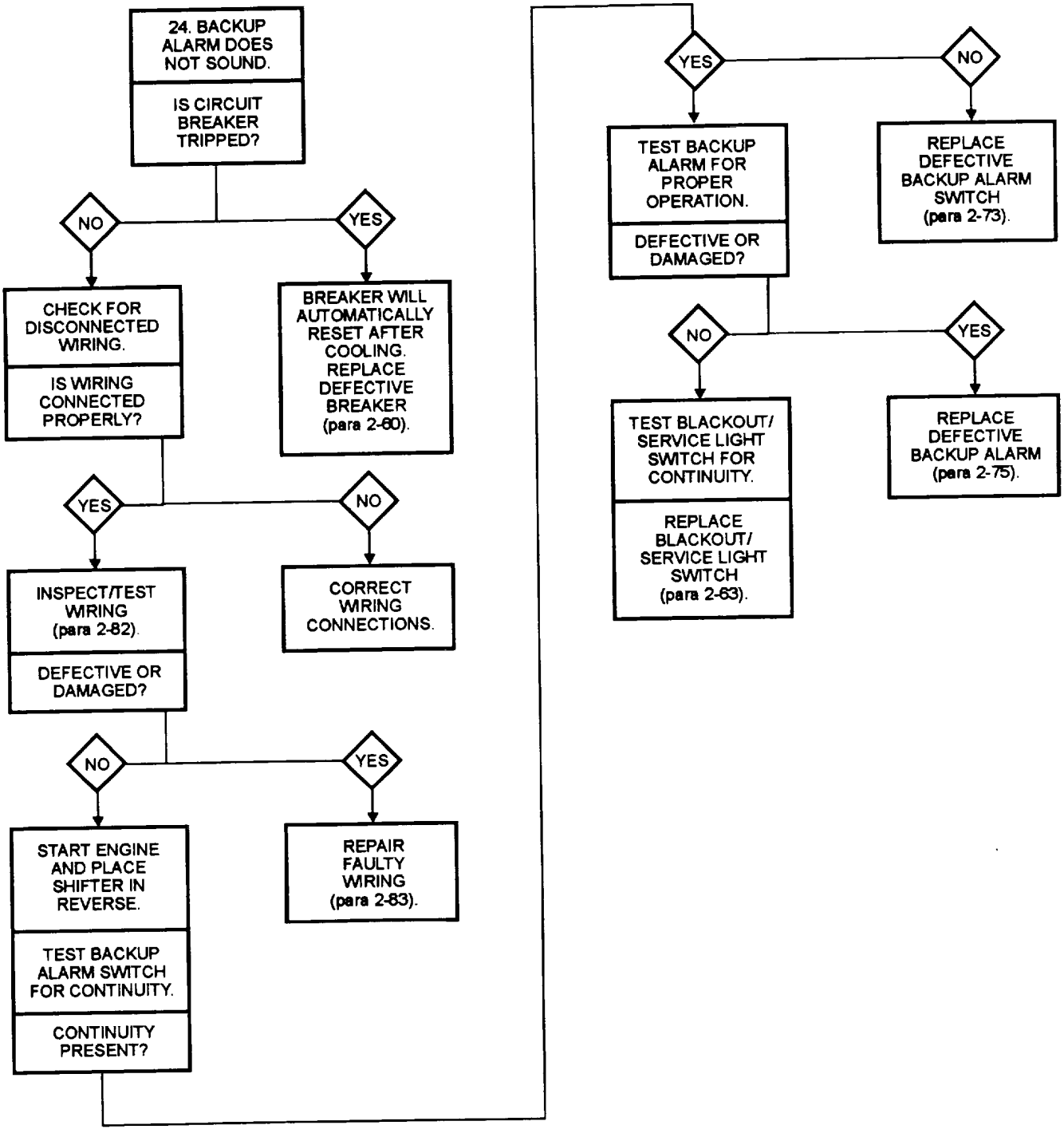
Trouble Symptom 22. Stop and Blackout Taillights Do Not Work



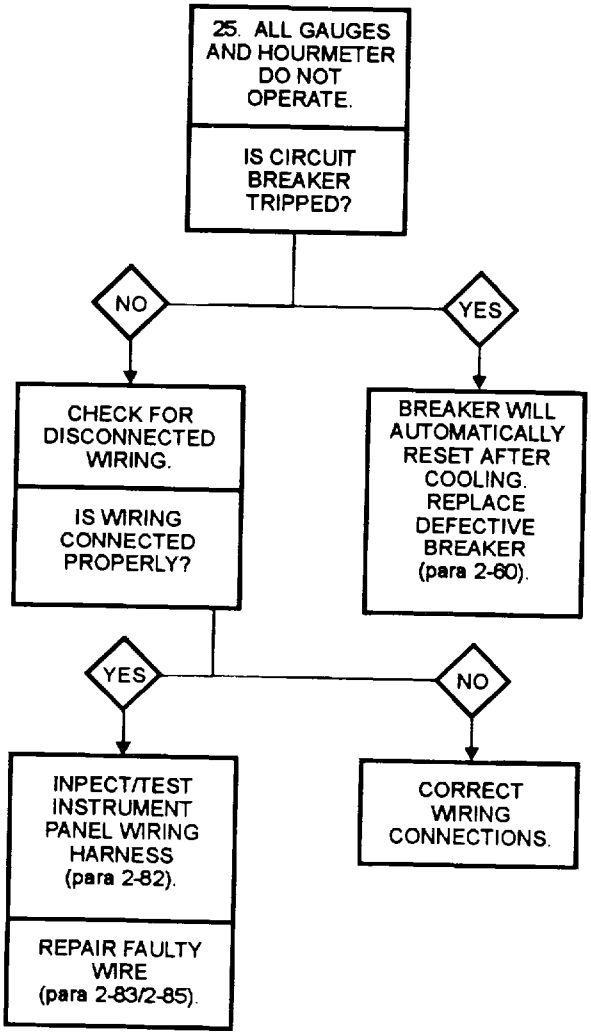
Trouble Symptom 23. Backup Alarm Does Not Sound



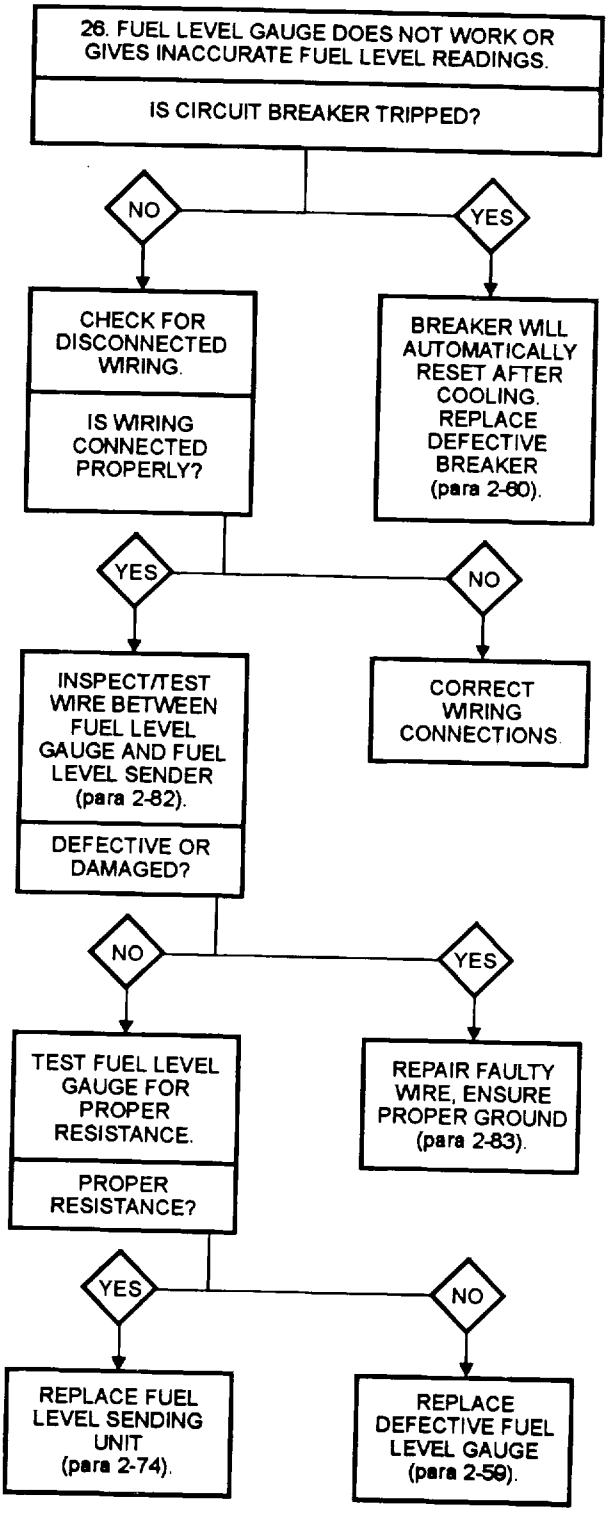
Trouble Symptom 24. Backup Alarm Does Not Sound



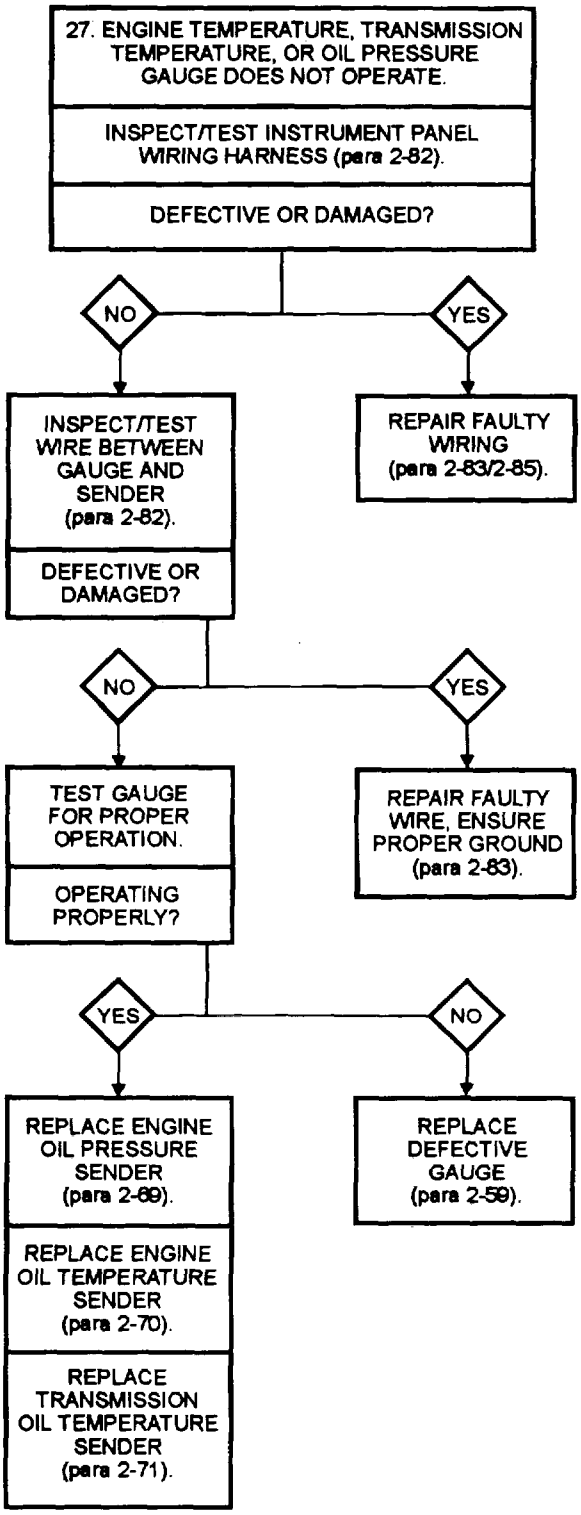
Trouble Symptom 25. All Gauges. and Hourmeter Do Not Operate



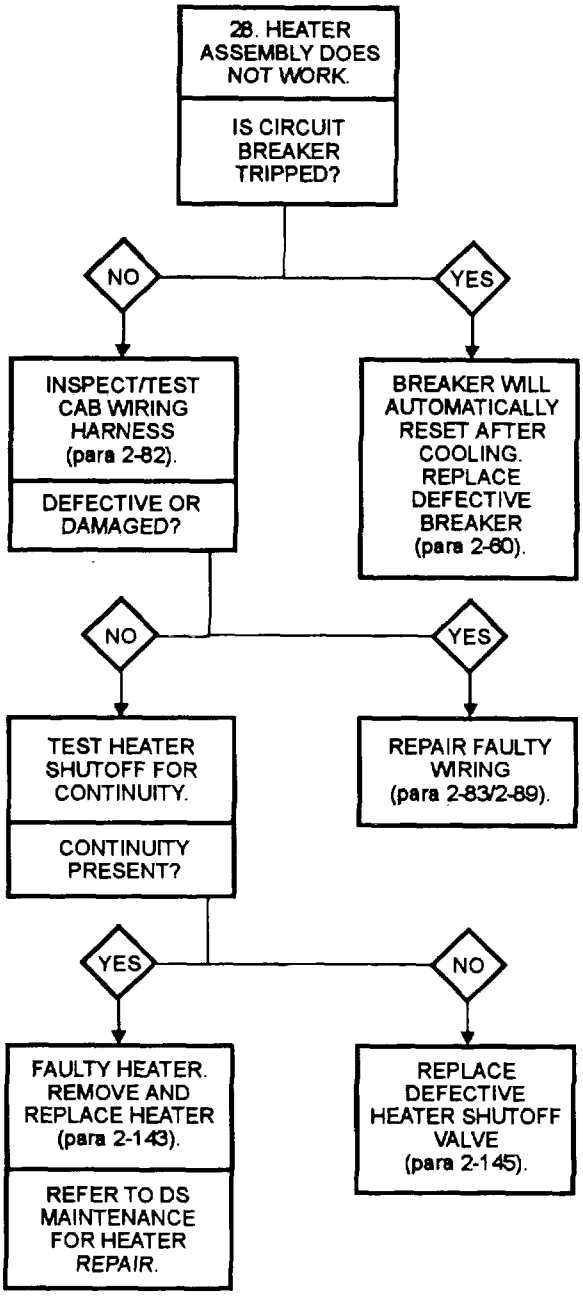
Trouble Symptom 26. Fuel Level Gauge Does Not Work or Gives Inaccurate Fuel Level Readings



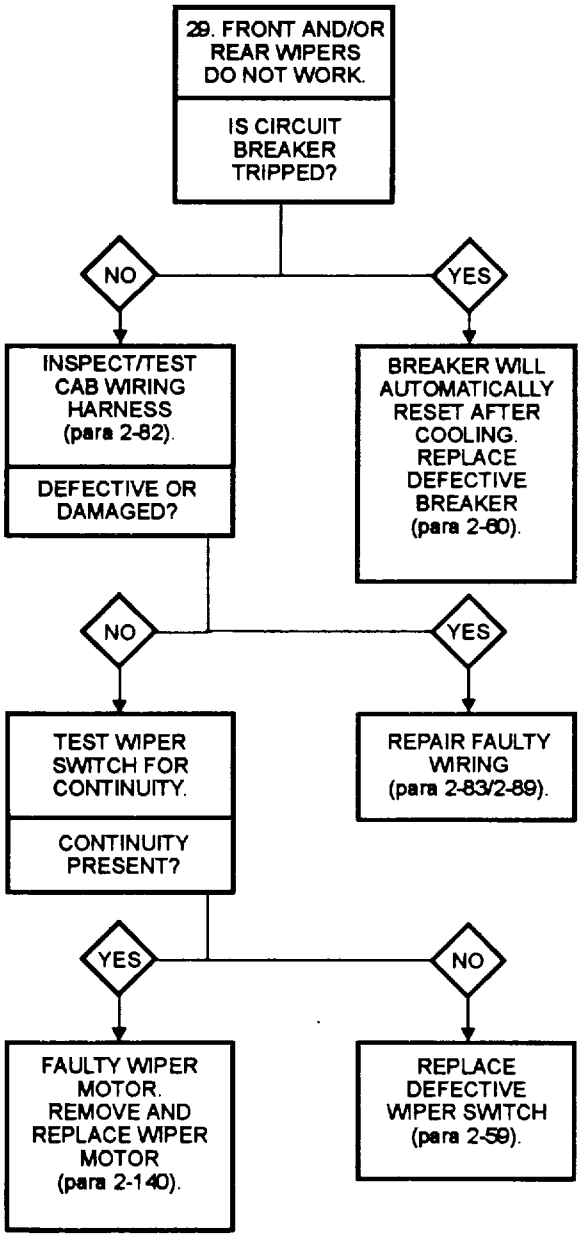
Trouble Symptom 27. Engine Temperature, Transmission Temperature, or Oil Pressure Gauge Does Not Operate



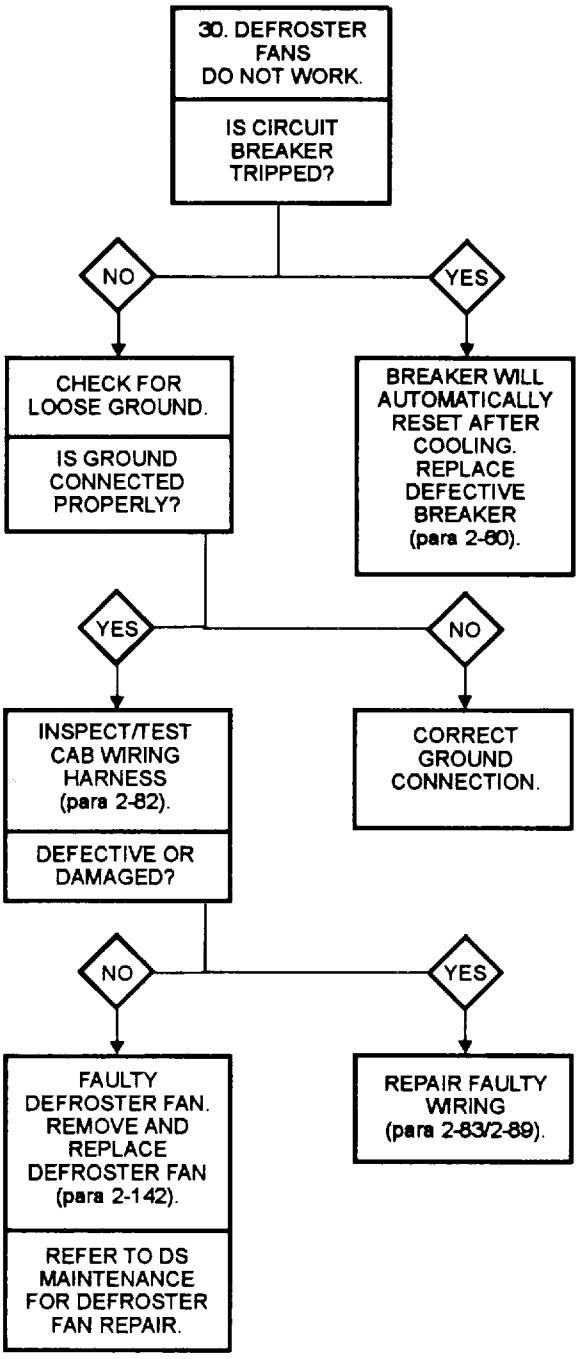
Trouble Symptom 28. Heater Assembly Does Not Work



Trouble Symptom 29. Front and/or Rear Wipers Do Not Work



Trouble Symptom 30. Defroster Fans Do Not Work



Trouble Symptom 31. Transmission Will Not Engage

31. TRANSMISSION WILL NOT ENGAGE.

CHECK TRANSMISSION FLUID LEVEL.

ADEQUATE TRANSMISSION FLUID?

YES → IS INCHING VALVE ACTUATED?

NO → SERVICE TRANSMISSION ASSEMBLY (para 2-93).

IS INCHING VALVE ACTUATED?

NO → CHECK VOLTAGE AT VALVES. IS VOLTAGE BETWEEN 18 AND 28 VOLTS?

YES → CHECK BRAKE PEDAL ASSEMBLY AND ADJUST AS REQUIRED (para 2-109).

IS VOLTAGE BETWEEN 18 AND 28 VOLTS?

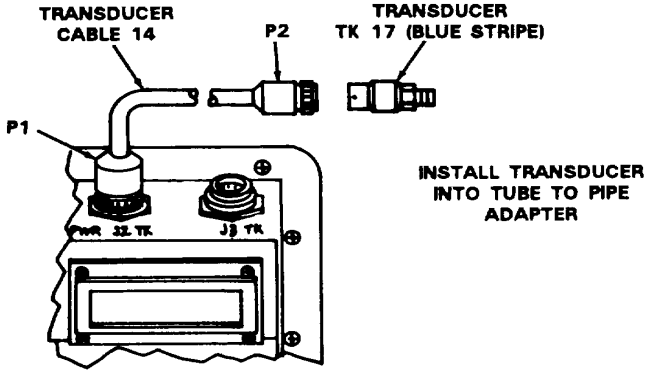
YES → TEST TRANSMISSION OIL PRESSURE USING STE/ICE TEST #50 AS FOLLOWS:

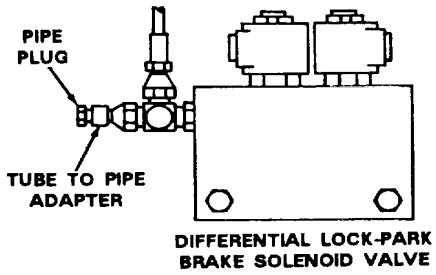
- REMOVE PIPE PLUG FROM ADAPTER ON INLET OF DIFFERENTIAL LOCK-PARK BRAKE SOLENOID VALUE.
- INSTALL PRESSURE TRANSDUCER (TK 17, BLUE STRIPE) INTO ADAPTER.
- CONNECT P1 OF TRANSDUCER CABLE W4 TO J2 OR J3 ON VTM.
- CONNECT P2 OF TRANSDUCER CABLE W4 TO CONNECTOR ON PRESSURE TRANSDUCER.
- DIAL 50 INTO ***TEST SELECT***.
- PRESS AND HOLD ***TEST*** UNTIL ***CAL*** APPEARS ON DISPLAY.
- RELEASE ***TEST*** AND OBSERVE DISPLAY FOR OFFSET VALUE.
- OFFSET VALUE SHOULD BE BETWEEN -150 TO +150. IF NOT, REFER TO STE/ICE MANUAL TO TROUBLESHOOT OFFSET PROBLEM.
- DIAL 01 INTO ***TEST SELECT***.
- PRESS AND RELEASE ***TEST***.
- WHEN ***PASS*** APPEARS ON DISPLAY, DIAL 50 INTO ***TEST SELECT***.
- PRESS AND RELEASE ***TEST***. VTM WILL NOW DISPLAY RPM AND OIL PRESSURE ALTERNATELY.
- START THE ENGINE AND OPERATE ENGINE AT 2000 RPM.
- OBSERVE DISPLAY FOR TRANSMISSION OIL PRESSURE.
- OIL PRESSURE SHOULD BE BETWEEN 220 TO 270 PSI.

TEST TRANSMISSION ASSEMBLY (para 2-94).

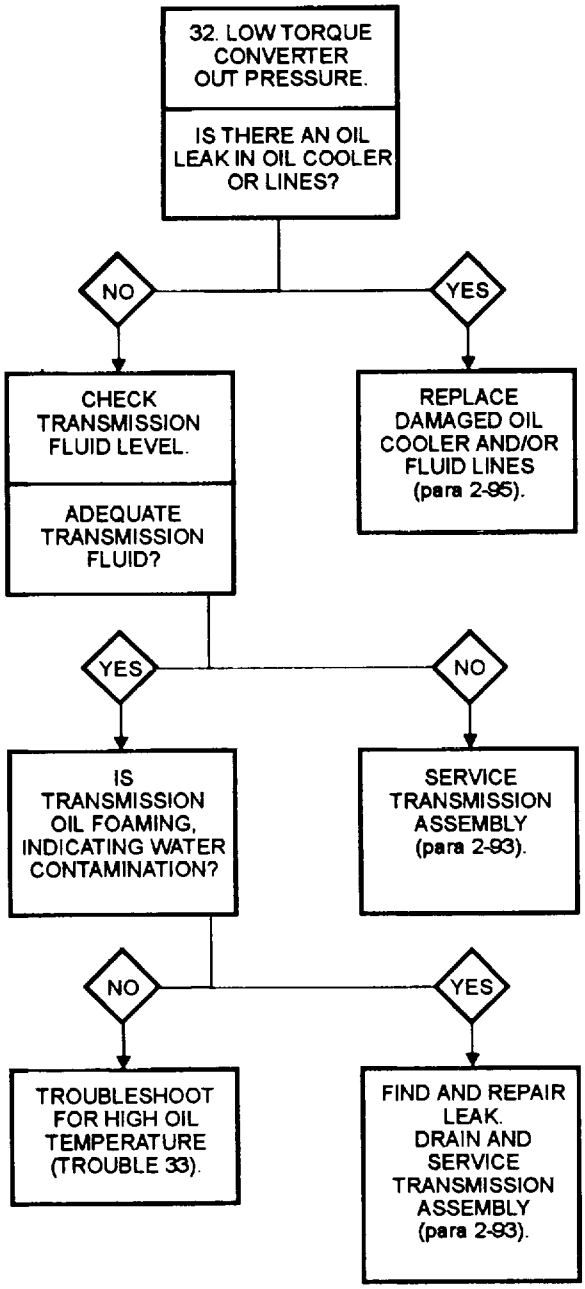
REFER TO DS MAINTENANCE FOR TRANSMISSION REMOVAL AND REPLACEMENT.

NO → REFER TO DS MAINTENANCE FOR CONTROL VALVE REMOVAL AND REPLACEMENT.

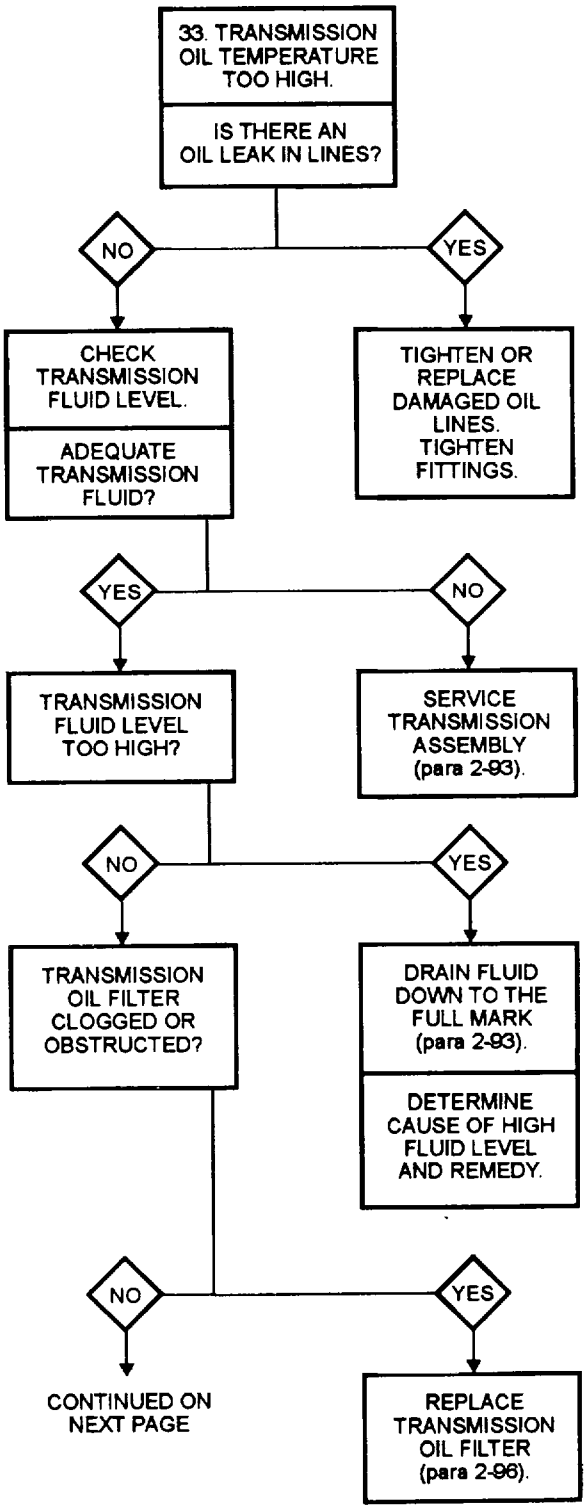




Trouble Symptom 32. Low Torque Converter Out Pressure



Trouble Symptom 33. Transmission Oil Temperature Too High



Trouble Symptom 33. Transmission Oil Temperature Too High - continued

33. TRANSMISSION OIL TEMPERATURE TOO HIGH.

CONTINUED

NO

TEST TRANSMISSION OIL PRESSURE USING STE/ICE TEST #50 AS FOLLOWS:

- REMOVE PIPE PLUG FROM ADAPTER ON INLET OF DIFFERENTIAL LOCK-PARK BRAKE SOLENOID VALUE.
- INSTALL PRESSURE TRANSDUCER (TK 17, BLUE STRIPE) INTO ADAPTER.
- CONNECT P1 OF TRANSDUCER CABLE W4 TO J2 OR J3 ON VTM.
- CONNECT P2 OF TRANSDUCER CABLE W4 TO CONNECTOR ON PRESSURE TRANSDUCER.
- DIAL 50 INTO ***TEST SELECT***.
- PRESS AND HOLD ***TEST*** UNTIL ***CAL*** APPEARS ON DISPLAY.
- RELEASE ***TEST*** AND OBSERVE DISPLAY FOR OFFSET VALUE.
- OFFSET VALUE SHOULD BE BETWEEN -150 TO +150. IF NOT, REFER TO STE/ICE MANUAL TO TROUBLESHOOT OFFSET PROBLEM.
- DIAL 01 INTO ***TEST SELECT***.
- PRESS AND RELEASE ***TEST***.
- WHEN ***PASS*** APPEARS ON DISPLAY, DIAL 50 INTO ***TEST SELECT***.
- PRESS AND RELEASE ***TEST***. VTM WILL NOW DISPLAY RPM AND OIL PRESSURE ALTERNATELY.
- START THE ENGINE AND OPERATE ENGINE AT 2000 RPM.
- OBSERVE DISPLAY FOR TRANSMISSION OIL PRESSURE.
- OIL PRESSURE SHOULD BE BETWEEN 220 TO 270 PSI.

ADEQUATE PRESSURE?

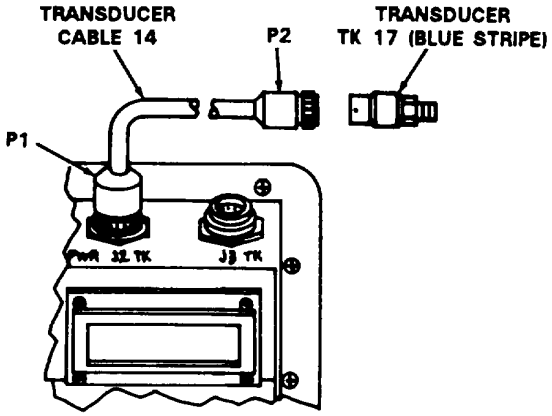
YES

CHECK OIL COOLER FOR LEAKAGE OR OBVIOUS DAMAGE. REPLACE OIL COOLER (para 2-95).

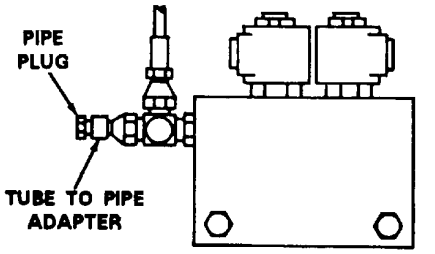
NO

TEST TRANSMISSION ASSEMBLY (para 2-94).

REFER TO DS MAINTAENANCE FOR TRANSMISSION REMOVAL AND REPLACEMENT.

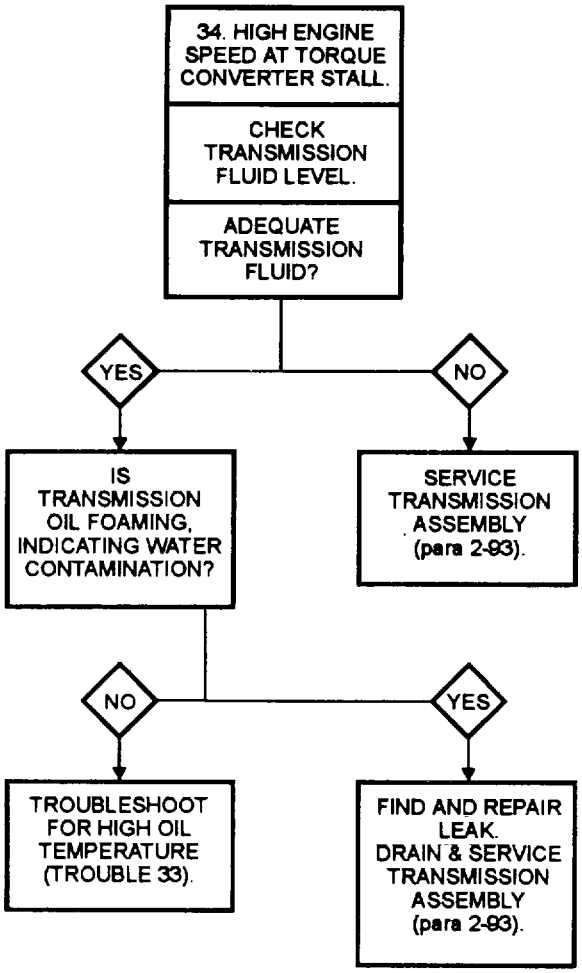


INSTALL TRANSDUCER INTO TUBE TO PIPE ADAPTER

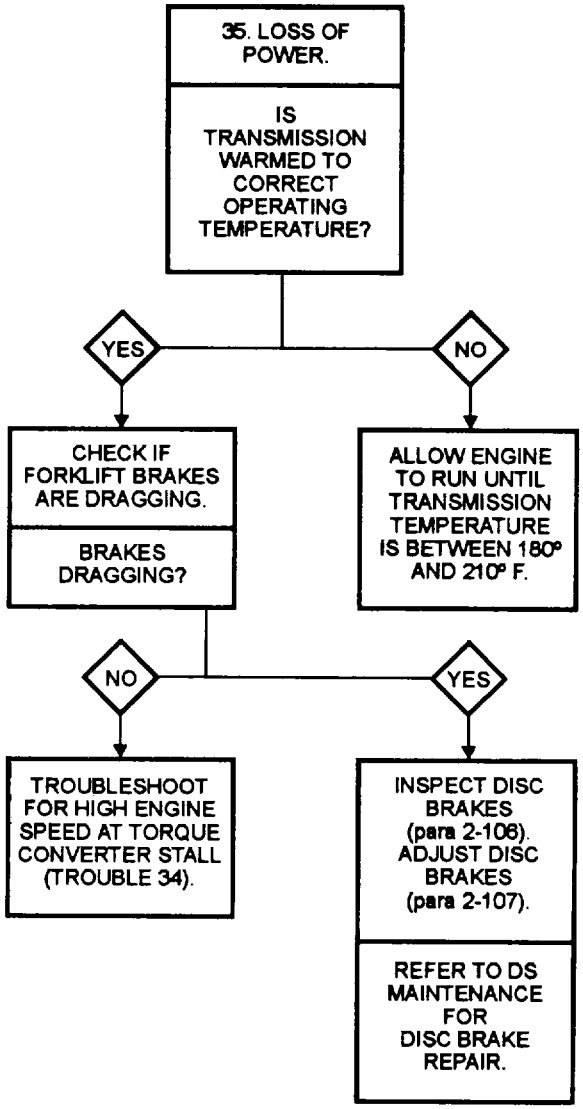


DIFFERENTIAL LOCK-PARK BRAKE SOLENOID VALVE

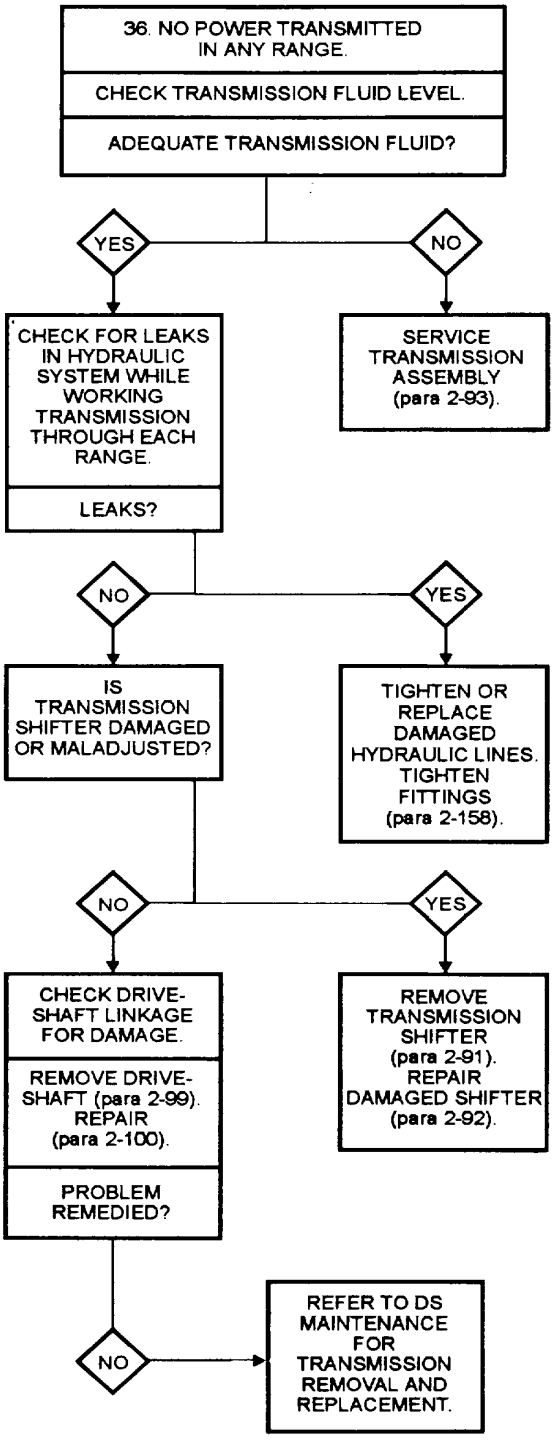
Trouble Symptom 34. High Engine Speed at Torque Converter Stall



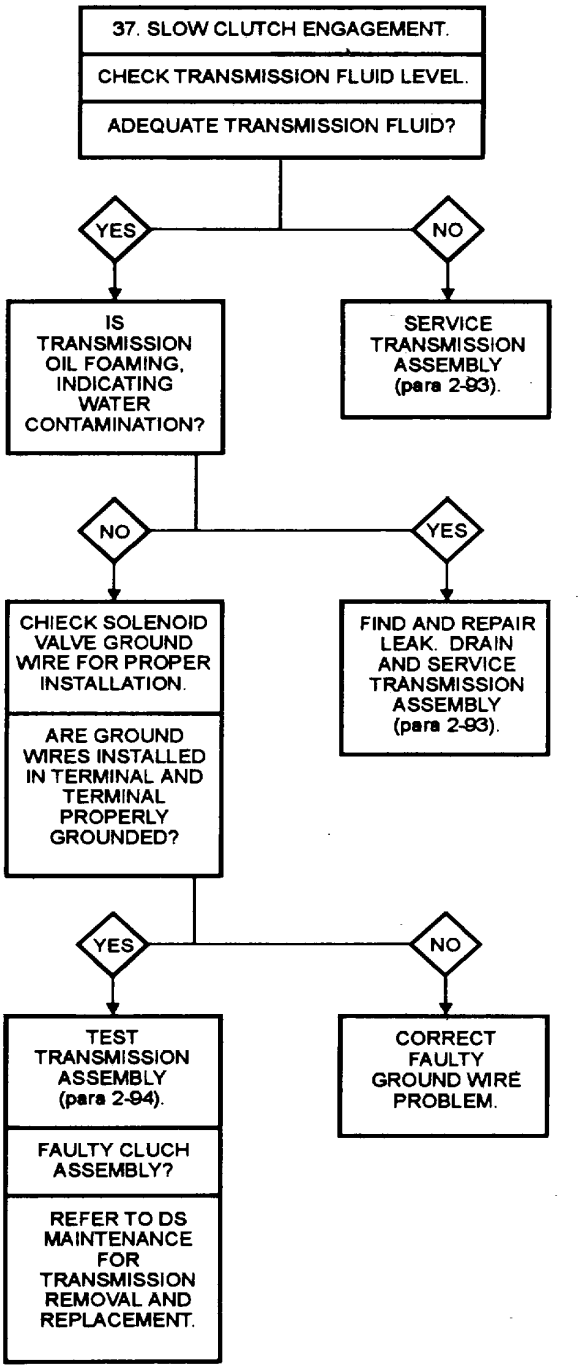
Trouble Symptom 35. Loss of Power



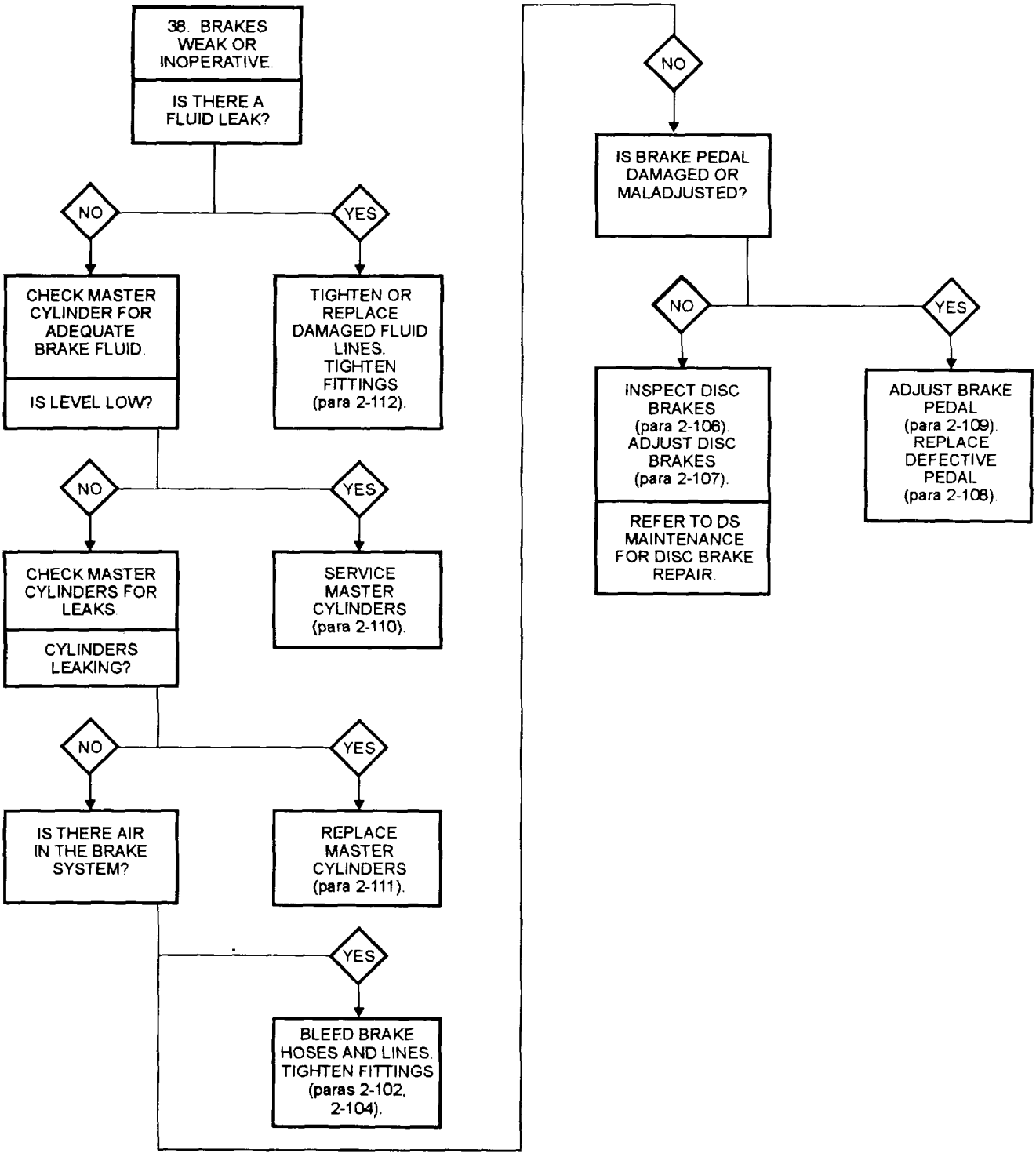
Trouble Symptom 36. No Power Transmitted in Any Range



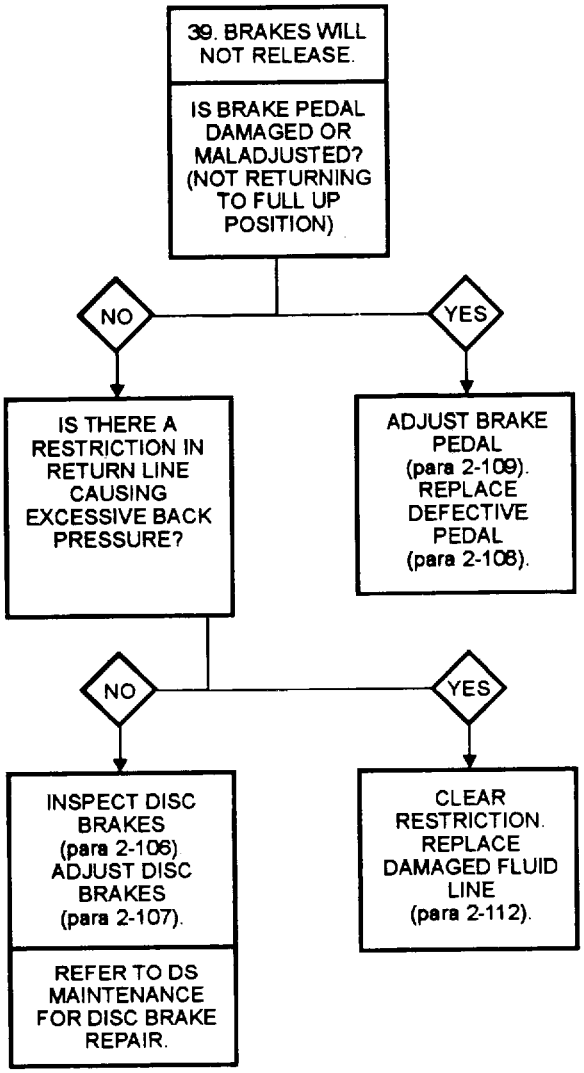
Trouble Symptom 37. Slow Clutch Engagement



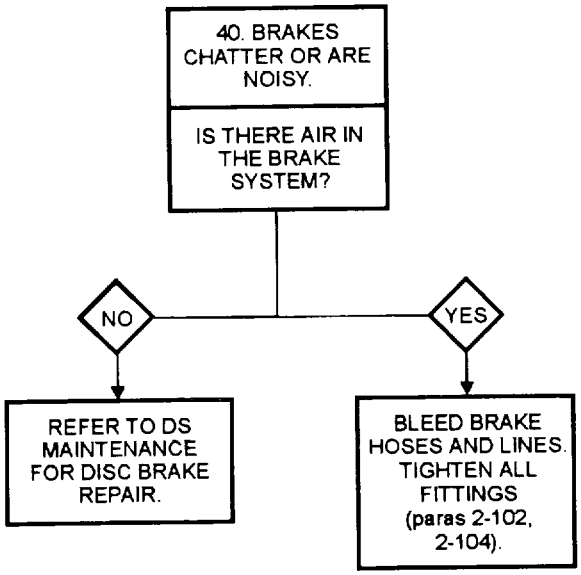
Trouble Symptom 38. Brakes Weak or Inoperative



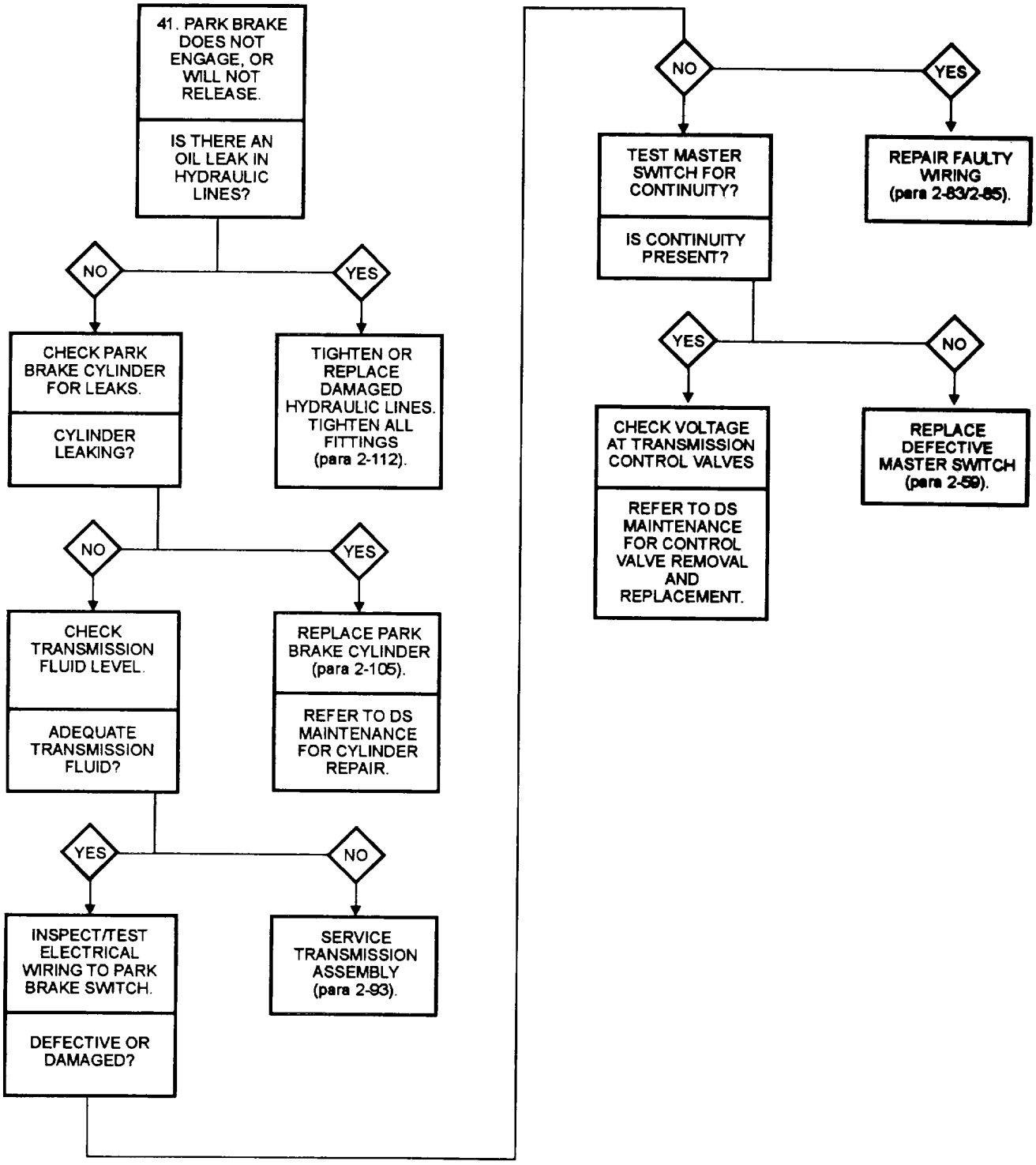
Trouble Symptom 39. Brakes Will Not Release



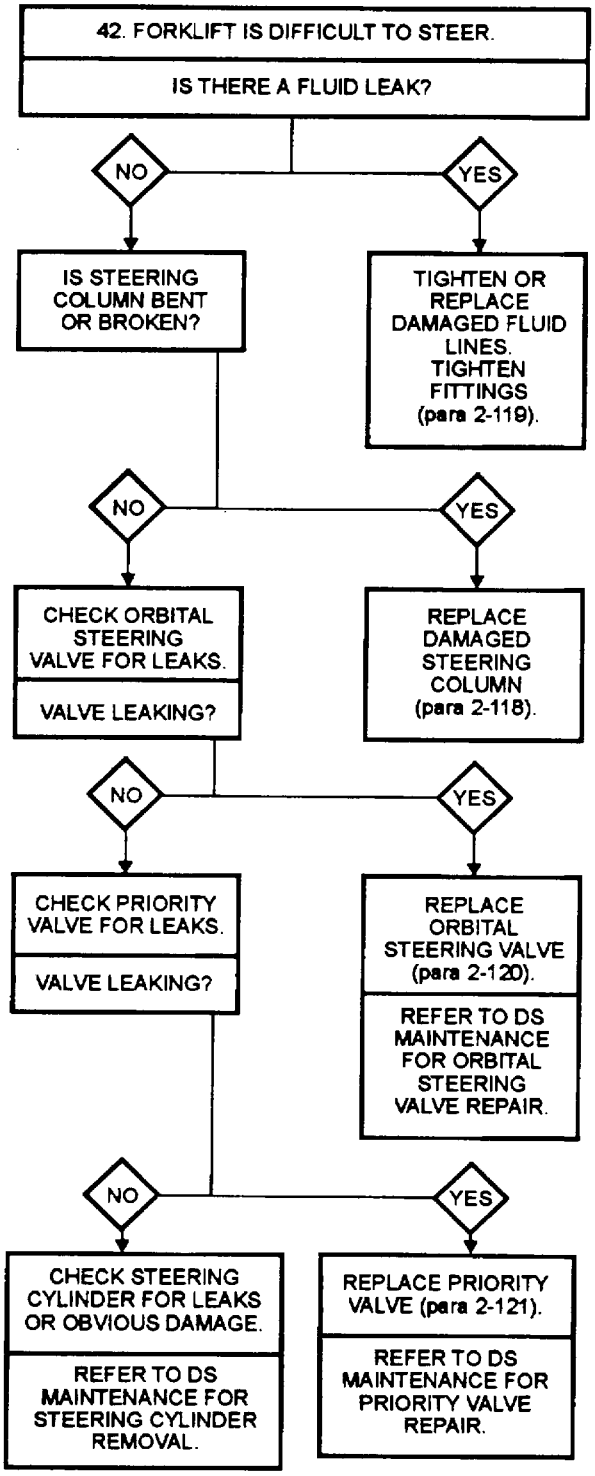
Trouble Symptom 40. Brakes Chatter or are Noisy



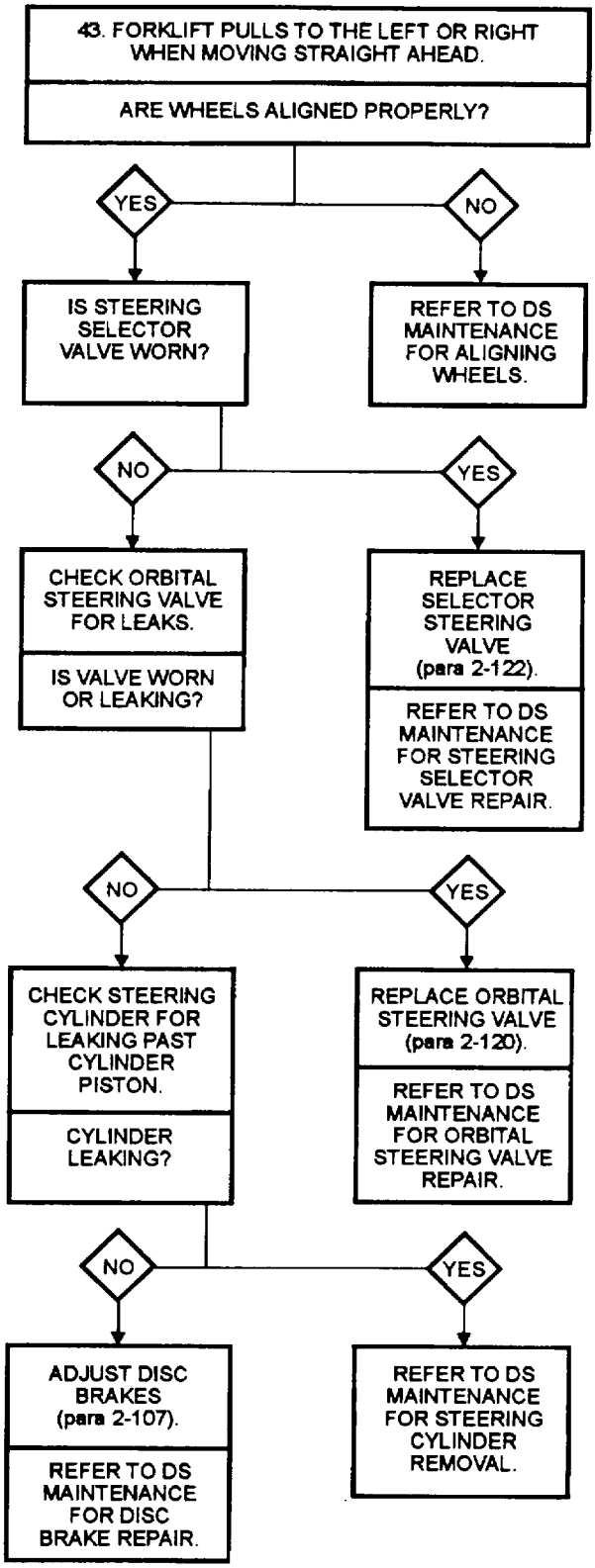
Trouble 41. Park Brake Does Not Operate



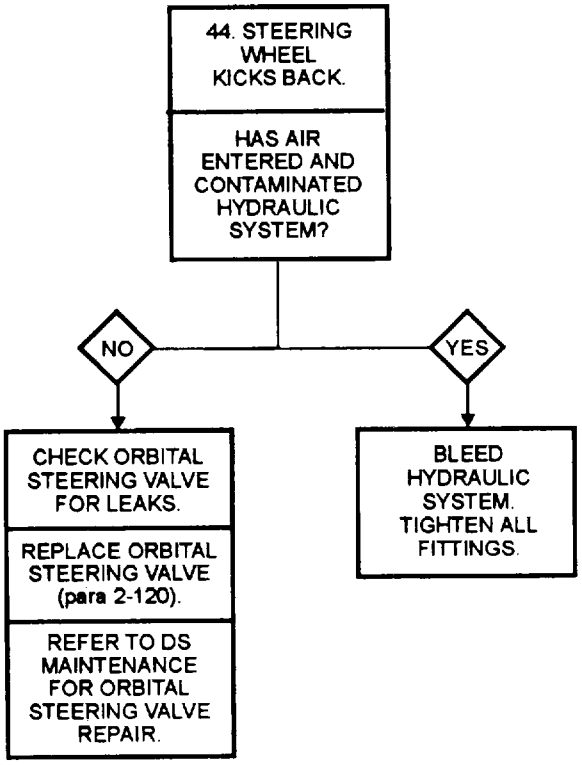
Trouble Symptom 42. Forklift is Difficult to Steer Straight Ahead



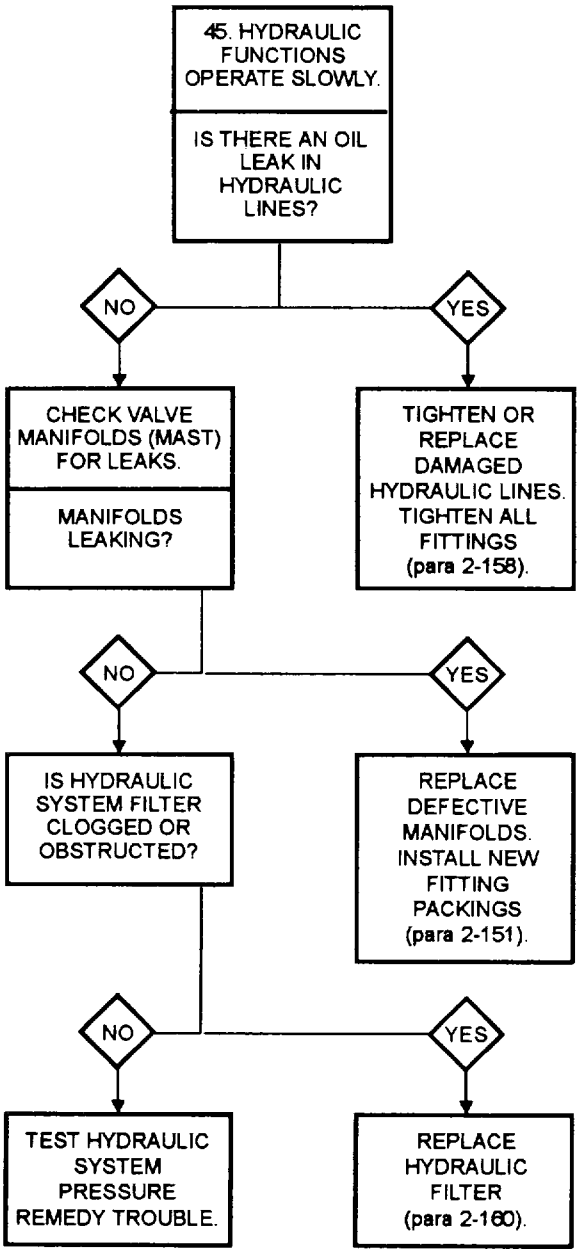
Trouble Symptom 43. Forklift Pulls to the Left Or Right When Moving



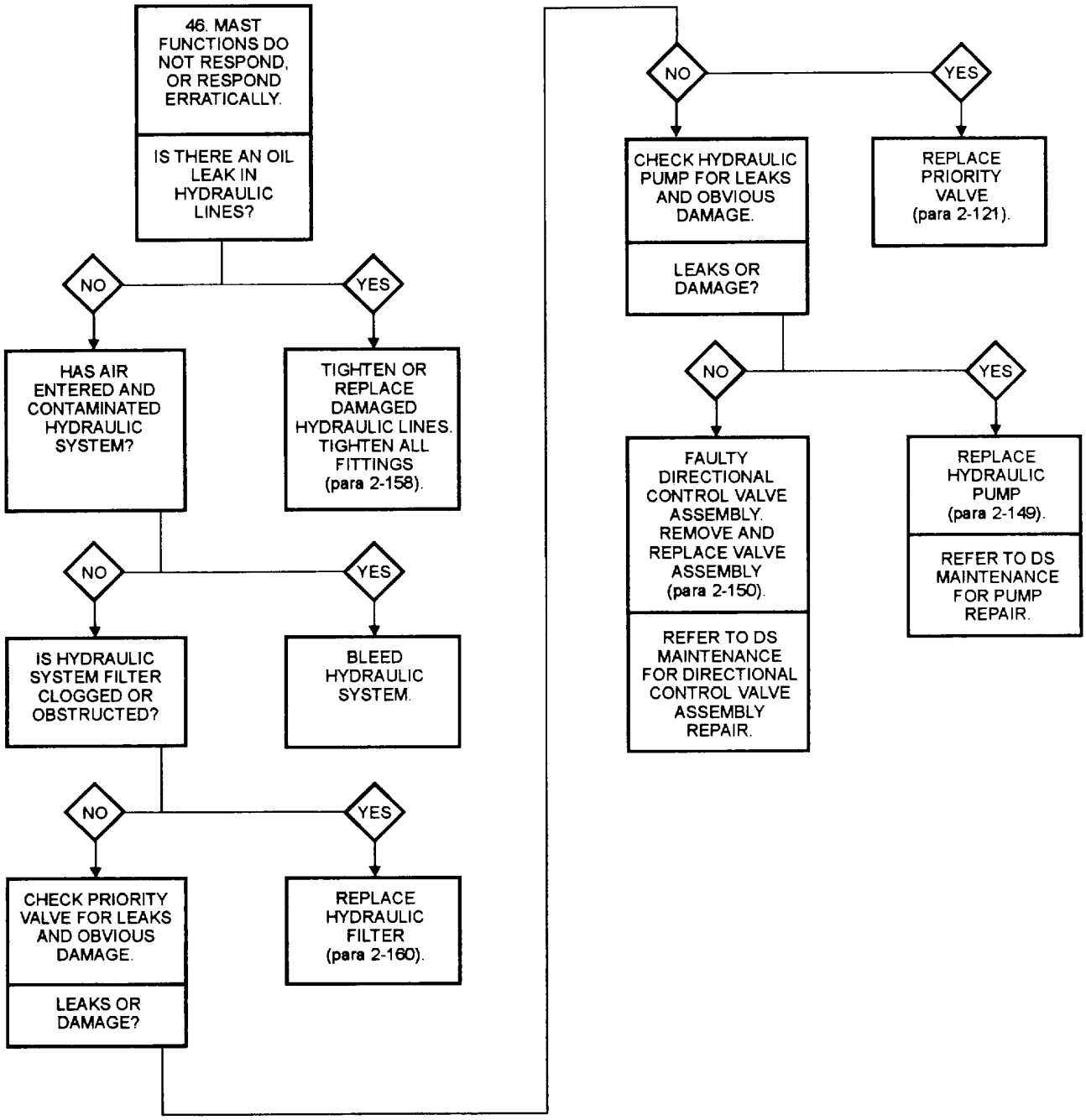
Trouble Symptom 44. Steering Wheel Kicks Back



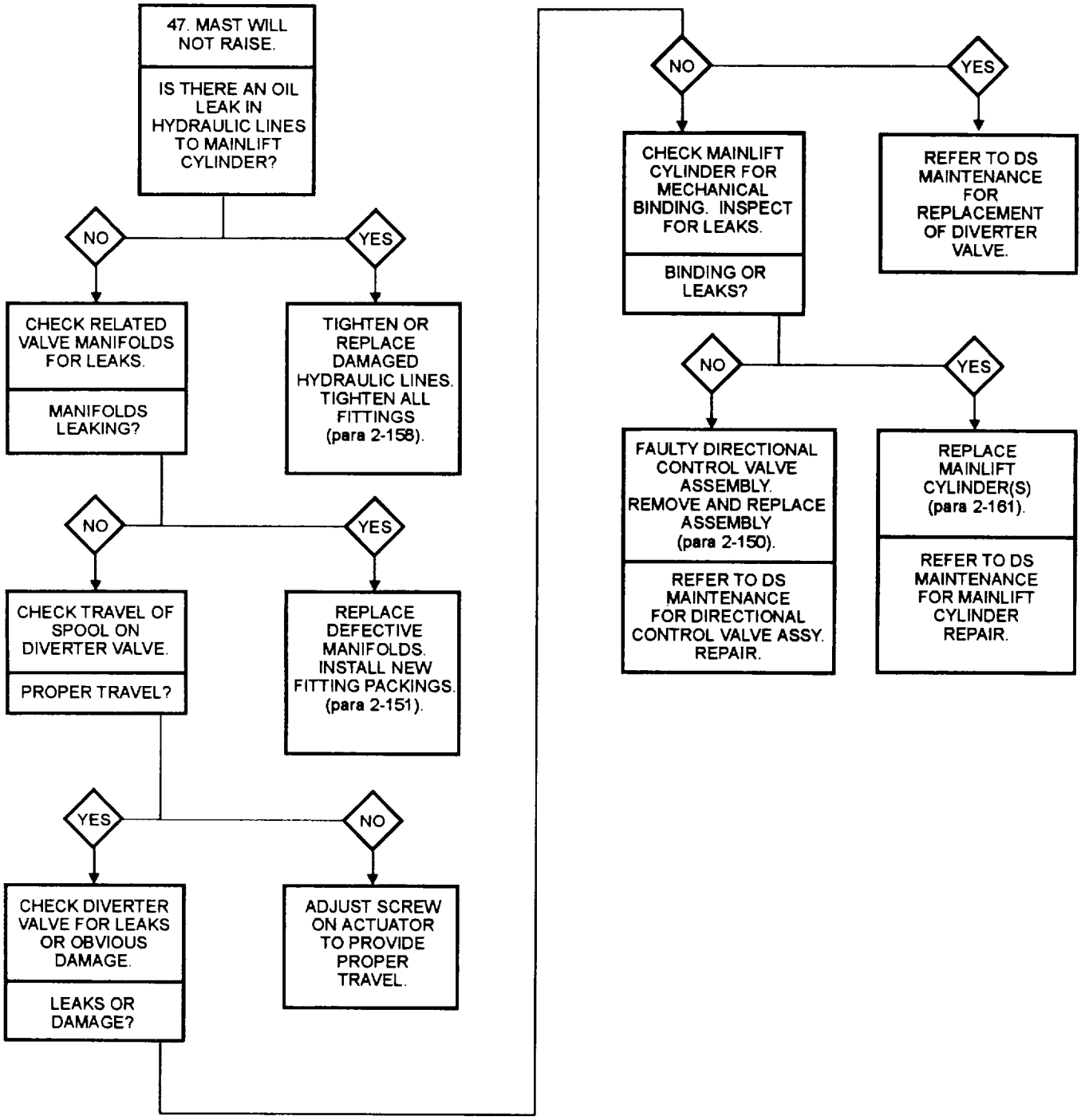
Trouble Symptom 45. Hydraulic Functions Operate Slowly



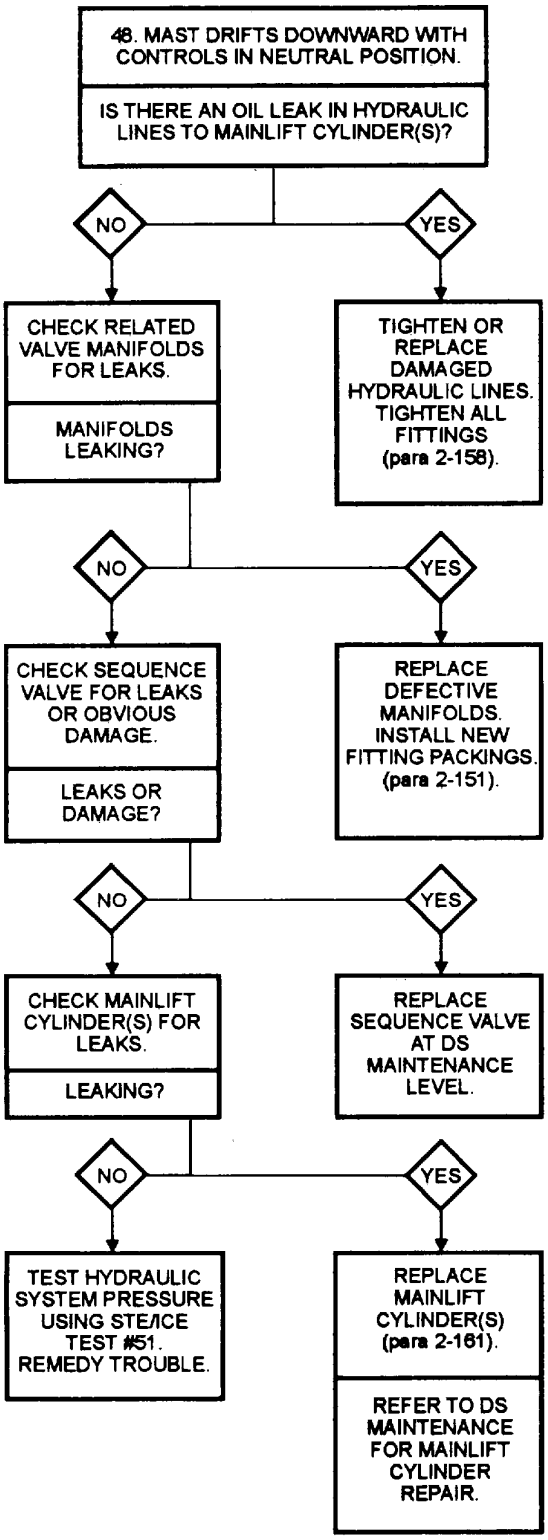
Trouble Symptom 46. Mast Functions Do Not Respond, or Respond Erratically



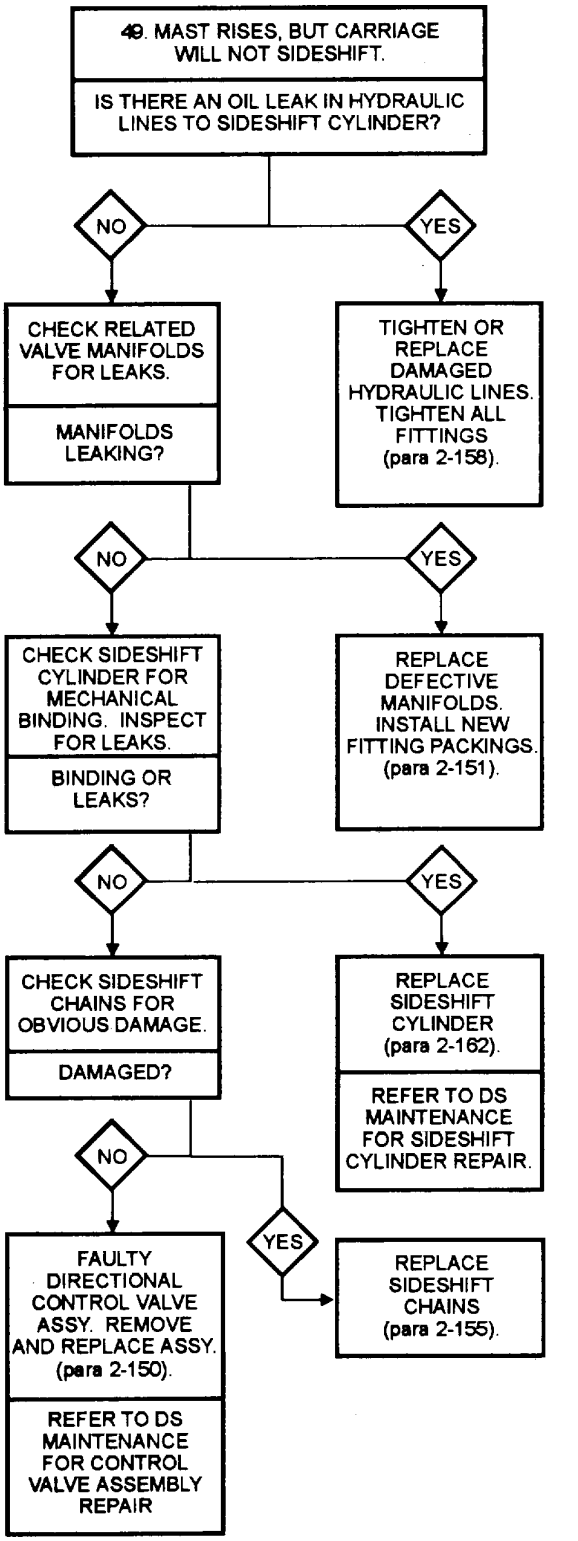
Trouble Symptom 47. Mast Will Not Raise



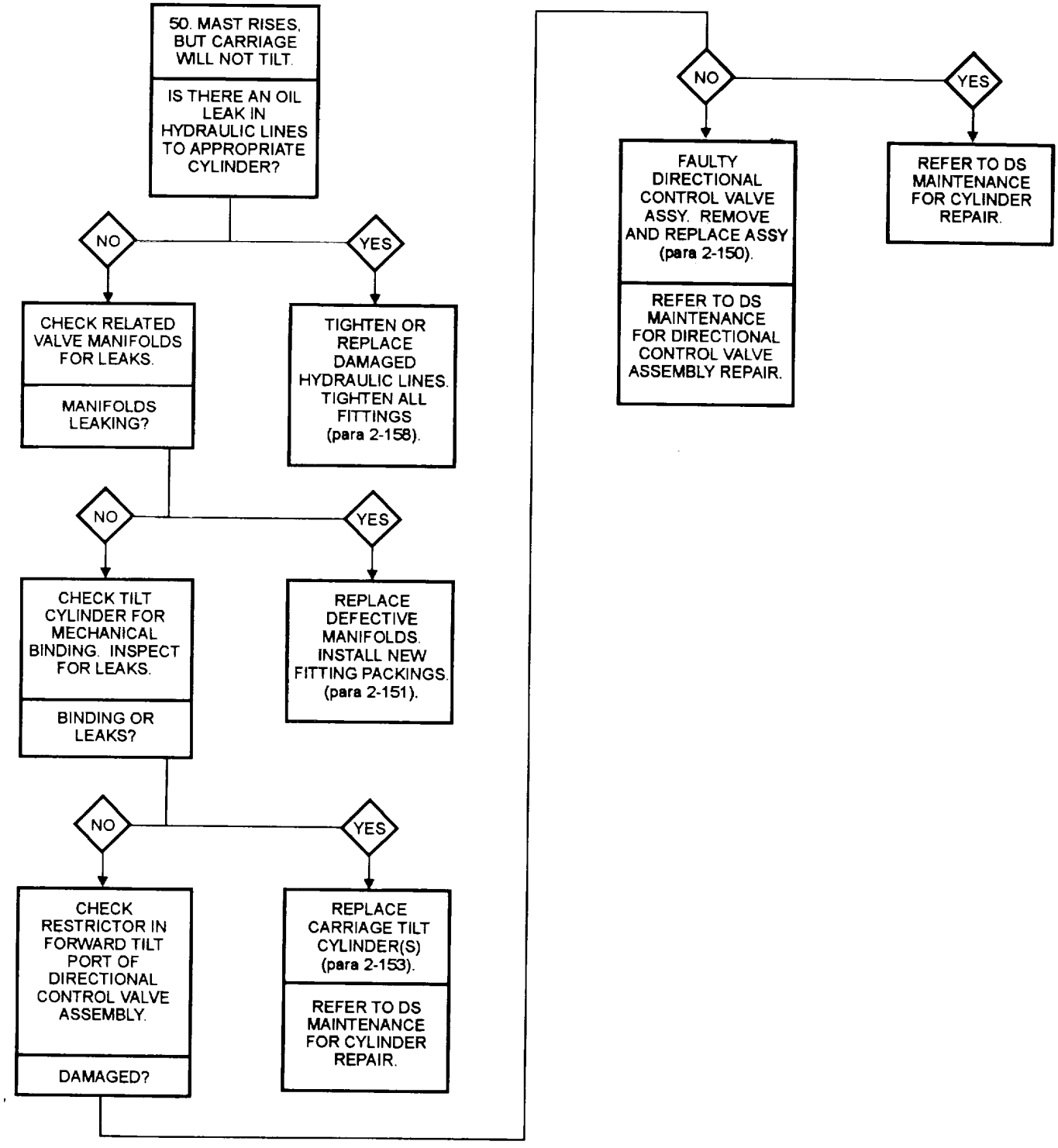
Trouble Symptom 48. Mast Drifts Downward With Controls in Raised Position



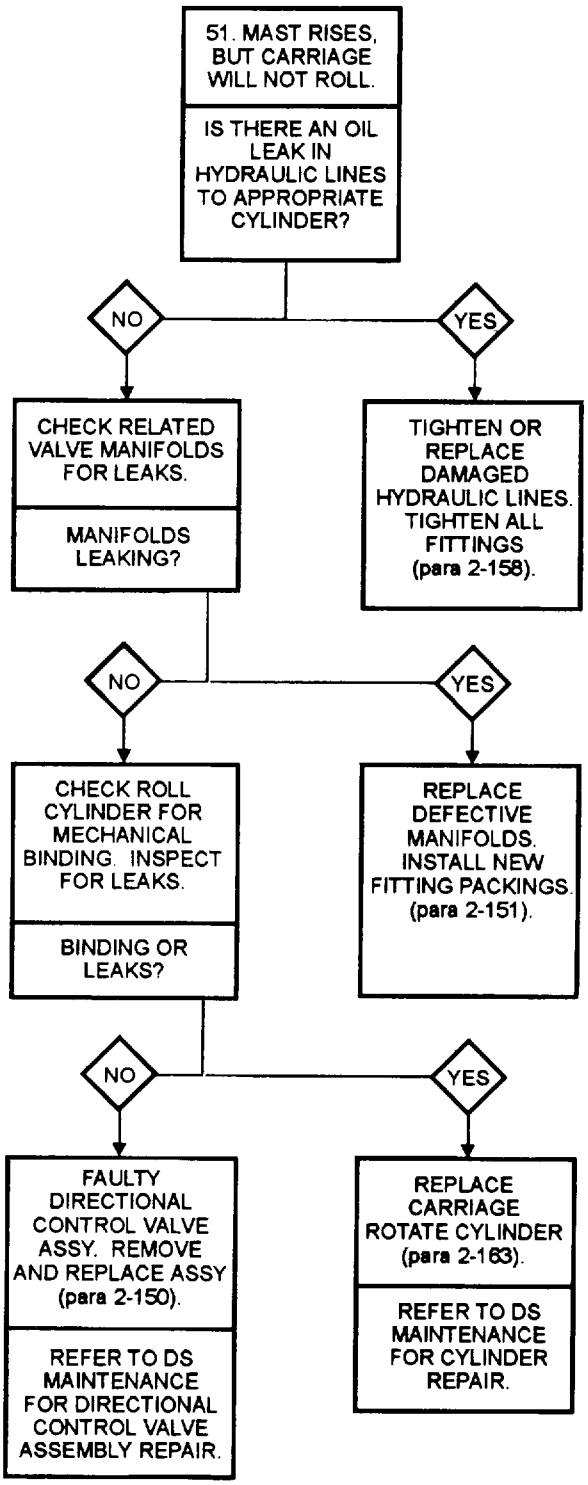
Trouble Symptom 49. Mast Rises, But Carriage Will Not Side shift



Trouble Symptom 50. Mast Rises, But Carriage Will Not Tilt



Trouble Symptom 51. Mast Rises, But Carriage Will Not Roll



Section VI. ENGINE COMPONENT MAINTENANCE

2-14. LIFTING BRACKET REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

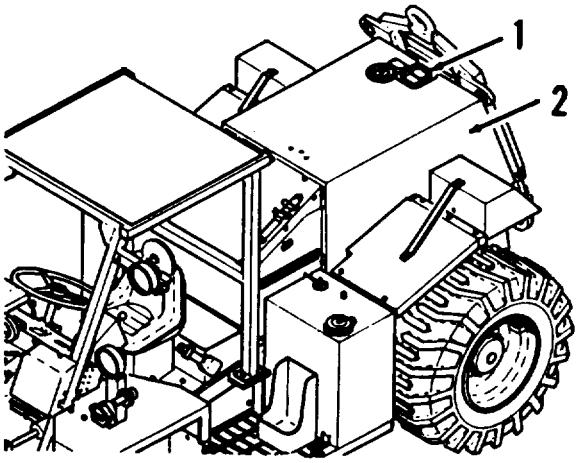
INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Equipment Condition:
Towbar lowered (para. 2-126)

A. REMOVAL

1 Release hood assembly (2) by lifting handle (1). Open hood assembly.



2 Remove front lifting bracket (3) by removing thermostat housing (4) in accordance with paragraph 2-49.
3 Remove rear lifting bracket (5) by removing screws (6).

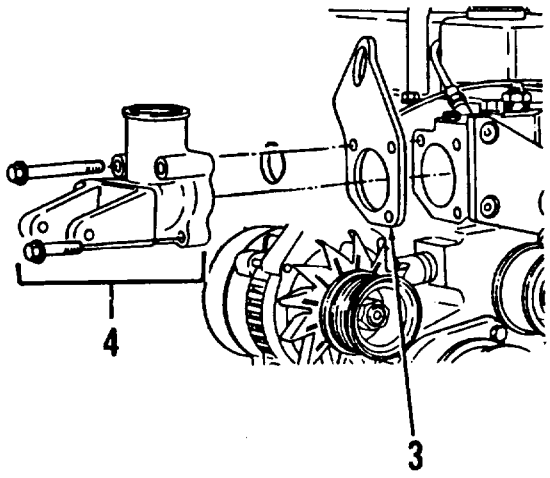
B. CLEANING
Clean brackets in accordance with paragraph 1-24.

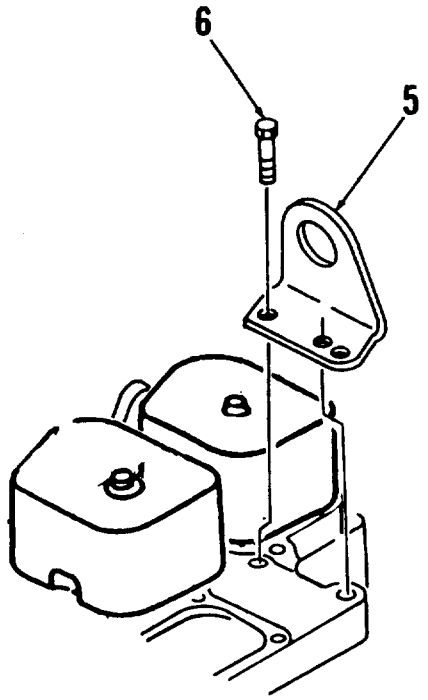
C. INSPECTION
Inspect components in accordance with paragraph 1-24.

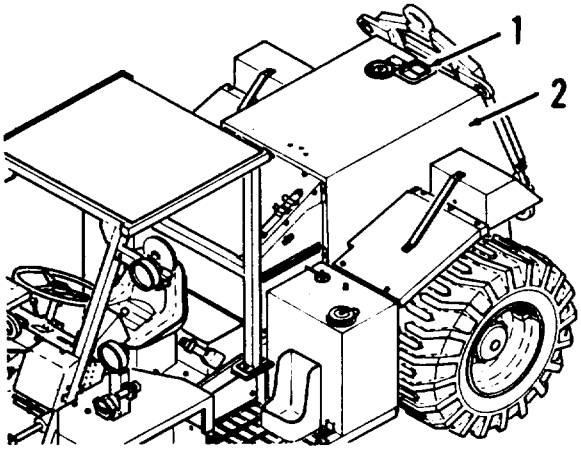
D. INSTALLATION
1 Install rear lifting bracket (5) using screws (6).
2 Torque screws (6) to 57 ft-lbs (77 Nm).
3 Install front lifting bracket (3) and thermostat housing (4) in accordance with paragraph 2-49.
4 Close hood assembly (2). Ensure handle (1) is fully engaged.

FOLLOW-ON MAINTENANCE:
Raise towbar and lock in position (para. 2-126)

END OF TASK







2-15. CYLINDER HEAD ASSEMBLY (WITH VALVES) ADJUSTMENT

This task covers: Removal, Adjustment, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Feeler Gage (21, App. E)
Torque Wrench (32, App. E)
Crowsfoot Wrench (54, App. E)

Materials / Parts:
O-Ring Seal, Item 5 (4 ea.)
Gasket, Item 6 (4 ea.)

Equipment Condition:
Towbar lowered (para. 2-126)

A. REMOVAL

1 RELEASE HOOD ASSEMBLY (2) BY LIFTING HANDLE (1) OPEN HOOD ASSEMBLY.

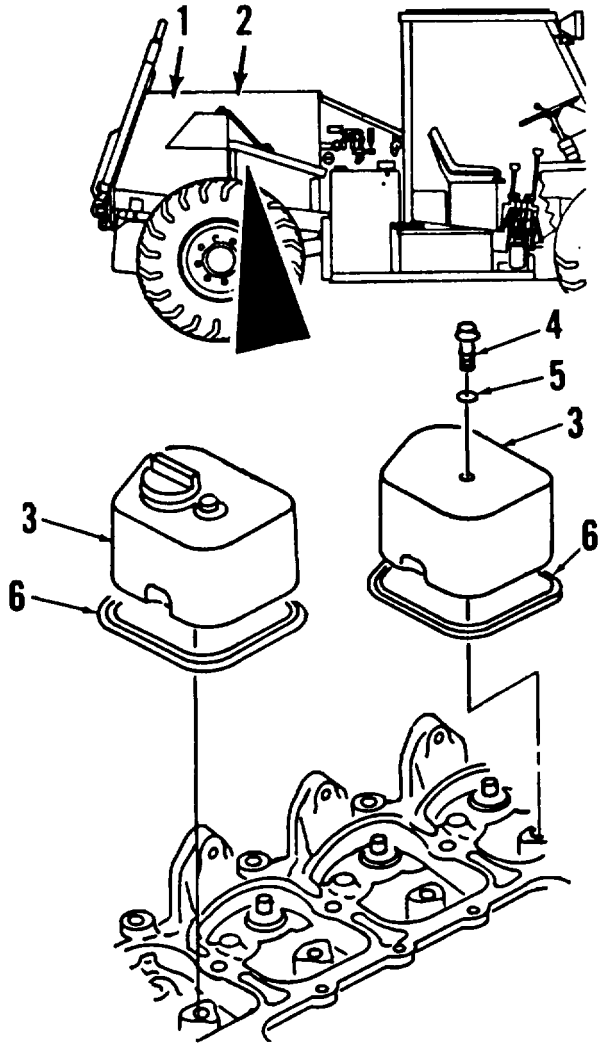
2 REMOVE VALVE COVERS (3).

a. Remove valve covers (3) by removing screws (4). Remove and discard O-ring seals (5).

NOTE

Ensure that all gasket material is removed from cylinder head and cover.

b. Remove and discard gaskets (6).



B. ADJUSTMENT

NOTE
Adjust valve clearance only when engine is cold (below 140 degrees F (66 degrees C)).

1. LOCATE TOP DEAD CENTER (TDC) FOR CYLINDER NUMBER 1.

   a. Press on engine timing pin (7) (located below fuel injection pump) while manually rotating crankshaft until timing pin engages hole in camshaft gear (8). Cylinder I is now at Top Dead Center (TDC) on compression stroke.

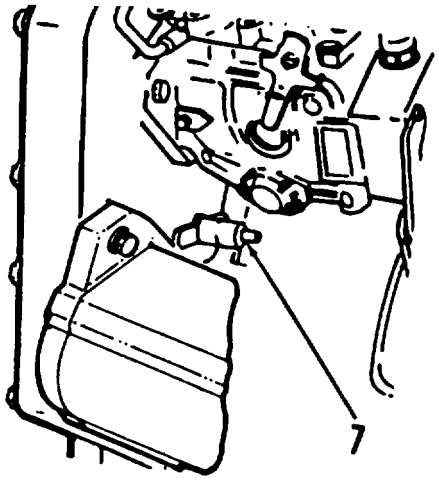
   b. Disengage timing pin (7).

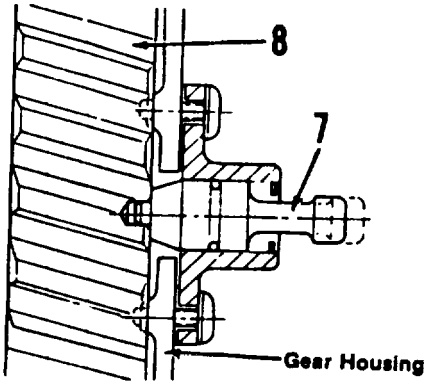
2. USING FEELER GAGE, CHECK VALVES IN FIGURE FOR PROPER CLEARANCE.

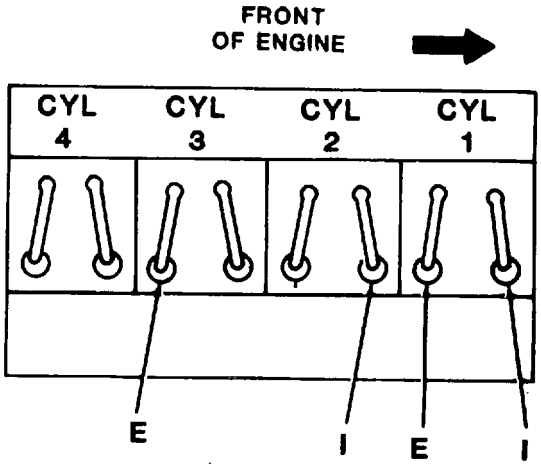
   a. Intake valve (I) clearance shall be 0.010 in (0.254 mm).

   b. Exhaust valve (E) clearance shall be 0.020 in (0.508 mm).

NOTE
Clearance is correct when some friction is felt as feeler gage is moved between valve stem and rocker lever.







3. ADJUST VALVE CLEARANCE.

   a. Loosen adjusting screw lock nut (9).

   b. Rotate adjusting screw (10) until proper clearance is achieved between rocker lever and valve stem (11).

   c. Tighten locknut (9). Recheck clearance and adjust as required.

4. TORQUE LOCKNUT (9) TO 18 FT-LBS (24 Nm).

CAUTION
Ensure timing pin is disengaged before rotating crankshaft.

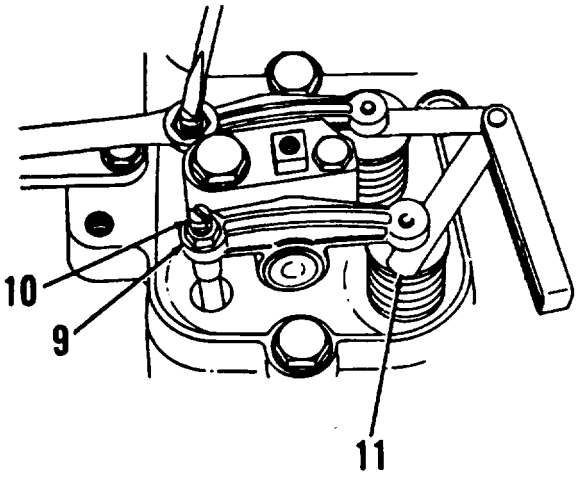
5. MATCH MARK CRANKSHAFT PULLEY (12) TO GEAR COVER. MANUALLY ROTATE CRANKSHAFT 360 DEGREES.

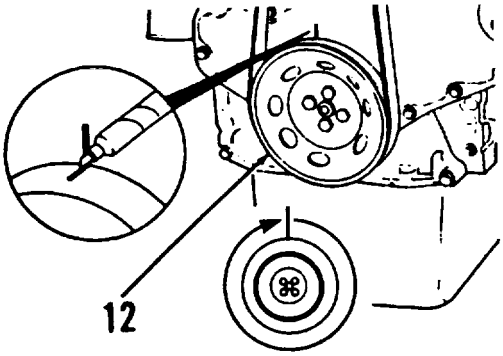
6 USING A FEELER GAGE, CHECK REMAINING VALVES FOR PROPER CLEARANCE.

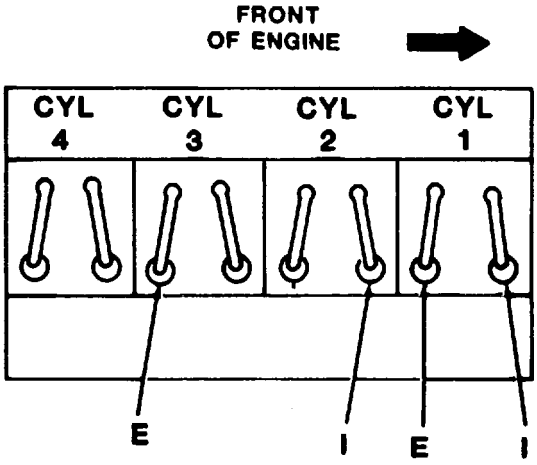
   a. Intake valve (I) clearance shall be 0.010 in (0.254 mm).

   b. Exhaust valve (E) clearance shall be 0.020 in (0.508 mm).

7. ADJUST VALVE CLEARANCE (STEP 3) IF REQUIRED.







C. INSTALLATION

1. INSTALL VALVE COVERS.

   a. Mate valve covers (3) to new valve cover gaskets (6).

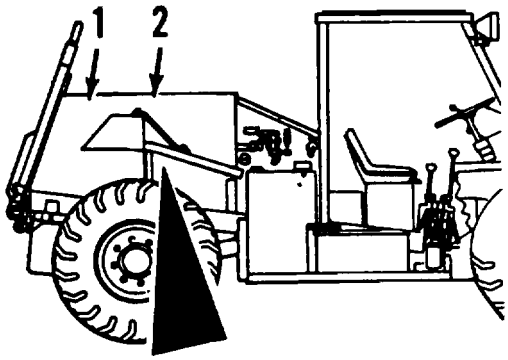
   b. Secure valve covers (3) using screws (4) and new O-ring seals (5).

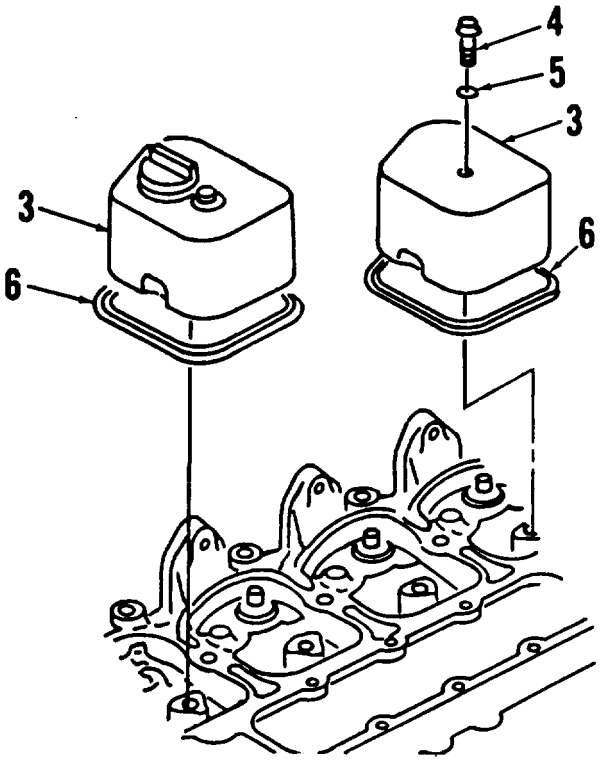
2. TORQUE SCREWS (4) TO 18 FT-LBS (24 Nm).

3. CLOSE HOOD ASSEMBLY (2). ENSURE HANDLE (1) IS FULLY ENGAGED.

FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)





END OF TASK

2-16. ENGINE VALVE COVER ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Equipment Condition:

Towbar lowered (para. 2-126)

Materials / Parts:

O-Ring Seal, Item 3 (4 ea.)
Gasket, Item 4 (4 ea.)

A. REMOVAL

1. RELEASE HOOD ASSEMBLY (2) BY LIFTING HANDLE (1). OPEN HOOD ASSEMBLY.

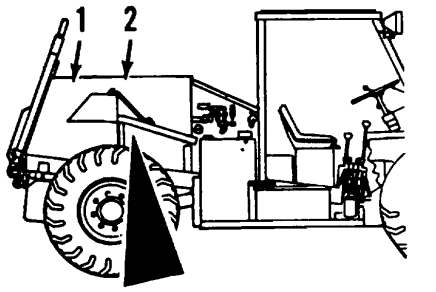
2. REMOVE VALVE COVERS (3).

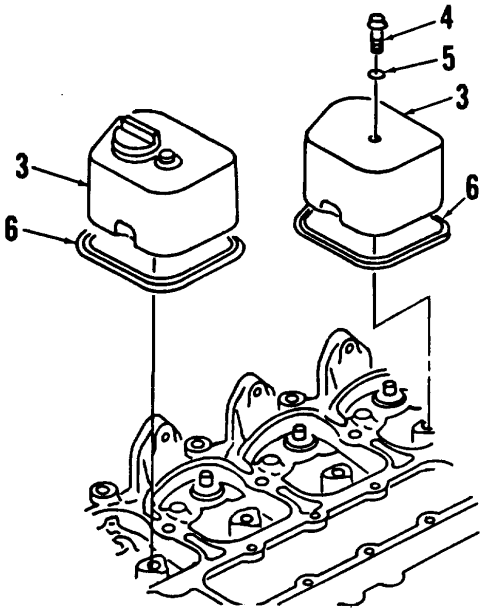
   a. Remove valve covers (3) by removing screws (4). Remove and discard O-ring seals (5).

   NOTE
   Ensure that all gasket material is removed from cylinder head and cover.

   b. Remove and discard gaskets (6).

3. REMOVE FILLER CAP (7) FROM FRONT VALVE COVER (3).





B. CLEANING

Clean valve cover in accordance with paragraph 1-24.

C. INSPECTION

Inspect valve cover components in accordance with paragraph 1-24.

D. INSTALLATION

1. INSTALL FILLER CAP (7) INTO FRONT VALVE COVER (3).

2. INSTALL VALVE COVERS.

   a. Mate valve covers (3) to new valve cover gaskets (6).

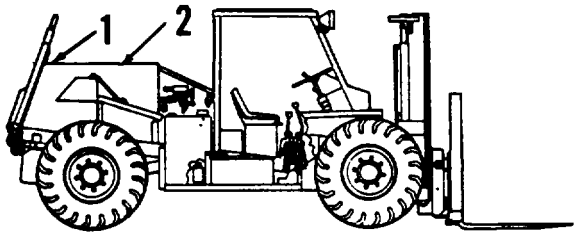
   b. Secure valve covers (3) using screws (4) and new O-ring seals (5).

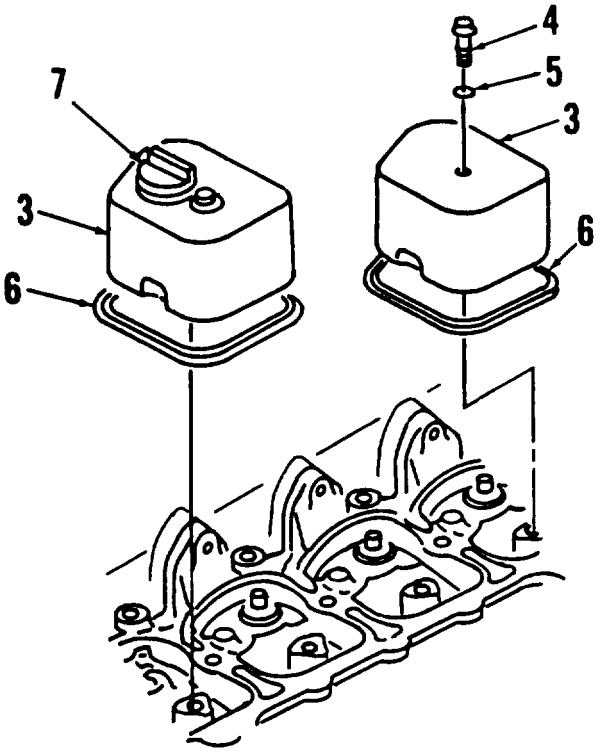
3. TORQUE SCREWS (4) TO 18 FT-LBS (24 Nm).

4. CLOSE HOOD ASSEMBLY (2). ENSURE HANDLE (1) IS FULLY ENGAGED.

FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)





END OF TASK

2-17. OIL COOLER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Oil Filter Tool (27, App. E)
Torque Wrench (32, App. E)
Drain Pan (10, App. E)
Compressed Air Source, 70 PSI

Reference:

LO 10-3930-664-12

Materials / Parts:

Engine Oil (14, App. C)
Gasket, Item 9 (1 ea.)
Gasket, Item 11 (1 ea.)
O-Ring, Item 13 (1 ea.)

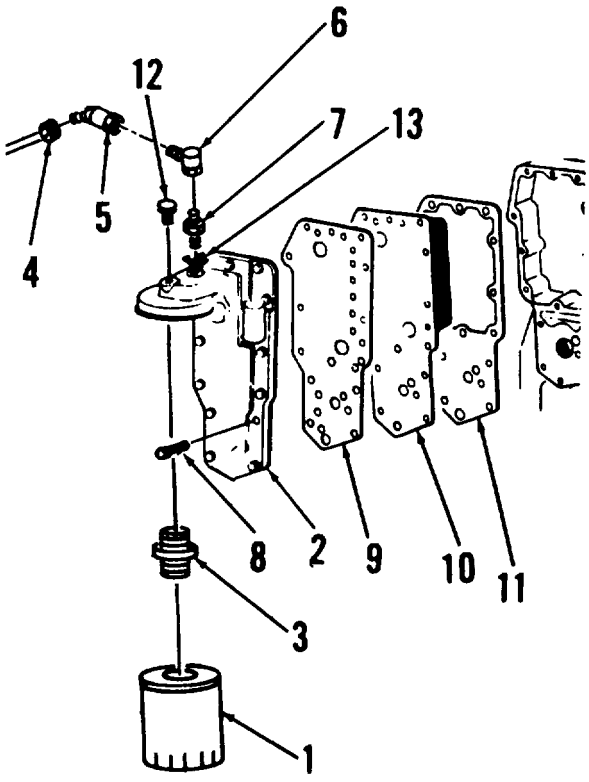
Equipment Condition:

Radiator drained (para. 2-46)
Engine oil drained (para. 2-20)
Alternator removed (para. 2-55)

A. REMOVAL

WARNING
Heated engine parts and hot engine oil can burn you. Take care not to touch exhaust manifold while replacing oil filter.

1. Remove oil filter (1) from filter head (2) using a oil filter tool. Discard filter. Remove filter adapter (3) only if replacement is required.
2. Disconnect engine oil sampling tube (4). Remove elbows (5, 6) and adapter (7). Remove and discard O-ring (13).
3. Remove filter head (2) by removing fourteen screws (8).
4. Remove filter head gasket (9), cooler core (10), and core gasket (11). Discard gaskets.
5. Remove plug (12) only if replacement is required.



B. CLEANING

WARNING

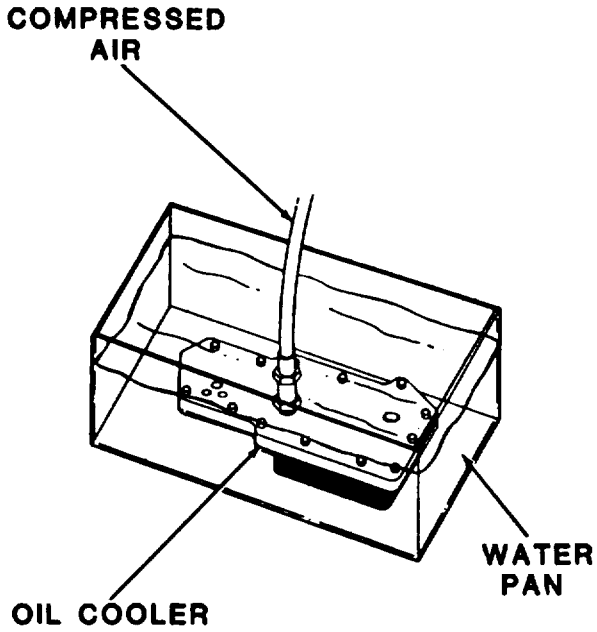
Observe cleaning solvent and compressed air warnings during cleaning of cooler core. Refer to paragraph 1-24.

1. Plug cooler core and soak in cleaning solvent to remove coolant deposits.

2. Remove plugs and back flush oil passages using cleaning solvent. Dry using compressed air.

3. Scrape gasket remnants from cooler sealing surface to ensure proper seal.

4. Clean remaining components in accordance with paragraph 1-24.



C. INSPECTION

1. Inspect oil cooler components in accordance with paragraph 1-24.

2. Inspect cooler core joints for corrosion, cracks, or other damage.

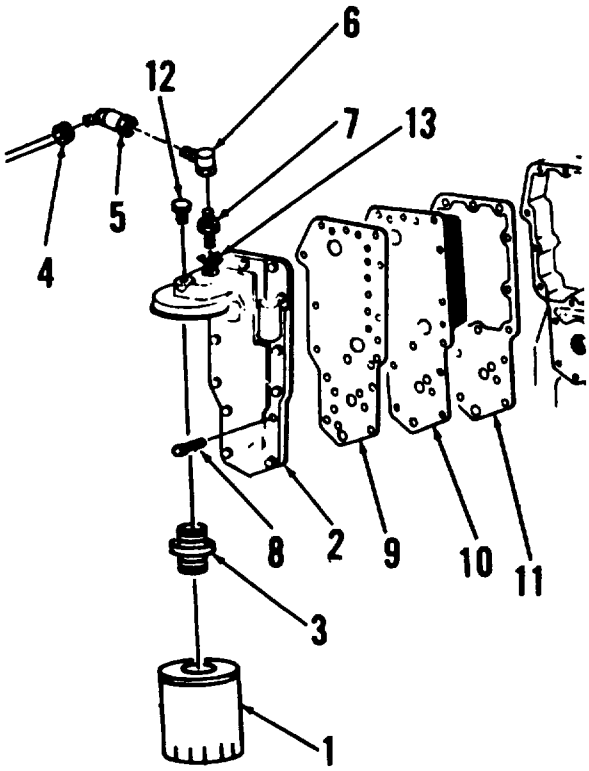
D. TESTING

1. Fill water pan with enough water to allow for submersion of oil cooler.
2. Connect 70 psi (483 kPa) compressed air source to oil cooler.

3. Apply compressed air and check for air leaks. If air leaks are discovered, replace defective components.

E. INSTALLATION

NOTE
If new oil cooler is being installed, ensure shipping plugs are removed.



1. Install plug (12) into filter head (2).
2. Mate core gasket (11) and cooler core (10) to cooler sealing surface.
3. Mate filter head gasket (9) to filter head (2). Install filter head using fourteen screws (8).
4. Torque screws (8) to 18 ft-lbs (24 Nm).
5. Install new O-ring (13) onto adapter (7) and install adapter and elbows (5, 6) onto filter head (2). Connect tube (4).
6. Install filter adapter (3) into oil filter head (2).
7. Fill new oil filter (1) with oil. Apply a light coat of oil to filter sealing gasket.
8. Install new oil filter (1) onto filter adapter (3).

FOLLOW-ON MAINTENANCE:

Install alternator (para. 2-55) Service radiator coolant (para. 2-46) Service engine oil in accordance with Lubrication Order

END OF TASK

2-18. OIL FILTER BYPASS VALVE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

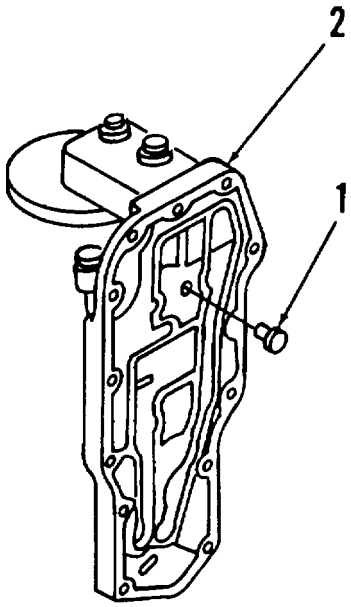
General Mechanics Tool Kit (1, App. E)

Equipment Condition:

Oil cooler removed (para. 2-17)

A. REMOVAL

Remove oil filter bypass valve (1) from rear of oil filter head (2) using a flat blade screwdriver.



B. CLEANING

Clean oil filter head in accordance with paragraph 1-24.

C. INSPECTION

Inspect bypass valve bore in filter head for damage.

D. INSTALLATION

1. Insert oil filter bypass valve (1) into oil filter head (2).
2. Using hammer and punch, drive bypass valve into filter head bore until valve bottoms against step.

FOLLOW-ON MAINTENANCE:

Install oil cooler (para. 2-17)

END OF TASK

2-19. OIL PRESSURE RELIEF VALVE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Equipment Condition:

Towbar lowered (para. 2-126)

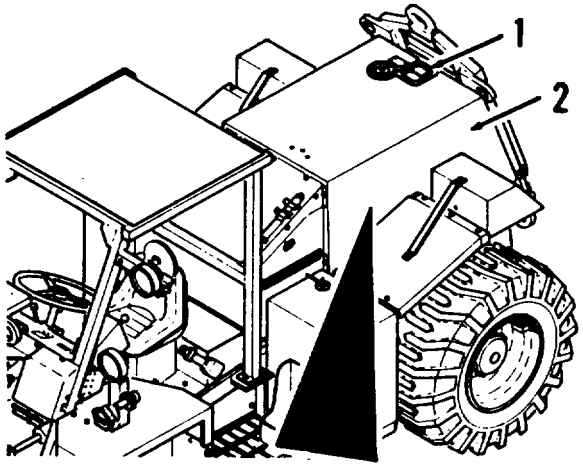
Materials / Parts:

O-Ring, Item 5 (1 ea.)

A. REMOVAL

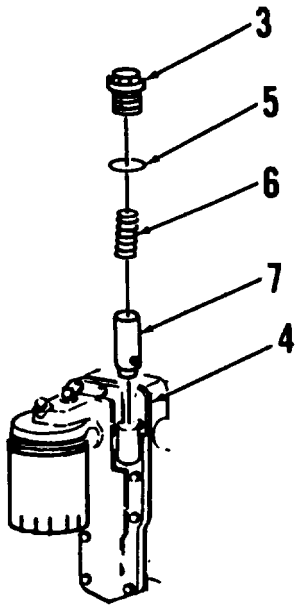
WARNING
Heated engine parts and hot oil can burn you. Take care not to touch engine parts when replacing relief valve and related components.

1. Release hood assembly (2) by lifting handle (1). Open hood assembly.
2. Remove plug (3) from oil filter head (4). Remove and discard O-ring (5).
3. Remove spring (6) and pressure regulator plunger (7) from oil filter head (4).



B. CLEANING

Clean pressure relief valve components in accordance with paragraph 1-24.



C. INSPECTION

1. Inspect components in accordance with paragraph 1-24.

2. Inspect plunger, bore, and seat for damage. Plunger must move freely in valve bore.

D. INSTALLATION

1. Install plunger (7) and spring (6) into oil filter head (4). Ensure plunger moves freely in valve bore.

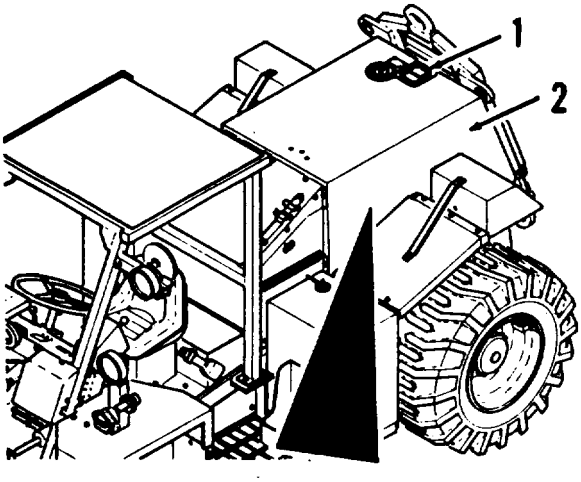
2. Install new O-ring (5) onto plug (3). Install plug into oil filter head (4).

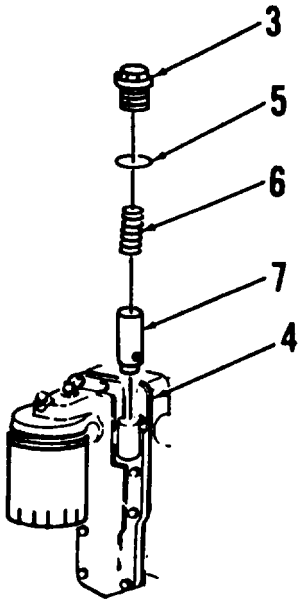
3. Torque plug (3) to 60 ft-lbs (80 Nm).

4. Close hood assembly (2). Ensure handle (1) is fully engaged.

FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)





END OF TASK

2-20. OIL FILTER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Oil Filter Tool (27, App. E)

Reference:

LO 10-3930-664-12

Materials / Parts:

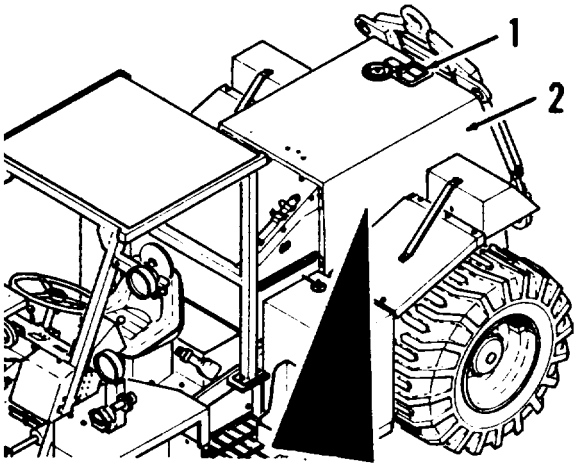
Engine Oil (14, App. C)
Oil Filter, Item 3 (1 ea.)

Equipment Condition:

Engine oil drained
Towbar lowered (para. 2-126)

A. REMOVAL

WARNING
Heated engine parts and hot engine oil can burn you. Take care not to touch exhaust manifold or muffler while removing oil filter.



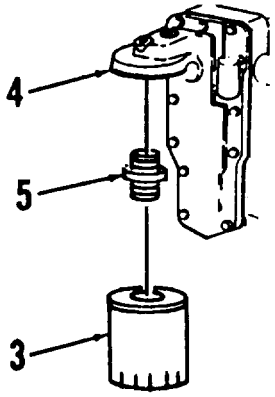
1. Release hood assembly (2) by lifting handle (1). Open hood assembly.
2. Remove oil filter (3) from oil filter head (4) using oil filter tool. Discard filter.
3. Remove filter adapter (5) only if replacement is required.

B. CLEANING

Clean filter adapter in accordance with paragraph 1-24.

C. INSPECTION

Inspect filter adapter in accordance with paragraph 1-24.



D. INSTALLATION

1. INSTALL FILTER ADAPTER (5) AND NEW OIL FILTER (3).

   a. Install filter adapter (5) into oil filter head (4).

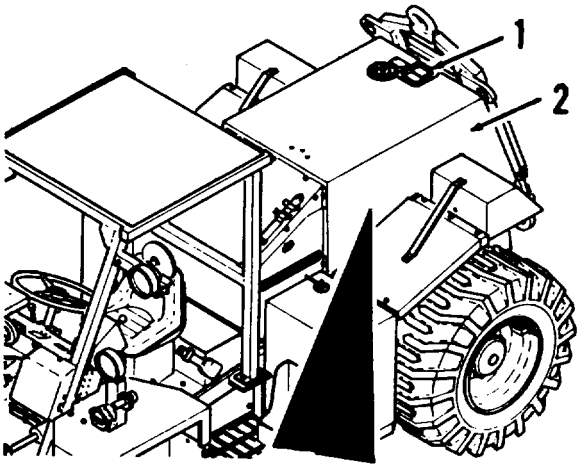
   b. Fill new oil filter (3) with oil. Apply a light coat of oil to filter sealing gasket.

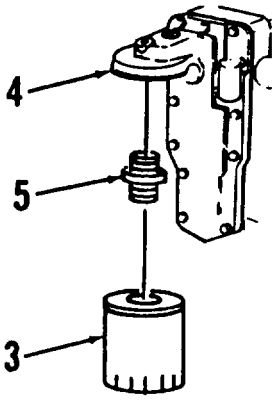
   c. Install new oil filter (3) onto filter adapter (5).

3. CLOSE HOOD ASSEMBLY (2). ENSURE HANDLE (1) IS FULLY ENGAGED.

FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126) Service engine oil in accordance with Lubrication Order





END OF TASK

2-21. OIL LEVEL DIPSTICK REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Towbar lowered (para. 2-126)

Equipment Condition:

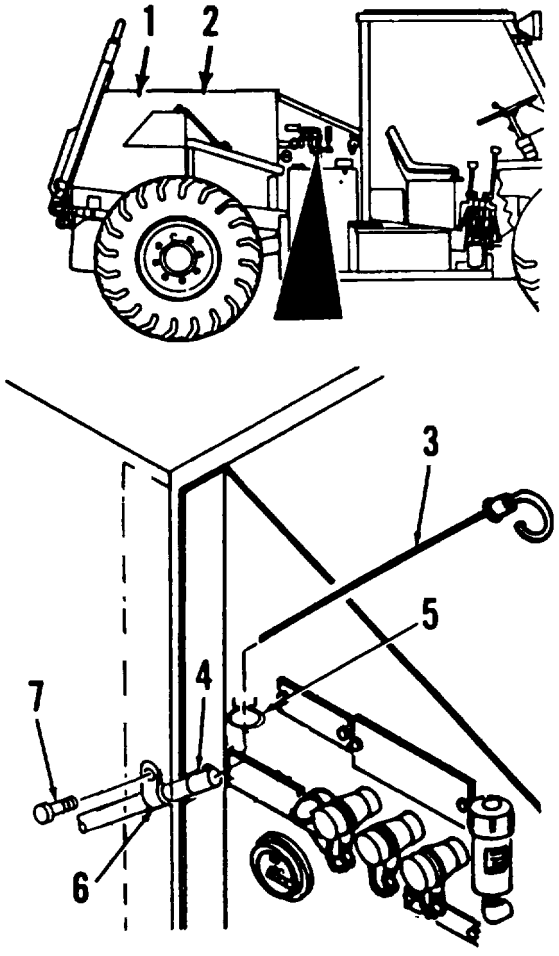
Engine oil drained

Reference:

LO 10-3930-664-12

A. REMOVAL

1. Release hood assembly (2) by lifting handle (1). Open hood assembly.
2. Remove oil level dipstick (3) from tube (4). Tube protrudes through hole at left side of transmission side panel.
3. Remove hose clamp (5) from tube (4).
4. Release tube (4) from hood bracket by removing clamp (6) and screw (7). Pull tube through hole at left side of transmission side panel.



5. Remove tube (4) from tube end (8). Disconnect short tube section (9).

B. CLEANING

Clean oil level dipstick components in accordance with paragraph 1-24.

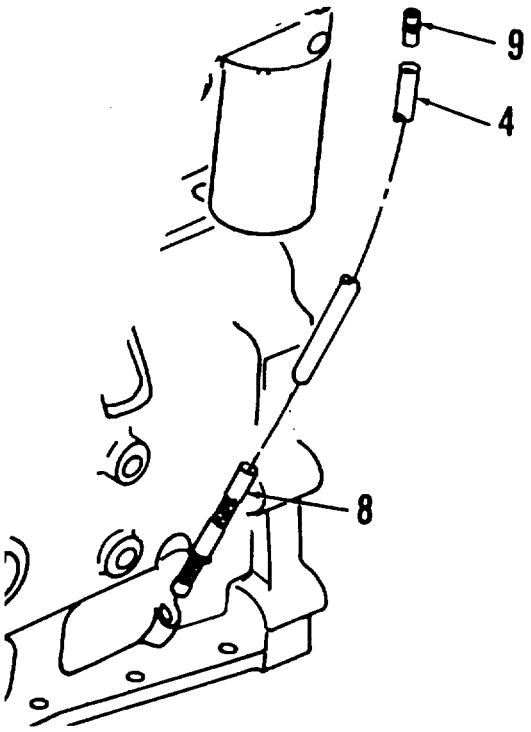
C. INSPECTION Inspect dipstick and related components in accordance with paragraph 1-24.

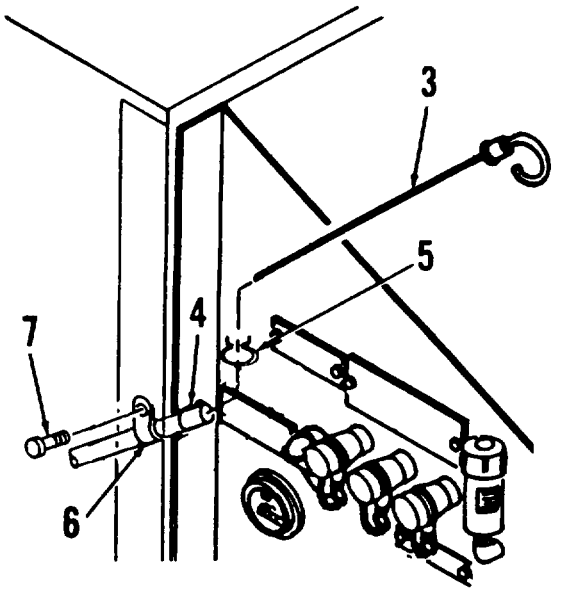
D. INSTALLATION

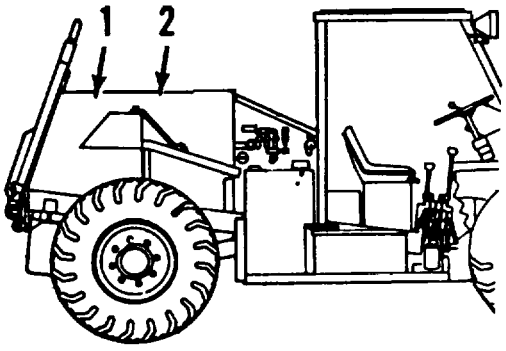
1. Install tube (4) onto tube end (8). Connect short tube section (9).
2. Push tube (4) through hole at left side of transmission side panel. Secure using clamp (6) and screw (7).
3. Fasten tube (4) using hose clamp (5).
4. Slide oil level dipstick (3) into tube (4).
5. Close hood assembly (2). Ensure handle (1) is fully engaged.

FOLLOW-ON MAINTENANCE:

Service engine oil in accordance with Lubrication Order Raise towbar and lock in position (para. 2-126)







END OF TASK

2-22. OIL SAMPLING VALVE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Reference:

LO 10-3930-664-12

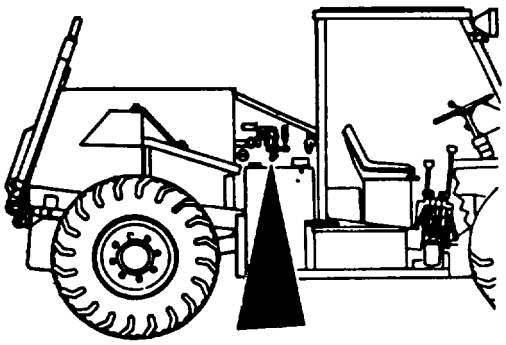
Materials / Parts:

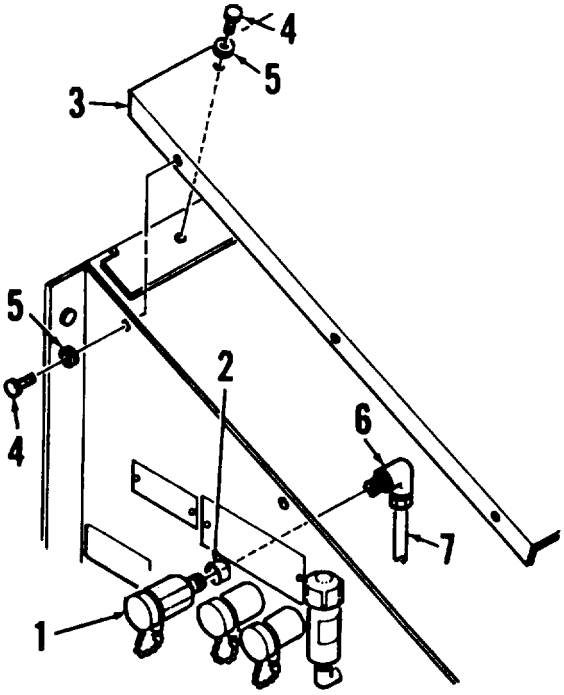
Teflon Tape (35, App. C)
Loctite 242 (20, App. C)

A. REMOVAL

NOTE
Sampling valve can be removed without removing transmission top cover. Remove cover only if elbow or hose replacement is required.

1. Remove oil sampling valve (1) from welded pipe coupling (2). Plug pipe coupling.
2. If required, remove transmission cover top (3) by removing nine screws (4) and washers (5).
3. Tag and disconnect hose assembly (7) from elbow (6). Remove elbow from welded pipe coupling (2).





B. CLEANING

Clean oil sampling valve in accordance with paragraph 1-24.

C. INSPECTION

Inspect valve and related components in accordance with paragraph 1-24.

D. INSTALLATION

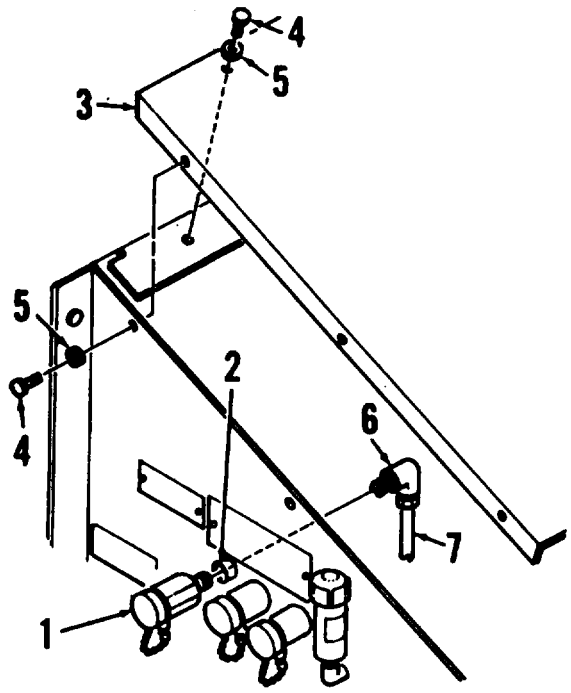
1. Install elbow (6) into welded pipe coupling (2). Connect hose assembly (7) to elbow.

2. Apply Loctite to threads of nine screws (4). Position transmission top cover (3) in place and secure using screws and washers (5).

3. Apply teflon tape to threads of oil sampling valve (1) and install valve into welded pipe coupling (2). Ensure valve sampling spout points down.

FOLLOW-ON MAINTENANCE:

Service engine oil in accordance with Lubrication Order



END OF TASK

2-23. EXHAUST MANIFOLD REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Equipment Condition:

Towbar lowered (para. 2-126)

Materials / Parts:

Gasket, Item 6 (1 ea.)
Gasket, Item 8 (4 ea.)

A. REMOVAL

WARNING

Significant burn hazard exists. Allow engine to cool before you perform maintenance on the exhaust manifold. Do not touch hot exhaust system with bare hands; injury will result. If necessary, use insulated pads and gloves.

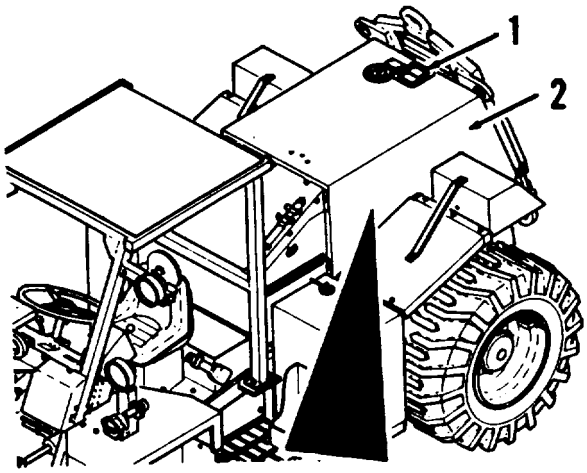
1. RELEASE HOOD ASSEMBLY (2) BY LIFTING HANDLE (1). OPEN HOOD ASSEMBLY.

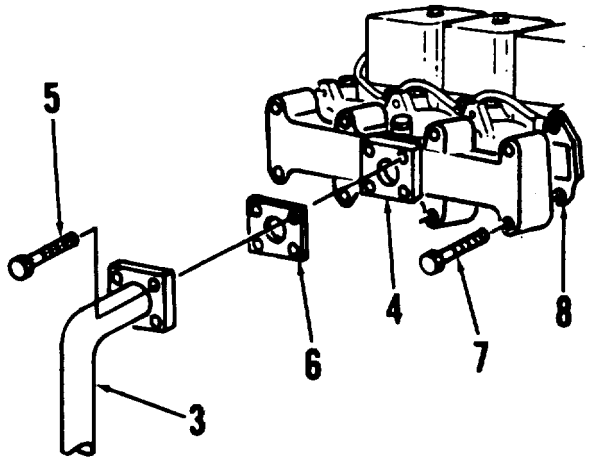
2. REMOVE EXHAUST PIPE (3) AND EXHAUST MANIFOLD (4).

   a. Remove exhaust pipe (3) from exhaust manifold (4) by removing screws (5).

   b. Remove and discard gasket (6).

   c. Remove exhaust manifold (4) from engine by removing screws (7). Remove and discard gaskets (8).





B. CLEANING

Clean exhaust manifold in accordance with paragraph 1-24.

C. INSPECTION

Inspect manifold and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. MATE NEW GASKETS (8) TO ENGINE. INSTALL EXHAUST MANIFOLD (4) USING SCREWS (7). TORQUE SCREWS TO 32 FT-LBS (43 Nm).

2. INSTALL EXHAUST PIPE (3).

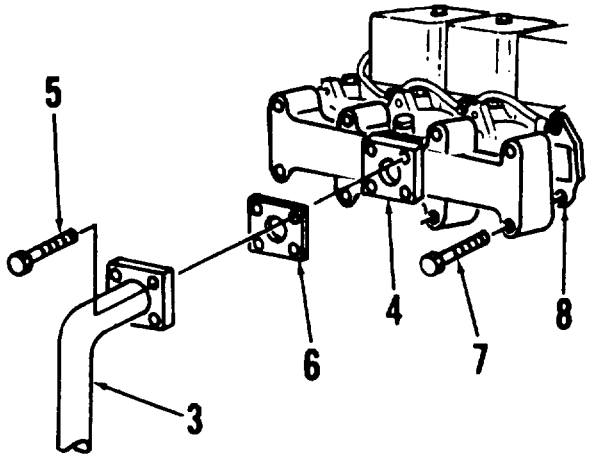
   a. Mate new gasket (6) to exhaust manifold (4).

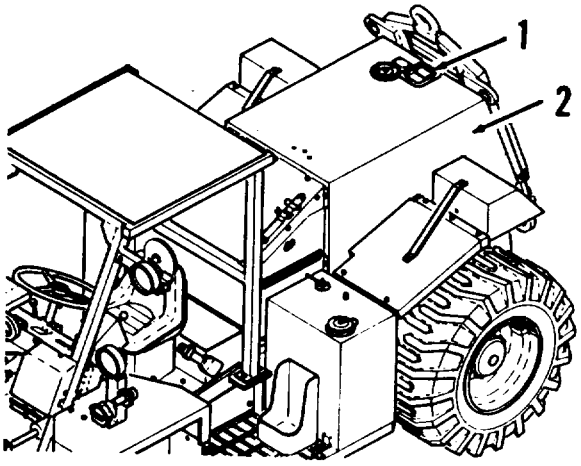
   b. Install exhaust pipe (3) using screws (5).

3. CLOSE HOOD ASSEMBLY (2). ENSURE HANDLE (1) IS FULLY ENGAGED.

FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)





END OF TASK

2-24. INTAKE MANIFOLD COVER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Equipment Condition:

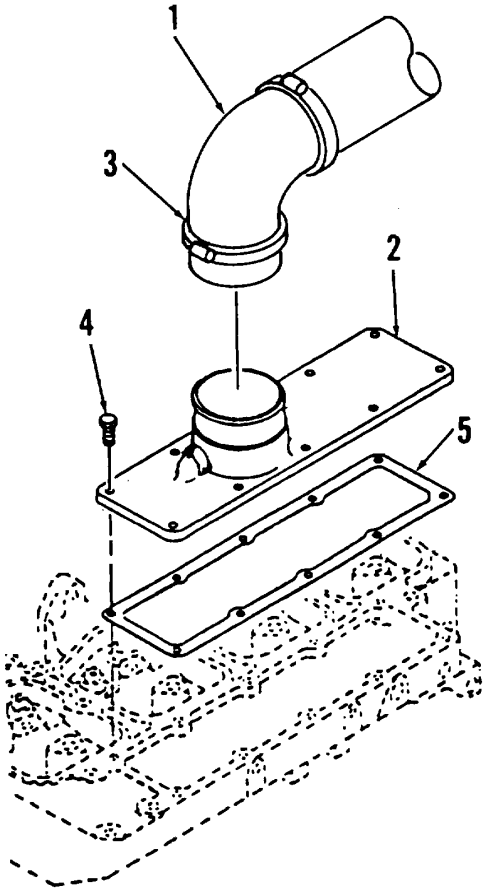
Engine fuel line and fitting replacement (para. 2-27), high pressure fuel lines remove

Materials / Parts:

Sealant (42, App. C)
Gasket, Item 5 (1 ea.)

A. REMOVAL

1. Remove rubber elbow (1) from intake manifold cover (2) by loosening clamp (3).
2. Remove intake manifold cover (2) by removing 10 screws (4). Remove and discard gasket (5).
3. Scrape gasket remnants from manifold cover and sealing surface to ensure proper seal.



B. CLEANING

Clean intake manifold cover in accordance with paragraph 1-24.

C. INSPECTION

Inspect components in accordance with paragraph 1-24..

D. INSTALLATION

1. Position new gasket (5) and intake manifold cover (2) onto engine.

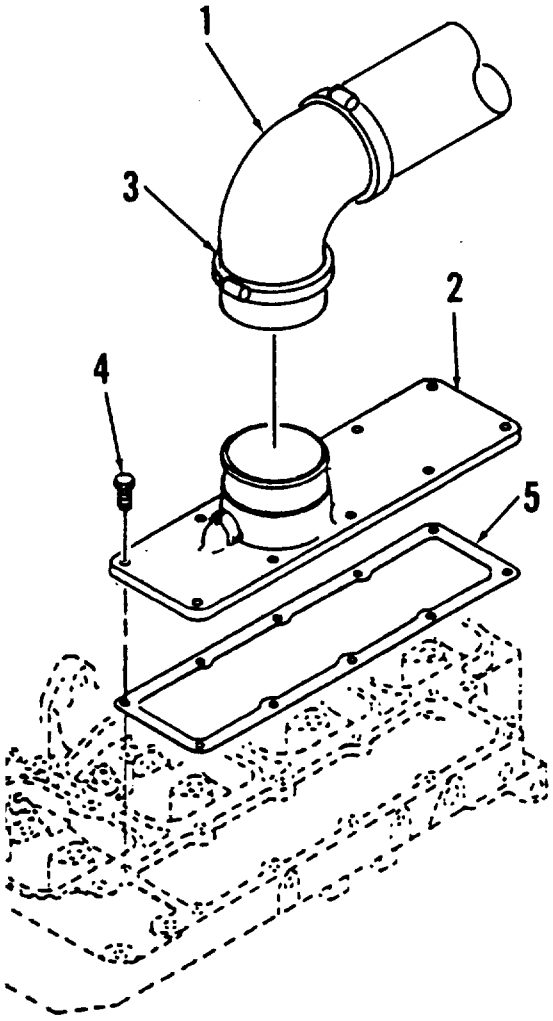
NOTE

Five manifold cover holes closest to valve covers are drilled through and must be sealed.

2. Apply sealant to five screws (4) and install screws into cover holes closest to valve covers.

3. Install five remaining screws (4). Torque all screws to 18 ft-lbs (24 Nm).

4. Install rubber elbow (1) and secure by tightening clamp (3).



FOLLOW-ON MAINTENANCE:

Install high pressure fuel lines (para. 2-27)

END OF TASK

Section VII. FUEL SYSTEM MAINTENANCE

2-25. FUEL LIFT TRANSFER PUMP REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Drain Pan (10, App. E)

Reference:

Materials / Parts:

Gasket, Item 7 (1 ea.)

Equipment Condition:

Towbar lowered (para. 2-126)

A. REMOVAL

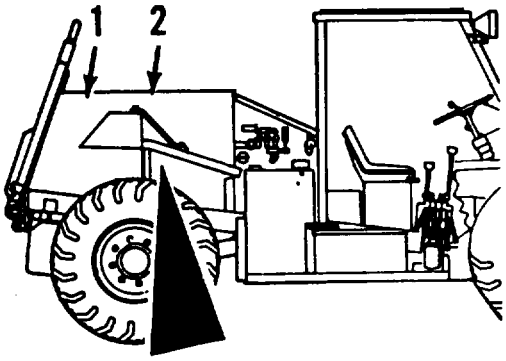
WARNING

Fuel is very flammable and can easily explode. To avoid serious injury or death, observe the following precautions: - Keep away from open flame or any spark (ignition source).

- Keep at least a B-C fire extinguisher within easy reach when working with fuel or on the fuel system.

- Do not work on fuel system when engine is hot.

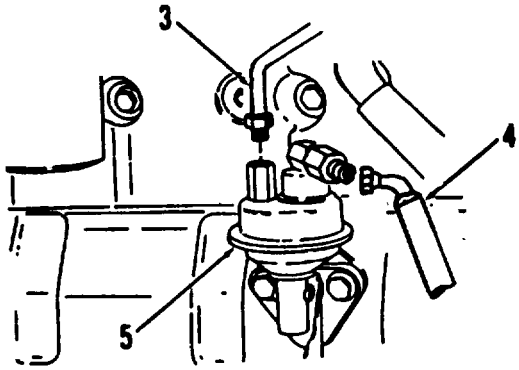
- Post signs that read "NO SMOKING WITHIN 50 FEET" when working with open fuel, fuel lines, or fuel tank.



1. Release hood assembly (2) by lifting handle (1). Open hood assembly.

NOTE

Place drain pan beneath lines when disconnecting. Drain lines into pan.



2. Tag and disconnect fuel lines (3, 4) from fuel lift transfer pump (5).

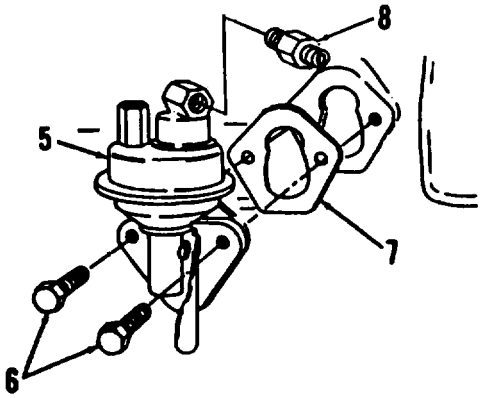
3. Remove transfer pump (5) from engine block by removing screws (6). Remove and discard gasket (7).

4. Scrape gasket remnants from pump and sealing surface to ensure proper seal.

5. Remove adapter (8) from transfer pump (5).

B. CLEANING

Clean transfer pump in accordance with paragraph 1-24.



C. INSPECTION

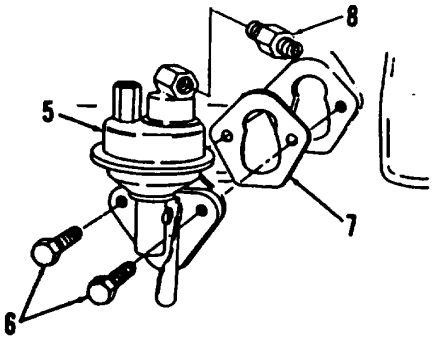
Inspect components in accordance with paragraph 1-24.

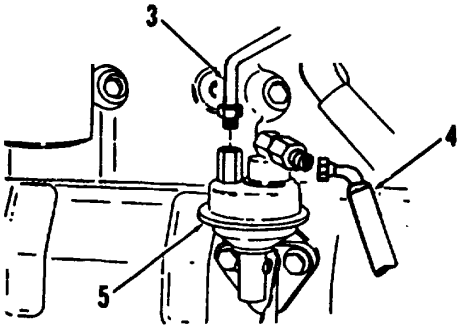
D. INSTALLATION

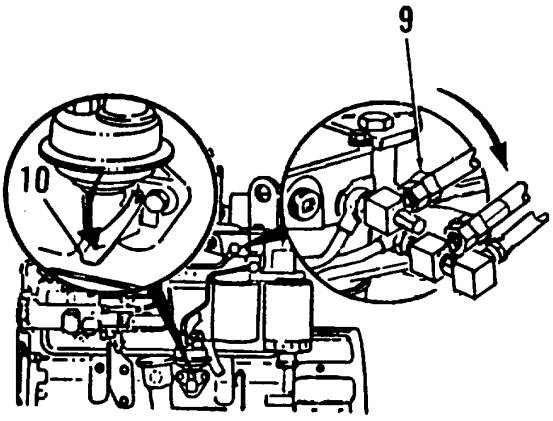
1. Install adapter (8) onto transfer pump (5).
2. Position new gasket (7) and transfer pump (5) onto engine and secure using screws (6).
3. Torque screws (6) to 18 ft-lbs (24 Nm).
4. Connect fuel lines (3, 4).
5. Loosen hose assembly (9) to bleed low pressure fuel line.
6. Operate transfer pump hand lever (10) until fuel flowing from screw fitting is free of air.
7. Tighten hose assembly (9).
8. Close hood assembly (2). Ensure handle (1) is fully engaged.

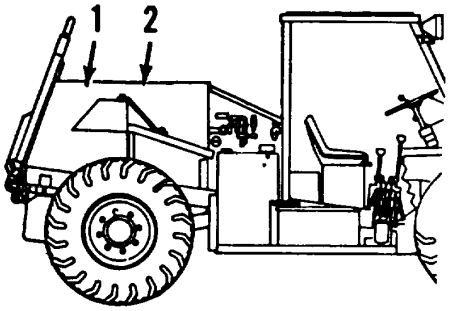
FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)









END OF TASK

2-26. FUEL SHUTOFF BALL VALVE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
drain fuel tank

Equipment Condition:

Fuel Tank Servicing (para. 2-34),

Materials / Parts:

Diesel Fuel (11, 12, 13, App. C)
Teflon Tape (35, App. E)

A. REMOVAL

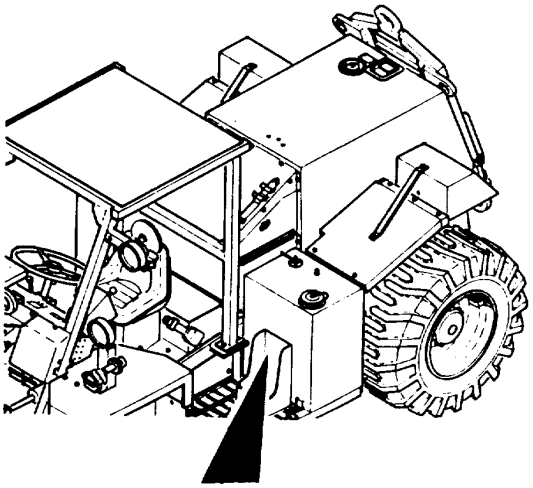
WARNING

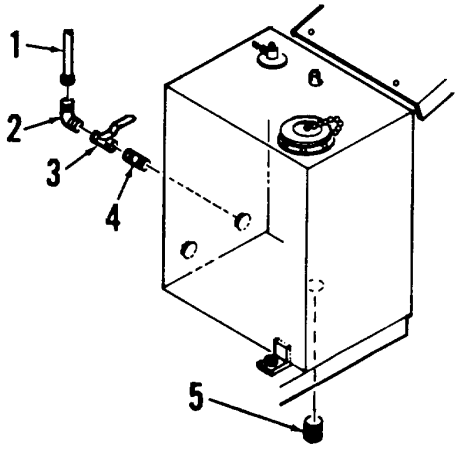
Fuel is very flammable and can easily explode. To avoid serious injury or death, observe the following precautions: - Keep away from open flame or any spark (ignition source).

- Keep at least a B-C fire extinguisher within easy reach when working with fuel or on the fuel system.

- Do not work on fuel system when engine is hot.

- Post signs that read "NO SMOKING WITHIN 50 FEET" when working with open fuel, fuel lines, or fuel tank.





1. Place handle of fuel shutoff valve in closed position (handle parallel to side of tank).
2. Disconnect fuel hose assembly (1) from elbow (2) and allow fuel to drain into pan. Remove elbow and cap hose end.
3. Remove shutoff ball valve (3) from pipe nipple (4). Remove nipple from tank only if replacement is required.

B. CLEANING

Clean shutoff ball valve in accordance with paragraph 1-24.

C. INSPECTION

Inspect shutoff ball valve and related components in accordance with paragraph 1-24.

D. INSTALLATION

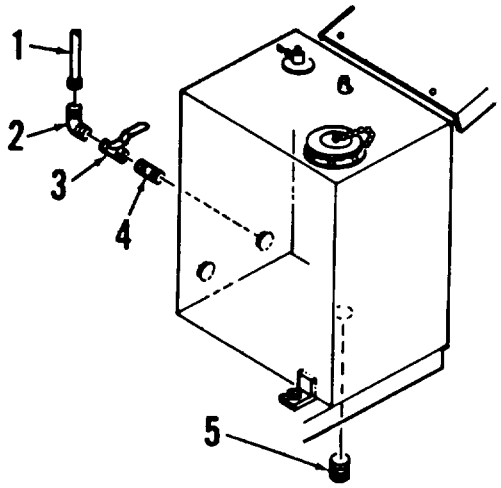
1. Wrap pipe threads on nipple (4) and elbow (2) with teflon tape before installing.

2. Install pipe nipple (4), shutoff ball valve (3), and elbow (2).

3. Connect fuel hose assembly (1) to elbow (2).

4. Service fuel tank with approved fuel. Check for leaks and tighten connections as required.

5. Place shutoff ball valve handle in open position after servicing fuel tank.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-27. ENGINE FUEL LINE AND FITTING REPLACEMENT

This task covers: Removal, Cleaning, Inspection, installation, and Bleeding

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Drain Pan (10, App. E)

Equipment Condition:

Fuel filter assembly replacement (para. 2-36), fuel filters removed

Materials / Parts:

Teflon Tape (35, App. C)
O-Ring, Item 9 (2 ea.)
Sealing Washer, Item 11 (2 ea.)
Sealing Washer, Item 13 (2 ea.)
Grommet Seal, Item 26 (1 ea.)
Grommet Seal, Item 28 (1 ea.)
Grommet Seal, Item 32 (1 ea.)
Banjo Connector Seal, Item 35 (4 ea.)
Grommet Seal, Item 39 (3 ea.)

A. REMOVAL

WARNING

Fuel is very flammable and can easily explode. To avoid serious injury or death, observe the following precautions:

- Keep away from open flame or any spark (ignition source).

- Keep at least a B-C fire extinguisher within easy reach when working with fuel or on the fuel system.

- Do not work on fuel system when engine is hot.

- Post signs that read "NO SMOKING WITHIN 50 FEET" when working with open fuel, fuel lines, or fuel tank.

NOTE

Place container beneath fuel lines during removal to catch residual fuel. Cap all fuel lines to prevent contamination.

1. DISCONNECT HOSE ASSEMBLIES (1, 2) AND REMOVE TEES (3), ADAPTER (4), AND ELBOW (6). DISCARD O-RINGS.

   a. Tag and disconnect hose assemblies (1, 2) from tees (3) and elbow (6).

   b. Remove pipe plug (4) and fitting (5) from upper tee (3).

   c. Remove pressure sensor adapter (7) and elbow (6) from lower tee (3).

   d. Remove tees (3) from banjo connector screws (8). Remove and discard O-rings (9).

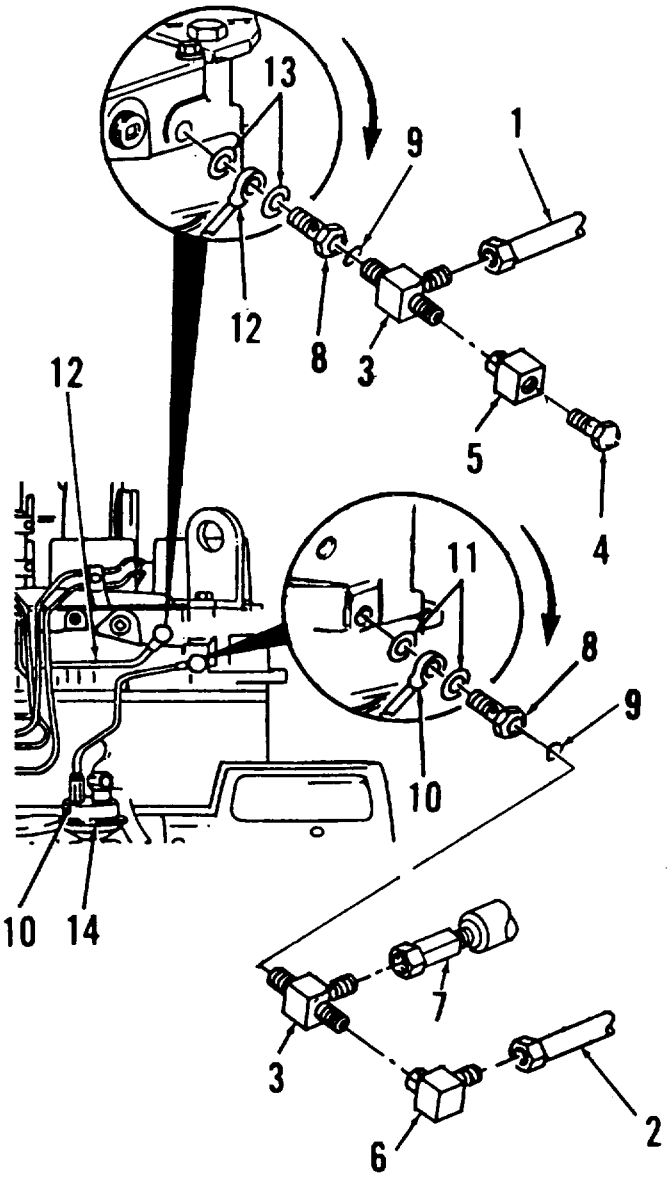
2. REMOVE LOW PRESSURE AND FUEL SUPPLY LINES (10, 12).

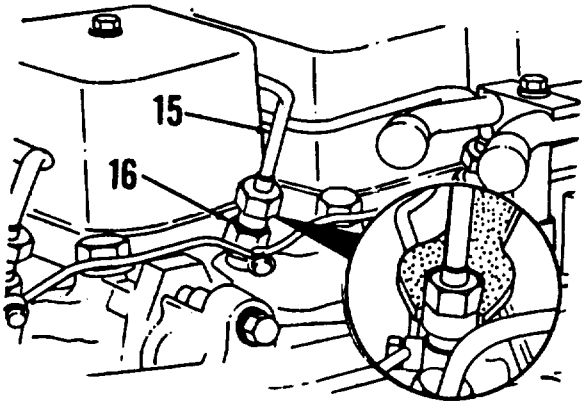
   a. Disconnect low pressure fuel line (10) from fuel lift transfer pump (14) by loosening line nut.

   b. Disconnect low pressure fuel line (10) from engine by removing banjo connector screw (8) and sealing washers (11). Discard sealing washers.

   c. Disconnect fuel supply line (12) from engine by removing banjo connector screw (8) and sealing washers (13). Discard sealing washers.

3. DISCONNECT FOUR HIGH PRESSURE FUEL LINES (15) FROM FUEL INJECTORS (16) AND INJECTION PUMP.





4. RELEASE HIGH PRESSURE FUEL LINES (17) FROM FOUR TUBE BRACES AT TOP OF INTAKE MANIFOLD COVER (16).

   a. Remove screws (19) and washers (20) securing front tube braces (21) to rear tube braces (22).

   b. Separate fuel lines (17) from vibration isolators (23).

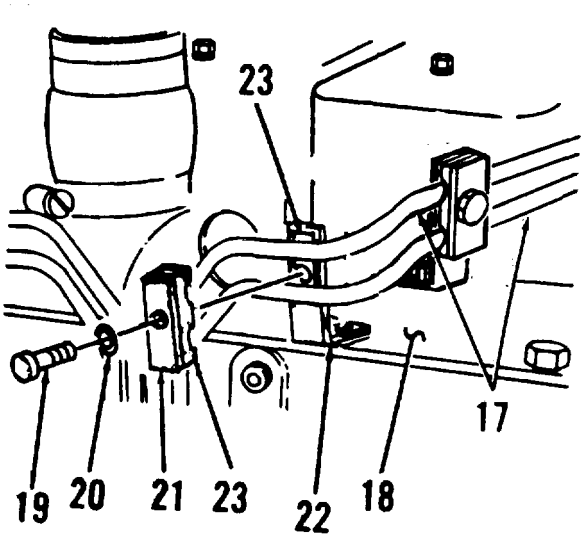
5. REMOVE FUEL DRAIN LINES (24, 27, 31).

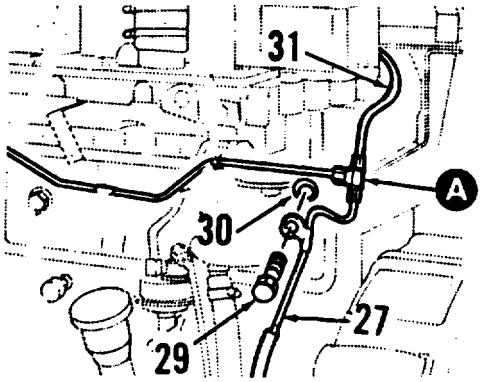
   a. Disconnect drain line (24) from tee (25). Remove and discard grommet seal (26).

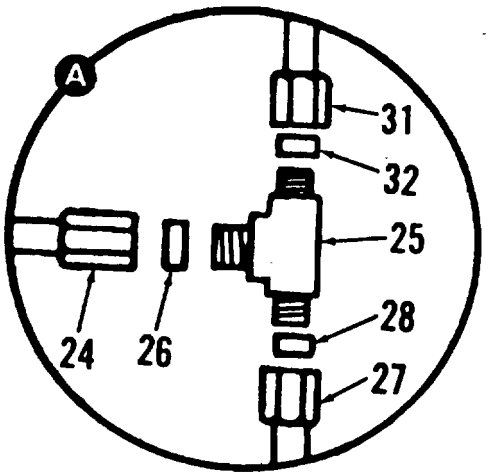
   b. Disconnect drain line (27) from tee (25). Remove and discard grommet seal (28).

   c. Remove drain line (27) from engine block by removing screw (29) and grommet seal (30).

   d. Disconnect drain line (31) from tee (25). Remove and discard grommet seal (32).







6. REMOVE DRAIN LINE (31) FROM FOUR FUEL INJECTORS (33) BY REMOVING BANJO CONNECTOR SCREWS (34) AND SEALS (35). DISCARD SEALS.

7. REMOVE INJECTION PUMP SUPPLY LINES (12, 36, 40).

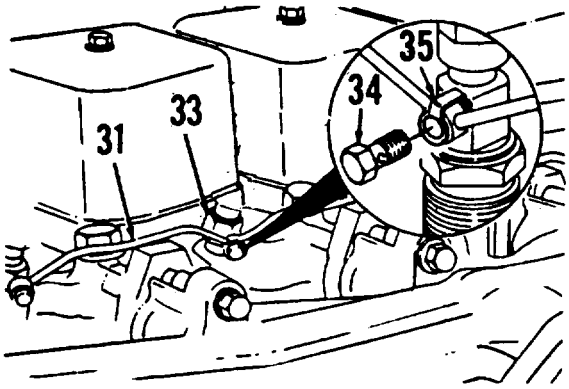
   a. Disconnect injection pump supply line (36) from rear fitting on injection pump (37).

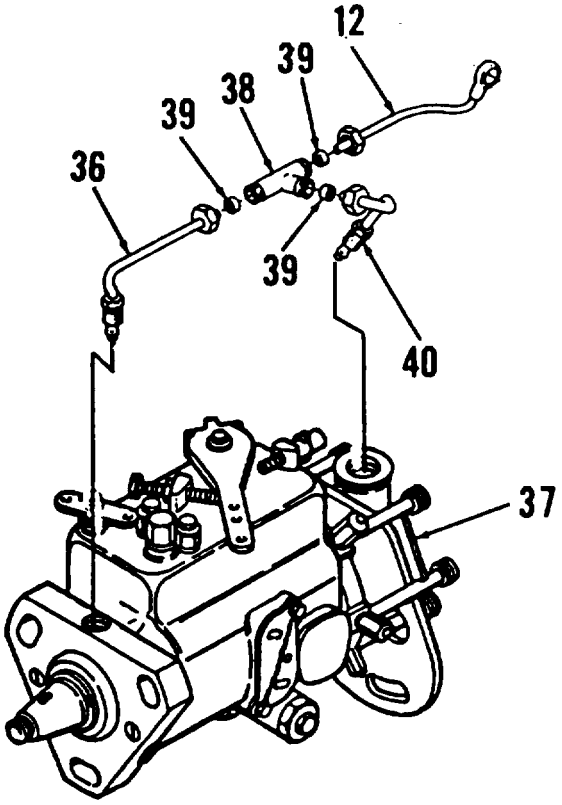
   b. Disconnect supply line (36) from tee (38). Remove and discard grommet seal (39).

   c. Disconnect supply line (40) from front fitting on injection pump (37).

   d. Disconnect supply line (40) from tee (38). Remove and discard grommet seal (39).

   e. Disconnect supply line (12) from tee (38). Remove and discard grommet seal (39).





B. CLEANING

Clean fuel lines and fittings in accordance with paragraph 1-24.

C. INSPECTION

Inspect components in accordance with paragraph 1-24.

D. INSTALTATION

1. APPLY TEFLON TAPE TO ALL FUEL FITTINGS BEFORE INSTALLATION.

2. NSTALL INJECTION PUMP SUPPLY LINES (12, 36, 40).

   a. Install three new grommet seals (39) onto tee (38).

   b. Connect injection pump supply line (12) to tee (38).

   c. Connect supply line (40) to front fitting on injection pump (37).

   d. Connect supply lines (36, 40) to tee (38).

   e. Connect supply line (36) to rear fitting on injection pump (37).

3. TORQUE ALL SUPPLY LINE NUTS TO 24 FT-LBS (32 Nm).

4. INSTALL FUEL DRAIN LINES (24, 27, 31).

   a. Install three new grommet seals (26, 28, 32) onto tee (25).

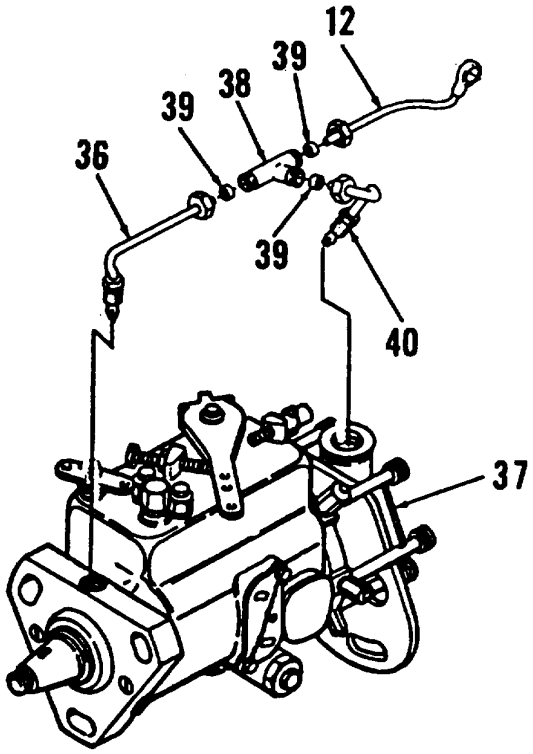
   b. Connect drain lines (27, 31) to tee (25).

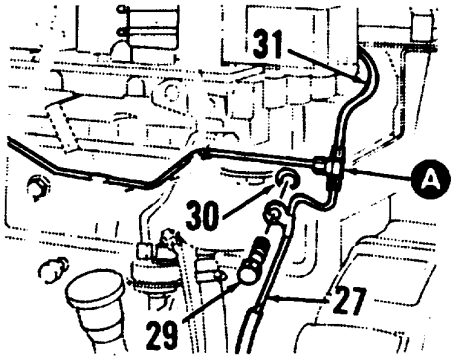
   c. Secure drain line (27) to engine block using screw (29) and grommet seal (30).

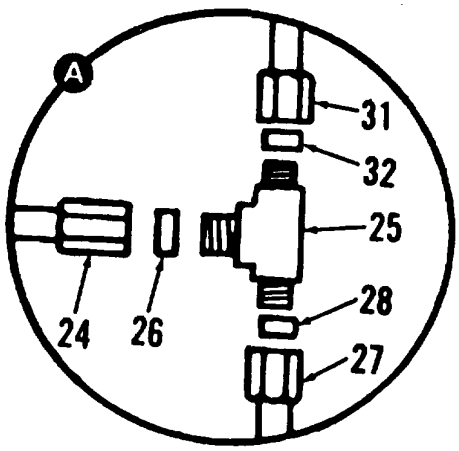
   d. Connect drain line (24) to tee (25).

5. TORQUE ALL FUEL DRAIN LINE NUTS TO 18 FT-LBS (24 Nm).

6. TORQUE SCREW (29) TO 18 FT-LBS (24 Nm).







7. CONNECT FUEL DRAIN LINES (31) TO FOUR FUEL INJECTORS (33) USING BANJO CONNECTOR SCREWS (34) AND CONNECTOR SEALS (35).

8. TORQUE BANJO CONNECTOR SCREWS (34) TO 11 FT-LBS (15 Nm).

9. INSTALL HIGH PRESSURE FUEL LINES (17).

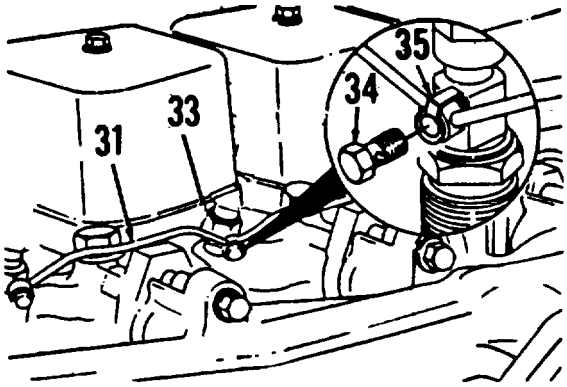
   a. Secure high pressure fuel lines (17) to four tube braces at top of intake manifold cover (18) as follows:

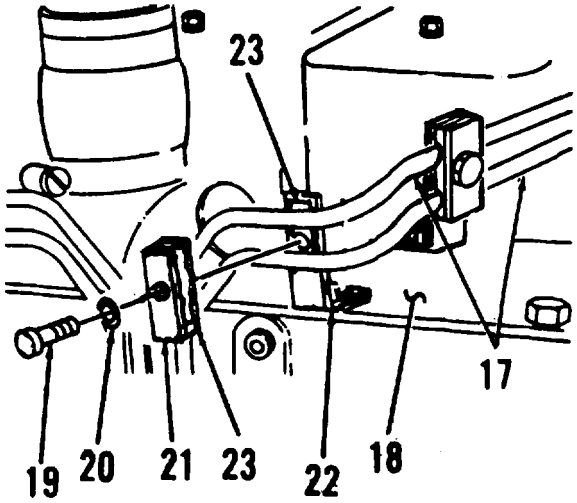
      (1) Install rear vibration isolators (23) on braces (22) and position fuel lines (17).

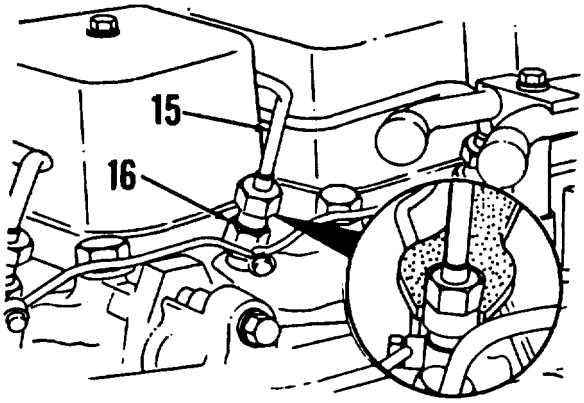
      (2) Secure fuel lines (17) using screws (19), washers (20), front tube braces (21), and remaining vibration isolators (23).

   b. Connect fuel lines (15) to injection pump and fuel injectors (16).

10. TORQUE FUEL LINE NUTS TO 18 FT-LBS (24 Nm).







11. INSTALL LOW PRESSURE AND FUEL SUPPLY LINES (10, 12).

    a. Connect fuel supply line (12) to engine using banjo connector screw (8) and new sealing washers (13).

    b. Connect low pressure fuel line (10) to engine using banjo connector screw (8) and new sealing washers (11).

    c. Connect low pressure fuel line (10) to fuel lift transfer pump (14).

13. TORQUE BANJO CONNECTOR SCREWS (8) TO 6 FT-LBS (8 Nm).

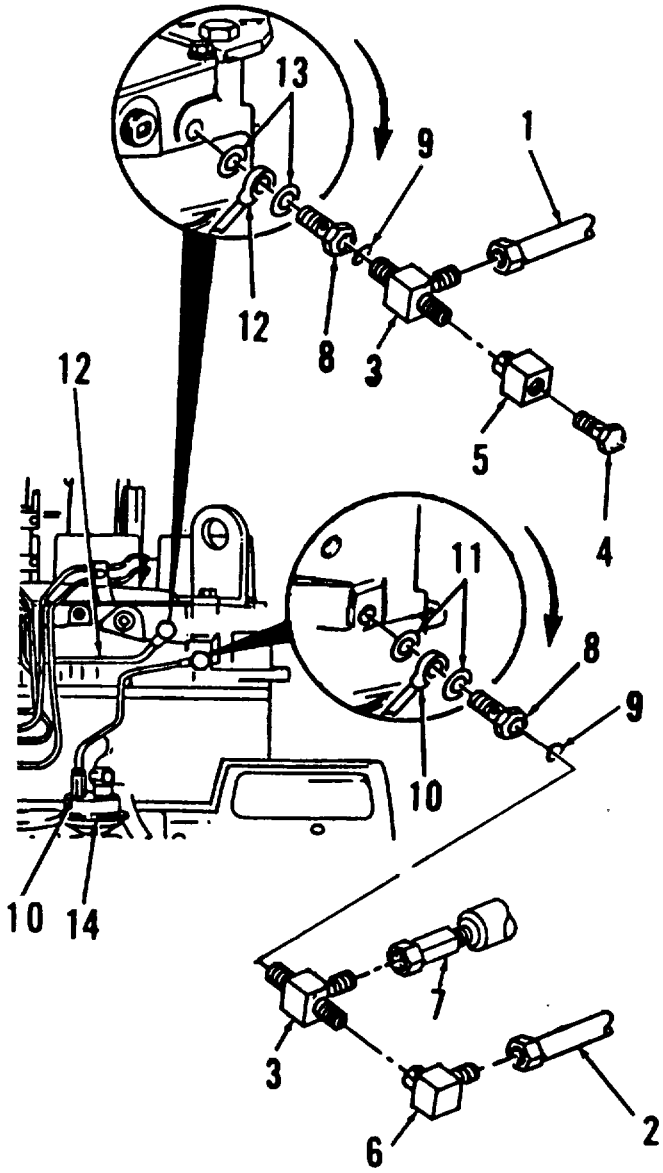
14. INSTALL TEES (3), ADAPTER (7), ELBOW (6), AND NEW O-RINGS (9). CONNECT HOSE ASSEMBLIES (1, 2).

    a. Install new O-rings (9) onto tees (3). Install tees into banjo connector screws (8).

    b. Install fitting (5) onto upper tee (3). Install pipe plug (4) into fitting. Tighten fitting until hand tight, then tighten an additional flat.

    c. Install pressure sensor adapter (7) and elbow (6) onto lower tee (3). Tighten adapter and elbow until hand tight, then tighten an additional flat.

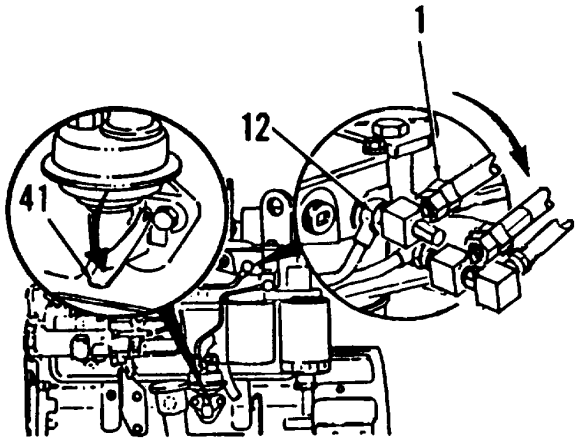
    c. Connect hose assemblies (1, 2) onto tees (3).



E. BLEEDING

WARNING

Do not bleed a hot engine. Fuel may spill onto hot exhaust manifold creating fire danger. Pressure in fuel line can penetrate skin and cause serious bodily injury. Use extreme caution.



1. BLEED LOW PRESSURE FUEL LINE (12).

   a. Loosen hose assembly (1).

   b. Operate transfer pump hand lever (41) until fuel flowing from screw fitting is free of air.

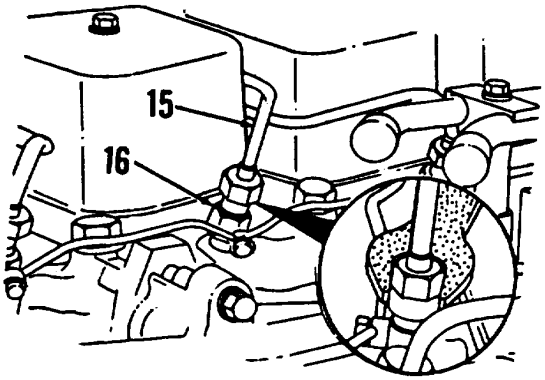
   c. Tighten hose assembly (1).

2. BLEED HIGH PRESSURE FUEL LINES (15).

   a. Start engine.

   b. Vent high pressure lines (15) at fuel injectors (16) one at a time until engine runs smoothly.

   c. Shutdown engine.



3. TORQUE HIGH PRESSURE FUEL LINE NUTS TO 18 FT-LBS (24 Nm).

FOLLOW-ON MAINTENANCE:

Install fuel filter (para. 2-36) Raise towbar and lock in position (para. 2-126)

END OF TASK

2-28. AIR CLEANER ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Equipment Condition:

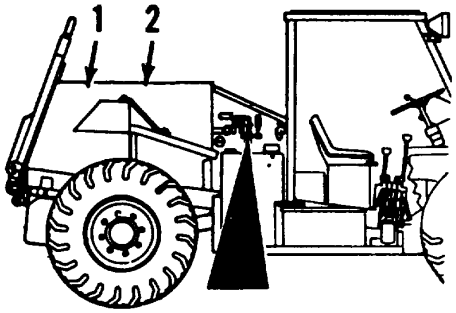
Towbar lowered (para. 2-126)

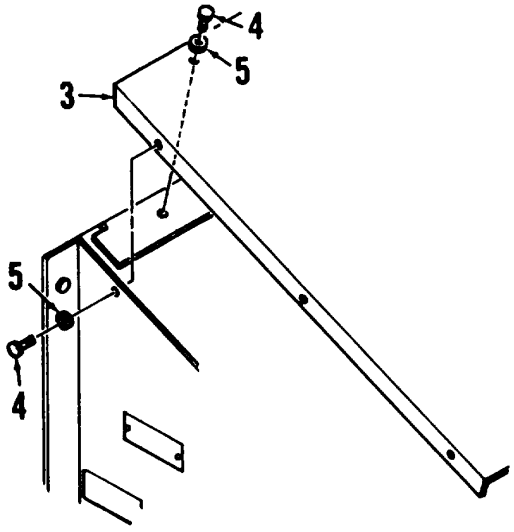
Materials / Parts:

Loctite 242 (20, App. C)

A. REMOVAL

1. Release hood assembly (2) by lifting handle (1). Open hood assembly.
2. Remove transmission top cover (3) from cover frame and transmission side plates by removing nine screws (4) and washers (5).





3. Disconnect hose (6) from compression elbow (7). Remove elbow.

4. Loosen hose clamp (8) to release air inlet elbow (9) from air cleaner assembly (10).

5. Remove four P-clamps (11, 12) by removing two screws (13) and washer (14).

6. Remove P-clamp (15) by removing screw (16) and washer (17).

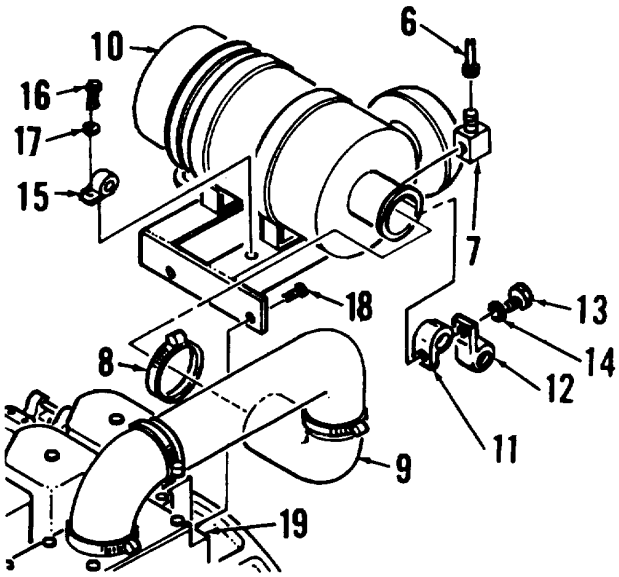
7. Remove air cleaner assembly (10) from engine (19) by removing screws (18).

8. Loosen clamp (20) to remove evacuator valve (21) from air cleaner (22).

9. Remove air inlet cap (23) from air cleaner (22).

10. Release air cleaner (22) from mounting bands (24) by removing screws (25), washers (26), and nuts (27). Slide air cleaner out of mounting bands.

11. Remove screws (28) and nuts (29) to release mounting bands (24) from mount (30).

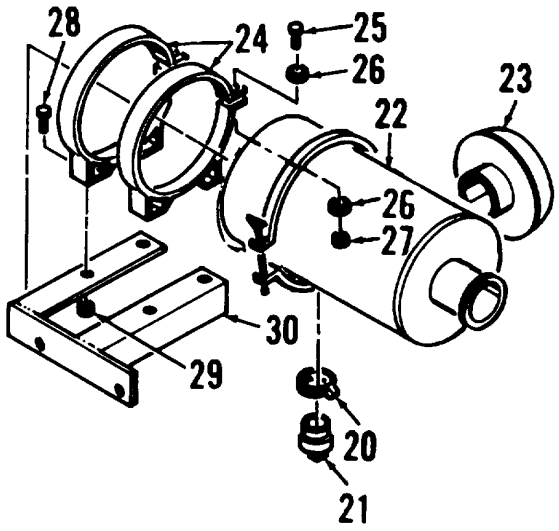


B. CLEANING

Clean exterior of air cleaner assembly in accordance with paragraph 1-24.

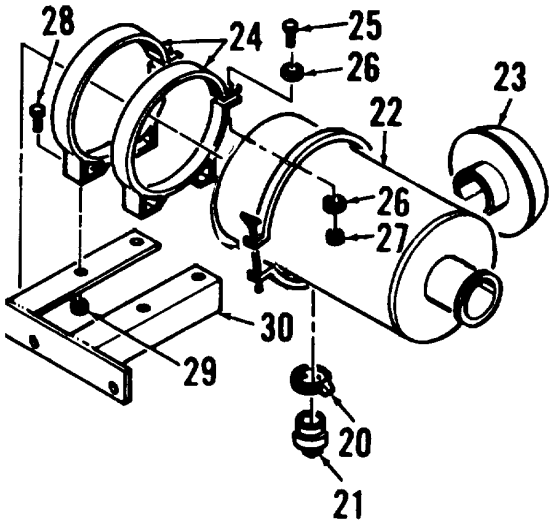
C. INSPECTION

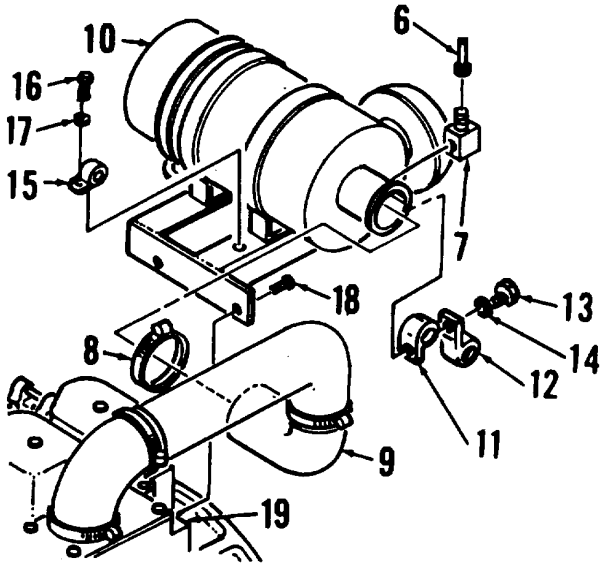
Inspect air cleaner, mounting bracket, and air inlet fittings in accordance with paragraph 1-24.

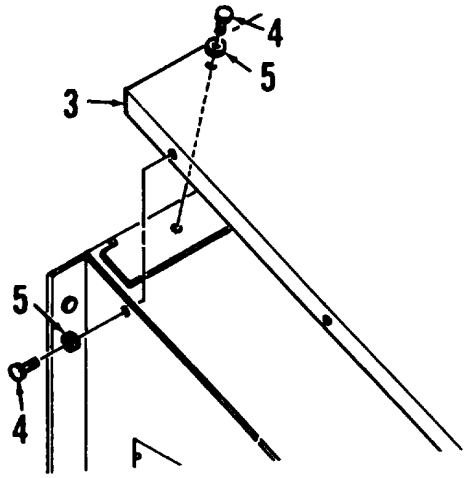


D. INSTALLATION

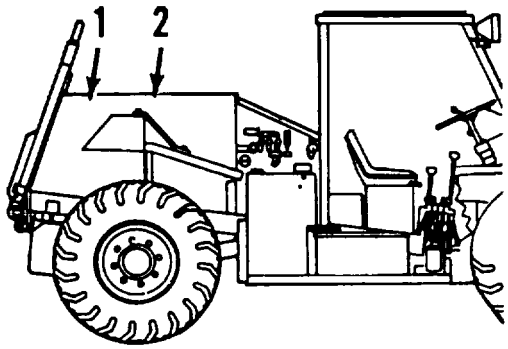
1. Secure mounting bands (24) to mount (30) using screws (28) and nuts (29). Slide air cleaner (22) into mounting bands.
2. Secure mounting bands (24) around air cleaner (22) using screws (25), washers (26), and nuts (27).
3. Install air inlet cap (23) onto air cleaner (22).
4. Install evacuator valve (21) onto air cleaner (22) using clamp (20).
5. Position air cleaner assembly (10) to engine (19) and secure using screws (18).
6. Install P-clamp (15) using screw (16) and washer (17).
7. Install four P-clamps (11, 12) using two screws (13) and washer (14).
8. Mate air inlet elbow (9) to air cleaner assembly (10). Secure by tightening hose clamp (8).
9. Connect hose (6) to compression elbow (7).
10. Apply loctite to threads of nine screws (4). Install transmission top cover (3) and secure using screws and washers (5).







11. Close hood assembly (2). Ensure handle (1) is fully engaged.



FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)

END OF TASK

2-29. AIR CLEANER ELEMENT SERVICE

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Materials / Parts:

Filter Element, Item 7 (1 ea.)

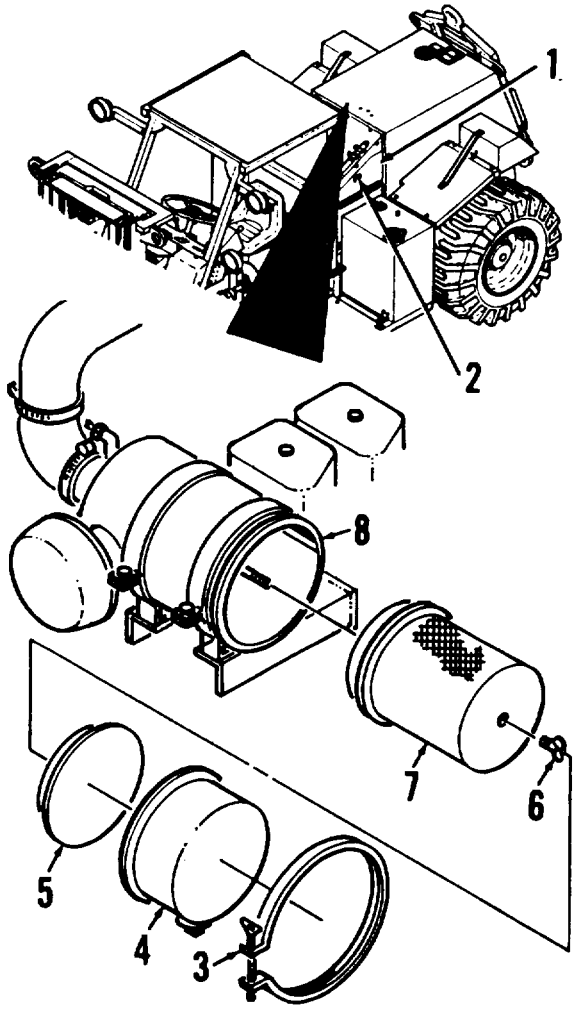
A. REMOVAL

1. Open access door (1) located on left side transmission cover by rotating handle (2) counterclockwise.
2. Loosen clamp (3). Remove clamp, cup (4), and baffle (5) from air cleaner (8).
3. Remove wing nut (6) and slide filter element (7) out of air cleaner (8).

B. CLEANING

CAUTION
Do not tap the element against a hard surface as this can damage the element.

1. Remove loose dust from the filter element by tapping the element with the palm of your hand.



WARNING

Compressed air used for cleaning purposes will not exceed 30 psi (206 kPa). Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).

2. Remove remaining dust from the filter element using compressed air under 30 psi (206 kPa). Blow the air up and down the pleats from the inside of the element. Be careful not to damage or tear the element.

3. Clean interior of air cleaner by wiping with a damp cloth.

4. Clean remaining air cleaner assembly components in accordance with paragraph 1-24.

C. INSPECTION

Inspect filter element to ensure all dirt is removed. Inspect for obvious damage to filter surface. Discard if dirty or damaged.

D. INSTALLATION

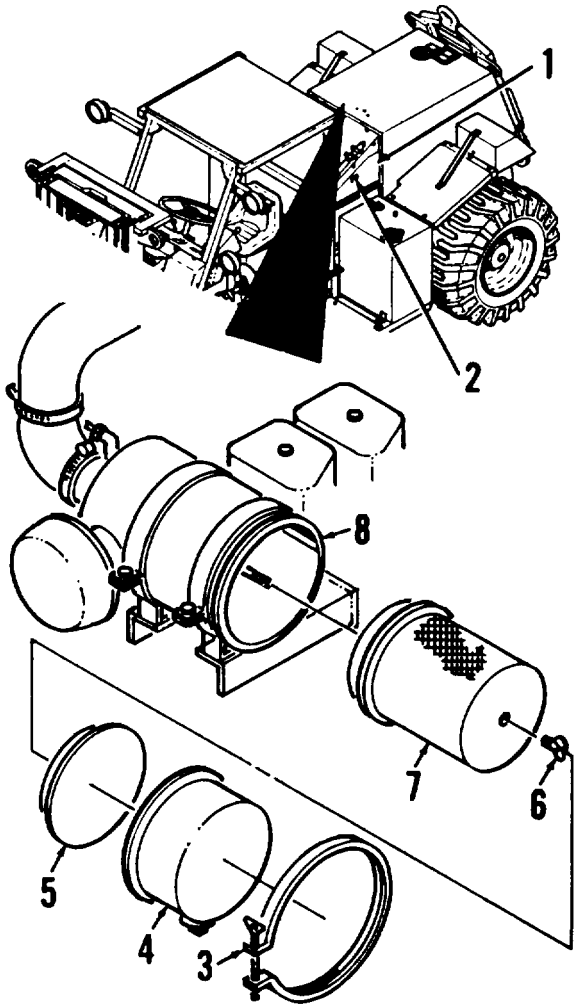
1. Slide filter element (7) into air cleaner (8). Secure using wing nut (6).

NOTE

When installing cup (4) onto air cleaner (8), ensure evacuator valve points down.

2. Install baffle (5), cup (4), and clamp (3) onto air cleaner (8). Secure by tightening clamp.

3. Close access door (1) and secure by rotating handle (2) clockwise until fully engaged.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-30. AIR RESTRICTION INDICATOR REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

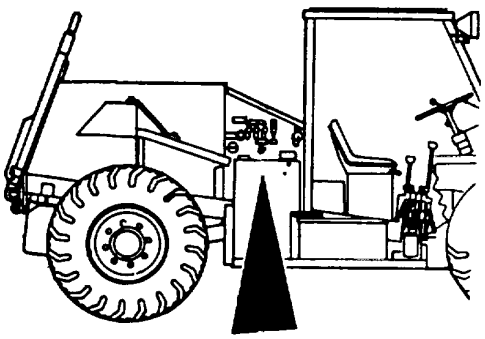
Materials / Parts:

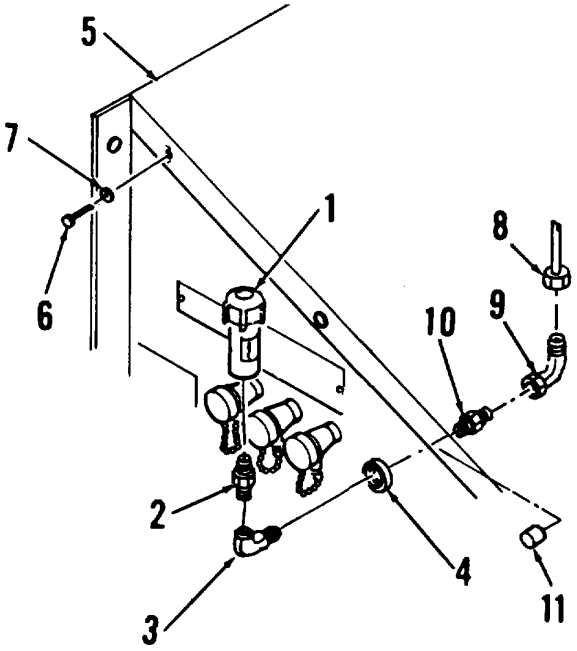
Loctite 242 (20, App. C)

A. REMOVAL

NOTE
Air restriction indicator can be removed without removing transmission top cover. Remove cover only if nipple, elbow, or hose replacement is required.

1. Unscrew air restriction indicator (1) from pipe nipple (2). Remove pipe nipple from elbow (3).
2. Remove elbow (3) from welded pipe coupling (4). Plug pipe coupling.
3. If required, remove transmission cover top (5) from cover frame and transmission side plates by removing nine screws (6) and washers (7).
4. Tag and disconnect hose assembly (8) from elbow (9). Remove elbow and indicator adapter (10) from welded pipe coupling (4).





B. CLEANING

Clean air restriction indicator and associated components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect air restriction indicator for obvious damage. Replace if damaged.

2. Inspect remaining components in accordance with paragraph 1-24.

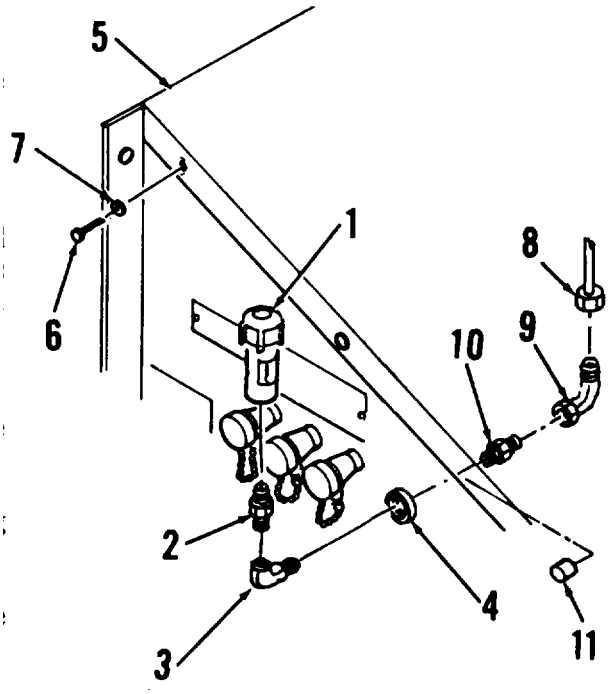
D. INSTALLATION

1. Install indicator adapter (10) into welded pipe coupling (4). Ensure filter (11) faces coupling (4). Install elbow (9) and connect hose assembly (8).

2. Apply loctite to threads of nine screws (6). Position transmission top cover (5) in place and secure using screws and washers (7).

3. Install elbow (3) into welded pipe coupling (4). Install pipe nipple (2) into elbow.

4. Install air restriction indicator (1) onto pipe nipple (2).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-31. AIR INLET CAP REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Equipment Condition:

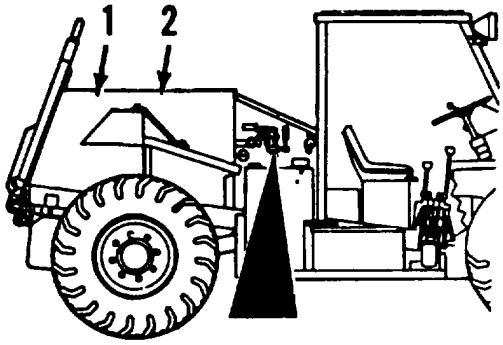
Towbar lowered (para. 2-126)

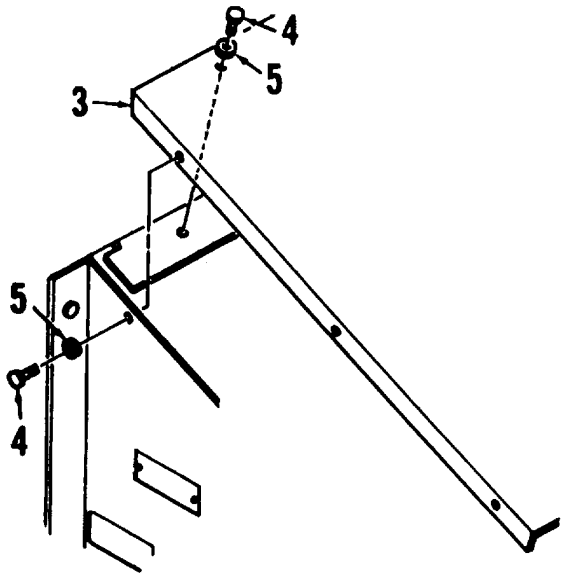
Materials / Parts:

Loctite 242 (20, App. C)

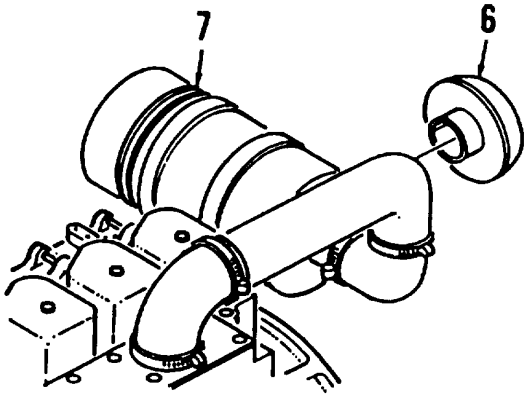
A. REMOVAL

1. Release hood assembly (2) by lifting handle (1). Open hood assembly.
2. Remove transmission top cover (3) from cover frame and transmission side plates by removing nine screws (4) and washers (5).





3. Remove air inlet cap (6) from air cleaner (7).



B. CLEANING

Clean air inlet cap in accordance with paragraph 1-24.

C. INSPECTION

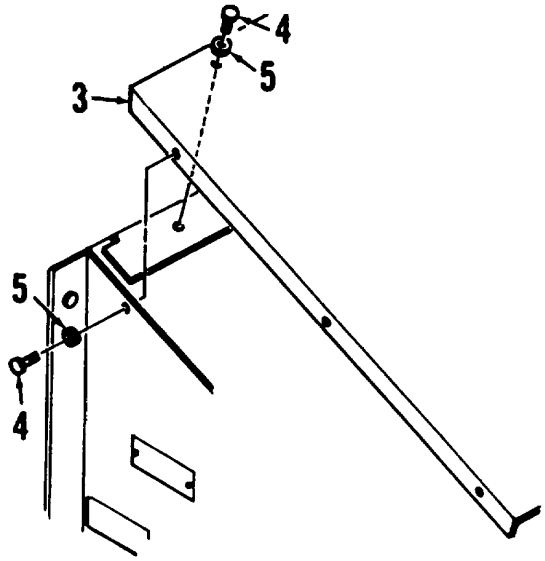
Inspect air inlet cap for obvious damage. Replace if damaged.

D. INSTALLATION

1. Install air filter cap (6) onto air cleaner (7).

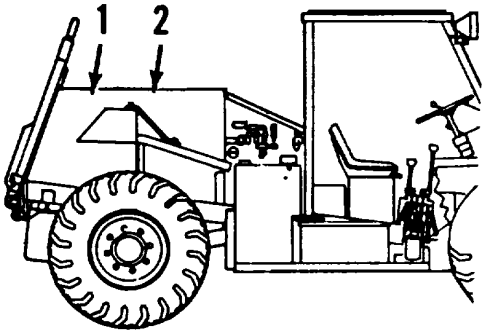
2. Apply loctite to threads of nine screws (4). Install transmission top cover (3) and secure with screws and washers (5).

3. Close hood assembly (2). Ensure handle (1) is fully engaged.



FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)



END OF TASK

2-32. EVACUATOR VALVE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

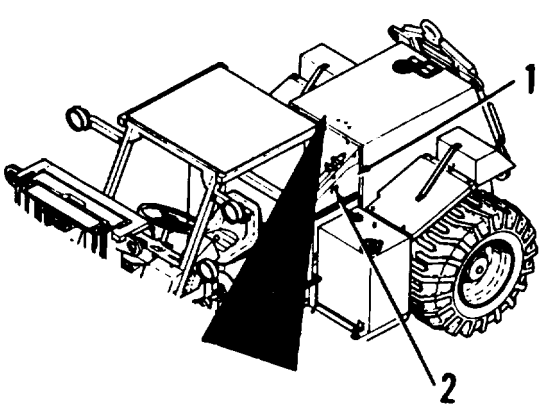
INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

A. REMOVAL

1. Open access door (1) located on left side transmission cover by rotating handle (2) counterclockwise.
2. Remove evacuator valve (4) from air cleaner (5) by loosening clamp (3).



B. CLEANING

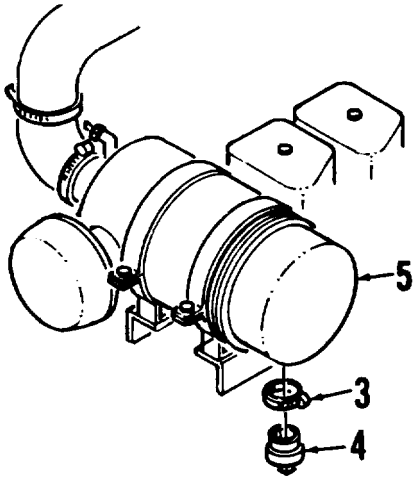
Clean evacuator valve in accordance with paragraph 1-24.

C. INSPECTION

Inspect evacuator valve for obvious damage. Replace if damaged.

D. INSTALLATION

1. Install evacuator valve (4) onto air cleaner (5) and secure using clamp (3).
2. Close access door (1) and secure by rotating handle (2) clockwise until fully engaged.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-33. AIR INLET TUBE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App E)

Equipment Condition:

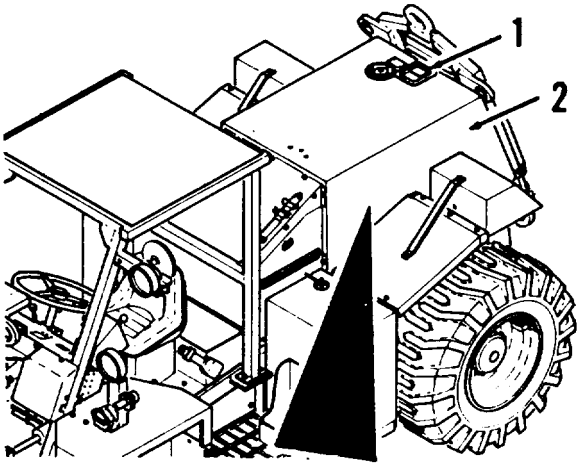
Towbar lowered (para 2-126)

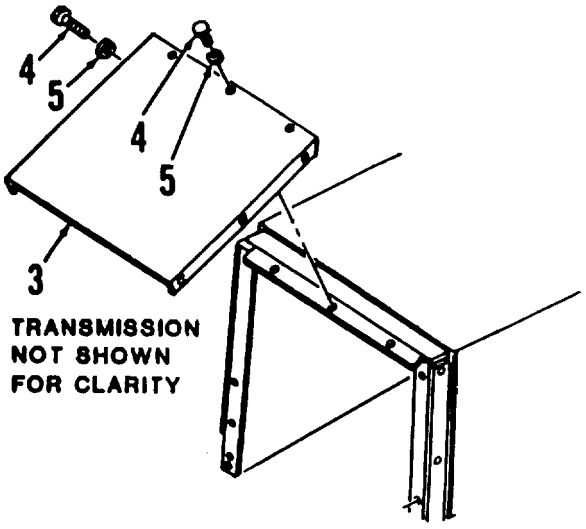
Material / Parts:

Loctite 242 (20, App. C)

A. REMOVAL

1. Release hood assembly (2) by lifting handle (1). Open hood assembly.
2. Remove transmission top cover (3) from cover frame and transmission side plates by removing nine screws (4) and washers (5).





3. Loosen clamps (7). Remove air inlet tube (6) from air inlet elbows.

4. Loosen clamp (9) and remove air inlet elbow (8) from air cleaner (13).

5. Loosen clamp (11) and remove air inlet elbow (12) from engine manifold (10).

B. CLEANING

Clean air inlet tube and fittings in accordance with paragraph 1-24.

C. INSPECTION

Inspect tube and elbows for cracks and splits. Inspect clamps for proper operation.

D. INSTALLATION

1. Install short leg of air inlet elbow (12) onto engine manifold (10). Secure using clamp (11).

2. Install short leg of air inlet elbow (8) onto air cleaner (13). Secure using clamp (9).

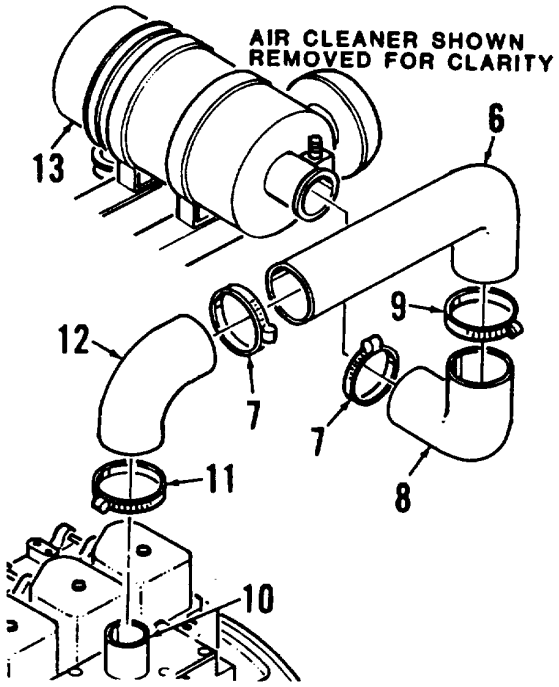
3. Mate air inlet tube (6) to air inlet elbows (8, 12). Secure using clamps (7).

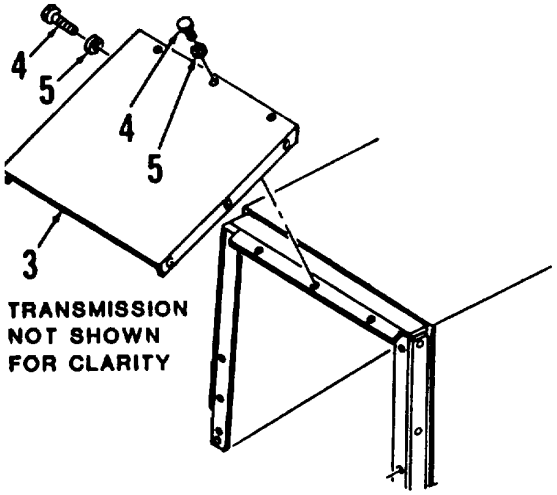
4. Apply loctite to threads of nine screws (4). Install transmission top cover (3) and secure with screws and washers (5).

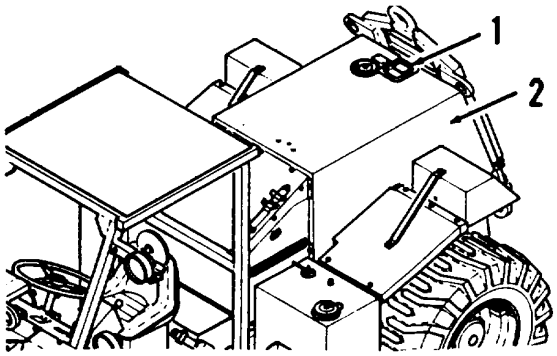
5. Close hood assembly (2). Ensure handle (1) is fully engaged.

FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)







END OF TASK

2-34. FUEL TANK SERVICING

This task covers: Draining, Strainer Removal, Cleaning, Inspection, Strainer Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

Materials / Parts:

Diesel Fuel (11, 12, 13, App. C)
Teflon Tape (35, App. C)
Loctite 242 (20, App. C)
Gasket, Item 7 (2 ea.)

A. DRAINING

WARNING

Fuel is very flammable and can easily explode. To avoid serious injury or death, observe the following precautions:

- Keep away from open flame or any spark (ignition source).

- Keep at least a B-C fire extinguisher within easy reach when working with fuel or on the fuel system.

- Do not work on fuel system when engine is hot.

- Post signs that read "NO SMOKING WITHIN 50 FEET" when working with open fuel, fuel lines, or fuel tank.

1. Place handle of fuel shutoff valve (1) in closed position (handle parallel to side of tank).

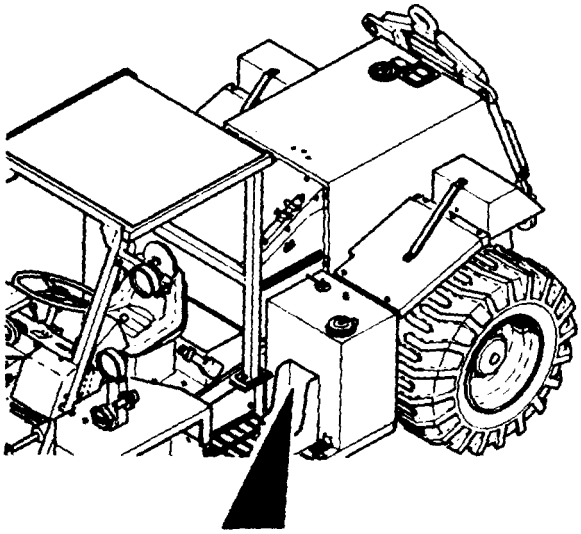
NOTE

Fuel tank capacity is 27 gallons. It may be necessary to drain tank in portions.

2. Place pan beneath drain plug (2) in bottom of tank (3). Remove drain plug and drain fuel tank.

3. Wrap threads of drain plug (2) with teflon tape. Reinstall drain plug after all fuel is drained.

4. Place handle of shutoff valve (1) in open position after servicing fuel tank.



B. STRAINER REMOVAL

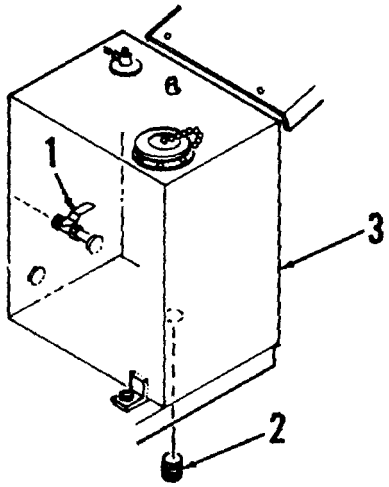
1. Remove cap (4) from flange (5). Remove flange from fuel tank (3) by removing six screws (6).

NOTE

To avoid possible contamination, cover filler neck opening once strainer has been removed.

2. Remove gaskets (7) and fuel strainer (8). Discard gaskets.

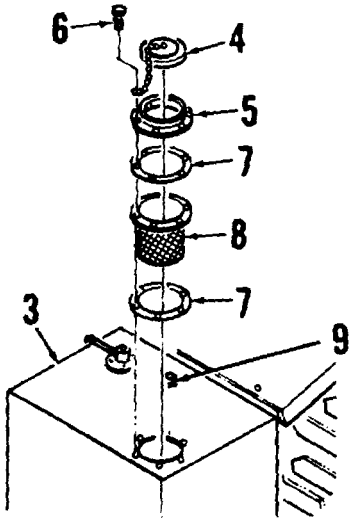
3. Remove breather (9) from fuel tank (3).



C. CLEANING

1. Clean fuel strainer and breather by agitating in clean fuel. Ensure all particles are removed from mesh. Allow to air dry.

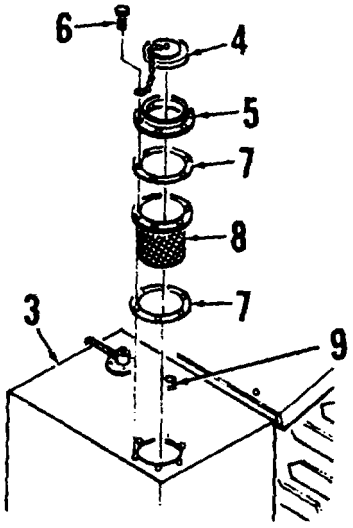
2. Clean remaining components in accordance with paragraph 1-24.



D. INSPECTION

1. Inspect fuel strainer for cuts, tears, cracks, corrosion, or other damage. Replace if damaged.

2. Inspect remaining components in accordance with paragraph 1-24.



E. STRAINER INSTALLATION

1. Wrap threads of breather (9) with teflon tape. Install breather into fuel tank (3), ensuring breather port points towards engine compartment.

2. Install fuel strainer (8) and new gaskets (7) onto fuel tank (3).

3. Install flange (5). Apply loctite to six screws (6). Align screw holes and install screws. Install cap (4) onto flange.

F. SERVICING

Service fuel tank using approved fuel. Check fittings for leaks and tighten as required.

FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-35. FUEL LINE AND FITTING REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App E)
Towbar lowered (para. 2-126)

Equipment Condition:

Feel tank servicing, (para. 2-34), fuel drained

Materials / Parts:

Teflon Tape (35, App. C)

A. REMOVAL

WARNING

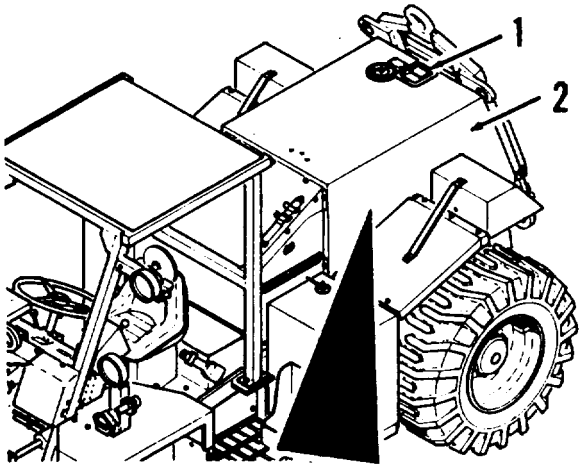
Fuel is very flammable and can easily explode. To avoid serious injury or death, observe the following precautions:

Keep away from open flame or any spark (ignition source).

- Keep at least a B-C fire extinguisher within easy reach when working with fuel or on the fuel system.

- Do not work on fuel system when engine is hot.

- Post signs that read "NO SMOKING WITHIN 50 FEET" when working with open fuel, fuel lines, or fuel tank.



1. Release hood assembly (2) by lifting handle (1). Open hood assembly.

NOTE

Place pan beneath fuel lines when removing to capture residual fuel.

2. Disconnect fuel supply line (3) from elbow (4) and fitting (5).

3. Disconnect fuel supply line (6) from elbow (7) and fuel pump (8).

4. Remove fitting (5) and elbow (7) from fuel/water separator (10) only if replacement is required.

5. Disconnect fuel return line (II1) from elbow (12) and fitting (13). Remove elbow and fitting only if replacement is required.

B. CLEANING

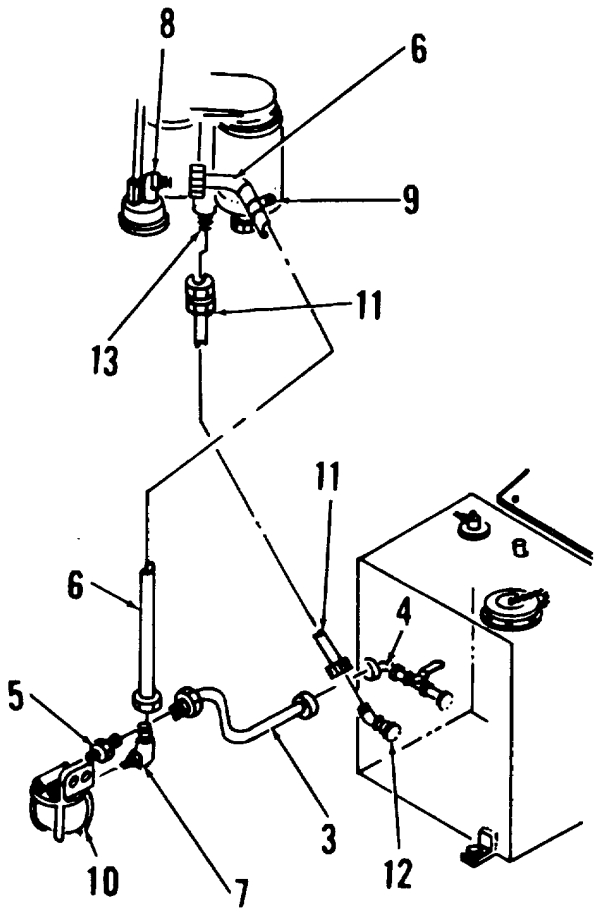
Clean fuel lines and fittings in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect fuel lines for cracks, splits, cuts, evidence of leakage, and obvious damage. Replace line if damaged.

2. Inspect fuel line nuts for security. Check for crossed, stripped, or damaged threads.

3. Inspect fuel fittings and related components in accordance with paragraph 1-24.



D. INSTALLATION

NOTE
Wrap pipe threads of all fuel fittings with teflon tape before assembling.

1. Install elbow (12) and fitting (13). Connect fuel return line (11) to elbow and fitting.

2. Install fitting (5) and elbow (7) into fuel/water separator (10).

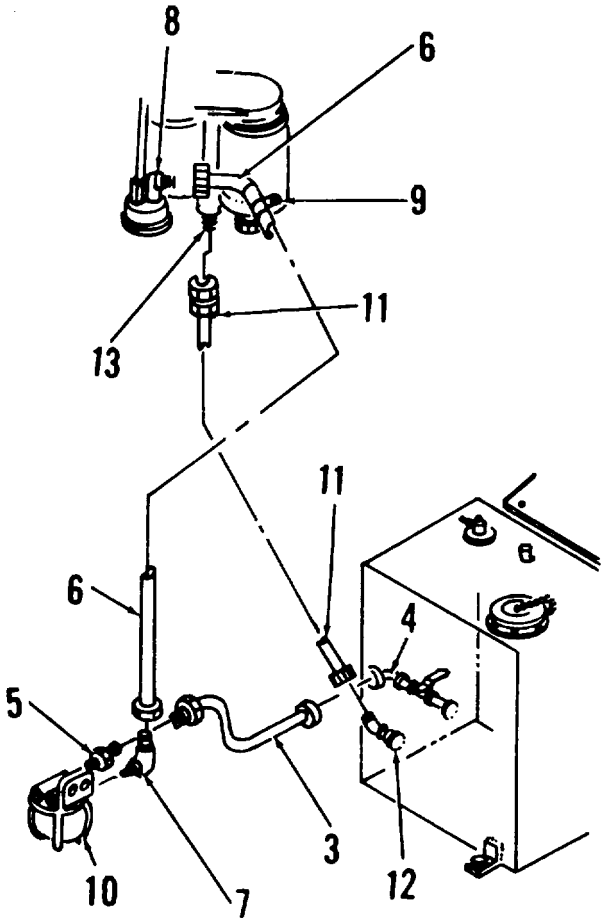
3. Connect fuel supply line (6) to elbow (7) and fuel pump (8). Secure fuel supply line using two clamps (9) and attaching hardware.

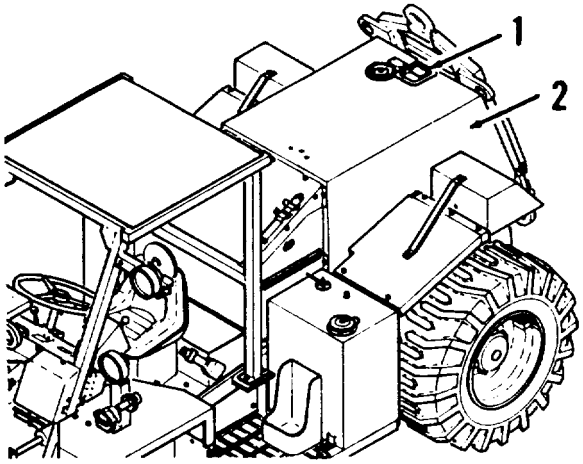
4. Connect fuel supply line (3) to elbow (4) and fitting (5).

5. Close hood assembly (2). Ensure handle (1) is fully engaged.

FOLLOW-ON MAINTENANCE:

Service fuel tank (para. 2-34) Bleed fuel system (para. 2-27) Raise towbar and lock in position (para. 2-126)





END OF TASK

2-36. FUEL FILTER ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Oil Filter Tool (27, App. E)
Torque Wrench (32, App. E)
Drain Pan (10, App. E)

Equipment Condition:

Towbar lowered (para. 2-126)

Materials / Parts:

Diesel Fuel (11, 12, 13, App. C)
Engine Oil (14, App. C)
Fuel Filter, Item 3 (1 ea.)
Fuel Filter, Item 6 (1 ea.)
Filter Seal, Item 5 (1 ea.)
Filter Seal, Item 7 (1 ea.)
Ring Seal, Item 10 (1 ea.)
Ring Seal, Item 11 (1 ea.)

A. REMOVAL

WARNING

Fuel is very flammable and can easily explode. To avoid serious injury or death, observe the following precautions:

- Keep away from open flame or any spark (ignition source).

- Keep at least a B-C fire extinguisher within easy reach when working with fuel or on the fuel system.

- Do not work on fuel system when engine is hot.

- Post signs that read "NO SMOKING WITHIN 50 FEET" when working with open fuel, fuel lines, or fuel tank.

1. RELEASE HOOD ASSEMBLY (2) BY LIFTING HANDLE (1). OPEN HOOD ASSEMBLY.

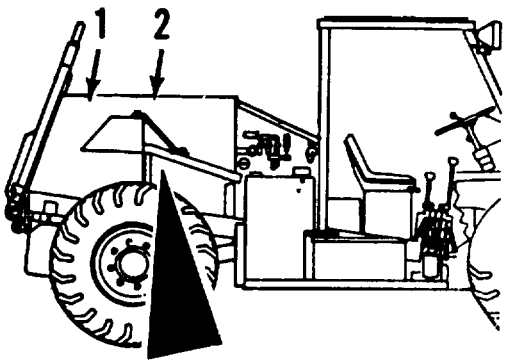
2. PLACE DRAIN PAN BENEATH FILTERS. REMOVE FUEL FILTERS (3, 6) AND FILTER HEAD (4).

   a. Remove fuel filter (3) from filter head (4) using a oil filter tool. Remove and discard filter seal (5).

   b. Remove fuel filter (6) from filter head (4) using a strap wrench. Remove and discard filter seal (7).

   c. Remove jam nut (8) and filter head adapter (9) from engine block.

   d. Remove filter head (4). Remove and discard ring seals (10, 11).

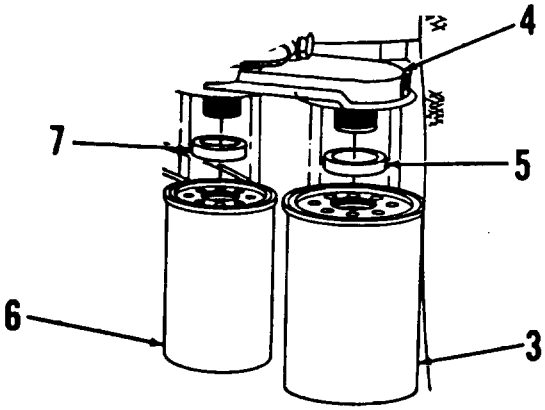


B. CLEANING

Clean filter head and adapter in accordance with paragraph 1-24.

C. INSPECTION

Inspect components in accordance with paragraph 1-24.



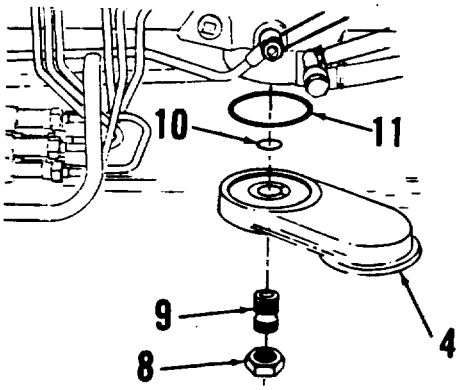
D. INSTALLATION

1. INSTALL FILTER HEAD (4).

   a. Install new ring seals (10, 11) onto filter head (4).

   b. Mate filter head (4) to engine block. Install filter head adapter (9) and jam nut (8).

2. TORQUE JAM NUT (8) TO 24 FT-LBS (32 Nm).



3. INSTALL FUEL FILTERS (3, 6).

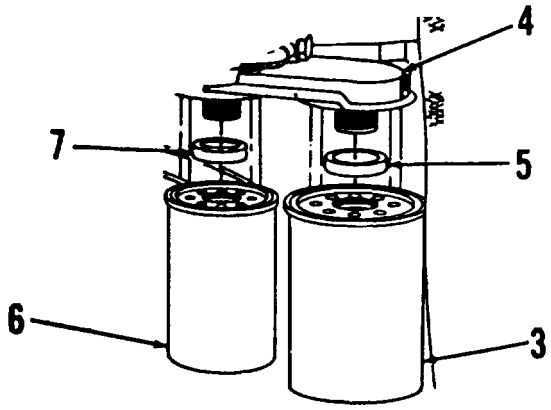
   a. Fill new fuel filter (3) with clean fuel.

   b. Lubricate filter seal (5) with lubricating oil.

   c. Install filter (3) and hand tighten until filter seal (5) contacts filter head (4). Tighten an additional 1/2 turn.

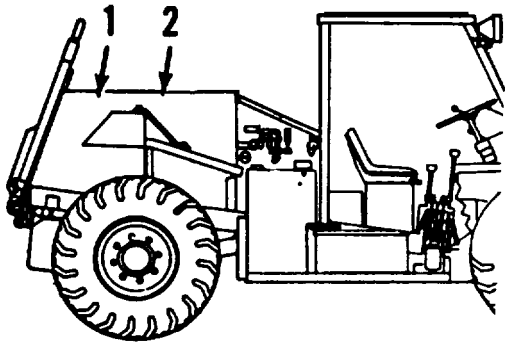
   d. Repeat steps a. through c. for fuel filter (6) and seal (7).

4. CLOSE HOOD ASSEMBLY (2). ENSURE HANDLE (1) IS FULLY ENGAGED.



FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)



END OF TASK

2-37. FUEL/WATER SEPARATOR REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

Materials / Parts:

Teflon Tape (35, App. C)
O-Ring, Item 10 (1 ea.)
O-Ring, Item 111 (lea.)
O-Ring, Item 13 (2 ea.)

A. REMOVAL

WARNING

Fuel is very flammable and can easily explode. To avoid serious injury or death, observe the following precautions:

- Keep away from open flame or any spark (ignition source).

- Keep at least a B-C fire extinguisher within easy reach when working with fuel or on the fuel system.

- Do not work on fuel system when engine is hot.

- Post signs that read "NO SMOKING WITHIN 50 FEET" when working with open fuel, fuel lines, or fuel tank.

NOTE

Fuel/water separator is located behind fuel tank, attached to mounting bracket on inside of chassis side rail.

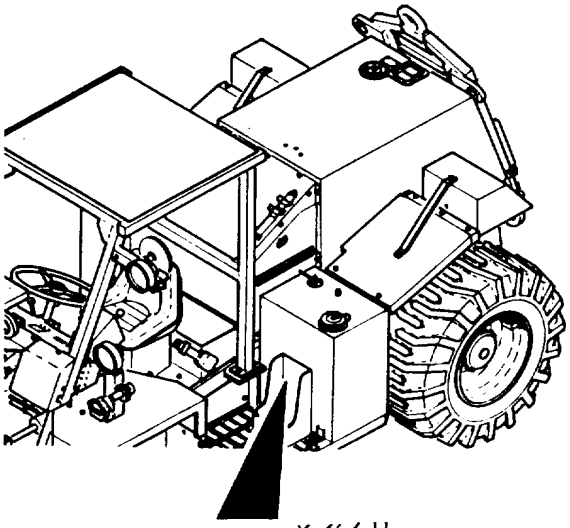
1. Place handle of fuel shutoff valve in closed position.

2. Place drain pan beneath fuel/water separator (3). Tag and disconnect fuel lines (1, 2) from fuel/water separator.

3. Remove fuel/water separator (3) from mounting bracket (4) by removing screws (5), lockwashers (6), and washers (7).

4. Remove fitting (8) and elbow (9) from fuel/water separator (3). Remove and discard O-rings (10, 11).

5. Remove two plugs (12) from fuel/water separator (3). Remove and discard O-rings (13).



B. CLEANING

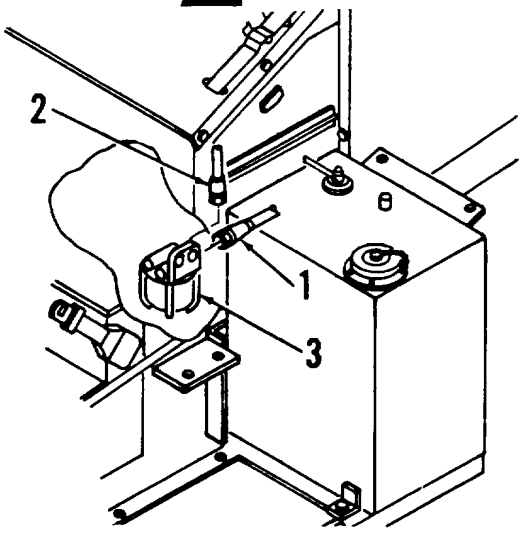
Clean fuel/water separator in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect fuel lines for cracks, splits, cuts, evidence of leakage, and obvious damage. Replace line if damaged.

2. Inspect fuel line nuts for security. Check for crossed, stripped, or damaged threads.

3. Inspect fuel/water separator and related components in accordance with paragraph 1-24.



D. INSTALLATION

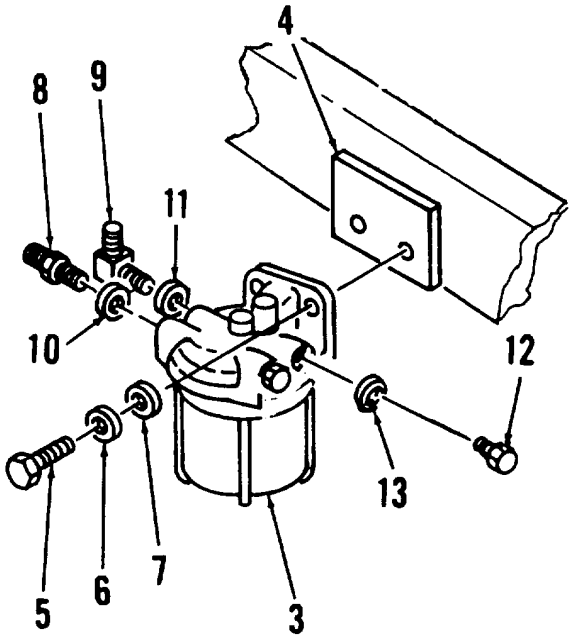
NOTE

Wrap pipe threads of fuel fitting and elbow with teflon tape before assembling.

1. Install two plugs (12) and new O-rings (13) into fuel/water separator (3).

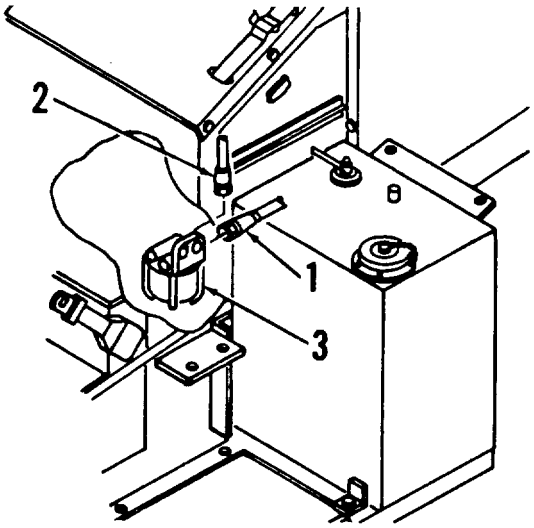
2. Install fitting (8), elbow (9), and new O-rings (10, 11) into fuel/water separator (3).

3. Install fuel/water separator (3) onto mounting bracket (4) using screws (5), lockwashers (6), and washers (7).



4. Connect fuel lines (1, 2) to fuel/water separator (3).

5. Place handle of fuel shutoff valve in the open position.



FOLLOW-ON MAINTENANCE:

Service fuel tank (para. 2-34)
Bleed fuel lines (para. 2-27)

END OF TASK

2-38. ETHER INJECTOR THERMOSTAT REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

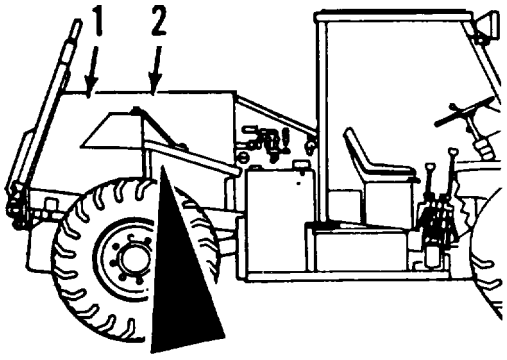
General Mechanics Tool Kit (1, App. E)

Equipment Condition:

Towbar lowered (para. 2-126)

A. REMOVAL

1. Release hood assembly (2) by lifting handle (1). Open hood assembly.
2. Disconnect electrical lead (3) from ether injector thermostat (4).
3. Remove ether injector thermostat (4) from engine head assembly (5).

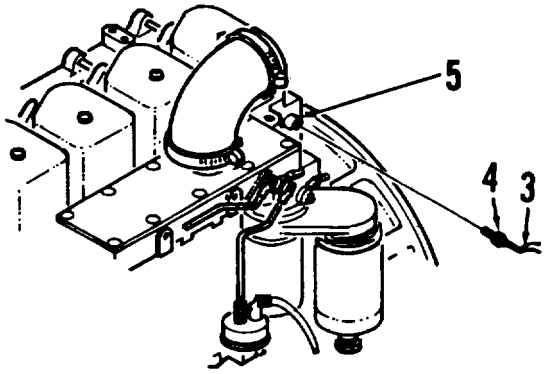


B. CLEANING

Clean ether injector thermostat in accordance with paragraph 1-24.

C. INSPECTION

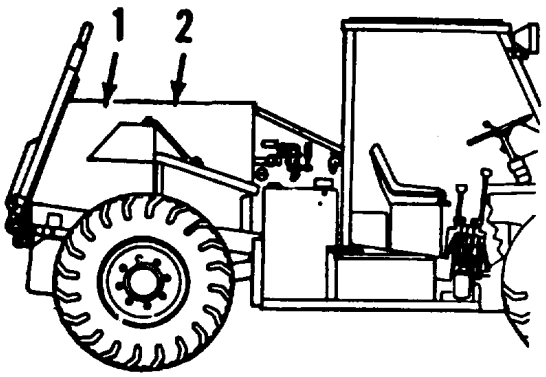
Inspect thermostat and related components in accordance with paragraph 1-24.



D. INSTALLATION

1. Insert ether injector thermostat (4) into engine head assembly (5).
2. Connect electrical lead (3) to ether injector thermostat (4).

3. Close hood assembly (2). Ensure handle (1) is fully engaged.



FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)

END OF TASK

2-39. ETHER INJECTOR ATOMIZER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Container for catching residual fluids

Equipment Condition:

Towbar lowered (para. 2-126)

A. REMOVAL

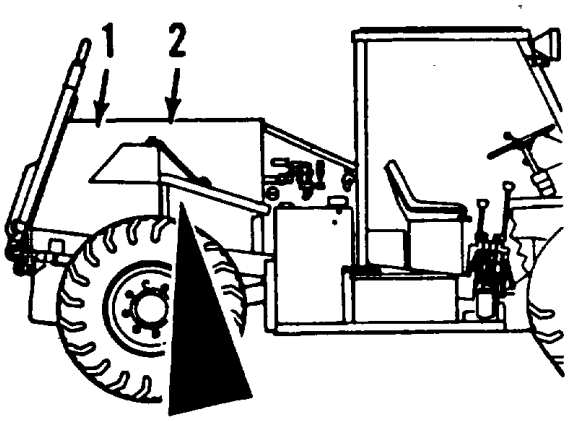
1. Release hood assembly (2) by lifting handle (1). Open hood assembly.
2. Place container beneath tube assembly (3). Disconnect tube assembly from ether injector atomizer (4).
3. Remove ether injector atomizer (4) from engine intake manifold (5).

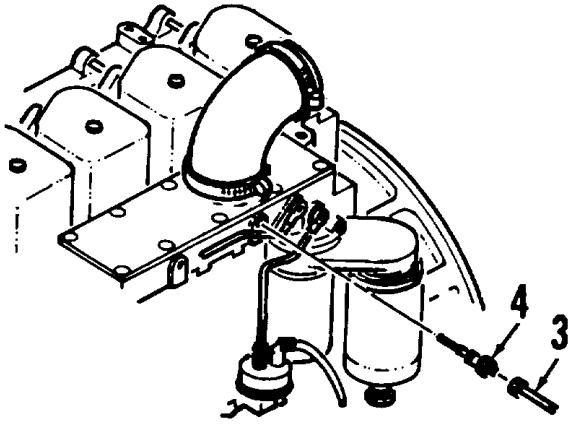
B. CLEANING

Clean ether injector atomizer in accordance with paragraph 1-24.

C. INSPECTION

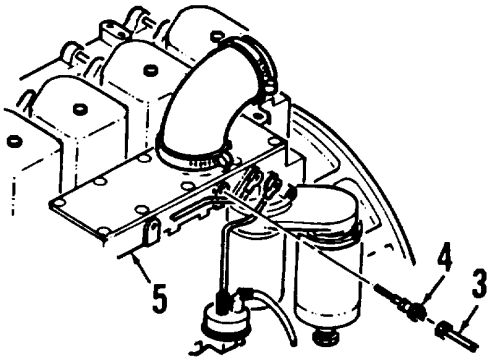
Inspect atomizer and related components in accordance with paragraph 1-24.





D. INSTALLATION

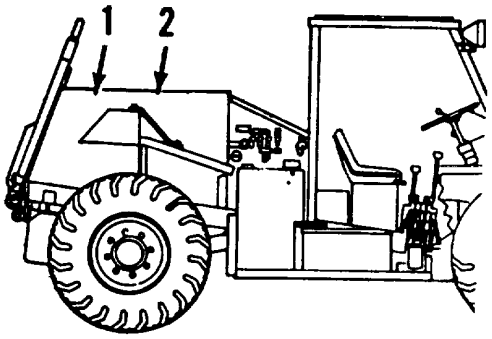
1. Insert ether injector atomizer (4) into engine intake manifold (5).
2. Connect tube assembly (3) to ether injector atomizer (4).
3. Close hood assembly (2). Ensure handle (1) is fully engaged.



FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)

END OF TASK



2-40. ETHER CYLINDER REPLACEMENT

This task covers: Removal and Installation

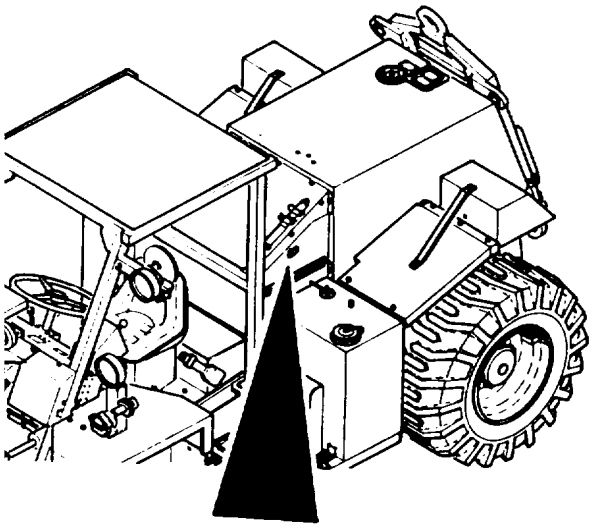
INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

A. REMOVAL

1. Open transmission access door (1) by rotating handle (2) left.



WARNING

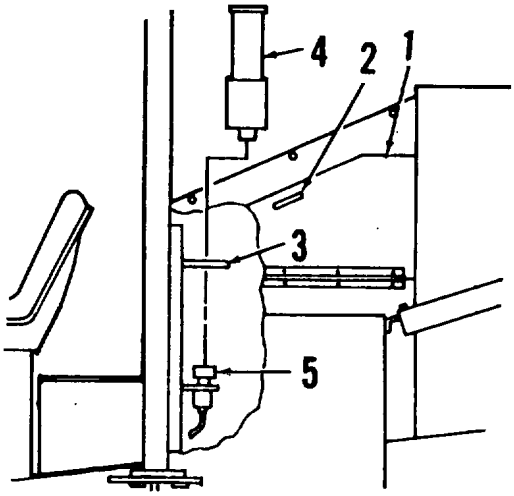
Starting fluid is toxic and highly flammable. Container is pressurized. Never heat container and never discharge starting fluid in confined areas or near an open flame. Failure to comply can result in severe injury.

2. Loosen clamp (3) until it is completely disconnected. Remove ether canister (4) from injector assembly (5) by turning left.

B. INSTALLATION

1. Install new ether canister (4) into injector assembly (5) by turning right. Secure by tightening clamp (3).

2. Close transmission access door (1) and secure by rotating handle (2).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-41. ACCELERATOR CONTROL RESERVOIR REPLACEMENT

This task covers: Removal, Cleaning, Inspection, Installation, and Servicing

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

Equipment Condition:

Master cylinder replacement (para. 2-111), cylinder cover removed

Materials / Parts:

Brake Fluid (5, App. C)

A. REMOVAL

1. Place drain pan beneath accelerator control reservoir (2). Disconnect hose (1) from base of reservoir. Cap connection.
2. Remove throttle control reservoir (2) from master cylinders (4) by removing nut (3).

B. CLEANING

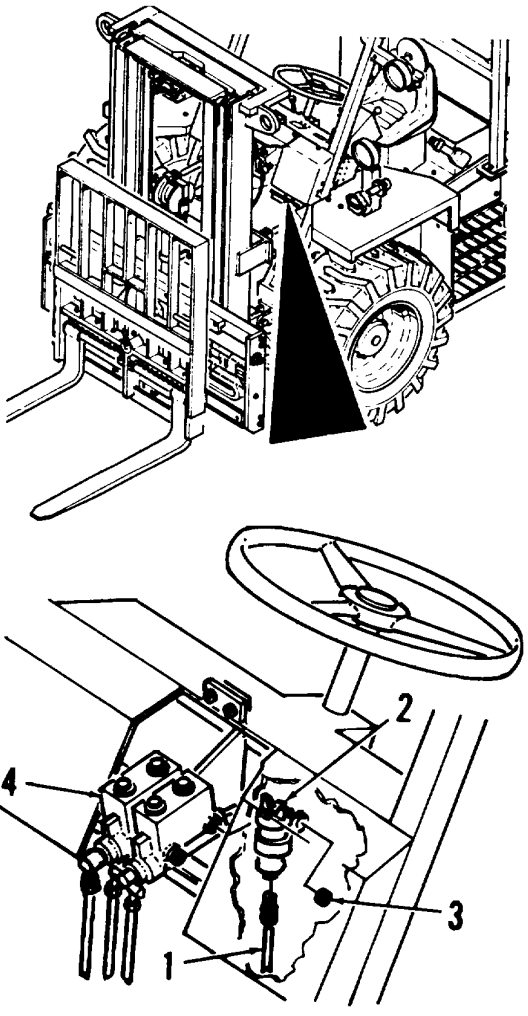
Clean throttle control reservoir in accordance with paragraph 1-24. Reservoir filler cap may be removed from housing to allow internal **cleaning**.

C. INSPECTION

Inspect reservoir and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install throttle control reservoir (2) onto master cylinders (4) using nut (3).
2. Connect hose (1) to base of throttle control reservoir (2).



E. **SERVICING**

1. Remove cap from throttle control reservoir and add brake fluid until fluid level is one-half inch (12.5 mm) from top of reservoir.

2. Install cap onto throttle control reservoir.

FOLLOW-ON MAINTENANCE:

Bleed accelerator actuator (para. 2-44)
Bleed accelerator slave cylinder (para. 2-43)
Install master cylinder cover(s) (para. 2-111)

END OF TASK

2-42. ACCELERATOR SLAVE CYLINDER ADJUSTMENT

This task covers: Adjustment

INITIAL SETUP:

Tools and Test Equipment:

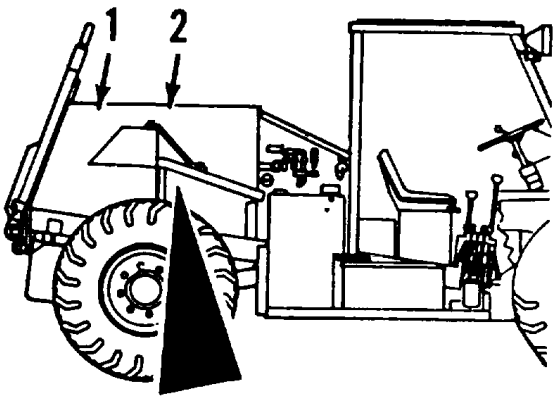
General Mechanics Tool Kit (1, App. E)

Equipment Condition:

Towbar lowered (para. 2-126)

A. ADJUSTMENT

1. Release hood assembly (2) by lifting handle (1). Open hood assembly.



NOTE

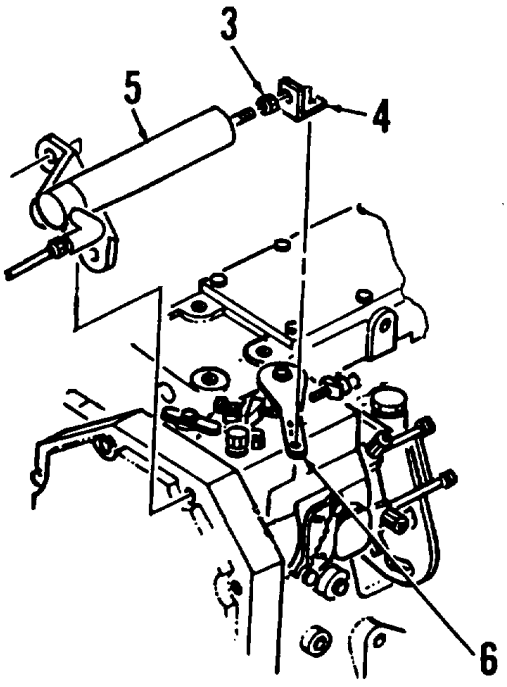
The accelerator slave cylinder (5) requires occasional adjustment to ensure full travel of the fuel pump lever arm (6).

2. Loosen nut (3).

3. Adjust position of cylinder threaded rod in bracket (4). Tighten nut (3) against bracket.

4. Start up forklift and operate accelerator pedal to ensure proper cylinder adjustment.

5. Close hood assembly (2). Ensure handle (I) is fully engaged.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-43. ACCELERATOR SLAVE CYLINDER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

Equipment Condition:

Towbar lowered (para. 2-126)

A. REMOVAL

1. RELEASE HOOD ASSEMBLY (2) BY LIFTING HANDLE (1). OPEN HOOD ASSEMBLY.

2. PLACE DRAIN PAN BENEATH CYLINDER ELBOW (4). DISCONNECT HOSE (3) FROM ELBOW. CAP HOSE END.

4. REMOVE ACCELERATOR SLAVE CYLINDER (5) FROM BRACKET (7) AND MOUNT (12). REMOVE BRACKET AND MOUNT AS REQUIRED.

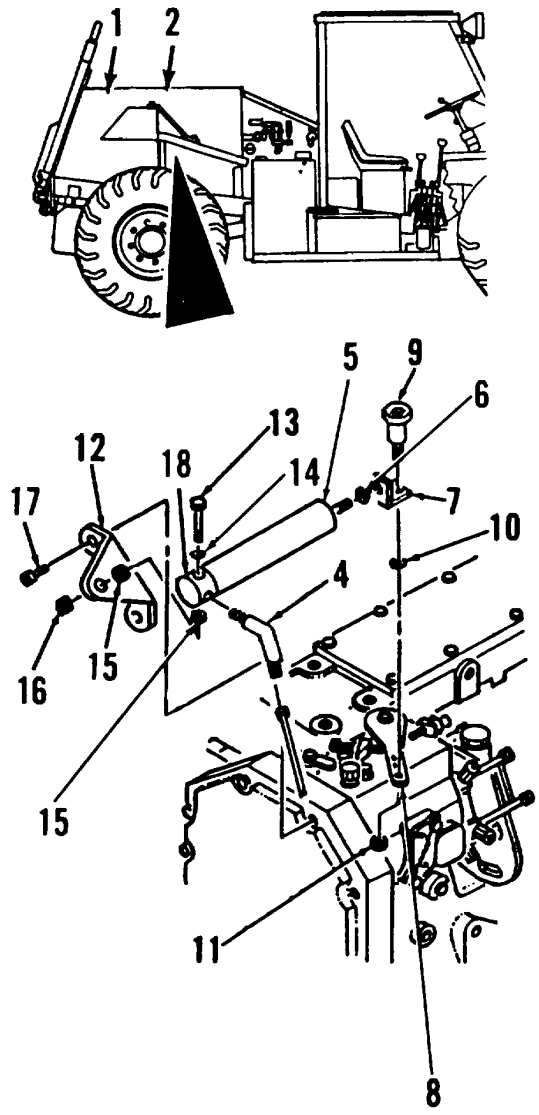
   a. Remove bracket (7) from fuel pump control lever (8) by removing shoulder bolt (9), washer (10), and nut (11).

   b. Release accelerator slave cylinder (5) from bracket (7) by loosening nut (6) and removing threaded cylinder rod from bracket.

   c. Remove accelerator slave cylinder (5) from throttle mount (12) by removing screw (13), washers (14), nut (15) and locknut (16).

   d. Remove elbow (4) from accelerator slave cylinder (5).

   e. Remove mount (12) from engine by removing screws (17).



B. CLEANING

Clean components in accordance with paragraph 1-24.

C. INSPECTION

Inspect components in accordance with paragraph 1-24.

D. INSTALLATION

1. INSTALL BRACKET (7) AND MOUNT (12). INSTALL ACCELERATOR SLAVE CYLINDER (5).

   a. Install mount (12) to engine using screws (17).

   b. Secure accelerator slave cylinder (5) to bracket (7) by threading cylinder rod into bracket and tightening nut (6) against bracket.

   c. Install bracket (7) to fuel pump control lever (8) using shoulder bolt (9), washer (10), and nut (11).

   d. Install elbow (4) into accelerator slave cylinder (5).

   e. Secure accelerator slave cylinder (5) to mount (12) using screw (13), washers (14), nut (15) and locknut (16).

2. CONNECT HOSE (3) TO ELBOW (4).

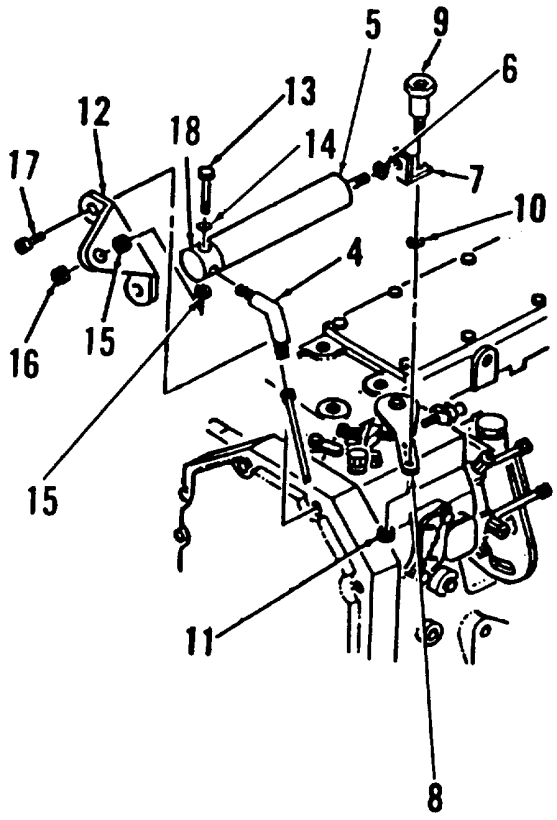
3. ADJUST THROTTLE CONTROL CYLINDER IN ACCORDANCE WITH PARAGRAPH 2-42.

NOTE

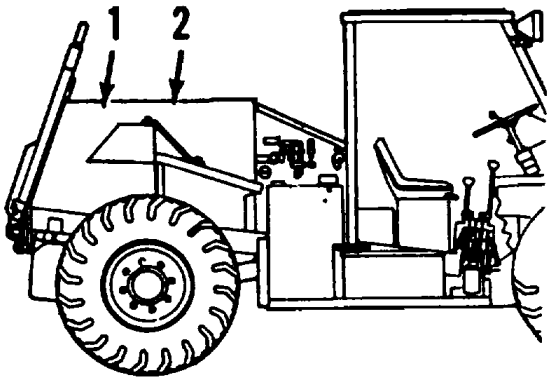
Capacity of throttle control reservoir is small. Check fluid level in reservoir frequently and add fluid as necessary during bleeding process.

4. BLEED ACCELERATOR SLAVE CYLINDER.

   a. Depress accelerator pedal and open bleeder screw (18) to allow air to escape.
   b. Close bleeder screw and release accelerator pedal.
   c. Repeat steps a. and b. until fluid flowing from bleeder screw is free of air.



5. CLOSE HOOD ASSEMBLY (2). ENSURE HANDLE (1) IS COMPLETELY ENGAGED.



FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)

END OF TASK

2-44. ACCELERATOR ACTUATOR WITH PEDAL REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

Materials / Parts:

Teflon Tape (35, App. C)
Brake Fluid (5, App. C)

Personnel Required:

2 Personnel

A. REMOVAL

1. DISCONNECT HOSES (1, 2) AND REMOVE ACCELERATOR ACTUATOR ASSEMBLY (3) FROM FLOOR PLATE.

   a. Place drain pan beneath accelerator actuator assembly (3).

   b. Disconnect hoses (1, 2) from elbow (7) and actuator fitting. Cap hose ends.

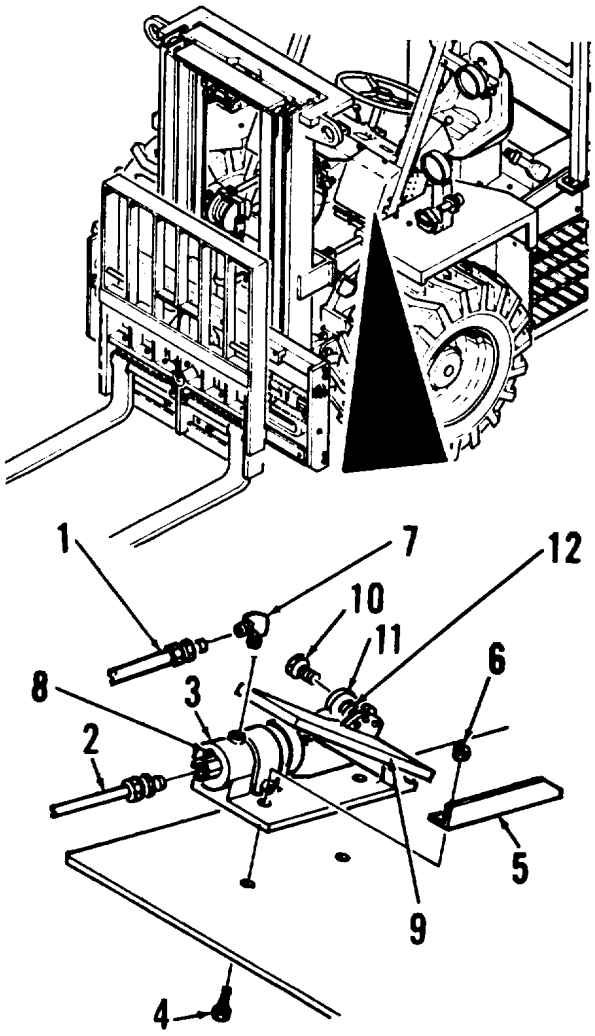
   NOTE

   Observe pedal (9) and note which mounting hole is used before removing screw (10). This will aid in reassembly.

   c. Remove screw (10) that secures rod end (11) to pedal (9). Remove spacer (12).

   d. Remove accelerator actuator assembly (3) from floor plate by removing screws (4), accelerator stop (5), and nuts (6).

   e. Remove elbow (7) from accelerator actuator assembly (3).

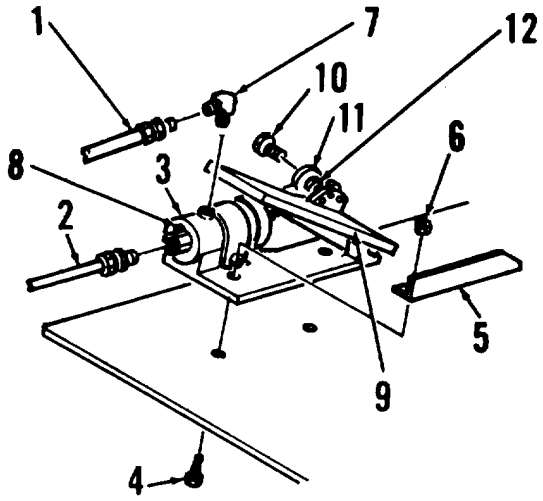


B. CLEANING

Clean accelerator actuator assembly in accordance with paragraph 1-24.

C. INSPECTION

Inspect actuator and related components in accordance with paragraph 1-24.



D. INSTALLATION

1. INSTALL ACCELERATOR ACTUATOR ASSEMBLY (3) ONTO FLOOR PLATE. CONNECT HOSES (1, 2).

   a. Apply teflon tape to threads of elbow (7). Install elbow into accelerator actuator assembly (3).

   b. Mate accelerator actuator assembly (3) to floor plate mounting holes. Install screws (4), accelerator stop (5), and nuts (6).

   c. Install spacer (12) between rod end (11) and pedal (9). Install screw (10) into mounting hole noted during removal.

   d. Connect hoses (1, 2) to elbow (7) and accelerator actuator assembly fitting.

2. BLEED ACTUATOR ASSEMBLY.

NOTE

Capacity of throttle control reservoir is small. Check fluid level in reservoir frequently and add fluid as necessary during bleeding process.

   a. Depress accelerator pedal and open bleeder screw (8) to allow air to escape.

   b. Close bleeder screw (8) and release accelerator pedal.

   c. Repeat steps a. and b. until fluid flowing from bleeder screw (8) is free of air.

FOLLOW-ON MAINTENANCE:

Service accelerator control reservoir (para. 2-41)

END OF TASK

Section VIII. EXHAUST SYSTEM MAINTENANCE

2-45. MUFFLER / SPARK ARRESTOR ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Equipment Condition:

Counterweight removed (para. 2-124)

Materials / Parts:

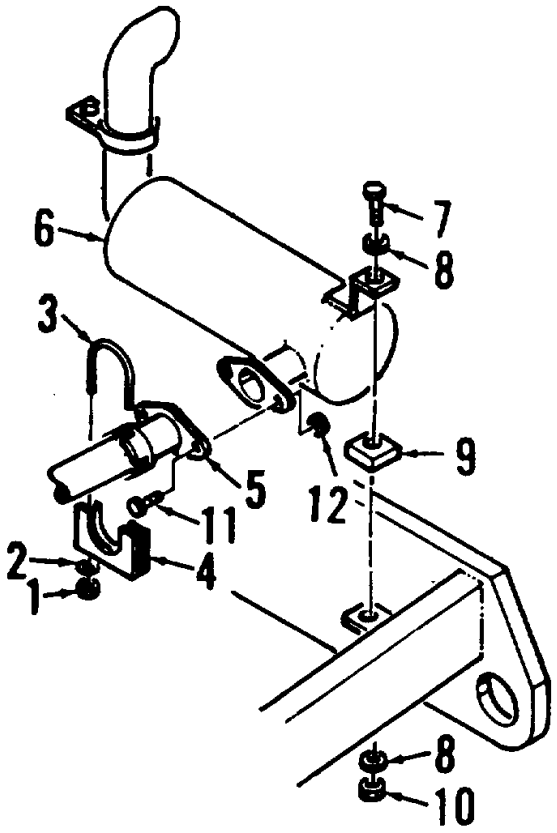
Locknut, Item 10 (2 ea)
Locknut, Item 12 (2 ea)

A. REMOVAL

WARNING

Significant burn hazard exists. Allow engine to cool before you perform maintenance on the muffler or exhaust pipe. Do not touch hot exhaust system with bare hands; injury will result. If necessary, use insulated pads and gloves.

1. Remove nuts (1) and washers (2). Separate U-bolt (3) from clamping brace (4).
2. Release inlet extension (5) from muffler (6) by removing screws (11) and locknuts (12). Discard locknuts.
3. Remove muffler (6) from forklift chassis by removing screws (7), washers (8), vibration mounts (9), and locknuts (10). Discard locknuts.



B. CLEANING

Clean muffler/spark arrestor in accordance with paragraph 1-24.

C. INSPECTION

Inspect muffler and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install muffler (6) onto forklift chassis using screws (7), washers (8), vibration mounts (9) and new locknuts (10).

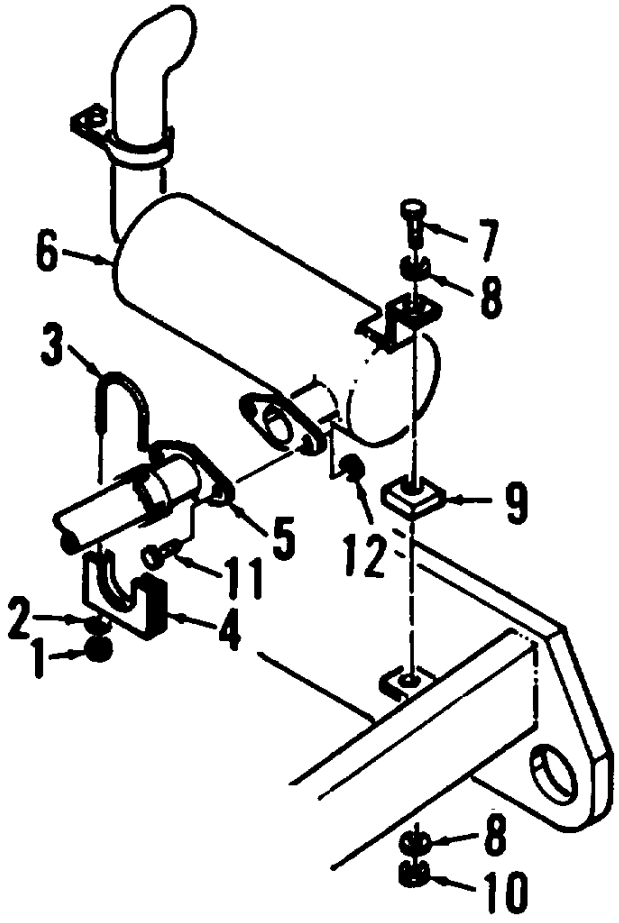
2. Mate inlet extension (5) onto muffler (6) Secure using screws (11) and new locknut: (12).

3. Secure inlet extension and exhaust pipe using clamping brace (4), U-bolt (3), washers (2) and nuts (1).

FOLLOW-ON MAINTENANCE:

Install counterweight (para. 2-124)

END OF TASK



Section IX. COOLING SYSTEM MAINTENANCE

2-46. RADIATOR ASSEMBLY SERVICING

This task covers: Draining, Servicing

INITIAL SETUP:

Tools and Test Equipment:

Drain Pan (10, App. E)

Materials / Parts:

Antifreeze (3, 4, App. C)

Reference:

TM 750-254

Equipment Condition:

Towbar lowered (para. 2-126)

A. DRAINING

WARNING

Do not remove the radiator cap when the engine is hot; hot steaming gases can escape and burn you. Use extreme care when removing the radiator cap. The sudden release of pressure can cause a steam flash which could seriously injure you. Slowly loosen cap to first stop to relieve pressure before removing cap completely. After use, tighten cap securely.

WARNING

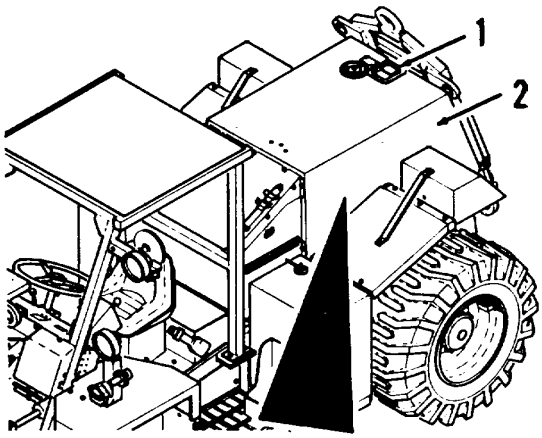
Use a clean thick waste cloth or like to remove the cap. Avoid using gloves, because you could be burned if hot water soaked through them.

1. Slowly loosen radiator cap (3) to first stop. Allow pressure release. Remove cap.

2. Release hood assembly (2) by lifting handle (1). Open hood assembly.

3. Place drain pan beneath drain tube (4). Move handle on drain cock (5) to open position and drain radiator.

4. Return handle on drain cock (5) to closed position.



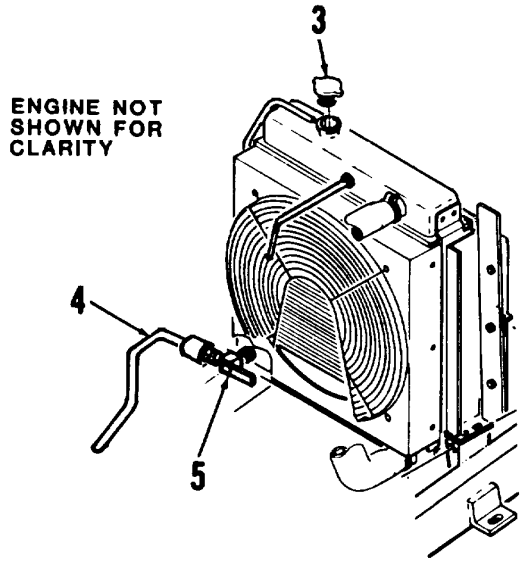
B. CLEANING

Clean and flush radiator in accordance with TM 750-254.

C. SERVICING

NOTE

Use a 50-50 mix of ethylene glycol (MIL-A-46153) and clean water for radiator coolant. Plain water is not recommended. Mix coolant mixture before pouring into radiator.



1. Fill radiator with coolant. Radiator has a 5 gallon capacity.

2. Close hood assembly (2). Ensure handle (1) is fully engaged.

3. Install radiator cap (3).

FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)

END OF TASK

2-47. RADIATOR ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

Equipment Condition:

Radiator assembly servicing (para. 2-46), radiator drained
Radiator baffles replacement (para. 2-48), baffles removed

Materials / Parts:

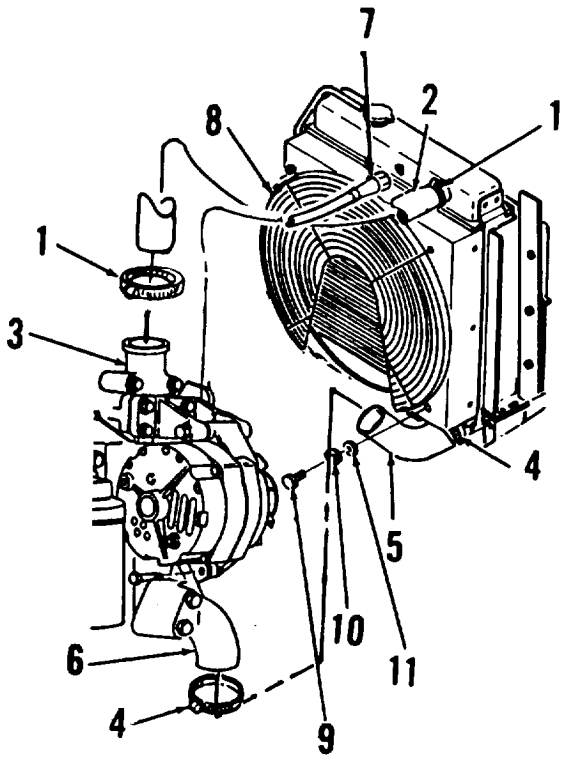
Antifreeze (3, 4, App. C)

Personnel Required:

2 Personnel

A. REMOVAL

1. REMOVE RADIATOR HOSES (2, 5) AND AERATOR HOSE (7). CAP HOSE ENDS.
   a. Loosen clamp (1) and remove upper radiator hose (2) from engine water inlet (3).
   b. Loosen clamp (4) and remove lower radiator hose (5) from engine water outlet (6).
   c. Remove radiator hoses (2, 5) from radiator by loosening clamps (1, 4).
   d. Disconnect aerator hose (7) from radiator and engine.
2. REMOVE FAN GUARD (8) FROM RADIATOR SHROUD BY REMOVING SCREWS (9), LOCKWASHERS (10), AND WASHERS (11).



3. PLACE DRAIN PAN BENEATH RADIATOR DRAIN TUBING (10). DISCONNECT AND REMOVE TUBING.

   a. Ensure handle on radiator drain cock (9) is in the closed position.

   b. Place drain pan beneath radiator drain tubing (10).

   c. Release drain tubing (10) from chassis (12) by removing screw (13), cover (14), and clamp halves (15).

   d. Disconnect drain tubing (10) from rubber tube (11). Remove rubber tube from drain cock (9).

4. RELEASE LOWER RADIATOR BAFFLE (16) FROM STUDS ON BOTTOM OF RADIATOR ASSEMBLY (18) BY REMOVING NUTS (17).

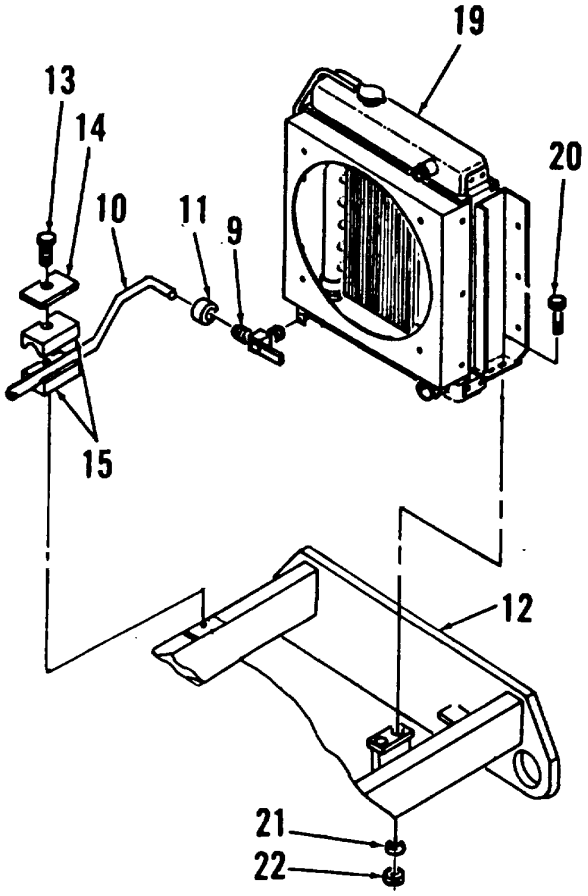
5. REMOVE RADIATOR OVERFLOW HOSE (18) FROM BAFFLE (16).

WARNING

Enlist the help of an assistant when removing radiator. Radiator is heavy and awkward. Use care to prevent damage to equipment and injury to personnel.

6. REMOVE RADIATOR ASSEMBLY (18) FROM CHASSIS (12) BY REMOVING SCREWS (19), WASHERS (20), AND NUTS (21). LIFT RADIATOR UP AND OUT OF CHASSIS.

7. REMOVE LOWER RADIATOR BAFFLE (16).

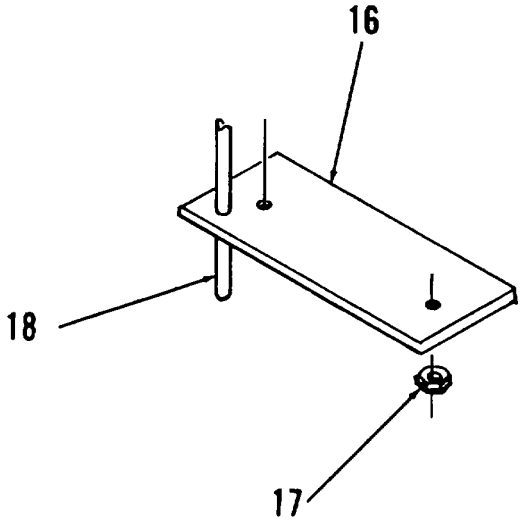


B. CLEANING

Clean radiator assembly and related components in accordance with paragraph 1-24.

C. INSPECTION

Inspect components in accordance with paragraph 1-24.



D. **INSTALLATION**

WARNING

Enlist the help of an assistant when installing radiator. Radiator is heavy and awkward. Use care to prevent damage to equipment and injury to personnel.

1. POSITION LOWER RADIATOR BAFFLE (16) IN CHASSIS FOR INSTALLATION ONTO RADIATOR ASSEMBLY (18).

2. POSITION RADIATOR ASSEMBLY (18) ONTO RADIATOR MOUNTS ON CHASSIS (12). SECURE USING SCREWS (19), WASHERS (20), AND NUTS (21).

3. INSTALL LOWER RADIATOR BAFFLE (16) ONTO RADIATOR ASSEMBLY (18) USING NUTS (17).

4. POSITION RADIATOR OVERFLOW HOSE THROUGH HOLE IN LOWER RADIATOR BAFFLE (16).

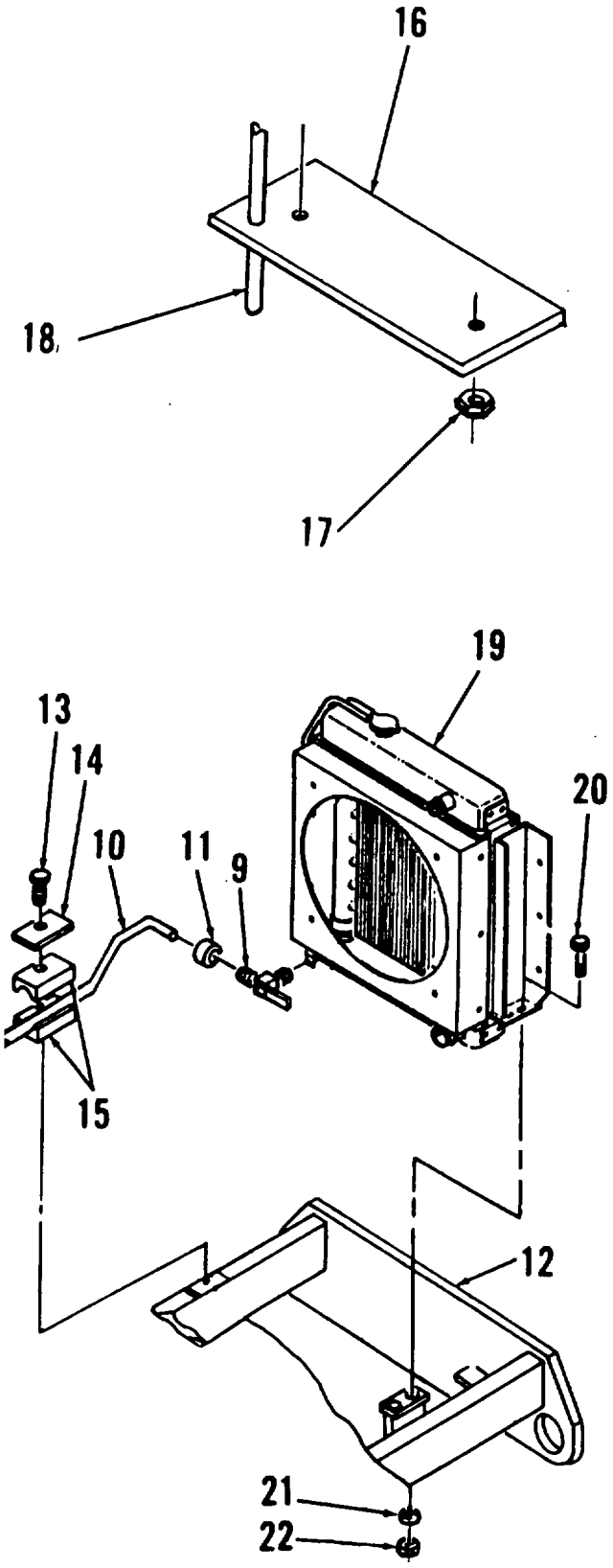
5. CONNECT RADIATOR DRAIN TUBING (10).

   a. Install rubber tube (11) onto drain cock (9). Connect drain tubing (10) to rubber tube.

   b. Secure drain tubing (10) to chassis using screw (13), cover (14), and clamp halves (15).

   c. Ensure handle on radiator drain cock (9) in closed position.

6. INSTALL FAN GUARD (8) ONTO RADIATOR SHROUD USING SCREWS (9), LOCKWASHERS (10), AND WASHERS (11).



7. INSTALL RADIATOR HOSES (2, 5) AND AERATOR HOSE (7).

   a. Connect upper radiator hose (2) to engine water inlet (3) and radiator. Secure by tightening clamps (1).

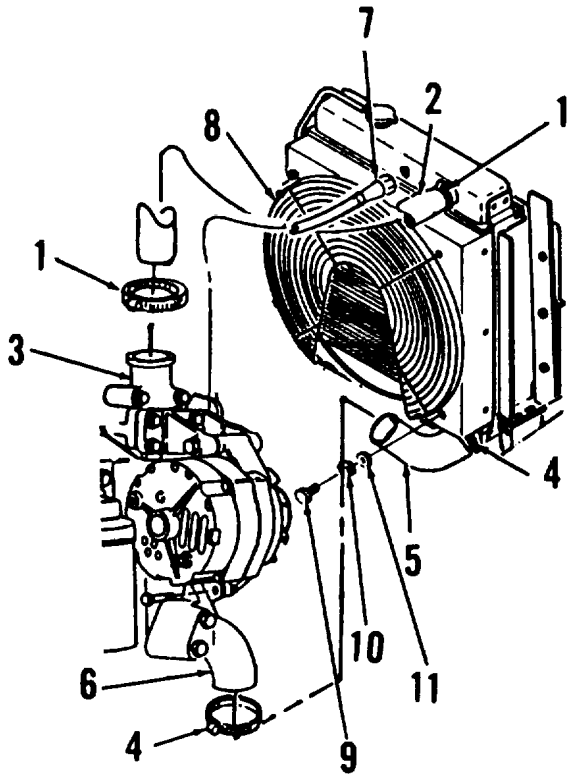
   b. Connect lower radiator hose (5) to engine water outlet (6) and radiator. Secure by tightening clamps (4).

   c. Connect aerator hose (7) to radiator and engine.

NOTE

Use a 50-50 mix of ethylene glycol (MIL-A-46153) and clean water for radiator coolant. Plain water is not recommended. Mix coolant mixture before pouring into radiator.

6. FILL RADIATOR WITH COOLANT (5 GALLON CAPACITY). CHECK FOR LEAKS AND TIGHTEN CONNECTIONS AS REQUIRED. INSTALL RADIATOR CAP.



FOLLOW-ON MAINTENANCE:

Install radiator baffles (para. 2-48)

END OF TASK

2-48. RADIATOR BAFFLE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

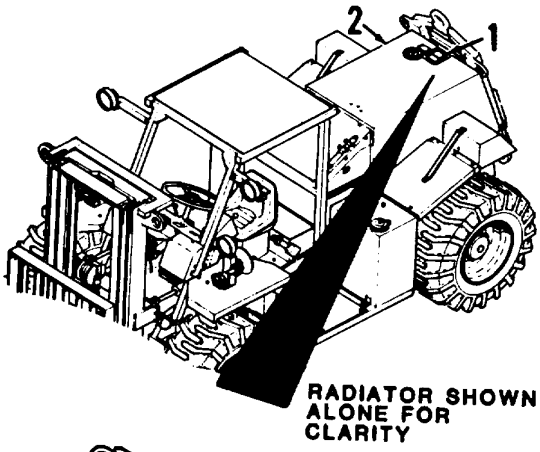
General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
1-1/8" Open End Wrench (52, App. E)

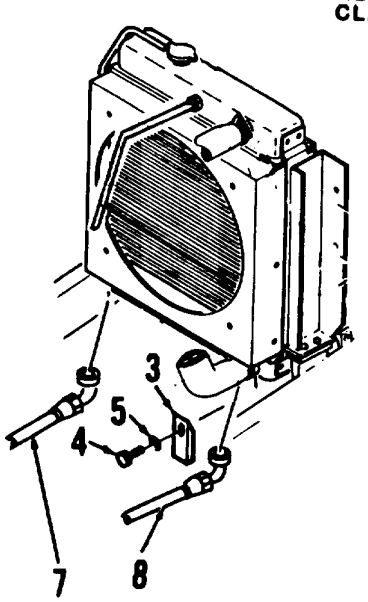
Equipment Condition:

Towbar lowered (para. 2-126)

A. REMOVAL

1. Release hood assembly (2) by lifting handle (1). Open hood assembly.
2. Place drain pan beneath hose assemblies (7, 8). Disconnect hose assemblies from elbows at base of oil cooler.
3. Remove lower left and right radiator baffles (3) by removing screws (4), washers (5), and nuts (6).





NOTE

Screws securing oil cooler assembly (14) to radiator mount must be removed to replace side baffles (15).

4. Remove screws (9, 10), washers (11), lanyard brackets (12), and nuts (13). Remove transmission oil cooler assembly (14) and side baffles (15).

B. CLEANING

Clean baffles in accordance with paragraph 1-24.

C. INSPECTION

Inspect baffles and related components in accordance with paragraph 1-24.

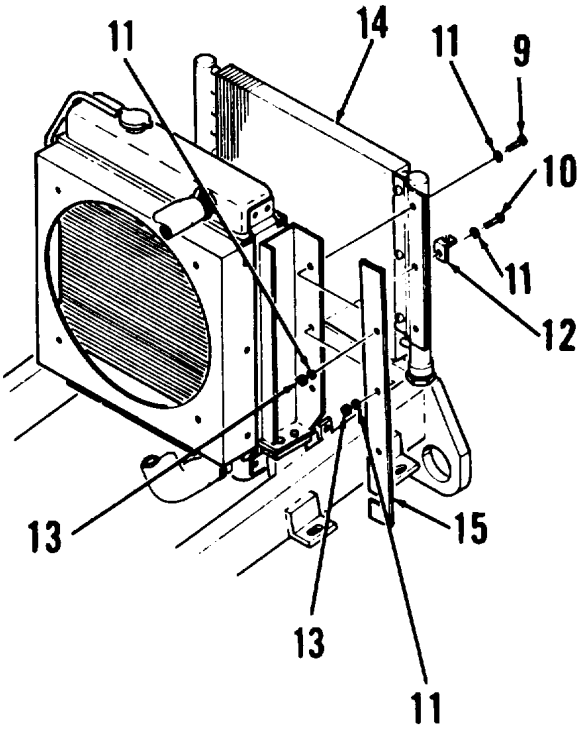
D. INSTALLATION

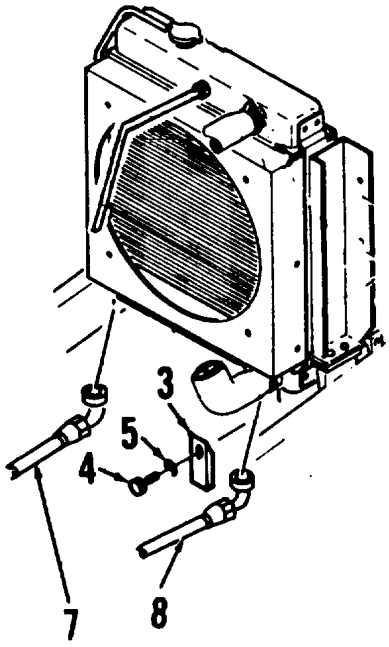
1. Position side baffles (15) and transmission oil cooler assembly (14), ensuring proper alignment of mounting holes.

2. Install screws (9, 10), washers (11), lanyard brackets (12), and nuts (13) to secure oil cooler assembly (14) to radiator mount.

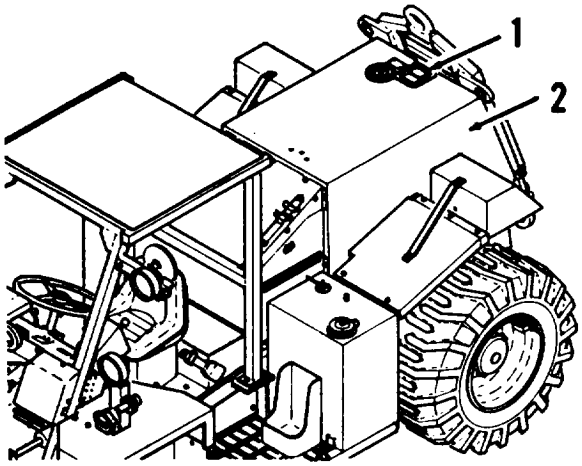
3. Install lower left and right radiator baffles (3) using screws (4), washers (5), and nuts (6).

4. Connect hose assemblies (7, 8) to elbows at base of oil cooler.





5. Close hood assembly (2). Ensure handle (1) is fully engaged.



FOLLOW-ON MAINTENANCE:
Raise towbar and lock in position (para. 2-126)
END OF TASK

2-49. THERMOSTAT REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Drain Pan (10, App. E)

Equipment Condition:

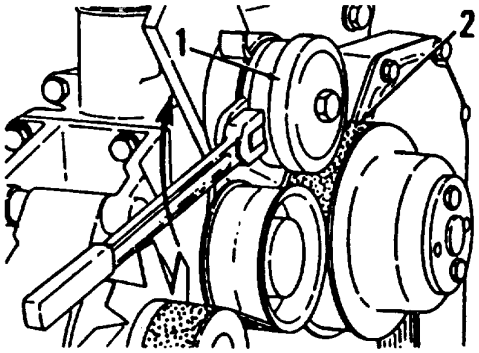
Radiator assembly servicing (para. 2-46), radiator drained
Fan guard removed (para. 2-53)

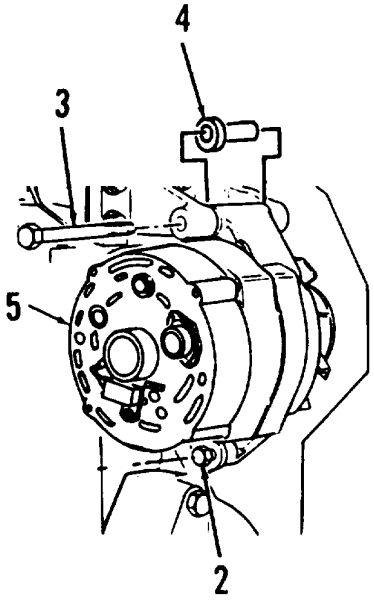
Materials / Parts:

Gasket, Item 10 (1 ea.)

A. REMOVAL

1. REMOVE DRIVE BELT (2).
   a. Using 3/8" square drive handle, lift up on belt tensioner arm (1) to release tension on drive belt (2).
   b. Carefully remove drive belt (2) from alternator.
2. LOOSEN ALTERNATOR LINK SCREW (3). REMOVE MOUNTING SCREW (4) AND ALLOW ALTERNATOR (5) TO SWING DOWNWARD.





NOTE

Place drain pan beneath thermostat components during removal to catch residual fluids.

3. REMOVE THERMOSTAT HOUSING (6) AND THERMOSTAT (11).

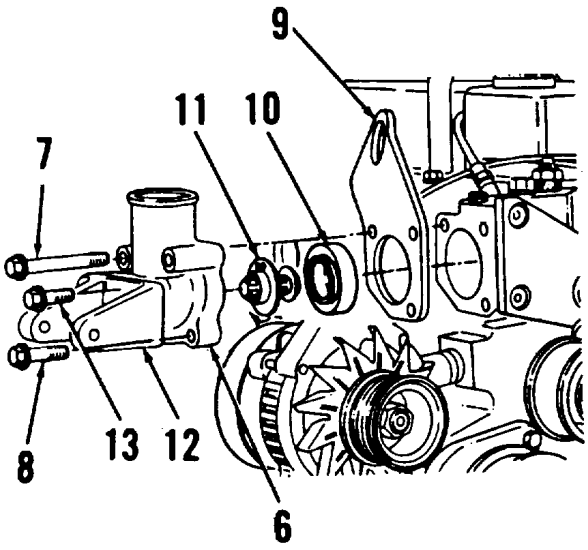
   a. Remove thermostat housing (6) from engine block by removing two screws (7) and screw (8).

   b. Remove lifting bracket (9). Remove and discard gasket (10).

NOTE

Ensure that all gasket material is removed from housing and bracket.

   c. Remove thermostat (11) from inside of housing (6).
   d. Remove alternator support (12) by removing screws (13).



B. CLEANING

CLEAN THERMOSTAT COMPONENTS IN ACCORDANCE WITH PARAGRAPH 1-24.

C. INSPECTION

1. INSPECT COMPONENTS IN ACCORDANCE WITH PARAGRAPH 1-24.

D. **INSTALLATION**

1. INSTALL THERMOSTAT HOUSING (6) AND THERMOSTAT (9).

   a. Install alternator support (12) onto thermostat housing (6) using screws (13).

   b. Install thermostat (11) into housing (6).

   c. Install new gasket (10) into housing (6), ensuring side of gasket with lip faces housing.

   d. Mate lifting bracket (9) to housing (6), aligning mounting holes.

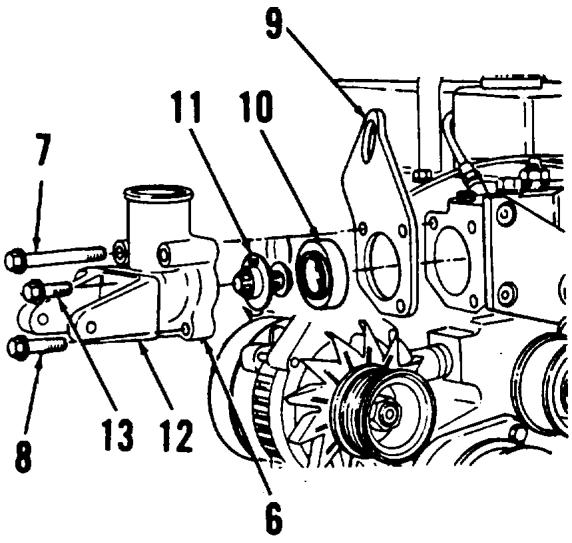
   e. Install assembled components onto engine block using two long screws (7) and short screw (8). Short screw goes into bottom mounting hole.

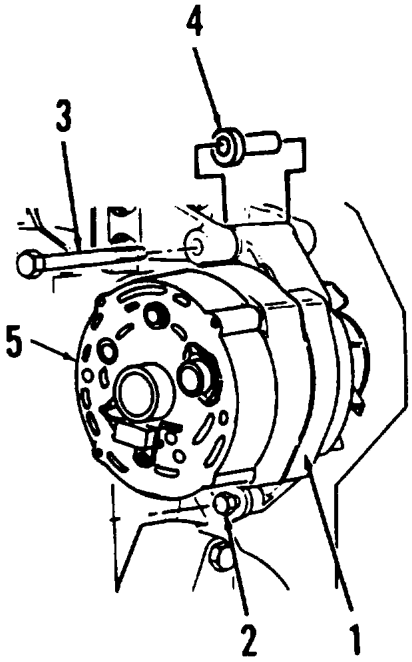
2. TORQUE SCREWS (7, 8) TO 18 FT-LBS (24 Nm).

3. LIFT ALTERNATOR (5) INTO POSITION AND INSTALL MOUNTING SCREW (4).

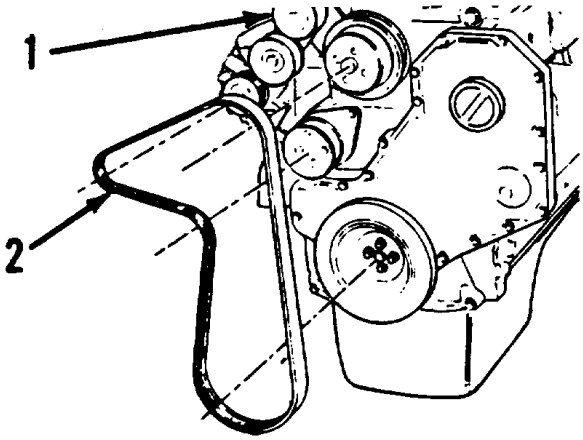
4. POSITION ALTERNATOR (5) FOR CORRECT BELT ALIGNMENT. TIGHTEN LINK SCREW (3).

5. TORQUE SCREW (3) TO 18 FT-LBS (24 Nm). TORQUE SCREW (4) TO 32 FT-LBS (43 Nm).





6. INSTALL DRIVE BELT (2).



a. Using 3/8" square drive handle, lift up on belt tensioner arm (1).

b. Carefully install drive belt (2) onto alternator.

c. Release belt tensioner arm (1).

d. It may be necessary to reposition alternator after belt installation to ensure correct belt tension. Reposition alternator by loosening link screw and lifting or lowering alternator.

FOLLOW-ON MAINTENANCE:

Test belt deflection (para. 2-54)
Service radiator (para. 2-46)
Install fan guard (para. 2-53)

END OF TASK

2-50. RADIATOR HOSE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Equipment Condition:

Radiator assembly servicing (para. 2-46), radiator drained

A. REMOVAL

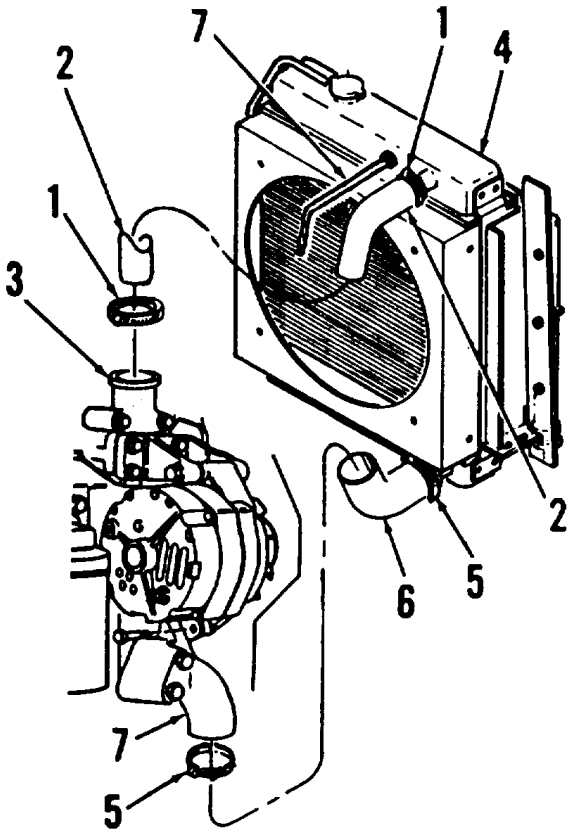
1. Loosen clamps (1) and remove upper radiator hose (2) from engine water inlet (3) and radiator (4).
2. Loosen clamps (5) and remove lower radiator hose (6) from engine water outlet (7) and radiator (4).
3. Disconnect aerator hose (7) from radiator (4) and engine.

B. CLEANING

Clean radiator hoses and aerator hose in accordance with paragraph 1-24.

C. INSPECTION

Inspect hoses and related components in accordance with paragraph 1-24.

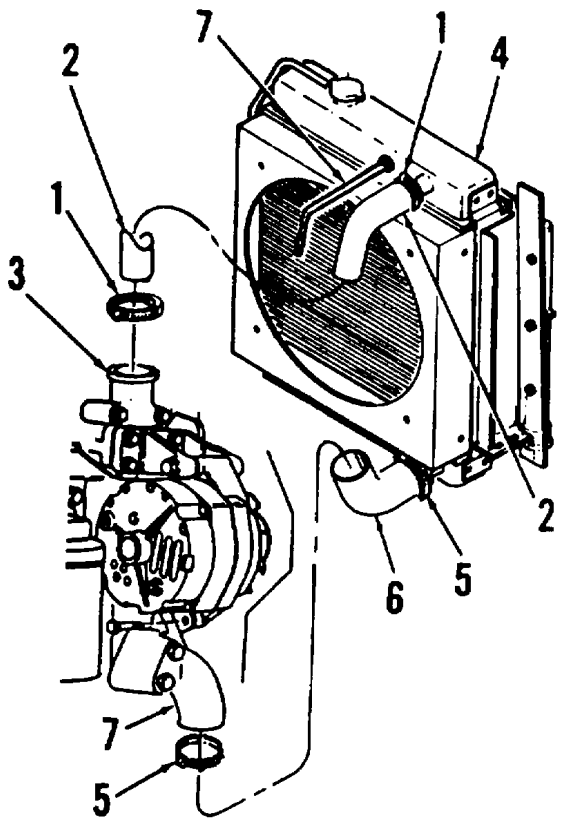


D. INSTALLATION

1. Connect aerator hose (7) to radiator (4) and engine.

2. Connect lower radiator hose (6) to engine water outlet (7) and radiator (4). Secure by tightening clamps (5).

3. Connect upper radiator hose (2) to engine water inlet (3) and radiator (4). Secure by tightening clamps (1).



FOLLOW-ON MAINTENANCE:

Service radiator (para. 2-46)

END OF TASK

2-51. WATER PUMP REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Drain Pan (10, App. E)

Equipment Condition:

Radiator assembly servicing (para. 2-46), radiator drained
Fan blade removed (para. 2-52)

Materials / Parts:

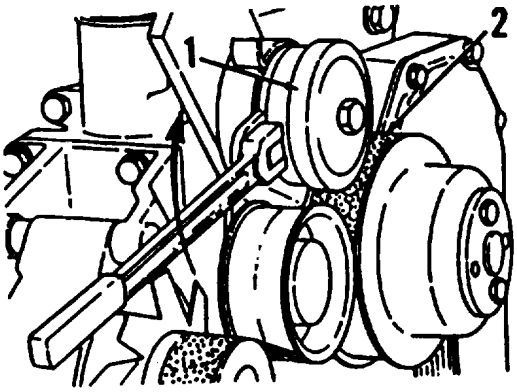
Ring Seal, Item 5 (1 ea.)

A. REMOVAL

1. REMOVE DRIVE BELT (2).

   a. Using 3/8" square drive handle, lift up on belt tensioner arm (1) to release tension on drive belt (2).

   b. Carefully remove drive belt (2) from alternator, water pump, and fan pulley.

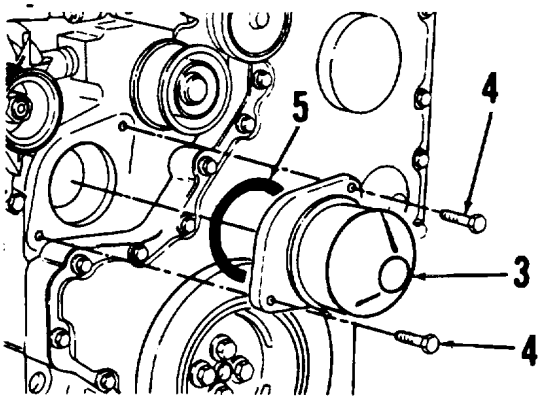


NOTE
Place drain pan beneath water pump during removal to catch residual fluids.

2. REMOVE WATER PUMP (3).

   a. Remove water pump (3) from engine block by removing screws (4).

   b. Remove and discard ring seal (5).

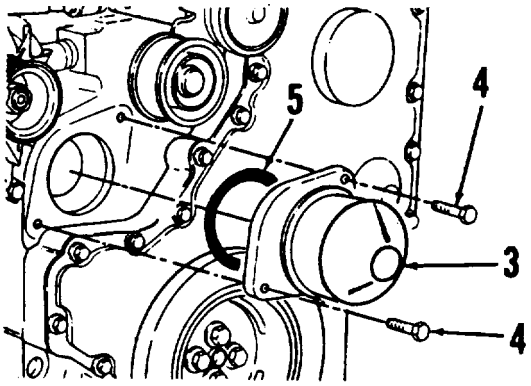


B. CLEANING

Clean water pump in accordance with paragraph 1-24.

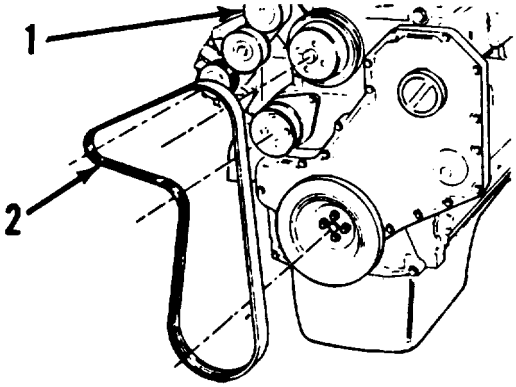
C. INSPECTION

1. Inspect components in accordance with paragraph 1-24.
2. Inspect impeller blades for corrosion or damage.
3. Manually turn pump to ensure smooth rotation.
4. Check weep hole at base of pump for evidence of leakage. If leaking, replace pump.



D. INSTALLATION

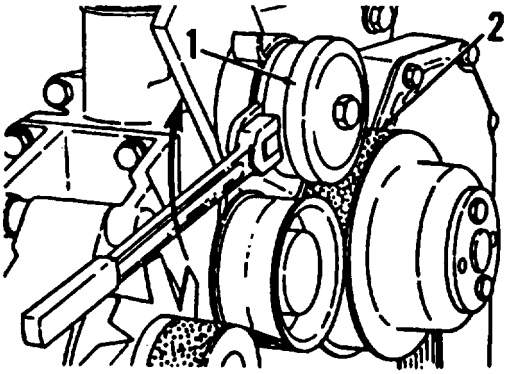
1. INSTALL WATER PUMP (3).
    a. Install new ring seal (5) into water pump groove.
    b. Install water pump (3) into engine block using screws (4).
2. TORQUE SCREWS (4) TO 18 FT-LBS (24 N•m).
3. INSTALL DRIVE BELT (2).
    a. Using 3/8" square drive handle, lift up on belt tensioner arm (1).
    b. Carefully install drive belt (2) onto alternator, water pump, and fan pulley.
    c. Release belt tensioner arm (1).



FOLLOW-ON MAINTENANCE:

Install fan blade (para. 2-52)
Service radiator (para. 2-46)

END OF TASK



2-52. FAN BLADE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Equipment Condition:
Fan guard removed (para. 2-53)

A. REMOVAL

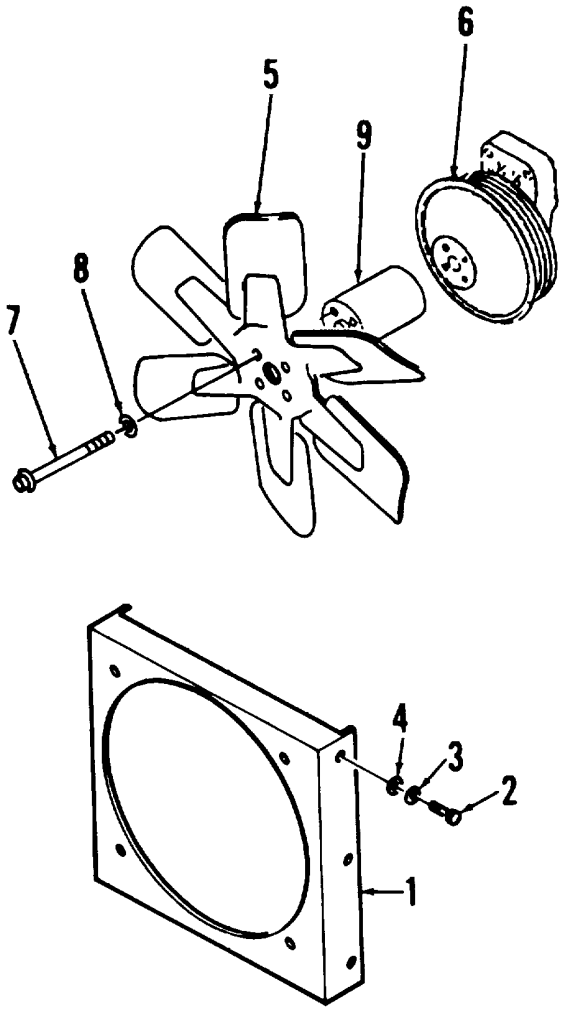
1. Remove fan shroud (1) from radiator by removing six screws (2), six lockwashers and six flat washers (4).
2. Remove fan blade (5) and fan pulley (6) by removing screws (7) and washers (8). Remove pilot spacer (9).

B. CLEANING

Clean fan blade and pilot spacer in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect components in accordance with paragraph 1-24.
2. Inspect blade for cracks or chipping. Ensure individual blades are securely fastened to spokes.



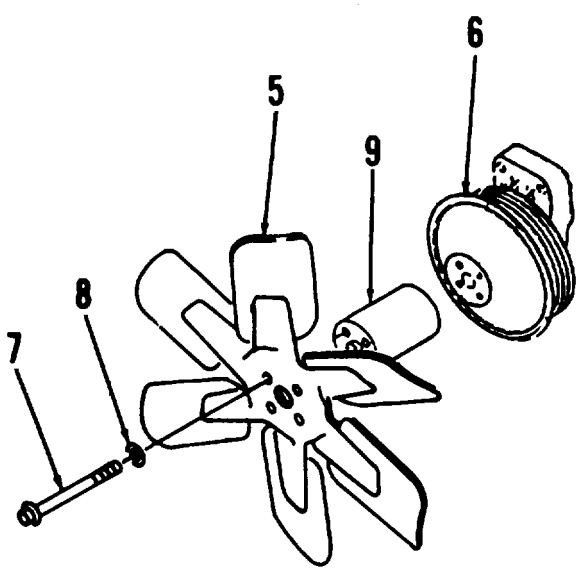
D. INSTALLATION

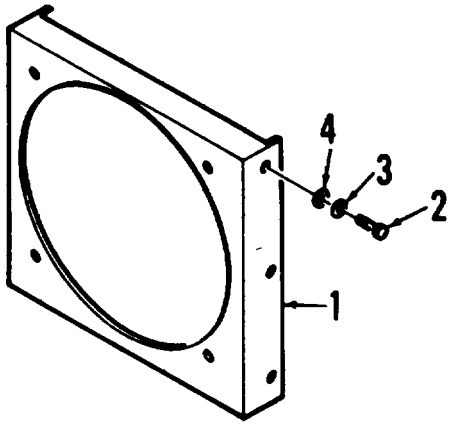
1. Install fan pulley (6) onto fan drive shaft.
2. Install fan blade (5) and pilot spacer (9) using screws (7) and washers (8). Torque screws to 18 ft-lbs (24 N•m).
3. Install fan shroud (1) onto radiator (9) using six screws (2) six lockwashers (3) and six flat washers (4).

FOLLOW-ON MAINTENANCE:

Install fan guard (para. 2-53)

END OF TASK





2-53. FAN GUARD REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

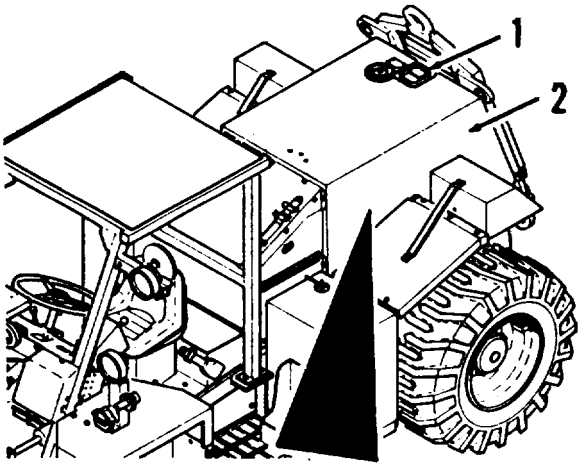
INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Equipment Condition:
Towbar lowered (para. 2-126)

A. REMOVAL

1. Release hood assemb;y (2) by lifting handle (1). Open hood assembly.
2. Remove fan guard (3) from radiator shroud by removing screws (4), lockwashers (5), and flat washers (6).



B. CLEANING

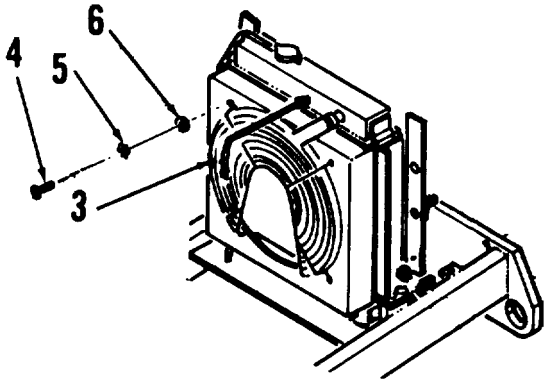
Clean fan guard in accordance with paragraph 1-24.

C. INSPECTION

Inspect fan guard for corrosion or damage. Replace guard if defective.

D. INSTALLATION

1. Install fan guard (3) onto radiator shroud using screws (4) and washers (5, 6).
2. Close hood assembly (2). Ensure handle (1) is fully engaged.



FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)

END OF TASK

2-54. DRIVE BELT REPLACEMENT

This task covers: Testing, Removal, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Equipment Condition:

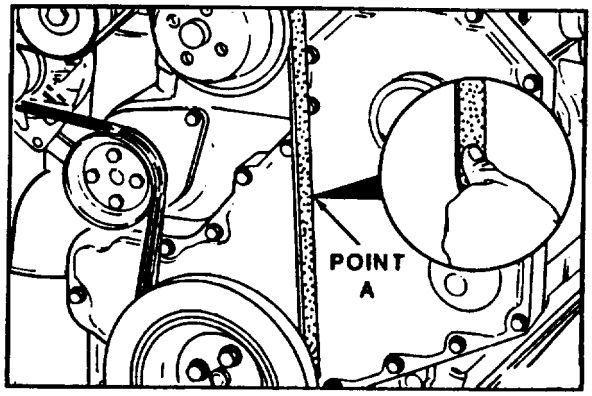
Fan guard removed (para. 2-53)

A. TESTING

NOTE

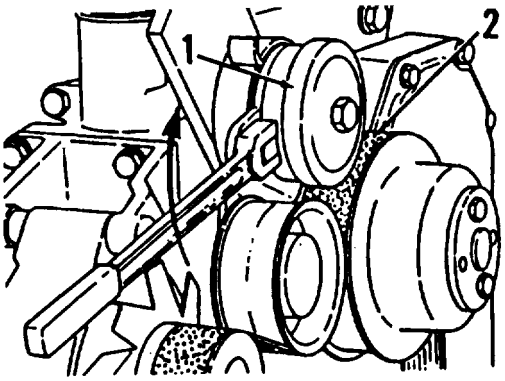
Check belt deflection at longest span of belt (reference point A).

1. Press firmly on drive belt with thumb as shown. Maximum deflection shall be 3/8 to 1/2 inch (9.5 to 12.7 mm).



B. REMOVAL

1. Using a 3/8 inch square drive handle, lift up on belt tensioner arm (1) to release tension on drive belt (2).
2. Carefully remove drive belt (1).

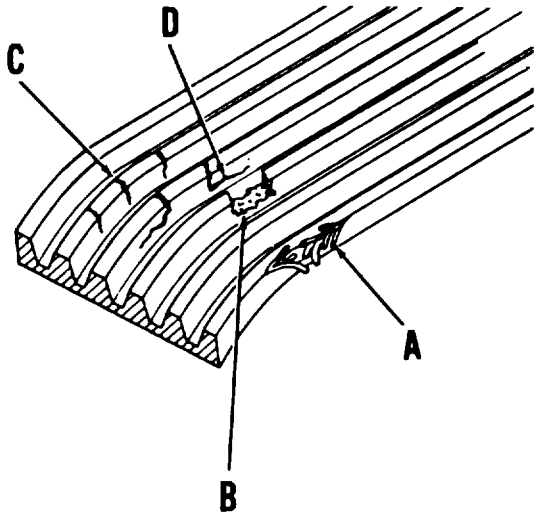


B. CLEANING

Clean belt in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect belt for frays (see A). Inspect for missing material (B).
2. Inspect for cracks. Cracks running across belt (C) are acceptable. Cracks running direction of belt (D) are cause for belt replacement.



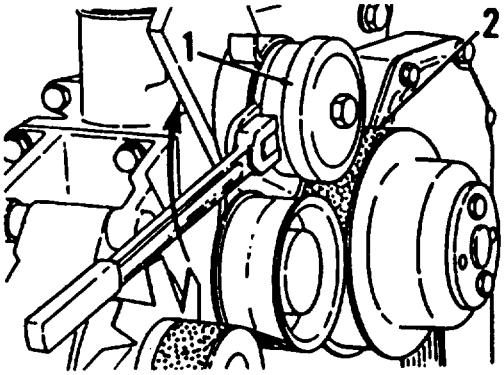
D. INSTALLATION

1. Using a 3/8 inch square drive handle, lift up on belt tensioner arm (1).
2. Carefully install drive belt (2).
3. If belt installation is difficult (belt too tight), position belt over grooved pulleys first, then over water pump pulley.
4. Release belt tensioner arm (1).

FOLLOW-ON MAINTENANCE:

Install fan guard (para. 2-53)

END OF TASK



Section X. ELECTRICAL SYSTEM MAINTENANCE

2-55. ALTERNATOR REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
- General Mechanics Tool Kit (1, App. E)
- Torque Wrench (32, App. E)
- Strap Wrench (47, App. E)
- Vise (30, App. E)
- Puller (56, App. E)

Personnel Required:
- 2 Personnel

Materials/Parts:
- Spring Washer, Item 14 (1 ea)
- Batteries disconnected (para. 2-78)

Equipment Condition:
- Drive belt removed (para. 2-54)

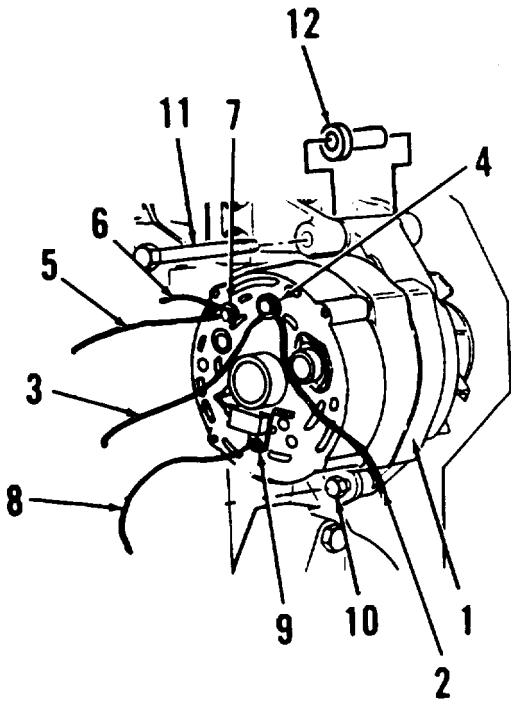
A. REMOVAL

1. TAG AND DISCONNECT ELECTRICAL WIRING FROM ALTERNATOR (1).
   a. Disconnect red wire (2) and black wire (3) from terminal (4).
   b. Disconnect black wire (5) and green wire (6) from terminal (7).
   c. Disconnect black wire (8) from screw (9) which secures suppression capacitor (2) to alternator (1).
2. REMOVE ALTERNATOR LINK SCREW (10).

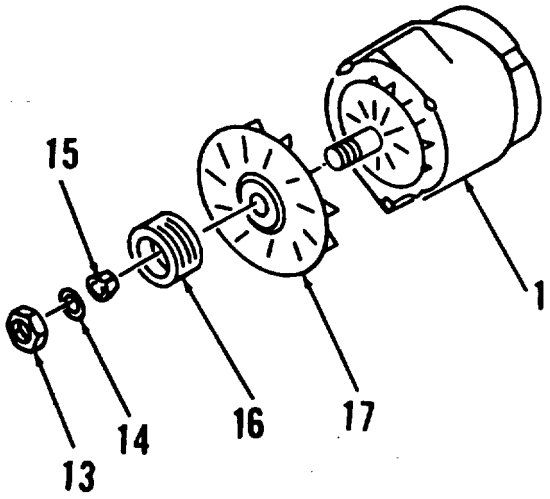
NOTE

Have aide hold alternator in position when removing screw (11).

3. REMOVE ALTERNATOR (1) BY REMOVING MOUNTING SCREW (11). REMOVE MOUNTING SPACER (12).



4. PLACE ALTERNATOR (1) IN A VISE.
5. USING STRAP WRENCH TO HOLD PULLEY (16), REMOVE NUT (13) AND SPRING WASHER (14).
6. USING PULLER, REMOVE RETAINER (15) AND PULLEY (16) FROM ALTERNATOR (1).
7. CAREFULLY SLIDE FAN (17) OFF ALTERNATOR SHAFT.



B. CLEANING

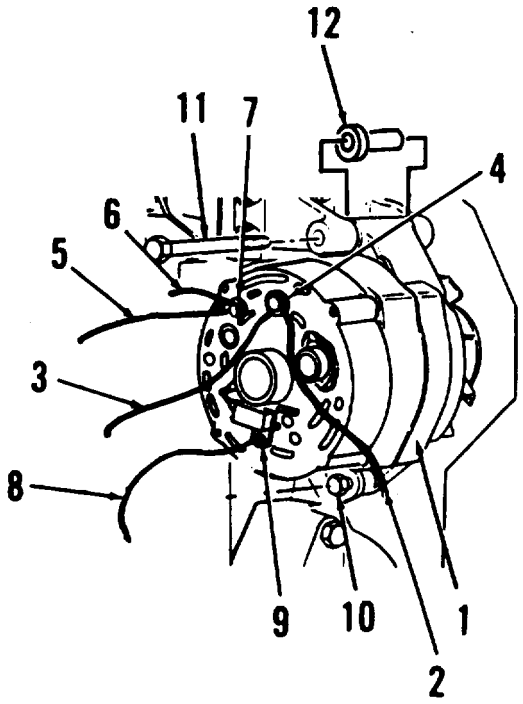
Clean fan, pulley, and exterior of alternator in accordance with paragraph 1-24.

C. INSPFCTION

Inspect components in accordance with paragraph 1-24.

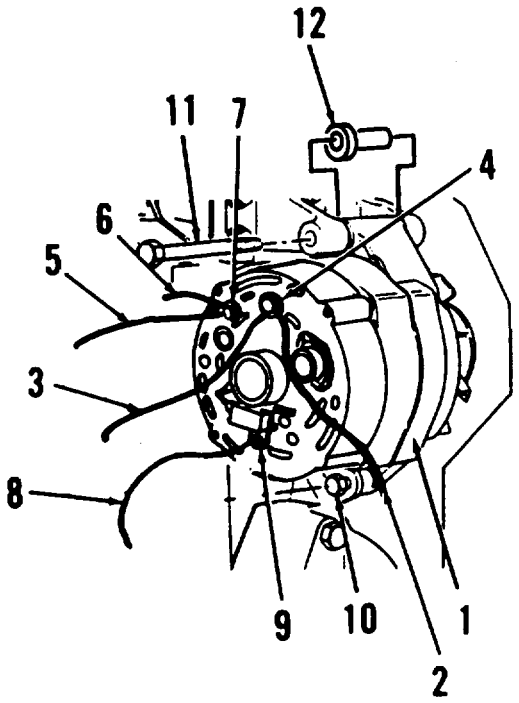
D. INSTALLATION

1. CAREFULLY SLIDE FAN (17) ONTO ALTERNATOR SHAFT.
2. INSTALL PULLEY (16) ONTO ALTERNATOR (1). SECURE USING RETAINER (15).
3. INSTALL NEW SPRING WASHER (14) AND NUT (13).
4. INSTALL MOUNTING SPACER (12). LIFT ALTERNATOR (1) INTO POSITION AND INSTALL MOUNTING SCREW (11).



5. POSITION ALTERNATOR (1) FOR CORRECT BELT ALIGNMENT. INSTALL LINK SCREW (10).
6. TORQUE SCREW (10) TO 32 FT-LBS (43 N•m). TORQUE SCREW (11) TO 18 FT-LBS (24 N•m).
7. CONNECT ELECTRICAL WIRING TO ALTERNATOR (1).

    a. Connect red wire (2) and black wire (3) to terminal (4).
    b. Connect black wire (5) and green wire (6) to terminal (7).
    c. Connect black wire (8) to screw (9) which secures suppression capacitor (2) to alternator (1).



FOLLOW-ON MAINTENANCE:

Install drive belt (para. 2-54)
Connect battery cables (para. 2-78)

END OF TASK

2-56. ALTERNATOR PULLEY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

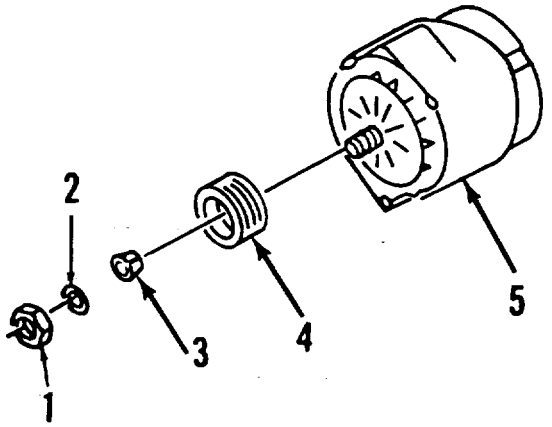
INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Strap Wrench (47, App. E)
Puller Kit (26, App. E)

Equipment Condition:
Drive belt removed (para. 2-54)

A. REMOVAL

1. Using strap wrench to hold pulley (4), remove nut (I) and spring washer (2).
2. Using puller, remove retainer (3) and pulley (4) from alternator (5).



B. CLEANING

Clean pulley and exterior of alternator in accordance with paragraph 1-24.

C. INSPECTION

Inspect components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install pulley (4) onto alternator (5). Secure using retainer (3).
2. Install new spring washer (2) and nut (1).

FOLLOW-ON MAINTENANCE:

Install drive belt (para. 2-54)

END OF TASK

2-57. STARTER MOTOR REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Equipment Condition:
Towbar lowered (para. 2-126)
Batteries disconnected (para. 2-78)

A. REMOVAL

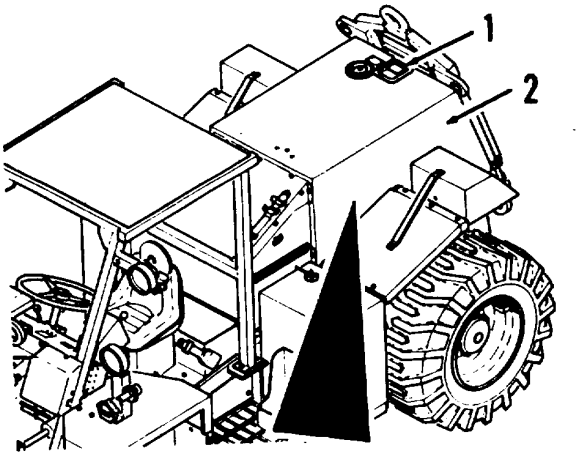
1. RELEASE HOOD ASSEMBLY (2) BY LIFTING HANDLE (1). OPEN HOOD ASSEMBLY.
2. REMOVE STARTER HEAT SHIELD (3) FROM ENGINE BLOCK BY REMOVING SCREWS (4) AND WASHERS (5).

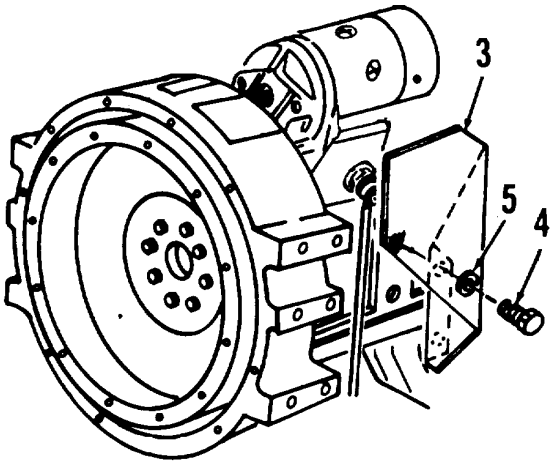
WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

NOTE

Tag electrical wiring before removing to aid in determining proper location during installation.

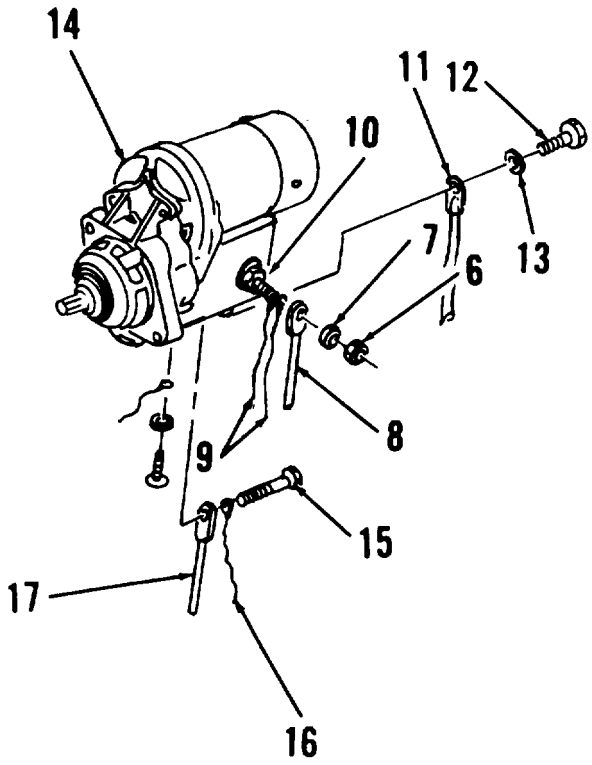




TRANSMISSION
NOT SHOWN
FOR CLARITY

3. TAG AND DISCONNECT ELECTRICAL CABLES AND WIRING. REMOVE STARTER MOTOR (14) BY REMOVING SCREWS (15).

    a. Remove nut (6) and washer (7) from starter stud (10). Remove and tag electrical cable (8) and two wires (9).
    b. Remove electrical wire (11) from bracket underneath starter motor by removing screw (12) and lockwasher (13). Tag wire.
    c. Tag electrical wire (16) and cable (17). Wire and cable will come off when outside mounting screw (15) is removed.
    d. Remove starter motor (14) by removing screws (15).



B. CLEANING

Clean starter motor in accordance with paragraph 1-24.

C. INSPECTION

Inspect motor and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. INSTALL STARTER MOTOR (14) USING SCREWS (15). CONNECT ELECTRICAL CABLES AND WIRING.

    a. Install electrical wire (16) and cable (17) onto outside mounting screw (15).
    b. Mate starter motor (14) to housing, ensuring gear teeth mesh. Secure using screws (15).
    c. Attach electrical wire (11) to bracket underneath starter motor using screw (12) and lockwasher (13).
    d. Install electrical cable (8) and two wires (9) onto starter stud (10). Secure using nut (6) and washer (7).

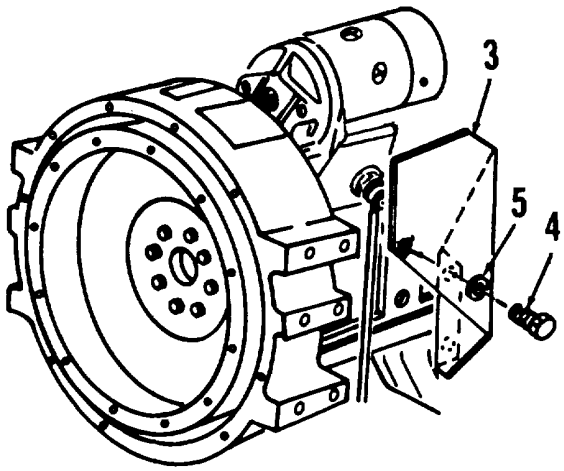
2. TORQUE SCREWS (15) TO 32 FT-LBS (43 N•m).

3. INSTALL HEAT SHIELD (3) USING SCREWS (4) AND WASHERS (5).
4. CLOSE HOOD ASSEMBLY (2). ENSURE HANDLE (1) IS FULLY ENGAGED.

FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)
Raise towbar and lock in position (para. 2-126)

END OF TASK



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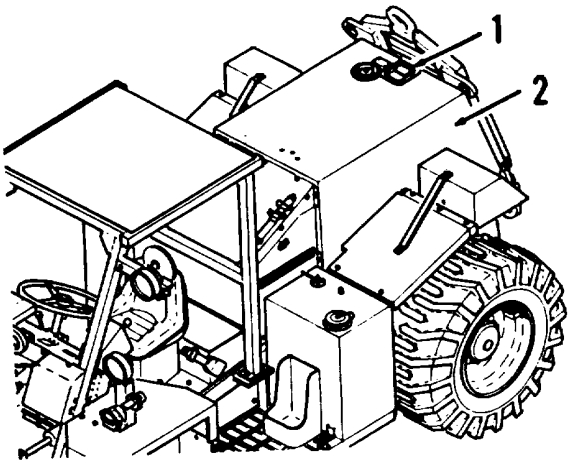


2-58. INSTRUMENT PANEL REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

Materials / Parts:
Wire Ties, Item, 11 (4 ea.)
Lockwasher, Item 18 (1 ea.)
Locknut, Item 19 (1 ea.)

Equipment Condition:
Transmission shifter removed (para. 2-91)
Steering column removed (para. 2-118)

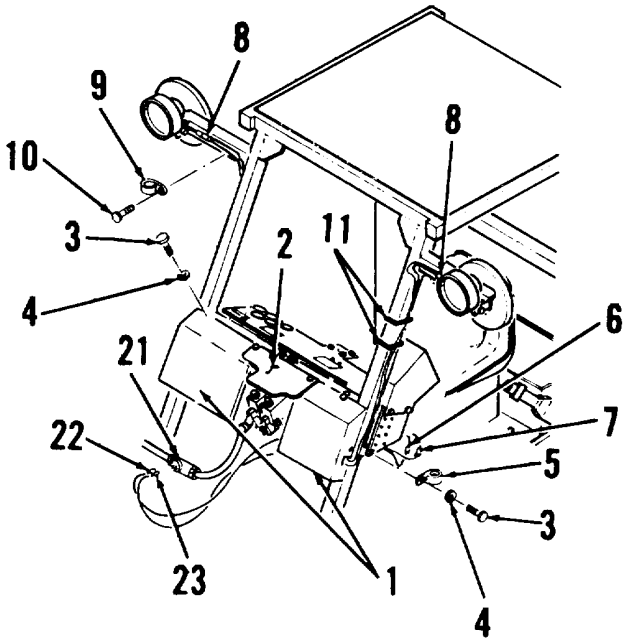
Personnel Required:
2 Personnel

A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance.

1. Remove instrument panel covers (1) and master cylinder cover (2) by removing screws (3) and washers (4). Clamps (5) are secured by screws on sides of front covers. Leave clamps attached to wiring.
2. Disconnect dash wiring harness at two plugs (6, 7).
3. Disconnect front floodlight wiring at connectors (8).
4. Remove wiring harness clamps (9) by removing screws (10). Leave clamps attached to wiring.
5. Remove floodlight wiring from ROPS by removing wire ties (11). Discard wire ties.
6. Remove sealant from wire connections at stoplight switch (21) and disconnect two wires (22, 23).

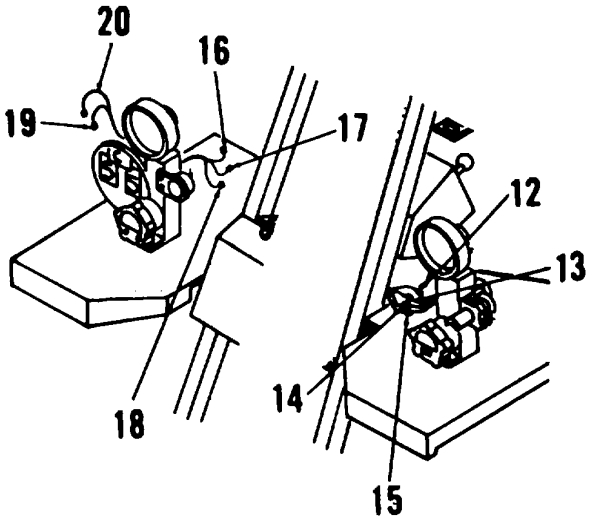


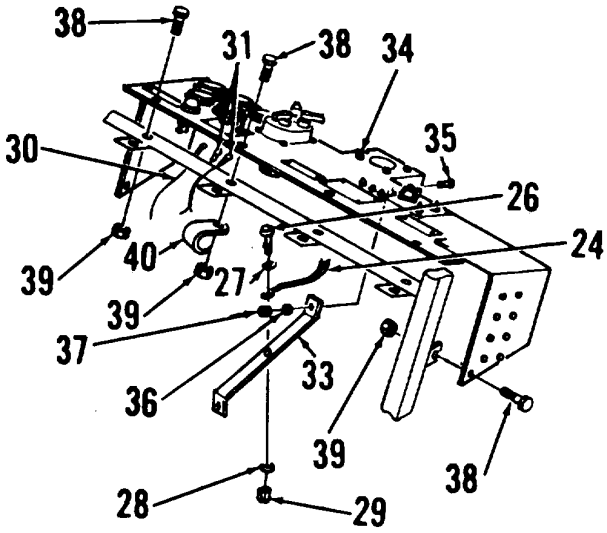
7. Disconnect wires (12, 13, 14, 15) from left front light mount assembly.
8. Disconnect wires (16, 17, 18) from right front light mount assembly. Disconnect wires (19, 20) from horn.
9. Disconnect dash wiring harness ground wire (24) from brace (25) by removing screw (26), washer (27), lockwasher (28), and locknut (29). Discard lockwasher and locknut.
10. Disconnect wire (30) from ammeter negative terminal (S). Disconnect wires (31, 32) from ammeter positive terminal (I).
11. Detach instrument panel brace (33) from instrument panel (34) by removing screw (35), washer (36), and nut (37).

CAUTION

Instrument panel (34) is large and awkward. Enlist the help of an aide when removing to avoid personal injury or prevent damage to components.

12. Remove instrument panel (34) from forklift frame by removing six screws (38) and nuts (39). Top four screws and nuts secure wiring harness clamps (40).





B. CLEANING

Clean instrument panel and its components in accordance with paragraph 1-24.

C. INSPECTION

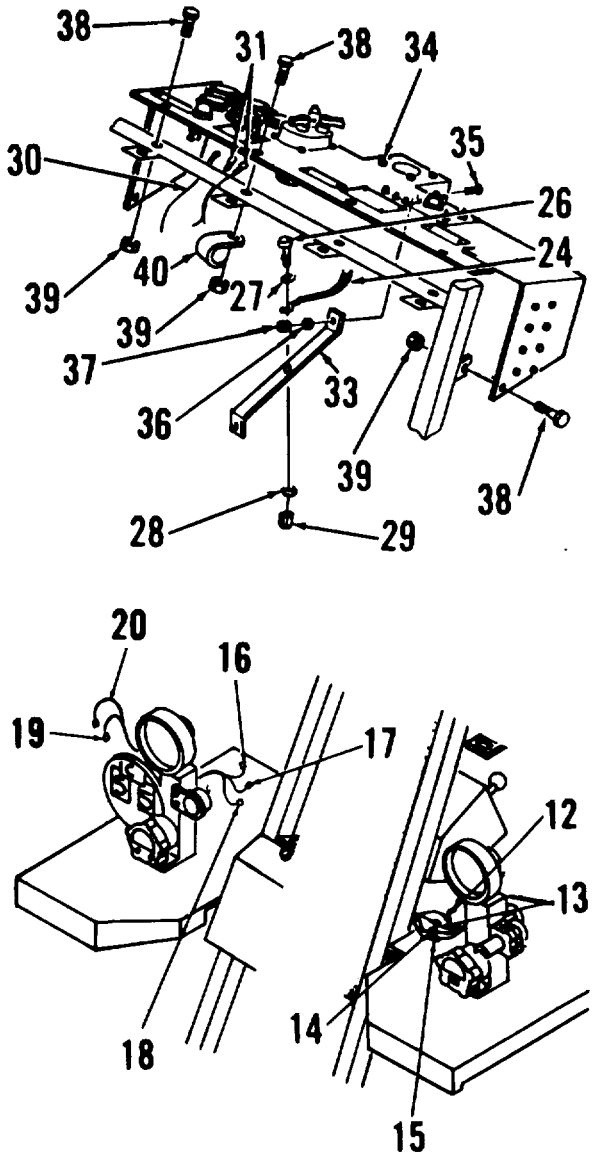
Inspect instrument panel and its components in accordance with paragraph 1-24.

D. INSTALLATION

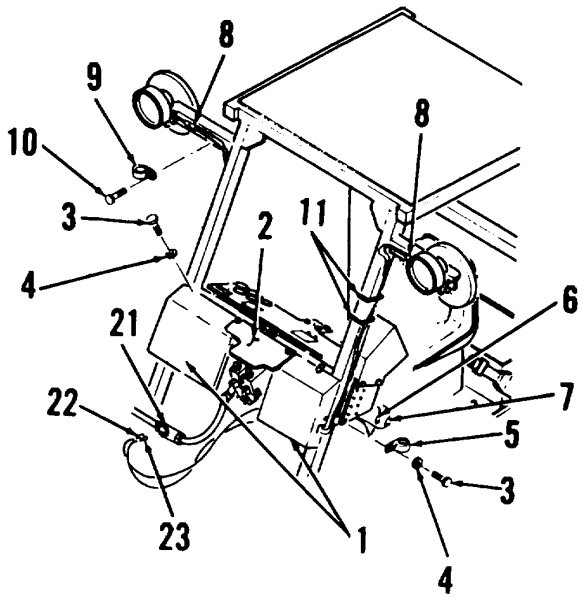
CAUTION

Instrument panel (34) is large and awkward. Enlist the help of an aide when installing to avoid injury to personnel or damage to components.

1. Install instrument panel (34) using six screws (38) and nuts (39). Position four wiring harness clamps (40) so that top four panel screws and nuts secure clamps.
2. Attach instrument panel brace (33) to bottom of instrument panel (34) using screw (35), washer (36), and nut (37).
3. Connect wire (30) to ammeter negative terminal (S). Connect wires (31, 32) to ammeter positive terminal (1).
4. Connect dash wiring harness ground wire (24) to brace (25) using screw (26), washer (27), lockwasher (28), and locknut (29).
5. Connect wires (16, 17, 18) to right front light mount assembly. Connect wires (19, 20) to horn.
6. Connect wires (12, 13, 14, 15) to left front light mount assembly.



7. Connect two wires (22, 23) to stoplight switch (21). Apply sealant to connections at switch, ensuring sealant completely covers wire terminals and terminals on switch.
8. Route floodlight wiring along front uprights of ROPS. Secure using wire ties (11) equally spaced along uprights.
9. Install wiring harness clamps (9) using screws (10).
10. Connect front floodlight wiring to wiring harness using connectors (8).
11. Connect dash wiring harness plugs (6, 7) to main wiring harness.
12. Install instrument panel covers (1) and master cylinder cover (2) using screws (3) and washers (4). Clamps (5) are secured by screws on sides of front covers.



FOLLOW-ON MAINTENANCE:

Install transmission shifter (para. 2-91)
Install steering column (para. 2-118)

END OF TASK

2-59. INSTRUMENT PANEL GAUGE, SWITCH, LIGHT REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Instrument panel replacement
(para. 2-58), brace removed

Equipment Condition:
Batteries disconnected (para. 2-78)

A. REMOVAL

WARNING

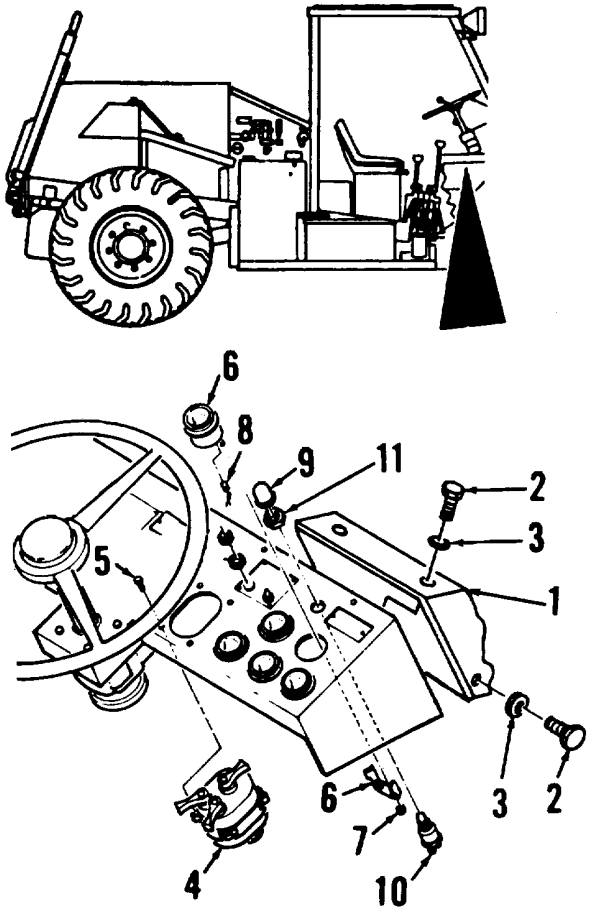
Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance.

1. REMOVE LEFT AND RIGHT DASH COVERS (1) BY REMOVING SIX SCREWS (2) AND SIX WASHERS (3).

CAUTION

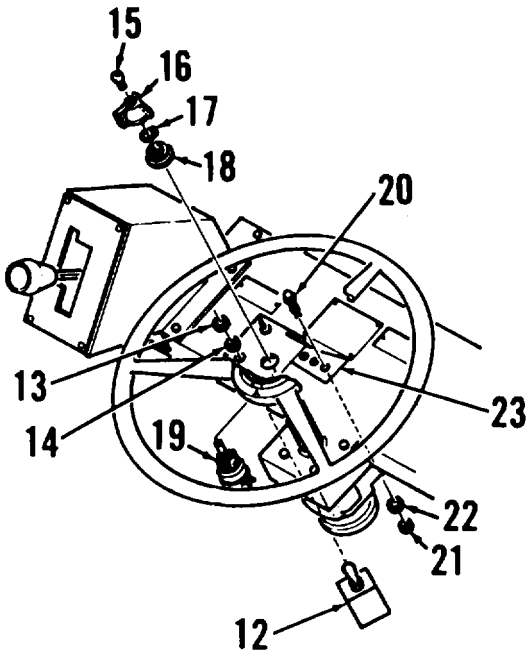
When disconnecting power wires from I terminal on gauges, tag wires to ensure correct installation. Connecting power wire to S terminal will destroy gauge.

2. TAG AND DISCONNECT ELECTRICAL WIRES FROM SWITCHES, GAUGES, AND LIGHTS AS REQUIRED.
3. REMOVE MASTER SWITCH (4), GAUGES (6), AND ETHER SWITCH (10).
   a. Remove master switch (4) from instrument panel by removing screws (5).
   b. Remove gauges (6) and gauge brackets by removing nuts (7). Remove light kits (8) from bottom of gauges.
   c. Remove rubber switch cover (9) from ether switch (10). Remove ether switch by removing nut (11).



4. REMOVE TOGGLE SWITCHES (12), IGNITION SWITCH (19), AND INDICATOR LIGHTS (20).

    a. Remove toggle switches (12) by removing nuts (13) and washers (14).
    b. Remove screw (15) and knob (16) from ignition switch (19). Remove ignition switch by removing retainer (17) and nut (18).
    c. Remove indicator lights (20) by removing nuts (21) and washers (22). Sunguard (23) is secured to panel by lights.



B. CLEANING

Clean instrument panel components in accordance with paragraph 1-24.

C. INSPECTION

Inspect instrument panel components in accordance with paragraph 1-24.

D. INSTALLATION

1. FOR EASE OF INSTALLATION, CONNECT ELECTRICAL WIRES TO INSTRUMENT PANEL SWITCHES, GAUGES, AND LIGHTS BEFORE INSTALLING.

CAUTION

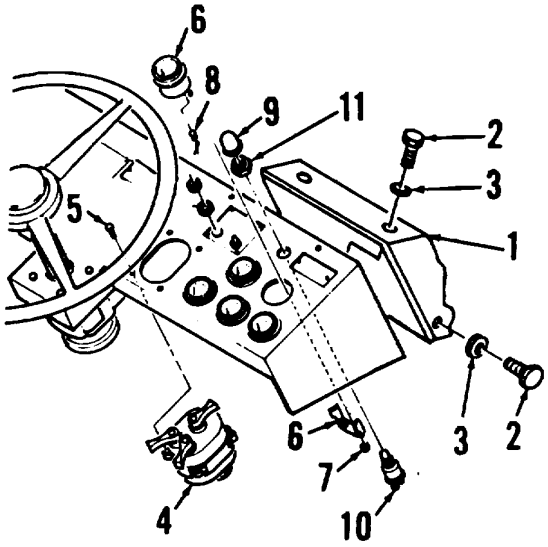
When connecting electrical wires to gauges, ensure that power wire is connected to I terminal. Connecting power wire to S terminal will destroy gauge.

2. INSTALL TOGGLE SWITCHES (12), IGNITION SWITCH (19), AND INDICATOR LIGHTS (20).

    a. Install toggle switches (12) onto instrument panel using nuts (13) and washers (14).
    b. Install ignition switch (19) using retainer (17) and nut (18). Install knob (16) using screw (15).
    c. Install indicator lights (20) and sunguard (23) using nuts (21) and washers (22).

3. INSTALL MASTER SWITCH (4), GAUGES (5), AND ETHER SWITCH (10).

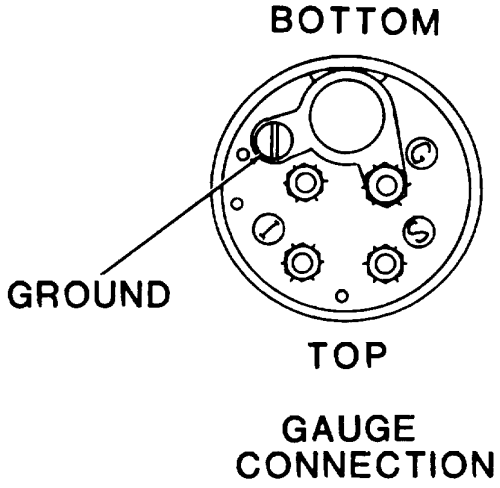
   a. Install master switch (4) using screws (5). Attach electrical plug.
   b. Insert light kits (8) into bottom of gauges (6). Install gauges and gauge brackets using nuts (7).
   c. Install ether switch (10) using nut (11). Install rubber switch cover (9) onto ether switch.



CAUTION

When connecting power wires from I terminal on gauge, ensure correct installation. Connecting power wire to S terminal will destroy gauge.

4. CONNECT ELECTRICAL WIRES TO SWITCHES, GAUGES, AND LIGHTS.



FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)
Install instrument panel brace (para. 2-58)

END OF TASK

2-60. CIRCUIT BREAKER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

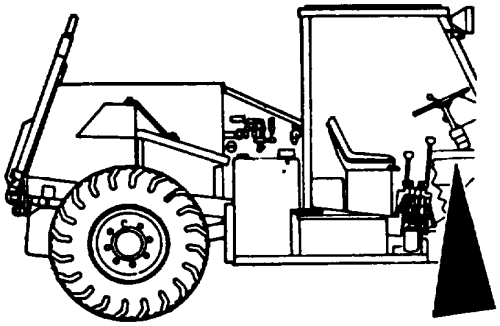
Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Equipment Condition:
Batteries disconnected (para. 2-78)

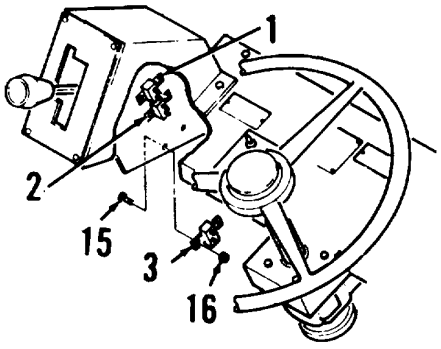
A. REMOVAL

WARNING

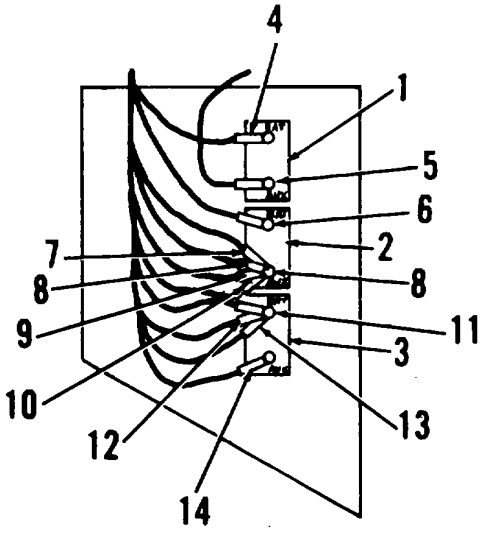
Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.



1. TAG AND DISCONNECT ELECTRICAL WIRES FROM CIRCUIT BREAKERS (1, 2, 3).
   a. Disconnect red wire (4) from short stud on circuit breaker (1). Disconnect red wire (5) from long stud.
   b. Disconnect blue wire (6) from short stud on circuit breaker (2). Disconnect orange (7), purple (8), yellow (9), and brown (10) wires from long stud.
   c. Disconnect green wire (11) and two blue wires (12, 13) from short stud on circuit breaker (3). Disconnect purple wire (14) from long stud.



2. REMOVE CIRCUIT BREAKERS (1, 2, 3) FROM INSTRUMENT PANEL BY REMOVING SCREWS (15) AND NUTS (16).



B. CLEANING

Clean circuit breakers in accordance with paragraph 1-24.

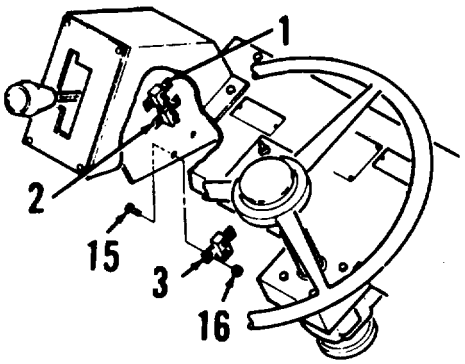
C. INSPECTION

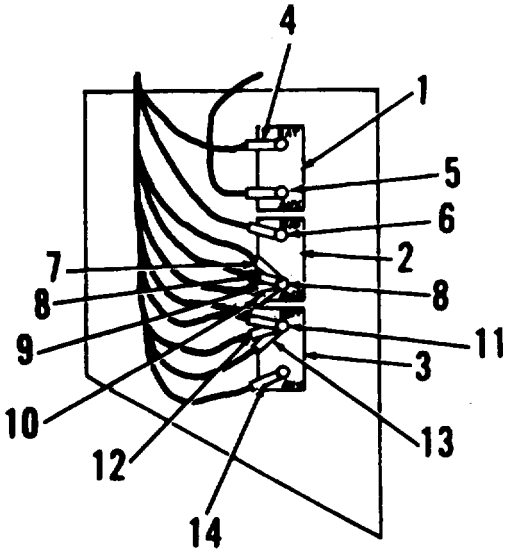
Inspect circuit breakers and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. INSTALL CIRCUIT BREAKERS (1, 2, 3) TO INSTRUMENT PANEL USING SCREWS (15) AND NUTS (16). ENSURE THAT SHORT STUD ON EACH CIRCUIT BREAKER IS ON TOP.
2. CONNECT ELECTRICAL WIRES TO CIRCUIT BREAKERS (1, 2, 3).

    a. Connect red wire (4) to short stud on circuit breaker (1). Connect red wire (5) to long stud.
    b. Connect blue wire (6) to short stud on circuit breaker (2). Connect orange (7), purple (8), yellow (9), and brown (10) wires to long stud.
    c. Connect green wire (11) and two blue wires (12, 13) to short stud on circuit breaker (3). Connect purple wire (14) to long stud.





FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK

2-61. STE/ICE ELECTRICAL COMPONENT TESTING

This task covers: Testing

INITIAL SETUP:

Tools and Test Equipment:
STE/ICE Tester (3, App. E)

Reference:
TM 9-4910-571-12&P

A. TESTING

1. Conduct STE/ICE confidence test (test no. 66) in accordance with troubleshooting paragraph 2-12.
2. Replace defective STE/ICE components in accordance with paragraph 2-62.

FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-62. STE/ICE ELECTRICAL COMPONENT REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Materials / Parts:
Loctite 242 (20, App. C)

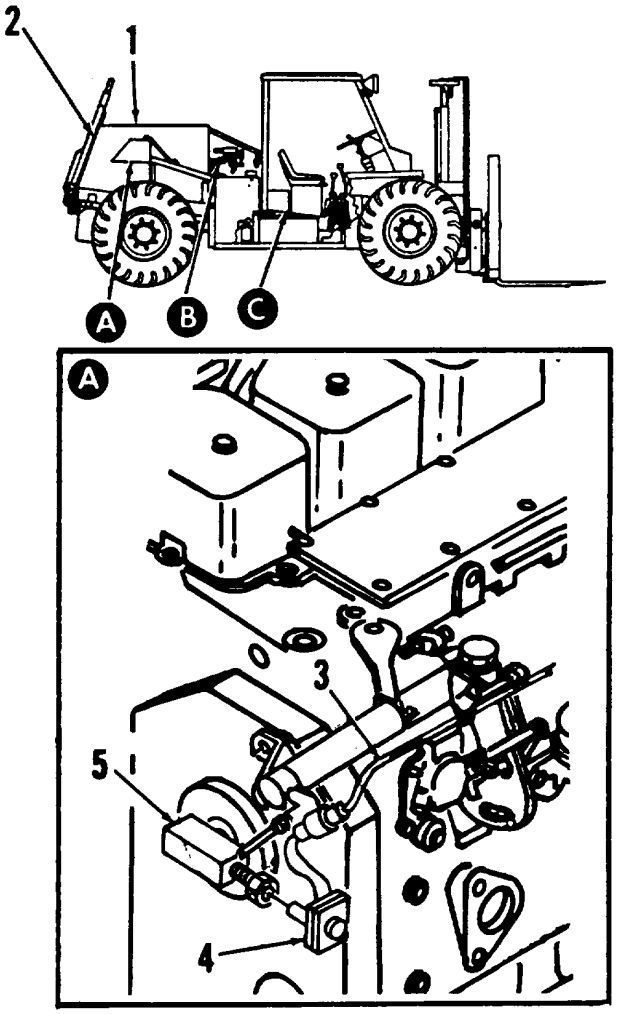
Equipment Condition:
Batteries disconnected (para. 2-78)
Towbar lowered (para. 2-126)

A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

1. RELEASE HOOD ASSEMBLY (2) BY LIFTING HANDLE (1). OPEN HOOD ASSEMBLY.
2. TAG AND DISCONNECT ELECTRICAL WIRING (3) FROM RPM SENDER (4). REMOVE RPM SENDER FROM MECHANICAL TACHOMETER DRIVE (5) ON ENGINE.



3. REMOVE TOP TRANSMISSION TOP (6) BY REMOVING NINE SCREWS (7) AND WASHERS (8).
4. REMOVE DIFFERENTIAL PRESSURE SWITCH (9) FROM DCA PLATE (10).

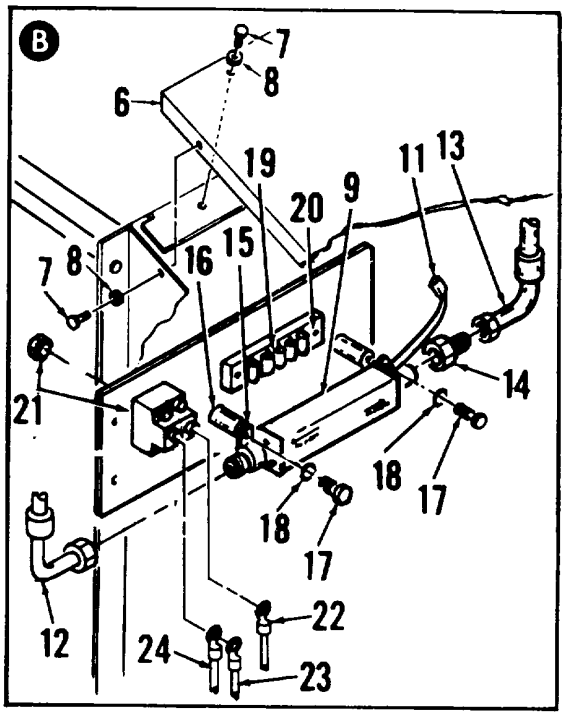
    a. Tag and disconnect differential pressure switch electrical wiring (11).
    b. Tag and disconnect two hose assemblies (12, 13) from fittings (14).
    c. Remove differential pressure switch (9), clamps (15) and spacers (16) from DCA plate (10) by removing screws (17) and lockwashers (18).
    d. Remove fittings (14) and clamps (15) from differential pressure switch (9).

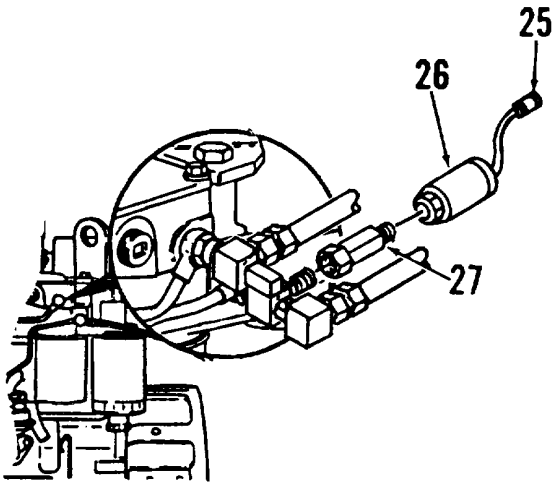
5. REMOVE RESISTOR ASSEMBLY (19) AND ALTERNATE FUEL SHUTOFF SWITCH (21) FROM DCA PLATE (10).

    a. Remove resistor assembly (19) from DCA plate (10) by removing screws (20).
    b. Tag and disconnect electrical wiring from resistor assembly (19). Tag and disconnect wires (22, 23, 24) from alternate fuel shutoff switch (21).
    c. Remove alternate fuel shutoff switch (21) from DCA plate (10) by removing attaching nut.

6. REMOVE PRESSURE TRANSDUCER (22).

    a. Tag and disconnect pressure transducer electrical wiring (25).
    b. Remove pressure transducer (26) from adapter (27). Remove adapter (27) only if replacement is required.





7. REMOVE DCA SHUNT (41) FROM FORKLIFT FLOOR PLATE.
   a. Tag and disconnect electrical cable (28) and wiring (29) from DCA shunt (41) by removing screw (30) and lockwasher (31).

   b. Tag and disconnect electrical cable (32) and wiring (33) from DCA shunt (41) by removing screw (34) and lockwasher (35).

   c. Tag and disconnect electrical wiring (36, 37) from DCA shunt (41) by removing screws (38), lockwashers (39), and washers (40).

   d. Remove DCA shunt (41) from forklift floor plate by removing screws (42), lockwashers (43), and locknuts (44).

B CLEANING

Clean STE/ICE electrical components in accordance with paragraph 1-24.

C. INSPECTION

Inspect STE/ICE electrical components and related parts in accordance with paragraph 1-24.

D. INSTALLATION

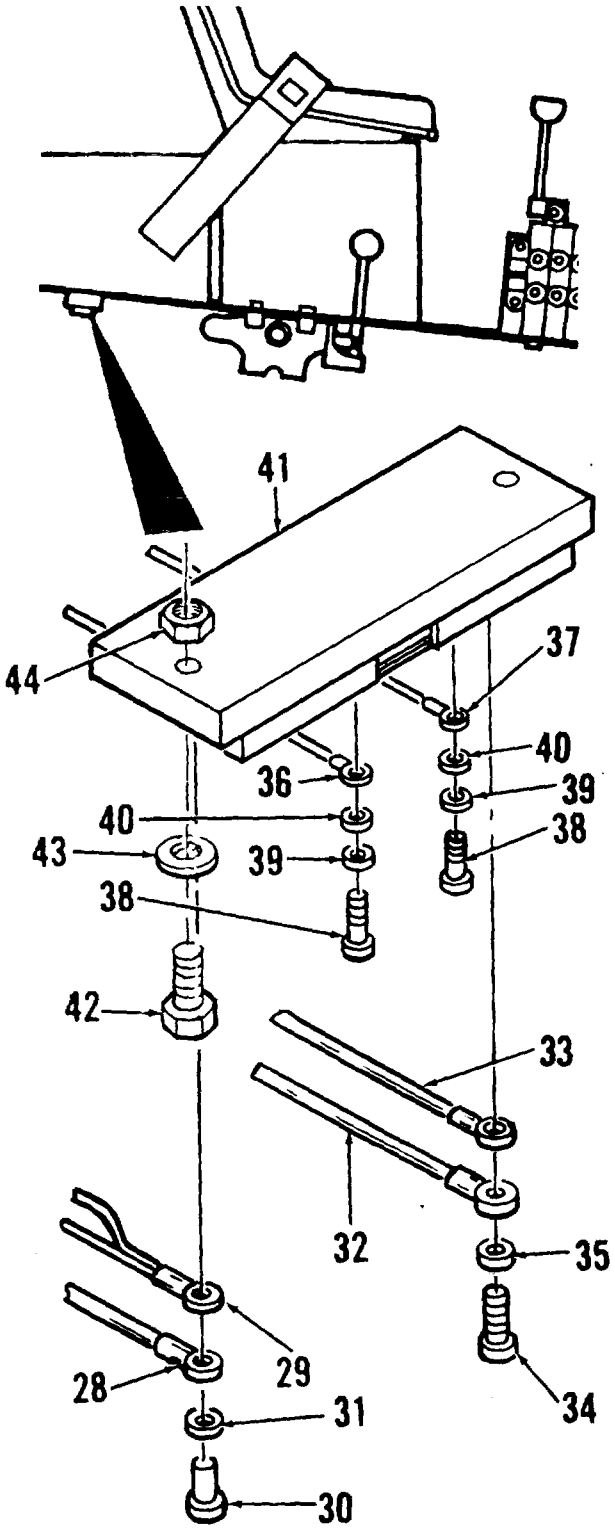
1. INSTALL DCA SHUNT (41) ONTO FORKLIFT FLOOR PLATE.

   a. Install DCA shunt (41) onto forklift floor plate using screws (42), lockwashers (43), and locknuts (44).

   b. Connect electrical wiring (36, 37) to DCA shunt (41) using screws (38), lockwashers (39), and washers (40).

   c. Connect electrical cable (32) and wire (33) to DCA shunt (41) using screw (34) and lockwasher (35).

   d. Connect electrical cable (28) and wire (29) to DCA shunt (41) using screw (30) and lockwasher (31).



2. INSTALL PRESSURE TRANSDUCER (22).
   a. Install adapter (27). Install pressure transducer (26) onto adapter.

   b. Connect pressure transducer electrical wiring (25).

3. INSTALL RESISTOR ASSEMBLY (19) AND ALTERNATE FUEL SHUTOFF SWITCH (21) ONTO DCA PLATE (10).
   a. Install alternate fuel shutoff switch (21) onto DCA plate (10) using attaching nut.

   b. Connect electrical wiring to resistor assembly (19). Connect wires (22, 23, 24) to alternate fuel shutoff switch (21).
   c. Install resistor assembly (19) onto DCA plate (10) using screws (20).

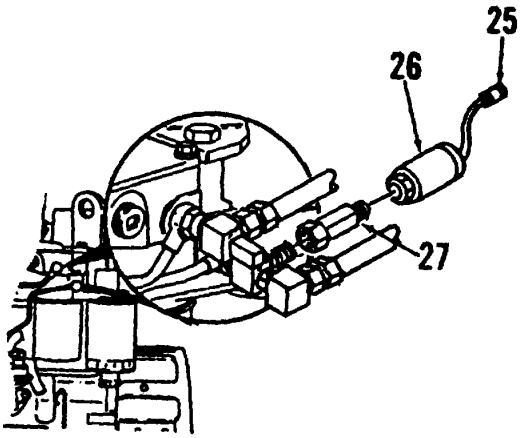
4. INSTALL DIFFERENTIAL PRESSURE SWITCH (9) ONTO DCA PLATE (10).
   a. Install fittings (14) onto differential pressure switch (9). Install clamps (15).

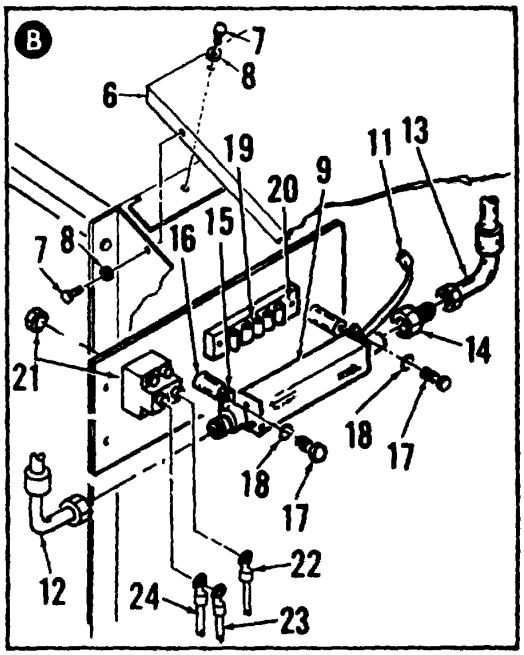
   b. Align spacers (16) with holes in DCA plate (10). Secure differential pressure switch (9) onto DCA plate using screws (17) and lockwashers (18).

   c. Connect hose assemblies (12, 13) to fittings (14).

   d. Connect differential pressure switch electrical wiring (11).

5. APPLY LOCTITE TO SCREWS (7). INSTALL TRANSMISSION COVER TOP (6) USING NINE SCREWS (7) AND WASHERS (8).





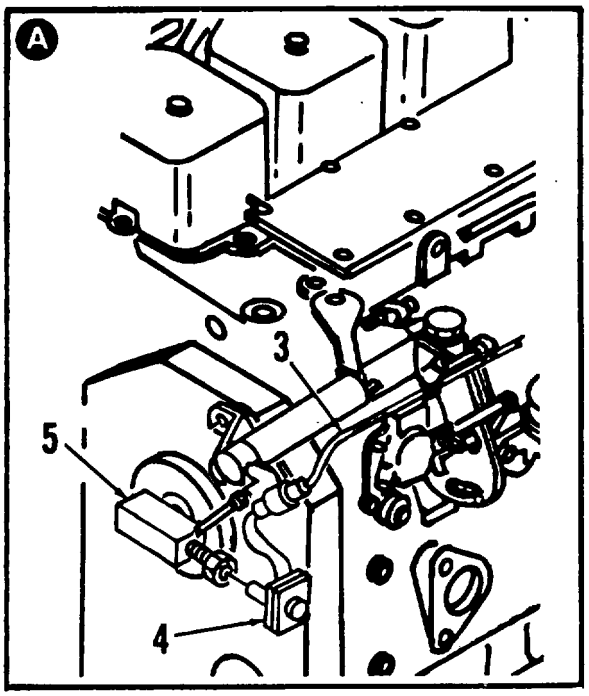
6. INSTALL RPM SENDER (4) ONTO MECHANICAL TACHOMETER DRIVE (5) ON ENGINE. CONNECT ELECTRICAL WIRING (3) TO RPM SENDER.

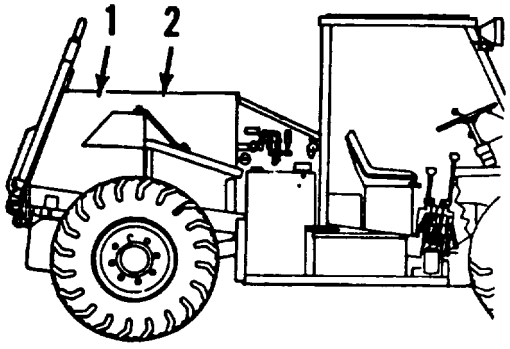
8. CLOSE HOOD ASSEMBLY (2). ENSURE HANDLE (1) IS FULLY ENGAGED.

FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78) Raise towbar and lock in position (para. 2-126)

END OF TASK





2-63. BLACKOUT/SERVICE LIGHT SWITCH (MASTER SWITCH) REPLACEMENT

This task covers: Removal, cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Equipment Condition:
Batteries disconnected (para. 2-78)

A. REMOVAL

WARNING

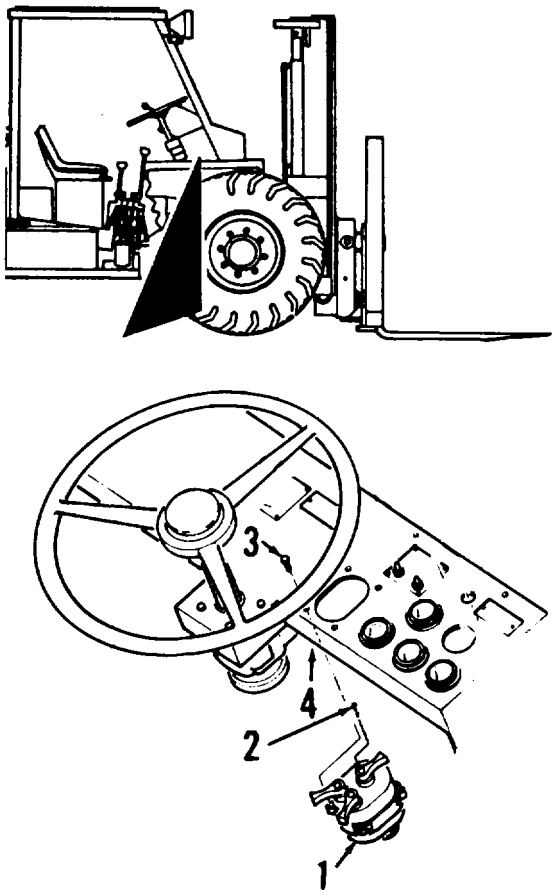
Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

1. Tag and disconnect electrical wiring from blackout/service light switch (1).

2. Remove three handles from blackout/service light switch (I) by removing screws (2).

Handles must be removed to allow switch removal.

3. Remove blackout/service light switch (1) from instrument panel (4) by removing screws (3).



B. CLEANING

Clean blackout/service light switch in accordance with paragraph 1-24.

C. INSPECTION

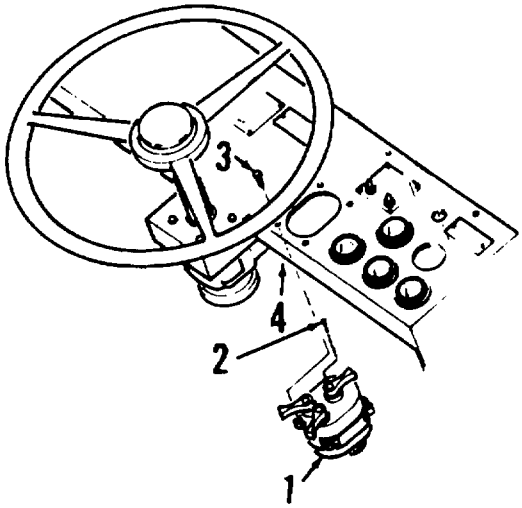
Inspect light switch and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install blackout/service light switch (1) onto instrument panel (4) using screws (3).

2. Install three handles onto blackout/service light switch (1) using screws (2), ensuring proper orientation.

3. Connect electrical wiring to blackout/service light switch (1).



FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK

2-64. WORK/DRIVE LIGHT REPLACEMENT

This task covers:

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Vise (30, App. E)

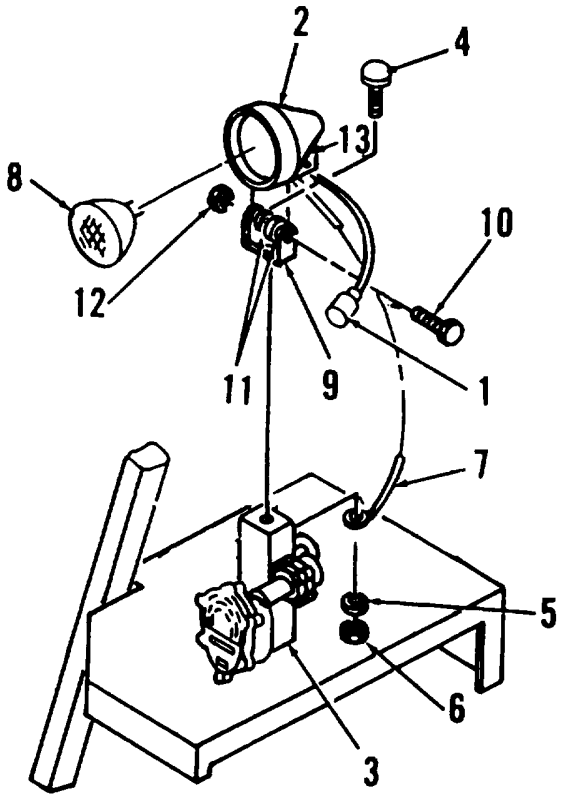
Equipment Condition:
Batteries disconnected (para. 2-78)

A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance.

1. REMOVE LIGHT HOUSING (2) FROM LEFT FRONT FENDER. REMOVE SEALED BEAM (8).
   a. Tag and disconnect electrical wire (1) from light housing (2).
   b. Remove light housing (2) from light post (3) by removing carriage bolt (4), lockwasher (5), and nut (6). Remove ground wire (7).
   c. Remove light housing (2) from U-bracket (9) by removing carriage bolt (10), lockwashers (11), and nut (12). Remove bracket (13).
   d. Install light housing (2) into vise. Pull housing away from sealed beam (8) and pry sealed beam out of housing using screwdriver.
   e. Disconnect sealed beam (8) from light housing (2).
2. REPEAT STEP 1 FOR RIGHT FRONT FENDER LIGHT.



3. REMOVE LIGHT HOUSING (15) FROM LEFT SIDE OF ROPS. REMOVE SEALED BEAM (21).

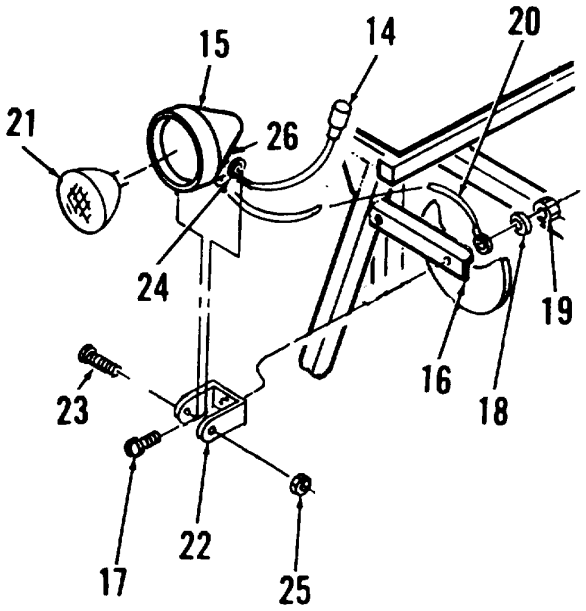
   a. Tag and disconnect electrical wire (14) from light housing (15).

   b. Remove light housing (15) from lightmount (16) by removing carriage bolt (17), lockwasher (18), and nut (19). Remove ground wire (20).

   c. Remove light housing (15) from U-bracket (22) by removing carriage bolt (23), lockwashers (24), and nut (25). Remove bracket (26).

   d. Install light housing (15) into vise. Pull housing away from sealed beam (21) and pry sealed beam out of housing using screwdriver.

   e. Disconnect sealed beam (21) from light housing (15).



4. REPEAT STEP 3 FOR RIGHT FRONT FENDER LIGHT.

5. REMOVE LIGHT HOUSING (28) FROM LEFT REAR LIGHT BOX (29). REMOVE SEALED BEAM (34).

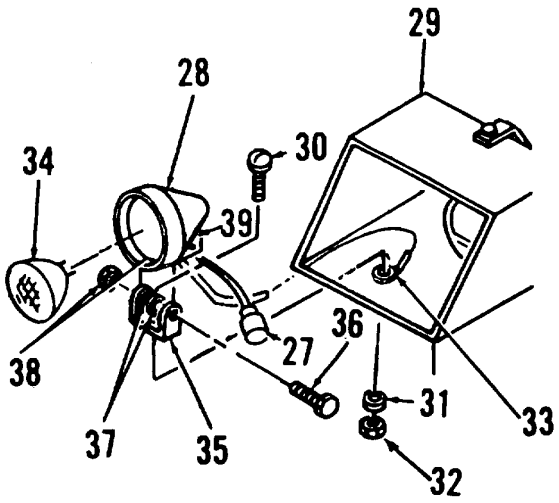
   a. Tag and disconnect electrical wire (27) from light housing (28).

   b. Remove light housing (28) from left rear light box (29) by removing carriage bolt (30), lockwasher (31), and nut (32). Remove ground wire (33).

   c. Remove light housing (28) from U-bracket (35) by removing carriage bolt (36), lockwashers (37), and nut (38). Remove bracket (39).

   d. Install light housing (28) into vise. Pull housing away from sealed beam (34) and pry sealed beam out of housing using screwdriver.

   e. Disconnect sealed beam (34) from light housing (28).



6. REPEAT STEP 5 FOR RIGHT REAR FLOOD LIGHT.

B. CLEANING

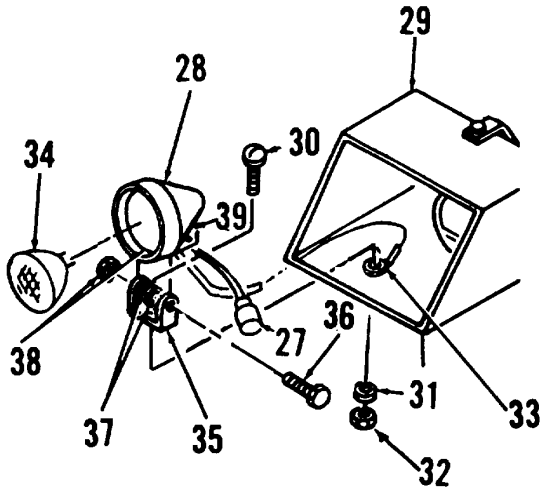
Clean light housings and brackets in accordance with paragraph 1-24.

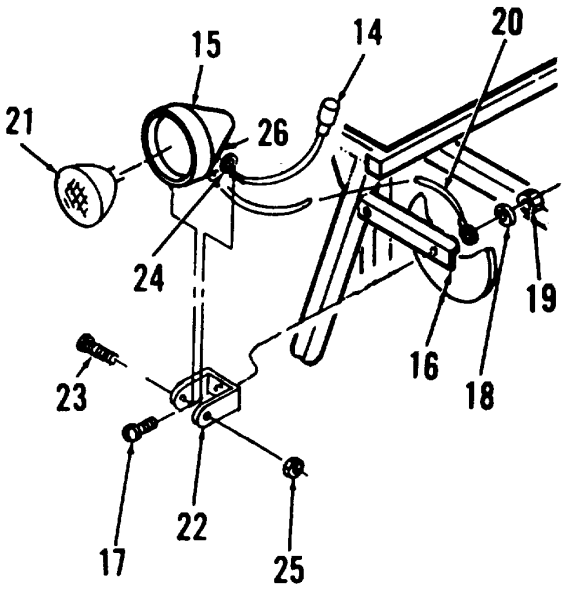
C. INSPECTION

Inspect housings and related components in accordance with paragraph 1-24.

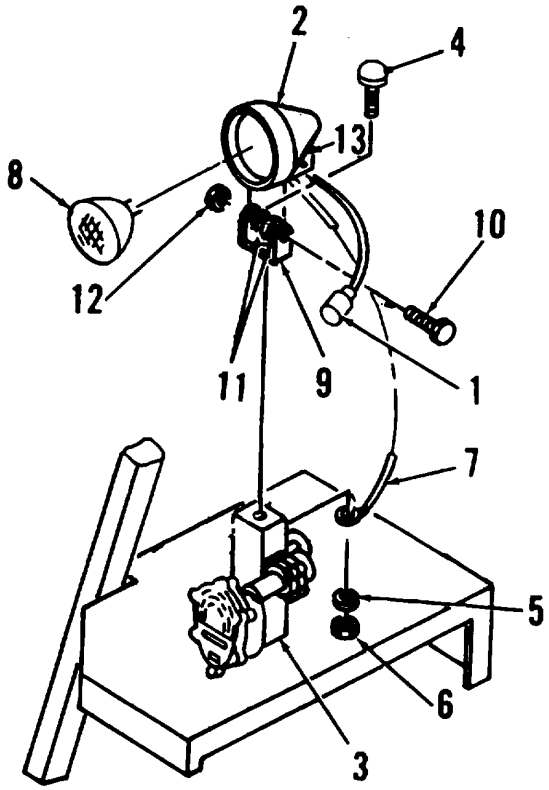
D. INSTALLATION

1. INSTALL LIGHT HOUSING (28) INTO LEFT REAR LIGHT BOX (29). INSTALL SEALED BEAM (34).
   a. Carefully install sealed beam (34) into light housing (28).
   b. Install left rear light housing (28) and bracket (39) onto U-bracket (35) using carriage bolt (36), lockwashers (37), and nut (38).
   c. Install light housing (28) into left rear light box (29) using carriage bolt (30), lockwasher (31), and nut (32). Ensure ground wire (33) is properly secured.
   d. Connect electrical wire (27) to light housing (28).
2. REPEAT STEP I FOR RIGHT REAR FLOOD LIGHT.
3. INSTALL LEFT LIGHT HOUSING (15) ONTO ROPS. INSTALL SEALED BEAM (21).
   a. Carefully install sealed beam (21) into light housing (15).
   b. Install left light housing (15) and bracket (26) onto U-bracket (22) using carriage bolt (23) lockwashers (24), and nut (25).
   c. Install light housing (15) onto lightmount (16) using carriage bolt (17), lockwasher (18), and nut (19). Ensure ground wire (20) is properly secured.
   d. Connect electrical wire (14) to light housing (15).
4. REPEAT STEP 3 FOR RIGHT FRONT FLOOD LIGHT.





5. INSTALL LIGHT HOUSING (2) ONTO LEFT FRONT LIGHT POST (3). INSTALL SEALED BEAM (8).
   a. Carefully install sealed beam (8) into light housing (2).
      (1) Install light housing (2) into vise.
      (2) Connect sealed beam (8) to light housing (2).
      (3) Push sealed beam (8) into light housing (2).
   b. Install left front light housing (2) and bracket (13) onto U-bracket (9) using carriage bolt (10), lockwashers (11), and nut (12).
   c. Install light housing (2) onto left front light post (3) using carriage bolt (4), lockwasher (5), and nut (6). Ensure ground wire (7) is properly secured.
   d. Connect electrical wire (2) to light housing (2).
6. REPEAT STEP 5 FOR RIGHT FRONT LIGHT.



FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK

2-65. BLACKOUT DRIVE LIGHT REPLACEMENT

This task covers:

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Equipment Condition:
Batteries disconnected (para. 2-78)

Materials / Parts:
Packing, Item 9 (1 ea.)

A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

1. TAG AND DISCONNECT ELECTRICAL WIRES FROM BLACKOUT DRIVE LIGHT BODY (1).

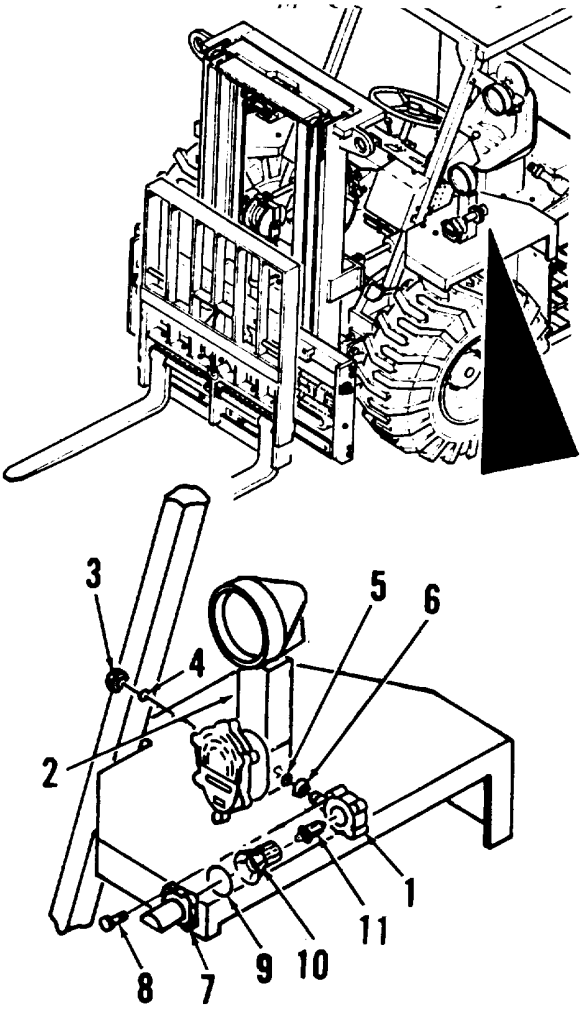
2 REMOVE AND DISASSEMBLE BLACKOUT DRIVE LIGHT. REMOVE LAMP (11).

   a. Remove blackout drive light body (I) from light post (2) by removing nut (3) and washers (4, 5, 6). Ensure that washers remain with light body.

   b. Remove door assembly (7) from light body (1) by removing four screws (8).

   c. Remove packing (9) only if replacement is required.

   d. Carefully remove reflector (10) from light body (1). Remove lamp (11).



B. CLEANING

Clean blackout drive light in accordance with paragraph 1-24.

C. INSPECTION

Inspect blackout drive light and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. INSTALL LAMP (11) INTO BLACKOUT DRIVE LIGHT BODY (1). ASSEMBLE AND INSTALL BLACKOUT DRIVE LIGHT.
   a. Carefully install lamp (11) into blackout drive light body (1). Install reflector (10).

   b. Install packing (9).

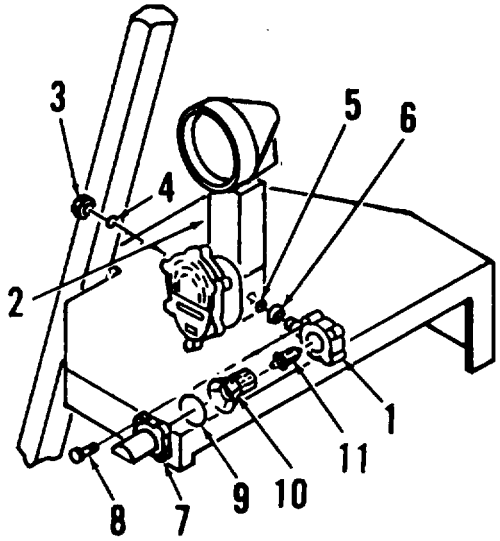
   c. Mate door assembly (7) to light body (1) and secure using four screws (8).

NOTE

If installing new blackout drive light, rotate door assembly 90 degrees left to ensure proper mounting.

   d. Install light body (1) onto light post (2) using nut (3) and washers (4, 5, 6).

2. CONNECT ELECTRICAL WIRES TO LIGHT BODY (1).



FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK

2-66. STOP AND BLACKOUT TAILLIGHT REPLACEMENT (COMPOSITE LIGHTS)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Equipment Condition:
Batteries disconnected (para. 2-78)

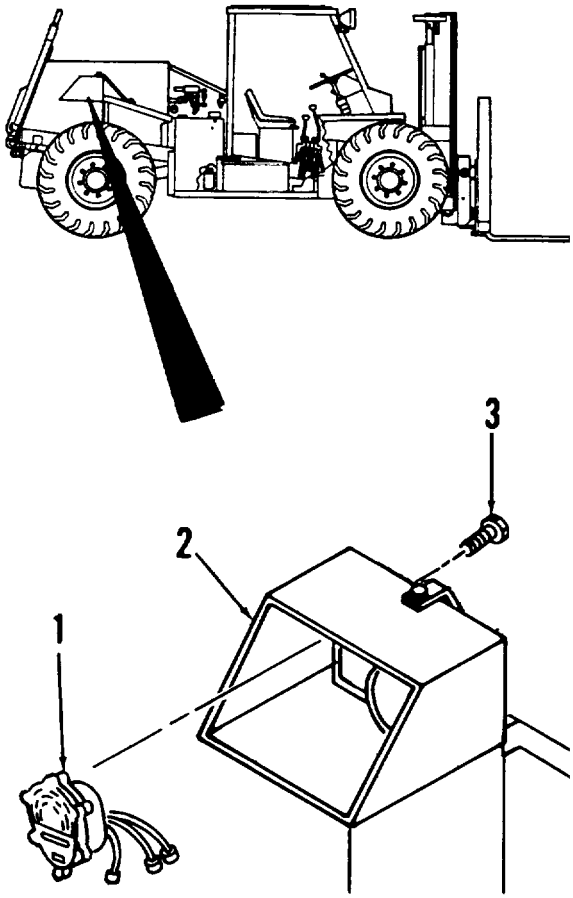
Materials / Parts:
Loctite 242 (20, App. C)

A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

1. REMOVE RIGHT REAR COMPOSITE LIGHT ASSEMBLY (1).
   a. Tag and disconnect electrical wires from composite light assembly (1) located in right rear light box (2).
   b. Remove composite light assembly (1) from right rear light box (2) by removing two screws (3).
2. REPEAT STEP 1 FOR LEFT REAR COMPOSITE LIGHT ASSEMBLY.



3. REMOVE LAMPS (7, 8) AND LIGHT BARS (13, 15) FROM COMPOSITE LIGHT ASSEMBLY.

   a. Remove composite light lens (4) from light body (12) by removing three outer screws (5) and two interior screws (6).

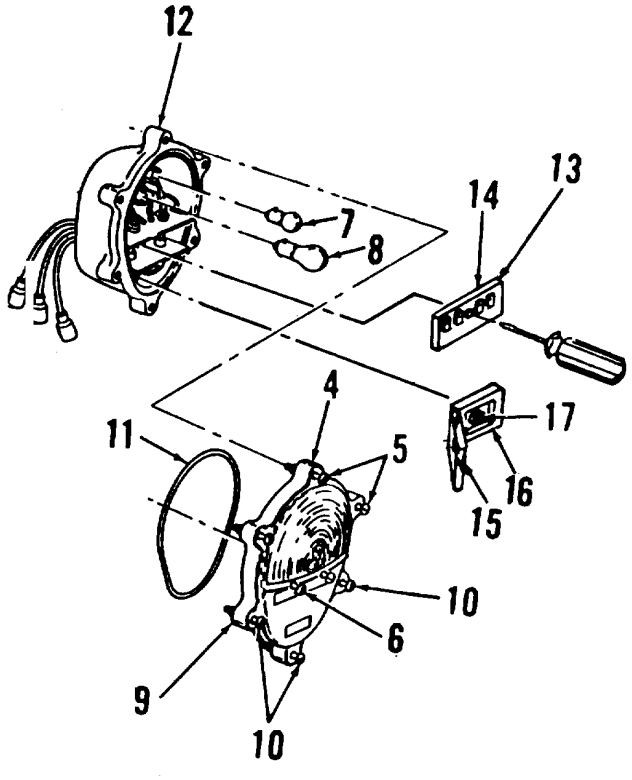
   b. Carefully remove lamps (7, 8) from light body (12).

   c. Remove composite light face plate (9) from light body (12) by removing remaining three outer screws (10).

   d. Remove packing (11) only if replacement is required.

   e. Remove upper light bar (13) from light body (12) by inserting a thin blade screwdriver into hole (14) and turning screw.

   f. Open front half of light bar (15) from rear half (16) using a screwdriver. Remove light bar from light body (12) by turning internal screw (17).



B. CLEANING

Clean composite lights in accordance with paragraph 1-24.

C. INSPECTION

Inspect lights and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. INSTALL LAMPS (7, 8) AND LIGHT BARS (13, 15) INTO COMPOSITE LIGHT ASSEMBLY.

   a. Position lower light bar into light body (12) and secure by turning internal screw (17). Snap front half of light bar (15) onto rear half (16).

   b. Position upper light bar (13) into light body (12). Secure by inserting a thin blade screwdriver into hole (14) and turning screw.

   c. Install packing (11).

   d. Install composite light face plate (9) onto light body (12) using three outer screws (10).

   e. Carefully install lamps (7, 8) into light body (12).

   f. Install composite light lens (4) onto light body (12) using three outer screws (5) and two interior screws (6).

2. INSTALL COMPOSITE LIGHT ASSEMBLY (1) INTO RIGHT REAR LIGHT BOX (2).

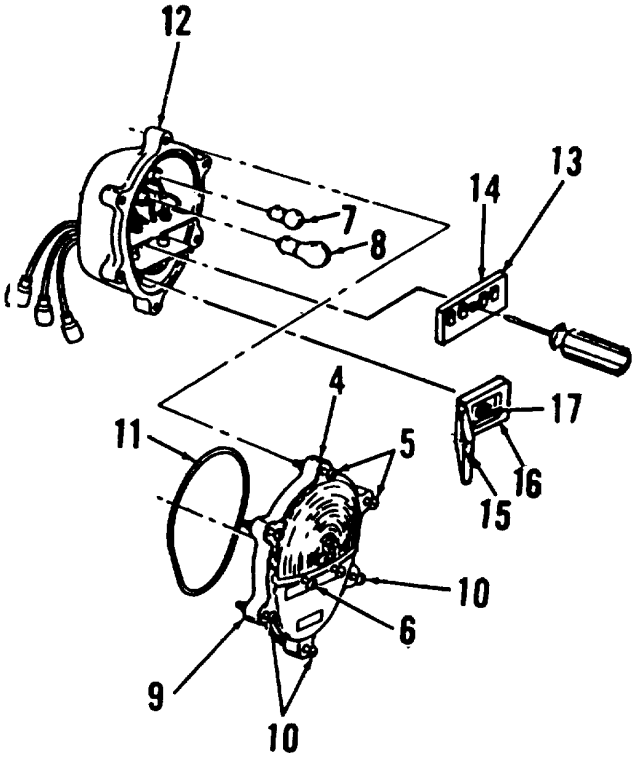
   a. Apply loctite to threads of screws (3).

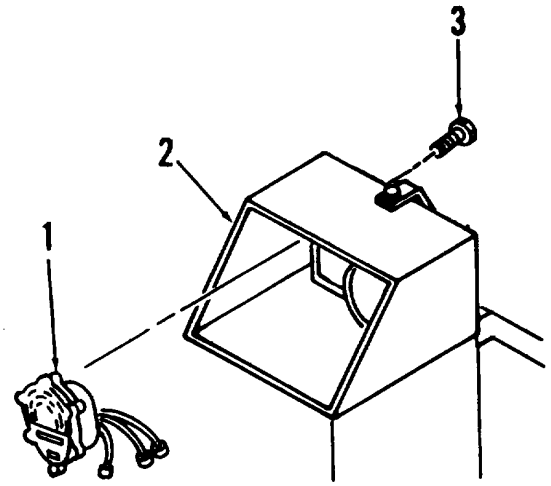
   b. Position composite light assembly (1) in right rear light box (2). Feed electrical wiring through hole in rear of light box.

   c. Install screws (3) to secure composite light assembly (1) to light box (2).

   d. Connect electrical wires to composite light assembly (1).

3. REPEAT STEP 2 FOR LEFT REAR COMPOSITE LIGHT ASSEMBLY.





FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK

2-67. PARKING LIGHT REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Equipment Condition:
Batteries disconnected (para. 2-78)

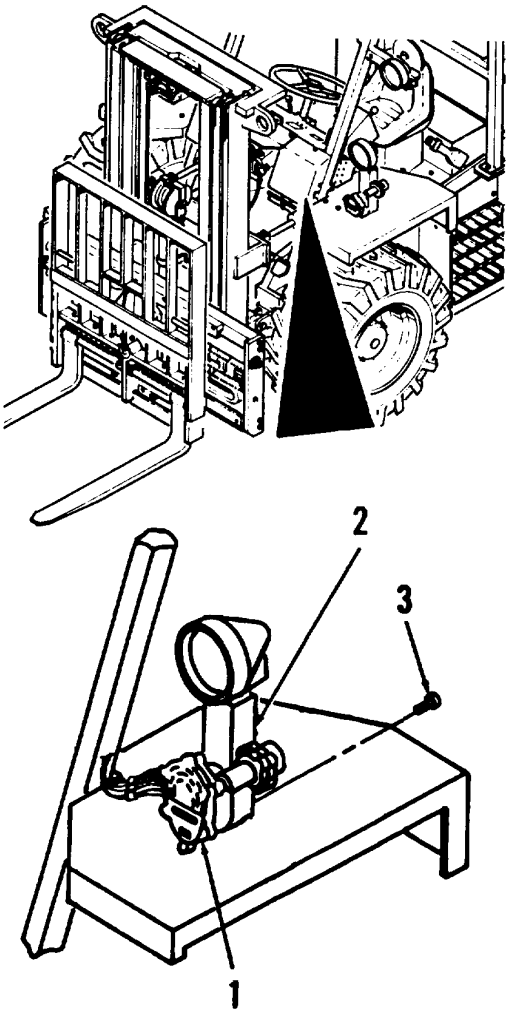
Materials / Parts:
Loctite 242 (20, App. C

A. REMOVAL

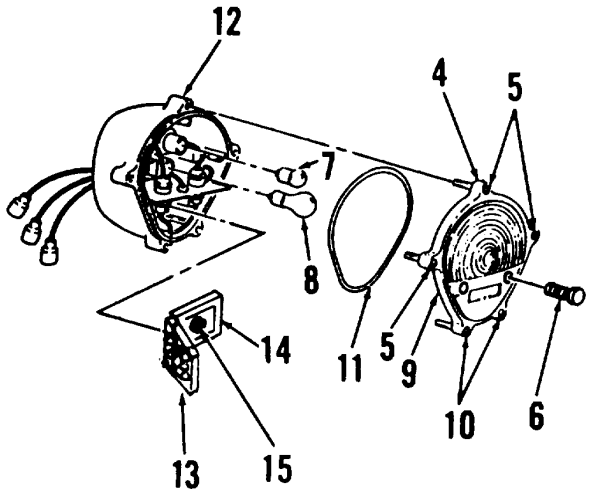
WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

1. REMOVE LEFT PARKING LIGHT (1).
   a. Tag and disconnect electrical wires from parking light (1).
   b. Remove parking light (1) from light post (2) by removing screws (3).
2. REPEAT STEP 1 FOR RIGHT PARKING LIGHT.



3. REMOVE LAMPS (7, 8) AND LIGHT BAR (13) FROM PARKING LIGHT ASSEMBLY.



   a. Remove composite light lens (4) from light body (12) by removing three outer screws (5) and two interior screws (6).

   b. Carefully remove lamps (7, 8) from light body (12).

   c. Remove composite light face plate (9) from light body (12) by removing remaining two outer screws (10).

   d. Remove packing (11) only if replacement is required.

   e. Open front half of light bar (13) from rear half (14) using a screwdriver. Remove light bar from light body (12) by turning internal screw (15).

B. CLEANING

Clean parking light housings and lens caps in accordance with paragraph 1-24.

C. INSPECTION

Inspect housings, lens caps, and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. INSTALL LAMPS (7, 8) AND LIGHT BAR (13) INTO PARKING LIGHT ASSEMBLY.

   a. Position light bar into light body (12) and secure by turning internal screw (15). Snap front half of light bar (13) onto rear half (14).

   b. Install packing (11).

   c. Install composite light face plate (9) onto light body (12) using two outer screws (10).

   d. Carefully install lamps (7, 8) into light body (12).

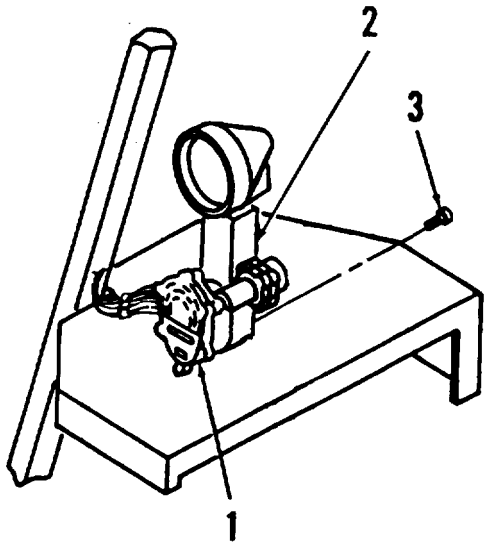
   e. Install composite light lens (4) onto light body (12) using three outer screws (5) and two interior screws (6).

2. INSTALL LEFT PARKING LIGHT (1).

   a. Apply loctite to threads of screws (3).

   b. Mate left parking light (1) to light post (2) and secure using screws (3).

   c. Connect electrical wires to left parking light (1).



3. REPEAT STEP 2 FOR RIGHT PARKING LIGHT.

FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK

2-68. ENGINE OIL PRESSURE SWITCH REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

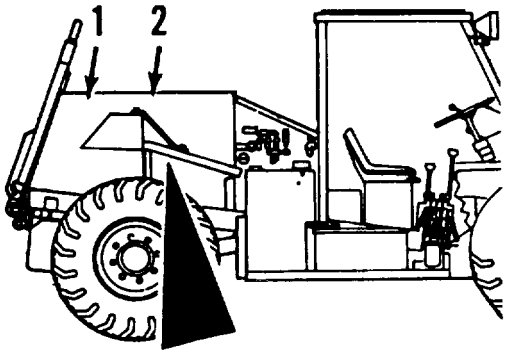
Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Equipment Condition:
Towbar lowered (para. 2-126)
Batteries disconnected (para. 2-78)

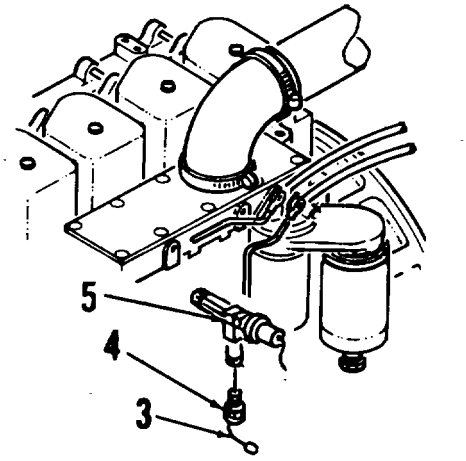
A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.



1. Release hood assembly (2) by lifting handle (1). Open hood assembly.
2. Tag and disconnect electrical wires (3) from engine oil pressure switch (4).
3. Remove engine oil pressure switch (4) from tee (5).



B. CLEANING

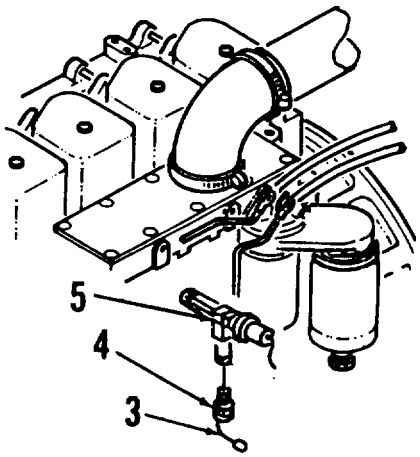
Clean engine oil pressure switch in accordance with paragraph 1-24.

C. INSPECTION

Inspect switch and related components in accordance with paragraph 1-24.

D. INSTALLATION

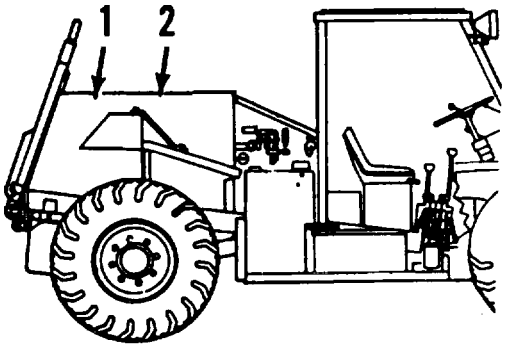
1. Connect electrical wires (3) to engine oil pressure switch (4).
2. Install engine oil pressure switch (4) into tee (5).
3. Close hood assembly (2). Ensure handle (1) is fully engaged.



FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78) Raise towbar and lock in position (para. 2-126)

END OF TASK



2-69. ENGINE OIL PRESSURE SENDER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

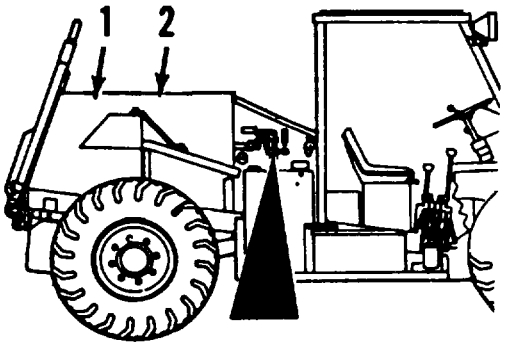
Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Equipment Condition:
Towbar lowered (para. 2-126)
Batteries disconnected (para. 2-78)

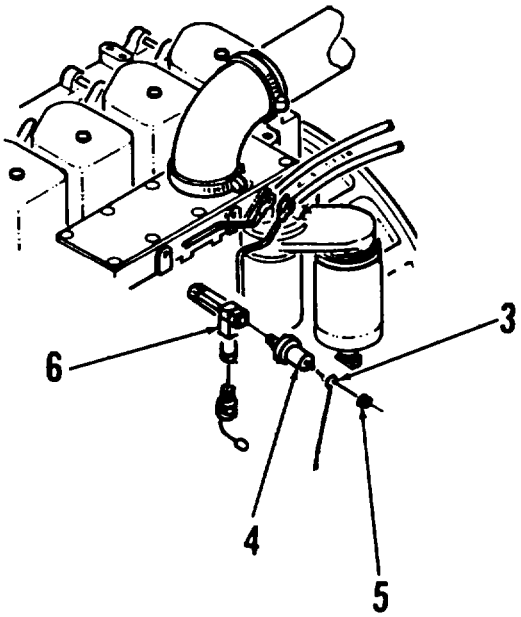
A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.



1. Release hood assembly (2) by lifting handle (1). Open hood assembly.
2. Tag and disconnect electrical wire (3) from engine oil pressure sender (4) by removing nut (5).
3. Remove engine oil pressure sender (4) from tee (6).



B. CLEANING

Clean engine oil pressure sender in accordance with paragraph 1-24.

C. INSPECTION

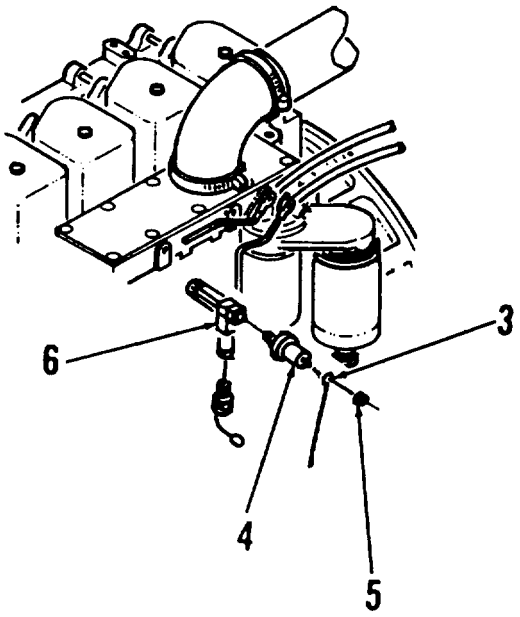
Inspect sender and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install engine oil pressure sender (4) into tee (6).

2. Install electrical wire (3) on engine oil pressure sender (4) using nut (5).

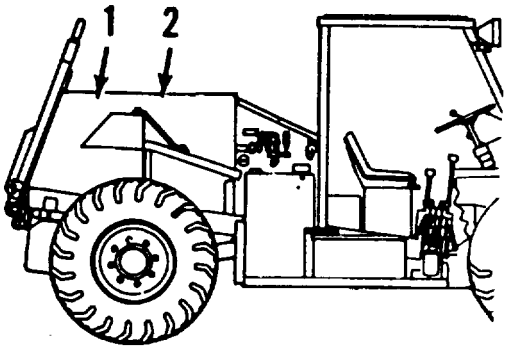
3. Close hood assembly (2). Ensure handle (1) is fully engaged.



FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)
Raise towbar and lock in position (para. 2-126)

END OF TASK



2-70. ENGINE HIGH TEMPERATURE SENDER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

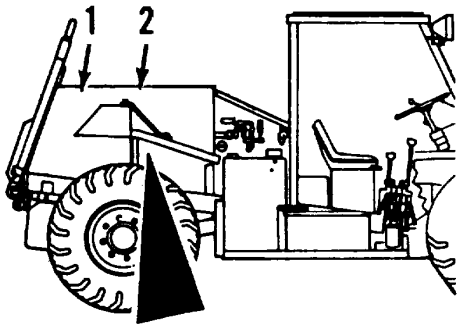
Equipment Condition:

Towbar lowered (para. 2-126)
Batteries disconnected (para. 2-78)

A. REMOVAL

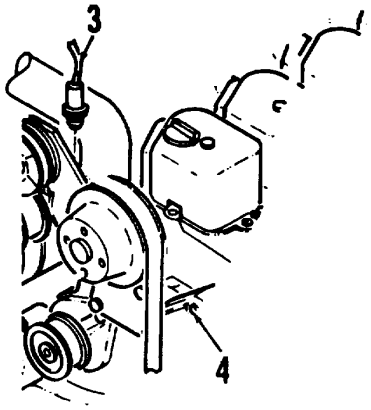
WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.



WARNING

Do not remove high temperature sender when engine is hot. Hot steaming gases can escape and burn personnel. Allow engine to cool before removing.



WARNING

Use extreme care when removing high temperature sender. The sudden release of pressure can cause a steam flash, resulting in injury.

1. Release hood assembly (2) by lifting handle (1). Open hood assembly.

2. Tag and disconnect electrical wire from engine high temperature sender (3).

3. Remove engine high temperature sender (3) from engine (4).

B. CLEANING

Clean engine high temperature sender in accordance with paragraph 1-24.

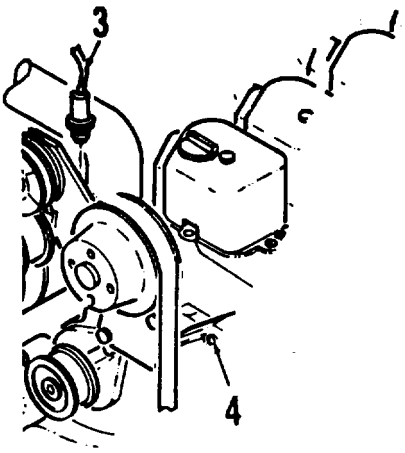
C. INSPECTION

Inspect sender and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install engine high temperature sender (3) into engine (4).

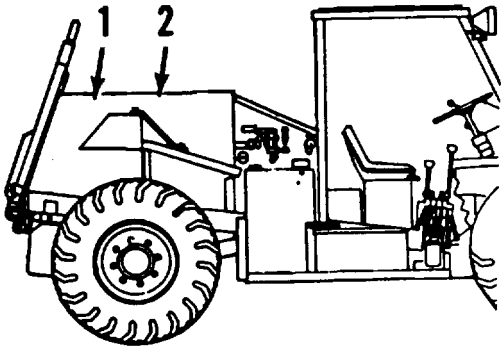
2. Connect electrical wires to engine high temperature sender (3).



FOLLOW-ON MAINTENANCE:

Service radiator (para. 2-46) Connect battery cables (para. 2-78) Raise towbar and lock in position (para. 2-126)

END OF TASK



2-71. TRANSMISSION OIL TEMPERATURE SENDER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Materials / Parts:

Loctite 242 (20, App. C)

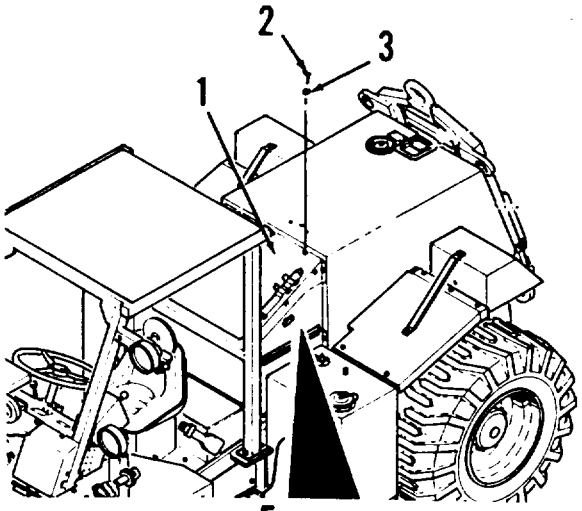
Equipment Condition:

Batteries disconnected (para. 2-78)

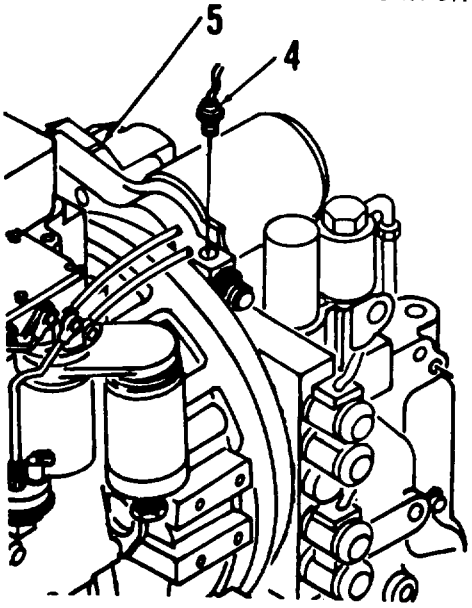
A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.



1. Remove top transmission cover (1) by removing nine screws (2) and washers (3).
2. Tag and disconnect electrical wire from transmission oil temperature sender (4).
3. Remove transmission oil temperature sender (4) from transmission (5).



B. CLEANING

Clean transmission oil temperature sender in accordance with paragraph 1-24.

C. INSPECTION

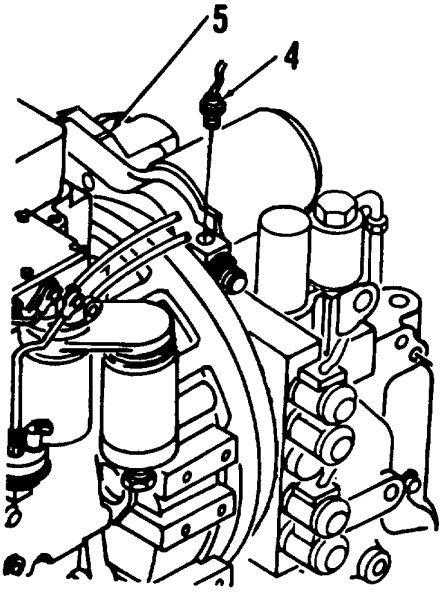
Inspect sender and related components in accordance with paragraph 1-24.

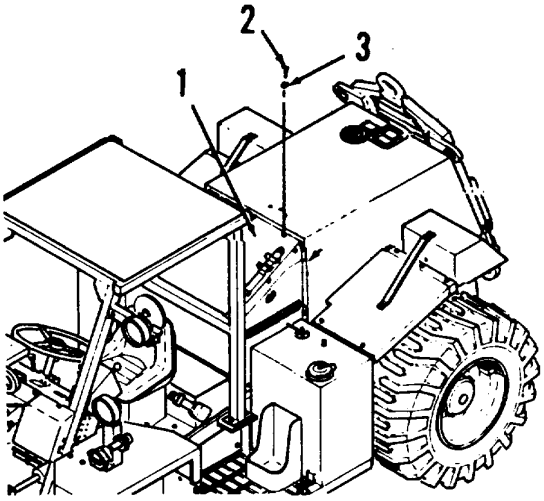
D. INSTALLATION

1. Install transmission oil temperature sender (4) into transmission (5).

2. Connect electrical wires to transmission oil temperature sender (4).

3. Apply loctite to threads of nine screws (2). Install top transmission cover (1) using screws (2) and washers (3).





FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK

2-72. STOP INDICATOR SWITCH REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Equipment Condition:

Batteries disconnected (para. 2-78)

Materials / Parts:

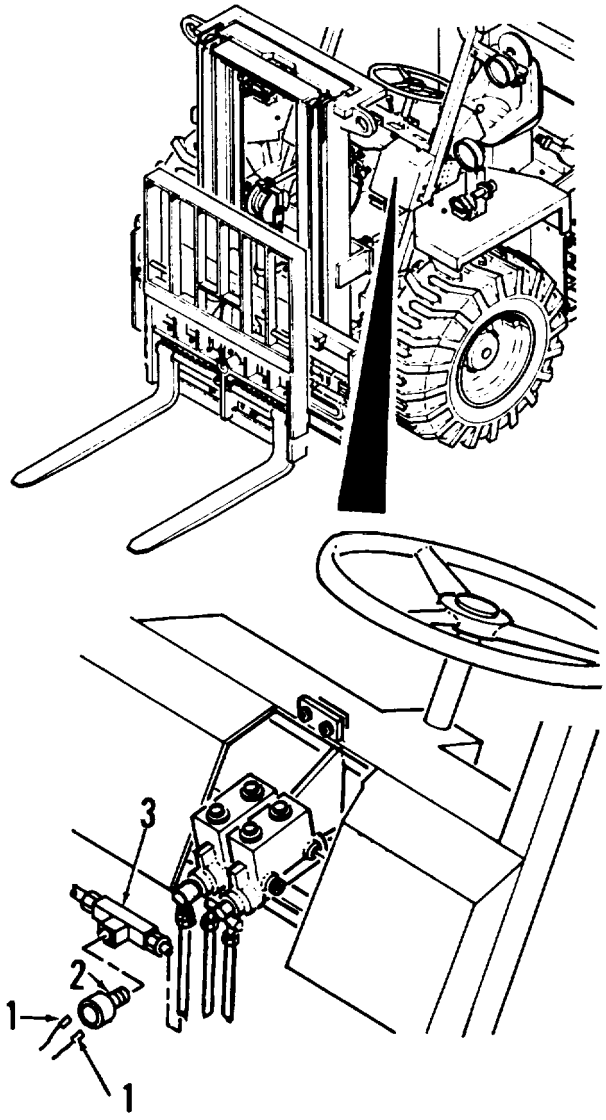
Teflon Tape (35, App. C)
Sealant (41, App. C)

A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

1. Remove sealant from switch and wiring terminals.
2. Tag and disconnect electrical wires (1) from stop indicator switch (2).
3. Remove stop indicator switch (2) from tee (3). Remove teflon tape.



B. CLEANING

Clean stop indicator switch in accordance with paragraph 1-24.

C. INSPECTION

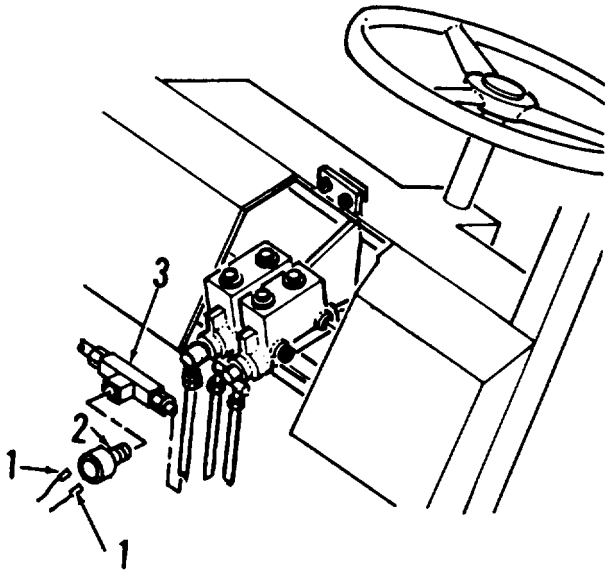
Inspect switch and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Apply teflon tape to threads of stop indicator switch (2). Install switch into tee (3).

2. Connect electrical wires (1) to stop indicator switch (2).

3. Apply sealant to switch and wiring terminals. Ensure terminals are completely encased.



FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK

2-73. BACKUP ALARM PRESSURE SWITCH REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Equipment Condition:

Batteries disconnected (para. 2-78)

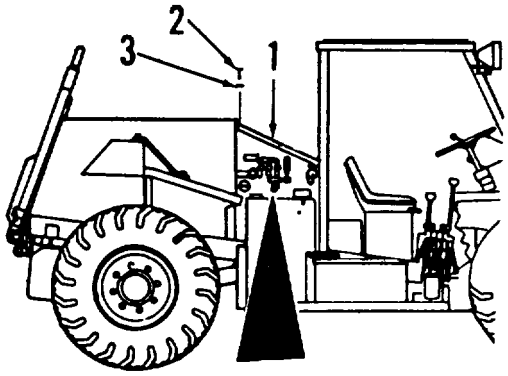
Materials / Parts:

Loctite 242 (20, App. C)

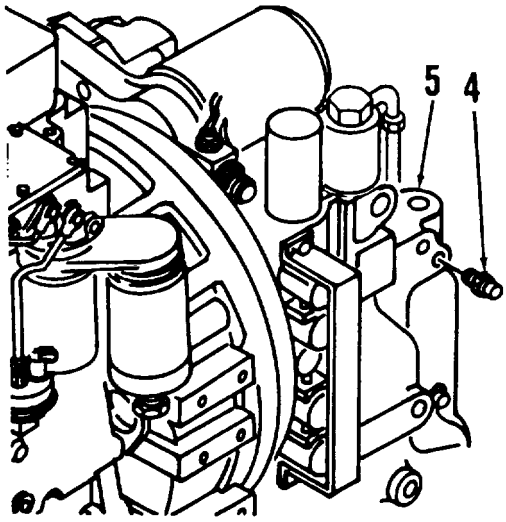
A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first "aid and seek medical assistance immediately.



1. Remove top transmission cover (1) by removing nine screws (2) and washers (3).
2. Tag and disconnect electrical wires from backup alarm pressure switch (4).
3. Remove backup alarm pressure switch (4) from transmission (5).



B. CLEANING

Clean backup alarm pressure switch in accordance with paragraph 1-24.

C. INSPECTION

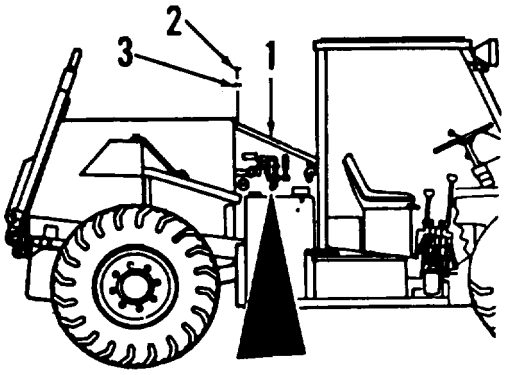
Inspect switch and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install backup alarm pressure switch (4) into transmission (5).

2. Connect electrical wires to backup alarm pressure switch (4).

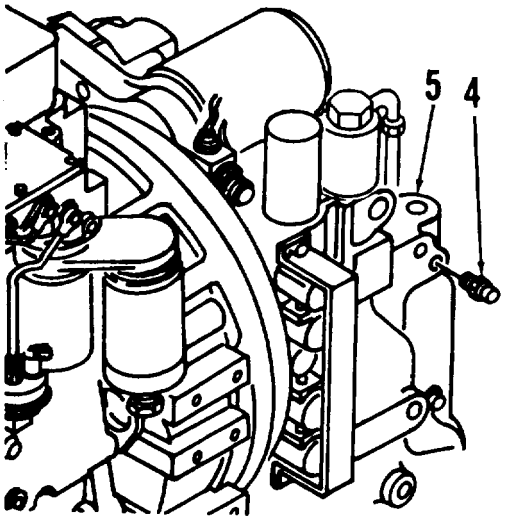
3. Apply loctite to threads of nine screws (2). Install top transmission cover (1) using screws and washers (3).



FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK



2-74. FUEL LEVEL SENDING UNIT REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Equipment Condition:

Batteries disconnected (para. 2-78)

Materials / Parts:

Gasket, Item 5 (1 ea.)

A. REMOVAL

WARNING

Fuel is very flammable and can easily explode. To avoid serious injury or death, observe the following precautions:

- Keep fuel away from open flame or any spark (ignition source).

- Keep at least a B-C fire extinguisher within easy reach when working with fuel.

- Do not work on fuel system when engine is hot; fuel can be ignited by a hot engine.

- Post signs that read "NO SMOKING WITHIN 50 FEET" when working with open fuel or fuel tank.

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

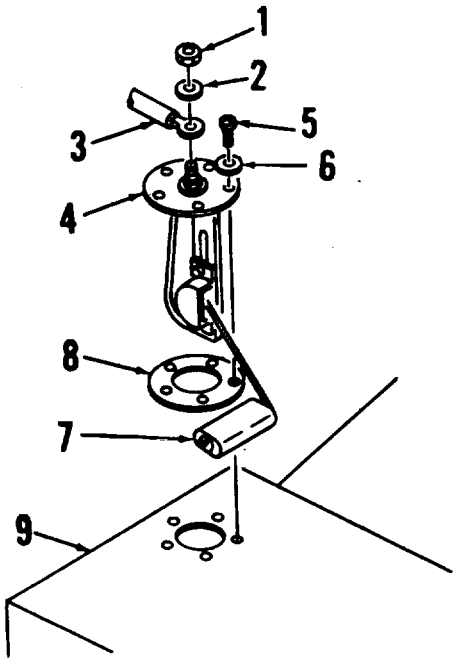
1. Remove nut (1) and washer (2). Tag and disconnect electrical wire (3) from fuel level sending unit (4).

CAUTION

Use care when removing fuel level sending unit (4) to prevent damage to level rod (7).

2. Remove screws (5) and lockwashers (6). Carefully lift fuel level sending unit (4) from fuel tank (9), making sure not to bend level rod (7).

3. Remove and discard gasket (8).



B. CLEANING

Clean fuel level sending unit in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect level rod for bends, kinks, or other damage. Ensure rod moves freely.

2. Inspect sending unit and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install new gasket (8) onto fuel tank (9), ensuring proper hole alignment.

CAUTION

Use care when installing fuel level sending unit (4) to prevent damage to level rod (7).

2. Carefully insert fuel level sending unit (4) into fuel tank (6), making sure not to bend level rod (7). Secure using screws (5) and lockwashers (6).

3. Connect electrical wire (3) to fuel level sending unit (4). Secure using nut (1) and washer (2).

FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK

2-75. REVERSE WARNING ALARM REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

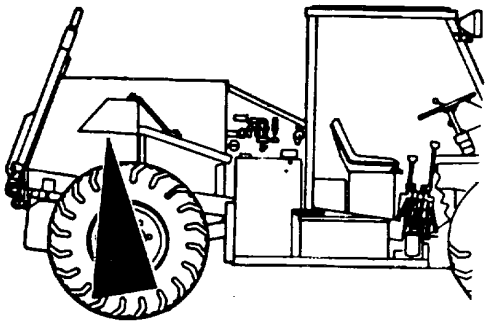
Equipment Condition:

Batteries disconnected (para. 2-78)

A. REMOVAL

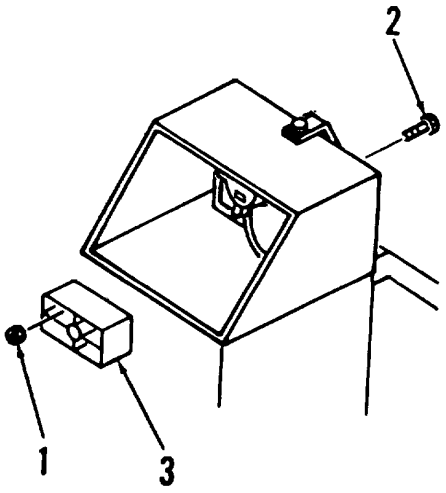
WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.



1. Tag and disconnect electrical wire from reverse warning alarm (1).

2. Remove reverse warning alarm (I) from right rear light box (4) by removing screws (2) and nuts (3).



B. CLEANING

Clean reverse warning alarm in accordance with paragraph 1-24.

C. INSPECTION

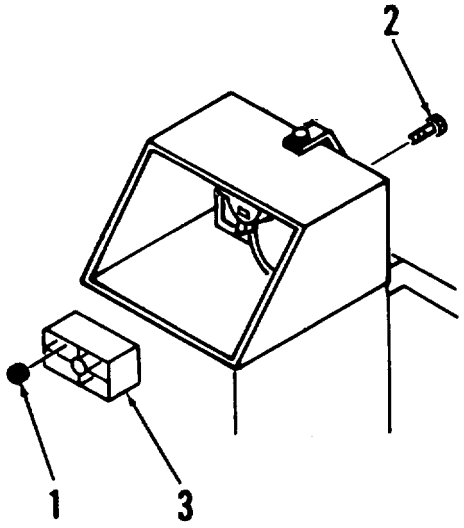
Inspect alarm and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Position reverse warning alarm (I) into right rear light box (4). Carefully feed electrical wires through hole in rear of box.

2. Secure reverse warning alarm (1) using screws (2) and nuts (3). Outside screw secures alarm ground wire.

3. Connect electrical wire to reverse warning alarm (1).



FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK

2-76. HORN REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

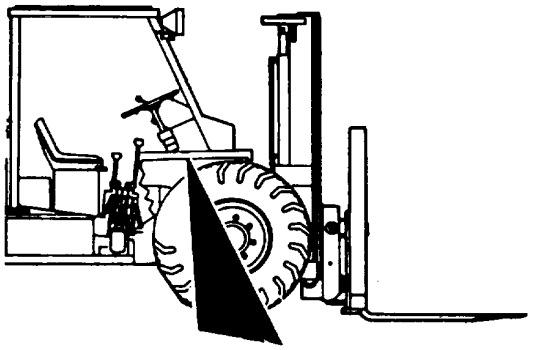
Equipment Condition:

Batteries disconnected (para. 2-78)

A. REMOVAL

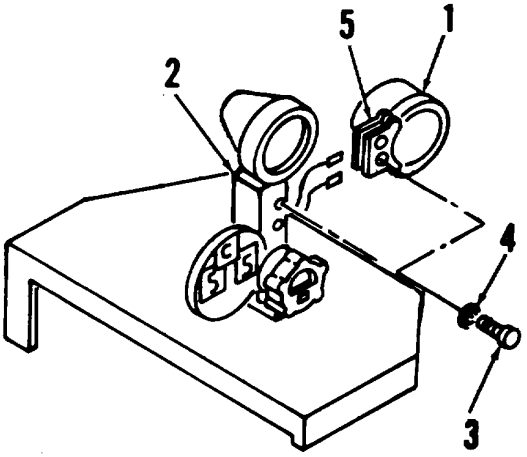
WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.



1. Tag and disconnect electrical wires from horn (1).

2. Remove horn (I) from right front light post (2) by removing screws (3), washers (4), and mounting plate (5).



B. CLEANING

Clean horn in accordance with paragraph 1-24.

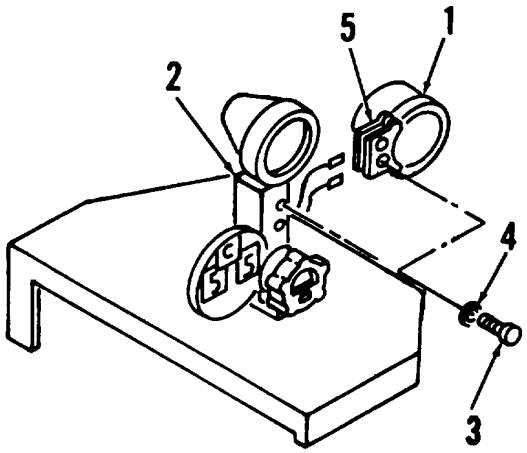
C. INSPECTION

Inspect horn and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install horn (1) onto right front light post (2) using screws (3), washers (4), and mounting plate (5).

2. Connect electrical wires to horn (1).



FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK

2-77. BATTERY SERVICING

This task covers: Servicing

INITIAL SETUP:

Tools and Test Equipment:

Rubber Gloves (9, App. E)
Apron (36, App. E)
Battery Filler (11, App. E)

Materials / Parts:

Electrolyte (34, App. C)

A. SERVICING

WARNING

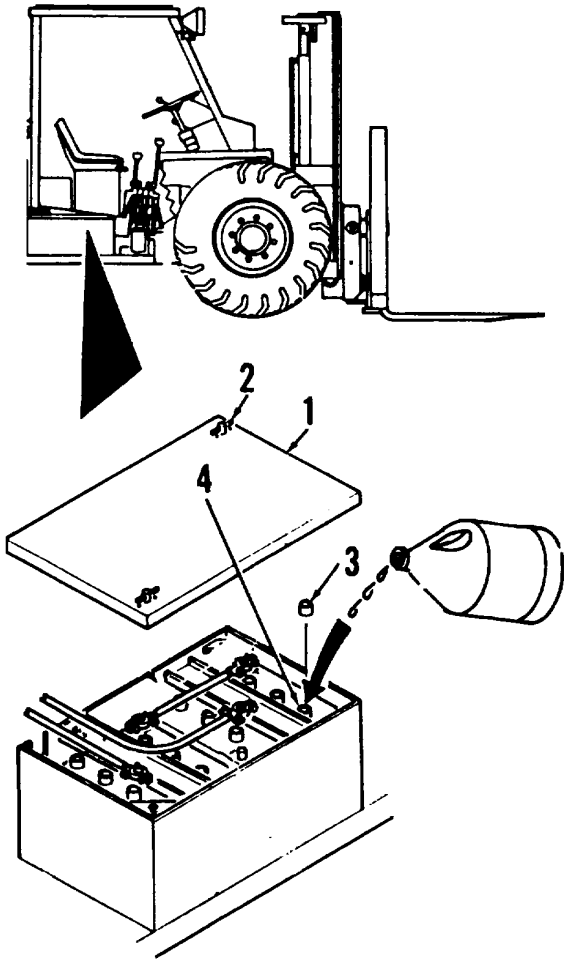
Batteries produce explosive gases and contain acid that can cause severe burns. To avoid serious injury, observe the following precautions:

- Keep sparks, flame, and smoking away from batteries.

- Ventilate when charging or using in an enclosed space.

- Wear safety goggles and acid-proof gloves when adding electrolyte.

- Avoid electrolyte contact with skin, eyes or clothing. If electrolyte spills, take immediate action to stop burning effects.



1. Remove battery box lid (1) by turning lid latches (2).

2. Remove battery caps (3) and inspect fluid level. Fill cells (4) with electrolyte as required. Install caps.

3. Install battery box lid (1) and turn lid latches (2) to secure.

FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-78. BATTERY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

A. REMOVAL

WARNING

Batteries produce explosive gases and contain acid that can cause severe burns. To avoid serious injury, keep sparks and flame away from batteries. Avoid electrolyte contact with skin, eyes or clothing. If electrolyte spills, take immediate action to stop burning effects.

1. REMOVE BATTERY BOX LID (1) BY TURNING LID LATCHES (2).

2. TAG AND DISCONNECT BATTERY CABLES (3, 4, 5).

   a. Remove ground cable (3, BLACK) from negative battery terminal by loosening cable lug nut.

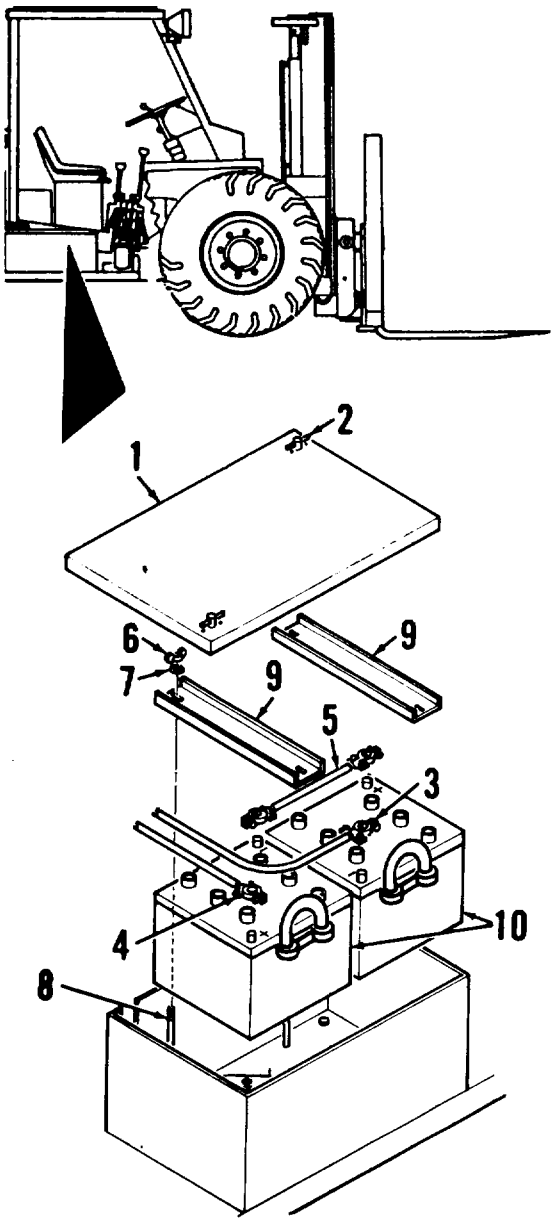
   b. Remove positive cable (4, RED) from positive battery terminal by loosening cable lug nut. Tag and remove additional electrical wire.

   c. Remove crossover cable (5) from positive and negative battery terminals by loosening cable lug nuts.

3. REMOVE BATTERIES (10).

   a. Remove wing nuts (6) and washers (7) from studs (8). Remove hold down brackets (9).

   b. Carefully lift batteries (10) out of box. Place on a level work surface for further maintenance.



B. CLEANING

Clean batteries and related components in accordance with TM9-6140-200-14.

C. INSPECTION

1. Inspect batteries and related components in accordance with paragraph 1-24.

2. Inspect cables for cuts, tears, or damage. Inspect cable lugs for corrosion.

3. Service batteries in accordance with paragraph 2-77.

D. INSTALLATION

1. INSTALL BATTERIES (10) AND SECURE.

   a. Carefully place batteries (10) into battery box, ensuring proper arrangement of terminals.

   b. Install hold down brackets (9) using wing nuts (6) and washers (7).

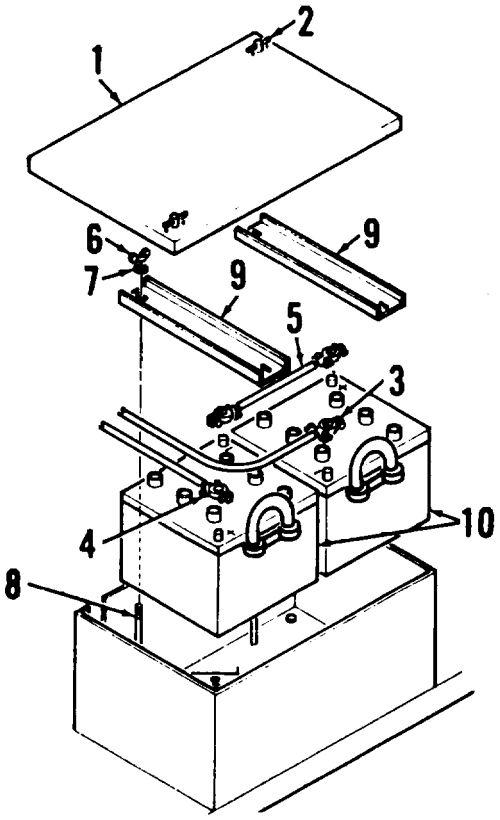
2. CONNECT BATTERY CABLES (3, 4, 5).

   a. Install crossover cable (5) onto positive and negative battery terminals and secure by tightening cable lug nuts.

   b. Install positive cable (4, RED) and electrical wire onto positive battery terminal and secure by tightening cable lug nut.

   c. Install ground cable (3, BLACK) onto negative battery terminal and secure by tightening cable lug nut.

3. INSTALL BATTERY BOX LID (1) AND TURN LID LATCHES (2) TO SECURE.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-79. BATTERY CABLE SERVICING

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

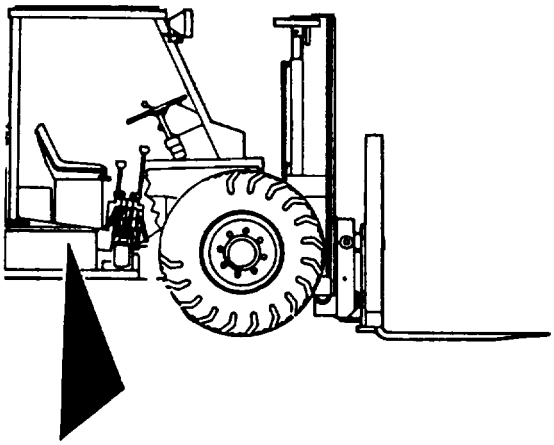
Tools and Test Equipment:

General Mechanics Tool Kit (I, App. E)

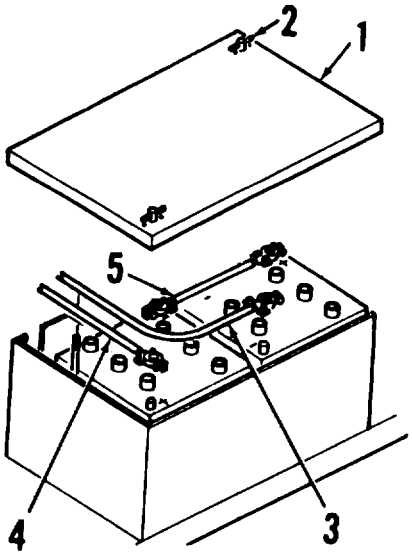
A. REMOVAL

WARNING

Batteries produce explosive gases and contain acid that can cause severe burns. To avoid serious injury, keep sparks and flame away from batteries. Avoid electrolyte contact with skin, eyes or clothing. If electrolyte spills, take immediate action to stop burning effects.



1. REMOVE BATTERY BOX LID (1) BY TURNING LID LATCHES (2).



2. TAG AND DISCONNECT BATTERY CABLES (3, 4, 5).

   a. Remove ground cable (3, BLACK) from negative battery terminal by loosening cable lug nut.

   b. Remove positive cable (4, RED) from positive battery terminal by loosening cable lug nut.

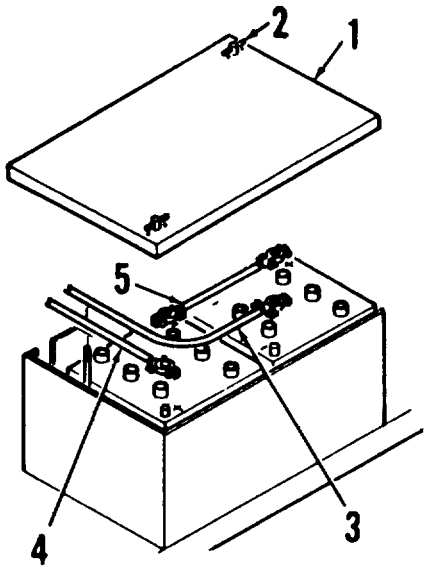
   c. Remove crossover cable (5) from positive and negative battery terminals by loosening cable lug nuts.

B. CLEANING

Clean battery cables in accordance with paragraph 1-24.

C. INSPECTION

Inspect cables for cuts, tears, or damage. Inspect cable lugs for corrosion.



D. INSTALLATION

1. CONNECT BATTERY CABLES (3, 4, 5).

   a. Install crossover cable (5) onto positive and negative battery terminals and secure by tightening cable lug nuts.

   b. Install positive cable (4, RED) onto positive battery terminal and secure by tightening cable lug nut.

   c. Install ground cable (3, BLACK) onto negative battery terminal and secure by tightening cable lug nut.

2. INSTALL BATTERY BOX LID (1) AND TURN LID LATCHES (2) TO SECURE.

FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-80. BATTERY CABLE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

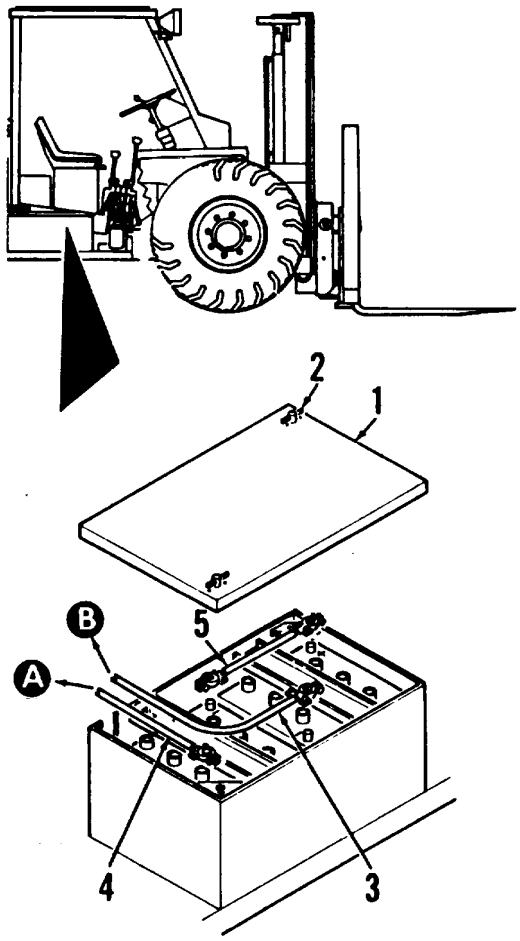
Materials / Parts:
Loctite 242 (20, App. C)

A. REMOVAL

WARNING

Batteries produce explosive gases and contain acid that can cause severe burns. To avoid serious injury, keep sparks and flame away from batteries. Avoid electrolyte contact with skin, eyes or clothing. If electrolyte spills, take immediate action to stop burning effects.

1. REMOVE BATTERY BOX LID (1) BY TURNING LID LATCHES (2).
2. TAG AND DISCONNECT BATTERY CABLES (3, 4, 5) FROM BATTERIES.
   a. Remove ground cable (3, BLACK) from negative battery terminal by loosening cable lug nut.
   b. Remove positive cable (4, RED) from positive battery terminal by loosening cable lug nut. Leave additional electrical wire installed.
   c. Remove crossover cable (5) from positive and negative battery terminals by loosening cable lug nuts.



3. REMOVE TRANSMISSION COVER TOP (6) BY REMOVING NINE SCREWS (7) AND WASHERS (8).

NOTE

Rear bolt on slave receptacle (9) holds two cables; one from battery and one from starter. Tag each cable for ease of installation.

4. TAG AND DISCONNECT POSITIVE CABLE (4) AND STARTER CABLE (10) FROM SLAVE RECEPTACLE (9) BY REMOVING BOLT (11).
5. REMOVE GROUND CABLE (3) FROM DCA SHUNT (14) BY REMOVING SCREW (12) AND LOCKWASHER (13).

B. CLEANING

Clean battery cables in accordance with paragraph 1-24.

C. INSPECTION

Inspect cables for cuts, tears, or damage. Inspect cable lugs for corrosion.

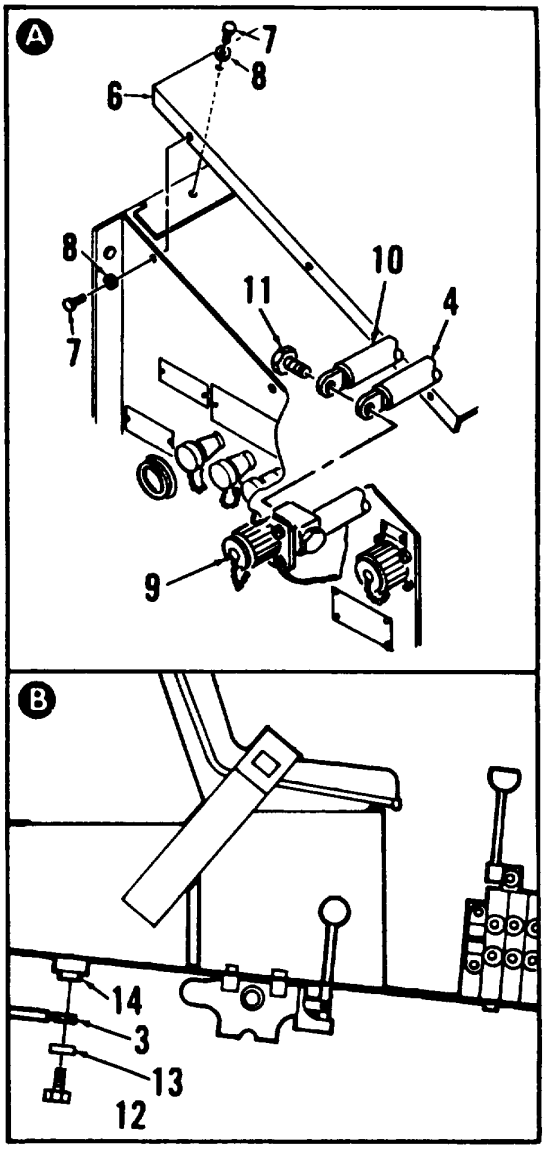
D. INSTALLATION

1. CONNECT GROUND CABLE (3) TO DCA SHUNT (14) AND SECURE USING SCREW (12) AND LOCKWASHER (13).

NOTE

Rear bolt on slave receptacle (9) holds two cables; one from battery and one from starter.

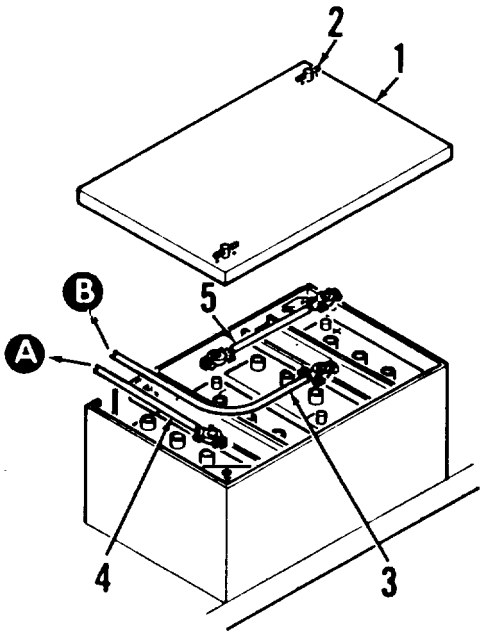
2. CONNECT POSITIVE CABLE (4) AND STARTER CABLE (10) TO SLAVE RECEPTACLE (9) USING BOLT (11).
3. APPLY LOCTITE TO THREADS OF NINE SCREWS (7). INSTALL TRANSMISSION COVER TOP (6) USING SCREWS AND WASHERS (8).



4. CONNECT BATTERY CABLES (3, 4, 5).

   a. Install crossover cable (5) onto positive and negative battery terminals and secure by tightening cable lug nuts.
   b. Install positive cable (4, RED) onto positive battery terminal and secure by tightening cable lug nut.
   c. Install ground cable (3, BLACK) onto negative battery terminal and secure by tightening cable lug nut.

5. INSTALL BATTERY BOX LID (1) AND TURN LID LATCHES (2) TO SECURE.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-81. BATTERY BOX COVER AND HOLD DOWN REPAIR

This task covers: Removal, Cleaning, Inspection, Repair, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

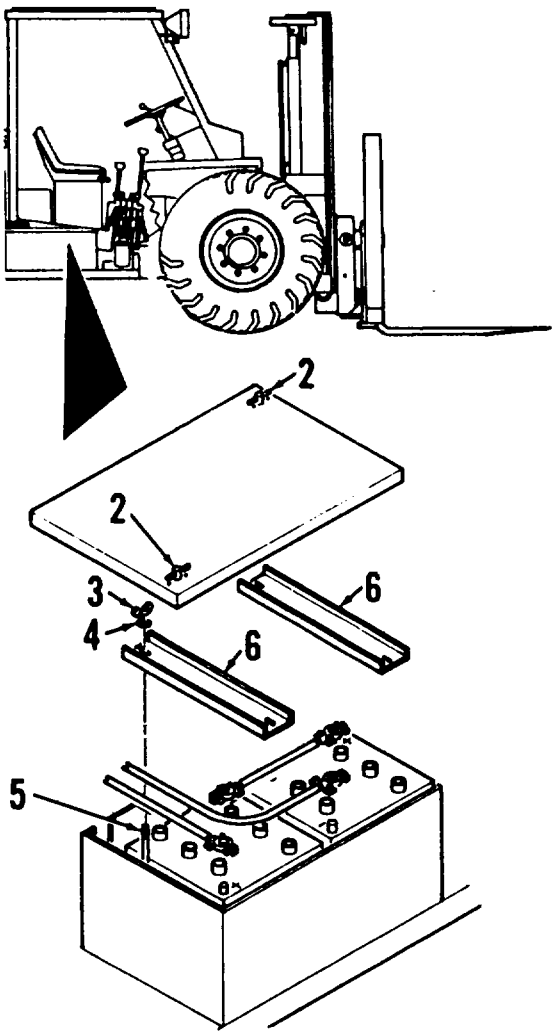
References:
TC 9-510

A. REMOVAL

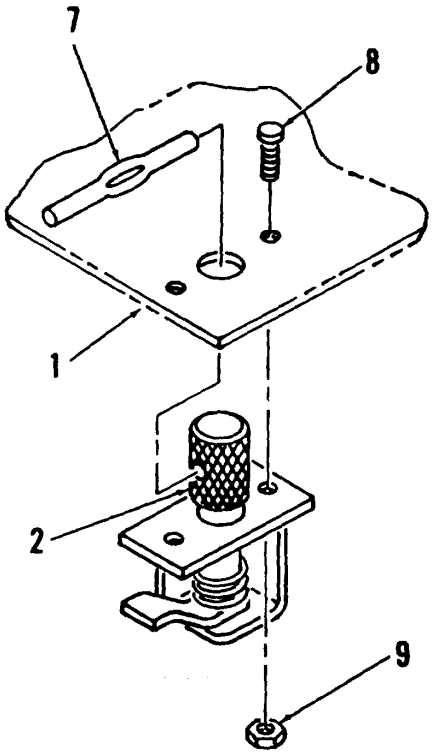
WARNING

Batteries produce explosive gases and contain acid that can cause severe burns. To avoid serious injury, keep sparks and flame away from batteries. Avoid electrolyte contact with skin, eyes or clothing. If electrolyte spills, take immediate action to stop burning effects.

1. Remove battery box lid (1) by turning lid latches (2).
2. Remove wing nuts (3) and washers (4) from studs (5). Remove hold down brackets (6).



3. Drive pin (7) out of lid latch (2). Remove lid latch from battery box lid (1) by removing screws (8) and nuts (9).



B. CLEANING

Clean battery box lid, hold downs, and latches in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect lid, hold downs, and latches in accordance with paragraph 1-24.

2. Operate lid latches to ensure there is no spring bind.

D. REPAIR

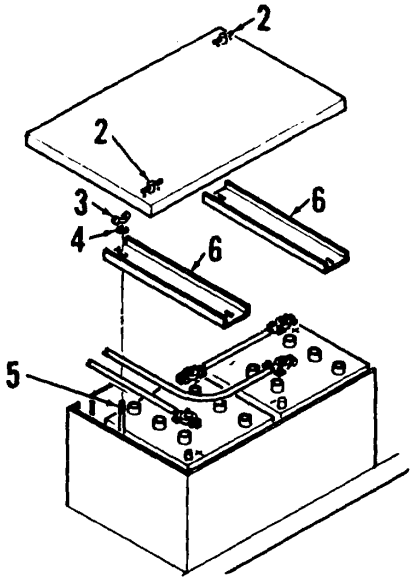
1. Repair of lid latches consists of removal and replacement of defective, deformed, corroded, or damaged components.
2. Repair battery box lid and battery hold down brackets in accordance with TC 9-510.

E. INSTALLATION

1. Install lid latch (2) onto battery box lid (1) using screws (8) and nuts (9). Drive pin (7) into lid latch.

2. Install hold down brackets (6) using wing nuts (3) and washers (4).

3. Install battery box lid (1) and turn lid latches (2) to secure.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-82. WIRING HARNESS TESTING

This task covers: Continuity and Short Circuit Testing, Measuring Resistance, and Measuring DC and AC Voltage

INITIAL SETUP:

Tools and Test Equipment:
Multimeter (6, App. E)

NOTE

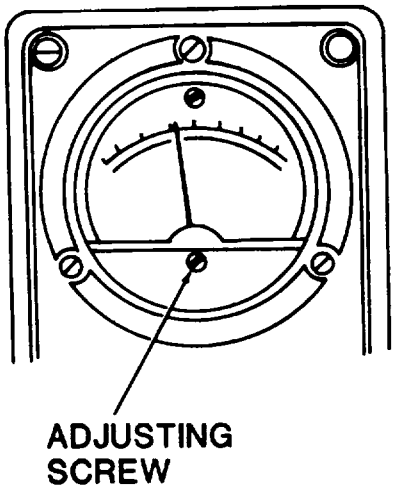
Proper operation of electrical components depends upon proper grounding. When troubleshooting components that depend on screws or physical contact for electrical ground use a jumper wire from component to forklift frame to check grounding.

NOTE

Do not touch multimeter probes to component terminal caps. Contact causes false readings.

NOTE

This task contains general information for multimeter use. Use of your multimeter may vary. Refer to multimeter operators manual for specific set-up, adjustment, and use instructions.



A. CONTINUITY TESTING

1. SET UP AND ZERO MULTIMETER.

   a. Before using multimeter, check mechanical zero of meter. If meter pointer is not exactly over zero line, reset pointer by rotating adjusting screw.

2. DISCONNECT CIRCUIT TO BE TESTED FROM POWER SOURCE.
3. CONNECT MULTIMETER PROBES TO BOTH TERMINALS OF CIRCUIT BEING TESTED. OBSERVE METER NEEDLE MOVEMENT.

    a. If needle swings to far right (over "0" at top of scale), circuit being tested has continuity.
    b. If needle does not move, circuit is open.
    c. If needle jumps or flickers, there is a loose connection in circuit being tested.

B. SHORT CIRCUIT TESTING

1. SET UP AND ZERO MULTIMETER.

    a. Before using multimeter, check mechanical zero of meter. If meter pointer is not exactly over zero line, reset pointer by rotating adjusting screw.

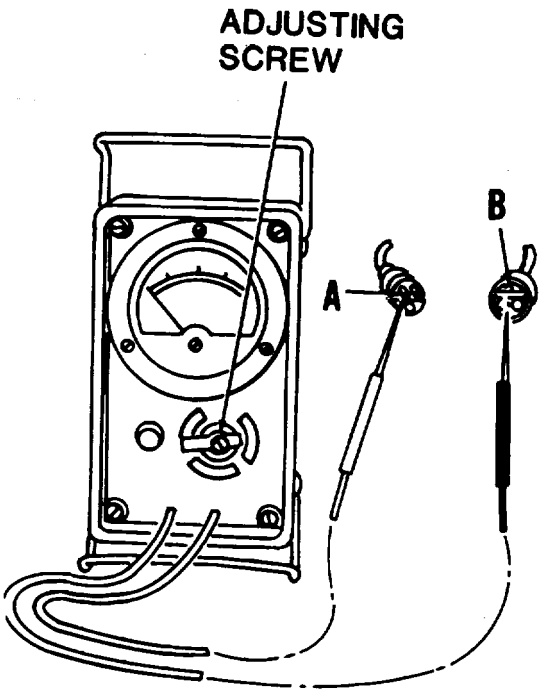
2. DISCONNECT CIRCUIT TO BE TESTED FROM POWER SOURCE.

3. CONNECT MULTIMETER PROBES TO CIRCUITS BEING TESTED.

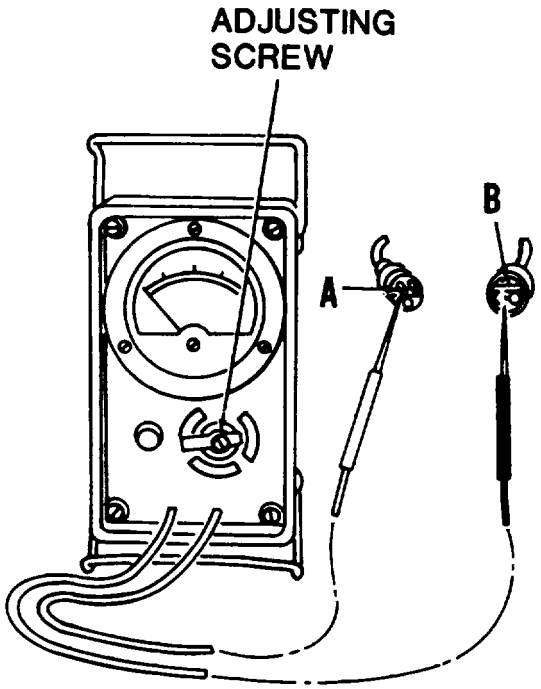
    a. Connect one meter probe to first circuit (see A in figure).
    b. Connect other meter probe to second circuit (see B).

4. OBSERVE METER NEEDLE MOVEMENT.

    a. If needle swings to far right (over "0" at top of scale), circuits being tested are shorted.
    b. If needle does not move, circuits are not shorted.
    c. If needle jumps or flickers circuits are intermittently short circuited.



C. MEASURING RESISTANCE



1. SET UP AND ZERO MULTIMETER.

   a. Before using multimeter, check mechanical zero of meter. If meter pointer is not exactly over zero line, reset pointer by rotating adjusting screw.

2. DISCONNECT CIRCUIT TO BE TESTED FROM POWER SOURCE.

3. SET MULTIMETER SELECTOR SWITCH TO PROPER OHM TEST RANGE.

4. CONNECT MULTIMETER PROBES ACROSS CIRCUIT BEING MEASURED.

NOTE

Figure shows measurement of one wire in a three-wire harness.

5. READ METER AND DETERMINE OHMS.

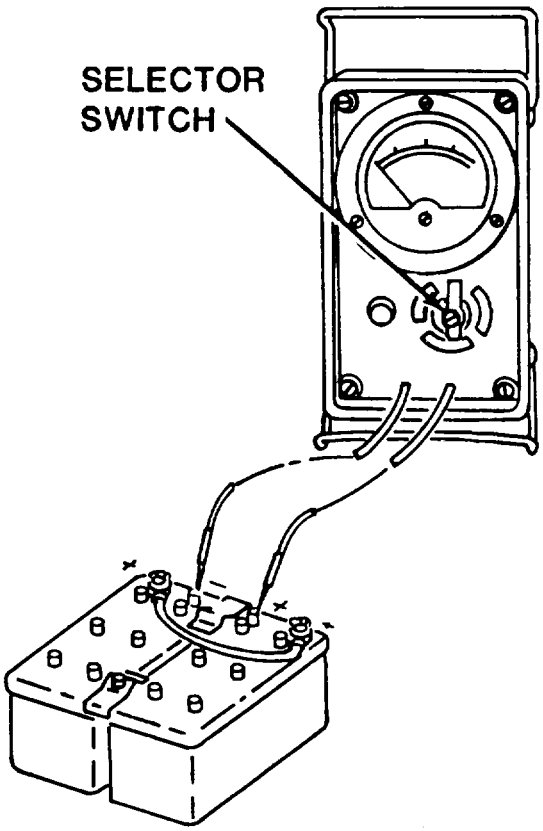
   a. If meter is set to RXI or XI ohm range, reading is taken directly from top of scale.
   b. If meter is set to ohm range other than RXI or X1, scale reading must be multiplied. Refer to Table 2-3.

Table 2-3. Ohm Reading

Switch Setting	Scale
X1 / RX1	Actual scale reading
X10 / RX10	Reading x 10
X100 / RX100	Reading x 100
X1K / RX1K	Reading x 1000
X10K / RXIOK	Reading x 10,000

6. ZERO MULTIMETER IF OHM RANGE CHANGES.

D. MEASURING DC VOLTAGE



1. SET UP AND ZERO MULTIMETER.

   a. Before using multimeter, check mechanical zero of meter. If meter pointer is not exactly over zero line, reset pointer by rotating adjusting screw.

CAUTION

Multimeter must be set to a voltage range higher than that being measured or multimeter damage may occur.

2. SET MULTIMETER SELECTOR SWITCH TO DC VOLTS RANGE.

   a. To measure 5 volts DC, set multimeter selector switch to 10 volts DC range. To measure 24 volts DC, set selector switch to 100 volts DC range.

3. CONNECT MULTIMETER PROBES TO CIRCUIT BEING MEASURED.

   a. Connect red probe to positive (+) side of circuit to be tested.
   b. Connect black probe to negative (-) side. Example shows 24 volts DC measured across batteries.

4. READ METER AND DETERMINE VOLTAGE.

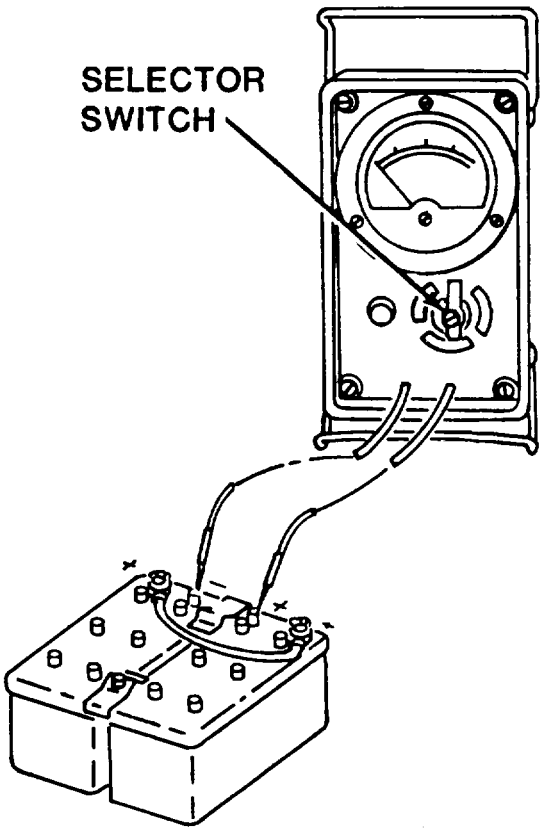
NOTE

If needle moves off scale to the left, reverse probes on circuit.

   a. If meter is set to 10 volts DC, reading is taken directly from scale.
   b. If meter is set to value other than 10 volts DC, scale reading must be multiplied. Refer to Table 2-4.

Table 2-4. Voltage Reading

Switch Setting	Scale
1 VDC	Reading divided by 10
10 VDC	Actual scale reading
100 VDC	Reading x 10
1000 VDC	Reading x 100



E. MEASURING AC VOLTAGE

1. SET UP AND ZERO MULTIMETER.

   a. Before using multimeter, check mechanical zero of meter. If meter pointer is not exactly over zero line, reset pointer by rotating adjusting screw.

2. SET MULTIMETER SELECTOR SWITCH TO 1000 VOLTS AC RANGE.

3. CONNECT MULTIMETER PROBES TO CIRCUIT BEING MEASURED.

   a. Connect red probe to positive (+) side of circuit to be tested.
   b. Connect black probe to negative (-) side.

4. READ THE AC SCALE ON METER AND DETERMINE VOLTAGE.

FOLLOW-ON MAINTENANCE:

Repair wiring harness (para. 2-83)

END OF TASK

2-83. WIRING HARNESS REPAIR

This task covers: Wiring Harness Connector Disassembly and Assembly

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Electrical Tool Kit (28, App. E)
Soldering Torch Kit (29, App. E)

Materials / Parts:
Solder (36, App. C)
Various repair parts

Reference:
TB SIG 222

Equipment Condition:
Wiring harness removed
(paras. 2-84, 2-86, 2-88)

A. GENERAL REPAIR INSTRUCTIONS

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

a. Repair of wiring harnesses and cables consists of replacement of defective connectors, shells, and terminals, or taping cut or worn insulation and exposed wire conductors.

b. Disassembly and assembly procedures are provided for typical electrical wires and harness connectors found on the forklift.

c. Tag and label all wires as they are removed for ease of reassembly.

d. Determine wire strip length using Table 2-5.

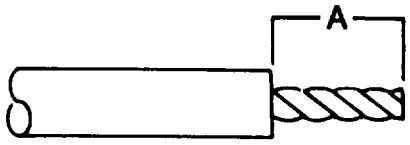
Table 2-5. Wire Strip Length

Wire Size	Length A +/- 0.020
20	0.188
16	0.250
12	0.250
8	0.500
4	0.500
0	0.625

e. When soldering is required, procedures in TB SIG 222 must be followed.

B. TERMINAL-TYPE CONNECTOR WITH SHELL

1. DISASSEMBLE. Cut wire close to shell. Remove and discard shell.

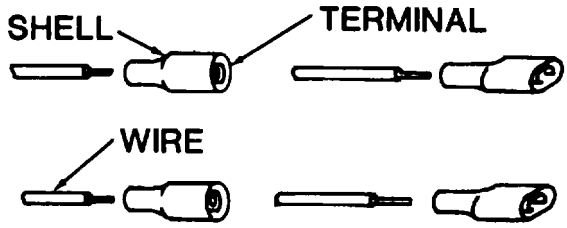


2. ASSEMBLE.

   a. Strip wire. Use care not to nick or cut wire strands.

NOTE

If solid core solder is used to coat wires, bare wires must be cleaned with flux before tinning.



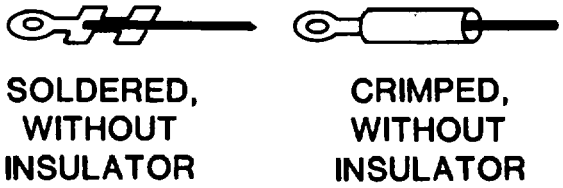
   b. Tin bare wire. Use rosin-core solder to coat bare wire. Strip and tin new wire.

   c. Slide shrink tubing onto bare wire. Splice bare wires and twist together tightly. Secure wires to prevent movement. Solder wires.

   d. Position shrink tubing over spliced wire. Apply heat and shrink tubing until tubing fits snuggly.

C. RING-TYPE CONNECTOR

1. DISASSEMBLE. Cut wire close to terminal. Remove and discard terminal.



2. ASSEMBLE.

   a. Strip wire. Use care not to nick or cut wire strands.

NOTE

If solid core solder is used to coat wires, bare wires must be cleaned with flux before tinning.

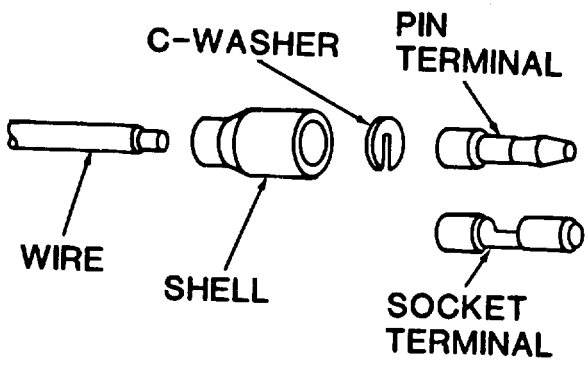
   b. Tin bare wire. Use rosin-core solder to coat bare wire.

NOTE

New terminal must match ring size of terminal with mounting screw at connection. New terminal crimp tabs must match thickness of wire.

   c. Insert wire into new terminal. Crimp terminal to secure wire. Solder wire to terminal.

D. PIN OR SOCKET-TYPE CONNECTOR



1. DISASSEMBLE.

   a. Slide shell back on wire to expose metal components.

   b. Remove C-washer.

   c. Cut wire close to terminal. Remove and discard terminal.

   d. Remove shell.

2. ASSEMBLE.

   a. Strip wire. Use care not to nick or cut wire strands.

NOTE

If solid core solder is used to coat wires, bare wires must be cleaned with flux before tinning.

   b. Tin bare wire. Use rosin-core solder to coat bare wire.

   c. Slide shell onto wire.

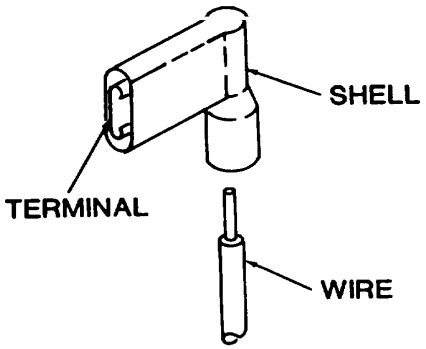
NOTE

New terminal must match size of mating contact at terminal connection. New terminal crimp area must match thickness of wire.

   d. Insert wire into new terminal. Crimp terminal to secure wire.

   e. Install C-washer. Slide shell up over new terminal and C-washer. Ensure C-washer is firmly seated in shell.

E. FI.AG-TYPF CONNFCTOR



1. DISASSEMBLE. Cut wire close to terminal. Remove and discard terminal.

2. ASSEMBLE.

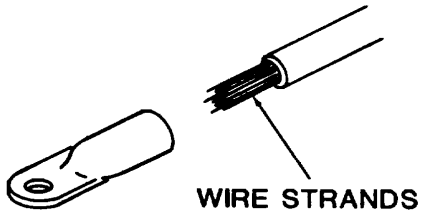
   a. Strip wire. Use care not to nick or cut wire strands.

NOTE

If solid core solder is used to coat wires, bare wires must be cleaned with flux before tinning.

   b. Tin bare wire. Use rosin-core solder to coat bare wire.
   c. Roll back insulation on new terminal to expose crimping area.
   d. Insert wires into new terminal. Crimp terminal to secure wire.
   e. Unroll insulation on new terminal to cover parts.

F. RING-TYPE CONNECTOR, SOLDERED



1. DISASSEMBLE. Cut wire close to terminal. Remove and discard terminal.
2. ASSEMBLE.

   a. Strip wire. Use care not to nick or cut wire strands.

NOTE

If solid core solder is used to coat wires, bare wires must be cleaned with flux before tinning.

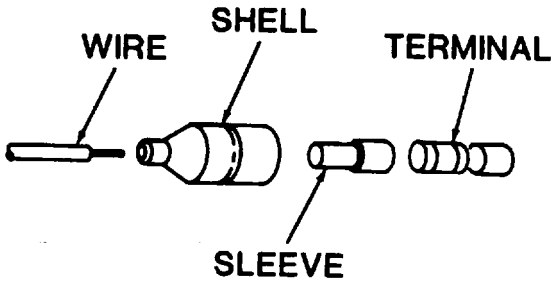
   b. Tin bare wires. Use rosin-core solder to coat bare wires.

NOTE

New terminal must match ring size of terminal with mounting screw at connection. New terminal wire solder area must match thickness of wire.

   c. Insert wires into new terminal. Secure wire to prevent movement.

d. Fill terminal wire cavity with melted solder. Allow solder to cool several minutes before moving wires or terminal.



G. WEATHER-PROOF TERMINAL-TYPE CONNECTOR

1. DISASSEMBLE.

   a. Slide shell back to expose sleeve.
   b. Slide sleeve back to expose terminal. Remove and discard terminal.
   c. Remove sleeve and shell.

2. ASSEMBLE.

   a. Strip wire. Use care not to nick or cut wire strands.

NOTE

If solid core solder is used to coat wires, bare wires must be cleaned with flux before tinning.

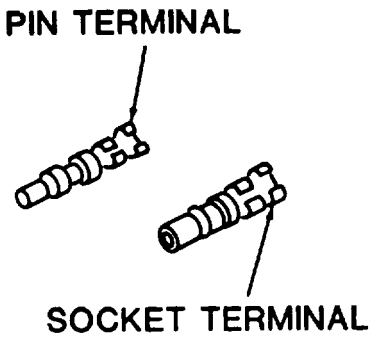
   b. Tin bare wires. Use rosin-core solder to coat bare wires.
   c. Slide shell and sleeve onto wire.

NOTE

New terminal must match size of mating contact at terminal connection. New terminal crimping area must match thickness of wire.

   d. Insert wire into new terminal.
   e. Slide shell over sleeve and terminal. Ensure sleeve is firmly seated on terminal and shell is firmly seated over sleeve.

H. MULTI-WIRE POLARIZED CONNECTOR



1. DISASSEMBLE.

NOTE

Tag and label all wires as they are removed for ease of reassembly. Indicate whether wire is connected to pin or socket-type connector.

a. Using pin removal tool, push connector terminal out of connector.
b. Remove and discard terminal.

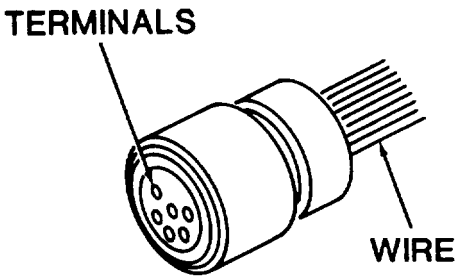
2. ASSEMBLE.

a. Strip wire. Use care not to nick or cut wire strands.

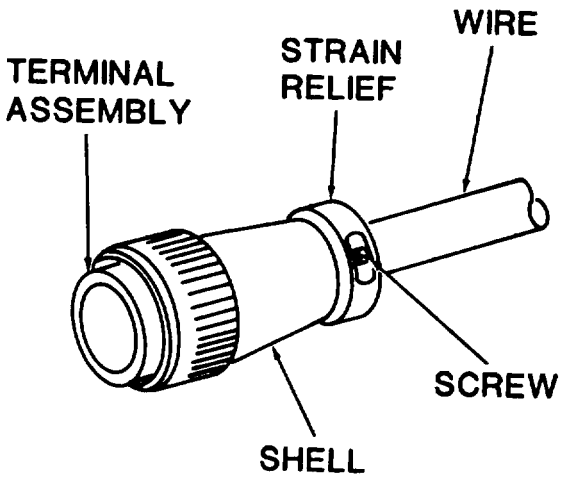
NOTE

If solid core solder is used to coat wires, bare wires must be cleaned with flux before tinning.

b. Tin bare wire. Use rosin-core solder to coat bare wire.
c. Insert wire into new terminal. Crimp terminal to secure wire.
d. Using pin insertion tool, install new terminal into hole of connector.



I. MULTI-WIRE HARD SHELL CONNECTOR



1. DISASSEMBLE.

NOTE

Tag and label all wires as they are removed for ease of reassembly. Indicate whether wire is connected to pin or socket-type connector.

a. Loosen two screws until wire is free to rotate.
b. Remove terminal assembly from shell.
c. Cuts wires close to terminals. Remove and discard terminals.
d. Remove and discard shell.

2. ASSEMBLE.

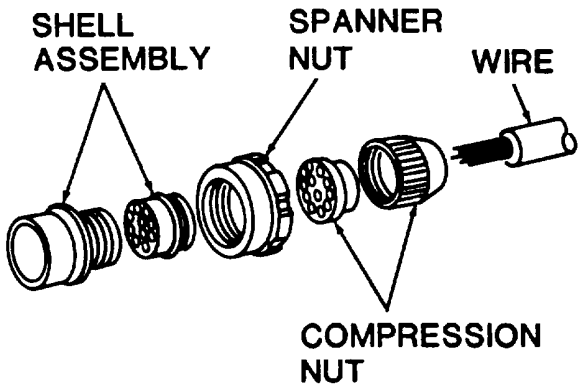
a. Strip wire. Use care not to nick or cut wire strands.

NOTE

If solid core solder is used to coat wires, bare wires must be cleaned with flux before tinning.

b. Tin bare wire. Use rosin-core solder to coat bare wire.
c. Slide new shell onto wires.
d. Insert wires into connector pins or socket wells. Crimp to secure wires.
e. Secure wires and terminal to prevent movement. Solder wires and terminal.

J. MULTI-WIRE COMPRESSION CONNECTOR



1. DISASSEMBLE.

NOTE

Tag and label all wires as they are removed for ease of reassembly. Indicate whether wire is connected to pin or socket-type connector.

a. Loosen compression nut from shell assembly.
b. Slide compression nuts and spanner nut up on wire to expose pin and socket terminals.
c. Cuts wires close to terminals. Remove and discard terminals.
d. Remove and discard shell assembly, spanner nut, and compression nut.

2. ASSEMBLE.

a. Slide new compression nut and spanner nut onto wire.
b. Strip wires. Use care not to nick or cut wire strands.

NOTE

If solid core solder is used to coat wires, bare wires must be cleaned with flux before tinning.

c. Tin bare wire. Use rosin-core solder to coat bare wire.
d. Insert wires into connector pins or socket wells.
e. Secure wires and terminals to prevent movement. Solder wires and terminals.

FOLLOW-ON MAINTENANCE:

Install wiring harness
(paras. 2-84, 2-86, 2-88)

END OF TASK

2-84. MAIN WIRING HARNESS REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Equipment Condition:
Batteries disconnected (para. 2-78)

A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

1. Refer to Figure FO-3, Main Wiring Harness, for information on wires and contact points. Main wiring harness is made up of three connectable cable assemblies; main cable assembly, dash cable assembly, and engine cable assembly.
2. Tag wire leads before disconnecting to aid in assembly.

B. CLEANING

Clean main wiring harnesses and components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect wiring for cuts, tears, crimping, or other obvious damage. Check for exposed wire.
2. Inspect terminal ends and lugs for damage. Ensure components are securely attached to wiring.

D. INSTALLATION

Connect wire leads in accordance with Figure FO-3. Ensure all leads are securely fastened to prevent malfunction.

FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK

2-85. MAIN WIRING HARNESS REPAIR

This task covers: Repair

INITIAL SETUP:

Equipment Condition:
Wiring cable assembly (or appropriate lead) removed/disconnected (para. 2-84)

A. REPAIR

1. Refer to Tables 2-6, 2-7, and 2-8 for wiring cable run lists.
2. Test wiring cable assemblies in accordance with paragraph 2-82.
3. Repair wiring cable assemblies in accordance with paragraph 2-83.

Table 2-6. MAIN CABLE ASSEMBLY

Wire	From	Terminal	To	Terminal	Gge	Lgth	Clr
1	Starter Sol J6	MS25036-114	Amp Gauge J10	MS25036-112	10	163	RD
4	Amp Gauge J11	MS25036-112	Alternator J7	MS25036-113	10	183	RD
5	Ign Sw (Acc) P1-1	8909A544-001	Alternator P3-1	8909A544-001	16	100	OG
15	Oil Press Lt P1-2	8909A544-001	Oil Sw P3-2	8909A544-001	16	100	BN
16	CB3 P1-3	8909A544-001	Fuel Sol P3-3	8909A544-001	16	100	YW
25	Rear Toggle P2-1	8909A544-001	L Flood Lt P77	MS27144-2	16	148	GN
26	Rear Toggle P2-2	8909A544-001	R Flood Lt P82	MS27144-2	16	193	GN
29	Light Sw (E) P2-3	8909A544-001	LR Bo Stop P73	MS27144-1	16	135	WT
29A	LR Bo Stop P73	MS27144-2	RR Bo Stop P78	MS27144-1	16	146	WT
30	Lt Sw (N) P2-4	8909A544-001	LR Bo Stop P74	MS27144-1	16	135	RD
30A	LR Bo Stop P74	MS27144-2	RR Bo Stop P79	MS27144-1	16	146	RD
31	Lt Sw (C) P2-5	8909A544-001	LR Stop Lt P75	MS27144-1	16	135	BL
31A	LR Stop Lt P75	MS27144-2	RR Stop Lt P80	MS27144-1	16	146	BL
32	Lt Sw (H) P2-6	8909A544-001	LR Stop Lt P76	MS27144-1	16	135	BN
32A	LR Stop Lt P76	MS27144-2	RR Stop Lt P81	MS27144-1	16	146	BN
38	Lt Sw (J) P2-7	8909A544-001	Bkup Al Sw P3-4	8909A544-001	16	100	WT
39	Bkup Al Sw J9	MS25036-108	Backup Al P3-14	8909A527-001	16	100	WT
44	Dif Lk Sw P1-5	8909A544-001	Sol Vlv P3-5	8909A544-001	16	100	GN
45	Park Brk Sw P1-6	8909A544-001	Sol Vlv P3-6	8909A544-001	16	100	PR
48	Gauge P1-7	8909A544-001	Trans Oil Temp Sndr P3-7	8909A544-001	16	100	OG
49	Gauge P1-8	8909A544-001	Cool Sndr P3-8	8909A544-001	16	100	YW

Table 2-6. MAIN CABLE ASSEMBLY (cont)

Wire	From	Terminal	To	Terminal	Gge	Lgth	Clr
50	Gauge P1-9	8909A544-001	Oil Pr Sndr P3-9	8909A544-001	16	100	BL
51	Gauge P1-14	8909A544-001	Fuel Lvl Sndr J4	MS25036-108	16	110	BN
52	Shifter P1-10	8909A544-001	Trans Sol (Rev) P3-10	8909A544-001	16	100	WT
53	Shifter P1-11	8909A544-001	Trans Sol (1st) P3-11	8909A544-001	16	100	RD
54	Shifter P1-12	8909A544-001	Trans Sol (Fwd) P3-12	8909A544-001	16	100	BL
55	Shifter P1-13	8909A544-001	Trans Sol (2nd, 3rd) P3-13	8909A544-001	16	100	PR
56	Shifter P1-15	8909A544-001	Start Sol J6	MS25036-108	16	125	YW
62	Push B P1-16	8909A544-001	Ether Vlv J8	8909A526-001	16	100	WT

Table 2-7. DASH CABLE ASSEMBLY

Wire	From	Terminal	To	Terminal	Gge	Lgth	Clr
2	CB1 J48	MS25036-112	Ign Sw J66	MS25036-112	10	21	RD
3	Ammeter J49	MS25036-112	Ign Sw (Bat) J53	MS25036-112	10	24	RD
5	Ign Sw (Acc) J52	MS25036-108	Alternator J1-1	8909A543-001	16	16.5	OG
8	Fuel Gauge (Gnd) J68	MS25036-108	Dash (Gnd) J69	MS25036-108	16	30	BK
9	Ign Sw J54	MS25036-108	CB3 J65	MS25036-108	16	24	BL
10	Ign Sw Jumper	MS25036-108	Pk Brk Sw	MS25036-108	16	2.75	RD
11	Ign Sw J55	MS25036-108	Shifter J92-1	8909A543-001	16	13.5	WT
12	CB3 J51	MS25036-108	Fuel Gauge J64	MS25036-108	16	29.5	OG
13	Power Jumpers	MS25036-108	Gauges	MS25036-108	16	3.5	GN
14	CB2 J63	MS25036-108	Oil Press Lt J33	8909A526-001	16	21	PR
15	Oil Press Lt J34	8909A526-001	Oil Sw J1-2	8909A543-001	16	17	BN
16	CB2 J62	MS25036-108	Fuel Sol J1-3	8909A543-001	16	19.5	YW
18	CB1 J41	MS25036-112	Lt Sw (F) P90-F	SOLDER	10	41	RD
19	Lt Sw (M) P90-M	SOLDER	CB3 J37	MS25036-108	16	42.5	GN
20	CB3 J38	MS25036-108	LF Headlt P101	MS27144-2	16	42	BL
21	CB3 J39	MS25036-108	RF Headlt P94	MS27144-2	16	69	BL
22	CB3 J40	MS25036-108	Lt Toggle Sw J27	MS25036-108	16	38	PR
22A	Fldlt Sw Jumpers	MS25036-108		MS25036-108	16	3.5	PR
23	Toggle Sw J28	MS25036-108	LF Floodlt P103	MS27144-2	16	1	YW
24	Toggle Sw J29	MS25036-108	RF Floodlt P93	MS27144-2	16	68.5	YW
25	Toggle Sw J30	MS25036-108	LR Flood Lt J2-1	8909A543-001	16	4	GN
26	Toggle Sw J31	MS25036-108	RR Flood Lt J2-2	8909A543-001	16	4	GN
27	Lt Sw (D) P90-D	SOLDER	L Blkout Drv P102	MS27142-3	16	71	OG

Table 2-7. DASH CABLE ASSEMBLY (cont)

Wire	From	Terminal	To	Terminal	Gge	Lgth	Clr
28	Lt Sw (E) P-90E	SOLDER	L Blkout Mrkr P99	MS27144-1	16	51	PR
28A	L Blkout Mrkr P99	MS27144-2	R Blkout Mrkr P96	MS27144-1	16	72	PR
29	Light Sw (E) P90-E	SOLDER	LR Bo Stop J2-3	8909A543-001	16	36	WT
30	Lt Sw (N) P90-N	SOLDER	LR Bo Stop J2-4	8909A543-001	16	36	RD
31	Lt Sw (C) P90-C	SOLDER	LR Stop Lt J2-5	8909A543-001	16	36	BL
32	Lt Sw (H) P90-H	SOLDER	LR Stop Lt J2-6	8909A543-001	16	36	BN
33	Lt Sw (H) P90-H	SOLDER	LF Clear Lt P100	MS27144-1	16	51	GN
33A	LF Clear Lt P100	MS27144-2	RF Clear Lt P95	MS27144-1	16	76	GN
34	Lt Sw (A) P90-A	SOLDER	Stop Lt Sw J25	8909A526-001	16	32	WT
35	Lt Sw (K) P90-K	SOLDER	Stop Lt Sw J26	8909A526-001	16	32	PR
36	Lt Sw (J) P90-J	SOLDER	Horn P-97	MS27144-2	16	46	OG
37	Horn P98	MS27144-2	St Wh J67	8909A528-001	16	49	BK
38	Lt Sw (J) P90-J	SOLDER	Bkup Al Sw J2-7	8909A543-001	16	36	WT
40	Prk Brk Sw J56	MS25036-108	Park Lt J36	8909A526-001	16	11.5	RD
42	Park Brk Sw Jmpr	MS25036-108	Diff Lock Sw	MS25036-108	16	3.5	RD
43	Diff Lock Sw J60	MS25036-108	Light J-35	8909A526-001	16	11.5	PR
44	Diff Lk Sw J59	MS25036-108	Sol Vlv J1-5	8909A543-001	16	14.5	GN
45	Park Brk Sw J58	MS25036-108	Sol Vlv J1-6	8909A543-001	16	14.5	PR
46	Park Brk Sw J57	MS25036-108	Shifter J92-2	8909A543-001	16	13.5	OG
48	Gauge J46	MS25036-108	Trans Oil Temp Sndr J1-7	8909A543-001	16	30	OG
49	Gauge J42	MS25036-108	Cool Sndr J1-8	8909A543-001	16	33	YW
50	Gauge J43	MS25036-108	Oil Pr Sndr J1-9	8909A543-001	16	33	BL
51	Gauge J47	MS25036-108	Fuel Lvl Sndr J1-14	8909A543-001	16	26	BN
52	Shifter J92-4	8909A544-001	Trans Sol (Rev) J1-10	8909A543-001	16	12	WT
53	Shifter J92-5	8909A544-001	Trans Sol (1st) J1-11	8909A543-001	16	12	RD
54	Shifter J92-6	8909A544-001	Trans Sol (Fwd) J1-12	8909A543-001	16	12	BL
55	Shifter J92-7	8909A544-001	Trans Sol (2nd, 3rd) J1-13	8909A543-001	16	12	PR
56	Shifter J92-9	8909A544-001	Start Sol J1-15	8909A543-001	16	12	YW
57	Lt Sw (B) P90-B	SOLDER	Gauge Lts P91	8909A557-001	16	9	PR
58	Socket Jumpers	8909A557-001	Gauge Lts	8909A557-001	16	3	OG
61	CB2 J61	MS25036-108	Ether Push B J45	MS25036-108	16	3	BN
62	Push B J44	MS25036-108	Ether Sol J1-16	8909A543-001	16	39	WT
63	Ign Sw (Gnd) J70	MS25036-108	Dash (GDN) J32	MS25036-108	16	18.0	BK
64	Gauge Lt (Gnds)	MS25036-108	Dash	MS25036-108	16	4.5	BK
65A	Lamp J91-1	Lamp Socket Lead	AM Gauge Lamp Pwr	8909A556-001	16	8	BK
65B	Lamp J91-3	Lamp Socket Lead	Fuel Gauge Lamp Pwr	8909A556-001	16	8	BK
65C	Lamp J91-4	Lamp Socket Lead	Eng Temp Lamp Pwr	8909A556-001	16	8	BK
65D	Lamp J91-5	Lamp Socket Lead	Trans Temp Gauge Lamp Pwr	8909A556-001	16	8	BK
65E	Lamp J91-6	Lamp Socket Lead	Oil Press Gauge Lamp Pwr	8909A556-001	16	8	BK

Table 2-8. ENGINE CABLE ASSEMBLY

Wire	From	Terminal	To	Terminal	Gge	Lgth	Clr
5	Ign Sw (Acc) J3-1	8909A543-001	Alternator J20	8909A526-001	16	46	OG
6	Alternator J18	8909A526-001	Hourmeter J22	8909A526-001	16	61	PR
15	Oil Press Lt J3-2	8909A543-001	Low Sw P89	MS27144-2	16	42	BN
16	CB3 J3-3	8909A543-001	Fuel Sol J15	MS25036-108	16	42	YW
16	CB3 J16	MS25036-108	Fuel Sol J24	8909A526-001	16	48	YW
38	Sw (J) J3-4	8909A543-001	Bkup Al Sw J19	MS27144-2	16	41.5	WT
39	Sw J3-14	8909A543-001	Bkup Al J8	MS27144-2	16	41.5	WT
44	Sw J3-5	8909A543-001	Diff Lock Sol P87-A	8909A540-001	16	13	GN
45	Sw J3-6	8909A543-001	Park Brk Sol P88-A	8909A540-001	16	13	PR
48	Gauge J3-7	8909A543-001	Trans Oil Temp Sndr J17	MS25036-108	16	28	OG
49	Gauge J3-8	8909A543-001	Cool Sndr J21	MS25036-108	16	59	YW
50	Gauge J3-9	8909A543-001	Oil Press Sndr J23	MS25036-108	16	46	BL
52	Shifter J3-10	8909A543-001	Trans Sol (Rev) P83-A	8909A540-001	16	40	WT
53	Shifter J3-11	8909A543-001	Trans Sol (1st) P84-A	8909A540-001	16	40	RD
54	Shifter J3-12	8909A543-001	Trans Sol (Fwd) P85-A	8909A540-001	16	40	BL
55	Shifter J3-13	8909A543-001	Trans Sol (2nd, 3rd) P86-A	8909A540-001	16	40	PR
62	Ether Valve J80	8909A526-001	Thermostat J26	8909A529-001	16	33	WT
66	Hrmtr Jumper	8909A526-001	Ground	MS25036-108	16	3	BK
Gnd	Trans Sol (Rev) J14	MS25036-157	Ground P83B	8909A540-001	16		BK
Gnd	Trans Sol (1st) J14	MS25036-157	Ground P84-B	8909A540-001	16		BK
Gnd	Trans Sol (Fwd) J14	MS25036-157	Ground P85-B	8909A540-001	16		BK
Gnd	Trans Sol (2nd, 3rd) J14	MS25036-157	Ground P86-B	8909A540-001	16		BK
Gnd	Diff Lock Sol J13	MS25036-114	Ground P87-B	8909A540-001	16		BK
Gnd	Park Brk Sol J13	MS25036-114	Ground P88-B	8909A540-001	16		BK

NOTES:

1. Main cable assembly drawing 8909-548-001.
2. Dash cable assembly drawing 8909-546-001.
3. Engine cable assembly drawing 8909-545-001.

FOLLOW-ON MAINTENANCE:

Install cable assembly, connect appropriate lead (para. 2-84)

END OF TASK

2-86. DCA WIRING HARNESS REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Materials / Parts:
Loctite 242 (20, App. C)

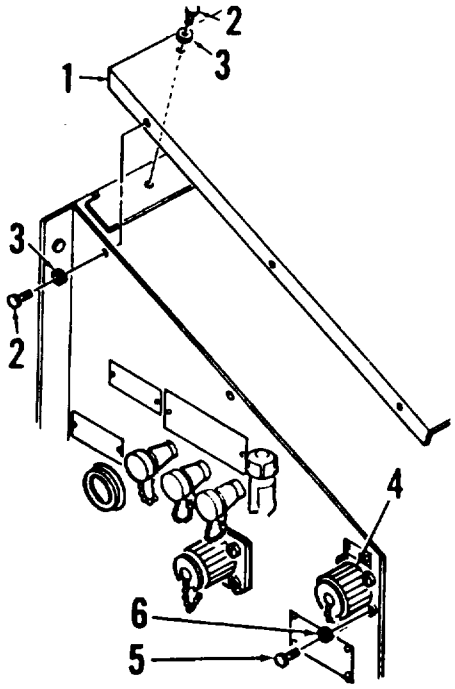
Equipment Condition:

Batteries disconnected (para. 2-78)

A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.



1. Refer to Figure FO-4, DCA Wiring Harness, for information on wires and contact points.
2. Tab wire leads before disconnecting to aid in assembly.
3. Remove top transmission cover (1) by removing nine screws (2) and washers (3).
4. Remove DCA connector (4) from right side transmission cover by removing screws (5) and washers (6).

B. CLEANING

Clean DCA wiring harness and components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect wiring for cuts, tears, crimping, or other obvious damage. Check for exposed wire.

2. Inspect terminal ends and lugs for damage. Ensure components are securely attached to wiring.

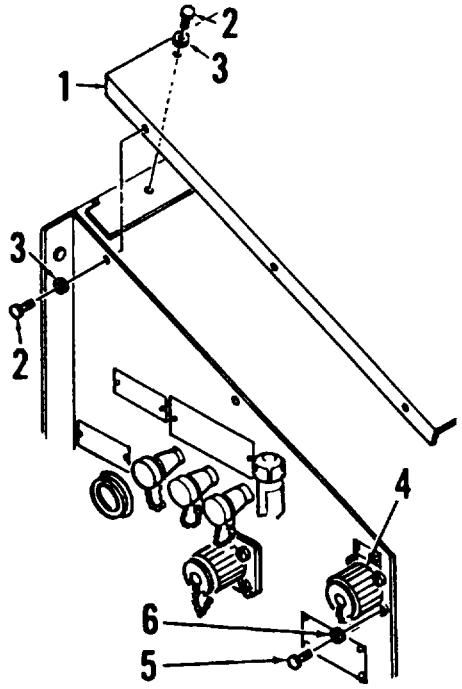
3. Inspect DCA connector for bent, broken, or missing connector pins.

D. INSTALLATION

1. Connect wire leads in accordance with Figure FO-4. Ensure all leads are securely fastened to prevent malfunction.

2. Install DCA connector (4) onto right side transmission cover using screws (5) and washers (6).

3. Apply Loctite to threads of nine screws (2). Install top transmission cover (1) using screws and washers (3).



FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK

2-87. DCA WIRING HARNESS REPAIR

This task covers: Repair

INITIAL SETUP:

Equipment Condition:

DCA wiring harness (or appropriate lead) removed/disconnected (para. 2-86)

A. REPAIR

1. Refer to Table 2-9 for DCA wiring harness wire run list.
2. Test DCA wiring harness in accordance with paragraph 2-82.
3. Repair DCA wiring harness in accordance with paragraph 2-83.

Table 2-9. DCA WIRING HARNESS

Wire	From DCA Connector to:	Lgth	Gage	Terminal	Clr
1	Alternator	78	18	MS25036-103	BK
1A	Alternator	78	18	MS25036-105	BK
2	Ground	57	16	MS25036-110	BK
3	Starter Solenoid	57	16	MS25036-110	BN
4A	Alternator	75	18	MS25036-103	BK
5A	Fuel Solenoid	24	16	MS25036-108	RD
6A	Fuel Filter D.P. (NOTE 1)	19	16	12258939-2	BL
7A	Fuel Filter D.P. (NOTE 1)	19	16	12258939-1	BK
8A	Battery (NOTE 4)	19	16	MS25036-110	RD
9A	Battery (NOTE 4)	19	16	MS25036-110	OG
10	Battery	51	16	MS25036-110	BK
11	DCA Shunt	51	16	MS25036-108	GN
12	DCA Shunt	51	16	MS25036-108	YW
13A	DCA Shunt Ground Mntg Bolt (NOTE 3)	51	16	MS25036-154	BK
14A	DCA Shunt Ground Mntg Bolt (NOTE 3)	51	16	MS25036-154	BK
15A	Fuel Supply Pressure (NOTE 6)	22	18	12258939-2	
16A	(NOTE 2)			12258939-2	
19A	Fuel Supply Pressure (NOTE 6)	22	18	12258939-2	
20A	(NOTE 2)	22	18	12258939-2	
21A	Resistor	25	18	MS25036-103	BK
22A	Resistor	25	18	MS25036-103	BK
23A	Tach Sensor (NOTE 6)	48	18	12258939-1	

Table 2-9. DCA WIRING HARNESS (continued)

Wire	From DCA Connector to:	Lgth	Gage	Terminal	Clr
24A	(NOTE 1)	48	18	12258939-2	
25A	Resistor	25	18	MS25036-103	BK 1
26A	Resistor	25	18	MS25036-103	BK 1
27A	Resistor	25	18	MS25036-103	BK 1
28	Resistor	25	16	MS25036-108	BK 1
29	Resistor	25	16	MS25036-108	BK 1
	K Jumpers	8	16	N/A	BK 5
	M Jumpers	8	16	N/A	BK 5
	U Jumpers	8	16	N/A	BK 6
	Shield Grd	3.5	16	MS25036-112	

NOTES:

1. Wires terminate in a two contact receptacle, 19207/12258940-2.
2. Wires terminate in a four contact receptacle, 19207/12258940-4.
3. These wires terminate in same MS25036-154 terminal.
4. These wires terminate in same MS25036-110 terminal.
5. These wires terminate in same terminal.
6. Shielded pair.

FOLLOW-ON MAINTENANCE:

Install DCA wiring harness, connect appropriate lead (para. 2-86)

END OF TASK

2-88. CAB WIRING HARNESS REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

1. Refer to Figure FO-5, Cab Wiring Harness, for information on wires and contact points.
2. Tag wire leads before disconnecting to aid in assembly. Disconnect wire leads.

B. CLEANING

Clean cab wiring harness and components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect wiring for cuts, tears, crimping, or other obvious damage. Check for exposed wire.
2. Inspect terminal ends and lugs for damage. Ensure components are securely attached to wiring.

D. INSTALLATION

Connect wire leads in accordance with Figure FO-5. Ensure all leads are securely fastened to prevent malfunction.

FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-89. CAB WIRING HARNESS REPAIR

This task covers: Repair

INITIAL SETUP:

Equipment Condition:

Cab wiring harness (or appropriate lead) removed/disconnected (para. 2-88)

A. REPAIR

1. Refer to Table 2-10 for cab wiring harness wire run list.
2. Test cab wiring harness in accordance with paragraph 2-82.
3. Repair cab wiring harness in accordance with paragraph 2-83.

Table 2-10. CAB WIRING HARNESS

From	Terminal	To	Terminal	Gge	Lgth	Clr
CB5	MS25036-108	Htr Fan Cntrl Sw (B)	8909A526-001	16	185	BK
CB5	MS25036-108	Rear Defrost Fan ON/OFF	MS25036-108	16	121	BK
CB5	MS25036-108	Frnt Defrost Fan ON/OFF	MS25036-108	16	47	BK
SW1-A (Hot)	MS25036-108	Rear Wiper Sw (Park)	8909AS526-001	16	94	BK
SW1-A (ON/OFF)	MS25036-108	Rear Wiper Sw (Slow)	8909AS526-001	16	94	RD
SW1-B (Hot)	MS25036-108	Frnt Wiper Sw (Park)	8909AS526-001	16	39	BK
SW1-B (ON/OFF)	MS25036-108	Frnt Wiper Sw (Slow)	8909AS526-001	16	39	RD

FOLLOW-ON MAINTENANCE:

Install cab wiring harness, connect appropriate lead (para. 2-88)

END OF TASK

2-90. SLAVE RECEPTACLE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Materials / Parts:

Loctite 242 (20, App. C)

A. REMOVAL

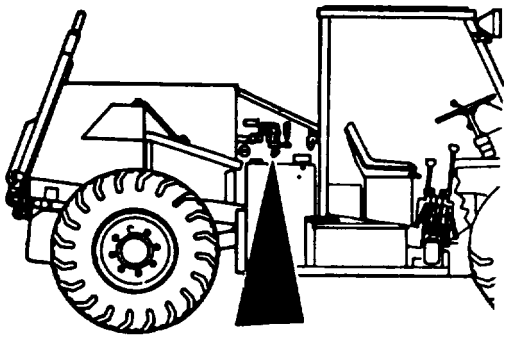
WARNING

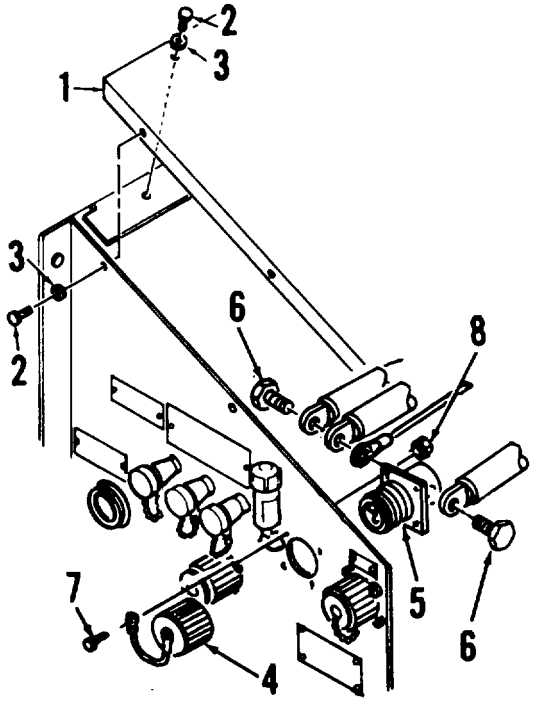
Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

1. Remove top transmission cover (1) by removing nine screws (2) and washers (3).

2. Tag electrical wiring. Remove cables and wiring from slave receptacle (5) by removing screws (6).

3. Remove cap (4). Remove slave receptacle (5) from side transmission cover by removing screws (7) and nuts (8).





B. CLEANING

Clean slave receptacle in accordance with paragraph 1-24.

C. INSPECTION

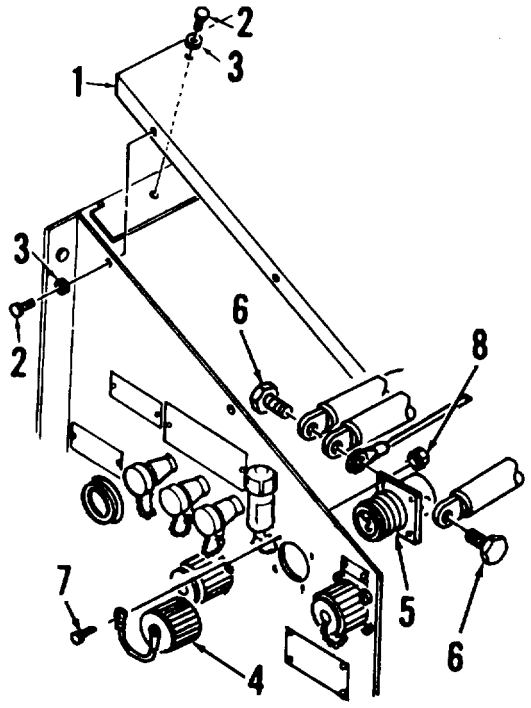
Inspect receptacle and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install slave receptacle (5) onto side transmission cover using screws (7) and nuts (8). Install cap (4).

2. Connect cables and electrical wiring to slave receptacle (5) using screws (6).

3. Apply Loctite to nine screws (2). Install top transmission cover (1) using screws and washers (3).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

Section XI. TRANSMISSION MAINTENANCE

2-91. TRANSMISSION SHIFTER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

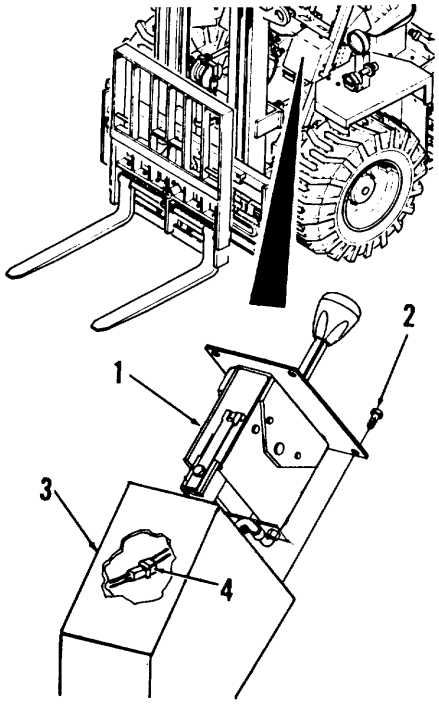
INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

A. REMOVAL

2. Tag and disconnect multiwire connector (4) from transmission shifter (1).

2. Release transmission shifter (1) from instrument panel box (3) by removing screws (2).



B. CLEANING

Clean transmission shifter in accordance with paragraph 1-24.

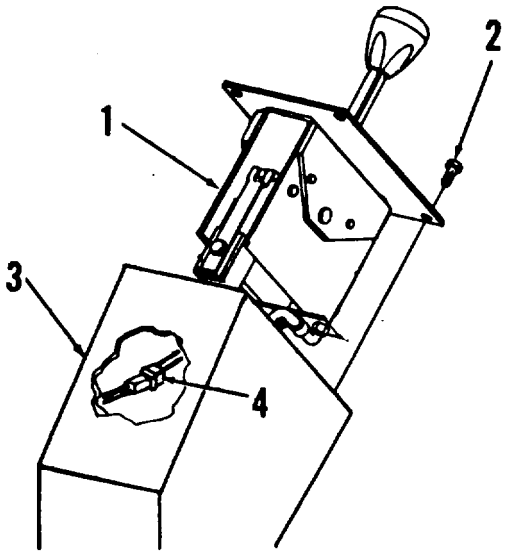
C. INSPECTION

Inspect transmission shifter and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Pass multiwire connector (4) through instrument panel box (3) and connect to transmission shifter (1).

2. Carefully slide transmission shifter (1) into instrument panel box (3) and secure using screws (2).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-92. TRANSMISSION SHIFTER REPAIR

This task covers: Disassembly, Cleaning, Inspection, and Assembly

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Equipment Condition:
Transmission shifter removed (para. 2-91)

A. DISASSEMBLY

CAUTION

Electrical wires (1) are soldered to micro switches (2). Use care during disassembly to prevent damage.

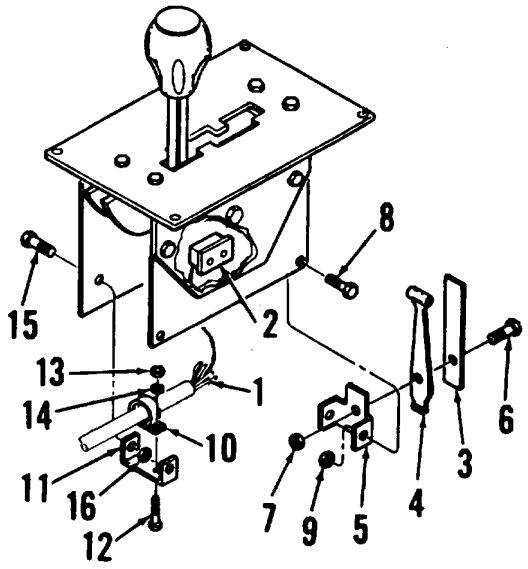
1. REMOVE LEAF SPRING (4), SPRING BRACKET (5), AND BRACKET (11).

   a. Remove spring (3) and leaf spring (4) from spring bracket (5) by removing screw (6) and nut (7).

   b. Remove spring bracket (5) from shifter housing by removing screws (8) and nuts (9).

   c. Remove wire clamp (10) from bracket (11) by removing screw (12), nut (13), and washers (14).

   d. Remove bracket (11) from shifter housing by removing screws (15) and nuts (16).

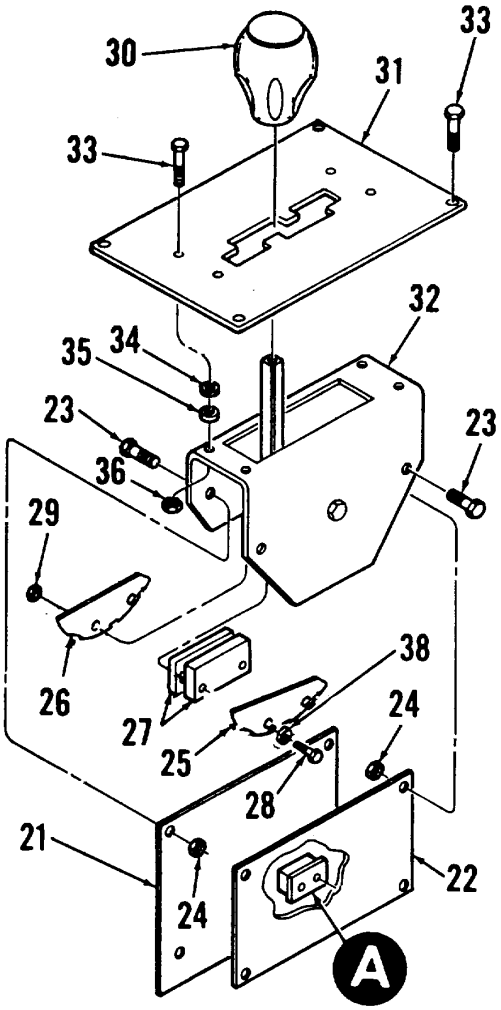


2. REMOVE FIVE MICRO SWITCHES (2) SWITCH SPACERS (17), ACTUATORS (18), AND FASTENERS (19) FROM SWITCH BRACKETS (21, 22) BY REMOVING SCREWS (20) AND LOCKWASHERS (37).

3. REMOVE SWITCH BRACKETS (21, 22) AND SWITCH ACTUATORS (25, 26).

    a. Remove switch brackets (21, 22) from shifter housing (32) by removing screws (23) and nuts (24).
    b. Remove switch actuators (25, 26) and spacers (27) from shifter housing (32) by removing screws (28), lockwashers (38), and nuts (29).

4. REMOVE KNOB (30). REMOVE GATE PLATE (31) FROM SHIFTER HOUSING (32) BY REMOVING SCREWS (33), WASHERS (34, 35), AND NUTS (36).



B. CLEANING

Clean transmission shifter components in accordance with paragraph 1-24.

C. INSPECTION

Inspect transmission shifter components in accordance with paragraph 1-24.

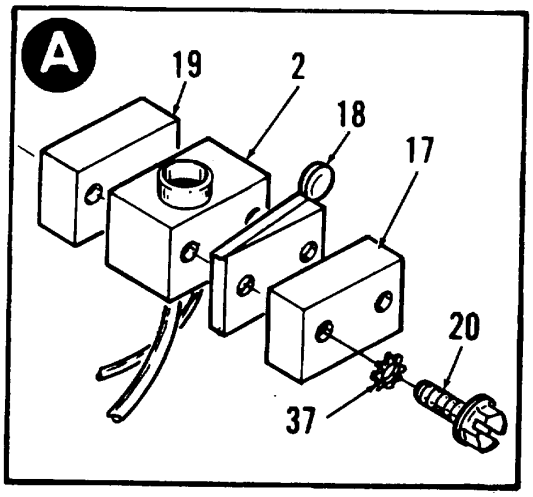
D. ASSEMBLY

1. INSTALL GATE PLATE (31) ONTO SHIFTER HOUSING (32) USING SCREWS (33), WASHERS (34, 35), AND NUTS (36). INSTALL KNOB (30).

2. INSTALL SWITCH BRACKETS (21, 22) AND SWITCH ACTUATORS (25, 26).

    a. Install switch brackets (21, 22) to shifter housing (32) using screws (23) and nuts (24).
    b. Install switch actuators (25, 26) and spacers (27) to shifter housing (32) using screws (28), lockwashers (38), and nuts (29).

3. INSTALL FIVE MICRO SWITCHES (2), SWITCH SPACERS (17), ACTUATORS (18), AND FASTENERS (19) TO SWITCH BRACKETS (21, 22) USING SCREWS (20) AND LOCKWASHERS (37).



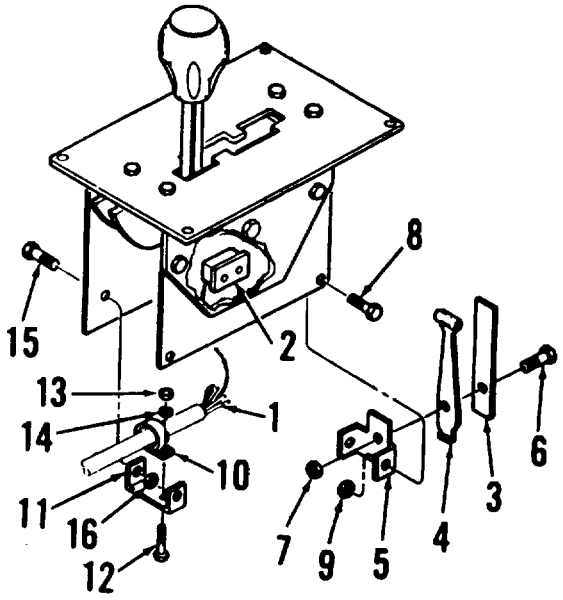
4. INSTALL LEAF SPRING (4), SPRING BRACKET (5), AND BRACKET (11).

   a. Secure bracket (11) to shifter housing using screws (15) and nuts (16).

   b. Install wire clamp (10) onto bracket (11) using screw (12), nut (13), and washers (14).

   c. Secure spring bracket (5) to shifter housing using screws (8) and nuts (9).

   d. Attach spring (3) and leaf spring (4) to spring bracket (5) using screw (6) and nut (7).



FOLLOW-ON MAINTENANCE:

Install transmission shifter (para. 2-91)

END OF TASK

2-93. TRANSMISSION ASSEMBLY SERVICING

This task covers: Draining and Servicing Transmission and Bleeding Inching Valve

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Oil Filter Tool (27, App. E)
Torque Wrench (32, App. E)
Drain Pan (10, App. E)

Reference:

LO 10-3930-664-12

Materials / Parts:

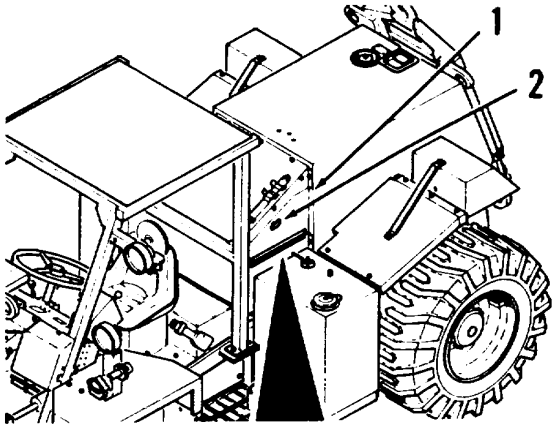
Transmission Oil (17, App. C)
Loctite No. 592 (24, App. C)
Loctite No. 242 (20, App. C)
Brake Fluid (5, App. C)
Filter, Item 5 (1 ea.)

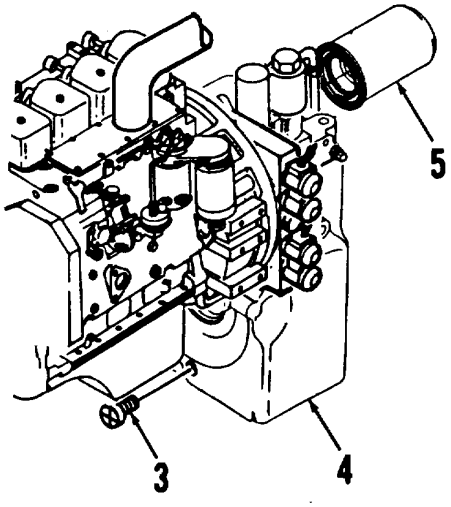
Personnel Required:

2 personnel

A. DRAINING

1. Open access door (1) located on left side transmission cover by rotating handle (2) left.
2. Place drain pan beneath transmission drain plug (3). Remove plug from transmission and drain fluid.
3. Apply a light coat of Loctite 592 to threads of drain plug (3). Install drain plug into transmission (4) and torque to 40-45 ft-lb. (54-61 NM).
4. Remove filter (5) and discard. Install new filter and torque to 20-25 ft-lbs (27-34 Nm).
5. Close access door (1) and secure by rotating handle (2) clockwise.





B. SERVICING

1. Remove transmission fill cap (6). Fill transmission with approximately 8 quarts of transmission fluid.

2. Check fluid level using dipstick (7). Level should be at "L" mark on dipstick. Add fluid as required.

3. Start engine and operate at idle. Maintain speed until transmission oil temperature reaches operating range of 180 to 250 degrees F (82 to 121 C).

4. Check transmission fluid level using dipstick (7). Level should be above "L" mark on dipstick. Add fluid as required.

5. Make a final fluid level check once engine reaches normal operating temperature. Level should be at the "H" mark on dipstick. Add fluid as required.

6. Shutdown engine. Install transmission fill cap (6).

C. BLEED INCHING VALVE

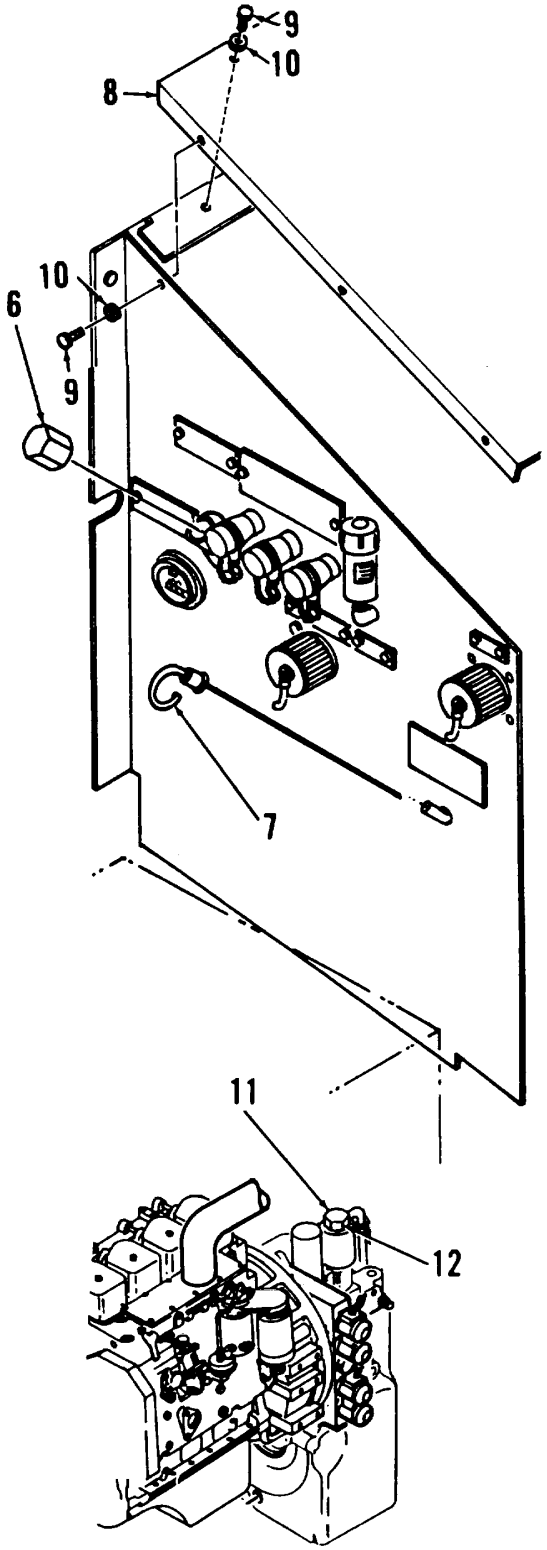
1. Remove transmission top cover (8) by removing nine screws (9) and washers (10).

2. Locate bleeder screw (11). Screw is located near the top of the inching valve (12).

3. Depress the service brake and inching pedal to actuate the inching valve. Open the bleeder screw (11) to allow air to escape.

4. Close bleeder screw (11) and repeat step (3) until inching valve is free of air.

5. Apply Loctite 242 to threads of nine transmission cover screws (9). Install top transmission cover using screws and washers (10).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-94. TRANSMISSION ASSEMBLY TESTING

This task covers: Active and static testing

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Pressure Gauge (42, App. E)

Equipment Condition:

Transmission serviced (para. 2-93)
STE/ICE Tester connected (para. 2-13)
Tow bar lowered (para. 2-126)

Materials / Parts:

Loctite 242 (20, App. C)

A. STALL TEST

NOTE

When performing stall test, shifter will not operate if parking brake is applied. Transmission will automatically declutch when brake pedal is fully depressed. Automatic safety declutch must be disengaged.

1. Stall test may be conducted two ways; using the parking brake or positioning forklift against a solid barrier.

   a. If the parking brake method is chosen, the automatic declutch safety feature must be disengaged. Tag and disconnect wire number 46 (purple) from parking brake solenoid.

   b. If solid barrier method is chosen, position forklift against a solid barrier and block wheels.

CAUTION

Do not operate in stall condition longer than 30 seconds at one time. Shift speed control lever to neutral for 15 seconds, then repeat procedure until operating temperature is reached.

Do not allow operating temperature to exceed 250 degrees F (121 C). High temperature will damage transmission components.

NOTE

Engine can only be started with transmission in the NEUTRAL (N) position on the travel and range selector.

2. Start engine and move travel and range select lever into 3rd gear, forward or reverse (F3, R3) as applicable.

3. Slowly increase engine speed to one-half throttle. Maintain speed until transmission oil temperature reaches operating range of 180 to 250 degrees F (82 to 121 C).

4. If engine operates at low rpm, check engine for malfunctions. If engine operates at proper rpm, proceed with mechanical test.

B. MECHANICAL TEST

1. Release hood assembly (1) by lifting handle (2). Open hood assembly.

2. Remove top transmission cover (3) by removing nine screws (4) and washers (5).

3. Check that radiator is clean and free from obstruction.

NOTE

All test measurements are to be made after engine has reached normal operating temperature. Oil temperature must be 180 to 220 degrees F (82 to 104 C).

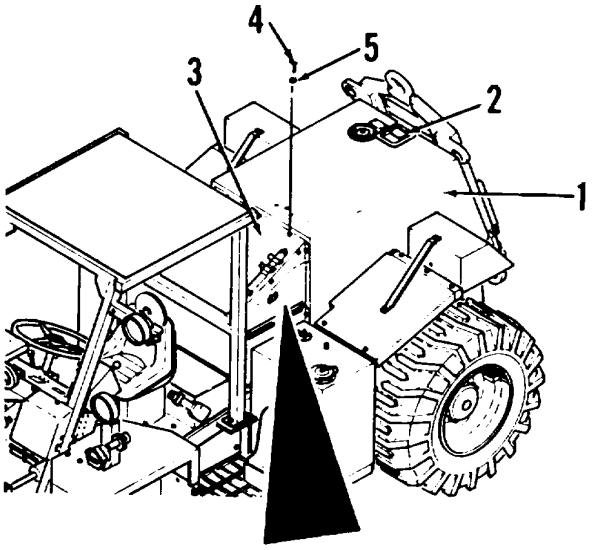
4. Place transmission in neutral.

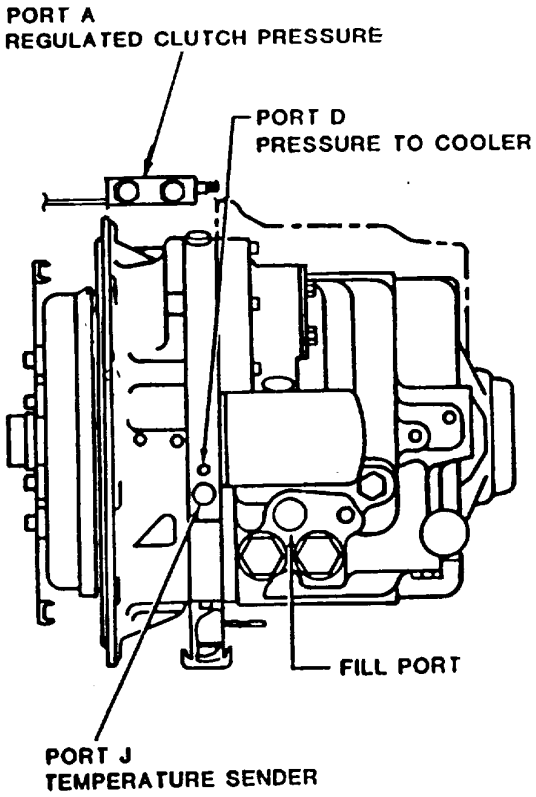
NOTE

Use STE/ICE tester to determine engine speed during pressure checks.

5. Connect pressure gauge to transmission port D. Measure operating pressure. Minimum pressure shall be 60 psi (414 kPa) at 2000 rpm engine speed. Maximum pressure shall be 120 psi (827 kPa) at no-load governed speed (2725 rpm).

6. Move pressure gauge to port A. Measure regulated clutch pressure. Normal operating pressure shall be 240 to 280 psi (1655 to 1930 kPa) at 2000 rpm engine speed.





NOTE

When performing the following test, the backup alarm switch (installed in Port C) must be removed to measure the pressure at Port C and to attach the gauge to Port M. Place the plug removed from Port M into port C during the forward clutch pressure test.

7. Connect pressure gauge to each port listed below and record each oil pressure. Transmission must be shifted to operate corresponding clutch. Engine idle shall be 400 to 600 rpm.

a. Port C = Reverse

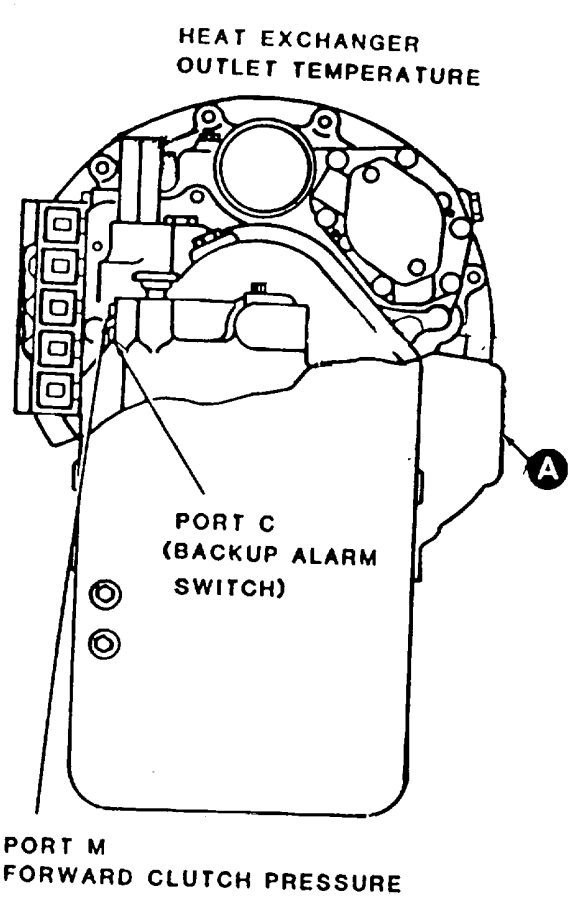
b. Port E = 2nd gear

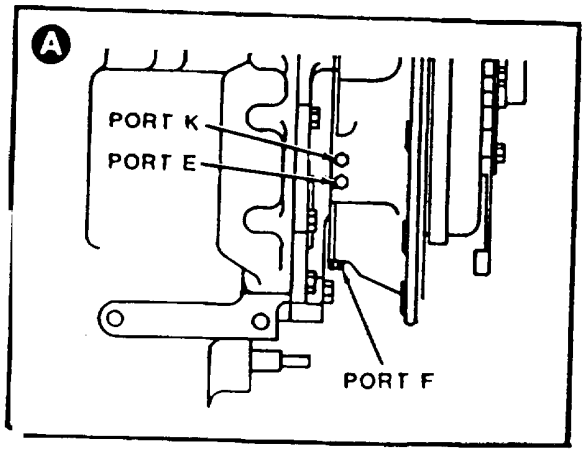
c. Port F = 3rd gear

d. Port K = 1st gear

e. Port M = Forward

8. All clutch pressure readings must be within 5 psi of each other. No reading may be less than 185 psi.
9. Apply Loctite to threads of nine transmission cover screws. Install top transmission cover using screws and washers.
10. Close hood assembly. Ensure handle is fully engaged.





FOLLOW-ON MAINTENANCE:

Disconnect STE/ICE tester (para. 2-13)
Raise tow bar and lock in position (para. 2-126)

END OF TASK

2-95. TRANSMISSION OIL COOLER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
Wrench, Combination, 1-1/8 inch (52, App. E)
Wrench, Combination, 1-1/4 inch (53, App. E)

Equipment Condition:

Radiator baffles removed (para. 2-48)

Materials / Parts:

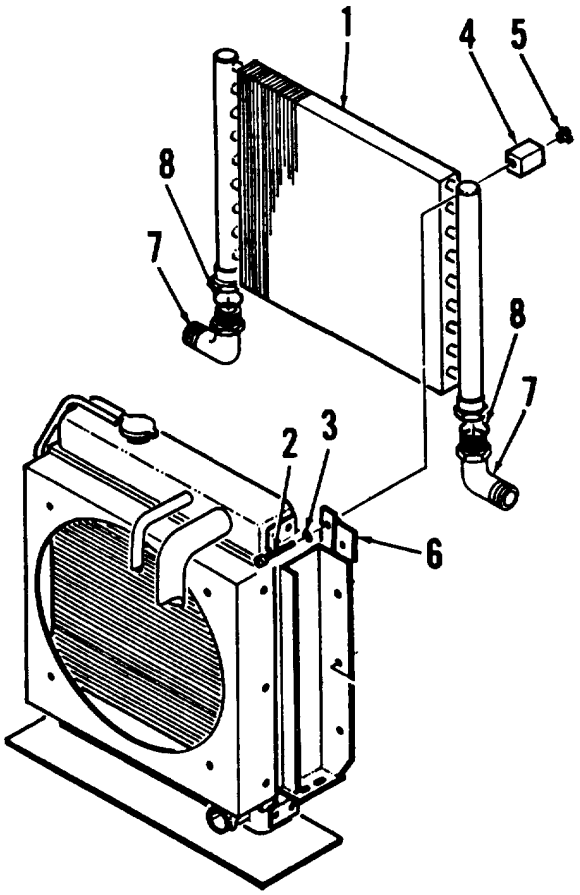
O-Ring, Item 8 (2 ea.)

A. REMOVAL

NOTE
Transmission oil cooler (l) and bracket (6) were separated from radiator during radiator side baffle removal.

1. Remove transmission cooler bracket (6) from oil cooler (1) by removing six screws (2), washers (3), mounting blocks (4), and nuts (5).

2. Remove elbows (7) from oil cooler (1). Remove and discard O-rings (8).



B. CLEANING

Clean transmission oil cooler in accordance with paragraph 1-24.

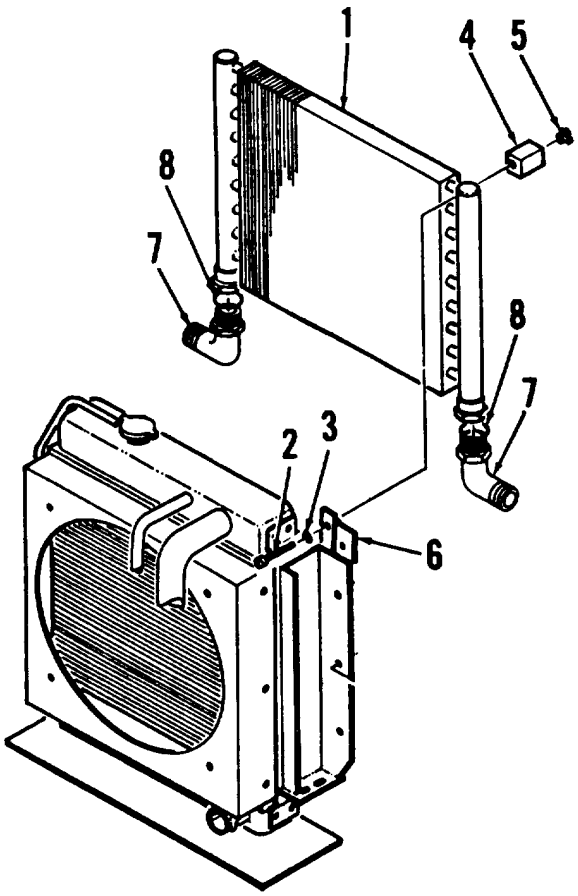
C. INSPECTION

Inspect cooler and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install elbows (7) and new O-rings (8) onto transmission oil cooler (1).

2. Install transmission cooler bracket (6) onto oil cooler (1) using screws (2), washers (3), mounting blocks (4), and nuts (5).



FOLLOW-ON MAINTENANCE:

Install radiator side baffles (para. 2-48)
Service transmission assembly (para. 2-93)

END OF TASK

2-96. TRANSMISSION OIL FILTER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
Strap Wrench (47, App. E)

Material / Parts:

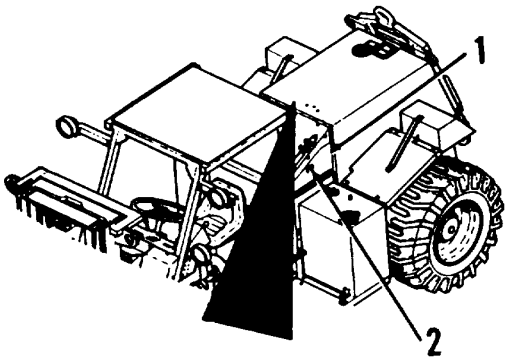
Transmission Oil Filter, Item 3 (1 ea.)

Reference:

TM 10-3930-664-24

A. REMOVAL

1. Open access door (1) located on left side transmission cover by rotating handle (2) counterclockwise.
2. Place container beneath oil filter (3).Remove filter and discard.



B. CLEANING

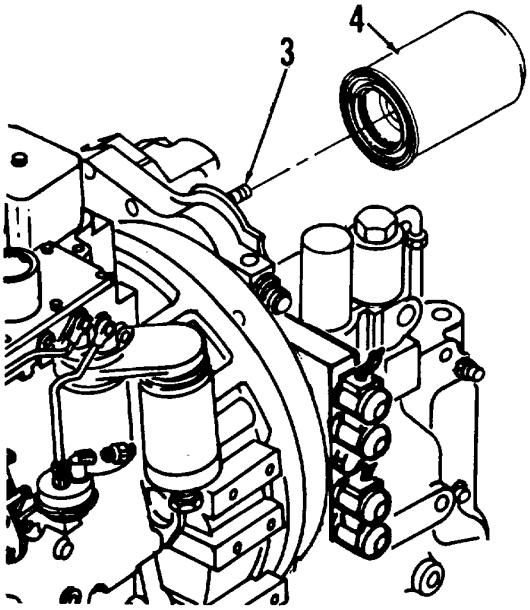
Clean regulator piston (4) and filter mating surface in accordance with paragraph 1-24.

C. INSPECTION

Inspect regulator piston (4) for damage. Check for stripped or crossed threads.

D. INSTALLATION

1. Install new filter (3) and tighten until snug, then turn filter 1/4 turn more.
2. Close access door (1). Secure by rotating handle (2) clockwise.



FOLLOW-ON MAINTENANCE:

Service transmission assembly (para. 2-93)

END OF TASK

2-97. OIL SAMPLING VALVE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Materials / Parts:

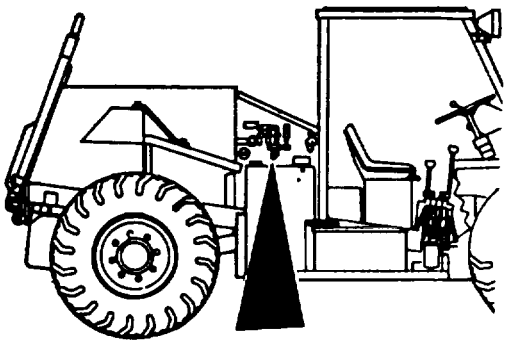
Teflon Tape (35, App. C)
Loctite 242 (20, App. C)

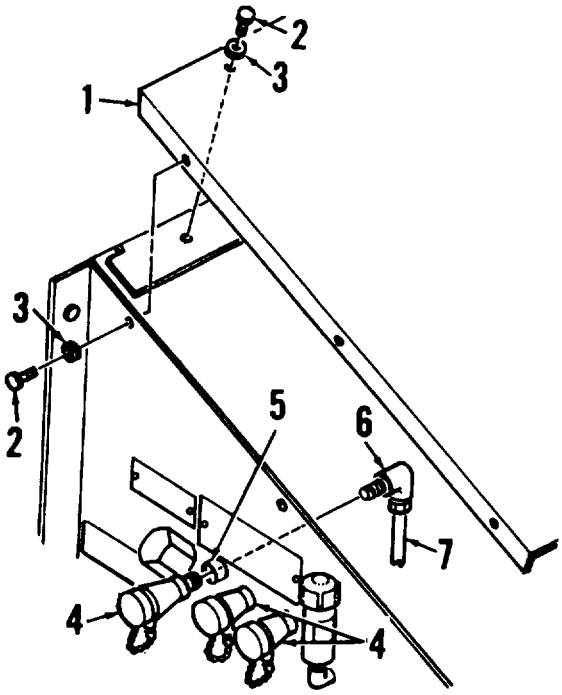
A. REMOVAL

NOTE

Sampling valve can be removed without removing transmission top cover. Remove cover only if elbow or hose replacement is required.

1. Remove transmission oil sampling valve (4) from welded pipe coupling (5). Plug pipe coupling.
2. If required, remove top transmission cover (1) by removing nine screws (2) and washers (3).
3. Tag and disconnect hose assembly (7) from elbow (6). Remove elbow from welded pipe coupling (5).





B. CLEANING

Clean oil sampling valve in accordance with paragraph 1-24.

C. INSPECTION

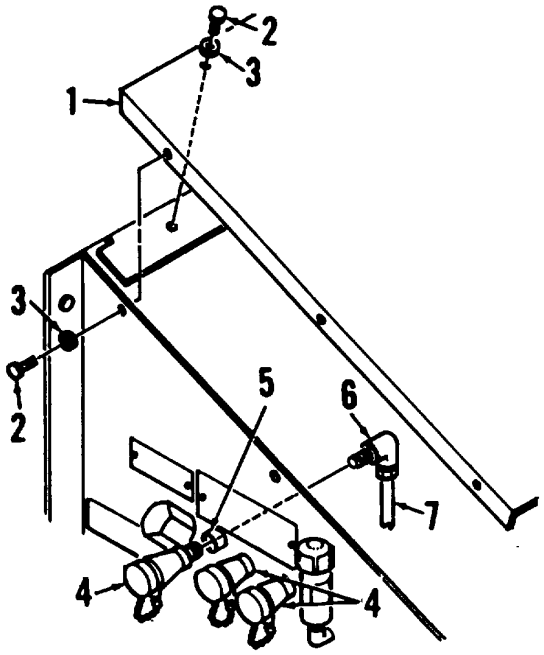
Inspect valve and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install elbow (6) into welded pipe coupling (5). Connect hose assembly (7) to elbow.

2. Apply Loctite to threads of nine screws (2). Position top transmission cover (I) in place and secure using screws and washers (3).

3. Apply Teflon tape to threads of transmission oil sampling valve (4) and install valve into welded pipe coupling (5). Ensure valve spout points down.



FOLLOW-ON MAINTENANCE:

Service transmission assembly (para. 2-93)

END OF TASK

Section XII. PROPELLER AND PROPELLER SHAFT MAINTENANCE

2-98. FRONT AND REAR DRIVESHAFT SERVICING

This task covers: Servicing

INITIAL SETUP:

Tools and Test Equipment:

Lubricator Kit (35, App. E)

Materials / Parts:

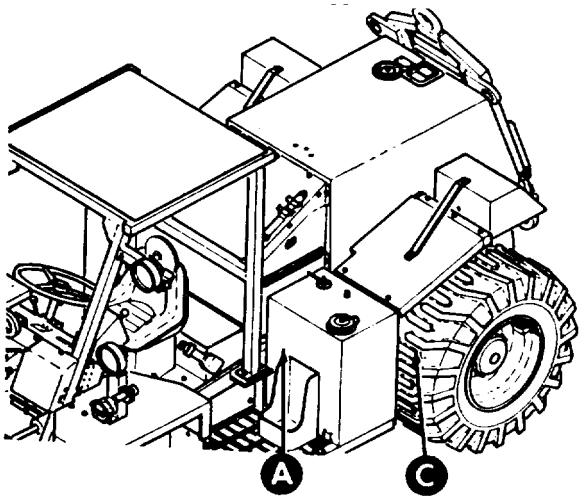
Grease (10, App. C)

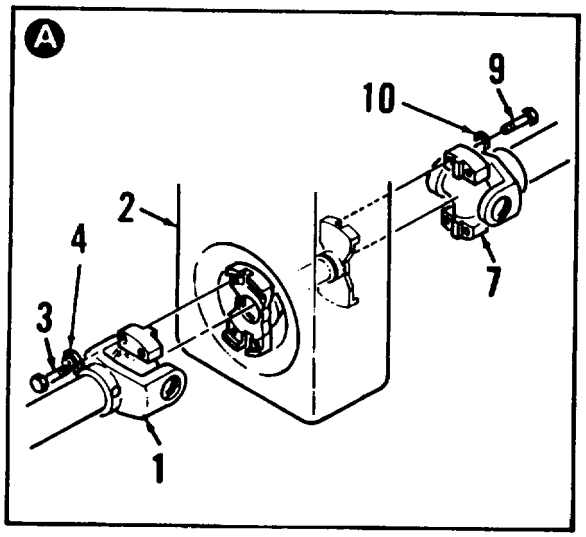
A. SERVICING

WARNING

Use extreme caution when operating lubricating devices that require compressed air. Improper use could cause personal injury.

1. SERVICE CROSS BEARINGS BY APPLYING GREASE AT FITTING (1).
   a. Apply grease gun to fitting (1). Fill until grease flows from the extreme outer edge of each bearing (2).
   b. If any bearings fail to purge, rotate drive shaft from side to side and reapply grease.
   c. Wipe away excess grease.



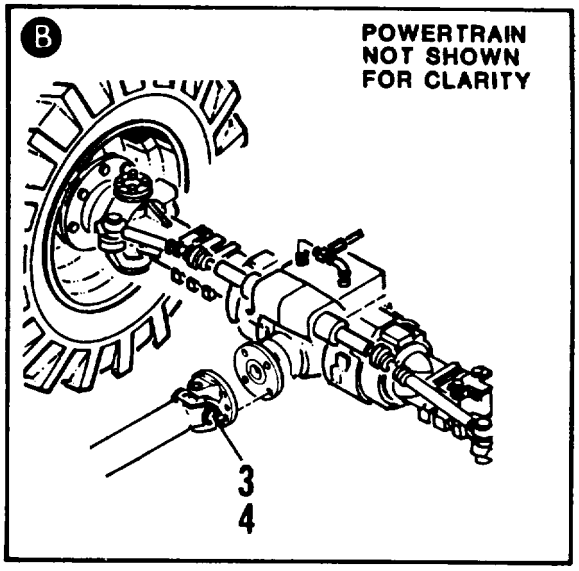


2. SERVICE SLIP YOKES BY APPLYING GREASE AT FITTING (3).

   a. Apply grease gun to fitting (3). Fill until grease flows from pressure relief hole at end of spline (4).

   b. Cover pressure relief hole (4) with finger. Apply grease gun pressure until grease appears at sleeve yoke seal.

   c. Wipe away excess grease.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-99. FRONT AND REAR DRIVE SHAFT REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Jack Stands (8, App. E) (2 ea.)

Personnel Required:

2 Personnel

Materials / Parts:

Lockwasher, Item 4 (4 ea.)
Locknut, Item 7 (4 ea.)
Lockwasher, Item 10 (4 ea.)
Locknut, Item 13 (4 ea.)

A. REMOVAL

WARNING

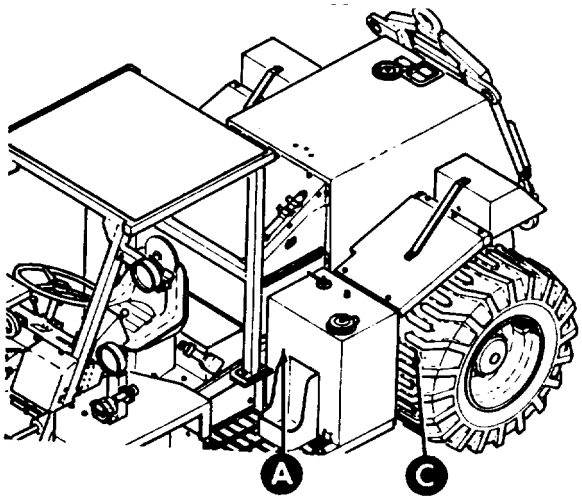
Drive shafts are heavy and awkward. Enlist the help of an aide when removing to prevent injury to personnel and damage to components.

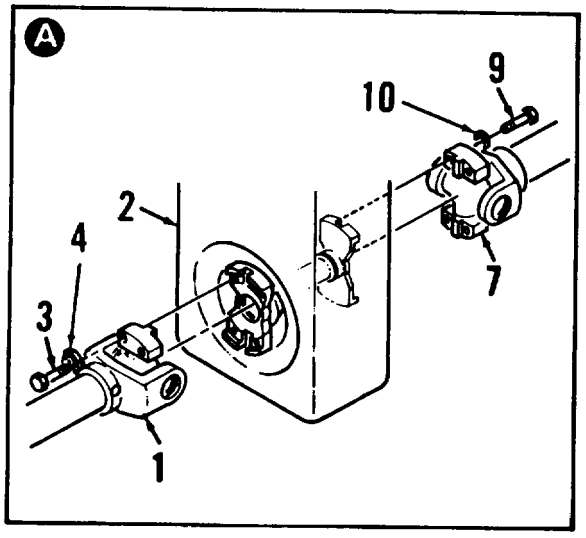
1. Place jack stands beneath front drive shaft (1). Raise stands until they meet drive shaft.

CAUTION

Use care when removing driveshaft to ensure that tube and yoke do not separate. Damage to components could result.

2. Remove front drive shaft (1) from transmission (2) by removing screws (3) and lockwashers (4). Discard lockwashers.





3. Remove front drive shaft (1) from front axle (5) by removing screws (6) and locknuts (7). Discard locknuts.

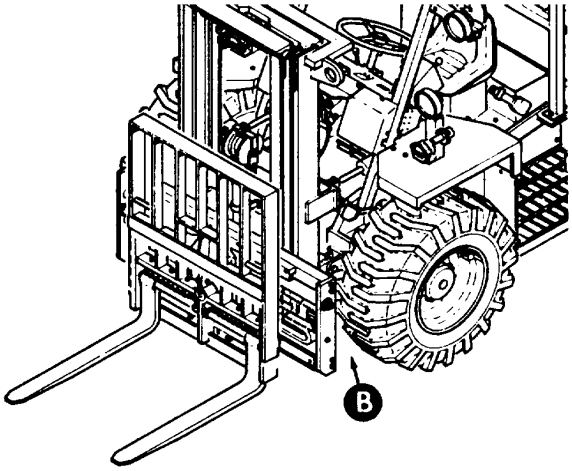
4. Place jack stands beneath rear drive shaft (8). Raise stands until they meet drive shaft.

CAUTION

Use care when removing driveshaft to ensure that tube and yoke do not separate. Damage to components could result.

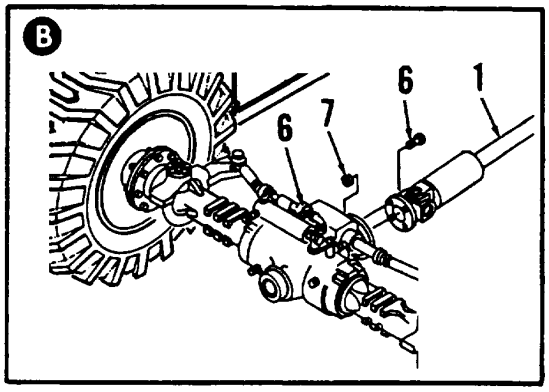
5. Remove rear drive shaft (8) from transmission (2) by removing screws (9) and lockwashers (10). Discard lockwashers.

6. Remove rear drive shaft (8) from rear axle (11) by removing screws (12) and locknuts (13). Discard locknuts.



B. CLEANING

Clean drive shafts in accordance with paragraph 1-24.



C. INSPECTION

1. Inspect drive shaft components in accordance with paragraph 1-24.

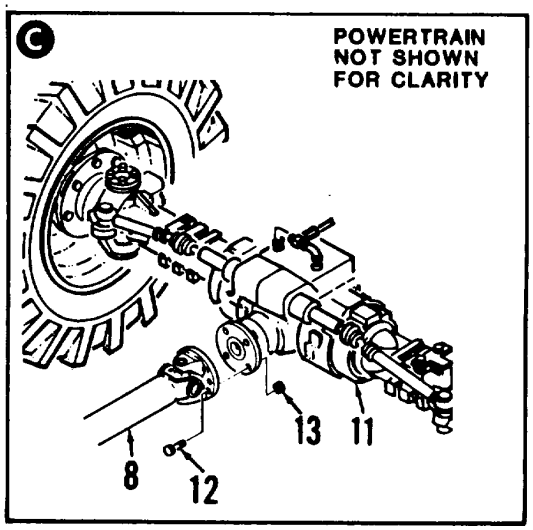
2. Inspect shafts for damaged, dented, or bent tubing. Inspect for missing balance weights.

3. Ensure shaft is free of foreign material, such as undercoat or concrete. If found, foreign material shall be removed carefully to avoid damaging shaft.

4. Ensure splines slide freely with slight drag from slip shaft seal.

5. Check that cross journals flex without excessive binding.

6. Inspect mounting flanges for burrs, paint, or foreign material.



D. INSTALLATION

1. Position rear drive shaft (8) to rear axle (11), ensuring proper hole alignment. Secure using screws (12) and locknuts (13).

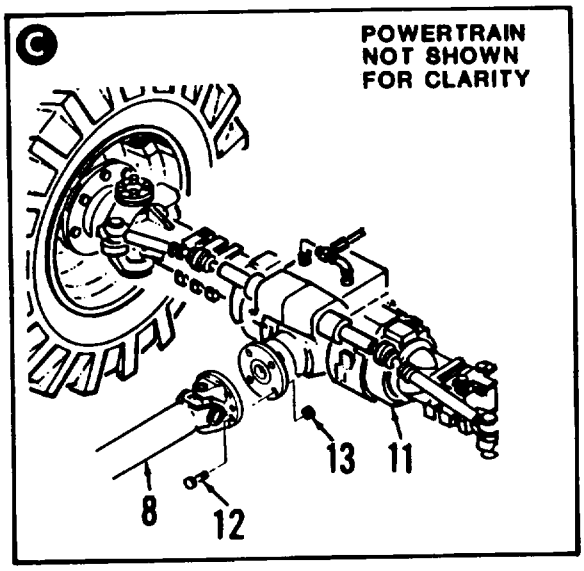
2. Position rear drive shaft (8) to transmission (2), ensuring proper hole alignment. Secure using screws (9) and lockwashers (10).

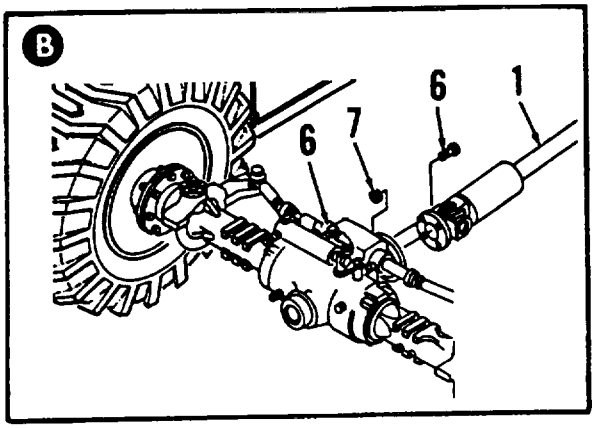
3. Torque screws (9, 12) to 40-48 ft-lbs (54-65 Nm).

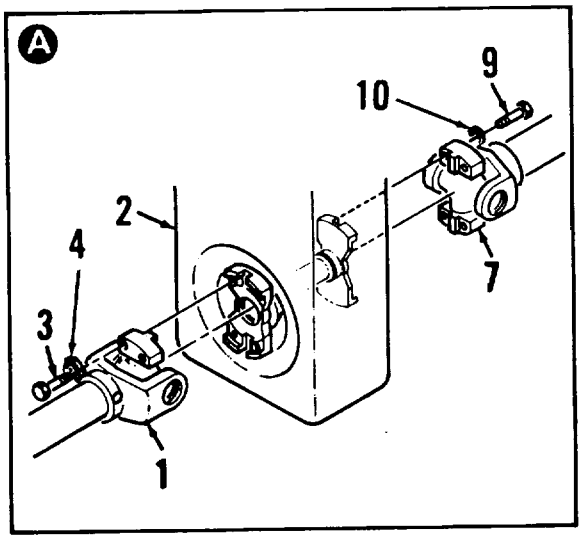
4. Position front drive shaft (1) to front axle (5), ensuring proper hole alignment. Secure using screws (6) and locknuts (7).

5. Position front drive shaft (1) to transmission (2), ensuring proper hole alignment. Secure using screws (3) and lockwashers (4).

6. Torque screws (3, 6) to 40-48 ft-lbs (54-65 Nm).







FOLLOW-ON MAINTENANCE:

Service front and rear drive shafts
(para. 2-98)

END OF TASK

2-100. FRONT AND REAR DRIVE SHAFT REPAIR

This task covers: Disassembly, Cleaning, Inspection, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Arbor Press (25, App. E)

Equipment Condition:

Drive shaft removed (para. 2-99)

Materials / Parts:

Grease (10, App. C)

A. DISASSEMBLY

1. Using a soft drift, tap outside of first bearing (4) to loosen snap ring (5). Remove snap ring.

2. Turn flange yoke (2) over and remove opposite snap ring (5). Remove remaining two snap rings in same manner.

NOTE

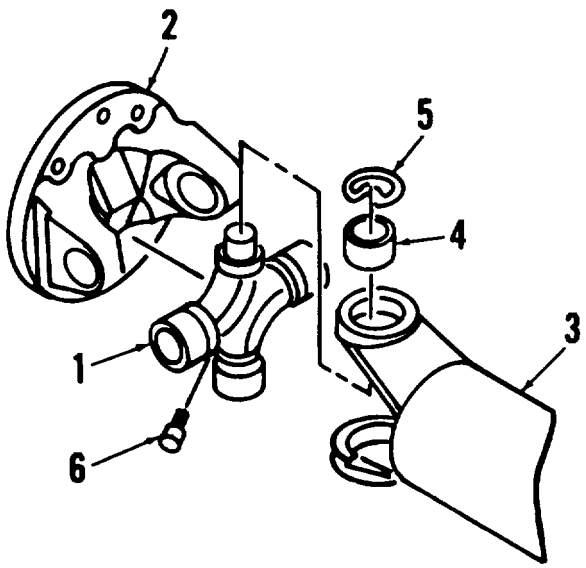
Use tube stock with I.D. of 1.5 inches to support flange yoke and shaft assembly.

3. Place flange yoke (2) in an arbor press with a piece of tube stock beneath it. Position flange yoke with grease fitting (6) up.

CAUTION

Ensure cross assembly (1) is straight when pressing out bearings. If cross assembly is cocked, bearing will score walls of cross holes and ruin flange yoke.

4. Place a solid plug on upper bearing (4) and press through to release lower bearing.



5. Turn flange yoke (2) over and place on tube stock. Carefully press on end of cross assembly (1) so that remaining bearing (4) moves out of flange yoke.

6. Remove flange yoke (2) from cross assembly (1).

7. Repeat steps 3 through 6 to remove cross assembly (1) from shaft assembly (3).

8. Using a soft drift, tap outside of first bearing (9) to loosen snap ring (10). Remove snap ring.

9. Turn slip yoke (8) over and remove opposite snap ring (10).

NOTE

Use tube stock with I.D. of 1.5 inches to support flange yoke and shaft assembly.

10. Place slip yoke (8) in an arbor press with a piece of tube stock beneath it. Position slip yoke with grease fitting (11) up.

CAUTION

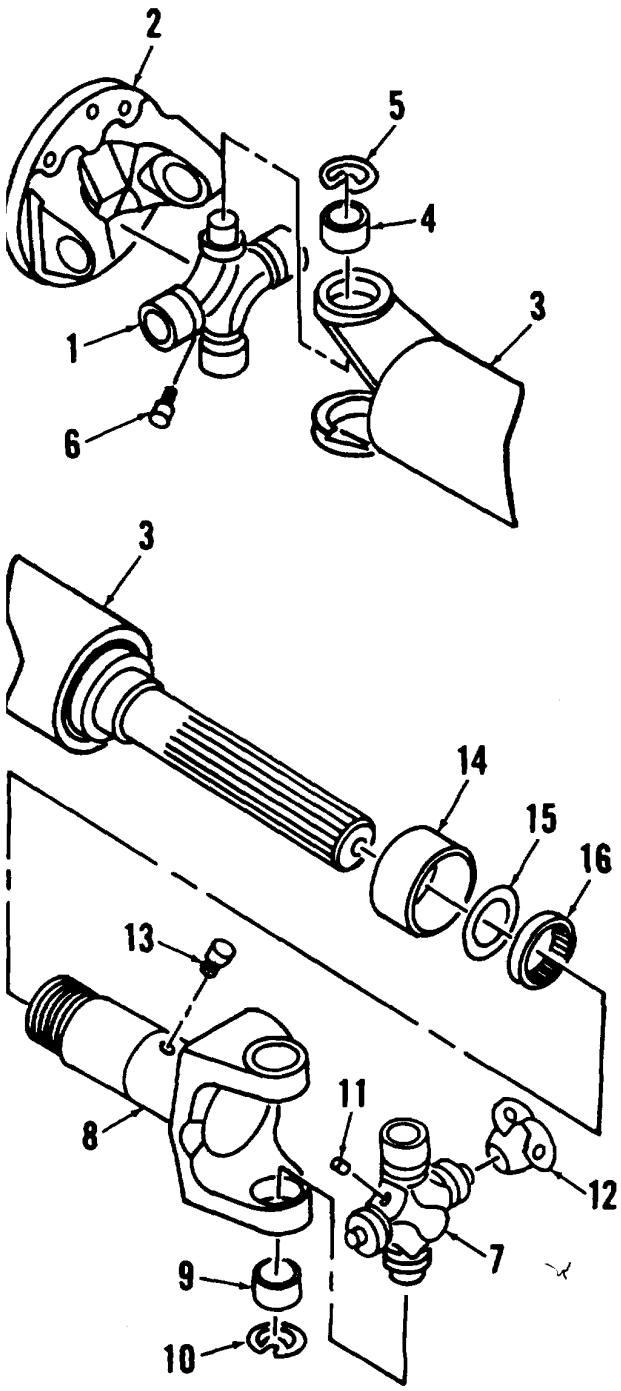
Ensure cross assembly (7) is straight when pressing out bearings. If cross assembly is cocked, bearing will score walls of cross holes and ruin slip yoke.

11. Place a solid plug on upper bearing (9) and press through to release lower bearing.

12. Turn slip yoke (8) over and place on tube stock. Carefully press on end of cross assembly (7) so that remaining bearing (9) moves out of slip yoke.

13. Remove slip yoke (8) from cross assembly (7).

14. Remove bearing trunions (12) from cross assembly (7) by prying lockwire from slots in bearing trunions and sliding bearings from cross assembly.

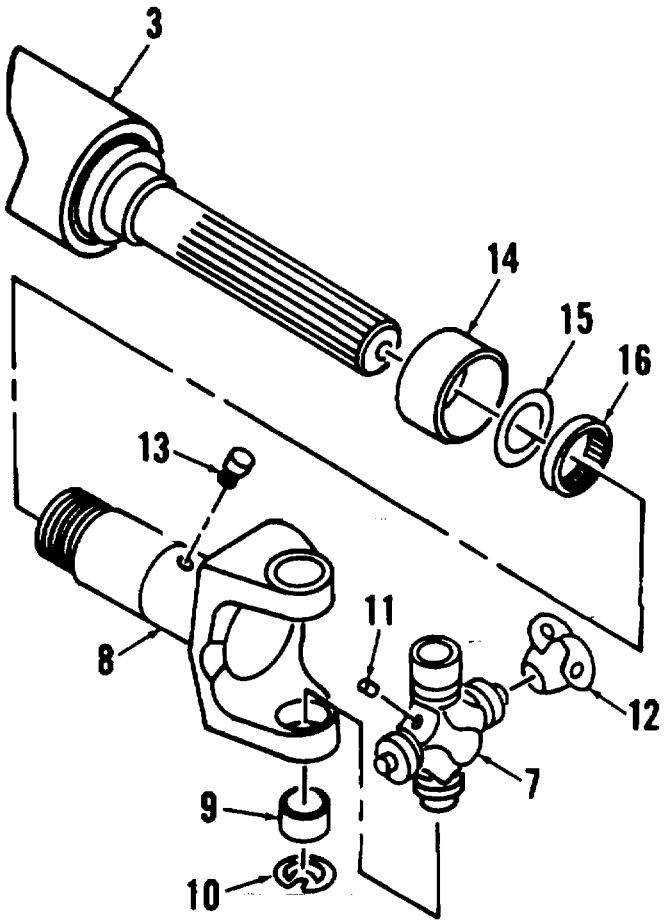


15. Remove grease fitting (13) from slip yoke (8) only if replacement is required.

NOTE

Mark shaft assembly (3) and slip yoke (8) before separating to assist in alignment during installation.

16. Remove slip yoke (8) from shaft assembly (3) by removing dust cap (14), steel washer (15), and rubber washer (16).



B. CLEANING

Clean drive shafts in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect drive shaft components in accordance with paragraph 1-24.

2. Inspect shafts for damaged, dented, or bent tubing.

3. Ensure shaft is free of foreign material, such as undercoat or concrete. If found, foreign material shall be removed carefully to avoid damaging shaft.

4. Inspect mounting flanges for burrs, paint, or foreign material.

D. ASSEMBLY

1. Align slip yoke (8) and shaft assembly (3) using match-marks. Secure slip yoke onto shaft assembly using dust cap (14), steel washer (15), and rubber washer (16).

2. Install grease fitting (13) into slip yoke (8).

3. Install bearing trunions (12) onto cross assembly (7). Secure by driving lockwire into slots in bearing trunions.

4. Lubricate grease cavities of cross assembly (7) with grease. Pack bearings (9) 1/4 full with grease.

5. Place cross assembly (7) into slip yoke assembly (8). Grease fitting (11) must face towards slip yoke.

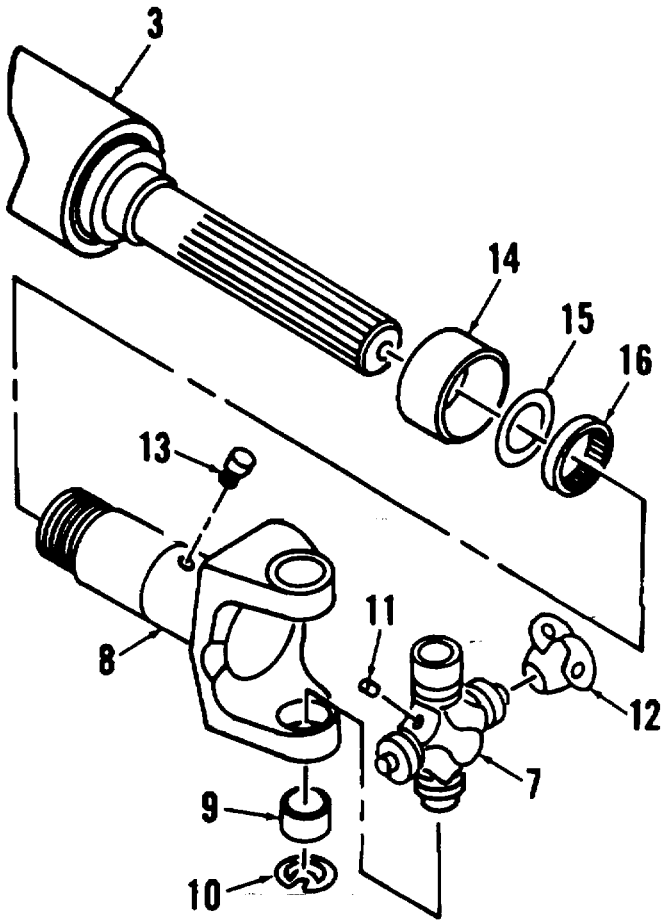
6. Position cross assembly (7) so that one end of cross sticks out beyond outer surface of slip yoke hole.

7. Place first bearing (9) onto the exposed end of cross assembly (7). Align bearing with hole in slip yoke.

8. Place slip yoke (8) in an arbor press. Place a solid plug on bearing (9) and press into hole in slip yoke.

9. Install snap ring (10).

10. Repeat steps 7 through 9 for remaining bearing.



11. Lubricate grease cavities of cross assembly (1) with grease. Pack bearings (4) 1/4 full with grease.

12. Place cross assembly (1) into flange yoke (2). Grease fitting (6) must face towards flange yoke.

13. Position cross assembly (1) so that one end of cross sticks out beyond outer surface of flange yoke hole.

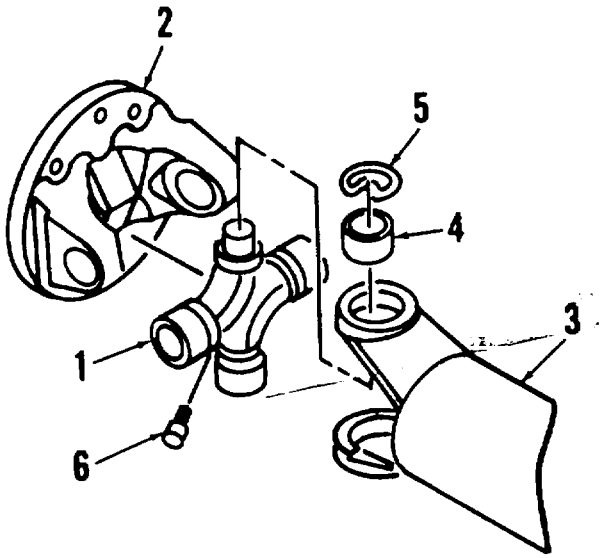
14. Place first bearing (4) onto the exposed end of cross assembly (1). Align bearing with hole in flange yoke.

15. Place flange yoke (2) in an arbor press. Place a solid plug on bearing (4) and press into hole in flange yoke.

16. Install snap ring (5).

17. Repeat steps d through f for opposite bearing.

18. Repeat steps 11 through 17 to install shaft assembly (3) onto cross assembly (1).



FOLLOW-ON MAINTENANCE:

Install drive shaft (para. 2-99)

END OF TASK

Section XIII. FRONT AXLE ASSEMBLY MAINTENANCE

2-101. FRONT AXLE ASSEMBLY INSPECTION

This task covers: Inspection

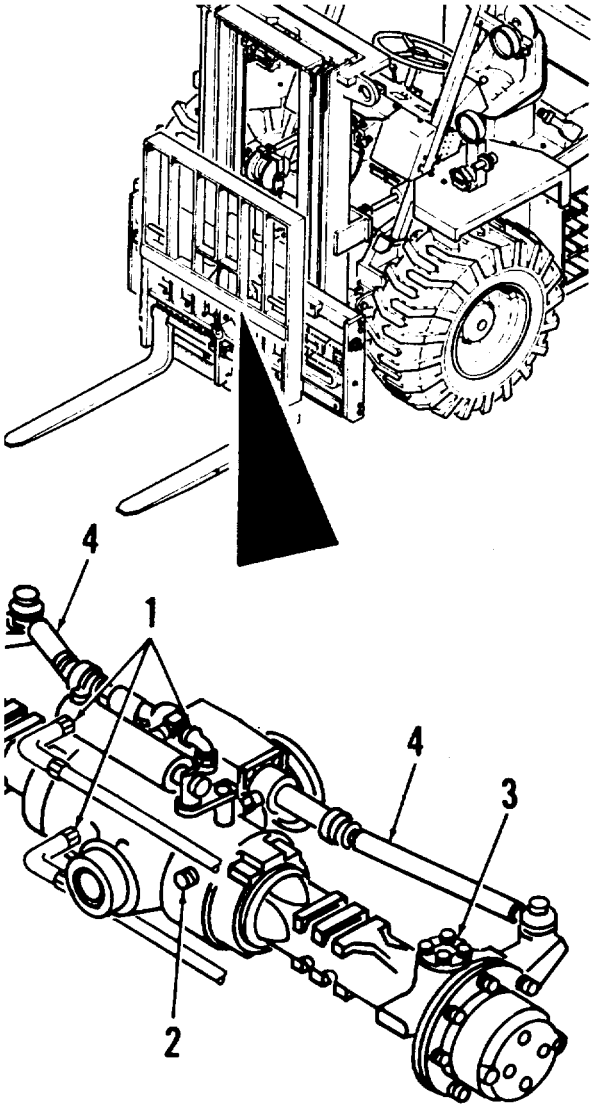
INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

A. INSPECTION

1. Perform overall inspection of front axle assembly components in accordance with paragraph 1-24.
2. Inspect all hydraulic fittings (1) for evidence of leakage. Tighten hose ends and fittings as required.
3. Inspect for evidence of leakage at axle plugs (2). Tighten plugs as required.
4. Inspect steering case pivot pins (3) for evidence of leakage. Check for signs of excessive wear and evidence of rubbing.
5. Inspect tie rods (4) for obvious damage. Ensure tie rod ends are securely fastened. Tighten as required.



FOLLOW-ON MAINTENANCE:
None

END OF TASK

2-102. FRONT AXLE ASSEMBLY SERVICING

This task covers: Servicing

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
Pressure Bleeder

References:

LO 10-3930-664-12

Materials / Parts:

Grease (10, App. C)
Lubricating Oil (16, App. C)
Brake Fluid (5, App. C)

A. SERVICING

NOTE
Place pan beneath drain plugs to catch fluids. Dispose of fluids in accordance with local ordinance.

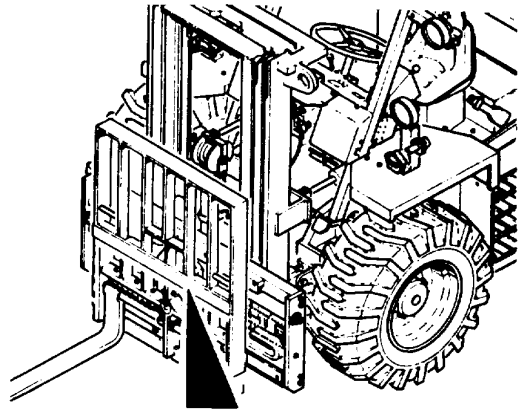
1. DRAIN AND SERVICE AXLE CASE (4).

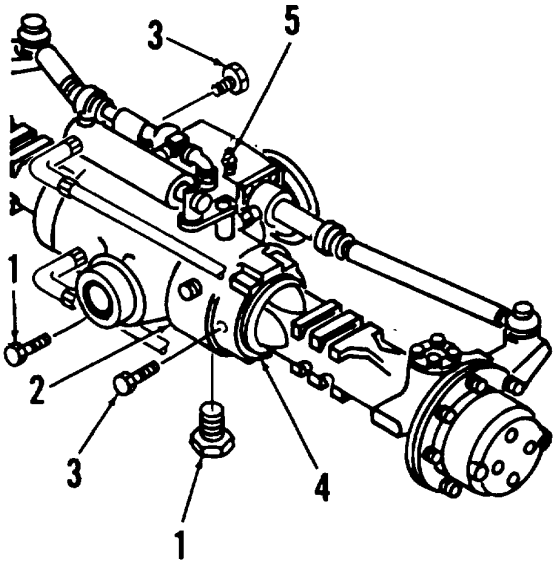
   a. To drain axle case, remove three drain plugs (1). Drain plugs are located on bottom of each intermediate cover (2) and at rear of differential housing (opposite driveshaft). Drain fluid into pan.

   b. Reinstall drain plugs (1).

   c. Remove fill plugs (3) from axle cases (4). Fill axle cases with oil until oil just begins to flow from fill opening.

   d. Reinstall fill plugs (3).





2. BLEED SERVICE BRAKES.

a. Locate bleeder screws (5). Screws are located on top of differential housing, one on each side of housing.

CAUTION

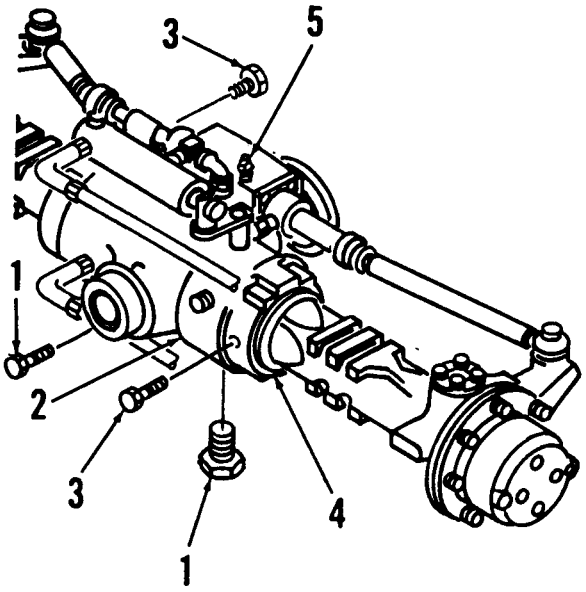
To prevent damage to master cylinder, do not apply more than 30 psi (206 kPa) to pressure bleeder.

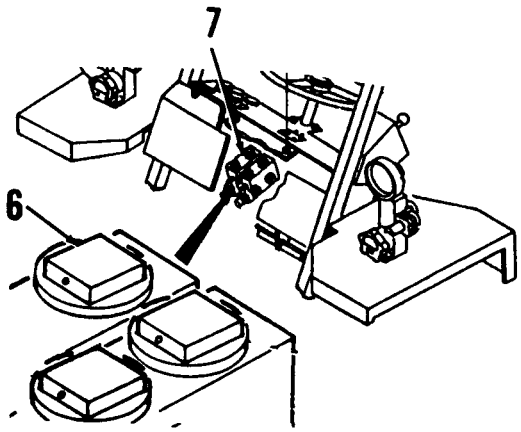
b. Remove filler cap (6) from master cylinder (7) for front brake system. Install pressure bleeder onto master cylinder using appropriate adapter from pressure bleeder set.

c. Using pressure bleeder, apply pressure and open bleeder screws (5) to allow air to escape.

d. Close bleeder screws (5) once system is bled. Disconnect pressure bleeder.

3. CHECK MASTER CYLINDER AND SERVICE AS REQUIRED (PARA. 2-110).





WARNING

Use extreme caution when operating lubricating devices that require compressed air. Improper use could cause personal injury.

4. APPLY GREASE TO PIVOT PIN GREASE FITTINGS (9). FITTINGS ARE LOCATED AT TOP AND BOTTOM OF AXLE CASES.

5. DRAIN AND SERVICE PLANETARY GEAR CARRIERS (10) THROUGH PLUGS (8).

NOTE

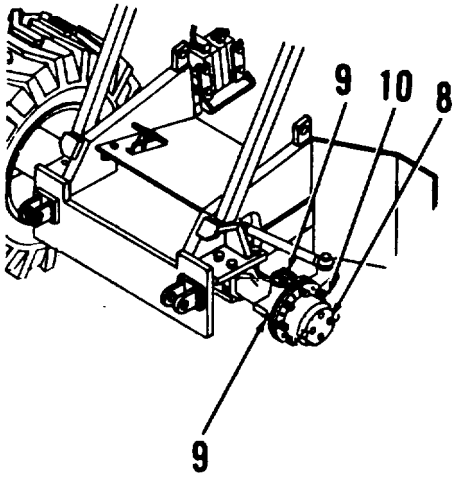
Planetary gear carriers must be positioned by moving the forklift forward or rearward to position the fill/drain plug as required to perform service.

a. Move forklift to position planetary gear carriers (10) so that plugs (8) are at 6 o'clock position (carrier arrow pointing left).

b. Remove plugs (8) and drain oil.

c. Move forklift to position planetary gear carriers (10) so that plugs (6) are at 3 o'clock position (carrier arrow pointing down).

d. Fill planetary gear carriers (10) with oil. Reinstall plugs (8).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

Section XIV. REAR AXLE ASSEMBLY MAINTENANCE

2-103. REAR AXLE ASSEMBLY INSPECTION

This task covers: Inspection

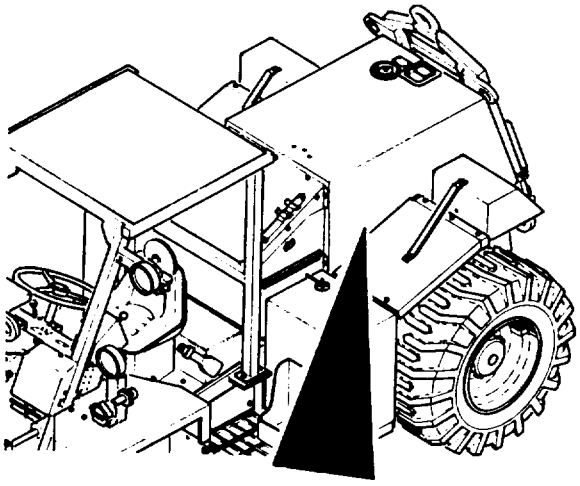
INITIAL SETUP:

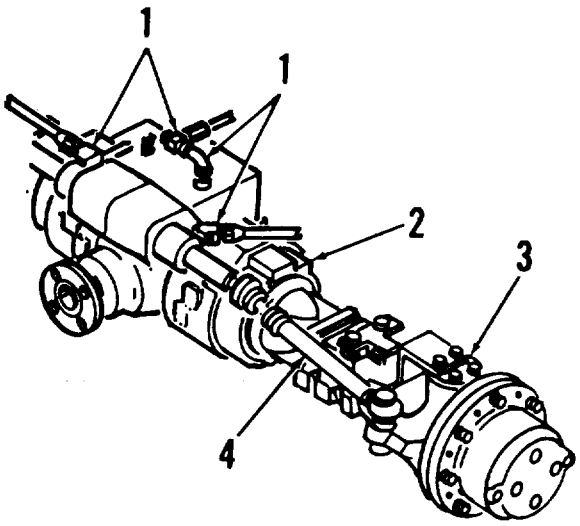
Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

A. INSPECTION

1. Perform overall inspection of rear axle assembly components in accordance with paragraph 1-24.
2. Inspect all hydraulic fittings (1) for evidence of leakage. Tighten hose ends and fittings as required.
3. Inspect for evidence of leakage at axle plugs (2). Tighten plugs as required.
4. Inspect steering case pivot pins (3) for evidence of leakage. Check for signs of excessive wear and evidence of rubbing.
5. Inspect tie rods (4) for obvious damage. Ensure tie rod ends are securely fastened. Tighten as required.





FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-104. REAR AXLE ASSEMBLY SERVICING

This task covers: Servicing

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
Pressure Bleeder

References:

LO 10-3930-664-12

Materials / Parts:

Grease (10, App. C)
Lubricating Oil (16, App. C)
Brake Fluid (5, App. C)

A. SERVICING

NOTE
Place pan beneath drain plugs to catch fluids. Dispose of fluids in accordance with local ordinance.

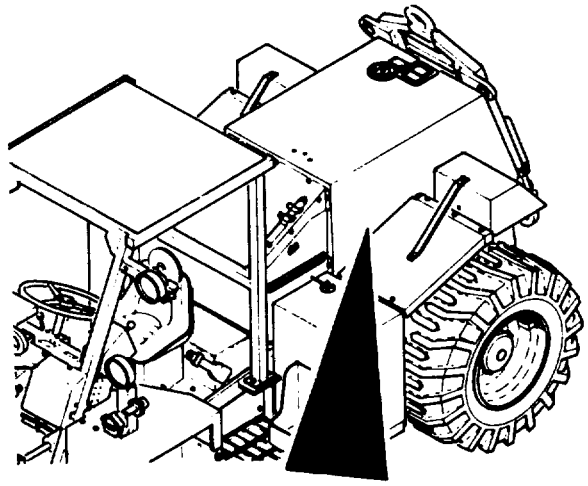
1. DRAIN AND SERVICE AXLE CASE (4).

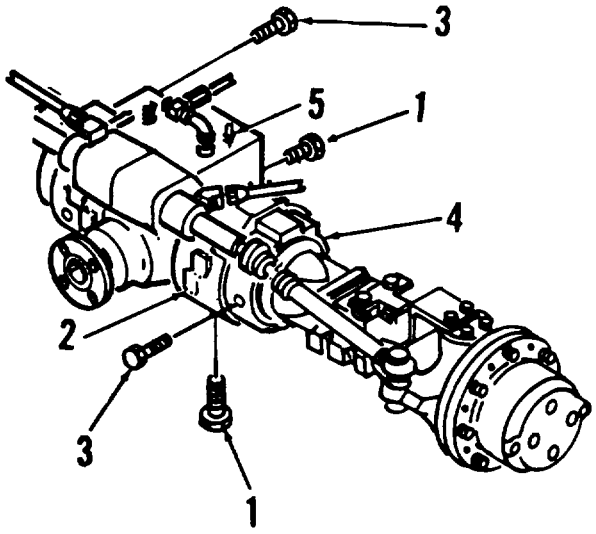
   a. To drain axle case, remove three drain plugs (1). Drain plugs are located on bottom of each intermediate cover (2) and at rear of differential housing (opposite driveshaft). Drain fluid into pan.

   b. Reinstall drain plugs (1).

   c. Remove fill plugs (3) from axle cases (4). Fill axle cases with oil until oil just begins to flow from fill opening.

   d. Reinstall fill plugs (3).





2. BLEED SERVICE BRAKES

a. Locate bleeder screws (5). Screws are located on top of differential housing, one on each side of housing.

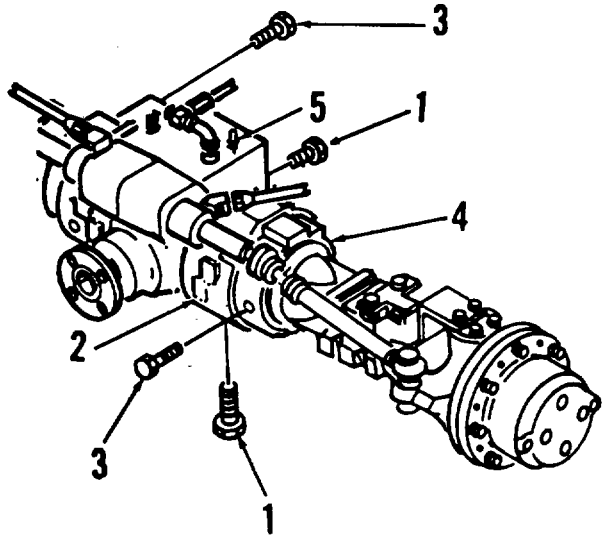
CAUTION

To prevent damage to master cylinder, do not apply more than 30 psi (206 kPa) to pressure bleeder.

b. Remove filler cap (6) from master cylinder (7) for rear brake system. Install pressure bleeder onto master cylinder using appropriate adapter from pressure bleeder set.

c. Using pressure bleeder, apply pressure and open bleeder screws (5) to allow air to escape.

d. Close bleeder screws (5) once system is bled. Disconnect pressure bleeder.



3. CHECK MASTER CYLINDER AND SERVICE AS REQUIRED (PARA. 2-110).

WARNING

Use extreme caution when operating lubricating devices that require compressed air. Improper use could cause personal injury.

4. APPLY GREASE TO PIVOT PIN GREASE FITTINGS (9). FITTINGS ARE LOCATED AT TOP AND BOTTOM OF AXLE CASES.

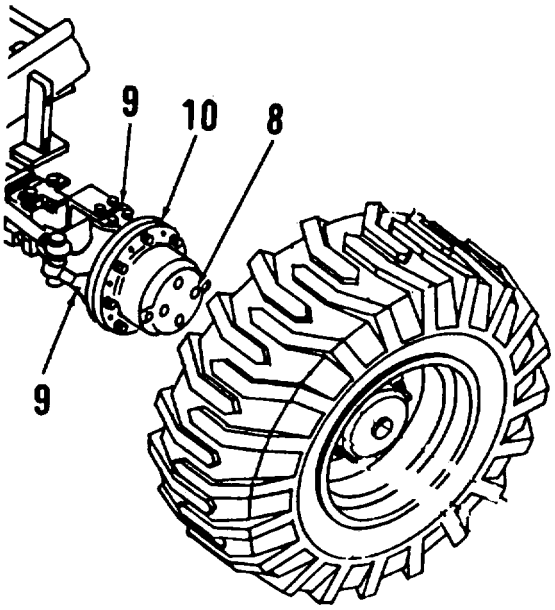
5. DRAIN AND SERVICE PLANETARY GEAR CARRIERS (10) THROUGH PLUGS (8).

   a. Manually rotate planet gear carriers (10) until plugs (8) are at 6 o'clock position (carrier arrow pointing left).

   b. Remove plugs (8) and drain oil.

   c. Manually rotate planet gear carriers (10) until plugs (8) are at 3 o'clock position (carrier arrow pointing down).

   d. Fill planetary gear carriers (10) with oil. Reinstall plugs (8).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

Section XV. BRAKE MAINTENANCE

2-105. PARK BRAKE CYLINDER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

A. REMOVAL

NOTE
Place pan beneath hose assembly to catch residual fluids.

1. Disconnect hose assembly (1) from cylinder fitting (2).
2. Remove park brake cylinder (3) from cylinder mount (4) by removing screw (5).
3. Remove park brake cylinder (3) from axle by lifting from mounting pin (6).
4. Remove mounting pin (6) from park brake lever by removing screw (7) and washer (8).
5. Remove cylinder mount (4) by removing screw (9) and washer (10).

B. CLEANING

Clean park brake cylinder in accordance with paragraph 1-24.

C. INSPECTION

Inspect cylinder and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install cylinder mount (4) using screw (9) and washer (10).
2. Install mounting pin (6) onto park brake lever using screw (7) and washer (8).
3. Position park brake cylinder (3) onto axle and slide onto mounting pin (6).
4. Install park brake cylinder (3) onto cylinder mount (4) using screw (5).
5. Connect hose assembly (1) to fitting (2).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-106. DISC BRAKE ASSEMBLY INSPECTION

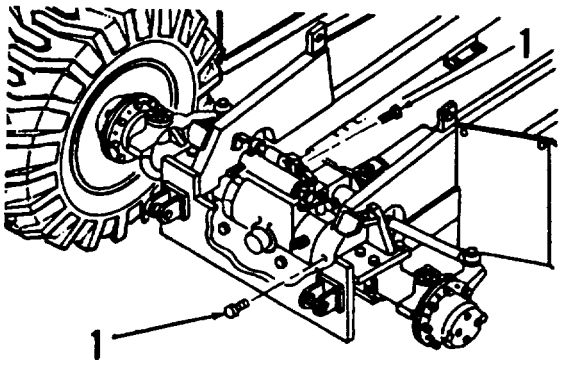
This task covers: Inspection

INITIAL SETUP:

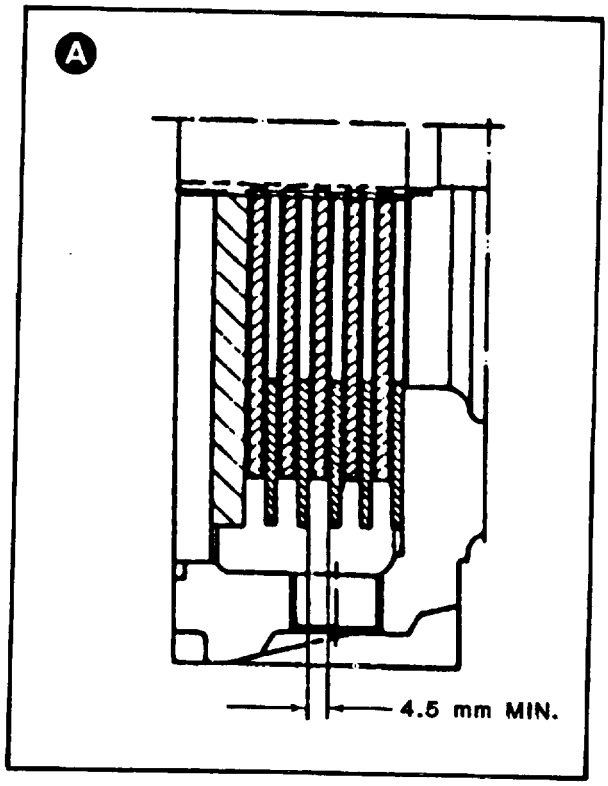
Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

A. INSPECTION



1. Remove filler plugs (1) from axle case.
2. Insert feeler gauge through filler opening in intermediate cover.
3. Measure thickness of brake discs (Detail A). Minimum thickness shall be 0.175 inch (4.5 mm).
4. Replace brake discs if thickness is less than minimum requirement (para. 4-36).
5. Reinstall plugs (1).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-107. DISC BRAKE ASSEMBLY ADJUSTMENT

This task covers: Adjustment

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

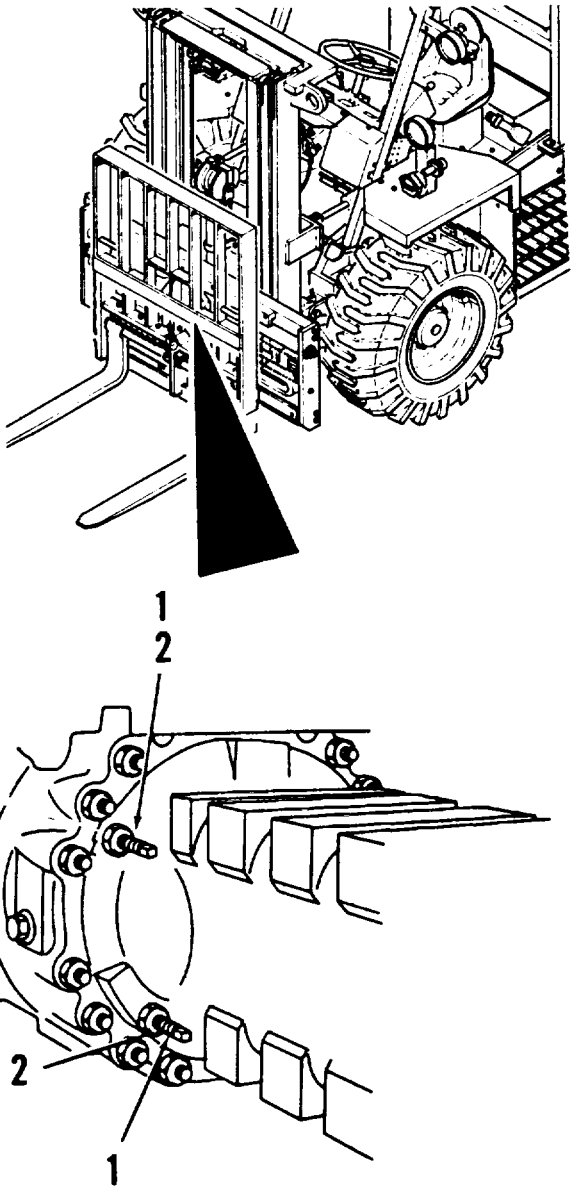
A. ADJUSTMENT

1. Locate three adjusting bolts (1) on axle case. These bolts are used to adjust brake disc gap.
2. Loosen locknut (2) on all three bolts (1).
3. Turn bolts (I) counterclockwise until tight. Back off bolts one full turn. Tighten locknuts (2).
4. This adjustment will result in a gap of 0.04 inch (1.0 mm) between brake discs.

FOLLOW-ON MAINTENANCE:

None

END OF TASK



2-108. BRAKE PEDAL ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

A. REMOVAL

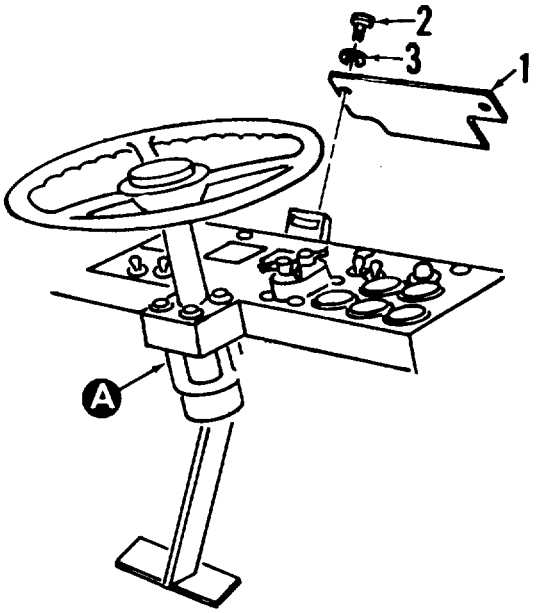
1. Remove master cylinder cover (1) from ROPS frame by removing screws (2) and washers (3).

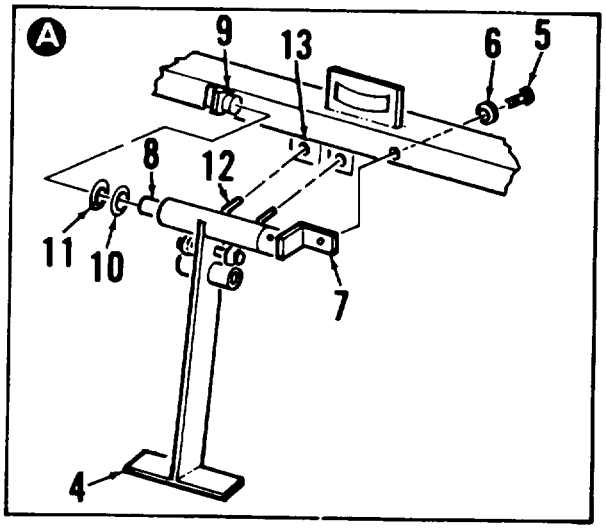
CAUTION
Hold brake pedal weldment in place while removing attaching parts. Brake is heavy and brake rods or master cylinders could be damaged.

2. While holding brake pedal weldment (4) in place, remove screw (5) and washer (6).

3. Pull out seat pivot (7) to release pivot (8) from welded seat pivot (9). Ensure thrust washers (10, 11) remain with pivot.

4. Carefully pull out on brake pedal weldment (4) until brake rods (12) are completely disengaged from master cylinders (13).





B. CLEANING

Clean brake pedal assembly in accordance with paragraph 1-24.

C. INSPECTION

Inspect brake pedal assembly and related components in accordance with paragraph 1-24.

D. INSTALLATION

CAUTION

Hold brake pedal weldment in place while installing to prevent damage to components. Use care when installing brake rods into master cylinders.

1. Lift brake pedal weldment (4) and carefully insert brake rods (12) into master cylinders (13).
2. Position brake pedal weldment (4) against ROPS frame, aligning top of weldment with seat pivot (9).
3. Ensure thrust washers (10, 11) are installed on pivot (8). Push in seat pivot (7) to insert pivot into welded seat pivot (9).
4. While holding brake pedal weldment (4) in place, install screw (5) and washer (6).
5. master cylinder cover (1) onto ROPS frame using screws (2) and washers (3).

FOLLOW-ON MAINTENANCE:

Adjust brake pedal assembly (para. 2-109)

END OF TASK

2-109. BRAKE PEDAL ASSEMBLY ADJUSTMENT

This task covers: Adjustment

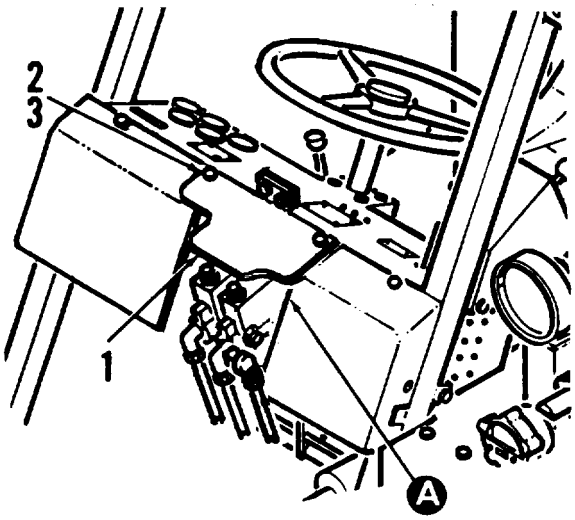
INITIAL SETUP:

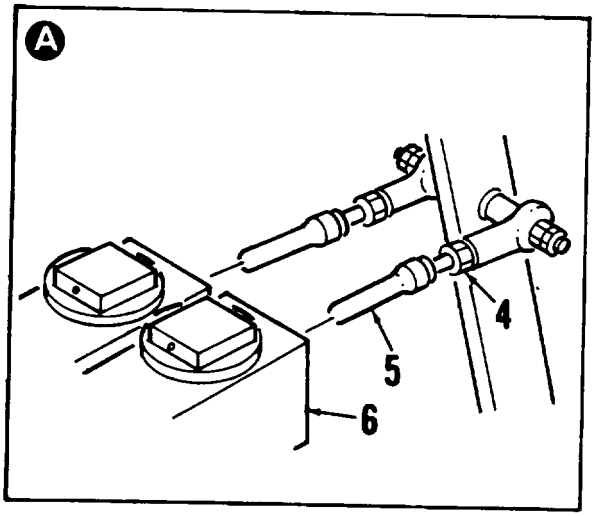
Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

A. ADJUSTMENT

1. Remove master cylinder cover (1) from ROPS frame by removing screws (2) and washers (3).
2. Back off nuts (4) to allow rod adjustment.
3. Screw rods (5) into master cylinders (6) until rods bottom on cylinders.
4. Back off rods (5) between 1/16 and 1/8 inch. Tighten nuts (4).
5. Ensure that adjustment of rods is equal and that pivot is level.
6. Install master cylinder cover (I) onto ROPS frame using screws (2) and washers (3).





FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-110. MASTER CYLINDER SERVICING

This task covers: Servicing

INITIAL SETUP:

Tools and Test Equipment

General Mechanics Tool Kit (1, App. E)

Materials / Parts:

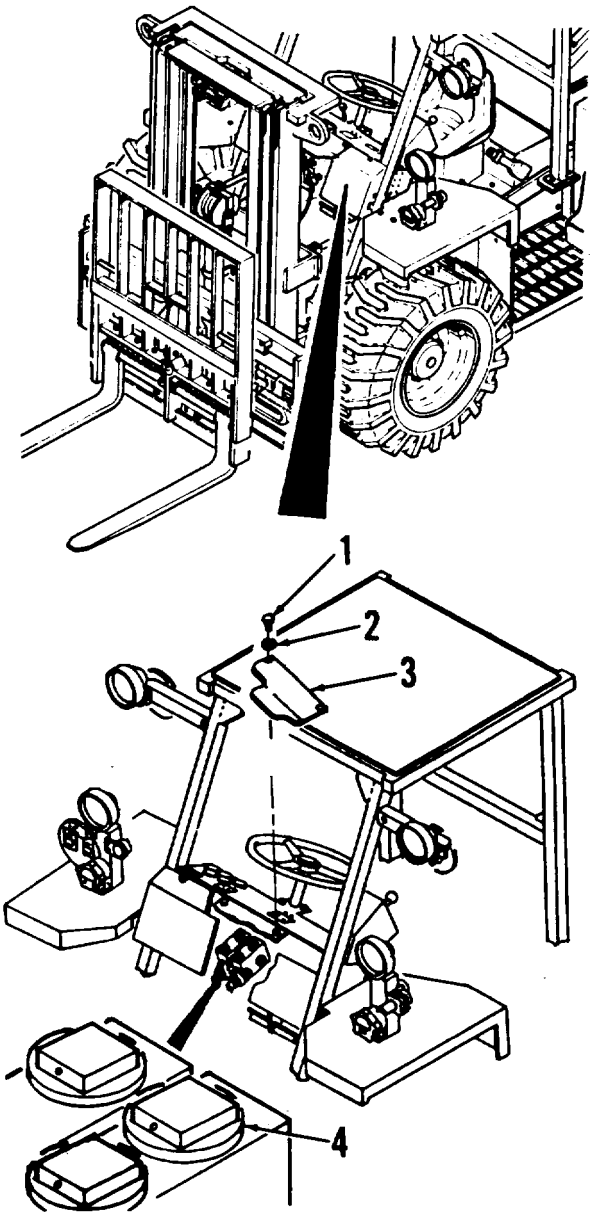
Brake Fluid (5, App. C)

A. SERVICING

NOTE

Procedures for forklift models MHE-270 and MHE-271 differ slightly. Perform only those steps which apply to your model.

1. MHE-270 ONLY: Remove master cylinder cover (3) by removing screws (1) and washer! (2).
2. MHE-271 ONLY: Remove master cylinder access cover from front cover by removing screws.
3. Remove fill plugs (4) from rear master cylinder ports. Inspect plug gaskets for damage and replace if required.
4. Fill master cylinders with brake fluid. Install plugs (4).
5. MHE-270 ONLY: Install master cylinder cover (3) using screws (1) and washers (2).
6. MHE-271 ONLY: Install master cylinder access cover onto front cover using screws.



FOLLOW-ON MAINTENANCE:

Bleed front axle assembly (para. 2-102)
Bleed rear axle assembly (para. 2-104)

END OF TASK

2-111. MASTER CYLINDER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (i, App. E)
Drain Pan (10, App. E)

Materials / Parts:

Brake Fluid (5, App. C)

A. REMOVAL

NOTE

Procedures for forklift models MHE-270 and MHE-271 differ slightly. Perform only those steps which apply to your model.

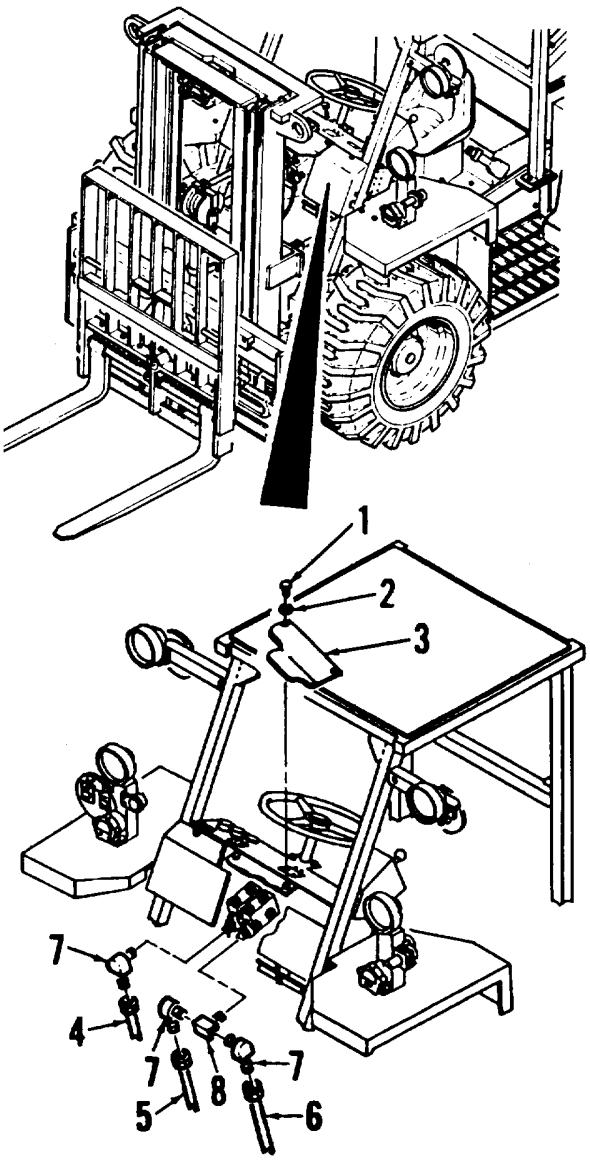
1. MHE-270 ONLY: Remove master cylinder cover (3) by removing screws (1) and washers (2).

2. MHE-271 ONLY: Remove master cylinder access cover from front cover by removing screws.

NOTE

Place drain pan beneath tube assemblies when disconnecting to catch residual fluids.

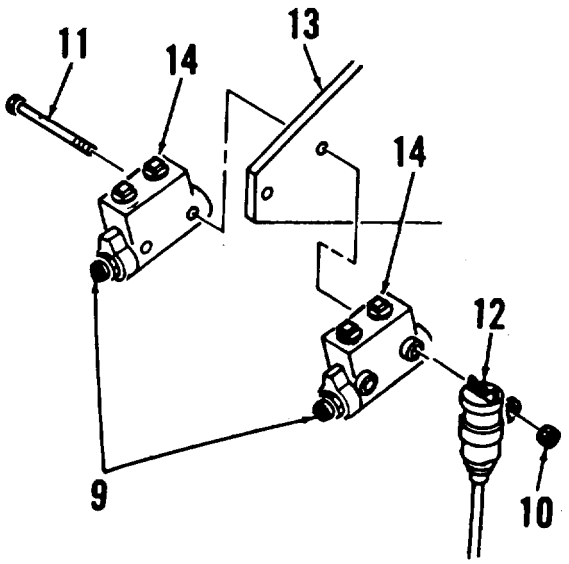
3. Tag and disconnect tube assemblies (4, 5, 6) from elbows (7). Remove elbows and tee (8) from master cylinders.



4. Remove rear nut (10) from screw (11) to release throttle control reservoir (12).

5. Remove remaining nut (10) and two screws (11) to release master cylinders (9) from bracket (13).

6. Carefully remove master cylinders from brake assembly rods by separating boots from master cylinders.



B. CLEANING

Clean master cylinders in accordance with paragraph 1-24

C. INSPECTION

Inspect cylinders and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Carefully install master cylinders onto brake assembly rods.

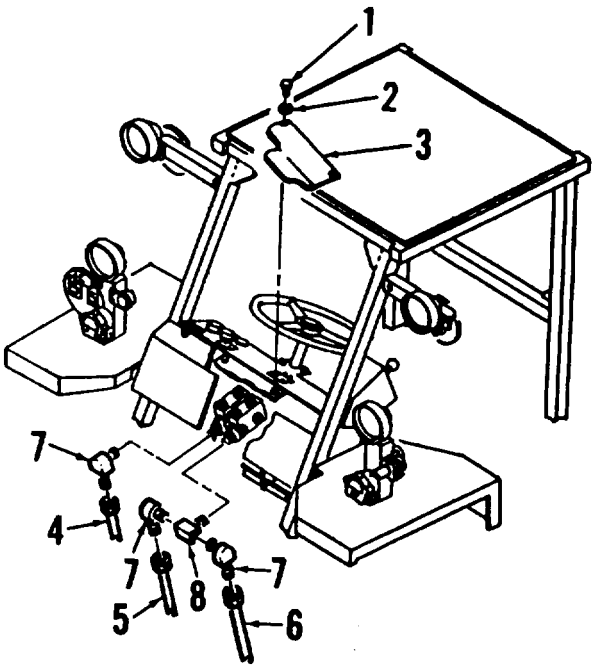
2. Mate master cylinders (9) to bracket (13). Install two screws (11) and front nut (10).

3. Position throttle control reservoir (12) onto rear screw (11) and secure using nut (10). Tighten both nuts.

4. Install tee (8) and elbows (7) onto master cylinders. Connect tube assemblies (4, 5, 6).

5. Remove fill plugs (14) from rear master cylinder ports. Inspect plug gaskets for damage and replace if required.

6. Fill master cylinders with brake fluid. Install plugs (14).



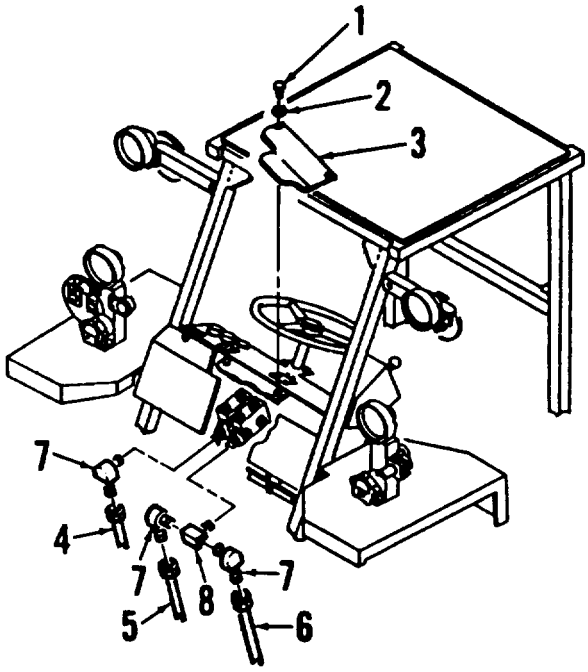
7. MHE-270 ONLY: Install master cylinder cover (3) using screws (1) and washers (2).

8. MHE-271 ONLY: Install master cylinder access cover onto front cover using screws.

FOLLOW-ON MAINTENANCE:

Bleed front axle assembly (para. 2-102)
Bleed rear axle assembly (para. 2-104)

END OF TASK



2-112. HYDRAULIC BRAKE HOSE, LINE, AND FITTING REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

Equipment Condition:

Towbar lowered (para. 2-126)

Materials/Parts:

Loctite 242 (20, App. C)
O-Ring, Item 12 (2 ea.)
O-Ring, Item 18 (1 ea.)
O-Ring, Item 21 (1 ea.)
O-Ring, Item 37 (2 ea.)
O-Ring, Item 42 (1 ea.)

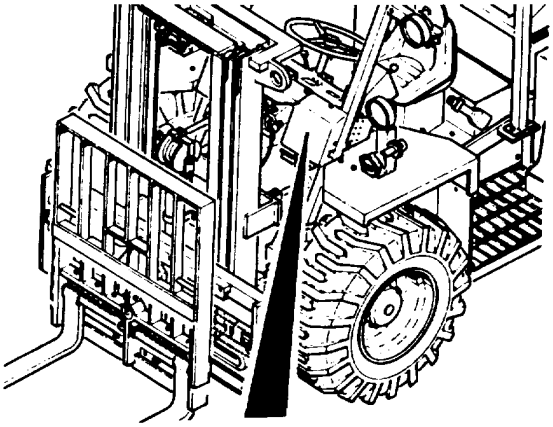
A. REMOVAL

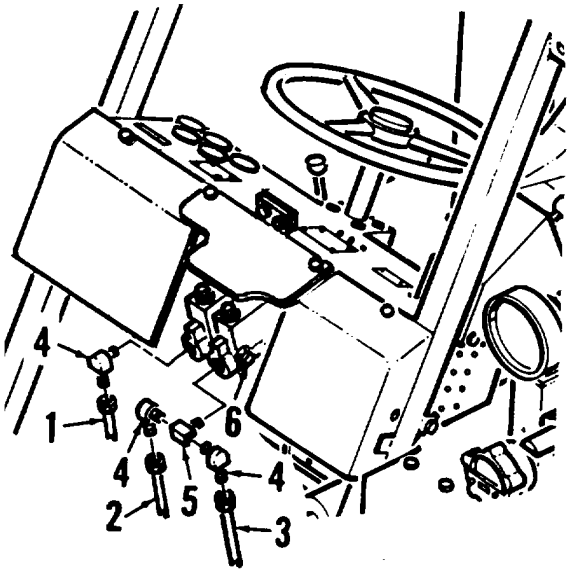
NOTE

Place drain pan beneath hoses when disconnecting. Drain hoses into pan.

1. MHE-271 ONLY: Remove master cylinder access cover from front cover by removing screws. Access cover must be removed to disconnect tube assemblies from master cylinders.

2. Tag and disconnect tube assemblies (1, 2, 3) from elbows (4). Remove elbows and tee (5) from master cylinders (6).





3. Tag and disconnect tube assembly (1) from front axle tee (7).

4. Tag and disconnect tube assembly (2) from front axle tee (8).

5. Remove tee (8), tubes (9), and fittings (10, 11) from front axle (15).Remove and discard O-rings (12).

6. Tag and disconnect vent hose assembly (13) from fitting (14). Remove fitting from front axle (15).

7. Remove vent (16) and fitting (17) from vent hose assembly (13). Remove and discard O-ring (18).

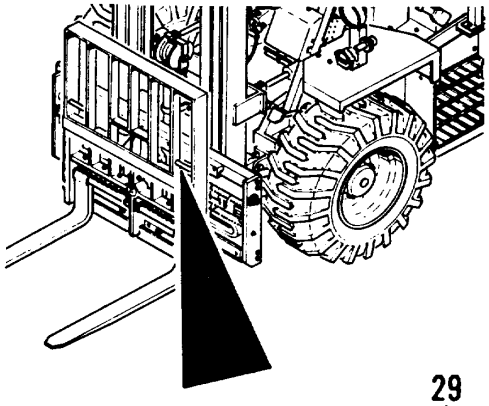
8. Tag and disconnect parking brake hose assembly (19) from fitting (20). Remove fitting from parking brake cylinder. Remove and discard O-ring (21).

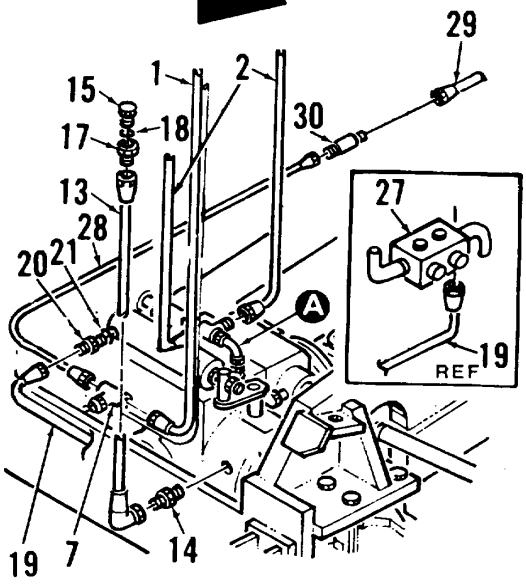
9. Release hood assembly (22) by lifting handle (23). Open hood assembly.

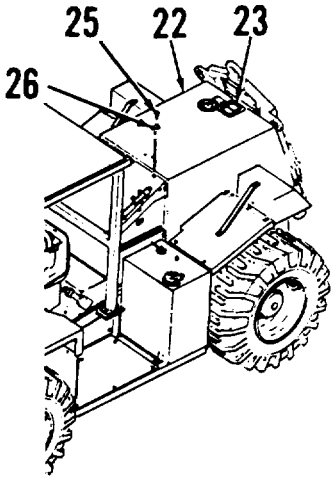
10. Remove top transmission cover (24) by removing nine screws (25) and washers (26).

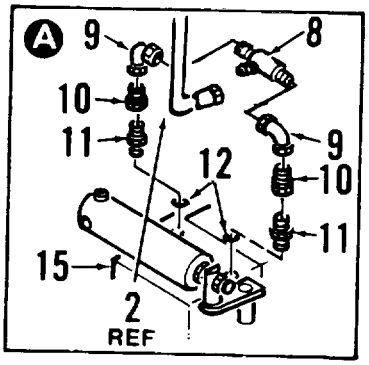
11. Tag and disconnect parking brake hose assembly(19) from rear fitting on differential lock solenoid valve (27). Solenoid valve is located on left side of transmission.

12. Tag and disconnect tube assembly (28) from tee (7). Disconnect tube assemblies (28, 29) from fitting (30).









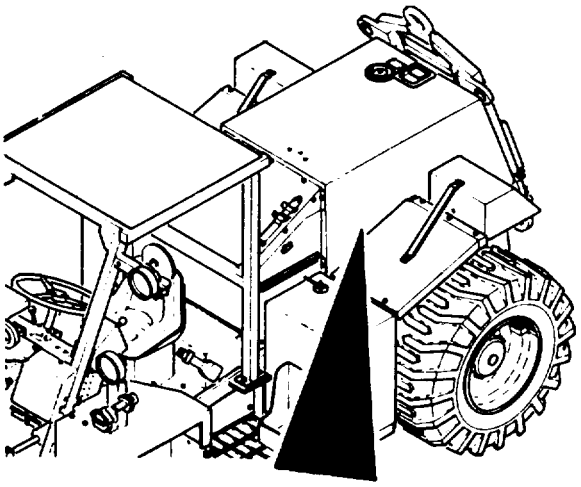
13. Disconnect tube assembly (29) and hose assembly (31) from fitting (32).

14. Tag and disconnect hose assembly (31) from rear axle tee (33).

15. Remove tee (33), tubes (34), and fittings (35, 36) from rear axle. Remove and discard O-rings (37).

16. Tag and disconnect vent hose assembly (38) from fitting (39). Remove fitting from rear axle.

17. Remove vent (40) and fitting (41) from vent hose assembly (38). Remove and discard O-ring (42).



B. CLEANING

Clean hoses, lines, and fittings in accordance with paragraph 1-24.

C. INSPECTION

Inspect hoses, lines, fittings, and related components in accordance with paragraph 1-24.

D. INSTALLATION

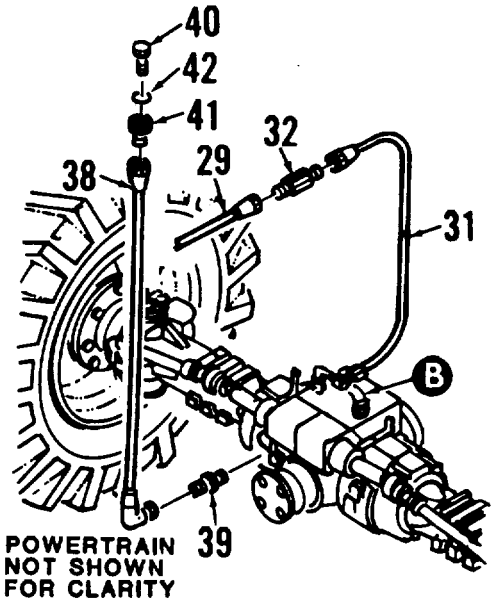
1. Install vent (40), fitting (41), and new O-ring (42) into vent hose assembly (38).

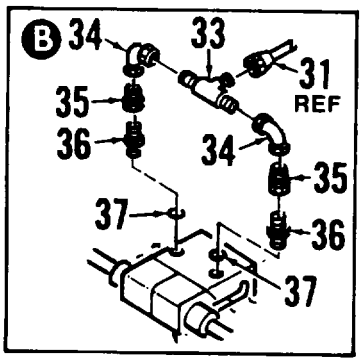
2. Install fitting (39) into rear axle. Connect vent hose assembly (38) to fitting.

3. Install tee (33), tubes (34), fittings (35, 36), and new O-rings (37) into rear axle.

4. Connect hose assembly (31) to rear axle tee (33).

5. Connect tube assembly (29) and hose assembly (31) to fitting (32).





6. Connect tube assembly (28) to tee (7). Connect tube assemblies (28, 29) to fitting (30).

7. Connect parking brake hose assembly (19) to rear fitting on differential lock solenoid valve (27).

8. Apply loctite to nine transmission cover screws (25). Install top transmission cover (24) using screws and washers (26).

9. Close hood assembly (22). Ensure handle (23) is fully engaged.

10. Install fitting (20) and new O-ring (21) into parking brake cylinder. Connect parking brake hose assembly (19) to fitting.

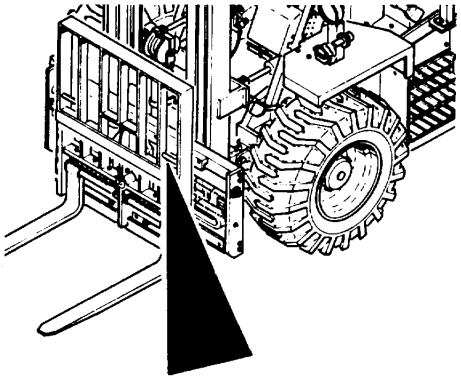
11. Install vent (16), fitting (17), and new O-ring (18) into vent hose assembly (13).

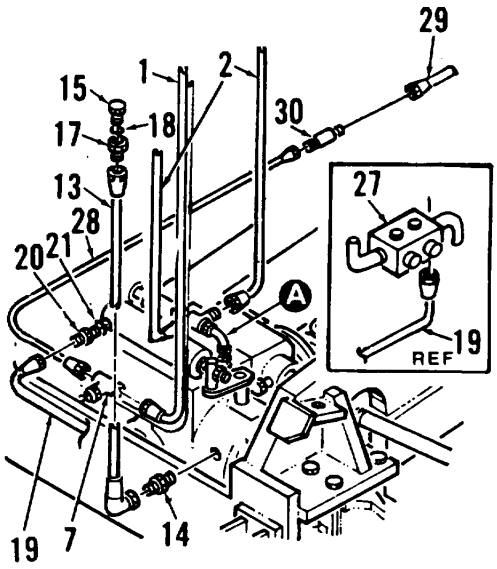
12. Install fitting (14) into front axle (15). Connect vent hose assembly (13) to fitting.

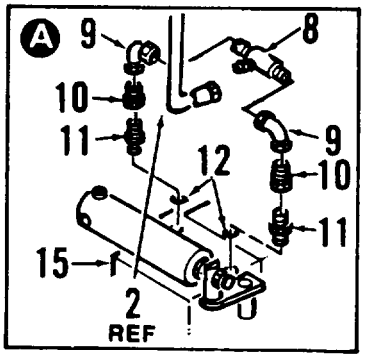
13. Install tee (8), tubes (9), fittings (10, 11), and new O-rings (12) into front axle (15).

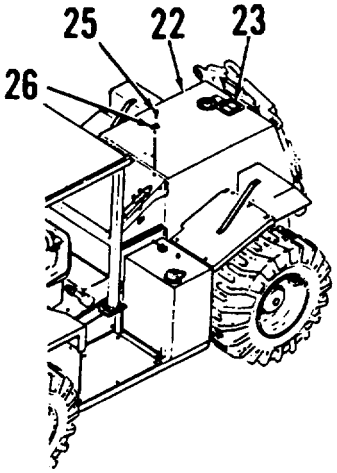
14. Connect tube assembly (2) to front axle tee (8).

15. Connect tube assembly (1) to front axle tee (7).







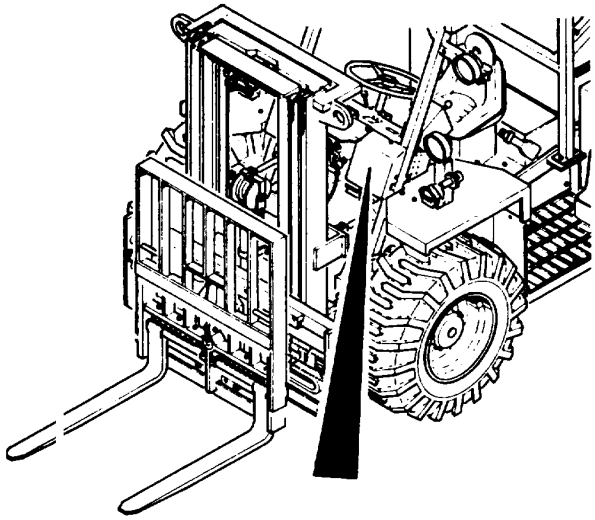


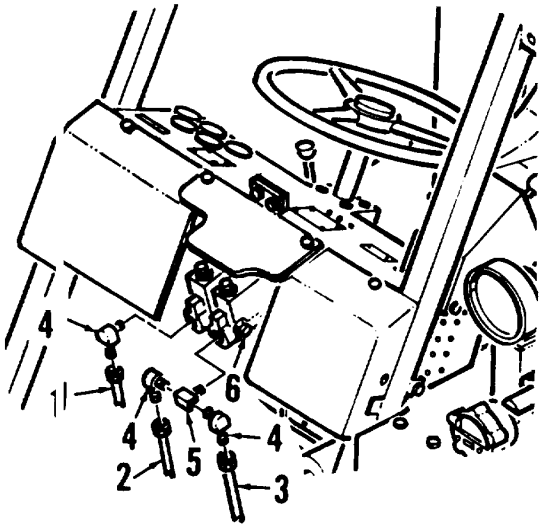
16. Install tee (5) and elbows (4) into master cylinders (6). Connect tube assemblies (1, 2, 3) to elbows.

FOLLOW-ON MAINTENANCE:

Service master cylinders (para. 2-110)
Bleed front axle brakes (para. 2-102)
Bleed rear axle brakes (para. 2-104)
Raise towbar and lock in position (para. 2-126)

END OF TASK





Section XVI. WHEEL MAINTENANCE

2-113. WHEEL ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Hydraulic Jack (7, App. E)
Jack Stands (8, App. E) (4 ea.)
Socket Wrench Set, 3/4" Drive (55, App. E)

A. REMOVAL

WARNING

Rear axle oscillates relative to the frame. When jacking the front of the unit, stabilize the frame with jack stands before jacking. Failure to stabilize the frame may result in personnel injury or damage to equipment.

1. Before jacking unit to remove front wheels, place jack stands under each side of frame just in front of rear axle. Adjust jack stands as necessary during jacking.

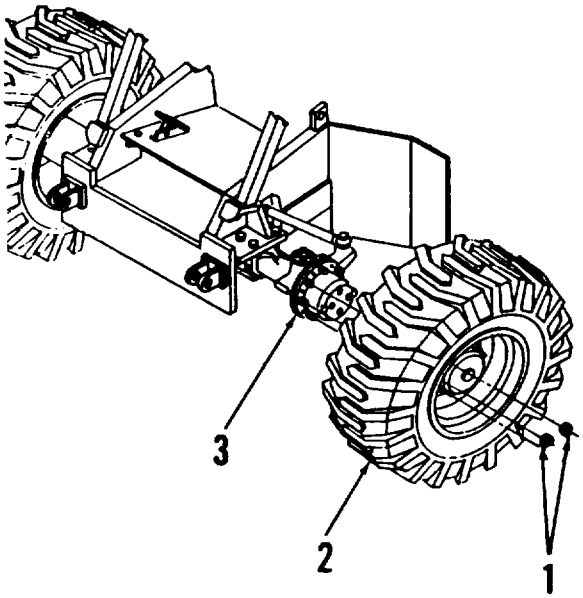
WARNING

Wheels are heavy and awkward. Enlist the help of an assistant when removing wheels to prevent injury to personnel and damage to components.

2. Loosen but do not remove lug nuts (1).

3. Using hydraulic jack, raise unit and install two jack stands. Remove wheels (2) by removing lug nuts.

4. Repeat steps 2 and 3 to remove wheels from rear axle.



B. CLEANING

Clean wheels and planet gear carrier (3) in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect wheel assemblies and related components in accordance with paragraph 1-24.

2. Inspect tires for air leaks and evidence of excessive or uneven wear.

D. INSTALLATION

1. Install wheels (2) onto planet gear carriers (3). Install lug nuts (1) and tighten.

2. Raise unit and remove jack stands. Lower unit. Torque lug nuts (1) in a criss-cross pattern to 300 ft-lb. (406 N•m).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-114. WHEEL ASSEMBLY REPAIR

This task covers: Disassembly, Cleaning, Inspection, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Air Compressor Unit (16, App. E)(para. 2-113)
Tire Pressure Gauge (22, App. E)

Equipment Condition:

Wheel assembly removed

Materials / Parts:

O-ring, Item 7 (1 ea.)
Gasket, Item 8 (1 ea.)

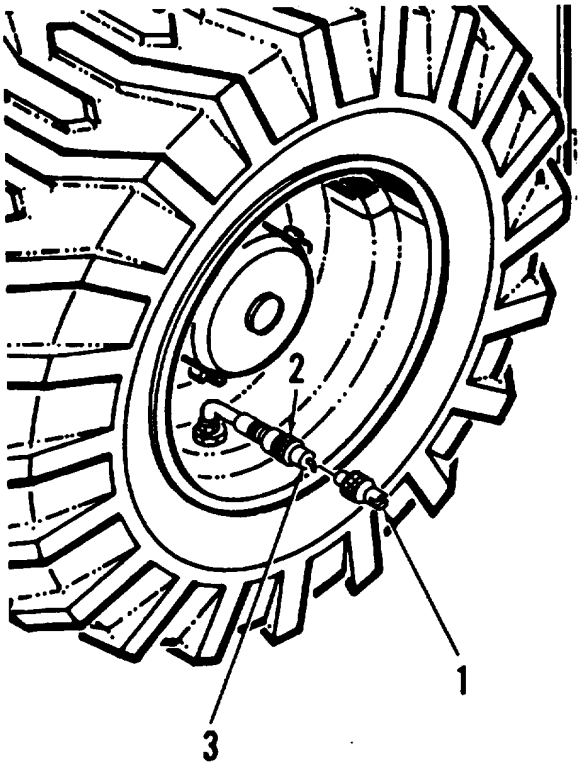
A. DISASSEMBLY

1. DEFLATE TIRE.

   a. Remove valve stem cap (1) from adapter (2).

   b. Depress deflector pin (3) to deflate tire.

2. REMOVE TIRE FROM WHEEL RIM.

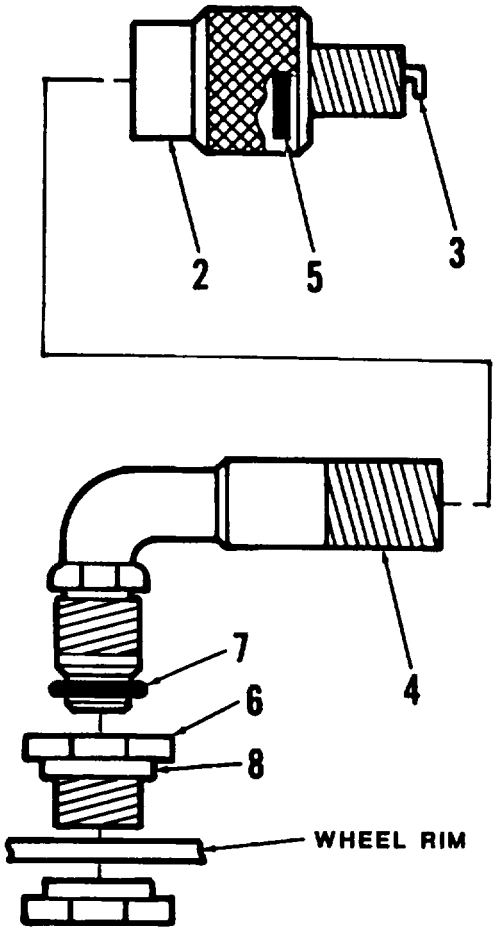


3. REMOVE VALVE STEM (4) AND SPUD (8) FROM WHEEL RIM. DISCARD O-RING (7) AND GASKET (8).

   a. Remove adapter (2) from valve stem (4). Use care not to damage deflector pin (3) or sealing washer (5).

   b. Remove valve stem (4) from spud (6). Remove and discard O-ring (7).

   c. Unscrew parts of spud (6) to remove from wheel rim. Remove and discard gasket (8).



B. CLEANING

Clean wheel assembly components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect valve stem components in accordance with paragraph 1-24.

2. Inspect sealing washer (5) for damage. Replace if torn or compressed.

3. Inspect tires for air leaks and evidence of excessive or uneven wear.

D. ASSEMBLY

1. INSTALL VALVE STEM (4) AND SPUD (8) ONTO WHEEL RIM USING NEW O-RING (7) AND GASKET (8).

   a. Mate new gasket (8) to spud (6). Install parts of spud onto wheel rim and tighten.

   b. Install new O-ring (7) onto valve stem (4). Install valve stem into spud (6).

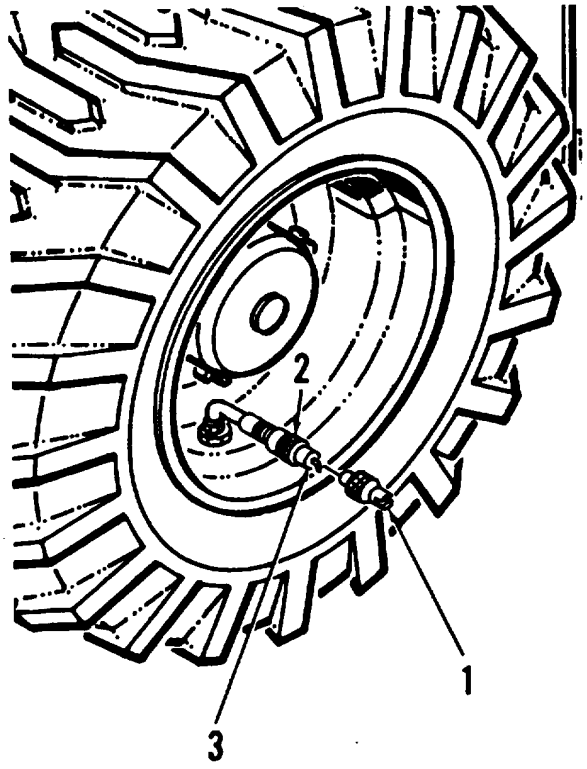
   c. Install adapter (2) onto valve stem (4), using care not to damage deflector pin (3) or sealing washer (5).

2. INSTALL TIRE ONTO WHEEL RIM.

WARNING

Use caution when inflating tires. Make sure tire is in a tire cage and properly seated on rim before inflating. An improperly seated tire can burst with explosive force. Failure to comply can cause death or serious injury.

3. INFLATE TIRE TO 45 PSI. INSTALL VALVE STEM CAP (1) INTO ADAPTER (2).



FOLLOW-ON MAINTENANCE:

Install wheel assembly (para. 2-113)

END OF TASK

2-115. TIRE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

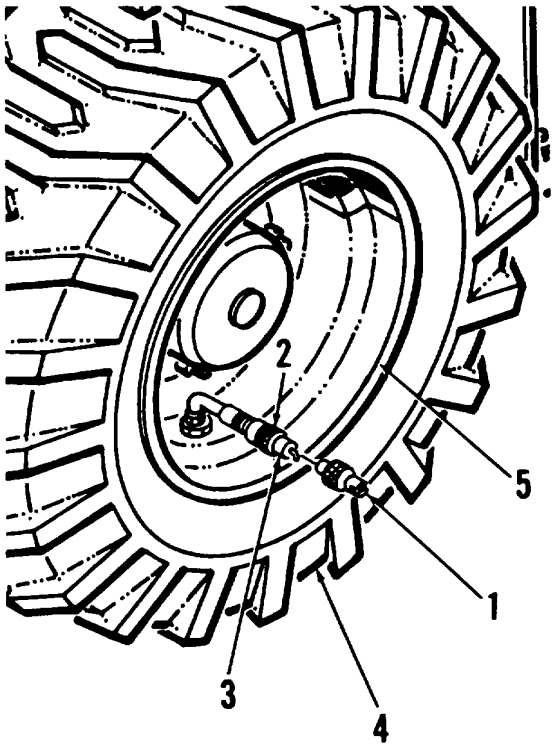
General Mechanics Tool Kit (1, App. E)
Air Compressor Unit (16, App. E)
Tire Pressure Gauge (22, App. E)

Equipment Condition:

Wheel assembly removed (para. 2-113)

A. REMOVAL

1. Remove valve stem cap (1) from adapter (2).
2. Depress deflector pin (3) to deflate tire.
3. Remove tire (4) from wheel rim (5).



B. CLEANING

Clean tire and related components in accordance with paragraph 1-24.

C. INSPECTION

Inspect tire for air leaks and evidence of excessive or uneven wear.

D. INSTALLATION

1. Install tire (4) onto wheel rim (5).

WARNING

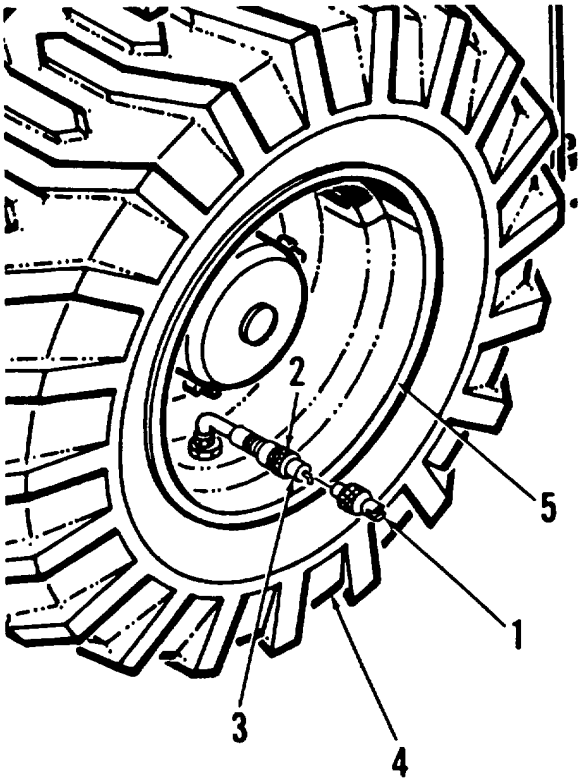
Use caution when inflating tires. Make sure tire is in a tire cage and properly seated on rim before inflating. An improperly seated tire can burst with explosive force. Failure to comply can cause death or serious injury.

2. Inflate tire to 45 psi. Install valve stem cap (1) into adapter (2).

FOLLOW-ON MAINTENANCE:

Install wheel assembly (para. 2-113)

END OF TASK



2-116. TIRE REPAIR

This task covers: Repair

INITIAL SETUP:

Tools and Test Equipment:

Tire Repair Kit, Pneumatic (43, App. E)

Equipment Condition:

Tire removed (para. 2-115)

References:

TM 9-2610-200-14

A. REPAIR

Tire repair is limited to minor patching and hole filling. Repair in accordance with TM 9-2610-200-14. Replace tire if severely damaged or if repair will adversely effect forklift performance.

FOLLOW-ON MAINTENANCE:

Install tire (para. 2-115)

END OF TASK

Section XVII. STEERING COMPONENT MAINTENANCE

2-117. STEERING WHEEL REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

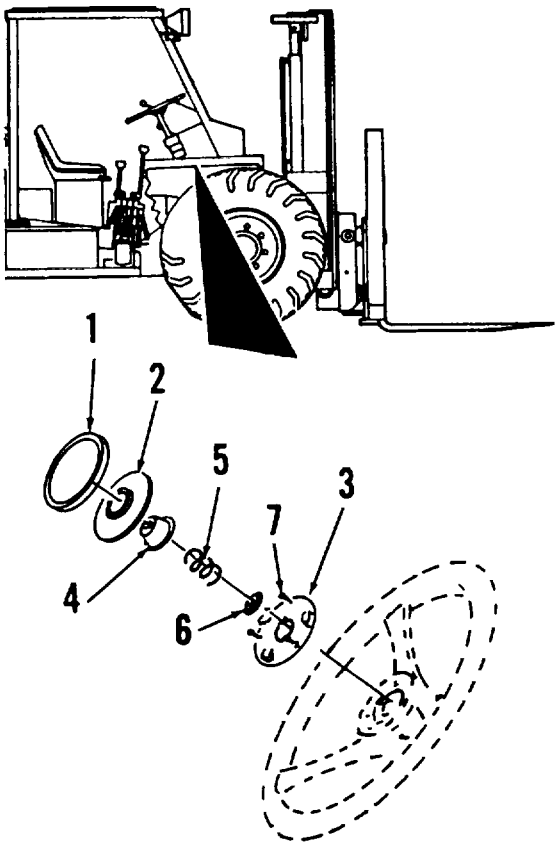
INITIAL SETUP:

Tools and Test Equipment:

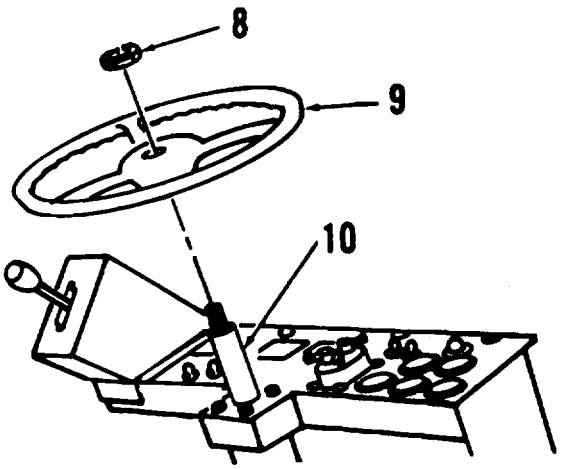
General Mechanics Tool Kit (1, App. E)
Steering Wheel Puller (44, App. E)
Torque Wrench (32, App. E)

A. REMOVAL

1. Remove weather cover (1) from horn button (2). Weather cover is secured to opening in center of horn button.
2. Remove horn button (2) from mount plate (3). Press down on horn button and twist to free button from mount plate.
3. Remove contact cup (4), spring (5), and contact (6).
4. Remove mount plate (3) from steering wheel by removing screws (7).



5. Remove nut (8). Carefully remove steering wheel (9) from steering column (10).



B. CLEANING

Clean steering wheel in accordance with paragraph 1-24.

C. INSPECTION

Inspect steering wheel and related components in accordance with paragraph 1-24.

D. INSTALLATION

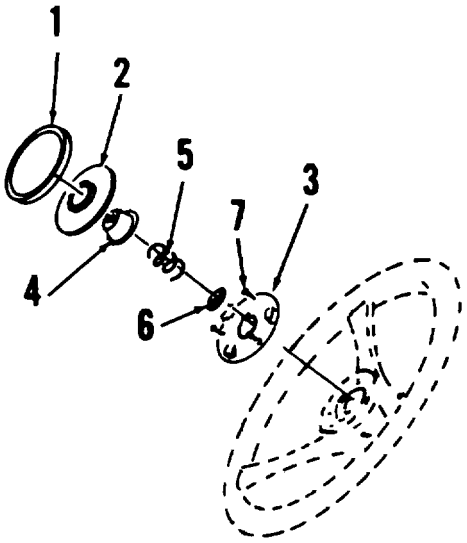
1. Carefully install steering wheel (9) onto steering column (10), ensuring proper alignment. Secure using nut (8).

2. Torque nut (8) to 25 ft-lb. (34 N•m).

3. Attach mount plate (3) to steering wheel using screws (7).

4. Position contact (6), spring (5), and contact cup (4) on mount plate (3). Install horn button (2) on mount plate. Press down on horn button and twist to secure the installation.

5. Install weather cover (1) on horn button (2) by pressing cover into opening on horn button.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-118. STEERING COLUMN REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

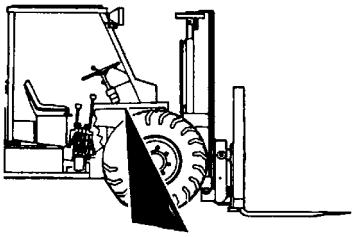
Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Steering Wheel Puller (44, App. E)
Torque Wrench (32, App. E)

Equipment Condition:
Batteries disconnected (para. 2-78)
Steering wheel removed (para. 2-117)

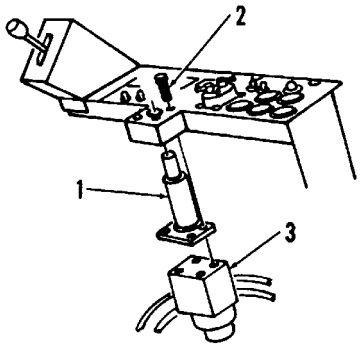
A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.



1. Tag and disconnect horn wire on steering column (1) from dash wiring harness.
2. Remove screws (2) to remove steering column (1) and orbital steering valve (3) from instrument panel.



B. CLEANING

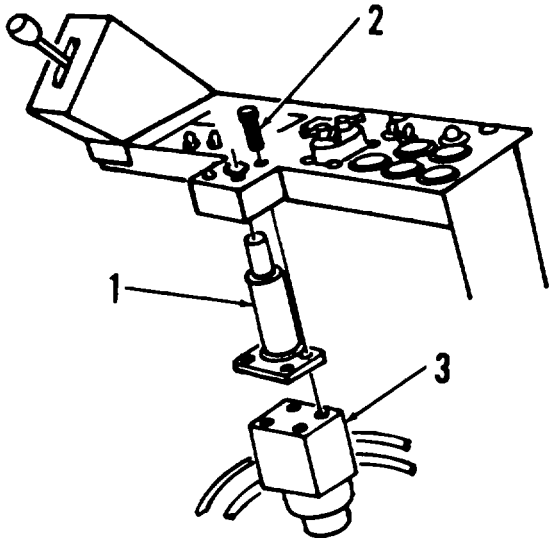
Clean steering column in accordance with paragraph 1-24.

C. INSPECTION

Inspect steering column and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Mate steering column (1) to orbital steering valve (3). Install column and valve onto instrument panel using screws (2).
2. Connect dash electrical wiring harness to horn wire on steering column (1).



FOLLOW-ON MAINTENANCE:
Install steering wheel (para. 2-117)
Connect battery cables (para. 2-78)

END OF TASK

2-119. STEERING SYSTEM HOSE, LINE, AND FITTING REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

Tools and Test Equipment:
General Medhanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

References:
LO 10-3930-664-12

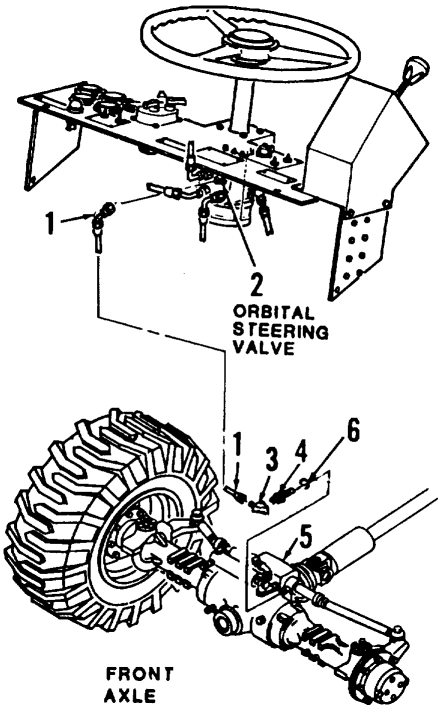
Materials / Parts:
O-Ring, Item 6 (1 ea.)
O-Ring, Item 10 (1 ea.)
O-Ring, Item 20 (1 ea.)
O-Ring, Item 23 (1 ea.)
O-Ring, Item 33 (1 ea.)
O-Ring, Item 34 (I ea.)
O-Ring, Item 38 (1 ea.)
O-Ring, Item 39 (1 ea.)

A. REMOVAL

NOTE

Place drain pan beneath hoses when disconnecting. Drain hoses into pan.

1. Tag and disconnect hose assembly (1) from orbital steering valve (2).
2. Disconnect hose assembly (1) from elbow (3).
3. Remove elbow (3) and fitting (4) from front axle steering cylinder (5). Remove and discard O-ring (6).



4. Tag and disconnect hose assembly (7) from steering selector valve (8).

5. Disconnect hose assembly (7) from elbow (9).

6. Remove elbow (9) from front axle steering cylinder (5). Remove and discard O-ring (10).

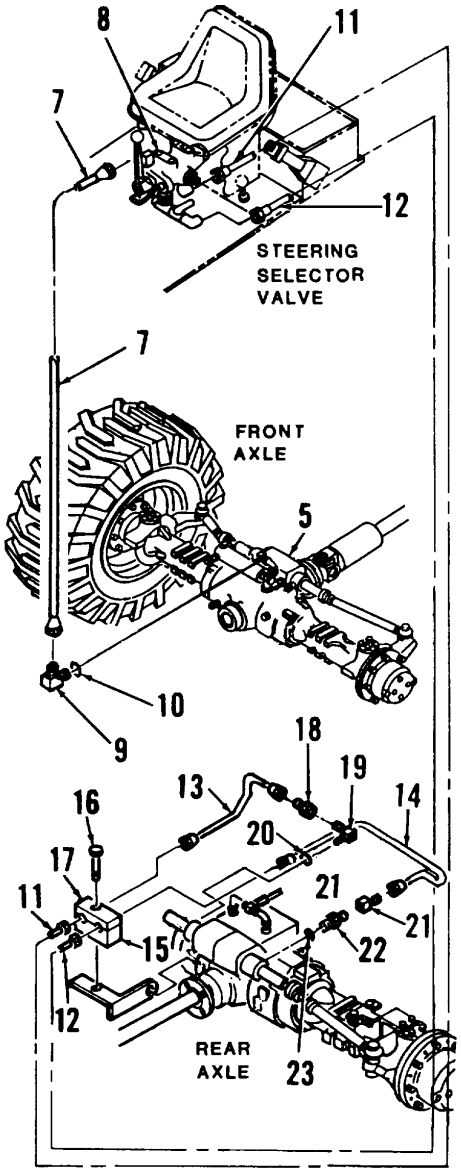
7. Tag and disconnect hose assemblies (11, 12) from steering selector valve (8).

8. Tag and disconnect hose assemblies (11, 12) from tube assemblies (13, 14).

9. Release tube assemblies (13, 14) from tube clamp (15) by removing screw (16) and washer (17). Separate top half of tube clamp from bottom half.

10. Tag and disconnect tube assembly (13) from reducer (18). Tag and disconnect tube assembly (14) from reducer (21).

11. Remove reducer (18), elbow (19), reducer (21), and fitting (22) from rear axle steering cylinder. Remove and discard O-rings (20, 23).

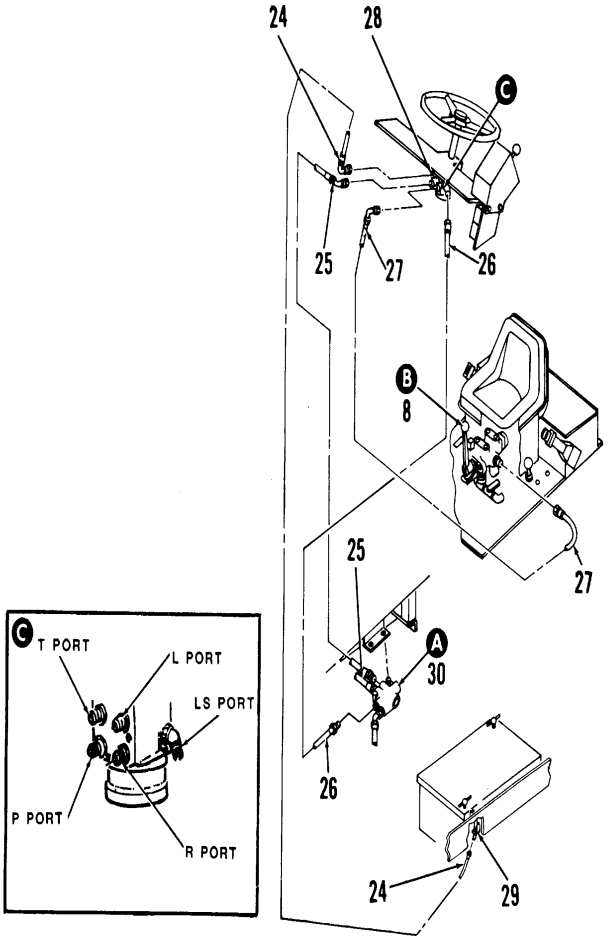


12. Tag and disconnect hose assemblies (24, 25, 26, 27) from orbital steering valve (28).

13. Tag and disconnect hose assembly (24) from elbow (29). Elbow is located beneath bracket welded to frame, behind battery box.

14. Tag and disconnect hose assemblies (25, 26) from priority valve (30).

15. Tag and disconnect hose assembly (27) from steering selector valve (8).



16. Remove elbows (31, 32) from priority valve (30) if replacement is required. Remove and discard O-rings (33, 34).

17. Remove fitting (35), elbow (36), and fitting (37) from steering selector valve (8) if replacement is required. Remove and discard O-rings (38, 39).

B. CLEANING

Clean hoses, lines, and fittings in accordance with paragraph 1-24.

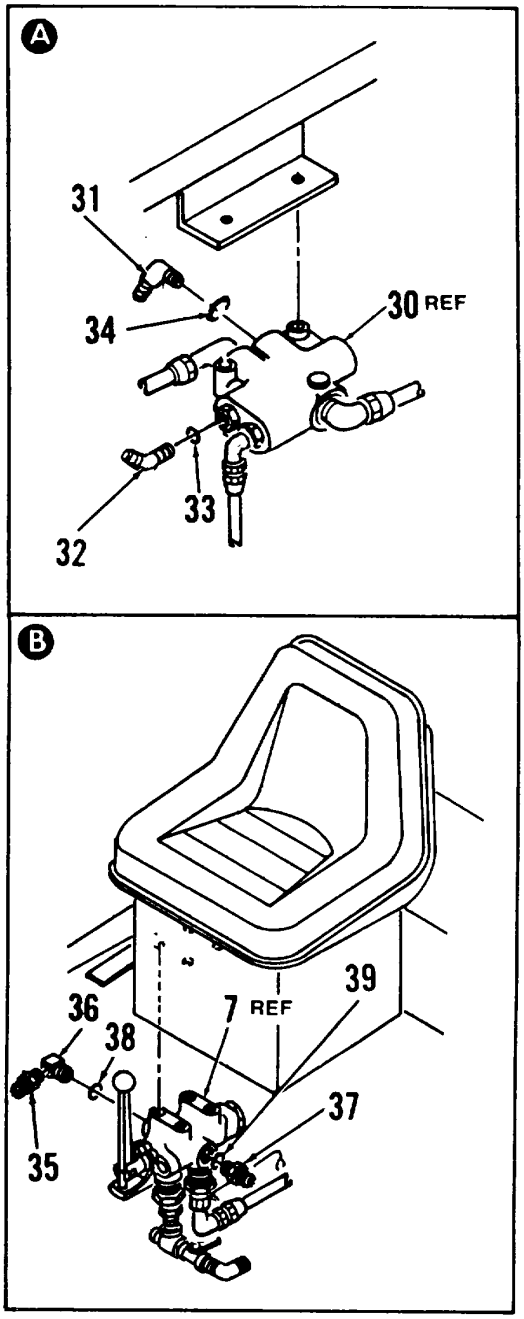
C. INSPECTION

Inspect hoses, lines, fittings, and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install fitting (35), elbow (36), fitting (37), and new O-rings (38, 39) into steering selector valve (8). Ensure proper orientation.

2. Install elbows (31, 32) and new O-ring (33, 34) into priority valve (30). Ensure proper orientation.

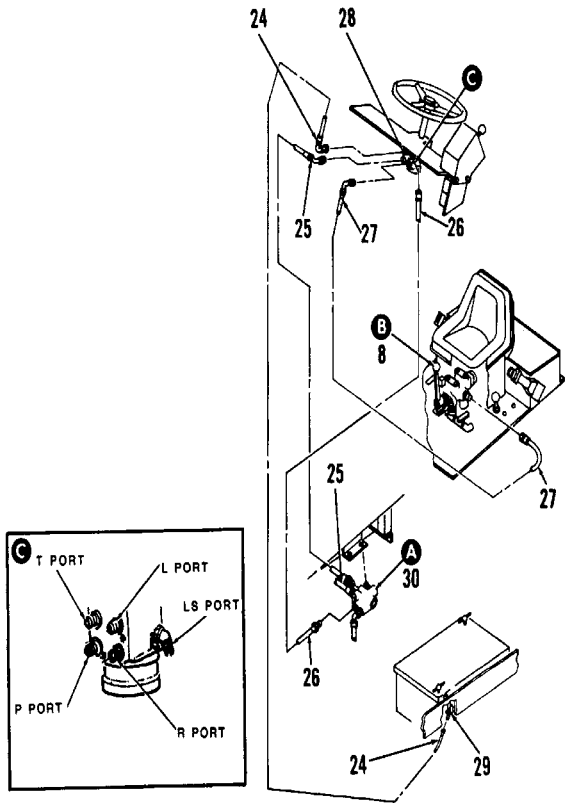


3. Connect hose assembly (27) to steering selector valve (8).

4. Connect hose assemblies (25, 26) to priority valve (30).

5. Connect hose assembly (24) to elbow (29). Elbow is located beneath bracket welded to frame, behind battery box.

6. Connect hose assemblies (24, 25, 26, 27) to orbital steering valve (28).



7. Install reducer (18), elbow (19), and new O-ring (20) into rear axle steering cylinder. Install reducer (21), fitting (22), and new O-ring (23).

8. Connect tube assembly (13) to reducer (18). Connect tube assembly (14) to reducer (21).

9. Secure tube assemblies (13, 14) onto tube clamp (15) using screw (16) and washer (17).

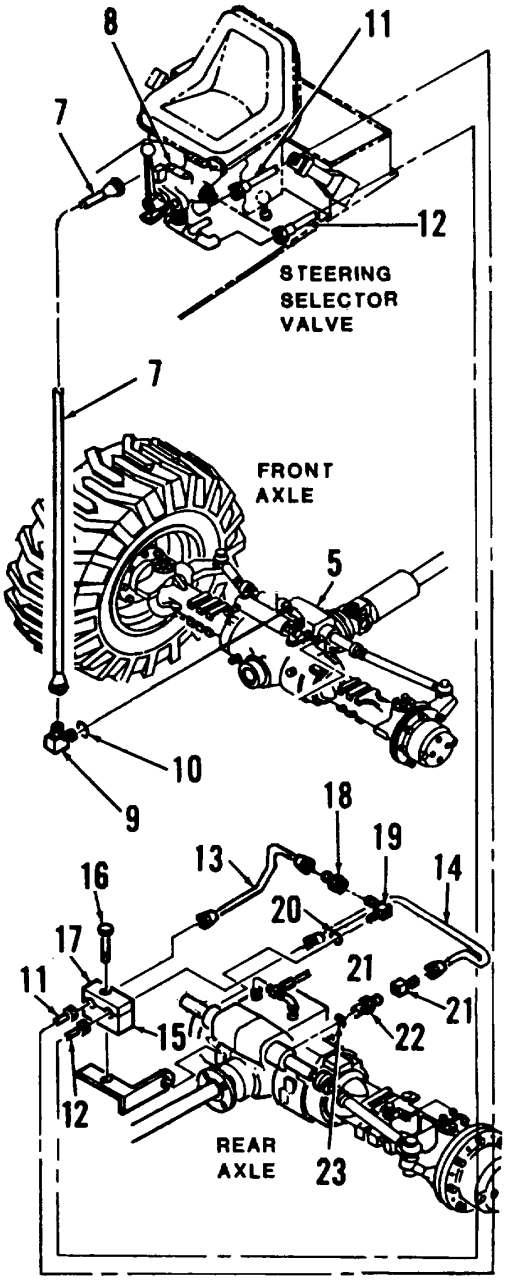
10. Connect hose assemblies (11, 12) to tube assemblies (13, 14).

11. Connect hose assemblies (11, 12) to steering selector valve (8).

12. Install elbow (9) and new O-ring (10) into front axle steering cylinder (5).

13. Connect hose assembly (7) to elbow (9).

14. Connect hose assembly (7) to steering selector valve (8).



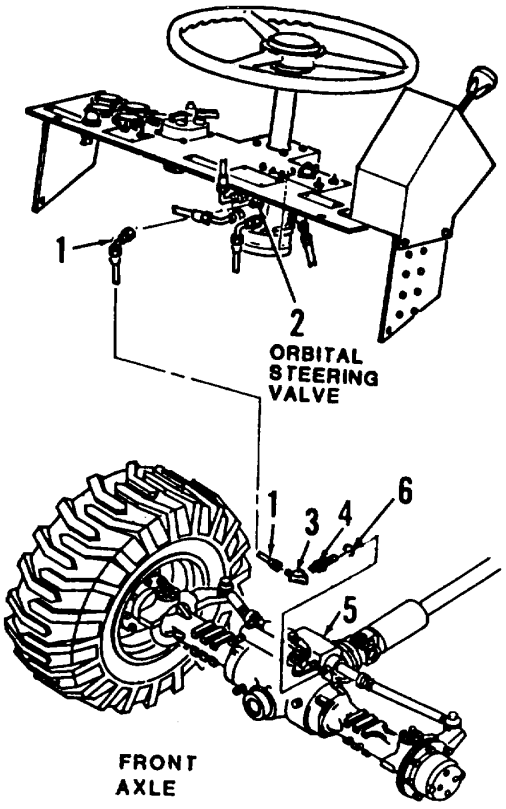
15. Install elbow (3), fitting (4), and new O-ring (6) into front axle steering cylinder (5).

16. Connect hose assembly (1) to elbow (3).

17. Connect hose assembly (1) to orbital steering valve (2).

FOLLOW-ON MAINTENANCE:
Service hydraulic oil in accordance with Lubrication Order

END OF TASK



2-120. ORBITAL STEERING VALVE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
- General Mechanics Tool Kit (1, App. E)
- Drain Pan (10, App. E)
- Vise (30, App. E)

References:
LO 10-3930-664-12

Materials / Parts:
- O-Ring, Item 11 (4 ea.)
- O-Ring, Item 12 (1 ea.)

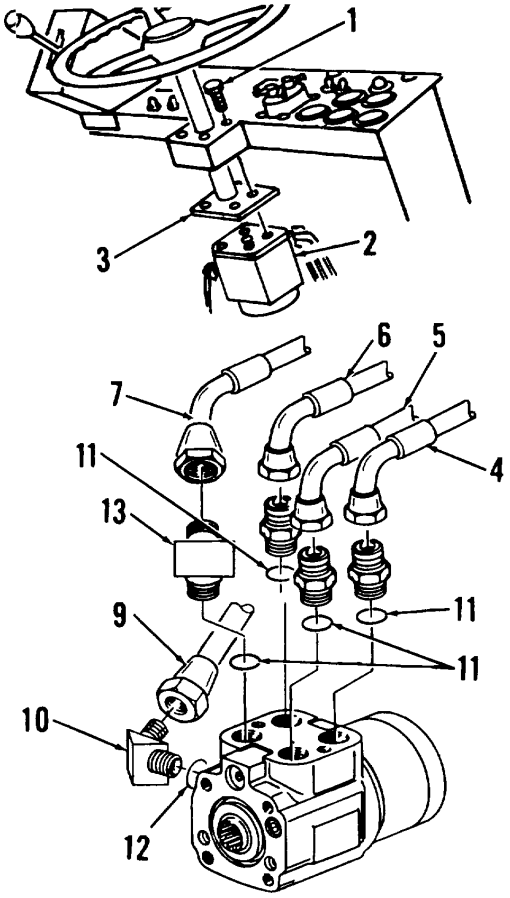
A. REMOVAL

1. Remove screws (1) to remove orbital steering valve (2) from steering column (3).

NOTE

Place drain pan beneath hoses when disconnecting. Drain hoses into pan.

2. Tag and disconnect hose assemblies (4, 5, 6) from fittings (8). Tag and disconnect hose assemblies (7, 9) from elbow (10, 13).
3. Install orbital steering valve (2) in vise. Remove fittings (8) and elbows (10, 13) from orbital steering valve (2). Remove and discard O-rings (11, 12).



B. CLEANING

Clean orbital steering valve in accordance with paragraph 1-24.

C. INSPECTION

Inspect steering valve and related components in accordance with paragraph 1-24.

D. INSTALLATION

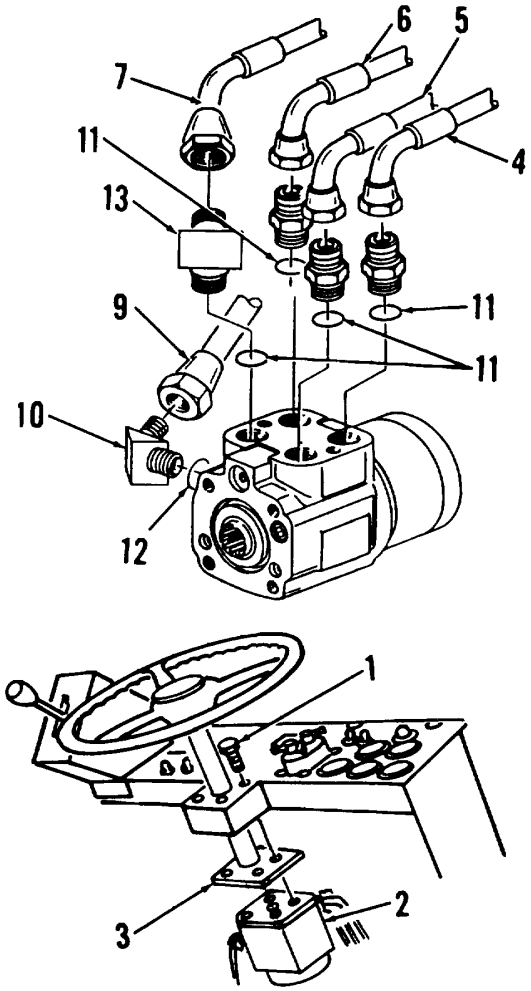
1. Install fittings (8), elbow (13) and new O-rings (11) into orbital steering valve (2). Install elbow (10) and new O-ring (12).

2. Connect hose assemblies (4, 5, 6) to fittings (8). Connect hose assembly (7) to elbow (13). Connect hose assembly (9) to elbow (10).

3. Mate orbital steering valve (2) to steering column (3) and instrument panel. Secure using screws (1).

FOLLOW-ON MAINTENANCE:
Service hydraulic oil in accordance with Lubrication Order

END OF TASK



2-121. PRIORITY VALVE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
Vise (30, App. E)

References:
LO 10-3930-664-12

Materials / Parts:
O-Ring, Item 11 (2 ea.)
O-Ring, Item 12, (2 ea.)
O-Ring, Item 13, (1 ea.)

A. REMOVAL

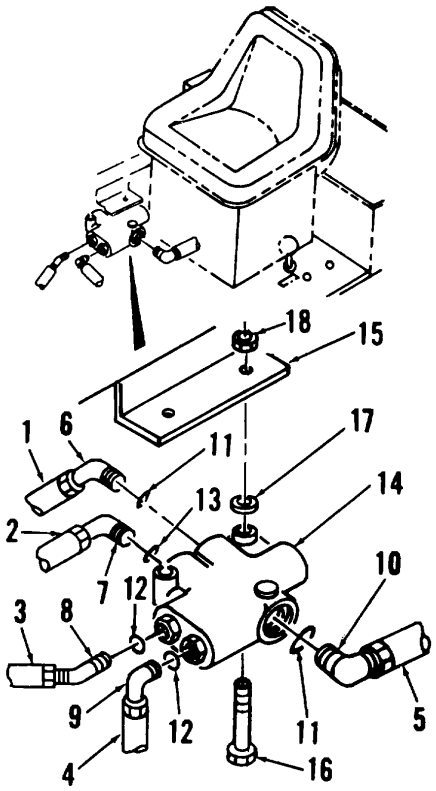
NOTE

Place drain pan beneath hoses when disconnecting. Drain hoses into pan.

1. Tag and disconnect five hose assemblies (1, 2, 3, 4, 5) from priority valve elbows (6, 7, 8, 9, 10).
2. Remove priority valve (14) from mounting plate bracket (15) by removing screws (16), grommets (17), and nuts (18).
3. Install priority valve (14) in vise. Remove elbows (6, 7, 8, 9, 10) from priority valve (14). Remove and discard O-rings (11, 12, 13).

B. CLEANING

Clean priority valve in accordance with paragraph 1-24.



C. INSPECTION

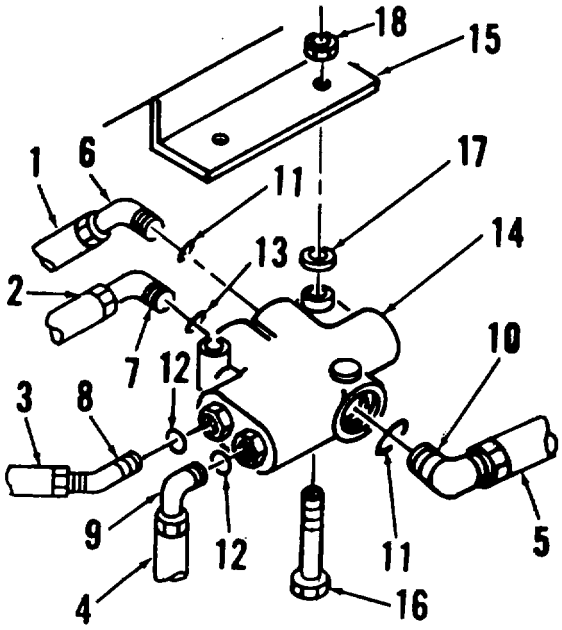
Inspect priority valve and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install elbows (6, 7, 8, 9, 10) and new O-rings (11, 12, 13) into priority valve (14). Ensure proper orientation of elbows.

2. Install priority valve (14) onto mounting plate bracket (15) using screws (16), grommets (17), and nuts (18).

3. Connect five hose assemblies (1, 2, 3, 4, 5) to priority valve elbows (6, 7, 8, 9, 10).



FOLLOW-ON MAINTENANCE:
Service hydraulic oil in accordance with Lubrication Order

END OF TASK

2-122. STEERING SELECTOR VALVE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
Materials / Parts:
Teflon Tape (35, App. C)
Cotter Pin, Item 7 (1 ea)
O-Ring, Item 14 (1 ea.)
O-Ring, Item 19 (1 ea.)
O-Ring, Item 23 (1 ea.)
O-Ring, Item 24 (1 ea.)

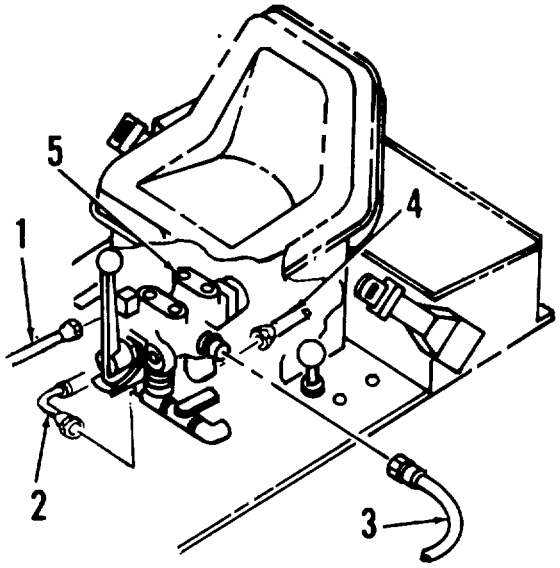
References:
LO 10-3930-664-12

A. REMOVAL

NOTE

Place drain pan beneath hoses when disconnecting. Drain hoses into pan.

1. TAG AND DISCONNECT FOUR HOSE ASSEMBLIES (1 2, 3, 4) FROM STEERING SELECTOR VALVE (5).



2. REMOVE HANDLE FROM STEERING SELECTOR VALVE (5) BY REMOVING HANDLE PIN (6) AND COTTER PIN (7). DISCARD COTTER PIN.

3. REMOVE STEERING SELECTOR VALVE (5). REMOVE TUBE ASSEMBLY (9) AND ALL FITTINGS.

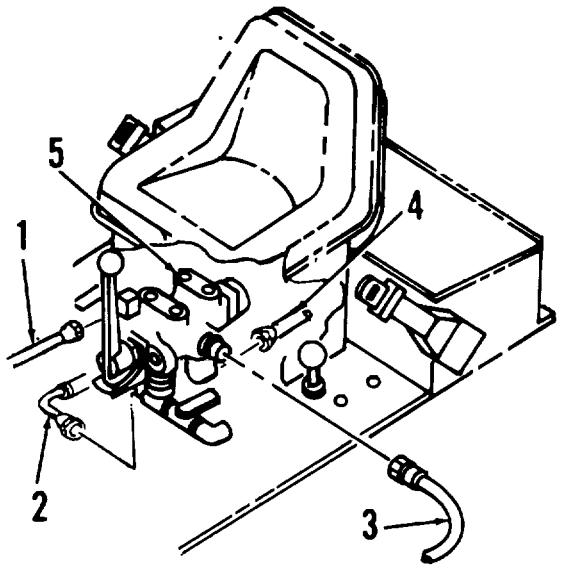
a. Remove steering selector valve (5) from floor plate by removing screws (8).

b. Tag and disconnect tube assembly (9) from elbow (10) and tee (11).

c. Remove reducer (12) and elbow (13) from steering selector valve (5). Remove and discard O-ring (14).

d. Remove elbow (10), shutoff valve (15), tee (16), and fittings (17, 18). Remove and discard o-ring (19).

e. Remove elbow (20), tee (11), reducer (21), and fitting (22). Remove and discard o-rings (23, 24).



B. CLEANING

Clean steering selector valve in accordance with paragraph 1-24.

C. INSPECTION

Inspect selector valve and related components in accordance with paragraph 1-24.

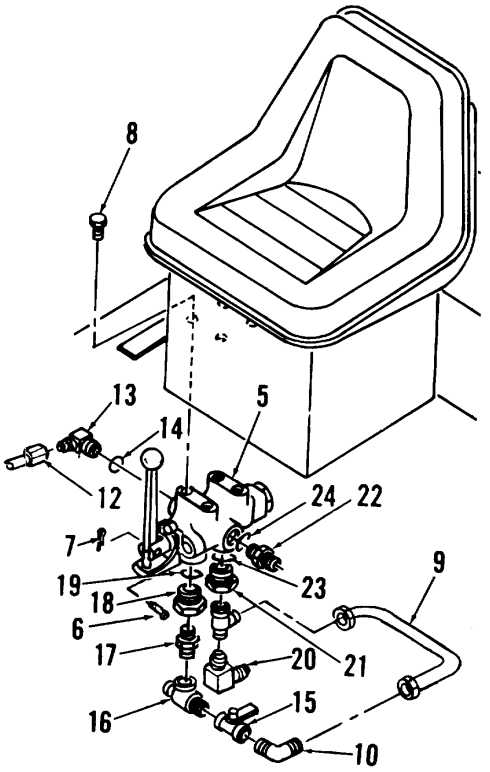
D. INSTALLATION

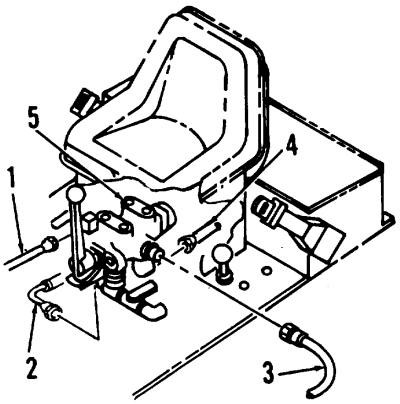
1. INSTALL TUBE ASSEMBLY (9) AND FITTINGS ONTO STEERING SELECTORVALVE (5). INSTALL STEERING SELECTOR VALVE.

    a. Install elbow (20), tee (11), reducer (21), fitting (22) and new o-rings (23, 24) onto steering selector valve (5).
    b. Wrap threads of elbow (10) and tee (16) with teflon tape.
    c. Install tee (16) and fittings (17, 18). Install shutoff valve (15) onto tee.
    d. Install elbow (10) onto shutoff valve (15), ensuring elbow points to rear of steering selector valve (5).
    e. Install reducer (12), elbow (13), and new O-ring (14).
    f. Connect tube assembly (9) to elbow (10) and tee (11).
    g. Install steering selector valve (5) onto floor plate using screws (8).

2. MATE HANDLE TO STEERING SELECTOR VALVE (5). SECURE USING HANDLE PIN (6) AND NEW COTTER PIN (7).

3. CONNECT FOUR HOSE ASSEMBLIES (1 2, 3, 4) TO STEERING SELECTOR VALVE (5).





FOLLOW-ON MAINTENANCE:
Service hydraulic oil in accordance with Lubrication Order
END OF TASK

Section XVIII. FRAME, TOWING ATTACHMENTS, AND DRAWBAR MAINTENANCE

2-123. STEP REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Personnel Required:
2 Personnel

A. REMOVAL

1. **Remove container bracket (1) from step plate (2) by removing screws (3), washers (4), and nuts (5).**

2. **Remove step plate (2) from step frame by removing screws (6), washers (7), and nuts (8).**

3. **Release step plate (2) from step guard (9) by removing screw (10), washer (11), and nut (12).**

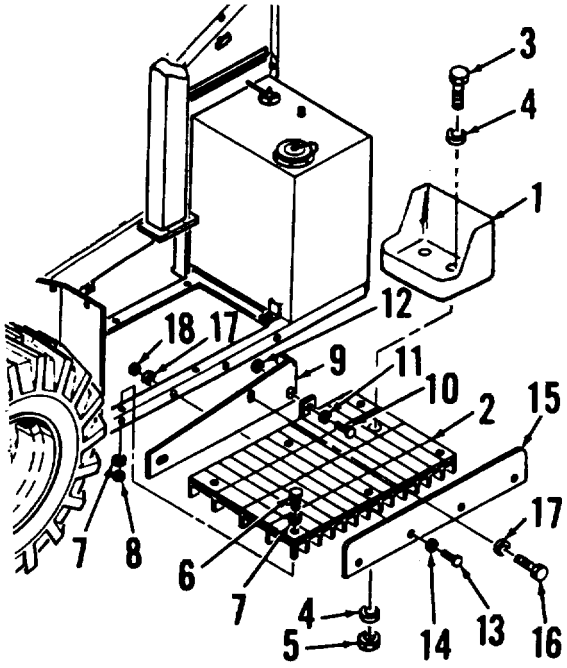
WARNING

Step plate (2) is heavy and awkward. Enlist the help of an assistant when removing to prevent injury to personnel and damage to components.

4. **Lift step plate (2) up and off step frame.**

5. **Remove step guard (9) by removing screws (13) and washers (14).**

6. **Remove step guard plate (15) by removing screws (16), washers (17), and nuts (18).**



B. CLEANING

Clean step and guards in accordance with paragraph 1-24.

C. INSPECTION

Inspect step, guards, and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install step guard plate (15) onto step frame using screws (16), washers (17), and nuts (18).
2. Install step guard (9) using screws (13) and washers (14).

WARNING

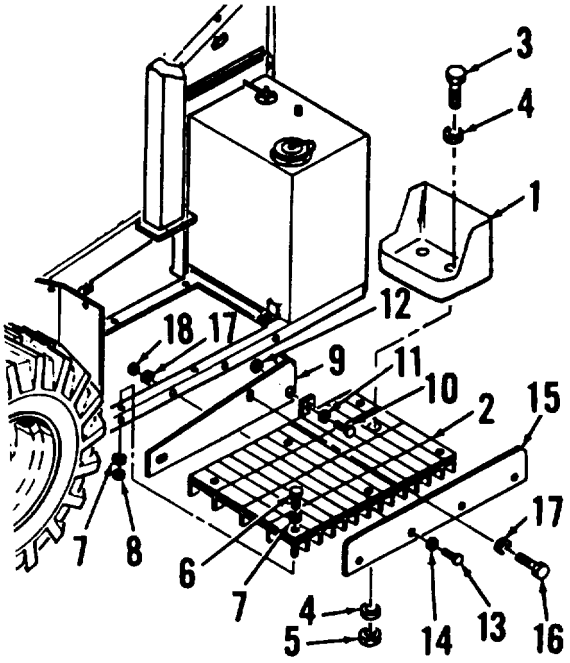
Step plate (2) is heavy and awkward. Enlist the help of an assistant when installing to prevent injury to personnel and damage to components.

3. Lift step plate (2) up and place onto step frame.

4. Secure step plate (2) to step guard (9) using screw (10), washer (11), and nut (12).

5. Secure step plate (2) to step frame using screws (6), washers (7), and nuts (8).

6. Install container bracket (1) onto step plate (2) using screws (3), washers (4), and nuts (5).



FOLLOW-ON MAINTENANCE:
None
END OF TASK

2-124. COUNTERWEIGHT REPLACEMENT

This task covers: Removal and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Hydraulic Floor Jack (48, App. E)
Torque Wrench (32, App. E)
Wooden Blocks, 6 x 6 x 24 inches (4 ea.)

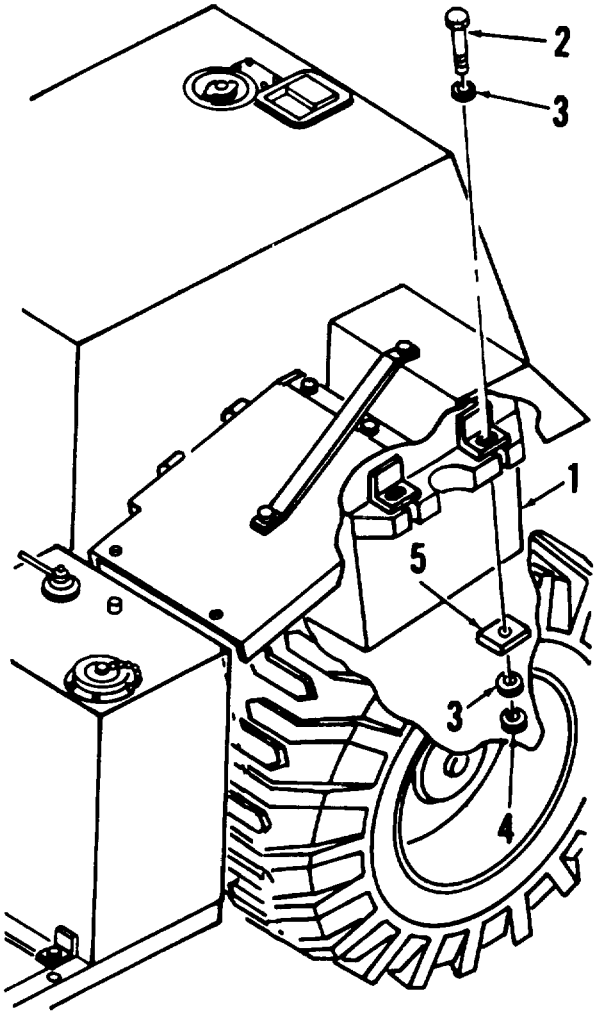
Personnel Required:
2 Personnel

A. REMOVAL

WARNING

Counterweight is heavy and awkward. Enlist the help of an aide when removing and installing to prevent injury to personnel and damage to components.

1. Place floor jack beneath counterweight (1). Raise jack to support counterweight.
2. Stack wooden blocks two high and place in desired location on floor so that counterweight is evenly supported after removal.
3. Remove counterweight (1) from forklift frame by removing nuts (4), washers (3), bolts (2), and clamp plates (5).

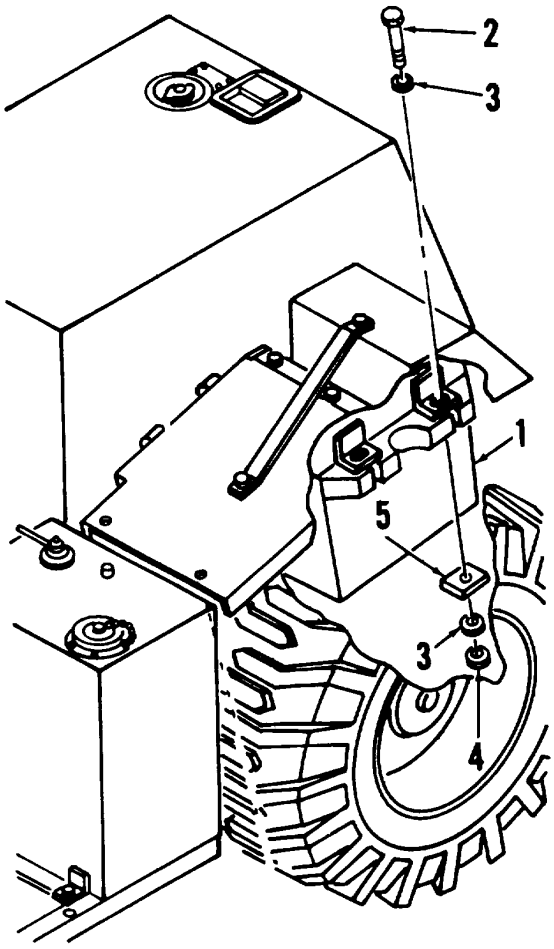


B. INSTALLATION

1. Place floor jack beneath counterweight (1). Raise jack to support counterweight and move counterweight into place for installation.

2. Install counterweight (1) onto forklift frame using nuts (4), washers (3), bolts (2), and clamp plates (5).

3. Torque nuts (2) in two steps; 100 ft-lbs (135 Nm), then 220 ft-lbs (298 Nm).



FOLLOW-ON MAINTENANCE:
None
END OF TASK

2-125. PINTLE HOOK REPLACEMENT

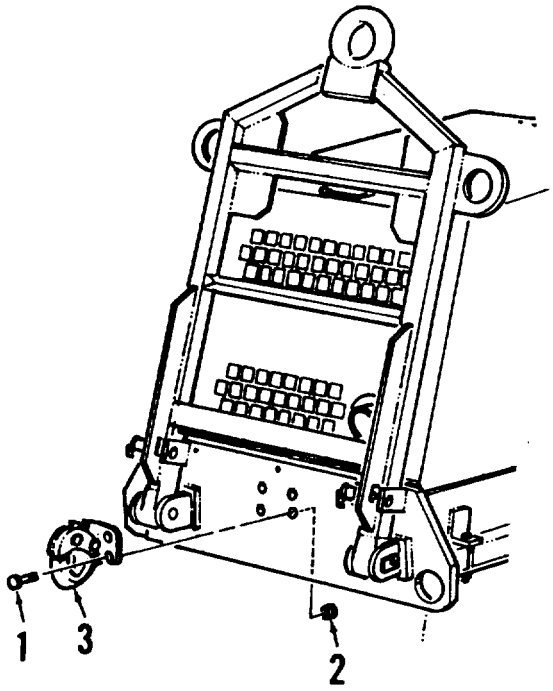
This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

A. REMOVAL

Remove pintle hook (3) from forklift frame by removing screws (1) and nuts (2).



B. CLEANING

Clean pintle hook in accordance with paragraph 1-24.

C INSPECTION

1. Inspect pintle hook and related components in accordance with paragraph 1-24.
2. Check hook for proper latching action. If defective, replace hook.

D. INSTALLATION

1. Install pintle hook (3) onto forklift frame using screws (1) and nuts (2).
2. Torque nuts (2) to 100 ft-lbs (135 N•m).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-126. TOW BAR REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

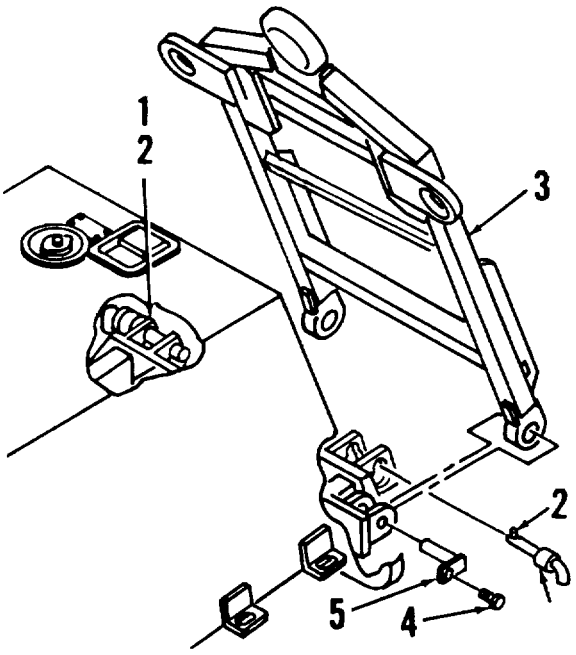
Personnel Required:
2 Personnel

A. REMOVAL

WARNING

Tow bar is heavy and awkward. Weight (120 lbs. (54 Kg)) exceeds the amount one person can safely handle. Enlist the help of an aide when removing and installing to prevent injury to personnel and damage to components.

1. Align spring pin (2) with notch in tow bar clevis. Pull latch pin (1) until clear of the clevis opening. Repeat for opposite latch pin.
2. Lower tow bar (3) until it rests on ground.
3. Remove tow bar (3) from forklift frame by removing screws (4) and pin weldments (5).



B. CLEANING

Clean tow bar in accordance with paragraph 1-24.

C. INSPECTION

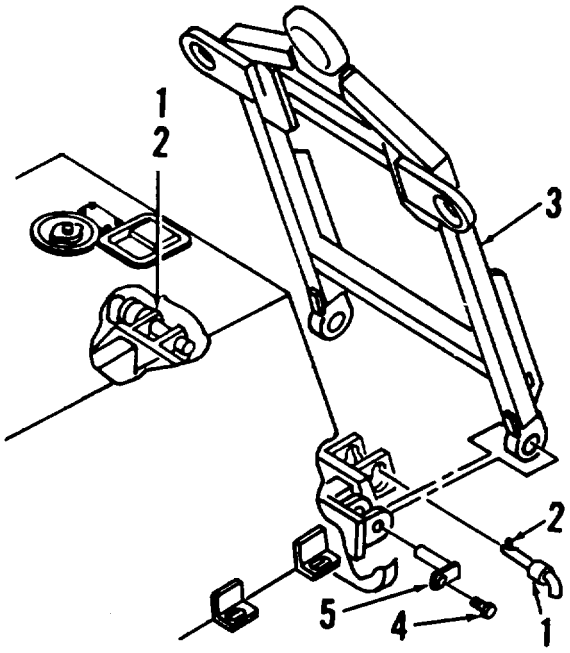
Inspect tow bar and related components in accordance with paragraph 1-24.

D. INSTALLATION

WARNING

Tow bar is heavy and awkward. Weight (120 lbs. (54 Kg)) exceeds the amount one person can safely handle. Enlist the help of an aide when removing and installing to prevent injury to personnel and damage to components.

1. Install tow bar (3) onto forklift frame using screws (4) and pin weldments (5).
2. Lift tow bar (3) into raised position. Lock in place using tow bar latch pins (1).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-127. TOW BAR LATCH PIN REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

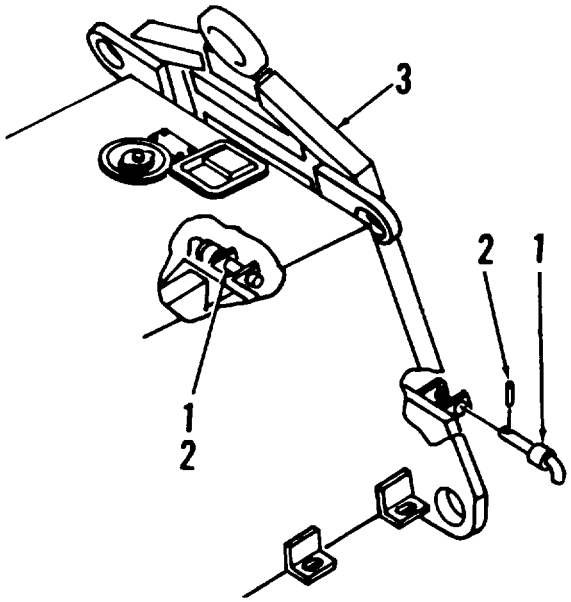
Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Personnel:
2 Personnel

A. REMOVAL

WARNING

Tow bar is heavy and awkward. Weight (120 lbs. (54 Kg)) exceeds the amount one person can safely handle. Enlist the help of an aide when removing and installing to prevent injury to personnel and damage to components.



1. Align spring pin (2) with notch in tow bar clevis. Pull latch pin (1) until clear of the clevis opening. Repeat for opposite latch pin.
2. Lower tow bar (3) until it rests on ground.
3. Remove tow bar latch pins (1) by removing spring pins (2).

B. CLEANING

Clean tow bar latch pins in accordance with paragraph 1-24.

C. INSPECTION

Inspect latch pins and related components in accordance with paragraph 1-24.

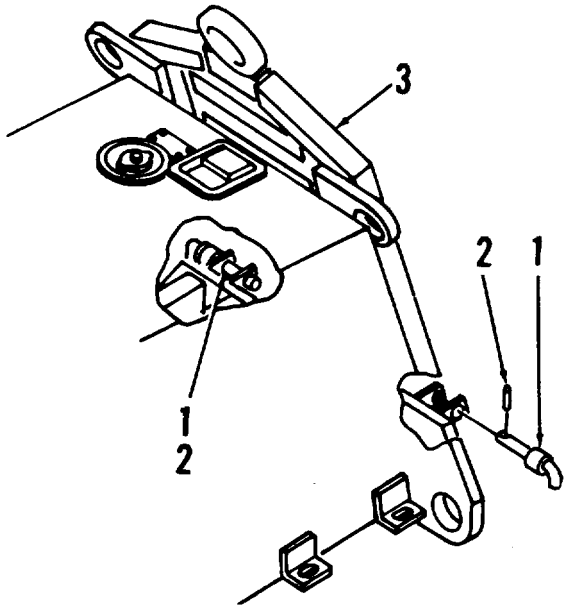
D. INSTALLATION

1. Install tow bar latch pins (1) using spring pins (2).

WARNING

Tow bar is heavy and awkward. Weight (120 lbs. (54 Kg)) exceeds the amount one person can safely handle. Enlist the help of an aide when removing and installing to prevent injury to personnel and damage to components.

2. Lift tow bar (3) into raised position. Lock in place using tow bar latch pins (1).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

Section XIX. BODY, CAB, HOOD, AND HULL MAINTENANCE

2-128. ENGINE COVER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
- General Mechanics Tool Kit (1, App. E)
- Sling (4, App. E)
- Wood Blocks

Materials / Parts:
- Locknut, Item 5 (2 ea.)
- Locknut, Item 8 (3 ea.)

Personnel Required:
- 2 Personnel

Equipment Condition:
- Towbar lowered (para. 2-126)

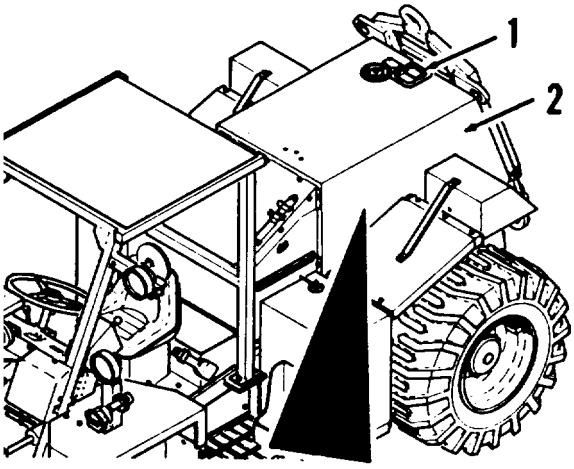
A. REMOVAL

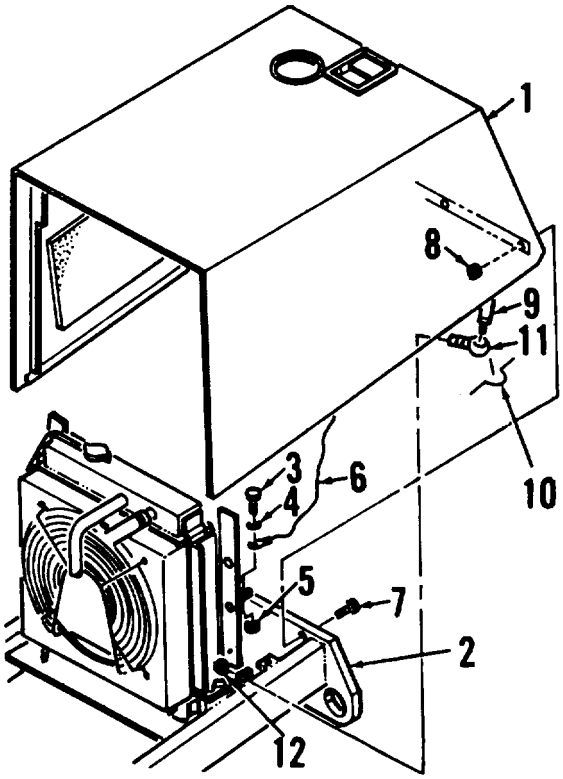
1. Release hood assembly (2) by lifting handle (1). Open hood assembly.

NOTE

Enlist the help of an assistant to hold hood and stabilize during removal.

2. Install sling through radiator cap access port and around front edge on top of hood. Attach sling to hoist and take up slack. Use blocks to secure front of hood during component removal.
3. Remove screws (3), washers (4), and locknuts (5) to release two safety lanyards (6). Discard locknuts.
4. Release gas springs (9) from chassis brackets by removing retainers (10). Secure gas springs to inside of hood to prevent damage.
5. Detach hood assembly (2) from forklift chassis by removing screws (7) and locknuts
(8). Discard locknuts.
6. If required, remove studs (11) from chassis brackets by removing nuts (12).
7. Lift hood assembly (2) from chassis and move to a level surface for cleaning or additional maintenance.





B. CLEANING

Clean hood assembly and related components in accordance with paragraph 1-24.

C. INSPECTION

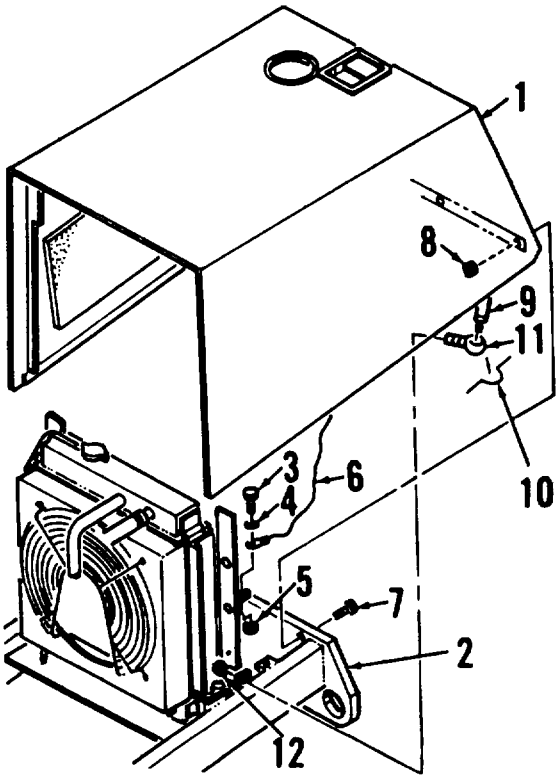
Inspect hood and related components in accordance with paragraph 1-24.

D. INSTALLATION

NOTE

Enlist the help of an assistant to hold hood and stabilize during installation.

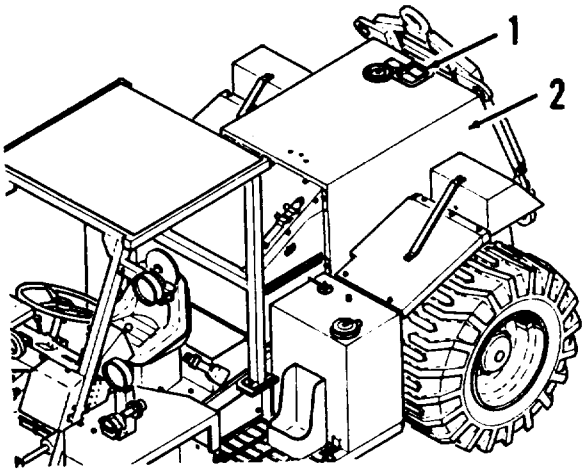
1. Install sling through radiator cap access port and around front edge on top of hood. Attach sling to hoist and take up slack. Use blocks to secure front of hood during component installation.
2. If removed, install ball studs (11) on chassis brackets using nuts (12).
3. Lift hood assembly (2) and position on forklift chassis.
4. Secure hood assembly (2) to rear of chassis using screws (7) and new locknuts (8).
5. Install gas springs (9) onto studs (11) a secure using retainers (10).
6. Attach safety lanyards (6) using screws (3) washers (4), and new locknuts (5).
7. Remove sling and hoist.
8. Close hood assembly (2). Ensure handle (1) fully engaged.



FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)

END OF TASK



2-129. HOOD LATCH AND LINKAGE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

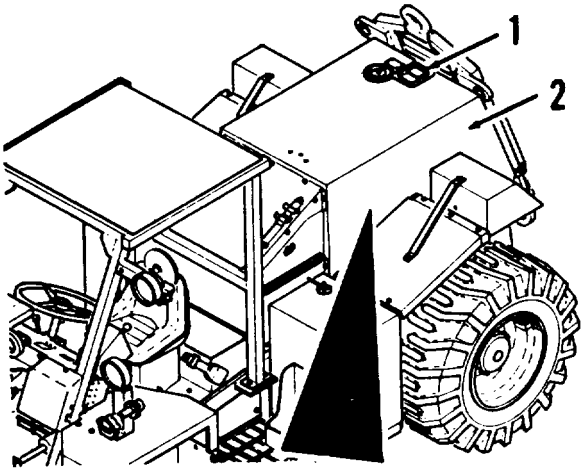
INITIAL SETUP:

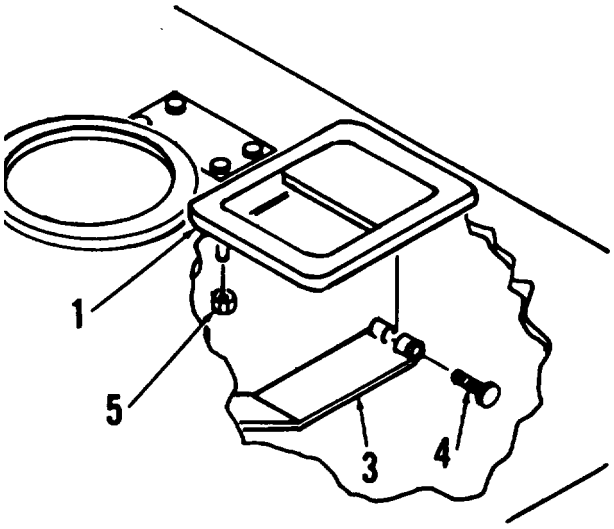
Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Equipment Condition:
Towbar lowered (para. 2-126)

A. REMOVAL

1. Release hood assembly (2) by lifting handle (1). Open hood assembly.
2. Release latch actuator arm (3) from bottom of handle (1) by removing screw (4).
3. Remove handle (1) from hood assembly (2) by removing nuts (5) from handle studs.





4. Release latch actuator arm (3) from stud on latch linkage (6) by removing nut (7).
5. Remove rod end (8) from latch actuator arm (3) only if replacement is required.
6. Remove assembled latch linkage (6), rotary latch (9), and latch spacer (10) from hood assembly (2) by removing screws (11) and nuts (12).
7. Remove linkage (6) from rotary latch (9) by removing screws (13) and nuts (14).

B. CLEANING

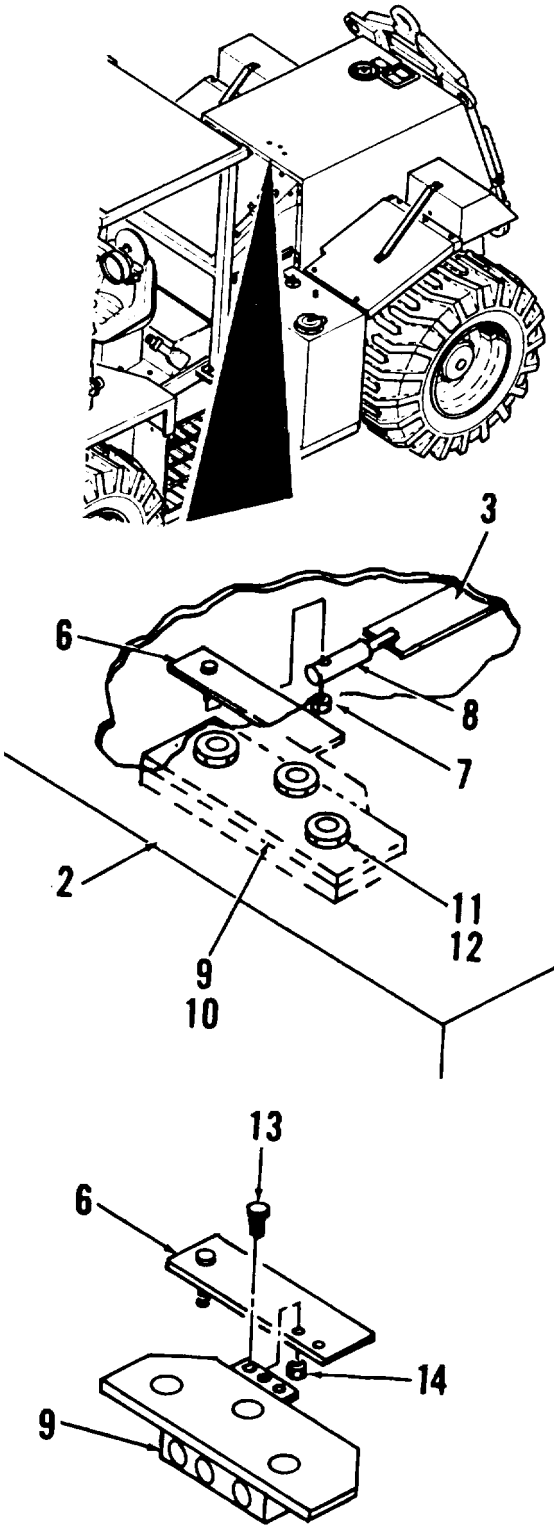
Clean hood latch and linkage in accordance with paragraph 1-24.

C. INSPECTION

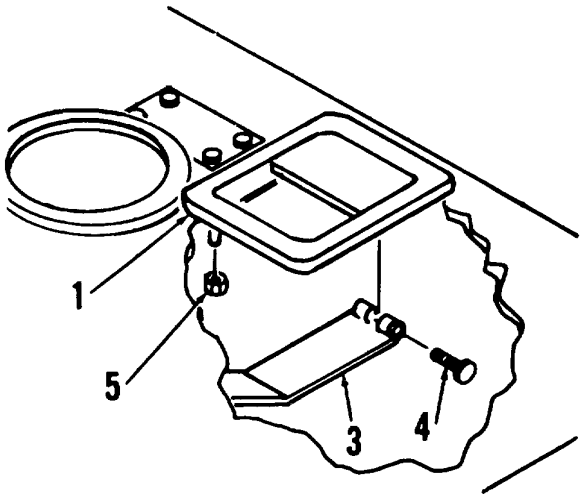
1. Inspect hood handle, rotary latch, and related components in accordance with paragraph 1-24.
2. Work hood handle and rotary latch to ensure smooth operation.

D. INSTALLATION

1. Install latch linkage (6) onto rotary latch (9) using screws (13) and nuts (14).
2. Install assembled latch linkage (6), rotary latch (9), and latch spacer (10) onto hood assembly (2) using screws (11) and nuts (12).
3. Install rod end (8) onto latch actuator arm (3).
4. Secure latch actuator arm (3) to stud on latch linkage (6) using nut (7).



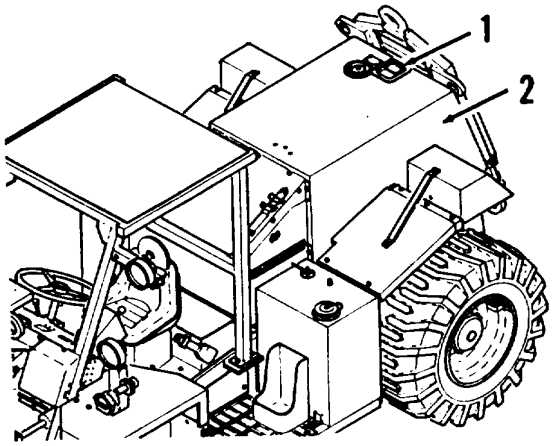
5. Install handle (1) onto hood assembly (2) using nuts (5).
6. Secure latch actuator arm (3) onto bottom of handle (1) using screw (4).
7. Close hood assembly (2). Ensure handle (1) is fully engaged. Operate handle and rotary latch to ensure proper installation.



FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)

END OF TASK



2-130. GAS-FILLED SPRING REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment**:**

General Mechanics Tool Kit (1, App. E

Personnel Required**:**

2 Personnel

Equipment Condition:

Towbar lowered (para. 2-126)

A. REMOVAL

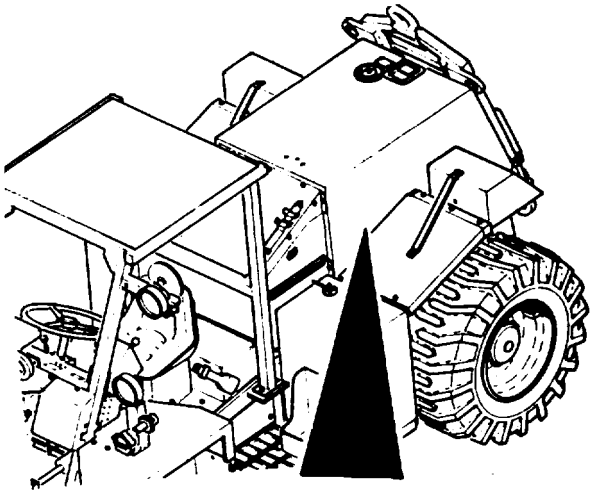
1. Release hood assembly (2) by lifting handle (1). Open hood assembly.

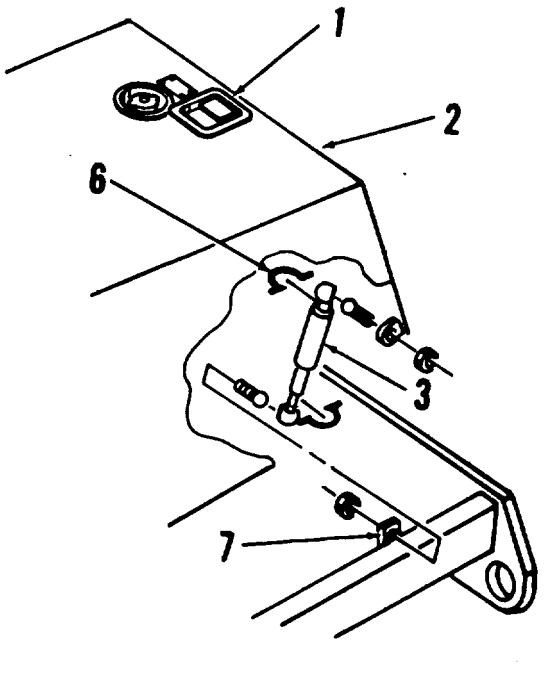
NOTE

Enlist the help of an assistant to hold hood and stabilize during removal of gas springs.

2. Release gas springs (3) from hood (2) by removing retainers (6).

3. Release gas springs (3) from hood (2) by removing retainers (6).





B. CLEANING

Clean gas springs in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect gas springs and related components in accordance with paragraph 1-24.

2. Ensure gas springs hold position. Faulty springs can result in hood collapse. Replace spring if defective.

D. INSTALLATION

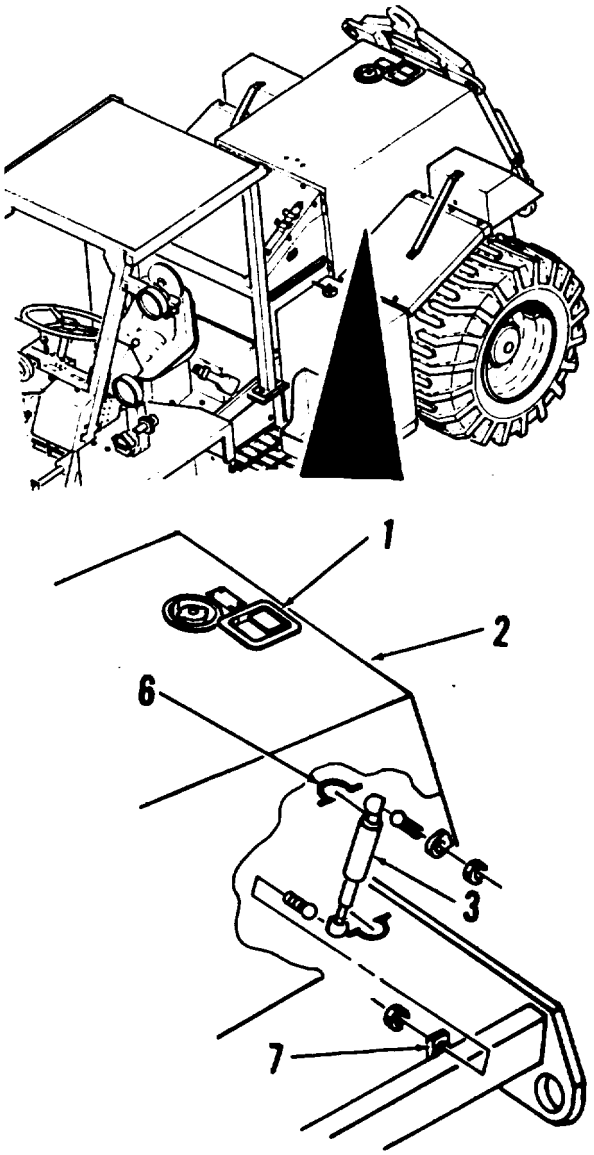
NOTE

Enlist the help of an assistant to hold hood and stabilize during gas spring installation.

NOTE

Ensure safety lanyards are installed in place before securing gas springs (3) to hood (2).

1. Secure gas springs (3) to hood (2) using retainers (6).
2. Secure gas springs (3) to chassis brackets (7) using retainers (6).
3. Close hood assembly (2). Ensure handle (1) is fully engaged.



FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)

END OF TASK

2-131. TRANSMISSION COVER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

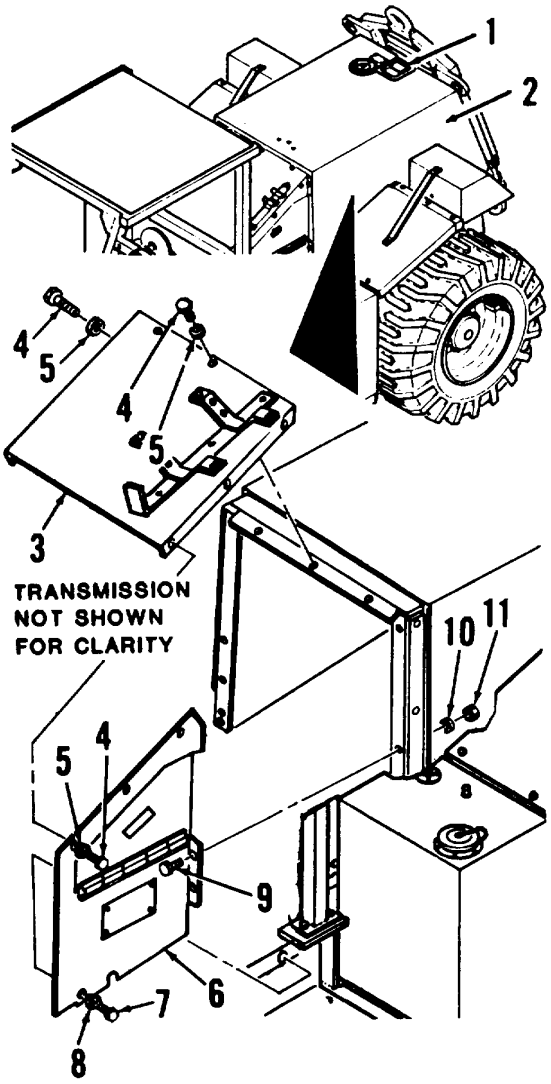
Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

Equipment Condition:
Batteries disconnected (para. 2-78)
Towbar lowered (para. 2-126)

Materials / Parts:
Loctite 242 (20, Ap. C)

A. REMOVAL

1. Open hood assembly (2) by lifting handle (1). Open hood assembly.
2. Remove top transmission cover (3) from cover frame and transmission side plates by removing nine screws (4) and washers (5).
3. Remove left transmission side plate (6) by removing screw (7), washer (8), screws (9), washers (10), and nuts (11).



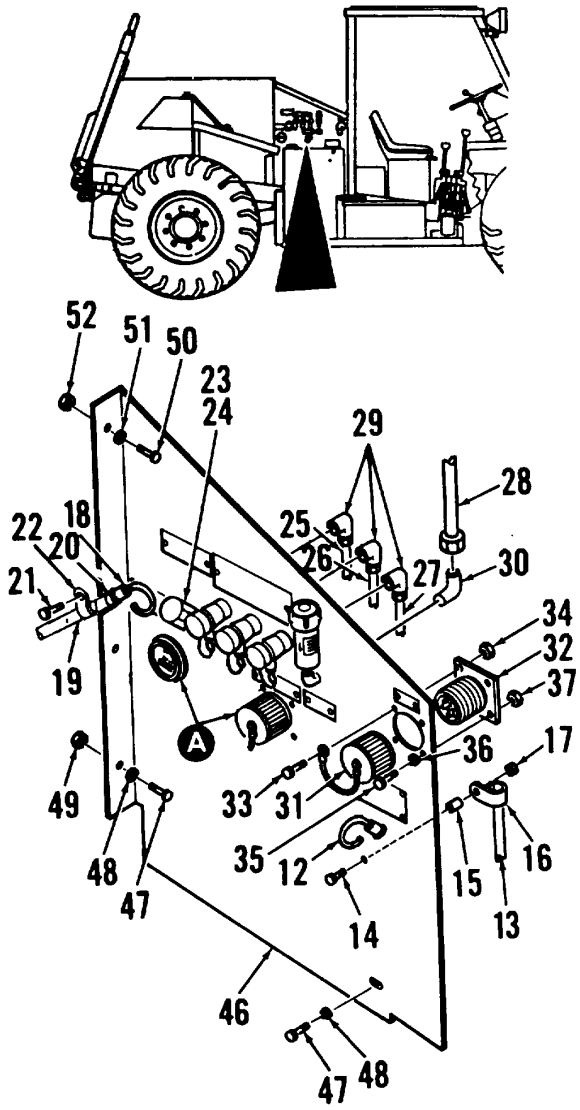
NOTE

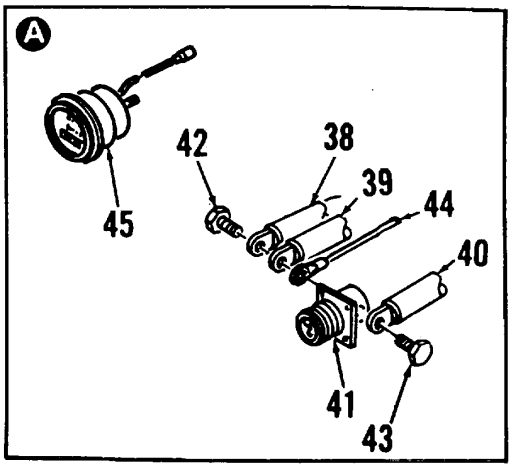
Place drain pan beneath fluid hoses when disconnecting. Drain hoses into pan.

NOTE

All oil tubes and hose ends should be covered with a shop towel or simular item to avoid contamination of fluids.

4. Remove transmission oil dipstick (12) from sleeve (13). Remove sleeve from right side plate by removing screw (14), spacer (15), clamp (16), and nut (17).
5. Remove engine oil dipstick (18) from sleeve (19) by removing clamp (20). Remove hose clamp (22) from hood assembly frame by removing screw (21).
6. Disconnect transmission filler hose (23) by loosening hose clamp (24) and pulling hose away from right side plate.
7. Tag and disconnect hose assemblies (25, 26, 27, 28) from elbows (29, 30). Remove elbows from welded pipe fittings only if replacement is required.
8. Remove cap (31) from DCA plug (32). Remove plug from right side plate by removing screws (33), nuts (34), screw (35), washer (36), and nut (37).
9. Tag electrical cables (38, 39, 40) and wire (44) located at rear of slave receptacle (41). Disconnect cables and wire from receptacle by removing screws (42, 43).
10. Tag and disconnect electrical wiring from rear of hourmeter (45).
11. right side plate (46) from forklift frame by removing screws (47), washers (48), nuts (49) screw (50), washer (51), and nut (52).





B. CLEANING

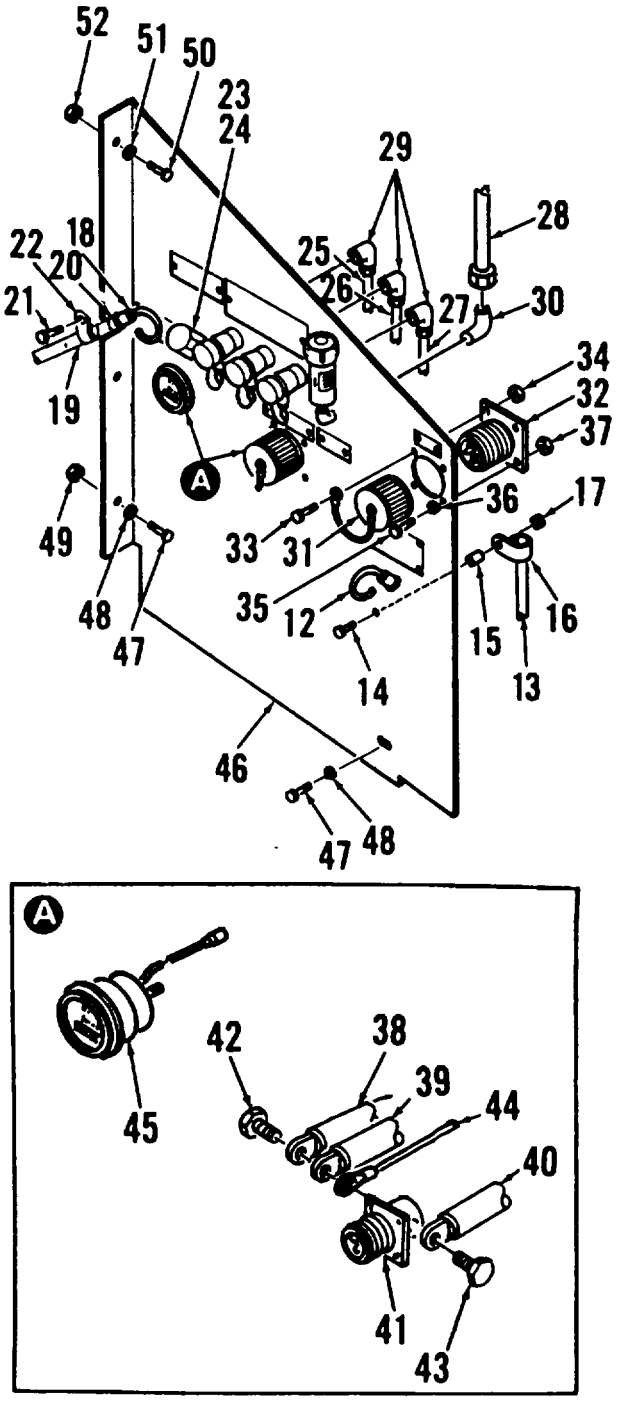
Clean transmission cover, side plates, and related components in accordance with paragraph 1-24.

C. INSPECTION

Inspect transmission cover, side plates, and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Position right side plate (46) onto forklift frame and secure using screws (47), washers (48), nuts (49) screw (50), washer (51), and nut (52).
2. Connect electrical wiring to rear of hourmeter (45).
3. Connect electrical cables (38, 39, 40) and wire (44) to rear of slave receptacle (41) using screws (42, 43).
4. Install DCA plug (32) onto right side plate using screws (33), nuts (34), screw (35), washer (36), and nut (37).
5. Install elbows (29, 30) into welded pipe fittings on rear of plate. Connect hose assemblies (25, 26, 27, 28) to elbows (29, 30).
6. Connect transmission filler hose (23) and tighten hose clamp (24) to secure.
7. Install engine oil dipstick (18) into sleeve (19) and secure using clamp (20). Secure hose clamp (22) to hood assembly frame using screw (21).
8. Attach transmission dipstick sleeve (13) to rear of plate using screw (14), spacer (15), clamp (16), and nut (17). Install transmission oil dipstick (12) into sleeve.

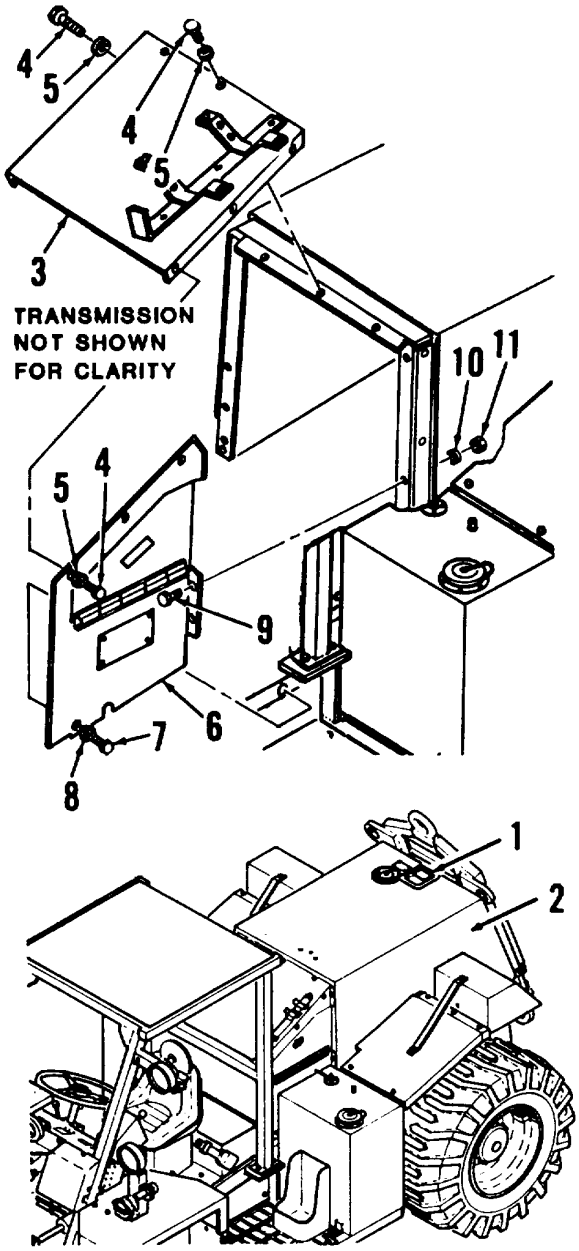


9. Install left transmission side plate (6) using screw (7), washer (8), screws (9), washers (10), and nuts (11).
10. Apply loctite to threads of nine screws (4). Install top transmission cover (3) onto cover frame and transmission side plates using screws and washers (5).
11. Close hood assembly (2). Ensure handle (1) if fully engaged.

FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)
Raise towbar and lock in position (para. 2-126)

END OF TASK



2-132. DOOR SERVICING (MODEL MHE-271 ONLY)

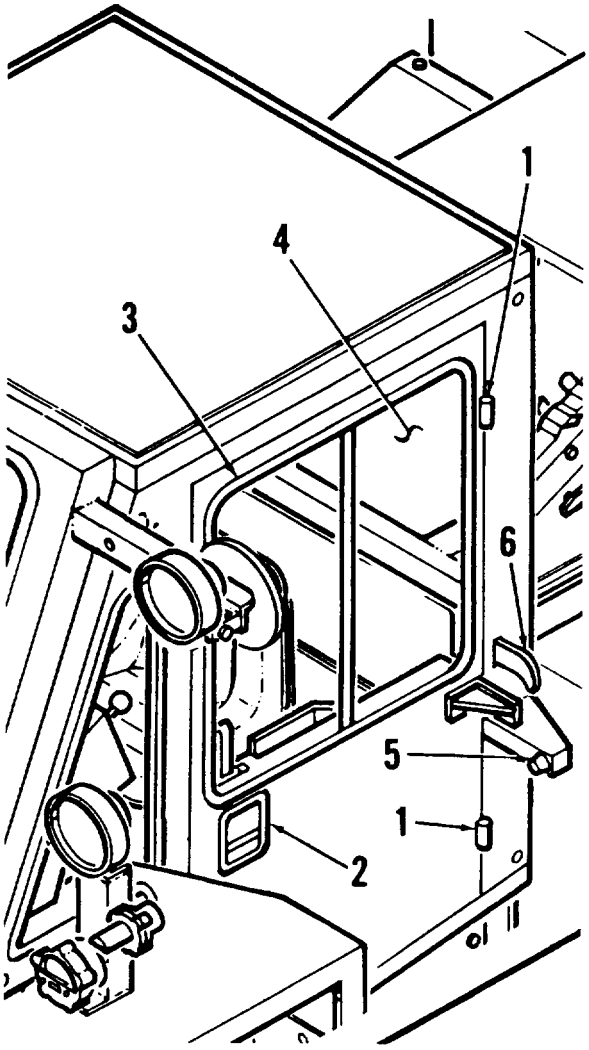
This task covers: Cleaning and Inspection

A. CLEANING

Clean door components in accordance with paragraph 1-24.

B. INSPECTION

1. Inspect door hinges (1) for smooth operation. Ensure bolt and nut are securely fastened.
2. Operate latch (2) from both inside and outside cab. Ensure smooth operation. Check that latch is fully engaged when door is closed.
3. Inspect window seal (3) for damage. Inspect window (4) for cracks or holes.
4. Inspect rubber door bumper (5) for deterioration. Ensure bumper is securely attached.
5. Inspect door hold back (6) for ease of operation.
6. Replace defective parts in accordance with paragraph 3-55.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-133. DOOR REPLACEMENT (MODEL MHE-271 ONLY)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

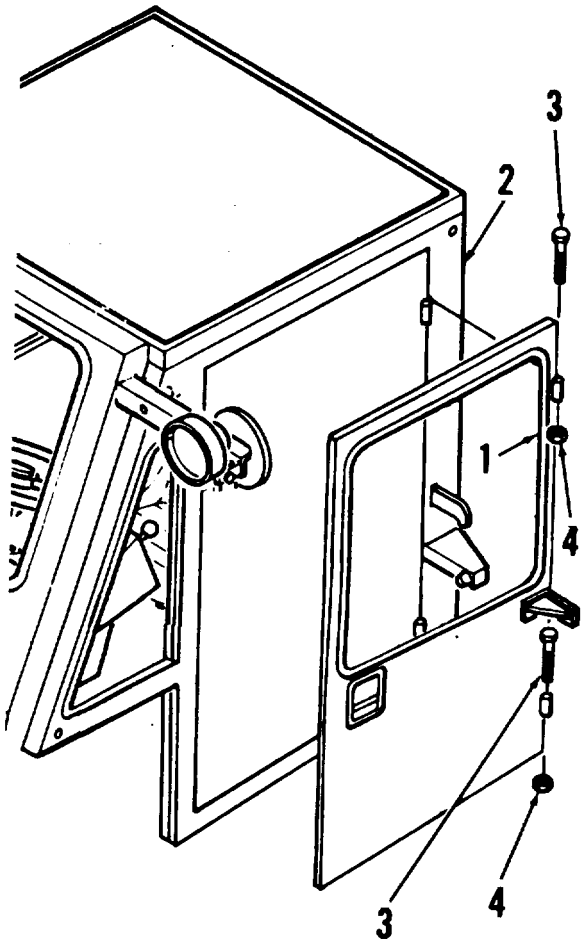
Personnel Required:
2 personnel

A. REMOVAL

CAUTION

To avoid damaging door, enlist the help of an assistant when removing. Hold door in place while hinge bolts are removed.

Remove door (1) from ROPS frame (2) by removing bolts (3) and nuts (4).



B. CLEANING

Clean door components in accordance with paragraph 1-24.

C. INSPECTION

Inspect door components in accordance with paragraphs 1-24 and 2-132.

D. INSTALLATION

Install door (1) onto ROPS frame (2) using bolts (3) and nuts (4).

FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-134. FENDER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App.)

Equipment Condition:
Batteries disconnected (para. 2-78)

Personnel Required:
2 Personnel

A. REMOVAL

WARNING

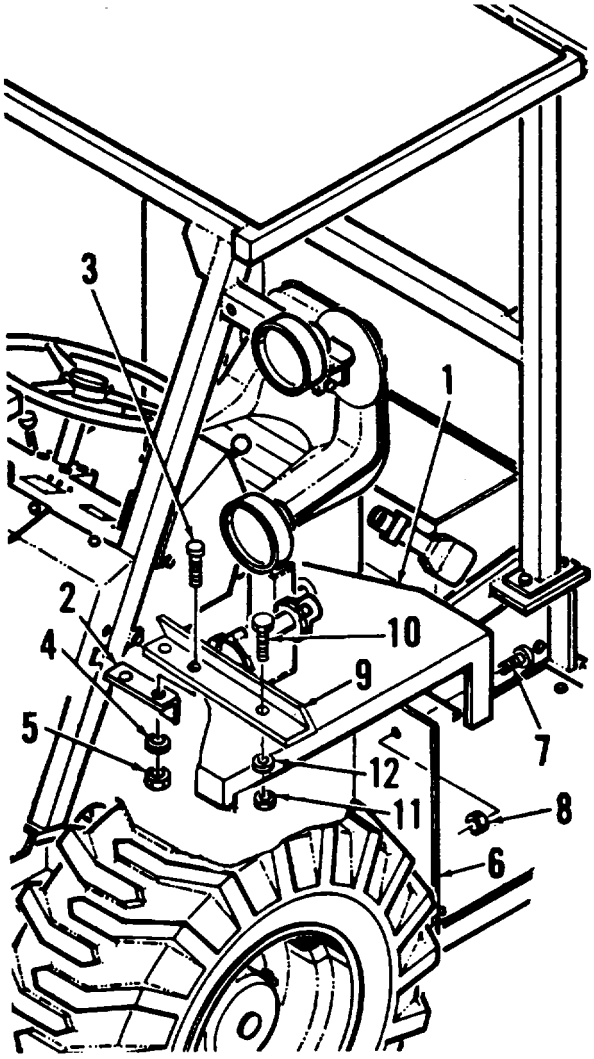
Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

1. Tag and disconnect electrical wiring from left front fender lights.

WARNING

Front fender assembly is heavy and awkward to handle. Enlist the aid of an assistant when removing to prevent injury to personnel and damage to components.

2. Remove left front fender assembly (1) from roll over bracket (2) by removing screws (3), washers (4), and nuts (5).
3. Remove left front fender assembly (1) from chassis (6) by removing screws (7) and nuts (8).
4. Remove left front fender brace (9) from left front fender assembly br removing screw (10), washer (12), and nut (11).

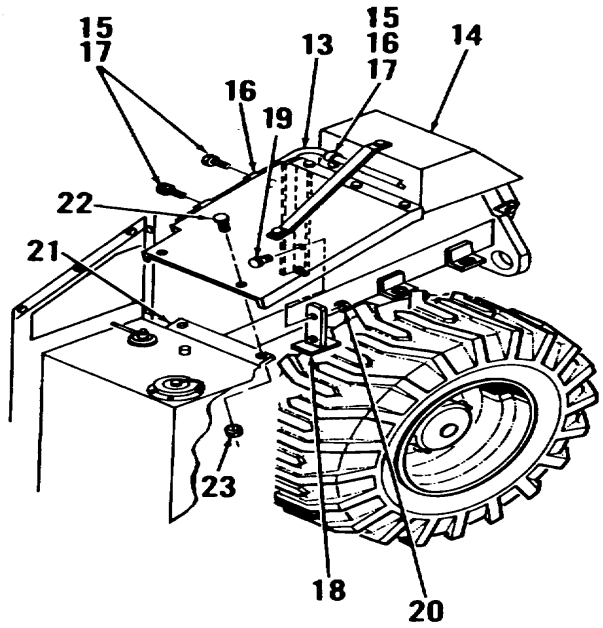


5. Repeat steps 1 through 4 for right front fender.
6. Tag and disconnect electrical wiring from left rear fender lights.

WARNING

Rear fender assembly is heavy and awkward to handle. Enlist the aid of an assistant when removing or installing to prevent injury to personnel and damage to components.

7. Remove electrical wiring (13) from left rear fender assembly (14) by removing screws (15), clamps (16), and nuts (17).
8. Remove left rear fender assembly (14) from bracket (18) by removing screws (19) and nuts (20).
9. Remove left rear fender assembly (14) from fuel tank (21) by removing screws (22) and nuts (23).
10. If replacement is required, remove fender brace (24) from fender (14) by removing screw (25), washer (26), and nut (27).
11. Remove fender brace (24) from light box (28) by removing screw (29) and nut (30).
12. Repeat steps 6 through 11 to remove right rear fender assembly from support bracket and hydraulic tank. On right rear fender two clamps are used to secure electrical wire.

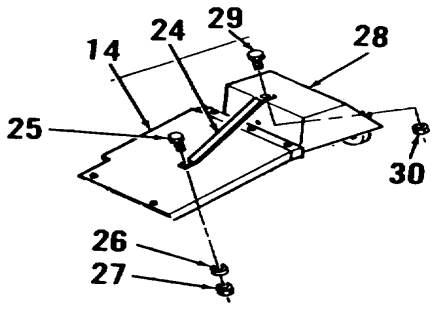


B. **CLEANING**

Clean fenders and components in accordance with paragraph 1-24.

C. **INSPECTION**

Inspect fenders and related components in accordance with paragraph 1-24.



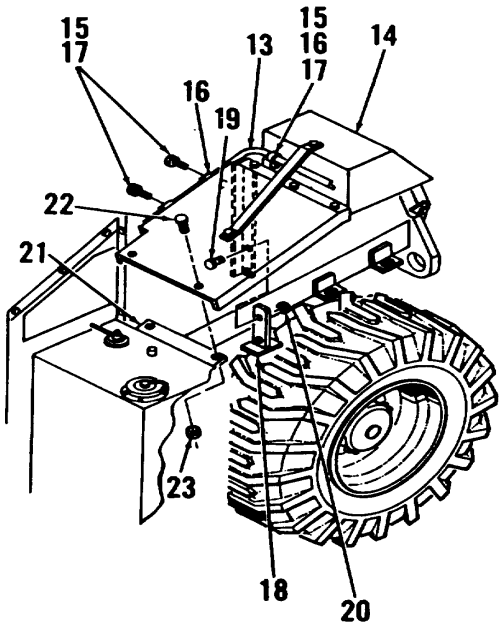
D. INSTALLATION

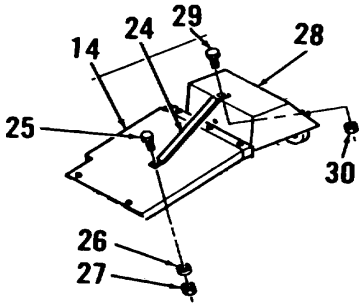
1.Attach fender brace (24) to fender panel (14) using screw (25), washer (26), and nut (27).
2.Attach fender brace (24) to light box (28) using screw (29) and nut (30).

WARNING

Rear fender assembly is heavy and awkward to handle. Enlist the aid of an assistant when installing to prevent injury to personnel and damage to components.

3.Install left rear fender assembly (14) onto fuel tank (21) using screws (22) and nuts (23).
4.Install left rear fender assembly (14) onto bracket (18) using screws (19) and nuts (20).
5.Secure electrical wiring (13) to left rear fender (14) using screws (15), clamps (16), and nuts (17).
6.Connect electrical wiring to left rear fender lights.
7.Repeat step 1 through 6 to install right rear fender onto support bracket and hydraulic tank. On right rear fender two clamps are used to secure electrical wire.





WARNING

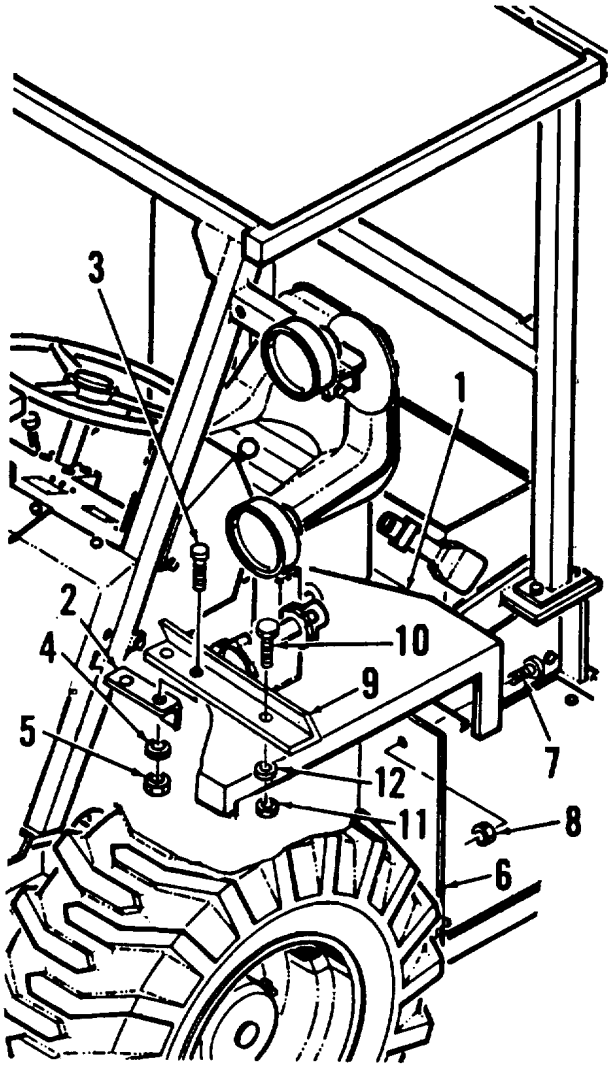
Front fender assembly is heavy and awkward to handle. Enlist the aid of an assistant when installing to prevent injury to personnel and damage to components.

8. Install left front fender assembly (1) onto chassis (6) using screw (7) and nut (8).
9. Position left front fender brace (9) on left front fender assembly and secure with screw (10), washer (12), and nut (11).
10. Install left front fender assembly (1) and left front fender brace (9) onto roll over bracket (2) using screws (3), washers (4), and nuts (5).
11. Connect electrical wiring to left front fender lights.
12. steps 8 through 11 for right front fender.

FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK



2-135. CAB WINDOW REPLACEMENT (MODEL MHE-271 ONLY)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

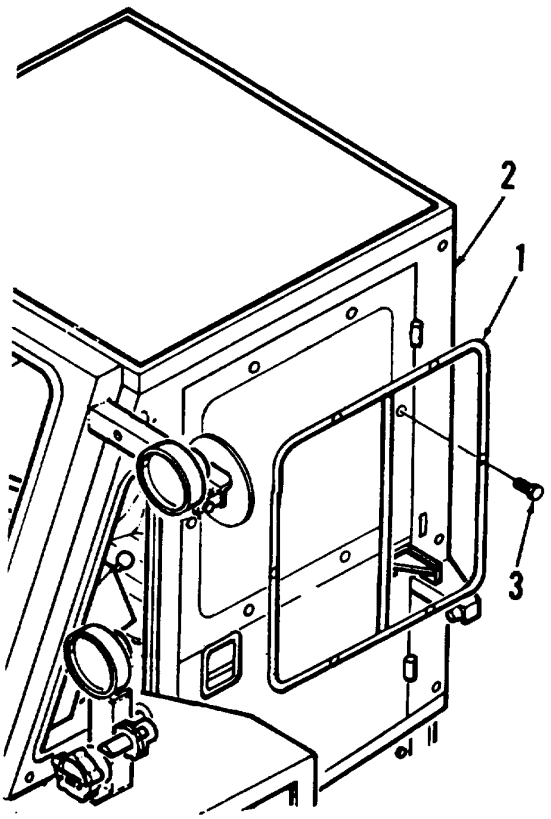
Personnel Required:
2 personnel

Materials / Parts:
Urethane Sealant (38, App. C)

A. REMOVAL

CAUTION
To avoid damaging windows, enlist the help of an assistant when removing. Hold window in place while removing attaching parts.

1. REMOVE DRIVERS SIDE WINDOW (1) FROM DOOR (2) BY REMOVING SIX SCREWS (3).



2 REMOVE FRONT WINDSHIELD WIPER ARM (4). REMOVE FRONT WINDOW (7)

a Remove windshield wiper arm (4) from wiper motor (5) to allow window removal

b Release seal on inside of window and remove window glass (7) from front panel (8).

c If damaged, remove window rubber (6) from front panel (8).

3 REMOVE REAR WINDSHIELD WIPER ARM (9) REMOVE REAR WINDOW (13)

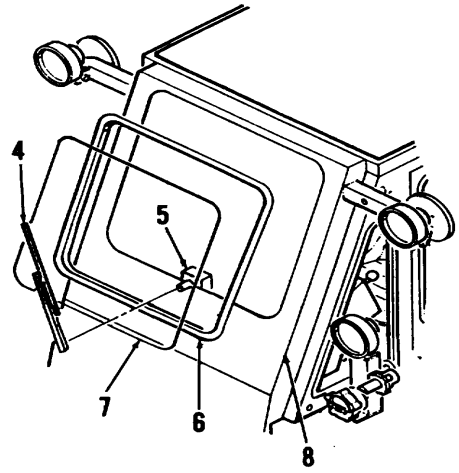
a Remove windshield wiper arm (9) from wiper motor (10).

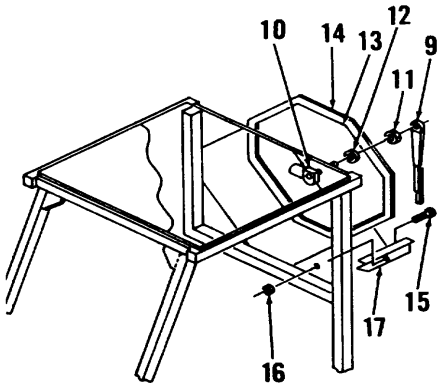
b Remove nut (11) and collar (12) from wiper motor (10) to allow window removal.

c Remove two top hold-downs (17) by removing screws (15) and nuts (16).

d Loosen two bottom hold-downs (17) and remove assembled window rubber (14) and window (13).

e Remove window rubber. (14) from window (13), using care not to damage rubber.





4. RELEASE SEAL ON OUTSIDE OF RIGHT SIDE WINDOW (18). CAREFULLY REMOVE RIGHT SIDE WINDOW FROM WINDOW FRAME (20).
5. IF DAMAGED, REMOVE WINDOW RUBBER (19) FROM WINDOW FRAME (20).

B.CLEANING

Clean windows and related components in accordance with paragraph 1-24.

C.INSPECTION

1.Inspect windows for cracks or holes. Check for chipped edges.

2.Inspect window rubber for cracking, deformation, or permanent set.

D.INSTALLATION

1.IF WINDOW RUBBER (19) WAS REMOVED, INSTALL IN RIGHT SIDE WINDOW FRAME (20).

2.INSTALL WINDOW (18) INTO WINDOW RUBBER (19). RESEAL RUBBER ON OUTSIDE OF WINDOW USING URETHANE SEALANT.

3.INSTALL REAR WINDOW (13) AND WINDSHIELD WIPER ARM (9).

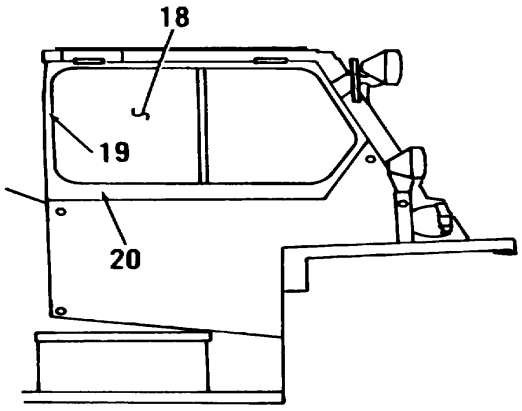
a. Install window rubber (14) onto window (13), using care not to damage rubber.

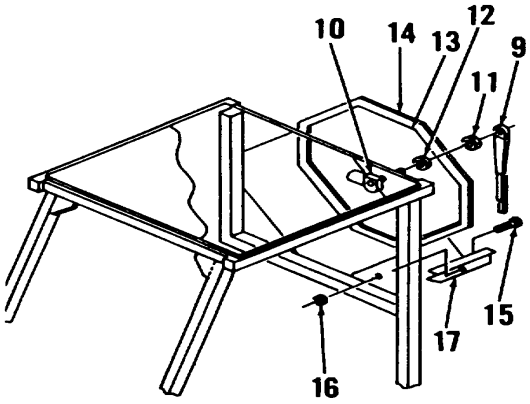
b. Install assembled window rubber (14) and window (13) into two bottom hold-downs (17). Tighten hold-downs.

c. Install two top hold-downs (17) using screws (15) and nuts (16).

d. Install nut (11) and collar (12) onto wiper motor (10).

e. Install windshield wiper arm (9) onto wiper motor (10).



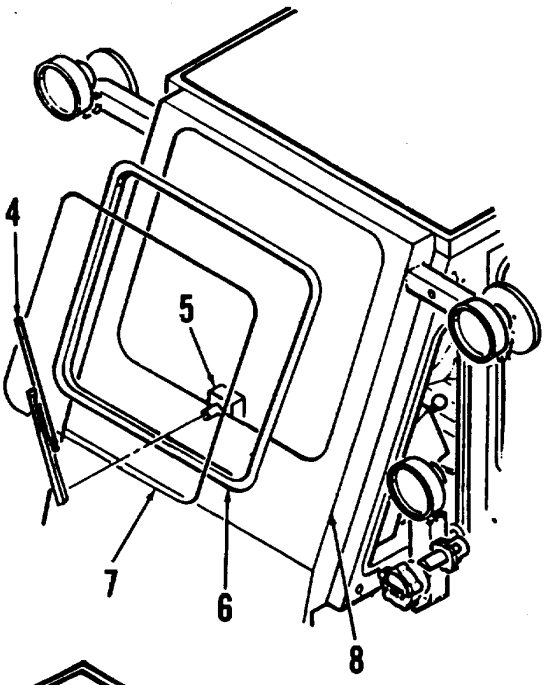


4. INSTALL FRONT WINDOW (7) AND FRONT WINDSHIELD WIPER ARM (4).
   a. If removed, install window rubber (6 into front panel (8) using care not to damage rubber.

   b. Carefully install window (7) into window rubber (6). Seal rubber on inside of front panel using urethane sealant.

   c. Attach windshield wiper arm (4) to wiper motor (5).

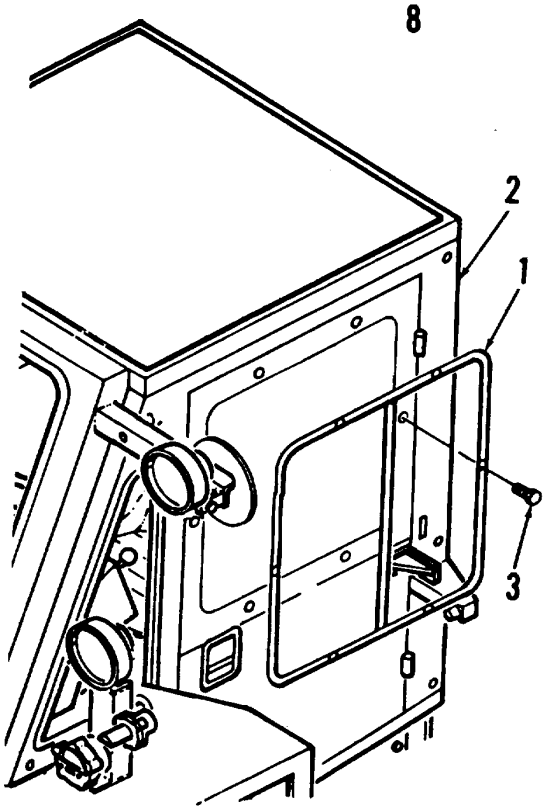
5. INSTALL DRIVERS SIDE WINDOW (1) ONTO DOOR (2) USING SIX SCREWS (3). SEAL AROUND OUTSIDE OF WINDOW USING URETHANE SEALANT.



FOLLOW-ON MAINTENANCE:

None

END OF TASK



2-136. FLOOR MAT REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App E)

Materials / Parts:
Urethane Sealant (38, App C).
Cotter Pin, Item 5 (1 ea.)

Equipment Condition:
Accelerator actuator removed (para. 2-44)
Directional control valve removed (para 2-150)
Seat assembly removed (para. 2-138)

References:
TM 10-3930-664-24P

A. REMOVAL

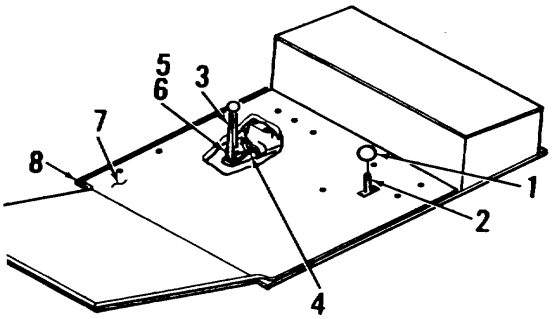
1. Unscrew knob (1) from axle disconnect lever (2).
2. Remove steering selector handle (3) from steering selector valve (4) by removing cotter pin (5) and clevis pin (6). Discard cotter pin.
3. Remove floor mat (7) from floor plate (8).

B. CLEANING

1. Clean floor mat and floor plate in accordance with paragraph 1-24.
2. Ensure all residual sealant is removed from floor plate. Residual sealant will prevent proper installation.

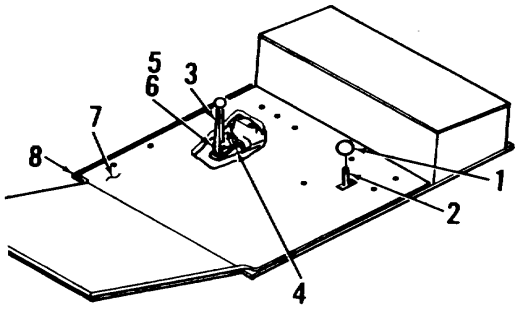
C. INSPECTION

Inspect floor mat for cuts, tears, deformation, or deterioration. Replace if damaged.



D. INSTALLATION

1. Position floor mat (7) from floor plate (8), ensuring proper alignment of component mounting holes.
2. Install steering selector handle (3) onto steering selector valve (4) using clevis pin (6) and new cotter pin (5).
3. Screw knob (1) onto axle disconnect lever (2).
4. Caulk as required using urethane sealant to fill voids. Allow sealant to dry completely before mat is disturbed.



FOLLOW-ON MAINTENANCE:
Install accelerator actuator (para.. 2-44)
Install directional control valve
(para 2-150)
Install seat assembly (para. 2-138)
END OF TASK

2-137. FLOOR PLATE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App E)

Personnel Required:
2 Personnel

Equipment Condition:
Floor mat removed (para. 2-135)
Steering selector valve removed (para 2-122)
Tool box removed (para. 2-140)

A. REMOVAL

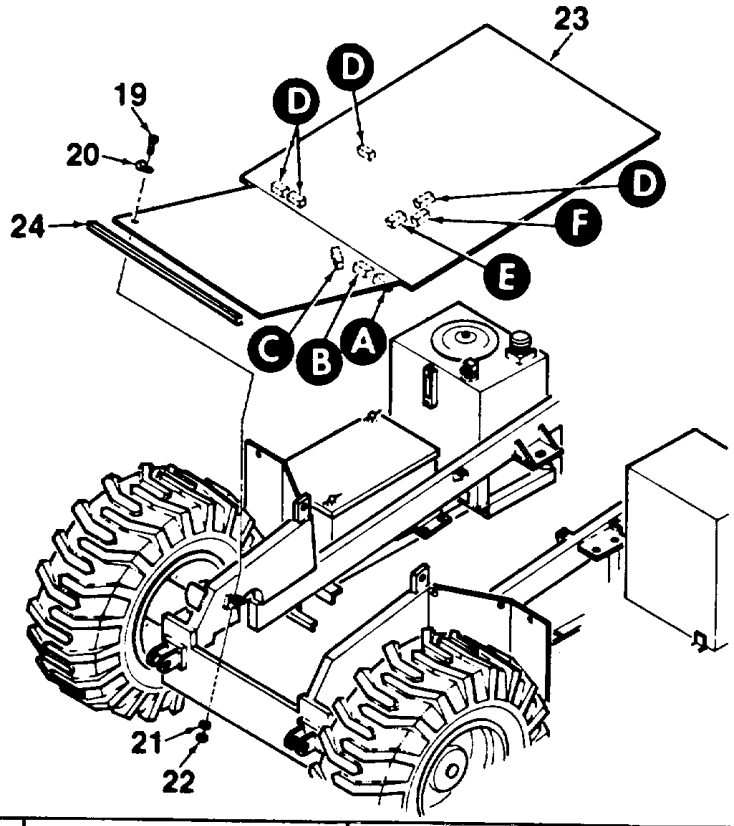
1. REMOVE HOSES AND HOSE CLAMPS FROM BOTTOM OF FLOOR PLATE (23).

NOTE

The following clamp removal procedures are for typical clamp arrangements. Individual clamp assembly components may vary. Tag hoses and clamps to eliminate confusion during installation. Loosely assemble components after removal to prevent loss.

   a. Remove two bolts (1), cover plate (2), and two-piece tube clamp (3). Separate clamp and remove hose.
   b. Remove two stacking bolts (4), locking plate (5), and two-piece tube clamp (3) from bottom of floor plate (23). Separate clamp and remove hose.
   c. Remove bolt (6), cover plate (7), and two-piece tube clamp (8). Separate clamp and remove hoses.
   d. Remove stacking bolt (9), locking piece (10), and two-piece tube clamp (8) from bottom of floor plate (23) Separate clamp and remove hoses.
   e. Remove two bolts (12), cover plate (13), and two-piece tube clamp (14). Separate clamp and remove hose.
   f. Remove two stacking bolts (15), locking plate (16), and two-piece tube clamp (14) from bottom of floor plate (23).. Separate clamp and remove hose.
   g. Remove two bolts (17), cover plate (18), and two-piece tube clamp (11). Separate clamp and remove hose.

2. REMOVE BOLTS (19), CLAMP (20), WASHERS (21), AND NUTS (22) THAT SECURE FLOOR PLATE (23) TO FORKLIFT CHASSIS.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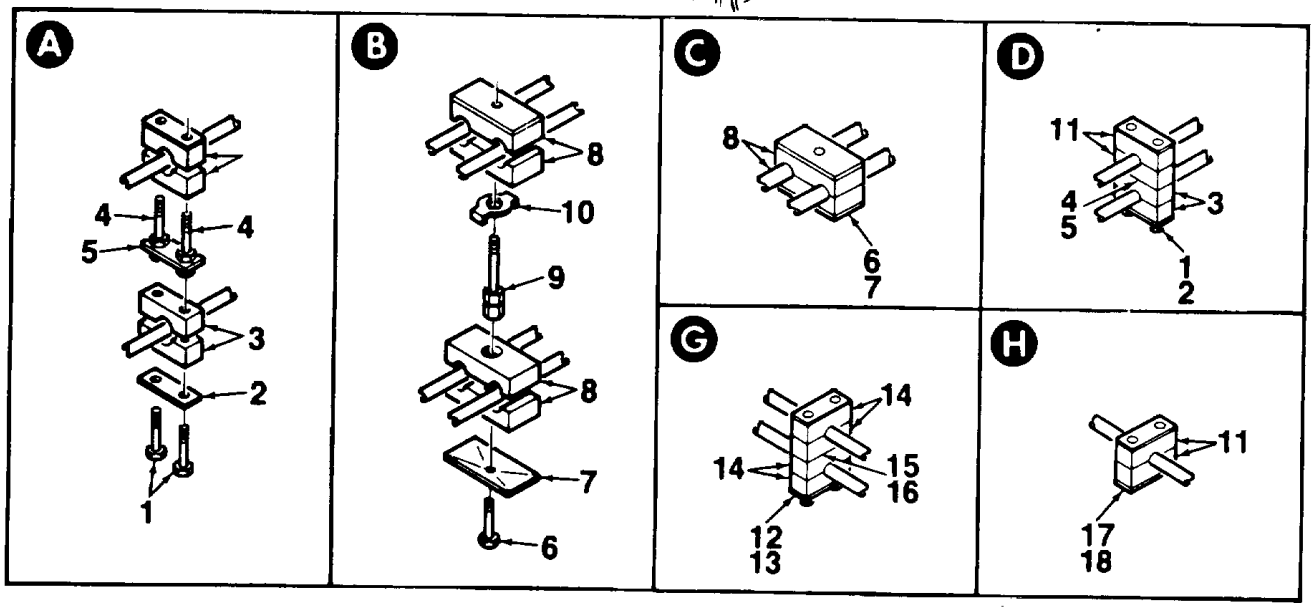
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WARNING

Floor plate (23) is heavy and awkward. Enlist the help of an assistant when removing to prevent injury to personnel and damage to components.

3. CAREFULLY LIFT FLOOR PLATE (23) OFF OF FORKLIFT CHASSIS.

B. CLEANING

Clean floor plate in accordance with paragraph 1-24.

C. INSPECTION

Inspect floor plate and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. CAREFULLY LIFT FLOOR PLATE (23) UP AND POSITION ONTO FORKLIFT CHASSIS. SECURE USING BOLTS (19), CLAMP (20), WASHERS (21), AND NUTS (22).
2. INSTALL HOSES AND HOSE CLAMPS ONTO BOTTOM OF FLOOR PLATE (23).

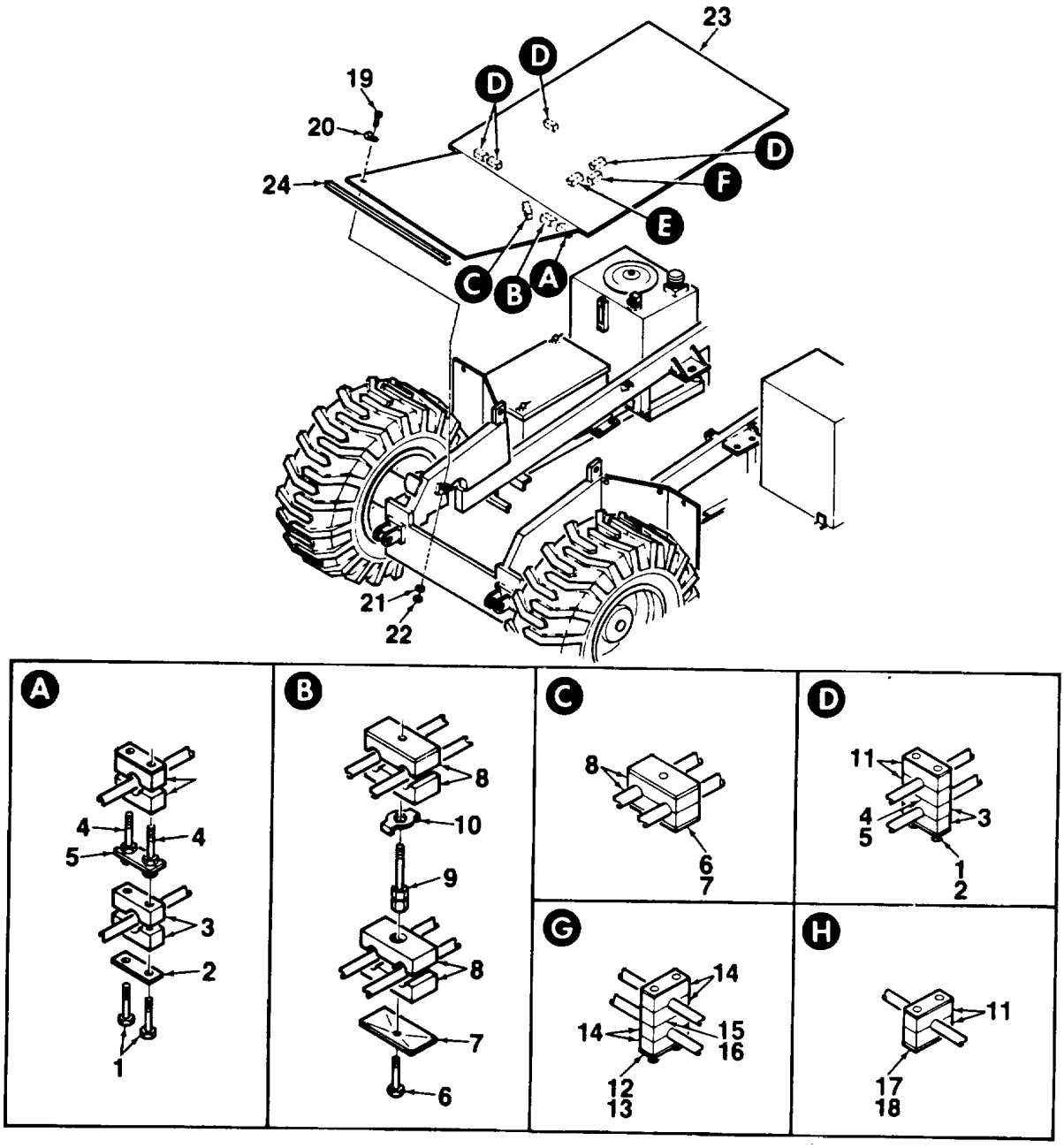
NOTE

The following clamp procedures are for typical clamp arrangements. Individual clamp assembly components may vary.

a. Insert hose into base of two-piece tube clamp (11). Mate clamp halves and install onto bottom of floor plate (23) using two bolts (17) and cover plate (18). b. Insert hose into base of two-piece tube clamp (14). Mate clamp halves and install onto bottom of floor plate (23) using two stacking bolts (15) and locking plate (16). c. Insert hose into base of second two-piece tube clamp (14). Mate clamp halves and attach to first clamp using bolts (12) and cover plate (13).
d. Insert hoses into base of two-piece tube clamp (8). Mate clamp halves and install onto bottom of floor plate (23) using stacking bolt (9) and locking piece (10).
e. Insert hoses into base of second two-piece tube clamp (8). Mate clamp halves and attach to first clamp using bolt (6) and cover plate (7).
f. Insert hose into base of two-piece tube clamp (3. Mate clamp halves and install onto bottom of floor plate (23) using two stacking bolts (4) and locking plate (5).
g. Insert hose into base of second two-piece tube clamp (3). Mate clamp halves and attach to first clamp using two bolts (1) and cover plate (2).

FOLLOW-ON MAINTENANCE:

Install steering selector valve (para 2-122)
Install tool box (para. 2-140)
Install floor mat (para. 2-135)
END OF TASK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2-138. SEAT ASSEMBLY REPAIR

This task covers: Removal, Disassembly, Cleaning, Inspection, Assembly, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Reference:
TC 9-510

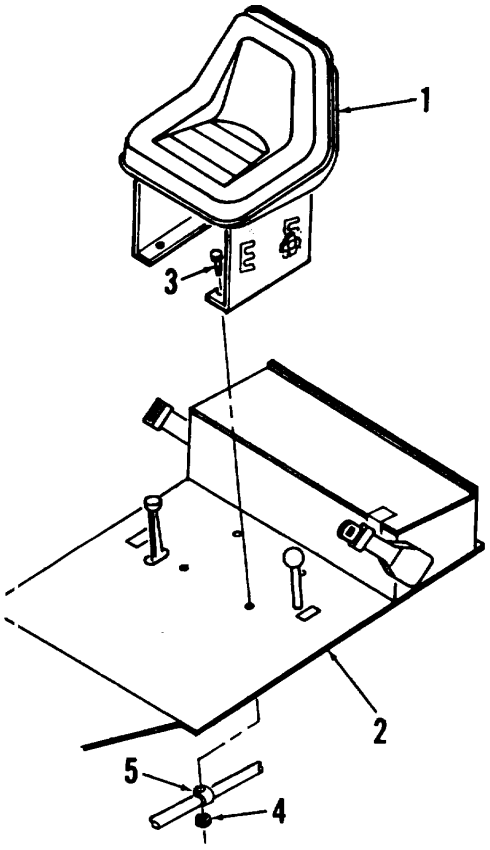
Personnel Required:
2 Personnel

A. REMOVAL

WARNING

Seat assembly is heavy and awkward. Enlist the help of an assistant when removing to prevent injury to personnel and damage to components.

Remove seat assembly (1) from floorplate (2) by removing screws (3) and nuts (4). Do not remove clamp (5) from hose.



B. DISASSEMBLY

1. Remove assembled seat (6) and adjuster set (7) from upper riser by removing nuts (8).
2. Remove adjuster set (7) from seat (6) by removing screws (9) and spacers (10).
3. Remove clamping knobs (11) from upper riser studs. Separate upper riser (12) from lower risers (13).

C. CLEANING

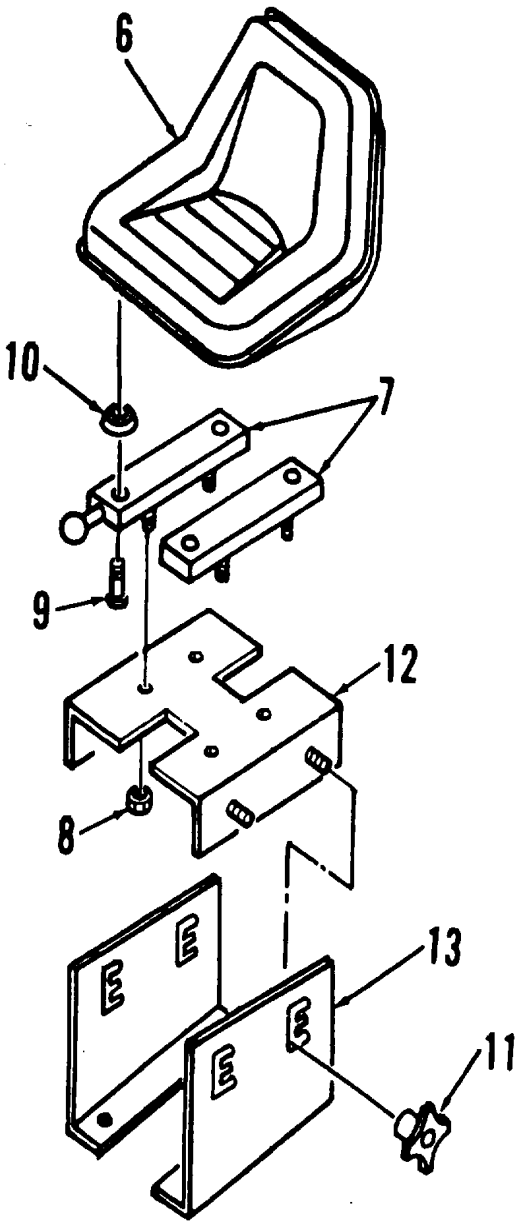
Clean seat assembly components in accordance with paragraph 1-24.

D. INSPECTION

1. Inspect seat assembly components in accordance with paragraph 1-24. Inspect seat for rips or tears. Ensure seat is securely fastened to base.

E. ASSEMBLY

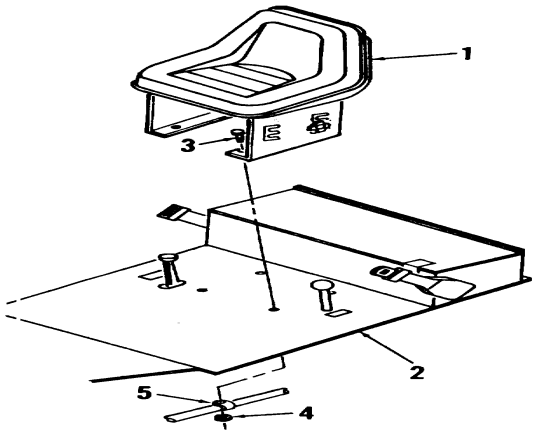
1. Mate upper riser (12) to lower risers (13). Secure using clamping knobs (11).
2. Install adjuster set (7) onto seat (6) using screws (9) and spacers (10).
3. Install assembled seat (6) and adjuster set (7) onto upper riser using nuts (8).



F. INSTALLATTION

WARNING

Seat assembly Is heavy and awkward. Enlist the help of an assistant when installing to prevent injury to personnel and damage to components. Install seat (1) onto floor plate (2) using screws (3) and nuts (4). Ensure clamp (5) us secured.



FOLLOW-ON MAINTENANCE:
None
END OF TASK

2-139. SEAT BELT REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

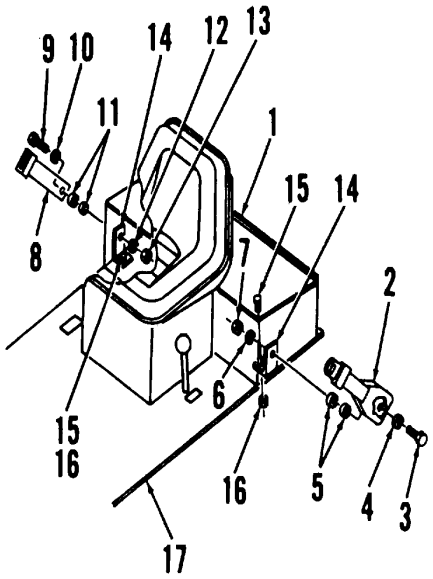
Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

A. REMOVAL

WARNING

Secure tool box top when removing seat belts to prevent accidental injury.

1. Open tool box (1) to gain access to seat belt attaching parts. Secure tool box top in place.
2. Remove male seat belt (2) from bracket (14) by removing screw (3), washers (4, 5, 6), and nut (7).
3. Remove female seat belt (8) from bracket . (14) by removing screw (9), washers (10, 11, 12), and nut (13).
4. If required, remove brackets (14) from tool box (1) and floorplate (17) by removing screws (15) and nuts (16).



B. CLEANING

Clean seat belts in accordance with paragraph 1-24.

C. INSPECTION

Inspect seat belts and related components in accordance with paragraph 1-24.

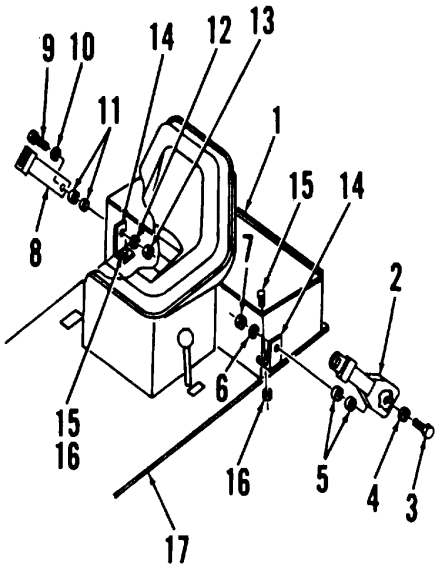
D. INSTALLATION

1. If removed, install brackets (14) into tool box (1) and onto floorplate (17) using screws (15) and nuts (16).

2.Install female seat belt (8) onto bracket (14) using screw (9), washers (10, 11, 12), and nut (13).

3.Install male seat belt (2) onto bracket (14) using screw (3), washers (4, 5, 6), and nut (7).

4.Close tool box (1).



FOLLOW-ON MAINTENANCE:
None
END OF TASK

2-140. TOOL BOX REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (I, App E)

Equipment Condition:
Batteries disconnected (para. 2-78)
Seat belts removed (para. 2-139)

Personnel Required:
2 Personnel

A. REMOVAL

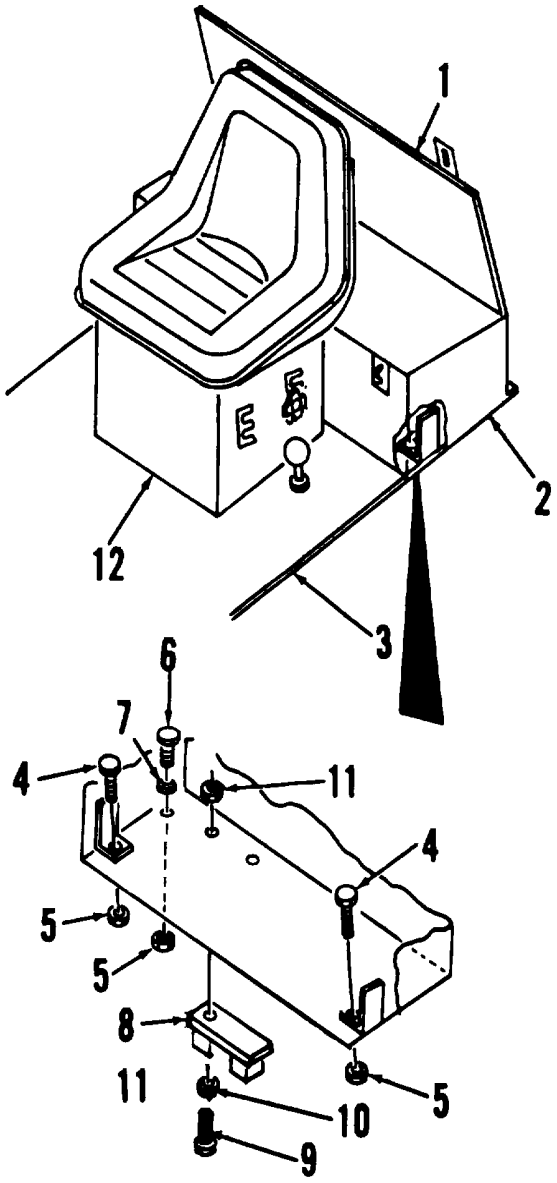
WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

WARNING

Secure tool box lid when removing components to prevent accidental injury.

1. Open tool box lid (1) to gain access to attaching parts. Secure tool box lid in place.
2. Release DCA shunt (8) from tool box (2) by removing screws (9), lockwashers (10), and nuts (11).
3. Remove screws (4), nuts (5), screws (6), washers (7), and nuts (5).
4. Slide tool box (2) out from behind seat assembly (12).



B. CLEANING
Clean tool box in accordance with paragraph 1-24.

C. INSPECTION
Inspect tool box in accordance with paragraph 1-24.

D. INSTALLATION

1. Position tool box (2) behind seat assembly (12) on floorplate (3).

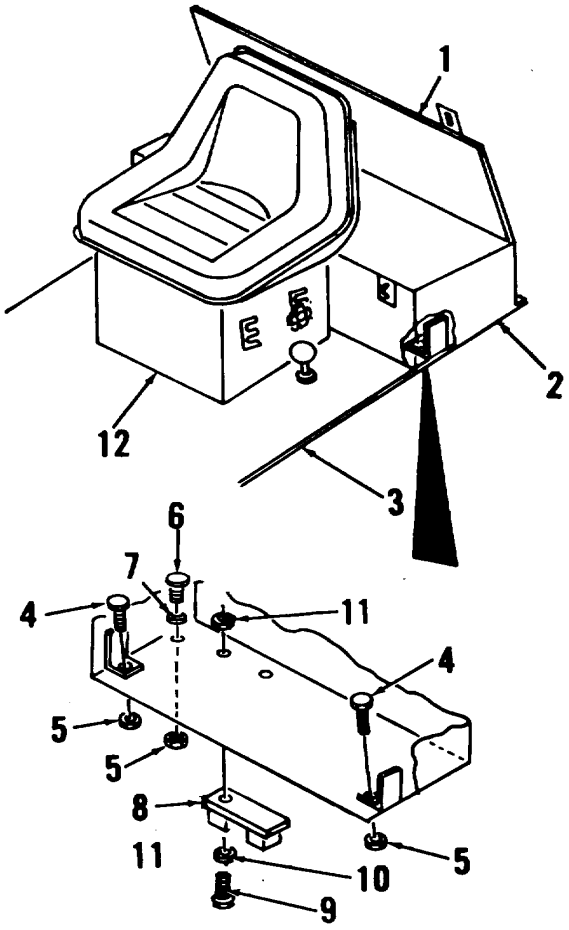
2. Secure tool box (2) to floorplate (3) using screws (4, 6), washers (7), and nuts (5).

3. Attach DCA shunt (8) to floor plate (3) using screws (9), lockwashers (10), and nuts (11).

FOLLOW-ON MAINTENANCE:

Install seat belts (para. 2-139)
Connect battery cables (para. 2-78)

END OF TASK



2-141. DECON CAN BRACKET REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

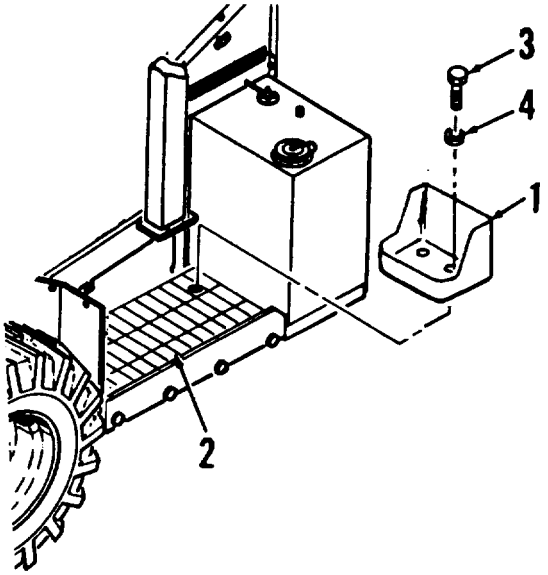
Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

A. REMOVAL
Remove decon can bracket (1) from step plate (2) by removing screws (3), washers (4), and nuts (5).

B. CLEANING
Clean bracket in accordance with paragraph 1-24.

C. INSPECTION
Inspect bracket in accordance with paragraph 1-24.

D. INSTALLATION
Install decon can bracket (I) onto step plate (2) using screws (3), washers (4), and nuts (5).



FOLLOW-ON MAINTENANCE:
None
END OF TASK

Section XX. BODY, CHASSIS, AND HULL ACCESSORY ITEM MAINTENANCE

2-142. WINDSHIELD WIPER ASSEMBLY REPLACEMENT (MODEL MHE-271 ONLY)

This task covers: Removal, Clearing, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

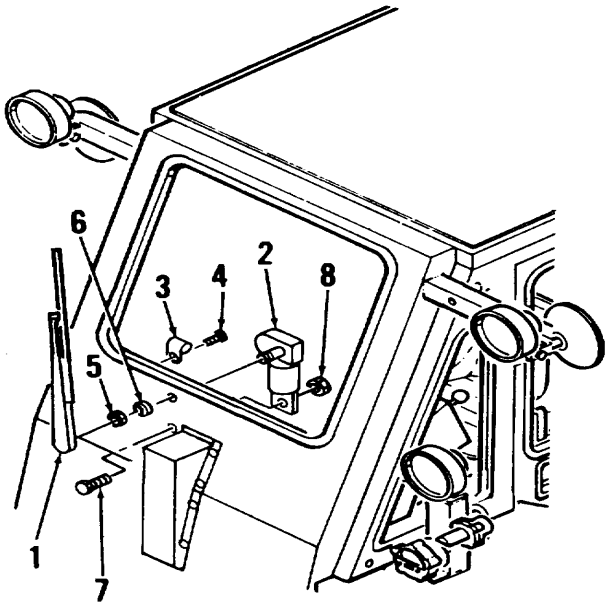
Equipment Condition:
Batteries disconnected (para. 2-78)

A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

1 Remove front windshield wiper arm (1) from wiper motor (2).
2 Remove clamp (3) securing electrical wiring to instrument panel by removing screw (4).
3 Remove nut (5) and collar (6) from wiper motor shaft.
4 Remove wiper motor (2) from cab front panel by removing screw (7) and nut (8).
5 Remove rear windshield wiper arm (9) from wiper motor (10).
6 Remove nut (11) and collar (12) from wiper motor shaft.
7 Remove wiper motor (10) from ROPS frame by removing screw (13) and nut (14).
8 Tag and disconnect electrical wiring from windshield wiper motors (2, 10).

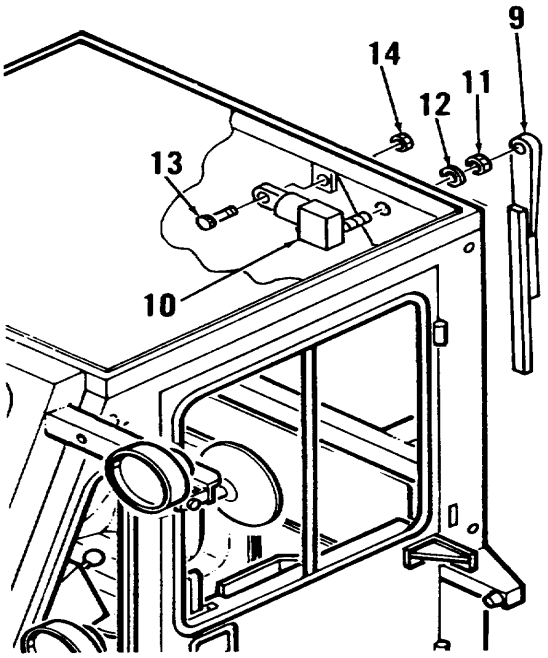


B. CLEANING

Clean windshield wiper assemblies in accordance with paragraph 1-24.

C. INSPECTION

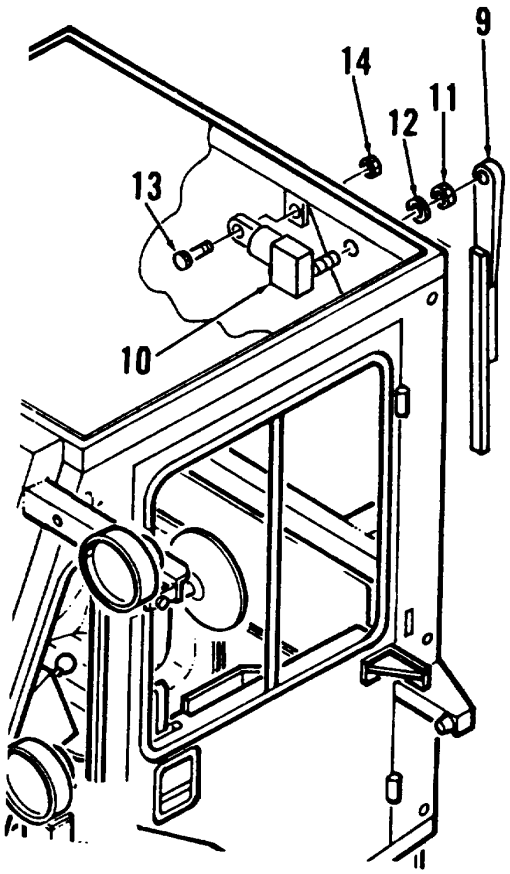
1 Inspect wiper assemblies and related components in accordance with paragraph 1-24.
2 Inspect wiper blade (1) and wiper arm (2) for damage or deformation. Replace as required.
3 Replace wiper motor (3) if windshield wiper fails to operate or does not operate smoothly.
4 Repair of the windshield wiper assembly is limited to removal and replacement of damaged components.

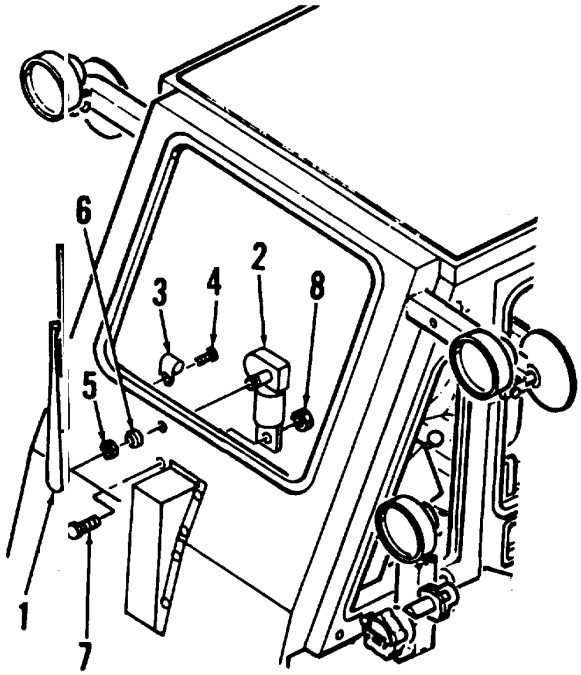


D. INSTALLATION

1 Connect electrical wiring to windshield wiper motors (2, 10).
2 Install rear wiper motor (10) to ROPS frame using screw (13) and nut (14).
3 Install nut (11) and collar (12) onto wiper motor shaft.
4 Attach rear windshield wiper arm (9) to wiper motor (10).
5 Install front wiper motor (2) onto cab front panel using screw (7) and nut (8).
6 Install nut (5) and collar (6) onto wiper motor shaft.
7 Attach clamp (3) securing electrical wiring to instrument panel using screw (4).
8 Attach front windshield wiper arm (1) to wiper motor (2).

FOLLOW-ON MAINTENANCE:
Connect battery cables (para. 2-78)
END OF TASK





2-143. MIRROR REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Materials / Parts:
Loctite 242 (20, App. C)

A. REMOVAL

1 Remove left mirror (1) from bracket (2) by removing screw (3).
2 Remove bracket (2) from ROPS frame by removing screw (4), washer (5), and nut (6).
3 Repeat steps 1 and 2 for right mirror.

B. CLEANING

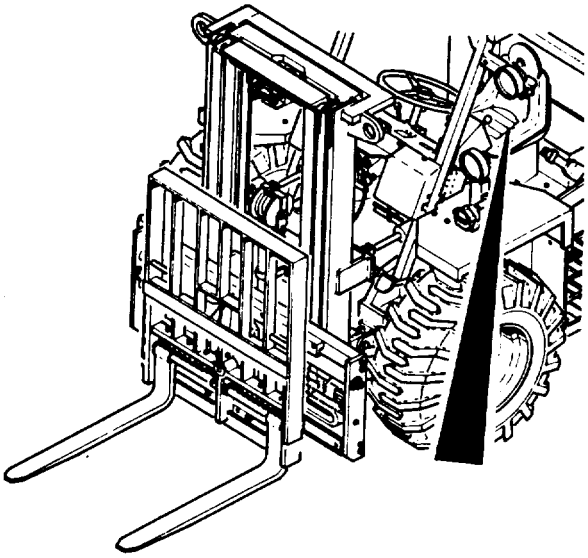
Clean mirrors in accordance with paragraph 1-24.

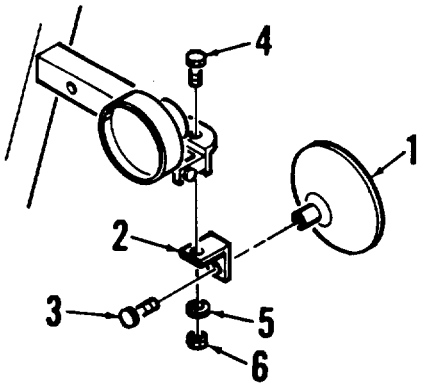
C. INSPECTION

Inspect mirrors for cracks. Ensure glass is securely fastened to mirror plate.

D. INSTALLATION

1 Install left mirror bracket (2) onto ROPS frame using screw (4), washer (5), and nut (6).
2 Apply loctite to screw (3). Install left mirror (1) onto bracket (2) using screw.
3 Repeat steps 1 and 2 for right mirror.





FOLLOW-ON MAINTENANCE:
None
END OF TASK

2-144. DEFROSTER FAN ASSEMBLY REPLACEMENT (MODEL MHE-271 ONLY)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

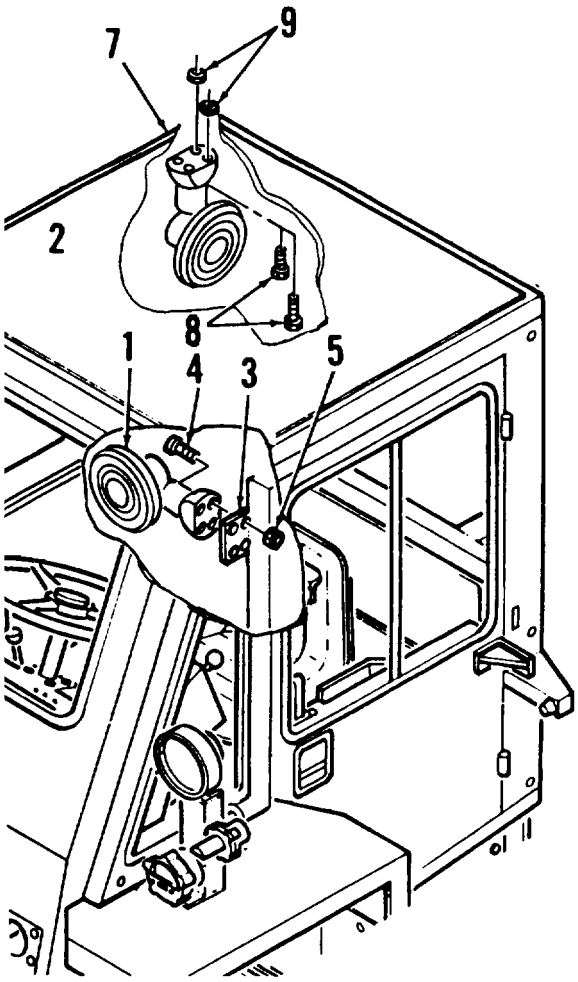
Equipment Condition:
Batteries disconnected (para. 2-78)

A. REMOVAL

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

1 Tag and disconnect electrical wiring from defroster fans (1, 2).
2 Remove front defroster fan (1) from bracket on driver side panel (3) by removing screws (4) and nuts (5).
3 Remove rear defroster fan (2) from right window frame (7) by removing screws (8) and nuts (9).



B. CLEANING

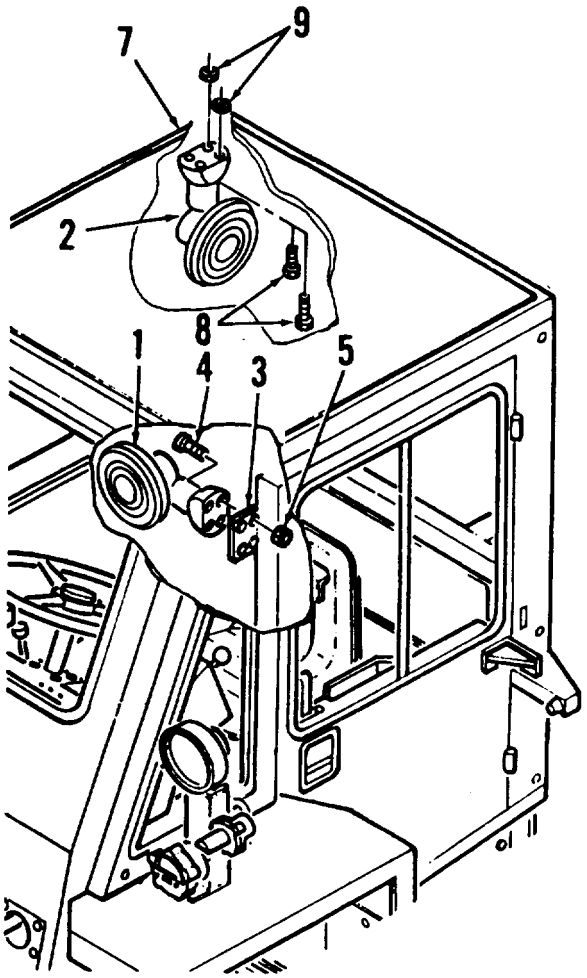
Clean defroster fans in accordance with paragraph 1-24.

C. INSPECTION

1 Inspect fans for obvious damage. Inspect for evidence of overheating or shorting.
2 Inspect fan blade guards for bent or broken wire. Ensure fan blade does not rub against guard.
3 Inspect fan blades for cracks, splits, or bends.

D. INSTALLATION

1 Install rear defroster fan (2) onto right window frame (7) using screws (8) and nuts (9).
2 Install front defroster fan (1) onto bracket on driver side panel (3) using screws (4) and nuts (5).
3 Connect electrical wiring to defroster fans (1, 2).



FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK

2-145. HEATER ASSEMBLY REPLACEMENT (MODEL MHE-271 ONLY)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment: **Equipment Condition:**
General Mechanics Tool Kit (1, App. E) Batteries disconnected (para. 2-78)
Drain Pan (10, App. E)

A. REMOVAL

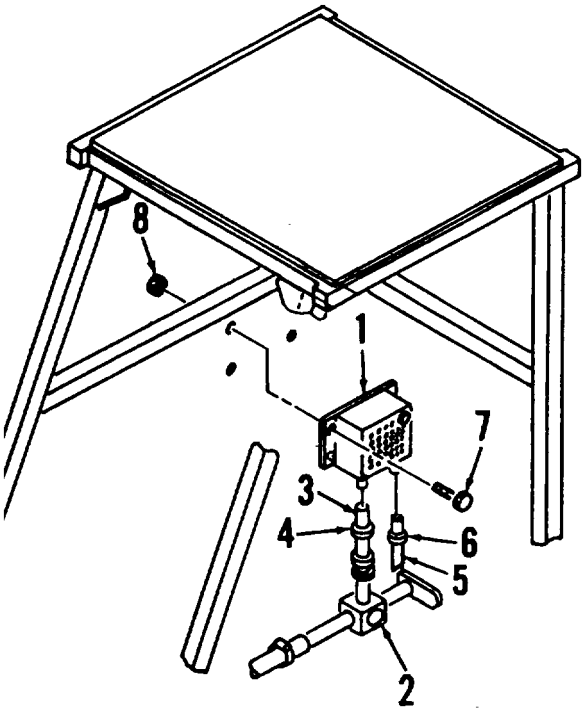
WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

WARNING

Do not remove heater hoses when engine is hot. Hot water could flow out and burn you.

1 Tag and disconnect electrical wiring from heater assembly (1).
2 Close heater shutoff valve (2) by turning valve handle.
3 Place container beneath heater hoses during removal to catch residual fluids.
4 Tag and disconnect hoses (3, 5) from heater assembly (1) by loosening clamps (4, 6).
5 Remove heater assembly (1) from right side panel by removing screws (7) and nuts (8).



B. CLEANING

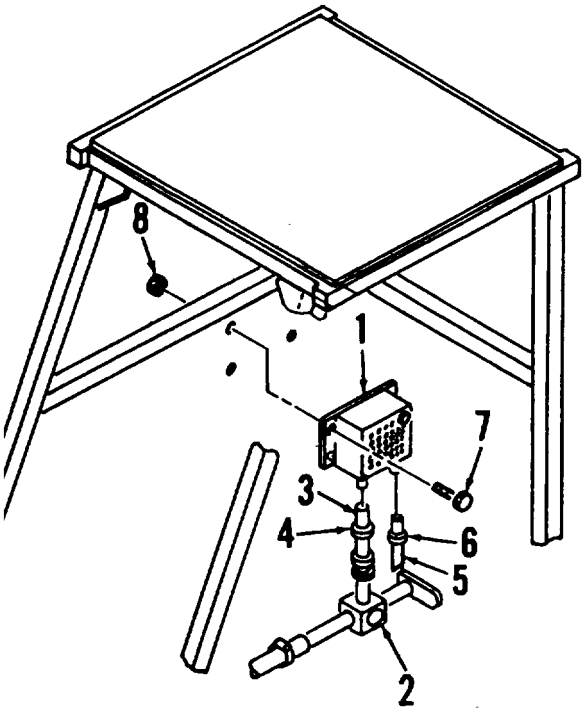
Clean heater assembly and related components in accordance with paragraph 1-24.

C. INSPECTION

Inspect heater assembly and related components in accordance with paragraph 1-24.

D. INSTALLATION

1 Install heater assembly (1) onto right side panel using screws (7) and nuts (8).
2 Connect hoses (3, 5) to heater assembly (1) using clamps (4, 6).
3 Open heater shutoff valve (2) by turning valve handle.
4 Connect electrical wiring to heater assembly (1).



FOLLOW-ON MAINTENANCE:
Connect battery cables (para. 2-78)
END OF TASK

2-146. HEATER HOSE REPLACEMENT (MODEL MHE-271 ONLY)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

Equipment Condition:
Towbar lowered (para. 2-126)

Materials / Parts:
Loctite 242 (20, App. C)

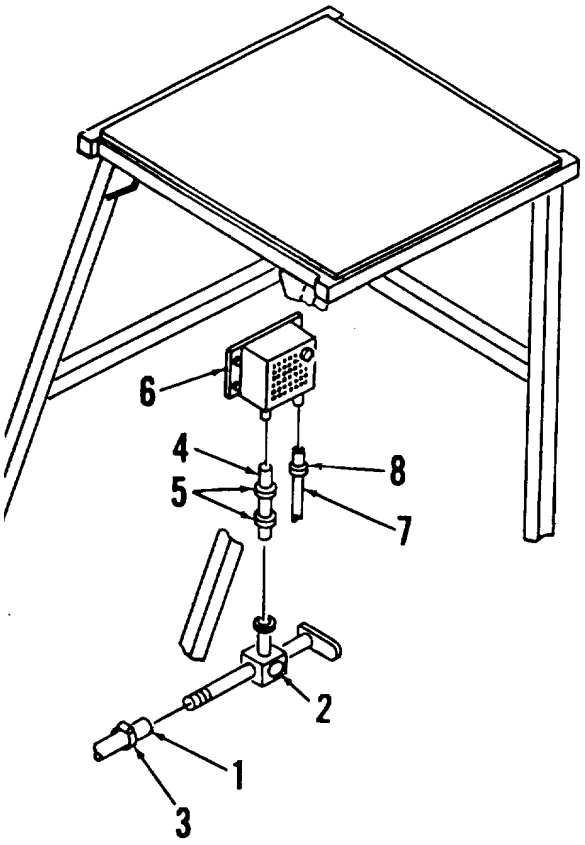
A. REMOVAL

WARNING

Do not remove heater hoses when engine is hot. Hot water could flow out and burn you.

1 PLACE CONTAINER BENEATH HEATER HOSES DURING REMOVAL TO CATCH RESIDUAL FLUIDS.
2 TAG AND DISCONNECT HOSES (1, 4, 7) FROM HEATER COMPONENTS.

a. Tag inlet hose (1). Disconnect inlet hose from heater shutoff valve (2) by loosening clamp (3).
b. Remove heater shutoff valve (2) and hose (4) from heater assembly (8) by loosening clamps (5).
c. Tag outlet hose (7). Disconnect outlet hose from heater assembly (6) by loosening clamp (8).



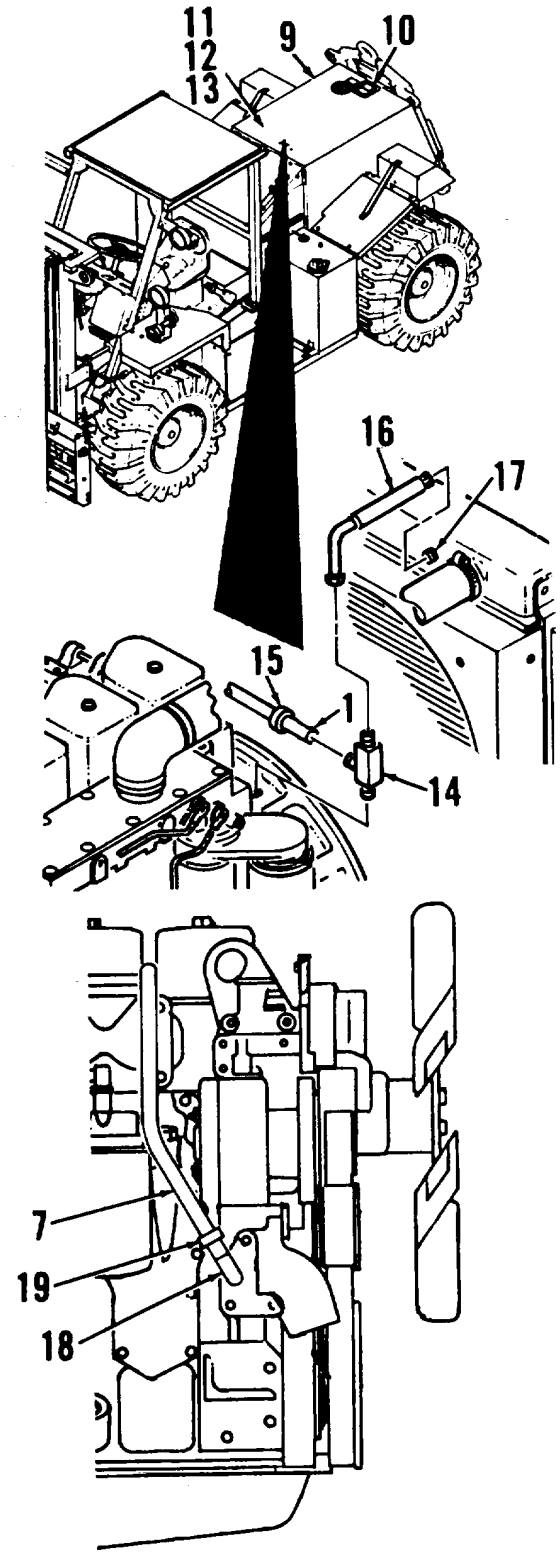
3 RELEASE HOOD ASSEMBLY (9) BY LIFTING HANDLE (10). OPEN HOOD ASSEMBLY.
4 REMOVE TOP TRANSMISSION COVER (11) BY REMOVING NINE SCREWS (12) AND WASHERS (13).
5 TAG AND DISCONNECT HOSES (1, 7, 16) FROM ENGINE AND RADIATOR.

a. Tag inlet hose (1). Disconnect inlet hose from tee (14) at top of engine by loosening clamp (15).

b. Tag and disconnect short hose (16) from tee (14) and radiator fitting (17).

c. Tag outlet hose (7). Disconnect outlet hose from tee (18) at bottom of engine by loosening clamp (19).

d. Remove tees (14, 18) from engine only if replacement is required.



B. CLEANING

Clean heater hoses and related components in accordance with paragraph 1-24.

C. INSPECTION

Inspect heater hoses and related components in accordance with paragraph 1-24.

D. INSTALLATION

1 CONNECT HOSES (1, 7, 16) TO ENGINE AND RADIATOR.

a. Install tees (14, 18) into engine, ensuring proper orientation.

b. Connect outlet hose (7) to tee (18) at bottom of engine. Secure by tightening clamp (19).

c. Connect short hose (16) to tee (14) at top of engine and radiator fitting (17).

d. Connect inlet hose (1) to tee (14). Secure by tightening clamp (15).

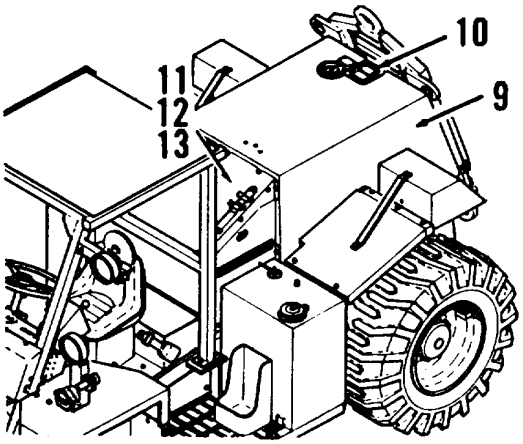
2 APPLY LOCTITE TO THREADS OF NINE TRANSMISSION COVER SCREWS (12).INSTALL TOP TRANSMISSION COVER (11) USING SCREWS AND WASHERS (13).
3 CLOSE HOOD ASSEMBLY (9). ENSURE HANDLE (10) IS FULLY ENGAGED.
4 CONNECT HOSES (1, 4, 7) TO HEATER COMPONENTS.

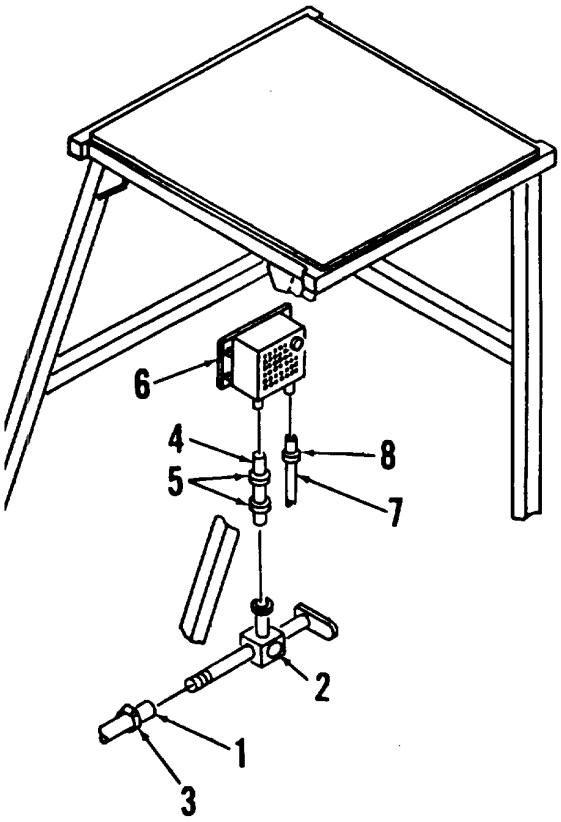
a. Connect outlet hose (7) to heater assembly (6) using clamp (8).

b. Install hose (4) to heater assembly (6). Secure using clamp (5).

c. Install heater shutoff valve (2) to hose (4). Secure using clamp (5).

d. Connect inlet hose (1) to heater shutoff valve (2) using clamp (3).





FOLLOW-ON MAINTENANCE:

Raise towbar and lock in position (para. 2-126)
Service radiator assembly (para. 2-46)

END OF TASK

2-147. HEATER SHUTOFF VALVE REPLACEMENT (MODEL MHE-271 ONLY)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

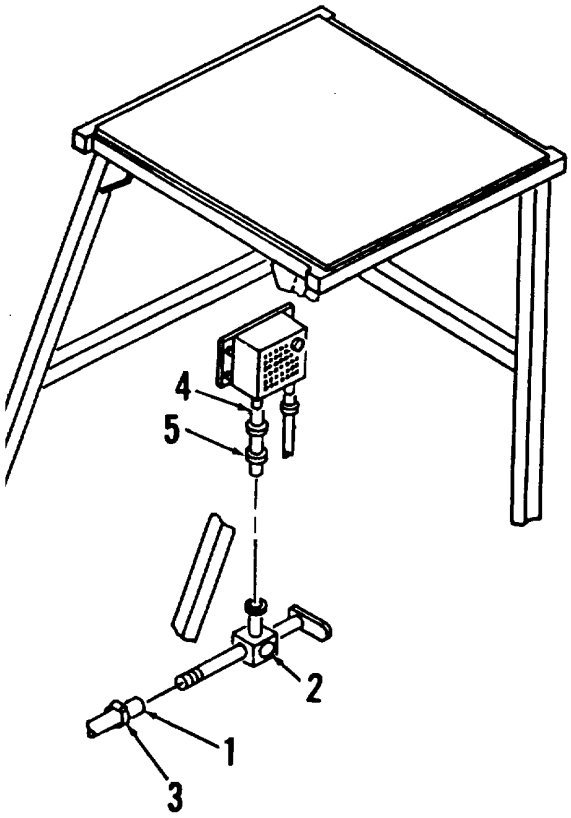
General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

A. REMOVAL

WARNING

Do not remove heater hoses when engine is hot. Hot water could flow out and burn you.

1. Place container beneath heater hoses during removal to catch residual fluids.
2. Tag inlet hose (1). Disconnect inlet hose from heater shutoff valve (2) by loosening clamp (3).
3. Remove heater shutoff valve (2) from hose (4) by loosening clamp (5).



B. CLEANING

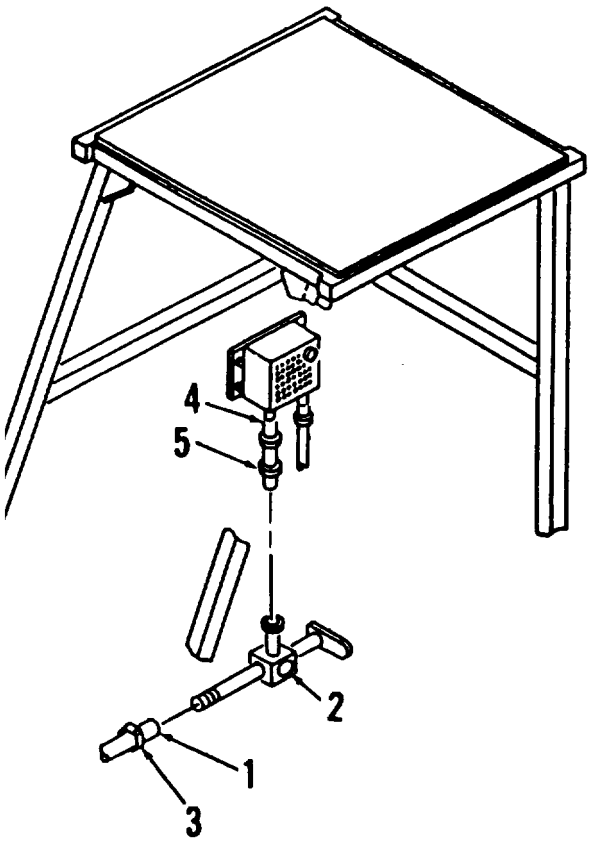
Clean heater shutoff valve and heater hoses in accordance with paragraph 1-24.

C. INSPECTION

Inspect heater shutoff valve and hoses in accordance with paragraph 1-24.

D. INSTALLATION

1. Install heater shutoff valve (2) into hose (4). Secure using clamp (5).
2. Connect inlet hose (1) to heater shutoff valve (2) using clamp (3).



FOLLOW-ON MAINTENANCE:
Service radiator assembly (para. 2-46)
END OF TASK

2-148. DATA PLATE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Hand Riveter (45, App. E)
Portable Drill (18, App. E)

Materials / Parts:

Rivets

A. REMOVAL

1. Refer to Figure 1-4 for location and content of forklift data plates and decals.
2. Remove data plates and decals only if a component with a data plate / decal is being replaced or if data plate / decal has been damaged.
3. Remove rivets using a drill, 1/4" drill bit, punch, and hammer.

B. CLEANING

Clean data plates in accordance with paragraph 1-24.

C. INSPECTION

Inspect data plates for legibility.

D. INSTALLATION

1. Align holes in data plate with holes in component where plate is to be mounted.
2. Install rivets using hand riveter.

FOLLOW-ON MAINTENANCE:
None
END OF TASK

Section XXI. HYDRAULIC AND FLUID SYSTEMS MAINTENANCE

2-149. HYDRAULIC PUMP REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
Torque Wrench (32, App. E)

References:

LO 10-3930-664-12

Equipment Condition:

Towbar lowered (para. 2-126)

A. REMOVAL

1. Release hood assembly (2) by lifting handle (1). Open hood assembly.

NOTE

Place drain pan beneath hydraulic pump hoses when disconnecting to catch residual fluids.

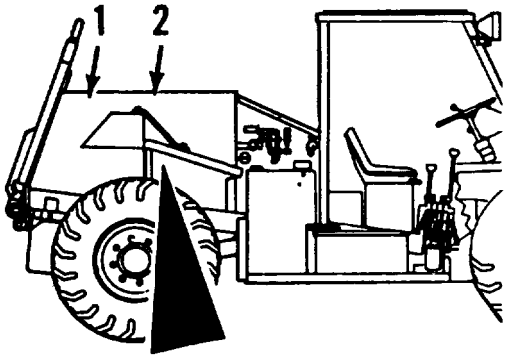
2. Tag and disconnect hose assemblies (3, 4) from fitting (5) and elbow (6).
3. Remove elbow (6) from fitting (7). Remove fittings (5, 7) from hydraulic pump (8).
4. Remove hydraulic pump (8) from engine (9) by removing screws (10).
5. Remove drive gear (11) from hydraulic pump (8) by removing nut (12).

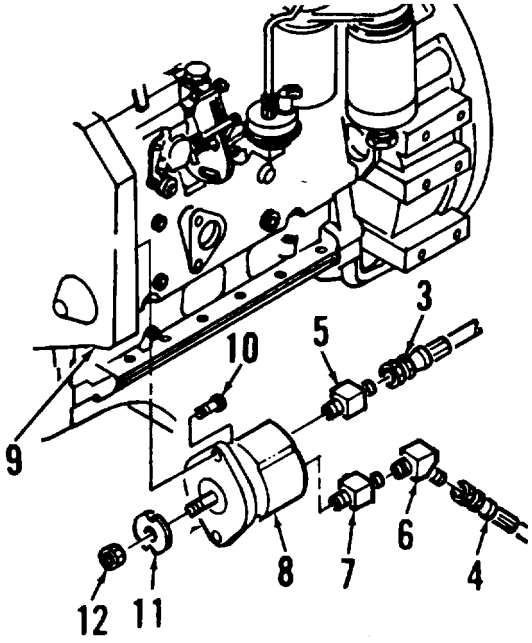
B. CLEANING

Clean hydraulic pump in accordance with paragraph 1-24.

C. INSPECTION

Inspect pump and related components in accordance with paragraph 1-24.



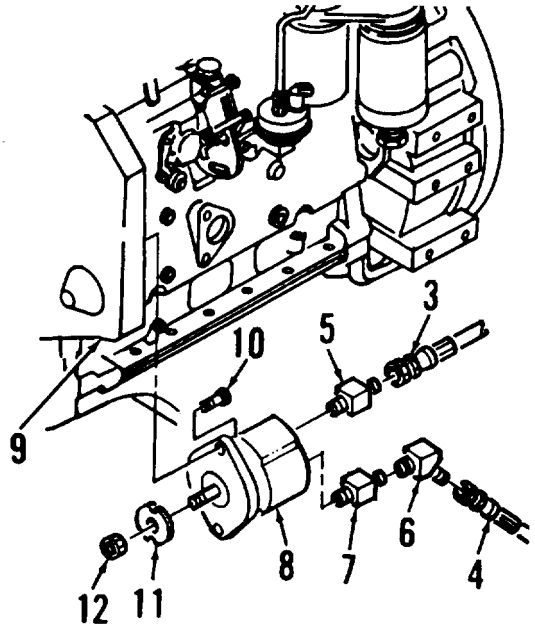


D. INSTALLATION

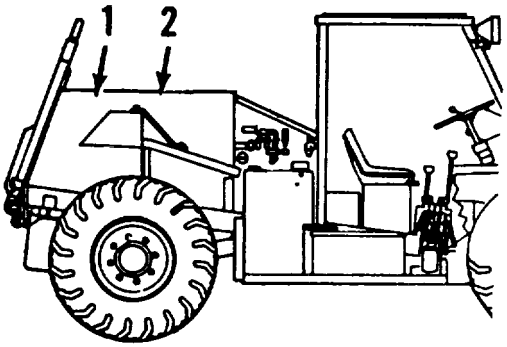
1. Install drive gear (11) onto hydraulic pump (8) using nut (12). Torque nut to 75 to 85 ft-lbs (101 to 115 Nm).
2. Install hydraulic pump (8) onto engine (9) using screws (10).
3. Install fittings (5, 7) into hydraulic pump (8).

Install elbow (6) onto fitting (7).

4. Connect hose assemblies (3, 4) to fitting (5) and elbow (6).
5. Close hood assembly (2). Ensure handle (1) is fully engaged.



FOLLOW-ON MAINTENANCE:
Service hydraulic oil in accordance with Lubrication Order
Raise towbar and lock in position (para. 2-126)
END OF TASK



2-150. DIRECTIONAL CONTROL VALVE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
Vise (30, App. E)

Materials / Parts:
O-Ring, Item 25 (2 ea.)
O-Ring, Item 26 (1 ea.)
O-Ring, Item 27 (2 ea.)
O-Ring, Item 28 (1 ea.)
O-Ring, Item 29 (1 ea.)
O-Ring, Item 30 (1 ea.)
O-Ring, Item 31 (1 ea.)

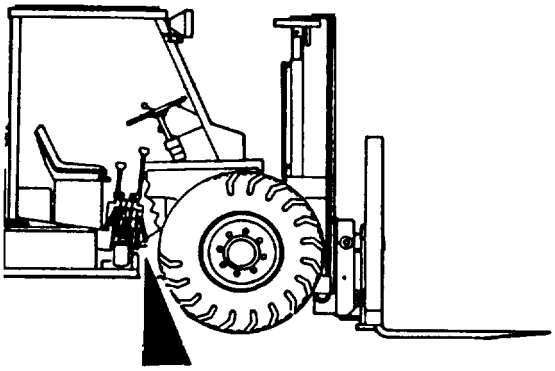
References:
LO 10-3930-664-12

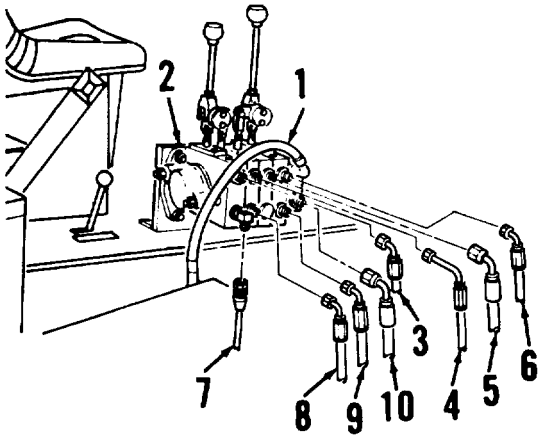
Personnel Required:
2 Personnel

A. REMOVAL

NOTE
Place drain pan beneath hydraulic pump hoses when disconnecting to catch residual fluids.

1. TAG AND DISCONNECT HOSE ASSEMBLIES (1, 3 THROUGH 10) FROM DIRECTIONAL CONTROL VALVE ASSEMBLY (2).
   a. Tag and disconnect large hose assembly (I) from directional control valve assembly (2).
   b. Tag and disconnect hose assemblies (3, 4, 5, 6) from top ports of directional control valve assembly (2).
   c. Tag and disconnect hose assemblies (7, 8, 9, 10) from bottom ports of directional control valve assembly (2).





WARNING

Directional control valve assembly is heavy and awkward. Enlist the help of an assistant when removing to prevent injury to personnel and damage to components.

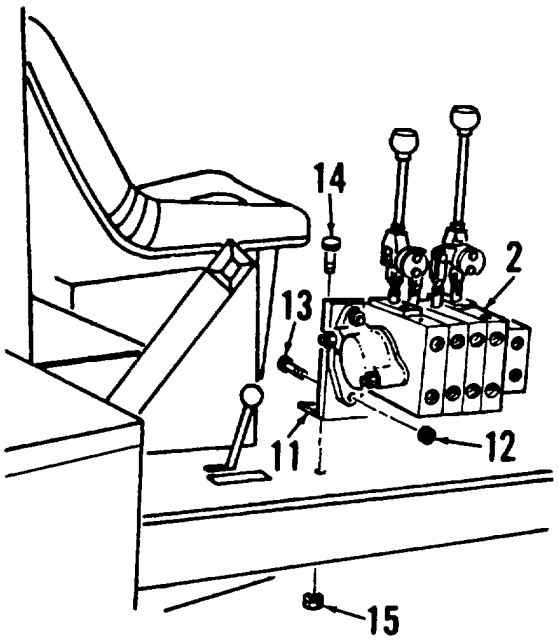
2. REMOVE DIRECTIONAL CONTROL VALVE ASSEMBLY (2). REMOVE FITTINGS AND ELBOWS.

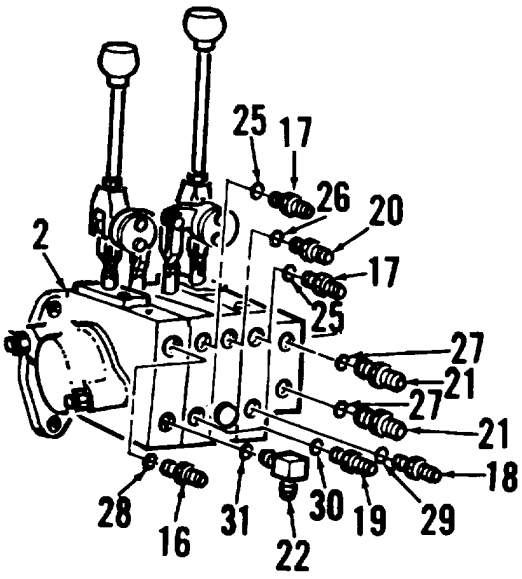
   a. Remove directional control valve assembly (2) from bracket (11) by removing screws (12) and nuts (13).

   b. If replacement is required, remove bracket (11) from floor plate by removing screws (14) and nuts (15).

   c. Install valve assembly (2) into vise. Remove fittings (16 through 20) and elbow (22) from front ports of directional control valve assembly (2).

   d. Remove and discard O-rings (23 through 29).





B. CLEANING

Clean directional control valve assembly in accordance with paragraph 1-24.

C. INSPECTION

Inspect directional control valve assembly and related components in accordance with paragraph 1-24.

D. INSTALLATION

WARNING

Directional control valve assembly is heavy and awkward. Enlist the help of an assistant when installing to prevent injury to personnel and damage to components.

1. INSTALL FITTINGS AND ELBOWS INTO DIRECTIONAL CONTROL VALVE ASSEMBLY (2). INSTALL ASSEMBLY.

    a. Install new O-rings (23 through 29) onto fittings (16 through 20) and elbow (22).

    b. Install directional control valve assembly (2) into vise. Install fittings (16 through 20) and elbow (22) into front ports of directional control valve assembly (2).

    c. Install bracket (11) onto floor plate using screws (14) and nuts (15).

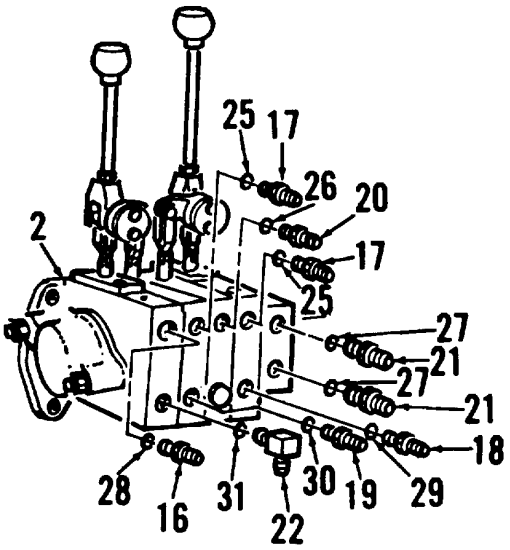
    d. Attach directional control valve assembly (2) to bracket (11) using screws (12) and nuts (13).

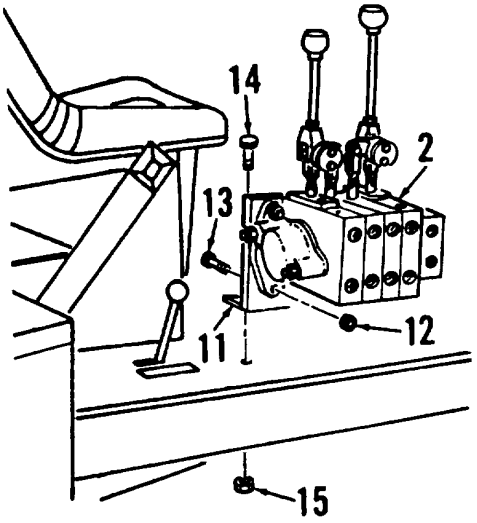
2. CONNECT HOSE ASSEMBLIES (1, 3 THROUGH 10) TO DIRECTIONAL CONTROL VALVE ASSEMBLY (2).

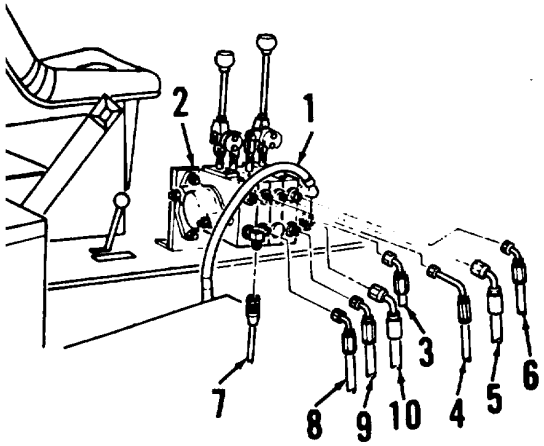
    a. Connect hose assemblies (7, 8, 9, 10) to bottom ports of directional control valve assembly (2).

    b. Connect hose assemblies (3, 4, 5, 6) to top ports.

    c. Connect large hose assembly (1).







FOLLOW-ON MAINTENANCE:
Service hydraulic oil in accordance with Lubrication Order

END OF TASK

2-151. MAST ASSEMBLY MANIFOLD REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

References:

LO 10-3930-664-12

Materials / Parts:
Loctite 242 (20, App. C)
Loctite 271 (26, App. C)
O-Ring, Item 6 (2 ea.)
O-Ring, Item 7 (1 ea.)
O-Ring, Item 15 (2 ea.)
O-Ring, Item 16 (1 ea.)
O-Ring, Item 25 (2 ea.)
O-Ring, Item 26 (1 ea.)
O-Ring, Item 34 (2 ea.)
O-Ring, Item 35 (1 ea.)
O-Ring, Item 42 (4 ea.)
O-Ring, Item 43 (2 ea.)
O-Ring, Item 48 (2 ea.)
O-Ring, Item 49 (2 ea.)
O-Ring, Item 52 (1 ea.)
O-Ring, Item 61 (2 ea.)
O-Ring, Item 64 (2 ea.)

A. REMOVAL

WARNING

Relieve hydraulic pressure before disconnecting hydraulic lines. Pressurized lines could cause serious injury to personnel.

NOTE

Place drain pan beneath hoses when disconnecting. Drain hoses into pan.

1. DISCONNECT HOSE ASSEMBLIES (1, 2, 8, 9, 10) FROM LEFT OUTER RAIL MANIFOLD (5). REMOVE MANIFOLD AND FITTINGS.

    a. Tag and disconnect hose assemblies (1, 2) from fittings (3, 4).

    b. Remove fittings (3, 4) from left outer rail manifold (5). Remove and discard O-rings (6, 7).

    c. Tag and disconnect hose assemblies (8, 9, 10) from elbows (11, 12).

    d. Remove elbows (11, 12) and adapters (13, 14) from left outer rail manifold (5). Remove and discard O-rings (15, 16).

    e. Remove left outer rail manifold (5) from manifold mount (17) by removing screws (18).

    f. Remove manifold mount (17) from outer rail by removing screws (19).

2. DISCONNECT HOSE ASSEMBLIES (20, 21, 27, 28, 29) FROM RIGHT OUTER RAIL MANIFOLD (24). REMOVE MANIFOLD AND FITTINGS.

    a. Tag and disconnect hose assemblies (20, 21) from fittings (22, 23).

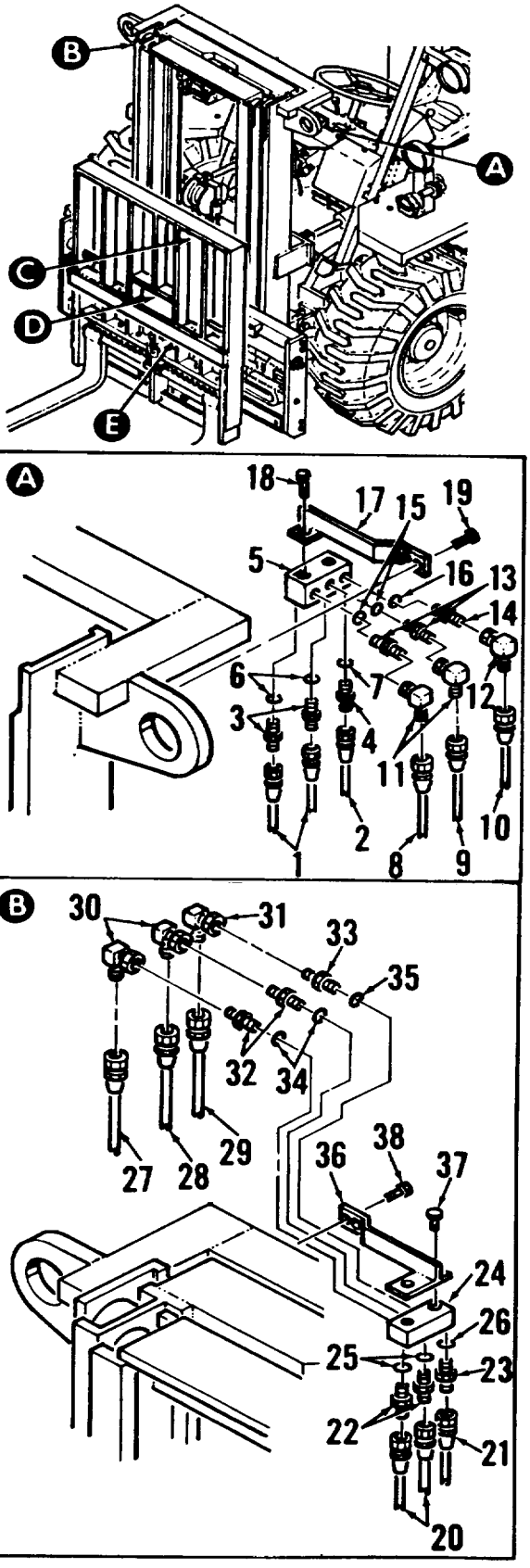
    b. Remove fittings (22, 23) from right outer rail manifold (24). Remove and discard O-rings (25, 26).

    c. Tag and disconnect hose assemblies (27, 28, 29) from elbows (30, 31).

    d. Remove elbows (30, 31) and adapters (32, 33) from right outer rail manifold (24). Remove and discard O-rings (34, 35).

    e. Remove right outer rail manifold (24) from manifold mount (36) by removing screws (37).

    f. Remove manifold mount (36) from outer rail by removing screws (38).



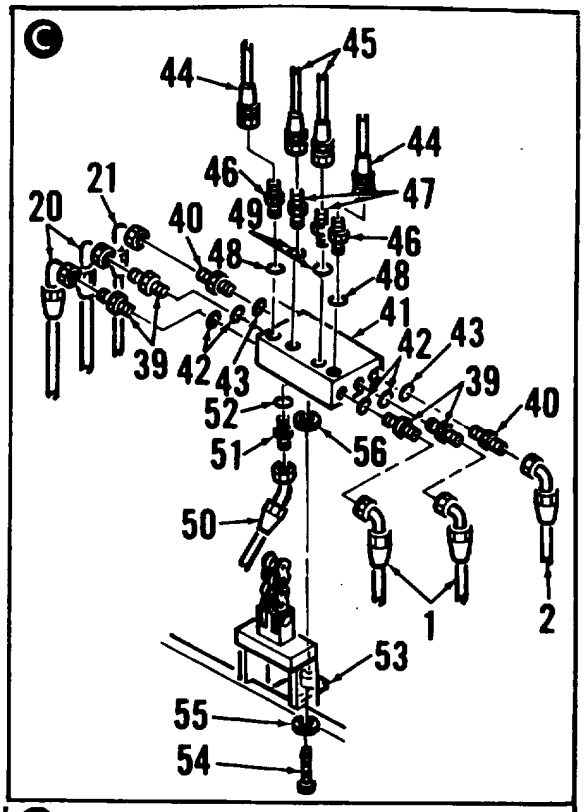
3. TAG AND DISCONNECT HOSE ASSEMBLIES (1, 2, 20, 21, 44, 45, 50) FROM INTERMEDIATE RAIL MANIFOLD (41).
4. REMOVE INTERMEDIATE RAIL MANIFOLD (41) AND ADAPTERS.

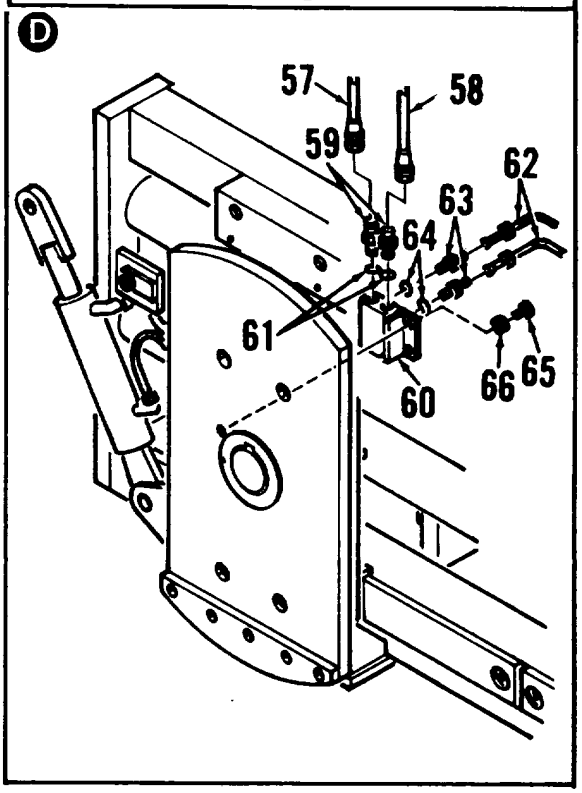
NOTE

Tension of hose assemblies (44, 45) is determined by position of intermediate rail manifold (24). Position of manifold is adjusted by adding or subtracting washers (56) between bracket and manifold. When removing manifold, record number of washers (55, 56) between bracket and manifold and between bracket and head of screw (54). It is important that the same number of washers are used during installation.

   a. Remove intermediate rail manifold (41) from inner rail by removing screw (54) and washers (55, 56).
   b. Remove adapters (39, 40, 46, 47, 51) from intermediate rail manifold (41).
   c. Remove and discard O-rings (42, 43, 48, 49, 52).
5. DISCONNECT HOSE ASSEMBLIES (57, 58) AND TUBE ASSEMBLIES (62) FROM SPINE MANIFOLD (60). REMOVE SPINE MANIFOLD AND ADAPTERS.

   a. Remove mud guard from sideshift carrier by removing attaching screws, washers, and spacers.
   b. Tag and disconnect hose assemblies (57, 58) from fittings (59).
   c. Remove fittings (59) from spine manifold (60). Remove and discard O-rings (61).
   d. Tag and disconnect tube assemblies (62) from adapters (63).
   e. Remove adapters (63) from spine manifold (60). Remove and discard O-rings (64).
   f. Remove spine manifold (60) from spine assembly by removing screws (65) and washers (66).





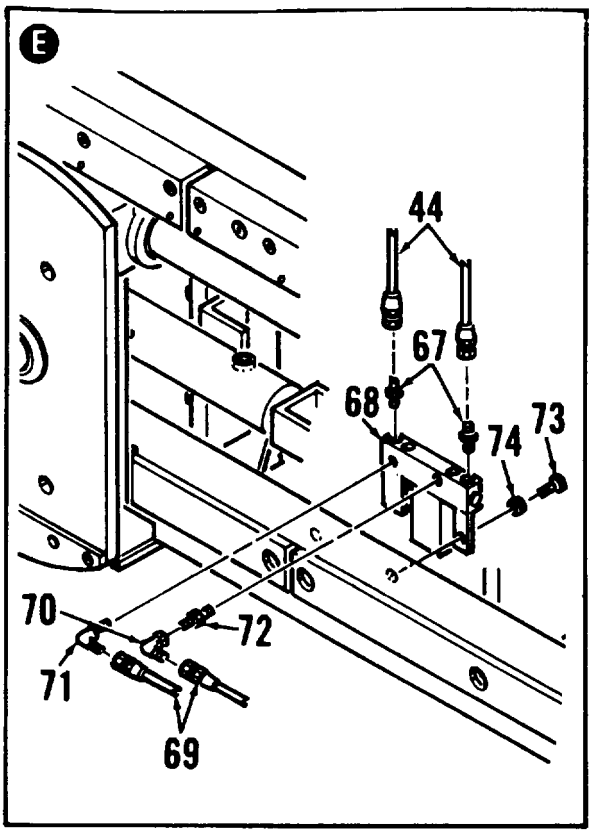
6. SIDESHIFT ROTATE CARRIAGE TO THE RIGHT TO GAIN ACCESS TO THE ROTATE MANIFOLD.
7. DISCONNECT HOSE ASSEMBLIES (44, 69) FROM ROTATE MANIFOLD (68). REMOVE ROTATE MANIFOLD AND FITTINGS.

    a. Disconnect elbow (70) from adapter (72).

    b. Remove rotate manifold (68) from sideshift carrier by removing screws (73) and washers (74).

    c. Tag and disconnect hose assemblies (44) from adapters (67). Remove adapters from rotate manifold (68).

    d. Tag and disconnect hose assemblies (69) from elbows (70, 71). Remove elbows and adapter (72) from rotate manifold (68).



B. CLEANING

Clean mast assembly manifolds in accordance with paragraph 1-24.

C. INSPECTION

Inspect manifolds and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. INSTALL ROTATE MANIFOLD (68).

    a. Install adapter (72) and elbow (71) into rotate manifold (68).

    b. Connect inner hose assembly (69) to elbow (70). Connect outer hose assembly (69) to elbow (71).

    c. Apply permanent loctite to threads of screws (73). Install rotate manifold (68) onto sideshift carrier using screws and washers (74).

    d. Install elbow (70) onto adapter (72).

2. INSTALL ADAPTERS (67) INTO ROTATE MANIFOLD (68). CONNECT HOSE ASSEMBLIES (44).

3. INSTALL SPINE MANIFOLD (60) AND ADAPTERS. CONNECT HOSE ASSEMBLIES (57, 58) AND TUBE ASSEMBLIES (62).

   a. Install adapters (63) and new O-rings (64) into spine manifold (60).

   b. Install adapters (59) and new O-rings (61) into spine manifold (60).

   c. Apply removable loctite to threads of screws (65). Install spine manifold (60) onto spine assembly using screws and washers (66).

   d. Connect tube assemblies (62) to adapters (63).

   e. Connect hose assemblies (57, 58) to adapters (59).

   f. Install mud guard onto sideshift carrier using attaching screws, washers, and spacers.

4. INSTALL INTERMEDIATE RAIL MANIFOLD (41) AND ADAPTERS.

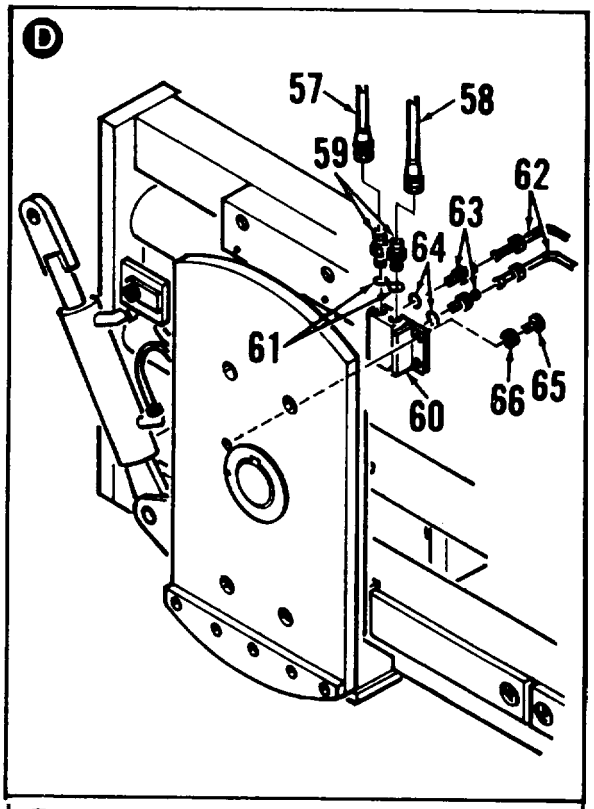
   a. Install adapters (39, 40, 46, 47, 51) and new O-rings (42, 43, 48, 49, 52) into intermediate rail manifold (41).

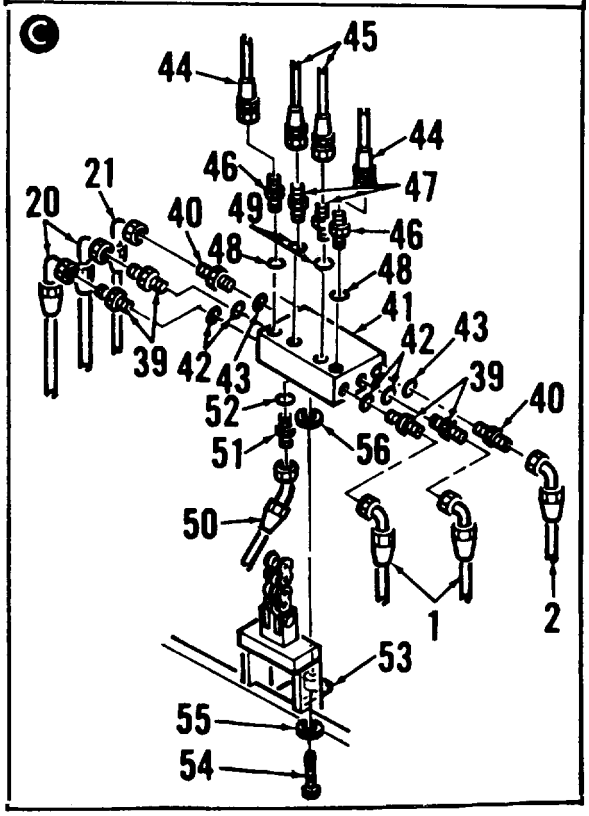
NOTE

Use the same number of washers (55, 56) between bracket (53) and intermediate rail manifold (41) and between bracket (53A) and head of screw (54) as recorded during removal of manifold.

b. Install intermediate rail manifold (41) onto inner rail using screw (54) and washers (55, 56).

5. CONNECT HOSE ASSEMBLIES (1, 2, 20, 21, 44, 45, 50) TO ADAPTERS.





6.INSTALL RIGHT OUTER RAIL MANIFOLD (24) AND FITTINGS. CONNECT HOSE ASSEMBLIES (20, 21, 27, 28, 29).

a. Install fittings (22, 23) and new O-rings (25, 26) into right outer rail manifold (24).

b. Install elbows (30, 31), adapters (32, 33), and new O-rings (34, 35) into right outer rail manifold (24).

c. Apply removable loctite to threads of screws (38). Install manifold mount (36) onto outer rail using screws.

d. Apply removable loctite to threads of screws (37). Install right outer rail manifold (24) onto manifold mount (36) using screws.

e. Connect hose assemblies (20, 21) to fittings (22, 23).

f. Connect hose assemblies (27, 28, 29) to elbows (30, 31).

7.INSTALL LEFT OUTER RAIL MANIFOLD (5) AND FITTINGS. CONNECT HOSE ASSEMBLIES (1, 2, 8, 9, 10).

a. Install fittings (3, 4) and new O-rings (6, 7) into left outer rail manifold (5).

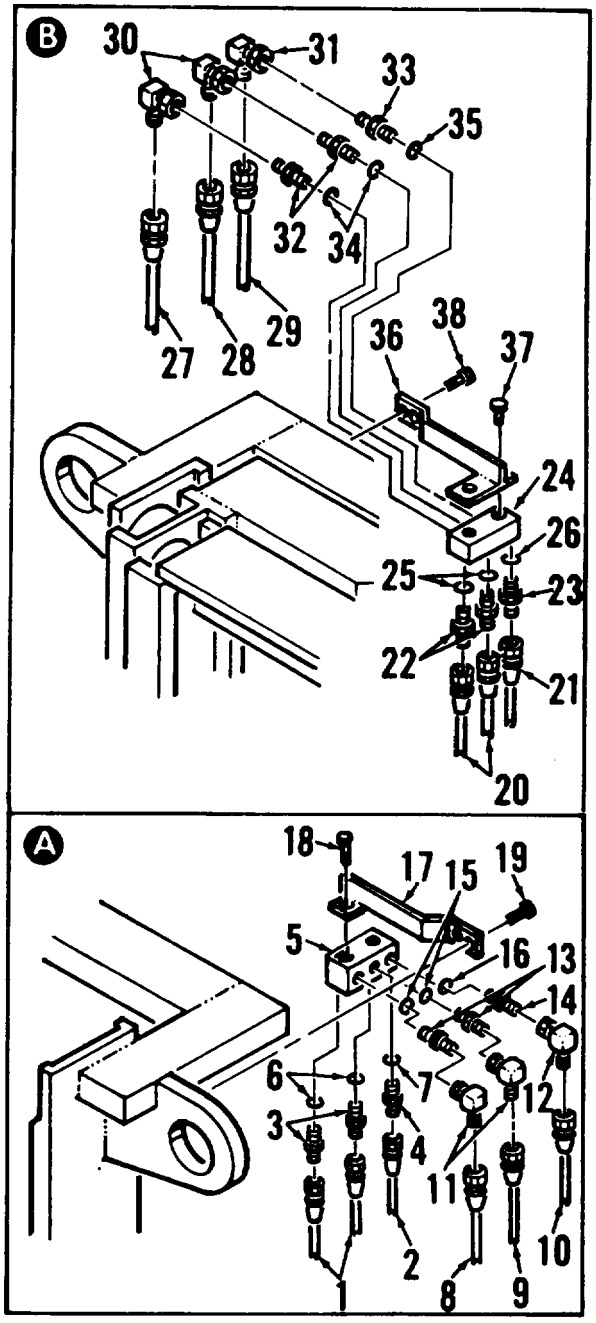
b. Install elbows (11, 12), adapters (13, 14), and new O-rings (15, 16) into left outer rail manifold (5).

c. Apply removable loctite to threads of screws (19). Install manifold mount (17) onto outer rail using screws.

d. Apply removable loctite to threads of screw (18). Install left outer rail manifold (5) onto manifold mount (17) using screws.

e. Connect hose assemblies (1, 2) to fittings (3, 4).

f. Connect hose assemblies (8, 9, 10) to elbows (11, 12).



FOLLOW-ON MAINTENANCE:

Service hydraulic system in accordance with Lubrication Order

END OF TASK

2-152. CARRIAGE TILT CYLINDER SERVICING

This task covers: Servicing

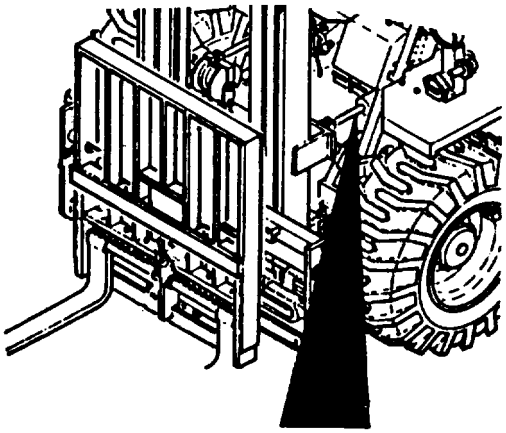
INITIAL SETUP:

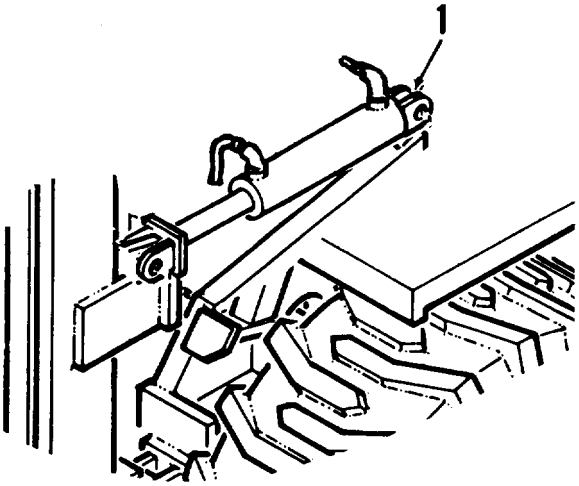
Tools and Test Equipment:
Lubricator Kit (35, App. E)

Materials / Parts:
Grease (10, App. C)

A. SERVICING

1. Position mast in near vertical position. Rest forks on ground.
2. Maneuver tilt mechanism until pressure is relieved from tilt cylinder attaching pins.
3. Apply grease to tilt cylinder grease fitting (1). Fill until grease flows from fitting.
4. Wipe away excess grease.





FOLLOW-ON MAINTENANCE:
None
END OF TASK

2-153. CARRIAGE TILT CYLINDER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
Lubricator Kit (35, App. E)
Hoist (59, App. E)

References:

LO 10-3930-664-12

Materials / Parts:

Grease (10, App. C)
O-Ring, Item 8 (1 ea.)
O-Ring, Item 13 (1 ea.)
O-Ring, Item 15 (1 ea.)
O-Ring, Item 17 (1 ea.)

A. REMOVAL

1. POSITION MAST IN NEAR VERTICAL POSITION. SUPPORT MAST WITH HOIST. REST FORKS ON GROUND.
2. MANEUVER TILT MECHANISM UNTIL PRESSURE IS RELIEVED FROM TILT CYLINDER ATTACHING PINS.

WARNING

Relieve hydraulic pressure before disconnecting hydraulic lines. Pressurized lines could cause serious injury to personnel.

NOTE

Place drain pan beneath hoses when disconnecting. Drain hoses into pan.

3. TAG AND DISCONNECT HOSE ASSEMBLIES (1, 2, 3, 4, 5). REMOVE FITTINGS, TEES, AND ELBOWS.

   a. Tag and disconnect hose assemblies (1, 2) from lower tee (6) and bulkhead tee (7). Remove and discard O-ring (8).

   b. Tag and disconnect hose assembly (4) from bulkhead tee (7) and elbow (9). Remove elbow from right tilt cylinder (10).

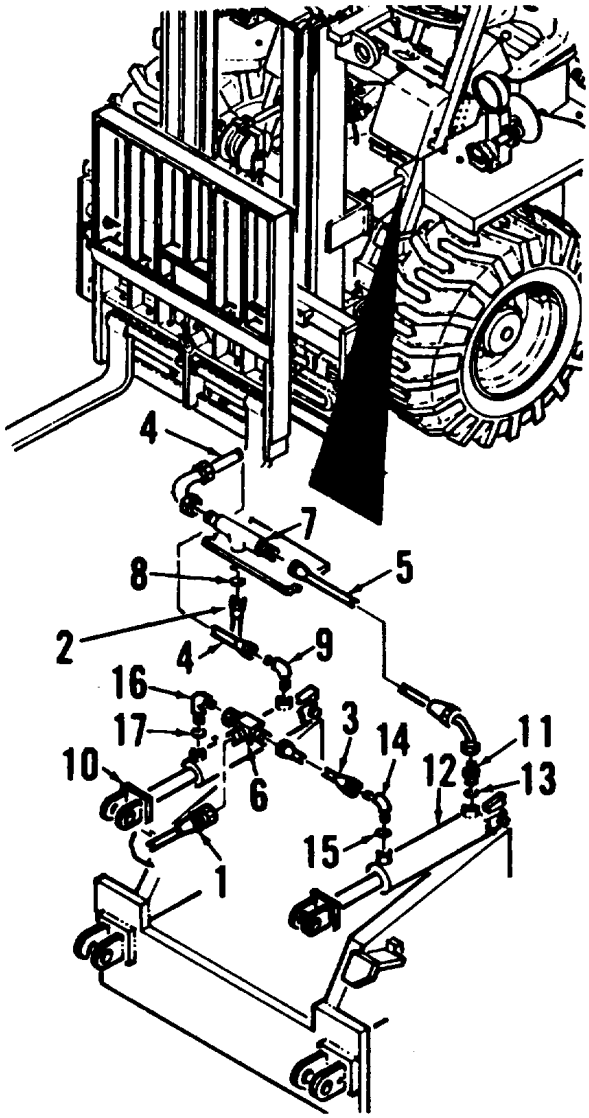
   c. Tag and disconnect hose assembly (5) from bulkhead tee (7) and fitting (11).

   d. Remove fitting (11) from left tilt cylinder (12). Remove and discard O-ring (13).

   e. Tag and disconnect hose assembly (3) from tee (6) and elbow (14).

   f. Remove elbow (14) from left tilt cylinder (12). Remove and discard O-ring (15).

   g. Remove tee (6) and elbow (16) from right tilt cylinder (10). Remove and discard O-ring (17).



4. LOOSEN SETSCREW (30). REMOVE LEFT TILT CYLINDER (12) FROM FRAME BRACKET (18) BY REMOVING ROLL PINS (19) AND CYLINDER PIN (20).

5. REMOVE CYLINDER (12) FROM MAST ASSEMBLY (21) BY REMOVING ROLL PINS (22) AND CYLINDER PIN (23).

6. MHE-271 MODEL ONLY: REMOVE TILT CYLINDER BOOT (24) BY REMOVING SCREW (25), HOSE CLAMP (26), SCREWS (27), LOCKWASHERS (28), AND WASHERS (29). BREAK SEALANT AND REMOVE BOOT FROM ROD END OF CYLINDER.

7. REPEAT STEPS 4, 5, 6 FOR RIGHT TILT CYLINDER.

B. CLEANING

Clean tilt cylinders in accordance with paragraph 1-24.

C. INSPECTION

Inspect tilt cylinders and related components in accordance with paragraph 1-24.

D. INSTALLATION

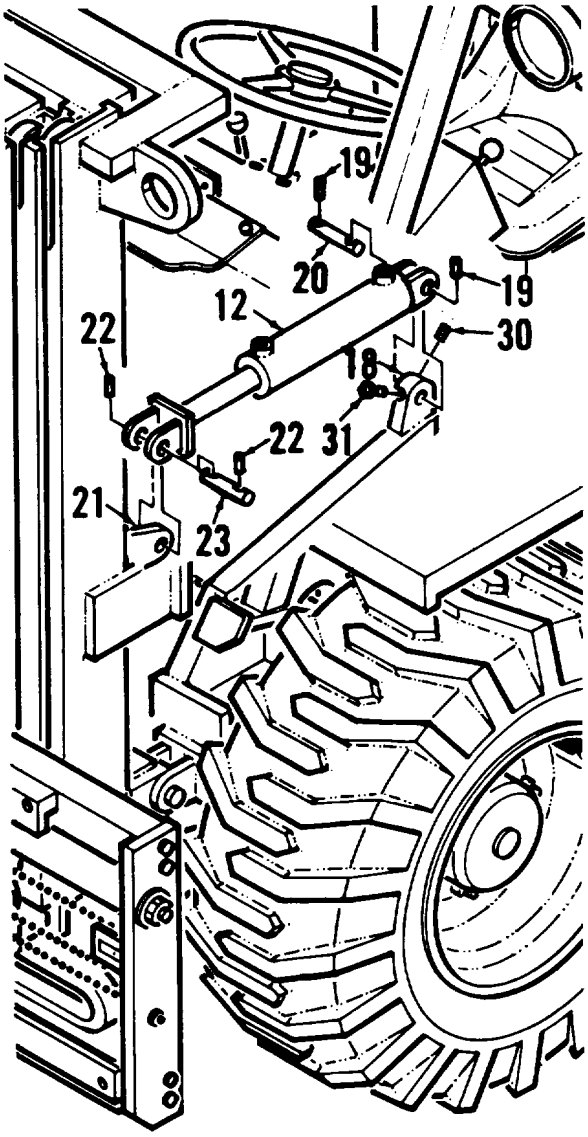
1. MHE-271 MODEL ONLY: INSTALL TILT CYLINDER BOOT (24) OVER ROD END OF CYLINDER. SECURE BOOT TO CAB COVER USING SCREW (25), HOSE CLAMP (26), SCREWS (27), LOCKWASHERS (28), AND WASHERS (29).

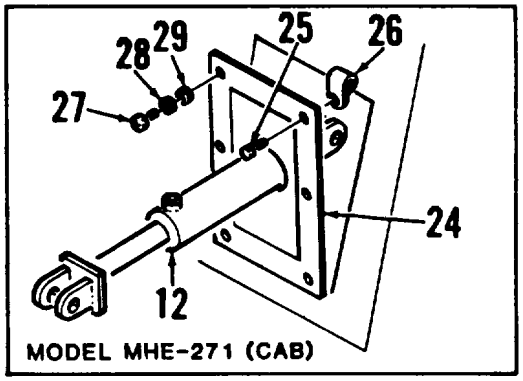
2. INSTALL LEFT TILT CYLINDER (12) ONTO MAST ASSEMBLY (21) USING CYLINDER PIN (22) AND ROLL PINS (23).

3. INSTALL LEFT TILT CYLINDER (12) ONTO FRAME BRACKET (18) USING CYLINDER PIN (19) AND ROLL PINS (20).

4. APPLY GREASE TO CYLINDER GREASE FITTING (31). FILL UNTIL GREASE FLOWS FROM FITTING. WIPE AWAY EXCESS GREASE.

5. REPEAT STEPS 1, 2, 3, 4 FOR RIGHT TILT CYLINDER.





MODEL MHE-271 (CAB)

6. INSTALL FITTINGS, TEES, AND ELBOWS ONTO TILT CYLINDERS. CONNECT HOSE ASSEMBLIES (1, 2, 3, 4, 5).

   a. Install tee (6), elbow (16), and new O-ring (17) into right tilt cylinder (10).

   b. Install elbow (14) and new O-ring (15) into left tilt cylinder (12).

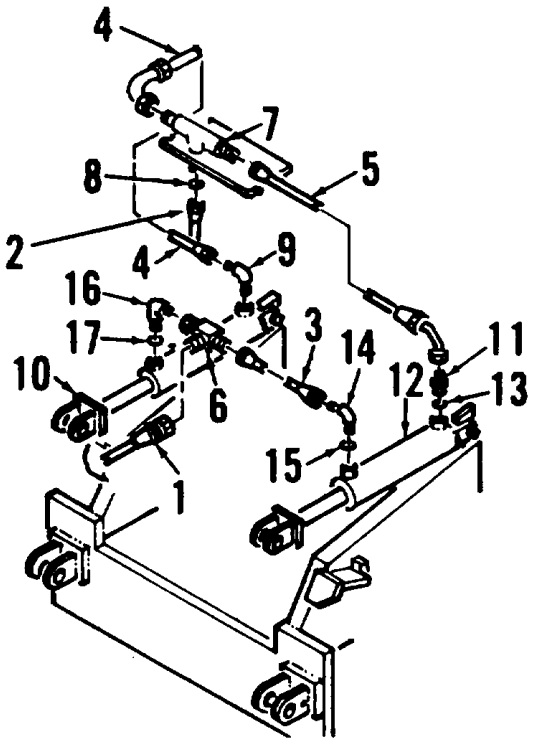
   c. Connect hose assembly (3) to tee (6) and elbow (14).

   d. Install fitting (11) and new O-ring (13) into left tilt cylinder (12).

   e. Connect hose assembly (5) to bulkhead tee (7) and fitting (11).

   f. Install elbow (9) into right tilt cylinder (10). Connect hose assembly (4) to bulkhead tee (7) and elbow.

   g. Connect hose assemblies (1, 2) to lower tee (6) and bulkhead tee (7).



7. REMOVE HOIST FROM MAST ASSEMBLY.

FOLLOW-ON MAINTENANCE:

Service hydraulic system in accordance with Lubrication Order

END OF TASK

2-154. CARRIAGE ASSEMBLY SERVICING

This task covers: Servicing

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Lubricator Kit (35, App. E)

Materials / Parts:

Grease (10, App. C)

A. SERVICING

NOTE

Remove lube fitting (1) from rotate carriage pin (2) only if cleaning or replacement is required.

1. Using grease gun, apply grease to fitting (1) to lubricate rotate carriage pin (2). Rotate carriage in each direction and reapply grease.

NOTE

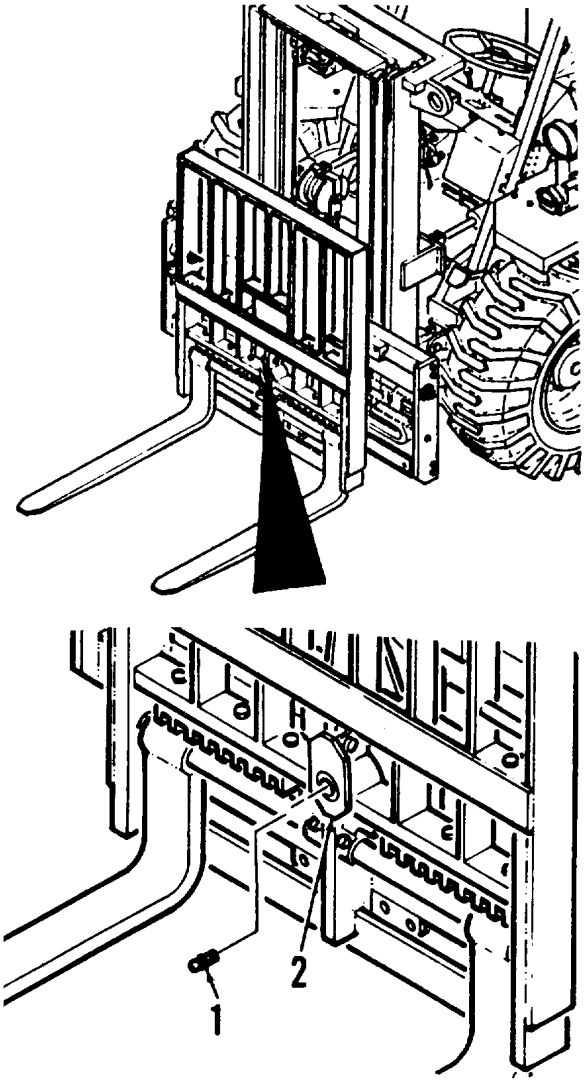
Lubrication fitting on spine assembly is reached through an access hole in mud guard on side of sideshift carrier.

2. Shift carriage all the way right to align lube fitting on back of spine assembly with access hole in mud guard.

3. Using grease gun, apply grease to fitting on back of spine assembly.

4. Shift carriage all the way left to align lube fitting on back of spine assembly with access hole in mud guard.

5. Using grease gun, apply grease to fitting on back of spine assembly.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-155. LIFT AND SIDESHIFT CHAIN REPLACEMENT

This task covers: Removal, Cleaning, Inspection, Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Personnel Required:

2 Personnel

Materials / Parts:

Loctite 242 (20, App. C)
Loctite 271 (26, App. C)

References:

TM 10-3930-664-10

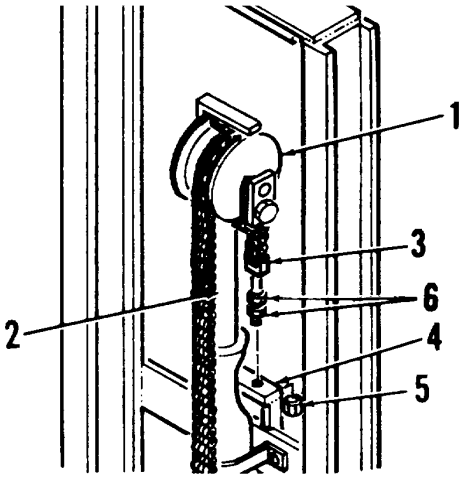
A. REMOVAL

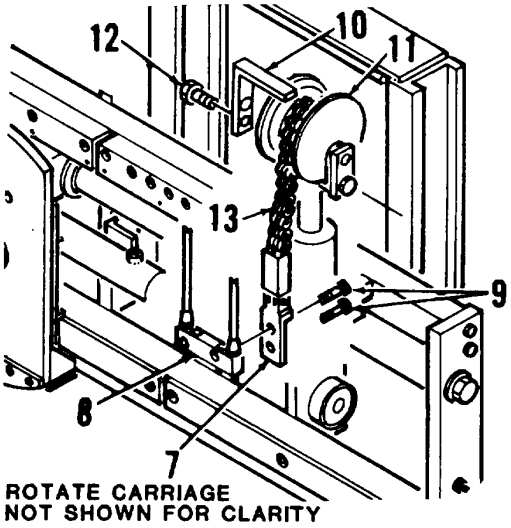
1. Lower sideshift carrier until it rests on the ground. While operating the lift function in the "Lower" mode, have an assistant push down on the freelift chain roller (1) until cylinder rod (2) has retracted approximately 2" more.

2. Loosen jam nuts (6). Remove freelift chain adjuster (3) from bracket (4) by removing nut (5).

3. Slide cover up chain to expose freelift chain anchor (7). Remove anchor from sideshift carrier (8) by removing screws (9).

4. Remove hose guard (10) from chain roller (11) by removing screw (12). Separate freelift chain assembly (13) from chain roller.





7. Lower mainlift cylinders until cylinder rods are fully collapsed.

6. Loosen jam nuts (14). Remove right mainlift chain adjuster (15) from bracket (16) by removing nut (17).

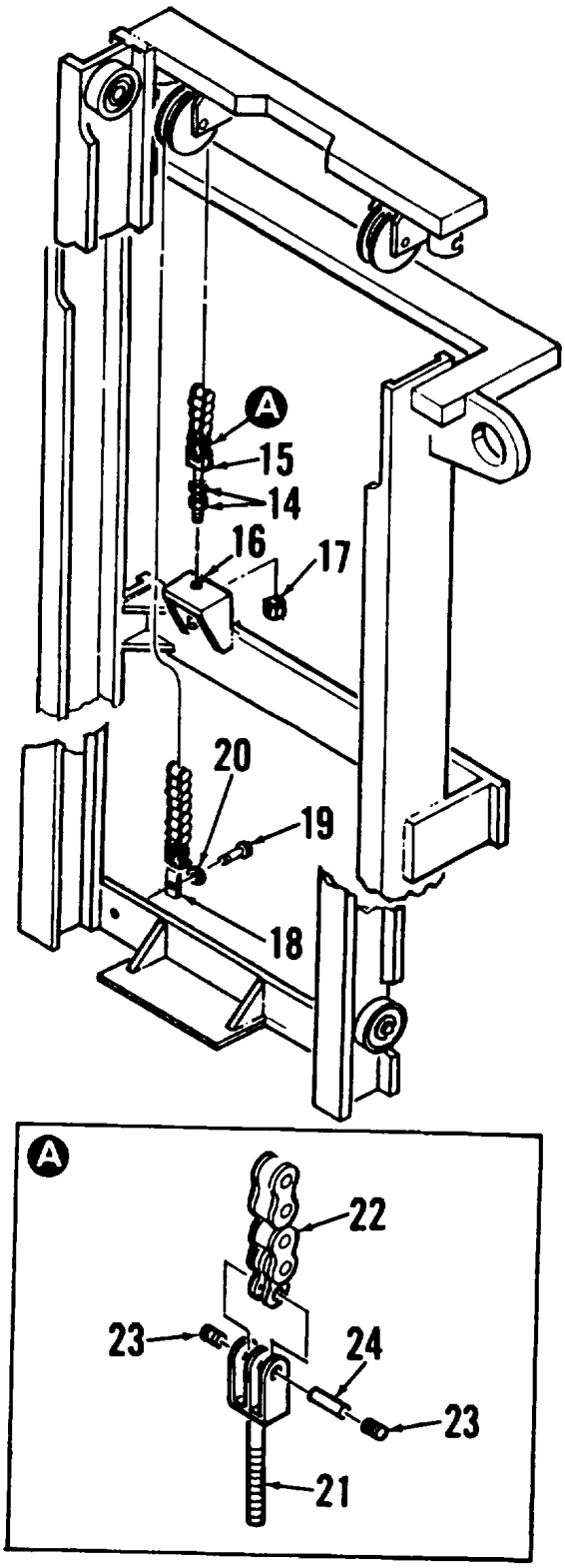
7. Remove right mainlift chain anchor (18) by removing screws (19) and washers (20).

8. Separate chain adjuster (21) from chain (22) by removing setscrews (23) and driving out chain pin (24).

9. Feed right mainlift chain through upper chain roller.

10. Repeat steps 6 through 9 for left mainlift chain.

11. Remove splash guards from sideshift carrier by removing attaching parts.



12. Remove right sideshift chain adjuster (25) from sideshift carrier (26) by removing nut (27), nine beville washers (28), and flat washer (29).

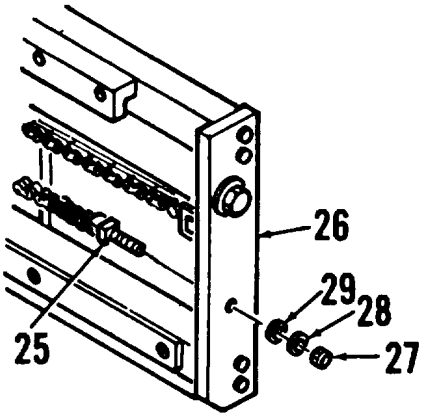
13. Repeat step 12 for left sideshift chain.

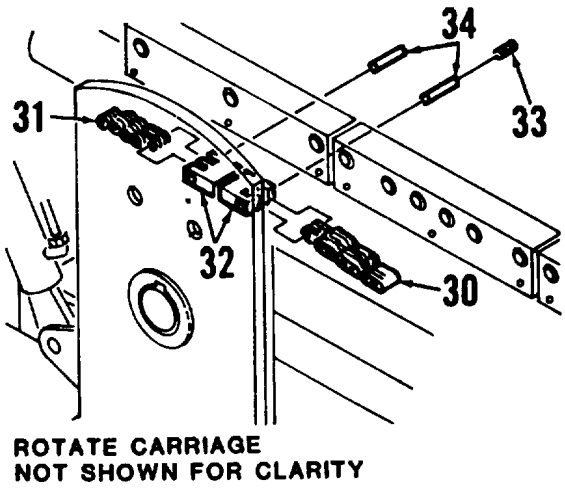
NOTE

Chain pins used to attach sideshift chain anchors on spine assembly are accessible through the two holes at back of spine assembly.

14. Remove sideshift chains (30, 31) from chain anchors (32) by removing set screws (33) and pins (34).

15. Feed sideshift chains (30, 31) through chain rollers (35) and remove from sideshift carrier assembly.





B. CLEANING

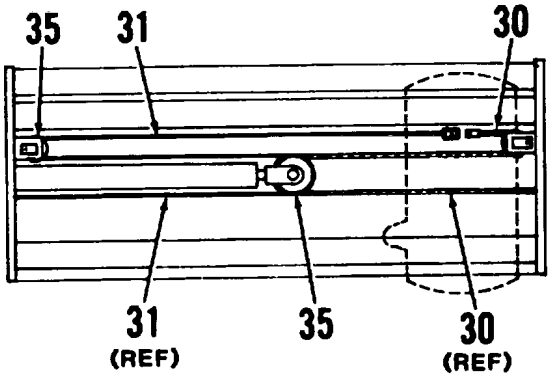
Clean chains in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect chains and related components in accordance with paragraph 1-24.

2. Inspect for damaged or defective chain links. Check for bent or missing lin1 pins.

3. Inspect for kinks in chain that prevent smooth operation.



D. INSTALLATION

1. Feed sideshift chains (30, 31) through chain rollers (35), ensuring proper alignment.

2. Secure sideshift chains (30, 31) to chain anchors (32) using set screws (33) and pins (34).

3. Secure right sideshift chain adjuster (25) to sideshift carrier (26) using nut (27), nine beville washers (28), and flat washer (29). Flat washer mounts closest to carrier.

4. Repeat step 3 for left sideshift chain.

5. Feed right mainlift chain through upper chain roller.

6. Mate chain adjuster (21) to chain (22). Secure using setscrews (23) and chain pin (24).

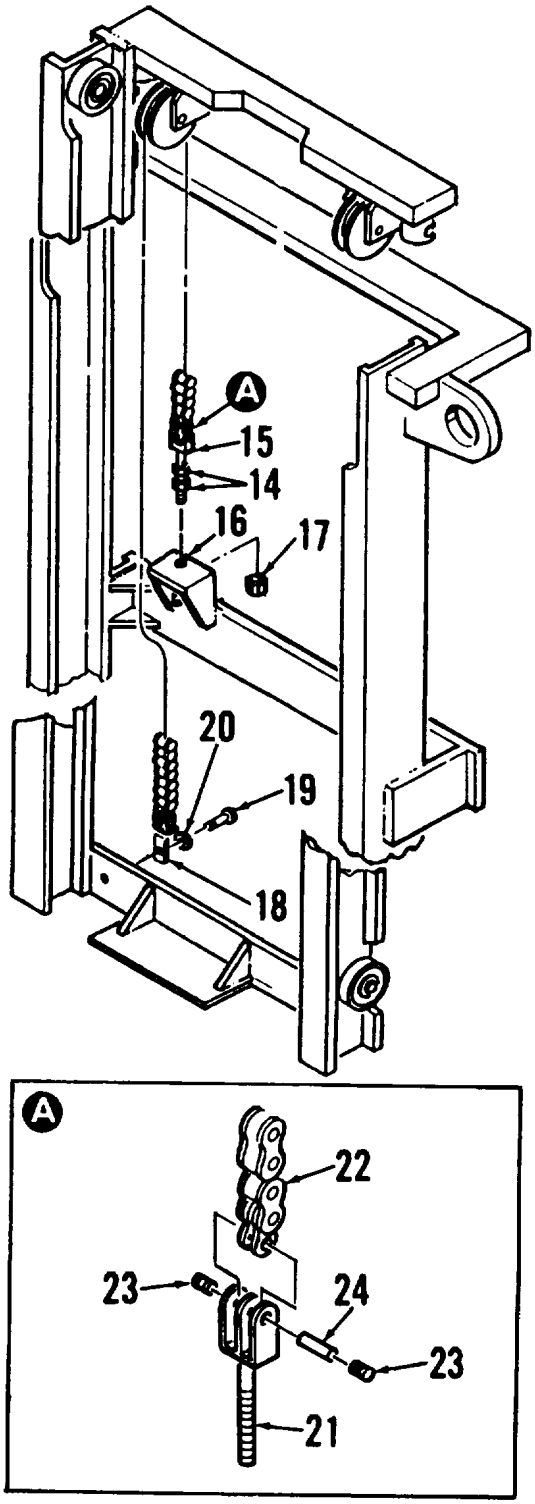
7. Apply removable thread adhesive to screws (19). Secure right manifold chain anchor (18) to inner rail using screws and washers (20).

8. Loosen jam nuts (14). Install right mainlift chain adjuster (15) to bracket (16) using nut (17).

9. Lower mainlift cylinders until cylinder rods are fully collapsed.

10. Repeat steps 5 through 9 for left mainlift chain.

11. Raise mainlift cylinders to place tension on drive chains. Torque mainlift chain anchor screws (19) to 450 ft-lbs.



12. Slide cover up chain to expose freelift chain anchor (7).

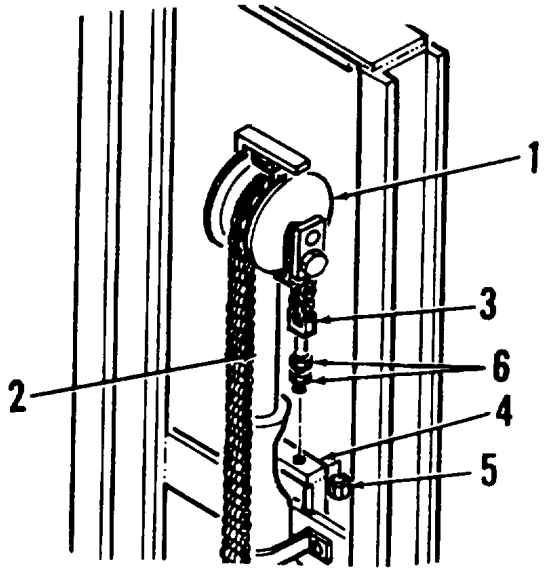
13. Apply permanent loctite to screws (9). Secure anchor to sideshift carrier (8) using screws. Torque screws to 420 ft-lbs.

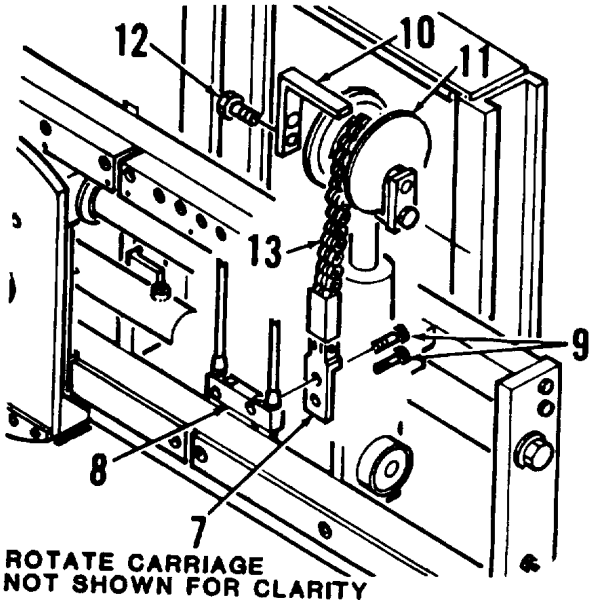
14. Place freelift chain assembly (13) onto chain roller.

15. Apply removable loctite to screw (12). Install hose guard (10) onto chain roller (11) using screw.

16. Loosen jam nuts (6). Secure freelift chain adjuster (3) to bracket (4) using nut (5).

17. Slowly raise the freelift cylinder rod by operating the lift control until tension on the chain is achieved. When all slack on the chain has been removed, normal operation can be resumed.





E. CHAIN ADJUSTMENT

1. Raise sideshift carrier (25) until freelift cylinder is fully extended. Ensure that rail assembly does not raise. Support mast assembly during chain adjustment.

2. Measure gap between underside of the top cross member of inner rail (26) and stops (27) on top of sideshift carrier rails. Gap shall be 0.0625 inch. If required, adjust freelift chain (3) as follows:

   a. Disconnect two hose assemblies (28) from intermediate rail manifold (29). Cap hose assemblies and remove two adapters (30).

   b. If gap is less than 0.0625 inch, lengthen freelift chain (3) by loosening nuts (6) and turning nut (5) to the left until correct gap is achieved.

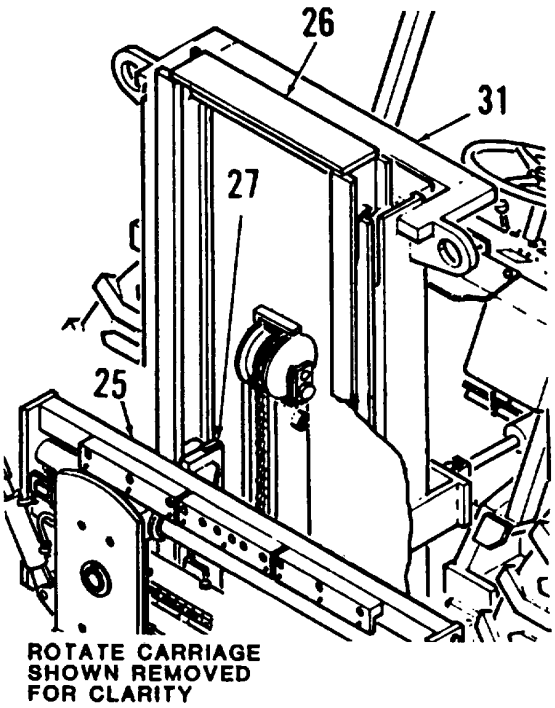
   c. If gap is greater that 0.0625 inch, shorten freelift chain (3) by loosening nuts (6) and turning nut (5) to the right until correct gap is achieved.

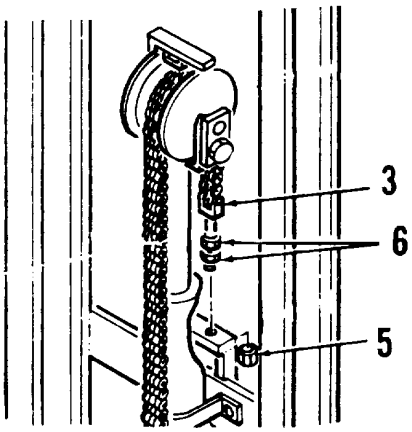
   d. Check to make sure that stops (27) do not touch inner rail. Tighten nuts (6).

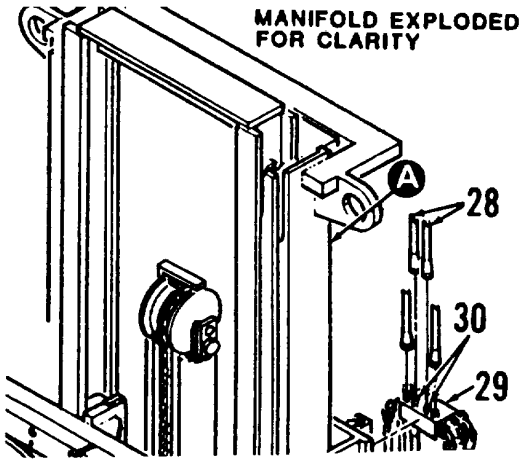
   e. Install two adapters (30) into intermediate rail manifold (29). Connect two hose assemblies (28) to adapters.

3. Lower sideshift carrier (25) and remove support from mast.

4. Lower mainlift cylinder:: until cylinder rods are fully collapsed.







5. Measure distance between top of inner rail (26) and top of outer rail (31) on both sides. Distance shall be 1.0 inch. If required, adjust mainlift chains as follows:

NOTE

Make sure that both mainlift chains (22) are adjusted evenly to ensure that inner rail raises level.

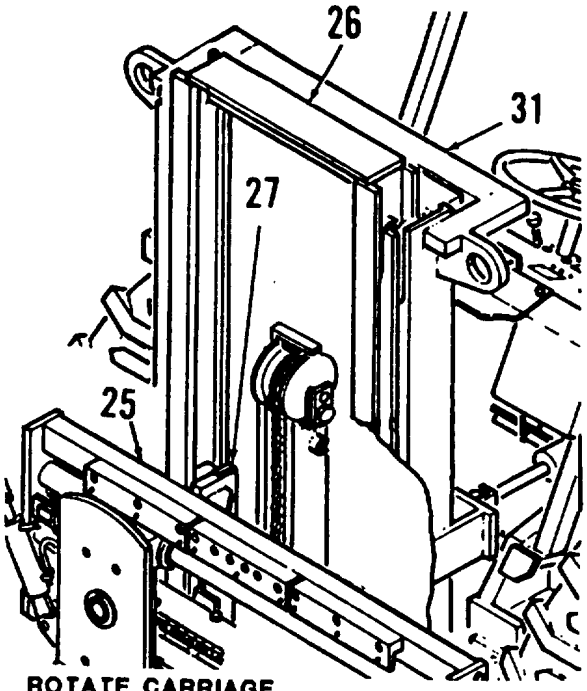
a. If distance is less than 1.0 inch, lengthen mainlift chain (22) by loosening nuts (14) and turning nut (17) to the left until correct distance is achieved.

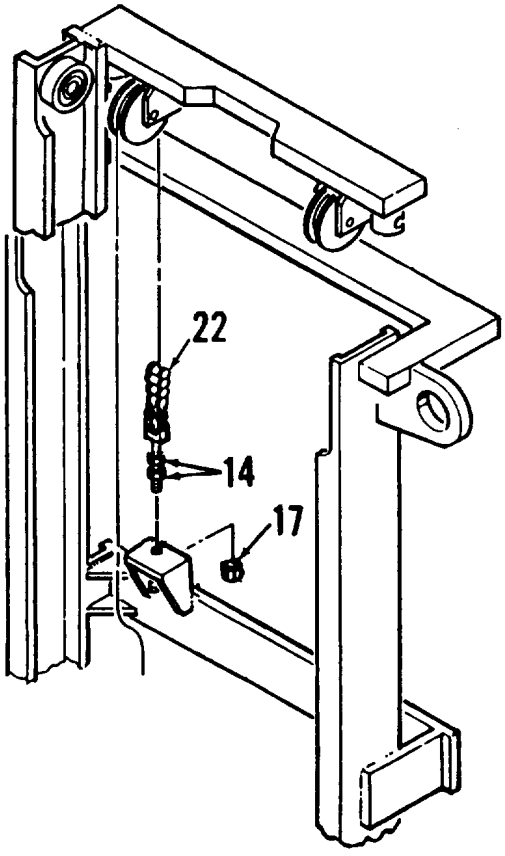
c. If distance is greater that 1.0 inch, shorten mainlift chain (22) by loosening nuts (14) and turning nut (17) to the right until correct distance is achieved.

d. Tighten nuts (14).

FOLLOW-ON MAINTENANCE:

Adjust sideshift chains in accordance with Operators Manual





2-156. MAST ASSEMBLY SERVICING

This task covers: Servicing

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Lubricator Kit (35, App. E)

Materials / Parts:

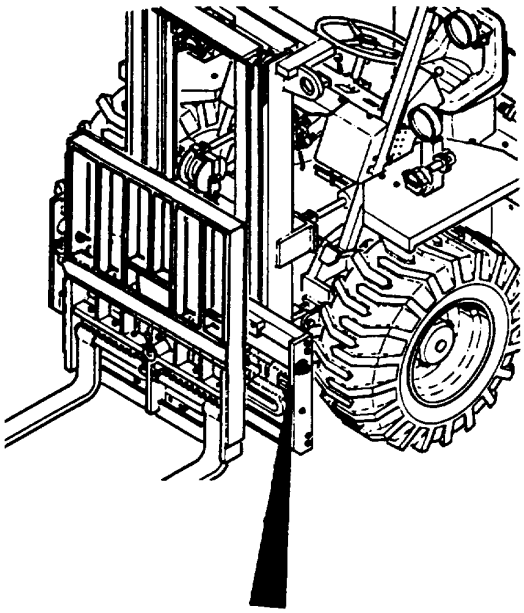
Grease (10, App. C)

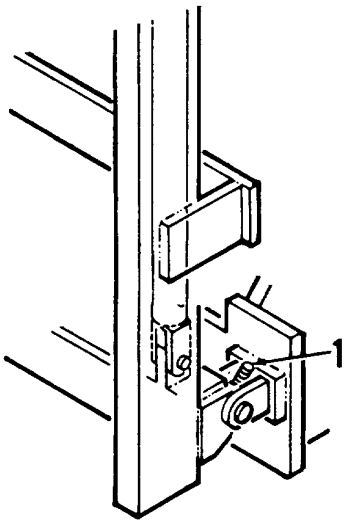
A. SERVICING

WARNING

Use extreme caution when operating lubricating devices that require compressed air. Improper use could cause personal injury.

1. Lube fittings (1) are located on outer rail mounting ears where rail mounts to forklift. Shift carriage to the right to align right lube fitting with access hole in mud guard.
2. Apply grease to right lube fitting (1).
3. Shift carriage to the left to align left lube fitting with access hole in mud guard.
4. Apply grease to left lube fitting (1).
5. Service carriage tilt cylinders in accordance with paragraph 2-152.
6. Service carriage assembly in accordance with paragraph 2-154.
7. Clean mast assembly chains in accordance with paragraph 1-24.





FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-157. FORK REPLACEMENT

This task covers: Removal, Cleaning, Inspection, Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Materials / Parts:

Locknut, Item 5, (2 ea.)

Personnel Required:

2 Personnel

A. REMOVAL

WARNING

Carriage backrest is heavy and awkward. Enlist the help of an aide when removing to prevent injury to personnel and damage to components.

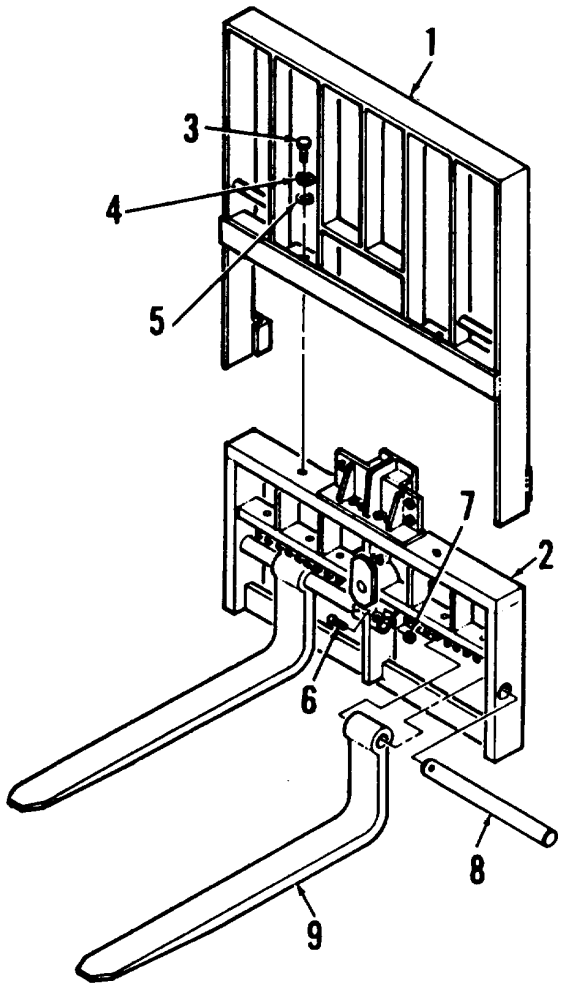
1. Remove carriage backrest (1) from carriage weldment (2) by removing screws (3), lockwashers (4), and washers (5).
2. Remove screws (6) and locknuts (7) to release fork bars (8) from carriage weldment (2). Discard locknuts.
3. Remove fork bars (8) from carriage weldment (2). Remove forks (9).

B. CLEANING

Clean forks in accordance with paragraph 1-24.

C. INSPECTION

Inspect forks and related components in accordance with paragraph 1-24.



SIDESHIFT CARRIER NOT SHOWN FOR CLARITY

D. INSTALLATION

1. Slide fork bars (8) through holes in sides of carriage weldment (2). Feed bars through forks (9) and into weldment mounts.

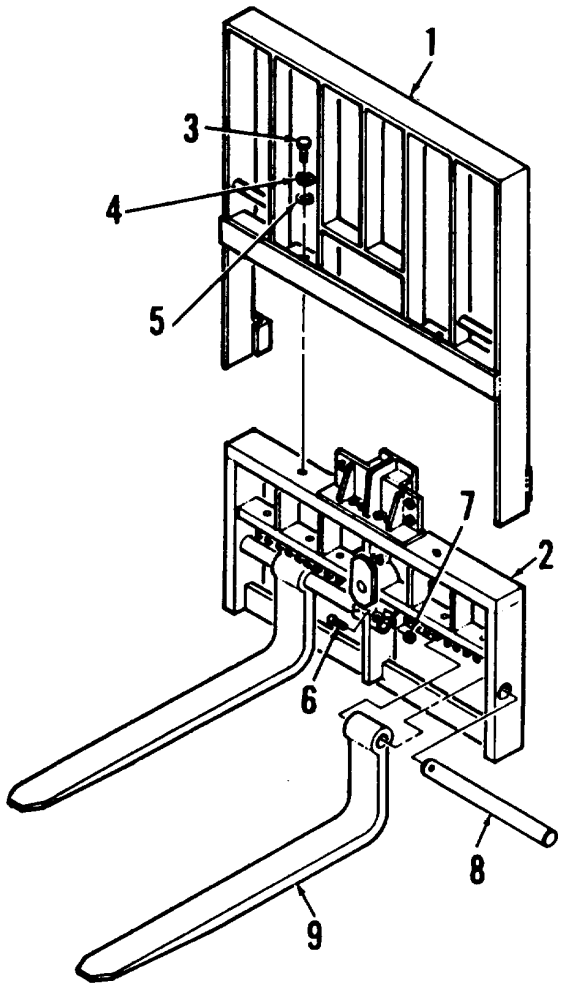
2. Install screws (4) and new locknuts (7) to secure fork bars (8) to carriage weldment (2).

3. Install carriage backrest (1) onto carriage weldment (2) and secure using screws (3), lockwashers (4), and washers (5).

FOLLOW-ON MAINTENANCE:

None

END OF TASK



SIDESHIFT CARRIER
NOT SHOWN
FOR CLARITY

2-158. HOSE, LINE, TUBING, AND FITTING REPLACEMENT (MAST ASSEMBLY)

This task covers: Removal, Cleaning, Inspection, Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

Materials / Parts:

Loctite 242 (20, App. C)
Loctite 271 (26, App. C)
O-Ring, Item 7 (2 ea.)
O-Ring, Item 10 (2 ea.)
O-Ring, Item 14 (2 ea.)
O-Ring, Item 24 (2 ea.)
O-Ring, Item 41 (2 ea.)
O-Ring, Item 42 (4 ea.)
O-Ring, Item 45 (2 ea.)
O-Ring, Item 46 (2 ea.)
O-Ring, Item 49 (2 ea.)
O-Ring, Item 56 (2 ea.)
O-Ring, Item 57 (1 ea.)
O-Ring, Item 62 (2 ea.)
O-Ring, Item 63 (1 ea.)
O-Ring, Item 70 (2 ea.)
O-Ring, Item 71 (1 ea.)
O-Ring, Item 76 (2 ea.)
O-Ring, Item 77 (1 ea.)
O-Ring, Item 82 (2 ea.)
O-Ring, Item 104 (2 ea.)
O-Ring, Item 113 (2 ea.)
O-Ring, Item 114 (1 ea.)
O-Ring, Item 119 (1 ea.)

A. REMOVAL

WARNING

Relieve hydraulic pressure before disconnecting hydraulic lines. Pressurized lines could cause serious injury to personnel.

NOTE

Place drain pan beneath hoses and fittings when disconnecting to catch fluids.

1. SHIFT SIDESHIFT CARRIER ALL THE WAY TO THE RIGHT TO GAIN ACCESS TO COMPONENTS.

2. RAISE CARRIAGE TO APPROXIMATELY 50 INCHES TO RELIEVE PRESSURE ON DIVERTER VALVE SPRING. BLOCK CARRIAGE WITH ON EACH SIDE PRIOR TO REMOVING ANY HOSE.

WARNING

Do not attempt to remove main lift or free lift chains with carriage raised and blocked. Serious injury could occur.

3. TAG AND DISCONNECT HOSE ASSEMBLIES (1, 2) AND TUBING (3) FROM ROTATE CYLINDER AND SPINE MANIFOLD. REMOVE FITTINGS.

   a. Tag and disconnect hose assemblies (1, 2) from elbows (4, 5). Remove elbows (4, 5) from rotate cylinder (6). Remove and discard O-rings (7).

   b. Tag and disconnect hose assemblies (1, 2) from adapters (8). Remove adapters (8) from spine manifold (9). Remove and discard O-rings (10).

   c. Tag and disconnect tubing (3) from adapters (11, 12). Remove adapters (11) from spine manifold (9).

   d. Tag and disconnect hose assemblies (13) from adapters (12). Remove adapters from bracket on spine assembly by removing attaching nuts. Remove and discard O-rings (14).

4. REMOVE LEFT SPLASH GUARD BY REMOVING ATTACHING PARTS.

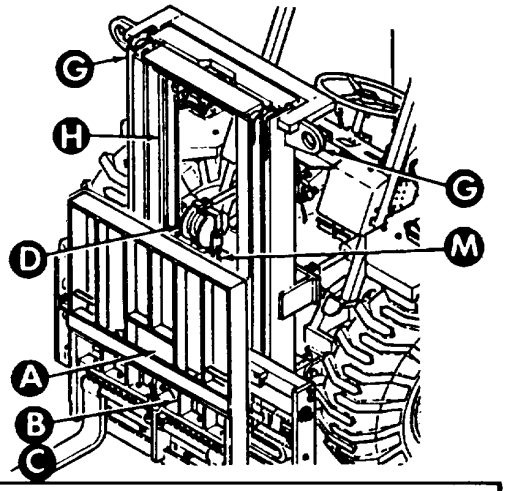
5. TAG AND DISCONNECT HOSE ASSEMBLIES (13) FROM ROTATE MANIFOLD (15). REMOVE FITTINGS.

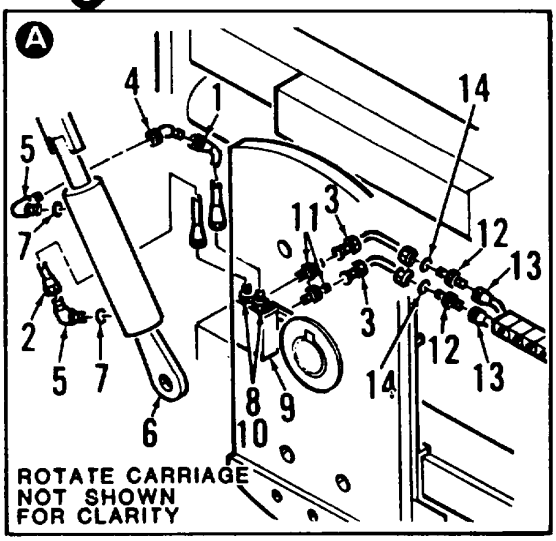
   a. Disconnect elbow (16) from fitting (17).

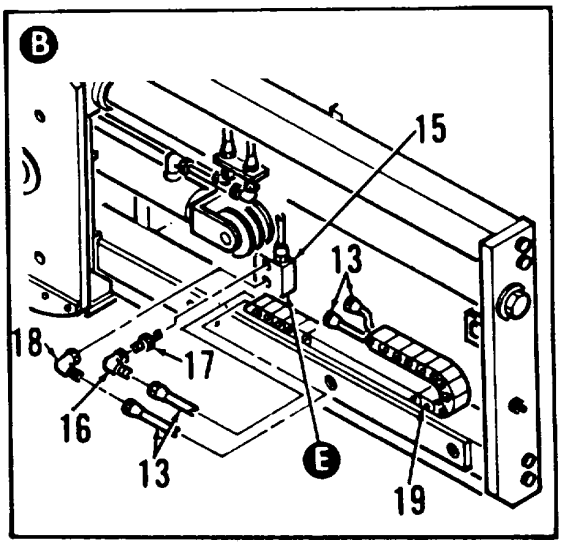
   b. Tag and disconnect hose assemblies (13) from elbows (16, 18).

   c. Remove elbows (16, 18) and fitting (17) from rotate manifold (15).

   d. Remove power track (19) with hose assemblies (13) from sideshift assembly. Carefully feed hose assemblies through power track.







6. SHIFT SIDESHIFT CARRIER ALL THE WAY TO THE LEFT TO GAIN ACCESS TO COMPONENTS.

7. REMOVE RIGHT SPLASH GUARD BY REMOVING ATTACHING PARTS.

8. TAG AND DISCONNECT TUBE ASSEMBLIES (20, 21) FROM SIDESHIFT CYLINDER (22). REMOVE FITTINGS.

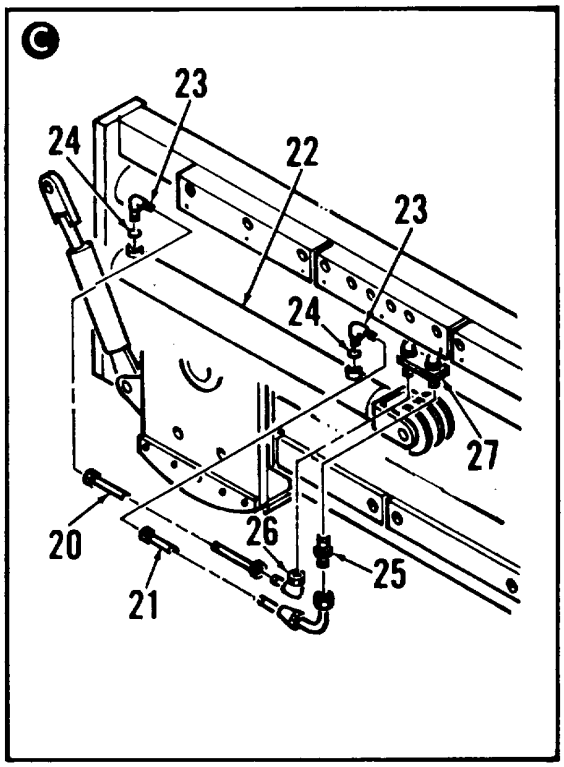
   a. Tag and disconnect tube assemblies (20, 21) from elbows (23).

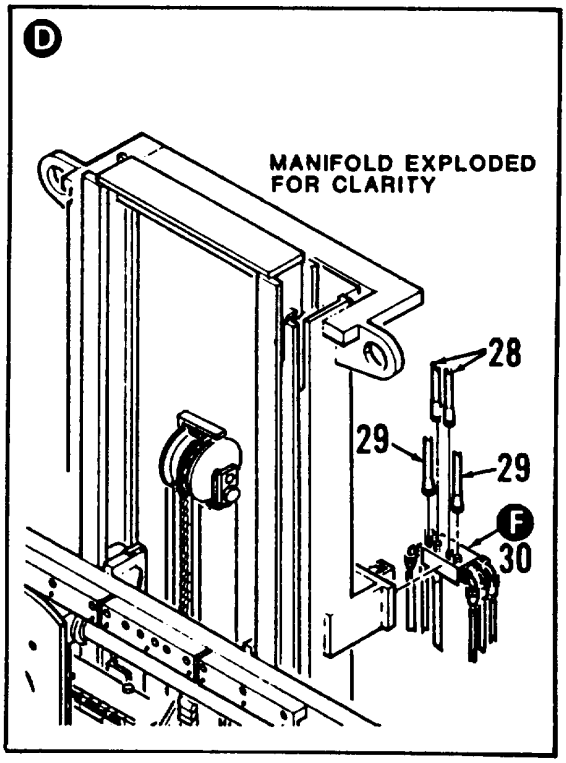
   b. Remove elbows (23) from sideshift cylinder (22). Remove and discard O-rings (24).

   c. Tag and disconnect tube assemblies (20, 21) from fitting (25) and elbow (26).

   d. Remove fitting (25) and elbow (26) from bulkhead bracket (27).

9. TAG AND DISCONNECT HOSE ASSEMBLIES (28, 29) FROM INTERMEDIATE RAIL MANIFOLD (30).





10. TAG AND DISCONNECT HOSE ASSEMBLIES (28, 29) FROM ROTATE MANIFOLD (15). REMOVE FITTINGS.

    a. Tag and disconnect hose assemblies (28, 29) from fittings (31, 32) and elbow (33).

    b. Carefully feed hose assemblies (28, 29) over freelift chain roller.

    c. Remove bulkhead fitting (31) and bulkhead elbow (33) from sideshift bracket (34) by removing nuts.

    d. Remove fittings (32) from rotate manifold (15).

11. TAG AND DISCONNECT HOSE ASSEMBLIES (35, 36, 37, 38) FROM INTERMEDIATE RAIL MANIFOLD (30). REMOVE ADAPTERS.

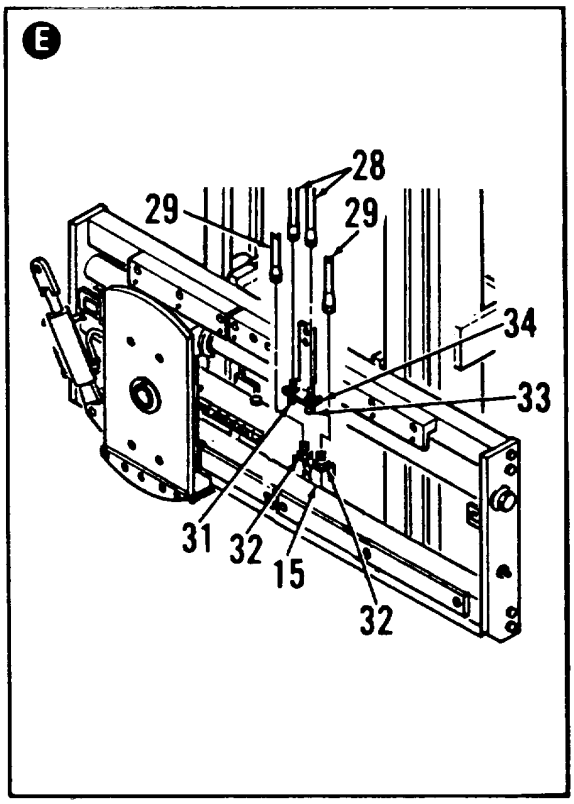
    a. Tag and disconnect hose assemblies (35, 36, 37, 38) from intermediate rail manifold (30).

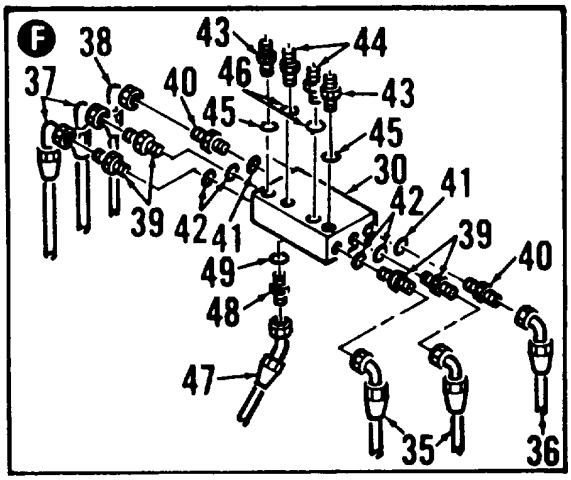
    b. Remove adapters (39, 40) from sides of intermediate rail manifold (30). Remove and discard O-rings (41, 42).

    c. Remove adapters (43, 44) from top of intermediate rail manifold (30). Remove and discard O-rings (45, 46).

    d. Tag and disconnect hose assembly (47) from bottom of intermediate rail manifold (30) and bottom of main lift cylinder.

    e. Remove adapter (48). Remove and discard O-ring (49).





12. DISCONNECT HOSE ASSEMBLIES (35, 36, 50, 51, 52) FROM LEFT OUTER RAIL MANIFOLD (53). REMOVE FITTINGS.

    a. Tag and disconnect hose assemblies (35, 36) from fittings (54, 55).

    b. Remove fittings (54, 55) from left outer rail manifold (53). Remove and discard O-rings (56, 57).

    c. Tag and disconnect hose assemblies (50, 51, 52) from elbows (58, 59).

    d. Remove elbows (58, 59) and adapters (60, 61) from left outer rail manifold (53). Remove and discard O-rings (62, 63).

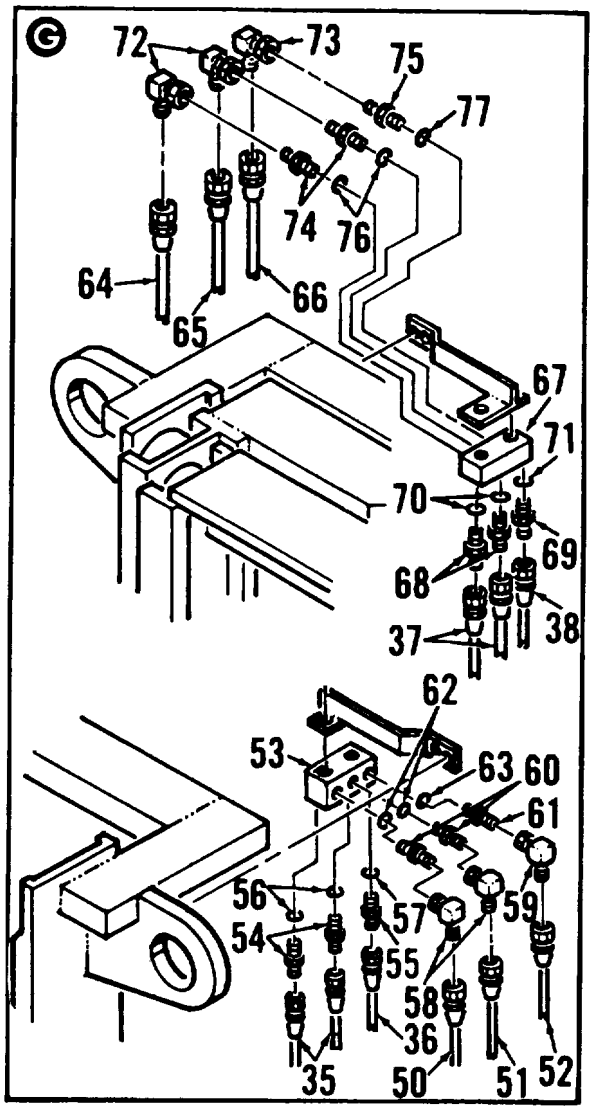
13. DISCONNECT HOSE ASSEMBLIES (37, 38, 64, 65, 66) FROM RIGHT OUTER RAIL MANIFOLD (67). REMOVE FITTINGS.

    a. Tag and disconnect hose assemblies (37, 38) from fittings (68, 69).

    b. Remove fittings (68, 69) from right outer rail manifold (67). Remove and discard O-rings (70, 71).

    c. Tag and disconnect hose assemblies (64, 65, 66) from elbows (72, 73).

    d. Remove elbows (72, 73) and adapters (74, 75) from right outer rail manifold (67). Remove and discard O-rings (76, 77).



14. TILT MAST FORWARD.

15. TAG AND DISCONNECT TUBING (78, 79, 83). REMOVE FITTINGS.

    a. Tag and disconnect tubing (78, 79) from elbows (81) at top of main lift cylinders (80).

    b. Remove elbows (81) from lift cylinders (80). Remove and discard O-rings (82).

    c. Tag and disconnect tubing (78) and hose assembly (83) from tee (84). Hose assembly leads to hydraulic tank.

    d. Remove tubing (79) from rail brace by removing screws (85) and clamps (86).

    e. Tag and disconnect tubing (79) from tee (87).

16. TAG AND DISCONNECT HOSE ASSEMBLIES (88, 90, 93, 94, 96). REMOVE FITTINGS.

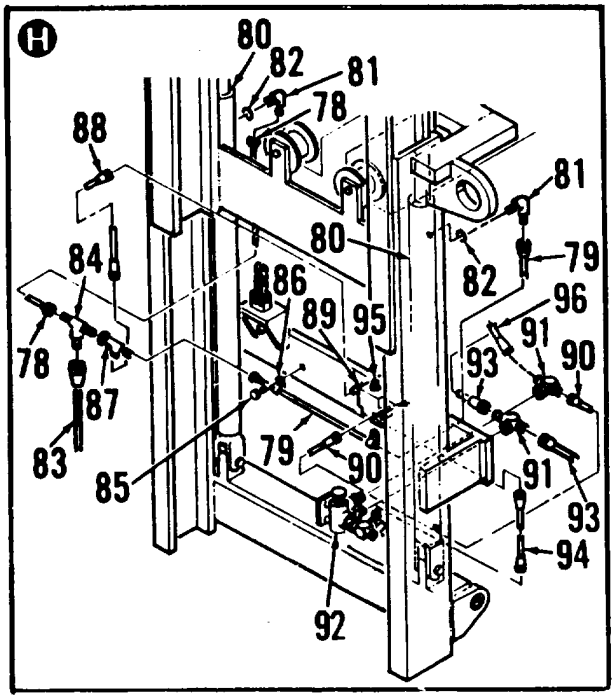
    a. Tag and disconnect hose assembly (88) from tee (87) and elbow (89).

    b. Tag and disconnect hose assembly (96) from upper tee (91) on diverter valve (92).

    c. Tag and disconnect hose assembly (90) from elbow (89) and upper tee (91).

    d. Tag and disconnect hose assemblies (93) from lower tee (91). Remove tees from diverter valve (92).

    e. Tag and disconnect hose assembly (94) from fitting on bottom of sequence valve (95) and tee on diverter valve (92).



17. TAG AND DISCONNECT HOSE ASSEMBLIES (96, 99). REMOVE FITTINGS AND FUSES.

    a. Tag and disconnect hose assembly (96) from elbow (97) and diverter valve (92).

    b. Remove elbow (97) from tee (98).

    c. Tag and disconnect hose assembly (99) from tee (98) and fitting (100).

    d. Remove tee (98), fitting (100), and velocity fuses (101) from fittings (102).

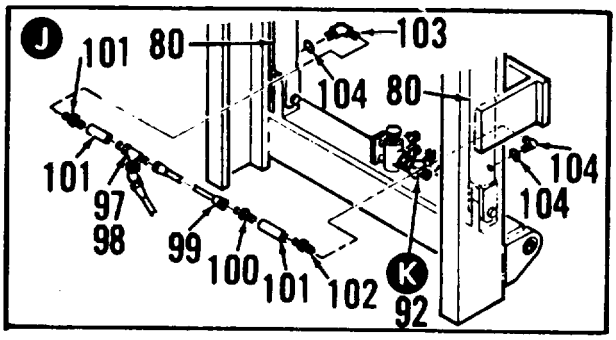
    e. Remove fittings (102) from elbows (103) located at bottom of main lift cylinders (80).

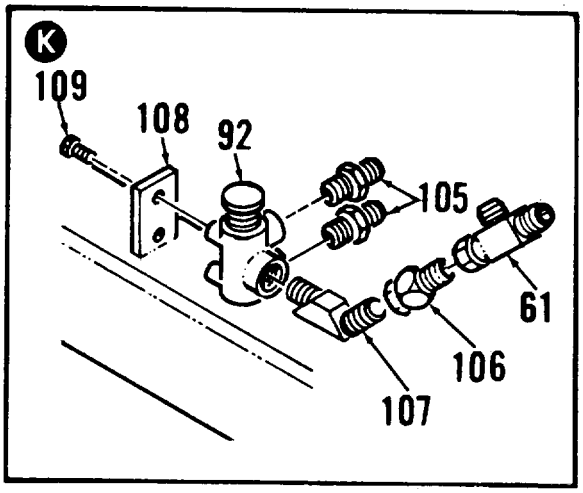
    f. Remove elbows (103) from main lift cylinders (80). Remove and discard O-rings (104).

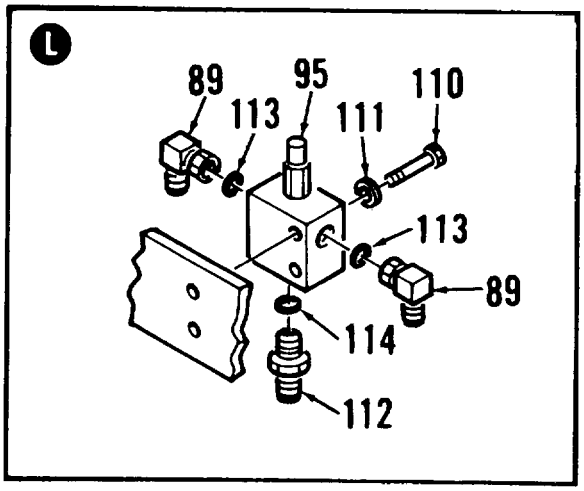
18. REMOVE DIVERTER VALVE (92) FROM BRACKET (108) BY REMOVING SCREWS (109). REMOVE FITTINGS (105), TEE (106), AND ELBOW (107) FROM DIVERTER VALVE.

19. REMOVE SEQUENCE VALVE (95) BY REMOVING SCREWS (110) AND LOCKWASHERS (111).

20. REMOVE ELBOWS (89) AND FITTING (112) FROM SEQUENCE VALVE (95). REMOVE AND DISCARD O-RINGS (113, 114).



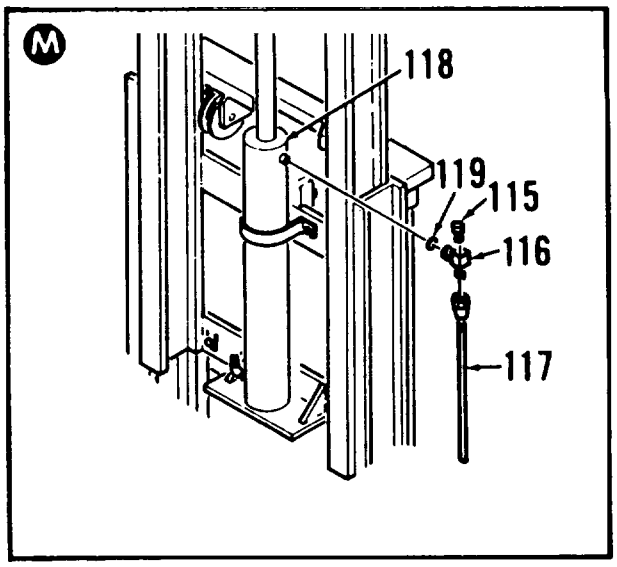




21. REMOVE BREATHER (115) FROM TEE (116). TAG AND DISCONNECT TUBING (117) FROM TEE.

22. REMOVE TEE (116) FROM FREELIFT CYLINDER 9118). REMOVE AND DISCARD O-RING

23. TAG AND DISCONNECT HOSE ASSEMBLIES 51, 52, 65, 66, 93) FROM DIRECTIONAL CONTROL VALVE ASSEMBLY (120)



B. CLEANING

Clean hoses, tubing, fittings, and related components in accordance with paragraph 1-24.

C. INSPECTION

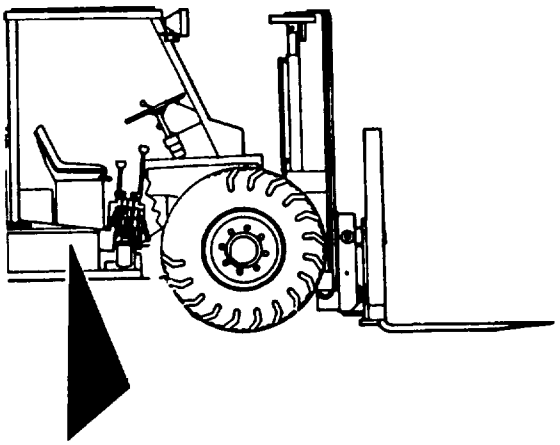
Inspect hoses, tubing, fittings, and related components in accordance with paragraph 1-24.

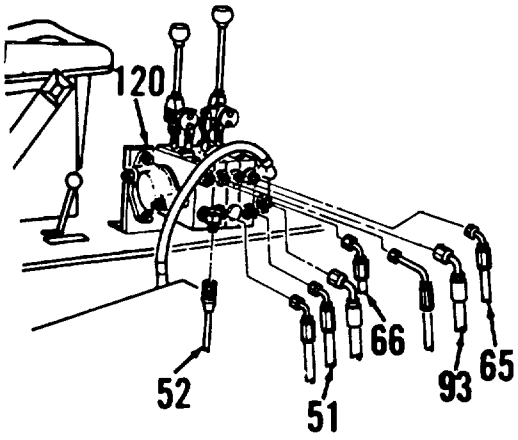
D. INSTALLATION

1. CONNECT HOSE ASSEMBLIES 51, 52, 65, 66, 93) TO DIRECTIONAL CONTROL VALVE ASSEMBLY (120).

2. INSTALL TEE (116) AND NEW O-RING (119) INTO FREELIFT CYLINDER (118).

3. INSTALL BREATHER (115) INTO TEE (116). CONNECT TUBING (117) TO TEE.





4. INSTALL ELBOWS (89), FITTING (112), AND NEW O-RINGS (113, 114) INTO SEQUENCE VALVE (95).

5. INSTALL SEQUENCE VALVE (95) USING SCREWS (110) AND LOCKWASHERS (111).

NOTE

When installing a new diverter valve, remove diverter valve knob from old valve and use on new valve. Apply loctite to threads on spool of new diverter valve and install knob onto spool.

6. INSTALL FITTINGS (105), TEE (106), AND ELBOW (107) ONTO DIVERTER VALVE (92). INSTALL DIVERTER VALVE ONTO BRACKET (108) USING SCREWS (109).

7. CONNECT HOSE ASSEMBLIES (96, 99) WITH FITTINGS AND FUSES.

   a. Install elbows (103) and new O-rings (104) into bottom of main lift cylinders (80).

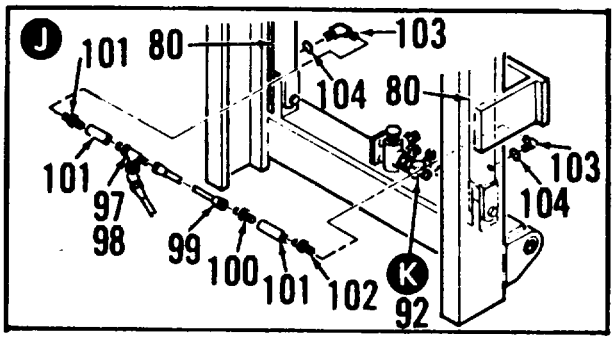
   b. Install fittings (102) onto elbows (103).

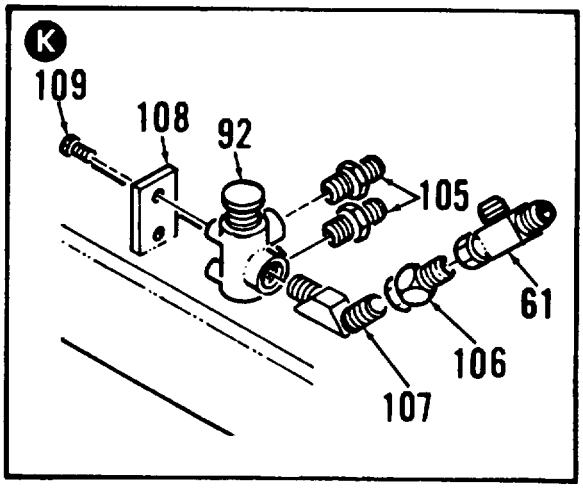
   c. Install tee (98), fitting (100), and velocity fuses (101) onto fittings (102).

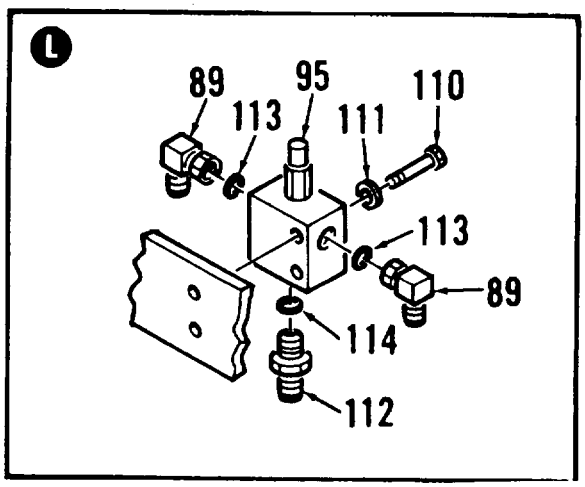
   d. Connect hose assembly (99) to tee (98) and fitting (100).

   e. Install elbow (97) onto tee (98).

   f. Connect hose assembly (96) to elbow (97) and diverter valve (92).







8. CONNECT HOSE ASSEMBLIES (88, 90, 93, 94, 96) WITH FITTINGS.

    a. Install tees (91) onto diverter valve (92). Connect hose assemblies (93) to lower tee (91).

    b. Connect hose assembly (90) to elbow (89) and upper tee (91) on diverter valve (92).

    c. Connect hose assembly (94) to fitting on bottom of sequence valve (95) and tee on diverter valve (92).

    d. Connect hose assembly (96) to upper tee (91) on diverter valve (92).

    e. Connect hose assembly (88) to tee (87) and elbow (89).

9. CONNECT TUBING (78, 79, 83) WITH FITTINGS.

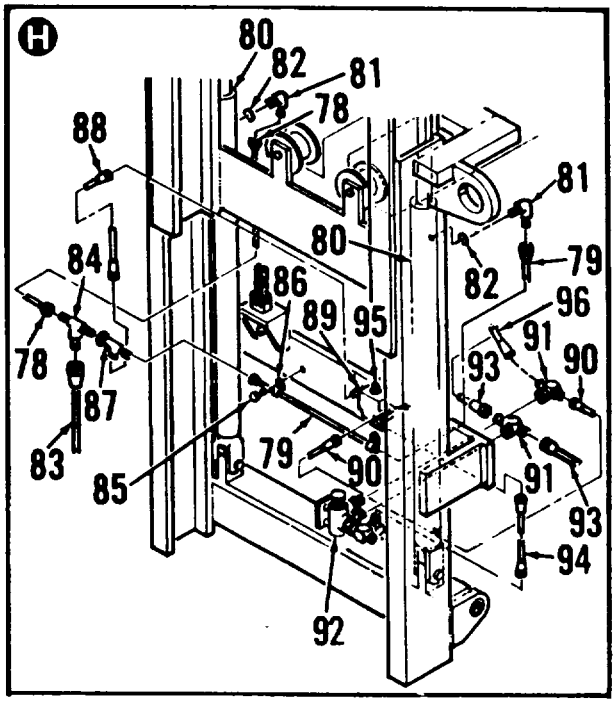
    a. Connect tubing (79) to tee (87).

    b. Secure tubing (79) to rail brace using screws (85) and clamps (86).

    c. Connect tubing (78) and hose assembly (83) to tee (84). Hose assembly leads to hydraulic tank.

    d. Install elbows (81) and new O-rings (82) into top of main lift cylinders (80).

    e. Connect tubing (78, 79) to elbows (81).



10. CONNECT HOSE ASSEMBLIES (37, 38, 64, 65, 66) AND FITTINGS TO RIGHT OUTER RAIL MANIFOLD (67).

    a. Install elbows (72, 73), adapters (74, 75), and new O-rings (76, 77) into right outer rail manifold (67).

    b. Connect hose assemblies (64, 65, 66) to elbows (72, 73).

    c. Install fittings (68, 69) and new O-rings (70, 71) into right outer rail manifold (67).

    d. Connect hose assemblies (37, 38) to fittings (68, 69).

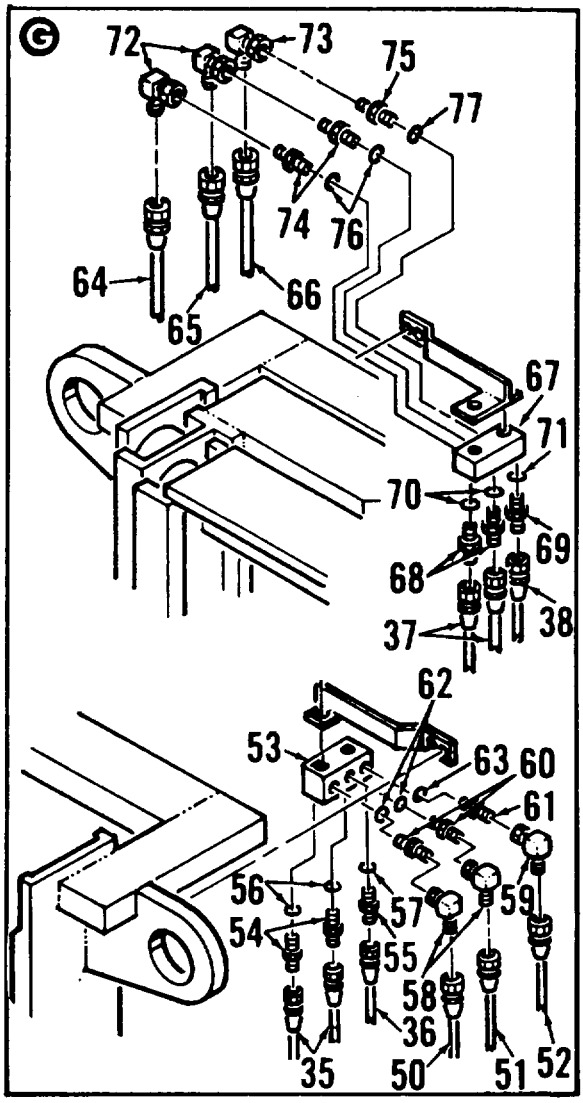
11. CONNECT HOSE ASSEMBLIES (35, 36, 50, 51, 52) AND FITTINGS TO LEFT OUTER RAIL MANIFOLD (53).

    a. Install elbows (58, 59), adapters (60, 61), and new O-rings (62, 63) into left outer rail manifold (53).

    b. Connect hose assemblies (50, 51, 52) to elbows (58, 59).

    c. Install fittings (54, 55) and new O-rings (56, 57) into left outer rail manifold (53).

    d. Connect hose assemblies (35, 36) to fittings (54, 55).



12. CONNECT HOSE ASSEMBLIES (35, 36, 37, 38) WITH FITTINGS TO INTERMEDIATE RAIL MANIFOLD (30).

    a. Install adapter (48) and new O-ring (49) into intermediate rail manifold (30).

    b. Connect hose assembly (47) to adapter (48) and bottom of main lift cylinder.

    c. Install adapters (43, 44) and new O-rings (45, 46) into top of intermediate rail manifold (30).

    d. Install adapters (39, 40) and new O-rings (41, 42) into sides of intermediate rail manifold (30).

    e. Connect hose assemblies (35, 36, 37, 38) to intermediate rail manifold (30).

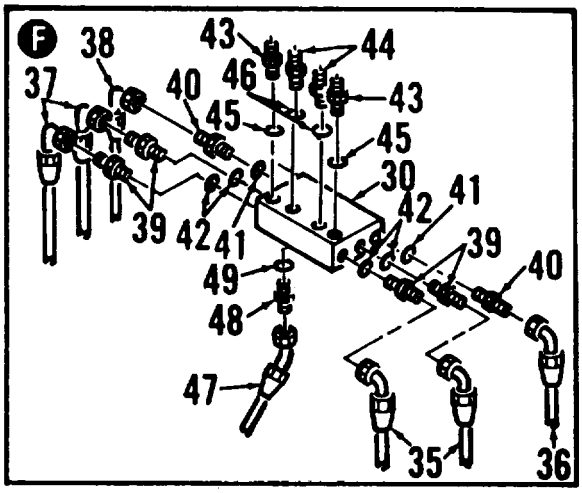
13. CONNECT HOSE ASSEMBLIES (28, 29) WITH FITTINGS TO ROTATE MANIFOLD (15).

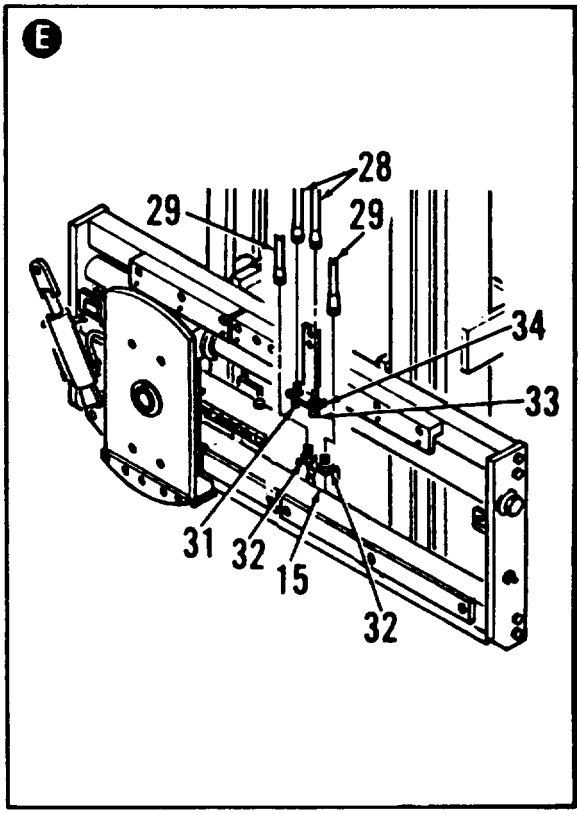
    a. Install fittings (32) into rotate manifold (15).

    b. Install bulkhead fitting (31) and bulkhead elbow (33) onto sideshift bracket (34) using nuts.

    c. Carefully feed hose assemblies (28, 29) over freelift chain roller.

    d. Connect hose assemblies (28, 29) to fittings (31, 32) and elbow (33).





14. SHIFT SIDESHIFT CARRIER ALL THE WAY TO THE LEFT TO GAIN ACCESS TO COMPONENTS.

15. CONNECT HOSE ASSEMBLIES (28, 29) TO INTERMEDIATE RAIL MANIFOLD (30).

16. CONNECT TUBE ASSEMBLIES (20, 21) WITH FITTINGS TO SIDESHIFT CYLINDER (22).

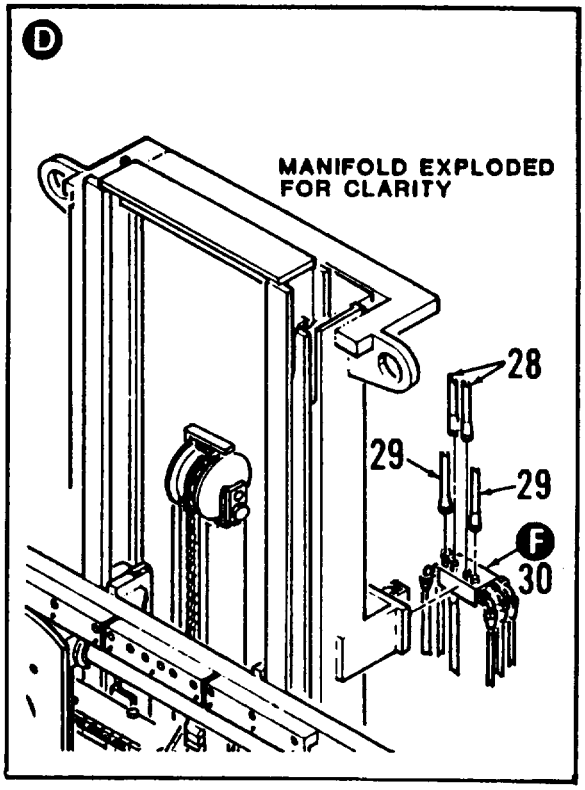
    a. Install fitting (25) and elbow (26) onto bulkhead bracket (27).

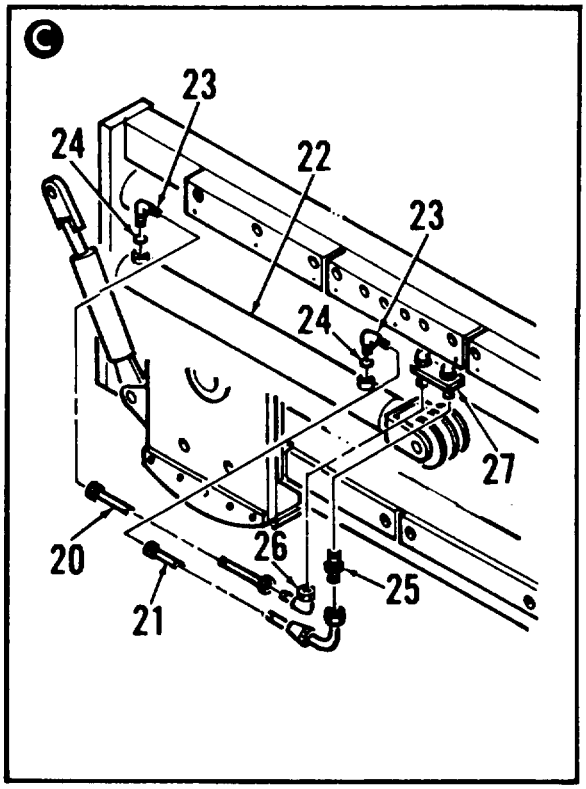
    b. Connect tube assemblies (20, 21) to fitting (25) and elbow (26).

    c. Install elbows (23) and new O-rings (24) into sideshift cylinder (22).

    d. Connect tube assemblies (20, 21) to elbows (23).

17. INSTALL RIGHT SPLASH GUARD USING ATTACHING PARTS.





18. CONNECT HOSE ASSEMBLIES (13) WITH FITTINGS TO ROTATE MANIFOLD (15).

    a. Connect elbow (16) to fitting (17).

    b. Connect hose assemblies (13) to elbows (16, 18).

    c. Install elbows (16, 18) and fitting (17) into rotate manifold (15).

    d. Carefully feed hose assemblies (13) into power track (19). Install power track with hose assemblies onto sideshift assembly.

19. INSTALL LEFT SPLASH GUARD USING ATTACHING PARTS.

20. CONNECT HOSE ASSEMBLIES (1, 2) AND TUBING (3) WITH FITTINGS TO ROTATE CYLINDER AND SPINE MANIFOLD.

    a. Install adapters (12) with new O-rings (14) onto bracket on spine assembly using attaching nuts.

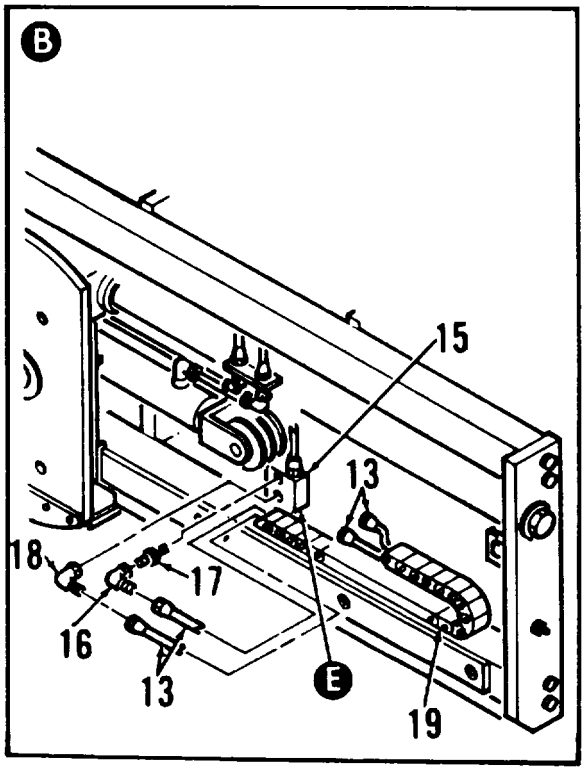
    b. Connect hose assemblies (13) to adapters (12).

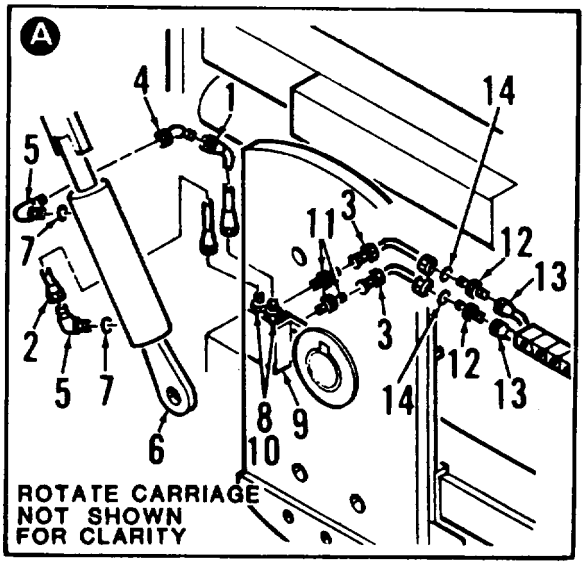
    c. Install adapters (11) into spine manifold (9). Install adapters (8) and new O-rings (10).

    d. Connect tubing (3) to adapters (11, 12). Connect hose assemblies (1, 2) to adapters (8).

    e. Install elbows (4, 5) and new O-rings (7) into rotate cylinder (6).

    f. Connect hose assemblies (1, 2) to elbows (4, 5).





FOLLOW-ON MAINTENANCE:

Service hydraulic system in accordance with Lubrication Order

END OF TASK

2-159. OIL SAMPLING VALVE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Materials / Parts:

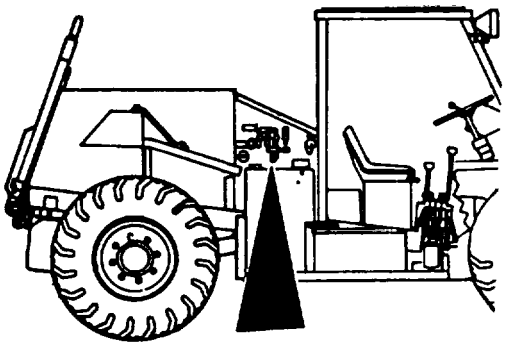
Loctite 242 (20, App. C)
Teflon Tape (35, App. C)

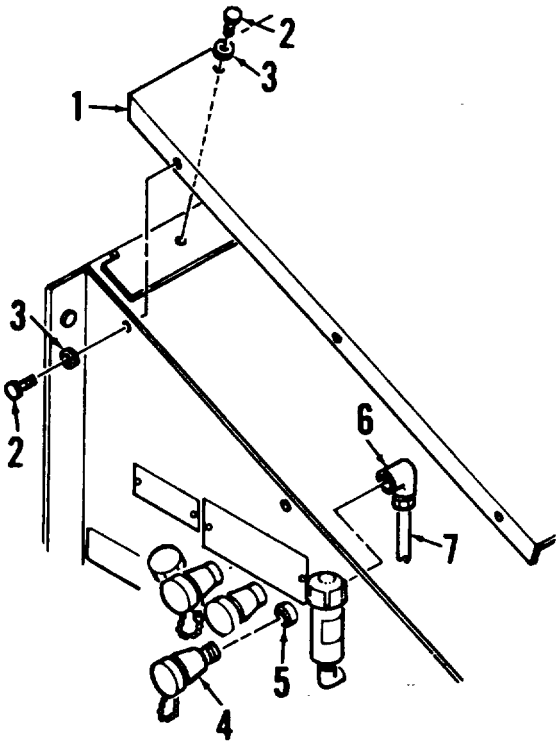
A. REMOVAL

NOTE

Sampling valve can be removed without removing transmission top cover. Remove cover only if elbow or hose replacement is required.

1. Remove oil sampling valve (4) from welded pipe coupling (5). Plug pipe coupling.
2. If required, remove top transmission cover (1) by removing nine screws (2) and washers (3).
3. Tag and disconnect hose assembly (7) from elbow (6). Remove elbow from welded pipe coupling (5).





B. CLEANING

Clean oil sampling valve in accordance with paragraph 1-24.

C. INSPECTION

Inspect valve and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install elbow (6) into welded pipe coupling (5). Connect hose assembly (7) to elbow.

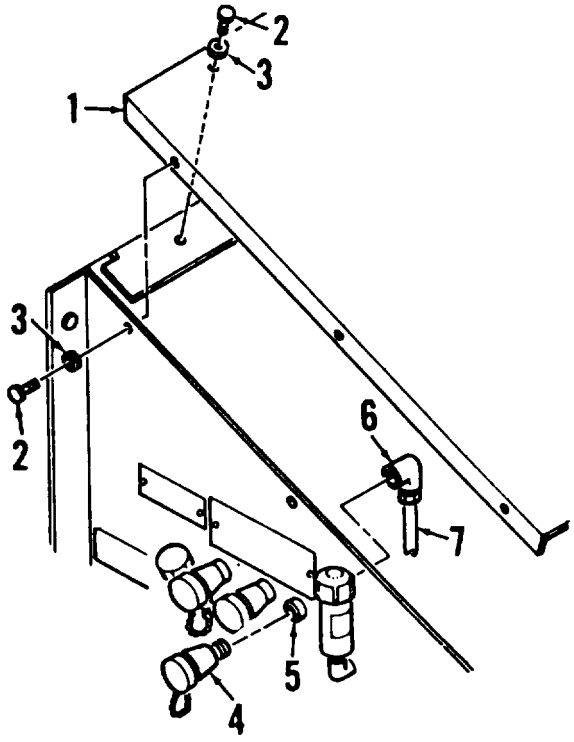
2. Apply loctite to threads of nine screws (2). Position top transmission cover (1) in place and secure using screws and washers (3).

3. Apply teflon tape to threads of oil sampling valve (4) and install valve into welded pipe coupling (5). Ensure valve spout points down.

FOLLOW-ON MAINTENANCE:

None

END OF TASK



2-160. HYDRAULIC FILTER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
Oil Filter Tool (27, App. E)

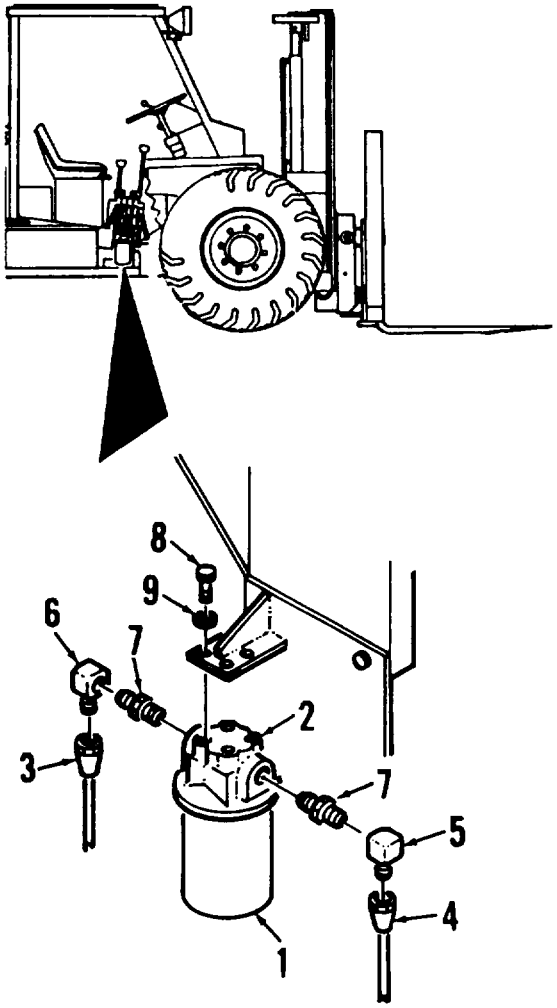
Materials / Parts:

Lubricating Oil (18, App. C)
Filter Canister, Item 1 (1 ea.)

A. REMOVAL

NOTE
Place drain pan beneath hydraulic filter assembly and hoses to catch fluids released during removal.

1. Using strap wrench remove filter canister (1) from filter head (2). Discard canister.
2. Tag and disconnect hose assemblies (3, 4) from elbows (5, 6).
3. Remove elbows (5, 6) and reducers (7) from filter head (2).
4. Remove filter head (2) from mounting bracket by removing screws (8) and washers (9).

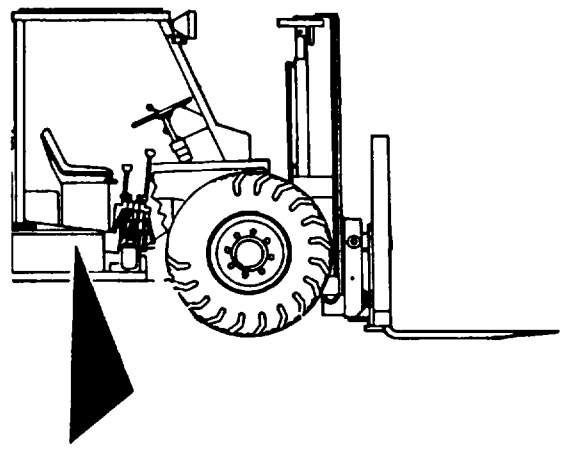


5. Tag and disconnect hose assembly (3) from elbow (10).

6. Tag and disconnect hose assembly (4) from hydraulic tank elbow (11). Remove clamp from hose assembly.

7. If replacement of elbow (10) is required, tag and disconnect hose assemblies (12, 13, 14).

8. Remove elbow (10) from bracket (15) by removing nut (16).



B. CLEANING

Clean hose assemblies and fittings in accordance with paragraph 1-24.

C. INSPECTION

Inspect hose assemblies and fittings in accordance with paragraph 1-24.

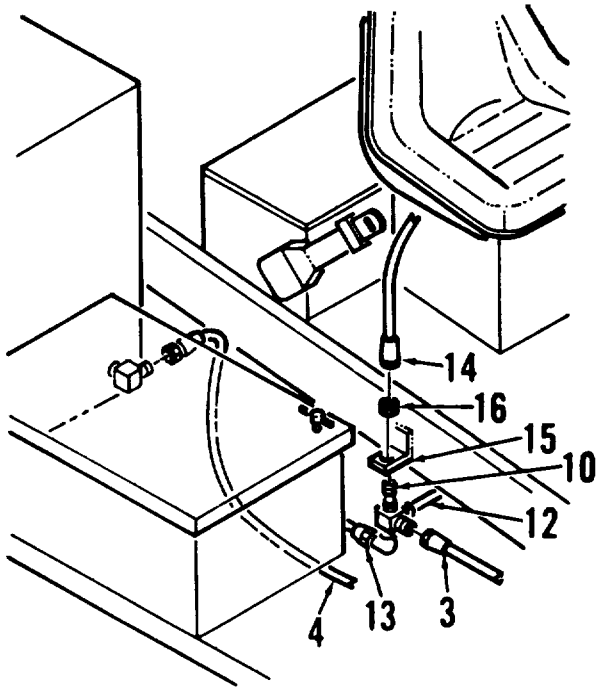
D. INSTALLATION

1. Install elbow (10) onto bracket (15) using nut (16).

2. Connect hose assemblies (12, 13, 14) to elbow (10).

3. Connect hose assembly (4) to hydraulic tank elbow (11). Secure using clamp.

4. Connect hose assembly (3) to elbow (10).



5. Install filter head (2) onto mounting bracket using screws (8) and washers (9).

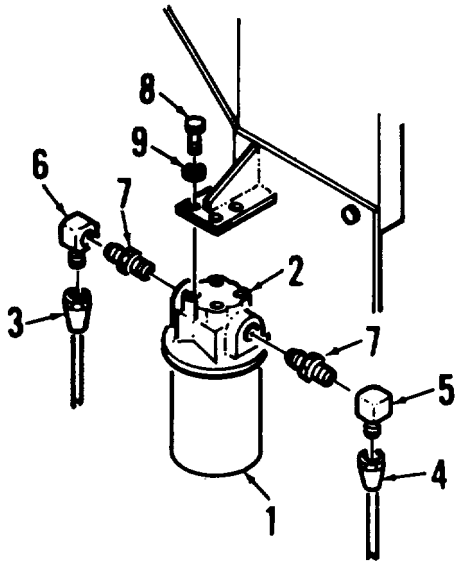
6. Install elbows (5, 6) and reducers (7) into filter head (2).

7. Connect hose assemblies (3, 4) to elbows (5, 6).

8. Using strap wrench remove filter canister (1) from filter head (2). Discard canister.

9 Apply a light coat of clean hydraulic oil to gasket on new filter canister (1).

10. Install new filter canister (1) onto filter head (2). Hand tighten canister until gasket makes contact with filter head. Tighten an additional one-half turn.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-161. LIFT CYLINDER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Jack Stand (8, App. E)
Sling (4, App. E)
Drain Pan (10, App. E)

Personnel Required:

2 Personnel

Materials / Parts:

O-Ring, Item 7 (1 ea.)
O-Ring, Item 27 (2 ea.)
O-Ring, Item 30 (2 ea.)

References:

LO 10-3930-664-12
TM 10-3930-664-10

A. REMOVAL

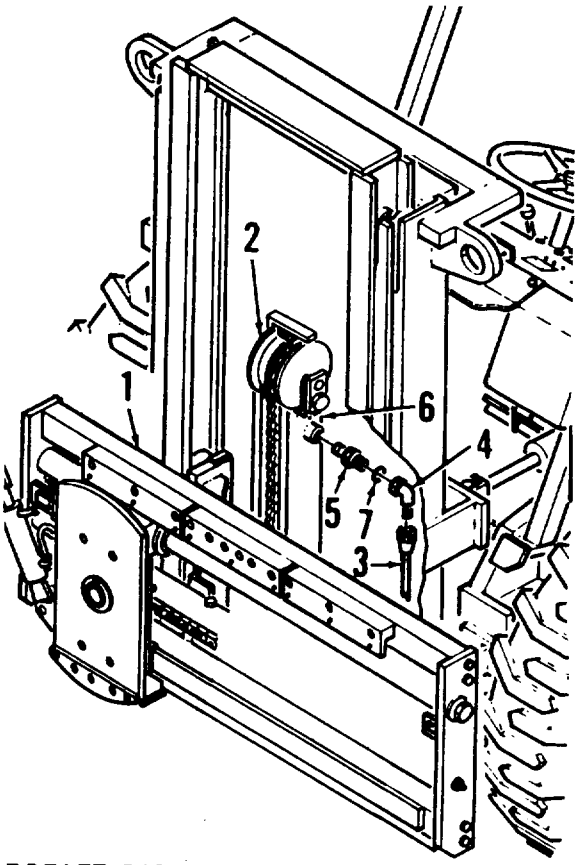
1. Shift carriage all the way left to allow access to freelift cylinder.

2. Lower sideshift carrier (1) until it rests on the ground. While operating in the "Lower" mode, have an assistant push down on the freelift chain roller (2) until cylinder rod has retracted approximately 2 more inches.

NOTE
Place drain pan beneath hoses and tubing when disconnecting to catch fluids.

3. Tag and disconnect tubing (3) from elbow (4).

4. Remove elbow (4) and fitting (5) from freelift cylinder (6). Remove and discard O-ring (7).



ROTATE CARRIAGE SHOWN REMOVED FOR CLARITY

5. Tag and disconnect hose assemblies (8, 9) from intermediate rail manifold (10). Carefully remove hose assemblies from chain roller (11).

6. Remove hose guard (12) from chain roller (11) by removing screw (13).

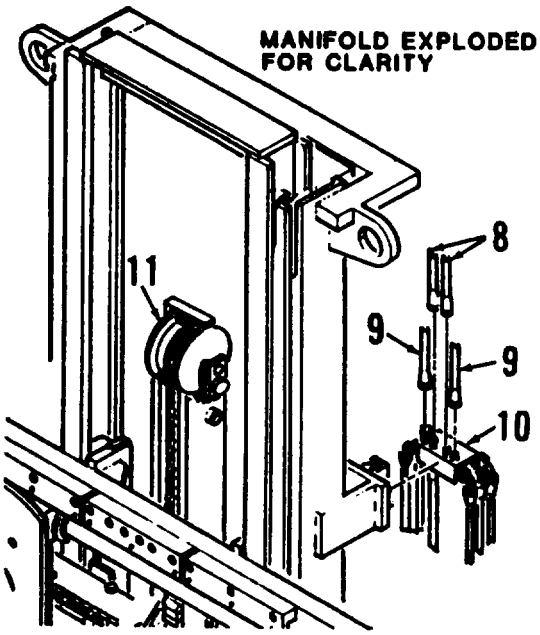
7. Loosen locknuts (14). Remove freelift chain adjuster (15) from bracket (16) by removing nut (17).

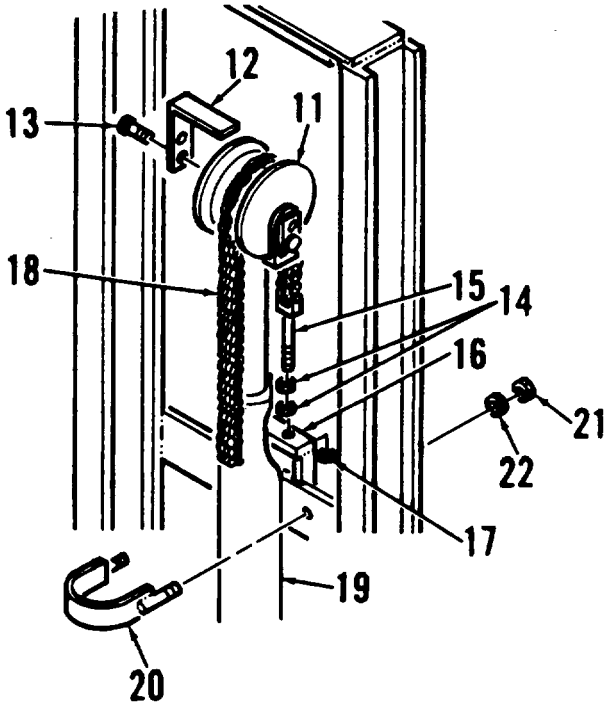
8. Remove freelift chain (18) from chain roller (11).

WARNING

Freelift cylinder is heavy and awkward. Enlist the help of an aide when removing to prevent injury to personnel and damage to components.

9. Remove freelift cylinder (19) from inner rail by removing nuts (21), washers (22) and cylinder retaining strap (20).





10. Center carriage to allow equal access to main lift cylinders.

11. Tag and disconnect tube assemblies (23, 24) from elbows (25).

12. Remove elbows (25) and adapters (26) from mainlift cylinders (37). Remove and discard O-rings (27).

13. Remove fittings (28) from elbows (29). Remove elbows from mainlift cylinders (37). Remove and discard O-rings (30).

14. Attach lifting sling and hoist to intermediate rail (31). Lift rail to remove strain on pins (35).

15. Release top of mainlift cylinders (37) from cylinder mounts by removing screws (32) and nuts (33).

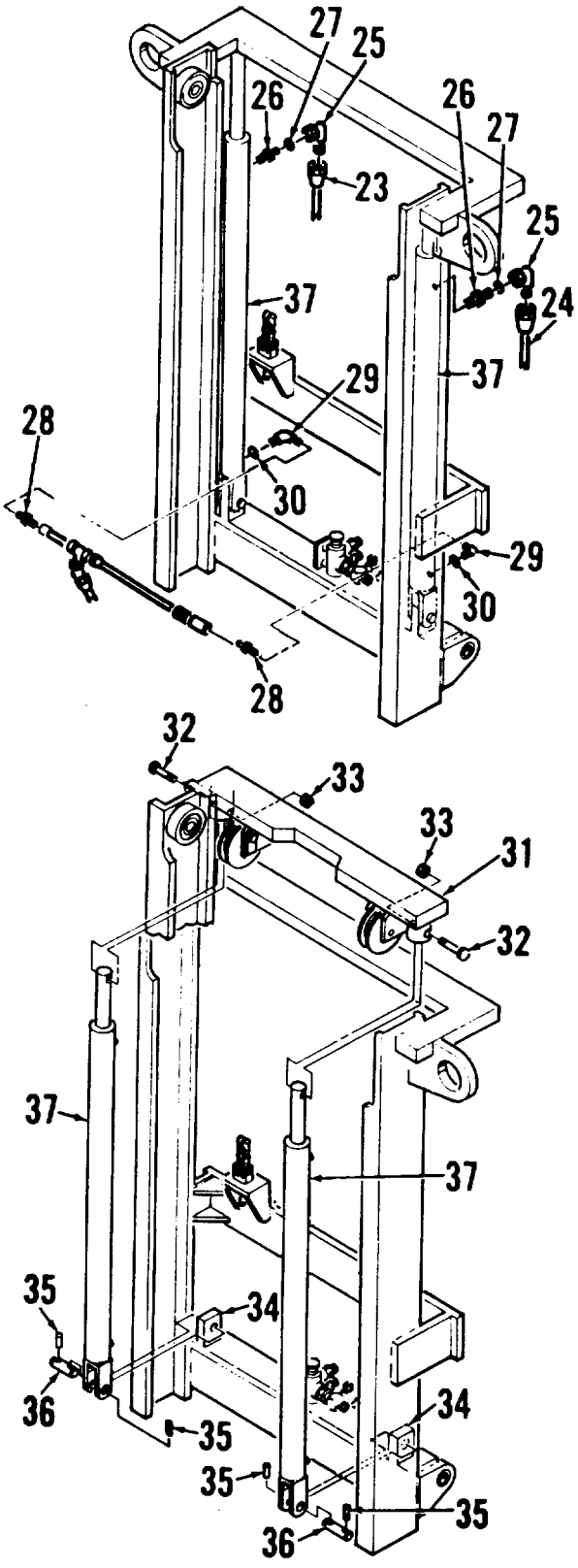
NOTE

Only outboard roll pins (35) need be removed to remove pins (36) from brackets (34).

16. Release bottom of mainlift cylinders (37) from brackets (34) by removing roll pins (35) and pins (36).

17. Using hoist, lift intermediate rail (31) approximately 20 inches. Support intermediate rail with jack stands.

18. Remove mainlift cylinders (37).



B. CLEANING

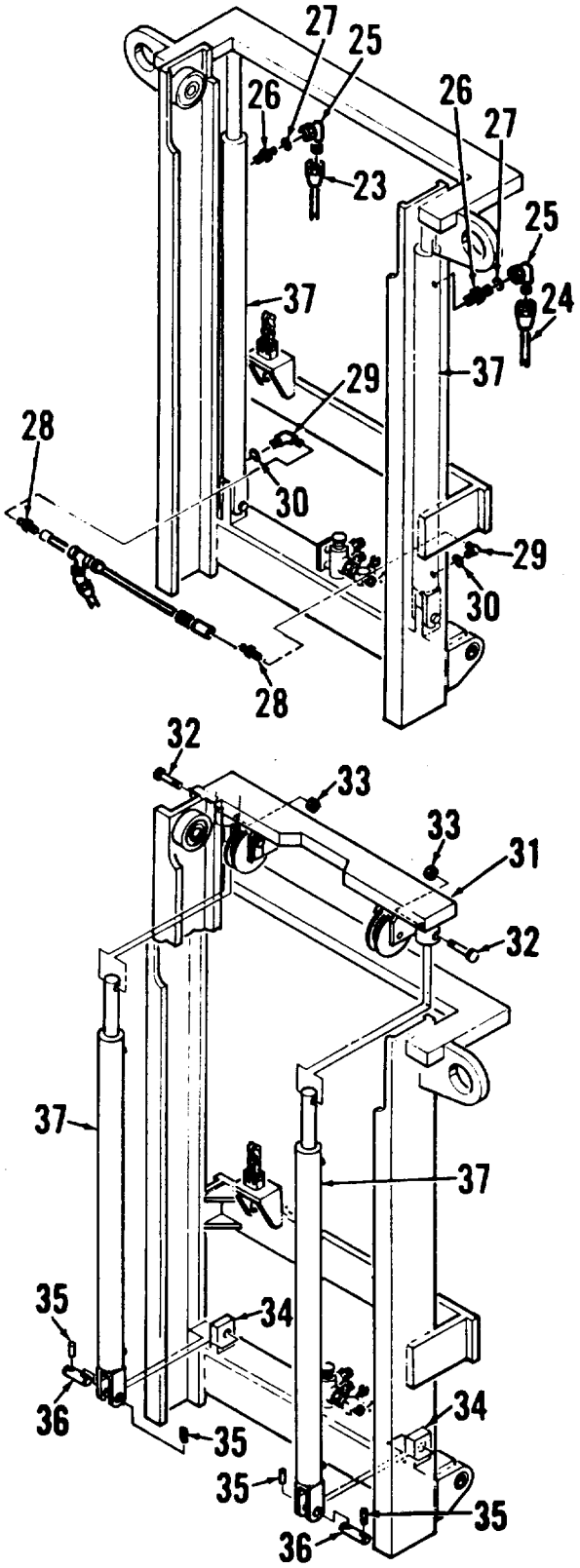
Clean cylinders and related components in accordance with paragraph 1-24.

C. INSPECTION

Inspect cylinders and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Attach lifting sling and hoist to intermediate rail (31). Raise rail enough to remove jack stands.
2. Position mainlift cylinders (37) into lower brackets (34).
3. Lower intermediate rail (31) until mainlift cylinder rod ends fit inside upper mounts.
4. Secure top of mainlift cylinders (37) to upper mounts using screws (32) and nuts (33).
5. Secure bottom of mainlift cylinders (37) to brackets (34) using pins (36) and roll pins (35).
6. Remove lifting sling and hoist.
7. Install elbows (29) and new O-rings (30) into bottom ports on mainlift cylinders (37). Connect fittings (28) onto elbows.
8. Install fittings (26), elbows (25), and new O-rings (27) into top ports of mainlift cylinders (37).
9. Connect tube assemblies (23, 24) to elbows (25).



WARNING

Freelift cylinder is heavy and awkward. Enlist the help of an aide when installing to prevent injury to personnel and damage to components.

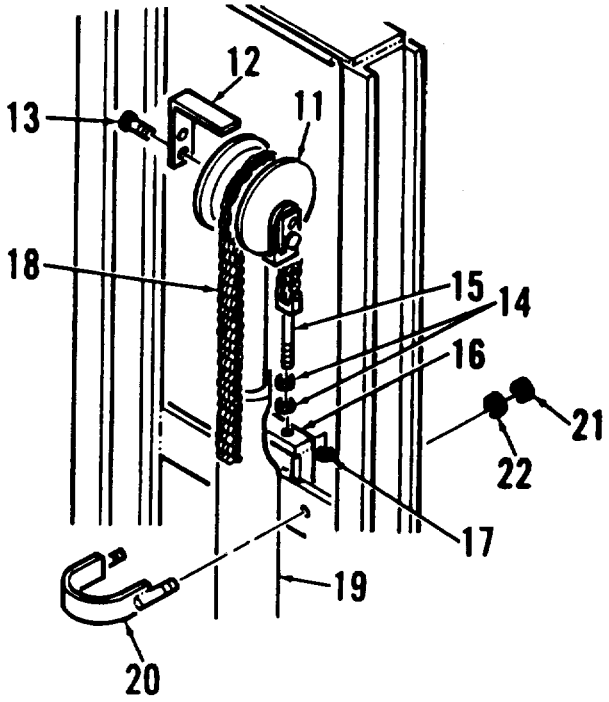
10. freelift cylinder (19) onto inner rail using cylinder retaining strap (20), washers (22), and nuts (21).

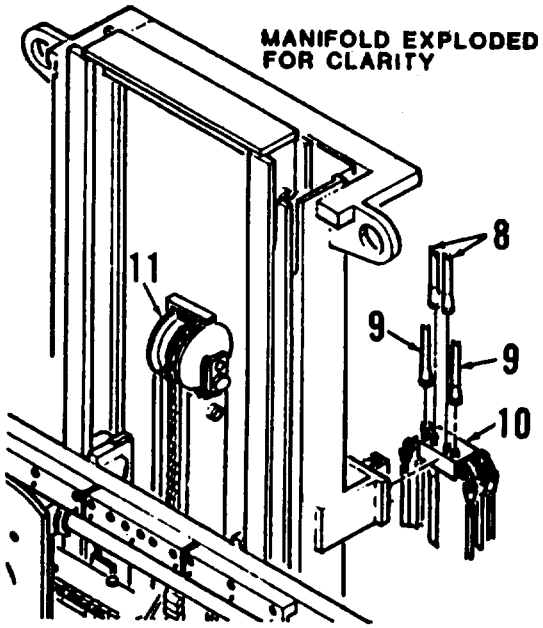
11. Carefully install freelift chain (18) onto chain roller (11).

12. Loosen locking nuts (14). Secure freelift chain adjuster (15) to bracket (16) using nut (17).

13. Carefully place hose assemblies (8, 9) onto chain roller (11). Connect hose assemblies to intermediate rail manifold (10).

14. Apply loctite to threads of screw (13). Install hose guard (12) using screw.





15. Install adapter (5), elbow (4), and new O-ring (7) into freelift cylinder (6).

16. Connect tubing (3) to elbow (4).

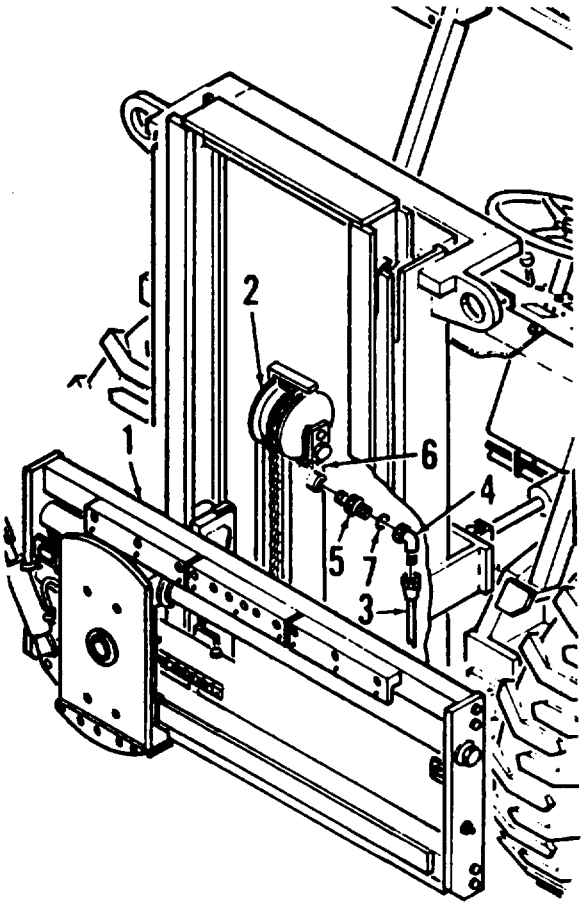
17. Service hydraulic oil in accordance with Lubrication Order.

18. Slowly raise freelift cylinder rod by operating lift control until tension on freelift chain is achieved. When all slack in chain has been removed, normal operation can be resumed.

FOLLOW-ON MAINTENANCE:

Adjust freelift chain (para. 2-155)

END OF TASK



ROTATE CARRIAGE SHOWN REMOVED FOR CLARITY

2-162. SIDESHIFT CYLINDER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
Torque Wrench (32, App. E)

Personnel Required:

2 Personnel

Materials / Parts:

O-Ring, Item 25 (2 ea.)

Equipment Condition:

Sideshift carrier lowered and fully left

References:

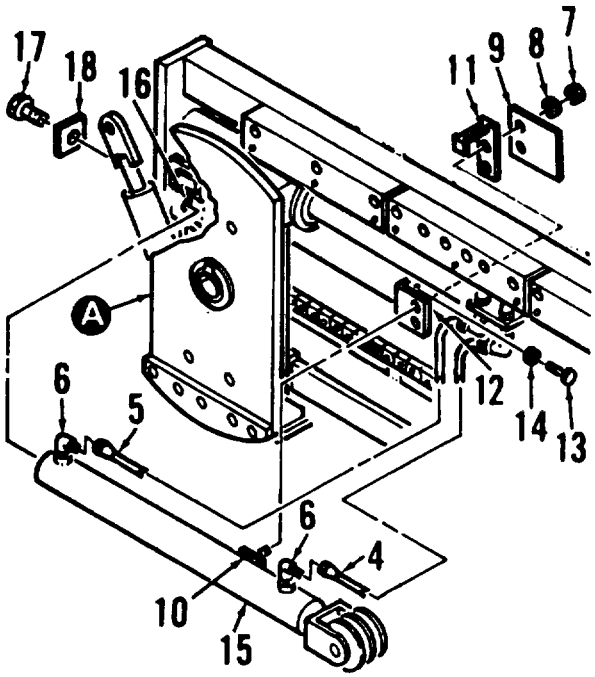
TM 10-3930-664-10

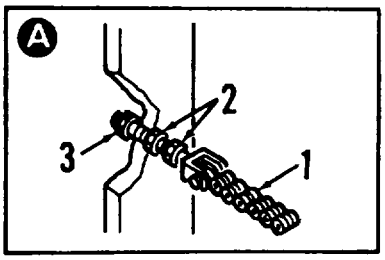
A. REMOVAL

1. Relieve tension on sideshift chains (1) by loosening locking nuts (2). Loosen, but do not remove nuts (3).

NOTE
Place drain pan beneath hoses when disconnecting to catch fluids.

2. Tag and disconnect tube assemblies (4, 5) from elbows (6).
3. Remove nuts (7), washers (8), and mounting plate (9) from sideshift cylinder studs (10). Remove chain adjustment indicator (11).
4. Release mounting bracket (12) from rail by removing screws (13) and washers (14).
5. Release sideshift cylinder (15) from carrier end plate (16) by removing screw (17) and retainer (18).





6. Remove screw (19) from sideshift cylinder clevis.
7. Remove chain roller (20) from clevis by driving out shaft (21). Remove bearings (22) and bushings (23).
8. Carefully slide sideshift cylinder (15) out of carrier.
9. Remove elbows (24) and fittings (26) from sideshift cylinder (15). Remove and discard O-rings (25).

B. CLEANING

Clean sideshift cylinder and related components in accordance with paragraph 1-24.

C. INSPECTION

Inspect sideshift cylinder and related components in accordance with paragraph 1-24.

D. INSTALLATION

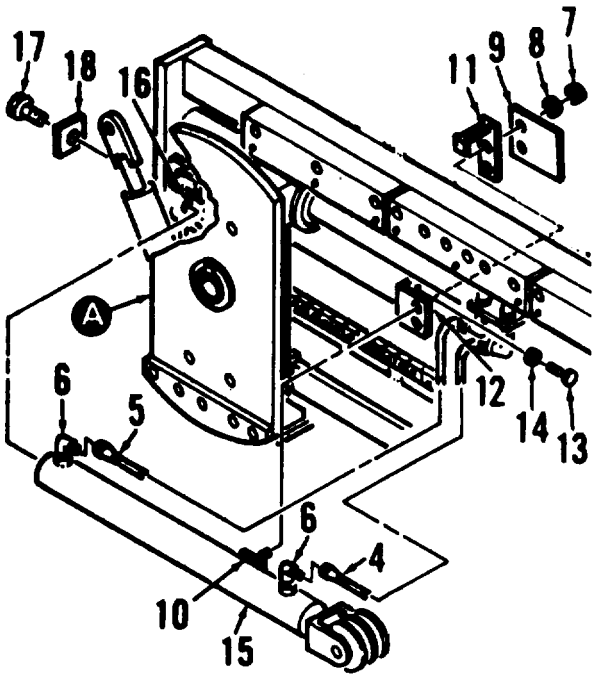
1. Install elbows (24), fittings (26), and new O-rings (25) into sideshift cylinder (15). Ensure proper orientation.
2. Carefully slide sideshift cylinder (15) into carrier. Position cylinder into carrier end plate.
3. Thread left sideshift chain through inside groove on chain roller (20).
4. Install chain roller (20) onto clevis using shaft (21), bearings (22), and bushings (23).
5. Align punch mark on shaft (21) with screw (19) and install screw into sideshift cylinder clevis. Torque screw to 70 in-lbs.
6. Position right sideshift chain over chain roller (20).

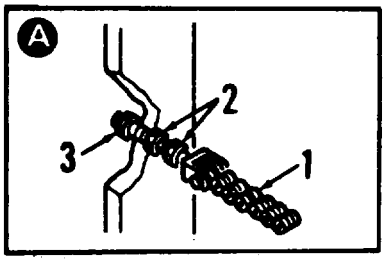
7. Secure sideshift cylinder (15) onto end plate (16) using screw (17) and retainer (18).
8. Position mounting bracket (12) onto sideshift cylinder studs (10).
9. Position chain adjustment indicator (11) and mounting plate (9) onto sideshift cylinder studs (10). Secure using nuts (7), washers (8),
10. Attach mounting bracket (12) onto rail using screws (13) and washers (14).
11. Connect tube assemblies (4, 5) to elbows (6).
12. Torque screw (17) to 420 in-lbs.

FOLLOW-ON MAINTENANCE:

Adjust sideshift chains in accordance with Operators Manual

END OF TASK





2-163. CARRIAGE ROTATE CYLINDER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

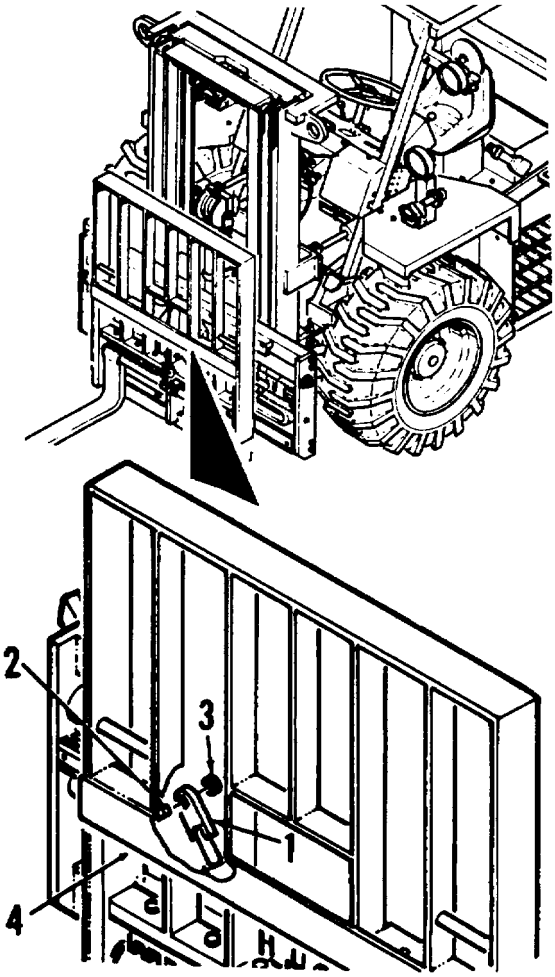
Tools and Test Equipment:
- General Mechanics Tool Kit (1, App. E)
- Drain Pan (10, App. E)
- Lubricator Kit (35, App. E)

References:

Materials / Parts:
- Grease (10, App. C)
- Loctite 242 (20, App. C)
- O-Ring, Item 12 (2 ea.)

A. REMOVAI.

1. Release rotate cylinder (1) from stub shaft (2) on rotate carriage (4) by removing retainer (3).



NOTE

Place drain pan beneath hoses when disconnecting to catch fluids.

2. Tag and disconnect hose assemblies (5, 6) from elbows (7).
3. Remove rotate cylinder (1) from spine assembly (8) by removing screw (9) and headless pin (10).
4. Remove elbows (7) and fittings (11) from rotate cylinder (1). Remove and discard O-rings (12).
5. Remove lube fitting (13) from rotate cylinder (1) only if cleaning or replacement is required.

B. CLEANING

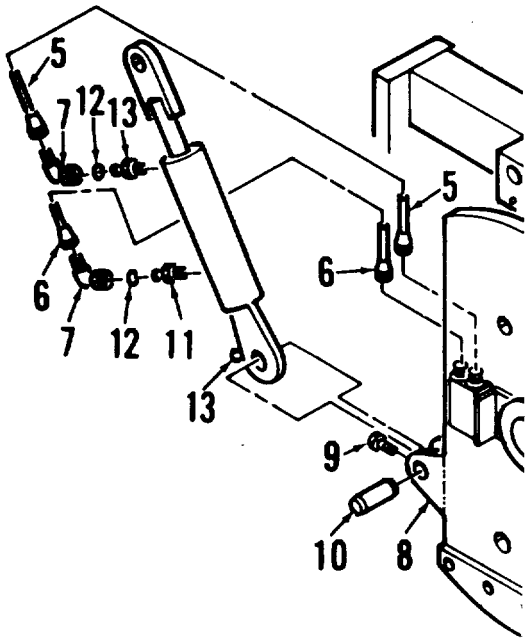
Clean rotate cylinder and related components in accordance with paragraph 1-24.

C. INSPECTION

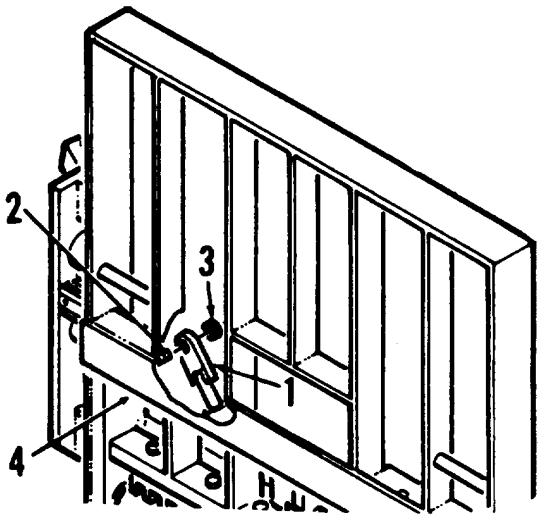
Inspect cylinder and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install lube fitting (13) into rotate cylinder (1).
2. Install elbows (7), fittings (11), and new O-rings (12) into rotate cylinder (1).
3. Apply loctite to threads of screw (9). Attach rotate cylinder (1) to spine assembly (8) using screw and headless pin (10).
4. Connect hose assemblies (5, 6) to elbows (7).



5. Secure rotate cylinder (1) to stub shaft (2) on rotate carriage (4) using retainer (3).
6. Using grease gun, apply grease to lube fitting to lubricate rotate carriage pin. Rotate carriage in each direction and reapply grease.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

2-164. HYDRAULIC SYSTEM RESERVOIR REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
- General Mechanics Tool Kit (1, App. E)
- Drain Pan (10, App. E)

Materials / Parts:
- Teflon Tape (35, App. C)
- O-Ring, Item 10 (1 ea.)

Reference:
- TM 10-3930-664-12

Equipment Condition:
- Right rear fender removed (para. 2-134)

A. REMOVAL

1. Tag and disconnect hose assembly (1) from elbow (2). Remove elbow from hydraulic reservoir (3).

NOTE

Hydraulic system reservoir capacity is 30 gallons.

2. Place drain pan beneath reservoir (3). Remove drain plug (4) and drain hydraulic reservoir.
3. Tag and disconnect hose assemblies (5, 6, 7).
4. Remove tee (8) and elbow (9) from hydraulic reservoir (3). Remove and discard O-ring (10).
5. Remove hydraulic reservoir (3) from forklift frame by removing screws (11), washers (12), and nuts (13).

B. CLEANING

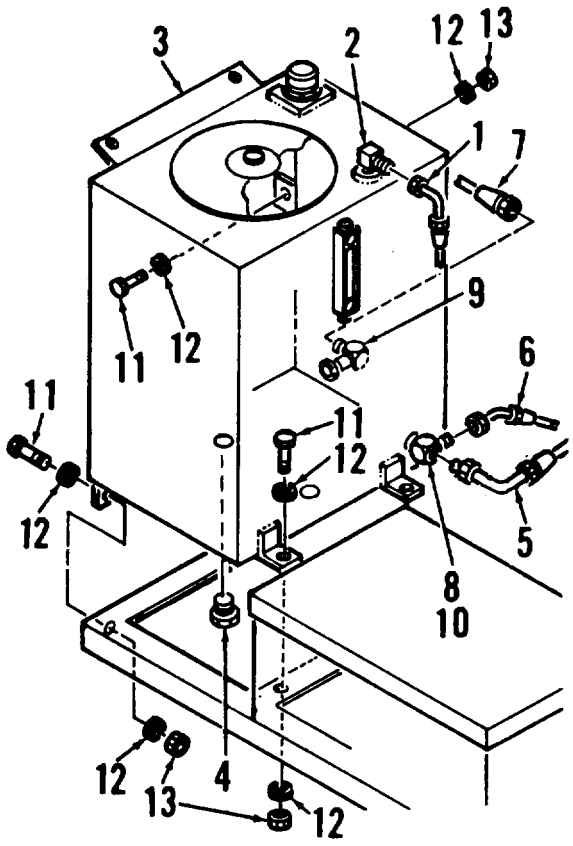
Clean hydraulic reservoir and related components in accordance with paragraph 1-24.

C. INSPECTION

Inspect reservoir and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Wrap threads of drain plug (4) with teflon tape. Install drain plug into hydraulic reservoir (3).
2. Install hydraulic reservoir (3) onto forklift frame using screws (11), washers (12), and nuts (13).
3. Wrap threads of tee (8) and elbow (9) with teflon tape. Install tee, elbow, and new O-ring (10) into hydraulic reservoir (3).
4. Install elbow (2) into hydraulic reservoir (3).
5. Connect hose assemblies (1, 5, 6, 7).



FOLLOW-ON MAINTENANCE:

Install right rear fender (para. 2-134)
Service hydraulic reservoir in accordance with Lubrication Order

END OF TASK

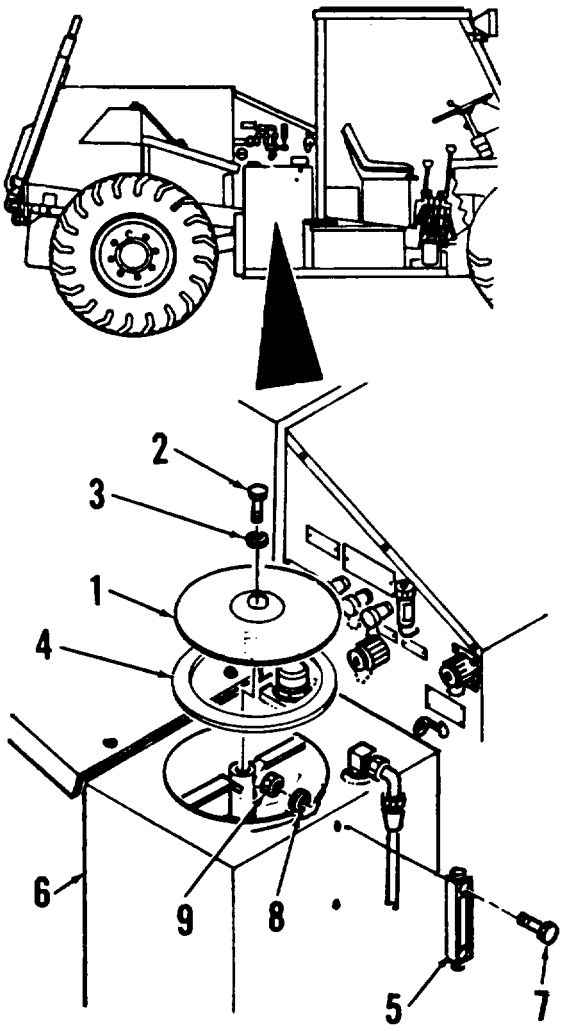
Section XXII. NON-ELECTRICAL GAGE MAINTENANCE

2-165. HYDRAULIC RESERVOIR SIGHT GAGE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:
Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

References:
LO 10-3930664-12



A. REMOVAL

1. Remove cleanout cover (1) from hydraulic reservoir (6) by removing screw (2) and washer (3).
2. Remove and inspect gasket (4). Replace if damaged.

CAUTION
Do not remove hollow bolts (7) from sight gage (5). Gage -rings will be damaged.

NOTE
Hydraulic reservoir sight gage and attaching hardware are supplied as an assembly kit. If any component is damaged during removal, replacement of the entire assembly will be required.

3. Remove hydraulic reservoir sight gage (5) from hydraulic reservoir (6) by removing loosening hollow bolts (7) and removing washers (8) and nuts (9).

B. CLEANING
Clean hydraulic reservoir sight gage in accordance with paragraph 1-24.

C. INSPECTION

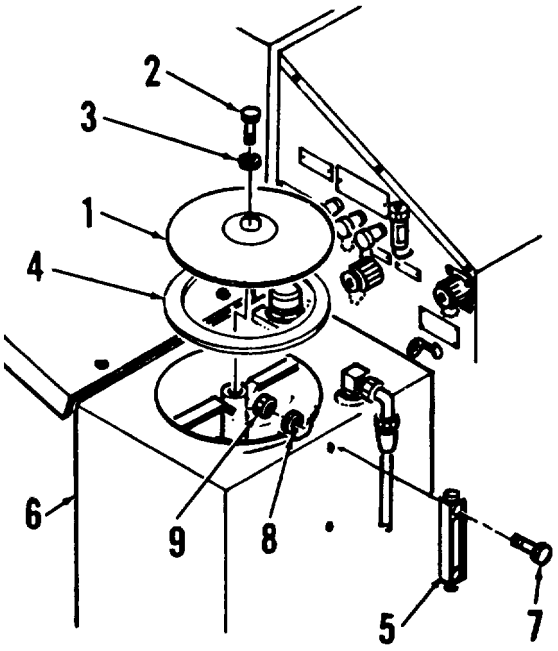
Inspect sight gage in accordance with paragraph 1-24. Replace entire gage and attaching hardware if any component is damaged or defective.

D. **INSTALLATION**

CAUTION

Do not overtighten hollow bolts (7) as damage to gage and O-rings can result. Tighten only until gage fits snug against reservoir wall.

1. Install hydraulic reservoir sight gage (5) onto hydraulic reservoir (6) using hollow bolts (7), washers (8), and nuts (9).
2. Install gasket (4).
3. Install cleanout cover (1) onto hydraulic reservoir (6) using screw (2) and washer (3).



FOLLOW-ON MAINTENANCE:

Service hydraulic reservoir in accordance with Lubrication Order

END OF TASK

2-166. VEHICLE LEVEL INDICATOR GAGE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

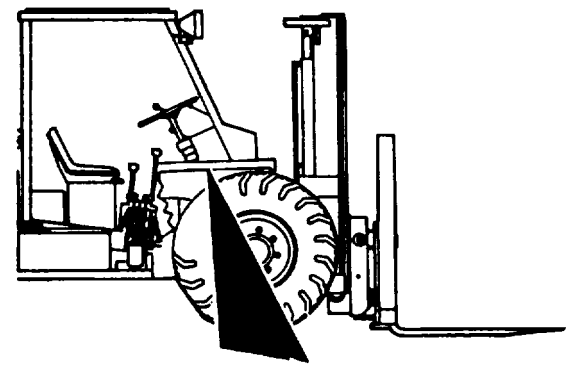
Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

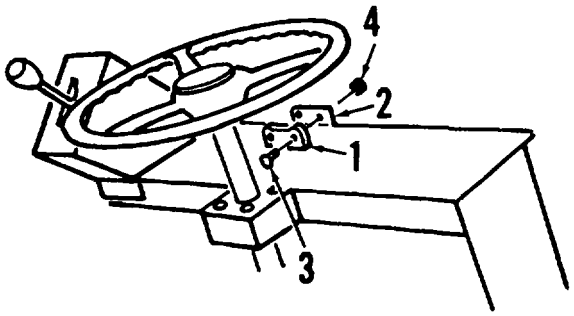
A. REMOVAL
Remove vehicle level indicator gage (1) from gage bracket (2) by removing screws (3) and nuts (4).

B. CLEANING
Clean vehicle level indicator gage in accordance with paragraph 1-24.

C. INSPECTION
Inspect vehicle level indicator gage in accordance with paragraph 1-24.

D. INSTATL-ATION
Install vehicle level indicator gage (1) onto gage bracket (2) using screws (3) and nuts (4).





FOLLOW-ON MAINTENANCE:
None
END OF TASK

CHAPTER 3
DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

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

3-1. COMMON TOOLS AND EQUIPMENT.

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

3-2. SPECIAL TOOLS AND EQUIPMENT.

Refer to the Maintenance Allocation Chart (Appendix B) and TM 10-3930-664- 24P for identity and authorization of any special tools or equipment required for unit maintenance.

3-3. REPAIR PARTS.

Repair parts are listed and illustrated the repair parts and special tools list, TM 10-3930-664-24P, covering unit, direct support, and general support maintenance of the forklift.

Section II. DIRECT SUPPORT TROUBLESHOOTING

3-4. GENERAL.

a. This section contains troubleshooting information for identifying and correcting malfunctions which may develop during forklift operation. Each malfunction or trouble symptom is addressed and is followed by a series of inspections or tests necessary to determine the probable cause and corrective action.

b. The Direct Support Troubleshooting Symptom Index, Table 3-1, lists the common malfunctions which may occur. It refers you to the proper page for troubleshooting procedures.

c. This manual cannot list all possible malfunctions that may occur, all tests or inspections that must be performed, or all corrective actions for each malfunction. If a malfunction is not listed, or is not remedied by corrective actions, notify personnel at next highest maintenance level.

d. Prior to using troubleshooting trees, be sure you have performed all normal operational checks. Refer to the electrical schematic (Figure FO-2) and hydraulic flow diagram (Figure FO-1) to assist in troubleshooting.

e. When troubleshooting a malfunction:

(1) Question the operator and/or unit maintenance level personnel to obtain any information that might help determine the cause of the malfunction. Before continuing, ensure that all applicable operator and unit level troubleshooting has been performed.

(2) Locate the symptom or symptoms in Table 3-1 that best describe the malfunction. If the appropriate symptom is not listed, notify your supervisor.

(3) Turn to the page where the troubleshooting procedures for that malfunction are described.

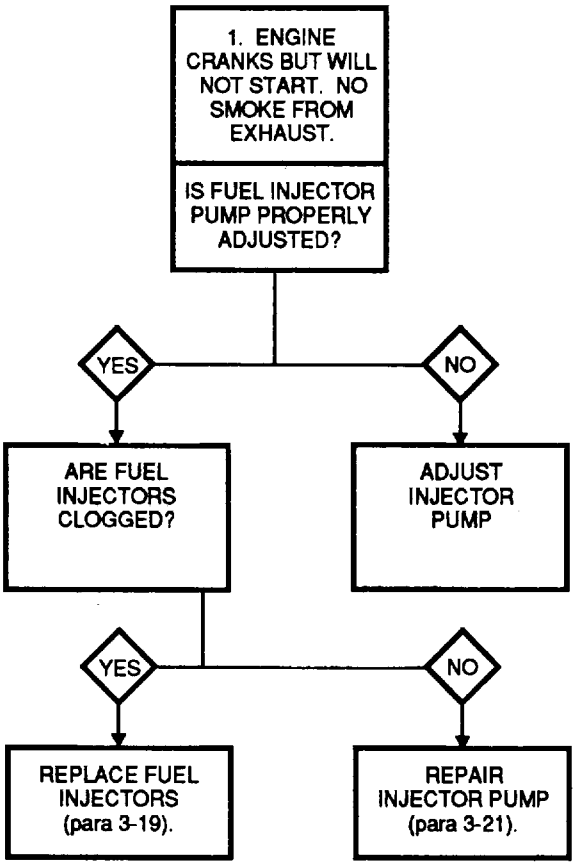
(4) Perform each step in order until the malfunction is corrected. Do not perform any maintenance task unless the table directs you to do so.

Table 3-1. Direct Support Troubleshooting Symptom Index

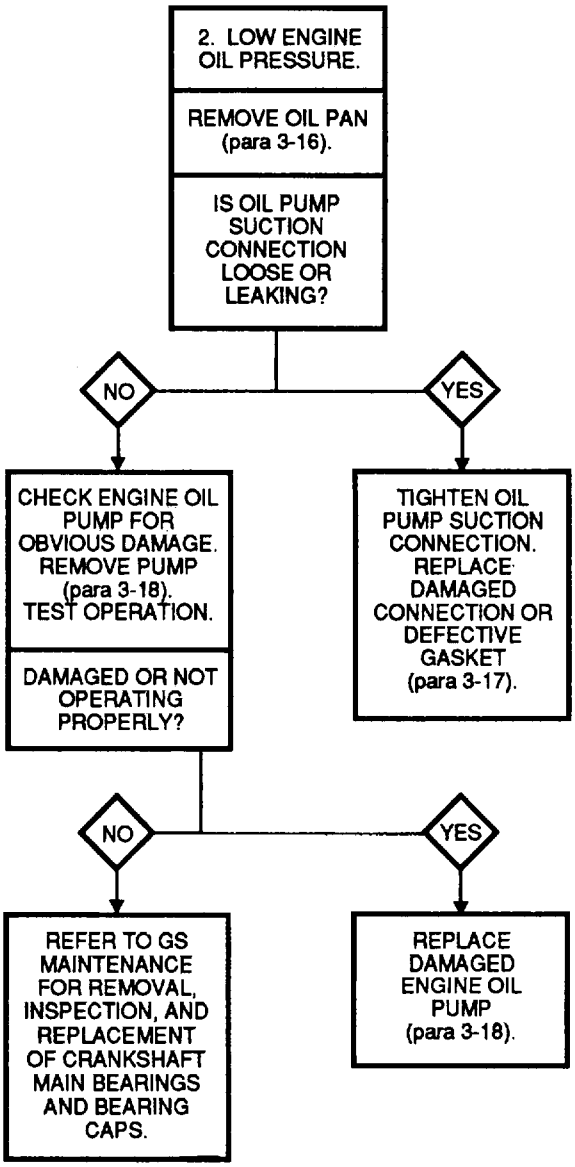
3-5. TROUBLESHOOTING.

Use the symptom index to quickly locate a particular fault or malfunction. All related troubleshooting steps contained in Chapter 2 must be performed prior to attempting to isolate a malfunction to a specific component addressed in this chapter.

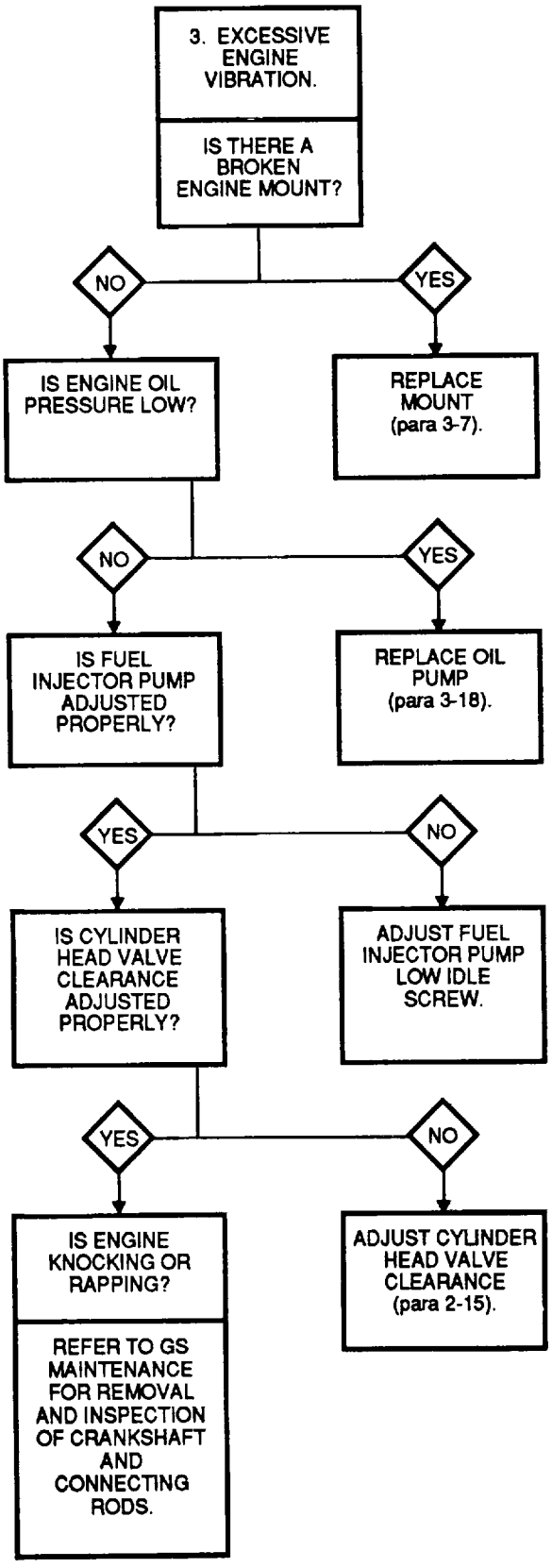
Trouble Symptom 1. Engine Cranks But Will Not Start, No Smoke From Exhaust



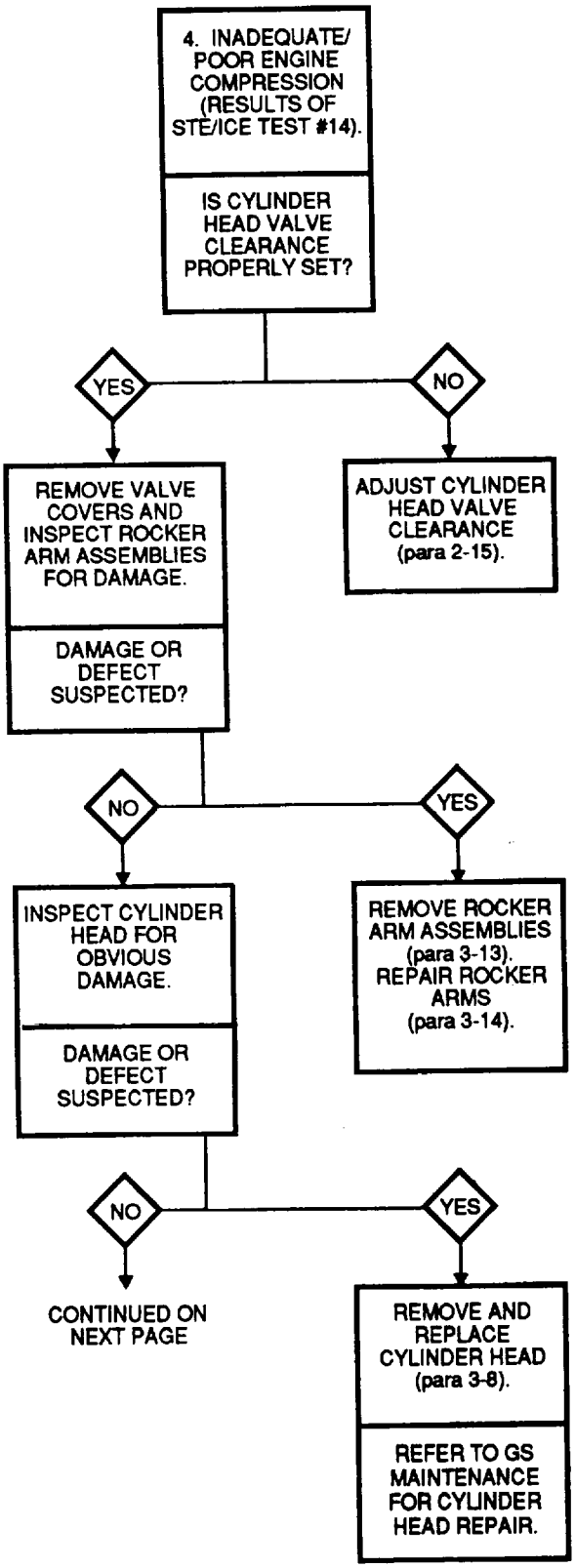
Trouble Symptom 2. Low Engine Oil Pressure



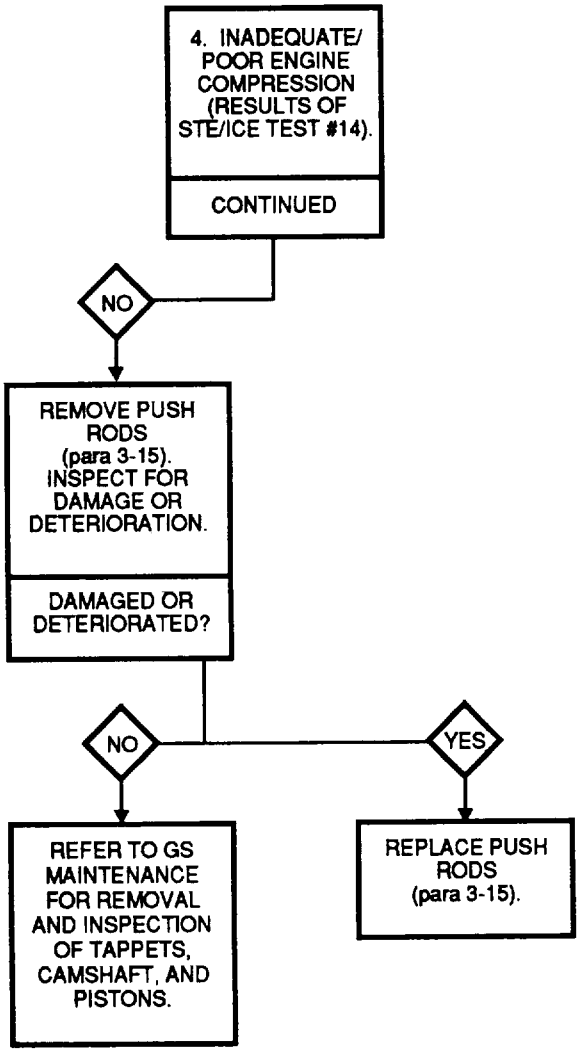
Trouble Symptom 3. Excessive Engine Vibration



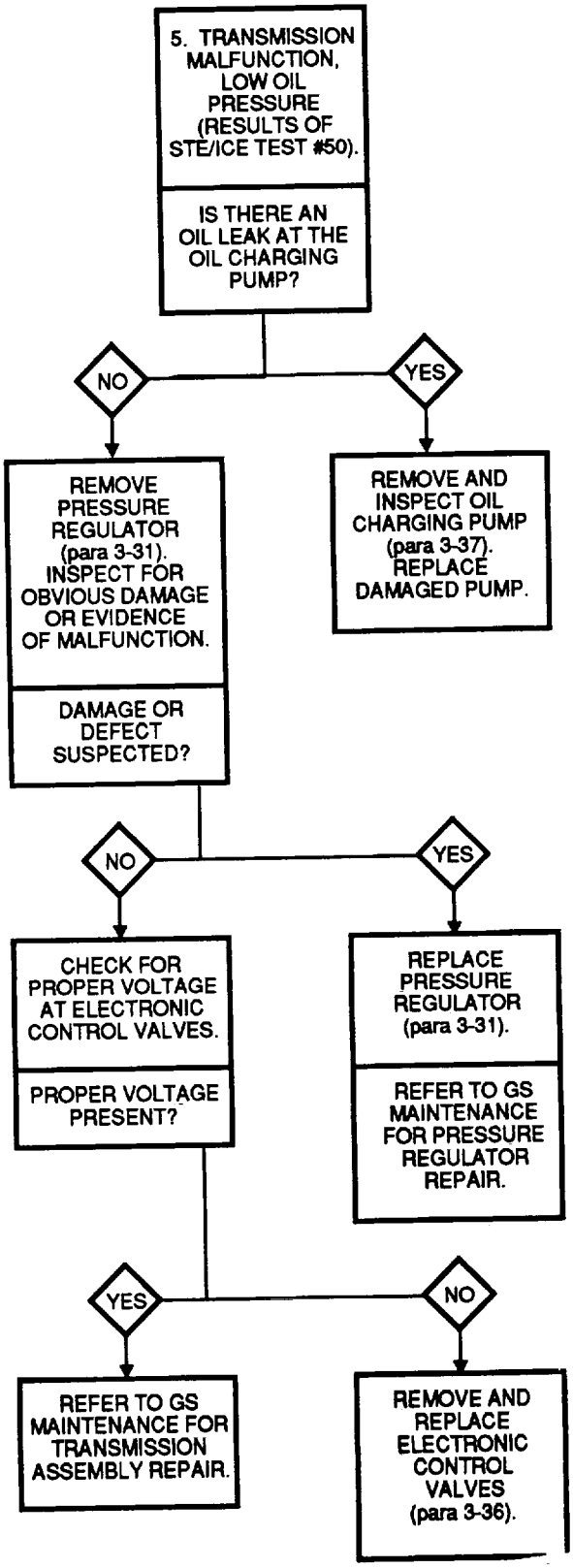
Trouble Symptom 4. Inadequate/Poor Engine Compression



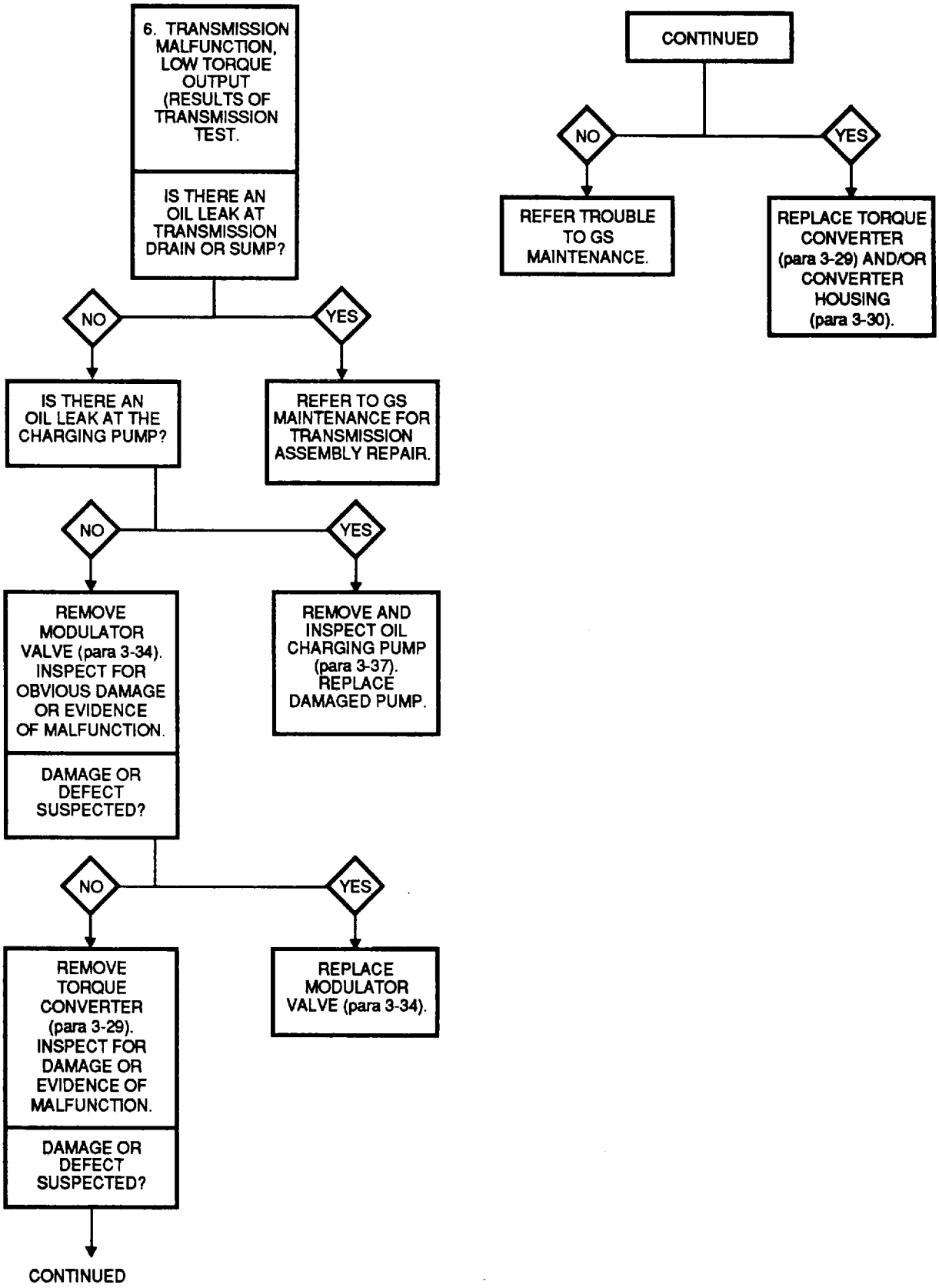
Trouble Symptom 4. Inadequate/Poor Engine Compression - continued



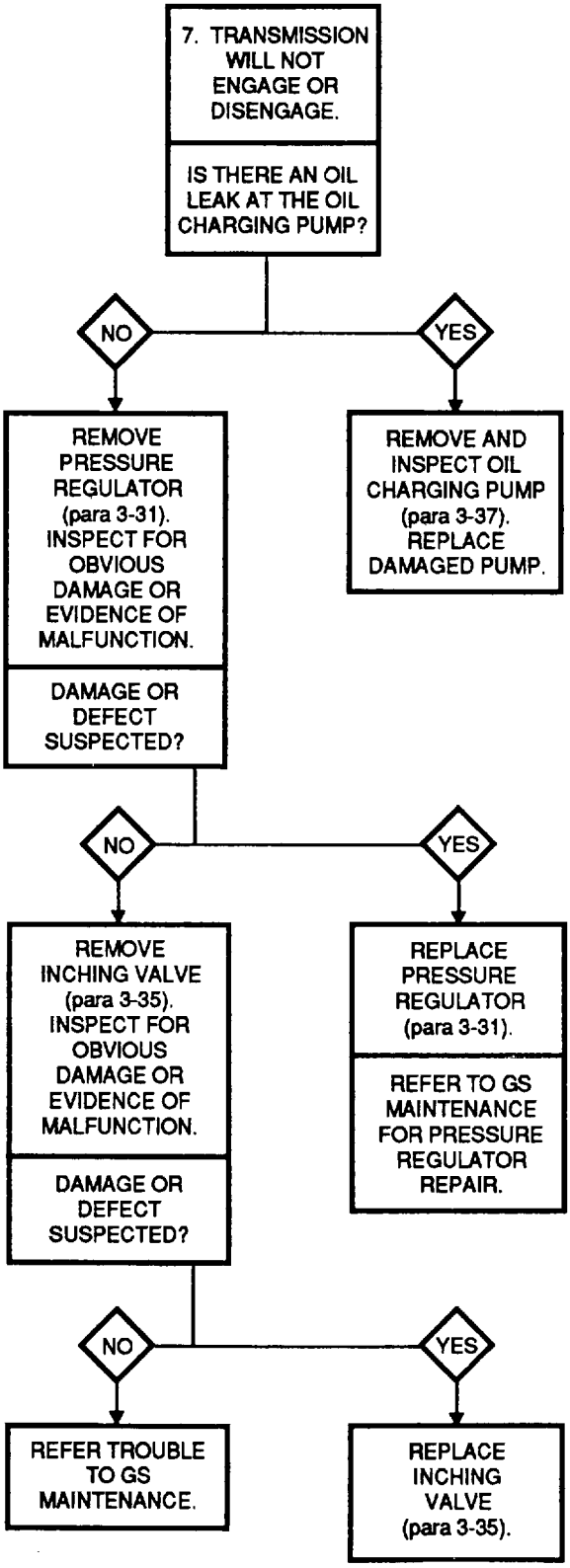
Trouble Symptom 5. Transmission Malfunction, Low Oil Pressure



Trouble Symptom 6. Transmission Malfunction, Low Torque Output



Trouble Symptom 7. Transmission Will Not Engage or Disengage



Section III. ENGINE COMPONENT MAINTENANCE

3-6. ENGINE ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
- General Mechanics Tool Kit (1, App. E)
- Jack Stands, 6 ea. (8, App. E)
- Drain Pan (10, App. E)
- Chain with Screw Pin Shackle, 3 ea. (46, App. E)
- Hoist (59, App. E)
- Torque Wrench (32, App. E)
- Torque Wrench (33, App. E)
- Open End Wrench, 1-3/4" (57, App. E)
- Open End Wrench, 2" (58, App. E)
- Socket Wrench Set, 3/4" Drive (55, App. E)

Equipment Condition:
- Engine cover removed (para. 2-128)
- Transmission covers removed (para. 2-131)
- Radiator removed (para. 2-47)
- Air cleaner removed (para. 2-28)

Materials / Parts:
- Loctite 242 (20, App. C)
- Silicone Sealant (41, App. C)
- Gasket, Item 4 (1 ea.)
- Lockwashers, Items 69, 72 (8 ea.)
- Bolt, 12mm x 3.0, GR8, course thread (3 ea.)
- Washer, 1/2 inch (3 ea.)
- Nut, 12mm (1 ea.)

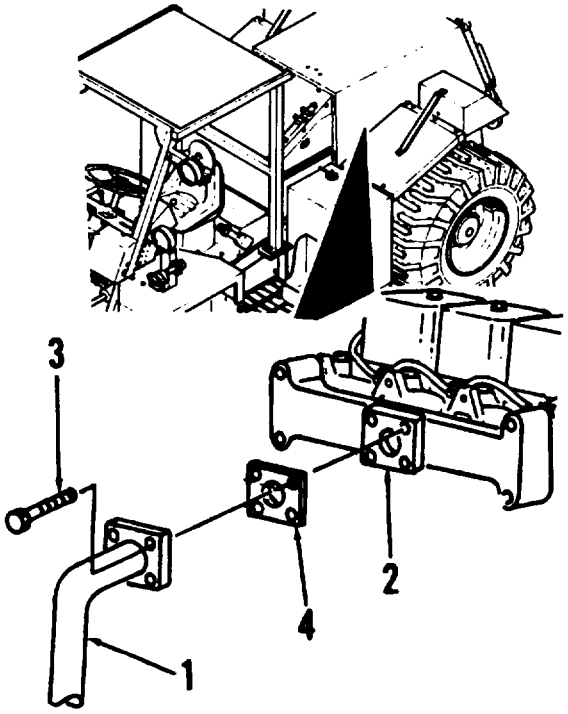
Personnel Required:
- 2 personnel

A. REMOVAL

WARNING

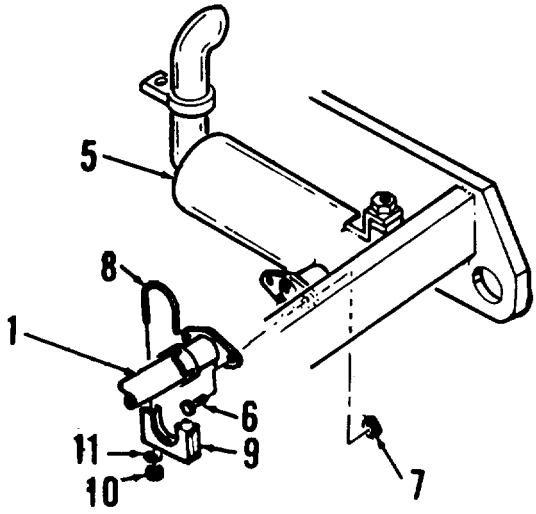
Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

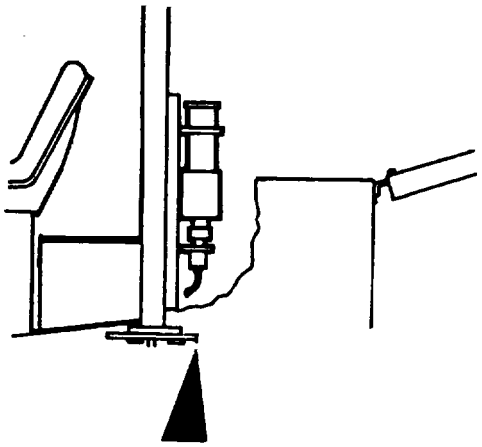
1. Remove exhaust pipe (1) from exhaust manifold (2) by removing screws (3). Remove and discard casket (4).

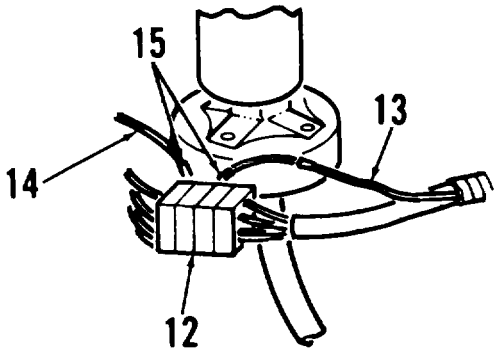


2. Disconnect exhaust pipe (1) from muffler spark arrestor (5) by removing nuts (6) and washers (7). Separate U-bolt (8) from clamping brace (9) by removing nuts (10) and washers (11). Separate exhaust pipe.

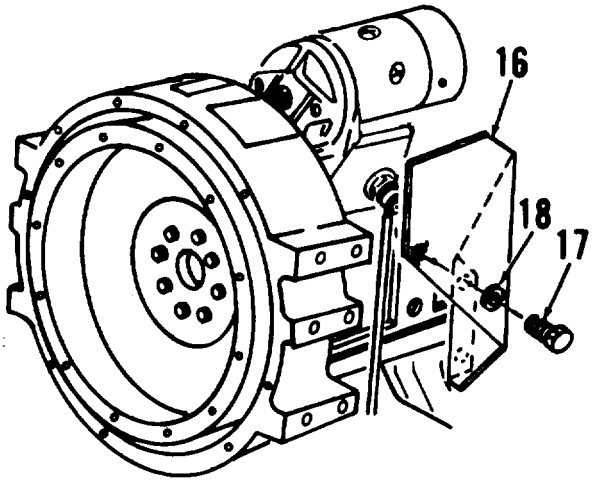
3. Tag and disconnect electrical wiring harness at plug (12). Tag and disconnect white wire (13) in engine wiring harness and white wire (14) in main wiring harness from black wire! (15) on ether valve.







4. Remove starter heat shield (16) from engine by removing screws (17) and washers (18).
5. Remove nut (19) and washer (20) from starter stud (21). Remove and tag electrical cable (22), red wire (23), and yellow wire (24).
6. Remove nut (25) from alternator B+ terminal (26). Tag and disconnect red wire (27). Leave black wire (28) connected.



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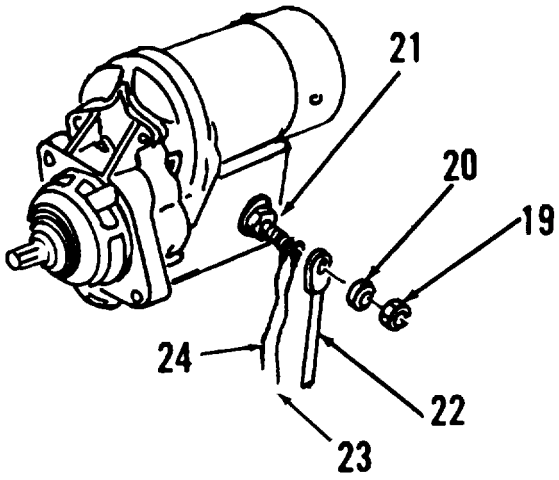
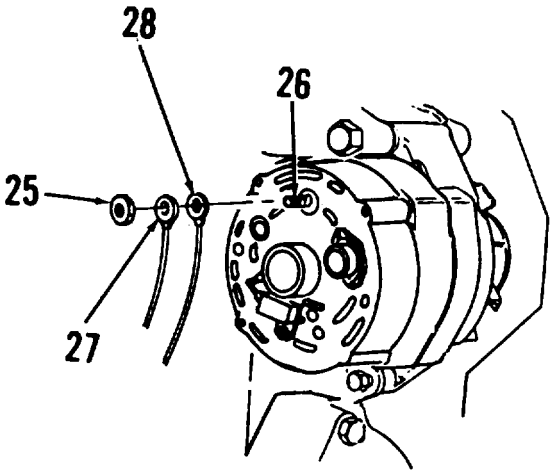
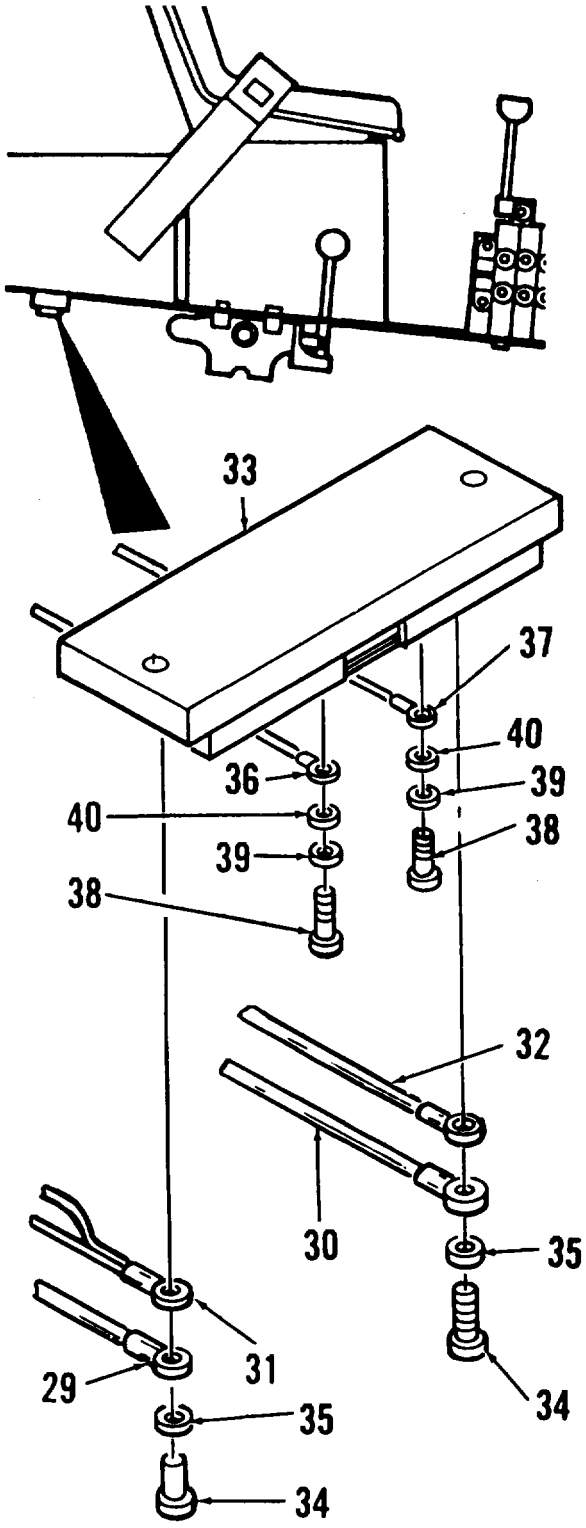




7. Tag and disconnect electrical cables (29, 30) and wires (31, 32) from DCA shunt (33) by removing screws (34) and lockwashers (35).
8. Tag and disconnect wires (36, 37) from DCA shunt (33) by removing screws (38), lockwashers (39), and washers (40).



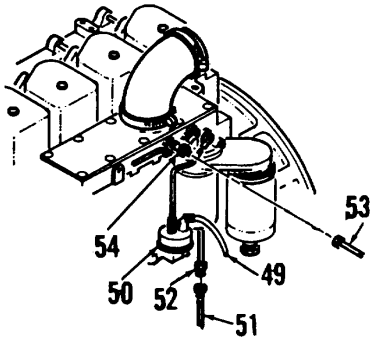
9. Disconnect throttle supply hose (41) from throttle slave cylinder assembly (42).
10. Remove clamp (43) holding throttle supply hose (41) to right engine mount by removing screw (44) and washer (45). Leave clamp on hose.

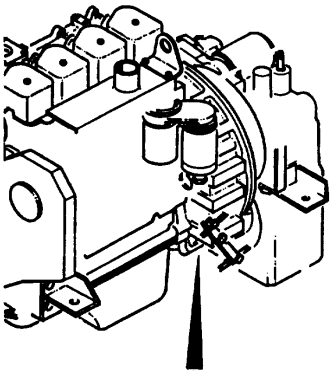
WARNING

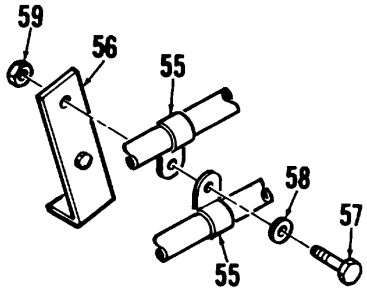
You must relieve hydraulic pressure before disconnecting hydraulic lines. Pressurized lines could cause serious injury to personnel.

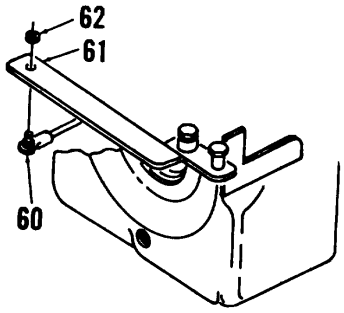
11. Relieve hydraulic pressure by moving both joystick handels on directional control valves forward, rearward, left, and right.
12. Disconnect outlet hose (46) and inlet hose (47) from hydraulic pump (48).

13. Disconnect fuel supply hose (49) from fuel lift pump (50). Disconnect fuel return hose (51) from fuel drain tube (52). Cap hoses.
14. Disconnect tube assembly (53) from ether injector atomizer (54).
15. Remove clamps (55) from hose bracket (56) by removing screw (57), washer (58), and nut (59). Leave clamps attached to hoses.
16. Release axle disconnect rod (60) from bracket (61) by removing nut (62).







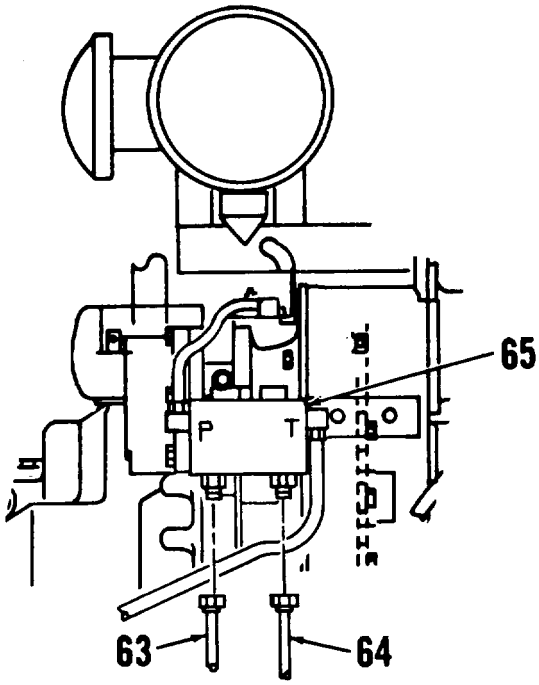


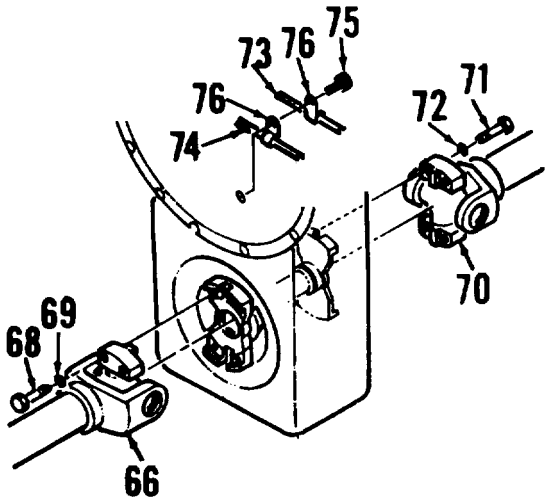
17. Tag and disconnect park brake hose (63) and differential lock hose (64) from bottom of park brake and differential lock solenoid valve (65).

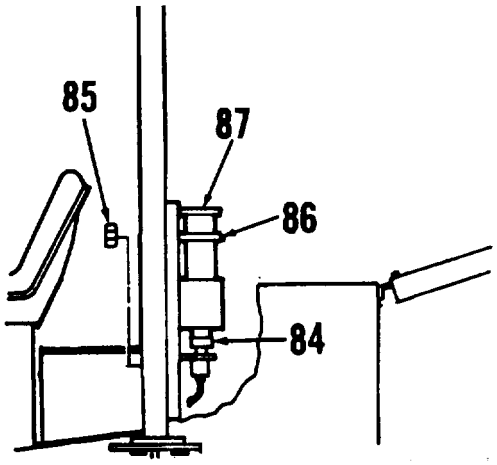
WARNING

Drive shafts are heavy and awkward. Enlist the help of an aide when disconnecting to prevent injury to personnel and damage to components.

18. Place jack stand beneath front drive shaft (66), close to where drive shaft meets transmission (67). Raise jack stand until it meets drive shaft.
19. Remove front drive shaft (66) from transmission (67) by removing screws (68) and lockwashers (69). Discard lockwashers.
20. Place jack stand beneath rear drive shaft (70), close to where drive shaft meets transmission (67). Raise jack stand until it meets drive shaft.
21. Remove rear drive shaft (70) from transmission (67) by removing screws (71) and lockwashers (72). Discard lockwashers.
22. Free fuel supply hose (73) and fuel return hose (74) from bottom of transmission (67) by removing screw (75) and clamps (76).
23. Remove ether injector assembly (84) by removing nuts (85) and loosening clamp (86) to free ether cylinder (87).







24. Remove cover frame assembly (77) from forklift chassis (78) by removing three screws (79), three nuts (80), screw (81), washers (82), and nut (83). Ground cable is detached when screw (81) on left side of frame is removed.

WARNING

To avoid personal injury, use a hoist and get help when lifting the engine and transmission. Be-sure all chains, hooks, etc. are in good condition and are of correct capacity. Be sure hooks are positioned correctly. Always use a spreader bar when necessary. Do not side load lifting hooks.

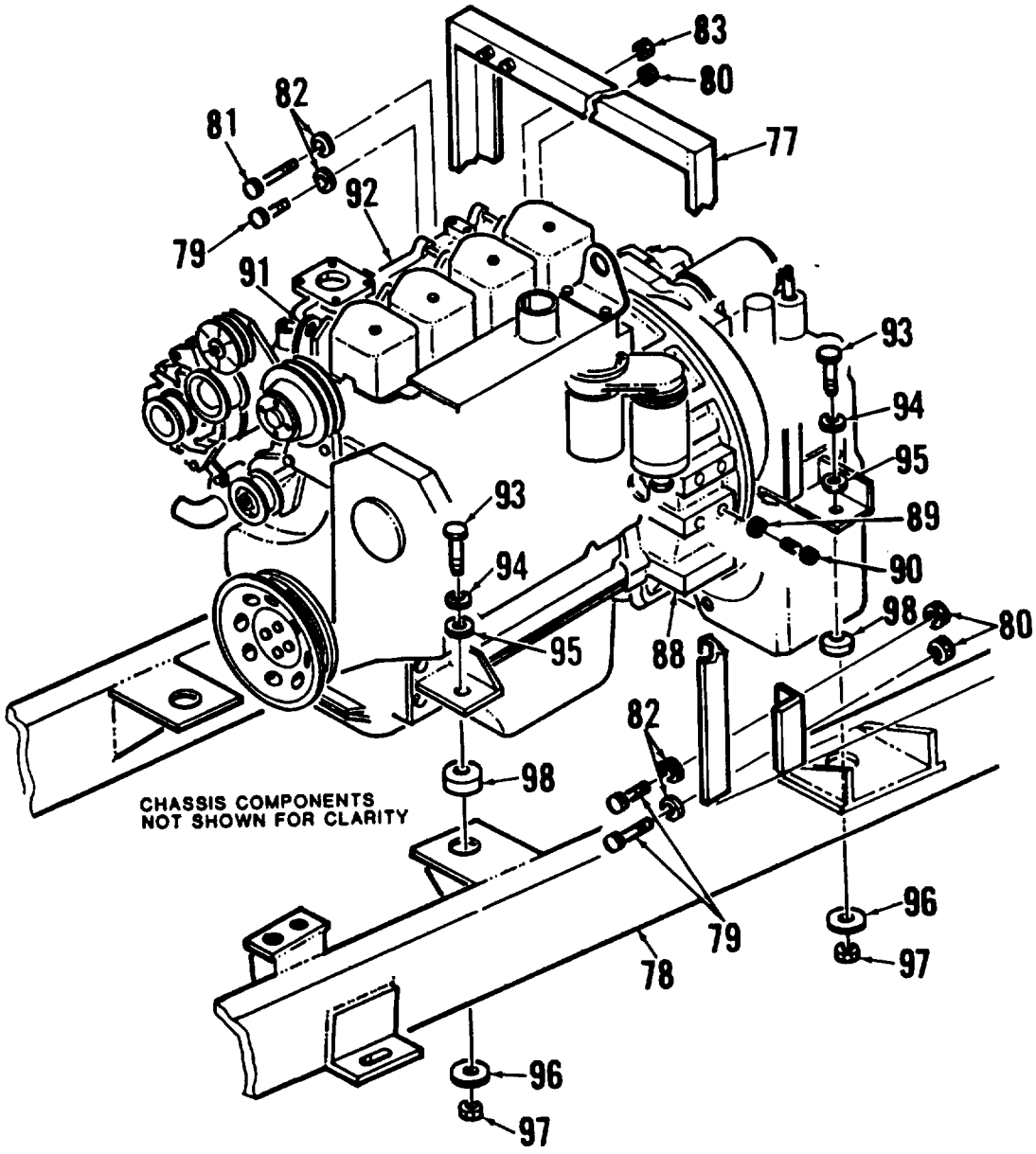
WARNING

Rear lifting hook on engine must not be used to lift the assembly engine and transmission. Use of the rear lifting hook can result in injury to personnel and damage to the engine or transmission.

NOTE

The center holes on each side of the engine flywheel housing are filled with silicone sealant. Sealant must be removed those holes which will be used during lifting of the engine and transmission.

25. Attach lifting chain to each side of engine flywheel housing (88) as follows:
    a. Install 1/2 inch washers (89) onto two 12mm x 3.0 bolts (90). Insert bolts through chain links of lifting chain.
    b. Install one bolt (90) into hole nearest transmission on each side of flywheel housing (88), as shown in figure. Thread bolts a minimum of one inch.
    c. Attach lifting chain to hoist using shackles.
26. Locate front lifting bracket (91) on engine. Ensure bracket is securely fastened.
27. Connect lifting chain to front lifting bracket (91). Attach chain to hoist using shackle.
28. Adjust length of lifting chains so that transmission and engine mounts break free from chassis (78) at the same time. Transmission and engine assembly must remain level while lifting.
29. Raise hoist to take up slack in chains. Readjust chains as required.
30. Release assembled engine and transmission (92) from forklift chassis (78) by removing screws (93), washers (94), washers (95), washers (96), and nuts (97). Remove rubber mount (98) only if replacement is required.
31. Lift assembled engine and transmission (92) up off forklift chassis (78) and move to an appropriate work area for further disassembly.
32. Support the assembled engine and transmission (92) during disassembly by placing jack stands under engine mounts (99) and mounting pads on flywheel housing (88). Adjust height of jack stands to keep engine level. Remove chains.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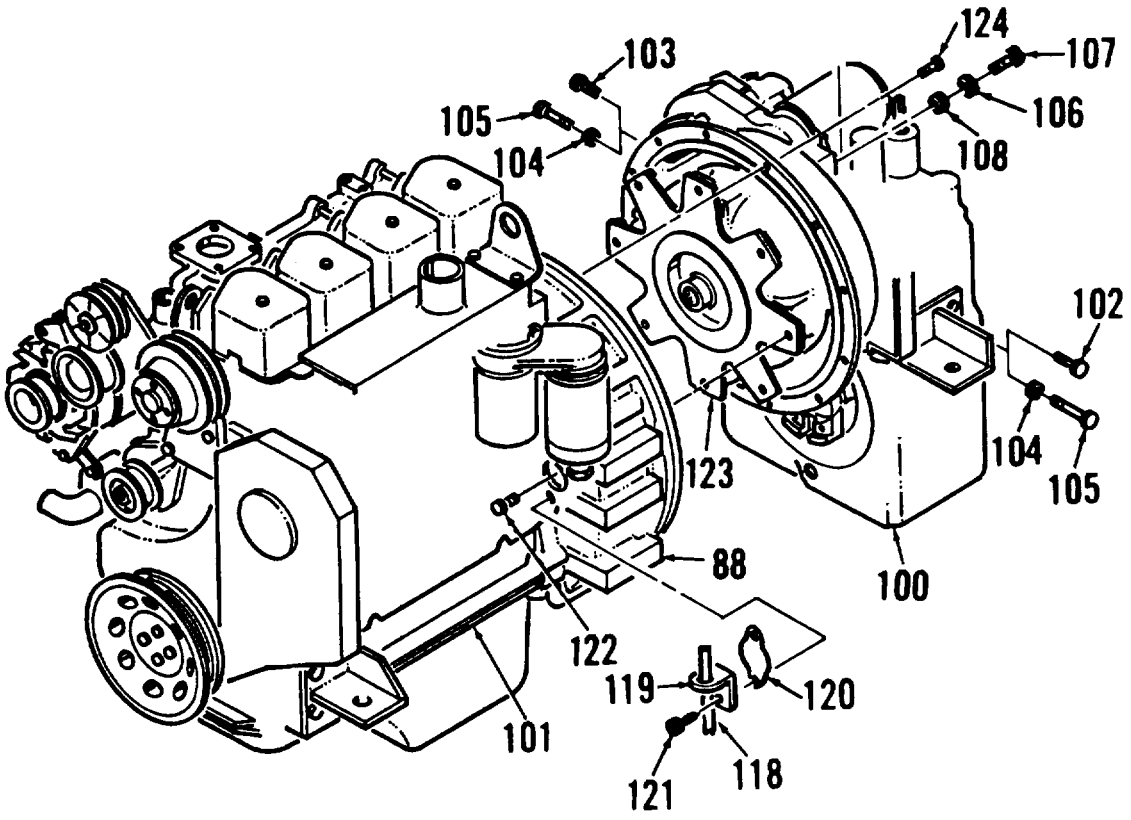
33. During removal of transmission (100) from engine (101), support transmission with a lifting chain and hoist. Attach lifting chain to sides of transmission as follows:
    a. Remove bottom screw (102) from right transmission mount and left screw (103) from left transmission mount.
    b. Install 1/2 inch washers (104) onto two 12mm x 3.0 bolts (105). Insert bolts through chain links of lifting chain.
    c. Install bolts (105) into holes on transmission mounts where screws (102, 103) were removed. Thread bolts a minimum of one inch.
    d. Attach lifting chain to hoist using shackles.
34. Attach lifting chain to top of transmission (100) as follows:
    a. Install 1/2 inch washer (106) onto 12mm x 3.0 bolt (107). Insert bolt through chain link of lifting chain. Install nut (108) onto bolt.
    b. Install bolt (107) into hole at top of transmission (100), to the right of the oil filter. Thread bolt completely into hole then tighten nut (108).
    c. Attach lifting chain to hoist using shackle.
35. Raise hoist to take up slack in chains. Readjust chains as required.
36. Tag and disconnect supply hose (109) and return hose (110) from park brake and differential lock solenoid valve (65).
37. Tag and disconnect two wires (111, 112) from back-up alarm switch (113) and orange wire (114) from transmission temperature sender (115). Tag and disconnect four plugs (116) from transmission solenoids (117). Tag and disconnect ground wire (125) by removing screw (126).
38. Remove crankcase breather hose (118) from bracket (119). Remove access cover (120) and bracket by removing screws (121).
39. Locate access hole in flywheel housing. Manually rotate engine flywheel by turning crankshaft pulley until first drive plate mounting screw (122) is visible. Remove screw.
40. Rotate flywheel and remove remaining seven screws (122) to separate engine flywheel from transmission drive plates (123).

WARNING

Transmission is heavy and awkward. Enlist the help of two aides when removing to prevent injury to personnel and damage to components. Transmission must be held in place until all attaching screws are removed.

41. Remove transmission (100) from engine (101) by removing eleven screws (124). Move transmission to a suitable work area for further maintenance. Support front edge of torque converter housing with wooden blocks stack to approximately 9 inches. Remove lifting chains.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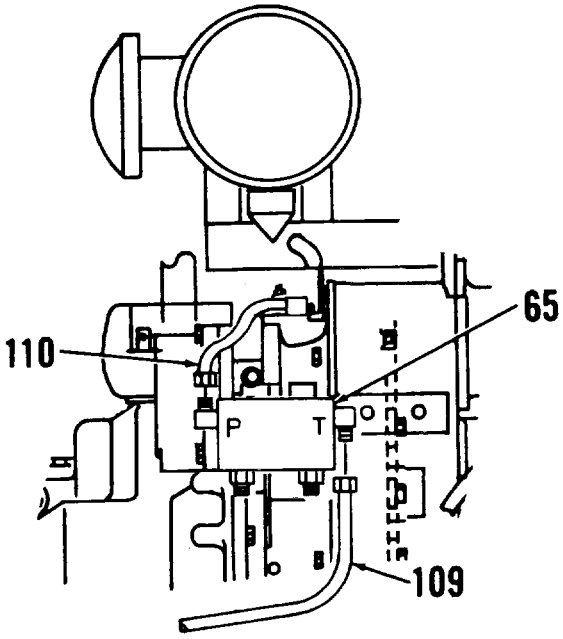
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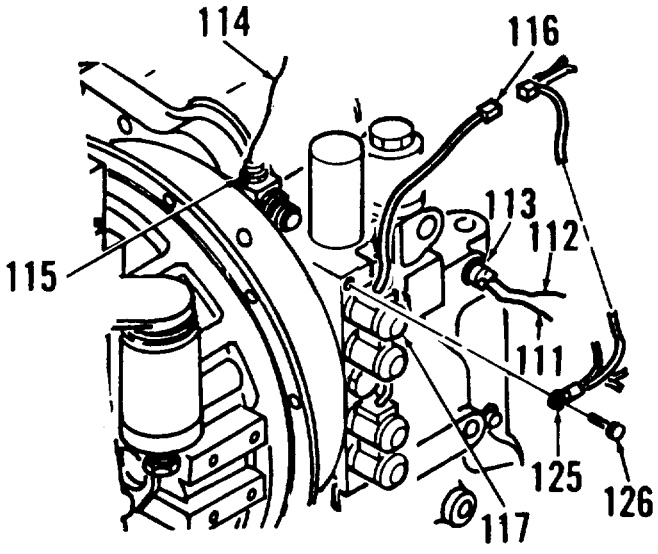
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B. CLEANING

Clean engine and transmission assemblies and related components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect engine and transmission assemblies and related components in accordance with paragraph 1-24.
2. Inspect flywheel mounting face and nose pilot bore for burrs. Remove all burrs and clean drive plate surface using cleaning solvent.
3. Measure and record engine crankshaft end play.
4. Inspect front and rear drive shafts for damaged, dented, or bent tubing. Inspect for missing balance weights.
5. Ensure drive shafts are free of foreign material, such as undercoat or concrete. If found, foreign material shall be removed carefully to avoid damaging shaft.
6. Ensure drive shaft splines slide freely with slight drag from slip shaft seal.
7. Check that drive shaft cross journals flex without excessive binding.
8. Inspect drive shaft mounting flanges and ears for burrs, paint, or foreign material.

D. INSTALLATION

WARNING

To avoid personal injury, use a hoist and get help when lifting the engine and transmission. Be sure all chains, hooks, etc. are in good condition and are of correct capacity. Be sure hooks are positioned correctly. Always use a spreader bar when necessary. Do not side load lifting hooks. Transmission must be held in place until all attaching screws are tightened.

NOTE

Before installing transmission, ensure that all thread lock residue has been removed from drive plate nuts.

1. Attach lifting chain to sides of transmission (100) as follows:
   a. If installed, remove bottom screw (102) from right transmission mount and left screw (103) from left transmission mount.
   b. Install 1/2 inch washers (104) onto two 12mm x 3.0 bolts (105). Insert bolts through chain links of lifting chain.
   c. Install bolts (105) into holes on transmission mounts where screws (102, 103) were removed. Thread bolts a minimum of one inch.
   d. Attach lifting chain to hoist using shackles.

2. Attach lifting chain to top of transmission (100) as follows:

   a. Install 1/2 inch washer (106) onto 12mm x 3.0 bolt (107). Insert bolt through chain link of lifting chain. Install nut (108) onto bolt.

   b. Install bolt (107) into hole at top of transmission (100), to the right of the oil filter. Thread bolt completely into hole then tighten nut (108).

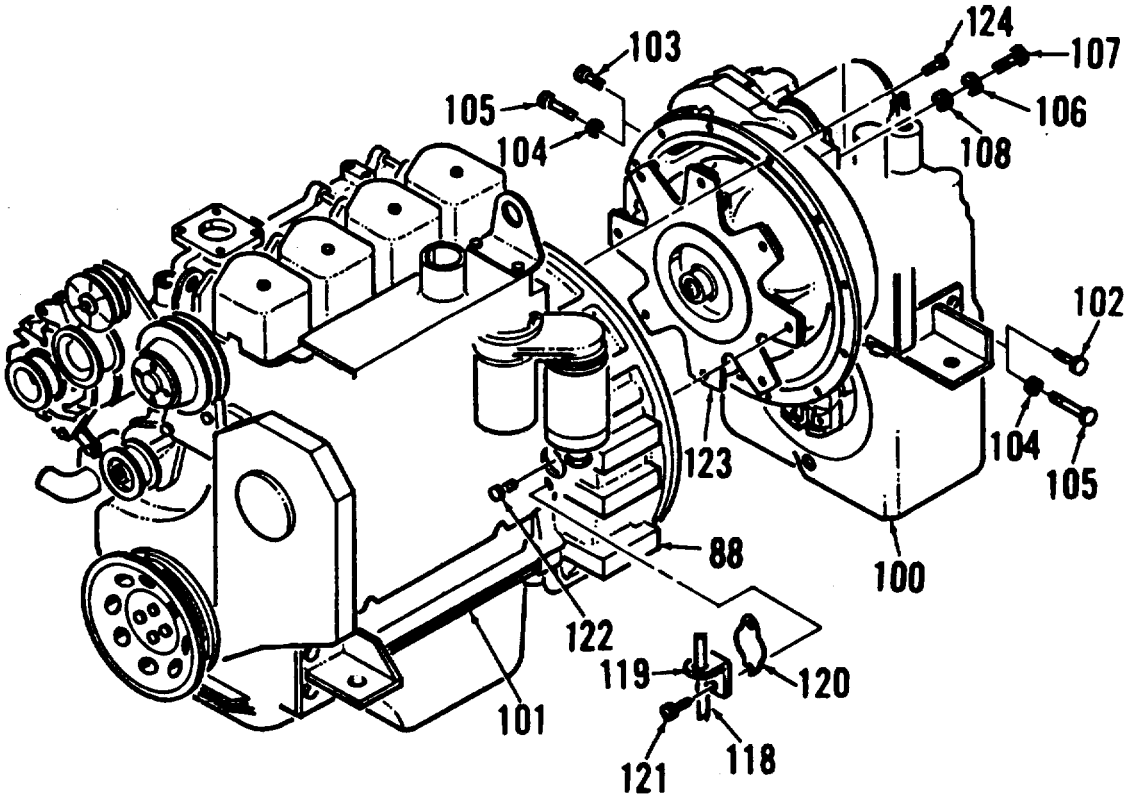
   c. Attach lifting chain to hoist using shackle.

3. Raise hoist to take up slack in chains. Readjust chains as required. Move transmission (100) into place for assembly to engine (101).

4. If required, manually rotate engine flywheel by turning crankshaft pulley until drive plate mounting hole is aligned with flywheel housing access hole. Mate transmission (100) to engine (101).

5. Apply loctite to eleven screws (124). Install screws and torque to 35 45 ft-lbs (47 60 Nm). Remove lifting chains from transmission.

6. Apply loctite to screws (102, 103). Install screw (102) into bottom hole of right transmission mount. Install screw (103) into left hole of left transmission mount.



CAUTION

Drive plate mounting screws must be installed very carefully to prevent cross threading of drive plate nuts. Insert screws through flywheel and thread into drive plate nuts only far enough to ensure that screws properly engages nuts. Do not tighten screws.

7. Apply loctite to first drive plate mounting screw (122). Install screw but do not tighten.

8. Apply loctite to remaining seven drive plate mounting screws (122). Manually rotate engine flywheel by turning crankshaft pulley to gain access to remaining drive plate mounting holes. Install but do not tighten screws.

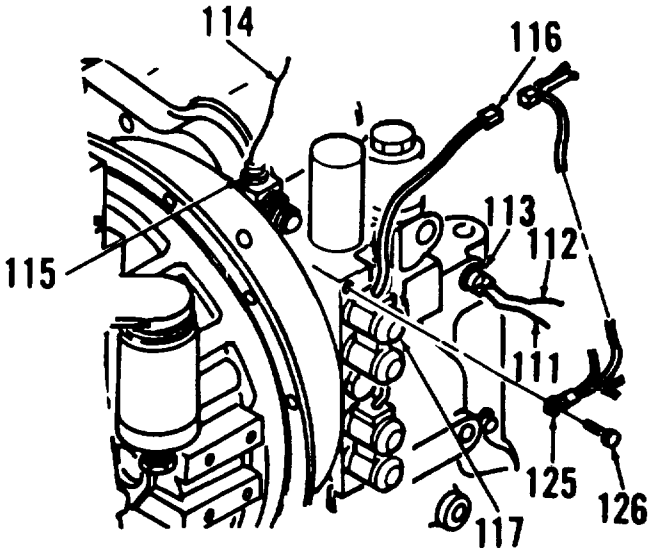
9. After all eight screws (122) are installed, torque screws to 26 29 ft-lbs (35 39 Nm).

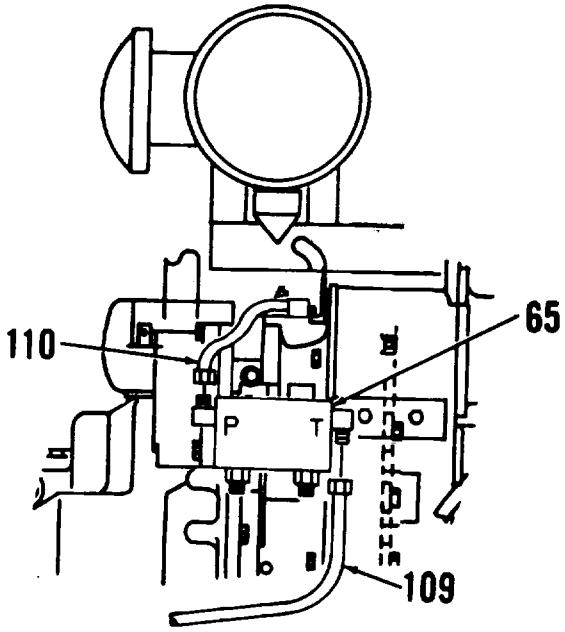
10. Measure crankshaft end play after transmission has been installed. End play must be within .001 inch (.025 mm) of value recorded during inspection.

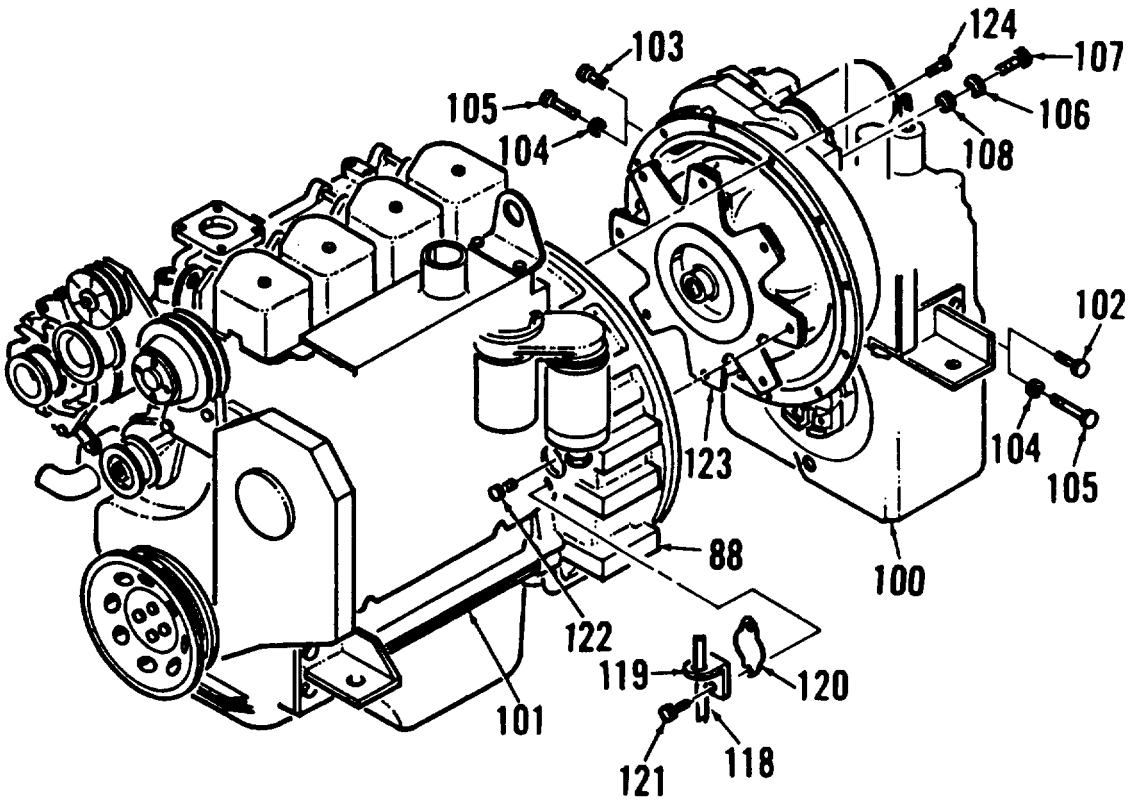
11. Install crankcase breather hose (118) into bracket (119). Install access cover (120) and bracket over flywheel housing access hole using screws (121).

12. Connect ground wire (125) to transmission using screw (126). Connect four plugs (116) to transmission solenoids (117). Connect orange wire (114) to transmission temperature sender (115) and two wires (111, 112) to back up alarm switch (113).

13. Connect supply hose (109) and return hose (110) to park brake and differential solenoid valve (90).



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WARNING

To avoid personal injury, use a hoist and get help when lifting the assembled engine and transmission. Be sure all chains, hooks, etc. are in good condition and are of correct capacity. Be sure hooks are positioned correctly. Always use a spreader bar when necessary. The lifting hooks must not be side loaded.

WARNING

Rear lifting hook on engine must not be used to lift the assembly engine and transmission. Use of the rear lifting hook can result in injury to personnel and damage to the engine or transmission.

14. Attach lifting chain to each side of engine flywheel housing (88) as follows:

    a. Install 1/2 inch washers (89) onto two 12mm x 3.0 bolts (90). Insert bolts through chain links of lifting chain.

    b. Install one bolt (90) into hole nearest transmission on each side of flywheel housing (88), as shown in figure. Thread bolts a minimum of one inch.

    c. Attach lifting chain to hoist using shackles.

15. Connect lifting chain to front lifting bracket (91). Attach chain to hoist using shackle.

16. Adjust length of lifting chains so that transmission and engine will remain level while lifting.

17. Raise hoist to take up slack in chains. Readjust chains as required.

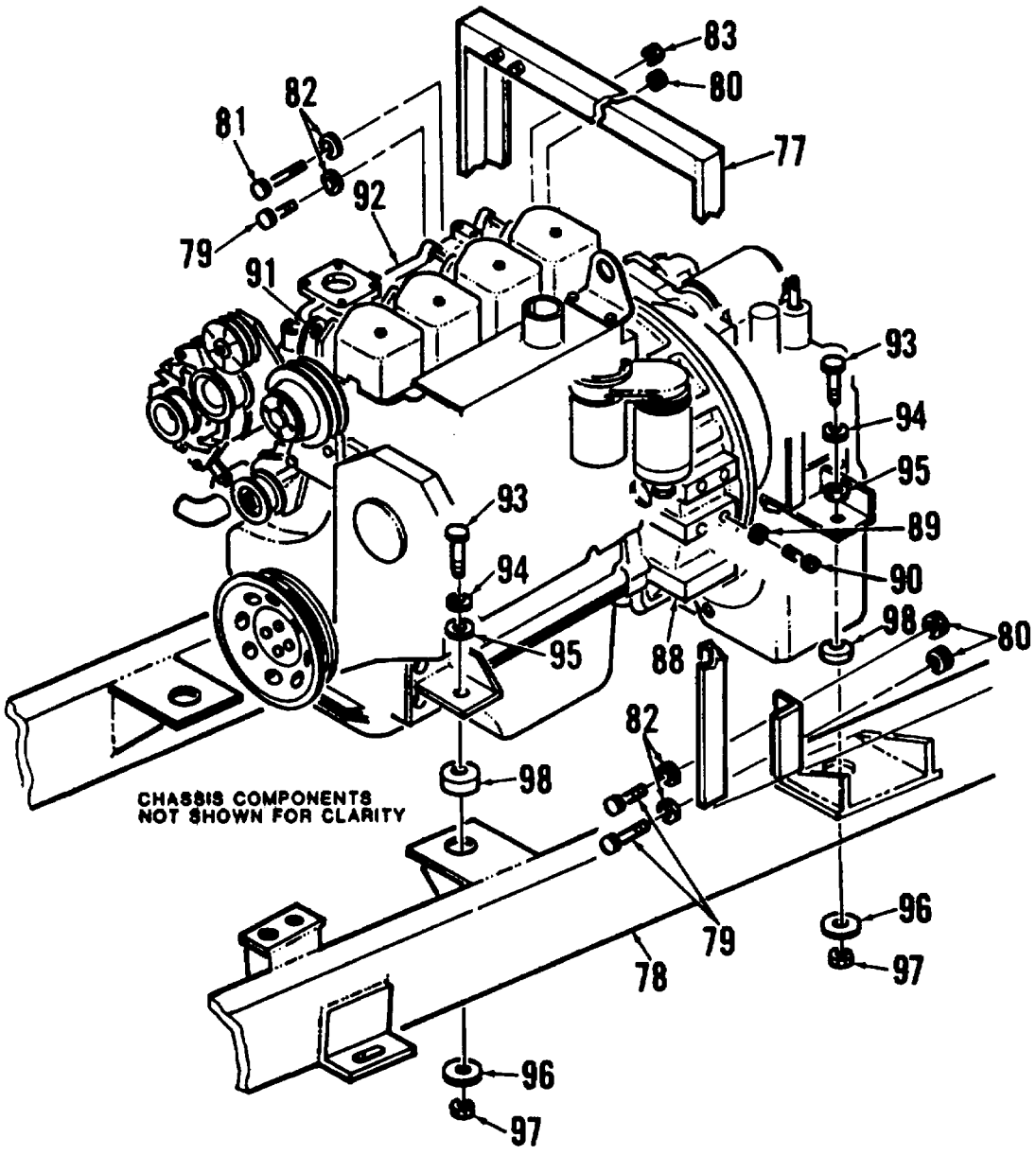
18. If replacement is required, install new rubber mounts (98). Position washers (95) onto mounts.

19. Lift assembled engine and transmission (92) and move into position for installation onto forklift chassis (78). Position so that mounts align with mounting brackets on chassis.

20. Mate assembled engine and transmission (92) to forklift chassis (78). Secure using screws (93), washers (94), washers (96), and nuts (97). Torque nuts to 150 ft-lbs (201 Nm). Remove lifting chains.

21. Fill center holes on flywheel housing (used for lifting assembled engine and transmission) with silicone sealant. Use sealant sparingly to form a plug no more than 1/2 inch long.

22. Attach cover frame assembly (77) to forklift chassis (78) using three screws (79), three nuts (80), screw (81), washers (82), and nut (83). Screw (81), washer (82), and nut (83) go into top hole on left side of fame and secure ground cable.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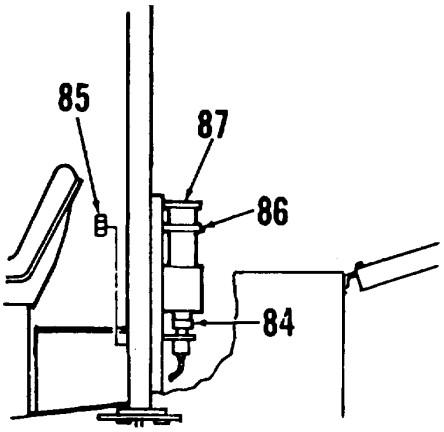
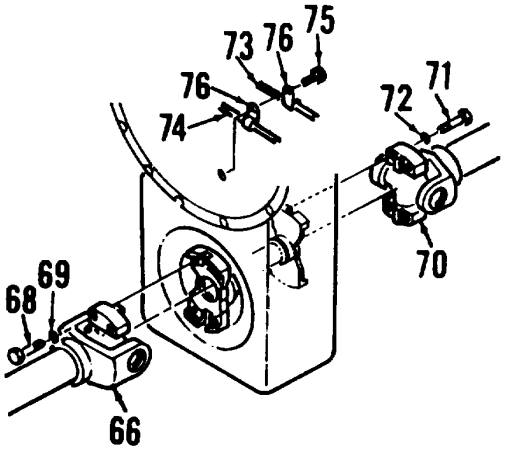
23. Insert ether cylinder (87) into clamp (86). Secure ether injector assembly (84) using nuts (85). Tighten clamp to secure ether cylinder.

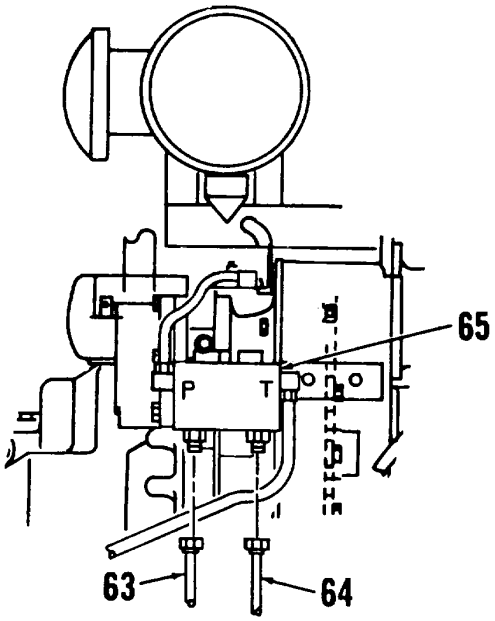
WARNING

Drive shafts are heavy and awkward. Enlist the help of an aide when connecting to prevent injury to personnel and damage to components.

24. Mate front drive shaft (66) to transmission (67). Secure using screws (68) and new lockwashers (69).
25. Mate rear drive shaft (70) to transmission (67). Secure using screws (71) and new lockwashers (72).
26. Attach fuel supply hose (73) and fuel return hose (74) to bottom of transmission (67) using screw (75) and clamps (76).
27. Connect park brake hose (63) and differential lock hose (64) to bottom of park brake and differential lock solenoid valve (65).





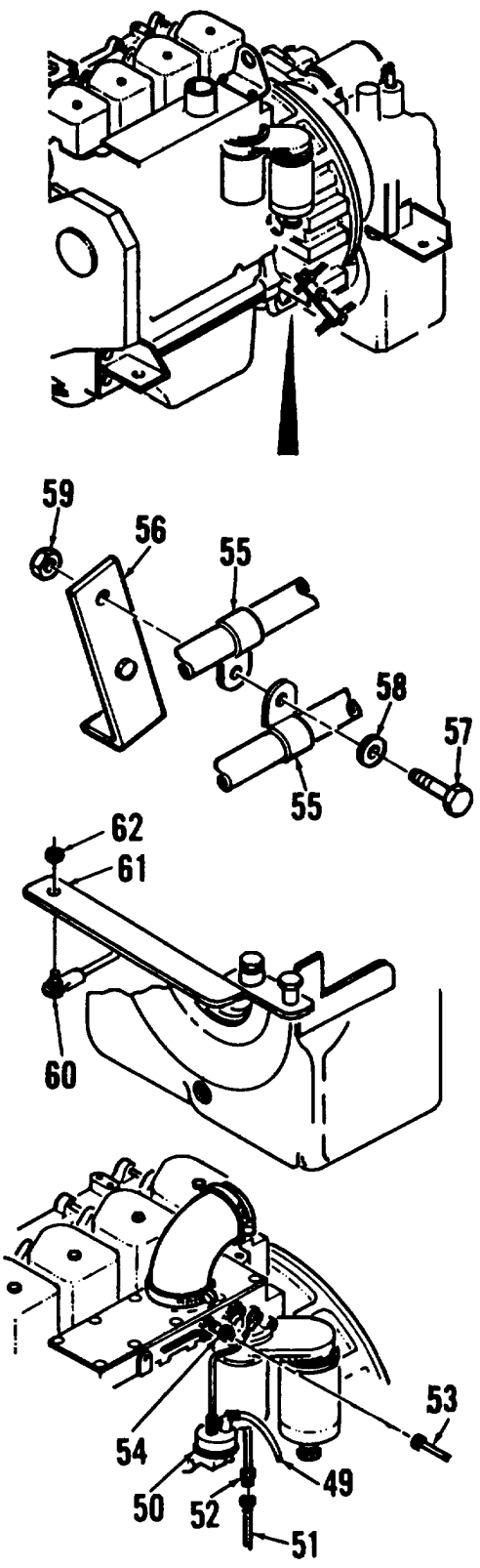


28. Attach axle disconnect rod (60) to bracket (61) using nut (62).

29. Attach transmission oil cooler hoses to hose bracket (56) using clamps (55), screw (57), washer (58), and nut (59).

30. Connect tube assembly (53) to ether injector atomizer (54).

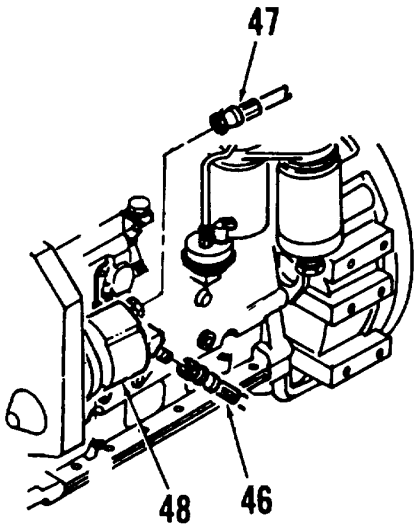
31. Connect fuel supply hose (49) to fuel lift pump (50). Connect fuel return hose (51) to fuel drain tube (52).

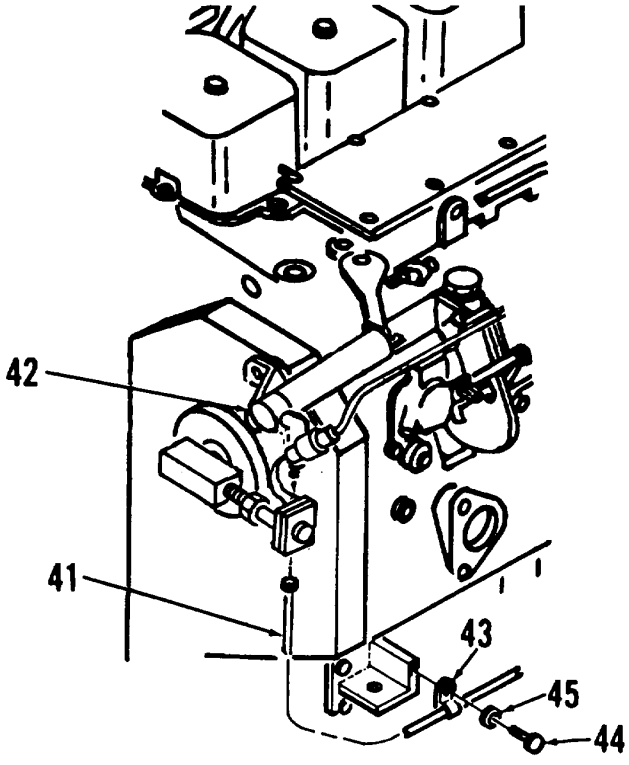


32. Connect outlet hose (46) and inlet hose (47) to hydraulic pump (48).

33. Connect throttle supply hose (41) to throttle slave cylinder assembly (42).

34. Attach clamp (43) holding throttle supply hose (41) to right engine mount using screw (44) and washer (45).

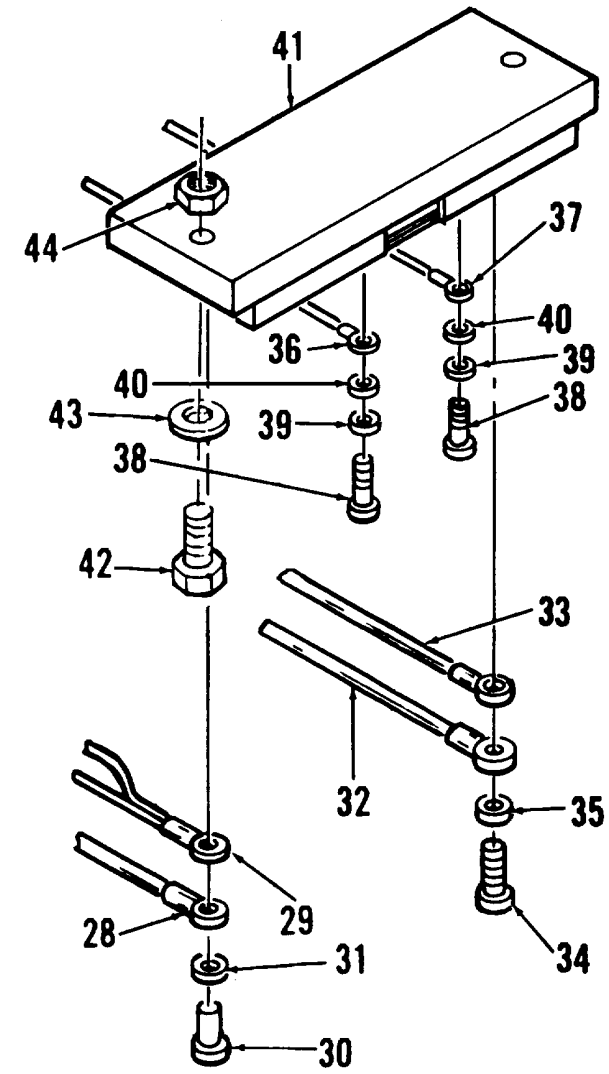


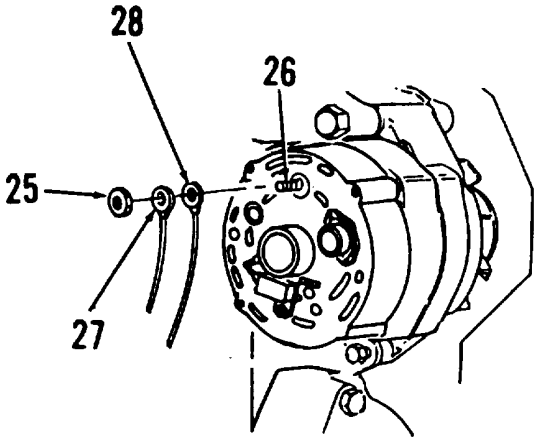


35. Connect electrical cables (29, 30) and wires (31, 32) to DCA shunt (33) using screws (34) and lockwashers (35).

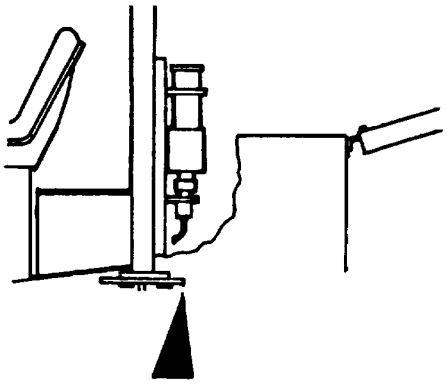
36. Connect wires (36, 37) to DCA shunt (33) using screws (38), lockwashers (39), and washers (40).

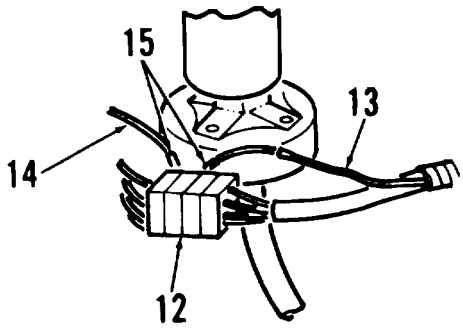
37. Connect red wire (27) and black wire (28) to alternator B+ terminal (26) using nut (25).

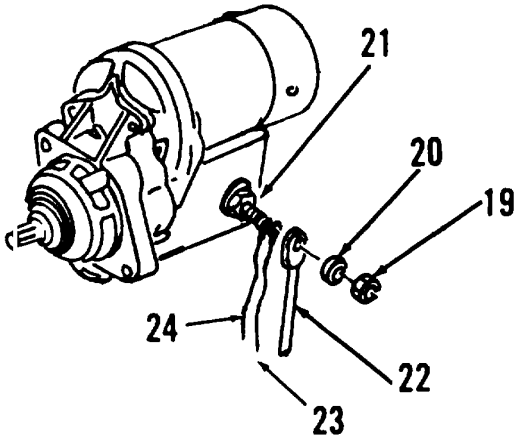


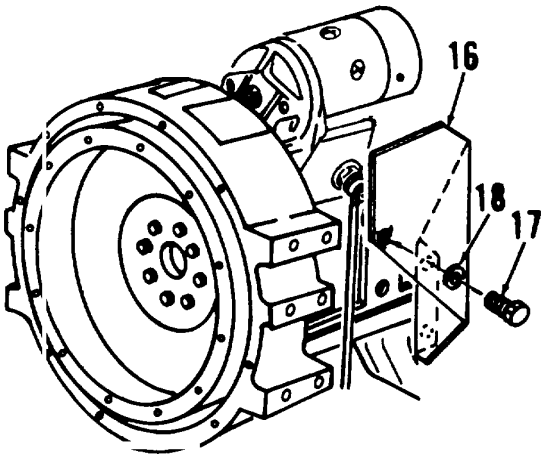


38. Connect electrical wiring harness at plug (12). Connect white wire (13) in engine wiring harness and white wire (14) in main wiring harness to black wires (15) on ether valve.
39. Connect electrical cable (22), red wire (23), and yellow wire (24). to starter stud (21) using nut (19) and washer (20).
40. Apply loctite to screws (17). Install starter heat shield (16) onto engine using screws and washers (18).







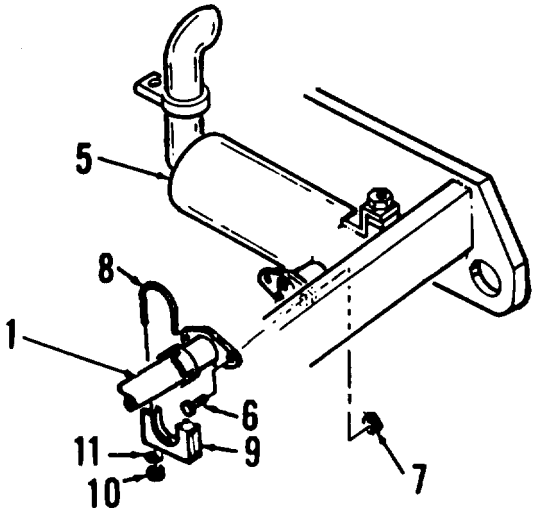


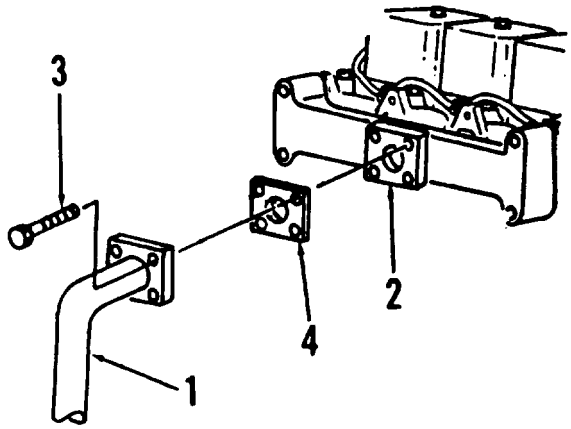
41. Insert exhaust pipe (1) into connector on muffler / spark arrestor (5). Install U-bolt (8) and clamping brace (9), ensuring threaded ends of U-bolt are horizontal and point toward center of chassis. Secure using nuts (10) and washers (11).
42 Install nuts (6) and washers (7).
43. Mate new gasket (4) to exhaust manifold (2). Install exhaust pipe (1) to exhaust manifold using screws (3).

FOLLOW-ON MAINTENANCE:

Install air cleaner assembly (para. 2-28)
Install radiator (para. 2-47)
Install transmission covers (para. 2-131)
Install engine cover (para. 2-128)

END OF TASK





3-7. ENGINE MOUNT REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Equipment Condition:

Engine assembly removed (para. 3-6)

A. REMOVAL

Remove engine mounts (1) from engine crankcase (2) by removing bolts (3).

B. CLEANING

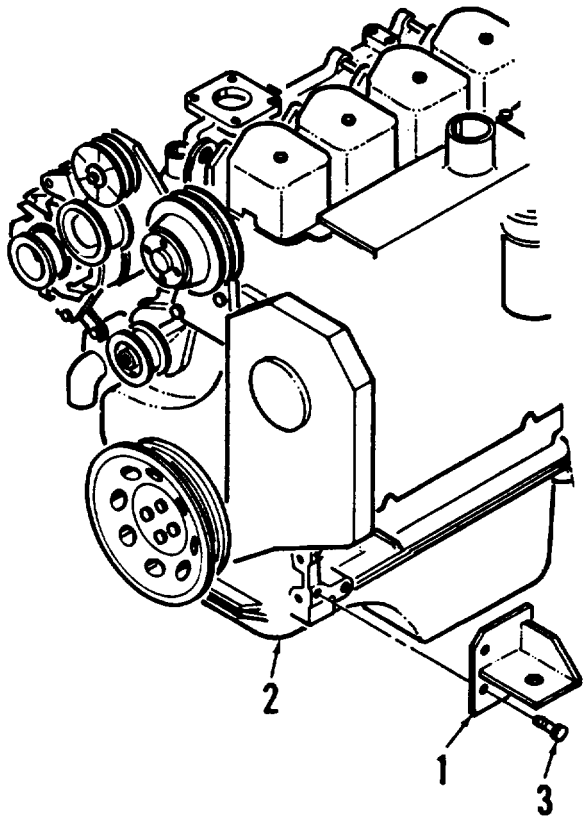
Clean engine mounts in accordance with paragraph 1-24.

C. INSPECTION

Inspect engine mounts in accordance with paragraph 1-24.

D. INSTALLATION

Install engine mounts (1) onto engine crankcase (2) using bolts (3). Torque bolts to 55 ft-lbs (74 Nm).



FOLLOW-ON MAINTENANCE:

Install engine assembly (para. 3-6)

END OF TASK

3-8. CYLINDER HEAD ASSEMBLY (WITH VALVES) REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Caliper, Inside (12, App. E)
Feeler Gage (21, App. E)

Materials / Parts:

Lubricating Oil (14, App. C)
Gasket, Item 5 (1 ea.)

References:

TM 10-3930-664-24P
TM 10-3930-664-12

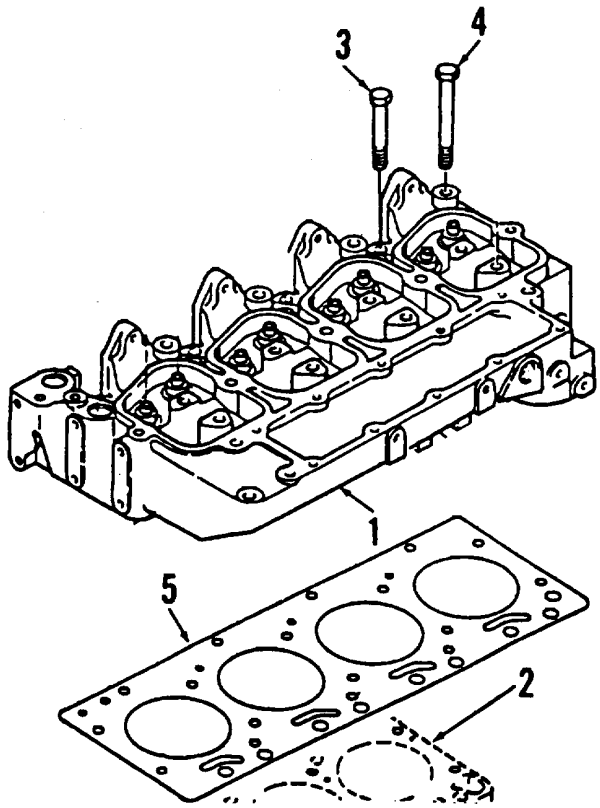
Equipment Condition:

Engine oil drained
Radiator drained (para. 2-46)
Exhaust manifold removed (para. 2-23)
Intake manifold cover removed (para. 2-24)
Fuel filter removed (para. 2-36)
Alternator removed (para.2-55)
Fan hub removed (para. 2-52)
Belt tensioner removed (para. 2-57)
Lifting bracket removed (para. 2-14)
Rocker arm assemblies removed (para. 3-12)
Fuel injector nozzles removed (para. 3-19)

A. REMOVAL

1. Remove cylinder head (1) from engine cylinder block (2) by removing four screws (3) and ten screws (4). Remove screws starting in the center, alternately working to the ends of the cylinder head.

2. Remove and discard gasket (5). Ensure all gasket material is removed from cylinder head and cylinder block mating surfaces.



B. CLEANING

Clean cylinder head and related components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect cylinder head and related components in accordance with paragraph 1-24.
2. Inspect coolant passages for blockage. A large build up of rust and lime will require removal of cylinder block for cleaning in a hot tank.
3. Inspect cylinder bores for damage and excessive wear. Manually rotate crankshaft so that the piston for bore being inspected is at bottom of bore.
4. Measure cylinder bores as follows (refer to figure):

   a. Maximum bore I.D. shall be 4.0203 in. (102.116 mm).

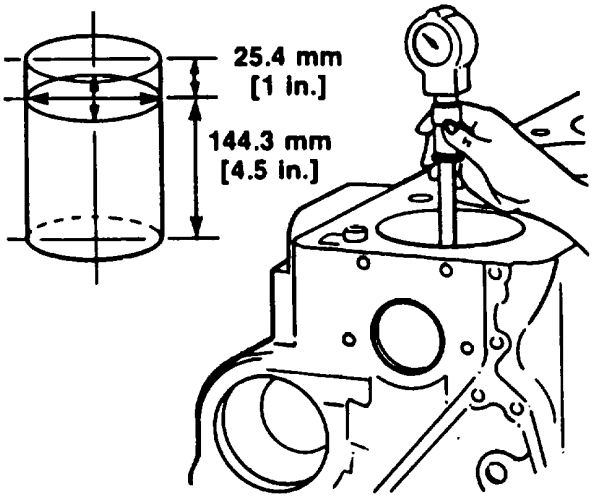
   b. Out of round shall not exceed .0015 in. (.038 mm).

   c. Taper shall not exceed .003 in. (.076 mm).

5. Check top surface of cylinder block for damage caused by leaking cylinder head gasket.

6. Check top surface of cylinder block for flatness between cylinders. Variance shall not exceed .002 in. (.050 mm).

7. Do not proceed with cylinder head replacement if crankcase is damaged or tolerances in steps 4 and 6 are not met. Remove engine from service and send to depot maintenance shop for overhaul.

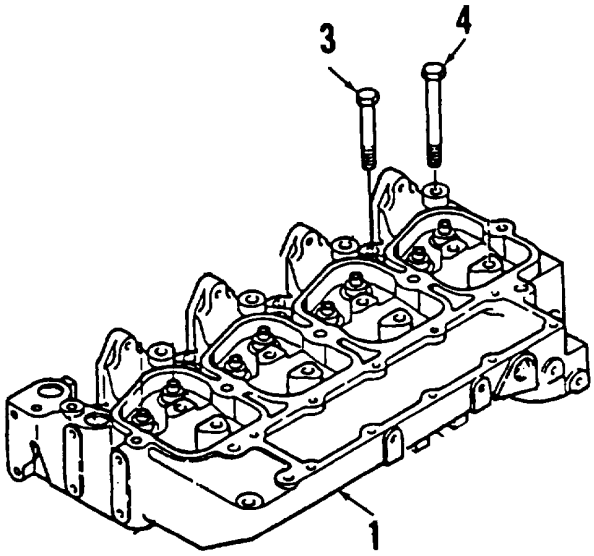


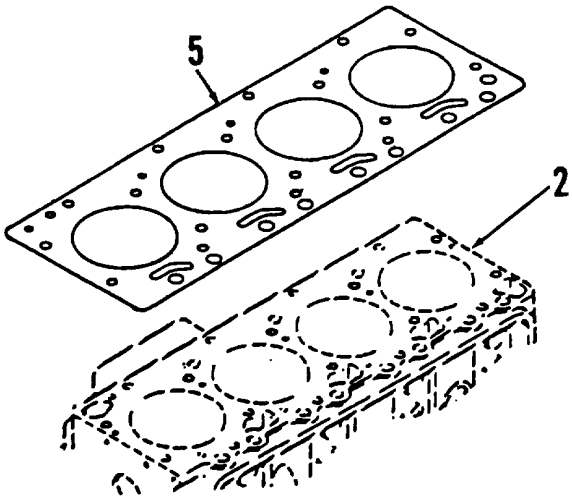
D. INSTALLATION

1. Mate new gasket (5) to engine cylinder block (2). Ensure gasket fits properly over cylinder block dowels.

2. Carefully install cylinder head (1) onto dowels.

3. Lubricate threads of screws (3, 4) with oil. Install four screws (3) and ten screws (4) to secure cylinder head (1). Hand tighten screws.





4. Install push rods (6) into valve tappet sockets. Lubricate push rod sockets with oil.

CAUTION

Ensure rocker lever set screws are completely backed out before installing rocker arm assemblies.

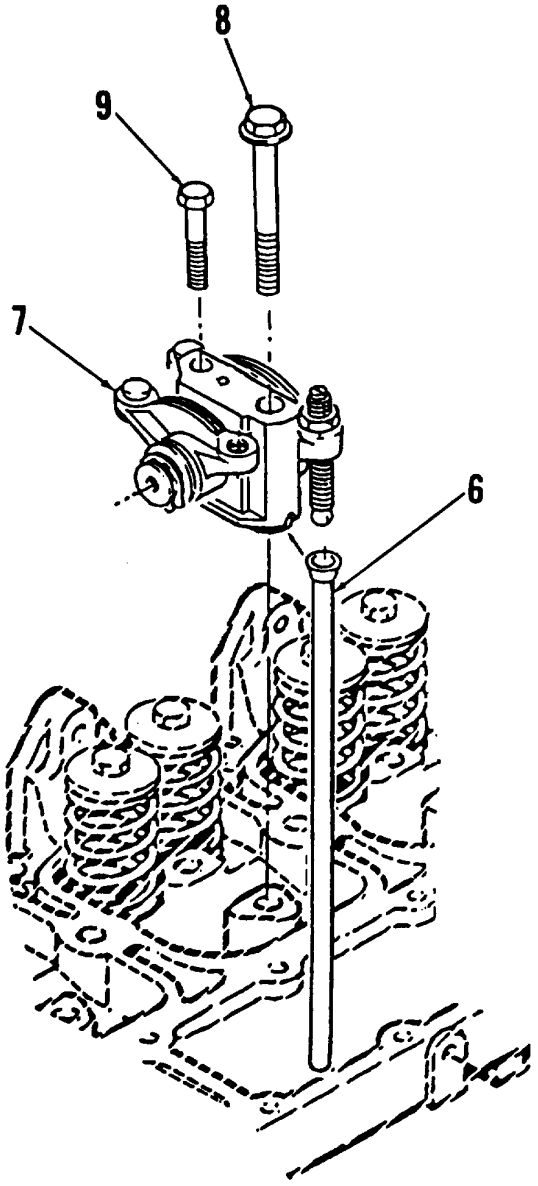
5. Install rocker arm assemblies (7) into cylinder head. Ensure dowel ring in rocker support mates with dowel bore.
6. Lubricate threads and under heads of screws (8, 9). Install screws.
7. Torque screws (3, 4, 8) as follows using sequence shown in figure:
   a. Torque all screws (3, 4, 8) to 66 ft-lbs (90 Nm).
   b. Retorque all screws (3, 4, 8) to 66 ft-lbs (90 Nm).
   c. Torque four screws (3) to 89 ft-lbs (120 Nm).
   d. Tighten all screws (3, 4, 8) an additional 1/4 turn.
8. Torque screws (9) to 18 ft-lbs (24 Nm).

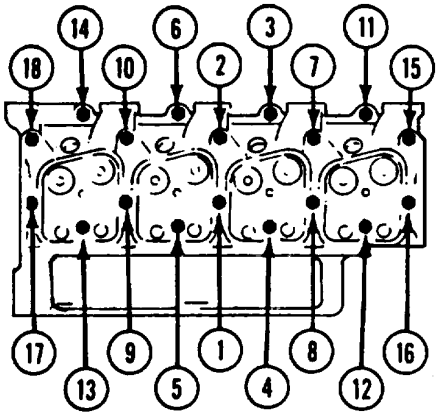
9. Adjust rocker arm clearance in accordance with paragraph 2-15.

FOLLOW-ON MAINTENANCE:

Install fuel injector nozzles
(para. 3-19)
Install rocker arm assemblies
(para. 3-12)
Install belt tensioner (para. 2-54)
Install fan hub (para. 2-52)
Install alternator (para. 2-55)
Install lifting bracket (para. 2-14).
Install fuel filter (para. 2-39)
Install intake manifold cover
(para. 2-24)
Install exhaust manifold (para. 2-23)
Service radiator (para. 2-46)
Service engine oil in accordance with
Lubrication Order

END OF TASK





3-9. FLYWHEEL AND REAR SEAL REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drill Set (19, App. E)
Electric Drill (18, App. E)
Soft Head Hammer (23, App. E)
Slide Hammer (39, App. E)
Torque Wrench (32, App. E)
Gloves (9, App. E)
Screw, #10 Sheet Metal (2 ea.)

Equipment Condition:

Engine removed (para. 3-6)

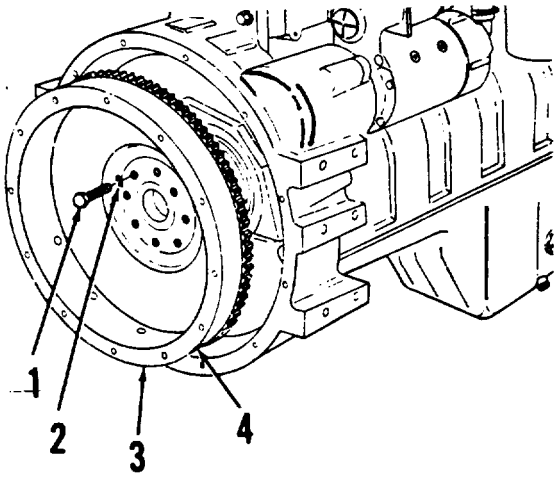
Materials / Parts:

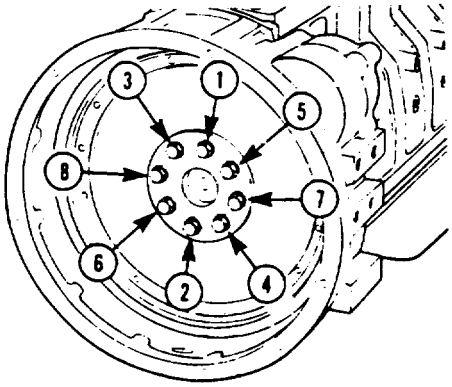
Oil Seal Replacement Kit (1 ea.)
Ring Seal, Item 5 (1 ea.)

A. REMOVAL

WARNING
Use caution when removing flywheel. Flywheel may have sharp edges and will cut hands. Wear gloves at all times when handling flywheel.

1. Remove eight screws (1) and washers (2).
2. Pull flywheel (3) from flywheel housing (4).





3. Using an electric drill and 1/8 inch drill bit, drill two holes (180 degress apart) into outer edge of oil seal (5).

4. Install #10 sheet metal screws into drilled holes.

5. Extract oil seal (5) from carrier using slide hammer. Discard oil seal.

B. CLEANING

1. Clean flywheel in accordance with paragraph 1-24.

2. Clean and dry sealing surface of crankshaft. Seal lip and sealing surface must be free of all oil residue to prevent leaks.

C. INSPECTION

1. Inspect components in accordance with paragraph 1-24.

2. Inspect flywheel ring gear for chipped, missing, or damaged teeth.

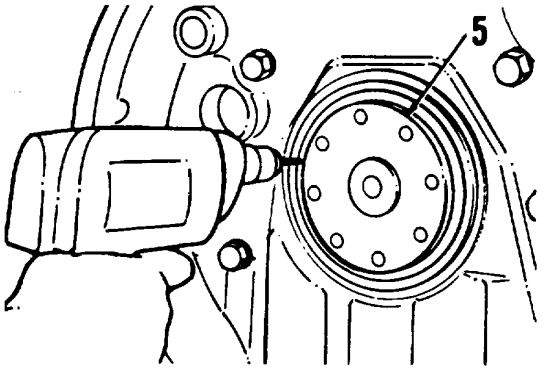
D. INSTALLATION

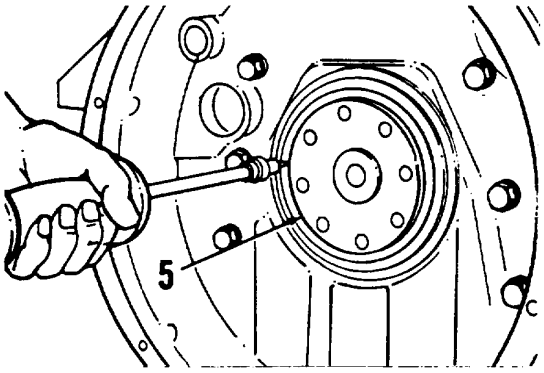
1. Install oil seal (5) and pilot from seal replacement kit onto crankshaft. Push seal into bore of housing and remove pilot.

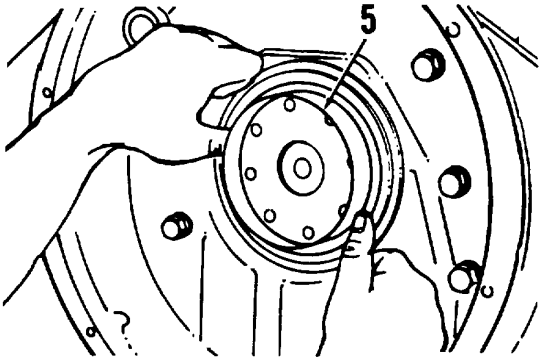
NOTE

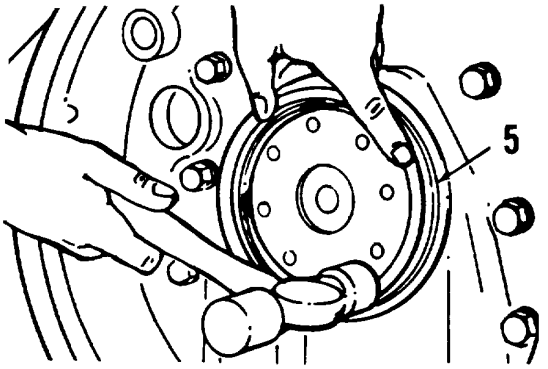
Use installation tool supplied with seal replacement kit to install seal to correct depth.

2. Install seal (5) by tapping with soft head hammer. To ensure proper seat, alternate tapping at 12, 3, 6, and 9 o'clock positions.



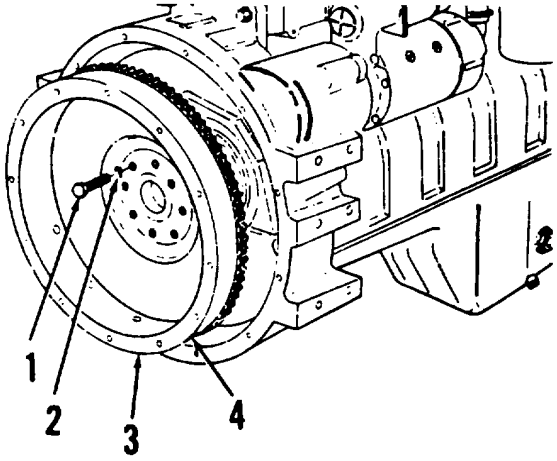






3. Mate flywheel (3) to flywheel housing (4).

4. Install eight screws (1) and washers (2). Torque screws to 101 ft-lbs (137 Nm) in sequence shown in figure.



FOLLOW-ON MAINTENANCE:

Install engine (para. 3-6)

END OF TASK

3-10. FLYWHEEL HOUSING REPLACEMENT

This task covers: Housing Bore Check, Housing Face Alignment Check, Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Dial Indicator Set (17, App. E)
Soft Head Hammer (23, App. E)

Equipment Condition:

Flywheel and rear seal removed (para. 3-9)

Materials / Parts:

Sealant (29, App. C)
Rear Cover Gasket, Item 12 (1 ea.)
O-Ring, Item 10 (1 ea.)

A. FLYWHEEL HOUSING BORE CHECK

1. Attach dial indicator to crankshaft as shown in figure. Indicator extension bar must be rigid for accurate readings. If the extension bar sags or the indicator slips, readings will not be accurate.

2. Move dial indicator to 6 o'clock position. Adjust dial until needle points to zero.

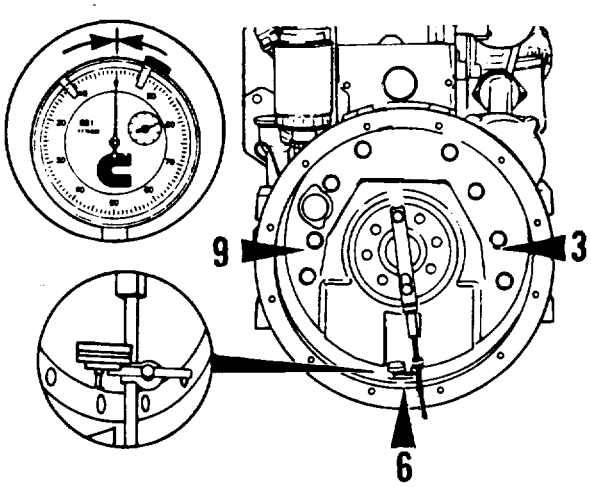
3. Slowly rotate crankshaft. Record dial readings at 9, 12, and 3 o'clock positions.

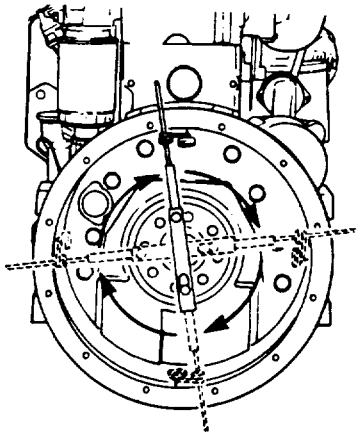
NOTE

Dial readings at 9, 12, and 3 o'clock positions may be positive or negative.

4. Continue to rotate crankshaft until dial indicator is at 6 o'clock position. Check indicator to ensure needle points to zero.

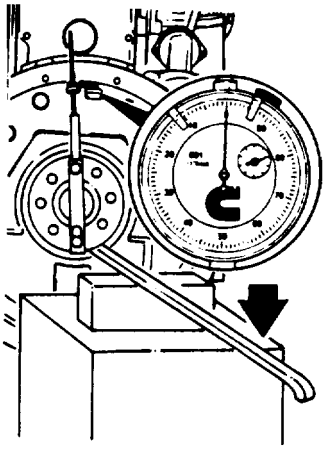
5. Rotate crankshaft until dial indicator is at 12 o'clock position. Adjust dial until needle points to zero.





CAUTION

Use care when raising crankshaft to prevent damage. Do not force crankshaft beyond the point where bearing clearance has been removed.



6. Using a floor mounted support and padded pry bar, raise rear of crankshaft to its upper limit.

7. Record new dial reading at 12 o'clock position. New reading indicates vertical bearing clearance.

8. Calculate a "total horizontal" value by subtracting the 3 o'clock reading (step 3) from the 9 o'clock reading:

   9 o'clock reading
   - 3 o'clock reading
   = total horizontal value

9. Calculate a "total vertical" value by adding the 12 o'clock reading (step 3) to the vertical bearing clearance (step 7):

   12 o'clock reading
   + vertical bearing clearance
   = total vertical value

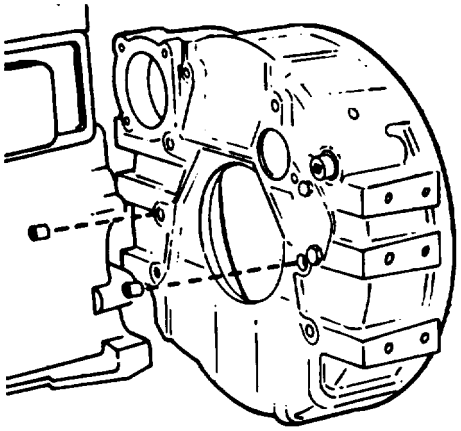
10. Mark the "total horizontal" value on horizontal side of adjacent chart. Mark the total vertical" value on vertical side.

11. Using a straight edge, find the intersection point of the two values. Intersection point must fall within shaded area of chart.

12. If intersection falls outside shaded area on chart, housing concentricity is not within specifications. Remove flywheel housing (paragraph C) and remove dowel rings.

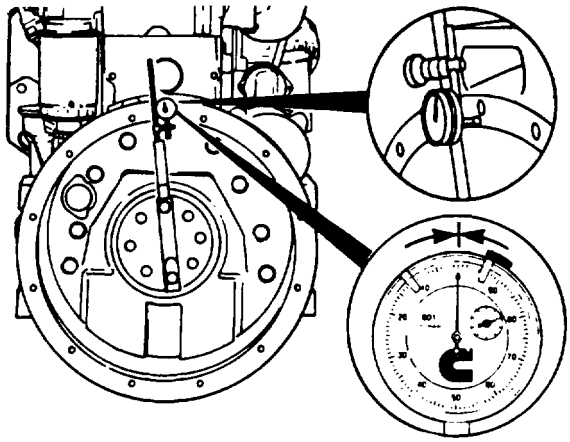
13. After dowel rings are discarded, reinstall flywheel housing. Tighten capscrews enough to hold housing in place, but loose enough to allow small movement when struck lightly with a mallet.

14. Recheck concentricity. Torque capscrews.



B. HOUSING FACE ALIGNMENT CHECK

1. Attach dial indicator to crankshaft as shown in figure. Indicator extension bar must be rigid for accurate readings. If the extension bar sags or the indicator slips, readings will not be accurate.



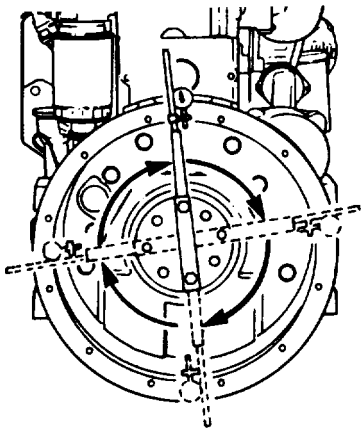
CAUTION

Dial indicator tip must not enter cap screw holes or dial indicator will be damaged.

2. Move dial indicator to 12 o'clock position. Adjust dial until needle points to zero.

NOTE

Each time a position is measured, the crankshaft must be pushed toward front of engine to eliminate crankshaft end clearance.

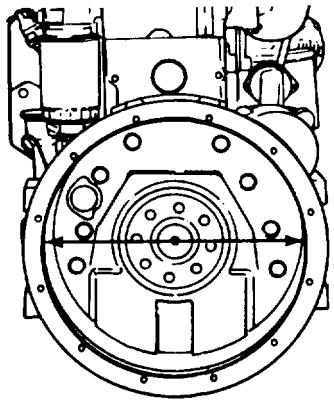


3. Slowly rotate crankshaft. Record dial readings at 3, 6, and 9 o'clock positions.

4. Continue to rotate crankshaft until dial indicator is at 12 o'clock position. Check indicator to ensure needle points to zero.

5. Calculate total indicator reading (TIR) as follows (numbers are for example only):

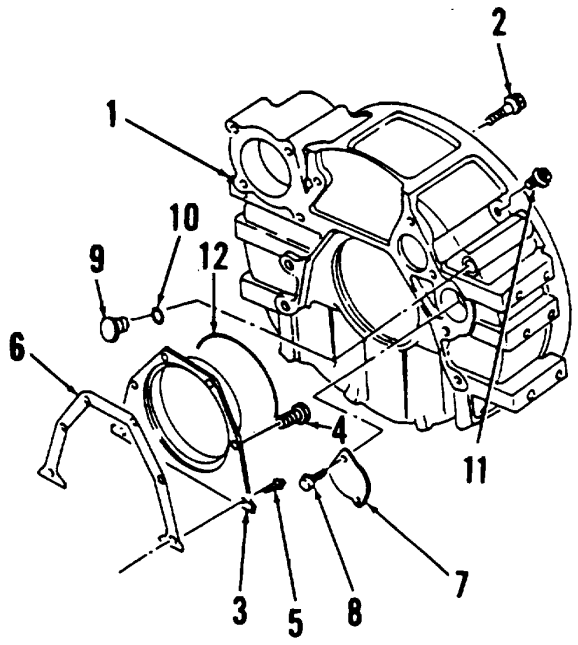
	12 O'Clock Reading -	+ 0.000 IN.
+	3 O'Clock Reading =	+ 0.003 IN.
+	6 O'Clock Reading =	- 0.002 IN.
+	9 O'Clock Reading =	+ 0.003 IN.
	Equals TIR	+ 0.005 IN.



6. TIR reading for face alignment check shall not exceed 0.008 inch. If TIR exceeds 0.008 inch, housing face is out of alignment and housing must be replaced.

C. REMOVAL

1. Remove flywheel housing (1) by removing eight screws (2).
2. Remove rear cover (3) by removing four screws (4) and four screws (5). Screws (5) also secure oil pan.
3. Remove and discard rear cover gasket (5).
4. Remove cover plate (7) by removing screws (8).
5. Remove plug (9) and O-ring (10). Discard O-ring. Remove plug (11).
6. Support the seal area of rear cover (3) and drive seal (12) from rear cover.



D. CLEANING

Clean flywheel housing and related components in accordance with paragraph 1-24.

E. INSPECTION

Inspect flywheel housing and related components in accordance with paragraph 1-24.

F. INSTALLATION

1. Install new rear cover gasket (5).

2. Use installation tool supplied with oil seal replacement kit to align rear cover (3) with crankshaft.

3. Install rear cover (3) using four screws (4) and four screws (5). Screws (5) also secure oil pan. Torque screws to 18 ft-lbs (24 Nm).

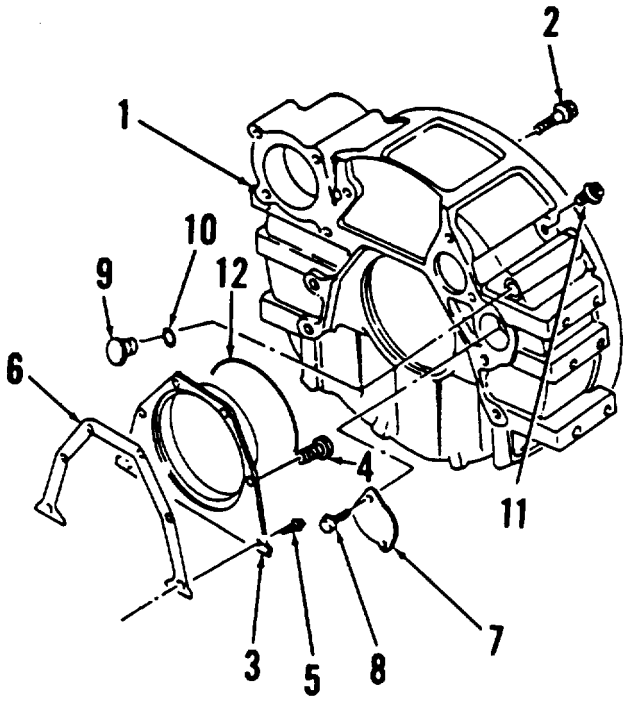
4. Trim gasket (5) even with oil pan mounting surface. Apply sealant to joints between rear cover and oil pan rail.

5. Install plug (9) and new o-ring (10). Seat plug using a soft head hammer.

6. Install plug (11).

7. Install cover plate (7) using screws (8). Install new ring seal (12).

8. Install flywheel housing (1) using eight screws (2). Torque screws to 45 ft-lbs (60 Nm).



FOLLOW-ON MAINTENANCE:

Install flywheel and rear oil seal (para. 3-9)

END OF TASK

3-11. CAM FOLLOWER COVER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Materials / Parts:

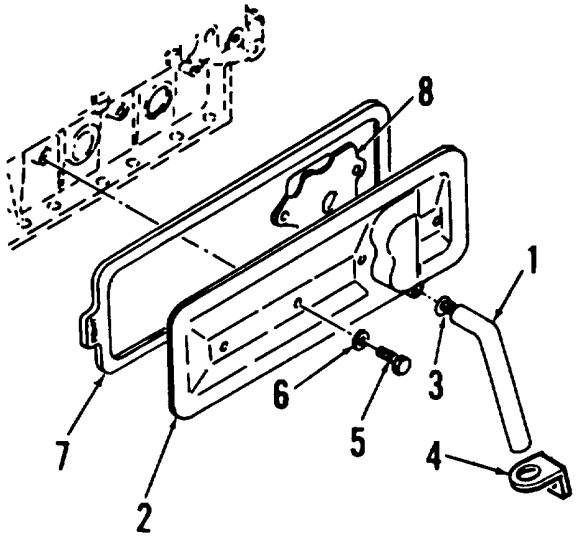
O-Ring Seals, Item 6 (2 ea.)
Cover Gasket, Item 7 (1 ea.)

Equipment Condition:

Fuel filter removed (para. 2-36)
Fuel injection pump removed (para. 3-20)

A. REMOVAL

1. Remove hose (1) from push rod cover (2) by removing hose clamp (3). Remove hose from clip (4).
2. Remove push rod cover (2) by removing screws (5) and O-ring seals (6). Remove and discard cover gasket (7).
3. Remove breather baffle (8).



B. CLEANING

Clean cam follower cover components in accordance with paragraph 1-24.

C. INSPECTION

Inspect cam follower cover components in accordance with paragraph 1-24.

D. INSTALLATION

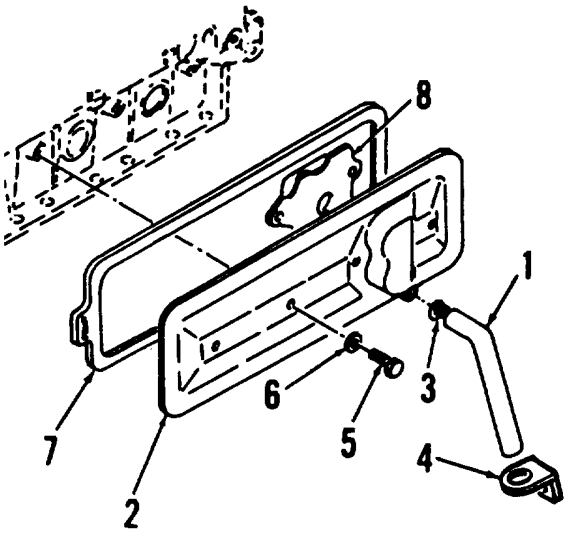
1. Mate breather baffle (8) to rear of push rod cover (2).

NOTE

Gasket (7) must be installed so that tab is toward fan end of engine and the word "'FRONT" is visible from outside of push rod cover.

2. Mate new gasket (7) to rear of cover (2). Install cover using screws (5) and new o-ring seals (6). Torque screws to 18 ft-lbs (24 Nm).

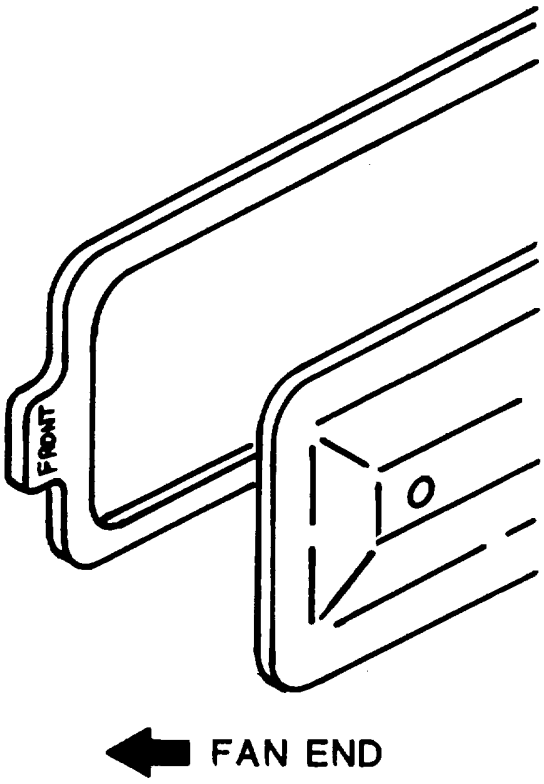
3. Insert hose (1) into clip (4). Secure hose to cover (2) using hose clamp (3).



FOLLOW-ON MAINTENANCE:

Install fuel injection pump (para. 3-20)
Install fuel filter (para. 2-36)

END OF TASK



3-12. ENGINE GEAR COVER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Soft-Head Hammer (23, App. E)

Materials / Parts:

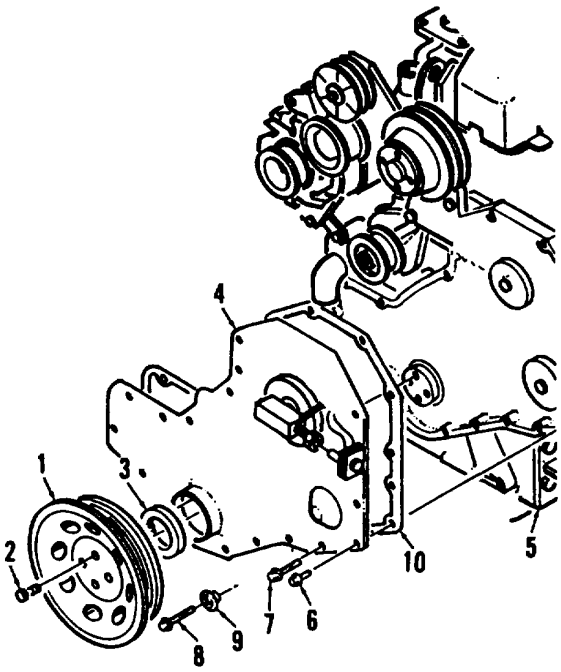
Engine Oil (14, App. C)
Loctite 277 (23, App. C)
Gasket, Item 10 (1 ea.)
Seal Replacement Kit (1 ea.)

Equipment Condition:

Fan blade and fan pulley removed (para. 2-52)
Drive belt removed (para. 2-54)
Accelerator slave cylinder removed (para. 2-43)

A. REMOVAL

1. Disconnect RPM sensor (11).
2. Remove crankshaft pulley (1) by removing screws (2).
3. Remove gear cover (4) from gear housing (5) by removing sixteen screws (6), ten screws (7), screw (8), and belt retainer (9).
4. Support front gear cover (4). Drive seal (3) from back side of gear cover. Use care not to damage O.D. of seal and I.D. of gear cover hole.
5. Remove and discard gasket (10). Ensure all gasket material is removed from gear cover (4) and gear housing (5).



B. CLEANING

Clean pulley and gear cover in accordance with paragraph 1-24.

C. INSPECTION

Inspect gear cover and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Lubricate front gear train with clean engine oil. Wipe oil from seal area of crankshaft.

NOTE

Use installation tool supplied with seal replacement kit to align gear cover with crankshaft.

2. Mate gasket (10) and gear cover (4) to gear housing (5). Use care not to damage crankshaft.

3. Install sixteen screws (6), ten screws (7), screw (8), and belt retainer (9). Torque screws to 18 ft-lbs (24 Nm).

NOTE

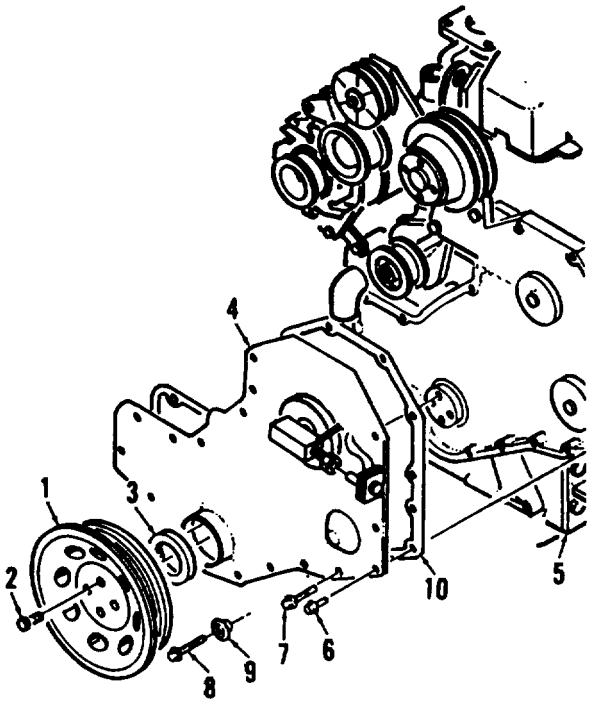
Use installation tool supplied with seal replacement kit to install seal to correct depth.

4. Ensure that seal area of crankshaft is clean and dry. Apply a bead of loctite to O.D. of seal (3) and press seal onto crankshaft.

5. Using installation tool and a soft-head hammer, tap seal (3) into place. Tap seal at alternating spots to ensure even seat.

6. Install crankshaft pulley (1) using screws (2). Torque screws to 92 ft-lbs (125 Nm).

7. Connect RPM sensor (11).



FOLLOW-ON MAINTENANCE:

Install drive belt (para. 2-54)
Install fan blade and pulley (para. 2-52)
Install accelerator slave cylinder (para. 2-43)

END OF TASK

3-13. ROCKER ARM ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Materials / Parts:

Laundry Detergent (33, App. C)
Lubricating Oil (14, App. C) (para. 2-27)
O-Ring Seal, Item 3 (4 ea.)
Cover Gasket, Item 4 (4 ea.)

Equipment Condition:

Injector fuel lines removed

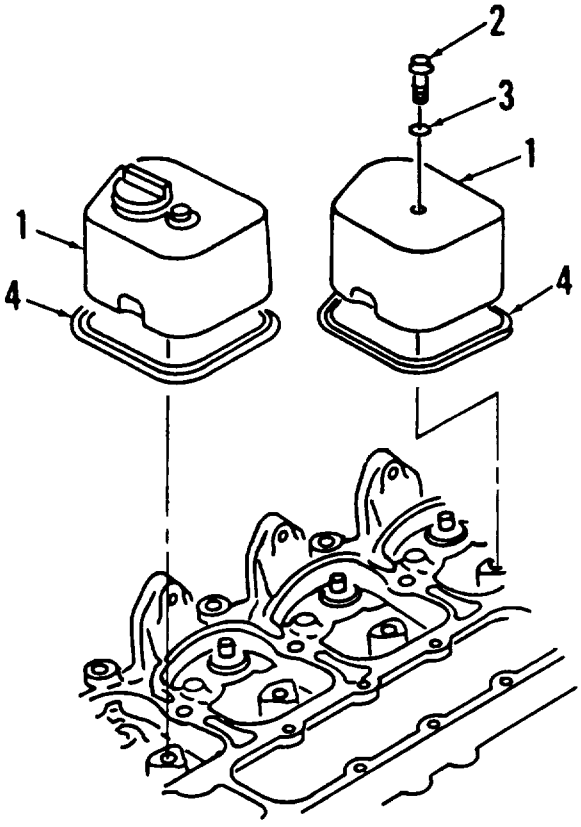
A. REMOVAL

1. Remove valve covers (1) by removing screws (2). Remove and discard O-ring seals (3).

NOTE

Ensure that all gasket material is removed from cylinder head and cover.

2. Remove and discard gaskets (4).



3. Loosen set screw locknut (6). Loosen set screw (5) until it stops.

4. Remove screws (7, 8). Lift rocker arm assembly (9) out of cylinder head.

5. Remove push rods (10) only if replacement is required.

B. CLEANING

1. Clean components in strong solution of laundry detergent and hot water.

2. Rinse components in hot water and air dry.

C. INSPECTION

Inspect components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install push rods (10) into valve tappet sockets. Lubricate push rod sockets with oil.

CAUTION

Ensure rocker lever set screws (5) are completely backed out before installing rocker arm assemblies.

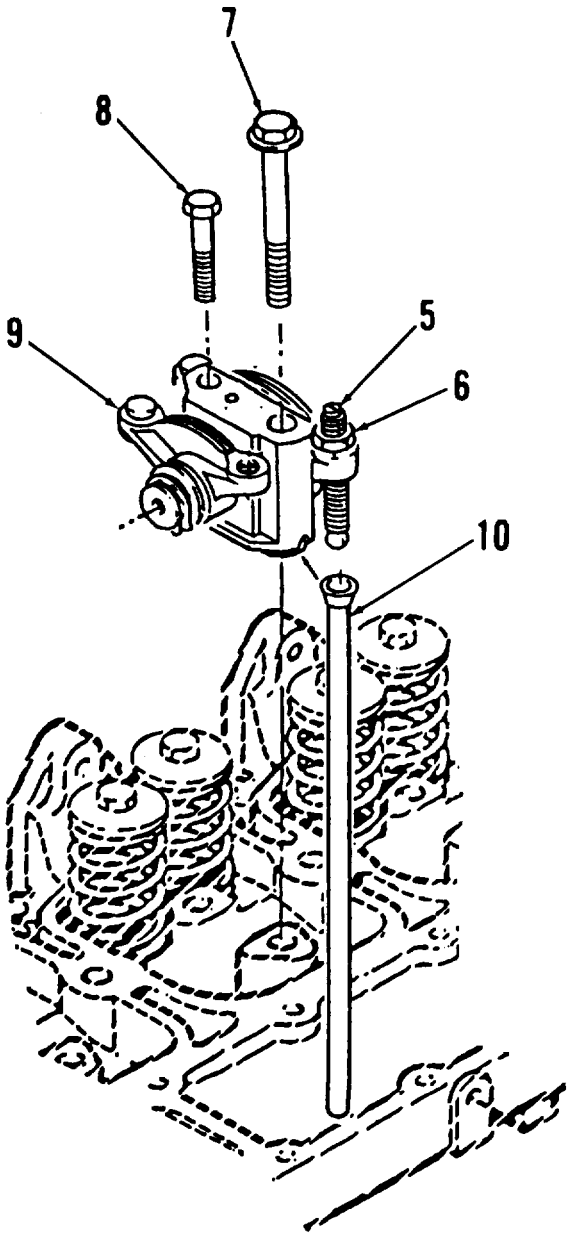
2. Install rocker arm assembly (9) into cylinder head. Ensure dowel ring in rocker support mates with dowel bore.

3. Lubricate threads and under heads of screws (7, 8). Install screws.

4. Torque four cylinder head screws (7) in three stages as follows:

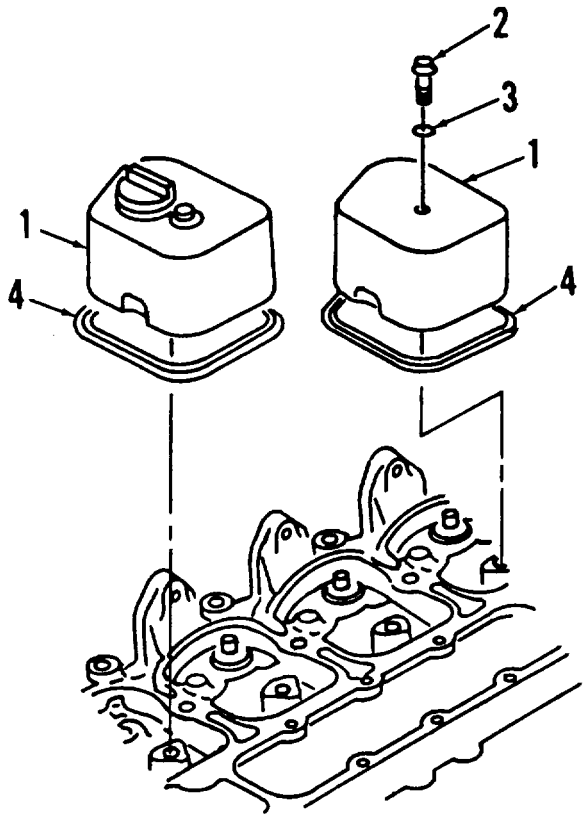
   a. Stage 1 = 66 ft-lbs (90 Nm).
   b. Stage 2 = 89 ft-lbs (120 Nm).
   c. Stage 3 = tighten screws an additional 1/4 turn.

5. Torque four screws (8) to 18 ft-lbs (24 Nm).



6. Mate valve covers (1) to new valve cover gaskets (4).

7. Secure valve covers (1) using screws (2) and new O-ring seals (3). Torque screws to 18 ft-lbs (24 Nm).



FOLLOW-ON MAINTENANCE:

Install injector fuel lines (para. 2-27)
Adjust cylinder head assembly (para. 2-15)

END OF TASK

3-14. ROCKER ARM ASSEMBLY REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Caliper, Inside (12, App. E)
Caliper Set (13, App. E)
Retaining Ring Pliers (24, App. E)

Equipment Condition:

Rocker arm assembly removed (para. 3-13)

Materials / Parts:

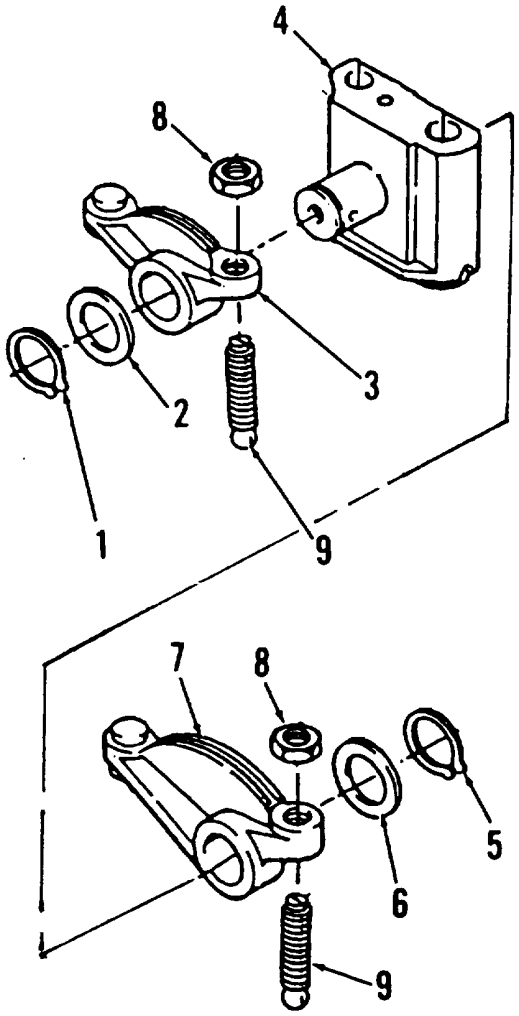
Laundry Detergent (33, App. C)
Lubricating Oil (14, App. C)

A. DISASSEMBLY

1. Remove retaining ring (1) and washer (2). Slide rocker lever (3) off lever support (4).
2. Remove retaining ring (5) and washer (6). Slide rocker lever (7) off lever support (4).
3. Remove nuts (8) and set screws (9) from rocker levers (3, 7).

NOTE

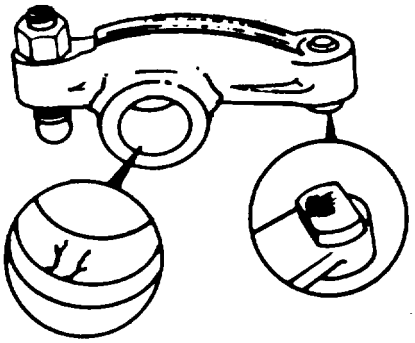
Do not disassemble rocker lever support (4). Support and shaft must be replaced as an assembly.



B. CLEANING

1. Clean components in strong solution of laundry detergent and hot water.

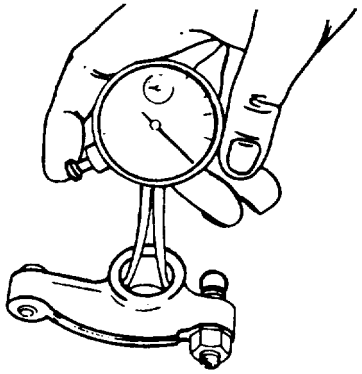
2. Rinse components in hot water and air dry.



C. INSPECTION

1. Inspect for cracks and excessive wear in rocker lever bores. Inspect lever contact surface for excessive wear.

2. Using internal caliper, measure rocker lever bore. Maximum diameter shall be 0.75 in. (19.05 mm). Replace lever if out of limits.

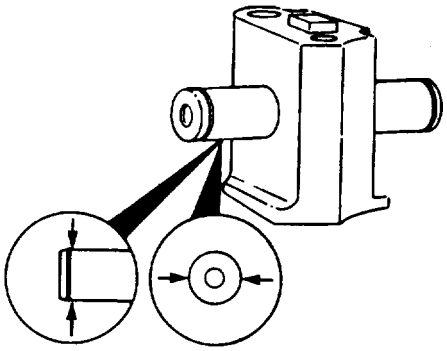


3. Inspect lever support and shaft for damage.

4. Using external caliper, measure support shaft diameter. Minimum diameter shall be 0.746 in. (18.94 mm). Replace lever support assembly if shaft is out of limits.

D. REPAIR

Repair of the rocker arm assembly consists of removal and replacement of defective, deformed, or damaged components.



E. ASSEMBLY

1. Install nuts (8) and set screws (9) into rocker levers (3, 7).

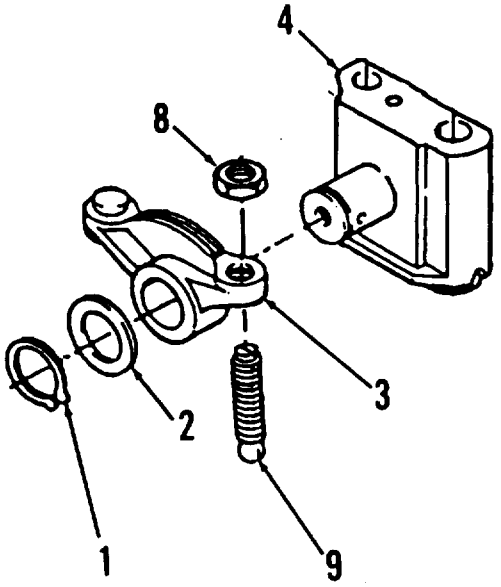
NOTE

Ensure intake and exhaust levers are installed in correct positions. Refer to figure.

2. Lubricate shaft of lever support (4) with engine oil.

3. Slide rocker lever (7) onto lever support (4). Install washer (6) and retaining ring (5).

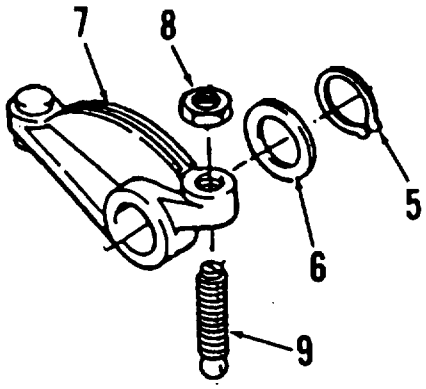
4. Slide rocker lever (3) onto lever support (4). Install washer (2) and retaining ring (1).

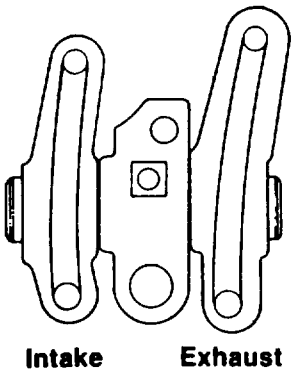


FOLLOW-ON MAINTENANCE:

Install rocker arm assembly (para. 3-13)

END OF TASK





3-15. PUSH ROD REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Materials / Parts:

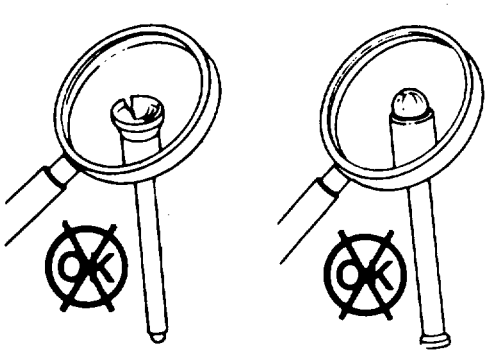
Laundry Detergent (33, App. C)

Equipment Condition:

Rocker arm assembly and push rod removed (para. 3-13)

A. CLEANING

1. Clean push rod in strong solution of laundry detergent and hot water.
2. Rinse push rod in hot water and allow to air dry.



B. INSPECTION

1. Inspect push rod ball and socket for signs of scoring. Inspect for cracks where ball and socket are pressed into tube.
2. Inspect push rod for roundness and straightness.

FOLLOW-ON MAINTENANCE:

Install push rod and rocker arm assembly (para. 3-13)

END OF TASK

3-16. OIL PAN REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (I, App. E)
Torque Wrench (32, App. E)

Equipment Condition:

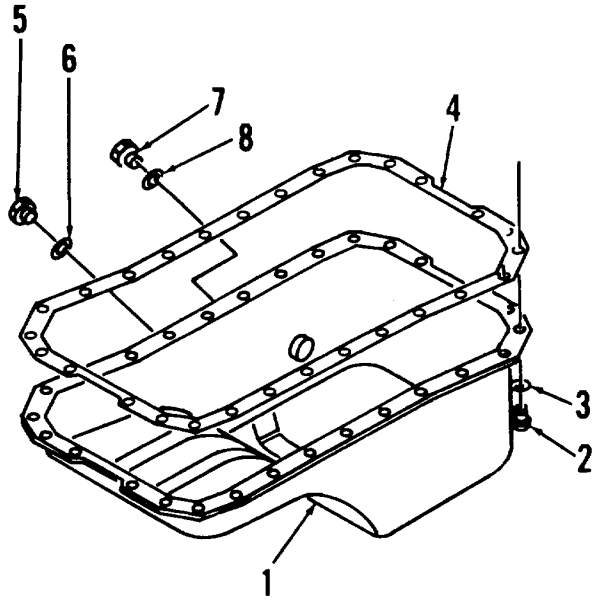
Engine removed (para. 3-6)

Materials / Parts:

Sealant (29, App. C)
Gasket, Item 4 (1 ea.)
Sealing Washer, Item 6 (1 ea.)
Sealing Washer, Item 8 (1 ea.)

A. REMOVAL

1. Remove oil pan (1) from engine block by removing 28 screws (2) and washers (3).
2. Remove and discard oil pan gasket (4). Ensure that all gasket material is removed from oil pan and engine block mating surfaces.
3. Remove plugs (5, 7) and sealing washers (6, 8) from oil pan (1). Discard sealing washers.



C. CLEANING

Clean oil pan components in accordance with paragraph 1-24.

D. INSPECTION

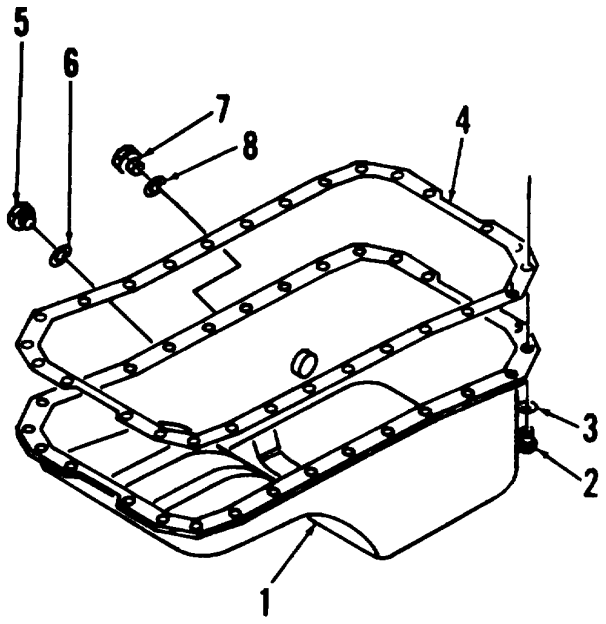
Inspect oil pan and related components in accordance with paragraph 1-24.

E. INSTALLATION

1. Apply sealant to both sides of gasket (4). Mate gasket to oil pan (1). Ensure proper alignment of mounting holes.

2. Install oil pan (1) and gasket (4) onto base of engine block using 28 screws (2) and washers (3).

3. Install plugs (5, 7) and new sealing washers (6, 8) into oil pan (1). Torque plugs to 60 ft-lbs (80 Nm).



FOLLOW-ON MAINTENANCE:

Install engine assembly (para. 3-6)

END OF TASK

3-17. OIL PUMP SUCTION CONNECTION REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Materials / Parts:

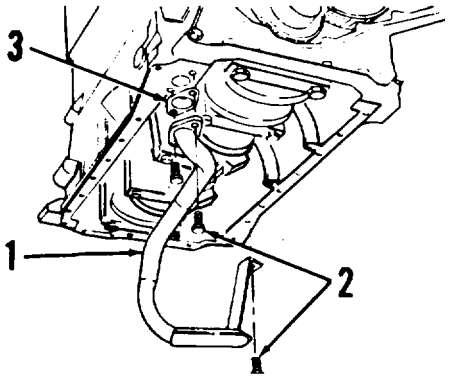
Gasket, Item 3 (1 ea.)

Equipment Condition:

Oil pan removed (para. 3-16)

A. REMOVAL

Remove oil suction connection (1) by removing three screws (2). Remove and discard gasket (3).



B. CLEANING

Clean oil suction connection in accordance with paragraph 1-24.

C. INSPECTION

Inspect oil suction connection and related components in accordance with paragraph 1-24.

D. INSTALLATION

Install oil suction connection (1) and new gasket (3) using three screws (2).

FOLLOW-ON MAINTENANCE:

Install oil pan (para. 3-16)

END OF TASK

3-18. ENGINE OIL PUMP REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Equipment Condition:

Gear cover removed (para. 3-12)

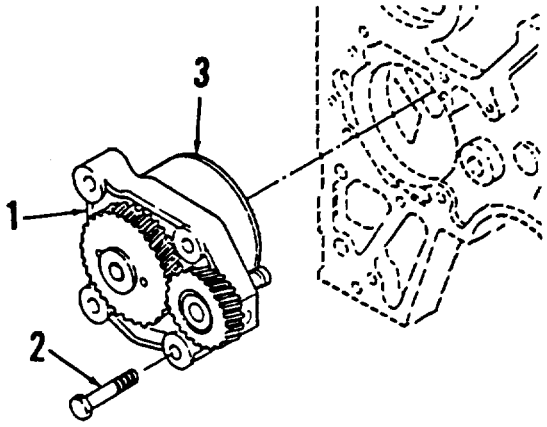
Materials / Parts:

Lubricating Oil (14, App. C)

A. REMOVAL

1. Remove engine oil pump (1) by removing bolts (2). Remove back plate (3).

2. Mark "TOP" on geroter planetary (4). Remove planetary from pump housing (5).



B. CLEANING

Clean engine oil pump in accordance with paragraph 1-24.

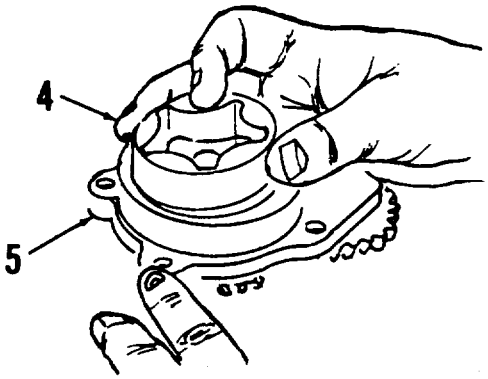
C. INSPECTION

1. Conduct general inspection of engine oil pump and related components in accordance with paragraph 1-24.

2. Inspect geroter planetary and pump housing for excessive wear or obvious damage.

D. INSTALLATION

1. Install geroter planetary (4) onto pump housing (5). Ensure that "TCP" mark faces up.



2. Measure clearance between geroter planetary and body bore (dimension A). Maximum clearance shall be 0.015 in. (0.0381 mm).

3. Measure planetary drive tip clearance (dimension B). Maximum clearance shall be 0.007 in. (0.1778 mm).

4. Measure clearance between geroter planetary (4), pump housing (5), and geroter drive (6). Maximum clearance shall be 0.005 in. (0.127 mm).

5. Measure gear backlash (dimension C). Backlash shall be 0.003 TO 0.013 in. (0.05 TO 0.33 mm).

6. Replace engine oil pump if the fit and clearance limits in steps 2 through 5 are not met.

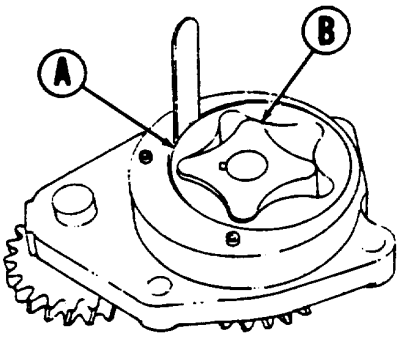
7. Install back plate (3) onto oil pump (1). Fill oil pump with clean engine oil.

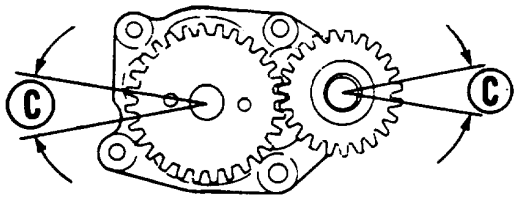
8. Mate oil pump (1) to cylinder block, ensuring that idler gear pin is installed into locating bore in cylinder block.

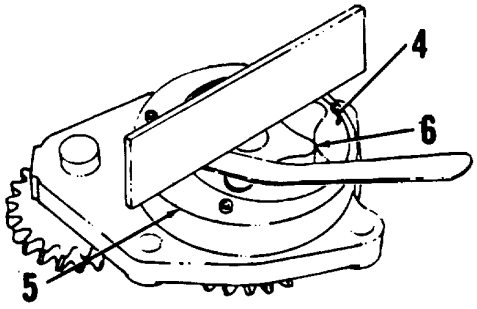
9. Secure oil pump (1) to cylinder block using screws (2). Torque screws to 18 ft-lbs (24 Nm) following the sequence shown in figure.

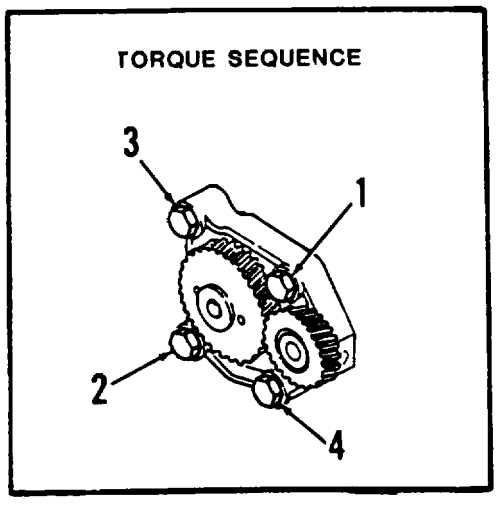
NOTE

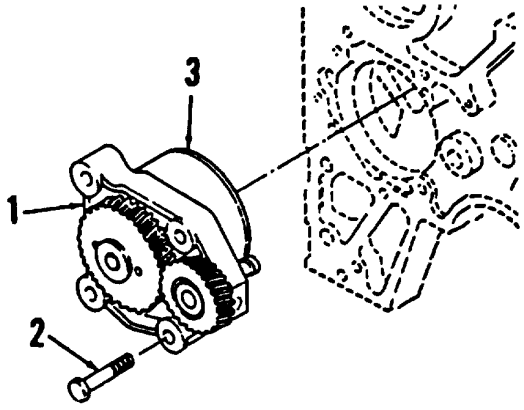
Pump back plate (3) seats against bottom of bore in cylinder block. When pump is correctly installed. the flange on pump will not touch cylinder block.



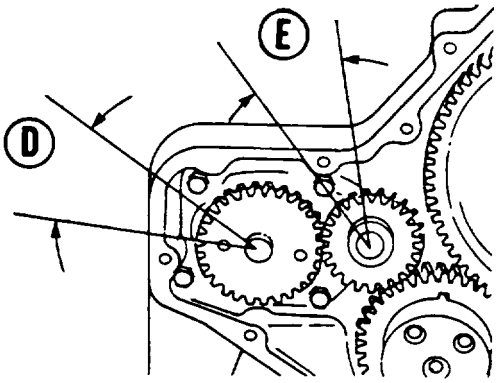








10. If installing a new oil pump, measure gear backlash (dimensions D AND E). Backlash limits for D and E shall be 0.003 TO 0.013 in. (0.08 TO 0.33 mm).



FOLLOW-ON MAINTENANCE:

Install gear cover (para. 3-12)

END OF TASK

Section IV. FUEL SYSTEM MAINTENANCE

3-19. FUEL INJECTOR REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

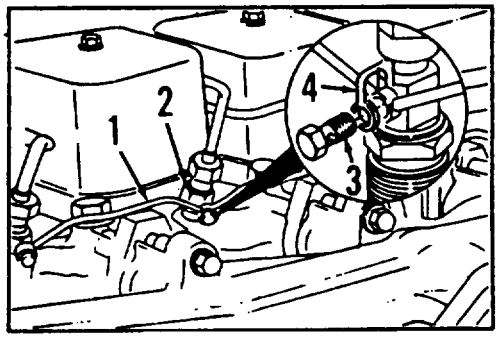
Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Materials / Parts:
Anti-Seize Compound (9, App, C)
Lubricating Oil (14, App. C)
Banjo Connector Seal, Item 4 (4 ea.)
Copper Washer, Item 7 (4 ea.)

Equipment Condition:
High pressure fuel lines removed (para. 2-27)

A. RFMOVAL

1. Remove drain line (1) from fuel injectors (2) by removing banjo connector screws (3) and banjo connector seals (4).



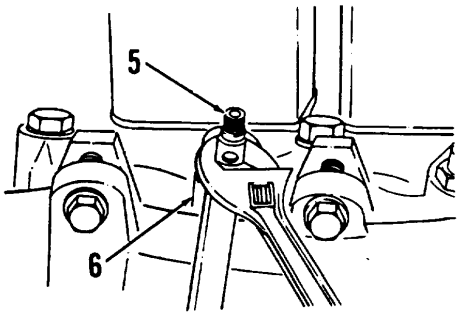
CAUTION

Fuel injector must not rotate in cylinder head bore. Rotation will damage cylinder head.

2. Place wrench on flats at top of fuel injector body (5) to hold body in place.

3. Loosen hold-down nut (6) using second wrench.

4. Carefully remove fuel injector from cylinder head bore.



B. CLEANING

Clean fuel injector in accordance with paragraph 1-24.

C. INSPECTION

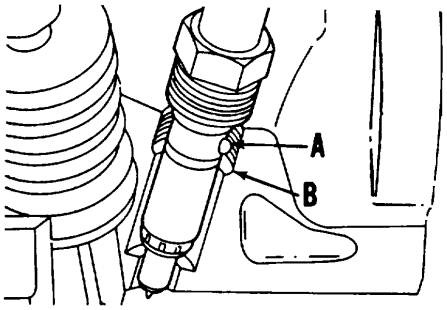
Inspect fuel injector in accordance with paragraph 1-24.

D. INSTALLATION

1. Remove and discard old copper washer (7). Apply a light coat of oil to new washer and install onto fuel injector.

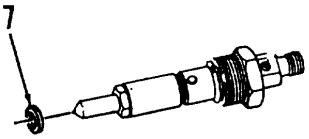
2. Apply anti-seize compound to threads of hold-down nut (6).

3. Install fuel injector into cylinder head bore. Ensure protrusion on side of nozzle (A) fits into notch in cylinder head (B).



4. Place 18 mm wrench on flats at top of fuel injector body (5) to hold body in place. Torque hold-down nut (6) to 44 ft-lbs (60 N•m).

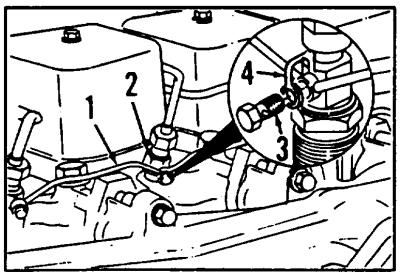
5. Install fuel drain line (1) to four fuel injectors (2) using banjo connector screws (3) and banjo connector seals (4). Torque screws to 11 ft-lbs (15 N•m).



FOLLOW-ON MAINTENANCE:

Install high pressure fuel lines (para. 2-27)

END OF TASK



3-20. FUEL INJECTOR PUMP REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Puller Kit (26, App. E)
Torque Wrench (32, App. E)
Drain Pan (10, App. E)

Materials / Parts:
Gasket, Item 12 (1 ea.)
Seal, Item 15 (1 ea.)
Gasket, Item 25 (1 ea.)

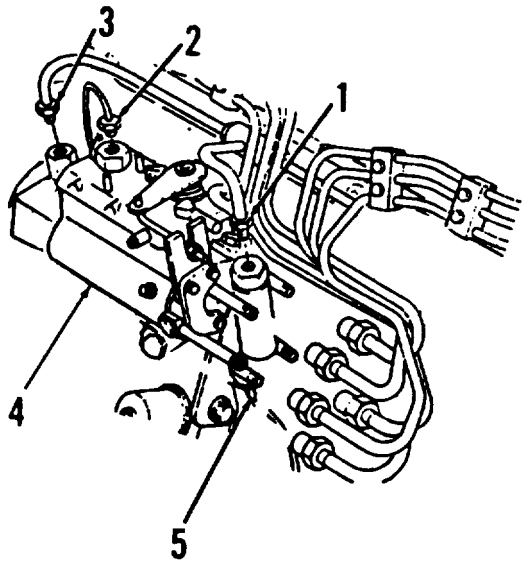
Equipment Condition:
High pressure fuel lines removed (para. 2-27)
Accelerator slave cylinder removed (para. 2-43)
Fan guard removed (para. 2-53)

A. REMOVAL

NOTE
Place drain pan beneath fuel lines during removal to catch residual fuel.

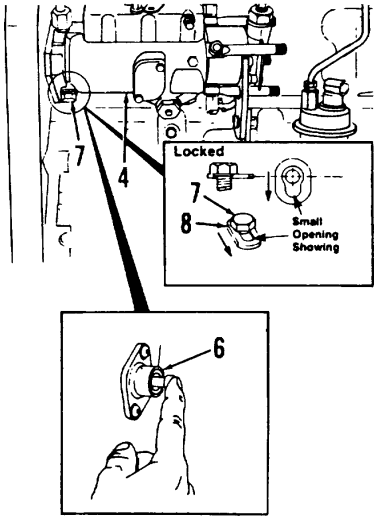
1. Disconnect fuel supply line (1), drain line (2), and supply line (3) from fuel injector pump (4).

2. Disconnect electrical lead from fuel pump solenoid (5).



3. Locate top dead center (TDC) for cylinder number 1 as follows:

   a. Press in engine timing pin (6) (located below fuel injection pump).
   b. Install wrench onto crankshaft pulley nut.
   c. Manually rotate crankshaft until timing pin (6) engages hole in camshaft gear. Cylinder 1 is now at Top Dead Center (TDC) on compression stroke.
   d. Disengage timing pin (6).

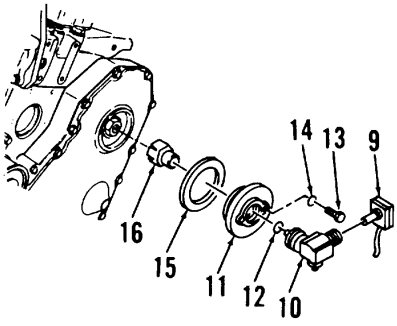


4. Loosen lockscrew (7). Position special washer (8) as shown in figure. Torque lockscrew to 6 ft-lbs (8 N•m).

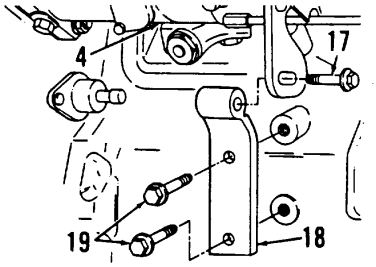
5. Remove DCA RPM sender (9) from mechanical tachometer drive (10).

6. Remove mechanical tachometer drive (10) from drive adapter (11). Remove and discard gasket (12).

7. Remove drive adapter (11) from front cover by removing screws (13) and washers (14). Remove and discard seal (15). Remove hub (16).



8. Remove screw (17) to release fuel pump (4) from pump brace (18). Remove pump brace from engine block by removing screws (19).

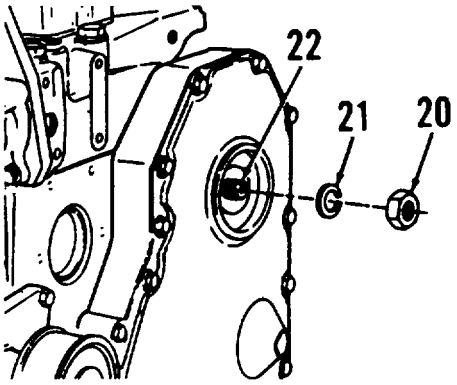


9. While holding crankshaft to prevent fuel injection pump from turning, remove nut (20) and washer (21) from fuel pump shaft (22).

10. Using puller kit, push pump shaft (22) from fuel pump drive gear.

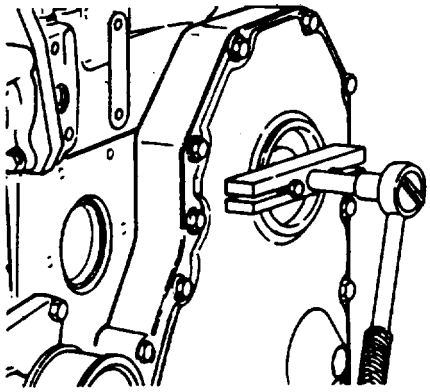
11. Remove fuel pump (4) by removing .three nuts (23). Remove studs (24) only if replacement is required.

12. Remove and discard gasket (25). Ensure that all gasket material is removed from mounting surface.



B. CLEANING

Clean fuel pump and related components in accordance with paragraph 1-24.



C. INSPECTION

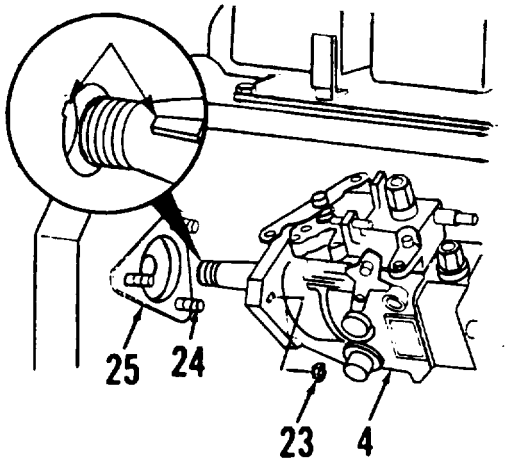
Inspect fuel pump and related components in accordance with paragraph 1-24.

D. INSTALLATION

1. Locate top dead center (TDC) for cylinder number 1 in accordance with step A-3.

2. Install new gasket (25).

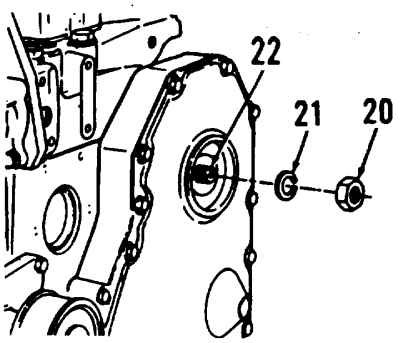
3. Install fuel pump (4) onto studs (24) and finger tighten three nuts (23). Pump must be free to move in mounting slots.



NOTE

Fuel pump may rotate slightly during shaft nut installation. Slight rotation is acceptable as long as pump is free to move on flange slots and crankshaft does not move.

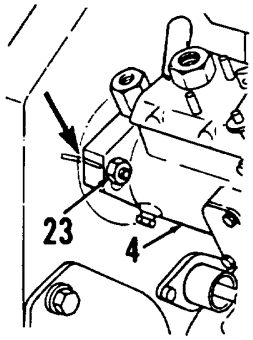
4. Install nut (20) and washer (21) onto fuel pump shaft (22). Torque nut to 11-15 ft-lbs (15-20 N•m).

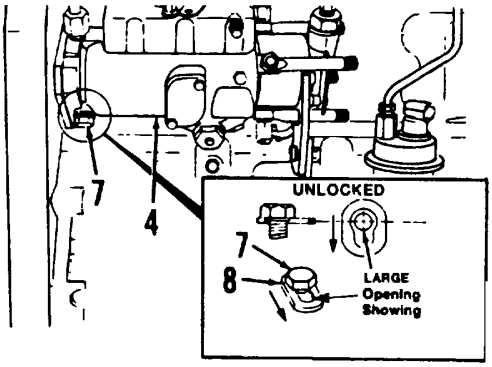


5. Align fuel pump (4) as follows:

   a. If reinstalling original fuel pump (4), rotate pump to align scribe marks.
   b. If installing a new or rebuilt fuel pump (4) without scribe marks, take up gear lash by rotating pump against direction of drive rotation. Mark pump flange to match mark on gear housing.

6. Torque nuts (23) to 18 ft-lbs (24 N•m).
7. Loosen lockscrew (7). Position special washer (8) behind lockscrew head as shown in figure. Torque lockscrew to 15 ft-lbs (20 N•m).
8. Disengage timing pin.





9. Install pump brace (18) onto engine block using screws (19). Install screw (17) to secure fuel pump (4) to pump brace.

10. Torque screws (19) to 18 ft-lbs (24 N•m). Torque screw (17) to 18 ft-lbs (24 N•m).

11. Torque fuel pump shaft nut to 48 ft-lbs (65 N•m).

12. Install hub (16) onto fuel pump shaft. Install new seal (15) and drive adapter (11) onto front cover using screws (13) and washers (14).

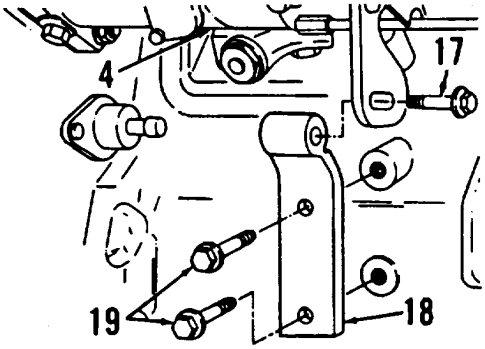
13. Install mechanical tachometer drive (10) and new gasket (12) onto drive adapter (11).

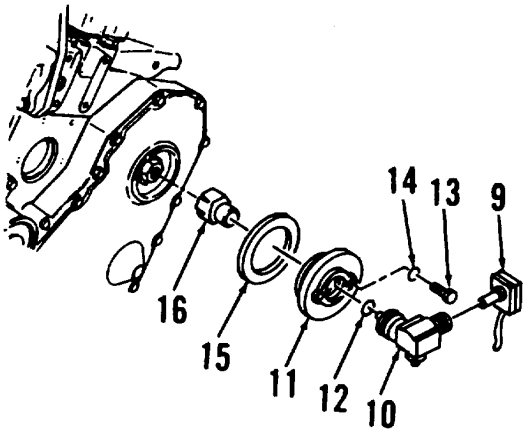
14. Connect DCA RPM sender (9) to mechanical tachometer drive (10).

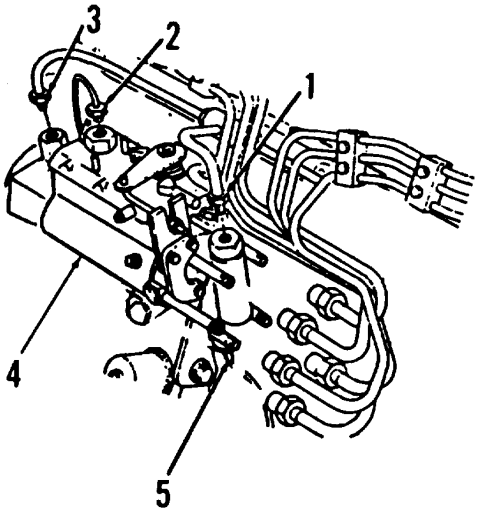
15. Connect electrical lead to fuel pump solenoid (5).

16. Connect fuel supply lines (1, 3). Torque supply line nuts to 24 ft-lbs (32 N•m).

17. Connect fuel drain line (2). Torque drain line nut to 18 ft-lbs (24 N•m).







FOLLOW-ON MAINTENANCE:

Install high pressure fuel lines (para. 2-27)Install accelerator slave cylinder (para. 2-43)
Install fan guard (para. 2-53)

END OF TASK

3-21. FUEL INJECTOR PUMP REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:
- General Mechanics Tool Kit (1, App. E)
- Torque Wrench (32, App. E)
- Torque Wrench (33, App. E)
- Drain Pan (10, App. E)

Materials / Parts:
- Lubricating Oil (14, App. C)
- Grease (10, App. C)
- Lockwire, App. C)
- Gasket, Item 4 (1 ea.)
- Sealing Ring, Item 25 (1 ea.)
- Washer, Item 27 (1 ea.)
- Sealing Ring, Item 30 (1 ea.)
- Sealing Ring, Item 38 (1 ea.)

Equipment Condition:
- Fuel injector pump removed (para. 3-20)

A. DISASSEMBLY

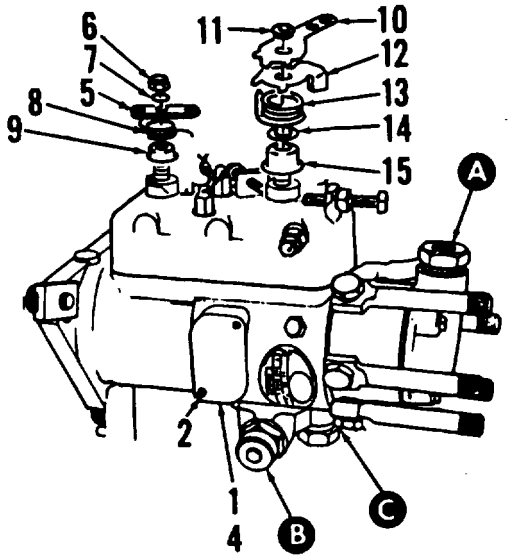
1. Place fuel pump on its side, cover plate (1) facing up. Remove lockwire from screws and discard.

2. Remove cover plate (1) by removing screws (2) and washers (3). Remove and discard gasket (4).

3. Drain pump oil into pan.

4. Remove mechanical shutdown lever (5) by removing nut (6) and washer (7). Remove spring (8) and guide (9).

5. Remove control lever (10) by removing nut (11). Remove lever stop (12), spring (13) washer (14), and guide (15).



6. Unscrew fuel connection (16) from end plate (21). Remove washer (17).

NOTE

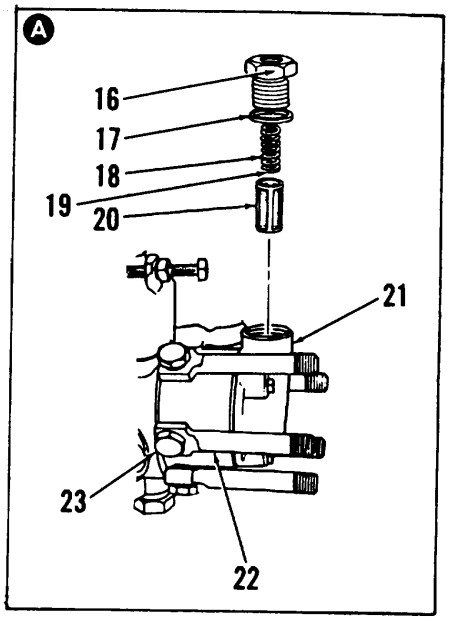
Do not disassemble pressure adjuster (19). Pressure adjuster must be replaced as an assembly.

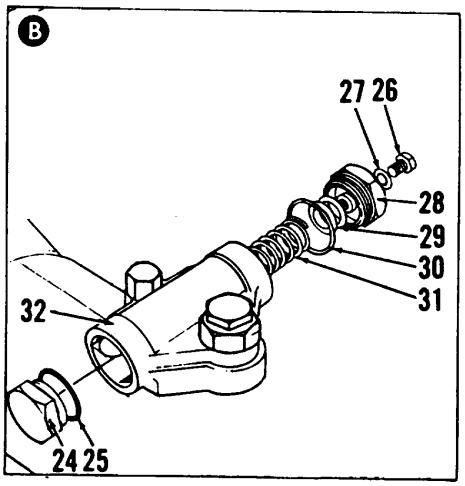
7. Remove spring (18) and pressure adjuster (19) from connection (16). Remove filter (20).

NOTE

Banjo connections should be reinstalled in original locations. Note position, type of connection, and letter identifier before removing.

8. Remove banjo connections (22) and pressure valves (23).
9. Remove screw (26) and washer (27) from spring cap (28). Discard washer.
10. Slowly unscrew spring cap (28) and remove shims (29) and spring (31). Remove and discard sealing ring (30).
11. Unscrew piston plug (24) from auto-advance housing (32). Remove and discard sealing ring (25).

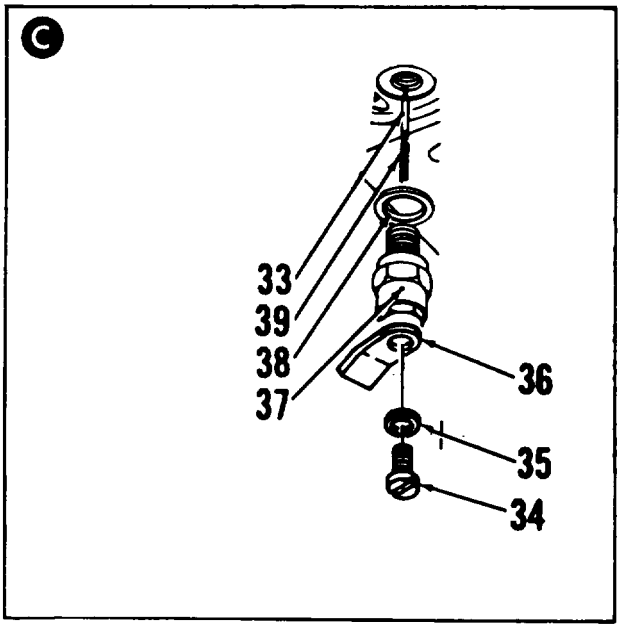




12. Remove screw (34), washer (35), and blade (36).

13. Unscrew solenoid (37) from pump head. Remove and discard sealing ring (38).

14. Remove spring (39) and plunger (33) from pump head.



B. CLEANING

Clean fuel injector pump and components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect components in accordance with paragraph 1-24.

2. Check for distorted or fractured springs.

D. REPAIR

Repair of the fuel injector pump at intermediate maintenance level consists of removal and replacement of defective, deformed, or damaged components covered in this task.

E. ASSEMBLY

NOTE

Lubricate internal seals with clean oil before installing. Lightly coat external seals with grease.

1. Install spring (39) and plunger (33) into pump head.

2. Install new sealing ring (38) onto solenoid (37). Install solenoid into pump head. Torque solenoid to 11 ft-lbs (14.7 N•m)

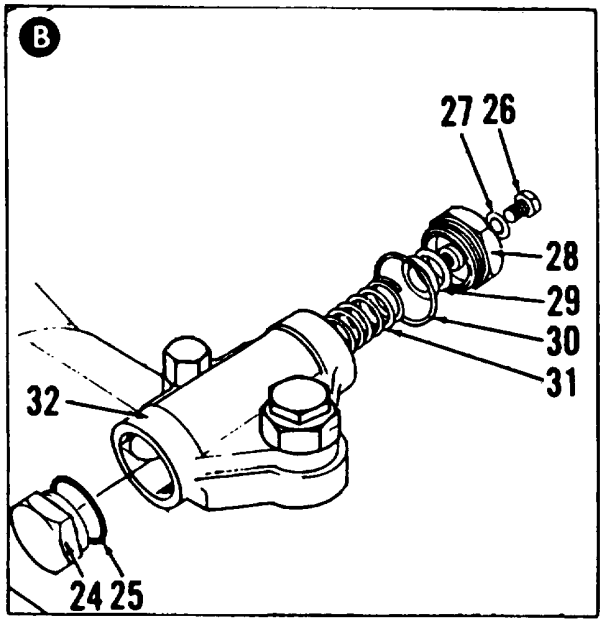
3. Install screw (34), washer (35), and blade (36).

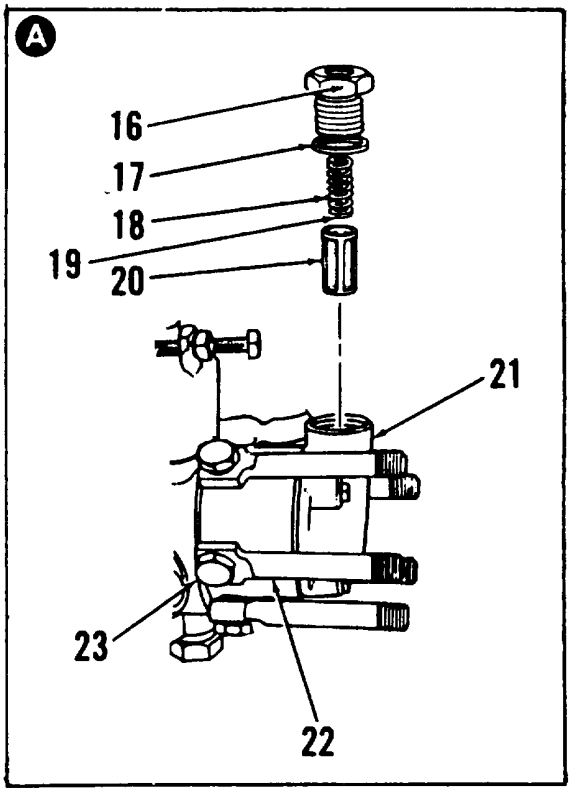
4. Install spring (31) into advance head (32).
5. Install new sealing ring (30) onto spring cap (28). Install spring cap and shims (29). Torque spring cap to 17.5 ft-lbs (28.4 N•m).
6. Install screw (26) and new washer (27) into spring cap (28).
7. Install new sealing ring (25) onto piston plug (24). Install piston plug and torque to 17.5 ft-lbs (28.4 N•m).

NOTE

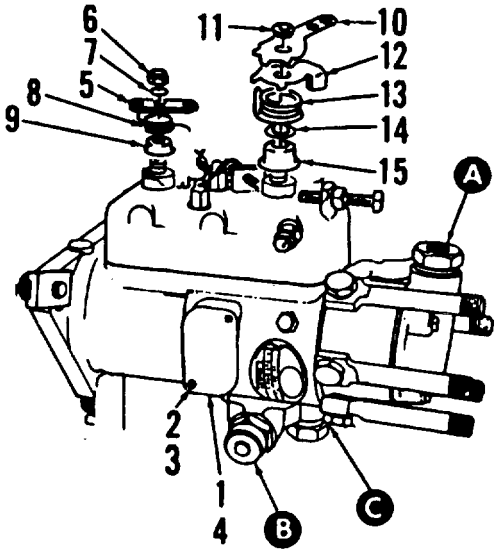
Banjo connections should be reinstalled in original locations.

8. Install banjo connections (22) and pressure valves (23). Torque pressure valves to 23 ft-lbs (27.1 N•m).
9. Install filter (20) into end plate (21).
10. Install spring (18) and pressure adjuster (19) into fuel connection (16).
11. fuel connection (16) and washer (17) into end plate (21). Torque fuel connection to 38 ft-lbs (47.6 N•m).





12. Install guide (15), washer (14), spring (13), and lever stop (12). Install control lever (10) using nut (11).
13. Install guide (9) and spring (8) with spring loop around boss on governor cover. Hook opposite end of spring around mechanical shutdown lever (5).
14. Rotate mechanical shutdown lever (5) clockwise until lever engages onto shaft.
15. Install nut (6) and washer (7). Torque nut to 30 in-lbs (3.4 N•m).
16. Mate new gasket (4) to cover plate (1). Install cover plate (1) using screws (2) and washers (3). Install lockwire between screws.



FOLLOW-ON MAINTENANCE:

Install fuel injector pump (para. 3-20)

END OF TASK

3-22. FUEL TANK REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

Equipment Condition:
Left rear fender removed (para. 2-134)

Personnel Required:
2 Personnel

References:
LO 10-3930-664-12

A. REMOVAL

WARNING

Fuel is very flammable and can easily explode. To avoid serious injury or death, observe the following precautions:

- Keep away from open flame or any spark (ignition source).

- Keep at least a B-C fire extinguisher within easy reach when working with fuel or on the fuel system.

- Do not work on fuel system when engine is hot.

- Post signs that read "NO SMOKING WITHIN 50 FEET" when working with open fuel, fuel lines, or fuel tank.

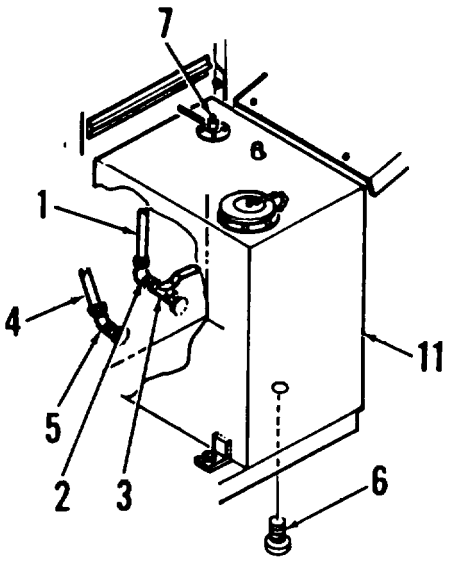
1. REMOVE DRAIN PLUG (6) AND DRAIN FUEL TANK. DISCONNECT HOSES (1, 4).

   a. Place shutoff ball valve (3) handle in closed position.

NOTE

Fuel tank capacity is 27 gallons. It will be necessary to drain tank in portions.

   b. Remove drain plug (6) and allow fuel tank to drain into pan. Install drain plug when tank is empty.
   c. Tag and disconnect supply hose assembly (1) from elbow (2) and allow fuel to drain into pan.
   d. Tag and disconnect return hose assembly (4) from elbow (5) and allow fuel to drain into pan.

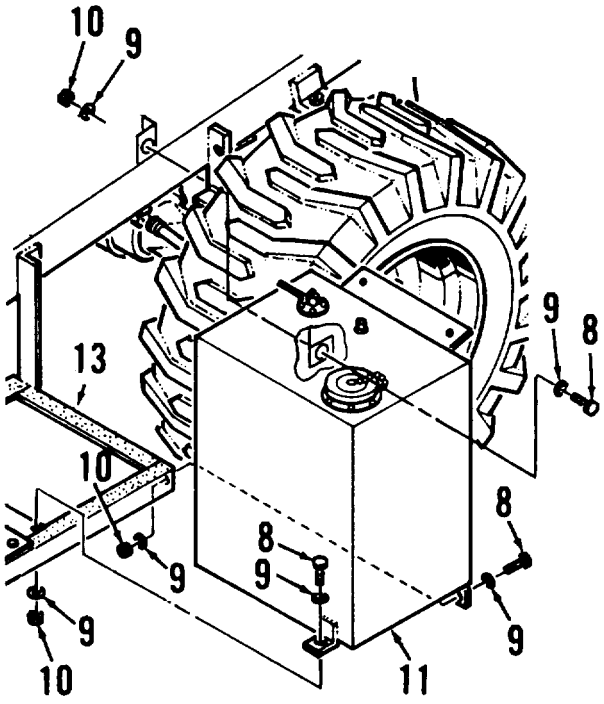


2. TAG AND DISCONNECT ELECTRICAL WIRING FROM FUEL LEVEL SENDER (7).
3. REMOVE FUEL TANK (11) FROM CHASSIS.

WARNING

Fuel tank is heavy and awkward. Enlist the help of an assistant during removal to prevent injury to personnel and damage to components.

   a. Remove three screws (8), six washers (9), and three lock nuts (10).
   b. Carefully lift fuel tank (11) from chassis and place on clean work surface.



B. CLEANING

Clean fuel tank and related components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect fuel tank and related components in accordance with paragraph 1-24.

2. Inspect three neoprene rubber pads (13) for damage, deterioration, or permanent set. Replace pads as required.

D. INSTALLATION

1. INSTALL FUEL TANK (11) ONTO CHASSIS.

WARNING

Fuel tank is heavy and awkward. Enlist the help of an assistant during installation to prevent injury to personnel and damage to components.

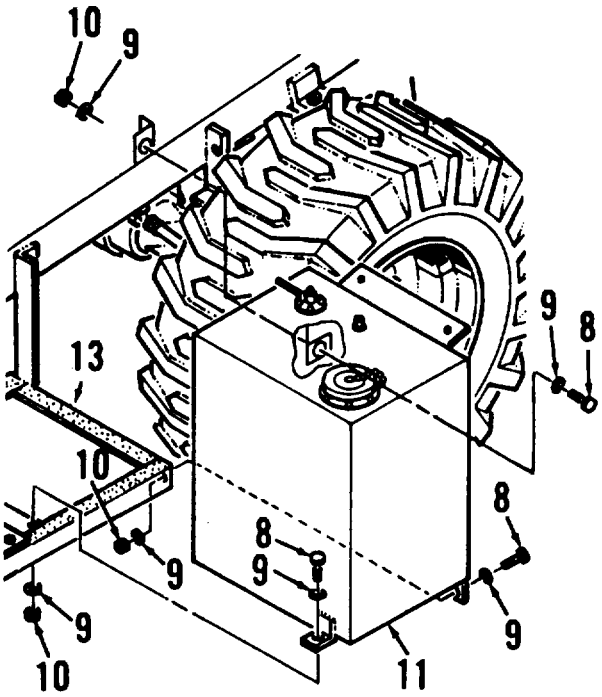
   a. Ensure drain plug is installed and secure in bottom of fuel tank (11).
   b. Carefully place fuel tank (11) onto three rubber pads (13).
   c. Secure fuel tank (11) using three screws (8), six washers (9), and three lock nuts (10).

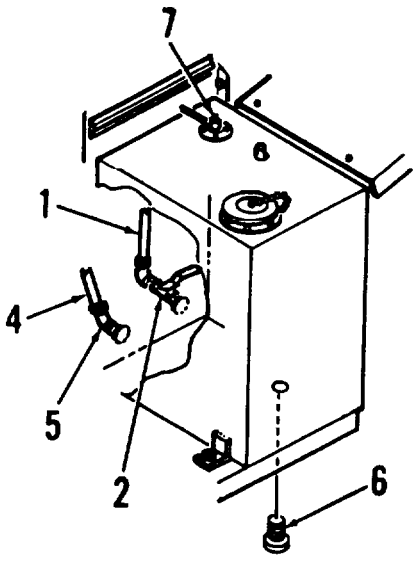
2. CONNECT ELECTRICAL WIRING TO FUEL LEVEL SENDER (7).
3. CONNECT RETURN HOSE ASSEMBLY (4) TO ELBOW (5).
4. CONNECT SUPPLY HOSE ASSEMBLY (1) TO ELBOW (2).
5. SERVICE FUEL TANK WITH APPROVED FUEL. CHECK FOR LEAKS AND TIGHTEN CONNECTIONS AS REQUIRED.

FOLLOW-ON MAINTENANCE:

Install left rear fender (para. 2-134)

END OF TASK





3-23. FUEL TANK REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)

Materials / Parts:
Teflon Tape (35, App. C)
Loctite 242 (20, App. C)
Gasket, Item 4 (2 ea.)
Gasket, Item 10 (1 ea.)

Reference:
TC 9-510

Equipment Condition:
Fuel tank removed (para. 3-22)

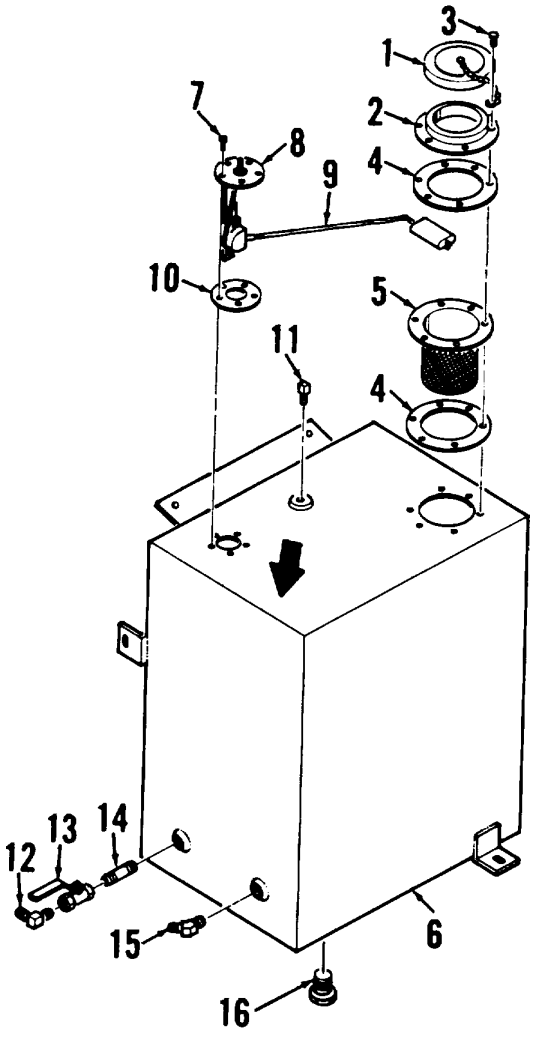
A. DISASSEMBLY

1. Remove cap (1) and flange (2) from fuel tank (6) by removing six screws (3).
2. Remove gaskets (4) and strainer (5). Discard gaskets.

CAUTION

Use care when removing fuel level sending unit (8) to prevent damage to level rod (9).

3. Remove five screws (7). Carefully lift fuel level sending unit (8) from fuel tank (6), making sure not to bend level rod (9).
4. Remove and discard gasket (10).
5. Remove air breather (11) from fuel tank (6), noting direction of breather opening.
6. Remove elbow (12), shutoff ball valve (13), pipe nipple (14), and elbow (15). Remove drain plug (16).



B. CLEANING

WARNING

Fuel is very flammable and can easily explode. To avoid serious injury or death, observe the following precautions:

- Keep away from open flame or any spark (ignition source).
- Keep at least a B-C fire extinguisher within easy reach when working with fuel or on the fuel system.
- Post signs that read "NO SMOKING WITHIN 50 FEET" when working with fuel.

1. Clean fuel strainer (5) by agitating in clean fuel. Ensure all particles are removed from mesh. Allow to air dry.
2. Clean remaining fuel tank components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect fuel strainer (5) for cuts, tears, cracks, corrosion, or other damage. Replace if damaged.
2. Inspect sending unit level rod (9) for bends, kinks, or other damage. Ensure rod moves freely.
3. Inspect magnetic drain plug (16) for proper operation.
4. Inspect remaining fuel tank components in accordance with paragraph 1-24.

D. REPAIR

1. Remove and replace defective, deformed, corroded, or damaged components.
2. Repair fuel tank (6) in accordance with TC 9-510.

E. ASSEMBLY

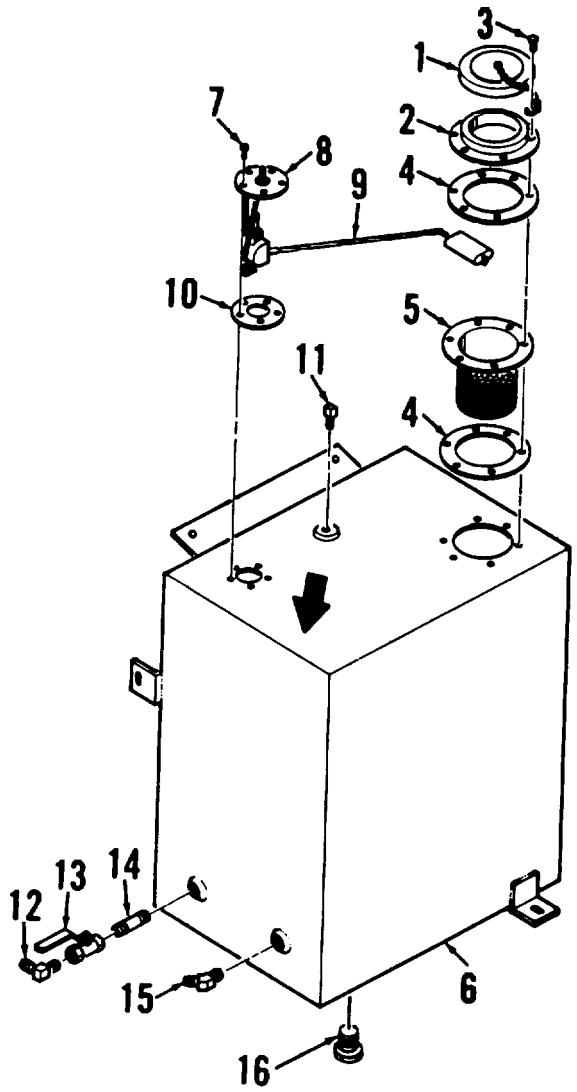
1. Wrap all pipe threads with teflon tape before assembling.

2. Install pipe nipple (14), shutoff ball valve (13), and elbows (12, 15). Install drain plug (16).
3. Install air breather (11) into fuel tank (6). Breather must be installed so that opening faces correct direction (see figure).
4. Install new gasket (10) onto fuel tank (6), ensuring proper hole alignment.

CAUTION

Use care when installing fuel level sending unit (8) to prevent damage to level rod (9).

5. Carefully insert fuel level sending unit (8) into fuel tank (6), making sure not to bend level rod (9). Apply loctite to threads of screws (7) and install.
6. Install new gaskets (4) and strainer (5).
7. Install cap (1) and flange (2) onto fuel tank (6). Secure using six screws (3).



FOLLOW-ON MAINTENANCE:

Install fuel tank (para. 3-22)

END OF TASK

3-24. ACCELERATOR SLAVE CYLINDER REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:
General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

Materials / Parts:
Isopropyl Alcohol (2, App. C)
Brake Fluid (5, App. C)
O-Ring, Item 5 (1 ea.)
T-Seal, Item 14 (1 set)

Equipment Condition:
Accelerator slave cylinder removed (para. 2-43)

A. DISASSEMBLY

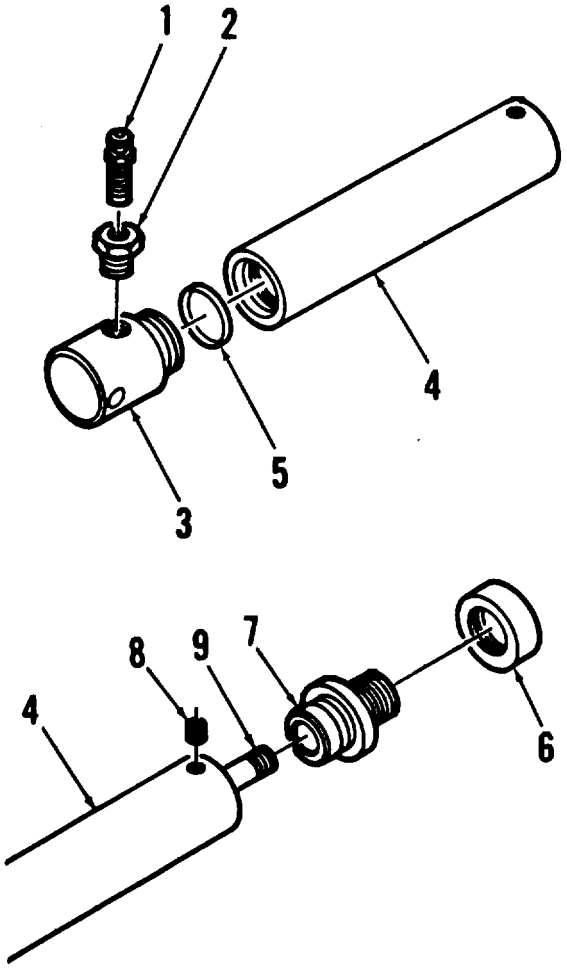
CAUTION

Do not place cylinder in a vise or similar tool to disassemble. Vise will damage cylinder housing and prevent proper cylinder operation.

NOTE

Disassemble cylinder over drain pan to catch fluids.

1. Remove bleeder screw (1) and plug (2) from end cap (3).
2. Remove end cap (3) from cylinder housing (4). Remove and discard O-ring (5).
3. Remove wiper seal (6) by carefully threading off end of end cap assembly (7).
4. Remove three setscrews (8). Remove assembled end cap assembly (7) and push rod (9) from cylinder housing (4).

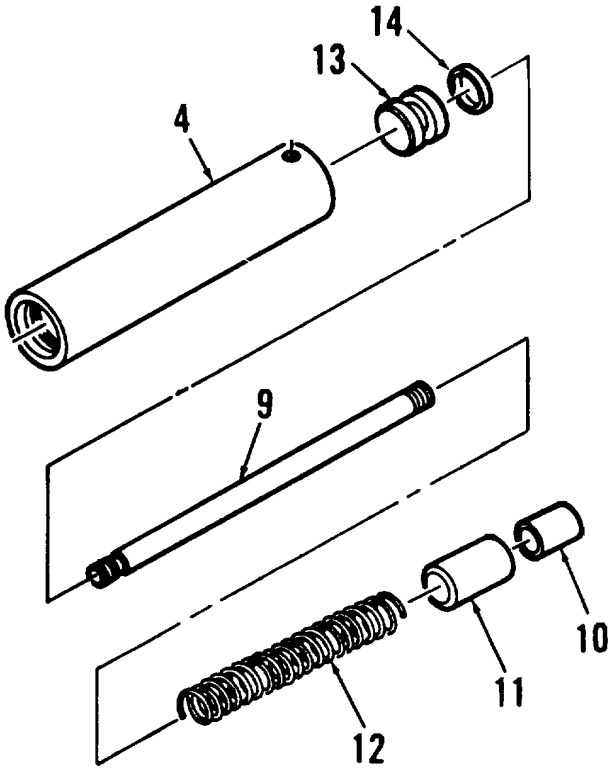


NOTE

End cap bearing is press fit into end cap (7). Do not remove bearing. If either component is damaged, end cap and bearing must be replaced as a set.

5 Remove spacer (10), sleeve (11), and spring (12) from push rod (9).

6. Remove piston (13) from push rod (9). Remove T-seal (14) from piston and discard T-seal.



B. CLEANING WARNING

Isopropyl alcohol is flammable. Inhalation of vapors can cause dizziness and headache. Contact with skin may cause irritation. To avoid injury, observe the following precautions: Keep isopropyl alcohol away from open flame or any spark (ignition source).

- Keep at least a B-C fire extinguisher within easy reach when working with isopropyl alcohol.

- Post signs that read "NO SMOKING WITHIN 50 FEET" when working with isopropyl alcohol.

- Ensure adequate ventilation. If vapors cause drowsiness, go to fresh air.

- If liquid contact skin or eyes, immediately flush affected areas thoroughly with water.

Clean cylinder components in isopropyl alcohol. Allow to air dry.

C. INSPECTION

Inspect components in accordance with paragraph 1-24.

D. REPAIR

Repair of the accelerator slave cylinder consists of removal and replacement of defective, deformed, or damaged components.

E. ASSEMBLY

CAUTION

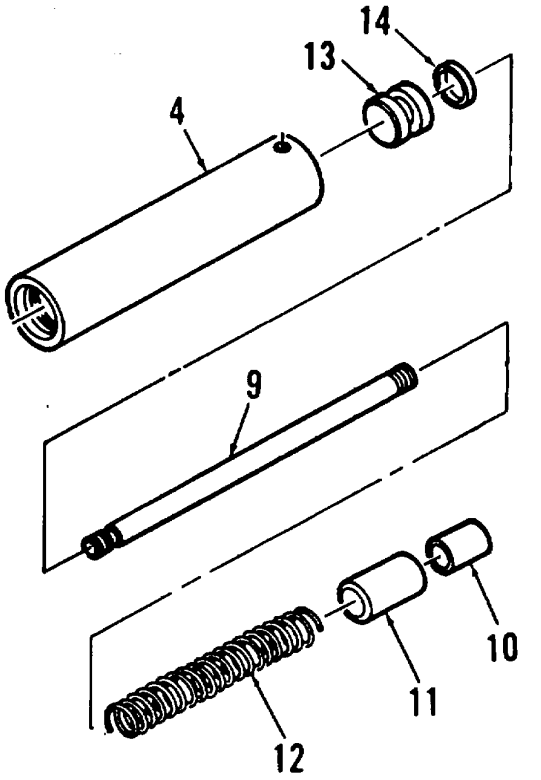
Use caution when installing T-seal (14) to prevent damage to piston (13).

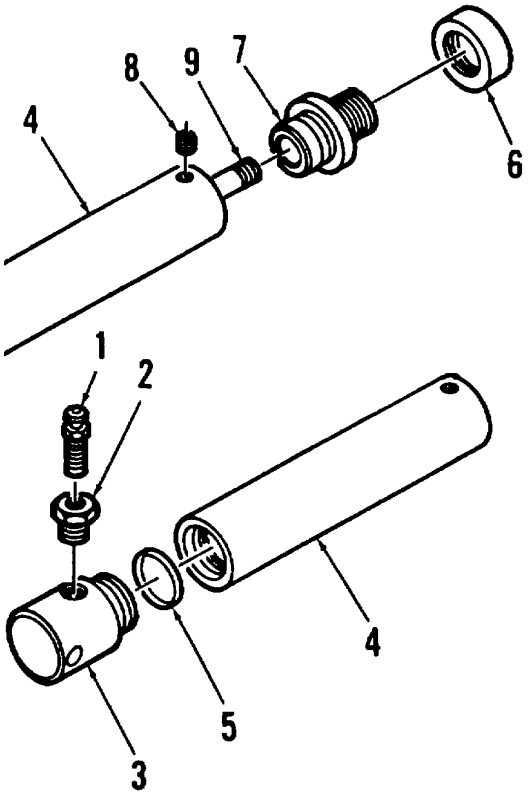
1. Lubricate T-seal (14) with clean brake fluid and install onto piston (13). Install piston (13) onto push rod (9).
2. Lubricate piston end of piston and push rod assembly and install into cylinder housing (4).
3. Install spring (12), sleeve (11), and spacer (10) onto piston and push rod assembly.
4. Install end cap assembly (7) onto piston and push rod assembly. Install three set screws (8) to secure end cap in cylinder housing (4).
5. Carefully thread wiper seal (6) onto end cap assembly (7).
6. Install new O-ring (5) onto end cap (3). Install end cap into cylinder housing (4).
7. Install bleeder screw (1) and plug (2) into end cap (3).

FOLLOW-ON MAINTENANCE:

Install accelerator slave cylinder (para. 2-43)

END OF TASK





3-25. ACCELERATOR ACTUATOR WITH PEDAL REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

Materials / Parts:

Isopropyl Alcohol (2, App. C)
Cotter Pin, Item 12 (1 ea.)
Repair Kit, Pedal Assembly (I ea.)

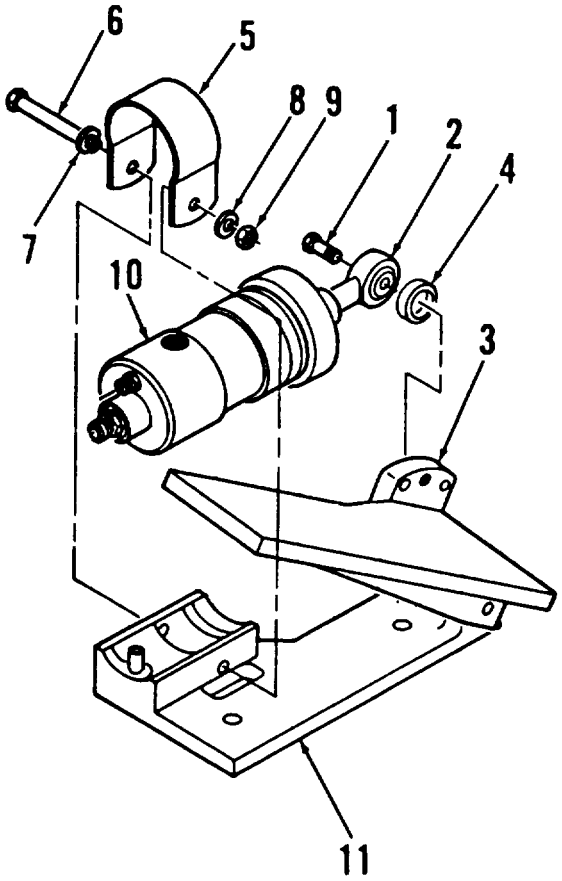
Equipment Condition:

Accelerator actuator removed (para. 2-44)

A. DISASSEMBLY

NOTE
Note which mounting hole on pedal (3) is utilized before removing screw (1). This will aid in re-assembly.

1. Remove screw (1) that secures cylinder rod end (2) to pedal (3). Remove spacer (4).
2. Remove cylinder clamp (5) from base (11) by removing screw (6), washer (7), lockwasher (8), and nut (9).
3. Remove cylinder (10) from base (11) and place on a clean work surface for further disassembly.



4. Remove pedal (3) from base (11) by removing cotter pin (12) and clevis pin (13). Discard cotter pin.

5. Remove spring pin (14) from base (11) only if replacement is required.

CAUTION

Do not place cylinder in a vise or similar tool to disassemble. Vise will damage cylinder housing and prevent proper cylinder operation.

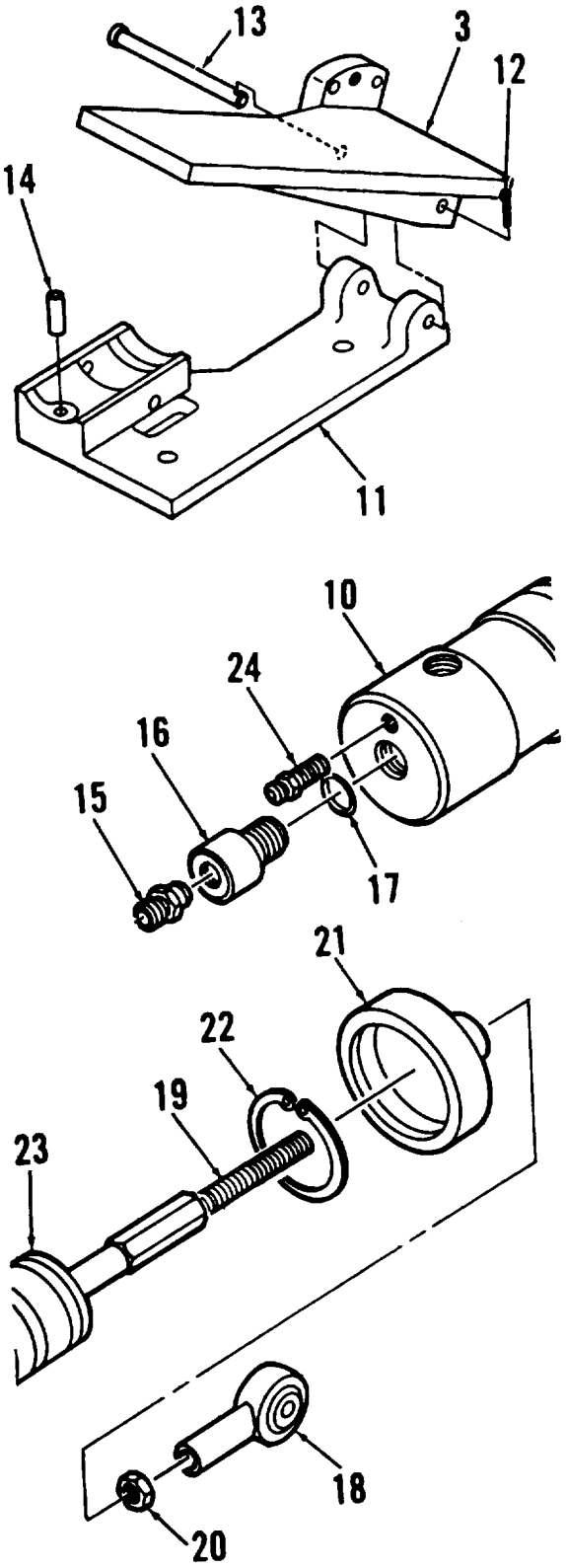
NOTE

Disassemble cylinder over drain pan to catch fluids.

6. Remove bleeder screw (24) and drain cylinder into pan.

7. Remove fitting (15), adapter (16), and O-ring (17) from cylinder (8). Discard O-ring.

8. Remove rod end (18) and nut (20) from push rod (19). Remove boot (21) and snap ring (22).



CAUTION

Use care when removing O-ring (26) and cup (27) to prevent damage to piston (25).

9. Carefully pull push rod and piston (25) from cylinder housing (23). Remove and discard O-ring (26) and cup (27).

10. Remove stem assembly (28) from cylinder housing (23).

WARNING

Stem assembly is under spring tension. Use care when disassembling to prevent injury to personnel.

11. Remove snap ring (35) from stem (29) and discard. Remove retainers (30, 32) and springs (31, 33).

12. Discard stem (29) and seat (34).

B. CLEANING

WARNING

Isopropyl alcohol is flammable. Inhalation of vapors can cause dizziness and headache. Contact with skin may cause irritation. To avoid injury, observe the following precautions:

- Keep isopropyl alcohol away from open flame or any spark (ignition source).

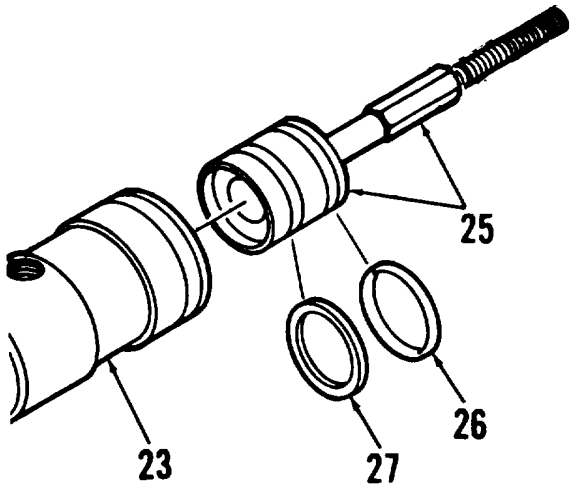
- Keep at least a B-C fire extinguisher within easy reach when working with isopropyl alcohol.

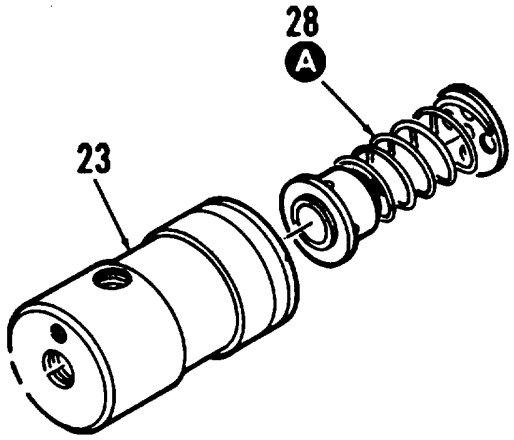
- Post signs that read "NO SMOKING WITHIN 50 FEET" when working with isopropyl alcohol.

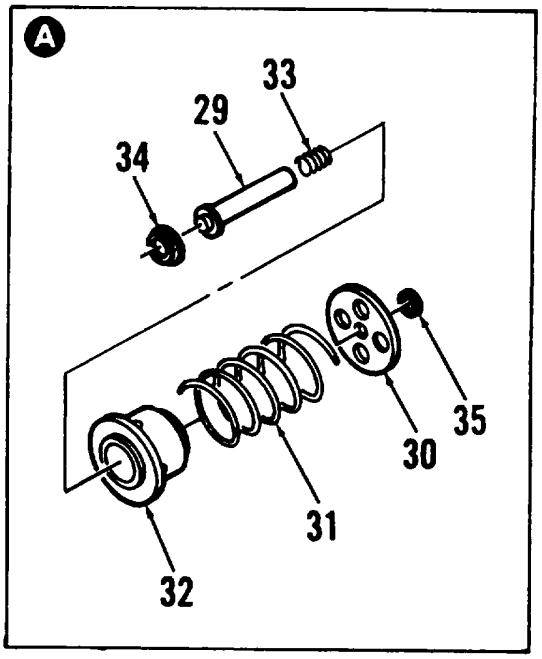
- Ensure adequate ventilation. If vapors cause drowsiness, go to fresh air.

- If liquid contact skin or eyes, immediately flush affected areas thoroughly with water.

Clean cylinder components in isopropyl alcohol. Allow to air dry.







C. INSPECTION

Inspect components in accordance with paragraph 1-24.

D. REPAIR

Repair of the actuator pedal and cylinder consists of removal and replacement of defective, deformed, or damaged components.

E. ASSEMBLY

1. Install new seat (34) onto new stem (29).

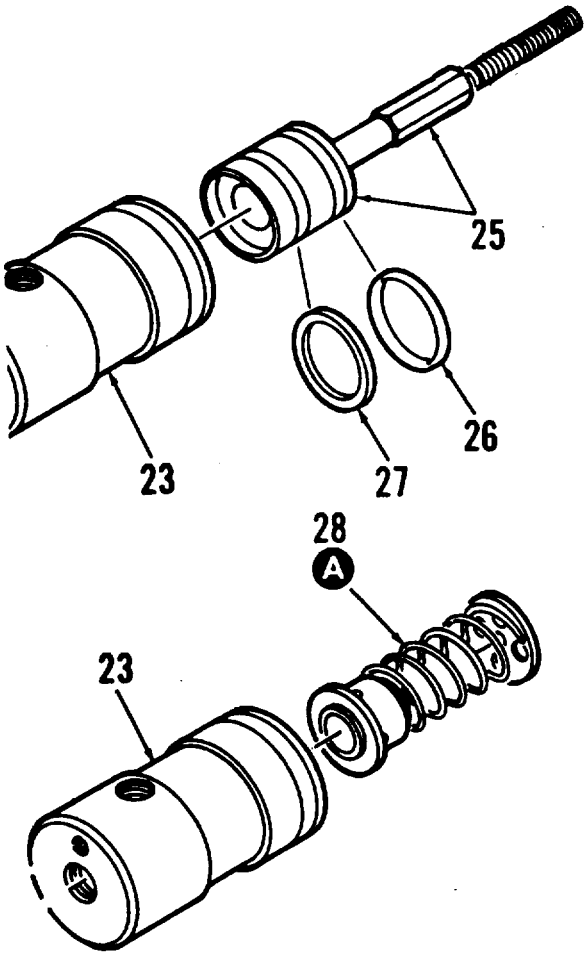
2. Install retainers (30, 32) and springs (31, 33) onto stem (29). Compress retainer (30) and install new snap ring (35).

3. Install stem assembly (28) into cylinder housing (23).

CAUTION

Use care when installing O-ring (26) and cup (27) to prevent damage to piston.

4. Carefully install new O-ring (26) and new cup (27) onto piston. Insert rod and piston (25) into cylinder housing (23) using a slight twisting motion.



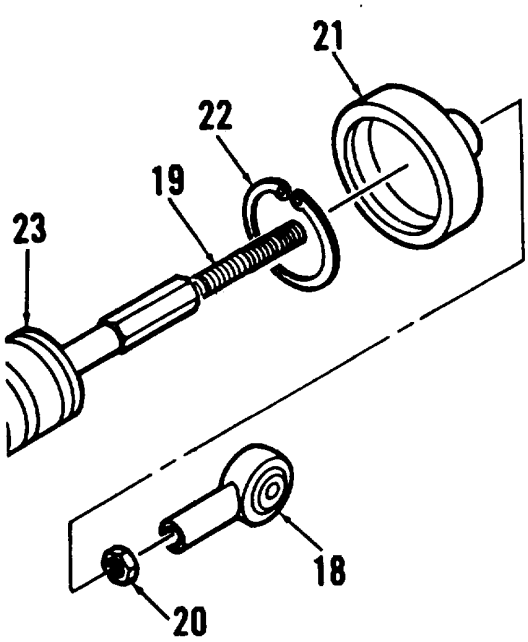
5. Install snap ring (22) and boot (21) onto cylinder housing (23). Install rod end (18) and nut (20) onto push rod (19).

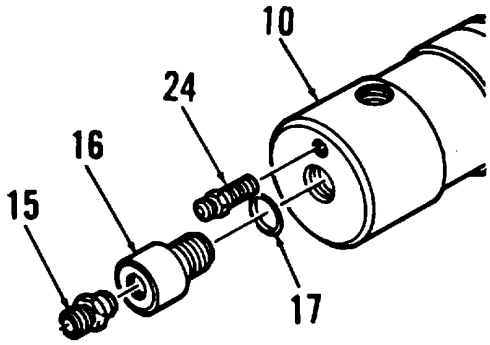
6. Install fitting (15), adapter (16), and new O-ring (17) into cylinder (10).

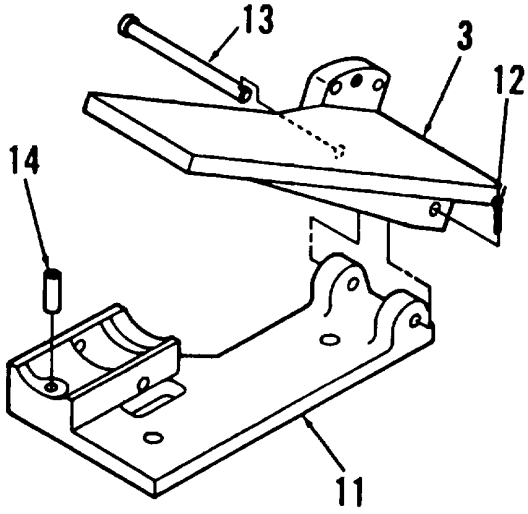
7. Install bleeder screw (24).

8. Install spring pin (14) into base (11).

9. Secure pedal (3) to base (11) using new cotter pin (12) and clevis pin (13).







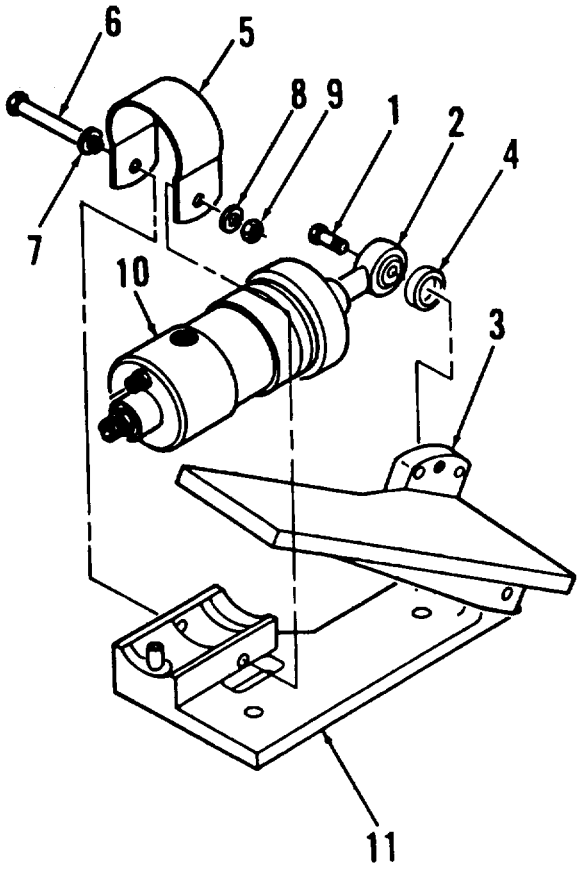
10. Position cylinder (10) onto base (11). Install cylinder clamp (5) onto base using screw (6), washer (7), lockwasher (8), and nut (9).

11. Install screw (1) and spacer (4) to secure cylinder rod end (2) to pedal (3).

FOLLOW-ON MAINTENANCE:

Install accelerator actuator (para. 2-44)

END OF TASK



Section V. COOLING SYSTEM MAINTENANCE

3-26. RADIATOR ASSEMBLY REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Radiator removed (para. 2-47)

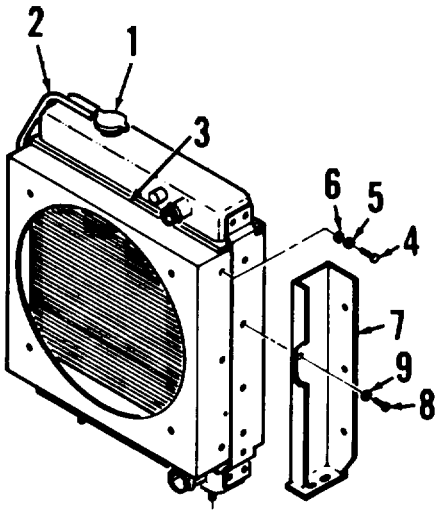
Equipment Condition:

Oil cooler removed (para. 2-95)

Reference:

TM 750-254

A. DISASSEMBLY



1. Remove fill cap (1). Disconnect drain tube (2) from radiator fill neck.
2. Remove radiator shroud (3) by removing screws (4), lockwashers (5), and flat washers (6).
3. Remove radiator mount weldments (7) by removing screws (8) and washers (9).

B. CLEANING

Clean radiator components in accordance with paragraph 1-24.

C. INSPECTION

Inspect radiator and related components in accordance with paragraph 1-24.

D. REPAIR

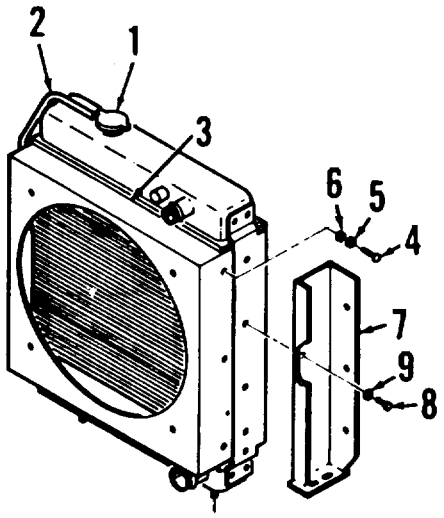
1. Repair radiator in accordance with TM 750-254.
2. Repair of remaining components consists of removal and replacement of defective, deformed, or damaged parts.

E. ASSEMBLY

1. Install radiator mount weldments (7) using screws (8) and washers (9).

2. Install radiator shroud (3) using screws (4), lockwashers (5), and flat washers (6).

3. Install fill cap (1). Connect drain tube (2) to radiator fill neck.



FOLLOW-ON MAINTENANCE:

Install radiator assembly (para. 2-47)
Install oil cooler (para. 2-95)

END OF TASK

Section VI. ELECTRICAL SYSTEM MAINTENANCE

3-27. ALTERNATOR REPAIR

This task covers: Suppression Capacitor Check, Disassembly, Cleaning, Inspection, Repair, Assembly, and Testing

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Digital Multimeter (6, App. E)
Test Set (2, App. E) (2 ea.)
Torch Kit, Soldering (29, App. E)
Puller Kit (26, App. E)
Rotor Test Stand (41, App. E)
Dial Indicator (17, App. E)
Arbor Press (25, App. E)
Feeler Gage (21, App. E) (3 ea.)

Equipment Condition:

Alternator removed (para. 2-55)

Materials / Parts:

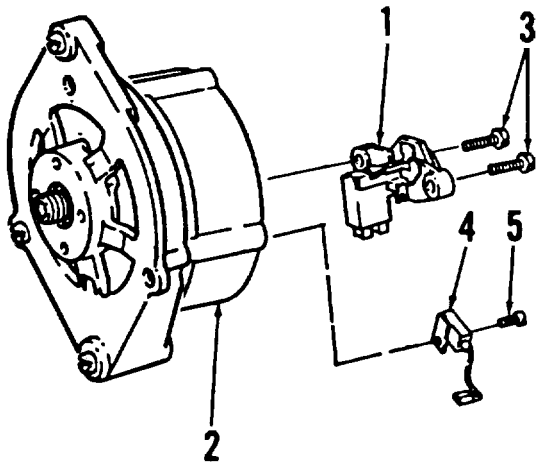
Solder, Colophonium Tin (36, App. C)
O-Ring, Item 26 (1 ea.)

A. SUPPRESSION CAPACITOR CHECK

1. Remove capacitor lead from terminal B+.
2. Connect multimeter between lead of capacitor and terminal B-.
3. Meter shall read 1.8 to 2.6 μF. Replace suppression capacitor if value is not met.

B. DISASSEMBLY

1. Remove transistor regulator (1) from alternator (2) by removing screws (3). Remove suppression capacitor (4) by removing screw (5).
2. Before proceeding, match mark shields (6, 7) and stator for ease of assembly.
3. Remove four screws (8) and carefully separate drive end shield (6) from ring end shield (7).



4. Test for proper operation of rectifier plate (9) prior to removal. Using multimeter, check resistance between the following test points:

   - Housing and winding ends
   - B+ and winding ends
   - D+ and winding ends

   Resistance between all test points should be less than 0.33 ohms. Higher reading indicates defective diode. Replace rectifier plate (9) if diode is defective.

5. Test for proper stator resistance prior to removal of stator (10). Resistance between phase outlets shall be 0.22 ohms + 10%.

6. Using soldering gun, remove solder from phase connections on rectifier plate (9). Using a screwdriver, straighten ends of leads. Pull leads out of fastening holes.

7. Carefully pull stator (10) out of ring end shield (11).

8. Remove two screw and washer sets (12). Remove nuts (13), washers (14), insulating washers (16), spring washers (15), insulators (17), and insulator caps (18) from B+ and D+ terminals.

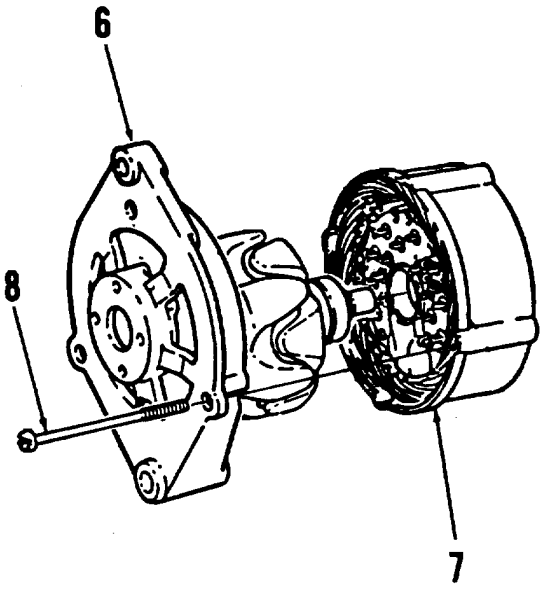
9. Carefully remove rectifier plate (9) from ring end shield (11).

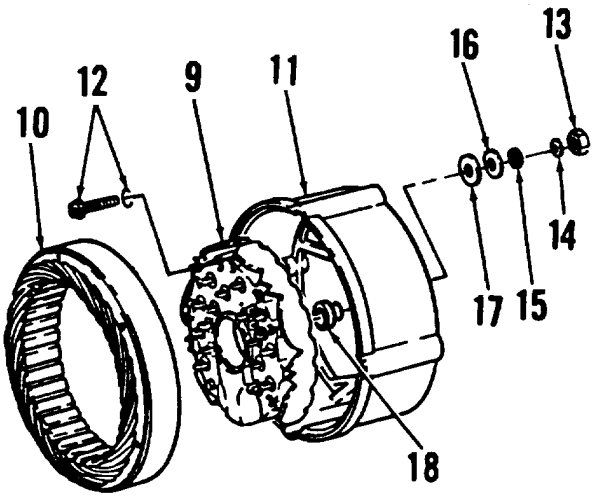
10. Remove four screws (19). Pull assembled rotor (20) and bearing (21) out of drive end shield (22).

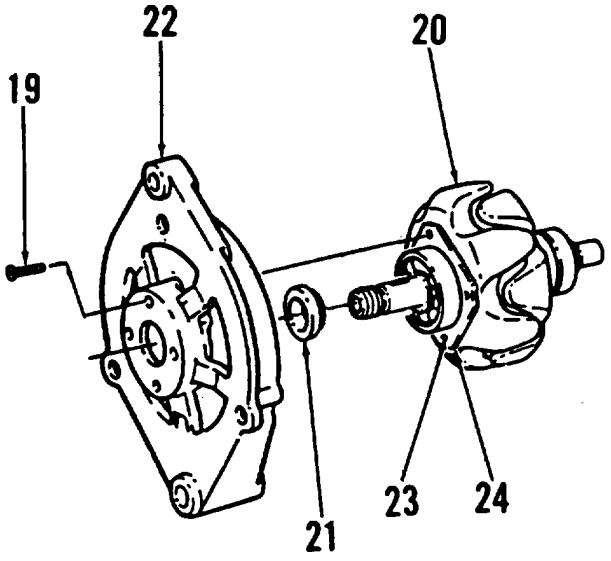
11. Using bearing puller, remove bearings (21, 23) from rotor (20). Remove cover plate (24).

12. Test rotor (20) for proper resistance. Resistance shall be 9.0 ohms +10%.

13. Using test prods, apply 80 vac to rotor (20). Check for short circuit to ground.





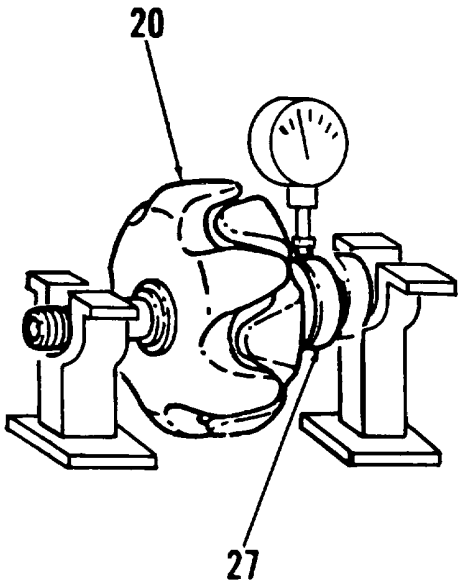


14. Mount rotor (20) in test stand as shown in figure. Using dial indicator, conduct true-running test at the following points:

    - OD of rotor (20)
    - OD of collector rings (27)

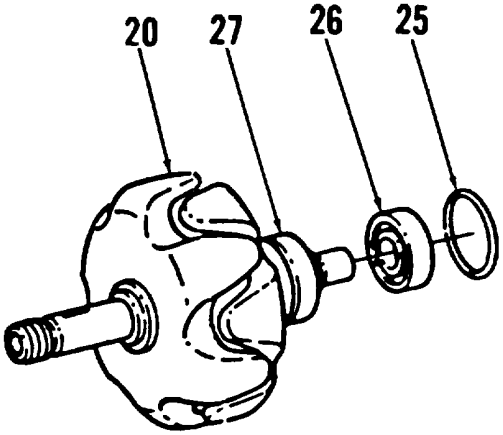
    Maximum error for rotor (20) is 0.05 mm. Maximum error for collector rings (27) is 0.03 mm.

15. Remove rotor (20) from test stand.



16. Remove and discard O-ring (25). Using bearing puller, remove bearing (26) from rotor (20).

17. Unsolder leads of excitation winding from collector rings (27). Using bearing puller, remove collector rings from rotor (20).



C. CLEANING

Clean alternator components in accordance with paragraph 1-24.

D. INSPECTION

1. Inspect alternator components in accordance with paragraph 1-24.

2. Inspect carbon brushes on transistor regulator (1) for obvious damage. Brushes shall project 0.27 inches (minimum).

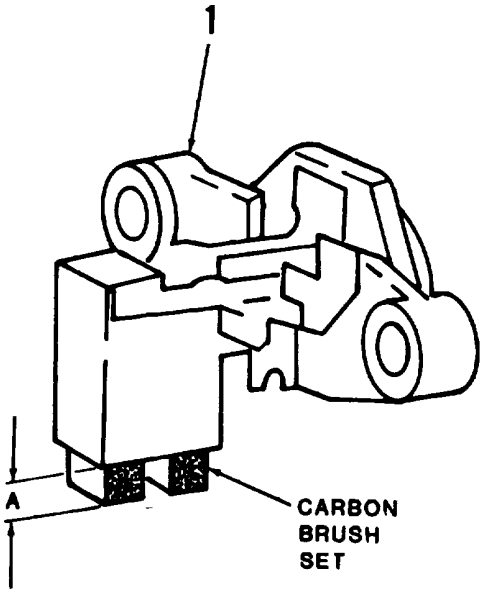
E. RFPAIR

CAUTION

Do not allow solder to contact brushes.

1. If brush set is damaged or brushes project less than 0.27 inches, unsolder brush set and replace. New brushes shall project 0.39 inches. Check brushes for freedom of movement after installation.

2. Repair of the alternator consists of removal and replacement of defective, deformed, or damaged components.



F. ASSEMBIY

1. Insert one lead of excitation winding into groove in collector rings (27). Using an arbor press, install collector rings onto rotor (20).

2. Solder leads of excitation winding to collector rings (27). Turn down soldered joint on both rings until rings are even.

3. Press bearing (26) onto rotor (20). Install new O-ring (25).

4. Press bearings (23) into drive end shield (22). Install cover plate (24) and secure using four screws (19).

5. Place drive end shield (22) on arbor press. Insert rotor (20) into bearing (23) and press into place.

6. Install insulator caps (18) on B+ and D+ terminals mounted to rectifier plate (9). Install rectifier plate (9) into ring end shield (11).Secure rectifier plate using three screw and washer sets (12).

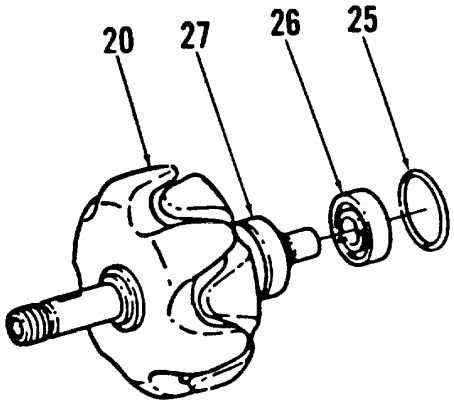
7. Install insulators (17), spring washers (15), insulating washers (16), washers (14), and nuts (13).

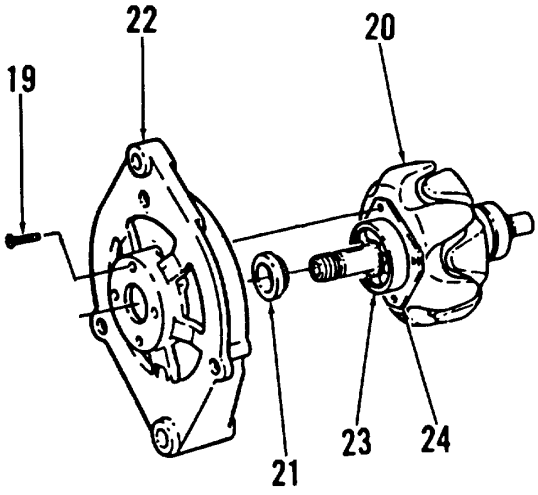
8. Place stator (10) against rectifier plate (9). Match markings on stator, rectifier plate, and ring end shield (11).

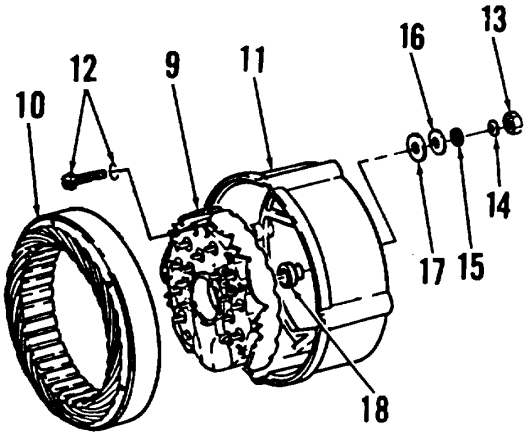
CAUTION

Do not use excessive solder. Too much solder can cause short-circuit bridges.

9. Solder connection wires of stator (10). Ensure connection wires will not contact rotor once rotor is installed.







10. Carefully mate rotor and drive end shield (6) to ring end shield (7).

11. To obtain proper running alignment, insert three 0.008 inch feeler gages between stator and rotor. Install four screws (8) and tighten in a criss-cross pattern.

12. Install transistor regulator (1) onto alternator (2) using screws (3). Install suppression capacitor (4) using screw (5).

13. Plug connector on capacitor (4) onto B+ terminal.

G. TESTING

1. Install alternator in test set-up as shown in figure. Set regulated voltage on test set-up to 26 volts.

CAUTION

Connection between alternator and battery must not be disconnected when alternator is running. Semiconductors and regulator may be destroyed.

2. Operate alternator at 2000 rpm for 2 minutes to bring alternator to normal operating temperature.

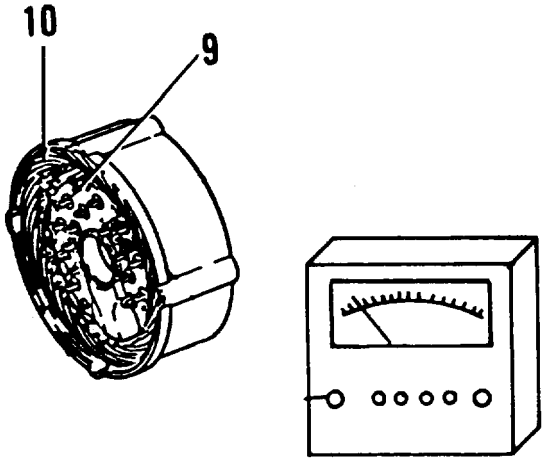
3. Reduce alternator speed to 1750 rpm.

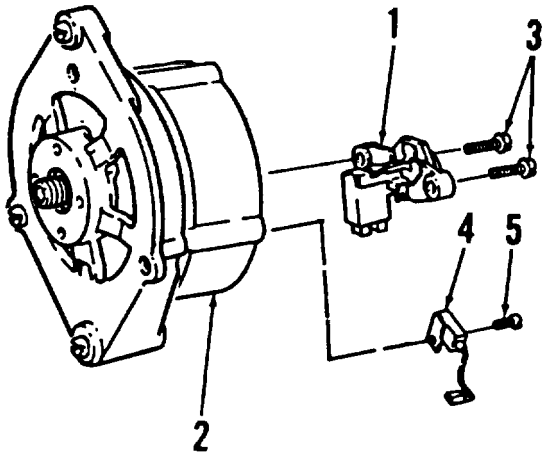
4. Adjust loading resistor until a reading of 10 amps is achieved. Indicated voltage shall be 26 volts.

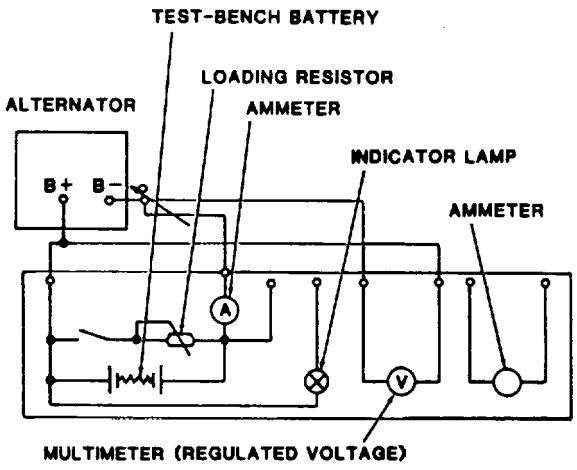
5. Raise alternator speed to 2750 rpm.

6. Adjust loading resistor until a reading of 30 amps is achieved. Indicated voltage shall be 26 volts.

7. Raise alternator speed to 6000 rpm.







8. Adjust loading resistor until a reading of 45 amps is achieved. Indicated voltage shall be 26 volts.

9. Reduce alternator speed to 0 rpm. Remove from test set-up.

FOLLOW-ON MAINTENANCE:

Install alternator (para. 2-55)

END OF TASK

3-28. STARTER MOTOR REPAIR

This task covers: Disassembly, Cleaning, Inspection, Component Testing, Repair, Assembly, and Performance Testing

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Puller Kit (26, App. E)
Digital Multimeter (6, App. E)
Test Set (2, App. E)
Dial Indicator (17, App. E)
Caliper, Inside (12, App. E)

Equipment Condition:

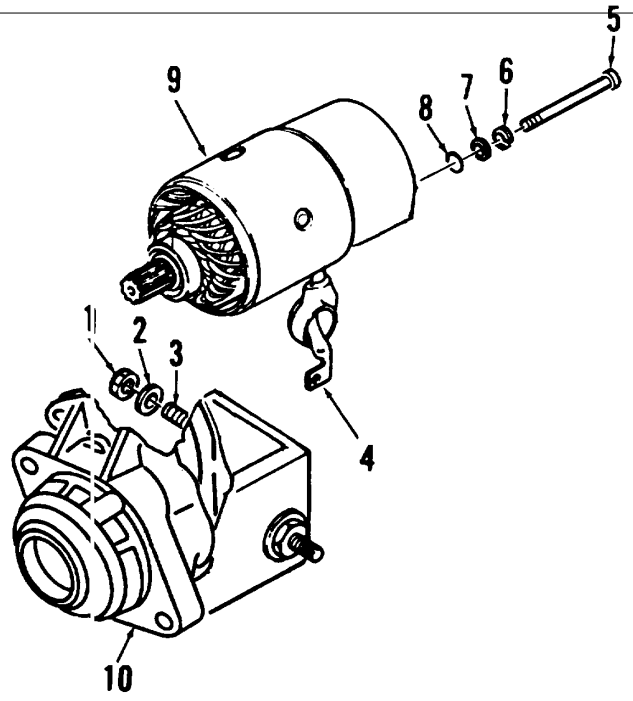
Starter motor removed (para. 2-57)

Materials / Parts:

Grease (10, App. C)
O-Ring, Item 8 (1 ea.)
O-Ring, Item 21 (2 ea.)
Seal, Item 30 (1 ea.)

A. DISASSEMBLY

1. Remove nut (1) and washer (2) from stud Remove lead wire (4) from stud.
2. Remove through bolt (5), washers (6, 7), and O-ring (8). Discard O-ring.
3. Carefully separate yoke assembly (9) from magnetic switch assembly (10).



4. Remove screw (11) and washer (12) sets. Remove end frame (13) from yoke housing (16).

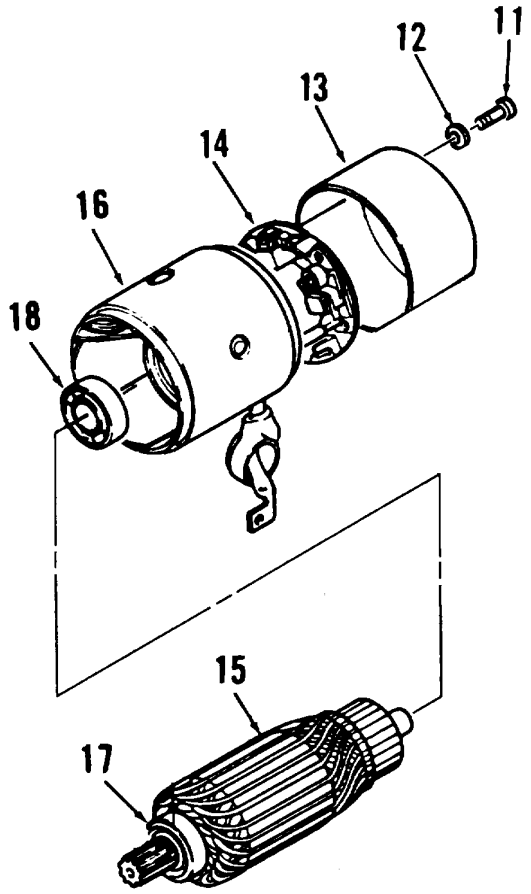
5. Using needle-nose pliers, remove brushes from brush holder (14). Remove brush holder from yoke housing (16).

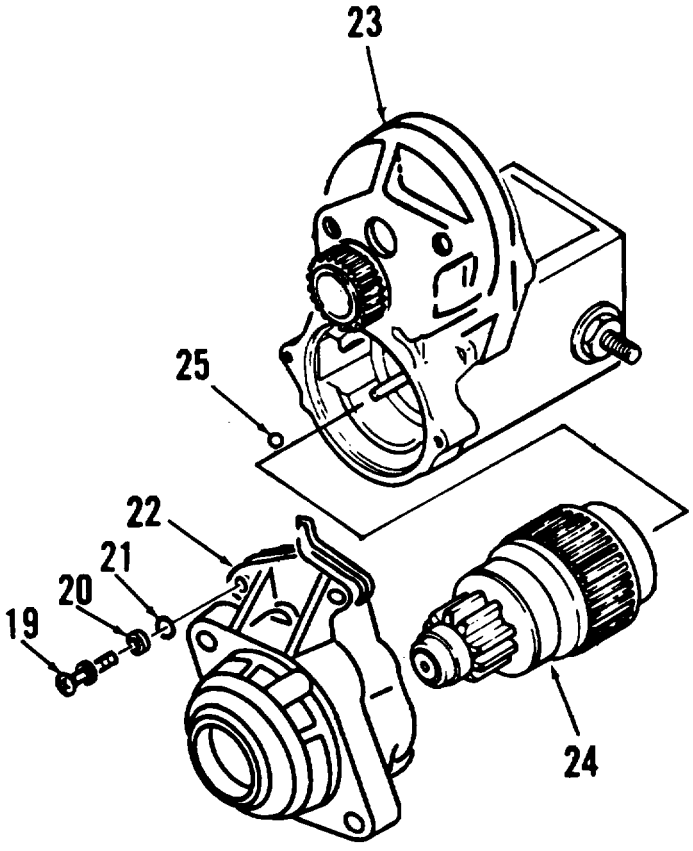
6. Remove armature (15) from yoke housing (16). Using bearing puller, remove bearings (17, 18) from armature.

7. Remove screws (19), washers (20), and O-rings (21). Discard O-rings.

8. Carefully separate starter housing (22) from magnetic switch (23).

9. Remove clutch assembly (24) from magnetic switch (23). Remove steel ball (25) from clutch assembly.





10. Remove retainer (26), five rollers (27), starter pinion (28) and washer (29) from magnetic switch (23).

11. Remove spring (30). Remove and discard seal (31).

B. CLEANTNG

Clean starter motor components in accordance with paragraph 1-24.

C. INSPECTION

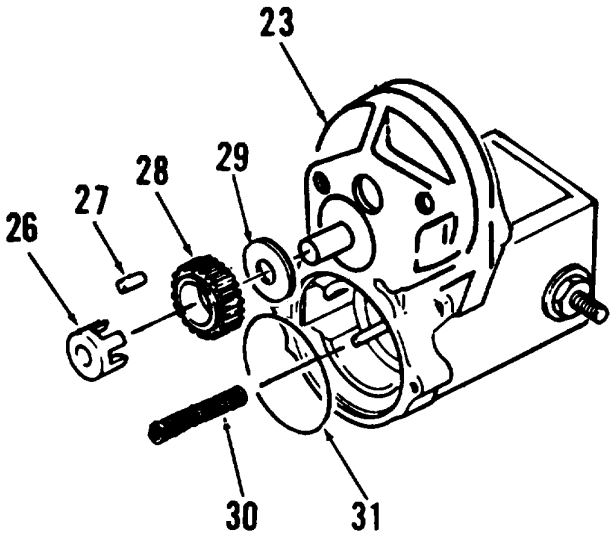
1. Inspect starter motor components in accordance with paragraph 1-24.

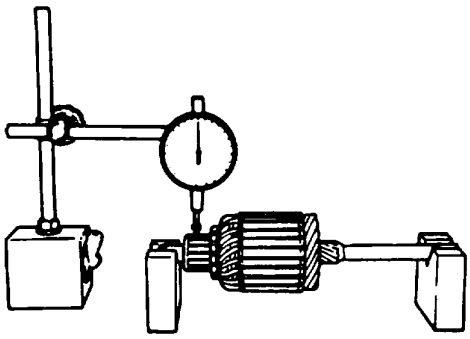
2. Inspect armature commutator surface for burned spots. Burning indicates an open circuit. Replace armature if surface is damaged.

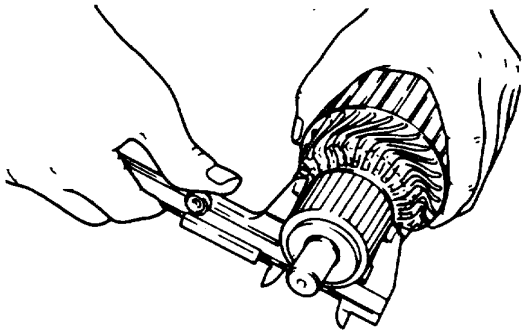
3. Using dial indicator, check commutator run-out as shown in figure. Service limit is 0.4 mm.

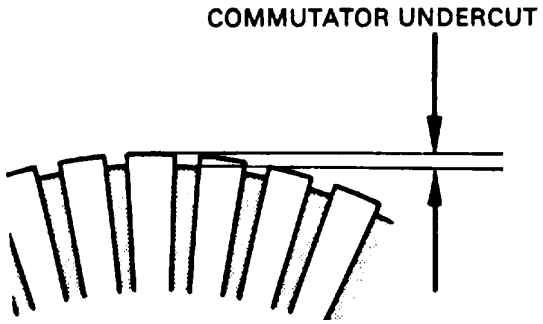
4. Using caliper, measure O.D. of armature commutator surface. Service limit is 35 mm.

5. Measure armature segment commutator undercut depth. Service limit is 0.2 mm.









6. Measure armature shaft and bore clearance as follows:

   a. Measure I.D. of shaft bore in magnetic switch assembly.

   b. Measure O.D. of armature shaft.

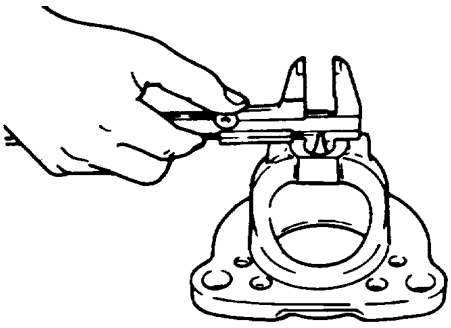
c. Subtract shaft O.D. from bore I.D. (A - B). Service limit is 0.2 MM.

7. Inspect brush holder for damage to brushes or springs. Check insulation for deterioration. Replace brushes if less than 2/3 original length.

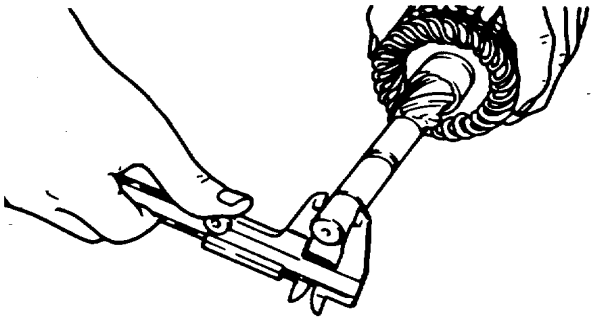
8. Using multimeter, conduct brush holder continuity test. If there is continuity, replace brush holder.

9. Using multimeter, conduct yoke winding continuity test. There shall be continuity.

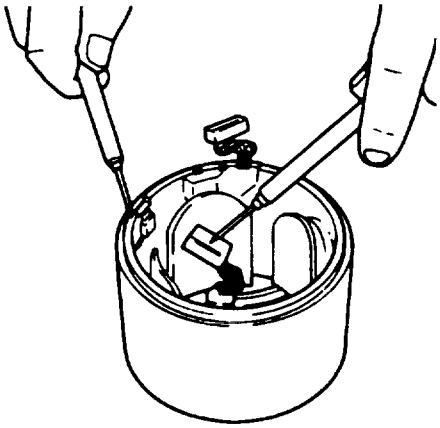
10. Inspect clutch pinion to ensure free movement in direction of starter rotation. Clutch shall lock if pinion is rotated in opposite direction.

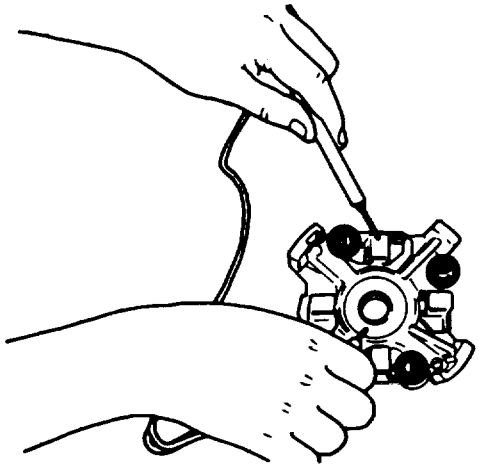


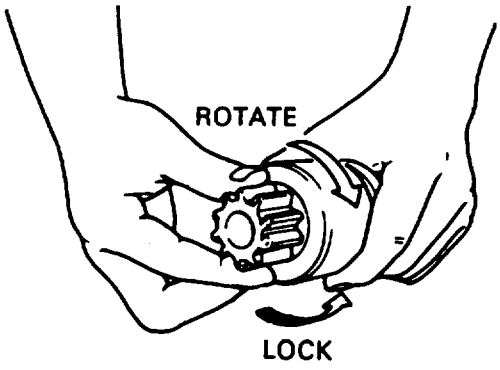
A:INNER DIA. OF FRONT HOUSING



B:OUTER DIA. OF ARMATURE SHAFT







D. REPAIR

Repair of the starter motor consists of removal and replacement of defective, deformed, or damaged components.

E. ASSEMBLY

1. Lubricate spring (30) with grease and install into magnetic switch (23) along with washer (29). Install new seal (31).

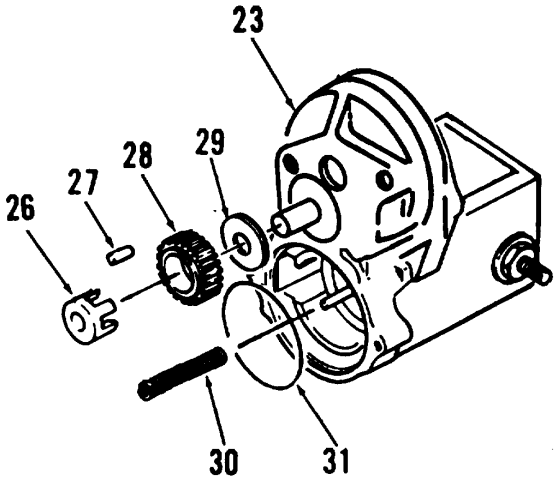
2. Lubricate five rollers (27) with grease and install into retainer (26). Install retainer and starter pinion (28) onto magnetic switch (23)

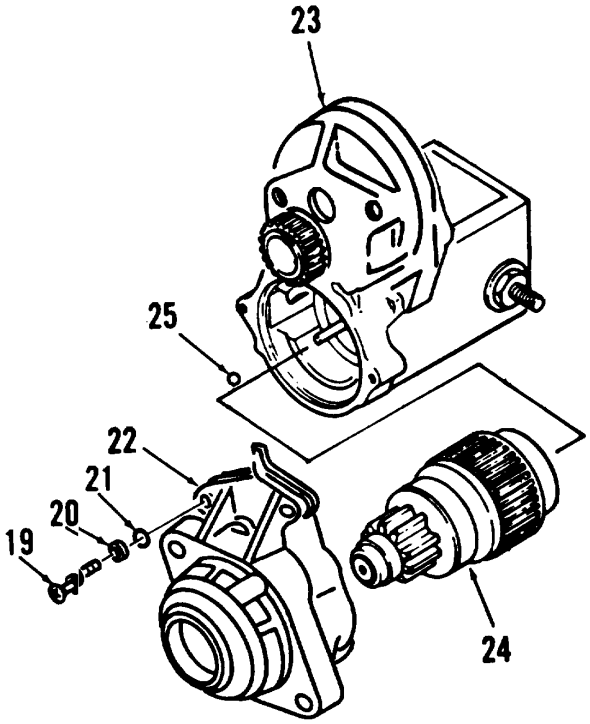
3. Lubricate steel ball (25) with grease and insert into clutch assembly (24).

4. Lubricate clutch assembly (24) with grease and install into starter housing (22).

5. Carefully mate starter housing (22) to magnetic switch (23).

6. Secure starter housing (22) using screws (19) washers (20), and new O-rings (21).





7. Pack bearings (17, 18) with grease. Press bearings into armature (15).

8. Insert armature (1S) into yoke housing (16). Carefully mate yoke housing to magnetic switch (23). Ensure tab on yoke engages notch in magnetic switch.

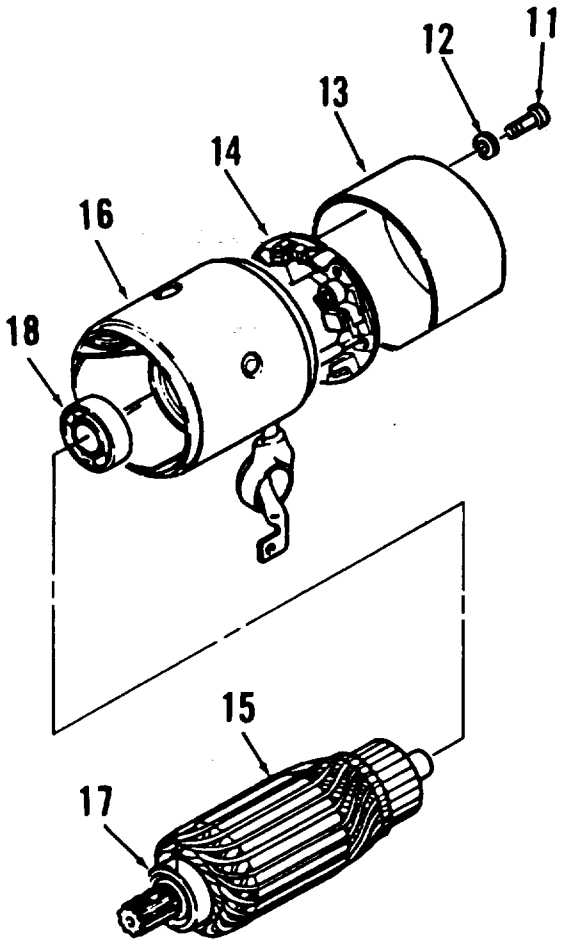
9. Install two brushes attached to brush holder (14) into brush holder. Install two brushes attached to armature (15) into brush holder. Ensure positive brush lead wires are not grounded.

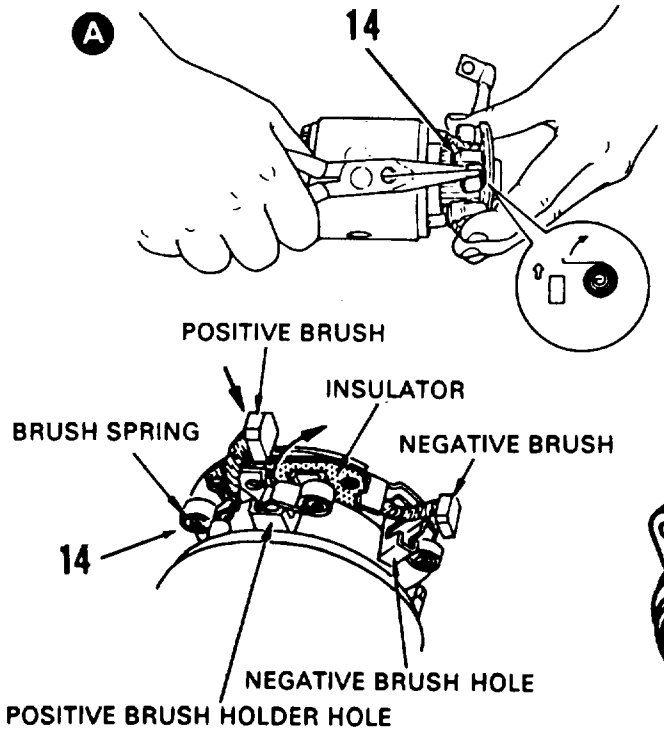
CAUTION

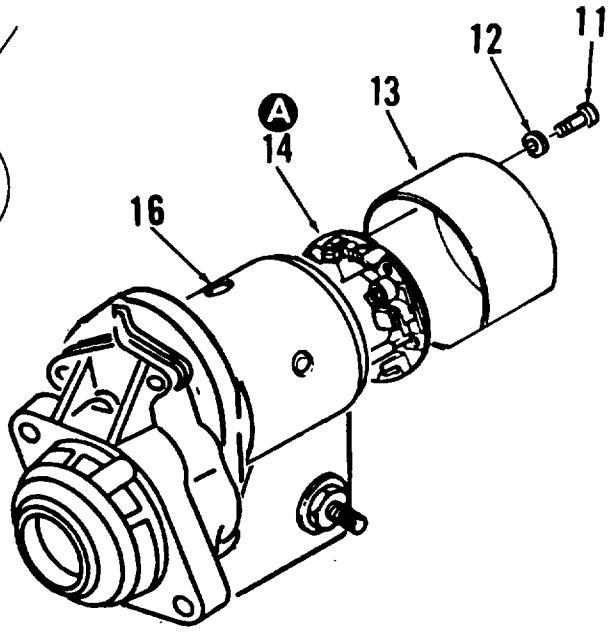
Use care when installing brush holder (14) to prevent damage. Do not allow oil to contact brush holder components.

10. brush holder (14) into yoke housing (16).

11. end frame (13) to yoke housing (16). Ensure tab on bottom of end frame engages lead wire grommet. Secure end frame using screw (11) and washer (12) sets.







12. Install through bolt (5), washers (6, 7), and new O-ring (8).

13. lead wire (4) onto stud (3). Secure using nut (1) and washer.

F. PERFORMANCE TESTING

1. Install starter motor in test set-up as shown in figure. Clamp starter securely in a vise.

2. Connect positive lead of battery and lead from ammeter to starter terminal 50. Connect negative lead to starter body.

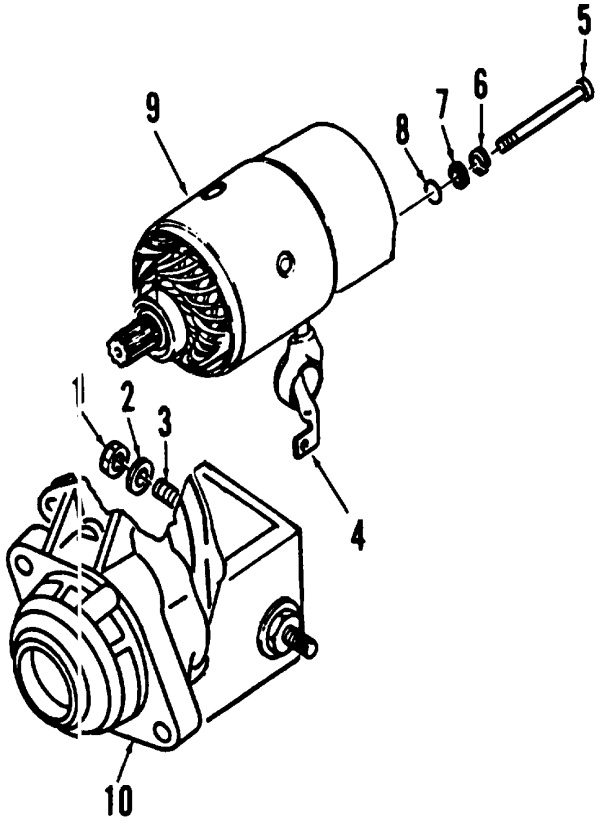
3. Starter motor shall show smooth and steady rotation. Pinion shall draw less than 90 amps.

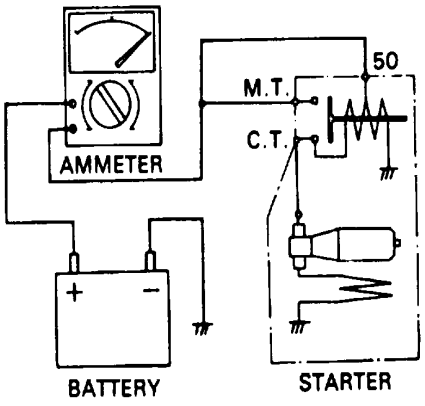
4. Remove starter motor from test set-up.

FOLLOW-ON MAINTENANCE:

Install starter motor (para. 2-57)

END OF TASK





Section VII. TRANSMISSION MAINTENANCE

3-29. TORQUE CONVERTER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Retaining Ring Pliers (24, App. E)
Torque Wrench (32, App. E)

Equipment Condition:

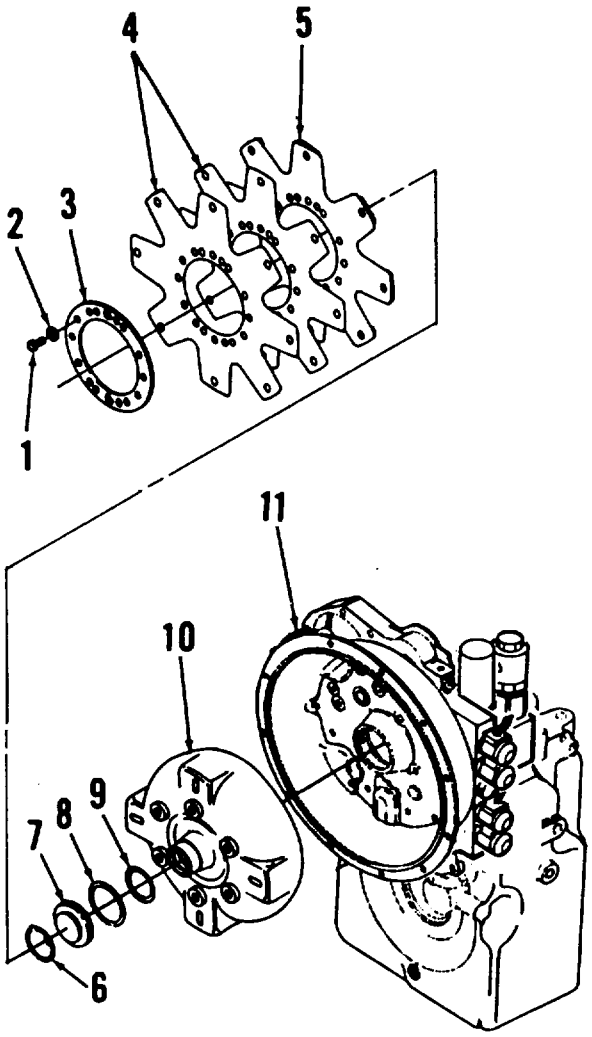
Engine and transmission removed (para. 3-6)

Materials / Parts:

Lubricating Oil (17, App. C)
O-Ring, Item 8 (1 ea.)

A. REMOVAL

1. Remove six screws (1) and washers (2) that secure backing ring (3) and drive plates (4, 5).
2. Carefully remove backing ring (3) and drive plates (4, 5) from converter housing.
3. Using pliers. remove snap ring (6) from stator shaft.
4. Remove torque converter plug (7), O-ring (8), and snap ring (9). Discard O-ring.
5. Carefully remove torque converter (10) from converter housing (11). Place converter on a clean work surface for inspection.



B. CLEANING

Clean backing ring, drive plates, and torque converter components in accordance with paragraph 1-24.

C. INSPECTION

Inspect components in accordance with paragraph 1-24.

D. INSTALLATION

1. Carefully position torque converter (10) into converter housing (11). Ensure proper engagement with stator shaft.

2. Using pliers, install snap ring (9) onto stator shaft.

3. Lubricate new O-ring (8) with clean transmission oil and install. Install torque converter plug (7) and snap ring (6).

4. Position drive plate (5) with weld nuts onto torque converter. Weld nuts must face torque converter.

5. Install drive plates (4) and backing ring (3). Two dimples on backing ring must face away from torque converter.

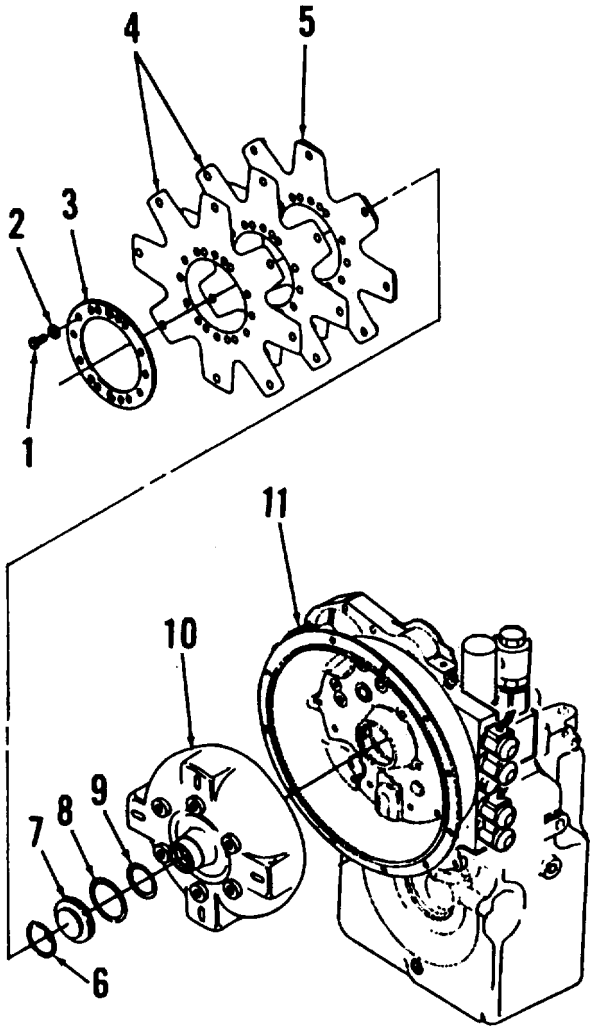
6. Align holes in backing ring (3) and drive plates (4, 5) with mounting holes in torque converter.

7. Install six screws (1) and washers (2). Torque screws, in a criss-cross pattern, to 26 to 29 ft-lbs (35 to 39 Nm).

FOLLOW-ON MAINTENANCE:

Install engine and transmission (para. 3-6)

END OF TASK



3-30. TORQUE CONVERTER HOUSING REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Retaining Ring Pliers (24, App. E)
Puller Kit (26, App. E)
Soft Head Hammer (23, App. E)
Torque Wrench (32, App. E)

Equipment Condition:

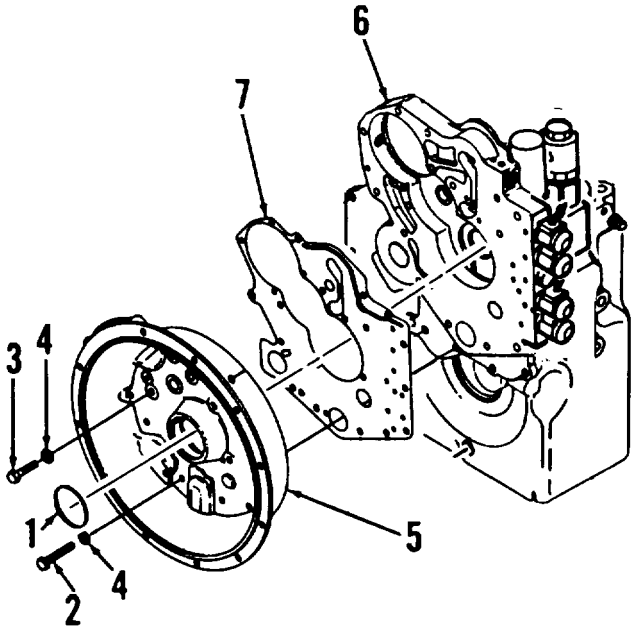
Torque converter removed (para. 3-29)

Materials / Parts:

Lubricating Oil (17, App. C)
Loctite 243 (21, App. C)
Loctite 592 (24, App. C)
Permatex Sealant #2 (40, App. C)
Grease (10, App. C)
Gasket, Item 7 (1 ea.)
O-Ring, Item 15 (1 ea.)
O-Ring, Item 17 (1 ea.)

A. REMOVAL

1. Using pliers, remove impeller hub snap ring (1).
2. Remove seventeen screws (2, 3) and washers (4) that secure converter housing (5) to spacer plate (6).
3. Carefully separate converter housing (5) from spacer plate (6). Place converter housing on a clean work surface for further disassembly.
4. Remove and discard housing to plate gasket (7).



5. Remove thrust washer (8), idler gear (9), and gear bearing (10) from idler shaft (11).

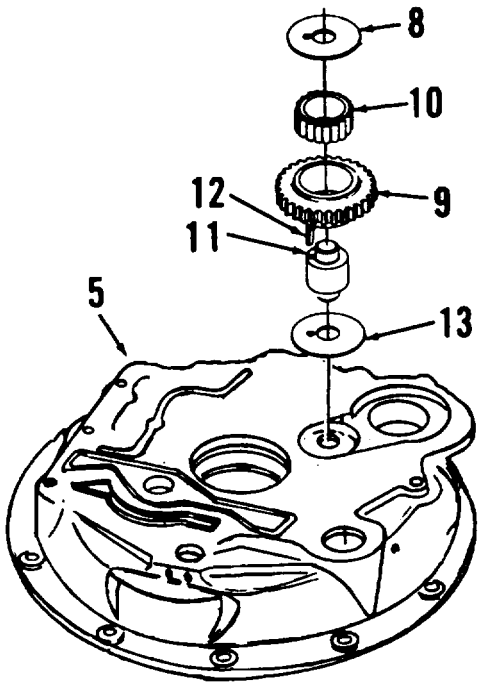
6. Remove idler shaft (11) and thrust washer (13) from converter housing (5). Remove pin (12).

7. Remove bearing (14) from converter housing (5).

9. Remove O-rings (15, 17), oil distributor ring (16), and oil seal (18). Discard O-rings.

10. Remove four plugs (19) from converter housing (5). Remove setscrews (20).

11. Using a bearing puller, remove oil distributor sleeves (21, 22) from converter housing (5).



B. CLEANING

Clean converter housing and components in accordance with paragraph 1-24.

C. INSPECTION

Inspect converter housing and components in accordance with paragraph 1-24.

D. INSTALLATION

1. Insert oil distributor sleeves (21, 22) into bores in converter housing (5). Ensure notches in sleeves align with setscrew holes.

CAUTION

Ensure loctite does not enter holes in setscrews (20) or sleeves will be damaged.

2. Tap in distributor sleeves (21, 22) using soft head hammer. Apply loctite 243 to threads of setscrews (20) and install.

3. Apply loctite 592 to threads of four plugs (19). Install plugs into converter housing (5).

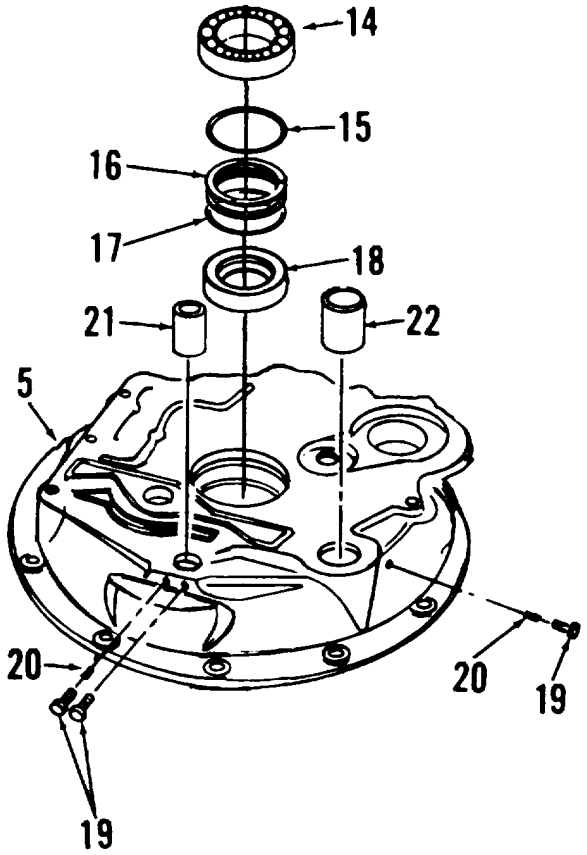
4. Apply a light coat of permatex sealant to O.D. of oil seal (18). Install oil seal into converter housing (5) with lip of seal facing in.

5. Apply clean lubricating oil to new O-rings (15, 17). Install O-rings with oil distributor ring (16), ensuring that distributor ring is installed with long hub facing oil seal.

6. Press bearing (14) into converter housing (5).

7. Install idler shaft (11) and thrust washer (13) into converter housing (5). Install pin (12).

8. Install idler gear (9), gear bearing (10), and thrust washer (8) onto idler shaft (11).

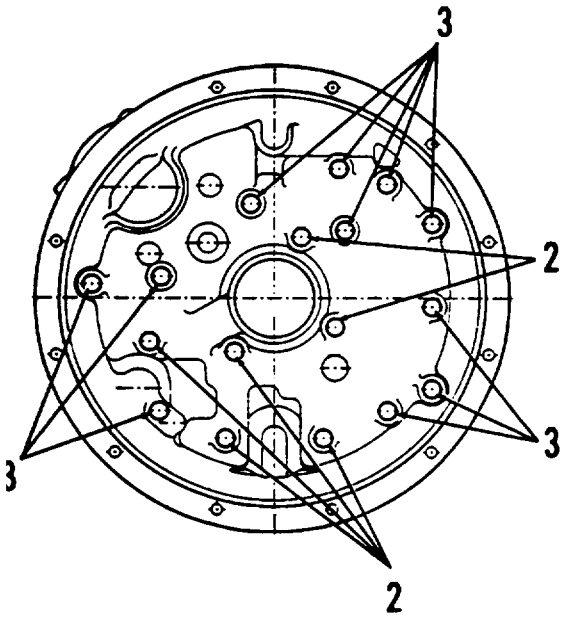


9. Apply a light coat of grease to face of spacer plate (6). Position gasket (7) onto spacer plate.

10. Carefully mate converter housing (5) to spacer plate (6). Ensure proper alignment of screw mounting holes.

11. Install seventeen screws (2, 3) and washers (4) to secure converter housing (5) to spacer plate (6). Refer to figure for screw locations.

12. Torque screws (2, 3), in a criss-cross pattern, to 30 to 37 ft-lbs (40 to 50 Nm).



FOLLOW-ON MAINTENANCE:

Install torque converter (para. 3-29)

END OF TASK

3-31. PRESSURE REGULATOR ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
Strap Wrench (47, App. E)
Torque Wrench (32, App. E)
Transmission Tool (App. D)

Equipment Condition:

Towbar lowered (para. 2-126)

Materials / Parts:

Lubricating Oil (17, App. C)
Oil Filter, Item 3 (1 ea.)

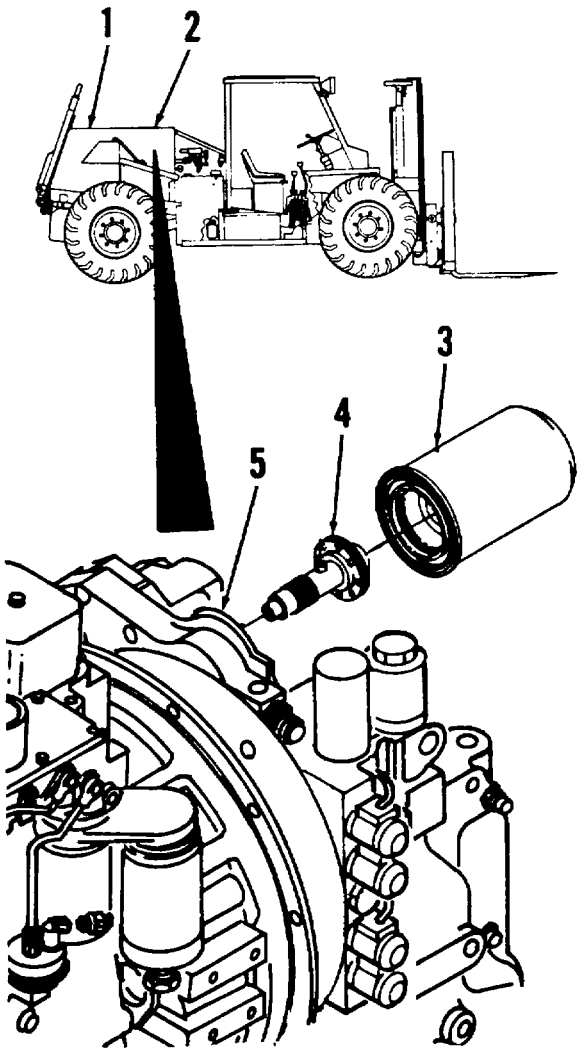
A. REMOVAL

1. Release hood assembly (2) by lifting handle (1). Open hood assembly.

NOTE
Place drain pan beneath oil filter when removing to catch fluids.

2. Using strap wrench, remove oil filter assembly (3). Discard oil filter.

3. Using manufactured tool and 1/2 in. drive handle, remove pressure regulator assembly (4) from transmission (5).



B. CLEANING

Clean pressure regulator assembly and transmission bore in accordance with paragraph 1-24.

C. INSPECTION

Inspect pressure regulator assembly and transmission bore in accordance with paragraph 1-24.

D. INSTALLATION

1. Insert pressure regulator assembly (4) into bore in transmission (5).

2. Using manufactured tool and torque wrench, tighten regulator assembly sleeve to 45 to 50 ft-lbs (61 to 67 Nm).

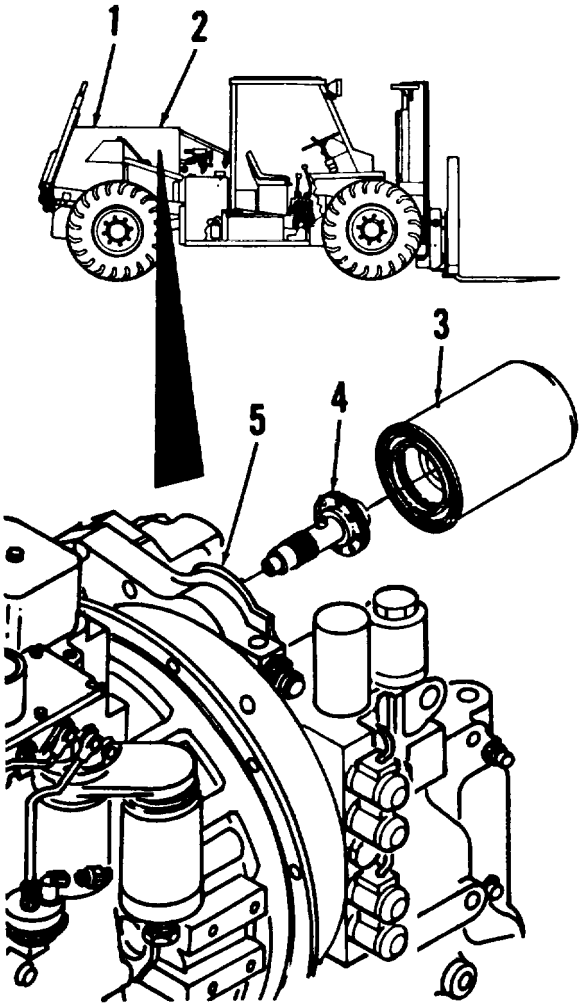
3. Install new oil filter (3). Torque to 20 to 25 ft-lbs (27 to 34 Nm).

4. Close hood assembly (2). Ensure handle (1) is fully engaged.

FOLLOW-ON MAINTENANCE:

Service transmission (para. 2-93)
Raise towbar and lock in position (para. 2-126)

END OF TASK



3-32. TRANSMISSION ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Equipment Condition:

Engine and transmission removed (para. 3-6)

A. REMOVAL

Transmission and engine assemblies are removed from forklift as a unit. Refer to paragraph 3-6 for removal of engine / transmission from forklift and separation of engine and transmission.

B. CLEANING

Clean transmission assembly in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect transmission housing for evidence of fluid leaks. Inspect for cracks or dents.

2. Inspect transmission assembly components in accordance with paragraph 1-24.

D. INSTALLATION

Mate transmission assembly to engine and install assembled unit onto forklift in accordance with paragraph 3-6.

FOLLOW-ON MAINTENANCE:

None

END OF TASK

3-33. TRANSMISSION BRACKET REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

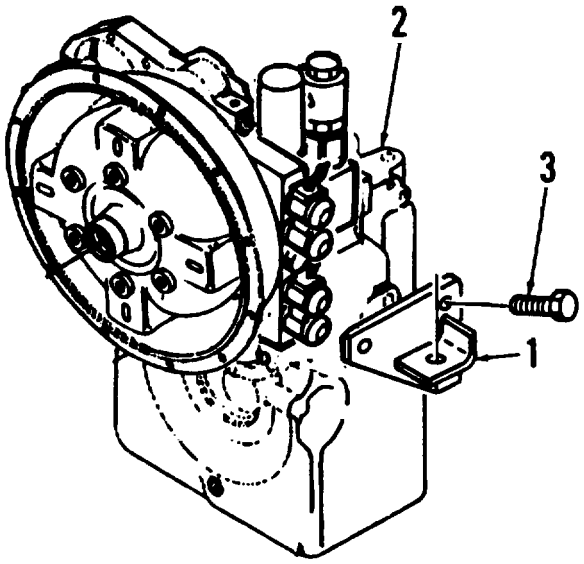
General Mechanics Tool Kit (1, App. E)

Equipment Condition:

Engine and transmission removed (para. 3-6)

A. REMOVAL

Remove transmission brackets (1) from transmission (2) by removing screws (3).



B. CLEANING

Clean brackets in accordance with paragraph 1-24.

C. INSPECTION

Inspect brackets in accordance with paragraph 1-24.

D. INSTALLATION

Install transmission brackets (1) onto transmission (2) using screws (3).

FOLLOW-ON MAINTENANCE:

Install engine and transmission (para. 3-6)

END OF TASK

3-34. MODULATOR VALVE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

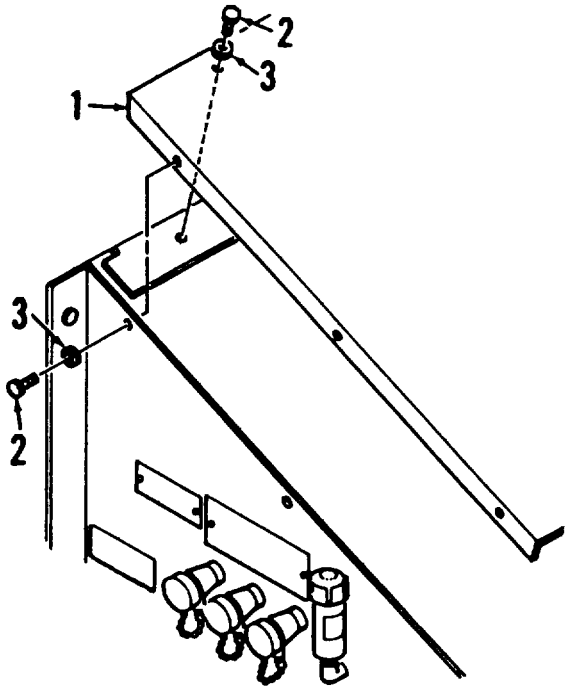
General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
Retaining Ring Pliers (24, App. E)
Torque Wrench (32, App. E)

Materials / Parts:

Lubricating Oil (17, App. C)
Loctite 242 (20, App. C)
O-Ring, Item 5 (1 ea.)
O-Ring, Item 20 (1 ea.)
O-Ring, Item 23 (1 ea.)
Screw, #10-24 UNC x 3.0 in. long

A. REMOVAL

1. Remove top transmission cover (1) by removing nine screws (2) and washers (3).



NOTE

Place drain pan beneath transmission filler hose when removing to catch fluids.

2. Remove transmission filler hose (26) from transmission fitting by loosening clamp (27).

3. Remove modulator housing (4) from transmission (13). Remove and discard O-ring (5).

4. Remove stop pin (6), springs (7, 8, 9), accumulator spool (10), and modulator sleeve (11) from transmission (13). Remove pin (12).

5. Using pliers, remove snap ring (14) from modulator sleeve (11). Remove regulator spool (15), spring (16), and spool stop (17) from modulator sleeve.

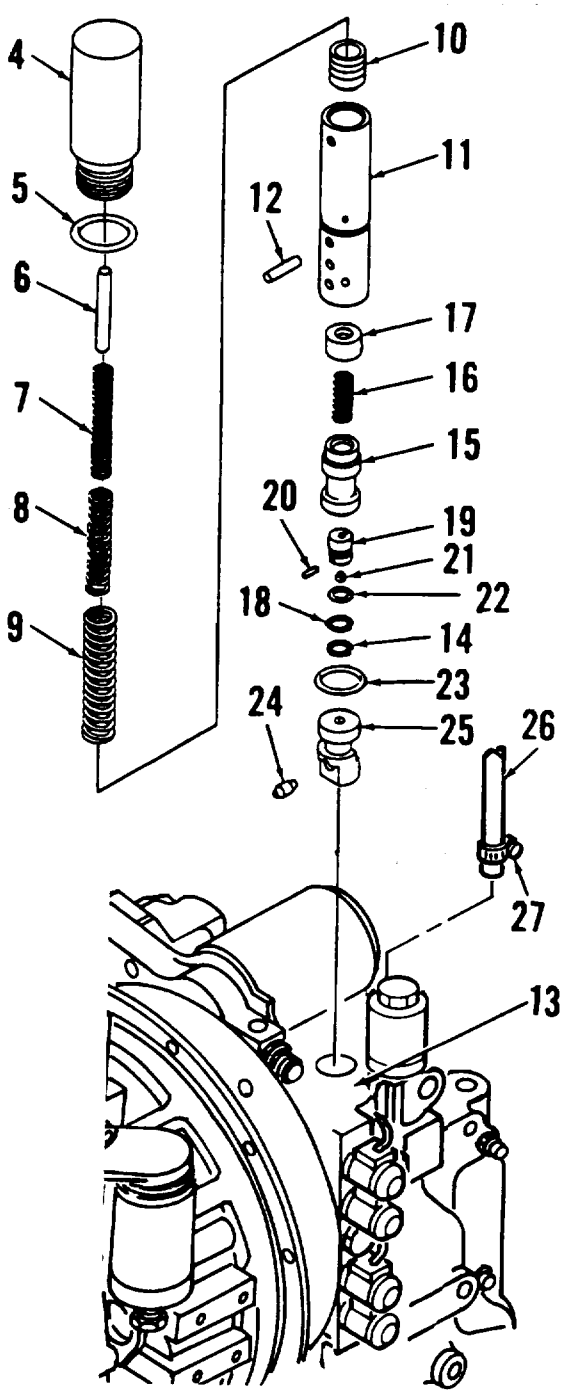
6. Using pliers, remove snap ring (18) from regulator spool (15).

7. Remove spool sleeve (19) from regulator spool (15). Remove pin (20), ball (21), and O-ring (22) from spool sleeve. Discard O-ring.

8. Remove O-ring (23) from modulator sleeve (11). Discard O-ring.

9. Remove shuttle spool (24) from transmission (13).

10. Insert #10-24 UNC x 3.0 in. screw into hole on top of shuttle sleeve (25). Remove shuttle sleeve from transmission (13).



B. CLEANING

Clean modulator valve components in accordance with paragraph 1-24.

C. INSPECTION

Inspect modulator valve components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install shuttle spool (24) and shuttle sleeve (25) into transmission bore.

2. Lubricate new O-ring (22) with clean transmission oil and install onto spool sleeve (19). Install ball (21) and pin (20) into spool sleeve.

3. Insert spool sleeve (19) into regulator spool (15) with pin (20) facing up. Secure using snap ring (18).

4. Install regulator spool (15), spring (16), and spool stop (17) into modulator sleeve (11). Secure using snap ring (14).

5. Lubricate new O-ring (23) with clean lubricating oil and install onto modulator sleeve (21).

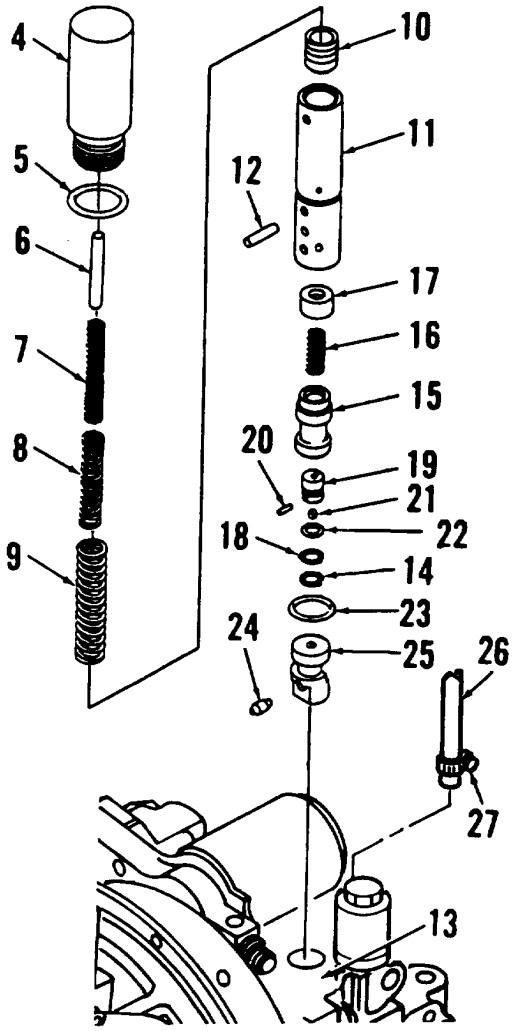
6. Install stop pin (6), springs (7, 8, 9), accumulator spool (10), and modulator sleeve (11) into transmission (13).

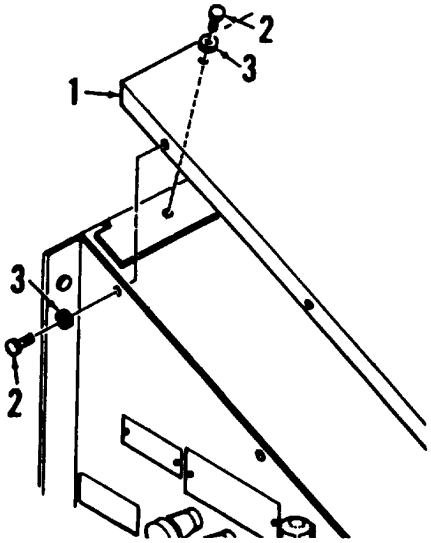
7. Lubricate new O-ring (5) with clean lubricating oil and install onto modulator housing (4).

8. Install modulator housing (4) into transmission (13).

9. Install transmission filler hose (26) onto transmission fitting. Secure by tightening clamp (27).

10. Apply loctite to threads of nine screws (2). Install top transmission cover (1) using screws and washers (3).





FOLLOW-ON MAINTENANCE:

Service transmission (para. 2-93)

END OF TASK

3-35. INCHING VALVE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)

Reference:

TM 10-3930-664-24P

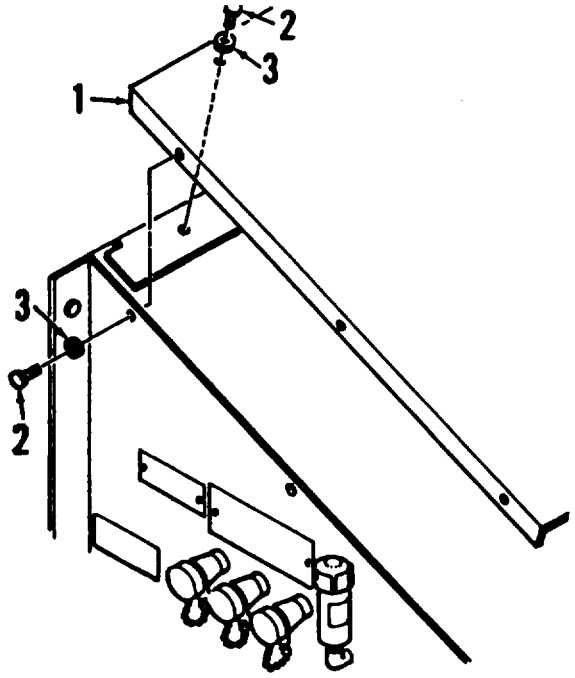
Materials / Parts:

Lubricating Oil (17, App. C)
Loctite 242 (20, App. C)
Packing, Item 13 (1 ea.)
O-Ring, Item 15 (1 ea.)

A. REMOVAL

1. Remove top transmission cover (1) by removing nine screws (2) and washers (3).

NOTE
Place drain pan beneath tube when removing to catch fluids.



2. Tag and disconnect short tube (4) from brake adapter (5). Remove brake adapter from inching cover (6). Remove plugs (7) only if replacement is required.

3. Unscrew inching cover (6) from body (8).

WARNING

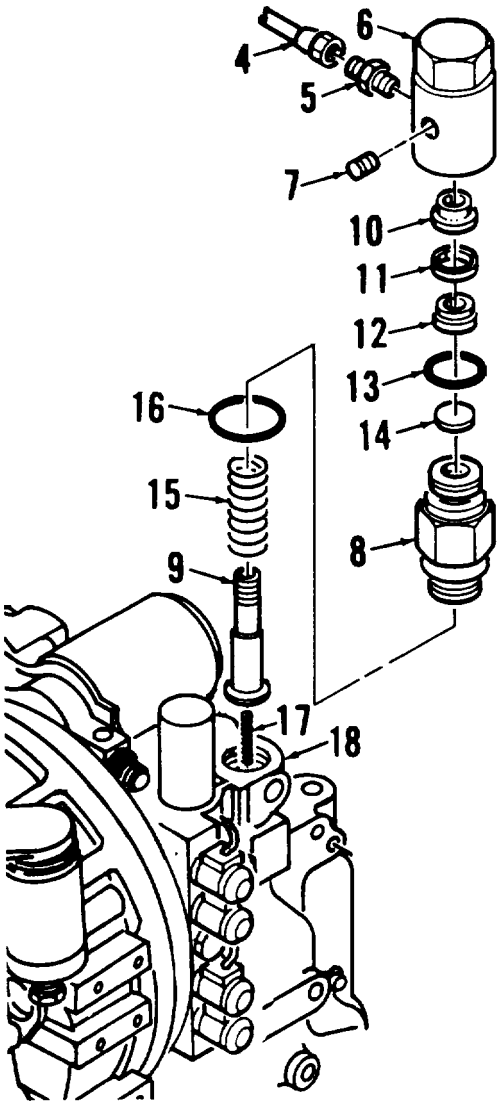
Inching body is under tension from return spring. Use care when removing inching body to prevent damage or injury.

4. Unscrew assembled inching body (8) and actuator rod (9) from transmission (18). Place on a clean work surface for disassembly.

5. Remove upper piston (10), piston seal (11), and lower piston (12) from actuator rod (9).

6. Remove packing (13) and body seal (14) from inching body (9). Discard packing.

7. Remove actuator rod (9), return spring (15) and O-ring (16) from inching body (8). Discard O-ring. Remove spring (17).



B. CLEANING

Clean inching valve components in accordance with paragraph 1-24.

C. INSPECTION

Inspect inching valve components in accordance with paragraph 1-24.

D. INSTALLATION

1. Lubricate new O-ring (16) with clean lubricating oil and install. Install actuator rod (9) and return spring (15) into inching body (8).

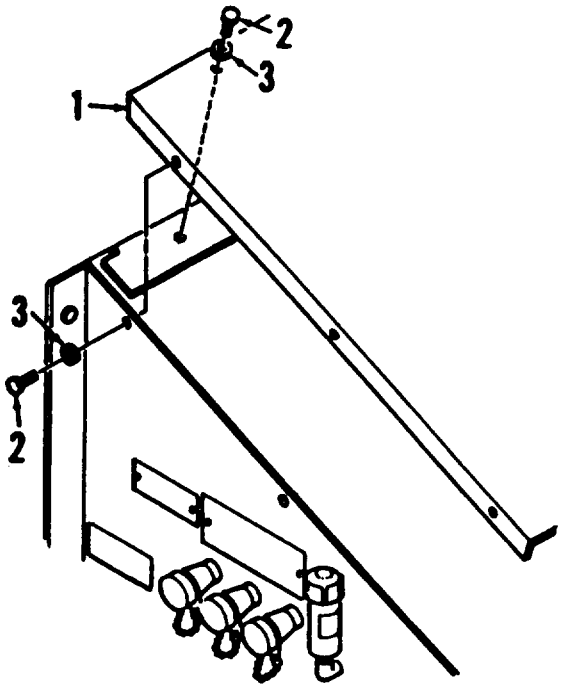
2. Lubricate new packing (13) with clean lubricating oil. Install packing and body seal (14) into inching body (9).

3. Install lower piston (12), piston seal (11), and upper piston (10) onto actuator rod (9).

4. Screw assembled inching body (8) and actuator rod (9) into transmission (18).

5. Screw inching cover (6) onto body (8). Install adapter (5) and connect short tube (4).

6. Apply loctite to threads of nine screws (2). Install top transmission cover (1) using screws and washers (3).



FOLLOW-ON MAINTENANCE:

Transmission Assembly Servicing (para. 2-93), bleed hydraulic inching valve.

END OF TASK

3-36. ELECTRONIC CONTROL VALVE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Equipment Condition:

Batteries disconnected (para. 2-78)

Materials / Parts:

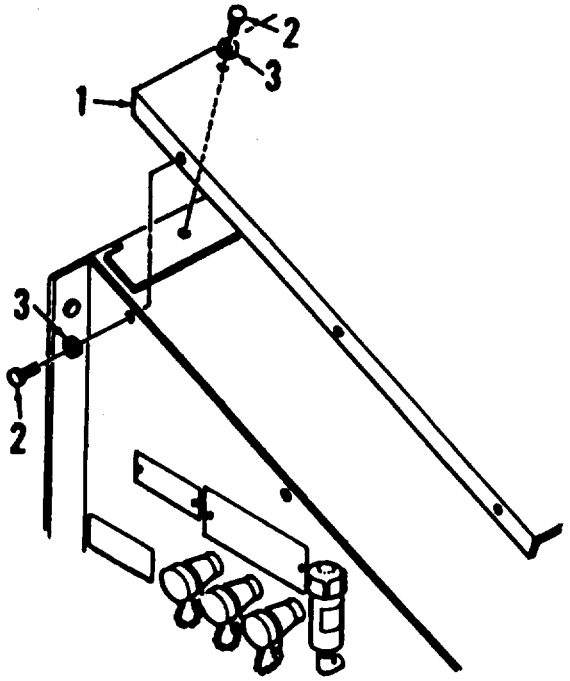
Lubricating Oil (17, App. C)
Loctite 242 (20, App. C)
O-Ring Kit, P/N 802440 (1 ea.)
O-Ring, Item 11 (4 ea.)

A. REMOVAL

1. Remove top transmission cover (1) by removing nine screws (2) and washers (3).

WARNING

Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.



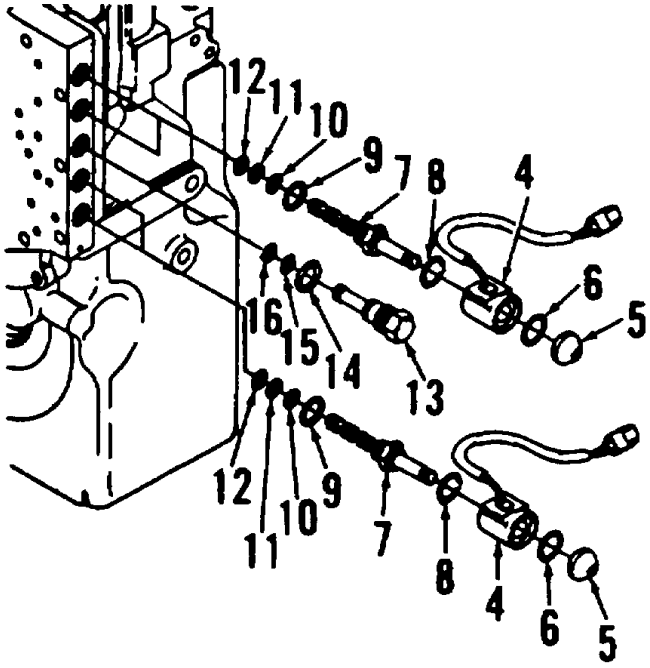
2. Tag and disconnect electrical connectors from solenoid coils (4).

3. Remove cartridge nuts (5) from solenoid coils (4). Remove and discard O-rings (6).

4. Remove solenoid coils (4) from valve cartridges (7).

5. Remove valve cartridges (11) from transmission. Remove and discard O-rings (8 through 12).

6. Remove solenoid bore plug (13). Remove and discard O-rings (14, 15, 16).



B. CLEANING

Clean electronic control valve components in accordance with paragraph 1-24.

C. INSPECTION

Inspect electronic control valve components in accordance with paragraph 1-24.

D. INSTALLATION

1. Lubricate new O-rings (14, 15, 16) with clean lubricating oil and install onto solenoid bore plug (13).

2. Install solenoid bore plug (13) into transmission and tighten to 16 to 20 ft-lbs (22 to 27 Nm).

3. Lubricate new O-rings (8 through 12) with clean lubricating oil and install onto valve cartridges (7).

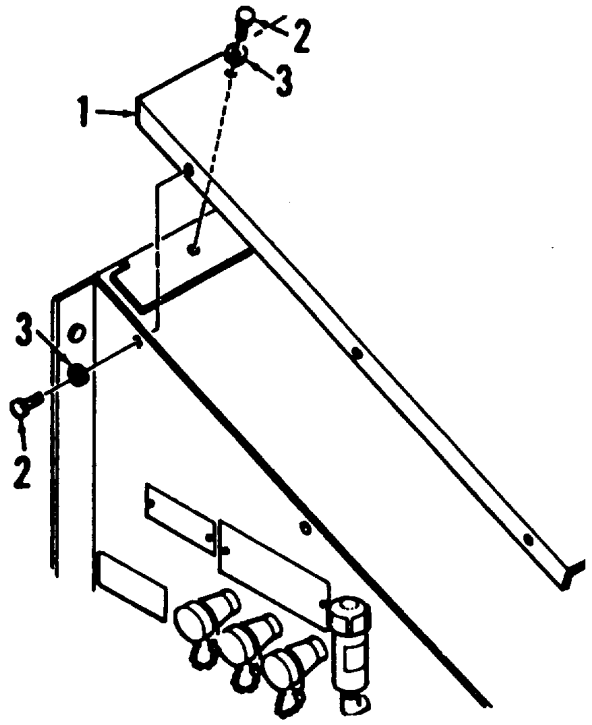
4. Install valve cartridges (7) into transmission cartridge bores. Torque cartridges to 16 to 20 ft-lbs (22 to 27 Nm).

5. Install solenoid coils (4) onto valve cartridges (7).

6. Lubricate new 0-rings (6) with clean lubricating oil and install onto solenoid coils (4). Install cartridge nuts (5).

7. Connect electrical connectors to solenoid coils (4).

8. Apply loctite to threads of nine screws (2). Install top transmission cover (1) using screws and washers (3).



FOLLOW-ON MAINTENANCE:

Connect battery cables (para. 2-78)

END OF TASK

3-37. OIL CHARGING PUMP REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

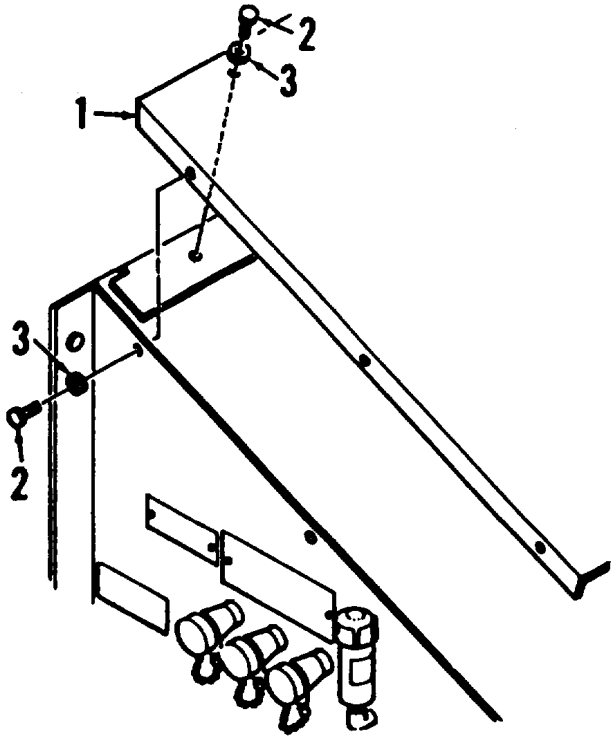
General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Materials / Parts:

Loctite 242 (20, App. C)
Gasket, Item 10 (1 ea.)

A. REMOVAL

1. Remove top transmission cover (1) by removing nine screws (2) and washers (3).



2. Remove screws (4, 5, 6) and washers (7, 8) from oil charging pump (9).

3. Carefully separate oil charging pump (9) from transmission (11). Remove and discard gasket (10).

B. CLEANING

Clean oil charging pump and transmission bore in accordance with paragraph 1-24.

C. INSPECTION

Inspect oil charging pump and transmission bore in accordance with paragraph 1-24.

D. INSTALLATION

1. Mate new gasket (10) to oil charging pump (9).

2. Install oil charging pump (9) into transmission (11), ensuring that pump drive gear meshes with idler gear in transmission.

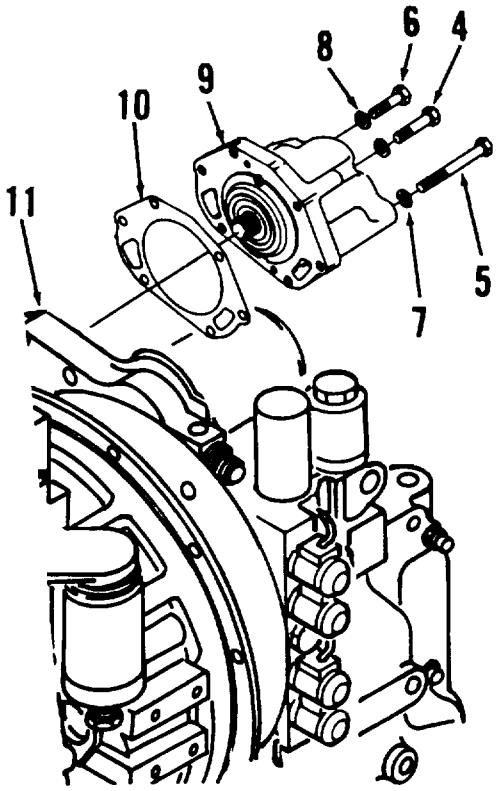
3. Install screws (4, 5, 6) and washers (7, 8). Torque screws (4, 5) to 16 to 20 ft-lbs (22 to 27 Nm). Torque long screw (6) to 26 to 29 ft-lbs (35 to 39 Nm).

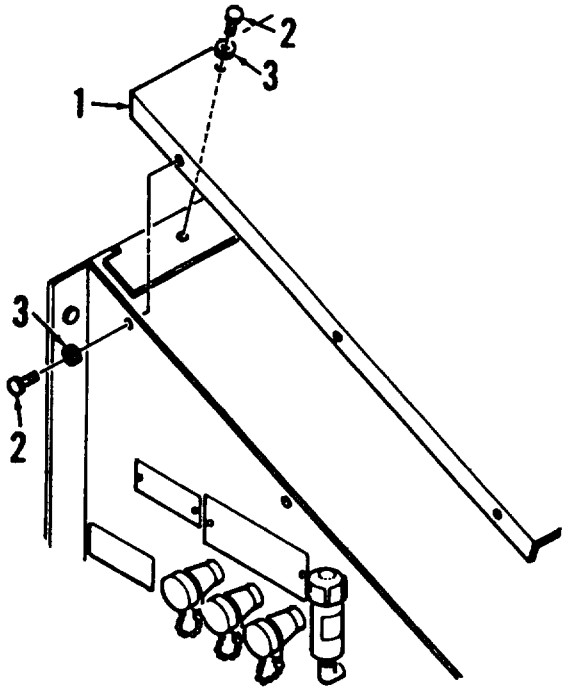
4. Apply loctite to threads of nine screws (2). Install top transmission cover (1) using screws and washers (3).

FOLLOW-ON MAINTENANCE:

None

END OF TASK





Section VIII. FRONT AXLE MAINTENANCE

3-38. FRONT AXLE ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (34, App. E)
Floor Jack (48, App. E)
Jack Stands (8, App. E) (4 ea.)

Materials / Parts:

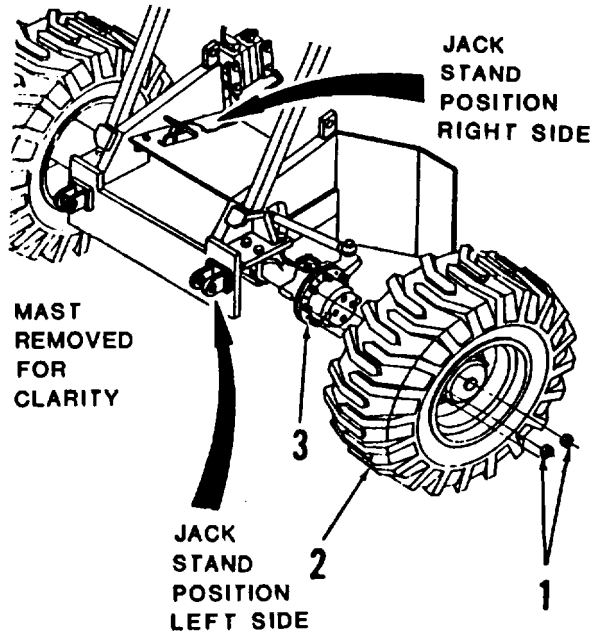
Screw, Item 6 (8 ea.)
Nut, Item 7 (8 ea.)

Equipment Condition:

Front drive shaft removed (para. 2-99, Step 3)
Brake.lines disconnected (para. 2-112, Steps 4 and 8)
Steering lines disconnected (para. 2-119, Step 2)

A. REMOVAL

1. Place two jack stands under rear lifting eyes to stabilize forklift during front axle removal.
2. Loosen but do not remove lug nuts (1).
3. Place floor jack under front of unit, centered on chassis. Raise unit approximately 12 inches and install two jack stands under chassis. Place one jack stand under mast mounting clevis on left side. Place second jack stand under frame rail on the right side, as near the directional control valve as possible. Remove floor jack.
4. Remove wheels (2) from axle planet gears (3) by removing lug nuts (1).



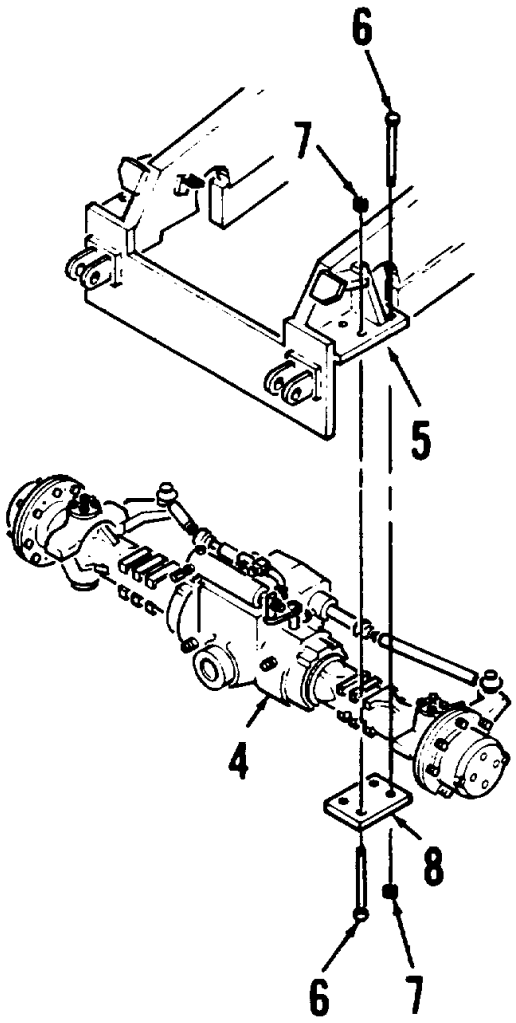
WARNING

Front axle assembly is very heavy and awkward. Enlist the help of an aide when removing from chassis to prevent injury to personnel and damage to components.

4. Place floor jack under center of front axle assembly (4). Raise floor jack until it meets front axle assembly.

5. Release front axle assembly (4) from forklift chassis (5) by removing screws (6), nuts (7), and axle retainers (8). Discard screws and nuts.

6. Lower floor jack. Pull front axle assembly (4) out from side of chassis (5).



B. CLEANING

Clean front axle assembly in accordance with paragraph 1-24.

C. INSPECTION

1. Perform overall inspection of front axle assembly components in accordance with paragraph 1-24.

2. Inspect all hydraulic fittings for evidence of leakage. Tighten fittings as required.

3. Inspect for evidence of leakage at plugs. Tighten plugs as required.

4. Inspect steering case pivot pins for evidence of leakage. Check for signs of excessive wear and evidence of rubbing.

5. Inspect tie rods for obvious damage. Ensure tie rod ends are securely fastened. Tighten as required.

D. INSTALLATION

WARNING

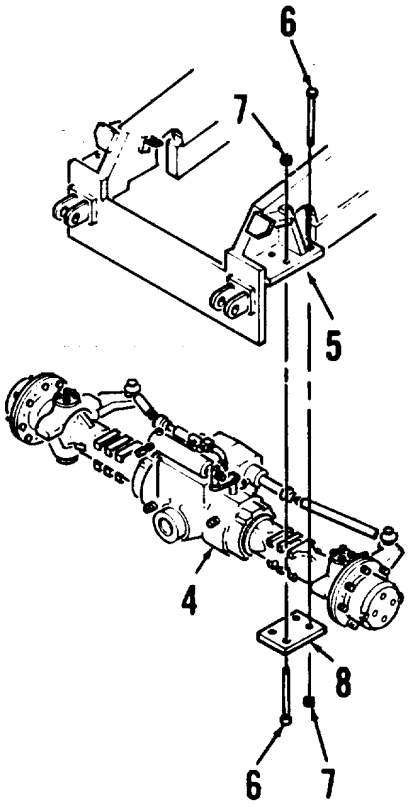
Front axle assembly is very heavy and awkward. Enlist the help of an aide when installing onto chassis to prevent injury to personnel and damage to components.

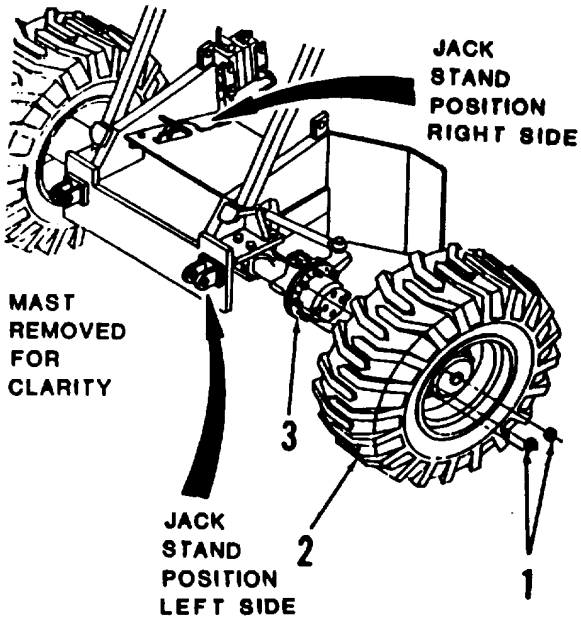
1. Place front axle assembly (4) under chassis (5) and center on top of floor jack.
2. Connect right hand steering hose to front axle assembly fitting.
3. Raise floor jack until front axle assembly (4) mates with chassis mounts. Position axle so that inside of chassis mount is 12.38 inches from centerline of axle.

NOTE

When securing front axle assembly, rear outside screw installs from top of chassis. Remaining three screws install from bottom.

4. Secure front axle assembly to chassis (5) using new screws (6), new nuts (7), and axle retainers (8). Torque screws in two steps, first to 250 ft-lbs, then to 420 ft-lbs.
5. Connect brake lines to front axle in accordance with paragraph 2-112, Steps 10 and 11.
6. Install wheels (2) onto planet gear carriers (3). Install lug nuts (1) and tighten.
7. Raise unit and remove front jack stands. Lower unit. Torque lug nuts (1) in a criss-cross pattern to 300 ft-lbs (407 Nm).
8. Remove rear jack stands.





FOLLOW-ON MAINTENANCE:

Install front drive shaft (para. 2-99)
Connect steering lines (para. 2-119)
Bleed brake lines (para. 2-102)

END OF TASK

3-39. FRONT AXLE STEERING CYLINDER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (34, App. E)

Equipment Condition:

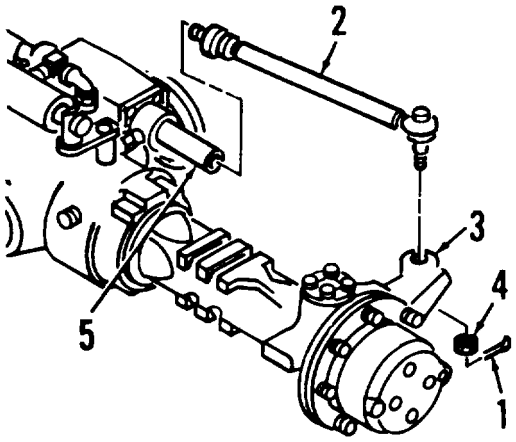
Front axle assembly removed (para. 3-38)

Materials / Parts:

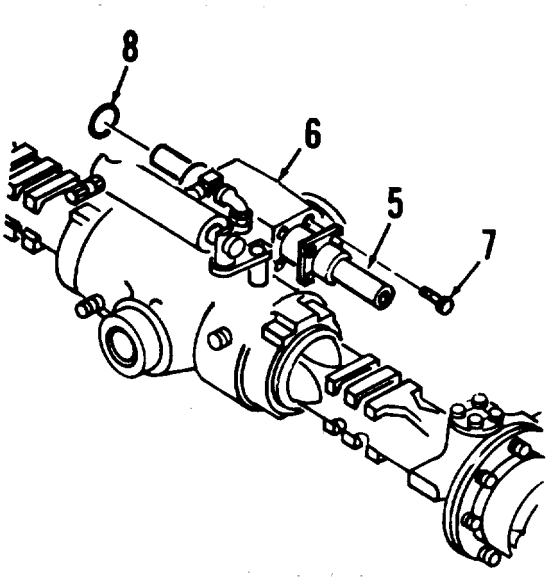
Lubricating Oil (16, App. C)
Loctite 242 (20, App. C)
Cotter Pin, Item 1 (2 ea.)
O-Ring, Item 8 (1 ea.)

A. REMOVAL

1. Remove and discard cotter pins (1). Remove tie rods (2) from steering cases (3) by removing nuts (4).
2. Unscrew tie rods (2) from steering cylinder (5).



3. Remove steering cylinder (5) from differential housing (6) by removing four bolts (7). Remove and discard O-ring (8).



B. CLEANING

Clean steering cylinder in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect steering cylinder and differential housing in accordance with paragraph 1-24.

2. Inspect tie rods for obvious damage

D. INSTALLATION

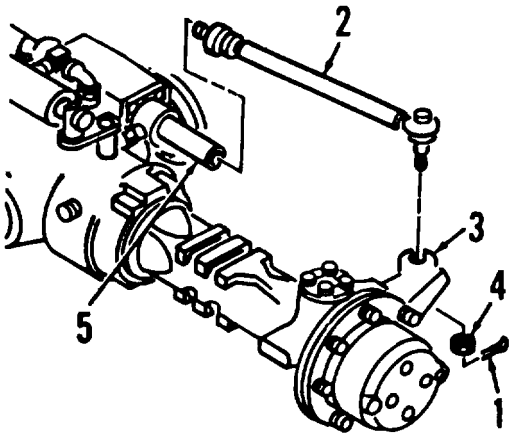
1. Lubricate new O-ring (8) with clean lubricating oil and install into differential housing (6).

2. Install steering cylinder (5) into differential housing (6) and secure using four bolts (7).

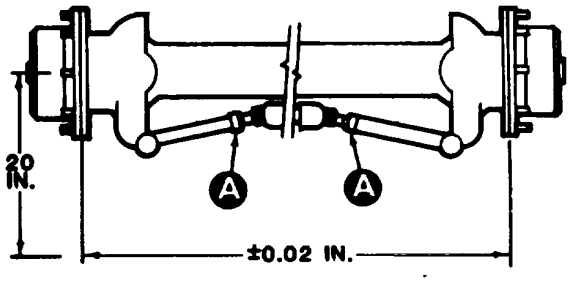
3. Apply a light coat of loctite to threads of tie rods (2). Screw tie rods into steering cylinder (5).

4. Insert tie rods (2) into steering cases (3) and secure using nuts (4). Torque nuts to 192 to 215 ft-lbs (260 to 290 Nm).

5. Loosen nuts (4) slightly until holes in nuts align with holes in tie rods (2). Install new cotter pins (1).



6. Check tie rod alignment as follows:

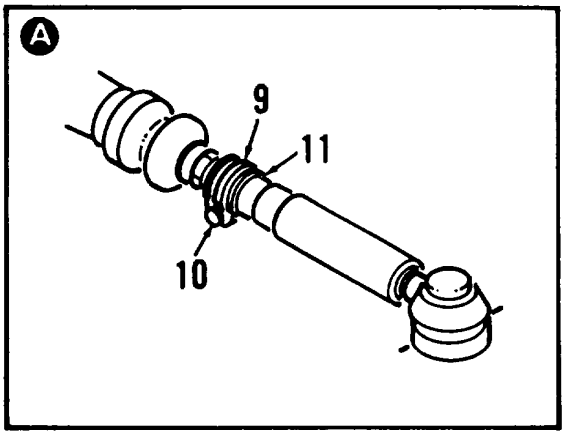


   a. Ensure that piston rod of steering cylinder is at half stroke.

   b. Check parallelism between both wheel hubs at approximately 20 inches from hub center.

   c. If not parallel, loosen security clip bolts (10) and nuts (11).

   d. Adjust until parallel. Position security clips (9) and tighten bolts (10) and nuts (11).



FOLLOW-ON MAINTENANCE:

Install front axle assembly (para. 3-38)

END OF TASK

3-40. FRONT AXLE STEERING CYLINDER REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Retaining Ring Pliers (24, App. E)

Equipment Condition:

Steering cylinder removed (para. 3-39)

Materials / Parts:

Lubricating Oil (16, App. C)
Cylinder Kit, P/N 278.24.450.01 (1 ea.)

A. DISASSEMBLY

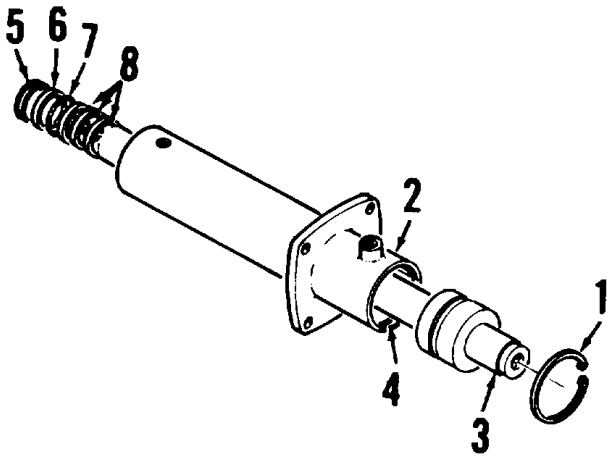
1. Using pliers, remove snap ring (1) from cylinder housing (2).

2. Push piston rod (3) with gland into cylinder housing (2) until snap ring (4) is exposed.

CAUTION
Use care when extracting snap ring (4) to prevent damage to inside of cylinder housing (2). Use a deburred screwdriver.

3. Use screwdriver to remove snap ring (4) from cylinder housing (2).

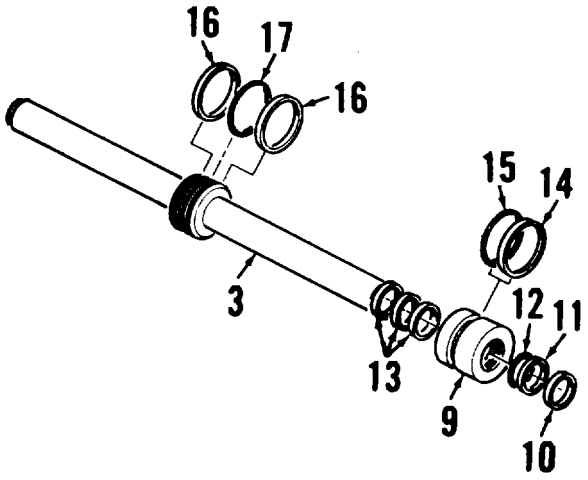
4. Remove piston rod (3) from cylinder housing (2). Remove and discard wiper (5), back-up ring (6), seal ring (7), and three wear rings (8).



5. Remove gland (9) from piston rod (3).Remove and discard wiper (10), back-up ring (11), seal ring (12), and three wear rings (13).

6. Remove and discard back-up ring (14) and O-ring (15).

7. Remove and discard wear rings (16) and glyd ring (17).



B. CLEANING

Clean steering cylinder components in accordance with paragraph 1-24.

C. INSPECTION

Inspect steering cylinder components in accordance with paragraph 1-24.

D. REPAIR

1. Repair of the steering cylinder consists of removal and replacement of defective, deformed, or damaged components.

2. Replace all rings, wipers, and seals with new components from parts kit.

E. ASSEMBLY

1. Install new wear rings (16) and glyd ring (17) onto piston rod (3).

2. Lubricate new O-ring (15) with clean lubricating oil and install onto gland (9). Install new back-up ring (14).

3. Install new wiper (10), back-up ring (11), seal ring (12), and three wear rings (13) into gland (9). Install gland onto piston rod (3).

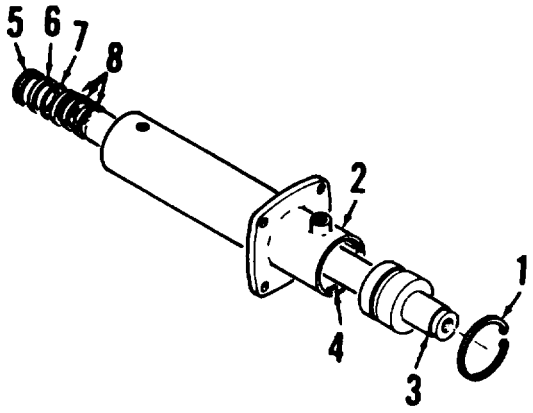
4. Install new wiper (5), back-up ring (6), seal ring (7), and three wear rings (8) into cylinder housing (2).

CAUTION

Use care when installing piston rod (3) to prevent damage to wiper, rings, and inside of cylinder housing (2).

5. Carefully insert piston rod (3) with gland into cylinder housing (2) until groove in cylinder housing is exposed. Install snap ring (4).

6. Push piston rod (3) with gland out of cylinder housing (2) until groove in gland is outside housing. Secure using snap ring (1).



FOLLOW-ON MAINTENANCE:

Install steering cylinder (para. 3-39)

END OF TASK

Section IX. REAR AXLE MAINTENANCE

3-41. REAR AXLE ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

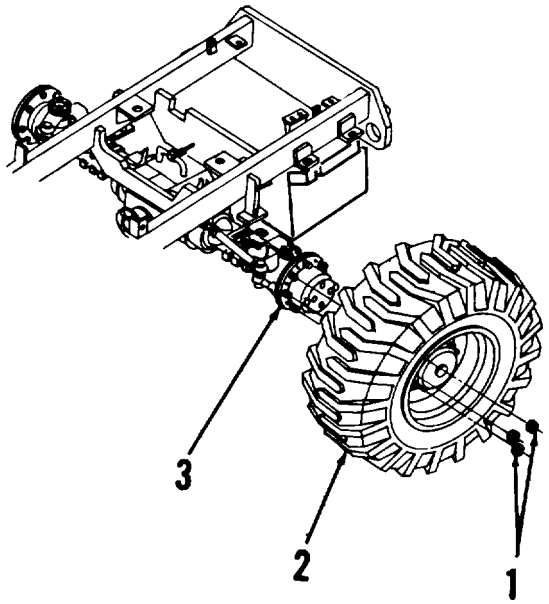
General Mechanics Tool Kit (1, App. E)
Torque Wrench (34, App. E)
Floor Jack (48, App. E)

Equipment Condition:

Counterweight removed (para. 2-124)
Rear drive shaft removed (para. 2-99, Step 6)
Brake lines disconnected (para. 2-112, Step 13)
Steering lines disconnected (para. 2-119, Step 8)

A. REMOVAL

1. Loosen but do not remove lug nuts (1).
2. Remove wheels (2) from axle planet gears (3) by removing lug nuts (1).



WARNING

Rear axle assembly is very heavy and awkward. Enlist the help of an aide when removing from chassis to prevent injury to personnel and damage to components.

3. Place floor jack under center of rear axle assembly (4). Raise floor jack until it meets rear axle assembly.

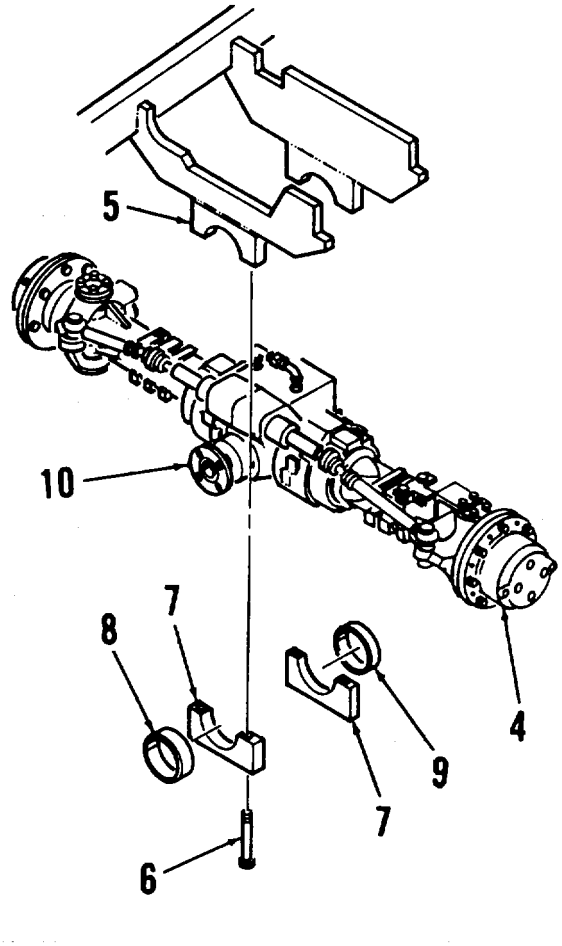
4. Match mark upper trunnions (5) to lower trunnions (7) to ensure similar installation.

5. Release rear axle assembly (4) from upper trunnions (5) by removing screws (6) and lower trunnions (7).

6. Lower floor jack until rear axle assembly (4) is clear of upper trunnions (5). Pull rear axle assembly (4) out from rear of chassis.

7. Remove rear axle bushing (9) from rear axle assembly (4).

8. Remove axle flange (10) and front axle bushing (8).



B. CLEANING

Clean rear axle assembly in accordance with paragraph 1-24.

C. INSPECTION

1. Perform overall inspection of rear axle assembly components in accordance with paragraph 1-24.

2. Inspect all hydraulic fittings for evidence of leakage. Tighten fittings as required.

3. Inspect for evidence of leakage at plugs.

Tighten plugs as required.

4. Inspect steering case pivot pins for evidence of leakage. Check for signs of excessive wear and evidence of rubbing.

5. Inspect tie rods for obvious damage. Ensure tie rod ends are securely fastened. Tighten as required.

D. INSTALLATION

WARNING

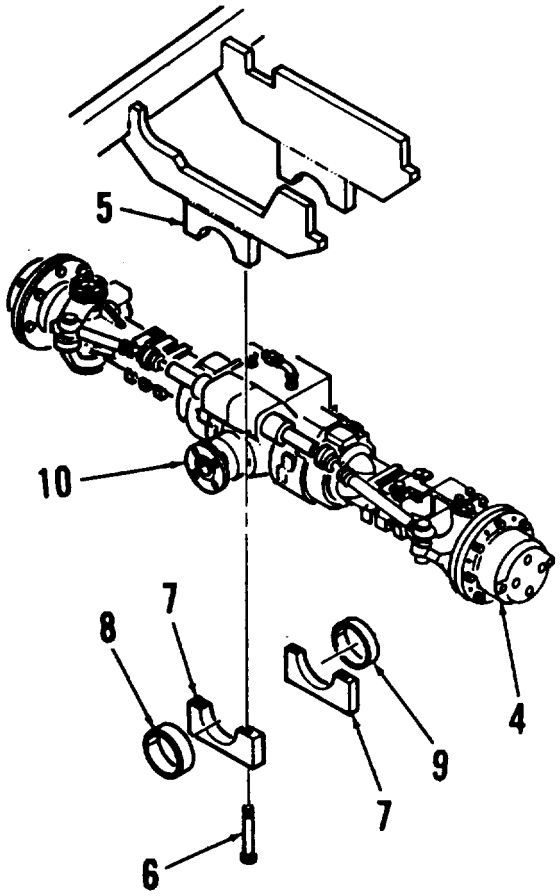
Front axle assembly is very heavy and awkward. Enlist the help of an aide when installing onto chassis to prevent injury to personnel and damage to components.

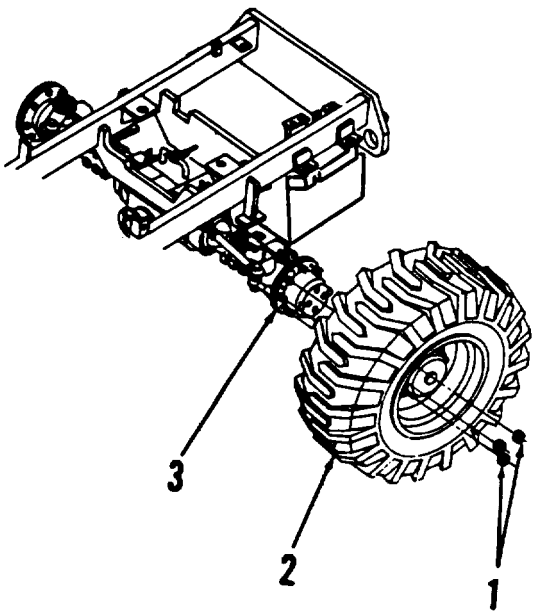
1. Install rear axle bushing (9) onto rear axle assembly (4).
2. Install axle flange (10) and front axle bushing (8). Torque to 190 to 220 in-lbs (22 to 25 Nm).
3. Place rear axle assembly (4) under chassis and center on top of floor jack.
4. Connect right hand steering hose to rear axle assembly fitting.

NOTE

Using match marks, mate lower trunnions to original upper trunnions.

5. Raise floor jack until rear axle assembly (4) mates with upper trunnions (5). Secure rear axle assembly using lower trunnions (7) and screws (6). Torque screws (6) to 260 ft-lbs.
6. Connect brake lines to rear axle in accordance with paragraph 2-112, Step 5.
7. Install wheels (2) onto planet gear carriers (3). Install lug nuts (1) and tighten.
8. Raise unit and remove jack stands. Lower unit. Torque lug nuts (1) in a criss-cross pattern to 300 ft-lbs (407 Nm).





FOLLOW-ON MAINTENANCE:

Install counterweight (para. 2-124)
Install rear drive shaft (para. 2-99)
Connect steering lines (para. 2-119)
Bleed rear brakes (para. 2-104)

END OF TASK

3-42. REAR AXLE STEERING CYLINDER REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (34, App. E)

Equipment Condition:

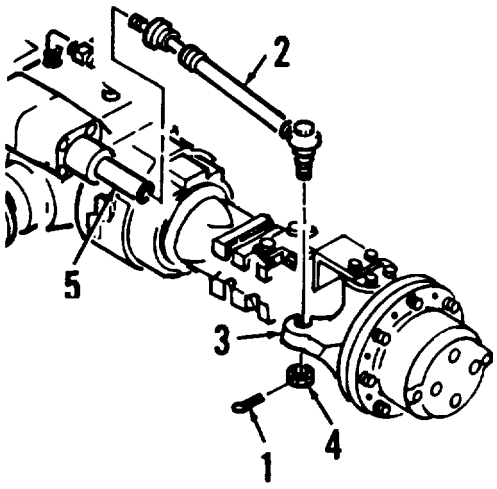
Rear axle assembly removed (para. 3-41)

Materials / Parts:

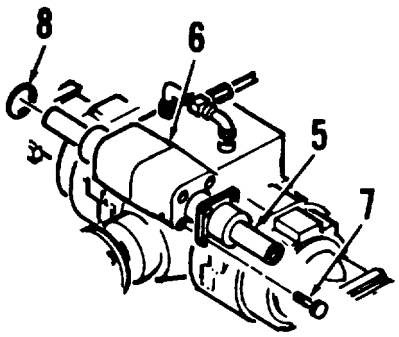
Lubricating Oil (16, App. C)
Loctite 242 (20, App. C)
Cotter Pin, Item 1 (2 ea.)
O-Ring, Item 8 (1 ea.)

A. REMOVAL

1. Remove and discard cotter pins (1). Remove tie rods (2) from steering cases (3) by removing nuts (4).
2. Unscrew tie rods (2) from steering cylinder (5).



3. Remove steering cylinder (5) from differential housing (6) by removing four bolts (7). Remove and discard O-ring (8).



B. CLEANING

Clean steering cylinder in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect steering cylinder and differential housing in accordance with paragraph 1-24.

2. Inspect tie rods for obvious damage

D. INSTALLATION

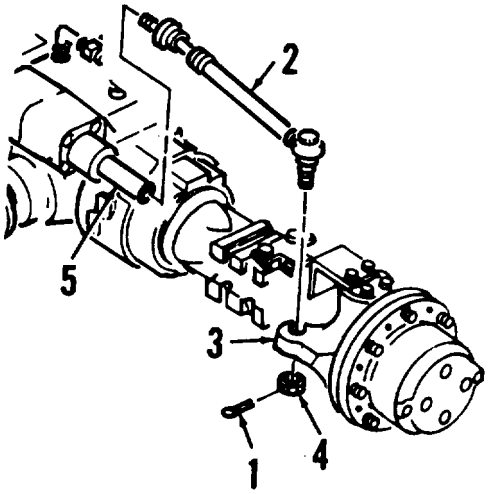
1. Lubricate new O-ring (8) with clean lubricating oil and install into differential housing (6).

2. Install steering cylinder (5) into differential housing (6) and secure using four bolts (7).

3. Apply a light coat of loctite to threads of tie rods (2). Screw tie rods into steering cylinder (5).

4. Insert tie rods (2) into steering cases (3) and secure using nuts (4). Torque nuts to 192 to 215 ft-lbs (260 to 290 Nm).

5. Loosen nuts (4) slightly until holes in nuts align with holes in tie rods (2). Install new cotter pins (1).



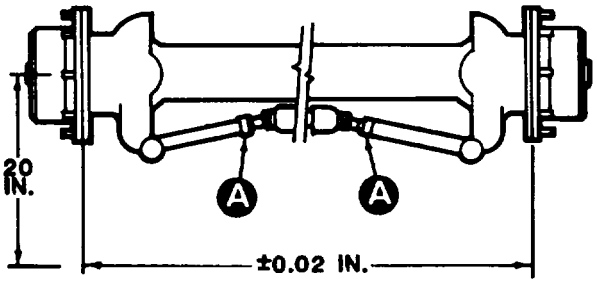
6. Check tie rod alignment as follows:

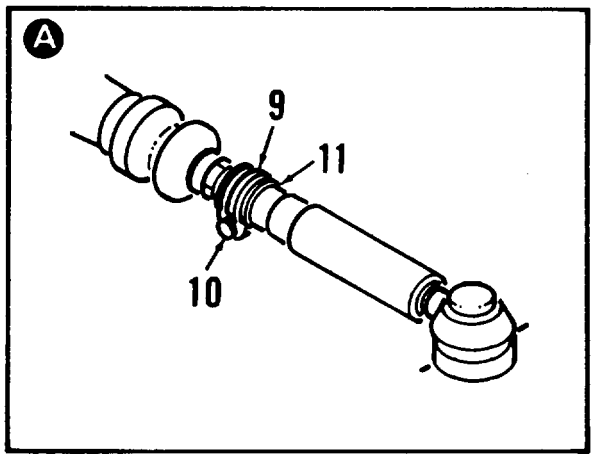
   a. Ensure that piston rod of steering cylinder is at half stroke.

   b. Check parallelism between both wheel hubs at approximately 20 inches from hub center.

   c. If not parallel, loosen security clip bolts (10) and nuts (11).

   d. Adjust until parallel. Position security clips (9) and tighten bolts (10) and nuts (11).





FOLLOW-ON MAINTENANCE:

Install rear axle assembly (para. 3-41)

END OF TASK

3-43. REAR AXLE STEERING CYLINDER REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Retaining Ring Pliers (24, App. E)

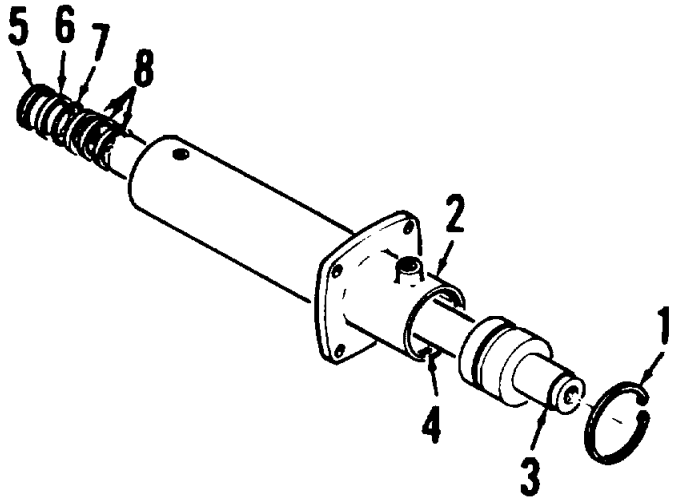
Equipment Condition:

Steering cylinder removes (para. 3-42)

Materials / Parts:

Lubricating Oil (16, App. C)
Cylinder Kit, P/N 278.24.450.01 (1 ea.)

A. DISASSEMBLY



1. Using pliers, remove snap ring (1) from cylinder housing (2).

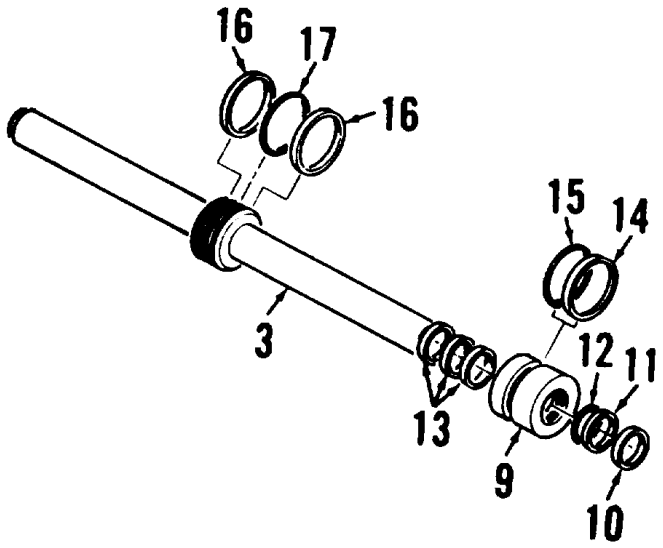
2. Push piston rod (3) with gland into cylinder housing (2) until snap ring (4) is exposed.

CAUTION
Use care when extracting snap ring (4) to prevent damage to inside of cylinder housing (2). Use a deburred screwdriver.

3. Use screwdriver to remove snap ring (4) from cylinder housing (2).

4. Remove piston rod (3) from cylinder housing (2). Remove and discard wiper (5), back-up ring (6), seal ring (7), and three wear rings (8).

5. Remove gland (9) from piston rod (3). Remove and discard wiper (10), back-up ring (11), seal ring (12), and three wear rings (13).
6. Remove and discard back-up ring (14) and O-ring (15).
7. Remove and discard wear rings (16) and glyd ring (17).



B. CI.EANING

Clean steering cylinder components in accordance with paragraph 1-24.

C. INSPECTION Inspect steering cylinder components in accordance with paragraph 1-24.

D. REPAIR

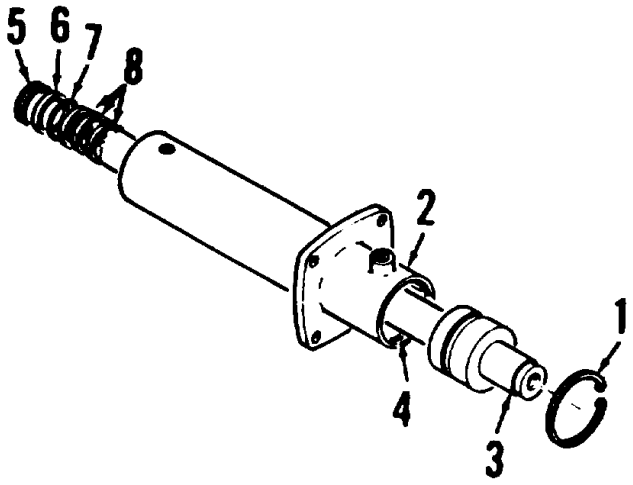
1. Repair of the steering cylinder consists of removal and replacement of defective, deformed, or damaged components.
2. Replace all rings, wipers, and seals with new components from parts kit.

E. ASSEMBLY

1. Install new wear rings (16) and glyd ring (17) onto piston rod (3).
2. Lubricate new O-ring (15) with clean lubricating oil and install onto gland (9). Install new back-up ring (14).
3. Install new seal ring (12), back-up ring (11), wiper ring (10), and three wear rings (13) into gland (9). Install gland onto piston rod (3).

4. Install three new wear rings (8), and new seal ring (7), back-up ring (6), and wiper (5) into cylinder housing (2).

5. Carefully insert piston rod (3) with gland into cylinder housing (2) until groove in cylinder housing is exposed. Install snap ring (4).
6. Push piston rod (3) with gland out of cylinder housing (2) until groove in gland is outside housing. Secure using snap ring (1).



FOLLOW-ON MAINTENANCE:

Install steering cylinder (para. 3-42)

END OF TASK

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Section X. BRAKE MAINTENANCE

3-44. PARK BRAKE CYLINDER REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Too] Kit (1, App. E)
Arbor Press (25, App. E)
Spanner Wrench (31, App. E)
Strap Wrench (47, App. E)
Vise (30, App. E)

Equipment Condition:

Park brake cylinder removed (para. 2-105)

Materials / Parts:

Lubricating Oil (16, App. C)
Cylinder Kit, P/N 6331-TC230 (1 ea.)

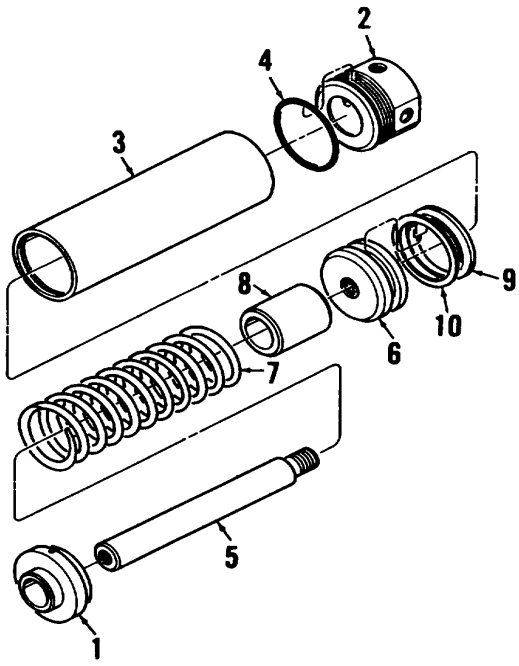
A. DISASSEMBLY

1. Place cylinder in arbor press with rod end head (1) down. Close press against rod end head and blind end head (2).

WARNING

Do not remove cylinder from press until blind end head is fully released from body threads. Head is under spring pressure and could injure personnel.

2. Install strap wrench onto cylinder body (3). Insert 1/2 inch rod through hole in blind end head (2). Turn head counterclockwise while releasing arbor press to disengage head from body.
3. Remove cylinder from arbor press and place on a clean work surface for further disassembly.
4. Remove blind end head (2) from body (3). Remove and discard seal (4).



5. Remove assembled rod (5) and piston (6) from body (3). Remove spring (7) and stop tube (8).
6. Remove and discard seal (9) and ring (10). Remove piston (6) from rod (5).
7. Remove rod end head (1) from body (3) using an adjustable spanner wrench.

B. CLEANING

Clean park brake cylinder components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect park brake cylinder components in accordance with paragraph 1-24.
2. Inspect body to ensure drain hole is open.

D. REPAIR

1. Repair of the park brake cylinder consists of removal and replacement of defective, deformed, or damaged components.
2. Replace seals and ring with new components from repair kit.

E. ASSEMBLY

1. Install rod end head (1) onto body (3) using an adjustable spanner wrench.
2. Place body (3) in arbor press with rod end head (1) down.
3. Insert spring (7) and stop tube (8) into body (3).
4. Install new seal (9) and ring (10) onto piston (6). Lips of seal and ring shall face blind end of cylinder.
5. Install piston (6) onto rod (5). Install assembled components into body (3).
6. Install new seal (4) onto blind end head (2). Seat blind end head onto body (3).
7. Using press, carefully apply pressure to blind end head (2) to compress spring.
8. Install strap wrench onto body (3). Turn blind end head (2) clockwise using a 1/2 inch rod. Ensure that drain hole in body (3) is in-line with through hole in blind end head.
9. Remove park brake cylinder from arbor press.

FOLLOW-ON MAINTENANCE:

Install park brake cylinder (para. 2-105)

END OF TASK

Section XI. STEERING COMPONENT MAINTENANCE

3-45. ARTICULATION TIE ROD ADJUSTMENT

This task covers: Adjustment

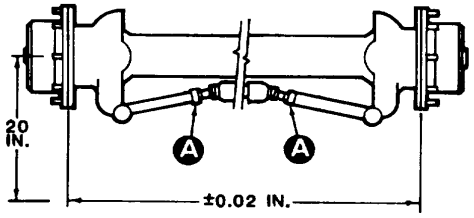
INITIAL SETUP:

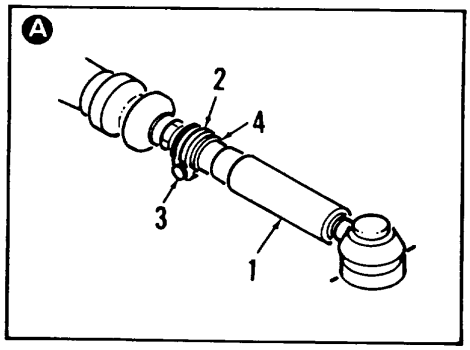
Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

A. TIE ROD ADJUSTMENT

1. Ensure that piston rod of steering cylinder is at half stroke.
2. Check parallelism between both wheel hubs at approximately 20 inches from hub center.
3. If not parallel, loosen security clip bolts (2) and nuts (3).
4. Adjust until parallel. Position security clips (4) and tighten bolts (2) and nuts (3).





FOLLOW-ON MAINTENANCE:

None

END OF TASK

3-46. ARTICULATION TIE ROD REPLACEMENT

This task covers: Removal, Cleaning, Inspection, Installation, and Adjustment

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (34, App. E)

Materials / Parts:

Loctite 242 (20, App. C)
Cotter Pin, Item 3 (1 ea.)

A. REMOVAL.

1. Remove and discard cotter pin (3). Remove tie rod (1) from steering case (2) by removing nut (4).
2. Unscrew tie rod (1) from steering cylinder (5).

B. CLEANING

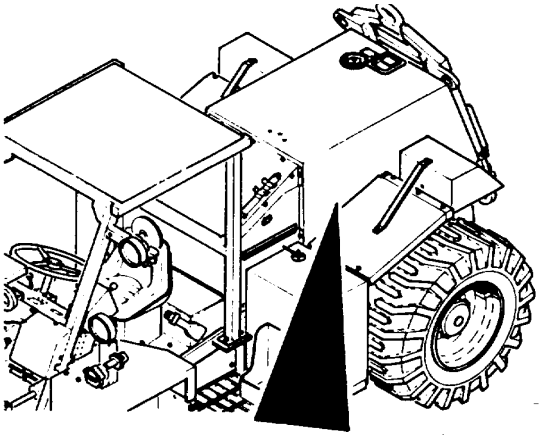
Clean articulation tie rod in accordance with paragraph 1-24.

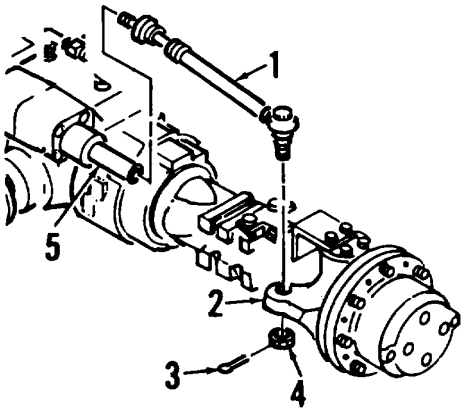
C. INSPECTION

Inspect tie rod in accordance with paragraph 1-24.

D. INSTALLATION

1. Apply a light coat of loctite to threads of tie rod (1). Screw tie rod into steering cylinder (5).
2. Insert tie rod (1) into steering case (2) and secure using nut (4). Torque nut to 192 to 215 ft-lbs (260 to 290 Nm).
3. Loosen nut (4) slightly until hole in nut aligns with hole in tie rod (1). Install new cotter pin (3).

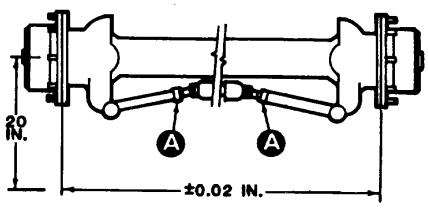


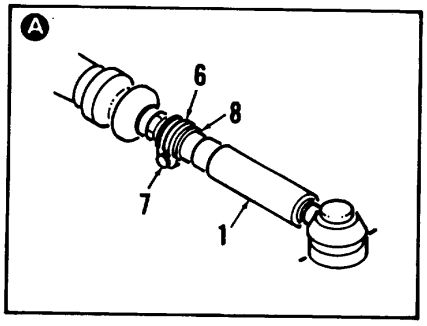


POWERTRAIN COMPONENTS
NOT SHOWN FOR CLARITY

E. ADJUSTMENT

1. Ensure that piston rod of steering cylinder is at half stroke.
2. Check parallelism between both wheel hubs at approximately 20 inches from hub center.
3. If not parallel, loosen security clip bolts (6) and nuts (7).
4. Adjust until parallel. Position security clips (8) and tighten bolts (6) and nuts (7).





FOLLOW-ON MAINTENANCE:

None

END OF TASK

3-47. ORBITAL STEERING VALVE REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Vise (30, App. E)
Retaining Ring Pliers (24, App. E)
Torque Wrench (32, App. E)
Torque Wrench (34, App. E)
Soft Headed Hammer (23, App. E)

Equipment Condition:

Orbital steering valve removed (para. 2-120)

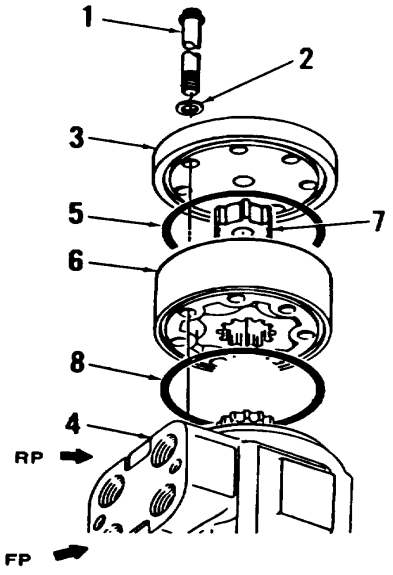
Materials / Parts:

Seal, Item 5 (1 ea.)
Seal, Item 7 (1 ea.)
Seal, Item 10 (1 ea.)
Seal, Quad Ring, Item 17 (1 ea.)
Seal, Item 21 (1 ea.)
Retaining Ring, Item 14 (1 ea.)
Screw, 1/8"-24, machine, 1-1/2 in. long (1 ea.)

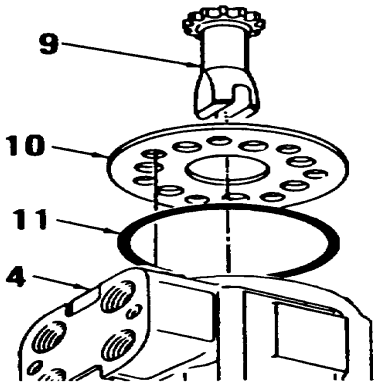
A. DISASSEMBLY

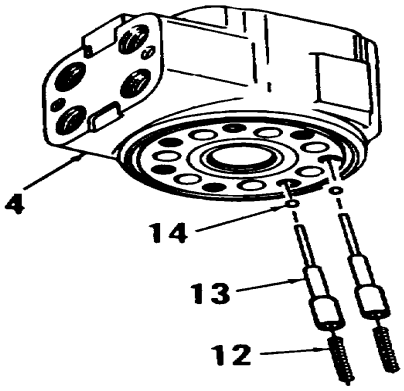
CAUTION
Use care when clamping valve in vise. Housing distortion could result if jaws are overtightened. Use protective material on vise jaws to prevent damage.

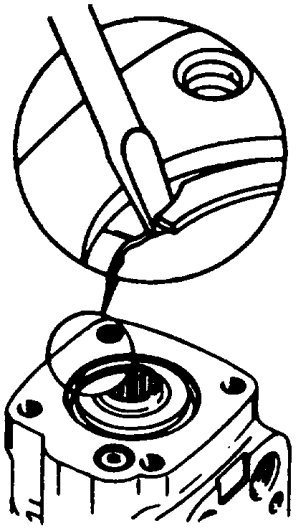
1. Install valve in vise, meter end up.
2. Remove seven cap screws (1) and seal washers (2) from end cap (3).
3. Remove end cap (3) from valve housing (4). Remove and discard seal (5).
4. Separate drive spacer (7) and meter (6) from housing (4). Ensure star remains with meter. Remove and discard seal (8).

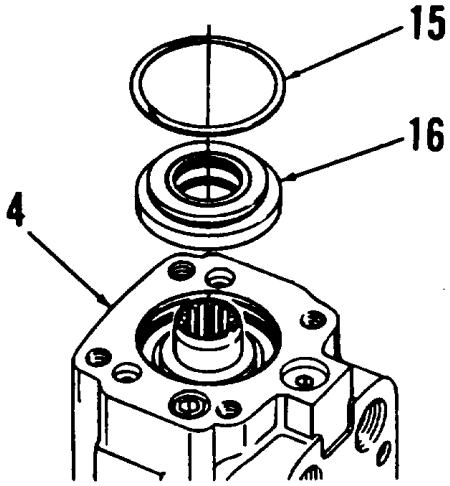


5. Remove drive (9) and spacer plate (10) from housing (4). Remove and discard seal (11).
6. Remove housing from vise.
7. Tip housing (4) as shown. Remove two springs (12), retainer plugs (13), and balls (14).
8. Place housing (4), geroter end down, on a clean soft cloth.
9. Remove retaining ring (15) from housing (4) using a thin bladed screwdriver. Use care not to damage surfaces.
10. Lift spool and sleeve assembly up far enough to free seal gland bushing (16). Remove bushing from housing (4).









11. Remove dust seal (17) from bushing (16) using thin bladed screwdriver. Remove and discard quad ring seal (18).

WARNING

Spool has sharp edges. Use care when handling spool to prevent injury.

12. Remove two bearing races (19) and needle thrust bearing (20) from spool and sleeve assembly (21). Remove and discard seal (22).
13. Tip housing (4) onto port face. Slowly rotate and pull spool and sleeve assembly (21) to remove from meter end of housing.
14. Push pin (23) from spool and sleeve assembly (21). Remove spool (24) from sleeve (25).
15. Carefully remove six centering springs (26) from spool (24).
16. Remove and discard seal (27).
17. Remove set screw (28 from housing (4) using 1/4 inch hex key.
18. Screw #1/8 inch-24 machine screw into end of check ball seat (29). Lift seat from housing (4) by pulling on screw with pliers.
19. Remove seals (30, 31) from seat (29). Discard seals.
20. Tip housing (4) to remove check ball (32) and retainer (33).
21. Do not remove any other components from valve housing. Remaining valves are factory preset and must not be removed.

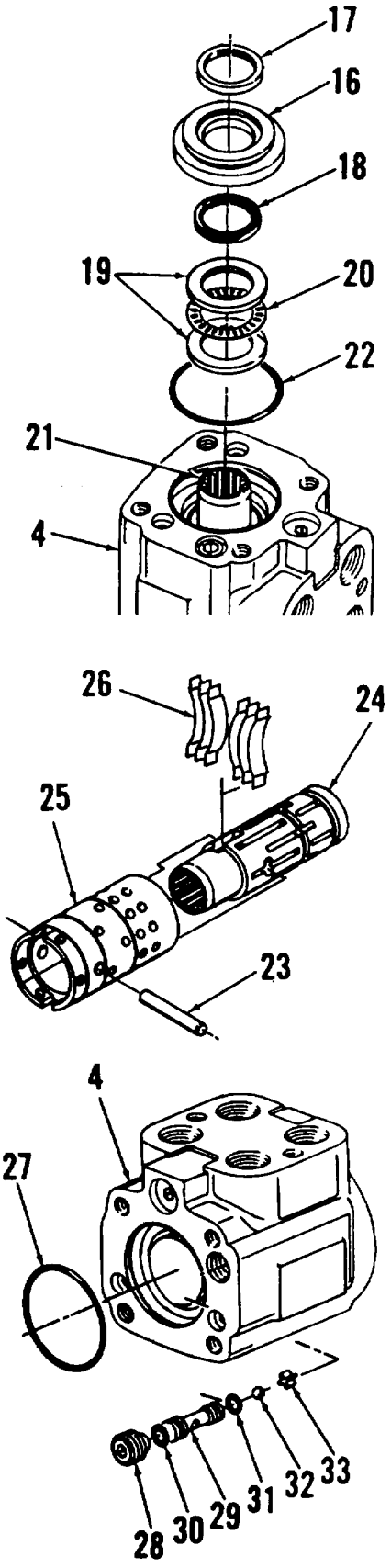
B. CLEANING

Clean steering valve components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect steering valve components in accordance with paragraph 1-24.

2. Inspect all mating surfaces for scratches or burrs that could cause leaking.



D. REPAIR

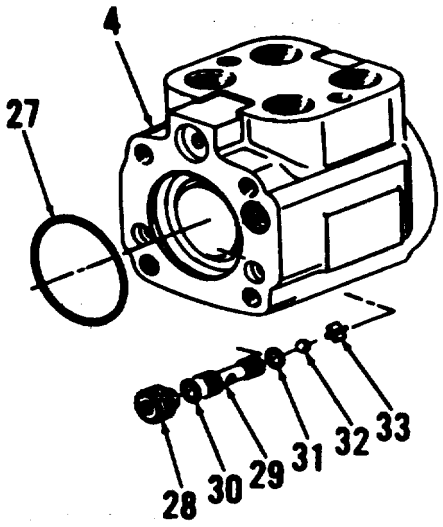
Repair of the steering valve consists of removal and replacement of defective, deformed, or damaged components.

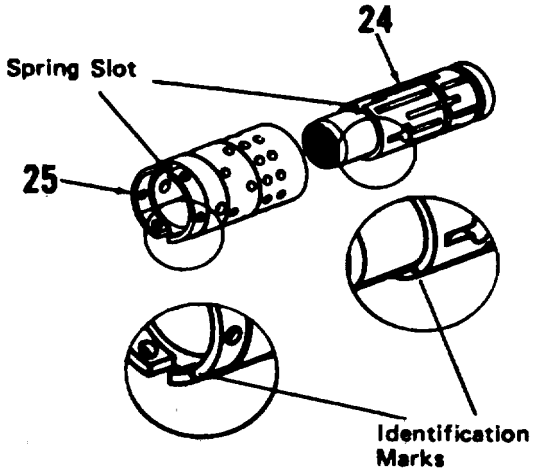
E. ASSEMBLY

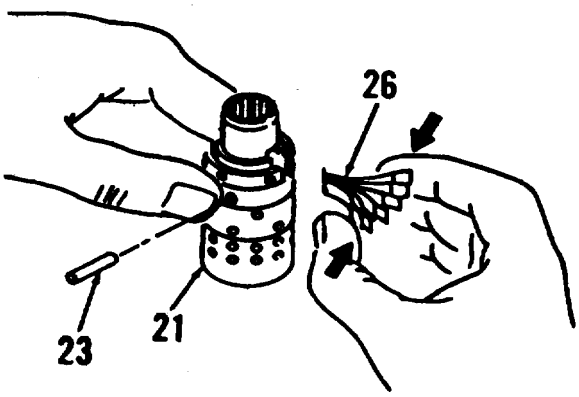
1. Use tweezers or needle nose pliers to lower retainer (33) into housing (4). Ensure retainer is straight (not tilted). Install check ball (32).
2. Install new seals (30, 31) onto check ball seat (29). Lubricate seat and seals. Install seat into housing (4), open end of seat first.
3. Install set screw (28) into housing (4). Use 1/4 inch hex key to torque set screw to 100 in-lbs (11 Nm).
4. Assemble spool (24) and sleeve (25), ensuring spring slots are properly aligned. Some spool and sleeve sets have identification marks.

Align these marks.

5. Test spool and sleeve assembly (21) for free rotation. Spool (24) should rotate smoothly in sleeve (25) with fingertip force applied at splined end.
6. Align spring slots and stand parts on bench.
7. Assemble all six centering springs (26) on bench so that extended edges are down and arched center sections are together.
8. Insert two outer springs (26) into spring slots of spool and sleeve assembly (21). Insert remaining springs one at a time between the two outer springs until all springs are in the spool and sleeve assembly.
9. Center spring set in spring slot. Seat springs evenly, flush with upper surface of spool and sleeve assembly (21).
10. Push pin (23) into spool and sleeve assembly (21) until pin is flush on both sides.







11. Position spool and sleeve assembly (21) so that splined end of spool enters 15 hole end of housing.

NOTE

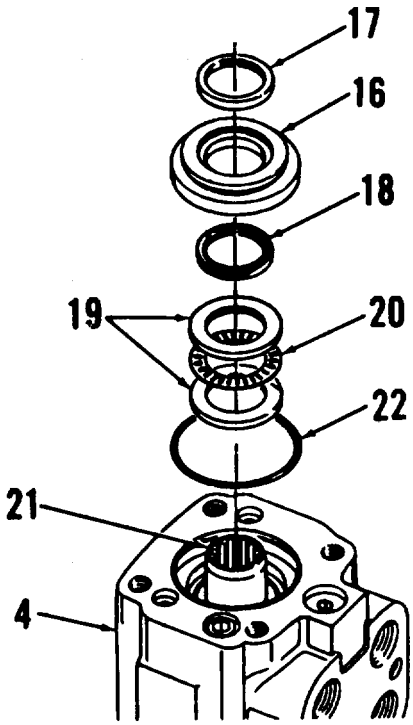
When inserting spool and sleeve assembly into housing, ensure that parts do not tilt out of position. Keep pin in horizontal position.

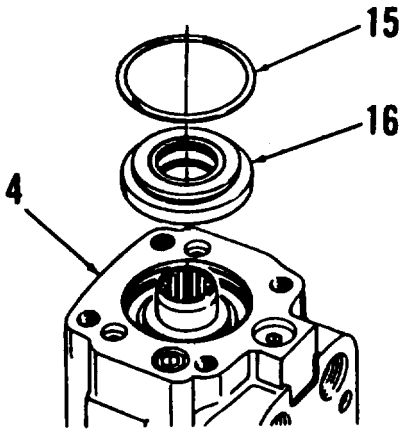
12. Insert spool and sleeve assembly (21) into housing using a slight rotating motion. Push until assembly is flush with 15 hole end of housing.
13. Check spool and sleeve assembly (21) for free rotation by turning assembly with fingertip force at splined end.
14. Place housing (4), geroter end down, on a clean, lint-free cloth.
15. Install new seal (22). Install two bearing races (19) and needle thrust bearing (20) onto spool and sleeve assembly (21).
16. Install dust seal (17) into seal gland bushing (16). Smooth side of seal must face towards bushing. Install quad ring seal (18).
17. Install seal gland bushing (16) over spool and sleeve assembly (21) with twisting motion.Tap bushing in place -using a soft head hammer.
18. Install retaining ring (15) into housing (4). Pry around ring circumference using a thin bladed screwdriver to seat ring in groove. Use care not to damage surfaces.

CAUTION

Use care when clamping valve in vise. Housing distortion could result if jaws are overtightened. Use protective material on vise jaws to prevent damage.

19. Install valve in vise, meter end up.





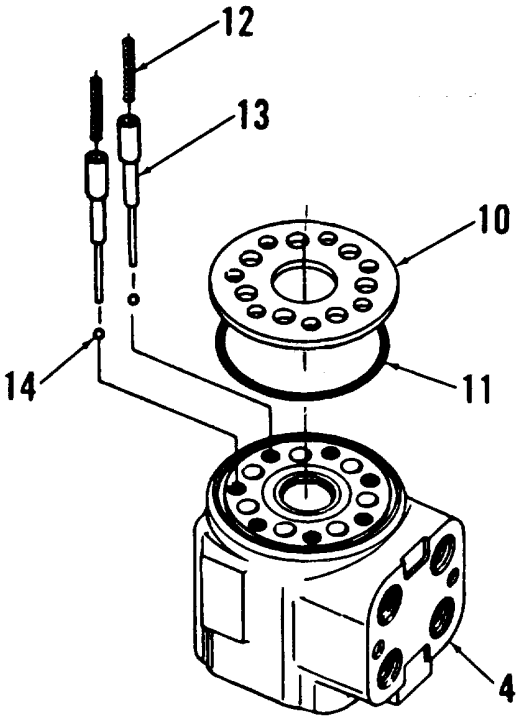
20. Ensure that spool and sleeve assembly is flush with 15 hole end of housing. Clean upper surface of housing by wiping with palm of clean hand.

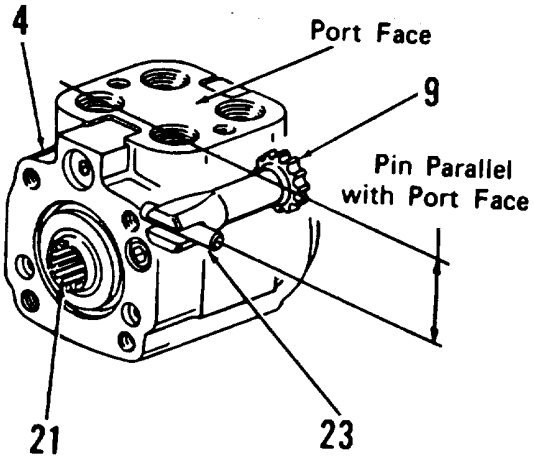
21. Install balls (14), retainer plugs (13), and two springs (12). Ensure springs are properly seated in holes.

22. Install new seal (11). Install spacer plate (10) onto housing (4), ensuring proper alignment of bolt holes.

23. Rotate spool and sleeve assembly (21) until pin (23) is parallel with port face of housing (4).

24. Install drive (9), ensuring drive fork is fully engaged with pin (23). Mark top of drive as shown in "B" on following page.

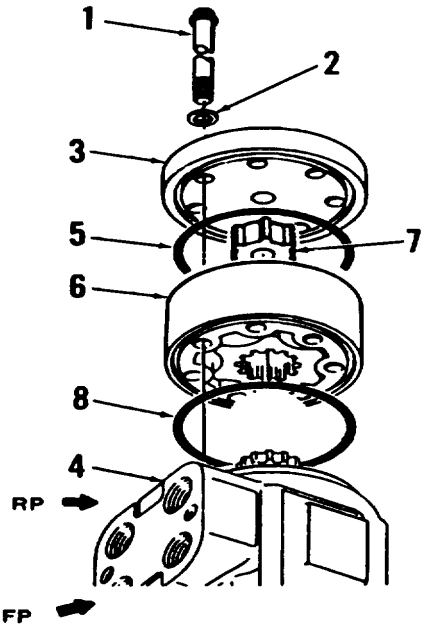


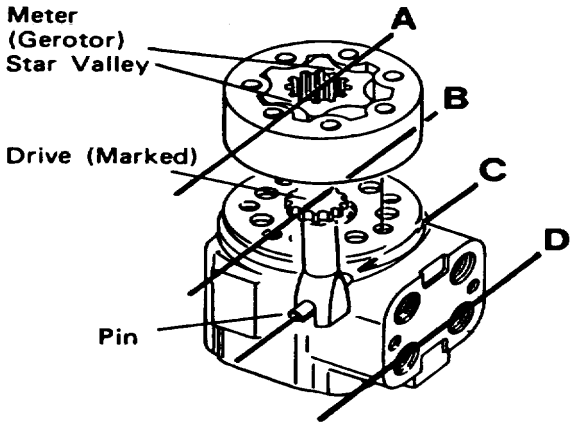


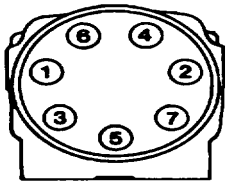
25. Install new seal (8) into meter (6).
26. Align meter star valleys (reference A) with mark on drive (B). Valleys must align with pin. Install meter (6).
27. Note parallel relationship of reference lines A, B, C, and D. Align bolt holes without disengaging meter (6) from drive. Install drive spacer (7).
28. Install new seal (5) into end cap (3). Install end cap onto meter (6), ensuring proper hole alignment.
29. Install seven cap screws (1) and seal washers (2) into end cap (3).
30. Tighten screws (1) to 150 in-lbs. (17 Nm), then torque screws to 225-275 in-lbs. (25-30 Nm) in sequence shown.
31. Remove valve from vise.

FOLLOW-ON MAINTENANCE:

Install orbital steering valve (para. 2-120)
END OF TASK







3-48. PRIORITY VALVE REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Vise (30, App. E)
Depth Gauge (20, App. E)
Torque Wrench (32, App. E)

Equipment Condition:

Priority valve removed (para. 2-121)

Materials / Parts:

Lubricating Oil (16, App. C)
O-Ring, Item 3 (1 ea.)
O-Ring, Item 10 (1 ea.)

A. DISASSEMBLY

CAUTION

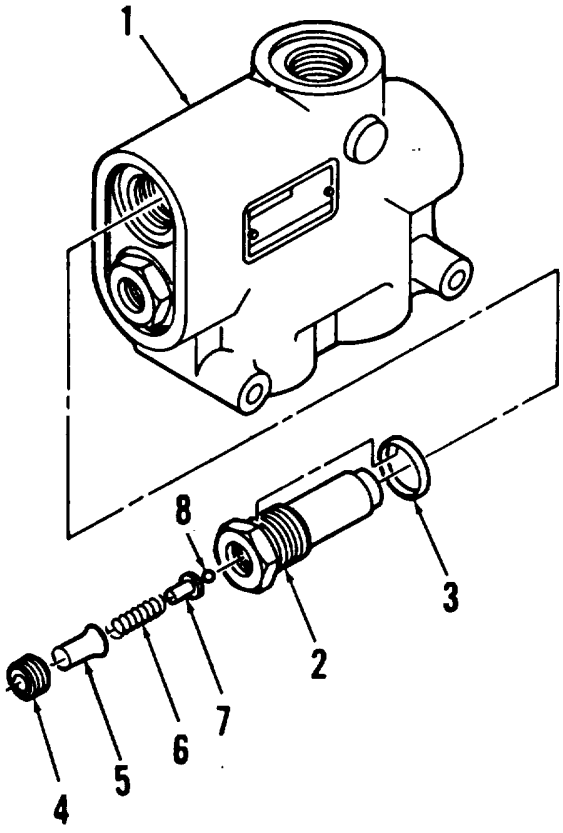
Use care when clamp;,: i valve in vise. Body distortion could result if jaws are overtightened. Use protective material on vise jaws to prevent damage.

1. Install priority valve in vise, relief valve end up.
2. Remove relief valve body (2) from valve body (1). Remove and discard O-ring (3).

NOTE

Before removing adjusting screw (4), measure depth of screw and record for installation.

3. Remove adjusting screw (4) from relief valve body (2). Remove spring guide (5), spring (6), ball holder (7), and ball (8).



4. Remove plug (9) and spring (11) from body (1). Remove and discard O-ring (10).
5. Remove plug assembly (12). Carefully slide spool (13) out of body (2).

B. CLEANING

Clean priority valve components in accordance with paragraph 1-24.

C. INSPECTION

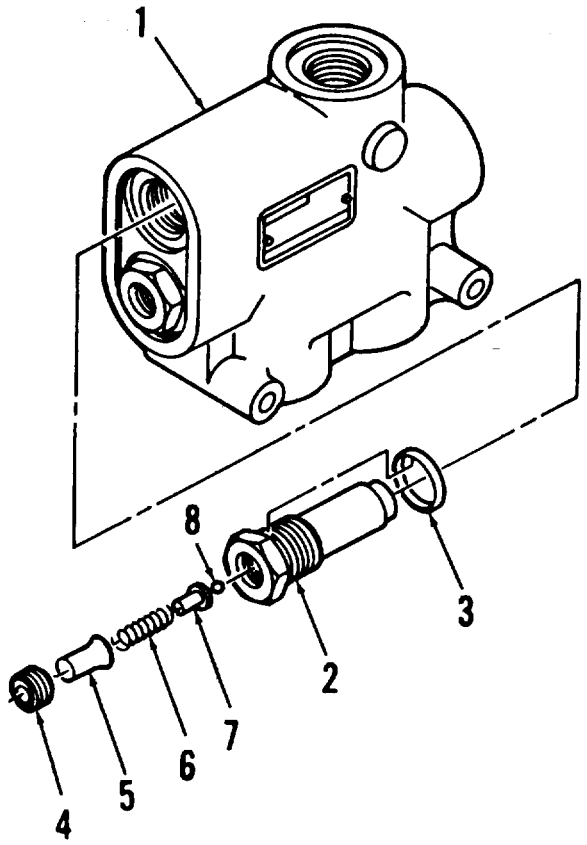
Inspect priority valve components in accordance with paragraph 1-24.

D. REPAIR

Repair of the priority valve consists of removal and replacement of defective, deformed, or damaged components.

E. ASSEMBLY

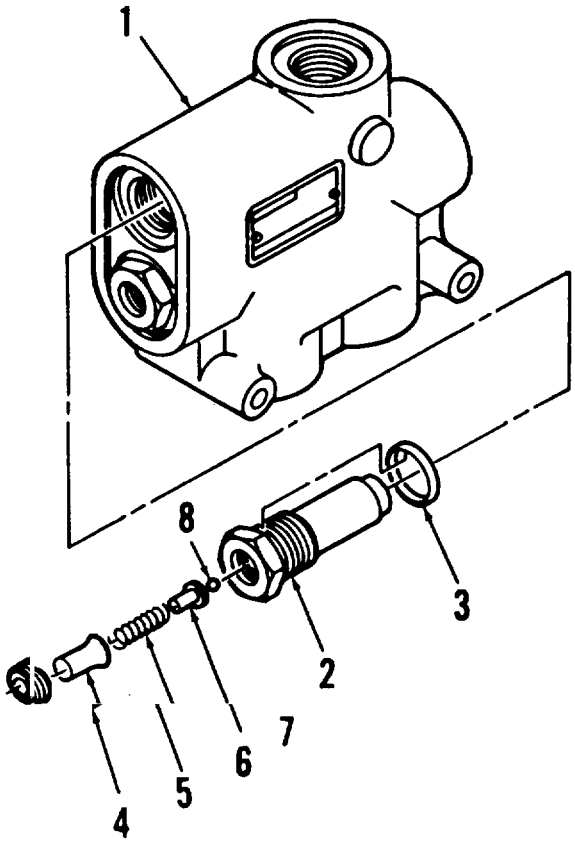
1. Carefully slide spool (13) into body (2). Install plug assembly (12) and tighten to 25 to 40 ft-lbs (34 to 54 Nm).
2. Lubricate new O-ring (10) with clean lubricating oil and install onto plug (9). Install plug and spring (11) into body (l).
3. Tighten plug (9) to 25 to 40 ft-lbs (34 to 54 Nm).



4. Install spring guide (5), spring (6), ball holder (7), and ball (8) into relief valve body (2).
5. Install adjusting screw (4) to depth recorded during disassembly.
6. Lubricate new O-ring (3) with clean lubricating oil and install onto relief valve body (2).
7. Install relief valve body (2) into valve body (1). Torque to 25 to 40 ft-lbs (34 to 54 Nm).
8. Remove priority valve from vise.

FOLLOW-ON MAINTENANCE:

Install priority valve (para. 2-121)
END OF TASK



3-49. STEERING SELECTOR VALVE REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, Assembly, and Adjustment

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Vise (30, App. E)
Torque Wrench (32, App. E)

Equipment Condition:

Steering selector valve removed (para. 2-122)

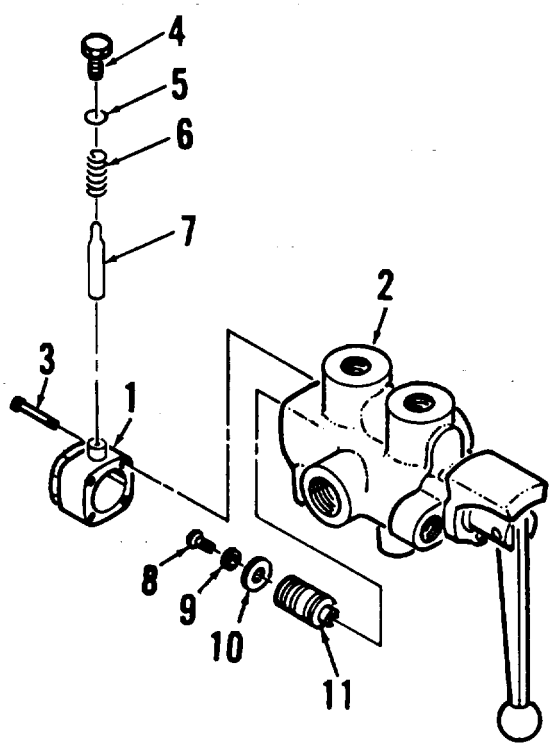
Materials / Parts:

Cotter Pin, Item 12 (1 ea.)
Seal, Item 15 (2 ea.)

A. DISASSEMBLY

CAUTION
Use care when clamping valve in vise. Housing distortion could result if jaws are over-tightened. Use protective material on vise jaws to prevent damage.

1. Install steering selector valve in vise.
2. Remove cap (4), washer (5), spring (6), and pin (7) from bonnet (1).
3. Remove bonnet (1) from valve housing (2) by removing screws (3).
4. Remove screw (8), lockwasher (9), and washer (10) from spool adapter (11) and remove spool adapter from valve housing (2).



NOTE

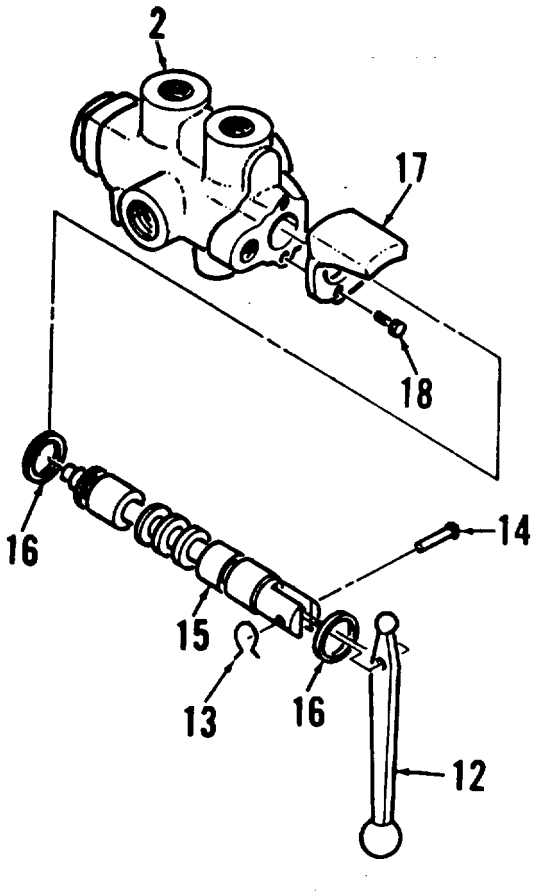
Handle (12) is removed when selector valve is removed from forklift. If reinstalled, removal is required.

5. Remove handle (12) from valve spool (15) by removing cotter pin (13) and handle pin (14). Discard cotter pin.
6. Carefully slide valve spool (15) out of valve housing (2).

CAUTION

Use care when removing spool seals (16) to prevent damage to spool surface. Note position of seals before removing to aid in installation.

7. Remove spool seals (16) from valve spool (15) using a small tip screwdriver.
8. Remove handle bracket (17) from valve housing (2) by removing screws (18).



B. CLEANING

Clean selector valve components in accordance with paragraph 1-24.

C. INSPECTION

Inspect selector valve components in accordance with paragraph 1-24.

D. REPAIR

Repair of the selector valve consists of removal and replacement of defective, deformed, or damaged components.

E. ASSEMBLY

1. Install handle bracket (17) onto valve housing (2) using screws (18).

CAUTION

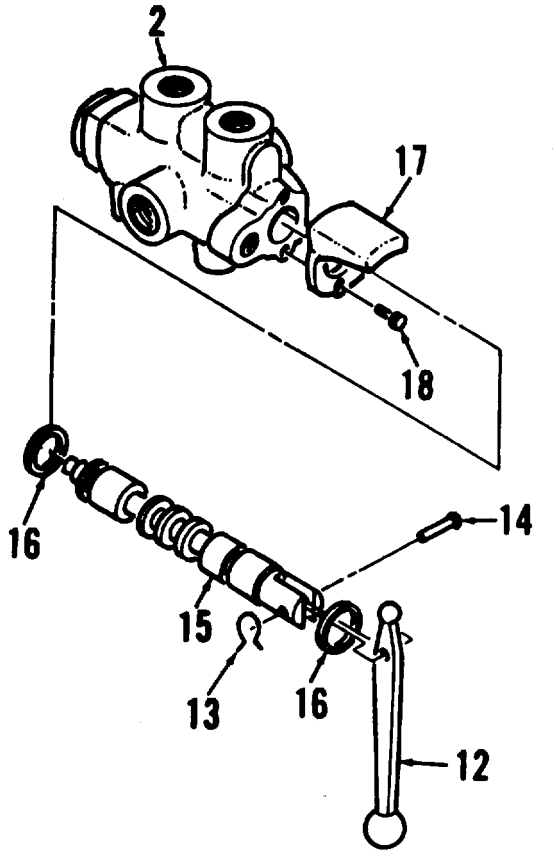
Push valve spool (15) through housing (2) only far enough to expose seal groove. Forcing spool beyond that point may damage spool.

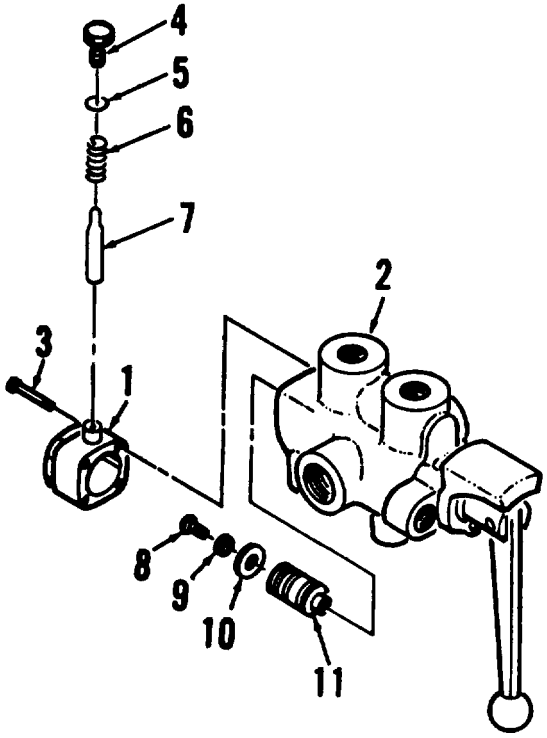
2. Carefully slide valve spool (15) into valve housing (2) until seal groove is exposed at bonnet end of housing. Install new seal (16).
3. Pull valve spool (15) back toward handle end of housing until seal groove is exposed. Install new seal (16).
4. Insert valve spool (15) into valve housing (2) using a slight turning motion.

NOTE

Handle (12) is installed when selector valve is installed onto forklift. Install handle now only if selector valve will not be installed onto forklift.

5. Install handle (12) onto valve spool (15) using handle pin (14) and new cotter pin (13).
6. Install screw (8), lockwasher (9), washer (10), and spool adapter (11) into valve housing (2).Torque screw to 8 ft-lbs (11 Nm).
7. Install bonnet (1) onto valve housing (2) using screws (3).
8. Install cap (4), washer (5), spring (6), and pin (7) into bonnet (1).
9. Test operation using handle. Spool shall move smoothly through housing. If spool binds, loosen screws (3), adjust position of bonnet (1), and retighten screws.
10. Remove valve from vise.





FOLLOW-ON MAINTENANCE:
Install steering selector valve (para. 2-122)

END OF TASK

Section XII. FRAME, TOWING ATTACHMENTS, AND DRAWBAR MAINTENANCE

3-50. STEP REPAIR

This task covers: Repair

INITIAL SETUP:

Equipment Condition:	**Reference:**
Step removed (para. 2-123)	TC 9-510 TB 9-2300-247-40

A. REPAIR

Repair step, guards, plates, and related frame work in accordance with TC 9-510 and TB 9-2300-247-40.

FOLLOW-ON MAINTENANCE:
Install step (para. 2-123)
END OF TASK

Section XIII. BODY, CAB, HOOD, AND HULL MAINTENANCE

3-51. ENGINE COVER REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Reference:

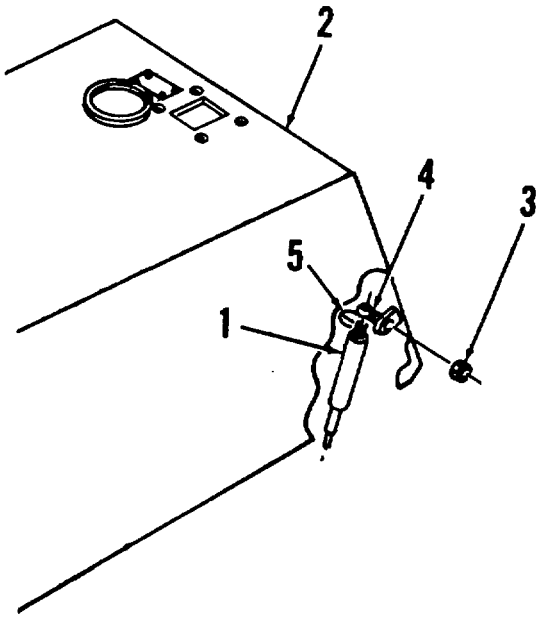
TC 9-510

Equipment Condition:

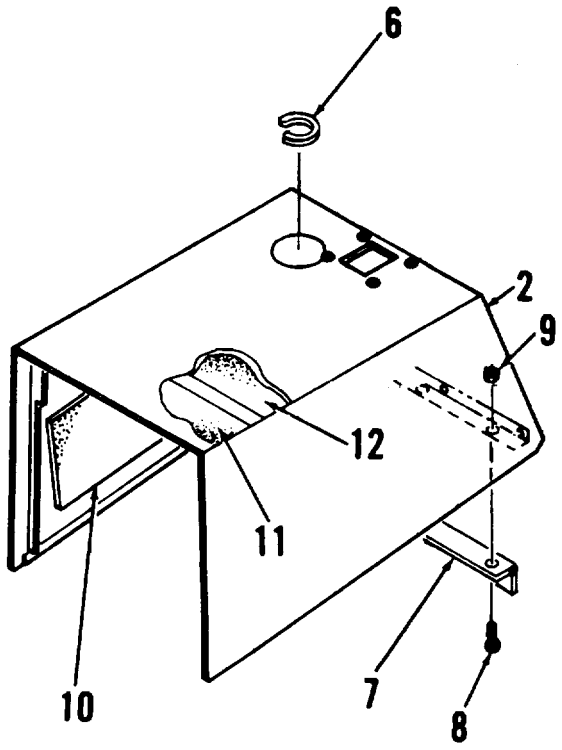
Engine cover removed (para. 2-128)
Latch and linkage removed (para 2-129)

A. DISASSEMBLY

1. Release gas springs (1) from hood (2) by removing retainers (5).
2. Remove studs (4) from hood (2) by removing nuts (3). Place safety lanyards aside for reassembly.



3. Remove edge molding (6) from hood (2).
4. Remove hood hinge (7) from hood (2) by removing four screws (8) and nuts (9).
5. Remove sound proofing sheet (10) and pads (11, 12) only if replacement is required.



B. CLEANING

Clean hood components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect hood components in accordance with paragraph 1-24.
2. Ensure gas springs hold position. Faulty springs can result in hood collapse. Replace spring if defective.
3. Inspect sound proofing material for rips, cuts, tears, or deterioration.

D. REPAIR

1. Repair of the hood assembly consists of removal and replacement of defective, deformed, or damaged components.
2. Repair hood metal in accordance with TC 9-510.

E. ASSEMBLY

1. Install sound proofing sheet (10) and pads (11, 12) onto hood (2).
2. Install hood hinge (7) onto hood (2) using four screws (8) and nuts (9).
3. Install edge molding (6).
4. Secure studs (4) and safety lanyards to hood (2) using nuts (3).
5. Secure gas springs (1) to studs (4) using retainers (5).

FOLLOW-ON MAINTENANCE:

Install latch and linkage (para. 2-129)
Install engine cover (para. 2-128)

END OF TASK

3-52. TRANSMISSION COVER REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App E)

Materials / Parts:
Rivet, Item 12 (16 ea. (AR))
Rivet, Item 34 (2 ea. (AR))

Reference:

TC 9-510

Equipment Condition:
Transmission covers removed (para. 2-131)

A. DISASSEMBLY

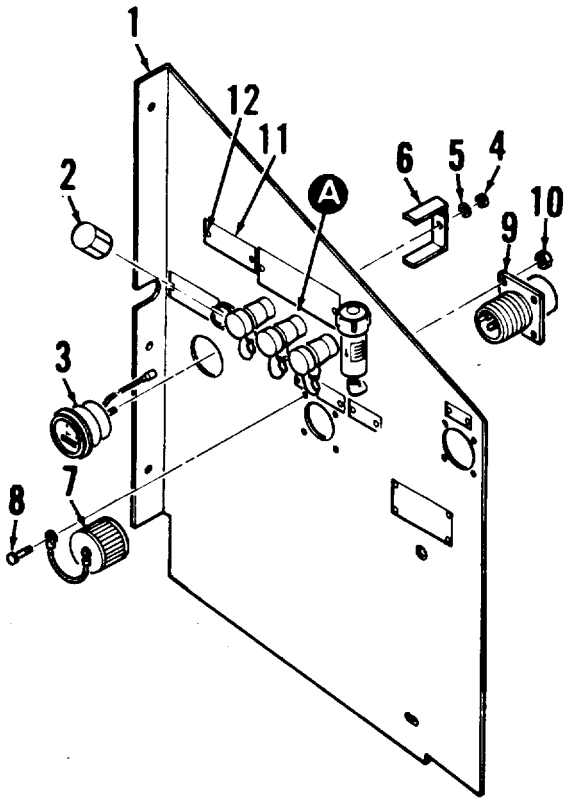
1. REMOVE TRANSMISSION FILL CAP (2), HOURMETER (3), AND SLAVE RECEPTACLE (4) FROM RIGHT SIDE PLATE (1).

   a. Remove transmission fill cap (2) from right side plate (1).

   b. Remove hour meter (3) from side plate (1) by removing nut (4), washer (5), and bracket (6).

   c. Remove dust cap (7) and slave receptacle (9) by removing screws (8) and nuts (10).

   d. Remove identification plates (11), if required, by drilling out rivets (12).

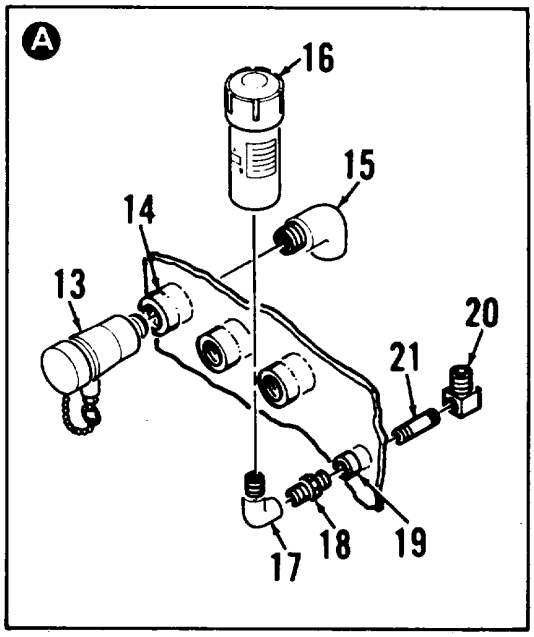


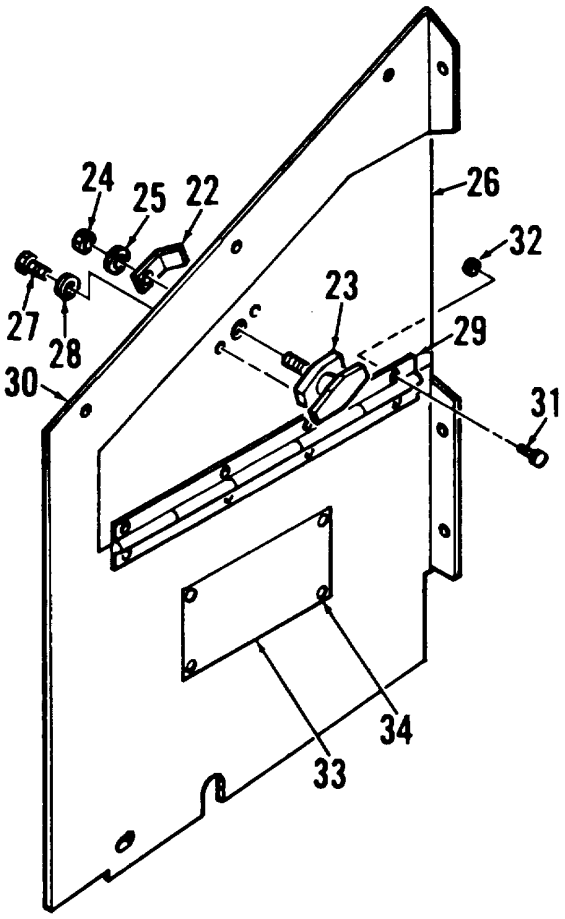
2. REMOVE OIL SAMPLING VALVES (13), AIR RESTRICTION INDICATOR (16), AND FITTINGS.

    a. Remove oil sampling valves (13) from welded couplings (14) on right side plate.
    b. Remove elbows (15) from welded couplings (14) on rear of plate.
    c. Remove air restriction indicator (16) from elbow (17). Remove elbow and adapter (18) from welded coupling (19).
    d. Remove elbow (20) and fitting (20) from welded coupling (19).

3. REMOVE LATCH ASSEMBLY (23) AND DOOR HINGE (29) FROM LEFT SIDE PLATE.

    a. Remove pawl (22) from door latch assembly (23) by removing nut (24) and lockwasher (24).
    b. Release latch assembly (23) from access door (26) by removing screws (27) and washers (28).
    c. Remove hinge (29) from left side plate (30) and access door (26) by removing four screws (31) and nuts (32).
    d. Remove sound proof foam from access door (26) only if replacement is required.
    e. Remove fuel plate (33), if required, by drilling out rivets (34).





B. CLEANING

Clean transmission cover components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect transmission cover components in accordance with paragraph 1-24.

2. Work latch assembly to ensure smooth operation.

3. Inspect sound proof foam for rips, cuts, tears, or deterioration.

4. Inspect data and information plates for legibility and security of attachment. If replacement is required, record all pertinent data before disposing of plate.

D. REPAIR .

1. Repair of transmission cover assemblies consists of removal and replacement of defective, deformed, or damaged components.
2. Repair cover sheet metal in accordance with TC 9-510.

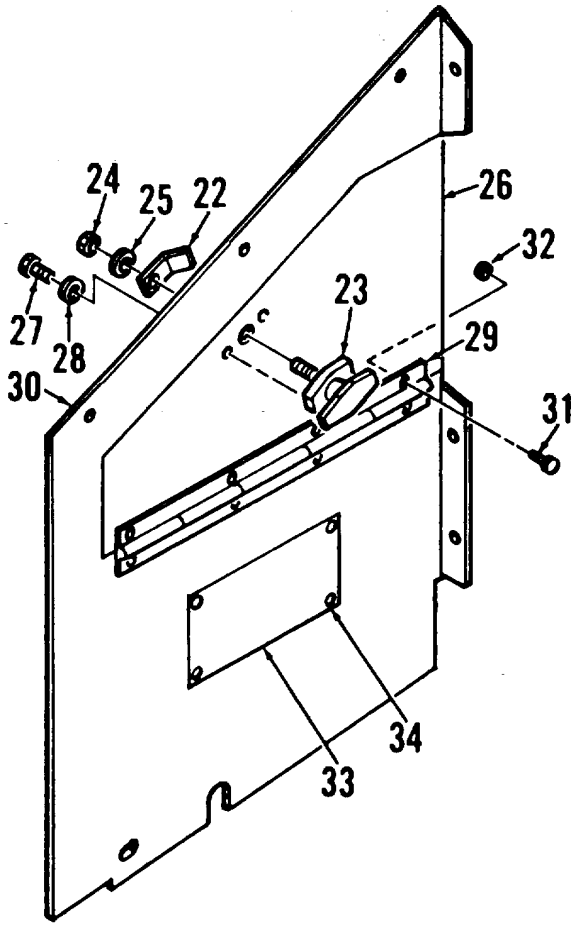
E. ASSEMBLY

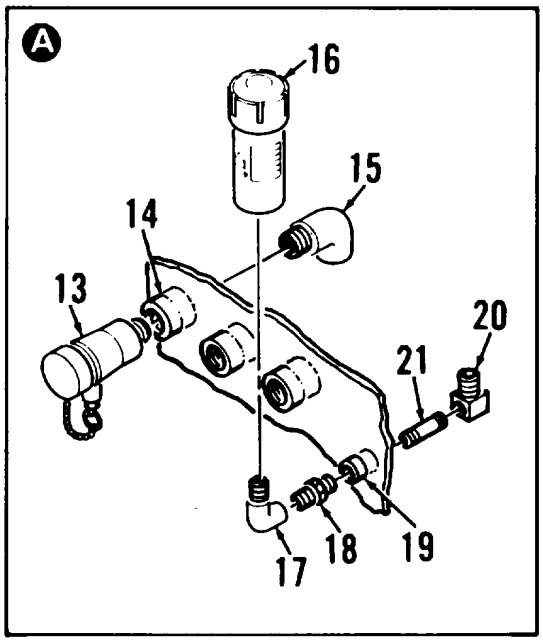
1. INSTALL LATCH ASSEMBLY (23) AND DOOR HINGE (29) ONTO LEFT SIDE PLATE.

   a. Install fuel plate (33) using new rivets (34).
   b. Install hinge (29) onto left side plate (30) and access door (26) using four screws (31) and nuts (32).
   c. Secure latch assembly (23) onto access door (26) using screws (27) and washers (28).
   d. Install pawl (22) onto door latch assembly (23) using nut (24) and lockwasher (24).

2. INSTALL OIL SAMPLING VALVES (13), AIR RESTRICTION INDICATOR (16), AND FITTINGS ONTO RIGHT SIDE PLATE.

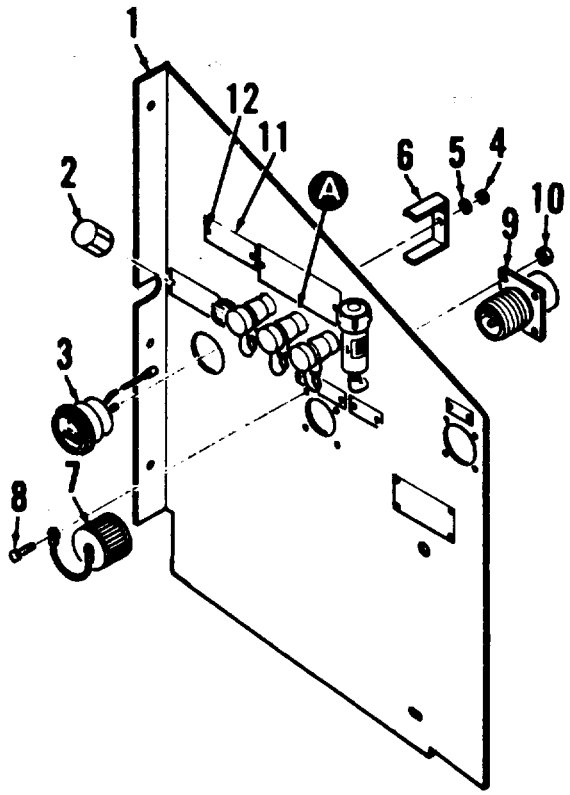
   a. Install elbow (20) and fitting (20) into welded coupling (19).
   b. Install elbow and adapter (18) into welded coupling (19). Install air restriction indicator (16) onto elbow (17).
   c. Install elbows (15) into welded couplings (14).
   d. Install oil sampling valves (13) into welded couplings (14).





3. INSTALL TRANSMISSION FILL CAP (2), HOURMETER (3), AND SLAVE RECEPTACLE (4).

    a. Install identification plates (11) onto right side plate (1) using new rivets (12).
    b. Install dust cap (7) and slave receptacle (9) using screws (8) and nuts (10).
    c. Install hour meter (3) using nut (4), washer (5), and bracket (6).
    d. Install transmission fill cap (2) onto right side plate (1).



FOLLOW-ON MAINTENANCE:

Install transmission covers (para. 2-131)

END OF TASK

3-53. CAB ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App E)

Equipment Condition:

Batteries disconnected (para. 2-78)
Tilt cylinders released from mast assembly (para. 2-151)

Personnel Required:

2 Personnel

A. RFMOVAL

WARNING

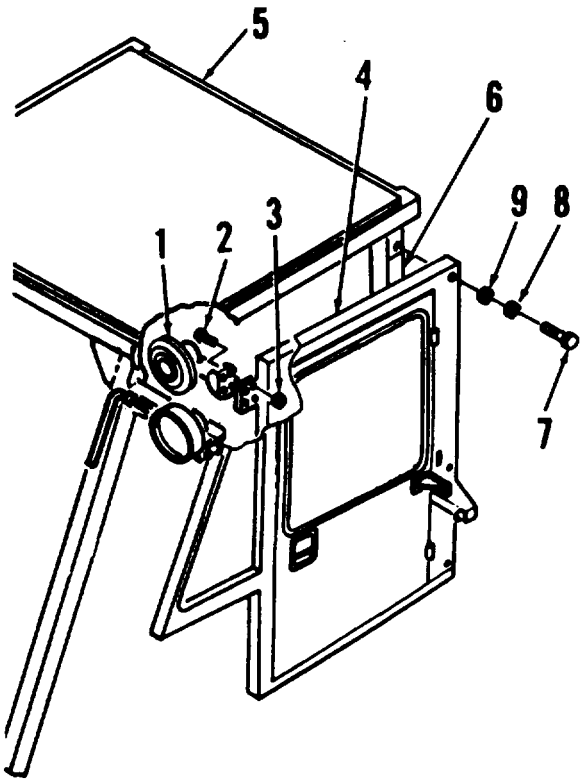
Electrical shock hazard. Disconnect battery ground cable or power source prior to working on electrical components. Failure to heed warning could cause shock, injury or death. If electrical shock occurs, administer first aid and seek medical assistance immediately.

1. Tag and disconnect electrical wiring from defroster fan (1).
2. Remove front defroster fan (1) from left door panel assembly (4) by removing screws (2) and nuts (3).

CAUTION

To avoid damaging left side panel assembly, enlist the help of an assistant when removing. Hold assembly in place while attaching parts are removed.

3. Remove left side panel assembly (4) from ROPS frame (6) by removing five bolts (7), lockwashers (8), and washers (9).



4. Tag and disconnect electrical wiring from windshield wiper motor (18).
5. Tag and disconnect electrical wiring from upper flood lights (19) and lights on front fenders. Release wiring from clamps (20) and feed through holes in sides of front cover assembly (14).
6. Release cylinder slot covers (10) from front cover assembly (14) by removing fourteen screws (11).
7. Remove hose clamp (13) from right tilt cylinder. Break sealant around slot covers (10) and slide covers and cover seals (12) off tilt cylinders.

CAUTION

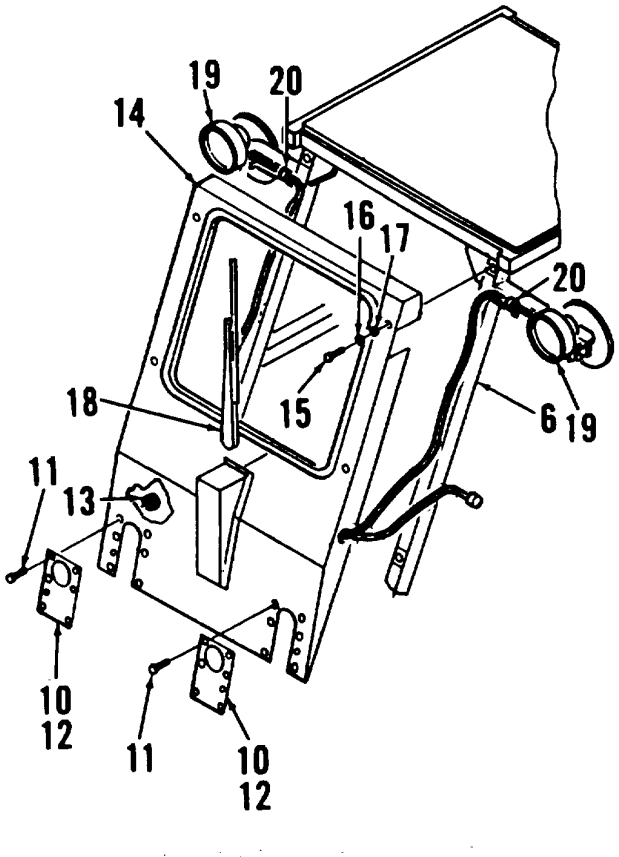
To avoid damaging front cover assembly, enlist the help of an assistant when removing. Hold assembly in place while attaching parts are removed.

8. Remove front cover assembly (14) from ROPS frame (6) by removing four bolts (15), lockwashers (16), and washers (17).

CAUTION

Use care when removing heater to prevent damage to hoses. Hoses may be left on during removal.

9. Remove heater (21) from right side panel (22) by removing screws (23) and nuts (24). Disconnect hoses as required.
10. Release right window frame (25) from right side panel bracket (26) by removing screw (27) and nut (28).
11. Tag and disconnect electrical wiring from rear defroster fan (29).
12. Remove rear defroster fan (29) from right window frame and cab roof (5) by removing screws (30) and nuts (31).



CAUTION

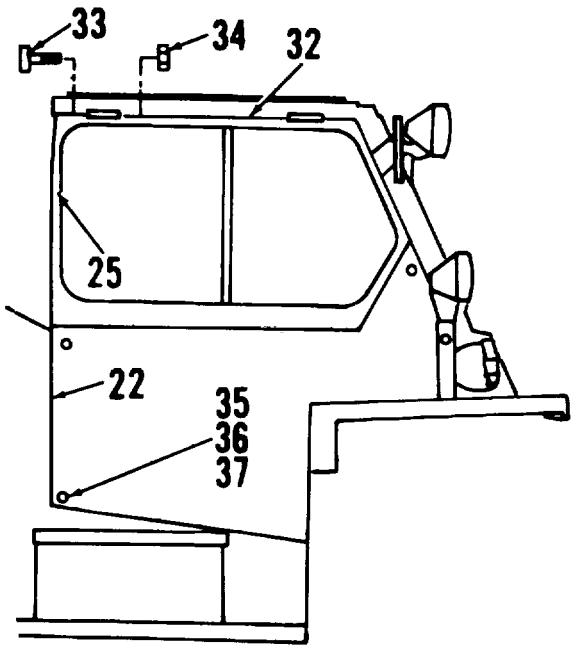
To avoid damaging right window frame and side panel, enlist the help of an assistant when removing. Hold frame and panel in place while attaching parts are removed.

13. Remove right window frame (25) from window hinge (32) by removing bolts (33) and nuts (34).

14. Remove right side panel (22) from ROPS frame by removing five bolts (35), lockwashers (36), and washers (37).

15. Remove windshield wiper arm (38) from wiper motor (39). Remove wiper motor from ROPS frame (6) by removing nut (40) and washer (41).

16. Remove assembled window rubber and window (42) from ROPS frame (6) by removing screws (43), nuts (44), and hold-downs (45).



B. CLEANING

Clean cab assembly components in accordance with paragraph 1-24.

C. INSPECTION

1. Conduct overall inspection of cab assembly components in accordance with paragraph 1-24.

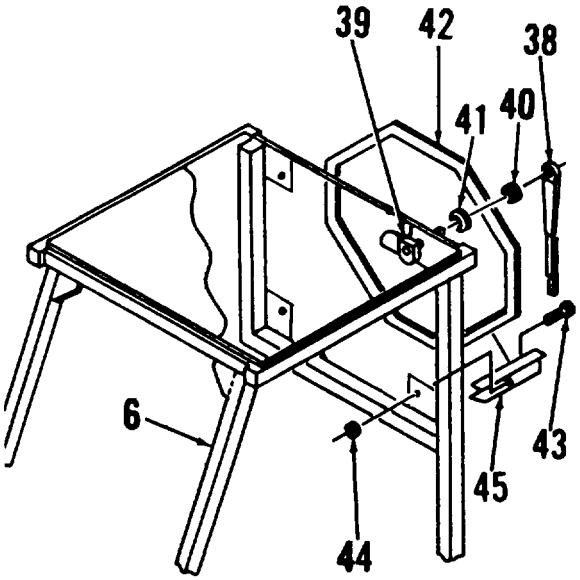
2. Inspect fans for obvious damage. Inspect for evidence of overheating or shorting.

3. Inspect fan blade guards for bent or broken wire. Ensure fan blade does not rub against guard.

4. Inspect fan blades for cracks, splits, or bends.

5. Inspect cab windows for cracks or holes. Check for chipped edges.

6. Inspect window rubber for cracking, deformation, or permanent set.



D. INSTALLATION

1. Install assembled window rubber and window (42) onto ROPS frame (6) using screws (43), nuts (44), and hold-downs (45).

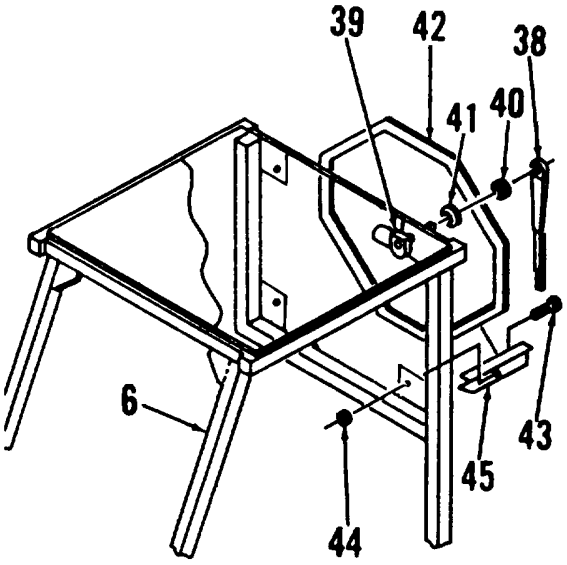
2. Secure wiper motor (39) to ROPS frame (6) using nut (40) and washer (41). Install windshield wiper arm (38) onto wiper motor.

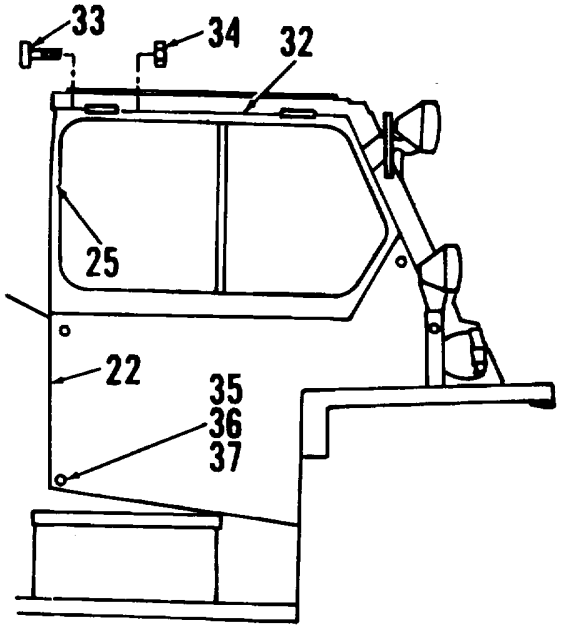
CAUTION

To avoid damaging right window frame and side panel, enlist the help of an assistant when removing. Hold frame and panel in place while attaching parts are removed.

3. Install right side panel (22) onto ROPS frame using five bolts (35), lockwashers (36), and washers (37).

4. Install right window frame (25) to window hinge (32) using bolts (33) and nuts (34).





5. Install rear defroster fan (29) onto right window frame and cab roof (5) using screws (30) and nuts (31).

6. Connect electrical wiring to rear defroster fan (29).

7. Secure right window frame (25) to right side panel bracket (26) using screw (27) and nut (28).

CAUTION

Use care when installing heater to prevent damage to hoses.

8. Install heater (21) onto right side panel (22) using screws (23) and nuts (24).

CAUTION

To avoid damaging front cover assembly, enlist the help of an assistant when installing.

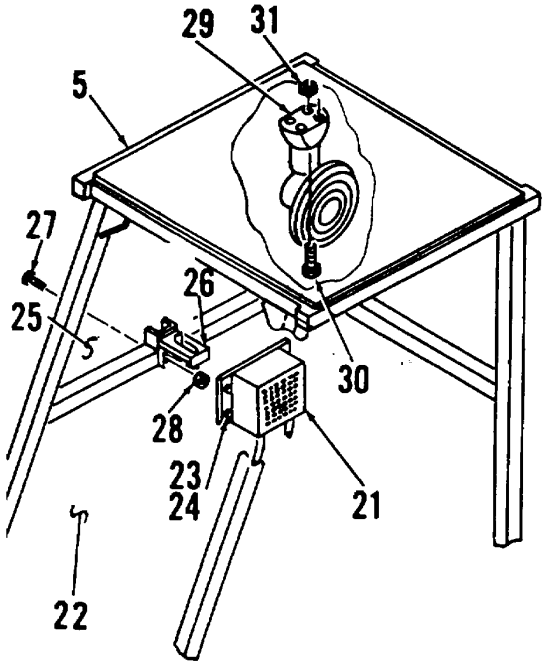
9. Mate front cover assembly (14) to ROPS frame (6). Secure using bolts (15), lockwashers (16), and washers (17).

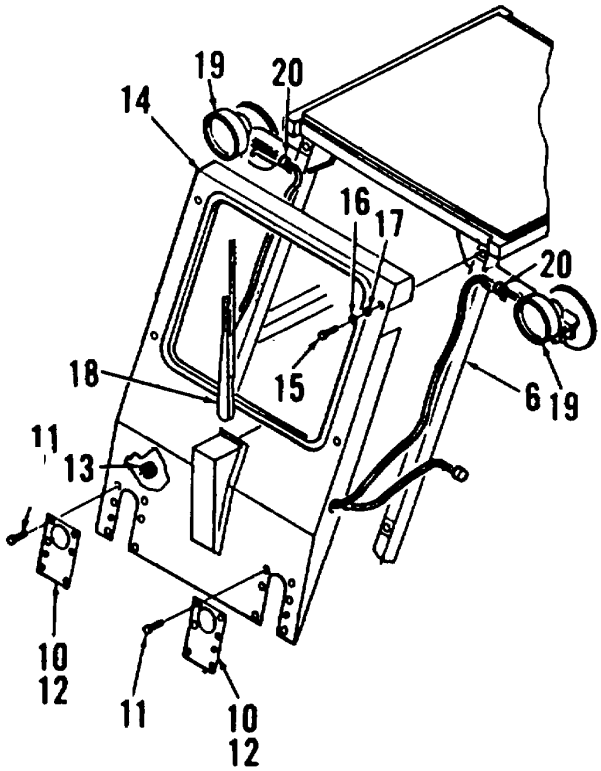
10. Apply sealant to lips of cylinder slot covers (10). Carefully slide covers and cover seals (12) over tilt cylinders, making sure not to get sealant on cylinders.

11. Secure cylinder slot covers (10) to front cover assembly (14) using fourteen screws (11).

12. Feed electrical wiring through holes in sides of front cover assembly (14). Connect wiring to upper flood lights (19) and lights on front fenders. Secure wiring in clamps (20).

13. Connect electrical wiring to front windshield wiper motor (18).





CAUTION

To avoid damaging left side panel assembly, enlist the help of an assistant when installing.

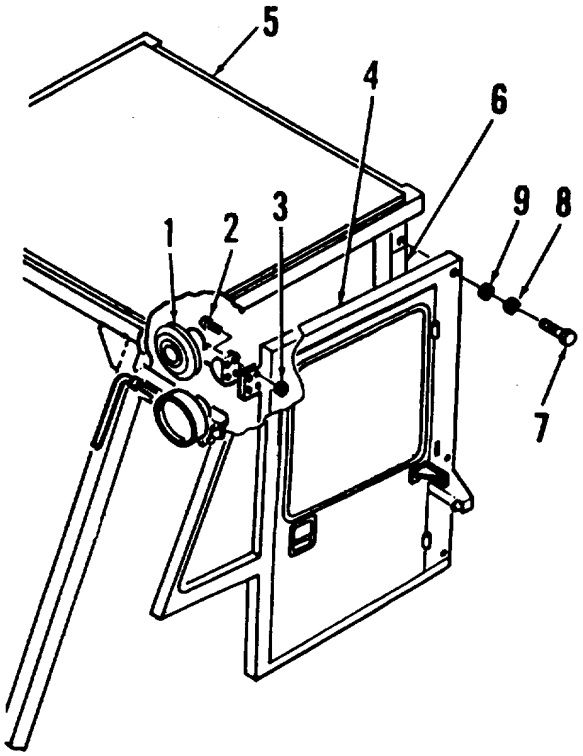
14. Mate left side panel assembly (4) to ROPS frame (6). Secure using five bolts (7), lockwashers (8), and washers (9).

15. Install front defroster fan (1) onto left door panel assembly (4) using screws (2) and nuts (3).

16. Connect electrical wiring from defroster fan (1).

FOLLOW-ON MAINTENANCE:

Secure tilt cylinders to mast assembly (para. 2-151) Connect battery cables (para. 2-78)



END OF TASK

3-54. CAB ASSEMBLY REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App E)

Reference:

TC 9-510

Equipment, Condition):

Cab windows removed (para 2-135)
Cab doors removed (para. 2-133)
Cab assembly removed (para 3-53)

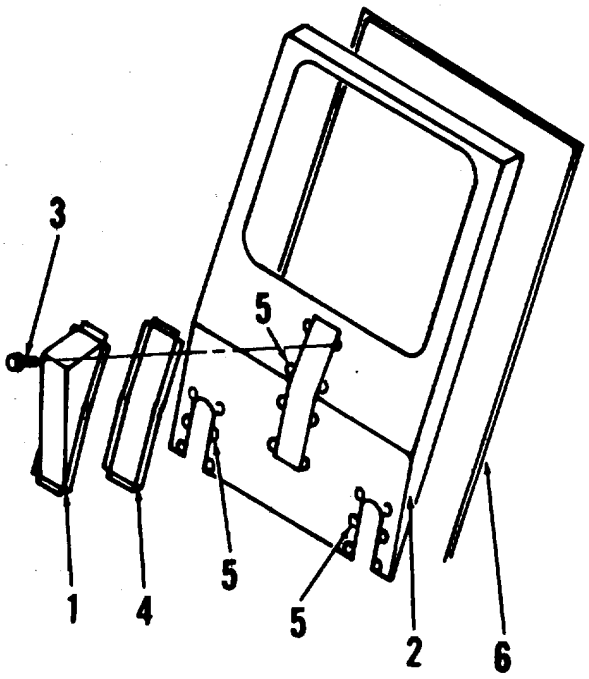
A. DISASSEMBLY

1. REMOVE FRONT COVER (1) AND RUBBER SEAL (6) FROM CABFRONT PANEL (2).

   a. Remove front cover (1) from cab front panel (2) by removing eight screws (3). Remove seal (4).

   b. Inspect rivets (5) for stripped, crossed, or damaged threads. Replace only if required.

   c. Remove rubber seal (6) from front panel (2).



2. REMOVE BUMPER (7), SEAL PLATE (10), AND STRIKER (13) FROM DRIVER SIDE PANEL WELDMENT (8).

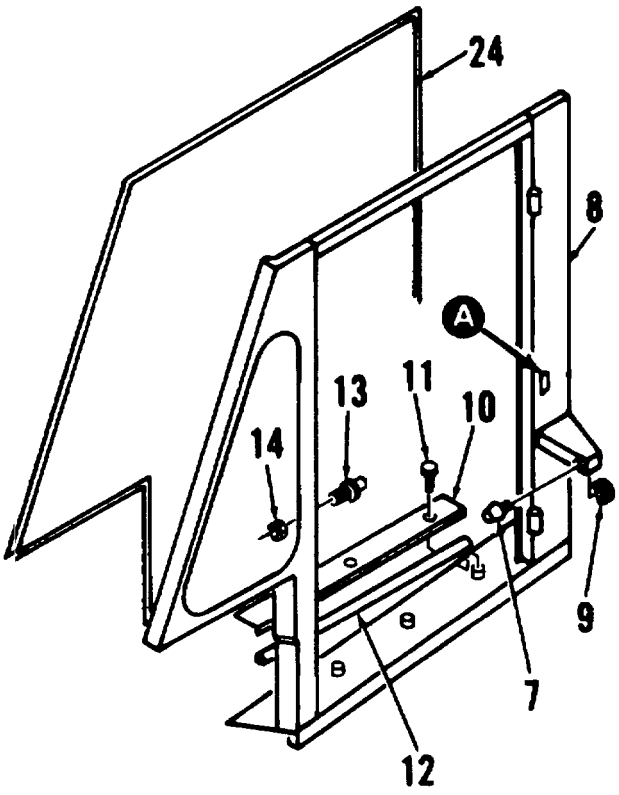
    a. Remove rubber bumper (7) from panel weldment (8) by removing nut (9).
    b. Remove seal plate (10) from base of panel weldment (8) by removing four screws (11). Remove rubber seal (12).
    c. Remove striker (13) from panel weldment (8) by removing nut (14).
    d. Remove rubber seal (24) from panel weldment (8).

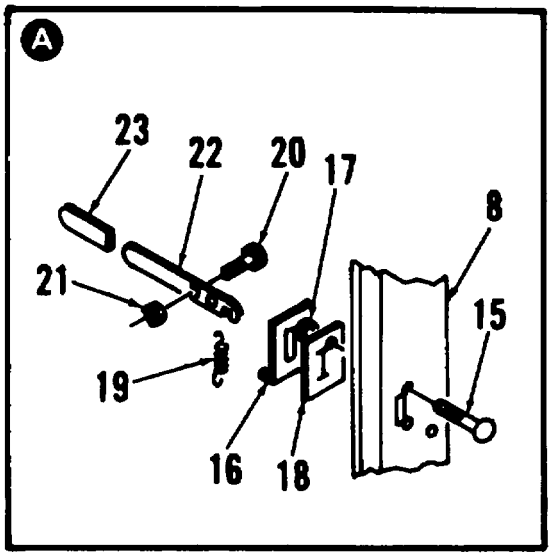
3. REMOVE LATCH LEVER (22) FROM PANEL WELDMENT (8).

    a. Remove screws (15), backup seal (16), and door release seal (18) from panel weldment (8).
    b. Inspect rivnuts (17) for crossed, stripped, or damage threads. Replace rivnuts only if required.
    c. Remove spring (19) from lever (22).
    d. Remove screw (20) and nut (21) from lever (22). Remove plastic grip (23) only if replacement is required.

4. REMOVE RIGHT WINDOW SLIDE (26) FROM WINDOW FRAME (25).

    a. Remove right window slide (26) from window frame (25) by removing screw (27), lockwasher (28), and washer (29).
    b. Remove knob (30), washers (31, 32), and bracket (33) from right window slide (26).





5. REMOVE RUBBER SEAL (34) FROM PANEL WELDMENT (35).REMOVE INSULATION (40) ONLY IF REPLACEMENT IS REQUIRED.

6. REMOVE ANGLE BRACKET (36) FROM PANEL WELDMENT (35) BY REMOVING SCREWS (37), WASHERS (38), AND LOCKNUTS (39).

B. CLEANING

Clean cab assembly components in accordance with paragraph 1-24.

C. INSPECTION

1. Conduct overall inspection of cab assembly components in accordance with paragraph 1-24.

2. Inspect rubber seals for cracking, tears, discoloration, or deformation.

D. REPAIR

1. Repair of the cab assembly consists of removal and replacement of defective, deformed, or damaged components.

2. Repair cab assembly sheet metal in accordance with TC 9-510.

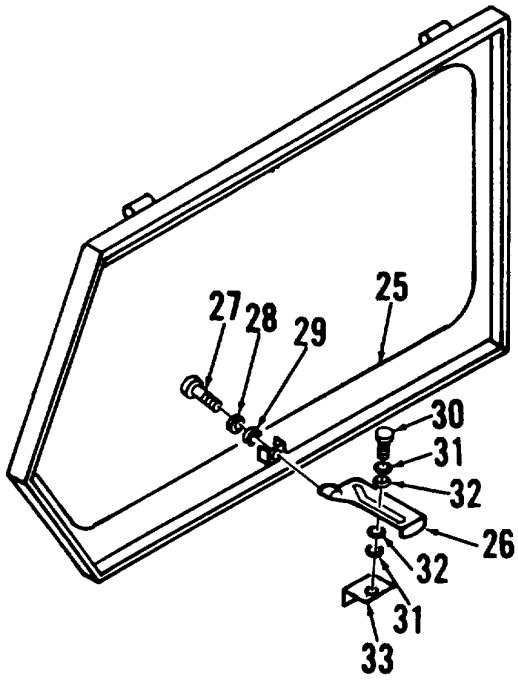
E. ASSEMBLY

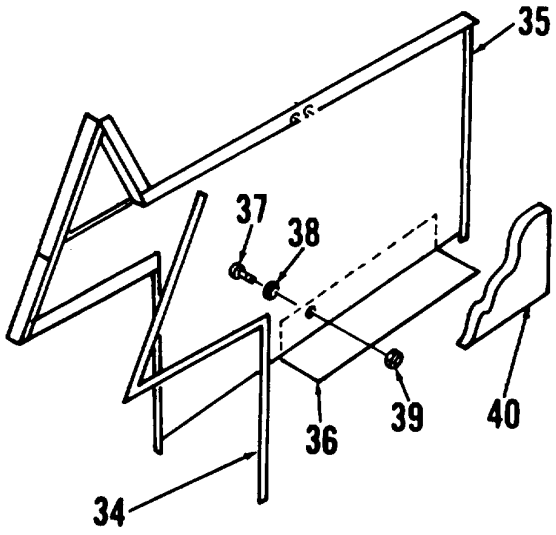
1. INSTALL ANGLE BRACKET (36) ONTO PANEL WELDMENT (35) USING SCREWS (37), WASHERS (38), AND LOCKNUTS (39).

2. INSTALL RUBBER SEAL (34) ONTO PANEL WELDMENT (35). INSTALL INSULATION (40).

3. INSTALL RIGHT WINDOW SLIDE (26) ONTO WINDOW FRAME (25).

    a. Secure right window slide (26) to window frame (25) using screw (27), lockwasher (28), and washer (29).
    b. Install knob (30), washers (31, 32), and bracket (33) onto right window slide (26).



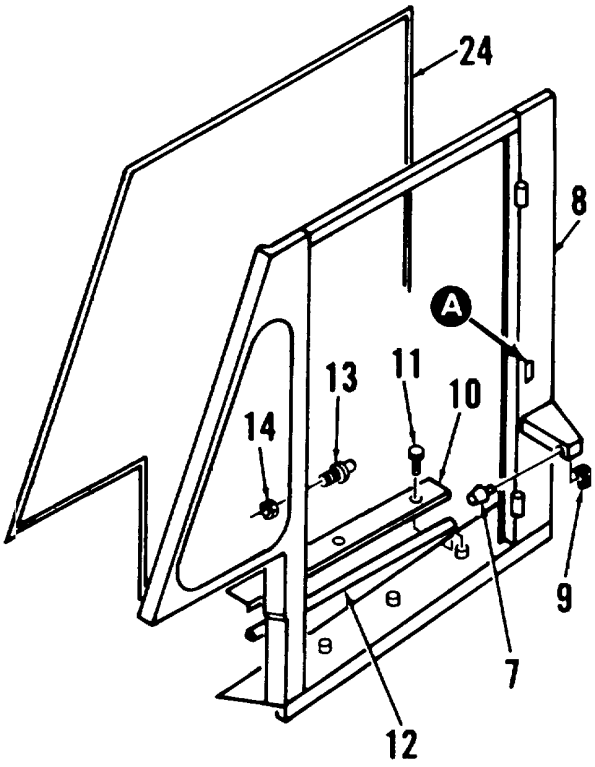


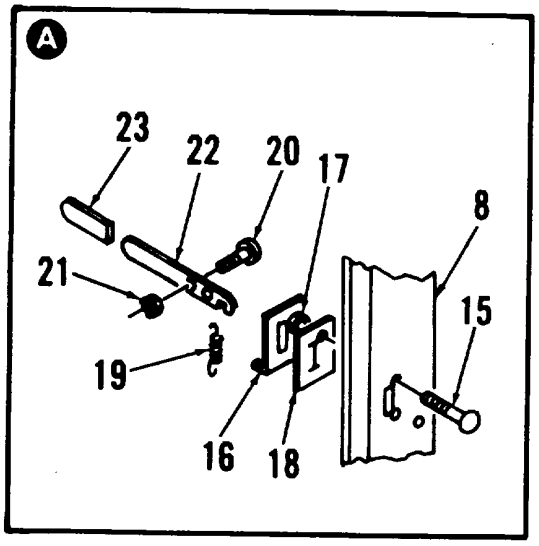
4. INSTALL LATCH LEVER (22) ONTO DRIVER SIDE PANEL WELDMENT (8).

   a. Install plastic grip (23) onto lever (22). Install screw (20), nut (21), and lever.
   b. Install screws (15), backup seal (16), nuts (17), and door release seal (18) onto panel weldment (8).
   c. Attach spring (19).

5. INSTALL BUMPER (7), SEAL PLATE (10), AND STRIKER (13) ONTO PANEL WELDMENT (8).

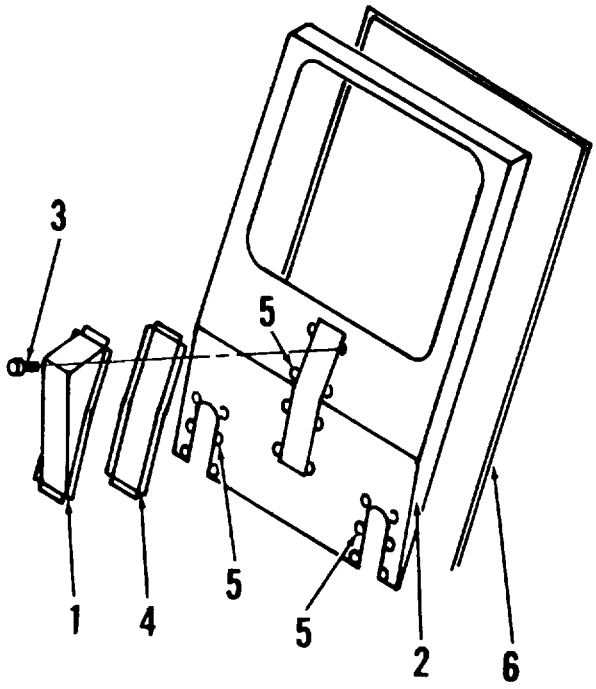
   a. Install striker (13) onto panel weldment (8) using nut (14).
   b. Install rubber seal (12) and seal plate (10) onto base of panel weldment (8) using four screws (11).
   c. Install rubber bumper (7) onto panel weldment (8) using nut (9).





6. INSTALL FRONT COVER (1) AND RUBBER SEAL (6) ONTO CAB FRONT PANEL (2).

    a. Install rubber seal (6) onto front panel (2).
    b. Mate seal (4) to front cover (1). Install front cover onto cab front panel (2) using eight screws (3).



FOLLOW-ON MAINTENANCE:

Install cab assembly (para. 3-53)
Install cab doors (para. 2-133)
Install cab windows (para. 2-135)

END OF TASK

3-55. ROLLOVER PROTECTION STRUCTURE (ROPS) REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App E)
Sling (4, App E)

Reference:

TB 9-2300-247-40

Personnel Required:

2 Personnel

Equipment Condition:

Instrument panel removed (para. 2-58)
Ether cylinder removed (para. 2-40)
ROPS drive lights removed (para. 2-65)
Master cylinders removed (para. 2-111)
Front fenders removed (para. 2-134)
Cab assy removed (para 3-53)

A. **REMOVAL**

1. Tag electrical wiring (1). Remove wiring from ROPS frame (5) by removing screws (2) and clamps (3).

2. Remove mirrors (4) and brackets from ROPS frame (5) by removing screws (6), washers (7), and nuts (8).

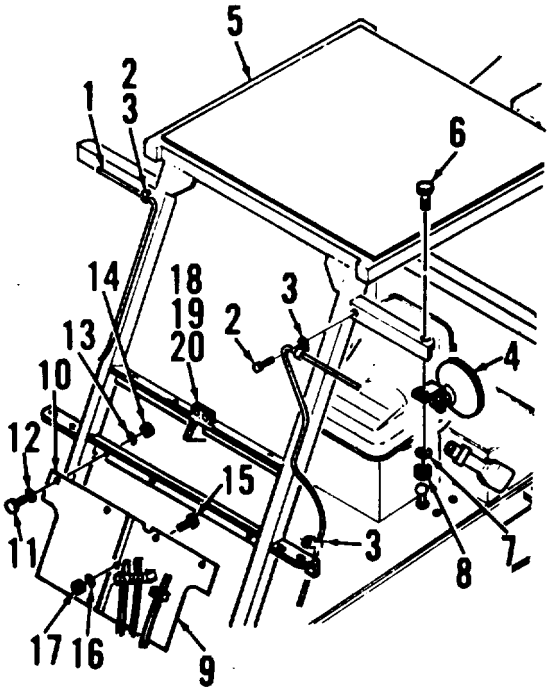
NOTE

Hose assemblies are secured to left splash guard (9) with clamps. Hose assemblies and clamps may remain in place during guard removal.

3. Remove left and right splash guards (9, 10) from ROPS frame (5) by removing four screws (11), washers (12), lockwashers (13), and nuts (14).

4. Separate left splash guard (9) from right splash guard (10) by removing screw (15), washer (16), and nut (17).

5. Remove forklift level indicator gauge (18) from ROPS frame (5) by removing screws (19) and nuts (20).



WARNING

Rollover protection structure is very heavy and awkward. Enlist the help of an aide when removing from chassis to prevent injury to personnel and damage to forklift components.

6. Install sling onto top of ROPS frame (5). Tighten sling. Connect hoist to sling and lift to take up slack.

7. Remove ROPS frame (5) from forklift chassis by removing screws (21, 22), washers (23, 24), and nuts (25).

B. CLEANING

Clean ROPS frame and related components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect ROPS frame and related components in accordance with paragraph 1-24.

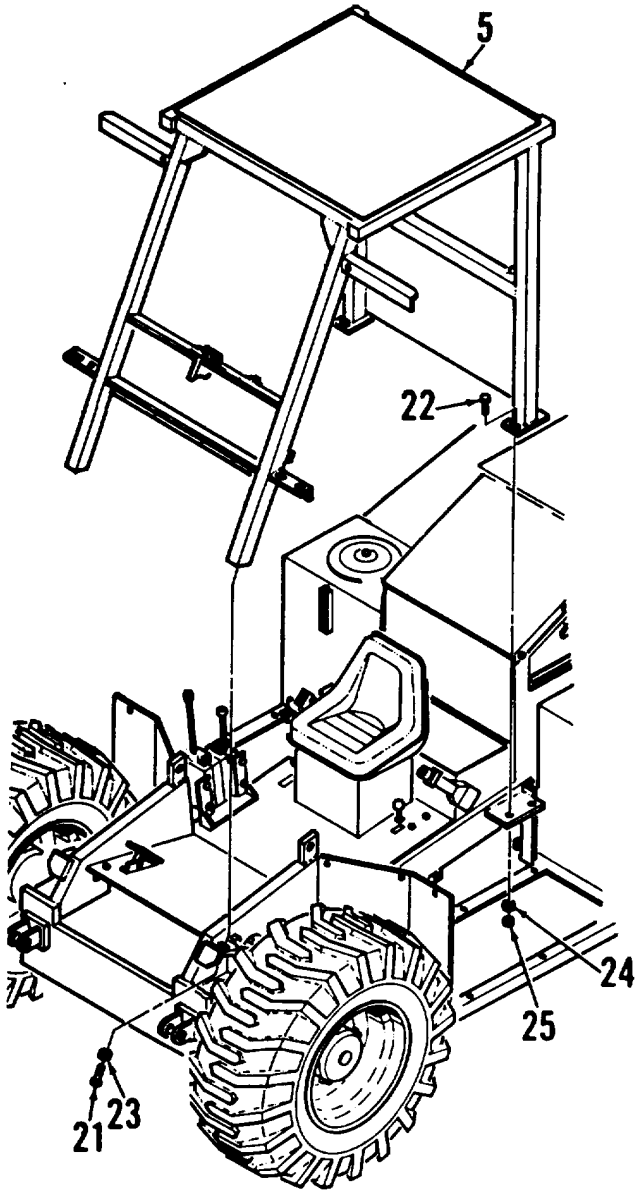
2. Repair frame in accordance with TB 9-2300-247-40.

D. INSTALLATION

WARNING

Rollover protection structure is very heavy and awkward. Enlist the help of an aide when installing onto chassis to prevent injury to personnel and damage to forklift components.

1. Using hoist, lift ROPS frame (5) and position onto forklift chassis. Secure using screws (21, 22), washers (23, 24), and nuts (25).



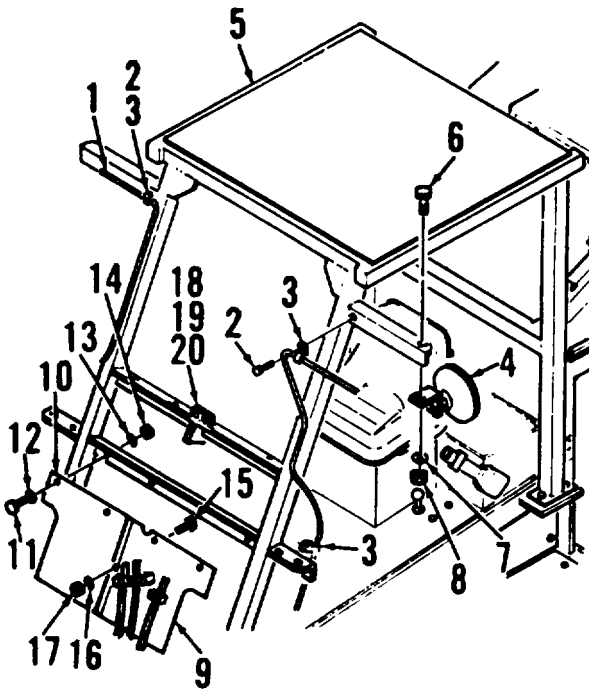
2. Install forklift level indicator gauge (18) onto ROPS frame (5) using screws (19) and nuts (20).

3. Attach left and right splash guards (9, 10) to ROPS frame (5) using four screws (11), washers (12), lockwashers (13), and nuts (14).

4. Secure left splash guard (9) to right splash guard (10) using screw (15), washer (16), and nut (17).

5. Install mirrors (4) and brackets onto ROPS frame (5) using screws (6), washers (7), and nuts (8).

6. Secure electrical wiring (1) to ROPS frame (5) using screws (2) and clamps (3).



FOLLOW-ON MAINTENANCE:

Install ether cylinder (para. 2-40)
Install master cylinders (para. 2-111)
Install instrument panel (para. 2-58)
Install ROPS drive lights (para. 2-64)
Install cab assembly (para. 3-50)
Install front fenders (para. 2-134)

END OF TASK

3-56. DOOR REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Reference:

TC 9-510

Materials / Parts:

Urethane Sealant (38, App. C)

Equipment Condition:

Door removed (para. 2-133)

A. DISASSEMBLY

CAUTION

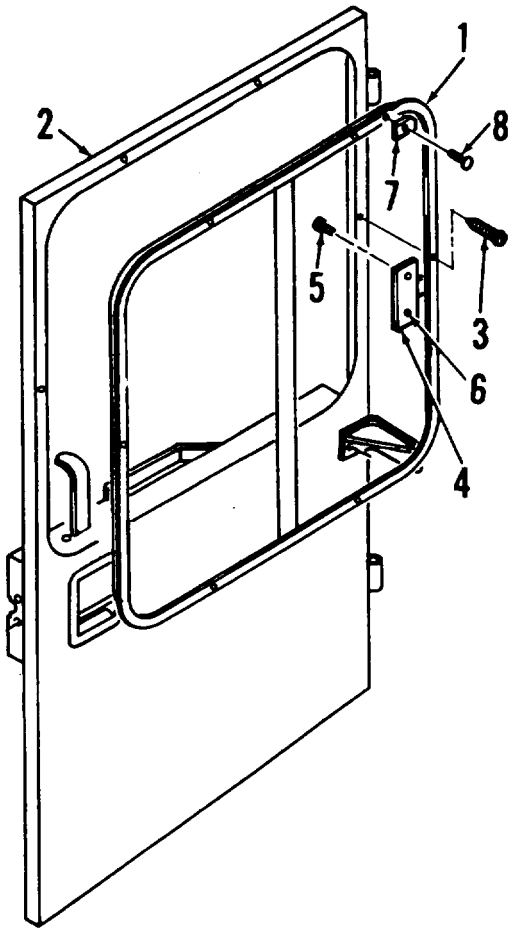
To avoid damaging window, enlist the help of an assistant when removing. Hold window in place while removing attaching parts.

1. REMOVE DRIVERS SIDE WINDOW (1). REMOVE LATCH (4) AND STOP (7).

   a. Remove drivers side window (1) from door (2) by removing six screws (3). Break window free from caulk sealant.

   b. Remove window latch (4) from window (1) by removing screws (5). Inspect rubber mounts (7) for damage and replace as required.

   c. Remove window stop (7) by removing screw (8).



2. REMOVE LATCH CAM (10), LATCH (11), AND LATCH RELEASE (16).

   a. Disconnect spring (9) from latch cam (10) and latch (11) by removing bolt (12).

   b. Remove shoulder bolt (13), washers (14), and nut (15) to release latch cam (10) from latch release (16).

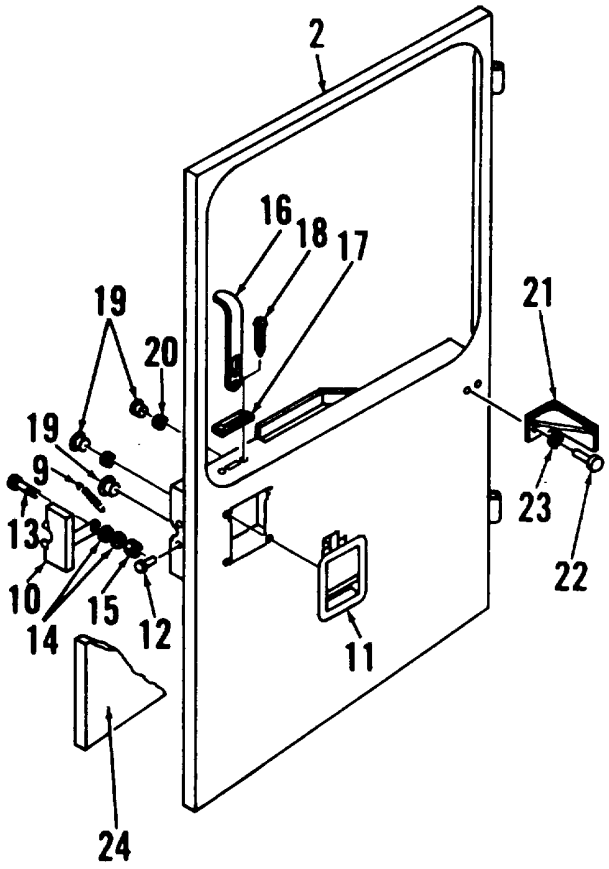
   c. Remove door bezel (17) from door (2) by removing screws (18). Remove latch release (16).

   d. Remove latch cam (10) from door (2) by removing remaining bolts (12).

   e. Remove plugs (19). Remove latch (11) from door (2) by removing nuts (20).

3. REMOVE DOOR HOLD BRACKET (21) BY REMOVING BOLTS (22) AND WASHERS (23).

4. REMOVE INSULATION (24) FROM DOOR (2) ONLY IF REPLACEMENT IS REQUIRED.



B. CI.EANING

Clean door assembly components in accordance with paragraph 1-24.

C. INSPECTION

1. Conduct overall inspection of door assembly components in accordance with paragraph 1-24.

2. Inspect window for cracks or holes. Check for chipped edges.

3. Inspect window rubber for cracking, deformation, or permanent set.

4. Work latch to ensure smooth operation.

D. REPAIR

1. Repair of the door assembly consists of removal and replacement of defective, deformed, or damaged components.

2. Repair door sheet metal in accordance with TC 9-510.

E. ASSEMBLY

1. INSTALL INSULATION (24) INTO DOOR (2).

2. INSTALL DOOR HOLD BRACKET (21) ONTO DOOR (2) USING BOLTS (22) AND WASHERS (23).

3. INSTALL LATCH CAM (10), LATCH (11), AND LATCH RELEASE (16).

   a. Install latch (11) onto door (2) using nuts (20). Install plugs (19).

   b. Install latch cam (10) onto door (2) using bolts (12).

   c. Install door bezel (17) using screws (18). Install latch release (16).

   d. Use shoulder bolt (13), washers (14), and nut (15) to secure latch cam (10) to latch release (16).

   e. Connect spring (9) to latch cam (10) and latch (11). Secure using bolt (12).

4. INSTALL DRIVERS SIDE WINDOW (1). INSTALL LATCH (4) AND STOP (7).

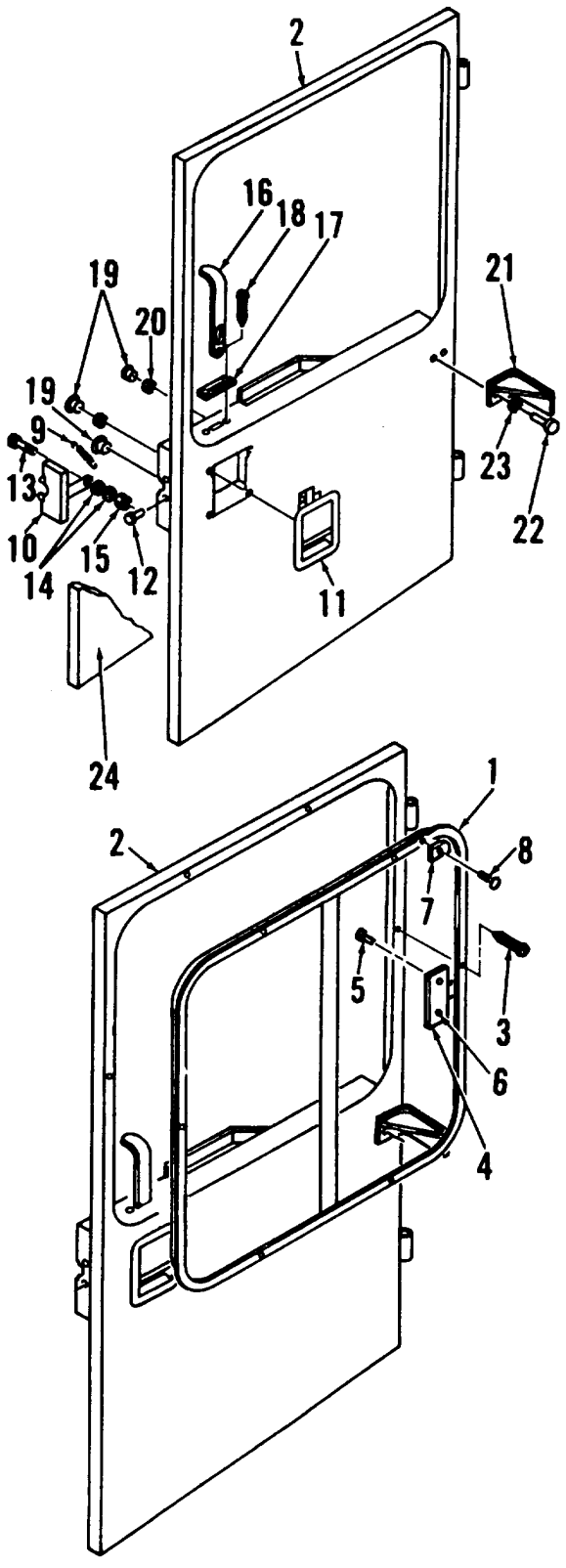
   a. Install window stop (7) using screw (8).

   b. Install window latch (4) using screws (5).

   c. Install drivers side window (1) onto door (2) using six screws (3). Apply sealant around outer edge of window.

FOLLOW-ON MAINTENANCE:

Install door (para. 2-133)



END OF TASK

3-57. FENDER REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Materials / Parts:

Rivet, Item 31 (4 ea. (AR))
Rivet, Item 78 (4 ea. (AR))
Rivet, Item 80 (4 ea. (AR))
Rivet, Item 82 (4 ea. (AR))

Equipment Condition:

Fenders removed (para. 2-134)

Reference:

TC 9-510

A. DISASSEMBLY

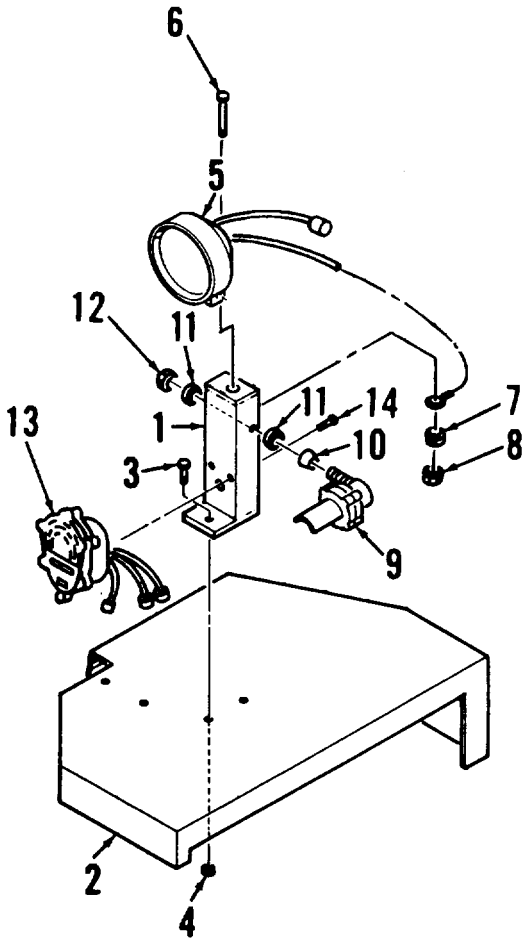
1. REMOVE LIGHT MOUNT (1) FROM LEFT FRONT FENDER (2). REMOVE LIGHTS (5, 9, 13) FROM LIGHT MOUNT.

   a. Remove light mount (1) from left front fender (2) by removing screws (3) and nuts (4).

   b. Remove drive light (5) from light mount (1) by removing screw (6), washer (7), and nut (8).

   c. Remove blackout light (9) from light mount (1) by removing cone washer (10), washers (11), and nut (12).

   d. Remove turn signal light (13) from light mount (1) by removing screws (14).



2. REMOVE LIGHT MOUNT (15) FROM RIGHT FRONT FENDER (16). REMOVE LIGHTS (19, 25) AND HORN (23) FROM LIGHT MOUNT.

   a. Remove light mount (15) from right front fender (16) by removing screws (17) and nuts (18).

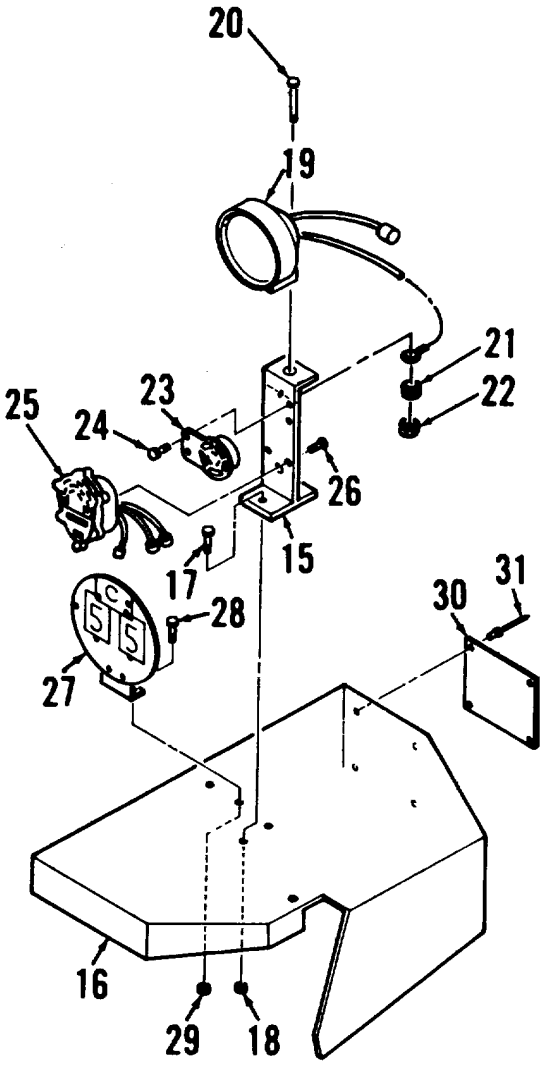
   b. Remove drive light (19) from light mount (15) by removing screw (20), washer (21), and nut (22).

   c. Remove horn (23) from light mount (15) by removing screws (24).

   d. Remove turn signal light (25) from light mount (15) by removing screws (26).

3. REMOVE NUMBER PLATE (27) FROM RIGHT FRONT FENDER (16) BY REMOVING SCREWS (28) AND NUTS (29).

4. REMOVE BATTERY DATA PLATE (30), IF REQUIRED, BY DRILLING OUT RIVETS (31).



5. REMOVE BRACE (32), LIGHT BOX (36), AND BRACKET (39) FROM LEFT REAR FENDER (42). REMOVE LIGHTS (46, 49).

   a. Remove fender brace (32) from left rear fender (42) by removing screw (33), washer (34), and nut (35).

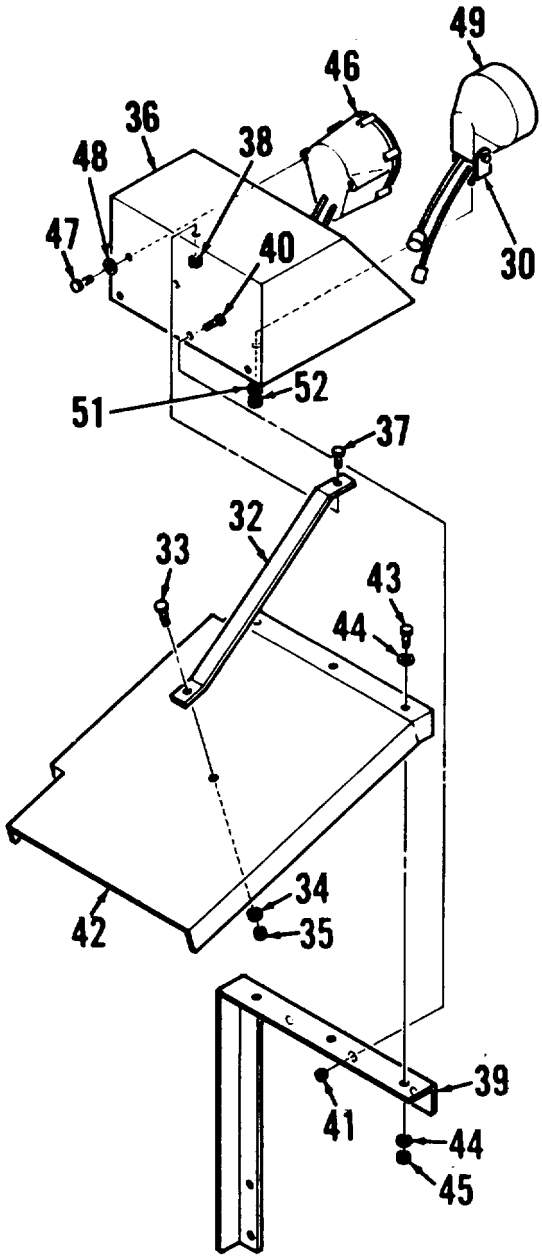
   b. Remove fender brace (32) from light box (36) by removing screw (37) and nut (38).

   c. Remove light box (36) from fender bracket (39) by removing screws (40) and nuts (41).

   d. Remove fender bracket (39) from fender (42) by removing screws (43), washers (44), and nuts (45).

   e. Remove composite light (46) from light box (36) by removing screws (47) and washers (48).

   f. Remove drive light (49) from light box (36) by removing screw (50), washer (51), and nut (52).



6. REMOVE BRACE (56), LIGHT BOX (61), AND BRACKET (64) FROM RIGHT REAR FENDER (57). REMOVE LIGHTS (53, 70).

   a. Remove fender brace (56) from right rear fender (57) by removing screw (58), washer (59), and nut (60).

   b. Remove fender brace (56) from light box (61) by removing screw (62) and nut (63).

   c. Remove light box (61) from fender bracket (64) by removing screws (65) and nuts (66).

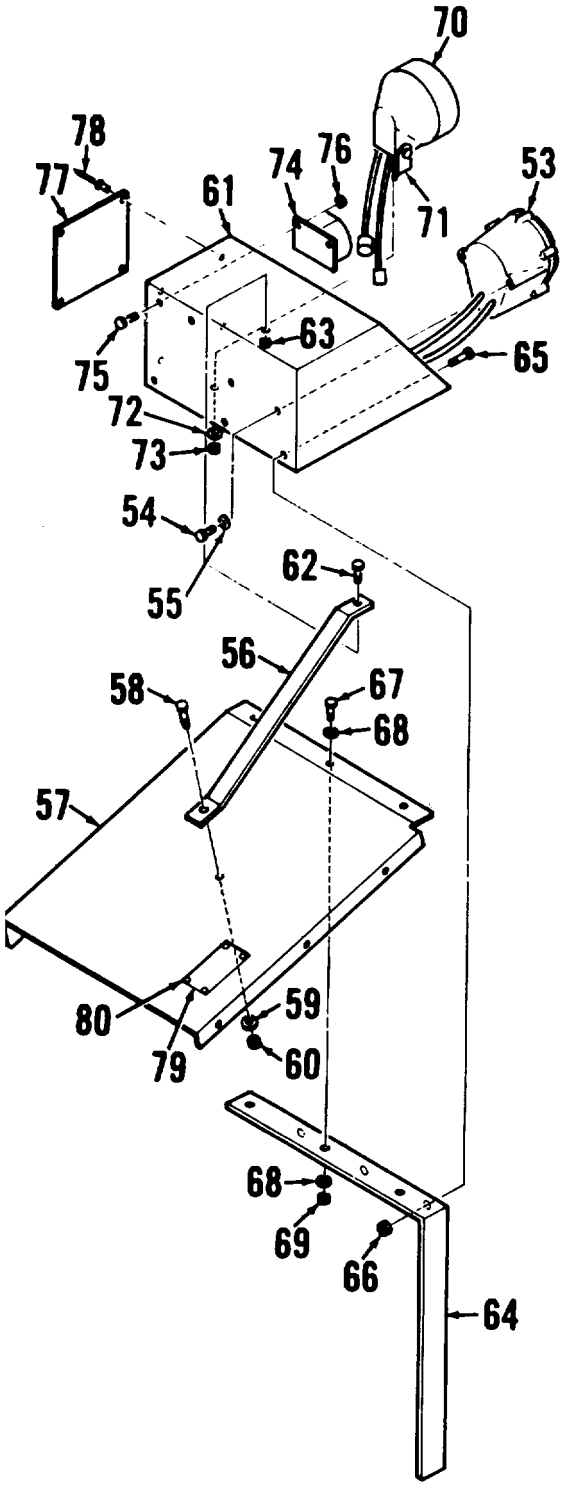
   d. Remove fender bracket (64) from fender (57) by removing screws (67), washers (68), and nuts (69).

   e. Remove drive light (70) from light box (61) by removing screw (71), washer (72) and nut (73).

   f. Remove backup alarm (74) by removing screws (75) and nuts (76).

   g. Remove composite light (53) by removing screws (54) and washers (55).

7. REMOVE DATA PLATES (77, 79), IF REQUIRED, BY DRILLING OUT RIVETS (78, 80).



B. CLEANING

Clean fender assembly components in accordance with paragraph 1-24.

C. INSPECTION

Inspect fender assembly components in accordance with paragraph 1-24.

D. REPAIR

1. Repair of the fender assembly consists of removal and replacement of defective, deformed, or damaged components.

2. Repair fender sheet metal in accordance with TC 9-510.

E. ASSEMBLY

1. INSTALL BRACE (56), LIGHT BOX (61), AND BRACKET (64) ONTO RIGHT REAR FENDER (57). INSTALL LIGHTS (53, 70).

   a. Install composite light (53) into light box (61) using screws (54) and washers (55).

   b. Install backup alarm (74) using screws (75) and nuts (76).

   c. Install drive light (70) using screw (71), washer (72) and nut (73).

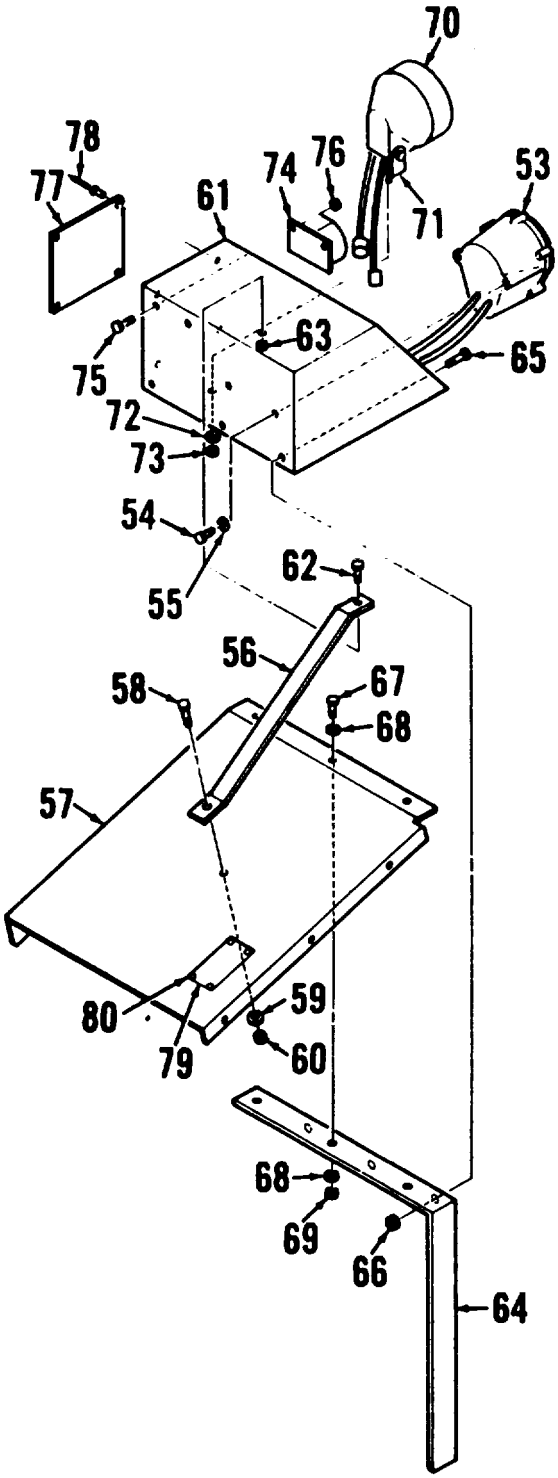
   d. Secure fender bracket (64) to fender (57) using screws (67), washers (68), and nuts (69).

   e. Install light box (61) onto fender bracket (64) using screws (65) and nuts (66).

   f. Attach fender brace (56) to light box (61) using screw (62) and nut (63).

   g. Attach fender brace (56) to right rear fender (57) using screw (58), washer (59), and nut (60).

2. INSTALL DATA PLATES (77, 79) USING NEW RIVETS (78, 80).



3. INSTALL BRACE (32), LIGHT BOX (36), AND BRACKET (39) ONTO LEFT REAR FENDER (42). INSTALL LIGHTS (46, 49).

   a. Install drive light (49) into light box (36) using nut screw (50), washer (51), and (52).

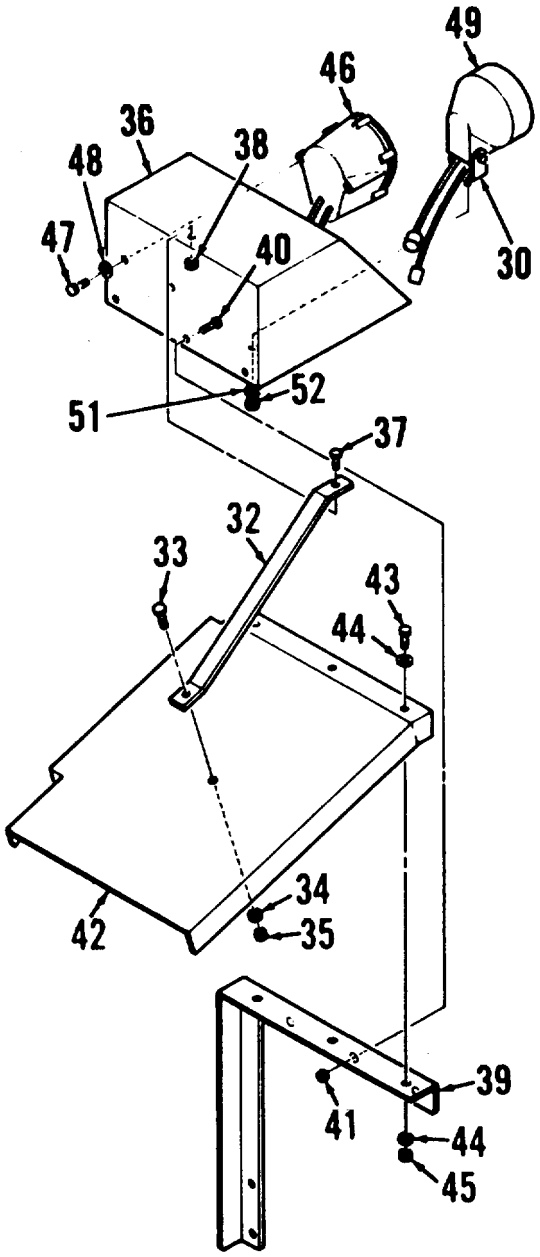
   b. Install composite light (46) using screws (47) and washers (48).

   c. Secure fender bracket (39) to fender (42) using screws (43), washers (44), and nuts (45).

   d. Install light box (36) onto fender bracket (39) using screws (40) and nuts (41).

   e. Attach fender brace (32) to light box (36) using screw (37) and nut (38).

   f. Attach fender brace (32) to left rear fender (28) using screw (33), washer (34), and nut (35).



4. INSTALL LIGHT MOUNT (15) ONTO RIGHT FRONT FENDER (16). INSTALL LIGHTS (19, 25) AND HORN (23) ONTO LIGHT MOUNT.

   a. Attach light mount (15) to right front fender (16) using screws (17) and nuts (18).

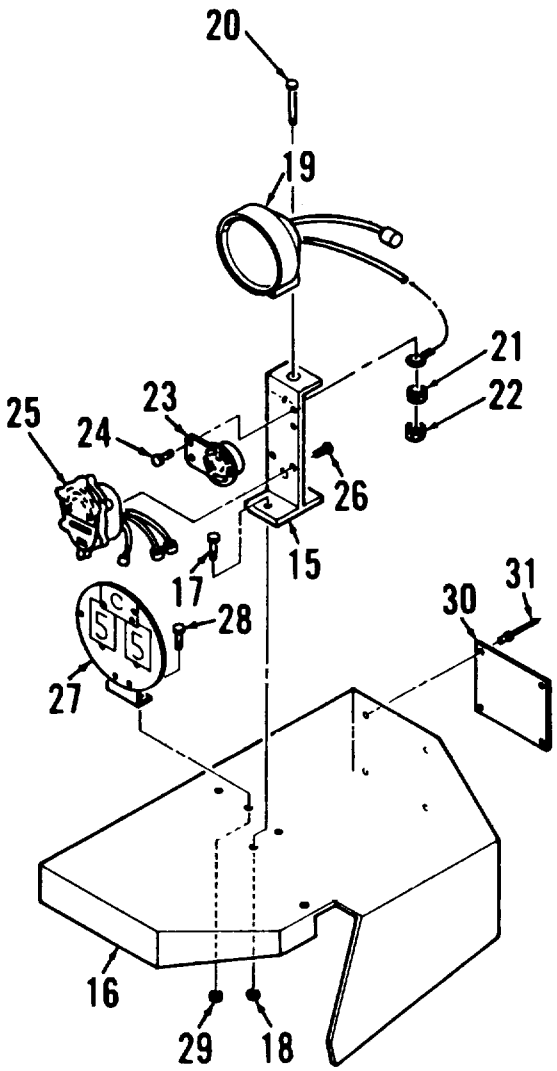
   b. Install turn signal light (25) onto light mount (15) using screws (26).

   c. Install horn (23) onto light mount (15) using screws (24).

   d. Install drive light (19) onto light mount (15) using screw (20), washer (21), and nut (22).

5. ATTACH NUMBER PLATE (27) TO RIGHT FRONT FENDER (16) USING SCREWS (28) AND NUTS (29).

6. INSTALL BATTERY DATA PLATE (30) USING NEW RIVETS (31).



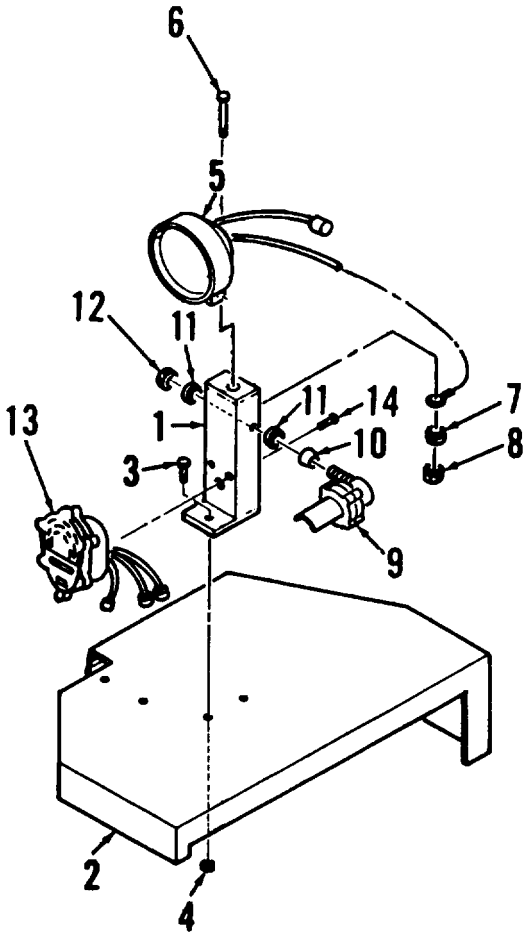
7. INSTALL LIGHT MOUNT (1) ONTO LEFT FRONT FENDER (2). INSTALL LIGHTS (5, 9, 13) ONTO LIGHT MOUNT.

   a. Attach light mount (1) to left front fender (2) using screws (3) and nuts (4).

   b. Install turn signal light (13) onto light mount (1) using screws (14).

   c. Install blackout light (9) onto light mount (1) using cone washer (10), washers (11), and nut (12).

   d. Install drive light (5) onto light mount (1) using screw (6), washer (7), and nut (8).



FOLLOW-ON MAINTENANCE:

Install fenders (para. 2-134)

END OF TASK

3-58. FLOOR PLATE REPAIR

This task covers: Repair

INITIAL SETUP:

Equipment Condition:

Floor plate removed (para. 2-137)

Reference:

TC 9-510
TB 9-2300-247-40

A. REPAIR

Repair floor plate related frame work in accordance with TC 9-510 and TB 9-2300-247-40.

FOLLOW-ON MAINTENANCE:

Install floor plate (para. 2-137)

END OF TASK

3-59. TOOL BOX REPAIR

This task covers: Repair

INITIAL SETUP:

Equipment Condition:	Reference:
Tool box removed (para. 2-138)	TC 9-510 TB 9-2300-247-40

A. REPAIR

Repair tool box in accordance with TC 9-510 and TB 9-2300-247-40.

FOLLOW-ON MAINTENANCE:

Install tool box (para. 2-138)

END OF TASK

Section XIV. BODY, CHASSIS, AND HULL ACCESSORY ITEM MAINTENANCE

3-60. DEFROSTER FAN ASSEMBLY REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E) (para. 2-142)

Equipment Condition:

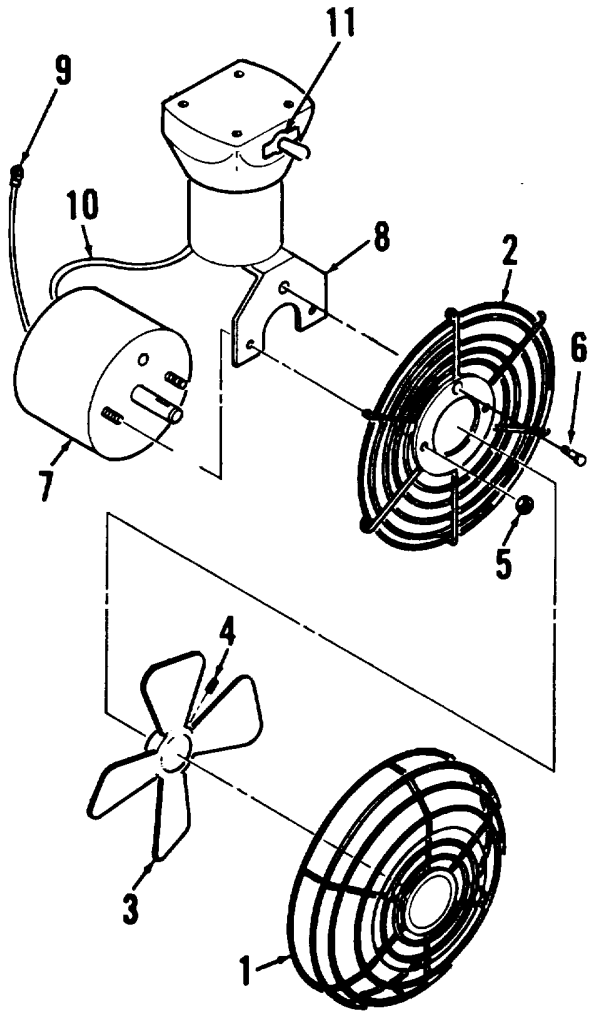
Defroster fan assembly removed

A. DISASSEMBLY

CAUTION

Use care when removing front fan guard (1) to prevent damage to prongs on rear, guard (2).

1. Carefully pry front fan guard (1) off of rear guard (2).
2. Remove fan blade (3) from motor shaft by loosening setscrew (4).
3. Remove rear guard (2) from motor studs by removing nuts (5) and screw (6). Separate motor (7) from bracket (8).
4. Replace terminal on wire (9), as required, in accordance with paragraph 2-83. Wire (10) connects to ON-OFF switch (11).



B. CLEANING

Clean defroster assembly components in accordance with paragraph 1-24.

C. INSPECTION

1. Conduct overall inspection of defroster fan assembly components in accordance with paragraph 1-24.

2. Inspect fan motor for obvious damage. Inspect for evidence of overheating or shorting.

3. Inspect fan blade front and rear guards for bent or broken wire. Ensure fan blade does not rub against guard when assembling.

4. Inspect fan blades for cracks, splits. or bends.

D. REPAIR

Repair of the defroster fan assembly consists of removal and replacement of defective, deformed, or damaged components.

E. ASSEMBLY

1. Ensure terminal is securely fastened to wire (9). Connect wire (10) to ON-OFF switch (11).

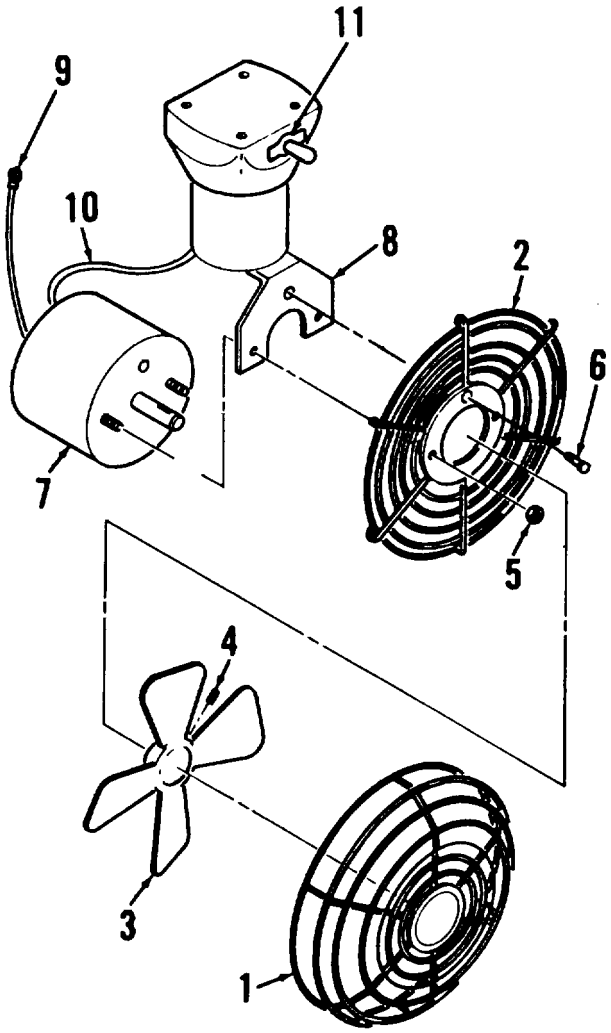
2. Install motor (7) into bracket (8). Mate rear guard (2) to motor studs and secure using nuts (5) and screw (6).

3. Mount fan blade (3) onto motor shaft. Blade hub must face motor. Secure by tightening setscrew (4) onto flat of motor shaft.

CAUTION

Use care when installing front fan guard (1) to prevent damage to prongs on rear guard (2).

4. Carefully install front fan guard (1) onto rear guard (2). Start with bottom prong first and work around.



FOLLOW-ON MAINTENANCE:

Install defroster fan assembly (para. 2-142)

END OF TASK

3-61. HEATER ASSEMBLY REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Equipment Condition:

Heater assembly removed (para. 2-143)

A.. DISASSEMBLY

1. REMOVE FRONT HOUSING (4) FROM REAR HOUSING (5). REMOVE HEATER SWITCH (7) AND SHROUDING (8, 10).

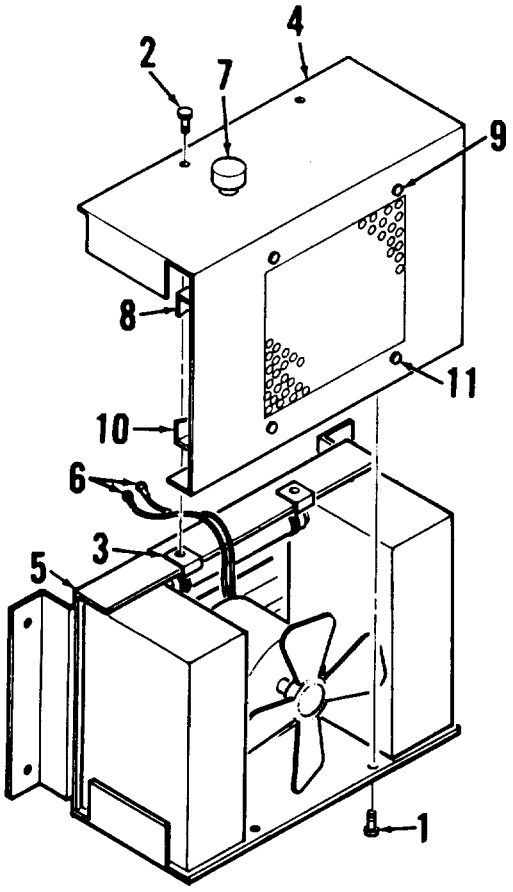
   a. Remove two screws (1) from bottom of rear housing (5).

   b. Remove two screws (2) from clips (3) at top of rear housing (5).

   c. Separate front housing (4) from rear housing (5) to gain access to switch wiring. Disconnect wires (6) from heater switch (7).

   d. Remove heater switch (7) from front housing (4) by removing attaching nuts.

   e. Remove shrouding (8, 10) from front housing (4) by removing screws (9, 11).



2. REMOVE FAN BLADE (12) AND MOTOR (14) FROM REAR HOUSING (5). REMOVE HEATER CORES (18).

   a. Remove fan blade (12) from motor shaft by loosening setscrew (13).

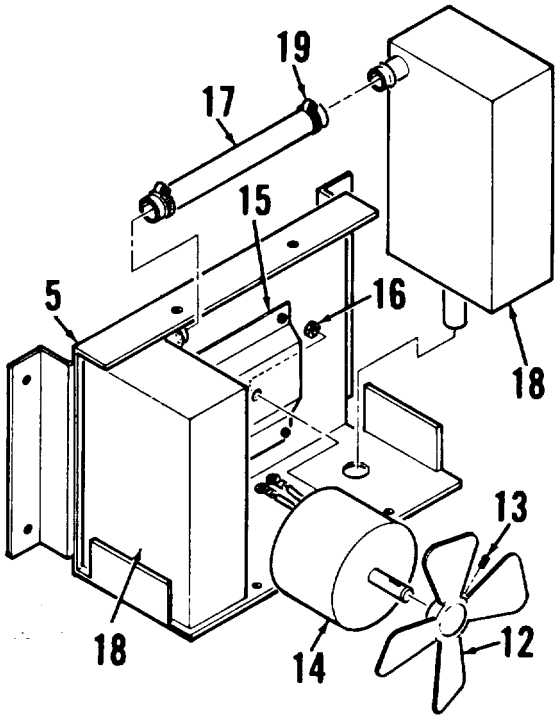
   b. Remove motor (14) from motor bracket (15) by removing nuts (16).

   c. Remove motor bracket (15) from rear housing (5), if required, by drilling out four rivets.

   d. Remove hose (17) from heater cores (18) by loosening hose clamps (19).

   e. Remove heater cores (18) from rear housing (5).

3. REPLACE MOTOR TERMINALS, AS REQUIRED, IN ACCORDANCE WITH PARAGRAPH 2-94.



B. CLEANING

Clean heater assembly components in accordance with paragraph 1-24.

C. INSPECTION

1. Conduct overall inspection of heater assembly components in accordance with paragraph 1-24.

2. Inspect fan motor for obvious damage. Inspect for evidence of overheating or shorting.

3. Inspect fan blades for cracks, splits, or bends.

4. Inspect heater hose for cracks, splits, or permanent deformation. Ensure hose is not dried out.

D. REPAIR

Repair of the heater assembly consists of removal and replacement of defective, deformed, or damaged components.

E. ASSEMBLY

1. INSTALL FAN BLADE (12) AND MOTOR (14) ONTO REAR HOUSING (5). INSTALL HEATER CORES (18).

    a. Place heater cores (18) into holes rear housing (5).

    b. Attach hose (17) to heater cores (18) and secure by tightening hose clamps (19).

    c. Attach motor bracket (15) to rear housing (5) using new rivets.

    d. Mate motor (14) to motor bracket (15) and secure using nuts (16).

    e. Mount fan blade (12) onto motor shaft. Blade hub must face motor. Secure by tightening setscrew (13) onto flat of motor shaft.

2. INSTALL SHROUDING (8, 10) ONTO FRONT HOUSING (4) USING SCREWS (9, 11).

3. INSERT HEATER SWITCH (7) INTO FRONT HOUSING(4) ANDSECUREUSING ATTACHING NUTS.

4. INSTALL FRONT HOUSING (4) ONTO REAR HOUSING (5).

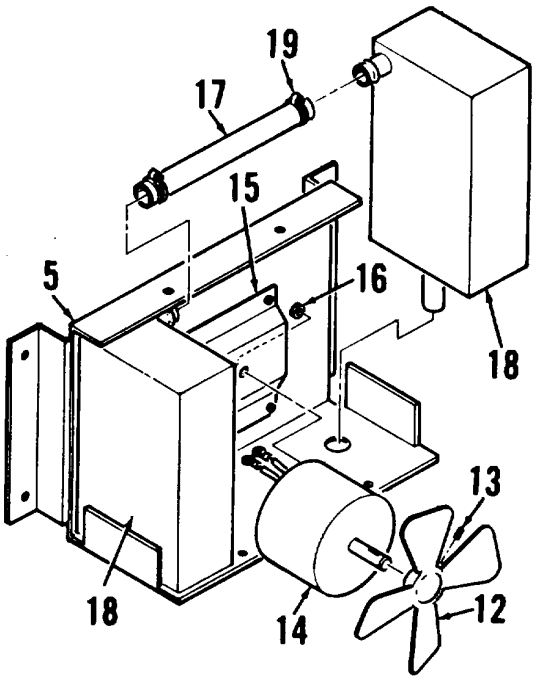
    a. Connect motor wires (6) to heater switch (7). Mate front housing (4) to rear housing (5).

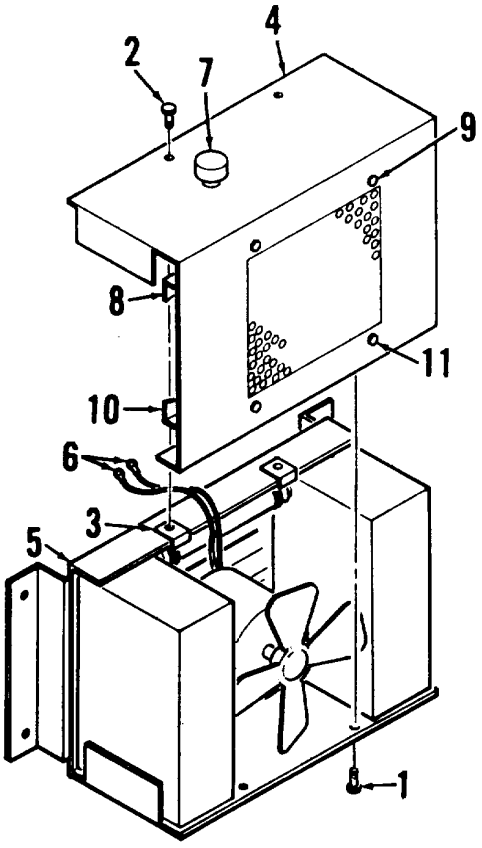
    b. Install two screws (2) into clips (3) at top of rear housing (5).

    c. Install two screws (1) into bottom of rear housing (5).

FOLLOW-ON MAINTENANCE:

Install heater assembly (para. 2-143)





END OF TASK

Section XV. HYDRAULIC AND FLUID SYSTEM MAINTENANCE

3-62. HYDRAULIC PUMP REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Soft Head Hammer (23, App. E)
Torque Wrench (32, App. E)

Equipment Condition:

Hydraulic pump removed (para. 2-147)

Materials / Parts:

Lubricating Oil (16, App. C)
Grease (10, App. C)
E-Seal, Item 9 (2 ea.)
Backup Ring, Item 10 (2 ea.)
O-Ring, Item 11 (2 ea.)
Shaft Seal, Item 14 (1 ea.)

A. DISASSEMBLY

1. Tape end of shaft to prevent damage to oil seal during shaft removal.

2. Remove four bolts (1) and remove end cover (2) from gear housing (3). Set end cover aside.

3. Match mark inlet side of gear housing (3) to mounting flange (4) to aid in installation.

4. Separate gear housing (3) from mounting flange (4), making sure that bearing block remain with shafts.

5. Remove rear bearing block (5) from drive and idler gear shafts.

6. Remove idler shaft (6) from gear housing (3). Carefully remove drive shaft (7) from gear housing, making sure not to damage components.

7. Remove front bearing block (8) from gear housing (3).

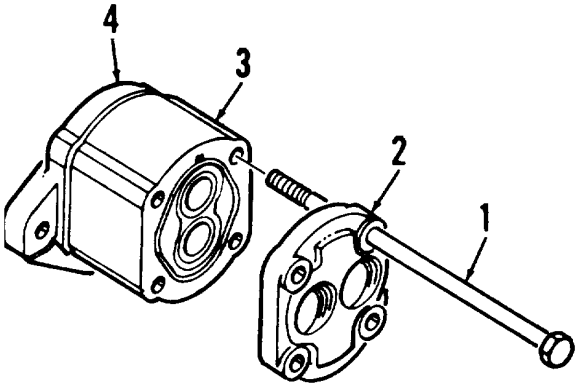
8. Place bearing blocks (5, 8) on a clean work surface, E-seals (9) facing up. Remove E-seals and backup rings (10) from bearing blocks and discard.

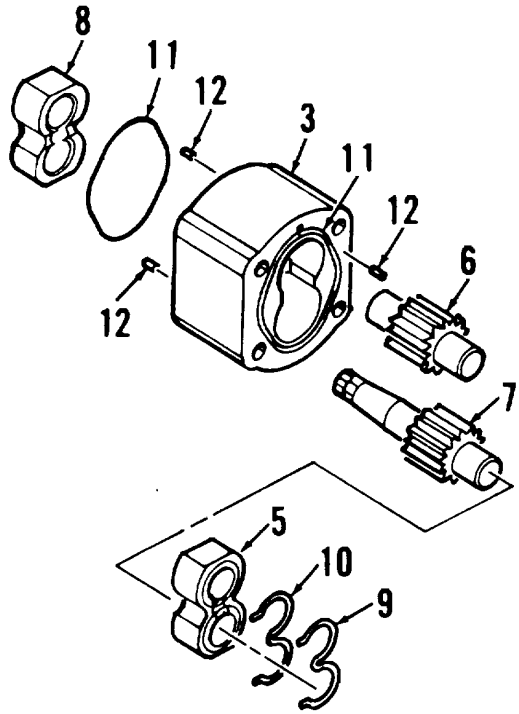
9. Remove O-rings (11) from gear housing (3) and discard. Remove dowel pins (12) only if replacement is required.

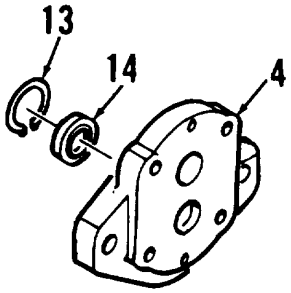
CAUTION

Use care when removing oil seal (14) to prevent damage to mounting flange (4). Scratches in seal bore will cause leakage and require replacement of mounting flange.

10. Place mounting flange (4) on a clean work surface, seal retaining ring (13) facing up. Carefully remove retaining ring and oil seal (14) from mounting flange. Discard oil seal.







B. CLEANING

1. Clean hydraulic pump components in accordance with paragraph 1-24.

2. Clean seal grooves well to ensure all foreign material is removed. Dirt or other contaminants will prevent proper seal installation, causing leakage.

C. INSPECTION

1. Inspect pump components in accordance with paragraph 1-24.

2. Inspect bearing blocks for damage. Bearings shall rotate freely in races.

3. Inspect gear journals and faces for damage. Inspect for damage gear teeth. Replace if faces or journals are scored.

D. RFPAIR

Repair of the hydraulic pump consists of removal and replacement of defective, deformed, or damaged components.

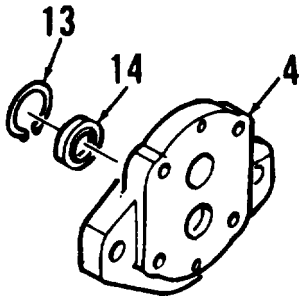
E. ASSEMBLY

CAUTION

Use care when installing oil seal (14) to prevent damage to mounting flange (4). Seal must be seated evenly.

1. Place mounting flange (4) on a clean work surface, oil seal bore facing up.

2. Place new oil seal (14) into mounting flange bore, part number side up. Apply even pressure to oil seal to seat into bore. Install retaining ring (13).



3. Apply a light coat of grease to new O-rings (11) and install into gear housing (3).

4. Place bearing blocks (5, 8) on a clean work surface, E-seals groove facing up.

5. Apply a light coat of grease in E-seal grooves and onto backs (flat side) of new E-seals (9). Install E-seals and backup rings (10) into bearing blocks (5, 8).

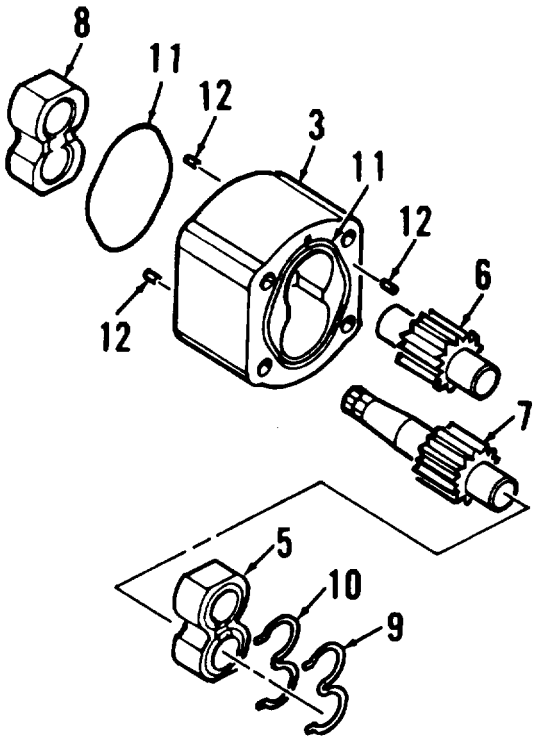
6. Install front bearing block (8) onto mounting flange (4). E-seal (9) must face flange with open side of E-seal pointing towards match mark on flange.

7. Apply a light coat of oil on exposed face of front bearing block (8). Insert drive end of drive gear (7) and insert through bearing block and into oil seal (14).

8. Insert idler shaft (6) through front bearing block (8) and into mounting flange (4).

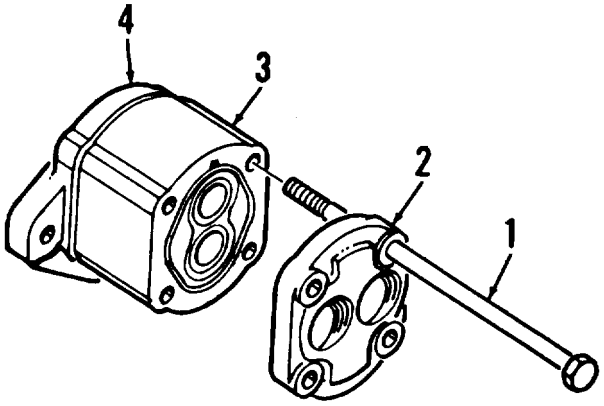
9. Apply a light coat of oil to back face of idler and drive gears (6, 7). Install rear bearing block (5) onto gear shafts, making sure E-seal face up and open side of E-seal points towards inlet side of pump.

10. Gently place gear housing (3) over rear bearing block (5). Slide gear housing down over gears (6, 7) and front bearing block (8). Ensure marks made during disassembly match.



NOTE

Rear bearing block face should sit just below back face of gear housing (3). If bearing block sits higher than housing face, remove gear housing and check that E-seals, backup rings, or O-rings did not shift during assembly.



11. If removed, insert dowel pins into gear housing (3).

12. Mate end cover (2) to gear housing (3). Install four bolts (1) and torque to 56 ft-lbs (77 Nm).

13. Place a small amount of oil into pump inlet port. Rotate driveshaft away from inlet port one full revolution. If driveshaft binds, disassemble and reassemble pump.

FOLLOW-ON MAINTENANCE:

Install hydraulic pump (para. 2-147)

END OF TASK

3-63. DIRECTIONAL CONTROL VALVE ASSEMBLY REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Vise (30, App. E)
Drain Pan (10, App. E)
Torque Wrench (32, App. E)

Equipment Condition:

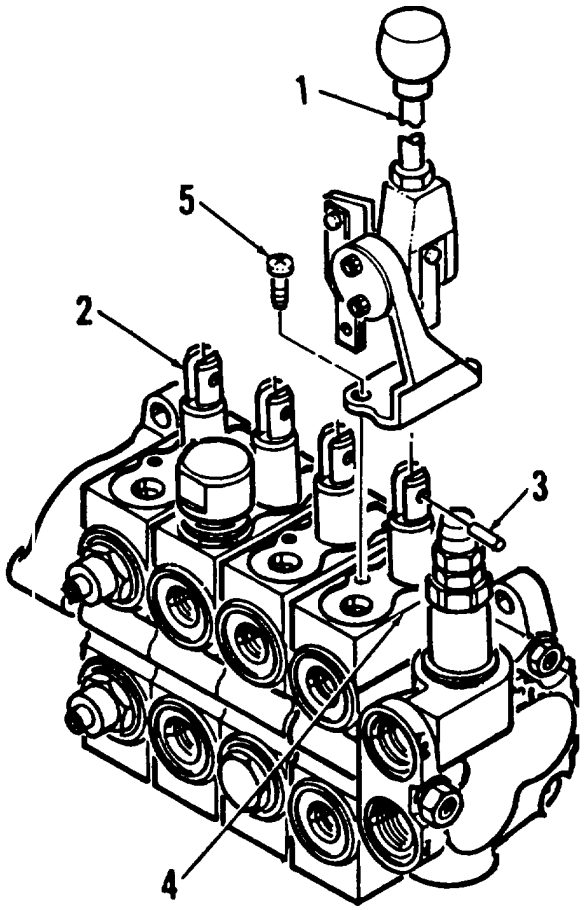
Directional control valve removed (para. 2-150)

Materials / Parts:

Lubricating Oil (16, App. C)
Loctite 242 (20, App. C)
Roll Pin, Item 3 (4 ea.)
O-Ring, Item 7 (I ea.)
O-Ring, Item 9 (1 ea.)
O-Ring, Item 13 (3 ea.)
Wiper Seal, Item 16 (4 ea.)
O-Ring, Item 17 (4 ea.)
Wiper Seal, Item 25 (4 ea.)
O-Ring, Item 26 (4 ea.)
O-Ring, Item 36 (5 ea.)
O-Ring, Item 39 (1 ea.)

A. DISASSEMBLY

1. Place directional control valve assembly in a vise for disassembly.
2. Detach valve handles (1) from spools (2) by driving out roll pins (3). Discard roll pins.
3. Remove valve handles (1) from spool housings (4) by removing screws (5).



4. Remove anti-void assembly (6) from spool housing. Remove spring (37). Remove and discard O-ring (7).

5. Remove relief valve (8) and plug (38) from inlet housing. Remove and discard O-rings (9, 39).

6. Remove restriction poppets (10) from restriction plugs (11).

7. Remove restriction plugs (11) and plug (12) from spool housings. Remove and discard O-rings (13).

8. Remove seal plate (14) from spool housing (4) by removing screws (15).

CAUTION

Use care when removing wiper seals and O-rings from spool housings to prevent damage to bore surfaces.

9. Depress spool (23) and carefully remove wiper seal (16) and O-ring (17) from spool bore. Discard wiper seal and O-ring. Release spool.

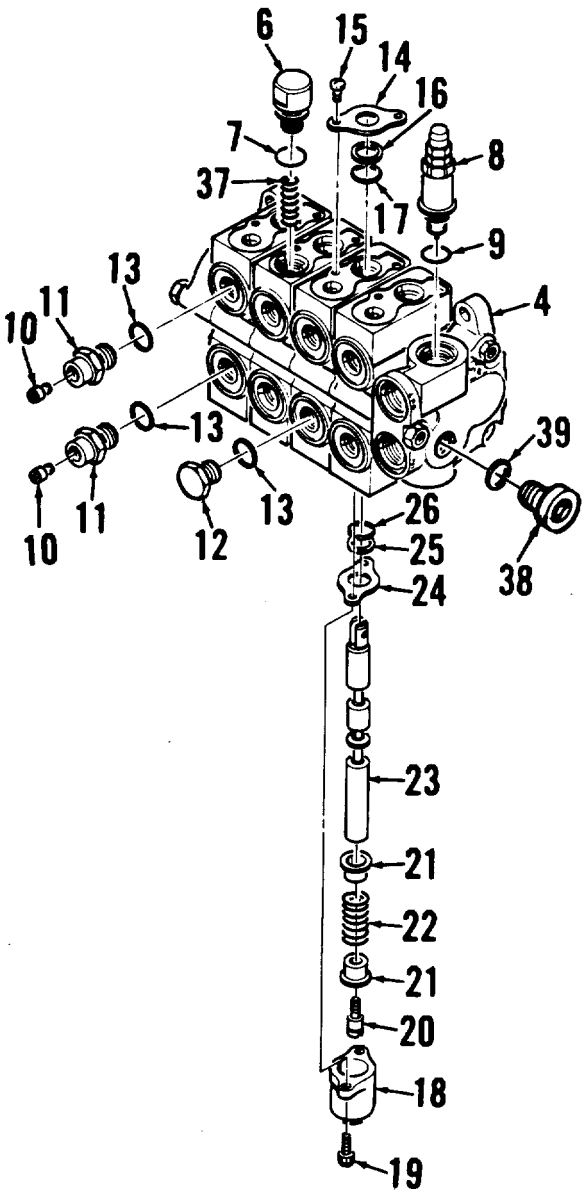
10. Remove spool cap (18) from spool housing (4) by removing screws (19).

11. Remove spool end (20), spring seats (21), and spring (22) from spool housing (4).

12. Carefully slide spool (23) out of spool housing (4). Remove seal plate (24).

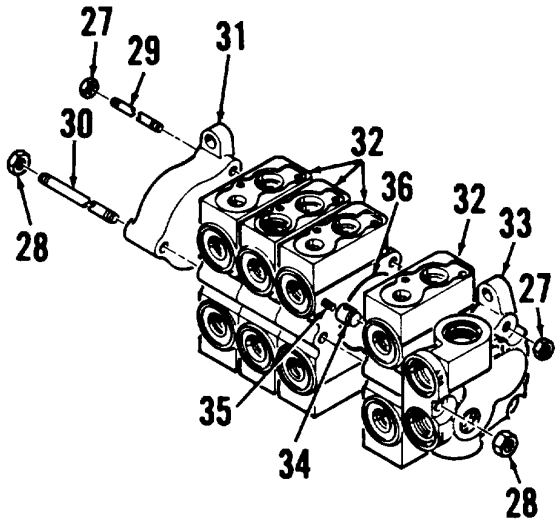
13. Carefully remove wiper seal (25) and O-ring (26) from spool bore. Discard wiper seal and O-ring.

14. Repeat steps 8 through 13 for remaining spools.



15. Remove nuts (27, 28) from tie rods (29, 30). Remove tie rods and separate outlet housing (31), spool housings (32), and inlet housing (33).

16. Remove four poppets (34) and springs (35) from spool housings (32). Remove and discard O-rings (36).



B. CLEANING

Clean directional control valve components in accordance with paragraph 1-24.

C. INSPECTION

1. Conduct overall inspection of directional control valve components in accordance with paragraph 1-24.

2. Inspect spools and spool bores for damage or deformation. Check for evidence of excessive or uneven wear.

3. Inspect outlet, inlet, and spool housings for cracks. Inspect mating surfaces for damage that may prevent a proper seal. Check for evidence of leakage.

D. REPAIR

Repair of the directional control valve assembly consists of removal and replacement of defective, deformed, or damaged components.

E. ASSEMBLY

1. Lubricate new O-rings (36) with clean lubricating oil and install into inlet housing (33) and spool housings (32).

2. Insert four poppets (34) and springs (35) into spool housings (32) as each section is assembled.

3. Mate outlet housing (31), spool housings (32), and inlet housing (33). Inset tie rods (29, 30) and install nuts (27, 28). 3. Torque nuts (27) to 13 to 15 ft-lbs (18 to 20 Nm). Torque nut (28) to 30 to 36 ft-lbs (41 to 49 Nm).

4. Lubricate new wiper seal (25) and O-ring (26) with clean lubricating oil and install into spool bore.

5. Lubricate seal plate (24) with clean hydraulic oil and install. Carefully slide spool (23) into spool housing (4).

6. Install spring seats (21) and spring (22) into spool housing (4).

7. Install spool end (20). Torque to 6 to 8 ft-lbs (8 to 11 Nm).

8. Install spool cap (18) onto spool housing (4) using screws (19). Torque screws to 6 to 8 ft-lbs (8 to 11 Nm).

9. Lubricate new O-ring (17) and wiper seal (16) with clean lubricating oil and install into spool bore.

10. Install seal plate (14) onto spool housing (4) using screws (15). Torque screws to 6 to 8 ft-lbs (8 to 11 Nm).

11. Repeat steps 4 through 10 for remaining spools.

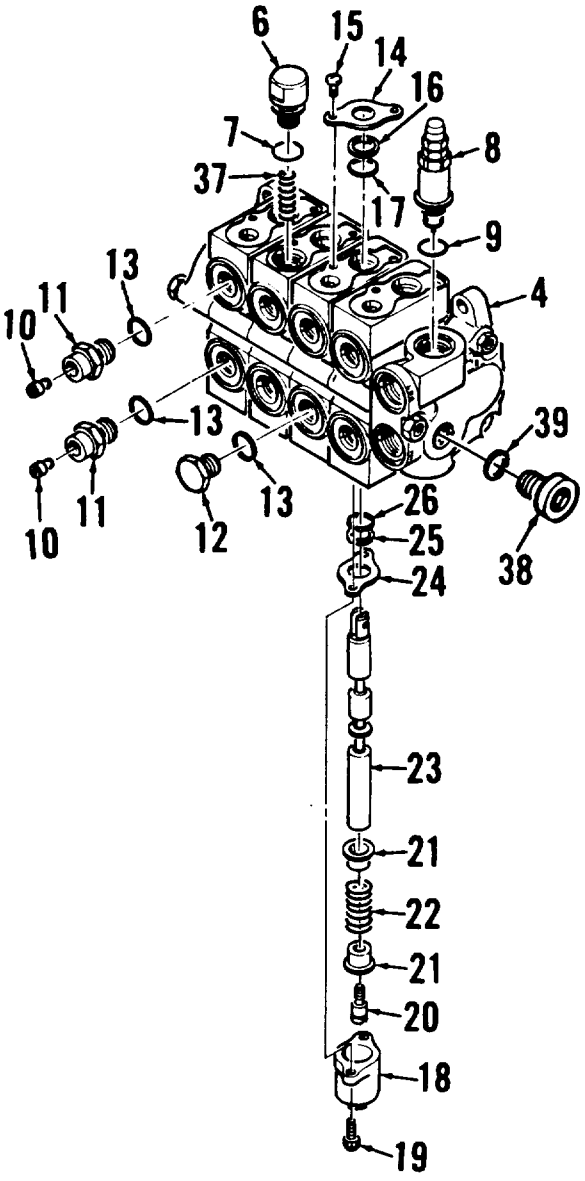
12. Lubricate new O-rings (13) with clean lubricating oil and install onto plugs (11, 12). Install plugs into spool housings and torque to 30 to 36 ft-lbs (41 to 49 Nm).

13. Install restriction poppets (10) into restriction plugs (11).

14. Lubricate new O-ring (9) with clean lubricating oil and install onto relief valve (8). Install relief valve into inlet housing and torque to 6 to 8 ft-lbs (8 to 11 Nm).

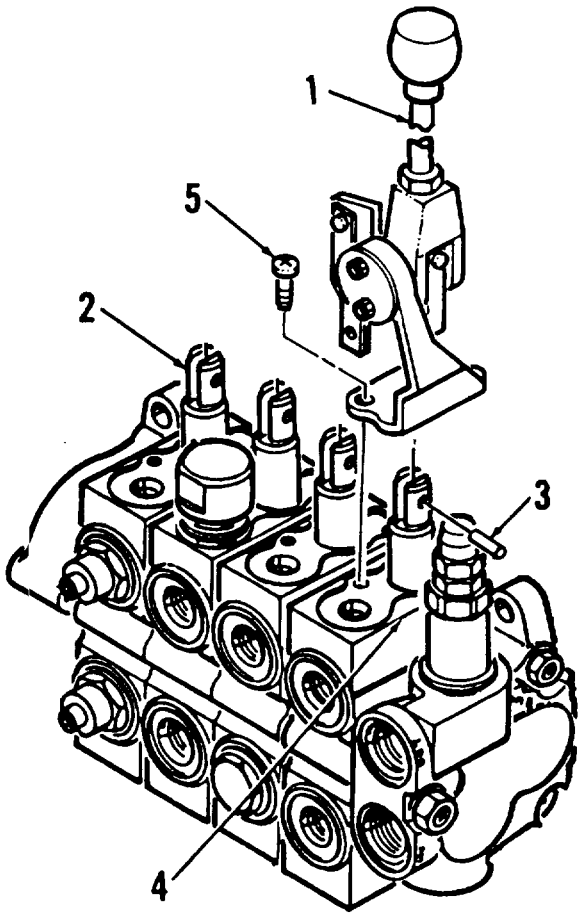
15. Lubricate new O-ring (39) with clean lubricating oil and install onto plug (38). Install plug into inlet housing and torque to 30 to 36 ft-lbs (41 to 49 Nm).

16. Lubricate new O-ring (7) with clean lubricating oil and install onto anti-void assembly (6). Install assembly and spring (37) into spool housing and torque to 30 to 36 ft-lbs (41 to 49 Nm).



17. Attach handle valves (1) to spool housings (4) using screws (5).

18. Secure valve handles (1) to spools (2) using new roll pins (3).



FOLLOW-ON MAINTENANCE:

Install directional control valve assembly (para. 2-148)

END OF TASK

3-64. CARRIAGE TILT CYLINDER REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment.

General Mechanics Tool Kit (1, App. E)
Torque Wrench (34, App. E)
Vise (30, App. E)
3/4" Drive Socket Set (55, App. E)
Spanner Wrench (31, App. E)

Equipment Condition:

Carriage tilt cylinder removed (Para. 2-151)

Materials / Parts:

Lubricating Oil (17, App. C)
Loctite 277 (23, App. C)
Seal Kit, P/N 6961-34 (1 ea.)

A. DISASSEMBLY

NOTE
Drain oil from cylinder before beginning repair of cylinder.

1. Place butt end of cylinder in a vise. Ensure clevis is not deformed during clamping.

2. Pull rod assembly (2) out of cylinder barrel (1) until completely extended.

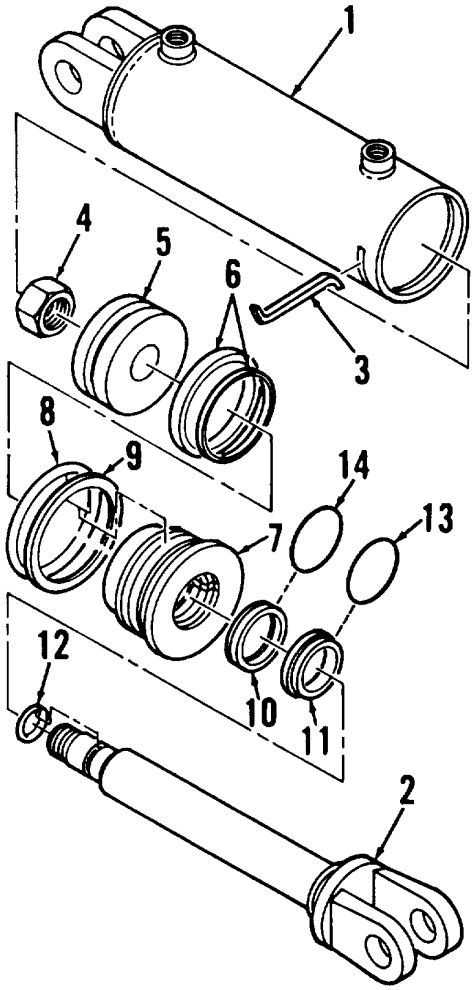
3. Using a screwdriver, pry up lockwire (3) to enable removal from cylinder. Unscrew gland (7) until lockwire is removed.

CAUTION
Use care when extracting and handling rod assembly components to prevent damage.

4. Remove rod assembly (2) from barrel (1). Place rod end clevis in a vise. Ensure clevis is not deformed during clamping.

5. Remove nut (4) from rod assembly (2). Remove piston (5) and gland (7).

6. Remove and discard piston seal (6), O-ring (8), backup ring (9), seal (10), wiper (11), O-rings (12, 13) and seal (14).



B. CLEANING

Clean carriage tilt cylinder components in accordance with paragraph 1-24.

C. INSPECTION

1. Conduct overall inspection of carriage tilt cylinder components in accordance with paragraph 1-24.

2. Inspect used piston seals for signs of scoring. If seals are scored, examine barrel for damage. If barrel is scored it must be replaced.

D. REPAIR

1. Repair of the carriage tilt cylinder consists of removal and replacement of defective, deformed, or damaged components.

2. Replace all rings, wipers, and seals with new components from seal kit.

E. ASSEMBLY

1. Lubricate new O-ring (12) with clean lubricating oil and install onto rod assembly (2).

2. Lubricate new O-ring (13) with clean lubricating oil and install into gland (7). Install new seal (14).

NOTE

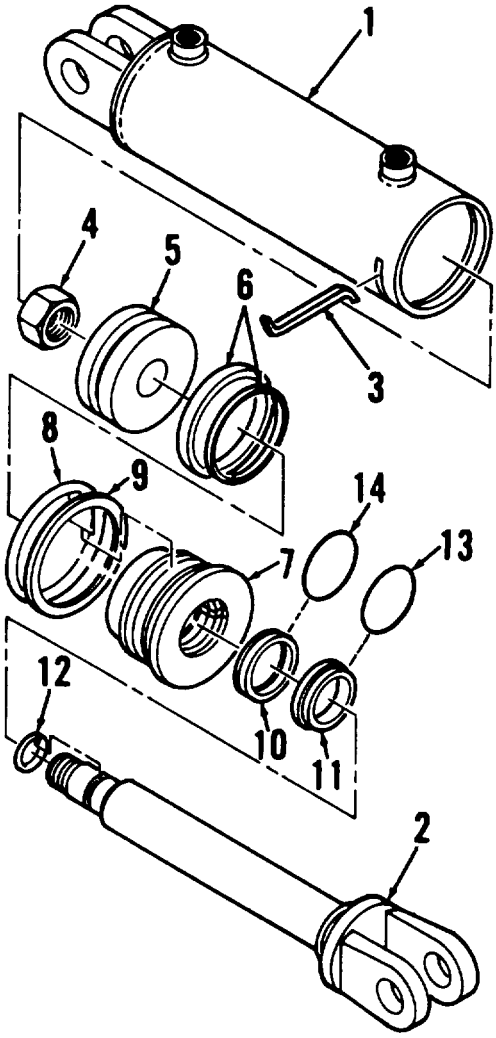
Warming seal (10) in warm water may make it easier to install. Bend seal and insert seal into gland (7). Seat seal using rounded portion of screwdriver or similar tool.

3. Install new seal (14), wiper (11), seal (10), and backup ring (9) onto gland (7). Lubricate new O-ring (8) with clean lubricating oil and install.

4. Install new piston seal (6) onto piston (5).

5. Lubricate I.D. of gland (7) and piston (5) with lubricating oil and install onto rod assembly (2) with wear ring nearest nut (4).

6. Apply loctite to threads of rod assembly (2). Install nut (4) and torque to 253 to 279 ft-lbs (340 to 376 Nm).



CAUTION

Use care when installing piston assembly (2) to prevent damage to seals, rings, and inside of cylinder barrel (1).

7. Lubricate O.D. of piston (5) and gland (7) with grease. Carefully install rod assembly (2) into barrel (1).

8. Tap gland (7) into barrel (1) until it seats. Insert lockwire (3) through barrel slot and into hole in gland. Rotate gland to the right until lockwire is completely installed.

FOLLOW-ON MAINTENANCE:

Install carriage tilt cylinder (para. 2-151)

END OF TASK

3-65. CARRIAGE ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Jack Stand, 2 ea. (8, App. E)
Sling (4, App. E)
Soft Head Hammer (23, App. E)
Hoist (59, App. E)
Pliers, Snap Ring (24, App. E)

Personnel Required:

2 Personnel

Reference:

TM 10-3930-664-10

Equipment Condition:

Forks removed (para. 2-157)
(Backrest also removed as part of para. 2-157)

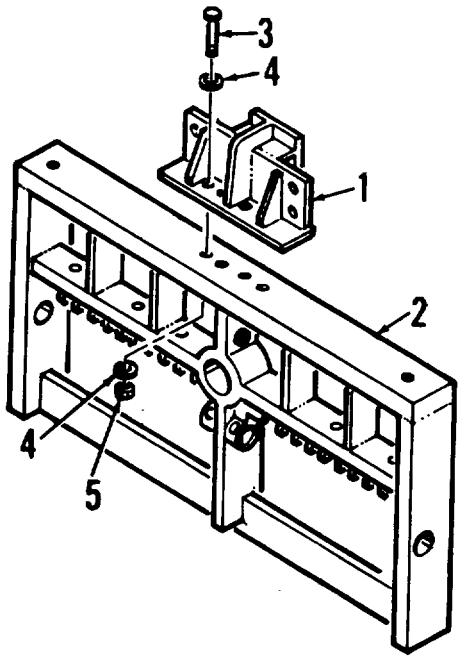
Materials / Parts:

Locknut, Item 12 (1 ea.)

A. REMOVAL

1. Raise sideshift carrier and install two jacks stands beneath carrier to secure during carriage removal procedures.

2. Remove upper carriage retainer (1) from carriage weldment (2) by removing screws (3), washers (4), and nuts (5).



3. Release rotate cylinder (6) from stub shaft (7) on rotate carriage by removing retainer (8).

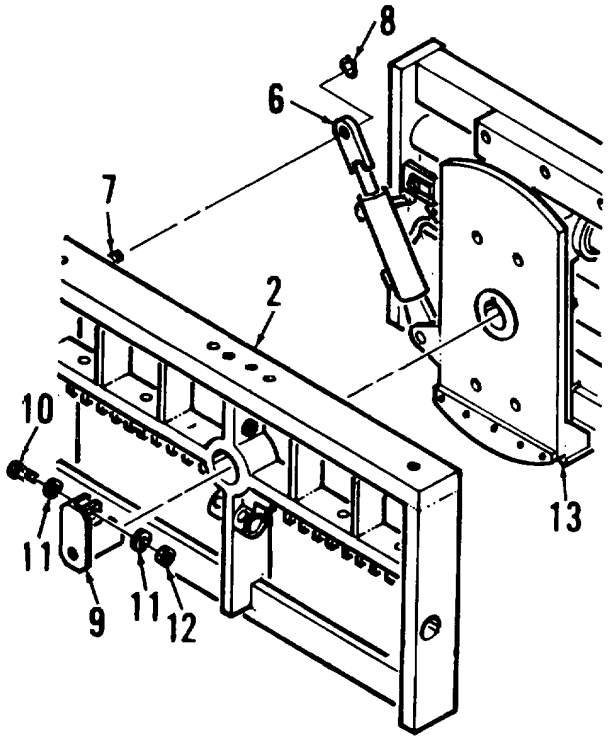
WARNING

Carriage assembly is heavy and awkward. Enlist the help of an aide when removing to prevent injury to personnel and damage to components.

4. Attach lifting sling to carriage weldment (2). Attach hoist to secure carriage weldment during removal.

5. Release rotate carriage pin (9) from carriage weldment (2) by removing screw (10), washers (11), and nut (12). Discard nut (12).

6. Remove rotate carriage pin (9) from carriage weldment (2). Separate carriage weldment from sideshift carrier (13).



B. CLEANING

Clean carriage assembly in accordance with paragraph 1-24.

C. INSPECTION

Inspect carriage assembly and related components in accordance with paragraph 1-24.

D. INSTALLATION

WARNING

Carriage assembly is heavy and awkward. Enlist the help of an aide when installing to prevent injury to personnel and damage to components.

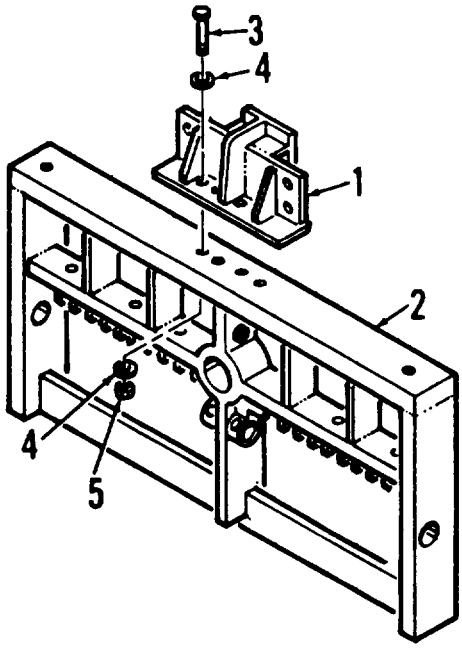
1. Using hoist, mate carriage weldment (2) to sideshift carrier (13). Install rotate carriage pin (9) using a soft head hammer.

2. Secure rotate carriage pin (9) to carriage weldment (2) using screw (10), washers (11), and new nut (12).

3. Secure rotate cylinder (6) to stub shaft (7) using retainer (8).

4. Install upper carriage retainer (1) onto carriage weldment (2) using screws (3), washers (4), and nuts (5). Torque screws to 220 ft-lbs (297 Nm).

5. Remove lift sling from carriage weldment (2). Raise sideshift carrier and remove jack stands.



FOLLOW-ON MAINTENANCE:

Install forks (para. 2-157)

END OF TASK

3-66. MAST ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Jack Stands, 2 ea. (8, App. E)
Sling (4, App. E)
Drain Pan (10, App. E)
Hoist (59, App. E)
Wrench, Open End, 1-1/16 inch (51, App. E)
Wrench, Open End, 1-1/8 inch (52, App. E)

Personnel Required:

2 Personnel

Reference:

TM 10-3930-664-10

Equipment Condition:

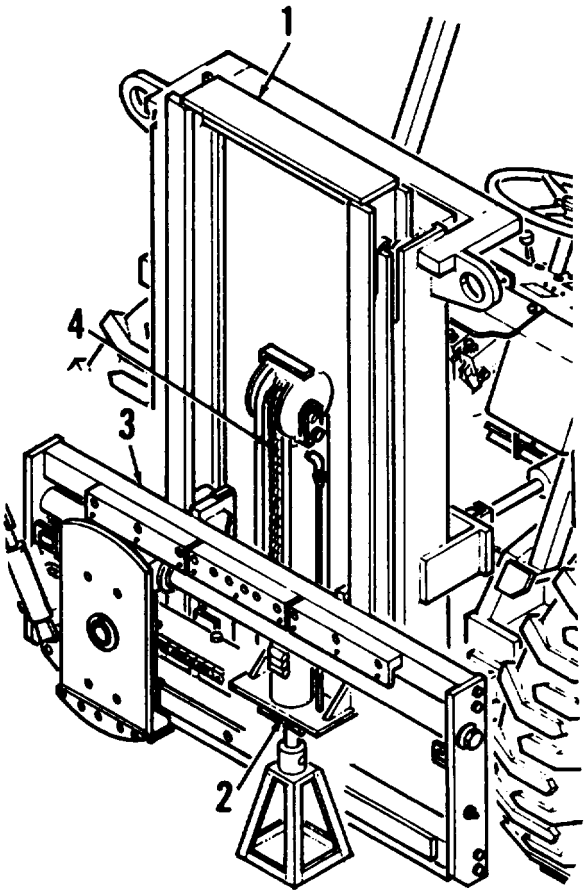
Carriage assembly removed (para. 3-65)

A. REMOVAL

1. Tilt mast assembly rearward. Attach lifting sling to inner rail of mast assembly (1). Lift mast assembly to a height of 2-1/2 to 3 feet.

2. Support mast assembly (1) by placing jack stands under freelift cylinder mount base (2). Lower mast assembly until it rests on jack stands.

3. Remove lifting sling from mast assembly (1) and attach to sideshift carrier (3). Lift sideshift carrier to remove tension from freelift chain (4).



NOTE

Place drain pan beneath hose assemblies when disconnecting to catch fluids.

4. Tag and disconnect hose assemblies (5, 7) from intermediate rail manifold (8). Carefully feed hose assemblies through chain roller.

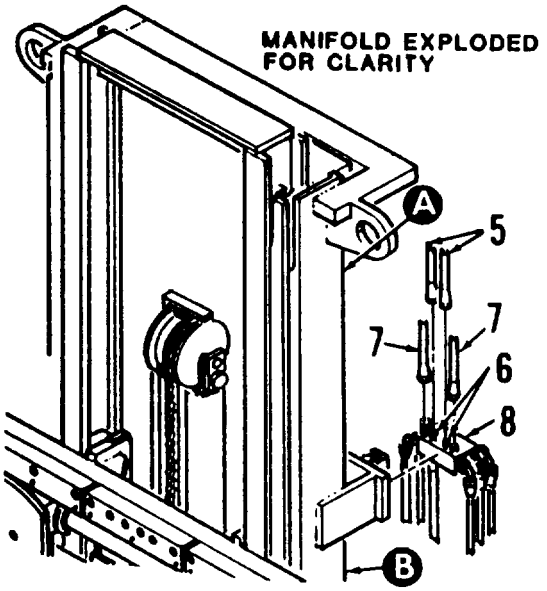
5. Remove adapters (6) from which hose assemblies (5) were removed.

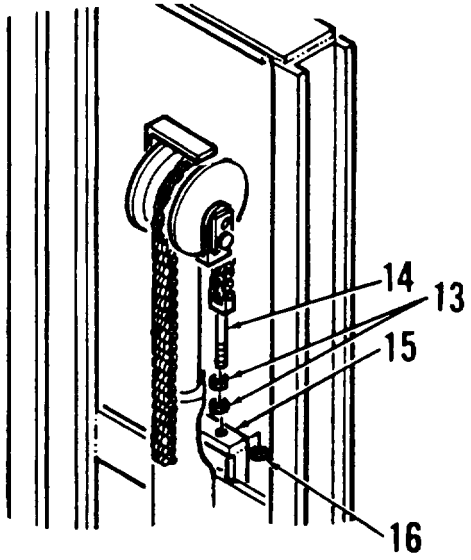
6. Loosen two freelift chain adjusting nuts (13). Remove freelift chain adjuster (14) from bracket (15) by removing nut (16).

7. Feed freelift chain through chain roller and remove with mast assembly.

8. Lower sideshift carrier until free from rail assembly. Remove sideshift carrier.

9. Remove lifting sling from sideshift carrier. Install sling on mast assembly lifting eyes in preparation for mast removal.



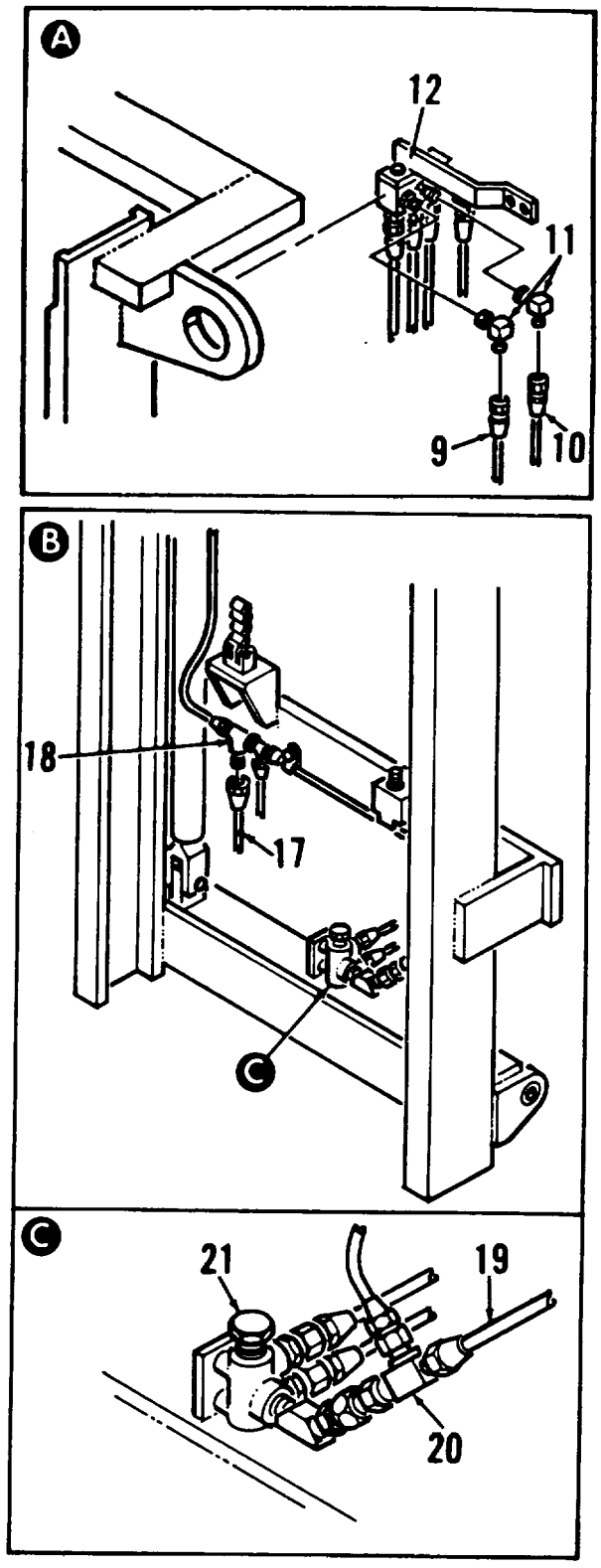


9. Tag and disconnect hose assemblies (9, 10) from elbows (11) on left and right outer rail manifolds (12). Remove elbows from manifolds only if replacement is required.

10. Remove hose clamps securing hose assemblies (9, 10). Feed hose assemblies to the rear and clear of mast assembly.

11. Tag and disconnect return hose assembly (17) from tee (18).

12. Tag and disconnect hose assembly (19) from tee (20) installed into sequence valve (21).



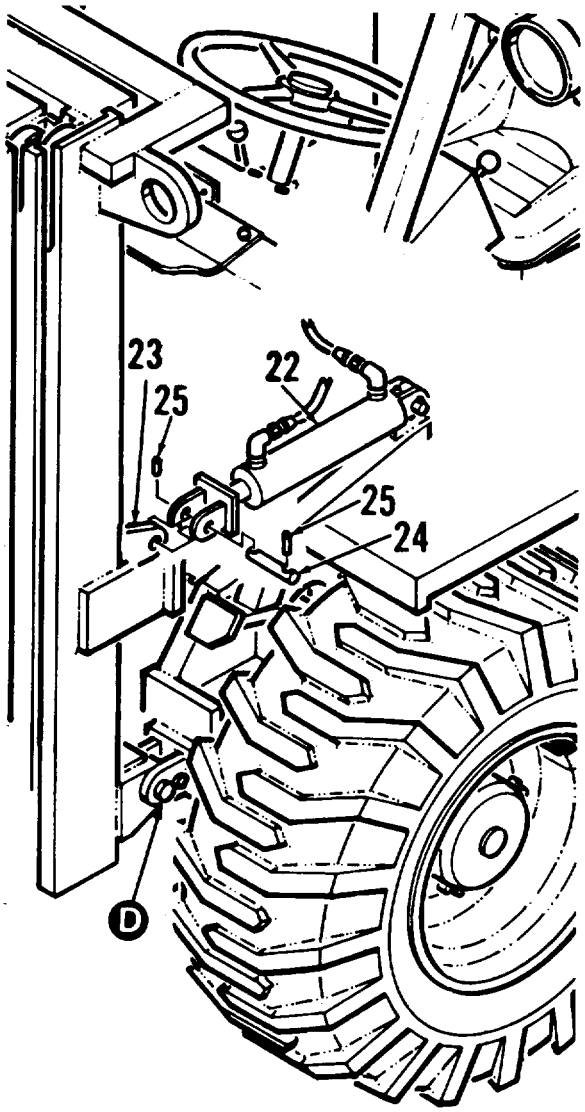
13. Release left tilt cylinder (22) from mast clevis (23) by removing roll pins (25) and pin (24).

14. Repeat step 12 for right tilt cylinder.

WARNING

Mast assembly is heavy and awkward. Enlist the help of an aide when removing to prevent injury to personnel and damage to components. Ensure lifting sling is securely attached to lifting eyes and taut.

15. Remove mast assembly (26) from frame bracket (27) by removing screws (28), rod ends (29), pins (30), thrust bearings (31), and bushings (32).



B. CLEANING

Clean mast assembly in accordance with paragraph 1-24.

C. INSPECTION

Inspect mast assembly and related components in accordance with paragraph 1-24.

D. INSTALLATION

WARNING

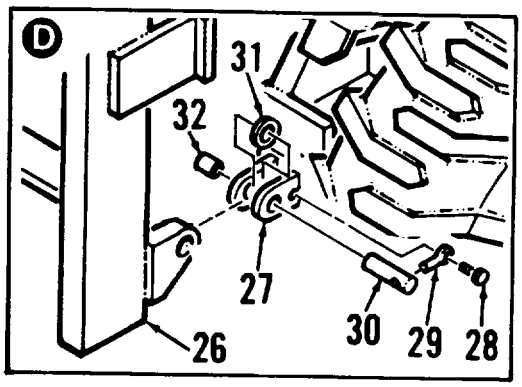
Mast assembly is heavy and awkward. Enlist the help of an aide when installing to prevent injury to personnel and damage to components. Ensure lifting sling is securely attached to lifting eyes.

1. Attach lifting sling to mast assembly lifting eyes. Position mast assembly for mounting to forklift frame.

2. Attach mast assembly (26) to frame bracket (27) using screws (28), rod ends (29), pins (30), thrust bearings (31), and bushings (32).

3. Attach left tilt cylinder (22) to mast clevis (23) using roll pins (25) and pin (24).

4. Repeat step 3 for right tilt cylinder.



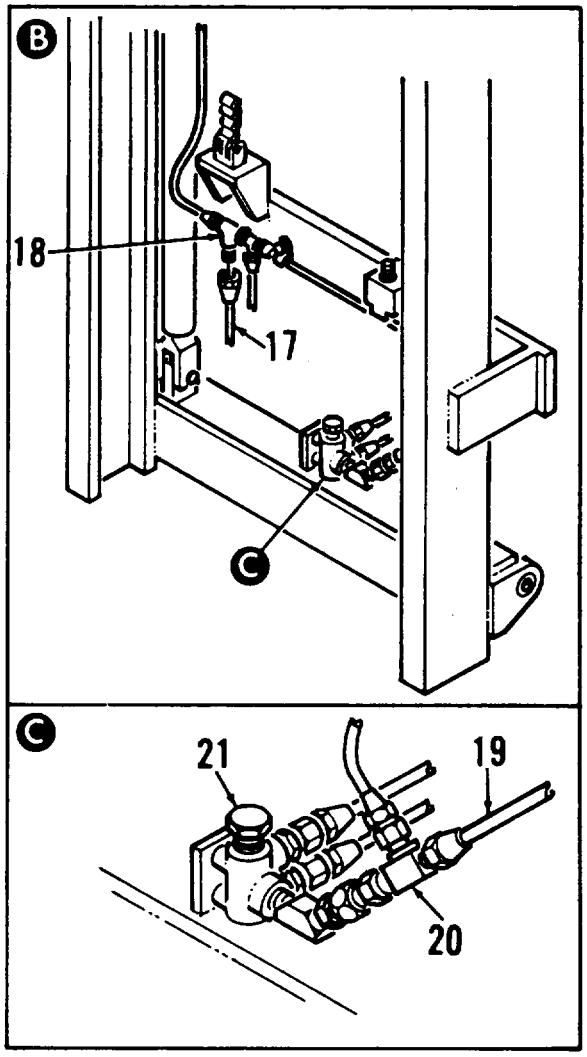
5. Connect hose assembly (19) to tee (20) installed into sequence valve (21).

6. Connect return hose assembly (17) to tee (18).

7. Connect hose assemblies (9, 10) to elbows (11) on left and right outer rail manifolds (12). Install hose clamps.

8. Support mast assembly by placing jack stands under freelift cylinder mount base. Lower mast assembly until it rests on jack stands.

9. Remove lifting sling from mast assembly and install on sideshift carrier. Mate sideshift carrier to mast assembly.

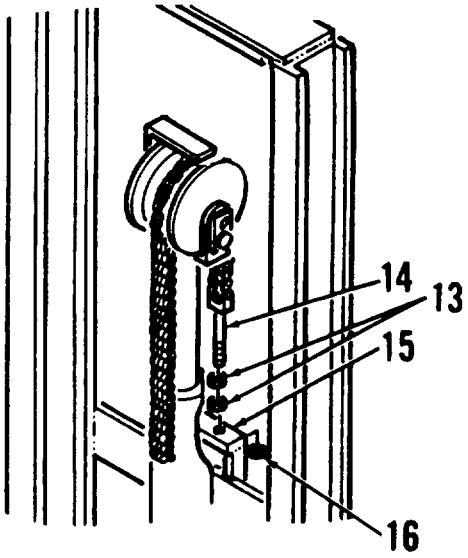


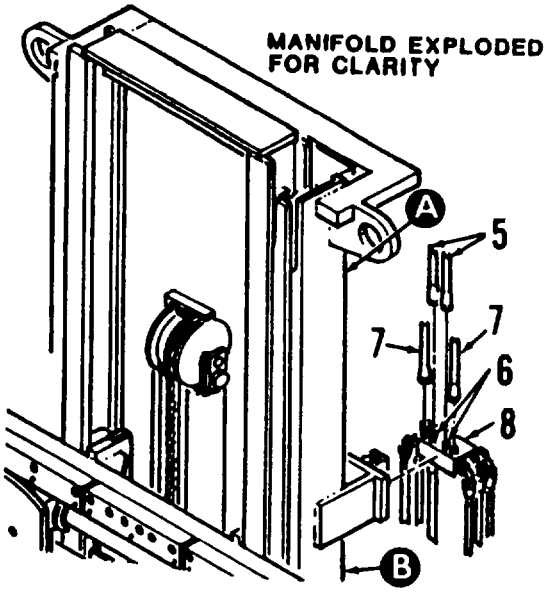
10. Feed freelift chain through chain roller.

11. Loosen two freelift chain adjusting nuts (13). Attach freelift chain adjuster (14) to bracket (15) using nut (16).

12. Install adapters (6) into intermediate rail manifold (8).

13. Carefully feed hose assemblies (5, 7) through chain roller. Connect hose assemblies to intermediate rail manifold (8).

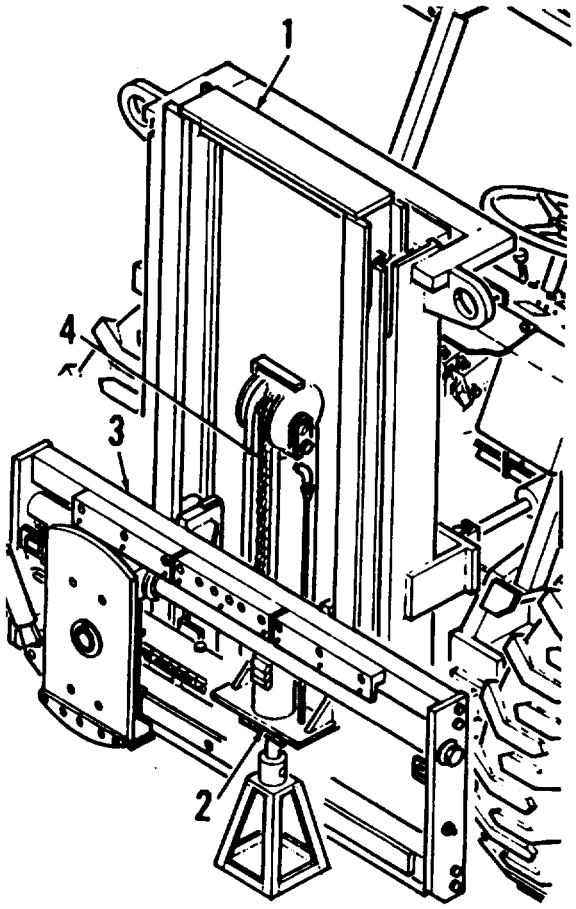




14. Lower sideshift carrier (3). Remove lifting sling from sideshift carrier and install onto inner rail of mast assembly (1).

15. Lift mast assembly (1) and remove jack stands from under freelift cylinder mount base (2).

16. Lower mast assembly (1) and remove lifting sling.



FOLLOW-ON MAINTENANCE:

Install carriage assembly (para. 3-65)
Service mast assembly (para. 2-154)
Service carriage tilt cylinders (para. 2-150)
Adjust freelift chain (para. 2-155)

END OF TASK

3-67. LIFT CYLINDER REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Spanner Wrench (31, App. E)
Torque Wrench (32, App. E)
Torque Wrench (34, App. E)

Equipment Condition:

Lift cylinders removed
(para. 2-159)

Materials / Parts:

Lubricating Oil (16, App. C)
Grease (10, App. C)
Emery Cloth (7, App. C)
Seal Kit, Freelift Cylinder, P/N 9025-34 (1 ea.)
Seal Kit, Main Lift Cylinder, P/N 6962-34 (1 ea.)

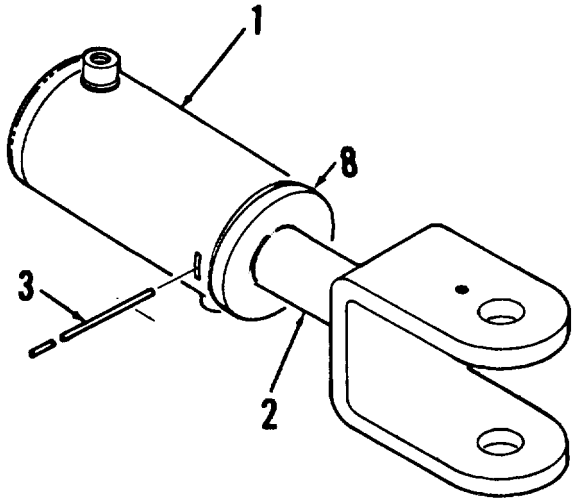
A. DISASSEMBLY OF FREELIFT CYLINDER

1. Place cylinder clevis in a vice with clevis perpendicular to vise jaws. Support cylinder barrel (1). Pull rod assembly (2) out of barrel until completely extended.

2. Using a screwdriver, pry up lockwire (3) to enable removal from freelift cylinder. Using a spanner wrench, unscrew gland (8) until lockwire is completely removed.

CAUTION
Use care when extracting and handling rod assembly components to prevent damage.

3. Remove rod assembly (2) from barrel (1) and place clevis end of rod assembly in a vise. Support rod assembly.



4. Remove nut (4) from rod assembly (2). Remove piston (5) and gland (8).

5. Remove and discard wear ring (6), piston seal (7), O-ring (9), backup ring (10), seal (11), wiper (12), and O-ring (13).

B. DISASSEMBLY OF MAIN LIFT CYLINDER

1. Place cylinder clevis in a vice with clevis perpendicular to vise jaws. Support cylinder barrel (14). Pull rod assembly (17) out of barrel until completely extended.

2. Using a screwdriver, pry up lockwire (15) to enable removal from freelift cylinder. Using a spanner wrench, unscrew gland (16) until lockwire is completely removed.

CAUTION

Use care when extracting and handling rod assembly components to prevent damage.

3. Place pin through hole in rod assembly (17) and against vise to keep rod assembly from turning. Remove rod assembly from barrel (14) and place in a v: se with soft metal holders.

4. Remove nut (18) from rod assembly (17). Remove piston (19) and gland (16).

5. Remove and discard wear ring (20), piston seal (21), and O-ring (22).

6. Remove and discard O-ring (23), backup ring (24), wiper (25), and seal (26).

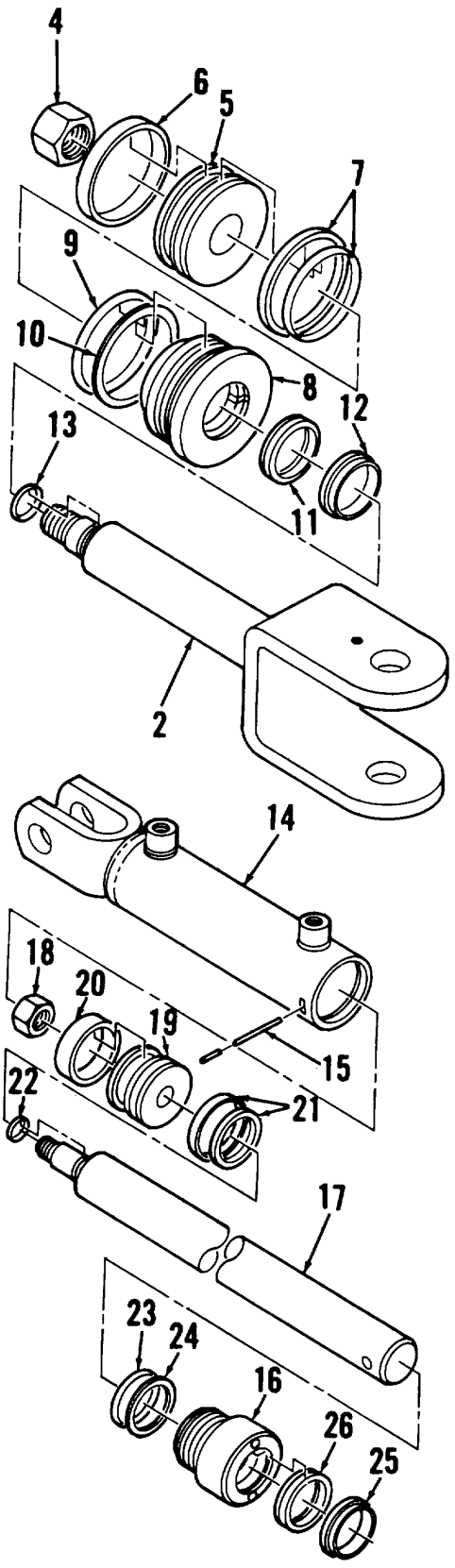
C. CLEANING

Clean lift cylinder components in accordance with paragraph 1-24.

D. INSPECTION

1. Conduct overall inspection of lift cylinder components in accordance with paragraph 1-24.

2. Inspect used piston seals for signs of scoring. If seals are scored, examine barrel for damage. If barrel is scored it must be replaced.



E. REPAIR

1. Repair of the lift cylinders consists of removal and replacement of defective, deformed, or damaged components.

2. Replace all rings, wipers, and seals with new components from seal kits.

F. ASSEMBLY OF MAIN LIFT CYLINDER

1. Lubricate new O-ring (22) with clean lubricating oil and install onto rod assembly (17).

2. Install new seal (26), wiper (25), and backup ring (24) onto gland (16). Lubricate new O-ring (23) with clean lubricating oil and install.

3. Install new piston seal (21) and wear ring (20) onto piston (19).

4. Lubricate I.D. of gland (16) and piston (18) with grease and install onto rod assembly (17).

5. Install clevis end of rod assembly (17) in a vise. Install piston nut (18) and torque to 75 to 100 ft-lbs (100 to 135 Nm).

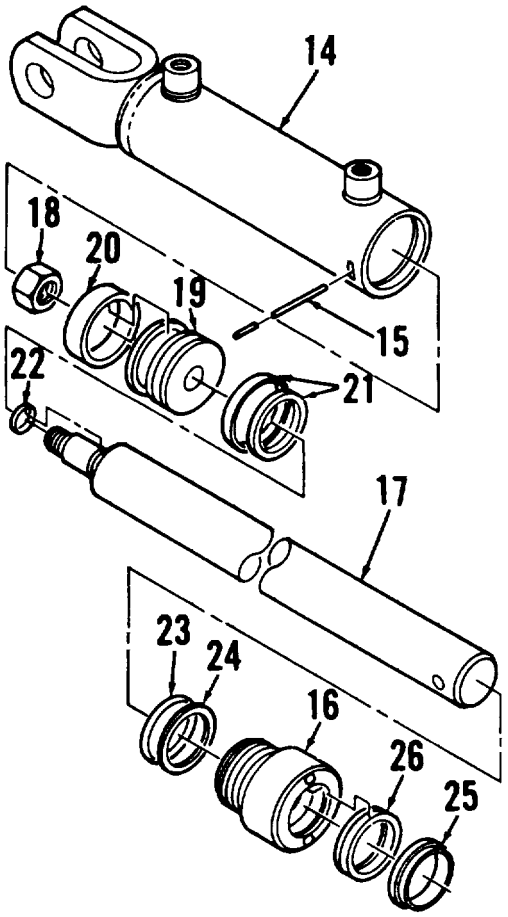
CAUTION

Use care when installing piston assembly (17) to prevent damage to seals, rings, and inside of cylinder barrel (14). Lock ring groove in barrel may contain small burrs. Deburr using emery cloth.

6. Lubricate O.D. of piston (19) and gland (16) with grease. Carefully install barrel (14) over rod assembly (17).

7. Tap gland (16) into barrel (14) until it seats. Insert lockwire (15) through barrel slot and into hole in gland.

8. Using spanner wrench, rotate gland (16) to the right until lockwire is completely installed.



G. ASSEMBLY OF FREELIFT CYLINDER

1. Lubricate new O-ring (13) with clean lubricating oil and install onto rod assembly (2).

2. Install new seal (11), wiper (12), and backup ring (10) onto gland (8). Lubricate new O-ring (9) with clean lubricating oil and install.

3. Install new piston seal (7) and wear ring (6) onto piston (5).

4. Lubricate I.D. of gland (8) and piston (5) with grease and install onto rod assembly (2).

5. Install clevis end of rod assembly (2) in a vise. Install piston nut (4) and torque to 263 to 289 ft-lbs (355 to 390 Nm).

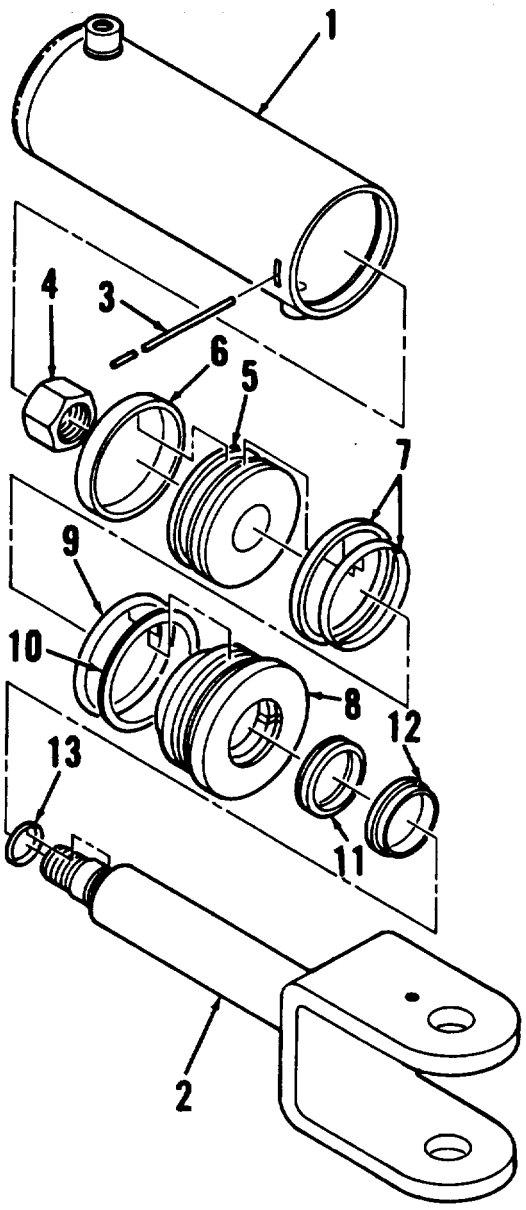
CAUTION

Use care when installing piston assembly (2) to prevent damage to seals, rings, and inside of cylinder barrel (1). Lock ring groove in barrel may contain small burrs. Deburr using emery cloth.

6. Lubricate O.D. of piston (5) and gland (8) with grease. Carefully install barrel (1) over rod assembly (2).

7. Tap gland (8) into barrel (1) until it seats. Insert lockwire (3) through barrel slot and into hole in gland.

8. Using spanner wrench, rotate gland (8) to the right until lockwire is completely installed.



FOLLOW-ON MAINTENANCE:

Install lift cylinders (para. 2-159)

END OF TASK

3-68. SIDESHIFT CYLINDER REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (34, App. E)
Spanner Wrench (31, App. E)

Equipment Condition:

Sideshift cylinder removed (para. 2-160)

Materials / Parts:

Lubricating Oil (16, App. C)
Grease (10, App. C)
Emery Cloth (7, App. C)
Seal Kit, P/N 9110-34 (1 ea.)

A. DISASSEMBLY

1. Place cylinder clevis in a vice with clevis perpendicular to vise jaws. Support cylinder barrel (1). Pull rod assembly (2) out of barrel until completely extended.

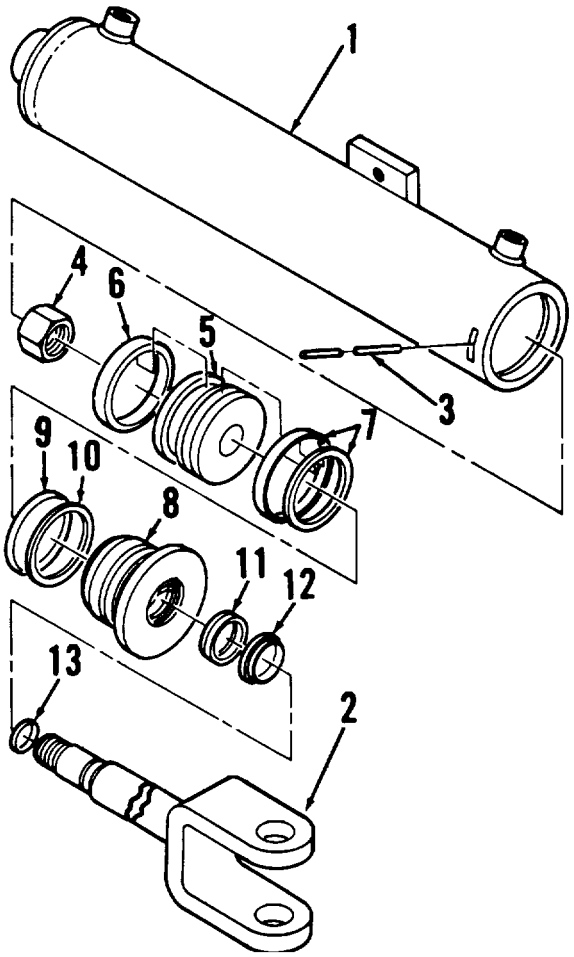
2. Using a screwdriver, pry up lockwire (3) to enable removal from freelift cylinder. Using a spanner wrench, unscrew gland (8) until lockwire is completely removed.

CAUTION
Use care when extracting and handling rod assembly components to prevent damage.

3. Remove rod assembly (2) from barrel (1) and place clevis end of rod assembly in a vise. Support rod assembly.

4. Remove nut (4) from rod assembly (2). Remove piston (5) and gland (8).

5. Remove and discard wear ring (6), piston seal (7), O-ring (9), backup ring (10), seal (11), wiper (12), and O-ring (13).



B. CLEANING

Clean sideshift cylinder components in accordance with paragraph 1-24.

C. INSPECTION

1. Conduct overall inspection of sideshift cylinder components in accordance with paragraph 1-24.

2. Inspect used piston seals for signs of scoring. If seals are scored, examine barrel for damage. If barrel is scored it must be replaced.

D. REPAIR

1. Repair of the sideshift cylinder consists of removal and replacement of defective, deformed, or damaged components.

2. Replace all rings, wipers, and seals with new components from seal kit.

E. ASSEMBLY

1. Lubricate new O-ring (13) with clean lubricating oil and install onto rod assembly (2).

2. Install new seal (11), wiper (12), and backup ring (10) onto gland (8). Lubricate new O-ring (9) with clean lubricating oil and install.

3. Install new piston seal (7) and wear ring (6) onto piston (5).

4. Lubricate I.D. of gland (8) and piston (5) with grease and install onto rod assembly (2).

5. Install clevis end of rod assembly (2) in a vise. Install piston nut (4) and torque to 163 to 180 ft-lbs (220 to 243 Nm).

CAUTION

Use care when installing piston assembly (2) to prevent damage to seals, rings, and inside of cylinder barrel (1). Lock ring groove in barrel may contain small burrs. Deburr using emery cloth.

6. Lubricate O.D. of piston (5) and gland (8) with grease. Carefully install barrel (1) over rod assembly (2).

7. Tap gland (8) into barrel (1) until it seats. Insert lockwire (3) through barrel slot and into hole in gland. Using spanner wrench, rotate gland to the right until lockwire is completely installed.

FOLLOW-ON MAINTENANCE:

Install sideshift cylinder (para. 2-160)

END OF TASK

3-69. ROTATE CYLINDER REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Spanner Wrench (31, App. E)

Equipment Condition:

Rotate cylinder removed (para. 2-161)

Materials / Parts:

Lubricating Fluid (16, App. C)
Grease (10, App. C)
Emery Cloth (7, App. C)
Seal Kit, P/N 6965-34 (1 ea.)

A. DISASSEMBLY

1. Place cylinder clevis in a vice with clevis perpendicular to vise jaws. Support cylinder barrel (1). Pull rod assembly (2) out of barrel until completely extended.

2. Using a screwdriver, pry up lockwire (3) to enable removal from freelift cylinder. Using a spanner wrench, unscrew gland (7) until ,lockwire is completely removed.

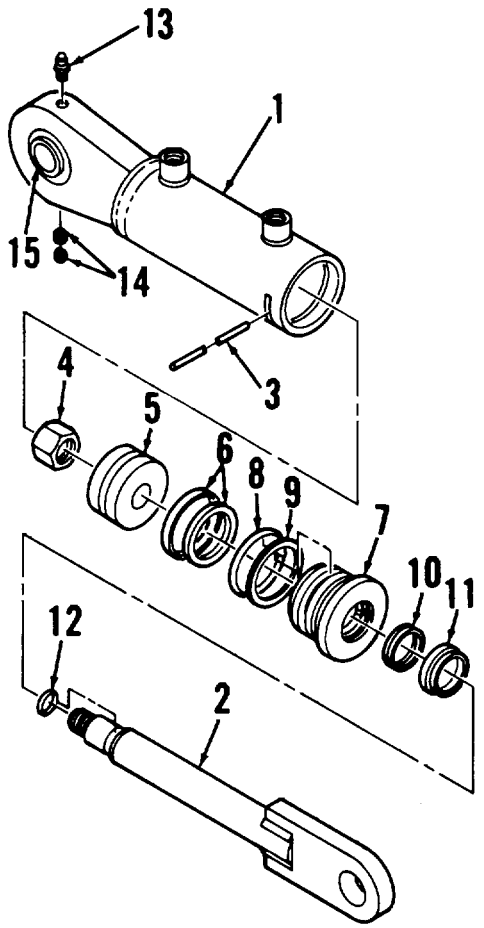
CAUTION
Use care when extracting and handling rod assembly components to prevent damage.

3. Remove rod assembly (2) from barrel (1) and place clevis end of rod assembly in a vise with soft metal jaws. Support rod assembly.

4. Remove nut (4) from rod assembly (2). Remove piston (5) and gland (7).

5. Remove and discard piston seal (6), O-ring (8), backup ring (9), seal (10), wiper (11), and O-ring (12).

6. Remove grease fitting (13) and setscrews (14). Remove bearing (15).



B. CLEANING

Clean rotate cylinder components in accordance with paragraph 1-24.

C. INSPECTION

1. Conduct overall inspection of rotate cylinder components in accordance with paragraph 1-24.

2. Inspect used piston seals for signs of scoring. If seals are scored, examine barrel for damage. If barrel is scored it must be replaced.

D. REPAIR

1. Repair of the rotate cylinder consists of removal and replacement of defective, deformed, or damaged components.

2. Replace all rings, wipers, and seals with new components from seal kits.

E. ASSEMBLY

1. Lubricate bearing (15) with grease and install into barrel (1). Install setscrews (14) and grease fitting (13).

2. Lubricate new O-ring (12) with clean lubricating oil and install onto rod assembly (2).

3. Install new seal (10), wiper (11), and backup ring (9) onto gland (7). Lubricate new O-ring (8) with clean lubricating oil and install.

4. Install new piston seal (6) onto piston (5).

5. Lubricate I.D. of gland (7) and piston (5) with grease and install onto rod assembly (2).

6. Install clevis end of rod assembly (2) in a vise. Install piston nut (4) and torque to 105 to 115 ft-lbs (142 to 156 Nm).

CAUTION

Use care when installing piston assembly (2) to prevent damage to seals, rings, and inside of cylinder barrel (1). Lock ring groove in barrel may contain small burrs. Deburr using emery cloth.

7. Lubricate O.D. of piston (5) and gland (7) with grease. Carefully install barrel (1) over rod assembly (2).

8. Tap gland (7) into barrel (1) until it seats. Insert lockwire (3) through barrel slot and into hole in gland. Using spanner wrench, rotate gland to the right until lockwire is completely installed.

FOLLOW-ON MAINTENANCE:

Install rotate cylinder (para. 2-161)

END OF TASK

CHAPTER 4

GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

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

4-1. COMMON TOOLS AND EQUIPMENT.

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

4-2. SPECIAL TOOLS AND EQUIPMENT.

Refer to the Maintenance Allocation Chart (Appendix B) and TM 10-3930-664-24P for identity and authorization of any special tools or equipment required for general support maintenance.

4-3. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list, TM 10-3930-664-24P, covering unit, direct support, and general support maintenance of the forklift.

Section II. GENERAL SUPPORT TROUBLESHOOTING

4-4. GENERAL.

a. This section contains general support maintenance level troubleshooting information for identifying and correcting malfunctions which may develop during forklift operation. Each malfunction or trouble symptom is addressed and is followed by a series of inspections or tests necessary to determine the probable cause and corrective action.

b. The General Support Troubleshooting Symptom Index, Table 4-1, lists the common malfunctions which may occur. It refers you to the proper page for troubleshooting procedures.

c. This manual cannot list all possible malfunctions that may occur, all tests or inspections that must be performed, or all corrective actions for each malfunction. If a malfunction is not listed, or is not remedied by corrective actions, notify your supervisor.

d. Prior to using troubleshooting trees, be sure you have performed all normal operational checks. Refer to the electrical schematic (Figure FO-2) and hydraulic flow diagram (Figure FO-1) to assist in troubleshooting.

e. When troubleshooting a malfunction:

(1) Question the direct support level maintenance personnel to obtain any information that might help determine the cause of the malfunction. Before continuing, ensure that all applicable direct support level troubleshooting has been performed.

(2) Locate the symptom or symptoms in Table 4-1 that best describe the malfunction. If the appropriate symptom is not listed, notify your supervisor.

(3) Turn to the page where the troubleshooting procedures for that malfunction are described.

(4) Perform each step in order until the malfunction is corrected. Do not perform any maintenance task unless the table directs you to do so.

4-5. TROUBLESHOOTING.

Refer to Table 4-1 for General Support troubleshooting procedures. Use the symptom index to quickly locate a particular fault or malfunction. All related troubleshooting steps contained in Chapters 2 and 3 must be performed prior to attempting to isolate a malfunction to a specific component addressed in this chapter.

Table 4-1. General Support Troubleshooting Symptom Index

4-6. TRANSMISSION CHECKS.

a. **Transmission Pressure Check.** Transmission problems can be isolated by the use of pressure checks. When the stall check indicates a slipping clutch, measure clutch pack pressure to determine if the slippage is due to low pressure or clutch plate friction material failure. In addition, converter charging pressure and transmission lubrication pressure may also be measured.

b. **Transmission Mechanical Check.** Prior to checking any part of the system for hydraulic friction (pressure checking), the following mechanical checks must be performed:

(1) Check mechanical inching from brake pedal to inching valve on transmission.

(2) Check linkage from axle disconnect to disconnect actuator.

(3) Check parking brake and inching pedal for correct adjustment and travel. Be sure the pedal moves freely and returns fully.

(4) Check that all linkages are properly connected and adjusted in each segment and at all connecting points.

(5) Check wiring and electrical control components for obvious damage.

(6) Check that cooling system is in good working order. Radiator fins must be clean to maintain proper cooling and operating temperatures.

(7) The engine must be fully operational to perform pressure checks.

c. **Transmission Hydraulic Check.** Before checking the transmission clutches, torque converter, charging pump, and hydraulic circuits for pressure and rate of flow, it is important to make the following checks:

(1) Check oil level in the transmission. The transmission fluid must be at the correct (full) level.

(2) All clutches, converter, and fluid lines must be fully charged (filled) at all times during pressure checks.

CAUTION

The transmission fluid must be at operating temperature of 180-200OF (82-930C) to obtain correct fluid level and pressure readings. Do not attempt to make these checks with cold oil.

(3) To raise the oil temperature to 180-200OF (82-930C), operate (work) the vehicle or perform the STALL CHECK.

d. Transmission Stall Check.

CAUTION

Ensure that the vehicle does not move unexpectedly when operating the engine and converter at stall RPM.

(1) Place the vehicle against a solid barrier, such as a wall, and/or apply the parking brake.

(2) Block front and rear wheels.

(3) Place directional control lever in FORWARD or REVERSE position as applicable.

(4) Place speed control lever in HIGH.

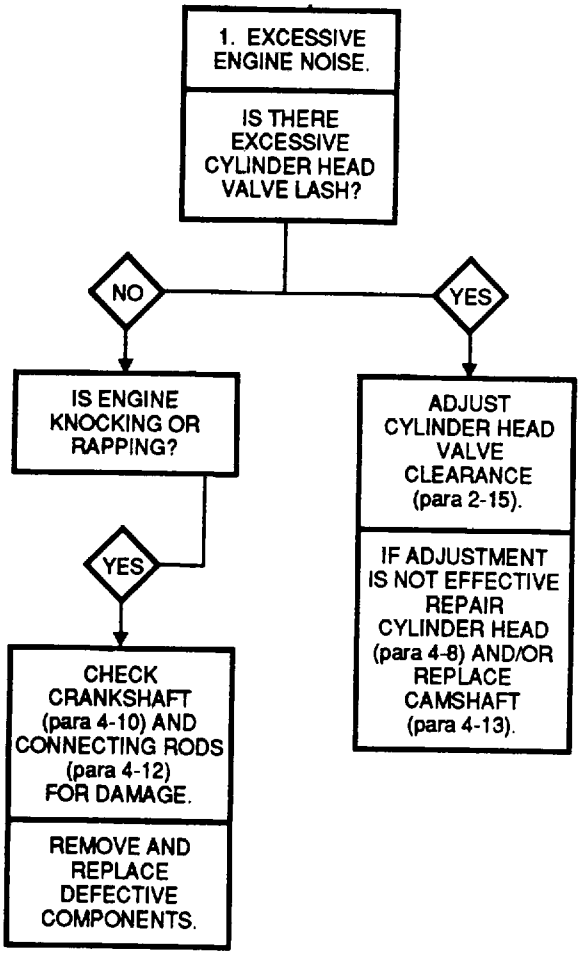
(5) With engine running, slowly increase speed to approximately one-half throttle and hold for 30 seconds. Place speed control lever in NEUTRAL.

CAUTION

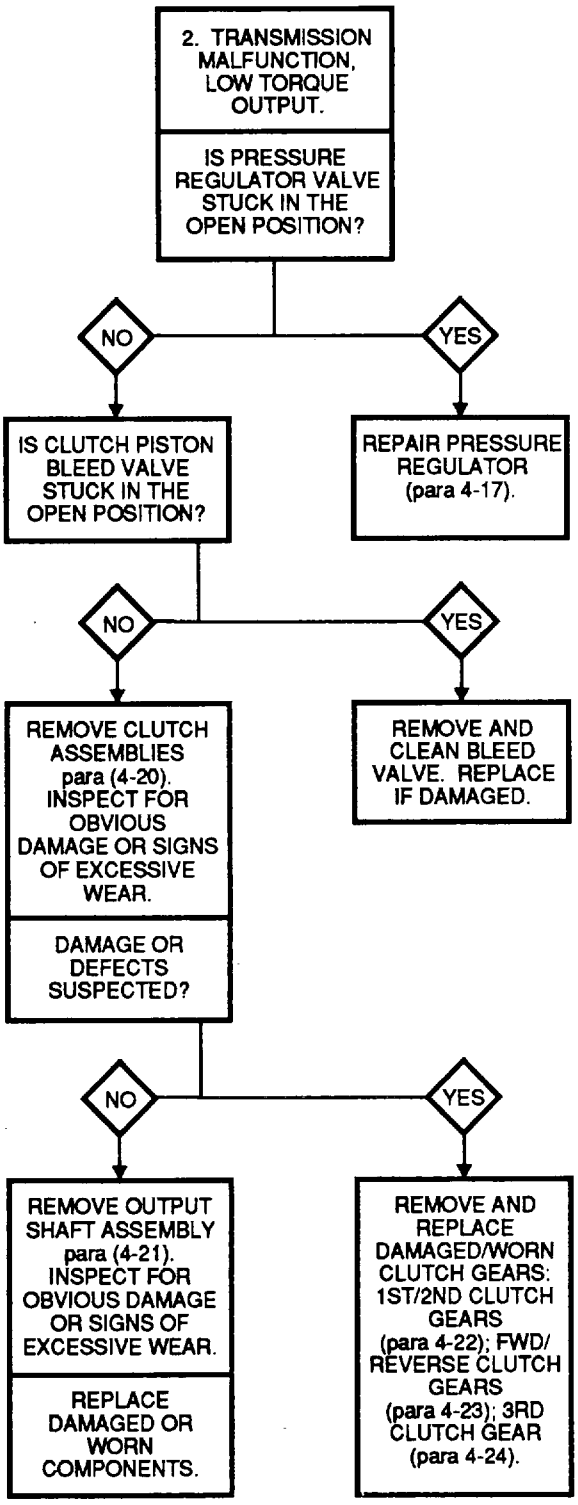
Excessive temperatures +250°F (120°C) will cause damage to transmission clutches, fluid, converter, and seals. Do not operate the converter at stall condition longer than 30 seconds at one time.

(6) Operate the converter at stall condition no longer than 30 seconds. Shift to NEUTRAL for 15 seconds and repeat then procedure until desired temperature is reached.

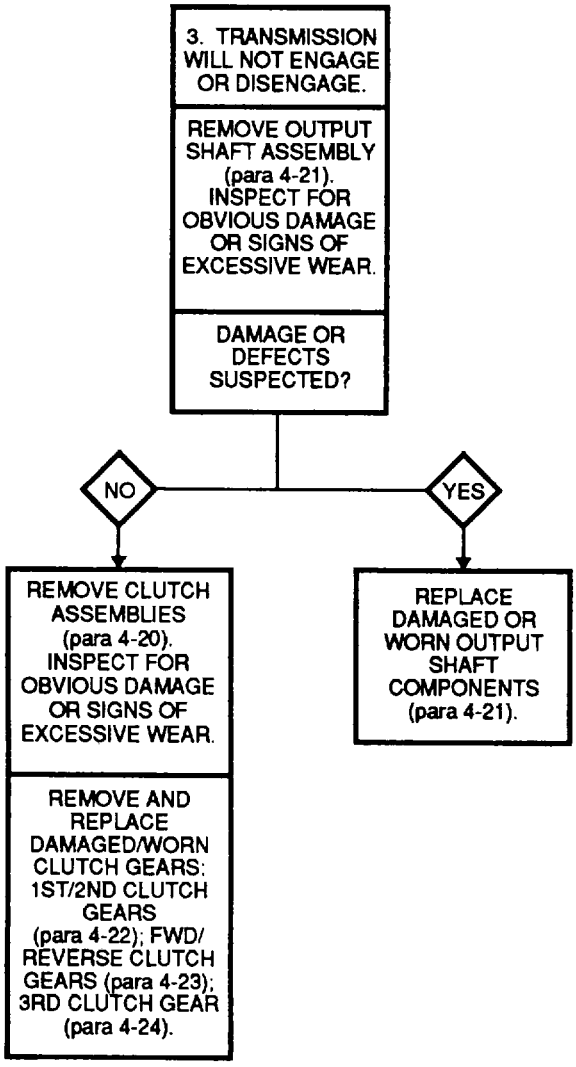
Trouble Symptom 1. Excessive Engine Noise



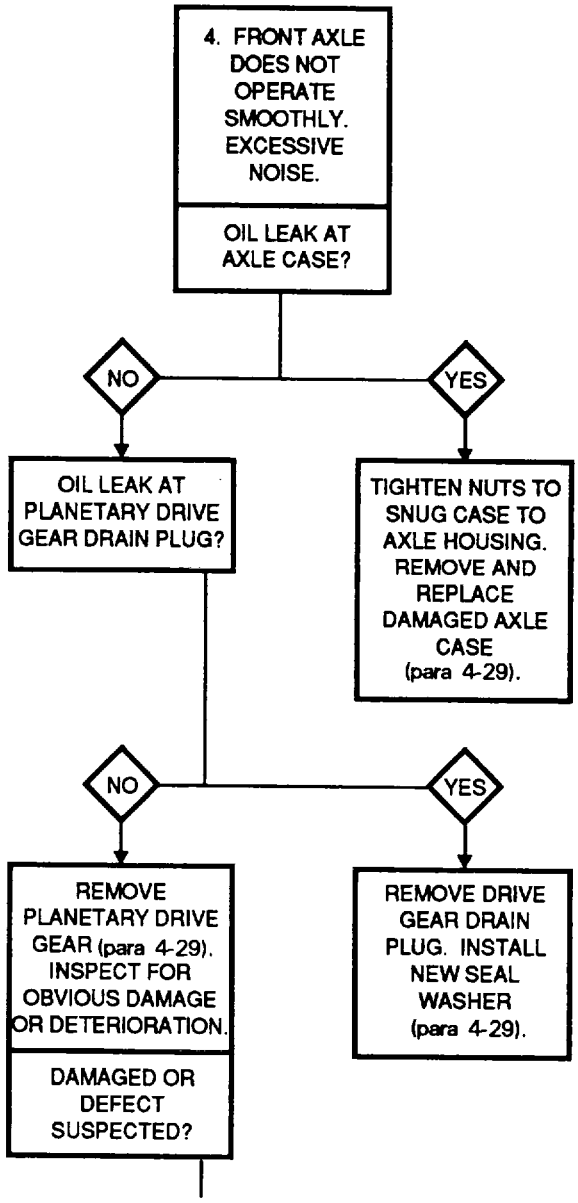
Trouble Symptom 2. Transmission Malfunction, Low Torque Output



Trouble Symptom 3. Transmission Will Not Engage or Disengage



Trouble Symptom 4. Front Axle Does Not Operate Smoothly, Excessive Noise



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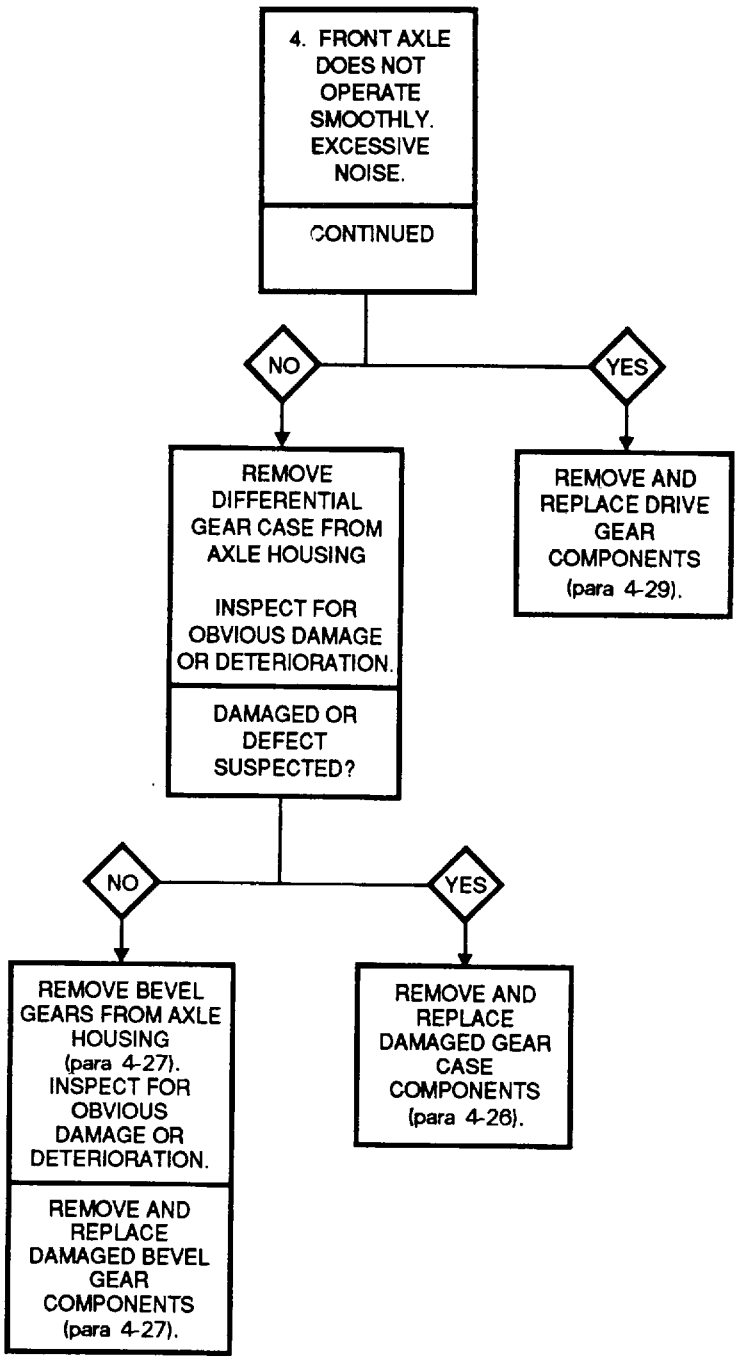
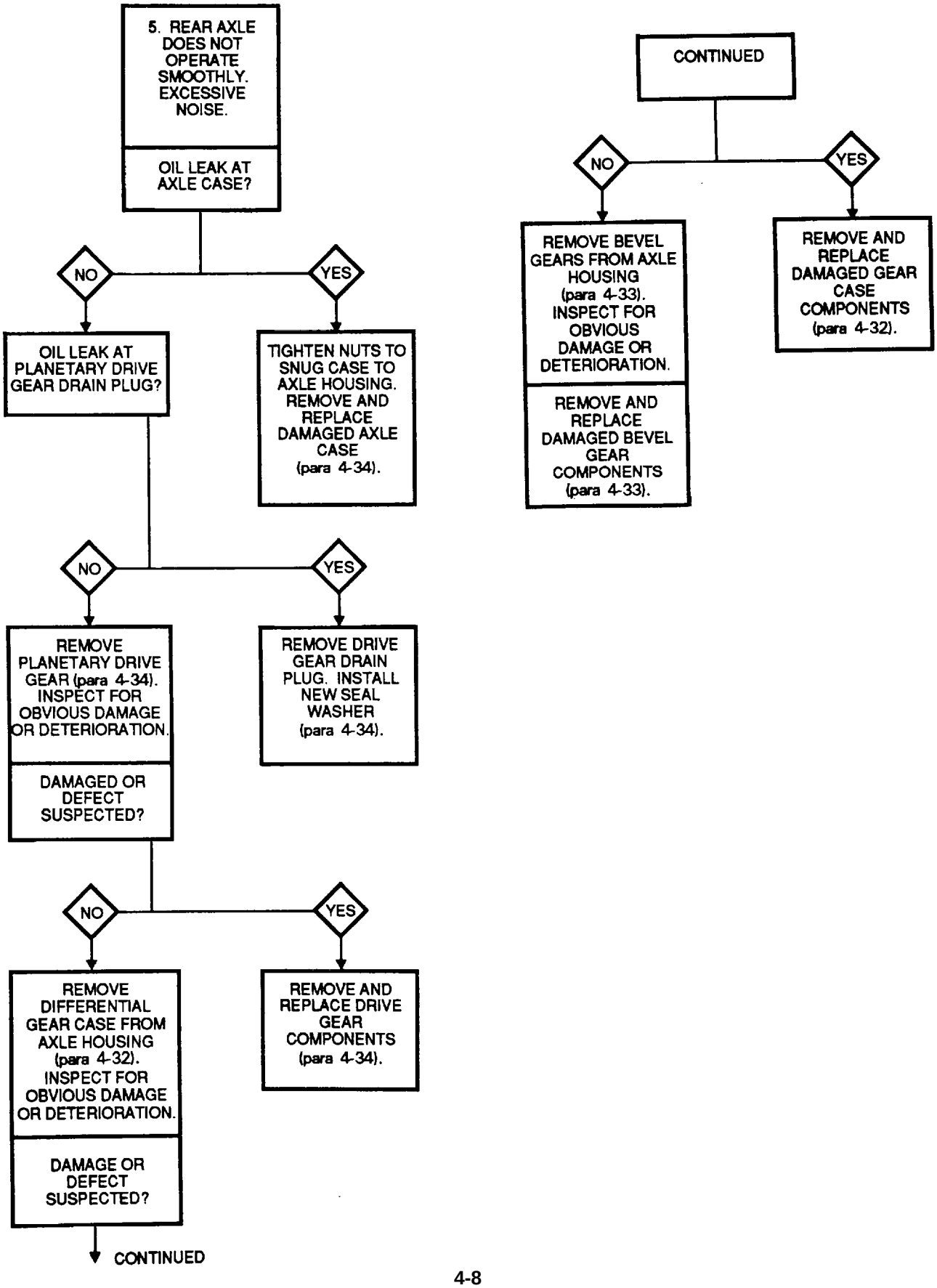
Trouble Symptom 4. Front Axle Does Not Operate Smoothly, Excessive Noise - continued



Trouble Symptom 5. Rear Axle Does Not Operate Smoothly, Excessive Noise



Section III. ENGINE MAINTENANCE

4-7. ENGINE ASSEMBLY / CYLINDER BLOCK REPAIR

This task covers: Repair

INITIAL SETUP:

Equipment Condition:

Engine assembly and transmission removed (para. 3-6)

A. REPAIR

Repair of the engine assembly at the General Support maintenance level is limited to removal and replacement of component parts. Refer to engine tasks in Chapters 2, 3, and 4 for removal and replacement procedures.

FOLLOW-ON MAINTENANCE:

Install engine and transmission (para. 3-6)

END OF TASK

4-8. CYLINDER HEAD ASSEMBLY (WITH VALVES) REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Nylon Brush (38, App. E)
Caliper Set, Outside (13, App. E)
Caliper, Inside (12, App. E)
Depth Gage (20, App. E)
Valve Grinding Kit (50, App. E)
Soft Head Hammer (23, App. E)

Equipment Condition:

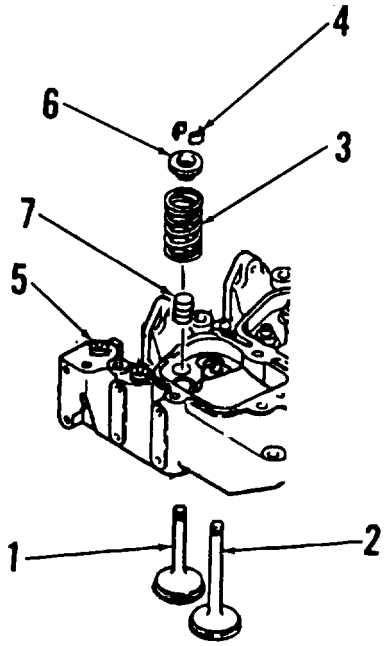
Cylinder head assembly removed (para. 3-8)

Materials / Parts:

Lubricating Oil (16, App. C)
Crocus Cloth (6, App. C)
Valve Lapping Compound (30, App. C)
Valve Stem Seal, Item 7 (8 ea.)

A. DISASSEMBLY

1. Mark valves (1, 2) with a grease pencil to identify their position.
2. Compress valve spring (3) and remove collets (4) from cylinder head (5). Release valve spring and remove retainer (6) and spring.
3. Remove valves (1, 2) and place in a labeled rack for identification.
4. Remove valve system seals (7) from valve guides and discard.



B. CLEANING

1. Ensure all gasket material is Removed from cylinder head assembly and cylinder block mating surfaces.
2. Clean carbon from injector nozzle seats using a nylon brush.

3. Clean cylinder head assembly and related components in hot soapy water solution. Allow to air dry.

4. Polish valve stems using crocus cloth. Remark valves for location in cylinder head.

C. INSPECTION

1. Conduct general inspection of cylinder head assembly components in accordance with paragraph 1-24.

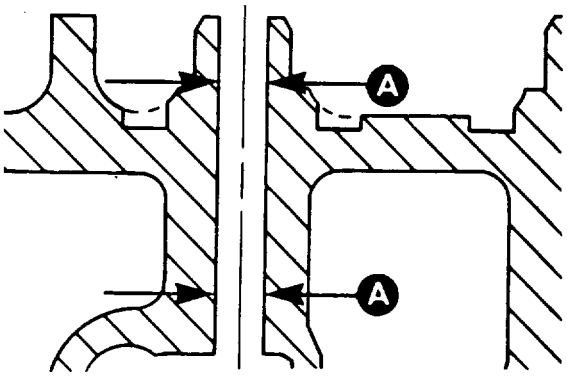
2. Inspect valve guides for scuffing or scoring. Measure valve guide bore (dimension A). Bore diameter shall not exceed 0.3157 in. (8.019 mm).

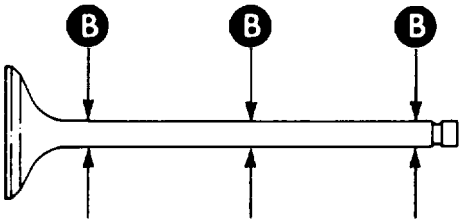
3. Inspect cylinder head surface for nicks, erosion, or damage. Check for head distortion. Variation within any 2 inch diameter area shall not exceed 0.0004 in. (0.01 mm).

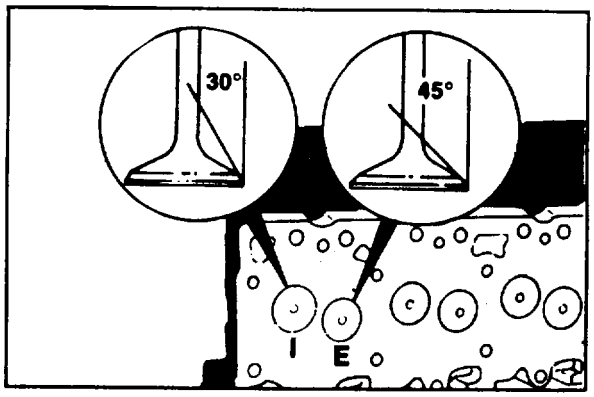
4. Inspect for abnormal wear on valve heads and stems. Measure valve stem diameter (dimension B). Diameter shall not exceed 0.3134 in. (7.960 mm).

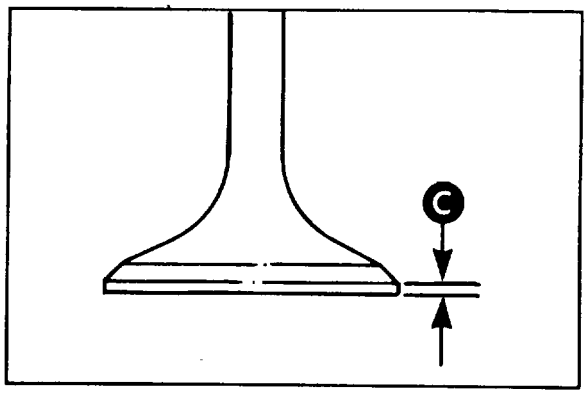
5. Check valve seat angles for distortion. Intake angle must be 30 degrees. Exhaust angle must be 45 degrees.

6. Measure valve head rim thickness (dimension C). Thickness shall nor exceed 0.031 in. (0.79 mm).









7. Inspect valve stem tip for flatness. If required, resurface valve stem tip.

8. Grind valve seat as follows:

   a. Install valve in designated bore and measure valve depth (dimension D). Valve depth is the distance from valve face to head deck. Record depth and remove valve from bore.

   b. Grind valve seat to remove scores, scratches, and burns. Ensure seat angles are maintained. Intake angle must be 30 degrees. Exhaust angle must be 45 degrees.

   c. Reinstall valve and measure valve depth again. Record depth as D1.

   d. Calculate grind depth (GD) by subtracting dimension D from dimension D1. Grind valve seat until GD equals 0.010 in (0.254 mm).

D1 D = 0.010 inch (GD)

   e. Reinstall valve seat and measure valve depth again. Depth shall be 0.0389 to 0.0598 in (0.99 to 1.52 mm). Replace valve if out of limits.

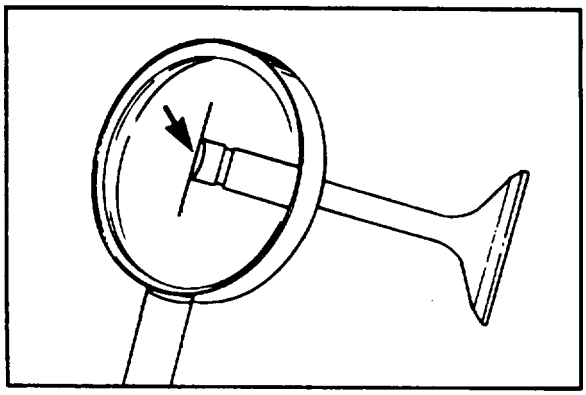
   f. Repeat steps a through e for remaining valves.

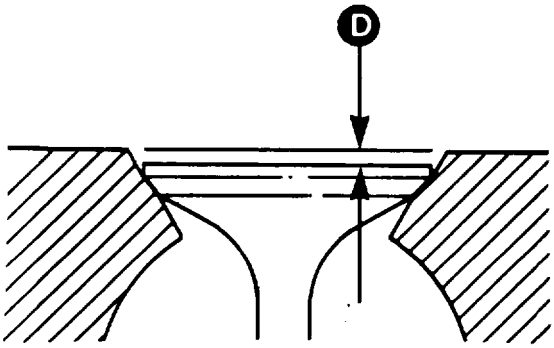
9. Apply a light coat of lapping compound to each valve. Lap valves to companion seats.

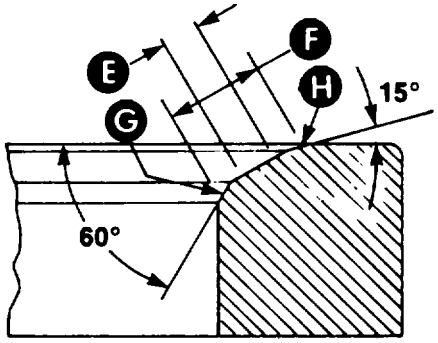
10. Remove valves. Clean lapping compound from valves and seats.

11. Measure valve seat width indicated by lapped surface (dimensions E AND F). Width E shall not exceed 0.060 in. (1.5 mm). Width F shall nor exceed 0.080 in. (2.0 mm).

12. Grind areas G and H, as required, to center seat on valve face. Grind area G with a 60 degree stone and area H with a 15 degree stone.

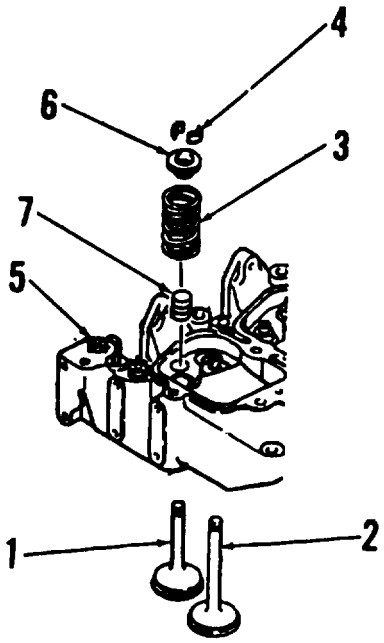






13. Measure valve springs. Free length shall be approximately 2.190 in. (55.63 mm).

14. Check valve spring tension using spring tester. A minimum load of 65 lbs is required to compress spring to a height of 1.94 in. (49.25 mm).



D. REPAIR

1. Repair of the cylinder head assembly is limited to grinding and lapping detailed in INSPECTION procedures.

2. All other repair consists of removal and replacement of defective, deformed, or damaged components.

E. ASSEMBLY

1. Install new valve stem seals (7) onto valve guides.

2. Lubricate valve stems with lubricating oil. Install valves (1, 2) into proper bores.

3. Install assembled valve springs (3) and retainers (6) into cylinder head (5).

4. Compress valve springs (3) and install collets (4). Release valve springs.

WARNING

Wear eye protection when checking collets. If collets are not properly installed, they can fly out when stems are hit with hammer.

5. Hit valve stems with soft headed hammer to ensure collets are seated.

FOLLOW-ON MAINTENANCE:

Install cylinder head assembly (para. 3-8)

END OF TASK

4-9. CRANKSHAFT REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Nylon Brush (38, App. E)
Caliper Set, Outside (13, App. E)
Puller Kit (26, App. E)

Materials / Parts:

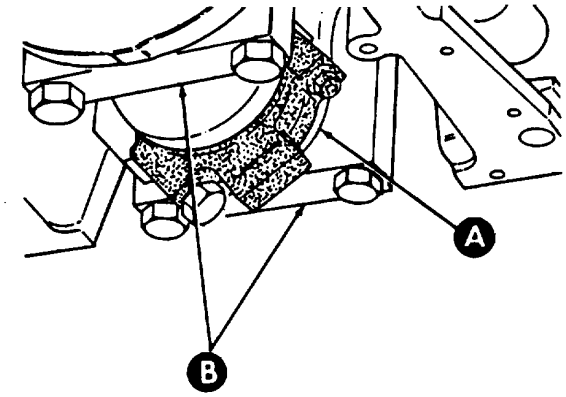
Lubricate 105 (39, App. C)
Lubricating Oil (14, App. C)

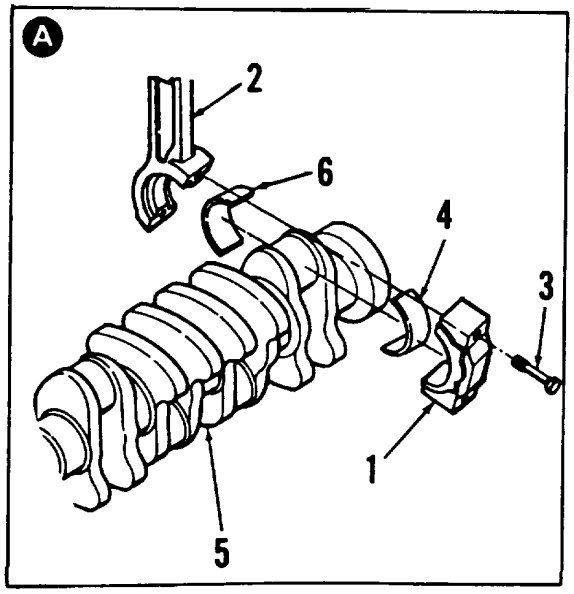
Equipment Condition:

Oil suction connection removed (para. 3-17)
Engine gear cover removed (para. 3-12)
Flywheel housing removed (para. 3-10)
Gear housing removed (para. 4-16)

A. REMOVAL

1. Using a grease pencil, mark rod caps and upper halves of connecting rods (1) according to cylinder location.
2. Remove lower halves of connecting rods (1) from upper halves (2) by removing screws (3).
3. Separate bearing halves (4) from crankshaft (5) or lower halves of connecting rods (1). Remove bearing halves (6) once crankshaft is removed.



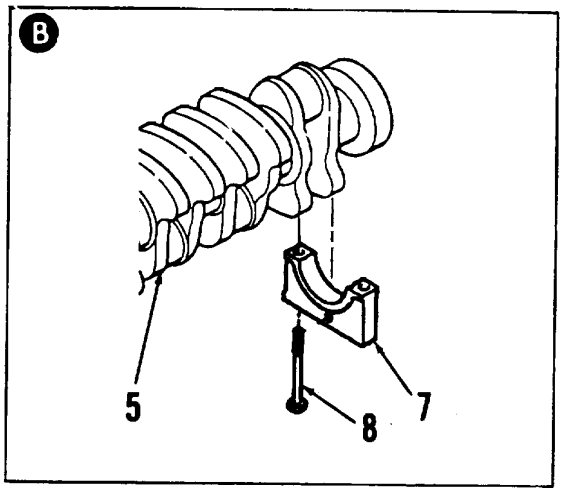


4. If main bearing caps (7) are not numbered, mark with correct number using a grease pencil.

5. Remove main bearing caps (7) from cylinder block by removing screws (8).

6. Carefully remove crankshaft (5) from cylinder block and place on a clean work surface.

7. Remove gear (9) and locating pin (10) only if replacement is required. Use puller to remove gear.



B. CLEANING

1. Clean crankshaft journals using a nylon brush.

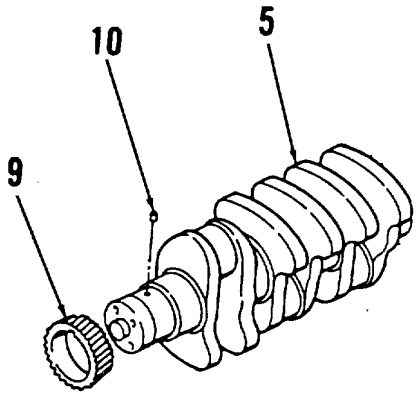
2. Clean crankshaft and related components in accordance with paragraph 1-24.

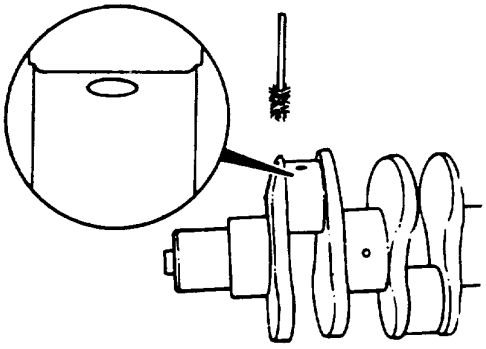
C. INSPECTION

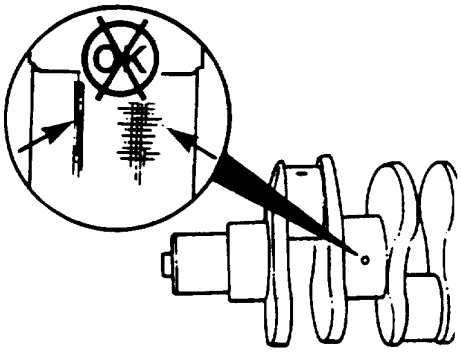
1. Conduct general inspection of crankshaft components in accordance with paragraph 1-24.

2. Inspect crankshaft journals for deep scratches or indications of overheating.

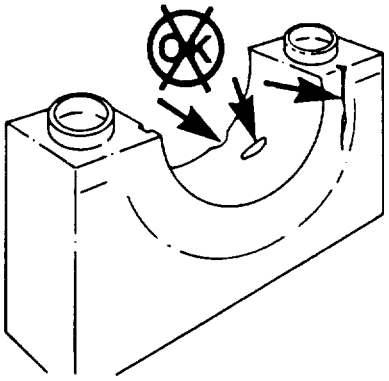
3. Inspect main bearings for signs of overheating, deep scratches, or other obvious damage. Replace as required in accordance with paragraph 4-10.







4. Inspect main bearing caps for dents, cracks, or other damage.

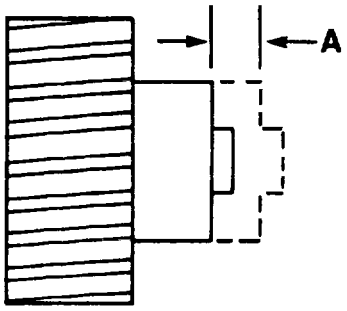


NOTE

Main bearings must be removed in order to determine journal diameter (dimension A). Remove bearings in accordance with paragraph 4-10 if measurement is desired.

5. Measure main bearing journal diameter (dimension A). Diameter shall be at least 3.266 in. (82.96 mm).

6. Measure connecting rod journal diameter (dimension B). Diameter shall be at least 2.715 in. (68.96 mm).



7. Out of round shall not exceed 0.002 in. (0.050 mm) for any journal. Maximum taper shall be 0.0005 in. (0.013 mm).

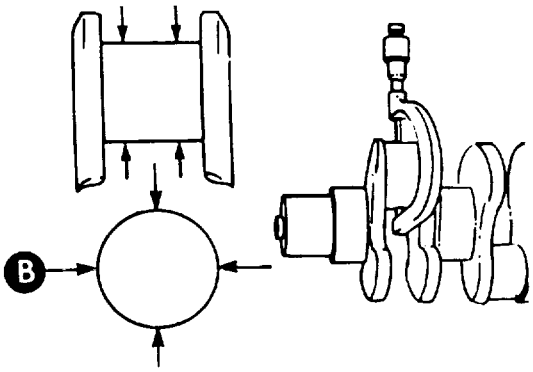
D. INSTALLATION

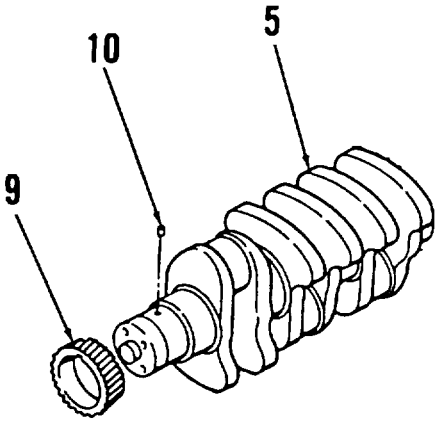
WARNING

Use care when handling hot gear. Wear gloves at all times. Do not overheat gear as damage will occur.

1. Install locating pin (10) into crankshaft (5).

2. Heat crankshaft gear (9) at 300 degrees F for 45 minutes. Remove gear from over and mate to crankshaft, ensuring proper alignment with pin.





3. Install upper bearing halves (6) onto connecting rods (2). Lubricate bearings with Lubricate 105.

4. Ensure main bearings are installed in block and main bearing caps. Carefully install crankshaft (5) into cylinder block.

5. Lightly lubricate screws (8) with lubricating oil. Install main bearing caps (7) onto cylinder block using screws. Torque screws in sequence shown in three steps:

   a. Step 1: 44 ft-lbs (60 Nm).

   b. Step 2: 88 ft-lbs (119 Nm).

   c. Step 3: 129 ft-lbs (176 Nm).

6. Manually rotate crankshaft (5) to ensure smooth operation. If crankshaft does not rotate freely, remove crankshaft and inspect main bearings.

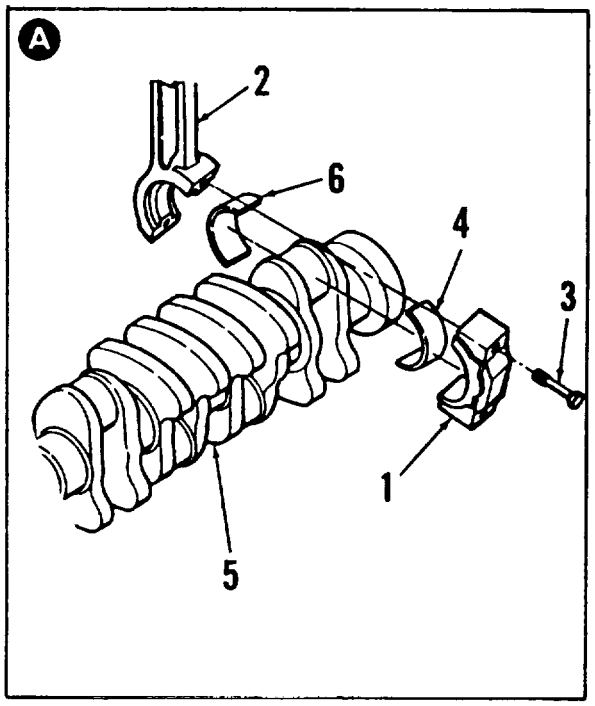
7. Install lower bearing halves (4) into lower halves of connecting rods (1). Lubricate bearings with Lubricate 105.

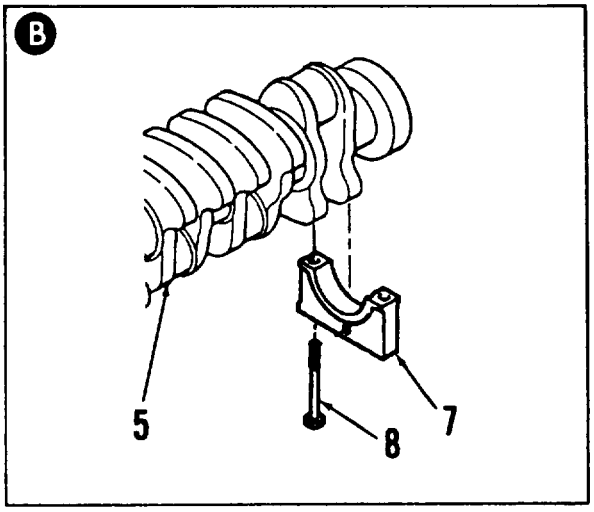
8. Lightly lubricate screws (3) with lubricating oil. Install lower halves of connecting rods (1) onto upper halves (2) using screws. Tighten screws in three steps:

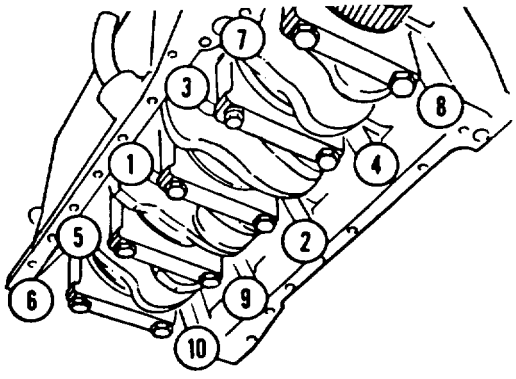
   a. Step 1: 26 ft-lbs (35 Nm).

   b. Step 2: 52 ft-lbs (71 Nm).

   c. Step 3: 74 ft-lbs (100 Nm).







FOLLOW-ON MAINTENANCE:

Install oil suction connection
(para. 3-15)
Install flywheel housing (para. 3-10)
Install engine gear cover (para. 3-12)
Install gear housing (para. 4-16)

END OF TASK

4-10. CRANKSHAFT MAIN BEARING REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanic. Tool Kit (1, App. E)
Nylon Brush (38, App. E)
Caliper Set, Outside (13, App. E)

Materials / Parts:

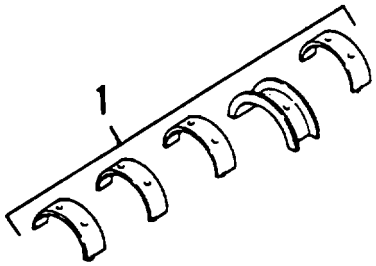
Lubricate 105 (39, App. C)

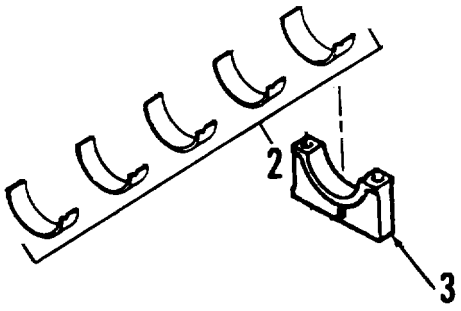
Equipment Condition:

Crankshaft removed (para. 4-9)

A. REMOVAL

1. Remove bearing halves (1, 2) from cylinder block and main bearing caps (3).
2. Determine size of bearings removed and obtain same size replacements (as required)
3. Remove piston cooling nozzles from journals in cylinder block only if replacement is required.





B. CLEANING

1. Clean crankshaft journals using a nylon brush.
2. Clean crankshaft, main bearing caps, and main bearings in accordance with paragraph 1-24.

C. INSPECTION

1. Conduct general inspection of crankshaft components in accordance with paragraph 1-24.
2. Inspect crankshaft journals for deep scratches or indications of overheating.

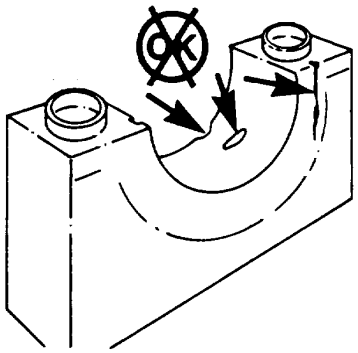
3. Inspect main bearings for signs of overheating, deep scratches, or other obvious damage. Replace as required.

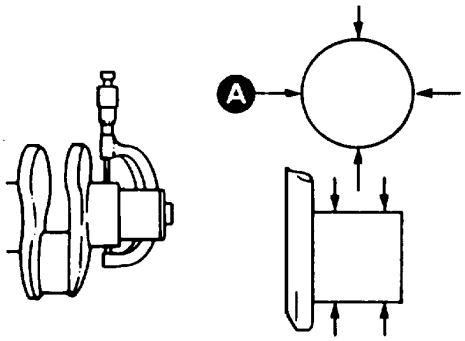
4. Inspect main bearing caps for dents, cracks, or other damage.

5. Measure main bearing journal diameter (dimension A) Diameter shall be at least 3.266 in. (82.96 mm).

6. Measure connecting rod journal diameter (dimension B). Diameter shall be at least 2.715 in. (68.96 mm).

7. Out of round shall not exceed 0.002 in. (0.050 mm) for any journal. Maximum taper shall be 0.0005 in. (0.013 mm).

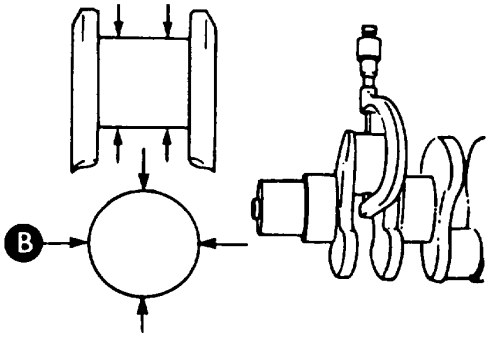


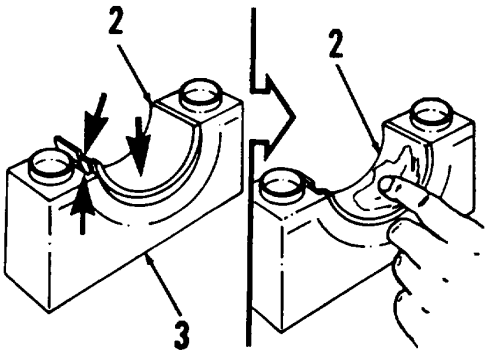


D. INSTALLATION

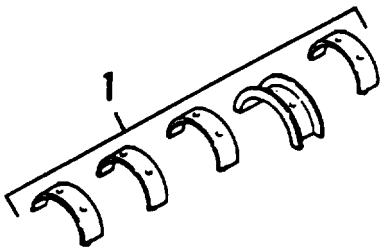
1. Install piston cooling nozzles into journals in cylinder block.

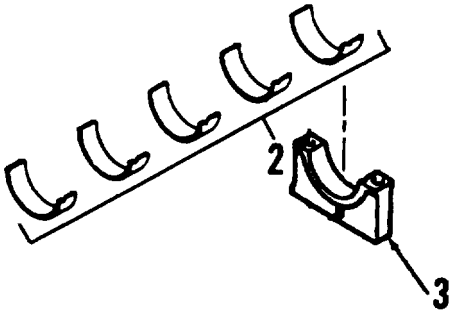
2. Install lower bearing halves (2) onto main bearing caps (3). Ensure tangs on bearing halves set into notches in bearing caps. Lubricate bearings with Lubricate 105.





3. Install lower bearing halves (1) onto journals in cylinder block. Ensure tangs on bearing halves set into notches in journals. Lubricate bearings with Lubricate 105.





FOLLOW-ON MAINTENANCE:
Install crankshaft (para. 4-9)
END OF TASK

4-11. PISTON, PISTON PIN, AND PISTON RING REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Retaining Ring Pliers (24, App. E)
Feeler Gage (21, App. E)
Caliper Set, Outside (13, App. E)
Caliper, Inside (12, App. E)
Ring Compressor (40, App. E)

Equipment Condition:

Oil suction connection removed (para. 3-17)
Cylinder head assembly removed (para. 3-8)

Materials / Parts:

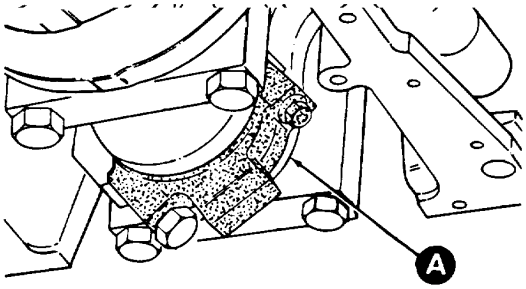
Lubriplate 105 (39, App. C)
Lubricating Oil (14, App. C)
Retaining Ring, Item 11 (8 ea.)
Piston Ring Set, Item 13 (4 ea.)

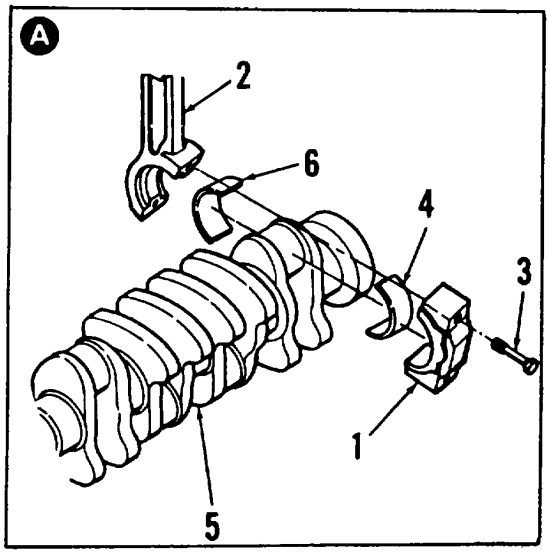
A. REMOVAL

1. Using a grease pencil, mark rod caps and upper halves of connecting rods (1) according to cylinder location.

2. Remove lower halves of connecting rods (1) from upper halves (2) by removing screws (3).

3. Separate bearing halves (4) from crankshaft (5) or lower halves of connecting rods (1). Remove bearing halves (6) once piston is removed.





4. Carefully pull assembled piston and connecting rod (7) out of cylinder block, making sure piston bore is not scratched or marred in any way.

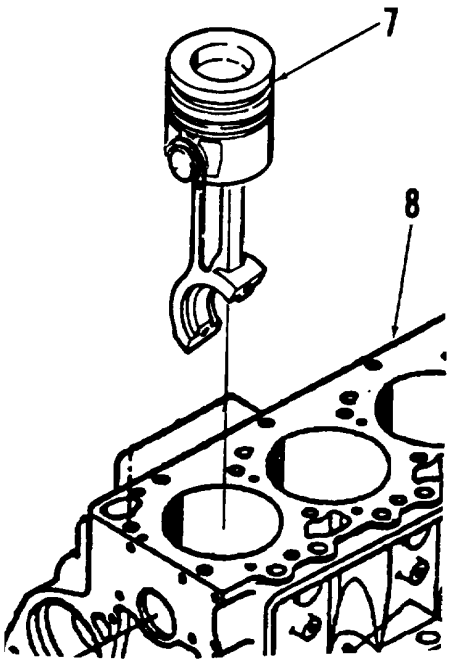
5. Using pliers, remove retaining rings (11) from piston pin (12).

6. Remove piston pin (12) from piston (10).Remove connecting rod (9).

CAUTION

Use care when removing piston ring set to prevent damage to piston.

7. Using pliers, carefully remove piston ring set (13) from piston (10).



B. CLEANING

1. Clean pistons, pins, and connecting rods in a solution of laundry detergent and hot water.

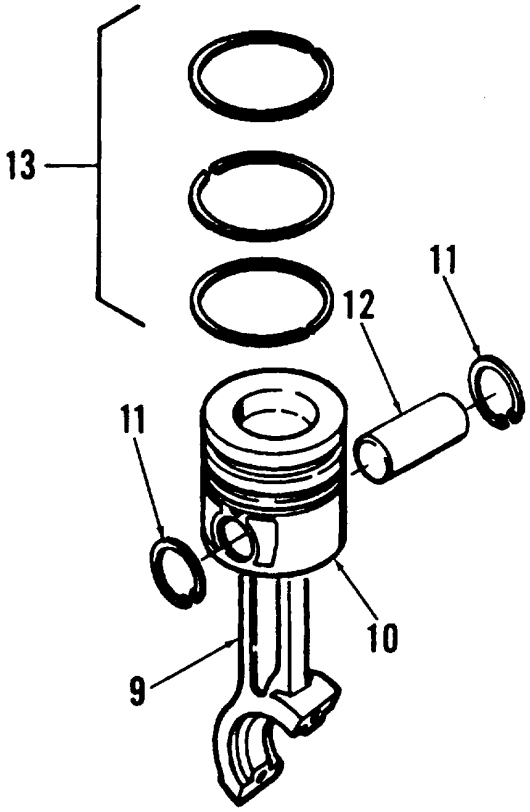
CAUTION

Use care when cleaning piston ring grooves to prevent damage.

2. Clean carbon deposits from piston ring grooves using the square end of a broken ring.

3. Wash pistons again in laundry detergent. Allow to air dry.

4. If carbon deposits remain, soak pistons overnight in cleaning solvent. Refer to paragraph 1-24.



C. INSPECTION

1. Conduct general inspection of pistons, pins, and connecting rods in accordance with paragraph 1-24.

2. Inspect pistons for damage and excessive wear. Inspect top, ring grooves, skirt, and pin bore for chips or cracks.

3. Measure piston skirt diameter (dimension A). Minimum diameter shall be 4.0088 in.(101.823 mm).

4. Use a new piston ring to measure clearance in ring grooves. Maximum clearance for each ring groove shall be as follows:

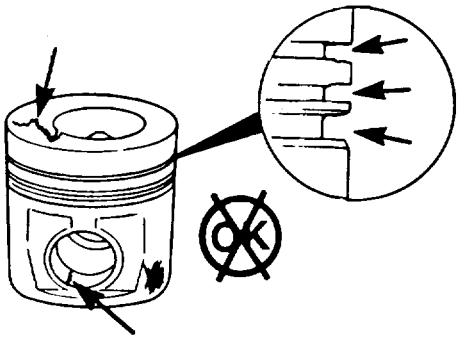
   a. Top groove: 0.006 in (0.150 mm).

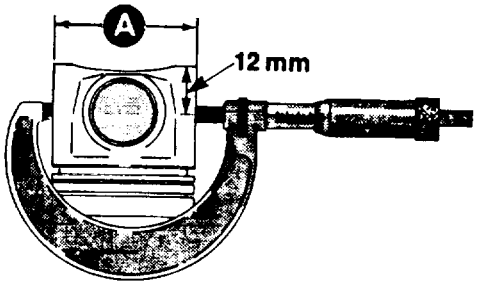
   b. Intermediate groove: 0.006 in (0.150 mm).

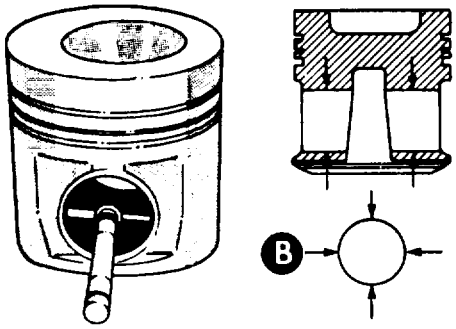
   c. Oil control groove (bottom): 0.005 in (0.130 mm).

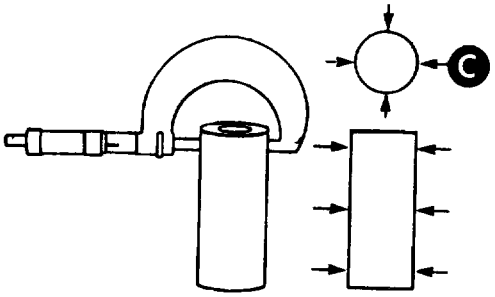
4. Measure pin bore in piston (dimension B). Maximum diameter shall be 1.5758 in. (40.025 mm).

5. Inspect piston pin for nicks, gouges, or excessive wear. Measure pin diameter (dimension C). Minimum diameter shall be 1.5744 in. (39.990 mm).



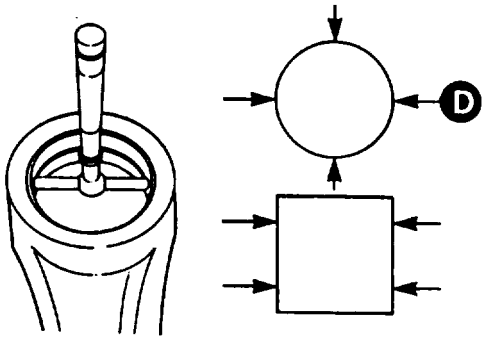






6. Inspect connecting rod for damage or excessive wear. I-beam section must be free of dents or other damage. Damage to I-beam can cause stress risers which will progress to breakage.

7. Measure connecting rod pin bore (dimension D). Maximum diameter shall be 1.5769 in.(40. mm).



D. INSTALLATION

1. Insert connecting rod (9) into piston (10). Ensure FRONT marking on piston and identification numbers on connecting rod are oriented as shown in figure.

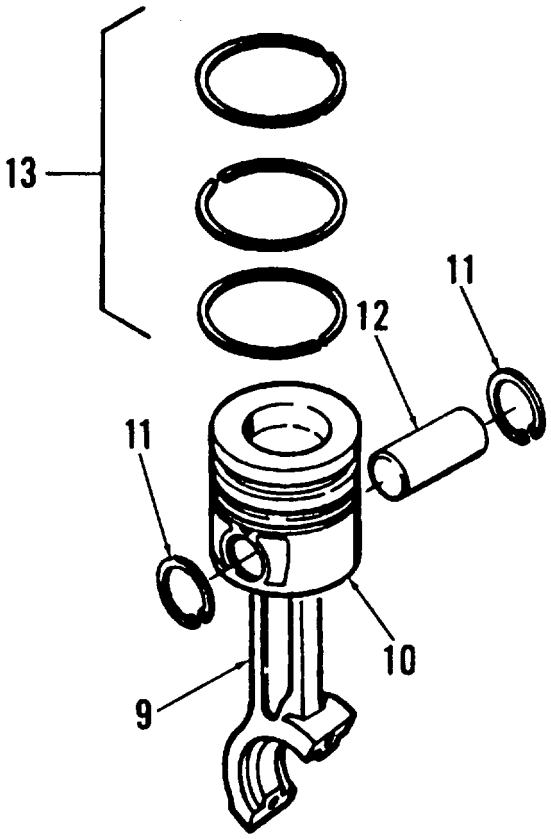
2. Install retaining ring (11) into pin groove on FRONT side of piston (10).

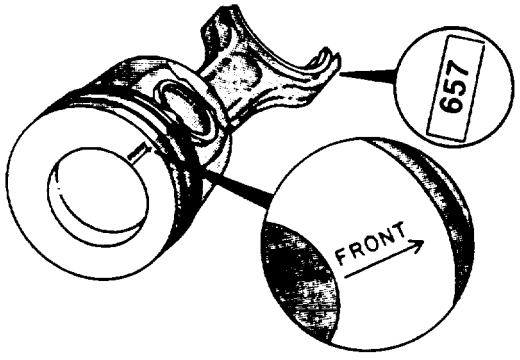
3. Lubricate pin (12) and pin bore with oil. Insert pin into piston (10) and secure using second retaining ring (11).

4. Determine diameter of piston (1) and obtain proper ring set (13).

5. Position each ring of set (13) into cylinder. Distance from top of cylinder head to bottom ring shall be 3.5 in. (89 mm). Use piston to square rings with bore.

6. Using a feeler gage, measure gap. Gap shall be 0.0100 to 0.0215 in. (0.25 to 0.55 mm) for each ring.





7. Top surface of each ring in set is identified. Assemble with the word TOP or supplier mark up.

8. Position oil expander ring (14) in oil control ring groove (bottom groove). Install oil control ring (15) with end gap opposite ends on expander ring.

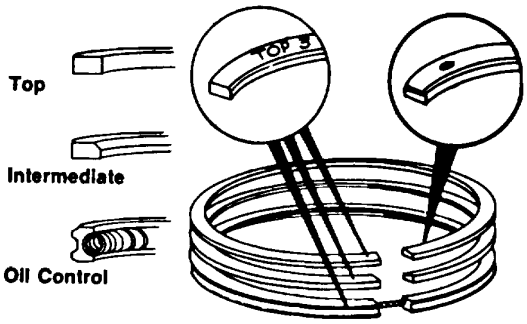
9. Install top and intermediate rings (16, 17) into appropriate grooves. Position ring gaps as shown in figure. Make sure ring gaps do not align with center of piston pin or along center line of connecting rod.

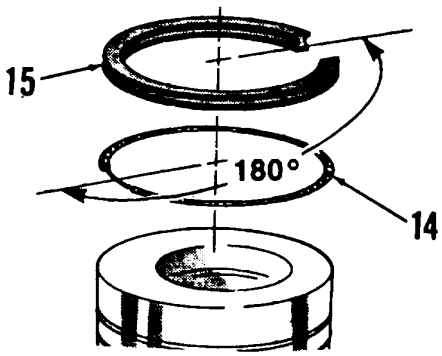
10. Bar crankshaft so that rod journal for piston to be installed is at bottom dead center (BDC).

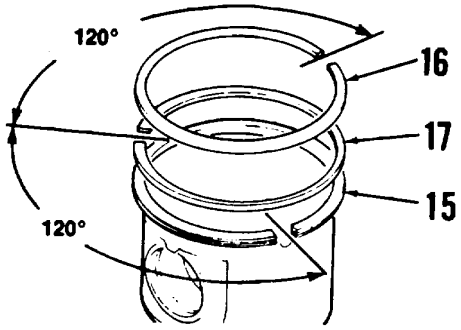
11. Install upper bearing halves into connecting rods. Lubricate bearing halves with Lubriplate 105.

12. Lubricate piston skirt, rings, and cylinder bore with clean lubricating oil.

13. Compress rings (15, 16, 17) using ring compressor.







CAUTION

Use care when installing piston and connecting rod to prevent damage to cylinder bore.

14. Position piston and rod assembly (18) into cylinder bore with the word FRONT on piston towards front of cylinder block (19).

15. Push piston and rod assembly (18) into bore until top of piston is approximately 2 inches (50 mm) below top of bore.

16. Pull connecting rod (20) down onto crankshaft journal. Ensure bearing halves seat on crankshaft journals.

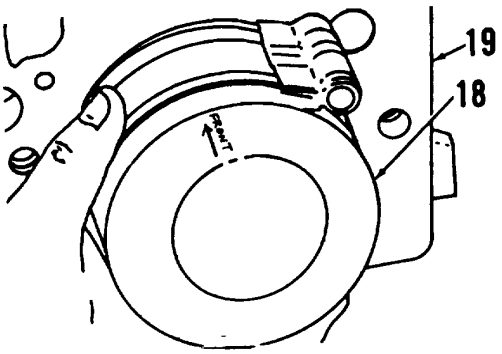
17. lower bearing halves (4) onto lower halves of connecting rods (1). Lubricate bearings with Lubriplate 105.

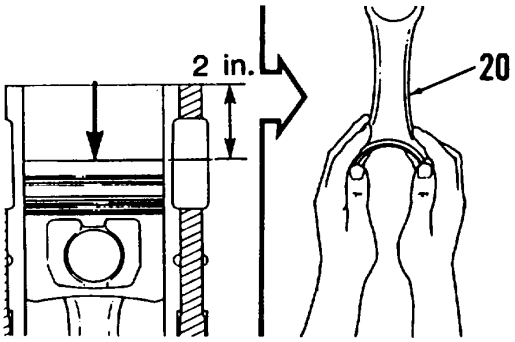
18. Lightly lubricate screws (3) with oil. Install lower halves of connecting rods (1) onto upper halves (2) using screws. Tighten screws in three steps:

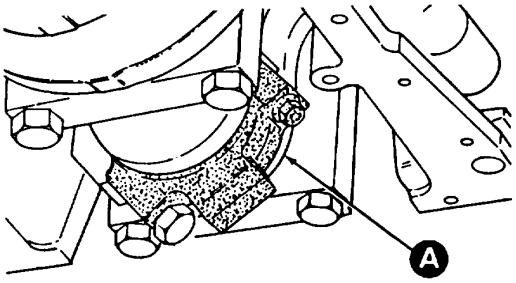
    a. Step 1: 26 ft-lbs (35 Nm)

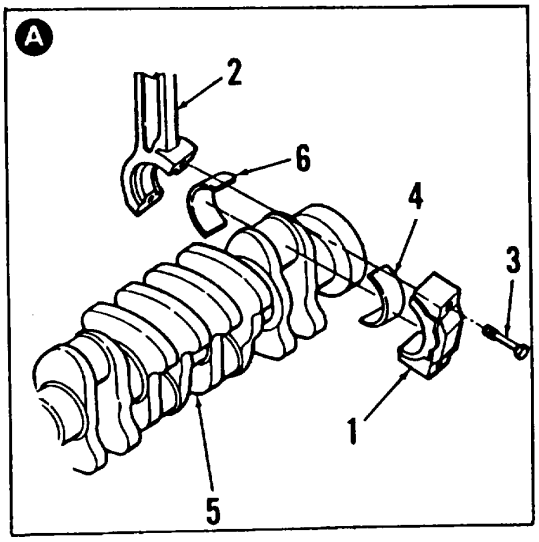
    b. Step 2: 52 ft-lbs (71 Nm)

    c. Step 3: 74 ft-lbs (100 Nm)









FOLLOW-ON MAINTENANCE:

Install oil suction connection (para. 3-17)
Install cylinder head assembly (para. 3-8)

END OF TASK

4-12. CONNECTING ROD AND BEARING REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Equipment Condition:

Pistons removed (para. 4-11)

Refer to paragraph 4-11 for removal, cleaning, inspection, and installation of connecting rods and rod bearings.

FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-13. CAMSHAFT REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Caliper Set, Outside (13, App. E)
Caliper, Inside (12, App. E)
Torque Wrench (32, App. E)

Materials / Parts:

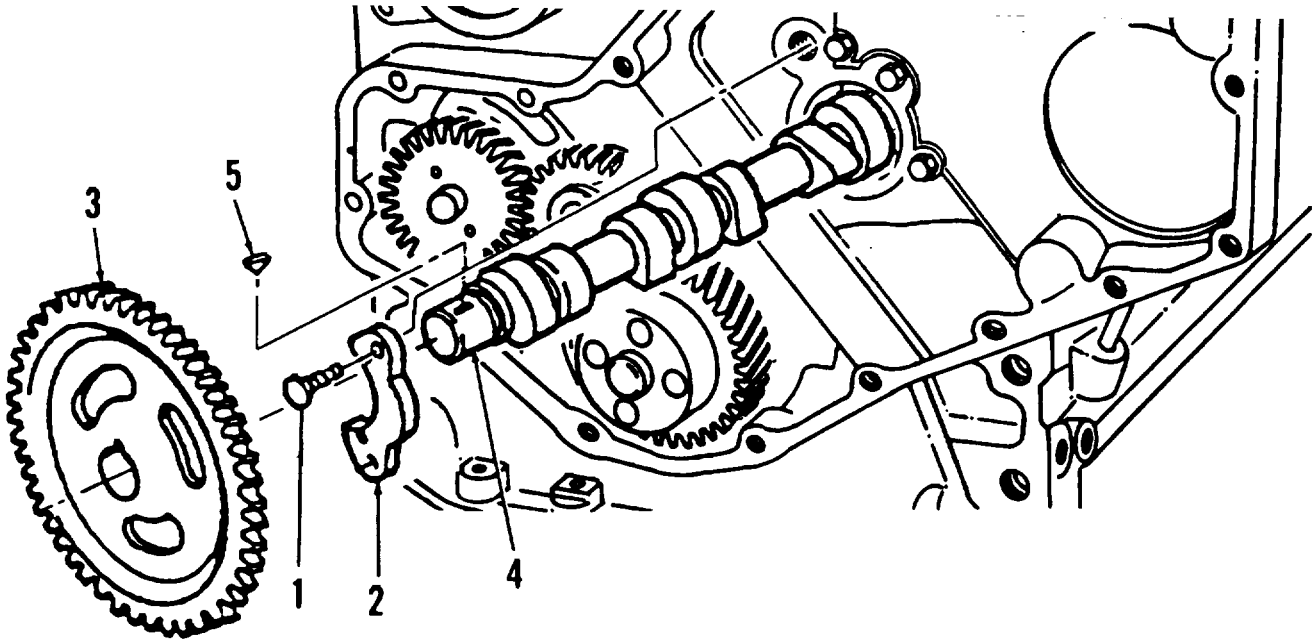
Lubriplate 105 (39, App. C)

Equipment Condition:

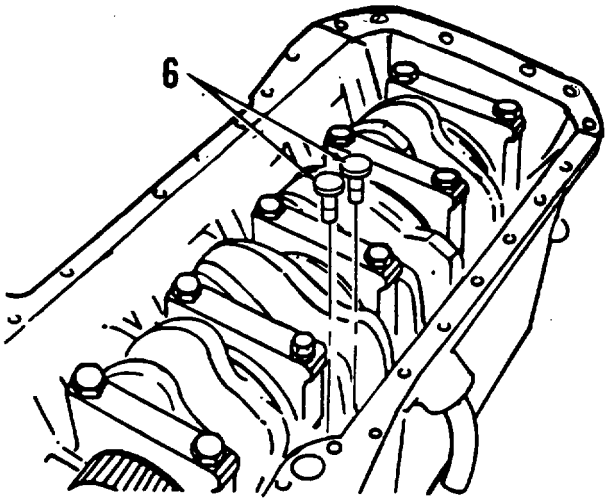
Fuel lift transfer pump removed (para. 2-25)
Push rods removed (para. 3-15)
Engine gear cover removed (para. 3-12)
Oil suction connection removed (para. 3-17)
Engine installed upside down in maintenance stand

A. REMOVAL

1. Manually rotate the engine until crankshaft gear and camshaft gear timing marks align.
2. Remove screws (1) from camshaft support (2) to release camshaft gear (3) and camshaft (4) from cylinder block.
3. Carefully pull assembled camshaft gear (3) and camshaft (4) from cylinder block, making sure not to damage camshaft or bore.
4. Separate camshaft gear (3) from camshaft (4). Remove key (5) if required.



5. Reach into cylinder block and remove valve tappets (6) from bores.



B. CLEANING

Clean camshaft gear, camshaft, and valve tappets in accordance with paragraph 1-24.

C. INSPECTION

1. Conduct overall inspection of camshaft gear, camshaft, valve tappets, cylinder block, and related components in accordance with paragraph 1-24.

2. Inspect camshaft lift pump lobe, valve lobes, and bearing journals for wear, cracking, or pitting.

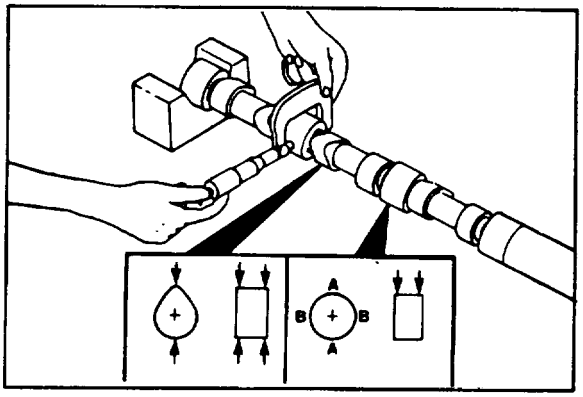
3. Inspect camshaft gear teeth for wear and damage. Inspect for broken or chipped teeth. Check for cracks at the root of each tooth.

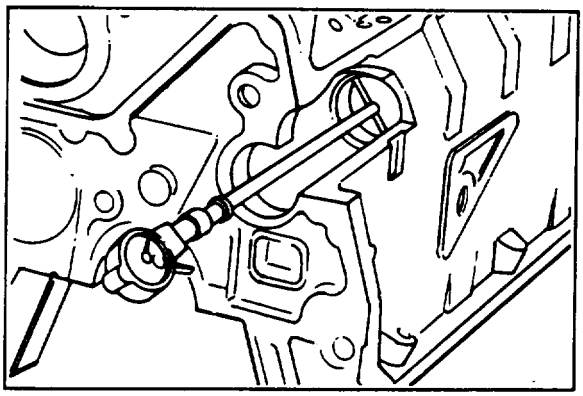
4. Measure camshaft journal diameter. Diameter shall be at least 2.125 in. (53.96 mm).

5. Measure valve lobe diameter. Minimum diameter at peak of intake valve lobe shall be 1.852 in. (47.04 mm). Minimum diameter at peak of exhaust valve lobe shall be 1.841 in. (46.77 mm).

6. Measure lift pump lobe diameter. Diameter shall be at least 1.398 in. (35.50 mm).

7. Inspect camshaft bore for damage or excessive wear. Bore I.D. shall be a maximum of 2.131 in. (54.13 mm). Replace bushing if beyond limit.





NOTE

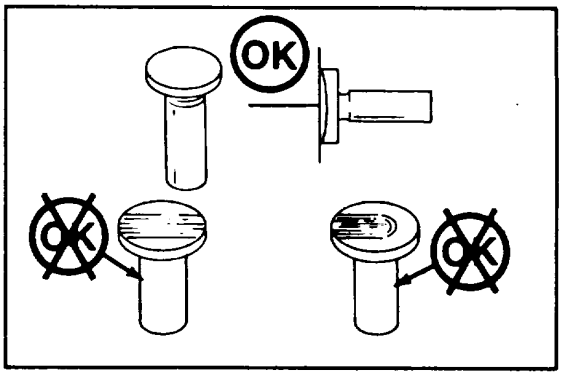
When installing new bushing, mark cylinder block to ensure that oil hole in bushing aligns with oil hole in bore.

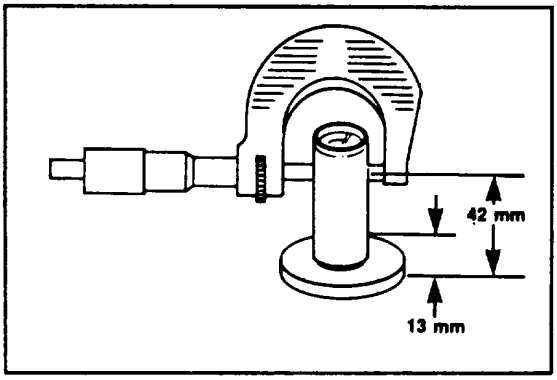
8. Inspect valve tappet socket, stem, and face for excessive wear or cracks.

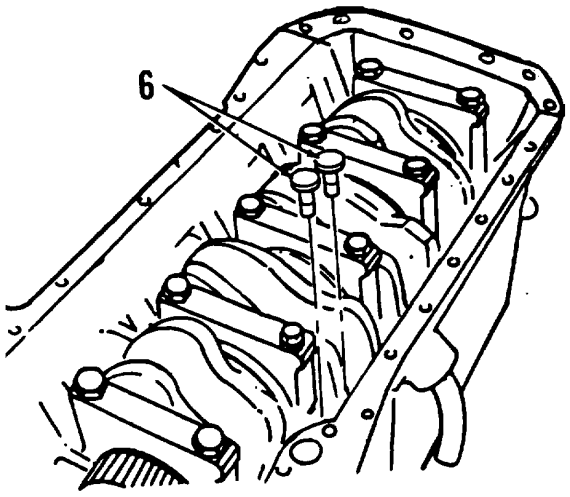
9. Measure tappet stem diameter. Diameter shall be at least 0.627 in. (15.93 mm).

D. INSTALLATION

1. Apply Lubriplate 105 to stems of tappets (6). Insert tappets into bores in bottom of cylinder block.







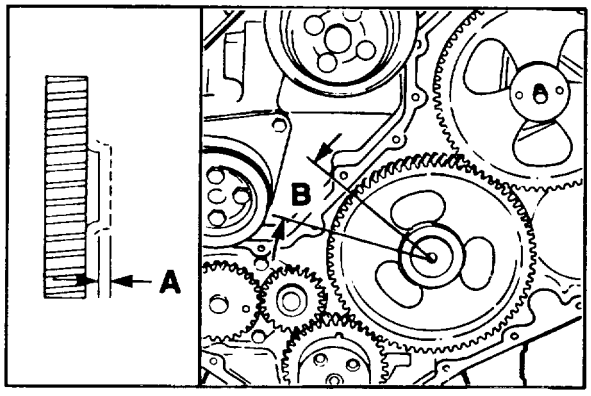
2. Install key (5) into camshaft (4). Install camshaft gear (3) over key and onto camshaft.

3. Apply Lubriplate 105 to camshaft lobes, journals, and camshaft support. Apply Lubriplate 105 to camshaft bores.

4. Align timing marks on crankshaft gear and camshaft gear. Carefully insert assembled camshaft gear (3) and camshaft (4) into cylinder block.

5. Install screws (1) into camshaft support (2) to secure camshaft gear (3) and camshaft (4). Torque screws to 18 ft-lbs. (24 Nm).

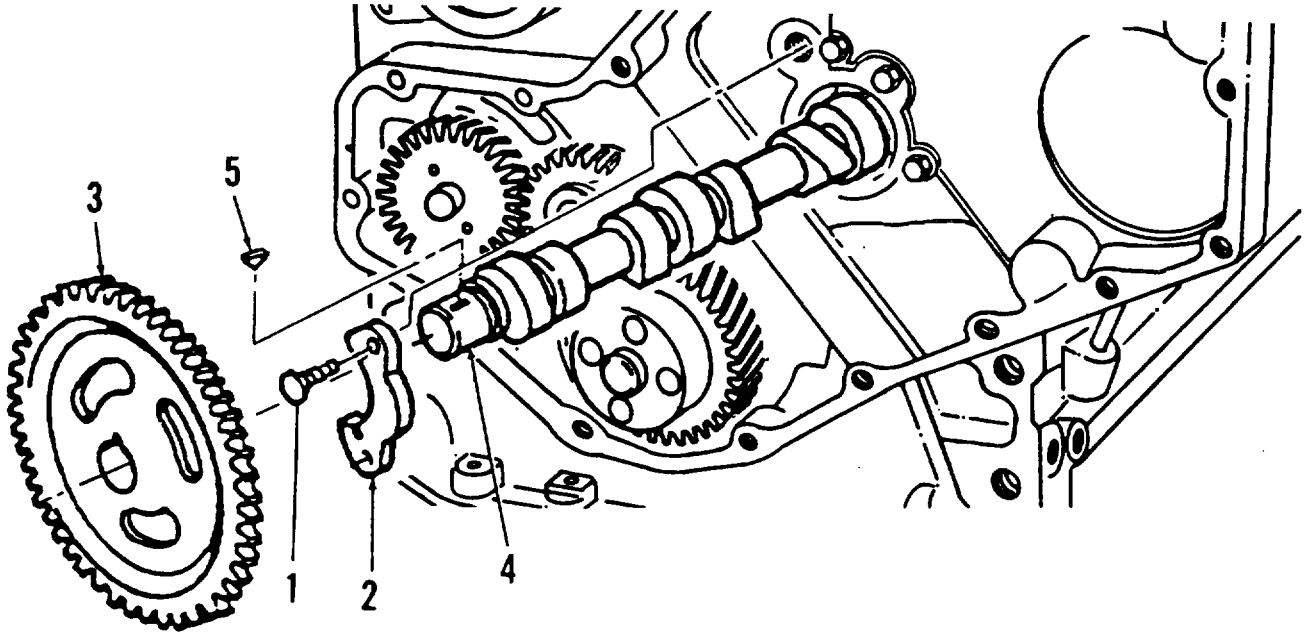
6. Check camshaft for proper backlash and end play. End play (dimension A) shall be 0.006 to 0.010 in. (0.152 to 0.254 mm). Backlash (dimension B) shall be 0.005 to 0.013 in. (0.12 to 0.33 mm).



FOLLOW-ON MAINTENANCE:

Install fuel lift transfer pump (para. 2-25)
Install push rods (para. 3-15)
Install engine gear cover (para. 3-12)
Install oil suction connection (para. 3-17)

END OF TASK



4-14. TIMING PIN REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (33, App. E)

Materials / Parts:

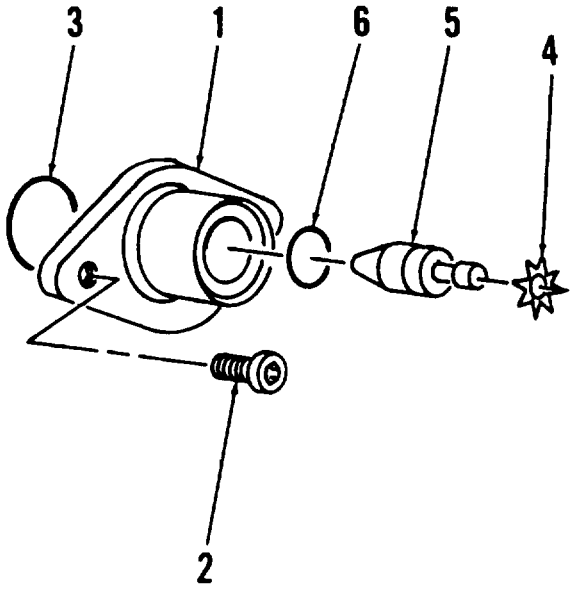
Seal, Item 3 (1 ea.)
O-Ring, Item 6 (1ea.)

A. REMOVAL

1. Locate top dead center (TDC) for cylinder number 1 by manually turning engine while pressing in engine timing pin.

2. Remove housing (1) from cylinder block by removing screws (2). Remove and discard seal (3).

3. Remove retainer (4) from housing (1). Remove timing pin (5) and O-ring (6). Discard O-ring.



B. CLEANING

Clean timing pin components in accordance with paragraph 1-24.

C. INSPECTION

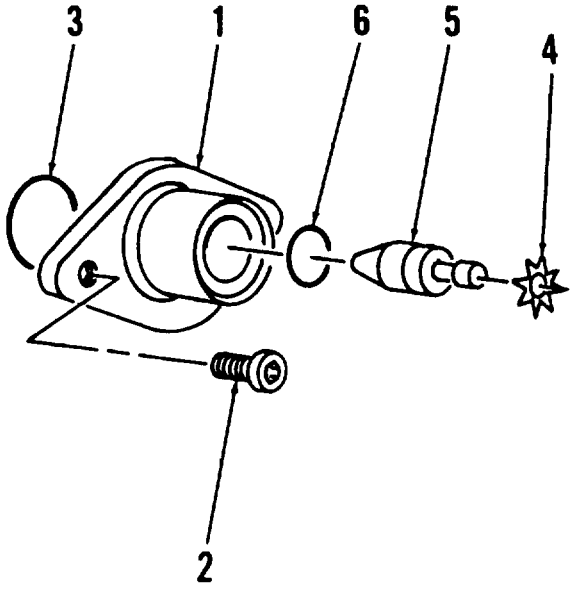
Inspect timing pin components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install new O-ring (6) onto timing pin (5). Install timing pin into housing (1) and secure using retainer (4).

2. Install new seal (3) into housing (1). Install housing (1) onto cylinder block using screws (2).

3. Hold timing pin (5) in hole in camshaft gear to align housing (1). Torque screws (2) to 48 in-lbs (5 Nm).



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-15. ENGINE GEAR HOUSING REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)

Equipment Condition:

Camshaft removed (para. 4-13)
Timing pin removed (para. 4-14)

Materials / Parts:

Gasket Kit, P/N 3802019 (1 ea.)

A. REMOVAL

1. Remove engine gear housing (1) from cylinder block by removing sixteen screws (2) and ten screws (3).

2. Remove and discard gasket (4). Ensure all gasket material is removed from cylinder block and back of gear housing.

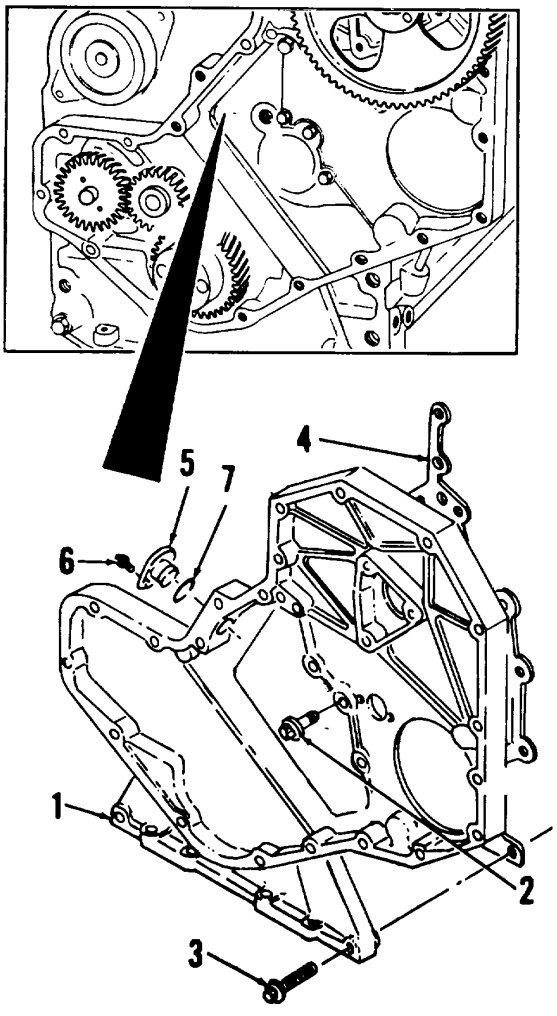
3. Remove cover plate (5) by removing screw (6). Remove and discard O-ring seal (7).

B. CLEANING

Clean engine gear cover and related components in accordance with paragraph 1-24.

C. INSPECTION

Inspect engine gear cover, cylinder block mating surface, and related components in accordance with paragraph 1-24.



D. INSTALLATION

1. Mate new gasket (4) to cylinder block. Ensure bolt holes align.

2. Install engine gear housing (1) onto cylinder block using sixteen screws (2) and ten screws (3). Torque screws to 18 ft-lbs. (24 Nm).

3. Install cover plate (5) and new seal (7) using screw (6).

4. Install camshaft in accordance with paragraph 4-13.

NOTE

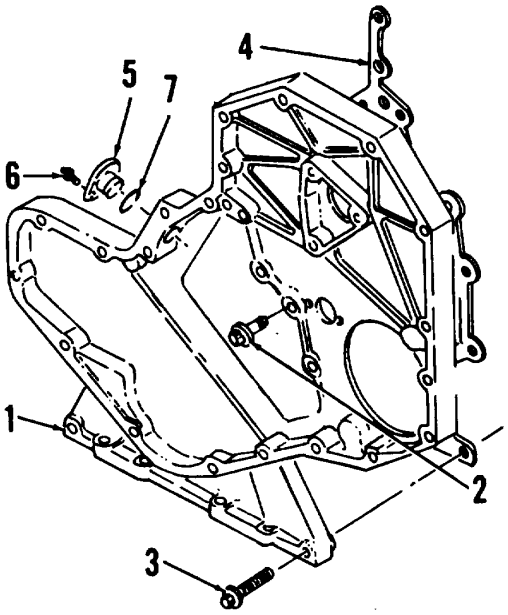
Location of timing pin on gear housing is critical for correct engine adjustment. Follow procedures exactly to ensure timing pin corresponds to top dead center (TDC) for cylinder 1.

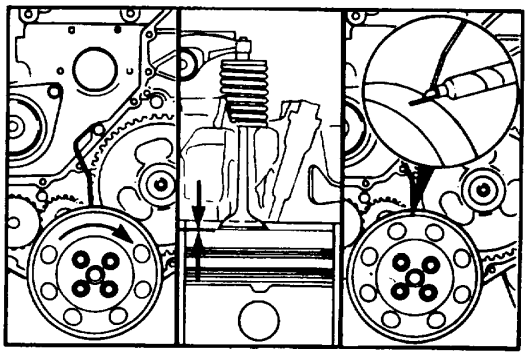
5. Install rocker levers and exhaust push rod for cylinder 1 in accordance with paragraph 3-13. Adjust exhaust rocker lever to zero valve clearance.

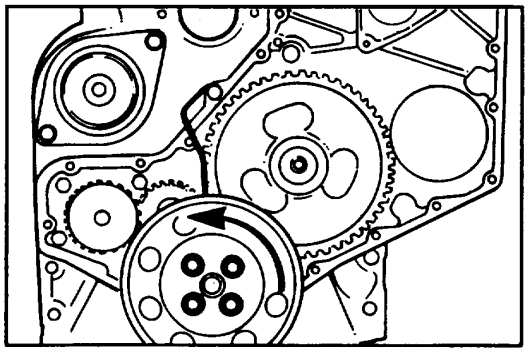
6. Temporarily install crankshaft pulley. Fabricate and install a wire pointer as shown.

7. Rotate crankshaft 1/4 rotation to the left.

8. Tighten adjusting screw for exhaust valve two complete rotations.







CAUTION

Use extreme care to ensure that piston does not push against exhaust valve with too much force. Excessive force will bend push rod.

9. Rotate crankshaft slowly clockwise until piston touches exhaust valve. Mark crankshaft pulley.

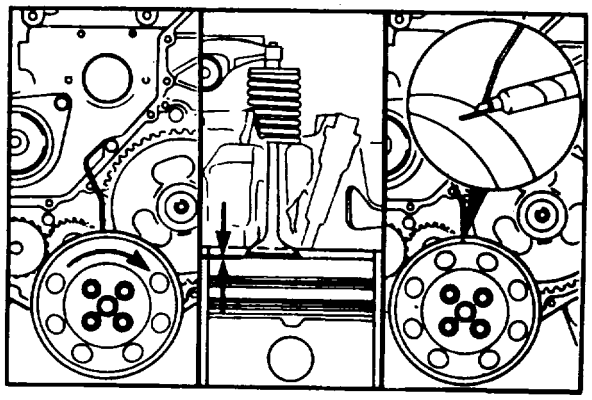
10. Rotate crankshaft counterclockwise until piston touchesexhaust valve. Mark crankshaft pulley.

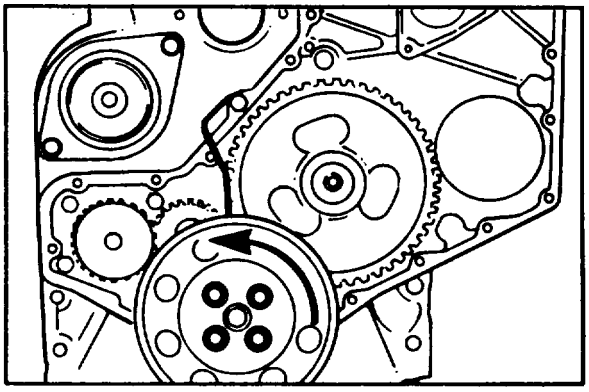
11. Measure the distance between two marks on crankshaft pulley. Make a third mark half-way between the first two marks. Third mark is the TDC mark.

12. Completely loosen exhaust valve adjusting screw.

13. Rotate crankshaft clockwise until fabricated wire pointer is aligned with the TDC mark. Look through timing pin mounting hole. Matching hole in camshaft gear shall be visible. If not, rotate crankshaft one revolution.

14. Install timing pin in accordance with paragraph 4-14.





FOLLOW-ON MAINTENANCE:

Install fuel lift transfer pump (para. 2-25)
Install push rods (para. 3-15)
Install engine gear cover (para. 3-12)
Install oil suction connection (para. 3-17)

END OF TASK

4-16. TAPPET REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Equipment Condition:

Camshaft removed (para. 4-13)

Refer to paragraph 4-13 for removal, cleaning, inspection, and installation of tappets.

FOLLOW-ON MAINTENANCE:

None

END OF TASK

Section IV. TRANSMISSION MAINTENANCE

4-17. PRESSURE REGULATOR ASSEMBLY REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITLAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Soft Head Hammer (23, App. E)

Equipment Condition:

Pressure regulator assembly removed (para. 3-31)

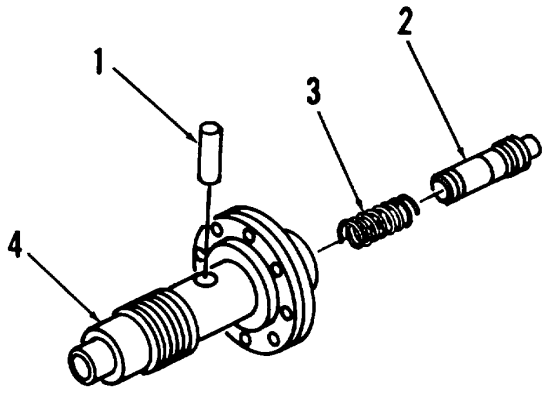
Materials / Parts:

Pin, Item 1 (1 ea.)

A. DISASSEMBLY

WARNING
Use caution when disassembling regulator assembly. Piston is under spring pressure.

1. Drive pin (1) from sleeve (4) using a soft head hammer. Discard pin.
2. Remove piston (2) and spring (3) from sleeve (4).



B. CLEANING

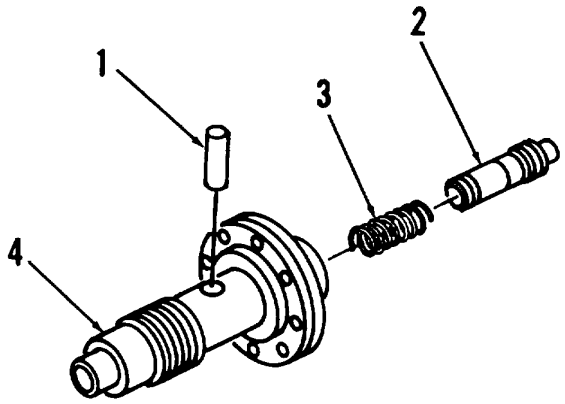
Clean regulator assembly components in accordance with paragraph 1-24.

C. INSPECTION

Inspect regulator assembly components in accordance with paragraph 1-24.

D. REPAIR

Repair of the pressure regulator assembly consists of removal and replacement of defective, deformed, or damaged components.



E. ASSEMBLY

1. Install piston (2) and spring (3) into sleeve (4).

2. Compress piston (2) and spring (3). Install new pin (1) into sleeve (4) using a soft head hammer.

FOLLOW-ON MAINTENANCE:

Install pressure regulator assembly (para. 3-31)

END OF TASK

4-18. TRANSMISSION ASSEMBLY REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Equipment Condition:

Engine and transmission assembly
removed (para. 3-6)

A. DISASSEMBLY

Refer to the appropriate paragraphs in chapters 2, 3, and 4 for removal and disassembly of transmission assembly components.

B. CLEANING

Clean transmission assembly components in accordance with paragraph 1-24.

C. INSPECTION

Inspect transmission assembly components in accordance with paragraph 1-24 and appropriate subcomponent replacement tasks.

D. REPAIR

Repair of the transmission assembly consists of removal and replacement of defective, deformed, or damaged components.

E. ASSEMBLY

Refer to the appropriate paragraphs in chapters 2, 3, and 4 for assembly and installation of transmission assembly components.

FOLLOW-ON MAINTENANCE:

Install engine and transmission assembly (para. 3-6)

END OF TASK

4-19. TRANSMISSION SPACER PLATE REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App E)
Torque Wrench (32, App E)
Retaining Ring Pliers (24, App E)
Soft Head Hammer (23, App E)

Equipment Condition:

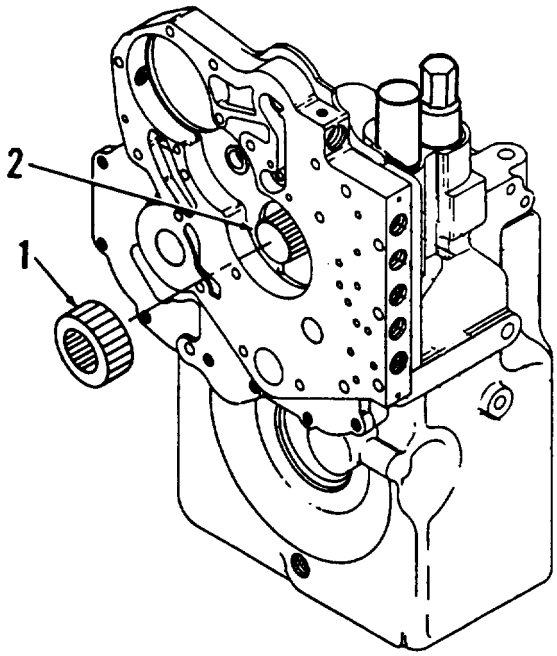
Torque converter housing removed (para. 3-30)
Electronic control valves removed (para. 3-36)

Materials / Parts:

Lubricating Oil (14, App. C)
Loctite 592 (24, App. C)
Grease (10, App. C)
Lockwasher, Item 5 (7 ea.)
Gasket, Item 9 (1 ea.)
Seal, Item 11 (1 ea.)
Packing Kit, P/N 802440 (1 ea.)

A. REMOVAL

1. Remove impeller hub gear (1) from stator assembly (2).

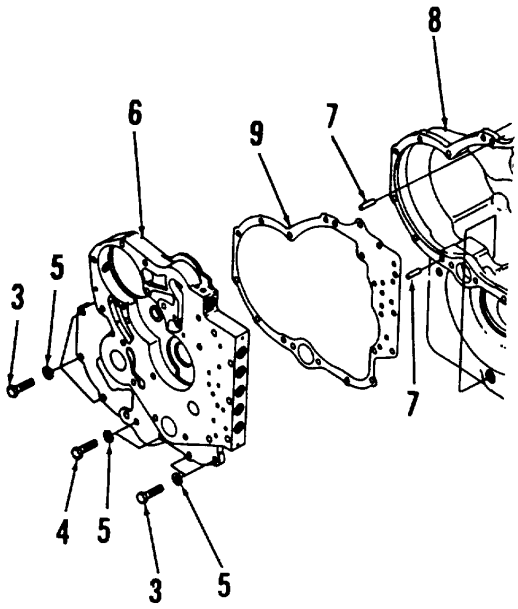


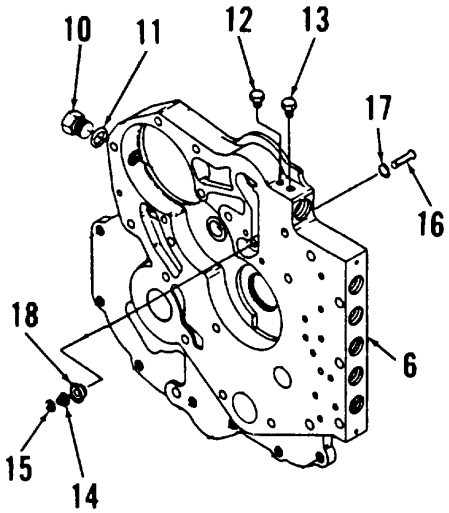
2. Remove five screws (3), two screws (4), and lockwashers (5) from spacer plate (6). Discard lockwashers.

CAUTION

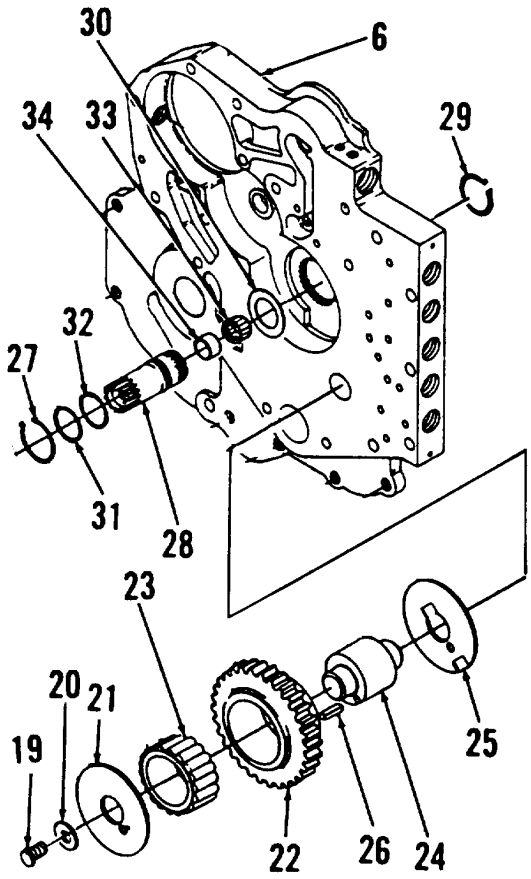
Use care when prying off spacer plate (6) to prevent damage to plate and transmission mating surfaces.

3. Using a screwdriver, carefully pry spacer plate (6) from dowel pins (7). Remove spacer plate from transmission (8).
4. Remove and discard gasket (9).
5. Remove sensor port plug (10) from spacer plate (6). Remove and discard seal (11).
6. Remove pressure plug (12) and outlet temperature plug (13) from spacer plate (6).
7. Compress poppet spring (14) and remove retaining washer (15). Remove safety valve poppet (16) from spacer plate (6).
8. Using pliers, remove snap ring (17) from spacer plate (6). Press out seat (18).





9. Remove screw (19) and washer (20) from reverse idler gear shaft (26). Remove end plate (21) from pin (26).
10. Remove reverse idler gear (22) and bearing (23) from idler gear shaft (26).
11. To remove idler gear shaft (26), support spacer plate (6) around idler gear shaft opening. Press idler gear shaft from spacer plate and remove thrust washer (25). Remove locator ring.
12. Remove retaining ring (27) from convertor end of stator gearshaft (28).
13. Push stator gearshaft (28) towards transmission side of spacer plate (6) to expose retaining ring (29). Remove retaining ring.
14. Remove stator gearshaft (28) and thrust washer (30) from spacer plate (6).
15. Remove piston rings (31, 32) from stator gearshaft (28) and discard.
16. Remove bearing (33) and bushing (34) from stator gearshaft (28) only if replacement is required.



B. CLEANING

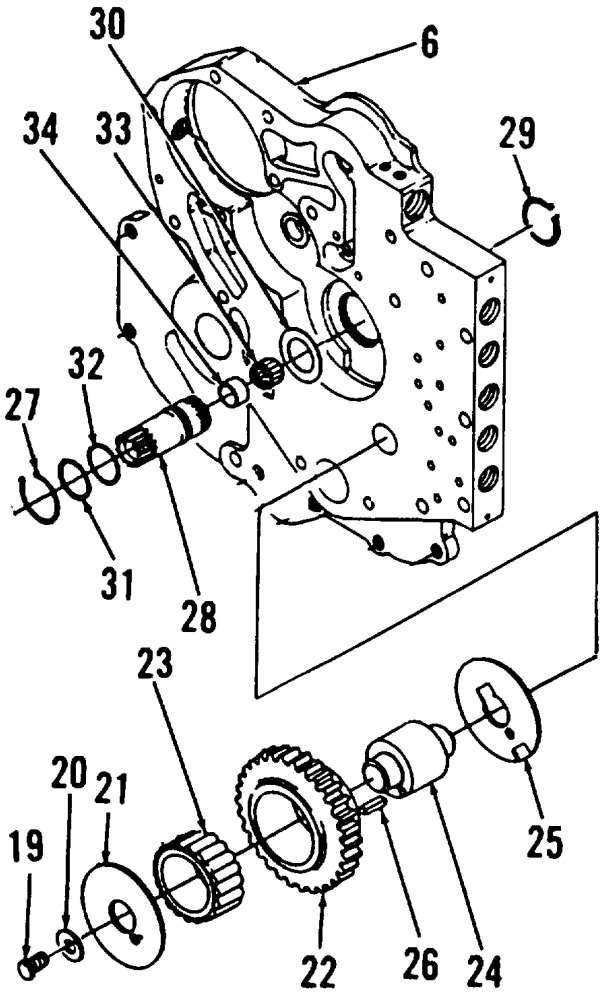
Clean spacer plate, gears, and related components in accordance with paragraph 1-24.

C. INSPECTION

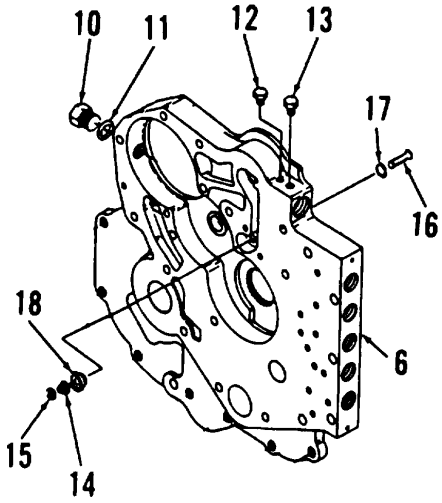
Inspect spacer plate, gears, shafts, and related components in accordance with paragraph 1-24.

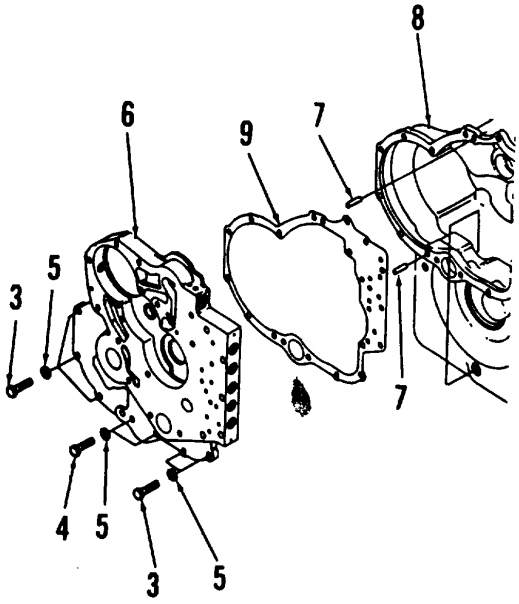
D. INSTALLATION

1. Lubricate bearing (33) with grease. Install bearing and bushing (34) into stator gearshaft (28).
2. Install new piston rings (31, 32) onto stator gearshaft (28). Ring gaps shall be 180 degrees apart.
3. Install thrust washer (30) and stator gearshaft (28) into spacer plate (6). Install retaining ring (27).
4. Push stator gearshaft (28) through spacer plate (6) until retaining ring (27) shoulders in support bore.
5. Turn spacer plate (6) over and install retaining ring (29).
6. Install locating ring on reverse idler gear shaft (26). Support spacer plate (6) around idler gear shaft opening. Press idler gear shaft into spacer plate and tight against locating ring.
7. Turn spacer plate (6) over and position thrust washer (25) onto idler gear shaft (26). Ensure tang in washer fits in notch in spacer plate.
8. Lubriplate bearing (23) with grease. Install reverse idler gear (22) and bearing onto idler gear shaft (26).
9. Position end plate (21) onto pin (26). Install screw (19) and washer (20).

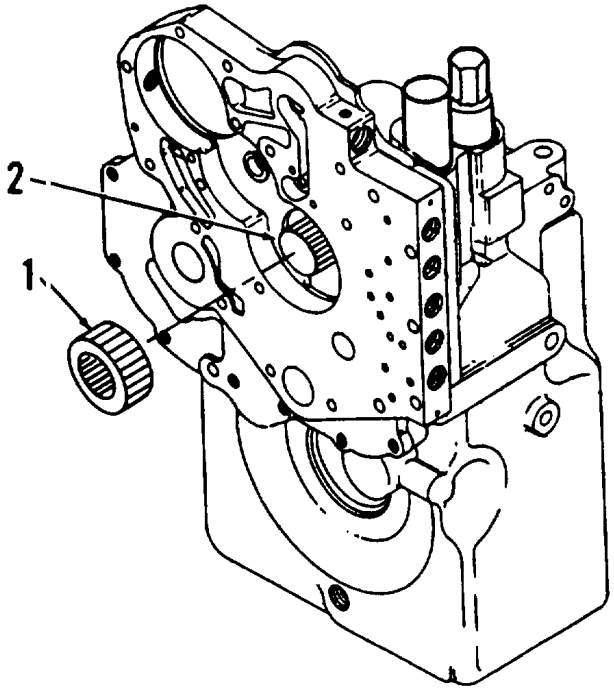


10. Press seat (18) into spacer plate (6). Secure using new snap ring (17).
11. Install safety valve poppet (16) into seat (18). Compress spring (14) and install retaining washer (15).
12. Apply a thin coat of loctite to threads of pressure plug (12) and outlet temperature plug (13). Install plugs into spacer plate (6).
13. Lubricate new seal (11) with oil and install onto sensor port plug (10). Apply a thin coat of loctite to threads of plug and install into spacer plate (6).
14. Mate new gasket (9) to transmission (8). A light coat of grease will hold gasket in place.
15. Mount spacer plate (6) onto dowel pins (7). Tap spacer plate into position on transmission (8) using a soft head hammer.
16. Install five screws (3), two screws (4), and new lockwashers (5). Torque screws to 50 to 55 ft-lbs. (68 to 75 Nm).





17. Position impeller hub gear (1) onto stator assembly (2).



FOLLOW-ON MAINTENANCE:

Install torque converter housing (para. 3-30)
Install electronic control valves (para. 3-36)

END OF TASK

4-20. CLUTCH ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Equipment Condition:

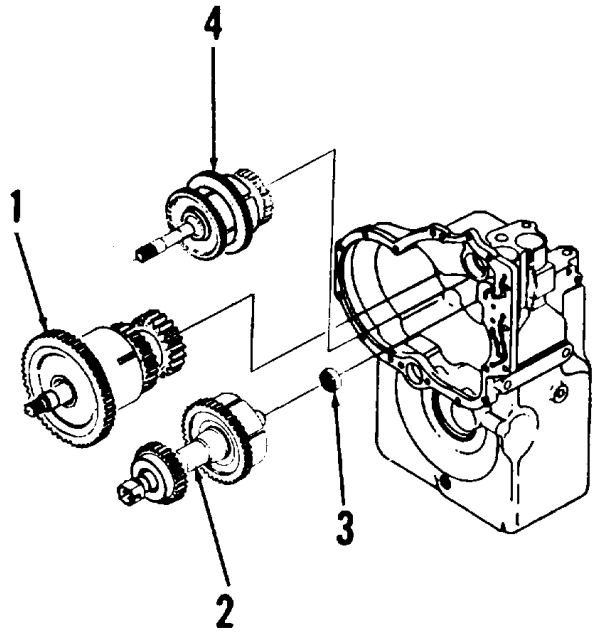
Spacer plate removed (para. 4-19)

A. REMOVAL

CAUTION

Use care when removing clutch assemblies from transmission to prevent damage to clutch assemblies and transmission bores.

1. Remove first and second speed clutch assembly (1) from transmission. Place on a clean work surface for further maintenance.
2. Remove third speed clutch assembly (2) from transmission and place on a clean work surface. Remove shaft pilot bearing (3).
3. Remove forward and reverse clutch assembly (4) from transmission and place on a clean work surface.



B. CLEANING

Clean clutch assemblies in accordance with paragraph 1-24.

C. INSPECTION

Conduct general inspection of clutch assemblies in accordance with paragraph 1-24.

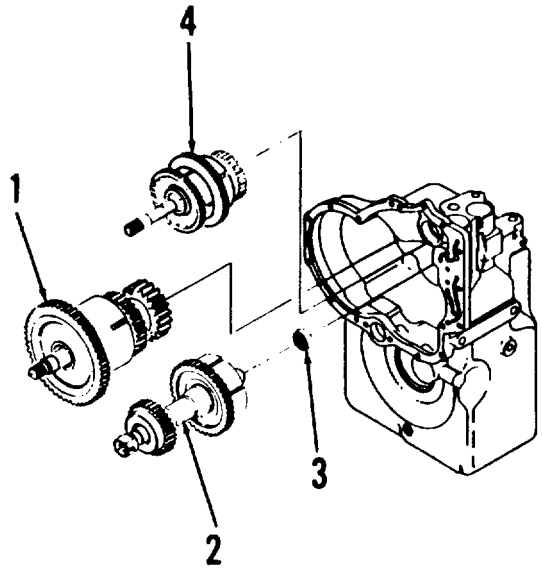
D. INSTALLATION

1. Position shaft pilot bearing (3) into clutch gear.

CAUTION

Use care when aligning third speed clutch assembly to prevent damage to shaft pilot bearing. Gear splines must be in full position with internal teeth of all friction discs.

2. Install third speed clutch assembly (2) into clutch gear disc hub, ensuring splines on disc hub align with internal teeth of friction discs.
3. Install forward and reverse clutch assembly (4) into transmission.
4. Install first and second speed clutch assembly (1) into transmission.



FOLLOW-ON MAINTENANCE:

Install spacer plate
(para. 4-19)

END OF TASK

4-21. OUTPUT SHAFT ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

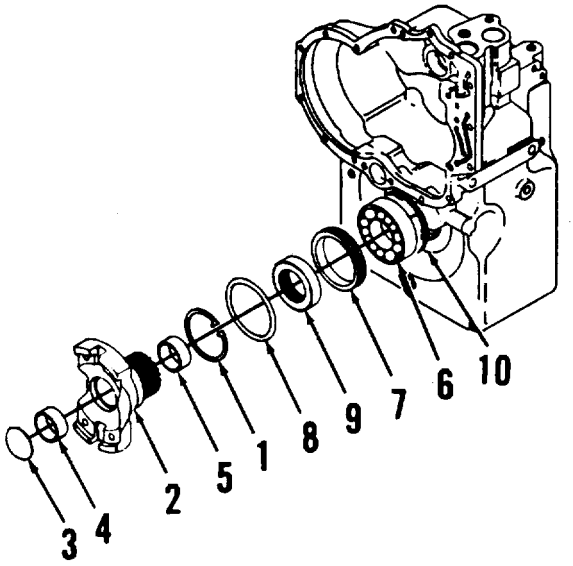
Tools and Test Equipment:
- General Mechanics Tool Kit (1, App. E)
- Retaining Ring Pliers (24, App. E)
- Soft Head Hammer (23, App. E)
- Puller Kit (26, App. E)
- Depth Gage (20, App. E)

Materials / Parts:
- Loctite No. 641 (25, App. C)
- Loctite No. 577 (27, App. C)
- Permatex #2 Sealant (40, App. C)
- O-Ring, Item 8 (1 ea.)
- O-Ring, Item 31 (1 ea.)
- O-Ring, Item 28 (1 ea.)

Equipment Condition:
- Clutch assemblies removed (para. 4-20)

A. REMOVAL

1. Using pliers, remove snap ring (1) from ring groove.
2. Carefully pry assembled output flange (2) and bearing (6) from bearing bore.
3. Remove plug (3) and bushings (4, 5) from output flange (2) only if replacement of bushings is required.
4. Using pliers, remove retaining ring (10) from output flange (2). Using a bearing puller, remove bearing (6).
5. Remove seal sleeve (7) and oil seal (9) from output flange (2). Remove and discard O-ring (8).
6. Remove oil seal (9) from seal sleeve (7). Remove snap ring (1).



WARNING

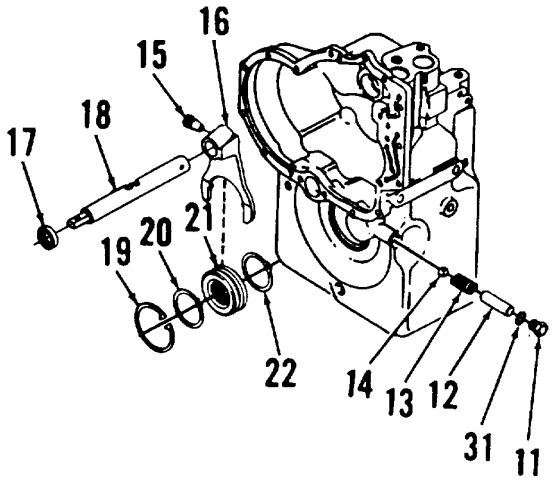
Use care when removing plug (11). Plug is under spring pressure and injury can occur.

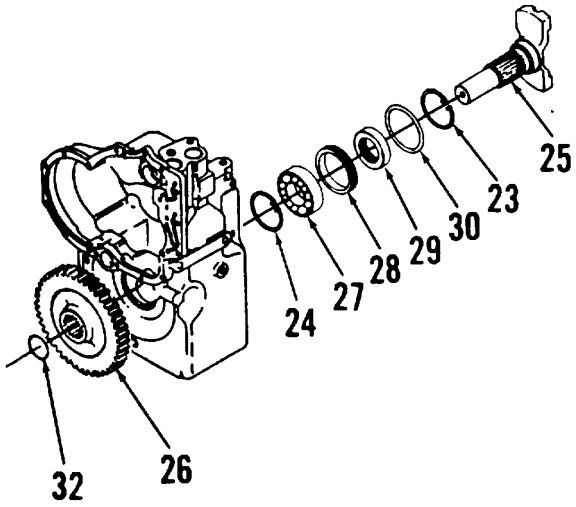
7. Remove plug (11) from transmission. Remove and discard O-ring (31).
8. Remove disconnect pin (12), spring (13), and ball (14) from transmission.
9. Remove shift fork to shift rail lockscrew (15).
10. Remove shift fork (16) and fork rod (18) from transmission. Remove disconnect oil seal (17).
11. Using pliers, remove snap ring (19) from ring groove. Remove flange rings (20, 22) and shift hub (21) from bore.
12. Using pliers, remove snap ring (23) from ring groove. Remove snap ring (24) from opposite side.

NOTE

Seal sleeve (28) and bearing (27) may come out with output flange (25).

13. Tap output flange (25) from output gear and rear bearing using a soft head hammer.
14. Remove output gear (26) from transmission.
15. Using a bearing puller, remove bearing (27) from output flange (25).
16. Remove seal sleeve (28) and oil seal (29) from output flange (25). Remove and discard O-ring (30).
17. Remove snap ring (23).
18. If seal sleeve (28) and bearing (27) did not come out when output flange (25) was removed, remove sleeve and bearing from transmission case. Remove bearing locating ring (32).





B. CLEANING

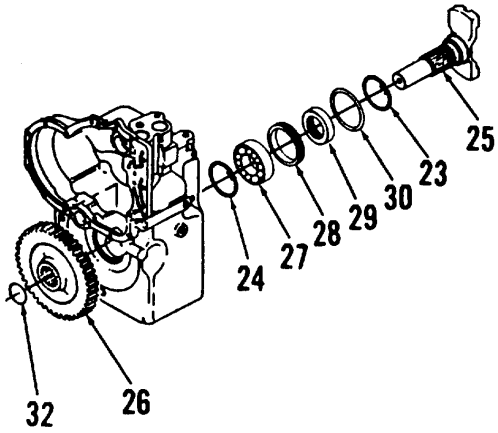
Clean output shaft assembly components in accordance with paragraph 1-24.

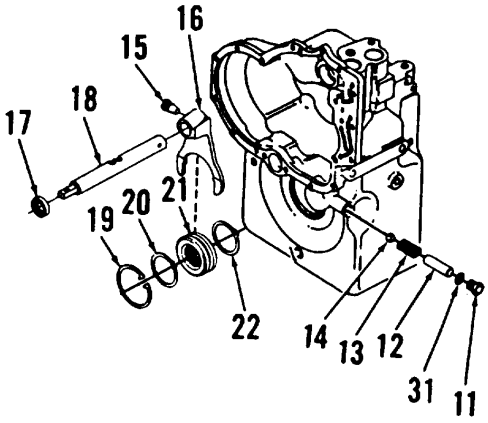
C. INSPECTION

Inspect output shaft assembly components in accordance with paragraph 1-24.

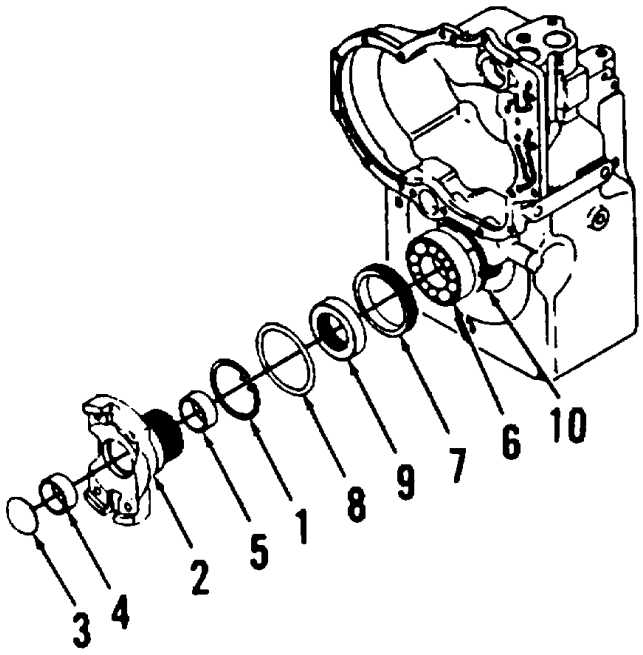
D. INSTALLATION

1. Apply a light coat of permatex #2 to O.D. of oil seal (29). Press oil seal into seal sleeve (28). Seal must be flush with one side of sleeve. Lip of seal must be in.
2. Install new O-ring (30) onto seal sleeve (28).
3. Install snap ring (24) into transmission case. Install bearing (27) against snap ring.
4. Position seal sleeve (28) into transmission case with recessed portion of seal facing bearing. Install snap ring (23).
5. Place output gear (26) into transmission. Long hub of gear must face front of case.
6. Install rear output flange (25) into transmission. Align splines on flange shaft with splines on output gear (26).
7. Using pliers, install locating ring (32) into groove on output flange (25).
8. Position flange rings (20, 22) and shift hub (21) onto output flange (25). Install snap ring (19).
9. Position shift fork (16) in hub on output shaft. Insert fork rod (18) through oil seal and align with fork.
10. Install shift fork to shift rail lockscrew (15) and tighten.
11. ball (14), spring (13), and disconnect pin (12) into transmission.
12. Install new O-ring (31) onto plug (11). Install plug into transmission and tighten securely.





13. Install flange bushings (4, 5) into front output flange (2) as shown in figure.
14. a light coat of loctite 577 to outer edge of plug (3) and install plug into output flange (2).
15. Apply a light coat of loctite 641 to O.D. of oil seal (9). Press oil seal into seal sleeve (7). Seal must be flush with one side of sleeve. Lip of seal must be in.
16. Install new O-ring (8) onto seal sleeve (7).
17. Install seal sleeve (7), oil seal (9), snap ring (1), and bearing (6) onto output flange (2).
18. Install retaining ring (10) into groove on output flange (2).
19. Position front output flange (2) onto rear flange shaft.
20. Using pliers, squeeze ends of snap ring (1) together and tap flange until snap ring can seat in ring groove.



FOLLOW-ON MAINTENANCE:

Install clutch assemblies (para. 4-20)

END OF TASK

4-22. FIRST AND SECOND CLUTCH GEAR REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

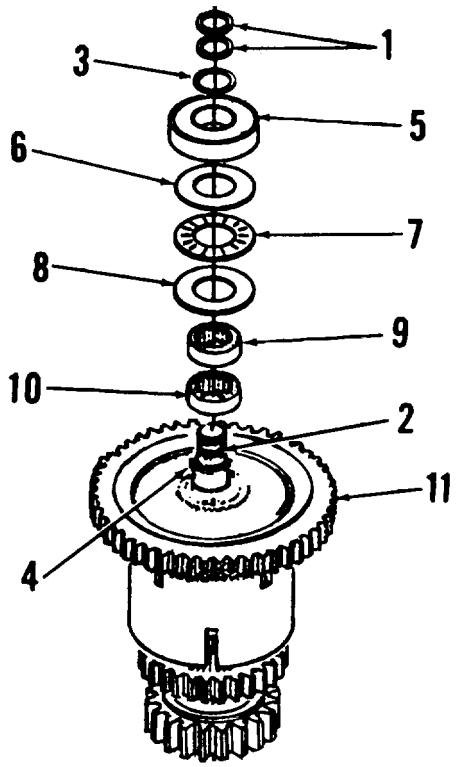
Tools and Test Equipment:
- General Mechanics Tool Kit (1, App. E)
- Retaining Ring Pliers (24, App. E)
- Soft Head Hammer (23, App. E)
- Puller Kit (26, App. E)
- Feeler Gage (21, App. E)

Equipment Condition:
- Clutch assemblies removed para. 4-20)

Materials / Parts:
- Grease (10, App. C)
- Piston Ring, Item 1 (2 ea.)
- Seal, Item 25 (1 ea.)
- Seal, Item 26 (1 ea.)
- Seal, Item 49 (1 ea.)
- Seal, Item 50 (1 ea.)

A. REMOVAL

1. Remove piston rings (1) from shaft (2) and discard.
2. Using pliers, remove snap ring (3) from ring groove (4).
3. Using a bearing puller, remove bearing (5) from shaft (2).
4. Remove outer thrust washer (6), bearing (7), inner thrust washer (8), and bearings (9, 10).

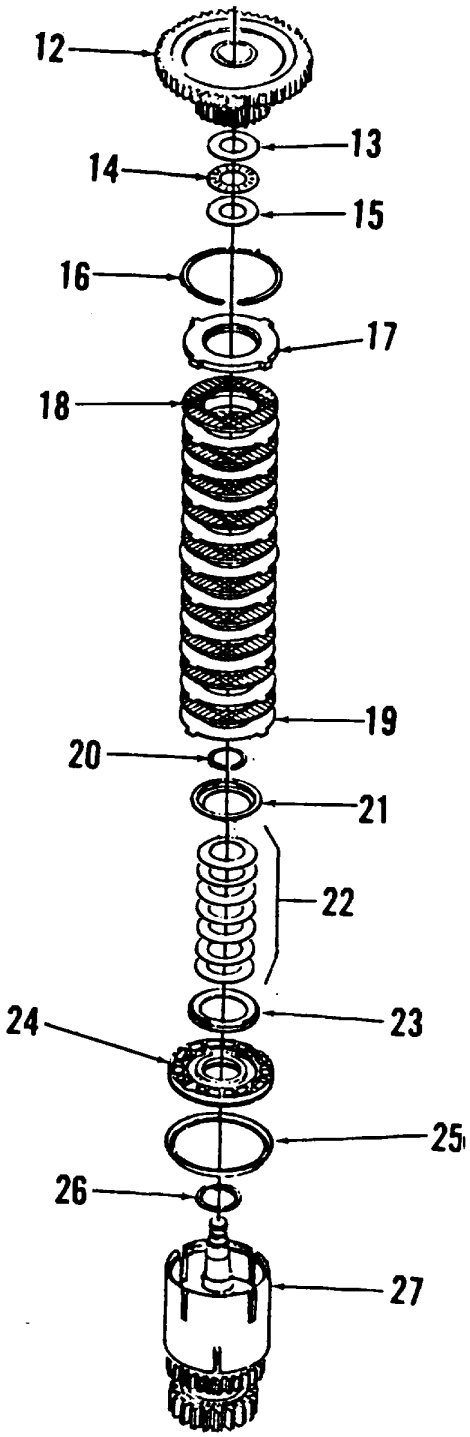


5. Remove gear and bearing assembly (12), outer thrust washer (13), bearing (14), and inner thrust washer (15) from shaft (27).
6. Using pliers, remove snap ring (16) from ring groove.
7. Remove clutch end plate (17), ten inner discs (18), and ten outer discs (19) from shaft (27).
8. Compress disc washers (22) and remove snap ring (20) using pliers. Remove retainer (21).

NOTE

Disc washers are installed as a set. Do not intermix with sets from other clutches. Replace disc washers as a set.

9. Remove seven disc washers (22) and wear plate (23) from shaft (27).
10. Turn clutch over and tap shaft (27) with a soft head hammer to remove clutch piston (24).
11. Remove and discard seals (25, 26).

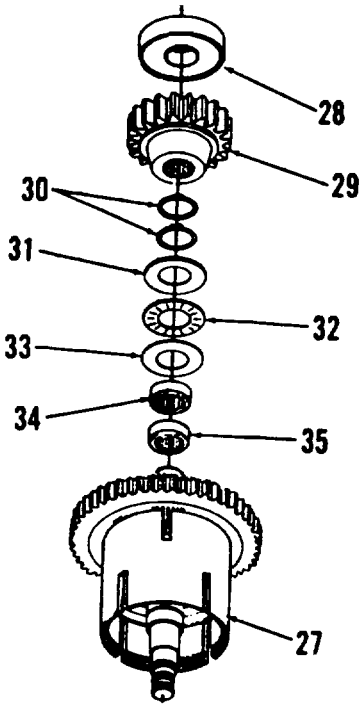


12. Remove rear bearing (28) from shaft (27).
13. Using a bearing puller, remove gear (29) and inner race of bearing (28).
14. Using pliers, remove snap rings (30) from ring grooves.
15. Remove outer thrust washer (31), bearing (32), inner thrust washer (33), and bearings (34, 35) from shaft (27).
16. Remove gear and bearing assembly (36) from shaft (27).
17. Remove outer thrust washer (37), bearing (38), and inner thrust washer (39) from shaft (27).
18. Remove snap ring (40) from ring groove.
19. Remove clutch end plate (41), five inner discs (42), and five outer discs (43) from shaft (27).
20. Compress disc washers (46) and remove snap ring (44) and retainer (45) from ring grooves.

NOTE

Disc washers are installed as a set. Do not intermix with sets from other clutches. Replace disc washers as a set.

21. Remove five disc washers (46), washer plate (47), and clutch piston (48) from shaft (27).
22. Remove and discard seals (49, 50).

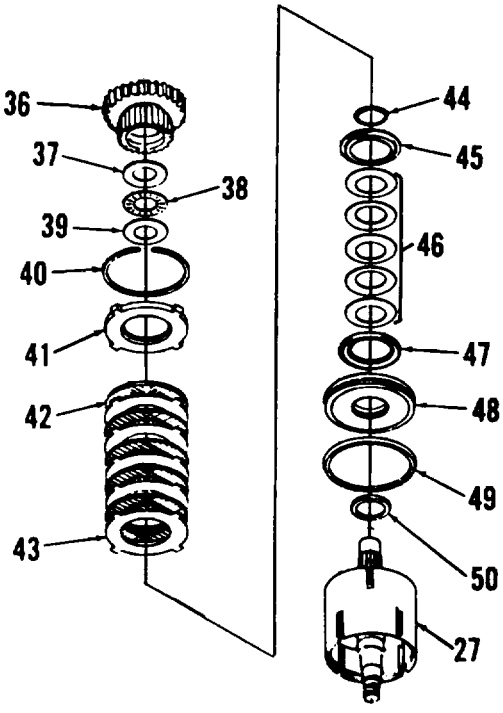


B. CLEANING

Clean first and second clutch gear components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect first and second clutch gear components in accordance with paragraph 1-24.
2. Ensure two bleed valves in clutch drum are clean and free of foreign material.



D. INSTALLATION

1. Install seals (49, 50) onto clutch piston (48). Inner seal (50) must be sized before installing piston. Hold a round object against new seal and rotate piston until seat is flush with groove.

CAUTION

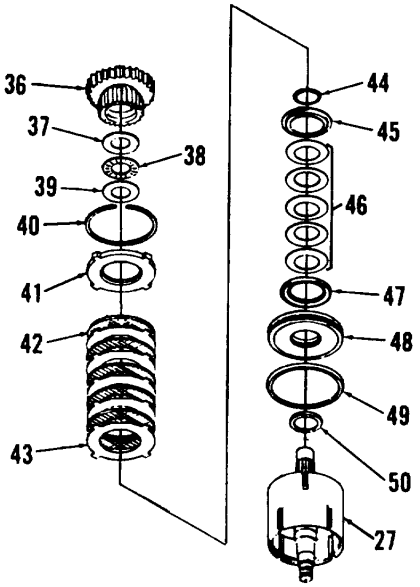
Use care when installing piston (48) to prevent damage to seals.

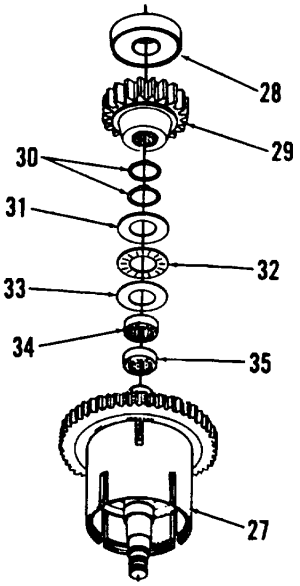
2. Install clutch piston (48) and wear plate (47) onto shaft (27).

NOTE

Disc washers are installed as a set. Do not intermix with sets from other clutches. Replace disc washers as a set.

3. Install first disc washer (46) with large diameter of bevel toward wear plate (47). Alternate remaining four disc washers. Install retainer (45).
4. Compress disc washers (47) and install snap ring (44) into ring groove.
5. Install five inner discs (42), five outer discs (43), and clutch end plate (41) onto shaft (27).
6. Install snap ring (40) into ring groove.
7. Install inner thrust washer (39), bearing (38), and outer thrust washer (37) onto shaft (27).
8. Press bearings (35, 34) into gear and bearing assembly (36). Bearing must be flush with face of gear on both sides.
9. Carefully install gear and bearing assembly (36) onto shaft (27). Align gear teeth with clutch inner discs. Press down on gear and bearing assembly until fully seated. Do not force this operation.
10. Install inner thrust washer (33), bearing (32), and outer thrust washer (31) onto shaft (27).
11. Using pliers, install snap rings (30) into ring grooves.





12. Install gear (29) with long hub down. Install inner race of bearing (28) onto shaft (27). Position outer race of bearing onto inner race.
13. Install seals (25, 26) onto clutch piston (24). Inner seal (26) must be sized before installing piston. Hold a round object against new seal and rotate piston until seat is flush with groove.

CAUTION

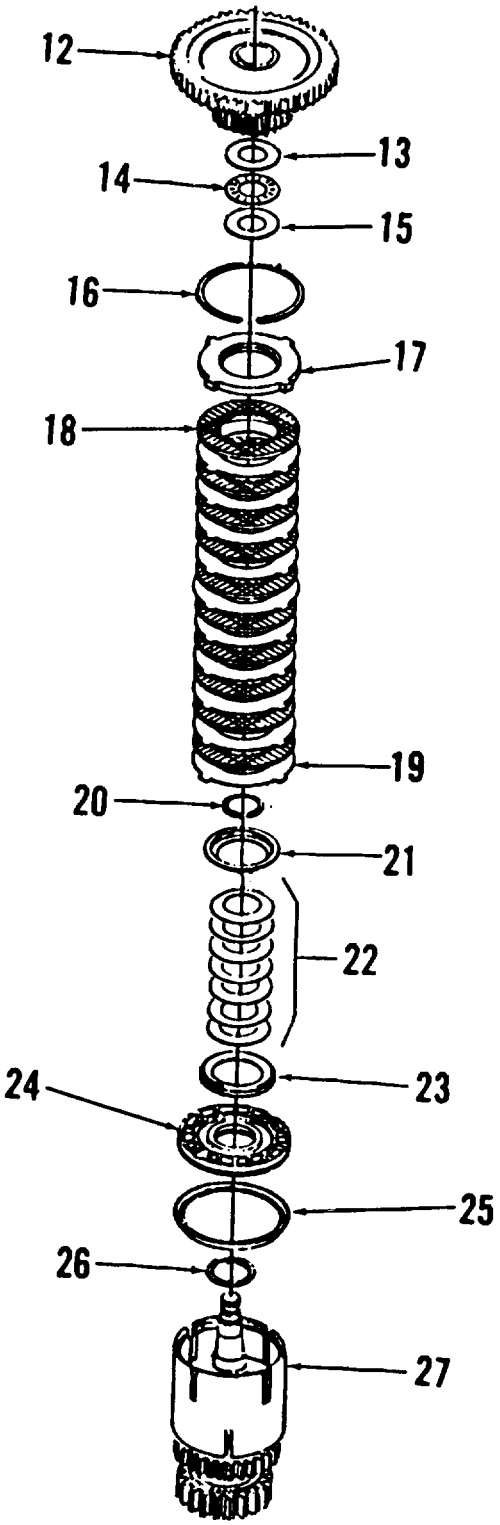
Use care when installing piston (24) to prevent damage to seals.

14. Install clutch piston (24) and wear plate (23) onto shaft (27).

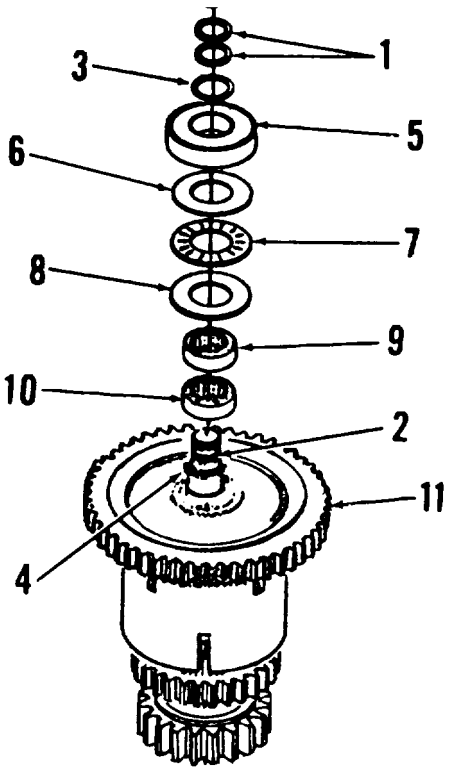
NOTE

Disc washers are installed as a set. Do not intermix with sets from other clutches. Replace disc washers as a set.

15. Install first disc washer (22) with large diameter of bevel toward wear plate (23). Alternate remaining six disc washers. Install retainer (21).
16. Compress disc washers (7) and install snap ring (20) using pliers.
17. Install ten inner discs (18), ten outer discs (19), and clutch end plate (17) onto shaft (27).
18. Install snap ring (16) into ring groove.
19. Stand clutch assembly on end. Discs will fall to end plate (17). Measure distance between piston (24) and outer disc (19) by inserting a feeler gage through slots in clutch drum. Distance shall be 0.080 to 0.135 in. (2.03 to 3.43 mm).
20. If clearance is greater than specified, add one outer disc (19) under end plate (17).
21. Install inner thrust washer (15), bearing (14), and outer thrust washer (13) onto shaft (27).



22. Press bearings (10, 9) into gear and bearing assembly (12). Bearings must be flush with face of gear on both sides.
23. Carefully install gear and bearing assembly (12) onto shaft (27). Align gear teeth with clutch inner discs. Press down on gear and bearing assembly until fully seated. Do not force this operation.
24. Install inner thrust washer (8), bearing (7), and outer thrust washer(6) onto shaft (11).
25. Press bearing (5) onto shaft (11). Bearing has a shield in it which must face up.
26. Using pliers, install snap ring (3) into ring groove (4).
27. Install new piston rings (1). Grease rings to aid installation into transmission housing.



FOLLOW-ON MAINTENANCE:

Install clutch assemblies (para. 4-20)

END OF TASK

4-23. FORWARD AND REVERSE CLUTCH GEAR REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

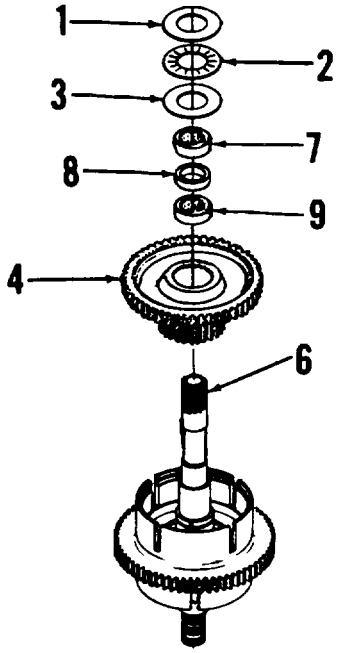
Tools and Test Equipment:
- General Mechanics Tool Kit (1, App. E)
- Retaining Ring Pliers (24, App. E)
- Soft Head Hammer (23, App. E)
- Puller Kit (26, App. E)
- Feeler Gage (21, App. E)

Equipment Condition:
- Clutch assemblies removed (para. 4-20)

Materials / Parts:
- Grease (10, App. C)
- Seal, Item 22 (1 ea.)
- Seal, Item 23 (1 ea.)
- Piston Ring, Item 25 (3 ea.)
- Seal, Item 46 (1 ea.)
- Seal, Item 47 (1 ea.)

A. REMOVAL

1. Remove outer thrust washer (1), bearing (2), inner thrust washer (3), and gear and bearing assembly (4) from shaft (5). Use care not to damage shaft splines (6).
2. Remove bearings (7, 9) and spacer (8) from gear and bearing assembly (4).

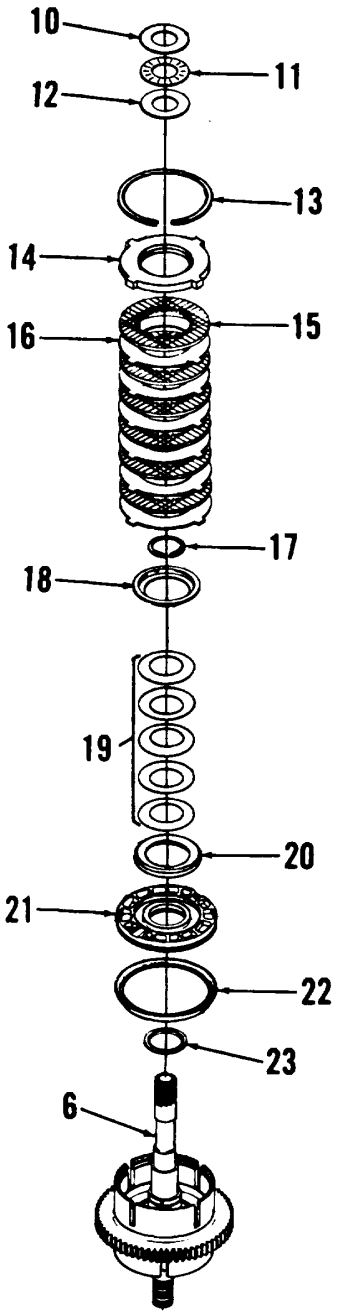


3. Remove outer thrust washer (10), bearing (11), and inner thrust washer (12) from shaft (6).
4. Remove snap ring (13) from ring groove.
5. Remove clutch end plate (14), six inner discs (15), and six outer discs (16) from shaft (6).
6. Compress disc washers (19) and remove snap ring (17) using pliers. Remove retainer (18).

NOTE

Disc washers are installed as a set. Do not intermix with sets from other clutches. Replace disc washers as a set.

7. Remove five disc washers (19) and wear plate (20) from shaft (6).
8. Turn clutch over and tap shaft (6) with a soft head hammer to remove clutch piston (21).
9. Remove and discard seals (22, 23).



10. Remove and discard three piston rings (25).

11. Remove bearing (26) from shaft (6).

12. Remove outer thrust washer (27), nearing (28), inner thrust washer (29), and gear and bearing assembly (33) from shaft (6).

13. Remove bearings (30, 32) and spacer (31) from gear and bearing assembly (33).

14. Remove outer thrust washer (34), bearing (35), and inner thrust washer (36) from shaft (6).

15. Remove snap ring (37) from ring groove.

16. Remove clutch end plate (38), six inner discs (39), and six outer discs (40) from shaft (6).

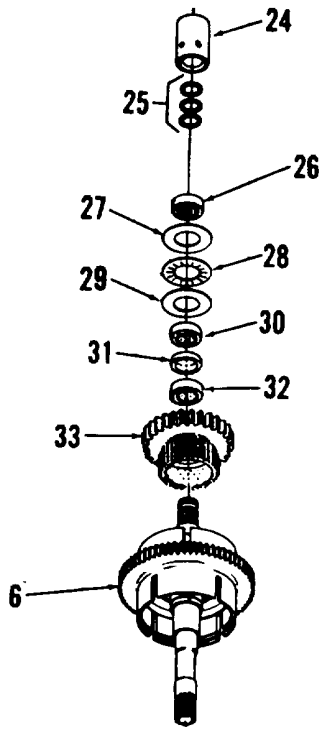
17. Compress disc washers (43) and remove snap ring (41) from ring groove. Remove retainer (42).

NOTE

Disc washers are installed as a set. Do not intermix with sets from other clutches. Replace disc washers as a set.

18. Remove five disc washers (43), wear plate (44), and clutch piston (45) from shaft (6).

19. Remove and discard seals (46, 47).



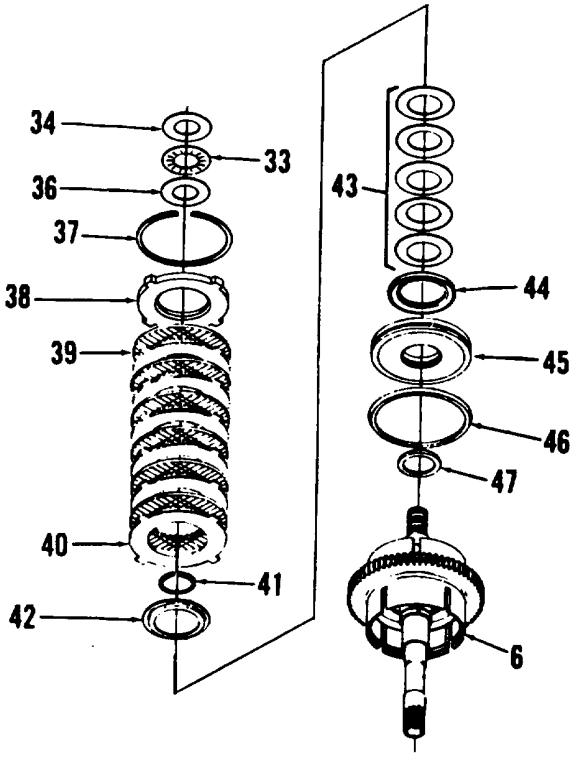
B. CLEANING

Clean forward and reverse clutch gear components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect forward and reverse clutch gear components in accordance with paragraph 1-24.

2. Ensure bleed orifice in clutch piston is clean and free of foreign material.



D. INSTALLATION

1. Install seals (46, 47) onto clutch piston (45). Inner seal (47) must be sized before installing piston. Hold a round object against new seal and rotate piston until seat is flush with groove.

CAUTION

Use care when installing piston (45) to prevent damage to seals.

2. Install clutch piston (45) and wear plate (44) onto shaft (6).

NOTE

Disc washers are installed as a set. Do not intermix with sets from other clutches. Replace disc washers as a set.

3. Install first disc washer (43) with large diameter of bevel toward washer plate (44). Alternate remaining four disc washers. Install retainer (42).

4. Compress disc washers (43) and install snap ring (41) into ring groove.

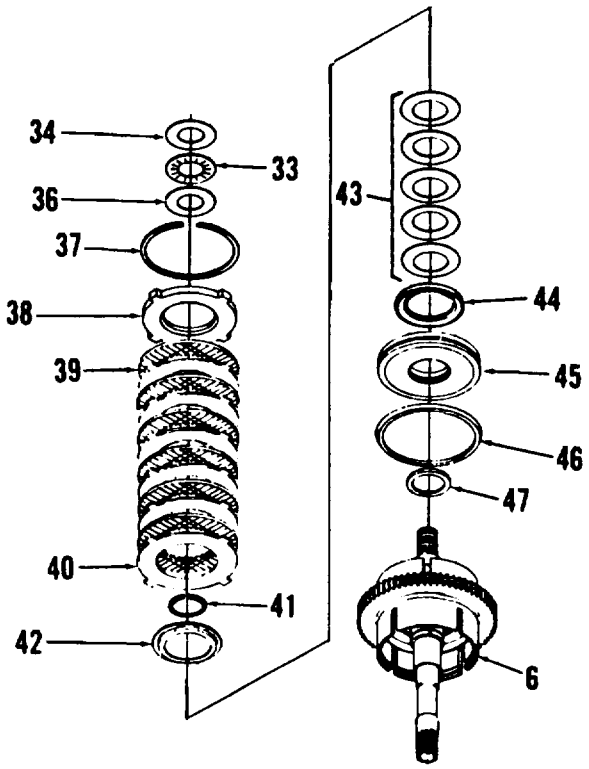
5. Install six inner discs (39), six outer discs (40), and clutch end plate (38) onto shaft (6).

6. Install snap ring (37) into ring groove.

7. Stand clutch assembly on end. Discs will fall to end plate (38). Measure distance between piston (45) and outer disc (40) by inserting a feeler gage through slots in clutch drum. Distance shall be 0.048 to 0.102 in. (1.22 to 2.74 mm).

8. If clearance is greater than specified, add one outer disc (40) under end plate (38).

9. Install inner thrust washer (36), bearing (33), and outer thrust washer (34) onto shaft (6).



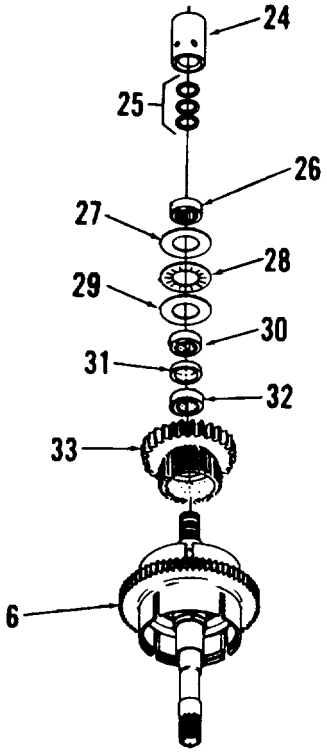
10. Press bearings (32, 30) and spacer (33) into reverse gear and bearing assembly (33). Bearings must be flush with face of gear on both sides.

11. Carefully install gear and bearing assembly (33) onto shaft (6). Align gear teeth with clutch inner discs. Press down on gear and bearing assembly until fully seated. Do not force this operation.

12. Install inner thrust washer (29), bearing (28), and outer thrust washer (27) onto shaft (6).

13. Install bearing (26) onto shaft (6).

14. Install new piston rings (25) onto shaft (6).



15. Install seals (22, 23) onto clutch piston (21). Inner seal (23) must be sized before installing piston. Hold a round object against new seal and rotate piston until seat is flush with groove.

CAUTION

Use care when installing piston (21) to prevent damage to seals.

16. Install clutch piston (21) and wear plate (20) onto shaft (6).

NOTE

Disc washers are installed as a set. Do not intermix with sets from other clutches. Replace disc washers as a set.

17. Install first disc washer (19) with large diameter of bevel toward wear plate (20). Alternate remaining four disc washers. Install retainer (18).

18. Compress disc washers (19) and install snap ring (17) using pliers.

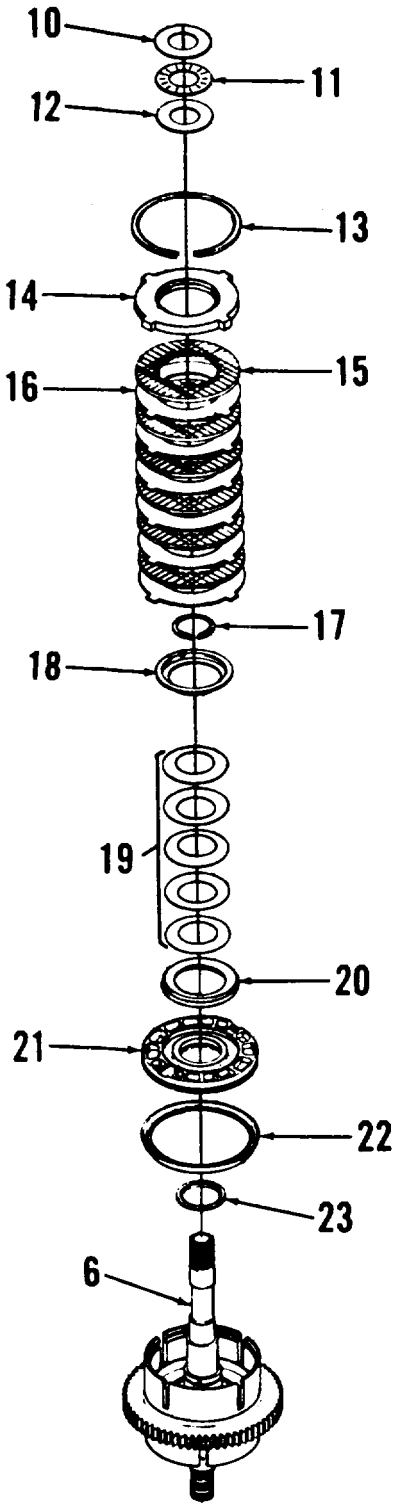
19. Install six inner discs (15), six outer discs (16), and clutch end plate (14) onto shaft (6).

20. Install snap ring (13) into ring groove.

21. Stand clutch assembly on end. Discs will fall to end plate (14). Measure distance between piston (21) and outer disc (16) by inserting a feeler gage through slots in clutch drum. Distance shall be 0.048 to 0.102 in. (1.22 to 2.74 mm).

22. If clearance is greater than specified, add one outer disc (16) under end plate (38).

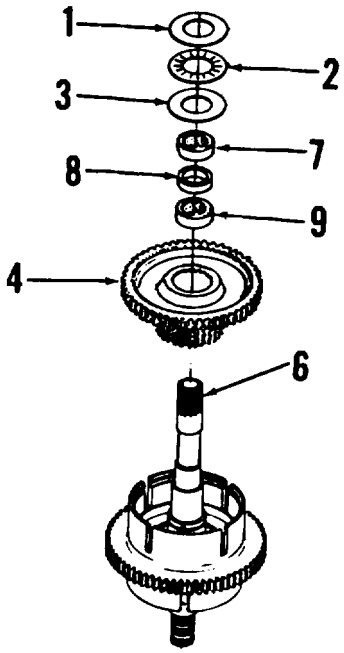
23. Install inner thrust washer (12), bearing (11), and outer thrust washer (10) onto shaft (6).



24. Press bearings (9, 7) and spacer (8) into forward gear and bearing assembly (4). Bearings must be flush with face of gear on both sides.

25. Carefully install gear and bearing assembly (4) onto shaft (5), using care not to damage shaft splines (6). Align gear teeth with clutch inner discs. Press down on gear and bearing assembly until fully seated. Do not force this operation.

26. Install inner thrust washer (3), bearing (2), and outer thrust washer (1) onto shaft (5).



FOLLOW-ON MAINTENANCE:

Install clutch assemblies (para. 4-20)

END OF TASK

4-24. THIRD CLUTCH GEAR REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Retaining Ring Pliers (24, App. E)
Soft Head Hammer (23, App. E)
Puller Kit (26, App. E)
Feeler Gage (21, App. E)

Equipment Condition:

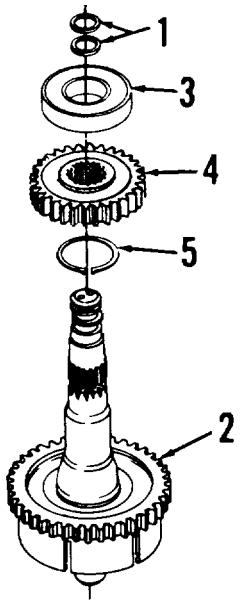
Clutch assemblies removed (para. 4-20)

Materials / Parts:

Grease (10, App. C)
Piston Ring, Item 1 (2 ea.)
Seal, Item 17 (1 ea.)
Seal, Item 18 (1 ea.)

A. REMOVAL

1. Remove piston rings (1) from shaft (2) and discard.
2. Using a bearing puller, remove bearing (3) and clutch gear (4) from shaft (2).
3. Using pliers, remove snap ring (5) from groove in shaft (2).



4. Remove outer thrust washer (6), bearing (7), and inner thrust washer (8) from shaft (2).

5. Using pliers, remove snap ring (9) from ring groove.

6. Remove clutch end plate (10), five inner discs (11), and five outer discs (12) from shaft (2).

8. Compress disc washers (13) and remove snap ring (14) using pliers. Remove retainer (15).

NOTE

Disc washers are installed as a set. Do not intermix with sets from other clutches. Replace disc washers as a set.

9. Remove five disc washers (13) and wear plate (16) from shaft (2).

10. Turn clutch over and tap shaft (2) with a soft head hammer to remove clutch piston (17).

11. Remove and discard seals (18, 19).

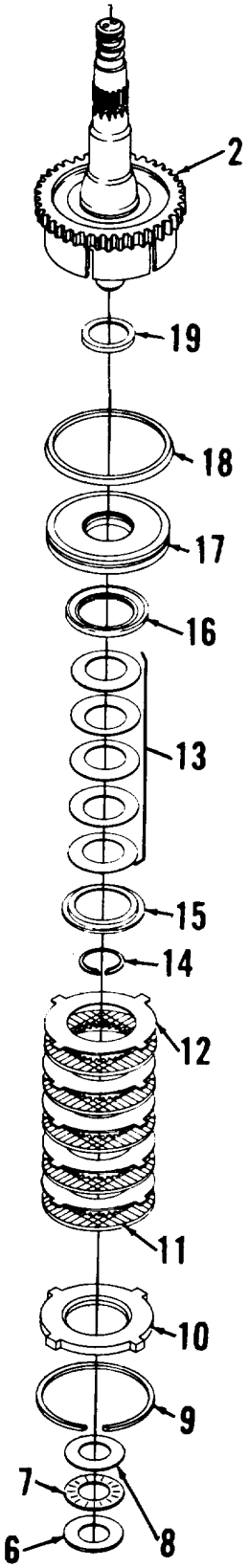
B. CLEANING

Clean third clutch gear components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect third clutch gear components in accordance with paragraph 1-24.

2. Ensure two bleed valves in clutch drum are clean and free of foreign material.



D. INSTALLATION

1. Install seals (18, 19) onto clutch piston (17). Inner seal (19) must be sized before installing piston. Hold a round object against new seal and rotate piston until seat is flush with groove.

CAUTION

Use care when installing piston (17) to prevent damage to seals.

2. Install clutch piston (17) and wear plate (16) onto shaft (2).

NOTE

Disc washers are installed as a set. Do not intermix with sets from other clutches. Replace disc washers as a set.

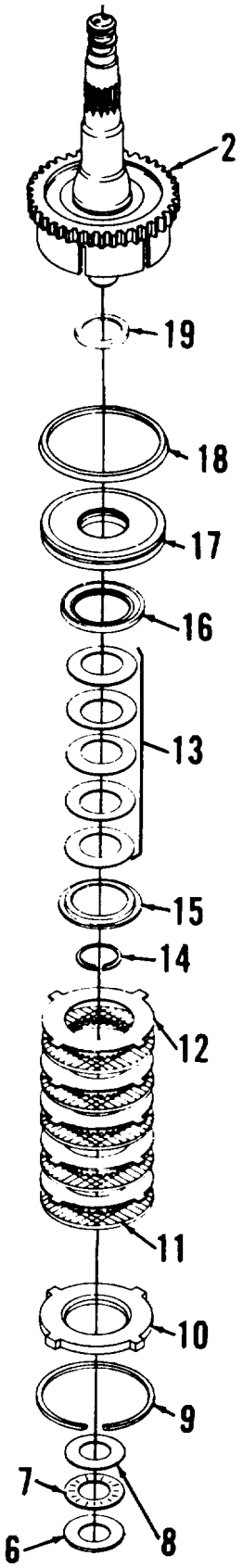
3. Install first disc washer (13) with large diameter of bevel toward wear plate (16). Alternate remaining four disc washers. Install retainer (15).

4. Compress disc washers (13) and install snap ring (14) into ring groove.

5. Install five inner discs (11), five outer discs (12), and clutch end plate (10) onto shaft (2).

6. Install snap ring (9) into ring groove.

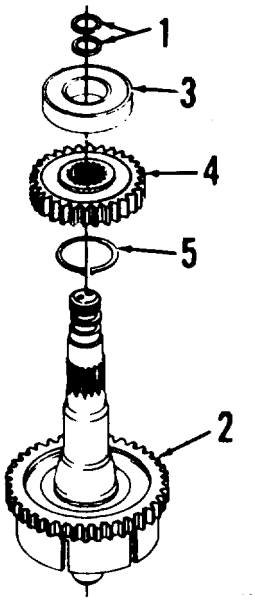
7. Install inner thrust washer (8), bearing (7), and outer thrust washer (6) onto shaft (2).



8. Using pliers, install snap ring (5) into ring groove.

9. Install gear (4) with long hub down. Install inner race of bearing (3) onto shaft (2).v Position outer race of bearing onto inner race.

10 Install new piston rings (1). Grease rings to aid installation into transmission housing.



FOLLOW-ON MAINTENANCE:

Install clutch assemblies (para. 4-20)

END OF TASK

Section V. FRONT AXLE ASSEMBLY MAINTENANCE

4-25. FRONT AXLE ASSEMBLY REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair and Assembly

INITIAL SETUP:

Equipment Condition: Front axle assembly removed (para. 3-38)

A. DISASSEMBLY

Refer to paragraphs 4-26 through 4-30 for removal and disassembly of front axle assembly components.

B. CLEANING

Clean front axle assembly components in accordance with paragraph 1-24.

C. INSPECTION

Inspect front axle assembly components in accordance with paragraph 1-24 and appropriate subcomponent replacement tasks.

D. REPAIR

Repair of the front axle assembly consists of removal and replacement of defective, deformed, or damaged components.

E. ASSEMBLY

Refer to paragraphs 4-26 through 4-30 for assembly and installation of front axle assembly components.

FOLLOW-ON MAINTENANCE:

Install front axle assembly (para. 3-38)

END OF TASK

4-26. DIFFERENTIAL GEAR REPLACEMENT (FRONT AXLE ASSEMBLY)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Puller Kit (26, App. E)
Soft Head Hammer (23, App. E)
Depth Gage (20, App. E)

Equipment Condition:

Tie rod removed (para. 4-30, steps 1, 2, 3)

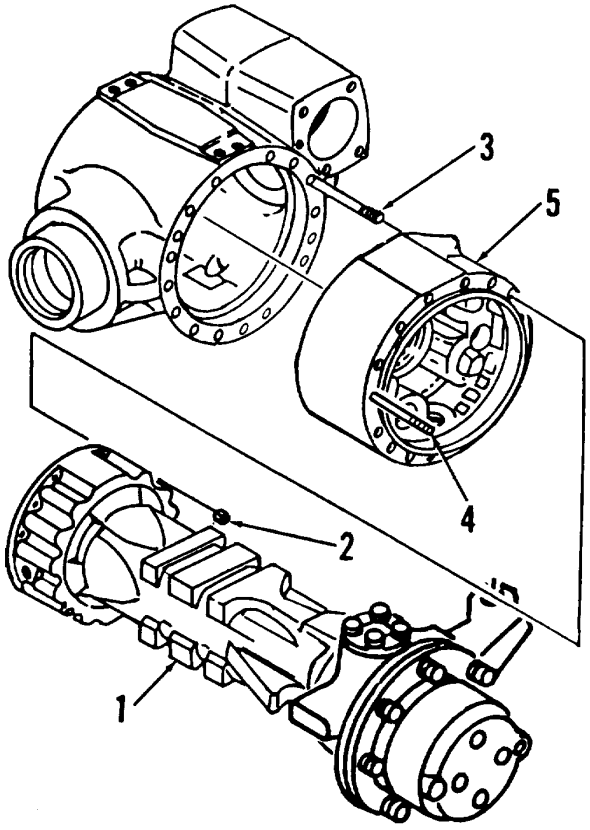
Materials / Parts:

Loctite No. 270 (22, App. C)

A. REMOVAL

WARNING
Axle case is heavy and awkward. Enlist the help of an assistant when removing from axle to prevent injury to personnel and damage to components.

1. While holding right axle case (I) in place, remove sixteen nuts (2) from studs (3, 4).
2. Carefully remove right axle case (I) from studs (3, 4).
3. Remove two shouldered studs (4) from intermediate cover (5). Remove intermediate cover from studs (3).



4. Carefully remove assembled differential gear case (6) from axle housing (7).

5. Remove bearing cone (8) from gear case (6).

6. Remove twelve bolts (9) from sprocket (10). Remove sprocket, thrust bearing (11), friction washer (12), and differential gear (13) from gear case (6).

NOTE

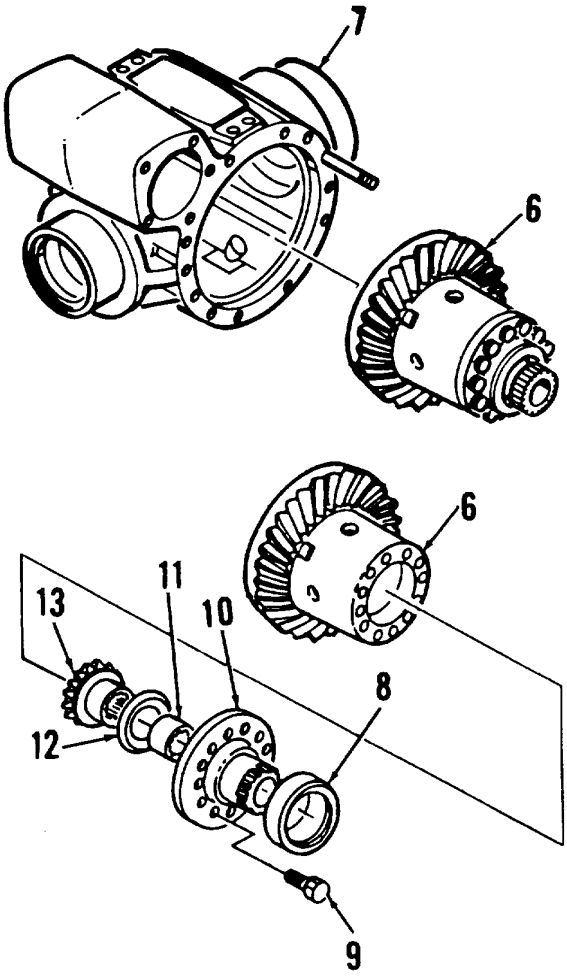
Shafts (15, 16) are marked with a part number on one end. Holes for pins (14) are located on marked end. Two different lengths of shaft are used; one long (15) and two short (16).

7. Using a soft head hammer and pin punch, drive pins (14) fully into shafts (15, 16). Depth from face of gear case (6) to top of pins shall be 41 mm (see figure).

8. Extract shafts (15, 16) from gear case (6). Remaining parts will fall loose into case.

9. Remove pins (14) from shafts (15, 16).

10. Remove shaft retainer (17), differential pinions (18), and friction washers (19) from gear case (6).



B. CLEANING

Clean components in accordance with paragraph 1-24.

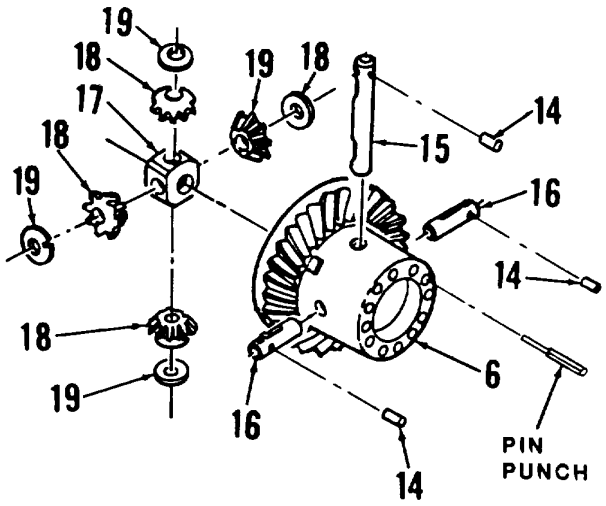
C. INSPECTION

Inspect components in accordance with paragraph 1-24.

D. INSTALLATION

1. Insert long shaft (15) part way into gear case (6). Install one friction washer (19) and pinion gear (18) onto shaft.

2. Push shaft (15) through shaft retainer (17) and install second pinion gear (18) and friction washer (19).



3. Rotate shaft (15) as required to align pin hole on shaft with matching hole in gear case (6). Fully install shaft.

4. Insert pin (14) into gear case (6). Using a soft head hammer and pin punch, drive pin half-way into shaft (15) to secure shaft in case. Depth from face of case to top of pins shall be 33 mm.

5. Repeat steps 1 through 4 for two short shafts (16) and remaining pinion gears and friction washers.

6. Install bearing cone (8) onto sprocket (10).

7. Install differential gear (13), friction washer (12), and thrust bearing (11) into gear case (6).

8. Apply loctite to threads of twelve bolts (9). Install sprocket (10) onto gear case and secure using bolts. Torque bolts to 52 to 55 ft-lbs (70 to 75 Nm).

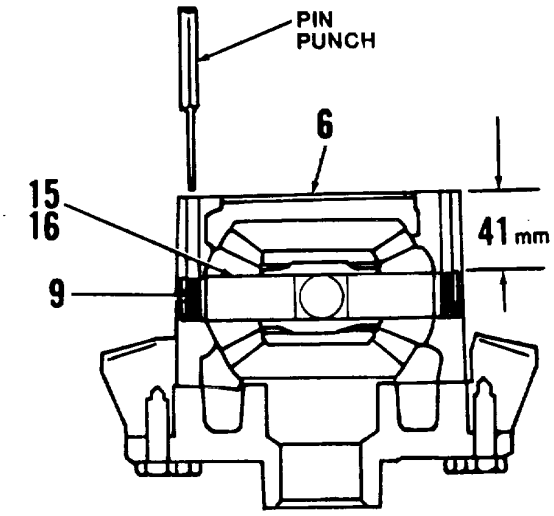
9. Carefully install assembled differential gear case (1) into axle housing (2).

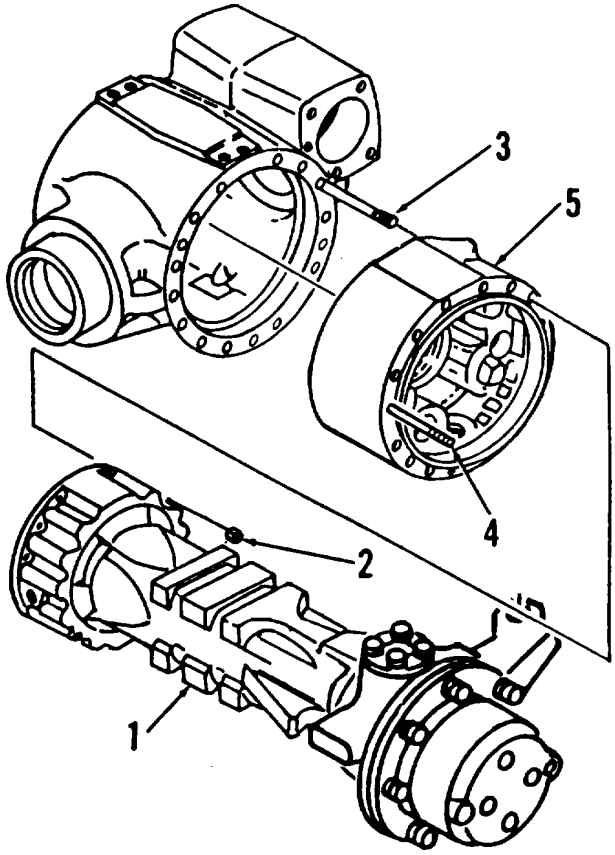
10. Carefully install intermediate cover (5) onto studs (3). Install two shouldered studs (4) into intermediate cover.

11. Install axle case (1) onto studs (3, 4). Install sixteen nuts (2) onto studs and torque to 25 ft-lbs. (34 Nm).

FOLLOW-ON MAINTENANCE:

Install tie rod (para. 4-30)





END OF TASK

4-27. BEVEL GEAR REPLACEMENT (FRONT AXLE ASSEMBLY)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Puller Kit (26, App. E)
Arbor Press (25, App. E)
3/4" Drive Socket Set (55, App. E)

Equipment Condition:

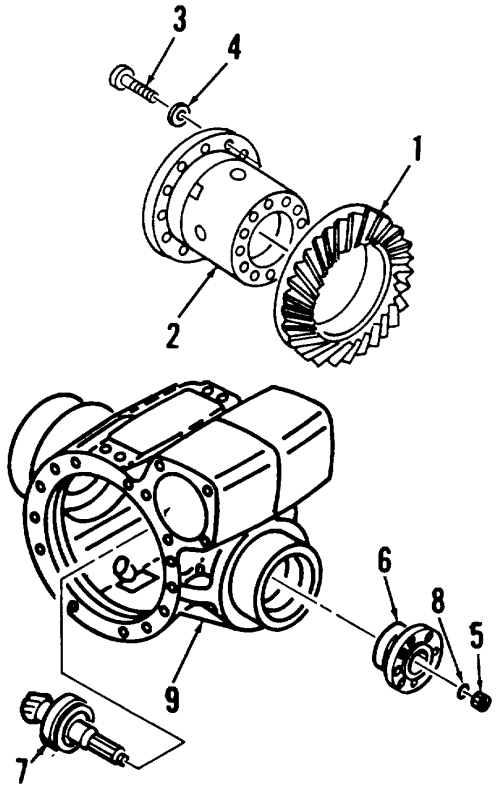
Differential gear case removed (para. 4-26)

Materials / Parts:

Loctite No. 270 (22, App. C)
Bolt, Item 3 (12 ea.)
O-Ring, Item 8 (1 ea.)
Shim, Item 14 (As required)
Shim, Item 16 (As required)

A. REMOVAL

1. Remove large bevel gear (1) from differential case (2) by removing twelve bolts (3) and washers (4). Discard bolts.
2. Remove nut (5) and pull flange (6) off assembled bevel pinion (7). Remove and discard O-ring (8).
3. Using a bearing puller, press assembled bevel pinion (7) toward inside of differential housing (9). Remove assembled bevel pinion from axle housing.
4. Bevel pinion (7) is stamped with a factory recommended mounting distance (center-line of axle to shoulder of closed end bearing). Note and record this distance for use during installation.



NOTE

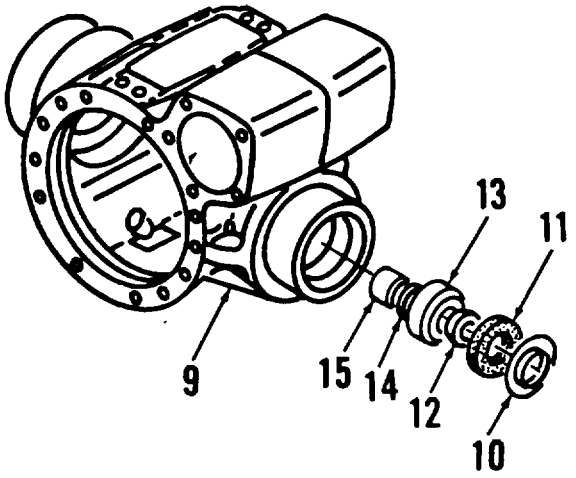
For ease of assembly, note number and size of shims (14, 16) when removing.

5. Remove cover plate (10), seal (11), and spacer (12), inner race of bearing (13), shim (14), and spacer (15) from differential housing (9).

6. Remove shims (16) from bevel gear shaft (18).

7. Using an arbor press, remove inner race of bearing (17) from bevel gear shaft (18).

8. Remove outer races of bearings (13, 17) from cavities in differential housing.

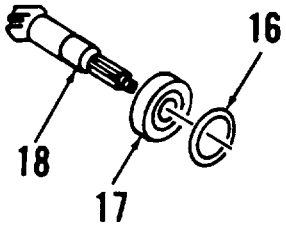


B. CLEANING

Clean bevel gear components in accordance with paragraph 1-24.

C. INSPECTION

Inspect bevel gear components in accordance with paragraph 1-24.



D. INSTALLATION

1. Install shims (16) into front bearing cavity on differential housing (9). Press outer race of bearing (17) into cavity.

2. Press outer race of bearing (13) into rear bearing cavity in differential housing (9).

3. Press inner race of bearing (17) onto bevel gear shaft (18).

4. Install spacer (15), shims (14), and inner race of bearing (13) into differential housing (9).

5. Support bearing (13) with tube stock of suitable inside diameter. Press bevel gear shaft (18) with bearing (17) into differential housing (9).

6. Install spacer (12), seal (11), cover plate (10), and flange (9) onto bevel gear shaft (18).

7. Install new O-ring (8) onto bevel gear shaft (18). Install nut (5) and torque to 192 to 222 ft-lbs. (260 to 300 Nm).

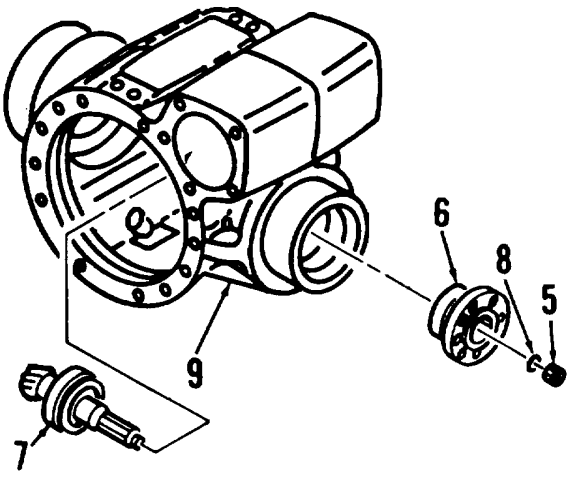
8. Install large bevel gear (1) onto differential case (2).

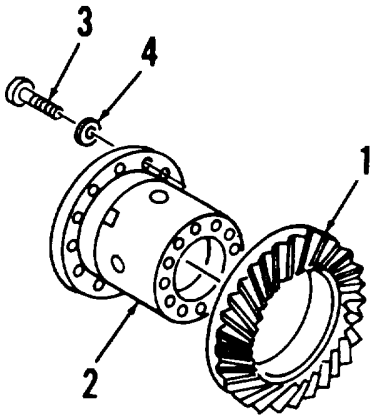
9. Apply loctite to threads of twelve new bolts (3) and install with washers (4). Torque bolts to 46 to 53 ft-lbs. (69 to 72 Nm).

10. Install differential gear case (para. 4-26).

11. Measure from center-line of axle to shoulder of closed end pinion bearing to determine bevel pinion (7) mounting distance. Compare this measurement with factory recommended mounting distance recorded during removal.

12. Remove bevel pinion components and add or subtract shims (14, 16) until actual mounting distance matches factory recommended mounting distance.





FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-28. DIFFERENTIAL LOCK REPLACEMENT (FRONT AXLE ASSEMBLY)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Spanner Wrench (31, App. E)
Torque Wrench (32, App. E)

Personnel Required:

2 personnel

Materials / Parts

Loctite No. 242 (20, App. C)
O-Ring, Item 12 (1 ea.)
O-Ring, Item 13 (2 ea.)
O-Ring, Item 14 (1 ea.)
O-Ring, Item 15 (2 ea.)
O-Ring, Item 16 (1 ea.)

Equipment Condition:

Differential gear replacement (para 4-26), steps 1, 2, 3

A. REMOVAL

1. Position box end wrench on nut (2) and hold slot in position using a flat blade screwdriver. Remove differential lock lever (3) and change selector by removing nut.

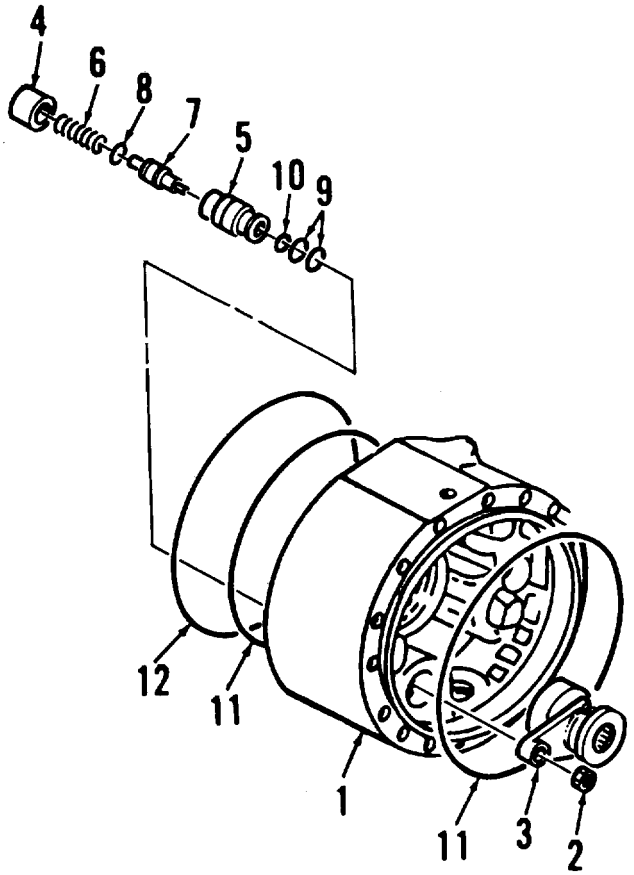
WARNING
Ring nut (4) is under spring pressure. Loosen nut carefully to prevent injury to personnel.

2. Slowly remove ring nut (4) using a spanner wrench.

3. Place jaws of open end wrench into slots on base of cylinder (5). Turn wrench using vise grip to remove cylinder from intermediate cover (1).

4. Remove spring (6) and piston (7) from cylinder (5). Remove and discard O-rings (8, 9, 10).

5. Remove O-rings (11, 12) from intermediate cover (5) and discard.



B. CLEANING

Clean axle case, intermediate cover, and differential lock components in accordance with paragraph 1-24.

C. INSPECTION

Inspect axle case, intermediate cover, and differential lock components in accordance with paragraph 1-24.

D. INSTALLATION

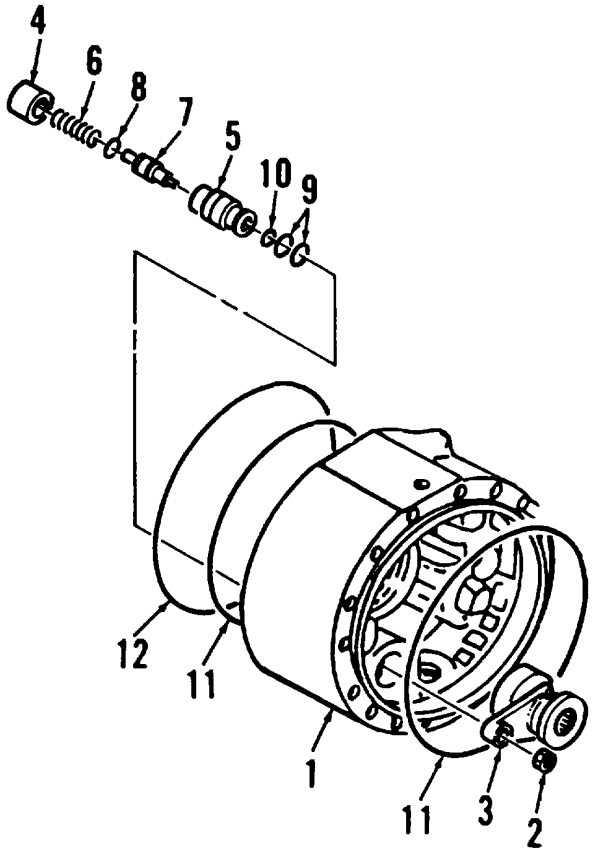
1. Install new O-rings (11, 12) into intermediate cover (1).

2. Install new O-rings (8, 9, 10) onto cylinder (5). Assemble spring (6), piston (7), and cylinder.

3. Apply loctite to threads on cylinder (5) body and install into intermediate cover (1). When installed, front of cylinder shall be 1.63 to 1.65 in. (41.5 to 42 mm) from mounting surface of intermediate cover.

4. Install ring nut (4) onto cylinder (5).

5. Apply loctite to threads of nut (2). Install differential lock lever (3) and change lever using nut.



FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-29. PLANETARY DRIVE GEAR REPLACEMENT (FRONT AXLE ASSEMBLY)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
Puller Kit (26, App. E)
Retaining Ring Pliers (24, App. E)
Soft Head Hammer (23, App. E)
Torque Wrench (32, App. E)
Arbor Press (25, App. E)

Personnel required:

2 Personnel

Materials / Parts:

Loctite 242 (20, App. C)
Lubricating Oil (16, App. C)
Seal Washer, Item 2 (1 ea.)
Circlip, Item 6 (1 ea.)
O-Ring, Item 7 (3 ea.)
O-Ring, Item 23 (1 ea.)

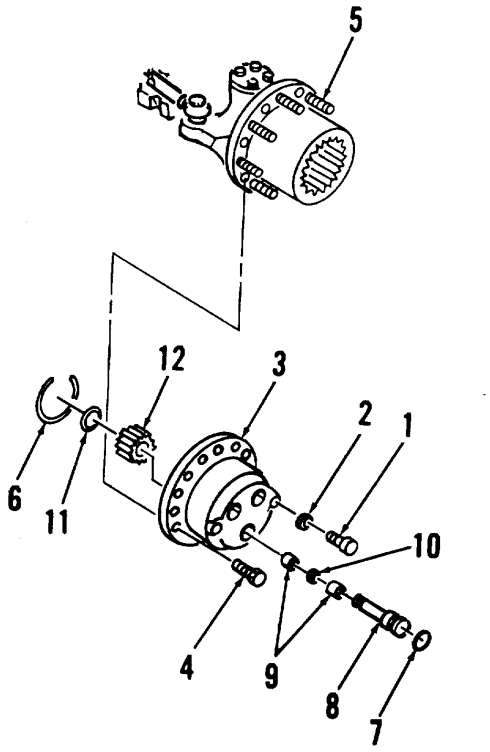
Equipment Condition:

Wheel assembly removed (para. 2-113)

A. REMOVAL

NOTE
Before removing wheel assembly, position vehicle so that drain fill port is at bottom position. Place drain pan beneath carrier plug to capture oil.

1. Remove plug (1) and seal washer (2) from planet gear carrier (3). Drain planet gear carrier oil into pan. Discard seal washer.
2. Remove four bolts (4) and remove carrier (3) from wheel hub (5).
3. Using pliers, remove circlip (6) from rear of carrier (3). Discard circlip.
4. Use an arbor press to remove assembled pins (8) and bearings (9) from carrier (3).
5. Remove and discard O-rings (7). Separate bearings (9) and spacers (10) from pins (8).
6. Remove three friction washers (11) and planet gears (12) from carrier (3).



7. Remove eight bolts (13) from steering case (17). Remove assembled ring gear (15) from wheel hub (16).

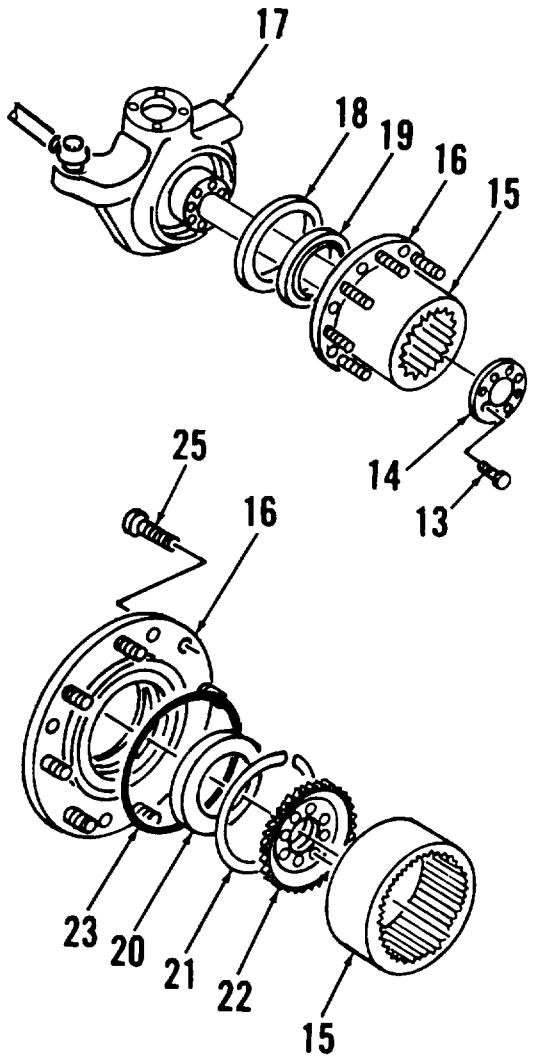
8. Using puller, remove wheel hub (16) from steering case (17).

9. Remove seal (18) and roller bearing (19) from steering case (17).

10. Using pliers, remove snap ring (21) from ring gear (15). Remove ring gear support (22).

11. Remove roller bearing (20) and O-ring (23) from wheel hub (16). Discard O-ring.

12. Remove eight wheel studs (23) from wheel hub (16) only if replacement is required.



B. CLEANING

Clean planetary drive gear components in accordance with paragraph 1-24.

C. INSPECTION

Inspect planetary drive gear components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install eight wheel studs (23) onto wheel hub (16).

2. Press roller bearing (20) onto wheel hub (16). Install new O-ring (23).

3. Install seal (18) and roller bearing (19) into wheel hub (16).

4. Install wheel hub (16) onto steering case (17). Tap into place using a soft head hammer.

5. Install ring gear support (22) into ring gear (15). Secure using snap ring (21).

6. Install assembled ring gear (15) onto steering case (17), ensuring proper bolt hole alignment. Apply loctite to threads of eight bolts (13) and install. Torque bolts to 5 to 15 ft-lbs. (7 to 20 Nm).

7. Insert three planet gears (12) into carrier (3).

8. Install bearings (9) and spacers (10) onto pins (8). Install new Orings (7).
9. Position friction washers (11) under planet gears (12), ensuring that washers are aligned with holes in planet gears and gear carriers.

Tab must be on inside of gear carrier ring.

10. Press assembled pins (8) and bearings (9) into carrier (3). Tap into place using a soft head hammer.

11. Install new circlip (6) into groove at rear of carrier (3).

12. Carefully install carrier (3) onto wheel hub (5). Secure using three bolts (4).

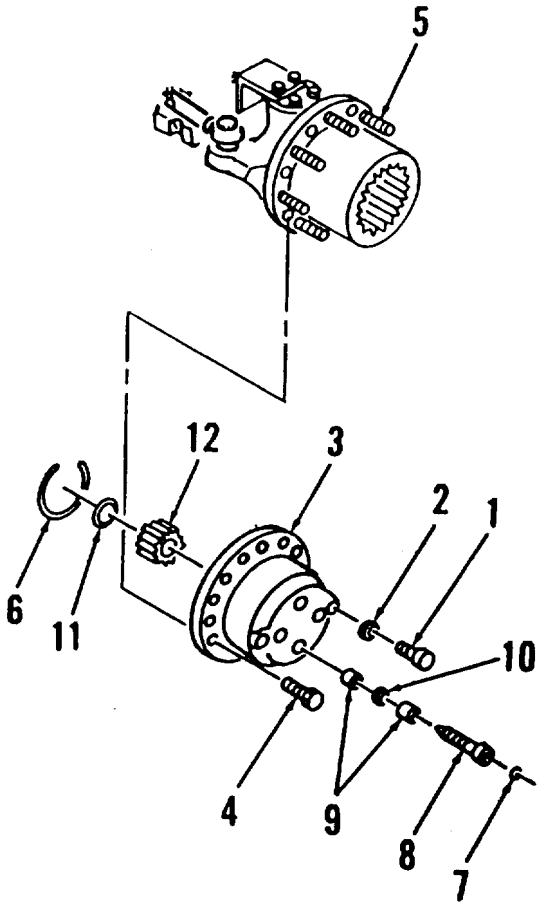
13. Install wheel assembly (para. 2113).

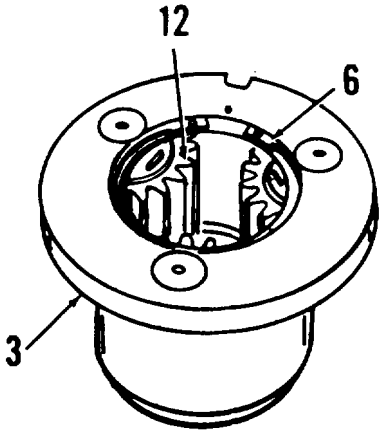
14. Position fill/drain port at center of axle. Service planetary gear carrier with fresh oil. Install plug (1) and new seal washer (2).

FOLLOW-ON MAINTENANCE:

None

END OF TASK





4-30. ARTICULATION JOINT REPLACEMENT (FRONT AXLE ASSEMBLY)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Puller, Kit (26, App. E)
Retaining Ring Pliers (24, App. E)
Soft Head Hammer (23, App. E)
Feeler Gauge (21, App. E)
Torque Wrench (32, App. E)
Torque Wrench (34, App. E)
Arbor Press (25, App. E)
3/4" Drive Socket Set (55, App. E)
Drain Pan (10, App. E)
Puller, Tie Rod (56, App. E)

Equipment Condition:

Wheel assembly removed (para. 2-113)

Personnel Required:

2 Personnel

Materials / Parts:

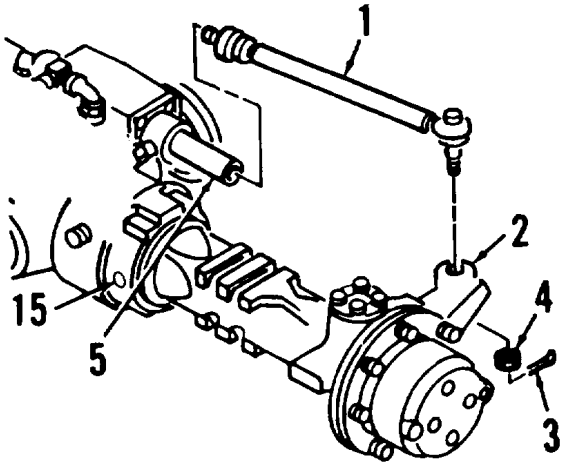
Grease (10, App. C)
Cotter Pin, Item 3 (1 ea.)
Circlip, Item 21 (1 ea.)
Shims, Item 42 (As required)
Spring Washer, Item 7 (8 ea.)

A. REMOVAL

NOTE

Brake discs must be locked before disconnecting articulation joint.

1. Lock brake discs by turning three brake adjustment nuts (15) right until tight.
2. Remove and discard cotter pin (3). Remove tie rod (1) from steering case (2) by removing nut (4)and separating tie rod using puller.
3. It is not necessary to remove tie rod (1) from steering cylinder (5). Remove tie rod only if replacement is required.



4. Remove four bolts (6) and washers (7) from lower pivot pin (9).

5. Install two bolts (6) into holes not used to mount lower pivot pin (9) to steering case (11). Alternately tighten bolts until pin separates from case.

6. Remove grease fitting (10).

7. Using a bearing puller, remove bearing cones (8) from pivot pin (9). Remove seal (13).

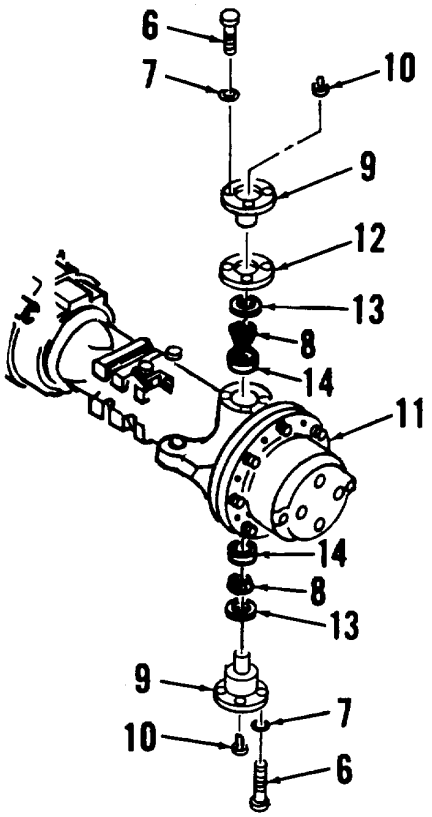
8. Repeat steps 4, 5, and 7 for upper pivot pin (9).

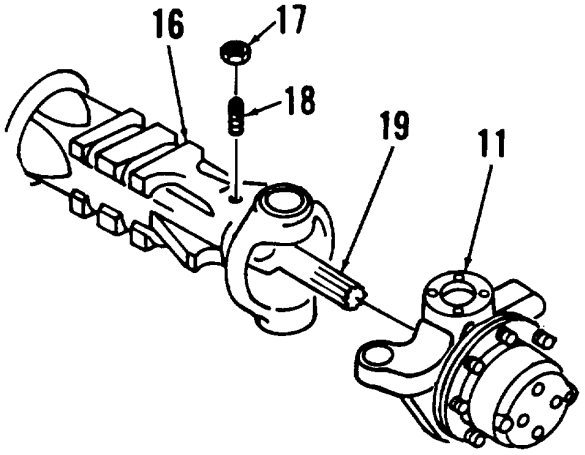
9. Remove grease fitting (10) and shims (12).

10. Carefully remove steering case (11) from axle case (16).

11. If replacement is required, remove bearing cups (14) from axle case (16) using a bearing puller.

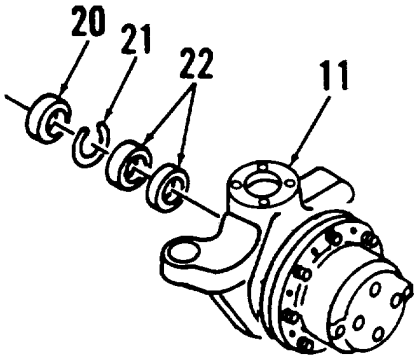
12. Loosen nut (17) and remove setscrew (18) from axle case (16). Remove articulation shaft (19) from axle case.





13. Remove seal (20) from steering case (11). Using pliers, remove and discard circlip (21).

14. Using a bearing puller, remove bearings (22) from steering case (11).



B. CLEANING

Clean pivot pins, steering case, articulation shaft, and associated components in accordance with paragraph 1-24.

C. INSPECTION

Inspect pivot pins, steering case, articulation shaft, and associated components in accordance with paragraph 1-24.

D. INSTALLATION

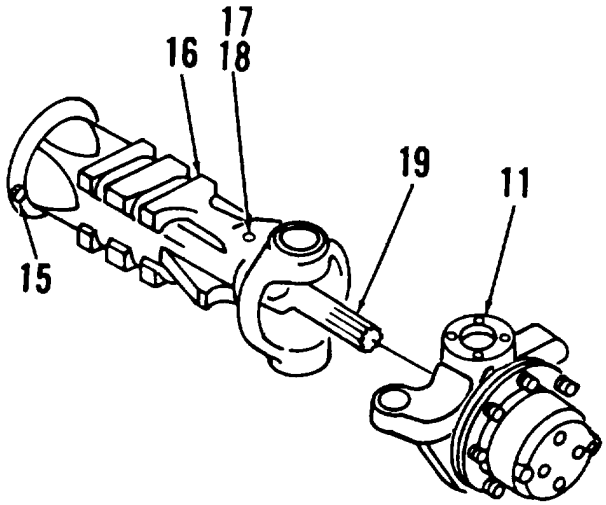
1. Apply grease to bearings (22) and insert into steering case (11). Press into place using an arbor press.

2. Install new circlip (21) into groove in steering case (11). Install seal (20).

3. Install articulation shaft (19) into axle case (16). Install setscrew (18) until tight to secure shaft. Lock setscrew using nut (17).

4. Insert bearing cups (14) into axle case (16) and seat by tapping with a soft head hammer.

5. Carefully install steering case (I 1) onto axle case (16).



6. Determine quantity of shims (12) required to preload roller bearings as follows:

   a. Install lower pivot pin (9) into steering case (11). Do not install shims (12).

   b. Install four bolts (6) and washers (7). Tighten bolts.

   c. Using feeler gauge, measure gap between pivot pin (9) and steering case (11). Choose correct quantity of shims (12) to eliminate gap.

   d. Remove bolts (6), washers (7), and pivot pin (9).

7. Install seal (13) and bearing cone (8) onto lower pivot pin (9).

8. Install lower pivot pin (9) and required number of shim(s) (12).

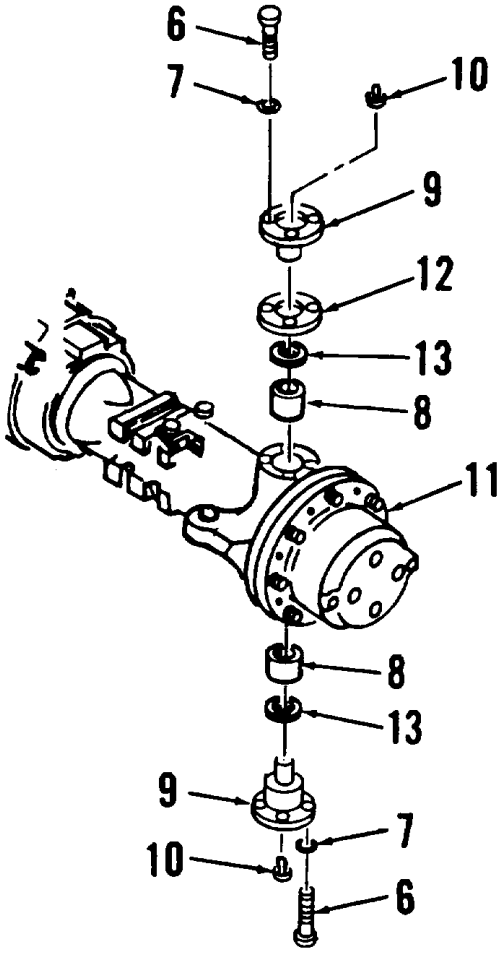
9. Install grease fitting (10).

10. Install four bolts (6) and washers (7) to secure lower pivot pin (9). Torque bolts to 50 to 55 ft-lbs. (67 to 75 N•m).

11. Repeat steps 7, 8, 10 for upper pivot pin (9).

12. Insert tie rod (1) into steering case (2) and secure using nut (4). Tighten nut to 192 to 215 ft-lbs. (260 to 290 N•m).

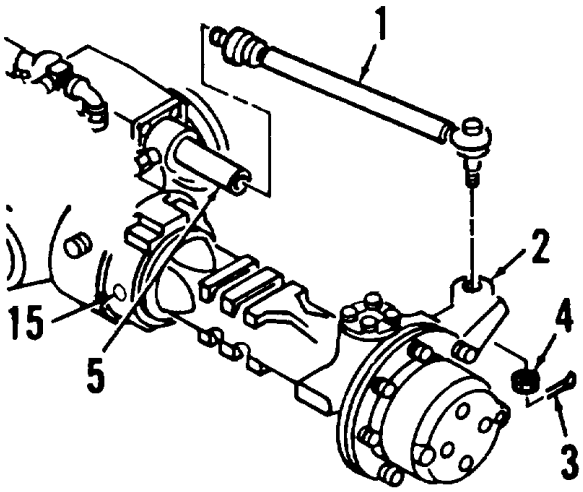
13. Loosen nut (4) slightly until holes in nut align with holes in tie rod (1). Install new cotter pin (3).



FOLLOW-ON MAINTENANCE:

Install wheel assembly (para. 2-113)
Adjust brakes (para. 2-107)

END OF TASK



Section VI. REAR AXLE ASSEMBLY MAINTENANCE

4-31. REAR AXLE ASSEMBLY REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Equipment Condition:

Rear axle assembly removed (para. 3-41)

A. DISASSEMBLY

Refer to paragraphs 4-32 through 4-34 for removal and disassembly of rear axle assembly components.

B. CLEANING

Clean rear axle assembly components in accordance with paragraph 1-24.

C. INSPECTION

Inspect rear axle assembly components in accordance with paragraph 1-24 and appropriate subcomponent replacement tasks.

D. REPAIR

Repair of the rear axle assembly consists of removal and replacement of defective, deformed, or damaged components.

E. ASSEMBLY

Refer to paragraphs 4-32 through 4-34 for assembly and installation of rear axle assembly components.

FOLLOW-ON MAINTENANCE:

Install rear axle assembly (para. 3-41)

END OF TASK

4-32. DIFFERENTIAL GEAR REPLACEMENT (REAR AXLE ASSEMBLY)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Puller Kit (26, App. E)
Soft Head Hammer (23, App. E)
Depth Gage (20, App. E)

Equipment Condition:

Tie rod removed (para. 4-35, steps 1, 2, 3)

Materials / Parts:

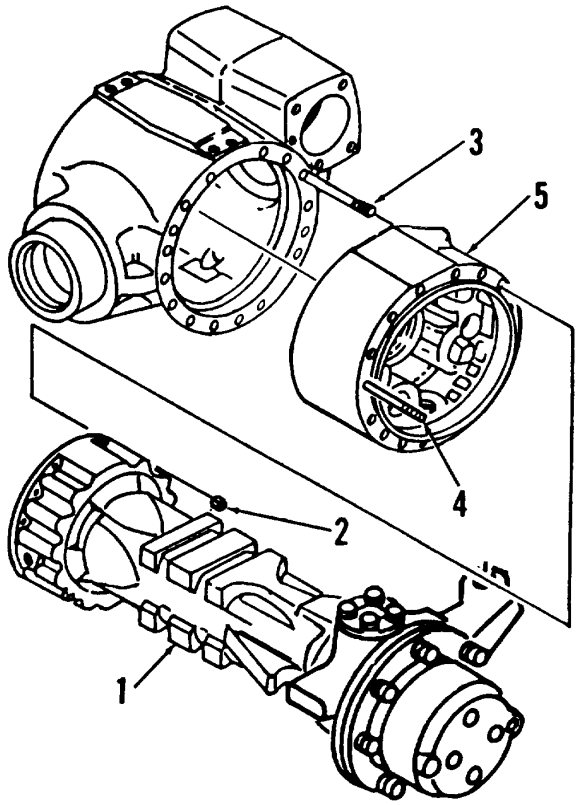
Loctite No. 270 (22, App. C)

A. REMOVAL

WARNING

Axle case is heavy and awkward. Enlist the help of an assistant when removing from axle to prevent injury to personnel and damage to components.

1. While holding right axle case (1) in place, remove sixteen nuts (2) from studs (3, 4).
2. Carefully remove right axle case (1) from studs (3, 4).
3. Remove two shouldered studs (4) from intermediate cover (5). Remove intermediate cover from studs (3).



4. Carefully remove assembled differential gear case (6) from axle housing (7).

5. Remove bearing cone (8) from gear case (6).

6. Remove twelve bolts (9) from sprocket (10). Remove sprocket, thrust bearing (11), friction washer (12), and differential gear (13) from gear case (6).

NOTE

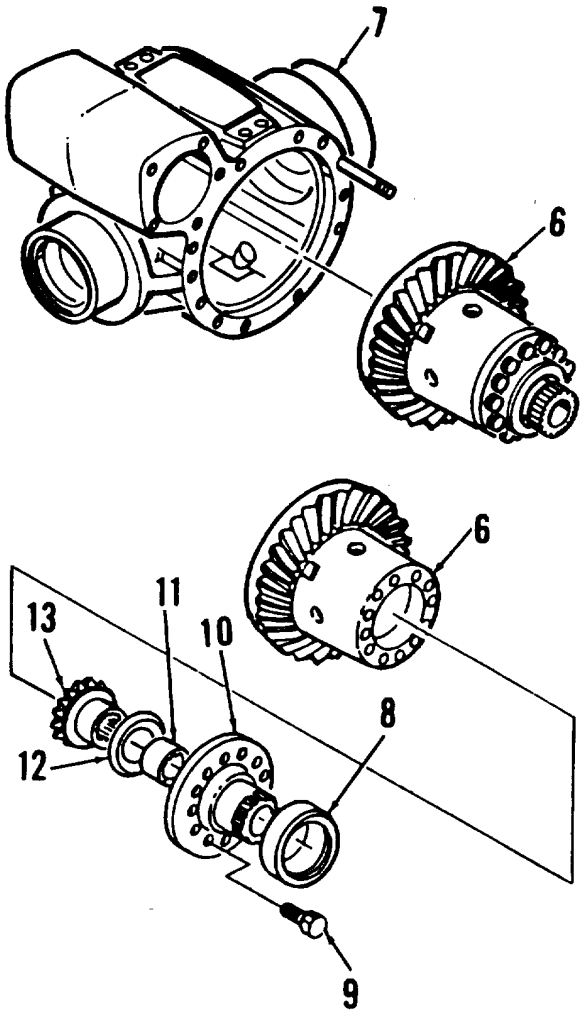
Shafts (15, 16) are marked with a part number on one end. Holes for pins (14) are located on marked end. Two different lengths of shaft are used; one long (15) and two short (16).

7. Using a soft head hammer and pin punch, drive pins (14) fully into shafts (15, 16). Depth from face of gear case (6) to top of pins shall be 41 mm (see figure).

8. Extract shafts (15, 16) from gear case (6). Remaining parts will fall loose into case.

9. Remove pins (14) from shafts (15, 16).

10. Remove shaft retainer (17), differential pinions (18), and friction washers (19) from gear case (6).



B. CLEANING

Clean components in accordance with paragraph 1-24.

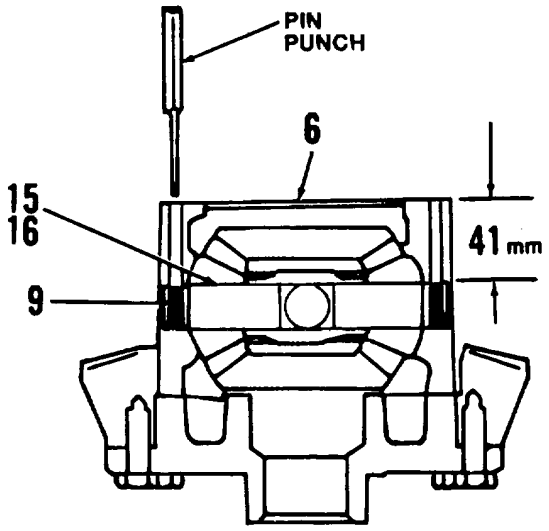
C. INSPECTION

Inspect components in accordance with paragraph 1-24.

D. INSTALLATION

1. Insert long shaft (15) part way into gear case (6). Install one friction washer (19) and pinion gear (18) onto shaft.

2. Push shaft (15) through shaft retainer (17) and install second pinion gear (18) and friction washer (19).



3. Rotate shaft (15) as required to align pin hole on shaft with matching hole in gear case (6). Fully install shaft.

4. Insert pin (14) into gear case (6). Using a soft head hammer and pin punch, drive pin half-way into shaft (15) to secure shaft in case. Depth from face of case to top of pins shall be 33 mm.

5. Repeat steps 1 through 4 for two short shafts (16) and remaining pinion gears and friction washers.

6. Install bearing cone (8) onto sprocket (10).

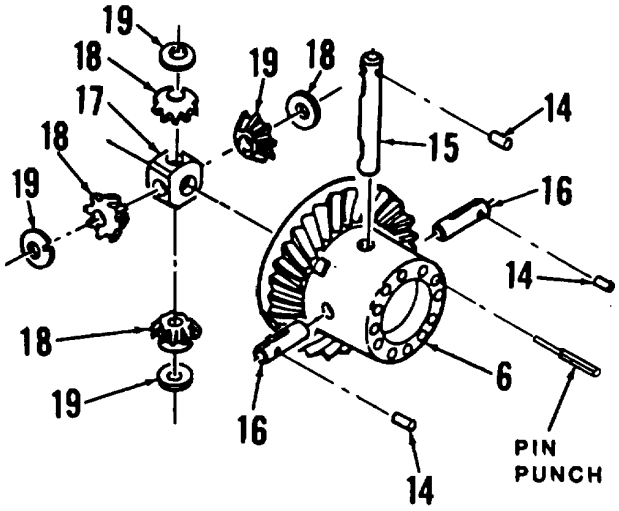
7. Install differential gear (13), friction washer (12), and thrust bearing (11) into gear case (6).

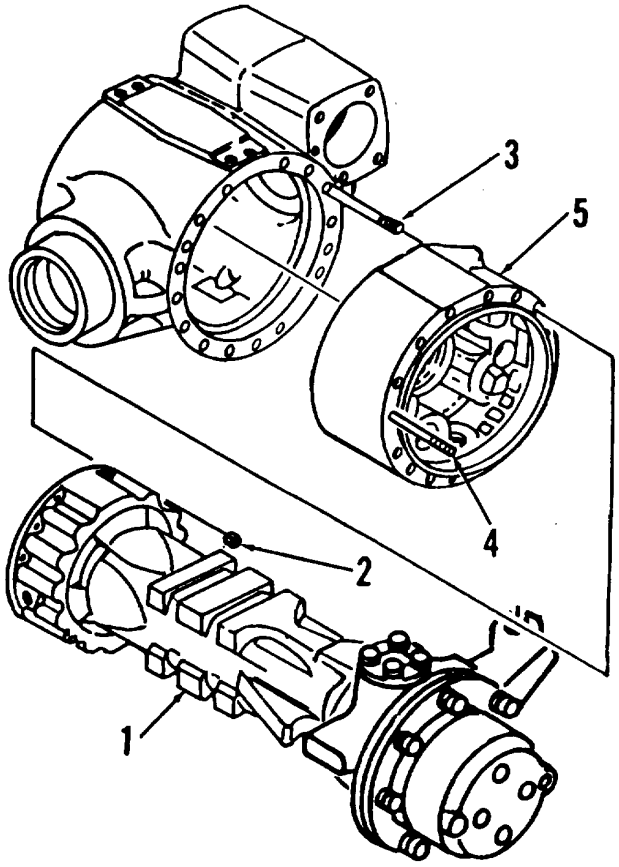
8. Apply loctite to threads of twelve bolts (9). Install sprocket (10) onto gear case and secure using bolts. Torque bolts to 52 to 55 ft-lbs (70 to 75 N•m).

9. Carefully install assembled differential gear case (1) into axle housing (2).

10. Carefully install intermediate cover (5) onto studs (3). Install two shouldered studs (4) into intermediate cover.

11. Install axle case (1) onto studs (3, 4). Install sixteen nuts (2) onto studs and torque to 25 ft-lbs. (34 N•m).





FOLLOW-ON MAINTENANCE:

Install tie rod (para. 4-35)

END OF TASK

4-33. BEVEL GEAR REPLACEMENT (REAR AXLE ASSEMBLY)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Puller Kit (26, App. E)
3/4" Drive Socket Set (55, App. E)
Arbor Press (25, App. E)

Equipment Condition:

Differential gear case removed (para. 4-32)

Materials / Parts:

Loctite No. 270 (22, App. C)
Bolt, Item 3 (12 ea.)
O-Ring, Item 8 (1 ea.)
Shim, Item 14 (As required)
Shim, Item 16 (As required)

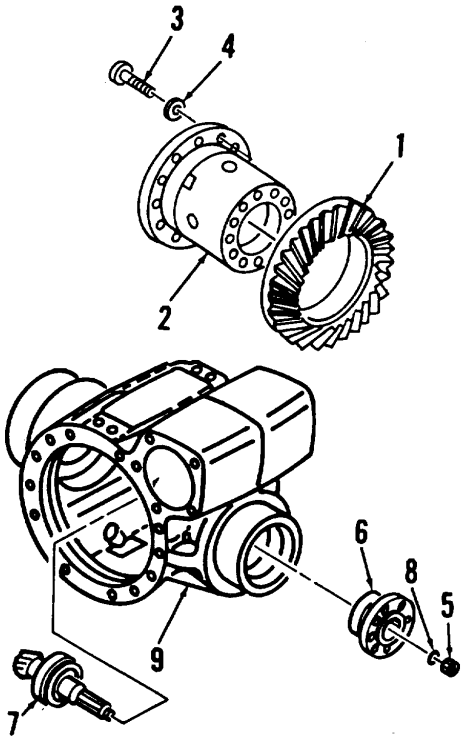
A. REMOVAL

1. Remove large bevel gear (1) from differential case (2) by removing twelve bolts (3) and washers (4). Discard bolts.

2. Remove nut (5) and pull flange (6) off assembled bevel pinion (7). Remove and discard O-ring (8).

3. Using a bearing puller, press assembled bevel pinion (7) toward inside of differential housing (9). Remove assembled bevel pinion from axle housing.

4. Bevel pinion (7) is stamped with a factory recommended mounting distance (center-line of axle to shoulder of closed end bearing). Note and record this distance for use during installation.



NOTE

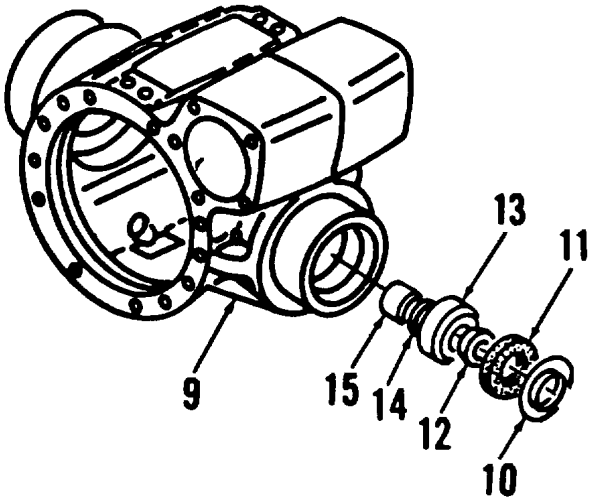
For ease of assembly, note number and size of shims (14, 16) when removing.

5. Remove cover plate (10), seal (11), and spacer (12), inner race of bearing (13), shim (14), and spacer (15) from differential housing (9).

6. Remove shims (16) from bevel gear shaft (18).

7. Using an arbor press, remove inner race of bearing (17) from bevel gear shaft (18).

8. Remove outer races of bearings (13, 17) from cavities in differential housing.

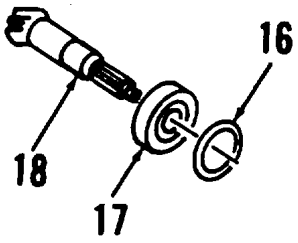


B. CLEANING

Clean bevel gear components in accordance with paragraph 1-24.

C. INSPECTION

Inspect bevel gear components in accordance with paragraph 1-24.



D. INSTALLATION

1. Install shims (16) into front bearing cavity on differential housing (9). Press outer race of bearing (17) into cavity.

2. Press outer race of bearing (13) into rear bearing cavity in differential housing (9).

3. Press inner race of bearing (17) onto bevel gear shaft (18).

4. Install spacer (15), shims (14), and inner race of bearing (13) into differential housing (9).

5. Support bearing (13) with tube stock of suitable inside diameter. Press bevel gear shaft (18) with bearing (17) into differential housing (9).

6. Install spacer (12), seal (11), cover plate (10), and flange (9) onto bevel gear shaft (18).

7. Install new O-ring (8) onto bevel gear shaft (18). Install nut (5) and torque to 192 to 222 ft-lbs. (260 to 300 N•m).

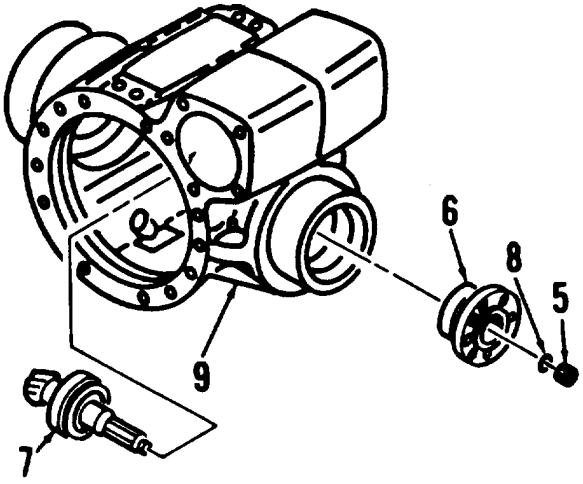
8. Install large bevel gear (1) onto differential case (2).

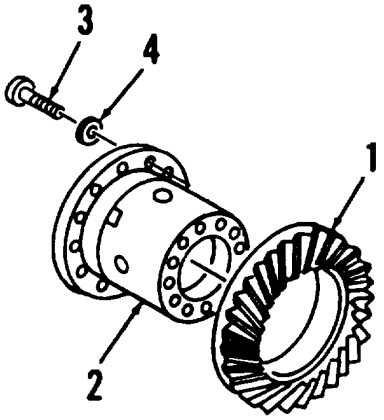
9. Apply loctite to threads of twelve new bolts (3) and install with washers (4). Torque bolts to 46 to 53 ft-lbs. (69 to 72 N•m).

10. Install differential gear case (para. 4-32).

11. Measure from center-line of axle to shoulder of closed end pinion bearing to determine bevel pinion (7) mounting distance. Compare this measurement with factory recommended mounting distance recorded during removal.

12. Remove bevel pinion components and add or subtract shims (14, 16) until actual mounting distance matches factory recommended mounting distance.





FOLLOW-ON MAINTENANCE:

None

END OF TASK

4-34. PLANETARY DRIVE GEAR REPLACEMENT (REAR AXLE ASSEMBLY)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Drain Pan (10, App. E)
Puller Kit (26, App. E)
Retaining Ring Pliers (24, App. E)
Soft Head Hammer (23, App. E)
Torque Wrench (32, App. E)
Arbor Press (25, App. E)

Personnel required:

2 Personnel

Materials / Parts:

Loctite 242 (20, App. C)
Lubricating Oil (16, App. C)
Seal Washer, Item 2 (1 ea.)
Circlip, Item 6 (1 ea.)
O-Ring, Item 7 (3 ea.)
O-Ring, Item 23 (1 ea.)

Equipment Condition:

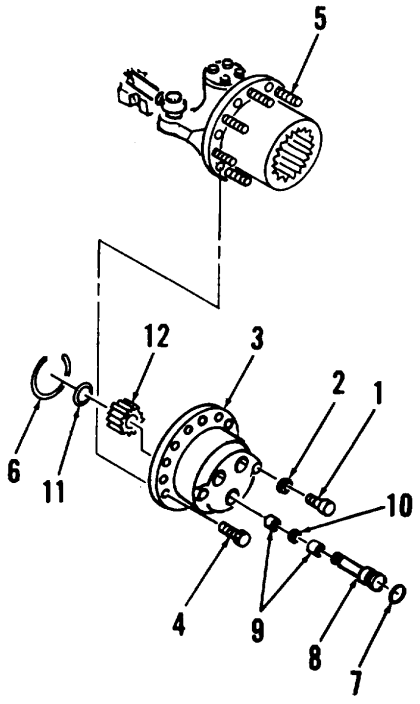
Wheel assembly removed (para. 2-113)

A. REMOVAL

NOTE

Before removing wheel assembly, position vehicle so that drain fill port is at bottom position. Place drain pan beneath carrier plug to capture oil.

1. Remove plug (1) and seal washer (2) from planet gear carrier (3). Drain planet gear carrier oil into pan. Discard seal washer.
2. Remove four bolts (4) and remove carrier (3) from wheel hub (5).
3. Using pliers, remove circlip (6) from rear of carrier (3). Discard circlip.
4. Use an arbor press to remove assembled pins (8) and bearings (9) from carrier (3).
5. Remove and discard O-rings (7). Separate bearings (9) and spacers (10) from pins (8).
6. Remove three friction washers (11) and planet gears (12) from carrier (3).



7. Remove eight bolts (13) from steering case (17). Remove assembled ring gear (15) from wheel hub (16).

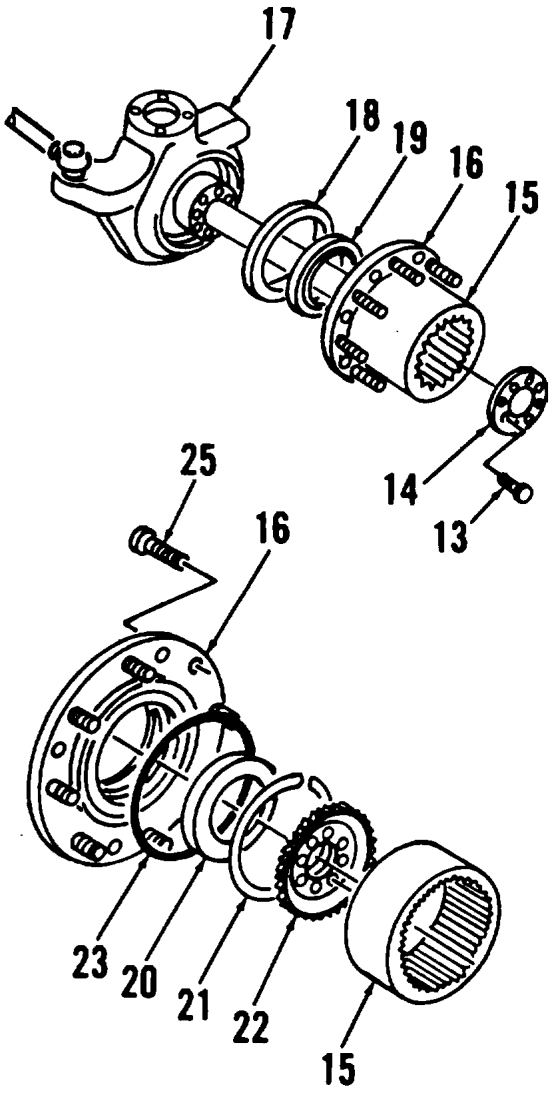
8. Using puller, remove wheel hub (16) from steering case (17).

9. Remove seal (18) and roller bearing (19) from steering case (17).

10. Using pliers, remove snap ring (21) from ring gear (15). Remove ring gear support (22).

11. Remove roller bearing (20) and O-ring (23) from wheel hub (16). Discard O-ring.

12. Remove eight wheel studs (23) from wheel hub (16) only if replacement is required.



B. CLEANING

Clean planetary drive gear components in accordance with paragraph 1-24.

C. INSPECTION

Inspect planetary drive gear components in accordance with paragraph 1-24.

D. INSTALLATION

1. Install eight wheel studs (23) onto wheel hub (16).

2. Press roller bearing (20) onto wheel hub (16). Install new O-ring (23).

3. Install seal (18) and roller bearing (19) into wheel hub (16).

4. Install wheel hub (16) onto steering case (17). Tap into place using a soft head hammer.

5. Install ring gear support (22) into ring gear (15). Secure using snap ring (21).

6. Install assembled ring gear (15) onto steering case (17), ensuring proper bolt hole alignment. Apply loctite to threads of eight bolts (13) and install. Torque bolts to 5 to 15 ft-lbs. (7 to 20 N•m).

7. Insert three planet gears (12) into carrier (3).

8. Install bearings (9) and spacers (10) onto pins (8). Install new O-rings (7).

9. Position friction washers (11) under planet gears (12), ensuring that washers are aligned with holes in planet gears and gear carriers. Tab must be on inside of gear carrier ring.

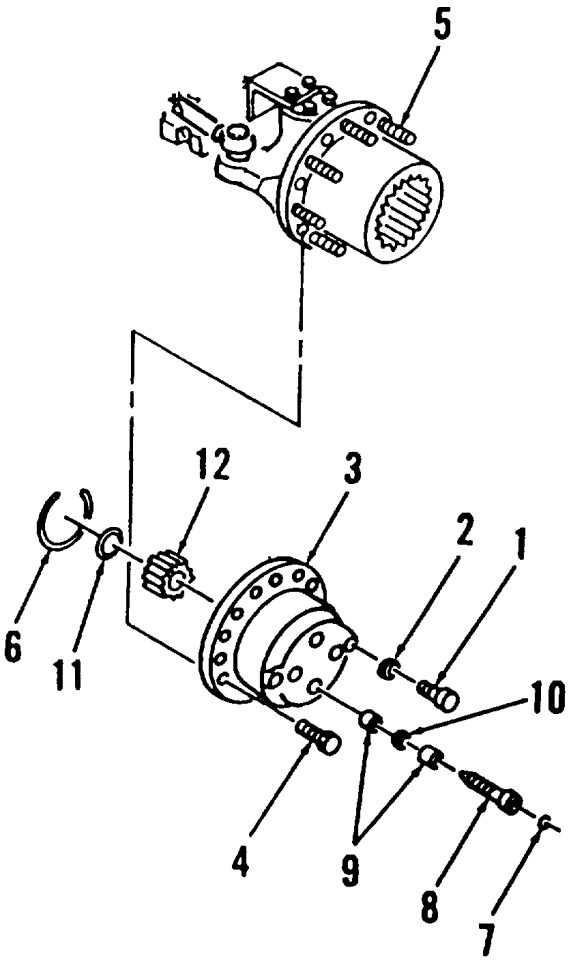
10. Press assembled pins (8) and bearings (9) into carrier (3). Tap into place using a soft head hammer.

11. Install new circlip (6) into groove at rear of carrier (3).

12. Carefully install carrier (3) onto wheel hub (5). Secure using three bolts (4).

13. Install wheel assembly (para. 2-113).

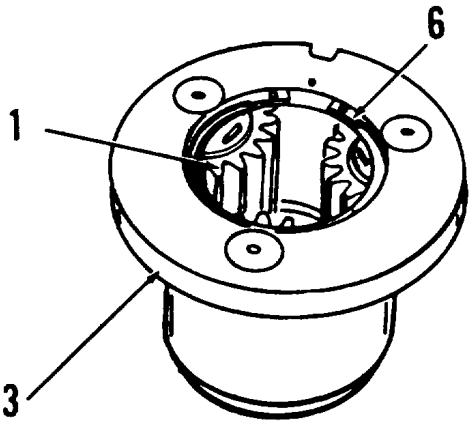
14. Position fill/drain port at center of axle. Service planetary gear carrier with fresh oil. Install plug (1) and new seal washer (2).



FOLLOW-ON MAINTENANCE:

None

END OF TASK



4-35. ARTICULATION JOINT REPLACEMENT (REAR AXLE ASSEMBLY)

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Puller, Kit (26, App. E)
Retaining Ring Pliers (24, App. E)
Soft Head Hammer (23, App. E)
Feeler Gauge (21, App. E)
Torque Wrench (32, App. E)
Torque Wrench (34, App. E)
Arbor Press (25, App. E)
3/4" Drive Socket Set (55, App. E)
Drain Pan (10, App. E)
Puller, Tie Rod (56, App. E)

Equipment Condition:

Wheel assembly removed (para. 2-113)

Personnel Required:

2 Personnel

Materials / Parts:

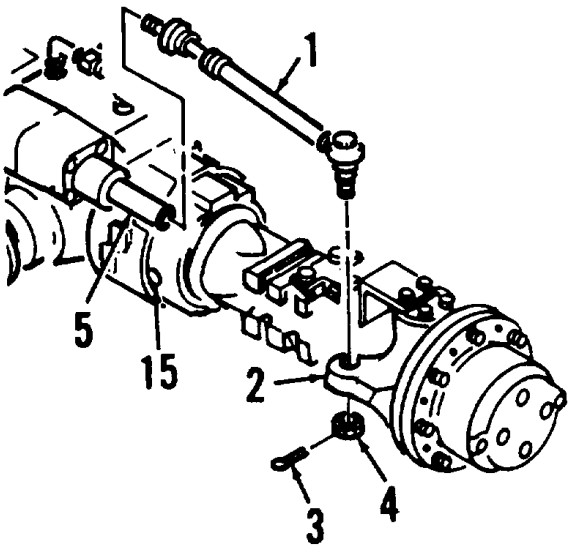
Grease (10, App. C)
Cotter Pin, Item 3 (1 ea.)
Circlip, Item 21 (1 ea.)
Shims, Item 42 (As required)
Spring Washer, Item 7 (8 ea.)

A. REMOVAL

NOTE

Brake discs must be locked before disconnecting articulation joint.

1. Lock brake discs by turning three brake adjustment nuts (15) right until tight.
2. Remove and discard cotter pin (3). Remove tie rod (1) from steering case (2) by removing nut (4)and separating tie rod using puller.
3. It is not necessary to remove tie rod (1) from steering cylinder (5). Remove tie rod only if replacement is required.



4. Remove four bolts (6) and washers (7) from lower pivot pin (9).

5. Install two bolts (6) into holes not used to mount lower pivot pin (9) to steering case (11). Alternately tighten bolts until pin separates from case.

6. Remove grease fitting (10).

7. Using a bearing puller, remove bearing cones (8) from pivot pin (9). Remove seal (13).

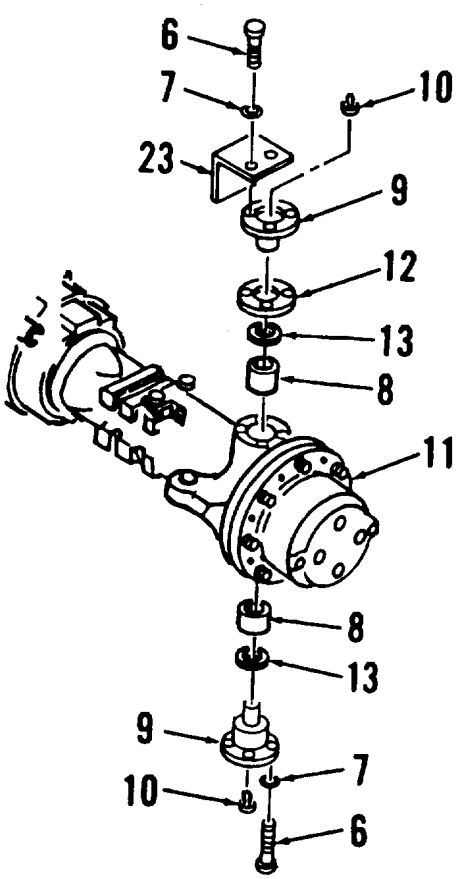
8. Repeat steps 4, 5, and 7 for upper pivot pin (9).

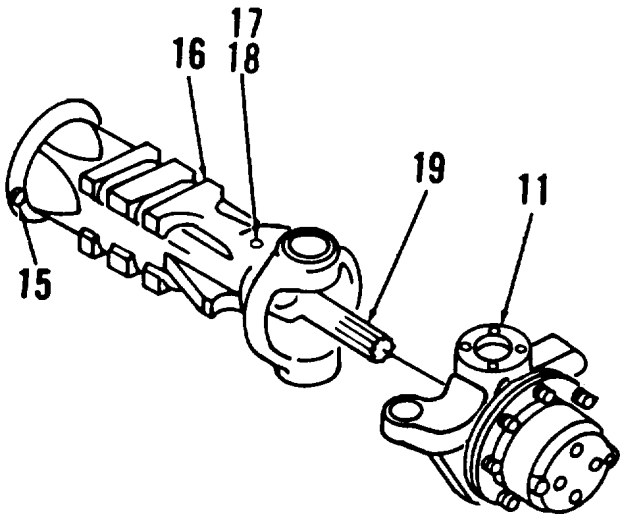
9. Remove grease fitting (10) and shims (12).

10. Carefully remove steering case (11) from axle case (16).

11. If replacement is required, remove bearing cups (14) from axle case (16) using a bearing puller.

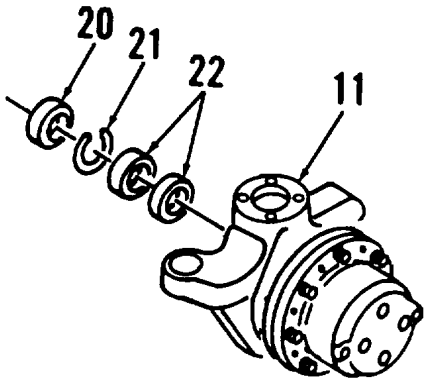
12. Loosen nut (17) and remove setscrew (18) from axle case (16). Remove articulation shaft (19) from axle case.





13. Remove seal (20) from steering case (11). Using pliers, remove and discard circlip (21).

14. Using a bearing puller, remove bearings (22) from steering case (11).



B. CLEANING

Clean pivot pins, steering case, articulation shaft, and associated components in accordance with paragraph 1-24.

C. INSPECTION

Inspect pivot pins, steering case, articulation shaft, and associated components in accordance with paragraph 1-24.

D. INSTALLATION

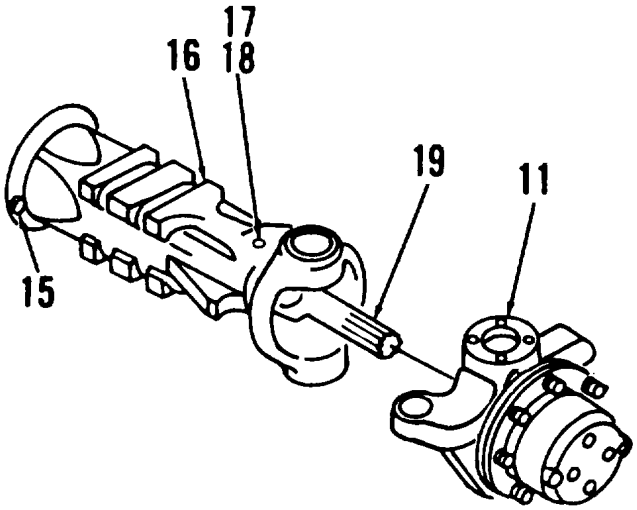
1. Apply grease to bearings (22) and insert into steering case (11). Press into place using an arbor press.

2. Install new circlip (21) into groove in steering case (11). Install seal (20).

3. Install articulation shaft (19) into axle case (16). Install setscrew (18) until tight to secure shaft. Lock setscrew using nut (17).

4. Insert bearing cups (14) into axle case (16) and seat by tapping with a soft head hammer.

5. Carefully install steering case (11) onto axle case (16).



6. Determine quantity of shims (12) required to preload roller bearings as follows:

   a. Install lower pivot pin (9) into steering case (11). Do not install shims (12).

   b. Install four bolts (6) and washers (7). Tighten bolts.

   c. Using feeler gauge, measure gap between pivot pin (9) and steering case (11). Choose correct quantity of shims (12) to eliminate gap.

   d. Remove bolts (6), washers (7), and pivot pin (9).

7. Install seal (13) and bearing cone (8) onto lower pivot pin (9).

8. Install lower pivot pin (9) and required number of shim(s) (12).

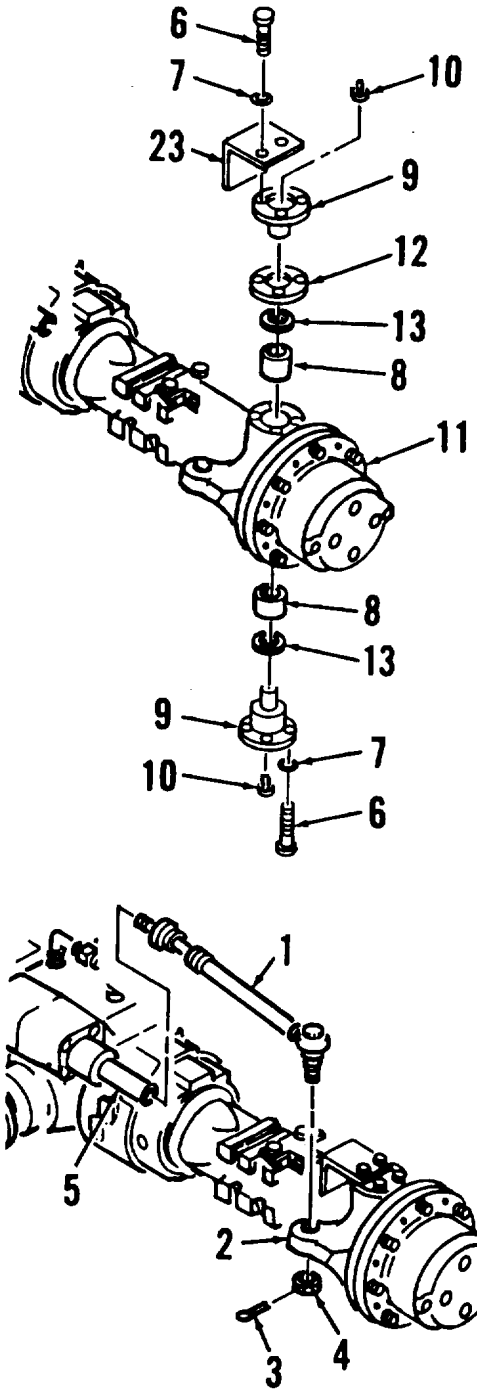
9. Install grease fitting (10).

10. Install four bolts (6) and washers (7) to secure lower pivot pin (9). Torque bolts to 50 to 55 ft-lbs. (67 to 75 N•m).

11. Repeat steps 7, 8, 10 for upper pivot pin (9).

12. Insert tie rod (1) into steering case (2) and secure using nut (4). Tighten nut to 192 to 215 ft-lbs. (260 to 290 N•m).

13. Loosen nut (4) slightly until holes in nut align with holes in tie rod (1). Install new cotter pin (3).



FOLLOW-ON MAINTENANCE:

Install wheel assembly (para. 2-113)
Adjust brakes (para. 2-107)

END OF TASK

Section VII. DISC BRAKE ASSEMBLY MAINTENANCE

4-36. DISC BRAKE ASSEMBLY REPLACEMENT

This task covers: Removal, Cleaning, Inspection, and Installation

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Torque Wrench (32, App. E)
Torque Wrench (34, App. E)
Air Compressor Unit (16, App. E)
3/4" Drive Socket Set (55, App. E)
Drain Pan (10, App. E)
Puller, Tie Rod (56, App. E)

Equipment Condition:

Wheel assembly removed (para. 2-113)
Front axle servicing, drain (para. 2-102)
Rear axle servicing, drain (para. 2-104)

Materials / Parts:

Loctite No. 242 (20, App. C)
Cotter Pin, Item 3 (2 ea.)
Seal, Item 16 (1 ea.)
Seal, Item 18 (1 ea.)
Packing, Item 21 (1 ea.)
Packing, Item 25 (3 ea.)

Personnel Required:

2 personnel

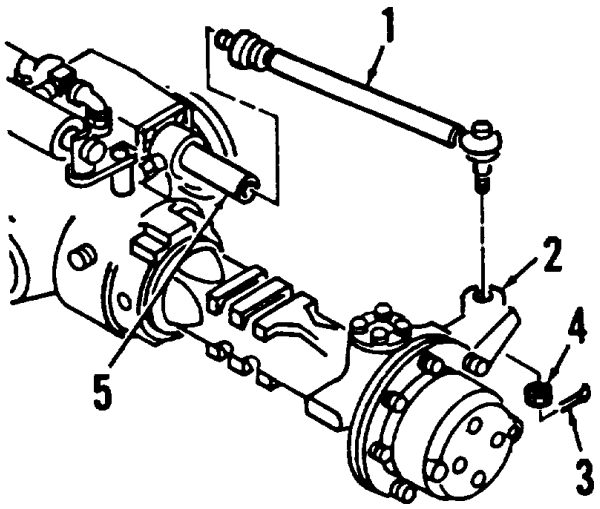
A. REMOVAL

NOTE

These procedures are used for both the front and rear axle assemblies. Perform steps 5, 6, 7, and 8 only on the front axle assembly.

1. Remove and discard cotter pin (3). Remove tie rod (1) from steering case (2) by removing nut (4) and separating tie rod using a puller.

2. It is not necessary to remove tie rod (1) from steering cylinder (5). Remove tie rod only if replacement is required.



WARNING

Axle case is heavy and awkward. Enlist the help of an assistant when removing from axle to prevent injury to personnel and damage to components.

CAUTION

Use care when removing axle case to prevent damage to articulation shaft.

3. While holding axle case (6) in place, remove sixteen nuts (8) from studs (7).

4. Carefully remove axle case (6) from studs (7).

5. Remove mechanical stop(10)from intermediate cover (34) by removing bolt (11). Remove bolt (12) and nut (13).

6. Remove screw (14), washer (15), seal (16), lever (17), and seal (18). Discard seals.

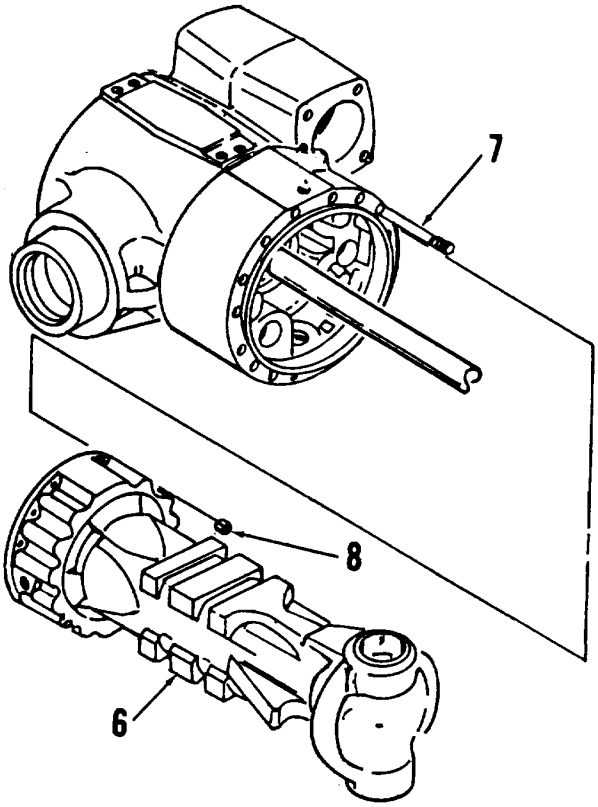
7. Loosen setscrew (19) and remove spacer (20) from intermediate cover (34). Remove and discard O-ring (21).

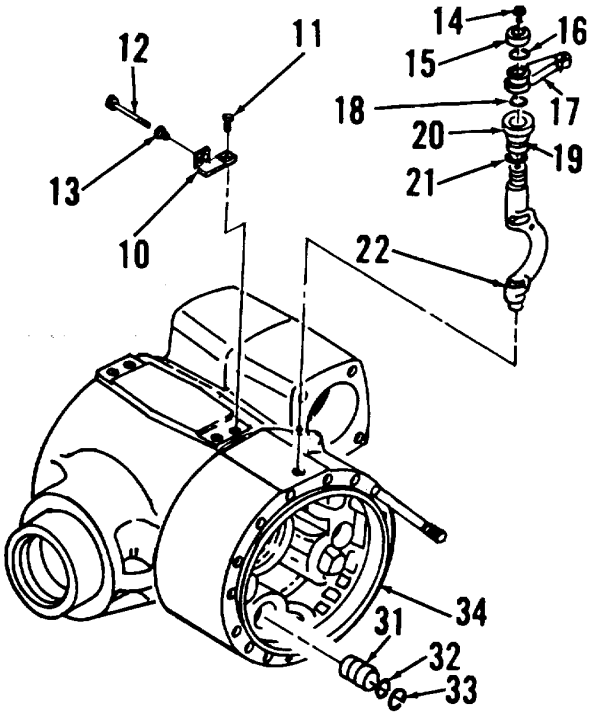
8. Remove remote control lever (22) from intermediate cover (34).

WARNING

Use caution when working with compressed air. Use only with effective personnel protective equipment (goggles/shield, gloves, etc.). Do not direct airstream towards self or other personnel.

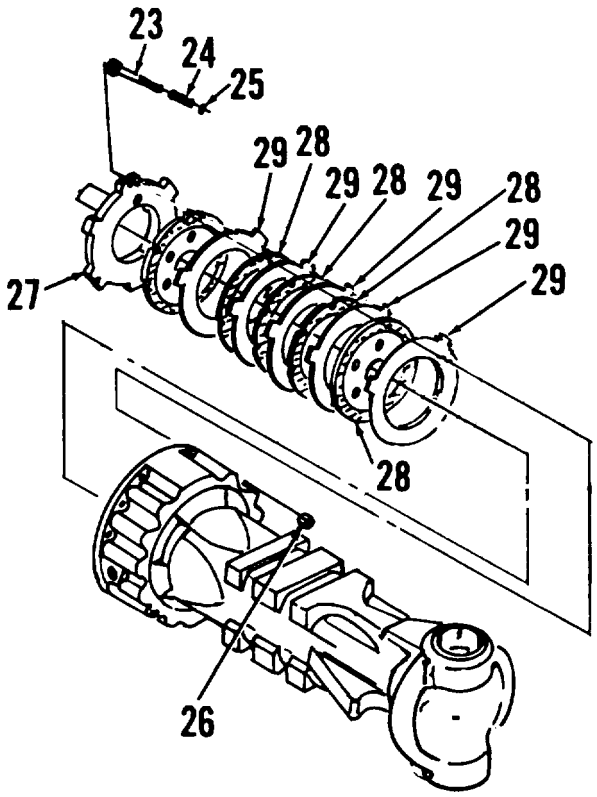
9. Apply 45 to 80 psi. air pressure to brake fittings to force pistons (31) from intermediate cover (34). Remove retaining ring (33) and packing (32).





10. Remove three nuts (26), then remove three bolts (23), springs (24), and packings (25). Discard packings.

11. Remove outer brake disc (27), five brake discs (28), and five brake discs (29) from axle case (6).



B. CLEANING

Clean axle case, remote control lever, piston, and disc components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect axle case, remote control lever, piston, and disc components in accordance with paragraph 1-24.

2. Inspect piston and brake discs for evidence of unusual or uneven wear. Replace any component that is worn or damaged.

D. INSTALLATION

NOTE

When installing outer brake disc (27), ensure that projections on disc line up with location of brake pistons.

1. Install five brake discs (28), five brake discs (29), and outer brake disc (27), into axle case (6). Ensure lubrication holes in discs (28) are aligned.

2. Install three bolts (23), springs (24), and new packings (25). Tighten bolts until snug, then turn bolts left one full turn. Install nuts (26) and tighten.

3. Install new packing (32), retaining ring (33) and brake piston (31) into intermediate cover (34).

4. Install new packing (21) onto spacer (20). Install spacer into intermediate cover (34). Secure by tightening setscrew (19).

5. Insert remote control lever (22) into intermediate cover (34).

6. Install screw (14), washer (15), new seal (16), lever (17), and new seal (18).

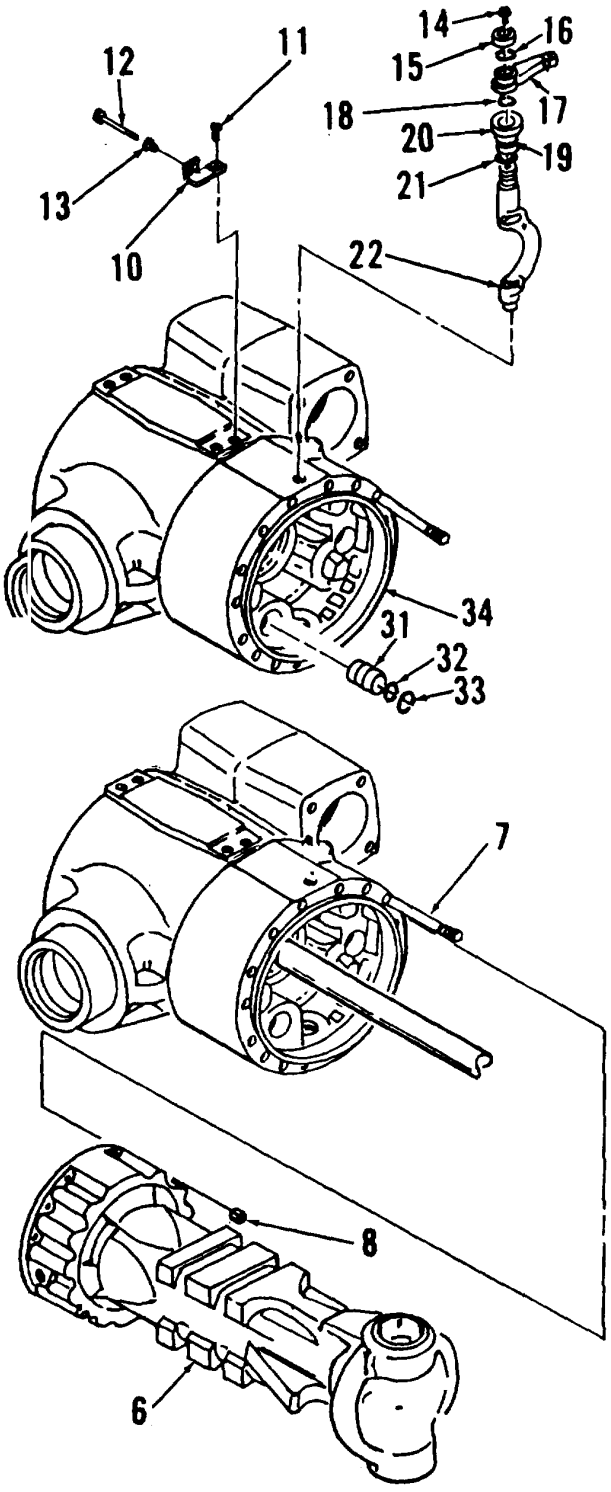
7. Install mechanical stop (10) onto intermediate cover (34) using bolt (11) Install bolt (12) and nut (13).

CAUTION

Use care when installing axle case to prevent damage to articulation shaft.

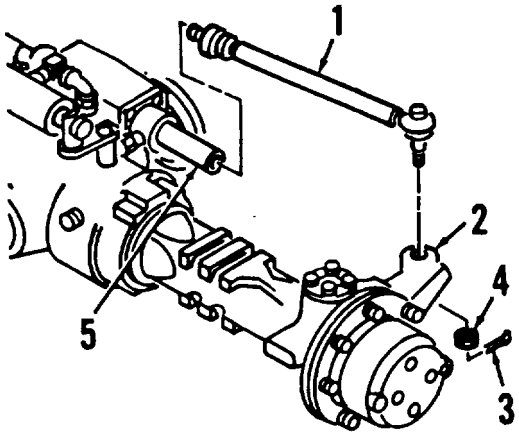
8. Carefully install axle case (6) onto studs (7).

9. Apply loctite to studs (7). Install sixteen nuts (8) onto studs (7). Torque nuts to 25 ft-lb. (34 N•m).



10. Insert tie rod (1) into steering case (2) and secure using nut (4). Tighten nut to 192 to 215 ft-lb. (260 to 290 N•m).

11. Loosen nut (4) slightly until holes in nut align with holes in tie rod (1). Install new cotter pin (3).



FOLLOW-ON MAINTENANCE:

Front axle assembly servicing, fill and bleed (para. 2-102).
Rear axle assembly servicing, fill and bleed (para. 2-104).
Install wheel assembly (para. 2-113).
Adjust brakes (para. 2-107).

END OF TASK

Section VIII. FRAME, TOWING ATTACHMENT AND DRAWBAR MAINTENANCE

4-39. FRAME ASSEMBLY REPAIR

This task covers: Cleaning, Inspection, and Repair

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Equipment Condition:

Components removed as required to access frame for repair

Reference:

TC 9-510
TB 9-2300-247-40

A. CLEANING

Clean frame area to be repaired in accordance with paragraph 1-24.

B. INSPECTION

Inspect frame and related components in accordance with paragraph 1-24.

C. REPAIR

Repair forklift frame in accordance with TC 9-510 and TB 9-2300-247-40.

FOLLOW-ON MAINTENANCE:

Install forklift components

END OF TASK

Section IX. HYDRAULIC AND FLUID SYSTEM MAINTENANCE

4-40. CARRIAGE ASSEMBLY REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)

Equipment Condition:

Carriage assembly removed (para. 3-65)

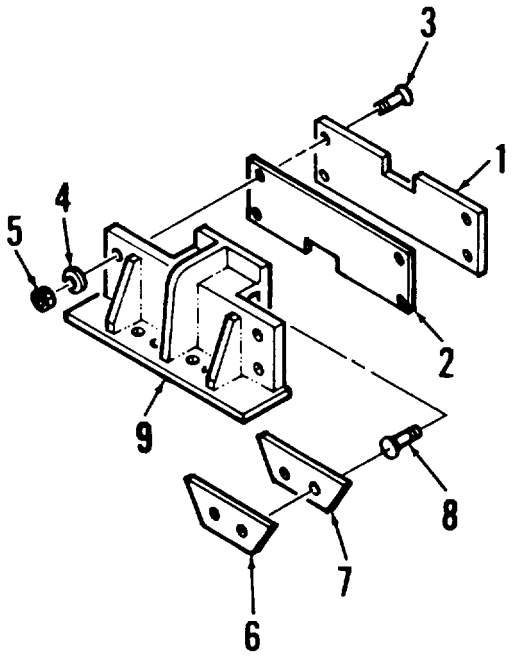
Materials / Parts:

Loctite 242 (20, App. C)

A. DISASSEMBLY

1. Remove wear pad (1) and shim (2) from upper carriage retainer (9) by removing screws (3), washers (4), and nuts (5).

2. Remove wear pad (6) and shim (7) from upper carriage retainer (9) by slipping off screws (8).



3. Remove fork positioners (10) from carriage weldment (11) by removing screws (12, 14) and washers (13).

B. CLEANING

Clean carriage assembly components in accordance with paragraph 1-24.

C. INSPECTION

1. Inspect carriage assembly components in accordance with paragraph 1-24.

2. Inspect wear pads and shims for uneven or excessive wear. Replace pads if worn.

D. REPAIR

Repair of the carriage assembly consists of removal and replacement of defective, deformed, or damaged components and worn pads.

E. ASSEMBLY

1. Apply loctite to threads of screws (12, 14). Install fork positioners (10) onto carriage weldment (11) using screws and washers (13).

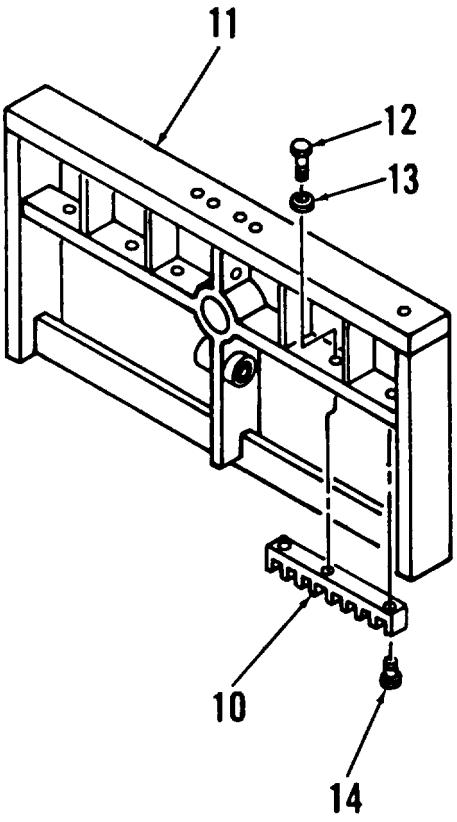
2. Install wear pad (6) and shim (7) onto upper carriage retainer (9) by pushing wear pad onto heads of screws (8).

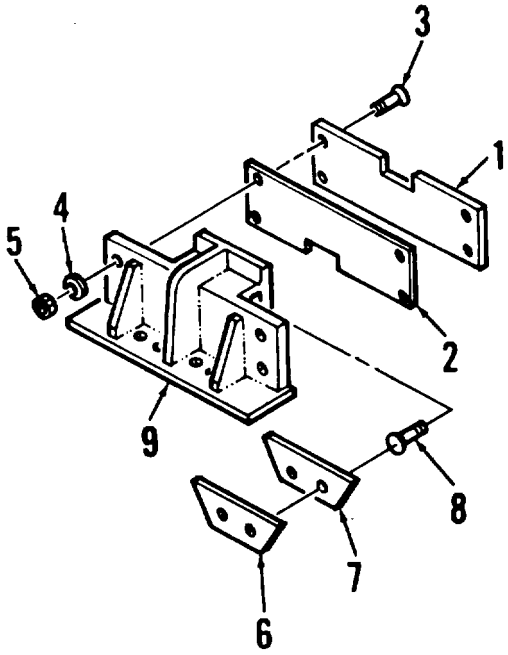
3. Install wear pad (1) and shim (2) onto upper carriage retainer (9) using screws (3), washers (4), and nuts (5).

FOLLOW-ON MAINTENANCE:

Install carriage assembly (para. 3-65)

END OF TASK





4-41. MAST ASSEMBLY REPAIR

This task covers: Disassembly, Cleaning, Inspection, Repair, and Assembly

INITIAL SETUP:

Tools and Test Equipment:

General Mechanics Tool Kit (1, App. E)
Sling (4, App. E)

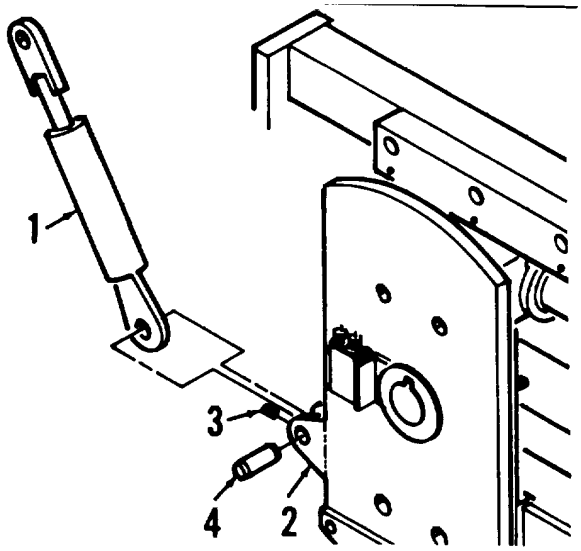
Equipment Condition:

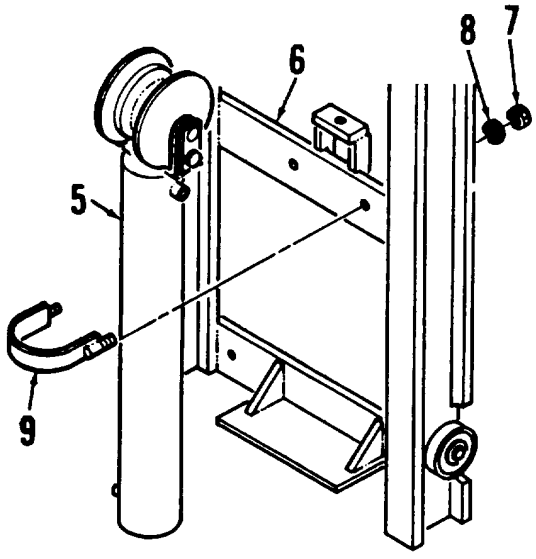
Hoses, lines, and tubing removed (para. 2-156)
Sideshift cylinder removed (para. 2-160)
Mast assembly removed (para. 3-66)

A. DISASSEMBLY

1. REMOVE ROTATE CYLINDER (1) FROM SIDESHIFT SPLINE (2) BYREMOVING SETSCREW (3) AND ROLL PIN (4).

2. REMOVE FREELIFT CYLINDER (5) FROM BRACE (6) BY REMOVING NUTS (7), WASHERS (8), AND CYLINDER RETAINING STRAP (9).





3. REMOVE MAINLIFT CYLINDERS (10).

   a. Release top of mainlift cylinders (10) from cylinder mounts (11) by removing screws (12) and nuts (13).

   NOTE

   Only outboard roll pins (15) need to be removed in order to remove spring pins (16). Inboard roll pins can remain installed in spring pins.

   b. Release bottom of mainlift cylinders (10) from brackets (14) by removing spring pins (15) and roll pins (16).

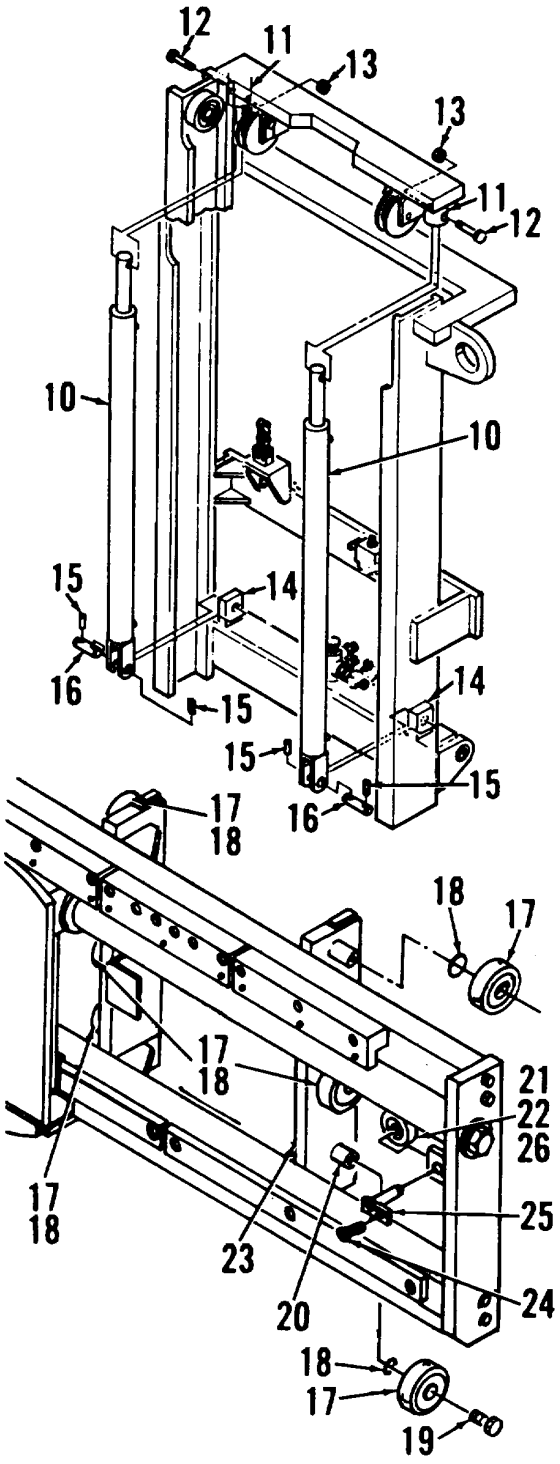
4. REMOVE ROLLERS (17,21) FROM SIDESHIFT CARRIER.

   a. Remove countersunk screws (19) from two lower mounting stubs (20).

   b. Remove six rollers (17) and shims (18) from carrier frame (23).

   c. Remove two chain rollers (21) and shims (22) from carrier frame(23) by removing screws (24) and roller pins (25).

   d. Remove bushings (26) from chain rollers (21) only if replacement is required.



5. REMOVE FOUR ROLLERS (27) FROM CARRIER FRAME (33).

   a. Remove four rollers (27) from carrier frame (33) by removing screws (30).

   b. Remove rollers (27) from stub shafts (29) by removing retaining rings (28).

6. REMOVEMUDGUARDS(31),HOSE BRACKET (35), AND MANIFOLD (37) FROM CARRIER FRAME (33).

   a. Remove mudguards (31) and spacers (32) from carrier frame (33) by removing screws (34).

   b. Remove hose bracket (35) from carrier frame (33) by removing screws (36).

   c. Remove manifold (37) from carrier frame (33) by removing screws (38) and washers (39).

7. REMOVE RETAINERS (40) AND WEAR PADS (42, 44, 49) FROM CARRIER FRAME (33).

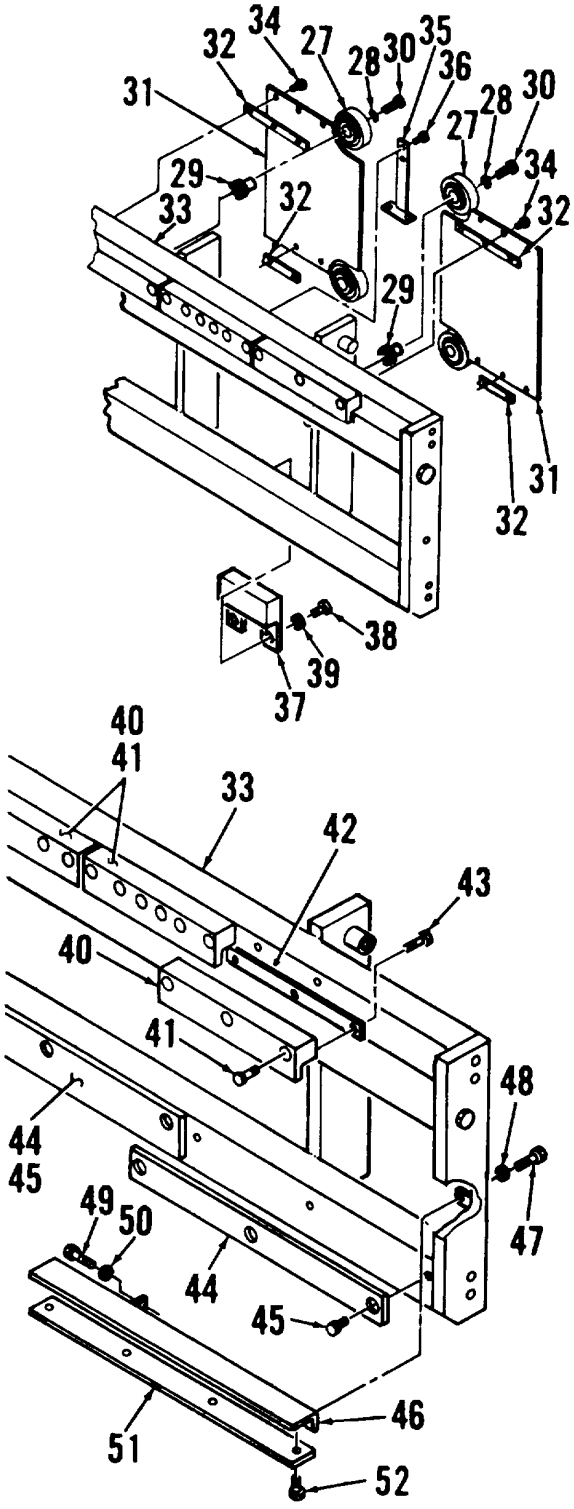
   a. Remove retainers (40) from carrier frame (33) by removing screws (41).

   b. Remove retainer wear pads (42) from retainers (40) by removing screws (43).

   c. Remove sideshift wear pads (44) from carrier frame (33) by removing screws (45).

   d. Remove hose guide (46) from carrier frame (33) by removing screws (47, 49) and washers (48, 50).

   e. Remove wear strip (51) by removing screws (52).



8. REMOVE WEAR PADS (53) AND SHIMS (54) FROM CARRIER WELDMENT (62) BY REMOVING SCREWS (55) AND SLOTTED STUDS (56).

9. REMOVESPINE ASSEMBLY(63) AND CARRIER END PLATES (57).

WARNING

Spine assembly is heavy and awkward. Enlist the help of an assistant when removing to prevent injury to personnel and damage to components.

a. Attach lifting sling to spine assembly (63). Connect to hoist and take up slack.

b. Release carrier end plates (57) from sideshift bar (58) by removing screws (59) and washers (60).

c. Remove carrier end plates (57) from carrier frame (33) by removing eight screws (61).

10. DISASSEMBLE SPINE ASSEMBLY (63) AS REQUIRED.

a. Carefully slide spine assembly (63) off of sideshift bar (64).

b. Remove front wear pad (65) from spine assembly (63) by removing screws (66).

c. Remove rear wear pad (67) from spine assembly (63) by removing screws (68) and washers (69, 70).

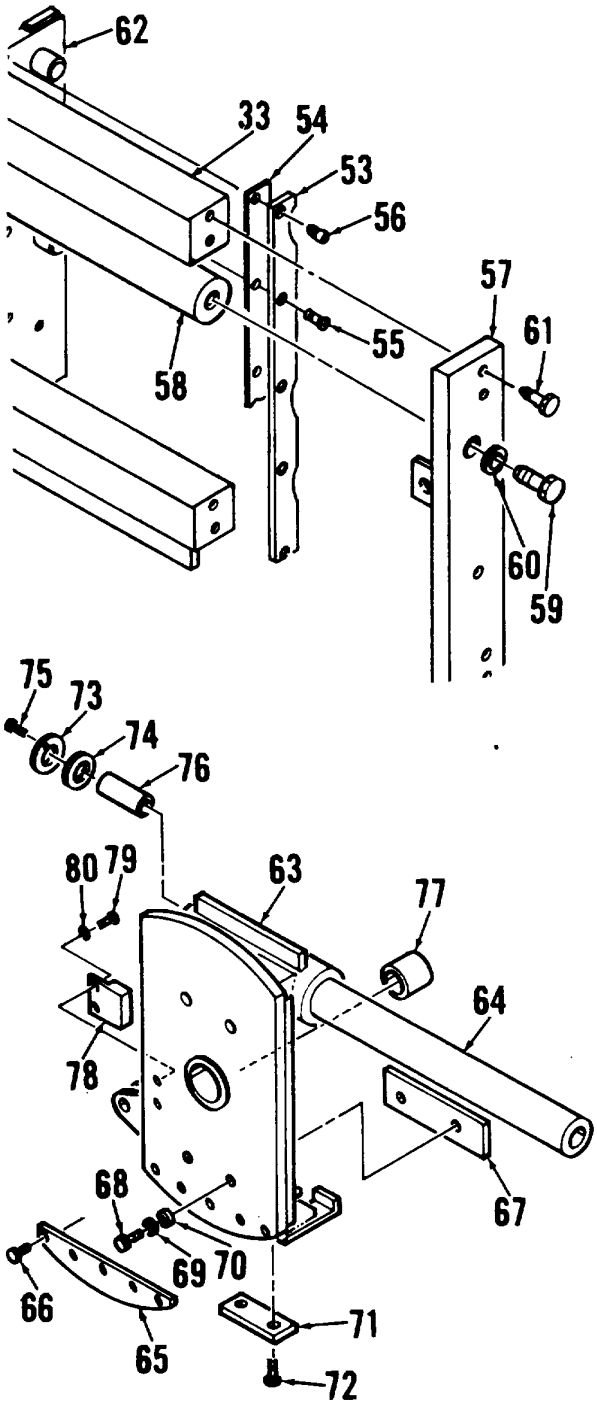
d. Remove lower wear pad (71) from spine assembly (63) by removing screws (72).

e. Remove seal retainers (73) and seals (74) from spine tube by removing screws (75).

f. Press sleeve bushings (76) from spine tube only if replacement is required.

g. Press bushing (77) from spine assembly (63) only if replacement is required.

h. Remove manifold (78) from spine assembly (63) by removing screws (79) and washers (80).



11. CAREFULLY SEPARATE INNER, OUTER, AND INTERMEDIATE RAILS FOR FURTHER DISASSEMBLY.

12. REMOVEROLLERS(81, 87)AND MANIFOLD MOUNTS (84, 85).

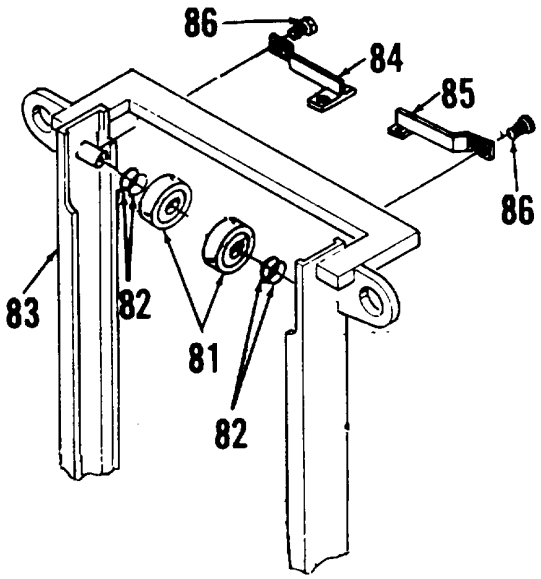
NOTE

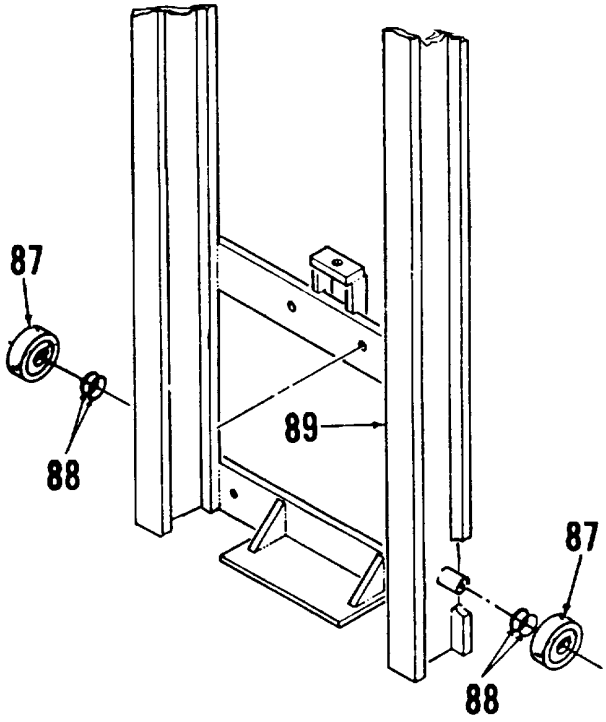
For ease of assembly, note number of shims removed with each roller during removal. Retain shims with rollers.

a. Remove rollers (81) and shims (82) from top of outer rail (83).

b. Remove manifold mounts (84, 85) from outer rail (83) by removing screws (86).

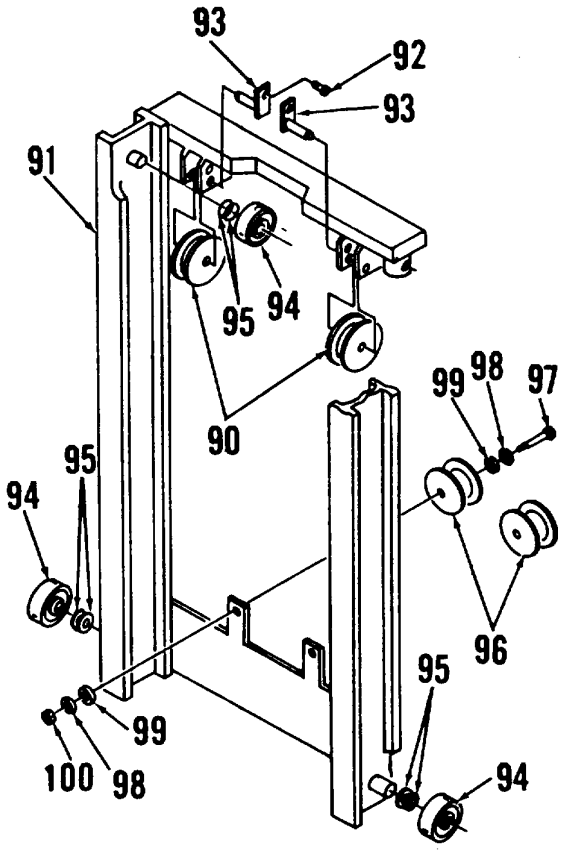
c. Remove rollers (87) and shims (88) from bottom of inner rail (89).





13. REMOVE ROLLERS (90, 94) AND ROLLERTM 10-3930-664-24 GUIDES (96).

    a. Remove drive chain rollers (90) from top of intermediate rail (91) by removing screws (92) and roller pins (93).
    b. Remove four rollers (94) and shims (95) from intermediate rail (91).
    c. Remove mainlift hose roller guides (96) from bottom of intermediate rail (91) by removing bolts (97) and washers (98, 99).



B. CLEANING

Clean mast assembly components in accordance with paragraph 1-24.

C. INSPECTION

a. Inspect mast assembly components in accordance with paragraph 1-24.

b. Inspect wear pads (53, 65, 67, 71) for uneven or excessive wear. Check for small semi-circle on face of pad. If semi-circle has worn away, replace pad.

D. REPAIR

Repair of the mast assembly consists of removal and replacement of defective, deformed, or damaged components and worn pads.

E. ASSEMBLY

1. INSTALL ROLLERS (90 94) AND ROLLER GUIDES (96).

    a. Install mainlift hose roller guides (96) onto bottom of intermediate rail (91) using bolts (97) and washers (98, 99).

    b. Install four rollers (94) and shims (95) onto intermediate rail (91).

    c. Install drive chain rollers (90) onto top of intermediate rail (91) using screws (92) and roller pins (93).

2. INSTALLROLLERS(81, 87) AND MANIFOLD MOUNTS (84, 85).

NOTE

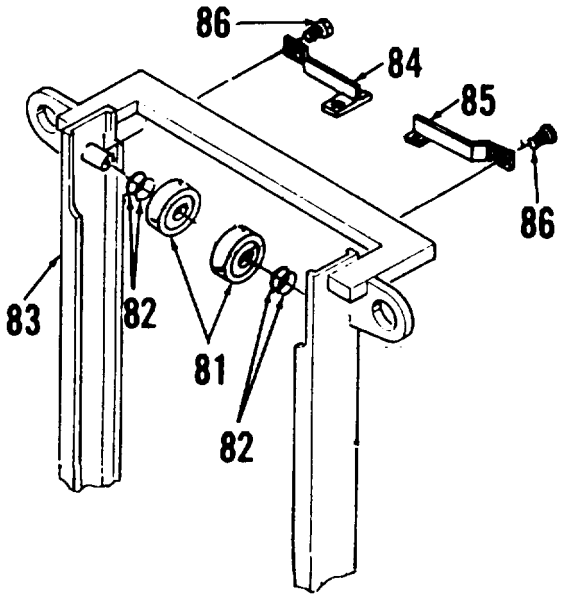
Install same number of shims with each roller as noted during removal.

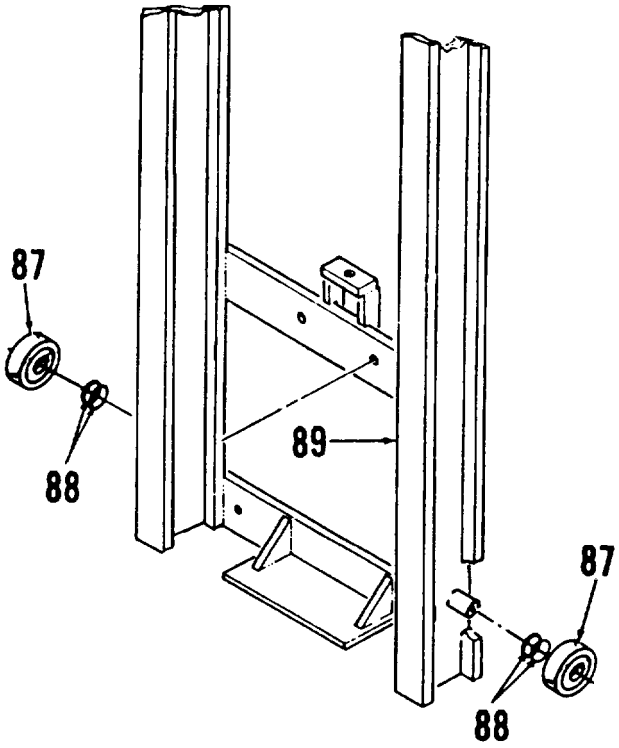
a. Install rollers (87) and shims (88) onto bottom of inner rail (89).

b. Install manifold mounts (84, 85) onto outer rail (83) using screws (86).

c. Install rollers (81) and shims (82) onto top of outer rail (83).

3. CAREFULLY MATE INNER, OUTER, AND INTERMEDIATE RAILS. INSPECT FIT AND ALIGNMENT OF ROLLERS ON EACH RAIL. INSTALL ADDITIONAL ROLLER SHIMS AS REQUIRED TO ENSURE SMOOTH OPERATION OF RAIL ASSEMBLY.





4. ASSEMBLE SPINE ASSEMBLY (63).

   a. Install manifold (78) onto spine assembly (63) using screws (79) and washers (80).

   b. Press bushing (77) into spine assembly (63).

   c. Press sleeve bushings (76) into spine tube.

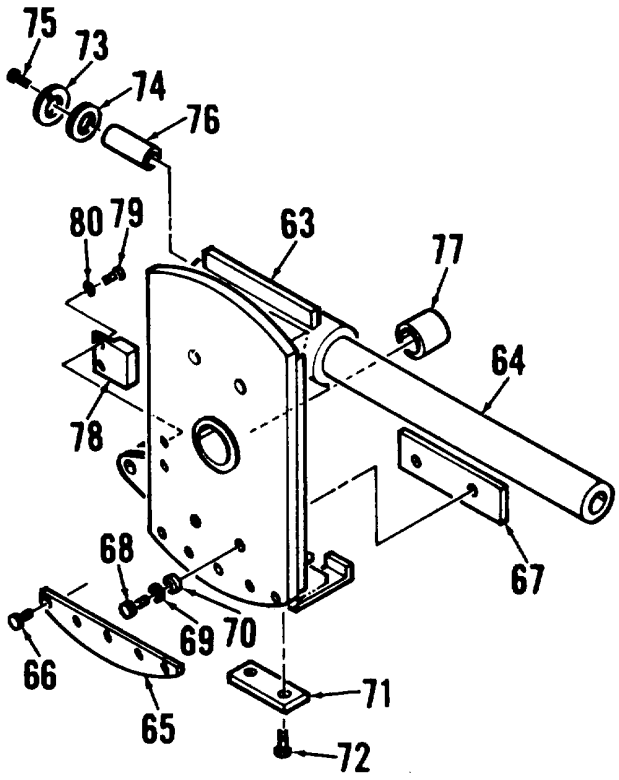
   d. Install seal retainers (73) and seals (74) onto spine tube using screws (75).

   e. Attach lower wear pad (71) to spine assembly (63) using screws (72).

   f. Attach rear wear pad (67) to spine assembly (63) using screws (68) and washers (69, 70).

   g. Attach front wear pad (65) to spine assembly (63) using screws (66).

   h. Carefully slide spine assembly (63) onto sideshift bar (64).



5. INSTALL SPINE ASSEMBLY (63) AND CARRIER END PLATES (57).

WARNING

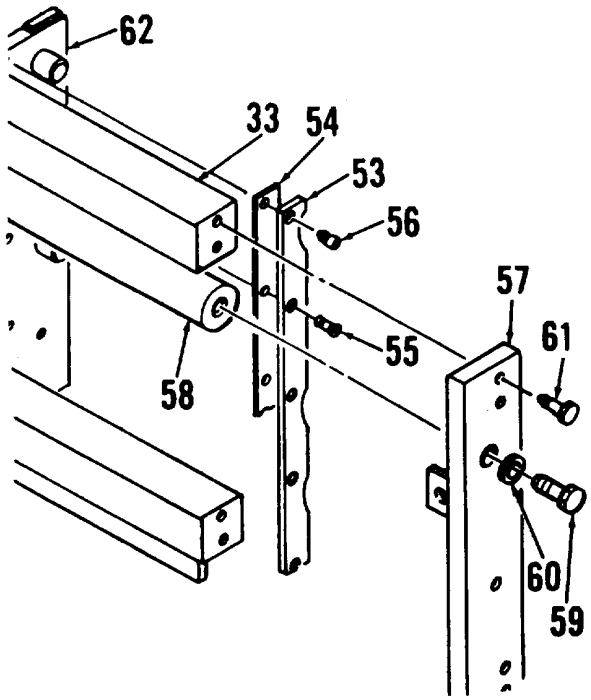
Spine assembly is heavy and awkward. Enlist the help of an assistant when installing to prevent injury to personnel and damage to components.

   a. Attach lifting sling to spine assembly (63). Connect to hoist and take up slack.

   b. Position spine assembly (63) onto carrier frame (33). Install carrier end plates onto carrier frame using eight screws (61).

   c. Attach carrier end plates (57) to sideshift bar (58) using screws (59) and washers (60).

6. INSTALL WEAR PADS (53) AND SHIMS (54) ONTO CARRIER WELDMENT (62) USING SCREWS (55) AND SLOTTED STUDS (56).



7. INSTALL RETAINERS (40) AND WEAR PADS (42, 44, 49) ONTO CARRIER FRAME (33).

    a. Install wear strip (51) onto hose guide (46) using screws (52).

    b. Install hose guide (46) onto carrier frame (33) using screws (47, 49) and washers (48, 50).

    c. Install sideshift wear pads (44) onto carrier frame (33) using screws (45).

    d. Install retainer wear pads (42) onto retainers (40) using screws (43).

    e. Install retainers (40) onto carrier frame (33) using screws (41).

8. INSTALLMUDGUARDS(31),HOSE BRACKET (35), AND MANIFOLD (37) ONTO CARRIER FRAME (33).

    a. Install manifold (37) onto carrier frame (33) using screws (38) and washers (39).

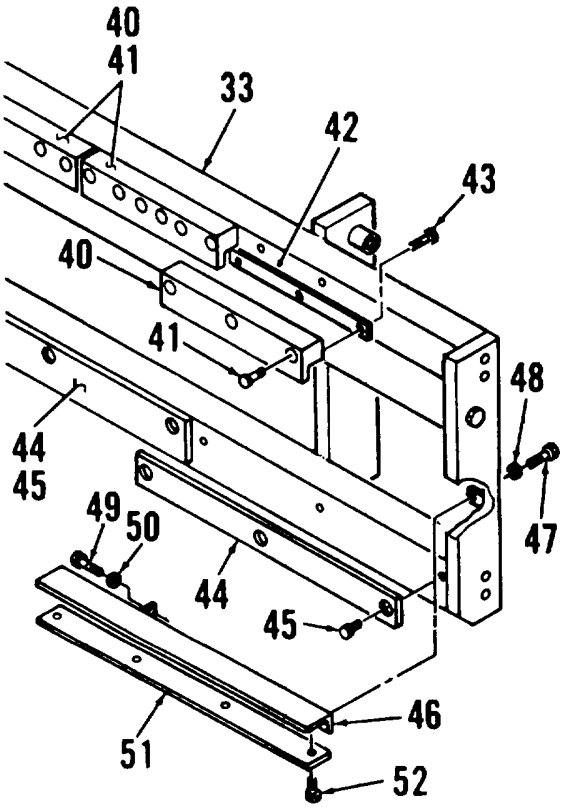
    b. Install hose bracket (35) onto carrier frame (33) using screws (36).

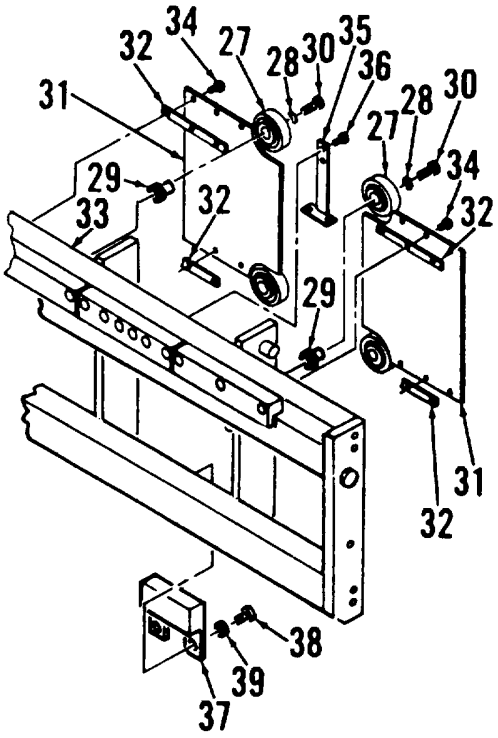
    c. Install mudguards (31) and spacers (32) onto carrier frame (33) using screws (34).

9. ASSEMBLE FOUR ROLLERS (27) AND INSTALL ONTO CARRIER FRAME (33).

    a. Assemble rollers (27) onto stub shafts (29) using retaining rings (28).

    b. Install assembled rollers (27) onto carrier frame (33) using screws (30).





10. INSTALL ROLLERS (17, 21) ONTO SIDESHIFT CARRIER.

    a. Press bushings (26) into chain rollers (21).

    b. Install two chain rollers (21) and shims (22) onto carrier frame (23) using screws (24) and roller pins (25).

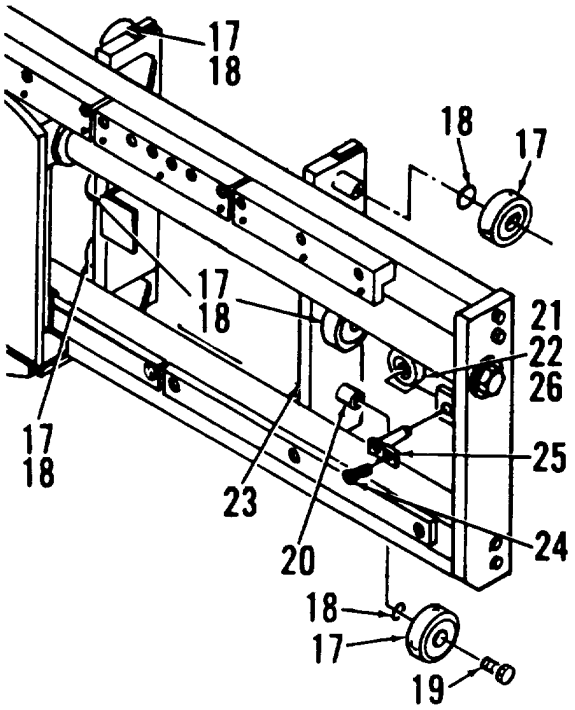
    c. Install six rollers (17) and shims (18) onto carrier frame (23).

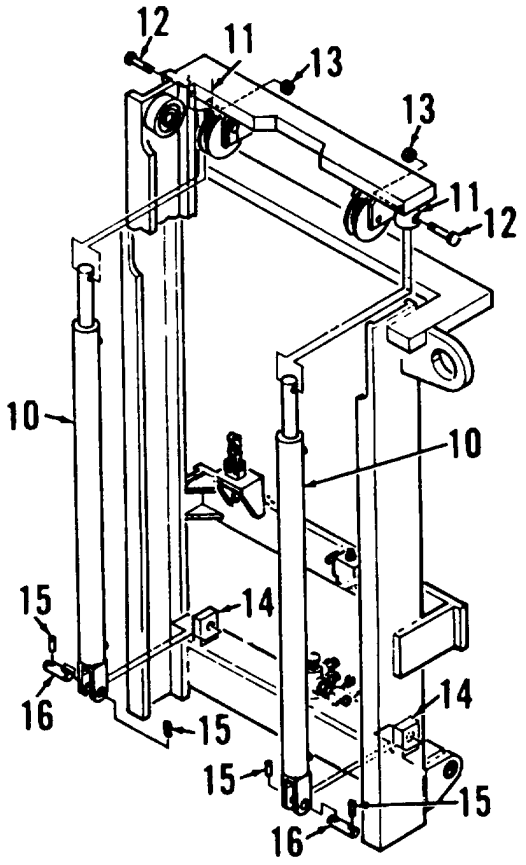
    d. Install countersunk screws (19) into two lower mounting stubs (20).

11. INSTALL MAINLIFT CYLINDERS (10).

    a. Install top of mainlift cylinders (10) into cylinder mounts (11) and secure using screws (12) and nuts (13).

    b. Attach bottom of mainlift cylinders (10) to brackets (14) using spring pins (15 and roll pins (16).





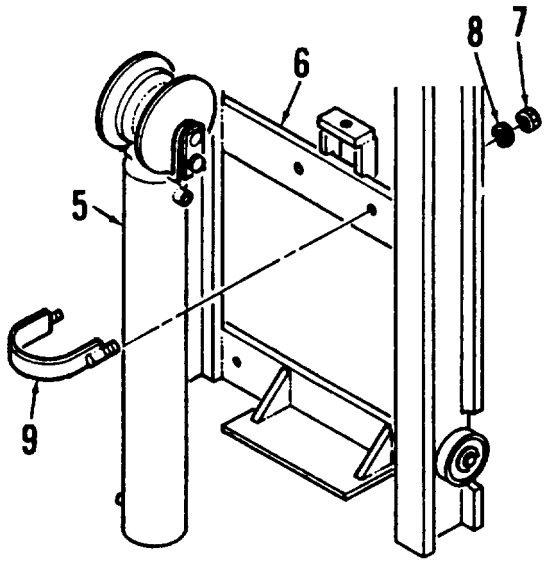
12. INSTALL FREELIFT CYLINDER (5) ONTO BRACE (6) USING NUTS (7), WASHERS (8), AND CYLINDER RETAINING STRAP (9).

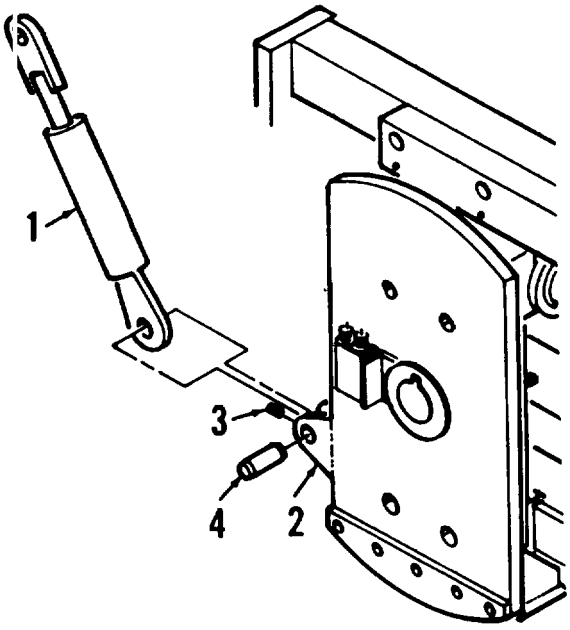
13. ATTACH ROTATE CYLINDER (1) TO SIDESHIFT SPLINE (2) USING SETSCREW (3) AND ROLL PIN (4).

FOLLOW-ON MAINTENANCE:

Install mast assembly (para. 3-66)
Install sideshift cylinder (para. 2-160)
Install hoses, lines, and tubing (para. 2-156)

END OF TASK





APPENDIX A

REFERENCES

A-1. SCOPE. This appendix contains a list of forms, field manuals, technical manuals, and other reference publications that may be used in conjunction with this TM in the maintenance of the 4K RTFL Forklift Truck.

A-2. FORMS AND RECORDS.

DA Form 1222	Routing Slip
DA Form 2028	Recommended Changes to Publications and Blank Forms
DA Form 2028-2	Recommended Changes to Equipment Technical Manuals
DA Form 2258	De-preservation Guide for Vehicles and Equipment
DA Form 2404	Equipment Inspection and Maintenance Worksheet
DA Form 2408-9	Equipment Control Record
DD Form 2407	Maintenance Request
DA Pam 25-30	Consolidated Index of Army Publications and Blank Forms
SF 368	Product Quality Deficiency Report

A-3. ARMY REGULATIONS.

AR 310-25	Dictionary of United States Army Terms
AR 310-50	Authorized Abbreviations and Brevity Codes

A-4. LUBRICATION.

LO 10-3930-664-12	Technical Publication Lubrication Order, Truck, Forklift, 4000 lb. Capacity Rough Terrain, DED, Pneumatic Tire
C9100-IL	Identification List for Fuels, Lubricants, Oils, and Waxes
TB703-1	Specification List of Standard Liquid Fuels, Lubricants, Preservatives, and Related Products Authorized for Use by US Army

A-5. OPERATION.

TM 10-3930-664-10	Operators Manual, Truck, Forklift, 4000 lb. Capacity Rough Terrain, DED, Pneumatic Tire
TBMED 251	Noise and Conservation of Hearing

A-6. PAINTING.

AR 740-1	Color, Marking, and Preparation of Equipment for Shipment
AR 746-5	Color and Marking of Army Material
MIL-T-704	Treatment and Painting of Material

A-7. MAINTENANCE.

TM 10-3930-664-24P	Unit, Direct Support, and General Support, Repair Parts and Special Tools List, Truck, Forklift, 4000 lb. Capacity Rough Terrain, DED, Pneumatic Tire
TM38-750	The Army Maintenance Management System (TAMMS)
TB SIG 222	Electrical Soldering Procedures
TC 9-510	Metal Body Repairs and Related Operations
TB 9-2300-247-40	Repair of Frames
TM 750-254	Cooling Systems for Tactical Vehicles

A-8. SHIPMENT AND STORAGE.

MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of US Military Property
MIL-STD-162	Materials Handling Equipment: Preparation for Shipment, Storage, Cyclic Maintenance, Routine Testing and Processing
MIL-STD-209	Slinging and Tie-down Provisions for Lifting and Tying Down Military Equipment
TM740-90-1	Administrative Storage of Equipment

A-9. DEMOLITION OF EQUIPMENT.

TM750-244-6	Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use

A-10. FIRE PROTECTION.

TB5-4200-200-10	Hand Portable Fire Extinguishers Approved for Army Use

APPENDIX B

MAINTENANCE ALLOCATION CHART (MAC)

Section I. INTRODUCTION

B-1. GENERAL.

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS. Maintenance functions will be limited to, and defined as follows:

a. **Inspect**. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound or feel).

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

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

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

e. **Align**. To adjust specified variable elements of an item to bring about optimum or desired performance.

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

g. **Remove/Install.** To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. **Replace.** To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the 3rd position code of the SMR code.

i. **Repair.** The application of maintenance services, including fault location / troubleshooting, removal / installation, and disassembly / assembly procedures, and maintenance actions to identify troubles and restore service- ability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item or system.

j. **Overhaul.** That maintenance effort (service / action) prescribed to restore an item to a completely serviceable / operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

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

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

a. **Column 1 - GROUP NUMBER.** Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End group item number is "00".

b. **Column 2 - COMPONENT / ASSEMBLY.** Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. **Column 3 - MAINTENANCE FUNCTION.** Column 3 lists the functions to be performed on the item listed in column 2. For a detailed explanation of these functions, refer to paragraph B-2.

d. **Column 4 - MAINTENANCE LEVEL.** Column 4 specifies, by the listing of a work time figure in the appropriate sub-column(s), the category of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly / assembly time), troubleshooting / fault isolation time, and quality assurance / quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

C Unit (Operator or Crew)
O Unit Organizational Maintenance
F Direct Support Maintenance
H General Support Maintenance
D Depot Maintenance

e. **Column 5 - TOOLS AND EQUIPMENT.** Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. **Column 6 - REMARKS.** This column shall, when applicable, contain a letter code, in alphabetical order, which shall be keyed to the remarks contained in Section IV.

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

a. **Column 1 - TOOL OR TEST EQUIPMENT REFERENCE CODE.** The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. **Column 2 - MAINTENANCE CATEGORY.** The lowest category of maintenance authorized to use the tool or test equipment.

c. **Column 3 - NOMENCLATURE.** Name or identification of the tool or test equipment.

d. **Column 4 - NATIONAL / NATO STOCK NUMBER.** The national or NATO stock number of the tool or test equipment.

e. **Column 5 - TOOL NUMBER.** The manufacturer's part number.

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

a. **Column I - REFERENCE CODE.** The code recorded in Section II, Column 6.

b. **Column 2 - REMARKS.** This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
01	ENGINE:								A
0100	ENGINE ASSEMBLY	INSPECT	0.1						
		SERVICE	0.1	2.0				1, 3, 11	B
		TEST		1.0				1, 3, 10	C
		REPLACE			7.0			1, 3, 20	D
		REPAIR				20.0		1, 4, 5, 16, 17	
	ENGINE MOUNTS	INSPECT		0.1					
		REPLACE			2.0			1, 3	
	LIFTING BRACKETS	REPLACE		1.0				1	
0101	CYLINDER BLOCK & CYLINDER HEAD:								
	CYLINDER BLOCK	REPLACE				30.0		1, 4	
		REPAIR				8.0		1, 4, 5	
	CYLINDER HEAD ASSEMBLY WITH VALVES	ADJUST		2.0				1, 3	E
		REPLACE			8.0			1, 3	
		REPAIR				8.0		1, 4, 5	
0102	CRANKSHAFT								
	CRANKSHAFT	REPLACE				6.0		1, 4	
	CRANKSHAFT MAIN BEARINGS	REPLACE				6.0		1, 4	R
0103	FLYWHEEL ASSEMBLY								
	FLYWHEEL	REPLACE			4.0			1, 3, 4	
	FLYWHEEL HOUSING	REPLACE			4.0			1, 4	

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
0104	PISTONS, CONNECTING RODS								
	PISTONS, PISTON	REPLACE				10.0		5	
	PINS AND RINGS								
	CONNECTING RODS AND BEARINGS	REPLACE				10.0		5	
0105	VALVES, CAMSHAFT AND TIMING SYSTEM								
	ENGINE VALVE COVER ASSEMBLY	REPLACE		0.8				1	F
	CAMSHAFT	REPLACE				5.0		1, 4	
	TIMING PIN	REPLACE				4.0		1, 4	
	CAM FOLLOWER COVER	REPLACE			1.0			1, 4	
	ROCKER, ARM ASSEMBLY	REPLACE REPAIR			2.0 4.0			1, 3 1, 3	
	TAPPETS	REPLACE				4.0		1, 2	
	PUSH RODS	REPLACE			4.0			1, 2	
0106	ENGINE LUBRICATING SYSTEM								
	OIL COOLER	REPLACE		1.0				1, 3	
	OIL FILTER BYPASS VALVE	REPLACE		1.0				1, 3	
	OIL PRESSURE RELIEF VALVE	REPLACE		1.0				1, 3	

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
	OIL PUMP SUCTION CONNECTION	REPLACE			2.0			1, 3	
	OIL PAN	INSPECT			0.1				G
		REPLACE			2.0			1, 3	
	ENGINE OIL PUMP	REPLACE			1.0			1, 3	
	OIL FILTER	REPLACE		0.2				11	
	OIL LEVEL DIPSTICK	REPLACE		0.5				1	
	OIL SAMPLING VALVE	REPLACE		0.5				1	
0108	MANIFOLDS								
	EXHAUST MANIFOLD	REPLACE		1.0				1, 3	
	INTAKE MANIFOLD COVER	REPLACE		1.0				1, 3	
03	FUEL SYSTEM:								
0301	FUEL INJECTORS	REPLACE			1.0			1	
0302	FUEL PUMP								
	FUEL INJECTOR PUMP	ADJUST				2.0		3	
		REPLACE			1.0			1, 3	
		REPAIR			1.0				
	FUEL LIFT TRANSFER PUMP	REPLACE		1.0				1	
	FUEL SHUTOFF BALL VALVE	REPLACE		1.0				1	
	ENGINE FUEL LINES & FITTINGS	REPLACE		0.7				1	

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
0304	AIR CLEANERS								
	AIR CLEANER ASSEMBLY	REPLACE		0.7				1	
	AIR CLEANER ELEMENT	SERVICE		0.5				2	H
	AIR RESTRICTION INDICATOR	INSPECT	0.1						I
		REPLACE		0.5				1	
	AIR INLET CAP	INSPECT	0.1						
		REPLACE		0.3				1	
	EVACUATOR VALVE	INSPECT	0.1						
		SERVICE		0.2				1, 3	
		REPLACE		0.2				1	
	AIR INLET TUBE	REPLACE		0.2				1	
0306	TANKS, LINES AND FITTINGS								
	FUEL TANK	INSPECT	0.1						G
		SERVICE	0.3	1.5					J
		REPLACE			2.0			1	
		REPAIR			2.0			6.8	
	FUEL LINES AND FITTINGS	INSPECT	0.1						G
		REPLACE		1.0				1	
0309	FUEL FILTER ASSEMBLY	SERVICE	0.1						
		REPLACE		0.5				11	
	FUEL/WATER SEPARATOR	SERVICE	0.1						
		REPLACE		0.5				1	
0311	ENGINE STARTING AIDS								

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
	THERMOSTAT, ETHER INJECTOR	REPLACE		0.7				1	
	ATOMIZER, ETHER INJECTOR	REPLACE		0.7				1	
	ETHER CYLINDER	REPLACE		0.2				1	
0312	ACCELERATOR CONTROLS								
	ACCELERATOR CONTROL RESERVOIR	SERVICE	0.1					3	K
		REPLACE		1.0				1, 3	
	ACCELERATOR SLAVE CYLINDER	ADJUST		0.5				1, 3	
		REPLACE		1.0				1, 3	
		REPAIR			1.5			1	
	ACCELERATOR ACTUATOR WIPEDAL	INSPECT	0.1						L
		REPLACE		1.0				1, 3	
		REPAIR			1.5			1, 3	
04	EXHAUST SYSTEM:								
0401	MUFFLER / SPARK ARRESTOR ASSEMBLY	REPLACE		1.0				1	
05	COOLING SYSTEM:								
0501	RADIATOR								
	RADIATOR ASSEMBLY	INSPECT	0.1						G
		SERVICE		0.2				1	
		REPLACE		2.0				1	
		REPAIR			2.0			1, 3, 5	
0502	COWLINGS, SHROUDS: RADIATOR BAFFLES	REPLACE		1.0				1	

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
0503	WATER MANIFOLD, HEADERS, THERMOSTAT, AND HOUSING GASKET								
	THERMOSTAT	REPLACE		0.5				1, 3	
	RADIATOR HOSES	INSPECT	0.1						G
		REPLACE		0.5				1	
0504	WATER PUMP	REPLACE		2.0				1, 3	
0505	FAN ASSEMBLY								
	FAN BLADE	INSPECT	0.1						
		REPLACE		1.5				1, 3	
	FAN GUARD	INSPECT	0.1						
		REPLACE		1.0				1	
	DRIVE BELT	INSPECT	0.1						
		REPLACE		1.0				1, 3	
06	ELECTRICAL SYSTEM:								
0601	ALTERNATOR								
	ALTERNATOR	REPLACE		0.5				1, 3	
		REPAIR			4.0			1, 7	
	PULLEY	REPLACE		1.0				1, 3	
	ALTERNATOR WIRING HARNESS	REPLACE		0.3				1	
0603	STARTER								
	STARTER MOTOR	REPLACE		0.5				1	
		REPAIR			4.0			1, 3, 7	
0607	INSTRUMENT PANEL:								

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
	INSTRUMENT PANEL	REPLACE		4.0				1, 3	
	GAUGES, SWITCHES, AND LIGHTS	INSPECT	0.2						
		REPLACE		0.5				1.3	
0606	MISCELLANEOUS ELECTRICAL COMPONENTS								
	CIRCUIT BREAKERS	INSPECT	0.1						
		REPLACE		0.5				3	
	STE / ICE ELECTRICAL COMPONENTS	TEST		0.5				1, 3, 10	C
		REPLACE		0.2				1, 3	
	BLACKOUT / SERVICE LIGHT SWITCH	INSPECT	0.1						
		REPLACE		0.5				1	
0609	LIGHTS								
	WORK / DRIVE	INSPECT	0.1						
		REPLACE		0.5				1	M
	BLACKOUT DRIVE LIGHTS	INSPECT	0.1						
		REPLACE	0.5					1	N
	STOP AND BLACKOUT TAILLIGHTS	INSPECT	0.1						
		REPLACE		0.5				1	N
	BLACKOUT MARKER LIGHTS	INSPECT	0.1						
		REPLACE		0.5				1	N
0610	SENDING UNITS AND WARNING SWITCHES: ENGINE OIL PRESSURE SWITCH	REPLACE		0.3				1, 3	

Section H. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
	ENGINE OIL PRESSURE SENDER	REPLACE		0.3				1,3	
	ENGINE COOLANT TEMP SENDER	REPLACE		0.3				1,3	
	TRANSMISSION OIL TEMP. SENDER	REPLACE		0.3				1,3	
	STOP INDICATOR SWITCH	REPLACE		0.3				1,3	
	FUEL LEVEL SENDING UNIT	REPLACE		0.3				1,3	
	REVERSE WARNING ALARM SWITCH	REPLACE		0.3				1,3	
0611	HORN, SIRENS								
	REVERSE WARNING ALARM	INSPECT	0.1						
		REPLACE		0.5				1	
	HORN	INSPECT	0.1						
		REPLACE		0.5				1	
0612	BATTERIES								
	BATTERIES	INSPECT	0.1						
		SERVICE		0.3				3	
		REPLACE		0.5				1,3	
	BATTERY CABLES	INSPECT	0.1						
		SERVICE		0.3				1,3	
		REPLACE		0.5				1,3	

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
	BATTERY BOX COVERS AND HOLDDOWN	INSPECT	0.1						
		REPLACE		1.0				1	
		REPAIR			1.0			1,8	
0613	WIRING HARNESS								
	MAIN WIRING HARNESS	REPLACE		4.0					
		REPAIR		2.0					
	CAB WIRING HARNESS	REPLACE		2.0				1,3	
		REPAIR		1.0				1,3	
	DCA HARNESS	REPLACE		4.0				1,3	
		REPAIR		2.0				1,3	
	SLAVE RECEPTACLE	REPLACE		0.5				1,3	
07	TRANSMISSION:								
0705	TRANSMISSION SHIFTER	INSPECT	0.1						
		REPLACE		0.5				1,3	
		REPAIR		1.0				1,3	
0708	TORQUE CONVERTER	REPLACE			8.0			1,3	
	TORQUE CONVERTER HOUSING	REPLACE			4.0			1,3	
	PRESSURE REGULATOR ASSEMBLY	REPLACE			8.0			1,3,4	
		REPAIR				2.0		1,3,4,14	
0710	TRANSMISSION								

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
	TRANSMISSION ASSEMBLY	INSPECT	0.1						G
		SERVICE	0.1	0.5				1,3	O
		TEST		0.5				1,9,13	
		REPLACE			8.0			1,3,4,	
		REPAIR				8.0		1,3,4,9,14	
	MOUNTING BRACKETS	REPLACE			2.0			1,3	
	SPACER PLATE	REPLACE				2.0		3	
	CLUTCH ASSEMBLIES	REPLACE				4.0		1,4	
	OUTPUT SHAFT ASSEMBLY	REPLACE				4.0		1,4	
	CLUTCH GEARS 1St AND 2nd; AND 3rd	REPLACE				3.0		1,4	
	CLUTCH GEARS FORWARD/REVERSE	REPLACE				3.0		1,4	
0714	SERVO UNIT								
	MODULATOR VALVE	REPLACE			1.0			1	
	INCHING VALVE	REPLACE			1.0			1	
	ELECTRONIC CONTROL VALVES	REPLACE			1.0			1	
0721	COOLERS, PUMPS, MOTORS								
	OIL CHARGING PUMP	REPLACE			4.0			1	
	TRANSMISSION OIL COOLER	REPLACE		2.0				1	

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
	TRANSMISSION OIL FILTER	REPLACE		0.2				1,11	
	OIL SAMPLING VALVE	REPLACE		0.2				1	
09	PROPELLER AND PROPELLER SHAFTS:								
	FRONT AND REAR PROPELLER SHAFTS	SERVICE		0.1				1,3	
		REPLACE		0.5				1,3	
		REPAIR		1.0				1.3	
10	FRONT AXLE:								
1000	FRONT AXLE ASSEMBLY	INSPECT		0.1					
		SERVICE		0.1				1,3	
		REPLACE			2.0			1,3,4,18	
		REPAIR				3.5		1,3,4	
1002	DIFFERENTIAL REPLACE GEARS					2.0		1,3	
	BEVEL GEARS	REPLACE				3.5		1,3,4,15	
	DIFFERENTIAL LOCK	REPLACE				1.5		1,3	
1003	PLANETARY DRIVE GEARS	REPLACE				2.0		1,3	
1004	ARTICULATION JOINT	REPLACE				2.0		1,3	
	STEERING CYLINDERS	INSPECT	0.2						G
		REPLACE			3.0			1,3	Q
		REPAIR			3.0			1,3	Q
11	REAR AXLE:								

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
1100	REAR AXLE ASSEMBLY	INSPECT		0.1					
		SERVICE		0.1				1,3	
		REPLACE			2.0			1,3,4,18	
		REPAIR				3.5		1.3,4	
1102	DIFFERENTIAL GEARS	REPLACE				2.0		1,3	
	BEVEL GEARS	REPLACE				3.5		1,3,4,15	
1103	PLANETARY DRIVE GEARS	REPLACE				2.0		1,3	
	ARTICULATION JOINT	REPLACE				2.0		1,3.4	
1104									
	STEERING CYLINDERS	INSPECT	0.2						G
		REPLACE			3.0			1,3	Q
		REPAIR			3.0			1,3	Q
12	BRAKES:								
1201	PARK BRAKE								
	PARK BRAKE CYLINDER	INSPECT	0.1						
		REPLACE		0.5				1,3	
		REPAIR			2.0			1,3	
1202	SERVICE BRAKES								
	DISK BRAKE ASSEMBLY	INSPECT		0.5				1	P
		REPLACE			4.0			1,3,4	
		ADJUST		0.5				1	
1204	HYDRAULIC BRAKE SYSTEM								
	MASTER CYLINDER	SERVICE		0.2					
		REPLACE		0.5				1,3	

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
	HYDRAULIC BRAKE HOSES, LINES AND FITTINGS	INSPECT	0.1						G
		REPLACE		1.0				1,3	
13	WHEELS:								
1311	WHEEL ASSEMBLY	INSPECT	0.2						
		REPLACE		1.0				3	
		REPAIR		0.5				1	
1313	TIRE	INSPECT	0.2						
		SERVICE	0.1					3	
		REPLACE		1.0				3,18	
		REPAIR		1.0				3,19	
14	STEERING:								
1401	STEERING GEAR ASSEMBLY								
	ARTICULATION TIE ROD	ADJUST			0.5			1,3,4	
		REPLACE			0.5			1,3,4	
	STEERING WHEEL	REPLACE		0.5				1,3	
	STEERING COLUMN	REPLACE		1.0				1,3	
1411	HOSES, LINES, AND FITTINGS	INSPECT	0.1						
		REPLACE		1.0				1,3	
1414	STEERING SYSTEM VALVES								
	ORBITAL STEERING VALVE	INSPECT	0.1						G
		REPLACE		1.0				1,3	
		REPAIR			1.5			1,3	

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
	PRIORITY VALVE	REPLACE		1.0				1,3	
		REPAIR			1.5			1,3	
	STEERING SELECTOR VALVE	REPLACE		1.0				1,3	
		REPAIR			1.5			1,3	
15	FRAME, TOWING ATTACHMENTS AND DRAWBARS:								
1501	FRAME ASSEMBLY	REPAIR				2.0		6,8	
	ACCESS PLATFORMS, LADDERS, STEPS, AND HAND HOLDS	REPLACE		1.0				1	
		REPAIR			1.0			6,8	
1502	COUNTERWEIGHT	REPLACE		1.0				1,3	
1503	PINTLE HOOK	INSPECT	0.1						
		REPLACE		0.5				1	
	TOW BAR	INSPECT	0.1						
		REPLACE		1.0				1	
	TOW BAR LOCKING PIN	INSPECT	0.1						
		REPLACE		1.0				1	
18	BODY, CAB, HOOD AND HULL:								
1801	BODY, CAB, HOOD & HULL ASSEMBLIES								
	ENGINE COVER	REPLACE		0.5				1,3	
		REPAIR			1.0			1,8	
	LATCH & LINKAGE	REPLACE		1,0				1,3	
		ADJUST		.5				1,3	

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
	GAS-FILLED SPRING	REPLACE		0.5				1,3	
	TRANSMISSION COVERS	REPLACE		0.5				1,3	
		REPAIR			1.0			1,8	
	CAB ASSEMBLY	INSPECT	0.1						
		REPLACE			4.0			1,3	
		REPAIR			1.5			1,8	
	ROLLOVER PROTECTION STRUCTURE	INSPECT	0.1						
		REPLACE			4.0			1,3	
	DOORS	SERVICE		0.1				3	
		REPLACE		0.2				1,3	
		REPAIR			1.0			1,8	
1802	FENDERS, RUNNING BOARDS, WINDSHIELD GLASS								
	FENDERS	REPLACE		0.2				1	
		REPAIR			0.5			1,8	
	FENDER BRACES	REPLACE		0.2				1	
	CAB WINDOWS	REPLACE		2.0				1,3	
1805	FLOOR PLATE	REPLACE		2.0				1	
		REPAIR			1.0			1,8	
1806	UPHOLSTERY, SEATS AND CARPETS								
	SEAT ASSEMBLY	INSPECT	0.1						
		REPLACE		1.0				1	
		REPAIR			1.0			3,5	

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
	SEAT BELTS	INSPECT	0.1						
		REPLACE		0.2				1,3	
1808	TOOL BOX	REPLACE		0.5				1	
		REPAIR						1,8	
	DECON CAN BRACKET	REPLACE		0.5				1	
22	BODY, CHASSIS AND HULL ACCESSORY ITEMS:								
2202	WINDSHIELD WIPER ASSEMBLIES	INSPECT	0.2						
		REPLACE		1.0				1	
		REPAIR		0.5				1	
	MIRRORS	INSPECT	0.1						
		REPLACE		0.2				1	
	DEFROSTER ASSEMBLY	REPLACE		1.0				1	
		REPAIR			1.0			1	
2207	WINTERIZATION EQUIPMENT								
	HEATER ASSEMBLY	INSPECT	0.2						
		REPLACE		1.0				1	
		REPAIR			1.5			1	
	HEATER HOSES	REPLACE		1.0				1	
	HEATER SHUTOFF VALVE	REPLACE		0.5				1	
2210	DATA PLATES	REPLACE		0.2				3	
24	HYDRAULIC AND FLUID SYSTEMS:								

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
2401	HYDRAULIC PUMP	REPLACE		1.5				1,3	
		REPAIR			2.0			1,3	
2402	MANIFOLD AND CONTROL VALVES								
	DIRECTIONAL MANIFOLD CONTROL VALVE ASSEMBLY	REPLACE		0.5				1	
		REPAIR			1.0			3	
	MANIFOLDS	REPLACE		0.5				1	
2404	TILT CYLINDER								
	CARRIAGE TILT CYLINDER	REPLACE		1.0				1	
		REPAIR			1.0			1,3,13	
2405	MAST COLUMN								
	CARRIAGE ASSEMBLY	INSPECT	0.3						
		SERVICE		0.3				3	
		REPLACE			1.5			1,3,4	
		REPAIR				2.0		1,3,4,8	
	LIFT & SIDESHIFT CHAINS	ADJUST	0.5	0.5				1,3,16	
		REPLACE		1.0				1,3,16	
	MAST ASSEMBLY	INSPECT	0.3						
		SERVICE		0.3				3	
		REPLACE			1.5			1,3,4	
		REPAIR				2.0		1,3,4,8	
	FORKS	INSPECT	0.2						
		REPLACE		1.0				1,3	
2406	STRAINERS, FILTERS, LINES AND FITTINGS								

Section II. MAINTENANCE ALLOCATION CHART - continued

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
	HOSES, LINES, TUBING AND FITTINGS	INSPECT	0.3						G
		REPLACE		1.0				1	
	OIL SAMPLING VALVE	REPLACE		0.1				1	
	HYDRAULIC FILTER	REPLACE		0.2				11	
2407	HYDRAULIC CYLINDERS								
	LIFT CYLINDERS	INSPECT	0.2						
		REPLACE		0.5				1	
		REPAIR			1.0			3,13	
	SIDE SHIFT CYLINDER	INSPECT	0.2						G
		REPLACE		0.5				1	
		REPAIR			1.0			3,13	
	CARRIAGE ROTATE CYLINDER	INSPECT	0.2						G
		REPLACE		0.5				1	
		REPAIR			1.0			3,13	
2408	HYDRAULIC SYSTEM RESERVOIR	INSPECT	0.2						G
		SERVICE	0.1					3	
		REPLACE		2.0				1	
		REPAIR			1.0			3,8	
47	GAUGES, NON-ELECTRICAL:								
4702	HYDRAULIC RESERVOIR SIGHT GAUGE ’	INSPECT	0.1						
		REPLACE		0.5				1	
	VEHICLE LEVEL INDICATOR GAUGE	INSPECT	0.1						
		REPLACE		0.5				1	

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER	FSCM
1	O,F,H	TOOL KIT, GENERAL MECHANICS AUTOMOTIVE (GMTK) SC518-96-N26.	5180-00-177-7033	#W33004	50980
2	O,F,H	SETS, KITS AND OUTFITS COMPONENT LIST. SHOP EQUIPMENT, AUTOMOTIVE MAINTENANCE AND REPAIR COMMON NO. 1 LESS POWER SC4910-95-CL-A74.	4910-00-754-0654	#W32593	19204
3	O,F,H	SETS, KITS AND OUTFITS COMPONENT LIST. SHOP EQUIPMENT, AUTOMOTIVE MAINTENANCE, COMMON NO. 2. LESS POWER SC4910-95CL-A72.	4910-00-754-0650	#W32730	19204
4	F,H	SETS, KITS AND OUTFITS COMPONENT LIST. SHOP EQUIPMENT, AUTOMOTIVE MAINTENANCE AND REPAIR FIELD MAINTENANCE BASIC, LESS POWER SC4910-95-A31.	4910-00:754-0705	#T24660	19204
5	F,H	SETS, KITS, OUTFITS AND TOOLS. TOOL KIT, MACHINISTS: POST, CAMP AND STATION SC5280-95-A02.	5280-00-511-1950	#W44512	19204
6	F,H	SETS, KITS, OUTFITS, AND TOOLS. SHOP EQUIPMENT, FIELD MAINTENANCE BASIC SC3470-95-A02.	3470-00-754-0708	#T15644	19204
7	F,H	SETS, KITS AND OUTFITS COMPONENT LIST. SHOP EQUIPMENT, FUEL AND ELECTRICAL SYSTEM ENGINE: FIELD MAINTENANCE BASIC LESS POWER SC4940-95-CL4B20-HR.	4940-00-754-0714	#T30414	19204

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS - continued

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER	FSCM
8	F,H	SETS, KITS AND OUTFITS. TOOL KIT, BODY AND FENDER REPAIR SC5180-90-N34.	5180-00-754-0643	#W33689	50980
9	O	GAUGE, HYDRAULIC PRESSURE	4940-01-0868756	13221E6828	97403
10	O	SIMPLIFIED TEST EQUIPMENT FOR INTERNAL COMBUSTION ENGINES (STE/ICE) TM9-4910-571-34&P.	4910-00-124-2554	2389409	49671
11	O	WRENCH, STRAP 1-6' CAPACITY.	5120-00776-1840	W18-36	37078
12	F,H	TOOL OUTFIT, HYDRAULIC SYSTEM, TEST AND REPAIR (HSTRU) SC4940-95-CL-B07-HR.	4940-036-5784	T30377	97403
13	F	FLOWMETER, HYDRAULIC	4940-01-079-5263	13221E6829	97403
14	H	PRESSURE REGULATOR WRENCH	TBD	8909454-001	20722
15	H	DIFFERENTIAL RING NUT WRENCH	TBD	8909453-001	20722
16	H	ENGINE MAINTENANCE STAND	4910-01-159-6197	82-7012 3575194	05083 15434
17	H	ENGINE MAINTENANCE STAND ADAPTER	4910-01-1174344	1750A 3376975	45255 15434
18 CAPACITY	F,H	FLOOR JACK, 10 TON	4910-00-289-7233	TBD	TBD
19	O	REPAIR KIT, TIRE AND TUBE	2640-00-102-0978	TBD	TBD
20	F	SLING, ENGINE, TRANSMISSION, MOTOR VEHICLE, 3000 LB CAP	4910-00-9444915	TBD	TBD

Section IV. REMARKS

Reference Code

A. Engine Assembly is manufactured to metric and English measure.

B. Organizational level service by changing oil and filter.

C. STE/ICE Tests.

D. Engine and transmission are removed as unit. Faulty engine/transmission is repaired. Serviceable engine/transmission remated prior to installation.

E. Consists of adjusting valve clearance.

F. Valve cover consists of 4 valve covers. Front cover has provisions for engine oil fill.

G. Inspect for leaks.

H. Consists of cleaning filter with compressed air.

I. Consists of preop inspection for condition.

J. Crews adds fuel. Unit maintenance drains, cleans and refills tank.

K. Service consists of adding fluid.

L. Actuating cylinder and pedal are one assembly.

M. Replace consists of replacing sealed beam unit.

N. Replace consists of changing bulb.

O. Crew adds oil; unit maintenance drains transmission and refills; replace filter.

P. Service brakes are internal to front and rear axles.

Q. Steering cylinders are integral to front and rear axles.

R. Oversize bearings are available.

APPENDIX C

EXPENDABLE / DURABLE SUPPLIES AND MATERIALS LIST

Section 1. INTRODUCTION

C-1. SCOPE. This appendix lists expendable supplies and materials you will need to operate and maintain the 4K RTFL Forklift Truck. This listing is for informational purposes only and is not authority to requisition the needed items. These items are authorized to you by CTA 50-970, Expendable / Durable Items (except Medical, Class V, Repair Parts, and Heraldic Items) or CTA 8-100, Army Medical Department Expendable / Durable Items.

C-2. EXPLANATION OF COLUMNS. The following provides an explanation of the columns found in the tabular listing:

a. Column 1 ITEM NUMBER. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (eg., "Use cleaning compound, item 5, App. C).

b. Column 2 LEVEL. This column identifies the lowest level of maintenance that requires the listed item. The symbol designations for the various maintenance categories are as follows:

C	Unit (Operator or Crew)
O	Unit Organizational Maintenance
F	Direct Support Maintenance
H	General Support Maintenance
D	Depot Maintenance

c. Column 3 NATIONAL STOCK NUMBER. This is the National Stock Number (NSN) assigned to the item. Use the NSN to request or requisition the item.

d. Column 4 DESCRIPTION. This column 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). This column indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (eg., ea, in, dz.). 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	OFH	5350-00-186-8854	Abrasive Paper, 400 grit, CID A-A-1049, Type II	pkg.
2	F	6810-00-286-5435	Alcohol, Isopropyl	qt
3	O	6850-00-181-7929	Antifreeze, Ethylene Glycol, Inhibited, Heavy Duty, MIL-A-46153	
4	O	6850-00-174-1806	Antifreeze, Ethylene Glycol, Inhibited, Heavy Duty, Arctic, MIL-A-11755	
5	OF	9150-01-123-3152	Brake Fluid, Silicone, Automotive, All-Weather, Operational and Preservative, MIL-B-46176	gl
6	H	5330-01-221-0872	Cloth, Crocus	ea
7	F	5350-00-584-4654	Cloth, Emery, Medium Grit	ea
8	OFH	7920-01-004-7847	Cloth, Lint Free	ea
9	F	8030-00-293-3285	Compound, Anti-Seize, MIL-T-83483	oz
10	OFH	---	Grease, Automotive and Artillery, GAA, MIL-G-10924 (81349) (SAE-J-310)	lb
		9150-00-935-1017	14 oz. cartridge	oz
		9150-00-190-0905	6-1/2 lb. can	lb
		9150-00-190-0907	35 lb. can	lb
11	O	9140-00-286-XXXX	Oil, Fuel, Diesel, DF-2, Regular VV-F-800 (81349)	
		9140-00-286-5295	5 gallon can	gal
		9140-00-286-5296	55 gallon drum	gal
		9140-00-286-5294	Bulk	gal
12	O	9140-00-286-XXXX	Oil, Fuel, Diesel, DF-1, Winter W-F-800 (81349)	
		9140-00-286-5287	5 gallon can	gal
		9140-00-286-5288	55 gallon drum	gal
		9140-00-286-5286	Bulk	gal

Section II. EXPENDABLE / DURABLE SUPPLIES AND MATERIALS LIST (cont)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
13	O	9140-00-286-XXXX	Oil, Fuel, Diesel, DF-A, Arctic WV-F-800 (81349)	
		9140-00-286-5282	5 gallon can	gal
		9140-00-286-5284	55 gallon drum	gal
		9140-00-286-5283	Bulk	gal
14	OFH	9150-00-152-XXXX	Oil, Lubricating, Engine OE/HDO-15/40, MIL-L-2104D (81349)	
		9150-00-152-4117	1 quart can	qt
		9150-00-152-4118	5 gallon can	gal
		9150-00-152-4119	55 gallon drum	gal
15	OFH	9150-00-402-XXXX	Oil, Lubricating, Engine Arctic OEA, MIL-L-46167 (81349)	
		9150-00-402-4478	1 quart can	qt
		9150-00-402-2372	5 gallon can	gal
		9150-00-402-7197	55 gallon drum	gal
16	OFH	9150-01-035-XXXX	Oil, Lubricating, Gear Multipurpose, GO 80/90 MIL-L-2105D (81349)	
		9150-01-035-5392	1 quart can	qt
		9150-01-035-5393	5 gallon can	gal
		9150-01-035-5394	55 gallon drum	gal
17	OF	---	Oil, Lubricating, Transmission/ Hydraulic OE/HDO-10 MIL-L-2104D (81349)	
		9150-00-189-6727	1 quart can	qt
		9150-00-191-2772	55 gallon drum	gal
18	O	9150-00-231-6689	Oil, Lubricating, General Purpose, Corrosion and Oxidation Resistant, W-L-800	qt
19	OFH	---	Solvent, Dry Cleaning, PD 680, Type II	
		6850-00-664-5685	1 quart container	qt
		6850-00-281-1985	1 gallon container	gal
		6850-00-285-8011	1 drum	dr
20	OFH	8030-01-014-5869	Sealant, Loctite 242, MIL-S-46163, Type II, Grade N (80244)	oz

Section II. EXPENDABLE / DURABLE SUPPLIES AND MATERIALS LIST (cont)

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
21	F	---	Sealant, Loctite 243	oz
22	H	8030-01-121-4135	Sealant, Loctite 270	oz
23	F	8030-01-063-7510	Sealant, Loctite 277	oz
24	OFH	1016-01-205-9673	Sealant, Loctite 592	oz
25	H	---	Sealant, Loctite 641	oz
26	O	8030-01-158-6070	Sealant, Loctite 271	oz
27	O	---	Sealant, Loctite 577	oz
28	OFH	7930-00-889-3479	Soap, Liquid, P-S-560, Type I	gl
29	F	---	Compound, Joint, Three Bond 1207-C	
30	H	5350-01-010-7007	Compound, Valve Lapping 34B (77247)	oz
31	O	8135-00-753-4462	Barrier Material, Greaseproofed, Waterproofed, Flexible, Smooth, MIL-B-121, Grade A	rl
32	O	6850-00-264-6572	Desiccant, Bagged, Packaging Use and Static Dehumidification, MIL-D-3464	bg
33	F	---	Detergent, Laundry	
34	O	- - -	Sulphuric Acid, Electrolyte, O-S-801E	
35	O	- - -	Teflon Tape	
36	O	---	Solder, Colophonium Tin	
37	O	---	Lockwire	
38	O	---	Sealant, Urethane	
39	O	9150-00-868-0134	Lubricant, Lubriplate 105	oz
40	F	8030-00-252-3391	Sealant, Permatex #2	oz
41	F	---	Sealant, Silicone, RTV 732	oz
42	O	8030-01-054-0740	Sealant, PST	oz

APPENDIX D

MANUFACTURED ITEMS LIST

D-1. There are no manufactured or fabricated items required for operation or maintenance of the forklift.

APPENDIX E

TOOL IDENTIFICATION LIST

Section I. INTRODUCTION

E-1. SCOPE. This appendix lists tools and test equipment you will need to operate and maintain the 4K RTFL Forklift Truck. This listing is for informational purposes only and is not authority to requisition the needed items.

E-2. EXPLANATION OF COLUMNS. The following provides an explanation of the columns found in the tabular listing:

a. Column 1 ITEM NUMBER. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the tool (eg., "General Mechanics Tool Kit (1, App. E)").

b. Column 2 ITEM NAME. This column indicates the Federal item name and, if required, a description to identify the item.

c. Column 3 NATIONAL STOCK NUMBER. This is the National Stock Number (NSN) assigned to the item. Use the NSN to request or requisition the item.

d. Column 4 PART NUMBER. This is the manufacturers part number assigned to the item. Use the part number for reference only. Use the NSN to request or requisition the item.

e. Column 5 REFERENCE. This column identifies operation, maintenance, calibration, or reference manuals that are used in conjunction with the identified tool.

Section I. TOOL IDENTIFICATION LIST

(1) ITEM NUMBER	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) REFERENCE
1	Tool Kit, General Mechanic's Automotive	5180-00-177-7033	#W33004	SC 5180-90-CL-N26
2	Test Set, Generator and Voltage Regulator, Automotive: includes ammeter, voltmeter, accessories, case	4910-00-092-9136		
3	Simplified Test Equipment for Internal Combustion Engines (STE/ICE)	4910-00-124-2554	2389409	TM 9-4910-571-34&P
4	Sling, Engine and Transmission, Motor Vehicle: 3000 lb max cap, 74 in chain, gear box w/tilting mechanism	4910-00-159-6197	3575194	
5	Stand, Maintenance, Engine	4910-01-117-4344	1750A	
6	Multimeter: portable, internal battery source, w/test clip leads and accessories	6625-00-999-6282	AN/URM-105C	
7	Jack, Hydraulic Hand: self-contained, 12 ton max cap	5120-00-224-7330		
8	Jack Stand: automotive			
9	Gloves, Chemical: protective, rubber natural	8415-00-266-8677		
10	Pan, Drain: 4 gal cap, w/push-pull and lifting handles, pouring lip	4910-00-387-9592		
11	Battery Filler, Gravity: jug type w/pitcher handle, 4 qt cap	6140-00-635-3824		
12	Caliper, Inside: spr jt, 4 in size	5210-00-229-3062		

(1) ITEM NUMBER	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) REFERENCE
13	Caliper Set, Micrometer: 6 calipers, 0 to 152 mm, w/friction stop and spdl locking lever	5210-01-117-0468		
14	Can, Radiator Filling: glvd steel, w/spout 30 degree angle, 3 gal cap	7240-00-499-8028		
15	Cleaner, Battery Terminal	6140-00-831-3449		
16	Compressor Unit: power, gasoline engine driven, 175 psi max discharge	4310-00-542-4566		
17	Dial Indicator Set: c/o 1 swvl slv, 1 pl and post, 2 ext rods, 1 c-clamp	5210-00-794-9178		
18	Drill, Electric, Portable: 1/2 in size, keyed jaw chuck, hvy-duty, AC/DC 115V	5130-00-293-1849		
19	Drill Set, Twist: HSS, str rnd shk, RH cut, w/case	5133-00-293-0983		
20	Gage, Depth, Rule: 0 to 6 in, 64th in increments	5210-00-221-1902		
21	Gage, Feeler: 20 bl, 3 in lg, 0.05 to 1.00 mm, 0.05 mm increments	5210-01-045-3526		
22	Gage, Inflator, Pneumatic Tire: exposed bar indicator, 10 to 20 lb range	4910-00-319-7506		
23	Hammer, Hand: soft-head, 14oz, plastic head, non-bounce	5120-01-071-5356		
24	Pliers, Retaining Ring: external, fl jaws, str tip	5120-00-293-0044		
25	Press, Arbor, Hand-Operated: hydr, floor type, channel col, 60 ton pressure	3444-00-449-7295		

(1) ITEM NUMBER	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) REFERENCE
26	Puller Kit, Mechanical: gear and bearing	5180-00-423-1596		
27	Removal Tool, Oil Filter: end gripping, self adjust, self lock	5120-00-865-0933		
28	Tool Kit, Electrical: w/crimping tool, removers, wire stripper	5180-00-876-9336		
29	Torch Kit, Soldering: dispos-able fuel cyl, It and med flame tips, soldering iron tip, flame spreader	3439-00-542-0531		
30	Vise, Machinists: swvl base type, 4 in jaw, 6 in opng, replaceable jaw faces	5120-00-293-1439		
31	Wrench, Spanner: adj locking type, fixed pivot point	120-00-288-6468		
32	Wrench, Torque: rigid frame end drive style, 1/2 in drive, 175 ft-lb cap	5120-00-640-6364		
33	Wrench, Torque: deflecting frame end dr style, 1/2 in male sq dr, 300 in-lb cap	5120-00-247-2536		
34	Wrench, Torque: rigid frame end drive style, 3/4 in drive, 600 ft-lb cap	5120-00-221-7983		
35	Lubricator Kit, Bearing: w/lubricating gun, fitting tool, adapters	4930-00-357-6301		
36	Apron, Impermeable: cotton duck, chloroprene rbr-coated	8415-00-082-6108		
37	Adapter Plate, Maintenance Stand	4910-01-117-4344	3376975	

(1) ITEM NUMBER	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) REFERENCE
38	Brush, Dusting, Painters: 50 pct horsehair, 50 pct nylon, 4-1/4 in lg, 2-1/2 in dia	7920-00-685-3980		
39	Hammer, Slide	TBD		
40	Ring Compressor	TBD		
41	Test Stand, Rotor	TBD		
42	Gage, Pressure, Multiple Dial: 22 in lg, 1.69 in	4940-01-086-8756	13221E6828	
43	Repair Kit, Tire and Tube: c/o 1/2 pt vulcanizing fluid, 1 qt buffer fluid, 30 ea chem bond patches	2640-00-102-0978		
44	Puller, Mechanical: steering wheel, C-shaped puller body, w/adapter	5120-00-620-0020		
45	Riveter, Blind, Hand: w/hex key wrench pulling hd, case	5120-00-017-2849		
46	Chain, w/Screw Pin Shackle	TBD		
47	Wrench, Strap, 1 to 6 in cap	5120-00-776-1840	W18-36	
48	Jack, Floor, Dolly Type, Hydraulic: 10 ton cap, 2 speed, swivel type rear wheels, rotating type cap	4910-00-289-7233		
49	Fire Extinguisher, Dry Chemical: hand held	4210-00-965-1107		
50	Valve Grinding Kit	TBD		
51	Wrench, Open End: 1-11/16 in	5120-00-449-8141		
52	Wrench, Combination: 1-1/8 in	5120-00-895-9577		

(1) ITEM NUMBER	(2) ITEM NAME	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) REFERENCE
53	Wrench, Combination: 1-1/4 in	TBD		
54	Wrench, Crowsfoot: steel, 10 in lg, 3/4 in size	5120-00-795-0895		
55	Wrench Set, Socket: 3/4 in sq dr, w/case	5120-00-204-1999		
56	Puller, Tie Rod	TBD		
57	Wrench, Open End: 1-3/4 in	TBD		
58	Wrench, Open End: 2 in	TBD		
59	Hoist, 3000 lb cap	TBD		

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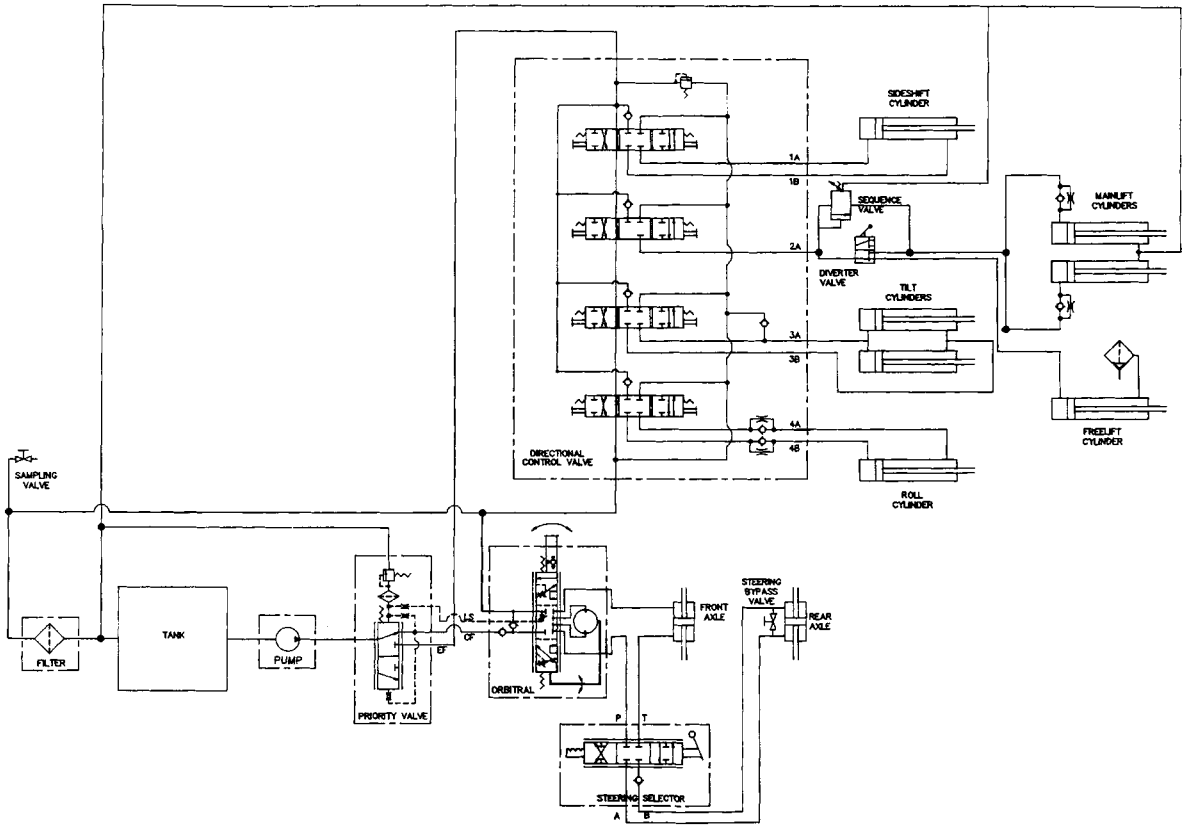

Figure FO1. Hydraulic Schematic

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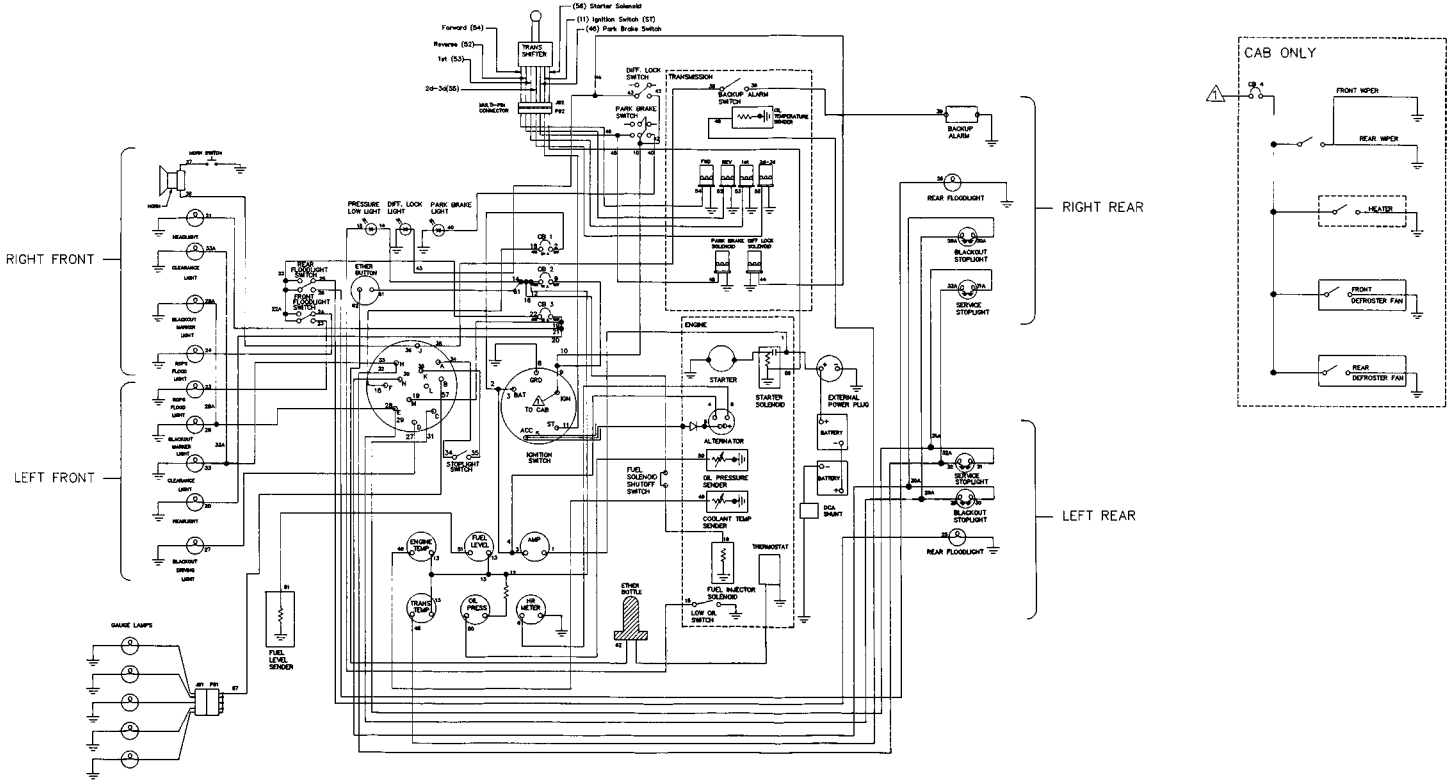

Figure FO-2. Electrical Schematic

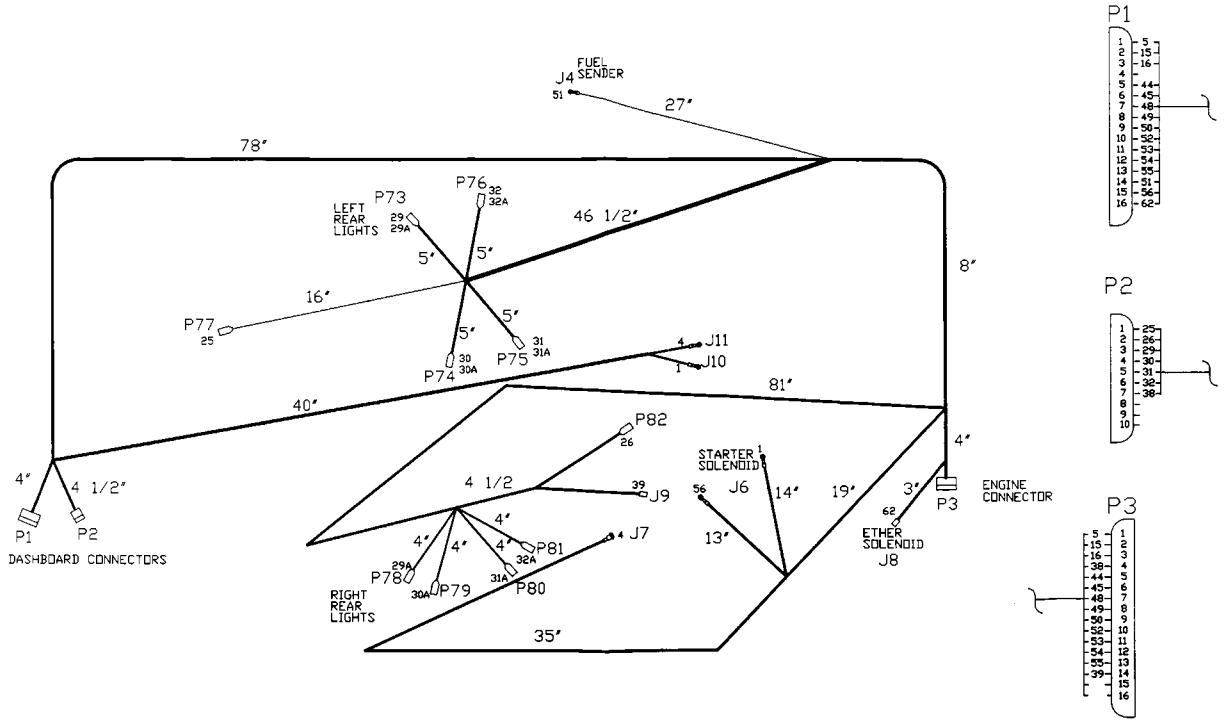

Figure FO-3. Main Wiring Harness (Sheet 1 of 3)

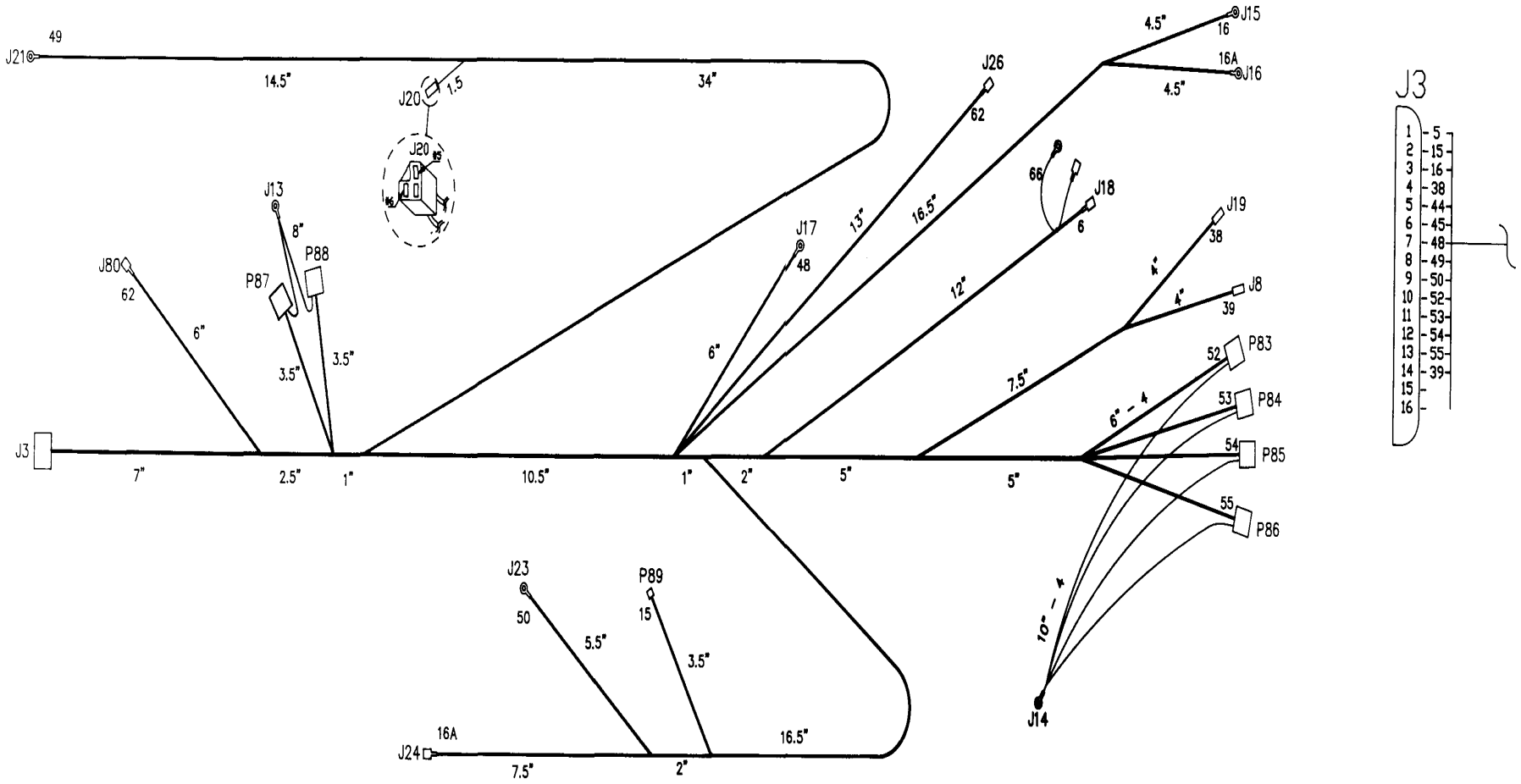

Figure FO-3 Main Wiring Harness

(sheet 2)

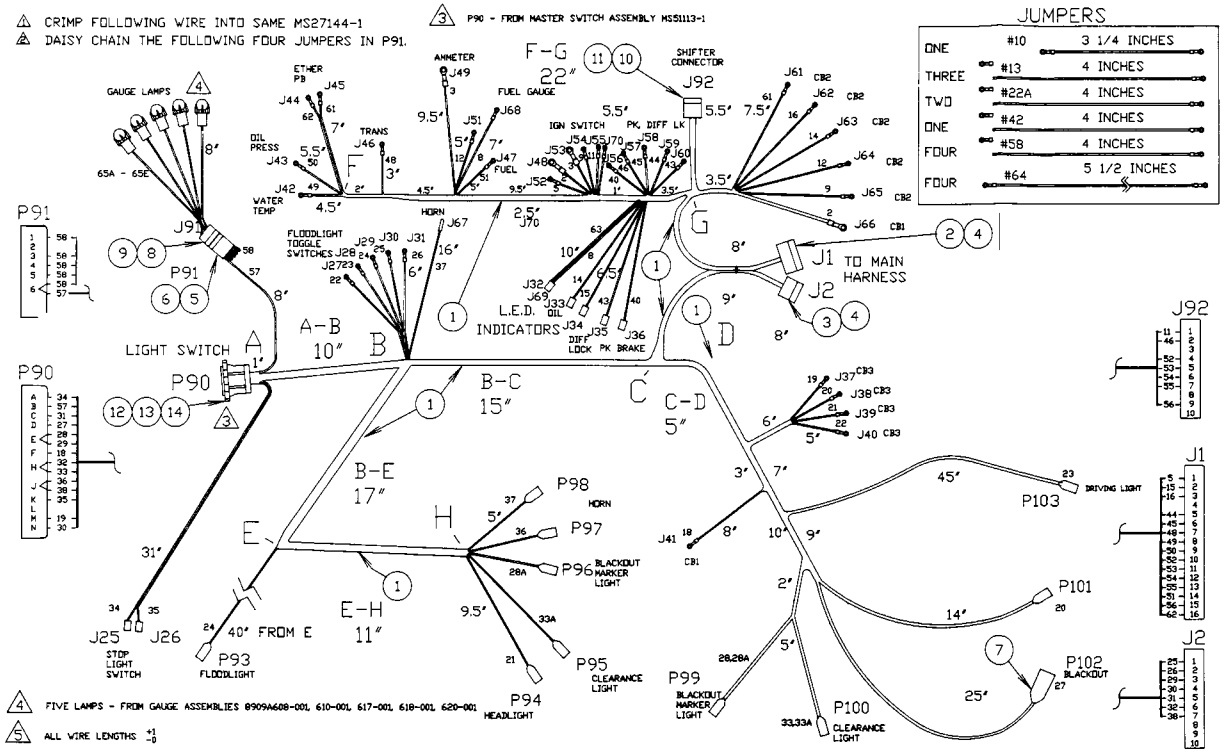

Figure FO-3. Main Wiring Harness (Sheet 3)

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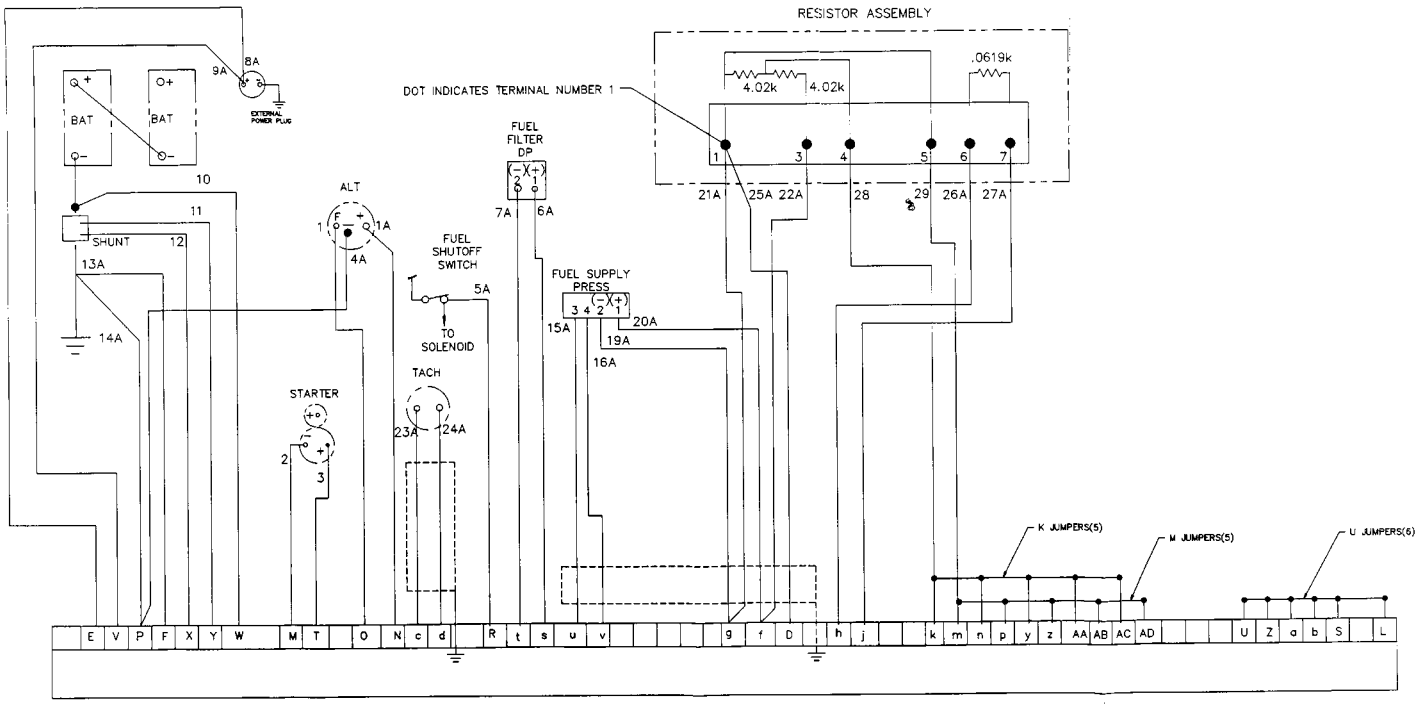

Figure FO-4. DCA Wiring Harness

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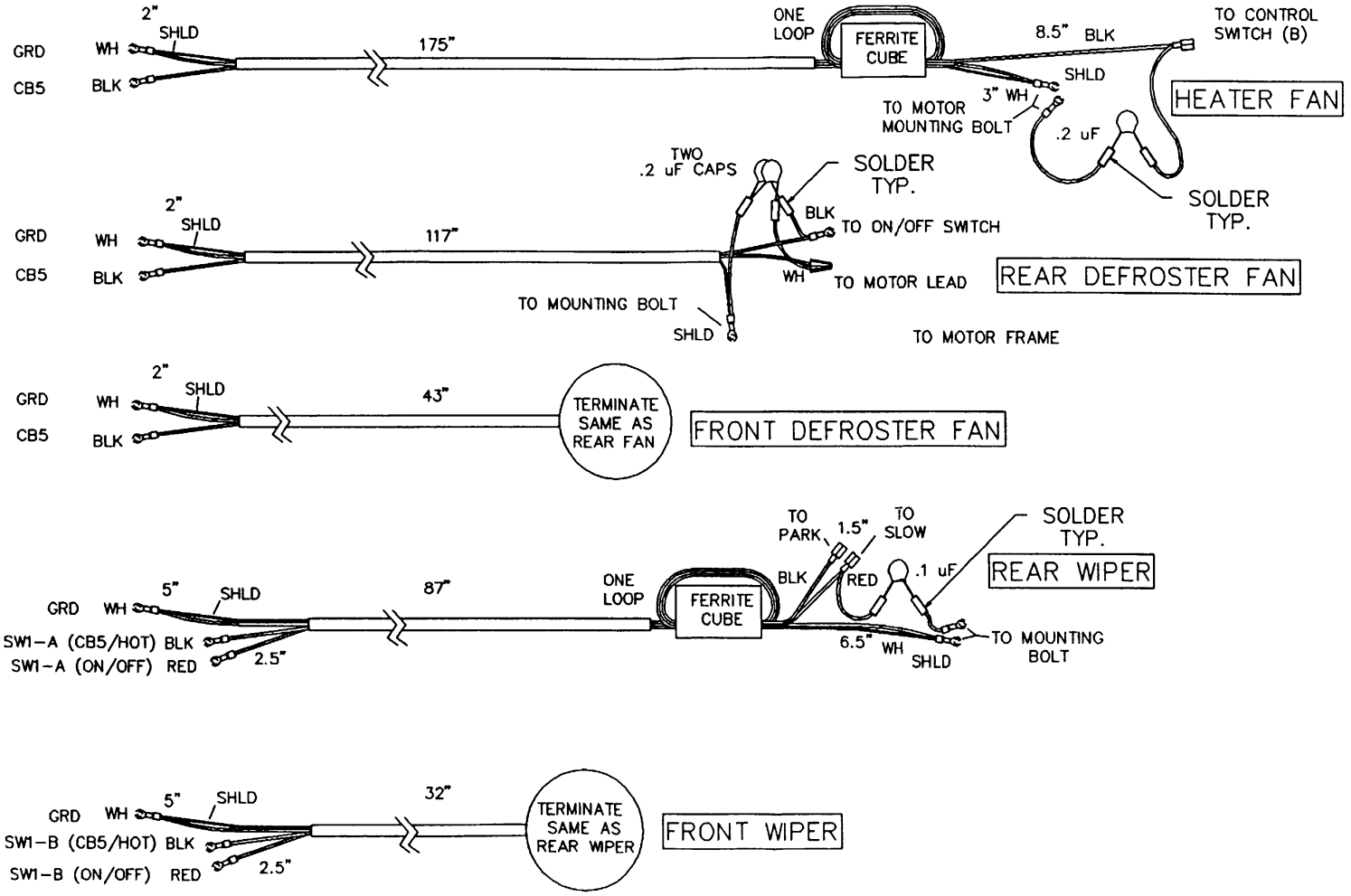


Figure FO-5. Cab Wiring Harness

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

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

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces

1 Liter = 1,000 Milliliters = 33.82 Fluid Ounces

TEMPERATURE

5/9 (°F -32) = °C

212° Fahrenheit is equivalent to 100° Celsius

90° Fahrenheit is equivalent to 32.2° Celsius

32° Fahrenheit is equivalent to 0° Celsius

9/5 C° +32 = F°

WEIGHTS

1 Gram = 0.001 Kilograms = 1,000 Milligrams = 0.035 Ounces

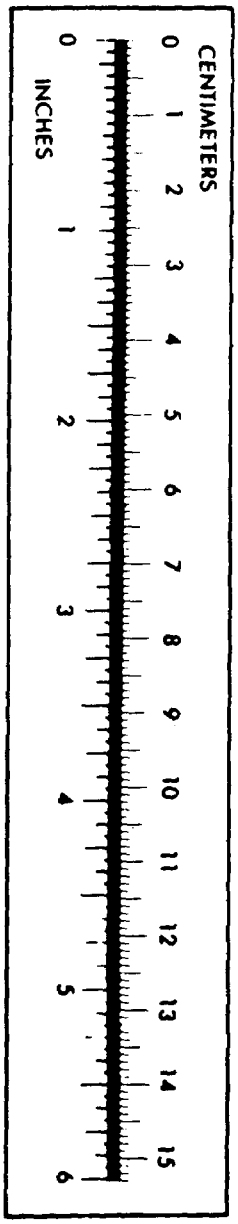
1 Kilogram = 1,000 Grams = 2.2 Lb.

1 Metric Ton = 1,000 Kilograms = 1 Megagram = 1.1 Short Tons

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



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