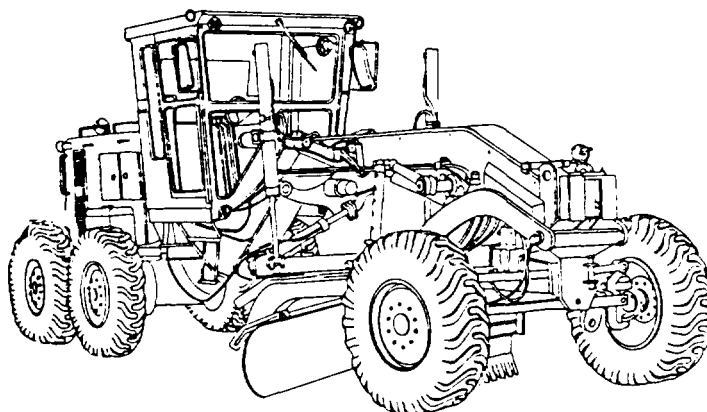


**DIRECT SUPPORT AND GENERAL
SUPPORT MAINTENANCE**

**TECHNICAL
MANUAL**



**GRADER, HEAVY, ROAD,
MOTORIZED,
CATERPILLAR MODEL 130G
(NSN 3805-01-150-4795)**

Approved for public release; distribution is unlimited.

**HEADQUARTERS, DEPARTMENT OF THE ARMY
APRIL 1989**

WARNING

FIRE HAZARD

Diesel fuel and combustible materials are used in operation and maintenance of this equipment. Do not smoke or allow open flames or sparks in areas where diesel fuel and combustible materials are used or stored. DEATH or severe injury may result if personnel fail to observe this precaution. If you are burned, seek medical help immediately.

WARNING

OIL UNDER 2500 PSI PRESSURE

High pressure hydraulics operate this equipment. NEVER disconnect any hydraulic lines or fittings without checking manual to see how to drop the pressure to zero. Failure to follow this procedure could cause SEVERE INJURY. If you are struck by a high pressure oil stream, seek medical help immediately.

WARNING

ELECTRICAL SHOCK HAZARD

Always turn disconnect switch off and disconnect the right side battery cable (positive (+)) first before working on electrical components of this equipment. DEATH or severe injury may result if you fail to observe this procedure. If you receive an electrical shock, seek medical help.

WARNING

FALLING EQUIPMENT HAZARD

Never crawl under equipment when performing maintenance unless equipment is securely blocked. Keep clear of equipment when it is being raised or lowered. Do not allow heavy components to swing while suspended by lifting device. Exercise extreme caution when working near any cable or chain under tension.

WARNING

BURN HAZARD

Allow engine to cool off before you perform maintenance on the muffler, exhaust pipe, exhaust manifold, or turbocharger. If necessary, use insulated pads and gloves. If you are burned, seek medical help immediately.

CHANGE

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington D.C, 29 October 1992

NO. 1

**DIRECT SUPPORT AND GENERAL
SUPPORT MAINTENANCE MANUAL**

**GRADER, HEAVY ROAD, MOTORIZED
CATERPILLAR MODEL 130G
(NSN 3805-01-150-4795)**

TM 5-3850-261-34, 25 APRIL 1989, is changed as follows:

1. Remove old pages and insert new pages as indicated below.
2. New or changed material is indicated by a vertical bar in the margin of the page.

Remove Pages

iii and iv
2-13 and 2-14
3-107 and 3-108
3-161 and 3-162
4-81 and 4-82
4-93 thru 4-96
4-99 and 4-100
4-105 and 4-106
4-109 and 4-110
5-17 and 5-18
5-29 and 5-30
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5-41 and 5-42
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6-27 and 6-28
6-39 and 6-40
6-43 and 6-44
7-3 and 7-4
9-3 and 9-4
10-85 and 10-86
10-91 and 10-92

Insert Pages

iii and iv
2-13 and 2-14
3-107 and 3-108
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Remove Pages

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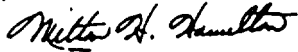
Inset Pages

10-97 and 10-98
10-109 and 10-110
10-115 and 10-116
16-3 and 16-4
None

3. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

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MILTON H. HAMILTON
*Administrative Assistant to the
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03031

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*General, United States Army
Chief of Staff*

Distribution:

To be distributed in accordance with DA Form 12-25-E, (BLK 4842) Direct Support and General Support maintenance requirements for TM5-3805-261-34.

WARNING

Articulation anti-pivot pin must be installed during maintenance procedure.

WARNING

TIRE DEFLATION

Deflate tire completely before removing tire from rim. Refer to the manual to find out how to completely deflate tire. Improperly seated tires can burst with explosive force. DEATH or severe injury may result if you do not observe this procedure. If you are injured while deflating the tire, seek medical help immediately.

WARNING

HIGH VELOCITY AIR

Compressed air, used for cleaning purposes, must not exceed 30 psi. Safety glasses must be used when cleaning parts with compressed air. Failure to protect your eyes may cause SERIOUS INJURY and possible BLINDNESS. If you injure your eyes or if a foreign object is blown into your eyes, seek medical help immediately.

WARNING

JACKING VEHICLE

Make sure that vehicle will not roll or shift. Secure with chock blocks. DEATH or severe injury may result by your failure to follow this procedure due to vehicle turning or slipping off jack or jack stands.

WARNING

TOXIC/FLAMMABLE

Dry cleaning solvent (P-D-680), used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe vapors. Do not use near open flame or excessive heat and do not smoke when using it. Failure to do so may cause SERIOUS INJURY. If you become dizzy while using cleaning solvent, immediately seek fresh air, and if necessary, medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash with water immediately and obtain medical help.

WARNING**EXHAUST GASES CAN BE DEADLY**

Exhaust gases can produce symptoms of headache, dizziness, loss of muscular control, or coma. Permanent brain damage or death can result from severe exposure. You can insure your safety by following these rules:

- Do not operate the engine in an enclosed area unless properly ventilated.
- Do not drive with any inspection plates, cover plates, or hoods off unless necessary for maintenance.
- If you notice exhaust odors or exposure symptoms, IMMEDIATELY VENTILATE the area. If symptoms persist, remove and treat the affected personnel:
 - Expose them to fresh air.
 - If necessary, give artificial respiration.
 - Keep them warm.
 - Do not permit physical exercise.

Refer to FM 21-11, First Aid for Soldiers, for first aid treatment of injured personnel.

WARNING**NOISE HAZARD**

Excessive noise levels are present any time the equipment is operating. Wear hearing protection while operating or working around equipment while it is running. Failure to do so could result in damage to your hearing. Seek medical aid should you suspect a hearing problem.

WARNING**STEAM UNDER PRESSURE**

Remove radiator cap slowly to relieve pressure before completely removing it when the engine is hot. Failure to follow this procedure may cause SEVERE INJURY. If you are scalded by steam, seek medical help immediately.

WARNING

OIL UNDER PRESSURE

Keep hands and feet clear of steering cylinder assemblies while checking for hydraulic leakage when engine is running. SEVERE INJURY may result if you fail to follow this procedure.

WARNING

OIL UNDER PRESSURE

When bleeding air from hydraulic cylinder assemblies, do not look directly at bleed ritting. Hydraulic oil is under high pressure. SEVERE INJURY may result if you fail to follow this procedure.

WARNING

FUEL UNDER PRESSURE

When testing fuel injectors, always direct fuel injector tip away from you. Fuel from orifices can penetrate clothing and skin. This can cause SERIOUS INFECTION. Be sure fuel injector tip is enclosed in a receptacle to contain the spray. If skin is broken by fuel injector spray, seek medical aid.

WARNING

PARTS UNDER SPRING TENSION

Exercise care when removing parts under spring tension. INJURY may result by the part striking your eye if you do not observe this precaution. If your eye is struck by a foreign object, seek medical help immediately.

WARNING

JEWELRY

Remove watches, rings and jewelry before working on vehicle.

HEADQUARTERS
 DEPARTMENT OF THE ARMY
 WASHINGTON D.C., 25 APRIL 1989

DIRECT SUPPORT AND GENERAL
 SUPPORT MAINTENANCE MANUAL

GRADER, HEAVY, ROAD, MOTORIZED, DED,
 COMMERCIAL CONSTRUCTION EQUIPMENT (CCE),
 CATERPILLAR MODEL 130G
 (NSN 3805-01-150-4795)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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

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HOW TO USE THIS MANUAL

This manual is designed to help you maintain the 130G Grader. It is divided into chapters, sections and appendices. The chapters contain direct support and general support maintenance procedures. The chapters are divided into a sections containing maintenance procedures for the various systems that comprise the 130G Grader.

The appendices contain supplemental information to help you maintain the 130G Grader. Included in the appendices are the Expendable Supplies and Materials List and the Manufactured Items List.

You must familiarize yourself with the entire maintenance procedure before beginning the maintenance task. The maintenance procedures contained in this manual tell you several things:

- What tools you need to do the job
- Materials or parts required
- What condition the vehicle must be in before work is started
- A step-by-step procedure of how to do the job.

In addition to the text, you will have either an assembled view or an exploded view illustration of the associated parts. Some of the illustrations will be keyed by an arrow to an overall view of the vehicle. This will help you determine the approximate location of the part. The illustration is keyed to the text by numbers. The following example will show some of the features of this manual.

EXAMPLE

An operator brings his 130G Grader into the shop with an engine problem: the engine stalls frequently or doesn't develop full power. The best way to solve this problem is by using your manual. This is what you do:

1. How do you start?
Look at the cover of the manual.

On the cover you will find a listing for TROUBLESHOOTING SYMPTOM INDEX. It tells you to go to page 2-1. To find the page fast, open the manual by using the black tab that lines up with the listing on the cover.

2. What kind of problem do you have?
Find it in the symptom index.

The symptom index is a list of problems covered by a section. It tells you that your problem, "engine misfires or runs rough," is covered in paragraph 3-2.

3. How do you determine what is causing the problem?
Go to paragraph 3-2.

There you will find the troubleshooting procedures you will need. The procedure has columns with the headings: MALFUNCTION, TEST or INSPECTION and CORRECTIVE ACTION. Starting at Step 1, read the procedure. Each step tells you what to do and what to look for. Follow the steps, in order, until you find your problem. The CORRECTIVE ACTION column will tell you what to do next.

Let's assume that the troubleshooting procedures lead you to a bad fuel injection nozzle. The replacement procedure is in paragraph 3-23. The procedure contains all the information you will need to replace the fuel injection nozzle. First, check the introductory material. It tells you what you will need before you start the job. Below the introductory material is an assembled view of the vehicle showing the approximate location of the fuel injection nozzle and an illustration which shows you how to do the job.

If, on the other hand, you know the cause of the problem, refer to the alphabetical index located at the rear of this manual. Find the name of the part to be replaced and the paragraph number for the maintenance procedure. For example, during PMCS at the organization level, it is noted that the front axle has an oil leak and the problem is referred to you. Refer to the alphabetical index. Under the listing "Front axle assembly," paragraph 5-13 is referenced. Turn to this paragraph for removal and installation procedures.

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CHAPTER 1
INTRODUCTION

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Section I. GENERAL INFORMATION

1-1. SCOPE.

a. Type of Manual. Direct Support and General Support Maintenance.

b. Model Number and Equipment Name. Grader, Heavy, Road, Motorized, DED, Commercial Construction Equipment (CCE), Caterpillar Model 130G Grader (NSN 3805-01-150-4795).

c. Purpose. The grader is designed for rough and finished grading, low and high bank sloping, flat and V-ditching, scarifying bituminous road mixes, and snow removal. Mission support role includes construction and maintenance of roads, airfields, hardstands, drainage, site preparation for pipelines and river crossings.

1-2. MAINTENANCE FORMS, RECORDS AND REPORTS. 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.

1-3. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE. Refer to TM 750-244-3, Procedures for Destruction of Equipment to Prevent Enemy Use.

GENERAL INFORMATION. (cont)

1-4. PREPARATION FOR STORAGE AND SHIPMENT. Refer to TM 740-90-1, "Administrative Storage of Equipment"; TB 740-97-2, "Preservation of USAMECOM Mechanical Equipment for Shipment and Storage"; TM 38-230-1&2, "Preservation and Packing of Military Supplies and Equipment"; MIL-V-62038, "Shipment and Limited Storage", and SB 740-98-1, "Storage and Serviceability Standard: Tracked Vehicles, Wheeled Vehicles and Component Parts".

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

a. No particular quality assurance or quality control technical manuals pertain specifically to the 130G Grader. Use standard QA/QC procedures.

b. Defective material received through the supply system should be reported on a Quality Deficiency Report (QDR), SF368. QDR's should be mailed directly to Commander, U.S. Army Tank Automotive Command, ATTN: AMSTA-MB, Warren, Michigan 48397-5000. A reply will be furnished directly to you.

1-6. NOMENCLATURE CROSS REFERENCE. This listing includes nomenclature cross-references used in this manual.

| <u>Common term</u> | <u>Military Term</u> |
|--------------------|---------------------------------|
| Lube Order | LO |
| O Ring | Packing, Preformed |
| Dipstick | Level Indicator, Oil Level Gage |
| Grader | Grader, Road |
| Technical Manual- | TM |
| Sight Gage | Level Indicator |
| Servicemeter | Hourmeter |
| Blade | Moldboard Assembly |
| Circle Drive | Circle Turn Assembly |
| Transmission | XMSN |
| Hydraulic Tank | Hydraulic Reservoir |

1-7. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR). If the 130G Grader needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on a DA Form 2407, Maintenance Request. Instructions for preparing EIR's are provided in DA PAM 738-750, The Army Maintenance Management System. EIR's should be mailed directly to: Commander, U.S. Army Tank Automotive Command, ATTN: AMSTA-MB, Warren, Michigan 48397-5000.

1-8. WARRANTY INFORMATION. The Caterpillar 130 Grader is warranted by Caterpillar Inc. for 15 months or 1500 hours of operation, whichever occurs first. The warranty starts on the date found on DA Form 2408-9 in the logbook. Report all defects in material or workmanship to your supervisor, who will take appropriate action through your organizational maintenance shop.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-9. EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES. Refer to the separate Operator's Manual, TM 5-3805-261-10, for the following tabulated data: Equipment Characteristics, Capabilities, and Features.

1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. Refer to the separate Operator's Manual, TM 5-3805-261-10, for location and description of major components.

1-11. EQUIPMENT DATA. Refer to the separate Operator's Manual, TM 5-3805-261-10, for the following equipment data: Capacities, Dimensions, and Weight.

a. Engine.

| | |
|----------------------------------|---------------------|
| Manufacturer | Caterpillar Inc. |
| Model number | 3304 |
| Part number | 2W821 |
| Type | 4 stroke |
| | Turbocharged diesel |
| Horsepower (SAE Net at 2200 rpm) | 135 hp |
| Number of cylinders | 4 |
| Bore | 4.75 inch |
| Stroke | 6.0 inch |
| Displacement | 425 cubic inch |
| Firing order | 1-3-4-2 |
| Number of main bearings | 5 |
| Oil filter | Full flow, spin on |
| Full load rating | 330 hp (246 kW) |

EQUIPMENT DESCRIPTION AND DATA. (cont)

1-11. EQUIPMENT DATA. (cont)

| | |
|--------------------------------------|-----------------------|
| Engine Speeds | |
| Full load | 1895 rpm |
| High idle | 2309 rpm |
| Low idle | 775 rpm |
| Stabilized | 2011 rpm |
| Torque check | 1200 rpm |
| Set point | 1915 rpm |
| Torque values | |
| Stabilized engine rpm | 869 16 ft (1175 N.m) |
| Torque check rpm | |
| Torque rise | 8.4 |
| Inlet manifold pressure at full load | |
| | 35.6 in. Hg (120 kPa) |
| Fuel timing | |
| Static at zero rpm | 26.50 |
| at low idle (700 rpm) | 19.50 to 21.90 |
| at full load stop (2300 rmp) | 21.lo to 23.50 |
| Piston travel | 0.444 in. (11.28 mm) |
| Static fuel setting | |
| Full load | 0.160 in. (4.06 mm) |
| Torque rise | 0.160 in. (4.06 mm) |
| Dynamic fuel settings | |
| Full load | 0.180 in. (4.56 mm) |
| Torque rise | 0.180 in. (4.56 mm) |
| Fuel consumption rates | |
| at full load | 2.073 lbs/min, |
| | 17.1 gal/hr, |
| | (940 gm/min), |
| | (66 l/hr) |
| Brake specific | |
| at full load | 0.377 lbs/hphr |
| | (229 gm/kwhr) |
| Valve clearance | |
| Exhaust | 0.030 in. (0.76 mm) |
| Intake | 0.015 in. (0.38 mm) |

b. Fuel System.

| | |
|--------------|--|
| Air cleaner | |
| Manufacturer | Donaldson |
| Part number | EGB11-0026 |
| Type | |
| | Dry, centrifugal particulate pre-cleaner |
| Governor | Hydrochemical |

EQUIPMENT DESCRIPTION AND DATA.

1-11. EQUIPMENT DATA.

c. Electrical System.

| | |
|---------------------|-------------------------------|
| Alternator | |
| Manufacturer | Robert Bosch |
| Part number | 0122469002 |
| Manufacturer | Delco Remy |
| Part number | 1117248 |
| Rating | 50 amp |
| Starter | |
| Rating | 24 volt DC negative ground |
| Manufacturer | Delco Remy |
| Part number | 1114845 |
| Manufacturer | Prestolite |
| Part number | MES6601k |
| Batteries (Storage) | 2-12 volt 220 Ampere Hour |

d. Transmission.

| | |
|--------------|---------------------|
| Manufacturer | Caterpillar Tractor |
| Part number | |
| Type | Direct Power Shift |
| Filter | |
| Strainer | |

e. Speeds.

| | |
|-------------------------|----------------------|
| 1st Forward and Reverse | 2.3 mph (3.7 km/h) |
| 2nd Forward and Reverse | 3.7 mph (6.0 km/h) |
| 3rd Forward and Reverse | 5.9 mph (9.5 km/h) |
| 4th Forward and Reverse | 9.7 mph (15.6 km/h) |
| 5th Forward and Reverse | 15.5 mph (25.0 km/h) |
| 6th Forward and Reverse | 24.5 mph (39.4 km/h) |

f. Brakes.

| | |
|------|---|
| Type | Air-Actuated, cam- operated expanding shoe type |
|------|---|

g. Wheels.

| | |
|------|--|
| Type | Steel with liquid cooled compartments |
|------|--|

EQUIPMENT DESCRIPTION AND DATA. (cont)

1-11. EQUIPMENT DATA. (cont)

h. Tires.

| | |
|----------|-------------------------|
| Size | 13.00-24 (8 Ply) |
| Type | Tubeless, traction type |
| Pressure | 35 psi (240 kPa) |

i. ROPS.

j. Hydraulic System.

k. Steering.

| | |
|---------------|-----------|
| Cylinders | |
| Articulation | |
| Bore Diameter | 5 inch |
| Rod Diameter | 2.5 inch |
| Stroke | 44.4 inch |
| Follow-up | |
| Bore Diameter | 1.5 inch |
| Rod Diameter | .75 inch |
| Stroke | 9.38 inch |
| Pumps | |

l. Hydraulic Cylinders.

| | |
|---------------|------------|
| Apron | |
| Bore Diameter | 7.25 inch |
| Rod Diameter | 2.75 inch |
| Stroke | 22.50 inch |
| Ejector | |
| Bore Diameter | 6.50 inch |
| Rod Diameter | 4 inch |
| Stroke | 61 inch |
| Bowl | |
| Bore Diameter | 6.5 inch |
| Rod Diameter | 2.5 inch |
| Stroke | 32 inch |

EQUIPMENT DESCRIPTION AND DATA.

1-12. SAFETY, CARE AND HANDLING. Most accidents involving machine operation are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. Improper operation is dangerous and could result in injury or death.

**READ AND UNDERSTAND ALL SAFETY PRECAUTIONS
AND WARNINGS BEFORE OPERATING THIS MACHINE.**

Basic safety cautions are listed before the procedures to which they apply. Warning labels have also been put on the machine to provide instructions and identify specific hazards, which if not heeded could cause bodily injury or DEATH. These labels identify hazards during repair for an untrained mechanic, but there is no way to label the machine against all such hazards. These warnings in the technical manual and on the machine are identified by the word WARNING.

Operations that may result in machine damage are identified by the labels on the machine and in this manual by the word CAUTION. Every possible hazard cannot be anticipated. The warnings and cautions in this manual are therefore not all inclusive. If you use a procedure, tool, device, or work method not specifically recommended, satisfy yourself that it is safe for you and others. Make sure that the machine will not be damaged or made unsafe by the procedures you choose.

WARNING

It is very important to know the weight of components. Do not lift heavy components by hand. Use a hoist. When using a hoist, follow the recommendations in the manual. Use lift tools as shown in illustrations to get the correct balance of the component you lift. This makes your work safer at all times. Never let a heavy component hang on a hoist. Lower it onto blocks or stands. Make sure the component rests solidly. A sudden fall can cause an accident.

When jacking up the vehicle, be sure to block the wheels at front and rear. Always place earthmoving equipment moldboard assembly and scarifier in lowered position when parking vehicle to prevent possible injury to personnel and to prevent needless stress on hydraulic and mechanical components.

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CHAPTER 2

TROUBLESHOOTING SYMPTOM INDEX
AND
GENERAL MAINTENANCE INFORMATION

CHAPTER OVERVIEW

This chapter contains an index of all troubleshooting data located within the manual and general maintenance information applicable to a wide variety of procedures. Included in the troubleshooting index are the paragraph/malfunction and page where the detailed procedure will be found.

2-1. GENERAL INFORMATION. This list of MALFUNCTIONS will give you an indication of where a possible problem might be found.

2-2. MALFUNCTION IDENTIFICATION PROCEDURES. To use this symptom index effectively, follow this procedure:

FIRST: Locate the appropriate MALFUNCTION from this index and go to the troubleshooting procedure paragraph designated locate the MALFUNCTION.

SECOND: Do the TEST or INSPECTION until you verify where the problem originates.

THIRD: Do the CORRECTIVE ACTION procedure to correct your problem.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

| <u>Component System</u> | <u>Paragraph/ Malfunction</u> | <u>Page</u> |
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| Loud combustion noise (knock) in engine | 3-2g | 3-7 |
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TROUBLESHOOTING SYMPTOM INDEX (cont)

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2-3. GENERAL MAINTENANCE INFORMATION.

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

b. Repair Methods.

(1) Complete disassembly is not always necessary to make a repair. Exercise good judgment to keep disassembly and assembly to a minimum.

(2) Repair or replace unserviceable parts and hardware. Always replace packing, gaskets and seals with new parts.

(3) Remove burrs with a stone or file. Remove burrs on closely fitted mating surfaces by lapping the surfaces with abrasive grade compound.

(4) Remove corrosion or rust with crocus or emery cloth. Use the method that will not damage the surface being cleaned. Crocus cloth should be used to remove corrosion and rust from polished surfaces. Make sure that critical dimensions are not altered when using crocus cloth.

(5) Repair damaged threads with a thread chaser or die.

(6) When welding is authorized, procedures in TM 9-327 must be followed. Welds must be inspected for cracks.

(7) Bearings should be inspected and maintained following procedures in TM 9-214.

(8) Clean electrical ground contacts with crocus cloth or emery cloth. Make sure ground connections are tight.

(9) Repair chafed, broken or damaged electrical wiring with insulation tape, electrical, specification MIL-HH-I-595. When soldering is required, procedures in TB SIG-222 must be followed.

(10) After locating the malfunction and repairing the component, test it for proper function.

c. Cleaning.

(1) Wire brush metal parts to remove rust and corrosion.

WARNING

Dry cleaning solvent P-D-680, used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes and clothes. Do not breathe the vapors. Do not use near open flame or excessive heat. Do not smoke while using it. Failure to do so may cause INJURY. If you become dizzy while using cleaning solvent, immediately seek fresh air, and if necessary, medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash with water immediately and obtain medical help.

2-3. GENERAL MAINTENANCE INFORMATION. (cont)c. Cleaning. (cont)

(2) Clean metal parts with dry cleaning solvent P-D-680. Metal or fiber brushes may be used to apply dry cleaning solvent P-D-680 and to remove softened or dissolved material. Hand scraping with metal scrapers may be used to remove soft coatings or deposits.

(3) Soak oily or greasy metal parts in a tank containing dry cleaning solvent P-D-680. The time parts must be in solvent varies with the type and amount of material to be removed.

(4) Do not use solvent to clean electrical insulation, wires, cables or wiring harnesses. Clean these parts by wiping with a damp cloth. Use a mild soap solution if necessary. Dry immediately with clean dry cloths. Clean contact points with flint abrasive paper and dust thoroughly after cleaning.

(5) Do not use solvent to clean rubber parts. Clean rubber parts by washing with mild solution of soap and water.

(6) Dry parts by blowing with low pressure compressed air or wiping with clean, lint-free cloths.

(7) Bearing should be cleaned by procedures in TM 9-214.

(8) Paint metal surfaces after repair, as required. Sand damaged paint areas. Apply one coat of rust inhibitor primer, specification TT-P-659. Allow primer to dry a minimum of 30 minutes before applying enamel. Paint with enamel to match existing color. Use a white enamel, specification TT-E-489 or olive drab enamel, specification TT-E-529.

d. Painting. Refer to TM 43-0139 and AR 750-58 for ways to paint and supplies to use. Refer to TM 5-200 for ways to camouflage parts.

e. Welds. Inspect and repair welds, refer to TM 9-327.

f. Tagging Parts. Follow the steps enumerated below, where applicable, to inspect the different types of parts with which you will work. If any of the conditions listed below are found to exist, withdraw the inspected part from service.

g. Inspection. Follow the steps enumerated below, where applicable, to inspect the different types of parts with which you will work. If any of the conditions listed below are found to exist, withdraw the inspected part from service.

(1) Inspect parts for cracks, warpage, tears, abrasion, structural damage or any other gross deformation that can be detected visually.

(2) Inspect flatness of machines surfaces with a straight edge of verified quality. There should be no visible gaps between machined surfaces and straight edge.

2-3. GENERAL MAINTENANCE INFORMATION.g. Inspection.

- (3) Inspect for burrs on edges of machined parts and remove them with a stone.
- (4) Inspect for rust and other corrosion. Remove all corrosion, refer to b. Repair Methods and check for pitting of machined surfaces.
- (5) Inspect all machined threads and restore if damaged, refer to b. Repair Methods.
- (6) Inspect welds for cracks, refer to TM 9-327.
- (7) Inspect bearings, refer to TM 9-214.
- (8) Inspect electrical wiring assemblies for chafing, corrosion of terminals, tears in insulation and frayed wiring.
- (9) Inspect glass parts for cracks, breakage and pitting.
- (10) Inspect rubber parts for tears, cracks, swelling, brittleness or decomposition.
- (11) Inspect rubber parts bonded to metal parts for delamination.
- (12) Inspect for scratched, blistered, flaked or cracked paint and repaint as required, refer to c. Cleaning.

h. Disposition of Components and/or Parts. When you are removing components and/or parts from your vehicle, you will notice that the manual tells you either to turn in or get rid of an item. The guidelines below should be followed at all times.

- (1) Turn in. Components and/or parts should be turned over to your immediate supervisor (motor sergeant, motor officer, section chief, etc.) who will in turn dispose of them in accordance with local policy and standing operating procedures (SOP).
- (2) Get rid of. Parts that are metal or contain metal (lockwashers, cotter pins, gaskets, etc.) should be disposed of in accordance with local policy and standard operating procedures (SOP). Parts that are not made of metal (gaskets, seals, packing, etc.) should be disposed of in a refuse container.

2-3. GENERAL MAINTENANCE INFORMATION. (cont)

i. Maintenance Forms and Records. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750 as contained in the Maintenance Management Update.

j. Lubrication. Keep a light coat of lubricating oil (PL - medium or PL -special) on parts during repair procedures to prevent rusting. Lubricate parts during repair and assembly as required by LO 9-2350-304-12.

k. Air Induction System Maintenance. When working on the air induction system, always keep in mind that the system's function is to provide the engine with clean air. Always protect the engine against severe damage from dirt, dust and foreign objects. Do everything you can to keep dirt out of the system. The following maintenance practices must be followed any time you are working on the air induction system.

- (1) Never start the engine without the air induction system completely installed.
- (2) Always protect the system when it is disassembled by closing off all ducts leading to the engine with heavy paper and tape.
- (3) Take off paper and tape and wipe all dirt out of the system before reassembling.
- (4) Always make sure seals are airtight and in top condition. Replace any seals that are cracked, split, torn or hardened.
- (5) Before taking off any hydraulic hoses, tubes or electrical harnesses, tag them to show location. Tagging saves time and avoids errors. Remove tags after parts are installed.

1. Hydraulic System Maintenance.

| |
|----------------|
| WARNING |
|----------------|

Hydraulic fluid may be absorbed through the skin. If hydraulic fluid gets on your skin, thoroughly wash it off with soap and water as soon as possible.

Always wear safety glasses when working on the hydraulic system. If hydraulic fluid gets in your eyes, you can be blinded.

Hot equipment can burn you. Wait until hydraulic tubes and hoses are cool enough to touch before you start work.

Cleaning compound can cause skin rash and can give off harmful vapors. To avoid injury, use in a well-ventilated area. Wash immediately with soap and water if compound gets on skin or clothing.

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

2-3. GENERAL MAINTENANCE INFORMATION.1. Hydraulic System Maintenance.

(1) Clean all hydraulic connections and mating parts with cleaning compound and rags when taking them off. If available, use compressed air to clean fittings.

(2) Before taking off any hydraulic hoses, tubes, electrical wires, harnesses or cables, tag them to show location. Tagging saves time and avoids errors. Remove tags after parts are installed.

(3) Keep a suitable container under tubes, hoses and fittings even after fluid has been drained.

WARNING

Wipe up spilled fluids immediately with rags. Hydraulic fluid is slippery.

(4) Put a rag under all connections to catch spilled fluids before you disconnect them.

(5) Unscrew connections with two wrenches. Use one wrench to unscrew the connection and the other wrench to hold the fitting or line to keep it from twisting. Make sure any old sealing compound or tape is removed.

(6) Cap or plug all open hydraulic tubes, lines or fittings when you disconnect them. This will keep dirt and dust out of the hydraulic system and will also stop fluid from siphoning through hoses and tubes. Do not take off caps or plugs until you are ready to connect the system.

(7) Cover large openings or ports with cardboard, sheets of plastic or masking tape.

WARNING**TOXIC/FLAMMABLE**

Dry cleaning solvent P-D-680, used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe the vapors. Do not use near open flame or excessive heat. Do not smoke while using it. Failure to do so may cause INJURY. If you become dizzy while using cleaning solvent, immediately seek fresh air, and if necessary, medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash with water immediately and obtain medical help.

(8) Clean up all spills and leaks with rags. When gasket is taken off, clean area with dry cleaning solvent P-D-680 and rags.

(9) Look at tube and hose nuts and fittings for bad threads. Replace bad nuts and fittings.

2-3. GENERAL MAINTENANCE INFORMATION. (cont)1. Hydraulic System Maintenance. (cont)

(10) Take protective caps or plugs off all tubes, lines, fittings, receptacles and connectors before they are installed.

(11) Make sure connection points and insides of all tubes, lines and fittings are clean before installing them.

WARNING

Sealing compound and solvent burn easily and can give off harmful vapors. To avoid injury, keep away from open fire and use in a well ventilated area.

WARNING**TOXIC/FLAMMABLE**

Dry cleaning solvent P-D-680, used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe the vapors. Do not use near open flame or excessive heat. Do not smoke while using it. Failure to do so may cause INJURY. If you become dizzy while using cleaning solvent, immediately seek fresh air, and if necessary, medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash with water immediately and obtain medical help.

(12) Before you put connection points together again, wipe off openings with solvent P-D-680 and a clean rag. If sealing compound was used around connection points, make sure it is removed.

(13) Put a light coat of lubricant, same as lubricant in system being worked on, on all preformed packing before installing packing.

WARNING

Lubricating oil MIL-L-23699 or MIL-L-7808 can cause skin rash. If oil gets on skin or clothing, wash with soap and water.

(14) Put lubricating oil on all threads, except pipe (tapered) threads, before you screw parts together.

(15) Always screw on and tighten tubes, hoses and fittings by hand to make sure that they are not cross-threaded. Tighten with two wrenches whenever possible until you feel solid resistance, then tighten 1/4 turn more

2-3. GENERAL MAINTENANCE INFORMATION.

1. Hydraulic System Maintenance.

CAUTION

Make sure that no hose is twisted, stretched or kinked. Hoses that are twisted or kinked can close off flow through the system and lead to component failure.

(16) Screw on both tube nuts with your fingers to position tubing and clamps correctly before tightening tube nuts.

(17) Put anti-seizing tape MIL-T-27730 on pipe (tapered) threads. Do not put tape on first two threads.

(18) Operate the system being worked on and check the system for leaks at all connections that were loosened. If a connection leaks, unscrew a full turn, then tighten. If it is still leaking, replace leaking parts.

(19) Always look carefully at equipment for likely signs of trouble while doing routine work. If hydraulic oil is leaking down on harnesses and connectors, repair the leak at once. Tie down any harness that is free to move and rub against metal. If you look for possible trouble spots and make repairs at once, you can cut down on repair time and extra work.

(20) Installing adjustable fittings.

(a) Put a light coat of lubricant, same as lubricant in system being worked on, on packing (1, Figure 2-3). Slide packing (1) on fitting (2) so that packing (1) is seated in groove (3) against washer (4) as far as it will go.

(b) Turn lock nut (5) clockwise until it touches washer (4).

(c) Screw fitting (2) into boss (6) until washer (4) touches boss (6).

(d) Turn fitting (2) counterclockwise, up to one full turn, until desired position is reached.

(e) Whenever possible, hold fitting (2) in position with one wrench and tighten lock nut (5) clockwise with other wrench.

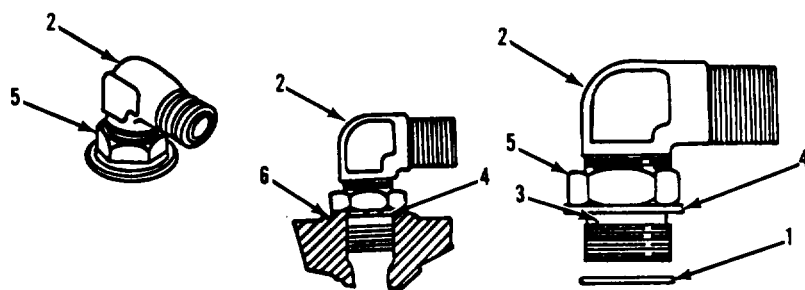


Figure 2-3.

2-3. GENERAL MAINTENANCE INFORMATION. (cont)

m. Electrical System Components and Wiring. The electrical system can be damaged by broken, bent, pushed-in or dirty pins and contacts or connectors and receptacles mated with the wrong equipment or harnesses. Harnesses improperly routed can also cause damage to the electrical system. The following practices must be followed any time you work on electrical systems.

(1) Tagging electrical wires.

(a) Look at part or wire to see if it has numbers, letters or an identification band. Each cable or each harness should have an identification band. If the identification band is missing or unreadable, tag each cable end termination before taking out the harness.

(b) Write numbers or letters on tags with pencil. Fasten tag on wire, terminal or part by twisting wire ends. Remove tag after part or wire is installed. If you cannot tag a wire because it must fit through a small hole or because you cannot reach it, write down the wire location and terminating point on paper.

(c) After installing a harness, take off any tags that were put on harness cables.

(2) Cleaning electrical components.

WARNING

Solvent can irritate skin and can give off harmful vapors. To avoid injury, keep solvent away from heat, wear protective clothing and use in a well-ventilated area.

CAUTION

Do not use a wire brush or any metal tool to remove corrosion from a connector shell, receptacle or pin. This could scratch the surface plating and let corrosion begin in the metal below.

(a) Clean off oil, grease and any dirt from cable harnesses and parts other than connectors with solvent and non-metallic brush or lint-free cloth. Be sure to cover clean parts with dust caps, plugs or lint-free cloths.

(b) Wipe up wet or damp places. Take steps to keep water away from electrical components.

(c) Dry the connector and receptacle to be cleaned either in open air or with air heat gun.

2-3. GENERAL MAINTENANCE INFORMATION.m. Electrical System Components and Wiring.

- (2) Cleaning electrical components.

WARNING

Cleaning compound can cause skin rash and can give off harmful vapors. To avoid injury, use in a well-ventilated area. Wash immediately with soap and water if compound gets on skin or clothing.

(d) Remove any corrosion and other contaminants inside the connector or receptacle with cleaning compound MIL-C-81302 on a pipe cleaner, acid swabbing brush or cotton swab. Remove external corrosion by scrubbing with aluminum abrasive material.

(e) Put about one ounce of cleaning compound MIL-C-81302, for each connector being cleaned, in an applicator bottle. Wash the connector shell and pins with compound. Hold connector with openings for pins (sockets) pointed slightly downward, when possible, while spraying compound into socket openings. This will rinse away loose corrosion products, dirt and other contaminants.

- (f) Wipe away any excess spray with a lint-free cloth.

WARNING

Before removing any component of electrical system, be sure the disconnect switch is set to OFF, and right battery positive cable is disconnected. You can get electrical burns if power is on.

(g) Clean dirt, grease, dust and old compounds off cable harnesses and parts by dipping them into container filled with cleaning compound MIL-C-81302. Shake parts in compound or wipe them clean in lint-free cloth. Clean dirt, grease and dust from recessed areas with acid-swabbing brush or lint-free cloth. Dry components completely with low pressure (25 to 30 psi) dry compressed air or with a clean, lint-free cloth.

(h) Remove rust from parts other than connector parts by scraping, wire brushing or both. If rust damage is too great or is on small thin parts that would be weakened by rust, you may need to replace the part. Find the cause of the rust and correct the problem.

WARNING

Cleaning compound can cause skin rash and can give off harmful vapors. To avoid injury, use in a well-ventilated area. Wash immediately with soap and water if compound gets on skin or clothing.

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

Change 1 2-13

2-3. GENERAL MAINTENANCE INFORMATION. (cont)m. Electrical System Components and Wiring. (cont)

(2) Cleaning electrical components. (cont)

(i) Threaded holes in metal must be thoroughly clean when sealing compounds are used to lock screws in place. Take off old preservative or sealing compounds from threads with tap and tap wrench. Blow loose particles out of holes with compressed air, then clean threads with cleaning compound MIL-C-81302 and brush. Let holes dry before putting in screws.

(3) Replacing electrical wiring or components.

(a) Always look carefully at equipment for likely signs of trouble while doing routine work. Tie down any harness that is free to move and rub against metal. If you look for possible trouble spots and make repairs at once, you can cut down on repair time and extra work. Replace any harness or harness wires that have splits, tears or worn spots. If troubleshooting isolates a broken harness, replace that harness.

(b) Replace broken or torn instrument or gage lenses.

(c) Replace damaged or crossthreaded screws and nuts. Check for torn or stretched gaskets and leaks.

(d) Replace any burned out lamps or fuses. If you cannot replace a lamp or fuse right away, tag it and go back to it later.

(e) Tighten all loose parts. Use correct torque values when tightening screws and nuts. Straighten bent parts where possible and check for cracks. Replace all missing parts.

(f) Make sure that ground points in electrical system are kept clean, free of corrosion and tight.

(g) Check mountings, parts and shafts for proper alignment.

(4) Removing electrical connectors.

WARNING

Be sure MASTER POWER is OFF before taking off or putting on connectors, refer to TM 5-3805-261-10. When working on the electrical system, always turn the disconnect switch off and disconnect the right side battery cable (positive (+)) first. If you don't follow this procedure you could get a shock or cause equipment damage.

Change 1 2-14

2-3. GENERAL MAINTENANCE INFORMATION.m. Electrical System Components and Wiring.

(4) Removing electrical connectors.

CAUTION

Do not use pliers without plastic jaw inserts on electrical connectors. Unprotected pliers will damage the outer plating of the connector. This will expose the metal beneath and cause corrosion.

(a) Dry the outside surface of electrical connectors and receptacles with a lint-free cloth before loosening them for disassembly. Moisture can be present from rain, snow, washing or dew.

(b) If connectors cannot be removed by hand, use conduit style, slip joint pliers with plastic jaw inserts to loosen them. Finish removal by hand. Straighten any bent contacts with long round nose pliers. When installing connectors on larger harnesses, another soldier will be needed to help align the mating ends of the cable. Make sure that contacts and keyways line up. Tighten twist-snap-type connectors until a click is heard. Tighten screw-on-type connectors until ratchet noise is heard to indicate that connectors are tight.

(c) Put a protective cap or cover over any electrical connector that is left uncovered. Cover connectors on any item being moved to or from the vehicle. Take off covers when connectors are put back.

(d) Look at connectors for broken, missing or pushed in contacts before making any connections. If a connector is bad, repair it.

(e) Tighten connectors by hand whenever tools are not called out.

(5) Cleaning electrical connectors.

(a) Use gun-type electric heater or open air to dry connector and receptacle.

WARNING

Cleaning compound can cause skin rash and can give off harmful vapors. To avoid injury, use in a well-ventilated area. Wash immediately with soap and water if compound gets on skin or clothing.

CAUTION

Do not use wire brush or any metal tool to take corrosion from connector, receptacle or pin. These could scratch the surface of the connector and expose metal and cause corrosion.

(b) Clean internal corrosion and other contamination from the connector or receptacle with cleaning compound MIL-C-81302. Clean external corrosion by scrubbing with abrasive mat.

2-3. GENERAL MAINTENANCE INFORMATION. (cont)m. Electrical System Components and Wiring. (cont)

(5) Cleaning electrical connectors. (cont)

(c) Rinse away loose corrosion, dirt and other contamination from the connector and pins with cleaning compound MIL-C-81302. Hold connector pointed slightly downward, if possible, while spraying cleaning compound MIL-C-81302 into socket openings.

(d) Wipe excess spray with a lint-free cloth.

(e) Do steps 2 thru 4 again, if necessary, to remove corrosion.

(f) Threaded holes in metal must be thoroughly clean when sealing compounds are used to lock screws in place. Clean old sealing compound out of threads with tap and tap wrench. Blow loose particles out of holes with compressed air and clean threads with cleaning compound MIL-C-81302 and acid-swabbing brush. Let holes dry before putting in screws.

(g) When cleaning and inspecting ground points, take off ground contact from mounting point. Clean ground point bolt, nut and contact with cleaning compound MIL-C-81302 and acid-swabbing brush. If corrosion is present, clean with wire brush and abrasive cloth. Look at all parts for cracks, looseness or stripped threads. Replace damaged or crossthreaded screws and nuts. Check for torn or stretched gaskets and leaks. Turn in bad parts. Be sure to tighten all nuts when mounting ground contacts.

(h) Rub corrosion off connector contacts and other parts with pencil eraser. Remove rust by scraping, wire brushing or both. If rust damage is too great or on small thin parts that would be weakened by rust, you may need to replace the part. Find the cause of the rust and correct the problem.

(6) Inspecting connectors.

(a) Disconnect the electrical connector to be inspected.

NOTE

Use a good light source to look at electrical contacts.

(b) Look for white powdery or granular material anywhere on the outer or inner surfaces of the connector and receptacle. Look at the male and female sockets for signs of blue-green discoloration at the base of the pins or sockets. Clean off surface corrosion before assembling. Electrical contacts corroded badly enough to destroy the outer metal coating should be replaced. Any part corroded badly enough to weaken it should be replaced.

(c) Look for bent, broken, missing or pushed-in contacts. Straighten bent pins with long, round-nosed pliers. Other damage should be repaired or parts replaced.

2-3. GENERAL MAINTENANCE INFORMATION.m. Electrical System Components and Wiring.

(7) Preserving connectors.

WARNING

Water-displacing corrosion preventive compound vapors can be harmful to eyes and lungs. To avoid harm, keep the corrosion preventive away from heat, wear protective goggles and use in a well-ventilated area.

CAUTION

Use water-displacing corrosion preventive compound MIL-C-81309, Type III, Class 2 only, on internal connector surfaces.

(a) Where possible, hold connectors with opening pointing slightly downward. Spray an even, thin film of compound over the male pin area of the connector and into the female socket openings.

CAUTION

Use water-displacing corrosion preventive compound MIL-C-85054, Type I only, on external connector surfaces.

(b) After preserving connectors internally, assemble connectors. Wipe the outer surface of the connector shell with a lint-free cloth dampened with cleaning compound MIL-C-81302. Spray a thin coating of water-displacing corrosion preventive compound MIL-C-85054, Type I, on all external surfaces of the connector set. Make sure the area where the connector set comes together is completely covered.

(c) Wipe away excess spray with a lint-free cloth.

(8) Soldering techniques.

WARNING

Cleaning compound can cause skin rash and can give off harmful vapors. To avoid injury, use in a well-ventilated area. Wash immediately with soap and water if compound gets on skin or clothing.

NOTE

Electrical Maintenance/Repair Kit 12285360 contains instructions and tools needed for repair and replacement of connectors, contacts and wires.

2-3. GENERAL MAINTENANCE INFORMATION. (cont)m. Electrical System Components and Wiring. (cont)

(8) Soldering techniques.(cont)

(a) Solder connections must be bright and clean before soldering. Remove dirt and grease from connections with solvent cleaning compound MIL-C-81302 and small, stiff fiber brush.

(b) Solder must be non-acid type (SN60WRAP2, QQ-S-571). Rosin flux, O-F-506, Type 1, Form A, can be used.

(c) All wires, parts and soldering iron must be pretinned for good connection and maximum transfer of heat.

(d) Clean all solder joints with acid-swabbing brush and cleaning compound MIL-C-81302 after soldering to obtain a clean, bright surface.

(9) Crimping wires.

(a) Cut off and get rid of broken, bent or discolored contacts with diagonal cutting pliers. Get rid of bad contacts. Using thermal wire stripper, strip insulation off wires.

(b) Put contact crimping tool with color band toward rear. Put bare wire into contact and squeeze crimping tool. Take crimped contact out of tool and check crimp by looking into inspection hole. You must be able to see end of bare wire.

(10) Installing insulation sleeving.

(a) Insulation sleeving should be twice the diameter of the part over which it will be shrunk. Slide insulation over wire and terminal. Hold portable heat gun 4 to 5 inches away from insulation and apply heat for 30 seconds. Take heat gun away as soon as insulation forms to shape of wire and terminal. Let insulation cool for 30 seconds before handling.

WARNING

Cleaning compound can cause skin rash and can give off harmful vapors. To avoid injury, use in a well-ventilated area. Wash immediately with soap and water if compound gets on skin or clothing.

(b) When replacing wires, cut insulation sleeving off terminals of wire to be replaced. Unsolder wire or cut if crimped. When soldering wires, hold the bare wire near the soldering point with long, round-nosed pliers. Pliers act as a heat sink, preventing heat damage to electrical and electronic components. Cut new wire to desired length and slide new insulation over ends of wire. Using thermal wire stripper, push insulation back and strip insulation off wiring. Solder or crimp wire to end terminal. Clean soldered joint with acid-swabbing brush and cleaning compound MIL-C-81302. Slide insulation over connection. Shrink insulation with heat gun.

2-3. GENERAL MAINTENANCE INFORMATION.m. Electrical System Components and Wiring.

(11) Applying preservatives to electrical connectors.

WARNING

Water-displacing corrosion preventive compound vapors can be harmful to eyes and lungs. To avoid injury, keep the corrosion preventive away from heat, wear protective goggles and use in a well-ventilated area.

CAUTION

There are two types of water-displacing corrosion preventive compounds. Care must be used to apply the correct compound. Failure to do so can cause loss of continuity or moisture protection.

(a) Pin contacts: Spray an even, thin coat of compound MIL-C-81309 over male pin area of connector.

(b) Socket contacts: Hold connector with openings pointed slightly downward, if possible. Spray compound MIL-C-81309 into socket openings. Wipe off any excess compound with a lint-free cloth.

CAUTION

Do not use water-displacing corrosion preventive compound MIL-C-81309 on the external surface of an electrical connector. Compound MIL-C-81309 is too light and will not give the protection needed to keep moisture out of the connector.

(c) External surfaces: Spray a thin coat of water-displacing corrosion preventive compound MIL-C-85054 on all external surfaces of the clean connector set. Make sure the area where the connector set comes together is completely covered.

(12) Installing electrical connectors.

(a) Look at connectors for broken, missing or pushed-in contact before making any connections. If connector is bad, notify supervisor.

(b) When installing connectors on large harnesses, another soldier will be needed to help align the mating ends of the cable. Make sure that contacts and key washers line up. Tighten twist-snap-type connectors until a click is heard. Tighten screw-on-type connectors until the connector is tight. Tighten ratchet-type connectors until colored aligning marks line up.

2-3. GENERAL MAINTENANCE INFORMATION. (cont)m. Electrical System Components and Wiring. (cont)

(12) Installing electrical connectors. (cont)

(c) Tighten connectors by hand only.

(d) Wipe the outer surface of the connector with a lint-free cloth dampened with cleaning compound.

(13) Connecting and disconnecting connectors.

(a) Look for broken, bent or missing pins when disconnecting or connecting receptacles and connectors. If you find any bent pins, tell your supervisor. Look at harnesses for cuts, kinks or torn or burned insulation. If insulation is bad, replace harness.

(b) If connectors cannot be removed by hand, use conduit-style, slip-joint pliers with plastic jaw inserts to remove them. When installing connectors on larger harnesses, another soldier will be needed to help align the mating ends of the cable. Make sure that pins and keyways line up. Tighten twist-snap-type connectors by hand only until a click is heard. Tighten the screw-on-type connectors by hand only until the connector **is** tight.

(c) Put protective caps and plugs on all connectors when they are taken out to keep pins from being damaged and to keep out dirt, dust or grease. When connectors are being put on, take off all caps and plugs.

(14) Harness routing.

(a) Before removing harnesses that require being placed over and under components during installation, the routing must be identified during removal to insure proper installation.

(b) If harness routing can be reached, route and tag twine where harness branches are laying before pulling harness out of place for removal.

(c) If harness routing cannot be reached, tie twine to ends of harness branches. Twine should be longer than harness. Pull harness out until twine can be tagged and untied from harness branches.

(d) Install harness by either feeding harness branches through where twine was placed or tie tagged twine to mating harness branch and pull harness into place with twine. Remove twine.

(e) Be sure that routed harness and branches are not twisted or sticking up where they can rub the opposite frame when the vehicle is being articulated.

2-3. GENERAL MAINTENANCE INFORMATION.m. Electrical System Components and Wiring.

(14) Harness routing.

(f) Routed harness and branches should not be lying loose against any rough surface that could cause chafing. Use additional tiedown straps as required to make harness stay in position.

(g) If it is necessary to articulate the vehicle to remove or install wiring harnesses, make sure harnesses are clear of moving parts which could damage harnesses or equipment.

(h) Do not tighten clamps or install tie wraps on replaced harnesses until entire harness is installed and positioned.

(15) System testing.

After you install a harness, always test the harness by operating the system it is in.

(16) Anti-chafing sleeves.

Make sure all tubes, hoses and metal-braided electrical cables are protected against chafing (rubbing) on one another. If they cannot be repositioned, install anti-chafing sleeves (P/N 94835-1 or 94835-2) in the area where rubbing could occur. In areas where tiedown straps are used to hold metal braided-electrical cables to tubes or hoses, anti-chafing sleeves will be used as required.

2-21/(2-22 blank)

CHAPTER 3

ENGINE, FUEL AND COOLING SYSTEM
TROUBLESHOOTING AND MAINTENANCE

CHAPTER OVERVIEW

The purpose of this chapter is to help the technician efficiently troubleshoot and repair malfunctioning equipment and to perform authorized direct support level maintenance procedures on the 130G Grader.

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Section I. ENGINE TROUBLESHOOTING.

3-1. GENERAL INFORMATION. This section lists the common engine malfunctions which may occur during the operation of the 130G. You should perform the tests, inspections and corrective actions in the order listed. Follow the troubleshooting procedures listed below step-by-step until you can go no further.

3-2. ENGINE TROUBLESHOOTING PROCEDURES. This section cannot list all possible malfunctions, nor can it list all possible tests, inspections or corrective actions. If a malfunction is not listed, contact your supervisor.

ENGINE TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

a. ENGINE WILL NOT START.

Step 1. Check for fuel in housing for the fuel injection pumps (Figure 3-1).

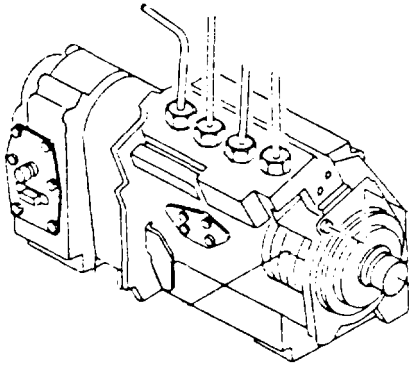


Figure 3-1.

If there is not enough fuel in housing, fill pumps with fuel with the priming pump. Remove air with the bleed valve. Refer to paragraph 3-23.

Step 2. Check the fuel injection timing.

If the timing is not correct--adjust. Refer to paragraph 3-7.

ENGINE TROUBLESHOOTING AND MAINTENANCE PROCEDURES. (cont)

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

b. ENGINE MISFIRES OR RUNS ROUGHLY.

Step 1. Check the fuel pressure at the fuel injection pump housing. Fuel pressure at high idle should be 15 psi.

If the fuel pressure is below 15 psi--replace fuel filter element.

Step 2. Check the fuel bypass and check valves in the fuel transfer pump.

If the bypass or check valves are damaged or defective--replace. Refer to paragraph 3-29.

Step 3. Check fuel injection valves and pumps. Run the engine at an RPM that causes rough running. Loosen a fuel line nut on the injection valve of each cylinder.

If the loosening of a fuel line nut does not make a difference--replace injection valve. Refer to paragraph 3-25.

Step 4. Check the fuel system timing.

If the fuel system is not timed correctly for the engine--adjust. Refer to paragraph 3-27.

Step 5. Check the valve clearance.

If the valve clearance is not correct--service or replace. Refer to paragraph 3-13.

Step 6. Check the push rods.

If a push rod is bent or broken--replace. Refer to paragraph 3-11.

Step 7. Check for worn valves or valve seats.

If the valves or valve seats are worn--cylinder head should be reconditioned. Contact General Support.

Step 8. Check the balancer shafts.

If balancer shafts are out of alignment -- replace.

Refer to paragraph 13-6.

ENGINE TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|------------------------------------|--|---|
| c. ENGINE STALLS AT A LOW RPM. | Step 1. Check the idle. | If the idle is not correct--adjust. Refer to paragraph 3-27. |
| | Step 2. Check the fuel injection valves and pumps. Run the engine at an RPM that causes rough running. Loosen a fuel line nut on the injection valve of each cylinder. | If the loosening of a fuel line nut does not make a difference--replace injection valve. Refer to paragraph 3-25. |
| d. SUDDEN CHANGES IN ENGINE SPEED. | Check the governor and fuel injection pump. | If the springs, linkage or other parts are damaged or defective--replace. Refer to paragraph 3-25. |
| e. NOT ENOUGH POWER. | Step 1. Check the fuel pressure at the fuel injection pump housing. Fuel pressure at high idle should be 15 psi. | If the fuel pressure is below 15 psi--replace fuel filter element. |
| | If the fuel pressure is still low--proceed to Step 2. | |
| | Step 2. Check the fuel bypass and check valves in the fuel transfer pump. | If the bypass or check valves are damaged or defective--replace. Refer to paragraph 3-29. |

ENGINE TROUBLESHOOTING AND MAINTENANCE PROCEDURES. (cont)

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

e. NOT ENOUGH POWER. (cont)

Step 3. Check the governor linkage.

If the governor linkage is not getting full travel--adjust. Refer to paragraph 3-25.

Step 4. Check the valve clearance.

If the valve clearance is not correct--service or replace. Refer to paragraph 3-13.

| |
|----------------|
| WARNING |
|----------------|

FUEL UNDER PRESSURE

When opening fuel system, do not look directly at fitting. Fuel is under pressure. SEVERE INJURY may result if you fail to follow this procedure.

Step 5. Check the fuel injection valves and pumps. Run the engine at an RPM that causes roughness. Loosen a fuel line nut on the injection valve of each cylinder one at a time, then tighten.

If loosening a fuel line nut does not make a difference—replace injection valve. Refer to paragraph 3-25.

Step 6. Check the fuel injection timing.

If the timing is not correct--adjust. Refer to paragraph 3-27.

Step 7. Check the turbocharger for carbon deposits or other causes of friction.

If you suspect a problem with the turbocharger--contact General Support.

f. TOO MUCH VIBRATION.

Step 1. Check pulley and vibration damper mounting.

If the bolt or nut holding the vibration damper pulley is loose--tighten.

Step 2. Check pulley and vibration damper.

If the pulley or vibration damper are damaged or defective--replace. Refer to paragraph 3-10.

ENGINE TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

f. TOO MUCH VIBRATION.

Step 3. Check the engine supports.

If the engine mounting or hardware is damaged or defective--replace. Refer to paragraph 3-5.

Step 4. Check balancer shafts for proper installation.

If balancer shafts are damaged or defective--replace. Refer to paragraph 13-6.

g. LOUD COMBUSTION NOISE (KNOCK) IN ENGINE.

| |
|----------------|
| WARNING |
|----------------|

FUEL UNDER PRESSURE

When opening fuel system, do not look directly at fitting. Fuel is under high pressure. SEVERE INJURY may result if you fail to follow this procedure.

Step 1. Check the fuel injection valves and pumps. Run the engine at an RPM that causes the most noise. Loosen a fuel line nut on the injection valve of each cylinder one at a time, then tighten. If loosening a fuel line nut does not make a difference—replace injection valve. Refer to paragraph 3-25.

Step 2. Check the fuel injection timing.

If the timing is not correct--adjust. Refer to paragraph 3-27.

h. CLICKING NOISE IN VALVE COMPARTMENT.

Step 1. Check the valve springs and locks.

If the valve springs or locks are damaged or defective--replace. Refer to paragraph 3-13.

Step 2. Check the lubrication in the valve compartment. There must be a strong flow of oil at a high RPM and a small flow at a low RPM.

If the oil level is not correct--service. Refer to paragraph 3-13.

Step 3. Check the valve clearance.

If the valve clearance is too much--adjust. Refer to paragraph 3-12.

ENGINE TROUBLESHOOTING AND MAINTENANCE PROCEDURES. (cont)

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

h. CLICKING NOISE IN VALVE COMPARTMENT. (cont)

Step 4. Check the valves.

If the valves are damaged or defective--replace. Refer to paragraph 3-13.

i. OIL IN THE COOLING SYSTEM.

Step 1. Check the core of the transmission oil cooler (Figure 3-2).

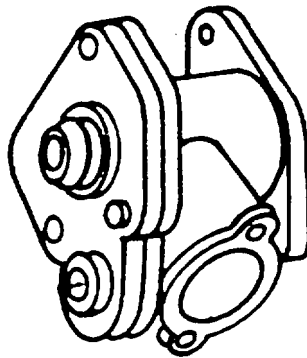


Figure 3-2.

If the transmission oil cooler is damaged or defective--replace. Refer to paragraph 5-12.

Step 2. Check the head gasket.

If the head gasket is damaged or defective--replace. Refer to paragraph 3-9.

j. MECHANICAL NOISE IN ENGINE.

Step 1. Check the connecting rod and bearing surface on the crankshaft.

If the connecting rod or bearing surface is damaged or defective--contact General Support.

Step 2. Check the timing gears.

If the timing gears are damaged or defective--contact General Support.

ENGINE TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|--------------------|---|---|
| j. | MECHANICAL NOISE IN ENGINE. | <p>Step 3. Check the crankshaft.</p> <p>If the crankshaft is damaged or defective--contact General Support.</p> |
| k. | FUEL CONSUMPTION IS TOO HIGH. | <p>Step 1. Check the fuel injection nozzles.</p> <p>If the fuel injection nozzles are damaged or defective--service or replace. Refer to paragraph 3-24.</p> <p>Step 2. Check the fuel injection timing.</p> <p>If the fuel injection timing is not correct--adjust. Refer to paragraph 3-27.</p> |
| 1. | LOUD NOISE FROM VALVES OR VALVE DRIVE COMPONENTS. | <p>Step 1. Check the valve springs.</p> <p>If the valve springs are damaged or defective--replace. Refer to paragraph 3-13.</p> <p>Step 2. Check the valve lifter.</p> <p>If the valves are not moving freely--replace valve lifters. Refer to paragraph 3-12.</p> <p>Step 3. Check the valves.</p> <p>If the valves are damaged or defective--replace. Refer to paragraph 3-12.</p> <p>Step 4. Check the camshaft.</p> <p>If you suspect a problem with the camshaft--contact General Support.</p> |

ENGINE TROUBLESHOOTING AND MAINTENANCE PROCEDURES. (cont)

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

m. LITTLE ROCKER ARM MOVEMENT OR TOO MUCH VALVE CLEARANCE.

Step 1. Check the valve clearance.

If there is too much valve clearance--adjust. Refer to paragraph 3-12.

Step 2. Check the lubrication in the valve compartment. There must be a strong flow of oil at a high RPM and a small flow at a low RPM.

If the oil level is not correct--service. Refer to paragraph 3-13.

Step 3. Check the face of the rocker arms contacting valve.

If a rocker arm is worn, damaged or defective--replace. Refer to paragraph 3-12.

Step 4. Check the valve stems.

If a valve stem is worn, damaged or defective--replace. Refer to paragraph 3-13.

Step 5. Check the push rods.

If the push rods are worn, damaged or defective--replace. Refer to paragraph 3-12.

ENGINE TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|--------------------|---|--|
| m. | LITTLE ROCKER ARM MOVEMENT OR TOO MUCH VALVE CLEARANCE. | <p>Step 6. Check the valve lifters.</p> <p>If the valves are not moving freely--replace valve lifters. Refer to paragraph 3-12.</p> <p>Step 7. Check the cams on camshaft.</p> <p>If the cams are worn, damaged or defective--contact General Support.</p> |
| n. | VALVE ROTOCOIL OR SPRING LOCK IS FREE. | <p>Step 1. Check the locks. Locks with damage can cause the valve to fall into the cylinder.</p> <p>If the locks are damaged or defective--replace. Refer to paragraph 3-13.</p> <p>Step 2. Check the valve springs.</p> <p>If the valve springs are damaged or defective--replace. Refer to paragraph 3-13.</p> |
| o. | OIL AT THE EXHAUST. | <p>Step 1. Check the valve compartment for excess oil.</p> <p>If there is too much oil in the valve compartment--make sure there are plugs at both ends of the rocker arm shaft. Refer to paragraph 3-12.</p> <p>Step 2. Check the valve guides.</p> <p>If the valve guides are worn--the cylinder head should be reconditioned. Contact General Support.</p> <p>Step 3. Check the piston rings.</p> <p>If the piston rings are worn, damaged or defective--contact General Support.</p> |

ENGINE TROUBLESHOOTING AND MAINTENANCE PROCEDURES. (cont)

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|---------------------------------|---|
| p. | LITTLE VALVE CLEARANCE. | <p>Check the valve seat and face of valve.</p> <p>If the valve seat or face of valve is worn--the cylinder head should be reconditioned. Contact General Support.</p> |
| q. | COOLANT IN THE LUBRICATION OIL. | <p>Step 1. Check the oil cooler core.</p> <p>If the core is damaged or defective--replace. Refer to paragraph 3-17.</p> <p>Step 2. Check the cylinder head gasket.</p> <p>If the cylinder head gasket is damaged or defective--replace. Refer to paragraph 3-9.</p> <p>Step 3. Check the cylinder head.</p> <p>If the cylinder head is cracked or defective--replace. Refer to paragraph 3-9.</p> <p>Step 4. Check the cylinder block.</p> <p>If the cylinder block is damaged or defective--contact General Support.</p> <p>Step 5. Check the seals of the cylinder lines.</p> <p>If you suspect a problem with the seals--contact General Support.</p> |
| r. | TOO MUCH BLACK OR GRAY SMOKE. | <p>Step 1. Check the fuel injection nozzles. Refer to Test procedure, paragraph 3-24.</p> <p>If a fuel injection nozzle is bad--replace. Refer to paragraph 3-24.</p> <p>Step 2. Check the fuel injection timing.</p> <p>If the fuel injection timing is not correct--adjust. Refer to paragraph 3-24.</p> |

ENGINE TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|-------------------------------|--|
| r. | TOO MUCH BLACK OR GRAY SMOKE. | <p>Step 3. Check the turbocharger.</p> <p>If you suspect a problem with the turbocharger--contact General Support.</p> |
| s. | TOO MUCH WHITE OR BLUE SMOKE. | <p>Step 1. Check the fuel injection timing.</p> <p>If the fuel injection timing is not correct--adjust. Refer to paragraph 3-7.</p> <p>Step 2. Check the valve guides.</p> <p>If the valve guides are worn--the cylinder head should be reconditioned. Contact General Support.</p> <p>Step 3. Check the piston rings.</p> <p>If the piston rings are worn--contact General Support.</p> <p>Step 4. Check the turbocharger oil seal.</p> <p>If the oil seal is damaged or defective, or if you suspect a problem with the turbocharger--contact General Support.</p> |
| t. | ENGINE OIL PRESSURE IS LOW. | <p>Step 1. Check the lubrication in the valve compartment.</p> <p>If the oil level is not correct--service. Refer to paragraph 3-12.</p> <p>Step 2. Check the oil pump suction pipe.</p> <p>If the oil pump suction pipe is damaged or defective--replace. Refer to paragraph 3-16.</p> <p>Step 3. Check the oil pump relief valve.</p> <p>If the relief valve is not operating correctly--replace. Refer to paragraph 3-16.</p> |

ENGINE TROUBLESHOOTING AND MAINTENANCE PROCEDURES. (cont)

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---------------------------------------|---|--|
| t. ENGINE OIL PRESSURE IS LOW. (cont) | Step 4. Check the clearance between the crankshaft and the crankshaft bearings. | If you suspect a problem with the crankshaft or the bearings--contact General Support. |
| | Step 5. Check the clearance between the camshaft and the camshaft bearings. | If you suspect a problem with the camshaft or the bearings—contact General Support. |
| | Step 6. Check the piston cooling orifices. | If you suspect a problem with the orifices--contact General Support. |
| | Step 7. Check the piston cooling orifices. | If you suspect a problem with the orifices--contact General Support. |
| u. ENGINE COOLANT IS TOO HOT. | Step 1. Check the water pump. | If the water pump is damaged or defective--repair or replace. Refer to paragraph 3-34. |
| | Step 2. Check the fuel injection timing. | If the fuel injection timing is not correct--adjust. Refer to paragraph 3-7. |

ENGINE TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------------------------------|---|---|
| v. ENGINE USES TOO MUCH OIL. | Step 1. Check the valve guides. | If the valve guides are worn--the cylinder head should be reconditioned. Contact General Support. |
| | Step 2. Check the piston rings and cylinder liners. | If the piston rings or cylinder liners are worn, damaged or defective--contact General Support. |
| | Step 3. Check the turbocharger seal rings. | If you suspect a problem with the turbocharger--contact General Support. |
| w. EXHAUST TEMPERATURE IS TOO HIGH. | Check the fuel injection timing. | If the fuel injection timing is not correct--adjust. Refer to paragraph 3-7. |

Section II. ENGINE MAINTENANCE.**3-3. ENGINE MAINTENANCE PROCEDURES.**

- a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the engine and its components in good repair.
- b. This section is arranged by functional group code and provides a list of engine components to be maintained and step-by-step maintenance procedures.

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ENGINE MAINTENANCE.

3-4. Engine. (Sheet 1 of 13)

This task covers:

- a. Removal
- d. Installation

b. Cleaning

c. Inspection

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Hoist and sling

References

TM 5-3805-261-10
LO 5-3805-261-12
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Detergent, Item 9, Appendix C
Small tags, Item 43, Appendix C
Caps
Cotter pin, Item 18
Preformed packings, Items 64

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Go to Sheet 2

3-17

ENGINE MAINTENANCE. (cont)

3-4. Engine. (Sheet 2 of 13)

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.
 Articulation anti-pivot pin installed.

LO 5-3805-261-12

Engine oil drained.

TM 5-3805-261-20

Battery cables and batteries removed.
 Coolant drained.
 Radiator inlet and outlet tubes removed.
 Engine compartment side panels removed.
 Engine compartment dash plate removed.
 Supplemental steering motor (with pump) removed.
 Exhaust assembly removed.
 Magnetic switch wire removed.
 Fuel pressure switch removed.

Paragraph 10-1

Hydraulic pump drive removed.

Go to Sheet 3

ENGINE MAINTENANCE.

3-4. Engine. (Sheet 3 of 13)

REMOVAL

WARNING

Articulation anti-pivot pin must be installed during maintenance procedure.

1. Turn fuel shutoff valve clockwise on right front of fuel tank to shut off fuel (Figure 3-3).
2. Remove nut (1, Figure 3-4) from rear, right side of solenoid.

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

3. Disconnect wire assembly (2) at terminal from solenoid.
4. Remove nut (3) and lockwasher (4).
5. Disconnect wire assembly (5) and cable assemblies (6 and 7) from "battery" terminal of solenoid.
6. Remove nut (8) and lockwasher (9).
7. Disconnect cable assembly (10) from starting motor and slave receptacle.
8. Remove lockwasher (11).
9. Disconnect cable assemblies (12 and 13) from starting motor.

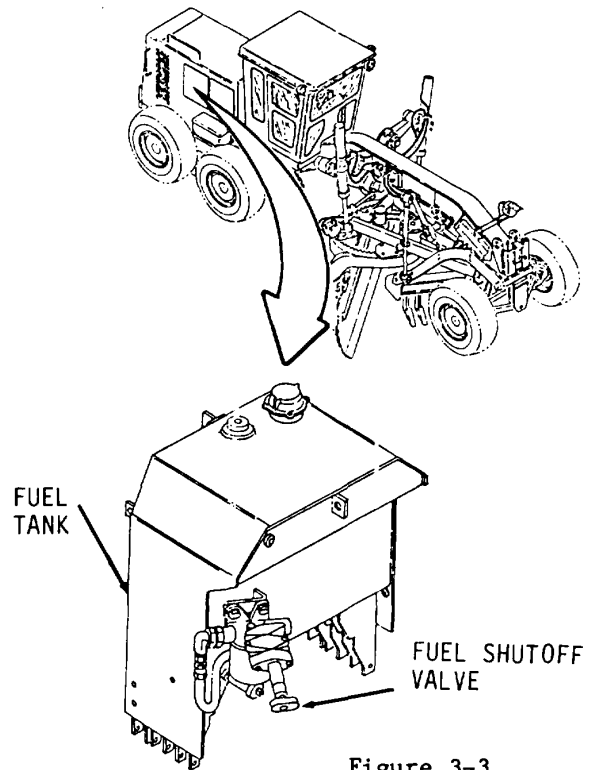


Figure 3-3
Figure 3-3.

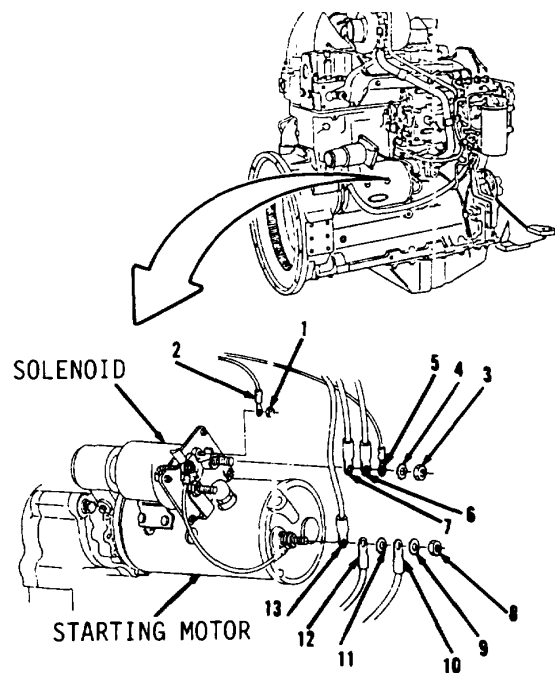


Figure 3-4.

Go to Sheet 4

ENGINE MAINTENANCE. (cont)

3-4. Engine. (Sheet 4 of 13)

REMOVAL (cont)

10. Remove bolt (14), washer (15) and clip (16, Figure 3-5).

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

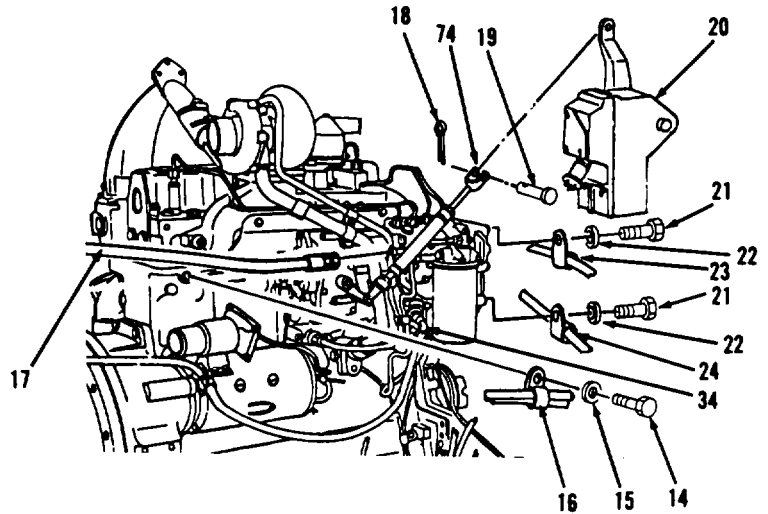


Figure 3-5.

11. Disconnect hose assembly (17) from fuel injection pump.
12. Disconnect hose assembly (34) from fuel transfer pump.
13. Remove and discard cotter pin (18) from pin (19).
14. Remove pin (19).
15. Separate linkage assembly (74) from governor control assembly (20) lever.
16. Support governor control assembly (20).
17. Remove three bolts (21), washers (22) and clips (23 and 24).
18. Position governor control assembly (20) in engine compartment.

Go to Sheet 5

ENGINE MAINTENANCE.

3-4. Engine. (Sheet 5 of 13)

REMOVAL

- 19. Remove bolt (25), washer (26) and clip (27, Figure 3-6) from lower, right side of engine.
- 20. Remove bolt (28) and washer (29).
- 21. Disconnect wire assembly (30) at terminal.
- 22. Remove bolt (31), washer (32) and clip (33) from oil filter tube.

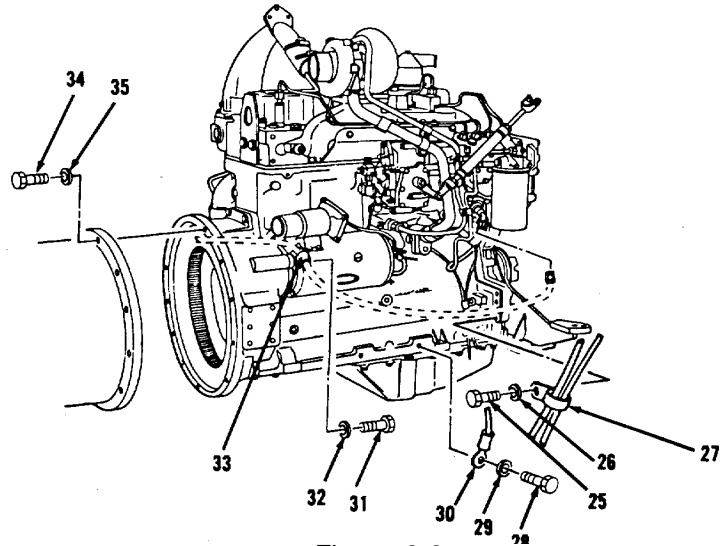


Figure 3-6.

- 23. Remove 12 bolts (34) and engine, disconnecting engine-to-transmission adapter from engine.
- 24. Disconnect hose assemblies (36 and 37, Figure 3-7) from air compressor and air compressor governor on left side of engine.
- 25. Remove bolt (38), washer (39) and clip (40) from supplemental steering motor mounting bracket on front of engine.
- 26. Remove bolt (41), washer (42) and clip (43) from front, left side of engine.
- 27. Remove three screws (44) from top of water pump.
- 28. Disconnect three wire assemblies (45) at terminals from coolant temperature switch.

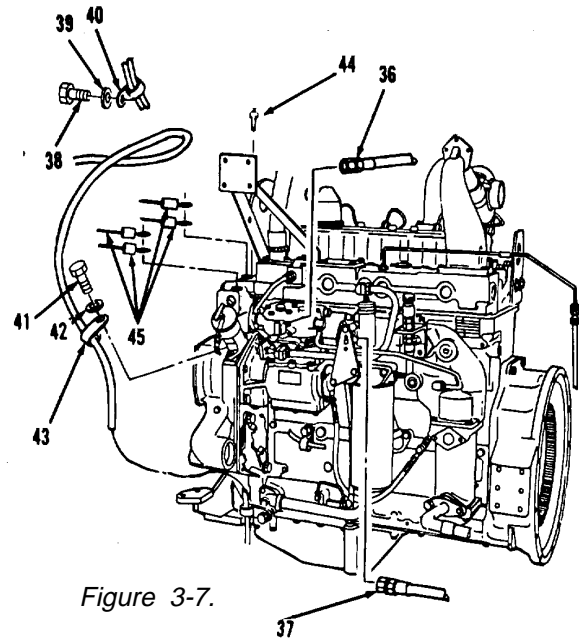


Figure 3-7.

ENGINE MAINTENANCE. (cont)

3-4. Engine. (Sheet 6 of 13)

REMOVAL (cont)

- 29. Disconnect tube assemblies (46 and 47, Figure 3-8) from rear of engine.
- 30. Disconnect hose (48) and clip from sampling valve assembly, (49) from engine oil cooler.
- 31. Remove bolt (50), washer (54) and clip (52) from lower, left side of engine.
- 32. Remove bolt (53), washer (54) and clip (55).
- 33. Remove four bolts (56) and washers (57, Figure 3-9).
- 34. Disconnect two hose assemblies (58) from transmission oil cooler.
- 35. Remove and discard two preformed packing (59).
- 36. Remove four screws (60) and washers (61), tag wires.

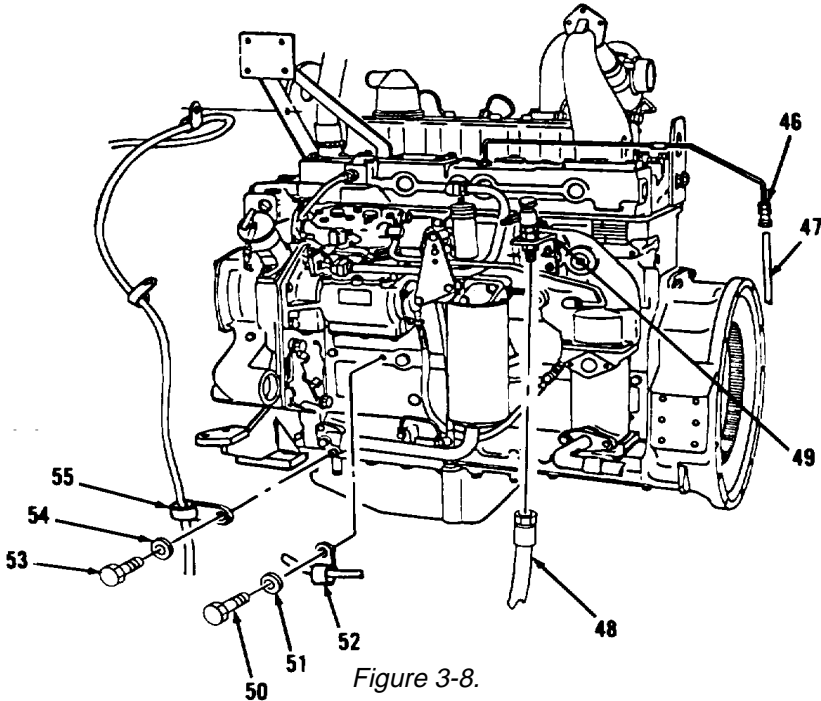


Figure 3-8.

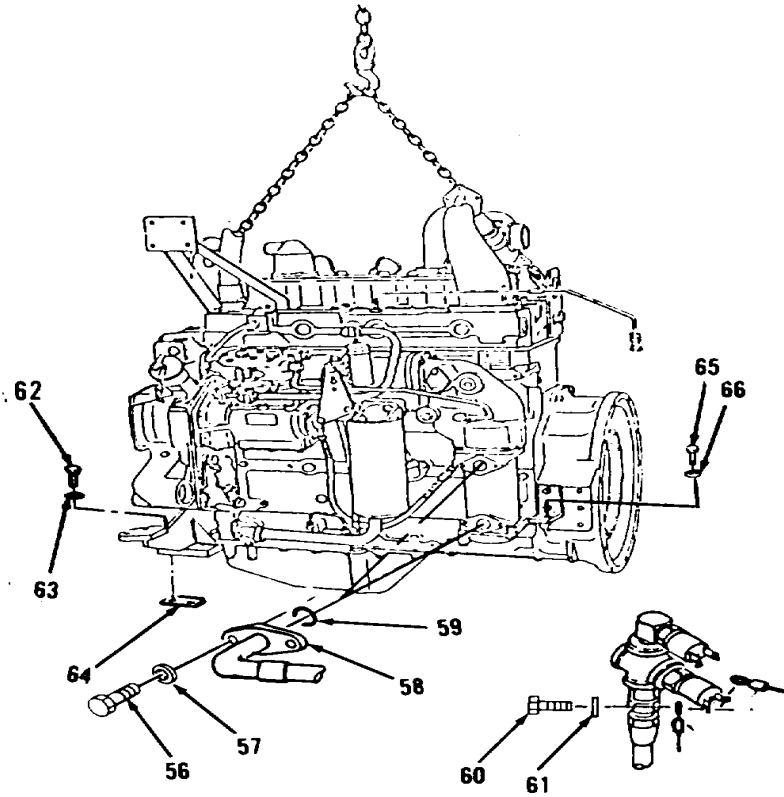


Figure 3-9.

Go to Sheet 7

ENGINE MAINTENANCE.

3-4. Engine. (Sheet 7 of 13)

REMOVAL**WARNING**

Weight of engine is approximately 1500 pounds. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

37. Attach hoist and sling to both lifting eyes mounted on each end of cylinder head and take up slack.
38. Remove four bolts (62) and lock washers (63) from trunnion on lower front, left and right sides of engine and separate.

CAUTION

Clear all hose, cable, wires and other detached assemblies from engine area before lifting engine from frame.

39. Remove engine. Lift engine slowly, always checking to be sure cables and hoses are not caught on anything. Do not allow engine to swing.
40. Support on engine stand or suitable blocking.

NOTE

If engine supports interferes with mounting, refer to paragraph 3-5, steps 3 through 6 for removal.

41. Remove hoist and sling.

Go to Sheet 8

ENGINE MAINTENANCE. (cont)

3-4. Engine. (Sheet 8 of 13)

REMOVAL (cont)

- 42. Remove shim(s) (64) from front of frame, left and right sides. Tie shim(s) (64) together and tag for identification.
- 43. Remove two bolts (65) and nuts (66) from lower rear of engine, left and right sides. Note the number of threads on bolts (65) that extend above nuts (66) before removing.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

- 1. Install two nuts (66) and bolts (65, Figure 3-9) in rear engine mounts, left and right sides of engine.
- 2. Position shim(s) (64) in same location as removed to front of frame, left and right sides.
- 3. Attach hoist and sling.
- 4. Position engine and lower slowly.
- 5. Align flywheel with engine coupling gear. If flywheel and coupling do not engage, turn crankshaft hub mounting bolt at front of engine. This will turn flywheel, allowing gear teeth to engage.

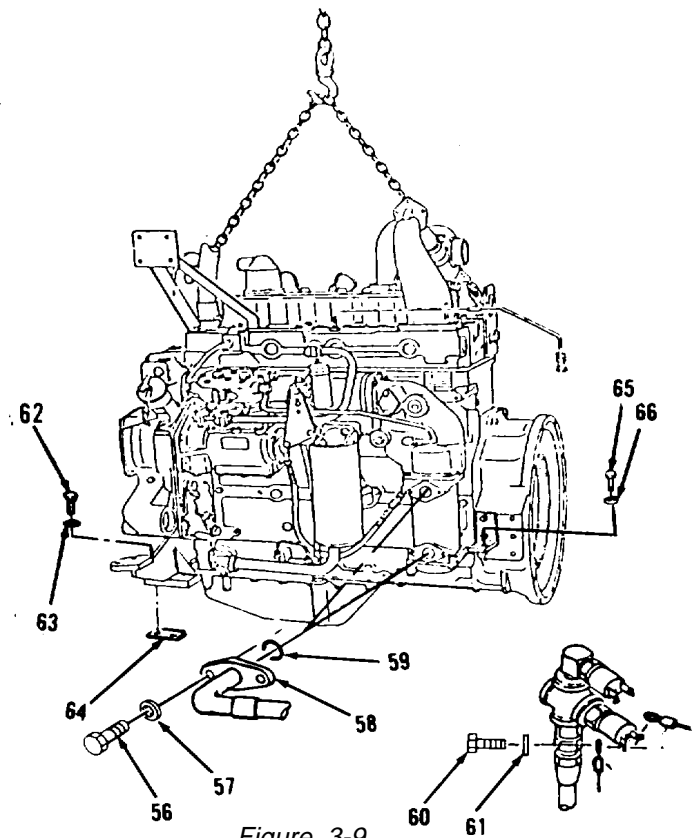
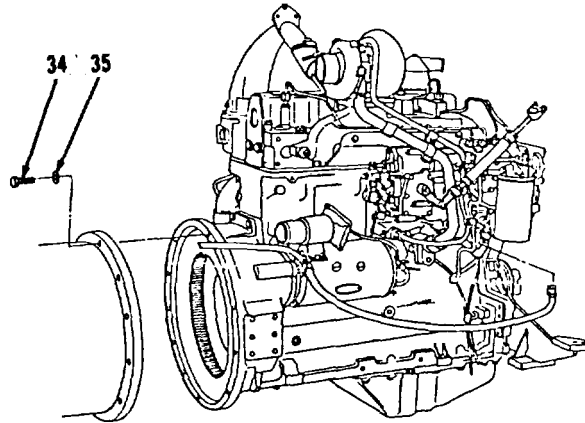


Figure 3-9.

Go to Sheet 9

ENGINE MAINTENANCE.3-4. Engine. (Sheet 9 of 13)**INSTALLATION**

6. Inspect shim(s) (64, Figure 3-9) for proper alignment.
7. Remove hoist and sling.
8. Install four lockwashers (63) and bolts (62) loosely in trunnion and frame on left and rights sides of lower, front of engine.
9. Install two of 12 lockwashers (35) and bolt (34, Figure 3-10) in two top mounting holes of engine-to-transmission adapter, securing adapter to engine.
10. Align engine.
11. After proper alignment has been made, tighten four bolts (62) to 150 ft-lb torque.
12. Install four washers (61) and screws (60).
13. Position two new preformed packing (59) and hose assemblies (58) on transmission oil cooler.
14. Install four washers (57) and bolts (56).

*Figure 3-10.***Go to Sheet 10**

ENGINE MAINTENANCE, (cont)

3-4. Engine. (Sheet 10 of 13)

INSTALLATION (cont)

15. Install clip (55), washer (54) and bolt (53, Figure 3-8).
16. Install clip (52), washer (51) and bolt (50). Route engine wiring harness between engine block and oil gage tube.
17. Bring three wire assemblies (45, Figure 3-7) behind coolant tube for transmission oil cooler, located behind air compressor.
18. Connect tube assemblies (46 and 47) to oil sampling valve at rear of engine.
19. Connect three wire assemblies (45, Figure 3-7) on coolant temperature switches on front of engine.
20. Install three screws (44).
21. Install clip (43), washer (42) and bolt (41) on left side of engine.
22. Install clip (40), washer (39) and bolt (38) to supplemental steering motor mounting bracket.
23. Connect hose assembly (37) to air compressor governor on left side of engine.
24. Connect hose assembly (36) to air compressor.

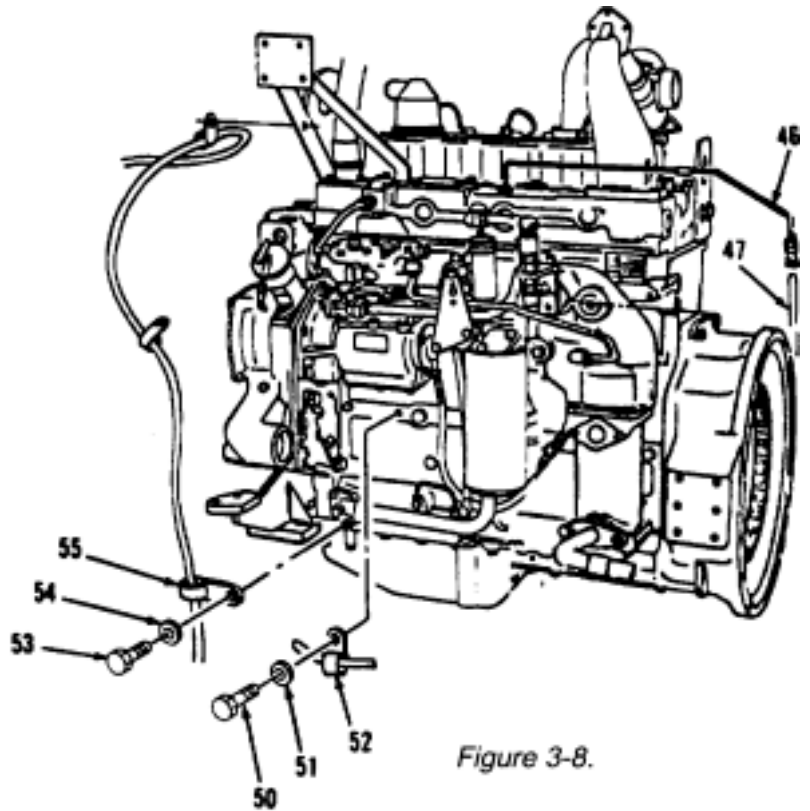


Figure 3-8.

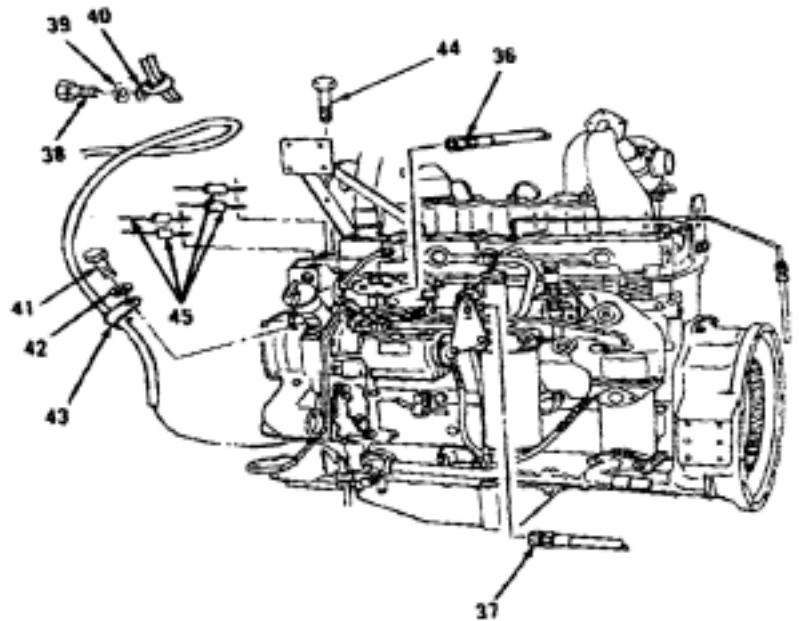
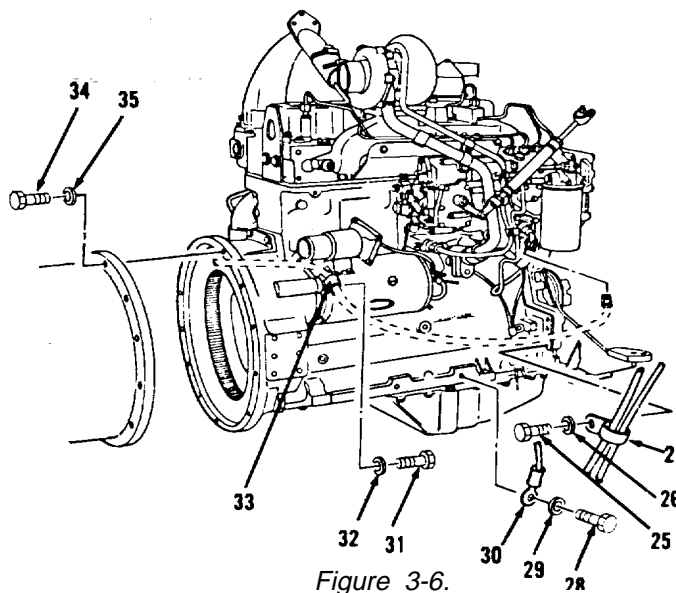


Figure 3-7.

Go to Sheet 11

ENGINE MAINTENANCE.3-4. Engine. (Sheet 11 of 13)**INSTALLATION**

25. Install ten of 12 lockwashers (35) and bolts (34, Figure 3-6) to rear of engine.
26. Install clip (33), washer (32) and bolt (31) to right side of engine.
27. Position wire assembly (30).
28. Install washer (29) and bolt (28).
29. Install clip (27), washer (26) and bolt (25) securing cables to backside of engine front cover.

**Go to Sheet 12**

ENGINE MAINTENANCE. (cont)

3-4. Engine. (Sheet 12 of 13)

INSTALLATION (cont)

30. Position governor control assembly (20, Figure 3-5) on backside of engine front cover between cover and fuel injection pump.

31. Position three washers (22) and bolts (21) through front cover in center mounting hole of governor control housing mounting plate.

32. Install clips (24 and 23), three washers (22) and bolts (21) securing hose, cables and governor control housing to engine front cover.

33. Position linkage assembly (74) on governor control assembly (20) lever.

34. Install pin (19) and new cotter pin (18).

35. Connect hose assembly (17) to fuel transfer pump on right side of engine.

36. Connect hose assembly (34) to fuel injection pump.

37. Install clip (16), washer (15) and bolt (14) securing three starting motor cables.
Figure 3-5

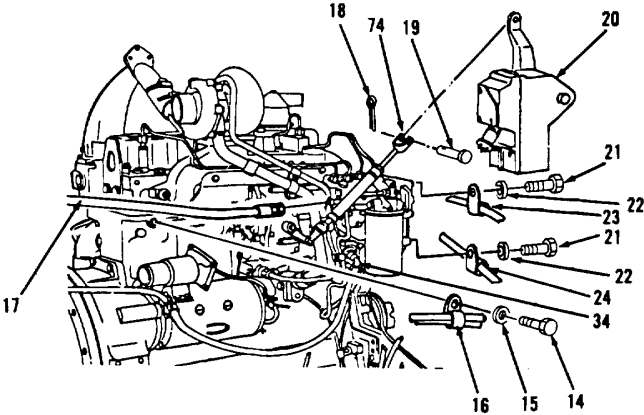


Figure 3-15.

Go to Sheet 13

ENGINE MAINTENANCE.3-4. Engine. (Sheet 13 of 13)**INSTALLATION**

38. Install cable assemblies (13 and 12), lockwasher (11), cable assembly (10), lockwasher (9) and nut (8, Figure 3-4) to starting motor. Tighten nut (8) to 22 ft-lb torque.
39. Install cable assemblies (7 and 6), wire assembly (5), lockwasher (4) and nut (3) to solenoid "battery" terminal. Tighten nut (3) to 22 ft-lb torque.
40. Install wire assembly (2) at terminal and nut (1) on "S" terminal of solenoid (9).
41. Turn fuel shutoff valve counterclockwise on right front of fuel tank to turn fuel on (Figure 3-3).
42. Refill engine oil crankcase to proper level. Refer to LO 5-3805-261-12.
43. Refill radiator to proper level. Refer to paragraph 6-48 in TM 5-3805-261-20.
44. Bleed air out of fuel lines. Refer to paragraph 6-15 in TM 5-3805-261-20. Refer to paragraph 6-15 in TM 5-3805-261-20.

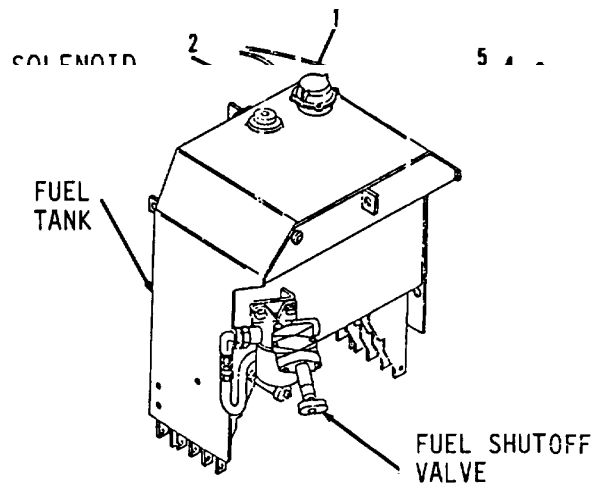


Figure 3-3.

NOTE

Return 130G Grader to original equipment condition.

End of Task

ENGINE MAINTENANCE. (cont)

3-5. Engine Mounting and Trunnion. (Sheet 1 of 4)

| | | | |
|-------------------|---------------|----------------|-----------------|
| This task covers: | a. Removal | b. Disassembly | c. Cleaning |
| | d. Inspection | e. Assembly | f. Installation |

INITIAL SETUP

Applicable Configurations
All

Personnel Required
Construction equipment
repairer MOS 62B

Tools
General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Puller

References
TM 5-3805-261-10

Special Environmental Conditions
None

Test Equipment
None

General Safety Instructions

None

Materials/Parts
Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Preformed packing, Item 21

Torque's
Except for special torque's shown,
all fasteners are tightened to
standard torque's. Refer to
Appendix E.

Troubleshooting References
None

Equipment Condition
TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 3-4

Engine removed.

Paragraph 3-9

Vibration damper removed.

Go to Sheet 2

ENGINE MAINTENANCE.

3-5. Engine Mounting and Trunnion. (Sheet 2 of 4)

REMOVAL

1. Remove two bolts (1), washers (2) and plates (3, Figure 3-11) from top, front of engine.
2. Remove two bolts (4), washers (5) and plate (6) from top, rear of engine.
3. Remove bolt (7) and nut (8) from support (9, Figure 3-12).
4. Remove two bolts (10) and support (9) from bottom, rear of engine.
5. Remove dowel (11) from support (9).
6. Remove bolt (12) and nut (13) from support (14).
7. Remove two bolts (15) and support (14) from bottom, rear of engine.
8. Remove dowel (16) from support (14).
9. Remove six bolts (17), washers (18) and support (19, Figure 3-13) from bottom, front of engine.

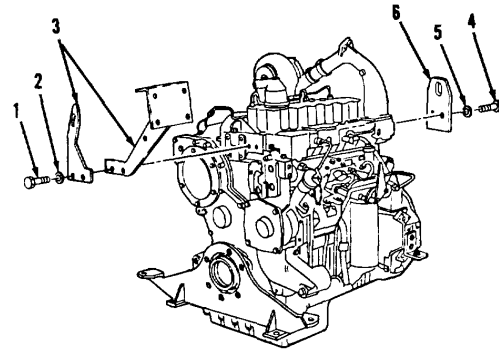


Figure 3-11.

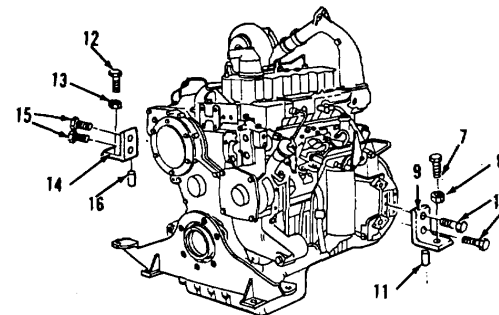


Figure 3-12.

CAUTION

Use care when removing and installing the trunnion to prevent damage to the crankshaft front seal.

10. Remove three bolts (20), trunnion items 22 thru 24 as an assembly and preformed packing (21). Discard preformed packing (21).

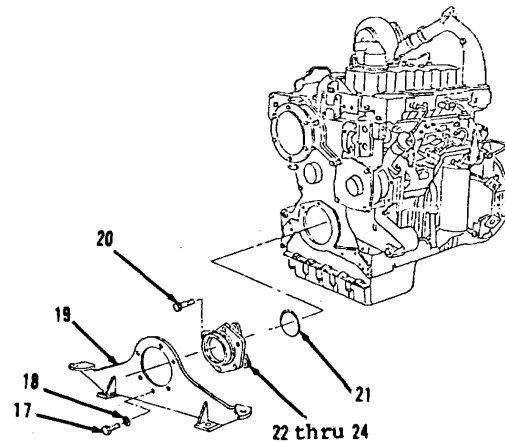


Figure 3-13.

Go to Sheet 3

ENGINE MAINTENANCE. (cont)

3-5. Engine Mounting and Trunnion. (Sheet 3 of 4)

DISASSEMBLY

CAUTION

Do not disassemble items 22 thru 24 unless inspection shows ring to be worn or defective.

Remove trunnion (22) and ring (23) from support (24, Figure 3-14).

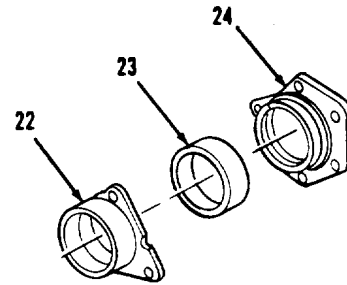


Figure 3-14.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install ring (23) in support (24, Figure 3-14). Ring (23) must be recessed 0.040 to 0.080 inch from back edge of support (24).
2. Install trunnion (22). Lubricate inner diameter of ring (23) with 3 percent soap solution.

INSTALLATION

1. Install new performed packing (21), items 22 thru 24 as an assembly and three bolts (20, Figure 3-13).
2. Install support (19), six washers (18) and bolts (17).

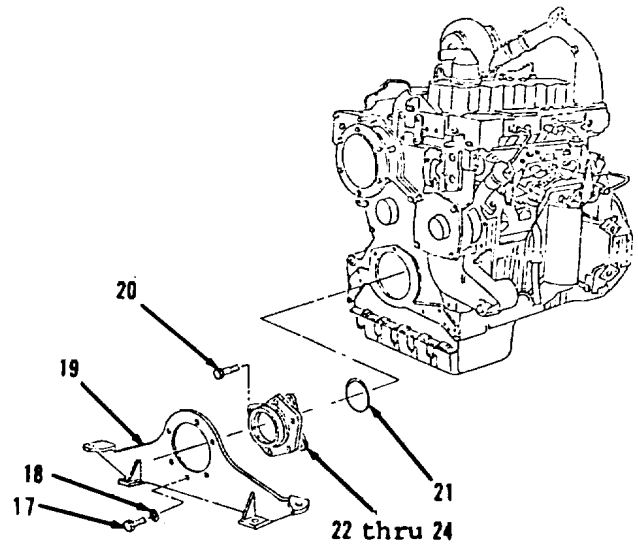


Figure 3-13.

Go to Sheet 4

ENGINE MAINTENANCE.

3-5. Engine Mounting and Trunnion. (Sheet 4 of 4)

INSTALLATION

3. Install dowel (16) to support (14, Figure 3-12).
4. Install support(14) and two bolts (15) to bottom, rear of engine.
5. Install bolt (12) and nut (13) to support (14). Bolt (12) must be installed to extend 0.118 inch below lower edge of support (14).
6. Install dowel (11) to support (9).

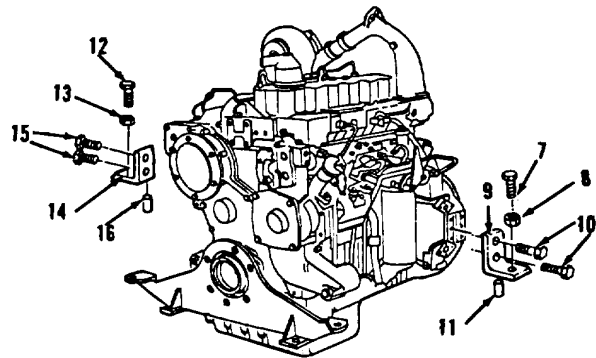


Figure 3-12.

7. Install support (9) and two bolts (10) to bottom, rear of engine.
8. Install bolt (7) and nut (8) to support (9). Bolt (7) must be installed to extend 0.118 inch below lower edge of support (9).
9. Install plate (6), two washers (5) and bolts (4, Figure 3-11) to top, rear of engine.
10. Install two plates (3), washers (2) and bolts (1) to top, front of engine.

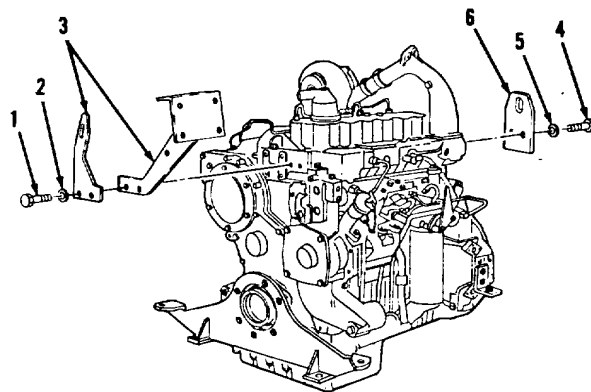


Figure 3-11.

NOTE

Return 130G Grader to original equipment condition.

End of Task

ENGINE MAINTENANCE. (cont)

3-6. Engine Front Covers. (Sheet 1 of 4)

This task covers: a. Removal
 d. Installation b. Cleaning c. Inspection

INITIAL SETUP

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Gasket cement, Item 19,
Appendix C
Detergent, Item 9, Appendix C
Small tags, Item 43,
Appendix C
Gaskets, Items 12, 19, 24
Preformed packing, Item 8
Caps

None

General Safety Instructions

Torque's

All fasteners are tightened to
standard torque's. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Water pump removed.
Fan belts removed.
Air compressor removed.

Paragraph 3-5

Engine mounting and trunnion removed.

Go to Sheet 2

ENGINE MAINTENANCE.

3-6. Engine Front Covers. (Sheet 2 of 4)

REMOVAL

1. Remove bolt (1), washer (2) and clip (3, Figure 3-15) from front of engine.

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

2. Disconnect hose assembly (4) from fuel priming pump and move away from front cover (7).
3. Install spacer (9) to each side of engine between oil pan plate and the engine block.
4. Remove two bolts (5), washers (6) and cover (7, Figure 3-16).
5. Remove and discard preformed pack-in (8) from front cover (7).

NOTE

Mark all bolts to ensure that during installation the bolts are installed in their original place.

6. Remove six nuts (10) and washers (11, Figure 3-17).
7. Remove cover (12) and gasket (13). Discard gasket (13). Remove all gasket material from mounting surfaces.
8. Remove two bolts (14).
9. Remove bolts (15), nuts (16) and washers (17).
10. Remove cover (18) and gasket (19). Discard gasket (19). Remove all gasket material from mounting surfaces.

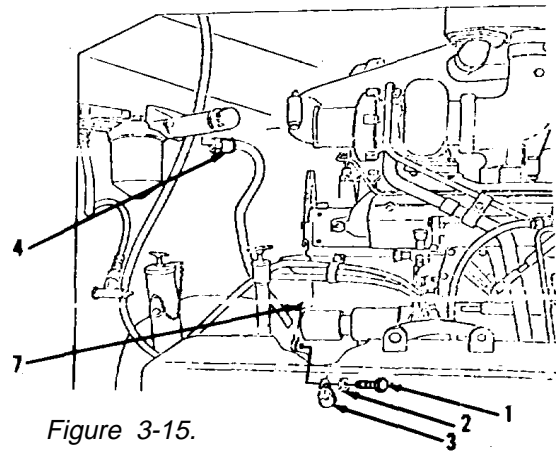


Figure 3-15.

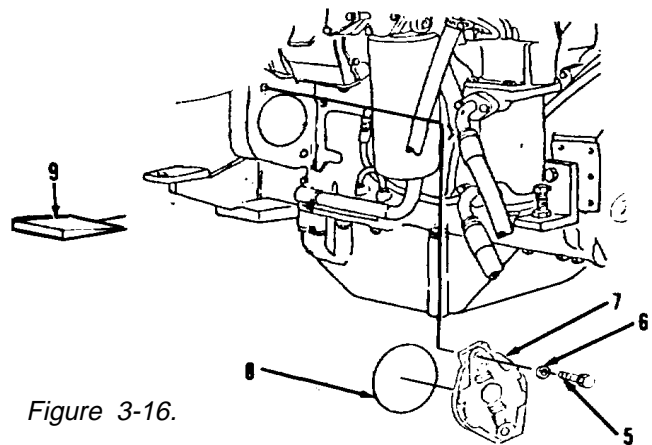


Figure 3-16.

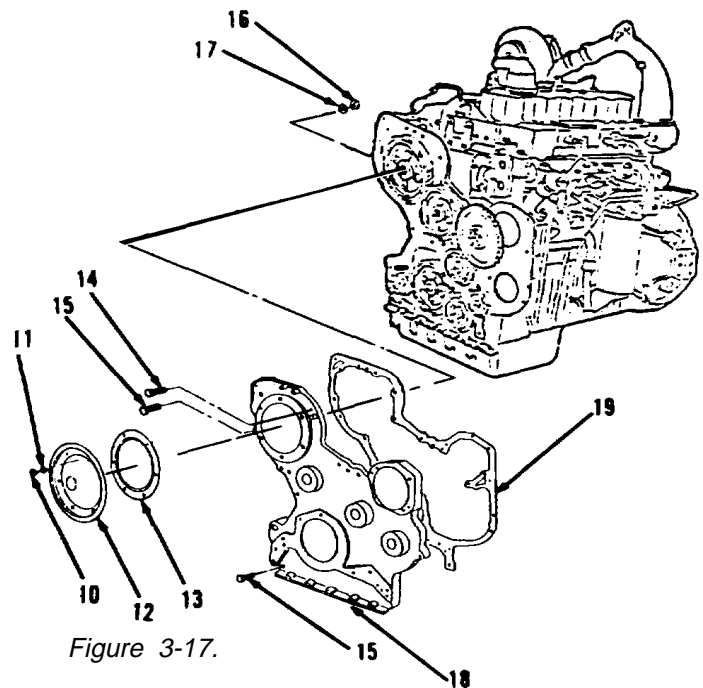


Figure 3-17.

Go to Sheet 3

ENGINE MAINTENANCE. (cont)3-6. Engine Front Covers. (Sheet 3 of 4)**CLEANING**

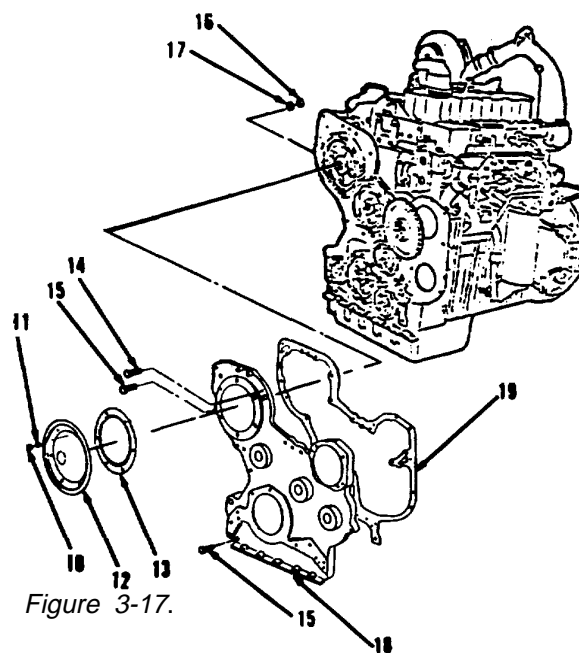
Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Position new gasket (19, Figure 3-17) on timing gear plate.
2. Cut gasket (19) even with bottom face of cylinder block.
3. Put gasket cement on bottom of gasket (19) where it touches the gasket for the oil pan plate.
4. Position timing gear cover (18) on timing gear plate.

**Go to Sheet 4**

ENGINE MAINTENANCE.

3-6. Engine Front Covers. (Sheet 4 of 4)

INSTALLATION

5. Install two bolts (14), bolts (15), washers (17) and nuts (16).

NOTE

Tighten bolts (1, Figure 3-18) to 17 ± 3 lb ft torque.

6. Position new gasket (13) and cover (12).
7. Install six washers (11) and nuts (10).
8. Position new preformed packing (8), cover (7), two washers (6) and bolts (5, Figure 3-16).
9. Remove spacer (9) from between oil pan plate and engine block on each side of engine.
10. Connect hose assembly (4, Figure 3-15) to fuel priming pump.
11. Install clip (3), washer (2) and bolt (1).

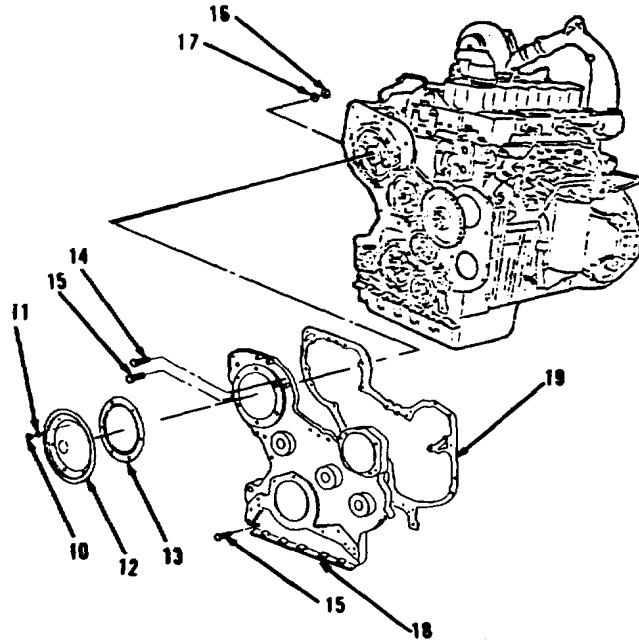


Figure 3-17.

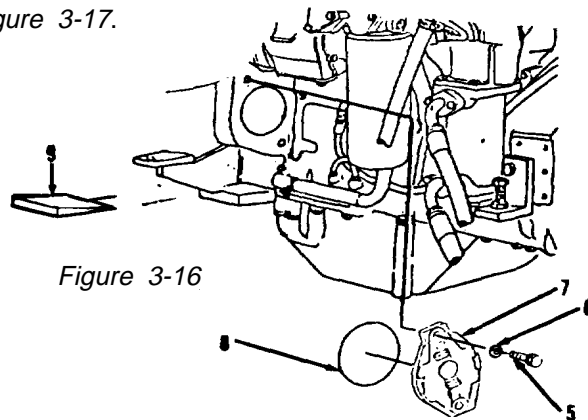


Figure 3-16

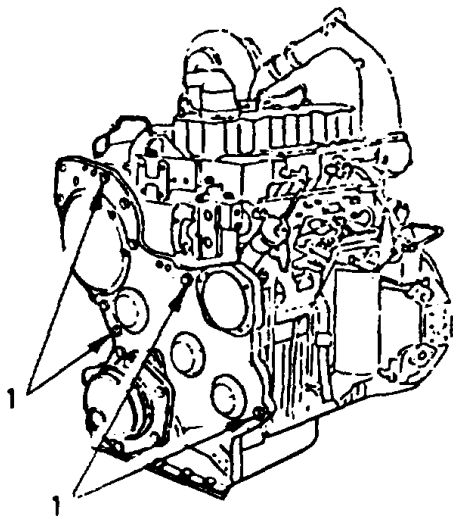


Figure 3-18.

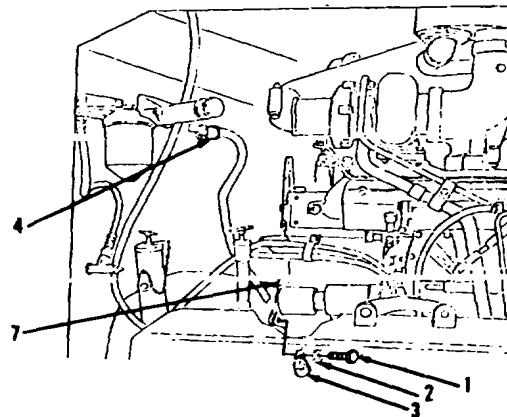


Figure 3-15.

End of Task

ENGINE MAINTENANCE. (cont)

3-7. Timing Gears and Plate. (Sheet 1 of 9)

This task covers: a. Removal b. Cleaning c. Inspection
 d. Installation

INITIAL SETUP

Applicable Configurations

All

Personnel Required

Construction equipment
 repairer MOS 62B

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)
 Engine turning tool 5P7307
 3/8-16NC bolt
 Pin 6V4186
 Adapter FT1644
 Arbor press
 Torque wrench

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Test Equipment

None

Torque's

Except for special torque's shown,
 all fasteners are tightened to
 standard torque's. Refer to
 Appendix E.

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Caskets, Items 14, 23
 Gasket Cement, Item 19
 Appendix C

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

Paragraph 3-6

Engine front covers removed.

Go to Sheet 2

ENGINE MAINTENANCE.

3-7. Timing Gears and Plate. (Sheet 2 of 9)

REMOVAL

1. Loosen bolt (1) on gear (3, Figure 3-19) approximately .25 inch.
2. Using a bearing puller, loosen gear (3) from shaft.
3. Remove bolt (1), washer (2) and gear (3, Figure 3-20).
4. Remove two bolts (4), plate (5) and gear (7, Figure 3-21).

NOTE

If maintenance is required, use an arbor press to remove bearing (6) from gear (7, Figure 3-22).

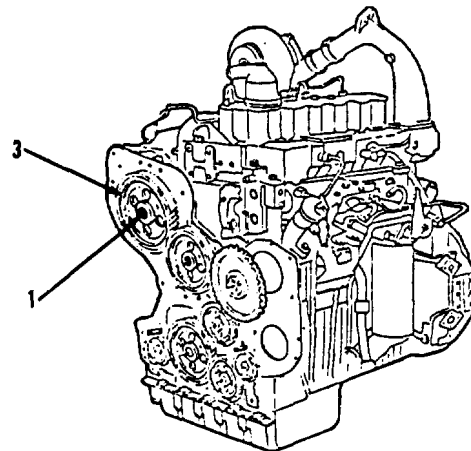


Figure 3-19.

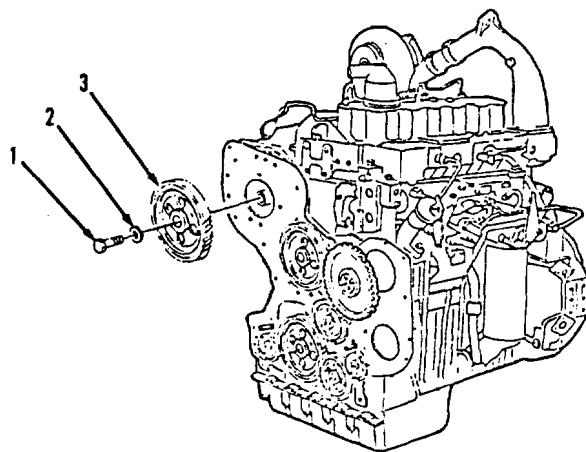


Figure 3-20.

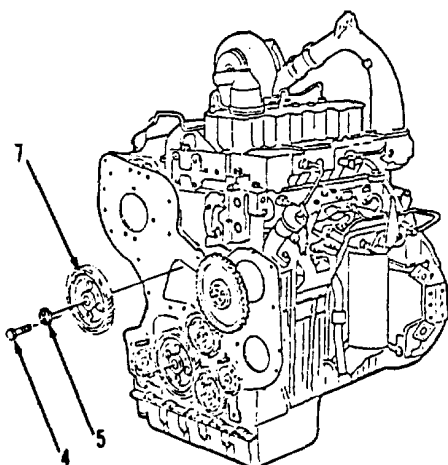


Figure 3-21.

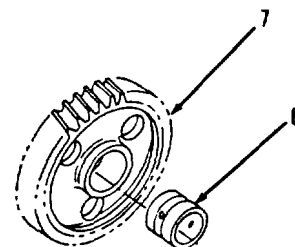


Figure 3-22.

Go to Sheet 3

ENGINE MAINTENANCE. (cont)

3-7. Timing Gears and Plate. (Sheet 3 of 9)

REMOVAL (cont)

- 5. Turn crankshaft and camshaft so the "C" marks are in alignment on gear (9, Figure 3-23) and crankshaft gear.

CAUTION

Do not turn crankshaft after camshaft gear has been removed. Failure to follow this procedure will result in valve damage.

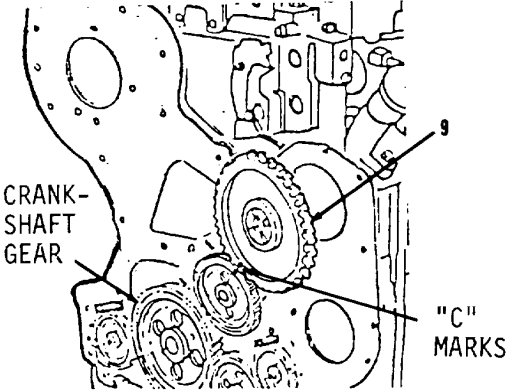


Figure 3-23.

- 6. Remove four bolts (8) and gear (9, Figure 3-24).
- 7. Remove three nuts (10) and washers (11) from studs that hold the fuel injection pump housing to plate (13, Figure 3-25).

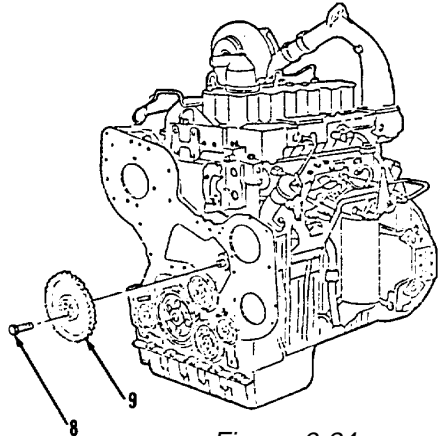


Figure 3-24.

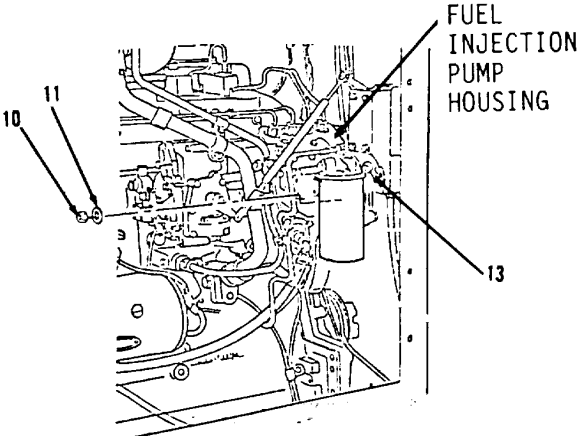


Figure 3-25.

Go to Sheet 4

ENGINE MAINTENANCE.3-7. Timing Gears and Plate. (Sheet 4 of 9)**REMOVAL**

8. Remove six bolts (12), locks (15), plate (13) and gasket (14, Figure 3-26) from engine block. Discard gasket (14). Remove all gasket material from mounting surfaces.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION**NOTE**

Before installing plate, make sure that preformed packing for the fuel injection pump housing are properly positioned.

1. Install new gasket (14, Figure 3-26) on cylinder block.
2. Trim gasket (14) even with bottom of cylinder block. Apply gasket cement to bottom of gasket (14) where it touches gasket for oil pan plate.
3. Install plate (13), locks (15) and six bolts (12).
4. Install three washers (11) and nuts (10, Figure 3-25) on studs that hold fuel injection pump to plate (13).

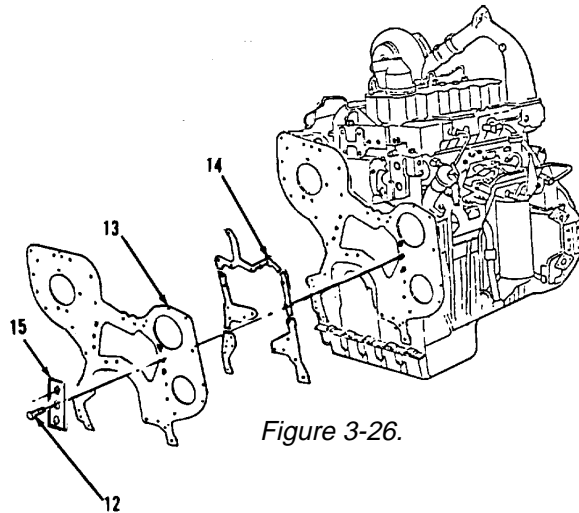


Figure 3-26.

Go to Sheet 5
3-41

ENGINE MAINTENANCE. (cont)

3-7. Timing Gears and Plate. (Sheet 5 of 9)

INSTALLATION (cont)

CAUTION

After plate is installed, be sure rack is free to move in fuel injection pump housing. Poorly positioned preformed packing on drive end of pump can hold rack and prevent movement. Observe movement through hole (A) in plate. If rack does not move freely, remove plate and properly position fuel injection pump housing preformed packing.

- 5. Position gear (9) on camshaft so that "C" marks on gear (9, Figure 3-27) and crankshaft gear are aligned.
- 6. Install four bolts (8) to secure gear (9, Figure 3-28). Tighten four bolts (8) to 41 ± 5 ft-lb torque.
- 7. Install bearing (6) in gear (7, Figure 3-22). The end of the bearing must be .60 inch below the face of the gear hub.

NOTE

Before installing gear, make sure that oil hole in the shaft for gear is open.

- 8. Install gear (7, Figure 3-21).
- 9. With finished side of plate (5) toward gear (7), install plate (5) and two bolts (4).

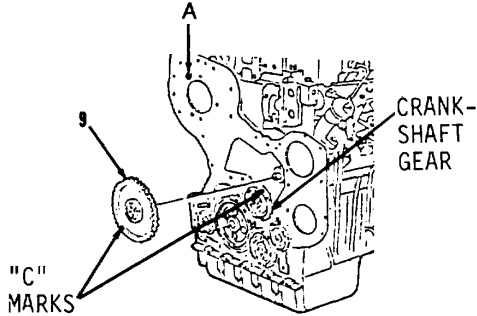


Figure 3-27.

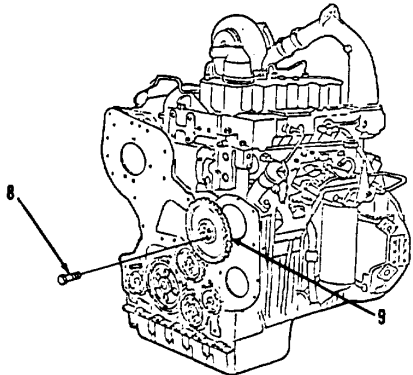


Figure 3-28.

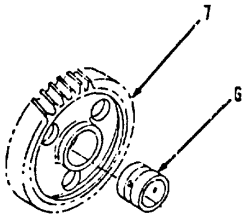


Figure 3-22.

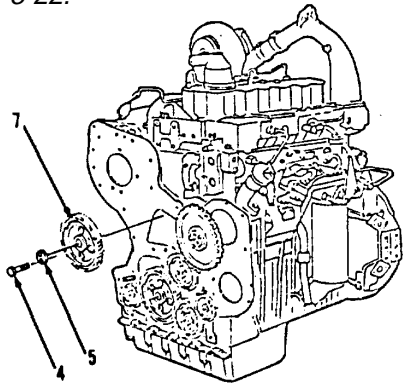


Figure 3-21.

Go to Sheet 6

ENGINE MAINTENANCE.

3-7. Timing Gears and Plate. (Sheet 6 of 9)

INSTALLATION

NOTE

Before installing gear (3, Figure 3-19), No. 1 piston must be at top center (TC) of compression. Perform steps 10 through 25 to insure proper timing.

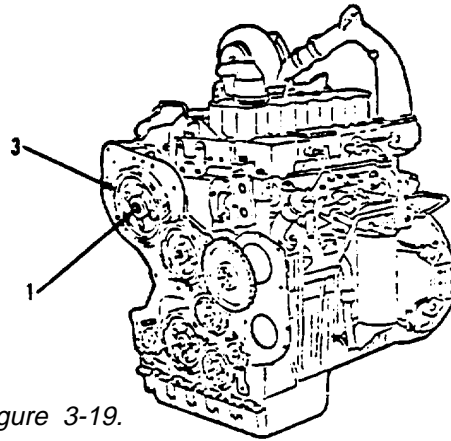


Figure 3-19.

10. Loosen two clamps (15, Figure 3-29).
11. Remove bolt (16), washer (17) and breather (18) from valve cover.
12. Remove plug (19, Figure 3-30) from flywheel housing.

CAUTION

Do not turn crankshaft counterclockwise.

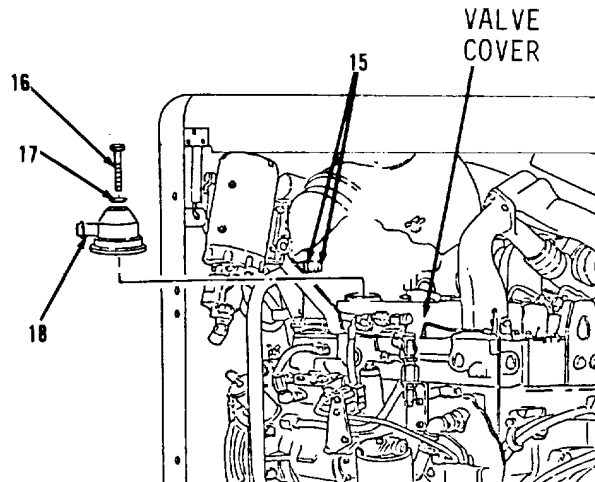


Figure 3-29.

13. Turn crankshaft clockwise (as seen from front of engine) until a 3/8-16NC bolt at least 2-5 inches long can be installed in flywheel through plug (19) hole in flywheel housing.
14. Observe rocker arms for No. 1 piston through breather hole (18) in valve cover. Check if both rocker arms can be moved backward and forward by hand.
15. If 3/8-16NC bolt is installed and both rocker arms move freely, the No. 1 piston is at top center of compression stroke.
16. If both rocker arms cannot be moved by hand, the No. 1 piston is not at top center of compression stroke. Remove 3/8-16NC bolt.
17. Turn crankshaft clockwise 360 degrees (one full turn).

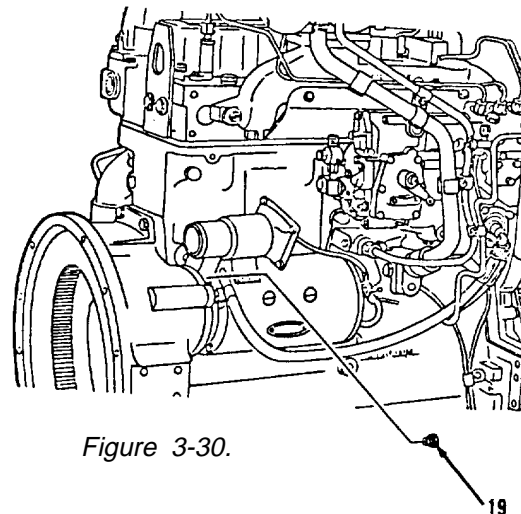


Figure 3-30.

Go to Sheet 7

ENGINE MAINTENANCE. (cont)

3-7. Timing Gears and Plate. (Sheet 7 of 9)

INSTALLATION (cont)

18. Install 3/8-16NC bolt in flywheel again.
19. Observe rocker arms for No. 1 piston through breather hole in valve cover. Check if both rocker arms move freely.
20. Repeat steps 17 thru 19 if rocker arms do not move freely. If rocker arms move freely, continue to next step.

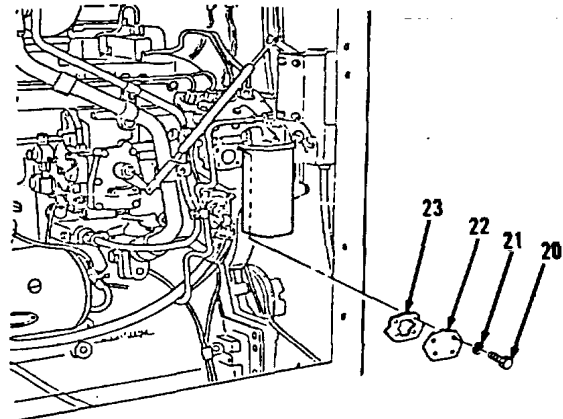


Figure 3-31.

21. Remove four bolts (20), washers (21), cover (22) and gasket (23, Figure 3-31) from fuel pump housing. Discard gasket (23). Remove all gasket material from mounting surfaces.

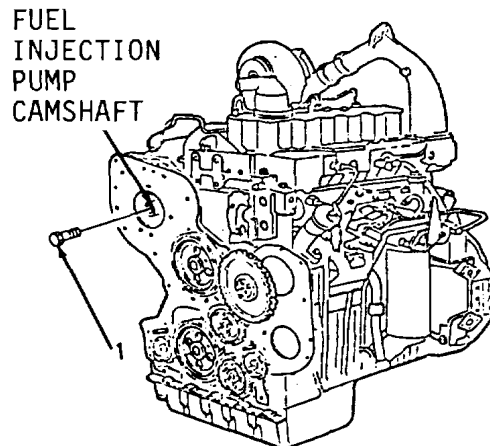


Figure 3-32.

22. Install bolt (1, Figure 3-32) on fuel injection pump camshaft.
23. Install pin in fuel injection pump housing (Figure 3-33).
24. Push on pin and turn fuel injection pump camshaft until pin slides down into groove in camshaft. Fuel injection pump is now in No. 1 piston top center position.

25. With pin still in camshaft groove, remove bolt (1, Figure 3-32) from fuel injection pump camshaft.

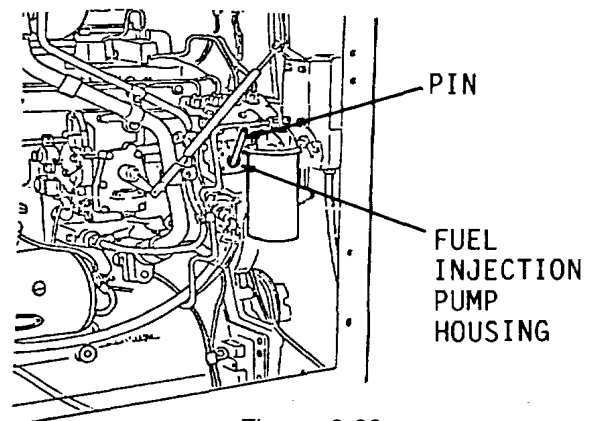


Figure 3-33.

Go to Sheet 8

ENGINE MAINTENANCE.3-7. Timing Gears and Plate. (Sheet 8 of 9)**INSTALLATION**

26. Position gear (3, Figure 3-20) on fuel injection pump camshaft.
27. With the flat side of the washer away from the gear, install washer (2) and bolt (1). Bolt (1) should be finger tightened.
28. Install adapter on gear (3).
29. Using two torque wrenches, put a clockwise force of 50 ft-lb on adapter to remove gear backlash, while bolt (1) is tightened to 199 ± 18 ft-lb torque.
30. Remove pin from fuel injection pump housing (Figure 3-33).
31. Remove 3/8-16NC bolt from flywheel.

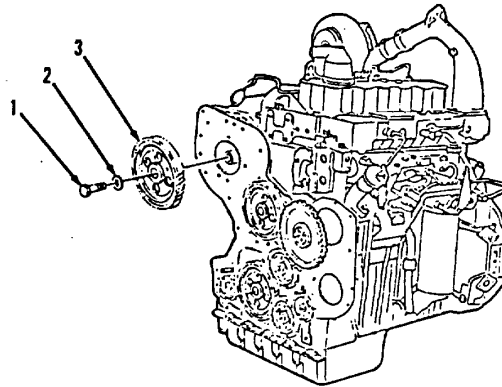


Figure 3-20.

NOTE

- Steps 32 thru 38 are to recheck timing to insure it is correct.
32. Turn crankshaft clockwise (as seen from front of engine) approximately 1/2 turn.
 33. Install pin in fuel injection pump housing.
 34. While crankshaft is turned clockwise (as seen from front of engine), push pin until it slides into groove on fuel injection pump camshaft.

Go to Sheet 9

ENGINE MAINTENANCE. (cont)

3-7. Timing Gears and Plate. (Sheet 9 of 9)

INSTALLATION (cont)

- 35. Install 3/8-16NC bolt into flywheel again.
- 36. If flywheel bolt is installed and pin is in groove of pump camshaft, the gears timing is correct. If so, go to next step. If not, repeat steps 30 thru 36.
- 37. Remove 3/8-16NC bolt from flywheel.
- 38. Install plug (19, Figure 3-30).
- 39. Install new gasket (23), cover (22), four washers (21) and bolts (20, Figure 3-31) on fuel injection pump housing. Torque bolts to 20 ± 5 ft-lb.
- 40. Position breather (18, Figure 3-29) on valve cover.
- 41. Tighten two clamps (15).
- 42. Install bolt (16) and tighten to 10 ± 2 ft-lb torque.

NOTE

Return 130G Grader to original equipment condition.

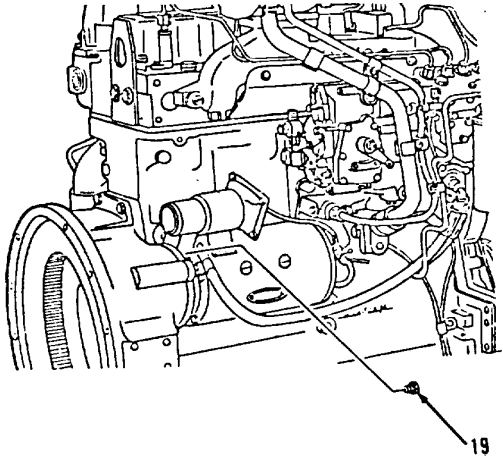


Figure 3-30.

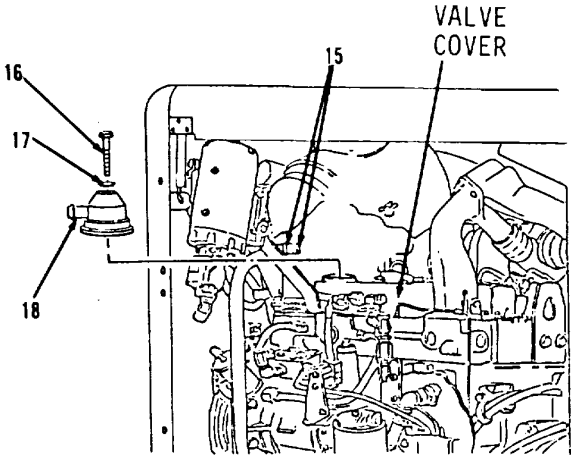


Figure 3-29.

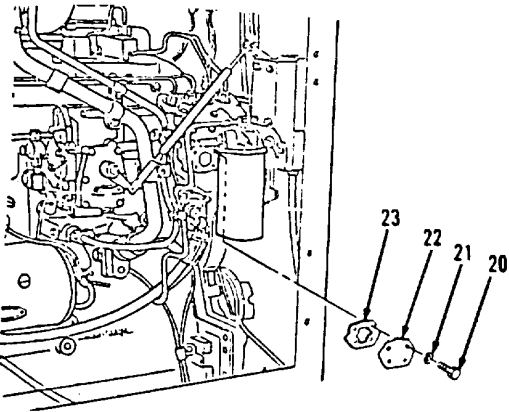


Figure 3-31.

ENGINE MAINTENANCE.

3-8. Cylinder Block Liners. (Sheet 1 of 3)

This task covers a. Inspection

INITIAL SETUP

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

Liner projection tool group

Spacer plate

Bolts

Crossbar

Plates None

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

Test Equipment

None

Torque's

Except for special torque's shown,
all fasteners are tightened to
standard torque's. Refer to
Appendix E.

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C

Clean cloths, Item 41,
Appendix C

Washers, Items 2, 7

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 3-9

Cylinder head removed.

Go to Sheet 2

3-47

ENGINE MAINTENANCE. (cont)3-8. Cylinder Block Liners. (Sheet 2 of 3)**INSPECTION**

1. Measure cylinder liner bore. Maximum allowable diameter is 4.755 inches. If oversized, mark for removal.
2. Install spacer plate (1), 20 washers (2) and ten bolts (3, Figure 3-34) in cylinder block. Tighten ten bolts (3) evenly in four steps of 10 ft-lb, 25 ft-lb, 50 ft-lb and 70 ft-lb torque. Use two of 20 washers (2) with each of ten bolts (3).
3. Install adapter plate (4), crossbar (5), two plates (6), washers (7) and bolts (8). Tighten two bolts (8) evenly in four steps of 5 ft-lb, 15 ft-lb, 25 ft-lb and 50 ft-lb torque. Measurement from bottom of crossbar (5) to spacer plate (1) must be the same on both sides of cylinder liner.
4. Assemble contact point, dial indicator (9) and gage body (10).
5. Adjust dial indicator (9) to zero.
6. Measure cylinder liner projection as close as possible to four corners of adapter plate (4) on cylinder liner. Liner projection must be 0.0012 to 0.0069 inch. Difference between four measurements on cylinder liner must not be more than 0.002 inch. Difference in average cylinder liner projection for liners next to each other must not be more than 0.002 inch. Maximum difference in average projection for all cylinder liners must not be more than 0.004 inch.

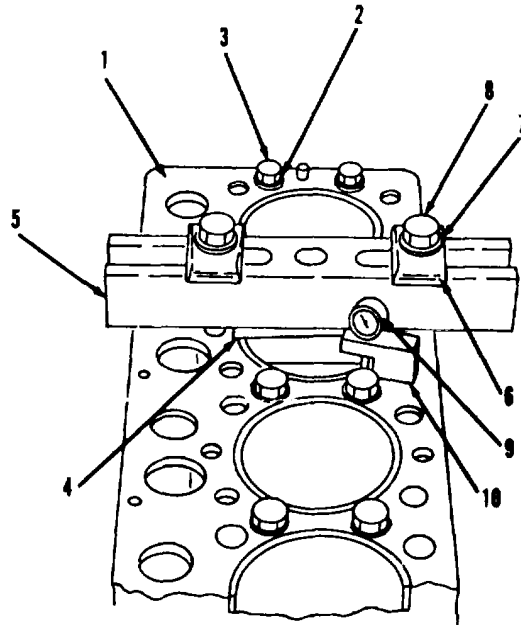


Figure 3-34.

Go to Sheet 3

ENGINE MAINTENANCE.

3-8. Cylinder Block Liners. (Sheet 3 of 3)

INSPECTION**NOTE**

If liner projection changes from point to point around liner, turn liner to new position in bore. If liner projection is still not to specifications, move liner to different bore.

7. Mark cylinder liner and spacer plate (1) with temporary mark. Marking will permit installation of cylinder liner in correct position during final installation. Refer to paragraph 13-2.

NOTE

Return 130G Grader to original equipment condition.

End of Task

3-49

ENGINE MAINTENANCE. (cont)

3-9. Cylinder Head Assembly. (Sheet 1 of 8)

This task covers: a. Removal b. Disassembly c. Cleaning
 d. Inspection e. Assembly f. Installation

INITIAL SETUP

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-177-7033)
 Extractor
 Handle assembly
 Valve grinder
 Hoist and sling

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Detergent, Item 9, Appendix C
 Small tags, Item 43,
 Appendix C
 Lubricating oil, Item 33,
 Appendix C
 Gaskets, Items 13, 14, 18,
 19, 25, 26
 Plugs, Items 34, 35, 36
 Seals, Items 20, 21
 Preformed packing, Item 20
 Directors, Item 37
 Prussian blue
 Caps

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-10
 TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torque's

Except for special torque's shown,
 all fasteners are tightened to
 standard torque's. Refer to
 Appendix E.

Go to Sheet 2

ENGINE MAINTENANCE.**3-9. Cylinder Head Assembly.** (Sheet 2 of 8)Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Hood removed.
Air cleaner assembly removed.
Turbocharger air lines removed.
Coolant switch removed.
Ether aid switch removed.
Coolant temperature regulator removed.
Supplemental steering motor mounting removed.

Paragraph 3-12

Rocker arm assembly removed.

Paragraph 3-19

Exhaust manifold removed.

Paragraph 3-24

Fuel injectors removed.

Go to Sheet 3**3-51**

ENGINE MAINTENANCE. (cont)

3-9. Cylinder Head Assembly. (Sheet 3 of 8)

REMOVAL

NOTE

All hose and tube assemblies should be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

1. Remove tube (1) from tube assembly (37) and atomizer (2, Figure 3-35) on top, left side of engine.
2. Remove atomizer (2) from cylinder head (18).
3. Disconnect tube assembly (3).
4. Remove elbow (4).
5. Disconnect tube assembly (5).
6. Remove connector (6) and bushing (7).
7. Loosen two clamps (39) on left side of engine.
8. Remove hose (8) by sliding back off pipe (40).
9. Remove bolts (9 and 10) and two bolts (11, Figure 3-36) from front, left side of engine.
10. Separate elbow (12) from cylinder head (18) and water pump.
11. Remove and discard gaskets (13 and 14). Remove all gasket material from mounting surfaces.
12. Remove five bolts (15), 14 bolts (16) and washers (17) from top of cylinder head (18).

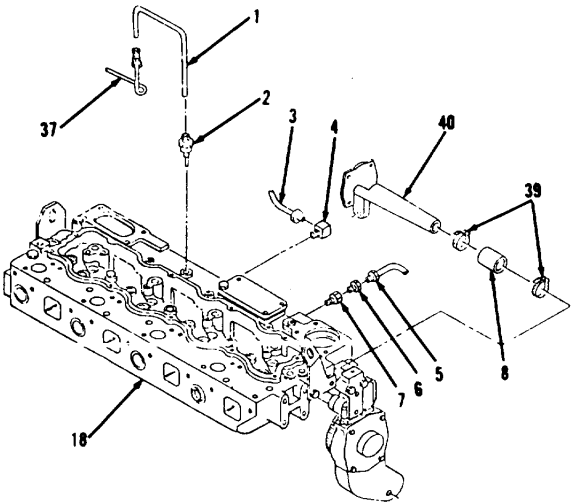


Figure 3-35.

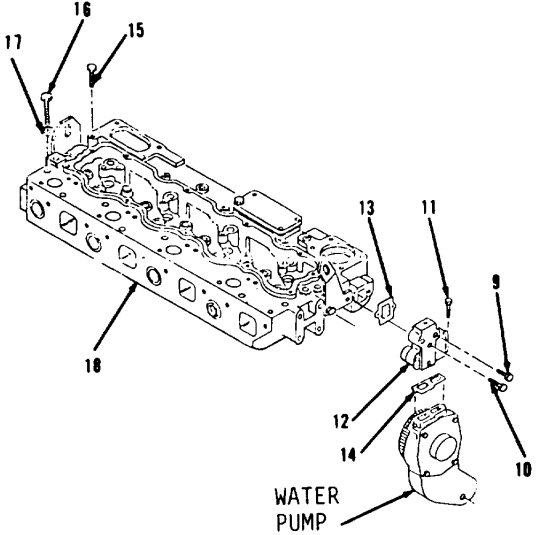


Figure 3-36.

Go to Sheet 4

ENGINE MAINTENANCE.**3-9. Cylinder Head Assembly.** (Sheet 4 of 8)

REMOVAL

WARNING

Weight of cylinder head assembly is approximately 129 pounds. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

13. Attach hoist and sling to plates (29 and 32, Figure 3-37).
14. Using hoist and sling, remove items 18 thru 37 as an assembly from engine.

CAUTION

Do not lay machined surfaces of cylinder head on an unprotected surface. Concrete or metal surfaces can scratch and cause damage to the cylinder head.

15. Remove hoist and sling.
16. Remove and discard gasket (19), preformed packing (20), four seals (21) and 12 seals (22) from top of engine. Remove all gasket material from mounting surfaces.
17. Inspect four cylinder liners projection and bore. Refer to paragraph 3-7.

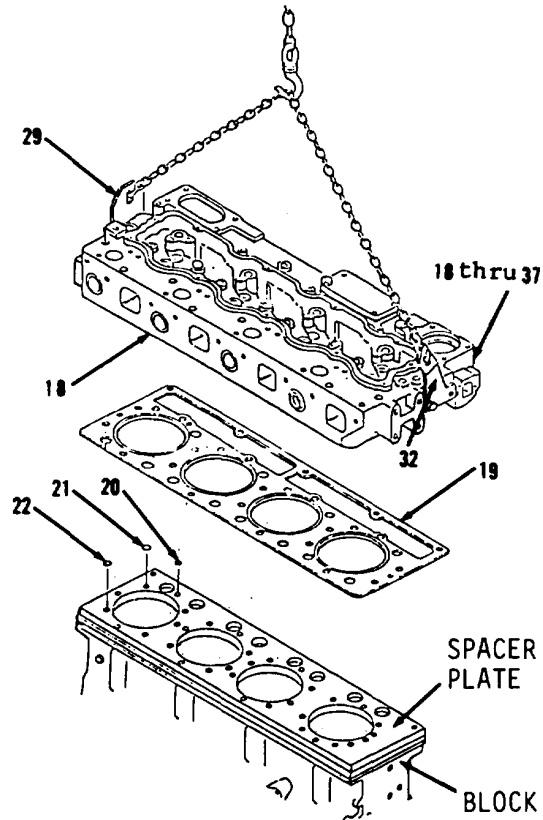


Figure 3-37.

Go to Sheet 5

ENGINE MAINTENANCE. (cont)**3-9. Cylinder Head Assembly.** (Sheet 5 of 8)**DISASSEMBLY**

1. Remove four bolts (23), washers (24), cover (25) and gasket (26, Figure 3-38). Discard gasket (26). Remove all gasket material from mounting surfaces.

NOTE

Plates can remain attached to cylinder head to aid in easy handling.

2. Remove two bolts (27), washers (28) and plate (29).
3. Remove two bolts (30), washers (31) and plate (32).
4. Remove three plugs (33).
5. Remove and discard four plugs (34 and 35) and eight plugs (36). Drill hole through plugs (36) and pry out.
6. Remove and discard 12 directors (37).

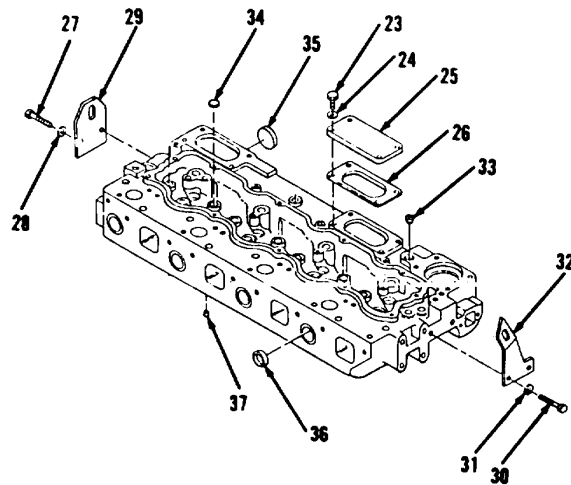


Figure 3-38.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

Go to Sheet 6

ENGINE MAINTENANCE.**3-9. Cylinder Head Assembly.** (Sheet 6 of 8)**ASSEMBLY**

1. Position 12 new directors (37, Figure 3-37). Aline notch in directors (37) with V stamped on bottom, at the edge of the bore for 12 new directors (37). Install 0.031 inch below surface of cylinder head (18).
2. Reduce temperature of eight new plugs (36) and four new plugs (35 and 34) and using suitable driver and hammer, install.
3. Install three plugs (33).
4. Install plate (32), two washers (31) and bolts (30).
5. Install plate (29), two washers (28) and bolts (27).
6. Install new gasket (26), cover (25), four washers (24) and bolts (23).

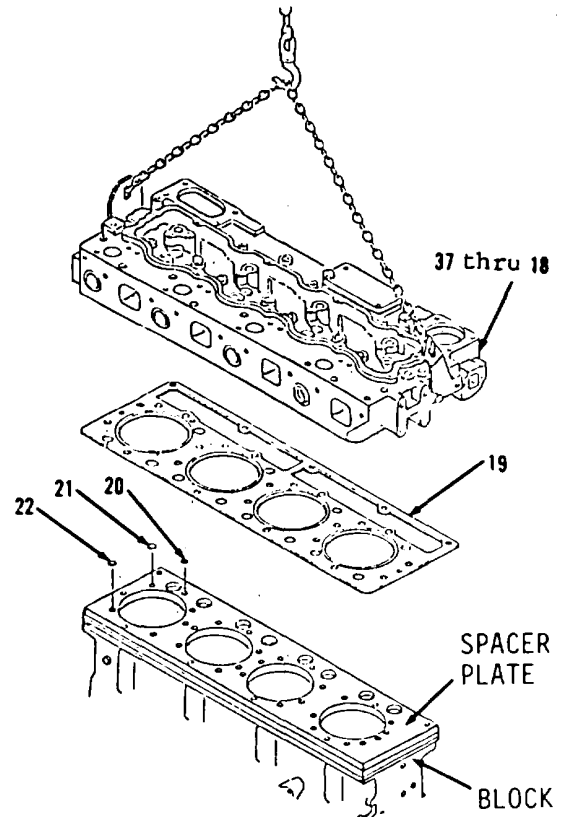


Figure 3-37.

INSTALLATION

1. Position 12 new seals (22), four new seals (21) and new preformed packing (20, Figure 3-37) on machined spacer plate.
2. Install new gasket (19) over spacer plate on dowels in block.
3. Install hoist and sling.
4. Using hoist and sling, position items 37 thru 18 as an assembly over engine. Aline with dowels in block and install.

Go to Sheet 7

3-9. Cylinder Head Assembly. (Sheet 7 of 8)

INSTALLATION (cont)

- 5. Install 14 washers (17), bolts (16) and five bolts (15) loosely into cylinder head (18, Figure 3-36). Lubricate five bolts (15) threads with clean oil.
- 6. Install rocker arm assembly. Refer to paragraph 3-12.
- 7. Tighten cylinder head (18, Figure 3-39) bolts A thru R in letter sequence to 115 ft-lb torque.
- 8. Tighten bolts A thru R in letter sequence to 185 ft-lb torque.
- 9. Tighten bolts A thru R again in letter sequence to 185 ft-lb torque.
- 10. Tighten bolts S thru W in letter sequence to 32 ft-lb torque.
- 11. Tighten bolts S thru W again in letter sequence to 32 ft-lb torque.
- 12. Adjust valves. Refer to paragraph 3-12.

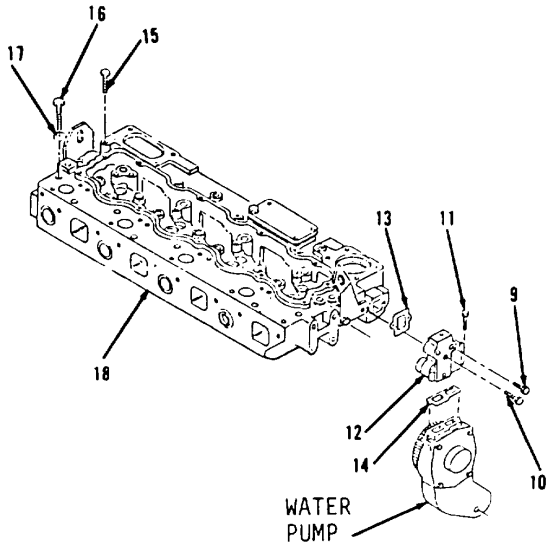


Figure 3-36.

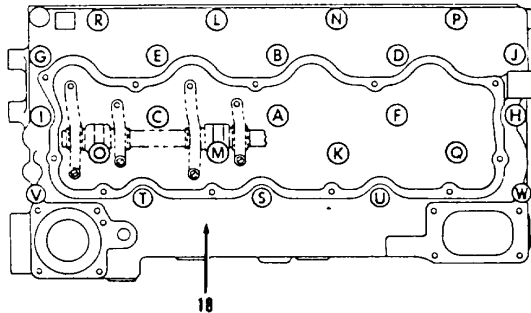


Figure 3-39.

Go to Sheet 8

ENGINE MAINTENANCE.**3-9. Cylinder Head Assembly.** (Sheet 8 of 8)**INSTALLATION**

13. Position new gaskets (14 and 13) and elbow (12, Figure 3-36) to left front of engine.
14. Install two bolts (11) and bolts (10 and 9).
15. Position hose (8) and two clamps (39) to left side of engine. Slide up pipe (40, Figure 3-35) onto neck of elbow (12).
16. Tighten two clamps (39).
17. Install bushing (7), connector (6) and tube assembly (5).
18. Install elbow (4) and connect hose assembly (3).
19. Install atomizer (2) to top left of cylinder head (18).
20. Install tube (1) to tube assembly (37) and atomizer (2).
21. Remove hoist and sling.

NOTE

Return 130G Grader to original equipment condition.

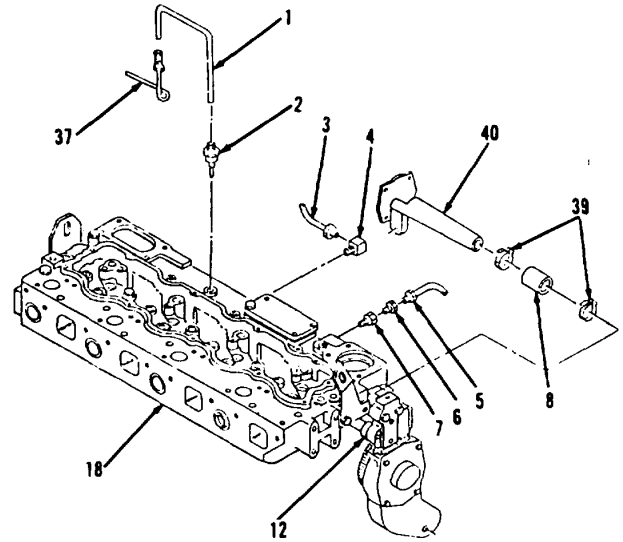


Figure 3-35.

End of Task

3-57

ENGINE MAINTENANCE. (cont)**3-10. Vibration Damper.** (Sheet 1 of 2)

This task covers: **a. Removal** **b. Cleaning** **c. Inspection**
 d. Installation

INITIAL SETUP:Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)
 Puller FT 530-2

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

Paragraph 3-4

Engine removed.

Go to Sheet 2**3-58**

ENGINE MAINTENANCE.**3-10. Vibration Damper.** (Sheet 2 of 2)**REMOVAL**

1. Loosen bolt from front of engine (Figure 3-40). Do not remove.

WARNING

Vibration damper is under extreme pressure. Remove carefully. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

2. Using suitable puller, loosen hub from crankshaft.
3. Remove bolt, washer and hub.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Position hub on crankshaft (Figure 3-40).
2. Install washer and bolt. Tighten bolt to 230 ft-lb torque. Tap with hammer. Retighten bolt to 230 ft-lb torque.

NOTE

Return 130G Grader to original equipment condition.

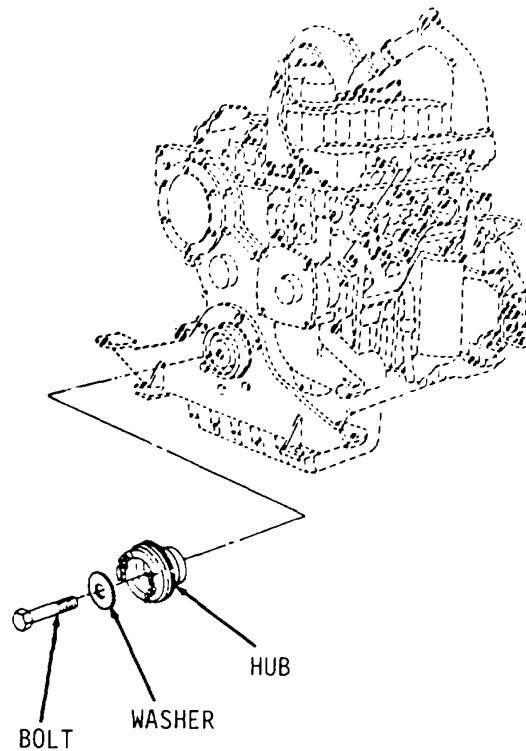


Figure 3-40.

End of Task

ENGINE MAINTENANCE. (cont)

3-11. Flywheel and Flywheel Housing. (Sheet 1 of 2)

- This task covers: a. Removal b. Cleaning c. Inspection
 d. Installation
-

INITIAL SETUP:

Applicable Configurations

All

Tools

- General Mechanic's Tool Kit:
Automotive (NSN 5180-00-177-7033)
- Hoist and sling
- Lifting Brackets, FT120 and FT121
- One 3/8-16-2B THD bolt
- Two 1/2-13NC guide bolts
- Two 5/8-18NF guide bolts

Test Equipment

None

Materials/Parts

- Dry cleaning solvent,
Item 15, Appendix C
- Clean cloths, Item 41,
Appendix C
- Gasket cement, Item 19,
Appendix C
- Gasket, Item 7

Personnel Required

Construction equipment
repairer MOS 62B

References

- TM 5-3805-261-10
- TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown, all fasteners are tightened to standard torques. Refer to Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Starting motor removed.

Paragraph 3-15

Oil pan and plate removed.

Go to Sheet 2

ENGINE MAINTENANCE.3-11. Flywheel and Flywheel Housing. (Sheet 2 of 5)**REMOVAL**

1. Remove plugs (1 and 2, Figure 3-41) from rear of engine.
2. Using scribe, matchmark flywheel assembly (4) and crankshaft at same location.
3. Install FT120 lifting bracket and 3/8-16-2B THD bolt on flywheel assembly (4).

WARNING

Weight of flywheel assembly is approximately 120 pounds. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

4. Attach hoist and sling to FT120 lifting bracket.
5. Remove nine bolts (3).
6. Remove flywheel assembly (4).
7. Remove hoist and sling and FT120 lifting bracket.

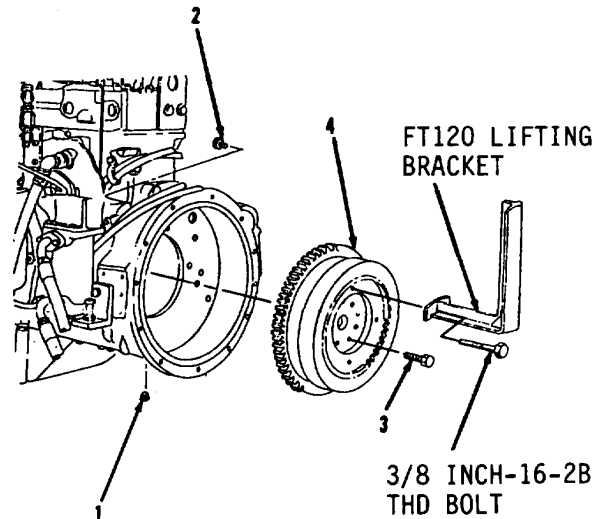


Figure 3-41.

Go to Sheet 3

ENGINE MAINTENANCE. (cont)**3-11. Flywheel and Flywheel Housing.** (Sheet 3 of 5)

REMOVAL (cont)

8. Install FT121 lifting bracket and 3/8-16-2B THD bolt to flywheel housing (6, Figure 3-42).

WARNING

Weight of flywheel housing is approximately 86 pounds. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

9. Attach hoist and sling to flywheel housing (6).
10. Remove 13 bolts (5).
11. Remove flywheel housing (6) and gasket (7). Discard gasket (7). Remove all gasket material from mounting surfaces.
12. Remove hoist and sling and FT121 lifting bracket.

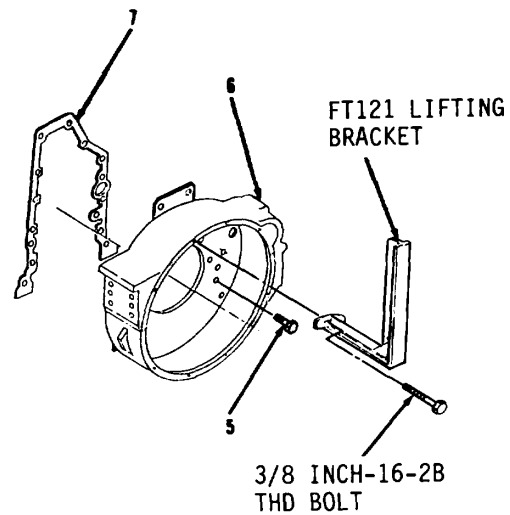


Figure 3-42.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

Go to Sheet 4

ENGINE MAINTENANCE.

3-11. Flywheel and Flywheel Housing. (Sheet 4 of 5)

INSTALLATION

1. Position new gasket (7, Figure 3-42) on rear of engine block. Use gasket cement to hold new gasket (7) in place.
2. Install FT121 lifting bracket and 3/8-16-2B THD bolt on flywheel housing (6).
3. Attach hoist and sling to FT121 lifting bracket.
4. Install two 1/2-13NC guide bolts (Figure 3-43).
5. Using hoist and sling, position flywheel housing (6) on guide bolts.
6. Install 11 of 13 bolts (5).
7. Remove two 1/2-13NC guide bolts.
8. Install remaining two of 13 bolts (5).
9. Tighten 13 bolts (5, Figure 3-44) in sequence, to 75 ft-lb torque.
10. Trim new gasket (7) even with bottom of cylinder block and flywheel housing (6, Figure 3-42).
11. Remove hoist and sling and FT121 lifting bracket.

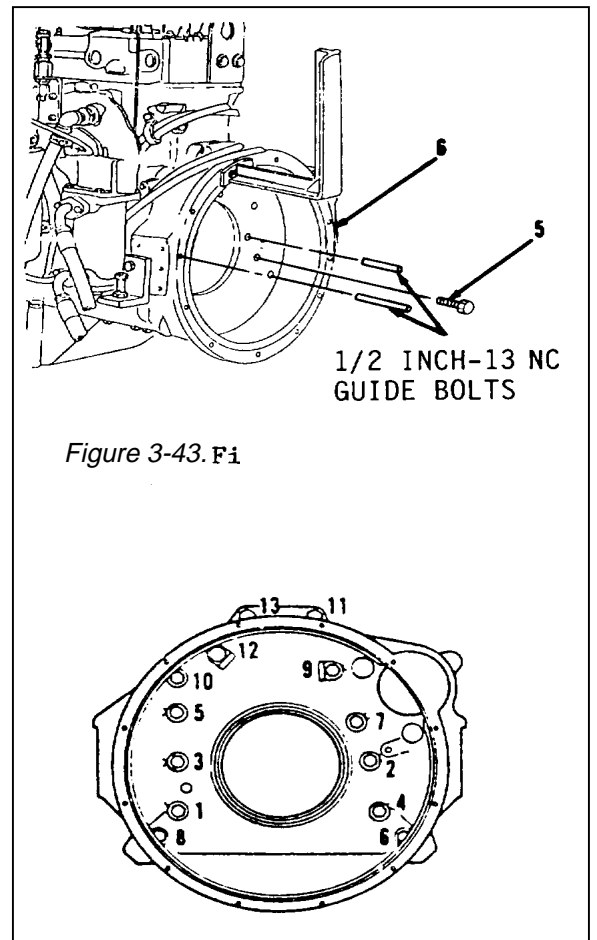


Figure 3-43. F1

Figure 3-44.

Go to Sheet 5

ENGINE MAINTENANCE. (cont)

3-11. Flywheel and Flywheel Housing. (Sheet 5 of 5)

INSTALLATION (cont)

12. Install two 5/8-18NF guide bolts in end of crankshaft (Figure 3-45).
13. Install FT120 lifting bracket and 3/8-16-2B THD bolt on flywheel assembly (4).
14. Install hoist and sling on FT120 lifting bracket.
15. Aline matchmarks on flywheel assembly (4) with crankshaft.
16. Position flywheel assembly (4) on two guide bolts.
17. Install nine bolts (3, Figure 3-46).
18. Install plugs (2 and 1).
19. Apply gasket cement to bottom of gasket (7), where it meets oil pan plate.
20. Remove hoist and sling and FT120 lifting bracket.

NOTE

Return 130G Grader to original equipment condition.

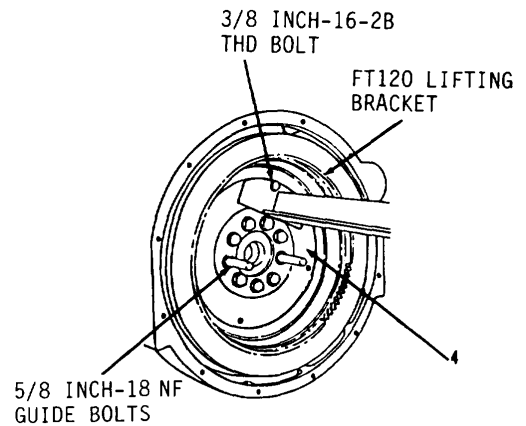


Figure 3-45.

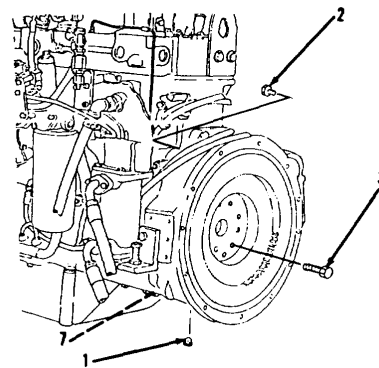


Figure 3-46.

End of Task

ENGINE MAINTENANCE.**3-12. Rocker Arm Assembly.** (Sheet 1 of 13)

This task covers: **a. Removal** **b. Cleaning** **c. Inspection**
 d. Installation

INITIAL SETUP:Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)
 Engine turning tool 5P7307
 3/8-16NC bolt
 Magnet

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Anti-seize compound, Item 8
 Appendix C
 Preformed packing, Item 46
 Plugs, Item 56

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

Paragraph 3-14

Valve cover removed.

Go to Sheet 2

ENGINE MAINTENANCE. (cont)

3-12. Rocker Arm Assembly. (Sheet 2 of 13)

REMOVAL

1. Remove four bolts (1) and washers (2, Figure 3-47) from top of cylinder head.
2. Remove items 5 thru 55 as an assembly. Pull straight up to remove from cylinder head.

NOTE

Each push rod and lifter must be numbered during removal so it can be installed in same position.

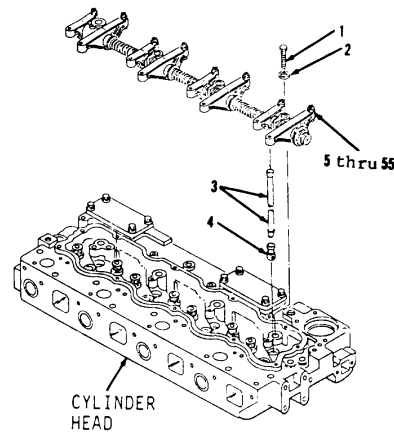


Figure 3-47.

3. Remove eight push rods (3).
4. Using magnet, remove eight lifters (4).
5. Remove ring (5), washer (6), spring (7) and washer (8, Figure 3-48).
6. Remove items 9 thru 11 as an assembly (Figure 3-49).
7. Remove lock nut (10) and screw (11) from arm (9, Figure 3-48).
8. Remove bracket (12) from shaft (55).
9. Remove dowel (13) from bracket (12).
10. Remove arm (14) from shaft (55).
11. Remove lock nut (15) and screw (16) from arm (14).

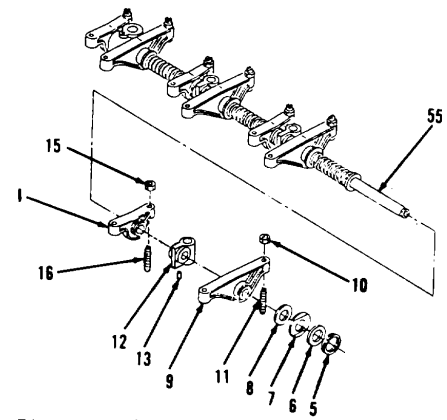


Figure 3-48.

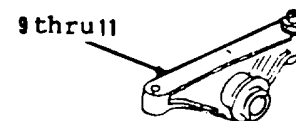


Figure 3-49.

Go to Sheet 3

ENGINE MAINTENANCE.

3-12. Rocker Arm Assembly. (Sheet 3 of 13)

REMOVAL

- 12. Remove washer (17), spring (18) and washer (19, Figure 3-50).
- 13. Remove items 20 thru 22 as an assembly (Figure 3-51).
- 14. Remove lock nut (21) and screw (22) from arm (20, Figure 3-50).
- 15. Remove bracket (23) from shaft (55).
- 16. Remove dowel (24) from bracket (23).
- 17. Remove items 25 thru 27 as an assembly (Figure 3-52).
- 18. Remove lock nut (26) and screw (27) from arm (25, Figure 3-50).

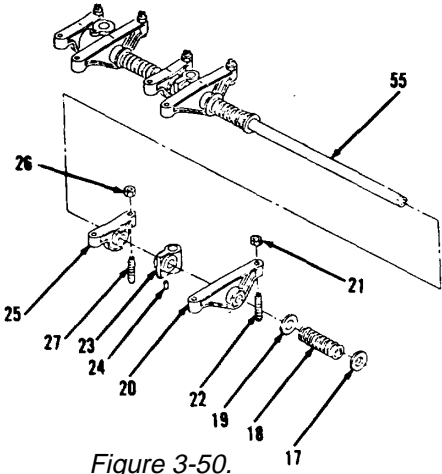


Figure 3-50.

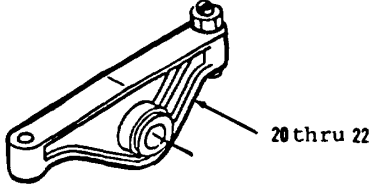


Figure 3-51.

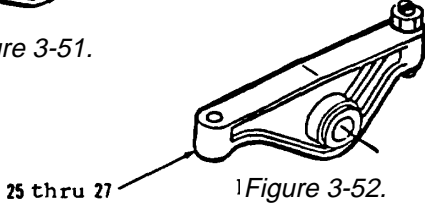


Figure 3-52.

Go to Sheet 4

ENGINE MAINTENANCE. (cont)

3-12. Rocker Arm Assembly. (Sheet 4 of 13)

REMOVAL (cont)

19. Remove washer (28), spring (29) and washer (30, Figure 3-53).
20. Remove items 31 thru 33 as an assembly (Figure 3-54).
21. Remove lock nut (32) and screw (33) from arm (31, Figure 3-53).
22. Remove bracket (34) from shaft (55).
23. Remove dowel (35) from bracket (34).
24. Remove arm (36) from shaft (55).
25. Remove lock nut (37) and screw (38) from arm (36).
26. Remove washer (39), spring (40) and washer (41, Figure 3-55).
27. Remove items 42 thru 44 as an assembly (Figure 3-56).

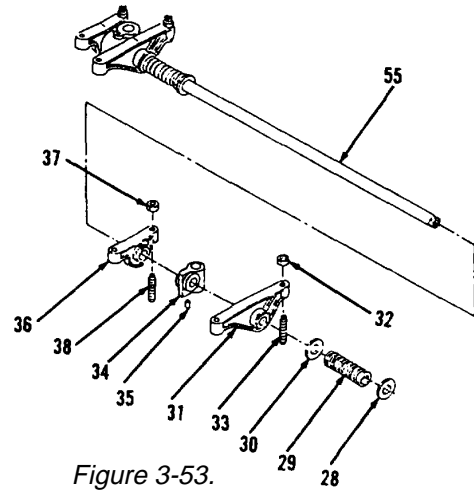


Figure 3-53.

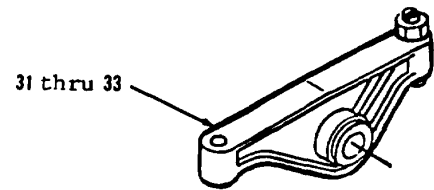


Figure 3-54.

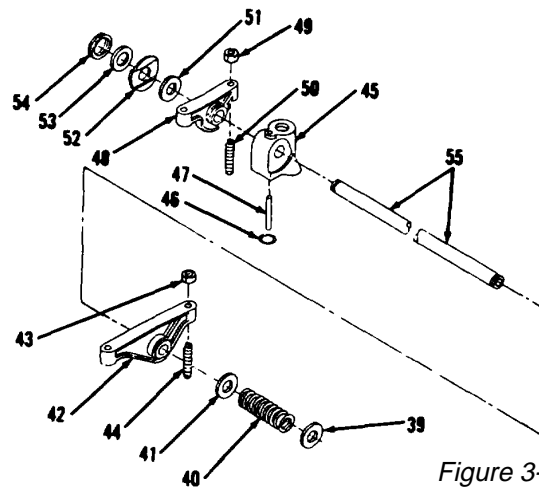


Figure 3-55.

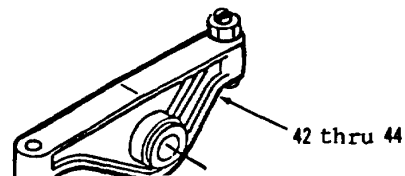


Figure 3-56.

Go to Sheet 5

ENGINE MAINTENANCE.**3-12. Rocker Arm Assembly.** (Sheet 5 of 13)**REMOVAL**

28. Remove lock nut (43) and screw (44) from arm (42, Figure 3-55).
29. Remove items 45 thru 47 as an assembly (Figure 3-57).
30. Remove and discard preformed packing (46) from bracket (45, Figure 3-55).
31. Using hammer and punch, remove dowel (47) from bracket (45).
32. Remove items 48 thru 50 as an assembly (Figure 3-58).
33. Remove lock nut (49) and screw (50) from arm (48, Figure 3-55).
34. Remove washer (51), spring (52), washer (53) and ring (54) from shaft (55).
35. Remove and discard two plugs (56) from shaft (55, Figure 3-59). Drill and pry out two plugs (56).

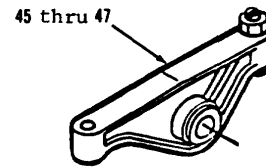


Figure 3-57.

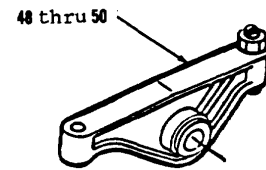


Figure 3-58.

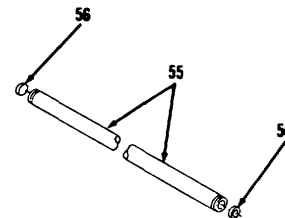


Figure 3-59.

Go to Sheet 6

ENGINE MAINTENANCE. (cont)

3-12. Rocker Arm Assembly. (Sheet 6 of 13)

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Install two new plugs (56) in ends of shaft (55, Figure 3-59). Tap in with hammer until flush with ends of shaft.
2. Install ring (54), washer (53), spring (52) and washer (51) on shaft (55, Figure 3-55).
3. Install screw (50) and lock nut (49) in arm (48). Loosely tighten lock nut (49).
4. Install items 50 thru 48 as an assembly (Figure 3-58).
5. Position bracket (45) on shaft (55, Figure 3-55). Align bracket (45) with large hole on end.
6. Using hammer, install dowel (47) in bracket (45). Dowel (47) must extend 0.378 inch out of bracket (45).
7. Install new preformed packing (46) in bracket (45).

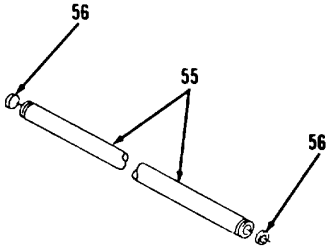


Figure 3-59.

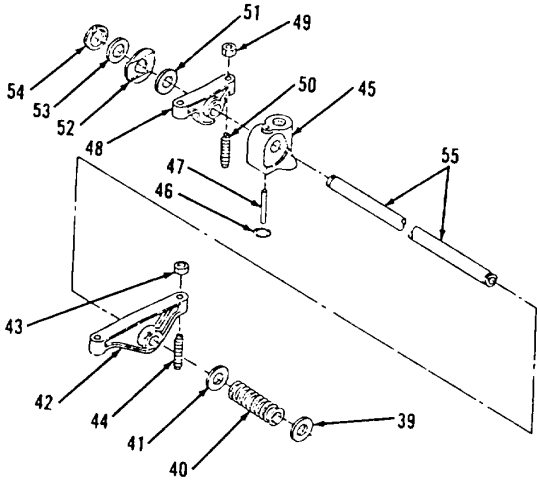


Figure 3-55.

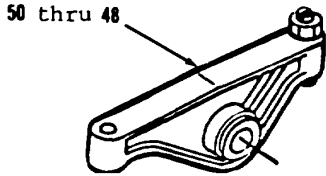


Figure 3-58.

Go to Sheet 7

ENGINE MAINTENANCE.

3-12. Rocker Arm Assembly. (Sheet 7 of 13)

INSTALLATION

- 8. Install items 47 thru 45 as an assembly (Figure 3-57).
- 9. Install screw (44) and lock nut (43) in arm (42). Loosely tighten lock nut (43, Figure 3-55).
- 10. Install items 44 thru 42 as an assembly (Figure 3-56).
- 11. Install washer (41), spring (40) and washer (39) on shaft (55, Figure 3-55).
- 12. Install screw (38) and lock nut (37) in arm (36, Figure 3-60). Loosely tighten lock nut (37).
- 13. Install arm (36) on shaft (55, Figure 3-53).
- 14. Install dowel (35) in bracket (34). Dowel (35) must extend 0.23 inch out of bracket (34).
- 15. Install bracket (34) on shaft (55).
- 16. Install screw (33) and lock nut (32) in arm (31). Loosely tighten lock nut (32).
- 17. Install items 33 thru 31 as an assembly (Figure 3-54).

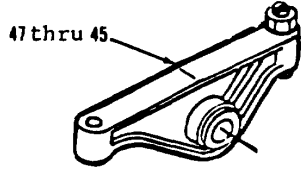


Figure 3-57.

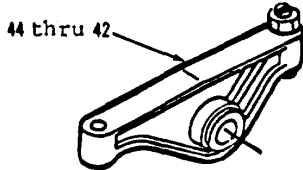


Figure 3-56.

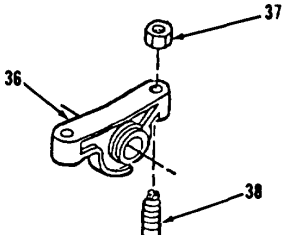


Figure 3-60.

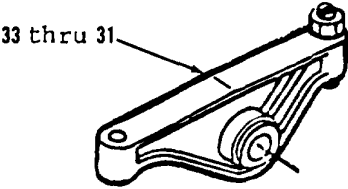


Figure 3-54.

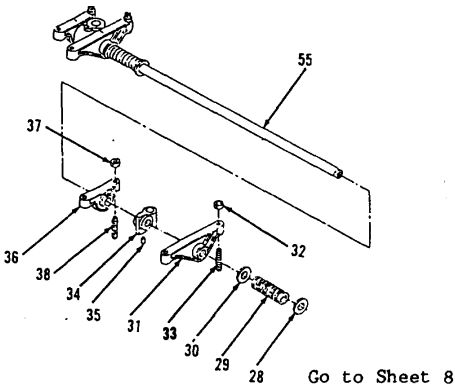


Figure 3-53.

Go to Sheet 8

ENGINE MAINTENANCE. (cont)

3-12. Rocker Arm Assembly. (Sheet 8 of 13)

INSTALLATION (cont)

- 18. Install washer (30), spring (29) and washer (28) on shaft (55, Figure 3-53).
- 19. Install screw (27) and lock nut (26) in arm (25, Figure 3-50). Loosely tighten lock nut (26).
- 20. Install items 27 thru 25 as an assembly (Figure 3-52).
- 21. Install dowel (24) in bracket (23, Figure 3-50). Dowel (24) must extend 0.23 inch out of bracket (23).
- 22. Install bracket (23) on shaft (55).
- 23. Install screw (22) and lock nut (21) in arm (20). Loosely tighten lock nut (21).
- 24. Install items 22 thru 20 as an assembly (Figure 3-51).
- 25. Install washer (19), spring (18) and washer (17) on shaft (55, Figure 3-50).

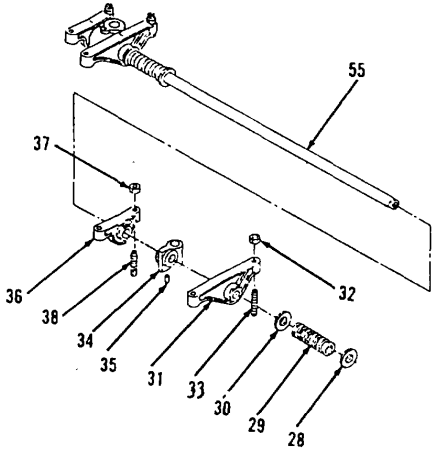


Figure 3-53.

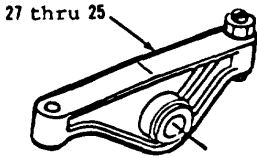


Figure 3-52.

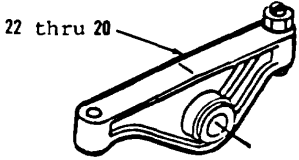


Figure 3-51.

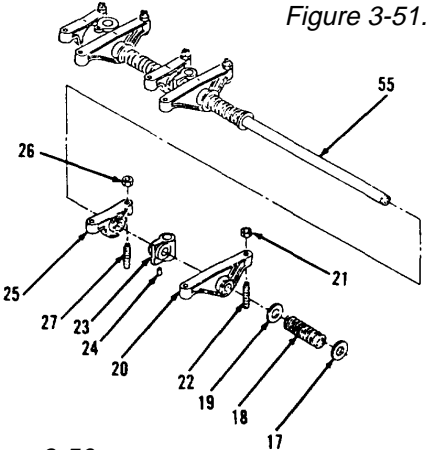


Figure 3-50.

Go to Sheet 9

ENGINE MAINTENANCE.

3-12. Rocker Arm Assembly. (Sheet 9 of 13)

INSTALLATION

26. Install screw (16) and lock nut (15) in arm (14, Figure 3-48). Loosely tighten lock nut (15).
27. Install arm (14) on shaft (55).
28. Install dowel (13) in bracket (12). Dowel (13) must extend 0.23 inch out of bracket (12).
29. Install bracket (12) on shaft (55).
30. Install screw (11) and lock nut (10) in arm (9). Loosely tighten lock nut (10).
31. Install items 11 thru 9 as an assembly (Figure 3-49).
32. Install washer (8), spring (7), washer (6) and ring (5) on shaft (55, Figure 3-48).

NOTE

Install push rods and lifters in original position.

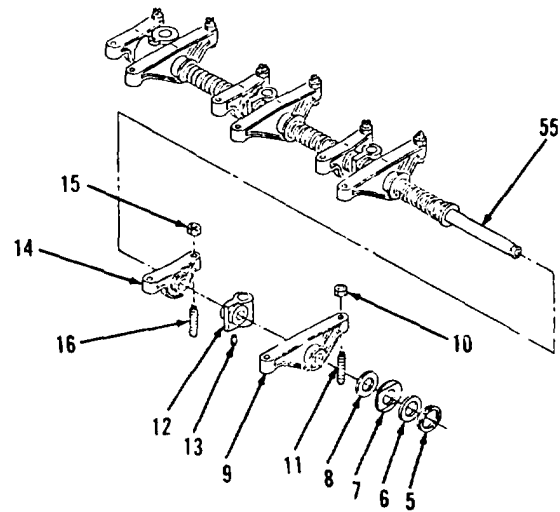


Figure 3-48.

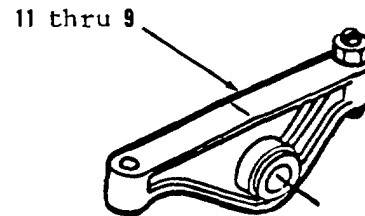


Figure 3-49.

Go to Sheet 10

ENGINE MAINTENANCE. (cont)

3-12. Rocker Arm Assembly. (Sheet 10 of 13)

INSTALLATION (cont)

- 33. Lubricate eight lifters (4) and push rods (3) with clean oil and install in cylinder head in original positions. Install flat end of eight lifters (4) first and ball end of push rods (3) to mate with lifters (4, Figure 3-47).
- 34. Cover threads of one bolt (1) with tape to protect preformed packing (46) in bracket (45).
- 35. Install washer (2) and bolt (1) with taped threads through bolt hole in bracket (45), then remove tape.
- 36. Install three washers (2) and bolts (1) through brackets (34, 23 and 12).
- 37. Apply anti-seize compound to threads of four bolts (1).
- 38. Install items 55 thru 5 and 2 and 1 as an assembly.

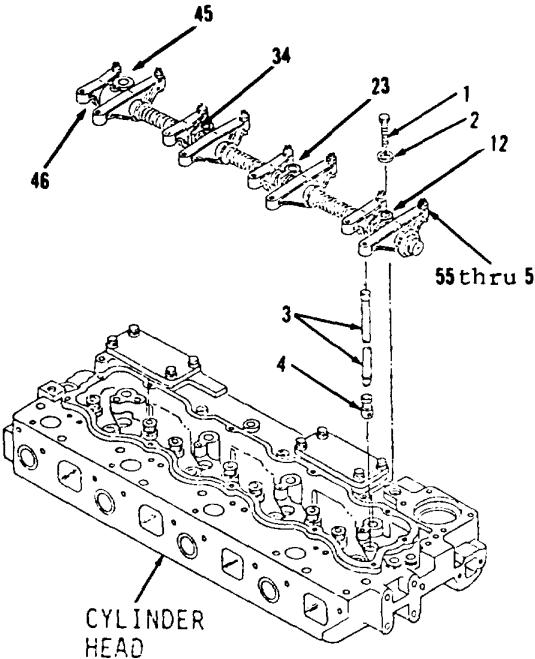


Figure 3-47.

CAUTION

Adjusting screws must be loose and seated on push rods before installing bolts.

- 39. Tighten four bolts (1) in sequence (Figure 3-61). First tighten to 115 ft-lb torque, then tighten to 185 ft-lb torque. Finally, repeat 185 ft-lb torque tightening sequence.

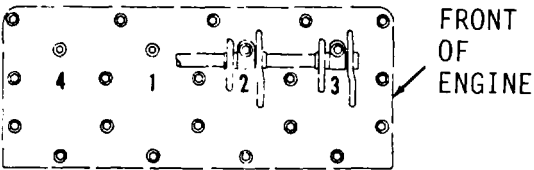


Figure 3-61.

Go to Sheet 11

ENGINE MAINTENANCE.**3-12. Rocker Arm Assembly.** (Sheet 11 of 13)

ADJUSTMENT

NOTE

The following step is for locating number one cylinder top center.

1. Remove starting motor on right side of engine. Refer to paragraph 7-11 in TM 5-3805-261-20.
2. Install engine turning tool on starting motor mounting flange.

NOTE

The engine is seen from the flywheel end when direction of rotation is given.

3. Using engine turning tool and ratchet, turn engine clockwise 30 degrees. This action will remove play in timing gears.
4. Remove plug (Figure 3-62).
5. Using engine turning tool and ratchet, turn engine counter-clockwise. Look through hole where plug was removed and watch for hole in flywheel where 3/8-16NC bolt can be installed. If hole in flywheel is passed up, repeat step 3.

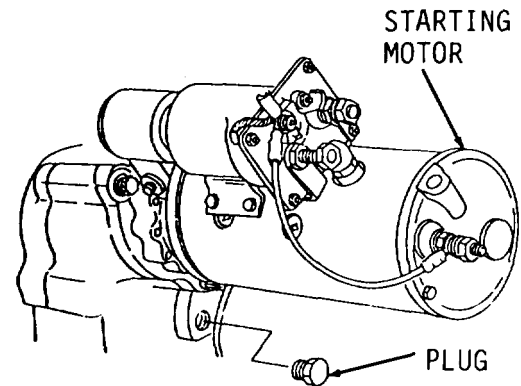


Figure 3-62.

Go to Sheet 12

ENGINE MAINTENANCE. (cont)**3-12. Rocker Arm Assembly.** (Sheet 12 of 13)

ADJUSTMENT (cont)

NOTE

The number one cylinder must be at the compression stroke to obtain proper valve adjustment.

6. Check number one cylinder for compression stroke. Intake and exhaust valves must be closed. This can be checked by visually inspecting the valves and by movement in both rocker arms. If exhaust valve is open, remove 3/8-16NC bolt and turn engine 360 degrees.
7. Adjust intake valves for cylinders 1 and 2 on top of engine. Turn adjusting screws in arms (14 and 25, Figure 3-63) until a clearance of 0.012 to 0.018 inch is obtained. Secure screws with lock nuts.
8. Adjust exhaust valves for cylinders 1 and 3. Turn screws in arms (9 and 30) until a clearance of 0.022 to 0.028 inch is obtained between arms (9 and 30) and push rods (3). Secure screws with lock nuts.
9. Remove 3/8-16NC bolt in flywheel before turning engine.
10. Turn engine counterclockwise 360 degrees. Number 4 cylinder should now be at top center position. Replace 3/8 inch-16NC bolt in flywheel.

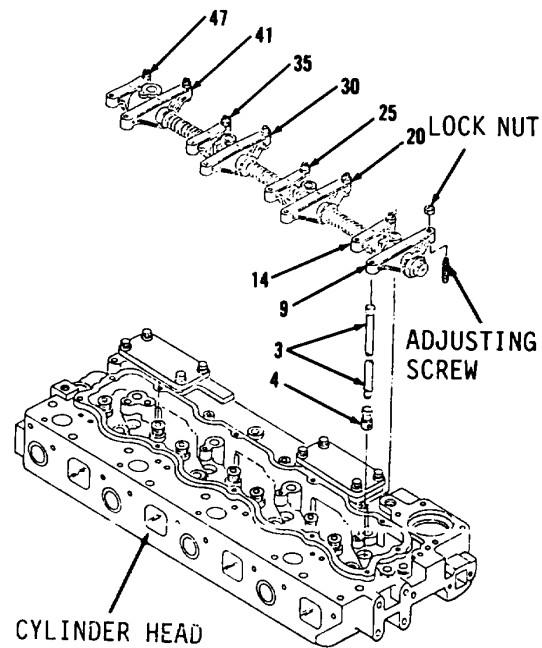


Figure 3-63.

Go to Sheet 13

ENGINE MAINTENANCE.**3-12. Rocker Arm Assembly.** (Sheet 13 of 13)

ADJUSTMENT

11. Adjust intake valves for cylinders 3 and 4 by turning screws in arms (35 and 47). Repeat adjustment procedures in step 7.
12. Adjust exhaust valves for cylinders 2 and 4 by turning screws in arms (20 and 41). Repeat adjustment procedures in step 8.
13. Tighten eight lock nuts. After adjustment, hold adjusting screws and tighten eight lock nuts to 22 ft-lb torque.
14. Remove engine turning tool from right side of engine.
15. Remove 3/8-16NC bolt in flywheel housing.
16. Install starting motor. Refer to paragraph 7-11 in TM 5-3805-261-20.

NOTE

Return 130G Grader to original equipment condition.

End of Task

3-77

ENGINE MAINTENANCE.

3-13. Valves. (Sheet 1 of 8)

- This task covers:**
- | | | |
|----------------------|------------------------|--------------------|
| a. Removal | b. Disassembly | c. Cleaning |
| d. Inspection | e. Test | f. Repair |
| g. Assembly | h. Installation | i. Testing |
-

INITIAL SETUP:

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-177-7033)
Plastic hammer
Valve spring compressor
Lock inserter

Test Equipment

Valve spring tester
Valve spring compressor
Lock inserter

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Engine oil, Item 36, Appendix C
Prussian blue
Lubricating oil, Item 33,
Appendix C
Dry ice

Personnel Required

Construction equipment
repairer MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 3-8

Cylinder head removed.

Go to Sheet 2

ENGINE MAINTENANCE.**3-13. Valves.** (Sheet 2 of 8)**REMOVAL****NOTE**

The following is a maintenance procedure for one valve. The maintenance procedure for the remaining seven valves is identical.

1. Position valve spring compressor on valve spring (3, Figure 3-64) and bottom of valve on cylinder head.
2. Compress valve spring (3).

WARNING

Use extreme caution when removing locks and rotocoil assembly. Wear safety glasses. Accidental release of the valve spring may cause INJURY. If you are injured, seek medical aid immediately.

NOTE

All parts must be tagged before removal to aid in identifying original locations during installation.

3. Remove two locks (1) and rotocoil assembly (2) from valve (4, Figure 3-65) stem carefully. Do not accidentally release valve spring (3).
4. Release valve spring compressor in valve spring (3) slowly.
5. Remove valve spring (3) and valve (4) from cylinder head.

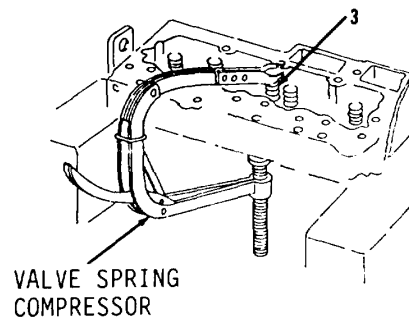


Figure 3-64.

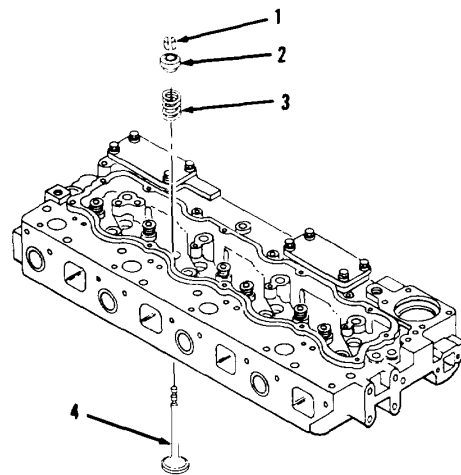


Figure 3-65.

Go to Sheet 3

ENGINE MAINTENANCE. (cont)**3-13. Valves.** (Sheet 3 of 8)

DISASSEMBLY

NOTE

Remove guides and inserts only if inspection indicates replacement is necessary.

1. Inspect eight guides (5, Figure 3-66). Replace if cracked, broken, grooved, scored or has a worn bore diameter exceeding 0.3772 inch.
2. Using suitable driver and hammer, remove bad guides (5) from bottom of cylinder head.
3. Inspect four exhaust inserts (6) and intake inserts (7). Replace if cracked, broken, burned or pitted. Using extractor, remove four intake inserts (7) along with handle assembly.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

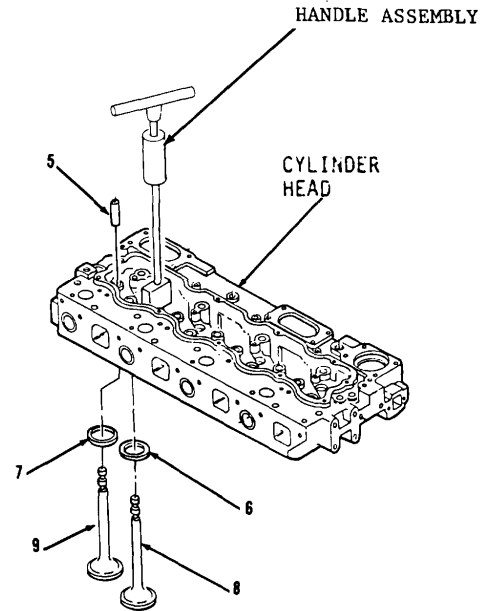


Figure 3-66.

Go to Sheet 4

ENGINE MAINTENANCE.3-13. Valves. (Sheet 4 of 8)**TESTING**

Using valve spring tester, test springs (3, Figure 3-67). Length of spring (3) under test force of 57.6 lbs must be 1.77 inches. Free length after test must be 2.05 inches.

REPAIR**NOTE**

The following is a maintenance repair procedure of one exhaust and one intake insert. The maintenance repair procedure of the remaining three exhaust and three intake inserts is identical.

1. Grind four exhaust inserts (6) and intake inserts (7, Figure 3-50). Angle of four exhaust inserts (6) and intake inserts (7) is 30 degrees. To reduce maximum seat angle, grind seat face to 15 degrees, if necessary.

NOTE

Valves must be marked and assigned to the insert valve recess from which they were measured.

2. Measure four exhaust inserts (6) and intake inserts (7) and valve recess. Minimum dimension below combustion surface of four exhaust valves (8) is 0.026 inch and minimum dimension for four intake valves (9) is 0.006 inch.

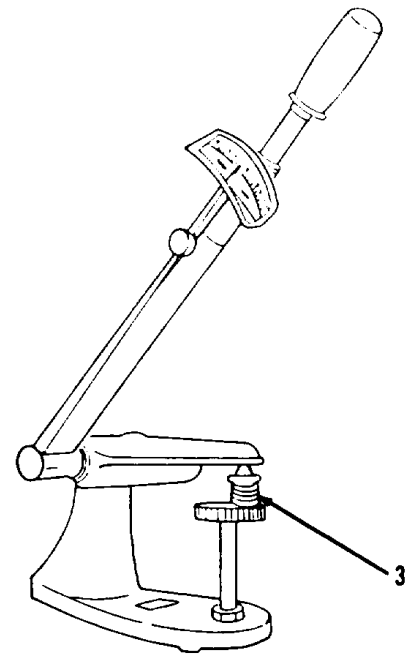
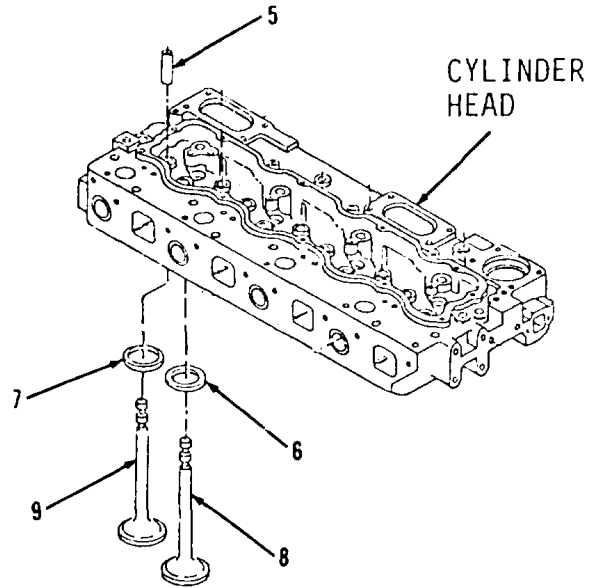


Figure 3-67.

Go to Sheet 5

ENGINE MAINTENANCE. (cont)3-13. Valves. (Sheet 5 of 8)**REPAIR (cont)**

3. Mark four exhaust valves (8) and intake valves (9) to respective inserts from which they were measured with.
4. Grind four exhaust valves (8) and intake valves (9). Angle of four exhaust valves (8) and intake valves (9) must be $29\text{-}1/4$ degrees.
5. Apply Prussian blue to face of four exhaust valves (8) and intake valves (9) and install into its matchmarked insert. Turn valve stem allowing valve face to lightly ride face of insert. Remove valve. If blue is transferred to center of valve face, contact is good. If blue is transferred to top of valve face, lower insert by grinding. When blue is transferred to bottom edge of valve face, raise insert by grinding.

*Figure 3-66.***ASSEMBLY****WARNING**

Use gloves or tongs to handle extremely cold parts such as those which have been chilled in dry ice. Contact between cold parts and your skin may cause frostbite and other INJURY. If you are injured, obtain medical help immediately.

Go to Sheet 6

ENGINE MAINTENANCE.3-13. Valves. (Sheet 6 of 8)**ASSEMBLY****CAUTION**

When installing new inserts, never expand the diameter of the extractor tooling when installing the insert.

1. Lower four exhaust inserts (6) and intake inserts (7, Figure 3-66) on cylinder head. Temperature should be approximately minus 54 degrees F.
2. Grind and install, if removed, using extractor tool for four intake inserts (7) and extractor tool for four exhaust inserts (6), along with handle assembly to drive insert in until seated on counterbore of cylinder head.
3. Measure valve recess. Valve must always be below combustion surface with no protrusion.

NOTE

Eight guides need to contract enough to allow easy fit into cylinder.

NOTE

Use dry ice to lower temperature of guides.

4. Lower temperature of eight guides (5).
5. Install eight new guides (5, Figure 3-68), if removed. Using suitable driver and press, install eight new guides (5) so they extend above top of cylinder head to proper dimension. Minimum diameter of bore of eight new guides (5) after installation is 0.3723 inch. Remove all burrs and clean eight new guides (5) after installation.

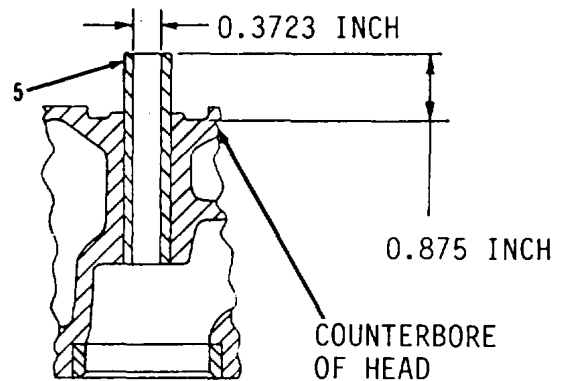


Figure 3-68.

Go to Sheet 7

ENGINE MAINTENANCE. (cont)

3-13. Valves. (Sheet 7 of 8)

INSTALLATION

- 1. Using clean engine oil, lubricate valve stem.
- 2. Install valve (4) and valve spring (3, Figure 3-65) in correct location in cylinder head.

WARNING

Use caution when valve spring is compressed. Wear safety glasses when installing valve spring assembly. Accidental release of valve spring may cause INJURY. If you are injured, seek medical aid immediately.

- 3. Position valve spring compressor on top of valve spring (3, Figure 3-64).
- 4. Tighten compression spring.
- 5. Install rotocoil assembly (2) to valve (4, Figure 3-65) stem.
- 6. Position two locks (1) into grooves on valve (4) stem.
- 7. Position lock inserter on two locks (1).
- 8. Install two locks (1).
- 9. Remove lock inserter.

NOTE

Be sure locks are in correct position in grooves on valve stems before removing valve spring compressor.

- 10. Remove valve spring compressor carefully from cylinder head.

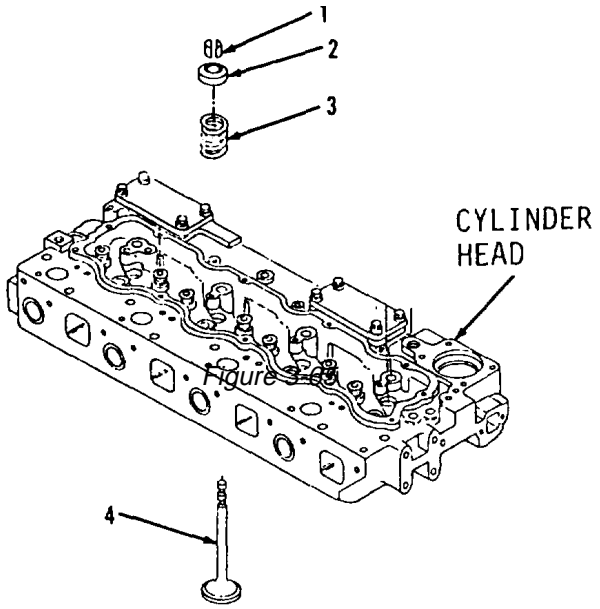


Figure 3-65.

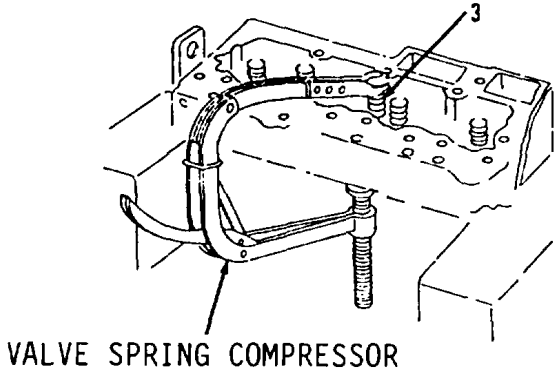


Figure 3-64.

Go to Sheet 8

ENGINE MAINTENANCE.

3-13. Valves. (Sheet 8 of 8)

TESTING

Mark rotocoil assembly (2) with chalk. Tap lightly with soft-tip plastic hammer six to eight times.

NOTE

- Rotocoil assembly must turn when tapped with hammer several times. Replace rotocoil assembly if it does not turn.
- Return 130G Grader to original equipment condition.

End of Task

3-85

ENGINE MAINTENANCE. (cont)

3-14. Valve Cover. (Sheet 1 of 2)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent, Item 15,
Appendix C
Clean cloths, Item 41,
Appendix C
Gasket cement, Item 19,
Appendix C
Gasket, Item 4

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Valve cover breather removed.

Go to Sheet 2

ENGINE MAINTENANCE.

3-14. Valve Cover. (Sheet 2 of 2)

REMOVAL

1. Remove 11 bolts (1) and lock-washers (2, Figure 3-69) from top of engine.
2. Separate cover (3) and gasket (4) from cylinder head. Do not pry on lip of cover (3). Discard gasket (4). Remove all gasket material from mounting surfaces.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Position new gasket (4) and cover (3, Figure 3-69) on cylinder head. Apply gasket cement to lip of cover (3), where gasket (4) makes contact. Install gasket (4).
2. Install 11 lockwashers (2) and bolts (1). Tighten bolts (1) to 10 ft-lb torque.

NOTE

Return 130G Grader to original equipment condition.

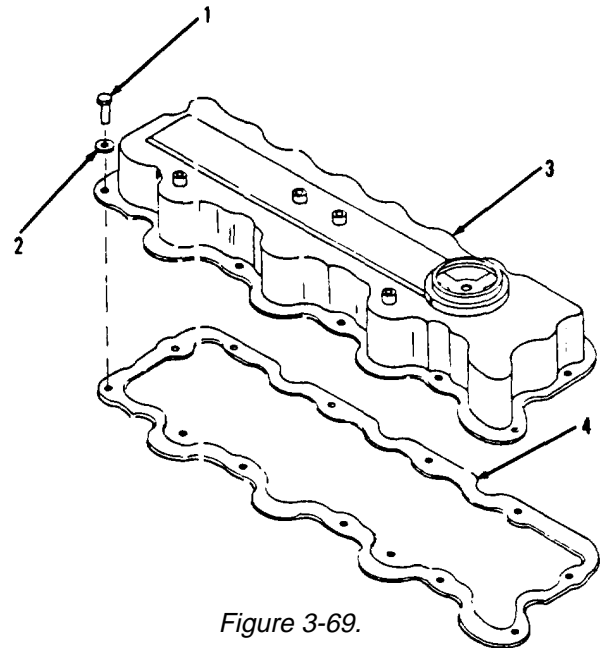


Figure 3-69.

End of Task

3-87

ENGINE MAINTENANCE. (cont)

3-15. Oil Pan and Oil Pan Plates. (Sheet 1 of 3)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Two 3/8-16NC guide bolts

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Detergent, Item 9, Appendix C
Caps
Gaskets, Items 4, 10, 14

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Engine oil level gage and tube
removed.

Paragraph 3-4

Engine removed.

Go to Sheet 2

ENGINE MAINTENANCE.

3-15. Oil Pan and Oil Pan Plate. (Sheet 2 of 3:

REMOVAL

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

1. Disconnect oil lines on left side of engine. Refer to paragraph 3-16.
2. Remove hose assembly (1, Figure 3-70) from bottom of engine.
3. Remove two bolts (2), adapter (3) and gasket (4). Discard gasket (4). Remove all gasket material from mounting surfaces.
4. Support oil pan (9).
5. Remove bolt (5), six bolts (6), 17 bolts (7) and 24 of 39 washers (8).
6. Remove oil pan (9) and gasket (10). Discard gasket (10). Remove all gasket material from mounting surfaces.
7. Loosen oil gage bolt (11) from oil pan (9).
8. Remove 15 bolts (12), 15 of 39 washers (8), oil pan plate (13) and gasket (14). Discard gasket (14). Remove all gasket material from mounting surfaces.
9. Remove oil pump scavenger tube. Refer to paragraph 5-10, step 5.
10. Remove drain plug (15) from adapter (3).

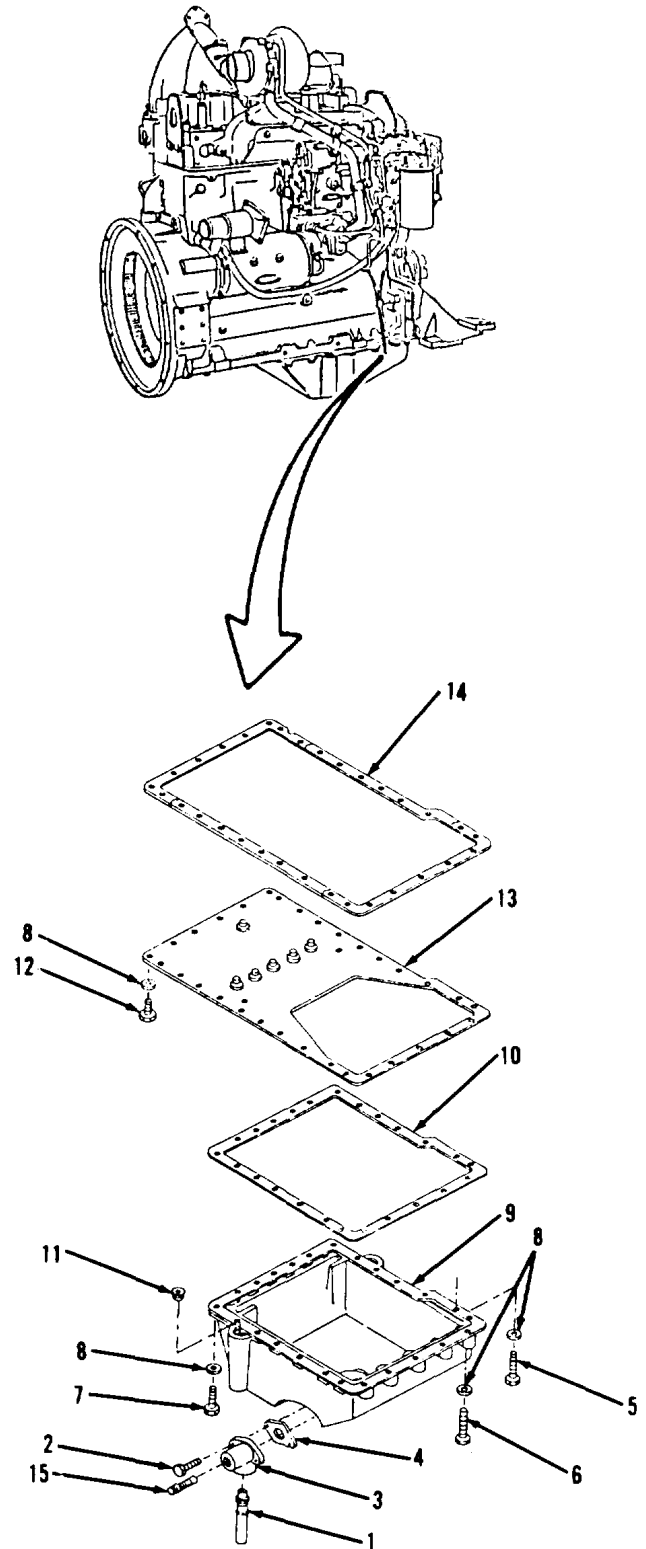


Figure 3-70.

Go to Sheet 3

ENGINE MAINTENANCE. (cont)

3-15. Oil Pan and Oil Pan Plate. (Sheet 3 of 3)

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Install plug (15) in adapter (3, Figure 3-70).
2. Install oil pump scavenger tube. Refer to paragraph 5-10, step 8.
3. Install new gasket (14), oil pan plate (13), 15 of 39 washers (8) and 15 bolts (12) to bottom of engine. Install two 3/8-16NC guide bolts into cylinder block to aid in installation.
4. Tighten oil gage bolt (11) in oil pan (9).
5. Install new gasket (10), oil pan (9), 24 of 39 washers (8), 17 bolts (7), six bolts (6) and bolt (5). Remove two 3/8-16NC guide bolts.
6. Install new gasket (4), adapter (3) and two bolts (2).
7. Install hose assembly (1).
8. Connect oil lines to left side of engine. Refer to paragraph 3-16.

NOTE

Return 130G Grader to original equipment condition.

End of Task

3-90

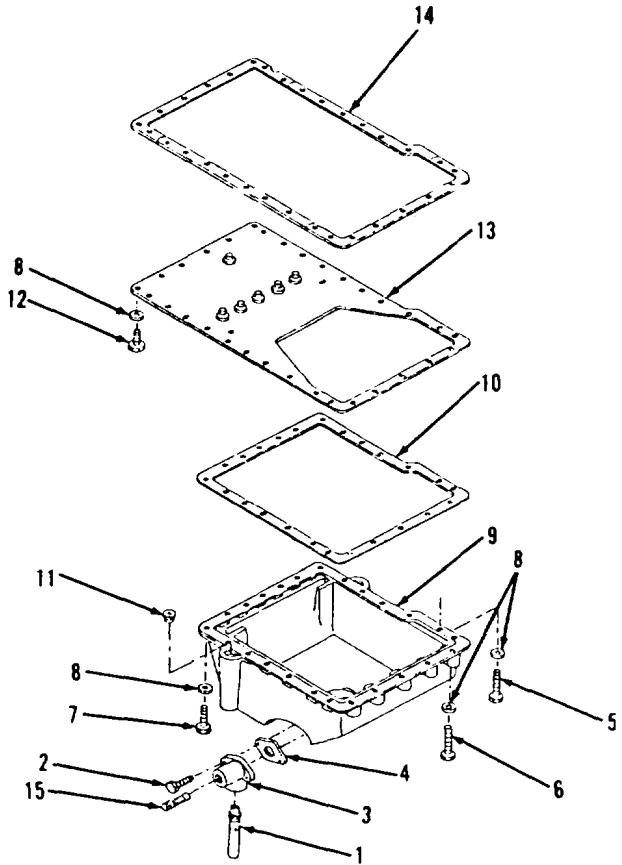


Figure 3-70.

ENGINE MAINTENANCE.

3-16. Oil Pump and Lines. (Sheet 1 of 6)

This task covers:

- a. Removal
- d. Installation

b. Cleaning

c. Inspection

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Two 3/8-16NC 1-1/2 inch
bolts

References

TM 5-3805-261-10

Special Environmental Conditions

None

Test Equipment

None

General Safety Instructions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item C
Appendix C
Lubricating oil, Item 33,
Appendix C
Small tags, Item 43,
Appendix C
Detergent, Item 9, Appendix C
Gaskets, Items 7, 11
Preformed packing, Item 20
Bearing, Item 13
Cap

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 3-15

Oil pan removed.

Go to Sheet 2

ENGINE MAINTENANCE. (cont)

3-16. Oil Pump and Lines. (Sheet 2 of 6)

REMOVAL

1. Remove bolts (1 and 2, Figure 3-71) from bottom of engine.
2. Support items 8 thru 18 as an assembly.
3. Remove two bolts (3), locks (4), bolts (5) and washers (6).
4. Remove items 8 thru 18 as an assembly and gasket (7) from elbow (19).
5. Remove and discard gasket (7) from engine. Remove all gasket material from mounting surfaces.
6. Remove two bolts (8), lock (9), bell (10) and gasket (11, Figure 3-72) from oil pump assembly. Discard gasket (11). Remove all gasket material from mounting surfaces.
7. Using suitable puller, remove gear (12).

CAUTION

Removal of bearing from gear will cause destruction of bearing. Remove bearing only if inspection indicates replacement is necessary.

8. Inspect bearing (13). Replace if cracked, broken, distorted, grooved or scored.
9. Using suitable driver and press, remove bearing (13) if necessary.

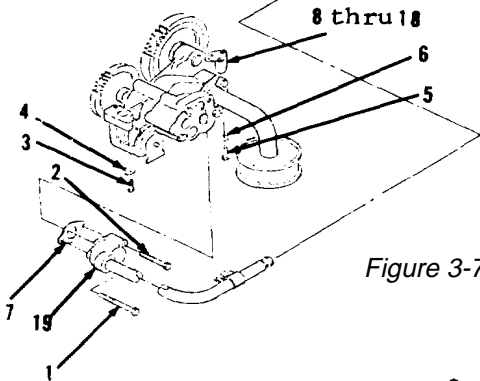
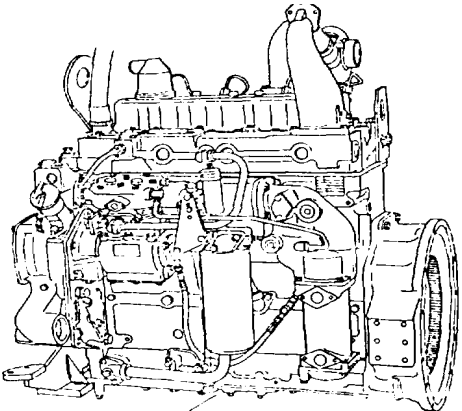


Figure 3-71.

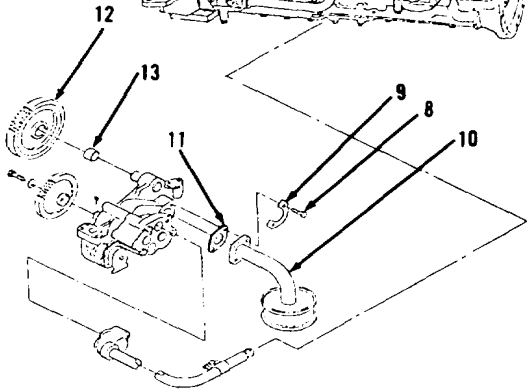
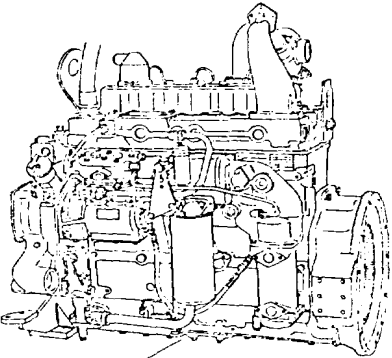


Figure 3-72.

Go to Sheet 3

ENGINE MAINTENANCE.

3-16. Oil Pump and Lines. (Sheet 3 of 6)

REMOVAL

10. Remove bolt (14) and washer (15).
11. Using suitable puller, remove gear (16).
12. Remove key (17) from oil pump (18) shaft.
13. Remove oil pan plate from bottom of engine. Refer to paragraph 3-15.
14. Remove items 19 thru 23 as an assembly.
15. Separate elbow (19) from items 20 thru 23 as an assembly (Figure 3-73).
16. Remove and discard preformed packing (20) from tube assembly (23).

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

17. Remove bolt (21), lock (22) and tube assembly (23) from oil pan plate.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

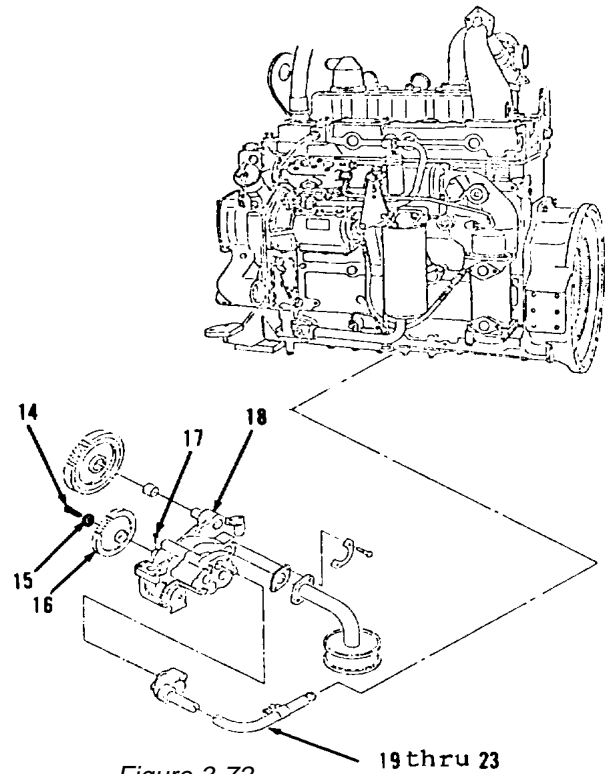


Figure 3-72.

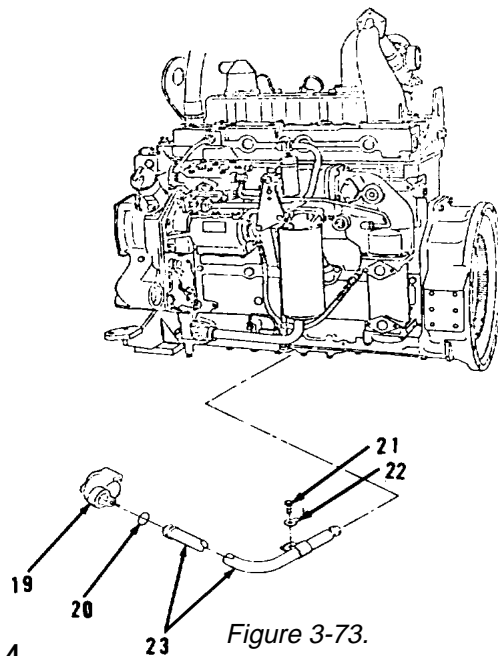


Figure 3-73.

Go to Sheet 4

ENGINE MAINTENANCE. (cont)

3-16. Oil Pump and Lines. (Sheet 4 of 6)

INSTALLATION

1. Position tube assembly (23, Figure 3-73) to oil pan plate.
2. Install lock (22) and bolt (21) Bend lock (22) tab up against bolt (21) head.
3. Install new preformed packing (20) on tube assembly (23). Lubricate outer diameter of new preformed packing (20). With clean oil.
4. Install elbow (19) on tube assembly (23).
5. Install items 23 thru 20 as an assembly (Figure 3-72) on oil pan plate.
6. Install oil pan plate. Refer to paragraph 3-15.
7. Install key (17) in shaft of oil pump (18).
8. Install gear (16) on shaft.
9. Install washer (15) and bolt (14). Tighten bolt (14) to 32 ft-lb torque.
10. Using suitable driver and press, install new bearing (13), if removed, flush with outer face of gear (12).
11. Install gear (12). Aline mark on gear (12) with gear (16) mark.
12. Lubricate oil pump (18) with clean oil.

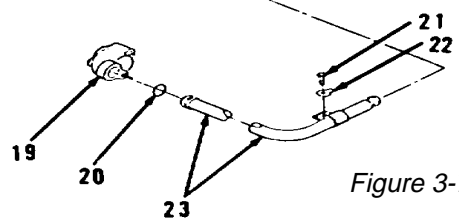
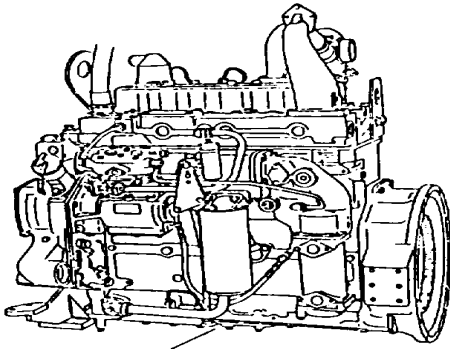


Figure 3-73.

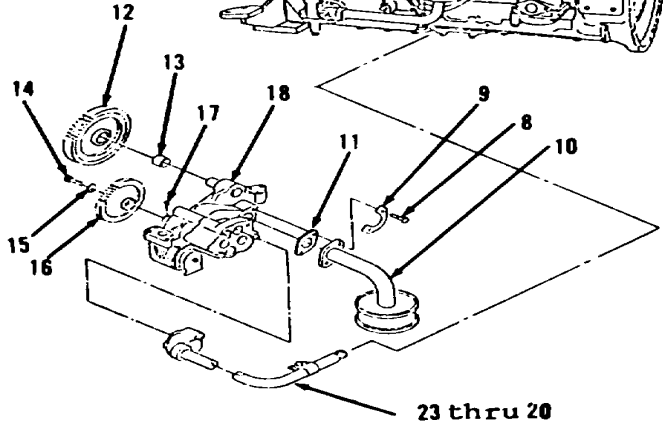
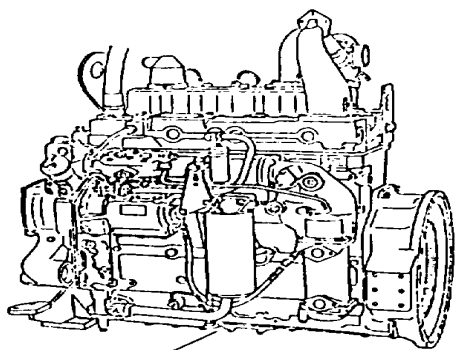


Figure 3-72.

Go to Sheet 5

ENGINE MAINTENANCE.3-16. Oil Pump and Lines. (Sheet 5 of 6)**INSTALLATION**

13. Position new gasket (11) and bell (10) on oil pump (18).
14. Install lock (9) and two bolts (8). Bend lock (9) tabs up against bolt (8) heads.
15. Locate top center of compression stroke of number one cylinder on engine. Refer to paragraph 3-12.
16. Aline two balancer shafts on bottom of engine. Turn balancer shafts so that the flat sides of the shafts face the opposite direction of oil pan plate. Install two 3/8-16NC 1-1/2 inch long bolts (1, Figure 3-74) through oil pan plate and into each of the balancer shafts. Tighten the bolts until they touch the bottom of the holes of the balancer shafts, then loosen 1/2 turn.

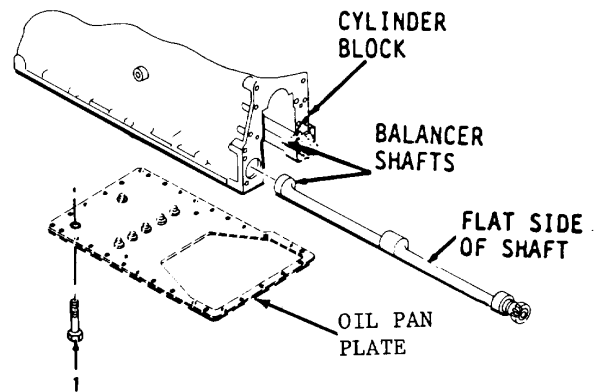


Figure 3-74.

Go to Sheet**3-95**

ENGINE MAINTENANCE. (cont)

3-16. Oil Pump and Lines. (Sheet 6 of 6)

INSTALLATION (cont)

CAUTION

Mark on gear must be in alignment with mark on other gear.

17. Position items 18 thru 8 as an assembly (Figure 3-71).
18. Install two washers (6), bolts (5), locks (4) and bolts (3) loosely.
19. Position new gasket (7) between elbow (19) and oil pump (18).
20. Install bolts (2 and 1) loosely.
21. Tighten two bolts (5) and bolts (3) evenly. Bend lock (4) tabs up, toward front of engine, against bolt heads.
22. Tighten bolts (2 and 1).
23. Remove two 3/8-16NC 1-1/2 inch long bolts from balancer shafts.

NOTE

- Proper timing of balancer shafts and oil pump gears is obtained when 3/8-16NC holes in balancer shafts are in alignment with holes in oil pan plate and number one cylinder is at top center compression stroke.
- Return 130G Grader to original equipment condition.

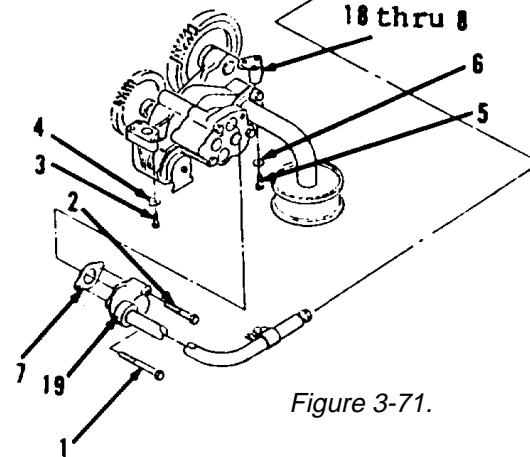
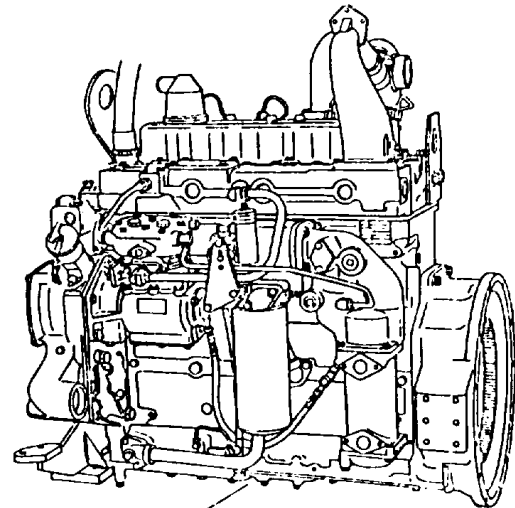


Figure 3-71.

End of Task

ENGINE MAINTENANCE.

3-17. Engine Oil Cooler. (Sheet 1 of 3)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Gaskets, Items 6, 7

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 3-18

Engine oil filter base removed.

Go to Sheet 2

ENGINE MAINTENANCE. (cont)3-17. Engine Oil Cooler. (Sheet 2 of 3)**REMOVAL**

1. Remove plug (1, Figure 3-75) on left side of engine.
2. Drain engine coolant.
3. Install plug (1) after engine coolant is drained.
4. Remove bolt (2), disconnecting oil gage and tube (3) from coolant tube.
5. Remove seven bolts (4).
6. Loosen two bolts (8) from transmission oil cooler enough to remove oil cooler (5). Do not remove bolts (8).
7. Remove oil cooler (5) and gaskets (6 and 7) from left side of engine. Discard gaskets (6 and 7). Remove all gasket material from mounting surfaces.

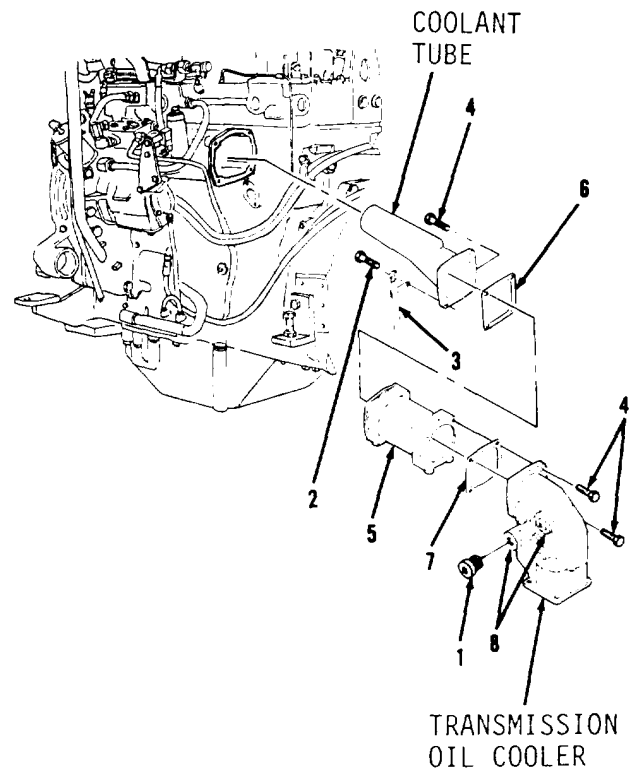


Figure 3-75.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

Go to Sheet 3

ENGINE MAINTENANCE.

3-17. Engine Oil Cooler. (Sheet 3 of 3)

INSTALLATION

1. Position new gaskets (7 and 6) and oil cooler (5, Figure 3-75) between transmission oil cooler and coolant tube on left side of engine.
2. Install seven bolts (4).
3. Tighten two bolts (8) on transmission oil cooler.
4. Position oil gage and tube (3) on coolant tube.
5. Install bolt (2).
6. Refill radiator to proper level. Refer to paragraph 6-48 in TM 5-3805-261-20.

NOTE

Return 130G Grader to original equipment condition.

End of Task

3-99

ENGINE MAINTENANCE. (cont)

3-18. Oil Filter Base. (Sheet 1 of 4)

This task covers:

- a. Removal
- d. Installation

b. Cleaning

c. Inspection

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Gaskets, Items 7, 14, 33, 39
Preformed packings, Items 8,
15, 42, 43
Caps

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Oil filter removed.

Go to Sheet 2

3-100

ENGINE MAINTENANCE.

3-18. Oil Filter Base. (Sheet 2 of 4)

REMOVAL

1. Remove two plugs (1) from top of oil filter base.
2. Remove bolts (2 and 3), washer (4), clip (5), spacer (6), tube (7), gasket (8) and preformed packing (9, Figure 3-76) from left side of engine. Discard gasket (8) and preformed packing (9). Remove all gasket material from mounting surfaces.

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

3. Remove bolts (10 and 11), washer (12), clip (13), tube (14), gasket (15) and preformed packing (16). Discard gasket (15) and preformed packing (16). Remove all gasket material from mounting surfaces.
4. Remove two bolts (17), washers (18) and spacers (19, Figure 3-77).
5. Remove bolt (20), washer (21), bolt (22), washer (23), bolt (24), washer (25), bolt (26) and washer (27).
6. Remove items 28 thru 42 as an assembly.
7. Remove and discard preformed packings (43 and 44).

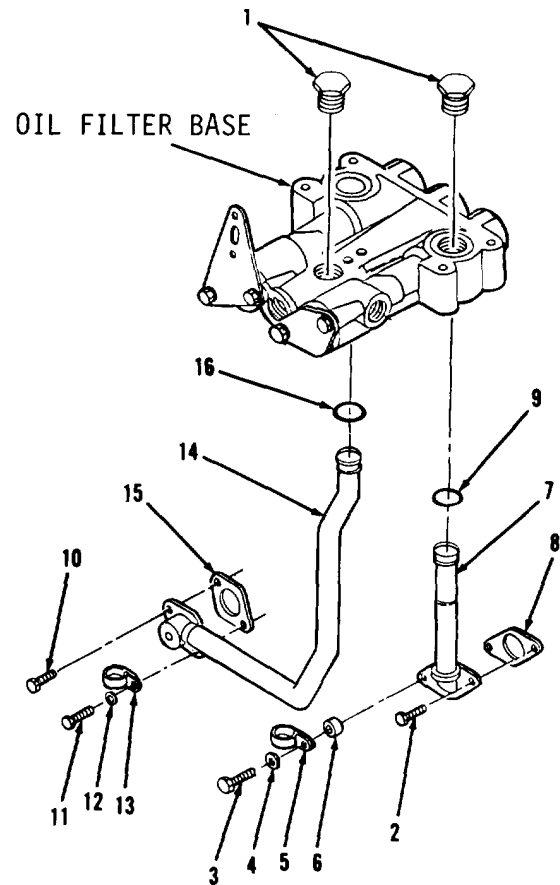


Figure 3-76.

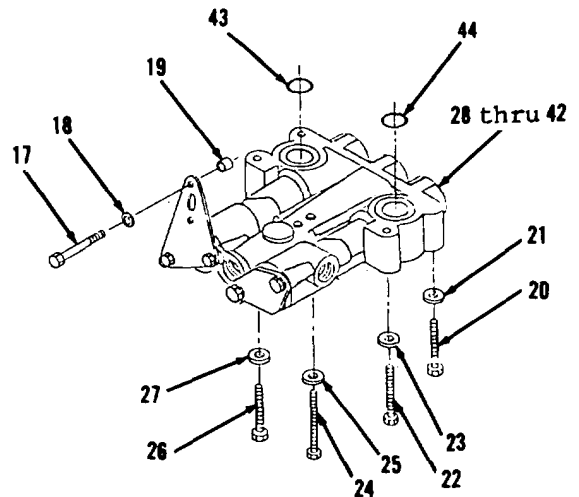


Figure 3-77.

Go to Sheet 3

ENGINE MAINTENANCE. (cont)3-18. Oil Filter Base. (Sheet 3 of 4)

REMOVAL (cont)

8. Remove two bolts (29), washers (30), bracket (31) and two spacers (32, Figure 3-78) from oil filter base.
9. Remove cover (33), gasket (34), spring (35) and plunger (36). Discard gasket (34). Remove all gasket material from mounting surfaces.
10. Remove two bolts (37), washers (38), cover (39), gasket (40), spring (41) and plunger (42). Discard gasket (40). Remove all gasket material from mounting surfaces.

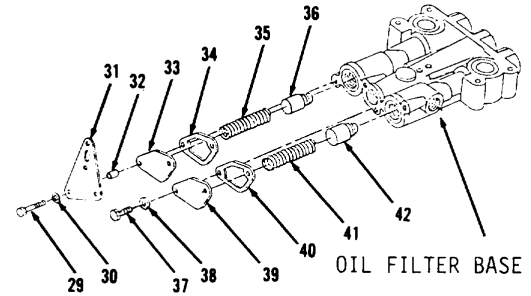


Figure 3-78.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Install plunger (42), spring (41), new gasket (40), cover (39), two washers (38) and bolts (37, Figure 3-78) to oil filter base.
2. Install plunger (36), spring (35), new gasket (34) and cover (33).
3. Install two spacers (32), bracket (31), two washers (30) and bolts (29).

Go to Sheet 4

ENGINE MAINTENANCE.

3-18. Oil Filter Base. (Sheet 4 of 4)

INSTALLATION

4. Install new preformed packings (44 and 43, Figure 3-77).
5. Install items 42 thru 28 as an assembly.
6. Install washer (27), bolt (26), washer (25), bolt (24), washer (23), bolt (22), washer (21) and bolt (20) to left side of engine.
7. Install two spacers (19), washers (18) and bolts (17).
8. Install new preformed packing (16), new gasket (15), tube (14), clip (13), washer (12) and bolts (11 and 10, Figure 3-76).
9. Install new preformed packing (9), new gasket (8), tube (7), spacer (6), clip (5), washer (4) and bolts (3 and 2).
10. Install two plugs (1) to top of oil filter base.

NOTE

Return 130G Grader to original equipment condition.

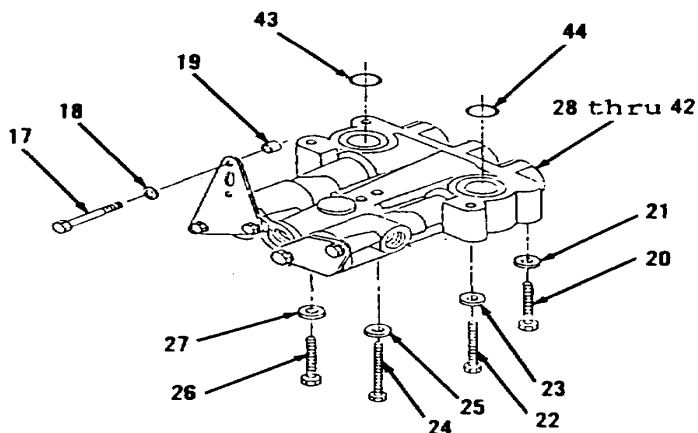


Figure 3-77.

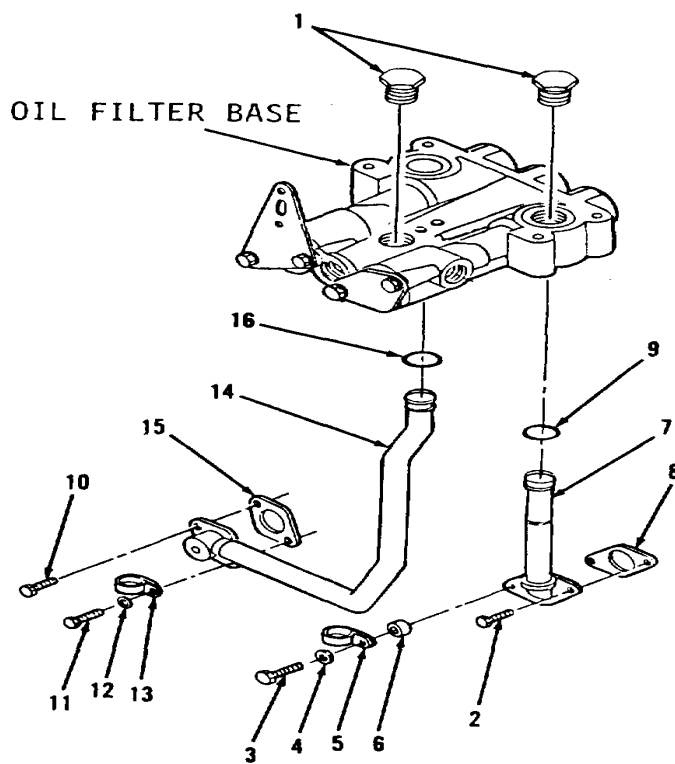


Figure 3-76.

End of Task

ENGINE MAINTENANCE. (cont)

3-19. Exhaust Manifold. (Sheet 1 of 3)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Anti-seize compound,
Item 8, Appendix C
Gaskets, Item 12

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Pipe and muffler removed.
Turbocharger removed.
Fuel injection lines removed.

Go to Sheet 2

ENGINE MAINTENANCE.

3-19. Exhaust Manifold. (Sheet 2 of 3)

REMOVAL

1. Remove two bolts (1), washers (2) and shield (3, Figure 3-79) from top, right side of engine.
2. Remove four nuts (4), washers (5), two brackets (6) and four washers (7).
3. Remove four nuts (8), washer (9) and three washers (10).
4. Remove manifold (11) and four gaskets (12, Figure 3-80). Discard four gaskets (12). Remove all gasket material from mounting surfaces.

CAUTION

Remove studs only if inspection proves replacement is necessary.

5. Remove stud (13), four studs (14) and three studs (15) on right side of cylinder head, if necessary. Replace if cracked, broken, heat damaged or threads damaged.

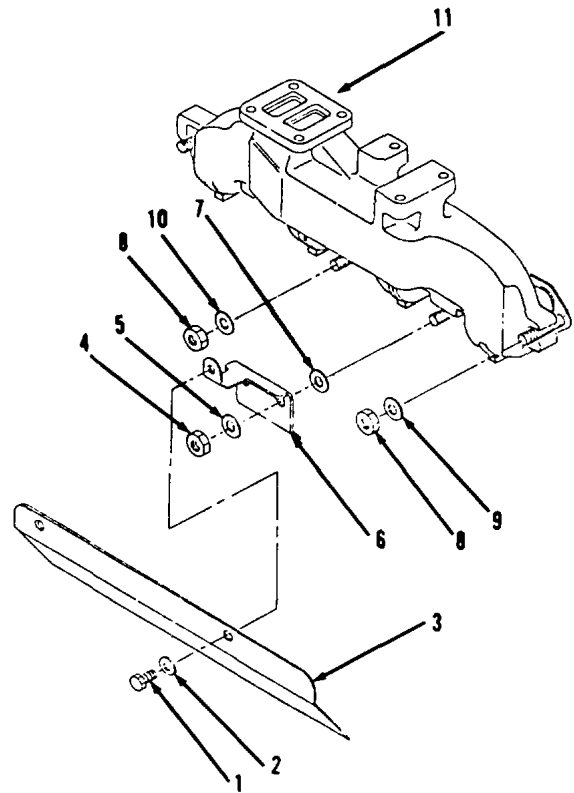


Figure 3-79.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

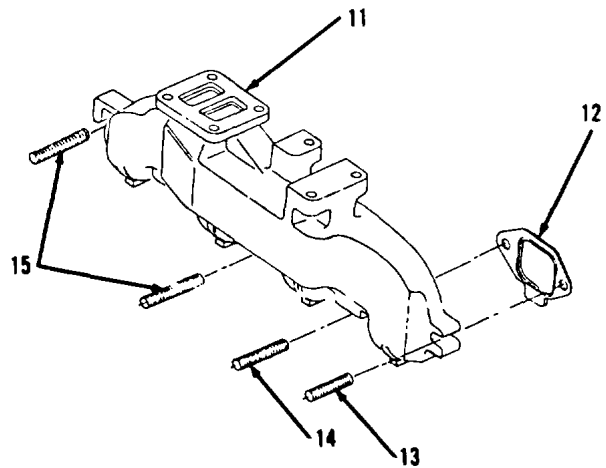


Figure 3-80.

Go to Sheet 3

ENGINE MAINTENANCE. (cont)

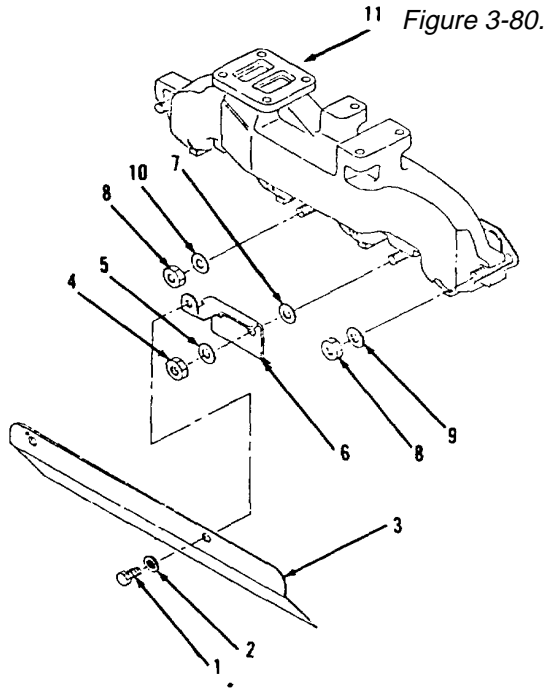
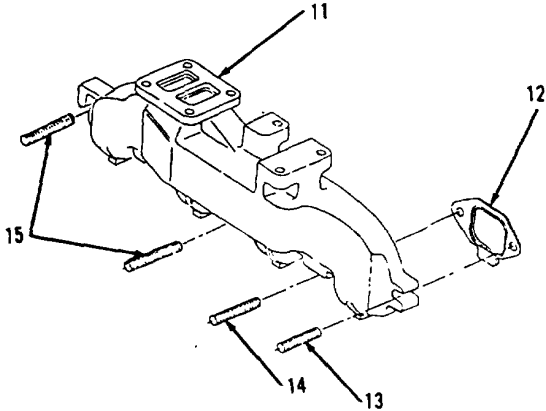
3-19. Exhaust Manifold. (Sheet 3 of 3)

INSTALLATION

1. Install three studs (15), four studs (14) and stud (13, Figure 3-80) to right side of cylinder head, if removed. Apply anti-seize compound to half of studs (15, 14 and 13) being installed in cylinder head. Tighten studs (15, 14 and 13) to 20 ft-lb torque.
2. Install four new gaskets (12) on studs (15, 14 and 13) in top, right side of engine.
3. Install manifold (11).
4. Install three washers (10), washer (9) and four nuts (8, Figure 3-79). Tighten four nuts (8) to 32 ft-lb torque.
5. Install four washers (7), two brackets (6), four washers (5) and nuts (4). Tighten four nuts (4) to 32 ft-lb torque.
6. Install shield (3), two washers(2) and bolts (1).

NOTE

Return 130G Grader to original equipment condition.



End of Task

Figure 3-79.

ENGINE MAINTENANCE.

3-20. Tachometer Drive. (Sheet 1 of 3)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Preformed packing, Item 4
Lubricating oil, Item 33,
Appendix C

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Positive cable on right side disconnected.

Go to Sheet 2

ENGINE MAINTENANCE. (cont)

3-20. Tachometer Drive. (Sheet 2 of 3)

REMOVAL

1. Remove bolt (1) lockwasher (2) and clamp (3, Figure 3-81) from rear fuel injection pump, right side of engine.
2. Remove items 4 thru 7 as an assembly from fuel injection pump rear governor housing.
3. Remove and discard preformed packing (4, Figure 3-82).
4. Remove adapter (5) from adapter (7).
5. Remove two caps (6).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Install two caps (6) on adapter (5, Figure 3-82).
2. Install adapter (5) on adapter (7).
3. Install new preformed packing (4) on groove of adapter (7). Lubricate outer diameter with clean oil.

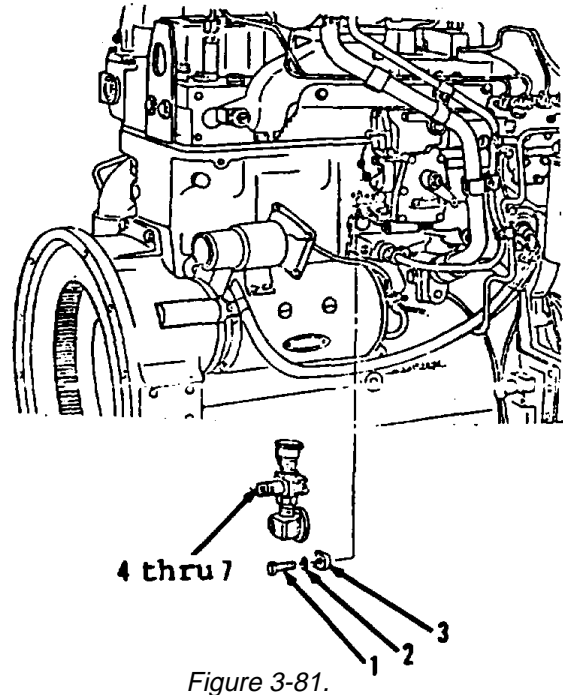


Figure 3-81.

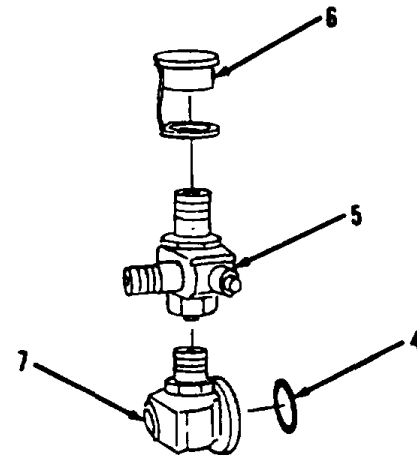


Figure 3-82.

Go to Sheet 3

ENGINE MAINTENANCE.

3-20. Tachometer Drive. (Sheet 3 of 3)

INSTALLATION

4. Install items 7 thru 4 as an assembly (Figure 3-81). Aline shaft of adapter (7) with shaft in rear governor housing.
6. Install clamp (3), lockwasher (2) and bolt (1).

NOTE

Return 130G Grader to original equipment condition.

End of Task

3-109

Section III. FUEL SYSTEM TROUBLESHOOTING.

3-21. GENERAL INFORMATION. This section lists the common fuel system malfunctions which may occur during the operation of the 130G Grader. You should perform the tests, inspections and corrective actions in the order listed. Follow the troubleshooting procedures listed below step-by-step until you can go no further.

3-22. FUEL SYSTEM TROUBLESHOOTING PROCEDURES. This section cannot list all possible malfunctions, nor can it list all possible tests, inspections or corrective actions. If a malfunction is not listed, contact your supervisor.

FUEL SYSTEM TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|-------------|--|---|
| a. | ENGINE WILL NOT START. | Refer to ENGINE TROUBLESHOOTING, paragraph 3-2.a. |
| b. | ENGINE MISFIRES OR RUNS ROUGHLY. | Refer to ENGINE TROUBLESHOOTING, paragraph 3-2.b. |
| c. | ENGINE STALLS AT LOW RPM. | Refer to ENGINE TROUBLESHOOTING, paragraph 3-2.c. |
| d. | SUDDEN CHANGES IN ENGINE SPEED. | Refer to ENGINE TROUBLESHOOTING, paragraph 3-2.d. |
| e. | NOT ENOUGH POWER. | Refer to ENGINE TROUBLESHOOTING, paragraph 3-2.e. |
| f. | LOUD COMBUSTION NOISE (KNOCK) IN ENGINE. | Refer to ENGINE TROUBLESHOOTING, paragraph 3-2.g. |
| g. | FUEL CONSUMPTION IS TOO HIGH. | Refer to ENGINE TROUBLESHOOTING, paragraph 3-2.k. |

FUEL SYSTEM TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

- | | | |
|----|----------------------------------|---|
| h. | TOO MUCH BLACK OR GRAY SMOKE. | Refer to ENGINE TROUBLESHOOTING, paragraph 3-2.r. |
| i. | TOO MUCH WHITE OR BLUE SMOKE. | Refer to ENGINE TROUBLESHOOTING, paragraph 3-2.s. |
| j. | ENGINE COOLANT IS TOO HOT. | Refer to ENGINE TROUBLESHOOTING, paragraph 3-2.u. |
| k. | EXHAUST TEMPERATURE IS TOO HIGH. | Refer to ENGINE TROUBLESHOOTING, paragraph 3-2.w. |

Section IV. FUEL SYSTEM MAINTENANCE.**3-23. FUEL SYSTEM MAINTENANCE PROCEDURES.**

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the fuel system and its components in good repair.

b. This section is arranged by functional group code and provides a list of fuel system components to be maintained and step-by-step maintenance procedures.

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| <u>Title</u> | <u>Paragraph</u> | <u>Page</u> |
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| Fuel Injection Pump | 3-25 | 3-116 |
| Fuel Injection Pump Mounting | 3-26 | 3-132 |
| Governor and Fuel Injection Pump | 3-27 | 3-135 |
| Governor | 3-28 | 3-144 |
| Fuel Transfer Pump | 3-29 | 3-161 |
| Governor Controls | 3-30 | 3-168 |

FUEL SYSTEM MAINTENANCE.

3-24. Fuel Injection Nozzles. (Sheet 1 of 3)

This task covers:

- | | | |
|---------------------------------------|-----------------------------------|----------------------|
| <p>a. Removal d. Installation</p> | <p>b. Cleaning e. Testing</p> | <p>c. Inspection</p> |
|---------------------------------------|-----------------------------------|----------------------|
-

INITIAL SETUP:

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-177-7033)
Nozzle puller 6V3129
Nozzle puller adapter FT1533

Test Equipment

Injection nozzle tester

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix
Clean cloths, Item 41,
Appendix C
Caps

Personnel Required

Construction equipment
repairer MOS 63G

References

TM 5-3805-261-10
TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

TM 5-3805-261-20

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Fuel injection lines removed.

Go to Sheet 2

3-113

FUEL SYSTEM MAINTENANCE. (cont)

3-24. Fuel Injection Nozzles. (Sheet 2 of 3)

REMOVAL

NOTE

The following is a maintenance procedure for one injection nozzle. The maintenance procedure for the remaining three injection nozzles is identical.

1. Remove bolt and clamp from top of cylinder head on engine (Figure 3-83).

CAUTION

Do not apply more than 150 lb-in torque to remove fuel injection nozzle.

2. Using nozzle puller and, if necessary, nozzle puller adapter, remove injection nozzle.
3. Cap nozzle to prevent contamination if it is to be stored.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

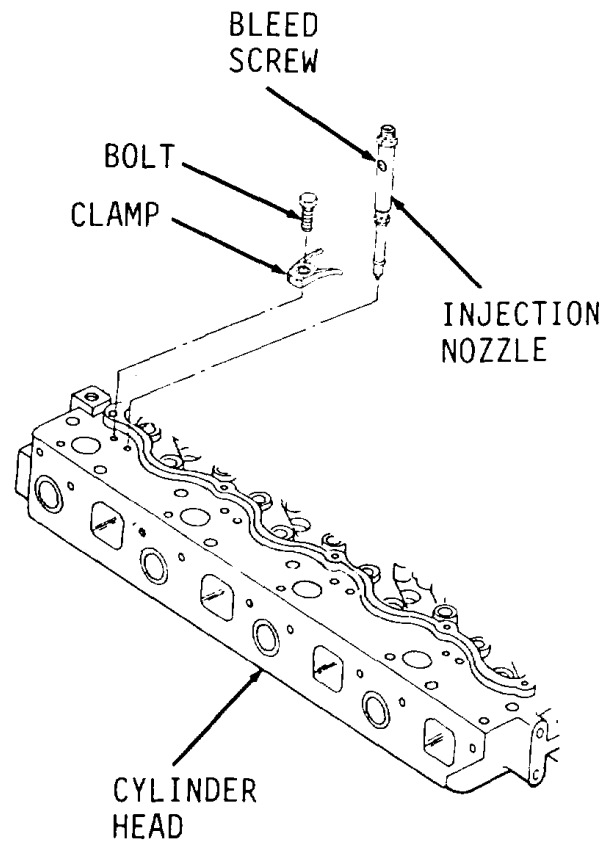
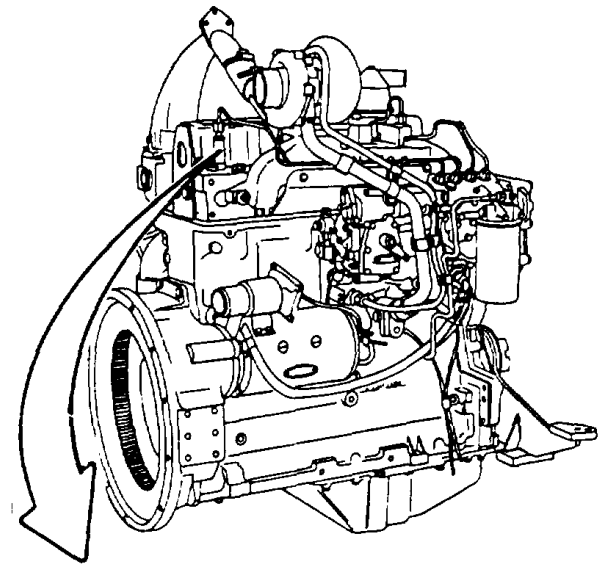


Figure 3-83.

Go to Sheet 3

FUEL SYSTEM MAINTENANCE.**3-24. Fuel Injection Nozzles. (Sheet 3 of 3)****TESTING****WARNING**

Safety glasses must be worn when testing fuel injection nozzles. Failure to do so may cause INJURY. If you are injured, seek medical aid immediately.

NOTE

All carbon must be removed from injection nozzle tip before proceeding with testing.

Using injection nozzle tester and calibration oil at 65 to 75 degrees F, test injection nozzle for valve opening pressure. Valve opening pressure must be 2050 to 2350 psi.

NOTE

It is possible for the pressure reading of the gage to go down fast if the valve makes a noise (chatters) when it opens. It is also possible for the pressure reading of the gage to be almost constant when the valve in the fuel injection nozzle opens.

INSTALLATION

1. Position injection nozzle on top of cylinder head (Figure 3-83).
2. Install clamp and bolt.

NOTE

Return 130G Grader to original equipment condition.

End of Task

FUEL SYSTEM MAINTENANCE. (cont)**3-25. Fuel Injection Pump. (Sheet 1 of 16)****This task covers:**

- | | | |
|------------------------|--------------------|----------------------|
| a. Removal | b. Cleaning | c. Inspection |
| d. Installation | e. Testing | |
-

INITIAL SETUP:Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

Hoist and sling
Timing pin 6V4186
Wrench 8S4613
Extractor 8S2244
Locator plate 6V2016
Driver 6V4818
Sleeve FT1443
1-3/4 inch contact pin
Wood block

Test Equipment

Spring tester

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Detergent, Item 9, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Gaskets, Items 16, 34
Cotter pin, Item 1
Lubricating oil, Item 33,
Appendix C
Felt washers, Item 17
Preformed packings, Items 5, 10,
11, 12, 13, 19, 47, 49, 51
Caps
Bearings, Items 42, 43, 44, 45

Personnel Required

Construction equipment
repairer MOS 63G

References

TM 5-3805-261-10
TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Go to Sheet 2

FUEL SYSTEM MAINTENANCE.**3-25. Fuel Injection Pump. (Sheet 2 of 16)**

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Fuel flow shut off.
Turbocharger oil lines removed.
Fuel injection lines removed.
Secondary fuel filter and mounting removed.
Starting motor removed.
Engine hood removed.

Paragraph 3-20

Tachometer drive removed.

Paragraph 3-29

Fuel transfer pump removed.

Go to Sheet 3**3-117**

FUEL SYSTEM MAINTENANCE. (cont)**3-25. Fuel Injection Pump. (Sheet 3 of 16)****REMOVAL****NOTE**

Cap all open fuel ports and individual injection pumps to prevent contamination.

1. Remove cotter pin (1) and pin (2, Figure 3-84) from right side of engine. Discard cotter pin (1).
2. Disconnect linkage assembly (53) from fuel injection pump and governor control lever. Move linkage assembly (53) out of the way.
3. Remove governor control lever. Refer to paragraph 3-30.

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

4. Disconnect hose assembly (3) from fuel injection pump.
5. Remove elbow (4) and preformed packing (5). Discard preformed packing (5).
6. Remove hose assembly (6).
7. Remove manifold shield. Refer to paragraph 3-19, step 1.
8. Remove three nuts (7).

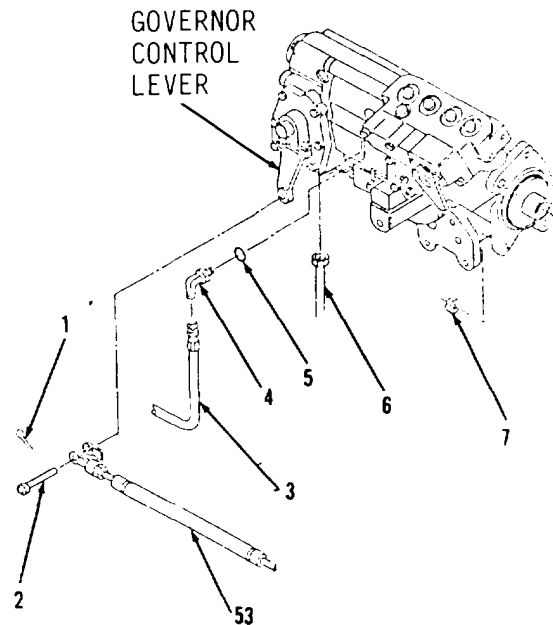


Figure 3-84.

Go to Sheet 4

FUEL SYSTEM MAINTENANCE.

3-25. Fuel Injection Pump. (Sheet 4 of 16)

REMOVAL

WARNING

Weight on fuel injection pump and governor is approximately 58 pounds. Use adequate hoist and sling for lifting. Failure to follow this procedure could cause INJURY.

9. Attach hoist and sling to fuel injection pump and governor (Figure 3-85).
10. Remove bolts (8 and 9) from under fuel injection pump and governor support.
11. Remove fuel injection pump and governor. Pull back to separate from front cover plate and lift up from support.
12. Remove and discard preformed packings (10 thru 13).
13. Remove governor assembly from fuel injection pump. Refer to paragraph 3-28.
14. Remove hoist and sling.

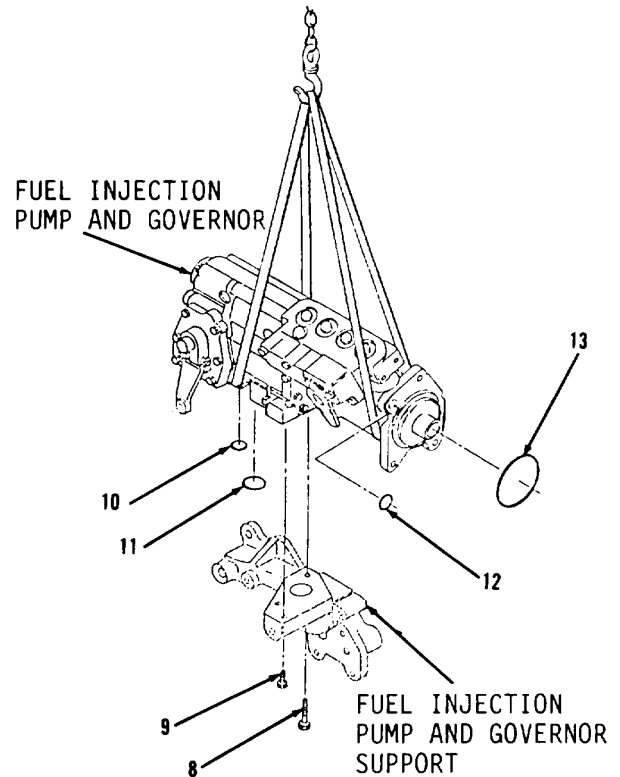


Figure 3-85.

DISASSEMBLY

1. Remove four bolts (14), cover (15) and gasket (16, Figure 3-86). Discard gasket (16). Remove all gasket material from mounting surfaces.

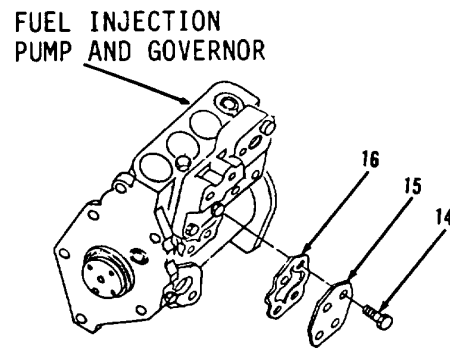


Figure 3-86.

Go to Sheet 5

FUEL SYSTEM MAINTENANCE. (cont)

3-25. Fuel Injection Pump. (Sheet 5 of 16)

DISASSEMBLY (cont)

- 2. Center rack (37). Install timing pin in zero rack pin hole. Move rack (37) until timing pin engages with center groove in rack (37, Figure 3-87).
- 3. Remove and discard four felt washers (17) from top of fuel injection pump (Figure 3-88).
- 4. Using wrench, remove four bushings (18).

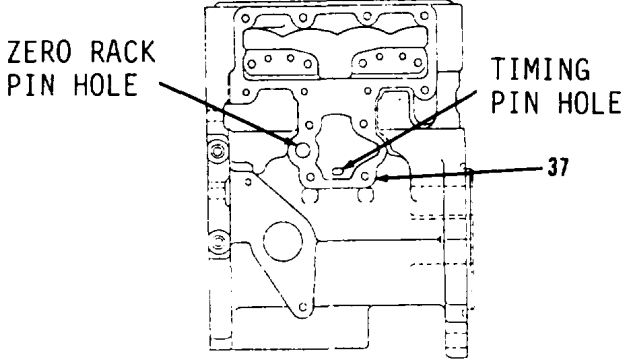


Figure 3-87.

NOTE

The following step is for maintenance of one fuel injection pump assembly. The procedure for the remaining three is identical.

- 5. Using extractor, remove items 20 thru 27 as an assembly and preformed packing (19). Discard preformed packing (19).
- 6. Remove items 28 thru 53 as an assembly.

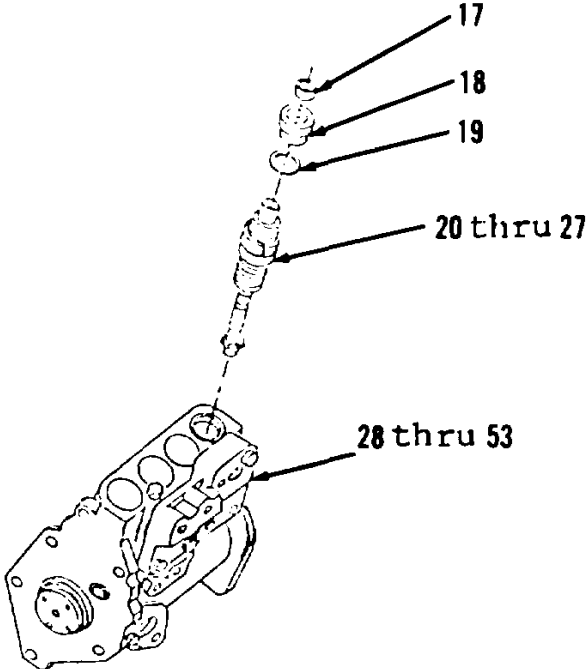


Figure 3-88.

Go to Sheet 6

FUEL SYSTEM MAINTENANCE.**3-25. Fuel Injection Pump. (Sheet 6 of 16)****DISASSEMBLY****CAUTION**

Use extreme care not to damage the injection pumps or components. Any scratches to the surfaces of the plungers, barrels and bonnets will cause leakage inside the fuel injection pump. The plunger and barrel for each pump are made as a set. Do not put the plunger of one pump in the barrel of another pump. Do not mix components from fuel injection pump assemblies.

7. Remove plunger assembly (20) out of spring (22) and barrel (24, Figure 3-89).
8. Remove spring seat (21) from plunger assembly (20).

NOTE

Do not remove the gear from plunger assembly. The gear and plunger are assembled and adjusted at the factory.

9. Remove spring (22) from barrel (24).
10. Hold barrel (24) and bonnet (27) together.
11. Remove ring (23).
12. Separate barrel (24) and bonnet (27).
13. Remove check (25) and spring (26) from bonnet (27). Do not disassemble check (25).

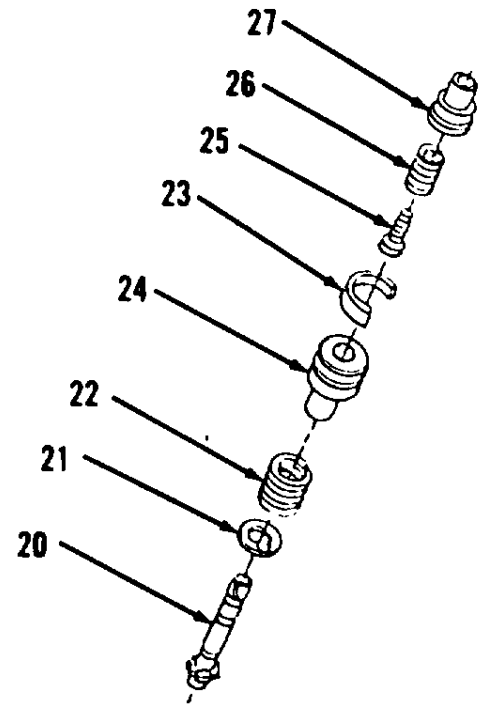


Figure 3-89.

Go to Sheet 7

FUEL SYSTEM MAINTENANCE. (cont)

3-25. Fuel Injection Pump. (Sheet 7 of 16)

DISASSEMBLY (cont)

- 14. Remove four spacers (28) from each of four cylinders in pump housing (53, Figure 3-90).
- 15. Remove two bolts (29), washers (30), bolts (31), four bolts (32), cover (33) and gasket (34). Discard gasket (34). Remove all gasket material from mounting surfaces.
- 16. Remove two bolts (35) and deflector (36) from cover (33).
- 17. Remove items 37 thru 53 as an assembly.
- 18. Remove rack (37) from housing (53, Figure 3-91).
- 19. Using a magnet, remove four lifters (38).
- 20. Using snap ring pliers, remove ring (39).

CAUTION

Do not allow camshaft to fall or become scratched when removing. Scratches to machined surfaces will cause destruction of camshaft.

- 21. Using plastic hammer, drive camshaft (41) free of washer (40) and separate. Do not allow camshaft (41) to drop.
- 22. Remove washer (40).
- 23. Remove camshaft (41) from rear of housing (53).

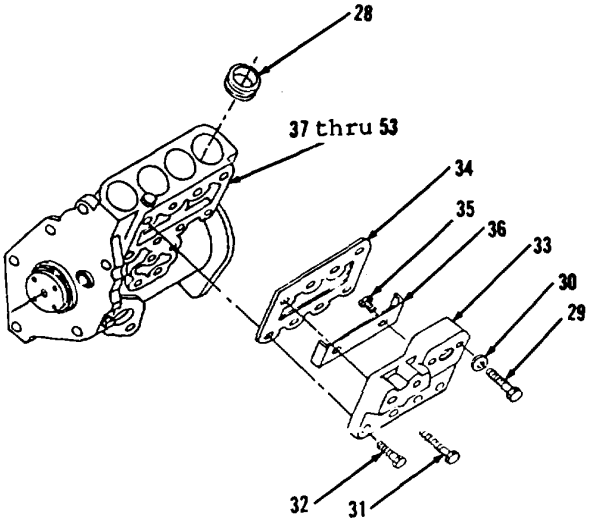


Figure 3-90.

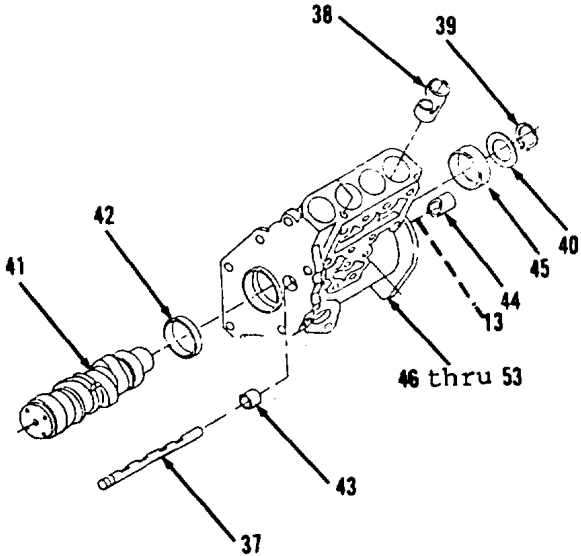


Figure 3-91.

Go to Sheet 8

FUEL SYSTEM MAINTENANCE.**3-25. Fuel Injection Pump. (Sheet 8 of 16)****DISASSEMBLY****CAUTION**

Do not remove bearings from housing unless replacement is necessary.

24. Using suitable puller, remove bearings (42 and 43).
25. Using suitable puller, remove bearing (44). Install locator plate so large bore in plate is in alignment with counterbore for preformed packing (13) and the small hole in the plate is over bearing (44). Scribe a mark on the plate. This mark will aid in proper installation of bearing (44).
26. Using suitable puller, remove bearing (45).
27. Remove items 46 thru 53 as an assembly.
28. Remove two plugs (46) and preformed packings (47, Figure 3-92). Discard preformed packings (47).
29. Remove plug (48) and preformed packing (49) from housing (53). Discard preformed packing (49).
30. Using hammer and punch, drive four pins (50) out from opposite side. Take care not to damage any machined surfaces.
31. Remove and discard four preformed packings (51).

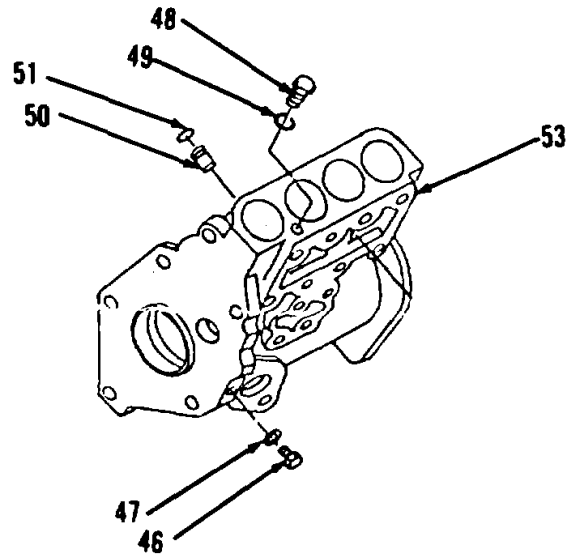


Figure 3-92.

Go to Sheet 9

FUEL SYSTEM MAINTENANCE. (cont)

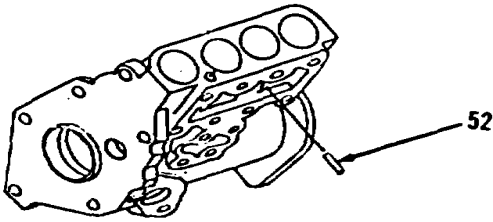
3-25. Fuel Injection Pump. (Sheet 9 of 16)

DISASSEMBLY (cont)

CAUTION

Do not remove dowels unless replacement is absolutely necessary.

- 32. Using hammer and punch, remove four dowels (52).



CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Using suitable driver and hammer, carefully install and tap four dowels (52) into position in housing (53, Figure 3-93). Dowels (52) must be installed extending beyond cylinder wall to dimensions.
2. Install four new preformed packings (51) on grooves of pins (50, Figure 3-94). Lubricate with clean oil.
3. Using suitable driver and hammer, install four pins (50) into housing (53) until pins seat with counterbore.
4. Install new preformed packing (49) and plug (48).
5. Install two new preformed packings (49) and plugs (46).

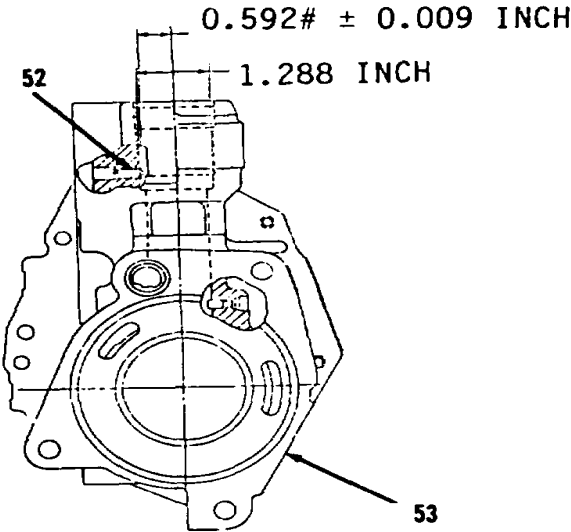


Figure 3-93.

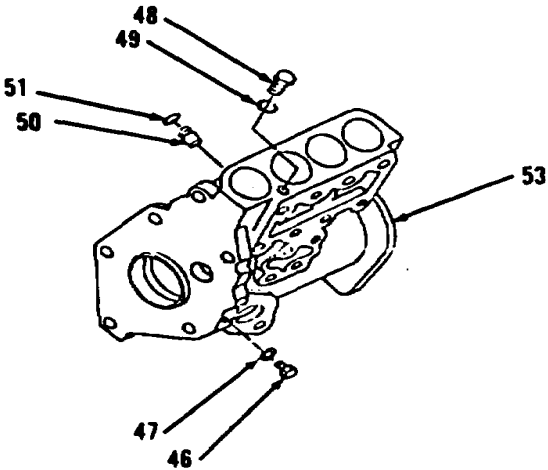
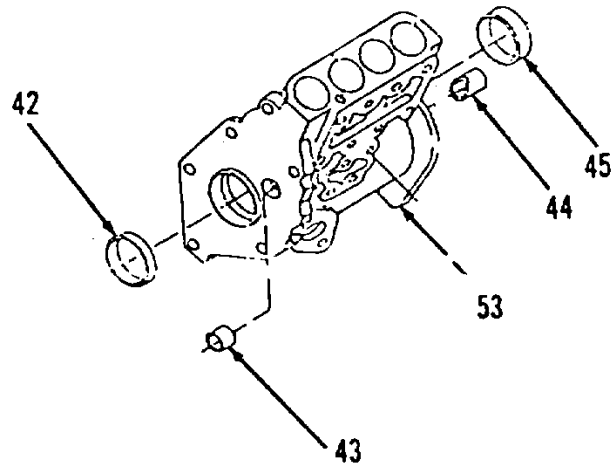


Figure 3-94.

Go to Sheet 10

FUEL SYSTEM MAINTENANCE.**3-25. Fuel Injection Pump. (Sheet 10 of 16)****ASSEMBLY**

6. Using suitable driver and hammer, install bearing (45, Figure 3-91), if removed. Position new bearing (45) with joint in new bearing (45) pointing straight up at top of housing (53). Drive new bearing (45) to a depth of 0.039 inch below surface of housing (53).
7. Install new bearing (44), if removed. Install locator plate, aligning scribed marks and securing the plate to housing (53) with attaching plate bolts. Use clean grease to hold new bearing (44) on the end of driver in locator plate, with the groove in the driver in alignment with the pin in the locator plate. Use a hammer to tap new bearing (44) until shoulder of driver is against locator plate. Remove locator plate.
8. Using a suitable driver and hammer, install new bearing (43), if removed, to a depth of 0.282 inch below surface of housing (53).
9. Using a suitable driver and hammer, install new bearing (42), if removed. Position new bearing (42) with joint in new bearing (42) pointing straight up toward top of housing (53) and install new bearing (42) 0.010 inch below surface of housing (53).

*Figure 3-91.***Go to Sheet 11**

FUEL SYSTEM MAINTENANCE. (cont)**3-25. Fuel Injection Pump. (Sheet 11 of 16)****ASSEMBLY (cont)**

10. Using clean oil, lubricate camshaft (41) and install.
11. Position housing (53). Stand camshaft (41) on end of housing (53). Do not allow camshaft (41) to fall. Install a wood block under camshaft (41).
12. Position washer (40) over end of camshaft (41).
13. Using sleeve and suitable driver and hammer, install washer (40) on camshaft (41). Camshaft (41) must have 0.0112 + 0.0093 inch end play after assembly.
14. Using snap ring pliers, install ring (39) in groove in end of camshaft (41).
15. Using clean oil, lubricate four lifters (38).
16. Using magnet, install four lifters (38). Do not drop four lifters (38) into place. Aline grooves in four lifters (38) with pin (50, Figure 3-91).
17. Install rack (37) through rear of new bearing (43) alining notch in new bearing (44) with the spline on rack (37).
18. Install timing pin to center of rack (37).

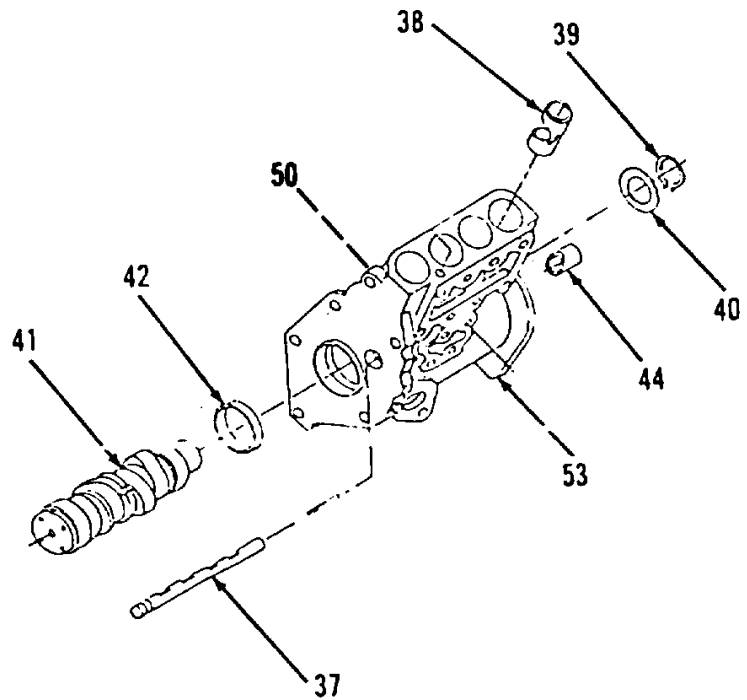


Figure 3-91.

Go to Sheet 12

FUEL SYSTEM MAINTENANCE.

3-25. Fuel Injection Pump. (Sheet 12 of 16)

ASSEMBLY

- 19. Install deflector (36) and two bolts (35) on cover (33, Figure 3-90).
- 20. Position new gasket (34) and cover (33).
- 21. Install four bolts (32), two bolts (31), washers (30) and bolts (29).
- 22. Install four spacers (28).

NOTE

The following maintenance procedure is for one pump assembly. The maintenance procedure for the remaining three pump assemblies is identical.

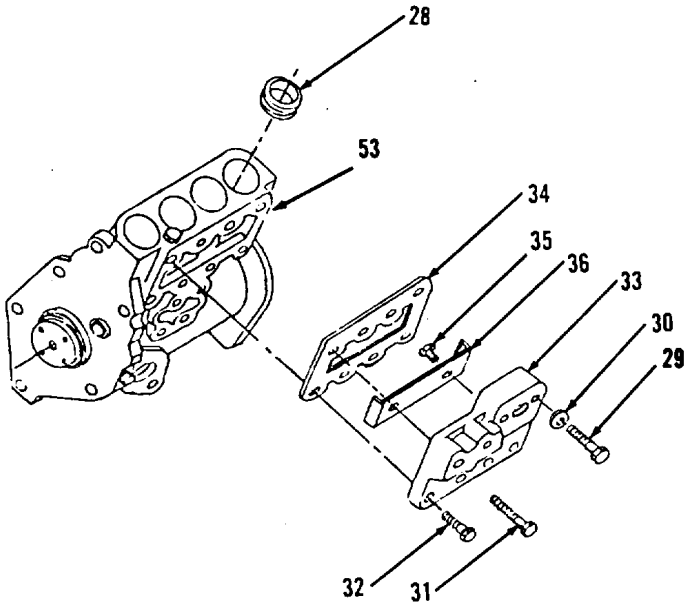


Figure 3-90.

- 23. Install spring (26) and check (25) in bonnet (27, Figure 3-89).

CAUTION

Do not slide bonnet across barrel. Check in bonnet will cause damage to face of barrel.

- 24. Position barrel (24) on bonnet (27).
- 25. Install ring (23), securing bonnet (27) to barrel (24).
- 26. Install spring (22) on barrel (24).

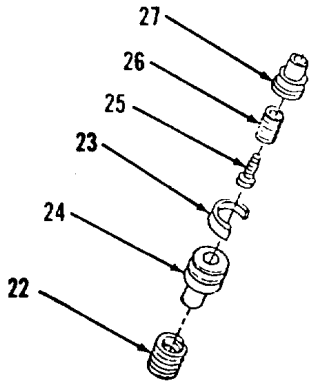


Figure 3-89.

Go to Sheet 13

FUEL SYSTEM MAINTENANCE. (cont)

3-25. Fuel Injection Pump. (Sheet 13 of 16)

ASSEMBLY (cont)

- 27. Position washer (21) on plunger assembly (20) with flat side of washer facing gear on plunger assembly (20).
- 28. Install plunger assembly (20) through spring (22) and into barrel (24) until washer (21) engages spring (22).
- 29. Aline items 27 thru 20 as an assembly with slot in gear on items 53 thru 28 180 degrees away from groove in barrel (24, Figure 3-95).
- 30. Using extractor, aline groove in barrel (24) with dowel (52) in housing (53) and install. Installation of remaining pump assemblies is the same.

NOTE

Installation of pump assembly is made easier by rotation of camshaft lobe away from four lifters.

- 31. Install new preformed packing (19) on top of bonnet (27, Figure 3-88).
- 32. Measure rack (37, Figure 3-96) travel. Install rack position tools, contact pin and C-clamp. Correct rack travel is 0.618 inch. A smaller measurement is an indication of wrong installation of items 27 thru 20. Remove tooling and install remaining items.

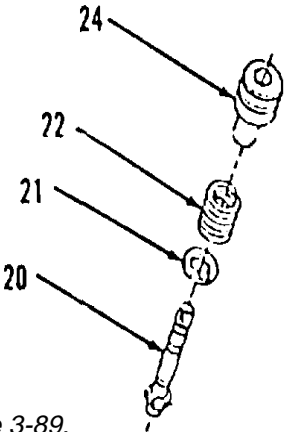


Figure 3-89.

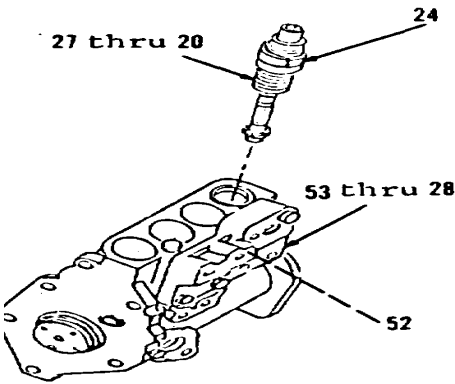


Figure 3-95.

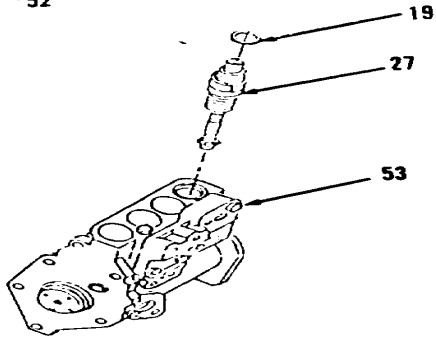


Figure 3-88.

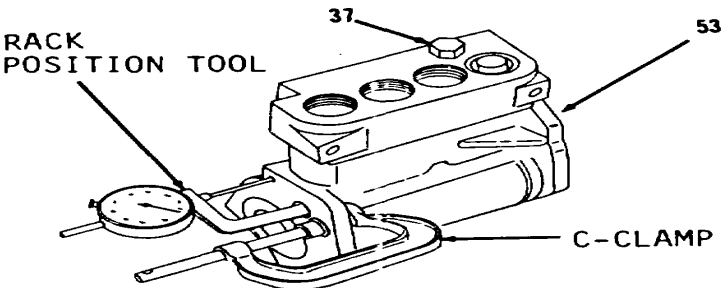


Figure 3-96.

Go to Sheet 14

FUEL SYSTEM MAINTENANCE.

3-25. Fuel Injection Pump. (Sheet 14 of 16)

ASSEMBLY

33. Install four bushings (18, Figure 3-97) and tighten to 120 ft-lb torque.
34. Install four new felt washers (17).
35. Install new gasket (16), cover (15) and four bolts (14).

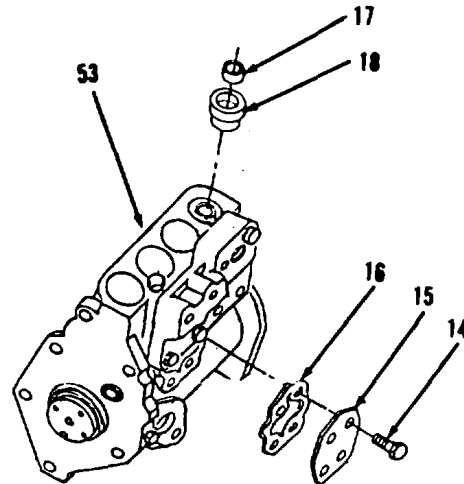


Figure 3-97.

INSTALLATION

1. Install governor assembly on injection pump. Refer to paragraph 3-28.
2. Lubricate and install new preformed packings (13 thru 10) under fuel injection pump and governor (Figure 3-85).
3. Using hoist and sling, position fuel injection pump and governor on support and timing gear plate.
4. Install bolts (9 and 8).
5. Remove hoist and sling.

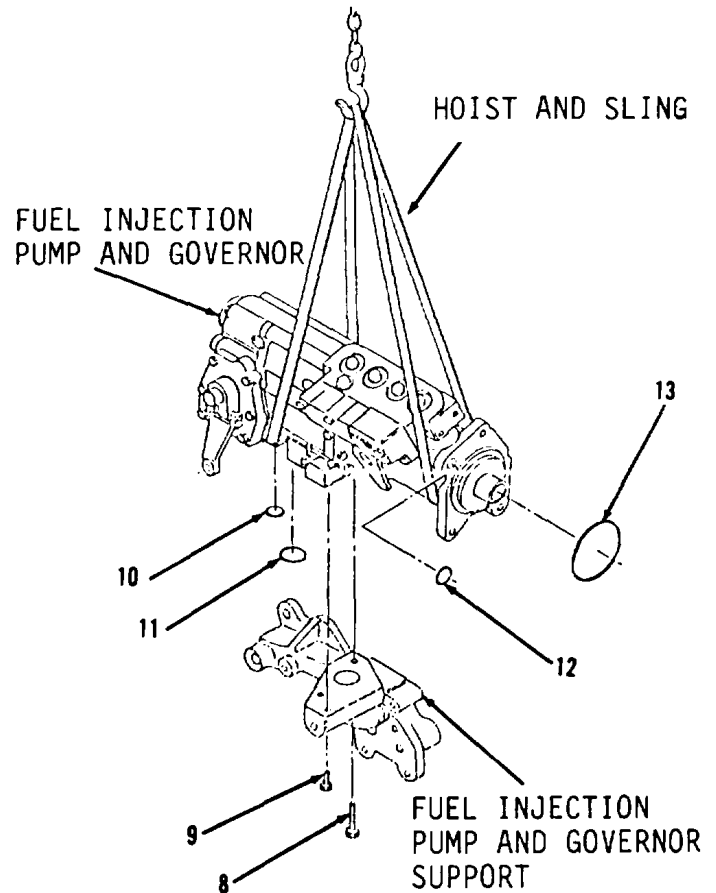


Figure 3-85.

Go to Sheet 15

FUEL SYSTEM MAINTENANCE. (cont)**3-25. Fuel Injection Pump. (Sheet 15 of 16)****INSTALLATION (cont)**

6. Install three nuts (7, Figure 3-84).
7. Install manifold shield. Refer to paragraph 3-19, step 6.
8. Install governor control lever. Refer to paragraph 3-30.

CAUTION

After the fuel injection pump and governor are installed, move governor control lever back and forth. Preformed packing can hold rack and prevent free movement. If rack does not move freely, remove fuel injection pump and governor and reset preformed packing.

9. Connect hose assembly (3).
10. Install hose assembly (6), new preformed packing (5) and elbow (4).
11. Position linkage assembly (53) on governor control lever.
12. Install pin (2) and new cotter pin (1).

CAUTION

Do not attempt to start engine until fuel injection pump and governor have been adjusted.

13. Install fuel injection pump drive gear. Refer to paragraph 3-7.
14. Install fuel transfer pump. Refer to paragraph 3-29.
15. Install starting motor. Refer to TM 5-3805-261-20.

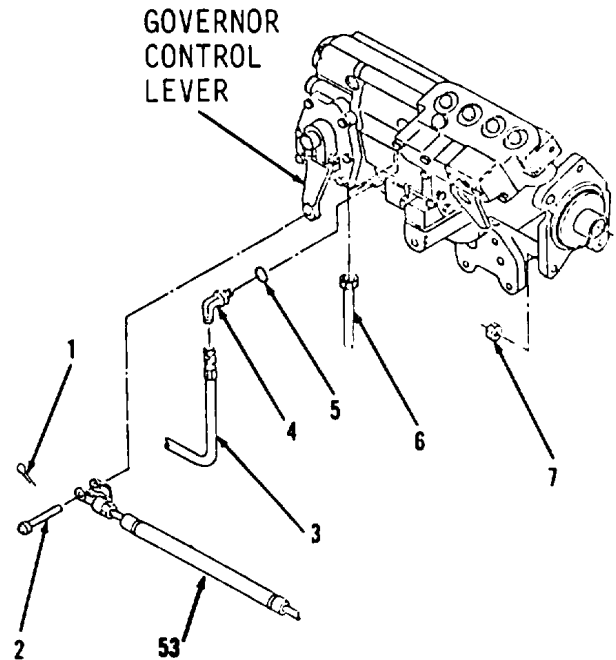


Figure 3-84.

Go to Sheet 16

FUEL SYSTEM MAINTENANCE.

3-25. Fuel Injection Pump. (Sheet 16 of 16)

INSTALLATION

16. Install tachometer drive. Refer to paragraph 3-20.
17. Install secondary fuel filter and mounting. Refer to TM 5-3805-261-20.
18. Install fuel injection lines. Refer to TM 5-3805-261-20.
19. Install turbocharger oil lines. Refer to TM 5-3805-261-20.
20. Adjust governor and fuel injection pump. Refer to paragraph 3-27.

NOTE

Return 130G Grader to original equipment condition.

End of Task

3-131

FUEL SYSTEM MAINTENANCE. (cont)

3-26. Fuel Injection Pump Mounting. (Sheet 1 of 3)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 63G

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Preformed packings, Items 9,
10, 11, 12

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 3-25

Governor and fuel injection pump
removed.

Go to Sheet 2

FUEL SYSTEM MAINTENANCE.

3-26. Fuel Injection Pump Mounting. (Sheet 2 of 3)

REMOVAL

- 1. Remove bolt (1) and washer (2, Figure 3-98) from front, right side of engine.

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

- 2. Disconnect wire assembly (3) at terminal.
- 3. Remove bolts (4, 5, 6 and 7), support (8) and preformed packings (9, 10, 11 and 12). Discard preformed packings (9, 10, 11 and 12).
- 4. Remove plugs (13, 14 and 15) from support (8).

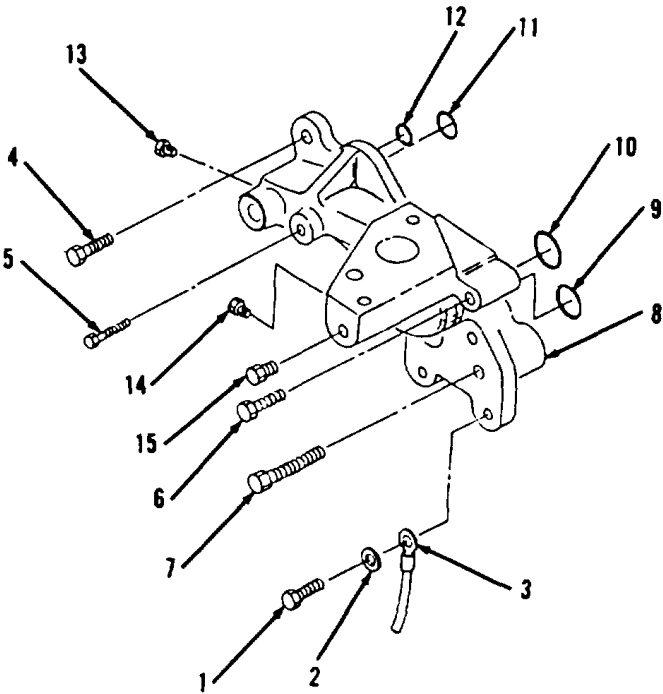


Figure 3-98.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

Go to Sheet 3

FUEL SYSTEM MAINTENANCE. (cont)

3-26. Fuel Injection Pump Mounting. (Sheet 3 of 3)

INSTALLATION

- 1. Install plugs (15, 14 and 13) on support (8, Figure 3-98).
- 2. Install new preformed packings (12, 11, 10 and 9), support (8) and bolts (7, 6, 5 and 4) on front, right side of engine.
- 3. Connect wire assembly (3) at terminal.
- 4. Install washer (2) and bolt (1).

NOTE

Return 130G Grader to original equipment condition.

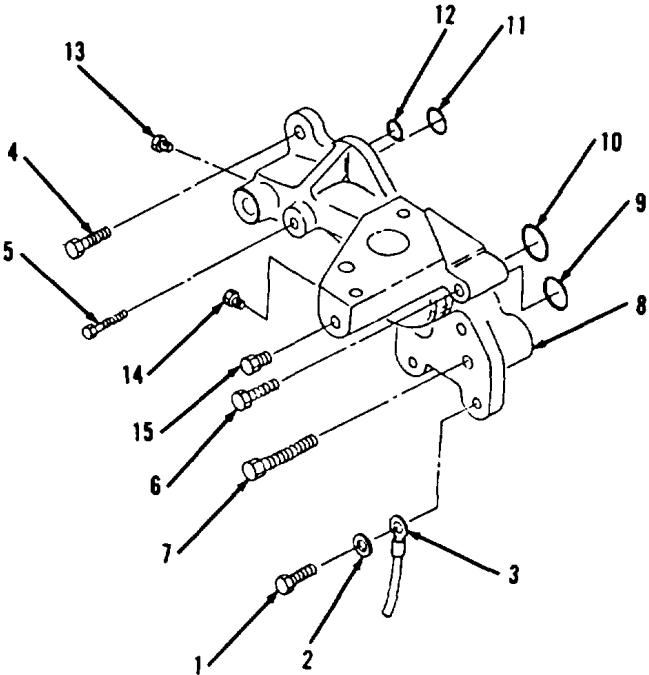


Figure 3-98.

End of Task

FUEL SYSTEM MAINTENANCE.

3-27. Governor and Fuel Injection Pump. (Sheet 1 of 9)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 63G

Tools

- General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
- Indicator bracket 6V2014
- Contact point 9S229
- Dial indicator 6V3075
- Collet 5P4814
- Timing pin 6V4186
- Over fueling spring compressor
6V2128

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Test Equipment

- Circuit tester
- Lamp tester
- Tachometer

Materials/Parts

- Gaskets, Items 4, 11, 20
- Preformed packing, Item 7

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 3-20

Tachometer drive removed.

Go to Sheet 2

FUEL SYSTEM MAINTENANCE. (cont)

3-27. Governor and Fuel Injection Pump. (Sheet 2 of 9)

TEST/ADJUST

Check fuel injection pump timing.
Refer to paragraph 3-7.

NOTE

Perform static fuel adjustment if governor or fuel injection pump have been repaired.

STATIC FUEL ADJUSTMENT

1. Remove secondary fuel filter (1, Figure 3-99) from fuel injection pump.
2. Remove four bolts (2), cover (3) and gasket (4). Discard gasket (4). Remove all gasket material from mounting surfaces.
3. Install collett on indicator bracket (Figure 3-100).
4. Install indicator bracket. Engage bracket lever in fuel rack slot (Figure 3-101). Tighten bracket to pump housing. The lever on indicator bracket (Figure 3-100) must move smoothly when governor control is moved from high to low idle.
5. Install contact point on dial indicator (Figure 3-102).

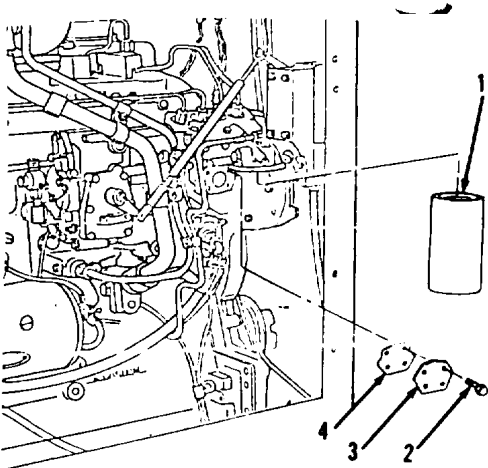


Figure 3-99.

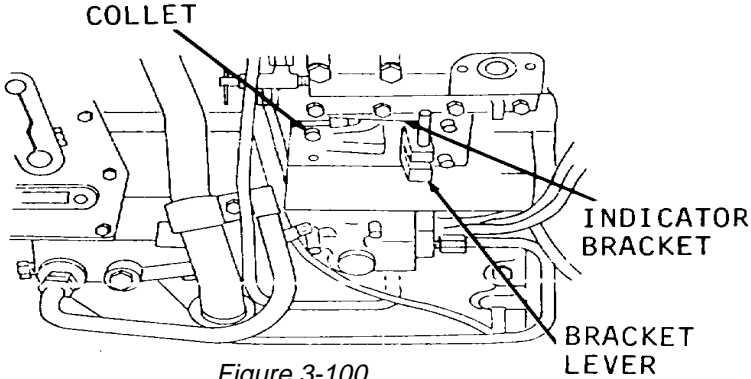


Figure 3-100.

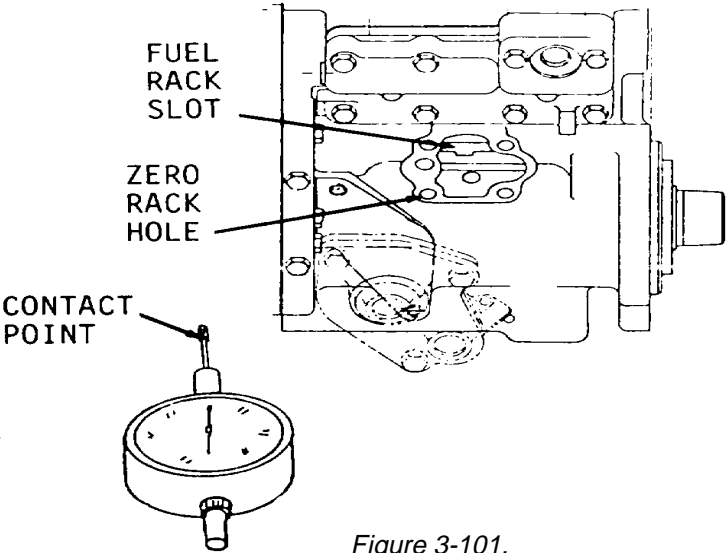


Figure 3-101.

Go to Sheet 3 Figure 3-102.

FUEL SYSTEM MAINTENANCE.

3-27. Governor and Fuel Injection Pump. (Sheet 3 of 9)

STATIC FUEL ADJUSTMENT

- 6. Install dial indicator in collet (Figure 3-103). Tighten collet just enough to hold dial indicator.
- 7. Move governor control lever (5, Figure 3-104) to shut-off position.
- 8. Install timing pin (Figure 3-105). Position through indicator bracket hole into zero rack pin hole in injection pump (Figure 3-101). Push timing pin in until contact with fuel rack is made.
- 9. Move governor control lever (5, Figure 3-104) to high idle. Fuel rack (Figure 3-101) will move against timing pin and stop.
- 10. Position and hold. Fuel rack is now in zero position.

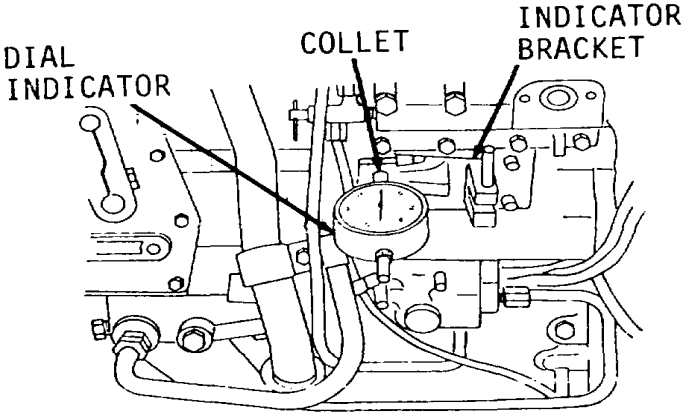


Figure 3-103.

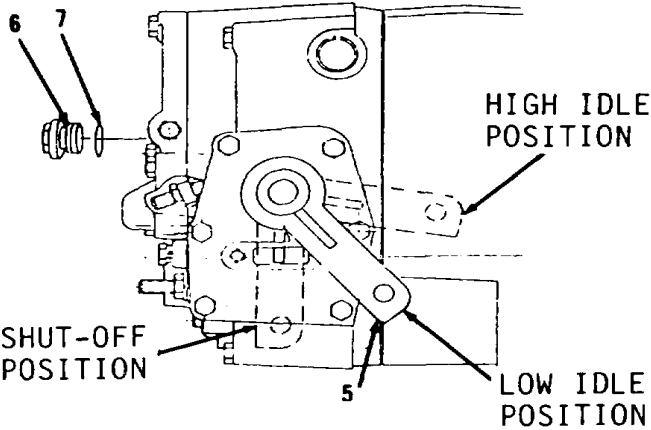


Figure 3-104.

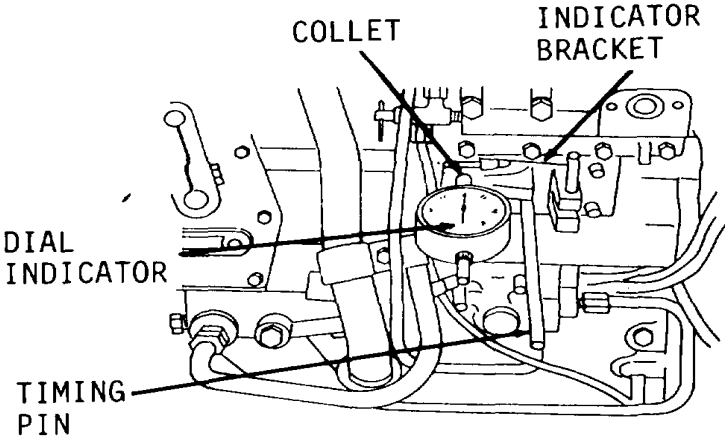


Figure 3-105.

Go to Sheet 4

FUEL SYSTEM MAINTENANCE. (cont)

3-27. Governor and Fuel Injection Pump.

STATIC FUEL ADJUSTMENT (cont)

- 11. Adjust dial indicator (Figure 3-105) to zero. Tighten collet only enough to hold dial indicator in zero position.
- 12. Remove timing pin.
- 13. Remove plug (6) and preformed packing (7, Figure 3-104). Discard preformed packing (7).
- 14. Adjust compressor. Back out the bolt at the end of compressor five turns.
- 15. Install bolt in hole where plug (6) was removed.
- 16. Install circuit tester. Connect one wire to insulator contact (8, Figure 3-106) and connect the other wire to ground.
- 17. Move governor control lever (5, Figure 3-104) to low idle position and hold.
- 18. Adjust compressor. Turn bolt at end of compressor clockwise as far as it will go. Turn bolt out until circuit tester indicates minimal current.
- 19. Dial indicator should read 0.056 inch if static fuel setting is correct. If not correct, proceed to next step.

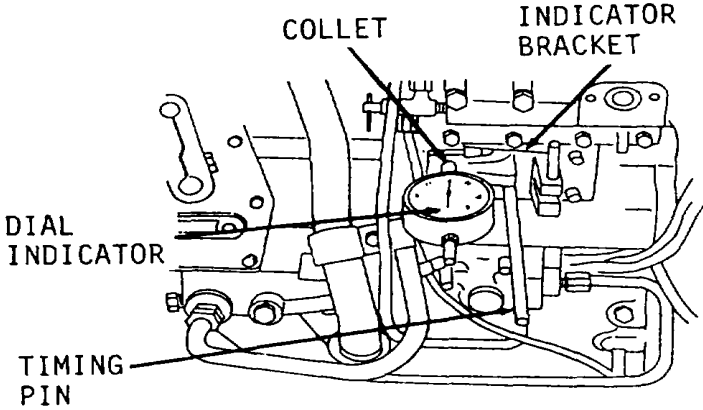


Figure 3-105.

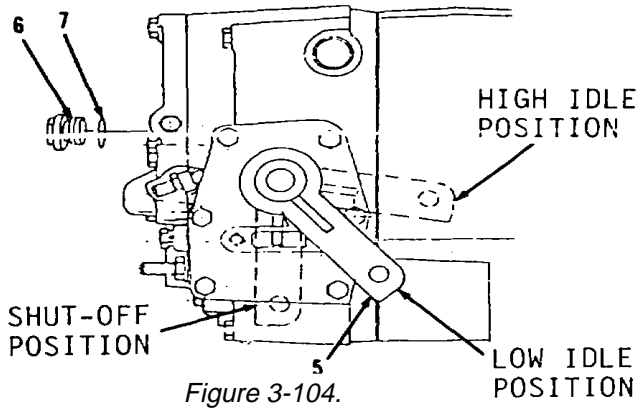


Figure 3-104.

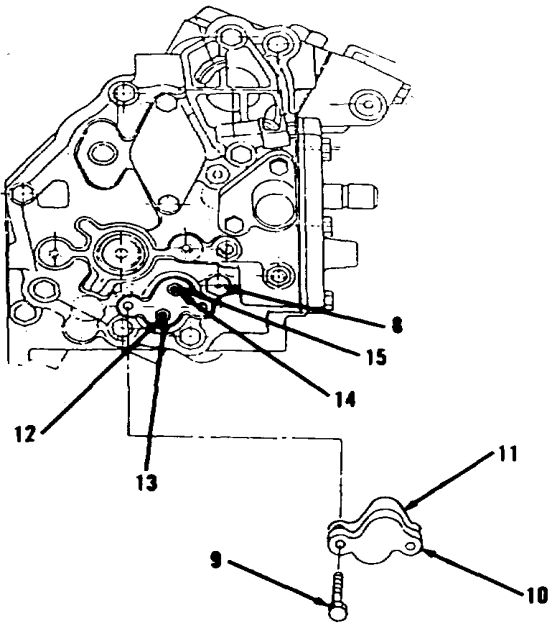


Figure 3-106.

Go to Sheet 5

FUEL SYSTEM MAINTENANCE.**3-27. Governor and Fuel Injection Pump. (Sheet 5 of 9)****STATIC FUEL ADJUSTMENT****NOTE**

Perform the next step if testing indicates static fuel setting is incorrect.

20. Remove two bolts (9), cover (10) and gasket (11, Figure 3-106) from rear governor housing. Discard gasket (11). Remove all gasket material from mounting surfaces.
21. Using rack adjustment tool, loosen lock nut (12).
22. Using rack adjustment tool, adjust screw (13). Turn screw clockwise to decrease the static fuel setting. One half turn of the setscrew will change reading on dial indicator approximately 0.016 inch. Turn until reading of 0.056 inch is obtained.

NOTE

It may be necessary to make an adjustment to torque rise by loosening lock nut (14) and adjusting screw (15) to obtain proper adjustment of power adjustment screw (13).

23. Tighten lock nut (12).
24. Install new gasket (11), cover (10) and two bolts (9). Remove indicator bracket tooling from fuel injection pump.

Go to Sheet 6

FUEL SYSTEM MAINTENANCE. (cont)

3-27. Governor and Fuel Injection Pump. (Sheet 6 of 9)

STATIC FUEL ADJUSTMENT (cont)

- 25. Remove bolt from plug (6, Figure 3-104) hole and install into end of compressor.
- 26. Install new preformed packing (7) and plug (6).
- 27. Install new gasket (4), cover (3) and four bolts (2, Figure 3-99) to right side of fuel injection pump.

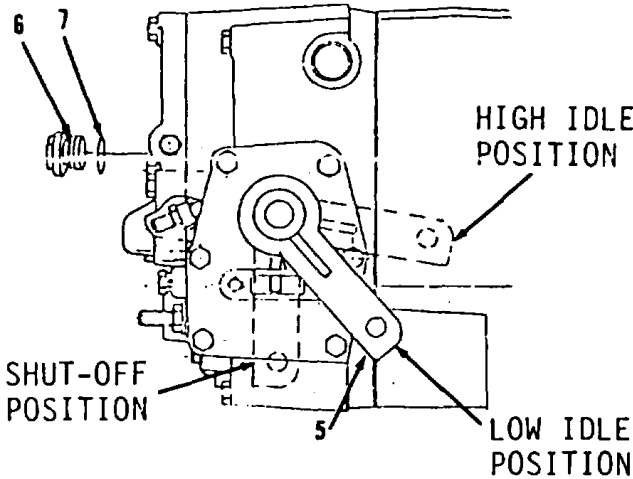


Figure 3-104.

GOVERNOR ADJUSTMENT

WARNING

If fuel injection pump and governor were assembled wrong, it is possible for the engine to run out of control. Follow the next step to take the necessary precaution to stop the engine if it overspeeds.

- 1. Remove turbocharger air pipe from top of engine. Refer to TM 5-3805-261-20. If engine runs out of control, a steel plate can be put over the turbocharger air inlet to starve engine of air.
- 2. Install secondary fuel filter (1) to right side of fuel injection pump.
- 3. Install tachometer drive to rear of fuel injection pump. Refer to paragraph 3-20.

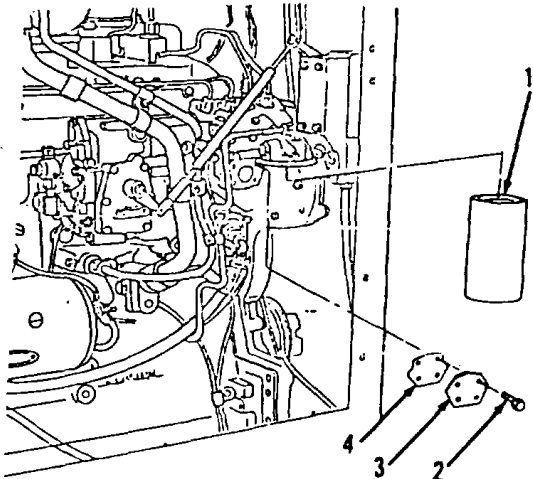


Figure 3-99.

Go to Sheet 7

FUEL SYSTEM MAINTENANCE.

3-27. Governor and Fuel Injection Pump. (Sheet 7 of 9)

GOVERNOR ADJUSTMENT

4. Start engine in operator's compartment. Run until normal operating temperature is reached. See warning. If engine runs out of control, place steel plate over air inlet of turbocharger if governor control lever (5, Figure 3-107) won't shut engine off.

LOW IDLE ADJUSTMENT

1. Position governor control lever (5) in low idle.
2. Loosen lock nut (16, Figure 3-108).
3. Using accurate tachometer, adjust low idle screw (17). Attach to tachometer drive at rear of governor, adjust low idle to 800 rpm.
4. Increase engine speed and return to low idle. Check low idle speed again with tachometer.
5. Tighten lock nut (16).
6. Stop engine.

HIGH IDLE ADJUSTMENT

1. Remove two bolts (18), cover (19) and gasket (20, Figure 3-108) from rear governor. Discard gasket (20). Remove all gasket material from mounting surfaces.
2. Start engine.

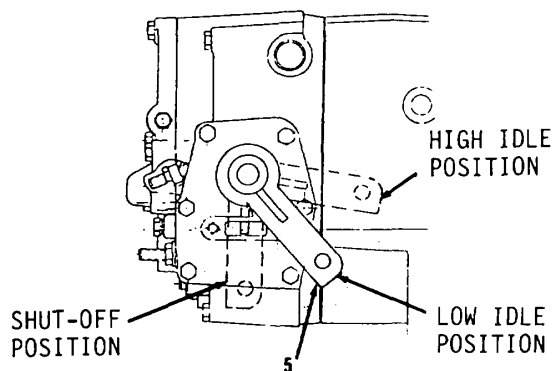


Figure 3-107.

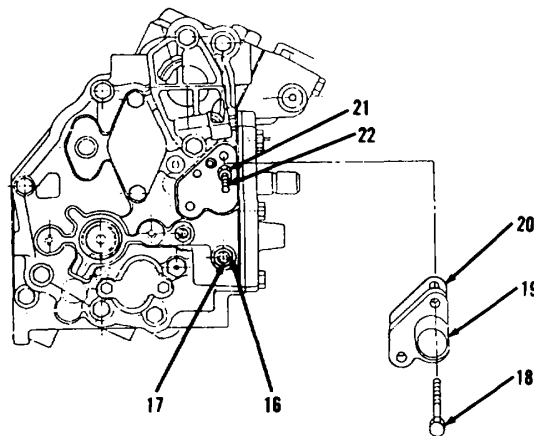


Figure 3-108.

Go to Sheet

3-141

FUEL SYSTEM MAINTENANCE. (cont)

3-27. Governor and Fuel Injection Pump. (Sheet 8 of 9)

HIGH IDLE ADJUSTMENT (cont)

3. Loosen lock nut (21).
4. Using accurate tachometer, adjust screw (22). Adjust high idle to 2336 rpm.
5. Decrease engine speed and return to high idle. Check high idle speed again with tachometer.
6. Tighten lock nut (21).
7. Install new gasket (20), cover (19) and two bolts (18).

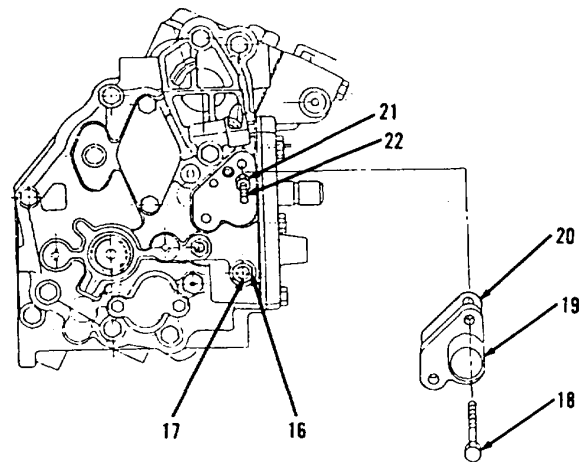


Figure 3-108.

DASHPOT ADJUSTMENT

1. Hold body (23, Figure 3-109).
2. Turn screw (24) clockwise until screw stops.
3. Adjust 1/2 turn counterclockwise.

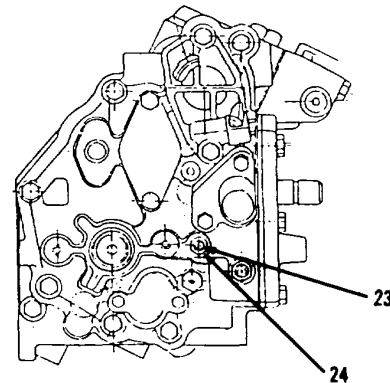


Figure 3-109.

TESTING/ADJUSTING BALANCING POINT

NOTE

- It is important for the correct operation of the transmission that the balance point is adjusted to the correct specification.
- The static fuel adjustment must be correct before adjustment is made for balance point.

1. Connect tachometer to tachometer drive.

Go to Sheet 9

FUEL SYSTEM MAINTENANCE.

3-27. Governor and Fuel Injection Pump. (Sheet 9 of 9)

TESTING/ADJUSTING BALANCING POINT

2. Connect lamp tester to insulator contact (8, Figure 3-106) and ground.
3. Start engine to obtain operating temperature.
4. Position governor control lever (5, Figure 3-107) in high idle. Record rpm.
5. Use hydraulic equipment to slowly add load on engine until lamp tester lights. Record rpm. Repeat putting load on engine several times to verify accurate readings.
6. Adjust high idle (22, Figure 3-108) if balance point of engine is not 2200 rpm. If adjustment cannot be obtained through adjusting screw (22), replace a weak or wrong governor spring. Remove test equipment.

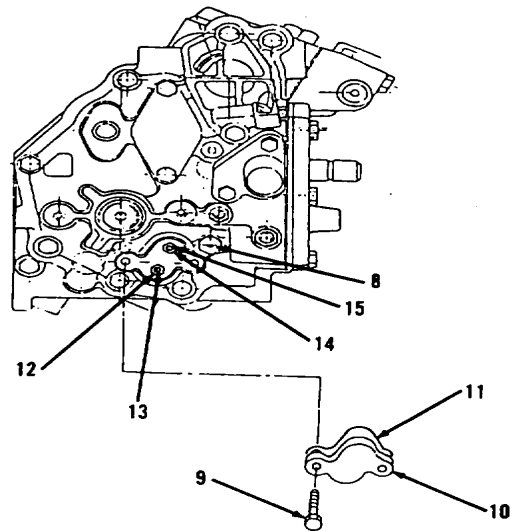


Figure 3-106.

NOTE

Return 130G Grader to original equipment condition.

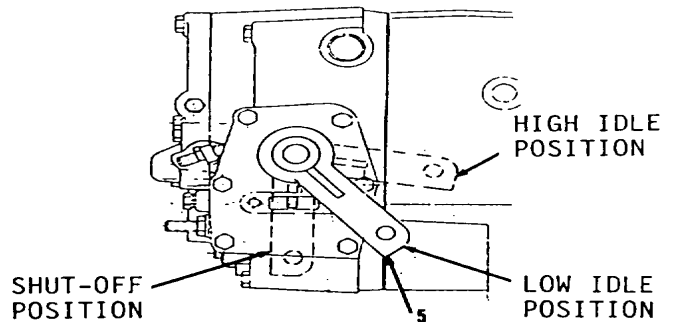


Figure 3-107.

End of Task

3-143

FUEL SYSTEM MAINTENANCE. (cont)

3-28. Governor. (Sheet 1 of 17)

This task covers:

- | | | |
|-----------------|----------------|-------------|
| a. Removal | b. Disassembly | c. Cleaning |
| d. Inspection | e. Test | f. Assembly |
| g. Installation | | |

INITIAL SETUP:

Applicable Configurations
All

Personnel Required
Construction equipment
repairer MOS 63G

Tools
General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References
TM 5-3805-261-10

Test Equipment
Spring tester
Test stand

Special Environmental Conditions
None

General Safety Instructions
None

Materials/Parts
Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Multi-purpose No.2 lithium
grease, Item 29, Appendix C
Washer, Item 17
Gaskets, Items 5, 12, 46, 53,
56, 68
Seals, Items 13, 34, 38
Shield, Item 119
Preformed packings, Items 40, 48,
50, 59, 60, 61, 62, 64, 100
Valve, Item 37
Set screws, Items 30, 82, 83
Dowels, Items 88, 89

Torques
Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References
None

Equipment Condition
TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 3-25

Governor and fuel injection pump
removed.

Go to Sheet 2

FUEL SYSTEM MAINTENANCE.

3-28. Governor. (Sheet 2 of 17)

REMOVAL

1. Remove four bolts (1), two bolts (2 and 3) and bolt (4, Figure 3-110) from governor and fuel injection pump assembly.
2. Separate items 6 thru 65 as an assembly and gasket (5) from fuel injection pump and center housing assembly. Discard gasket (5). Remove all gasket material from mounting surfaces.
3. Remove spring (6), two washers (7), washer (8) and seat (9) from guide (36, Figure 3-111) on rear governor housing.
4. Remove six bolts (10), cover (11) and gasket (12). Discard gasket (12). Remove all gasket material from mounting surfaces.
5. Using suitable driver and hammer, remove and discard seal (13).
6. Remove items 14 thru 65 as an assembly.
7. Remove items 20 thru 27 as an assembly and levers (14 and 15, Figure 3-112).
8. Remove screw (16), nut (17) and washers (18 and 19). Discard washer (19).
9. Remove four rings (20) from two pins (21, Figure 3-113).
10. Remove two pins (21), plates (22) and stop (23).
11. Remove dowel (24), pin (25) and spring (26) from shaft (27).

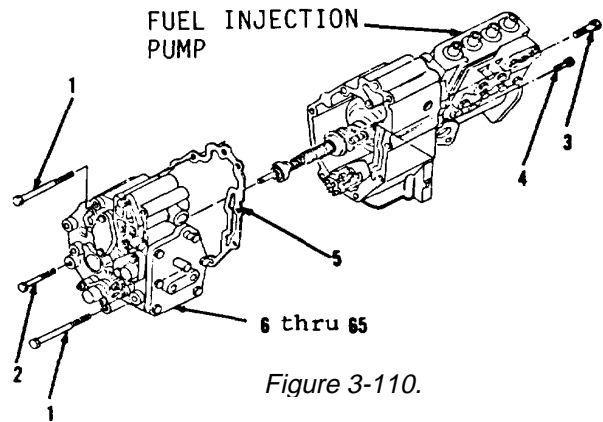


Figure 3-110.

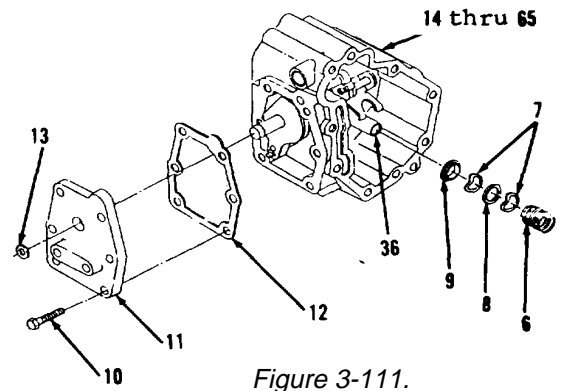


Figure 3-111.

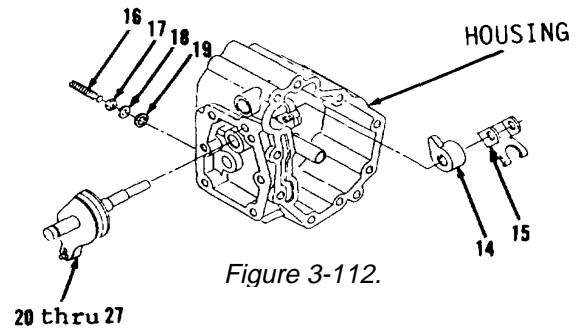


Figure 3-112.

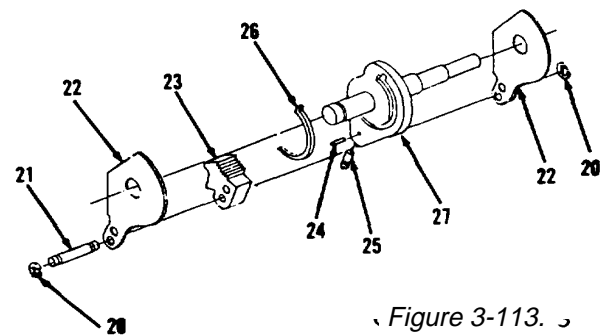


Figure 3-113.

**Go to Sheet
3-145**

FUEL SYSTEM MAINTENANCE. (cont)

3-28. Governor. (Sheet 3 of 17)

REMOVAL (cont)

12. Remove shaft (29, Figure 3-114) and items 30 thru 33 as an assembly.
13. Remove ring (28) from shaft (29).
14. Remove setscrew (30), nut (31) and sleeve (32) from lever (33, Figure 3-115) only if replacement proves necessary.
15. Remove items 34 thru 36 as an assembly from housing (65, Figure 3-116).
16. Remove and discard seal (34) from guide (36, Figure 3-117) bore.
17. Using snap ring pliers, remove ring (35) from guide (36) bore.

CAUTION

Removal of valve from housing will cause destruction of valve. Remove only if inspection proves necessary.

18. Inspect valve (37). Remove and replace if cracked, broken, distorted or not working properly.

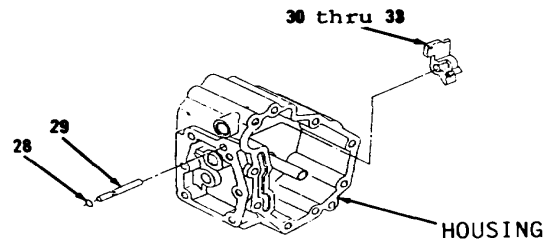


Figure 3-114.

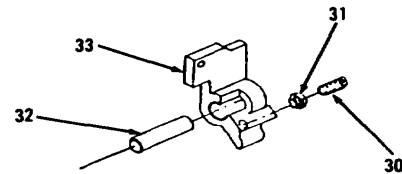


Figure 3-115.

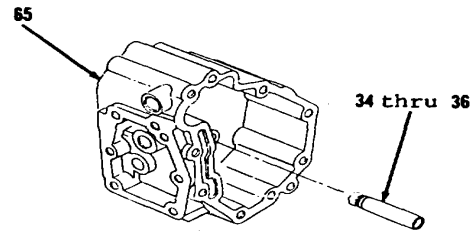


Figure 3-116.

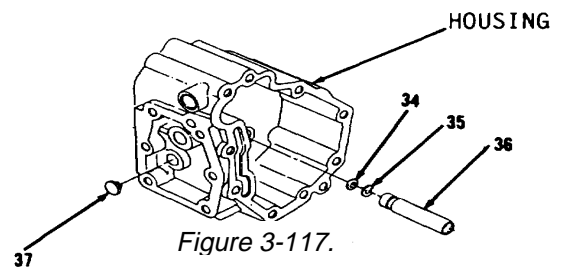


Figure 3-117.

Go to Sheet 4

FUEL SYSTEM MAINTENANCE.

3-28. Governor. (Sheet 4 of 17)

REMOVAL

19. Remove and discard seal (38, Figure 3-118) from housing.
20. Remove plug (39) and preformed packing (40). Discard preformed packing (40).
21. Remove screw (41) and nut (42).
22. Remove insulator (43).
23. Remove two bolts (44), cover (45) and gasket (46). Discard gasket (46). Remove all gasket material from mounting surfaces.
24. Remove valve (47) from body (49).
25. Remove preformed packing (48) from valve (47). Discard preformed packing (48).
26. Remove body (49) and preformed packing (50). Discard preformed packing (50).
27. Remove two bolts (51), cover (52) and gasket (53, Figure 3-119). Discard gasket (53). Remove all gasket material from mounting surfaces.
28. Remove two bolts (54), cover (55) and gasket (56). Discard gasket (56). Remove all gasket material from mounting surfaces.
29. Remove two bolts (57), cover (58) and preformed packings (59 thru 62). Discard preformed packings (59 thru 62).
30. Remove plug (63) and preformed packing (64). Discard preformed packing (64).

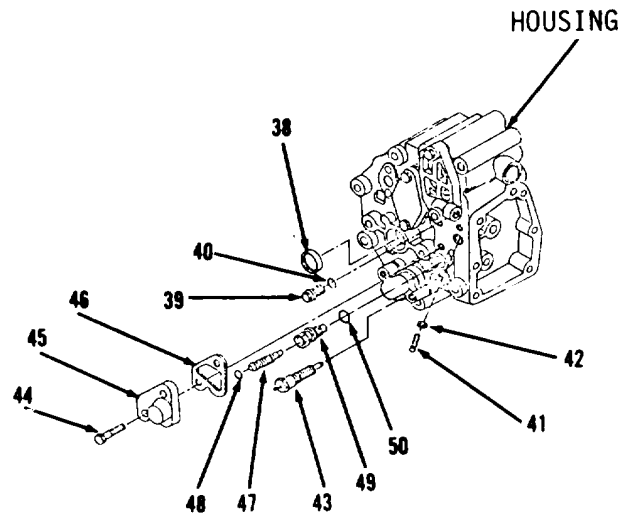


Figure 3-118.

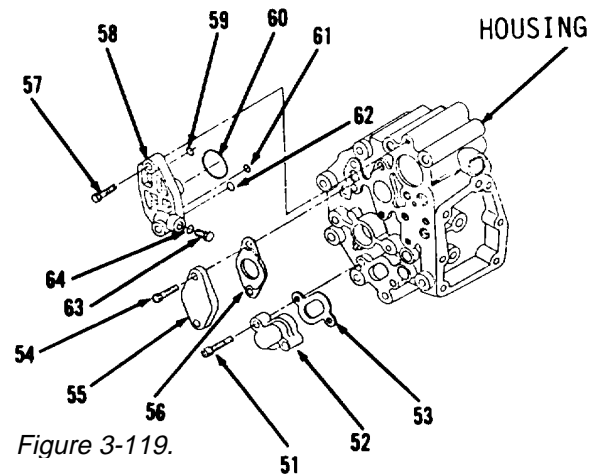


Figure 3-119.

Go to Sheet 5

FUEL SYSTEM MAINTENANCE. (cont)

3-28. Governor. (Sheet 5 of 17)

REMOVAL (cont)

31. Remove bolts (66 and 67, Figure 3-120) from fuel injection pump and governor center housing.
32. Separate items 69 thru 90 as an assembly and gasket (68) from fuel injection pump. Discard gasket (68). Remove all gasket material from mounting surfaces.
33. Remove two bolts (69), bar (70), insulator (71), shim (72), spring (73), contact (74), spacer (75), bar (76) and retainer (77) from housing (90, Figure 3-121) and separate.
34. Remove two bolts (78) and items 79 thru 87 as an assembly from housing (90).
35. Remove bolt (79), bolt (80) and spring (81) from collar (85, Figure 3-122).

NOTE

Remove setscrews and dowels only if inspection indicates replacement is necessary.

36. Remove setscrews (82 and 83) if necessary, two nuts (84) and collar (85).
37. Remove dowel (86) from block (87).
38. Remove two dowels (88) and four dowels (89) from housing (90, Figure 3-123) if necessary.

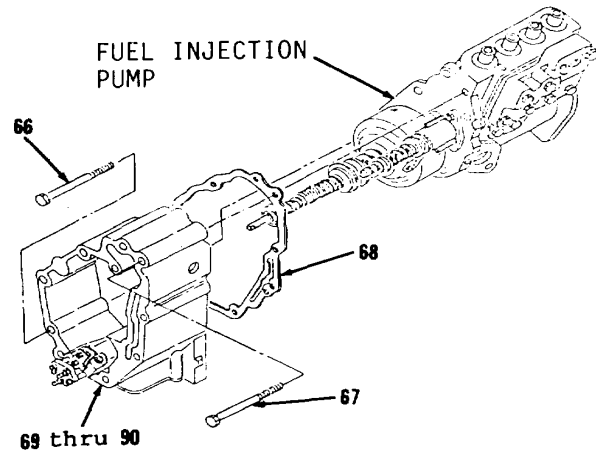


Figure 3-120.

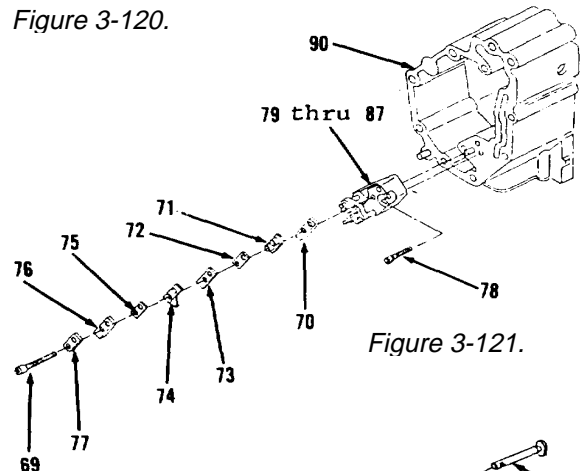


Figure 3-121.

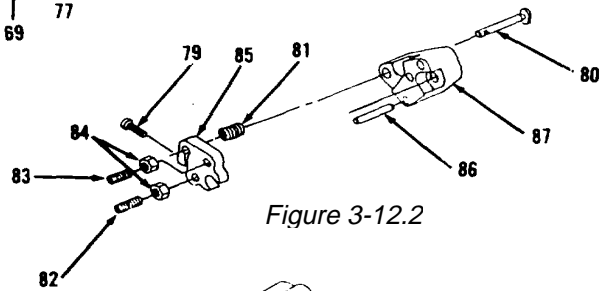


Figure 3-12.2

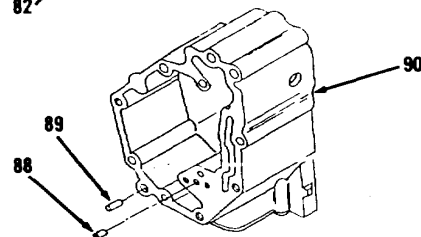


Figure 3-123.

**Go to Sheet 6
3-148**

FUEL SYSTEM MAINTENANCE.

3-28. Governor. (Sheet 6 of 17)

DISASSEMBLY

1. Remove three bolts (91, Figure 3-124).
2. Remove ring (92), seat (93), spring (94), sleeve (95) and items 97 thru 103 as an assembly (Figure 3-125).
3. Remove ring (96) from items 97 thru 103. Rotate items 97 thru 103 to disengage.
4. Remove valve (97), piston (98) and sleeve (99, Figure 3-126).
5. Remove preformed packing (100) from sleeve (99). Discard preformed packing (100).
6. Remove items 101 thru 103 as an assembly.
7. Using hammer and punch, drive pin (101) from cylinder (103). Remove lever (102, Figure 3-127).
8. Using suitable spring compressor, compress spring (107, Figure 3-128).
9. Remove ring (104).
10. Release spring (107) and remove spring compressor.
11. Remove bearing (105).
12. Remove two sleeves (106) and spring (107).
13. Remove ring (104) and items 108 thru 113 as an assembly.

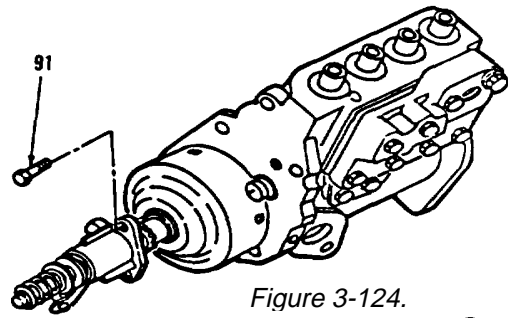


Figure 3-124.

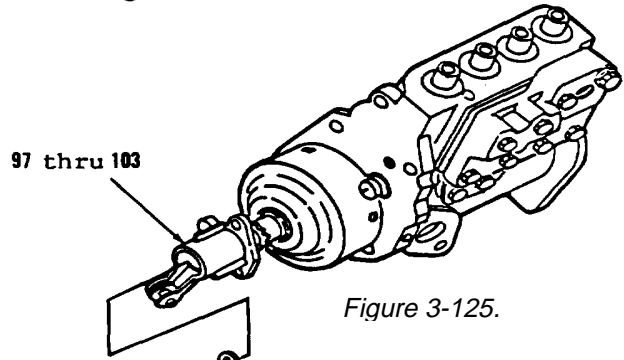


Figure 3-125.

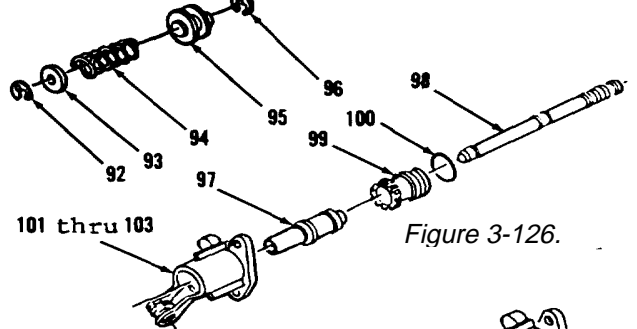


Figure 3-126.

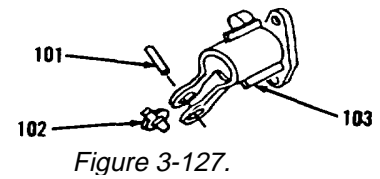


Figure 3-127.

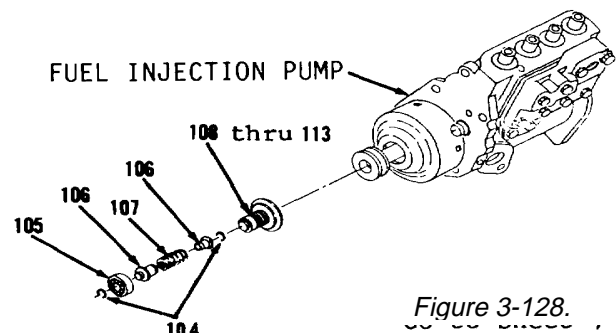


Figure 3-128.

**Go to Sheet 7
3-149**

FUEL SYSTEM MAINTENANCE. (cont)

3-28. Governor. (Sheet 7 of 17)

DISASSEMBLY (cont)

14. Remove ring (108) from seat (111, Figure 3-129).
15. Separate ring (109), spool (110), seat (111), spring (112) and seat (113).
16. Remove spring (114, Figure 3-130) and items 115 thru 118 as an assembly.
17. Remove ring (115), two races (116) and bearing (117) from riser (118, Figure 3-131).

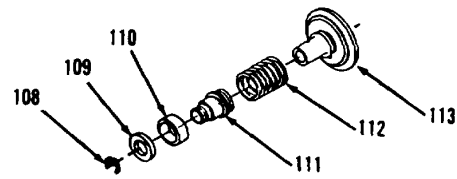


Figure 3-129.

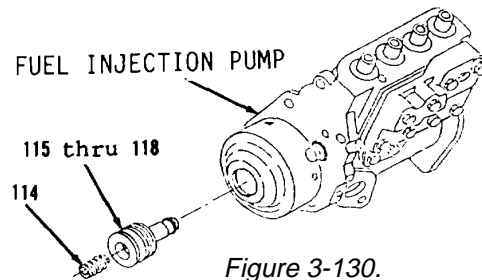


Figure 3-130.

CAUTION

Replace shield every time it is removed.

18. Remove and discard shield (119, Figure 3-132). Insert screwdriver in slots at end mounting fuel injection pump and pry up.
19. Remove four bolts (120) and items 121 thru 127 as an assembly.
20. Remove four dowels (121) and weights (122) from carrier (124, Figure 3-133).
21. Remove shaft (123) from carrier (124).
22. Remove dowel (125) from shaft (123).
23. Remove two races (126) and bearing (127) from camshaft at rear of fuel injection pump.

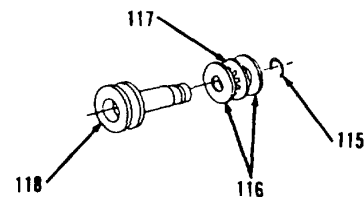


Figure 3-131.

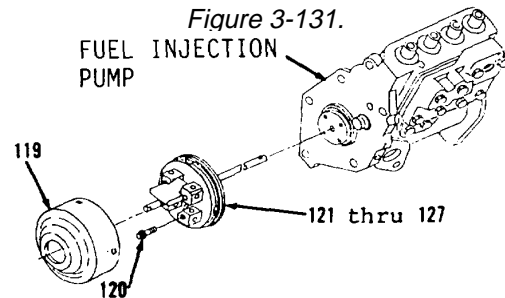


Figure 3-132.

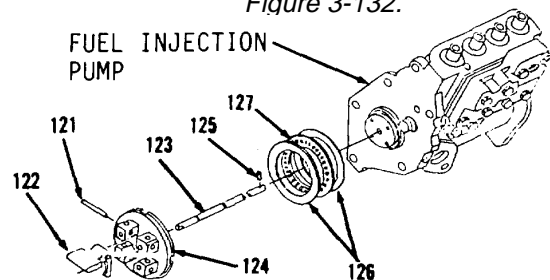


Figure 3-133

Go to Sheet 8

FUEL SYSTEM MAINTENANCE.**3-28. Governor. (Sheet 8 of 17)****CLEANING**

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

TESTING

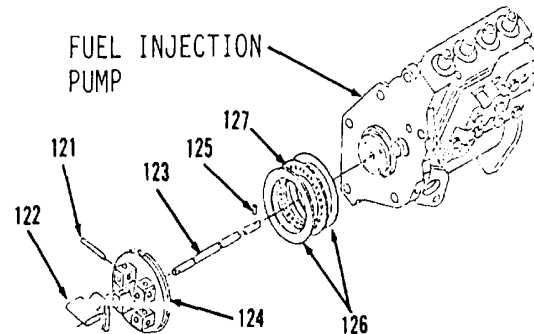
1. Using spring tester, test and preload spring (6) to 4 lbs. Compress an additional 0.9 inch. Total pressure on spring must be 13.5 lbs. Spring must return to a free length of approximately 2.34 inches after testing.
2. Using spring tester, test and preload spring (73) to 0.30 lb. Compress an additional .070 inch. Load must be 1.0 lb.
3. Using spring tester, test spring (81). Spring (81) must be at a length of 1.03 inch when compressed .043 lbs. and return to a free length of 1.26 inch after test.
4. Using a spring tester, test spring (94). Spring (94) must be at a length of 1.03 inch when compressed 3 lbs. and return to a free length of 2.28 inches after test.

Go to Sheet 9

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FUEL SYSTEM MAINTENANCE. (cont)**3-28. Governor. (Sheet 9 of 17)****TESTING (cont)**

5. Using spring tester, test spring (107). Spring (107) must be at a length of 0.76 inch when compressed to 13.7 lbs. and return to a free length of 1.22 inch after test.
6. Using spring tester, test spring (112). Spring (112) must be at a length of 1.03 inch when compressed to 1.0 lb. and return to a free length of 1.23 inch after test.
7. Using spring tester, test spring (114). Spring (114) must be at a length of 0.427 inch when compressed 0.5 lbs. and return to a free length of 1.29 inch after test.

*Figure 3-133.***ASSEMBLY**

1. Using clean oil, lubricate bearing (127) and two races (126, Figure 3-133) at rear of fuel injection pump.
2. Install bearing (127) and two races (126) over camshaft.
3. Install dowel (125) in shaft (123).
4. Install four weights (122) and dowels (121) on carrier (124). Weights must move freely on dowels and have an end play of 0.0004 to 0.009 inch.
5. Using clean oil, lubricate shaft (123) and install in carrier (124).

Go to Sheet 10

FUEL SYSTEM MAINTENANCE.

3-28. Governor. (Sheet 10 of 17)

ASSEMBLY

- 6. Position items 127 thru 121 (Figure 3-132) as an assembly on rear of fuel injection pump.
- 7. Install four bolts (120).
- 8. Using a wood block the same circumference as the new shield (119), with a hole in the middle for shaft (123) and a soft hammer to drive new shield (119) into position, install new shield (119). Stake bottom of new shield (119) in two places 180 degrees apart.
- 9. Using clean oil, lubricate riser (118).
- 10. Install riser bearing (117), two races (116) and ring (115) on riser (118, Figure 3-131).
- 11. Install items 118 thru 115 as an assembly (Figure 3-130) in fuel injection pump.
- 12. Using clean oil, lubricate spring (114) and install.
- 13. Install spring (112) on seat (113, Figure 3-129).
- 14. Install seat (111) in spring (112).
- 15. Position spool (110) and ring (109) on seat (111).
- 16. Install ring (108) in seat (111).

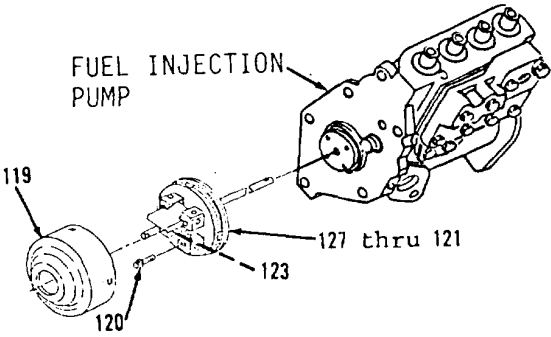


Figure 3-132.

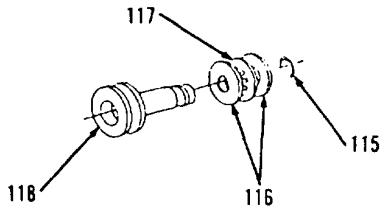


Figure 3-131.

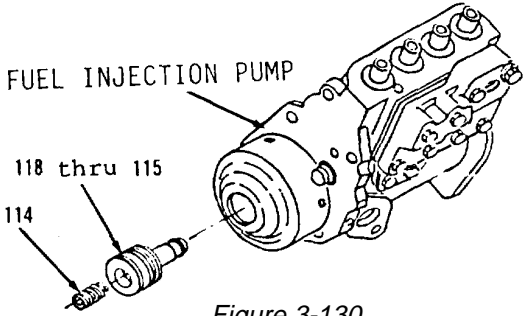


Figure 3-130.

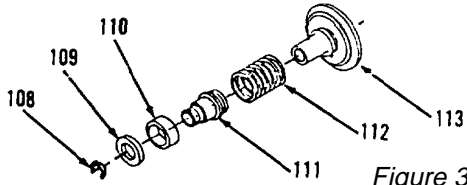


Figure 3-129.

Go to Sheet 11
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FUEL SYSTEM MAINTENANCE. (cont)

3-28. Governor. (Sheet 11 of 17)

ASSEMBLY (cont)

17. Install items 113 thru 108 as an assembly on shaft (123, Figure 3-128).
18. Install ring (104) in lower groove of shaft (123).
19. Install spring (107), two sleeves (106) and bearing (105) on shaft (123).
20. Using suitable spring compressor, compress spring (107).
21. Install ring (104) in upper groove of shaft (123).
22. Release spring (107) and remove spring compressor.
23. Install pin (101) on lever (102, Figure 3-127). Stake pin in four places 90 degrees apart on each side of fork of cylinder (103). Lever must turn freely after assembly.
24. Install new preformed packing (100) on sleeve (99, Figure 3-126).
25. Using clean grease, lubricate sleeve (99), piston (98) and valve (97) and install in items 103 thru 101 as an assembly.
26. Install ring (96) in groove in center of items 103 thru 97 (Figure 3-125).
27. Install sleeve (95), spring (94), seat (93) and ring (92). Engage sleeve (95) with lever (102).

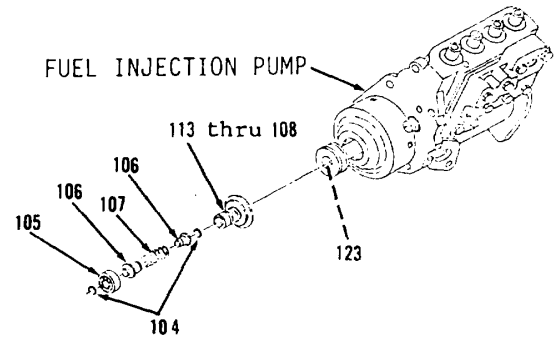


Figure 3-128.

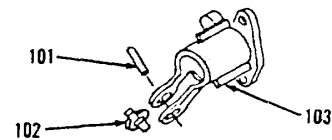


Figure 3-127.

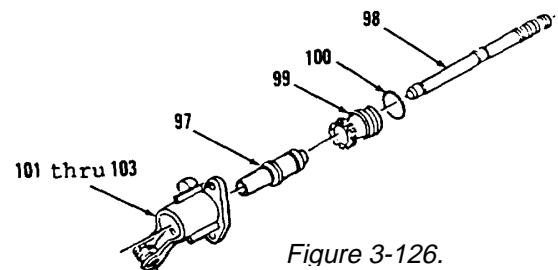


Figure 3-126.

**Go to Sheet 12
3-154**

FUEL SYSTEM MAINTENANCE.

3-28. Governor. (Sheet 12 of 17)

ASSEMBLY

28. Position items 103 thru 92 as an assembly (Figure 3-124) on rear of fuel injection pump. Engage lever (102) with riser (118). Engage piston (98) with fuel rack in fuel injection pump.

29. Install three bolts (91).

INSTALLATION

1. Install four dowels (89, Figure 3-123) to center governor housing, if removed. Install so 0.236 inch extends beyond machined surface of housing (90).
2. Install two dowels (88), if removed. Install so 0.020 inch extends beyond machined surface of housing (90).
3. Install dowel (86) in block (87, Figure 3-134).
4. Install two nuts (84) and setscrews (83 and 82) loosely, if removed, in collar (85, Figure 3-122).
5. Install bolt (80) in block (87).
6. Install spring (81) on bolt (80).
7. Install bolt (80) with notch on end of bolt (80) in alignment with bolt (79) hole.
8. Install bolt (79) securing collar (85) to bolt (80).

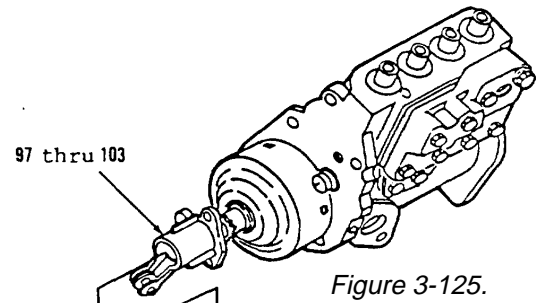


Figure 3-125.

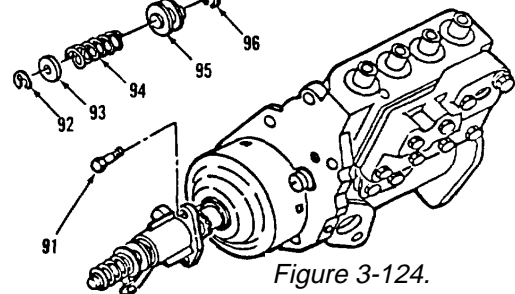


Figure 3-124.

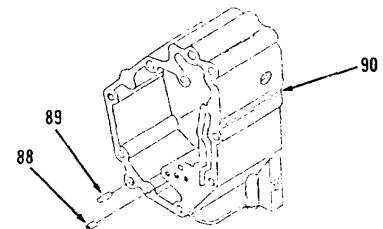


Figure 3-123.

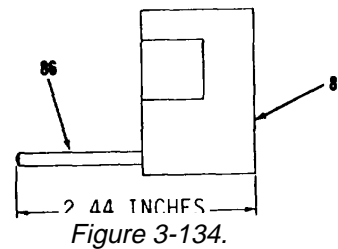


Figure 3-134.

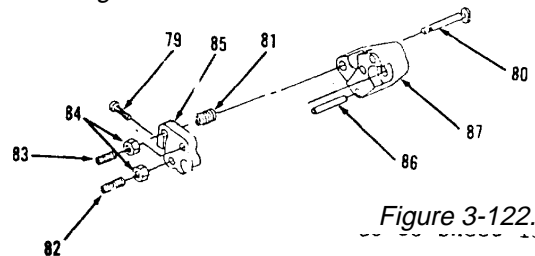


Figure 3-122.

**Go to Sheet 13
3-155**

FUEL SYSTEM MAINTENANCE. (cont)

3-28. Governor. (Sheet 13 of 17)

INSTALLATION (cont)

9. Position items 87 thru 79 as an assembly on dowels (88) in housing (90, Figure 3-121).
10. Install two bolts (78).
11. Install retainer (77), bar (76), spacer (75), contact (74), spring (73), shim (72), insulator (71), bar (70) and two bolts (69).
12. Adjust setscrews (83 and 82) turning clockwise until seated.
13. Tighten two nuts (84).

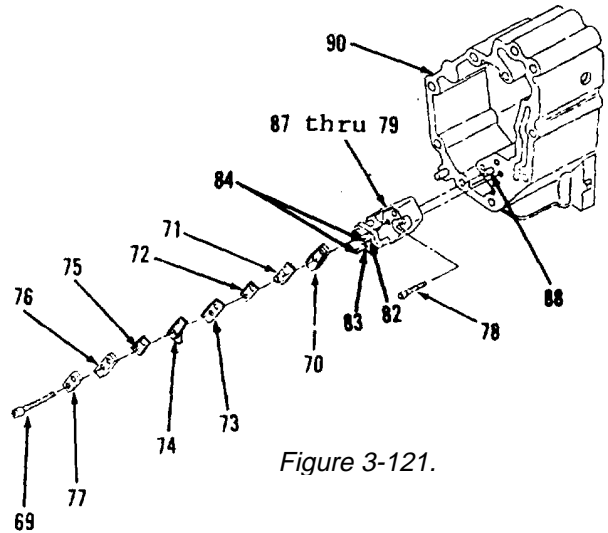


Figure 3-121.

WARNING

Flanged end of bolt must be installed properly between riser and seat when housing is installed on fuel injection pump. Failure to position bolt properly will cause engine to run at uncontrolled high rpm.

14. Position new gasket (68, Figure 3-120).
15. Position housing items 90 thru 69 as an assembly on fuel injection pump.
16. Install bolts (67 and 66).

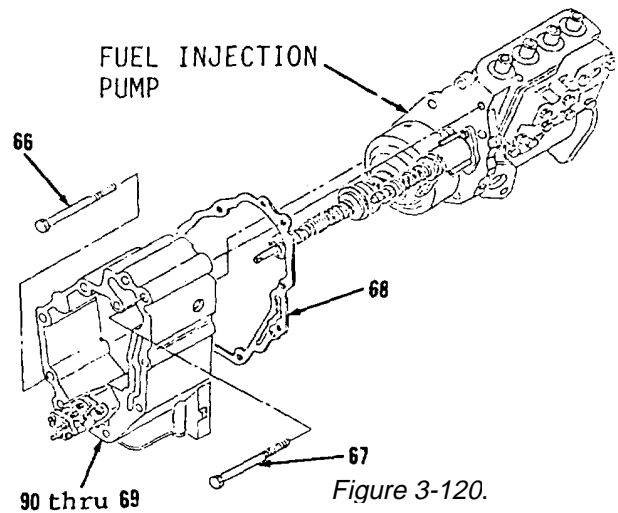


Figure 3-120.

**Go to Sheet 14
3-156**

FUEL SYSTEM MAINTENANCE.

3-28. Governor. (Sheet 14 of 17)

INSTALLATION

17. Install new preformed packing (64) and plug (63) in cover (58, Figure 3-119) to rear of governor housing.
18. Position new preformed packings (62 thru 65) and cover (58) on housing (65).
19. Install two bolts (57).
20. Install new gasket (56), cover (55) and two bolts (54).
21. Install new gasket (53), cover (52) and two bolts (51).
22. Install new preformed packing (50) on body (49, Figure 3-135).
23. Using clean oil, lubricate body (49) lightly to outer diameter and install in housing (65).
24. Install new preformed packing (48) on valve (47).
25. Apply clean oil lightly to outer diameter of valve (47) and install in body (49).
26. Install new gasket (46), cover (45) and two bolts (44).
27. Install insulator (43) and tighten to 40 lb-in torque.
28. Install nut (42) and screw (41).
29. Install new preformed packing (40) and plug (39).

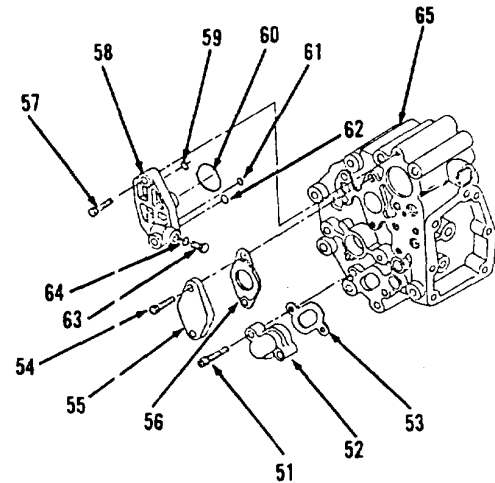


Figure 3-119.

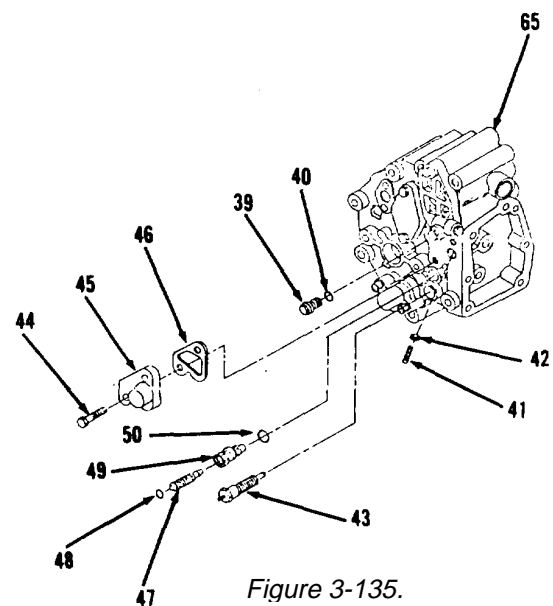


Figure 3-135.

Go to Sheet 15

FUEL SYSTEM MAINTENANCE. (cont)

3-28. Governor. (Sheet 15 of 17)

INSTALLATION (cont)

30. Install valve (37, Figure 3-117), if removed.
31. Install guide (36) approximately 0.055 inch below machined mounting surface of housing (65).
32. Using snap ring pliers, install ring (35) in bore of guide (36).
33. Using suitable driver and hammer, install new seal (34) with lips of new seal (34) facing inward in guide (36).
34. Using clean oil, lubricate lip of new seal (34) lightly.
35. Using suitable driver and hammer, install new seal (38) until new seal (38) seats on guide (36) with lips of new seal (38, Figure 3-136) facing in.
36. Using clean oil, lubricate lip of new seal (38).
37. Install sleeve (32) in lever (33, Figure 3-137).
38. Install nut (31) and setscrew (30, Figure 3-138) loosely.

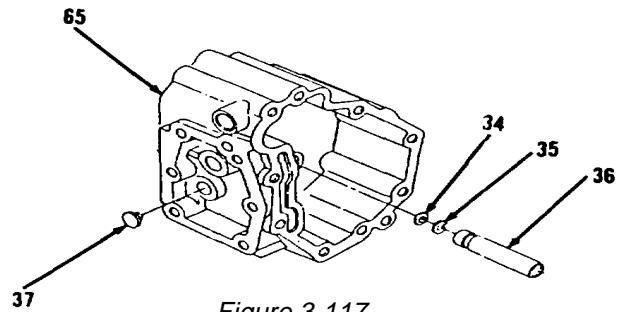


Figure 3-117.

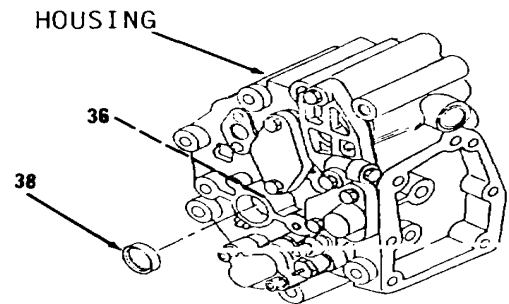


Figure 3-136.

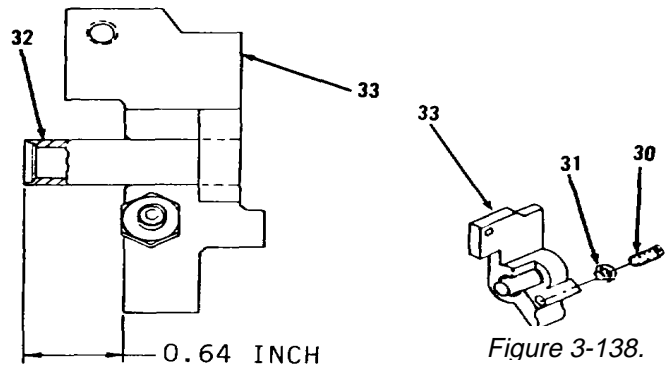


Figure 3-137.

Figure 3-138.

Go to Sheet 16

FUEL SYSTEM MAINTENANCE.

3-28. Governor. (Sheet 16 of 17)

INSTALLATION

39. Position items 33 thru 30 as an assembly on inside of housing (65, Figure 3-114).

40. Install ring (28) in groove of shaft (29).

41. Install items 29 and 28 as an assembly through housing (65) into lever (33).

42. Position spring (26) in groove of cam on shaft (27, Figure 3-113).

43. Install pin (25) so tip of pin (25) engages in hole at end of spring (26) when installed in shaft (27).

44. Install dowel (24) to hold pin (25) in shaft (27).

45. Position stop (23) and two plates (22) on shaft (27).

46. Install two pins (21) and four rings (20).

47. Position shaft items 27 thru 20 as an assembly through housing (65, Figure 3-112).

48. Install levers (15 and 14) on shaft (27).

49. Install items 27 thru 20 as an assembly.

50. Turn shaft (27) counterclockwise toward rear of housing (65).

51. Adjust setscrew (30, Figure 3-139) if removed.

52. Tighten nut (31) to 15 lb-in torque.

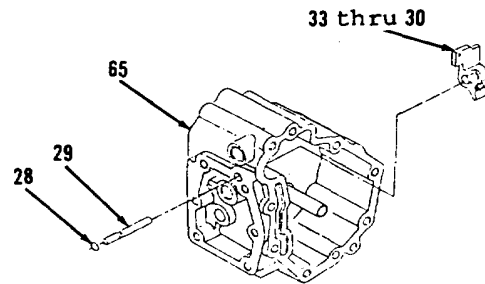


Figure 3-114.

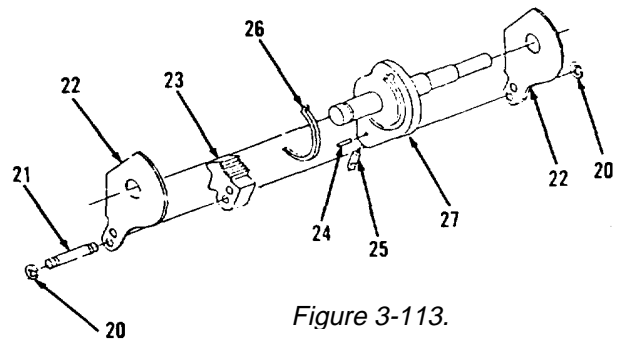


Figure 3-113.

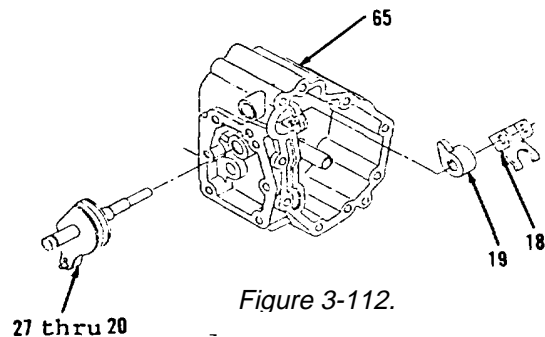


Figure 3-112.

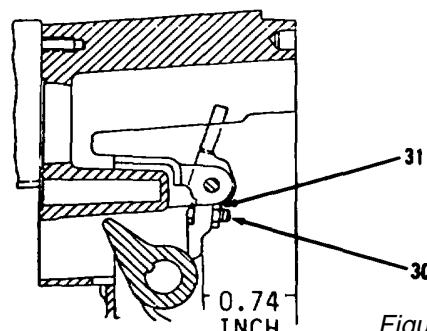


Figure 3-139.

Go to Sheet 17

3-159

FUEL SYSTEM MAINTENANCE. (cont)

3-28. Governor. (Sheet 17 of 17)

INSTALLATION (cont)

53. Install new washer (19), washer (18), nut (17) and screw (16, Figure 3-140).
54. Using suitable driver and hammer, install new seal (13) with lip facing in.
55. Using clean oil, lubricate lip of new seal (13).
56. Position new gasket (12) and cover (11).
57. Install six bolts (10).
58. Install seat (9), washer (8), two washers (7) and spring (6).

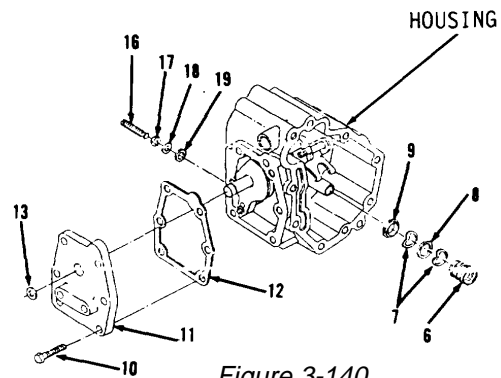


Figure 3-140.

NOTE

Seat, washers and spring must be in position on top of lever when rear governor housing is installed to center housing.

59. Position new gasket (5) and items 65 thru 6 as an assembly on dowels (89) in housing (90, Figure 3-110).
60. Install bolt (4), two bolts (3 and 2) and four bolts (1).

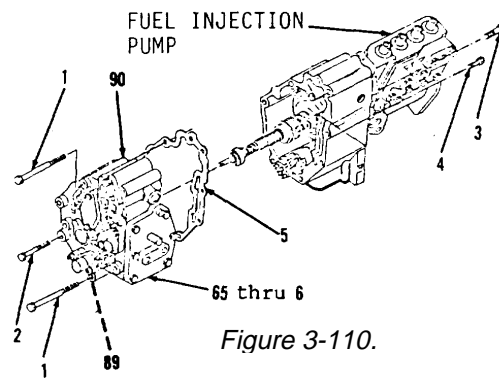


Figure 3-110.

NOTE

Return 130G Grader to original equipment condition.

End of Task

3-160

FUEL SYSTEM MAINTENANCE.

3-29. Fuel Transfer Pump. (Sheet 1 of 7)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 63G

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Detergent, Item 9, Appendix C
Caps
Preformed packings, Items 3, 6,
13, 15, 16, 21, 23, 25, 31
Diesel fuel, Item 70,
Appendix C

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Positive cable on right side disconnected.

Go to Sheet 2

Change 1 3-161

FUEL SYSTEM MAINTENANCE. (cont)

3-29. Fuel Transfer Pump. (Sheet 2 of 7)

REMOVAL

1. Turn fuel valve on lower right, front of fuel tank counterclockwise to close (Figure 3-141).
2. Open bleed valve on fuel injection pump to relieve fuel pressure and close (Figure 3-142).
3. Loosen bolt (34).

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

4. Disconnect tube assembly (1) from elbows (2 and 35).
5. Remove elbow (2) and preformed packing (3). Discard preformed packing (3).
6. Disconnect hose assembly (4).
7. Remove elbow (5) and preformed packing (6). Discard preformed packing (6).
8. Remove one of two bolts (7) and clip (8).
9. Install one of two bolts (7).
10. Remove bolt (9) and washer (10).
11. Remove bolt (11) and washer (12).
12. Remove items 13 thru 33 as an assembly from fuel injection pump.

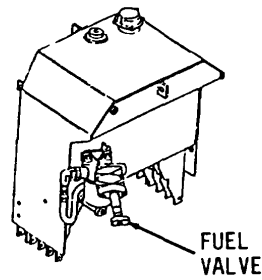


Figure 3-141.

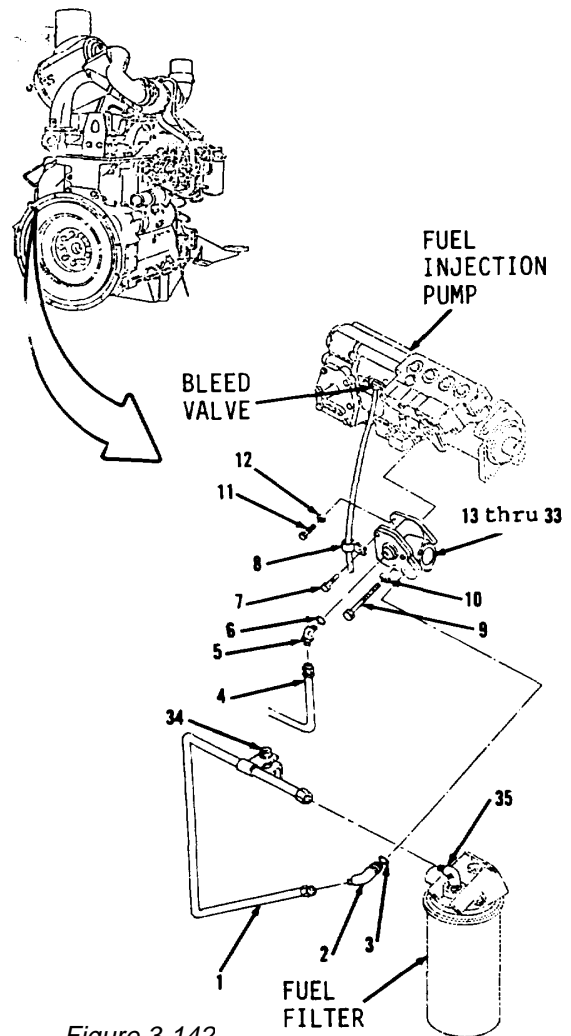


Figure 3-142

Go to Sheet 3

FUEL SYSTEM MAINTENANCE.**3-29. Fuel Transfer Pump. (Sheet 3 of 7)****REMOVAL**

13. Remove and discard preformed packing (13) from housing (33, Figure 3-143).

WARNING

Cover is under tension from spring, remove bolts carefully.

14. Remove two bolts (7) from housing (33).
15. Remove cover (14), preformed packings (15 and 16), valve (17) and spring (18). Discard preformed packings (15 and 16).
16. Remove washer (19).
17. Remove items 20 thru 22 as an assembly.
18. Remove valve (20) from inside piston (22, Figure 3-144).
19. Remove preformed packing (21) from valve (20). Discard preformed packing (21).

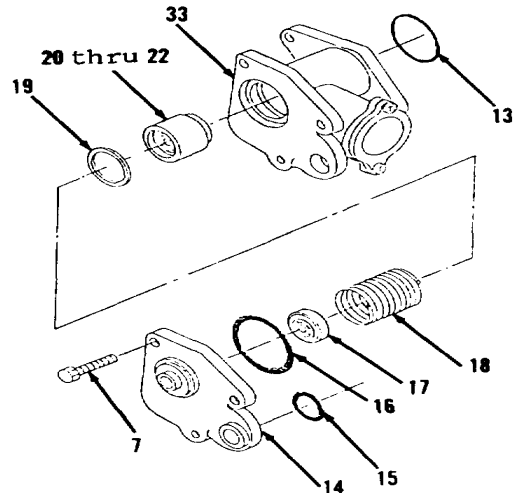


Figure 3-143.

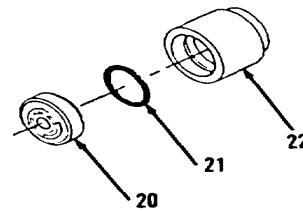


Figure 3-144.

Go to Sheet 4

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FUEL SYSTEM MAINTENANCE. (cont)

3-29. Fuel Transfer Pump. (Sheet 4 of 7)

REMOVAL (cont)

20. Remove sleeve (24, Figure 3-145).
21. Remove preformed packing (23) from sleeve (24). Discard preformed packing (23).
22. Remove items 25 thru 27 as an assembly from housing (33).
23. Remove and discard preformed packing (25, Figure 3-146).
24. Remove ring (26).
25. Separate tappet (27) and guide (28).
26. Remove two screws (29, Figure 3-147).
27. Remove cover (30) and preformed packing (31). Discard preformed packing (31).
28. Remove valve (32) from housing (33).

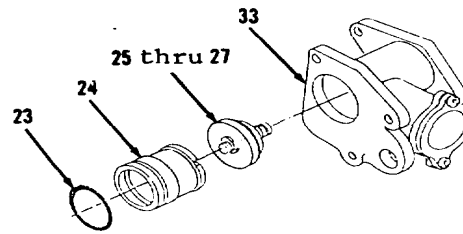


Figure 3-145.

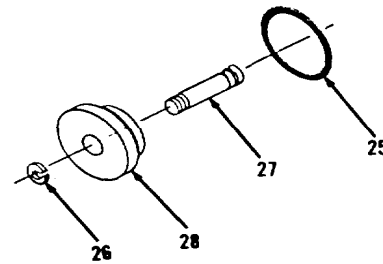


Figure 3-146.

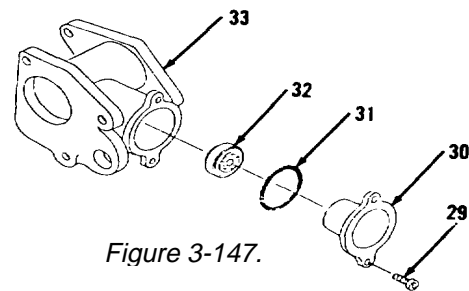


Figure 3-147.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

**Go to Sheet 5
3-164**

FUEL SYSTEM MAINTENANCE.**3-29. Fuel Transfer Pump. (Sheet 5 of 7)****INSTALLATION**

1. Install valve (32) in housing (33) with pyramid side of valve (32, Figure 3-147) facing out.
2. Install new preformed packing (31) and cover (30). Lubricate outer diameter of new preformed packing (31) with clean diesel fuel.
3. Install two screws (29).
4. Position tappet (27) in guide (28, Figure 3-146).
5. Install ring (26).
6. Install new preformed packing (25) on groove of guide (28). Lubricate outer diameter of new preformed packing (25) with clean diesel fuel.
7. Install items 27 thru 25 as an assembly in housing (33, Figure 3-145).
8. Install new preformed packing (23) on groove of sleeve (24). Lubricate outer diameter of new preformed packing (23) with clean diesel fuel.

Go to Sheet 6

3-165

FUEL SYSTEM MAINTENANCE. (cont)

3-29. Fuel Transfer Pump. (Sheet 6 of 7)

INSTALLATION (cont)

9. Install items 24 and 23 as an assembly in housing (33, Figure 3-148).

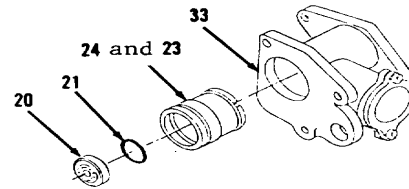


Figure 3-148.

10. Install new preformed packing (21) on pyramid side of valve (20). Lubricate outer diameter of valve (20) with clean diesel fuel.

11. Install items 21 and 20 as an assembly and washer (19) in piston (22, Figure 3-149).

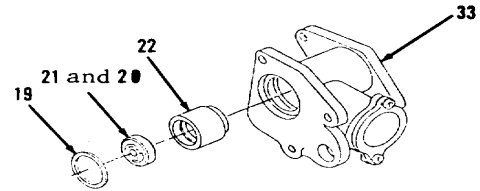


Figure 3-149.

12. Install items 18 thru 15 as an assembly (Figure 3-150).

13. Install spring (18).

14. Install new preformed packings (16 and 15) in cover (14).

15. Position valve (17) in cover (14).

16. Position cover (14) on housing (33). Valve (17) must seat in spring (18).

17. Install two bolts (7).

18. Install new preformed packing (13, Figure 3-151). Lubricate outer diameter of new preformed packing (13) with clean diesel fuel.

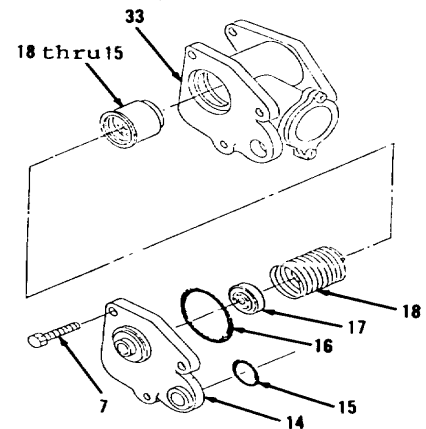


Figure 3-150.

19. Position items 33 thru 13 as an assembly on fuel injection pump. Insert tappet (27) and seat in plunger inside fuel injection pump.

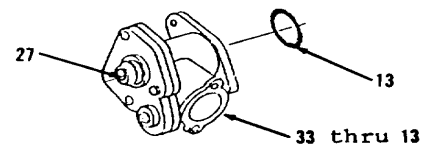


Figure 3-151.

**Go to Sheet 7
3-166**

FUEL SYSTEM MAINTENANCE.**3-29. Fuel Transfer Pump. (Sheet 7 of 7)****INSTALLATION**

20. Install washer (12), bolt (11) and two bolts (7, Figure 3-142). Tighten evenly.
21. Install washer (10) and bolt (9). Tighten evenly.
22. Remove one of two bolts (7).
23. Install clip (8) and one of two bolts (7) securing air bleed tube in fuel injection pump.
24. Install new preformed packing (6) and elbow (5).
25. Connect hose assembly (4).
26. Install new preformed packing (3) and elbow (2).
27. Connect tube assembly (1) to elbows (35 and 2).
28. Tighten bolt (34).
29. Turn fuel valve on lower, right front of fuel tank clockwise to open.
30. Bleed air from fuel lines. Refer to TM 5-3805-261-20.

NOTE

Return 130G Grader to original equipment condition.

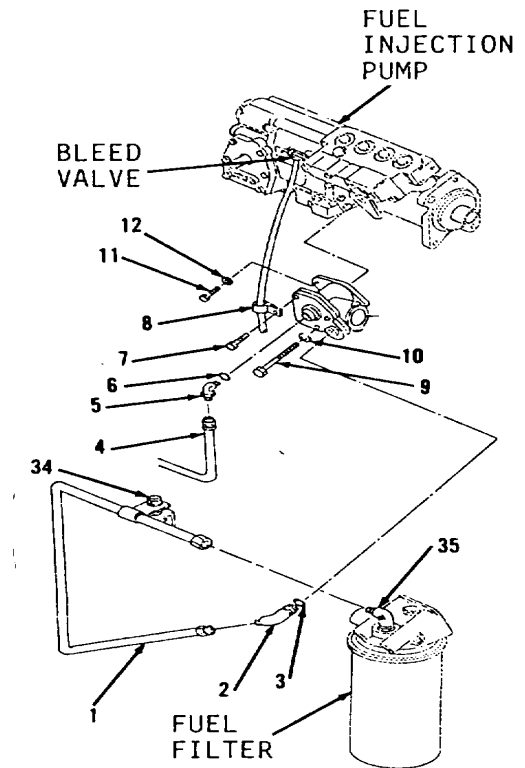


Figure 3-142.

End of Task

3-167

FUEL SYSTEM MAINTENANCE. (cont)

3-30. Governor Controls. (Sheet 1 of 21)

This task covers:

- | | | |
|------------------------|----------------------|------------------------|
| a. Removal | b. Cleaning | c. Inspection |
| d. Installation | e. Adjustment | f. Installation |
-

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

Lamp tester

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Cotter pins, Items 1, 3, 112
Gaskets, Items 20, 24, 55
Straps, Item 41
Bearings, Items 39, 40, 68,
69, 126
Bushing, Item 110

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Governor switch removed.

Go to Sheet 2

FUEL SYSTEM MAINTENANCE.

3-30. Governor Controls. (Sheet 2 of 21)

REMOVAL

1. Remove and discard cotter pin (1, Figure 3-152) from fuel injection pump governor on right side of engine.
2. Remove pin (2).
3. Separate rod end (7) and lever (12).
4. Remove and discard cotter pin (3) from inner, right side of dash panel in engine compartment.
5. Remove pin (4).
6. Separate rod (5) and lever (16).
7. Remove items 5 thru 9 as an assembly from vehicle.
8. Loosen nut (6, Figure 3-153).
9. Remove rod (5) and nut (6) from link (9).
10. Loosen nut (8).
11. Remove rod end (7), nut (8) and link (9).
12. Using scribe, matchmark lever (12) and fuel injection pump governor shaft to aid in aligning lever (12, Figure 3-154) on fuel injection pump governor shaft in installation to fuel injection pump governor.
13. Remove nut (10) and bolt (11).
14. Using screwdriver, remove lever (12) from fuel injection pump governor shaft.

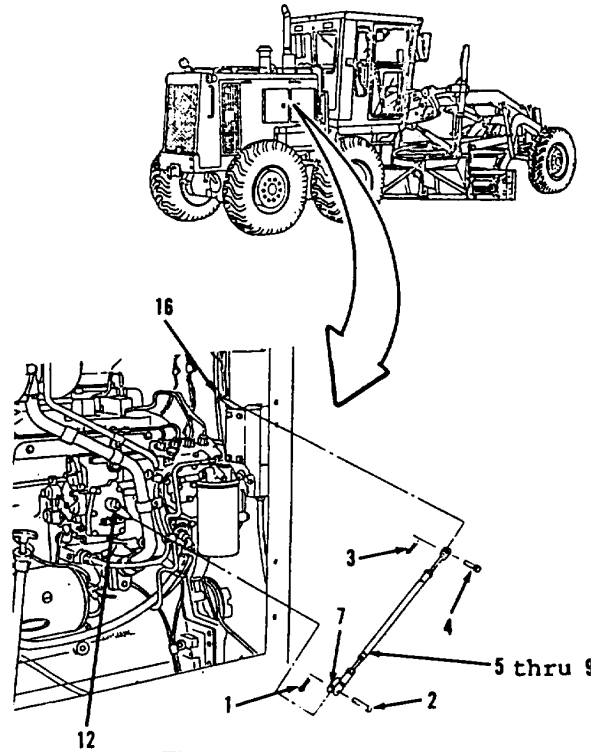


Figure 3-152.

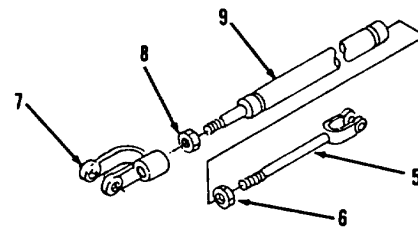


Figure 3-153.

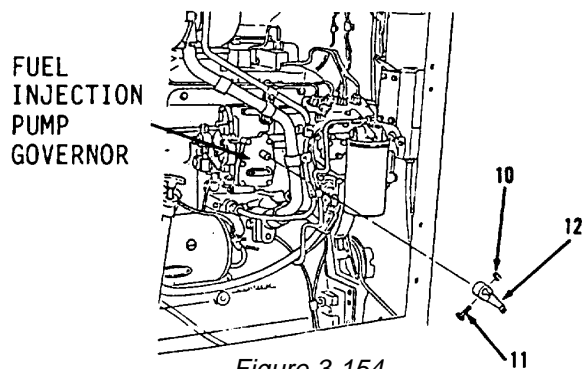


Figure 3-154.

**Go to Sheet 3
3-169**

FUEL SYSTEM MAINTENANCE. (cont)

3-30. Governor Controls. (Sheet 3 of 21)

REMOVAL (cont)

15. Remove nut (13) and bolt (14, Figure 3-155) from inner, right side of dash panel in engine compartment.
16. Using screwdriver, remove lever (15) from shaft (35) on inside of housing (40).
17. Remove key (16) from shaft (35).
18. Remove four bolts (17), washers (18), cover (19) and gasket (20). Discard gasket (20). Remove all gasket material from mounting surfaces.
19. Support housing (40).
20. Remove two bolts (21), washers (22), housing (23) and gasket (24, Figure 3-156). Discard gasket (24). Remove all gasket material from mounting surfaces.
21. Separate items 25 thru 40 as an assembly from cover (130).
22. Position items 25 thru 40 as an assembly on cover (130).

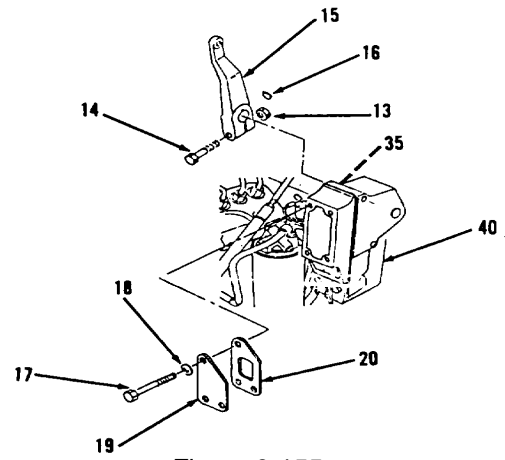


Figure 3-155.

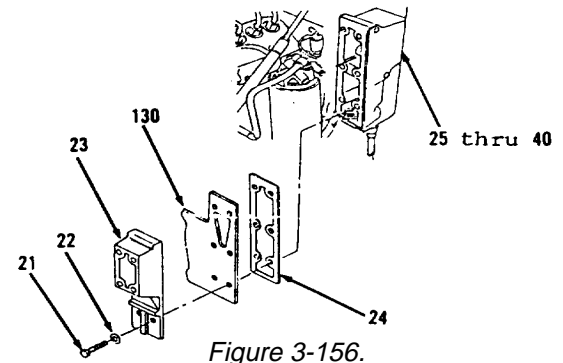


Figure 3-156.

**Go to Sheet 4
3-170**

FUEL SYSTEM MAINTENANCE.

3-30. Governor Controls. (Sheet 4 of 21)

REMOVAL

23. Remove bolt (25) and nut (26) from actuator (31, Figure 3-157).
24. Remove bolt (27), washer (28) and two springs (29).
25. Separate rod end (30) and lever (36).
26. Loosen nut (32).
27. Remove rod end (30), actuator (31) and nut (32) from cable (61).
28. Remove nut (33) from inside of housing (40).
29. Loosen bolt (37).
30. Move lever (36) on shaft (35) to expose key (34). Remove key (34) from shaft (35).
31. Remove shaft (35).
32. Remove items 36 and 37 as an assembly from housing (40).
33. Remove bolt (37) from lever (36, Figure 3-158).

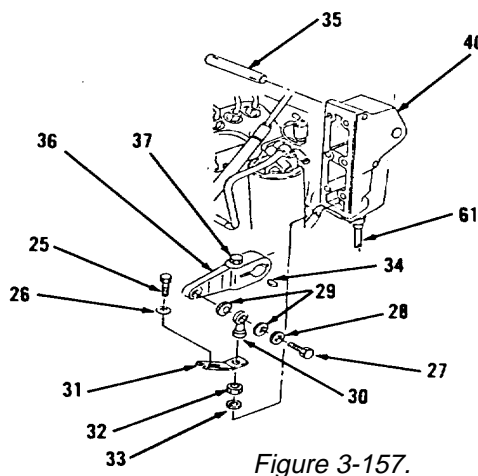


Figure 3-157.

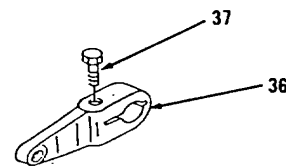


Figure 3-158.

**Go to Sheet 5
3-171**

FUEL SYSTEM MAINTENANCE. (cont)**3-30. Governor Controls. (Sheet 5 of 21)****REMOVAL (cont)**

NOTE

Removal of bearings from housing may cause destruction of bearings. Remove bearings only if inspection indicates replacement is necessary.

34. Inspect bearings (38 and 39, Figure 3-159). Replace if cracked, broken or worn.
35. Using suitable driver and hammer, remove bearings (38 and 39), if necessary, from housing (40).
36. Remove housing (40) from vehicle.
37. Remove and discard two straps (41).

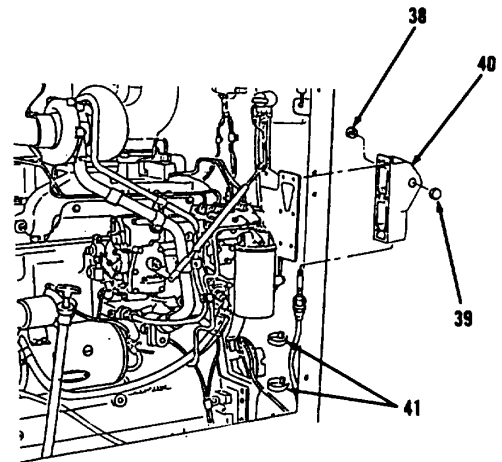


Figure 3-159.

**Go to Sheet 6
3-172**

FUEL SYSTEM MAINTENANCE.**3-30. Governor Controls.** (Sheet 6 of 21)**REMOVAL**

38. Remove four nuts (42), washers (43), three clips (44), two plates (45) and clamps (46, Figure 3-160) from lower, left and right sides of articulation area.
39. Separate cable (61) from left and right clamps (46) and pull cable (61) through articulation area.
40. Remove bolt (47), washer (48) and clip (49) from under right side of operator's compartment.
41. Remove bolt (50), washer (51) and clip assembly from under right side of operator's compartment. Leave clip assembly mounted to hydraulic hose.
42. Remove five bolts (52), washers (53), cover (54) and gasket (55). Discard gasket (55). Remove all gasket material from mounting surfaces.
43. Remove bolt (56) and washer (57).
44. Separate rod end (58) and lever (64).
45. Loosen nut (59).
46. Remove rod end (58) and nut (59).
47. Remove nut (60) from inside housing (66).
48. Remove cable (61) from vehicle.

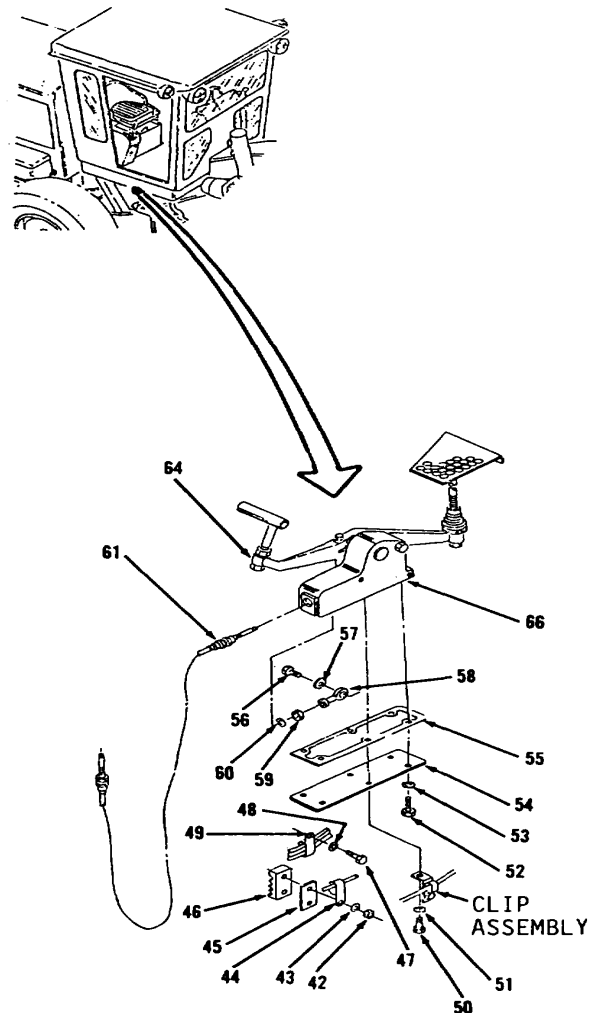


Figure 3-160.

**Go to Sheet 7
3-173**

FUEL SYSTEM MAINTENANCE. (cont)

3-30. Governor Controls. (Sheet 7 of 21)

REMOVAL (cont)

49. Remove bolt (62, Figure 3-161).
50. Remove three bolts (63) and washers (64).
51. Pull items 65 thru 72 as an assembly away from mounting bracket and at the same time pull lever (80) away from items 65 thru 72 as an assembly.
52. Remove items 65 thru 72 as an assembly.
53. Remove shaft (67) and keys (68 and 69).
54. Remove items 71 and 72 as an assembly.
55. Remove bolt (71) from lever (72, Figure 3-163).

NOTE

Removal of bearings from housing may cause destruction of bearings. Remove bearings only if inspection indicates replacement is necessary.

56. Inspect bearings (65 and 66, Figure 3-162). Replace if cracked, broken or worn.
57. Using suitable driver and hammer, remove bearings (65 and 66), if necessary, from housing (70).

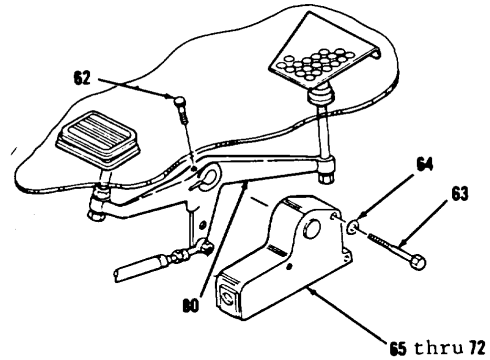


Figure 3-161.

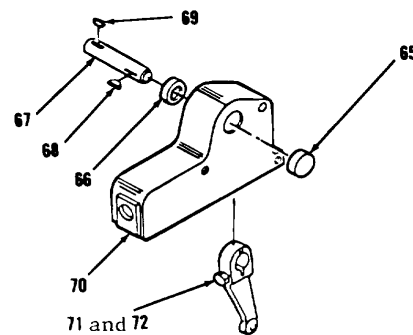


Figure 3-162.

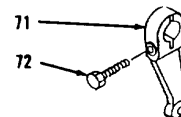


Figure 3-163.

**Go to Sheet 8
3-174**

FUEL SYSTEM MAINTENANCE.

3-30. Governor Controls. (Sheet 8 of 21)

REMOVAL

- 58. Remove bolt (73), nut (74) and washer (75, Figure 3-164).
- 59. Remove nut (76), washer (77) and bolt (78).
- 60. Remove nuts (79 and 80).
- 61. Remove lever (81).
- 62. Remove pad (82) and boot (83, Figure 3-165) from right side of floor in operator's compartment.
- 63. Remove treadle (84) and nut (85).
- 64. Remove treadle (86) and boot (87).
- 65. Remove nut (88), washer (89), bolt (90) and items 91 thru 93 as an assembly from items 112 thru 129 as an assembly (Figure 3-166).
- 66. Loosen two nuts (92, Figure 3-167).
- 67. Remove two rod ends (91) and nuts (92) from link (93).

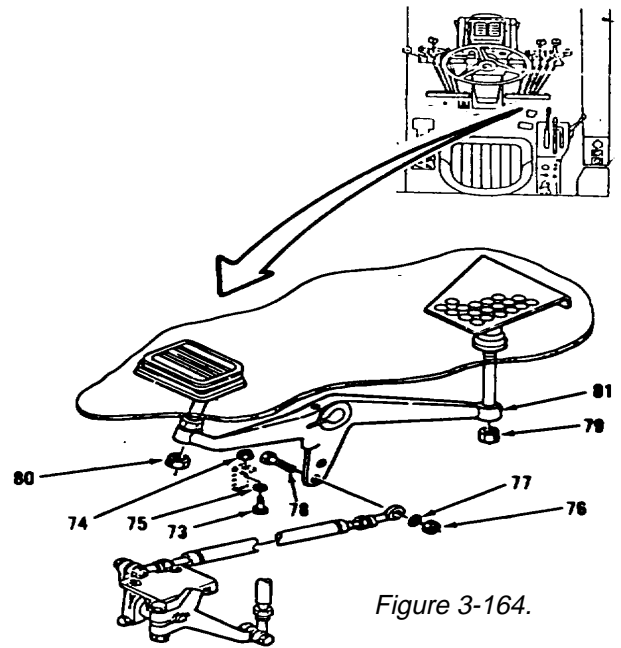


Figure 3-164.

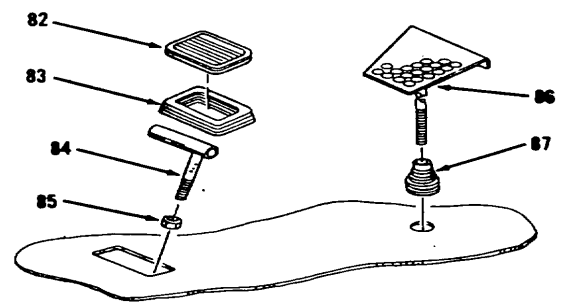


Figure 3-165.

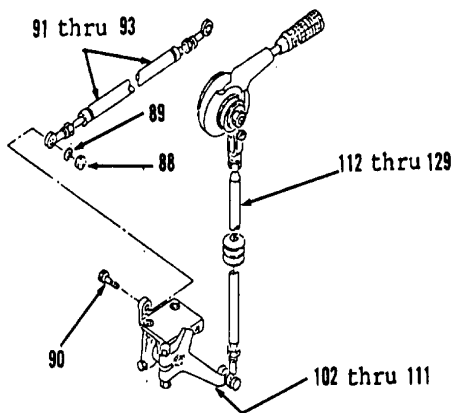


Figure 3-166.

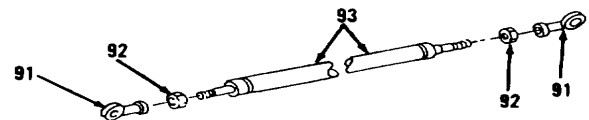


Figure 3-167.

**Go to Sheet 9
3-175**

FUEL SYSTEM MAINTENANCE. (cont)

3-50. Governor Controls. (Sheet 9 of 21)

REMOVAL (cont)

- 68. Remove nut (94) and bolt (95, Figure 3-168).
- 69. Remove lever (96)
- 70. Remove nut (97), washer (98) and bolt (99) from items 112 thru 129 as an assembly.
- 71. Support items 102 thru 111 as an assembly under right side of operator's compartment.
- 72. Remove two bolts (100), washers (101) and items 102 thru 111 as an assembly.
- 73. Remove key (102, Figure 3-169).
- 74. Remove nut (103) and bolt (104).
- 75. Remove lever (105) and key (106) from shaft (107).
- 76. Remove shaft (107) from bracket (111).
- 77. Remove two nuts (108) and bolts (109).

CAUTION

Removal of bushing may cause destruction of bearing. Remove bushing only if inspection indicates replacement is necessary.

- 78. Inspect bushing (110). Replace if cracked, broken, grooved or worn.
- 79. Using suitable driver and hammer, remove bushing (110), if necessary and bracket (111).

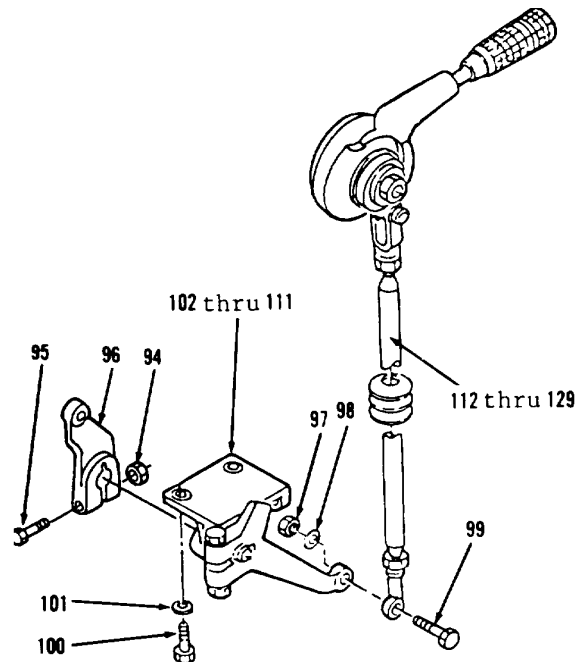


Figure 3-168.

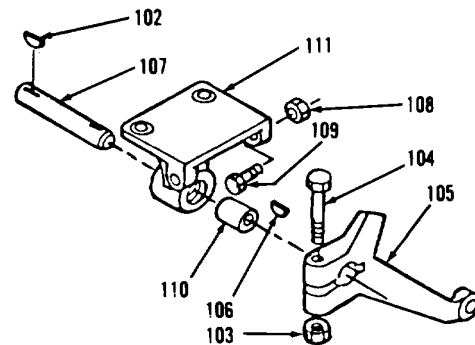


Figure 3-169.

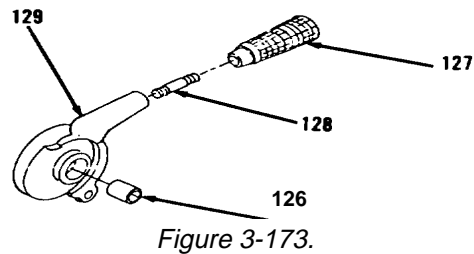
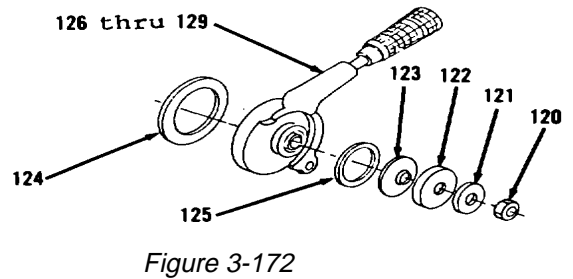
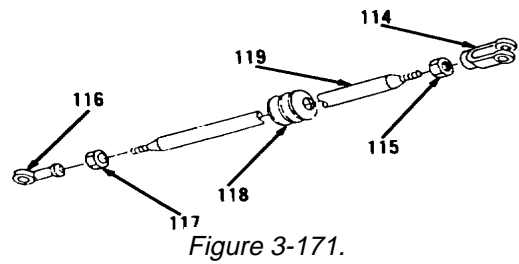
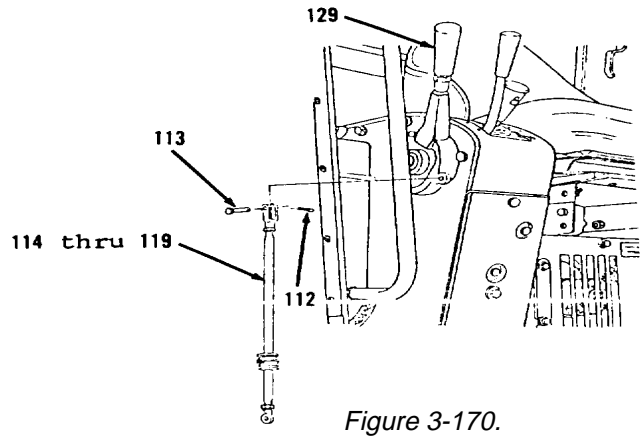
**Go to Sheet 10
3-176**

FUEL SYSTEM MAINTENANCE.

3-30. Governor Controls. (Sheet 10 of 21)

REMOVAL

- 80. Remove and discard cotter pin (112, Figure 3-170) from right side of operator's control console in operator's compartment.
- 81. Remove pin (113).
- 82. Separate items 114 thru 119 as an assembly from handle (129).
- 83. Remove items 114 thru 119 as an assembly from vehicle.
- 84. Loosen nuts (115 and 117, Figure 3-171).
- 85. Remove rod end (114), nut (115), rod end (116), nut (117), boot (118) and rod (119).
- 86. Remove nut (120), washer (121), seat (122), six springs (123), washer (124), items 126 thru 129 as an assembly and disc (125, Figure 3-172).



NOTE

Remove bearing only if inspection indicates replacement is necessary.

- 87. Inspect bearing (126, Figure 3-173). Replace if cracked, broken or worn.
- 88. Using suitable driver and hammer, remove bearing (126), if necessary.
- 89. Remove handle (127) from stud (128).
- 90. Remove stud (128) from handle (129).

**Go to Sheet 11
3-177**

FUEL SYSTEM MAINTENANCE. (cont)

3-30. Governor Controls. (Sheet 11 of 21)

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Using suitable driver and hammer, install new bearing (126, Figure 3-173), if removed, to right side of operator's console.
2. Install stud (128) in handle (129). Tighten stud (128) to 25 ft-lb torque.
3. Install handle (127) on stud (128).
4. Position disc (125), items 129 thru 126 as an assembly, washer (124), six springs (123), seat (122) and washer (121, Figure 3-172).
5. Install nut (120) loosely.
6. Position boot (118) on rod (119, Figure 3-171).
7. Install nut (117), rod end (116), nut (115) and rod end (114) on ends of rod (119).
8. Position items 119 thru 114 as an assembly through floor with rod end (114) positioned to eye of handle (129, Figure 3-170).
9. Install pin (113) and new cotter pin (112).

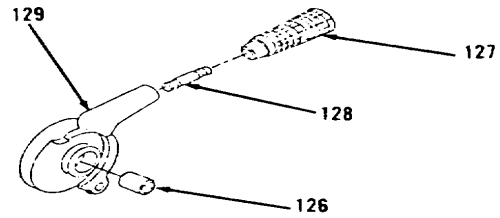


Figure 3-173.

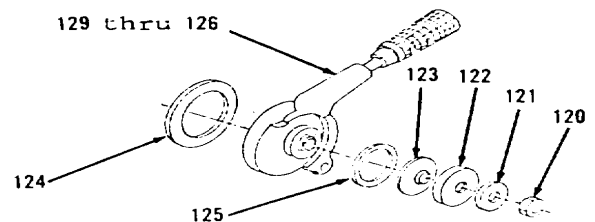


Figure 3-172.

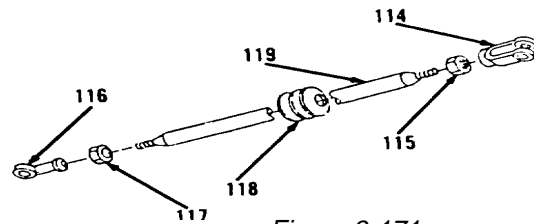


Figure 3-171.

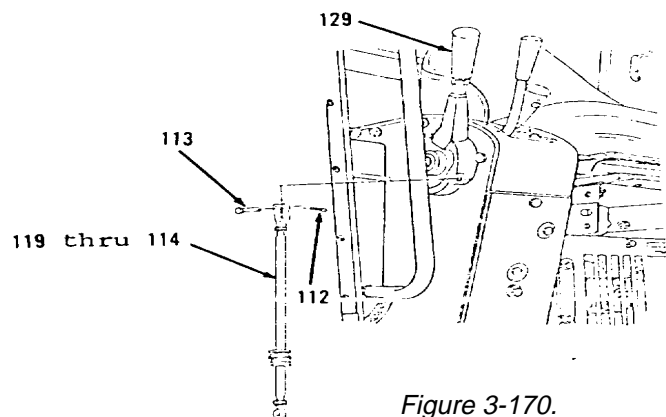


Figure 3-170.

**Go to Sheet 12
3-178**

FUEL SYSTEM MAINTENANCE.

3-30. Governor Controls. (Sheet 12 of 21)

INSTALLATION

- 10. Using suitable driver and hammer, install bushing (110), if removed and bracket (111, Figure 3-169) under right side of operator's compartment.
- 11. Install two bolts (109) and nuts (108) in bracket (111).
- 12. Install shaft (107).
- 13. Install key (106), lever (105), bolt (104) and nut (103).
- 14. Install key (102).
- 15. Install items 111 thru 102 as an assembly, two washers (101) and bolts (100, Figure 3-168).
- 16. Install bolt (99), washer (98) and nut (97).
- 17. Install lever (96).
- 18. Install bolt (95) and nut (94).
- 19. Install two nuts (92) and rod ends (91) loosely on link (93, Figure 3-167).
- 20. Position items 93 thru 91 as an assembly (Figure 3-166) on vehicle.
- 21. Install bolt (90), washer (89) and nut (88).

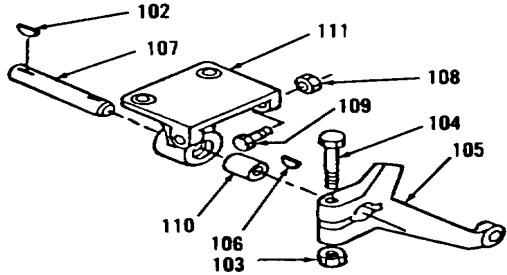


Figure 3-169.

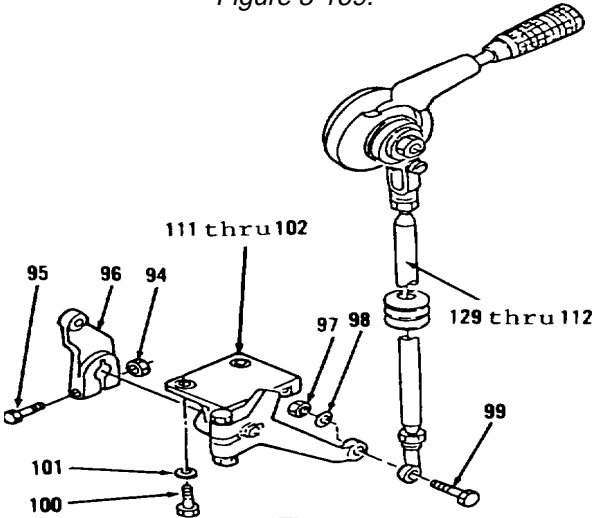


Figure 3-168.

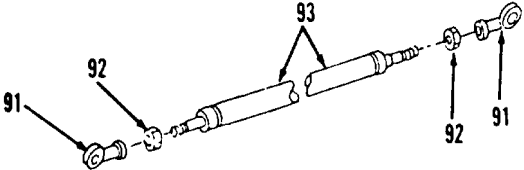


Figure 3-167.

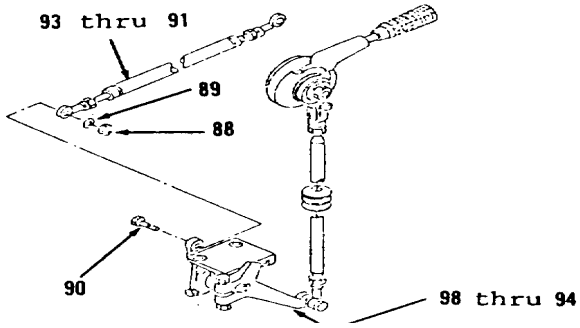


Figure 3-166.

Go to Sheet 13
3-179

FUEL SYSTEM MAINTENANCE. (cont)

3-30. Governor Controls. (Sheet 13 of 21)

INSTALLATION (cont)

22. Install boot (87) and treadle (86, Figure 3-165) in right side of floor in operator's compartment.
23. Install nut (85) and treadle (84).
24. Install boot (83) and pad (82).
25. Install lever (81, Figure 3-164).
26. Install nuts (80 and 79).
27. Install bolt (78), washer (77) and nut (76).
28. Install washer (75), nut (74) and bolt (73).
29. Install bolt (71) in lever (72, Figure 3-163).
30. Install items 72 and 71 as an assembly in housing (70, Figure 3-162).
31. Install keys (69 and 68) and shaft (67).
32. Install new bearings (66 and 65), if removed.

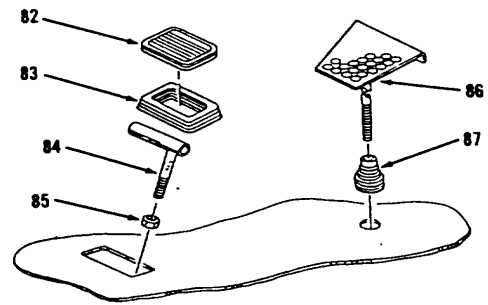


Figure 3-165.

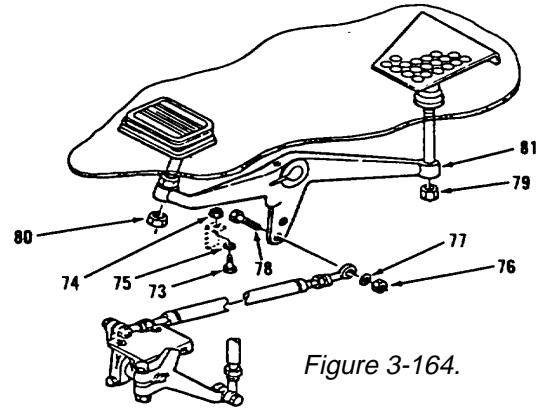


Figure 3-164.

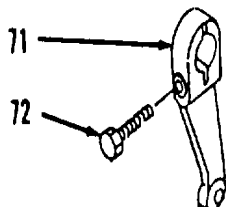


Figure 3-163.

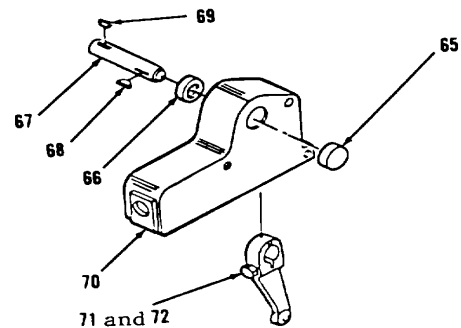


Figure 3-162.

**Go to Sheet 14
3-180**

FUEL SYSTEM MAINTENANCE.

3-30. Governor Controls. (Sheet 14 of 21)

INSTALLATION

33. Position items 72 thru 65 as an assembly (Figure 3-161).
34. Install three washers (64) and bolts (63).
35. Install bolt (62).
36. Position cable (61) through housing (66, Figure 3-160).
37. Install two nuts (60).
38. Install nut (59) and rod end (58) loosely.
39. Aline lever (64) and rod end (58).
40. Install washer (57) and bolt (56).
41. Install clip (49), washer (48) and bolt (47), securing cable (61) along with surrounding hose and clip assembly to right side of frame.

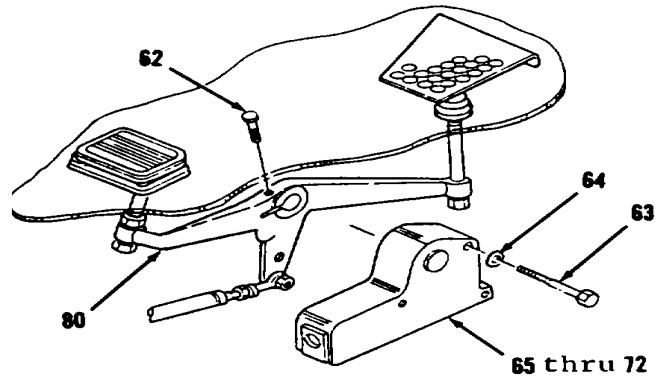


Figure 3-161.

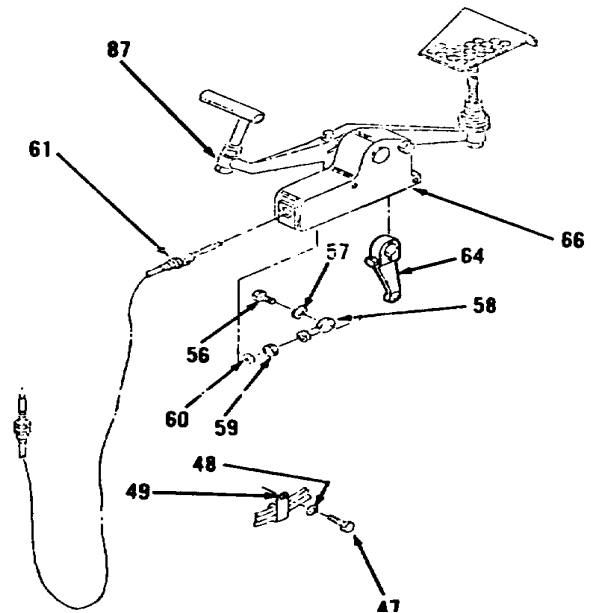


Figure 3-160.

**Go to Sheet 15
3-181**

FUEL SYSTEM MAINTENANCE. (cont)

3-30. Governor Controls. (Sheet 15 of 21)

INSTALLATION (cont)

42. Position cable (61) in lower slot of backing clamp (46, Figure 3-174) on right and left sides of articulation area.
43. Install one of two clamps (46), plates (45), two clips (44), washers (43) and nuts (42) loosely. Secure hoses to clips (44). Do not tighten nuts (42) at this time.
44. Position cable (61) through lower articulation area to left side of vehicle. Position cable (61) in lower slot of clamp (46).
45. Install one of two clamps (46), plates (45), clips (44), two washers (43) and nuts (42) loosely. Secure hose to clips (44). Do not tighten two nuts (42) at this time.
46. Position cable (61) from articulation area up to right side of engine compartment.
47. Using suitable driver and hammer, install new bearings (39 and 38, Figure 3-161), if removed. Drive new bearings (39 and 38) on stamped side into housing (40).
48. Install bolt (37) in lever (36, Figure 3-158).

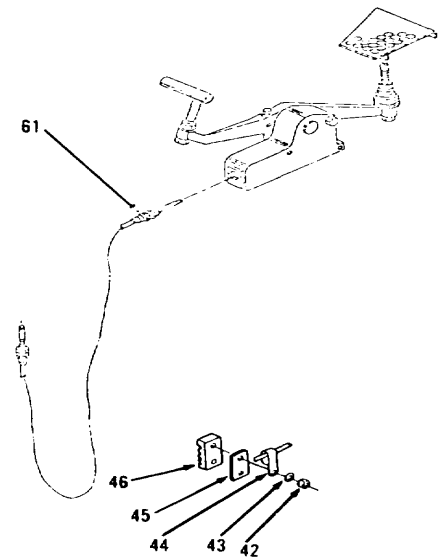


Figure 3-174.

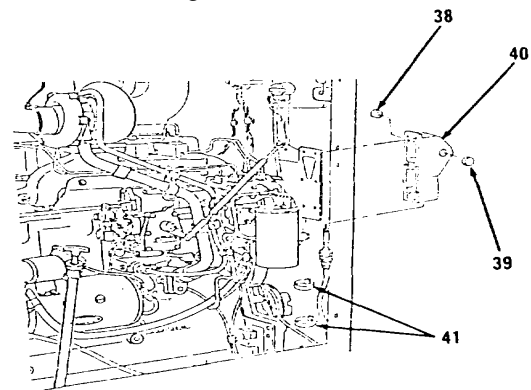


Figure 3-161.

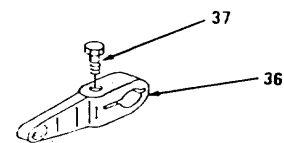


Figure 3-158.

**Go to Sheet 16
3-182**

FUEL SYSTEM MAINTENANCE.

3-30. Governor Controls. (Sheet 16 of 21)

INSTALLATION

- 49. Position shaft (35) in housing (40, Figure 3-157).
- 50. Install key (34) in shaft (35).
- 51. Install lever (36) on shaft (35) in housing (40).
- 52. Install shaft (35) into housing (40).
- 53. Tighten bolt (37).
- 54. Position cable (61) in housing (40).
- 55. Install two nuts (33).
- 56. Install nut (32), actuator (31) and rod end (30) on cable (61).
- 57. Aline lever (36) and rod end (30).
- 58. Install two springs (29), washer (28) and bolt (27).
- 59. Install nut (26) and bolt (25) in actuator (31).
- 60. Position items 40 thru 25 as an assembly, new gasket (24) and housing (23) on cover (130, Figure 3-156).
- 61. Install two washers (22) and bolts (21).
- 62. Install key (16) in shaft (35, Figure 3-155).
- 63. Install lever (15) on shaft (35).
- 64. Install bolt (14) and nut (13).

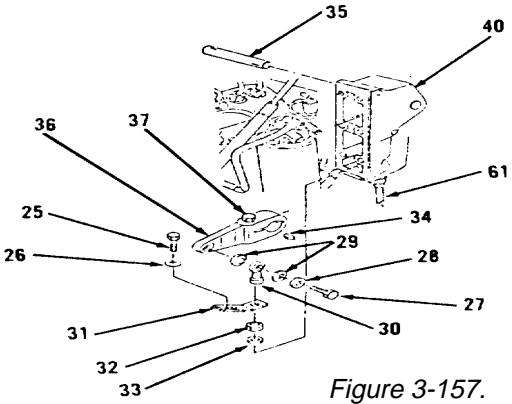


Figure 3-157.

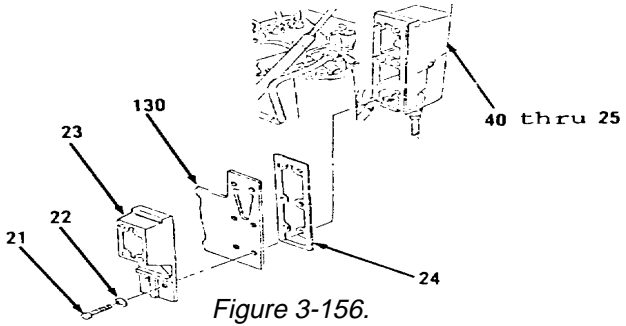


Figure 3-156.

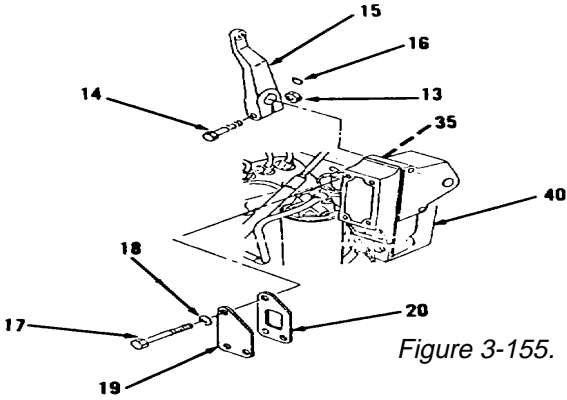


Figure 3-155.

Go to Sheet 17
3-183

FUEL SYSTEM MAINTENANCE. (cont)

3-30. Governor Controls. (Sheet 17 of 21)

INSTALLATION (cont)

- 65. Aline fuel injection pump governor shaft and lever (12, Figure 3-154) with matchmarks on fuel injection pump governor.
- 66. Install bolt (11) and nut (10).
- 67. Install nut (8), rod end (7), nut (6) and rod (5) loosely on link (9, Figure 3-153).
- 68. Position items 9 thru 5 as an assembly (Figure 3-152).
- 69. Install pin (4) and new cotter pin (3). Do not bend back cotter pin (3) at this time.
- 70. Install pin (2) and new cotter pin (1). Do not bend back cotter pin (1) at this time.

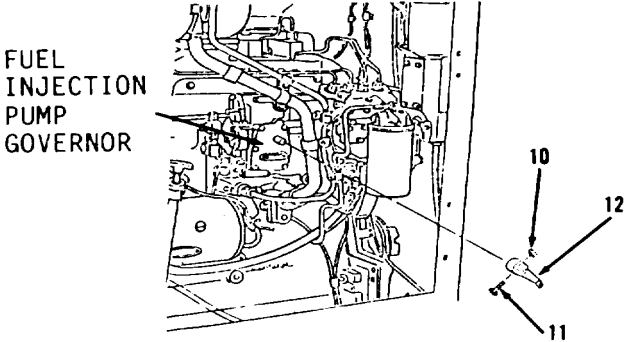


Figure 3-154.

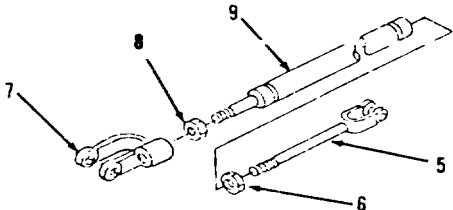


Figure 3-153.

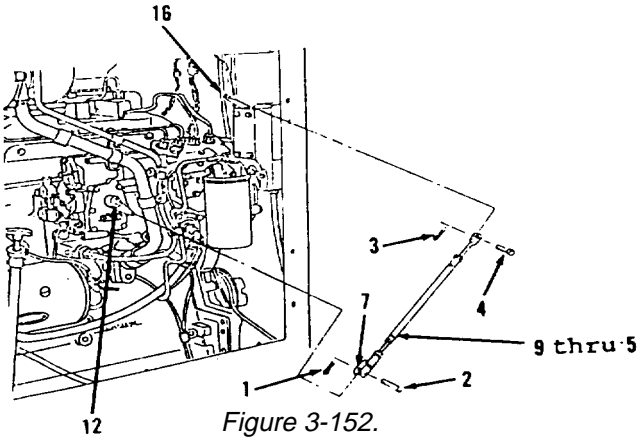


Figure 3-152.

Go to Sheet 18
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FUEL SYSTEM MAINTENANCE.

3-30. Governor Controls. (Sheet 18 of 21)

INSTALLATION

71. Tighten nut (59) securing rod end (58) in housing (70, Figure 3-175) under right side of operator's compartment.
72. Install new gasket (55), cover (54), five washers (53) and bolts (52).
73. Position clip assembly with hydraulic hose on cover (54).
74. Install washer (51) and bolt (50).
75. Tighten four nuts (42) at left and right sides of articulation area.

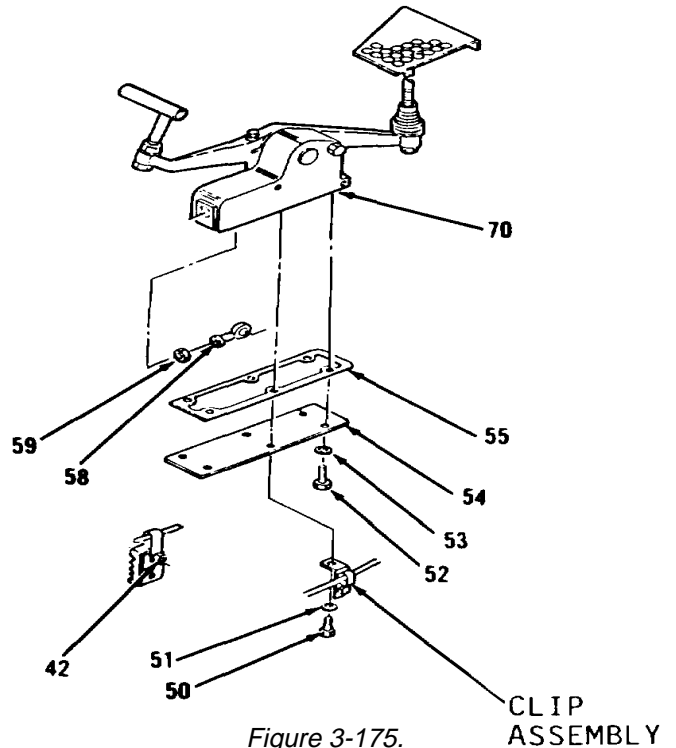


Figure 3-175.

**Go to Sheet 19
3-185**

FUEL SYSTEM MAINTENANCE. (cont)

3-30. Governor Controls. (Sheet 19 of 21)

ADJUSTMENT

1. Tighten nut (120) on operator's control console until position of handle (127) is not affected by movement of treadles (86 and 84, Figure 3-176).
2. Remove cotter pin (1) and pin (2, Figure 3-177) from fuel injection pump governor.
3. Separate rod end (7) and lever (12, Figure 3-176).
4. Loosen two nuts (108) and bolts (109) under right side of operator's compartment. Turn bolts (109) out far enough to keep lever (105) from making contact.
5. Position handle (127) in operator's control console. Push forward into low idle position.
6. Adjust low idle bolt (109) under right side of operator's compartment until contact with lever (105) is made.
7. Tighten nuts (108).
8. Remove nut (70), washer (71) and bolt (72).
9. Separate lever (87) and two rod ends (91).
10. Adjust two rod ends (91) until distance between top of lever (87) and operator's compartment floor is 1.5 inch.
11. Tighten two nuts (92).
12. Aline two rod ends (91) and lever (87).

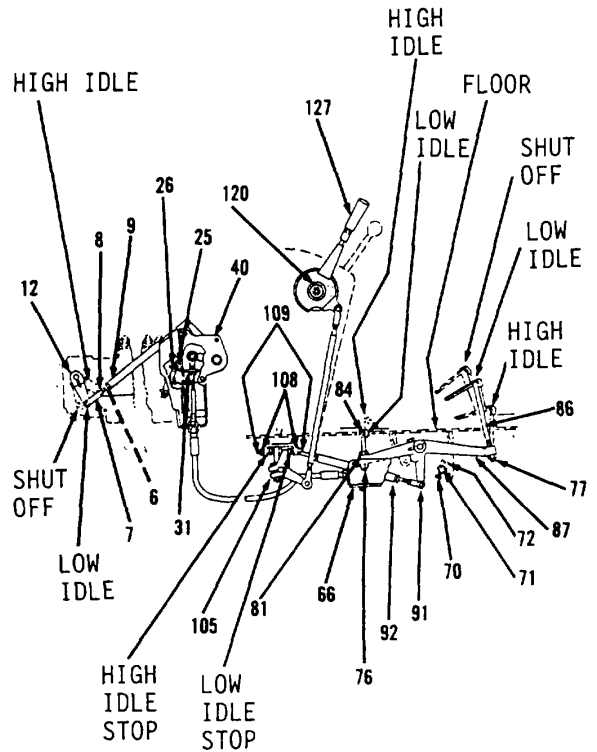


Figure 3-176.

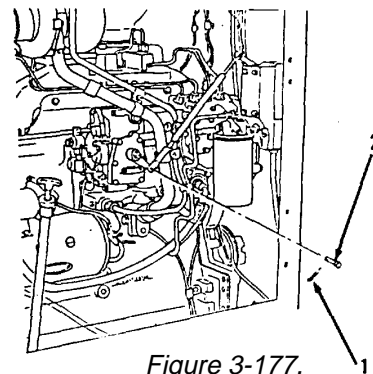


Figure 3-177.

**Go to Sheet 20
3-186**

FUEL SYSTEM MAINTENANCE.**3-30. Governor Controls.** (Sheet 20 of 21)**ADJUSTMENT**

13. Install bolt (72), washer (71) and nut (70).
Check distance between floor and lever (87) again.

NOTE

The following adjustment dimension is for a vehicle equipped with a floormat.

14. Loosen nuts (76 and 81).
15. Adjust treadle (80) so top of treadle extends 0.38 inch above operator's compartment floor.
16. Tighten nuts (81 and 76).
17. Position handle (127) on operator's control console. Pull back towards rear of vehicle into high idle position.
18. Adjust high idle bolt (109) under right side of operator's compartment until contact with lever (105) is made.
19. Tighten one nut (108).
20. Loosen nut (77).
21. Adjust treadle (82) so that a distance of 2.38 inches between floor and bottom of plate on treadle is obtained.
22. Tighten nut (77).
23. Adjust bolt (70) until contact with lever (87) in high idle position is made.
24. Tighten nut (71).

Go to Sheet 21
3-187

FUEL SYSTEM MAINTENANCE. (cont)

3-30. Governor Controls. (Sheet 21 of 21)

ADJUSTMENT (cont)

25. Position lever (12) on fuel injection pump governor and turn fully counterclockwise to high idle position.
26. Adjust link (9). Handle (127) must be in high position. Adjust link (9) until pin (2) can be installed through rod end (7) and lever (12).
27. Install pin (2) and cotter pin (1, Figure 3-177).
28. Tighten nuts (8 and 6, Figure 3-176).
29. Install governor switch (130). Do not connect wires to switch. Refer to TM 5-3805-261-20.
30. Position lever (12) in shut-off position in housing (40).
31. Connect lamp tester to terminals on governor switch (130) and adjust bolt (25) until lamp lights dimly. Turn bolt (25) one additional turn. Connect wire assemblies to governor switch (130).
32. Tighten nut (26).

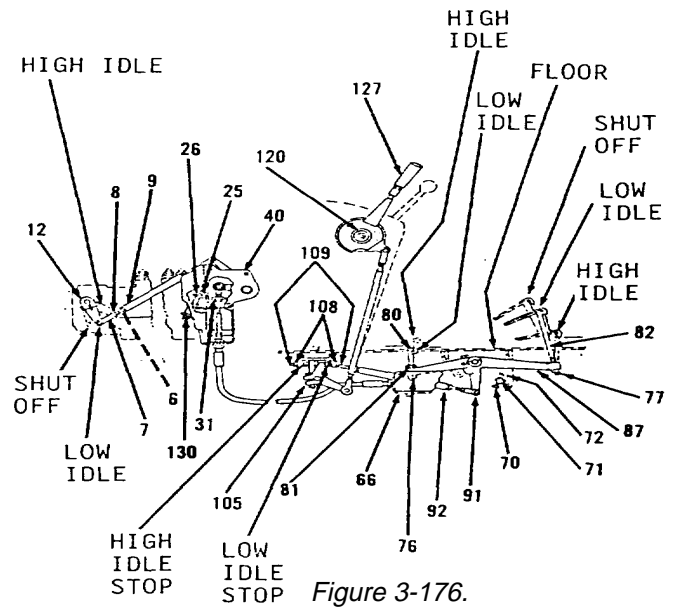


Figure 3-176.

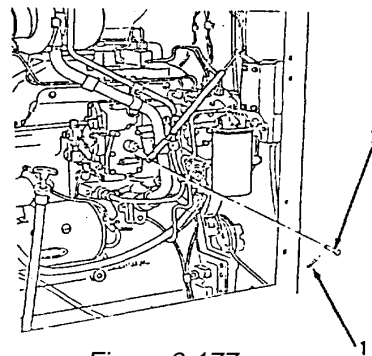


Figure 3-177.

INSTALLATION

1. Install two new straps (41) around cable (61, Figure 3-178) and governor switch wires.
2. Install new gasket (20), cover (19), four washers (18) and bolts (17).

NOTE

Return 130G Grader to original equipment condition.

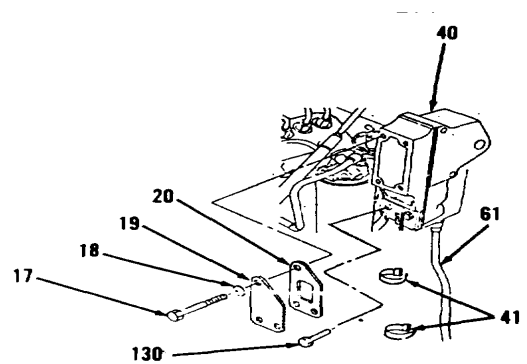


Figure 3-178.

**End of Task
3-188**

Section V. COOLING SYSTEM TROUBLESHOOTING.

3-31. GENERAL INFORMATION. This section lists the common cooling system malfunctions which may occur during the operation of the 130G Grader. You should perform the tests, inspections and corrective actions in the order listed. Follow the troubleshooting procedures listed below step-by-step until you can go no further.

3-32. COOLING SYSTEM TROUBLESHOOTING PROCEDURES. This section cannot list all possible malfunctions, nor can it list all possible tests, inspections or corrective actions. If a malfunction is not listed, contact your supervisor.

COOLING SYSTEM TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

ENGINE OVERHEATS.

WARNING

STEAM UNDER PRESSURE

- Remove radiator cap slowly to relieve pressure before completely removing it when the engine is hot. Failure to follow this procedure may cause INJURY. If you are scalded by steam, seek medical aid immediately.
- At operating temperature, the engine coolant is hot and under pressure.
- Steam can cause personal injury.
- Check the coolant level ONLY when the engine is stopped and the radiator fill cap is cool enough to touch with your hand.
- Cooling system conditioner contains alkali. Avoid contact with skin and eyes to prevent personal injury.

Step 1. Check coolant level.

Refer to TM 5-3805-261-20. Refill to proper level.

Step 2. Check the radiator fins.

If the radiator fins are bent, damaged or defective, use a radiator fin comb to straighten.

COOLING SYSTEM TROUBLESHOOTING AND MAINTENANCE PROCEDURES. (cont)

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

ENGINE OVERHEATS. (cont)

Step 3. Check the coolant flow from open drain outlet.

If coolant is dirty and the flow is slow, replace radiator. Refer to TM 5-3805-261-20.

NOTE

For the following procedures to be accurate, the engine should be at operating temperature and the ambient temperature should be similar to field conditions.

Step 4. Check the temperature at the top of the radiator tank with a probe from the Thermistor Thermometer Group. Insert probe into the top of tank.

Compare temperature reading at the top of the radiator tank with the ambient temperature (air temperature away from machine, not in direct sunlight).

If the difference between the top of the tank temperature and the ambient temperature is more than 110 degrees F, the engine is overheating. Proceed to step 6.

Step 5. Check the coolant temperature at the bottom of the radiator tank with a probe from the Thermistor Thermometer Group. Insert probe in the drain outlet of the radiator or in pipe plug location in the lower elbow of radiator.

Compare coolant temperature reading at the top of radiator tank with coolant temperature reading at the bottom of radiator tank.

If the difference between the top and bottom temperatures is more than 15 degrees F, proceed to step 6.

COOLING SYSTEM TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

ENGINE OVERHEATS.

Step 6. Check the water pump.

If the water pump is damaged or defective, service. Refer to paragraph 3-34.

Step 7. Check operation of water manifold thermostats.

If thermostats are damaged or defective, service. Refer to TM 5-3805-261-20.

Section VI. COOLING SYSTEM MAINTENANCE.

3-33. COOLING SYSTEM MAINTENANCE PROCEDURES.

- a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the cooling system and its components in good repair.
- b. This section is arranged by functional group code and provides a list of cooling system components to be maintained and step-by-step maintenance procedures.

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COOLING SYSTEM MAINTENANCE.

3-34. Water Pump. (Sheet 1 of 9)

This task covers: **a. Disassembly** **b. Cleaning** **c. Inspection**
 d. Assembly

INITIAL SETUP:

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-177-7033)
 7/16-14NC-2 1/2 inch long bolt
 3/8-16NC nut
 Puller 1H3107

Test Equipment

None

Materials/Parts

Dry cleaning solvent, Item 15, Appendix C
 Clean cloths, Item 41, Appendix C
 Lubricating oil, Item 33, Appendix C
 Gasket, Item 4
 Ring, Item 17
 Seals, Items 9, 18, 19
 Spring, Item 8
 Bearing, Item 15

Personnel Required

Construction equipment repairer MOS 62B

References

TM 5-3805-261-10
 TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown, all fasteners are tightened to standard torques. Refer to Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

TM 5-3805-261-20

Water pump removed.

Go to Sheet 2
3-193

COOLING SYSTEM MAINTENANCE. (cont)

3-34. Water Pump. (Sheet 2 of 9)

DISASSEMBLY

1. Remove two bolts (1) and washers (2, Figure 3-179).
2. Separate cover (3) and gasket (4) from housing (22). Discard gasket (4). Remove all gasket material from mounting surfaces.
3. Loosen bolt (5, Figure 3-180) ¼ turn.
4. Using soft hammer, strike bolt (5) head to loosen impeller (7).
5. Remove bolt (5) and washer (6, Figure 3-181).

NOTE

Do not pry impeller (7) out with a screwdriver.

6. Remove impeller (7).
7. Remove and discard spring (8) and seal (9, Figure 3-182).

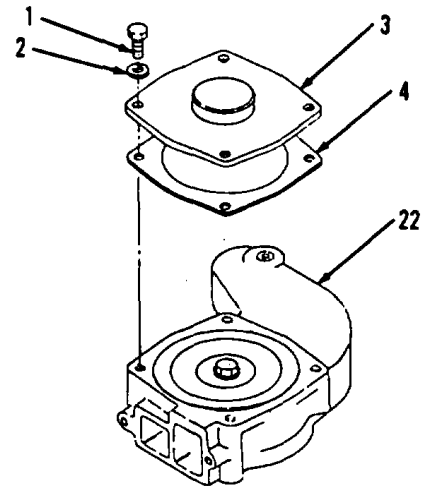


Figure 3-179.

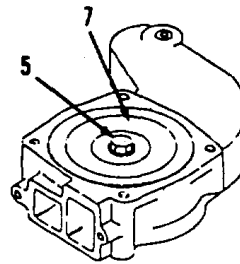


Figure 3-180.

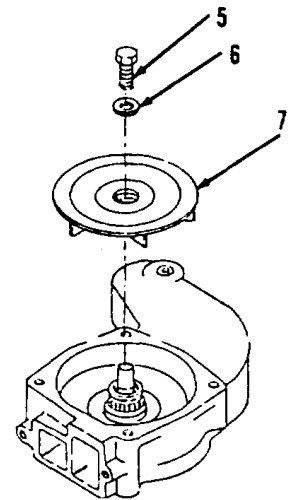


Figure 3-181.

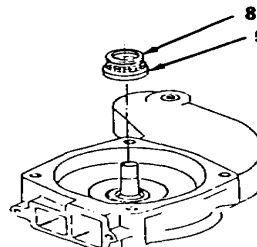


Figure 3-182.

**Go to Sheet 3
3-194**

COOLING SYSTEM MAINTENANCE.

3-34. Water Pump. (Sheet 3 of 9)

DISASSEMBLY

8. Invert housing (22, Figure 3-184).
9. Using a strap wrench, secure gear (13) and remove bolt (10) and washer (11).
10. Install 7/16-14NC-2 1/2 inch long bolt in bolt (10, Figure 3-185) hole.

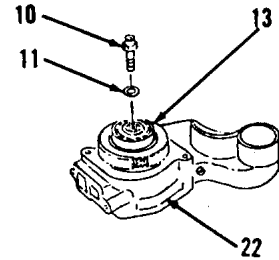


Figure 3-184.

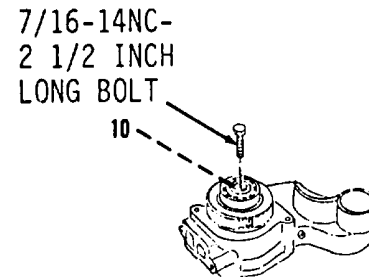


Figure 3-185.

**Go to Sheet 4
3-195**

COOLING SYSTEM MAINTENANCE. (cont)

3-34. Water Pump. (Sheet 4 of 9)

DISASSEMBLY (cont)

11. Using suitable puller to push against 7/16-14NC bolt, remove items 12 and 13 as an assembly from housing (22, Figure 3-187).
12. Using suitable press, remove bearing (12) from gear (13, Figure 3-188).
13. Using snap ring pliers, remove ring (14, Figure 3-189).
14. Remove items 15 and 16 as an assembly from housing (22, Figure 3-190).

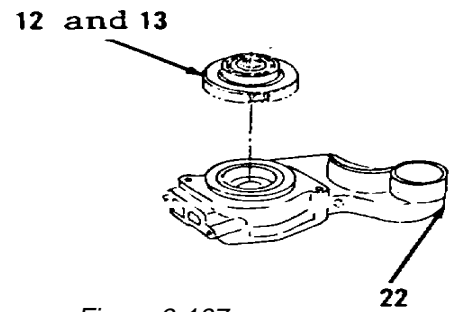


Figure 3-187.

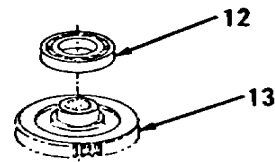


Figure 3-188.

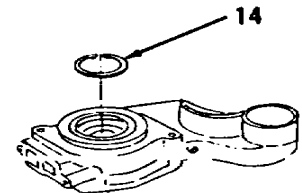


Figure 3-189.

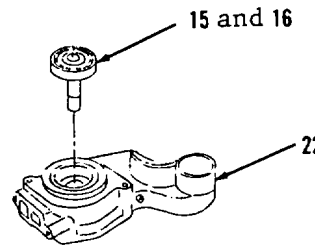


Figure 3-190.

**Go to Sheet 5
3-196**

COOLING SYSTEM MAINTENANCE.

3-34. Water Pump. (Sheet 5 of 9)

DISASSEMBLY

NOTE

Removal of bearing from gear will cause destruction of bearing. Remove bearing only if inspection indicates replacement is necessary.

15. Inspect bearing (15, Figure 3-191). Replace if cracked, broken, chipped, grooved or scored.
16. Using suitable driver and press, remove bearing (15) from shaft (16), if necessary.
17. Invert housing (22, Figure 3-192).
18. Remove and discard ring (17) and seal (18) from housing (22).
19. Using suitable driver and hammer, remove and discard seal (19, Figure 3-193).
20. Remove plugs (20 and 21, Figure 3-194).

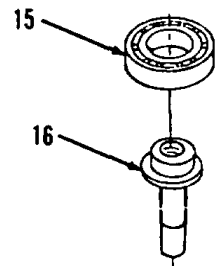


Figure 3-191.

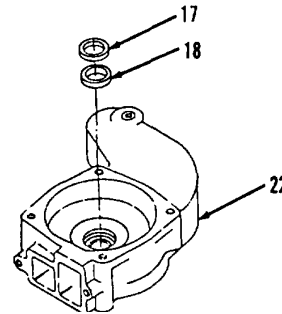


Figure 3-192.

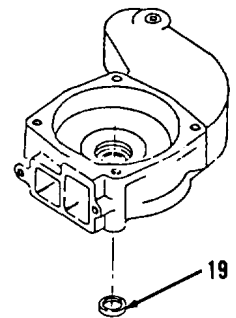


Figure 3-193.

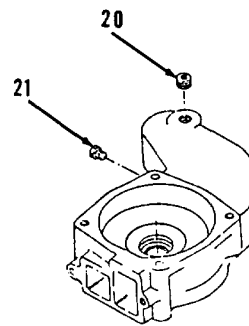


Figure 3-194.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

**Go to Sheet 6
3-197**

COOLING SYSTEM MAINTENANCE. (cont)

3-34. Water Pump. (Sheet 6 of 9)

ASSEMBLY

1. Install plugs (21 and 20, Figure 3-194).
2. Invert housing (22, Figure 3-195).
3. Using suitable driver and hammer, install new seal (19). Lip of new seal (19) must face gear (13) side of pump seat on bottom of counterbore.
4. Apply a light coat of lubricating oil to lip of new seal (19).
5. Using suitable driver and press, install new bearing (15), if removed on shaft (16, Figure 3-191).
6. Install items 16 and 15 as an assembly in housing (22, Figure 3-190).

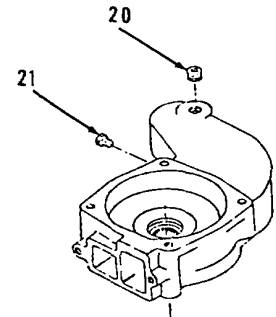


Figure 3-194.

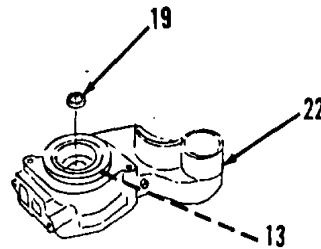


Figure 3-195.

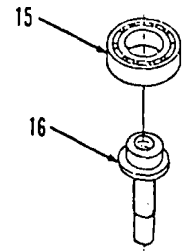


Figure 3-191.

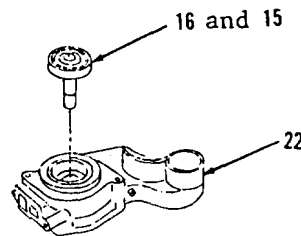


Figure 3-190.

**Go to Sheet 7
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COOLING SYSTEM MAINTENANCE.

3-34. Water Pump. (Sheet 7 of 9)

ASSEMBLY

7. Using snap ring pliers, install ring (14, Figure 3-189).
8. Using suitable driver and press, install bearing (12), if removed on gear (13, Figure 3-188).
9. Install items 13 and 12 as an assembly in housing (22, Figure 3-187).
10. Install strap wrench to secure driven gear (13, Figure 3-184).

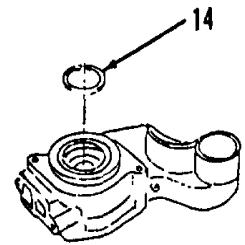


Figure 3-189.

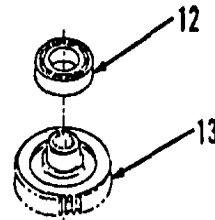


Figure 3-188.

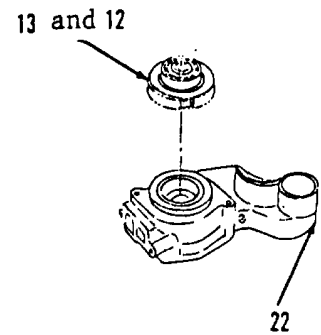


Figure 3-187.

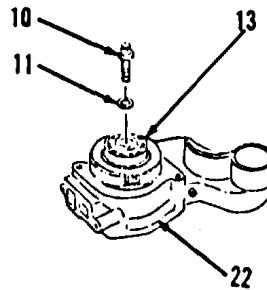


Figure 3-184.

**Go to Sheet 8
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COOLING SYSTEM MAINTENANCE. (cont)**3-34. Water Pump.** (Sheet 8 of 9)**ASSEMBLY (cont)**

11. Install washer (11) and bolt (10, Figure 3-184). Tighten bolt (10) to 71 ft-lb torque.
12. Remove strap wrench from driven gear (13).

CAUTION

Clean water only is permitted for use as a lubricant for assistance at installation.

Do not damage or put hands on the wear surfaces of rings and seals.

13. Install new ring (17), smooth side facing new seal (18, Figure 3-196).
14. Soak in clean, cold water for 30 seconds and lubricate new seal (18).
15. Using seal installation tool, install new seal (18) on shaft (16) and seat counterbore of housing (22).

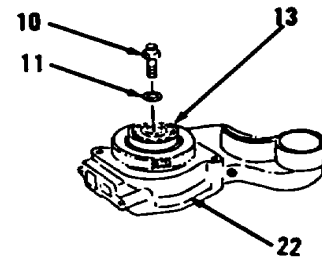


Figure 3-184.

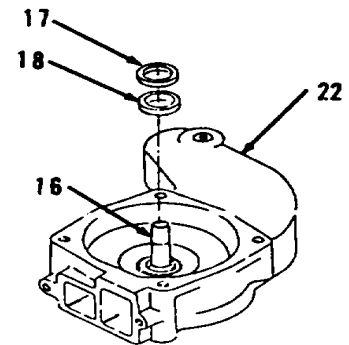


Figure 3-196.

**Go to Sheet 9
3-200**

COOLING SYSTEM MAINTENANCE.

3-34. Water Pump. (Sheet 9 of 9)

ASSEMBLY

- 16. Soak new seal (9) in cold, clean water for 30 seconds and lubricate new seal (9, Figure 3-182).
- 17. Using seal installer tool, install new seal (9) on shaft (16) until seal (9) touches new seal (18).
- 18. Install new spring (8) on new seal (9).
- 19. Position impeller (7) on shaft (16, Figure 3-181).
- 20. Install washer (6) and bolt (5). Tighten bolt (5) to 28 ft-lb torque.
- 21. Position new gasket (4) and cover (3, Figure 3-179).
- 22. Install two washers (2) and bolts (1).

NOTE

Return 130G Grader to original equipment condition.

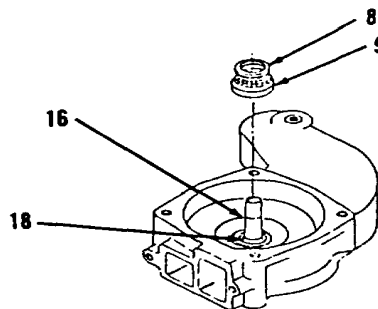


Figure 3-182.

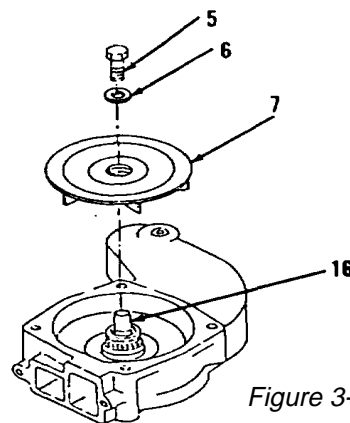


Figure 3-181.

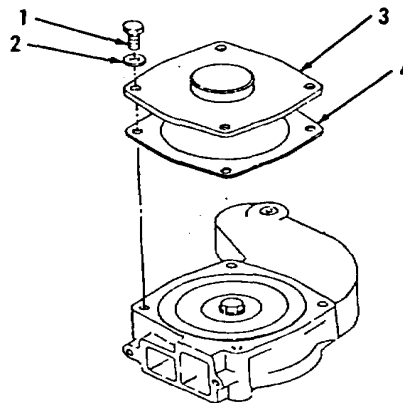


Figure 3-179.

End of Task

3-201/(3-202 blank)

CHAPTER 4
ELECTRICAL SYSTEM
TROUBLESHOOTING AND MAINTENANCE

CHAPTER OVERVIEW

The purpose of this chapter is to help the technician efficiently troubleshoot and repair malfunctioning equipment and to perform authorized direct support level maintenance procedures on the 130G Grader.

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Section I. CHARGING SYSTEM TROUBLESHOOTING.

4-1. GENERAL INFORMATION. This section lists the common charging system malfunctions which may occur during the operation of the 130G Grader. You should perform the tests, inspections and corrective actions in the order listed. Follow the troubleshooting procedures listed below step-by-step until you can go no further.

4-2. CHARGING SYSTEM TROUBLESHOOTING PROCEDURES. This section cannot list all possible malfunctions, nor can it list all possible tests, inspections or corrective actions. If a malfunction is not listed, contact your supervisor.

CHARGING SYSTEM TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

ALTERNATOR GIVES NO CHARGE.

Check the rotor.

If the rotor is damaged or defective, replace. Refer to paragraphs 4-4 and 4-5.

Section II. CHARGING SYSTEM MAINTENANCE.

4-3. CHARGING SYSTEM MAINTENANCE PROCEDURES.

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the electrical system and its components in good repair.

b. This section is arranged by functional group code and provides a list of electrical system components to be maintained and step-by-step maintenance procedures.

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| Alternator (Bosch) | 4-5 | 4-23 |

CHARGING SYSTEM MAINTENANCE.**4-4. Alternator (Delco). (Sheet 1 of 18)**

This task covers:

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

INITIAL SETUP:Applicable Configurations

All

Personnel RequiredConstruction equipment
repairer MOS 63GToolsGeneral Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
24 Volt battery
Three jumper leadsReferencesTM 5-3805-261-10
TM 5-3805-261-20Test EquipmentMultimeter
110 volt test lampSpecial Environmental Conditions

None

General Safety Instructions

None

Materials/PartsDry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Detergent, Item 9, Appendix C
Grease, Item 20, Appendix C
Delco-Remy Lubricant, Item 73,
Appendix C
Silicone sealant, Item 42,
Appendix C
Small tags, Item 43, Appendix C
Gaskets, Items 11, 44, 46, 64
Plug, Item 76
Seals, Items 63, 67
Bearing, Item 77
Wire assemblies, Item 50
Race, Item 59
Terminals, Item 69
Grommet, Item 70
Insulator, Item 71
Bushing, Item 78TorquesAll fasteners are tightened to
standard torques. Refer to
Appendix E.**Go to Sheet 2**

CHARGING SYSTEM MAINTENANCE. (cont)

4-4. Alternator (Delco). (Sheet 2 of 18)

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Alternator removed.

Go to Sheet 3

4-6

CHARGING SYSTEM MAINTENANCE.

4-4. Alternator (Delco). (Sheet 3 of 18)

DISASSEMBLY

1. Remove fan (1) and slinger (2, Figure 4-1).
2. Position items 3 thru 80 as an assembly in soft jawed vise.

NOTE

Using scriber, matchmark frame and housing.

3. Remove four screws (3), lockwashers (4) and plate (5).
4. Remove three screws (6), lockwashers (7), four screws (8), lockwashers (9), cover (10) and gasket (11). Discard gasket (11). Remove all gasket material from mounting surfaces.
5. Remove cap (12), nut (13), washer (14), nut (15), insulator (16), stud (17) and bushing (18, Figure 4-2).
6. Remove grommet (19).
7. Remove screw (20), washers (21 and 22) and insulator (23).
8. Remove three nuts (24).

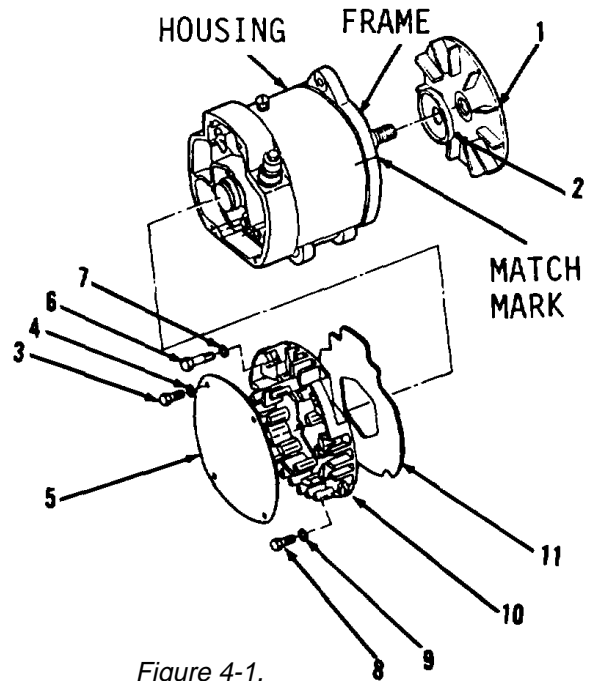


Figure 4-1.

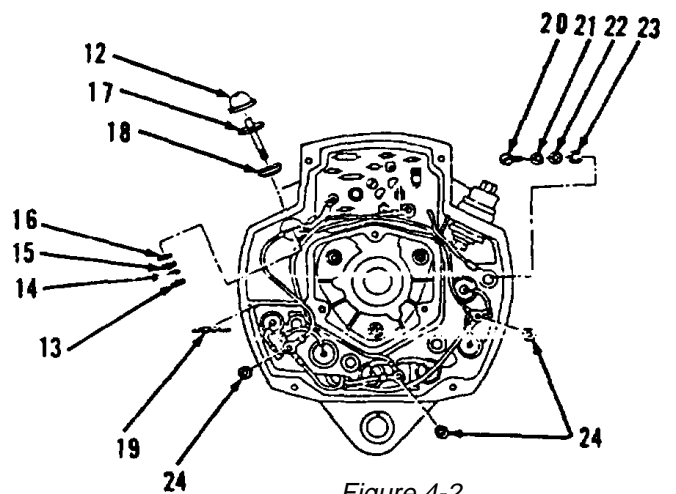


Figure 4-2.

Go to Sheet 4

CHARGING SYSTEM MAINTENANCE. (cont)

4-4. Alternator (Delco). (Sheet 4 of 18)

DISASSEMBLY (cont)

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

- 9. Disconnect wire assembly (25, Figure 4-3) at terminal.
- 10. Remove nut (26) and lockwasher (27).
- 11. Remove screw (28) and lockwasher (29).
- 12. Disconnect two field coil wire assemblies (75) at terminals.
- 13. Disconnect three regulator wire assemblies (34) at terminals.
- 14. Disconnect three stator wire assemblies (72) at terminals.
- 15. Disconnect three positive diode wire assemblies (50) at terminals.
- 16. Disconnect three negative diode wire assemblies (79) at terminals.
- 17. Remove two screws (30), lockwashers (31 and 32), three washers (33) and regulator (34, Figure 4-4).
- 18. Remove insulator (35).

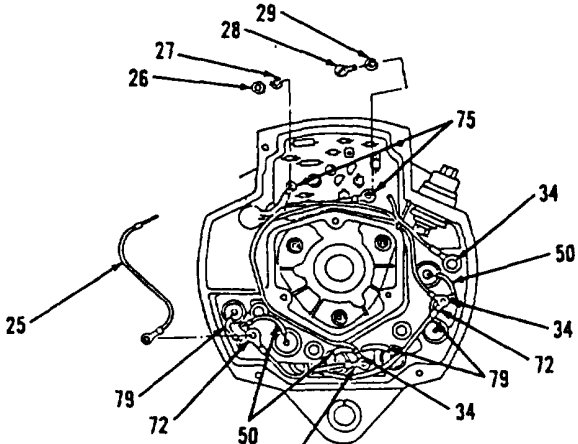


Figure 4-3.

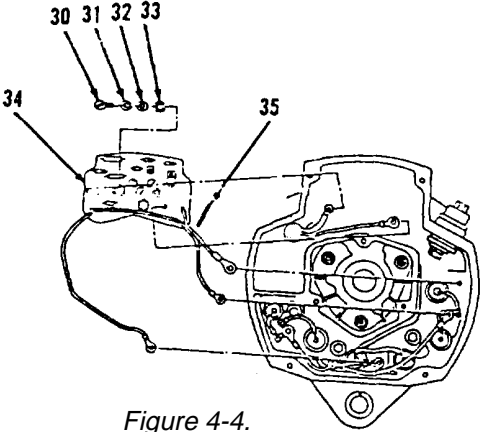


Figure 4-4.

Go to Sheet 5

CHARGING SYSTEM MAINTENANCE.

4-4. Alternator (Delco). (Sheet 5 of 18)

DISASSEMBLY

CAUTION

Do not damage wire assemblies. Destruction will cause need to replace housing.

19. Remove stud (40).

20. Remove nut (41), lockwasher (42), washer (43), gasket (44), stud (45) and gasket (46) and items 47 thru 51 as an assembly. Discard gaskets (44 and 46). Remove all gasket material from mounting surfaces.

21. Remove three bolts (36), lockwashers (37), washers (38) and insulators (39) from heat sink (51, Figure 4-5).

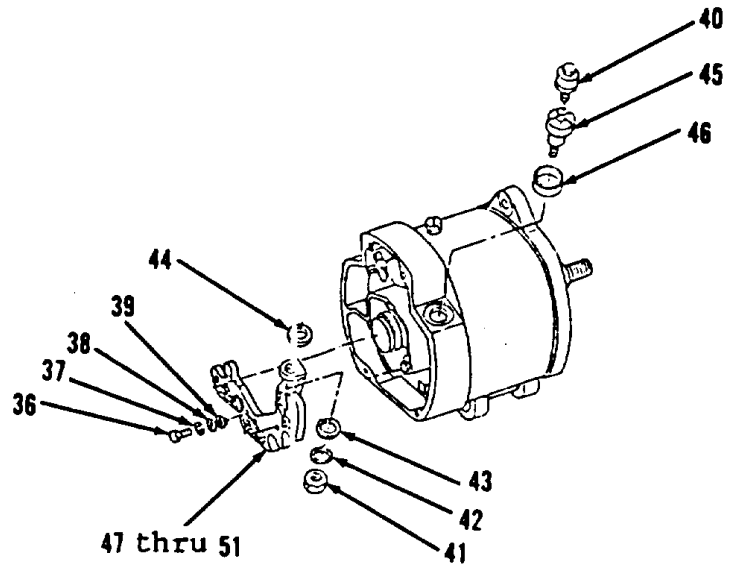


Figure 4-5.

Go to Sheet 6

CHARGING SYSTEM MAINTENANCE. (cont)

4-4. Alternator (Delco). (Sheet 6 of 18)

DISASSEMBLY (cont)

- 22. Remove insulator (47, Figure 4-6).
- 23. Remove three studs (48) and insulators (49) from heat sink (51).

CAUTION

Removal of positive diode wire assemblies from heat sink may cause destruction. Remove only if inspection or testing indicates replacement is necessary. Refer to testing procedures in this paragraph.

- 24. Support heat sink (51) and remove three positive diode wire assemblies (50) at terminals, if necessary.
- 25. Remove plug (52, Figure 4-7).
- 26. Remove screw (53) and lockwasher (54).
- 27. Remove four screws (55) and washers (56).

CAUTION

Use care when prying frame and rotor assembly from stator. Do not damage stator with screwdrivers.

- 28. Using two screwdrivers, separate items 57 thru 68 as an assembly from items 69 thru 80 as an assembly.
- 29. Position items 57 thru 68 as an assembly in suitable press.

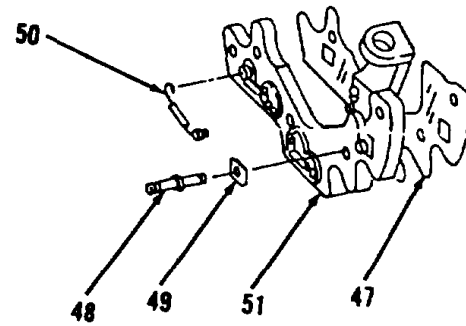


Figure 4-6.

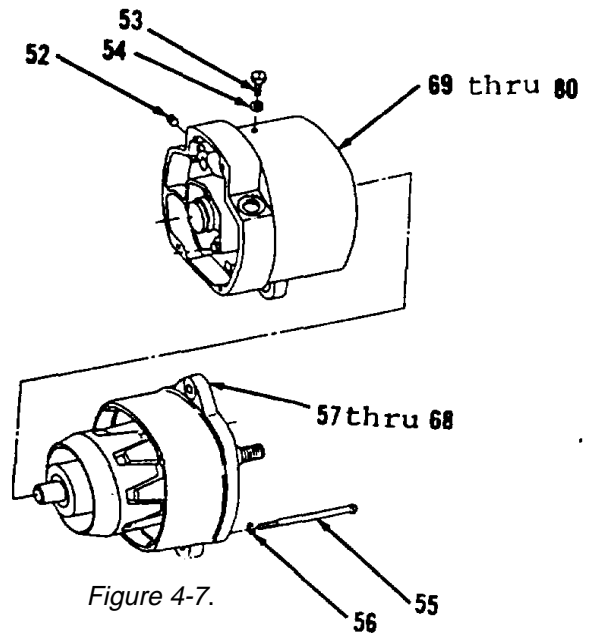


Figure 4-7.

Go to the Sheet 7

CHARGING SYSTEM MAINTENANCE.

4-4. Alternator (Delco). (Sheet 7 of 18)

DISASSEMBLY

- 30. Using a suitable press, remove rotor (57, Figure 4-8).
- 31. Remove collar (58).

CAUTION

Removal of race from rotor will cause destruction. Remove race only if inspection indicates replacement is necessary.

- 32. Inspect race (59). Replace if cracked, broken, distorted, grooved or scored.

- 33. Using suitable puller, remove race (59), if necessary.

- 34. Remove four screws (60), washers (61), retainer (62), seal (63), gasket (64), collar (65), bearing (66) and seal (67) from frame (68, Figure 4-9). Discard seals (63 and 67) and gasket (64). Remove all gasket material from mounting surfaces.

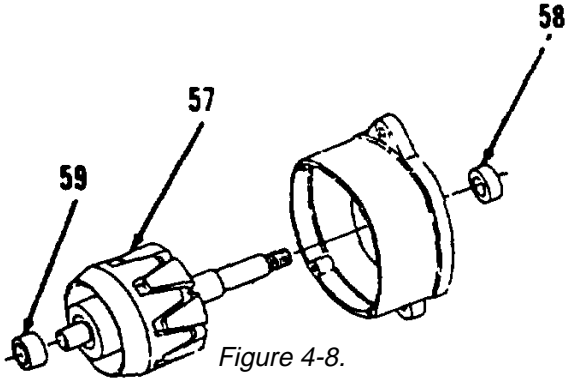


Figure 4-8.

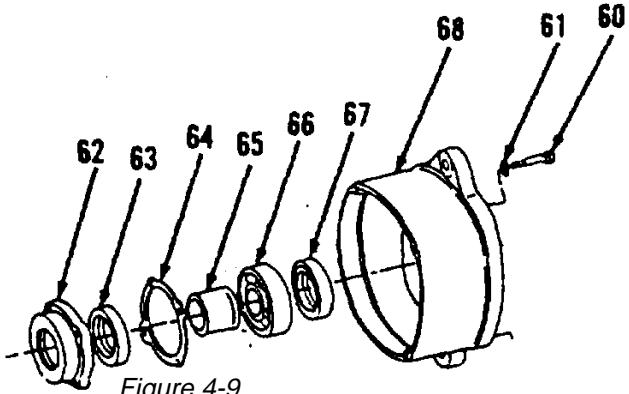


Figure 4-9.

Go to Sheet 8

CHARGING SYSTEM MAINTENANCE. (cont)

4-4. Alternator (Delco). (Sheet 8 of 18)

DISASSEMBLY (cont)

NOTE

Inspection of stator is necessary before proceeding with further disassembly. Refer to test procedures in this paragraph.

- 35. Inspect three terminals (69) on stator (72, Figure 4-10).
- 36. Inspect grommet (70) and insulator (71). Replace if cracked, broken or deteriorated.
- 37. Remove three terminals (69), grommet (70) and insulator (71) from stator (72), if necessary. Do not cut three terminals (69) off from wires.
- 38. Remove three screws (73).
- 39. Push grommet (74) from mounting hole in housing (80). Do not damage grommet (74).
- 40. Remove grommet (74) and field coil (75) as an assembly from housing (80).
- 41. Using suitable driver and hammer, remove and discard plug (76).
- 42. Using suitable driver and hammer, remove and discard bearing (77).

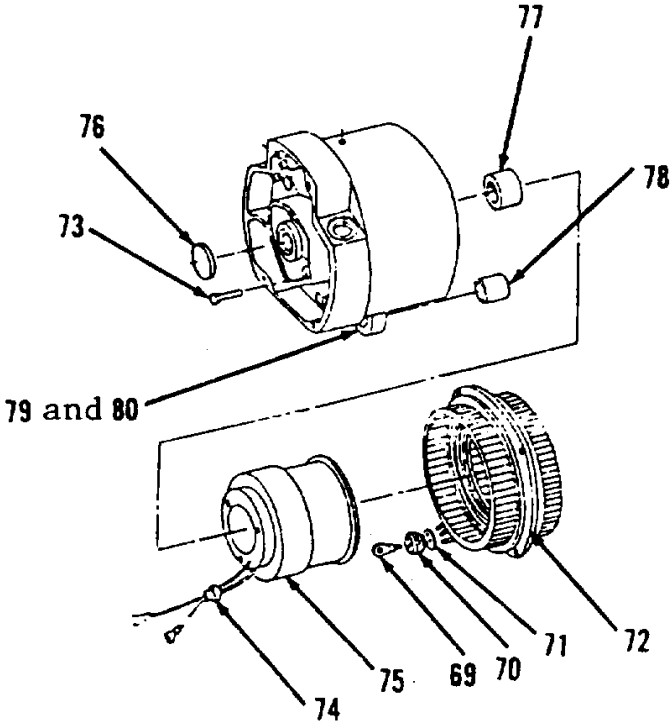


Figure 4-10.

CAUTION

Removal of bushing from housing will cause destruction of bushing. Remove bushing only if inspection indicates replacement is necessary.

- 43. Inspect bushing (78). Replace if cracked, broken or worn.

Go to Sheet 9

CHARGING SYSTEM MAINTENANCE.

4-4. Alternator (Delco). (Sheet 9 of 18)

DISASSEMBLY

- 44. Using suitable driver and press, remove bushing (78), if necessary.

TESTING

- 1. Using 110 volt test lamp or ohmmeter, test stator (72, Figure 4-11) for ground. Connect one test wire to stator (72) frame and the other test wire to each of three stator (72) wires. Replace stator (72) if lamp lights or meter reading is low.
- 2. Using 110 volt test lamp or ohmmeter, test stator (72) for opens. Perform at least three tests, switching test wires between any two of the stator (72) wires. Replace stator (72) if lamp does not light or meter reading is high.
- 3. Using test lamp or ohmmeter, test field coil (75, Figure 4-12) for ground. Connect one test wire to field coil (75) housing and the other to each of the field coil (75) wires. Replace field coil (75) if lamp lights or ohmmeter reading is low.
- 4. Using test lamp or ohmmeter, test field coil (75) for opens. Connect both test wires to both field coil (75) wires. Replace field coil (75) if lamp does not light or meter reading is high.

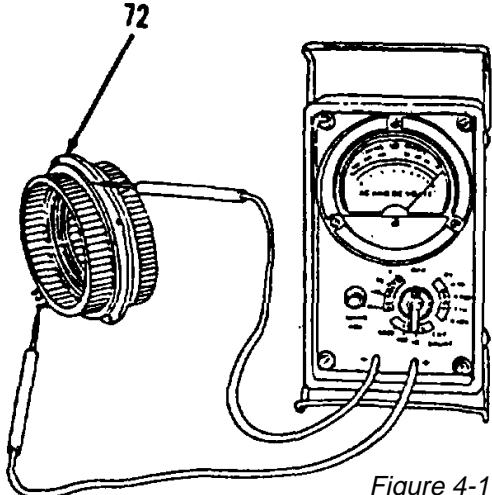


Figure 4-11.

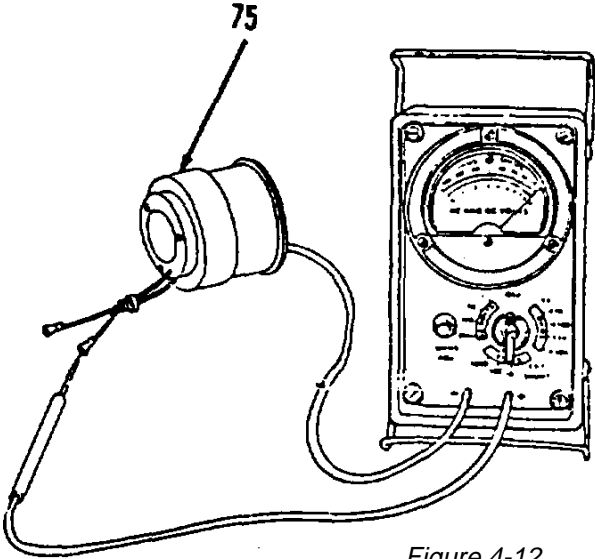


Figure 4-12.

Go to Sheet 10

CHARGING SYSTEM MAINTENANCE. (cont)

4-4. Alternator (Delco). (Sheet 10 of 18)

TESTING (cont)

- 5. Using ohmmeter set to lowest range, test three positive diode wire assemblies (50, Figure 4-13). Touch one test wire to the positive diode casing and the other wire to the terminal, then switch test wires. Meter should indicate one high and one low reading. Replace three positive diode wire assemblies (50) if readings are the same.

- 6. Using ohmmeter set to lowest range, test three negative diode wire assemblies (79, Figure 4-14). Touch one test wire to the negative diode casing and the other wire to the terminal, then switch test wires. Meter should indicate one high and one low reading. Replace three negative diode wire assemblies (79) if readings are the same.

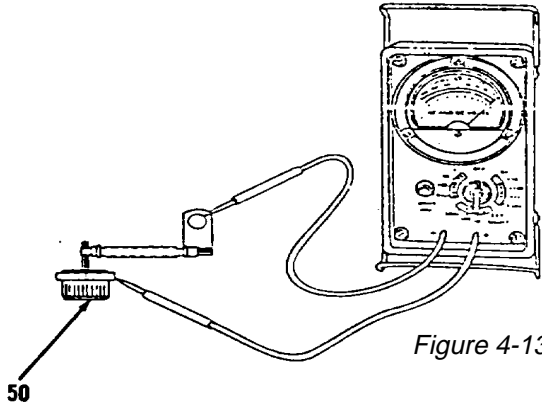


Figure 4-13.

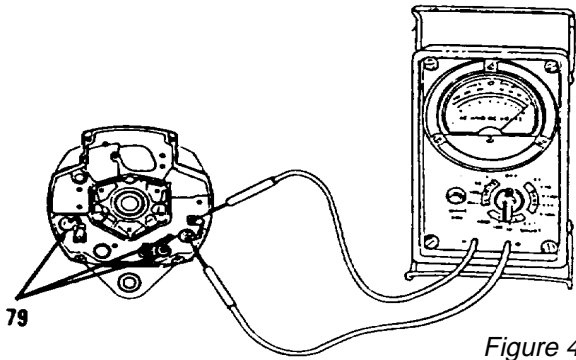


Figure 4-14.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

- 1. Using suitable driver and hammer, install bushing (78) to housing (80, Figure 4-10), if removed.

- 2. Pack new bearing (77) with clean lubricant.

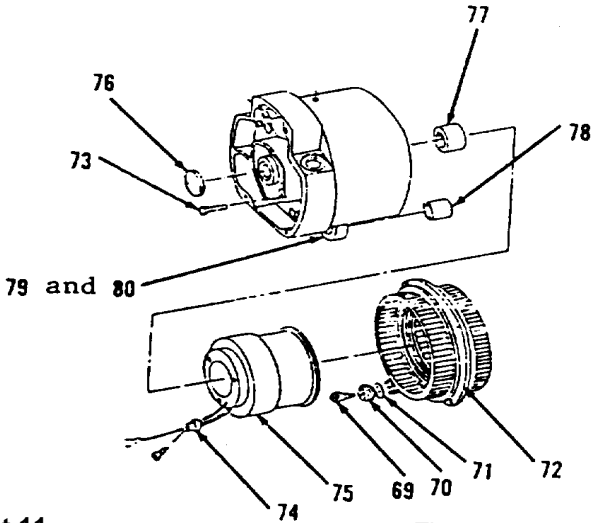


Figure 4-10.

Go to Sheet 11

CHARGING SYSTEM MAINTENANCE.

4-4. Alternator (Delco). (Sheet 11 of 18)

ASSEMBLY

- 3. Install new bearing (77), if removed. Press from the inside of housing (80) on the seal portion of new bearing (77) until new bearing (77) is a depth of 0.640 to 0.650 inch.
- 4. Using lubricant, fill housing (80, Figure 4-15) reservoir half full. Arrange lubricant so a portion will touch bearing (77).
- 5. Install new plug (76, Figure 4-10), tapping evenly with soft hammer.
- 6. Using lubricant, lubricate grommet (74) lightly.
- 7. Position field coil (75). Pull field coil (75) wires through bore in housing (80). Seat grommet (74) in hole and align field coil (75) mounting holes.
- 8. Install three screws (73).
- 9. Install new insulator (71), new grommet (70) and three new terminals (69) to stator (72), if removed.
- 10. Using lubricant, lubricate new grommet (70) lightly.
- 11. Position stator (72) aligning matchmarks.
- 12. Install stator (72) by pulling stator (72) wires through bore in housing (80). Seat new grommet (70) in bore, if removed.

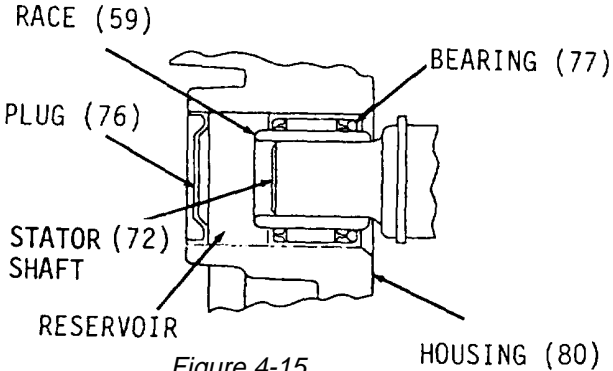


Figure 4-15.

Go to Sheet 12

CHARGING SYSTEM MAINTENANCE. (cont)**4-4. Alternator (Delco). (Sheet 12 of 18)****ASSEMBLY (cont)**

13. Using lubricant, lubricate new seal (67, Figure 16). Apply lubricant to new seal (67) lip and cavity between new seal (67) lip and st casing.
14. Install new seal (67) with lip of new seal (67) facing bearing (66).
15. Using clean grease, pack bearing (66).
16. Install bearing (66).
17. Using lubricant, lubricate new seal (63). Apply new seal (63) lip and fill cavity between the new seal (63) lip and the steel cavity.
18. Install new seal (63) in retainer (62) with lip of new seal (63) facing bearing (66).

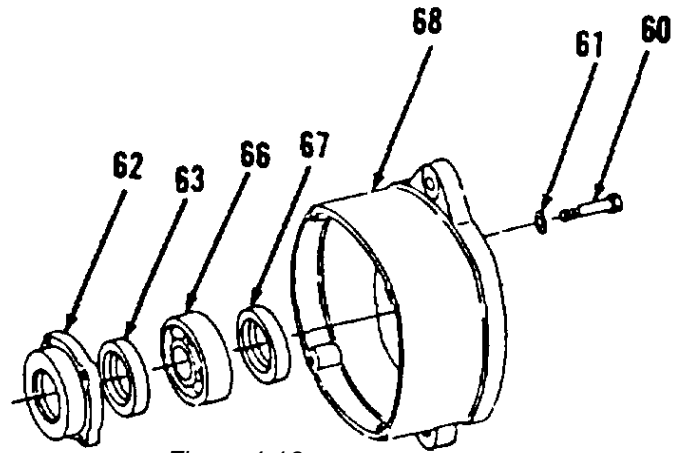


Figure 4-16.

Go to Sheet 13

CHARGING SYSTEM MAINTENANCE.

4-4. Alternator (Delco). (Sheet 13 of 18)

ASSEMBLY

- 19. Install race (59, Figure 4-17), if removed. Press on rotor (57) shaft until depth of 0.145 to 0.150 inch is made.
- 20. Install collar (65) through new seal (63) in retainer (62).
- 21. Using lubricant, lubricate retainer (62), collar (65) and new gasket (64). Fill reservoir between retainer (62) and collar (65) three-quarters full so at least a portion will contact bearing (66) after assembly. Position in frame (68).
- 22. Install four washers (61) and screws (60).
- 23. Using a suitable press, support collar (65) and press rotor (57) into retainer (62).
- 24. Install collar (58) on rotor (57).

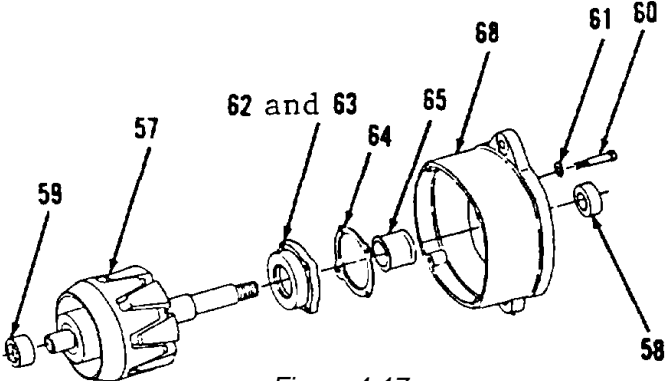


Figure 4-17.

Go to Sheet 14

CHARGING SYSTEM MAINTENANCE. (cont)

4-4. Alternator (Delco). (Sheet 14 of 18)

ASSEMBLY (cont)

- 25. Position items 68 thru 57 as an assembly on items 80 thru 69 as an assembly (Figure 4-7), aligning matchmarks.
- 26. Install, carefully sliding rotor (57) through stator (72) onto field coil (75) in housing (80).
- 27. Install four washers (56) and screws (55).
- 28. Install lockwasher (54) and screw (53).
- 29. Install plug (52).
- 30. Install three positive diode wire assemblies (50, Figure 4-6), if removed, at terminals. Press into heat sink (51).
- 31. Install three insulators (49) and studs (48).

NOTE

The use of silicone grease between insulation and housing will help promote heat transfer.

- 32. Using silicone grease, coat insulator (47) lightly.
- 33. Position insulator (47) on heat sink (51).

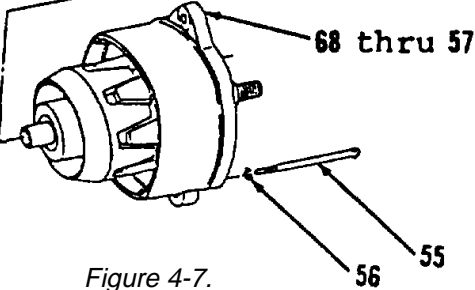
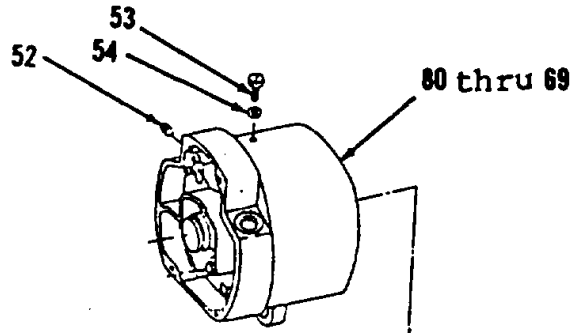


Figure 4-7.

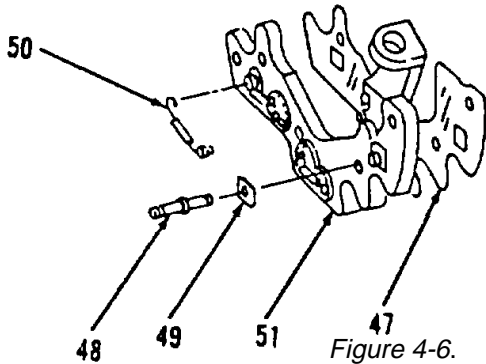


Figure 4-6.

Go to Sheet 15

CHARGING SYSTEM MAINTENANCE.

4-4. Alternator (Delco). (Sheet 15 of 18)

ASSEMBLY

- 34. Position items 51 thru 47 as an assembly (Figure 4-5).
- 35. Install three insulators (39), washers (38), lockwashers (37) and bolts (36) loosely.
- 36. Tighten nut (41). Stud (45) must be properly seated.
- 37. Tighten three bolts (36).
- 38. Install new gasket (46), stud (45), new gasket (44), washer (43), lockwasher (42), nut (41) and stud (40) loosely.
- 39. Install insulator (35, Figure 4-4).
- 40. Position regulator (34).
- 41. Install three washers (33), two lockwashers (32 and 31) and screws (30).

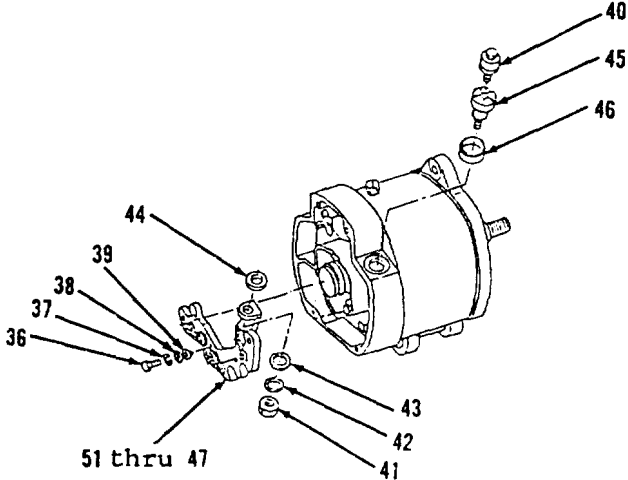


Figure 4-5.

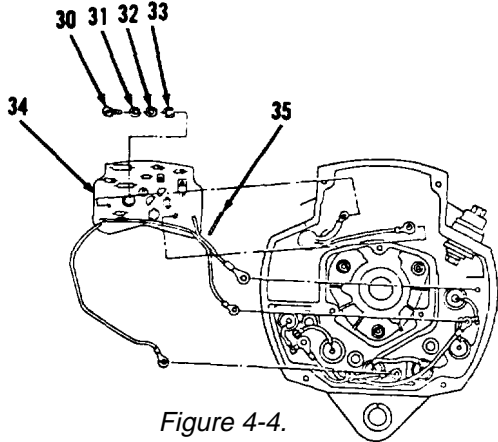


Figure 4-4.

Go to Sheet 16

CHARGING SYSTEM MAINTENANCE. (cont)

4-4. Alternator (Delco). (Sheet 16 of 18)

ASSEMBLY (cont)

- 42. Connect three negative diode wire assemblies (79, Figure 4-3) at terminals.
- 43. Connect three positive diode wire assemblies (50) at terminals.
- 44. Connect three stator wire assemblies (72) at terminals.
- 45. Connect three regulator wire assemblies (34) at terminals.
- 46. Connect two field coil wire assemblies (75) at terminals.
- 47. Install lockwasher (29) and screw (28).
- 48. Install lockwasher (27) and nut (26).
- 49. Connect wire assembly (25) at terminal.

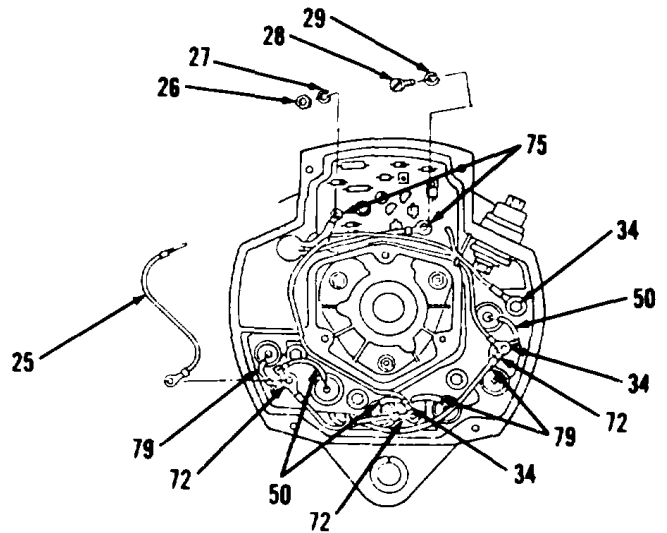


Figure 4-3.

Go to Sheet 17

CHARGING SYSTEM MAINTENANCE.

4-4. Alternator (Delco). (Sheet 17 of 18)

ASSEMBLY

- 50. Install three nuts (24, Figure 4-2).
- 51. Install insulator (23), washers (22 and 21) and screw (20).
- 52. Install grommet (19).
- 53. Install bushing (18), stud (17), insulator (16), nut (15), washer (14), nut (13) and cap (12).
- 54. Position new gasket (11) and cover (10, Figure 4-1).
- 55. Install four lockwashers (9), screws (8), three lockwashers (7) and screws (6).
- 56. Install plate (5), four lockwashers (4) and screws (3).
- 57. Install slinger (2) and fan (1).

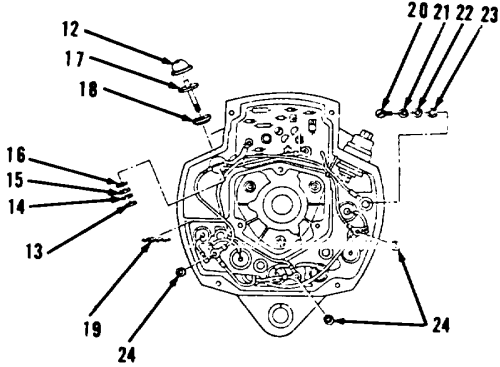


Figure 4-2.

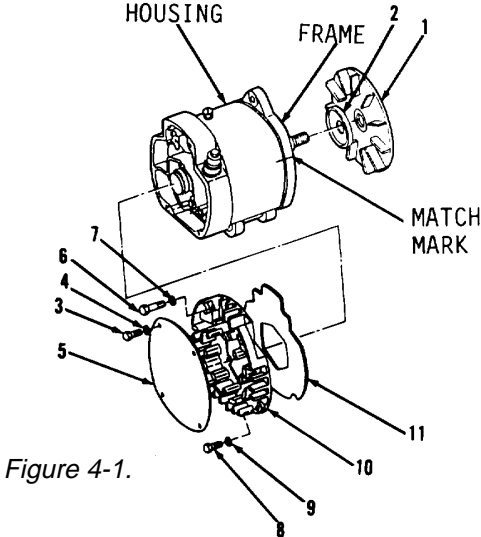


Figure 4-1.

Go to Sheet 18

CHARGING SYSTEM MAINTENANCE. (cont)**4-4. Alternator (Delco). (Sheet 18 of 18)****ASSEMBLY (cont)****NOTE**

Rotor may lose magnetism or a new rotor may need to be magnetized.

58. Using 24 volt battery, magnetize rotor (57). Connect positive wire on stud (40) and negative wire to housing (80, Figure 4-18). Connect third jumper wire to the positive battery jumper wire. Momentarily touch the other end of the third jumper wire to stud (17). This will magnetize rotor (57).

NOTE

Return 130G Grader to original equipment condition.

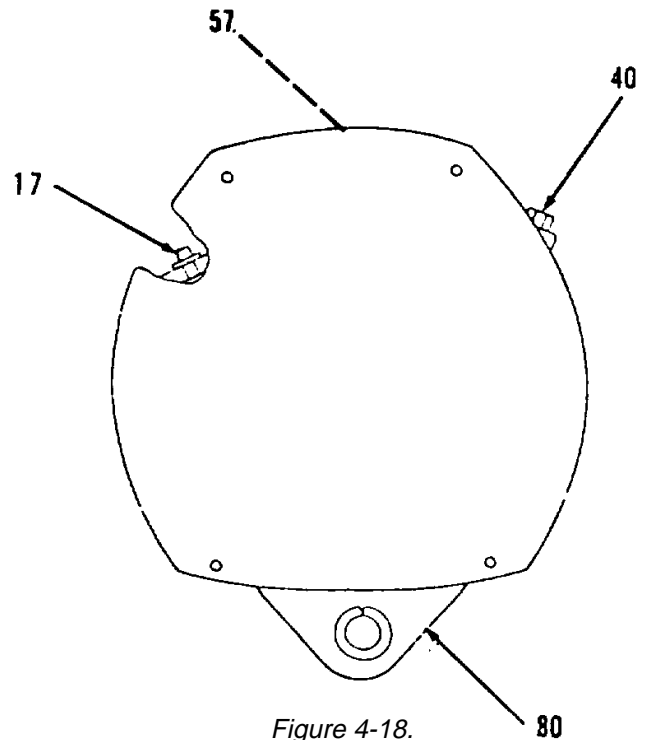


Figure 4-18.

End of Task

CHARGING SYSTEM MAINTENANCE.

4-5. Alternator (Bosch). (Sheet 1 of 12)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Soldering iron (180 watt)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

Multimeter
24 volt (3 amp) test
Carbon pile
Test bench
Ammeter
Voltmeter

Special Environmental Conditions

None

General Safety Instructions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Caulking compound, Item 13,
Appendix C
Bearing grease, Item 22,
Appendix C
Solder
Small tags, Item 43, Appendix C

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Alternator removed.

Go to Sheet

CHARGING SYSTEM MAINTENANCE. (cont)

4-5. Alternator (Bosch). (Sheet 2 of 12)

DISASSEMBLY

- 1. Position alternator in soft jawed vise.

NOTE

Using scribe, matchmark frames and stator to aid in assembly.

- 2. Remove nut (1), two washers (2), fan (3) and key (4) from inner frame (27, Figure 4-19).
- 3. Remove two screws (5), washers (6) and cover (7, Figure 4-20).

NOTE

Testing of capacitor is necessary prior to removal.

- 4. Test capacitor (12). Refer to Testing, step 1.
- 5. Remove nut (8) and lockwasher (9).

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

- 6. Disconnect capacitor (12) wire assembly at terminal.
- 7. Remove screw (10), lockwasher (11) and capacitor (12) from frame (54).

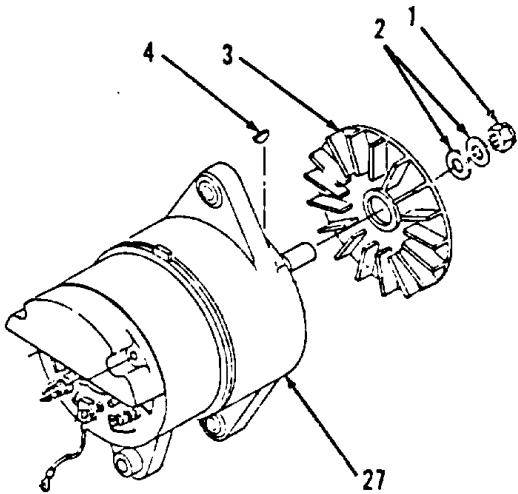


Figure 4-19.

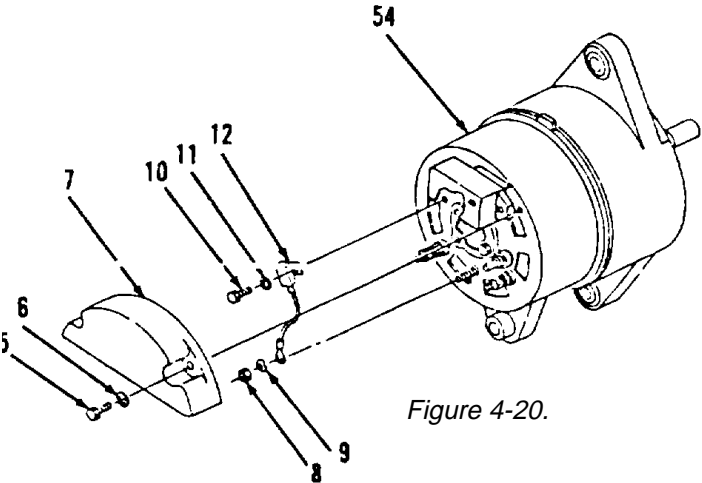


Figure 4-20.

Go to Sheet 3

CHARGING SYSTEM MAINTENANCE.**4-5. Alternator (Bosch). (Sheet 3 of 12)****DISASSEMBLY****NOTE**

Testing of regulator is necessary prior to removal.

8. Test regulator (17, Figure 4-21). Refer to Testing, step 4.
9. Remove two screws (13) and lockwashers (14).
10. Separate regulator (17) from frame (54) exposing field coil (24) wire assembly and diode assembly (39) wire assembly terminals.
11. Remove two screws (15) and lockwashers (16).
12. Disconnect field coil (24) wire assembly and diode assembly (39) wire assembly at terminals from regulator (17).
13. Remove regulator (17) from frame (54).

NOTE

Testing of field coil is necessary prior to further disassembly of alternator.

14. Test field coil (24). Refer to Testing, step 6.

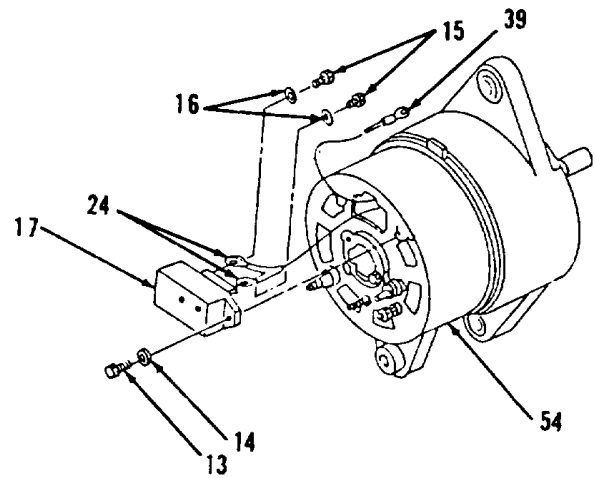


Figure 4-21.

Go to Sheet 4

CHARGING SYSTEM MAINTENANCE. (cont)

4-5. Alternator (Bosch). (Sheet 4 of 12)

DISASSEMBLY (cont)

15. Remove four screws (18) and washers (19, Figure 4-22).

CAUTION

Use care not to damage stator with screwdrivers when prying from frames.

16. Using two screwdrivers, separate items 20 thru 27 as an assembly from items 28 thru 54 as an assembly.

17. Position items 20 thru 27 as an assembly in arbor press.

CAUTION

Removal of rotor from frame may cause destruction of bearing.

18. Using an arbor press, remove rotor (20, Figure 4-23).

19. Remove spacer (21) from items 22 thru 27 as an assembly.

CAUTION

Epoxy putty covers wire assembly. Care must be taken when removing this epoxy so wire assembly is not damaged.

20. Disconnect field coil (24) wire assembly at two terminals from inner frame (27, Figure 4-24).

21. Remove six screws (22) and lockwashers (23).

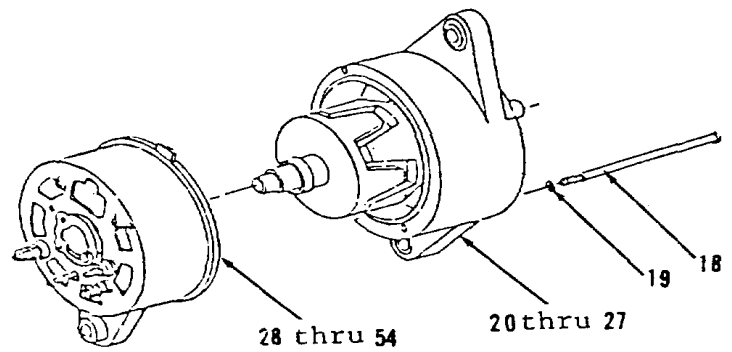


Figure 4-22.

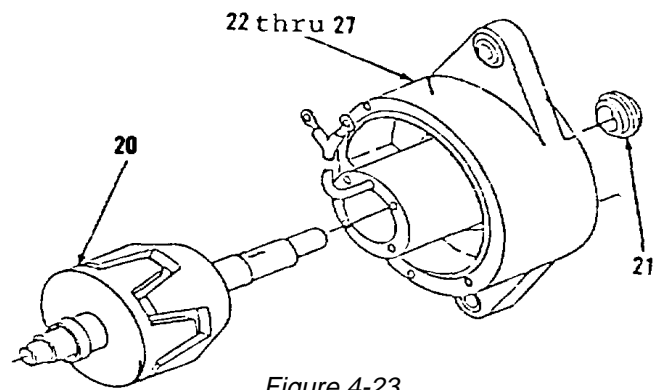


Figure 4-23.

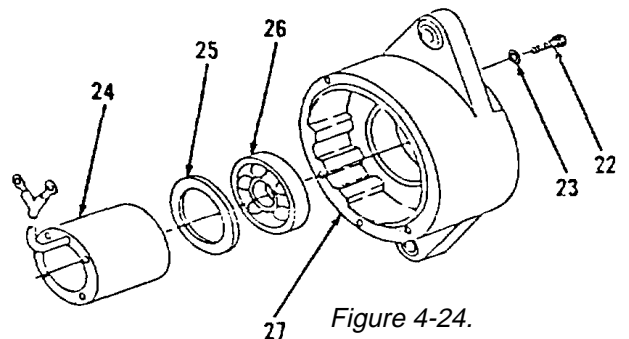


Figure 4-24.

Go to Sheet 5

CHARGING SYSTEM MAINTENANCE.

4-5. Alternator (Bosch). (Sheet 5 of 12)

DISASSEMBLY

- 22. Remove field coil (24) from inner frame (27). Remove all epoxy putty from inner frame (27) groove.
- 23. Remove ring (25) and bearing (26).
- 24. Unsolder three stator (28) wires from three diode assembly (39, Figure 4-25) terminals.
- 25. Using two screwdrivers, pry apart stator (28) and remove from frame (54, Figure 4-26). Be careful not to damage stator (28).

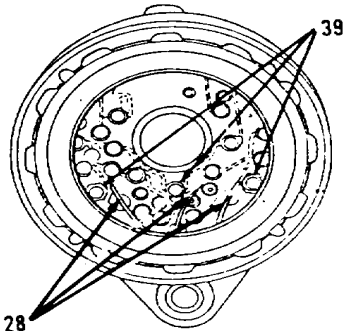


Figure 4-25.

NOTE

Testing of diode assembly is necessary prior to further disassembly.

- 26. Remove diode assembly (39). Refer to Testing, step 10.
- 27. Remove nut (29) and lockwasher (30) from frame (54).
- 28. Remove two nuts (31) and lockwashers (32).
- 29. Remove two nuts (33), lockwashers (34), washer (35) and insulator (36).
- 30. Heat sleeve (37) with soldering iron while gripping edge of sleeve (37, Figure 4-27) with needle nose pliers.
- 31. Unsolder and remove sleeve (37).

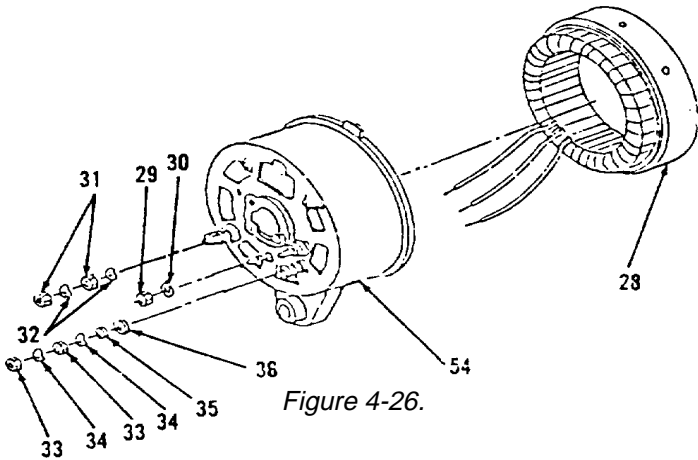


Figure 4-26.

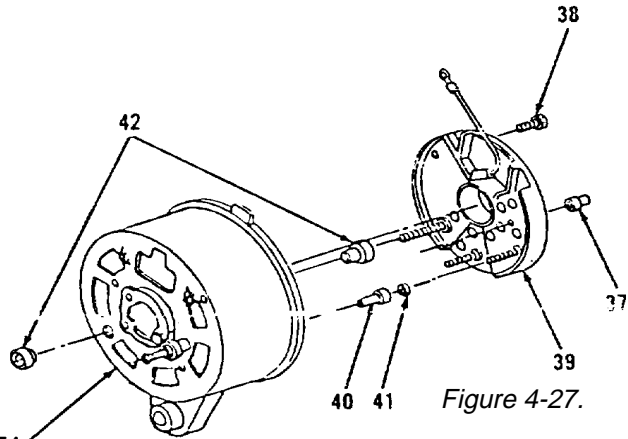


Figure 4-27.

Go to Sheet 6

CHARGING SYSTEM MAINTENANCE. (cont)

4-5. Alternator (Bosch). (Sheet 6 of 12)

DISASSEMBLY (cont)

- 32. Remove two screws (38) from diode assembly (39, Figure 4-27).
- 33. Remove diode assembly (39) from frame (54).
- 34. Remove insulator (40) and washer (41).
- 35. Remove two bushings (42).
- 36. Remove nut (43), lockwasher (44), washer (45), insulators (46 and 47), pin terminal (48) and bushing (49) from frame (54, Figure 4-28).
- 37. Remove three screws (50), lockwashers (51) and ring (52).
- 38. Remove bearing (53).

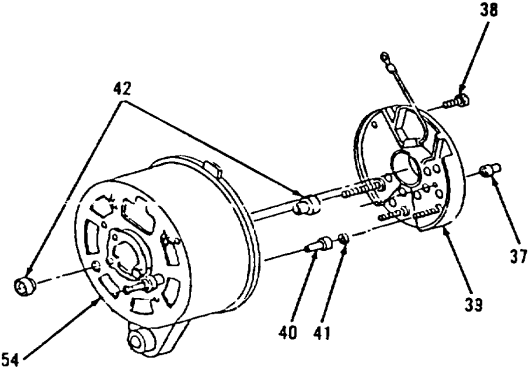


Figure 4-27.

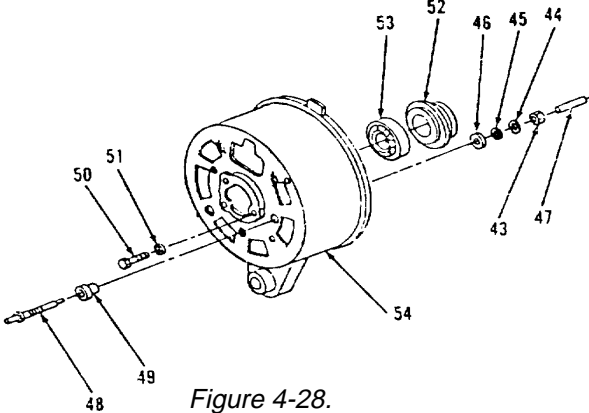


Figure 4-28.

TESTING

WARNING

Discharge capacitor after testing. This will prevent accidental igniting of flammable fluids or fuels caused by a spark discharged by capacitor. Failure to follow this procedure may cause INJURY.

- 1. Test capacitor (12) on alternator. Disconnect capacitor (12) wire assembly from (D+) terminal. Connect ohmmeter between capacitor (12) wire assembly and terminal (B-). Replace capacitor (12, Figure 4-29) if meter reading is not 200K ohms or more.

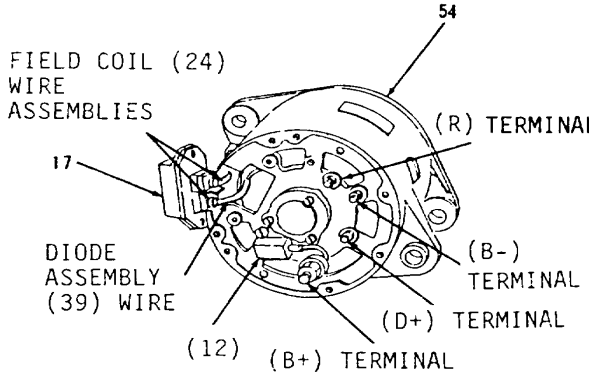


Figure 4-29.

Go to Sheet 7

CHARGING SYSTEM MAINTENANCE.

4-5. Alternator (Bosch). (Sheet 7 of 12)

TESTING

- 2. Discharge capacitor (12) ground .
- 3. Set up alternator on test bench connecting voltmeter, ammeter, battery and carbon pile (Figure 4-30).
- 4. Test regulator (17, Figure 4-29) on alternator.

CAUTION

Observe correct polarity when connecting voltmeter. Damage to vehicle may result if you fail to follow this procedure.

- 5. Set load current to 7 amps by adjusting carbon pile at a test speed of 5000 rpm. If after one minute, voltage does not read between 26.5 volts and 28.5 volts, replace regulator (17).
- 6. Test field coil (24) for opens or shorts. Removal of only regulator (17) is necessary. Connect ohmmeter to two wire assemblies of field coil (24). Replace field coil (24) if test s not 7 to 9 ohms.
- 7. Test field coil (24) for shorts to frame. Connect ohmmeter to the (B-) terminal and then to each of the two field coil (24) wire assemblies. If readings are not high, field coil (24) is shorting to frame and replacement is necessary.

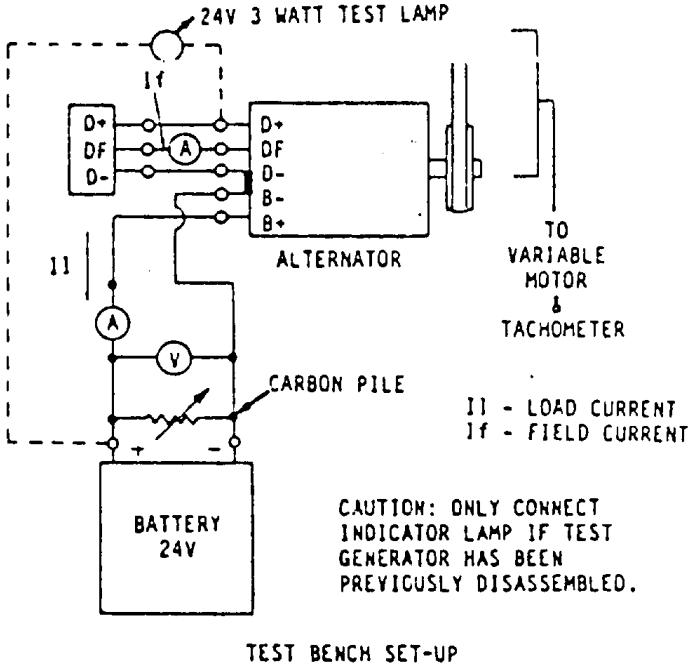


Figure 4-30.

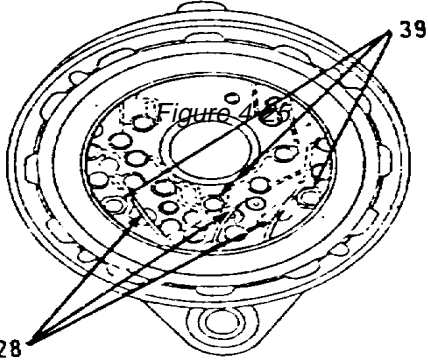
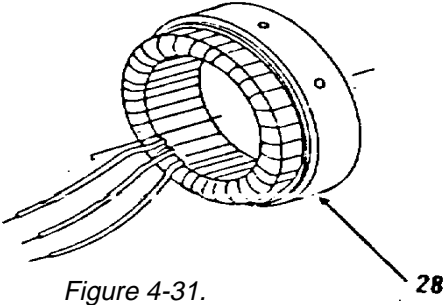
Go to Sheet 8

CHARGING SYSTEM MAINTENANCE. (cont)

4-5. Alternator (Bosch). (Sheet 8 of 12)

TESTING (cont)

- 8. Test stator (28, Figure 4-31) for windings continuity. Using ohmmeter, take three readings between pairs of the three stator (28) wires. Replace if readings are not 0.15 to 0.25 ohm.
- 9. Test stator (28) for shorts to frame. Using ohmmeter, touch one lead to stator (28) frame and touch the other to each of the three stator (28) wires. Readings should be very high. If not, replace stator (28).
- 10. Perform minus diode test. Using ohmmeter, connect test wire to frame (54) and the other wire to each of the terminals on the diode assembly (39) from where the three stator (28) wires were disconnected. Then switch the test wires from diode assembly (39) terminals to frame (54). If one high and one low reading are not obtained, replace diode assembly (39, Figure 4-25).
- 11. Perform positive diode test the same way as minus diode test, except connect one lead to the (B+) terminal (Figure 4-30). Results should be the same.
- 12. Perform excitation diode test, connecting one test wire to (D+) terminal.

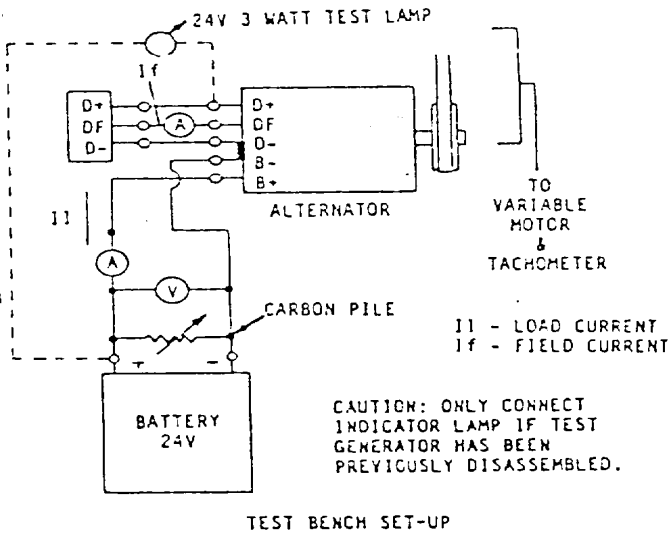


CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.



TEST BENCH SET-UP

Go to Sheet 9

Figure 4-30.

CHARGING SYSTEM MAINTENANCE.

4-5. **Alternator (Bosch).** (Sheet 9 of 12)

ASSEMBLY

- 1. Install bearing (53) in frame (54, Figure 4-28). Apply bearing grease, if necessary.
- 2. Position ring (52) over bearing (53).
- 3. Install three lockwashers (51) and screws (50).
- 4. Install bushing (49), pin terminal (48), insulators (47 and 46), washer (45), lockwasher (44) and nut (43) in hole of frame (54) marked "R".

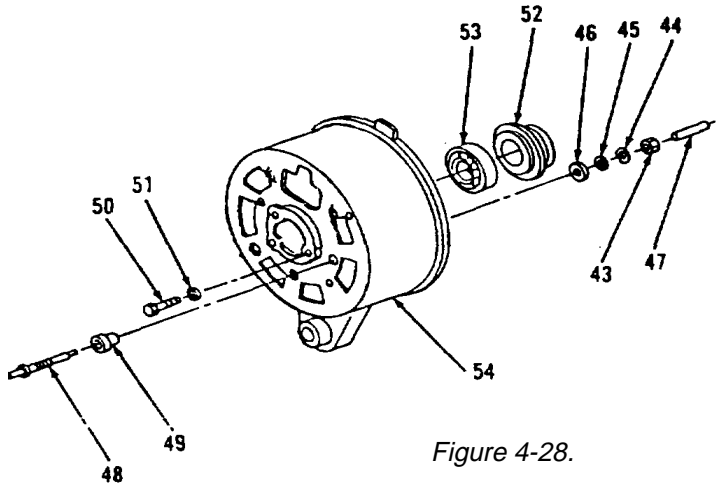


Figure 4-28.

- 5. Position two bushings (42) in hole of frame (54, Figure 4-32) marked "B+".
- 6. Position washer (41) and insulator (40) in hole of frame (54) marked "D+".
- 7. Install diode assembly (39) in frame (54).
- 8. Install two screws (38) securing diode assembly (39) to frame (54).

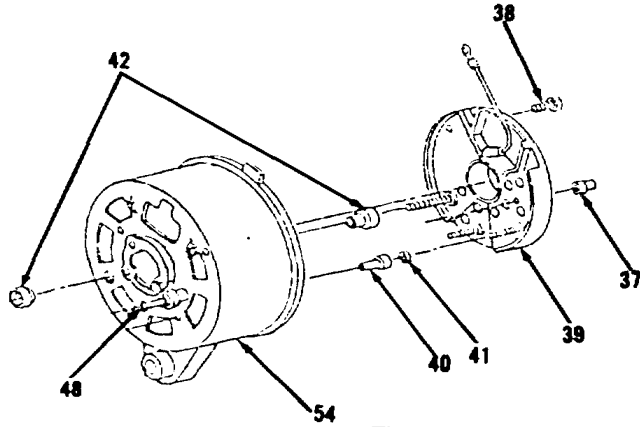


Figure 4-32.

- 9. Position sleeve (37) on end of pin terminal (48) and solder.
- 10. Install insulator (36), washer (35), two lockwashers (34) and nuts (33, Figure 4-26) on terminal stud marked "B+".
- 11. Install two lockwashers (32) and nuts (31) on terminal stud marked "B+".

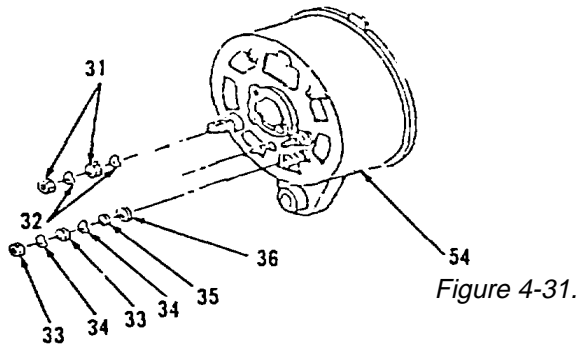


Figure 4-31.

Go to Sheet 12

CHARGING SYSTEM MAINTENANCE. (cont)

4-5. **Alternator (Bosch).** (Sheet 10 of 12)

ASSEMBLY (cont)

12. Install lockwasher (30) and nut (29, Figure 4-26) on terminal stud marked "B-".
13. Install stator (28) on frame (54) and align matchmarks made earlier.
14. Position three stator (28) wires on diode assembly (39, Figure 4-25) terminal and solder.
15. Install bearing (26) and ring (25) in inner frame (27, Figure 4-24).
16. Position field coil (24) in inner frame (27) and install field coil (24) wire assembly. Secure in deep groove of inner frame (27) with caulking compound.
17. Install six lockwashers (23) and screws (22).
18. Install spacer (21, Figure 4-23).
19. Position rotor (20) in press.
20. Install rotor (20) in inner frame (27), supporting spacer (21). Use 24 volt (3 watt) test lamp of 3 watt resistor and connections to magnetize rotor (20).

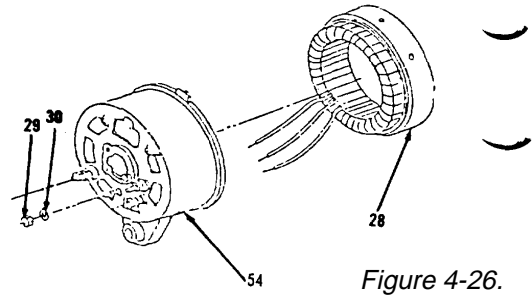


Figure 4-26.

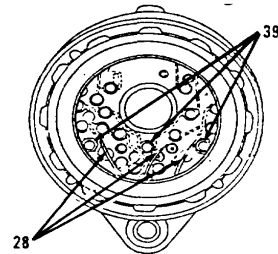


Figure 4-25.

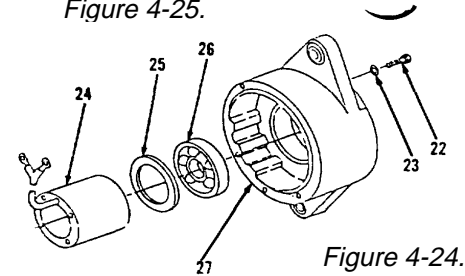


Figure 4-24.

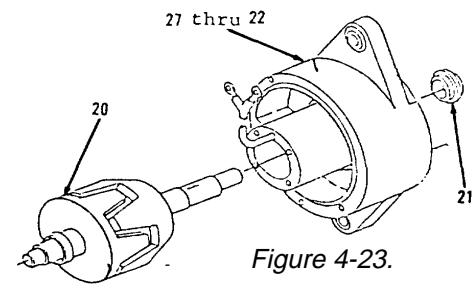


Figure 4-23.

Go to Sheet 11

CHARGING SYSTEM MAINTENANCE. (cont)

4-5. Alternator (Bosch). (Sheet 11 of 12)

ASSEMBLY

21. Install items 27 thru 20 as an assembly on items 54 thru 28 as an assembly (Figure 4-22) and align matchmarks made earlier.
22. Install four washers (19) and screws (18) loosely.
23. Align stator (28) and rotor (20, Figure 4-33). Position three 0.001 inch feeler gages.
24. Tighten four screws (18) to 3 to 4 ft-lb torque. Remove three feeler gages.
25. Position one of two field coil (24) wire assemblies on regulator (17, Figure 4-21) terminal.
26. Position remaining field coil (24) wire assembly and diode assembly (39) wire assembly on other regulator (17) terminal.
27. Install two lockwashers (16) and screws (15).
28. Position regulator (17) on rear of frame (54).
29. Install two lockwashers (14) and screws (13).

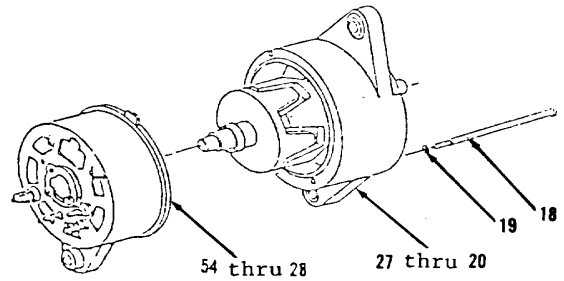


Figure 4-22.

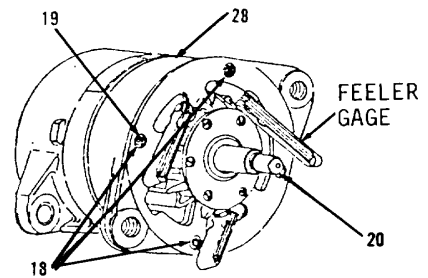


Figure 4-33.

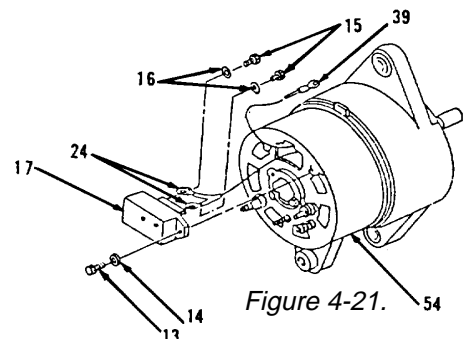


Figure 4-21.

Go to Sheet 12

CHARGING SYSTEM MAINTENANCE. (cont)

4-5. **Alternator (Bosch).** (Sheet 12 of 12)

ASSEMBLY (cont)

30. Install capacitor (12), lock-washer (11) and screw (10) on rear of frame (54, Figure 4-20).
31. Install capacitor (12) wire assembly, lockwasher (9) and nut (8) on terminal stud marked "D+".
32. Install cover (7), two washers (6) and screws (5).
33. Install key (4), fan (3), two washers (2) and nut (1) on inner frame (27, Figure 4-19).

NOTE

Return 130G Grader to original equipment condition.

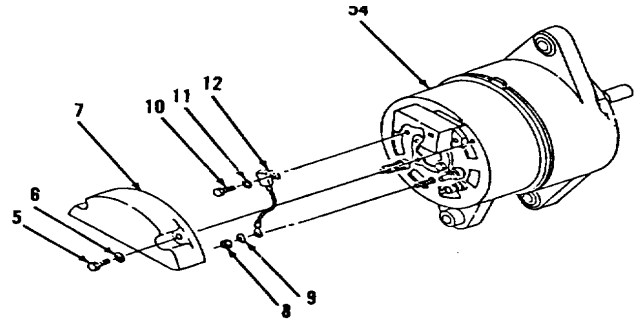


Figure 4-20.

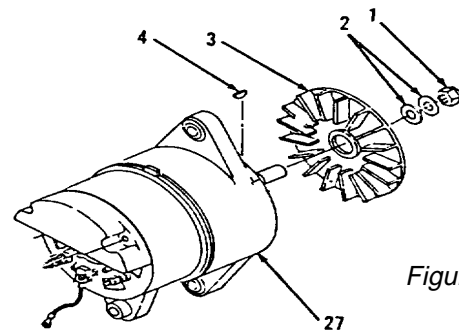


Figure 4-19.

End of Task

Section III. STARTING SYSTEM TROUBLESHOOTING.

4-6. GENERAL INFORMATION. This section lists the common starting system malfunctions which may occur during the operation of the 130G Grader. You should perform the tests, inspections and corrective actions in the order listed. Follow the troubleshooting procedures listed below step-by-step until you can go no further.

4-7. STARTING SYSTEM TROUBLESHOOTING PROCEDURES. This section cannot list all possible malfunctions, nor can it list all possible tests, inspections or corrective actions. If a malfunction is not listed, contact your supervisor.

STARTING SYSTEM TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

ENGINE CRANKSHAFT WILL NOT TURN WHEN THE START SWITCH IS ON.

Step 1. Check the starting motor solenoid (Figure 4-34).

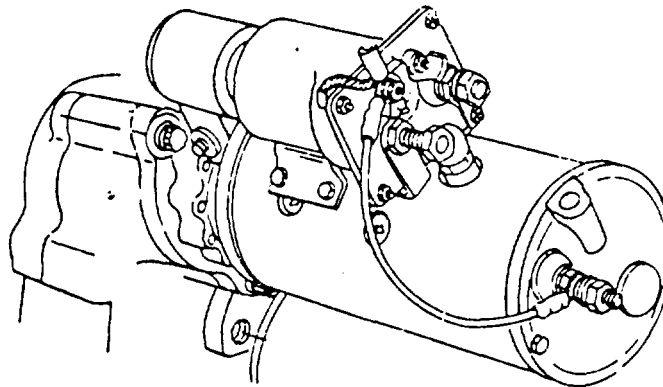


Figure 4-34.

If the solenoid is damaged or defective, service or replace. Refer to paragraph 4-10.

Step 2. Check the starting motor.

If the starting motor is damaged or defective, service or replace. Refer to paragraphs 4-9, 4-11 and 4-12.

Section IV. STARTING SYSTEM MAINTENANCE.

4-8. STARTING SYSTEM MAINTENANCE PROCEDURES.

WARNING

Before working on the starting system, turn disconnect switch off. Then disconnect the right side battery cable (positive (+)) first.

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the starting system and its components in good repair.

b. This section is arranged by functional group code and provides a list of starting system components to be maintained and step-by-step maintenance procedures.

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| <u>Title</u> | <u>Paragraph</u> | <u>Page</u> |
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| Starting Motor Solenoid (Prestolite) | 4-10 | 4-52 |
| Starting Motor (Prestolite) | 4-11 | 4-56 |
| Starting Motor (Bosch) | 4-12 | 4-65 |

STARTING SYSTEM MAINTENANCE.

4-9. Starting Motor (Delco-Remy). (Sheet 1 of 15)

This task covers:

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

INITIAL SETUP:

| | |
|--|--|
| <p>1</p> <p><u>Applicable Configurations</u> All</p> <p><u>Tools</u> <u>General Mechanic's Tool Kit:</u> Automotive (NSN 5180-00-177-7033)</p> <p><u>Test Equipment</u> Armature tester (growler) Ohmmeter</p> <p><u>Materials/Parts</u> Dry cleaning solvent, Item 15, Appendix C Clean cloths, Item 41, Appendix C Small tags, Item 43, Appendix C General purpose grease, Item 26, Appendix C Thread sealant, Item 60, Appendix C Sandpaper, Item 65, Appendix C Preformed packings, Items 2, 19, 38, 45, 53 Seals, Items 13, 54 Cups, Items 39, 55</p> | <p><u>Personnel Required</u> Construction equipment repairer MOS 62B</p> <p><u>References</u> TM 5-3805-261-10 TM 5-3805-261-20</p> <p><u>Special Environmental Conditions</u> None</p> <p><u>General Safety Instructions</u> None</p> <p><u>Torques</u> Except for special torques shown, all fasteners are tightened to standard torques. Refer to Appendix E.</p> |
|--|--|

Troubleshooting References
None

Equipment Condition
TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Starter removed.
Solenoid removed.

STARTING SYSTEM MAINTENANCE. (cont)

4-9. **Starting Motor (Delco-Remy). (Sheet 2 of 15)**

DISASSEMBLY

1. Remove plug (1) and preformed packing (2) from housing (57, Figure 4-35). Discard preformed packing (2).
2. Remove lock nut (3).
3. Remove items 4 thru 10 as an assembly from housing (57).
4. Remove snap ring (4), retainer (5), spring (6), retainer (7), boot (8) and washer (9) from shaft of plunger (10, Figure 4-36).

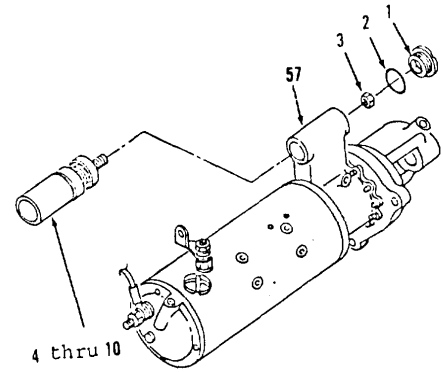


Figure 4-35.

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

5. Disconnect wire assembly (11, Figure 4-37).
6. Remove two plugs (12) and seals (13) from housing (66). Discard two seals (13).
7. Remove two screws (14, Figure 4-38).

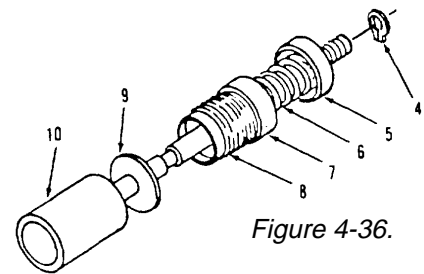


Figure 4-36.

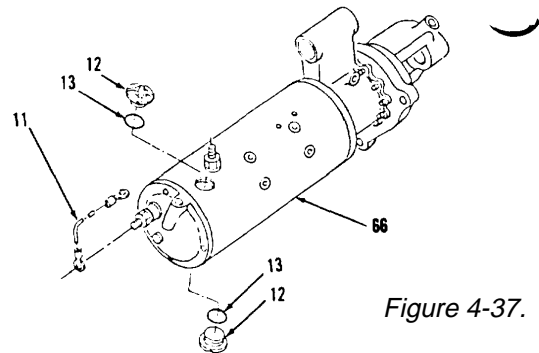


Figure 4-37.

NOTE

Starting motor end frame and housings must be matchmarked before disassembly to aid in assembly.

8. Using scribe, matchmark end frame (22) and housing (66).

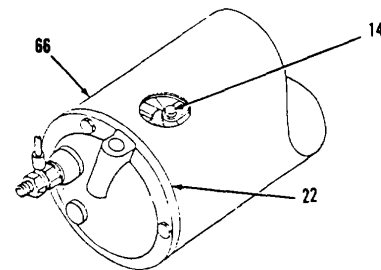


Figure 4-38.

Go to Sheet 3

STARTING SYSTEM MAINTENANCE.

4-9. **Starting Motor (Delco-Remy).** (Sheet 3 of 15)

DISASSEMBLY

9. Remove four bolts (15, Figure 4-39).
10. Remove items 16 thru 34 as an assembly from housing (66).
11. Remove nut and stud (16) and lockwasher (17) from stud of plate (34, Figure 4-40).
12. Remove screw (18).
13. Remove items 19 thru 22 as an assembly from items 23 thru 34 as an assembly (Figure 4-41).

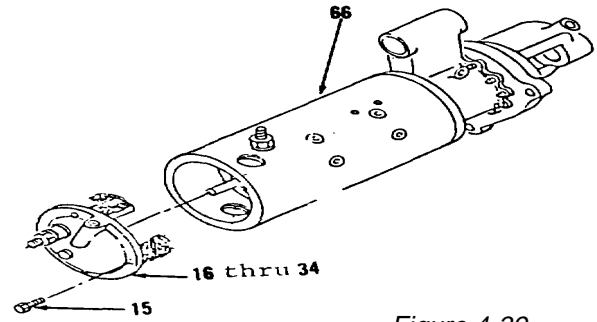


Figure 4-39.

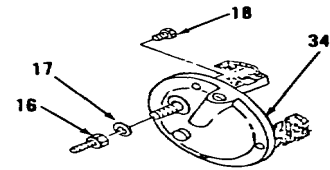


Figure 4-40.

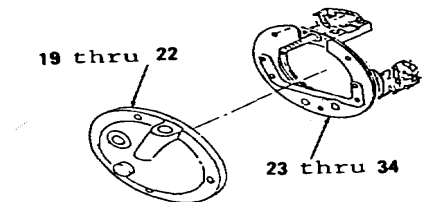


Figure 4-41.

Go to Sheet 4

STARTING SYSTEM MAINTENANCE. (cont)

4-9. **Starting Motor (Delco-Remy).** (Sheet 4 of 15)

DISASSEMBLY (cont)

14. Remove and discard preformed packing (19) and insulator (20) from end frame (22, Figure 4-42).

NOTE

Removal of bushing from end frame will cause destruction of bushing. Remove bushing only if inspection indicates replacement is necessary.

15. Inspect bushing (21) and if necessary, using a suitable driver and press, remove bushing (21) from end frame (22).
16. Remove washer (23) from plate (34).
17. Remove two screws (24, Figure 4-43).

NOTE

Mark locations of brushes to aid in installation.

18. Separate four brushes (25) from brush holders (30).
19. Remove four screws (26), four screws (27), four spring guides (28), four springs (29), four brush holders (30), three plates (31), plate and stud (32) and three insulators (33) from plate (34).

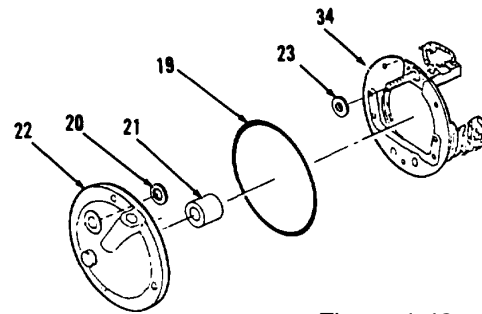


Figure 4-42.

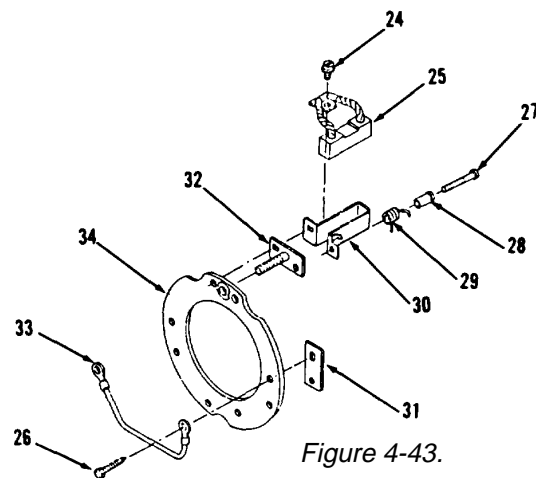


Figure 4-43.

Go to Sheet 5

STARTING SYSTEM MAINTENANCE.

4-9. **Starting Motor (Delco-Remy).** (Sheet 5 of 15)

DISASSEMBLY

- 20. Remove washer (35) from shaft of armature (46, Figure 4-44).
- 21. Remove screw (36) and five screws (37) from housing (42).
- 22. Separate housing (42) from housing (57).
- 23. Remove and discard preformed packing (38).
- 24. Drill hole in cup (39) and pry out of housing (42). Discard cup (39).
- 25. Remove wick (40).

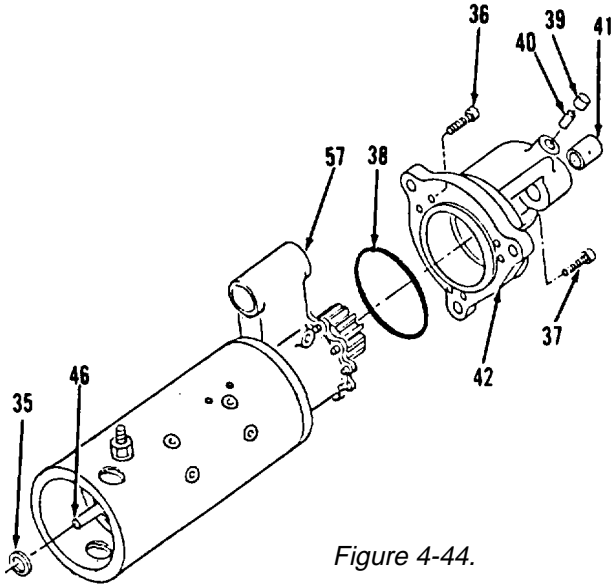


Figure 4-44.

NOTE

Removal of bushing from housing will cause destruction of bushing. Remove bushing only if inspection indicates replacement is necessary.

- 26. Inspect bushing (41) and if necessary, using a suitable driver and press, remove bushing (41) from housing (42).
- 27. Remove snap ring (43), shaft (44) and two preformed packings (45) from housing (57, Figure 4-45). Discard two preformed packings (45).
- 28. Remove armature (46) and spacer (47).
- 29. Remove drive (48) and lever (49) from housing (57).
- 30. Remove washer (50).

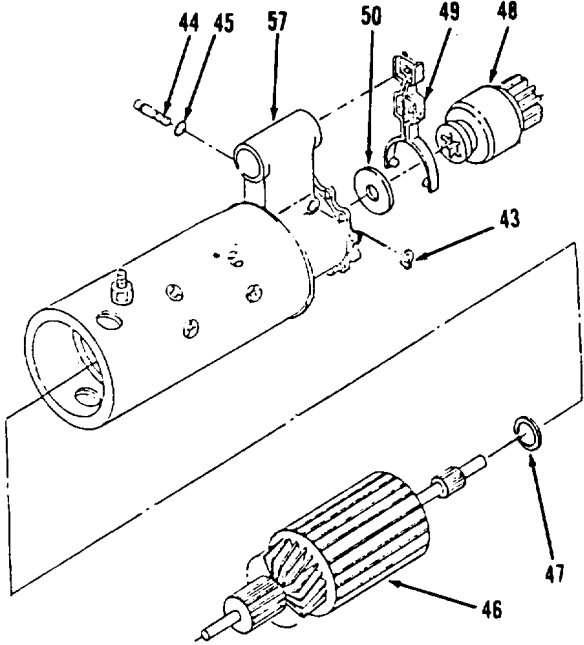


Figure 4-45.

Go to Sheet 6

STARTING SYSTEM MAINTENANCE. (cont)

4-9. **Starting Motor (Delco-Remy). (Sheet 6 of 15)**

DISASSEMBLY (cont)

- 31. Remove five bolts (51, Figure 4-46).
- 32. Separate housing (57) from housing (66).
- 33. Remove and discard preformed packing (52) and seal (53).
- 34. Drill hole in cup (54) and pry out of housing (57). Discard cup (54).
- 35. Remove wick (55).

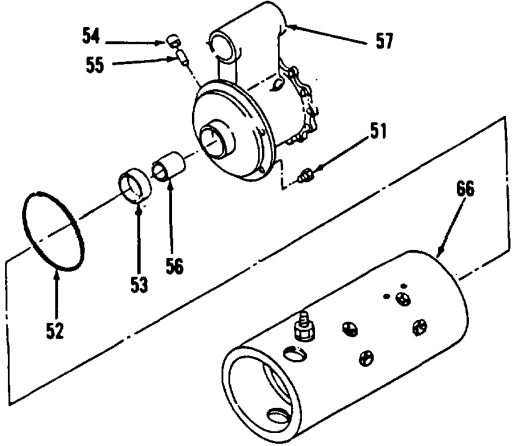


Figure 4-46.

NOTE

Removal of bushing from housing will cause destruction of bushing. Remove bushing only if inspection indicates replacement is necessary.

- 36. Inspect bushing (56) and if necessary, using a suitable driver and press, remove bushing (56) from housing (57).

Go to Sheet 7

STARTING SYSTEM MAINTENANCE.

4-9. Starting Motor (Delco-Remy). (Sheet 7 of 15)

DISASSEMBLY

37. Remove nut (58), washer (59) and two washers (60, Figure 4-47).

NOTE

Use press ram to exert pressure on wrench and screwdriver.

38. Using socket wrench and screwdriver attachment, remove eight pole shoe screws (61).
39. Remove four pole shoes (62).
40. Remove field coil (63).
41. Remove insulation (64) from housing (66).
42. Remove insulation bushing (65) from insulation (64).

CLEANING

1. Clean four brushes (25, Figure 4-48) with a dry cloth only. Do not permit dry cleaning solvent to contact brushes (25).

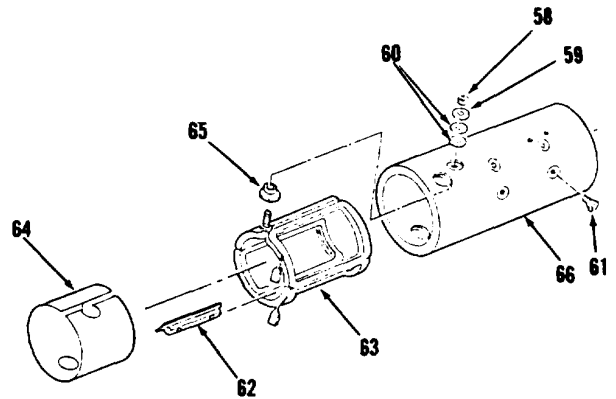


Figure 4-47.

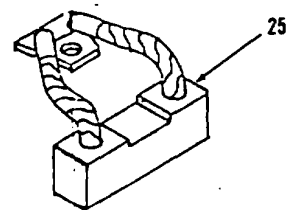


Figure 4-48.

Go to Sheet 8

STARTING SYSTEM MAINTENANCE. (cont)

4-9. Starting Motor (Delco-Remy). (Sheet 8 of 15)

CLEANING (cont)

WARNING

TOXIC/FLAMMABLE

Dry cleaning solvent, P-D-680, used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes and clothes. Do not breathe the vapors. Do not use near open flame or excessive heat. Do not smoke while using it. Failure to do so may cause INJURY. If you become dizzy while using cleaning solvent, immediately seek fresh air, and if necessary, medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash with water immediately and obtain medical help.

WARNING

HIGH VELOCITY AIR

Compressed air, used for cleaning purposes, must not exceed 30 psi. Safety glasses must be used when cleaning parts with compressed air. Failure to protect your eyes may cause INJURY and possible BLINDNESS. If you injure your eyes or if a foreign object is blown into your eyes, seek medical help immediately.

Go to Sheet 9

STARTING SYSTEM MAINTENANCE.

4-9. **Starting Motor (Delco-Remy). (Sheet 9 of 15)**

CLEANING

2. Remove loose particles from armature (46, Figure 5-49) with compressed air and wipe with a clean cloth dampened with dry cleaning solvent. Clean commutator lightly with sandpaper and remove all traces of dust with low pressure compressed air.
3. Clean all other parts. Refer to Chapter 2.

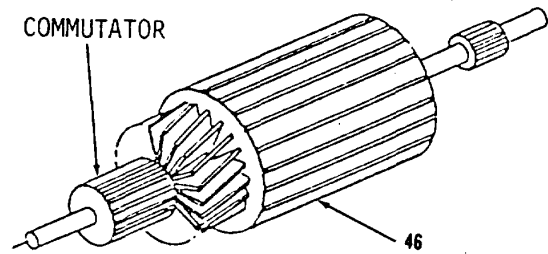


Figure 4-49.

INSPECTION

1. If any of four brushes (25) are worn more than half when compared to a new brush, replace all four brushes (25, Figure 4-50).
2. Check four holders (30, Figure 4-51) for dirt. Four brushes (25) must not bind in brush holders (30). Springs on brush holders (30) must hold brushes (25) firmly against commutator. Replace brush holders (30) if defective.
3. Inspect all other parts. Refer to Chapter 2.

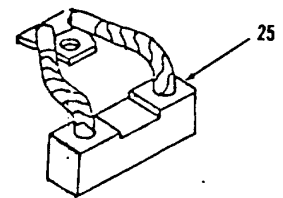


Figure 4-50.

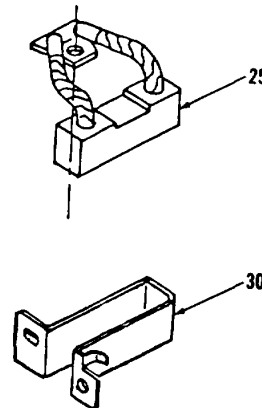


Figure 4-51.

Go to Sheet 10

STARTING SYSTEM MAINTENANCE. (cont)

4-9. **Starting Motor (Delco-Remy). (Sheet 10 of 15)**

ASSEMBLY

1. Position insulation bushing (65) and insulation (64) inside housing (66, Figure 4-47).
2. Install field coil (63) and position four pole shoes (62) inside housing (66).
3. Coat threads of eight pole shoe screws (61) with thread sealant and install.
4. Install two washers (60). washer (59) and nut (58).
5. Using suitable driver and press, install new bushing (56), if removed, in housing (57, Figure 4-46).
6. Saturate wick (55) with clean engine oil. Install wick (55) and new cup (54).
- 1 7. Install new seal (53).
8. Coat new preformed packing (52) with general purpose grease and install on housing (57).
9. Install housing (57) on housing (66).
10. Install five bolts (51).

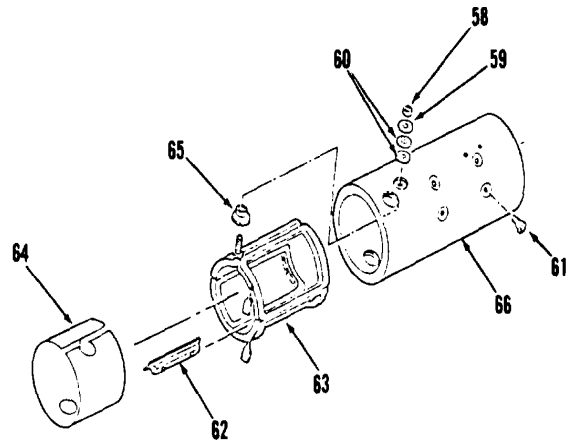


Figure 4-47.

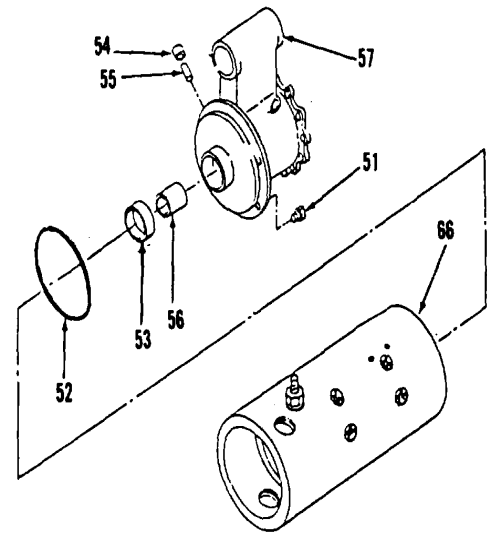


Figure 4-46.

Go to Sheet 11

STARTING SYSTEM MAINTENANCE.

4-9. **Starting Motor (Delco-Remy). (Sheet 11 of 15)**

ASSEMBLY

11. Install washer (50), lever (49) and drive (48) in housing (57, Figure 4-45).
12. Install spacer (47) and armature (46).
13. Install two new preformed packings (45), shaft (44) and snap ring (43).
14. Install new bushing (41, Figure 4-44), if removed.
15. Saturate plug (40) with clean engine oil and install in housing (42).
16. Install new cup (39).
17. Coat new preformed packing (38) with general purpose grease and install.
18. Install housing (42), five screws (37) and screw (36) on housing (57).
19. Install washer (35) on shaft of armature (46).

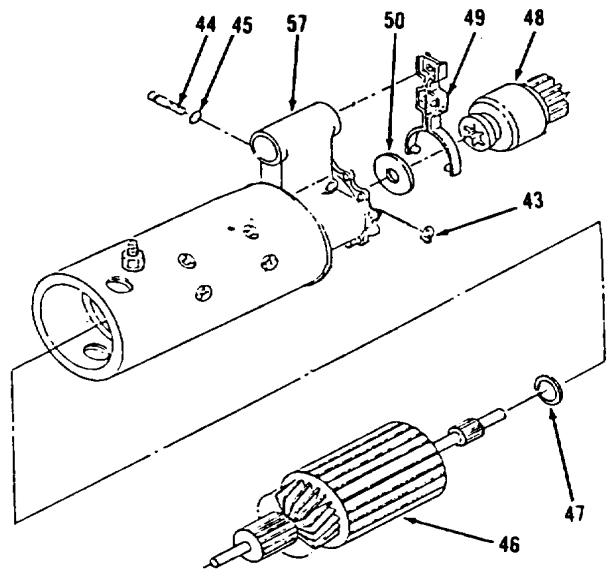


Figure 4-45.

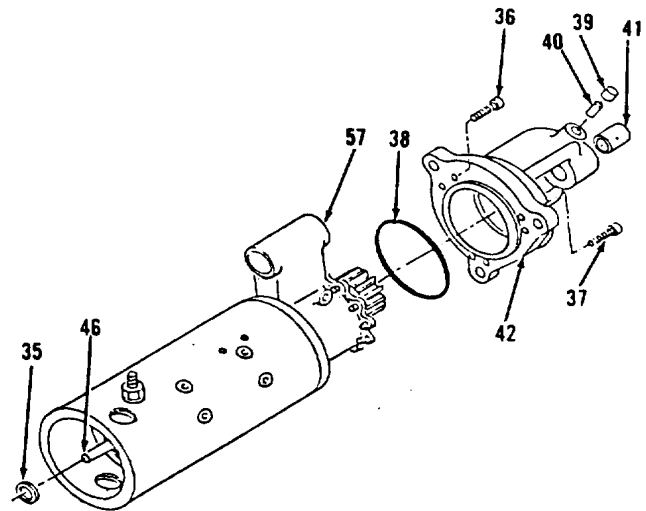


Figure 4-44.

Go to Sheet 12

STARTING SYSTEM MAINTENANCE. (cont)

4-9. **Starting Motor (Delco-Remy). (Sheet 12 of 15)**

ASSEMBLY (cont)

NOTE

Install brush holders with side bracket of brush holder to the outside of plate (34).

20. Install plate with stud (32), brush holder (30), insulator (33), screw (27), spring guide (28), spring (29), insulator (33) and screw (26) on plate (34, Figure 4-43).

21. Install plate (31), brush holder (30), screw (27), spring guide (28), spring (29) and screw (26).

22. Install plate (31), brush holder (30), insulator (33), screw (27), spring guide (28), spring (29) and screw (26).

23. Install plate (31), brush holder (30), screw (27), spring guide (28), spring (29) and screw (26).

24. Install four brushes (25) and two screws (24). When installing four new brushes (25), if necessary, check to be sure brushes (25) ride freely in brush holders (30).

25. Install washer (23) on plate (34, Figure 4-42).

26. Using suitable driver and press, install new bushing (21), if removed, in end frame (22).

27. Install new insulator (20) in end frame (22).

28. Coat new preformed packing (19) with general purpose grease and position on end frame (22).

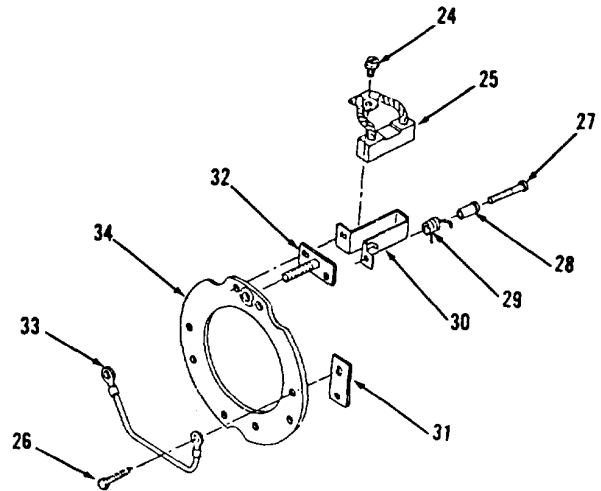


Figure 4-43.

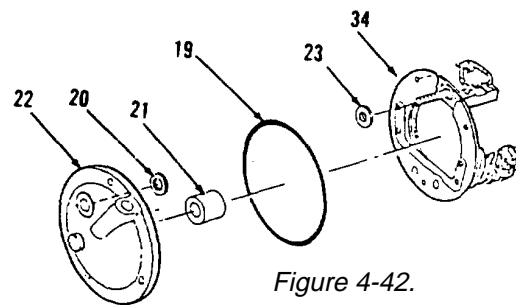


Figure 4-42.

Go to Sheet 13

STARTING SYSTEM MAINTENANCE.

4-9. **Starting Motor (Delco-Remy).** (Sheet 13 of 15)

ASSEMBLY

- 29. Position items 34 thru 23 as an assembly on items 22 thru 19 as an assembly (Figure 4-41).
- 30. Install screws (18, Figure 4-40).
- 31. Install lockwasher (17) and nut and stud (16) on stud of plate (34).

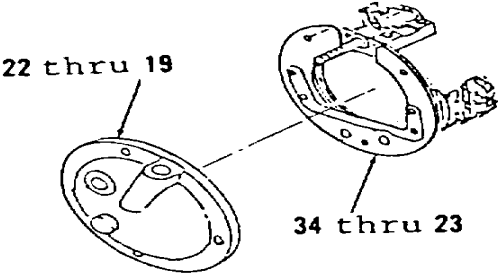


Figure 4-41.

NOTE

The two brush terminal wires connected to field coil must be in alinement with plug ports in housing before proceeding with further assembly.

- 32. Pull armature (46) out of housing (66) just far enough to permit four brushes (25, Figure 4-39) to be placed over commutator.
- 33. Place four brushes (25) over commutator, aline matchmarks on end frame (22) and housing (66).
- 34. Install four bolts (15).
- 35. Install two screws (14, Figure 4-38).

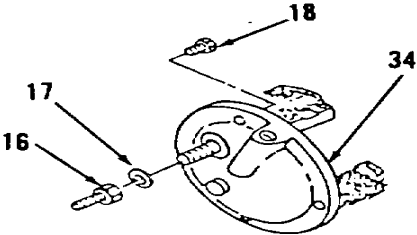


Figure 4-40.

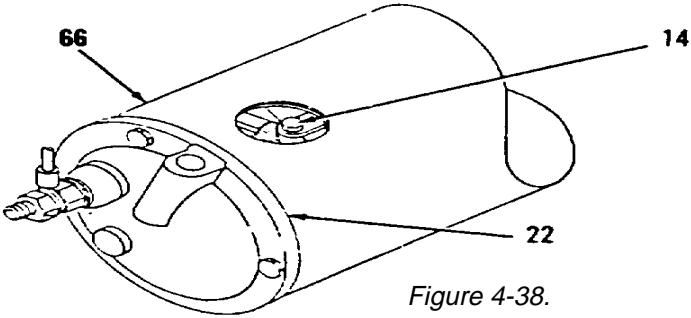


Figure 4-38.

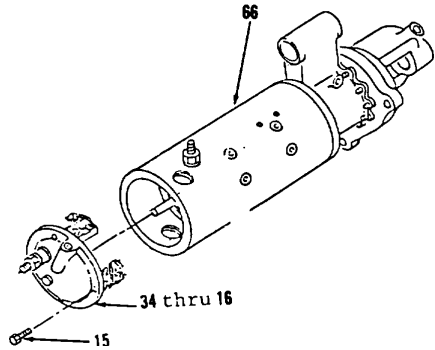


Figure 4-39.

Go to Sheet 14

STARTING SYSTEM MAINTENANCE. (cont)

4-9. **Starting Motor (Delco-Remy). (Sheet 14 of 15)**

ASSEMBLY (cont)

36. Install two new seals (13) and plugs (12, Figure 4-37).
37. Connect wire assembly (11).
38. Install washer (9), boot (8), retainer (7), spring (6) and retainer (5) on plunger (10, Figure 4-36).
39. Compress spring (6) and install snap ring (4) in groove of plunger (10) shaft.
40. Install items 10 thru 4 as an assembly on housing (57, Figure 4-52).
41. Install solenoid. Refer to TM 5-3805-261-20.
42. Install lock nut (3) loosely in housing (57).

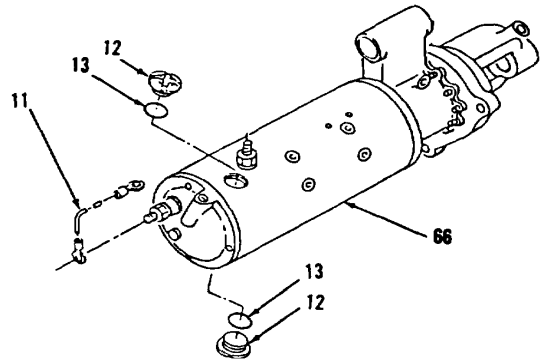


Figure 4-37.

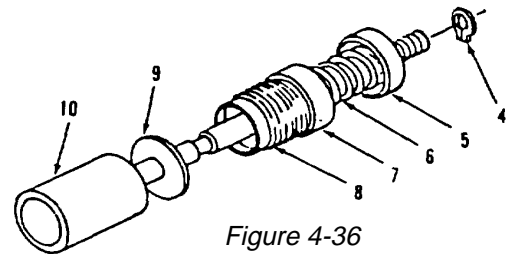


Figure 4-36

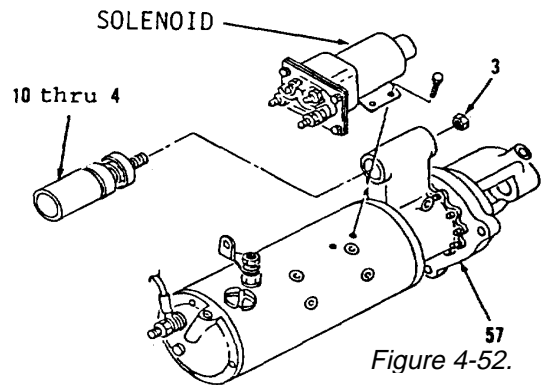


Figure 4-52.

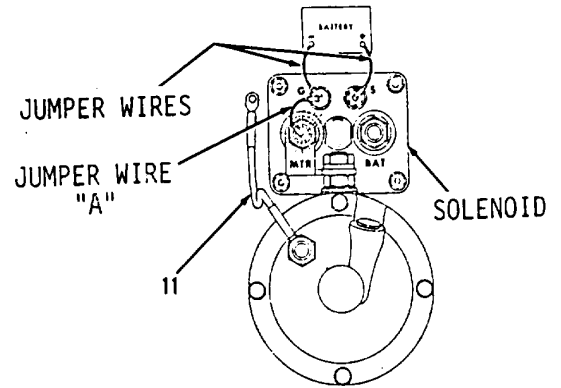
Go to Sheet 15

STARTING SYSTEM MAINTENANCE.

4-9. **Starting Motor (Delco-Remy). (Sheet 15 of 15)**

ADJUSTMENT

1. Disconnect wire assembly (11, Figure 4-53) from solenoid.
2. Connect solenoid to 24 volt battery, as shown, using three jumper wires. Do not connect ground to MTR terminal at this time.



CAUTION

Check pinion clearance quickly to avoid damage to solenoid windings.

3. Momentarily flash jumper wire "A" from ground to MTR terminal. Drive (48, Figure 4-54) will shift into cranking position.
4. Press drive (48) in direction of arrow to take up slack.
5. Using thickness gage, measure pinion clearance.
6. Adjust lock nut (3) until correct clearance.
7. Remove three jumper wires (Figure 4-53).
8. Install new preformed packing (2) and plug (1) in housing (58, Figure 4-55).
9. Connect wire assembly (11, Figure 4-56) to solenoid ground.

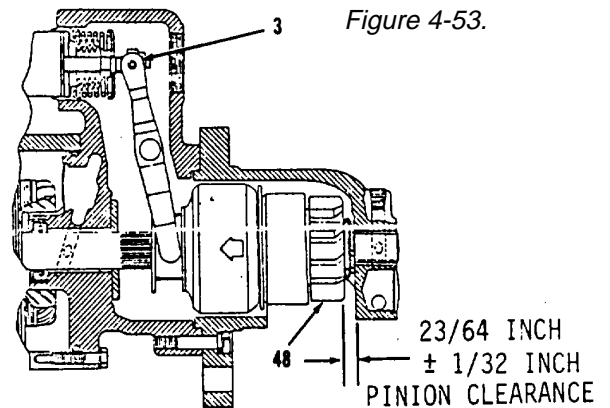


Figure 4-54.

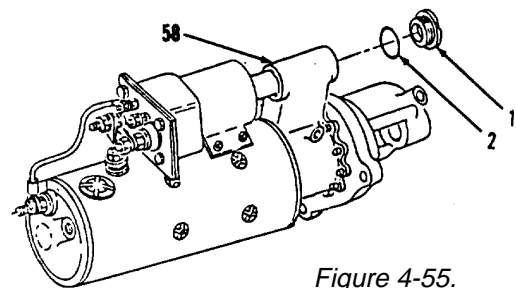


Figure 4-55.

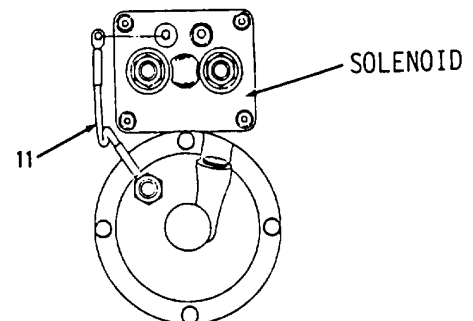


Figure 4-56.

NOTE

Return 130G Grader to original equipment condition.

End of Task

STARTING SYSTEM MAINTENANCE. (cont)

4-10. Starting Motor Solenoid (Prestolite). (Sheet 1 of 4)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43, Appendix C
Glyptal, Item 66, Appendix C
Gasket, Item 13

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Solenoid removed.

Go to Sheet 2

STARTING SYSTEM MAINTENANCE.

4-10. Starting Motor Solenoid (Prestolite). (Sheet 2 of 4)

DISASSEMBLY

1. Remove four nuts (1, Figure 4-57).
2. Carefully pull items 4 thru 12 as an assembly outward for access to screw (2).
3. Remove screw (2).

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

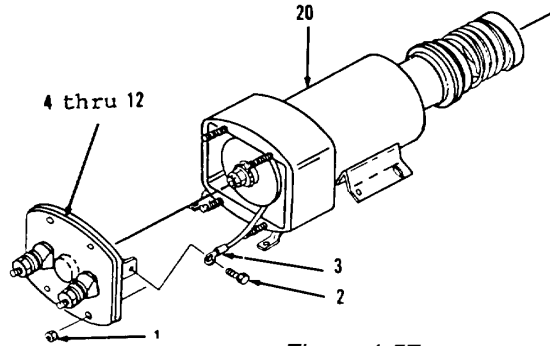


Figure 4-57.

4. Disconnect wire assembly (3) at terminal.
5. Remove items 4 thru 12 as an assembly from housing (20).
6. Remove two nuts (4), washers (5), lockwashers (6), washers (7) and spacers (8, Figure 4-58).

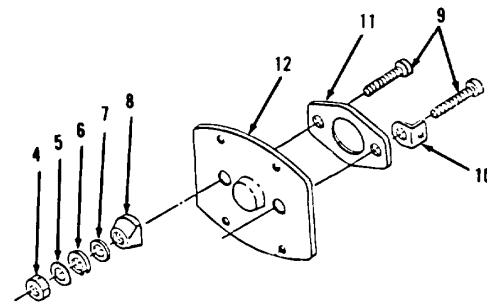


Figure 4-58.

7. Remove two studs (9), terminal (10) and insulator (11) from cover (12).
8. Remove and discard gasket (13) from housing (20, Figure 4-59). Remove all gasket material from mounting surfaces.
9. Using retaining ring pliers, remove ring (14).
10. Remove retainer (15), spring (16) and retainer (17).
11. Remove boot (18) and washer (19).
12. Remove items 21 thru 28 as an assembly from housing (20).

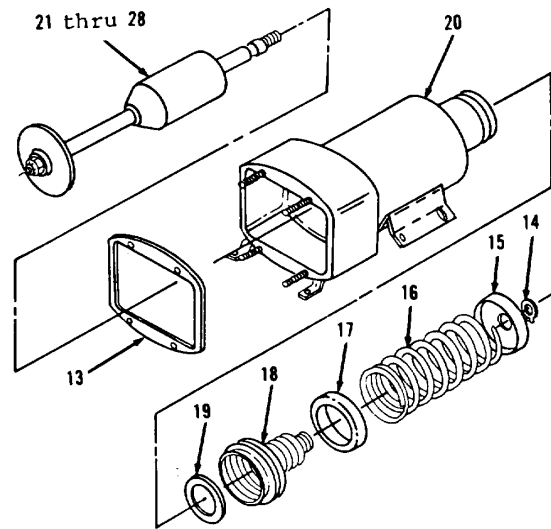


Figure 4-59.

Go to Sheet 3

STARTING SYSTEM MAINTENANCE. (cont)

4-10. Starting Motor Solenoid (Prestolite). (Sheet 3 of 4)

DISASSEMBLY (cont)

13. Remove nut (22), washer (23), contact assembly (24), spring (25) and retainer (26, Figure 4-60).
14. Using retaining ring pliers, remove ring (27) from core (28).

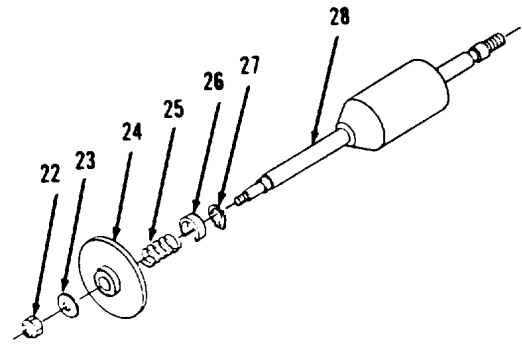


Figure 4-60.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install ring (27) on core (28, Figure 4-60).
2. Install retainer (26), spring (25), contact assembly (24), washer (23) and nut (22).
3. Install items 28 thru 21 as an assembly in housing (20, Figure 4-59).
4. Position washer (19).
5. Lubricate inside of boot (18) with clean engine oil and install boot (18) on housing (20).
6. Install retainer (17), spring (16) and retainer (15).
7. Using retaining ring pliers, install ring (14).
8. Install new gasket (13) on studs of housing (20).

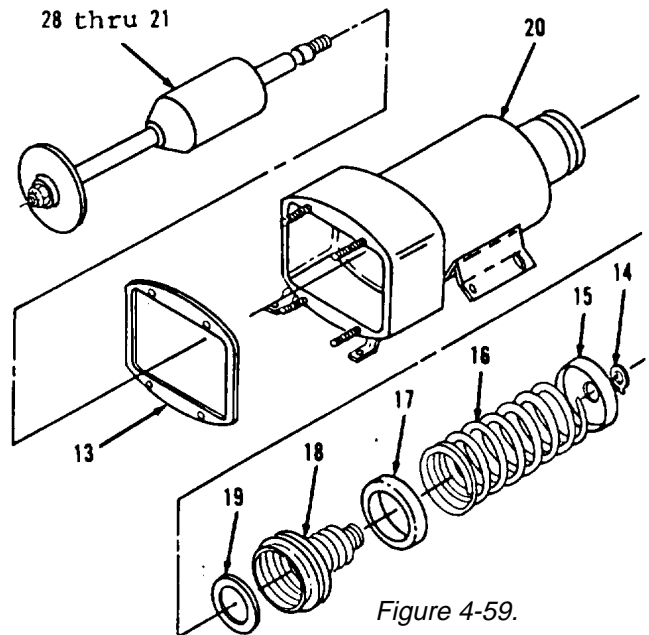


Figure 4-59.

Go to Sheet 4

STARTING SYSTEM MAINTENANCE.

4-10. Starting Motor Solenoid (Prestolite). (Sheet 4 of 4)

ASSEMBLY

9. Install insulator (11), terminal (10) and two studs (9) on cover (12, Figure 4-58).
10. Coat two spacers (8) with Glyptal.
11. Install two spacers (8), washers (7), lockwashers (6), washers (5) and nuts (4).
12. Position items 12 thru 4 as an assembly on housing (20, Figure 4-57).
13. Connect wire assembly (3).
14. Install screw (2).
15. Install four nuts (1).

NOTE

Return 130G Grader to original equipment condition.

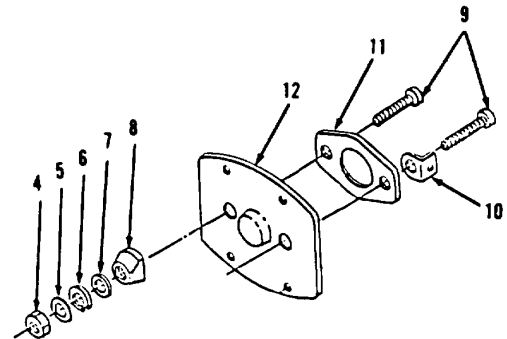


Figure 4-58.

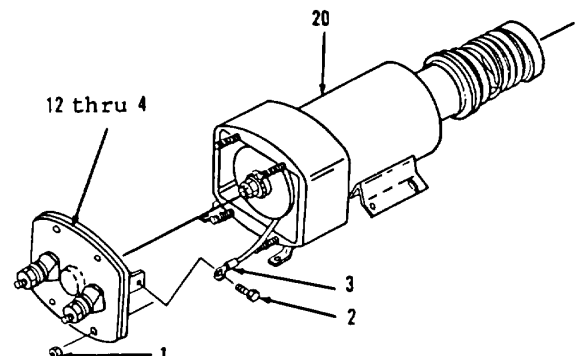


Figure 4-57.

End of Task

STARTING SYSTEM MAINTENANCE. (cont)

4-11. Starting Motor (Prestolite). (Sheet 1 of 9)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Tools

- General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
- Arbor press
- Brass driver

Test Equipment

None

Materials/Parts

- Dry cleaning solvent,
Item 15, Appendix C
- Clean cloths, Item 41,
Appendix C
- Engine oil SAE 10, Item 67,
Appendix C
- Engine oil SAE 20, Item 68,
Appendix C
- Seal, Item 46
- Gasket, Item 15
- Preformed packings, Items 22,
23, 28

Personnel Required

Construction equipment
repairer MOS 62B

References

- TM 5-3805-261-10
- TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake
applied. Equipment lowered to
the ground. Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Starter motor removed.
Solenoid removed.

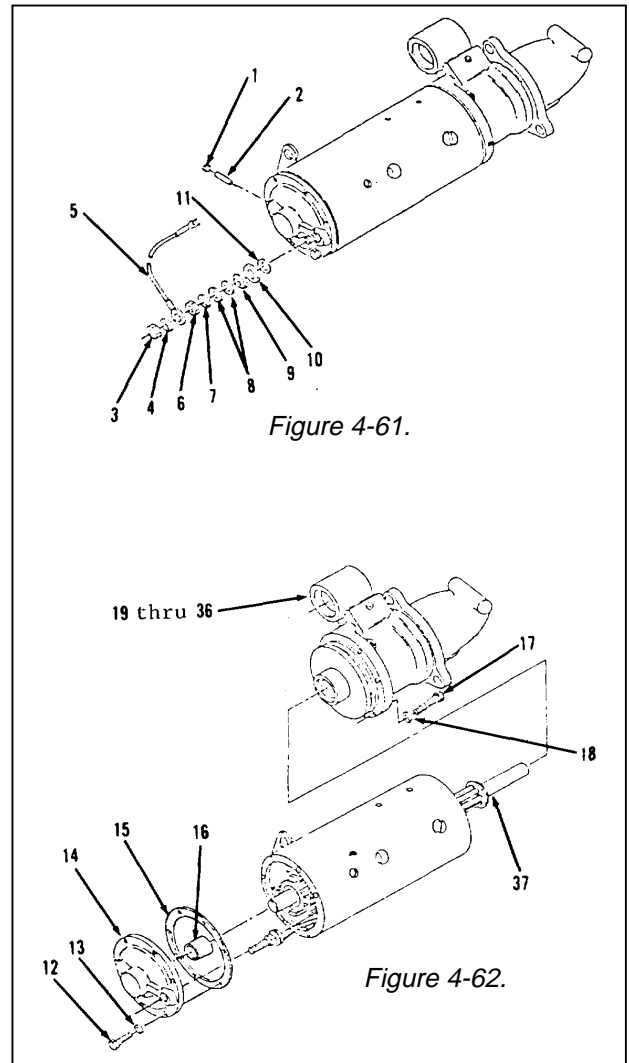
Go to Sheet 2

STARTING SYSTEM MAINTENANCE.

4-11. **Starting Motor (Prestolite).** (Sheet 2 of 9)

DISASSEMBLY

1. Remove plug (1) and wick (2, Figure 4-61).
2. Remove nut (3), lockwasher (4) and wire assembly (5).
3. Remove nut (6), lockwasher (7), two washers (8), insulating washers (9 and 10) and washer (11).
4. Remove four screws (12) and lockwashers (13, Figure 4-62).
5. Remove end assembly (14) and gasket (15). Discard gasket (15). Remove all gasket material from mounting surfaces.
6. Remove bearing (16).
7. Remove seven screws (17) and lockwashers (18).
8. Remove items 19 thru 36 as an assembly from armature (37).



Go to Sheet 3

STARTING SYSTEM MAINTENANCE. (cont)

4-11. **Starting Motor (Prestolite).** (Sheet 3 of 9)

DISASSEMBLY (cont)

9. Remove two plugs (19) and pin (20, Figure 4-63).
10. Remove bolt (21) and preformed packings (22 and 23). Discard preformed packings (22 and 23).
11. Remove bearing (24).

NOTE

Head and housing must be matchmarked before separation to aid in assembly.

12. Using scribe, matchmark head (26) and housing (36).
13. Remove three bolts (25).
14. Remove head (26) from items 27 thru 36 as an assembly.
15. Remove washer (27, Figure 4-64).
16. Remove and discard preformed packing (28).
17. Remove yoke (29), drive (30) and washer (31).

18. Remove plug (32), wick (33) and plug (34).
19. Using brass driver and hammer, remove bearing (35).
20. Remove armature (37), washers (38 and 39) and two washers (40, Figure 4-65).

21. Remove spacer (41) and washer (42).
22. Remove items 43 thru 47 as an assembly.

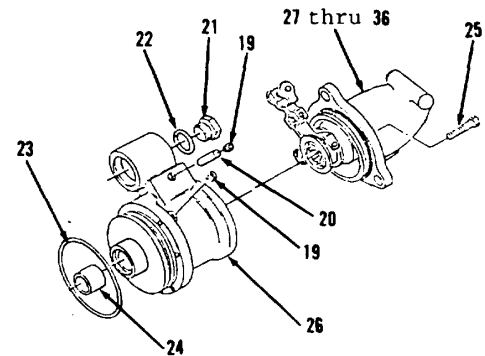


Figure 4-63.

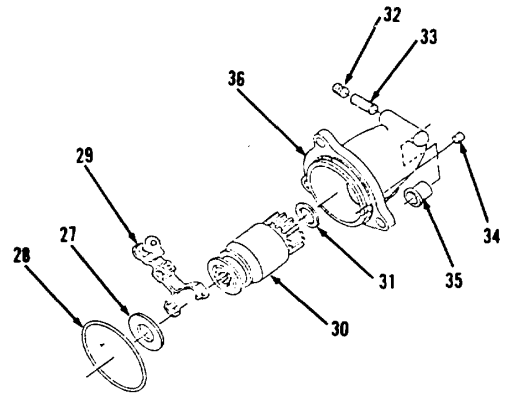


Figure 4-64.

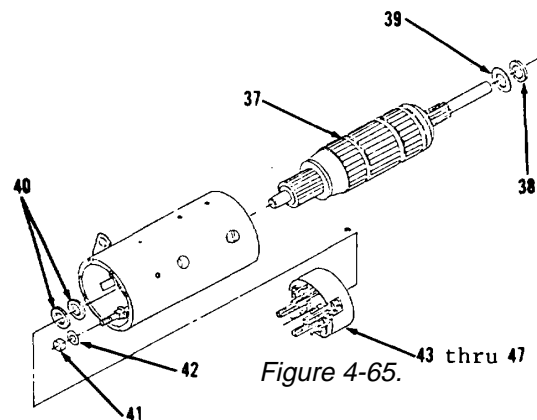


Figure 4-65.

Go to Sheet 4

STARTING SYSTEM MAINTENANCE.

4-11. **Starting Motor (Prestolite).** (Sheet 4 of 9)

DISASSEMBLY

23. Remove insulation (43, Figure 4-66).
24. Remove four springs (44) and brushes (45).
25. Remove and discard seal (46) from plate (47).
26. Remove three screws (48, Figure 4-67).
27. Remove four screws (49) and studs (50) from frame (63).
28. Remove coil (51) from frame (63).
29. Remove nut (52), lockwasher (53) and connector (54, Figure 4-68).
30. Remove nut (55), lockwasher (56), stud (57), spacer (58), bolt (59), lockwasher (60), spacer (61) and stud (62).

CLEANING

1. Clean brushes (45, Figure 4-69) with a dry cloth only. Do not permit dry cleaning solvent to contact brushes.

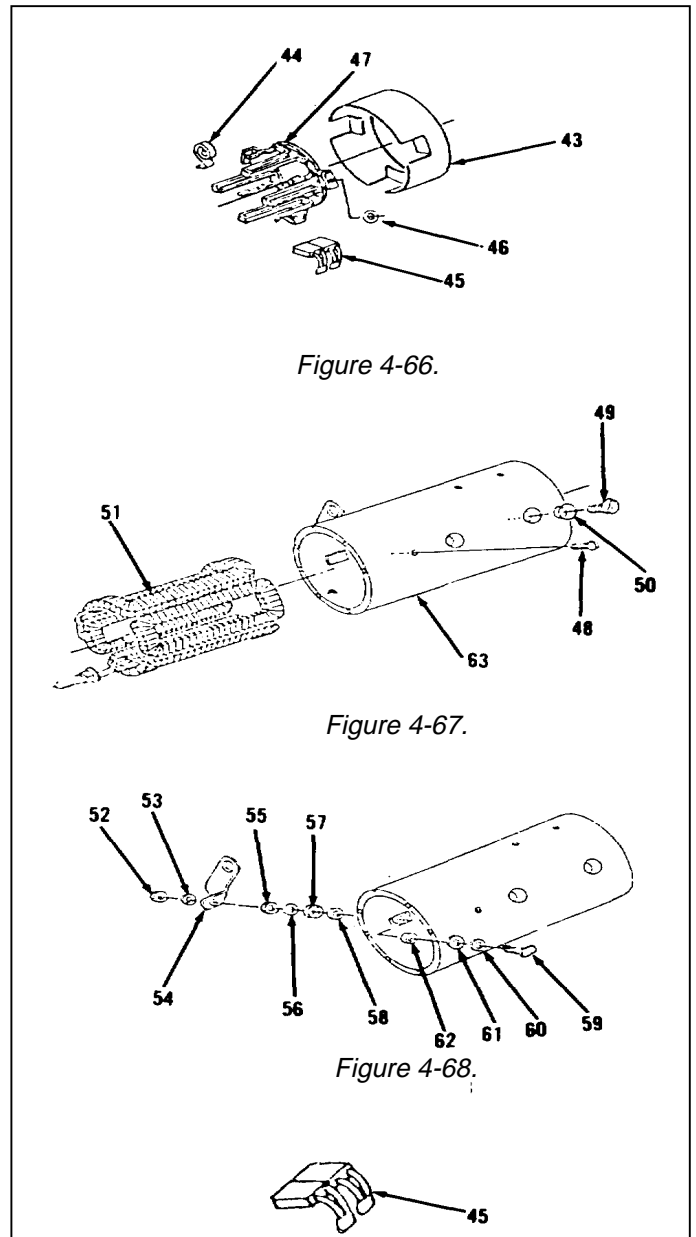


Figure 4-66.

Figure 4-67.

Figure 4-68.

Figure 4-69.

Go to Sheet 5

STARTING SYSTEM MAINTENANCE. (cont)

4-11. Starting Motor (Prestolite). (Sheet 5 of 9)

CLEANING (cont)

WARNING

TOXIC/FLAMMABLE

Dry cleaning solvent P-D-680 used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe the vapors. Do not use near open flame or excessive heat. Do not smoke while using it. Failure to do so may cause INJURY. If you become dizzy while using cleaning solvent, immediately seek fresh air, and if necessary, medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash with water immediately and obtain medical help.

WARNING

HIGH VELOCITY AIR

Compressed air, used for cleaning purposes, must not exceed 30 psi. Safety glasses must be used when cleaning parts with compressed air. Failure to protect your eyes may cause INJURY and possible BLINDNESS. If you injure your eyes or if a foreign object is blown into your eyes, seek medical help immediately.

Go to Sheet 6

STARTING SYSTEM MAINTENANCE.

4-11. **Starting Motor (Prestolite).** (Sheet 6 of 9)

CLEANING

2. Remove loose particles from armature (37, Figure 4-70) with compressed air and wipe with a clean cloth dampened with dry cleaning solvent. Clean commutator lightly with sandpaper and remove all traces of dust with low pressure compressed air.
3. Clean all other parts. Refer to Chapter 2.

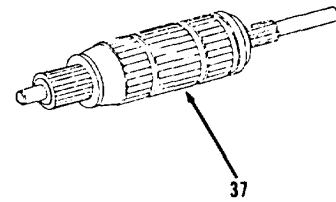


Figure 4-70.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install stud (62), spacer (61), lockwasher (60) and bolt (59) to inside of frame (63, Figure 4-68).
2. Install spacer (58), stud (57), lockwasher (56), nut (55), connector (54), lockwasher (53) and nut (52) onto bolt (59) on outside of frame (63).
3. Install coil (51) into frame (63, Figure 4-67).
4. Install four studs (50) and screws (49).
5. Install three screws (48).

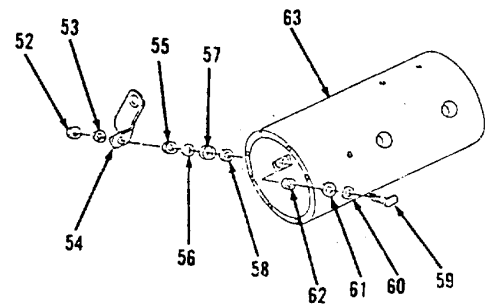


Figure 4-68.

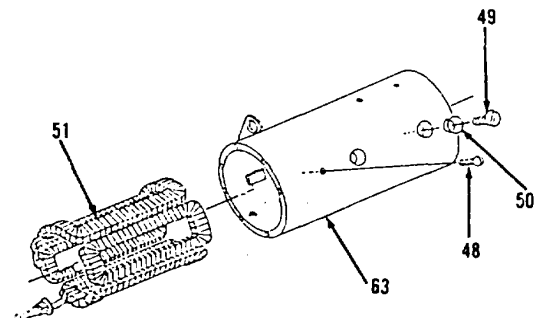


Figure 4-67.

Go to Sheet 7

STARTING SYSTEM MAINTENANCE. (cont)

4-11. **Starting Motor (Prestolite).** (Sheet 7 of 9)

ASSEMBLY (cont)

6. Install new seal (46) onto plate (47, Figure 4-66).
7. Install four brushes (45) and springs (44).
8. Install insulation (43) onto plate (47).
9. Install items 47 thru 43 as an assembly into frame (63, Figure 4-65).
10. Install washer (42) and spacer (41).
11. Install two washers (40) and washers (39 and 38) on armature (37).

NOTE

Coat bearing surfaces of armature with engine oil SAE 10 and lubricate armature shaft splines with MIL-G-23827A.

12. Install armature (37) into frame (63).
13. Using an arbor press, install bearing (35) into housing (36, Figure 4-64).
14. Install plug (34).
15. Dip wick (33) in engine oil SAE 20 and install in housing (36).
16. Install plug (32).
17. Install washer (31), drive (30) and yoke (29).
18. Install new preformed packing (28) and washer (27).

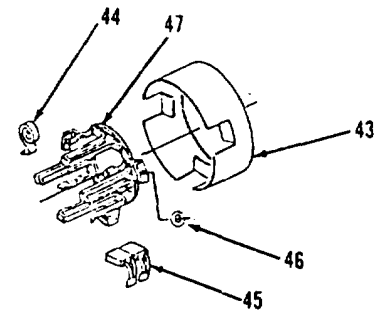


Figure 4-66.

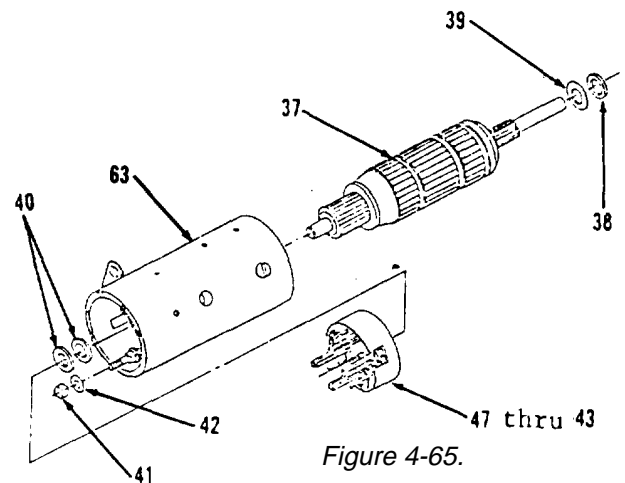


Figure 4-65.

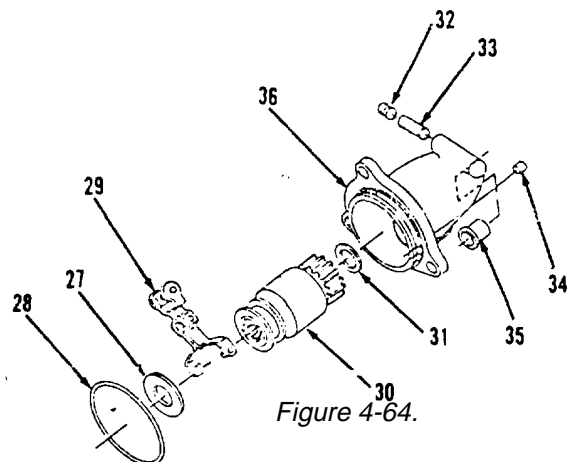


Figure 4-64.

Go to Sheet 8

STARTING SYSTEM MAINTENANCE.

4-11. **Starting Motor (Prestolite).** (Sheet 8 of 9)

ASSEMBLY

19. Using arbor press, install bearing (24) into head (26), Figure 4-63).
20. Aline matchmarks on items 36 thru 27 as an assembly with matchmarks on head (26).
21. Install three bolts (25) and tighten to 8 ft-lb torque.
22. Install new preformed packings (23 and 22).
23. Install bolt (21), pin (20) and two plugs (19).
24. Install items 36 thru 19 as an assembly on armature (37, Figure 4-62).
25. Install seven lockwashers (18) and screws (17).
26. Using an arbor press, install bearing (16) in end assembly (14).
27. Install new gasket (15) and end assembly (14).
28. Install four lockwashers (13) and screws (12).

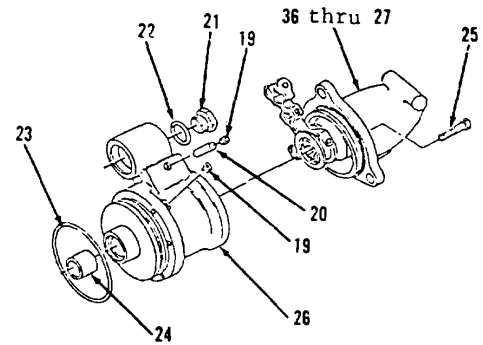


Figure 4-63.

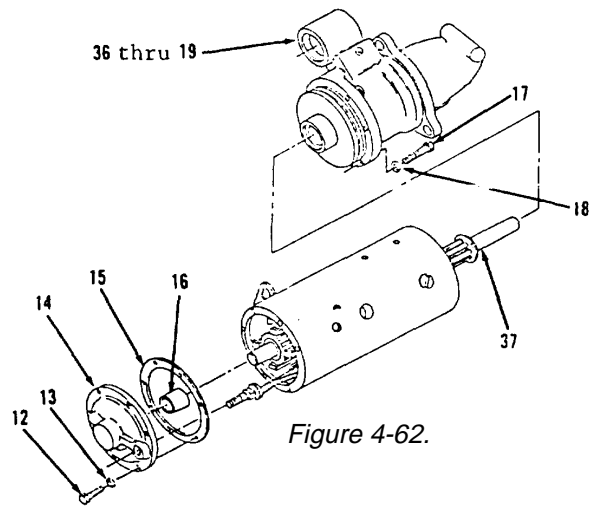


Figure 4-62.

Go to Sheet 9

STARTING SYSTEM MAINTENANCE. (cont)

4-11. Starting Motor (Prestolite). (Sheet 9 of 9)

ASSEMBLY (cont)

29. Install washer (11), insulating washers (10 and 9), two washers (8), lockwasher (7) and nut (6, Figure 4-61).
30. Install wire assembly (5), lockwasher (4) and nut (3).
31. Dip wick (2) in engine oil SAE 20.
32. Install wick (2) and plug (1).

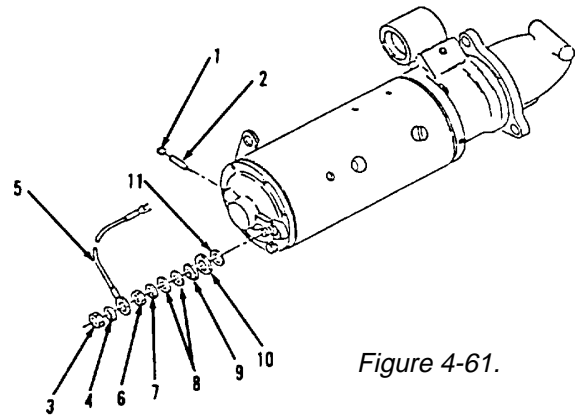


Figure 4-61.

NOTE

Return 130G Grader to original equipment condition.

**End of Task
4-64**

STARTING SYSTEM MAINTENANCE.

4-12. **Starting Motor (Bosch).** (Sheet 1 of 11)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Pole shoe spreader
Two M5X0.8 Hex nuts

References

TM 5-3805-261-10
TM 5-3805-261-20

Special Environmental Conditions

None

Test Equipment

None

General Safety Instructions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43, Appendix C
Lubricating oil, Item 33,
Appendix C
No. 00 Grit Sandpaper, Item 65,
Appendix C
Grease, Item 23, Appendix C
Seals, Items 9, 13, 40, 49
Spacers, Items 15, 28
Bearings, Items 14, 27, 41
Preformed packings, Items 25,
29, 34, 39

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Starting motor removed.
Solenoid removed.

Go to Sheet 2

STARTING SYSTEM MAINTENANCE. (cont)

4-12. **Starting Motor (Bosch).** (Sheet 2 of 11)

DISASSEMBLY

1. Position starting motor in soft-jawed vise.

NOTE

Using scribe, matchmark cover and housings to aid in assembly.

2. Remove nut (1), lockwasher (2) and bus bar (3, Figure 4-71).
3. Remove nut (4) and lockwasher (5).

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

4. Disconnect wire assembly (6) at terminal.
5. Remove washer (7), bushing (8) and seal (9). Discard seal (9).
6. Remove four nuts (10), lockwashers (11) and items 12 thru 16 as an assembly.
7. Remove plug (12) and seal (13) from cover (16, Figure 4-72). Discard seal (13).
8. Using spring collet and extractor, remove and discard bearing (14) and spacer (15) from cover (16).

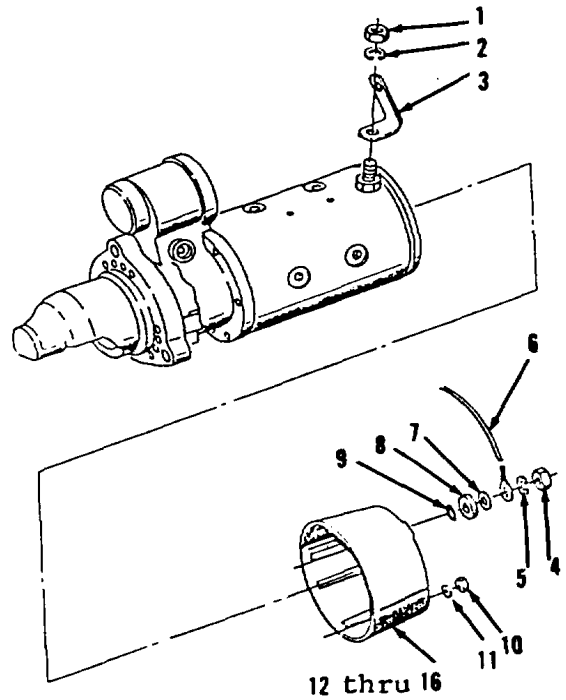


Figure 4-71.

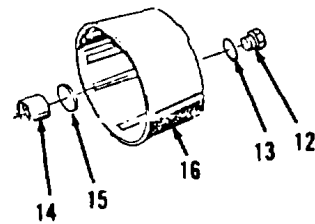


Figure 4-72.

Go to Sheet 3

STARTING SYSTEM MAINTENANCE.

4-12. Starting Motor (Bosch). (Sheet 3 of 11)

DISASSEMBLY

9. Remove bushing (17) from terminal stud (22, Figure 4-73).
10. Remove four screws (18).
11. Disconnect four brushes (19) wire assemblies.
12. Disconnect two field coil (51) wire assemblies.
13. Lift four springs (20) with suitable hook to remove four brushes (19).
14. Remove four brushes (19).
15. Remove four springs (20).
16. Remove two screws (21) and terminal stud (22).

NOTE

The following procedure is for the removal of one screw. Repeat steps 19 thru 21 for the removal of the remaining three screws.

17. Install two M5X0.8 hex nuts on screw (23).
18. Using suitable wrench to turn inside nut of two M5X0.8 hex nuts, remove screw (23) from plate assembly (24).
19. Remove two M5X0.8 hex nuts from screw (23).
20. Remove plate assembly (24) from housing (53).
21. Remove and discard preformed packing (25) from housing (53).

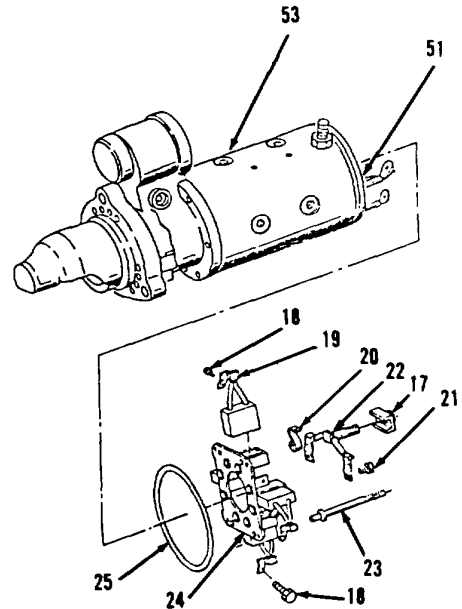


Figure 4-73.

STARTING SYSTEM MAINTENANCE. (cont)

4-12. **Starting Motor (Bosch). (Sheet 4 of 11)**

DISASSEMBLY (cont)

22. Remove six screws (26) and items 27 thru 30 as an assembly from housing (39, Figure 4-74).
23. Using spring loaded collet and extractor, remove and discard bearing (27, Figure 4-75).
24. Remove and discard spacer (28).
25. Remove and discard preformed packing (29) from housing (30).
26. Remove washer (31, Figure 4-76).
27. Remove ring (32), pin (33) and two preformed packings (34) from housing (39). Discard two preformed packings (34).
28. Remove drive (35), lever (36) and washer (37) from armature (43) shaft.
29. Remove six screws (38) and items 39 thru 42 as an assembly from housing (53, Figure 4-77).
30. Remove and discard preformed packing (39) and seal (40) from housing (42, Figure 4-78).
31. Using suitable driver and press, remove and discard bearing (41) from housing (42).

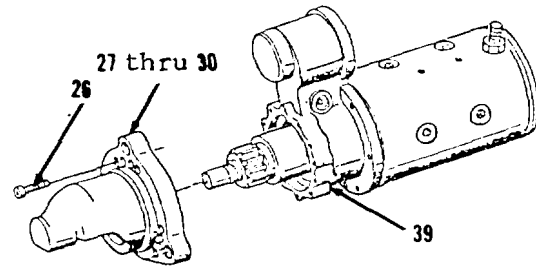


Figure 4-74.

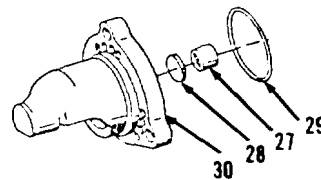


Figure 4-75.

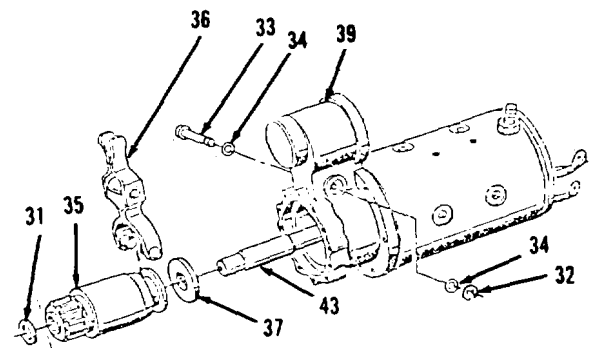


Figure 4-76.

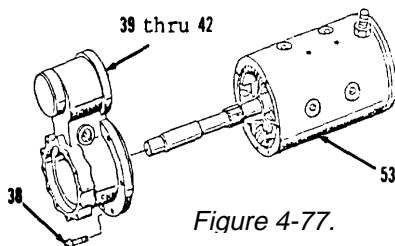


Figure 4-77.

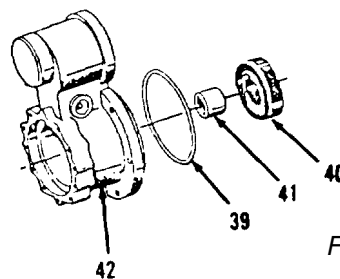


Figure 4-78.

Go to Sheet 5

STARTING SYSTEM MAINTENANCE.

4-12. **Starting Motor (Bosch). (Sheet 5 of 11)**

DISASSEMBLY

32. Remove armature (43) from housing (53, Figure 4-79).
33. Remove nut (44), lockwasher (45), washers (46 and 47), insulator (48) and seal (49) from field coil (51, Figure 4-80) pin terminal. Discard seal (49).

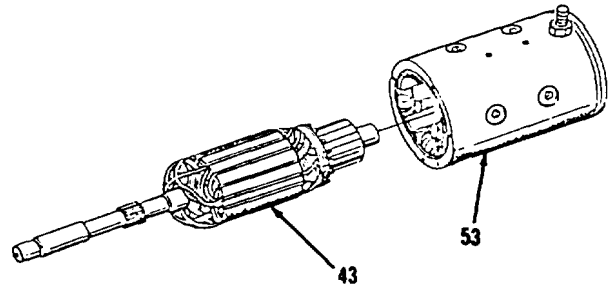


Figure 4-79.

NOTE

Positions of pole shoes in housing must be marked to aid in proper assembly.

34. Remove eight screws (50).
35. Remove field coil (51) and four pole shoes (52) from housing (53).
36. Remove bushing (54) from field coil (51) pin terminal.

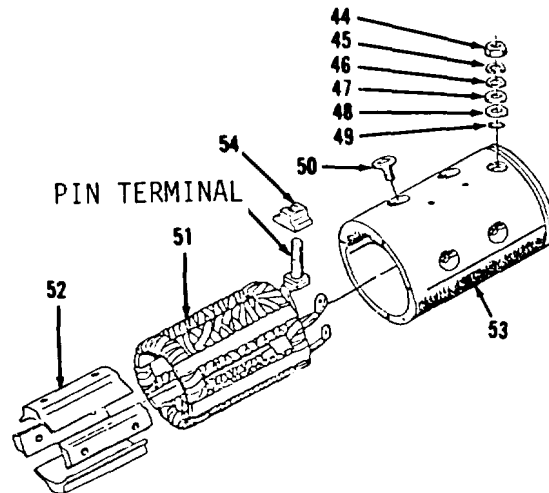


Figure 4-80.

CLEANING

1. Clean four brushes (19) with a dry cloth only. Do not permit dry cleaning solvent to come in contact with four brushes (19, Figure 4-81).

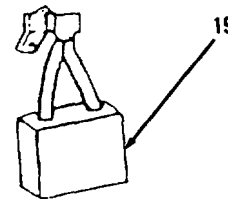


Figure 4-81.

Go to Sheet 6

STARTING SYSTEM MAINTENANCE. (cont)

4-12. Starting Motor (Bosch). (Sheet 6 of 11)

CLEANING (cont)

WARNING

TOXIC/FLAMMABLE

Dry cleaning solvent P-D-680 used to clean parts is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes. Do not breathe the vapors. Do not use near open flame or excessive heat. Do not smoke while using it. Failure to do so may cause INJURY. If you become dizzy while using cleaning solvent, immediately seek fresh air, and if necessary, medical attention. If contact with skin or clothes is made, flush thoroughly with water. If the solvent contacts your eyes, wash with water immediately and obtain medical help.

WARNING

HIGH VELOCITY AIR

Compressed air, used for cleaning purposes, must not exceed 30 psi. Safety glasses must be used when cleaning parts with compressed air. Failure to protect your eyes may cause INJURY and possible BLINDNESS. If you injure your eyes or if a foreign object is blown into your eyes, seek medical help immediately.

Go to Sheet 7

STARTING SYSTEM MAINTENANCE.

4-12. **Starting Motor (Bosch).** (Sheet 7 of 11)

CLEANING

2. Remove loose particles from armature (43, Figure 4-82) with compressed air and wipe with a clean cloth dampened with dry cleaning solvent. Clean commutator lightly with No. 00 Grit sandpaper and remove all traces of dust with low pressure compressed air.

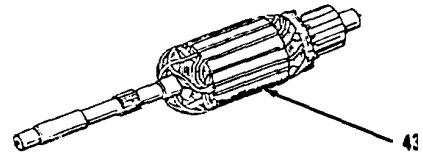


Figure 4-82.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install bushing (54) on field coil (51, Figure 4-80) pin terminal.
2. Position four pole shoes (52) in field coil (51) the same way as marked.

NOTE

Careful installation of the field coil is necessary to prevent shorting or grounding of the field coil as pole shoes are tightened into place.

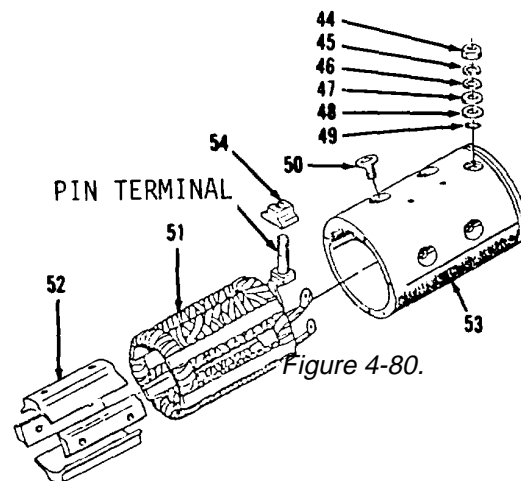


Figure 4-80.

3. Using pole shoe spreader, install field coil (51) in housing (53). Pull pin terminal through bore of housing (53).
4. Install eight screws (50) and tighten to 42 ft-lb torque.

Go to Sheet 8

STARTING SYSTEM MAINTENANCE. (cont)

4-12. **Starting Motor (Bosch).** (Sheet 8 of 11)

ASSEMBLY (cont)

5. Install new seal (49), insulator (48), washers (47 and 46), lock-washers (45) and nut (44) on field coil (51, Figure 4-80) pin terminal. Tighten nut (44) to 18 ft-lb torque. Remove pole spreader.

CAUTION

Do not allow grease or oil to get on commutator or armature.

6. Using clean grease, lightly lubricate points (A), (B) and (C) of armature (43, Figure 4-79) shaft. Apply clean lubricating oil to remaining areas of armature (43) shaft.

7. Install armature (43) in housing (53).

8. Using suitable driver and press, install new bearing (41) in housing (42, Figure 4-78).

9. Using clean grease, lubricate outer diameter of new seal (40).

10. Install new preformed packing (39) in groove of housing (42).

11. Using clean oil, lubricate outer diameter of new preformed packing (39).

12. Position items 42 thru 39 as an assembly on housing (53, Figure 4-77) alining matchmarks.

13. Install six screws (38) and tighten to 9 ft-lb torque.

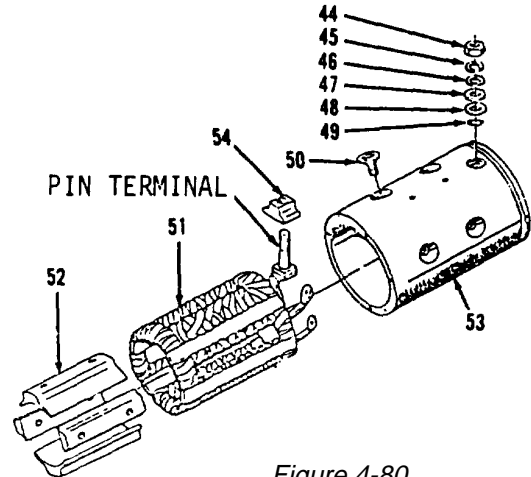


Figure 4-80.

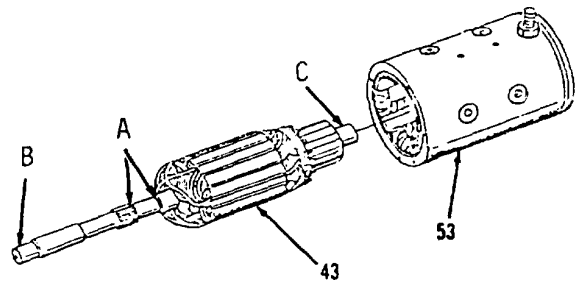


Figure 4-79.

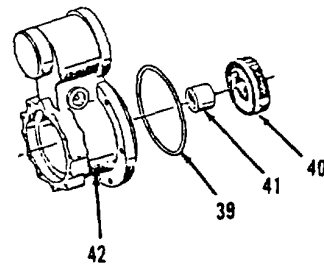


Figure 4-78.

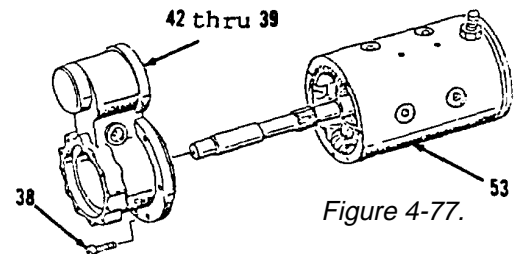


Figure 4-77.

Go to Sheet 9

STARTING SYSTEM MAINTENANCE.

4-12. **Starting Motor (Bosch). (Sheet 9 of 11)**

ASSEMBLY

14. Install washer (37) on armature (43, Figure 4-76) shaft.
15. Using clean grease, lubricate the groove on drive (35). Using clean oil, fill space between drive (35) housing and drive (35) pinion. Push pinion into housing as far as it will go.
16. Position lever (36) in housing (39).
17. Install drive (35) on armature (43) shaft and lever (36) in groove of drive (35).
18. Using clean grease, lightly lubricate pin (33).

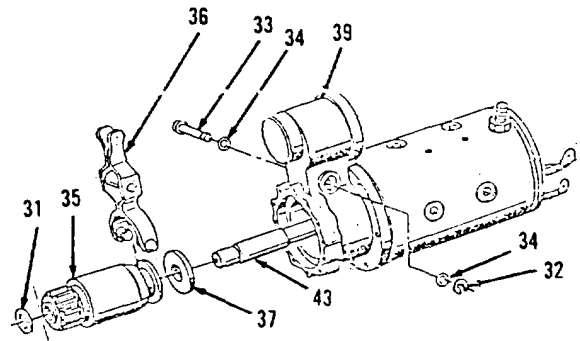


Figure 4-76.

19. Install one of two new preformed packings (34) and pin (33) through holes in housing (39) and lever (36).
20. Install remaining one of two new preformed packings (34) and ring (32) on pin (33).
21. Install new preformed packing (29) on groove in housing (30, Figure 4-75).

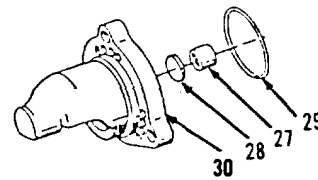


Figure 4-75.

22. Using clean oil, lightly lubricate outer diameter of new preformed packing (29).
23. Using clean grease, lubricate center of both sides of new spacer (28).
24. Install new spacer (28) in housing (30).
25. Using suitable driver and press, install new bearing (27).

Go to Sheet 10

STARTING SYSTEM MAINTENANCE. (cont)

4-12. **Starting Motor (Bosch). (Sheet 10 of 11)**

ASSEMBLY (cont)

26. Install items 30 thru 27 as an assembly on housing (39, Figure 4-74) alining matchmarks.
27. Install six screws (26) and tighten to 9 ft-lb torque.
28. Install new preformed packing (25) on groove of housing (53, Figure 4-73).
29. Using clean oil, lubricate outer diameter of new preformed packing (25).

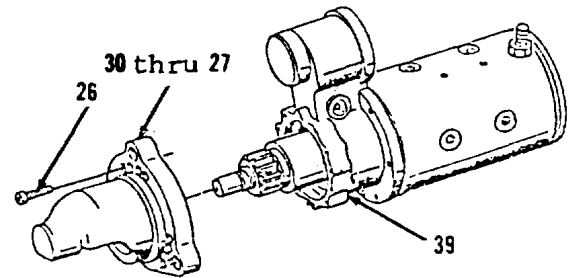


Figure 4-74.

30. Position plate assembly (24) on housing (53).
31. Install four screws (23) and tighten to 4 ft-lb torque.
32. Position terminal stud (22) on plate (24).
33. Install two screws (21) and four springs (20).
34. Using hook, lift springs (20) and install four brushes (19) in holders on plate (24).

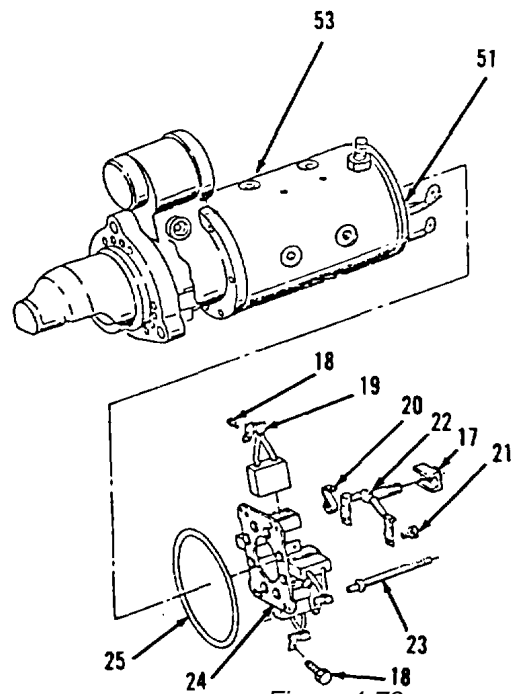


Figure 4-73.

35. Position two field coil (51) wire assemblies and two of four brushes (19) wire assemblies on plate (24).
36. Install two of four screws (18).
37. Position remaining two of four brushes (19) wire assemblies on plate (24).
38. Install remaining two of four screws (18).
39. Install bushing (17) on terminal stud (22).

Go to Sheet 11

STARTING SYSTEM MAINTENANCE.

4-12. **Starting Motor (Bosch).** (Sheet 11 of 11)

ASSEMBLY

40. Using clean grease, lubricate center of both sides of new spacer (15, Figure 4-72).
41. Install new spacer (15) in cover (16).
42. Using suitable driver and press, install new bearing (14).
43. Install new seal (13) and plug (12).
44. Install items 16 thru 12 as an assembly on housing (53, Figure 4-71).
45. Install four lockwashers (11) and nuts (10). Tighten nuts (10) to 4 ft-lb torque.
46. Install new seal (9), bushing (8) and washer (7).
47. Connect wire assembly (6) at terminal.
48. Install lockwasher (5) and nut (4). Tighten nut (4) to 22 ft-lb torque.
49. Install bus bar (3), lockwasher (2) and nut (1).

NOTE

Return 130G Grader to original equipment condition.

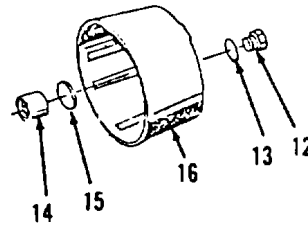


Figure 4-72.

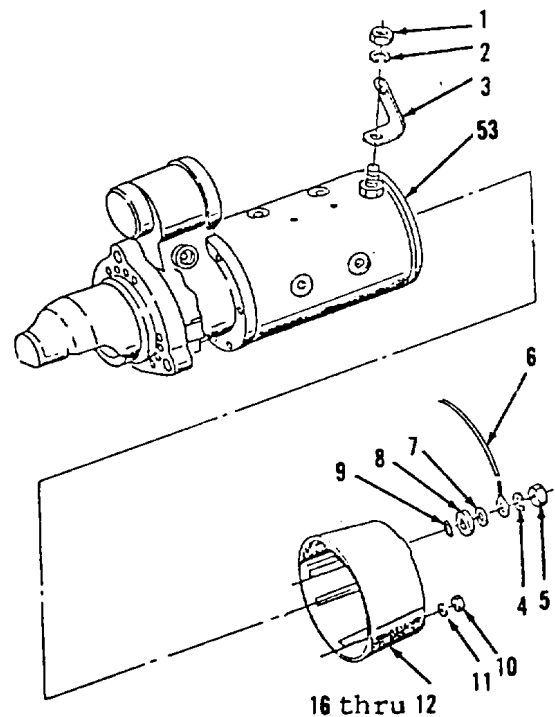


Figure 4-71.

End of Task

Section V. MONITORING SYSTEM MAINTENANCE.

4-13. MONITORING SYSTEM MAINTENANCE PROCEDURES.

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the monitoring system and its components in good repair.

b. This section is arranged by functional group code and provides a list of monitoring system components to be maintained and step-by-step maintenance procedures.

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MONITORING SYSTEM MAINTENANCE.

4-14. **Electrical Monitoring System Panel.** (Sheet 1 of 3)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Fuel and electrical systems repairer MOS 63G

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Thread sealant, Item 61,
Appendix C
Heat transfer compound,
Item 29, Appendix C
Preformed packings, Items 2, 5

General Safety Instructions

None

Torques

Except for special torques shown, all fasteners are tightened to standard torques. Refer to Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Monitoring system panel removed.

Go to Sheet 2

MONITORING SYSTEM MAINTENANCE. (cont)

4-14. Electrical Monitoring System Panel. (Sheet 2 of 3)

DISASSEMBLY

1. Remove plug (1) and preformed packing (2) from cover (4). Discard preformed packing (2, Figure 4-83).
2. Remove four stud bolts (3), cover (4) and preformed packing (5). Discard preformed packing (5).
3. Remove nut (6) from harness assembly (12).
4. Remove nine screws (7), lock-washers (8), board assembly (9) and housing (10, Figure 4-84).
5. Remove washer (11) from harness assembly (12).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install washer (11) on harness assembly (12, Figure 4-84).

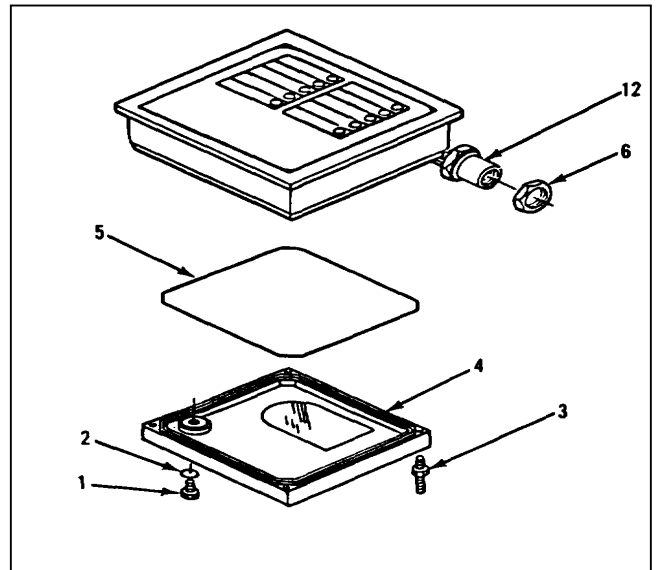


Figure 4-83.

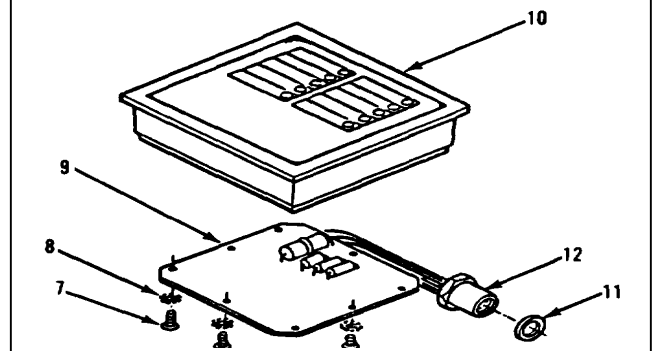


Figure 4-84.

Go to Sheet 3

MONITORING SYSTEM MAINTENANCE.

4-14. Electrical Monitoring System Panel. (Sheet 3 of 3)

ASSEMBLY

2. Apply heat transfer compound to corner of board where transistor and heat sink are located. Apply thread sealant to nine screws (7). Install housing (10), board assembly (9), nine lockwashers (8) and screws (7).
3. Install nut (6) on harness assembly (14, Figure 4-83) and tighten to 72 lb-in torque.
4. Install new preformed packing (5), cover (4) and four stud bolts (3). Tighten four stud bolts (3) to 48 lb-in torque.
5. Install new preformed packing (2) and plug (1).

NOTE

Return 130G Grader to original equipment condition.

End of Task

4-79

Section VI. WIRING AND HARNESS MAINTENANCE.**4-15. WIRING AND HARNESS MAINTENANCE PROCEDURES.**

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the electrical system and its components in good repair.

b. This section is arranged by functional group code and provides a list of electrical system components to be maintained and step-by-step maintenance procedures.

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WIRING AND HARNESS MAINTENANCE.

4-16. Rear Signal Light and Back-up Alarm Harness. (Sheet 1 of 5)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 63G

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43, Appendix C
Cable strap, Item 7

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-361-20

Positive cable on right side disconnected.
Radiator grill removed.
Engine screen doors open.

Go to Sheet 2

Change 1 4-81

WIRING AND HARNESS MAINTENANCE. (cont)

4-16. Rear Signal Light and Back-up Alarm Harness. (Sheet 2 of 5)

REMOVAL

1. Remove three nuts (1), washers (2) and clips (3, Figure 4-85).

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

2. Disconnect rear signal light and back-up alarm harness assembly (13) from main harness assembly.

3. Remove bolt (4), washer (5) and clip (6).

4. Cut and discard cable strap (7).

5. Disconnect rear signal light and back-up alarm harness assembly (13) from rear floodlight harness assembly.

6. Disconnect two wire assemblies (8) from rear signal light and back-up alarm harness assembly (13, Figure 4-86).

7. Remove rear signal light and back-up alarm harness assembly (13) from clip (14).

8. Disconnect wire assembly (9) from rear signal light and back-up alarm harness assembly (13).

9. Remove rear signal light and back-up alarm harness assembly (13) from clip (15).

10. Disconnect wire assembly (10) from rear signal light and back-up alarm harness assembly (13).

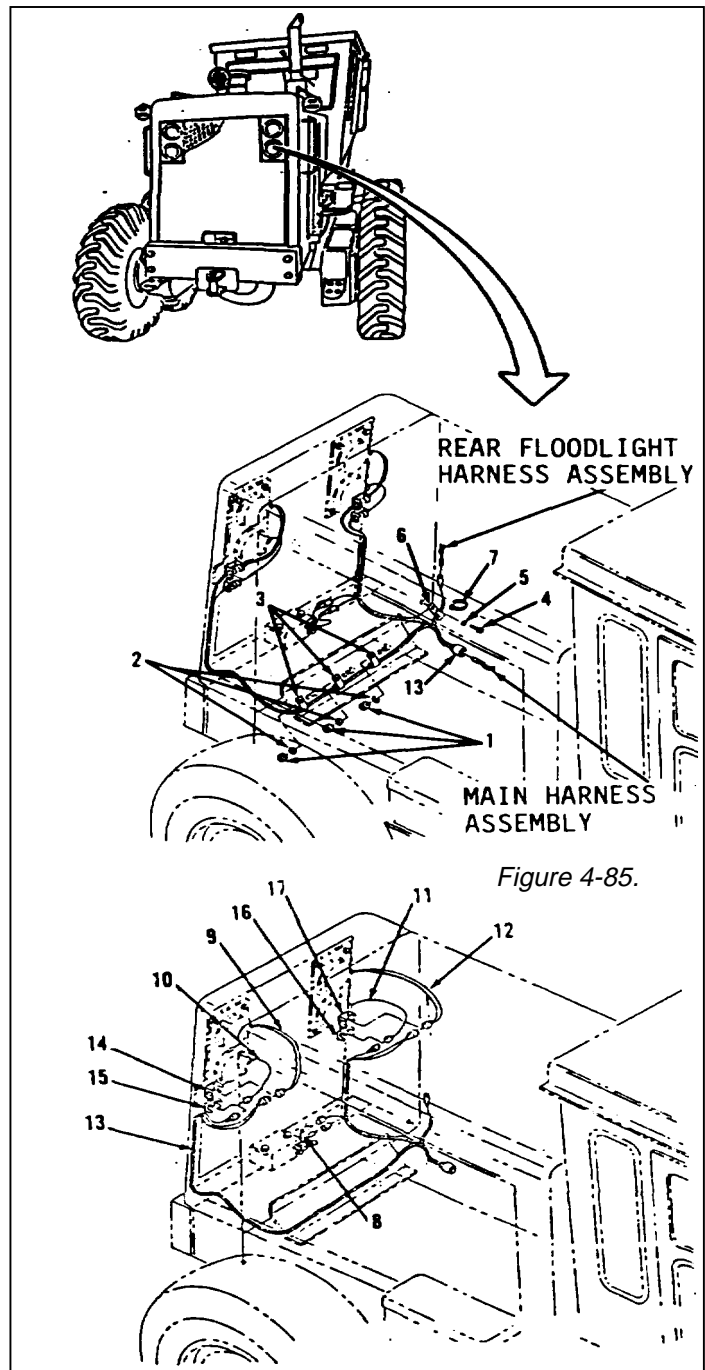


Figure 4-85.

Figure 4-86.

Go to Sheet 3

WIRING AND HARNESS MAINTENANCE.

4-16. Rear Signal Light and Back-up Alarm Harness. (Sheet 3 of 5)

REMOVAL

11. Remove rear signal light and back-up alarm harness assembly (13) from clip (16).
12. Disconnect wire assembly (11) from rear signal light and back-up alarm harness assembly (13).
13. Remove rear signal light and back-up alarm harness assembly (13) from clip (17).
14. Disconnect wire assembly (12) from rear signal light and back-up alarm harness assembly (13).
15. Remove rear signal light and back-up alarm harness assembly (13) from vehicle.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

1. Inspect all parts. Refer to Chapter 2.
2. Repair harness assembly, if necessary. Refer to TM 5-3805-261-20

Go to Sheet 4

WIRING AND HARNESS MAINTENANCE. (cont)

4-16. Rear Signal Light and Back-up Alarm Harness. (Sheet 4 of 5)

INSTALLATION

1. Position rear signal light and back-up alarm harness assembly (13, Figure 4-86) in vehicle.
2. Connect wire assembly (12) to rear signal light and back-up alarm harness assembly (13).
3. Install rear signal light and back-up alarm harness assembly (13) into clip (17).
4. Connect wire assembly (11) to rear signal light and back-up alarm harness assembly (13).
5. Install rear signal light and back-up alarm harness assembly (13) into clip (16).
6. Connect wire assembly (10) to rear signal light and back-up alarm harness assembly (13).
7. Install rear signal light and back-up harness assembly (13) into clip (15).
8. Connect wire assembly (9) to rear signal light and back-up alarm harness assembly (13).
9. Install rear signal light and back-up alarm harness assembly (13) into clip (14).
10. Connect two wire assemblies (8) to rear signal light and back-up alarm harness assembly (13).

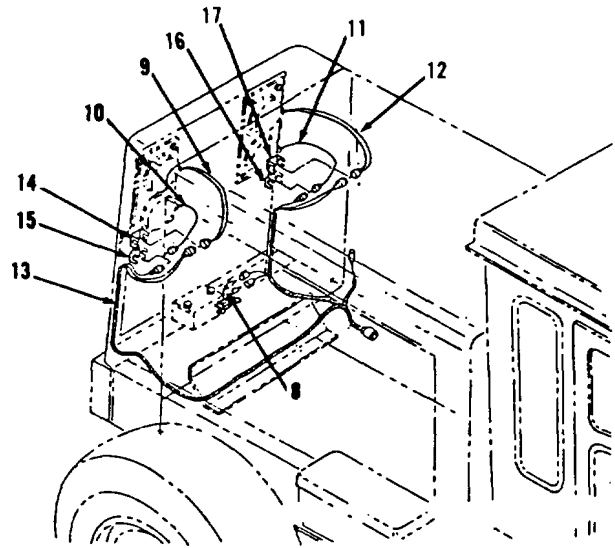


Figure 4-86.

Go to Sheet 5

WIRING AND HARNESS MAINTENANCE.

4-16. Rear Signal Light and Back-up Alarm Harness. (Sheet 5 of 5)

INSTALLATION

11. Connect rear signal light and back-up alarm harness assembly (13) to rear floodlight harness assembly (Figure 4-85).
12. Install new cable strap (7).
13. Install clip (6), washer (5) and bolt (4).
14. Connect rear signal light and back-up alarm harness assembly (13) to main harness assembly.
15. Install three clips (3), washers (2) and nuts (1).

NOTE

Return 130G Grader to original equipment condition.

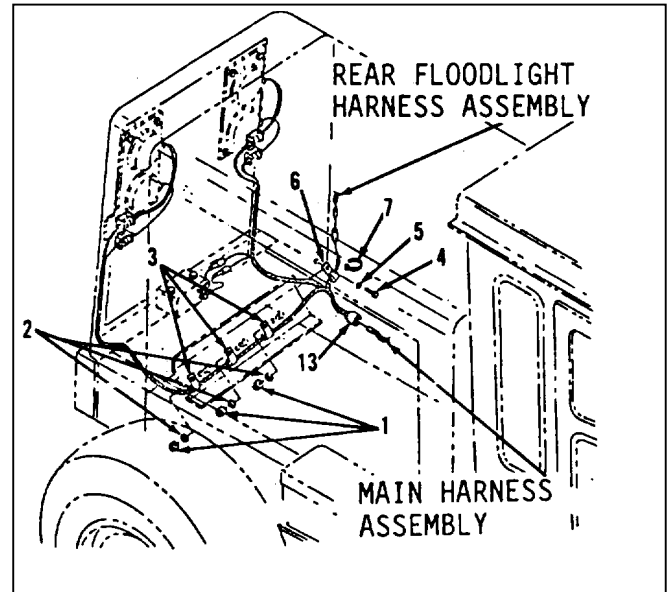


Figure 4-85.

End of Task

4-85

WIRING AND HARNESS MAINTENANCE. (cont)

4-17. **Main Harness.** (Sheet 1 of 4)

This task covers:

- a. Removal
- d. Installation

b. cleaning

c. Inspection

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 63G

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Cable straps

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Engine compartment side panels and
doors removed.

Paragraph 9-2

ROPS removed.

Paragraph 9-3

Operator's panel console base removed.

Go to Sheet 2

WIRING AND HARNESS MAINTENANCE.

4-17. **Main Harness.** (Sheet 2 of 4)

REMOVAL

- 1. Remove hood and four large plates from steering console support. Refer to TM 5-3805-261-20.

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

- 2. Disconnect main harness assembly from ether start valve, switches, gages, monitoring system panel, fuse box, starting motor and alternator (Figure 4-87).
- 3. Remove main harness assembly mounting clips, clamps and cable straps. Discard cable straps.
- 4. Remove main harness assembly.

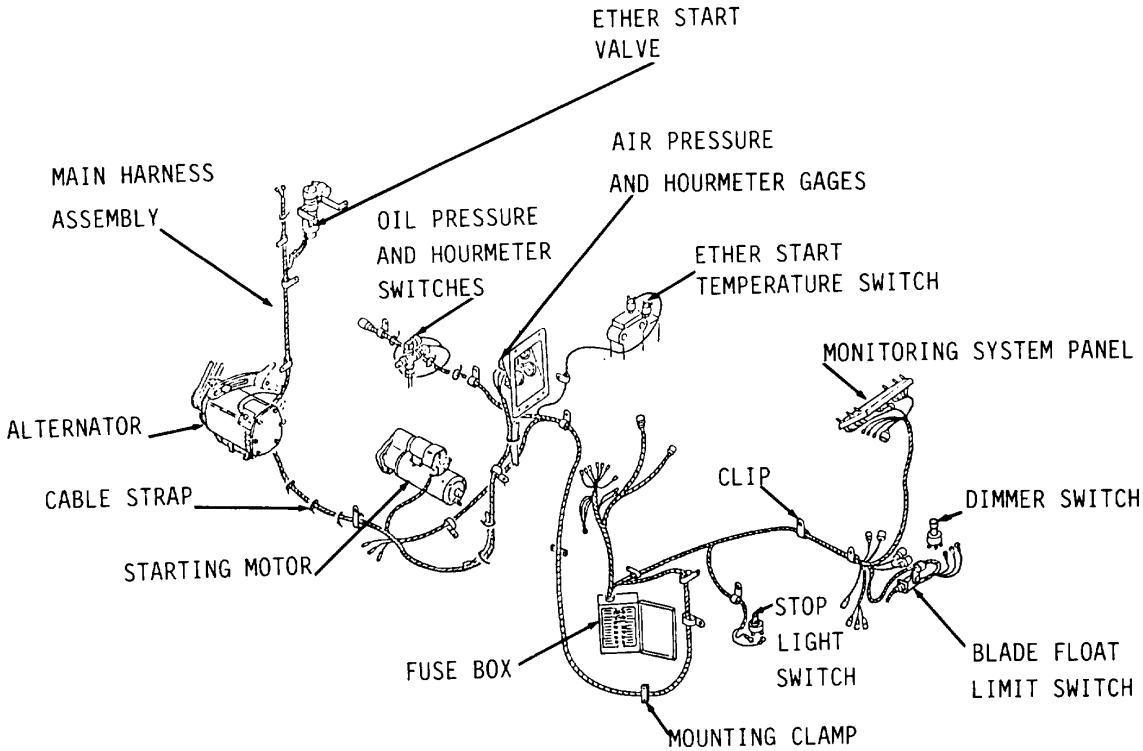
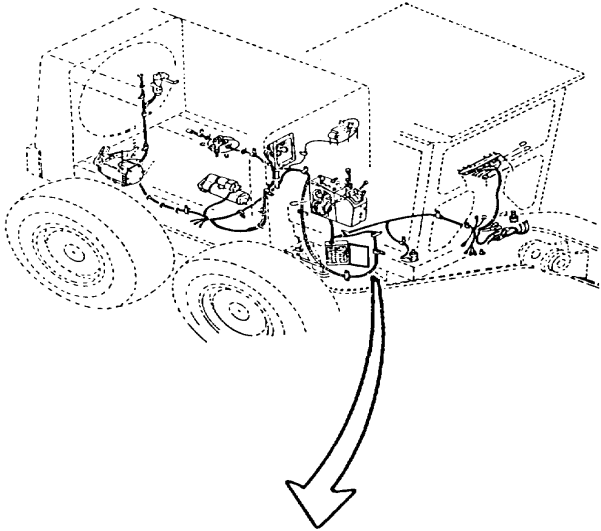


Figure 4-87.

WIRING AND HARNESS MAINTENANCE. (cont)

4-17. Main Harness. (Sheet 3 of 4)

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

1. Inspect all parts. Refer to Chapter 2.
2. Repair harness assembly, if necessary. Refer to TM 5-3805-261-20.

INSTALLATION

CAUTION

Do not position main harness assembly against any rough surface. Failure to follow this procedure may cause chafing.

NOTE

Route main harness assembly exactly as it was removed.

Go to Sheet 4

WIRING AND HARNESS MAINTENANCE.

4-17. **Main Harness.** (Sheet 4 of 4)

INSTALLATION

1. Position main harness assembly in vehicle (Figure 4-87).
2. Position new cable straps, clamps and clips on main harness assembly.
3. Connect main harness assembly to ether start valve, switches, gages, monitoring system panel, fuse box, starting motor and alternator.
4. Install new cable straps and mounting clamps and clips.
5. Install hood and four large plates on steering console support. Refer to TM 5-3805-261-20.

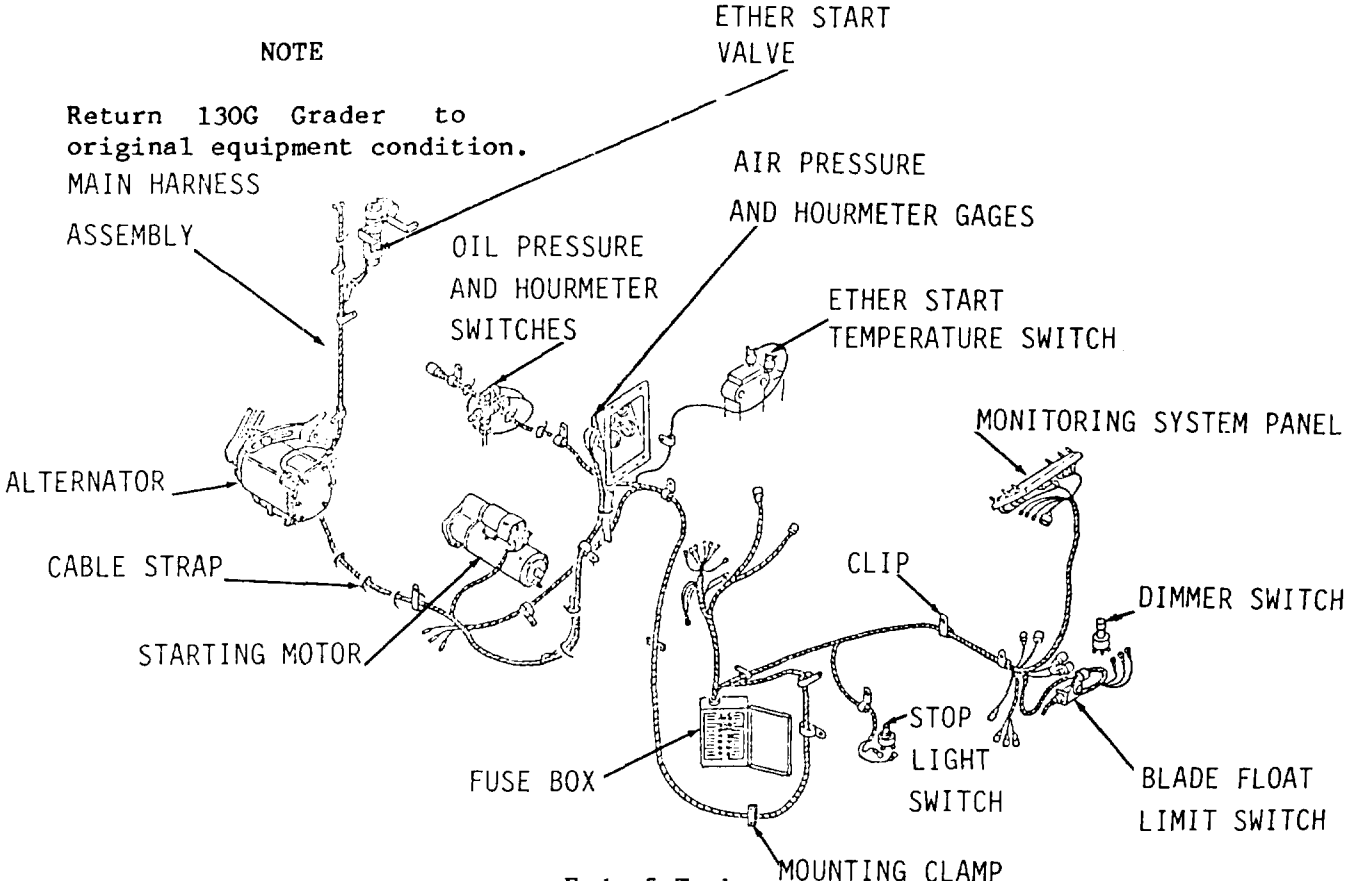


Figure 4-87.

End of Task

WIRING AND HARNESS MAINTENANCE. (cont)

4-18. Main Blackout Light Harness. (Sheet 1 of 3)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 63G

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Small tags, Item 43,
Appendix C
Cable straps

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Control console removed.
Vehicle light switch panels removed.

Go to Sheet 2

WIRING AND HARNESS MAINTENANCE.

4-18. Main Blackout Light Harness. (Sheet 2 of 3)

REMOVAL

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

1. Disconnect main blackout light harness assembly from magnetic switch, blackout switch, fuse box and blackout/stop light switch (Figure 4-88).
2. Remove main blackout light harness assembly, mounting clips and clamps and cable straps from the engine compartment and under cab. Discard cable straps.
3. Remove main blackout light harness assembly.

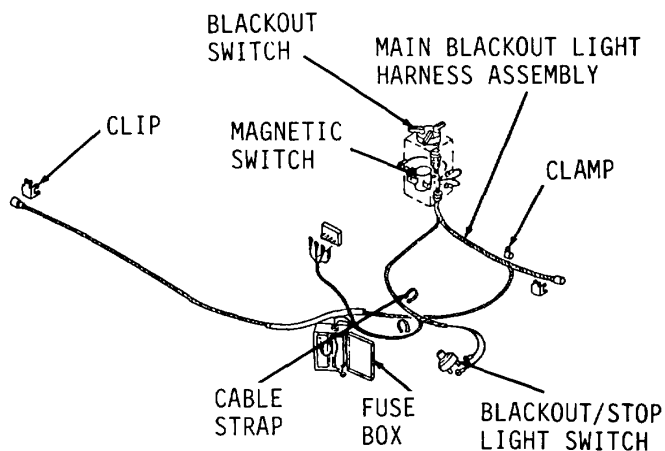
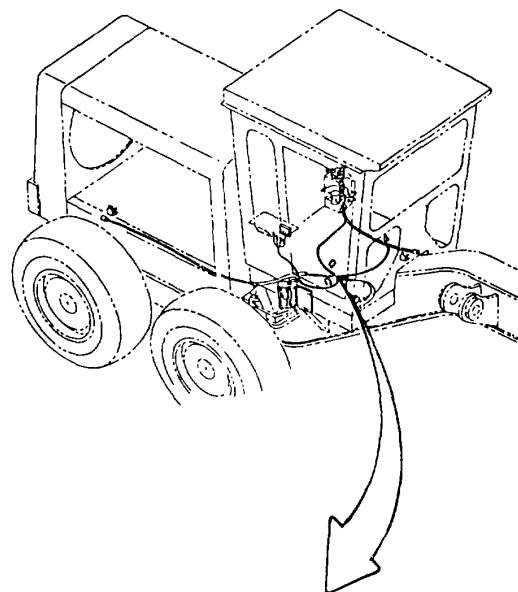


Figure 4-88.

Go to Sheet 3

WIRING AND HARNESS MAINTENANCE. (cont)

4-18. Main Blackout Light Harness. (Sheet 3 of 3)

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

1. Inspect all parts. Refer to Chapter 2.
2. Repair harness assembly, if necessary. Refer to TM 5-3805-261-20.

INSTALLATION

1. Install main blackout light harness assembly (Figure 4-88).
2. Install main blackout light harness assembly, new cable straps and mounting clamps and clips to engine compartment and under cab.
3. Connect main blackout light harness assembly to blackout/stop light switch, fuse box, blackout switch and magnetic switch.

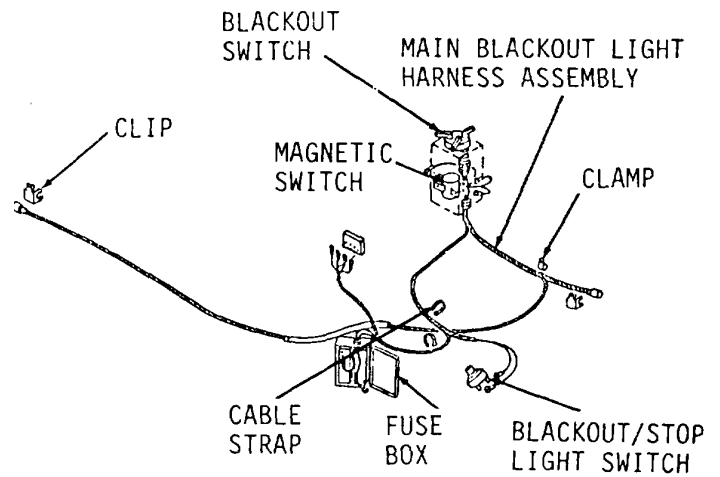


Figure 4-88.

NOTE

Return 130G Grader to original equipment condition.

End of Task

WIRING AND HARNESS MAINTENANCE.

4-19. Front Blackout Light Harness. (Sheet 1 of 3)

This task covers: a. Removal b. Cleaning c. Inspection
d. Installation

INITIAL SETUP:

Applicable Configurations Personnel Required

All Construction equipment
 repairer MOS 63C

Tools

General Mechanic's Tool Kit: References
Automotive (NSN 5180-00- TM 5-3805-261-10
177-7033) TM 5-3805-261-20

Test Equipment Special Environmental Conditions

None None

Materials/Parts General Safety Instructions

Dry cleaning solvent, None
Item 15, Appendix C
Clean cloths, Item 41, Torques
Appendix C All fasteners are tightened to
Straps, Items 5, 6 standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10 Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20 Positive cable on right side disconnected.
Frame covers removed, left side.

Go to Sheet 2

Change 1 4-93

WIRING AND HARNESS MAINTENANCE. (cont)

4-19. Front Blackout Light Harness. (Sheet 2 of 3)

REMOVAL

1. Disconnect front blackout light harness assembly (11) from back of front blackout light (4, Figure 4-89).
2. Remove nut (1).
3. Disconnect wire assembly (2) from bottom of front blackout light (4).
4. Remove lockwasher (3) and front blackout light (4).
5. Cut and discard seven straps (5) from left, front frame of vehicle.
6. Remove bolt (6) and washer (7).
7. Disconnect wire assembly (8).
8. Remove lockwasher (9).
9. Remove front blackout light harness assembly (10) and main blackout light harness (11) from clip (12).
10. Disconnect front blackout light harness assembly (10) from main blackout light harness (11).
11. Remove front blackout light harness assembly (10) from vehicle.

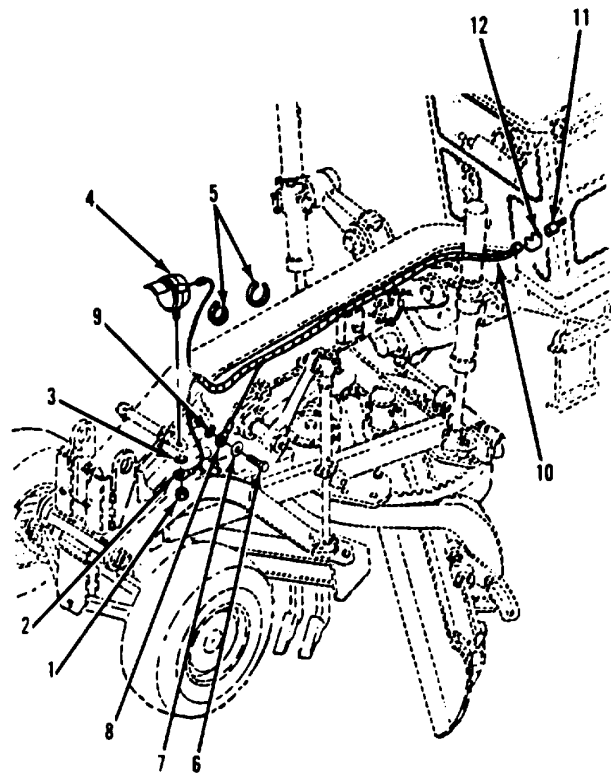


Figure 4-89.

CLEANING

Clean all parts. Refer to Chapter 2.

Go to Sheet 3

WIRING AND HARNESS MAINTENANCE.

4-19. Front Blackout Light Harness. (Sheet 3 of 3)

INSPECTION

1. Inspect all parts. Refer to Chapter 2.
2. Repair harness assembly, if necessary. Refer to TM 5-3805-261-20.

INSTALLATION

1. Position front blackout light harness assembly (10, Figure 4-89) on left side of cab on vehicle.
2. Connect front blackout light harness assembly (10) to main blackout light harness (11) and attach to clip (12).
3. Install lockwasher (9) on left, front frame of vehicle.
4. Connect wire assembly (8).
5. Install washer (7) and bolt (6).
6. Install seven new straps (5).
7. Install front blackout light (4) and lockwasher (3).
8. Connect wire assembly (2) to bottom of front blackout light (4).
9. Install nut (1).
10. Connect front blackout light harness assembly (11) to back of front blackout light (4).

NOTE

Return 130G Grader to original equipment condition.

End of Task

WIRING AND HARNESS MAINTENANCE. (cont)

4-20. Rear Blackout Light Harness. (Sheet 1 of 4)

This task covers: a. Removal b. Cleaning c. Inspection
d. Installation

INITIAL SETUP:

| | |
|----------------------------------|--|
| <u>Applicable Configurations</u> | <u>Personnel Required</u> |
| All | Construction equipment repairer MOS 63G |

Tools
General Mechanic's Tool Kit: References
Automotive (NSN 5180-00-177-7033) TM 5-3805-261-10
TM 5-3805-261-20

| | |
|-----------------------|---|
| <u>Test Equipment</u> | <u>Special Environmental Conditions</u> |
| None | None |

| | |
|--|---|
| <u>Materials/Parts</u> | <u>General Safety Instructions</u> |
| Dry cleaning solvent, Item 15, Appendix C | None |
| Clean cloths, Item 41, Appendix C | <u>Torques</u> All fasteners are tightened to standard torques. Refer to Appendix E. |
| Small tags, Item 43, Appendix C | |
| Tie strap, Item 16 | |

Troubleshooting References
None

Equipment Condition
TM 5-3805-261-10 Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20 Positive cable on right side disconnected.
Right and left engine screen doors open.

Go to Sheet 2

Change 1 4-96

WIRING AND HARNESS MAINTENANCE.

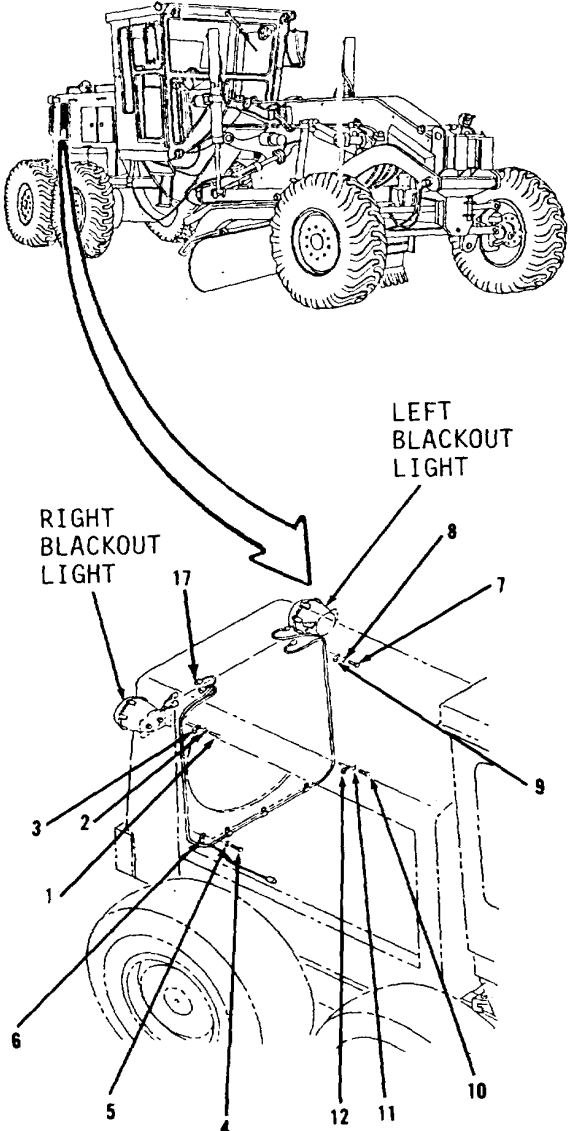
4-20. Rear Blackout Light Harness. (Sheet 2 of 4)

REMOVAL

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

- 1. Disconnect rear blackout light harness assembly (17, Figure 4-90) from right blackout light.
- 2. Remove two bolts (1), washers (2) and small clips (3).
- 3. Remove two bolts (4), washers (5) and large clips (6).
- 4. Disconnect rear blackout light harness assembly (17) from left blackout light.
- 5. Remove two bolts (7), washers (8) and small clips (9).
- 6. Remove two bolts (10), washers (11) and large clips (12).



Go to Sheet 3

Figure 4-90.

WIRING AND HARNESS MAINTENANCE. (cont)

4-20. Rear Blackout Light Harness. (Sheet 3 of 4)

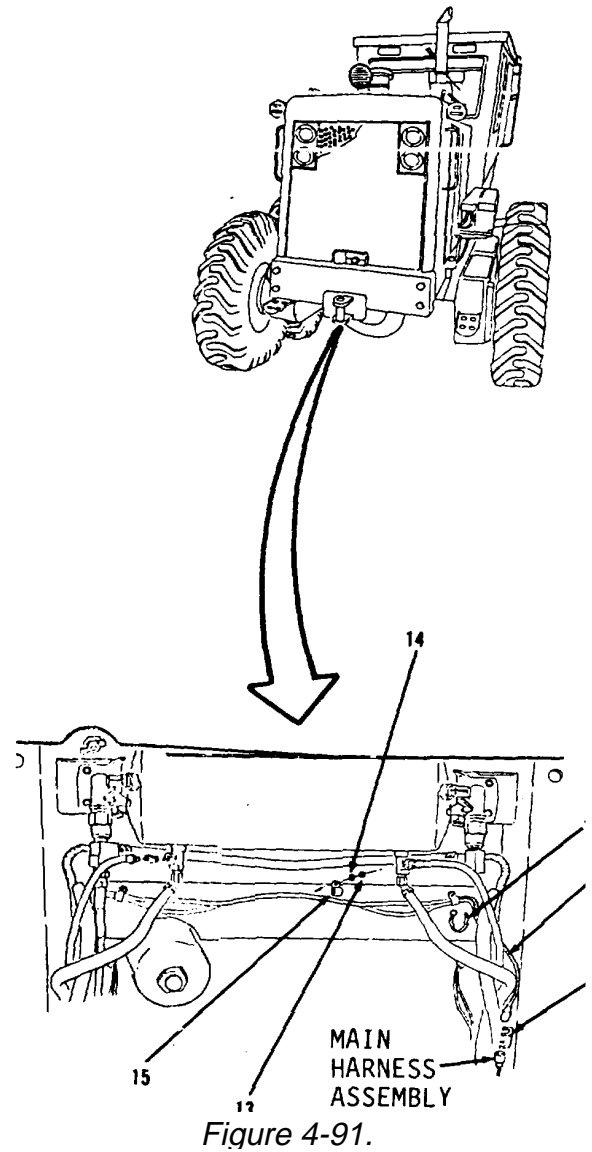
7. Remove three nuts (13), washers (14) and clips (15, Figure 4-91).
8. Cut and discard tie strap (16).
9. Remove rear blackout light harness assembly (17) from clip (18).
10. Disconnect rear blackout light harness assembly (17) from main harness assembly.
11. Remove rear blackout light harness assembly (17) from vehicle.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

1. Inspect all parts. Refer to Chapter 2.
2. Repair harness assembly, if necessary. Refer to TM 5-3805-261-20.



Go to Sheet 4

WIRING AND HARNESS MAINTENANCE.

4-20. Rear Blackout Light Harness. (Sheet 4 of 4:

INSTALLATION

1. Position rear blackout light harness assembly (17, Figure 4-90) in vehicle.
2. Connect rear blackout light harness (17) to main blackout light harness.
3. Install rear blackout light harness assembly (17) into clip (18).
4. Install new tie strap (16).
5. Install three clips (15), washers (14) and three nuts (13).
6. Install two large clips (12), washers (11) and bolts (10).
7. Install two small clips (9), washers (8) and bolts (7).
8. Connect rear blackout light harness assembly (17) to left blackout light.
9. Install two large clips (6), washers (5) and bolts (4).
10. Install two small clips (3), washers (2) and bolts (1).
11. Connect rear blackout light harness assembly (17) to right blackout light.

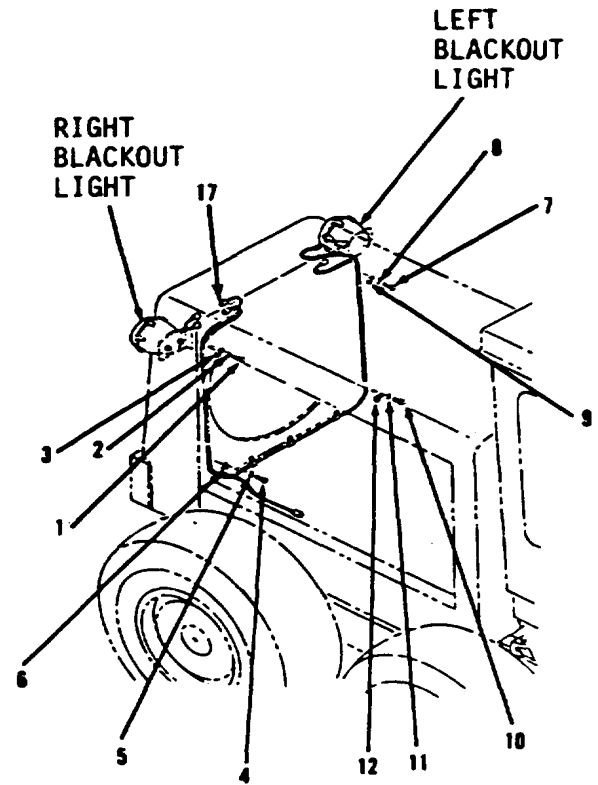


Figure 4-90.

NOTE

Return 130G Grader to original equipment condition.

End of Task

4-99

WIRING AND HARNESS MAINTENANCE. (cont)

4-21. Supplemental Steering Main Harness. (Sheet 1 of 5)

This task covers: a. Removal b. Cleaning c. Inspection
d. Installation

INITIAL SETUP:

| | |
|----------------------------------|--|
| <u>Applicable Configurations</u> | <u>Personnel Required</u> |
| All | Construction equipment repairer MOS 63G |

Tools
General Mechanic's Tool Kit: References
Automotive (NSN 5180-00-177-7033) TM 5-3805-261-10
TM 5-3805-261-20

| | |
|-----------------------|---|
| <u>Test Equipment</u> | <u>Special Environmental Conditions</u> |
| None | None |

| | |
|--|---|
| <u>Materials/Parts</u> | <u>General Safety Instructions</u> |
| Dry cleaning solvent, Item 15, Appendix C | None |
| Clean cloths, Item 41, Appendix C | <u>Torques</u> All fasteners are tightened to standard torques. Refer to Appendix E. |
| Small tags, Item 43, Appendix C | |
| Straps | |

Troubleshooting References
None

Equipment Condition
TM 5-3805-261-10 Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20 Engine side panels removed.
Steering control console plates removed.
Positive cable on right side disconnected.

Go to Sheet 2

Change 1 4-100

WIRING AND HARNESS MAINTENANCE.

4-21. Supplemental Steering Main Harness. (Sheet 2 of 5)

REMOVAL

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

- 1. Disconnect supplemental steering main harness assembly from monitoring system panel, fuse box, electronic control, indicator light, switches, wire assemblies and harnesses (Figure 4-92).
- 2. Remove supplemental steering main harness assembly mounting clips, clamps and straps. Discard straps.
- 3. Remove supplemental steering main harness assembly.

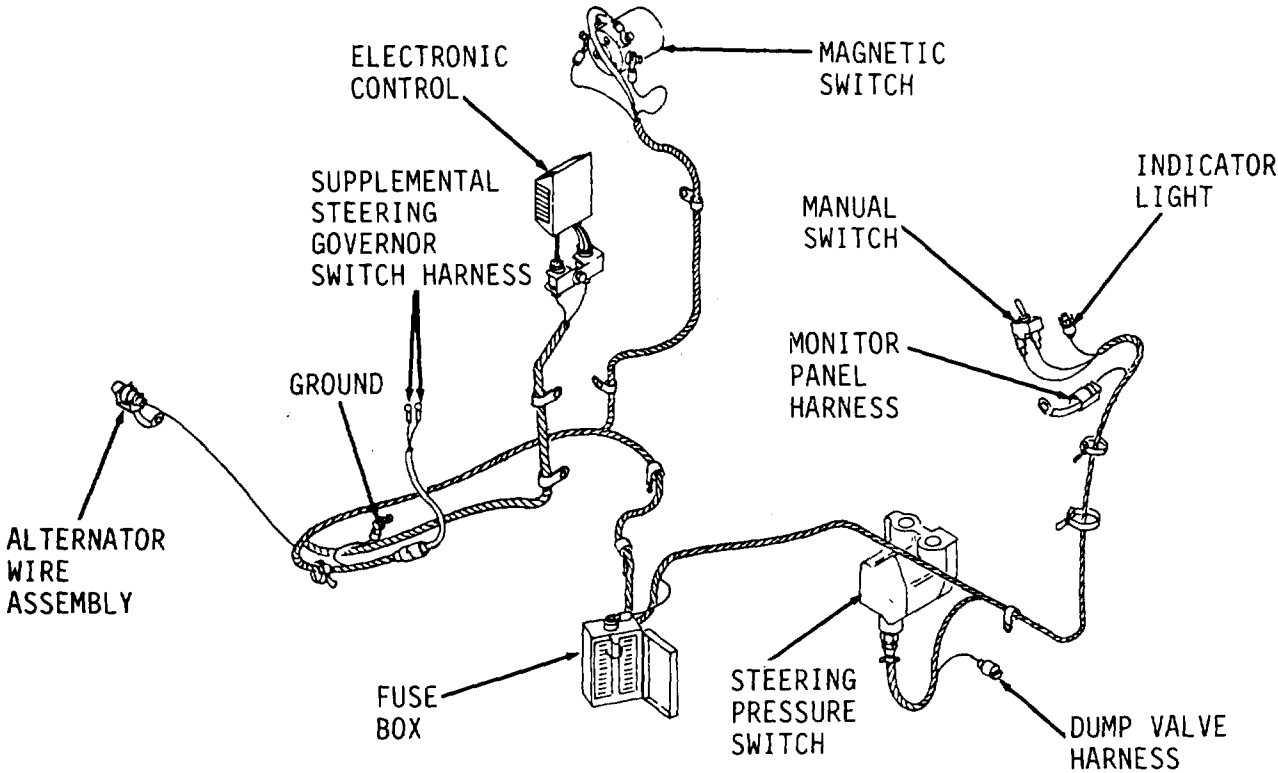


Figure 4-92.

Go to Sheet 3

WIRING AND HARNESS MAINTENANCE. (cont)

4-21. Supplemental Steering Main Harness. (Sheet 3 of 5)

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

1. Inspect all parts. Refer to Chapter 2.
2. Repair harness assembly, if necessary. Refer to TM 5-3805-261-20.

Go to Sheet 4

4-102

WIRING AND HARNESS MAINTENANCE.

4-21. Supplemental Steering Main Harness. (Sheet 4 of 5)

INSTALLATION

CAUTION

Do not position supplemental steering main harness assembly against any rough surface. Failure to follow this procedure could cause chafing.

NOTE

Route supplemental steering main harness assembly exactly as it was removed.

- 1. Position supplemental steering main harness assembly (Figure 4-92) in vehicle.

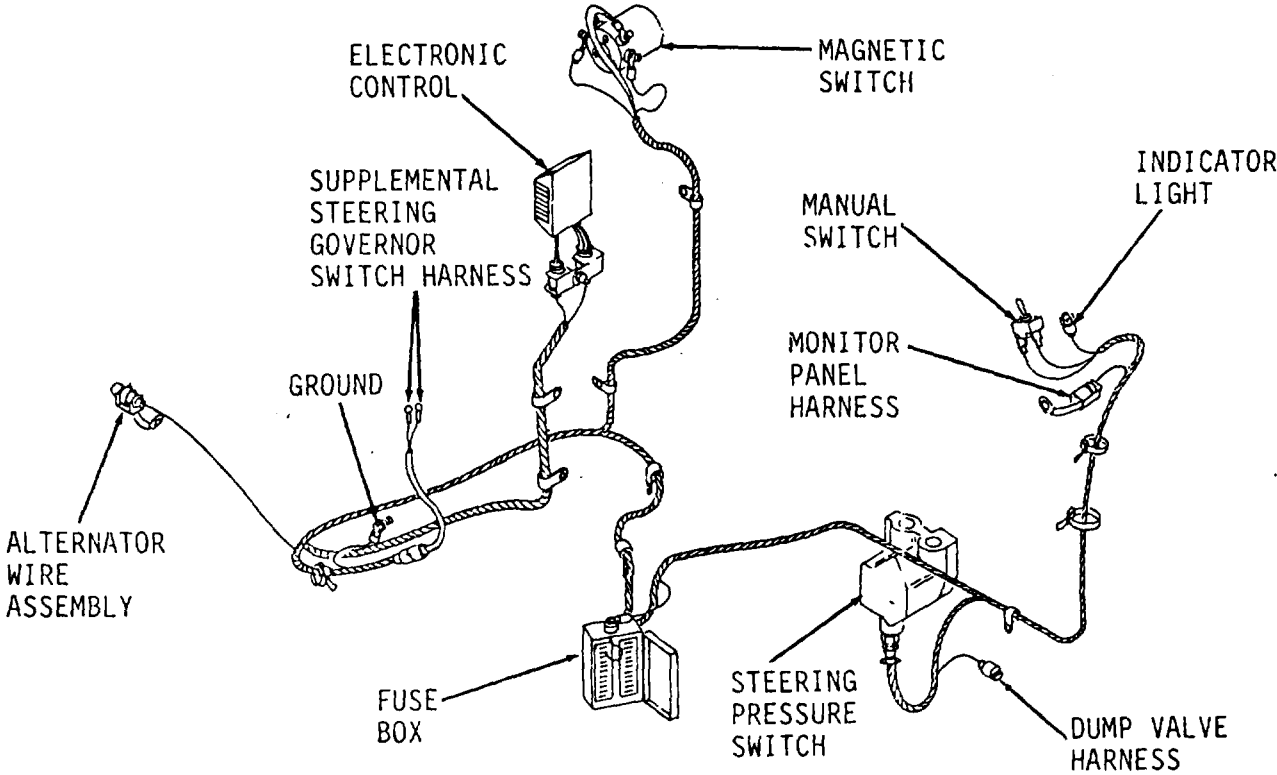


Figure 4-92.

Go to Sheet 5

WIRING AND HARNESS MAINTENANCE. (cont)

4-21. Supplemental Steering Main Harness. (Sheet 5 of 5)

INSTALLATION (cont)

- 2. Position new supplemental steering main harness assembly straps, clamps and mounting clips (Figure 4-92).
- 3. Connect supplemental steering main harness assembly to monitoring system panel, fuse box, electronic control, indicator light, switches, wire assemblies and harnesses.
- 4. Install new supplemental steering main harness assembly straps, clamps and mounting clips.

NOTE

Return 130G Grader to original equipment condition.

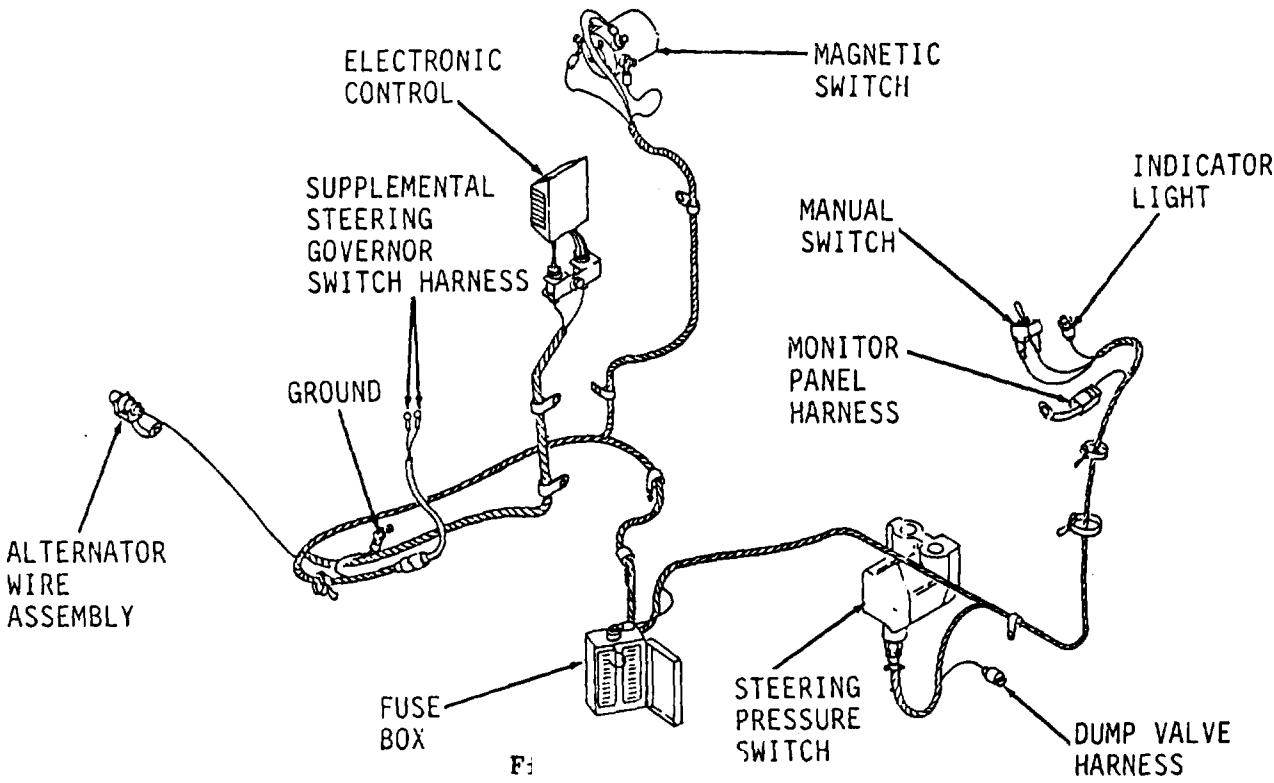


Figure 4-92.

End of Task

WIRING AND HARNESS MAINTENANCE.

4-22. Electrical Monitor Main Harness. (Sheet 1 of 5)

This task covers: a. Removal b. Cleaning c. Inspection
d. Installation

INITIAL SETUP:

Applicable Configurations Personnel Required

All Construction equipment
 repairer MOS 63G

Tools

General Mechanic's Tool Kit: References
Automotive (NSN 5180-00- TM 5-3805-261-10
177-7033) TM 5-3805-261-20

Test Equipment Special Environmental Conditions

None None

Materials/Parts General Safety Instructions

| | |
|--|---|
| Dry cleaning solvent, Item 15, Appendix C | None |
| Clean cloths, Item 41, Appendix C | <u>Torques</u> All fasteners are tightened to standard torques. Refer to Appendix E. |
| Small tags, Item 43, Appendix C | |
| Straps | |

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10 Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20 Engine side panels removed.
Steering control console support plates removed.
Positive cable on right side disconnected.

Go to Sheet 2

Change 1 4-105

WIRING AND HARNESS MAINTENANCE. (cont)

4-22. Electrical Monitor Main Harness. (Sheet 2 of 5)

REMOVAL

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

1. Disconnect monitor main harness assembly from EMS panel, lamp, supplemental steering, fuse box, warning horn, starting motor, alternator, jumper wire and switches (Figure 4-93).
2. Remove monitor main harness assembly mounting clips, clamps and straps. Discard straps.
3. Remove monitor main harness assembly.

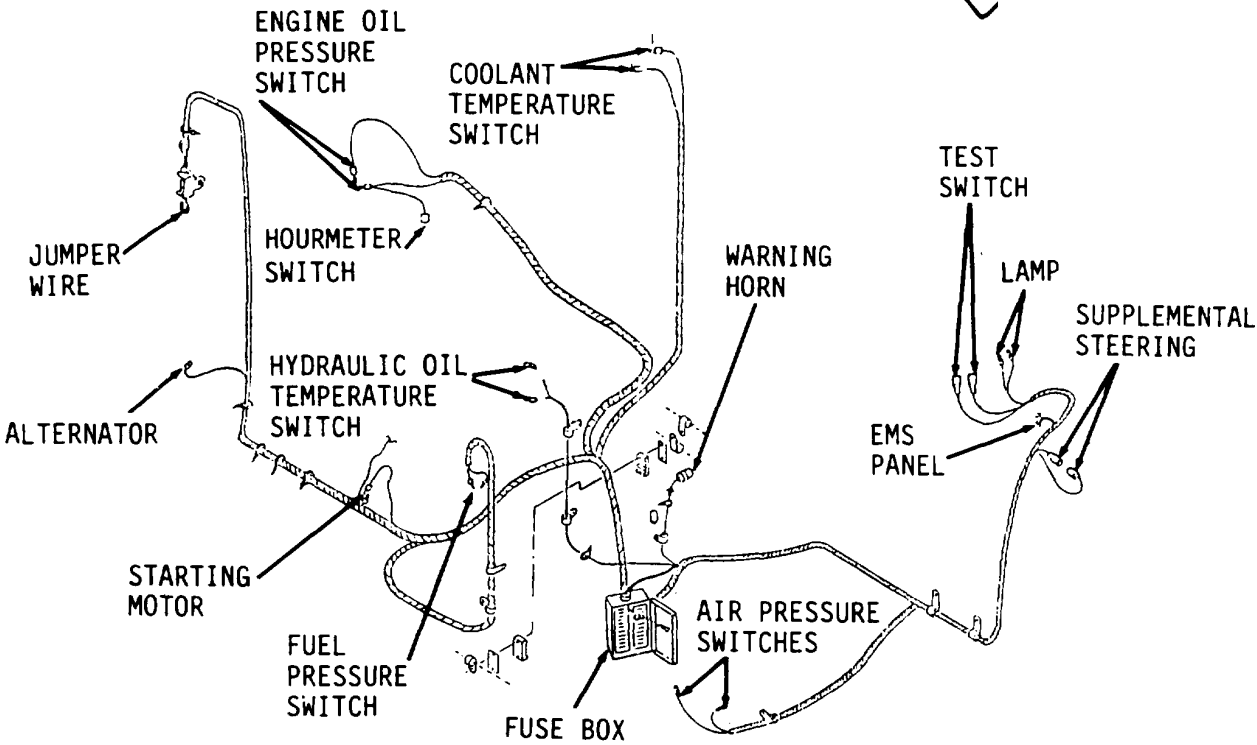
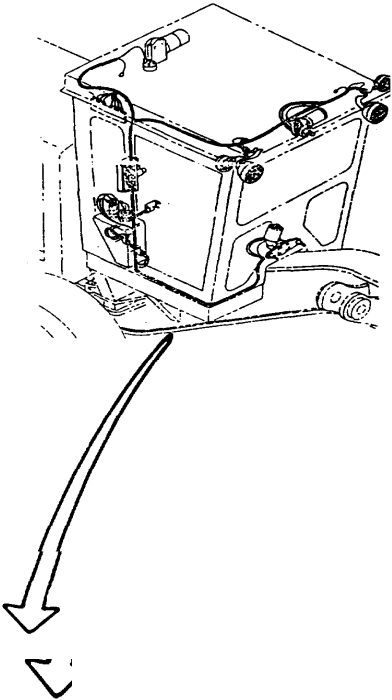


Figure 4-93.

Go to Sheet 3

WIRING AND HARNESS MAINTENANCE.

4-22. Electrical Monitor Main Harness. (Sheet 3 of 5)

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

1. Inspect all parts. Refer to Chapter 2.
2. Repair harness assembly, if necessary. Refer to TM 5-3805-261-20.

Go to Sheet 4

4-107

WIRING AND HARNESS MAINTENANCE. (cont)

4-22. Electrical Monitor Main Harness. (Sheet 4 of 5)

INSTALLATION

CAUTION

Do not position monitor main harness assembly against any rough surface. Failure to follow this procedure could cause chafing.

NOTE

Route monitor main harness assembly exactly as it was removed.

- 1. Position monitor main harness assembly in vehicle (Figure 4-93).

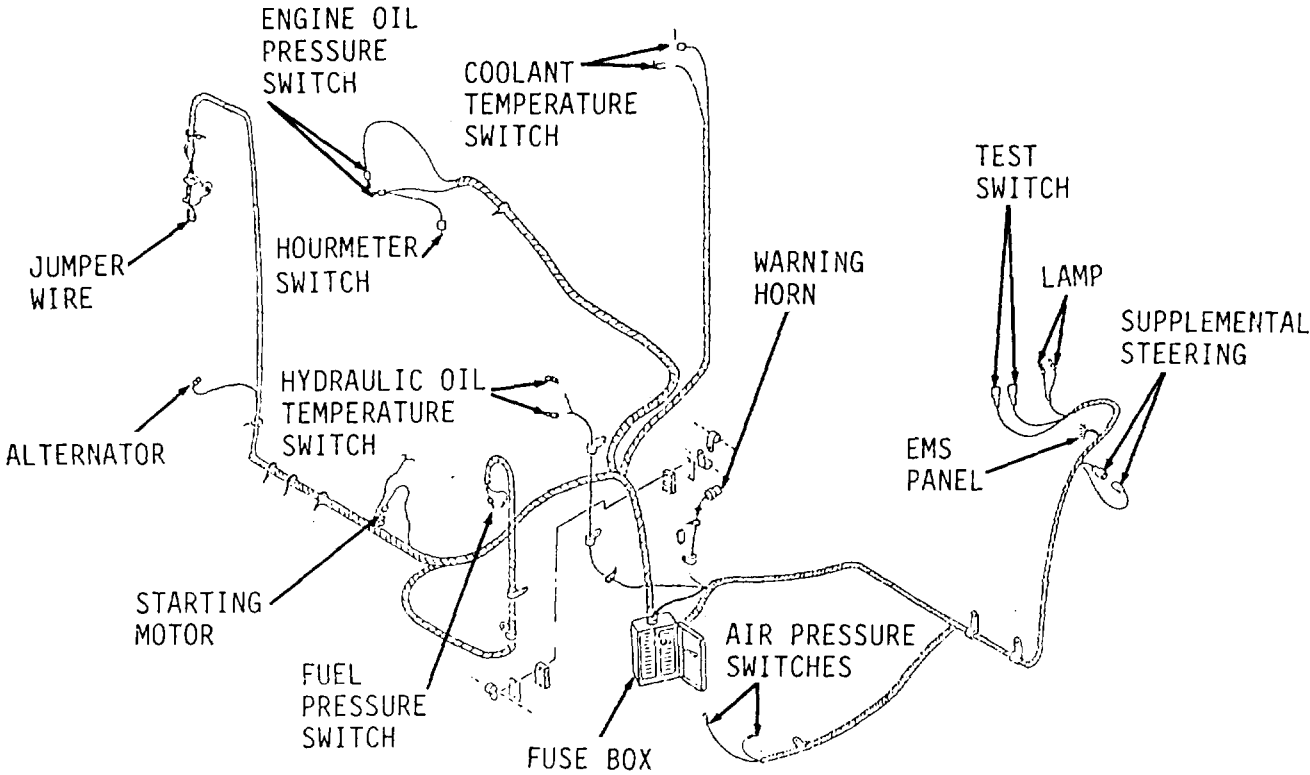


Figure 4-93.

Go to Sheet 5

WIRING AND HARNESS MAINTENANCE.

4-22. Electrical Monitor Main Harness. (Sheet 5 of 5)

INSTALLATION

2. Position new monitor main harness assembly straps, clamps and mounting clips.
3. Connect monitor main harness assembly to EMS panel, lamp, supplemental steering, fuse box, warning horn, starting motor, alternator, jumper wire and switches.
4. Install new monitor main harness assembly, straps, clamps and mounting clips.

NOTE

Return 130G Grader to original equipment condition.

End of Task

4-109

WIRING AND HARNESS MAINTENANCE. (cont)

4-23. Cab Main Harness. (Sheet 1 of 3)

This task covers: a. Removal b. Cleaning c. Inspection
d. Installation

INITIAL SETUP:

Applicable Configurations Personnel Required

All Construction equipment
 repairer NOS 63G

Tools

General Mechanic's Tool Kit: References
Automotive (NSN 5180-00- TM 5-3805-261-10
177-7033) TM 5-3805-261-20

Test Equipment Special Environmental Conditions

None None

Materials/Parts General Safety Instructions

| | |
|---|---|
| Dry cleaning solvent, Item 15, Appendix Clean cloths, Item · <u>Torques</u> Appendix C | None |
| Small tags, Item 43, Appendix C | All fasteners are tightened to standard torques. Refer to Appendix E. |

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10 Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20 Cab switch panel removed.
Windshield washer removed.
Positive cable on right side disconnected.

Go to Sheet 2

Change 1 4-110

WIRING AND HARNESS MAINTENANCE.

4-23. Cab Main Harness. (Sheet 2 of 3)

REMOVAL

1. Remove two plates behind right cab door hinge. Refer to TM 5-3805-261-20.

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

2. Disconnect cab main harness assembly from rear wiper switch. Refer to TM 5-3805-261-20.
3. Disconnect cab main harness assembly from cab fuse box, cab signal lights, headlights, wiper motors and harnesses (Figure 4-94).
4. Remove cab main harness assembly mounting clips and harness clip.
5. Remove cab main harness.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

1. Inspect all parts. Refer to Chapter 2.
2. Repair harness assembly, if necessary. Refer to TM 5-3805-261-20.

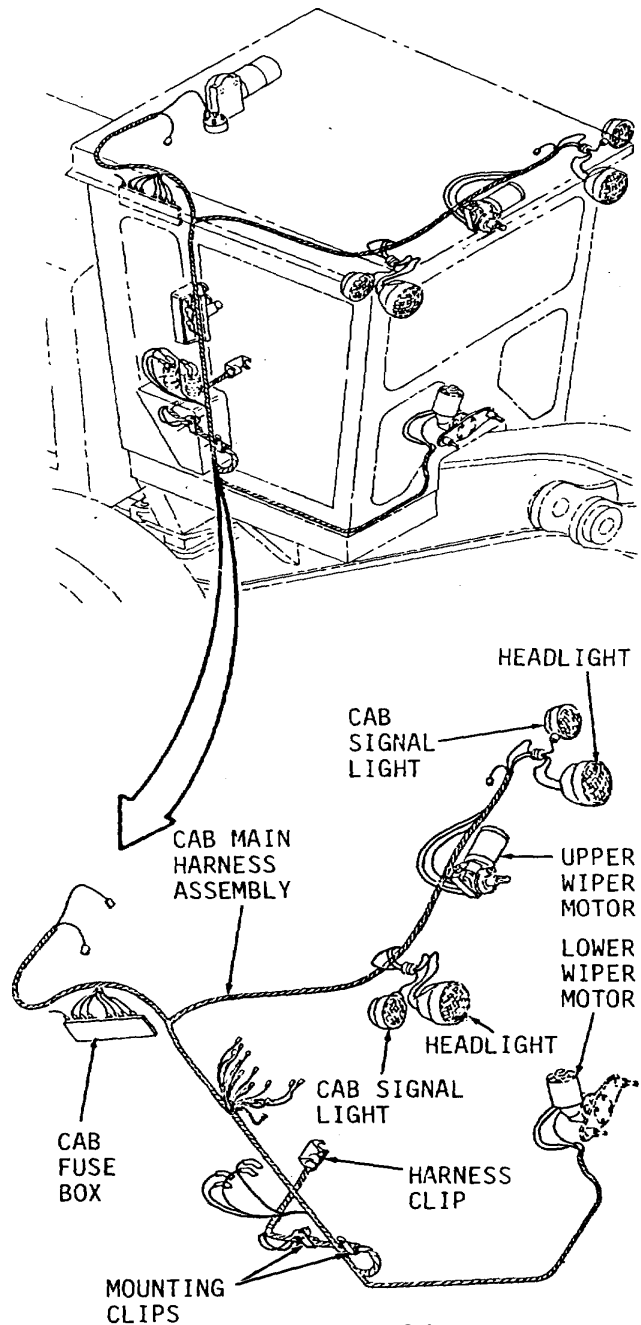


Figure 4-94.

Go to Sheet 3

WIRING AND HARNESS MAINTENANCE. (cont)

4-23. Cab Main Harness. (Sheet 3 of 3)

INSTALLATION

CAUTION

Do not position main harness assembly against any rough surface. Failure to follow this procedure could cause chafing.

NOTE

Route main harness assembly exactly as it was removed.

1. Position cab main harness assembly (Figure 4-94).
2. Position harness clip and mounting clips on cab main harness assembly.
3. Connect cab main harness assembly to cab fuse box, cab signal lights, headlights and harnesses.
4. Install mounting hardware on cab main harness assembly mounting clips.
5. Connect cab main harness assembly to rear wiper switch. Refer to TM 5-3805-261-20.
6. Install two plates behind right cab door hinge.

NOTE

Return 130G Grader to original equipment condition.

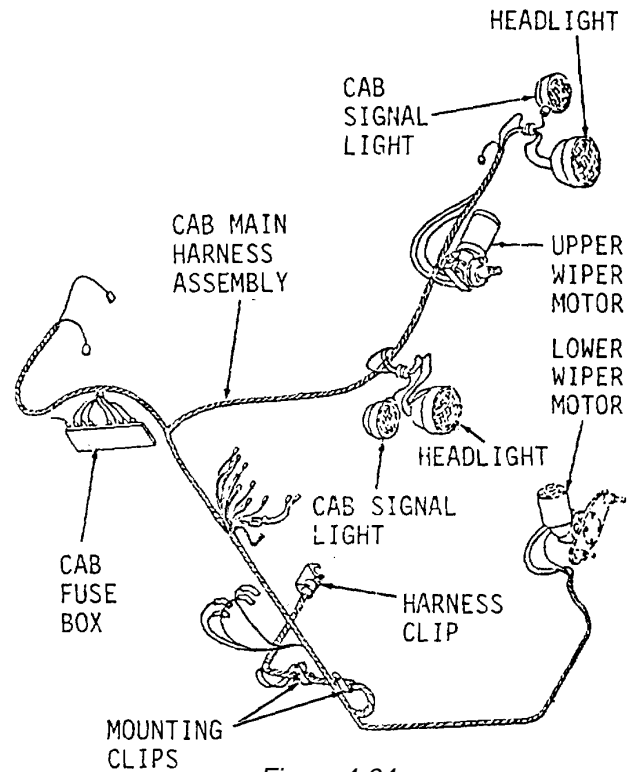


Figure 4-94.

End of Task

WIRING AND HARNESS MAINTENANCE.

4-24. Rear Wiper Harness. (Sheet 1 of 2)

This task covers: a. Removal b. Cleaning c. Inspection
d. Installation

INITIAL SETUP:

| | |
|----------------------------------|--|
| <u>Applicable Configurations</u> | <u>Personnel Required</u> |
| All | Construction equipment repairer MOS 63G |

Tools
General Mechanic's Tool Kit: References
Automotive (NSN 5180-00-177-7033) TM 5-3805-261-10
TM 5-3805-261-20

| | |
|-----------------------|---|
| <u>Test Equipment</u> | <u>Special Environmental Conditions</u> |
| None | None |

| | |
|--|---|
| <u>Materials/Parts</u> | <u>General Safety Instructions</u> |
| Dry cleaning solvent, Item 15, Appendix C | None |
| Clean cloths, Item 41, Appendix C | <u>Torques</u> All fasteners are tightened to standard torques. Refer to Appendix E. |
| Small tags, Item 43, Appendix C | |

Troubleshooting References
None

Equipment Condition
TM 5-3805-261-10 Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20 Rear wiper motor removed.

Go to Sheet 2

WIRING AND HARNESS MAINTENANCE. (cont)

4-24. Rear Wiper Harness. (Sheet 2 of 2)

REMOVAL

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

1. Disconnect five wire assemblies from motor (Figure 4-95).
2. Remove harness assembly.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Position harness assembly (Figure 4-95).
2. Connect five wire assemblies to motor.

NOTE

Return 130G Grader to original equipment condition.

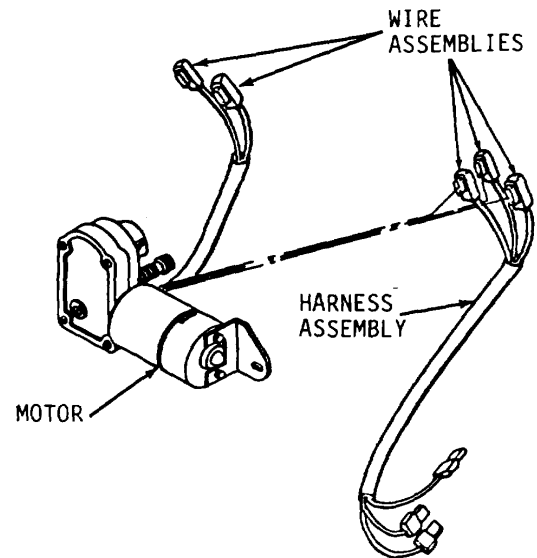


Figure 4-95.

End of Task

CHAPTER 5

TRANSMISSION
TROUBLESHOOTING AND MAINTENANCE

CHAPTER OVERVIEW

The purpose of this chapter is to help the technician efficiently troubleshoot and repair malfunctioning equipment and to perform authorized direct support level maintenance procedures on the 130 Grader transmission, drive shaft, front axle and rear axle.

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Section I. TRANSMISSION TROUBLESHOOTING.

5-1. GENERAL INFORMATION. This section lists the common transmission malfunctions which may occur during the operation of the 130G Grader. You should perform the tests, inspections and corrective actions in the order listed. Follow the troubleshooting procedures listed below step-by-step until you can go no further.

5-2. TRANSMISSION TROUBLESHOOTING PROCEDURES. This section cannot list all possible malfunctions, nor can it list all possible tests, inspections or corrective actions. If a malfunction is not listed, contact your supervisor.

TRANSMISSION TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

a. TRANSMISSION DOES NOT OPERATE IN ANY SPEED OR SLIPS IN ALL SPEEDS.

Step 1. Check the control linkage.

If the linkage is loose or needs adjustment--adjust or replace. Refer to paragraph 5-5.

Step 2. Check the oil pump.

If the oil pump is damaged or defective--replace. Refer to paragraph 5-10.

Step 3. Check for mechanical failure in transmission.

If the transmission is damaged or defective--replace. Refer to paragraph 5-6.

Step 4. Check the differential.

If the differential is damaged or defective--replace. Refer to paragraph 5-19.

Step 5. Check the final drive planetaries.

If you suspect a problem with the final planetaries--contact General Support.

TRANSMISSION TROUBLESHOOTING AND MAINTENANCE PROCEDURES. (cont)

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

b. TRANSMISSION DOES NOT SHIFT.

Check the oil pump.

If the oil pump is damaged or defective--replace. Refer to paragraph 5-10.

c. TRANSMISSION ENGAGES SUDDENLY (ROUGH SHIFTING).

Step 1. Check the primary relief valve.

If the primary relief valve is not operating properly--replace. Refer to paragraph 5-7.

Step 2. Check the control linkage.

If the linkage is loose or needs adjustment--adjust or replace. Refer to paragraph 5-5.

Step 3. Check the load piston.

If you suspect a problem with the load piston--contact General Support.

Step 4. Check the valve springs.

If the valve springs are weak or damaged--replace. Refer to paragraph 14-10.

d. SLOW SHIFTING.

Step 1. Check the control linkage.

If the linkage is loose or needs adjustment--adjust or replace. Refer to paragraph 5-5.

Step 2. Check the inlet side of oil pump for air leakage.

If the oil pump is damaged or defective--replace. Refer to paragraph 5-10.

TRANSMISSION TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

d. SLOW SHIFTING.

Step 3. Check the load piston.

If you suspect a problem with the load piston--contact General Support.

e. TRANSMISSION DOES NOT OPERATE IN FIRST AND FOURTH SPEEDS.

Check the Number Five clutch plates and discs.

If you suspect a problem with the clutch plates or discs--contact General Support.

f. TRANSMISSION DOES NOT OPERATE IN SECOND AND FIFTH SPEEDS.

Check the Number Four clutch plates and discs.

If you suspect a problem with the clutch plates or discs--contact General Support.

g. TRANSMISSION DOES NOT OPERATE IN THIRD AND SIXTH SPEEDS.

Check the Number Three clutch plates and discs.

If you suspect a problem with the clutch plates or discs--contact General Support.

h. TRANSMISSION WILL NOT OPERATE IN REVERSE.

Check the Number Two clutch plates and discs.

If you suspect a problem with the clutch plates or discs--contact General Support.

i. TRANSMISSION DOES NOT OPERATE IN FORWARD.

Check the Number One clutch plates and discs.

If you suspect a problem with the clutch plates or discs--contact General Support.

TRANSMISSION TROUBLESHOOTING AND MAINTENANCE PROCEDURES. (cont)

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

j. TRANSMISSION DOES NOT OPERATE IN FOURTH, FIFTH OR SIXTH SPEEDS.

Check the Number Six clutch plates and discs.

If you suspect a problem with the clutch plates or discs--contact General Support.

k. TRANSMISSION DOES NOT SHIFT OUT OF SPEED WHEN CONTROL LEVER MOVED.

Check the control linkage.

If the linkage is loose or needs adjustment--adjust or replace. Refer to paragraph 5-5.

l. TRANSMISSION ENGAGES BUT VEHICLE WILL NOT MOVE.

Step 1. Check the differential.

If the differential is damaged or defective--replace. Refer to paragraph 5-19.

Step 2. Check the final drive planetary.

If you suspect a problem with the final drive planetary—contact General Support.

Step 3. Check the clutches being engaged.

If you suspect too many clutches are being engaged--contact General Support.

m. TRANSMISSION GETS HOT.

Step 1. Check the core of the oil cooler.

If the core is not open completely or is damaged or defective--replace. Refer to paragraph 5-11.

Step 2. Check the clutch.

If you suspect too much resistance in the clutch--contact General Support.

Section II. TRANSMISSION MAINTENANCE.

5-3. TRANSMISSION MAINTENANCE PROCEDURES.

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the transmission and its components in good repair.

b. This section is arranged by functional group code and provides a list of transmission components to be maintained and step-by-step maintenance procedures.

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TRANSMISSION MAINTENANCE. (cont)

5-4. Transmission Control Lever and Housing. (Sheet 1 of 9)

This task covers: a. Removal b. Cleaning c. Inspection
d. Installation

INITIAL SETUP:

| | |
|----------------------------------|--|
| <u>Applicable Configurations</u> | <u>Personnel Required</u> |
| All | Construction equipment repairer MOS 62B |

Tools
General Mechanic's Tool Kit: References
Automotive (NSN 5180-00-177-7033) TM 5-3805-261-10
TM 5-3805-261-20

| | |
|-----------------------|---|
| <u>Test Equipment</u> | <u>Special Environmental Conditions</u> |
| None | None |

| | |
|--|--|
| <u>Materials/Parts</u> | <u>General Safety Instructions</u> |
| Dry cleaning solvent, Item 15, Appendix C | None |
| Clean cloths, Item 41, Appendix C | <u>Torques</u> Except for special torques shown, all fasteners are tightened to standard torques. Refer to Appendix E. |
| Small tags, Item 43, Appendix C | |
| Cotter pin, Item 33 | |
| Gasket, Item 4 | |

Troubleshooting References
None

Equipment Condition
TM 5-3805-261-10 Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20 Back-up alarm removed.
Back-up alarm switch removed.
Parking brake air control valve
removed.
Switch panel and mounting removed.

Paragraph 6-6 Parking brake control removed.

Go to Sheet 2

TRANSMISSION MINTENANCE.

5-4. Transmission Control Lever and Housing. (Sheet 2 of 9)

REMOVAL

1. Remove three bolts (1), washers (2), cover (3) and gasket (4, Figure 5-1) from right side of operator's compartment. Discard gasket (4). Remove all material from mounting surfaces.
2. Loosen nut (8).
3. Remove bolt (5) and washer (6).
4. Remove rod end (7) and nuts (8 and 9).
5. Loosen nut (13, Figure 5-2).
6. Remove bolt (10) and washer (11).
7. Remove rod end (12) and nuts (13 and 14).

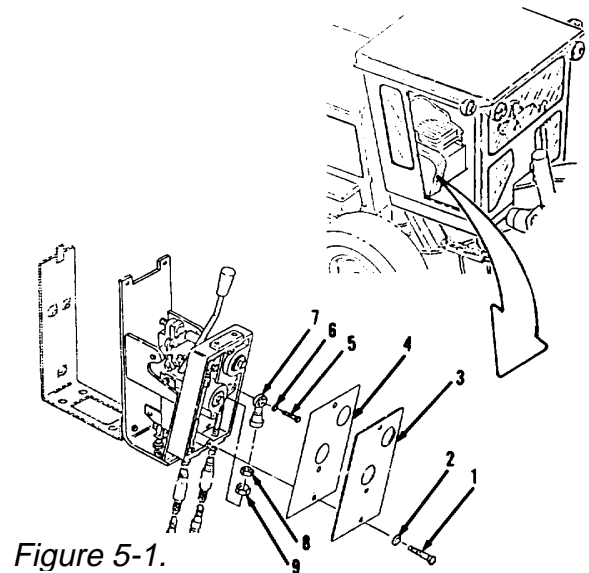


Figure 5-1.

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

8. Remove cables (15 and 16) through cab floor.
9. Remove washer (17), nut (18), washer (19) and nut (20).
10. Remove two bolts (21), washers (22), spacers (23) and mountings (24) from support (42, Figure 5-3).
11. Remove two bolts (25), washers (26) and nuts (27).

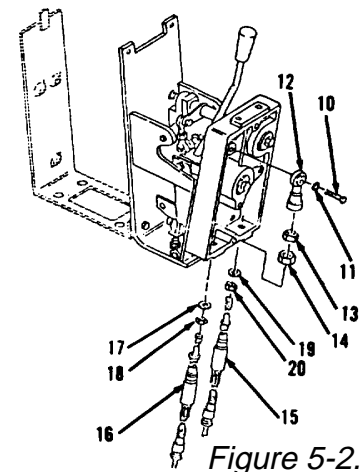


Figure 5-2.

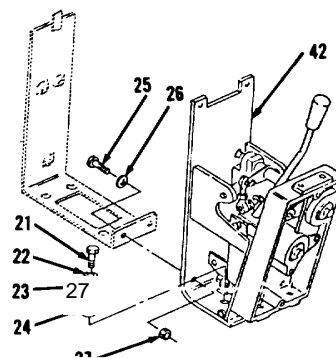


Figure 5-3.

Go to Sheet 3

TRANSMISSION MAINTENANCE. (cont)

5-4. Transmission Control Lever and Housing. (Sheet 3 of 9)

REMOVAL (cont)

- 12. Remove items 29 thru 73 as an assembly (Figure 5-4) from vehicle.
- 13. Remove pad (28).
- 14. Remove four bolts (29) and washers (30, Figure 5-5).
- 15. Separate housing items 31 thru 42 as an assembly from support items 43 thru 73 as an assembly.
- 16. Remove pin (31) and spring (32) from support (42, Figure 5-6).
- 17. Remove cotter pin (33), washer (34), pin (35), washer (36) and rod (37). Discard cotter pin (33).
- 18. Remove two bolts (38), washers (39) and items 40 and 41 as an assembly from support (42).
- 19. Remove bearing (40) from bracket (41, Figure 5-7).

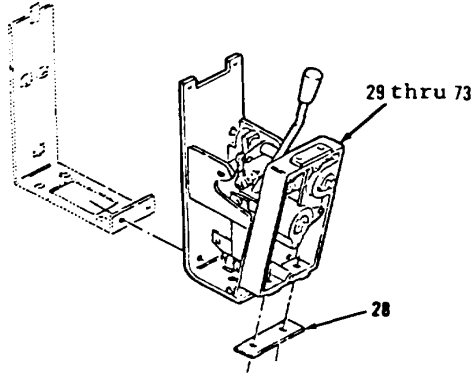


Figure 5-4.

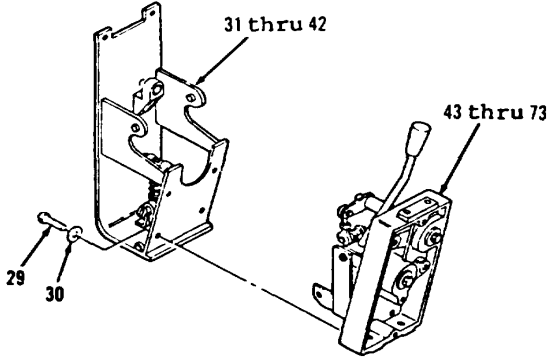


Figure 5-5.

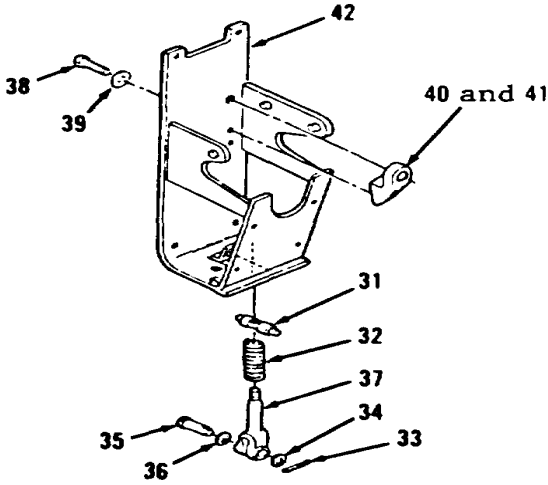


Figure 5-6.

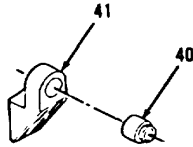


Figure 5-7.

Go to Sheet 4
5-10

TRANSMISSION MAINTENANCE.

5-4. Transmission Control Lever and Housing. (Sheet 4 of 9)

REMOVAL

20. Remove nut (43), washer (44) and bolt (45, Figure 5-8).
21. Remove nut (46), washer (47) and items 48 thru 50 as an assembly from lever (58).
22. Loosen nut (49, Figure 5-9).
23. Remove rod end (48) and nut (49) from rod (50).
24. Remove bolt (51), nut (52), washer (53) and items 55 thru 58 as an assembly from plate (54, Figure 5-10).
25. Remove two bearings (55) and shaft (56) from lever (58, Figure 5-11).
26. Remove knob (57).
27. Remove bolt (59), washer (60) and items 61 thru 63 as an assembly (Figure 5-12). Using hammer and punch, drive items 61 thru 63 as an assembly out of housing (73).

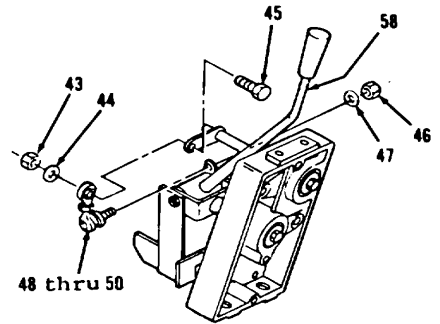


Figure 5-8.

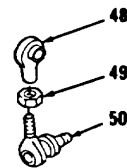


Figure 5-9.

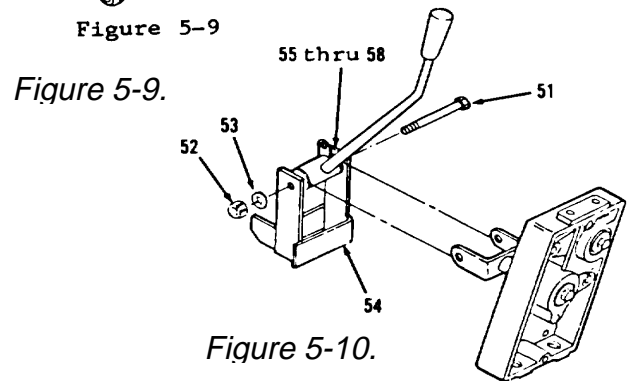


Figure 5-10.

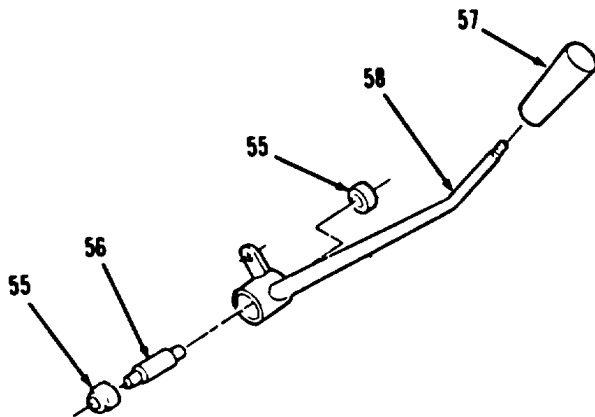


Figure 5-11.

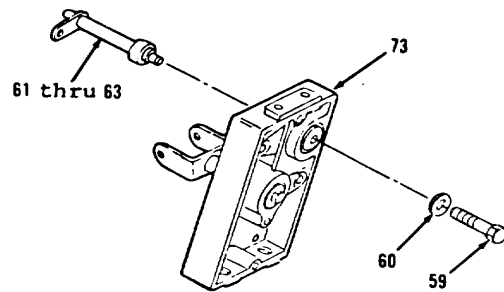


Figure 5-12.

Go to Sheet 5

TRANSMISSION MAIENANCE. (cont)

5-4. Transmission Control Lever and Busing. (Sheet 5 of 9)

REMOVAL (cont)

28. Remove key (61) and bearing (62) from shaft (63, Figure 5-13).
29. Remove bolt (64), washer (65) and items 66 thru 68 as an assembly (Figure 5-14).
30. Remove key (66) and bearing (67) from shaft (68, Figure 5-15).
31. Remove two bearings (69), rings (70), levers (71 and 72) from housing (73, Figure 5-16). Tag levers (71 and 72) as to their location in housing (73) to aid in installation.

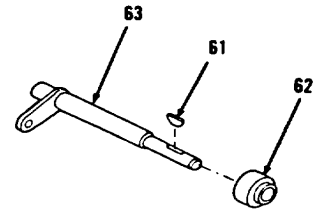


Figure 5-13.

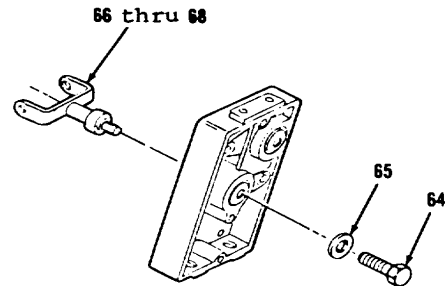


Figure 5-14.

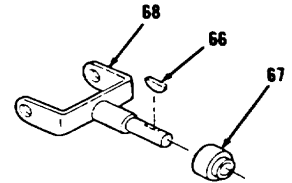


Figure 5-15.

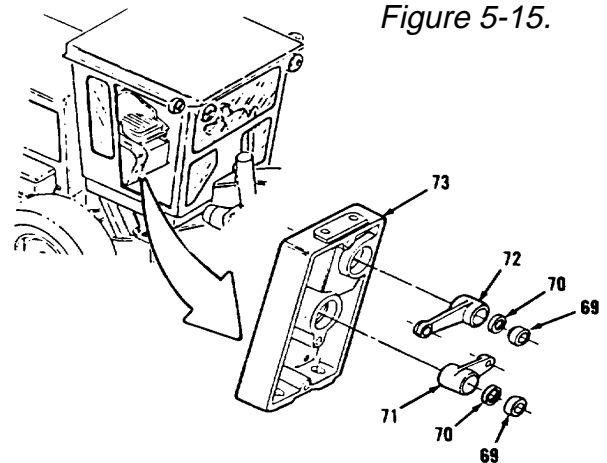


Figure 5-16.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Position levers (72 and 71) in housing (73, Figure 5-16) on right side of operator's compartment.
2. Install two rings (70) and bearings (69).
3. Install bearing (67) and key (66) on shaft (68, Figure 5-15).

**Go to Sheet 6
5-12**

TRANSMISSION MAINTENANCE.

5-4. Transmission Control Lever and Housing. (Sheet 6 of 9)

INSTALLATION

4. Install items 68 thru 66 as an assembly (Figure 5-14).
5. Install washer (65) and bolt (64). Tighten bolt (64) to 25 ft-lb torque.
6. Install bearing (62) and key (61) on shaft (63, Figure 5-13).
7. Install items 63 thru 61 as an assembly in housing (73, Figure 5-12).
8. Install washer (60) and bolt (59). Tighten bolt (59) to 25 ft-lb torque.
9. Install knob (57) on lever (58, Figure 5-11).
10. Install shaft (56) and two bearings (55).

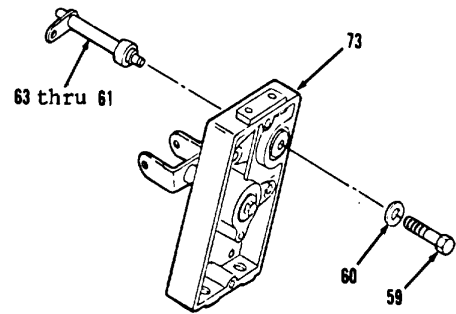


Figure 5-12.

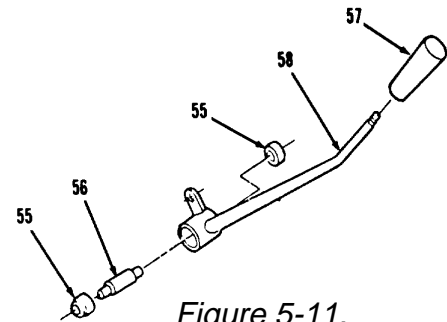


Figure 5-11.

Go to Sheet 7

TRANSMISSION MAINTENANCE. (cont)

5-4. Transmission Control Lever and Housing. (Sheet 7 of 9)

INSTALLATION (cont)

11. Install items 58 thru 55 as an assembly, washer (53), nut (52) and bolt (51) on plate (54, Figure 5-10).
12. Install nut (49) and rod end (48) on rod (50, Figure 5-9).
13. Install items 50 thru 48 as an assembly, washer (47) and nut (46) on lever (58, Figure 5-8).
14. Install bolt (45), washer (44) and nut (43).
15. Install bearing (40) in bracket (41, Figure 5-7).

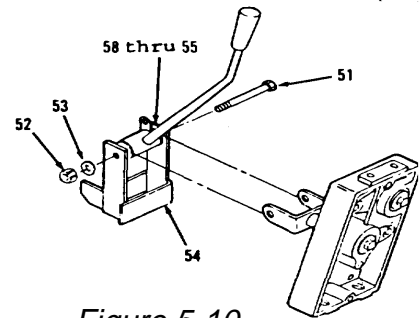


Figure 5-10.

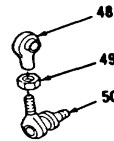


Figure 5-9.

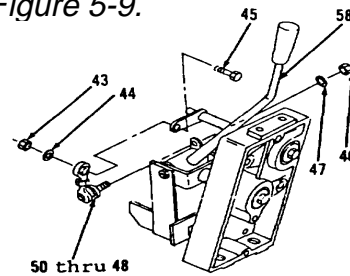


Figure 5-8.

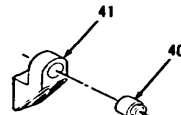


Figure 5-7.

Go to Sheet 8

TRANSMISSION MAINTENANCE.

5-4. Transmission Control Lever and Housing. (Sheet 8 of 9)

INSTALLATION

- 16. Install items 41 and 40 as an assembly, two washers (39) and bolts (38, Figure 5-6).
- 17. Install rod (37), washer (36), pin (35), washer (34) and new cotter pin (33).
- 18. Install spring (32) and pin (31).
- 19. Install items 73 thru 43 as an assembly to items 42 thru 31 as an assembly (Figure 5-5).
- 20. Install four washers (30) and bolts (29).
- 21. Position pad (28, Figure 5-4) and place on cab floor.
- 22. Position items 73 thru 29 as an assembly on cab floor.

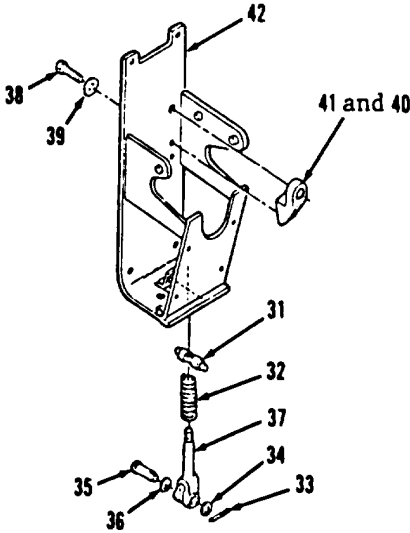


Figure 5-6.

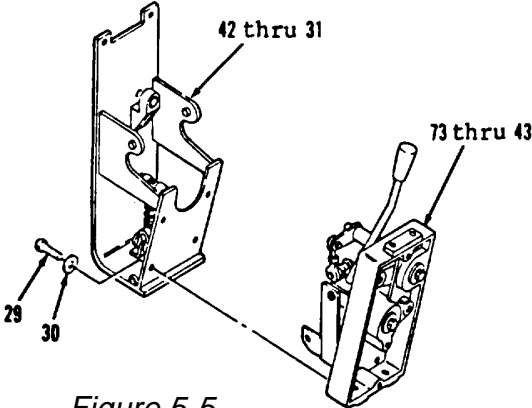


Figure 5-5.

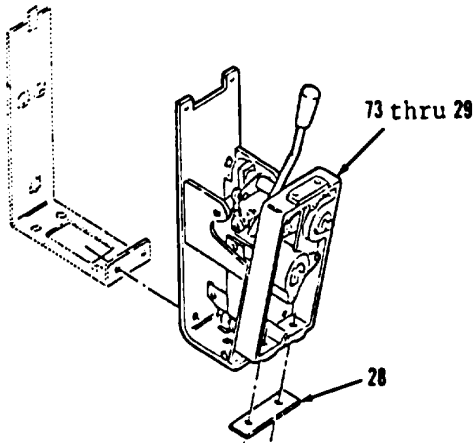


Figure 5-4.

Go to Sheet
9

TRANSMISSION MAINTENANCE. (cont)

5-4. Transmission Control Lever and Housing. (Sheet 9 of 9)

INSTALLATION (cont)

23. Install two nuts (27), washers (26) and bolts (25, Figure 5-3).
24. Install two mountings (24), spacers, (23), washers (22) and bolts (21) through support (42).
25. Position nut (20), washer (19), nut (18) and washer (17, Figure 5-2).
26. Position cables (16 and 15) extending up through cab floor.
27. Tighten nuts (20 and 18).
28. Install nuts (14 and 13) and rod end (12) on cable (16). Do not tighten nut (13).
29. Install washer (11) and bolt (10).
30. Tighten nut (13).
31. Install nuts (9 and 8) and rod end (7, Figure 5-1). Do not tighten nut (8).
32. Install washer (6) and bolt (5).
33. Tighten nut (8).
34. Install new gasket (4), cover (3), three washers (2) and bolts (1).

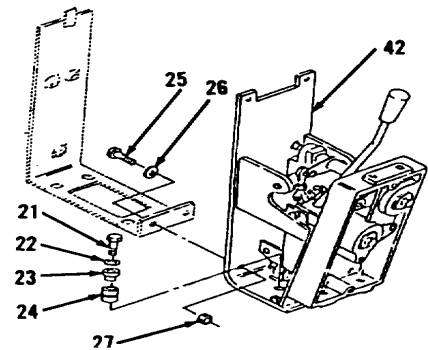


Figure 5-3.

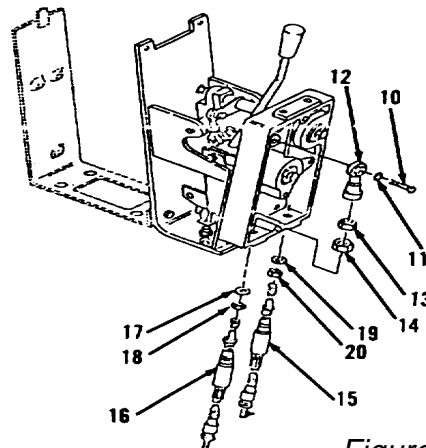


Figure 5-2.

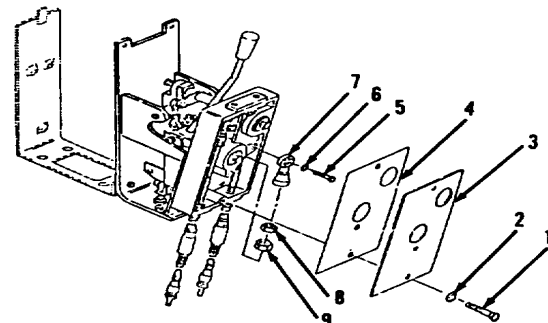


Figure 5-1.

NOTE

Return 130G Grader to original equipment condition.

End of Task

TRANSMISSION MAINTENANCE.

5-5. Control Cables. (Sheet 1 of 8)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer NOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00- T
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Three preformed packings,
Items 53
Three seals, Item 50
Six rings, Item 51

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Positive cable on right side
disconnected.

Go to Sheet 2

Change 1 5-17

TRANSMISSION MAINTENANCE. (cont)

5-5. **Control Cables.** (Sheet 2 of 8)

REMOVAL

1. Remove three bolts (1), washers (2), cover (3) and gasket (4, Figure 5-17) from front of operator's panel console. Discard gasket (4). Remove all gasket material from mounting surfaces.
2. Loosen nut (8, Figure 5-18).
3. Remove bolt (5), washer (6) and rod end (7).
4. Remove two nuts (8) and star washer (9).
5. Loosen nut (13).
6. Remove bolt (10), washer (11) and rod end (12).
7. Remove two nuts (13) and star washer (14).

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

8. Remove lockwasher (15), nut (16), lockwasher (17) and nut (18, Figure 5-19).
9. Remove bolt (19), washer (20) and clip (21) from under right side of cab.
10. Disconnect cables (55 and 56) through cab floor.

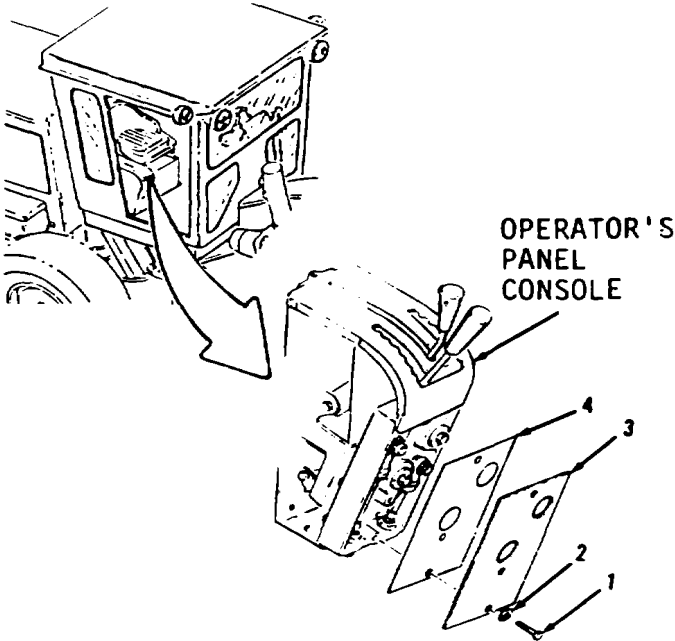


Figure 5-17.

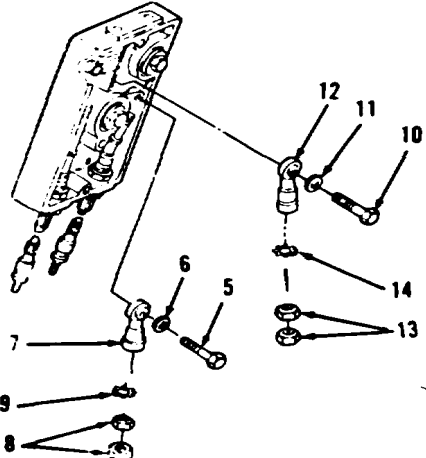


Figure 5-18.

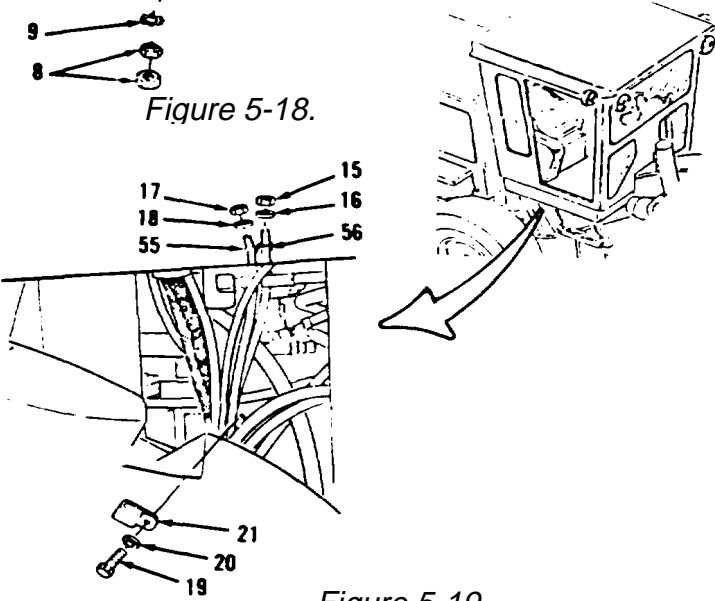


Figure 5-19.

Go to Sheet 3

TRANSMISSION MAINTENANCE.

5-5. Control Cables. (Sheet 3 of 8)

REMOVAL

- 11. Remove two nuts (22) and washers (23, Figure 5-20).
- 12. Remove clip (24).
- 13. Remove plate (25) and clamp (26).
- 14. Remove two nuts (27) and washers (28, Figure 5-21) from under left front side of engine compartment.
- 15. Remove clip (29).
- 16. Remove plate (30) and clamp (31).
- 17. Disconnect cable (54) from transmission modulation central housing. Refer to paragraph 8-5, TM 5-3805-261-20.
- 18. Remove two nuts (32) and washers (33, Figure 5-22) from under left, rear of cab.
- 19. Remove clip (34).
- 20. Remove plate (35) and clamp (36).

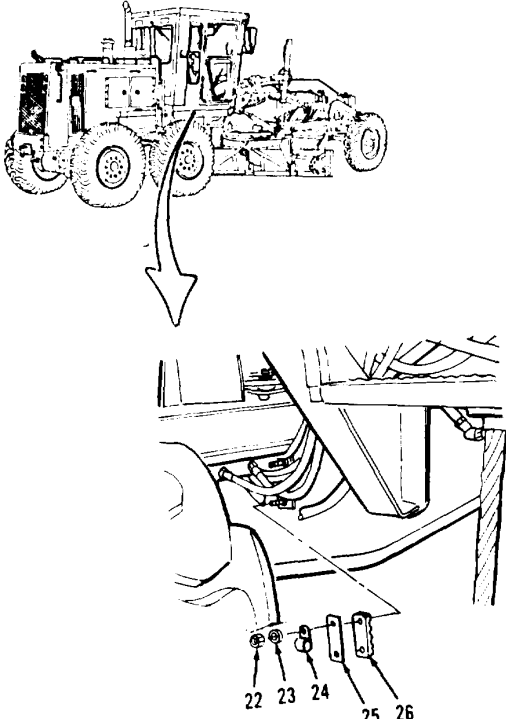


Figure 5-20.

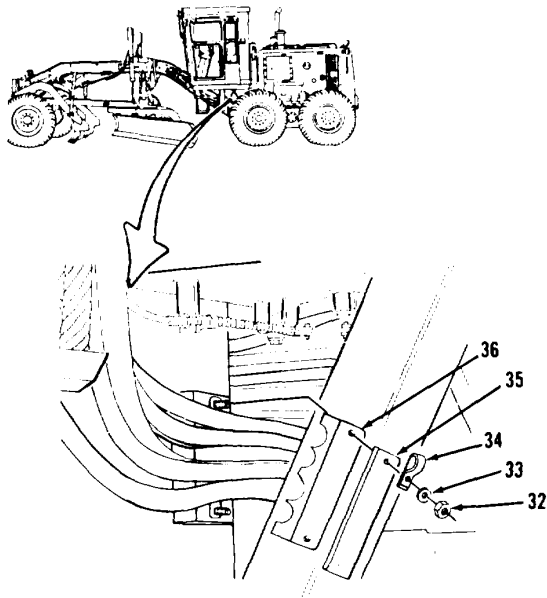


Figure 5-22.

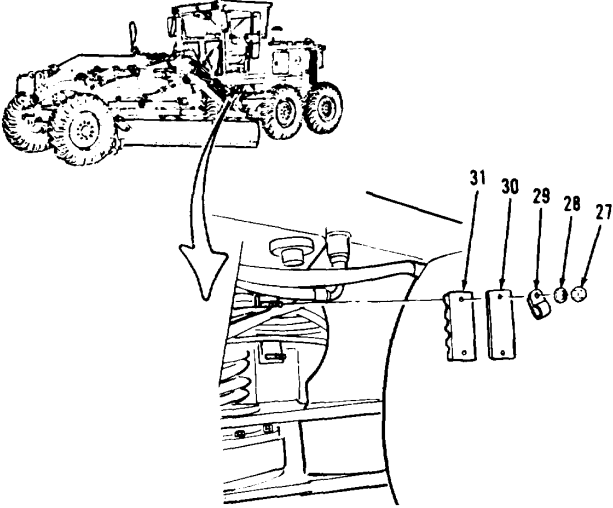


Figure 5-21.

Go to Sheet 4

TRANSMISSION MAINTENANCE. (cont)

5-5. Control Cables. (Sheet 4 of 8)

REMOVAL (cont)

- 21. Remove two nuts (37) and washers (38, Figure 5-23) from under right, front side of engine compartment.
- 22. Remove clip (39).
- 23. Remove plate (40) and clamp (41).
- 24. Remove two bolts (42) and washers (43, Figure 5-24) from left, front of transmission in the engine compartment.
- 25. Remove three nuts (44) and slide back on control cables (54, 55 and 56).
- 26. Slide back retainer (52) and remove three couplings (45) with items 50 and 51 attached on cables (54, 55 and 56, Figure 5-25).
- 27. Separate three rod ends (48) from transmission control valves.
- 28. Remove three rings (46) and pins (47) from rod ends (48).

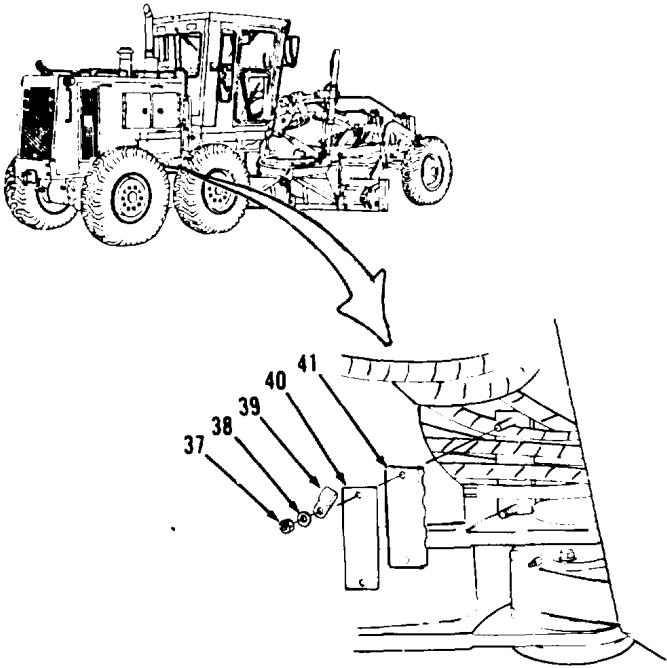


Figure 5-23.

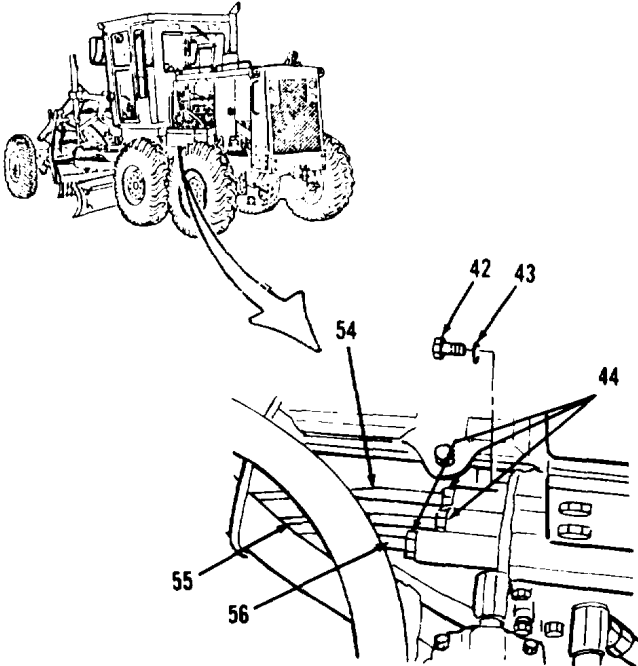


Figure 5-24.

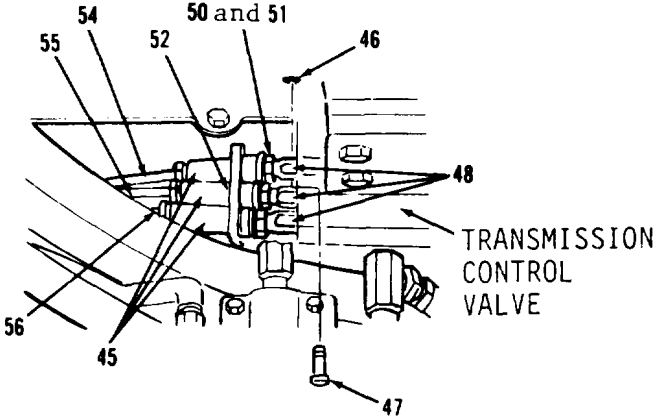
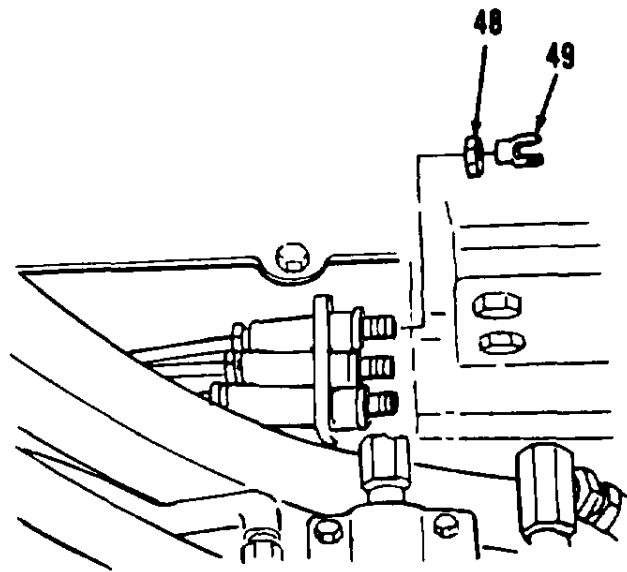


Figure 5-25.

Go to Sheet 5

TRANSMISSION MAINTENANCE.**5-5. Control Cables. (Sheet 5 of 8)****REMOVAL**

29. Loosen three nuts (49, Figure 5-26).
30. Remove three rod ends (48) and nuts (49).
31. Remove and discard three seals (50) and six rings (51) from three couplings (45, Figure 5-27).
32. Remove retainer (52) and three preformed packings (53) from cables (54, 55 and 56).
33. Remove cables (54, 55 and 56) from vehicle.

*Figure 5-26.***CLEANING**

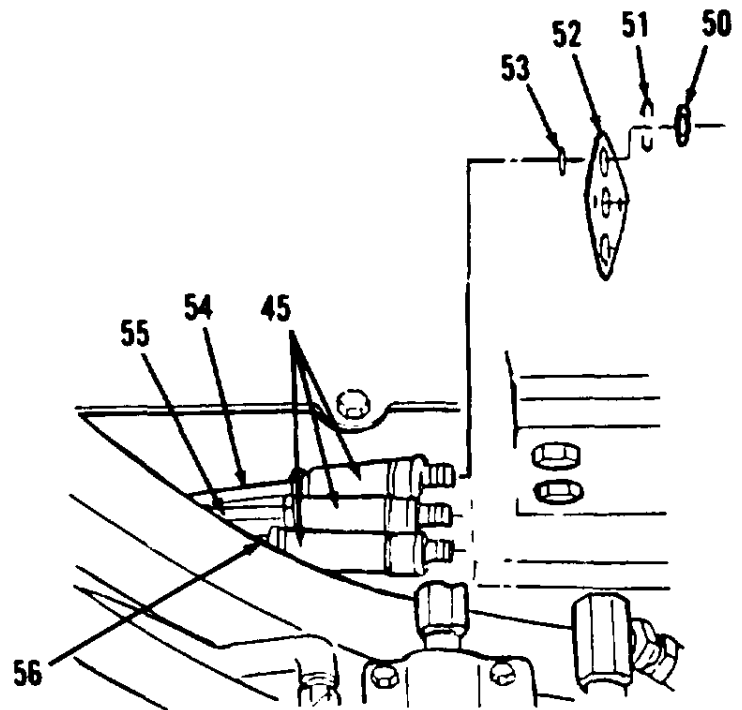
Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Position cables (56, 55 and 54, Figure 5-27) on vehicle.
2. Install three new preformed packings (53) on cables (56, 55 and 54) at transmission under left side of engine compartment.
3. Install retainer (52), six new rings (51) and three new seals (50) on couplings (45).
4. Install three nuts (49) and rod ends (48, Figure 5-26).

*Figure 5-27.*

Go to Sheet 6

TRANSMISSION MAINTENANCE. (cont)

5-5. Control Cables. (Sheet 6 of 8)

INSTALLATION (cont)

- 5. Install three pins (47) and rings (46, Figure 5-25).
- 6. Set three rod ends (48) into transmission control valves.
- 7. Move three couplings (45) with items 51 and 50 attached forward on cables (56, 55 and 54) and position over transmission control valves.
- 8. Slide retainer (52) forward and install three nuts (44, Figure 5-24). Tighten three nuts (44).
- 9. Install two washers (43) and bolts (42).
- 10. Install clamp (41), plate (40) and clip (39, Figure 5-23) under right, front side of engine compartment.
- 11. Install two washers (38) and nuts (37).
- 12. Install clamp (36), plate (35) and clip (34, Figure 5-22) under left, rear side of cab.
- 13. Install two washers (33) and nuts (32).

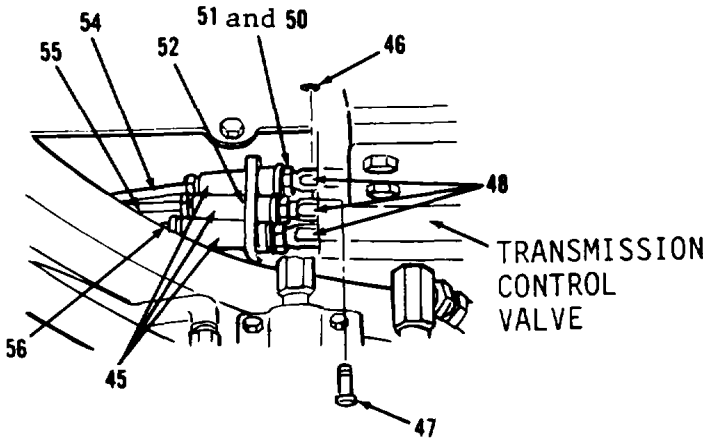


Figure 5-25.

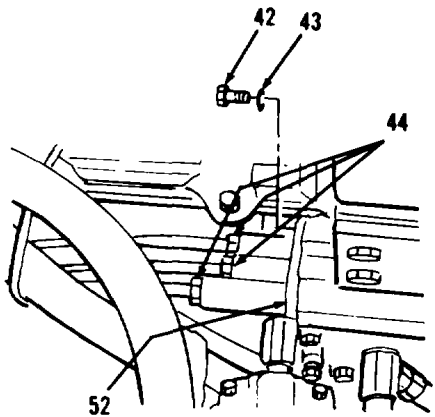


Figure 5-24.

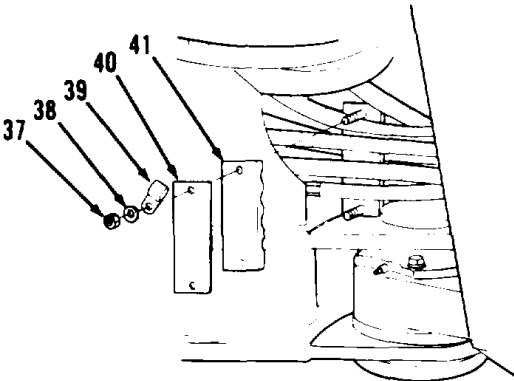


Figure 5-23.

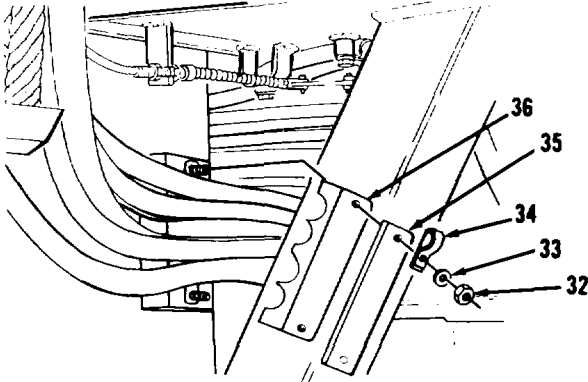


Figure 5-22.

Go to Sheet 7

TRANSMISSION MAINTENANCE.

5-5. Control Cables. (Sheet 7 of 8)

INSTALLATION

14. Connect cable (54) in transmission modulation control housing. Refer to paragraph 8-5.

15. Install clamp (31), plate (30) and clip (29, Figure 5-21) under right, front side of engine compartment.

16. Install two washers (28) and nuts (27).

17. Install clamp (26), plate (25) and clip (24, Figure 5-20) under right side of cab.

18. Install two washers (23) and nuts (22).

19. Connect cables (56 and 55, Figure 5-19) in transmission control housing.

20. Install clip (21), washer (20) and bolt (19).

21. Install nut (18) and lockwasher (17).

22. Install nut (16) and lockwasher (15).

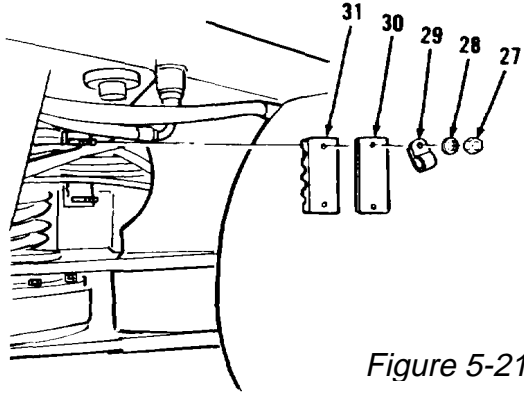


Figure 5-21.

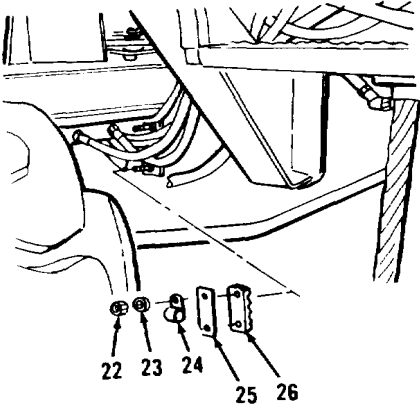


Figure 5-20.

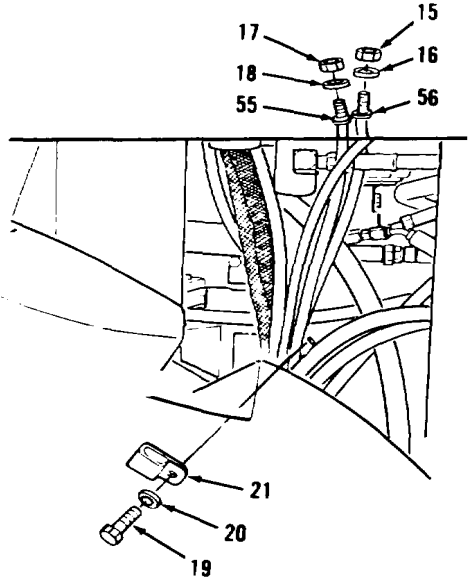


Figure 5-19.

Go to Sheet 8

TRANSMISSION MAINTENANCE. (cont)

5-5. Control Cables. (Sheet 8 of 8)

INSTALLATION (cont)

- 23. Install star washer (14) and two nuts (13) and rod end (12, Figure 5-18).
- 24. Adjust cable (56). Refer to TM 5-3805-261-20.
- 25. Install washer (11) and bolt (10) on rod end (12).
- 26. Install star washer (9), two nuts (8) and rod end (7).
- 27. Adjust cable (55). Refer to TM 5-3805-261-20.
- 28. Install washer (6) and bolt (5).
- 29. Install new gasket (4), cover (3), three washers (2) and bolts (1, Figure 5-17).

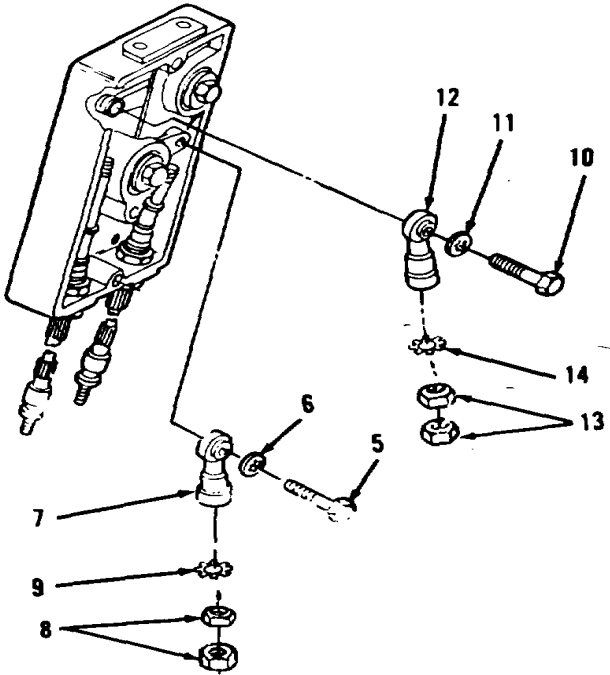


Figure 5-18.

NOTE

Return 130G Grader to original equipment condition.

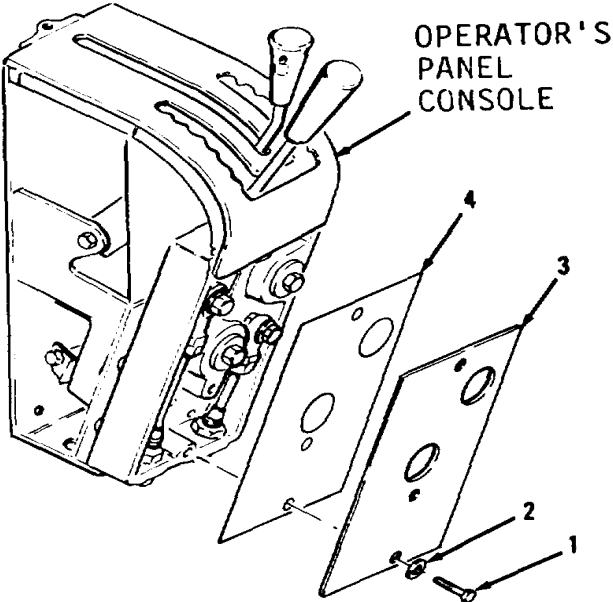


Figure 5-17.

End of Task

TRANSMISSION MAINTENANCE.

5-6. Transmission and Engine To Transmission Adapter. (Sheet 1 of 4)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-177-7033)
 Hoist and chains
 Hydraulic floor jack

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-10
 LO 5-3805-261-12
 TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

All fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Go to Sheet 2

TRANSMISSION MAINTENANCE. (cont)

5-6. Transmission and Engine To Transmission Adapter. (Sheet 2 of 4)

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Anti-articulation pin installed.

LO 5-3805-261-12

Oil drained from transmission.
Coolant drained from cooling system.

TM 5-3805-261-20

Fuel tank removed.
Transmission oil filter base removed.
Engine hood assembly removed.
Engine side door assemblies removed.
Radiator hoses removed.

Paragraph 5-5

Transmission control cables removed
from transmission housing.

Paragraph 5-9
Paragraph 5-10
Paragraph 5-20

Transmission oil lines removed.
Transmission oil pump removed.
Differential lock line disconnected
from transmission relief valve.

Paragraph 6-4

Parking brake actuator and valve
removed.

Go to Sheet 3

TRANSMISSION MAINTENANCE.

5-6. Transmission and Engine To Transmission Adapter. (Sheet 3 of 4)

REMOVAL

1. Attach hoist and chains to two lifting eyes (Figure 5-28) on transmission.
2. Remove 12 bolts (1) and washers (2) between adapter and flywheel housing.
3. Remove 11 nuts (3) and washers (4) between transmission (5, Figure 5-29) and differential housing.

WARNING

Weight of transmission is approximately 1500 lbs. Use adequate hoist and chains for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

4. Using hoist and chains, remove transmission and adapter (Figure 5-30) from vehicle.
5. Remove hoist and chains from two lifting eyes.

CLEANING

Clean all parts. Refer to Chapter 2.

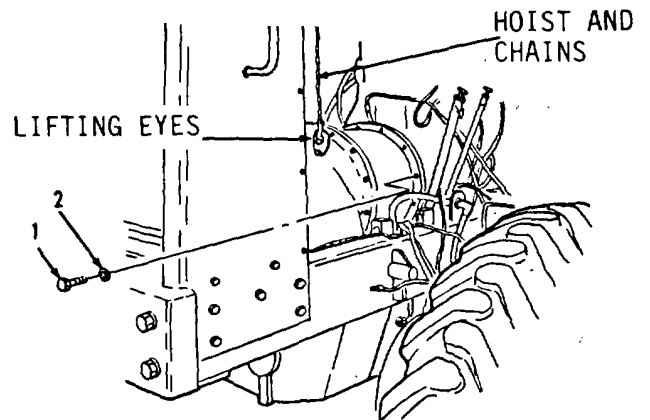


Figure 5-28.

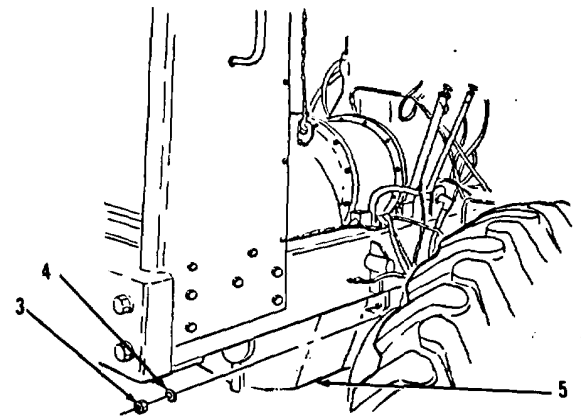


Figure 5-29.

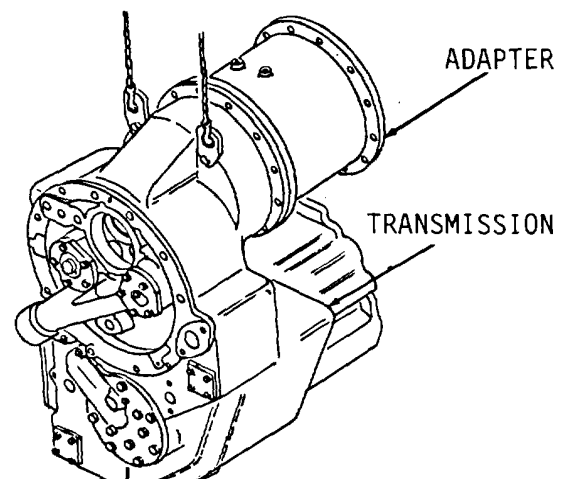


Figure 5-30.

Go to Sheet 4

TRANSMISSION MAINTENANCE. (cont)

5-6. Transmission and Engine To Transmission Adapter. (Sheet 4 of 4)

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

NOTE

Elevate two rear wheels, right or left.

1. Attach hoist and chains to two lifting eyes on transmission (5, Figure 5-30).
2. Using hoist and chains, install transmission and adapter in vehicle. Fit transmission splines in transmission into splines in differential. If the splines do not line up, turn elevated wheel until the two splines are in line.
3. Rotate oil pump shaft to aline splines of transmission adapter gear to engine flywheel.
4. Install 11 washers (4) and nuts (3) over studs between transmission (5, Figure 5-29) and differential housing.
5. Install 12 washers (2) and bolts (1, Figure 5-28) between adapter and flywheel housing.
6. Remove hoist and chains from lifting eyes.

NOTE

Return 13OG Grader to original equipment condition.

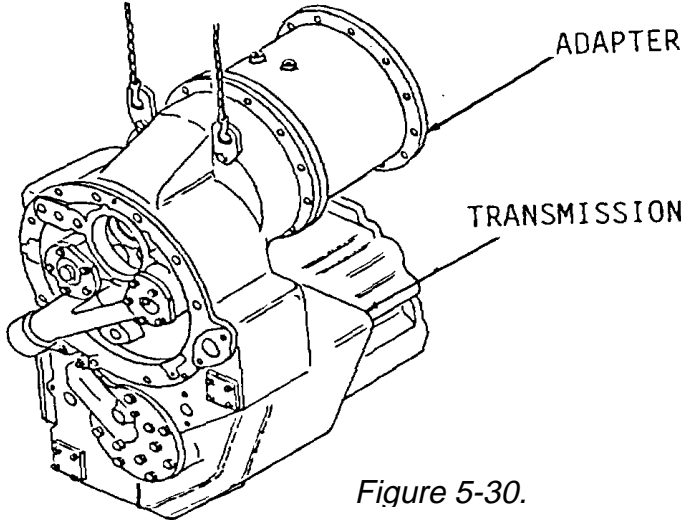


Figure 5-30.

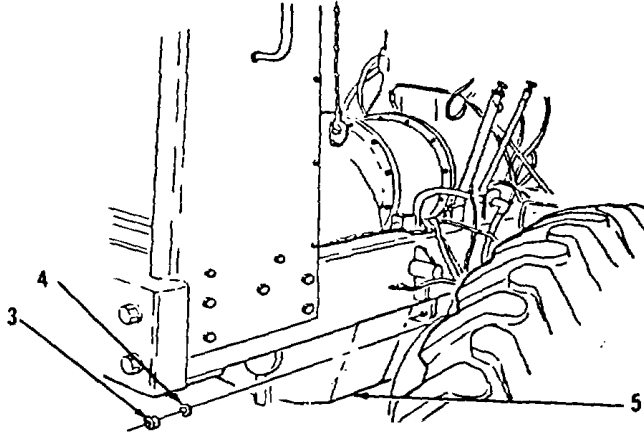


Figure 5-29.

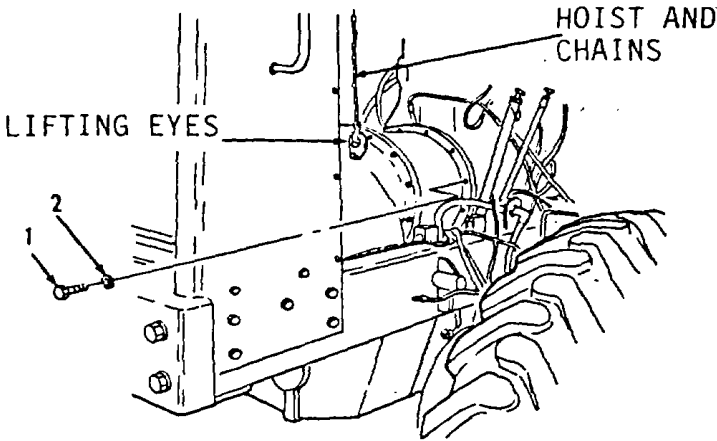


Figure 5-28.

End of Task

TRANSMISSION MAINTENANCE.

5-7. Transmission Oil Lines. (Sheet 1 of 3)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer NOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Preformed packings, Items 7, 11
Caps

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Articulation anti-pivot pin
installed.

TM 5-3805-261-20

Positive cable on right side
disconnected.
Transmission linkage adjusted.

Go to Sheet 2

Change 1 5-29

TRANSMISSION AINTENANCE. (cont)

5-7. Transmission Oil Lines. (Sheet 2 of 3)

REMOVAL

- 1. Remove bolt (1), lockwasher (2), clamp (3) and spacer (4, Figure 5-31) from left side of engine to transmission adapter.
- 2. Remove four bolts (5) and washers (6, Figure 5-32).

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

- 3. Disconnect hose assemblies (8 and 9) from transmission oil cooler.
- 4. Remove and discard two preformed packings (7).
- 5. Remove hose assemblies (8 and 9, Figure 5-33).
- 6. Remove two elbows (10) and preformed packings (11). Discard two preformed packings (11).

CLEANING

Clean all parts. Refer to Chapter 2.

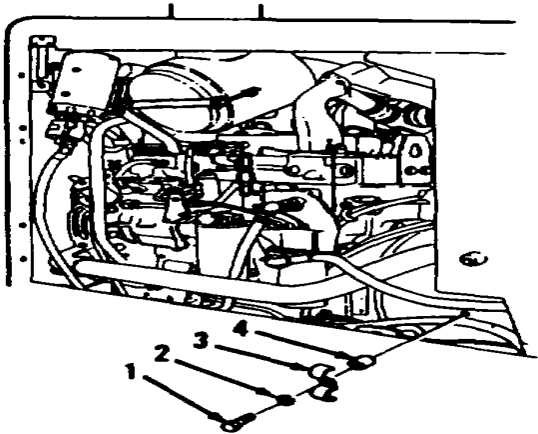


Figure 5-31.

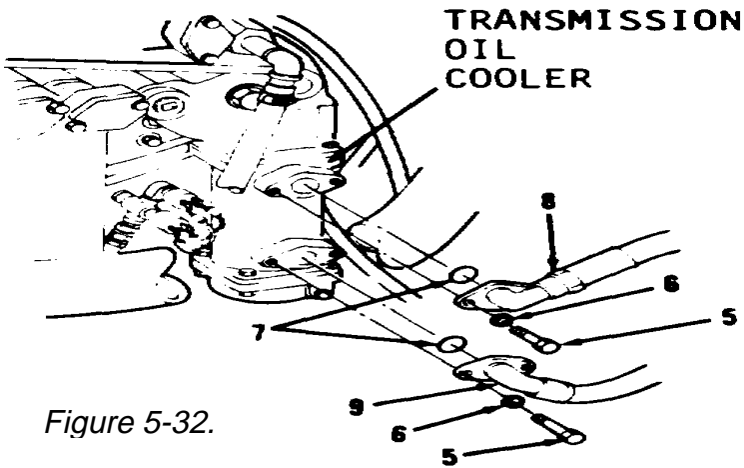


Figure 5-32.

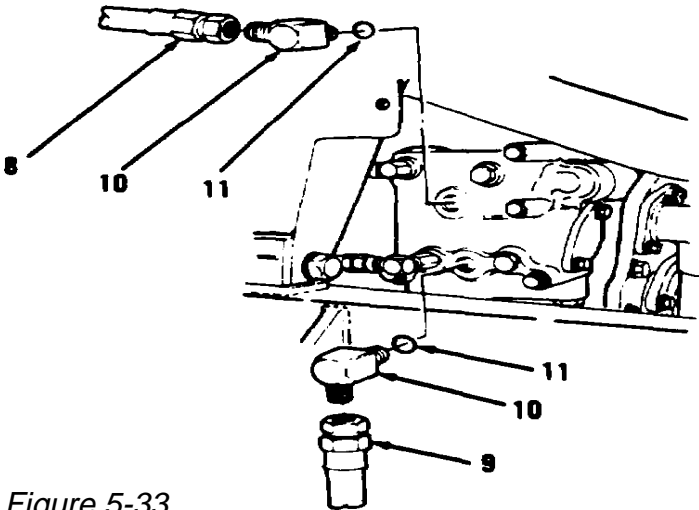


Figure 5-33.

Go to Sheet 3

TRANSMISSION MAINTENANCE.**5-7. Transmission Oil Lines. (Sheet 3 of 3)****INSPECTION**

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Install two new preformed packings (11) and elbows (10, Figure 5-33) on rear, left side of transmission.
2. Connect hose assemblies (9 and 8) to two elbows (10).
3. Position two new preformed packings (7) and connect hose assemblies (9 and 8, Figure 5-32) onto transmission oil cooler.
4. Install four washers (6) and bolts (5).
5. Install spacer (4), clamp (3), lockwasher (2) and bolt (1, Figure 5-31).
6. Refill transmission to proper level. Refer to LO 5-3805-261-12.
7. Start engine. Refer to TM 5-3805-261-10.
8. Check for leaks in tube and hose assemblies.
9. Stop engine.

NOTE

Return 130G Grader to original equipment condition.

End of Task

TRANSMISSION MAINTENANCE. (cont)

5-8. Engine to Transmission Adapter. (Sheet 1 of 3)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Hoist and sling
Two 3/8-16-2B TH eyebolts

References

TM 5-3805-261-10

Special Environmental Conditions

None

Test Equipment

None

General Safety Instructions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Lubricating oil, Item 33,
Appendix C
Gasket, Item 2
Preformed packings, Items 3,
7, 11

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Paragraph 5-6

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Transmission and engine to transmission
adapter removed.

Go to Sheet 2

TRANSMISSION MAINTENANCE.

5-8. Engine to Transmission Adapter. (Sheet 2 of 3)

REMOVAL

- 1. Remove plug (1) and gasket (2, Figure 5-34) from transmission (12). Discard gasket (2). Remove all gasket material from mounting surfaces.
- 2. Remove and discard preformed packing (3).

WARNING

Weight of housing is approximately 84 pounds. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

- 3. Install two 3/8 inch-16-2B THD eye bolts in holes at top of housing (6, Figure 5-35).
- 4. Attach hoist and sling to housing (6, Figure 5-36) and take up slack.
- 5. Remove 12 bolts (4) and lockwashers (5).
- 6. Remove housing (6) from transmission (12).

- 7. Remove hoist and sling.
- 8. Remove and discard preformed packing (7).
- 9. Support coupling (10).
- 10. Remove bolt (8), retainer (9) and coupling (10) from transmission (12, Figure 5-37) input shaft.
- 11. Remove and discard preformed packing (11).

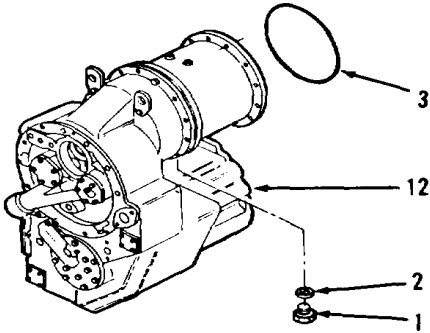


Figure 5-34.

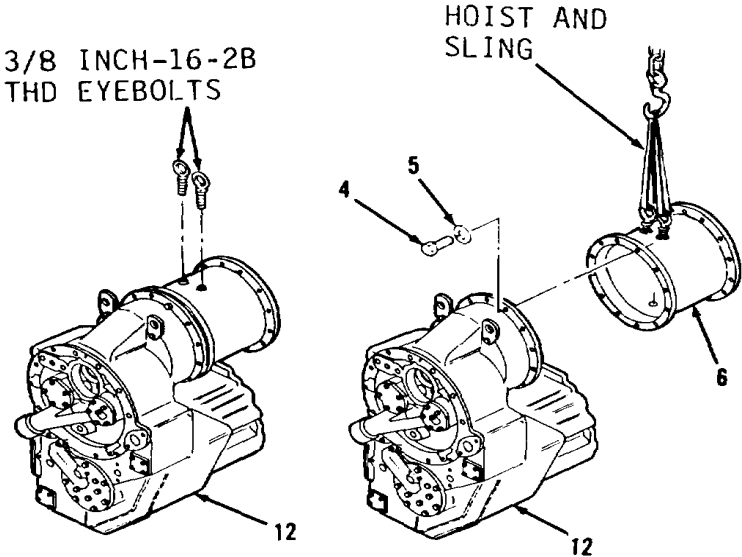


Figure 5-35.

Figure 5-36.

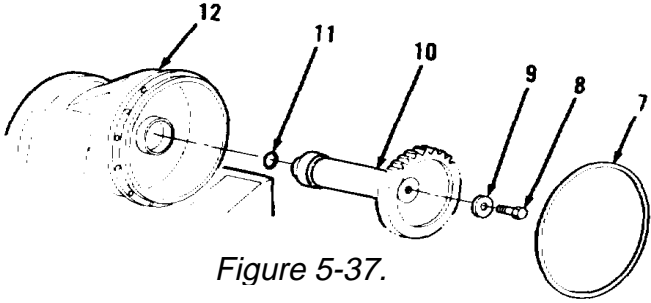


Figure 5-37.

Go to Sheet 3

TRANSMISSION MAINTENANCE. (cont)

5-8. Engine to Transmission Adapter. (Sheet 3 of 3)

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Position new preformed packing (11) on transmission (12, Figure 5-37) input shaft.
2. Position coupling (10).
3. Install retainer (9) and bolt (8). Tighten bolt (8) to 85 ft-lb torque.
4. Install new preformed packing (7) on groove of transmission (12).
5. Using hoist and sling, install housing (6, Figure 5-36) on transmission (12).
6. Install 12 lockwashers (5) and bolts (4).
7. Remove hoist and sling.
8. Remove two 3/8 inch-16-2B THD eyebolts (Figure 5-35).
9. Install new preformed packing (3, Figure 5-34) and lubricate with lubricating oil.
10. Install new gasket (2) with seam facing housing (6) and plug (1) in transmission (12).

NOTE

Return 13OG Grader to original equipment condition.

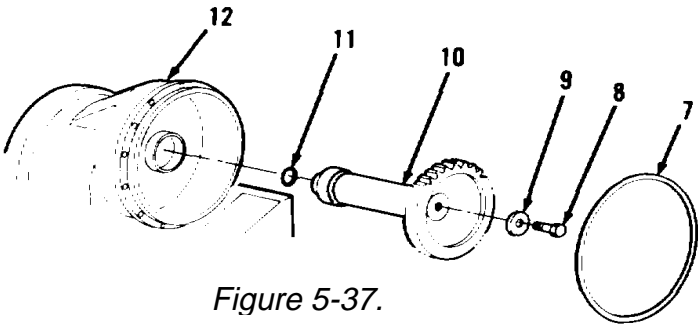


Figure 5-37.

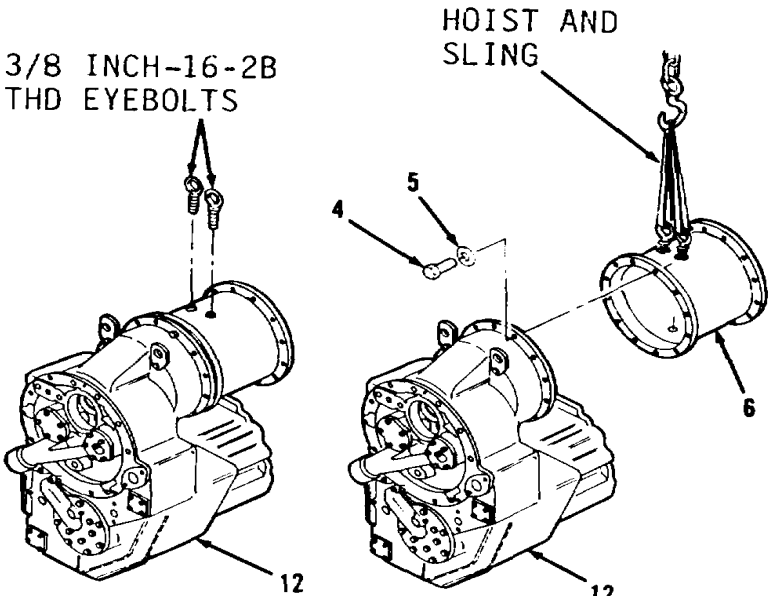


Figure 5-36.

Figure 5-35.

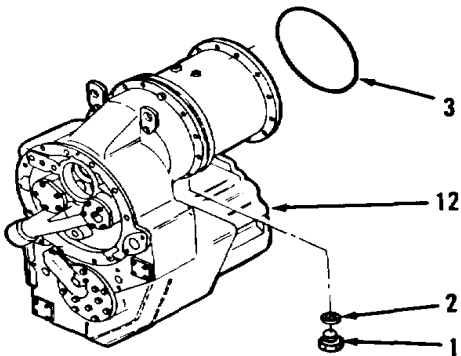


Figure 5-34.

End of Task

TRANSMISSION MAINTENANCE.

5-9. Control Relief Valve. (Sheet 1 of 6)

This task covers:

- | | | |
|----------------------|------------------------|--------------------|
| a. Testing | b. Removal | c. Cleaning |
| d. Inspection | e. Installation | |

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer NOS 62B

Tools

General Mechanic's Too1 Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

O to 200 psi pressure gage
O to 600 psi pressure gage
9/16 inch-18 2 THD adapter

Special Environmental Conditions

None

General Safety Instructions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Preformed packings, Items 3,
9, 12, 15, 18, 19, 20, 21
Caps

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Positive cable on right side
disconnected.

Go to Sheet 2

Change 1 5-35

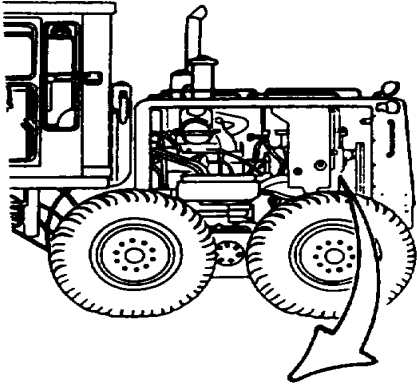
TRANSMISSION MAINTENANCE. (cont)

5-9. Control Relief Valve. (Sheet 2 of 6)

TESTING

NOTE

- The following test is for transmission pump relief pressure.
 - Test must be made with transmission hydraulic system at normal operating temperature.
 - All hose and tube assemblies must be tagged before disconnecting to aid in Installation. Cap all hose and tube ends to prevent contamination.
1. Disconnect hose assembly (1) from valve assembly (22, Figure 5-38) from rear, left side of transmission.
 2. Remove elbow (2) and preformed packing (3). Discard preformed packing (3).
 3. Using a 9/16 inch-18 2A TED adapter, install 0 to 600 psi pressure gage (Figure 5-39).
 4. Start engine. Refer to TM 5-3805-261-10.
 5. Position transmission selection lever in neutral. Read pressure gage. Pump pressure must be 330 to 350 psi. Record pressure if gage does not read within specified range and contact general support.
 6. Stop engine.
 7. Remove 0 to 600 psi pressure gage and 9/16 inch-18 2A TED adapter.



TO TRANSMISSION SAMPLING VALVE

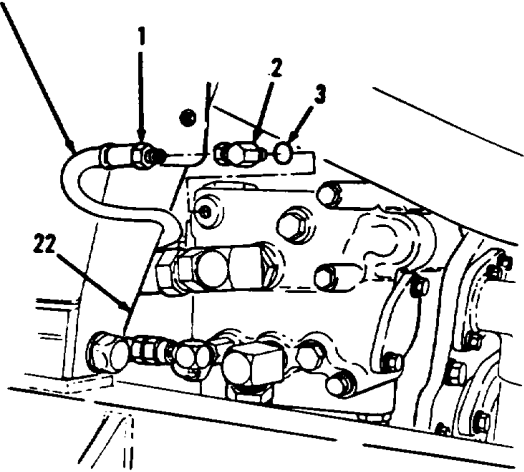


Figure 5-38.

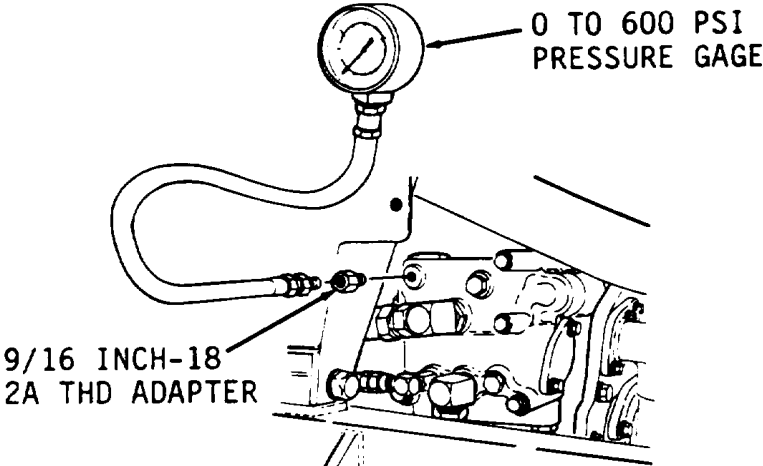


Figure 5-39.

Go to Sheet 3

TRANSMISSION MAINTENANCE.

5-9. Control Relief Valve. (Sheet 3 of 6)

TESTING

8. Install new preformed packing (3) and elbow (2, Figure 5-38).
9. Connect hose assembly (1).

NOTE

The following test is for transmission oil cooler relief pressure.

10. Disconnect hose assembly (4) from valve assembly (22, Figure 5-40).
11. Remove elbow (5), adapter (6) and preformed packing (7). Discard preformed packing (7).
12. Using a 9/16 inch-18 2A THD adapter, install 0 to 200 psi pressure gage (Figure 5-41).
13. Start engine.
14. Position transmission selection lever in first speed forward. Read pressure gage. Pressure gage must read 75 psi. Record pressure if gage does not read specified pressure and contact direct support.
15. Stop engine.
16. Remove 0 to 200 psi pressure gage and 9/16 inch-18 2A THD adapter.
17. Install new preformed packing (7), adapter (6) and elbow (5, Figure 5-40).
18. Connect hose assembly (4).

TO DIFFERENTIAL
LOCK VALVE

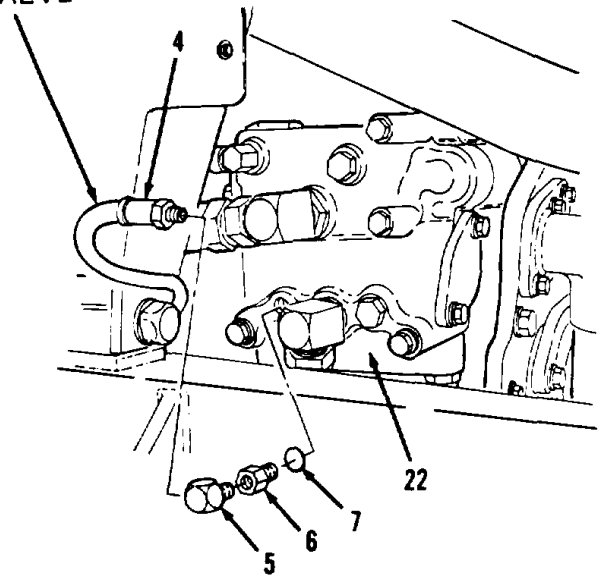
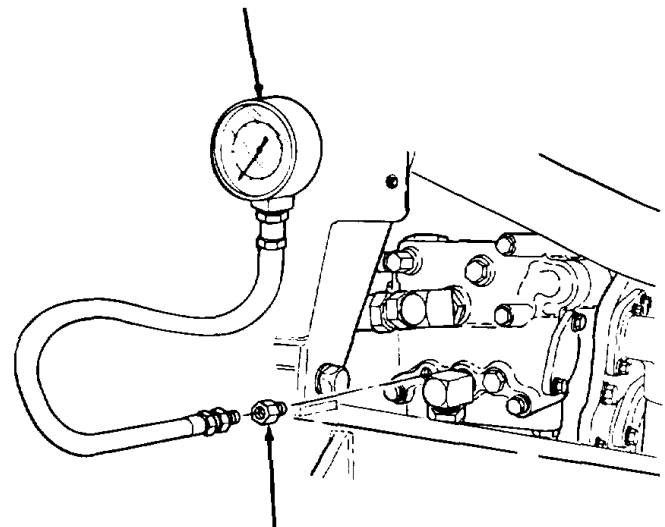


Figure 5-40.

0 TO 200 PSI
PRESSURE GAGE



9/16 INCH-18
2A THD ADAPTER

Figure 5-41.

Go to Sheet 4

TRANSMISSION MAINTENANCE. (cont)

5-9. Control Relief Valve. (Sheet 4 of 6)

TESTING (cont)

NOTE

The following test is for transmission lubrication oil relief pressure.

- 19. Remove plug (8) and preformed packing (9) from valve assembly (18, Figure 5-42). Discard preformed packing (9).
- 20. Test lubrication oil relief valve. Repeat steps 1 thru 16.
- 21. Install new preformed packing (9) and plug (8).

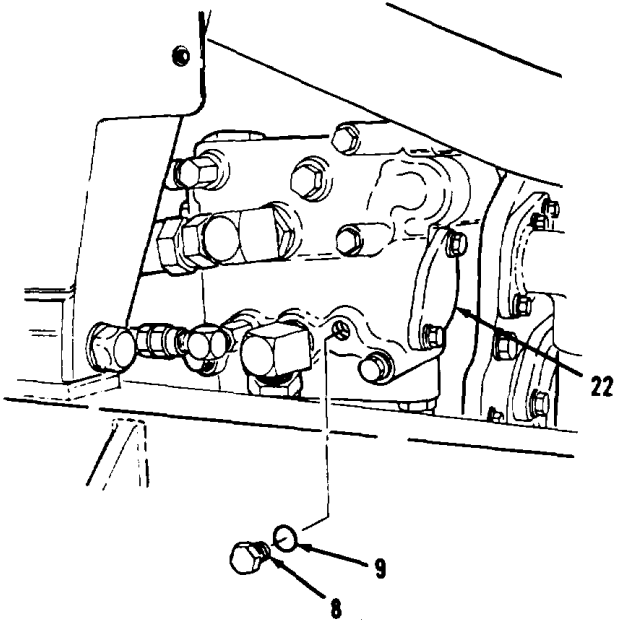


Figure 5-42.

REMOVAL

- 1. Disconnect hose assembly (1, Figure 5-43) from rear, left side of transmission.
- 2. Remove elbow (2) and preformed packing (3). Discard preformed packing (3).
- 3. Disconnect hose assembly (4).
- 4. Remove elbow (5), adapter (6) and preformed packing (7). Discard preformed packing (7).
- 5. Disconnect hose assembly (10).
- 6. Remove elbow (11) and preformed packing (12). Discard preformed packing (12).
- 7. Disconnect hose assembly (13).
- 8. Remove elbow (14) and preformed packing (15). Discard preformed packing (15).

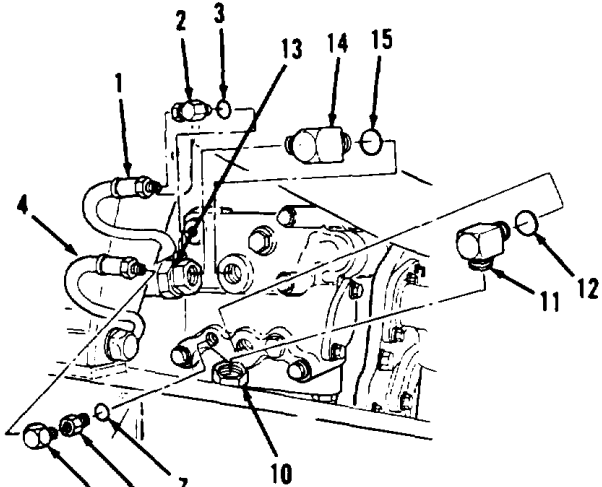


Figure 5-43.

Go to Sheet 5

TRANSMISSION MAINTENANCE.

5-9. Control Relief Valve. (Sheet 5 of 6)

REMOVAL

9. Support items 18 thru 22 as an assembly (Figure 5-44).
10. Remove four bolts (16), washers (17) and items 18 thru 22 as an assembly.
11. Remove and discard preformed packings (18 thru 21) from valve assembly (22, Figure 5-45).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

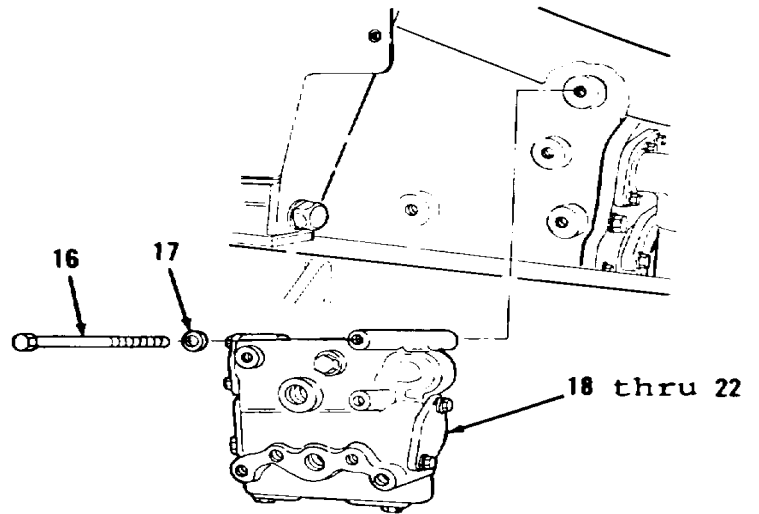


Figure 5-44.

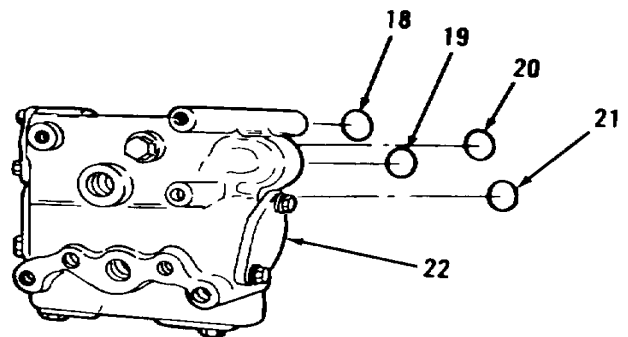


Figure 5-45.

Go to Sheet 6

TRANSMISSION MAINTENANCE. (cont)

5-9. Control Relief Valve. (Sheet 6 of 6)

INSTALLATION

1. Install new preformed packings (21 thru 18) in valve assembly (22, Figure 5-45).
2. Position items 22 thru 18 as an assembly (Figure 5-44) at rear, left side of transmission.
3. Install four washers (17) and bolts (16).
4. Install new preformed packing (15) and elbow (14, Figure 5-43).
5. Connect hose assembly (13).
6. Install new preformed packing (12) and elbow (11).
7. Connect hose assembly (10).
8. Install new preformed packing (7), adapter (6) and elbow (5).
9. Connect hose assembly (4).
10. Install new preformed packing (3) and elbow (2).
11. Connect hose assembly (1).

NOTE

Return 130G Grader to original equipment condition.

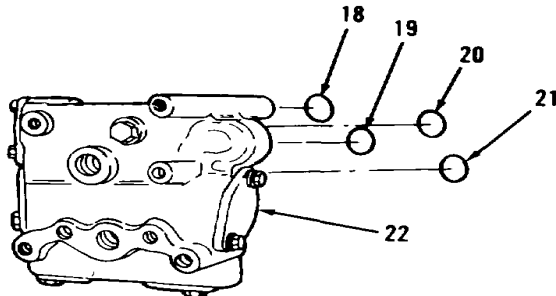


Figure 5-45.

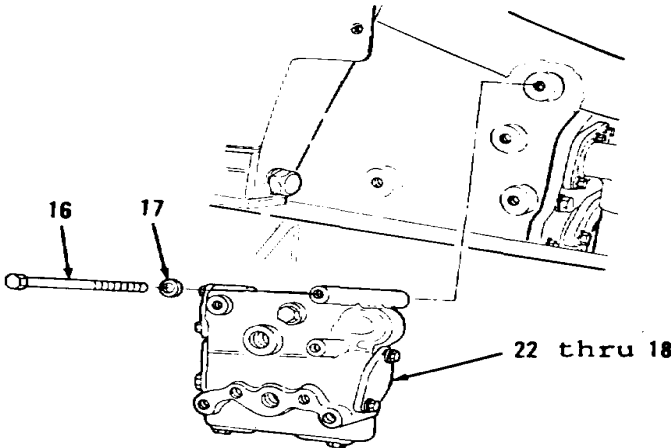


Figure 5-44.

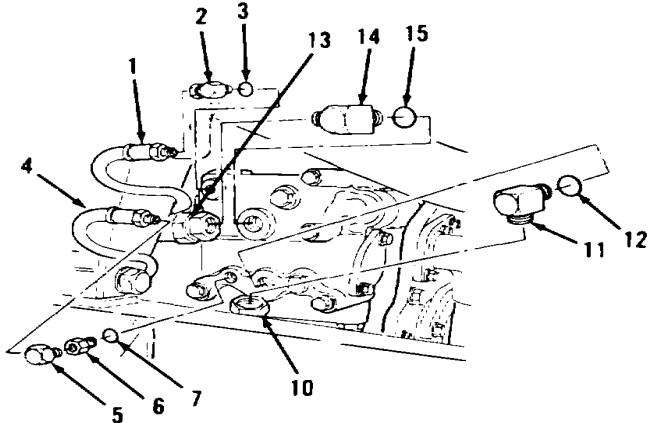


Figure 5-43.

End of Task

TRANSMISSION MAINTENANCE.

5-10. Transmission Oil Pump. (Sheet 1 of 7)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer nOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Floor Jack
Wood blocks

References

TM 5-3805-261-10
LO 5-3805-261-12
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Gasket, Item 40
Preformed packings, Items 12,
13, 19, 20, 26, 27, 33, 34,
41

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

LO 5-3805-261-12
TM 5-3805-261-20

Hydraulic pressure vented.
Positive cable on right aide
disconnected.
Fan belts removed.

Go to Sheet 2

Change 1 5-41

TRANSMISSION MAINTENANCE. (cont)

5-10. Transmission Oil Pump. (Sheet 2 of 7)

REMOVAL

1. Remove three nuts (1), washers (2) and clips (3) from under plate (6, Figure 5-46) at rear of engine compartment. Move wire assembly to one side.
2. Remove five bolts (4), washers (5) and plate (6).
3. Remove two bolts (7), lockwashers (8), bolts (9), lockwashers (10) and items 11 thru 13 as an assembly (Figure 5-47).
4. Remove and discard preformed packings (12 and 13) from tube (11, Figure 5-48).

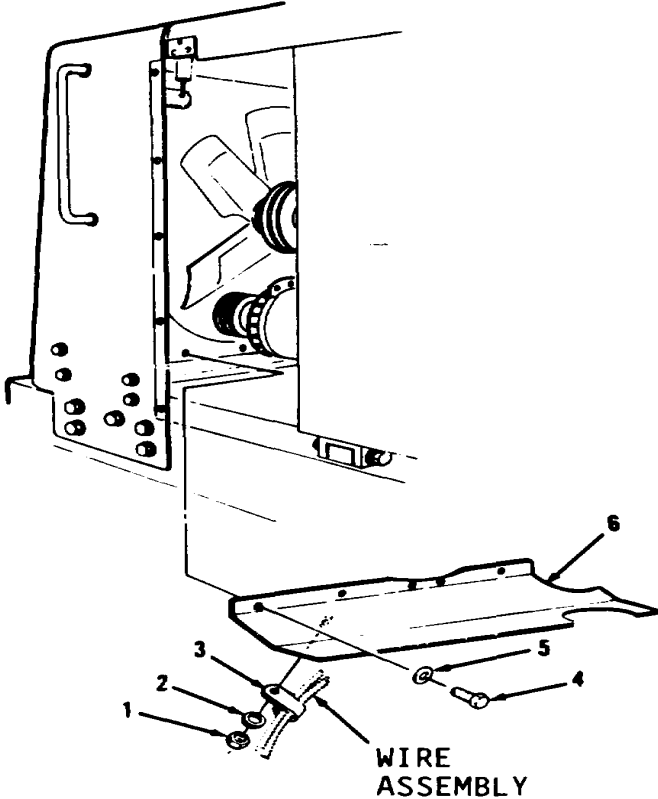


Figure 5-46.

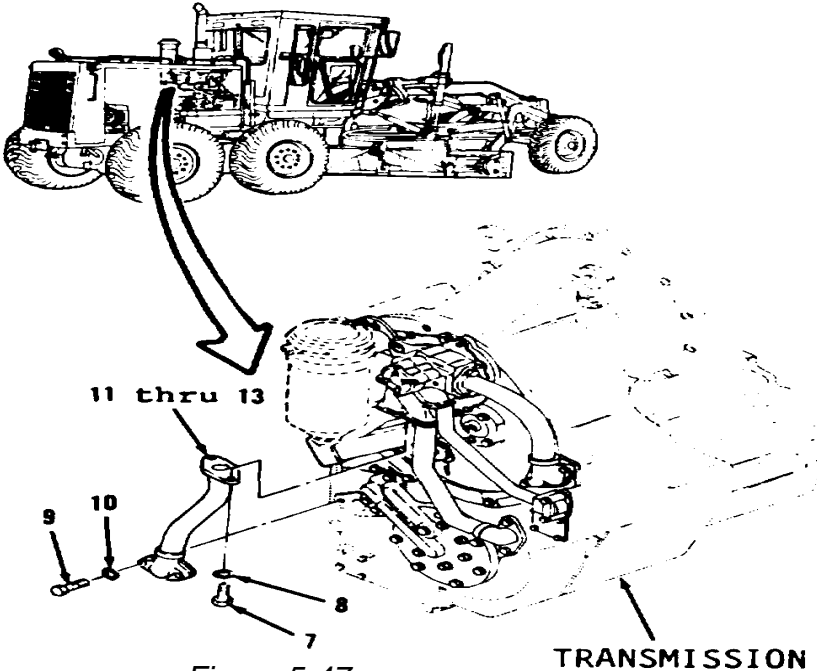


Figure 5-47.

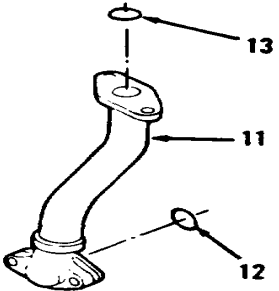


Figure 5-48.

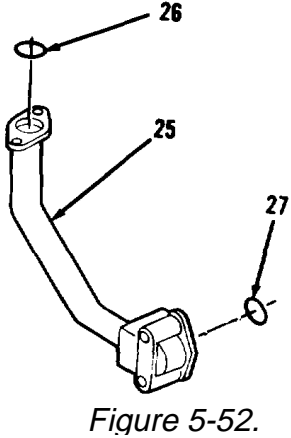
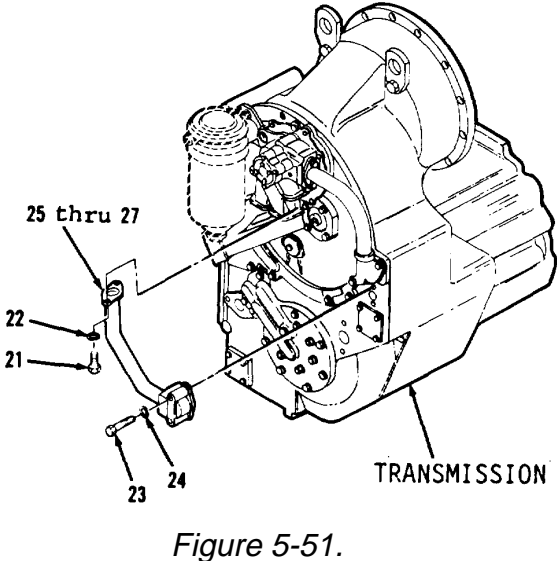
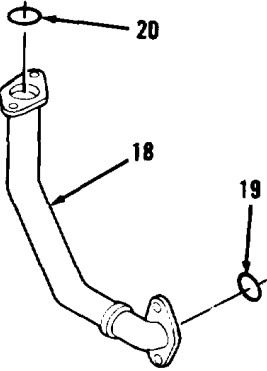
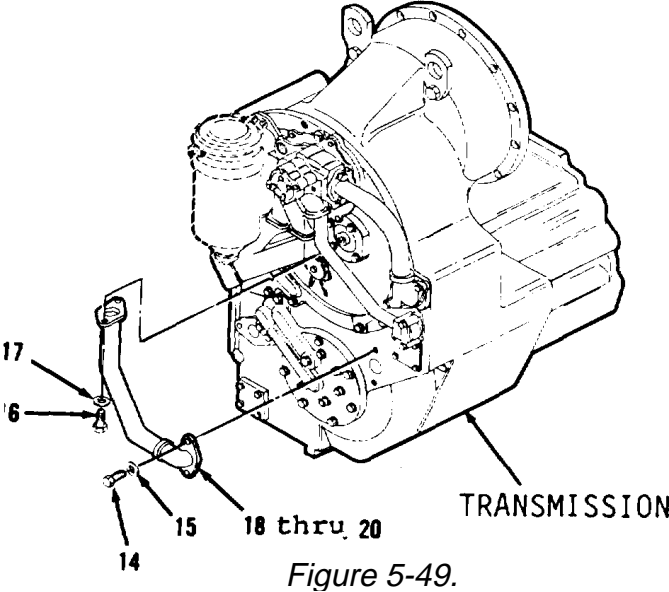
Go to Sheet 3

TRANSMISSION MAINTENANCE.

5-10. Transmission Oil Pump. (Sheet 3 of 7)

REMOVAL

- 5. Remove two bolts (14), lock-washers (15), bolts (16), lockwashers (17) and items 18 thru 20 as an assembly (Figure 5-49).
- 6. Remove and discard preformed packings (19 and 20) from tube (18, Figure 5-50).
- 7. Remove two bolts (21), lock-washers (22), bolts (23), lockwashers (24) and items 25 thru 27 as an assembly (Figure 5-51).
- 8. Remove and discard preformed packings (26 and 27) from tube (25, Figure 5-52).



Go to Sheet 4

TRANSMISSION MAINTENANCE. (cont)

5-10. Transmission Oil Pump. (Sheet 4 of 7)

REMOVAL (cont)

- 9. Remove two bolts (28), lock-washers (29), two bolts (30), lockwashers (31) and items 32 thru 34 as an assembly (Figure 5-53).
- 10. Remove and discard preformed packings (33 and 34) from tube (32, Figure 5-54).

WARNING

Weight of pump is 76 pounds. Use adequate jack and wood blocks. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

- 11. Using floor jack and wood blocks, support oil pump (41, Figure 5-55).
- 12. Remove two bolts (35), lock-washers (36), five bolts (37), and lockwashers (38, Figure 5-56).

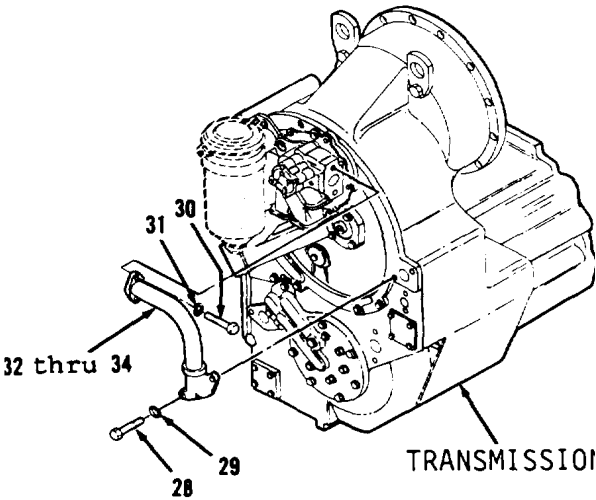


Figure 5-53.

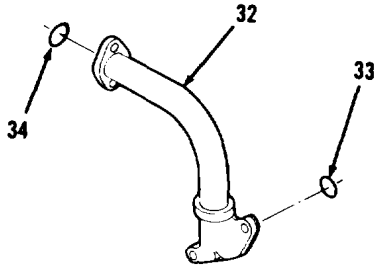


Figure 5-54.

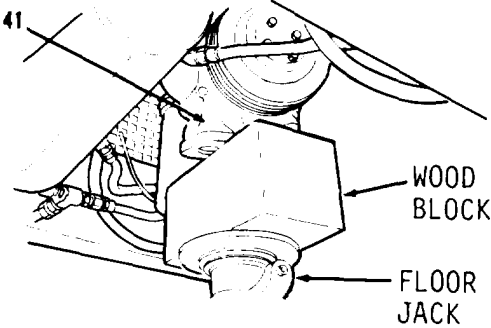


Figure 5-55.

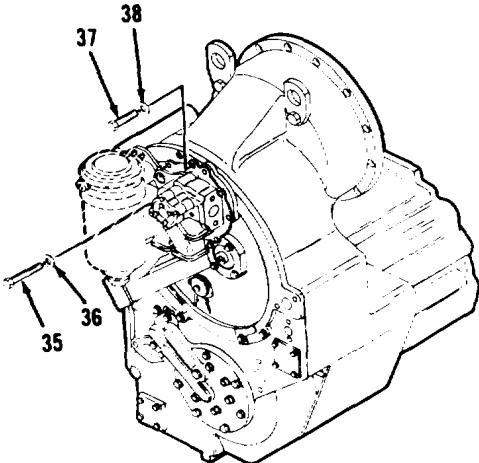


Figure 5-56.

Go to Sheet 5

TRANSMISSION MAINTENANCE.

5-10. Transmission Oil Pump. (Sheet 5 of 7)

REMOVAL

13. Remove items 39 thru 41 as an assembly (Figure 5-57). Pull items 39 thru 41 as an assembly away from dowel on transmission and turn so it can be lowered out bottom of vehicle.
14. Remove and discard preformed packing (39) and gasket (40) from oil pump (41, Figure 5-58). Remove all gasket material from mounting surfaces.

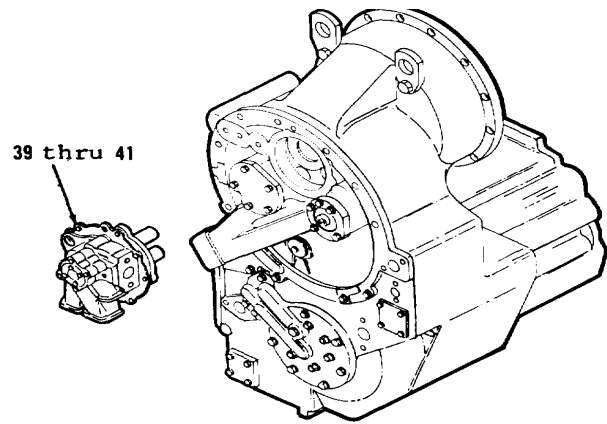


Figure 5-57.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Using floor jack and wood blocks, position oil pump (41, Figure 5-55) at rear of engine compartment.
2. Install oil pump (41), new gasket (40), new preformed packing (39), five lockwashers (38), bolts (37), two lockwashers (36) and bolts (35, Figure 5-59).

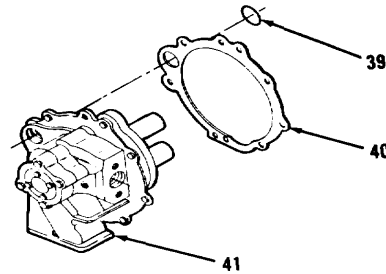


Figure 5-58.

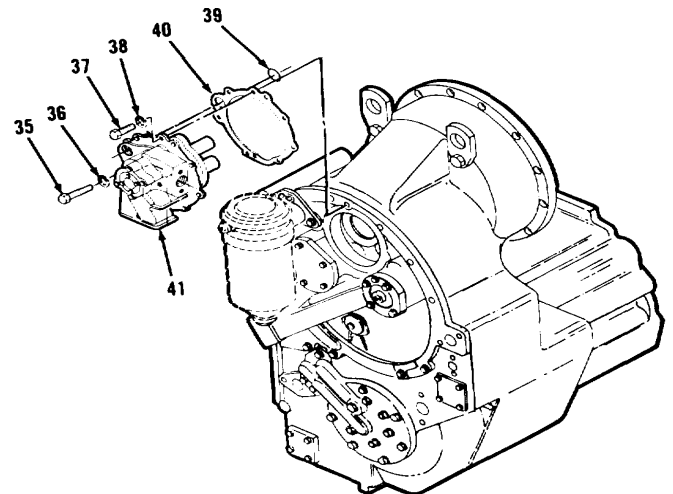


Figure 5-59.

Go to Sheet 6

TRANSMISSION MAINTENANCE. (cont)

5-10. Transmission Oil Pump. (Sheet 6 of 7)

INSTALLATION (cont)

- 3. Install new preformed packings (34 and 33) in tube (32, Figure 5-54).
- 4. Position items 34 thru 32 as an assembly and install two lockwashers (31), bolts (30), lockwashers (29) and bolts (28, Figure 5-53).
- 5. Install new preformed packings (27 and 26) in tube (25, Figure 5-52).
- 6. Position items 27 thru 25 as an assembly and install two lockwashers (24), bolts (23), lockwashers (22) and bolts (21, Figure 5-51).

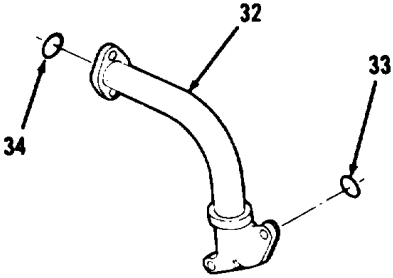


Figure 5-54.

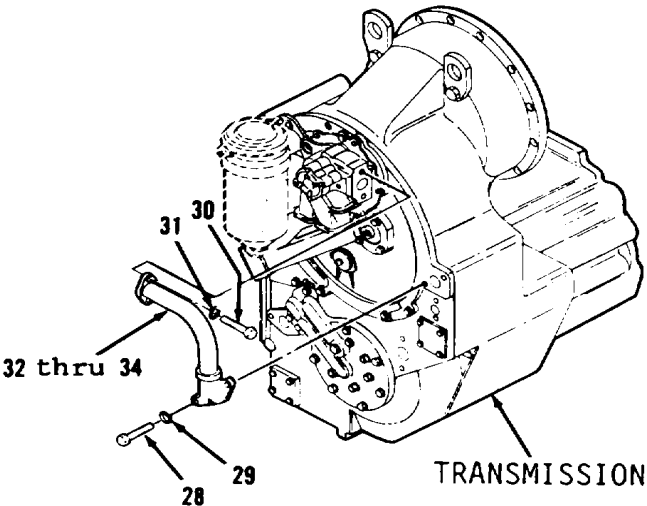


Figure 5-53.

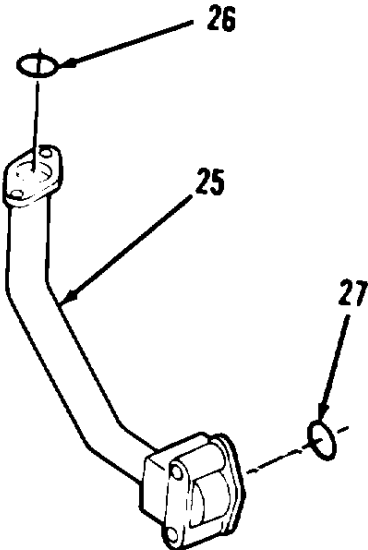


Figure 5-52.

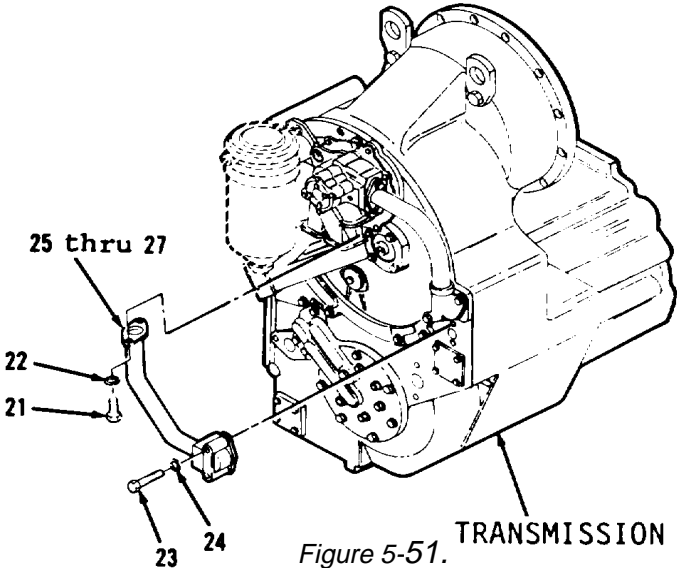


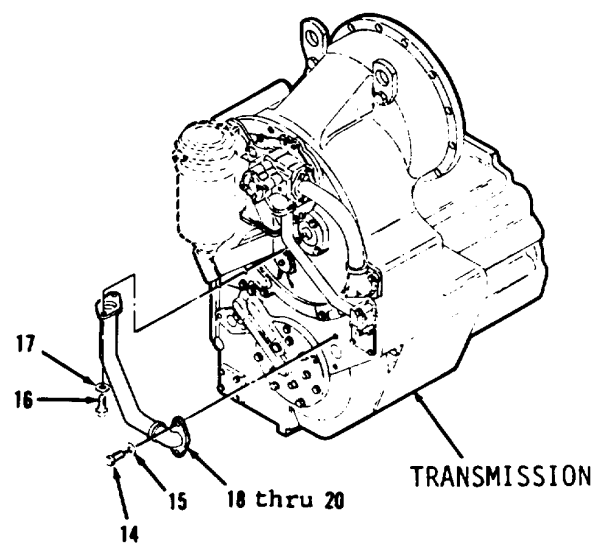
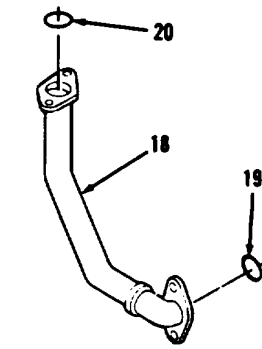
Figure 5-51.

TRANSMISSION MAINTENANCE.

5-10. Transmission Oil Pump. (Sheet 7 of 7:

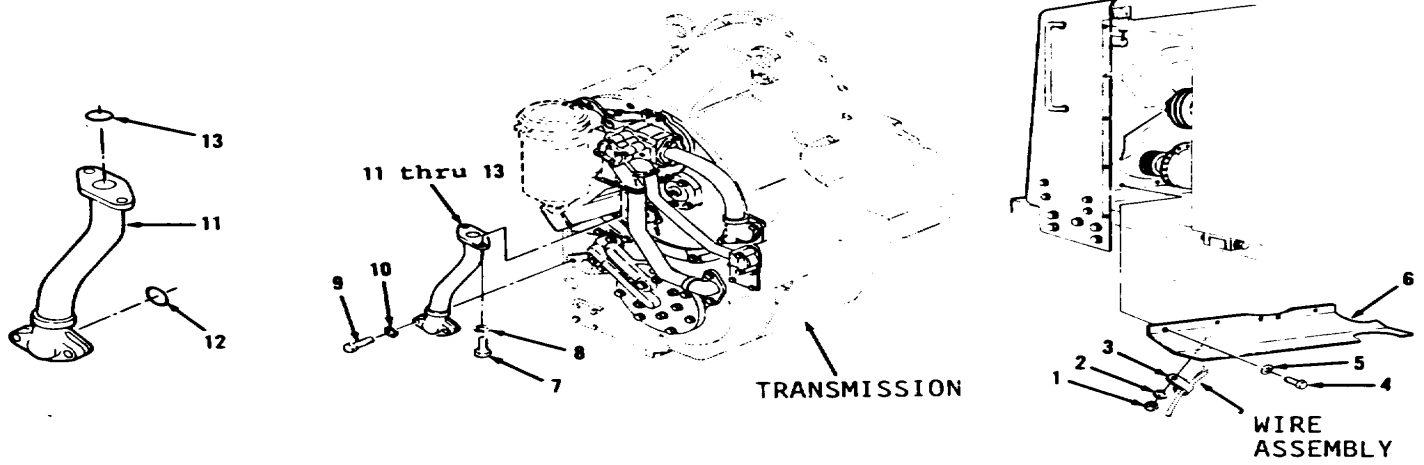
INSTALLATION

7. Install new preformed packings (20 and 19) in tube (18, Figure 5-50).
8. Position items 20 thru 19 as an assembly and install two lock-washers (17), bolts (16), lockwashers (15) and bolts (14, Figure 5-49).
9. Install new preformed packings (13 and 12) in tube (11, Figure 5-48).
10. Position items 13 thru 11 as an assembly and install two lock-washers (10), bolts (9), lockwashers (8) and bolts (7,
11. Install plate (6), five washers (S) and bolts (4, Figure 5-46).
12. Install three clamps (3), washers (2) and nuts (1) under plate (6).



NOTE

Return 130C Grader to original equipment condition.



End of Task

TRANSMISSION MAINTENANCE. (cont)

5-11. Transmission Oil Cooler. (Sheet 1 of 5)

This task covers: a. Removal b. Disassembly c. Cleaning
 d. Inspection e. Assembly f. Installation

INITIAL SETUP

Applicable Configurations

All

Personnel Required

Construction equipment
 repairer MOS 62B

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)

References

TM 5-3805-261-10
 TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Small tags, Items 43,
 Appendix C
 Detergent, Item 9, Appendix C
 Caps
 Gaskets, Items 16, 17, 22e
 24, 28
 Preformed packings, Items 4, 7

General Safety Instructions

None

Torques

All fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.
 Air pressure reduced to zero.

TM 5-3805-261-20

Positive cable on right side
 disconnected.
 Remove hood.
 Remove side panels.
 Radiator drained.
 Transmission sampling unit removed.

Go to Sheet 2

Change 1 5-48

TRANSMISSION MAINTENANCE.

5-11. Transmission Oil Cooler. (Sheet 2 of 5)

REMOVAL

NOTE

All hoses, lines and fittings must be tagged before disconnecting to aid in installation. Cap all hose ends to prevent contamination.

1. Disconnect air line (1) from elbow (30, Figure 5-60).
2. Remove bolt (2), oil line (3) and preformed packing (4) from transmission oil cooler core (23). Discard preformed packing (4).
3. Remove bolt (5), oil line (6) and preformed packing (7) from transmission oil cooler core (23). Discard preformed packing (7).
4. Loosen clamp (9) and slide down on water hose (8).
5. Remove water hose (8), clamp (9), adapter (10), elbow (11) and adapter (12).
6. Remove four bolts (13, Figure 5-61).
7. Remove bolts (14 and 15).
8. Remove and discard gaskets (16 and 17). Remove all gasket material from mounting surfaces.

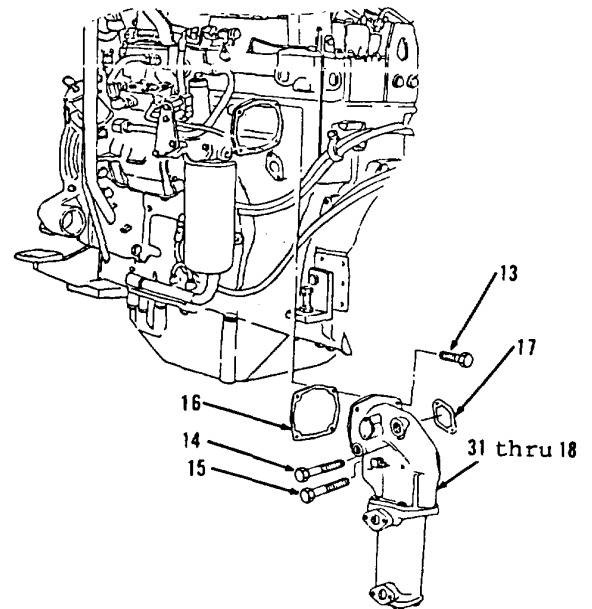
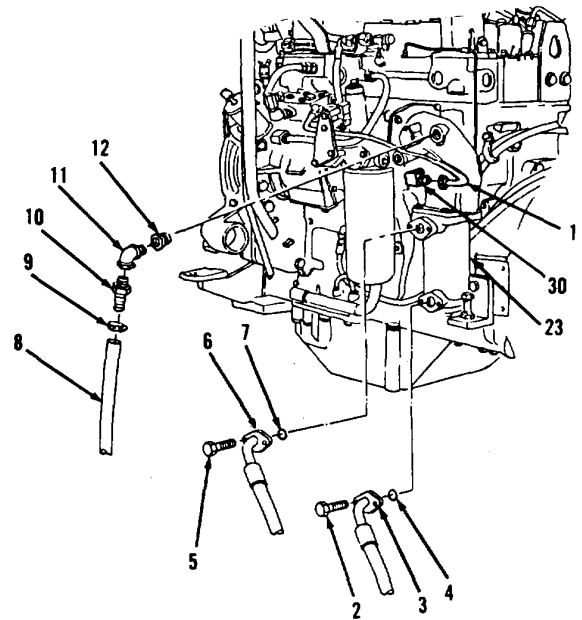


Figure 5-61.

Go to Sheet 3

TRANSMISSION MAINTENANCE. (cont)

5-11. Transmission Oil Cooler. (Sheet 3 of 5)

DISASSEMBLY

1. Remove eight bolts (18), items 19 thru 21 as an assembly and gasket (22) from transmission oil cooler core (23, Figure 5-62). Discard gasket (22). Remove all gasket material from mounting surfaces.
2. Remove plug (19) and washer (20) from bonnet (21, Figure 5-63).
3. Remove transmission oil cooler core (23), gasket (24) and items 25 thru 31 as an assembly (Figure 5-64). Discard gasket (24). Remove all gasket material from mounting surfaces.
4. Remove two bolts (25), washers (26), cover (27) and gasket (28) from bonnet (31, Figure 5-65). Discard gasket (28). Remove all gasket material from mounting surfaces.
5. Remove plug (29).
6. Remove elbow (30).

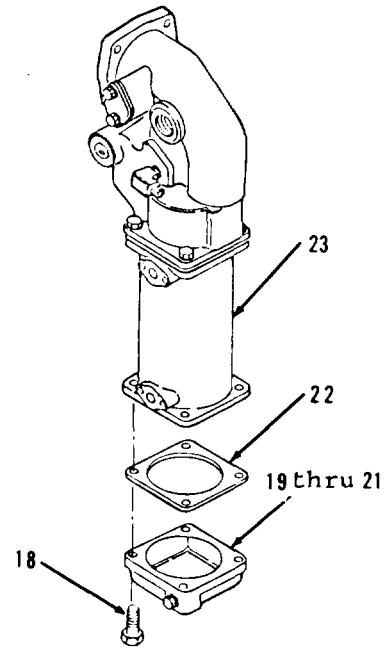


Figure 5-62.

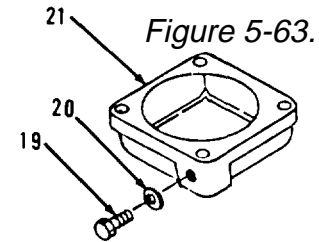


Figure 5-63.

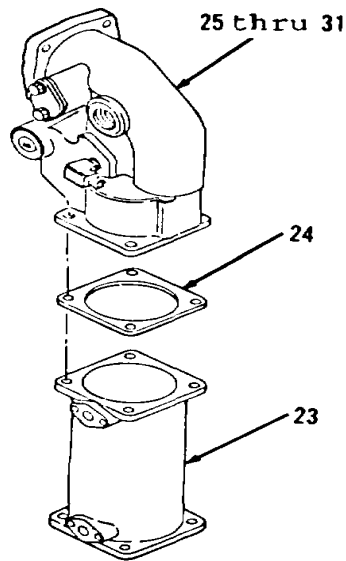


Figure 5-64.

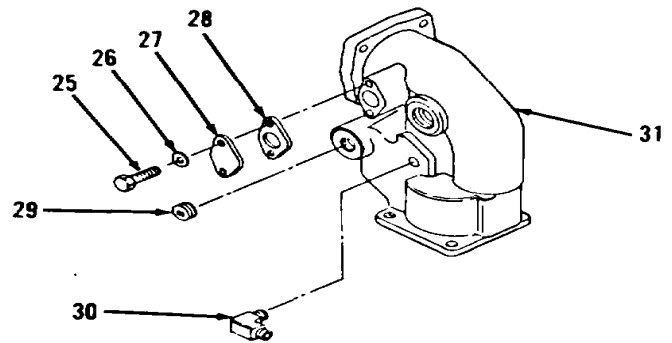


Figure 5-65.

Go to Sheet 4

TRANSMISSION MAINTENANCE.**5-11. Transmission Oil Cooler. (Sheet 4 of 5)****CLEANING**

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install elbow (30) on bonnet (31, Figure 5-65).
2. Install plug (29).
3. Install new gasket (28), cover (27), two washers (26) and bolts (25).
4. Position items 31 thru 25 as an assembly and new gasket (24) on top end of transmission oil cooler core (23, Figure 5-64).
5. install washer (20) and plug (19) in bonnet (21, Figure 5-63).
6. Position new gasket (22) and items 21 thru 19 as an assembly on bottom end of transmission oil cooler core (23, Figure 5-62).
7. Install eight bolts (18).

INSTALLATION

1. Position two new gaskets (17 and 16) and items 31 thru 18 as an assembly (Figure 5-61) on engine oil cooler.

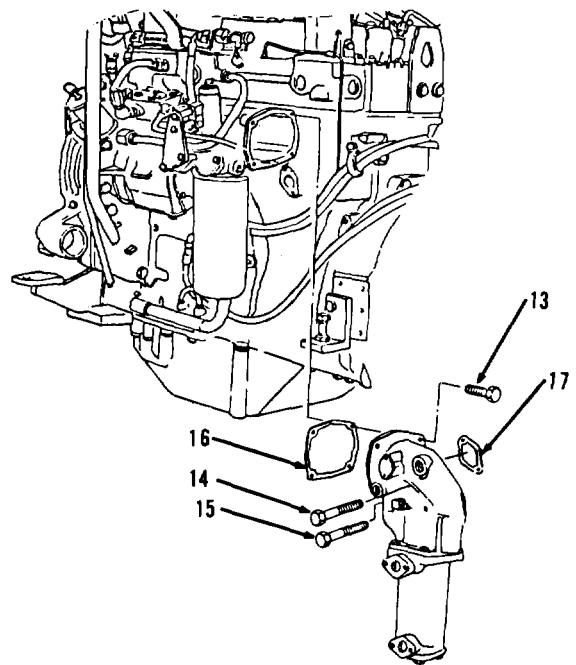


Figure 5-61.

Go to Sheet 5

TRANSMISSION MAINTENANCE. (cont)

5-11. Transmission Oil Cooler. (Sheet 5 of 5)

INSTALLATION (cont)

2. Install bolts (15 and 14) and four bolts (13).
3. Install adapter (12), elbow (11) and adapter (10, Figure 5-60).
4. Slide clamp (9) onto water hose (8).
5. Install water hose (8) and clamp (9).
6. Install new preformed packing (7), oil line (6) and bolt (5).
7. Install new preformed packing (4), oil line (3) and bolt (2).
8. Connect air line (1) on elbow (30).

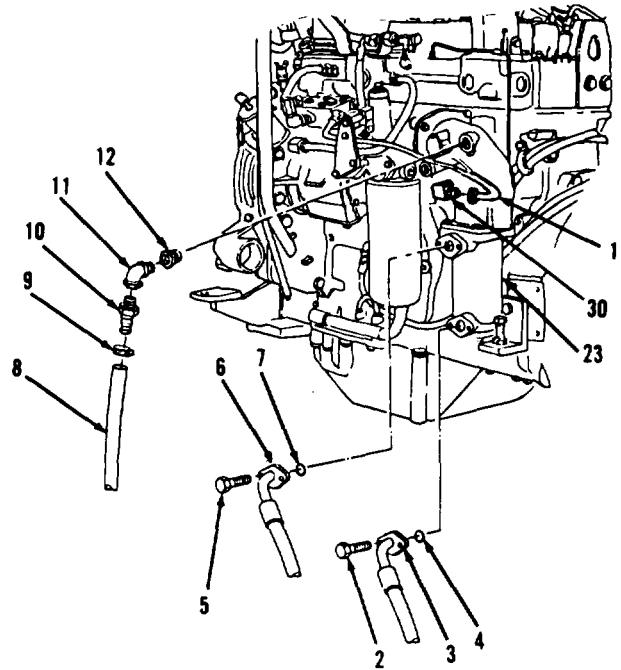


Figure 5-60.

NOTE

Return 13OG Grader to original equipment condition.

End of Task

Section III. FRONT AXLE MAINTENANCE.

5-12. FRONT AXLE MAINTENANCE PROCEDURES.

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the front axle and its components in good repair.

b. This section is arranged by functional group code and provides a list of front axle components to be maintained and step-by-step maintenance procedures.

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| <u>Title</u> | <u>Paragraph</u> | <u>Page</u> |
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| Steering Arms and Tie Rods | 5-14 | 5-58 |
| Wheel Spindle, Bearings and Seals | 5-15 | 5-68 |
| Leaning Wheel Mechanism | 5-16 | 5-75 |
| Leaning Wheel Cylinder | 5-17 | 5-83 |

FRONT AXLE MAINTENANCE. (cont)

5-13. Front Axle Assembly. (Sheet 1 of 4)

This task covers: a. Removal b. Cleaning c. Inspection
 d. Installation

INITIAL SETUP

Applicable Configurations
 All

Personnel Required
 Construction equipment
 repairer MOS 62B

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)
 Pulling adapter 1P1832
 Nut 1P543
 Washer 5F7353
 Stud 9S5559
 Puller assembly 7F9540
 Pump group 5P3100
 Pulling adapter 1P1833
 Puller assembly 5H9817
 Screw 8S6586
 Nut 1P544
 Jack stand
 Hoist and sling

References
 TM 5-3805-261-10
 TM 5-3805-261-20

Special Environmental Conditions
 None

General Safety Instructions
 None

Torques
 All fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Test Equipment
 None

Materials/Parts
 Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C

Troubleshooting References
 None

Equipment Condition
 TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

TM 5-3805-261-20

Front wheels removed.

Paragraph 5-16
 Paragraph 5-17
 Paragraph 8-5

Leaning wheel mechanism removed.
 Leaning wheel cylinder removed.
 Steering cylinders removed.

Go to Sheet 2

FRONT AXLE MAINTENANCE.

5-13. Front Axle Assembly. (Sheet 2 of 4:

REMOVAL

1. Position jack stand under circle drawbar (Figure 5-66).
2. Remove six fittings (1, Figure 5-67).

WARNING

Weight of front axle is approximately 1200 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

3. Install hoist and sling on front axle (13, Figure 5-68).
4. Remove nut (2), bolt (3), pin (4) and washer (5, Figure 5-69).
5. Remove nut (6), bolt (7), pin (8) and washers (9 and 10).

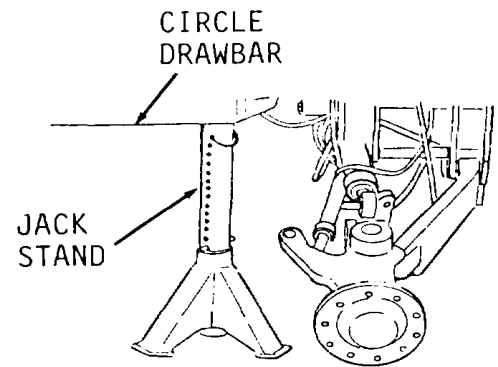


Figure 5-66.

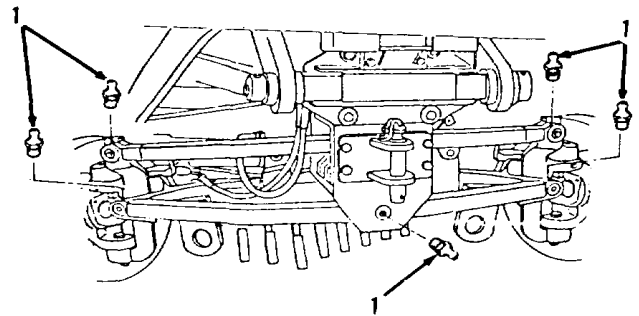


Figure 5-67.

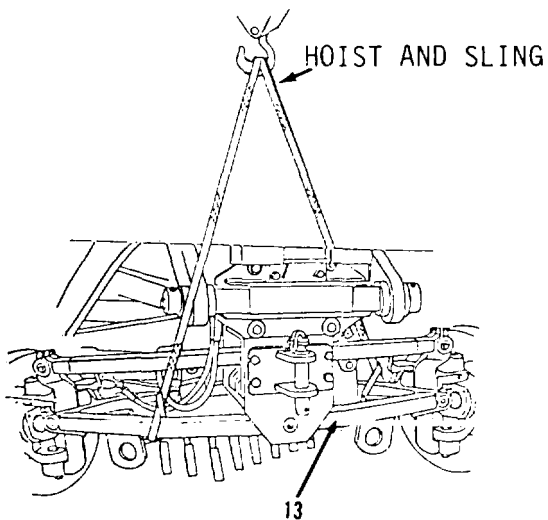


Figure 5-68.

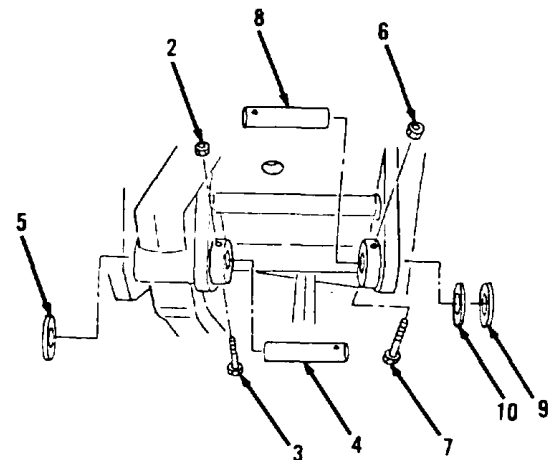


Figure 5-69.

Go to Sheet 3

FRONT AXLE MAINTENANCE. (cont)

5-13. Front Axle Assembly. (Sheet 3 of 4)

REMOVAL (cont)

6. Using hoist and sling, remove items 11 thru 13 as an assembly (Figure 5-70).
7. Remove hoist and sling.
8. Using suitable driver, remove two seals (11) and bearings (12) from axle (13, Figure 5-71).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

NOTE

During installation, special tools must be used to prevent damage to bearings.

1. Using pulling adapter, puller assembly, washer, screw and nut, install two bearings (12) 0.282 inch from each surface of axle (13, Figure 5-71).
2. Install two seals (11) with lips toward outside surface and even with outside surface of axle (13).
3. Attach hoist and sling to items 13 thru 11 as an assembly (Figure 5-70).
4. Position items 13 thru 11 as an assembly on vehicle.

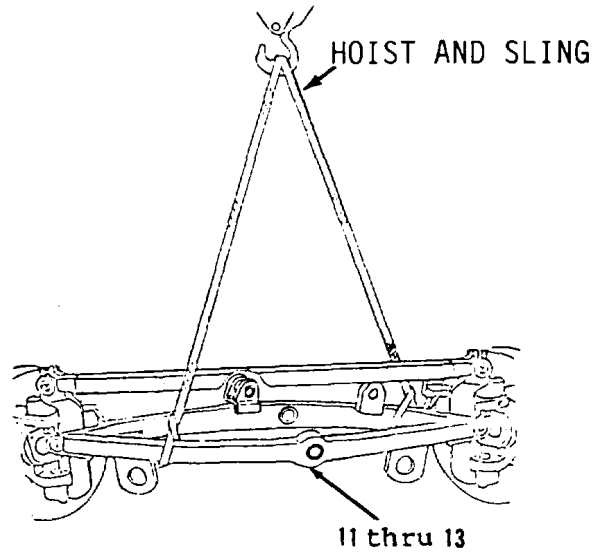


Figure 5-70.

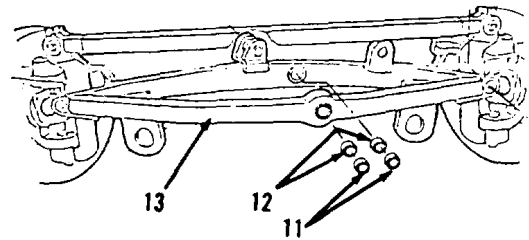


Figure 5-71.

Go to Sheet 4

FRONT AXLE MAINTENANCE.

5-13. Front Axle Assembly. (Sheet 4 of 4)

INSTALLATION

5. Install washer (10) and pin (8).
Use washer (9) only if required to obtain a maximum gap of 0.06 inch between axle (13) and vehicle frame. Hole in pin (8) must align with hole in axle (13), Figure 5-72).
6. Install washer (5) and pin (4).
Hole in pin (4) must align with hole in axle (13).
7. Remove hoist and sling.
8. Install bolt (7), nut (6), bolt (3) and nut (2, Figure 5-73).
9. Remove jack stand (Figure 5-66).
10. Lubricate and install six fittings (1, Figure 5-67). Refer to LO 5-3805-261-12.

NOTE

Return 130G Grader to original equipment condition.

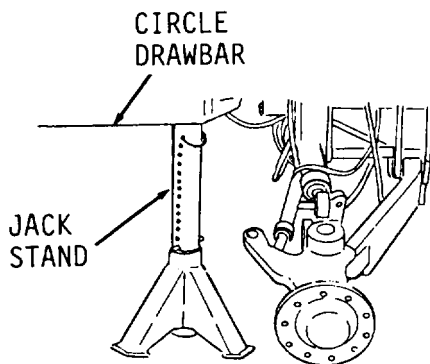
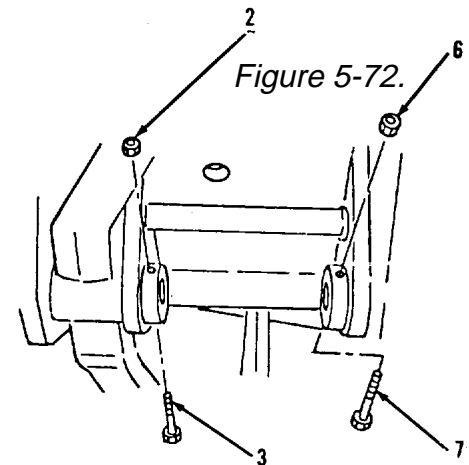
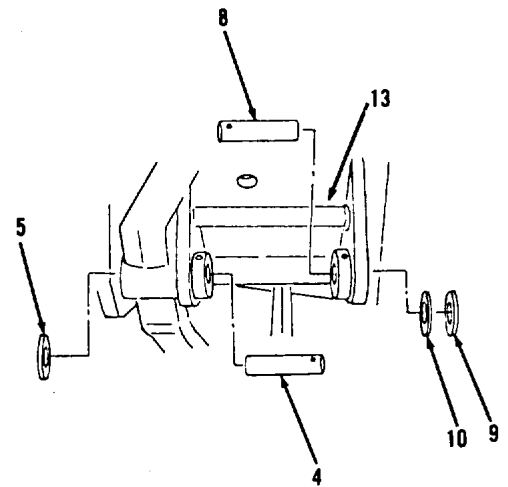


Figure 5-66.

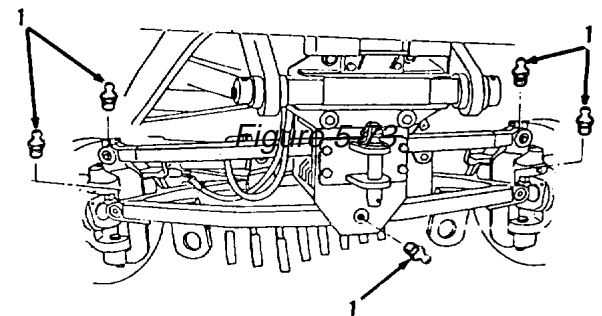


Figure 5-67.

End of Task

FRONT AXLE MAINTENANCE. (cont)**5-14. Steering Arms and Tie Rod. (Sheet 1 of 10)**

This task covers: a. Removal b. Cleaning c. Inspection
 d. Installation e. Adjustment

INITIAL SETUPApplicable Configurations

All

Personnel RequiredConstruction equipment
repairer KOS 62BToolsGeneral Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

Pulling adapter 5F7340
 Washer 5F7353
 Nut 5F7351
 Screw 5F7366
 Puller assembly 7F9540
 Pump Group 5P3100
 Spacer 5P197
 Leg 1H3109
 Puller assembly 1H3107
 Bearing puller assembly 5F7343
 Spacer L-1774
 Jack stands
 Jack
 Hoist and sling
 Tape

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Cotter pins, Items 10, 13
 Chalk
 Preformed packing, Item 32

Go to Sheet 2

FRONT AXLE MAINTENANCE.

5-14. Steering Arms and Tie Rod. (Sheet 2 of 10)

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Wheel lean prevention bolt and nut removed.

Paragraph 5-15

Wheel spindles removed.

Go to Sheet 3

FRONT AXLE MAINTENANCE. (cont)

5-14. Steering Arms and Tie Rod. (Sheet 3 of 10)

REMOVAL

1. Remove nut (1), washer (2), bolt (3) and lock (4, Figure 5-74) from wheel lean arm on right, front of vehicle.
2. Remove bolt (5), washer (6) and retainer (7).

CAUTION

Do not remove pin from wheel lean, lean arm or lean bar.

3. Remove pin (8) from leaning wheel rod assembly (9). Drive out pin (8) with hammer and punch just far enough to clear rod assembly (9).
4. Connect battery negative grounds to batteries. Refer to TM 5-3805-261-20.

WARNING

Only a qualified operator may perform the following procedure. All other personnel must clear the immediate area. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

5. Start engine. Refer to TM 5-3805-261-10.
6. Operate wheel lean control lever to retract rod assembly (9) into cylinder. Refer to TM 5-3805-261-10.

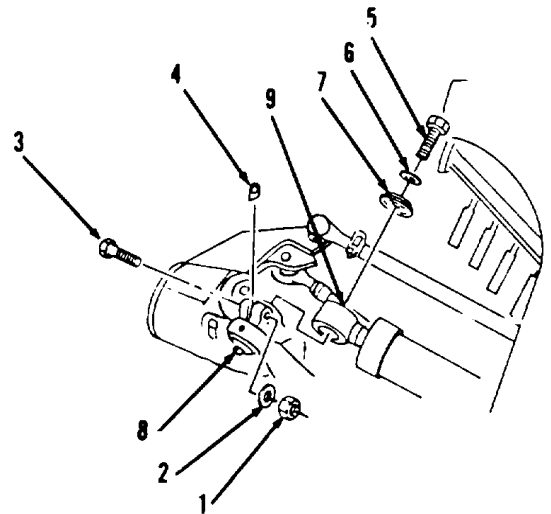
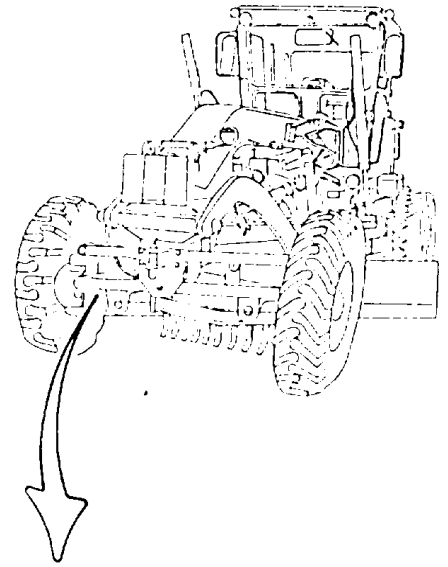


Figure 5-74.

Go to Sheet 4

FRONT AXLE MAINTENANCE.**5-14. Steering Arms and Tie Rod. (Sheet 4 of 10)**
REMOVAL

7. Stop engine.
8. Disconnect battery negative grounds from batteries. Refer to TM 5-3805-261-20.

NOTE

Steps 9 thru 32 are for removal of the right steering arm. Procedure for removal of the left steering arm is identical.

9. Remove and discard cotter pin (10) from right, front socket (41, Figure 5-75).
10. Loosen nut (11) until even with end of threads on socket assembly (41).

CAUTION

Do not damage socket assembly. Keep nut flush with end of socket assembly.

11. Tap nut (11) with hammer to loosen socket assembly (41) from its taper and remove nut (11).
12. Move socket assembly (41) away from housing (37).
13. Remove washer (12).
14. Remove and discard cotter pin (13).
15. Loosen nut (14) until even with end of threads on steering cylinder socket assembly (15).

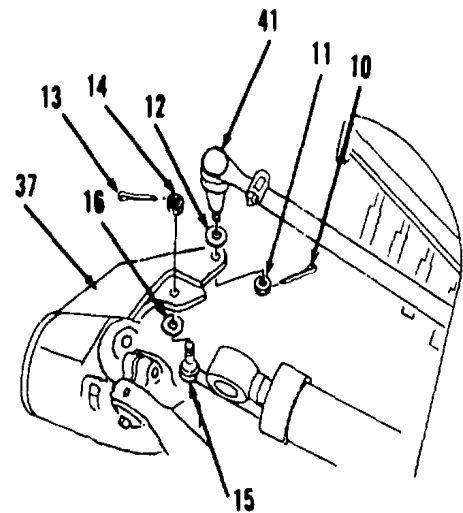


Figure 5-75.

Go to Sheet 5

FRONT AXLE MAINTENANCE. (cont)

5-14. Steering Arms and Tie Rod. (Sheet 5 of 10)

REMOVAL (cont)

CAUTION

Do not damage socket assembly. Keep nut flush with end of socket assembly.

16. Tap nut (14) with hammer to loosen socket assembly (15) from its taper and remove nut (14).
17. Move socket assembly (15) away from housing (37).
18. Remove washer (16).
19. Remove bolt (17), washer (18) and retainer (19, Figure 5-76).
20. Using suitable puller, remove ring (20) from retainer (19).
21. Remove bolt (21), washer (22) and retainer (23).
22. Using suitable puller, remove ring (24) from retainer (23).
23. Remove two bolts (25) and washers (26, Figure 5-77).

WARNING

Weight of housing is approximately 415 pounds. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

24. Attach hoist and sling to housing (37).
25. Using assembled puller adapter, washer, nut, screw, puller assembly, pump group and spacer, remove two pins (27).

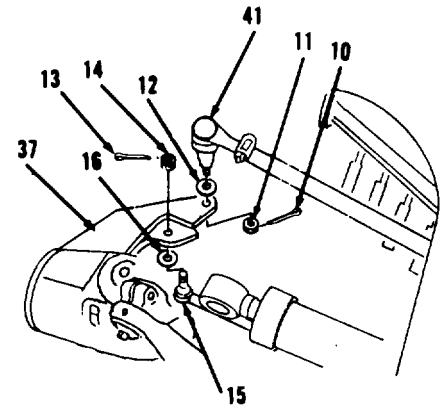


Figure 5-75.

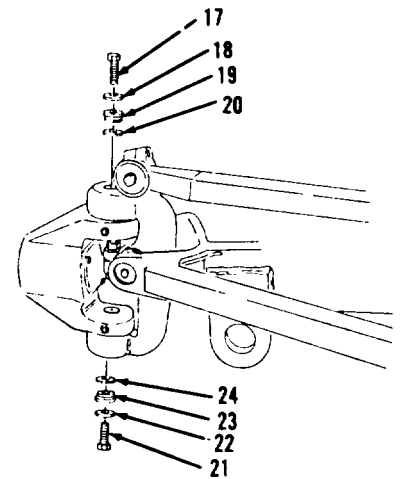


Figure 5-76.

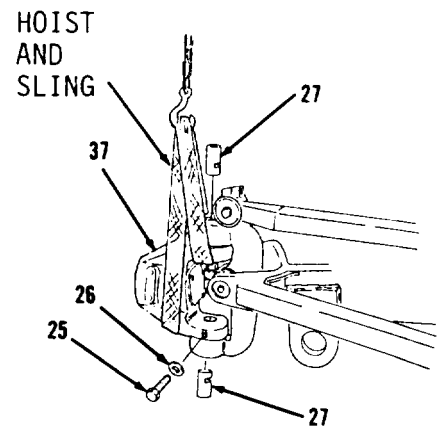


Figure 5-77.

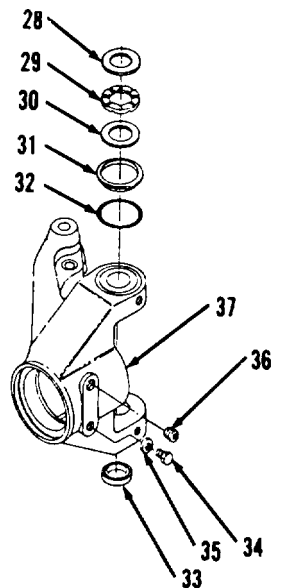
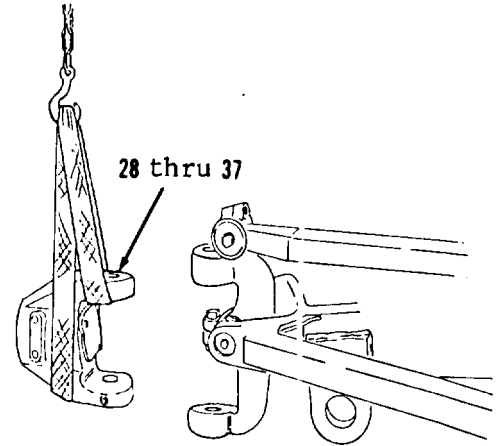
Go to Sheet 6

FRONT AXLE MAINTENANCE.

5-14. Steering Arms and Tie Rod. (Sheet 6 of 10)

REMOVAL

26. Remove items 28 thru 37 as an assembly (Figure 5-78).
27. Remove hoist and sling.
28. Remove washers (28, 29 and 30, Figure 5-79).
29. Remove seal (31), preformed packing (32) and seal (33). Discard preformed packing (32).
30. Remove plug (34), gasket (35) and plug (36) from housing (37).
31. Remove lock nut (38), bolt (39) and clamp (40, Figure 5-80).
32. Remove socket assembly (41) from steering tie rod (42).



CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

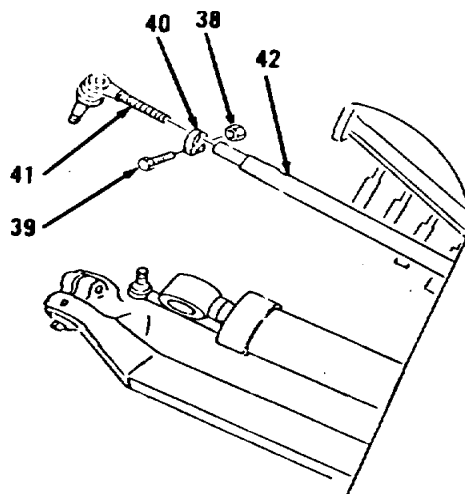


Figure 5-80.

Go to Sheet 7

FRONT AXLE MAINTENANCE. (cont)

5-14. Steering Arms and Tie Rod. (Sheet 7 of 10)

INSTALLATION

NOTE

Steps 1 thru 23 are for installation of the right steering arm. The maintenance procedure for installation of the left steering arm is identical.

1. Install socket assembly (41) on steering tie rod (42, Figure 5-80).
2. Install clamp (40), bolt (39) and lock nut (38). Tighten lock nut (38) to 55 ft-lb torque.
3. Install plug (36), gasket (35) and plug (34) in housing (37, Figure 5-79).
4. Install seal (33), new preformed packing (32) and seal (31).
5. Install washers (30, 29 and 28).
6. Attach hoist and sling to items 37 thru 28 as an assembly (Figure 5-78).
7. Position items 37 thru 28 as an assembly on wheel lean arm.

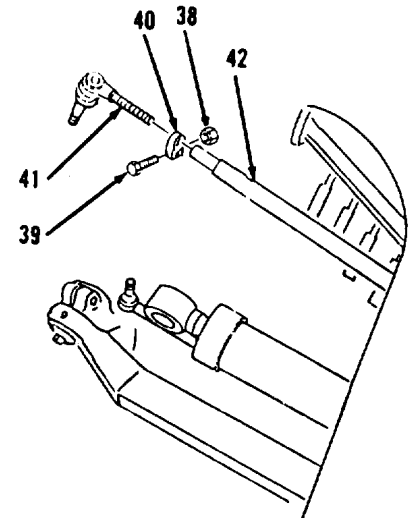


Figure 5-80.

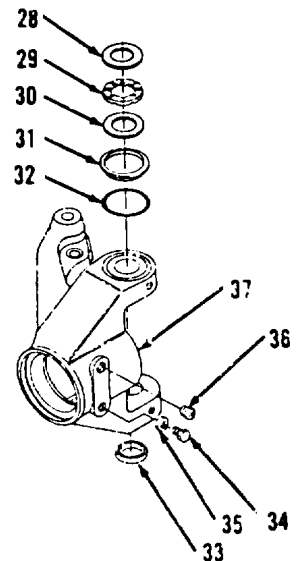
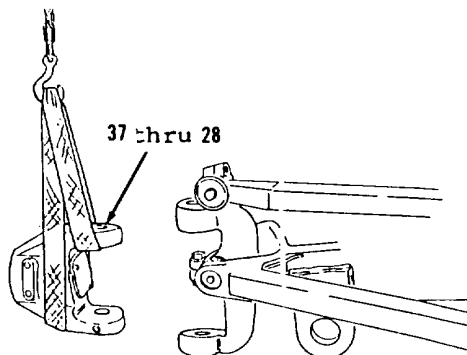


Figure 5-79.



Go to Sheet 8

FRONT AXLE MAINTENANCE.

5-14. Steering Arms and Tie Rod. (Sheet 8 of 10)
INSTALLATION

8. Lower temperature of two pins (27, Figure 5-77) to aid in installation.
9. Using assembled puller assembly, pump group, legs (2), puller assembly, bearing puller assembly and six spacers, install two pins (27). Make sure grooves in two pins (27) are in alignment with openings in housing (37).
10. Install two washers (26) and bolts (25).
11. Remove hoist and sling.
12. Install ring (24, Figure 5-76).
13. Using suitable driver, install retainer (23), washer (22) and bolt (21).
14. Install ring (20).
15. Install retainer (19), washer (18) and bolt (17).
16. Install washer (16) on socket assembly (15, Figure 5-75).
17. Install socket assembly (15) in housing (37).
18. Install nut (14) and tighten to 90 ft-lb torque. Slot in nut (14) must align with hole in socket assembly (15).
19. Install new cotter pin (13).
20. Install washer (12).
21. Position socket assembly (41) on housing (37).

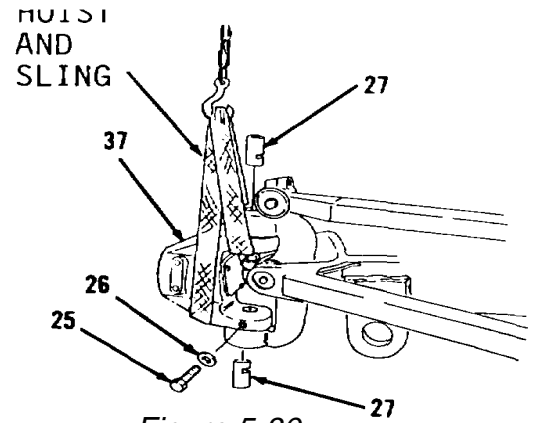


Figure 5-80.

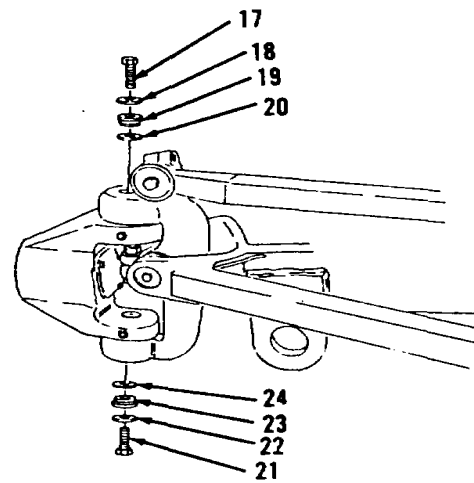


Figure 5-79.

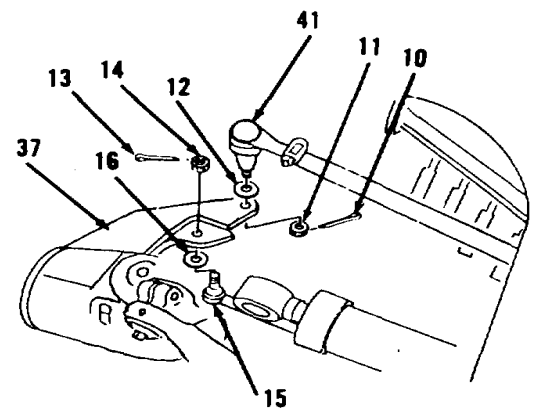


Figure 5-78.

Go to Sheet 8

FRONT AXLE MAINTENANCE. (cont)

5-14. Steering Arms and Tie Rod. (Sheet 9 of 10)

INSTALLATION (cont)

22. Install nut (11) and tighten to 90 ft-lb torque.
23. Install new cotter pin (10).
24. Connect battery negative grounds. Refer to TM 5-3805-261-20.

WARNING

Only a qualified operator may perform the following procedure. All other personnel must clear the immediate area. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

25. Start engine. Refer to TM 5-3805-261-10.
26. Operate wheel lean control lever to position rod assembly (9) in line with pin (8, Figure 5-74) on right front of vehicle.
27. Stop engine.
28. Disconnect battery negative grounds. Refer to TM 5-3805-261-20.
29. Position pin (8) through eye of rod assembly (9) on right front of vehicle.
30. Install retainer (7), washer (6) and bolt (5).
31. Install lock (4), bolt (3), washer (2) and nut (1). Tighten nut (1) to 185 ft-lb torque.

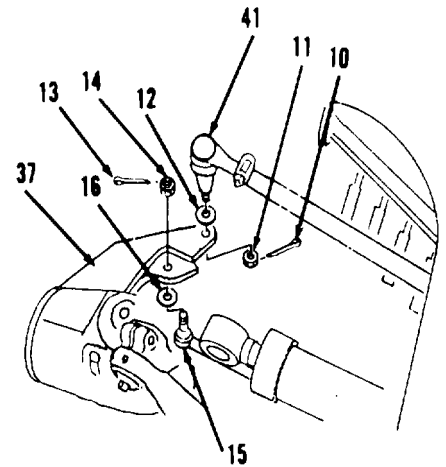


Figure 5-75.

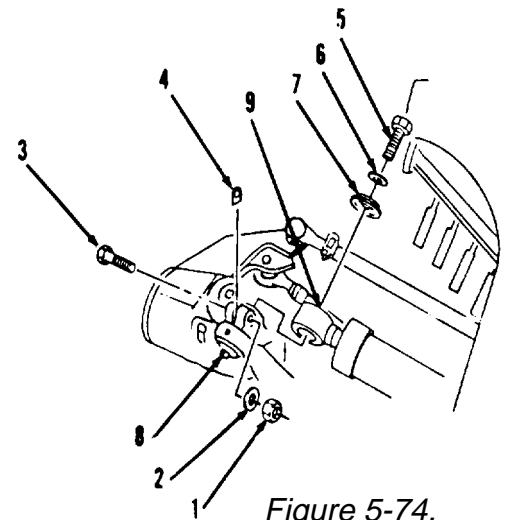


Figure 5-74.

Go to Sheet 10

FRONT AXLE MAINTENANCE.

5-14. Steering Arms and Tie Rod. (Sheet 10 of 10)

ADJUSTMENT

1. Install wheel spindles. Refer to paragraph 5-15.
2. Install front wheels. Refer to TM 5-3805-261-20.
3. Raise front axle off ground with jack and support with two Jack stands (Figure 5-81).
4. Using a piece of chalk to mark the center of the treads of both tires, rotate and mark front tires on front of vehicle. Tires should be facing straight ahead.
5. Measure distance between front centers and rear centers of tires. Measurement at the front of the tires should be 0.12 to 0.25 inch less than the measurement at the rear of the tires (Figure 5-82).
6. Loosen lock nut (38, Figure 5-83) if adjustment is necessary.
7. Turn steering tie rod (42) in direction needed to obtain the distance required.
8. Tighten lock nut (38) to 55 ft-lb torque.
9. Lower front axle to ground and remove jack and two jack stands.

NOTE

Return 130C Grader to original equipment condition.

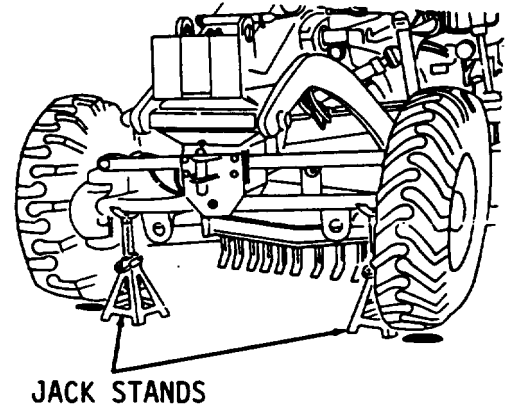


Figure 5-81.

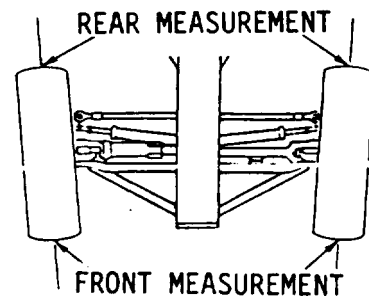


Figure 5-82.

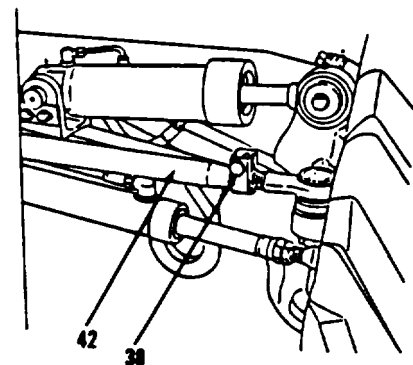


Figure 5-83.

End of Task

FRONT AXLE MAINTENANCE. (cont)

5-15. Wheel Spindle, Bearings and Seals. (Sheet 1 of 7)

This task covers: a. Removal b. Cleaning c. Inspection
 d. Installation

INITIAL SETUP

Applicable Configurations

All

Personnel Required

Construction equipment
 repairer NOS 62B

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)
 Jack group 5P2968
 Seal installer 5S4276

References

TM 5-3805-261-10
 LO 5-3805-261-12
 TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Small tags, Item 43, Appendix C
 standard torques. Refer to
 Trichloroethane, Item 62,
 Appendix C
 Gear lubricant, Item 25,
 Appendix C
 Preformed packing, Item 9

General Safety Instructions

None

Torques

Except for special torques shown,
 all fasteners are tightened to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.

Master disconnect switch off.

LO 5-3805-261-12

Wheel spindle housing lubricant
 drained.

TM 5-3805-261-20

Positive cable on right side
 disconnected.

Front wheels removed.

Go to Sheet 2

Change 1 5-68

FRONT AXLE MAINTENANCE.

E 7)

5-15. Wheel Spindle, Bearings and Seals. (Sheet 2 of 7)

REMOVAL

NOTE

The following is a maintenance procedure for the right wheel spindle, bearings and seals. The maintenance procedure for the left wheel spindle, bearings and seals is identical.

1. Remove two bolts (1) and cover (2, Figure 5-84) from right side of front axle.
2. Remove and discard preformed packing (3).
3. Remove three bolts (4), retainer (5) and shim(s) (6). Tie shim(s) (6) together and tag for identification.
4. Loosen bolt (18) and nut (19).
5. Position forks of jack group on threads of bolt (18) at center of wheel lean arm. Position other end of jack group against wheel spindle (11).
6. Remove items 7 thru 11 as an assembly from housing (17, Figure 5-85) by tightening nut on jack group.
7. Tighten bolt (18) and nut (19).
8. Remove and separate ring (7) and seal (8) from spindle (11, Figure 5-86). Be careful not to damage.
9. Using suitable puller, remove bearing (9) from spindle (11).
10. Remove ten studs (10) and spindle (11).

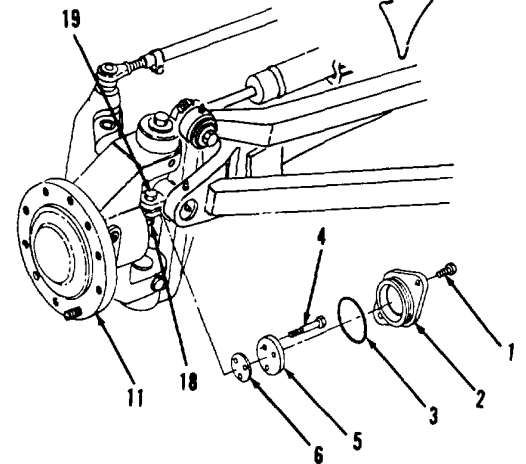
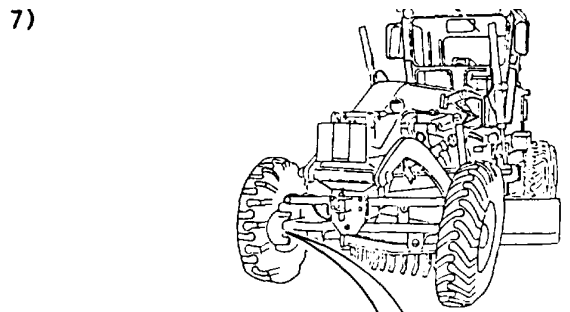


Figure 5-84.

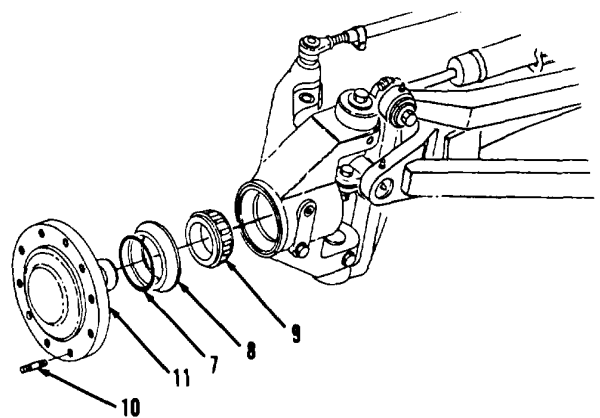
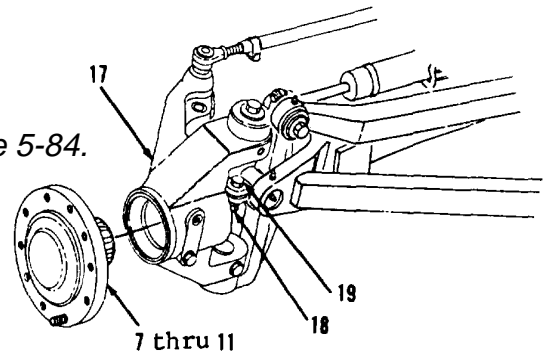


Figure 5-85.

FRONT AXLE MAINTENANCE. (cont)

5-15. Wheel Spindle, Bearings and Seals. (Sheet 3 of 7)

REMOVAL (cont)

11. Remove and separate ring (12) and seal (13) from housing (17, Figure 5-87).

NOTE

Be careful not to damage seals and rings.

12. Remove bearings (14, 15 and 16) from housing (17).

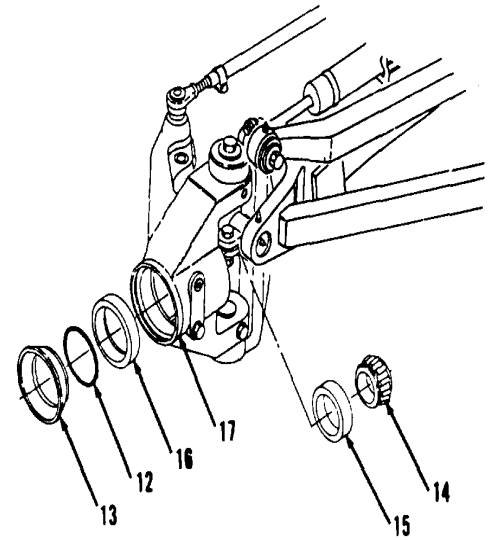


Figure 5-87.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Lower temperatures of bearings (16 and 15) to aid in installation and install into housing (17, Figure 5-87).
2. Heat bearing (14) to 275 degrees F and install into housing (17).
3. Install seal (13) on ring (12, Figure 5-88). Make sure seal (13) is not twisted and is properly seated on bottom of ramp of ring (12) and against retaining lip.
4. Install seal installer on items 13 and 12 as an assembly (Figure 15-89).

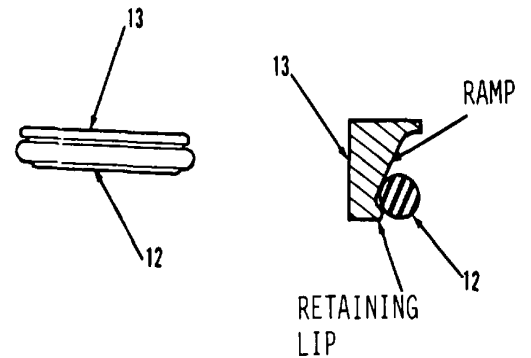


Figure 5-88.

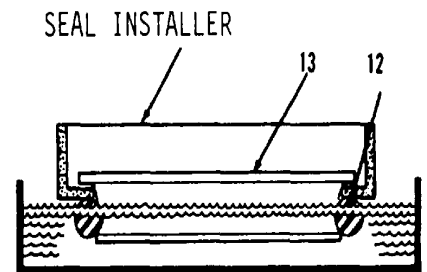


Figure 5-89.

Go to Sheet 4

FRONT AXLE MAINTENANCE.

5-15. Wheel Spindle, Bearings and Seals. (Sheet 4 of 7)
INSTALLATION

WARNING

Cleaning solvent contains Trichloroethane. Avoid prolonged skin contact. Avoid breathing vapors in enclosed areas without proper ventilation. Do not use near open flame, welding operations, or other heated surfaces. If contact with eyes is made, flush eyes with water immediately and seek medical aid at once.

5. Using a seal installer, lower items 13 and 12 as an assembly into container of Trichloroethane until completely wet.
6. Position seal (13) and ring (12) in housing (17). With ring (12) still wet, use seal installer to position items 13 and 12 as an assembly squarely against housing (17, Figure 5-90).
7. Install seal (13) and ring (12). With sudden and even pressure on the seal installer push to seat ring (12) under retaining lip of housing (17).
8. Measure at points (A thru D), 90 degrees apart with depth rule gage. Check height from housing surface to top of seal (13, Figure 5-91). Differences in heights between points (A thru D) must not exceed 0.04 inch.

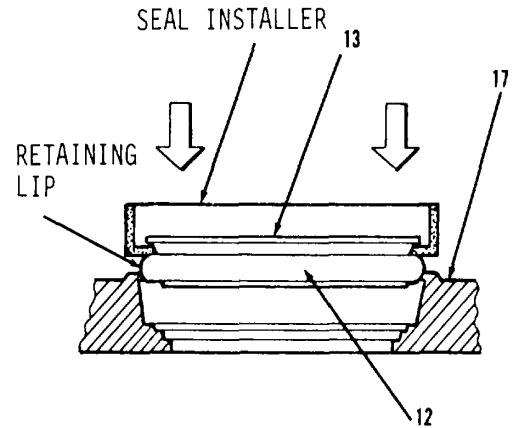


Figure 5-90.

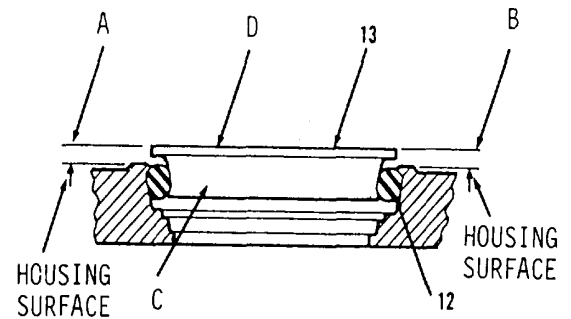


Figure 5-91.

Go to Sheet 5

FRONT AXLE MAINTENANCE. (cont)

5-15. Wheel Spindle, Bearings and Seals. (Sheet 5 of 7)

INSTALLATION (cont)

9. Adjust seal (13) and ring (12), if necessary, using a seal installer.
10. Clean seal (13) mating surface with a lint free cloth. If any dirt particles remain on seal face, seal (13) will leak.
11. Lubricate mating surface of seal (13) with gear lubricant.
12. Inspect ring (12) for twists or bulges. Incorrect installation will result in seal (13) failure. If incorrect installation is obvious, repeat step 6.
13. Install ten studs (10) on spindle (11, Figure 5-86). Tighten ten studs (10) to 170 ft-lb torque.
14. Heat bearing (9) to 275 degrees F and install on spindle (11).
15. Install ring (7) on seal (8, Figure 5-92). Make sure ring (7) is not twisted and is properly seated on bottom of seal (8) ramp and against retaining lip.
16. Install seal installer on seal (8) and ring (7, Figure 5-93).
17. Using a seal installer, lower seal (8) and ring (7) into container of Trichloroethane until ring (7) is completely wet.

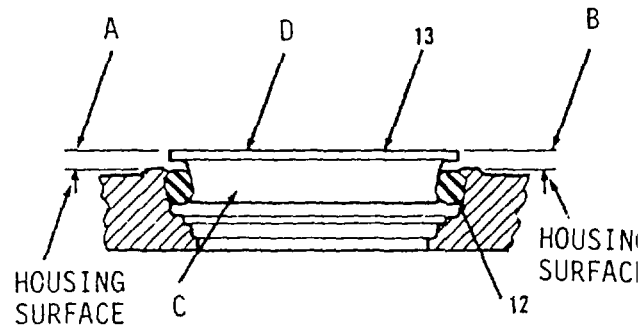


Figure 5-91.

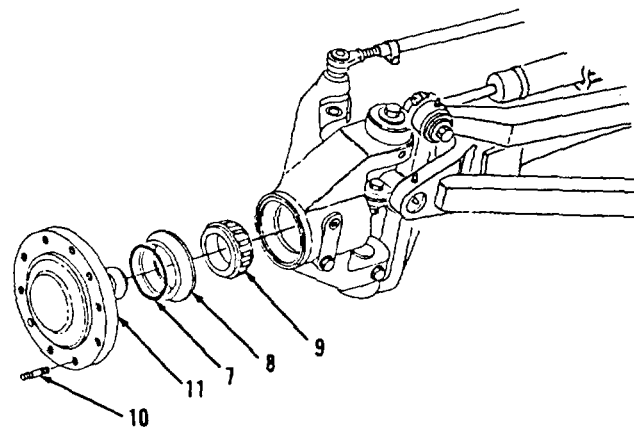


Figure 5-86.

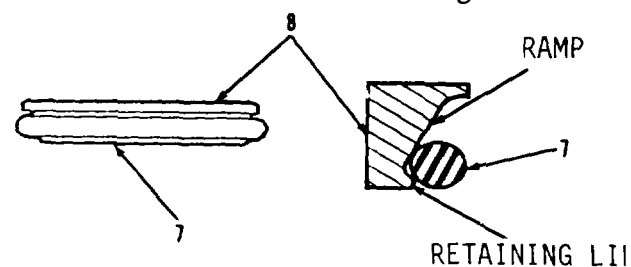


Figure 5-92.

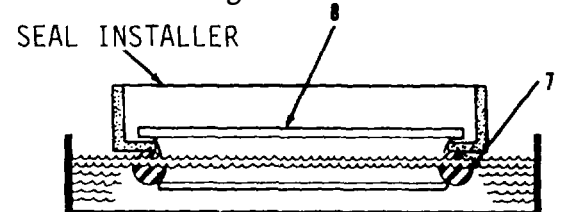


Figure 5-93.

Go to Sheet 5

FRONT AXLE MAINTENANCE.

5-15. Wheel Spindle, Bearing and Seals. (Sheet 6 of 7)

INSTALLATION

18. Position seal (8) and ring (7) in spindle (11, Figure 5-94). With ring (7) still wet, use seal installer to position seal (8) and ring (7) squarely against spindle (11).
19. Install seal (8) and ring (7). With sudden and even pressure on the seal installer push to seat ring (7) under retaining lip of spindle (11).
20. Adjust seal (8) and ring (7), if necessary, using seal installer.
21. Inspect ring (7) for twists or bulges. Incorrect installation will result in seal failure. If incorrect installation is obvious, repeat step 16.
22. Clean seal (8) mating surface with a lint free cloth. If any dirt particles remain on seal face, seal (8) will leak.
23. Lubricate mating surface of seal (8) with gear lubricant.
24. Loosen bolt (18) and nut (19, Figure 5-85).
25. Install items 11 thru 7 as an assembly in housing (17).

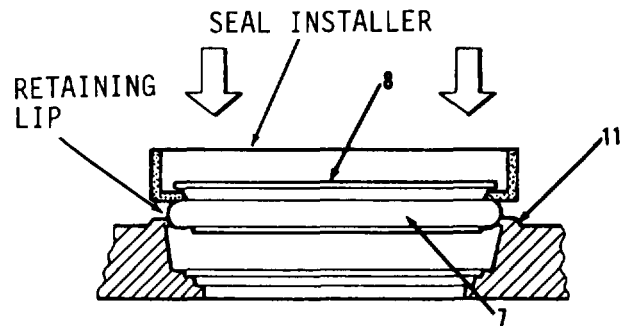


Figure 5-94.

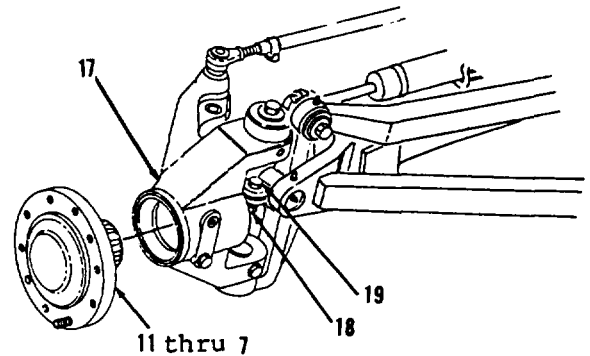


Figure 5-85.

NOTE

Use care not to damage seals and rings.

Go to Sheet 5

FRONT AXLE MAINTENANCE. (cont)**5-15. Wheel Spindle, Bearing and Seals. (Sheet 7 of 7)****INSTALLATION (cont)**

26. Tighten bolt (18) and nut (19, Figure 5-84).
27. Install shim(s) (6), retainer (5) and three bolts (4). Tighten bolts (4) to 96 ft-lb torque.
28. Install new preformed packing (3).
29. Install cover (2) and two bolts (1).

NOTE

Return 130G Grader to original equipment condition.

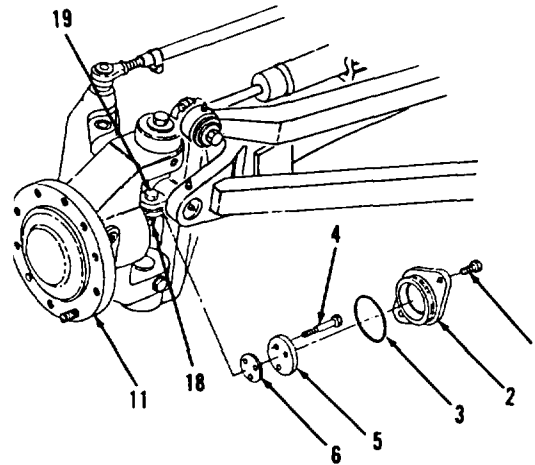


Figure 5-84.

End of Task

FRONT AXLE MAINTENANCE.

5-16. Leaning Wheel Mechanism. (Sheet 1 of 8)

This task covers: a. Removal b. Cleaning c. Inspection
 d. Installation

INITIAL SETUP

Applicable Configurations

All

Personnel Required

Construction equipment
 repairer MOS 62B

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)
 Ratchet assembly 8S9906
 Spacer 5P4197
 Nut 1P543
 Pulling adapter 1P833
 Pump group 5P3100
 Screw 8S6586
 Nut 5S7351
 Adapter 1P1832
 Hoist and sling

References

TM 5-3805-261-10
 LO 5-3805-261-12

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

Paragraph 5-14

Steering arms and tie rod removed.

Go to Sheet 2

FRONT AXLE MAINTENANCE. (cont)

5-16. Leaning Wheel Mechanism. (Sheet 2 of 8)

REMOVAL

1. Install wheel lean prevention bolt and nut. Refer to TM 5-3805-261-10.
2. Fasten ratchet assembly to arms (32 and 44) on front of vehicle. Ratchet assembly is used to reduce the load on pins (8 and 17, Figure 5-95) and aid in their removal.
3. Remove nut (1), washer (2), bolt (3) and lock (4, Figure 5-96) from right, front of vehicle.
4. Remove bolt (5), washer (6) and retainer (7) from arm (32).
5. Remove pin (8).
6. Remove nut (9), washer (10), bolt (11) and lock (12, Figure 5-97) from left, front of vehicle.
7. Remove bolt (13), washer (14) and retainer (15) from bar (20).
8. Remove pin (16) from arm (44).

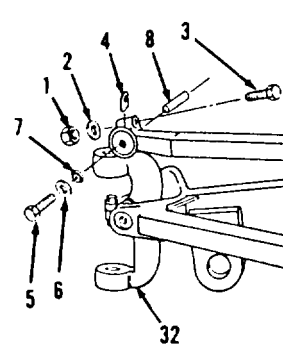
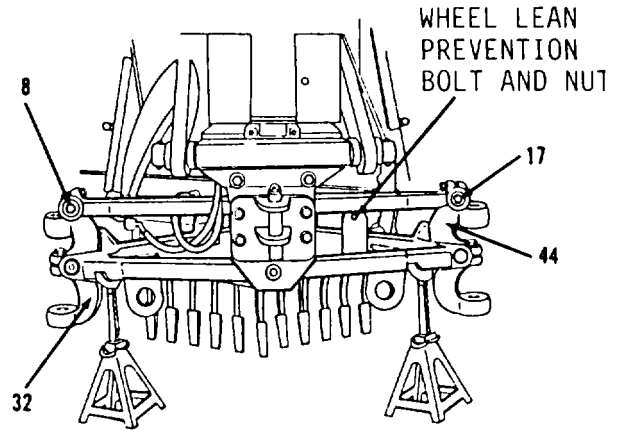


Figure 5-96.

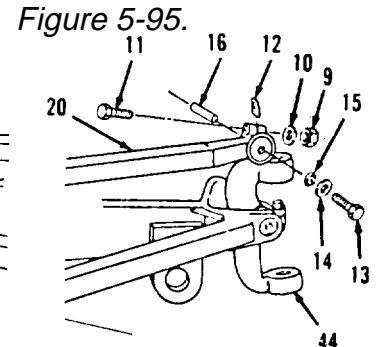
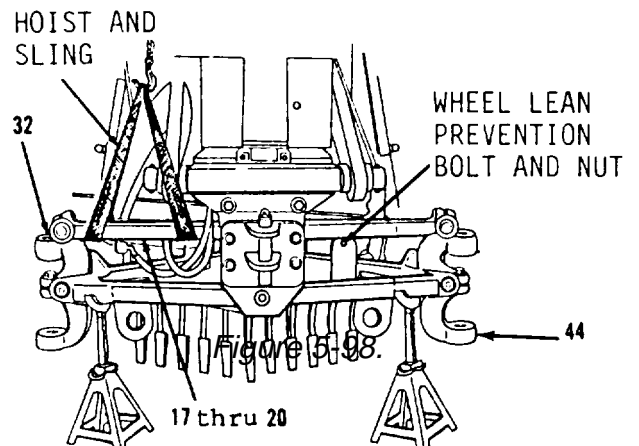


Figure 5-97.

WARNING

Weight of wheel lean bar is approximately 55 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

9. Attach hoist and sling to items 17 thru 20 as an assembly (Figure 5-98) on front of vehicle.



Go to Sheet 3

FRONT AXLE MAINTENANCE.

5-16. Leaning Wheel Mechanism. (Sheet 3 of 8)

REMOVAL

10. Remove wheel lean prevention bolt and nut. Refer to TM 5-3805-261-10.
11. Remove items 17 thru 20 as an assembly from arms (32 and 44).
12. Remove hoist and sling.
13. Using suitable puller, remove four seals (17) and two bearings (18, Figure 5-99).
14. Remove two fittings (19) from bar (20).
15. Remove two bolts (21) and washers (22 and 23, Figure 5-100) from right, front of vehicle.
16. Remove nut (24), bolt (25), washer (26) and lock (27).
17. Remove ratchet assembly.

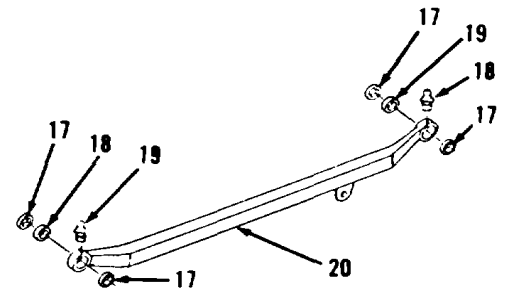


Figure 5-99.

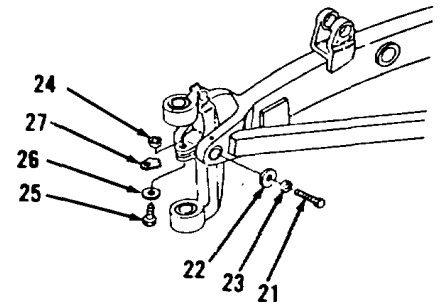


Figure 5-100.

WARNING

Weight of arm is approximately 60 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

18. Attach hoist and sling to arm (32, Figure 5-101).
19. Remove pin (28).
20. Remove items 29 thru 32 as an assembly.
21. Remove hoist and sling.

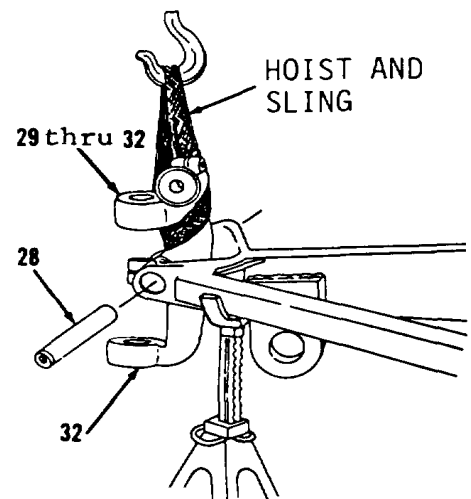


Figure 5-101.

Go to Sheet 4

FRONT AXLE MAINTENANCE. (cont)

5-16. Leaning Wheel Mechanism. (Sheet 4 of 8)

REMOVAL (cont)

22. Using suitable puller, remove bearings (29 and 30, Figure 5-102).
23. Remove two fittings (31) from arm (32).
24. Remove two bolts (33) and washers (34 and 35, Figure 5-103) from left, front of vehicle.
25. Remove nut (36), bolt (37), washer (38) and lock (39).
26. Attach hoist and sling to items 41 thru 44 as an assembly (Figure 5-104).
27. Remove pin (40).
28. Remove items 41 thru 44 as an assembly.
29. Remove hoist and sling.
30. Remove bearings (41 and 42, Figure 5-105).
31. Remove two fittings (43) from arm (44).

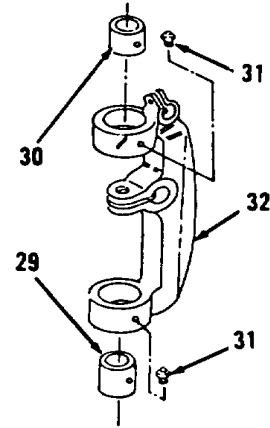


Figure 5-102.

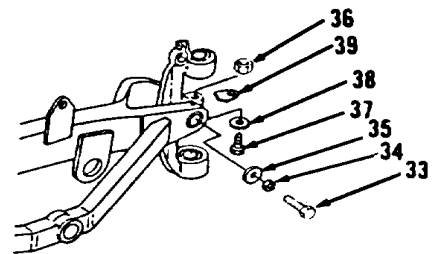


Figure 5-103.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

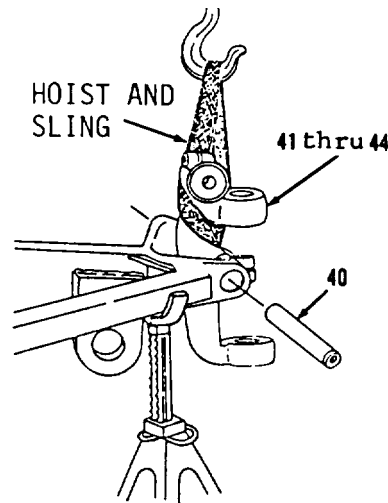


Figure 5-104.

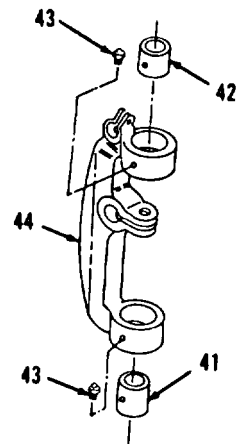


Figure 5-105.

Go to Sheet 5

FRONT AXLE MAINTENANCE.**5-16. Leaning Wheel Mechanism. (Sheet 5 of 8)**

INSTALLATION

1. Install two fittings (43) on arm (44, Figure 5-105) on left, front of vehicle.

CAUTION

To prevent damage, special tools must be used to install bearings.

2. Using assembled spacer, nut, pulling adapter, washer, nut, puller assembly and pump group, install bearing (42) flush with lower surface of collar on arm (44).
3. Install bearing (41). These tools must also be used to install flush with upper surface of collar on arm (44).
4. Attach hoist and sling to items 44 thru 41 as an assembly (Figure 5-104).
5. Position items 44 thru 41 as an assembly on vehicle.
6. Install pin (40). Groove in pin (40) must align with opening in arm (44).
7. Remove hoist and sling.
8. Install lock (39), washer (38), bolt (37) and nut (36, Figure 5-103). Tighten nut (36) to 515 ft-lb torque.
9. Install two washers (35 and 34) and bolts (33).

Go to Sheet 6

FRONT AXLE MAINTENANCE. (cont)

5-16. Leaning Wheel Mechanism. (Sheet 6 of 8)

INSTALLATION (cont)

10. Install two fittings (31) in arm (32, Figure 5-102) on right, front of vehicle.
11. Using assembled spacer, nut, pulling adapter, washer, nut, puller assembly and pump group, install bearing (30) flush with lower surface of collar on arm (32).
12. Install bearing (29) flush with upper surface of collar on arm (32).

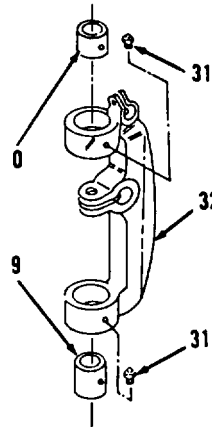


Figure 5-102.

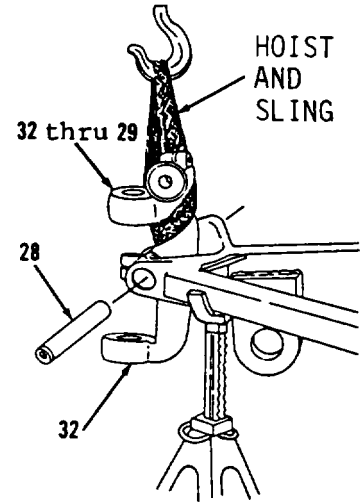


Figure 5-101.

13. Attach hoist and sling to items 32 thru 29 as an assembly (Figure 5-101).
14. Position items 32 thru 29 as an assembly on vehicle.
15. Install pin (28). Groove in pin (28) must align with opening in arm (32).
16. Remove hoist and sling.
17. Install lock (27), washer (26), bolt (25) and nut (24, Figure 5-100). Tighten nut (24) to 515 ft-lb torque.

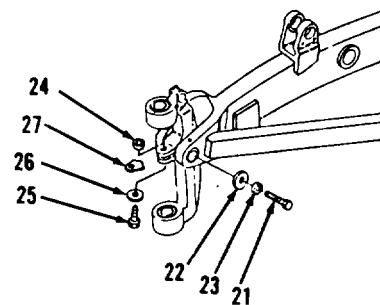


Figure 5-100.

18. Install two washers (23 and 22) and bolts (21).
19. Install two fittings (19) in bar (20, Figure 5-99).
20. Using assembled washer, puller assembly, pump group, screw, nut and adapter, install two bearings (18).
21. Install four seals (17) with lips toward the outside and even with the outside surface of bar (20).

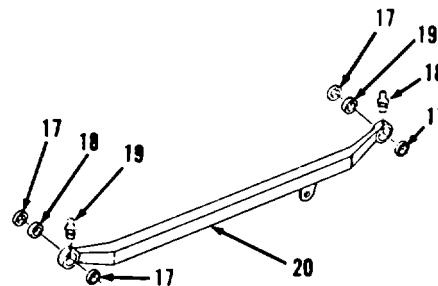


Figure 5-99.

Go to Sheet 7

FRONT AXLE MAINTENANCE.

5-16. Leaning Wheel Mechanism. (Sheet 7 of 8)

INSTALLATION

22. Fasten ratchet assembly to arms (44 and 32, Figure 5-98) and vehicle frame.
23. Attach hoist and sling to items 20 thru 17 as an assembly.
24. Position items 20 thru 17 as an assembly on arms (44 and 32).
25. Install wheel lean prevention bolt and nut. Refer to TM 5-3805-261-10.
26. Using ratchet assembly, align arms (44 and 32) with bar (20, Figure 5-97).
27. Install pin (16) on left, front of vehicle. Groove in pin (16) must align with opening in top of arm (44).
28. Install retainer (15), washer (14) and bolt (13). Use shim(s) between pin (16) and retainer (15) to give a 0.030 inch gap between bar (20) and retainer (15).
29. Install lock (12), bolt (11), washer (10) and nut (9). Tighten nut (9) to 185 ft-lb torque.

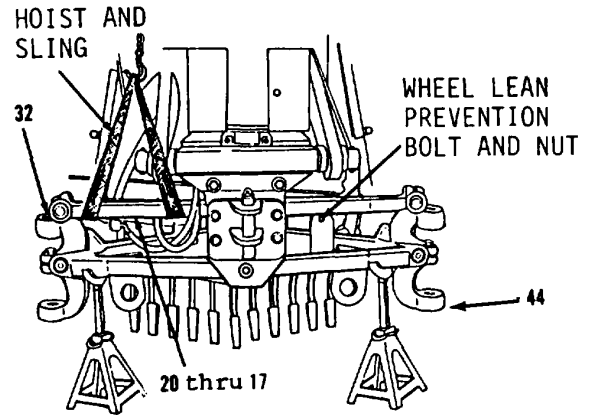


Figure 5-98.

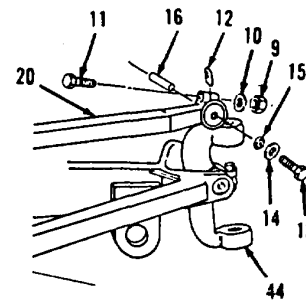


Figure 5-97.

Go to Sheet 8

FRONT AXLE MAINTENANCE. (cont)

5-16. Leaning Wheel Mechanism. (Sheet 8 of 8)

INSTALLATION (cont)

30. Install pin (8, Figure 5-96) on right, front of vehicle. Groove in pin (8) must align with opening in top of arm (32).
31. Install retainer (7), washer (6) and bolt (5). Use shim(s) between pin (8) and retainer (7) to give a 0.030 inch gap between bar (20) and retainer (7).
32. Install lock (4), bolt (3), washer (2) and nut (1).
33. Remove ratchet assembly from arms (44 and 32, Figure 5-98).
34. Remove wheel lean prevention bolt and nut. Refer to TM 5-3805-261-10.
35. Remove hoist and sling.
36. Lubricate lubrication fittings. Refer to LO 5-3805-261-12.

NOTE

Return 130G Grader to original equipment condition.

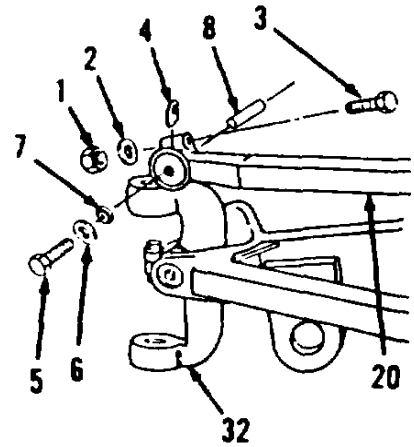


Figure 5-96.

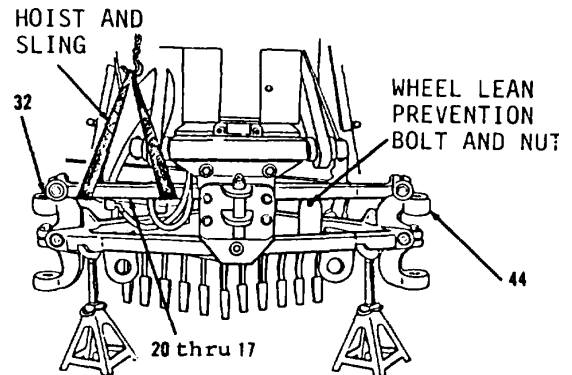


Figure 5-98.

End of Task

FRONT AXLE MAINTENANCE.

5-17. Leaning Wheel Cylinder. (Sheet 1 of 5)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit :
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
LO 5-3805-261-12
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43, Appendix C
Preformed packings, Items 4, 7
Seals, Item 15
Bearings, Item 16
Caps

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Wheel lean lock pin installed.

LO 5-3805-261-12

Hydraulic pressure vented.

TM 5-3805-261-20

Positive cable on right side
disconnected.

Go to Sheet 2

Change 1 5-83

FRONT AXLE MAINTENANCE. (cont)

5-17. Leaning Wheel Cylinder. (Sheet 2 of 5)

REMOVAL

WARNING

Wheel lean lock pin must be installed before disconnecting any hose assemblies. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

1. Remove two fittings (1, Figure 5-106) from right side of front axle on vehicle.

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

2. Disconnect hose assembly (2).
3. Remove elbow (3) and preformed packing (4). Discard preformed packing (4).
4. Remove hose assembly (5), elbow (6) and preformed packing (7, Figure 5-107). Discard preformed packing (7).

WARNING

Weight of cylinder is 55 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

5. Install hoist and sling on items 15 thru 17 as an assembly (Figure 5-109).

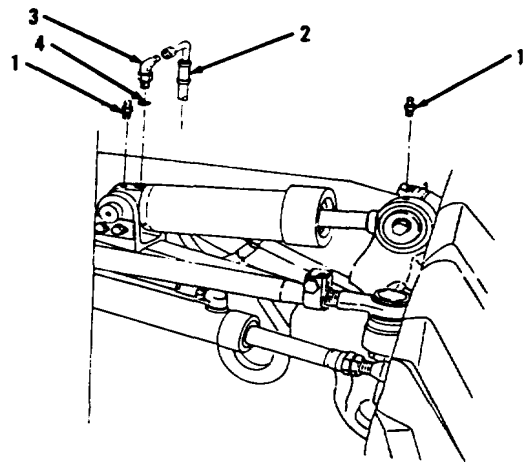


Figure 5-106.

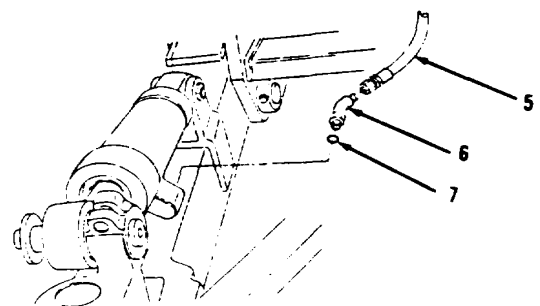


Figure 5-107.

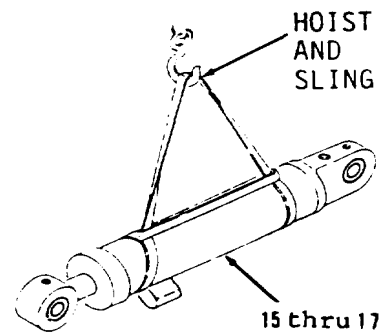


Figure 5-109.

Go to Sheet 3

FRONT AXLE MAINTENANCE.

5-17. Leaning Wheel Cylinder. (Sheet 3 of 5)

REMOVAL

6. Remove bolt (8), washer (9) and retainer (10, Figure 5-108).
7. Remove two bolts (11), washers (12), lock (13) and pin (14).
8. Remove items 15 thru 17 as an assembly (Figure 5-109) from vehicle.
9. Remove hoist and sling.
10. Remove and discard four seals (15) from cylinder (17, Figure 5-110).

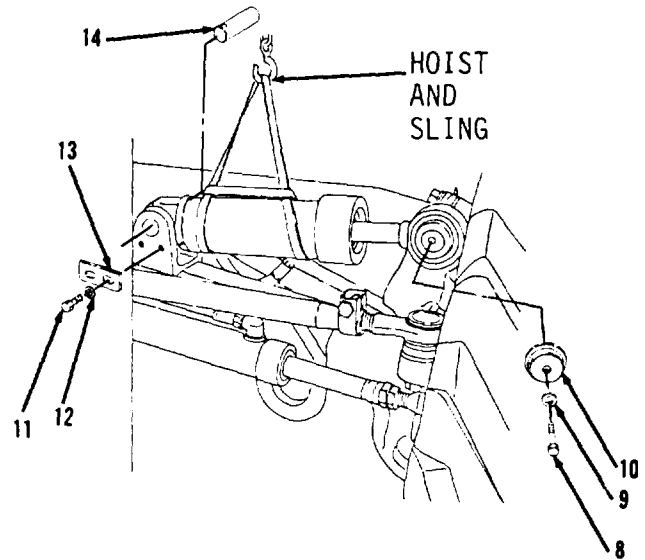


Figure 5-108.

CAUTION

Removal of bearings from cylinder eyes may cause destruction of bearings. Remove bearings only if inspection indicates replacement is necessary.

11. Inspect two bearings (16). Replace if cracked, broken, scored or grooved.
12. Using suitable driver and press, remove two bearings (16), if necessary.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

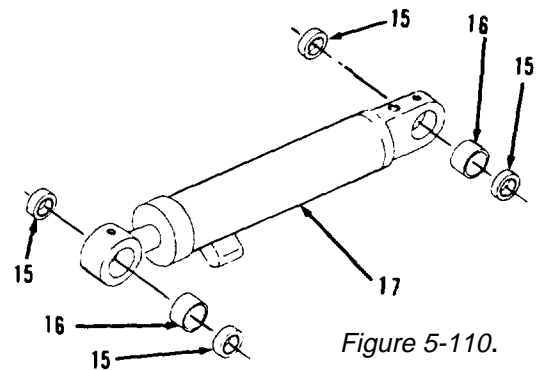


Figure 5-110.

Go to Sheet 4

FRONT AXLE MAINTENANCE. (cont)

5-17. Leaning Wheel Cylinder. (Sheet 4 of 5)

INSTALLATION

1. Using suitable driver and press, install two new bearings (16) centered on cylinder (17), if removed, allowing installation of four new seals (15, Figure 5-110).
2. Install four new seals (15) with lips facing outward.
3. Install hoist and sling.
4. Position items 17 thru 15 as an assembly (Figure 5-109) on right side, front axle of vehicle.
5. Install pin (14, Figure 5-108).
6. Position lock (13).
7. Install two washers (12) and bolts (11).
8. Install retainer (10), washer (9) and bolt (8).

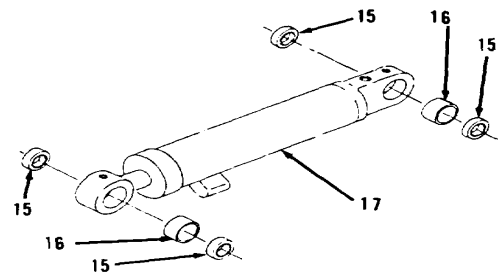


Figure 5-110.

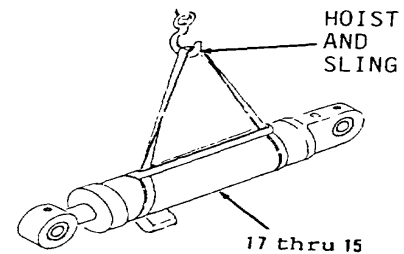


Figure 5-109.

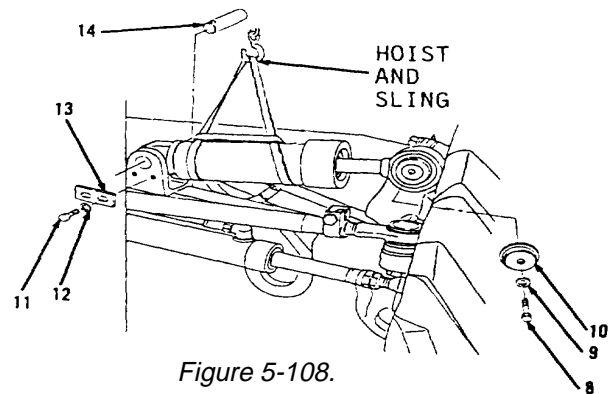


Figure 5-108.

Go to Sheet 5

FRONT AXLE MAINTENANCE.**5-17. Leaning Wheel Cylinder. (Sheet 5 of 5)****INSTALLATION**

9. Install new preformed packing (7) and elbow (6, Figure 5-107).
10. Install hose assembly (5).
11. Install new preformed packing (4) and elbow (3, Figure 5-106).
12. Connect hose assembly (2).
13. Install two fittings (1). Add new grease. Refer to LO 5-3805-261-12.

NOTE

Return 130G Grader to original equipment condition.

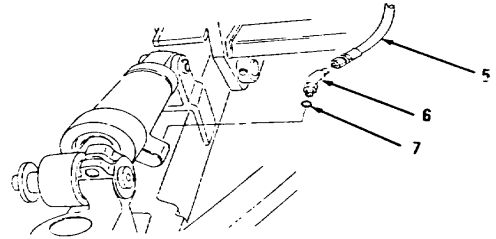


Figure 5-107.

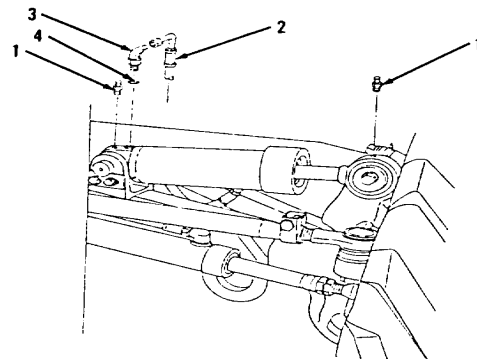


Figure 5-106.

End of Task

Section IV. REAR AXLE MAINTENANCE.**5-18. REAR AXLE MAINTENANCE PROCEDURES.**

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the rear axle and its components in good repair.

b. This section is arranged by functional group code and provides a list of rear axle components to be maintained and step-by-step maintenance procedures.

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REAR AXLE MAINTENANCE.

5-19. Differential. (Sheet 1 of 2)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Hoist and sling

References

TM 5-3805-261-10

Special Environmental Conditions

None

Test Equipment

None

General Safety Instructions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41
Appendix C

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 5-6

Transmission and mounting removed.

Paragraph 5-21

Drive axles removed.

Go to Sheet 2

REAR AXLE MAINTENANCE. (cont)**5-19. Differential. (Sheet 2 of 2)****REMOVAL****WARNING**

Weight of differential is 500 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

1. Attach hoist and sling to differential.
2. Remove ten nuts, washers and differential (Figure 5-111).
3. Remove hoist and sling.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Attach hoist and sling to differential.
2. Position differential to transmission (Figure 5-111).
3. Install ten washers and nuts.
4. Remove hoist and sling.

NOTE

Return 130G Grader to original equipment condition.

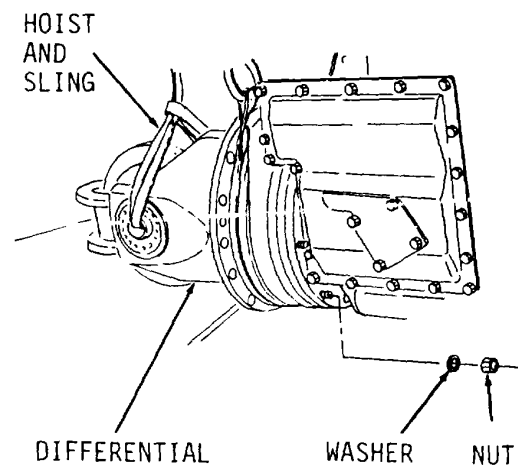


Figure 5-111.

End of Task

REAR AXLE MAINTENANCE.

5-20. Differential Lock Control Valve. (Sheet 1 of 5)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
LO 5-3805-261-12
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Detergent, Item 9, Appendix C
Small tags, Item 43, Appendix C
Preformed packings, Items 5,
8, 22, 23
Seal kit, Item 20
Caps

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

LO 5-3805-261-12

Hydraulic pressure vented.

TM 5-3805-261-20

Positive cable on right side
disconnected.

Go to Sheet 2

Change 1 5-91

REAR AXLE MAINTENANCE. (cont)

5-20. Differential Lock Control Valve. (Sheet 2 of 5)

REMOVAL

WARNING

OIL UNDER 2500 PSI PRESSURE

High pressure hydraulics operate this equipment. NEVER disconnect any hydraulic lines or fittings without checking manual to see how to drop the pressure to zero. Failure to follow this procedure may cause INJURY. If you are struck by a high pressure oil stream, seek medical aid immediately.

1. Remove bolt (1), washer (2) and clip (3, Figure 5-112) from left side of upper transmission housing.

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

2. Disconnect hose assembly (6, Figure 5-113) from transmission control relief valve.
3. Remove elbow (4) and preformed packing (5). Discard preformed packing (5).

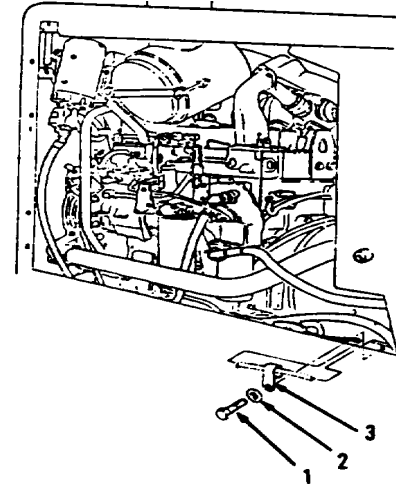
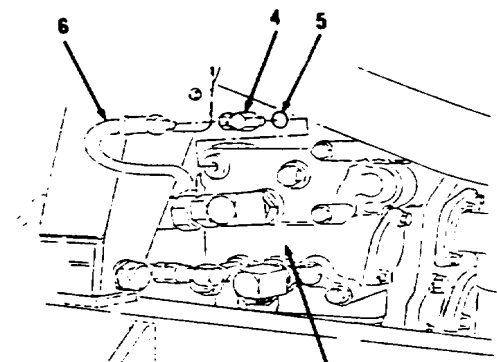
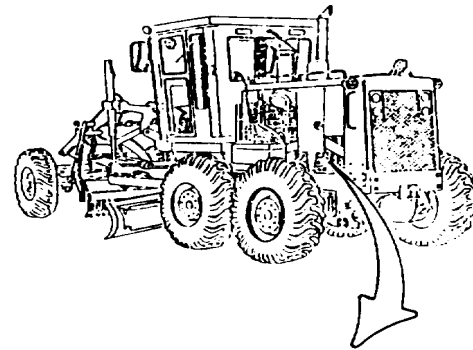


Figure 5-112.



TRANSMISSION CONTROL RELIEF VALVE

Figure 5-113.

Go to Sheet 3

REAR AXLE MAINTENANCE.

5-20. Differential Lock Control Valve. (Sheet 3 of 5)

REMOVAL

- 4. Remove hose assembly (6), elbow (7) and preformed packing (8, Figure 5-114) from top, center of differential housing. Discard preformed packing (8).
- 5. Remove cap (9), nut (10) and washer (11).

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

- 6. Disconnect wire assembly (12) at terminal.
- 7. Remove two bolts (13), washers (14) and clip (15).
- 8. Remove items 16 thru 24 as an assembly.
- 9. Remove nut (16) and lockwasher (17, Figure 5-115).
- 10. Separate coil (18) from items 19 thru 24 as an assembly.
- 11. Remove cartridge (19), seal kit (20), plug (21), preformed packing (22) and two preformed packings (23) from valve (24, Figure 5-116). Discard seal kit (20) and preformed packings (22 and 23).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

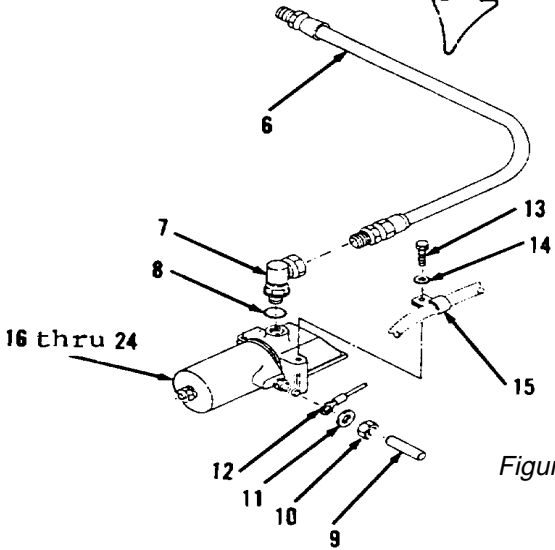
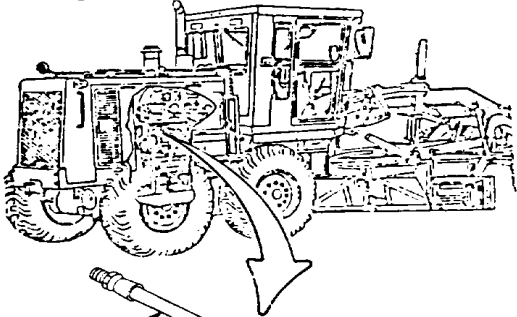


Figure 5-114.

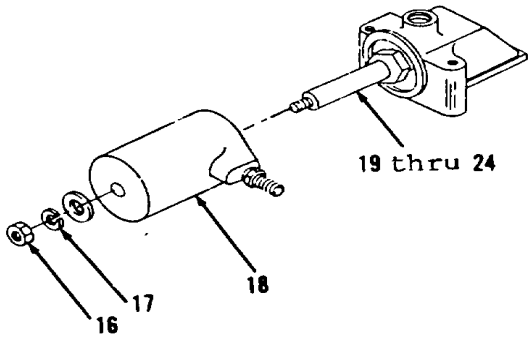


Figure 5-115.

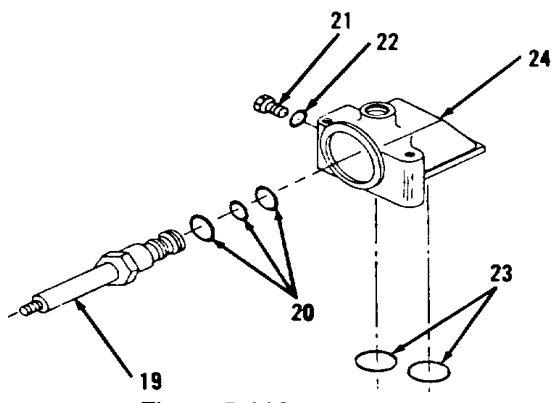


Figure 5-116.

Go to Sheet 4

REAR AXLE MAINTENANCE. (cont)

5-20. Differential Lock Control Valve. (Sheet 4 of 5)

INSTALLATION

1. Install new preformed packings (23 and 22) and plug (21) in valve (24, Figure 5-116).
2. Install new seal kit (20) and cartridge (19).
3. Install coil (18), lockwasher (17) and nut (16) on items 24 thru 19 as an assembly (Figure 5-115).
4. Position items 24 thru 16 as an assembly (Figure 5-114) on top, center of differential housing.
5. Install clip (15), two washers (14) and bolts (13).
6. Connect wire assembly (12) at terminal.
7. Install washer (11), nut (10) and cap (9).
8. Install new preformed packing (8) and elbow (7).
9. Install hose assembly (6).

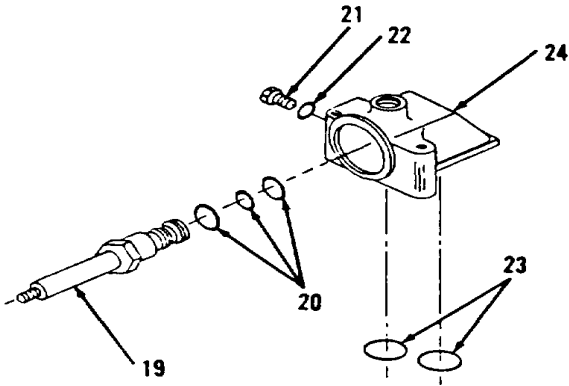


Figure 5-116.

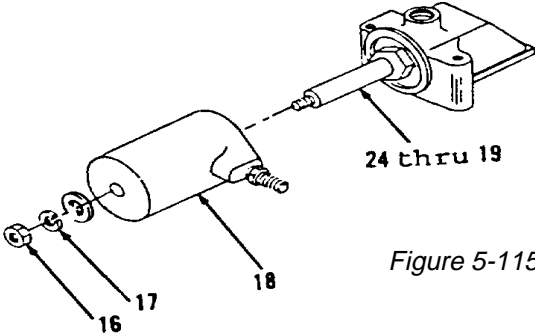


Figure 5-115.

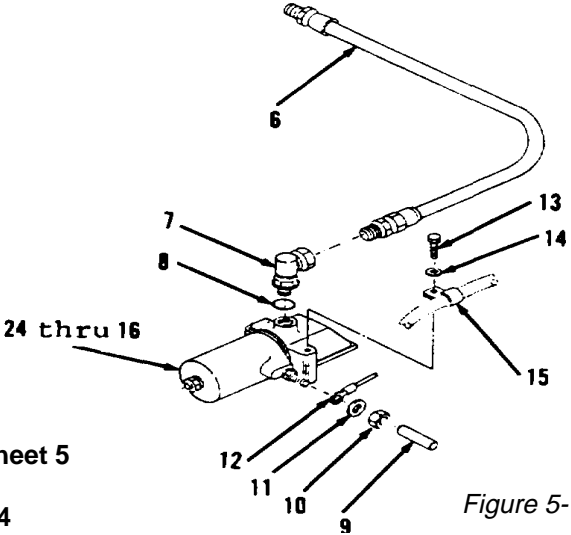


Figure 5-114.

Go to Sheet 5

REAR AXLE MAINTENANCE.

5-20. Differential Lock Control Valve. (Sheet 5 of 5)

INSTALLATION

10. Install new preformed packing (5) and elbow (4, Figure 5-113) to left side of upper transmission housing.
11. Connect hose assembly (6).
12. Install clip (3), washer (2) and bolt (1, Figure 5-112).

NOTE

Return 130G Grader to original equipment condition.

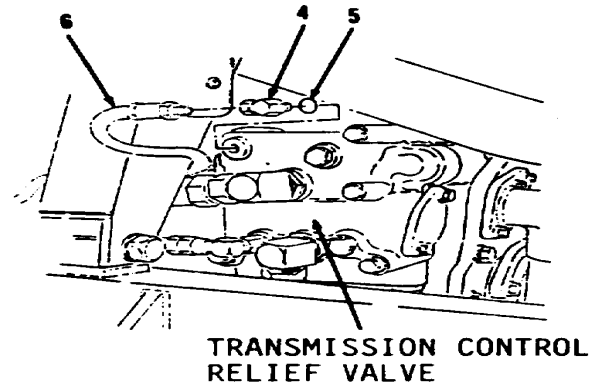


Figure 5-113.

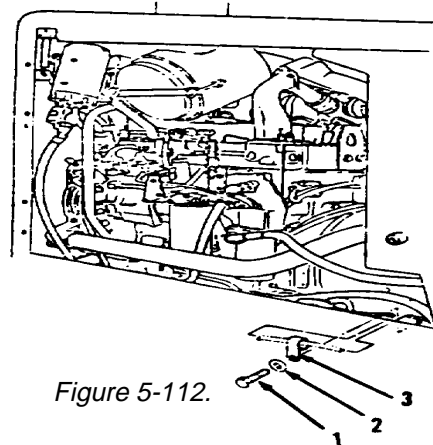


Figure 5-112.

End of Task

REAR AXLE MAINTENANCE. (cont)

5-21. Drive Axles. (Sheet 1 of 4)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Two 3/8-16 forcing screws
One 1/2-13 forged eyebolt

References

TM 5-3805-261-10
LO 5-3805-261-12
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Lubricating oil, Item 33,
Appendix C
Washer, Item 9
Preformed packing, Item 8
Casket, Item 4

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

LO 5-3805-261-12

Tandem drive housings drained below
drive axle level.

TM 5-3805-261-20

Positive cable on right aide
disconnected.

Go to Sheet 2

Change 1 5-96

REAR AXLE MAINTENANCE.

5-21. Drive Axles. (Sheet 2 of 4)

REMOVAL

NOTE

The following is a maintenance procedure for the right side drive axle. The maintenance procedure for the left side drive axle is identical.

1. Remove eight bolts (1), lock-washers (2), cover (3) and gasket (4, Figure 5-117) from right side of tandem drive housing. Discard gasket (4). Remove all gasket material from mounting surfaces.
2. Bend five locks (6) away from bolts (5).
3. Remove five bolts (5) and locks (6).
4. Install two 3/8-16 forcing screws to remove retainer (7, Figure 5-118).
5. Remove retainer (7, Figure 5-119).
6. Remove two 3/8-16 forcing screws (Figure 5-118).
7. Remove and discard preformed packing (8, Figure 5-119).
8. Install 1/2-13 forged eyebolt in end of shaft (10, Figure 5-120) to aid in removal.

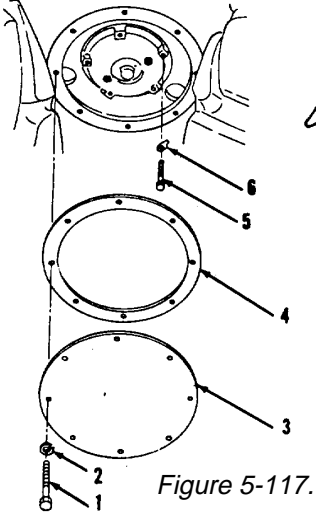
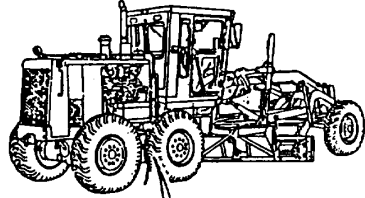


Figure 5-117.

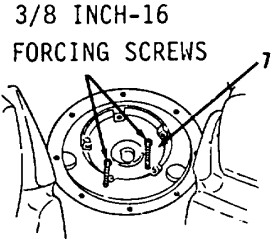


Figure 5-118.

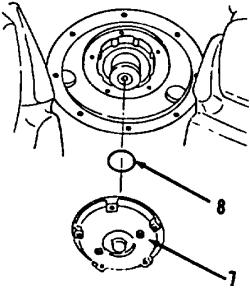


Figure 5-119.

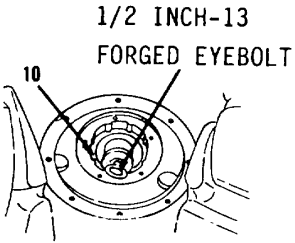


Figure 5-120.

Go to Sheet 3

REAR AXLE MAINTENANCE. (cont)

5-21. Drive Axles. (Sheet 3 of 4)

REMOVAL (cont)

- 9. Remove items 9 and 10 as an assembly (Figure 5-121).
- 10. Remove 1/2-13 forged eyebolt (Figure 5-120).

CAUTION

Removal of washer from shaft may cause destruction of washer. Remove washer only if inspection indicates replacement is necessary.

- 11. Inspect washer (9, Figure 5-122). Replace if cracked, broken, worn, grooved or scored.
- 12. Using suitable puller, remove washer (9), if necessary, from shaft (10).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

- 1. Using suitable driver and hammer, install new washer (9, Figure 5-122), if removed, to right side of tandem drive housing.
- 2. Install shaft (10). Align splines of shaft (10) with splines in final drive and differential.

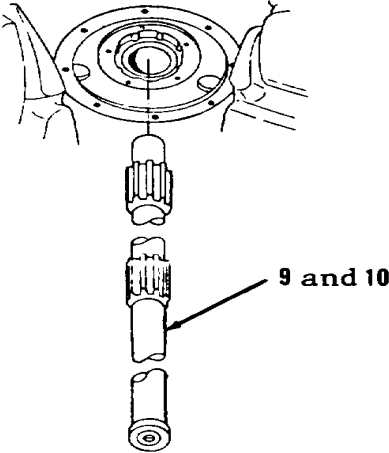


Figure 5-121.

**1/2 INCH-13
FORGED EYEBOLT**

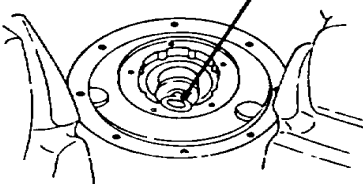


Figure 5-120.

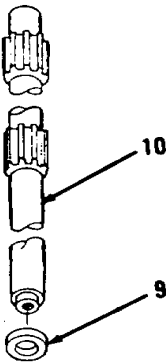


Figure 5-122.

Go to Sheet 4

REAR AXLE MAINTENANCE.**5-21. Drive Axles. (Sheet 4 of 4)****INSTALLATION**

3. Install new preformed packing (8) on groove of retainer (7, Figure 5-119).
4. Lubricate outer diameter of new preformed packing (8) with clean oil.
5. Position retainer (7) on shaft (10).
6. Install five locks (6) and bolts (5, Figure 5-117).
7. Bend tabs over five bolts (5) and locks (6).
8. Install new gasket (4) and cover (3).
9. Install eight lockwashers (2) and bolts (1).
10. Refill differential and tandem drive housings to proper level. Refer to LO 5-3805-261-12.

NOTE

Return 130CG Grader to original equipment condition.

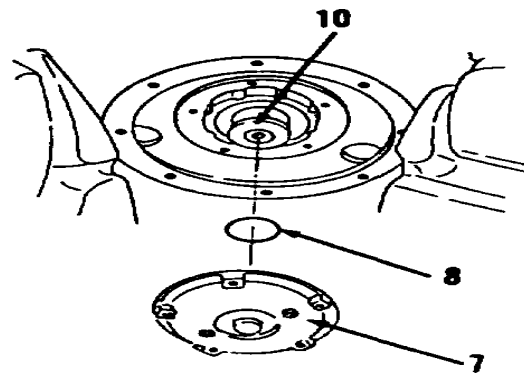


Figure 5-119.

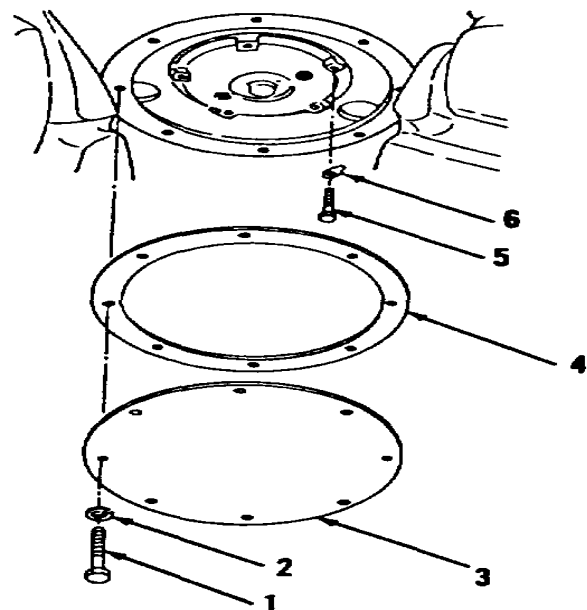


Figure 5-117.

End of Task

REAR AXLE MAINTENANCE. (cont)

5-22. Drive Sprockets. (Sheet 1 of 3)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Spanner socket 5P4204

References

TM 5-3805-261-10

Special Environmental Conditions

None

Test Equipment

None

General Safety Instructions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 5-24

Tandem drive housing removed.

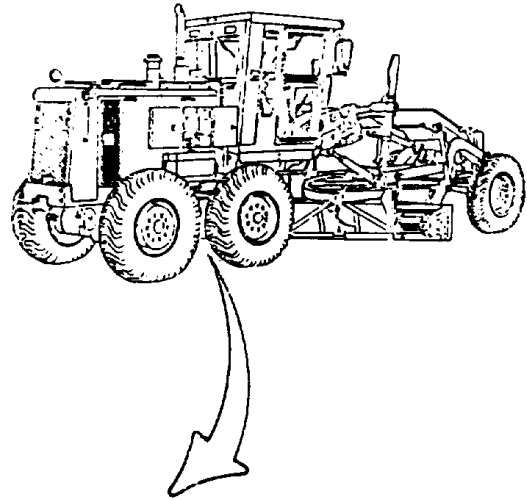
Go to Sheet 2

5-100

REAR AXLE MAINTENANCE.**5-22. Drive Sprockets. (Sheet 2 of 3)****REMOVAL****NOTE**

The following is a maintenance procedure for the right side drive sprockets. The maintenance procedure for the left side drive sprockets is identical.

1. Using spanner socket, remove nut (1, Figure 5-123).
2. Remove two drive sprockets (2 and 3). Weight of two drive sprockets (2 and 3) is 32 lbs.

**CLEANING**

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Install two drive sprockets (3 and 2, Figure 5-123) on drive shaft of vehicle. Install inner sprocket with hub away from final drives. Install outer sprocket with hub toward hub of inner sprocket.

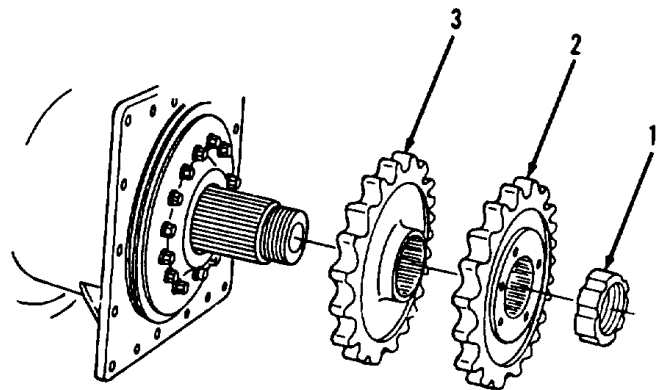


Figure 5-123.

Go to Sheet 3

REAR AXLE MAINTENANCE. (cont)**5-22. Drive Sprockets. (Sheet 3 of 3)****CAUTION**

The following procedure must be used to put the correct amount of preload on the final drive bearings.

2. Install drive shaft. Refer to paragraph 5-21.
3. Using spanner socket, install nut (1) and tighten to 100 ft-lb torque.
4. Turn sprockets (3 and 2) to put bearings in their seats.
5. Using large punch and hammer, hit hub of sprockets (3 and 2). Repeat steps 2, 3 and 4 until nut (1) does not turn when tightened.
6. Loosen nut (1).
7. Tighten nut (1) to 50 ft-lb torque.
8. Position retainer (4) over nut (1, Figure 5-124).
9. Check alinement of mount bolt holes. Retainer (4) bolt holes must line up with sprockets (3 and 2) bolt holes.
10. Tighten nut (1), if necessary, until mounting bolts can be installed.
11. Install five locks (6) and bolts (5).

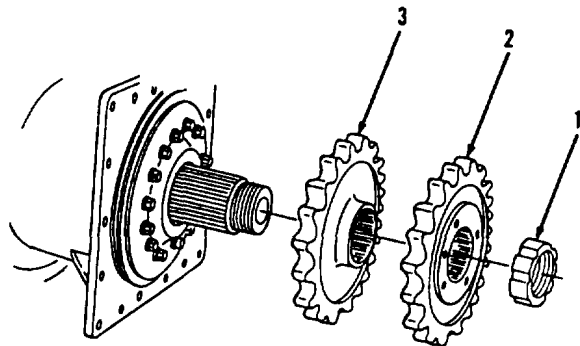


Figure 5-123.

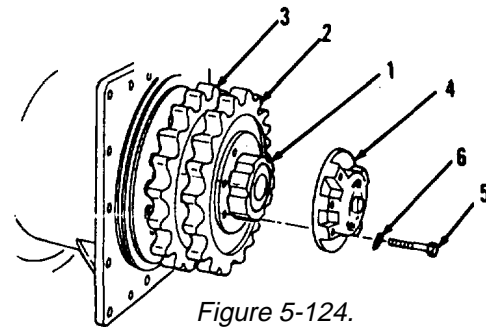


Figure 5-124.

NOTE

Return 130G Grader to original equipment condition.

End of Task

REAR AXLE MAINTENANCE.

5-23. Final Drive Assembly. (Sheet 1 of 10)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-177-7033)
Hoist and sling
Forklift
Floor jack
Pry bar
Saddle 8S8048
Bracket FT 522
Puller
Ratchet assembly
Cables
5/8-11NC eyebolts
3/4-10NC forcing screws

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Lubricating oil, Item 35,
Appendix C
Grease, Item 28, Appendix C
Small tags, Item 43, Appendix C
Preformed packings, Items 1, 16
Seals, Items 13, 37
Cups, Items 36, 38
Dry ice or freezer
Wire

Personnel Required

Two construction equipment
repairers MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Go to Sheet 2

REAR AXLE MAINTENANCE. (cont)

5-23. Final Drive Assembly. (Sheet 2 of 10)

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 5-22

Drive sprockets removed.

Go to Sheet 3

5-104

REAR AXLE MAINTENANCE.

5-23. Final Drive Assembly. (Sheet 3 of 10)

REMOVAL

NOTE

The following is a maintenance procedure for the left side final drive. The maintenance procedure for the right side final drive is identical.

1. Remove preformed packing (1) and roller bearing (2, Figure 5-125) from lower rear, left side of vehicle. Discard preformed packing (1).
2. Remove 16 bolts (3), washers (4), retainer (5), shim(s) (6) and washer (7, Figure 5-126). Tie shim(s) (6) together and tag for identification.
3. Support items 8 and 9 as an assembly (Figure 5-127) and install two 5/8-11NC eyebolts. Position forklift under items 8 and 9 as an assembly. Secure ratchet assembly to forklift and secure cables to eyebolts.
4. Using ratchet assembly and cables, remove items 8 and 9 as an assembly (Figure 5-128) from vehicle.

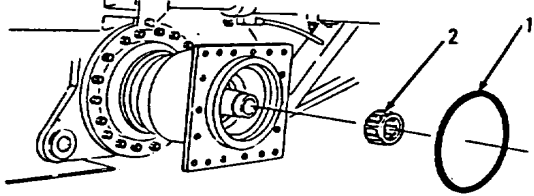


Figure 5-125.

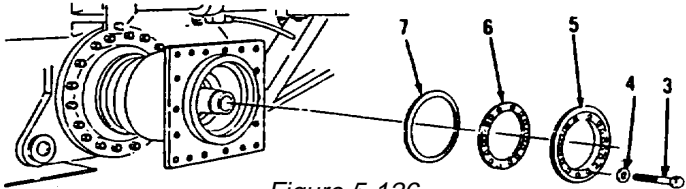


Figure 5-126.

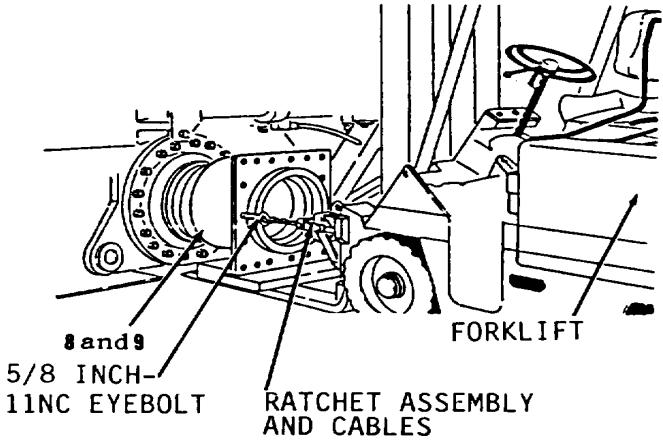


Figure 5-127.

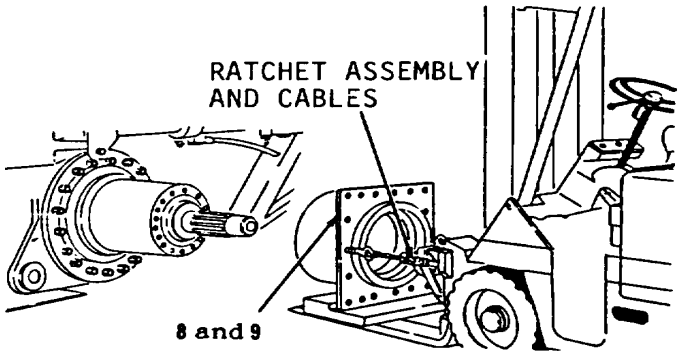


Figure 5-128.

Go to Sheet 4

REAR AXLE MAINTENANCE. (cont)

5-23. Final Drive Assembly. (Sheet 4 of 10)

REMOVAL (cont)

5. Remove plug (9) and seal (10) from outer housing (8, Figure 5-129).
6. Remove rings (11 and 12) and washer (13, Figure 5-130) from lower rear, left side of vehicle. Discard seal (13).
7. Remove 19 nuts (14) and washers (15).
8. Using saddle and floor jack, support items 16 thru 39 as an assembly. Use rags between saddle and floor jack and items 16 thru 39 as an assembly (Figure 5-131) to prevent damage to housing.

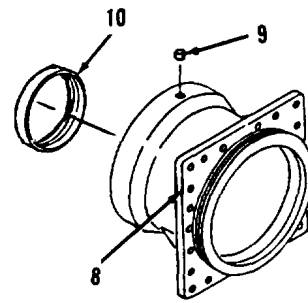


Figure 5-129.

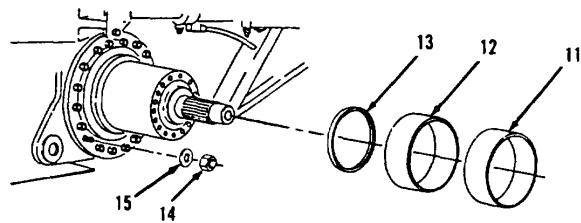


Figure 5-130.

WARNING

Weight of housing is approximately 360 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

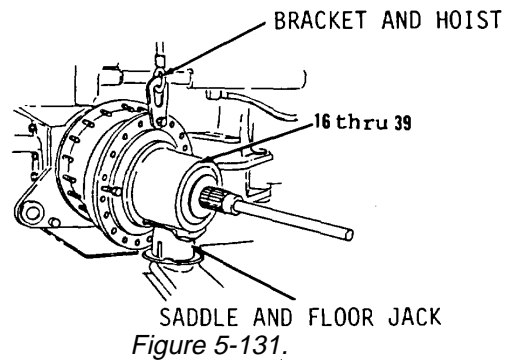


Figure 5-131.

9. Install two 3/4-10NC forcing screws in housing (39). Tighten each forcing screw a small amount at a time, alternating between screws, until housing (39) has been moved far enough out on the studs to install a bracket and hoist on housing (39). Put axle in position in housing (39) to keep items 16 thru 39 as an assembly in balance. Using bracket and hoist, carefully remove items 16 thru 39 as an assembly from vehicle. Make sure planet carrier (29, Figure 5-132) is held in place during removal.

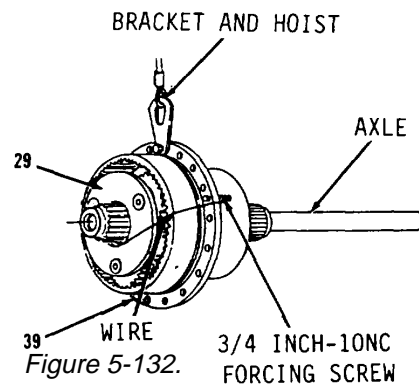


Figure 5-132.

Go to Sheet 5

REAR AXLE MAINTENANCE.

5-23. Final Drive Assembly. (Sheet 5 of 10)

REMOVAL

10. Install wire from forcing screws behind housing (39) across planet carrier (29) to keep planet carrier (29) from falling.
11. Position items 16 thru 39 as an assembly on blocks with planet carrier (29) facing up. Remove wire and forcing screws from housing (39, Figure 5-133).
12. Remove preformed packing (16) and gear (17). Discard preformed packing (16).

WARNING

Step 13 requires two mechanics. Weight of planet carrier is 90 lbs. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

13. Using pry bars, carefully remove items 18 thru 29 as an assembly turning over and placing on flat surface.
14. Remove six bolts (18), three locks (19), retainers (20) and shafts (21) from planet carrier (29, Figure 5-134).
15. Remove three washers (22 and 23) and items 24 thru 26 as an assembly.
16. Remove three rollers (24 and 25) from gears (26, Figure 5-135).

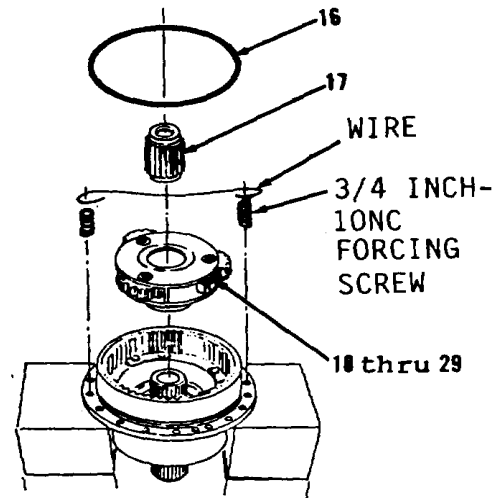


Figure 5-133.

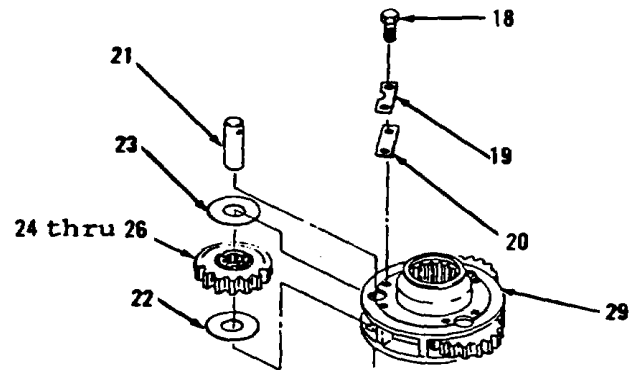


Figure 5-134.

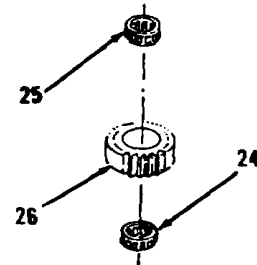


Figure 5-135.

Go to Sheet 6

REAR AXLE MAINTENANCE. (cont)

5-23. Final Drive Assembly. (Sheet 6 of 10)

REMOVAL (cont)

17. Remove retaining ring (27) and washer (28) from planetary carrier (29, Figure 5-136).
18. Remove eight bolts (30), four locks (31) and plates (32) from housing (39, Figure 5-137).
19. Remove gear (33).
20. Remove items 34 and 35 as an assembly.
21. Using suitable puller, remove roller bearing (34) from shaft (35, Figure 5-138).
22. Using suitable puller, remove and discard cup (36) and seal (37) from housing (39, Figure 5-139).
23. Remove and discard cup (38).

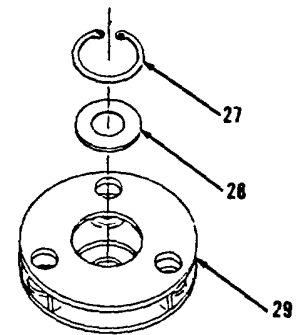


Figure 5-136.

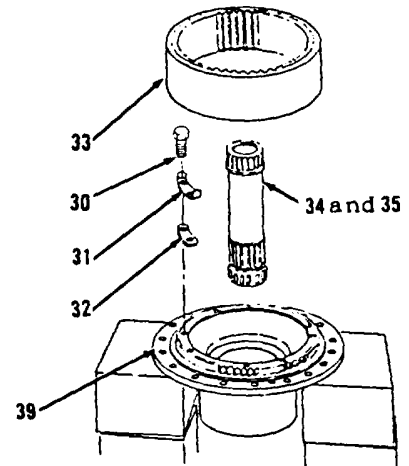


Figure 5-137.

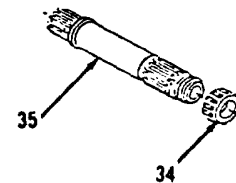


Figure 5-138.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Lower temperature of new cup (38) and install in housing (39, Figure 5-140).
2. Lubricate new seal (37) with oil and install with lip of new seal (37) toward new cup (36).

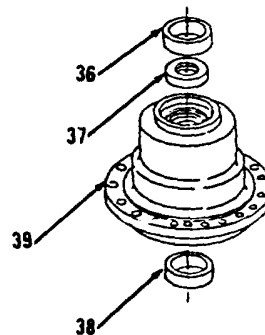


Figure 5-139.

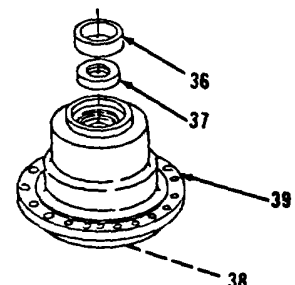


Figure 5-140.

Go to Sheet 7

REAR AXLE MAINTENANCE.5-23. Final Drive Assembly. (Sheet 7 of 10)**INSTALLATION**

3. Turn housing over (39, Figure 5-141) with items 37 and 36 as an assembly installed.
4. Lower temperature of new cup (38) and install.
5. Heat roller bearing (34) in oil to maximum temperature of 275 degrees F and install on shaft (35, Figure 5-138).
6. Install items 35 and 34 as an assembly in housing (39, Figure 5-137).
7. Install gear (33).
8. Install four plates (32), locks (31) and eight bolts (30).
9. Install washer (28) and retaining ring (27) to planet carrier (29, Figure 5-136).
10. Install three rollers (25 and 24) in gears (26, Figure 5-135).

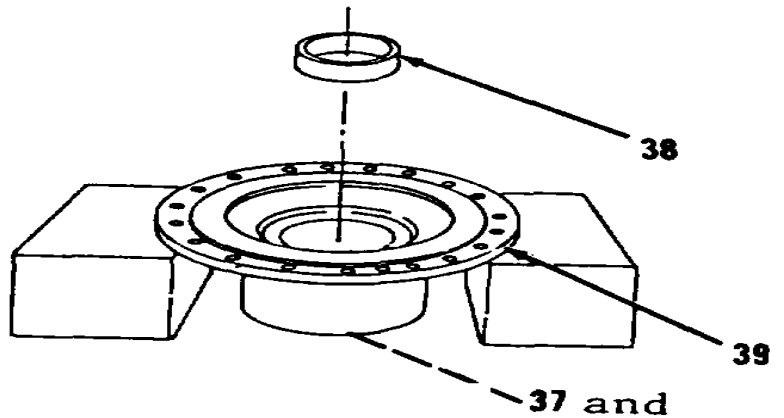


Figure 5-141.

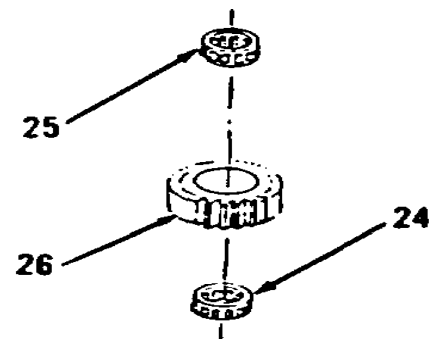


Figure 5-135.

Go to Sheet 8

REAR AXLE MAINTENANCE. (cont)

5-23. Final Drive Assembly. (Sheet 8 of 10)

INSTALLATION (cont)

- 11. Turn over items 29 thru 27 as an assembly and install items 26 thru 24 as an assembly, three washers (23 and 22), shafts (21), retainers (20), locks (19) and six bolts (18) in planet carrier (29, Figure 5-134).
- 12. Turn over items 29 thru 18 as an assembly and install over shaft (35, Figure 5-142).
- 13. Install gear (17) and new preformed packing (16, Figure 5-133).
- 14. Install two 3/4-10NC forcing screws in housing (39). Attach wire to forcing screws behind housing (39) across planet carrier (29) to keep planet carrier from falling when items 39 thru 16 as an assembly (Figure 5-132) are positioned on vehicle.

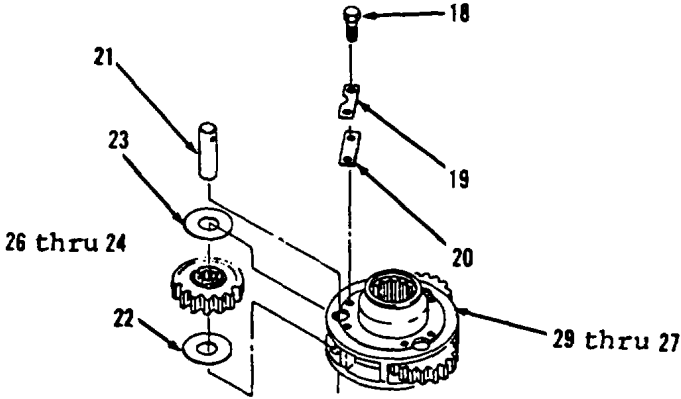


Figure 5-134.

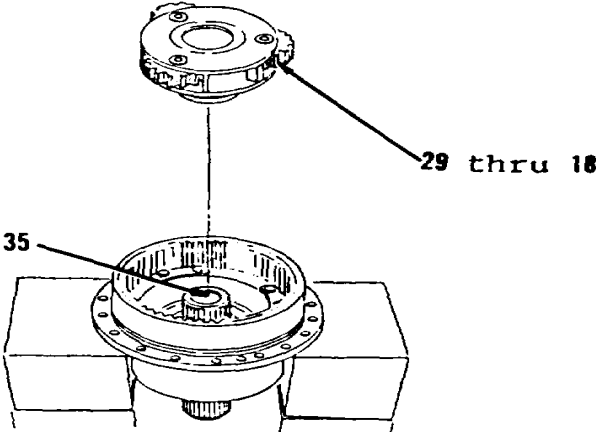


Figure 5-142.

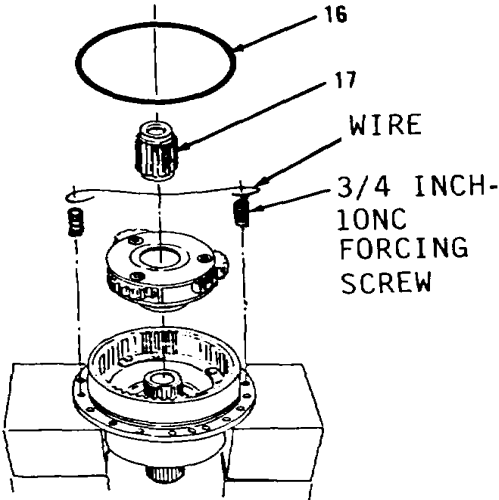


Figure 5-133.

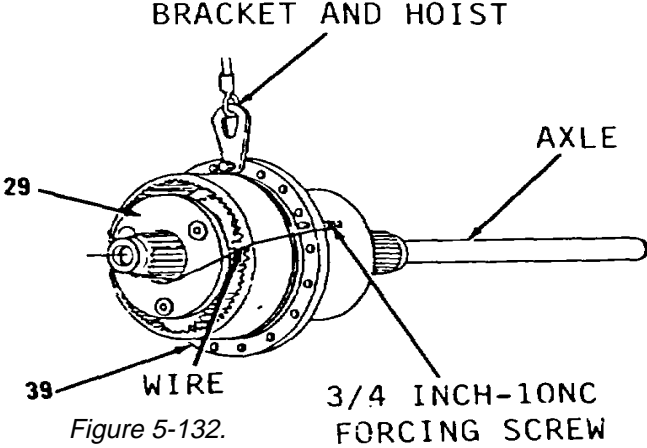


Figure 5-132.

Go to Sheet 9

REAR AXLE MAINTENANCE.

5-23. Final Drive Assembly. (Sheet 9 of 10)

INSTALLATION

15. Attach bracket and hoist to items 39 thru 16 as an assembly and position on saddle and floor jack. Put axle in position in housing (39) to keep items 39 thru 16 as an assembly (Figure 5-131) in balance.

16. Move items 39 thru 16 as an assembly to lower rear, left side of vehicle.

17. Remove wire and two 3/4-10NC forcing screws (Figure 5-132).

18. Position items 39 thru 16 as an assembly on studs of vehicle. Remove hoist and bracket and install 19 washers (15) and nuts (14, Figure 5-130). Tighten nuts (14) to 285 to 315 ft-lb torque.

19. Apply grease to washer (13) and install.

20. Lubricate outside surface of housing (39) and rings (12 and 11) with oil and install rings (12 and 11).

21. Apply oil to new seal (10) and install seal (10) and plug (9) in housing (8, Figure 5-129).

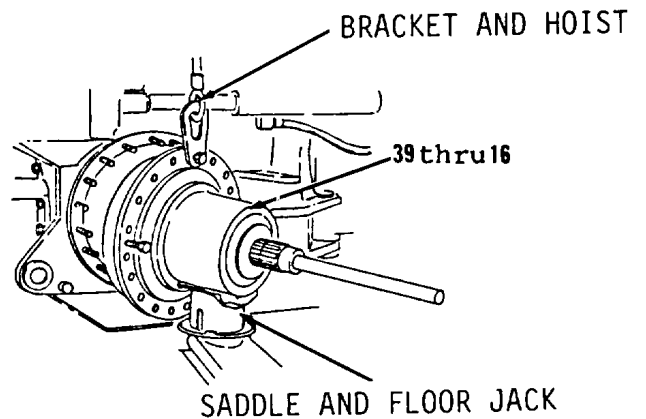


Figure 5-131.

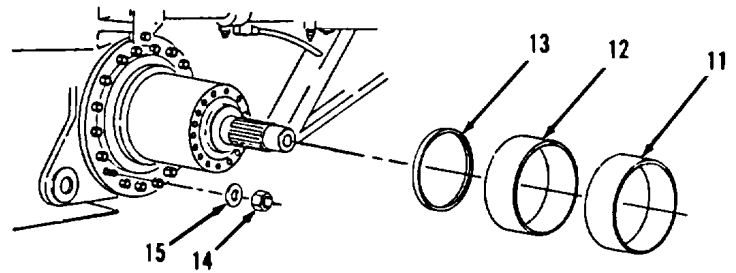


Figure 5-130.

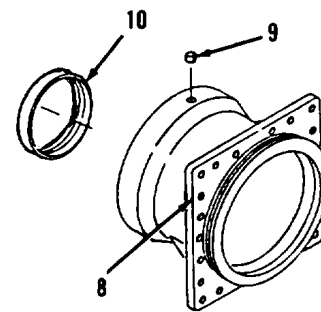


Figure 5-129.

Go to Sheet 10

REAR AXLE MAINTENANCE (cont)

5-23. Final Drive Assembly. (Sheet 10 of 10)

INSTALLATION (cont)

22. Install two 5/8-IINC eyebolts in items 9 and 8 as an assembly (Figure 5-143).
23. Using hoist and sling, position items 9 and 8 as an assembly on lower rear, left side of vehicle.
24. Install washer (7), shim(s) (6), retainer (5), 16 washers (4) and bolts (3).
25. Apply grease to washer (7) after installation. Adjust shim(s) (6) to provide 0.0 to 0.0025 inch end play between inner housing (39) and outer housing (8). Tighten 16 bolts (3) to 260 to 280 ft-lb torque.
26. Remove two 5/8-IINC eyebolts.
27. Install roller bearing (2) and new preformed packing (1, Figure 5-125).

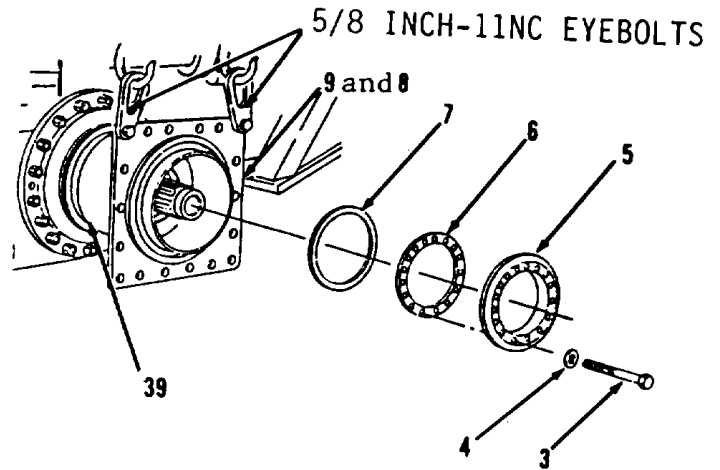


Figure 5-143.

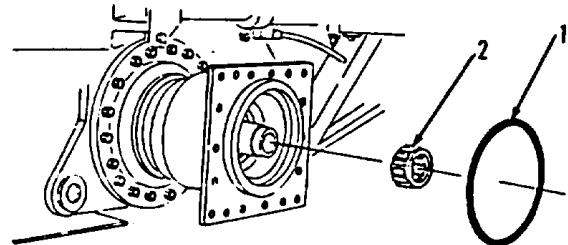


Figure 5-125.

NOTE

Return 1300 Grader to original equipment condition.

End of Task

5-112

REAR AXLE MAINTENANCE.

5-24. Tandem Drive Housing Assembly. (Sheet 1 of 4)

This task covers:

- | | | |
|---------------|----------------|-----------------|
| a. Removal | b. Disassembly | c. Cleaning |
| d. Inspection | e. Assembly | f. Installation |

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Hoist and chains
Ratchet assembly 8S9906
Chock blocks

References

TM 5-3805-261-10
TM 5-3805-261-20

Special Environmental Conditions

None

Test Equipment

None

General Safety Instructions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Thread sealant, Item 61,
Appendix C
Preformed packing, Item 6

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Wheels and tires removed.

Paragraph 6-7
Paragraph 6-9

Right service brakes removed.
Air brake lines removed.

Go to Sheet 2

REAR AXLE MAINTENANCE. (cont)

5-24. Tandem Drive Housing Assembly. (Sheet 2 of 4)

REMOVAL

NOTE

The following is a maintenance procedure for the right side tandem drive housing. The maintenance procedure for the left side tandem drive housing is identical.

WARNING

Weight of tandem drive housing is 1310 lbs. Use adequate hoist and chains for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

1. Attach hoist and chains and ratchet assembly to tandem drive housing (6) on rear, right side of vehicle.

WARNING

- Make sure that the vehicle will not roll or shift. Secure with chock blocks. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.
- Do not attempt to manually lift or support equipment over 50 pounds. Keep all personnel clear of equipment being raised or lowered. Do not allow equipment to swing while suspended by a lifting device. Exercise extreme caution when working near a cable or chain under tension. Failure to follow this procedure may cause INJURY.

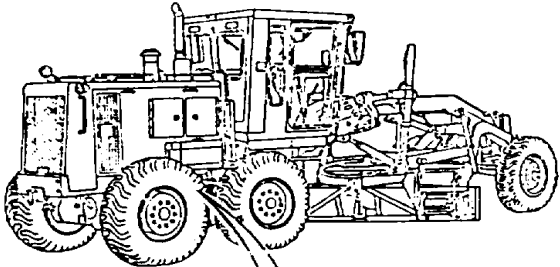
Go to Sheet 3

REAR AXLE MAINTENANCE.

5-24. Tandem Drive Housing Assembly. (Sheet 3 of 4)

REMOVAL

- 2. Remove 18 nuts (1), washers (2) and items 4 thru 6 as an assembly (Figure 5-144).
- 3. Remove and discard preformed packing (3).



DISASSEMBLY

- 1. Remove 12 studs (4, Figure 5-145) from outside of tandem drive housing (6).
- 2. Remove 15 studs (5) from inside of tandem drive housing (6).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

- 1. Apply thread sealant to 15 studs (5, Figure 5-145) on inside of tandem drive housing (6) and install.
- 2. Apply thread sealant to 12 studs (4) on outside of tandem drive housing (6) and install.

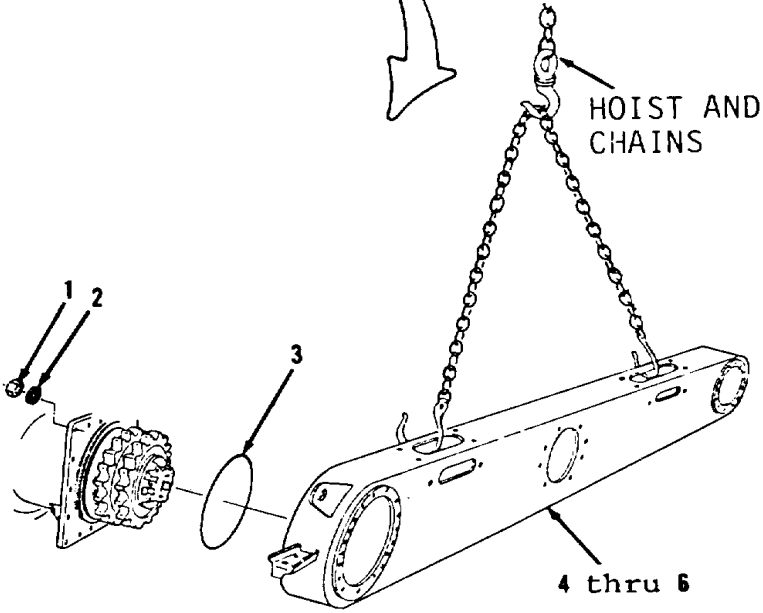


Figure 5-144.

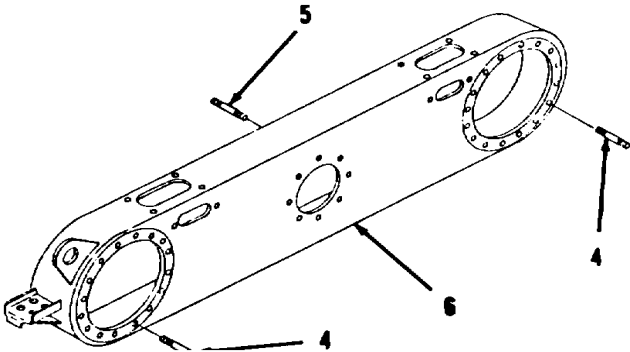


Figure 5-145.

Go to Sheet 4

REAR AXLE MAINTENANCE. (cont)

5-24. Tandem Drive Housing Assembly. (Sheet 4 of 4)

INSTALLATION

- 1. Install new preformed packing (3, Figure 5-144) on rear, right side of vehicle.
- 2. Using hoist and chains and ratchet assembly, position items 6 thru 4 as an assembly.
- 3. Install 18 washers (2) and nuts (1). Tighten 18 nuts (1) to 175 to 195 ft-lb torque.

NOTE

Return 130G Grader to original equipment condition.

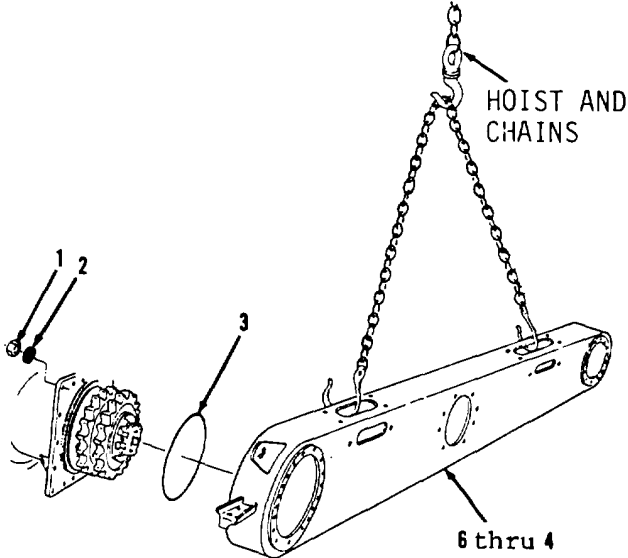


Figure 5-144.

End of Task

5-116

REAR AXLE MAINTENANCE.**5-25. Tandem Drive Chain Assembly.** (Sheet 1 of 4)

This task covers:

- | | | |
|-----------------|-------------|---------------|
| a. Removal | b. Cleaning | c. Inspection |
| d. Installation | | |

INITIAL SETUP:Applicable Configurations

All

Personnel RequiredConstruction equipment
repairer MOS 62BToolsGeneral Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Puller assembly 8B7554
Ratchet assembly
Two legs 7S7786References'TM 5-3805-261-10
LO 5-3805-261-12
TM 5-3805-261-20Special Environmental Conditions

None

Test Equipment

None

General Safety Instructions

None

Materials/PartsDry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Cotter pins, Item 13
Gaskets, Items 4, 8, 12TorquesExcept for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Rear wheels removed.

Paragraph 5-21

Drive shaft removed.

Go to Sheet 2**5-117**

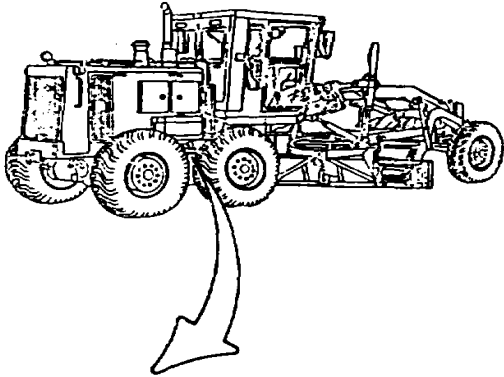
REAR AXLE MAINTENANCE (cont)

5-25. Tandem Drive Chain Assembly. (Sheet 2 of 4)

REMOVAL

NOTE

The following is a maintenance procedure for one right tandem drive chain assembly. The maintenance procedure for the remaining right chain and the left tandem drive chain assemblies is identical.



1. Remove four bolts (1), washers (2), cover (3) and gasket (4, Figure 5-146) from top of tandem housing on right axle, rear frame. Discard gasket (4). Remove all gasket material from mounting surfaces.
2. Remove two bolts (5), washers (6), cover (7) and gasket (8) from outer side of tandem housing. Discard gasket (8). Remove all gasket material from mounting surfaces.
3. Remove two bolts (9), washers (10), cover (11) and gasket (12) from inner side of tandem housing. Discard gasket (12). Remove all gasket material from mounting surfaces.
4. Turn spindle wheel until master link of chain assembly appears.
5. Remove and discard two cotter pins (13, Figure 5-147).
6. Using puller assembly and two legs, remove bar (14).
7. Using puller assembly and two legs, remove link (15).

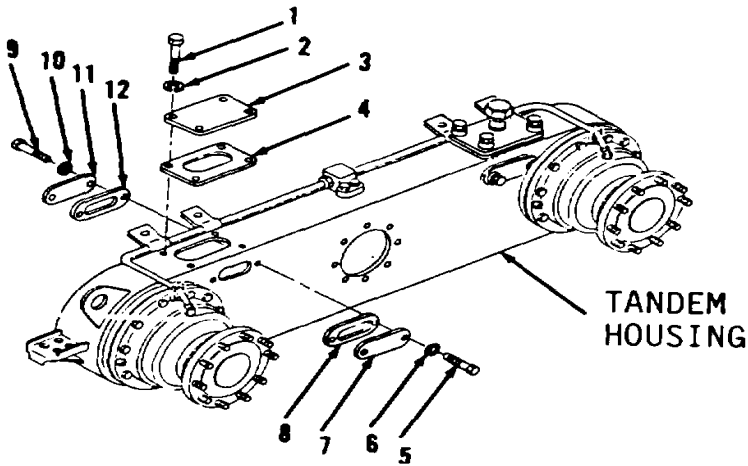


Figure 5-146.

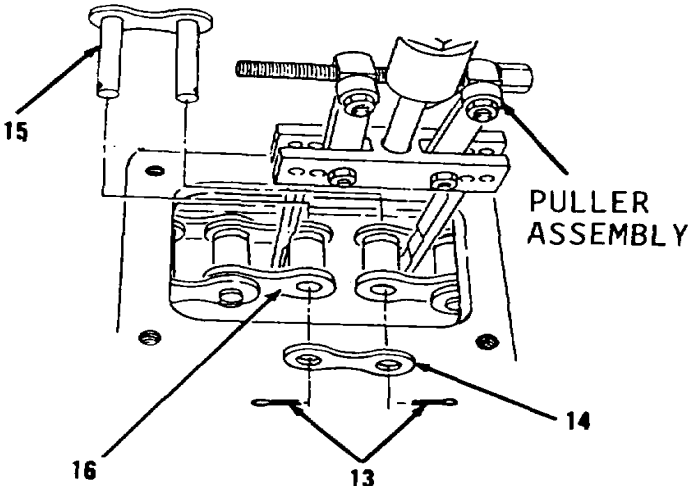


Figure 5-147.

Go to Sheet 3

REAR AXLE MAINTENANCE.**5-25. Tandem Drive Chain Assembly.** (Sheet 3 of 4)**REMOVAL**

8. Turn wheel spindle counterclockwise while pulling chain (16, Figure 5-148) out of tandem housing.
9. Remove chain (16). Weight of chain is 50 lbs.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION**NOTE**

Master link should be installed with the bar inward toward the other chain. Make sure that the master links of the two chains are not side by side on the same tooth of the drive sprocket.

1. Position chain (16, Figure 5-147) on the drive sprocket and the wheel spindle sprocket with ends of the chain at the openings.
2. Install ratchet assembly on chain (16).
3. Position link (15) in ends of chain (16).

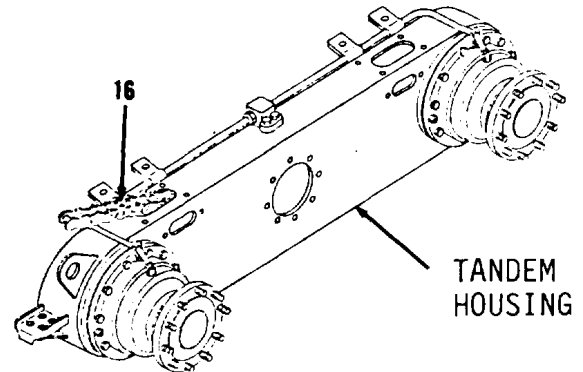


Figure 5-148.

Go to Sheet 4

REAR AXLE MAINTENANCE (cont)

5-25. Tandem Drive Chain Assembly. (Sheet 4 of 4)

INSTALLATION (cont)

- 4. Install puller assembly and two legs on chain (16).
- 5. Remove ratchet assembly from chain (16).
- 6. Install bar (14) on link (15).
- 7. Remove puller assembly and two legs from chain (16).
- 8. Install two new cotter pins (13) in link (15).
- 9. Install new gasket (12), cover (11), two washers (10) and bolts (9, Figure 5-146) on inner side of tandem housing.
- 10. Install new gasket (8), cover (7), two washers (6) and bolts (5) on outer side of tandem housing.
- 11. Install new gasket (4), cover (3), four washers (2) and bolts (1) on top of tandem housing.

NOTE

Return 130G Grader to original equipment condition.

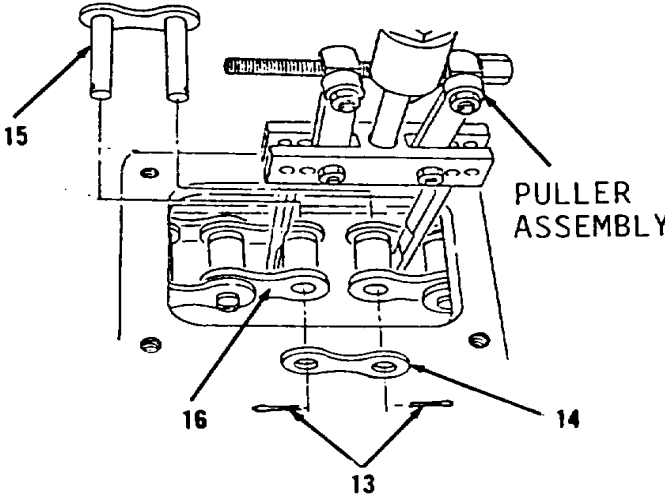


Figure 5-147.

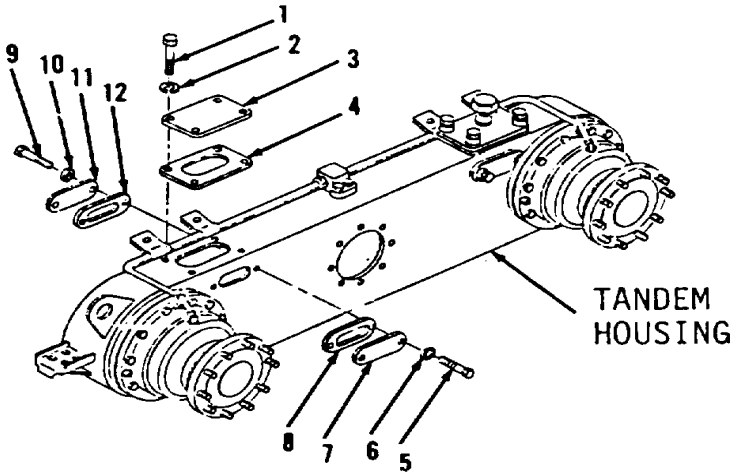


Figure 5-146.

End of Task

CHAPTER 6
BRAKES
TROUBLESHOOTING AND MAINTENANCE

CHAPTER OVERVIEW

The purpose of this chapter is to help the technician efficiently troubleshoot and repair malfunctioning equipment and to perform authorized organizational support level maintenance procedures on the 130G Grader.

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Section I. BRAKES TROUBLESHOOTING.

6-1. GENERAL INFORMATION. This section lists the common brake malfunctions which may occur during the operation of the 130G Grader. You should perform the tests, inspections and corrective actions in the order listed. Follow the troubleshooting procedures listed below step-by-step until you can go no further.

6-2. BRAKES TROUBLESHOOTING PROCEDURES. This section cannot list all possible malfunctions, nor can it list all possible tests, inspections or corrective actions. If a malfunction is not listed, contact your supervisor.

BRAKES TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

a. AIR COMPRESSOR PASSES EXCESSIVE OIL, INDICATED BY OIL SEEPING FROM AIR STRAINER.

Step 1. Check for restricted air intake. Check engine air cleaner assembly and compressor air inlet line for restrictions.

Remove restrictions from the intake system, if necessary. Refer to TM 5-3805-261-20.

Step 2. Check for restricted oil return line. Look for kinks, bends or restrictions in oil return line. Refer to paragraph 6-9. Oil drain passages in compressor and engine must be alined and unobstructed.

If oil return line is clear, go to step 3.

Step 3. Check for poorly filtered inlet air. Check for dirty engine air filters. Check for damaged intake strainers, gaskets, etc.

If filters are dirty--replace. Refer to TM 5-3805-261-20. If intake parts are damaged--replace. Refer to paragraph 6-13.

BRAKES TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

a. AIR COMPRESSOR PASSES EXCESSIVE OIL, INDICATED BY OIL SEEPING FROM AIR STRAINER. (cont)

- Step 4. Check for poor compressor cooling (compressor runs hot). Check coolant flow and temperature through compressor. Install suitable flow meter and temperature gage between compressor coolant outlet and engine block (Figure 6-1). Start engine. Flow through compressor should be at least 2.5 gpm. Coolant temperature should not exceed 200 degrees F. Stop engine.

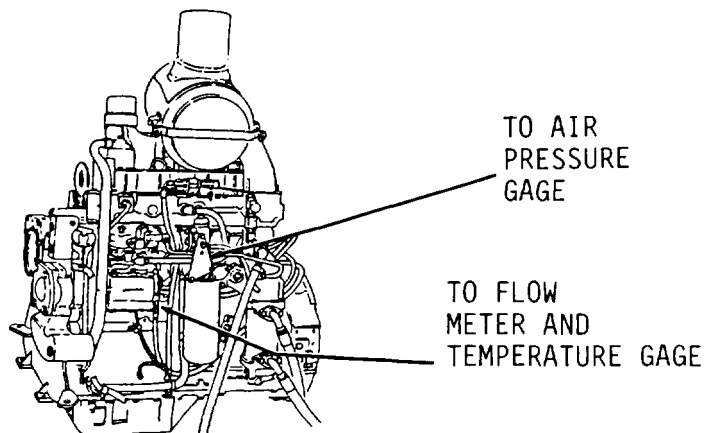


Figure 6-1.

If flow is not at least 2.5 gpm, check coolant lines and fittings for scales, kinks or restrictions. If coolant temperature exceeds 200 degrees F., refer to Cooling System Troubleshooting.

- Step 5. Check air system reservoir for build-up of dirt and water.

Drain reservoir. Refer to TM 5-3805-261-10.

- Step 6. Check if air compressor runs loaded an excessive amount of time. Measure air system leakage. Install suitable air pressure gage in air system (Figure 6-1). Start engine and let air pressure build up and stabilize. Observe air pressure gage. System leakage should not exceed 1 psi pressure drop per minute without brakes applied and 3 psi pressure drop with brakes applied. If leakage is excessive, look for system leaks. Stop engine.

Repair system leaks, if necessary. Refer to paragraphs 6-9 and 6-11.

BRAKES TROUBLESHOOTING AND MAINTENANCE PROCEDURES. (cont)

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

a. **AIR COMPRESSOR PASSES EXCESSIVE OIL, INDICATED BY OIL SEEPING FROM AIR STRAINER.**
(cont)

Step 7. Check for loose end cover and cylinder block bolts.

Tighten bolts to standard torques. Repair or replace compressor after completing steps 1 thru 7, if necessary. Refer to paragraph 6-13.

b. **NOISY COMPRESSOR OPERATIONS.**

Step 1. Check fit of drive gear on crankshaft. If crankshaft surface or its keyway are damaged, it is an indication of loose drive gear components.

If drive gear is not installed correctly--remove and install. Refer to TM 5-3805-261-20.

Step 2. Check for worn drive gear or pulley on air compressor crankshaft.

If drive gear or pulley is worn--replace. Refer to paragraph 6-13.

Step 3. Check cylinder head.

If carbon build-up is detected in cylinder head, check for proper cooling of compressor. Refer to TM 5-3805-261-20.

Step 4. Check for worn bearings. Check oil pressure and temperature. Install suitable oil pressure and temperature gages in oil supply line (Figure 6-2). Start engine. Oil pressure should be 5 psi at idle and 15 psi at maximum engine rpm.

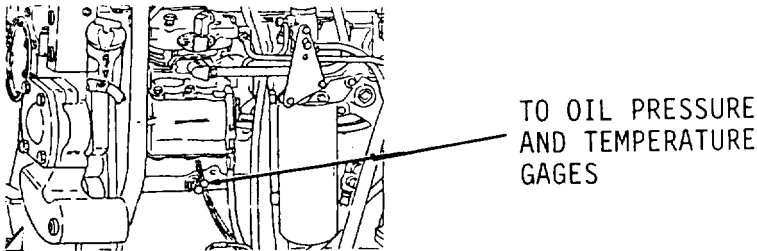


Figure 6-2.

Replace bearings if worn. Refer to paragraph 6-13. Repair or replace compressor after completing steps 1 thru 4, if necessary. Refer to paragraph 6-13.

BRAKES TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

c. EXCESSIVE BUILD-UP AND RECOVERY TIME.

Compressor should build up air system from 85-100 psi in 40 seconds with engine at maximum rpm.

Step 1. Check for dirty engine air filters.

If dirty--replace air filters. Refer to TM 5-3805-261-20.

Step 2. Check for restricted air inlet line.

Remove restriction or replace air inlet line if kinked. Refer to TM 5-3805-261-20.

Step 3. Check for carbon build-up or restrictions in compressor discharge line and discharge port.

If carbon build-up is found, check for proper compressor cooling. Replace discharge line if damaged. Refer to TM 5-3805-261-20.

Step 4. Check for sticking unloader pistons and plungers. Plungers and pistons should be fully retracted when in inlet cavity and compressor is loaded (pumping air).

If pistons and plungers are not retracted, check operation of air compressor governor. If governor is working properly—replace pistons and plungers. Refer to paragraph 6-13. Repair or replace compressor after completing steps 1 thru 4, if necessary.

d. COMPRESSOR FAILS TO UNLOAD.

Step 1. Check installation and operation of governor.

If governor does not operate properly--repair. Refer to paragraph 6-14.

Step 2. Check for defective or worn unloader pistons and bores.

If pistons and bores are dirty, corroded or worn--replace. Refer to paragraph 6-13. Repair or replace compressor after checking steps 1 and 2, if necessary.

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

e. COMPRESSOR LEAKS OIL.

Step 1. Check for damaged mounting gasket. Check mounting bolt torque.

If mounting bolt torque is low, replace mounting gasket and tighten bolts to standard torques. Refer to TM 5-3805-261-20.

Step 2. Check for cracked crankcase, cylinder block or end cover.

Replace any cracked parts. Refer to paragraph 6-13.

Step 3. Check for loose end cover or cylinder block bolts.

If bolts are tightened correctly, go to step 4. Refer to paragraph 6-13.

Step 4. Check for loose oil supply or return line fittings.

Tighten as necessary. Refer to paragraph 6-9.

f. COMPRESSOR CONSTANTLY CYCLES.

Step 1. Check for leaking unloader pistons. Remove air inlet adapter, strainer plate and gasket. Refer to paragraph 6-13. With compressor unloaded, check for air leakage around unloader pistons.

If leakage is found--replace piston. Refer to paragraph 6-13.

Step 2. Check operation of governor.

If governor does not operate properly--repair. Refer to paragraph 6-14.

Step 3. Test for excessive system leakage.

Repair system leaks, if necessary. Refer to paragraphs 6-9 and 6-11.

Step 4. Check for excessive reservoir contaminants.

Drain reservoir. Refer to TM 5-3805-261-10.

BRAKES TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

g. COMPRESSOR LEAKS COOLANT.

Step 1. Check for improperly tightened coolant line fittings and plugs. Do not over-torque fittings or plugs which can crack the head or block.

Tighten fittings and plugs to standard torques as necessary.

Step. 2. Check for freeze cracks due to improper anti-freeze strength.

Test and strengthen anti-freeze solution as necessary. Refer to TM 5-3805-261-20.

h. PARKING BRAKE NOT ENGAGING CORRECTLY.

Step 1. Check adjustment of parking brake air control valve.

Adjust control valve, if necessary. Refer to paragraph 6-5.

Step 2. Check for wear or damage to control valve.

If control valve is worn or damaged--replace. Refer to paragraph 6-5.

Step 3. Check for mud or dirt clogging exhaust port of quick release valve.

If quick release valve is dirty--clean. Refer to paragraph 6-4.

Step 4. Check for worn or damaged parking brake actuator.

If parking brake actuator is worn or damaged--repair. Refer to paragraph 6-4.

Step 5. Check that adjustment of rod end on parking brake actuator does not permit too much free movement of lever on transmission.

If rod end is not adjusted correctly--adjust. Refer to paragraph 6-12. Repair parking brake after completing steps 1 thru 5, if necessary.

BRAKES TROUBLESHOOTING AND MAINTENANCE PROCEDURES. (cont)

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

i. PARKING BRAKE NOT RELEASING CORRECTLY.

Step 1. Check for air pressure at supply port of control valve.

If no air pressure at supply port--troubleshoot air system.

Step 2. Check clearance adjustment of control valve.

Adjust control valve, if necessary. Refer to paragraph 6-5.

Step 3. Check for wear or damage to control valve.

If control valve is worn or damaged--replace. Refer to paragraph 6-5.

Step 4. Check for wear or damage to quick release valve.

If quick release valve worn or damaged--repair. Refer to paragraph 6-4.

Step 5. Check for worn or damaged parking brake actuator.

If parking brake actuator is worn or damaged--repair. Refer to paragraph 6-4.

Step 6. Check adjustment of rod end on parking brake actuator to ensure that with the brake off, a small amount of free travel of lever on transmission is permitted.

If no free travel is permitted--adjust rod end. Refer to paragraph 6-4. Repair parking brake after completing steps 1 thru 6, if necessary.

j. SERVICE BRAKES NOT ENGAGING CORRECTLY.

Step 1. Check for air pressure at supply ports of control valve.

If no air pressure at supply ports--troubleshoot air system.

Step 2. Check adjustment of pedal stop to ensure it permits enough travel of brake pedal to operate brakes.

If not enough travel is permitted--adjust pedal. Refer to paragraph 6-8.

BRAKES TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

j. SERVICE BRAKES NOT ENGAGING CORRECTLY.

Step 3. Check adjustment of screw on plunger of control valve to ensure enough travel of piston in air brake valve is permitted.

If too little travel is permitted--adjust screw. Refer to paragraph 6-12.

Step 4. Check for wear or damage to air brake valve.

If air brake valve is worn or damaged--repair. Refer to paragraph 6-12. Replace service brakes after completing all of the above, if necessary. Refer to paragraph 6-7.

k. SERVICE BRAKES NOT RELEASING CORRECTLY.

Step 1. Check adjustment of screw on plunger of control valve to ensure that screw does not stop piston from completely releasing from control valve.

If screw stops piston from releasing--adjust screw. Refer to paragraph 6-12.

Step 2. Check for wear or damage to parking brake air control valve.

If control valve is worn or damaged--repair. Refer to paragraph 6-5.

Section II. BRAKES MAINTENANCE.**6-3. BRAKES MAINTENANCE PROCEDURES.**

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the organizational support level to keep the brakes and its components in good repair.

b. This section is arranged by functional group code and provides a list of brake components to be maintained and step-by-step maintenance procedures.

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| Air Compressor Assembly | 6-13 | 6-59 |
| Air Compressor Governor | 6-14 | 6-69 |

BRAKES MAINTENANCE.

6-4. Parking Brake Actuator and Release Valve. (Sheet 1 of 6)

This task covers:

- | | | |
|----------------------|-----------------------|------------------------|
| a. Removal | b. Disassembly | c. Cleaning |
| d. Inspection | e. Assembly | f. Installation |
-

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer NOS 62B

Tools

General Mechanic's Tool Kit
Automotive (NSN 5180-00-
177-7033)

1H3107 Puller assembly
5F7343 Bearing assembly
T774 Spacer
Shop air line

References

TM 5-3805-261-10
TM 5-3805-261-20

Special Environmental Conditions

None

Test Equipment

None

General Safety Instructions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Preformed packing, Item 21
Seal, Item 22, 25
Caps

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Positive cable on right side
disconnected.

Go to Sheet 2

Change 1 6-11

BRAKES MAINTENANCE. (cont)

6-4. Parking Brake Actuator and Release Valve. (Sheet 2 of 6)

REMOVAL

WARNING

Do not disconnect the air line from the parking brake release valve until the air pressure is zero. All air must be bled from the air tanks. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

1. Disconnect hose assembly (1) from elbow (7, Figure 6-3).
2. Connect shop air line to elbow (7) and apply pressure to relieve release valve pressure.
3. Remove cotter pin (2) from pin (3).
4. Remove pin (3) from rod end (14).
5. Remove shop air line from elbow (7).
6. Remove two nuts (4), lockwashers (5) and bolts (6) from bracket (13).
7. Remove elbow (7) and plug (8) from release valve assembly.

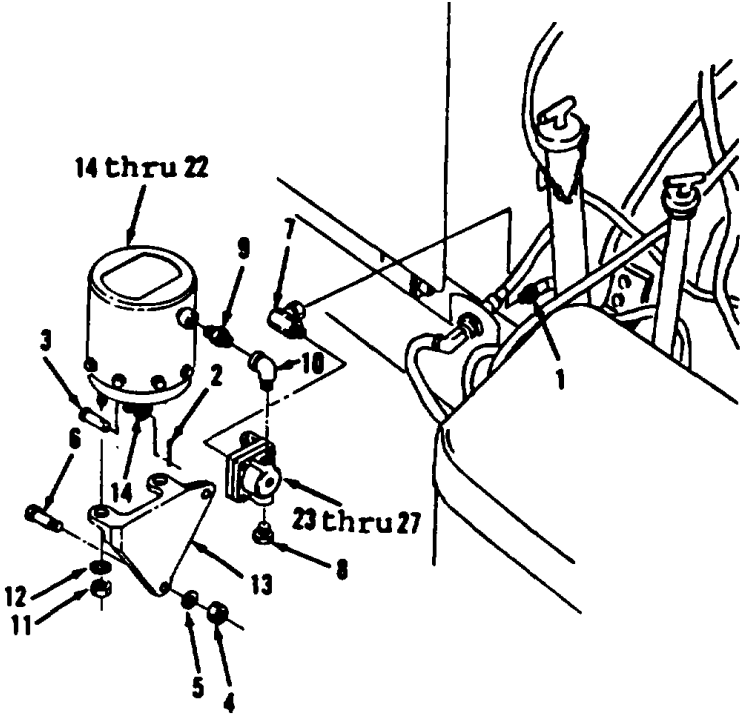


Figure 6-3.

Go to Sheet 3

BRAKES MAINTENANCE.

6-4. Parking Brake Actuator and Release Valve. (Sheet 3 of 6)

REMOVAL

- 8. Remove items 23 thru 27 as an assembly.
- 9. Remove nipple (9) and elbow (10).
- 10. Remove two nuts (11), lockwashers (12) and bracket (13).
- 11. Remove items 14 thru 22 as an assembly.

DISASSEMBLY

- 1. Loosen nut (15, Figure 6-4).
- 2. Remove rod end (14).
- 3. Remove nut (15).
- 4. Install puller assembly, bearing puller attachment and spacer on items 16 thru 22 as an assembly (Figure 6-5).
- 5. Remove eight bolts (16).

WARNING

Exercise care when removing parts under spring tension. INJURY may result by the part striking your eye if you do not observe this precaution. If your eye is struck by a foreign object, seek medical help immediately.

- 6. Slowly release tension on spring (18) with tooling.
- 7. Remove puller assembly, bearing puller attachment and spacer.

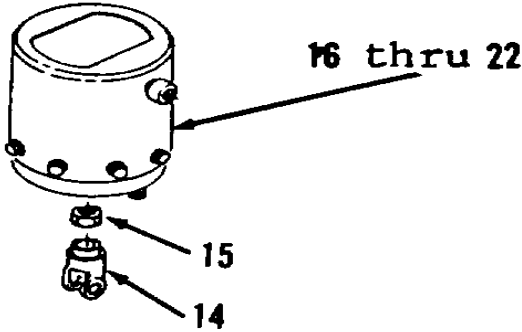


Figure 6-4.

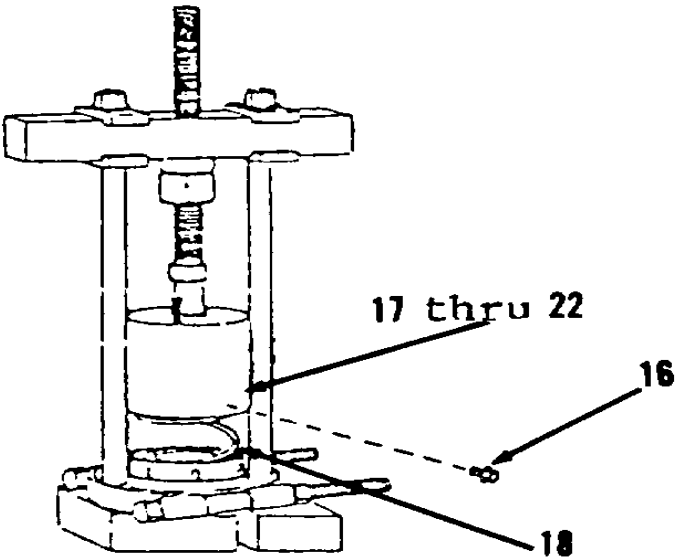


Figure 6-5.

Go to Sheet 4

BRAKES MAINTENANCE. (cont)

6-4. Parking Brake Actuator and Release Valve. (Sheet 4 of 6)

DISASSEMBLY (cont)

- 8. Remove cover (17) and spring (18) from housing (22, Figure 6-6).
- 9. Remove and discard preformed packing (19) and seal (20) from piston (21). Remove all seal material from piston (21).
- 10. Remove four screws (23), cover (24), seal (25) and diaphragm (26) from body (27, Figure 6-7). Discard seal (25) and diaphragm (26). Remove all seal material from cover (24).

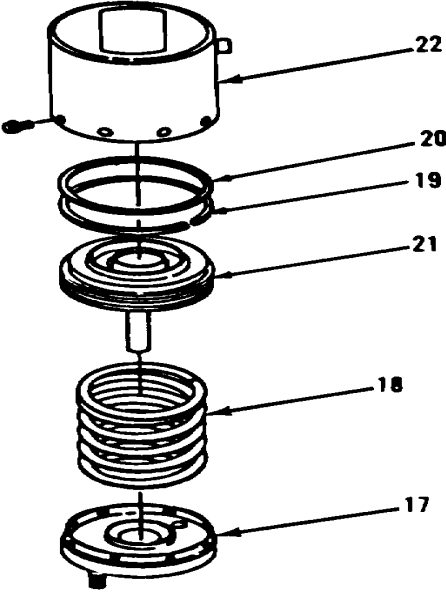


Figure 6-6.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

- 1. Install diaphragm (26) and new seal (25) in body (27, Figure 6-7).
- 2. Position cover (24) on body (27).
- 3. Install four screws (23) on cover (24).

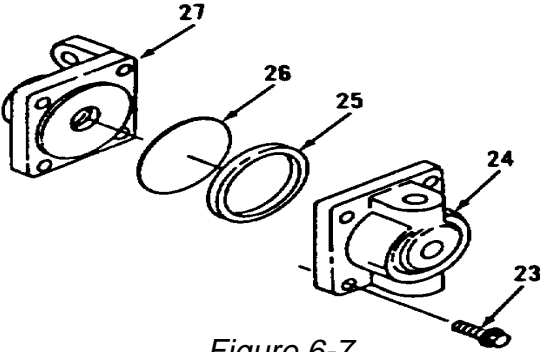
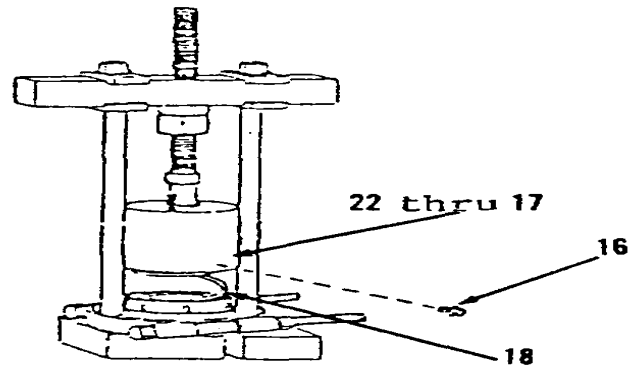
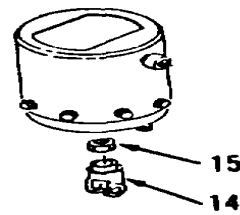


Figure 6-7.

Go to Sheet 5

BRAKES MAINTENANCE.**6-4. Parking Brake Actuator and Release Valve.** (Sheet 5 of 6)**ASSEMBLY**

4. Install new seal (20) and new preformed packing (19) on piston (21).
5. Install items 21 thru 19 as an assembly (22, Figure 6-6).
6. Install spring (18) and cover (17) in housing (22).
7. Install puller assembly, bearing puller attachment and spacer on items 22 thru 17 as an assembly (Figure 6-5).
8. Push spring (18) into housing (22) with tooling.
9. Install eight bolts (16).
10. Remove puller assembly, bearing puller attachment and spacer.
11. Install nut (15, Figure 6-4) loosely.
12. Install rod end (14).
13. Tighten nut (15).

*Figure 6-5**Figure 6-4***Go to Sheet 6**

BRAKES MAINTENANCE. (cont)

6-4. Parking Brake Actuator and Release Valve. (Sheet 6 of 6)

INSTALLATION

1. Position items 22 thru 14 as an assembly (Figure 6-3).
2. Install bracket (13), two lock-washers (12) and nuts (11).
3. Install elbow (10) and nipple (9).
4. Position items 27 thru 23 as an assembly.
5. Install plug (8) and elbow (7) to items 27 thru 23 as an assembly.
6. Install two bolts (6), lock-washers (5), nuts (4) on bracket (13).
7. Connect shop air line on elbow (7).
8. Install pin (3) to rod end (14).
9. Install cotter pin (2) to pin (3).
10. Apply air pressure to items 27 thru 23 as an assembly with shop air line.
11. Disconnect shop air line from elbow (7).
12. Connect hose assembly (1) to elbow (7).

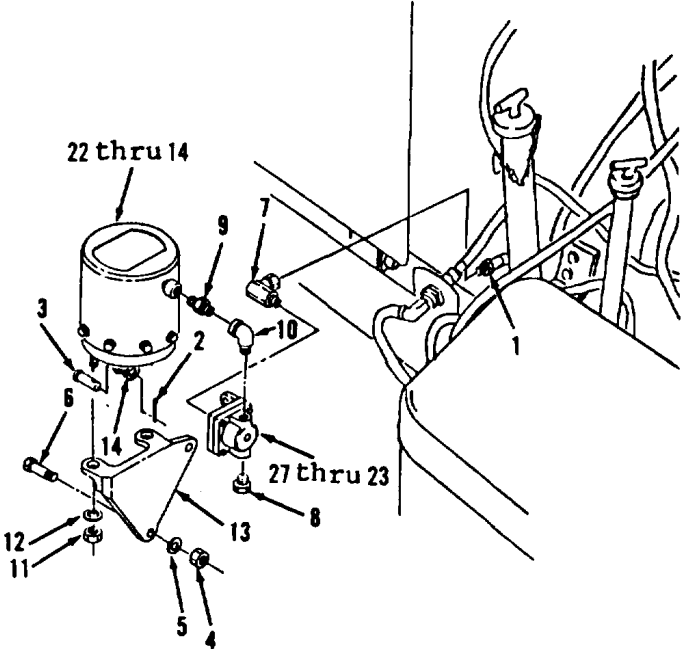


Figure 6-3.

NOTE

Return 130G Grader to original equipment condition.

End of Task

BRAKES MAINTENANCE.

6-5. Parking Brake Air Control Valve. (Sheet 1 of 3)

This task covers:

- | | | |
|----------------------|-----------------------|------------------------|
| a. Removal | b. Disassembly | c. Cleaning |
| d. Inspection | e. Assembly | f. Installation |
-

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Detergent, Item 9, Appendix C
Preformed packings, Items 10,
13
Caps

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Parking brake air control valve
removed.
Operator console side panels removed.

TM 5-3805-261-20

Go to Sheet 2

BRAKES MAINTENANCE. (cont)

6-5. Parking Brake Air Control Valve. (Sheet 2 of 3)

REMOVAL

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

- 1. Disconnect hose assembly (1, Figure 6-8) from control console in operator's compartment.
- 2. Remove connector (2).
- 3. Remove nut (3), boot (4) and items 5 thru 15 as an assembly.

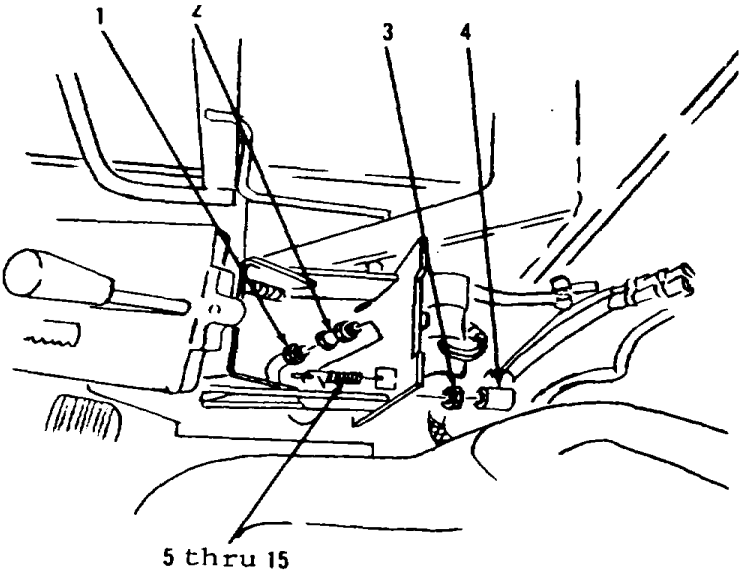


Figure 6-8.

DISASSEMBLY

WARNING

Spring is under compressive preload. Take precautions to restrain spring when removing port so that spring cannot fly out and strike you. Wear safety goggles.

- 1. Remove supply port (5), spring (6), seat (7), valve inlet (8), stem (9) and preformed packing (10) from body (11, Figure 6-9). Discard preformed packing (10).
- 2. Remove body (11), plunger (12) and preformed packing (13) from valve (15). Discard preformed packing (13).
- 3. Remove nut (14) from valve (15).

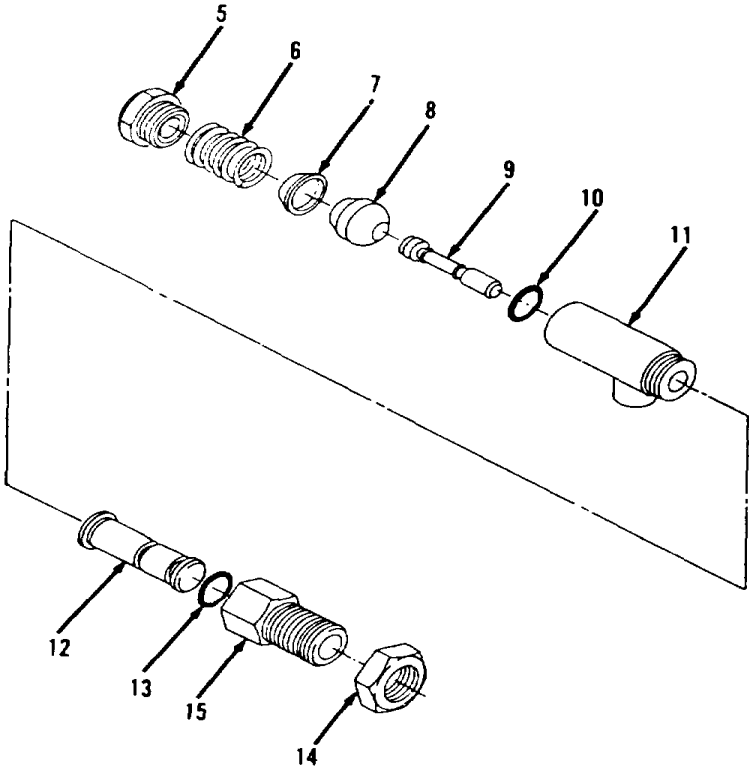


Figure 6-9.

Go to Sheet 3

BRAKES MAINTENANCE.**6-5. Parking Brake Air Control Valve.** (Sheet 3 of 3)**CLEANING**

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install nut (14) on valve (15, Figure 6-9).
2. Install new preformed packing (13), plunger (12) and body (11) in valve (15).
3. Install new preformed packing (10), stem (9), valve inlet (8), seat (7), spring (6) and supply port (5) in body (11).

INSTALLATION

1. Install items 15 thru 5 as an assembly, boot (4) and nut (3, Figure 6-8) in control console in operator's compartment.

NOTE

With brake lever in park position, adjust valve assembly on console to provide 0.03 inch clearance with plate.

2. Install connector (2).
3. Connect hose assembly (1).

NOTE

Return 130C Grader to original equipment condition.

End of Task

BRAKES MAINTENANCE. (cont)

6-6. Parking Brake Control. (Sheet 1 of 3)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

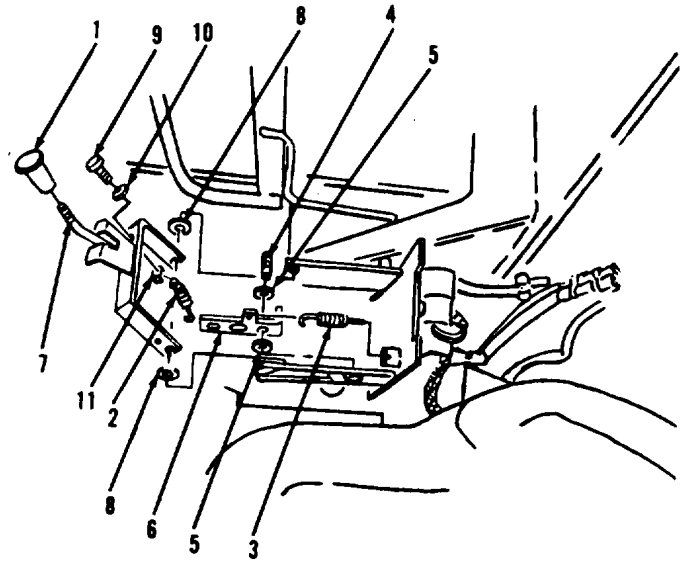
Operator's console right side
panel removed.

Go to Sheet 2

6-20

BRAKES MAINTENANCE.**6-6. Parking Brake Control.** (Sheet 2 of 3)**REMOVAL**

1. Remove knob (1) from lever (7, Figure 6-10) on outside of transmission control console.
2. Loosen bolt (9) enough to relieve spring compression preload.
3. Remove springs (2 and 3).
4. Remove two bolts (4), four washers (5) and plate (6).
5. Remove lever (7) and two washers (8).
6. Remove bolt (9), washer (10) and bracket (11) from lever (7).

*Figure 6-10.***CLEANING**

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

Go to Sheet 3

BRAKES MAINTENANCE. (cont)

6-6. **Parking Brake Control.** (Sheet 3 of 3)

- 1. Position bracket (11) on lever (7, Figure 6-10) inside of transmission control console.
- 2. Install washer (10) and bolt (9) loosely.
- 3. Install two washers (8) on console weldments.
- 4. Position lever (7).
- 5. Install plate (6), four washers (5) and two bolts (4).
- 6. Install springs (3 and 2).
- 7. Tighten bolt (9).
- 8. Install knob (1).
- 9. Check adjustment of parking brake air control valve. Refer to paragraph 6-5.

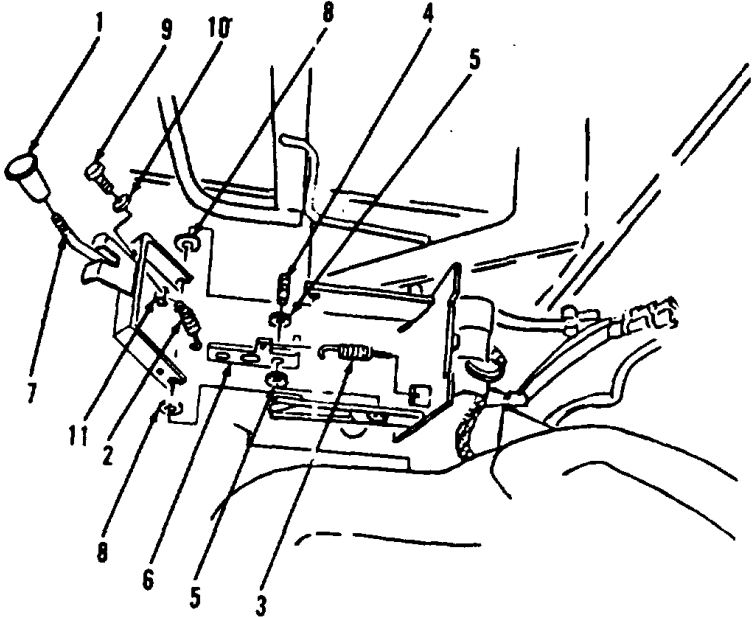


Figure 6-10.

NOTE

Return 130C Grader to original equipment condition.

End of Task

BRAKES MAINTENANCE.

6-7. Service Brake and Wheel Spindle Housing Assembly. (Sheet 1 of 4)

This task covers:

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

INITIAL SETUP:

Applicable Configurations
All

Personnel Required
Construction equipment
repairer MOS 62B

Tools
General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Ratchet assembly 8S9906
Hoist and sling
Two 7/8-14 THD nuts
Wood blocks

References
TM 5-3805-261-10

Special Environmental Conditions
None

General Safety Instructions
None

Test Equipment
None

Torques
All fasteners are tightened to
standard torques. Refer to
Appendix E.

Materials/Parts
Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Caps

Troubleshooting References
None

Equipment Condition
TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 5-25

Tandem drive chain assembly removed.

Go to Sheet 2

BRAKES MAINTENANCE. (cont)

6-7. Service Brake and Wheel Spindle Housing Assembly. (Sheet 2 of 4)

REMOVAL

NOTE

The following is a maintenance procedure for the right side, rear brake and wheel spindle housing assembly. The maintenance procedure for the remaining three brake and wheel spindle housing assemblies is identical.

- 1. Remove two nuts (1), lockwashers (2) and guard (3) from brake and wheel spindle housing assembly (8, Figure 6-11).

NOTE

All hose and tube assemblies must be tagged before removal to aid in installation. Cap all hose and tube ends to prevent contamination.

- 2. Loosen two nuts on tube assembly (4).
- 3. Remove tube assembly (4), elbow (5), bolt (6) and plate (7) from brake and wheel spindle housing assembly (8).

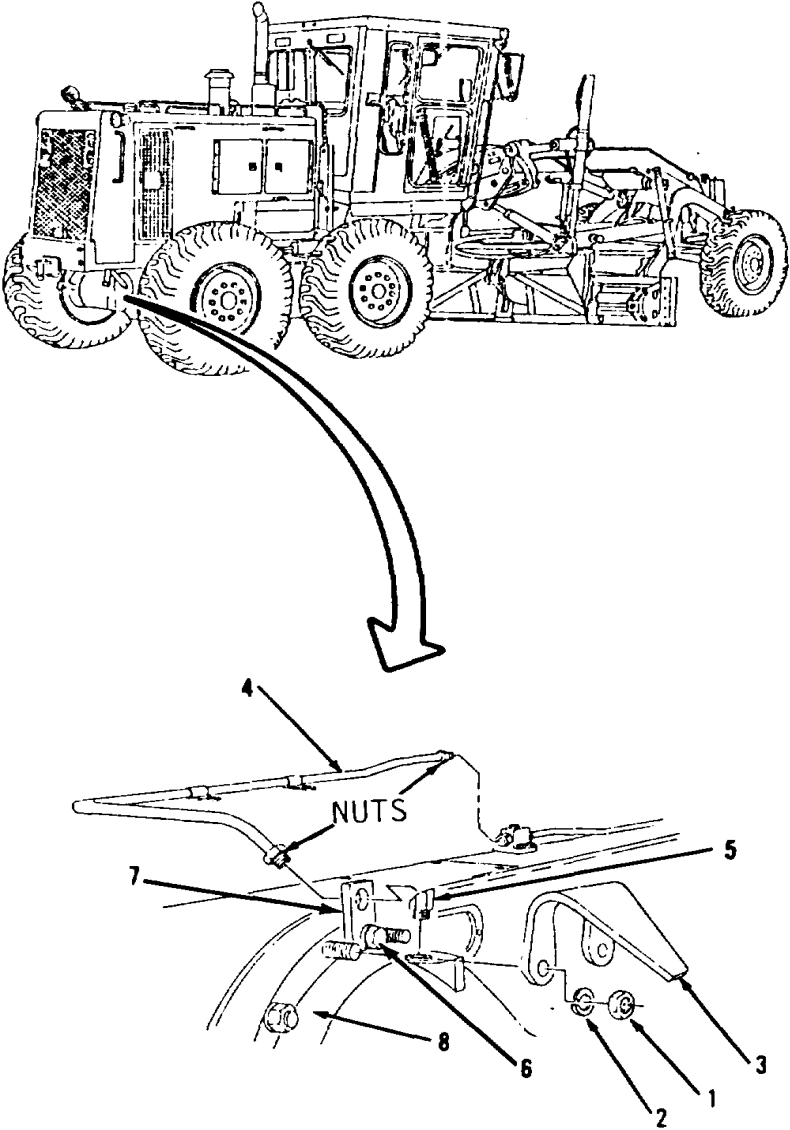


Figure 6-11.

Go to Sheet 3

BRAKES MAINTENANCE.**6-7. Service Brake and Wheel Spindle Housing Assembly.** (Sheet 3 of 4)**REMOVAL****WARNING**

Weight of brake and wheel spindle housing assembly is 350 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

4. Install hoist and sling and ratchet assembly on brake and wheel spindle housing assembly (8, Figure 6-12).
5. Install two 7/8-14 THD nuts on studs.
6. Remove ten nuts (9) and lock-washers (10).
7. Using ratchet assembly, remove brake and wheel spindle housing assembly (8) from tandem drive housing assembly.
8. Place brake and wheel spindle housing assembly (8) on wood blocks.
9. Remove two 7/8-14 THD nuts from studs.
10. Remove hoist and sling and ratchet assembly.

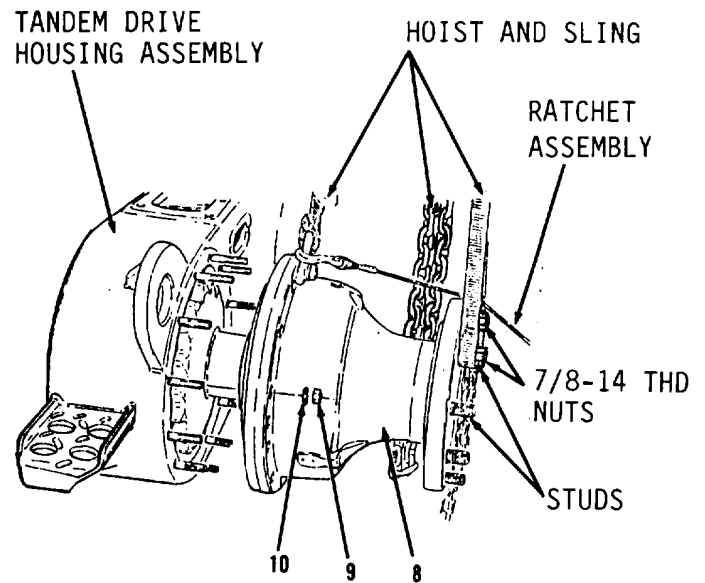


Figure 6-12.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

Go to Sheet 4

BRAKES MAINTENANCE. (cont)

6-7. Service Brake and Wheel Spindle Housing Assembly. (Sheet 4 of 4)

INSTALLATION

1. Install hoist and sling on brake and wheel spindle housing assembly (8, Figure 6-13).
2. Install two 7/8-14 THD nuts on studs.
3. Install brake and wheel spindle housing assembly (8) to tandem drive housing assembly.
4. Install ten lockwashers (10) and nuts (9).
5. Remove two 7/8-14 THD nuts from studs.
6. Remove hoist and sling.
7. Install plate (7), bolt (6), elbow (5) and tube assembly (4) on brake and wheel spindle housing assembly (8, Figure 6-11).
8. Tighten two nuts on tube assembly (4).
9. Install guard (3), two lockwashers (2) and nuts (1).

NOTE

Return 130G Grader to original equipment condition.

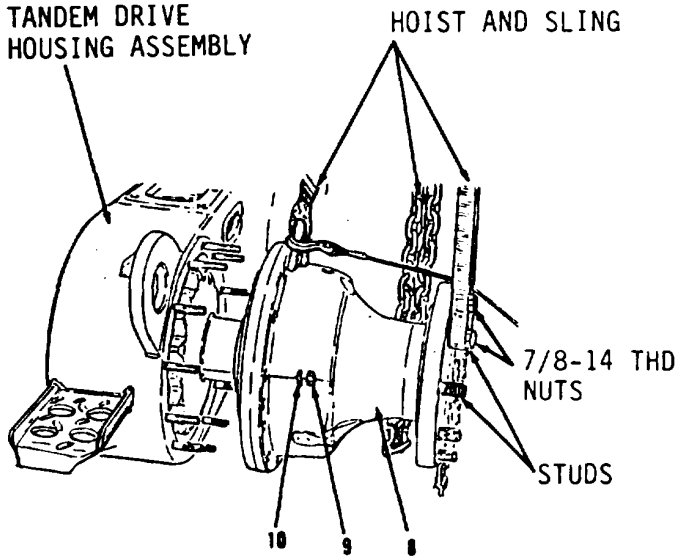


Figure 6-13.

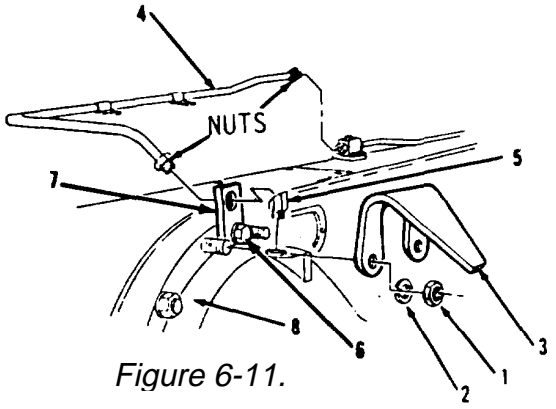


Figure 6-11.

End of Task

BRAKES MAINTENANCE.

6-8. Air Brake Control. (Sheet 1 of 4)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer NOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Cotter pins, Items 15, 17
Lubricating oil, Item 33,
Appendix C

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Positive cable on right side
disconnected .

Go to Sheet 2

Change 1 6-27

BRAKES MAINTENANCE. (cont)

6-8. Air Brake Control. (Sheet 2 of 4)

REMOVAL

1. Remove two bolts (1), washers (2), thread (3), washer (4) and boot (5, Figure 6-14) from right side of cab floor.
2. Remove setscrew (6) and nut (7) from base.
3. Remove spring (8), nut (9), bolt (10) and nut (11, Figure 6-15) under right side of cab floor.
4. Remove nut (12), bolt (13) and nut (14).
5. Disconnect governor control linkage. Refer to paragraph 3-30, steps 4 and 5.
6. Remove and discard cotter pin (15) from bracket and pedal (22).
7. Drive shaft (16) towards inner frame and lubricate shaft (16) with clean oil.
8. Using suitable pliers, push shaft (16) toward outside of vehicle while depressing governor control pedal.
9. Remove items 17 thru 22 as an assembly from bracket.
10. Remove cotter pin (17), pin (18) and roller (19) from pedal (22, Figure 6-16). Discard cotter pin (17).
11. Remove two washers (20) and roller bearings (21) from pedal (22).

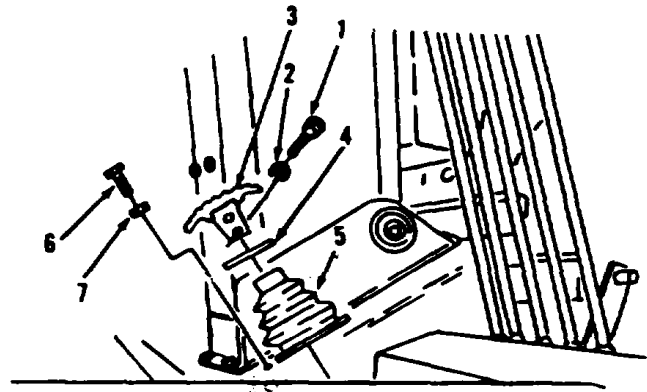


Figure 6-14.

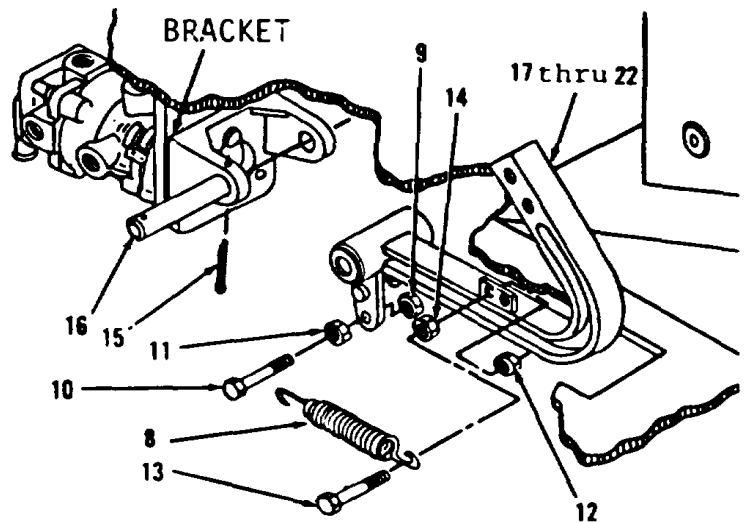


Figure 6-15.

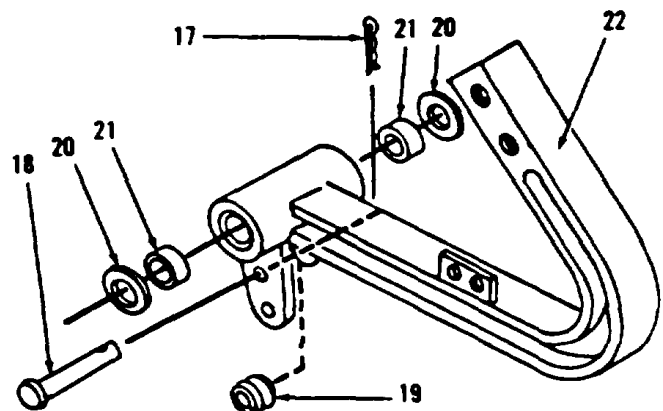


Figure 6-16.

CLEANING

Clean all parts. Refer to Chapter 2.

Go to Sheet 3

BRAKES MAINTENANCE.

6-8. Air Brake Control. (Sheet 3 of 4)

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Install two roller bearings (21) and washers (20, Figure 6-16).
2. Install roller (19), pin (18) and new cotter pin (17).
3. Install items 22 thru 17 as an assembly, shaft (16) and new cotter pin (15, Figure 6-15) on bracket.
4. Connect governor control linkage. Refer to paragraph 3-30, step 70.
5. Install nut (14), bolt (13) and nut (12).
6. Install nut (11), bolt (10), nut (9) and spring (8).
7. Install nut (7) and setscrew (6, Figure 6-14) on right side of cab floor.
8. Install boot (5), washer (4), thread (3), two washers (2) and bolts (1).

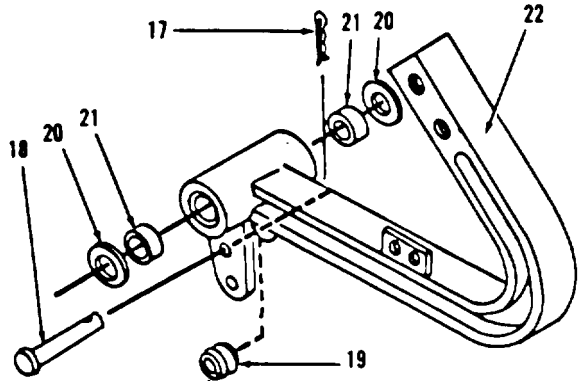


Figure 6-16.

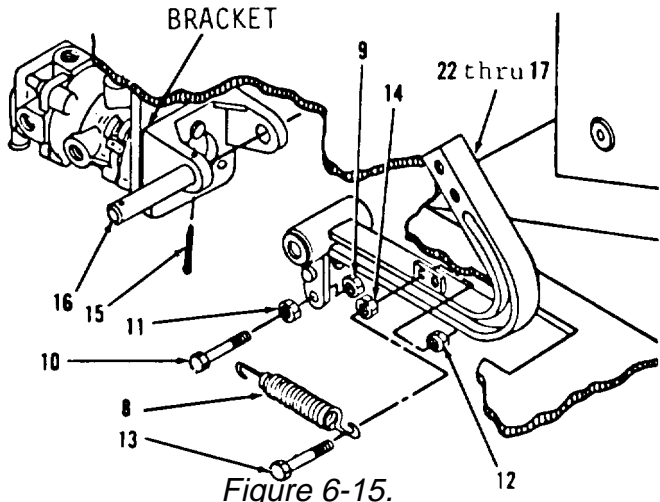


Figure 6-15.

ADJUSTMENT

1. Pump pedal (22, Figure 6-17) on right side of cab floor to drop line pressure to zero.

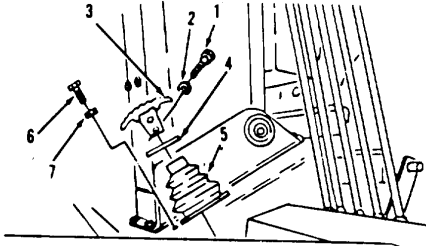


Figure 6-14.

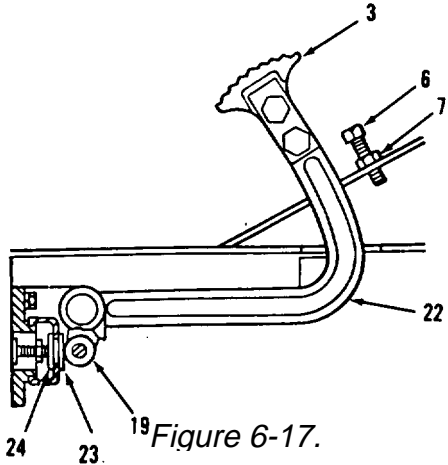


Figure 6-17.

Go to Sheet 4

BRAKES MAINTENANCE. (cont)**6-8. Air Brake Control.** (Sheet 4 of 4)**ADJUSTMENT (cont)**

2. Turn brake valve plunger adjustment screw (23) after loosening nut (24), until slight drag is felt when turning roller (19).

NOTE

Dirt and foreign material between pedal stop and cab floor must be removed to achieve proper pedal adjustment

3. Turn setscrew (7) all the way down after loosening nut (6).
4. Pull pedal (22, Figure 6-17) down and hold until solid stop is felt at end of full valve movement.

NOTE

If pedal hits floor before end of full valve movement, turn valve plunger adjustment screw out one full turn.

5. Turn valve plunger adjustment screw (24), if necessary.
6. Turn setscrew (6) out until it just touches bottom of thread (3).
7. Release pedal (22).
8. Tighten nut (7). Do not turn setscrew (6) after nut (7) is tightened.
9. Tighten nut (23). Do not turn valve plunger adjustment screw (24) after nut (23) is tightened.

NOTE

Return 130G Grader to original equipment condition.

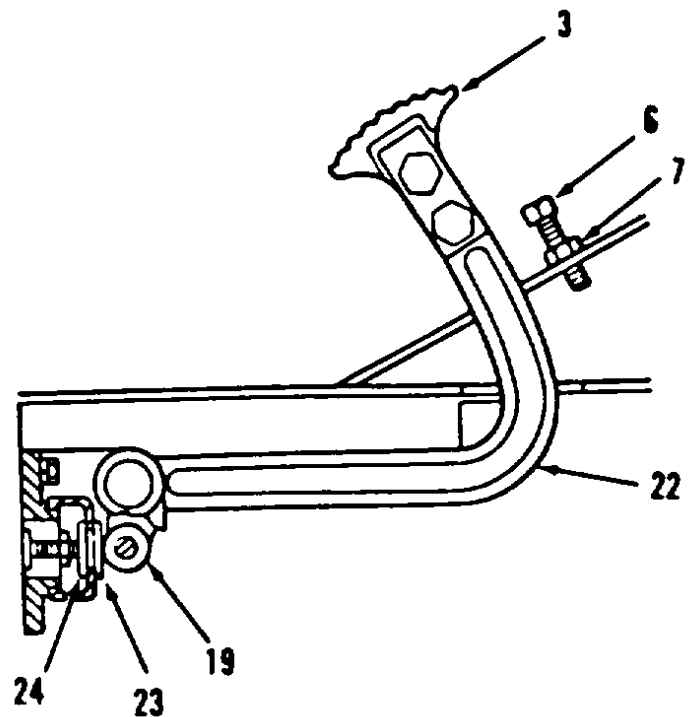


Figure 6-17.

End of Task

BRAKES MAINTENANCE.

6-9. Air Brake Lines. (Sheet 1 of 8)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-177-7033)

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Detergent, Item 9, Appendix C
Caps

Personnel Required

Construction equipment
repairer MOS 62B

References

TM 5-3805-261-10
TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

TM 5-3805-261-20

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Air reservoir drained.
Wheels blocked.
Operator's panel console removed.
All air pressure vented.

Go to Sheet 2

BRAKES MAINTENANCE. (cont)

6-9. Air Brake Lines. (Sheet 2 of 8)

REMOVAL

WARNING

HIGH VELOCITY AIR

Failure to protect your eyes may cause INJURY. If you injure your eyes, seek medical aid immediately.

NOTE

- The following is a maintenance procedure for the right side air brake lines. The maintenance procedure for the left side air brake lines is identical.
- All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

1. Remove four bolts (1) and washers (2, Figure 6-18).
2. Remove four clips (3).
3. Disconnect tube assemblies (4 and 5) from block (29) under engine compartment.
4. Remove tube assemblies (4 and 5).
5. Disconnect hose assembly (17) from block (29).
6. Disconnect hose assembly (16) from plate (23).

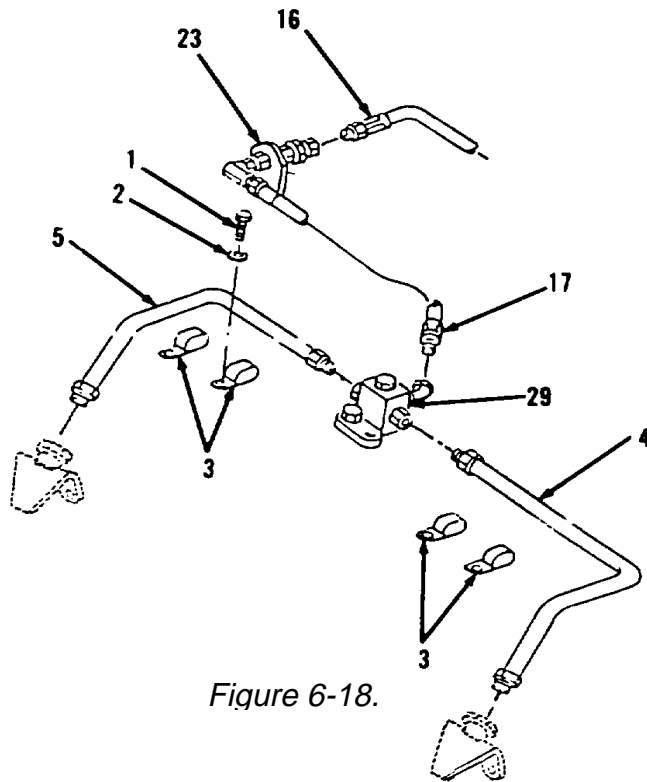
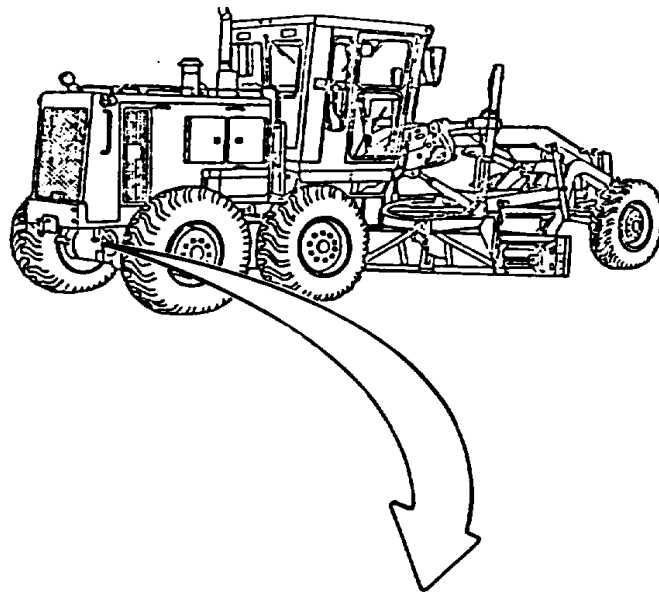


Figure 6-18.

Go to Sheet 3

BRAKES MAINTENANCE.

6-9. Air Brake Lines. (Sheet 3 of 8)

REMOVAL

- 7. Remove two nuts (6), washers (7), clip (8) and plate (9, Figure 6-19) under front, right side of engine compartment.
- 8. Remove clamp (10).
- 9. Remove two nuts (11), washers (12), clip (13) and plate (14).
- 10. Remove clamp (15).
- 11. Remove hose assembly (16) from air brake valve.
- 12. Remove hose assembly (17) from elbow (20, Figure 6-20).
- 13. Remove connector (18), two fittings (19) and elbow (20).
- 14. Remove two bolts (21), washers (22) and plate (23).
- 15. Remove elbow (24), two connectors (25), plug (26), two bolts (27), washers (28) and block (29, Figure 6-21).
- 16. Remove two elbows (30), four nuts (31), washers (32) and two guards (33).

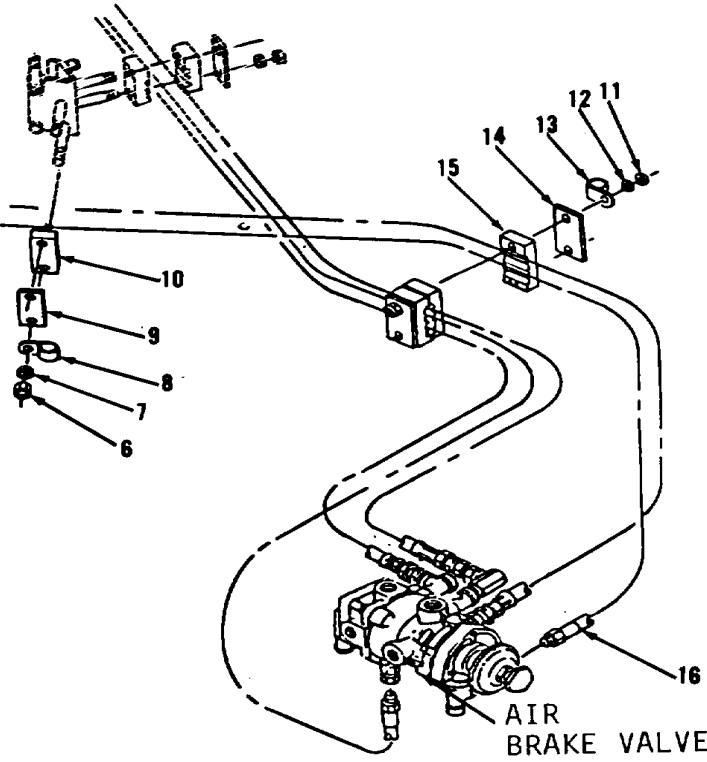


Figure 6-19.

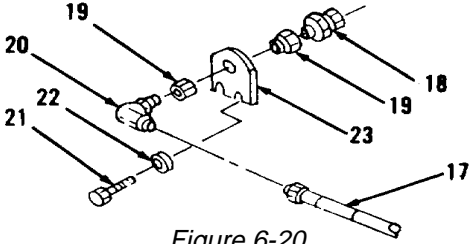


Figure 6-20.

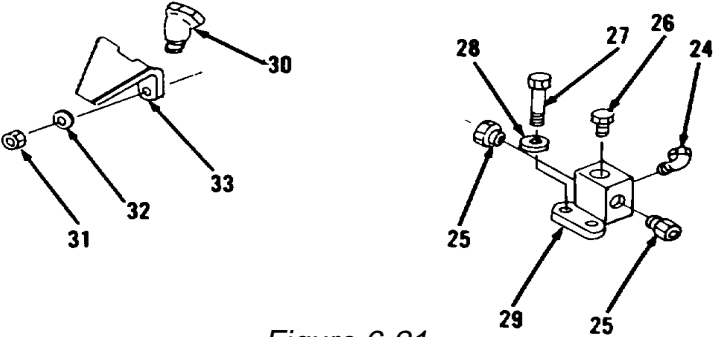


Figure 6-21.

Go to Sheet 4

BRAKES MAINTENANCE. (cont)

6-9. Air Brake Lines. (Sheet 4 of 8)

REMOVAL (cont)

NOTE

Steps 17 thru 30 are for the removal of the lines from the right side of the air reservoir to the air brake valve. Removal of the lines on the left side of the air reservoir is identical.

- 17. Disconnect hose assembly (41, Figure 6-22) from air brake reservoir.
- 18. Remove bolt (34), washer (35) and clip (36).
- 19. Remove nut (37), washer (38) and plate (39).
- 20. Remove clamp (40).
- 21. Remove hose assembly (41) from air brake valve.
- 22. Disconnect hose assembly (48) from air brake valve.
- 23. Remove bolt (42), washer (43) and clip (44, Figure 6-23).
- 24. Disconnect hose assembly (45) from parking brake actuator and release valve.
- 25. Remove hose assembly (45).
- 26. Remove check valve (46) and nipple (47).
- 27. Remove hose assembly (48).
- 28. Remove elbow (49) and solenoid valve (50).
- 29. Remove nipple (51).
- 30. Remove tee (52), check valve (53), elbow (54) and connector (55).

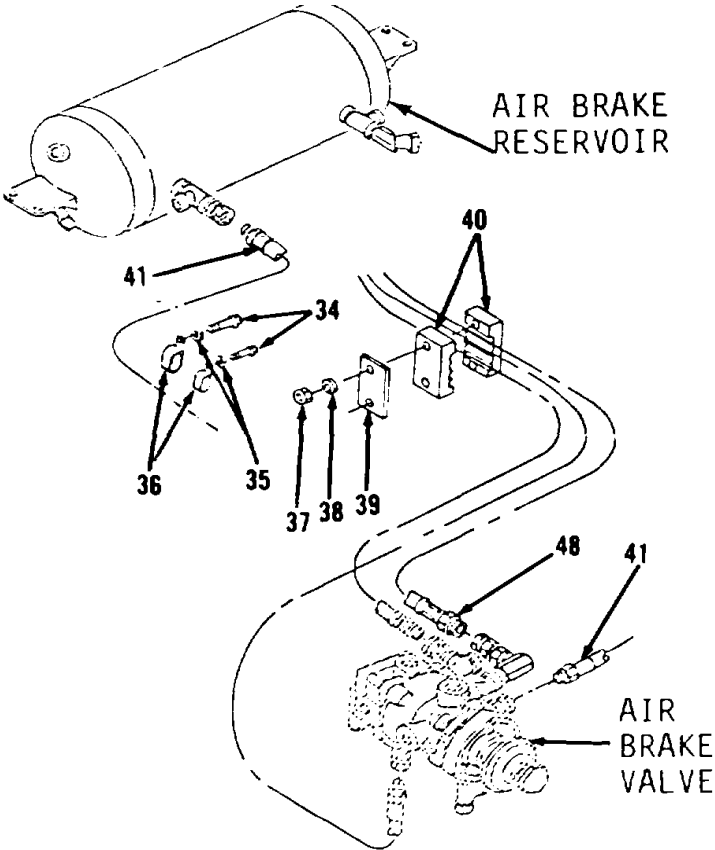


Figure 6-22.

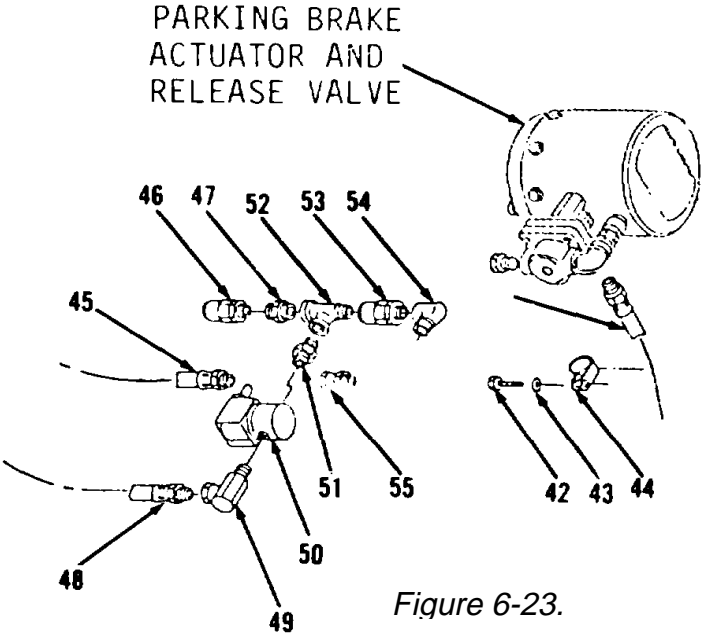


Figure 6-23.

Go to Sheet 5

BRAKES MAINTENANCE.

6-9. Air Brake Lines. (Sheet 5 of 8)

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION**NOTE**

Steps 1 thru 14 are for the installation of the lines from the right side of the air reservoir to the air brake valve. Installation of the lines on the left side of the air reservoir is identical.

1. Install connector (55), elbow (54), check valve (53) and tee (52, Figure 6-23).
2. Install nipple (51).
3. Install solenoid valve (50) and elbow (49).
4. Install hose assembly (48).
5. Install nipple (47) and check valve (46).
6. Install hose assembly (45).
7. Connect hose assembly (45) to parking brake actuator and release valve.
8. Install clip (44), washer (43) and bolt (42).

Go to Sheet 6

BRAKES MAINTENANCE. (cont)

6-9. Air Brake Lines. (Sheet 6 of 8)

INSTALLATION (cont)

9. Connect hose assembly (48, Figure 6-22) to air brake valve.
10. Install hose assembly (41) on air brake valve.
11. Install clamp (40).
12. Install plate (39), washer (38) and nut (37).
13. Install clip (36), washer (35) and bolt (34).
14. Connect hose assembly (41) to air brake reservoir.

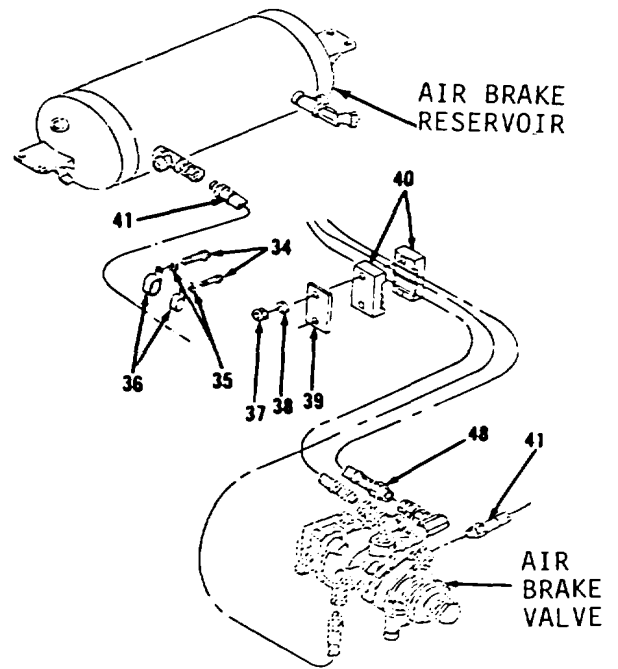


Figure 6-22.

Go to Sheet 7

BRAKES MAINTENANCE.

6-9. Air Brake Lines. (Sheet 7 of 8)

INSTALLATION

15. Install two guards (33), four washers (32), nuts (31) and two elbows (30, Figure 6-21).
16. Install block (29), two washers (28), bolts (27), plug (26), two connectors (25) and elbow (24).
17. Install plate (23), two washers (22) and bolts (21, Figure 6-20).
18. Install elbow (20), two fittings (19) and connector (18) under front, right side of engine compartment.
19. Install hose assembly (17).

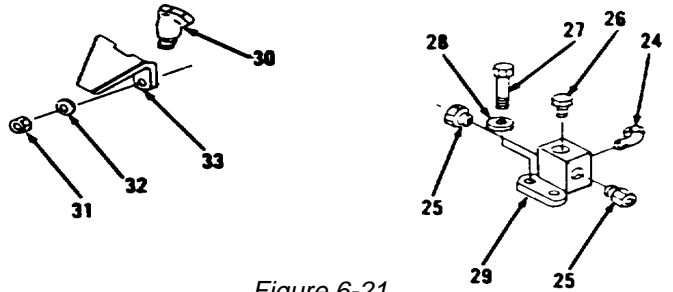


Figure 6-21.

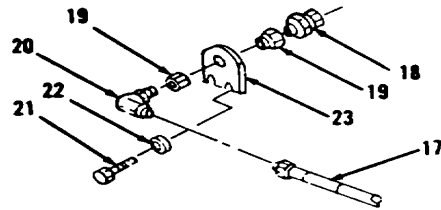


Figure 6-20.

Go to Sheet 8

BRAKES MAINTENANCE. (cont)

6-9. Air Brake Lines. (Sheet 8 of 8)

INSTALLATION (cont)

- 20. Install hose assembly (16, Figure 6-19) on air brake valve.
- 21. Install clamp (15).
- 22. Install plate (14), clip (13), two washers (12) and nuts (11).
- 23. Install clamp (10).
- 24. Install plate (9), cup (8), two washers (7) and nuts (6) under front, right side of engine compartment.
- 25. Connect hose assembly (16) to plate (23, Figure 6-18).
- 26. Connect hose assembly (17) to block (29).
- 27. Install tube assemblies (5 and 4).
- 28. Connect tube assemblies (5 and 4) to block (29).
- 29. Install four clips (3).
- 30. Install two washers (2) and bolts (1).

NOTE

Return 130C Grader to original equipment condition.

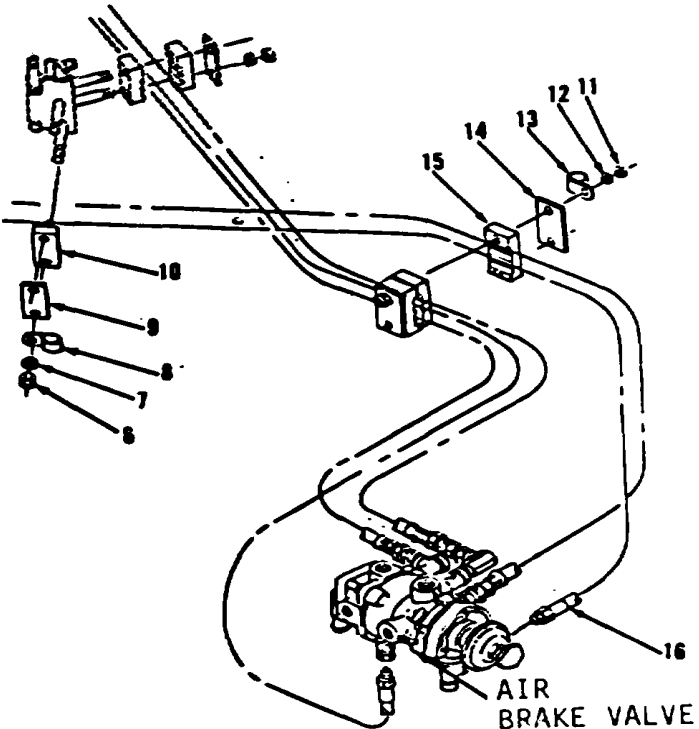


Figure 6-19.

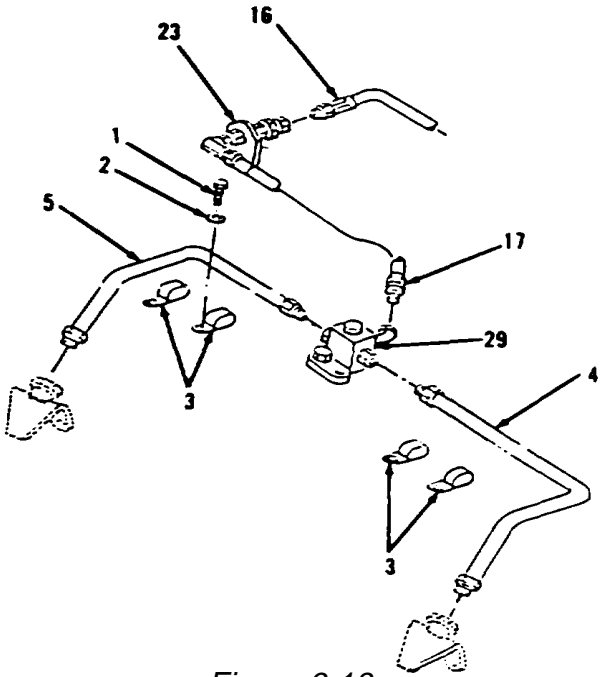


Figure 6-18.

End of Task

BRAKES MAINTENANCE.6-10. Air Brake Reservoir. (Sheet 1 of 5)**This task covers:**

- a. Removal
- d. Installation

b. **Cleaning**c. **Inspection****INITIAL SETUP:**Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43, Appendix C
Detergent, Item 9, Appendix C
Caps
Plugs

Personnel Required

Construction equipment
repairer NOS 62B

References

TM 5-3805-261-10
TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

TM 5-3805-261-20

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Air brake reservoir drained.

Positive cable on right side
disconnected.

Go to Sheet 2**Change 1 6-39**

BRAKES MAINTENANCE. (cont)

6-10. Air Brake Reservoir. (Sheet 2 of 5)

REMOVAL

- 1. Loosen four nuts (2, Figure 6-24).
- 2. Support reservoir (1). Weight of reservoir (1) is approximately 21 lbs.
- 3. Remove four nuts (2), washers (3 and 4), bolts (5), washers (6), grommets (7) and washers (8).
- 4. Remove drain cock (9), fitting (10) and bushing (11) from reservoir (1, Figure 6-25) from under rear of vehicle.

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all, hose and tube ends and plug all open ports to prevent contamination

- 5. Disconnect hose assembly (26).
- 6. Remove elbow (12), valve (13) and elbow (14).
- 7. Disconnect hose assembly (15).
- 8. Remove connector (16).
- 9. Disconnect hose assembly (17).
- 10. Remove connector (18) and tee (19).

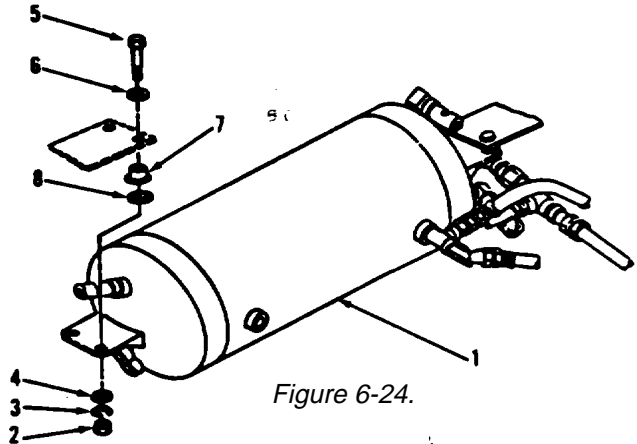
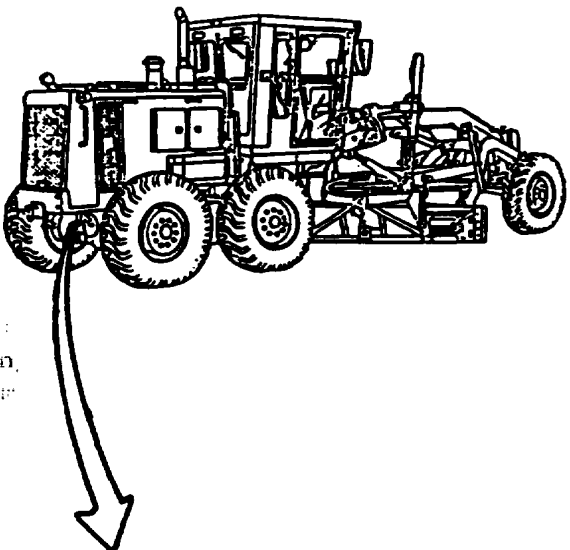


Figure 6-24.

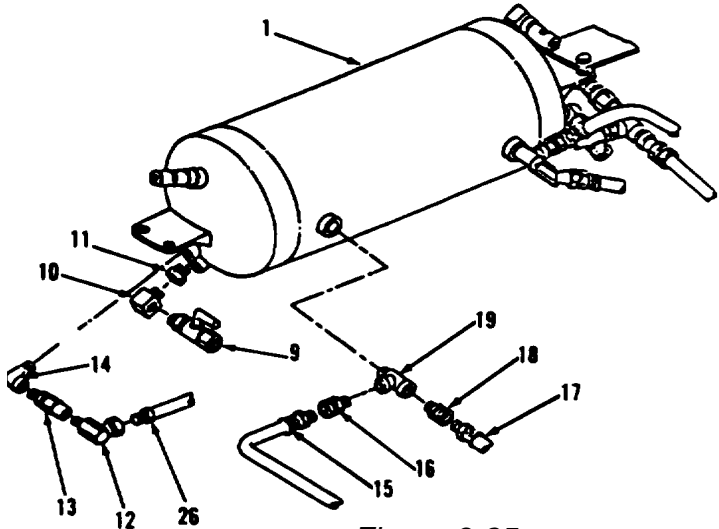


Figure 6-25.

Go to Sheet 3

BRAKES MAINTENANCE.

6-10. Air Brake Reservoir. (Sheet 3 of 5)

REMOVAL

- 11. Disconnect hose assembly (20, Figure 6-26).
- 12. Remove elbow (21).
- 13. Disconnect hose assembly (22).
- 14. Remove connector (23) and tee (24) from reservoir (1).
- 15. Disconnect hose assembly (25).
- 16. Remove hose assembly (26).
- 17. Remove bushing (27).
- 18. Remove connector (28), tee (29), valve (30) and elbow (31, Figure 6-27).
- 19. Remove drain cock (32), fitting (33) and bushing (34).
- 20. Remove valves (35 and 36) and fitting (37) from reservoir (1).

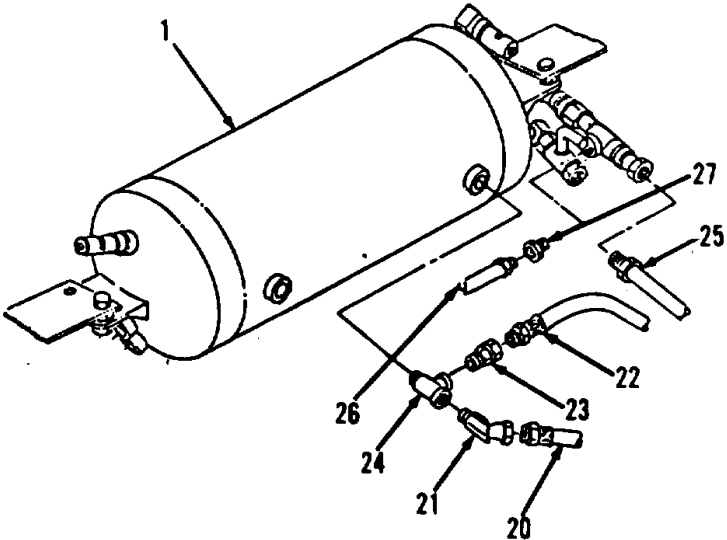


Figure 6-26;

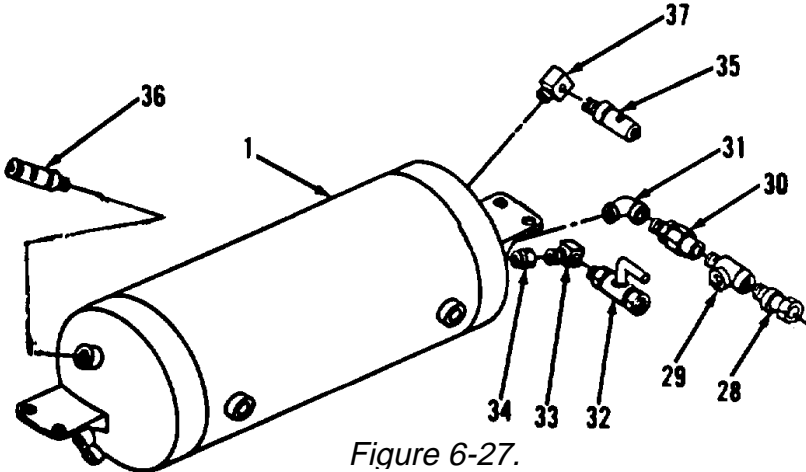


Figure 6-27.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

Go to Sheet 4

BRAKES MAINTENANCE. (cont)

6-10. Air Brake Reservoir. (Sheet 4 of 5)

INSTALLATION

1. Install fitting (37) and two valves (36 and 35) in reservoir (1, Figure 6-27).
2. Install bushing (34), fitting (33) and drain cock (32).
3. Install elbow (31), valve (30), tee (29) and connector (28).
4. Install bushing (27) and hose assembly (26, Figure 6-26).
5. Connect hose assembly (25).
6. Install tee (24) and connector (23) in reservoir (1).
7. Connect hose assembly (22).
8. Install elbow (21).
9. Connect hose assembly (20).

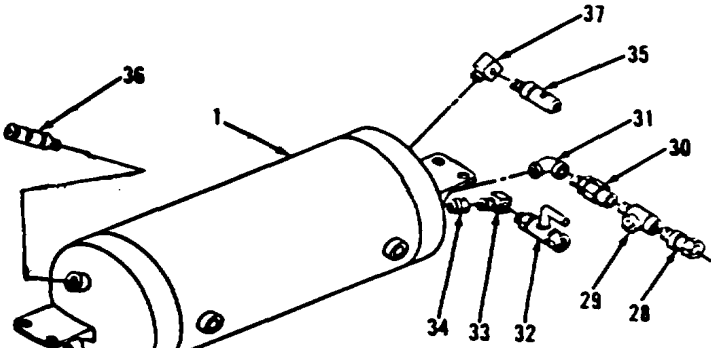


Figure 6-27.

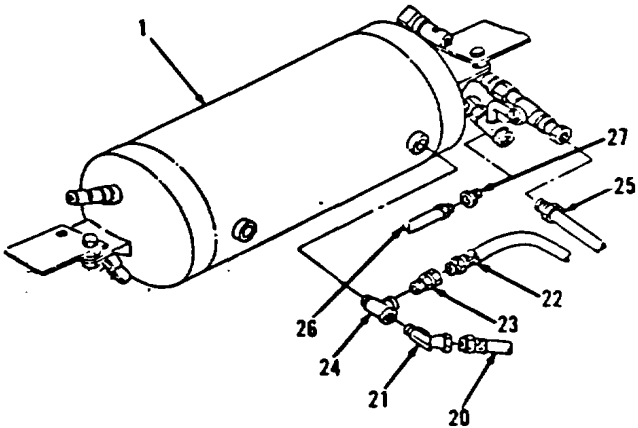


Figure 6-26.

Go to Sheet 5

BRAKES MAINTENANCE.

6-10. Air Brake Reservoir. (Sheet 5 of 5)

INSTALLATION

- 10. Install tee (19) and connector (18) in reservoir (1, Figure 6-25).
- 11. Connect hose assembly (17).
- 12. Install connector (16).
- 13. Connect hose assembly (15).
- 14. Install elbow (14), valve (13) and elbow (12).
- 15. Connect hose assembly (26).
- 16. Install bushing (11), fitting (10) and drain cock (9).
- 17. Position four washers (6) and bolts (5, Figure 6-24) in frame weldments under rear of vehicle.
- 18. Install reservoir (1), four washers (8), grommets (7), washers (6), bolts (5), washers (4 and 3) and nuts (2).
- 21. Inspect all hose and tube assemblies and connections for leaks. Refer to TM 5-3805-261-10.

NOTE

Return 130C Grader to original equipment condition.

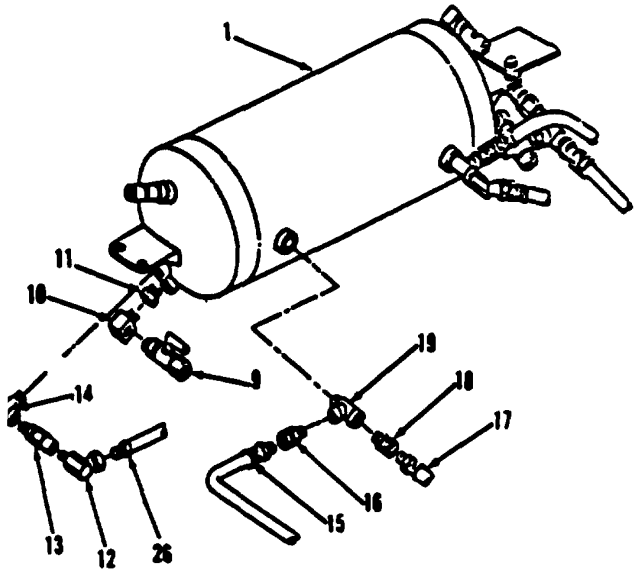


Figure 6-25.

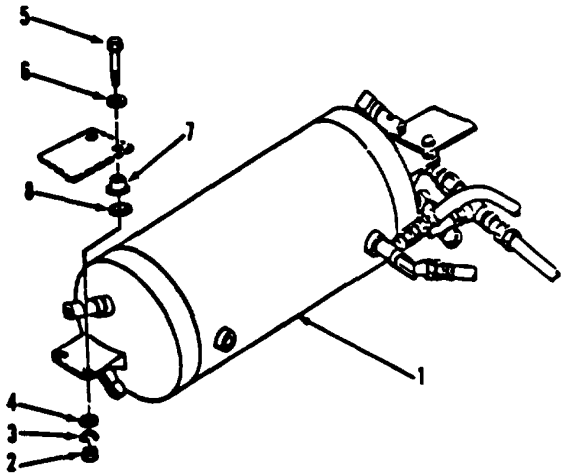


Figure 6-24.

End of Task

BRAKES MAINTENANCE. (cont)

6-11. Air Brake Reservoir Lines and Fittings. (Sheet 1 of 3)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer NOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Detergent, Item 9, Appendix C
Caps

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-380261-20

Positive cable on right side
disconnected.

Go to Sheet 2

Change 1 6-44

BRAKES MAINTENANCE.

6-11. Air Brake Reservoir Lines and Fittings. (Sheet 2 of 3)

REMOVAL

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

1. Disconnect air brake reservoir. Refer to paragraph 6-10, steps 1, 2 and 3.
2. Disconnect hose assembly (9, Figure 6-28) from air compressor.
3. Remove elbows (1 and 2).
4. Remove bolt (3), washer (4), clip (5), bolt (6), washer (7) and clip (8).
5. Remove hose assembly (9) from air tank.
6. Disconnect hose assembly (13, Figure 6-29).
7. Remove elbow (10), valve (11) and elbow (12) from air tank.
8. Remove hose assembly (13), connector (14), bushing (15), tee (16), valve (17) and elbow (18).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

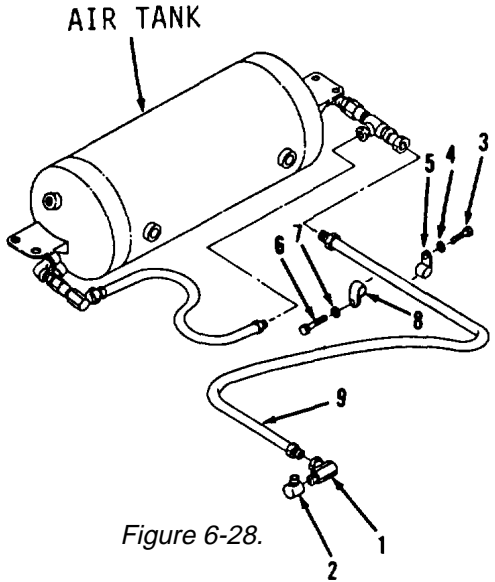


Figure 6-28.

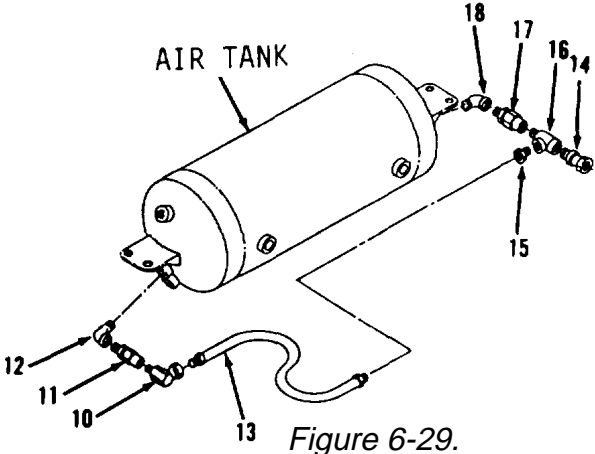


Figure 6-29.

Go to Sheet 3

BRAKES MAINTENANCE. (cont)

6-11. Air Brake Reservoir Lines and Fittings. (Sheet 3 of 3)

INSTALLATION

1. Install elbow (18), valve (17), tee (16), bushing (15), connector (14) and hose assembly (13), Figure 6-29) on air tank.
2. Install elbow (12), valve (11) and elbow (10).
3. Connect hose assembly (13).
4. Install hose assembly (9, Figure 6-28).
5. Install clip (8), washer (7), bolt (6), clip (5), washer (4) and bolt (3).
6. Install elbows (2 and 1) on air compressor.
7. Connect hose assembly (9).
8. Connect air brake reservoir. Refer to paragraph 6-10, steps 19, 20 and 21.

NOTE

Return 130G Grader to original equipment condition.

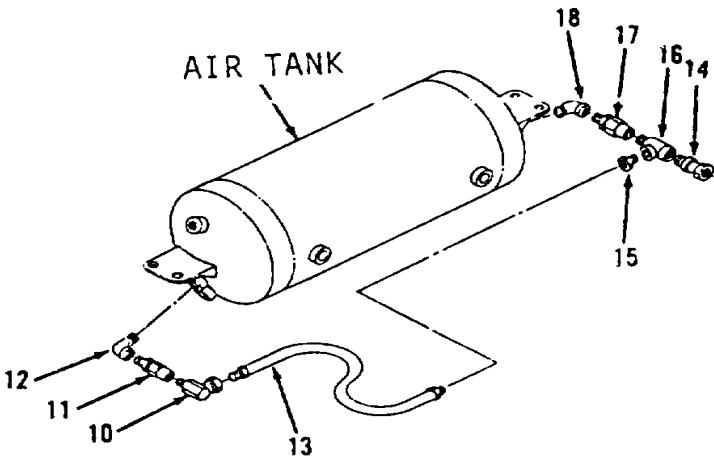


Figure 6-29.

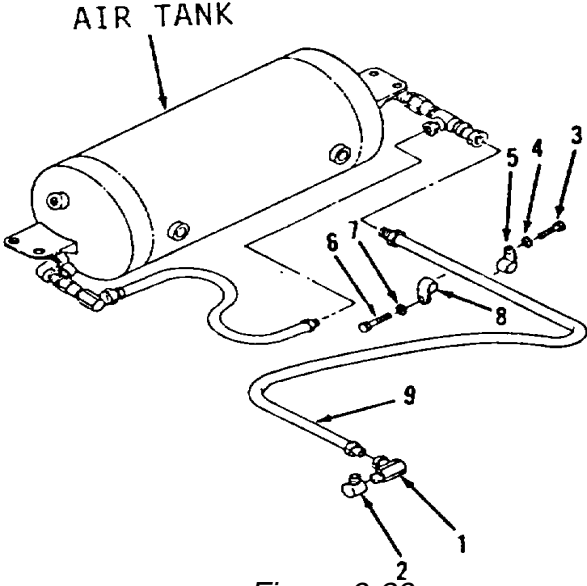


Figure 6-28.

End of Task

BRAKES MAINTENANCE.

6-12. Air Brake Valve. (Sheet 1 of 12)

This task covers:

- | | | |
|----------------------|-----------------------|------------------------|
| a. Removal | b. Disassembly | c. Cleaning |
| d. Inspection | e. Assembly | f. Installation |
-

INITIAL SETUP:

Applicable Configurations
All

Personnel Required
Construction equipment
repairer MOS 62B

Tools
General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References
TM 5-3805-261-20

Test Equipment
None

Special Environmental Conditions
None

Materials/Parts
Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Preformed packings, Items 12,
13, 25, 32, 34, 39, 40
Rubber spring, Item 24
Washer, Item 26

General Safety Instructions
None

Torques
All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References
None

Equipment Condition
TM 5-3805-261-20

Air pressure switch removed.
Blackout and service lights switch
removed.

Paragraph 6-8

Air brake controls removed.

Paragraph 6-9

Air brake lines removed.

Paragraph 6-11

Air brake reservoir lines, fittings
and mounting removed.

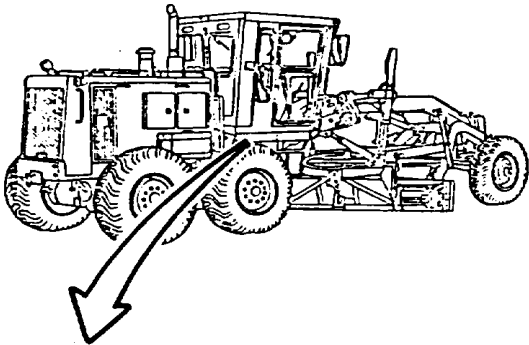
Go to Sheet 2

BRAKES MAINTENANCE. (cont)

6-12. Air Brake Valve. (Sheet 2 of 12)

REMOVAL

Remove three bolts (1), washer (2), bracket (3) and shaft (4, Figure 6-30) and air brake valve from under right side of cab.



DISASSEMBLY

1. Remove screw (5), nut (6), plunger (7) and boot (8, Figure 6-31).
2. Remove spacer (9) and retainer (10).
3. Remove four screws (11) and cover (12).
4. Remove items 13 thru 19 as an assembly from body and housing assembly.

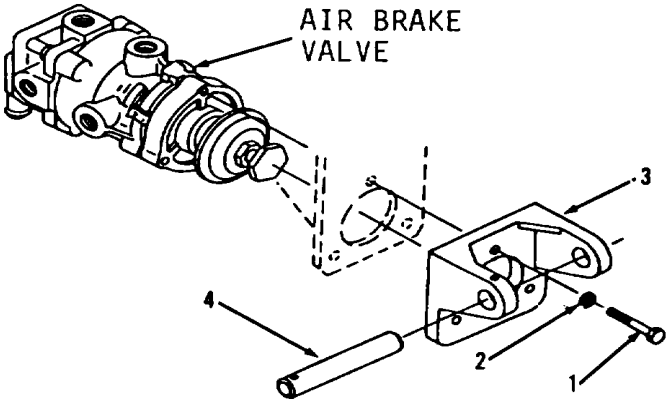


Figure 6-30.

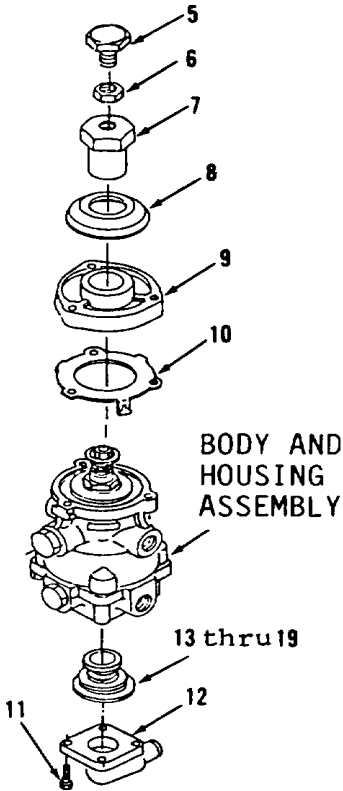


Figure 6-31.

Go to Sheet 3

BRAKES MAINTENANCE.

6-12. Air Brake Valve. (Sheet 3 of 12)

DISASSEMBLY

- 5. Remove retaining ring (13, Figure 6-32) from valve assembly.
- 6. Remove items 14 thru 16 as an assembly from valve assembly.
- 7. Remove preformed packings (14 and 15) from retainer (16, Figure 6-33). Discard preformed packings (14 and 15).
- 8. Remove spring (17) and retainer (18) from valve (19, Figure 6-34).

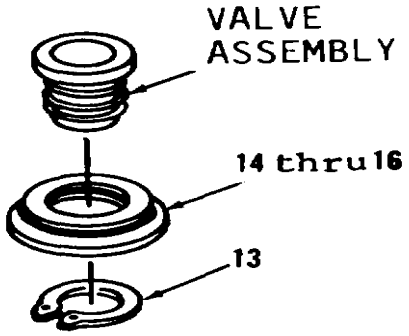


Figure 6-32.

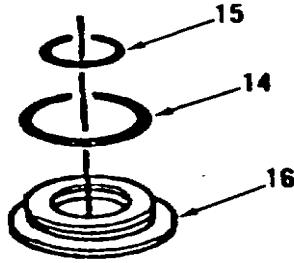


Figure 6-33.

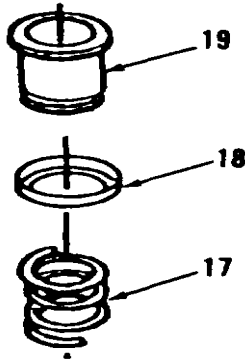


Figure 6-34.

Go to Sheet 4

BRAKES MAINTENANCE. (cont)

6-12. Air Brake Valve. (Sheet 4 of 12)

DISASSEMBLY (cont)

- 9. Remove nut (20), retainer (21), spring (22) and stem (23, Figure 6-35).
- 10. Remove items 24 thru 29 as an assembly from body and housing assembly.
- 11. Remove nut (24), seat (25), rubber spring (26), preformed packing (27) and washer (28) from piston (29, Figure 6-36). Discard rubber spring (26), preformed packing (27) and washer (28).

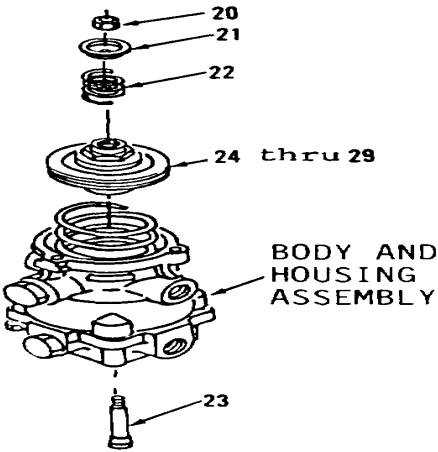


Figure 6-35.

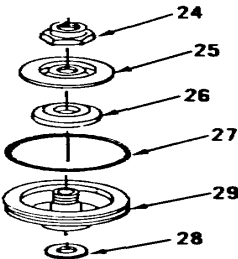


Figure 6-36.

Go to Sheet 5

BRAKES MAINTENANCE.

6-12. Air Brake Valve. (Sheet 5 of 12)

DISASSEMBLY

12. Remove spring (30) and plug (31, Figure 6-37) from body and housing assembly.
13. Remove four screws (32), housing (33) and preformed packing (34, Figure 6-38) from body assembly. Discard preformed packing (34).
14. Remove plug (35, Figure 6-39) from body assembly.
15. Remove items 36 and 37 as an assembly from body assembly.

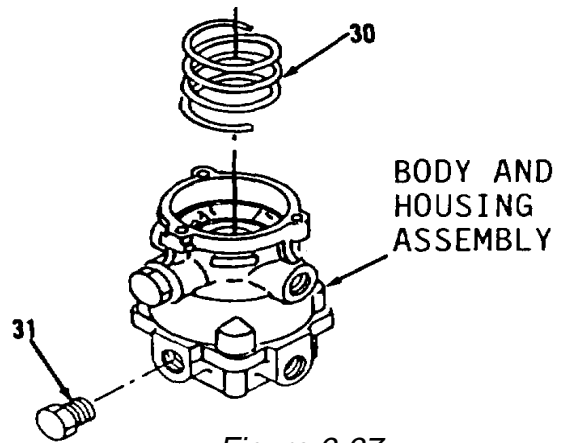


Figure 6-37.

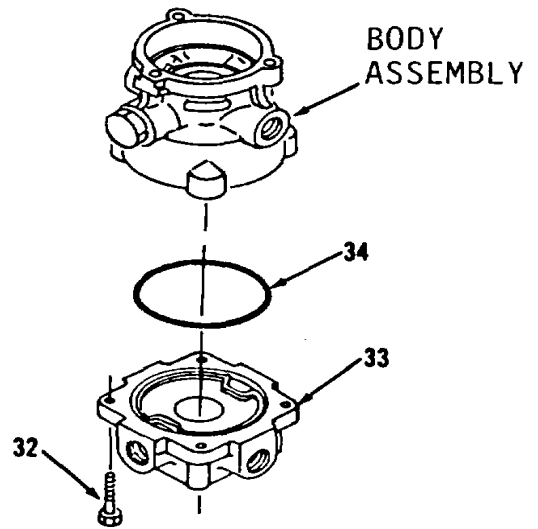


Figure 6-38.

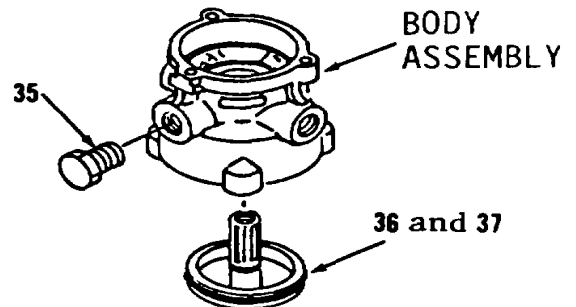


Figure 6-39.

Go to Sheet 6

BRAKES MAINTENANCE. (cont)

6-12. Air Brake Valve. (Sheet 6 of 12)

DISASSEMBLY (cont)

- 16. Remove preformed packing (36) from piston (37, Figure 6-40). Discard preformed packing (36).
- 17. Remove spring (38, Figure 6-41) from body assembly.
- 18. Remove retaining ring (39) and items 40 thru 46 as an assembly from body (47, Figure 6-42).

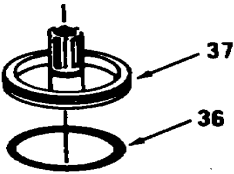


Figure 6-40.

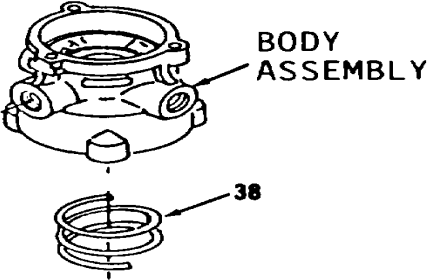


Figure 6-41.

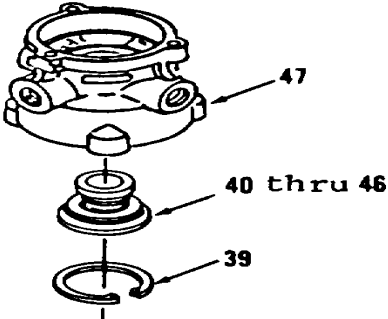


Figure 6-42.

Go to Sheet 7

BRAKES MAINTENANCE.

6-12. Air Brake Valve. (Sheet 7 of 12)

DISASSEMBLY

- 19. Remove retaining ring (40) and items 41 thru 43 as an assembly (Figure 6-43) from valve assembly.
- 20. Remove preformed packings (41 and 42) from retainer (43, Figure 6-44). Discard preformed packings (41 and 42).
- 21. Remove spring (44) and retainer (45) from valve (46, Figure 6-45).

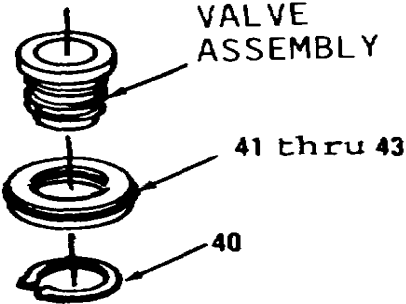


Figure 6-43.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

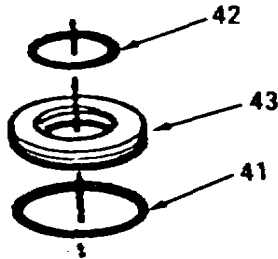


Figure 6-44.

ASSEMBLY

- 1. Install retainer (45) and spring (44) onto valve (46, Figure 6-45).
- 2. Install new preformed packings (42 and 41) onto retainer (43, Figure 6-44).
- 3. Install items 43 thru 41 as an assembly and retaining ring (40, Figure 6-43) onto valve assembly.

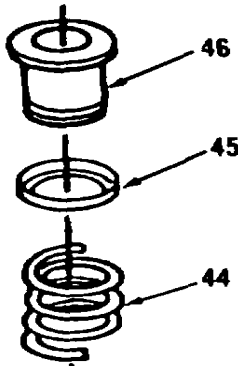


Figure 6-45.

Go to Sheet 8

BRAKES MAINTENANCE. (cont)

6-12. Air Brake Valve. (Sheet 8 of 12)

ASSEMBLY (cont)

- 4. Install items 46 thru 40 as an assembly and retaining ring (39) into body (47, Figure 6-42).
- 5. Install spring (38, Figure 6-41) into body assembly.
- 6. Install new preformed packing (36) onto piston (37, Figure 6-40).

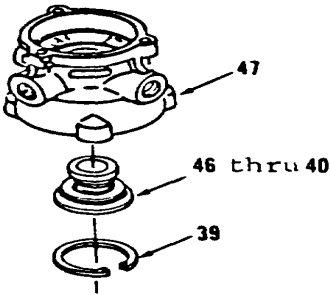


Figure 6-42.

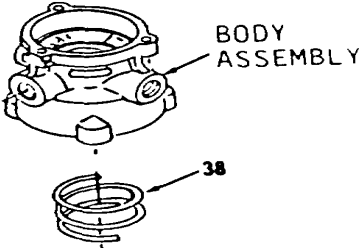


Figure 6-41.

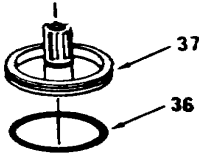


Figure 6-40.

Go to Sheet 9

BRAKES MAINTENANCE.

6-12. Air Brake Valve. (Sheet 9 of 12)

ASSEMBLY

- 7. Install items 37 and 36 as an assembly (Figure 6-39) into body assembly.
- 8. Install plug (35) into body assembly.
- 9. Install new preformed packing (34), housing (33) and four screws (32, Figure 6-38) to body assembly.
- 10. Install plug (31) and spring (30, Figure 6-37) to body and housing assembly.

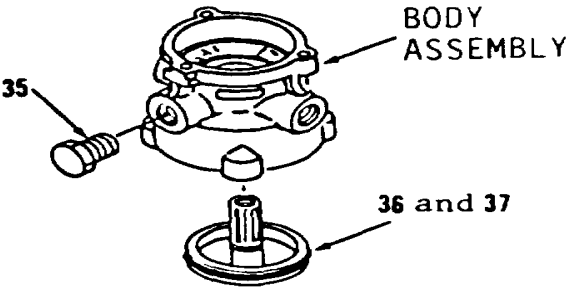


Figure 6-39.

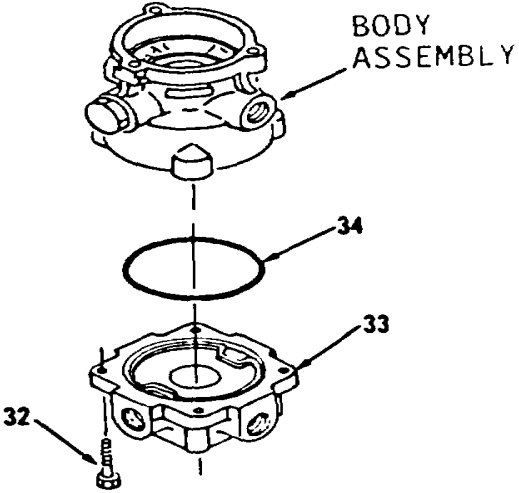


Figure 6-38.

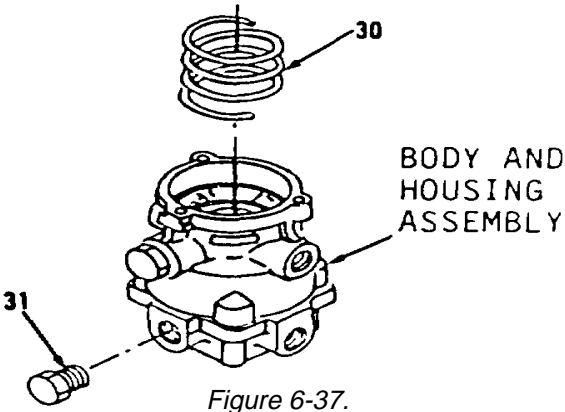


Figure 6-37.

Go to Sheet 10

BRAKES MAINTENANCE. (cont)

6-12. Air Brake Valve. (Sheet 10 of 12)

ASSEMBLY (cont)

- 11. Install new washer (28), new preformed packing (27), new rubber spring (26), seat (25) and nut (24) onto piston (29, Figure 6-36).
- 12. Install items 29 thru 24 as an assembly (Figure 6-35) into body and housing assembly.
- 13. Install stem (23), spring (22), retainer (21) and nut (20).

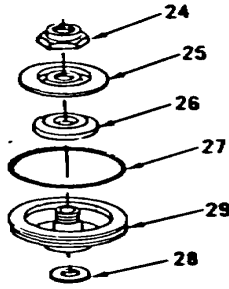


Figure 6-36.

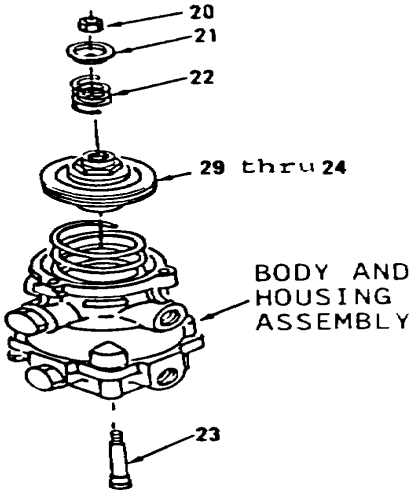


Figure 6-35.

Go to Sheet 11

BRAKES MAINTENANCE.

6-12. Air Brake Valve. (Sheet 11 of 12)

ASSEMBLY

- 14. Install retainer (18) and spring (17) onto valve (19, Figure 6-34).
- 15. Install new preformed packings (15 and 14) onto retainer (16, Figure 6-33).
- 16. Install items 16 thru 14 as an assembly (Figure 6-32) onto valve assembly.
- 17. Install retaining ring (13) onto valve assembly.

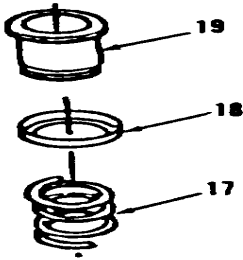


Figure 6-34.

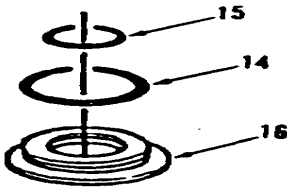


Figure 6-33.

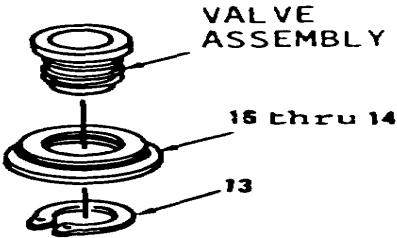


Figure 6-32.

Go to Sheet 12

BRAKES MAINTENANCE. (cont)

6-12. Air Brake Valve. (Sheet 12 of 12)

ASSEMBLY

- 18. Install items 19 thru 13 as an assembly (Figure 6-31) into body and housing assembly.
- 19. Install cover (12) and four screws (11) to body and housing assembly.
- 20. Install retainer (10) and spacer (9).
- 21. Install boot (8), plunger (7), nut (6) and screw (5).

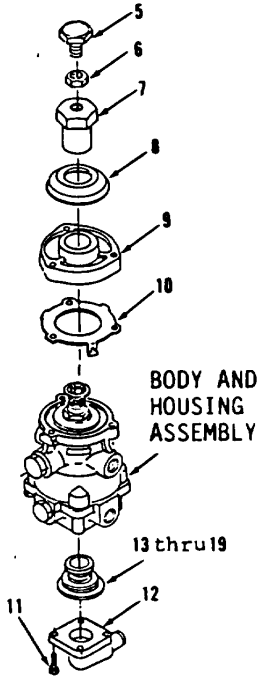


Figure 6-31.

INSTALLATION

Install air brake valve, shaft (4), bracket (3), three washers (2) and bolts (1, Figure 6-30) under right side of cab.

NOTE

Return 130C Grader to original equipment condition.

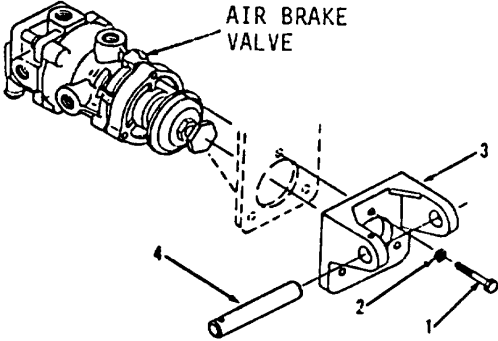


Figure 6-30.

End of Task

BRAKES MAINTENANCE.

6-13. Air Compressor Assembly. (Sheet 1 of 10)

This task covers:

- | | | |
|----------------------|-----------------------|------------------------|
| a. Removal | b. Disassembly | c. Cleaning |
| d. Inspection | e. Assembly | f. Installation |
-

INITIAL SETUP:

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Piston ring compression tool

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Lubricating oil, Item 48,
Appendix C
Gaskets, Items 8, 13, 22,
24, 37, 54
Springs, Item 14
Washers, Item 48
Rings, Items 30, 52
Preformed packing, Item 47
Grommets, Item 31

Personnel Required

Construction equipment
repairer MOS 62B

References

TM 5-3805-261-10
TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-20

Air compressor removed.

Go to Sheet 2

BRAKES MAINTENANCE. (cont)

6-13. Air Compressor Assembly. (Sheet 2 of 10)

DISASSEMBLY

1. Remove two nuts (1), springs (2) and valves (3) from cylinder head (12, Figure 6-46).
2. Remove two seats (4).
3. Remove two nuts (5), lockwashers (6), fitting (7), gasket (8) and two bolts (9). Discard gasket (8). Remove all gasket material from mounting surfaces.
4. Remove two plugs (10).
5. Remove eight bolts (11) from cylinder head (12) and block (53).

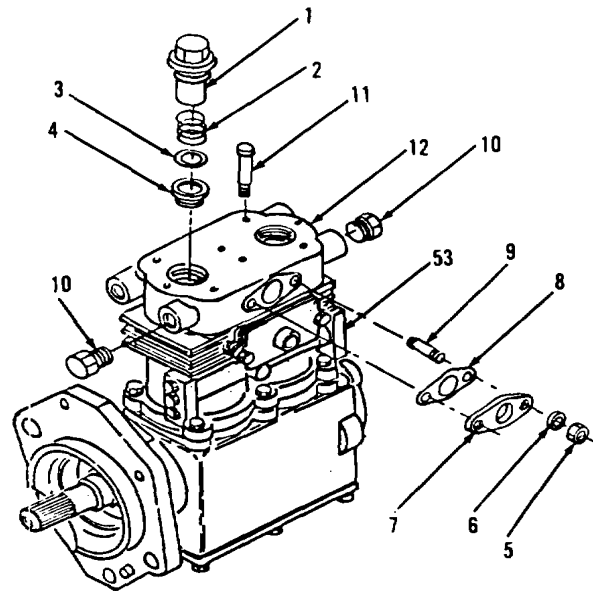


Figure 6-46.

6. Remove cylinder head (12) and gasket (13) from block (53, Figure 6-47). Discard gasket (13). Remove all gasket material from mounting surfaces.
7. Remove and discard two springs (14).
8. Remove two valve discs (15) from two guides (16).
9. Remove two guides (16) from two seats (32).
10. Remove two bolts (17) and lockwashers (18) from block (53).
11. Remove adapter (19), gasket (20), plate (21) and gasket (22). Discard gaskets (20 and 22). Remove all gasket material from mounting surfaces.

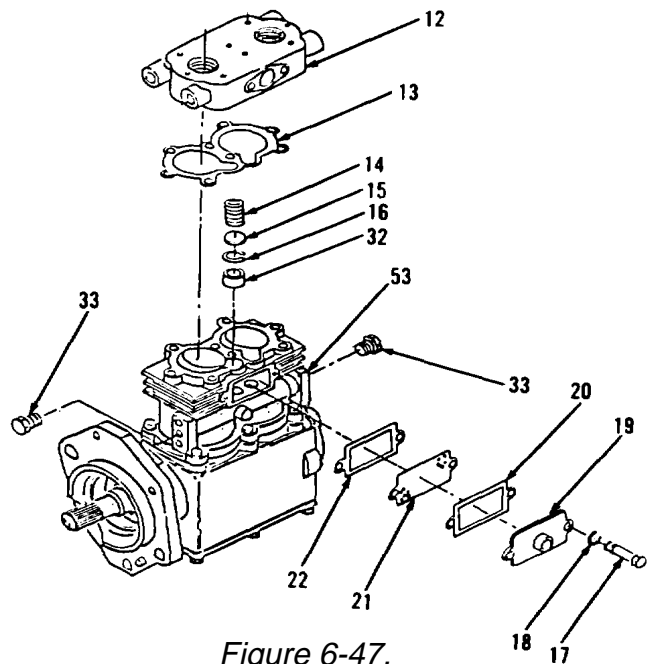


Figure 6-47.

Go to Sheet 3

BRAKES MAINTENANCE.

6-13. Air Compressor Assembly. (Sheet 3 of 10)

DISASSEMBLY

12. Remove spring (23), saddle (24) and seat (25, Figure 6-48).
13. Remove two guides (26), plungers (27), rings (28), grommets (29) and pistons (30). Discard two rings (28) and grommets (29).
14. Remove two bushings (31).

NOTE

Do not remove seats unless inspection shows need for replacement.

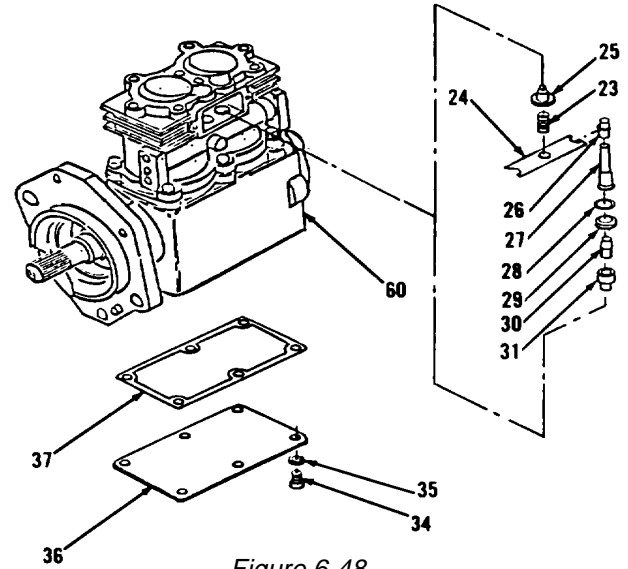


Figure 6-48.

15. Remove two seats (32).
16. Remove two plugs (33).
17. Remove six bolts (34), lock-washers (35), cover (36) and gasket (37) from bottom of crankcase (60). Discard gasket (37). Remove all gasket material from mounting surfaces.
18. Turn crankshaft (49) until a rod (58, Figure 6-49) journal is in the downward center position.

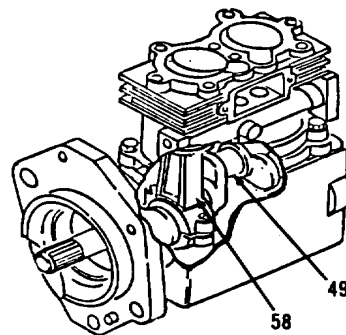


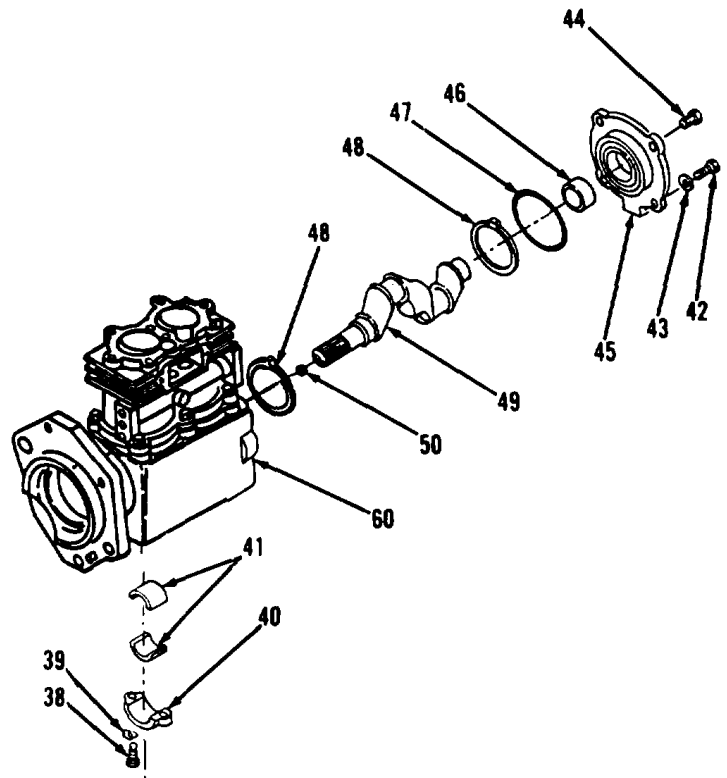
Figure 6-49.

Go to Sheet 4

BRAKES MAINTENANCE. (cont)6-13. Air Compressor Assembly. (Sheet 4 of 10)**DISASSEMBLY (cont)****NOTE**

Mark cap and rod with a metal scribe to match each cap with its rod to aid in installation. Do not interchange caps and rods.

19. Remove four bolts (38) and lock-washers (39, Figure 6-50).
20. Remove two caps (40) and four bearing halves (41).
21. Remove four bolts (42), lock-washers (43) and plug (44) from cover (45) at back end of crankcase (60).
22. Remove cover (45), bearing (46) and preformed packing (47). Discard preformed packing (47).
23. Remove two washers (48) and crankshaft (49) from bottom of crankcase (60). Discard two washers (48).
24. Remove plug (50) from end of crankshaft (49).

*Figure 6-50.***Go to Sheet 5**

BRAKES MAINTENANCE.

6-13. Air Compressor Assembly. (Sheet 5 of 10)

DISASSEMBLY

25. Remove six bolts (51) and lock-washers (52) from block (53) on crankcase (60, Figure 6-51).
26. Remove block (53) and gasket (54) from crankcase (60). Discard gasket (54). Remove all gasket material from mounting surfaces.

NOTE

Steps 32 thru 36 are for removal of one rod and piston assembly. Repeat these steps for disassembly of remaining rod and piston assembly.

27. Remove items 55 thru 59 as an assembly by pushing up through top of crankcase (60).
28. Remove and discard three rings (55) from piston (59, Figure 6-52).
29. Remove two plugs (56) from piston (59).
30. Remove pin (57), if necessary.
31. Remove rod (58) from piston (59).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

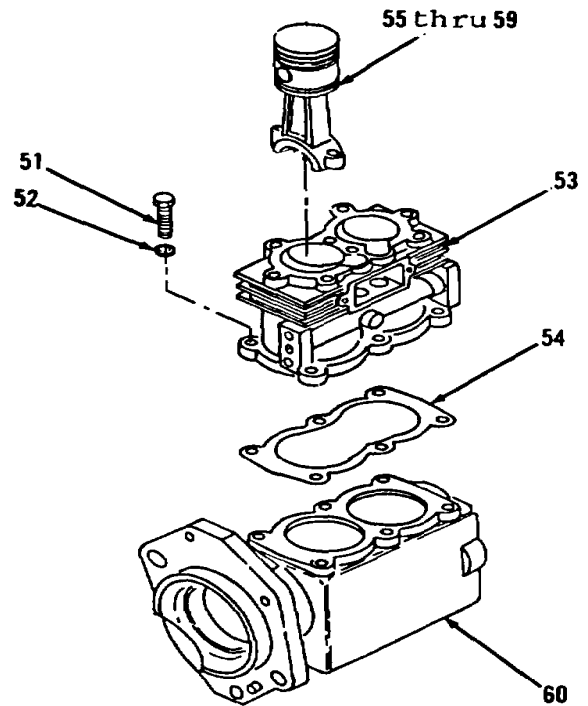


Figure 6-51.

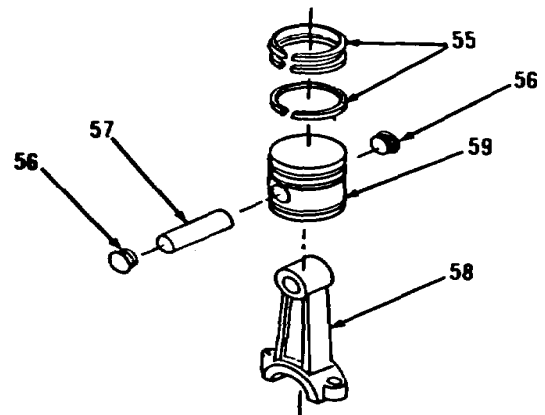


Figure 6-52.

Go to Sheet 6

BRAKES MAINTENANCE. (cont)

6-13. Air Compressor Assembly. (Sheet 6 of 10)

ASSEMBLY

- 1. Lubricate rear opening of crankcase (60) and bearing (46, Figure 6-53).
- 2. Install bearing (46) and new preformed packing (47) on cover (45).
- 3. Position new gasket (54) and block (53) on top of crankcase (60).
- 4. Install six lockwashers (52 and bolts (51).
- 5. Install plug (50) in end of crankshaft (49).
- 6. Position two new washers (48) and crankshaft (49) in crankcase (60).

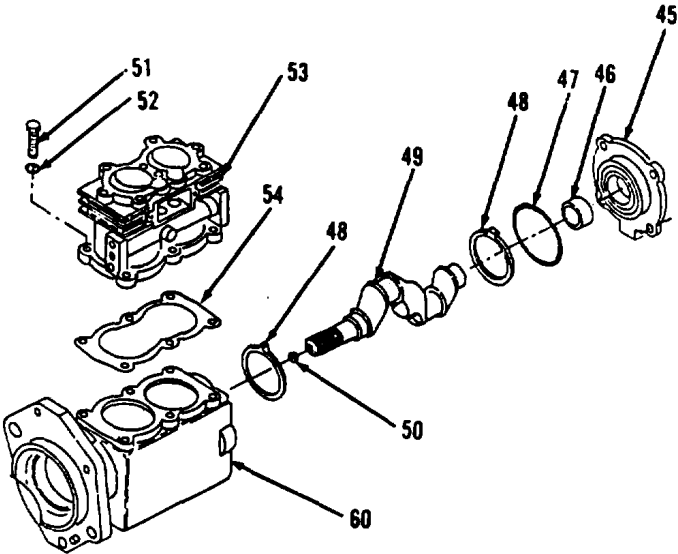


Figure 6-53.

Go to Sheet 7

BRAKES MAINTENANCE.

6-13. Air Compressor Assembly. (Sheet 7 of 10)

ASSEMBLY

- 7. Position items 47 thru 45 as an assembly on end of crankcase (60, Figure 6-54).
- 8. Install four lockwashers (43) and bolts (42).
- 9. Install plug (44) and tighten to 16 ft-lb torque.

NOTE

Steps 11 thru 19 are for assembly of one rod and piston assembly. Repeat these steps for assembly of remaining rod and piston assembly.

- 10. Lubricate piston (59) and three new rings (55) with oil.
- 11. Install three new rings (55) on piston (59). Stagger the position of gaps between three rings (55) 120 degrees apart.
- 12. Position rod (58) in piston (59).
- 13. Install pin (57) by pressing pin (57) in piston (59) and rod (58).
- 14. Install two plugs (56) in piston (59).
- 15. Using piston ring compression tool, compress three rings (55) in grooves of piston (59).
- 16. Turn crankshaft (49) until one of the rod (58, Figure 6-49) journals is in the downward center position.

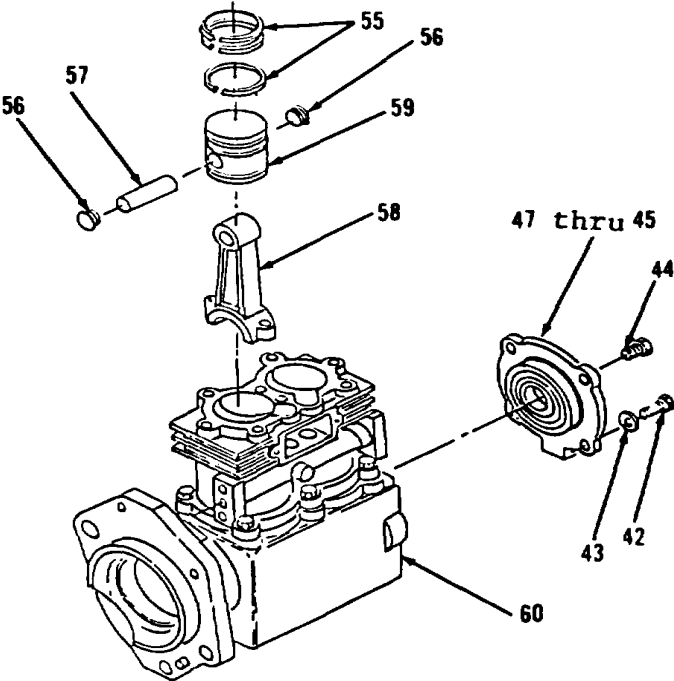


Figure 6-54.

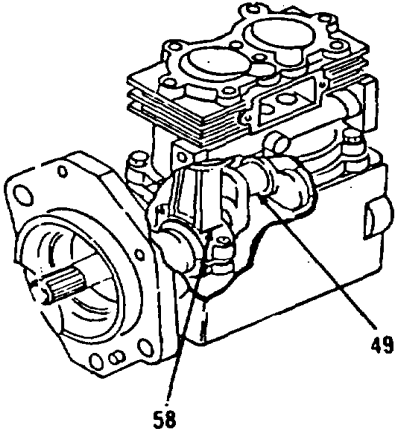


Figure 6-49.

Go to Sheet 8

BRAKES MAINTENANCE. (cont)

6-13. Air Compressor Assembly. (Sheet 8 of 10)

ASSEMBLY (cont)

- 17. Lubricate and install one of two bearing halves (41, Figure 6-55) on upper half of journal.
- 18. Position items 59 thru 55 as an assembly on upper half of one of two bearing halves (41) and journal.
- 19. Position one of two bearing halves (41) and cap (40) on lower half of journal.
- 20. Install four lockwashers (39) and bolts (38). Tighten four bolts (38) evenly. Bend four lockwashers (39) up against hex heads of four bolts (38).
- 21. Position new gasket (37) and cover (36) on bottom of crankcase (60).
- 22. Install six lockwashers (35) and bolts (34).
- 23. Install two plugs (33) in block (53).

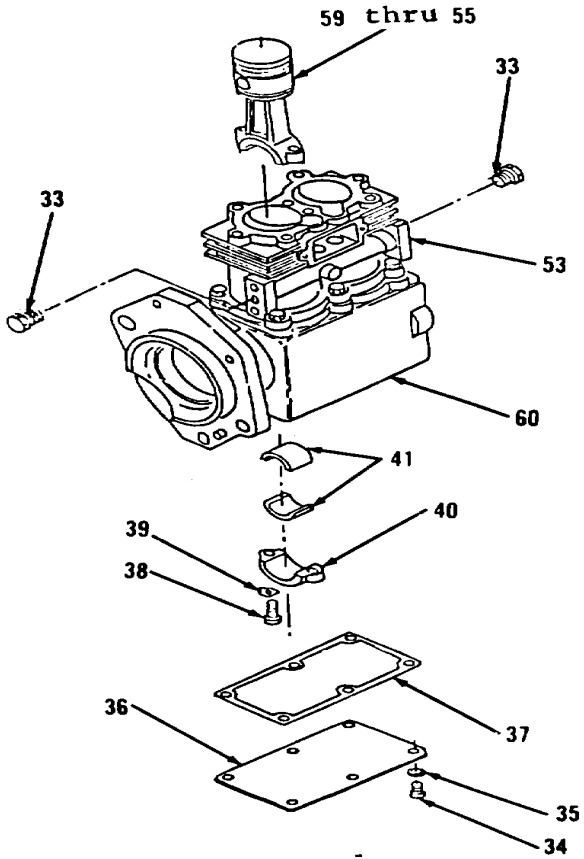


Figure 6-55.

Go to Sheet 9

BRAKES MAINTENANCE.

6-13. Air Compressor Assembly. (Sheet 9 of 10)

ASSEMBLY

NOTE

Make sure there is a loose sliding fit between the guide and the valve.
The dimension from top of block to seat should be a minimum of 0.101 inch and a maximum of 0.118.

24. Install two seats (32), guides (16) and valve discs (15, Figure 6-56).

25. Install two bushings (31) in unloader bore block.

26. Lubricate and install two new grommets (29) and two new rings (28) on pistons (30).

27. Lubricate two pistons (30) and bore in block (53).

28. Install two new springs (14) in cylinder head (12). Use small quantity of petroleum jelly to hold two springs (14) in place in cylinder head (12) so they will not fall out.

29. Position new gasket (13) and cylinder head (12) on block (53) with two springs (14) positioned over two valve discs (15) in block (53).

30. Install eight bolts (11).

31. Install items 30 thru 28 as an assembly (Figure 6-57).

32. Install two plungers (27) and guides (26). Slip two plungers (27) in top of two pistons (30).

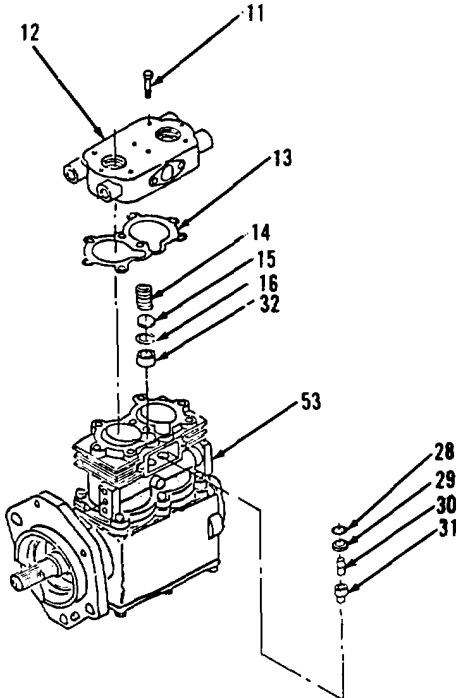


Figure 6-56.

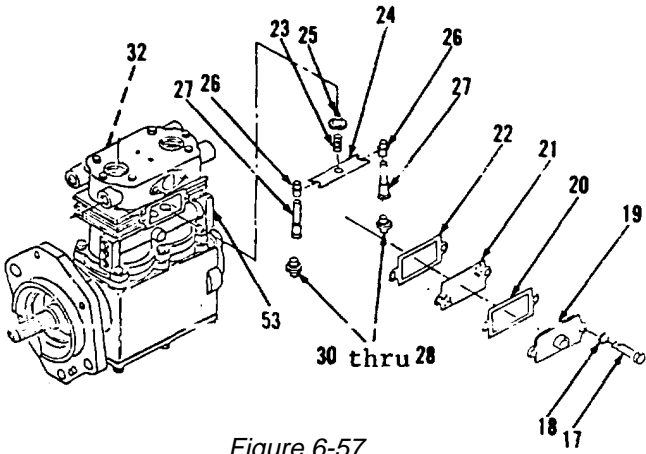


Figure 6-57.

Go to Sheet 10

BRAKES MAINTENANCE. (cont)

6-13. Air Compressor Assembly. (Sheet 10 of 10)

ASSEMBLY (cont)

33. Install seat (25) in small, drilled hole inside of block (53).
34. Install saddle (24) in unloader mechanism of block (53) by positioning forks of saddle (24) so they are centered on guides (26).
35. Install spring (23). Make sure spring (23) fits over seats (25 and 32) in both block (53) and on saddle (24).
36. Position new gasket (22), plate (21), new gasket (20) and adapter (19).
37. Install two lockwashers (18) and bolts (17).
38. Install two plugs (10, Figure 6-46).
39. Install two bolts (9) in side of cylinder head (12) on block (53).
40. Position new gasket (8) and fitting (7).
41. Install two lockwashers (6) and nuts (5).
42. Insert two seats (4), valves (3) and springs (2) in top of cylinder head (12).
43. Install two nuts (1).

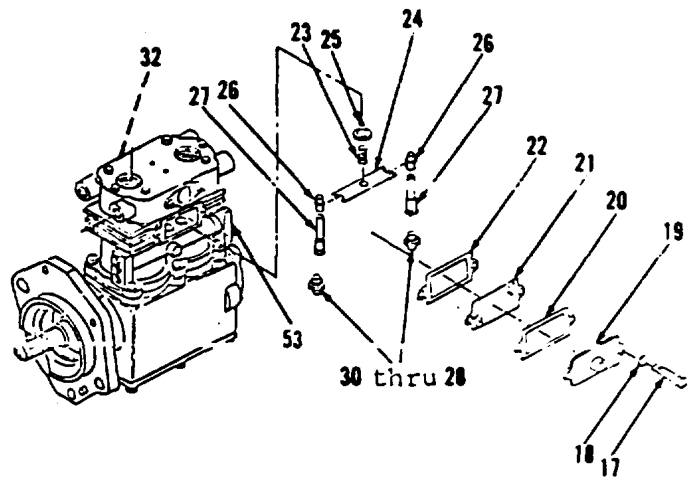


Figure 6-57.

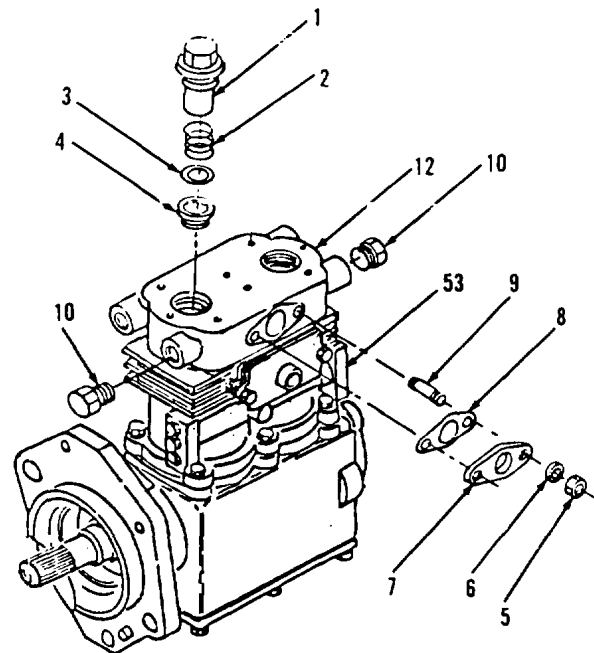


Figure 6-46.

NOTE

Return 130C Grader to original equipment condition.

End of Task

BRAKES MAINTENANCE.

6-14. Air Compressor Governor. (Sheet 1 of 6)

This task covers:

- | | | |
|----------------------|-----------------------|------------------------|
| a. Removal | b. Disassembly | c. Cleaning |
| d. Inspection | e. Assembly | f. Installation |
-

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Grease, Item 26, Appendix C
Preformed packing, Item 27
Grommet, Item 24

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Left side panel removed.
Air pressure relieved.

Go to Sheet 2

BRAKES MAINTENANCE. (cont)

6-14. Air Compressor Governor. (Sheet 2 of 6)

REMOVAL

WARNING

Do not disconnect air lines until air pressure is at zero.

- 1. Remove air line (1) from elbows (2 and 3) on air compressor governor (30, Figure 6-58).
- 2. Remove elbows (2 and 3) from air compressor governor (30).

CAUTION

Do not remove bottom two bolts in mounting bracket.

- 3. Remove two bolts (4), washers (5 and 6), two spacers (7) and nuts (8) from bracket and air compressor governor (30).
- 4. Disconnect air tank line (9) from air compressor governor (30).
- 5. Remove connector (10) and elbow (11).
- 6. Remove items 12 thru 30 as an assembly.

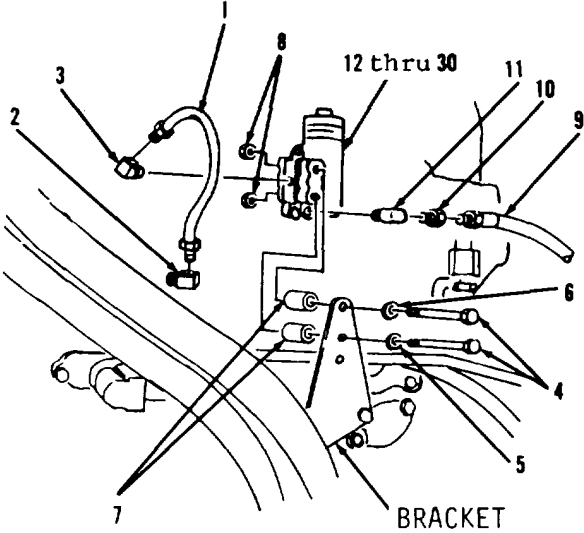


Figure 6-58.

Go to Sheet 3

BRAKES MAINTENANCE.

6-14. Air Compressor Governor. (Sheet 3 of 6)

DISASSEMBLY

WARNING

Wear safety goggles. Some components contain powerful springs and may cause INJURY if not properly disassembled.

1. Remove cover (12) and retaining ring (13, Figure 6-59).
2. Remove items 14 thru 20 as an assembly from air compressor governor (30).
3. Remove lock nut (14) from screw (20, Figure 6-60).
4. Remove seat (15).
5. Remove spring (16), seat (17), guide (18), seat (19) and screw (20).
6. Remove spring (21), washer (22) and stem (23) from air compressor governor (30).
7. Remove and discard grommet (24).
8. Turn air compressor governor (30, Figure 6-61) upside down and tap slightly.
9. Remove items 25 thru 28 as an assembly from air compressor governor (30).

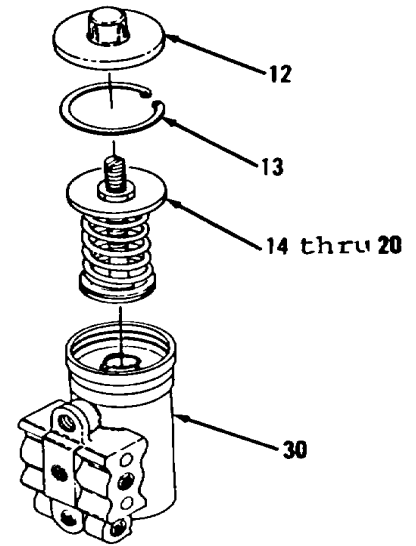


Figure 6-59.

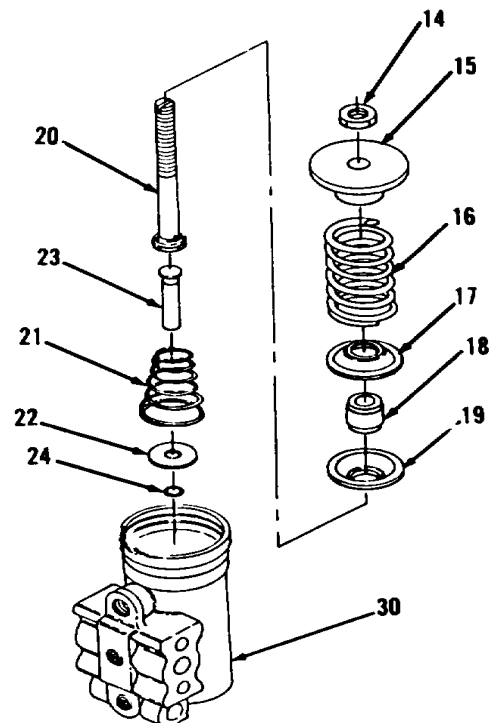


Figure 6-60.

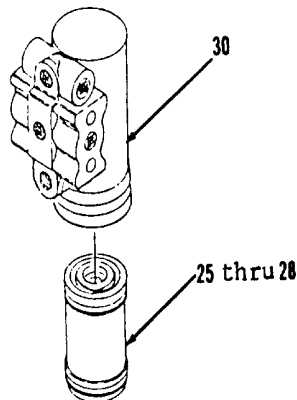


Figure 6-

Go to Sheet 4

BRAKES MAINTENANCE. (cont)**6-14. Air Compressor Governor.** (Sheet 4 of 6)

DISASSEMBLY (cont)

10. Turn air compressor governor (30, Figure 6-62) right side up.
11. Remove valve (25) and valve spring (26).
12. Remove and discard two preformed packings (27) from piston (28).
13. Remove two filters (29) from air compressor governor (30).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Lubricate air compressor governor (30) and piston (28) with grease.
2. Install two filters (29) in air compressor governor (30, Figure 6-62).
3. Turn piston (28) upside down.
4. Lubricate two new preformed packings (27) with grease and install in piston (28).
5. Drop valve (25) into place inside bottom of piston (28).
6. Install valve spring (26) into bottom of piston (28) with small end against valve (25). Dress down until the larger coiled end snaps into the groove inside piston (28). Turn piston (28) upright.

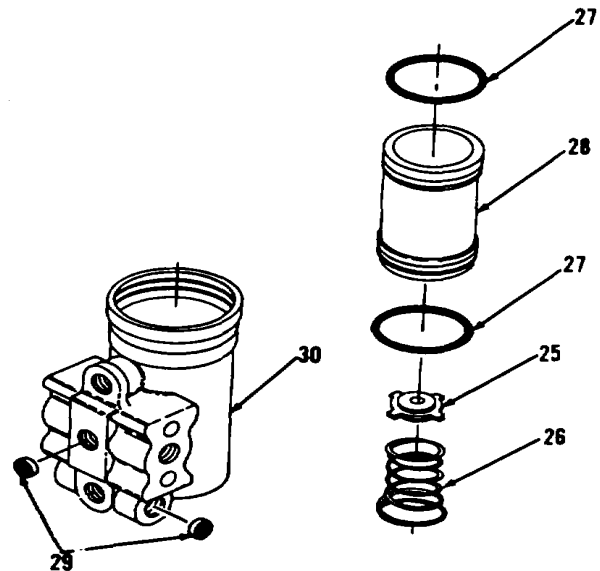


Figure 6-62.

Go to Sheet 5

BRAKES MAINTENANCE.

6-14. Air Compressor Governor. (Sheet 5 of 6)

ASSEMBLY

7. Install items 28 thru 25 as an assembly in air compressor governor (30, Figure 6-61).
8. Install new grommet (24) on stem (23, Figure 6-60) bore.
9. Install stem (23).
10. Position spring (21) over stem (23).
11. Install washer (22) and spring (21). Press carefully into spring bore of piston (28).
12. Lubricate screw (20) and guide (18) with grease.
13. Position screw (20).
14. Install seat (19), guide (18), seat (17) and spring (16) onto screw (20).
15. Install seat (15) and screw down onto screw (20) until dimension from top of seat (15) to bottom of screw (20) is approximately 1-7/8 inches.
16. Install lock nut (14).

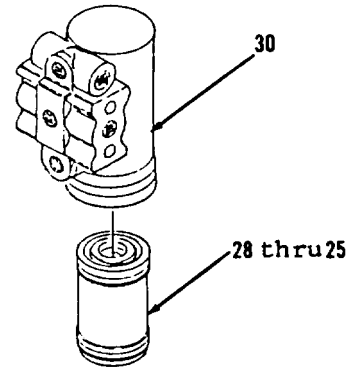


Figure 6-61.

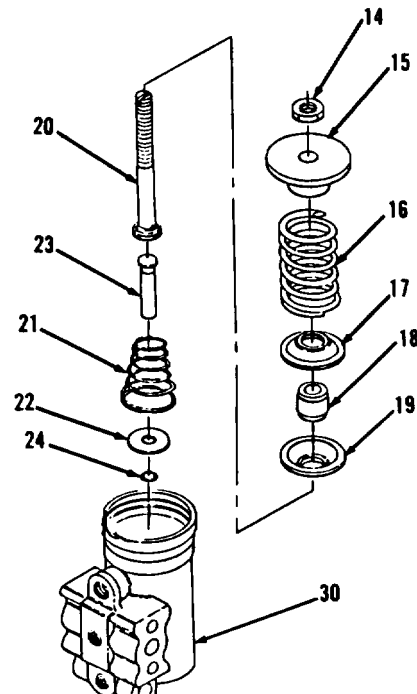


Figure 6-60.

**Go to Sheet 6
6-73**

BRAKES MAINTENANCE. (cont)

6-14. Air Compressor Governor. (Sheet 6 of 6)

ASSEMBLY (cont)

- 17. Install items 20 thru 14 as an assembly in air compressor governor (30, Figure 6-59).
- 18. Install retaining ring (13).
- 19. Install cover (12) on air compressor governor (30) tightly after checks have been completed.

INSTALLATION

- 1. Install items 30 thru 12 as an assembly.
- 2. Install elbow (11) and connector (10) on air compressor governor (30, Figure 6-58).
- 3. Connect air tank line (9).
- 4. Install two nuts (8), spacers (7), washers (6 and 5) and two bolts (4) to secure items 30 thru 12 as an assembly to bracket.
- 5. Install elbows (3 and 2) on air compressor governor (30).
- 6. Install air line (1) on elbows (3 and 2).

NOTE

Return 130G Grader to original equipment condition.

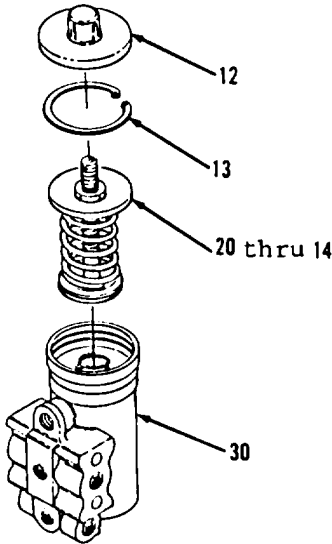


Figure 6-59.

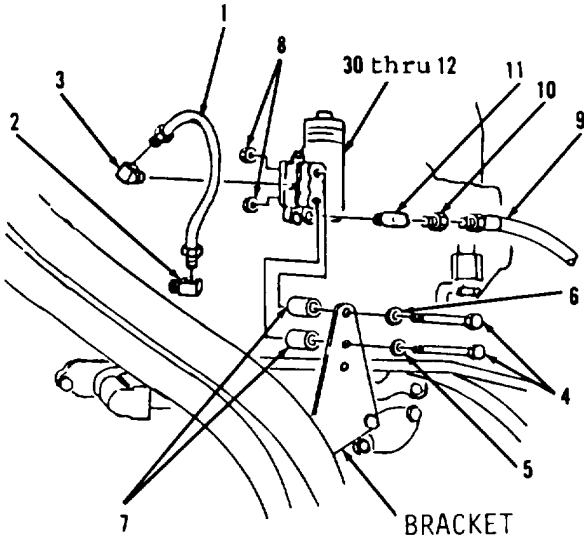


Figure 6-58.

**End of Task
6-74**

CHAPTER 7

WHEEL AND TIRE MAINTENANCE

CHAPTER OVERVIEW

The purpose of this chapter is to help the technician efficiently troubleshoot and repair malfunctioning equipment and to perform authorized direct support level maintenance procedures on the 130 Grader wheels and tires.

| <u>Section</u> | <u>Title</u> | <u>INDEX</u> | <u>Paragraph</u> | <u>Page</u> |
|----------------|---------------------------------------|--------------|------------------|-------------|
| I | WHEEL AND TIRE MAINTENANCE | | | |
| | Wheel and Tire Maintenance Procedures | | 7-1 | 7-2 |
| | Tire Removal | | 7-2 | 7-3 |
| | | 7-1 | | |

Section I. WHEEL AND TIRE MAINTENANCE.

7-1. WHEEL AND TIRE MAINTENANCE PROCEDURES.

- a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the wheel and tire and its components in good repair.
- b. This section is arranged by functional group code and provides a list of wheel and tire components to be maintained and step-by-step maintenance procedures.

| <u>Title</u> | INDEX | <u>Paragraph</u> | <u>Page</u> |
|--------------|------------|------------------|-------------|
| Tire Removal | | 7-2 | 7-3 |
| | 7-2 | | |

WHEEL AND TIRE MAINTENANCE.

7-2. Tire Removal. (Sheet 1 of 5)

This task covers: **a. Removal** **b. Cleaning** **c. Inspection**
 d. Installation

INITIAL SETUP:

Applicable Configurations
 All

Personnel Required
 Construction equipment
 repairer MOS 62B

Tools
 General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)
 Hoist and sling
 Pneumatic tire valve repair tool
 Pneumatic tire inflator gage
 Tire iron

References
 TM 5-3805-261-10
 TM 5-3805-261-20

Special Environmental Conditions
 None

Test Equipment
 None

General Safety Instructions
 None

Materials/Parts
 Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Rubber lubricant "Ru-Glyde",
 1 gal.
 Grommet, Item 8
 Preformed packing, Item 5

Torques
 All fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References
 None

Equipment Condition
 TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

TM 5-3805-261-20

Wheel and tire assembly removed.

Go to Sheet 2

Change 1 7-3

WHEEL AND TIRE MAINTENANCE. (cont)**7-2. Tire Removal.** (Sheet 2 of 5)

REMOVAL

WARNING

All air must be exhausted from tire.
Check the valve stem by running a piece of wire through it to make sure that it is not plugged.

1. Remove valve cap (1, Figure 7-1) and exhaust air from tire.
2. Using pneumatic tire valve repair tool, remove valve core (2).
3. Using a hammer and pry bars, remove lock ring (3).
4. Using a tire iron, break seal between tire bead and wheel rim around entire circumference of tire, inserting pieces of spare metal stock to prevent tire from reseating itself on wheel rim.
5. Using pry bars, remove flange (4).
6. Remove and discard preformed packing (5).

WARNING

Weight of wheel and tire assembly is approximately 485 lbs. for the front wheel and 430 lbs. for the rear wheel. Use suitable hoist and sling for lifting. Failure to do so may cause INJURY. If you are injured, seek medical aid immediately.

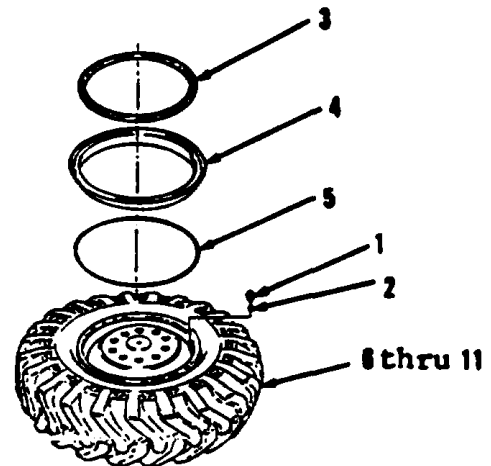


Figure 7-1.

Go to Sheet 3

7-4

WHEEL AND TIRE MAINTENANCE.**7-2. Tire Removal.** (Sheet 3 of 5)**REMOVAL**

7. Attach hoist and sling to items 6 thru 11 as an assembly, lift up, turn over and lower to work area with inside of wheel facing upward. Remove hoist and sling.
8. Using sledge hammer, remove items 7 thru 11 as an assembly from tire (6) and set down on work surface with stem (10, Figure 7-2) facing upward.
9. Remove spud (7), grommet (8), nut (9) and valve stem (10) from wheel (11, Figure 7-3). Discard grommet (8).

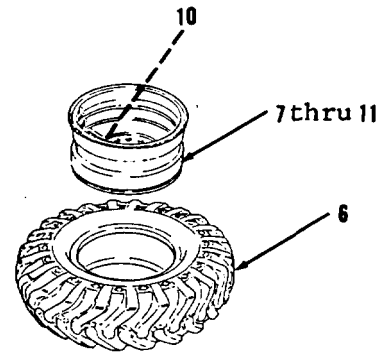


Figure 7-2.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Install valve stem (10), nut (9), new grommet (8) and spud (7) to wheel (11, Figure 7-3).

CAUTION

Do not use soap or detergent solutions to lubricate tire.

2. Apply rubber lubricant to inside bead of tire (6, Figure 7-2).

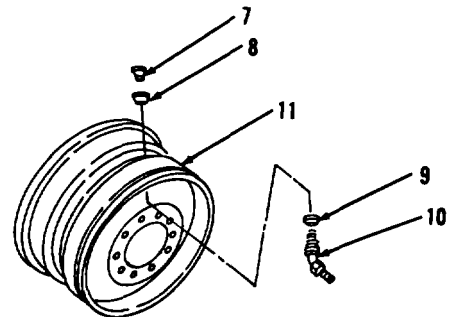


Figure 7-3.

**Go to Sheet 4
7-5**

WHEEL AND TIRE MAINTENANCE. (cont)

7-2. Tire Removal. (Sheet 4 of 5)

INSTALLATION (cont)

3. Install items 11 thru 7 as an assembly to tire (6, Figure 7-2).
4. Attach hoist and sling to items 11 thru 6 as an assembly, lift up, turn over and set down on work surface with inside face of wheel (11, Figure 7-1) downward. Remove hoist and sling.
5. Install flange (4) to wheel (11), making sure that groove for preformed packing (5, Figure 7-4) is exposed around entire circumference of wheel.
6. Apply non-detergent rubber lubricant to new preformed packing (5).

NOTE

Make sure that preformed packing is not twisted or cut during installation.

7. Install preformed packing (5) in second (shallow) groove of wheel (11, Figure 7-5).

NOTE

Make sure that lock ring is seated in first groove all around wheel.

8. Install lock ring (3) in first (deep) groove of wheel (11).
9. Apply non-detergent lubricant to bead of outer side of tire.

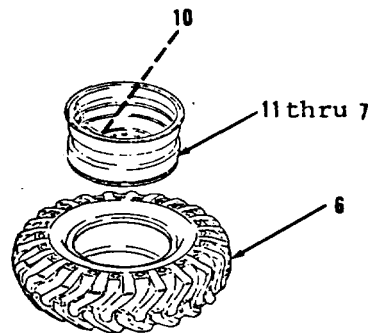


Figure 7-2.

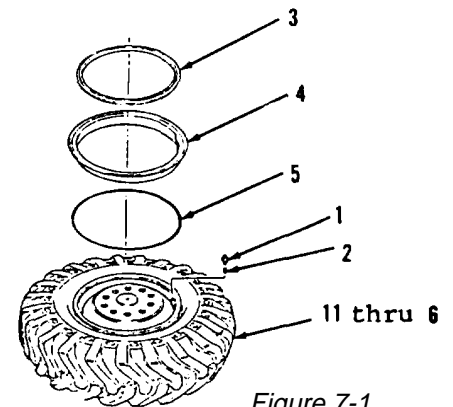


Figure 7-1.

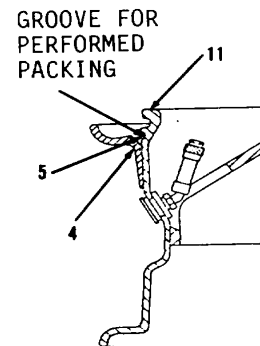


Figure 7-4.

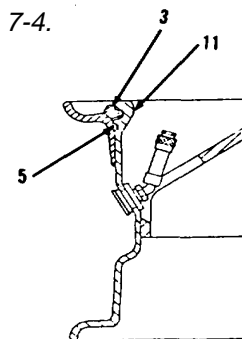


Figure 7-5.

WHEEL AND TIRE MAINTENANCE.**7-2. Tire Removal.** (Sheet 5 of 5)

INSTALLATION

10. Check to see that valve core is still not installed, then attach a pneumatic tire inflator-gage to valve stem (10, Figure 7-6).

WARNING

TIRE INFLATION

Stand behind tread when inflating tires. Ensure that tires are properly seated on rims. Correct pressure is 35 psi. Improperly seated and overinflated tires can burst with explosive force. Failure to follow these procedures may cause INJURY. If injured, seek medical aid immediately.

11. Inflate tire (11) to 35 psi. You may have to compress tire (11), using chains and cable hoist to get the beads to seat.
12. Remove air chuck and exhaust air from tire.
13. Install valve core (2, Figure 7-7).
14. Inflate tire (11) to 35 psi, observing WARNING which precedes step 11.
15. Install valve cap (1).

NOTE

Return 130G Grader to original equipment condition.

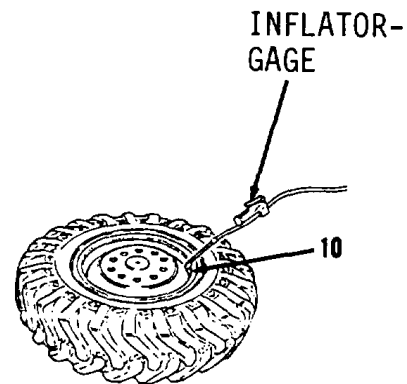


Figure 7-6.

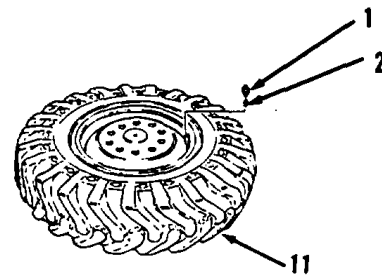


Figure 7-7.

End of Task
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CHAPTER 8
STEERING TROUBLESHOOTING
AND MAINTENANCE

CHAPTER OVERVIEW

The purpose of this chapter is to help the technician efficiently troubleshoot and repair malfunctioning equipment and to perform authorized organizational support level maintenance procedures on the 130G Grader.

| INDEX | | | | |
|----------------|-------------------------------------|--|------------------|-------------|
| <u>Section</u> | <u>Title</u> | | <u>Paragraph</u> | <u>Page</u> |
| I | STEERING TROUBLESHOOTING | | | |
| | General Information | | 8-1 | 8-2 |
| | Steering Troubleshooting Procedures | | 8-2 | 8-2 |
| II | STEERING MAINTENANCE | | | |
| | Steering Maintenance Procedures | | 8-3 | 8-6 |
| | Steering Control Pump | | 8-4 | 8-7 |
| | Steering Cylinder | | 8-5 | 8-12 |
| | Steering Valve | | 8-6 | 8-18 |
| | Combination Valve | | 8-7 | 8-21 |

Section I. STEERING TROUBLESHOOTING.

8-1. GENERAL INFORMATION. This section lists the common steering malfunctions which may occur during the operation of the 130G Grader. You should perform the tests, inspections and corrective actions in the order listed. Follow the troubleshooting procedures listed below step-by-step until you can go no further.

8-2. STEERING TROUBLESHOOTING PROCEDURES. This section cannot list all possible malfunctions, nor can it list all possible tests, inspections or corrective actions. If a malfunction is not listed, contact your supervisor.

STEERING TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

- a. WHEELS TURN SLOWLY OR NOT AT ALL WHEN STEERING WHEEL IS TURNED.

Step 1. Check steering pressure reducing valve. Reducing valve is part of steering combination valve. Vent hydraulic system. Refer to LO 5-3805-261-12. Remove plug and preformed packing from reducing valve (Figure 8-1). Install multi-range pressure gage. Start engine and operate all implements to raise temperature of hydraulic oil to 145 to 150 degrees F. Refer to TM 5-3805-261-10. Increase engine speed to 1500 rpm. Pressure gage should read 1800 to 1850 psi. Stop engine.

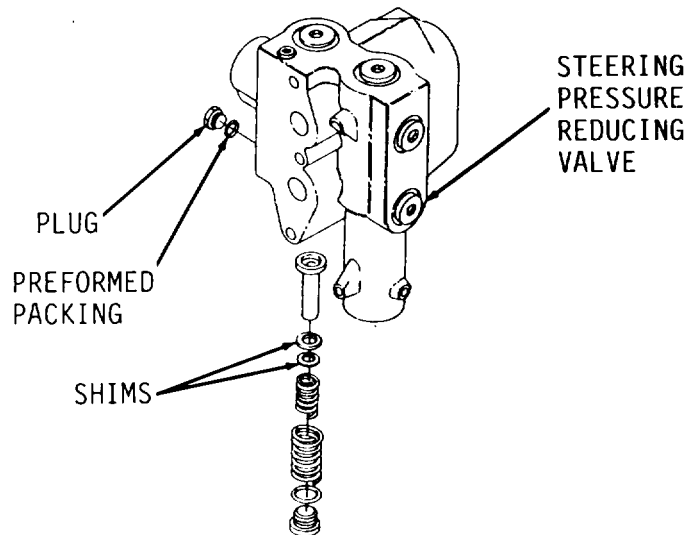


Figure 8-1.

If pressure is within limits, go to Step 2. To change pressure, add or remove shim(s) as required (Figure 8-1). One shim will change pressure approximately 25 psi. Refer to paragraph 8-7.

STEERING TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

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

- a. WHEELS TURN SLOWLY OR NOT AT ALL WHEN STEERING WHEEL IS TURNED.

NOTE

Steps 2 and 3 are for the right steering valve. Repeat steps 2 and 3 for the left steering valve.

Step 2. Check pressure at steering valve. Remove plug and preformed packing from relief valve (Figure 8-2). Install multi-range pressure gage. Start engine. Hydraulic oil must be 145 to 155 degrees F. Increase to 1500 rpm. Turn steering wheel to right three turns from straight ahead position or until wheels hit stops. Refer to TM 5-3805-261-10. Pressure gage should read 1850 to 1900 psi.

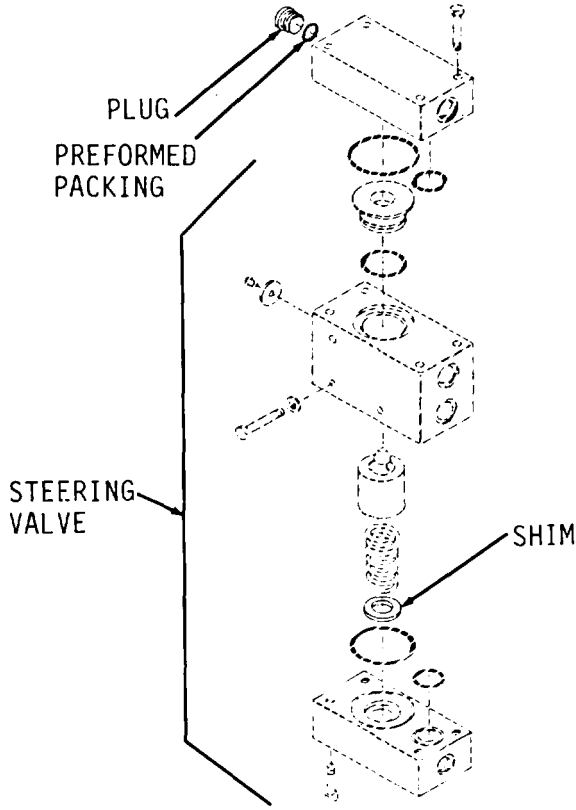


Figure 8-2.

If pressure is too low, go to step 3. If pressure is within limits, go to step 4. If pressure is too high, relief valve is stuck closed. Repair relief valve. Refer to paragraph 8-6.

STEERING TROUBLESHOOTING AND MAINTENANCE PROCEDURES. (cont)

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

a. **WHEELS TURN SLOWLY OR NOT AT ALL WHEN STEERING WHEEL IS TURNED. (cont)**

Step 3. Remove steering valve. Refer to TM 5-3805-261-20. Test valve on hydraulic test bench. Valve should open at 2343 to 2400 psi at 4.7 to 5.3 gpm.

If valve does not open properly, add or remove shim(s). One shim will change pressure approximately 170 psi. Refer to paragraph 8-6. If valve opens properly, go to step 4.

Step 4. Remove steering control pump. Refer to TM 5-3805-261-20. Disassemble pump and inspect for any worn or damaged parts. Refer to paragraph 8-4.

Replace any worn or damaged parts. Refer to paragraph 8-4.

b. **MACHINE HAS SUPPLEMENTAL STEERING, BUT NO PRIMARY STEERING.**

Remove the supplemental steering check valve that is mounted on the steering combination valve. Inspect supplemental steering check valve for proper installation. Refer to TM 5-3805-261-20. Arrow on check valve must point toward front of machine.

If check valve was installed properly, clean or replace check valve. Refer to TM 5-3805-261-20.

c. **SUPPLEMENTAL STEERING MOTOR STATUS LIGHT OFF, BUT SUPPLEMENTAL STEERING MOTOR AND PUMP RUNS WHEN ENGINE IS RUNNING.**

Remove the supplemental steering check valve that is mounted under left side of the cab. Inspect supplemental steering check valve for proper installation. Refer to TM 5-3805-261-20. Arrow on valve must point toward front of machine.

If check valve was installed properly, clean or replace check valve. Refer to TM 5-3805-261-20.

STEERING TROUBLESHOOTING AND MAINTENANCE PROCEDURES.

**MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION**

- d. STEERING EFFORT IS MORE FOR SUPPLEMENTAL STEERING THAN FOR PRIMARY STEERING.

Remove supplemental steering relief valve. Refer to TM 5-3805-261-20. Install multi-range pressure gage in discharge port of relief valve. Install relief valve with gage on vehicle (Figure 8-3). With engine stopped, use auto/manual switch to manually operate the supplemental steering system. Refer to TH 5-3805-261-10. Pressure gage should read 1725 to 1925 psi.

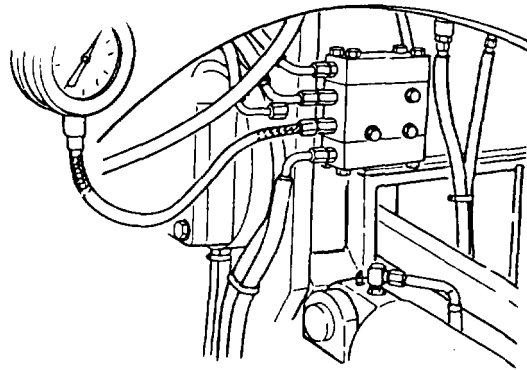


Figure 8-3.

If pressure is not correct, replace relief valve. Refer to TM 5-3805-261-20.

Section II. STEERING MAINTENANCE.

8-3. STEERING MAINTENANCE PROCEDURES.

- a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the organizational support level to keep the steering and its components in good repair.
- b. This section is arranged by functional group code and provides a list of steering components to be maintained and step-by-step maintenance procedures.

| <u>Title</u> | INDEX | <u>Paragraph</u> | <u>Page</u> |
|-----------------------|-------|------------------|-------------|
| Steering Control Pump | | 8-4 | 8-7 |
| Steering Cylinder | | 8-5 | 8-12 |
| Steering Valve | | 8-6 | 8-18 |
| Combination Valve | | 8-7 | 8-21 |

STEERING MAINTENANCE.**8-4. Steering Control Pump.** (Sheet 1 of 5)

This task covers: a. Disassembly b. Cleaning c. Inspection
 d. Installation

INITIAL SETUP:Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Torque wrench (3/4 inch drive)

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Lubricating oil, Item 48,
Appendix C
Preformed packings, Items 9,
13, 16, 25, 27, 29
Seals, Items 33, 34

Personnel Required

Construction equipment
repairer MOS 62B

References

TM 5-3805-261-10
TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Steering control pump removed.

Go to Sheet 2

STEERING MAINTENANCE. (cont)

8-4. Steering Control Pump. (Sheet 2 of 5)

DISASSEMBLY

1. Remove four bolts (1) and items 2 thru 6 as an assembly (Figure 8-4) from control pump.
2. Remove snap rings (2 and 3), bearing (4) and shaft (5) from housing (6, Figure 8-5).
3. Remove seven bolts (7), cap (8) and preformed packing (9) from items 17 thru 35 as an assembly (Figure 8-6). Discard preformed packing (9).
4. Remove gerotor (10), spacer (11), inner gear (12), preformed packing (13), drive (14), spacer (15) and preformed packing (16). Discard preformed packings (13 and 16).
5. Remove items 20 thru 23 as an assembly, race (17), bearing (18) and race (19) from items 24 thru 35 as an assembly (Figure 8-7).

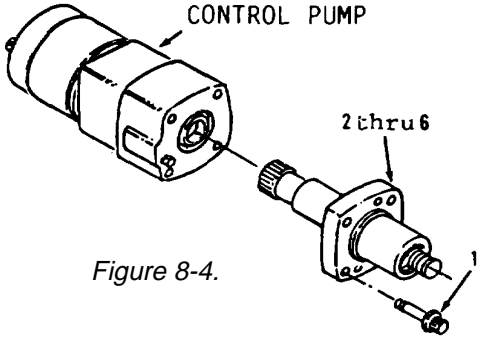


Figure 8-4.

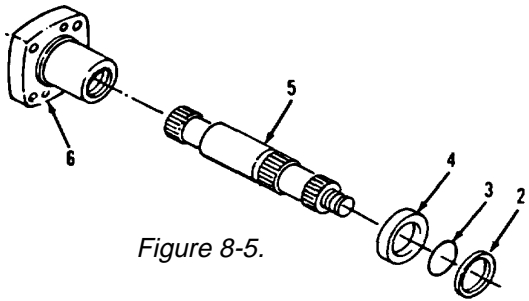


Figure 8-5.

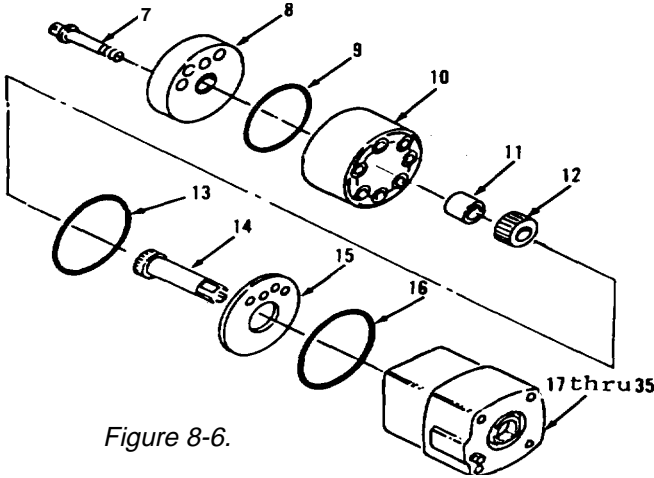


Figure 8-6.

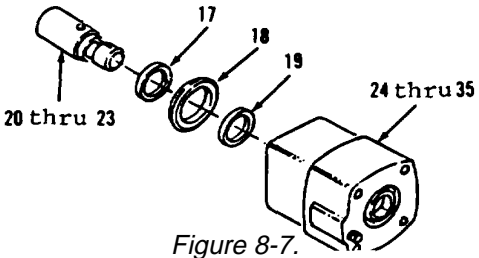


Figure 8-7.

Go to Sheet 3
8-8

STEERING MAINTENANCE.

8-4. Steering Control Pump. (Sheet 3 of 5)

DISASSEMBLY

6. Remove pin (20), sleeve (21), spool (22) and six springs (23, Figure 8-8).
7. Remove snap ring (24), items 33 thru 35 as an assembly and preformed packing (25) from pump body (32, Figure 8-9). Discard preformed packing (25).

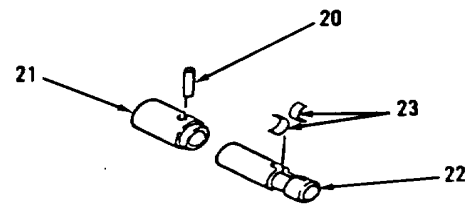


Figure 8-8.

NOTE

It is necessary to use a small threaded screw for removal of the seat.

8. Remove screw (26), seat (27), preformed packings (28 and 29), ball (30) and retainer (31) from pump body (32). Discard preformed packings (27 and 29).
9. Remove seals (33 and 34) from bushing (35, Figure 8-10). Discard seals (33 and 34).

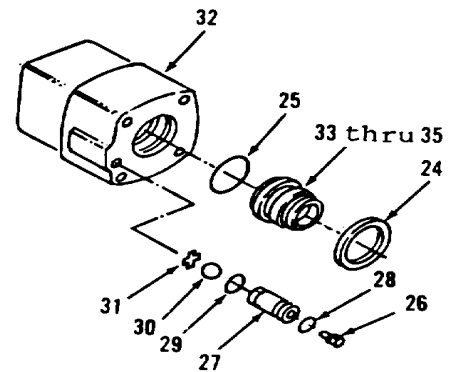


Figure 8-9.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install new seals (34 and 33) on bushing (35), Figure 8-10).

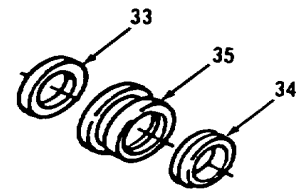


Figure 8-10.

Go to Sheet 4

STEERING MAINTENANCE. (cont)

8-4. Steering Control Pump. (Sheet 4 of 5)

ASSEMBLY (cont)

NOTE

Lubrication may be necessary for assembly.

- 2. Install retainer (31), ball (30), new preformed packing (29), seat (28), new preformed packing (27) and screw (26) in pump body (32, Figure 8-9). Tighten screw (26) to 8 ft-lb torque.
- 3. Install new preformed packing (25), items 35 thru 33 as an assembly and snap ring (24) in pump body (32).
- 4. Install spool (22), sleeve (21) and pin (20, Figure 8-8).
- 5. Install six springs (23) in spool (22) and sleeve (21). Make sure the curves of the springs (23) are in contact and in center of spool.
- 6. Install race (19), bearing (18), race (17), spool and items 23 thru 20 as an assembly into items 35 thru 24 as an assembly (Figure 8-7).
- 7. Pin (20) in sleeve assembly must be in alignment with gear (12, Figure 8-12).

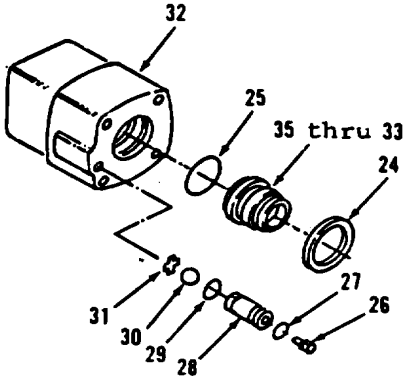


Figure 8-9.

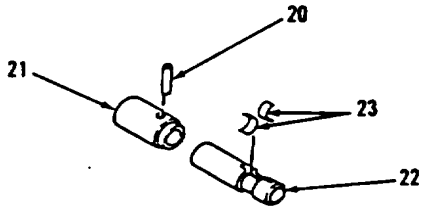


Figure 8-8.

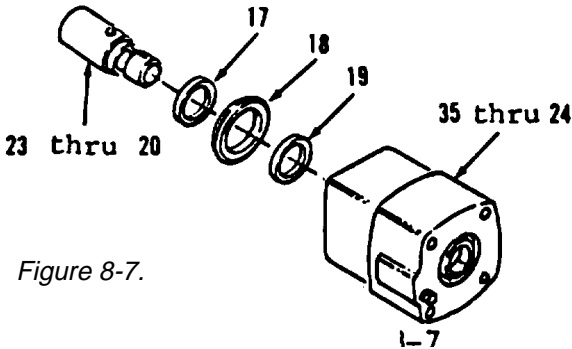


Figure 8-7.

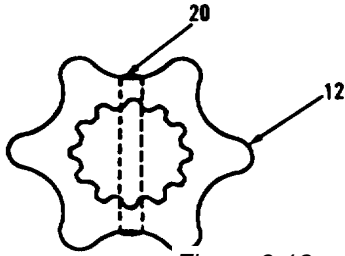


Figure 8-12.

Go to Sheet 5

STEERING MAINTENANCE.

8-4. Steering Control Pump. (Sheet 5 of 5)

ASSEMBLY

- 8. Install new preformed packing (16), spacer (15), drive (14), new preformed packing (13), inner gear (12), spacer (11) and gerotor (10, Figure 8-6).
- 9. Install new preformed packing (9), cap (8) and seven bolts (7). Tighten seven bolts (7, Figure 8-11) initially to 10 ft-lb torque in the order shown. Then tighten to 21 ft-lb torque.
- 10. Install shaft (5), bearing (4) and snap rings (3 and 2) into housing (6, Figure 8-5).
- 11. Install items 6 thru 2 as an assembly and four bolts (1, Figure 8-4) on control pump.

NOTE

Return 130G Grader to original equipment condition.

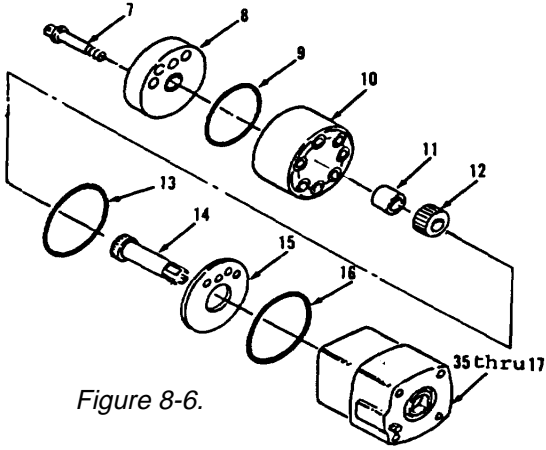


Figure 8-6.

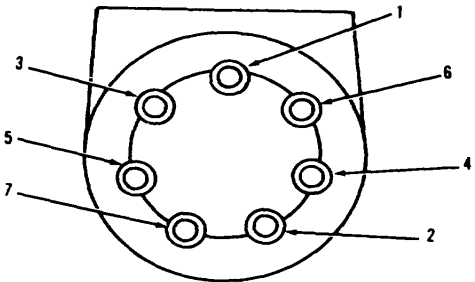


Figure 8-11.

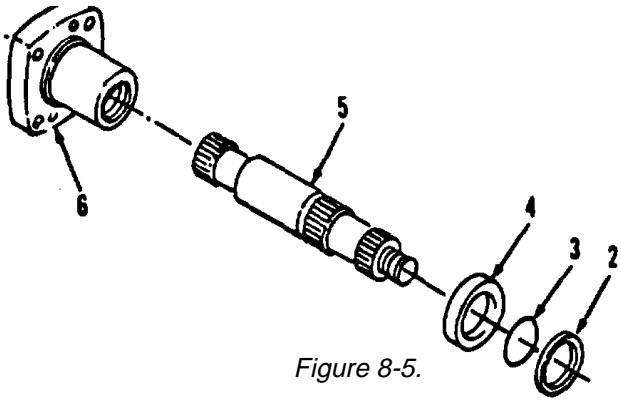


Figure 8-5.

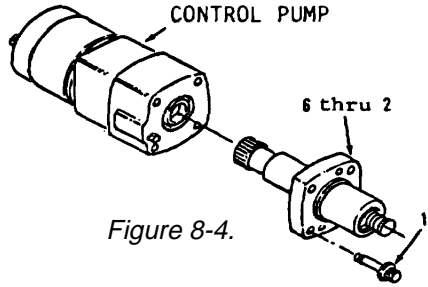


Figure 8-4.

**End of Task
8-11**

STEERING MAINTENANCE. (cont)

8-5. Steering Cylinder. (Sheet 1 of 6)

This task covers: a. Removal b. Cleaning c. Inspection
 d. Installation e. Adjustment

INITIAL SETUP:

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-177-7033)
 Socket removing tool
 Hydraulic jack
 Jack stands
 Wood blocks
 Torque wrench

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Small tags, Item 43,
 Appendix C
 Detergent, Item 9, Appendix C
 Preformed packings, Items 8,
 10
 Cotter pin, Item 11
 Caps

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-10
 TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.
 Relieve all hydraulic pressure.
 Leaning wheel lock pin installed.

TM 5-3805-261-20

Left battery negative ground
 disconnected.

**Go to Sheet 2
 8-12**

STEERING MAINTENANCE.**8-5. Steering Cylinder.** (Sheet 2 of 6)

REMOVAL

NOTE

The following is a maintenance procedure for the left hydraulic steering cylinder. The maintenance procedure for the right hydraulic steering cylinder is identical.

1. Remove bolt (1), washer (2), clip (3) and pin (4, Figure 8-13) from top of axle bracket on left side of front axle.

WARNING

High pressure hydraulics operate this equipment. NEVER disconnect any hydraulic lines or fittings without checking the manual to see how to drop the pressure to zero. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

2. Disconnect hose assemblies (5 and 6) from cylinder (20).
3. Remove elbow (7) and preformed packing (8). Discard preformed packing (8).
4. Remove connector (9) and preformed packing (10). Discard preformed packing (10).

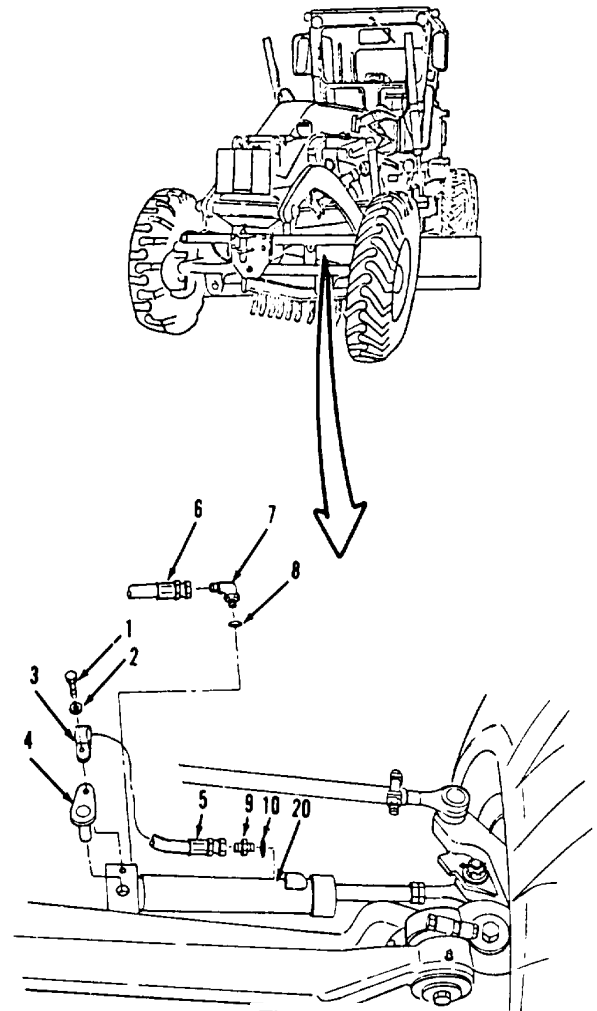


Figure 8-13.

**Go to Sheet 3
8-13**

STEERING MAINTENANCE. (cont)

8-5. Steering Cylinder. (Sheet 3 of 6)

REMOVAL (cont)

5. Remove cotter pin (11), nut (12) and washer (13, Figure 8-14). Discard cotter pin (11).
6. Remove items 18 thru 20 as an assembly from axle bracket by prying or pulling and from wheel spindle housing by using socket removing tool.
7. Remove spacer (14), bearing (15), spacer (16) and ring (17).

NOTE

Before removing socket and nut, measure and record the amount of exposed threads on the threaded rod to aid in installation.

8. Loosen nut (19) while holding hex (21, Figure 8-15) end of rod.
9. Remove socket (18) and nut (19) by unscrewing from cylinder (20).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

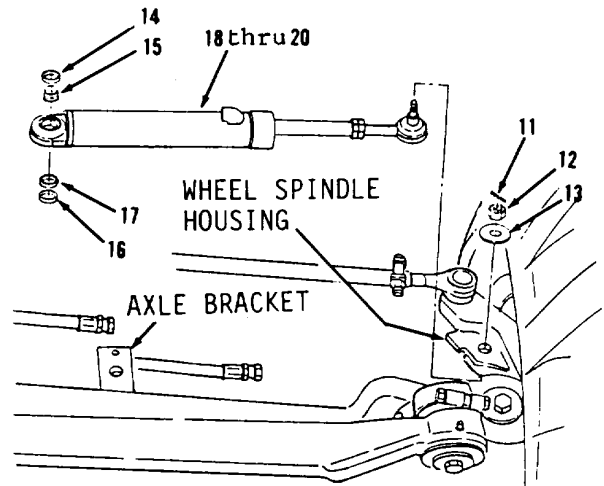


Figure 8-14.

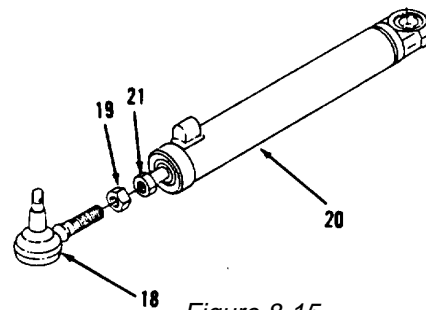


Figure 8-15.

Go to Sheet 4

STEERING MAINTENANCE.**8-5. Steering Cylinder.** (Sheet 4 of 6)**INSTALLATION**

1. Install nut (19) and socket (18) on cylinder (20, Figure 8-15). Screw socket (18) and nut (19) into cylinder (20) with the same amount of threads exposed as recorded in removal.
2. Tighten nut (19) while holding hex (21) end of rod.
3. Install ring (17), spacer (16), bearing (15) and spacer (14) in items 20 thru 18 as an assembly (Figure 8-14).
4. Install items 20 thru 18 as an assembly in axle bracket and wheel spindle housing.
5. Install washer (13), nut (12) and new cotter pin (11). Tighten nut (12) to 103 ft-lb torque.
6. Install new preformed packing (10) and connector (9) to cylinder (20, Figure 8-13).
7. Install new preformed packing (8) and elbow (7).
8. Connect hose assemblies (6 and 5).
9. Install pin (4), clip (3), washer (2) and bolt (1).
10. Remove leaning wheel lock pin. Refer to TM 5-3805-261-10.

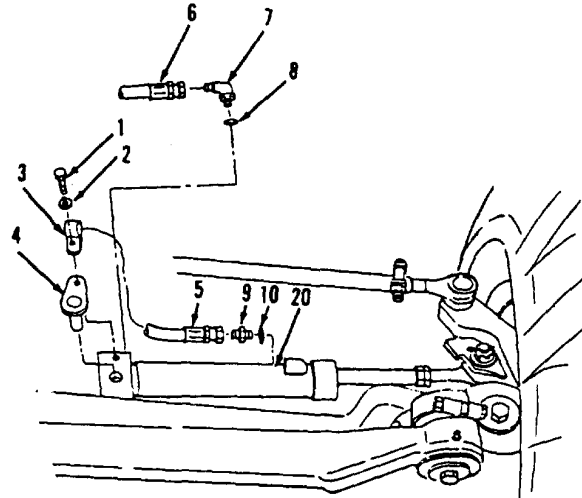


Figure 8-13.

**Go to Sheet 5
8-15**

STEERING MAINTENANCE. (cont)**8-5. Steering Cylinder.** (Sheet 5 of 6)

ADJUSTMENT

WARNING

Make sure the vehicle will not roll or shift. Secure with wood blocks. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

1. Install leaning wheel lock pin on front axle. Refer to TM 5-3805-261-10.
2. Lift front of vehicle using hydraulic jack.
3. Install jack stands at both ends of front axle.
4. Mark two front tires at center of tread while turning wheels.
5. Turn front wheels in straight ahead position. Refer to TM 5-3805-261-10.
6. Measure distance of front axle between marks at forward point of tires.
7. Measure distance of front axle at rear point on tires.
8. Subtract the larger distance from the smaller distance to determine the amount of toe-in.

**Go to Sheet 6
8-16**

STEERING MAINTENANCE.**8-5. Steering Cylinder.** (Sheet 6 of 6)

ADJUSTMENT

NOTE

The toe-in is correct if the front distance is 0.12 inch to 0.25 inch less than the rear distanced.

9. Loosen two nuts on clamps at ends of tie-rod.
10. Turn rod until toe-in is 0.12 inch to 0.25 inch. Tighten rod to 55 ft-lb torque.
11. Loosen nut (19) on cylinder rod while holding hex (21) on left steering cylinder.
12. Turn hex (21) all the way on threaded rod of socket (18).
13. Repeat step 12 for right steering cylinder.
14. Turn hex (21) until right spindle stop is 0.12 inch from right axle stop.
15. Tighten nut (19) while holding hex (21) on cylinder rod.
16. Turn front wheels all the way to the right.
17. Repeat step 16 so that right wheel spindle stop is 0.12 inch from left axle stop.
18. Remove jack stands and hydraulic jack.
19. Remove leaning wheel lock pin.

NOTE

Return 130C Grader to original equipment condition.

End of Task
8-17

STEERING MAINTENANCE. (cont)

8-6. Steering Valve. (Sheet 1 of 3)

This task covers: **a. Removal** **b. Cleaning** **c. Inspection**
 d. Assembly

INITIAL SETUP:

Applicable Configurations
 All

Personnel Required
 Construction equipment
 repairer MOS 62B

Tools
 General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)

References
 TM 5-3805-261-20

Test Equipment
 None

Special Environmental Conditions
 None

Materials/Parts
 Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Preformed packings, Items 3,
 4, 9, 12, 13, 15

General Safety Instructions
 None

Torques
 All fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References
 None

Equipment Condition
 TM 5-3805-261-20

Steering valve removed.

Go to Sheet 2
8-18

STEERING MAINTENANCE.

8-6. Steering Valve. (Sheet 2 of 3)

DISASSEMBLY

1. Loosen four bolts (1) to relieve spring (6, Figure 8-16) tension.
2. Remove four bolts (1) and cover (2) from items 8 thru 16 as an assembly.
3. Remove preformed packings (3 and 4) and shims (5). Discard preformed packings (3 and 4).
4. Remove spring (6) and valve (7).
5. Remove plug (8) and preformed packing (9, Figure 8-17). Discard preformed packing (9).
6. Remove four bolts (10) and cover (11).
7. Remove and discard two preformed packings (12 and 13).
8. Remove seat (14).
9. Remove and discard preformed packing (15).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

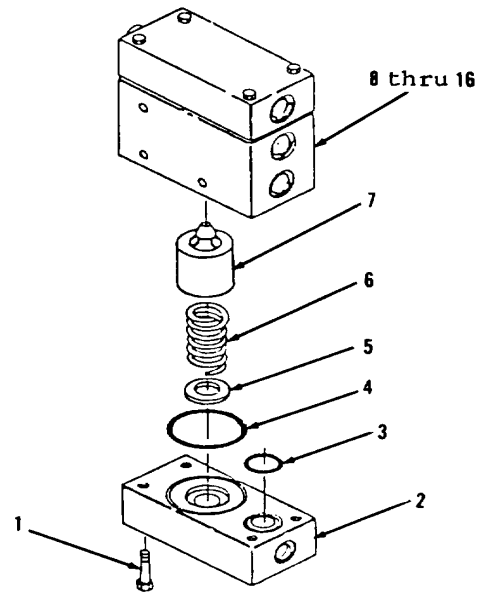


Figure 8-16.

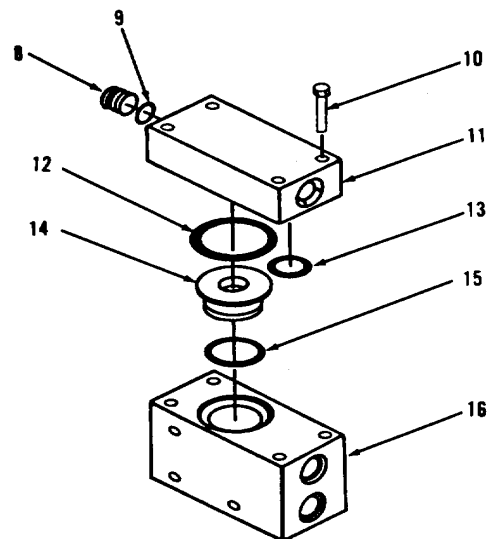


Figure 8-17.

**Go to Sheet 3
8-19**

STEERING MAINTENANCE. (cont)

8-6. Steering Valve. (Sheet 3 of 3)

ASSEMBLY

1. Install new preformed packing (15, Figure 8-17).
2. Install seat (14).
3. Install two new preformed packings (13 and 12).
4. Install cover (11) and four bolts (10).
5. Install new preformed packing (9) and plug (8).
6. Install valve (7) and spring (6, Figure 8-16).
7. Install shims (5) and new preformed packings (4 and 3).
8. Install cover (2) and four bolts (1) on items 16 thru 8 as an assembly.

NOTE

Return 130G Grader to original equipment condition.

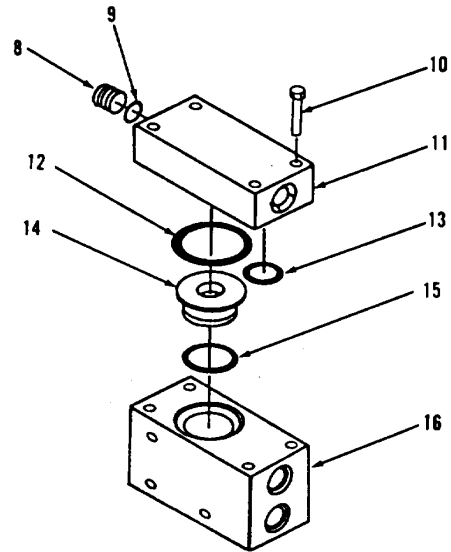


Figure 8-17.

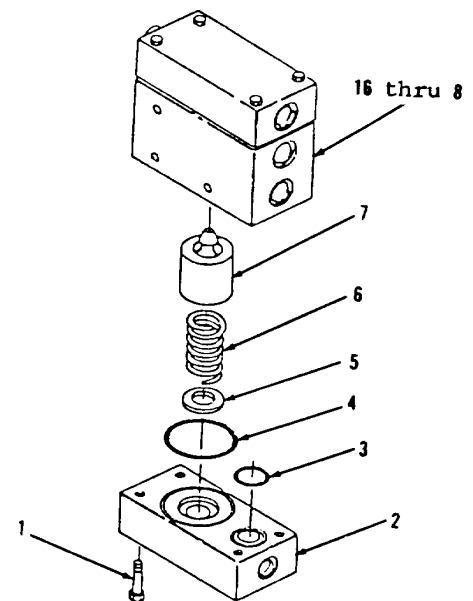


Figure 8-16.

End of Task

STEERING MAINTENANCE.

8-7. Combination Valve. (Sheet 1 of 9)

This task covers: **a. Disassembly** **b. Cleaning** **c. Inspection**
 d. Testing **e. Assembly**

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
 repairer MOS 62B

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)
 Vise
 Dial indicator
 Dial indicating scale, weight
 type
 Torque wrench

References

TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Test Equipment

Spring tester

Torques

All fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Preformed packings, Items 2, 3,
 4, 5, 11, 14, 19, 25, 28, 30,
 32, 35, 41, 48, 50, 57, 60,
 63, 65, 67, 69

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-20

Combination valve removed.

Go to Sheet 2
8-21

STEERING MAINTENANCE. (cont)

8-7. Combination Valve. (Sheet 2 of 9)

DISASSEMBLY

1. Remove three bolts (1, Figure 8-18).
2. Remove items 6 thru 33 as an assembly from items 34 thru 70 as an assembly.
3. Remove and discard preformed packings (2, 3, 4 and 5).
4. Remove two bolts (6), washers (7), boot (8) and items 9 thru 17 as an assembly (Figure 8-19).
5. Remove preformed packing (11), bearing (12), ring (13), preformed packing (14), lever (15) and bearing (16, Figure 8-20). Discard preformed packings (11 and 14).
6. Remove nut (9) and screw (10) from housing (17).
7. Remove plug (18) and preformed packing (19, Figure 8-21). Discard preformed packing (19).
8. Remove plug (20) and preformed packing (21). Discard preformed packing (21).
9. Remove plug (22) and preformed packing (23). Discard preformed packing (23).
10. Remove nut (24), washer (25) and elbow (26).
11. Remove plug (27) and preformed packing (28) from body (29). Discard preformed packing (28).

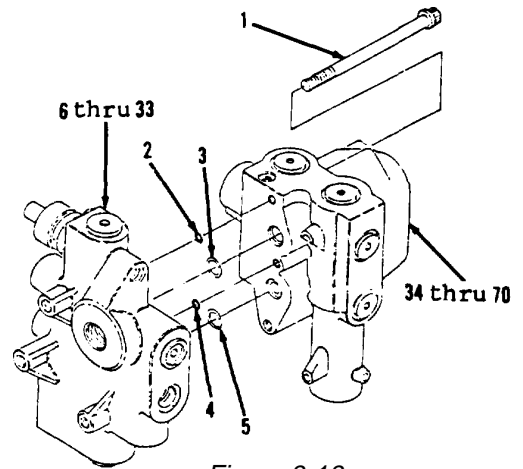


Figure 8-18.

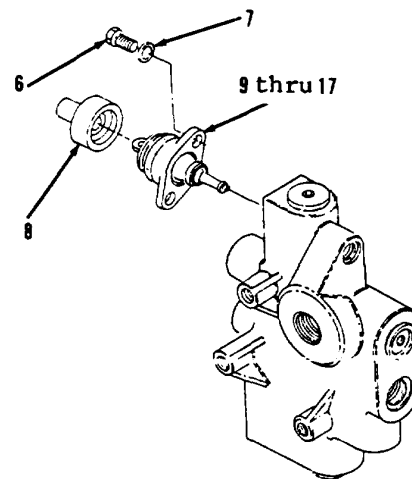


Figure 8-19.

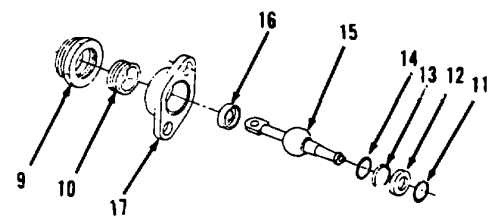


Figure 8-20.

**Go to Sheet 3
8-22**

STEERING MAINTENANCE.

8-7. Combination Valve. (Sheet 3 of 9)

DISASSEMBLY

- 12. Remove plug (30), preformed packing (31) and items 32 thru 35 as an assembly (Figure 8-22). Discard preformed packing (31).
- 13. Compress spring (33, Figure 8-23).
- 14. Remove two retainers (32), spring (33) and washer (34) from stem (35).

NOTE

Retain shims for reassembly.

- 15. Remove plug (36), preformed packing (37), retainer (38), shims (39), spring (40) and valve (41, Figure 8-24). Discard preformed packing (37).
- 16. Remove plug (42), preformed packing (43), springs (44 and 45) and items 46 thru 48 as an assembly (Figure 8-25). Discard preformed packing (43).

NOTE

Retain shims for reassembly.

- 17. Remove washer (47) and shims (48) from stop (46, Figure 8-25).

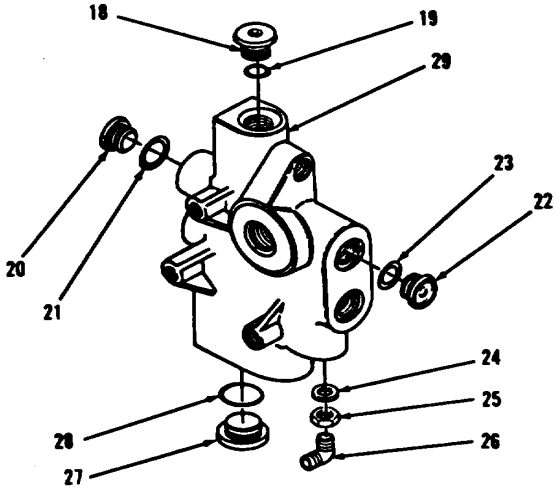


Figure 8-21.

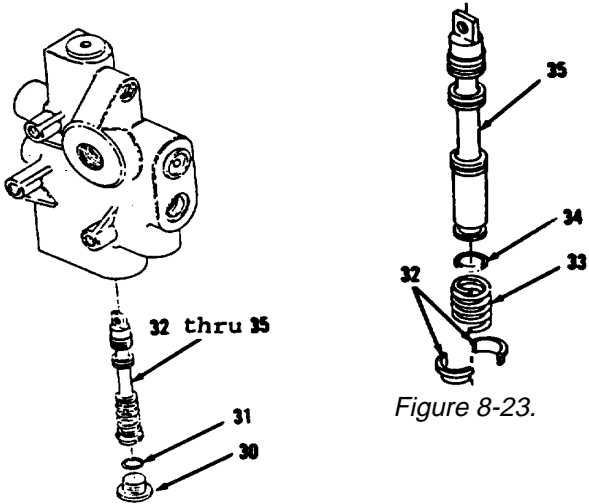


Figure 8-23.

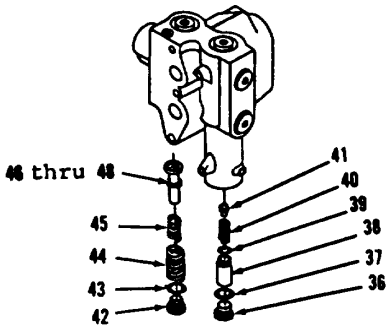


Figure 8-24.

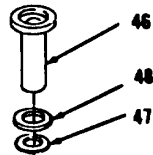


Figure 8-25.

**Go to Sheet 4
8-23**

STEERING MAINTENANCE. (cont)

8-7. Combination Valve. (Sheet 4 of 9)

DISASSEMBLY (cont)

- 18. Remove plug (49), preformed packing (50), spacer (51), preformed packing (52), spacer (53), valve (54), spring (55), body (56) and seat (57, Figure 8-26). Discard preformed packings (50 and 52).
- 19. Remove plug (58), preformed packing (59), piston (60), stem assembly (61, Figure 8-27). Discard preformed packing (59).
- 20. Remove plug (62) and preformed packing (63). Discard preformed packing (63).
- 21. Remove plug (64) and preformed packing (65, Figure 8-28). Discard preformed packing (65).
- 22. Remove elbow (66) and preformed packing (67). Discard preformed packing (67).
- 23. Remove elbow (68) and preformed packing (69) from body (70). Discard preformed packing (69).

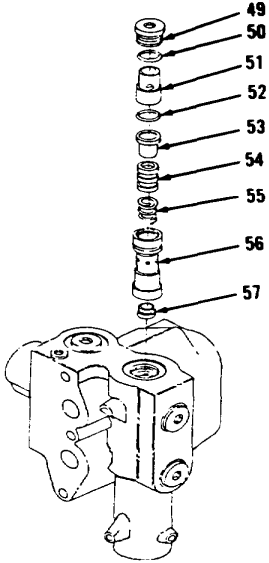


Figure 8-26.

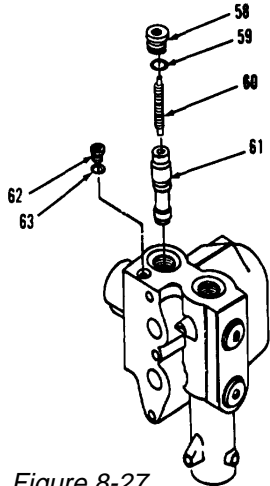


Figure 8-27.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

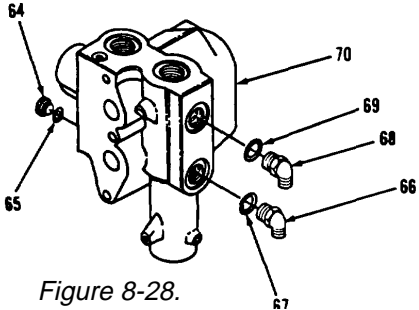


Figure 8-28.

Go to Sheet 5
8-24

STEERING MAINTENANCE.**8-7. Combination Valve.** (Sheet 5 of 9)**TESTING**

1. Using a spring tester and torque wrench, apply test load to spring (33, Figure 8-29). Test load is 24.99 to 27.61 lb.
2. Measure length of spring (33). Test length is 1.53 inches.
3. Remove test load.
4. Measure free length of spring (33, Figure 8-30). Free length should be 2.375 inches.
5. Using a spring tester and torque wrench, apply test load to spring (40). Test load is 64 to 70 lb.
6. Measure length of spring (40). Test length should be 1.43 inches.
7. Remove test load.
8. Measure free length of spring (40). Free length should be 1.74 inches.
9. Using a spring tester and torque wrench, apply test load to spring (44). Test load is 63.9 to 75.1 lb.
10. Measure length of spring (44). Test length should be 1.66 inches.
11. Remove test load.
12. Measure free length of spring (44). Free length should be 2.42 inches.

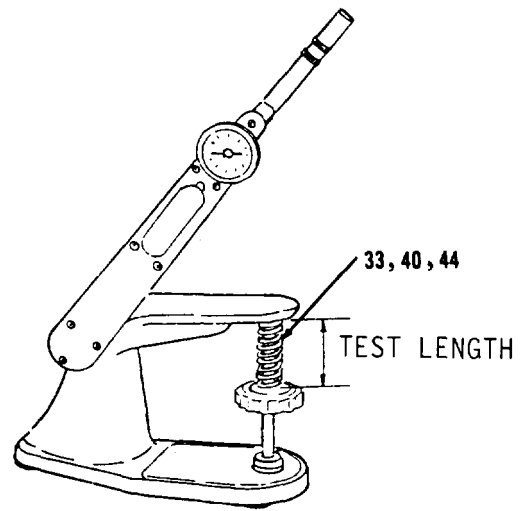


Figure 8-29.

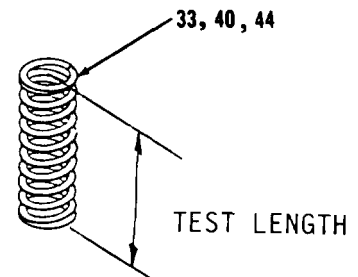


Figure 8-30.

Go to Sheet 6

STEERING MAINTENANCE. (cont)

8-7. Combination Valve. (Sheet 6 of 9)

TESTING (cont)

13. Using a spring tester and torque wrench, apply test load to spring (45, Figure 8-29). Test load is 26.3 to 30.9 lb.
14. Measure length of spring (45, Figure 8-30). Test length should be 1.66 inches.
15. Remove test load.
16. Measure free length of spring (45). Free length should be 2.46 inches.
17. Using a spring tester and torque wrench, apply test load to spring (55). Test load is 8 lb.
18. Measure length of spring (55). Test length should be 0.80 inches.
19. Remove test load.
20. Measure free length of spring (55). Free length should be 1.2 inches.

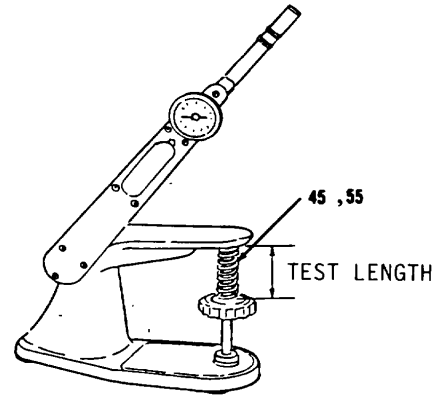


Figure 8-29.

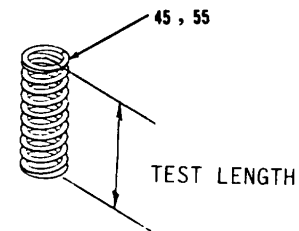


Figure 8-30.

ASSEMBLY

1. Install new preformed packing (69) and elbow (68) in body (70, Figure 8-28).
2. Install new preformed packing (67) and elbow (66).
3. Install new preformed packing (65) and plug (64).

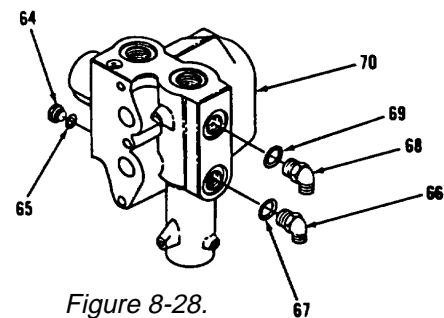


Figure 8-28.

Go to Sheet 7

STEERING MAINTENANCE.

8-7. Combination Valve. (Sheet 7 of 9)

ASSEMBLY

4. Install new preformed packing (63) and plug (62, Figure 8-27).
5. Install stem assembly (61), piston (60), new preformed packing (59) and plug (58).
6. Install seat (57), body (56), spring (55), valve (54), spacer (53), new preformed packing (52), spacer (51), new preformed packing (50) and plug (49, Figure 8-26).
7. Install shim (48) and washer (47) to stop (46, Figure 8-25).
8. Install items 48 thru 46 as an assembly, springs (45 and 44), new preformed packing (43) and plug (42, Figure 8-24).
9. Install valve (41), spring (40), shim (39), retainer (38), new preformed packing (37) and plug (36).

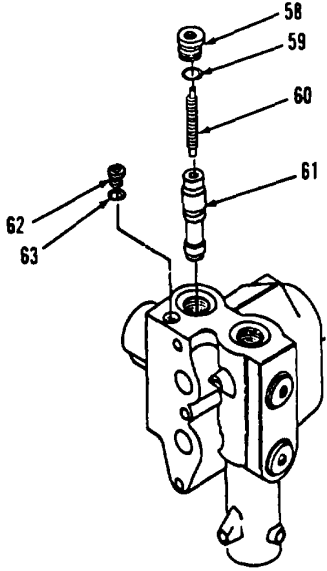


Figure 8-27.

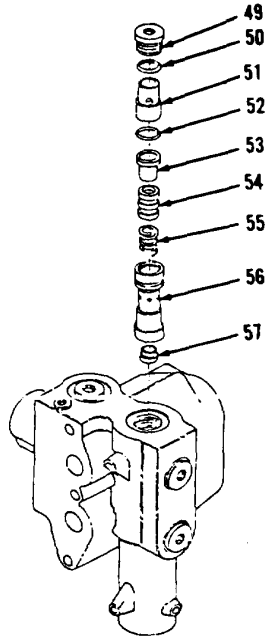


Figure 8-26.

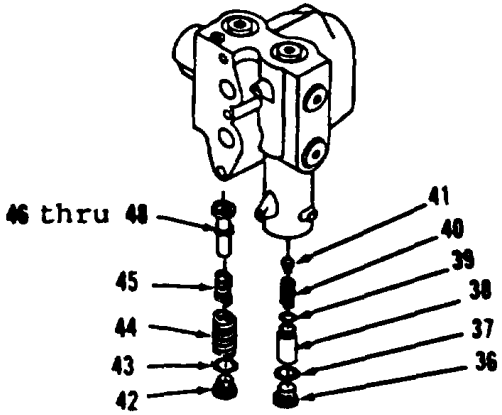


Figure 8-24.

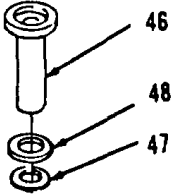


Figure 8-25.

Go to Sheet 8

STEERING MAINTENANCE. (cont)

8-7. Combination Valve. (Sheet 8 of 9)

ASSEMBLY (cont)

- 10. Install washer (34) and spring (33) on stem (35, Figure 8-23).
- 11. Compress spring (33).
- 12. Install two retainers (32).
- 13. Install items 35 thru 32 as an assembly, new preformed packing (31) and plug (30, Figure 8-22).
- 14. Install new preformed packing (28) and plug (27) in body (29, Figure 8-21).
- 15. Install elbow (26), washer (25) and nut (24).
- 16. Install new preformed packing (23) and plug (22).
- 17. Install new preformed packing (21) and plug (20).
- 18. Install new preformed packing (19) and plug (18).
- 19. Install new preformed packing (14), ring (13) and bearings (16 and 12) on lever (15, Figure 8-31).
- 20. Install housing (17).
- 21. Install new preformed packing (11).

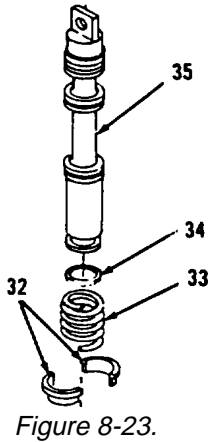


Figure 8-23.

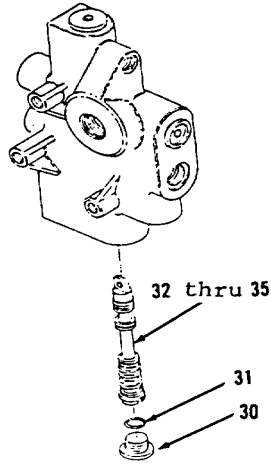


Figure 8-22.

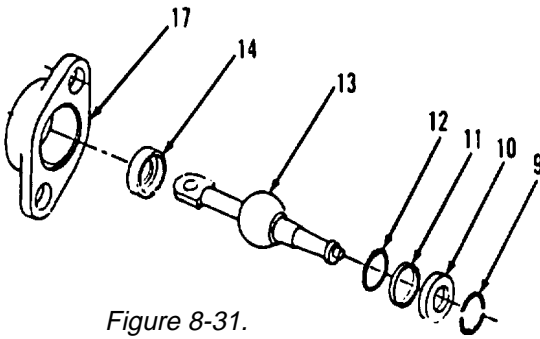


Figure 8-31.

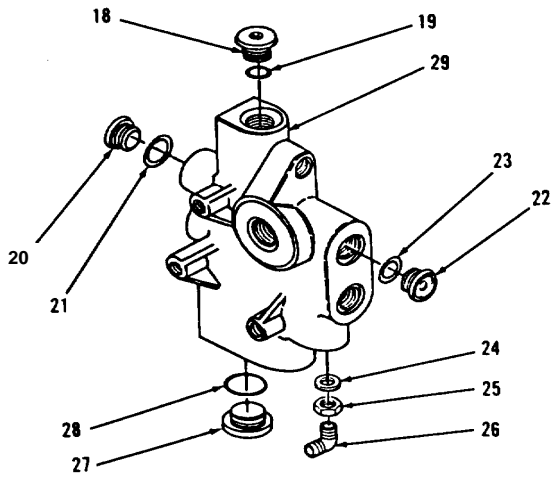


Figure 8-21.

Go to Sheet 9

STEERING MAINTENANCE.

8-7. Combination Valve. (Sheet 9 of 9)

TM 5-3805-261-34

ASSEMBLY

NOTE

Place unloader valve in vise.

22. Install items 11 thru 17 as an assembly, two washers (7) and bolts (6) in items 35 thru 18 as an assembly (Figure 8-32).
23. Install screw (10).
24. Lift lever (15, Figure 8-33) with a force of 25 lbs. Use a dial indicating scale to measure force.
25. Adjust screw (10). Turn screw (10) in or out until end play of lever is 0.003 to 0.009 inches. Use dial indicator to determine end play.
26. Install nut (9) and boot (8, Figure 8-34).
27. Install new preformed packings (5, 4, 3 and 2), items 35 thru 6 as an assembly with items 70 thru 36 as an assembly and three bolts (1).

NOTE

Return 130G Grader to original equipment condition.

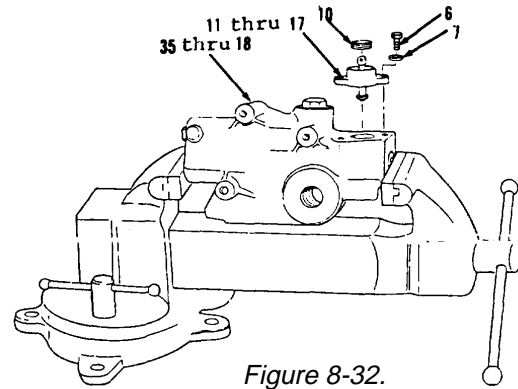


Figure 8-32.

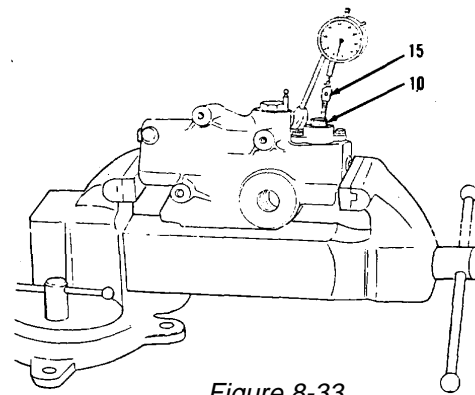


Figure 8-33.

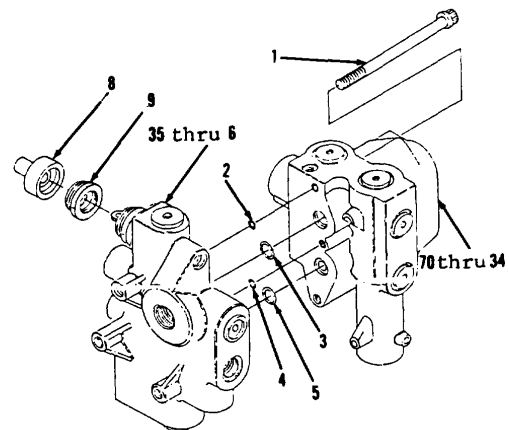


Figure 8-34.

End of Task

8-29/(8-30 blank)

CHAPTER 9

ARTICULATION MAINTENANCE

CHAPTER OVERVIEW

The purpose of this chapter is to help the technician efficiently troubleshoot and repair malfunctioning equipment and to perform authorized direct support level maintenance procedures on the 130G Grader articulation system.

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| <u>Section</u> | <u>Title</u> | <u>Paragraph</u> | <u>Page</u> |
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| | Articulation System Maintenance Procedures | 9-1 | 9-2 |
| | ROPS (Rollover Protection System) | 9-2 | 9-3 |
| | Operator's Panel Console-Base | 9-3 | 9-10 |

Section I. ARTICULATION MAINTENANCE.

9-1. ARTICULATION MAINTENANCE PROCEDURES.

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the body and its components in good repair.

b. This section is arranged by functional group code and provides a list of body components to be maintained and step-by-step maintenance procedures.

INDEX

| <u>Title</u> | <u>Paragraph</u> | <u>Page</u> |
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| ROPS (Rollover Protection System) | 9-2 | 9-3 |
| Operator's Panel Console-Base | 9-3 | 9-10 |

ARTICULATION SYSTEM MAINTENANCE.

9-2. **ROPS (Rollover Protection System)**. (Sheet 1 of 7)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Hoist and sling

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43, Appendix C
Pads, Items 9, 10, 12, 13

Personnel Required

Construction equipment
repairer MOS 62B

References

TM 5-3805-261-10
TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Go to Sheet 2

ARTICULATION SYSTEM MAINTENANCE. (cont)

9-2. ROPS (Rollover Protection System). (Sheet 2 of 7)

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground. Parking/emergency brake applied. Equipment lowered to the ground. Engine stopped. Master disconnect switch off.

TM 5-3805-261-20

Positive cable on right side disconnected. Dome light resistor removed. Front floodlights removed. Cab signal lights removed. Dome light removed. Blade float valve harness removed. Front defroster lead removed. Rear defroster lead removed. Front floodlight lead removed Cab signal light lead removed. Cab dome light removed. Dome light resistor harness remove. Right and left blade float harness removed. Front lower cab windows removed. Left and right cab doors removed. Upper front sound suppression panels removed. Lower front and rear cab sound suppression panels removed. Ceiling cab sound suppression panels removed. Rear cab sound suppression panels removed. Lower front wiper; removed. Upper front wipers removed. Rear wiper removes. Windshield washers removed. Front and rear defroster fans removed. Outside rearview mirror removed. ROPS accessories removed. Cab storage compartment removed.

Paragraph 4-23

Cab main harness removed.

Go to Sheet 3

Change 1

9-4

ARTICULATION SYSTEM MAINTENANCE.

9-2. ROPS (Rollover Protection System). (Sheet 3 of 7)

REMOVAL

1. Install two eyebolts (1) in top of ROPS (11, Figure 9-1).

WARNING

Weight of ROPS is approximately 1450 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical attention immediately.

2. Attach hoist and sling to two eyebolts (1) and front of ROPS (11).
3. Remove two nuts (2), washers (3) and bolts (4, Figure 9-2) from front corners of operator's cab.

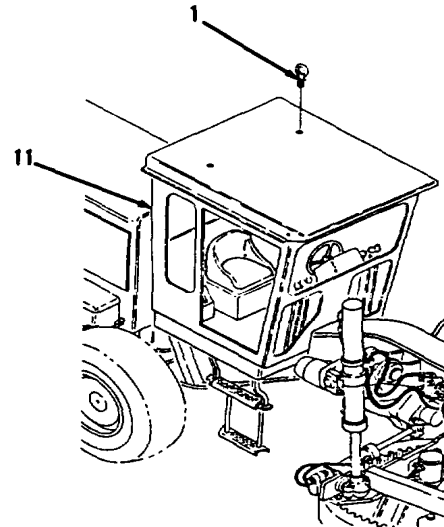


Figure 9-1.

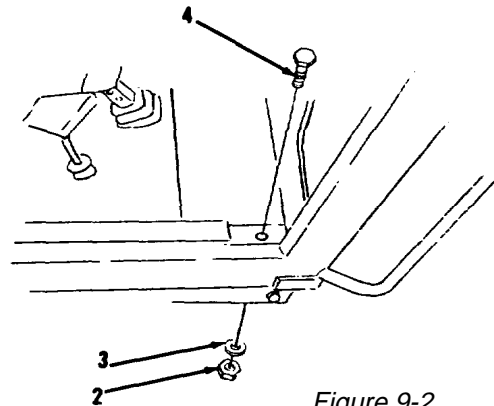


Figure 9-2.

Go to Sheet 4
9-5

ARTICULATION SYSTEM MAINTENANCE. (cont)

9-2. ROPS (Rollover Protection System). (Sheet 4 of 7)

REMOVAL (cont)

- 4. Remove six bolts (6), retainers (7, Figure 9-3) from right and left sides of cab.
- 5. Using hoist and sling, remove ROPS (11, Figure 9-4).
- 6. Remove six mountings (7) and two mountings (8).
- 7. Remove two pads (9) and pad (10) from ROPS (11, Figure 9-5). Discard pads (9 and 10). Pads (9 and 10) are secured with adhesive. Remove all dried adhesive, grease and dirt from pad mounting surfaces.
- 8. Lower ROPS (11) onto level surface.
- 9. Remove hoist and sling.

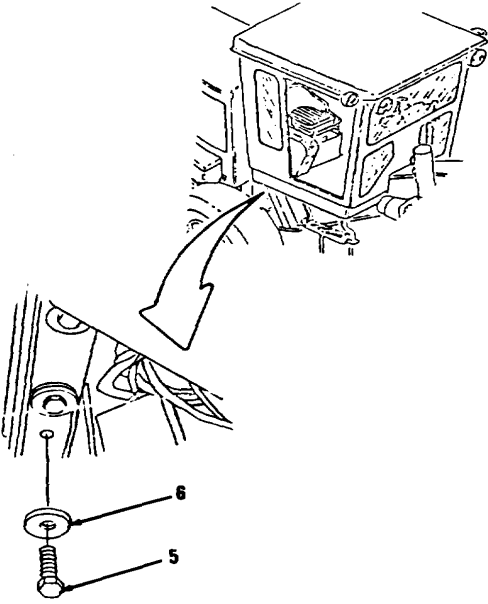


Figure 9-3.

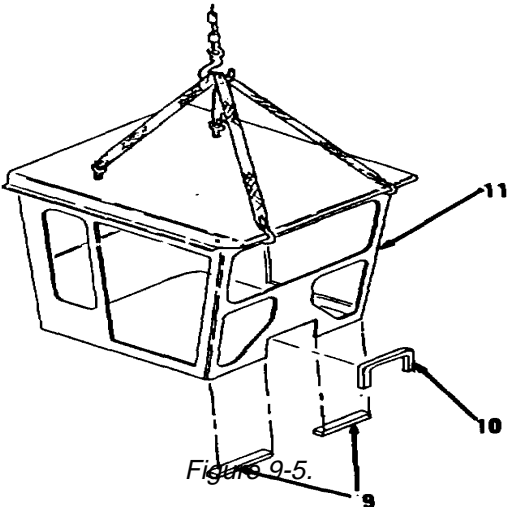


Figure 9-5.

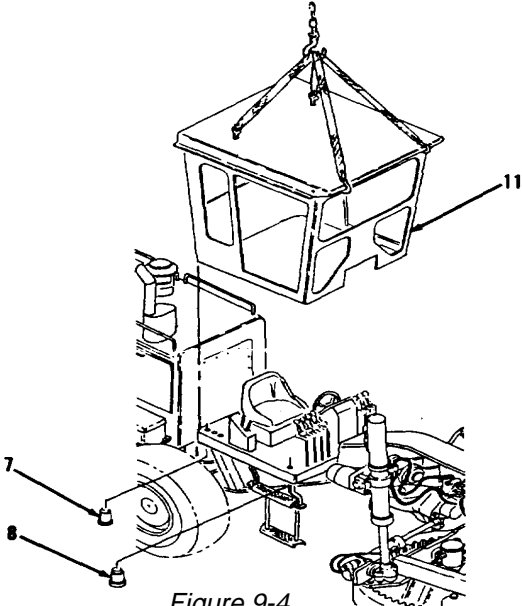


Figure 9-4.

Go to Sheet 5

ARTICULATION SYSTEM MAINTENANCE.

9-2. ROPS (Rollover Protection System). (Sheet 5 of 7)

REMOVAL

10. Remove two pads (12 and 13) and pad (14, Figure 9-6). Discard two pads (12 and 13).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Position pad (14) and two new pads (13 and 12, Figure 9-6).
2. Attach hoist and sling to ROPS (11, Figure 9-5).
3. Raise ROPS (11).
4. Install new pad (10) and two new pads (9).

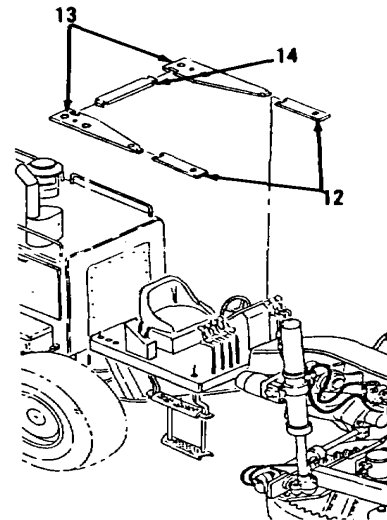


Figure 9-6.

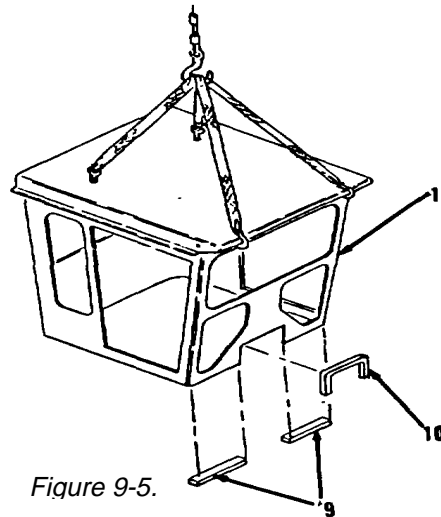


Figure 9-5.

Go to Sheet 6

ARTICULATION SYSTEM MAINTENANCE. (cont)

9-2. **ROPS (Rollover Protection System).** (Sheet 6 of 7)

INSTALLATION (cont)

5. Position two mountings (8) and six mountings (7, Figure 9-4).
6. Lower ROPS (11) to within 1/2 inch of operator's platform.

CAUTION

Do not lower ROPS onto operator's platform and slide to align bolts. This improper procedure could result in damage to pads. Any significant damage to pads could cause high sound levels for the operator.

7. Install six bolts (7) and retainers (6, Figure 9-3), starting six bolts (5) by hand and partially tightening. Holes for two bolts (4) must be aligned before bolts (5) can be tightened to proper torque.
8. Install two bolts (4), washers (3) and nuts (2, Figure 9-2) in two front corners of cab. Tighten two bolts (4) to 870 ft-lb torque.

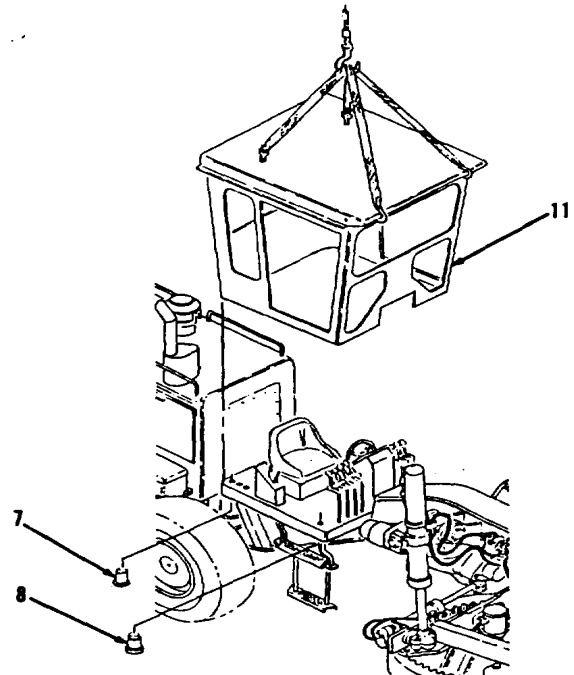


Figure 9-4.

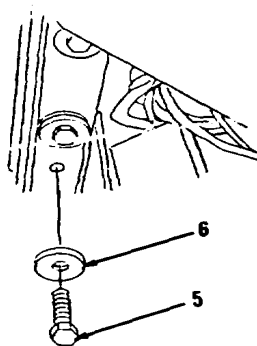


Figure 9-3.

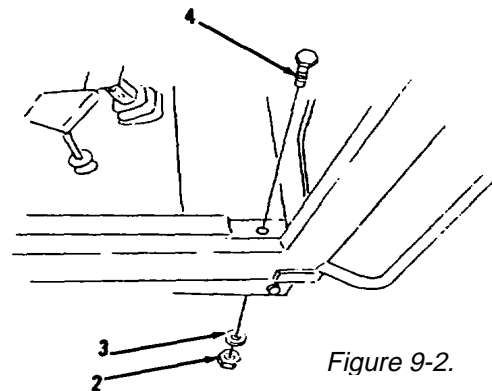


Figure 9-2.

Go to Sheet 7

ARTICULATION SYSTEM MAINTENANCE.

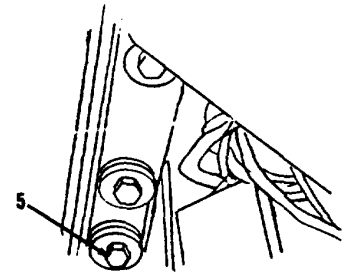
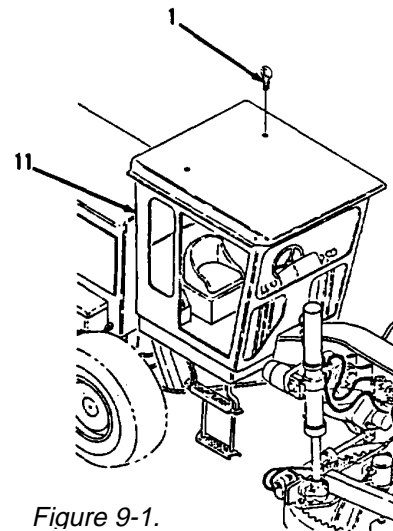
9-2. ROPS (Rollover Protection System). (Sheet 7 of 7)

INSTALLATION (cont)

9. Tighten six bolts (5, Figure 9-7) to 870 ft-lb torque.
10. Remove hoist and sling.
11. Remove two eyebolts (1, Figure 9-1).

NOTE

Return 130G Grader to original equipment condition.

*Figure 9-7.**Figure 9-1.*

End of Task

ARTICULATION SYSTEM MAINTENANCE. (cont)

9-3. Operator's Panel Console - Base. (Sheet 1 of 3)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Two seals, Item 6

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Control console removed.

Paragraph 5-4

Transmission control group assembly
removed.

Go to Sheet 2

ARTICULATION SYSTEM MAINTENANCE.

9-3. Operator's Panel Console - Base. (Sheet 2 of 3)

REMOVAL

1. Remove four bolts (1), washers (2) and two brackets (3, Figure 9-8) from right side of operator's compartment.
2. Remove four spacers (4 and 5).

NOTE

Remove seals only if inspection indicates replacement is necessary.

3. If necessary, remove two seals (6). Remove all adhesive from mounting surfaces.
4. Remove base (7) and four mountings (8, Figure 9-9).
5. Remove pad (9).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

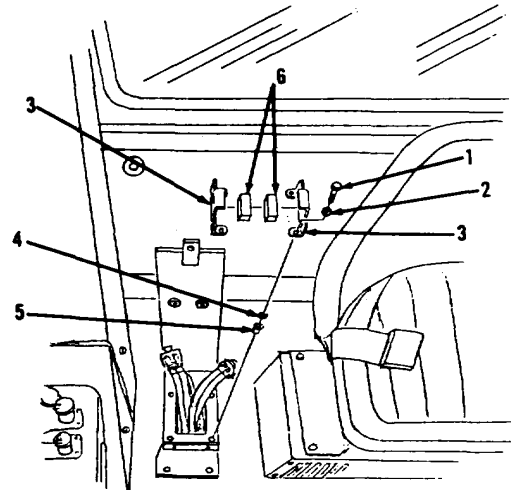
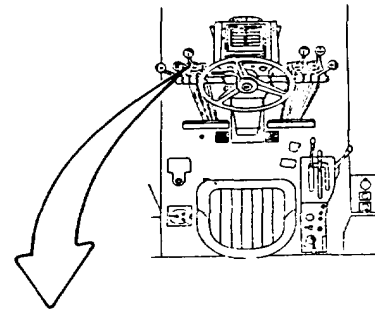


Figure 9-8.

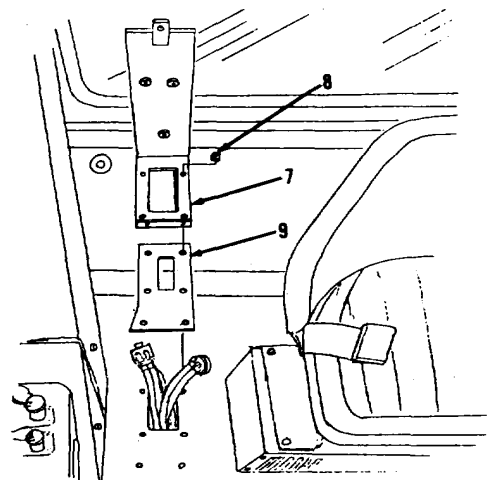


Figure 9-9.

Go to Sheet 3

ARTICULATION SYSTEM MAINTENANCE. (cont)

9-3. Operator's Panel Console - Base. (Sheet 3 of 3)

INSTALLATION

1. Install pad (9, Figure 9-9).
2. Install four mountings (8) and base (7).
3. Install two new seals (6, Figure 9-8), if removed.
4. Install four spacers (5 and 4).
5. Install two brackets (3), four washers (2) and bolts (1).

NOTE

Return 130G Grader to original equipment condition.

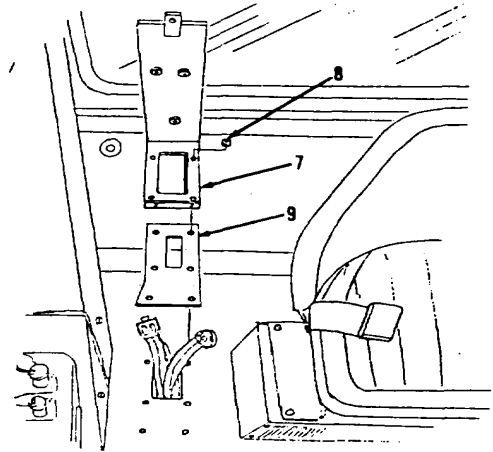


Figure 9-9.

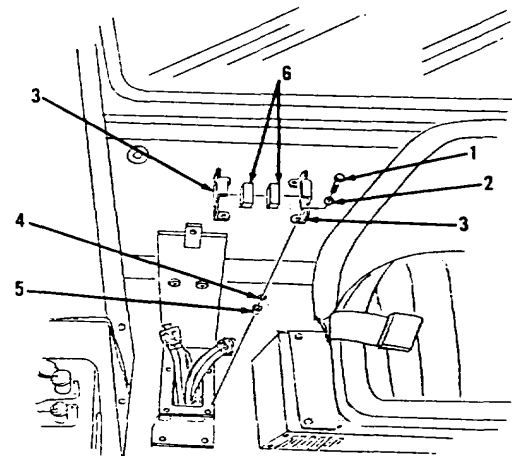


Figure 9-8.

**End of Task
9-12**

CHAPTER 10

HYDRAULIC SYSTEM MAINTENANCE

CHAPTER OVERVIEW

The purpose of this chapter is to help the technician efficiently troubleshoot and repair malfunctioning equipment and to perform authorized direct support level maintenance procedures on the 130G Grader hydraulic system.

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Section I. HYDRAULIC SYSTEM MAINTENANCE.

10-1. HYDRAULIC SYSTEM MAINTENANCE PROCEDURES.

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the hydraulic system and its components in good repair.

b. This section is arranged by functional group code and provides a list of hydraulic system components to be maintained and step-by-step maintenance procedures.

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HYDRAULIC SYSTEM MAINTENANCE.

10-2. Hydraulic Pump Drive. (Sheet 1 of 5)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Anti-seize compound,
Item 59, Appendix C
Seal, Item 16

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 13-20

Hydraulic drive protection cover
removed.

Go to Sheet 2

10-3

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-2. Hydraulic Pump Drive. (Sheet 2 of 5)

REMOVAL

1. Remove four bolts (1) and washers (2, Figure 10-1).
2. Remove four bolts (3), washers (4) and items 8 thru 22 as an assembly.
3. Remove nut (5), washer (6) and yoke (7).

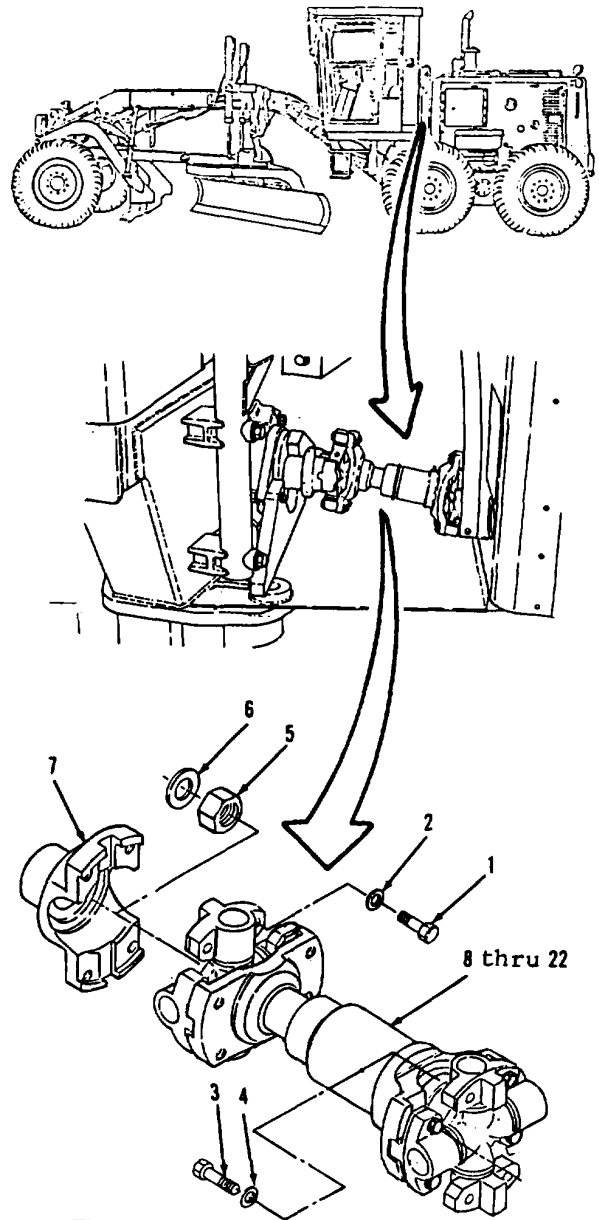


Figure 10-1.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE.

10-2. **Hydraulic Pump Drive.** (Sheet 3 of 5)

DISASSEMBLY

1. Remove four bolts (8), washers (9) and items 10 and 22 as an assembly (Figure 10-2) from drive assembly.
2. Remove four bolts (11), washers (12) and items 13 and 21 as an assembly.
3. Unscrew retainer (18). Slide retainer (18), washer (17), seal (16) and washer (15) onto yoke (14, Figure 10-3).
4. Remove items 14 thru 18 as an assembly (Figure 10-4).
5. Remove washer (15), seal (16), washer (17) and retainer (18) from yoke (14, Figure 10-5). Discard seal (16).
6. Remove fitting (20) from yoke (19).
7. Remove fitting (21) from spider (13).
8. Remove fitting (22) from spider (10).

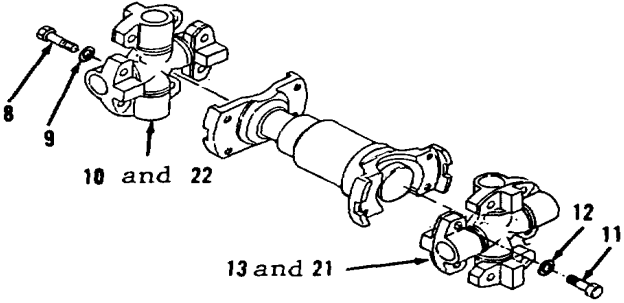


Figure 10-2.

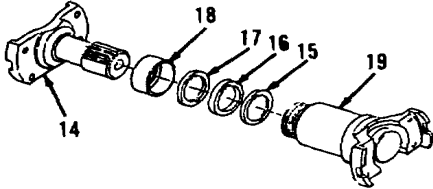


Figure 10-3.

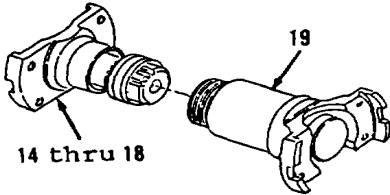


Figure 10-4.

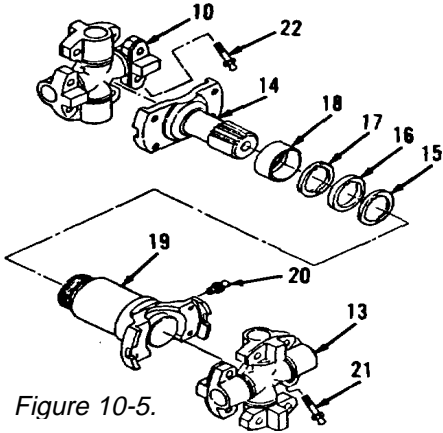


Figure 10-5.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-2. **Hydraulic Pump Drive.** (Sheet 4 of 5)

ASSEMBLY

1. Install fitting (22) in spider (10, Figure 10-5).
2. Install fitting (21) in spider (13).
3. Install fitting (20) in yoke (19).
4. Slide retainer (18), washer (17), new seal (16) and washer (15) onto yoke (14).
5. Install items 18 thru 14 as an assembly into yoke (19, Figure 10-4).
6. Install retainer (18), washer (17), new seal (16) and washer (15) onto yoke (19, Figure 10-3).
7. Install items 21 and 13 as an assembly, four washers (12) and bolts (11, Figure 10-2). Tighten four bolts (11) to 35 to 45 ft-lb.
8. Install items 22 and 10 as an assembly, four washers (9) and bolts (8). Tighten four bolts (8) to 35 to 45 ft-lb.

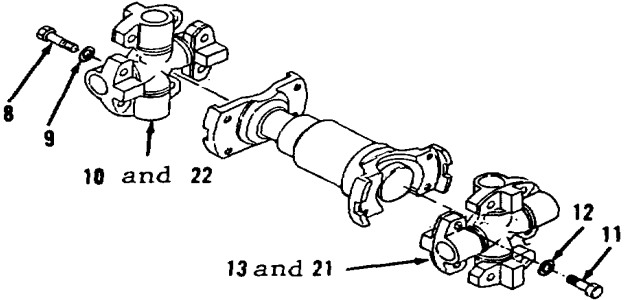


Figure 10-2

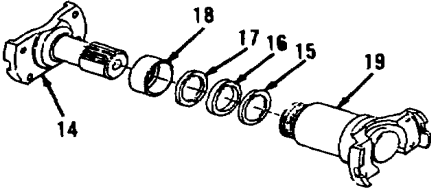


Figure 10-3.

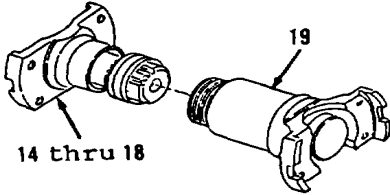


Figure 10-4.

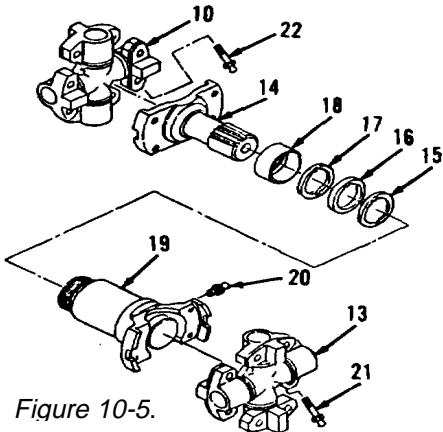


Figure 10-5.

Go to Sheet 5

HYDRAULIC SYSTEM MAINTENANCE.

10-2. Hydraulic Pump Drive. (Sheet 5 of 5)

INSTALLATION

1. Apply anti-seize compound to pump shaft before installing nut (5, Figure 10-1).
2. Install yoke (7), washer (6) and nut (5). Tighten nut (5) to 125 to 145 ft-lb.
3. Install items 22 thru 8 as an assembly, four washers (4) and bolts (3). Tighten four bolts (3) to 35 to 45 ft-lb.
4. Install four washers (2) and bolts (1). Tighten four bolts (1) to 35 to 45 ft-lb.
5. Apply grease to all fittings in drive assembly.

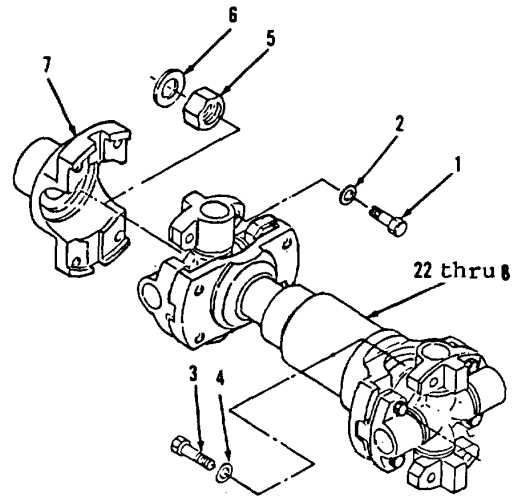


Figure 10-1.

NOTE

Return 130G Grader to original equipment condition.

End of Task

10-7

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-3. Hydraulic Pump Assembly and Mounting. (Sheet 1 of 7)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
LO 5-3805-261-12

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 41,
Appendix C
Preformed packings, Items 5,
20, 28, 30, 35, 37
Caps

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Hydraulic tank drained.

LO 5-3805-261-12

Paragraph 10-2

Hydraulic pump drive removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE.

10-3. Hydraulic Pump Assembly and Mounting.
(Sheet 2 of 7)

REMOVAL

1. Remove four bolts (1), washers (2) and two flange halves (3, Figure 10-6).

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

2. Remove hose assembly (4) from pump assembly (24).
3. Remove and discard preformed packing (5).
4. Disconnect hose assemblies (6 and 7) from front of pump assembly (24).
5. Disconnect hose assemblies (8 and 9) from bottom of hydraulic tank.
6. Remove hose assembly (9) from combination valve.
7. Disconnect hose assembly (10) from top of pump assembly (24).
8. Remove four bolts (11) and washers (12, Figure 10-7).
9. Disconnect hose assemblies (13 and 14).
10. Remove tee (15).
11. Remove four bolts (16), clip (17), flange (18), tube assembly (19) and preformed packing (20). Discard preformed packing (20).

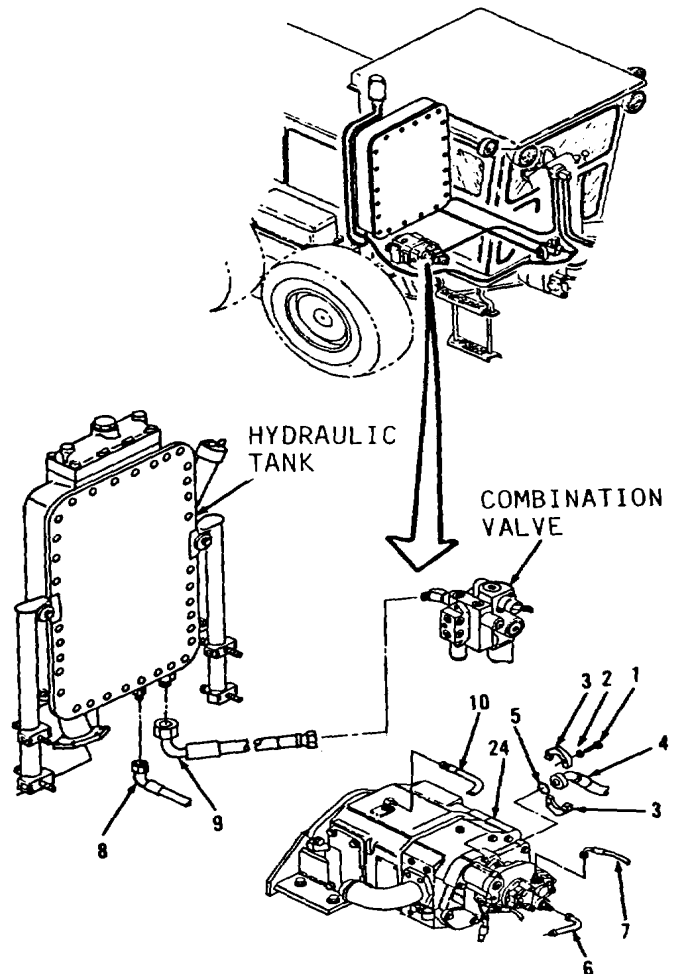


Figure 10-6.

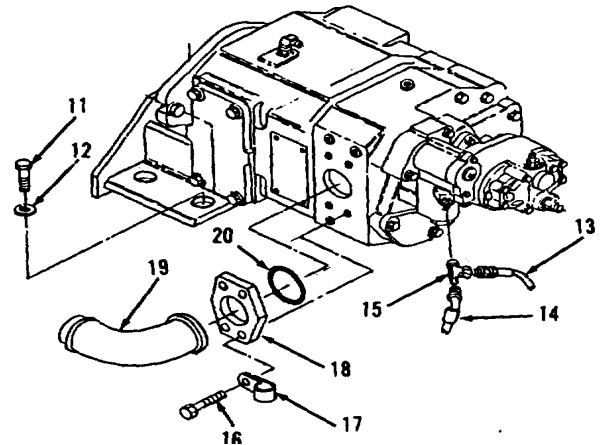


Figure 10-7.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-3. Hydraulic Pump Assembly and Mounting. (Sheet 3 of 7)

REMOVAL (cont)

12. Position pump assembly (24) on left side of pivot area. Slide items 21 thru 30 as an assembly (Figure 10-8) from underneath cab into a position where hoist and sling can be attached.

WARNING

Weight of pump assembly is approximately 159 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

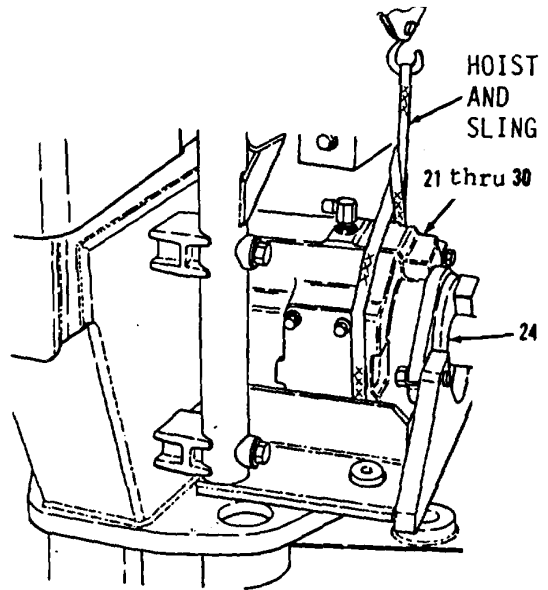


Figure 10-8.

13. Attach hoist and sling to items 21 thru 30 as an assembly and take up slack.
14. Remove items 21 thru 30 as an assembly from vehicle.
15. Remove two nuts (21), bolts (22) and washers (23, Figure 10-9).
16. Separate and remove pump assembly (24) and bracket (25).
17. Remove hoist and sling.
18. Remove four mounts (26) from bracket (25).
19. Remove connector (27) and preformed packing (28) from pump assembly (24). Discard preformed packing (28).
20. Remove connector (29) and preformed packing (30). Discard preformed packing (30).

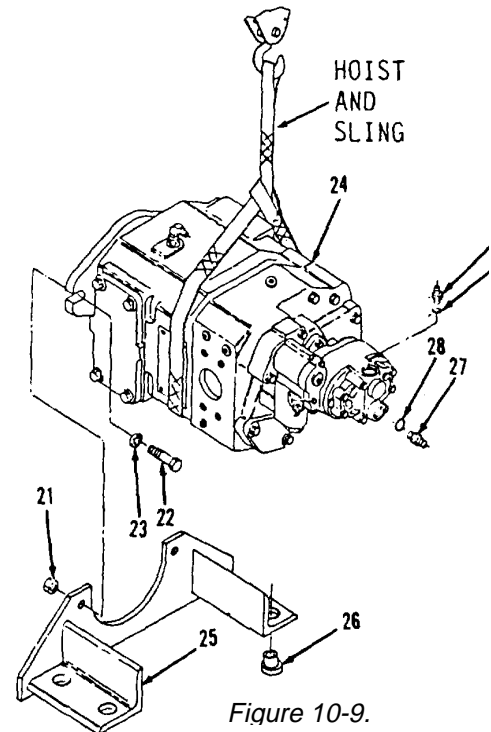


Figure 10-9.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE.

10-3. Hydraulic Pump Assembly and Mounting. (Sheet 4 of 7)

REMOVAL

21. Remove connectors (31 and 32) and elbow (33, Figure 10-10).
22. Remove elbow (34) and preformed packing (35). Discard preformed packing (35).
23. Remove connector (36) and preformed packing (37). Discard preformed packing (37).

CLEANING

Clean all part. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

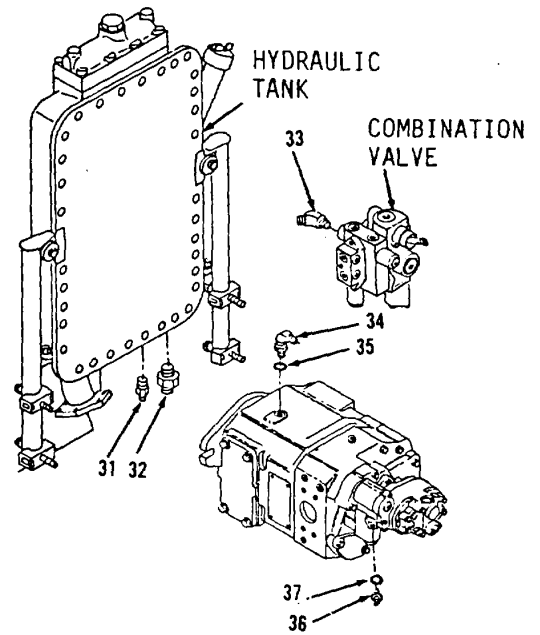


Figure 10-10.

Go to Sheet 5

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-3. Hydraulic Pump Assembly and Mounting. (Sheet 5 of 7)

INSTALLATION

1. Install new preformed packing (37) and connector (36) in pump assembly (24, Figure 10-10).
2. Install new preformed packing (35) and elbow (34).
3. Install elbow (33) and connectors (32 and 31).
4. Install new preformed packing (30) and connector (29, Figure 10-9).
5. Install new preformed packing (28) and connector (27).
6. Install four mounts (26) into bracket (25).
7. Position bracket (25) so when pump assembly (24) with attached items 30 thru 21 is installed on bracket (25), it can be slid into mounting position.
8. Using a hoist and sling, position pump assembly (24) on bracket (25).
9. Install two washers (23), bolts (22) and nuts (21).

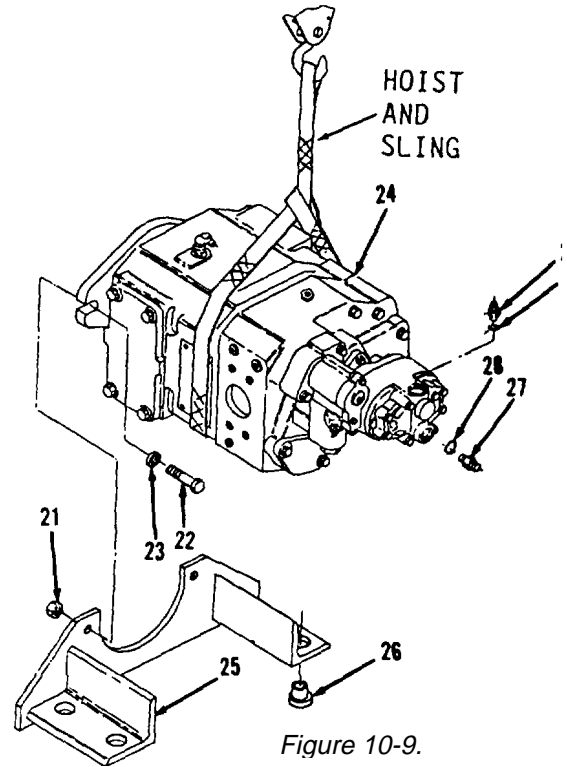


Figure 10-9.

Go to Sheet 6

HYDRAULIC SYSTEM MAINTENANCE.

10-3. Hydraulic Pump Assembly and Mounting. (Sheet 6 of 7)

INSTALLATION

10. Position items 30 thru 21 as an assembly (Figure 10-8). Slide onto mounting holes.
11. Remove hoist and sling.
12. Install new preformed packing (20), tube assembly (19), flange (18), clip (17) and four bolts (16, Figure 10-7).
13. Install tee (15).
14. Connect hose assemblies (14 and 13).
15. Install four washers (12) and bolts (11) onto pump assembly (24). Tighten four bolts (11) to 34 ft-lb.

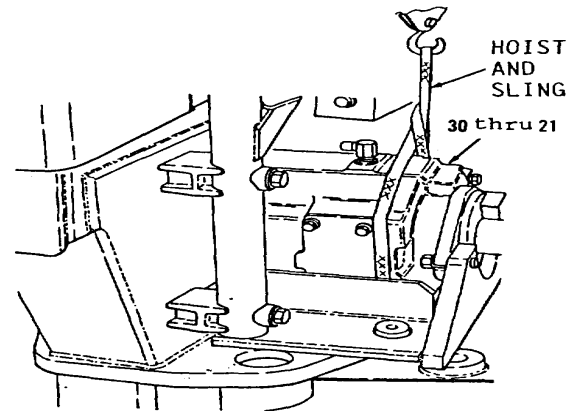


Figure 10-8.

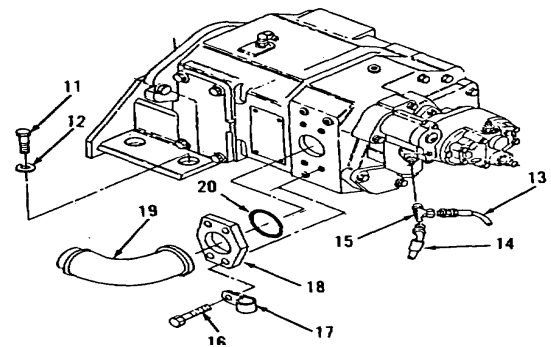


Figure 10-7.

Go to Sheet 7

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-3. Hydraulic Pump Assembly and Mounting. (Sheet 7 of 7)

INSTALLATION (cont)

16. Connect hose assembly (10) onto top of pump assembly (24, Figure 10-6).
17. Install hose assembly (9) to combination valve.
18. Connect hose assemblies (9 and 8) to bottom of hydraulic tank.
19. Connect hose assemblies (7 and 6) to front of pump assembly (24).
20. Install new preformed packing (5), hose assembly (4), two flange halves (3), four washers (2) and bolts (1) on left side of pump assembly (24).

NOTE

Return 130G Grader to original equipment condition.

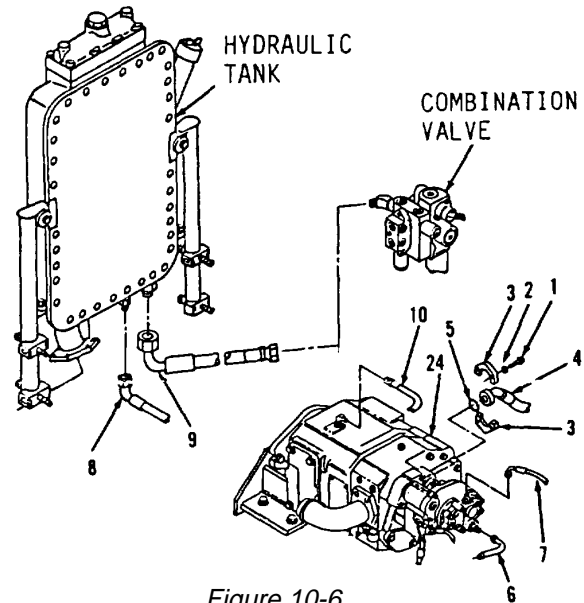


Figure 10-6.

End of Task

10-14

HYDRAULIC SYSTEM MAINTENANCE.

10-4. Pump Assembly. (Sheet 1 of 23)

This task covers:

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

INITIAL SETUP:Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Stop angle bar 5P976
Gage bar 3P1526
Depth gage 6F6992
Guide rods FT1016
Protective plate 5P975
Block FT1017
Fixture 2P5573

Test Equipment

None

Materials/Parts

Dry cleaning solvent, Item 15,
Appendix C Clean cloths, Item
41, Appendix C Small tags, Item
43, Appendix C Hydraulic fluid,
Item 30, Appendix C Thread
sealant, Item 60, Appendix C
600 grit emery polishing paper,
Item 11, Appendix C Gaskets,
Items 17, 18, 63 Preformed
packings, Items 3, 8, 25, 26, 27,
29, 31, 36, 37, 39, 46, 56, 79,
86, 88, 91, 93, 103, 107, 110,
114 Seals, Items 19, 20, 116
Seal kit 329717 Seal kit 3G1708

Personnel Required

Construction equipment
repairer MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Go to Sheet 2**10-15**

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-4. Pump Assembly. (Sheet 2 of 23)

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake
applied. Equipment lowered to
the ground. Engine stopped.
Master disconnect switch off.
Hydraulic pressure relieved.

Paragraph 10-3

Pump assembly removed.

Go to Sheet 3

10-16

HYDRAULIC SYSTEM MAINTENANCE.

10-4. **Pump Assembly.** (Sheet 3 of 23)

DISASSEMBLY

- 1. Remove two bolts (1), lockwashers (2) and items 3 thru 26 as an assembly from head (95, Figure 10-11).
- 2. Remove preformed packing (3) and coupling (4, Figure 10-12). Discard preformed packing (3).
- 3. Using scribe, matchmark back plate (9), body (13) and front plate (21) to aid in assembly.

CAUTION

Do not pry pump sections apart. Do not lay machined surfaces on unprotected surfaces. Scratches or grooves will cause destruction of part.

- 4. Remove four bolts (5) and two bolts (6 and 7) from back plate (9, Figure 10-13).
- 5. Separate back plate (9), body (13) and front plate (21, Figure 10-14).
- 6. Remove and discard preformed packing (8) from back plate (9, Figure 10-15).

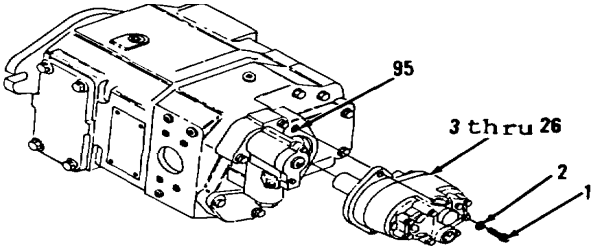


Figure 10-11.

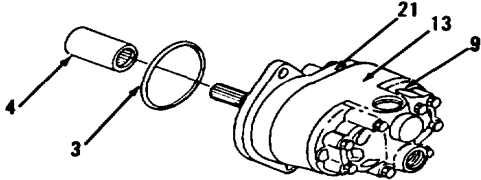


Figure 10-12.

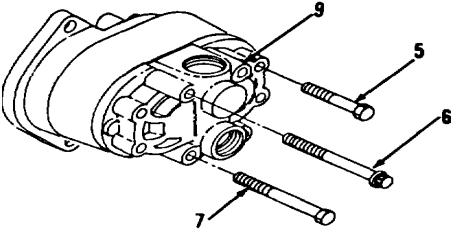


Figure 10-13.

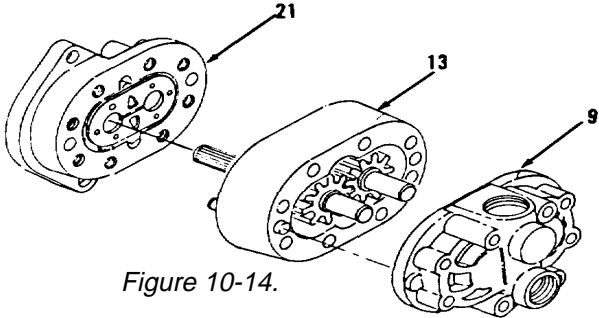


Figure 10-14.

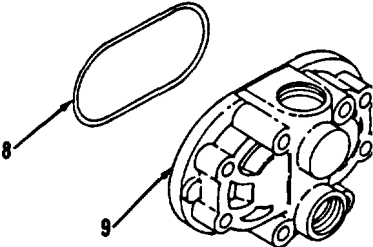


Figure 10-15.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-4. **Pump Assembly.** (Sheet 4 of 23)

DISASSEMBLY (cont)

- 7. Remove drive gear (10), idler gear (11) and two dowels (12) from body (13, Figure 10-16).
- 8. Remove diaphragm (14) from front plate (21, Figure 10-17).
- 9. Remove two springs (15) and balls (16, Figure 10-18).
- 10. Remove and discard gaskets (17 and 18) and seal (19). Remove all gasket material from mounting surfaces.
- 11. Using a suitable puller, remove and discard seal (20) from front plate (21).
- 12. Remove bolt (22), two bolts (23), lockwashers (24) and items 25 thru 52 as an assembly from head (95, Figure 10-19).
- 13. Remove and discard preformed packings (25 thru 27) from housing (47, Figure 10-20).
- 14. Remove plug (28), preformed packing (29), plug (30) and preformed packing (31). Discard preformed packings (29 and 31).

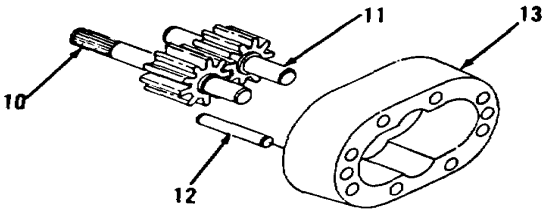


Figure 10-16.

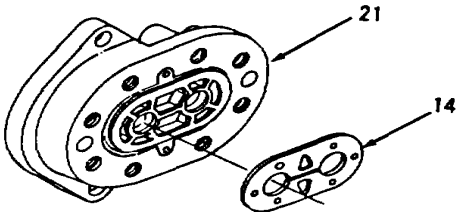


Figure 10-17.

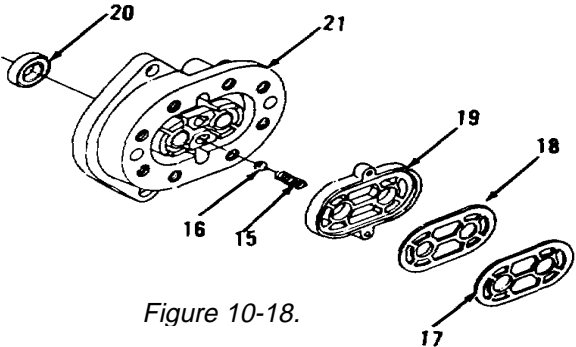


Figure 10-18.

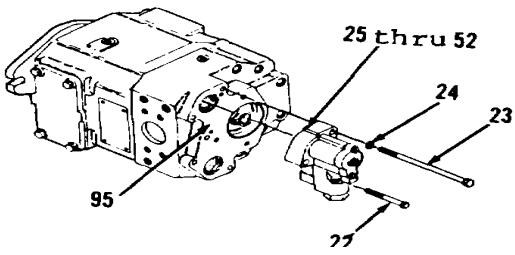


Figure 10-19.

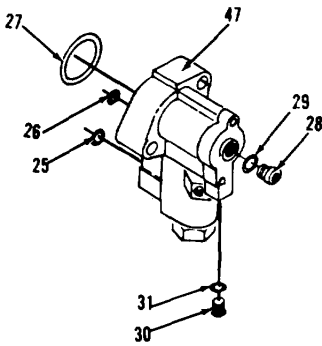


Figure 10-20.

Go to Sheet 5

HYDRAULIC SYSTEM MAINTENANCE.

10-4. **Pump Assembly.** (Sheet 5 of 23)

DISASSEMBLY

- 15. Remove two bolts (32), cover (33), piston (34), spacer (35) and preformed packings (36 and 37) from housing (47, Figure 10-21). Discard preformed packings (36 and 37).
- 16. Remove plug (38), preformed packing (39), spacer (40), piston (41), retainer (42), spring (43) and two shims (44) from housing (47, Figure 10-22). Discard preformed packing (39).
- 17. Remove plug (45) and preformed packing (46). Discard preformed packing (46).
- 18. Remove spring (48), three washers (49), seat (50), spring (51) and spacer (52) from head (95, Figure 10-23).
- 19. Remove two bolts (53), lockwashers (54), cover (55) and preformed packing (56, Figure 10-24). Discard preformed packing (56).
- 20. Remove bolt (57) and lockwasher (58) from head (95).

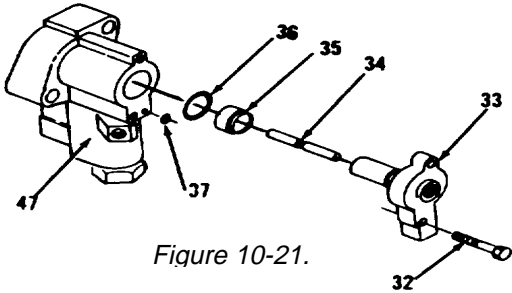


Figure 10-21.

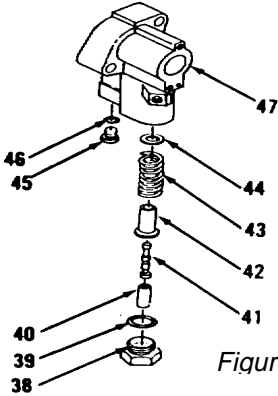


Figure 10-22.

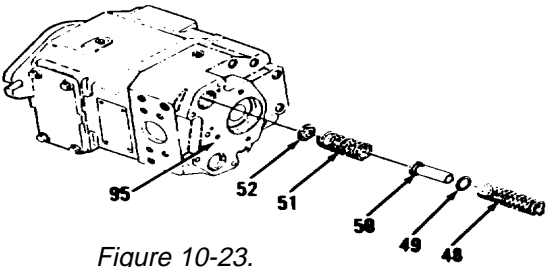


Figure 10-23.

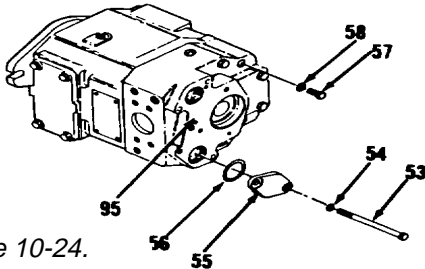


Figure 10-24.

Go to Sheet 6

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-4. **Pump Assembly.** (Sheet 6 of 23)

DISASSEMBLY (cont)

21. Install items 59 thru 138 as an assembly (Figure 10-25) in fixture.
22. Install two guide rods into head (95) and body (118).
23. Remove three bolts (59), lock-washers (60), two bolts (61) and lockwashers (62).
24. Separate head (95) from body (118) by sliding head (95) over guide rods.
25. Remove two guide rods.
26. Remove and discard gasket (63, Figure 10-26). Remove all gasket material from mounting surfaces.
27. Remove plate (64) from head (95).

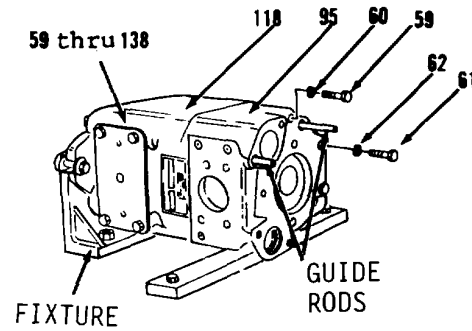


Figure 10-25.

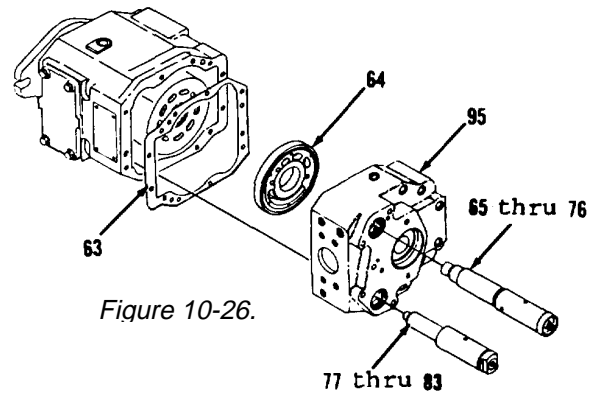


Figure 10-26.

NOTE

Cartridge assemblies must be tagged as to their locations before removing to aid in installation.

28. Remove items 65 thru 76 and 77 thru 83 as assemblies from head (95).
29. Remove pistons (65 and 66) from cartridge (76, Figure 10-27).
30. Remove ring (67) and insert (68).
31. Remove items 69 thru 74 as an assembly from cartridge (76).
32. Remove ring (69), spacer (70), ring (71) and stop (72, Figure 10-28).
33. Remove spool (73) from sleeve (74).

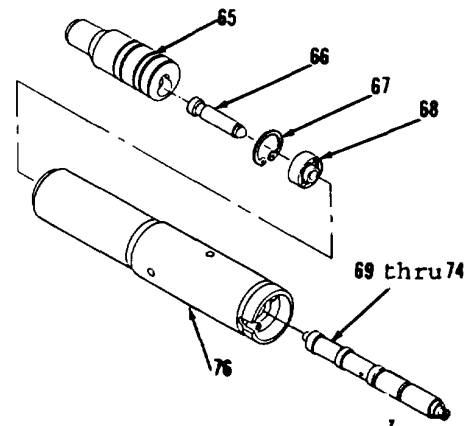


Figure 10-27.

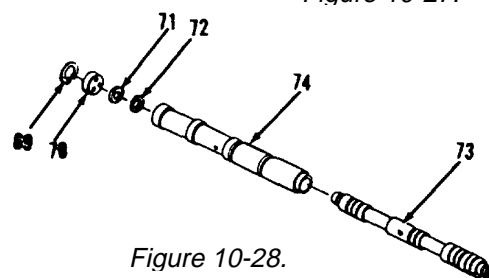


Figure 10-28.

Go to Sheet 7

HYDRAULIC SYSTEM MAINTENANCE.

10-4. **Pump Assembly.** (Sheet 7 of 23)

DISASSEMBLY

- 34. Remove setscrew (75) from cartridge (76, Figure 10-29).
- 35. Remove piston (77, Figure 10-30).
- 36. Remove plug (78).
- 37. Remove and discard preformed packing (79).
- 38. Remove spring (80) and pistons (81 and 82) from cartridge (83).
- 39. Remove two pins (84) from head (95, Figure 10-31).
- 40. Remove four rings (85), preformed packings (86), three rings (87) and preformed packings (88). Discard preformed packings (86 and 88).
- 41. Remove bearing cup (89, Figure 10-32).
- 42. Remove three plugs (90), preformed packings (91), five plugs (92) and preformed packings (93) from head (95). Discard preformed packings (91 and 93).
- 43. Remove two dowels (94) from head (95).

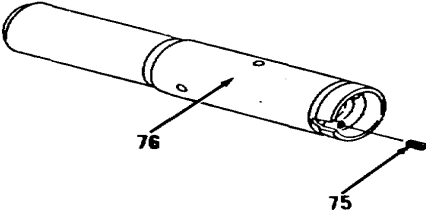


Figure 10-29.

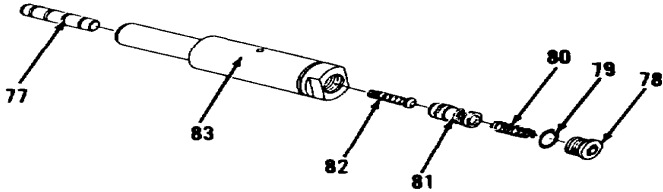


Figure 10-30.

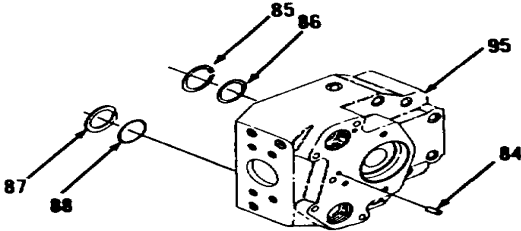


Figure 10-31.

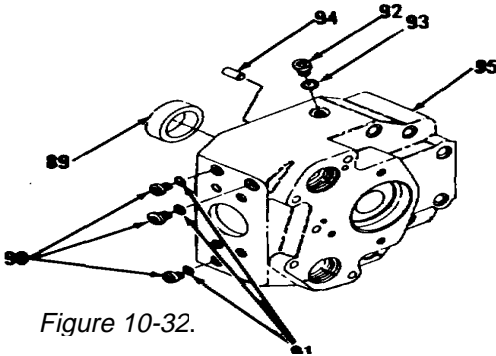


Figure 10-32.

Go to Sheet 8

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-4. **Pump Assembly.** (Sheet 8 of 23)

DISASSEMBLY (cont)

CAUTION

Protective plate must be used to prevent damage to the highly finished face of barrel when removing bearing.

- 44. Using protective plate and suitable puller, remove bearing (96, Figure 10-33).
- 45. Remove items 97 thru 130 as an assembly from fixture and install on block.

WARNING

Do not remove second ring. Large spring in center of barrel is under compression and release of spring by removal of second ring may cause INJURY.

- 46. Remove ring (97) from shaft (120, Figure 10-34).
- 47. Remove eight bolts (98), lock-washers (99), two covers (100), shim(s) (101 and 102) and two preformed packings (103) from body (118, Figure 10-35). Discard preformed packings (103).
- 48. Remove two bearings (104).

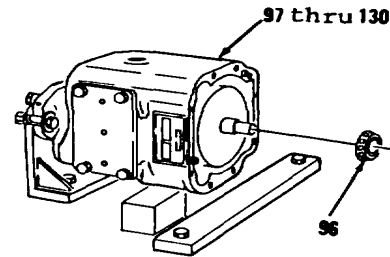


Figure 10-33.

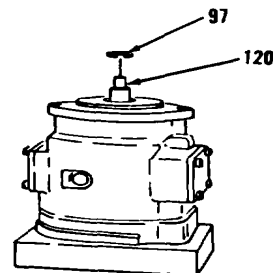


Figure 10-34.

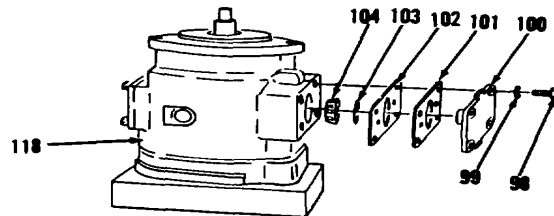


Figure 10-35.

Go to Sheet 9

HYDRAULIC SYSTEM MAINTENANCE.

10-4. **Pump Assembly.** (Sheet 9 of 23)

DISASSEMBLY

NOTE

Bolts must be tagged as to their locations in body to aid in assembly.

- 49. Remove nut (105), bolt (106), preformed packing (107), nut (108), bolts (109) and preformed packing (110, Figure 10-36). Discard preformed packings (107 and 110).
- 50. Remove four screws (111) and plate (112).
- 51. Remove two plugs (113) and preformed packings (114) from body (118). Discard preformed packings (114).
- 52. Separate body (118) from barrel (138, Figure 10-37).
- 53. Remove ring (115, Figure 10-38).
- 54. Remove and discard seal (116).
- 55. Remove bearing cup (117) from body (118).
- 56. Remove items 119 and 120 as an assembly from barrel (137, Figure 10-39).

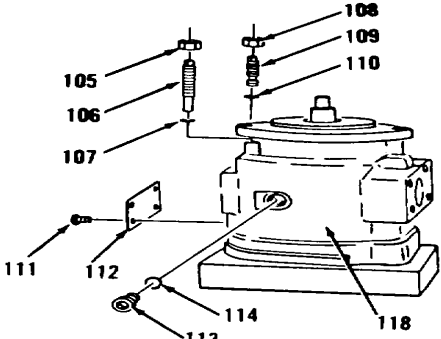


Figure 10-36.

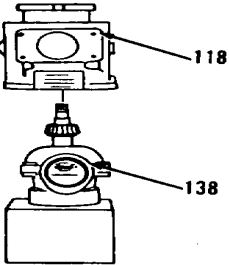


Figure 10-37.

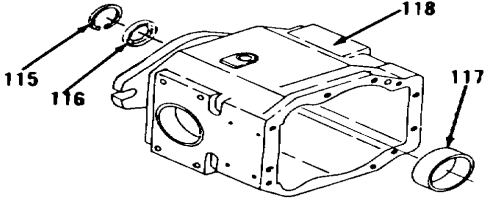


Figure 10-38.

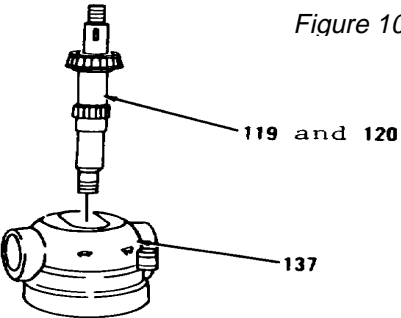


Figure 10-39.

G

Go to Sheet 10

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-4. **Pump Assembly.** (Sheet 10 of 23)

DISASSEMBLY (cont)

- 57. Remove bearing (119) from shaft (120, Figure 10-40).

CAUTION

Use extreme care not to damage the highly machined surfaces of pistons or barrel. Scratches or gouges in the surfaces will destroy parts.

NOTE

Pistons must be tagged to their positions in barrel before removing to aid in assembly.

- 58. Remove items 121 thru 134 as an assembly from barrel (138, Figure 10-41).
- 59. Remove four bolts (121), washers (122), two bearings (123), shim(s) (124 and 125) and plate (126, Figure 10-42).
- 60. Remove nine pistons (127), plate (128), dowel (129), two stops (130) and bearing cups (131) from swashplate (132).

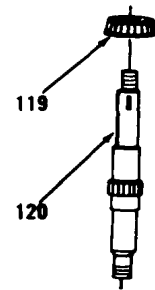


Figure 10-40.

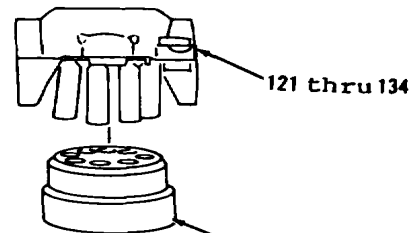


Figure 10-41.

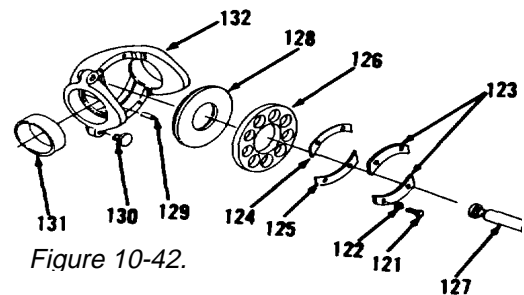


Figure 10-42.

Go to Sheet 11

HYDRAULIC SYSTEM MAINTENANCE.

10-4. **Pump Assembly.** (Sheet 11 of 23)

DISASSEMBLY

WARNING

Spring is under extreme pressure and care must be used when removing. Use an arbor press and proper diameter driver to compress spring.

61. Place protective plate over barrel (138) and remove ring (133), spacer (134), spring (135) and spacer (136, Figure 10-43).
62. Remove nine bearings (137) from barrel (138, Figure 10-44).

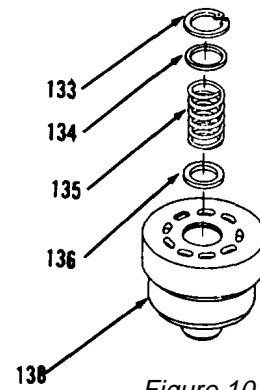


Figure 10-43.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

1. Inspect plate (64, Figure 10-45). Use touch lapping procedure if polished in the seal band area, minor erosion or scratches. Use grit emery polishing paper and dry cleaning solvent for touch lapping. Replace if cracked, broken, erosion across seal bands, deep scratches in seal bands or ports, or scratches that can be felt in the seal band area or thrust faces with a fingernail or pencil.
2. Inspect all other parts. Refer to Chapter 2.

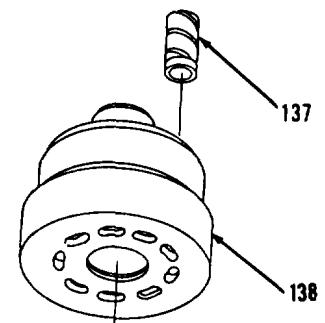


Figure 10-44.

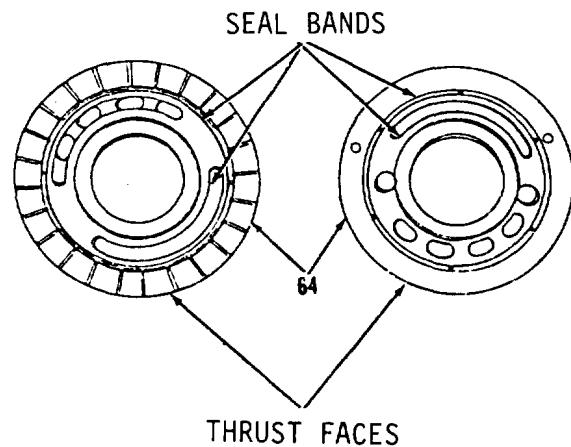


Figure 10-45.

Go to Sheet 12

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-4. Pump Assembly. (Sheet 12 of 23)

ASSEMBLY

1. Put a small amount of hydraulic fluid on all parts.
2. Install dowel (129) on swashplate (132, Figure 10-46).
3. Lower temperature of two bearing cups (131) and install in swashplate (132).
4. Install two stops (130).
5. Install plate (128) in swashplate (132) with hole in plate (128) in alignment with dowel (129).
6. Lower temperature of bearing cup (117) and install in body (118, Figure 10-47).
7. Install new preformed packing (110), bolt (109) and nut (108) in body (118). Bolt (109) is the maximum stop bolt and must be installed in the same hole from which it was removed.
8. Install new preformed packing (107), bolt (106) and nut (105). Bolt (106) is the minimum stop bolt and must be installed in the same hole from which it was removed.
9. Install swashplate (132) in body (118).

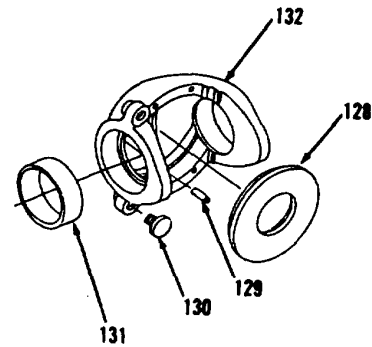


Figure 10-46.

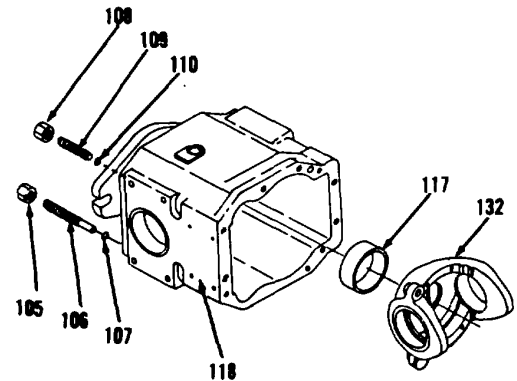


Figure 10-47.

Go to Sheet 13

HYDRAULIC SYSTEM MAINTENANCE.

10-4. Pump Assembly. (Sheet 13 of 23)

ASSEMBLY

10. Heat two bearings (104) in oil to a maximum temperature of 275 degrees F and install on two covers (100, Figure 10-48).
11. Install one of two new preformed packings (103) and enough shim(s) (102 and 101) to obtain a shim thickness of 0.15 inch on one of two covers (100).
12. Install one cover (100) on body (118).
13. Install four of eight lockwashers (99) and bolts (98). Tighten bolts (98) to 32 ft-lb torque.
14. Position second cover (100) on opposite side of other cover (100) with shim(s) (102 and 101).
15. Install remaining four of eight lockwashers (99) and bolts (98). Tighten bolts (98) evenly in a clockwise direction to 40 lb-in torque in steps of 10 lb-in torque. Move swashplate (132) back and forth while tightening bolts (98).

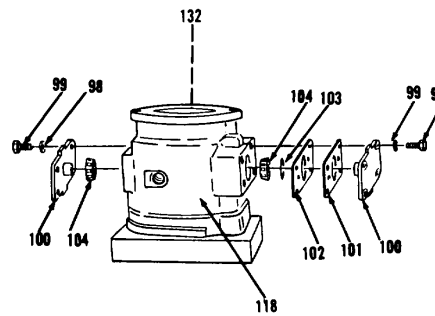


Figure 10-48.

Go to Sheet 14

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-4. **Pump Assembly.** (Sheet 14 of 23)

ASSEMBLY (cont)

16. Using feeler gage, measure gap between body (118) and cover (100, Figure 10-49) without shim(s). Measure at four bolt (98) locations. Note the average thickness and add 0.008 inch. This will be the total shim thickness to be added to cover without shim(s). If the thickness of shim(s) required is less than 0.005 inch and more than 0.025 inch, add thickness of the shim(s) required from feeler gage measurement plus 0.008 inch to the 0.015 inch shim thickness of the other cover. Divide the total thickness of the shim(s) evenly and install the same thickness of shim(s) on each cover (100).
17. Remove four of eight bolts (98), lockwashers (99) and the cover (100, Figure 10-50) without shim(s).

NOTE

Thickness of one shim is 0.00473 inch and thickness of other shim is 0.00197 inch.

18. Position shim(s) (102 and 101) on cover (100, Figure 10-51) at thickness determined in step 16.
19. Install remaining new preformed packing (103), cover (100), remaining four of eight lockwashers (99) and bolts (98). Tighten four bolts (98) to 32 ft-lb torque. Swashplate (132) must move freely after four bolts (98) are tightened.

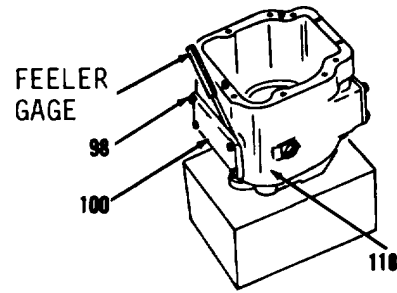


Figure 10-49.

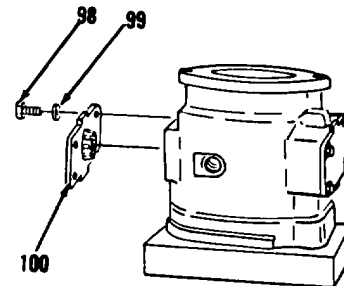


Figure 10-50.

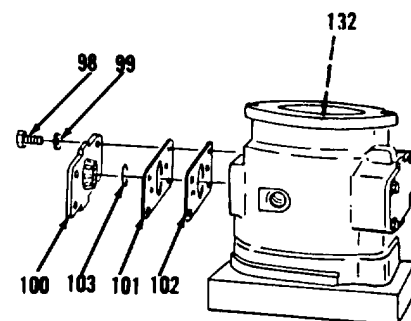


Figure 10-51.

Go to Sheet 15

HYDRAULIC SYSTEM MAINTENANCE.

10-4. Pump Assembly. (Sheet 15 of 23)

ASSEMBLY

20. Install stop angle bar on swashplate (132, Figure 10-52). Stop angle bar must be installed with the deepest point of the two angles toward the minimum stop bolt (106). The stop angle bar must be at a 90 degree angle to a line through the center of two bearings (104).

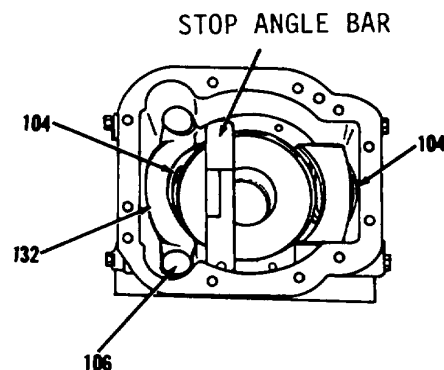


Figure 10-52.

21. Position gage bar and depth gage on body (118) with the edge against dowel (129, Figure 10-53). Install depth gage in one of the holes in the gage bar that is directly over the deepest angle of stop angle bar. The gage bar must be parallel with the centerline of two bearings (104).

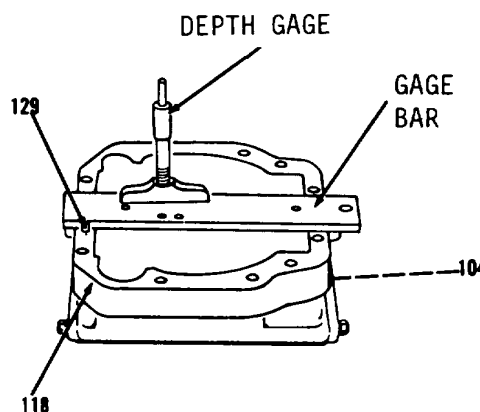


Figure 10-53.

22. Move swashplate (132) until it makes contact with bolt (109, Figure 10-54).

23. Adjust bolt (109) for maximum swashplate (132) angle. Use depth gage and measure the distance from the top of gage bar to the angle on the stop angle bar. Move the depth gage to the hole on the same side of the gage bar, over the same angle of the stop angle bar. Measure the distance from the top of the gage bar to the angle on the stop angle bar. Adjust bolt (109) until the measurements made from the top of the gage bar to the angle on the stop angle bar is the same.

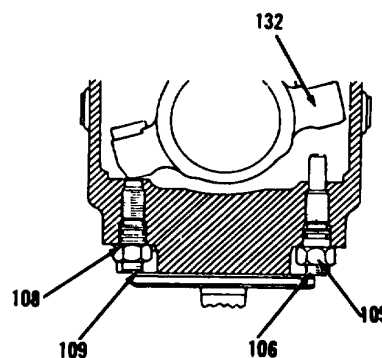


Figure 10-54.

Go to Sheet 16

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-4. Pump Assembly. (Sheet 16 of 23)

ASSEMBLY (cont)

24. Tighten nut (108) to 125 ft-lb torque.
25. Move swashplate (132) until contact with bolt (106) is made.
26. Adjust bolt (106) for minimum swashplate (132) angle. Install the depth gage over the small angle side of the stop angle bar. Measure the distances from both holes as in step 23 from the top of the gage bar to the smallest angle of the stop angle bar. Adjust bolt (106) until the distances are the same.
27. Tighten nut (105) to 125 ft-lb torque.
28. Remove depth gage, gage bar and stop angle bar.

NOTE

Shim(s) must be kept with the cover they were removed with.

29. Remove eight bolts (98), washers (99), two covers (100) and shim(s) (101 and 102, Figure 10-55).
30. Remove swashplate (132).
31. Install nine pistons (127), plate (126), shim(s) (125 and 124), two bearings (123), four washers (122) and bolts (121) in swashplate (132, Figure 10-56). Tighten four bolts (121) to 100 lb-in torque.

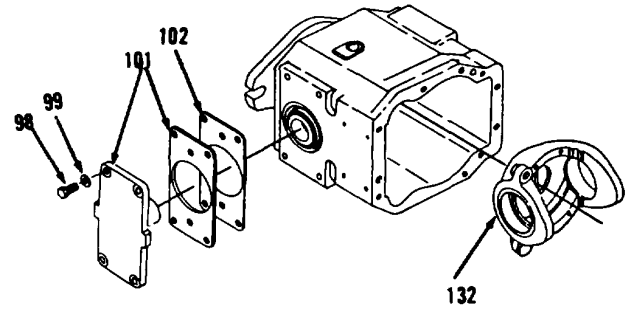


Figure 10-55.

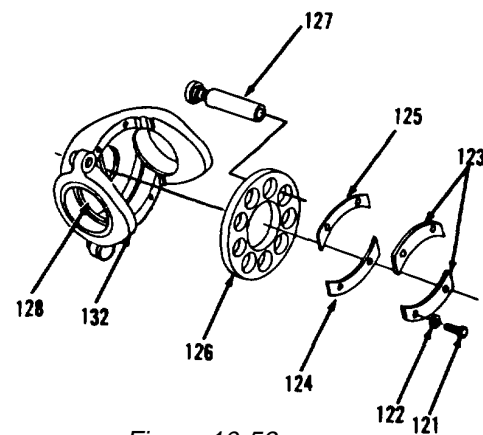


Figure 10-56.

Go to Sheet 17

HYDRAULIC SYSTEM MAINTENANCE.

10-4. Pump Assembly. (Sheet 17 of 23)

ASSEMBLY

- 32. Using feeler gage, measure clearance between plate (128) and nine pistons (127). Add or remove shim(s) (125 and 124) until a clearance of 0.003 inch is obtained.
- 33. Install nine bearings (137) in barrel (138, Figure 10-44).
- 34. Using protective plate and arbor press, install spacer (136), spring (135), spacer (134) and ring (133) on barrel (138, Figure 10-43).
- 35. Position items 138 thru 133 as an assembly (Figure 10-41) on block.
- 36. Install items 134 thru 121 as an assembly in items 138 thru 133 as an assembly.
- 37. Heat bearing (119) in oil to a maximum temperature of 275 degrees F and install on shaft (120, Figure 10-40).
- 38. Install bearing cup (117), new seal (116) and ring (115) in body (118, Figure 10-38).

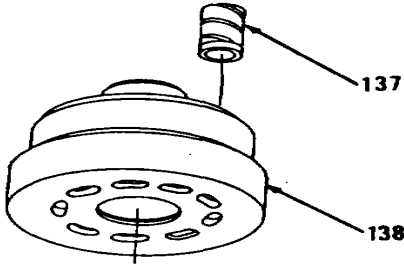


Figure 10-44.

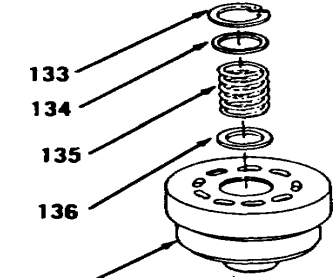


Figure 10-43.

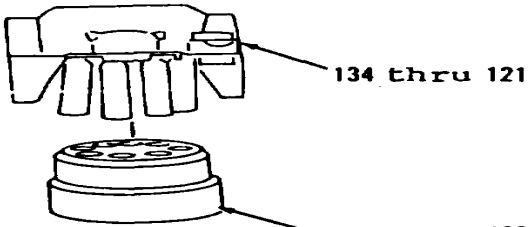


Figure 10-41.

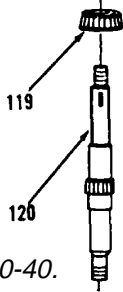


Figure 10-40.

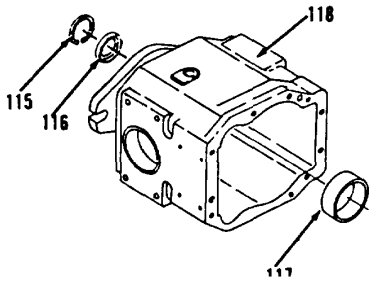


Figure 10-38.

Go to Sheet 18

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-4. Pump Assembly. (Sheet 18 of 23)

ASSEMBLY (cont)

39. Install items 120 and 119 as an assembly in barrel (138, Figure 10-39).
40. Position items 138 thru 120 as an assembly (Figure 10-37) on block.
41. Position body (118) onto items 138 thru 120 as an assembly.
42. Remove block and push (120) into body (118, Figure 10-57).
43. Install two new preformed packings (114) and two plugs (113, Figure 10-58).
44. Install plate (112) and four screws (111).
45. Lubricate two new preformed packings (103) with clean hydraulic fluid.
46. Install two new preformed packings (103), the right amount of shim(s) (102 and 101), two covers (100), eight lockwashers (99) and bolts (98).

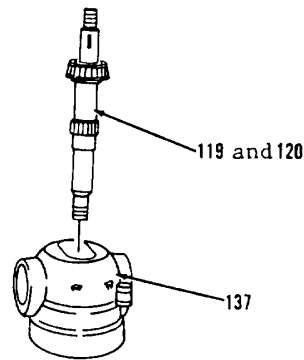


Figure 10-39.

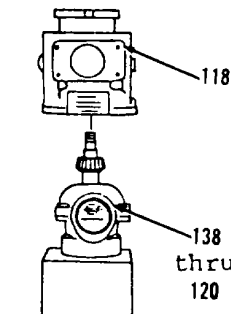


Figure 10-37.

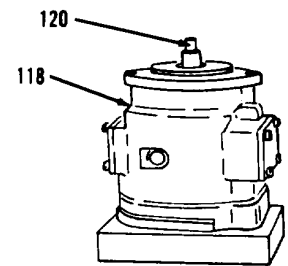


Figure 10-57.

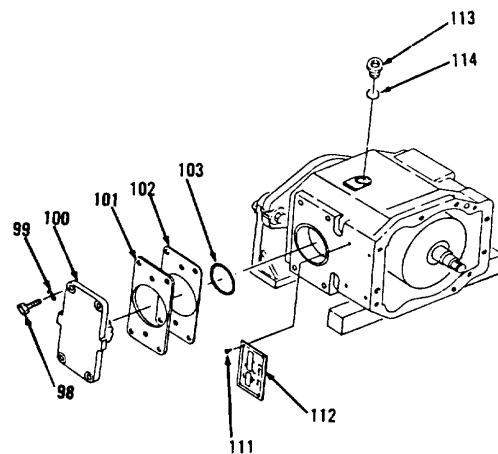


Figure 10-58.

Go to Sheet 19

HYDRAULIC SYSTEM MAINTENANCE.

10-4. Pump Assembly. (Sheet 19 of 23)

- 47. Install retaining ring (97, Figure 10-34).
- 48. Install bearing (96, Figure 10-33) using protective plate and suitable puller.
- 49. Install two dowels (94) in head (95, Figure 10-32).
- 50. Install five new preformed packings (93), plugs (92), three new preformed packings (91) and plugs (90).
- 51. Lower temperature of bearing cup (89) and install in head (95).
- 52. Install three new preformed packings (88), rings (87), four new preformed packings (86) and rings (85) in head (95, Figure 10-31).
- 53. Install two pins (84).

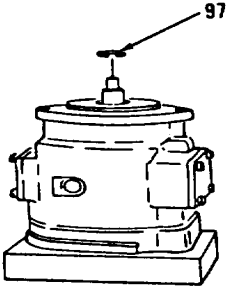


Figure 10-34.

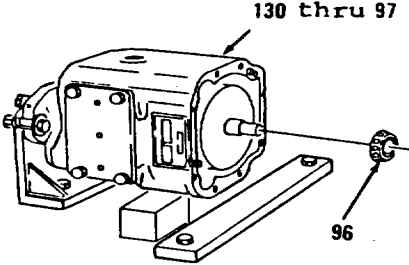


Figure 10-33.

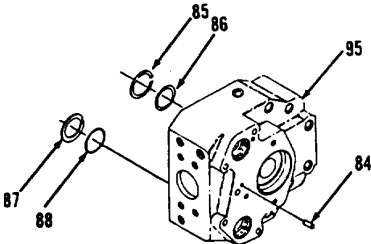


Figure 10-31.

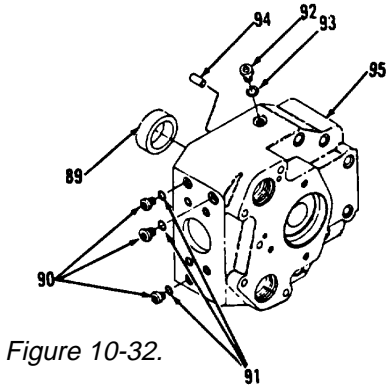


Figure 10-32.

Go to Sheet 20
10-33

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-4. Pump Assembly. (Sheet 20 of 23)

ASSEMBLY (cont)

- 54. Install pistons (82 and 81) and spring (80) in cartridge (83, Figure 10-30).
- 55. Install new preformed packing (79) and plug (78).
- 56. Install piston (77).
- 57. Apply thread sealant to setscrew (75) and install in cartridge (76, Figure 10-29).
- 58. Install spool (73) in sleeve (74, Figure 10-28).
- 59. Install stop (72), ring (71), spacer (70) and ring (69).
- 60. Install items 74 thru 69 as an assembly in cartridge (76, Figure 10-27).
- 61. Install insert (68) and ring (67) in cartridge (76).
- 62. Install pistons (66 and 65) in cartridge (76).
- 63. Install items 83 thru 77 and items 76 thru 65 as assemblies in head (95, Figure 10-26).
- 64. Install plate (64) and new gasket (63).

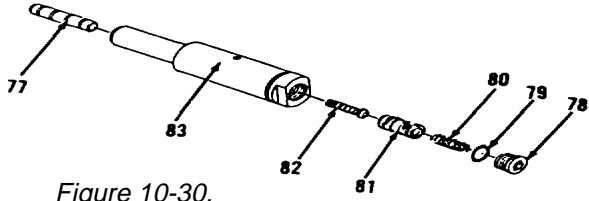


Figure 10-30.

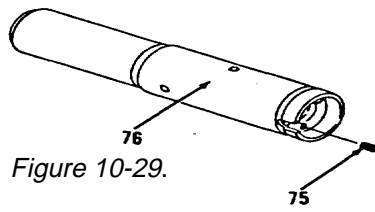


Figure 10-29.

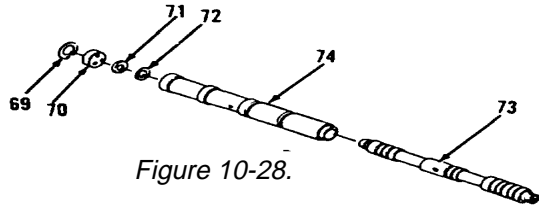


Figure 10-28.

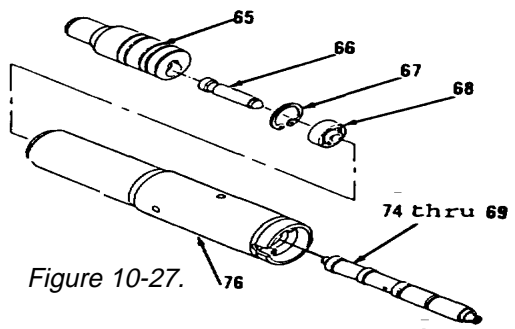


Figure 10-27.

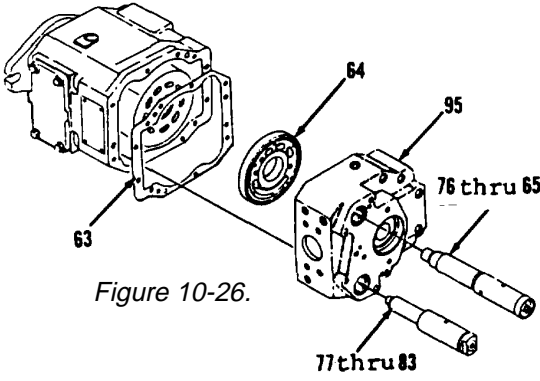


Figure 10-26.

Go to Sheet 21
10-34

HYDRAULIC SYSTEM MAINTENANCE.

10-4. Pump Assembly. (Sheet 21 of 23)

ASSEMBLY

65. Install two guide rods in body (118, Figure 10-25).
66. Position head (95) on guide rods.
67. Install two lockwashers (62), bolts (61), three lockwashers (60) and bolts (59).
68. Remove two guide rods.
69. Install lockwasher (58) and bolt (57, Figure 10-24).
70. Install new preformed packing (56), cover (55), two lockwashers (54) and bolts (53).
71. Install spacer (52), spring (51), seat (50), three washers (49) and spring (48) in head (95, Figure 10-23).
72. Install new preformed packing (46) and plug (45) in housing (47, Figure 10-22).
73. Install two shim(s) (44), spring (43), retainer (42), piston (41), spacer (40), new preformed packing (39) and plug (38).
74. Install new preformed packings (37 and 36), spacer (35), piston (34), cover (33) and two bolts (32) to housing (47, Figure 10-21).

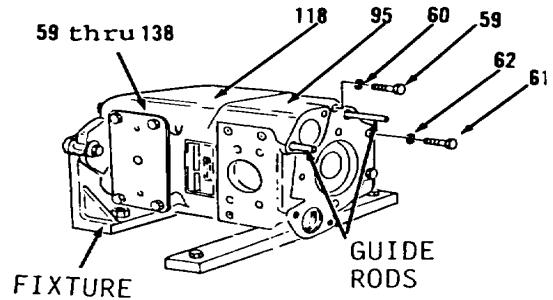


Figure 10-25.

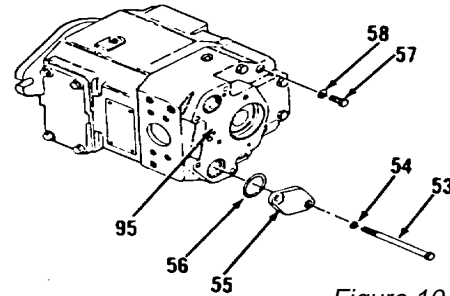


Figure 10-24.

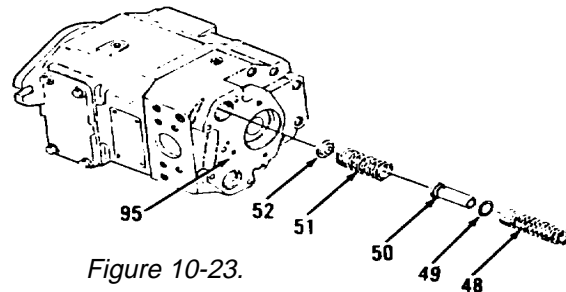


Figure 10-23.

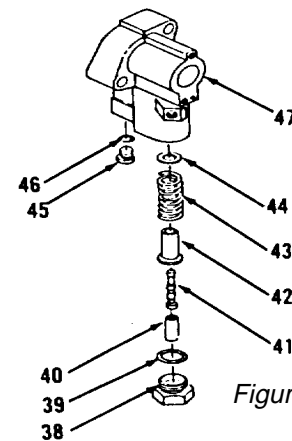


Figure 10-22.

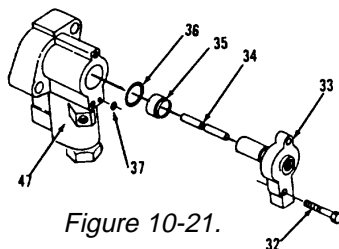


Figure 10-21.

Go to Sheet 22

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-4. Pump Assembly. (Sheet 22 of 23)

ASSEMBLY (cont)

- 75. Install new preformed packing (31), plug (30), new preformed packing (29) and plug (28) in housing (47, Figure 10-20).
- 76. Install new preformed packings (27 and 26).
- 77. Install items 52 thru 25 as an assembly, two lockwashers (24), bolts (23) and bolt (22) on head (95, Figure 10-19).
- 78. Install new seal (20) on front plate (21, Figure 10-18).
- 79. Install new seal (19) and new gaskets (18 and 17).
- 80. Install two balls (16) and springs (15).
- 81. Install new diaphragm (14) on front plate (21, Figure 10-17).
- 82. Install two dowels (12), idler gear (11) and drive gear (10) in body (13, Figure 10-16).

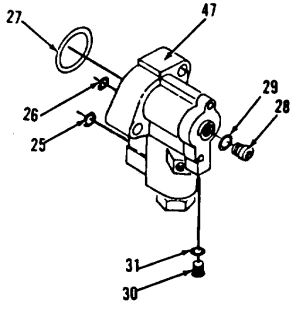


Figure 10-20

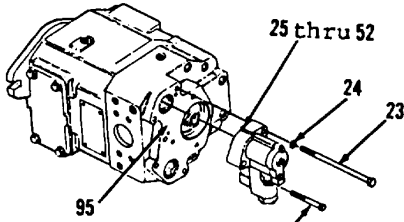


Figure 10-19.

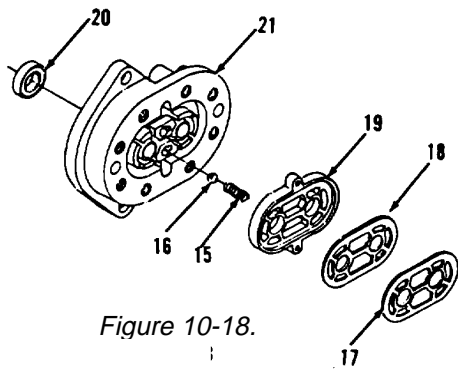


Figure 10-18.

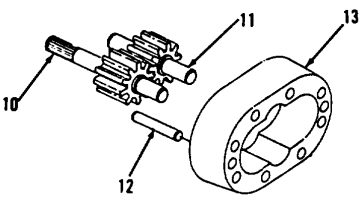


Figure 10-16.

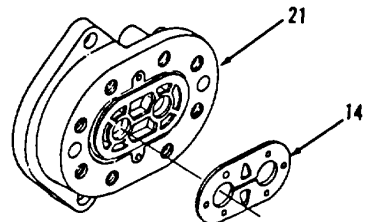


Figure 10-17.

Go to Sheet 23
10-36

HYDRAULIC SYSTEM MAINTENANCE.

10-4. Pump Assembly. (Sheet 23 of 23)

ASSEMBLY

- 83. Install new preformed packing (8) on back plate (9, Figure 10-15).
- 84. Position front plate (21), body (13) and back plate (9, Figure 10-14).
- 85. Install two bolts (7 and 6) and four bolts (5, Figure 10-13).
- 86. Install coupling (4) and new preformed packing (3, Figure 10-12).
- 87. Install items 26 thru 3 as an assembly, two lockwashers (2) and bolts (1) to head (95, Figure 10-11).
- 88. Test hydraulic pump assembly. Fill the pump half full with oil. Turn pump shaft (120, Figure 10-57) with a torque wrench. Not more than 10 ft-lb torque must be used to start shaft turning and 7 ft-lb torque should be needed to keep pump turning. If torque required exceeds these specifications, pump must be disassembled to locate the problem.

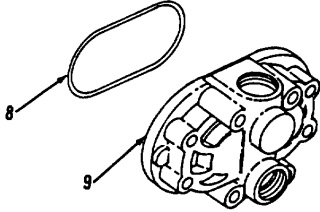


Figure 10-15.

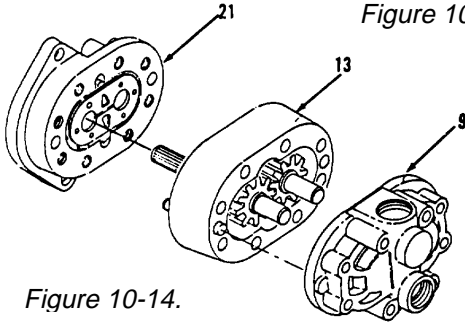


Figure 10-14.

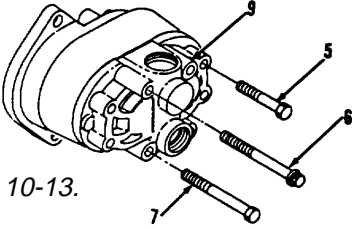


Figure 10-13.

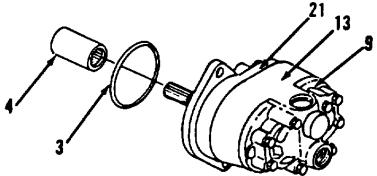


Figure 10-12.

NOTE

Return 130G Grader to original equipment condition.

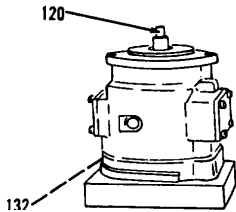


Figure 10-57.

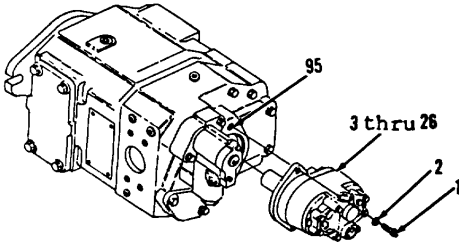


Figure 10-11.

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-5. Circle Drive Motor. (Sheet 1 of 5)

This task covers:

- a. Disassembly**
- b. Cleaning**
- c. Inspection**
- d. Assembly**

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Seals, Items 17, 21
Preformed packings,
Items 3, 6, 23

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Circle drive motor removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE.

10-5. Circle Drive Motor. (Sheet 2 of 5)

DISASSEMBLY

NOTE

A hammer and blunt chisel may aid in removal of cover (2).
Use care to prevent damage to housing.

1. Remove seven bolts (1), cover (2) and preformed packing (3, Figure 10-59). Discard preformed packing (3).
2. Remove inner plate (4) and outer plate (5) from sleeve (15).
3. Remove and discard preformed packing (6, Figure 10-60).
4. Remove manifold (7) and plate (8).
5. Remove inner rotor (9), seven pins (10) and outer rotor (11) as an assembly.
6. Remove plate (12).
7. Remove bearing (13) and link (14).
8. Remove sleeve (15) and shaft (16) from housing (28).

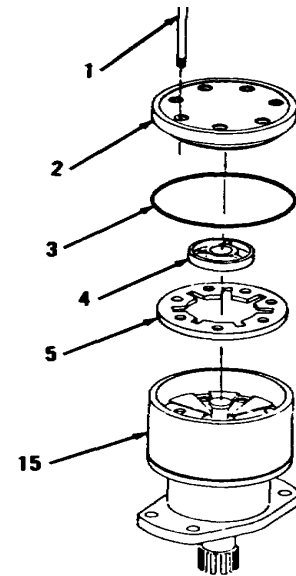


Figure 10-59.

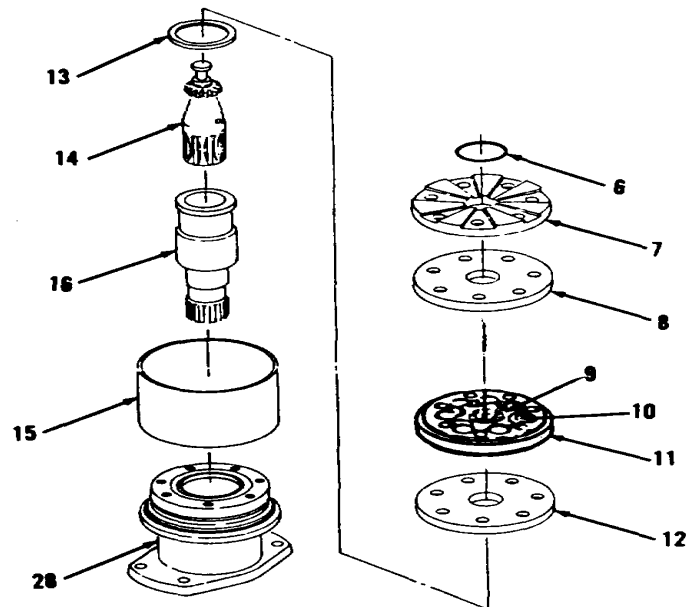


Figure 10-60.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-5. Circle Drive Motor. (Sheet 3 of 5)

DISASSEMBLY

9. Remove seal (17) from housing (28, Figure 10-61). Discard seal (17).
10. Using retaining ring pliers, remove retaining ring (18).
11. Remove spacer (19), washer (20) and seal (21). Discard seal (21).
12. Remove bearing (22) and preformed packing (23) from housing (28, Figure 10-62). Discard preformed packing (23).
13. Using arbor press, remove bearing (24), race (25), bearing (26) and race (27) from housing (28, Figure 10-63).

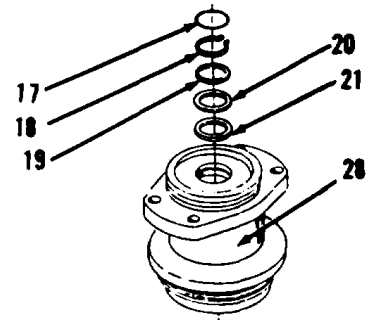


Figure 10-61.

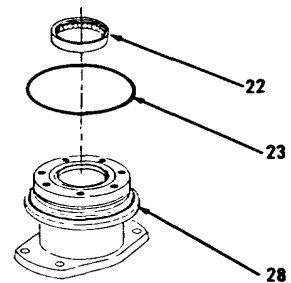


Figure 10-62.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

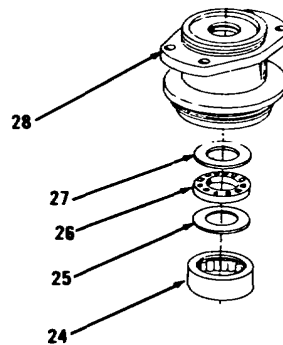


Figure 10-63.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE.**10-5. Circle Drive Motor. (Sheet 4 of 5)****ASSEMBLY**

1. Using arbor press, install race (27), bearing (26) and race (25) in housing (28, Figure 10-64), from surface "X" end.
2. Using arbor press, install bearing (24) in housing (28) from surface "X" end. Set to depth of 2.410 inches below surface "X".
3. Install new preformed packing (23).
4. Using an arbor press, install bearing (22) in housing (28), from surface "X" end. Set to depth of 0.100 inch below surface
5. Install new seal (21), washer (20) and spacer (19) in housing (28, Figure 10-51).
6. Using retaining ring pliers, install retaining ring (18).
7. Install new seal (17).

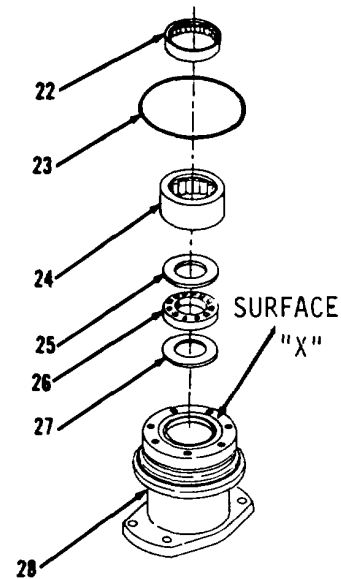


Figure 10-64.

Go to Sheet 5

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-5. Circle Drive Motor. (Sheet 5 of 5)

ASSEMBLY (cont)

8. Install shaft (16) and sleeve (15) on housing (28, Figure 10-60).
9. Install link (14) and bearing (13).
10. Install plate (12).
11. Install outer rotor (11), seven pins (10) and inner rotor (9) as an assembly..
12. Install plate (8) and manifold (7).
13. Install new preformed packing (6) on items 28 thru 7 as an assembly.
14. Install outer plate (5) and inner plate (4) into sleeve (15, Figure 10-59).
15. Install new preformed packing (3), cover (2) and seven bolts (1). Tighten seven bolts (1) to 50 ft-lb torque.

NOTE

Return 130G Grader to original equipment condition.

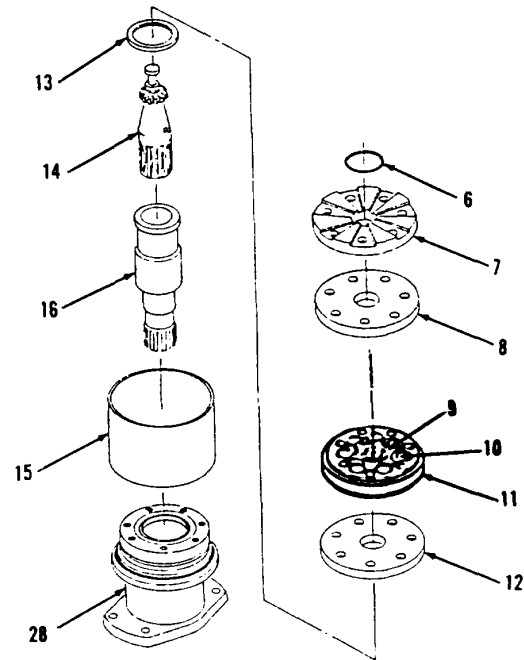


Figure 10-62.

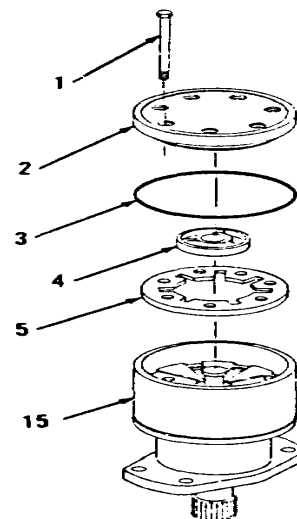


Figure 10-59.

End of Task

HYDRAULIC SYSTEM MAINTENANCE.

10-6. Blade Float Pilot Valve. (Sheet 1 of 2)

This task covers:

- a. **Disassembly**
- b. **Cleaning**
- c. **Inspection**
- d. **Assembly**

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Seals, Items 4, 5, 6, 11,
12, 13
Seal kit 9J3886

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Blade float pilot valve removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-6. Blade Float Pilot Valve. (Sheet 2 of 2)

DISASSEMBLY

1. Remove nut (1), coil (2), cartridge (3) and seals (4, 5 and 6) from body (14, Figure 10-65). Discard seals (4, 5 and 6).
2. Remove screw (7), washer (8), coil (9), cartridge (10) and seals (11, 12 and 13, Figure 10-66). Discard seals (11, 12 and 13).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install new seals (13, 12 and 11), cartridge (10), coil (9), washer (8) and screw (7) in body (14, Figure 10-66).
2. Install new seals (6, 5 and 4), cartridge (3), coil (2) and nut (1, Figure 10-65).

NOTE

Return 130G Grader to original equipment condition.

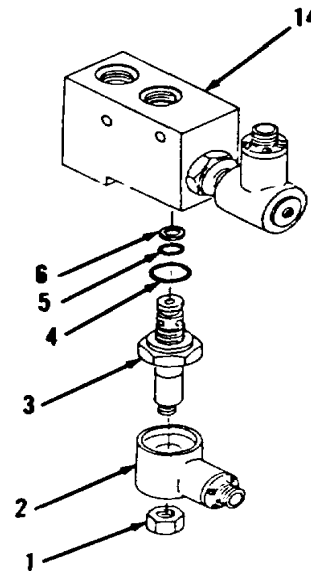


Figure 10-65.

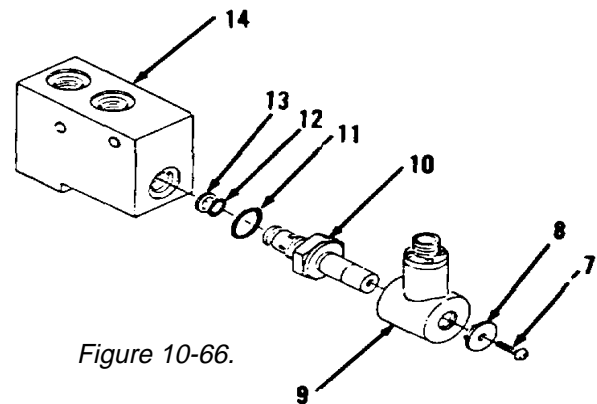


Figure 10-66.

End of Task

HYDRAULIC SYSTEM MAINTENANCE.

10-7. Blade Float Check Valve. (Sheet 1 of 4)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Preformed packings, Items 2,
8, 14, 16, 18, 20, 22
Dry ice or freezer

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Blade float check valve removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-7. Blade Float Check Valve. (Sheet 2 of 4)

DISASSEMBLY

1. Loosen plug (1) carefully to relieve spring (3, Figure 10-67) tension. Remove plug (1), preformed packing (2), spring (3) and ball (4). Discard preformed packing (2).
2. Loosen plug (7) carefully to relieve spring (9) tension. Remove plug (7), preformed packing (8), spring (9) and ball (10). Discard preformed packing (8).
3. Remove plug (13) and preformed packing (14, Figure 10-68). Discard preformed packing (14).
4. Remove plug (15) and preformed packing (16). Discard preformed packing (16).
5. Remove plug (17) and preformed packing (18). Discard preformed packing (18).
6. Remove plug (21) and preformed packing (22). Discard preformed packing (22).
7. Remove plug (19) and preformed packing (20). Discard preformed packing (20).

CAUTION

Brass rod and hammer must be used to remove seat and piston to prevent damage.

8. Using a .25 inch diameter brass rod and hammer, remove seat (5) and piston (6) from body (23).
9. Using a .69 inch diameter brass rod and hammer, remove seat (11) piston (12) from body (23).

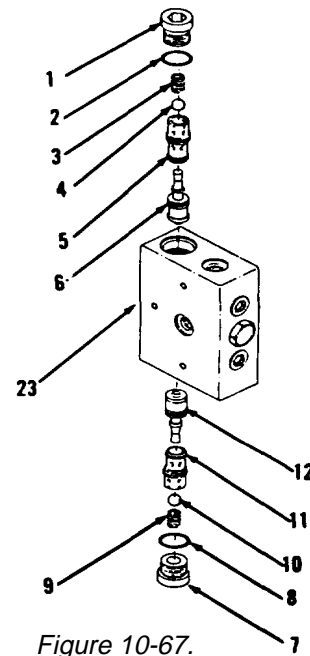


Figure 10-67.

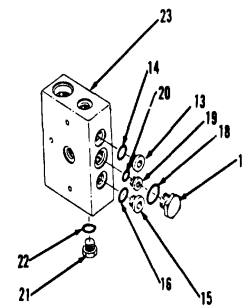


Figure 10-68.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-7. Blade Float Check Valve. (Sheet 3 of 4)

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

WARNING

COLD PARTS HAZARD

Use gloves or tongs to handle extremely cold parts. Contact between cold parts and your skin may cause frostbite or other INJURY.

1. Using a freezer, lower temperature of seat (11, Figure 10-67).
2. Using a .69 inch diameter brass rod and hammer, install seat (11) in body (23).
3. Install pistons (6) and (12) in body (23).
4. Using a freezer, lower temperature of seat (5).
5. Using a .69 inch diameter brass rod and hammer, install seat (5) in body (23).

NOTE

Allow assembly to warm to room temperature before proceeding.

6. Move pistons (6) and (12), checking for free travel.
7. Install ball (10), spring (9), new preformed packing (8) and plug (7) in body (23). Tighten plug (7) to 25 ft-lb torque.

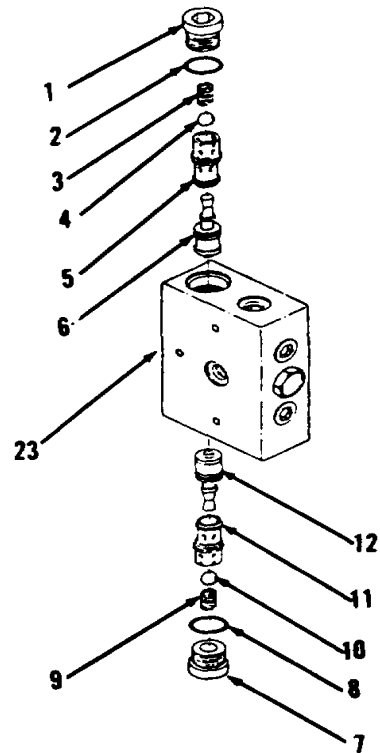


Figure 10-67.

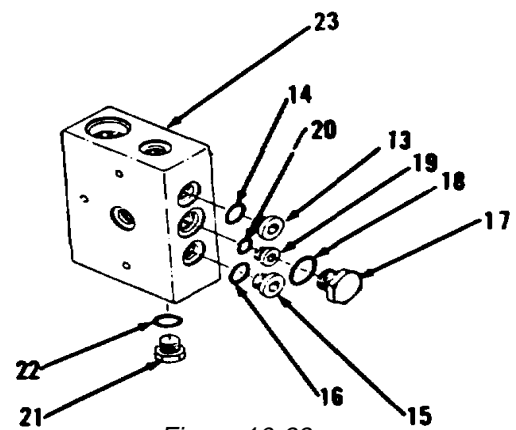


Figure 10-68.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-7. Blade Float Check Valve. (Sheet 4 of 4)

ASSEMBLY (cont)

- 8. Install ball (4), spring (3), new preformed packing (2) and plug (1) in body (23). Tighten plug (1) to 25 ft-lb torque.
- 9. Install new preformed packing (20, Figure 10-68) and plug (19) in body (23).
- 10. Install new preformed packing (22) and plug (21) in body (23).
- 11. Install new preformed packing (16) and plug (15) in body (23).
- 12. Install new preformed packing (18) and plug (17) in body (23).
- 13. Install new preformed packing (14) and plug (13) in body (23).

NOTE

Return 130 G Grader to original equipment condition.

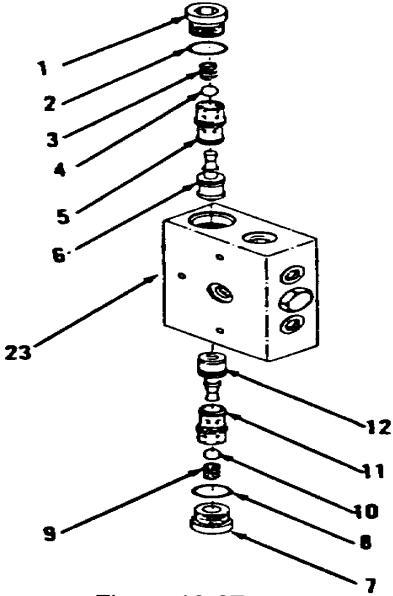


Figure 10-67.

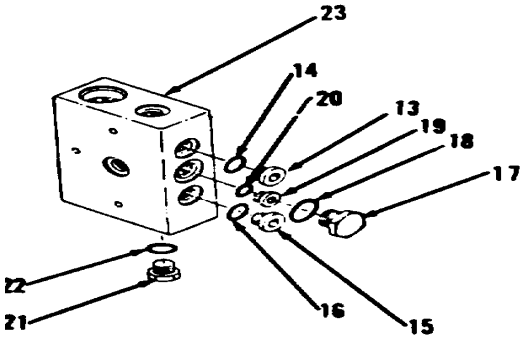


Figure 10-68.

End of Task

HYDRAULIC SYSTEM MAINTENANCE.

10-8. Right Hand Blade Lift, Articulation and Centershift Check Valve. (Sheet 1 of 4)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Preformed packings, Items 2,
5, 8, 14
Dry ice or freezer
Alignment punch

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Centershift check valve removed.
Right hand blade lift check valve
removed.
Articulation check valve removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-8. Right Hand Blade Lift, Articulation and Centershift Check Valve. (Sheet 2 of 4)

DISASSEMBLY

1. Remove adapter (1), preformed packing (2) and choke (3, Figure 10-69) from items 13 thru 18 as an assembly. Discard preformed packing (2).
2. Remove adapter (4), preformed packing (5) and choke (6). Discard preformed packing (5).
3. Loosen plug (7) carefully to relieve tension of spring (9). Remove plug (7), preformed packing (8), spring (9) and ball (10). Discard preformed packing (8).

CAUTION

Use alinement punch and hammer to remove seat and piston. Use caution not to damage seat.

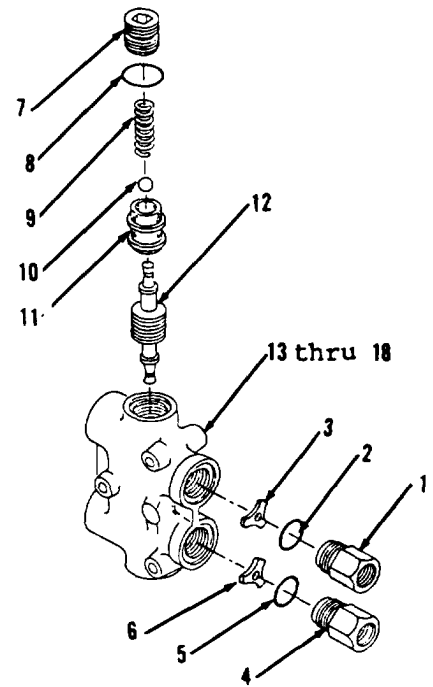


Figure 10-69.

4. Using an alignment punch and hammer, remove seat (11) and piston (12).
5. Loosen plug (13) carefully to relieve tension of spring (15). Remove plug (13), preformed packing (14), spring (15) and ball (16, Figure 10-70). Discard preformed packing (14).
6. Using an alignment punch and hammer, remove seat (17) from check valve body (18).

CLEANING

Clean all parts. Refer to Chapter 2.

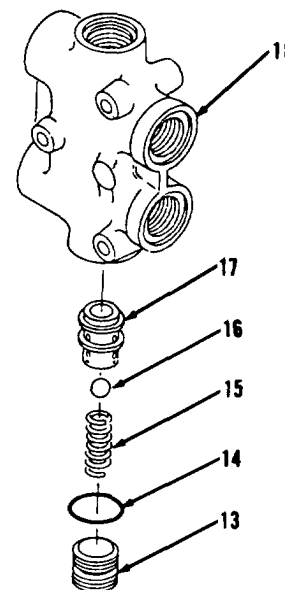


Figure 10-70.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE.**10-8. Right Hand Blade Lift, Articulation and Centershift Check Valve. (Sheet 3 of 4)****INSPECTION**

Inspect all parts. Refer to Chapter 2.

ASSEMBLY**WARNING****COLD PARTS HAZARD**

Use gloves or tongs to handle extremely cold parts, such as those which have been chilled in dry ice. Contact between cold parts and your skin may cause frostbite and other INJURY. If you are injured, obtain medical help immediately.

1. Using dry ice or freezer, lower temperature of seat (17, Figure 10-71).
2. Using an alignment punch and hammer, install seat (17) in check valve body (18).
3. Install piston (12).
4. Using dry ice or freezer, lower temperature of seat (11).
5. Using an alignment punch and hammer, install seat (11).

NOTE

Allow assembly to heat to room temperature before proceeding.

6. Move piston (12), checking for free travel.

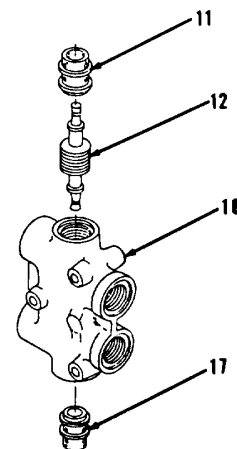


Figure 10-71.

Go to Sheet 4

10-51

HYDRAULIC SYSTEM MAINTENANCE. (cont)**10-8. Right hand Blade Lift, Articulation and Centershift Check Valve. (Sheet 4 of 4)****ASSEMBLY (cont)**

7. Install ball (16), spring (15), new preformed packing (14) and plug (13, Figure 10-72). Tighten plug (13) to 26 ft-lb torque.
8. Install ball (10), spring (9), new preformed packing (8) and plug (7). Tighten plug (7) to 25 ft-lb torque.
9. Install choke (6), new preformed packing (5) and adapter (4). Tighten adapter (4) to 55 ft-lb torque.
10. Install choke (3), new preformed packing (2) and adapter (1). Tighten adapter (1) to 55 ft-lb torque.

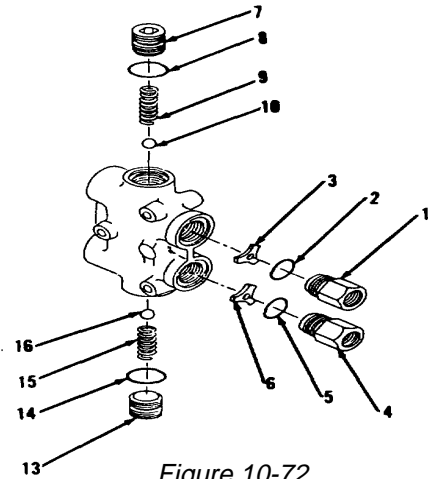


Figure 10-72.

NOTE

Return 130G Grader to original equipment condition.

End of Task

10-52

HYDRAULIC SYSTEM MAINTENANCE.

10-9. Left Hand Blade Lift and Scarifier Check and Relief Valves. (Sheet 1 of 4)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43, Appendix C
Preformed packings, Items 2,
5, 8, 14, 19, 20
Dry ice or freezer
Alignment punch

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Left hand blade lift, scarifier check
and relief valves removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-9. Left Hand Blade Lift and Scarifier Check and Relief Valves. (Sheet 2 of 4)

DISASSEMBLY

1. Remove adapter (1), preformed packing (2) and choke (3, Figure 10-73) from items 13 thru 26 as an assembly. Discard preformed packing (2).
2. Remove adapter (4), preformed packing (5) and choke (6). Discard preformed packing (5).
3. Loosen plug (7) carefully to relieve tension of spring (9). Remove plug (7), preformed packing (8), spring (9) and ball (10). Discard preformed packing (8).

CAUTION

Use brass rod and hammer to remove seat and piston. Use caution not to damage seat.

4. Using an alignment punch and hammer, remove seat (11) and piston (12).
5. Loosen plug (13) carefully to relieve tension of spring (15). Remove plug (13), preformed packing (14), spring (15) and ball (16, Figure 10-74). Discard preformed packing (14).
6. Using an alignment punch and hammer, remove seat (17).
7. Loosen plug (18) carefully to relieve tension of spring. Remove plug (18), preformed packings (19 and 20), valve (21), shim(s) (22), four shims (23), spring (24) and four washers (25) from body (26). Discard preformed packings (19 and 20). Tie shim(s) (22 and 23) together and tag for identification.

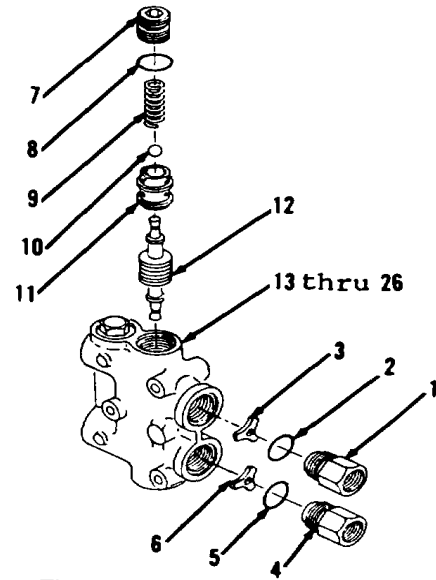


Figure 10-73.

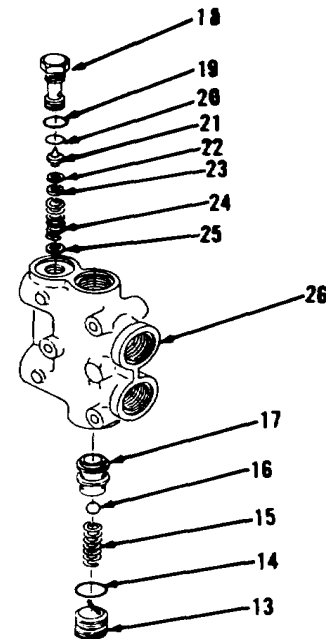


Figure 10-74.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE.**10-9. Left Band Blade Lift and Scarifier Check and Relief Valves. (Sheet 3 of 4)****CLEANING**

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install four washers (25), spring (24), four shims (23), shim(s) (22), valve (21), new preformed packings (20 and 19) and plug (18) in body (26, Figure 10-75).

WARNING**COLD PARTS HAZARD**

Use gloves or tongs to handle extremely cold parts, such as those which have been chilled in dry ice. Contact between cold parts and your skin may cause frostbite and other INJURY. If you are injured, obtain medical help immediately.

2. Using dry ice or freezer, lower temperature of seat (17).
3. Using an alignment punch and hammer, install seat (17).
4. Install piston (12).
5. Using dry ice or freezer, lower temperature of seat (11).
6. Using an alignment punch and hammer, install seat (11).

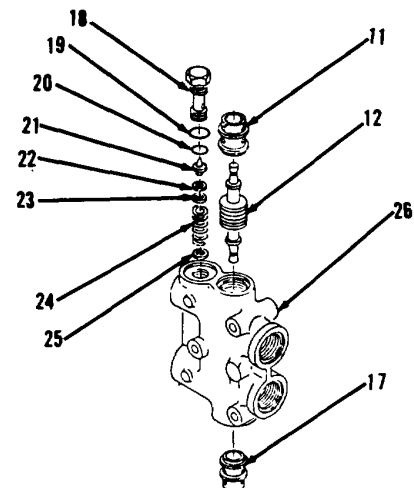


Figure 10-75.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-9. Left Hand Blade Lift and Scarifier Check and Relief Valves. (Sheet 4 of 4)

ASSEMBLY (cont)

NOTE

Allow assembly to heat to room temperature before proceeding.

7. Move piston (12) checking for free travel.
8. Install ball (16), spring (15), new preformed packing (14) and plug (13, Figure 10-76). Tighten plug (13) to 25 ft-lb torque.
9. Install ball (10), spring (9), new preformed packing (8) and plug (7). Tighten plug (7) to 25 ft-lb torque.
10. Install choke (6), new preformed packing (5) and adapter (4). Tighten adapter (4) to 55 ft-lb torque.
11. Install choke (3), new preformed packing (2) and adapter (1). Tighten adapter (1) to 55 ft-lb torque.

NOTE

Return 130G Grader to original equipment condition.

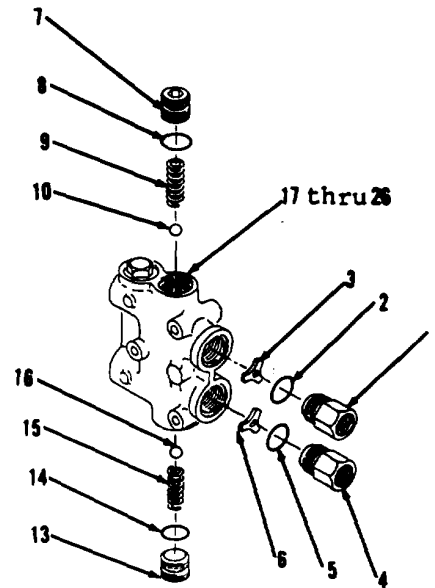


Figure 10-76.

HYDRAULIC SYSTEM MAINTENANCE.

10-10. Hydraulic Control Valves. (Sheet 1 of 11)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
8/32 2B THD Screw
Arbor press
Puller

References

TM 5-3805-261-10
TM 5-3805-261-20

Special Environmental Conditions

None

Test Equipment

None

General Safety Instructions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43, Appendix C
Preformed packings, Items 2,
4, 9, 10, 11, 12, 15, 20,
27, 33, 35, 39, 44, 46, 50,
51, 53

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Hydraulic control valves (left or
right side) removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-10. Hydraulic Control Valves. (Sheet 2 of 11)

DISASSEMBLY

NOTE

The following is a maintenance procedure for the left valve group. Except for positioning of valve assemblies and manifolds, the maintenance procedure for the right valve group is identical.

1. Remove plug (1) and preformed packing (2) from manifold (7, Figure 10-77). Discard preformed packing (2).
2. Remove plug (3) and preformed packing (4) from manifold (8). Discard preformed packing (4).

NOTE

Valve assembly must be matchmarked if entire valve group is disassembled to insure proper placement of each valve in assembly.

3. Using scribe, matchmark manifolds (7 and 8) and items 9 thru 55 as an assembly.

NOTE

The following procedure is for separation of valve assembly from a valve group. The procedure for remaining valves from the valve group is identical.

4. Remove three bolts (5) and lockwashers (6, Figure 10-78).

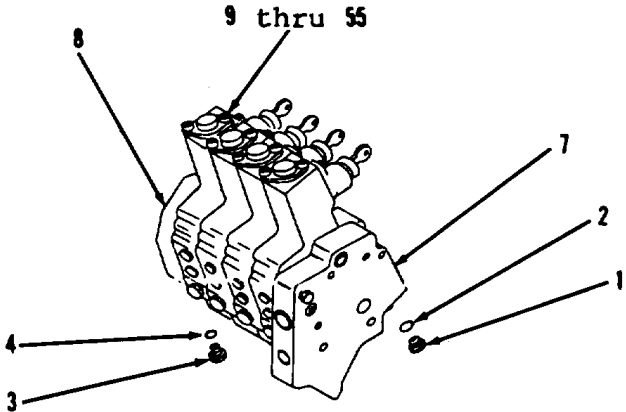


Figure 10-77.

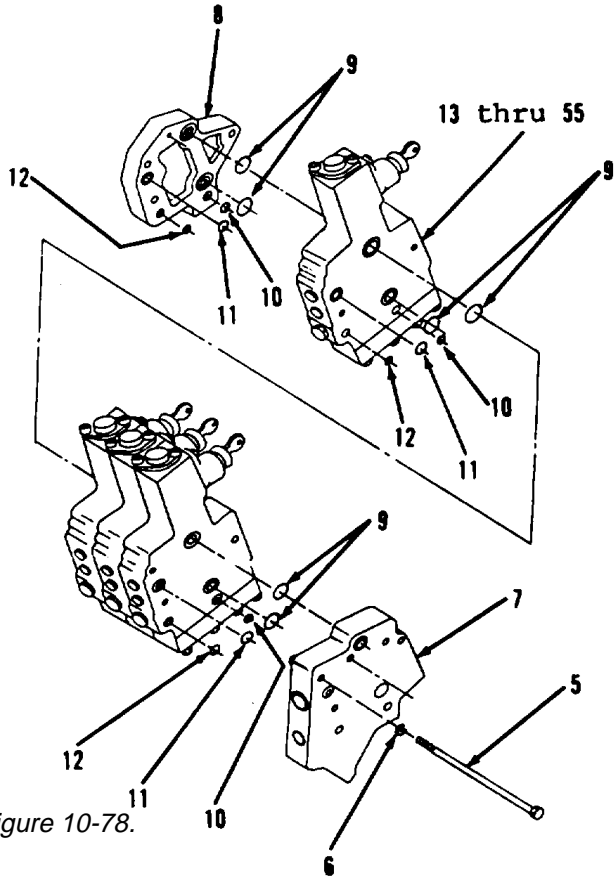


Figure 10-78.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE.**10-10. Hydraulic Control Valves. (Sheet 3 of 11)****DISASSEMBLY****CAUTION**

Do not lay machined surfaces of manifolds or valves on unprotected surface. Scratches or nicks will cause destruction of parts.

5. Separate manifolds (7 and 8) and items 13 thru 55 as an assembly.
6. Remove and discard six preformed packings (9) and preformed packings (10 thru 12).
7. Remove two bolts (13) and washers (14, Figure 10-79).
8. Separate items 16 thru 23 as an assembly from items 24 thru 55 as an assembly.
9. Remove and discard preformed packing (15).
10. Remove boot (16, Figure 10-80).
11. Remove nut (17) and screw (18).
12. Using suitable driver and press, remove two bearings (19), preformed packing (20), ring (21) and lever (22) from housing (23). Do not strike lever (22) to drive two bearings (19) from housing (23). Separate and discard preformed packing (20).

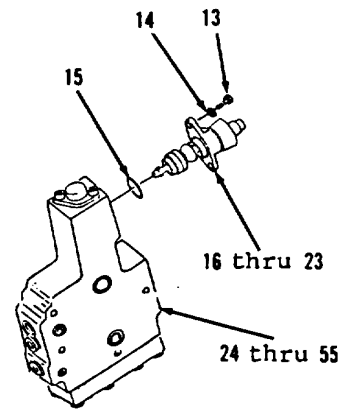


Figure 10-79.

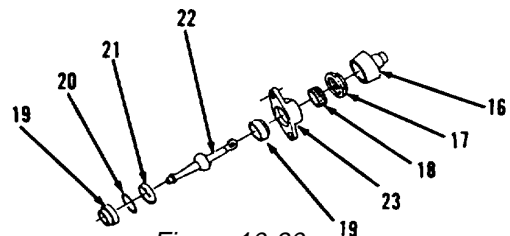


Figure 10-80.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-10. Hydraulic Control Valves. (Sheet 4 of 11)

DISASSEMBLY

13. Remove two bolts (24) and lock (25, Figure 10-81).

WARNING

Spring is under pressure.
Loosen plug carefully to keep
spring from becoming a
projectile.

14. Remove plug (26) and preformed packing (27). Discard preformed packing (27).
15. Remove items 28 thru 31 as an assembly from items 32 thru 55 as an assembly.
16. Compress spring (29, Figure 10-82).
17. Remove two retainers (28).
18. Remove spring (29) and two retainers (30) from stem (31).
19. Remove two plugs (32) and preformed packings (33, Figure 10-83). Discard preformed packings (33).

WARNING

Spring is under pressure.
Loosen plug carefully to
prevent spring from becoming
a projectile.

20. Remove items 34 and 35 as an assembly.
21. Remove and discard preformed packing (35) from plug (34, Figure 10-84).

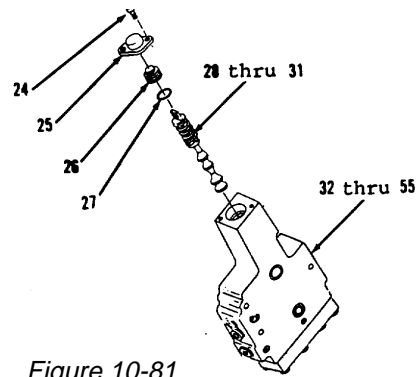


Figure 10-81.

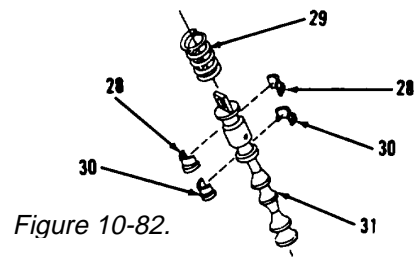


Figure 10-82.

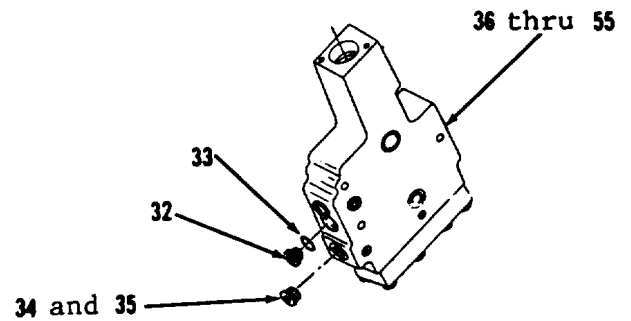


Figure 10-83.

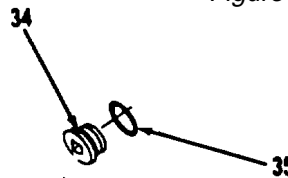


Figure 10-84.

Go to Sheet 5

HYDRAULIC SYSTEM MAINTENANCE.

10-10. Hydraulic Control Valves. (Sheet 5 of 11)

DISASSEMBLY

22. Remove spring (36) and ball (37, Figure 10-85).
23. Use 3/8 inch hex key to unscrew seat (38) and remove preformed packing (39). Discard preformed packing (39).

WARNING

Spring is under pressure. Loosen plug carefully to keep spring from becoming a projectile.

CAUTION

Do not allow shim(s) and spacers to fall from plug.

24. Remove items 40 thru 44 as an assembly from items 45 thru 55 as an assembly.

CAUTION

Each individual valve assembly, of a valve group, has been set at the factory for pressure required by a predetermined quantity of shim(s) and spacers. Do not change these quantities or operation of the vehicle equipment will be affected.

25. Remove spring (41), shim(s) (42), spacers (43) and preformed packing (44, Figure 10-86). Discard preformed packing (44). Tie shim(s) (42).

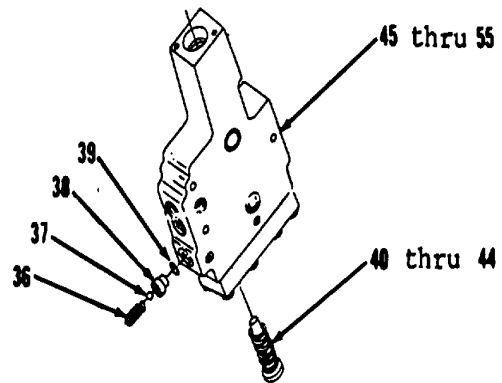


Figure 10-85.

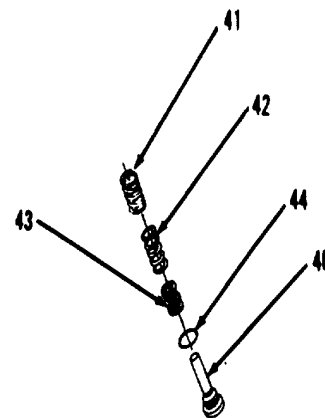


Figure 10-86.

Go to Sheet 6

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-10. Hydraulic Control Valves. (Sheet 6 of 11)

DISASSEMBLY (cont)

26. Remove plug (45) and preformed packing (46, Figure 10-87). Discard preformed packing (46).
27. Remove four bolts (47 and 48) and cover (49).
28. Remove and discard two preformed packings (50) and preformed packing (51).
29. Remove spool (52).
30. Using 8/32 2B THD screw and puller, remove items 53 and 54 as an assembly.
31. Remove and discard two preformed packings (53) from valve assembly (54, Figure 10-88).

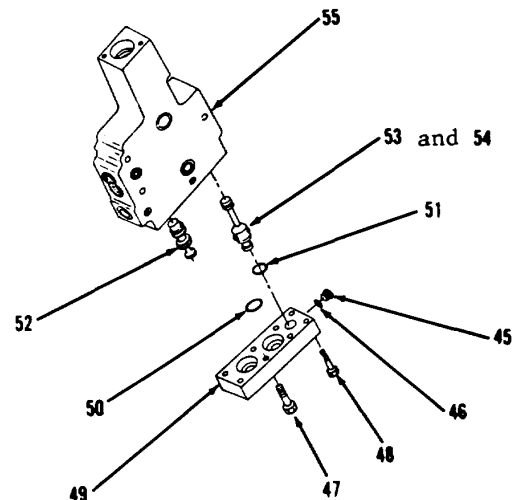


Figure 10-87.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install two new preformed packings (53) on valve assembly (54, Figure 10-88).
2. Using clean oil, lubricate outer diameters of two new preformed packings (53).

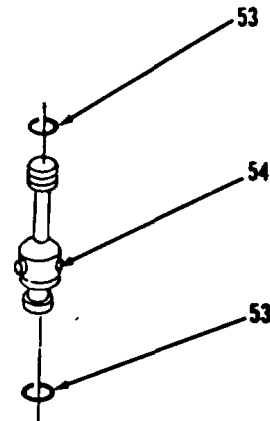


Figure 10-88.

Go to Sheet 7

HYDRAULIC SYSTEM MAINTENANCE.

10-10. Hydraulic Control Valves. (Sheet 7 of 11)

ASSEMBLY

- 3. Install items 54 and 53 as an assembly in body (55, Figure 10-87).
- 4. Install spool (52).
- 5. Install new preformed packing (51) and two new preformed packings (50) in cover (49).
- 6. Install cover (49) and four bolts (48 and 47).
- 7. Install new preformed packing (46) and plug (45).

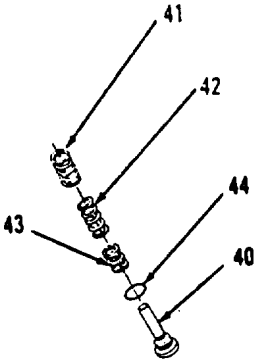


Figure 10-86.

| Valve Assembly | Quantity Shims (42) | Quantity Spacers (43) |
|------------------|------------------------|--------------------------|
| Scarifier | 5 | 4 |
| Blade lift, R.H. | 5 | 4 |
| Wheel lean | 6 | 3 |
| Centershift | 6 | 3 |
| Articulation | 2 | 4 |
| Blade tip | 5 | 3 |
| Circle drive | 1 | 3 |
| Side shift | 5 | 4 |
| Blade lift, L.H. | 5 | 4 |

- 8. Install new preformed packing (44), spacers (43), shim(s) (42) and spring (41) on plug (40, Figure 10-86). Install correct quantities of shim(s) and spacers. Refer to chart.
- 9. Install items 44 thru 40 as an assembly (Figure 10-89) and tighten to 35 ft-lb torque. Figure 10-89

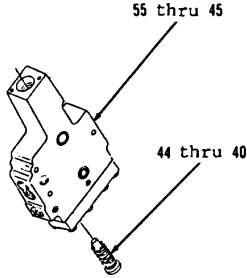


Figure 10-89.

**Go to Sheet 8
10-63**

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-10. Hydraulic Control Valves. (Sheet 8 of 11)

ASSEMBLY (cont)

10. Install new preformed packing (39) on seat (38, Figure 10-90).
11. Lubricate outer diameter of preformed packing (39) lightly with clean oil. Screen in seat must be clean before installing.
12. Install items 39 and 38 as an assembly (Figure 10-91). Tighten to 12 ft-lb torque.
13. Install new preformed packing (35) on plug (34, Figure 10-92).
14. Install ball (37), spring (36) and items 35 and 34 as an assembly (Figure 10-93).
15. Install two new preformed packings (33) and plugs (32).
16. Install two retainers (30) and spring (29). Position two retainers (30) together on stem (31, Figure 10-82) and slide spring (29) over two retainers (30).
17. Compress spring (29).
18. Install two retainers (28).
19. Release spring (29).

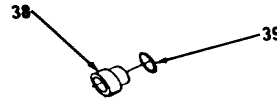


Figure 10-90.

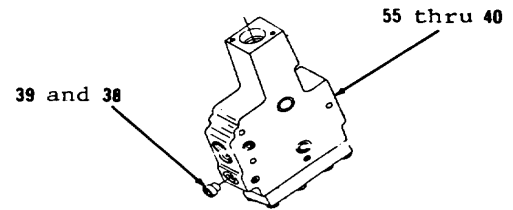


Figure 10-91.

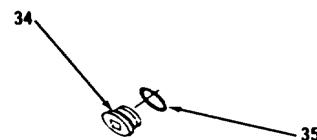


Figure 10-92.

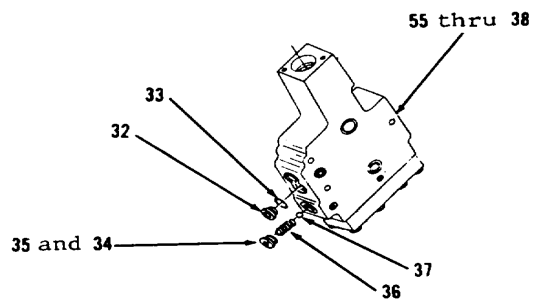


Figure 10-93.

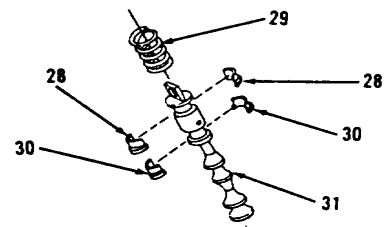


Figure 10-82.

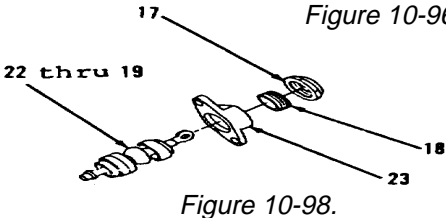
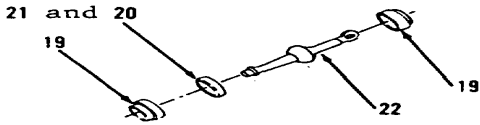
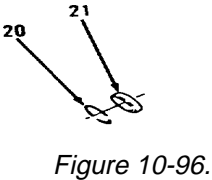
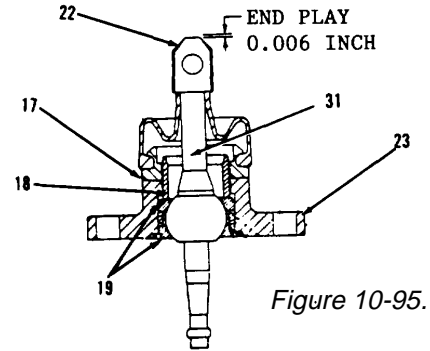
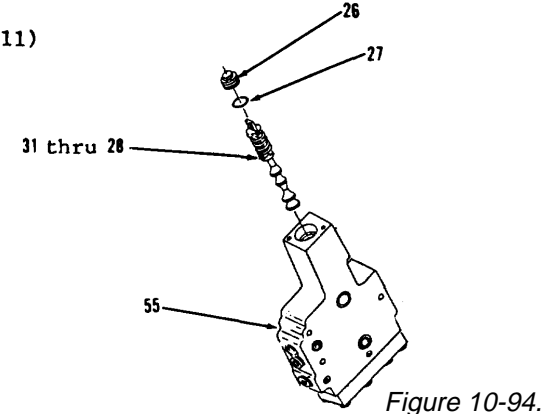
Go to Sheet 9

HYDRAULIC SYSTEM MAINTENANCE.

10-10. Hydraulic Control Valves. (Sheet 9 of 11)

ASSEMBLY

- 20. Install items 31 thru 28 as an assembly in body (55, Figure 10-94), aligning hole in end of stem (31) with hole for lever (22, Figure 10-95).
- 21. Install new preformed packing (27) and plug (26, Figure 10-94) loosely.
- 22. Install new preformed packing (20) on ring (21, Figure 10-96).
- 23. Position items 21 and 20 as an assembly and two bearings (19) on lever (22, Figure 10-97).
- 24. Position items 22 thru 19 as an assembly in housing (23, Figure 10-98),
- 25. Install screw (18) and nut (17) loosely.



Go to Sheet 10
10-65

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-10. Hydraulic Control Valves. (Sheet 10 of 11)

ASSEMBLY (cont)

26. Install new preformed packing (15, Figure 10-99).
27. Position items 23 thru 17 as an assembly on items 35 thru 24 as an assembly. Insert end of lever (22) in hole at end of stem (31).
28. Install two washers (14) and bolts (13).

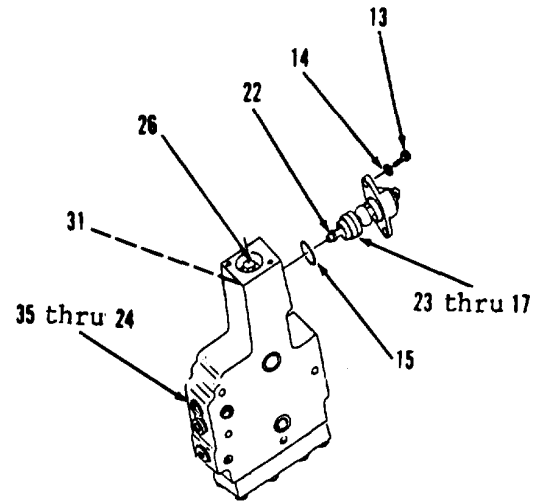


Figure 10-99.

ADJUSTMENT

1. Adjust plug (26). Tighten plug (26) to remove end clearance from stem (31). By movement of lever (22) in the neutral position, end clearance in the stem can be felt. Do not over tighten plug (26).
2. Adjust screw (18, Figure 10-85). Turn screw finder tight until it is against one bearing (19), then turn counterclockwise 45 degrees to obtain lever (22) end clearance of 0.006 inch.
3. Hold nut (17) and tighten to 25 ft-lb torque.

ASSEMBLY

1. Install lock (25) and two bolts (24, Figure 10-100).
2. Install boot (16).

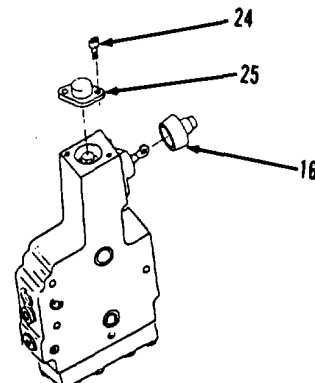


Figure 10-100.

Go to Sheet 11

HYDRAULIC SYSTEM MAINTENANCE.

10-10. Hydraulic Control Valves. (Sheet 11 of 11)

ASSEMBLY

NOTE

Valve groups must be assembled in the same positions as they were before disassembly.

3. Install new preformed packings (12 thru 10) and six new preformed packings (9, Figure 10-78).
4. Position items 55 thru 13 as an assembly and manifolds (8 and 7) as matchmarked.
5. Install three lockwashers (6) and bolts (5).
6. Install new preformed packing (4) and plug (3) in manifold (8, Figure 10-77).
7. Install new preformed packing (2) and plug (1) in manifold (7).

NOTE

Return 130C Grader to original equipment condition.

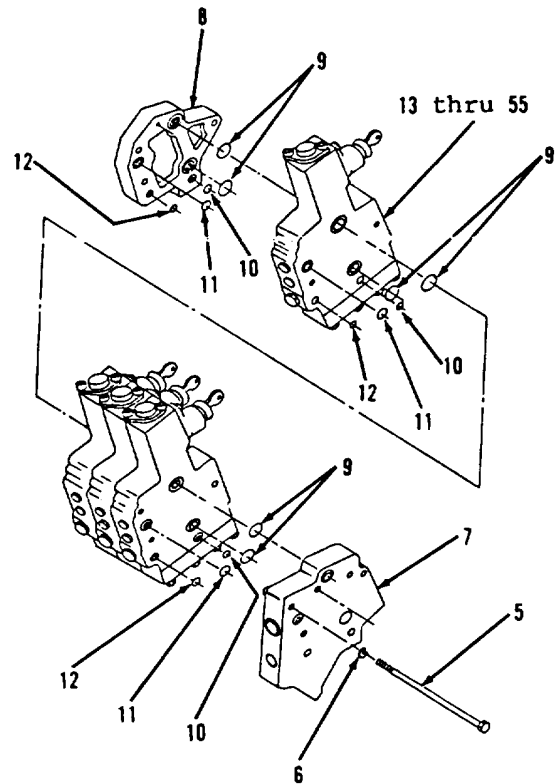


Figure 10-78.

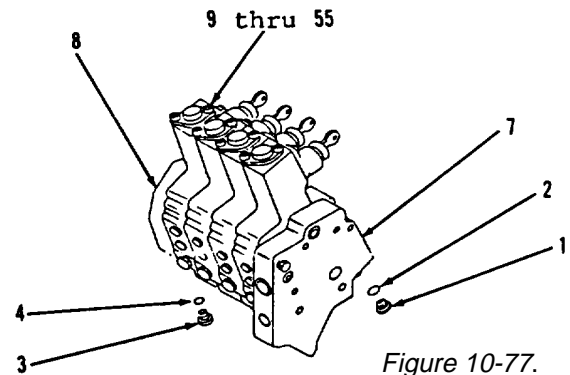


Figure 10-77.

End of Task

10-67

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-11. Hydraulic Pump Relief Valve. (Sheet 1 of 4)

This task covers:

- a. Disassembly**
- b. Cleaning**
- c. Inspection**
- d. Assembly**

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Preformed packings, Items 3,
5, 7, 9, 11, 12

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Hydraulic pump relief valve removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE.

10-11. Hydraulic Pump Relief Valve. (Sheet 2 of 4)

DISASSEMBLY

- 1. Remove tee (1) from valve (2, Figure 10-101).
- 2. Remove valve (2) and preformed packing (3) from valve (17). Discard preformed packing (3).
- 3. Remove elbow (4) and preformed packing (5). Discard preformed packing (5).
- 4. Remove connector (6) and preformed packing (7). Discard preformed packing (7).
- 5. Remove two connectors (8) and preformed packings (9). Discard preformed packings (9).
- 6. Remove plug (10) and preformed packing (11) from valve (17, Figure 10-102). Discard preformed packing (11).
- 7. Remove items 12 and 13 as an assembly and items 14 thru 16 as an assembly.

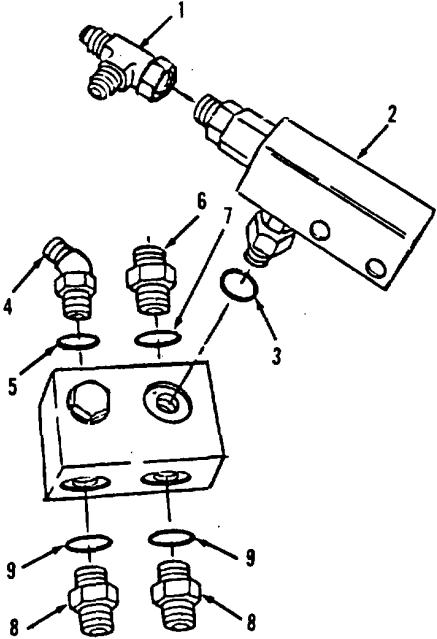


Figure 10-101.

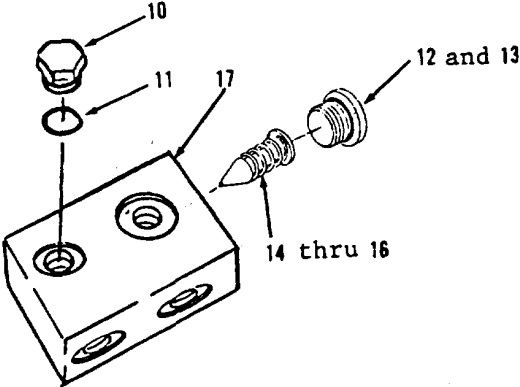


Figure 10-102.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-11. Hydraulic Pump Relief Valve. (Sheet 3 of 4)

DISASSEMBLY (cont)

- 8. Remove preformed packing (12) from plug (13, Figure 10-103). Discard preformed packing (12).

WARNING

COMPRESSED SPRINGS

Always wear safety glasses when removing or installing parts restraining compressed springs. Remove restraining parts slowly to relieve spring pressure. INJURY may result if you do not follow this procedure. If you are injured while removing or installing compressed springs, obtain medical aid immediately.

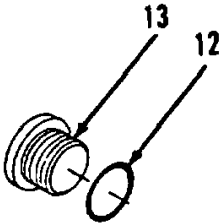


Figure 10-103.

- 9. Remove retainer (14) and spring (15) from valve (16, Figure 10-104).

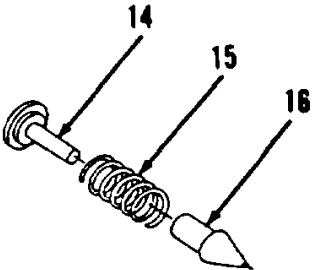


Figure 10-104.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

- 1. Install spring (15) and retainer (14) on valve (16, Figure 10-104).
- 2. Install new preformed packing (12) on plug (13, Figure 10-103).

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE.

10-11. Hydraulic Pump Relief Valve. (Sheet 4 of 4)

ASSEMBLY

- 3. Install items 16 thru 14 as an assembly and items 13 and 12 as an assembly in valve (17, Figure 10-102).
- 4. Install new preformed packing (11) and plug (10).
- 5. Install two new preformed packings (9) and connectors (8, Figure 10-101).
- 6. Install new preformed packing (7) and connector (6).
- 7. Install new preformed packing (5) and elbow (4).
- 8. Install new preformed packing (3) and valve (2).
- 9. Install tee (1) on valve (2).

NOTE

Return 130G Grader to original equipment condition.

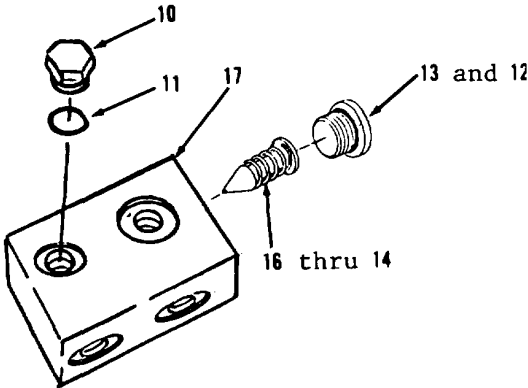


Figure 10-102.

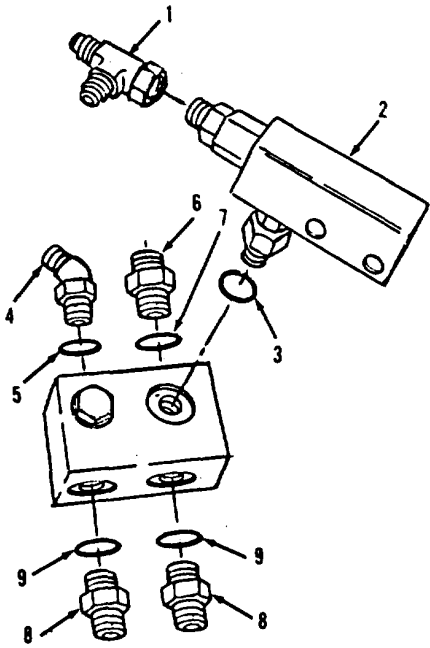


Figure 10-101.

End of Task

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-12. Circle Drive and Leaning Wheel Check Valves. (Sheet 1 of 3)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Preformed packings, Item 2
Dry ice or freezer
Alignment punch

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Circle drive check valve removed.
Leaning wheel check valve removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE.

10-12. Circle Drive and Leaning Wheel Check Valves. (Sheet 2 of 3)

DISASSEMBLY

NOTE

Springs are under pressure. Loosen plugs carefully to keep springs from becoming projectiles.

- 1. Remove two items 1 and 2 as an assembly (Figure 10-105).
- 2. Remove and discard two preformed packings (2) from plugs (1, Figure 10-106).
- 3. Remove two springs (3) and balls (4, Figure 10-107).
- 4. Using alignment punch and hammer, remove seat (5) and piston (6) from body (8, Figure 10-108).
- 5. Using alignment punch and hammer remove seat (7) from body (8).

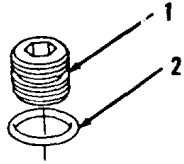
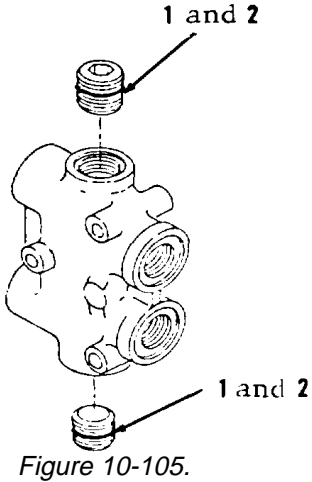


Figure 10-106.

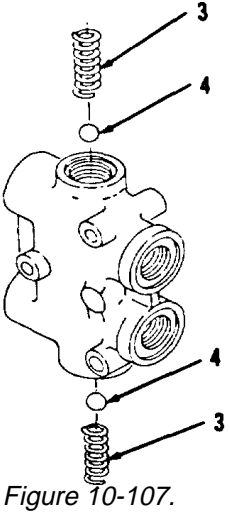


Figure 10-107.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

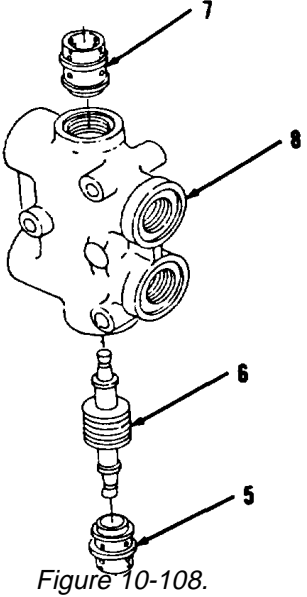


Figure 10-108.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-12. Circle Drive and Leaning Wheel Check Valves. (Sheet 3 of 3)

ASSEMBLY

WARNING

COLD PARTS HAZARD

Use gloves or tongs to handle extremely cold parts, such as those which have been chilled in dry ice. Contact between cold parts and your skin may cause frostbite and other INJURY. If you are injured, obtain medical help immediately.

1. Using dry ice or freezer, reduce temperature of seat (7) and install using alignment punch and hammer until seated against counterbore in body (8, Figure 10-108).
2. Position piston (6) in seat (7).
3. Using dry ice or freezer, reduce temperature of seat (5) and install using alignment punch and hammer until seated against counterbore in body (8).
4. Install two balls (4) and springs (3, Figure 10-107).
5. Install two new preformed packings (2) on plugs (1, Figure 10-106).
6. Install two items 2 and 1 as an assembly (Figure 10-105). Tighten two plugs (1) to 25 ft-lb torque.

NOTE

Return 130C Grader to original equipment condition.

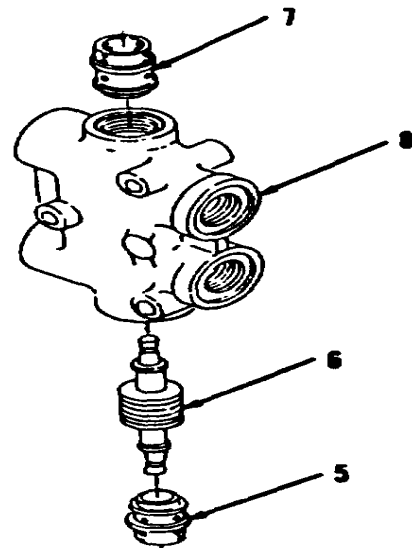


Figure 10-108.

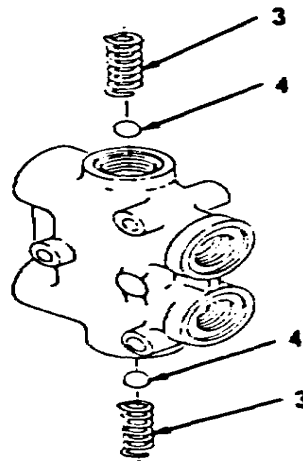


Figure 10-107.

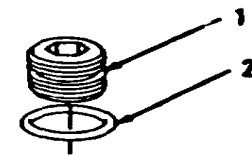


Figure 10-106.

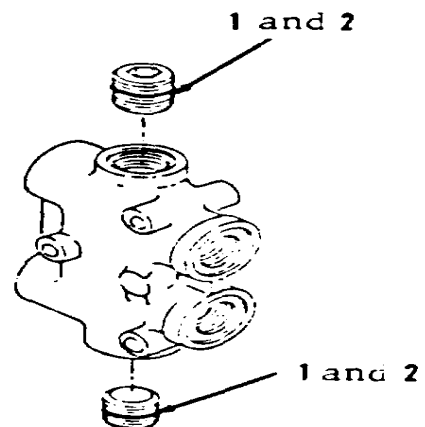


Figure 10-105.

End of Task

HYDRAULIC SYSTEM MAINTENANCE.

10-13. Power Blade and Blade Tip Check and Relief Valve. (Sheet 1 of 5)

This task covers:

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

INITIAL SETUP

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Lubricating oil, Item 33,
Appendix C
Preformed packings, Items 2,
4, 11, 12
Dry ice or freezer
Alignment punch

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Power blade and blade tip check
valve removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-13. Power Blade and Blade Tip Check and Relief Valve. (Sheet 2 of 5)

DISASSEMBLY

- 1. Remove two items 1 and 2 as an assembly (Figure 10-109).
- 2. Remove two adapters (1).
- 3. Remove and discard two preformed packings (2) from adapters (1, Figure 10-110).

WARNING

Springs are under pressure. Loosen plugs carefully to keep springs from becoming projectiles.

- 4. Remove two items 3 and 4 as an assembly (Figure 10-111).
- 5. Remove and discard two preformed packings (4) from plugs (3, Figure 10-112).

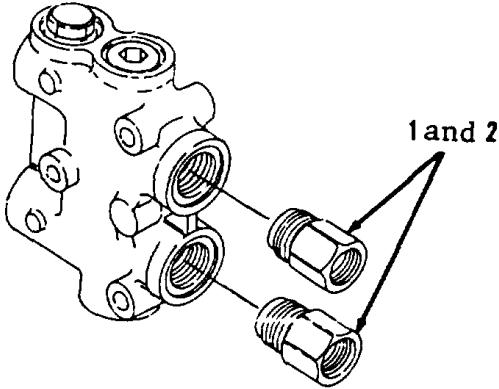


Figure 10-109.

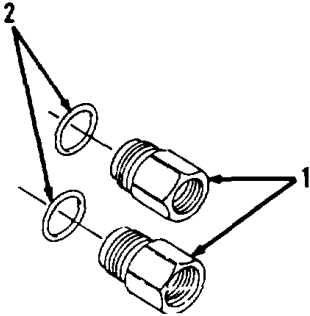


Figure 10-110.

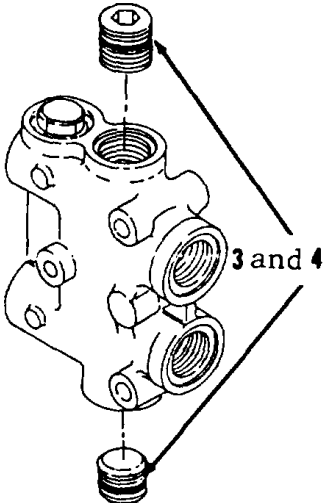


Figure 10-111.

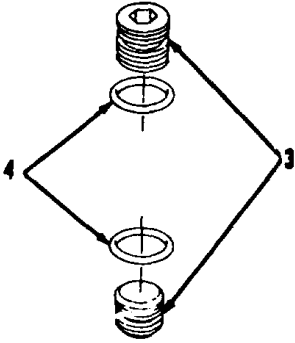


Figure 10-112.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE.

10-13. Power Blade and Blade Tip Check and Relief Valve. (Sheet 3 of 5)

DISASSEMBLY

- 6 . Remove two springs (5) and balls (6, Figure 10-113).
- 7. Using alignment punch and hammer, remove seat (7) and piston (8) from body (17).
- 8 . Using alignment punch and hammer, remove seat (9) from body (17).

WARNING

Spring is under pressure. Loosen plug carefully to keep spring from becoming a projectile.

- 9. Remove items 10 thru 12 as an assembly.
- 10. Remove and discard preformed packings (11 and 12) from plug (10, Figure 10-114).
- 11. Remove valve (13), shim(s) (14), spring (15) and washer (16, Figure 10-113). Tie shim(s) (14) together and tag for identification.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

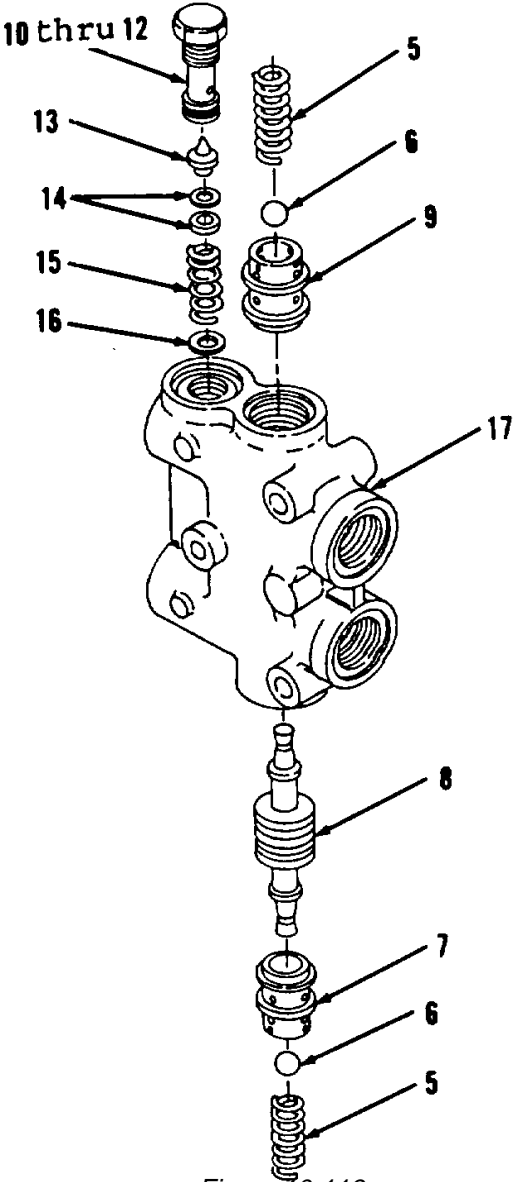


Figure 10-113.

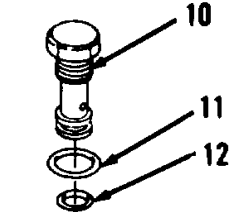


Figure 10-114.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-13. Power Blade and Blade Tip Check and Relief Valve

ASSEMBLY

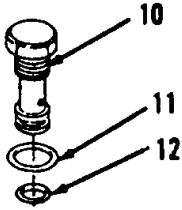


Figure 10-114.

| PART NO. | THICKNESS | PRESSURE CHANGE |
|----------|-------------|-----------------|
| 6J8696 | 0. 048 INCH | 670 PSI |
| 5J6153 | 0. 007 INCH | 95 PSI |
| 3K6116 | 0. 031 INCH | 430 PSI |

1. Install washer (16), spring (15), shim(s) (14, Figure 10-113) and valve (13) in body (17). Use washer (16) and shim(s) (14) as required to obtain a relief valve setting of 4000 psi at a flow rate of 2. 5 gallons per minute. Refer to chart.
2. Install new preformed packings (12 and 11) on plug (10, Figure 10-114).
3. Lubricate outer diameter of new preformed packings (12 and 11) with clean lubricating oil.
4. Install items 12 thru 10 as an assembly.
5. Using dry ice or freezer, reduce temperature of seat (9) and install using alignment punch and hammer until seated against counterbore in body (17).
6. Position piston (8) in seat (9) in body (17).
7. Using dry ice or freezer, reduce temperature of seat (7) and install using alignment punch and hammer until seated against counterbore in body (17). Check for full movement of piston (8) travel through seats (9 and 7).

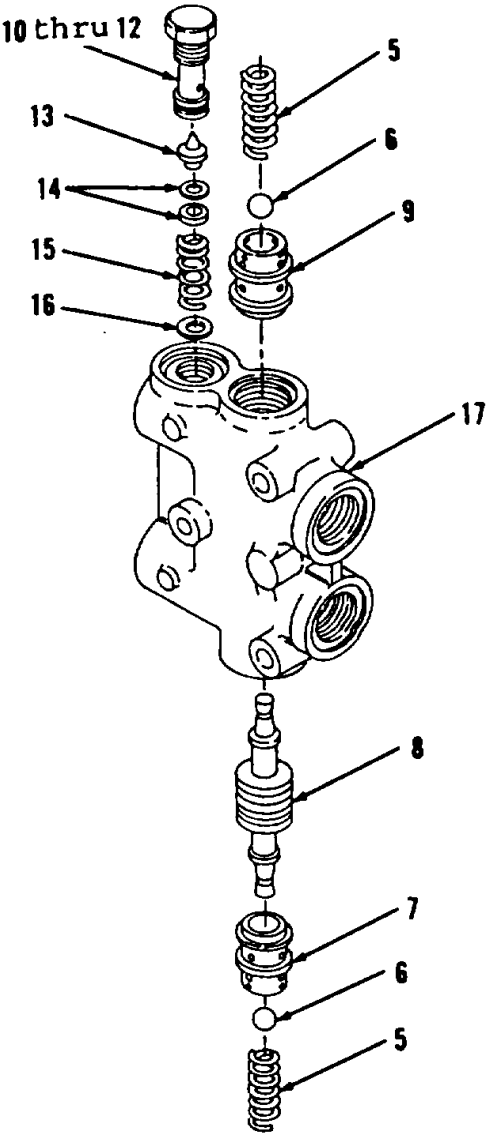


Figure 10-113.

Go to Sheet 5

HYDRAULIC SYSTEM MAINTENANCE.

10-13. Power Blade and Blade Tip Check and Relief Valve. (Sheet 5 of 5)

ASSEMBLY

- 8. Install two balls (6) and springs (5).
- 9. Install two new preformed packings (4) on plugs (3, Figure 10-112).
- 10. Install items 4 and 3 as an assembly (Figure 10-111). Tighten two plugs (3) to 25 ft-lb torque.
- 11. Install two new preformed packings (2) on adapters (1, Figure 10-110).
- 12. Install two items 2 and 1 as an assembly (Figure 10-109). Tighten two adapters (1) to 55 ft-lb torque.

NOTE

Return 130G Grader to original equipment condition.

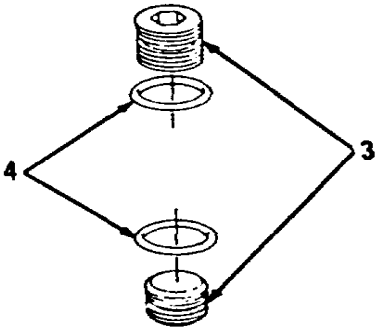


Figure 10-112.

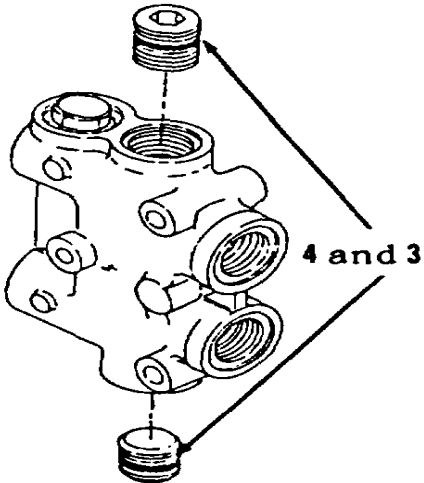


Figure 10-111.

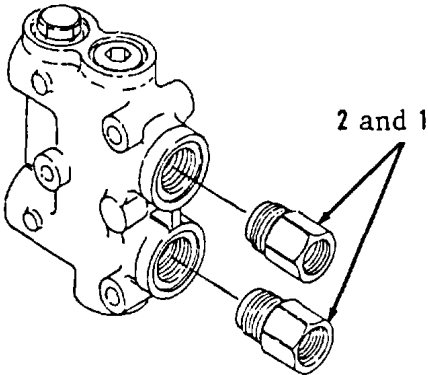


Figure 10-109.

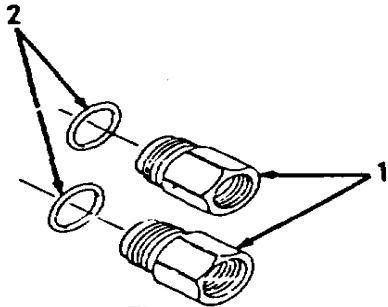


Figure 10-110.

End of Task

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-14. Scarifier Check and Relief Valve. (Sheet 1 of 5)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

Spring tester

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Lubricating oil, Item 33,
Appendix C
Preformed packings, Items 2,
5, 12, 13
Dry ice or freezer
Alignment punch

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Scarifier check and relief valve
removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE.

10-14. Scarifier Check and Relief Valve. (Sheet 2 of 5)

DISASSEMBLY

1. Remove two items 1 and 2 as an assembly and chokes (3, Figure 10-115).
2. Remove and discard two preformed packings (2) from adapters (1, Figure 10-116).

WARNING

Springs are under pressure. Loosen plugs carefully to keep springs from becoming projectiles.

3. Remove two items 4 and 5 as an assembly (Figure 10-117).
4. Remove two springs (6) and balls (7).
5. Remove and discard two preformed packings (5) from plugs (4, Figure 10-118).

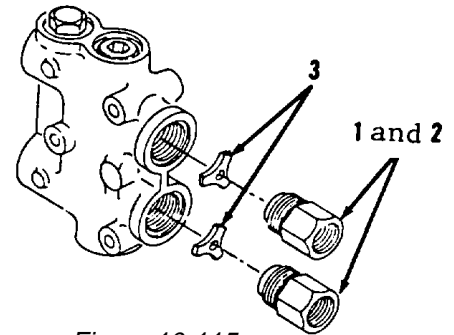


Figure 10-115.

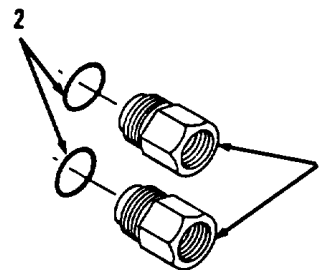


Figure 10-116.

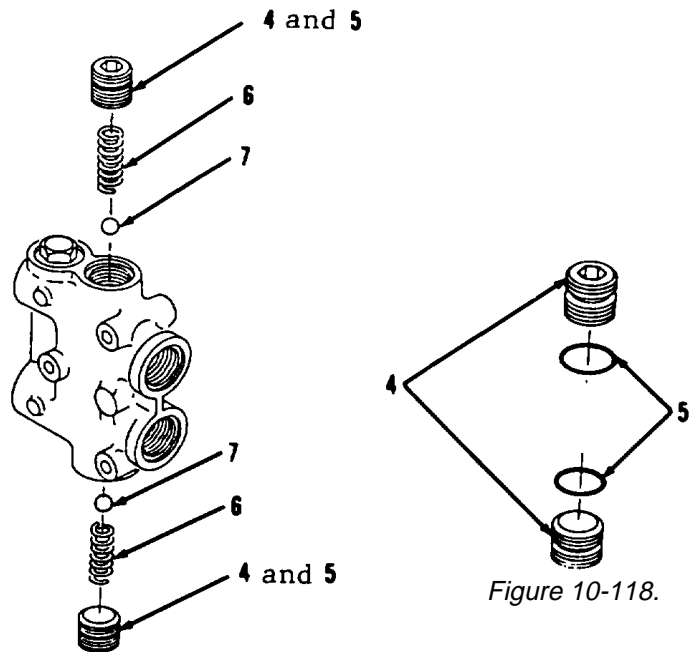


Figure 10-117.

Figure 10-118.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-14. Scarifier Check and Relief Valve. (Sheet 3 of 5)

DISASSEMBLY (cont)

- 6. Using alignment punch and hammer, remove seat (8) and piston (9) from body (18, Figure 10-119).
- 7. Using alignment punch and hammer, remove seat (10) from body (18).
- 8. Remove items 11 thru 13 as an assembly.

WARNING

Spring is under pressure. Loosen plug carefully to keep spring from becoming a projectile.

- 9. Remove valve (14), shim(s) (15), spring (16) and washers (17). Tie shim(s) (15) together and tag for identification.
- 10. Remove and discard preformed packings (12 and 13) from plug (11, Figure 10-120).

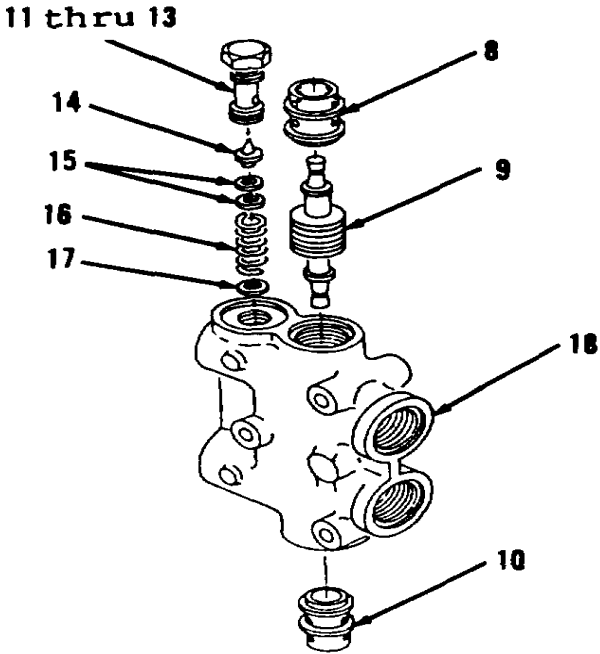


Figure 10-119.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

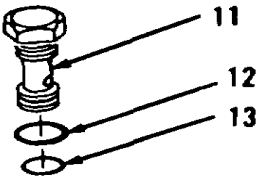


Figure 10-120.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE.

10-14. Scarifier Check and Relief Valve. (Sheet 4 of 5)

ASSEMBLY

- 1. Lubricate outer diameters of new preformed packings (13 and 12) with clean lubricating oil.
- 2. Install new preformed packings (13 and 12) on plug (11, Figure 10-120).

| PART NO. | THICKNESS | PRESSURE CHANGE |
|----------|-------------|-----------------|
| 6J8696 | 0. 048 INCH | 670 PSI |
| 5J6153 | 0. 007 INCH | 95 PSI |
| 3K6116 | 0. 031 INCH | 430 PSI |

- 3. Install washers (17), spring (16), shim(s) (15) and valve (14) in body (18, Figure 10-119). Use washers (17) and shim(s) (15) as required to obtain relief valve pressure setting of 2000 psi at flow rate of 2. 5 gallons per minute. Refer to chart.
- 4. Install items 13 thru 11 as an assembly.
- 5. Using dry ice or freezer, reduce temperature of seat (10) and install using alignment punch and hammer until seated against counterbore in body (18).
- 6. Position piston (9) in seat (10) in body (18).
- 7. Using dry ice or freezer, reduce temperature of seat (8) and install using alignment punch and hammer until seated against counterbore in body (18). Check for full movement of piston (9) through seats (10 and 8).

Go to Sheet 5

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-14. Scarifier Check and Relief Valve. (Sheet 5 of 5)

ASSEMBLY (cont)

- 8. Install two new preformed packings (5) on plugs (4, Figure 10-118).
- 9. Install two balls (7) and springs (6).
- 10. Install items 5 and 4 as an assembly (Figure 10-117). Tighten two plugs (4) to 25 ft-lb torque.
- 11. Install two new preformed packings (2) on two adapters (1, Figure 10-116).
- 12. Install two chokes (3) and items 2 and 1 as an assembly (Figure 10-115). Tighten two adapters (1) to 55 ft-lb torque.

NOTE

Return 130G Grader to original equipment condition.

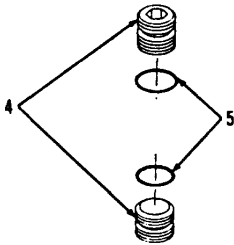


Figure 10-118.

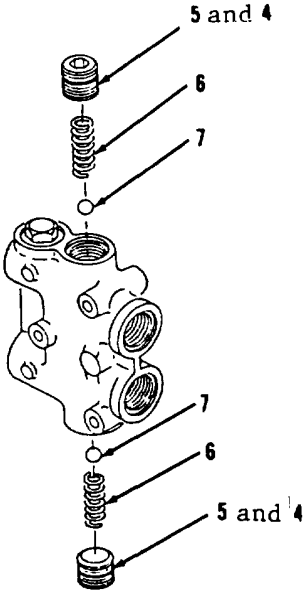


Figure 10-117.

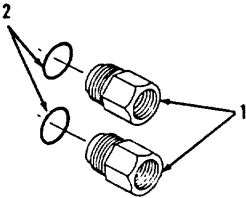


Figure 10-116.

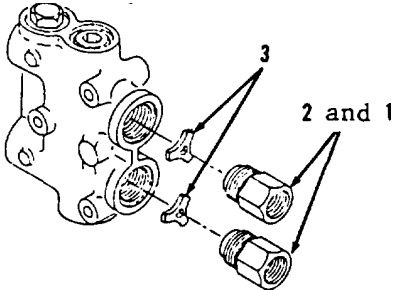


Figure 10-115.

End of Task

HYDRAULIC SYSTEM MAINTENANCE.

10-15. Centershift Cylinder. (Sheet 1 of 6)

This task covers:

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

INITIAL SETUP

Applicable Configurations

All

Personnel Required

Construction equipment
repairer NOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

Hoist and sling

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Detergent, Item 9,
Appendix C
Crease, Item 25, Appendix C
Preformed packings, Items 3, 7
Small tags, Item 43,
Appendix C
Caps

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Hydraulic pressure relieved.

TM 5-3805-261-20

Positive cable on right side
disconnected.

Change 1

10-85

HYDRAULIC SYSTEM MAINTENANCE. (cont)**10-15. Centershift Cylinder. (Sheet 2 Of 6)****REMOVAL****NOTE**

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

1. Disconnect hose assembly (1, Figure 10-121).
2. Remove connector (2) and preformed packing (3). Discard preformed packing (3).
3. Disconnect hose assembly (4).
4. Remove elbow (5), connector (6) and preformed packing (7). Discard preformed packing (7).

WARNING

Weight of Centershift cylinder is approximately 80 pounds. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

5. Attach hoist and sling to cylinder (22) above circle assembly. Remove slack from sling.

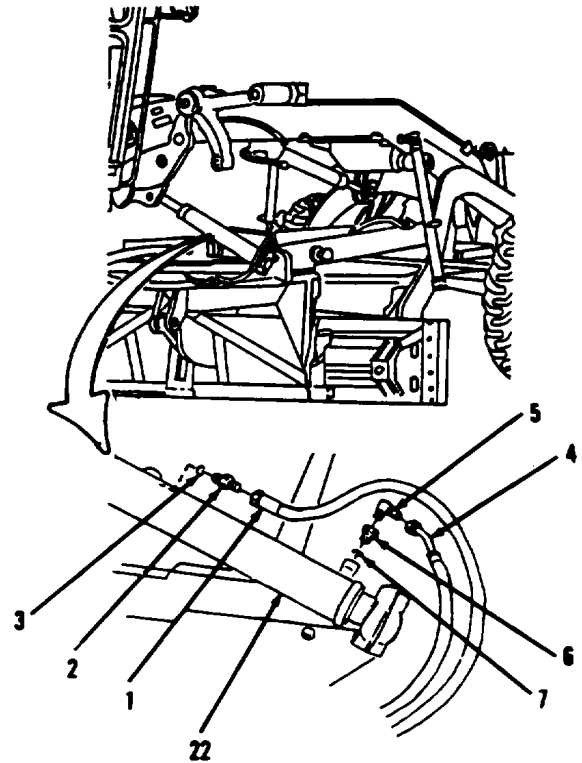


Figure 10-121.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE.

10-15. Centershift Cylinder. (Sheet 3 of 6)

REMOVAL

- 6. Remove two fittings (8), bolts (9), lockwashers (10) and cap (11) from rod (21, Figure 10-122).
- 7. Separate rod (21) from ballstud (23).
- 8. Remove shim(s) (12), two inserts (13) and shim(s) (14). Tie shim(s) (12 and 14) together and tag for identification.
- 9. Remove two bolts (15), lockwashers (16) and cap (17, Figure 10-123) from circle assembly.
- 10. Separate cylinder (22) from ballstuds (23 and 24) and lower onto suitable padding with hoist and sling.
- 11. Remove shim(s) (18), two inserts (19) and shim(s) (20). Tie shim(s) (18 and 20) together and tag for identification.
- 12. Remove hoist and sling.

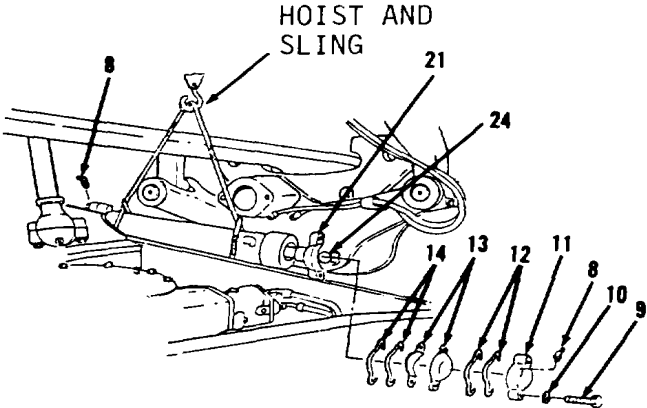


Figure 10-122.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

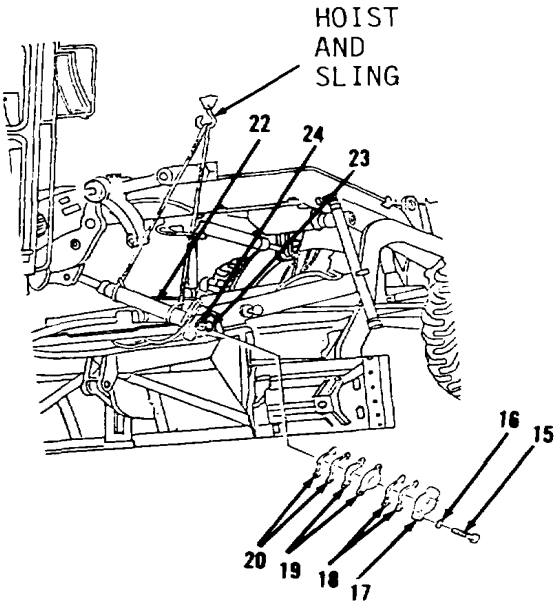


Figure 10-123.

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-15. Centershift Cylinder. (Sheet 4 of 6)

INSTALLATION

1. Attach hoist and sling to cylinder (22, Figure 10-124).
2. Using clean grease, lubricate ballstud (24) and two inserts (19) after surfaces are wiped clean.

NOTE

Install enough shim(s) to prevent excessive clearance around ballstuds. Be sure there is an equal number of shim(s) on each side of ballstud. Inserts must fit snugly on ballstuds.

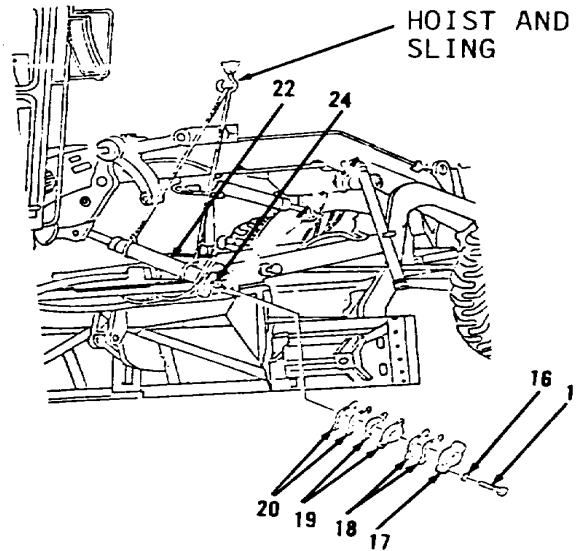


Figure 10-124.

3. Install shim(s) (20) and one of two inserts (19) on cylinder (22).
4. Using hoist and sling, position cylinder (22) on ballstud (24).
5. Install one of two inserts (19), shim(s) (18), cap (17), two lockwashers (16) and bolts (15). Tighten two bolts (15).
6. Using clean grease, lubricate ballstud (23) and two inserts (13, Figure 10-125), after surfaces are wiped clean.
7. Install shim(s) (14) and one of two inserts (13) on cylinder (22) on circle centershift linkage.
8. Position rod (21) on ballstud (23).

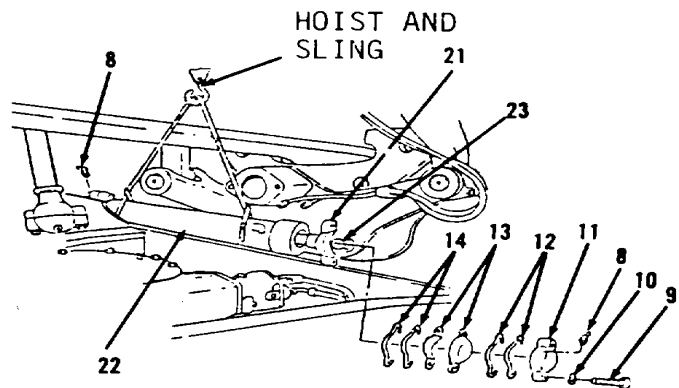
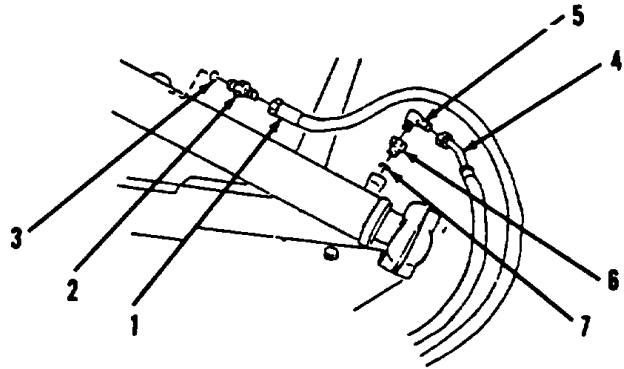


Figure 10-125.

Go to Sheet 5

HYDRAULIC SYSTEM MAINTENANCE.**10-15. Centershift Cylinder. (Sheet 5 of 6)****INSTALLATION**

- 9 . Install one of two inserts (13), shim(s) (12), cap (11), two lockwashers (10) and bolts (9). Tighten two bolts (9).
10. Remove hoist and sling.
11. Install two fittings (8).
12. Wipe clean grease, lubricate two fittings (8). Make sure greased fittings (8) are not blocked.
13. Install new preformed packing (7) and connector (6, Figure 10-121).
14. Install elbow (5) on connector (6).
15. Connect hose assembly (4) to elbow (5).
16. Install new preformed packing (3) and connector (2).
17. Connect hose assembly (1).
18. Connect battery negative ground. Refer to TM 5-3805-261-20.

*Figure 10-121.***Go to Sheet 6**

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-15. Centershift Cylinder. (Sheet 6 of 6)

INSTALLATION (cont)

WARNING

Only a qualified operator can perform the next steps. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

- 19. Start engine. Refer to TM 5-3805-261-10.
- 20. Operate centershift control. Move centershift cylinder (22, Figure 10-123) through at least five full movements of travel to bleed air from system.
- 21. Stop engine.
- 22. Inspect hose assemblies, fittings and cylinder (22) for leaks.

NOTE

Return 130G Grader to original equipment condition.

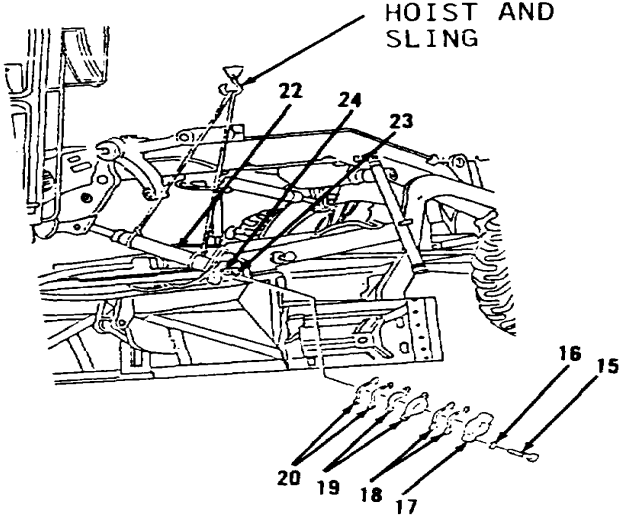


Figure 10-123.

End of Task

HYDRAULIC SYSTEM MAINTENANCE.

10-16. Blade Tip Cylinder. (Sheet 1 of 6)

This task covers:

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

INITIAL SETUP

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-177-7033)
 Hoist and sling

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Detergent, Item 9,
 Appendix C
 Small tags, Item 43
 Appendix C
 Cotter pin, Item 7
 Seals, Items 12, 13
 Preformed packings, Items 3, 6
 Caps

Personnel Required

Construction equipment
 repairer NOS 62B

References

TM 5-3805-261-10
 TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

All fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.
 Blade tipped all the way forward
 (toward front of vehicle).
 Hydraulic pressure relieved.

TM 5-3805-261-20

Positive cable on right side
 disconnected.

**Go to Sheet 2
 Change 1**

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-16. Tip Blade Cylinder. (Sheet 2 of 6)

REMOVAL

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

1. Disconnect hose assembly (1, Figure 10-126) from blade tip on circle assembly.
2. Remove connector (2) and preformed packing (3). Discard preformed packing (3).
3. Disconnect hose assembly (4).
4. Remove elbow (5) and preformed packing (6). Discard preformed packing (6).

WARNING

Weight of blade tip cylinder is approximately 50 pounds. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

5. Attach hoist and sling to cylinder (16). Remove slack from sling.
6. Remove and discard cotter pin (7).
7. Remove pin (8) and two spacers (9). Prevent spacers (9) from falling when removing pin (8).
8. Remove bolt (10).
9. Remove pin (11)

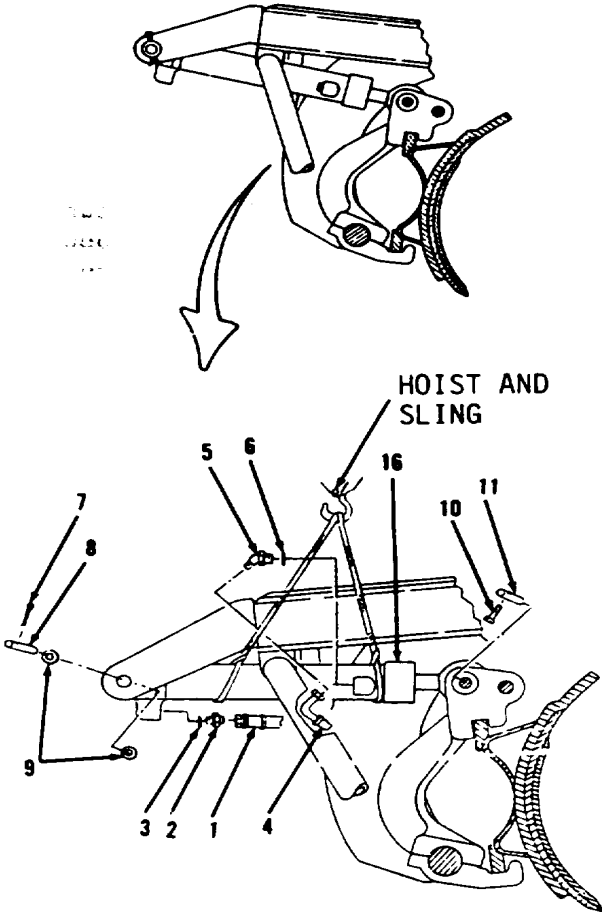


Figure 10-126.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE.

10-16. Blade Tip Cylinder. (Sheet 3 of 6)

REMOVAL

- 10. Using hoist and sling, lower items 12 thru 16 as an assembly (Figure 10-127) onto suitable padding.
- 11. Remove hoist and sling.
- 12. Using appropriate tool, remove and discard two seals (12) from cap (15, Figure 10-128).

CAUTION

Use care not to remove or damage bearing or bearing retaining rings which remain in cap.

- 13. Remove and discard two seals (13) from eye of rod (14).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

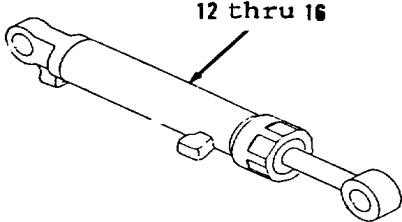


Figure 10-127.

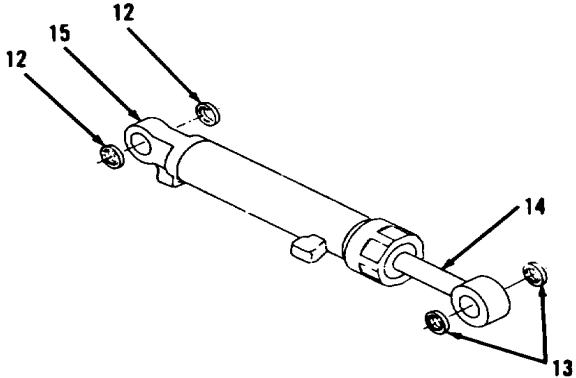


Figure 10-128.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-16. Blade Tip Cylinder. (Sheet 4 of 6)

INSTALLATION

CAUTION

Seals can be damaged by careless handling during installation. Driving tools must not strike bearings or rings which remain in rod and cap of cylinder assembly.

1. Using suitable driver and hammer, install two new seals (13) with lips toward outside and even with outer surface of eye of rod (14) on cylinder (16, Figure 10-128).
2. Install two new seals (12) in cap (15) of cylinder (16).
3. Attach hoist and sling to cylinder (16).
4. Using hoist and sling, position items 16 thru 12 as an assembly (Figure 10-127). Remove slack from sling.

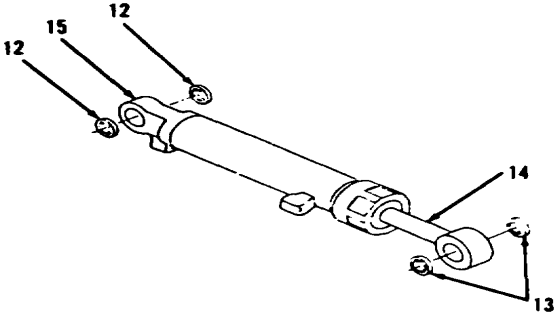


Figure 10-128.

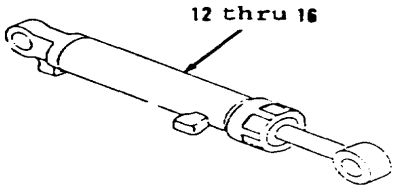


Figure 10-127.

Go To Sheet 5

HYDRAULIC SYSTEM MAINTENANCE.**10-16. Blade Tip Cylinder. (Sheet 5 of 6)**

INSTALLATION (cont)

5. Install pin (11, Figure 10-126).
6. Install bolt (10).
7. Position two spacers (9). Align spacers (9) with hole through seals (12).
8. Install pin (8) by pushing carefully through spacers (9). Use care not to damage seals (12).
9. Install new cotter pin (7) in pin (8).
10. Remove hoist and sling.
11. Install new preformed packing (6) and elbow (5).
12. Connect hose assembly (4) to elbow (5).
13. Install new preformed packing (3) and connector (2).
14. Connect hose assembly (1).

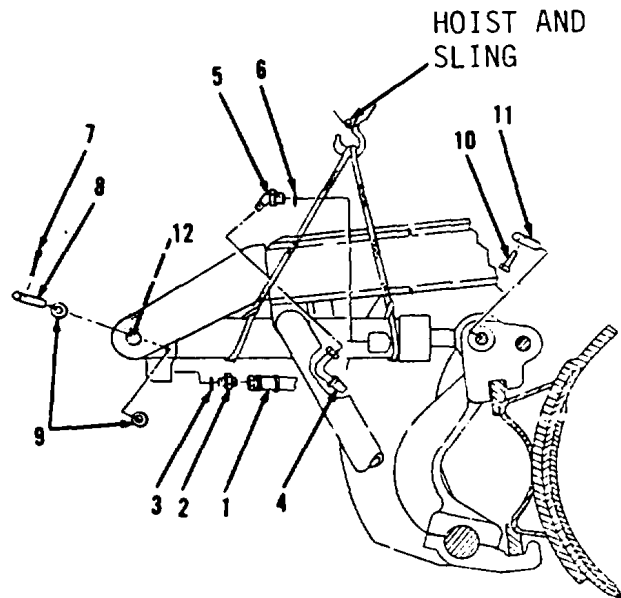


Figure 10-126.

Go to Sheet 6

HYDRAULIC SYSTEM MAINTENANCE. (cont)**10-16. Blade Tip Cylinder. (Sheet 6 of 6)**

INSTALLATION (cont)

WARNING

Only a qualified operator may perform the next procedure. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

15. Connect battery negative ground. Refer to TM 5-3805-261-20.
16. Start engine. Refer to TM 5-3805-261-10.
17. Operate blade tip control. Move cylinder (16) through at least five full movements of travel to bleed air from system.
18. Stop engine.
19. Inspect hose assemblies and cylinder (16) on rear of blade for leaks.

NOTE

Return 130C Grader to original equipment condition.

End of Task**10-96**

HYDRAULIC SYSTEM MAINTENANCE.

10-17. Blade Lift Cylinder. (Sheet 1 of 6)

This task covers:

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

INITIAL SETUP

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-177-7033)
Hoist and sling
Arbor press

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean clothes, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Grease, Item 25, Appendix C
Seals, Item 25
Performed packings, Items 3, 6
Caps

Personnel Required

Construction equipment
repairer NOS 62B

References

TM 5-3805-261-10
LO 5-3805-261-12
TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Positive cable on right side
disconnected.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-17. Blade Lift Cylinder. (Sheet 2 of 6)

REMOVAL

NOTE

- All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.
- The following is a maintenance procedure for the left blade lift cylinder. The maintenance procedure for the right blade lift cylinder is identical.

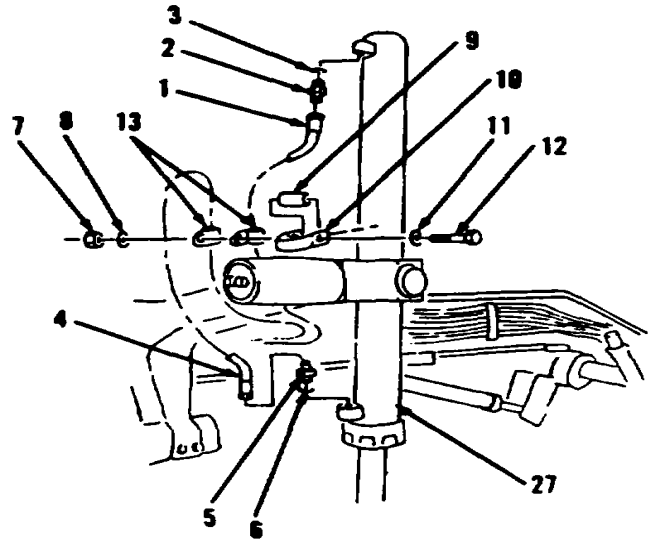


Figure 10-129.

1. Disconnect hose assembly (1, Figure 10-129) from left side of front frame.
2. Remove connector (2) and preformed packing (3) from left cylinder (27). Discard preformed packing (3).
3. Disconnect hose assembly (4).
4. Remove elbow (5) and preformed packing (6). Discard preformed packing (6).
5. Remove nut (7), washer (8), spacer (9), clamp (10), washer (11) and bolt (12).
6. Separate two clips (13) with hose assemblies (1 and 4) from cylinder (27). Two clips (13) remain attached to hose assemblies (1 and 4).

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE.

**10-17. Blade Lift Cylinder. (Sheet 3 of 6)
REMOVAL**

7. Remove fitting (14, Figure 10-130).
8. Remove two bolts (15) and lockwashers (16).
9. Remove cap (17), two shim(s) (18), inserts (19) and shim(s) (20). Tie shim(s) (18 and 20) together and tag for identification.

WARNING

Weight of blade lift cylinder is approximately 175 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

10. Attach hoist and sling to cylinder (27). Remove slack from sling.
11. Remove four bolts (21) and washers (22, Figure 10-131).
12. Remove two caps (23).

CAUTION

Be sure work surface is padded to avoid damaging sleeve bearings.

13. Remove items 24 thru 27 as an assembly. Lower cylinder (27) onto work surface.

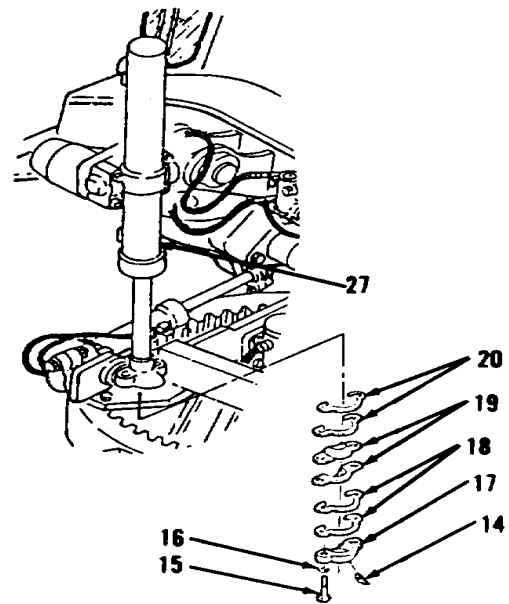


Figure 10-130.

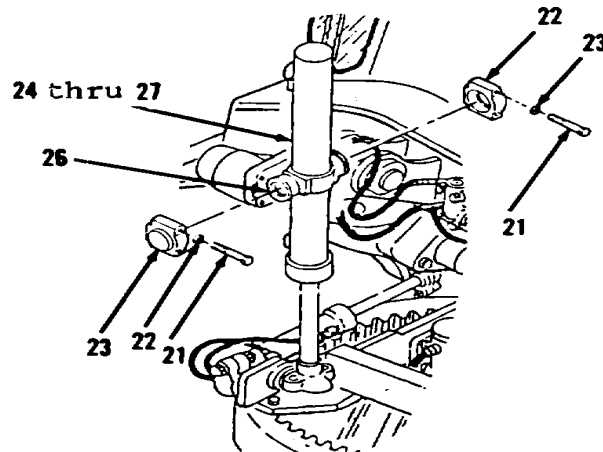


Figure 10-131.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-17. Blade Lift Cylinder. (Sheet 4 of 6)

REMOVAL (cont)

- 14. Using suitable puller, remove two bearings (24) and seals (25, Figure 10-132). Discard seals (25).
- 15. Using suitable puller, remove two sleeve bearings (26), if necessary, from cylinder (27).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

- 1. Using arbor press, install two new sleeve bearings (26) to cylinder (27, Figure 10-132), if removed.
- 2. Lubricate two new sleeve bearings (26) thoroughly with clean grease.
- 3. Using arbor press, install two new seals (25) in two caps (23) with lip on seals (25) facing inside of caps (23, Figure 10-133).

CAUTION

Do not use impact-type driver to install two bearings.

- 4. Using arbor press and suitable driver, install two bearings (24, Figure 10-132).

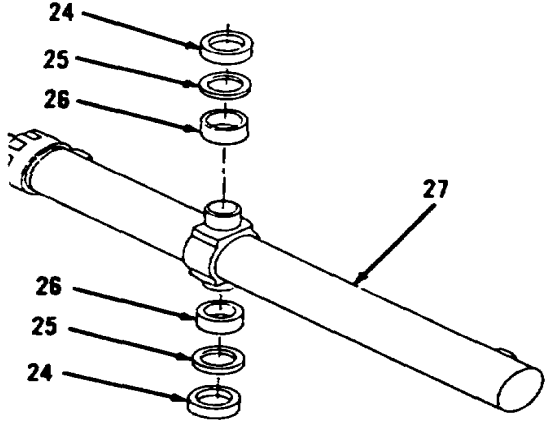


Figure 10-132.

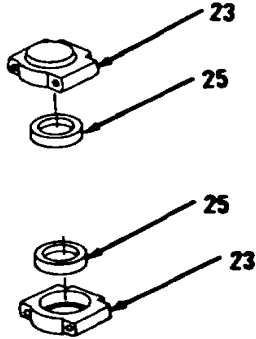


Figure 10-133.

Go to Sheet 5

HYDRAULIC SYSTEM MAINTENANCE.

10-17. Blade Lift Cylinder. (Sheet 5 of 6)

INSTALLATION

5. Position items 25 thru 23 as an assembly on cylinder (27, Figure 10-134).

6. Install new preformed packing (6), elbow (5), new preformed packing (3) and connector (2) on cylinder (27).

7. Attach hoist and sling to cylinder (27).

8. Lubricate ballstud and two inserts (19) with clean grease after surfaces are wiped cleaned.

9. Install two shim(s) (20) and one of two inserts (19) on cylinder (27).

10. Using hoist and sling, position items 27 thru 23 as an assembly (Figure 10-135).

11. Install one of two inserts (19), two shim(s) (18), cap (17), two lockwashers (16), bolts (15) and fitting (14).

12. Check ballstud and two inserts (19) for excessive clearance between ballstud and surrounding parts by moving cylinder assembly (27). If ballstud or two inserts (19) have become sufficiently worn, excessive clearance may be seen between ballstud and surrounding parts. One or more shim(s) (18 or 20) may be removed to reduce unwanted clearance. When removing two shim(s) (18 or 20), remove one shim from each side of ballstud.

13. Install four washers (22) and bolts (21) in two caps (23). Tighten four bolts (21) to 95 ft-lb torque.

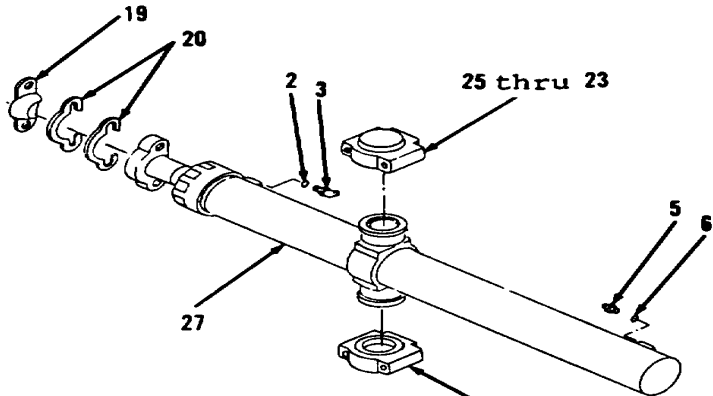


Figure 10-134. 25 thru 23

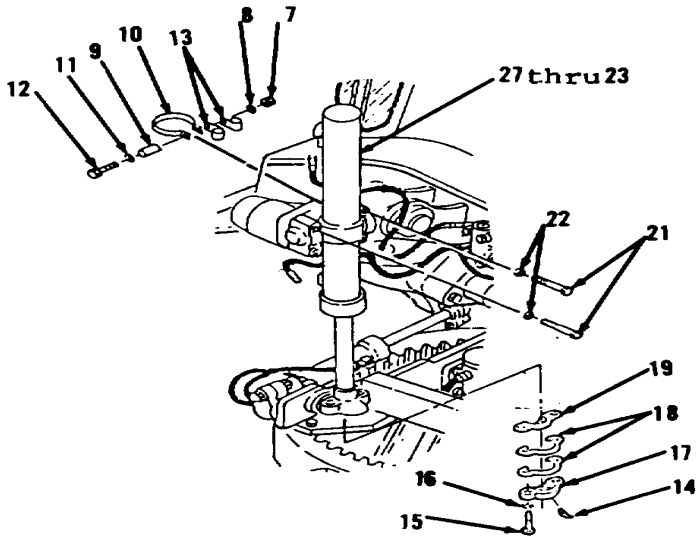


Figure 10-135.

Go to Sheet 6

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-17. Blade Lift Cylinder. (Sheet 6 of 6)

INSTALLATION (cont)

- 14. Install bolt (12), washer (11), clamp (10), two clips (13), spacer (9), washer (8) and nut (7, Figure 10-129).
- 15. Remove hoist and sling.
- 16. Connect hose assemblies (4 and 1, Figure 10-118).
- 17. Lubricate fitting (14) with clean grease. Refer to LO 5-3805-261-
- 12.
- 18. Connect battery negative ground. Refer to TM 5-3805-261-20.

WARNING

Only a qualified operator should perform the next steps. All other personnel must clear the immediate area. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

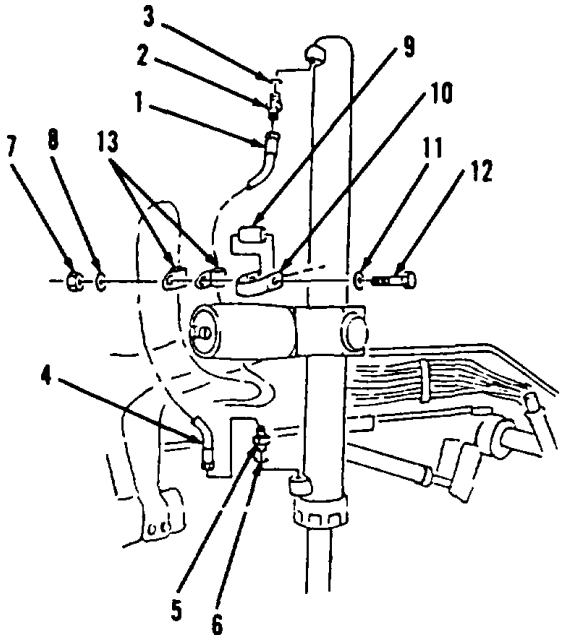


Figure 10-129.

- 19. Start engine. Refer to TM 5-3805-261-10.
- 20. Move left cylinder (27) through at least five full movements of travel to bleed air from system.
- 21. Stop engine.
- 22. Inspect hose assemblies, fittings and cylinder above circle assembly for leaks. Check for excessive clearance between ballstuds and inserts. Inserts should have a snug fit on ballstud.

NOTE

Return 130G Grader to original equipment condition.

End of Task

HYDRAULIC SYSTEM MAINTENANCE.

10-18. Articulation Cylinder. (Sheet 1 of 6)

This task covers:

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

INITIAL SETUP

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10
LO 5-3805-261-12

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Detergent, Item 9,
Appendix C
Small tags, Item 43,
Appendix C
Multi-purpose grease,
Item 23, Appendix C
Seals, Item 17
Performed packings, Items 3, 6
Caps

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-12

Drain hydraulic tanks and lines.

Go to Sheet 2

10-103

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-18. Articulation Cylinder. (Sheet 2 of 6)

REMOVAL

NOTE

The following is a maintenance procedure for the left articulation cylinder. The maintenance procedure for the right articulation cylinder is identical, except for step 1.

- 1. Remove radiator to coolant pump outlet pipe on inner left side of engine compartment. Refer to TM 5-3805-261-20.

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

- 2. Disconnect hose assembly (1, Figure 10-136) from center left side of vehicle.
- 3. Remove connector (2) and preformed packing (3). Discard preformed packing (3).
- 4. Disconnect hose assembly (4).
- 5. Remove connector (5) and preformed packing (6). Discard preformed packing (6).
- 6. Remove bolt (7), lockwasher (8) and washer (9) from rear, left side of front frame.

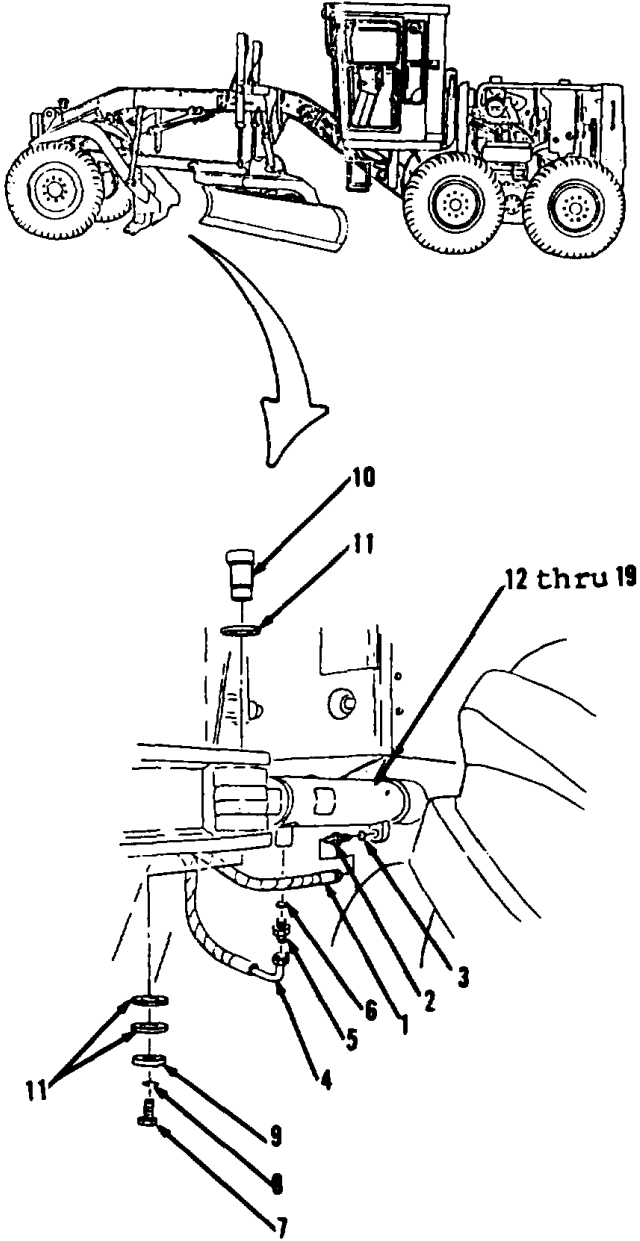


Figure 10-136.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE.

10-18. Articulation Cylinder. (Sheet 3 of 6)

REMOVAL

7. Using brass drift and hammer, remove pin (10).
8. Separate items 12 thru 19 as an assembly from frame mounting.
9. Remove three washers (11).
10. Remove bolt (12), lockwasher (13) and washer (14, Figure 10-137) from front, left side of rear frame.
11. Using suitable puller, remove pin (15).
12. Separate items 17 thru 19 as an assembly from rear frame mounting.
13. Remove three washers (16) and items 17 thru 19 as an assembly.
14. Remove and discard four seals (17, Figure 10-138) from cylinder (19).

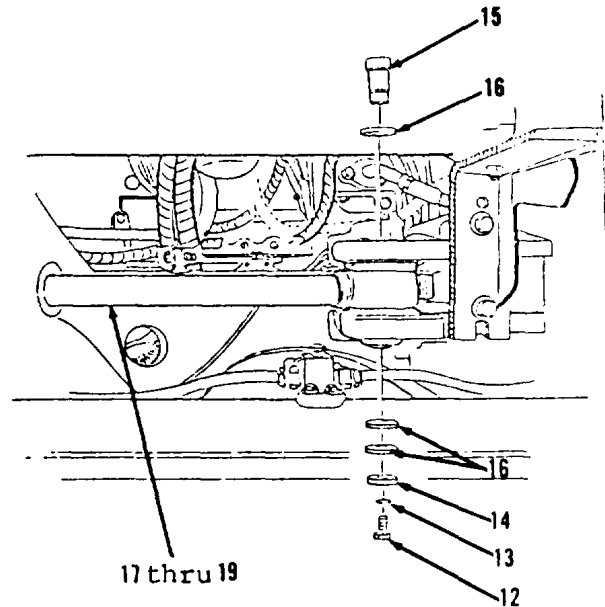


Figure 10-137.

CAUTION

Removal of bearings from cylinder can cause destruction of bearings. Remove bearings only if inspection indicates replacement is necessary.

15. Inspect two bearings (18). Replace if cracked, broken, distorted, grooved or worn.
16. Using suitable driver and press, remove two bearings (18), if necessary, from cylinder (19).

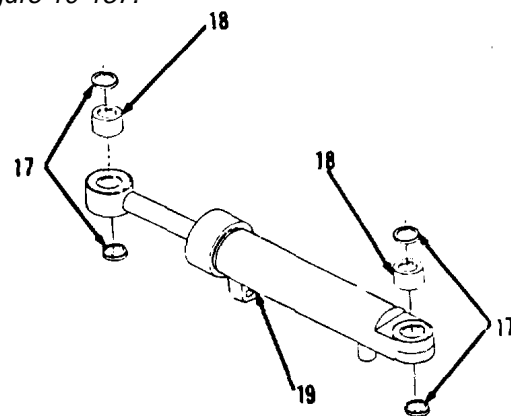


Figure 10-138.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-18. Articulation Cylinder. (Sheet 4 of 6)

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Using suitable driver and press, install two bearings (18, Figure 10-138), if removed, in cylinder (19).
2. Using suitable driver and hammer, install four new seals (17), two in each end of cylinder (19), with lip side facing out.
3. Position items 19 thru 17 as an assembly (Figure 10-137) on front, left side of rear frame.

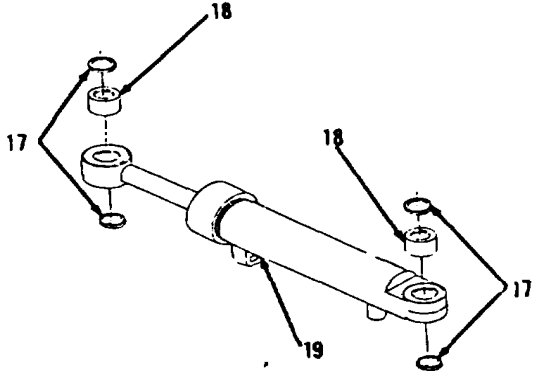


Figure 10-138.

NOTE

Use washers as required to obtain level cylinder installation.

4. Install three washers (16).
5. Aline three washers (16), rear frame mountings and cylinder (19) eye.
6. Install pin (15).
7. Install washer (14), lockwasher (13) and bolt (12).

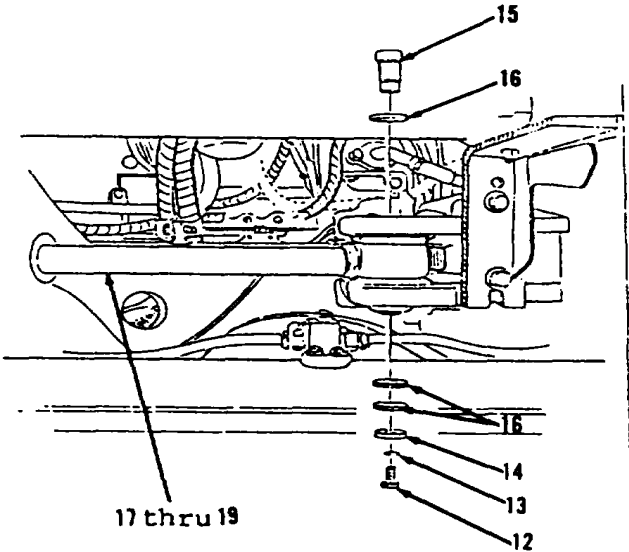


Figure 10-137.

Go to Sheet 5

HYDRAULIC SYSTEM MAINTENANCE.

10-18. Articulation Cylinder. (Sheet 5 of 6)

INSTALLATION

8. Position items 19 thru 12 as an assembly (Figure 10-136) on rear, left side of front frame.
9. Install three washers (11) as required.
10. Align three washers (11), front frame mountings and cylinder (19) rod eye.
11. Install pin (10).
12. Install washer (9), lockwasher (8) and bolt (7).
13. Install new preformed packing (6) and connector (5).
14. Connect hose assembly (4).
15. Install new preformed packing (3) and connector (2).
16. Connect hose assembly (1).

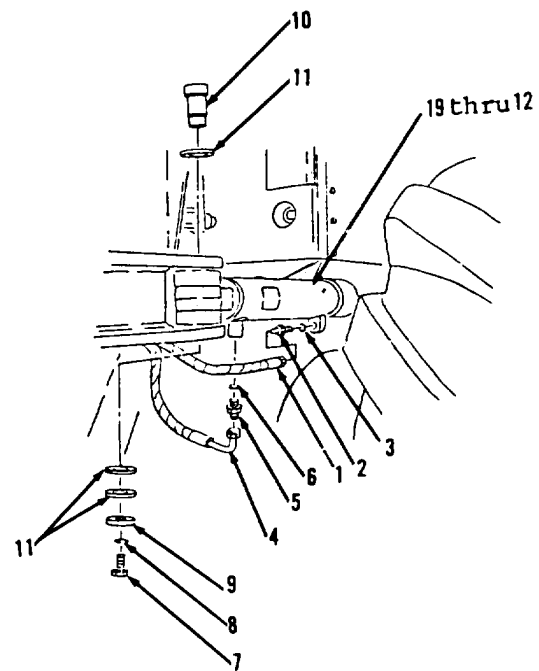


Figure 10-136.

WARNING

Only a qualified operator can perform the next procedure. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

17. Start engine. Refer to TM 5-3805-261-10.

Go to Sheet 6

HYDRAULIC SYSTEM MAINTENANCE. (cont)**10-18. Articulation Cylinder. (Sheet 6 of 6)**

INSTALLATION (cont)

CAUTION

Equipment must be up and differential unlocked before vehicle can be articulated.

18. Articulate vehicle slowly left and right to bleed air from the system and straighten.
19. Lower equipment to the ground and stop engine.
20. Refill hydraulic tank on outer rear of cab to proper level. Refer to LO 5-3805-261-12.
21. Check cylinder (19) for leaks.

NOTE

Return 13OG Grader to original equipment condition.

End of Task**10-108**

HYDRAULIC SYSTEM MAINTENANCE.

10-19. Hydraulic Side Shift Cylinder. (Sheet 1 of 7)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer NOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Hoist and sling
Wood blocks
Floor jack

References

TM S-3805-261-10
TM 5-3805-261-20

Special Environmental Conditions

None

Test Equipment

None

General Safety Instructions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Detergent, Item 9, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43, Appendix C
Cotter pins, Items 1, 29
Preformed packings, Items 19, 22
Caps

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Hydraulic pressure relieved.

TM 5-3805-261-20

Positive cable on right side
disconnected.

Go to Sheet 2

Change 1 10-109

HYDRAULIC SYSTEM MAINTNEANCE. (cont)

10-19. Hydraulic Side Shift Cylinder. (Sheet 2 of 7)

REMOVAL

NOTE

Blade must be tilted all the way forward.

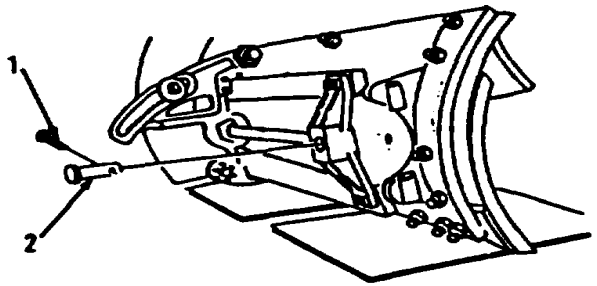


Figure 10-139.

1. Remove cotter pin (1) and pin (2, Figure 10-139). Discard cotter pin (1).
2. Start engine. Refer to TM 5-3805-261-10.
3. Retract rod end of cylinder (38, Figure 10-140).
4. Position wood blocks between rod end of cylinder (38) and bracket (41).

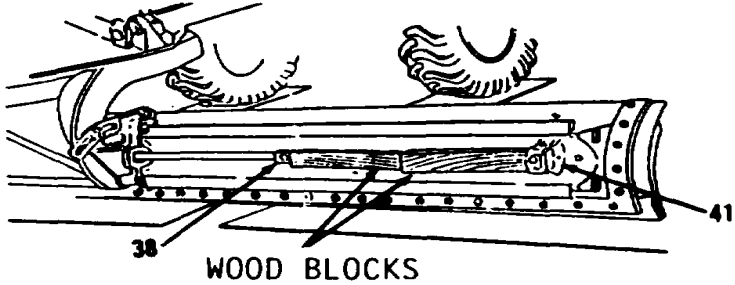


Figure 10-140.

5. Expand rod end of cylinder (38) in operator's compartment. Move blade far enough to right to get access to cylinder (38).
6. Stop engine.
7. Reduce hydraulic pressure to zero. Refer to TM 5-3805-261-10.
8. Remove wood blocks.
9. Remove two nuts (3), washers (4), bolts (5) and clamps (6, Figure 10-141).
10. Remove two bolts (7), washers (8 and 9) and spacers (10).
11. Remove two bolts (11) and washers (12).
12. Remove guards (13 and 14), two washers (15) and spacers (16).

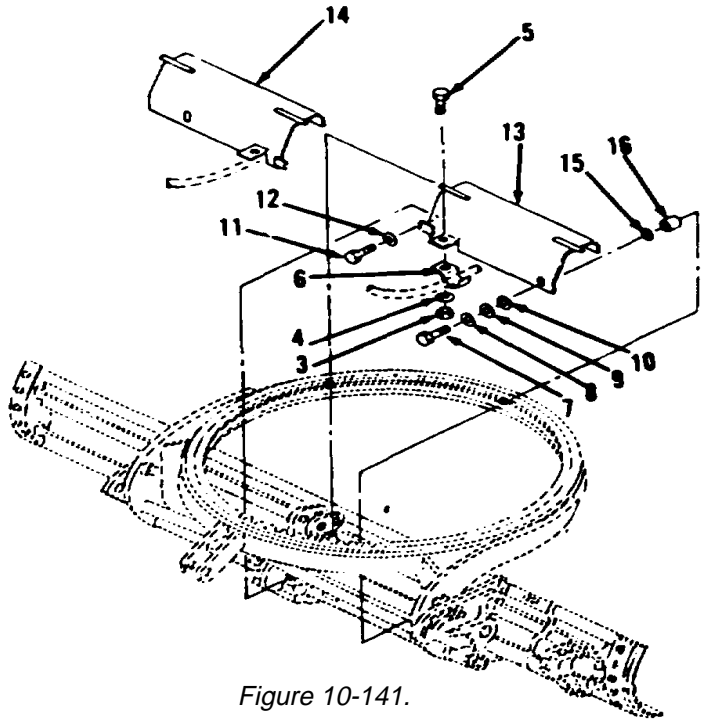


Figure 10-141.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE.

10-19. Hydraulic Side Shift Cylinder. (Sheet 3 of 7)

REMOVAL

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

- 13. Disconnect hose assembly (17, Figure 10-142).
- 14. Remove connector (18) and preformed packing (19). Discard preformed packing (19).
- 15. Disconnect hose assembly (20).
- 16. Remove connector (21) and preformed packing (22). Discard preformed packing (22).
- 17. Remove nut (23), washer (24), bolt (25), pin (26) and washers (27 and 28, Figure 10-143).

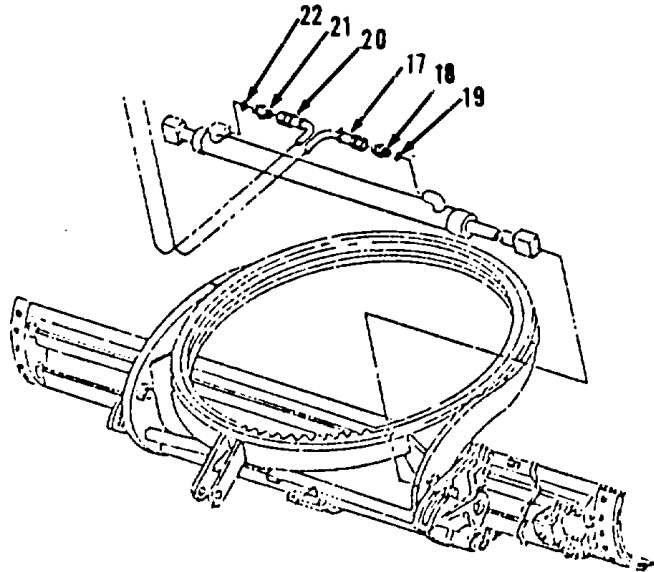


Figure 10-142.

WARNING

Weight of bracket is 75 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

- 18. Attach hoist and sling to bracket (36) and position floor jack under cylinder (38).
- 19. Remove cotter pin (29), nut (30), washer (31), nut (32), washers (33 and 34), nut (35), bracket (36) and washer (37). Discard cotter pin (29).
- 20. Remove hoist and sling from bracket (36).

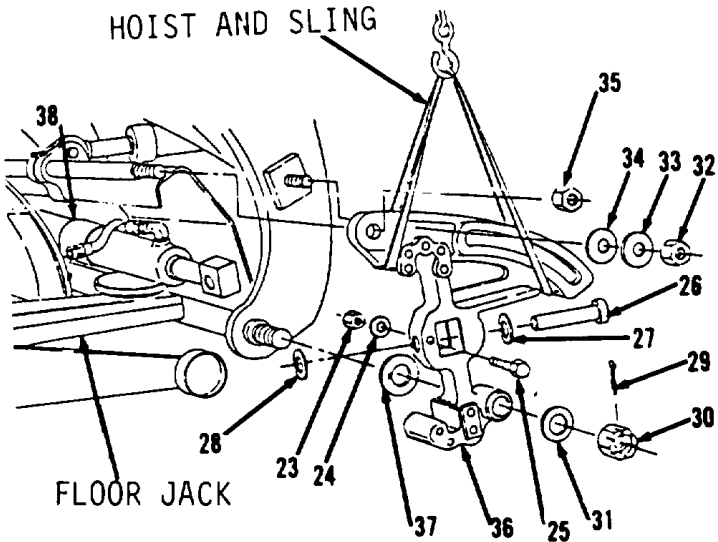


Figure 10-143.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-19. Hydraulic Side Shift Cylinder. (Sheet 4 of 7)

REMOVAL (cont)

WARNING

Weight of cylinder is approximately 130 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

- 21. Attach hoist and sling to cylinder (38).
- 22. Using hoist and sling, remove cylinder (38, Figure 10-144). Support with floor jack.
- 23. Remove four bolts (39), washers (40) and bracket (41, Figure 10-145).

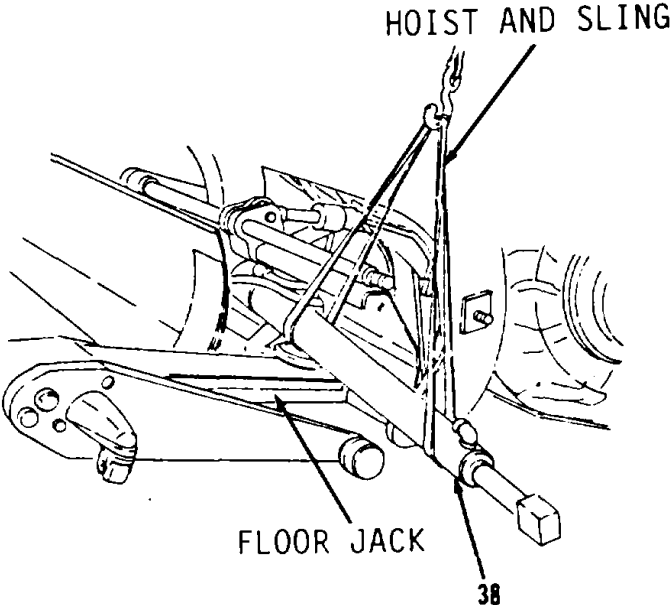


Figure 10-144.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

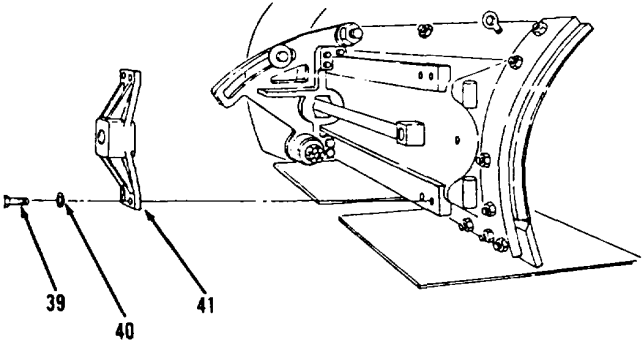


Figure 10-145.

Go To Sheet 5

HYDRAULIC SYSTEM MAINTENANCE.**10-19. Hydraulic Side Shift Cylinder. (Sheet 5 of 7)****INSTALLATION**

1. Install bracket (41), four washers (40) and bolts (39, Figure 10-145).
2. Using hoist and sling, position cylinder (38, Figure 10-144). Support with floor jack.
3. Remove hoist and sling.
4. Attach hoist and sling to bracket (36, Figure 10-143).
5. Using hoist and sling, position washer (37) and bracket (36). Use washer (37) as required to get sliding fit with maximum 0.7 inch clearance between bracket (36) and wear plate on circle drive.
6. Install bracket (36), nut (35), washers (34 and 33), nut (32), washer (31), nut (30) and new cotter pin (29). Tighten nut (30) to .00 clearance then back off nut (30) one slot to install cotter pin (29). Tighten nut (35) to 1200 ft-lb. torque. Maintain clearance given in previous step 5.
7. Install washers (28 and 27), pin (26), bolt (25), washer (24) and nut (23).
8. Remove hoist and sling from bracket (36).

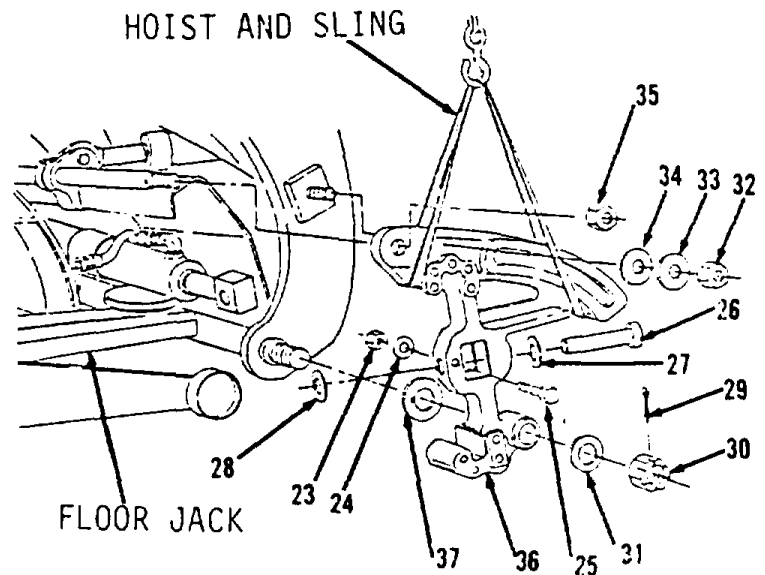


Figure 10-143.

Go to Sheet 6

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-19. Hydraulic Side Shift Cylinder. (Sheet 6 of 7)

INSTALLATION (cont)

- 9. Install new preformed packing (22) and connector (21, Figure 10-142).
- 10. Connect hose assembly (20).
- 11. Install new preformed packing (19) and connector (18).
- 12. Connect hose assembly (17).
- 13. Position two spacers (16), washers (15) and guards (14 and 13, Figure 10-141).
- 14. Install two washers (12) and bolts (11).
- 15. Install two spacers (10), washer (9 and 8) and two bolts (7).
- 16. Install two clamps (6), bolts (5), washers (4) and nuts (3).

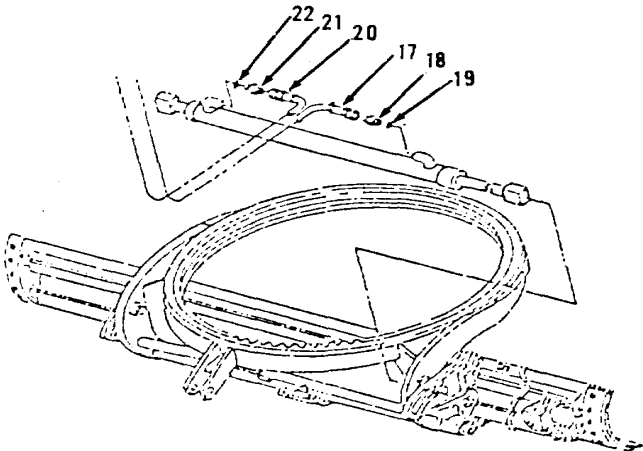


Figure 10-142.

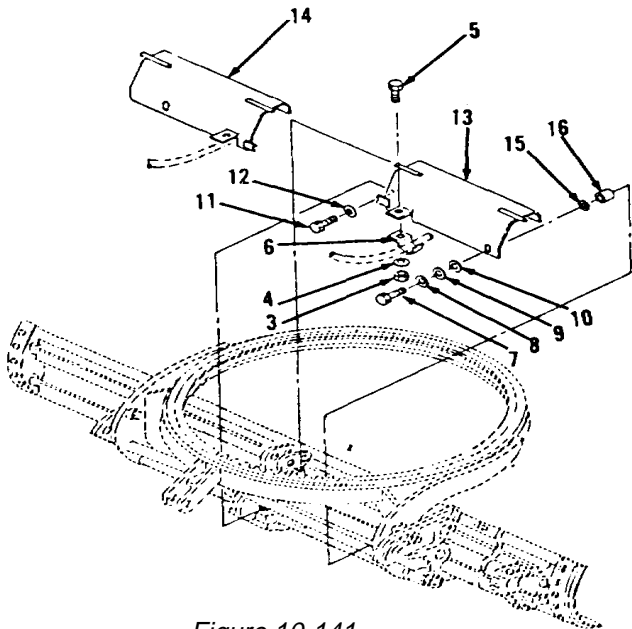


Figure 10-141.

Go to Sheet 7

HYDRAULIC SYSTEM MAINTENANCE.**10-19. Hydraulic Side Shift Cylinder. (Sheet 7 of 7)****INSTALLATION**

17. Connect chain to rod end of cylinder (38) and bracket (41, Figure 10-146).
18. Start engine. Refer to TM 5-3805-261-10.
19. Retract rod end of cylinder (38) and pull blade into position.
20. Stop engine.
21. Remove chain from blade.
22. Install pin (2) and new cotter pin (1, Figure 10-139).

NOTE

Return 130C Grader to original equipment condition.

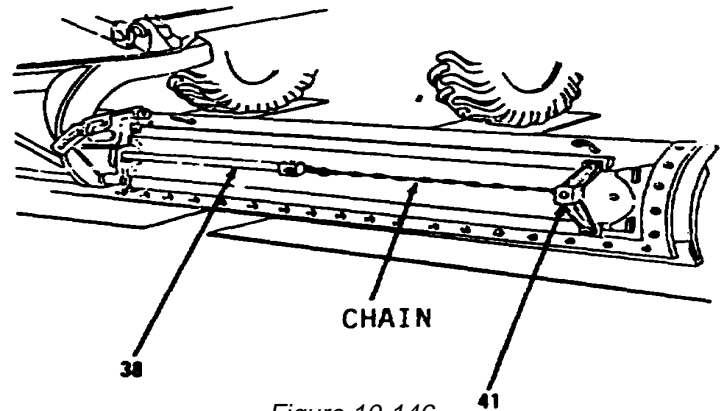


Figure 10-146.

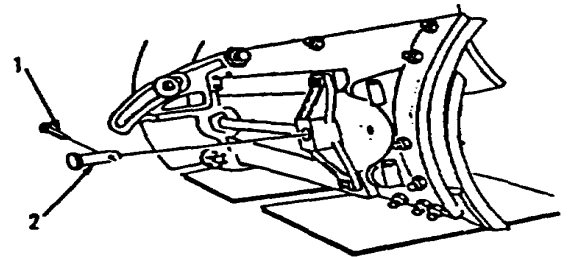


Figure 10-139.

End of Task

10-115

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-20. Scarifier Cylinder. (Sheet 1 of 5)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer NOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Hoist and sling

References

TM 5-3805-261-10
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Small tags, Item 43,
Appendix C
Four seals, Item 12
Tie, Item 1
Preformed packings, Items 4, 7
Caps

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

TM 5-3805-261-20

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Hydraulic pressure relieved.
Positive cable on right side
disconnected.

Go to Sheet 2

Change 1 10-116

HYDRAULIC SYSTEM MAINTENANCE.

10-20. Scarifier Cylinder. (Sheet 2 of 5)

REMOVAL

1. Remove and discard tie (1, Figure 10-147) from scarifier cylinder.

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

2. Disconnect hose assembly (2).
3. Remove elbow (3) and preformed packing (4). Discard preformed packing (4).
4. Disconnect hose assembly (5).
5. Remove connector (6) and preformed packing (7). Discard preformed packing (7).

WARNING

Weight of cylinder is approximately 65 pounds. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

6. Attach hoist and sling to items 8 thru 14 as an assembly. Remove slack from sling.

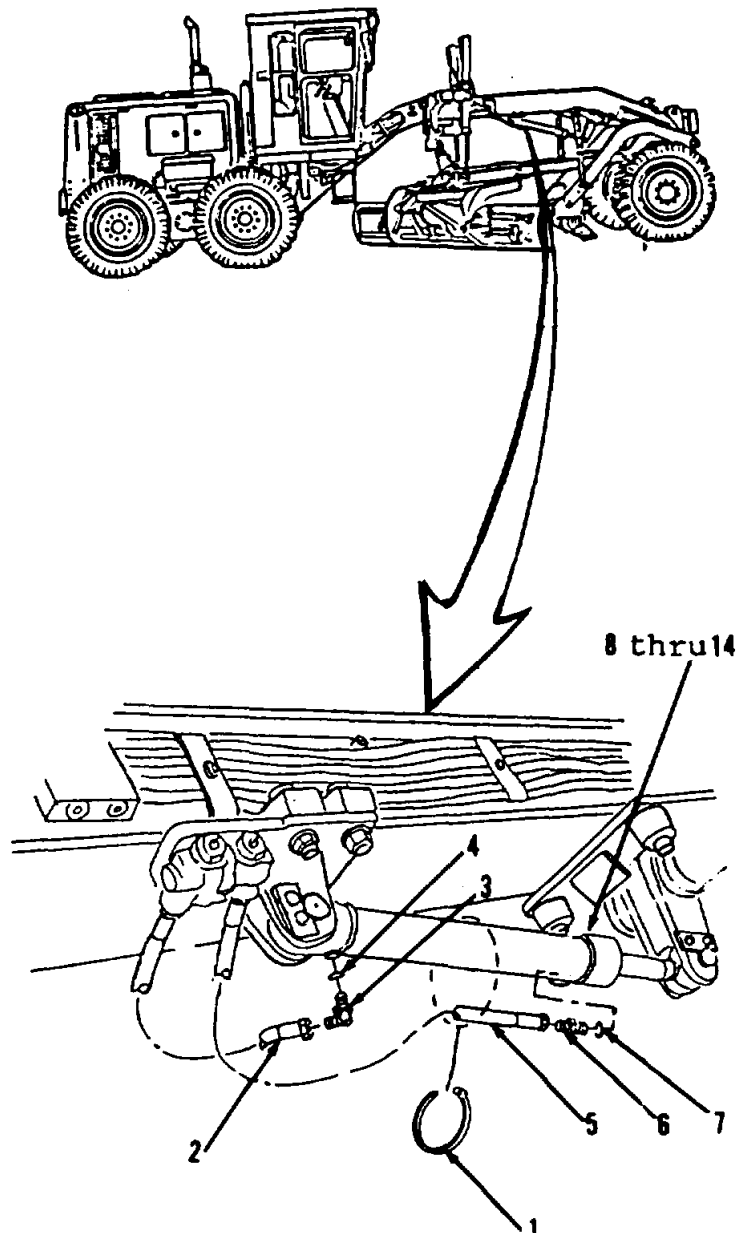


Figure 10-147.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-20. Scarifier Cylinder. (Sheet 3 of 5)

REMOVAL (cont)

- 7. Remove four bolts (8), four washers (9) and two locks (10, Figure 10-148).
- 8. Remove two pins (11).
- 9. Remove items 12 thru 14 as an assembly from mounting brackets and lower onto suitable repair stand or work bench with padding.
- 10. Remove hoist and sling.
- 11. Remove four seals (12) being careful not to damage bearings (13, Figure 10-149). Discard four seals (12).

CAUTION

Removal of bearings from cylinder can cause destruction of bearings. Remove bearings only if inspection indicates replacement is necessary.

- 12. Inspect two bearings (13). Replace if cracked, broken, distorted, grooved or worn.
- 13. Using suitable driver and press, remove two bearings (13), if necessary, from cylinder (14).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

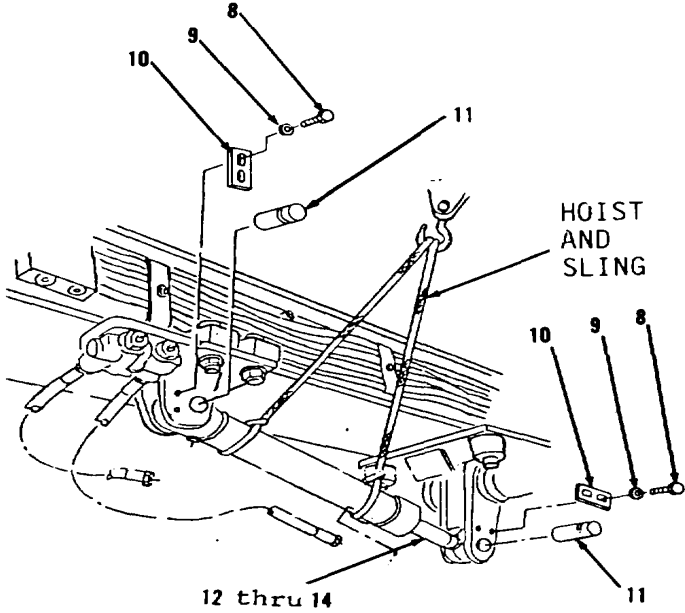


Figure 10-148.

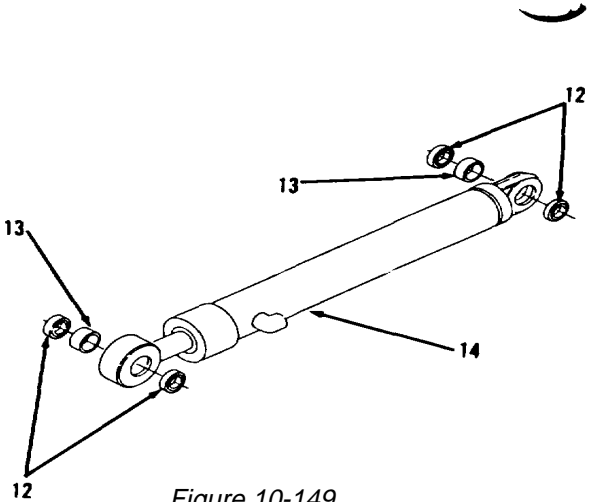


Figure 10-149.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE.**10-20. Scarifier Cylinder. (Sheet 4 of 5)****INSTALLATION**

1. Using suitable driver and hammer, install four new seals (12, Figure 10-149) in eye of rod with lips toward outside. Lips must be approximately even with outer surface of rod eye.
2. Using suitable driver and press, install two bearings (13). if removed. Two bearings (13) contact two new seals (12).

NOTE

Repeat steps 1 and 2 for new seals and bearings at opposite end of cylinder.

3. Attach hoist and sling to items 14 thru 12 as an assembly (Figure 10-148).
4. Using hoist and sling, position items 14 thru 12 as an assembly in mounting brackets. Remove slack from sling.
5. Install two pins (11), locks (10), four washers (9) and bolts (8). When installing two pins (11), use care not to damage four new seals (12) or two bearings (13).
6. Remove hoist and sling.

Go to Sheet 5

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-20. Scarifier Cylinder. (Sheet 5 of 5)

INSTALLATION (cont)

- 7. Install new preformed packing (7) and connector (6, Figure 10-147).
- 8. Connect hose assembly (5).
- 9. Install new preformed packing (4) and elbow (3).
- 10. Connect hose assembly (2).
- 11. Install new tie (1) on cylinder (14) to secure hose assembly (2).

WARNING

Only a qualified operator may perform the next steps. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

- 12. Start engine. Refer to TM 5-3805-261-10.
- 13. Operate scarifier control and move through at least five full movements of travel to bleed air from system.
- 14. Stop engine.
- 15. Inspect hose assemblies (5 and 2), fittings and cylinder (14) at front frame for leaks.

NOTE

Return 130G Grader to original equipment condition.

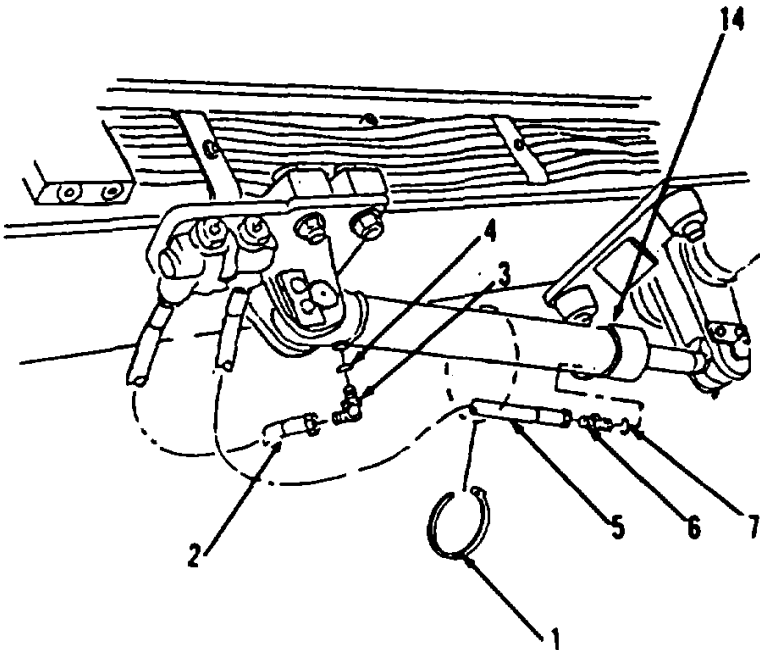


Figure 10-147.

End of Task

HYDRAULIC SYSTEM MAINTENANCE.

10-21. Hydraulic Tank and Mounting. (Sheet 1 of 7)

This task covers:

- a. Removal
- b. Disassembly
- c. Cleaning
- d. Inspection
- e. Assembly
- f. Installation

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Hoist and sling

References

TM 5-3805-261-10
LO 5-3805-261-12
TM 5-3805-261-20

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Detergent, Item 9, Appendix C
Small tags, Item 43,
Appendix C
Gasket, Item 43
Preformed packing, Item 54
Caps

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

LO 5-3805-261-12

Drain hydraulic tank and lines.

TM 5-3805-261-20

Remove hydraulic oil temperature
switch.
Hydraulic tank lines and fittings
removed.
Hydraulic tank filters removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-21. Hydraulic Tank and Mounting. (Sheet 2 of 7)

REMOVAL

WARNING

Weight of hydraulic tank is 250 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

NOTE

All hoses, lines and fittings must be tagged before disconnecting to aid in installation. Cap all hose ends to prevent contamination.

- 1. Attach hoist and sling to hydraulic tank.

NOTE

Steps 3 thru 6 are the maintenance procedure for the left support and hardware. The maintenance procedure for the right support and hardware is identical.

- 2. Remove two bolts (1), washers (2), spacers (3) and blocks (4, Figure 10-150).
- 3. Remove nut (5), washers (6 and 7), mounting (8), washers (9 and 10) and bolt (11).

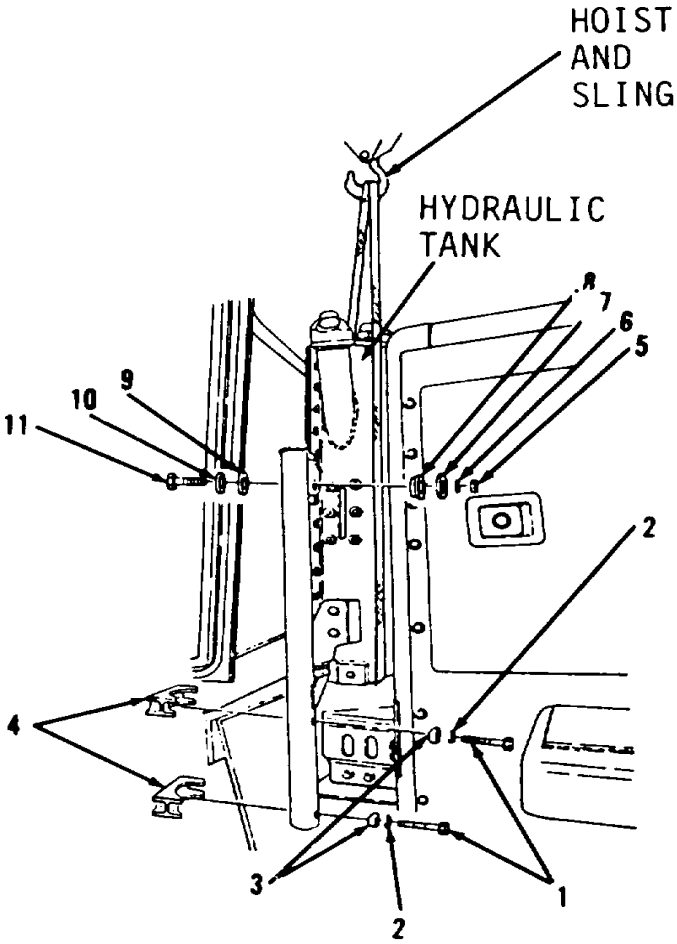


Figure 10-150.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE.

10-21. Hydraulic Tank and Mounting. (Sheet 3 of 7)

REMOVAL

- 4. Remove nut (12), washers (13 and 14), mounting (15), washers (16 and 17), bolt (18) and support (19, Figure 10-151).
- 5. Using hoist and sling, remove hydraulic tank from vehicle and move to workbench.
- 6. Remove hoist and sling.

DISASSEMBLY

- 1. Remove two bolts (20), nuts (21), washers (22) and plate (23, Figure 10-152).
- 2. Remove four bolts (24), washers (25) and brackets (26 and 27).
- 3. Remove plugs (28 and 29).
- 4. Remove two items 30 thru 38 as an assembly (Figure 10-153).

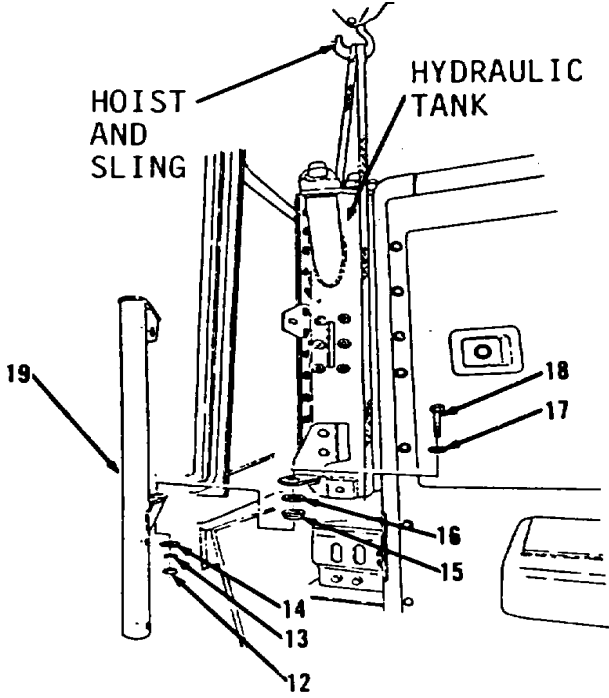


Figure 10-151.

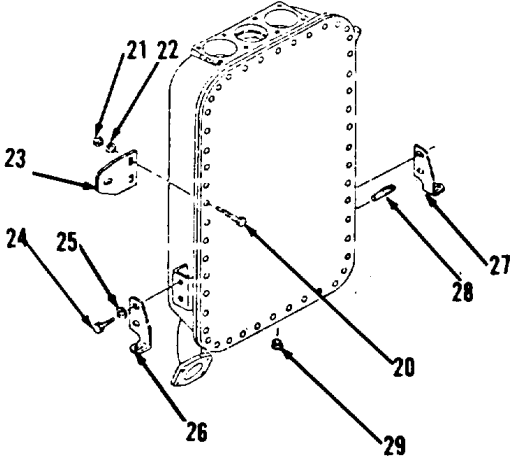


Figure 10-152.

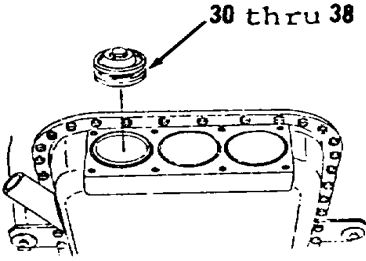


Figure 10-153.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-21. Hydraulic Tank and Mounting. (Sheet 4 of 7)

DISASSEMBLY (cont)

5. Remove two lock nuts (30), spacers (31), retainers (32), springs (33), seats (34), valves (35), springs (36) and retainers (37) from bolts (38, Figure 10-154).
6. Remove 48 nuts (39), washers (40), bolts (41) and cover (42, Figure 10-155). Matchmark cover (42) as to top or bottom to aid in installation.
7. Remove and discard gasket (43). Remove all gasket material from mounting surface.
8. Remove six nuts (44), washers (45), retainer (46), plate (47), grommet (48) and glass (49, Figure 10-156).
9. Remove two bolts (50), washers (51), lock (52), tube (53) and preformed packing (54). Discard preformed packing (54).

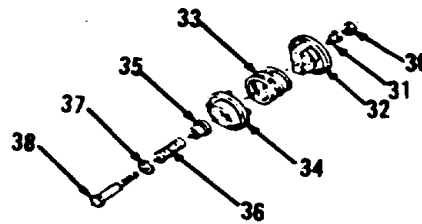


Figure 10-154.

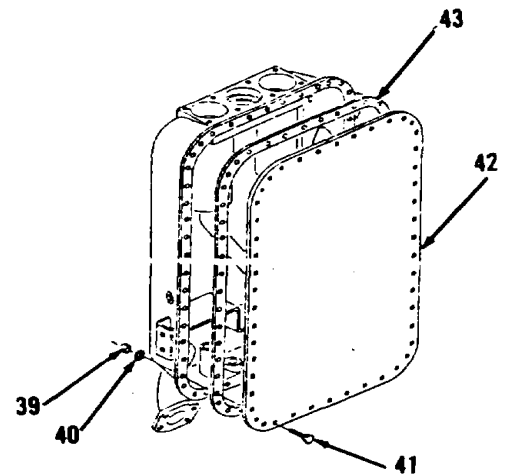


Figure 10-155.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

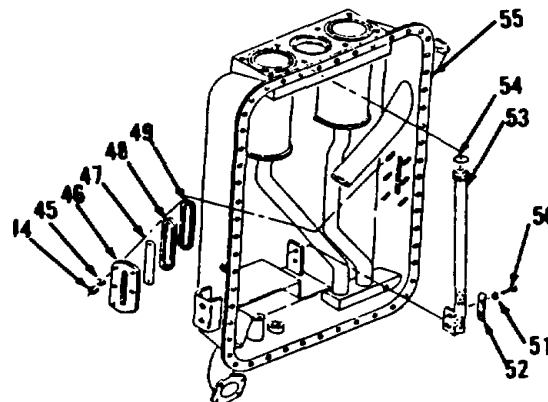


Figure 10-156.

Go to Sheet 5

HYDRAULIC SYSTEM MAINTENANCE.

10-21. Hydraulic Tank and Mounting. (Sheet 5 of 7)

ASSEMBLY

1. Install new preformed packing (54), tube (53), lock (52), two washers (51) and bolts (50) on tank (55, Figure 10-156).
2. Install glass (49), grommet (48), plate (47), retainer (46), six washers (45) and nuts (44).
3. Install new gasket (43, Figure 10-155).
4. Aline matchmark to install cover (42), 48 bolts (41), washers (40) and nuts (39). Tighten 48 nuts (39) to 28 ft-lb torque.
5. Install two retainers (37), springs (36), valves (35), seats (34), springs (33), retainers (32), spacers (31) and lock nuts (30) on bolts (38, Figure 10-154).
6. Install items 38 thru 30 as an assembly (Figure 10-153).
7. Install plugs (29 and 28, Figure 10-152).
8. Install brackets (27 and 26), four washers (25) and bolts (24).
9. Install plate (23), two washers (22), nuts (21) and bolts (20). Tighten two nuts (21) to 28 ft-lb torque.

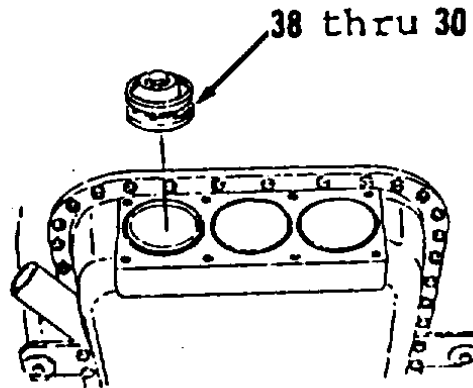


Figure 10-153.

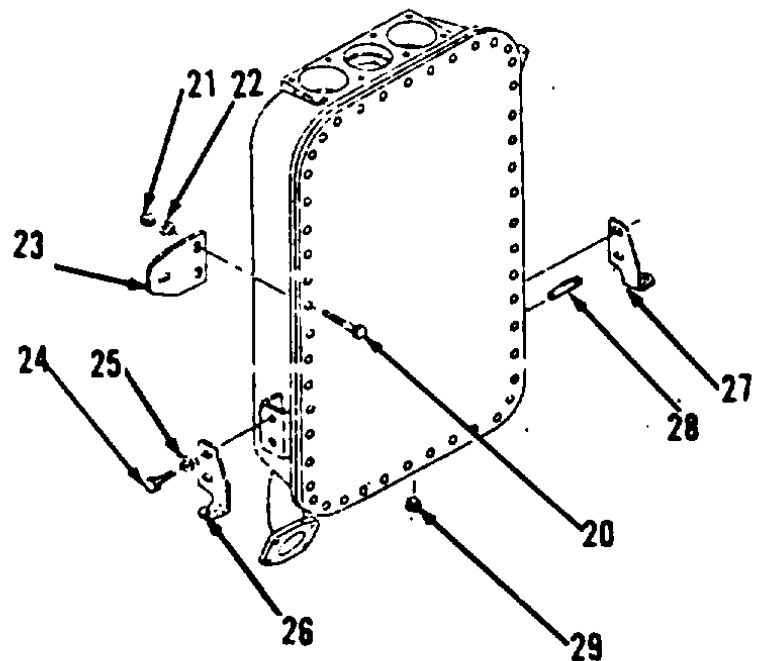


Figure 10-152.

Go to Sheet 6

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-21. Hydraulic Tank and Mounting. (Sheet 6 of 7)

INSTALLATION

- 1. Attach hoist and sling to hydraulic tank.
- 2. Position hydraulic tank behind operator's compartment.

NOTE

Steps 23 thru 25 are the maintenance procedure for the right support and hardware. The maintenance procedure for the left support and hardware is identical.

- 3. Install support (19), bolt (18), washers (17 and 16), mounting (15), washers (14 and 13) and nut (12, Figure 10-151). Tighten nut (12) to 40 ft-lb torque.
- 4. Install bolt (11), washers (10 and 9), mounting (8), washers (7 and 6) and nut (5, Figure 10-150). Tighten nut (5) to 40 ft-lb torque.
- 5. Install two blocks (4), spacers (3), washers (2) and bolts (1).
- 6. Remove hoist and sling.

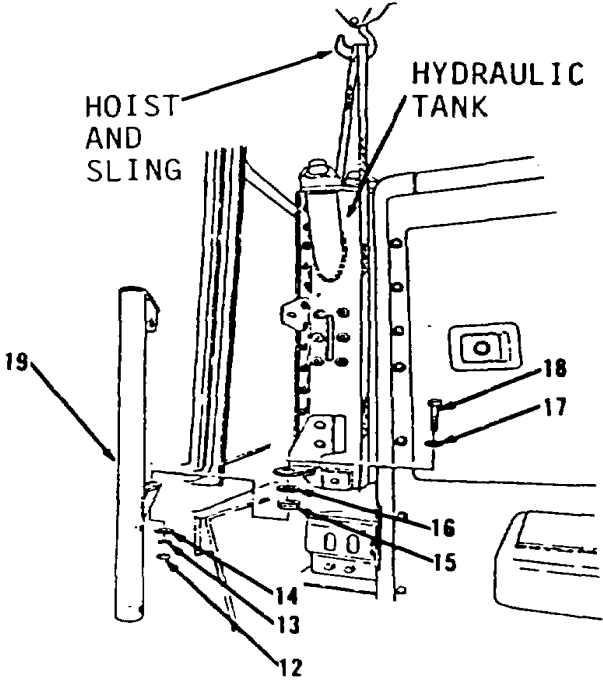


Figure 10-151.

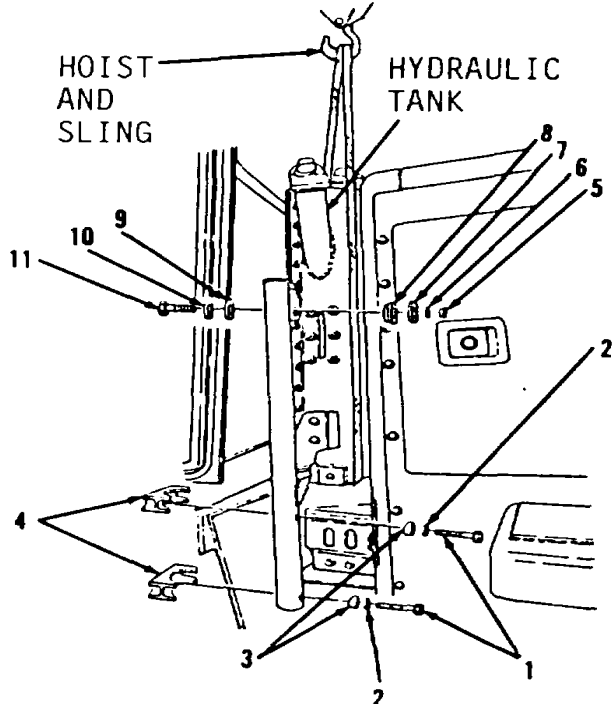


Figure 10-150.

Go to Sheet 7

HYDRAULIC SYSTEM MAINTENANCE.**10-21. Hydraulic Tank and Mounting. (Sheet 7 of 7)**

INSTALLATION

WARNING

Only a qualified operator may perform the next procedure. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

7. Refill hydraulic tank to proper level. Refer to LO 5-3805-261-12.
8. Start engine. Refer to TM 5-3805-261-10. Run one minute to work air out of hydraulic system.
9. Stop engine.
10. Inspect hose assemblies, connections and tank on outside rear of operator's compartment for leaks.
11. Refill hydraulic tank to proper level. Refer to LO 5-3805-261-12.

NOTE

Return 130C Grader to original equipment condition.

End of Task**10-127**

HYDRAULIC SYSTEM MAINTENANCE.

10-22. Hydraulic Pump and Control Valve Lines and Fittings. (Sheet 1 of 8)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-177-
7033)

References

TM 5-3805-248-10
LO 5-3805-248-12

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41
Appendix C
Detergent, Item 9, Appendix C
Small tags, Item 43,
Appendix C
Preformed packings, Items 2,
4, 8, 11, 14, 16, 20, 22,
24, 26, 29, 34, 42, 44, 48,

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-248-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Hydraulic pressure relieved.

Paragraph 3-4

Engine removed.

Go to Sheet 2

10-128

HYDRAULIC SYSTEM MAINTENANCE.

10-22. Hydraulic Pump and Control Valve Lines and Fittings. (Sheet 2 of 8)

REMOVAL

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

1. Disconnect hose assembly (9, Figure 10-157).
2. Loosen elbow locknut on elbow (1) and remove elbow (1).
3. Remove preformed packing (2). Discard preformed packing (2).
4. Disconnect hose assembly (31) from right side of vehicle.
5. Remove connector (3) and preformed packing (4). Discard preformed packing (4).
6. Remove bolt (5), washer (6) and two clips.
7. Disconnect hose assembly (12).
8. Remove connector (7) and preformed packing (8). Discard preformed packing (8).
9. Remove hydraulic pressure switch (Figure 10-158). Refer to TM 5-3805-261-20.
10. Remove hose assembly (9), connector (10) and preformed packing (11). Discard preformed packing (11).
11. Remove hose assembly (12), connector (13) and preformed packing (14). Discard preformed packing (14).

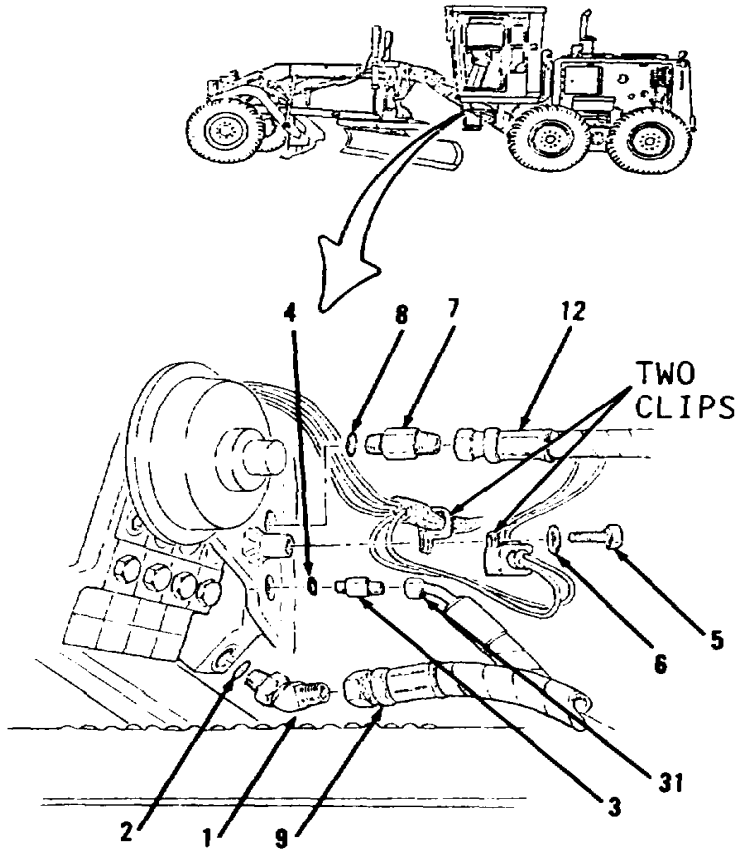


Figure 10-157. ---

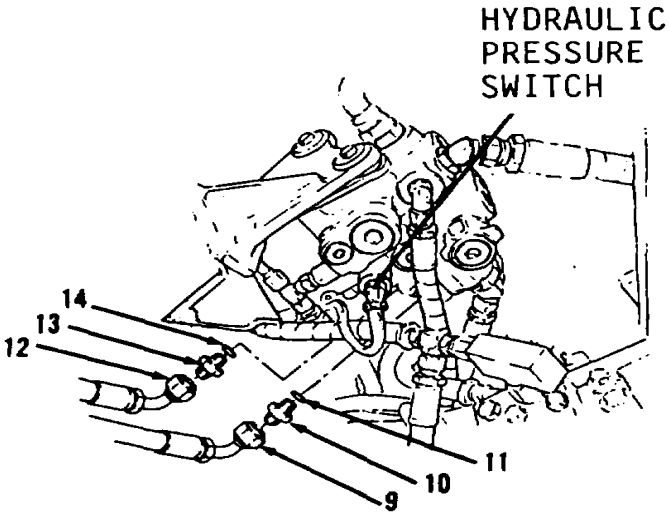


Figure 10-158.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-22. Hydraulic pump and control valve lines and fittings. (Sheet 3 of 8)

REMOVAL (cont)

12. Disconnect tee (17) from connector (15, Figure 10-159) under front, left of cab.

13. Remove connector (15) and preformed packing (16). Discard preformed packing (16).

14. Disconnect hose assemblies (18 and 54) from tee (17).

15. Remove tee (17).

16. Remove hose assembly (18) from elbow (19, Figure 10-160).

17. Remove elbow (19) and preformed packing (20). Discard preformed packing (20).

18. Disconnect hose assemblies (27, 30 and 40, Figure 10-161).

19. Remove connector (21) and preformed packing (22). Discard preformed packing (22).

20. Remove connector (23) and preformed packing (24). Discard preformed packing (24).

21. Loosen locknut on elbow (25) and remove elbow and preformed packing (26). Discard preformed packing (26).

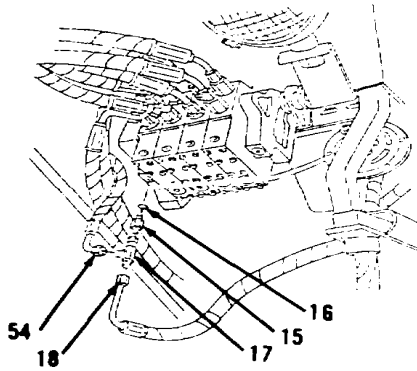


Figure 10-159.

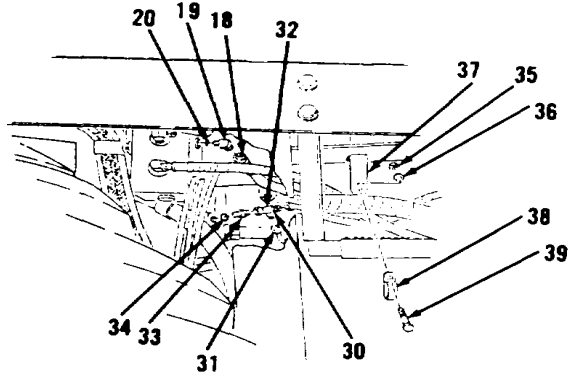
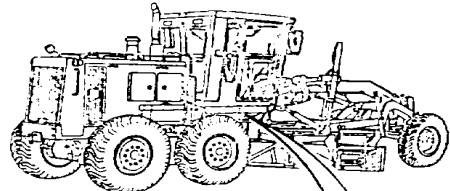


Figure 10-160.

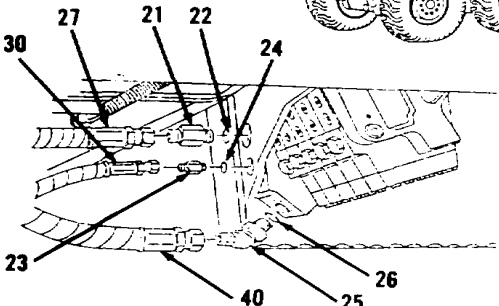
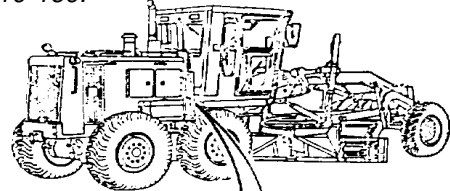


Figure 10-161.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE.

10-22. Hydraulic Pump and Control Valve Lines and Fittings. (Sheet 4 of 8)

REMOVAL

- 22. Remove hose assembly (27), elbow (28) and preformed packing (29, Figure 10-162) from steering control valve. Discard preformed packing (29).
- 23. Remove hose assemblies (30 and 31) from tee (32, Figure 10-160).
- 24. Remove tee (32), connector (33) and preformed packing (34). Discard preformed packing (34).
- 25. Remove nut (35), washer (36), support (37), clip (38) and bolt (39).
- 26. Remove hose assembly (40), elbow (41) and preformed packing (42, Figure 10-162) from steering control valve. Discard preformed packing (42).
- 27. Remove connector (43) and preformed packing (44, Figure 10-163). Discard preformed packing (44).
- 28. Disconnect hose assemblies (46 and 54) from tee (45).
- 29. Remove tee (45).

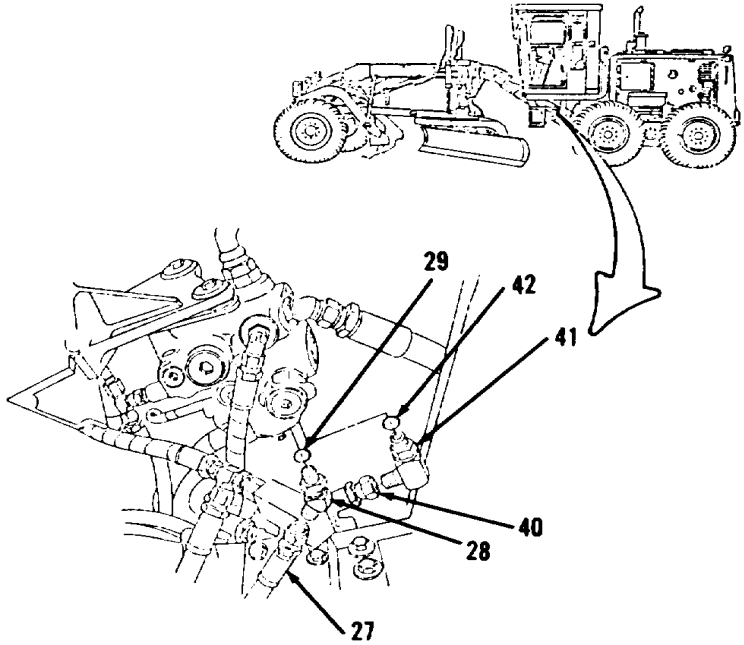


Figure 10-162.

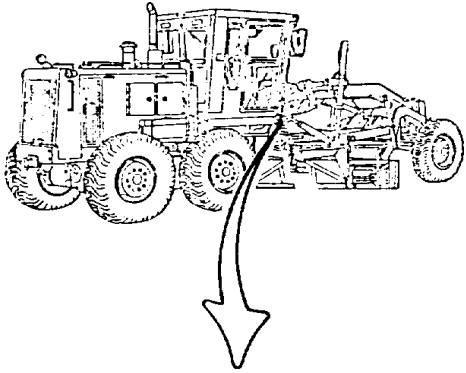


Figure 10-163.

Go to Sheet 5
10-131

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-22. Hydraulic Pump and Control Valve Lines and Fittings. (Sheet 5 of 8)

REMOVAL (cont)

30. Remove hose assembly (46), elbow (47) and preformed packing (48, Figure 10-164) from block.
31. Remove three bolts (49), washers (50 and 51) and mountings (52) from plate (53, Figure 10-165).
32. Remove plate (53).

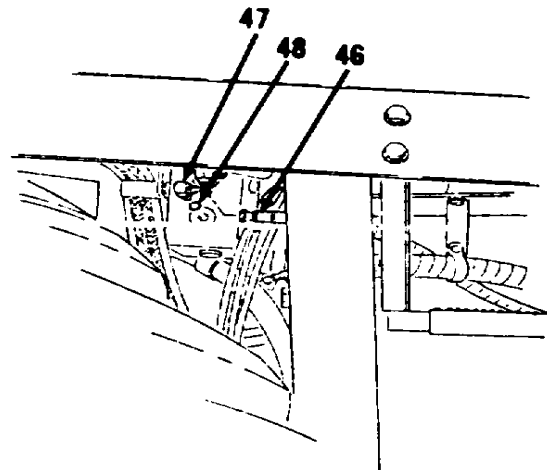


Figure 10-164.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Install plate (53, Figure 10-165).
2. Install three mountings (52), washers (51 and 50) and bolts (49) on plate (53).
3. Install new preformed packing (48), elbow (47) and hose assembly (46, Figure 10-164) on block.

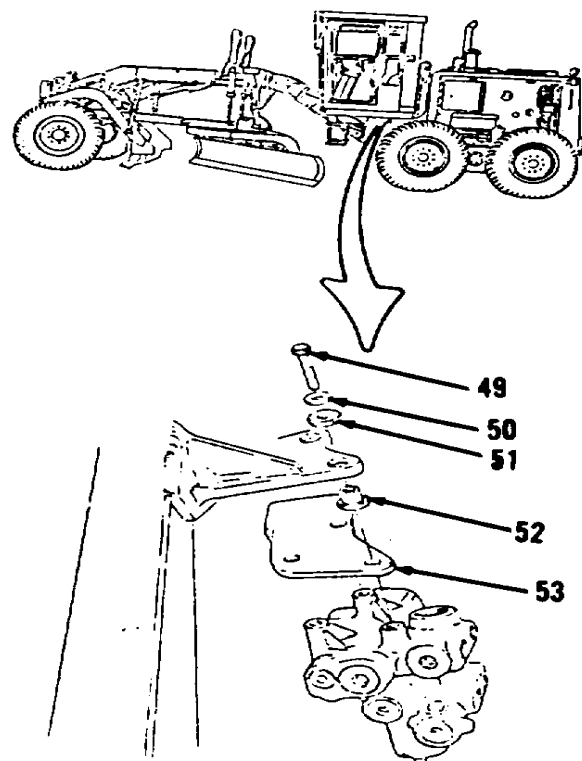


Figure 10-165.

HYDRAULIC SYSTEM MAINTENANCE.

10-22. Hydraulic Pump and Control Valve Lines and Fittings. (Sheet 6 of 8)

INSTALLATION

- 4. Install tee (45, Figure 10-163).
- 5. Connect hose assemblies (54 and 46) on tee (45).
- 6. Install new preformed packing (44) and connector (43).
- 7. Install new preformed packing (42), elbow (41) and hose assembly (40, Figure 10-162) on steering control valve.
- 8. Install bolt (39), clip (38), support (37), washer (36) and nut (35, Figure 10-160).
- 9. Install new preformed packing (34), connector (33) and tee (32).
- 10. Install hose assemblies (31 and 30) on tee (32).
- 11. Install new preformed packing (29), elbow (28) and hose assembly (27, Figure 10-162) on steering control valve.

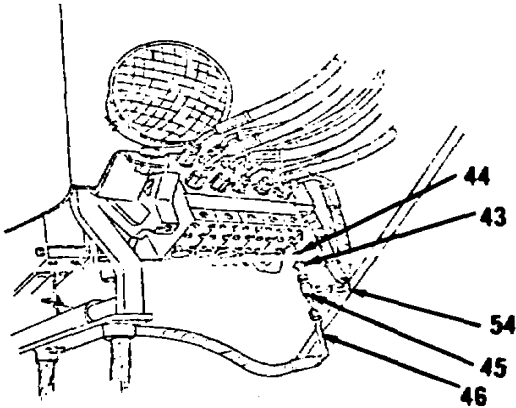


Figure 10-163.

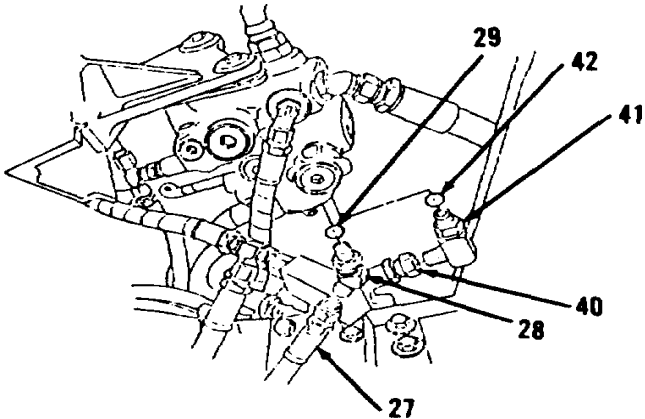


Figure 10-162.

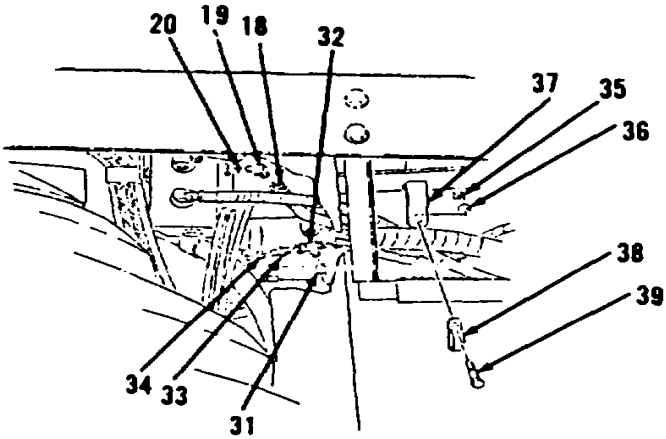


Figure 10-160.

Go to Sheet 7

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-22. Hydraulic Pump and Control Valve Lines and Fittings. (Sheet 7 of 8)

INSTALLATION (cont)

- 12. Install new preformed packing (26) and elbow (25, Figure 10-161).
- 13. Install new preformed packing (24) and connector (23).
- 14. Install new preformed packing (22) and connector (21).
- 15. Connect hose assemblies (40, 30 and 27).
- 16. Install new preformed packing (20) and elbow (19, Figure 10-160),
- 17. Install hose assembly (18) to elbow (19).
- 18. Connect hose assemblies (54 and 18) to tee (17, Figure 10-159).
- 19. Install new preformed packing (16) and connector (15).
- 20. Connect tee (17) to connector (15).

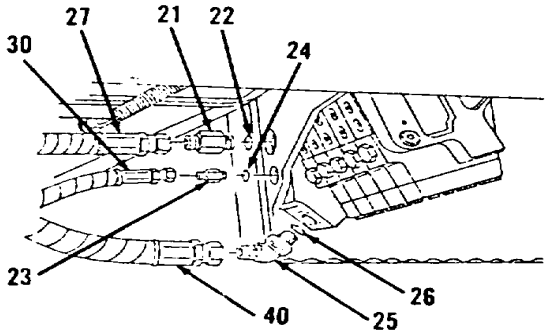


Figure 10-161.

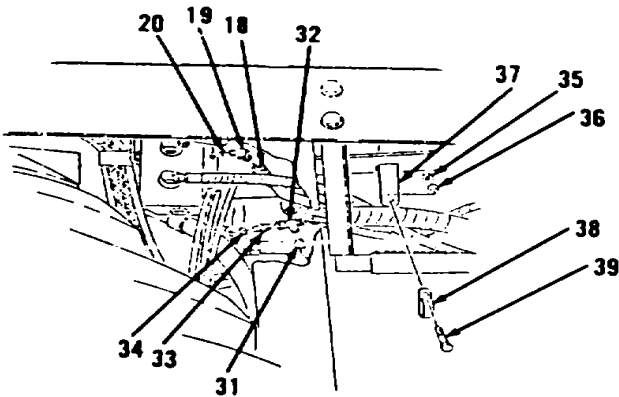


Figure 10-160.

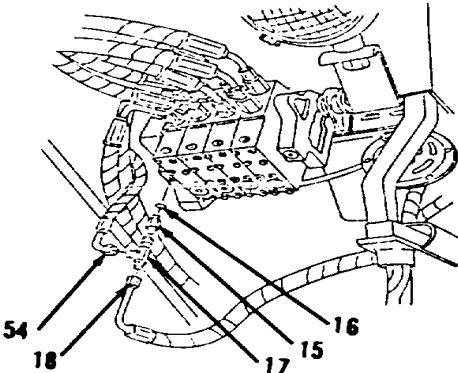


Figure 10-159.

Go to Sheet 8

HYDRAULIC SYSTEM MAINTENANCE.

10-22. Hydraulic Pump and Control Valve Lines and Fittings. (Sheet 8 of 8)

INSTALLATION

21. Install new preformed packing (14), connector (13) and hose assembly (12, Figure 10-158).
22. Install new preformed packing (11), connector (10) and hose assembly (9).
23. Install hydraulic pressure switch. Refer to TM 5-3805-261-20.
24. Install new preformed packing (8) and connector (7, Figure 10-157).
25. Connect hose assembly (12).
26. Install two clips, washer (6) and bolt (5).
27. Install new preformed packing (4) and connector (3).
28. Connect hose assembly (31).
29. Install new preformed packing (2) and elbow (1).
30. Connect hose assembly (9).

NOTE

Return 130G Grader to original equipment condition.

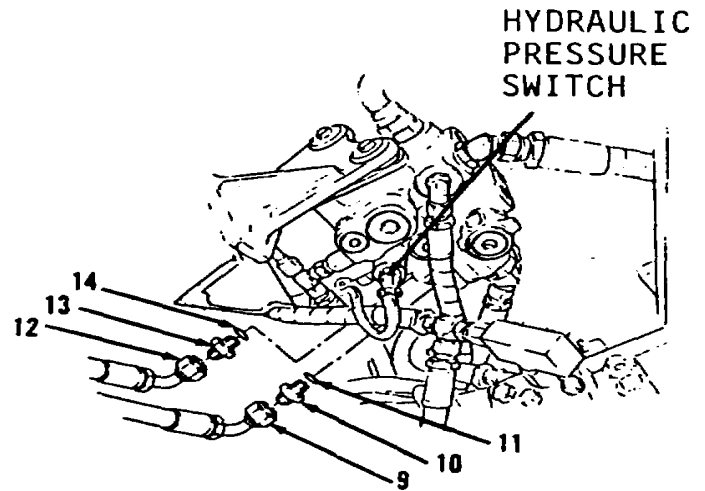


Figure 10-158.

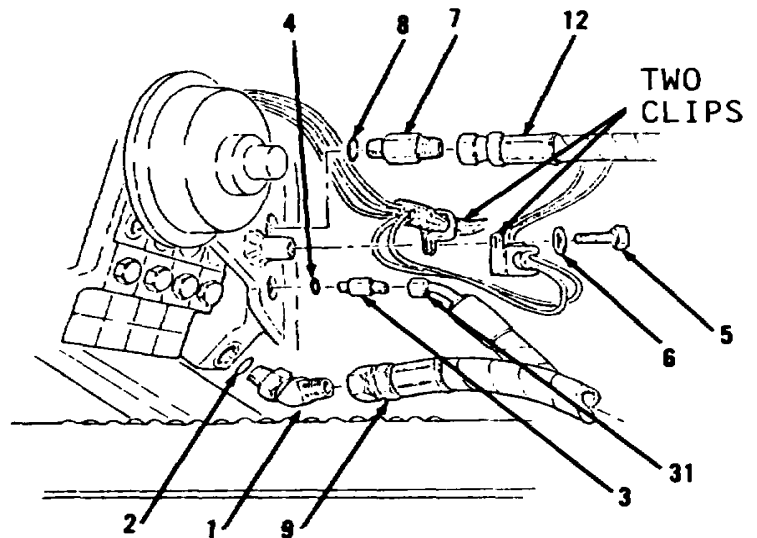


Figure 10-157.

End of Task

10-135

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-23. Oil Cooler to Relief Valve and Hydraulic Tank Lines and Fittings.
(Sheet 1 of 9)

This task covers:

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

INITIAL SETUP:

Applicable Configurations
All

Personnel Required
Construction equipment
repairer MOS 62B

Tools
General Mechanic's Tool Kit:
Automotive (NSN 5180-00-177-
7033)

References
TM 5-3805-261-10
LO 5-3805-261-12
TM 5-3805-261-20

Test Equipment
None

Special Environmental Conditions
None

Materials/Parts
Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41
Appendix C
Small tags, Item 43e
Appendix C
Detergent, Item 9, Appendix C
Preformed packings, Items 13,
15, 17, 19, 28, 30, 35, 62,
64, 66, 68, 71, 74
Seals, Items 6, 10
Caps
Plugs

General Safety Instructions
None

Torques
All fasteners are tightened to
standard torques. Refer to
Appendix E.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE.

10-23. Oil Cooler to Relief Valve and Hydraulic Tank Lines and Fittings.
(Sheet 2 of 9)

Equipment Condition
TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.

Engine stopped.

Master disconnect switch off.
Hydraulic pressure relieved.

TM 5-3805-261-20

Fuse box removed.
Steering hose clamps removed.

Engine compartment side panels and
doors removed.

LO 5-3805-261-12

Hydraulic tank drained.

Paragraph 3-4

Engine removed.

Go to Sheet 3

10-137

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-23. Oil Cooler to Relief Valve and Hydraulic Tank Lines and Fittings.
(Sheet 3 of 9)

REMOVAL

- 1. Loosen two clamps (2, Figure 10-166).

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends and plug all open hydraulic ports to prevent contamination.

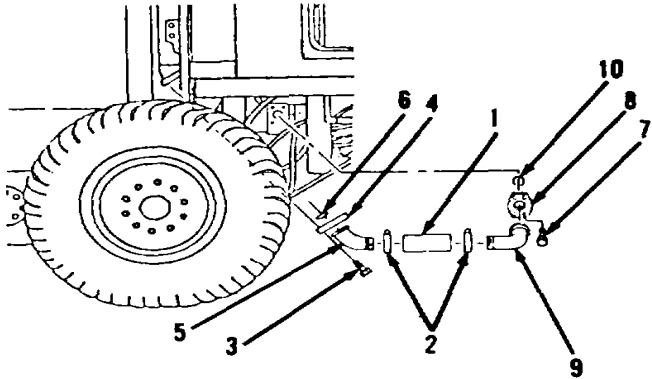


Figure 10-166.

- 2. Remove hose (1) and two clamps (2) from under right, rear of cab.
- 3. Remove four bolts (3), flange (4), hose (5) and seal (6) from bottom, right side of hydraulic tank. Discard seal (6).
- 4. Remove four bolts (7), flange (8), stem (9) and seal (10) from hydraulic pump under center of cab. Discard seal (10).
- 5. Disconnect hose assemblies (11, 22, 69 and 72, Figure 10-167) from bottom of hydraulic tank.

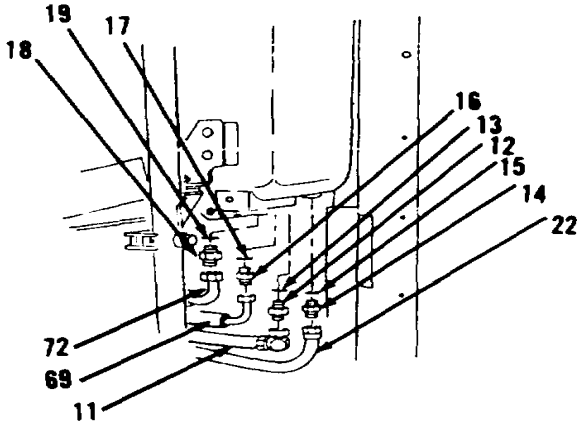


Figure 10-167.

- 6. Remove connector (12), preformed packing (13), connector (14) and preformed packing (15). Discard preformed packings (13 and 15).
- 7. Remove connector (16), preformed packing (17), connector (18) and preformed packing (19). Discard preformed packings (17 and 19).
- 8. Loosen two clamps (21, Figure 10-168).

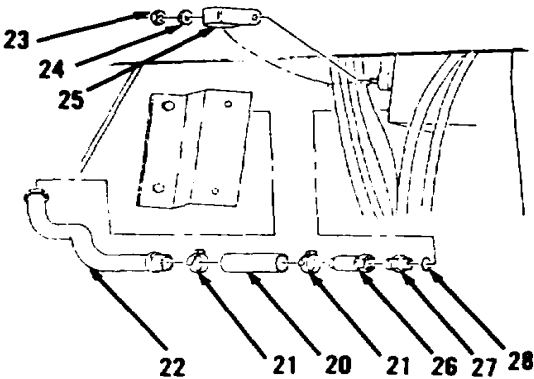


Figure 10-168.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE.

**10-23. Oil Cooler to Relief Valve and Hydraulic Tank Lines and Fittings.
(Sheet 4 of 9)**

REMOVAL

9. Remove hose (20), two clamps (21) and hose assembly (22).
10. Remove nut (23), washer (24), clip (25) and move wire and cable assemblies to one side.
11. Remove tube assembly (26), connector (27) and preformed packing (28) from junction block under right center of cab. Discard preformed packing (28).
12. Disconnect hose assembly (58, Figure 10-169).
13. Remove connector (29) and preformed packing (30). Discard preformed packing (30).
14. Remove four bolts (31), washers (32) and clips (33).
15. Disconnect hose assembly (59) from left side of oil cooler.
16. Remove connector (34) and preformed packing (35). Discard preformed packing (35).
17. Remove two bolts (36), washers (37) and clips (38, Figure 10-170) from left side frame rails.
18. Remove bolt (39), washer (40) and clip (41, Figure 10-171) from right side frame rail.
19. Remove bolt (42), washer (43) and clip (44, Figure 10-172) from right side frame rail.

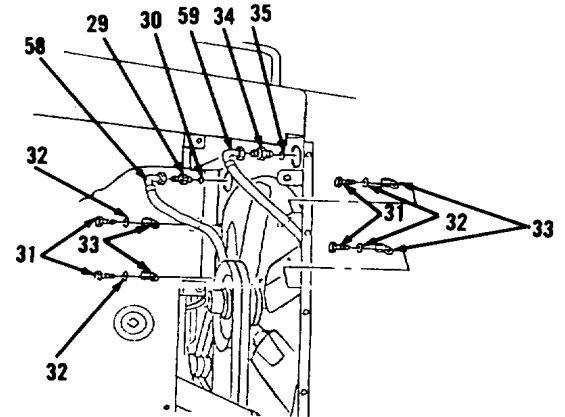


Figure 10-169

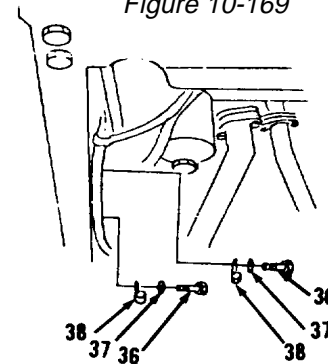


Figure 10-170.

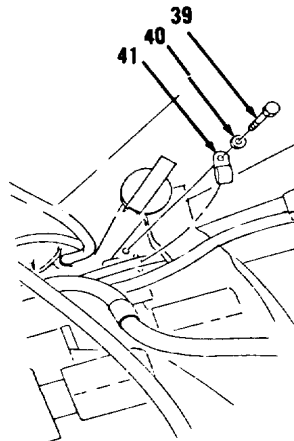


Figure 10-171.

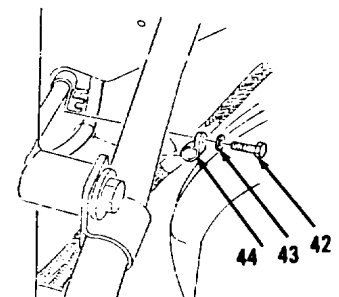


Figure 10-172.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-23. Oil Cooler to Relief Valve and Hydraulic Tank Lines and Fittings. (Sheet 5 of 9)

REMOVAL (cont)

- 20. Remove two nuts (45), washers (46), clip (47), plate (48) and clamp (49, Figure 10-173) from under left side of cab.
- 21. Remove bolt (50), washer (51) and clip (52, Figure 10-174) from under center of engine.
- 22. Remove two nuts (53), washers (54), clip (55), plate (56) and clamp (57, Figure 10-175) from center, under hydraulic tank.
- 23. Remove hose assemblies (58, 59 and 60, Figure 10-176) from hydraulic pump relief valve.
- 24. Remove connector (61), preformed packing (62), connector (63), preformed packing (64), connector (65) and preformed packing (66). Discard preformed packings (62, 64 and 66).
- 25. Disconnect hose assembly (69) from top of hydraulic pump relief valve.
- 26. Remove connector (67) and preformed packing (68).

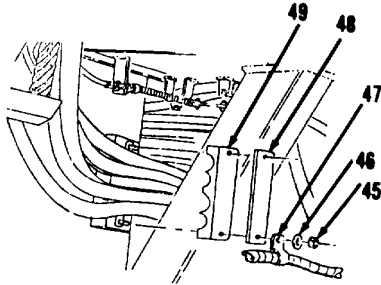


Figure 10-173.

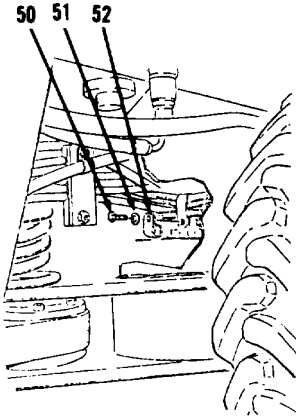


Figure 10-174.

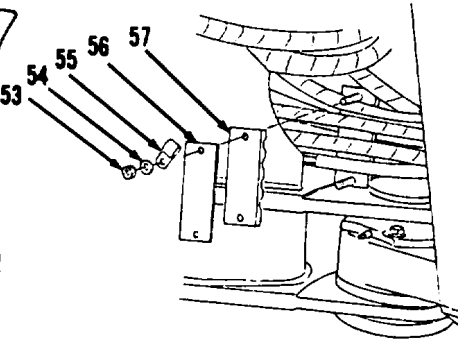
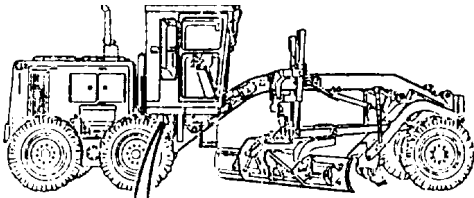


Figure 10-175

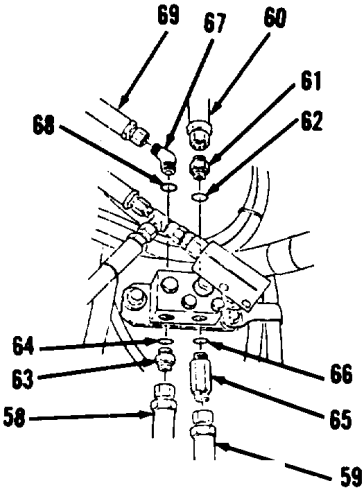


Figure 10-176.

Go to Sheet 6

HYDRAULIC SYSTEM MAINTENANCE.**10-23. Oil Cooler to Relief Valve and Hydraulic Tank Lines and Fittings.**
(Sheet 6 of 9)**REMOVAL**

27. Remove hose assembly (69, Figure 10-177) from hydraulic pump under center of cab.
28. Remove connector (70) and preformed packing (71). Discard preformed packing (71).
29. Remove hose assembly (72) from hydraulic unloading valve.
30. Remove elbow (73) and preformed packing (74). Discard preformed packing (74).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Install new preformed packing (74) and elbow (73, Figure 10-177).
2. Install hose assembly (72) to hydraulic unloading valve.
3. Install new preformed packing (71) and connector (70).
4. Install hose assembly (69).
5. Install new preformed packing (68) and connector (67, Figure 10-176).
6. Connect hose assembly (69).

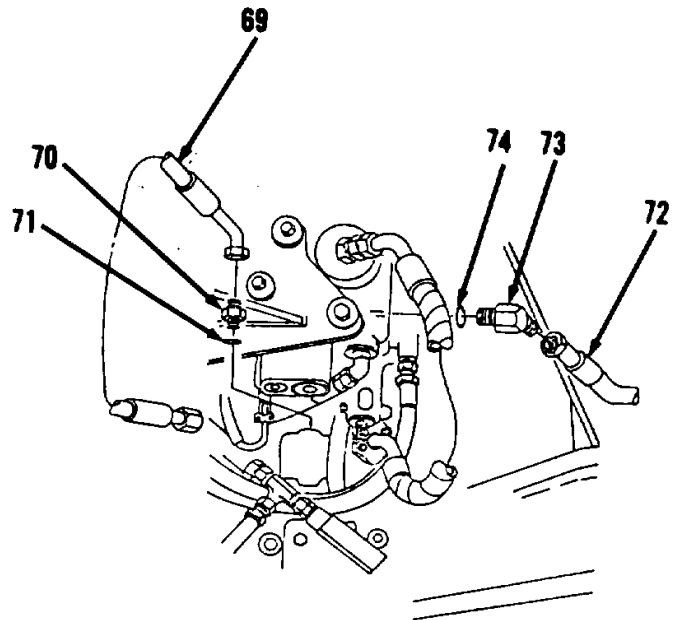


Figure 10-177.

Go to Sheet 7

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-23. Oil Cooler to Relief Valve and Hydraulic Tank Lines and Fittings. (Sheet 7 of 9)

INSTALLATION (cont)

- 7. Install new preformed packing (66) and connector (65).
- 8. Install new preformed packing (64) and connector (63).
- 9. Install new preformed packing (62) and connector (61).
- 10. Install hose assemblies (60, 59 and 58).
- 11. Install clamp (57), plate (56), clip (55, Figure 10-175).
- 12. Install two washers (54) and nuts (53).
- 13. Install clip (52), washer (51) and bolt (50, Figure 10-174).
- 14. Install clamp (49), plate (48) and clip (47, Figure 10-173).
- 15. Install two washers (46) and nuts (45).
- 16. Install clip (44), washer (43) and bolt (42, Figure 10-172).

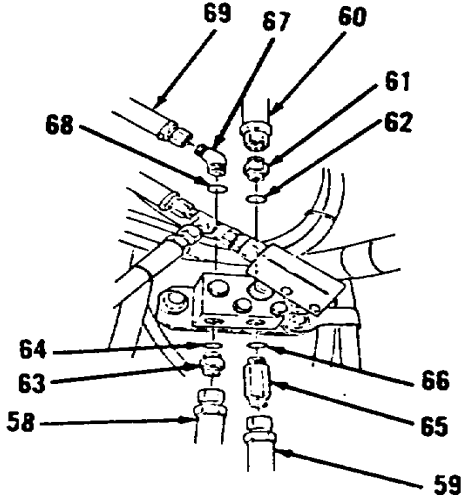


Figure 10-176.

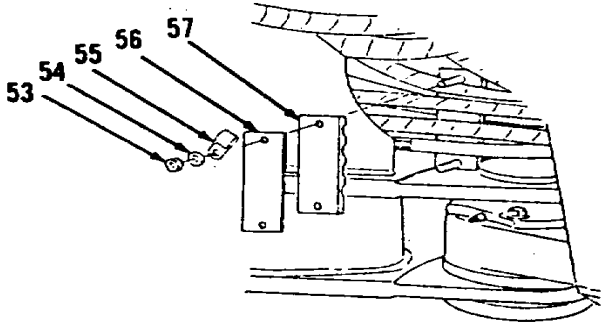


Figure 10-175.

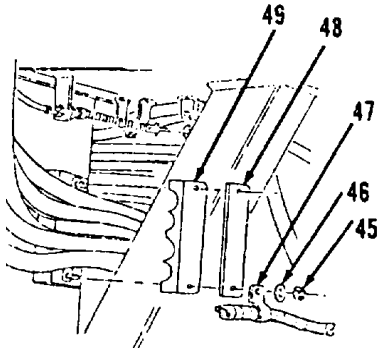


Figure 10-173.

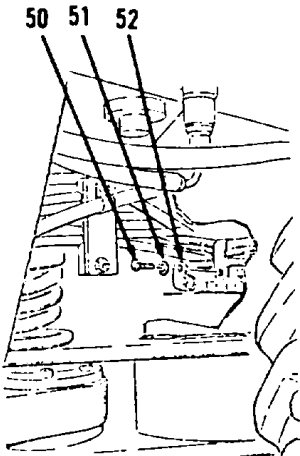


Figure 10-174.

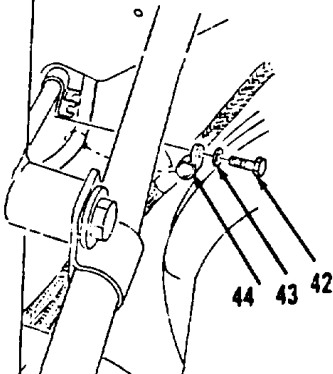


Figure 10-172.

Go to Sheet 8

HYDRAULIC SYSTEM MAINTENANCE.

10-23. Oil Cooler to Relief Valve and Hydraulic Tank Lines and Fittings.
(Sheet 8 of 9)

INSTALLATION

- 17. Install clip (41), washer (40) and bolt (39, Figure 10-171).
- 18. Install two clips (38), washers (37) and bolts (36, Figure 10-170).
- 19. Install new preformed packing (35) and connector (34, Figure 10-169).
- 20. Connect hose assembly (59).
- 21. Install four clips (33), washers (32) and bolts (31).
- 22. Install new preformed packing (30) and connector (29).
- 23. Connect hose assembly (58).
- 24. Install new preformed packing (28), connector (27) and tube assembly (26, Figure 10-168).
- 25. Install clip (25), washer (24) and nut (23).
- 26. Install hose assembly (22), two clamps (21) and hose (20).

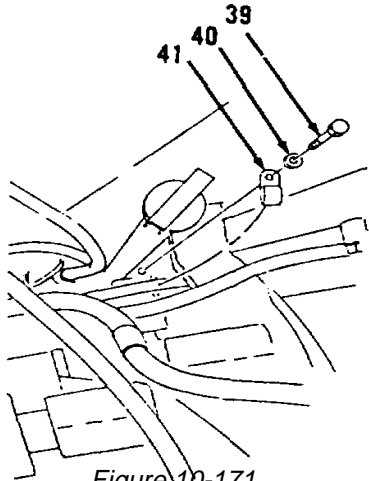


Figure 10-171.

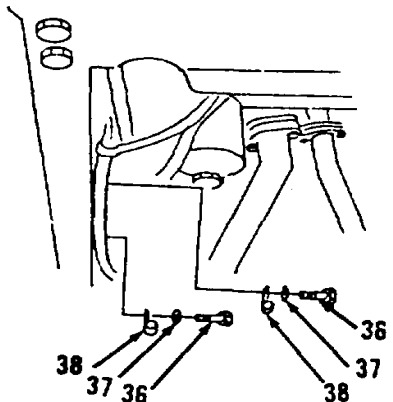


Figure 10-170.

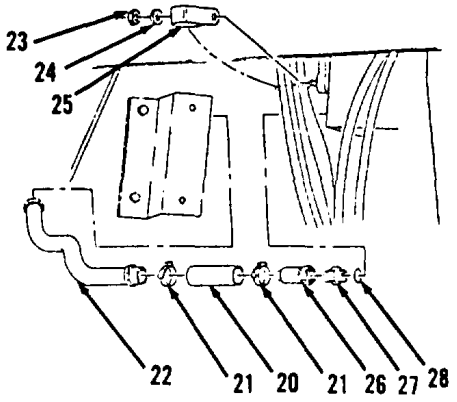


Figure 10-168.

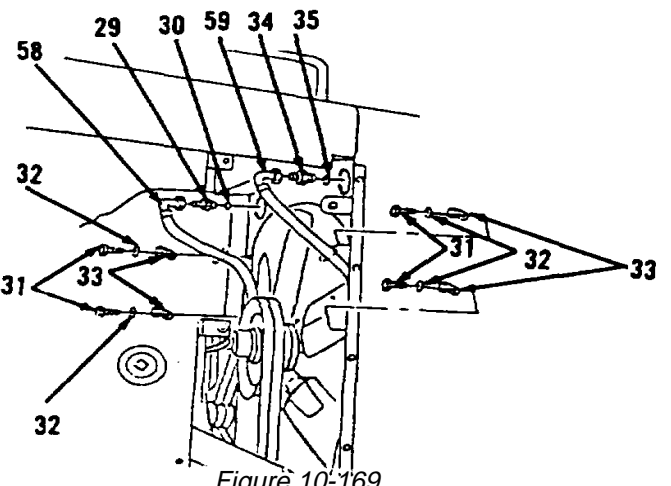


Figure 10-169.

Go to Sheet 9

HYDRAULIC SYSTEM MAINTENANCE. (cont)

10-23. Oil Cooler to Relief Valve and Hydraulic Tank Lines and Fittings. (Sheet 9 of 9)

INSTALLATION (cont)

- 27. Install new preformed packing (19) and connector (18, Figure 10-167).
- 28. Install new preformed packing (17) and connector (16).
- 29. Install new preformed packing (15) and connector (14).
- 30. Install new preformed packing (13) and connector (12).
- 31. Connect hose assemblies (72, 69, 22 and 11).
- 32. Install new seal (10), stem (9), flange (8) and four bolts (7, Figure 10-166).
- 33. Install new seal (6), hose (5), flange (4) and three bolts (3).
- 34. Install two clamps (2) and hose (1).

NOTE

Return 130G Grader to original equipment condition.

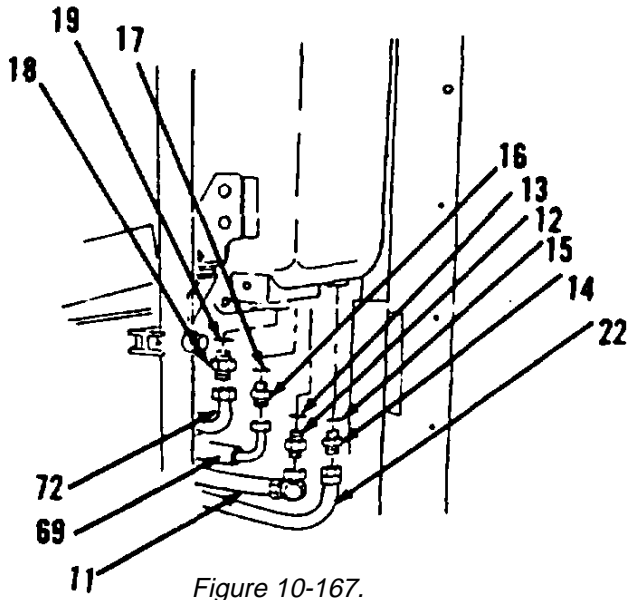


Figure 10-167.

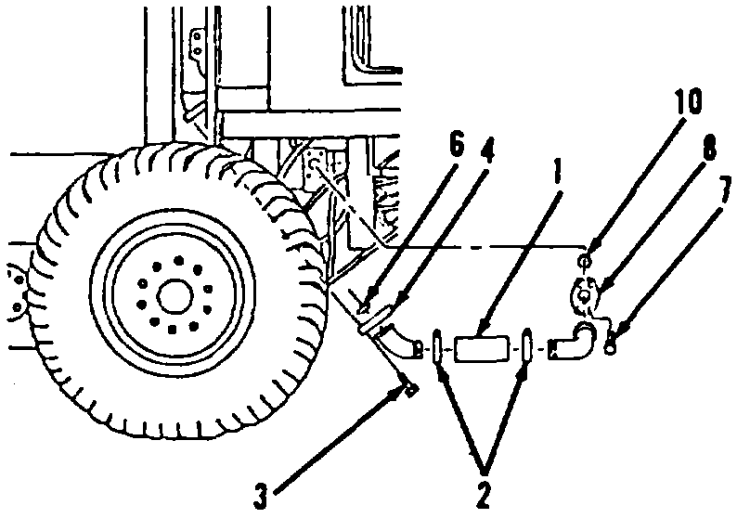


Figure 10-166.

End of Task

CHAPTER 11

GAGES (NON-ELECTRICAL) MAINTENANCE

CHAPTER OVERVIEW

The purpose of this chapter is to help the technician efficiently troubleshoot and repair malfunctioning equipment and to perform authorized direct support level maintenance procedures on the 130G Grader gages (non-electrical).

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| Gages (Non-Electrical) Maintenance Procedures | 11-1 | 11-2 |
| Air Pressure Gage to Air Tank Lines and Fittings | 11-2 | 11-3 |

11-1

GAGES (NON-ELECTRICAL) MAINTENANCE

11-1. GAGES (NON-ELECTRICAL) MAINTENANCE PROCEDURES.

- a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the gages (non-electrical) in good repair.
- b. This section is arranged by functional group code and provides a list of gages (non-electrical) to be maintained and step-by-step maintenance procedures.

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11-2

GAGES (NON-ELECTRICAL) MAINTENANCE.

11-2. Air Pressure Gage to Air Tank Lines and Fittings. (Sheet 1 of 7)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Detergent, Item 9, Appendix C
Small tags, Item 43,
Appendix C
Caps

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Air pressure reduced to zero.

Go to Sheet 2

GAGES (NON-ELECTRICAL) MAINTENANCE. (cont)

11-2. Air Pressure Gage to Air Tank Lines and Fittings. (Sheet 2 of 7)

REMOVAL

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

1. Disconnect hose assembly (12, Figure 11-1) from air tank under rear, right side of vehicle.
2. Remove connector (1) from air tank fitting.
3. Extract electrical lead from bracket on right, rear frame, near alternator and move lead out of way to gain access to bolt (2, Figure 11-2).
4. Remove bolt (2), washer (3) and clip (4).
5. Remove bolt (5), washer (6) and clip (7, Figure 11-3) from right side of engine compartment.

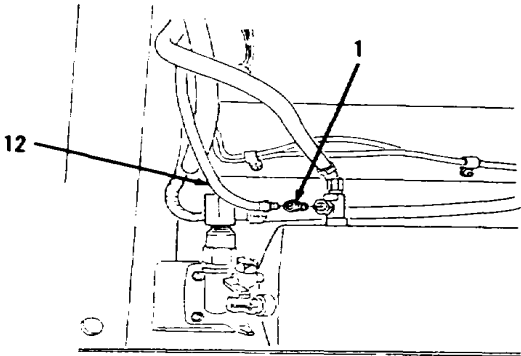


Figure 11-1.

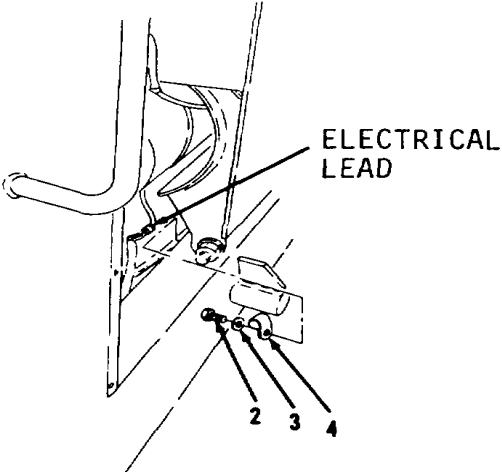


Figure 11-2.

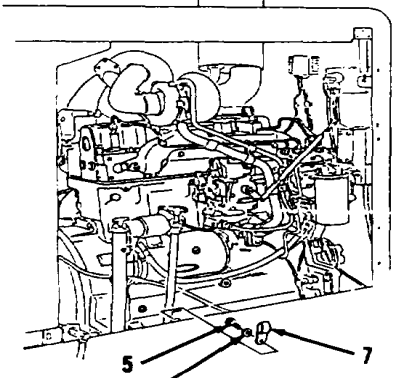


Figure 11-3.

Go to Sheet 3

GAGES (NON-ELECTRICAL) MAINTENANCE.

11-2. Air Pressure Gage to Air Tank Lines and Fittings. (Sheet 3 of 7)

REMOVAL

6. Remove nut (8), bolt (9), washer (10) and clip (11, Figure 11-4) from front, right side of engine compartment.
7. Disconnect hose assembly (12) from connector (13, Figure 11-5).
8. Remove hose assembly (12) from vehicle.
9. Remove connector (13) and elbow (14) from right air pressure gage.
10. Disconnect hose assembly (20, Figure 11-6) from air tank under rear, left side of vehicle.
11. Remove connector (15) from air tank fitting.

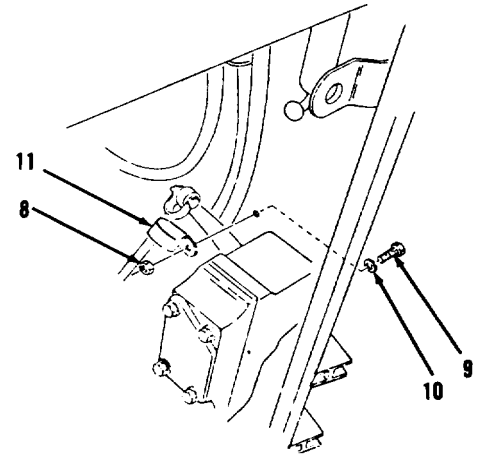


Figure 11-4.

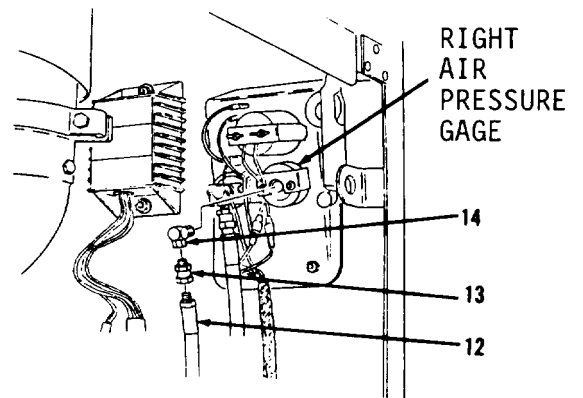


Figure 11-5.

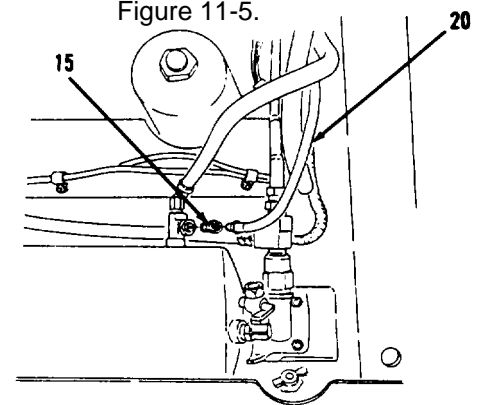


Figure 11-6.

GAGES (NON-ELECTRICAL) MAINTENANCE. (cont.)

11-2. Air Pressure Gage to Air Tank Lines and Fittings. (Sheet 4 of 7)

REMOVAL (cont.)

- 12. Remove two bolts (16), washers (17) and clips (18, Figure 11-7) from left side of engine compartment.
- 13. Disconnect air compressor hose assembly (19) from tee (22, Figure 11-8).
- 14. Remove hose assembly (20) and connector (21) from tee (27).
- 15. Disconnect hose assembly (35) from tee (22).
- 16. Remove tee (22), bushing (23) and plug (24) from tee (27).
- 17. Remove two bolts (25), washers (26) and tee (27, Figure 11-9).
- 18. Remove two bolts (28), washers (29) and clips (30, Figure 11-10) from front, left side of engine.

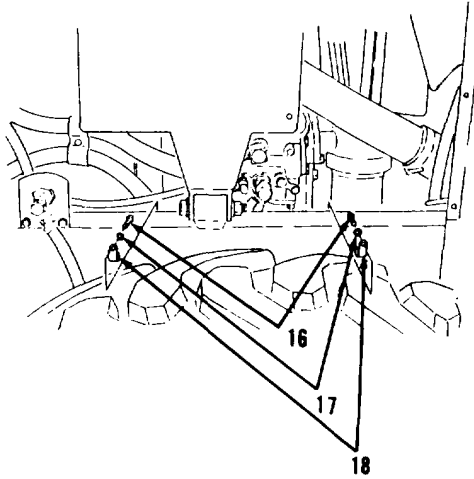


Figure 11-7.

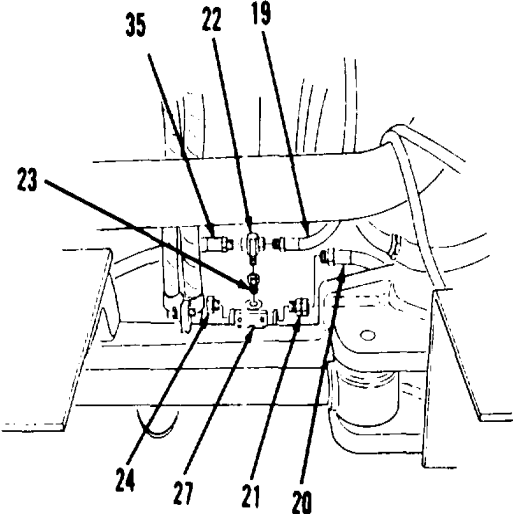


Figure 11-8.

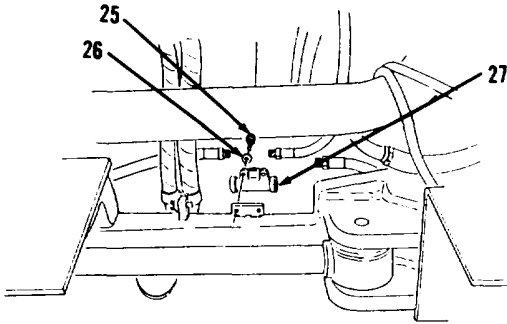


Figure 11-9.

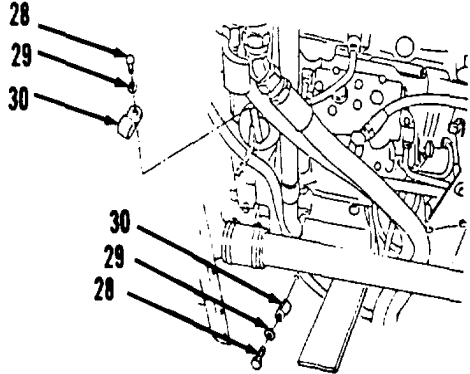


Figure 11-10.

Go to Sheet 5
11-6

11-2. Air Pressure Gage to Air Tank Lines and Fittings. (Sheet 5 of 7)**REMOVAL**

19. Remove nut (31), washer (32), bolt (33) and clip (34, Figure 11-11).
20. Disconnect hose assembly (35) from connector (36, Figure 11-12) from front, right side of engine compartment.
21. Remove hose assembly (35) from vehicle.
22. Remove connector (36) and elbow (37) from left air pressure gage.

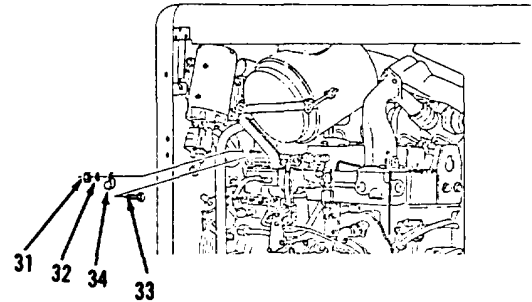


Figure 11-11.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Install elbow (37) and connector (36, Figure 11-12) on left air pressure gage.
2. Install hose assembly (35) on connector (36).
3. Install clip (34), bolt (33), washer (32) and nut (31, Figure 11-11).
4. Install two clips (30), washers (29) and bolts (28, Figure 11-10).
5. Install tee (27), two washers (26) and bolts (25, Figure 11-9).

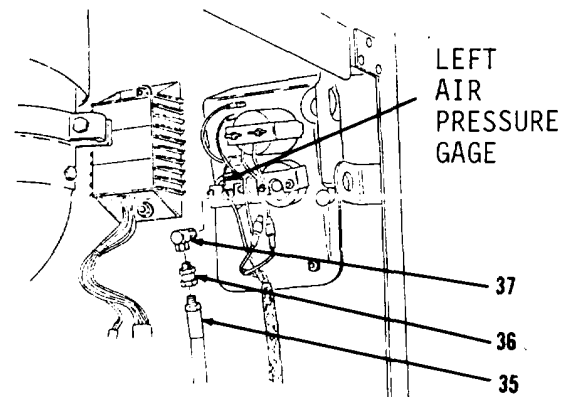


Figure 11-12.

GAGES (NON-ELECTRICAL) MAINTENANCE. (cont.)

11-2. Air Pressure Gage to Air Tank Lines and Fittings. (Sheet 6 of 7)

INSTALLATION (cont.)

- 6. Install plug (24), bushing (23) and tee (22) on tee (27, Figure 11-8).
- 7. Connect hose assembly (35) to tee (22).
- 8. Install connector (21) and hose assembly (20) to tee (27).
- 9. Connect air compressor hose assembly (19) to tee (22).
- 10. Install two clips (18), washers (17) and bolts (16, Figure 11-7) on left side of engine compartment.
- 11. Install connector (15, Figure 11-6) to air tank.
- 12. Connect hose assembly (20) to connector (15).
- 13. Install elbow (14) and connector (13, Figure 11-5) to right air pressure gage at front, right side of engine compartment.
- 14. Install hose assembly (12) to connector (13).

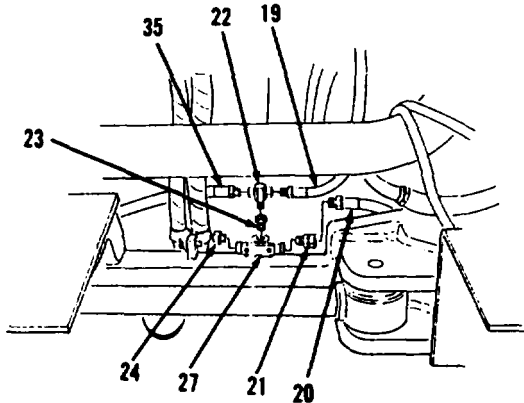


Figure 11-8.

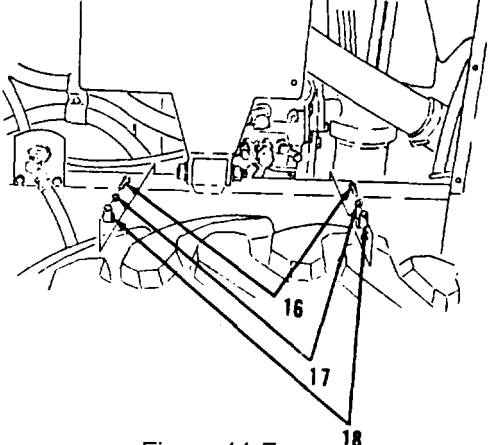


Figure 11-7.

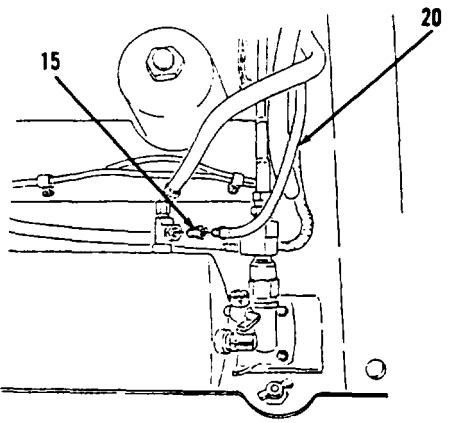


Figure 11-6.

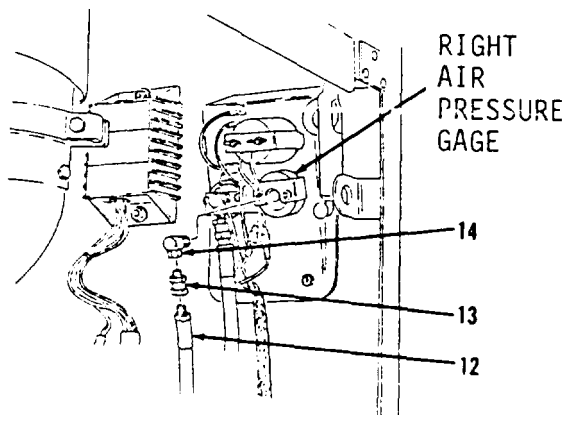


Figure 11-5.

GAGES (NON-ELECTRICAL) MAINTENANCE.

11-2. Air Pressure Gage to Air Tank Lines and Fittings. (Sheet 7 of 7)

INSTALLATION

15. Install clip (11), washer (10), bolt (9) and nut (8, Figure 11-4).
16. Install clip (7), washer (6) and bolt (5, Figure 11-3) on right side of engine compartment.
17. Install clip (4), washer (3) and bolt (2, Figure 11-2) on right, rear frame, near alternator.
18. Insert electrical lead into frame bracket above bolt (2).
19. Install connector (1, Figure 11-1) on air tank under rear, right side of vehicle.
20. Connect hose assembly (12) to connector (1).

NOTE

Return 130G Grader to original equipment condition.

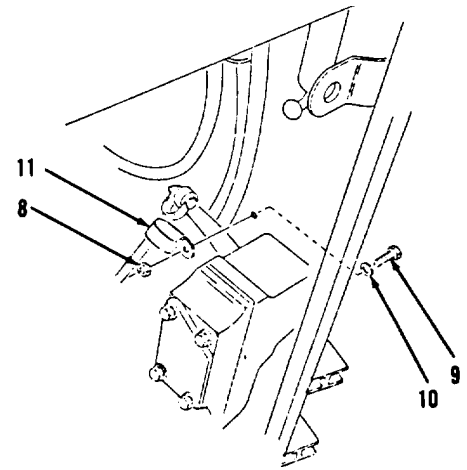


Figure 11-4.

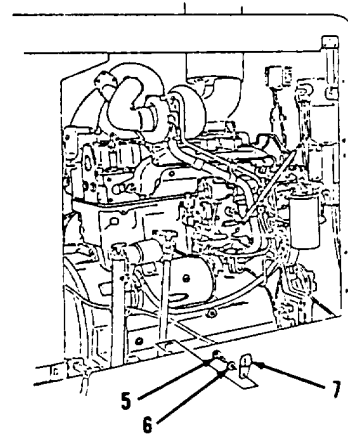


Figure 11-3.

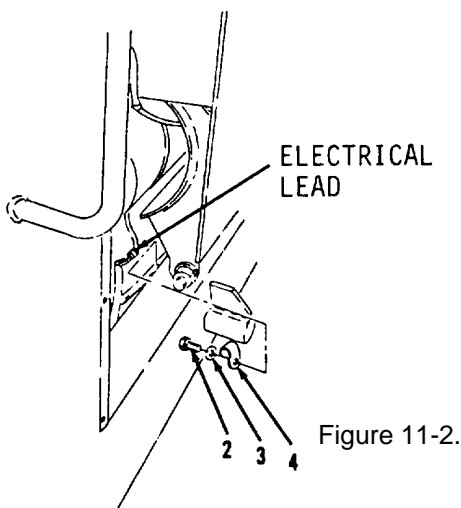


Figure 11-2.

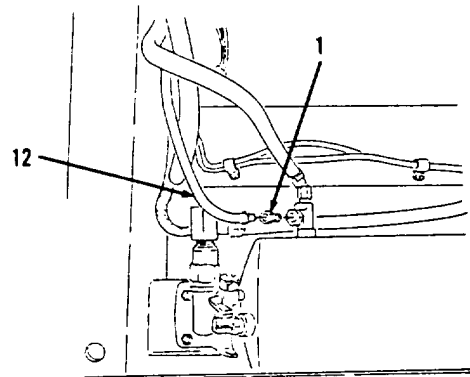


Figure 11-1.

**End of Task
11-9/(11-10 blank)**

CHAPTER 12

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE

CHAPTER OVERVIEW

The purpose of this chapter is to help the technician efficiently troubleshoot and repair malfunctioning equipment and to perform authorized direct support level maintenance procedures on the 13OG Grader earthmoving equipment.

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EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE. (cont.)**12-1. EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE PROCEDURES.**

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the earthmoving equipment and its components in good repair.

b. This section is arranged by functional group code and provides a list of earthmoving equipment components to be maintained and step-by-step maintenance procedures.

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EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.**12-2. Blade Assembly. (Sheet 1 of 5)**

This task covers: a. Removal b. Cleaning c. Inspection
 d. Installation

INITIAL SETUP**Applicable Configurations**

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)
 Hoist and sling
 Two 5/8-INCH eyebolts
 Wood blocks
 Chain

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Cotter pin, Item 1

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

All fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Paragraph 10-19

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

Hydraulic sideshift cylinder guards
 removed.

Go to Sheet 2
12-3

12-2. Blade Assembly. (Sheet 2 of 5)
REMOVAL

1. Move blade assembly (3, Figure 12-1) as far to right as possible and lower until just off the ground.
2. Remove cotter pin (1) and pin (2). Discard cotter pin (1).

WARNING

Only a qualified operator may perform the next procedure. All other personnel must clear the immediate area. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

3. Start engine. Refer to TM 5-3805-261-10.
4. Operate blade sideshift control to retract cylinder rod into cylinder as far as possible.

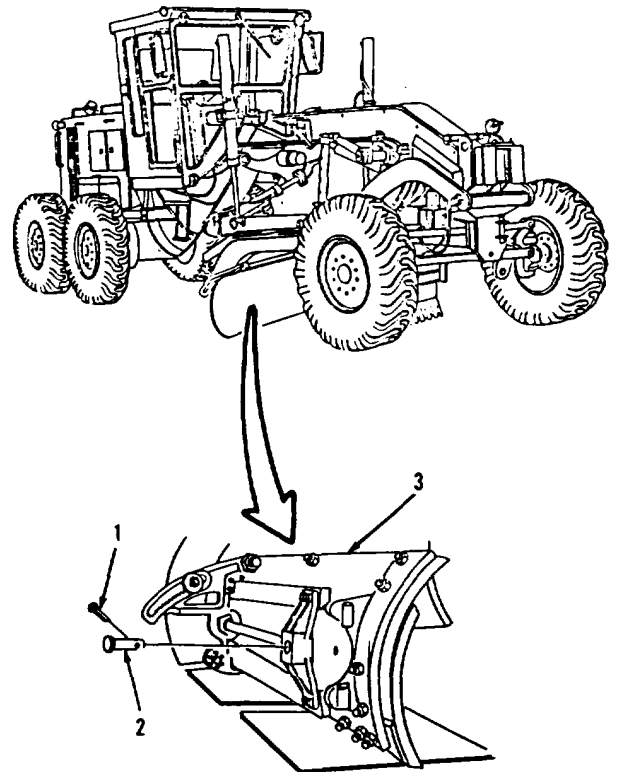


Figure 12-1.

Go to Sheet 3
12-4

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.

12-2. Blade Assembly. (Sheet 3 of 5)

REMOVAL

5. Position wood blocks between blade bracket and cylinder rod end (Figure 12-2).
6. Operate blade sideshift control and expand cylinder rod to push blade assembly (3) away from circle until two eyebolts can be installed.
7. Install two eyebolts to blade assembly (3).

WARNING

Weight of blade assembly is approximately 1500 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

8. Attach hoist and sling to two eyebolts on blade assembly (3).
9. Remove blade assembly (3). Operate blade sideshift control and expand cylinder rod to push blade assembly (3) away from circle.
10. Stop engine.
11. Remove hoist and sling and two eyebolts.
12. Remove 40 bolts (4), washers (5), ten plates (6), five strips (7) and shim(s) (8, Figure 12-3).

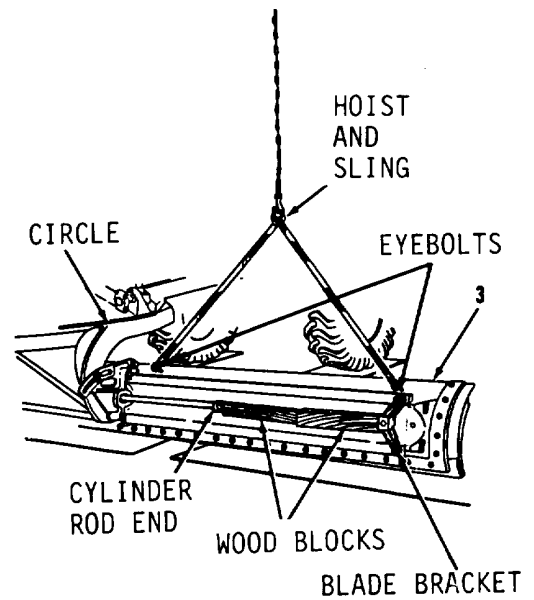


Figure 12-2.

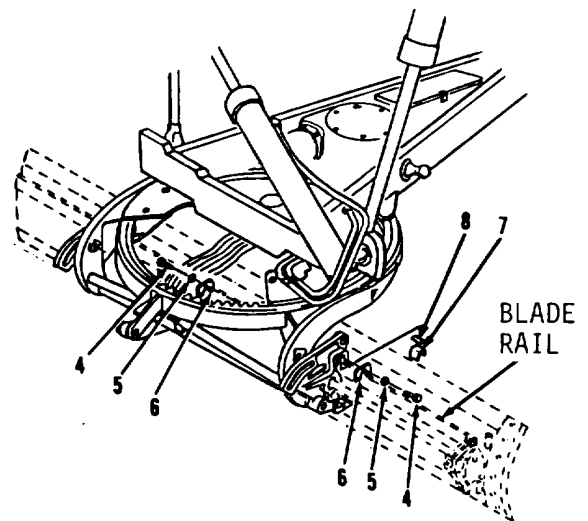


Figure 12-3.

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE. (cont.)**12-2. Blade Assembly. (Sheet 4 of 5)****CLEANING**

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Install two eyebolts to blade assembly (3, Figure 12-4)
2. Attach hoist and sling to two eyebolts on blade assembly (3).
3. Using hoist and sling, install blade assembly (3) on circle.
4. Attach chain to bracket and cylinder rod end.
5. Start engine. Refer to TM 5-3805-261-10.
6. Operate blade sideshift control to retract cylinder rod and blade assembly (3) up to nearest of two eyebolts to circle.
7. Remove one side of hoist and sling and one of two eyebolts from side of blade assembly (3) nearest to circle and chain from bracket and cylinder rod end.

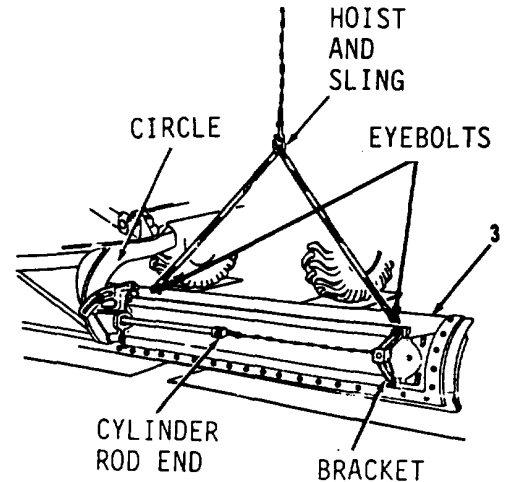


Figure 12-4.

Go to Sheet 5
12-6

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.

12-2. Blade Assembly. (Sheet 5 of 5)

INSTALLATION

- 8. Operate blade sideshift control and expand cylinder rod to align with bracket on blade assembly (3, Figure 12-5).
- 9. Install pin (2) and new cotter pin (1).
- 10. Operate blade sideshift control to retract cylinder rod and blade assembly (3) in place.
- 11. Remove remaining side of hoist and sling and second of two eyebolts from blade assembly (3).

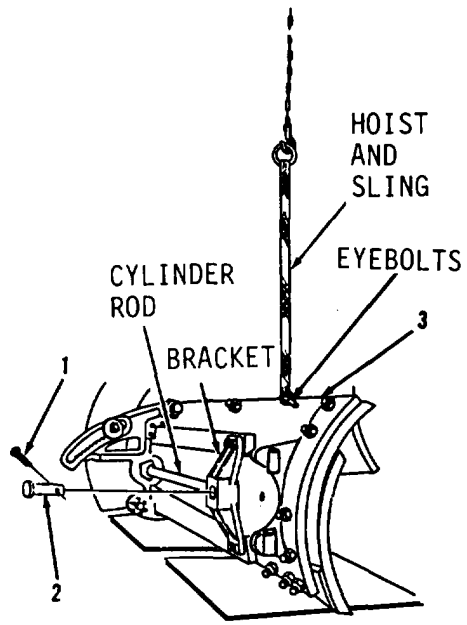


Figure 12-5.

NOTE

Shims are installed between strip and blade bracket. Add or remove shim(s) as required to get a 0.005 to 0.035 inch gap between blade rail and strip.

- 12. Install shim(s) (8), five strips (7), ten plates (6), 40 washers (5) and bolts (4, Figure 12-3).

NOTE

Return 130G Grader to original equipment condition.

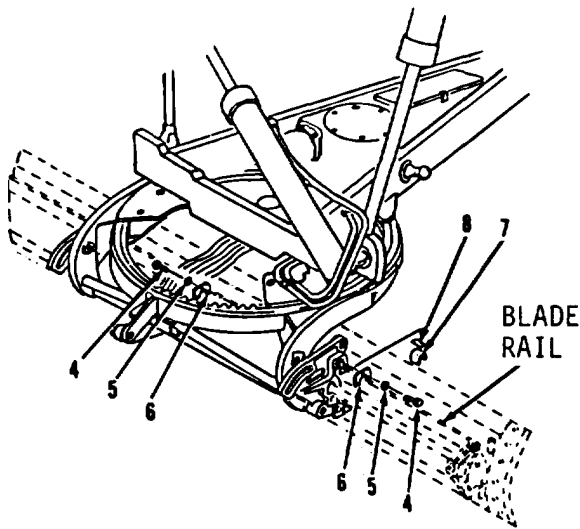


Figure 12-3.

End of Task 12-7

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE. (cont.)

12-3. Blade Lift Bar Assembly. (Sheet 1 of 6)

- This task covers:
- a. Removal
 - b. Disassembly
 - c. Cleaning
 - d. Inspection
 - e. Assembly
 - f. Installation

INITIAL SETUP

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

- General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
- Two hoist and slings
- Pulling adapter 1IP1834
- Stud 9S5558
- Nut 1P544
- Washer 3H467
- Puller assembly 5H9817
- Pump group 5P3100

References

- TM 5-3805-261-10
- TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Test Equipment

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Materials/Parts

- Dry cleaning solvent,
Item 15, Appendix C
- Clean cloths, Item 41,
Appendix C
- Seals, Items 27, 29
- Bearings, Items 28, 31, 33

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

- Vehicle parked on level ground.
- Parking/emergency brake applied.
- Equipment lowered to the ground.
- Engine stopped.
- Master disconnect switch off.

TM 5-3805-261-20

Centershift lock assembly removed.

REMOVAL

WARNING

Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

1. Attach hoist and sling to center-shift cylinder.
2. Remove two bolts (1), lockwashers (2), cap (3), shim(s) (4 and 5), inserts (6 and 7) and shim(s) (8 and 9). Move center-shift cylinder clear of blade lift bar (34, Figure 12-6).
3. Remove bolt (10), lockwasher (11) and clip (12) from items 27 thru 34 as an assembly (Figure 12-7) and move hoses to one side.

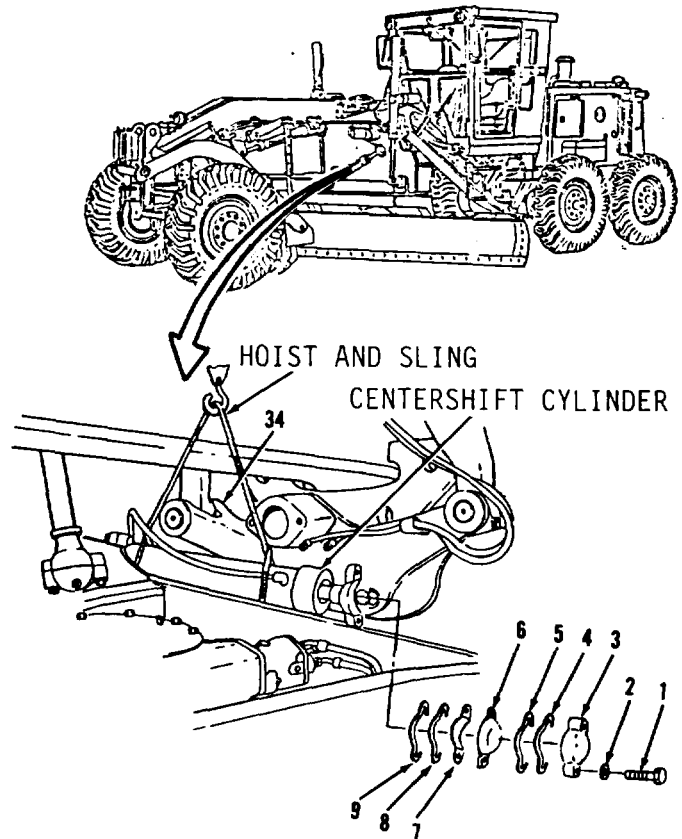


Figure 12-6.

WARNING

Weight of blade lift bar is approximately 200 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

4. Attach hoist and sling to items 27 thru 34 as an assembly.
5. Remove two bolts (13), washers (14) and lock (15) from left side of blade lift arm.
6. Remove pin (16) and two washers (17, 18 and 19).

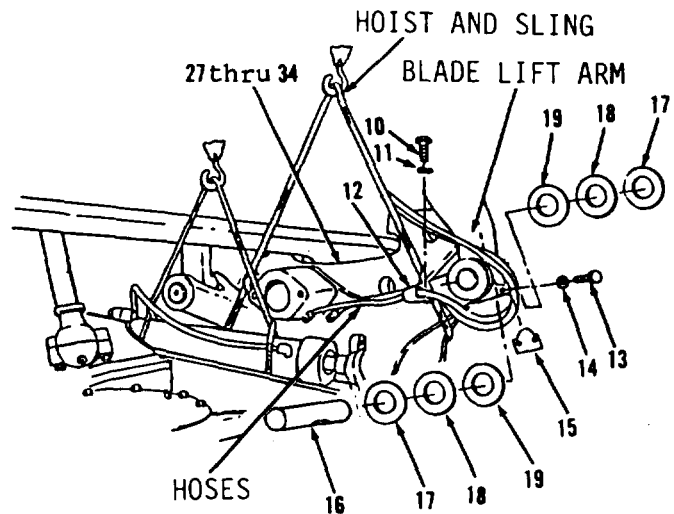


Figure 12-7.

Go to Sheet 3
12-9

12-3. Blade Lift Bar Assembly. (Sheet 3 of 6)**REMOVAL (cont.)**

7. Remove two bolts (20), washers (21) and lock (22, Figure 12-8) from right side of blade lift arm.
8. Remove pin (23) and two washers (24, 25 and 26).
9. Remove items 27 thru 34 as an assembly (Figure 12-9).
10. Remove hoist and sling.

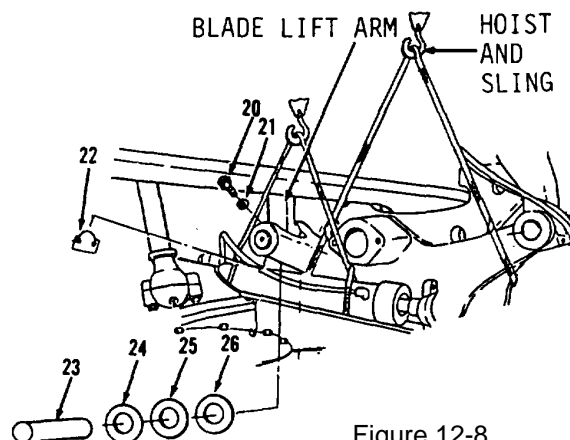


Figure 12-8.

DISASSEMBLY

1. Using a suitable puller, remove and discard eight seals (27) and four bearings (28, Figure 12-10).
2. Using a suitable puller, remove seal (29), ring (30), bearing (31), spacer (32) and bearing (33) from blade lift bar (34). Discard seal (29) and bearings (31 and 33).

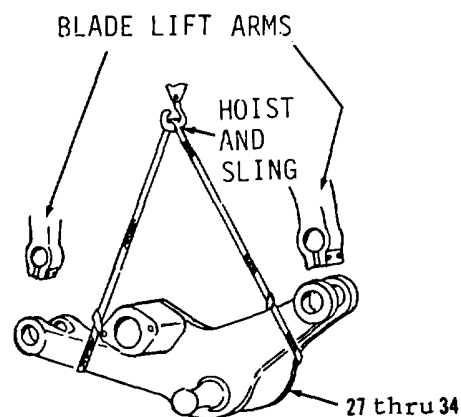


Figure 12-9.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

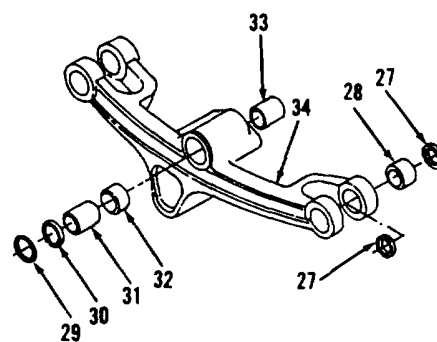


Figure 12-10.

Go to Sheet 4
12-10

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.**12-3. Blade Lift Bar Assembly. (Sheet 4 of 6)****ASSEMBLY**

1. Install ring (30) in blade lift bar (34, Figure 12-10).
2. Install new bearing (33), spacer (32) and new bearing (31). Using puller adapter, stud, nut, washer, puller assembly and pump group, bearings (33 and 31) and spacer (32) must bottom on ring (30).
3. Using a suitable driver, install new seal (29). Lip of seal (29) should be toward outside surface. Seal (29) should contact ring (30).
4. Using tooling in step 2, install four new bearings (28). Four bearings (28) should be at a depth of 0.390 to 0.422 inch from outside surfaces of blade lift bar (34).
5. Install eight new seals (27). Lip of eight seals (27) should be toward outside of bore. Eight seals (27) should be even with outside surfaces of blade lift bar (34).

INSTALLATION

1. Attach hoist and sling to items 34 thru 27 as an assembly (Figure 12-9).
2. Position items 34 thru 27 as an assembly at blade lift arms.

**Go to Sheet 5
12-11**

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE. (cont.)

12-3. Blade Lift Bar Assembly. (Sheet 5 of E INSTALLATION (cont.))

3. Install two washers (26, 25 and 24) between blade lift bar (34, Figure 12-8) and blade lift arms. Use two washers (26, 25 and 24) as required to obtain 0.06 to 0.12 inch clearance between blade lift bar (34) and lock plate.
4. Install pin (23). Groove in pin (23) must align with opening in blade lift arm.
5. Install lock (22), two washers (21) and bolts (20).
6. Install washers (19, 18 and 17) between items 34 thru 27 as an assembly (Figure 12-7) and blade lift arms. Use washers (19, 18 and 17) as required to obtain 0.06 to 0.12 inch clearance between blade lift bar (34) and lock plate.
7. Install pin (16). Groove in pin (16) must align with opening in blade lift arm.
8. Install lock (15), two washers (14) and bolts (13).
9. Remove hoist and sling from items 34 thru 27 as an assembly.
10. Install clip (12), lockwasher (11) and bolt (10) in blade lift bar (34).

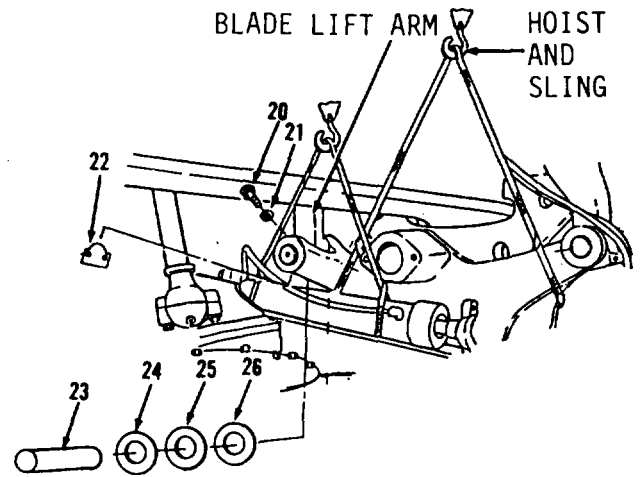


Figure 12-8.

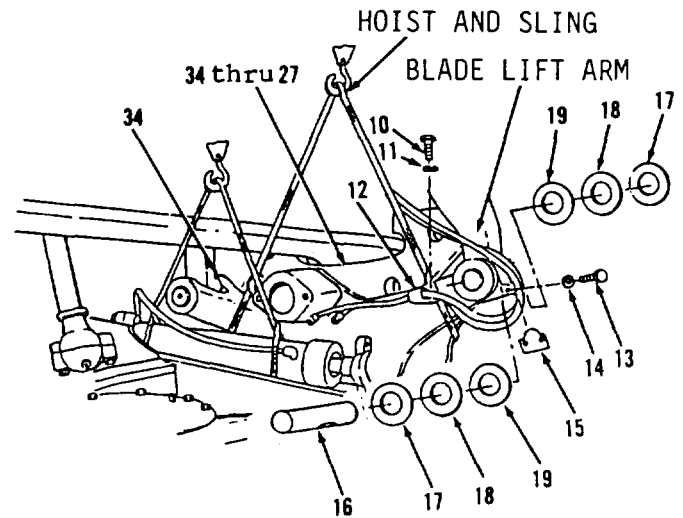


Figure 12-7.

**Go to Sheet 6
12-12**

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.

12-3. Blade Lift Bar Assembly. (Sheet 6 of "

INSTALLATION

11. Attach hoist and sling to center-shift cylinder (Figure 12-6).
12. Position center-shift cylinder.
13. Install shim(s) (9 and 8), inserts (7 and 6), shim(s) (5 and 4), cap (3), two lockwashers (2) and bolts (1).
14. Remove hoist and sling.

NOTE

Return 130G Grader to original equipment condition.

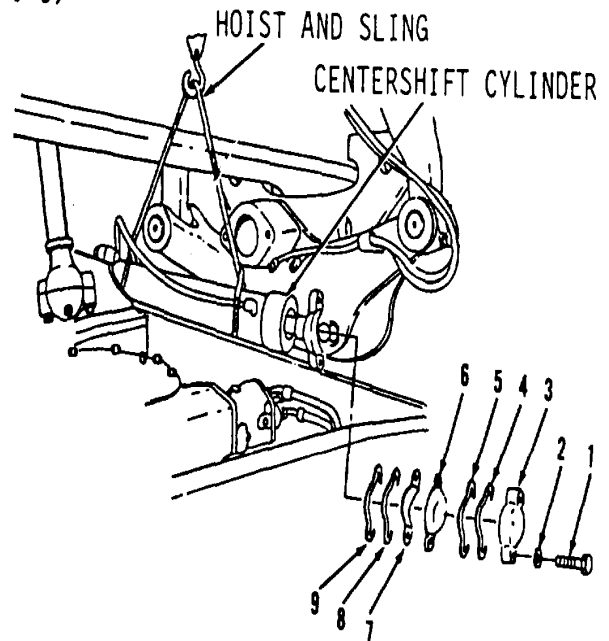


Figure 12-6.

**End of Task
12-13**

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE. (cont.)

12-4. Blade Lift Arm. (Sheet 1 of 5)

- This task covers:
- a. Removal
 - b. Cleaning
 - c. Inspection
 - d. Installation

INITIAL SETUP

Applicable Configurations

All

Tools

- General Mechanic's Tool Kit:
 - Automotive (NSN 5180-00-177-7033)
- Hoist and sling
- Puller assembly 7F9540
- Pump group 5P3100
- Screw 8S6586
- Pulling adapter 1P1835
- Nut 5S7351
- Washer 5F7353
- Pulling adapter 1P1837
- Expander assembly 4S9181
- Driver group 1P510
- Hand hack saw

Test Equipment

None

Materials/Parts

- Dry cleaning solvent,
 - Item 15, Appendix C
- Clean cloths, Item 41,
 - Appendix C
- Seals, Items 10, 15, 16, 29, 30
- Bearings, Items 11, 23, 24

Personnel Required

Construction equipment
repairer MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 10-18

Hydraulic blade lift cylinders removed.

Paragraph 12-3

Blade lift bar assembly removed.

**Go to Sheet 2
12-14**

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.
12-4. Blade Lift Arm. (Sheet 2 of 5)

REMOVAL

WARNING

Weight of arm is approximately 200 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

NOTE

The following is a maintenance procedure for the right side blade lift arm. The maintenance procedure for the left side blade lift arm is identical, except as noted.

1. Attach hoist and sling to blade lift arm (25, Figure 12-11) in center of vehicle frame.
2. Remove two bolts (1), washers (2) and lock (3).
3. Remove bolt (4), washer (5) and plate (6) on right side blade lift arm (25) only.
4. Remove pin (7), four washers (8), two washers (9) and items 12 thru 32 as an assembly (Figure 12-12).
5. Remove hoist and sling.
6. Remove and discard four seals (10) and two bearings (11).

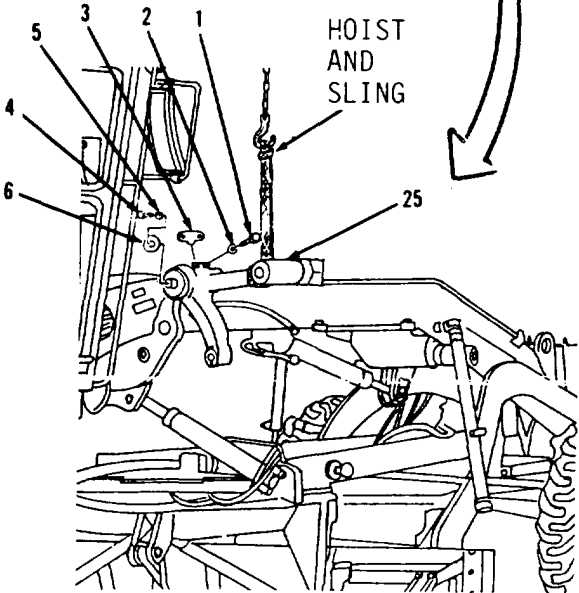
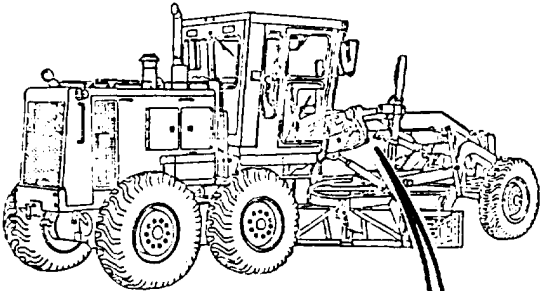


Figure 12-11.

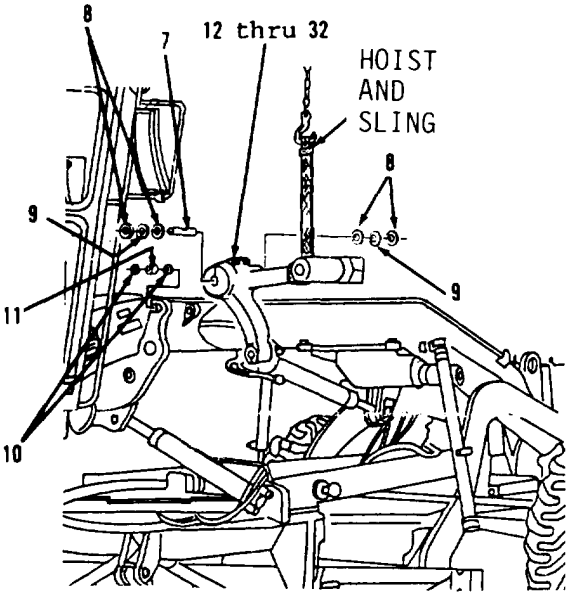


Figure 12-12.

12-4. Blade Lift Arm. (Sheet 3 of 5)
REMOVAL (cont.)

7. Remove two bolts (12), washers (13), retainer (14), seals (15 and 16), shim(s) (17, 18 and 19) and washers (20, 21 and 22, Figure 12-13). Discard seals (15 and 16).

NOTE

Weight of yoke is 40 lbs.

8. Remove items 26 thru 32 as an assembly from blade lift arm (25, Figure 12-14).

NOTE

Make saw cut down length of each bearing. Be careful not to cause damage to inside surface of lift arm.

9. Remove and discard bearings (23 and 24).
10. Remove washers (26, 27 and 28), seals (29 and 30) and ring (31) from yoke (32, Figure 12-15). Discard seals (29 and 30).

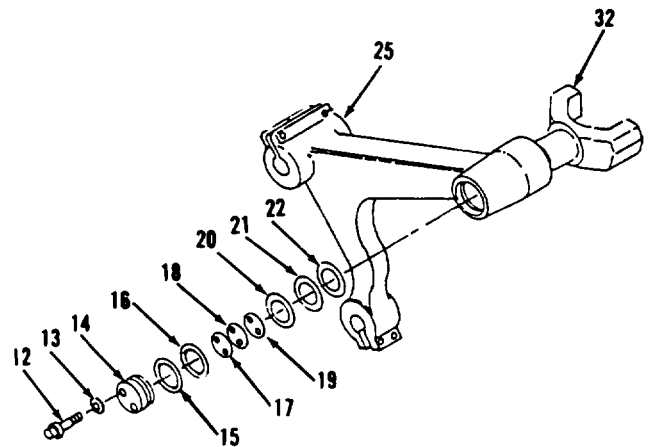


Figure 12-13.

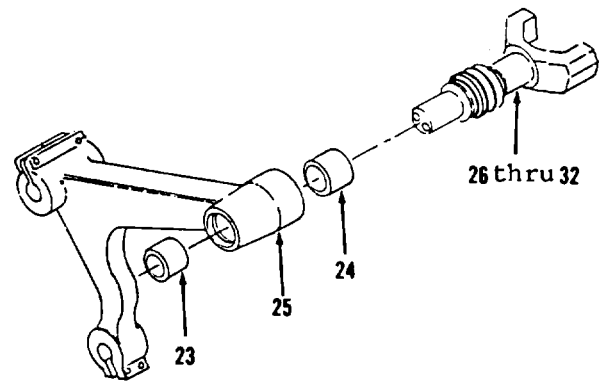


Figure 12-14.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

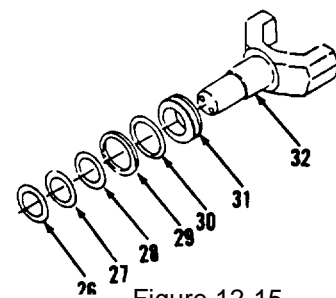


Figure 12-15.

Go to Sheet 4
12-16

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.**12-4. Blade Lift Arm. (Sheet 4 of 5)****INSTALLATION**

1. Install ring (31), new seals (30 and 29) and washers (28, 27 and 26) on yoke (32, Figure 12-15). Use expander assembly to install seals (30 and 29).

NOTE

Install bearings so contact is made with shoulders in arm.

2. Using puller assembly, pump group, screw, pulling adapter, nut and washer, install new bearings (24 and 23) in blade lift arm (25, Figure 12-14).
3. Install items 32 thru 26 as an assembly in blade lift arm (25).
4. Install washers (22, 21 and 20), shims (19, 18 and 17), new seals (16 and 15), retainer (14), two washers (13) and bolts (12). Use shims (19, 18 and 17) to get 0.01 inch maximum end clearance of yoke (32). Yoke (32) must rotate freely in blade lift arm (25, Figure 12-13).

**Go to Sheet 5
12-17**

12-4. Blade Lift Arm. (Sheet 5 of 5)**INSTALLATION (cont.)**

5. Using tooling given in step 2, install two new bearings (11) in center of vehicle frame. Install two bearings (11, Figure 12-12) to a depth of 0.359 to 0.391 inch.
6. Using a driver group, install four new seals (10). Lips of four seals (10) must be toward outside and even with outside surface.
7. Attach hoist and sling to items 32 thru 12 as an assembly and position on frame.
8. Install items 32 thru 12 as an assembly, two washers (9), four washers (8) and pin (7).

NOTE

Groove in pin must be in alignment with opening in blade lift arm.

9. Install plate (6), washer (5) and bolt (4) on right side blade lift arm (25, Figure 12-11) only.
10. Install lock (3), two washers (2) and bolts (1).
11. Remove hoist and sling.

NOTE

Return 130G Grader to original equipment condition.

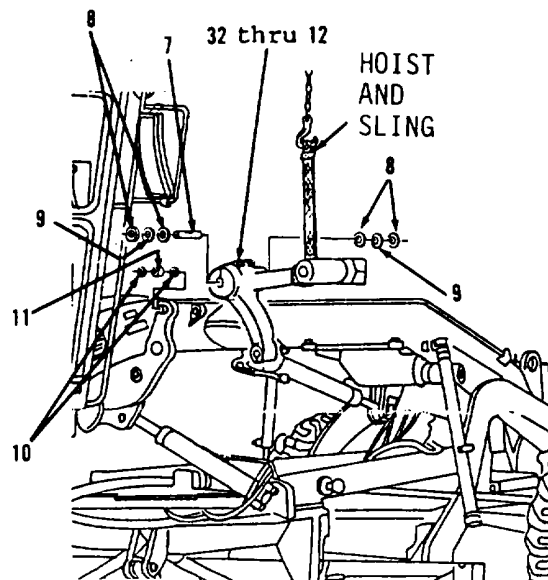


Figure 12-11.

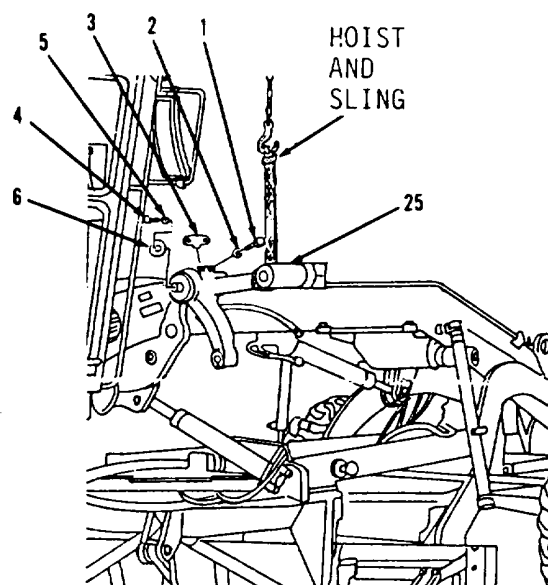


Figure 12-11.

End of Task
12-18

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.

12-5. Drawbar Assembly. (Sheet 1 of 5)

- This task covers:
- a. Removal
 - b. Cleaning
 - c. Inspection
 - d. Installation

INITIAL SETUP

Applicable Configurations

All

Tools

- General Mechanic's Tool Kit:
 - Automotive (NSN 5180-00-177-7033)
- Hoist and sling
- Jack stands

Test Equipment

None

Materials/Parts

- Dry cleaning solvent, Item 15, Appendix C
- Clean cloths, Item 41, Appendix C

Personnel Required

Construction equipment repairer MOS 62B

References

- TM 5-3805-261-10
- TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

All fasteners are tightened to standard torques. Refer to Appendix E.

**Go to Sheet 2
12-19**

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE. (cont.)

12-5. Drawbar Assembly. (Sheet 2 of 5)

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Circle drive swivel assembly removed.
Circle drive motor removed.
Circle drive motor lines removed.
Centershift cylinder lines removed.
Guide assembly removed.
Tool box removed.

Paragraph 10-15

Centershift cylinder disconnected.

Paragraph 12-2

Blade removed.

Paragraph 12-7

Circle assembly removed.

**Go to Sheet 3
12-20**

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.
12-5. Drawbar Assembly. (Sheet 3 of 5)

REMOVAL

WARNING

Weight of drawbar is approximately 500 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

1. Attach hoist and sling to drawbar (18, Figure 12-16) under front of vehicle.
2. Position jack stands under three corners of drawbar (18).

NOTE

The following is a maintenance procedure for the right drawbar assembly. The maintenance procedure for the left drawbar assembly is identical.

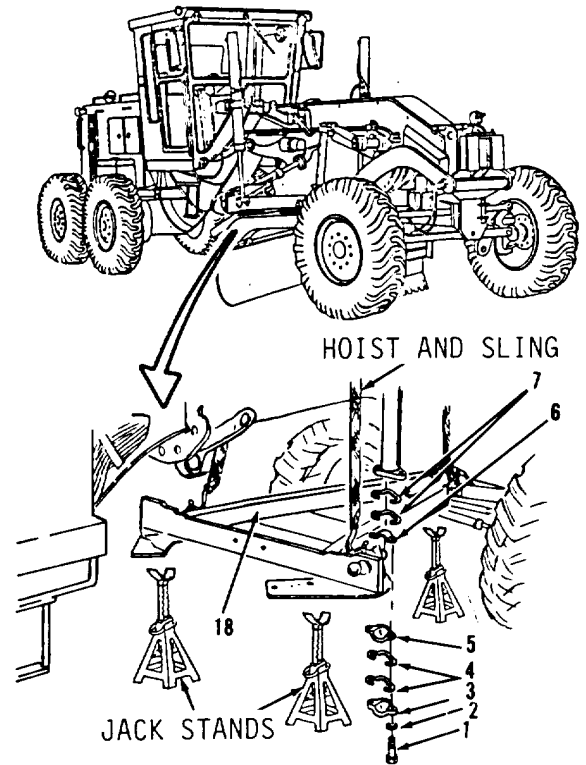


Figure 12-16.

3. Remove two bolts (1), washers (2), cap (3), two shims (4), inserts (5 and 6) and two shims (7) from rear corners of drawbar (18).
4. Remove four bolts (8), washers (9) and two bolts (10) at front corner of drawbar (18, Figure 12-17).
5. Slide cap (17) onto drawbar (18).
6. Lower drawbar (18) onto jack stands with hoist and sling.
7. Remove hoist and sling.
8. Remove adapter (11) and shims (12 and 13) from front corner of drawbar (18).

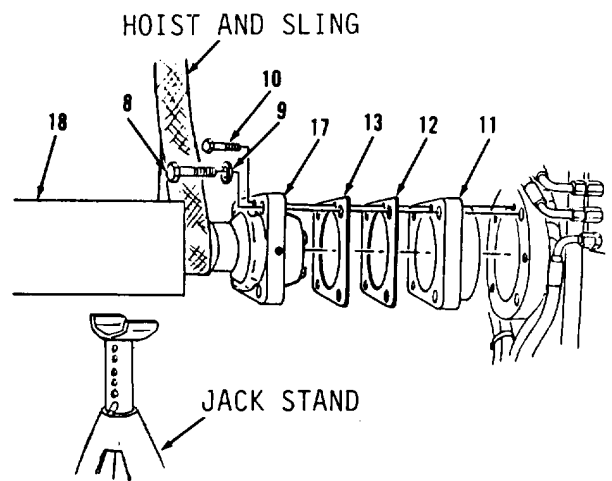


Figure 12-17.

Go to Sheet 4
12-21

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE. (cont.)**12-5. Drawbar Assembly. (Sheet 4 of 5)****REMOVAL (cont.)**

- Remove five bolts (14), ball (15), fitting (16) and cap (17) from drawbar (18, Figure 12-18).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

- Support drawbar (18, Figure 12-18) under front of vehicle on jack stands.
- Install cap (17), fitting (16), ball (15) and five bolts (14) to front corner of drawbar (18).

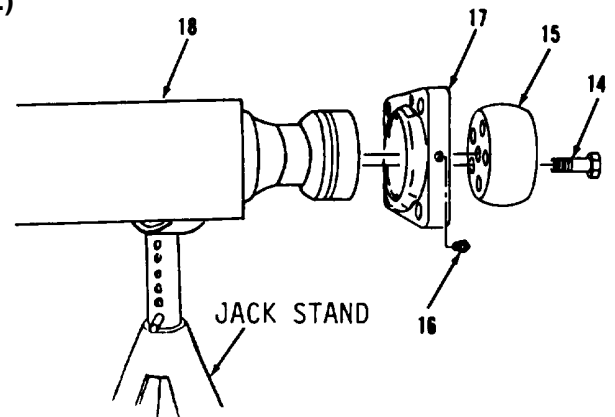


Figure 12-18.

**Go to Sheet 5
12-22**

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.

**12-5. Drawbar Assembly. (Sheet 5 of 5)
INSTALLATION**

3. Install shims (13 and 12) and adapter (11, Figure 12-17).
4. Attach hoist and sling.
5. Raise drawbar (18) into mounting position.
6. Install two bolts (10), four washers (9) and bolts (8) in cap (17) at front corner of drawbar (18).
7. Remove hoist and sling.
8. Install two shims (7), inserts (6 and 5), two shims (4), cap (3), two washers (2) and bolts (1) in rear corners of drawbar (18, Figure 12-16).

NOTE

Return 130G Grader to original equipment condition.

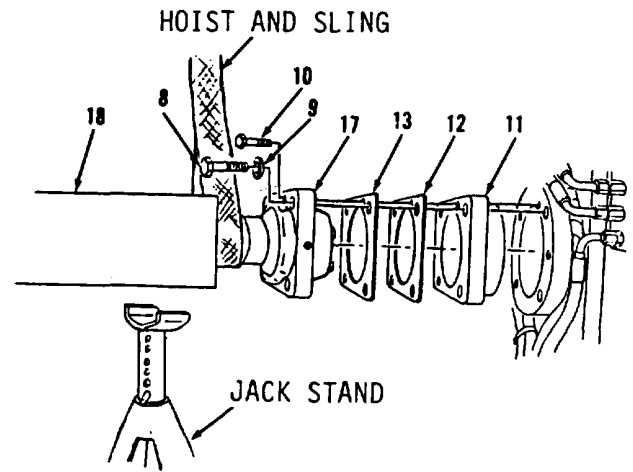


Figure 12-17.

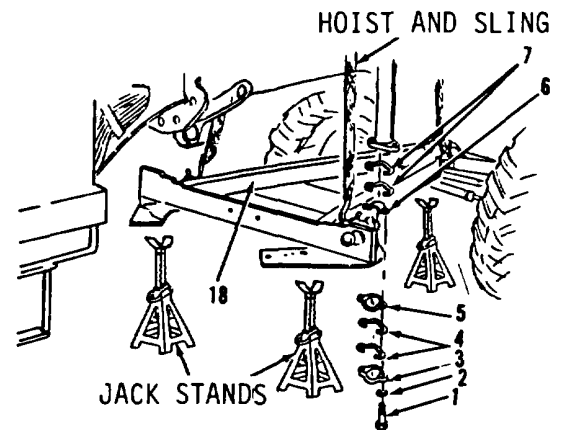


Figure 12-16.

**End of Task
12-23**

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE. (cont.)

12-6. Blade Brackets. (Sheet 1 of 5)

This task covers: a. Removal b. Cleaning c. Inspection
 d. Installation

INITIAL SETUP

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-177-7033)

Hoist and sling
 Torque wrench
 Torque multiplier
 Rope
 None

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Small tags, Item 43, Appendix C
 Cotter pin, Item 1

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Paragraph 12-2

Paragraph 10-17

Paragraph 10-20

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

Blade assembly removed.

Blade tip cylinder removed.

Side shift cylinder removed.

**Go to Sheet 2
 12-24**

REMOVAL

1. Support bar (15, Figure 12-19) by tying both ends to frame with rope.

WARNING

Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

2. Attach hoist and sling to bracket (9).
3. Remove cotter pin (1), nut (2), washer (3), nuts (4 and 5), washers (6 and 7), bolt (8) and bracket (9). Discard cotter pin (1).
4. Remove two washers (10).
5. Remove hoist and sling.
6. Remove nuts (11 and 12, Figure 12-20).
7. Remove two bolts (13) and washers (14).
8. Remove bar (15) and attached rope.
9. Remove rope from bar (15).

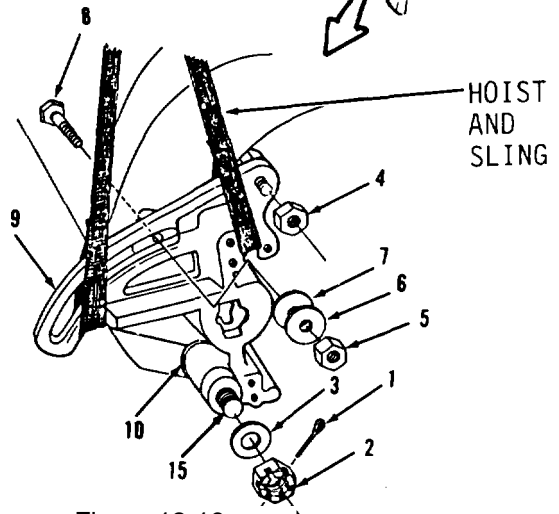
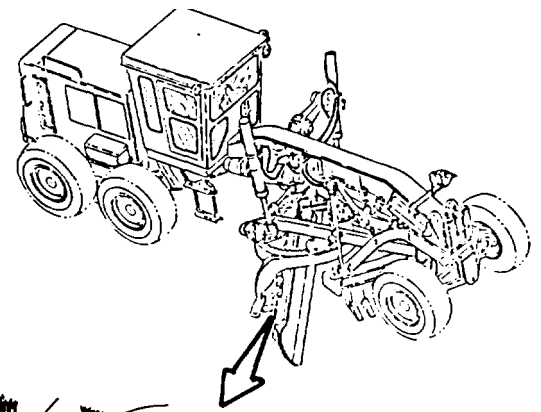


Figure 12-19.

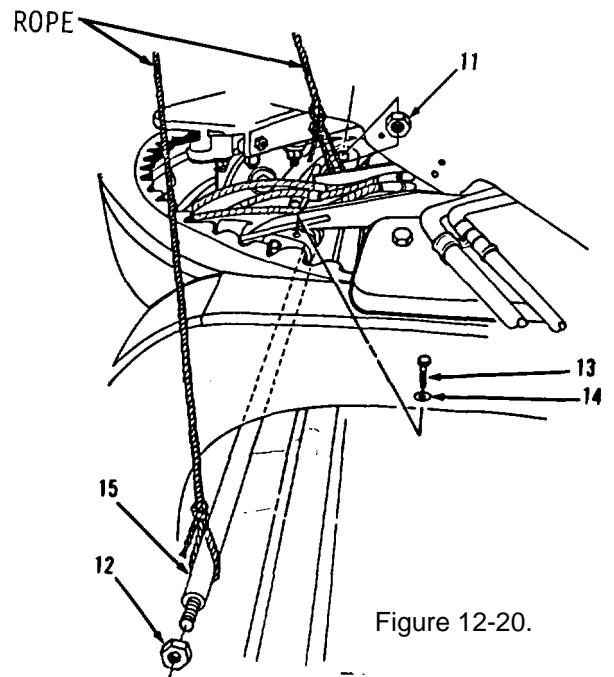


Figure 12-20.

Go to Sheet 3
12-25

12-6. Blade Brackets. (Sheet 3 of 5)

REMOVAL (cont.)

10. Attach hoist and sling to bracket (22, Figure 12-21).
11. Remove two bolts (16), washers (17), bolts (18), washers (19), cap (20) and ten shims (21) from bracket (22). Tie shims (21) together and tag for identification.
12. Remove bracket (22) and shaft (23, Figure 12-22).
13. Remove hoist and sling.

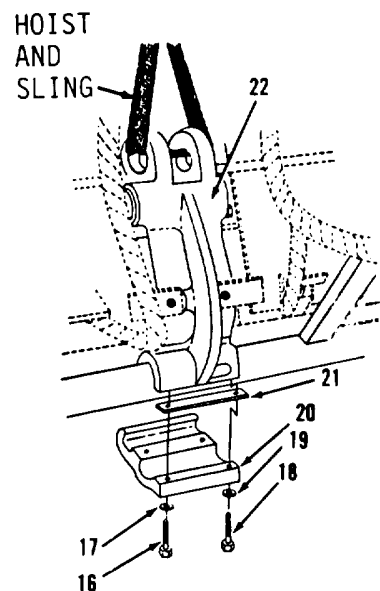


Figure 12-21.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

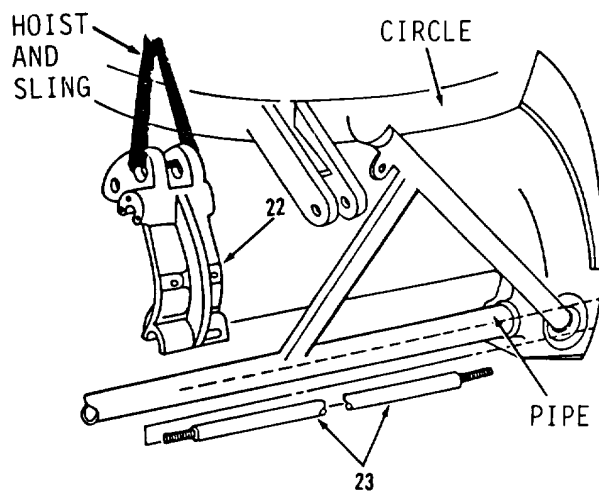


Figure 12-22.

12-6. Blade Brackets. (Sheet 4 of 5) INSTALLATION

1. Position shaft (23, Figure 12-22) in pipe at bottom rear of circle.
2. Attach hoist and sling to bracket (22).
3. Install bracket (22).
4. Install ten shims (21), cap (20), two washers (19), bolts (18), washers (17) and bolts (16, Figure 12-21).
5. Remove hoist and sling from bracket (22).
6. Install bar (15). Aline tapped holes in bar (15) with holes in bracket (22, Figure 12-20).
7. Support bar (15) by tying both ends to frame with rope.
8. Install two washers (14) and bolts (13).
9. Install nuts (12 and 11).

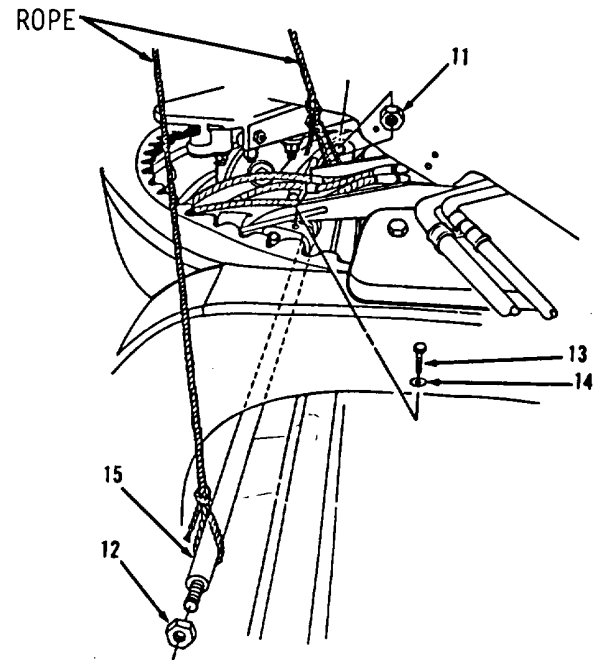


Figure 12-20.

Go to Sheet 5
12-27

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE. (cont.)**12-6. Blade Brackets. (Sheet 5 of 5)****INSTALLATION (cont.)**

10. Attach hoist and sling to bracket (9, Figure 12-19).
11. Install two washers (10). Use two washers (10) as required to get sliding fit of bracket (9) with maximum 0.07 inch clearance between bracket (9) and circle wear plate.
12. Install bracket (9).
13. Install bolt (8), washers (7 and 6) and nut (5).
14. Turn nut (12) out to make contact with bracket (9).
15. Install nut (4) and tighten to 1200 ft-lb torque using torque multiplier and torque wrench.
16. Install washer (3) and nut (2). Tighten nut (2) to 0.00 inch clearance and back off enough to permit installation of new cotter pin (1).
17. Install new cotter pin (1).
18. Remove rope and hoist and sling.

NOTE

Return 13OG Grader to original equipment condition.

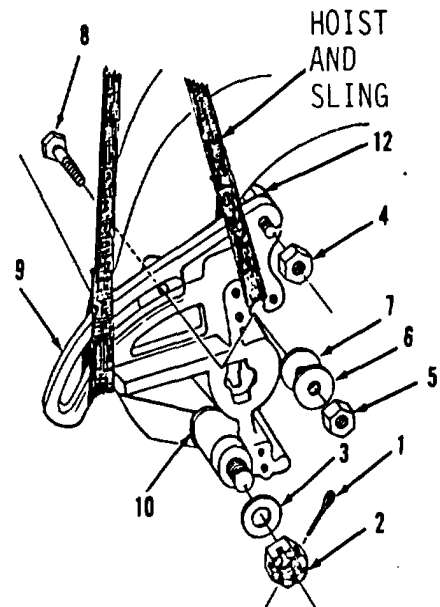


Figure 12-19.

**End of Task
12-28**

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.

12-7. Circle Assembly. (Sheet 1 of 6)

This task covers: a. Removal b. Cleaning c. Inspection
 d. Installation

INITIAL SETUP

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)
 Hoist and sling
 Jack stands
 Torque wrench

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-10
 TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

TM 5-3805-261-20

Blade brackets removed.

**Go to Sheet 2
 12-29**

12-7. Circle Assembly. (Sheet 2 of 6)

REMOVAL

1. Remove two nuts (1), washers (2) and bolts (3, Figure 12-23) from drawbar assembly.
2. Remove two cotter pins (4), washers (5), pin (6) and guide (7).
3. Using jack stands, support circle (21, Figure 12-24).
4. Loosen eight nuts (8).
5. Turn eight setscrews (9) all the way down.
6. Remove eight lock nuts (10), washers (11), bolts (12), washers (13), four bolts (14), washers (15), shoes (16), 24 shims (17), 28 shims (18), eight strips (19) and four strips (20, Figure 12-25).

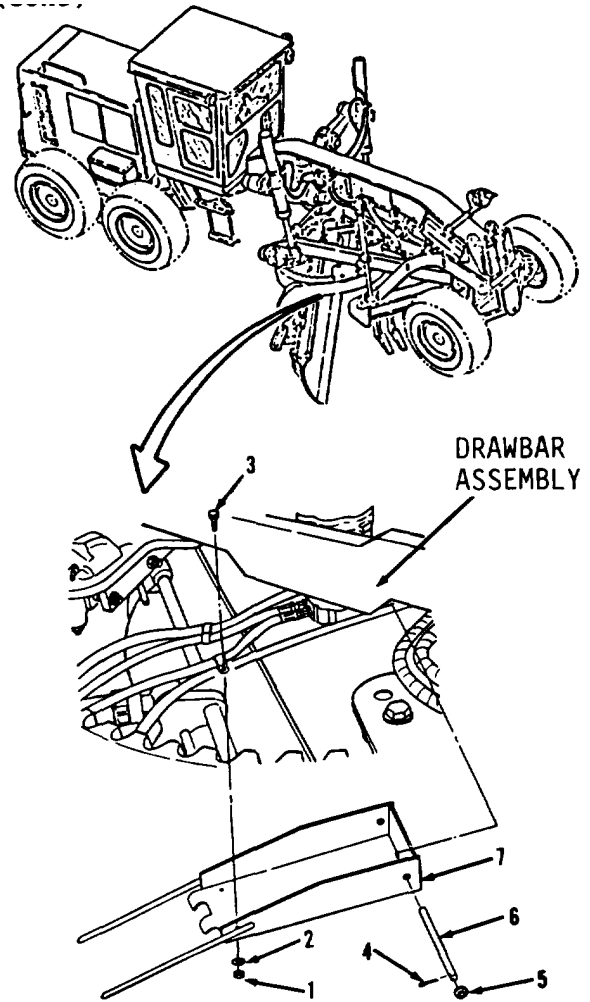


Figure 12-23.

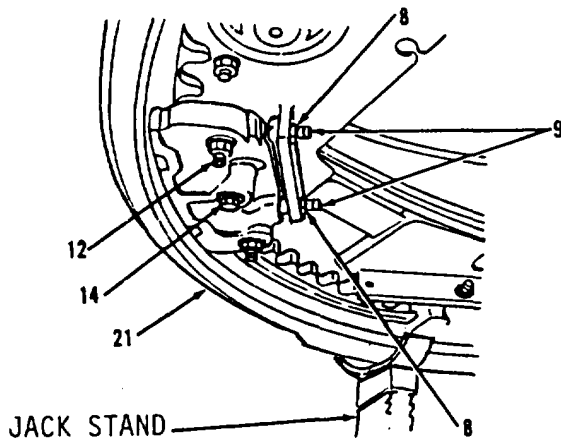


Figure 12-24.

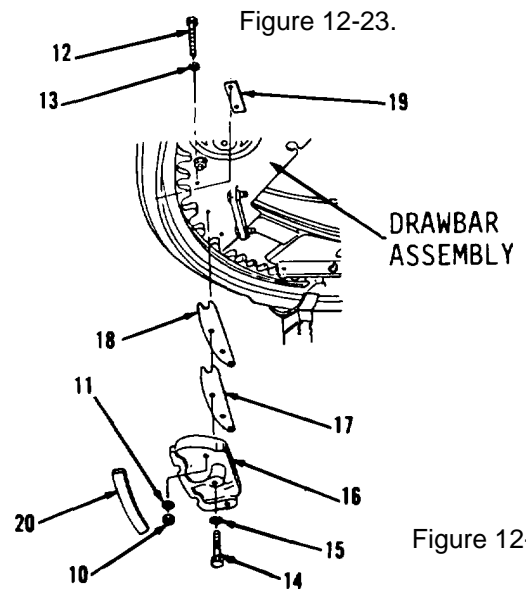


Figure 12-25.

Go to Sheet 3
12-30

12-7. Circle Assembly. (Sheet 3 of 6) REMOVAL

WARNING

Weight of circle is 1050 lbs.
Use adequate hoist and sling
for lifting. Failure to
follow this procedure may
cause INJURY. If you are
injured, seek medical aid
immediately.

7. Attach hoist and sling to circle (21, Figure 12-26).
8. Remove jack stands.

WARNING

Only a qualified operator may
perform the next procedure.
All other personnel must
clear the immediate area.
Failure to follow this
procedure may cause INJURY.
If you are injured, seek
medical aid immediately.

9. Start engine. Refer to TM 5-3805-261-10.
10. Move vehicle back, to remove circle drive motor pinion from engagement in circle (21). Lift drawbar assembly away from circle (21).
11. Lower circle (21) to ground.
12. Remove circle (21) from under vehicle.
13. Remove hoist and sling.
14. Stop engine.

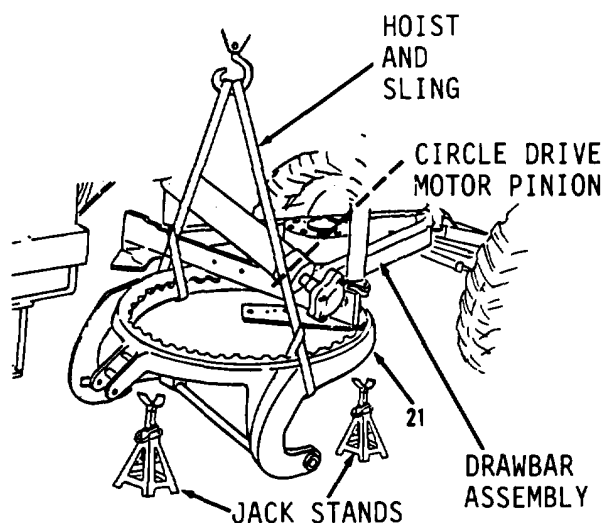


Figure 12-26.

Go to Sheet 4
12-31

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE. (cont.)**12-7. Circle Assembly. (Sheet 4 of 6)****CLEANING**

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Attach hoist and sling to circle (21, Figure 12-26) under vehicle.
2. Raise circle (21) into mounting position under vehicle.
3. Support circle (21) with jack stands.

WARNING

Only a qualified operator may perform the next procedure. All other personnel must clear the immediate area. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

4. Start engine. Refer to TM 5-3805-261-10.
5. Lower drawbar assembly into position over circle (21). Move vehicle slowly forward to engage circle drive motor pinion into circle (21).
6. Stop engine.

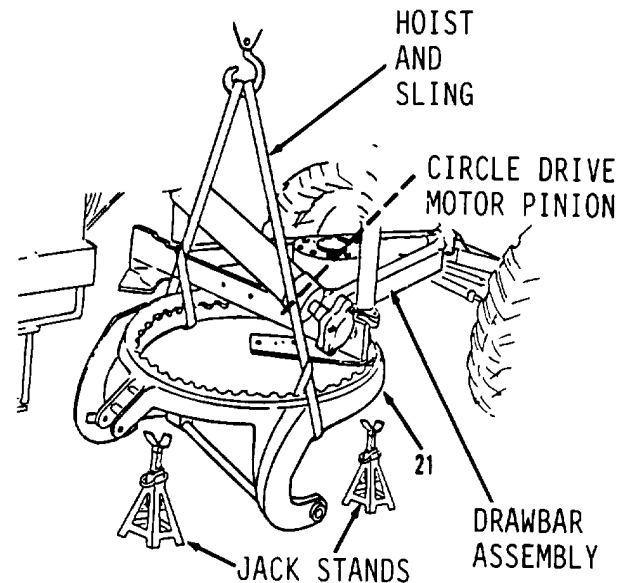


Figure 12-26

**Go to Sheet 5
12-32**

12-7. Circle Assembly. (Sheet 5 of 6)

INSTALLATION

NOTE

Be sure jack stand is not supporting circle when measuring clearance.

- Do not tighten bolts. Use shim(s) as required to obtain 0.020 inch maximum clearance between drawbar, strip and circle at each shoe.
7. Install four strips (20), eight strips (19), 28 shims (18), 24 shims (17), four shoes (16), washers (15), bolts (14), eight washers (13), bolts (12), washers (11) and lock nuts (10, Figure 12-25) in drawbar assembly.
 8. Remove hoist and sling.
 9. With the shoes (16) and shims (18) in position on drawbar, adjust four shoes (16, Figure 12-27).
 10. Loosen nuts (8) on setscrews (9).
 11. Tighten setscrews (9) until the shoes are against the inside of the circle.
 12. Loosen setscrews (9) until the circle is just free to turn.
 13. Tighten nuts (8) on setscrews (9).

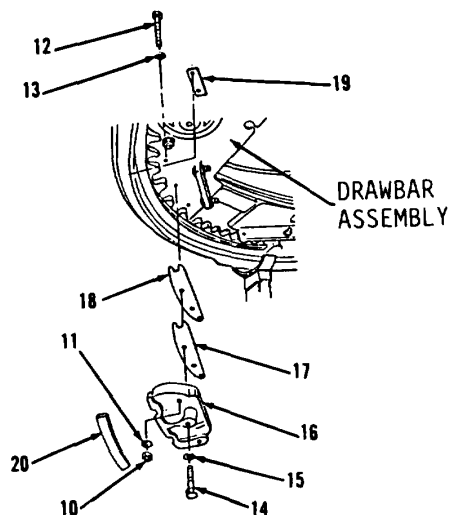


Figure 12-25.

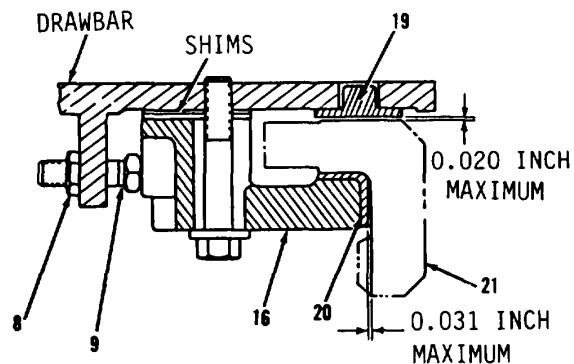


Figure 12-27.

Go to Sheet 6
12-33

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE. (cont.)

12-7. Circle Assembly. (Sheet 6 of 6)

INSTALLATION (cont.)

- 14. Tighten four bolts (14) and eight bolts (12, Figure 12-24) to 310 to 340 ft-lb torque. Recheck clearances and adjustments.
- 15. Remove jack stands from under circle (21).
- 16. Install guide (7), pin (6), two washers (5) and cotter pins (4, Figure 12-23).
- 17. Install two bolts (3), washers (2) and nuts (1).

NOTE

Return 130G Grader to original equipment condition.

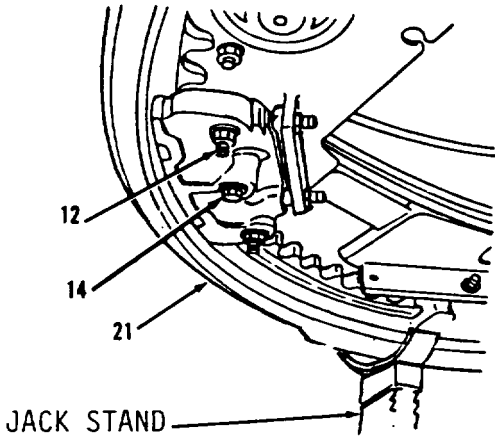


Figure 12-24.

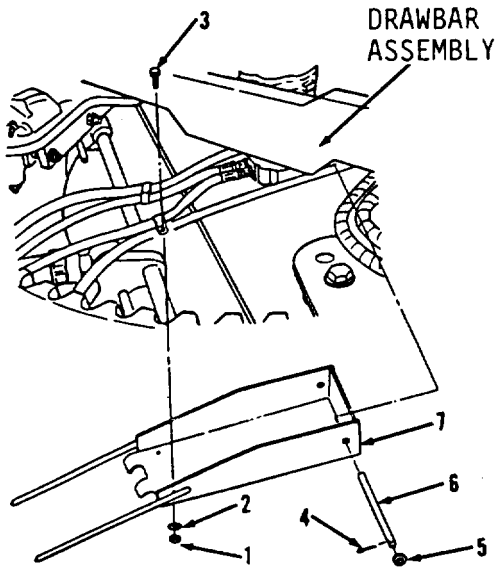


Figure 12-23.

End of Task
12-34

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.

12-8. Centershift Lock Control Valve Assembly. (Sheet 1 of 3)

This task covers: a. Disassembly b. Cleaning c. Inspection
 d. Assembly

INITIAL SETUP

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-177-7033)

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Preformed packings, Items 3, 9

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

All fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-20

Centershift lock control valve
 assembly removed.

**Go to Sheet 2
 12-35**

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE. (cont.)

**12-8. Centershift Lock Control Valve Assembly. (Sheet 2 of 3)
DISASSEMBLY**

1. Remove pin (1), lever (2), two plungers (4) from valve body (12, Figure 12-28).
2. Remove and discard two preformed packings (3) from two plungers (4).
3. Remove two springs (5).
4. Remove two bolts (6), washers (7) and cover (8) from valve body (12, Figure 12-29).
5. Remove and discard two preformed packings (9).
6. Remove two springs (10) and valves (11) from valve body (12).

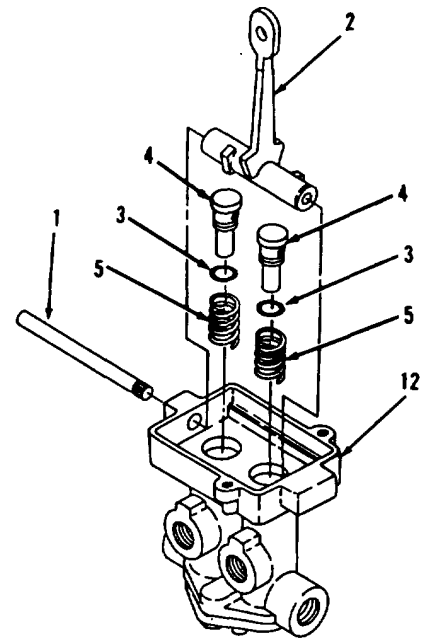


Figure 12-28.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

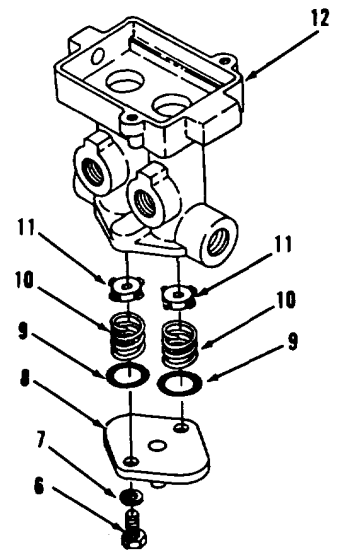


Figure 12-29.

**Go to Sheet 3
12-36**

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.

12-8. Centershift Lock Control Valve Assembly. (Sheet 3 of 3)

ASSEMBLY

1. Install two valves (11) and springs (10) in valve body (12, Figure 12-29).
2. Install two new preformed packings (9).
3. Install cover (8), two washers (7) and bolts (6) in valve body (12).
4. Install two springs (5, Figure 12-28).
5. Install two new preformed packings (3) on two plungers (4).
6. Install two plungers (4), lever (2) and pin (1) in valve body (12).

NOTE

Return 130G Grader to original equipment condition.

End of Task
12-37

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE. (cont)

12-9. Circle Drive Swivel Assembly. (Sheet 1 of 3)

This task covers: a. Disassembly b. Cleaning c. Inspection
d. Assembly

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit: References
Automotive (NSN 5180-00-177-7033) TM 5-3805-261-20

Bearing puller attachment Special Environmental Conditions
5F7343 None

Feeler gage

General Safety Instructions

Test Equipment

None

None

Torques

Materials/Parts

All fasteners are tightened to standard torques. Refer to Appendix E.
Dry cleaning solvent, Item 15, Appendix C
Clean cloths, Item 41, Appendix C
Hydraulic fluid, Item 30, Appendix C
Preformed packings, Items 9, 11
Seals, Items 4, 5, 10, 13, 14

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-20 Circle drive swivel assembly removed.

**Go to Sheet 2
12-38**

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.

12-9. Circle Drive Swivel Assembly. (Sheet 2 of 3)

REMOVAL

- 1. Remove two screws (1), retainer (2) and shim (3).
- 2. Remove and discard seals (4 and 5).
- 3. Remove four bolts (6), lockwashers (7) and cover (8).
- 4. Remove and discard four preformed packings (9).
- 5. Using bearing puller attachment, remove items (10 and 11).
- 6. Remove and discard seven seals (12) and preformed packings (13).
- 7. Remove and discard seals (14 and 15) from rotor (16). (Figure 12-32).

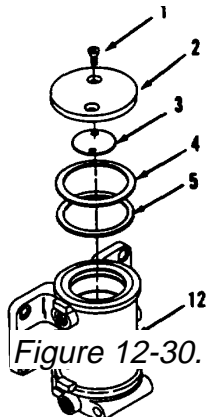


Figure 12-30.

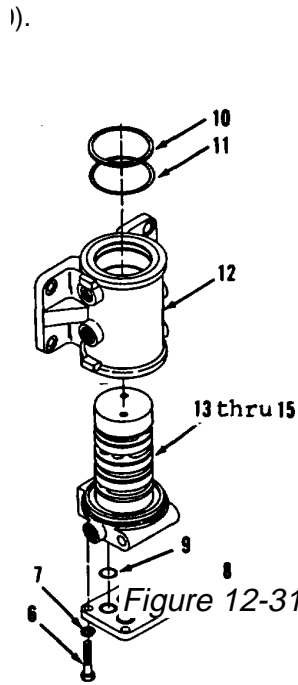


Figure 12-31.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

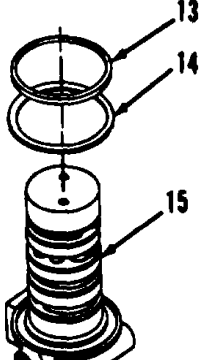


Figure 12-32.

Go to Sheet 3
12-39

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE. (cont)

12-9. Circle Drive Swivel Assembly. (Sheet 3 of 3)

INSTALLATION

1. Lubricate new seals (14 and 13) with hydraulic fluid and install on rotor (15, Figure 12-31).
2. Lubricate seven new preformed packings (11) and new seals (10) with hydraulic fluid (12, Figure 12-31).
3. Using a press, install items 15 thru 13 as an assembly.
4. Lubricate four new preformed packings (9) with hydraulic fluid.
5. Install cover (8), four lock washers (7) and bolts (6).
6. Lubricate two new seals (5 and 4, Figure 12-30) with hydraulic fluid.
7. Install two new seals (5 and 4), shim (3), retainer (2) and shim(s) (3) to obtain required gap.
8. Measure gap between retainer (2) and body (12). Install shim(s) (3) to obtain required gap.

NOTE

Return 130G Grader to original equipment condition.

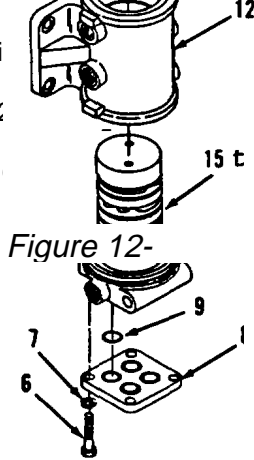
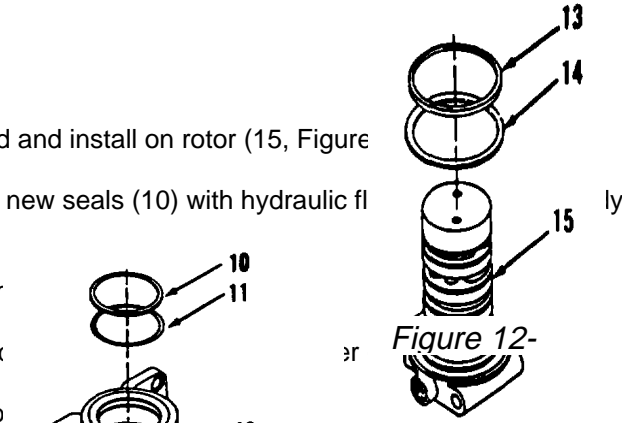


Figure 12-

(12).

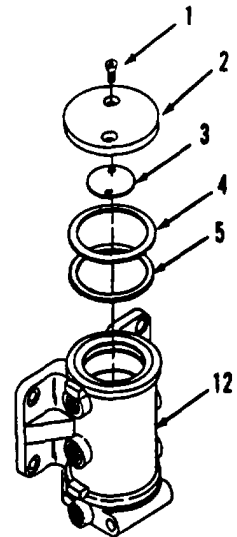


Figure 12-

End of Task
12-40

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.

12-10. Scarifier Actuating Shaft Assembly. (Sheet 1 of 4)

This task covers: a. Removal b. Cleaning c. Inspection
 d. Installation

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Two construction equipment
 repairers MOS 62B

Tools

| | | |
|--|---|------------------|
| General Mechanic's Tool Kit: | <u>References</u> | |
| Automotive (NSN 5180-00-177-7033) | TM 5-3805-261-20 | TM 5-3805-261-10 |
| Two slings, 500 lbs. capacity | <u>Special Environmental Conditions</u> | |
| Hoist and chain, 500 lbs. minimum capacity | None | |
| Arbor Press | <u>General Safety Instructions</u> | |
| Freezer or dry ice | None | |

Test Equipment Torques

None Except for special torques shown,
 all fasteners are tightened to

Materials/Parts

standard torques. Refer to Appendix E.

- Dry cleaning solvent, Item 15, Appendix C
- Clean cloths, Item 41, Appendix C
- General purpose grease, Item 26, Appendix C
- Small tags, Item 43, Appendix C
- Four seals, Item 31

Troubleshooting References

None

Equipment Condition

| | |
|------------------|---|
| TM 5-3805-261-10 | Vehicle parked on level ground. Parking/emergency brake applied. Equipment lowered to the ground. Engine stopped. Master disconnect switch off. Hydraulic pressure relieved. |
| TM 5-3805-261-20 | Scarifier Actuating Assembly removed. |

Go to Sheet 2
 12-41

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.

12-10. Scarifier Acuating Shaft Assembly. (Sheet 2 of 4)

REMOVAL

WARNING

Weight of shaft is 500 lbs. Use adequate hoist and sling for lifting. INJURY. If you are injured, seek medical aid immediately.

1. Support shaft (36, Figure 12-33), with forklift truck or eq

NOTE

Do not attempt to remove hoist and slings while shaft is supported. Remove hoist and slings only after shaft has been placed on ground or

2. Remove items 31 thru 36 from vehicle and set down on
3. Remove hoist and slings from shaft (36).
4. Remove items 31 thru 33 as an assembly from both sides
5. Remove and discard two seals (31) from each bracket (
6. Using an arbor press, remove bearing (32) from each bracket

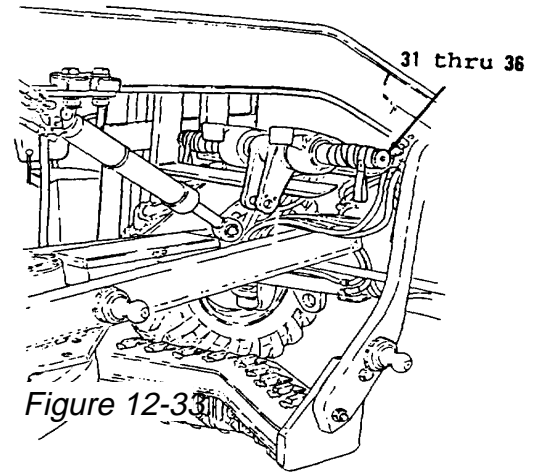


Figure 12-33

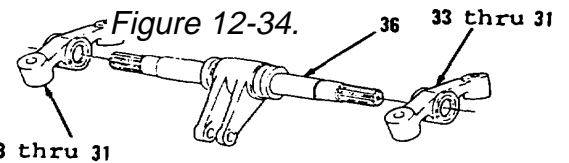


Figure 12-34.

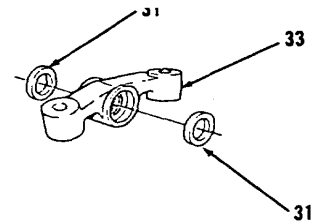
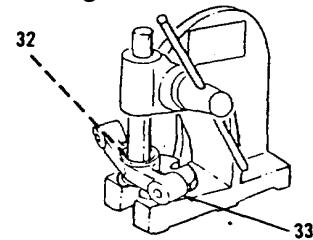


Figure 12-35.



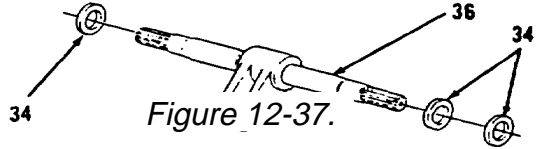
Go to Sheet 3

EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.

12-10 Scarifier Acuating Shaft Assembly. (Sheet 3 of 4)

REMOVAL (cont)

- 7. Remove three spacers (34) from shaft (36, Fig
- 8. Scribe alinement marks on arm (35) and shaft
- 9. Remove arm (35) from shaft (36, Figure 12-3



CLEANING

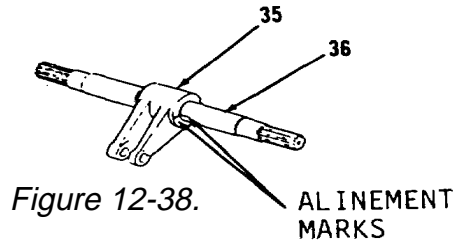
Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

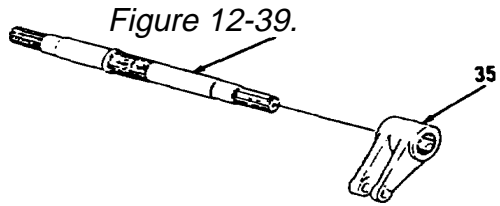
- 1. Install arm (35), onto shaft (36, Figure 12-39) 38).
- 2. Install three spacers (34). One of three space (34) next to flange on right side of arm (36, Figure 12-37).



2-

3RS

Go to Sheet 4
12-43



EARTHMOVING EQUIPMENT COMPONENTS MAINTENANCE.

12-10 Scarifier Acuating Shaft Assembly. (Sheet 4 of 4)

INSTALLATION (cont)

WARNING

Do not allow chilled parts to contact unprotected skin or they may cause immediately. Always wear suitable protective clothing and gloves when handling

NOTE

- Chill bearings and new seals in freezer for two hours before use.
- Allow clearance on both sides of bearings for seals when installing.
- 3. Using an arbor press, install bearing (32) into each bracket (33).
- 4. Install two new seals (31) in each bracket (33, Figure 12-33).
- 5. Install items 33 thru 31 as an assembly onto both sides of the shaft (36).
- 6. Attach hoist and slings to each end of shaft (36) and transport to the work area.
- 7. Using forklift truck or equivalent vehicle, position items 33 thru 31 on the shaft (36).

frame.

NOTE

Return 130G Grader to original equipment condition.

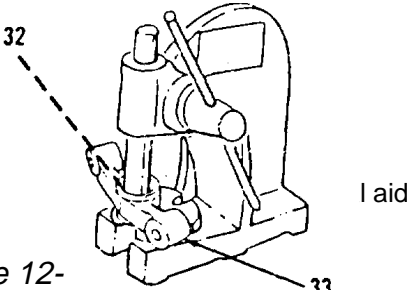


Figure 12-

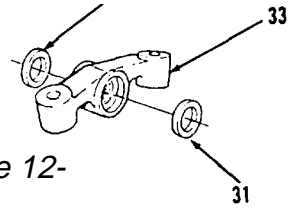


Figure 12-

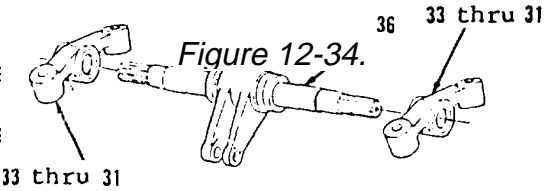


Figure 12-34.

33 thru 31

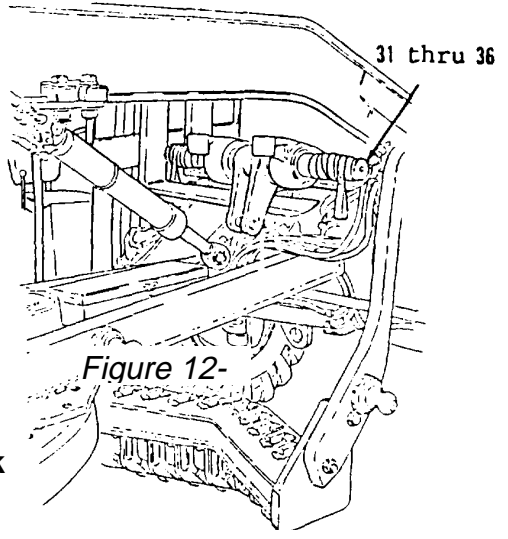


Figure 12-

End of Task

CHAPTER 13

ENGINE MAINTENANCE

CHAPTER OVERVIEW

The purpose of this chapter is to help the technician efficiently troubleshoot and repair malfunctioning equipment and to perform authorized general support level maintenance procedures on the 130G Grader engine system.

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ENGINE MAINTENANCE

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| Crankshaft Main Bearings | 13-5 | 13-21 | |
| Balancer Shaft Assembly and Bearings | 13-6 | 13-33 | |
| Flywheel Assembly | 13-7 | 13-37 | |
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Section I. ENGINE MAINTENANCE.

13-1. ENGINE MAINTENANCE PROCEDURES.

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the general support level to keep the engine and its components in good repair.

b. This section is arranged by functional group code and provides a list of engine components to be maintained and step-by-step maintenance procedures.

INDEX

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ENGINE MAINTENANCE.

13-2. Cylinder Block and Liners. (Sheet 1 of 7)

This task covers: a. Removal b. Cleaning c. Inspection
 d. Installation

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
 repairer MOS 62B

Tools

General Mechanic's Tool Kit:

Automotive (NSN 5180-00-
 177-7033)

References

TM 5-3805-261-10

Camshaft bearing tool group
 8S2241

Special Environmental Conditions

None

Ratchet box wrench 8H684

Cylinder liner installation
 tool 2P8260

General Safety Instructions

None

Installer assembly 5P1651

Top shaft 5P1657

Torques

Liner installer group 2P8620

All fasteners are tightened to

Collet 8S8284

standard torques. Refer to
 Appendix E.

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C

Clean cloths, Item 41,
 Appendix C

Lubricating oil, Item 36,
 Appendix C

Primer, Item 71, Appendix C

Retaining compound, Item 72,
 Appendix C

Gasket, Item 3

Cup plugs, Items 10, 19

Washer, Item 18

Preformed packings, Items 2, 25

Orifices, Item 23

Go to Sheet 2

ENGINE MAINTENANCE. (cont)

13-2. Cylinder Block and Liners. (Sheet 2 of 7)

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10 Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 3-6 Engine front covers removed.

Paragraph 13-4 Crankshaft removed.

Paragraph 13-6 Balancer shafts and bearings removed.

Paragraph 13-7 Flywheel removed.

Paragraph 13-8 Pistons, connecting rods and bearings
removed.

Paragraph 13-9 Camshaft removed.

Go to Sheet 3

13-4

ENGINE MAINTENANCE. (cont)

13-2. Cylinder Block and Liners. (Sheet 3 of 7)

REMOVAL

1. Remove plate (1), preformed packing (2) and gasket (3, Figure 13-1). Discard preformed packing (2) and gasket (3). Remove all gasket material from mounting surfaces.
2. Remove plug (4), pin (5) and dowels (6 and 7).
3. Remove dowel (8), stud (9) and cup plug (10). Discard cup plug (10).
4. Remove two dowels (11, Figure 13-2).
5. Using camshaft bearing tool group and ratchet box wrench, remove two bearings (12) and bearing (13).
6. Remove plugs (14 thru 17) and washer (18). Discard washer (18).
7. Remove and discard cup plug (19).
8. Remove two plugs (20), plug (21) and five balls (22, Figure 13-3).
9. Using suitable hammer and driver, remove and discard four orifices (23).

NOTE

Inspect cylinder liners according to procedure in paragraph 3-7. Do not remove cylinder liners unless required.

10. Using cylinder liner installation tool, remove items 24 thru 26 as an assembly.

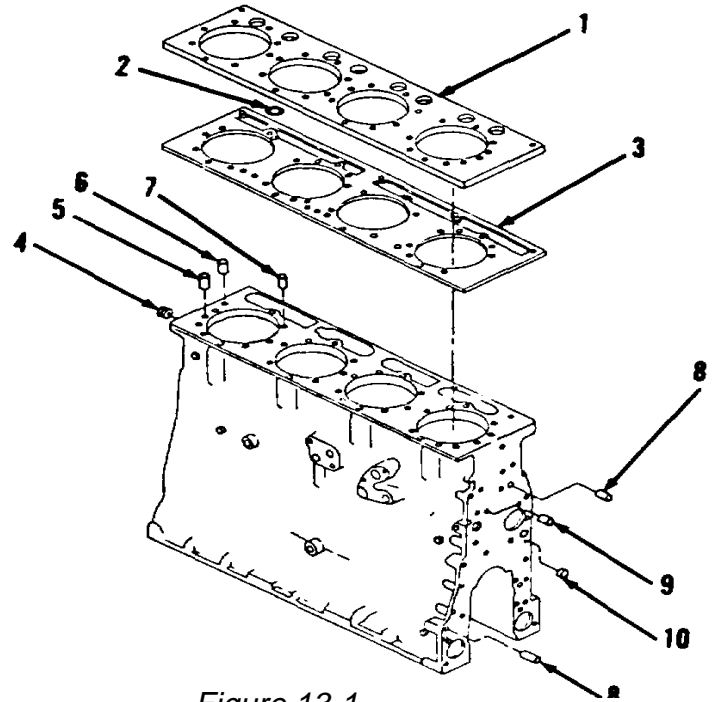


Figure 13-1.

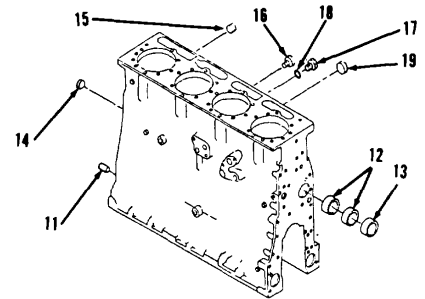


Figure 13-2.

**Go to Sheet 4
13-5**

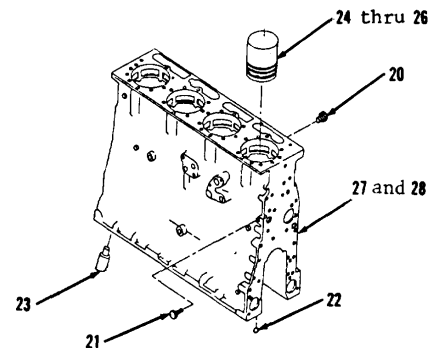


Figure 13-3.

ENGINE MAINTENANCE. (cont)

13-2. Cylinder Block and Liners. (Sheet 4 of 7)

REMOVAL (cont)

11. Remove four bands (24) and 12 preformed packings (25) from four cylinder liners (26, Figure 13-4).
(26) Discard 12 preformed packings (25).

12. Remove four inserts (27) from block (28, Figure 13-5).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

NOTE

Perform steps 1 thru 5 if counterbore procedure has been done.

1. Apply primer to counterbore area.
2. Apply thin ring of retaining compound around edges of counterbore and along any creases *Figure 13-5.*

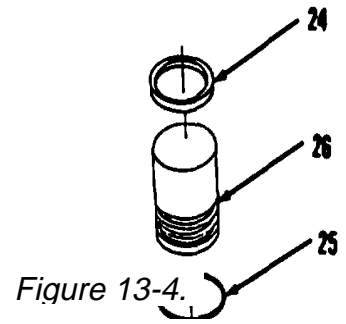
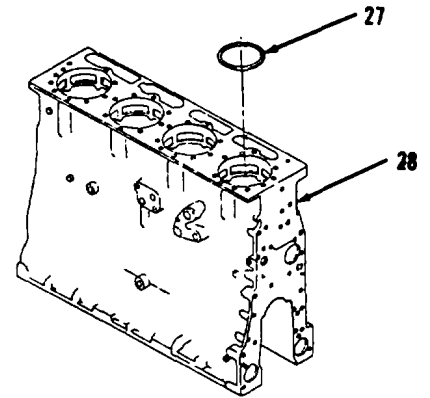


Figure 13-4.



Go to Sheet 5

ENGINE MAINTENANCE.

13-2. Cylinder Block and Liners. (Sheet 5 of 7)

INSTALLATION

3. Apply primer to insert (27, Figure 13-5).
4. Apply thin ring of retaining compound around top diameter and outside face of insert (27).
5. Using installer assembly, tap shaft with suitable hammer. Insure insert (27) is bottomed against counterbore.
6. Install four cylinder liners (26) in block (28, Figure 13-3).
7. Check liner projection. Refer to paragraph 3-7. Make temporary mark on liner and block to permit correct positioning during final installation.

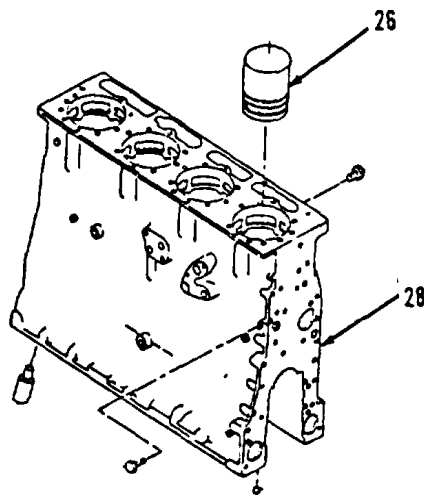


Figure 13-3.

Go to Sheet 6

ENGINE MAINTENANCE. (cont)

13-2. Cylinder Block and Liners. (Sheet 6 of 7)

INSTALLATION (cont)

8. Remove four cylinder liners (26) and apply liquid soap to 12 new preformed packings (25, Figure 13-4) grooves.
9. Install 12 new preformed packings (25) in cylinder liners (26). *Figure 13-4.*
10. Using oil, soak four bands (24) for 30 seconds and install.
11. Install items 26 thru 24 as an assembly in block (28). Four cylinder liners (26) must be installed quickly after bands (24) are installed before bands (24) swell. Use liner installer group to push items 26 thru 24 as an assembly to depth in block (28, Figure 13-3).
12. Recheck projection. Refer to paragraph 3-7.
13. Install four new orifices (23).
14. Check opening inside diameter which should be 0.093 to 0.097 inch.
15. Install five balls (22), plug (21) and two plugs (20).

Go to Sheet 7

13-8

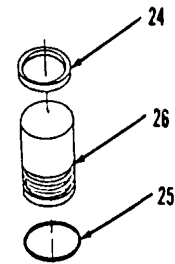
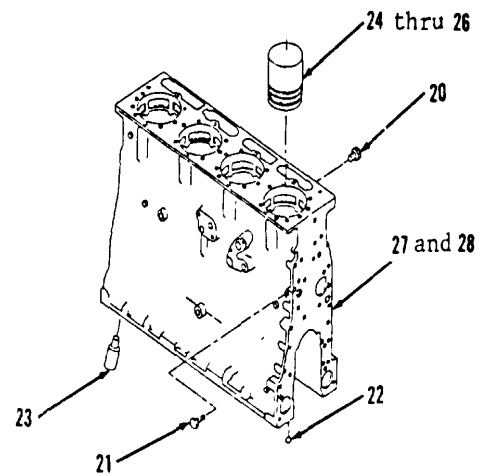


Figure 13-3.



ENGINE MAINTENANCE.

13-2. Cylinder Block and Liners. (Sheet 7 of 7)

INSTALLATION

16. Install new cup plug (19, Figure 13-2).
17. Install new washer (18) and plugs (17 thru 14).
18. Using collet and camshaft bearing installation group, install bearing (13) and two bearings (12). Oil holes in bearings must match oil holes in cylinder block with cinch butt joint above horizontal center line. Front bearing must be 0.00 to 0.20 inch from front face. Center bearing must be 11.917 to 11.957 inches from front face. Rear bearing must be 23.794 to 23.834 inches from front face.
19. Install two dowels (11).
20. Install new cup plug (10), stud (9) and dowel (8, Figure 13-1).
21. Install dowels (7 and 6), pin (5) and plug (4).
22. Install new gasket (3), new preformed packing (2) and plate (1).

NOTE

Return 130G Grader to original equipment condition.

End of Task

13-9

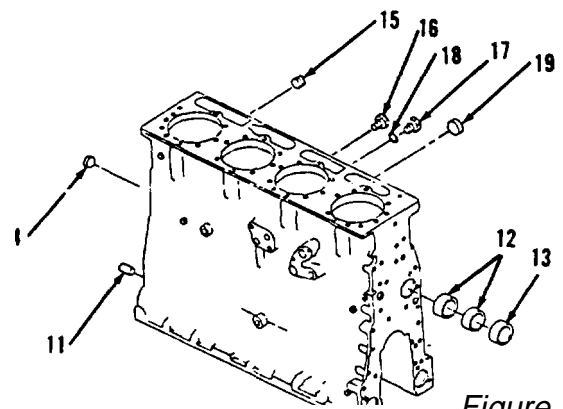


Figure 13-2.

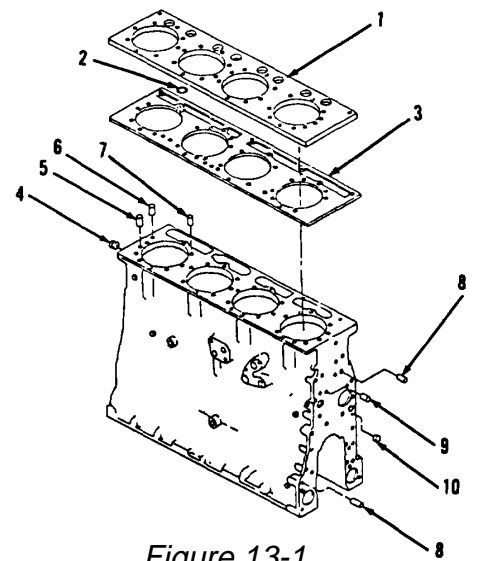


Figure 13-1.

ENGINE MAINTENANCE. (cont)

13-3. Cylinder Head Assembly Overhaul. (Sheet 1 of 6)

This task covers: a. Cleaning b. Inspection/Repair

INITIAL SETUP:

| | |
|----------------------------------|--|
| <u>Applicable Configurations</u> | <u>Personnel Required</u> |
| All | Construction equipment repairer MOS 62B |

Tools

| | |
|-----------------------------------|-------------------|
| General Mechanic's Tool Kit: | <u>References</u> |
| Automotive (NSN 5180-00-177-7033) | TM 5-3805-261-10 |

| | |
|---|---|
| Tank, parts cleaning, unheated | <u>Special Environmental Conditions</u> |
| Tank, parts cleaning, hot alkali solution | None |

| | |
|-------------------------------|------------------------------------|
| Thickness gage FT 1656 | <u>General Safety Instructions</u> |
| Valve guide gage group 5P3536 | None |

| | |
|---|----------------|
| Plug gage 6V7058 (may be used in place of 5P3526 group) | <u>Torques</u> |
|---|----------------|

| | |
|-----------------------|---|
| Grinding stone 6V4802 | All fasteners are tightened to standard torques. Refer to Appendix E. |
| Grinding wheel: | |

- Grit type - 23A
- Grit size - 46
- Hardness - H
- Structure - 12
- Bond - VBEP

Milling machine
Hoist and sling

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Cleaning solvent, alkali,
Item 63, Appendix C

**Go to Sheet 2
13-10**

ENGINE MAINTENANCE.

13-3. Cylinder Head Assembly Overhaul. (Sheet 2 of 6)

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10 Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 3-9 Cylinder head removed.

Paragraph 3-13 Valves and springs removed.

**Go to Sheet 3
13-11**

ENGINE MAINTENANCE. (cont)

13-3. Cylinder Head Assembly Overhaul. (Sheet 3 of 6)

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION/REPAIR

1. Position cylinder head on its intake port surface.
2. Insert gage or equivalent through fuel injection nozzle hole aligning one end of gage with straight edge placed across combustion surface and measure thickness (Figure 13-6). Replace if gage extends above combustion surface or head thickness is less than 3.774 inches. Repeat measurement at all nozzle holes (Figure 13-7).
3. Using a 24 inch straight edge and feeler gage, check flatness of combustion surface. Measure surface along each edge and both diagonals indicated as points "A" (Figure 13-8). If more than 0.006 inch from flat, discard and replace head. If less than 0.006 inch from flat, refer to step 11 for machining instructions to correct warpage. Check areas between valve ports shown as points "B" must be 0.003 inch or flatter.

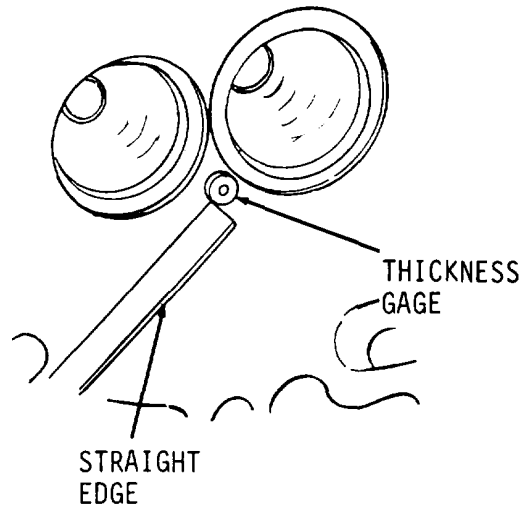


Figure 13-6.

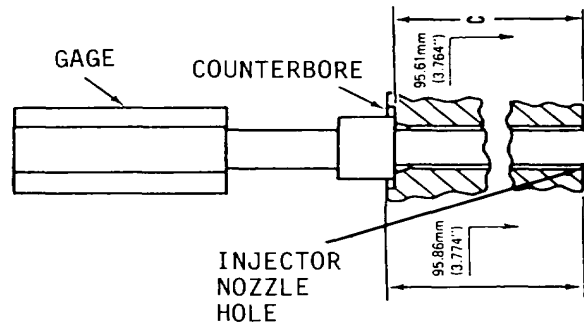


Figure 13-7.

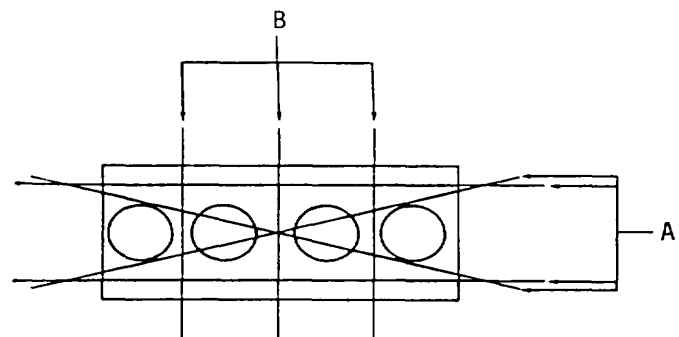


Figure 13-8.

**Go to Sheet 4
13-12**

ENGINE MAINTENANCE.

13-3. Cylinder Head Assembly Overhaul. (Sheet 4 of 6)

INSPECTION/REPAIR

- 4. Using magnetic particle, magnaflux or dye penetrant method, inspect combustion surface. Magnetic particle is preferred. Discard and replace head if cracks appear between valve seats and injector adapter holes. If cracks are in other areas and are less than 0.25 inch long and 0.125 inch deep, repair by welding.

- 5. Inspect combustion surface for damage and erosion across fire ring, seat area, between injector nozzle hole and valve seat area (Figure 13-9). Discard and replace head if erosion is severe. If erosion is slight, refer to step 11 for grinding instructions.

- 6. Using valve guide gage group, plug gage or equivalent measure inner diameter of both ends of each of eight valve guides. Maximum diameter is 0.3772 inch, minimum diameter is 0.3723 inch. Remove and replace guides worn beyond limits. Refer to paragraph 3-8.

- 7. Inspect all threaded holes for damaged threads, broken bolts or studs. Extract all broken bolts and studs. Repair damaged threads with threaded inserts.

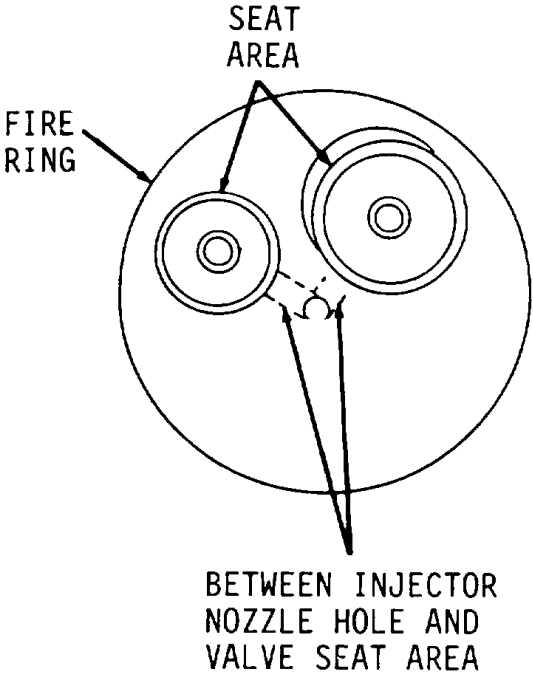


Figure 13-9.

Go to Sheet 5

ENGINE MAINTENANCE. (cont)

13-3. Cylinder Head Assembly Overhaul. (Sheet 5 of 6)

INSPECTION/REPAIR (cont)

8. Inspect valve seats on combustion surface. Remove and replace if cracked or badly burned. Refer to paragraph 3-12.
9. Inspect combustion surface for erosion. Check combustion chamber fire ring, oil passages, bolt holes and outer casting surface. If erosion has reduced any of these areas to 0.16 inch or less, you must grind the combustion surface.

WARNING

Wear safety goggles and respirator when grinding. Failure to follow this procedure may result in **SERIOUS INJURY**. If injured, seek medical aid immediately.

NOTE

Cylinder head may appear streaked or discolored after grinding. This appearance is normal and does not indicate any defect in either the material or reconditioning procedure. New cylinder heads from the factory may also have the same appearance but are completely satisfactory for use.

10. Using stone or equivalent, grind smooth all gas and coolant erosion on combustion surface (Figure 13-10).

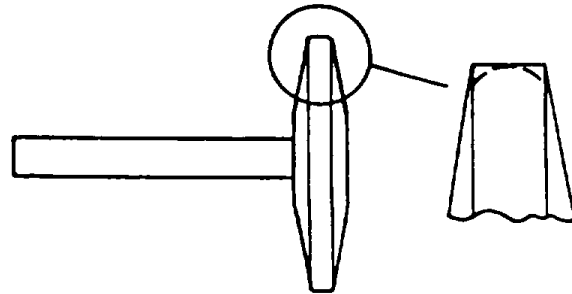


Figure 13-10.

Go to Sheet 6

ENGINE MAINTENANCE.

13-3. Cylinder Head Assembly Overhaul. (Sheet 6 of 6)

INSPECTION/REPAIR

11. Remove warpage of combustion surface. Use milling machine, table traverse 600 inches/minute, down feed 0.001 inch/cycle, grinding wheel per initial setup. Make 0.010 inch rough cut, 0.005 inch finish cut. Check thickness, refer to step 2. Check flatness. Refer to step 3.

NOTE

Return 130G Grader to original equipment condition.

**End of Task
13-15**

ENGINE MAINTENANCE. (cont)

13-4. Crankshaft Assembly. (Sheet 1 of 5)

This task covers: a. Removal b. Cleaning c. Inspection
 d. Installation

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:

References

Automotive (NSN 5180-00-
177-7033)

TM 5-3805-261-10

Hoist and sling Special Environmental Conditions

Puller assembly 8B7548 None

Ratchet box wrench 8H684

Step plate 8B7560 General Safety Instructions

Bearing puller attachment None
8B7551

3/4-16NC bolt Torques

Two 5/8-18NF bolts All fasteners are tightened to
to standard torques. Refer to

Test Equipment

Appendix E.

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C

Clean cloths, Item 41,
Appendix C

**Go to Sheet 2
13-16**

ENGINE MAINTENANCE.

13-4. Crankshaft Assembly. (Sheet 2 of 5)Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10 Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 3-4 Engine removed.
Paragraph 3-5 Trunnion and support removed.
Paragraph 3-6 Engine front covers removed.
Paragraph 3-9 Cylinder head removed.
Paragraph 3-11 Flywheel assembly removed.
Paragraph 3-13 Valves removed.
Paragraph 3-15 Oil pan and plate removed.
Paragraph 3-16 Oil pump removed.
Paragraph 13-5 Crankshaft main bearings removed.
Paragraph 13-8 Pistons removed.
Paragraph 13-10 Crankshaft front and rear seals and
wear sleeves removed.

**Go to Sheet 3
13-17**

ENGINE MAINTENANCE. (cont)

13-4. Crankshaft Assembly. (Sheet 3 of 5)

REMOVAL

1. Install 3/4-16NC bolt into gear end of crankshaft (Figure 13-11).
2. Install two 5/8-18NF bolts into flywheel end (rear) of crankshaft (3).

WARNING

Weight of crankshaft assembly is approximately 145 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

3. Install hoist and sling on three bolts in crankshaft (3).
4. Remove crankshaft (3).
5. Remove hoist and sling from crankshaft (3).
6. Using puller assembly, ratchet box wrench, step plate and bearing puller attachment, remove crankshaft gear (1) from crankshaft (3, Figure 13-12).
7. Remove four plugs (2).

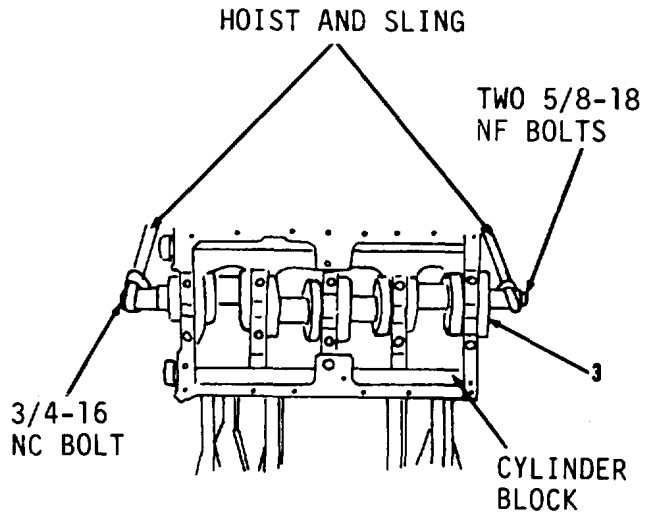


Figure 13-11.

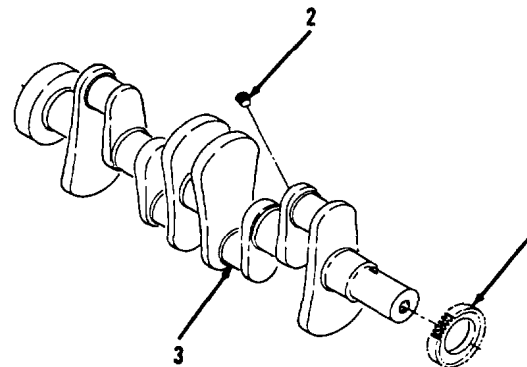


Figure 13-12.

**Go to Sheet 4
13-18**

ENGINE MAINTENANCE.

13-4. Crankshaft Assembly. (Sheet 4 of 5)

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Replace four plugs (2, Figure 13-12) on crankshaft (3).
2. Heat crankshaft gear (1) to a maximum temperature of 600 degrees F.
3. Install crankshaft gear (1) on end of crankshaft (3) with C mark facing out and away from front of crankshaft (3, Figure 13-13).
4. Turn camshaft gear until C mark on camshaft is positioned toward C mark on crankshaft (3) when installed.

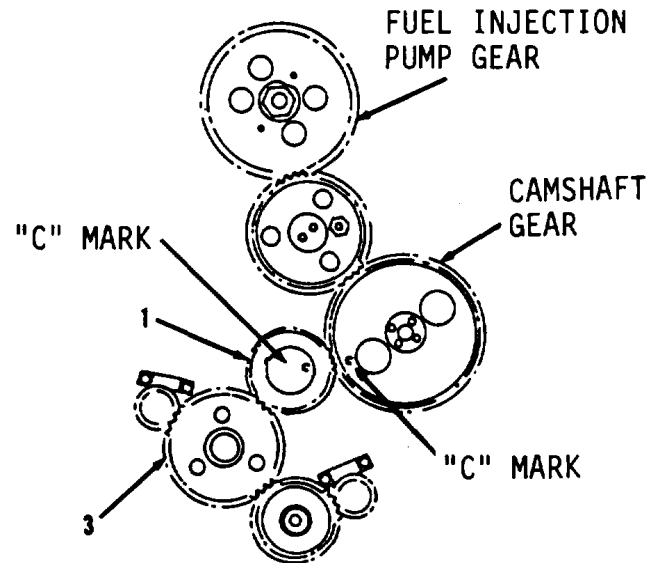


Figure 13-13.

Go to Sheet 5 13-19

ENGINE MAINTENANCE. (cont)

13-4. Crankshaft Assembly. (Sheet 5 of 5)

INSTALLATION (cont)

- 5. Using hoist and sling, position crankshaft (3, Figure 13-11) on cylinder block. Make sure the C marks are in alignment.
- 6. Remove hoist and sling from crankshaft (3).

NOTE

Return 130G Grader to original equipment condition.

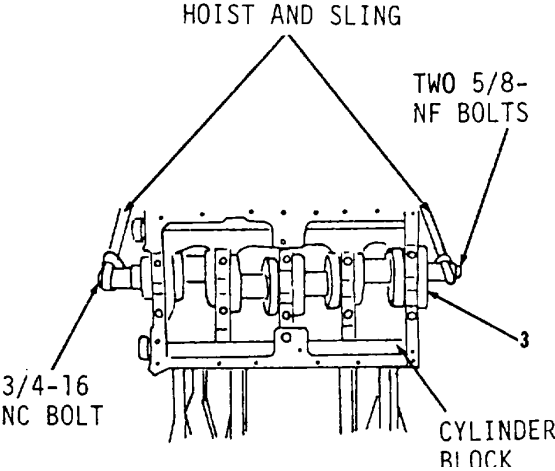


Figure 13-11.

**End of Task
13-20**

ENGINE MAINTENANCE.

13-5. **Crankshaft Main Bearings.** (Sheet 1 of 12)

This task covers: a. Removal b. Cleaning c. Inspection
d. Installation

INITIAL SETUP:

Applicable Configurations All
Personnel Required Construction equipment repairer MOS 62B

Tools General Mechanic's Tool Kit: References TM 5-3805-261-10
Automotive (NSN 5180-00-177-7033)

Main bearing removal and installation tool 2P5518 Special Environmental Conditions None

Test Equipment General Safety Instructions
Dial test indicator 8S2328 None

Materials/Parts Torques
Dry cleaning solvent, Item 15, Appendix C Except for special torques shown, all fasteners are tightened to standard torques. Refer to Appendix E.
Clean cloths, Item 41, Appendix C
Lubricating oil, Item 33, Appendix C
Main bearings 8N8223
Thrust plates 7N9342
Plastigage

Troubleshooting References
None

Equipment Condition
TM 5-3805-261-10 Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Paragraph 3-4 Engine removed.
Paragraph 3-10 Vibration damper removed.
Paragraph 3-11 Flywheel removed.
Paragraph 3-15 Oil pan removed.
Paragraph 3-16 Oil pump removed.

Go to Sheet 2
13-21

ENGINE MAINTENANCE. (cont)

13-5. Crankshaft Main Bearings. (Sheet 2 of 12)

REMOVAL (Front, Center and Rear Main Bearings and Thrust Bearings)

NOTE

- This task is divided into two sections: removal of front, center and rear main bearings and thrust bearings and removal of two intermediate main bearings.

- Each crankshaft bearing cap has a number and an arrow. The number indicates the cap's location in the engine. It matches a number on the outside of the block, next to which the cap is to be installed. The caps are numbered in order, from front of cylinder block to rear. The arrow on each cap must point toward engine front.

1. Remove six bolts (1), washers (2) and three items 3 and 4 as an assembly (Figure 13-14).
2. Remove and discard lower half of three main bearings (4) from crankshaft bearing caps (3, Figure 13-15).
3. Install dial test indicator on clean, machined surface at bottom of cylinder block, fourth main bearing journal from front (Figure 13-16).
4. Adjust contact pin until it just touches the side edge of crankshaft journal.
5. Adjust dial face so indicator reads "zero."

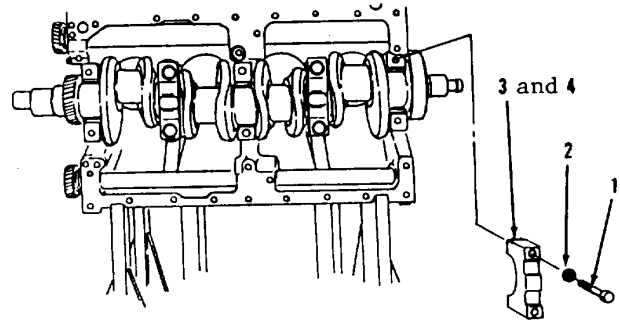


Figure 13-14.

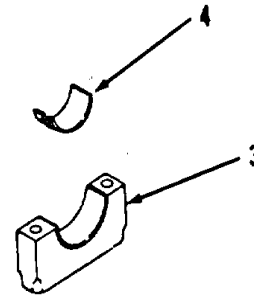
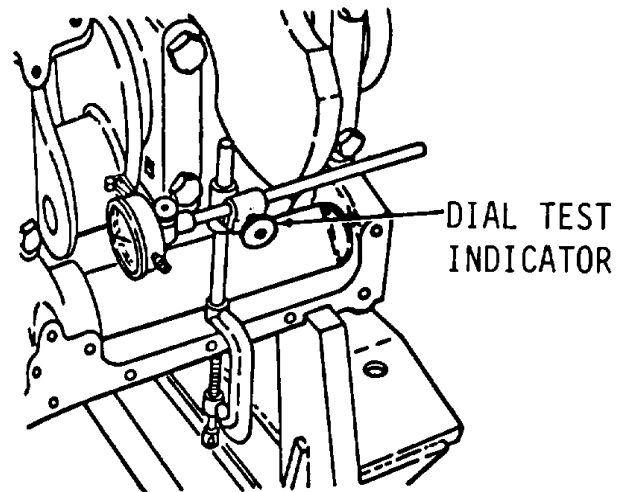


Figure 13-15.



**Go to Sheet 3
13-22**

Figure 13-16.

ENGINE MAINTENANCE.

13-5. **Crankshaft Main Bearings.** (Sheet 3 of 12)

REMOVAL (Front, Center and Rear Main Bearings and Thrust Bearings) (cont)

CAUTION

Do not use metal hammer to move crankshaft back and forth. Do not contact machined crankshaft surfaces with metal prybar. Failure to follow this procedure could result in damage to equipment.

- 6. Move crankshaft forward and backward, observing dial indicator to determine end play.
- 7. Record end play on dial indicator.
- 8. Remove dial indicator.
- 9. Remove and discard two thrust bearings (5, Figure 13-17) from rear crankshaft journal if crankshaft end play is less than 0.006 inch or more than 0.020 inch.
- 10. Install tool in oil hole of crankshaft journal where upper main bearings (6, Figure 13-18) are to be removed.

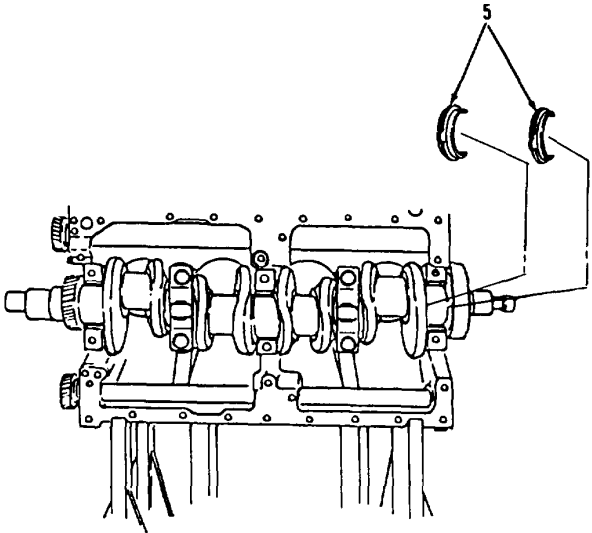


Figure 13-17.

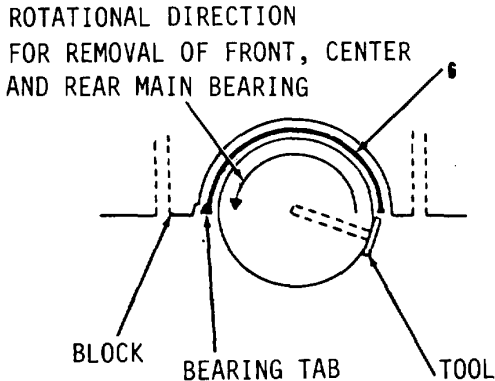


Figure 13-18.

**Go to Sheet 4
13-23**

ENGINE MAINTENANCE. (cont)

13-5. Crankshaft Main Bearings. (Sheet 4 of 12)

REMOVAL (Front, Center and Rear Main Bearings and Thrust Bearings) (cont)

CAUTION

Crankshaft must be rotated in direction of normal engine rotation when removing main bearings. Engine rotation is counterclockwise when viewed from rear. Failure to follow this procedure could result in damage to block, crankshaft, or both.

11. Rotate crankshaft and tool against upper main bearings (6) in direction of normal engine rotation.
12. Remove and discard upper half of three main bearings (6, Figure 13-19).

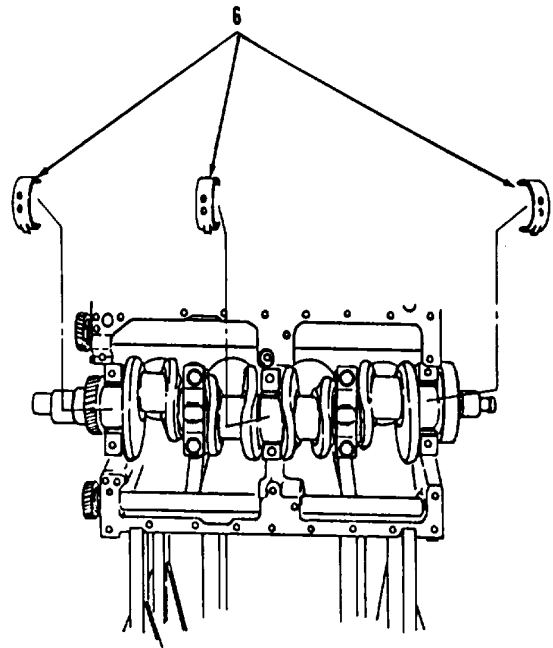


Figure 13-19.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION (Front, Center and Rear Main Bearings)

1. Coat three new lower main bearings (4, Figure 13-20) with clean engine oil.
2. Install in crankshaft bearing caps (3) with bearing tab toward tab locator in block.

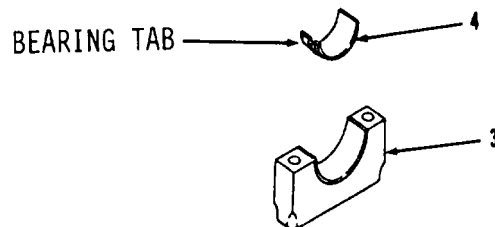


Figure 13-20.

Go to Sheet

5

13-24

ENGINE MAINTENANCE.

13-5. Crankshaft Main Bearings. (Sheet 5 of 12)

INSPECTION (Front, Center and Rear Main Bearings)

CAUTION

New upper main bearings must be installed with locating tabs positioned in slot of cylinder block. Failure to follow this procedure could result in damage to block, crankshaft, or both.

3. Install tool in crankshaft journal (Figure 13-21).
4. Coat upper half of three main bearings (6, Figure 13-19) with clean engine oil.
5. Position three upper main bearings (6) in cylinder block above front, center and rear crankshaft journals with bearing tabs toward tab locators in block.

CAUTION

When installing bearings in cylinder block, crankshaft must be rotated in **OPPOSITE DIRECTION** from normal engine rotation. Failure to follow this procedure could result in damage to block, crankshaft, or both.

6. Rotate crankshaft and tool against new upper main bearings (6, Figure 13-21) to push bearings into position. For this step, rotate crankshaft clockwise when engine is viewed from rear.
7. Cut plastigage in three pieces approximately 1-1/2 inches long.

ROTATIONAL DIRECTION FOR INSTALLATION OF FRONT, CENTER AND REAR MAIN BEARING

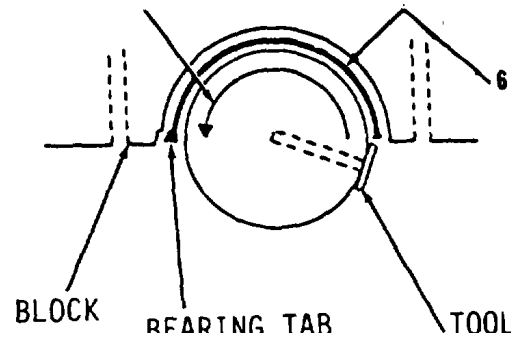


Figure 13-21.

Go to Sheet 6

ENGINE MAINTENANCE. (cont)

13-5. Crankshaft Main Bearings. (Sheet 6 of 12)

INSPECTION (Front, Center and Rear Main Bearings) (cont)

8. Position one piece of plastigage inside surface of lower main bearing (4) in each crankshaft bearing cap (3, Figure 13-22).

CAUTION

Arrow in bottom of crankshaft bearing cap must face front of engine; number on cap must match bearing number on outside of cylinder block. Failure to follow this procedure could result in damage to equipment.

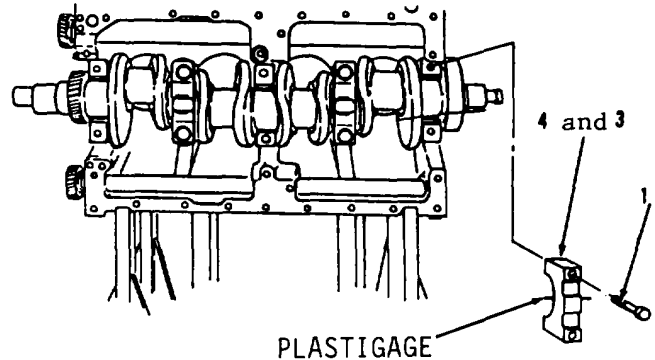


Figure 13-22.

9. Position three items 4 and 3 as an assembly and plastigage under crankshaft journal, aligning holes.
10. Coat six bolts (1) with clean engine oil and install finger tight.
11. Tighten six bolts (1) at bearing tab side of bearing cap (3, Figure 13-23) to 30 ft-lb torque.
12. Mark six bolts (1) and three bearing caps (3) with chalk.
13. Tighten three of six bolts (1) opposite tab side of three bearing caps (3) a further 90 degrees, using chalk mark as an aid in estimating how far to tighten three of six bolts (1).

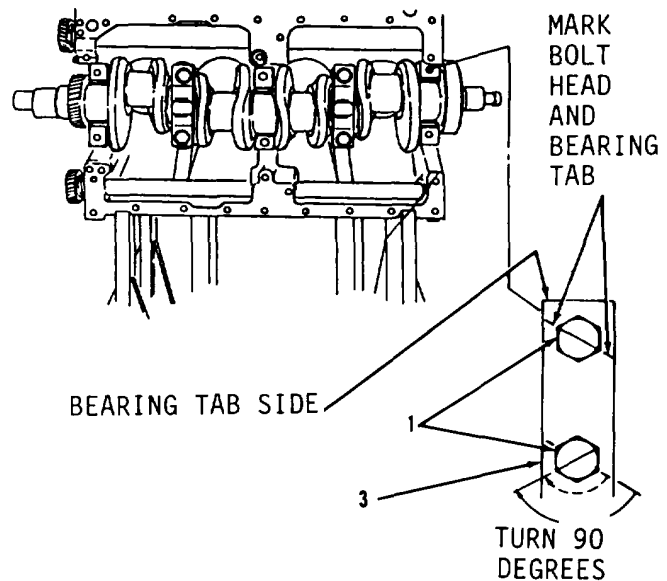


Figure 13-23.

**Go to Sheet
7**

ENGINE MAINTENANCE.

13-5. Crankshaft Main Bearings. (Sheet 7 of 12)

INSPECTION (Front, Center and Rear Main Bearings)

14. Remove six bolts (1) and three items 3 and 4 as an assembly (Figure 13-22).
15. Remove plastigage.
16. Using micrometer, measure and record thickness of plastic gage.
17. Compare recorded measurements from step 16 with range of 0.0037 to 0.0068 inch. Replace crankshaft if measurement falls outside this range.

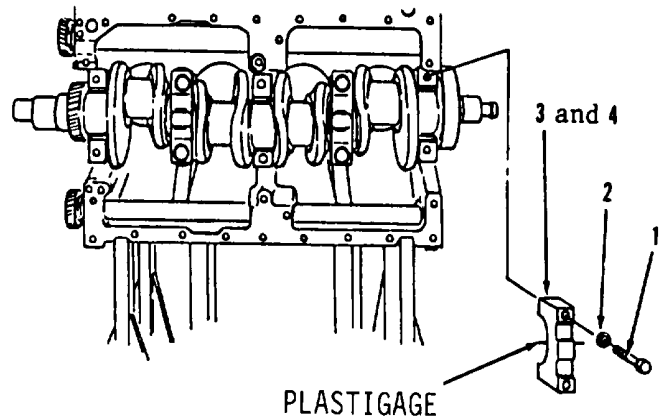


Figure 13-

INSTALLATION (Front, Center and Rear Main Bearings and Thrust Bearings)

1. Install two new thrust bearings (5, Figure 13-17) on crankshaft journal of rear main bearing, fifth bearing from front.
2. Position three items 4 and 3 as an assembly (Figure 13-14) under crankshaft journal of rear main bearing, aligning holes.
3. Coat six washers (2) and bolts (1) with clean engine oil and install finger tight.

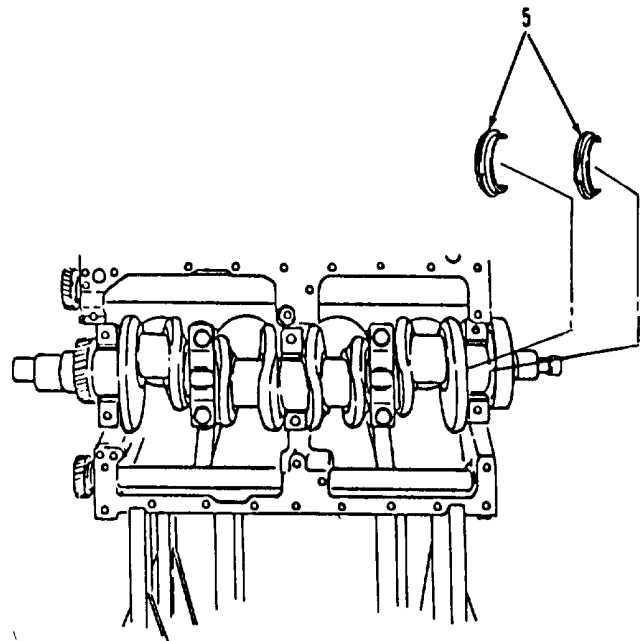


Figure 13-

Go to Sheet 8

ENGINE MAINTENANCE. (cont)

13-5. Crankshaft Main Bearings. (Sheet 8 of 12)

INSTALLATION (Front, Center and Rear Main Bearings and Thrust Bearings) (cont)

4. Tighten three of six bolts (1) at bearing tab side of three bearing caps (3, Figure 13-23) to 30 ft-lb torque.
5. Tighten three of six bolts (1) opposite bearing tab side of three bearing caps (3) to 30 ft-lb torque.
6. Mark six bolts (1) and three bearing caps (3) with chalk.
7. Tighten three of six bolts (1) opposite bearing tab side of three bearing caps (3) a further 90 degrees, using chalk mark as an aid in estimating how far to tighten bolts (1).
8. Tighten three of six bolts (1) at bearing tab side of three bearing caps (3) a further 90 degrees.

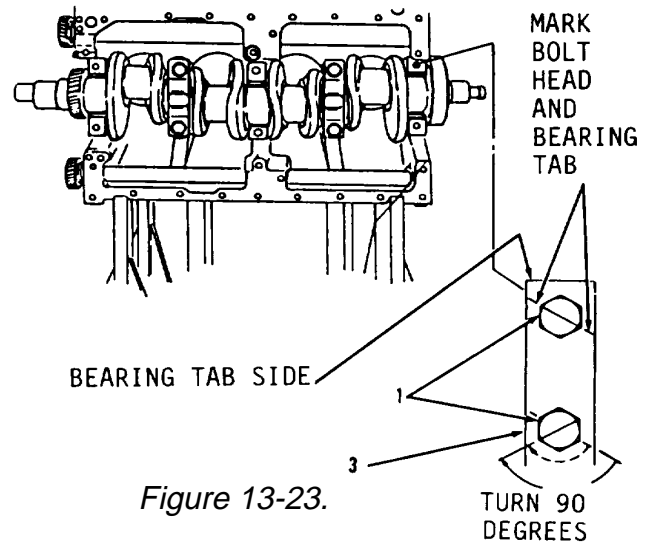


Figure 13-23.

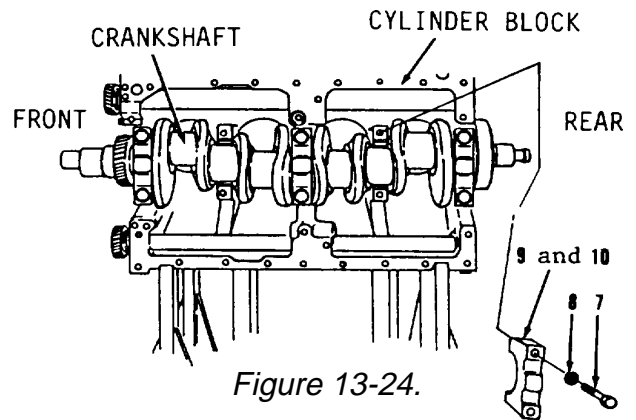


Figure 13-24.

REMOVAL (Intermediate Main Bearings)

1. Remove four bolts (7), washers (8) and two items 9 and 10 as an assembly (Figure 13-24).
2. Remove lower half of two intermediate main bearings (10) from two crankshaft bearing caps (9, Figure 13-25).

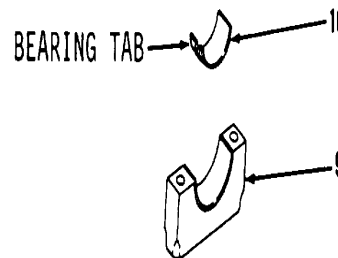


Figure 13-25.

Go to Sheet 9

ENGINE MAINTENANCE.

13-5. Crankshaft Main Bearings. (Sheet 9 of 12)

REMOVAL (Intermediate Main Bearings)

3. Install tool in oil hole of crankshaft journal where two bearings (11, Figure 13-26) are to be removed.

CAUTION

Crankshaft must be rotated in direction of normal engine rotation when removing main bearings. Engine rotation is counterclockwise when viewed from rear. Failure to follow this procedure could result in damage to block, crankshaft, or both.

4. Rotate crankshaft and tool against upper half of two intermediate main bearings (11) in direction of normal engine rotation.
5. Remove and discard upper half of two intermediate main bearings (11, Figure 13-27).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION (Intermediate Main Bearings)

1. Coat two new lower intermediate main bearings (10, Figure 13-28) with clean engine oil.
2. Install in two crankshaft bearing caps (9) with bearing tab toward tab locator in block.
3. Install tool in crankshaft journal (Figure 13-29).

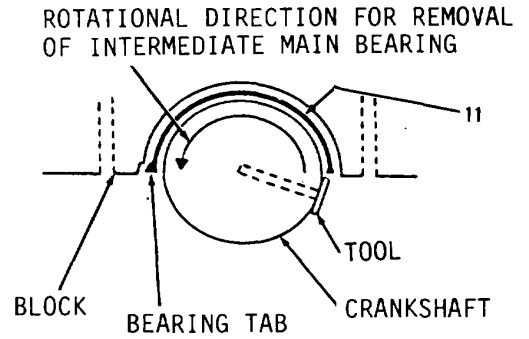


Figure 13-26.

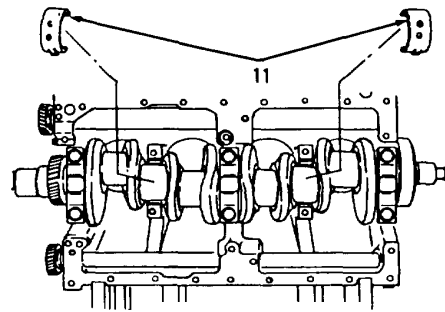


Figure 13-27.

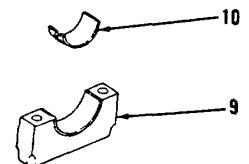


Figure 13-28.

ROTATIONAL DIRECTION FOR INSTALLATION OF INTERMEDIATE MAIN BEARING

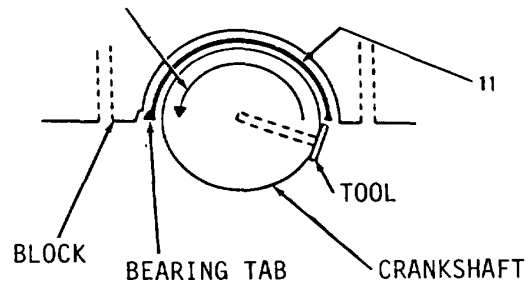


Figure 13-29.

Go to Sheet 10

ENGINE MAINTENANCE. (cont)

13-5. Crankshaft Main Bearings. (Sheet 10 of 12)

INSPECTION (Intermediate Main Bearings)
(cont)

CAUTION

When installing intermediate bearings in cylinder block, crankshaft must be rotated in OPPOSITE DIRECTION from normal engine rotation. Failure to follow this procedure could result in damage to block, crankshaft, or both.

4. Position two new upper intermediate main bearings (11, Figure 13-27) in cylinder block above crankshaft journal with bearing tab toward tab locator in block.
5. Rotate crankshaft and tool against two new upper intermediate bearings (11) to push bearings (11, Figure 13-29) into position. For this step, rotate crankshaft clockwise when engine is viewed from rear.
6. Cut two pieces of plastigage approximately 1-1/2 inches long and position one piece on inside surface of bearing (10) in each of two crankshaft bearing caps (9, Figure 13-30).

CAUTION

Arrow on bottom of bearing caps must face front of engine; number on cap must match bearing number on outside of cylinder block. Failure to follow this procedure could result in damage to equipment.

7. Position two items 10 and 9 as an assembly and plastigage under crankshaft journal, aligning holes.
8. Coat four bolts (7) with clean engine oil and install finger tight.

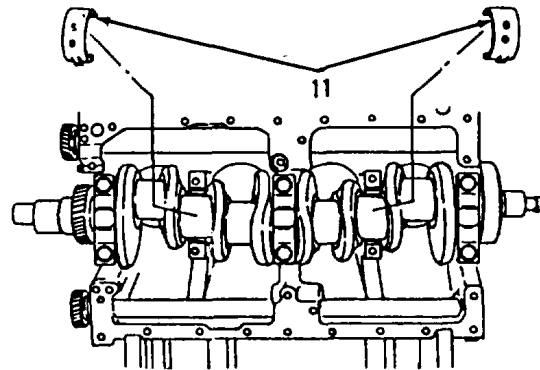


Figure 13-

ROTATIONAL DIRECTION FOR INSTALLATION OF INTERMEDIATE MAIN BEARING

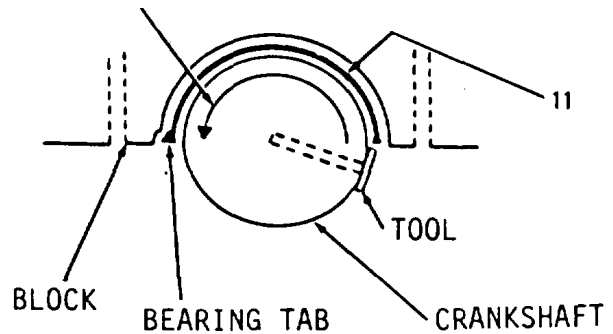


Figure 13-

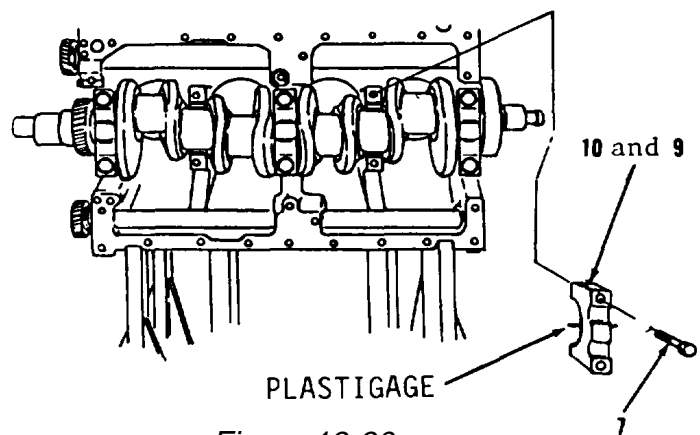


Figure 13-30.

Go to Sheet 11

ENGINE MAINTENANCE.

13-5. Crankshaft Main Bearings. (Sheet 11 of 12)

INSPECTION (Intermediate Main Bearings)

11. Tighten two of four bolts (7) opposite tab side of two bearing caps (9) a further 90 degrees, using chalk mark as an aid in estimating how far to tighten bolts (7).
12. Remove four bolts (7) and two items 10 and 9 as an assembly (Figure 13-30).
13. Remove plastigage.
14. Using micrometer, measure and record thickness.
15. Compare recorded measurements from step 14 with range of 0.0037 to 0.0068 inch. Replace crankshaft if measurement falls outside this range.

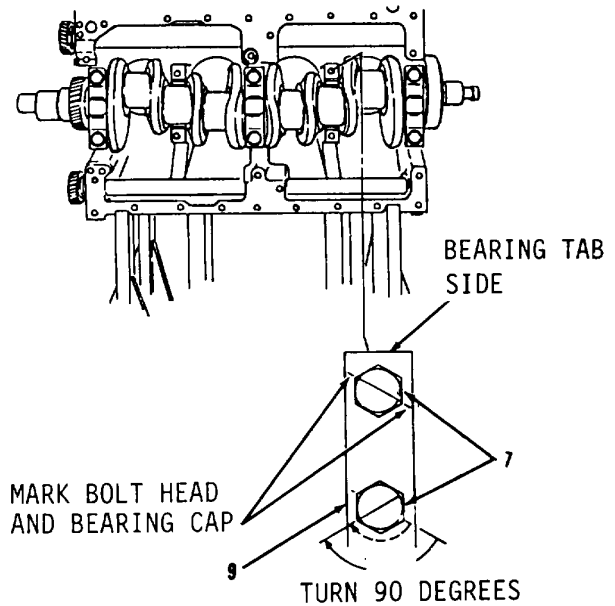


Figure 13-31.

**Go to Sheet 12
13-31**

ENGINE MAINTENANCE. (cont)

13-5. Crankshaft Main Bearings. (Sheet 12 of 12)

INSTALLATION (Intermediate Main Bearings)

1. Position two items 10 and 9 as an assembly (Figure 13-24) under crankshaft journal of intermediate main bearing, aligning holes.
2. Coat four washers (8) and bolts (7) with clean engine oil and install finger tight.
3. Tighten two of four bolts (7) at bearing tab side of two bearing caps (9, Figure 13-31) to 30 ft-lb torque.
4. Tighten two of four bolts (7) opposite bearing tab side of two intermediate bearing caps (9) to 30 ft-lb torque.
5. Mark four bolts (7) and two bearing caps (9) with chalk.
6. Tighten two of four bolts (7) opposite bearing tab side of two intermediate main bearing caps (9) a further 90 degrees, using chalk mark as an aid in estimating how far to tighten two of four bolts (7).
7. Tighten two of four bolts (7) at bearing tab side of two intermediate main bearing caps (9) a further 90 degrees.

NOTE

Return 130G Grader to original equipment condition.

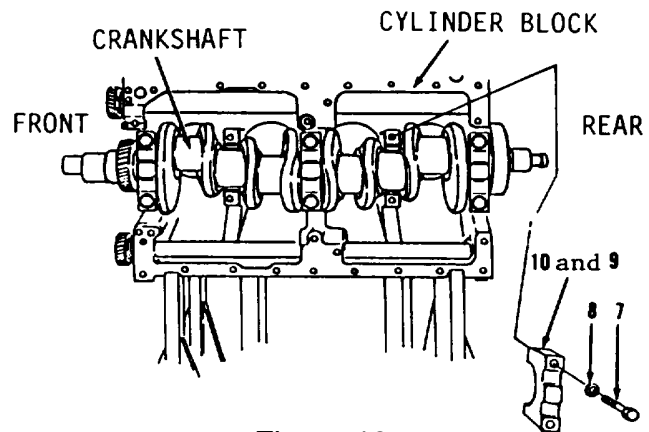


Figure 13-

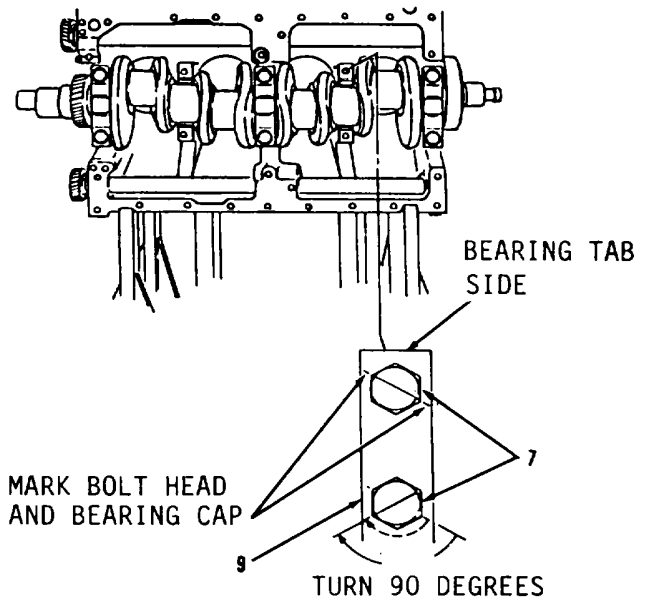


Figure 13-

End of Task

ENGINE MAINTENANCE.

13-6. Balancer Shaft Assembly and Bearings. (Sheet 1 of 4)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Camshaft bearing tool group
8S2241

References

TM 5-3805-261-10
TM 5-3805-261-20

Special Environmental Conditions

None

Test Equipment

None

General Safety Instructions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Hydraulic pump gear train removed.

Paragraph 3-4
Paragraph 3-6
Paragraph 3-13

Engine removed.
Engine front cover removed.
Oil pan and plate removed.

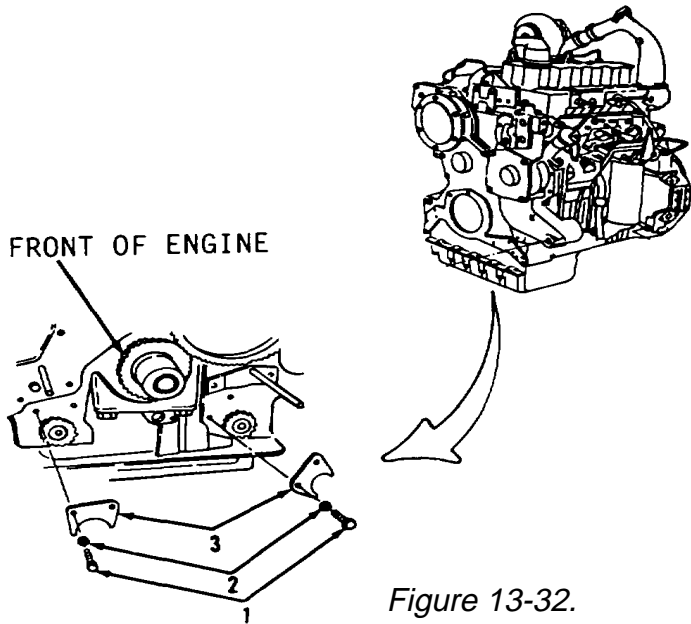
Go to Sheet 2

ENGINE MAINTENANCE. (cont)

13-6. Balancer Shaft Assembly and Bearings.

REMOVAL

1. Remove four bolts (1), two thrust plates (2) and four washers (3, Figure 13-32) from front engine block.
2. Remove items 4 thru 6 as an assembly (Figure 13-33). Mark two balancer shafts (4) to make sure they are installed in their original place.
3. Remove two gears (5) and keys (6) from balancer shafts (4, Figure 13-34).
4. Using camshaft bearing tool group and ratchet box wrench, remove two bearings (7) and bearing sleeves (8 and 9, Figure 13-35).

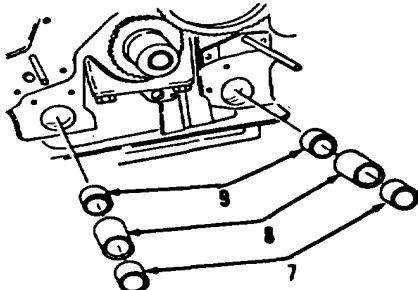
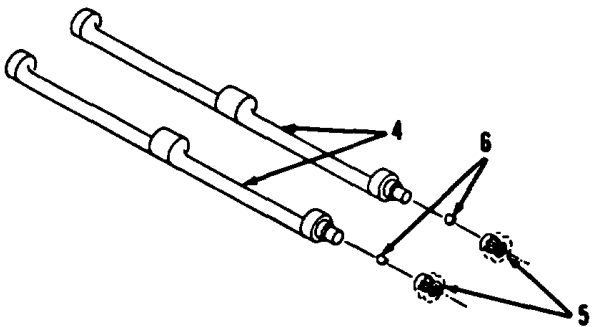
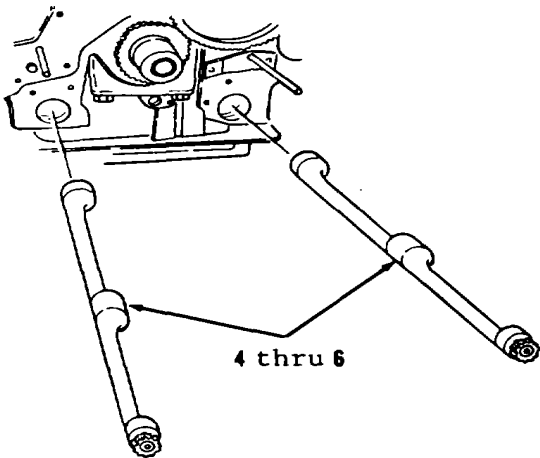


CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.



Go to Sheet 3

ENGINE MAINTENANCE.

13-6. Balancer Shaft Assembly and Bearings. (Sheet 3 of 4)

INSTALLATION**NOTE**

Make sure that the oil holes in bearing sleeves are in alignment with oil holes in cylinder block.

1. Install two bearing sleeves (9). Front of bearing sleeves (9, Figure 13-35) must be 23.64 to 23.68 inches from the front surface of the cylinder block.
2. Install two bearing sleeves (8). The front of bearing sleeves (8) must be 11.42 to 11.46 inches from the front surface of the cylinder block.
3. Using camshaft bearing tool group and ratchet box wrench, install two bearing sleeves (7) in engine block. The bearing sleeve must be .01 to .05 inch inside end of cylinder block after installation.
4. Turn crankcase. No. 1 piston must be in the top center compression position.
5. Install two keys (6) in balancer shafts (4, Figure 13-34)).
6. Install two gears (5).
7. Using engine oil, lubricate two items 6 thru 4 as an assembly (Figure 13-33) and install in cylinder block.
8. Install two thrust plates (2), four washers (3) and bolts (1, Figure 13-32).

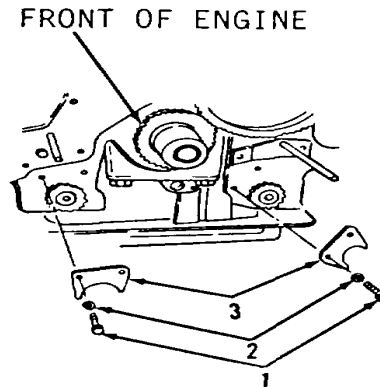
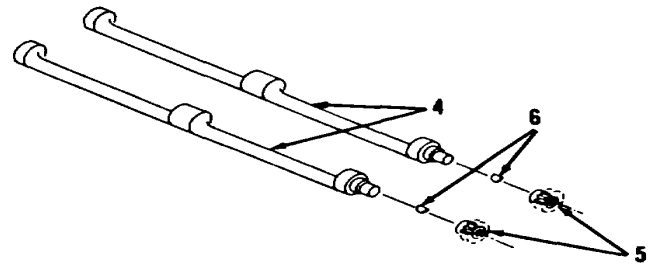
Go to Sheet 4

ENGINE MAINTENANCE. (cont)**13-6. Balancer Shaft Assembly and Bearings. (Sheet 4 of 4)****INSTALLATION (cont)**

8. Install two thrust plates (2), four washers (3) and bolts (1, Figure 13-32).
9. Turn two balancer shafts (4) until the flat part of both balancer shafts (4, Figure 13-34) is away from bottom of block.
10. Install two 3/8-16NC bolts 1-1/2 inches long in balancer shafts (4). This immobilizes balancer shafts (4).
11. Install oil pump. Refer to paragraph 3-15.
12. Remove two 3/8-16NC bolts, 1-1/2 inches long.

NOTE

- Balancer shaft timing is correct when holes in shaft are in alignment with the holes in oil pan plate and piston NO. 1 is at top center compression position.
- Return 130G Grader to original equipment condition.

*Figure 13-**Figure 13-***End of Task**

ENGINE MAINTENANCE.

13-7. Flywheel Assembly. (Sheet 1 of 3)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Gear

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 3-11

Flywheel removed.

Go to Sheet 2

13-37

ENGINE MAINTENANCE. (cont)**13-7. Flywheel Assembly. (Sheet 2 of 3)****DISASSEMBLY****CAUTION**

Separate gear from flywheel only if inspection indicates replacement of gear is necessary.

1. Inspect gear and flywheel (Figure 13-36). Replace gear if teeth are broken, chipped or cracked.
2. Using hammer and punch, drive gear evenly from flywheel and separate, if necessary. If removal is difficult, heat gear with torch.
3. Inspect gear and flywheel. Mating surface of gear and flywheel must not be grooved or scored.

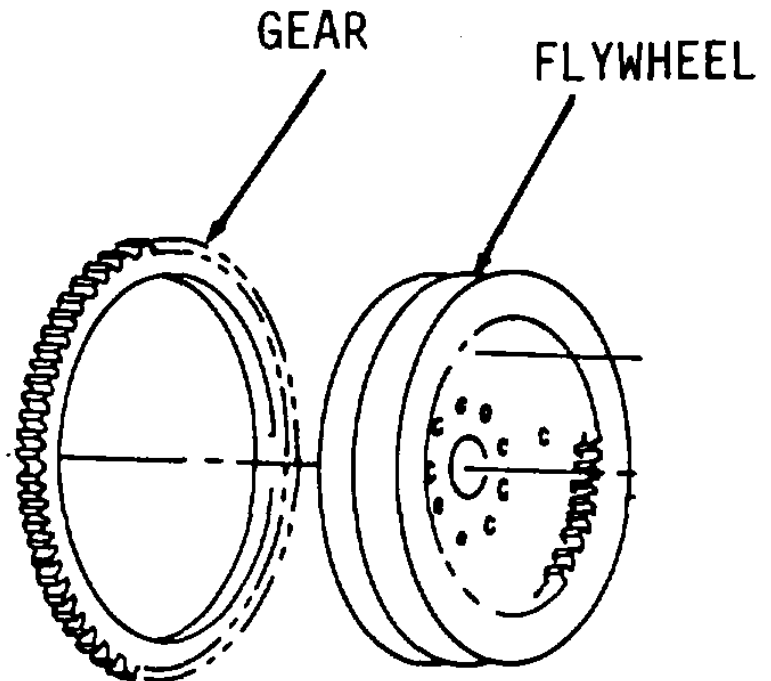


Figure 13-36.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

Go to Sheet 3

ENGINE MAINTENANCE.**13-7. Flywheel Assembly. (Sheet 3 of 3)****ASSEMBLY**

1. Using oven, heat gear (Figure 13-36). Do not exceed a temperature greater than 600 degrees F.
2. Install gear immediately, if removed. Gear must face engine and face of gear must rest flush against shoulder of flywheel. Allow gear time to cool (Figure 13-37).

NOTE

Return 130G Grader to original equipment condition.

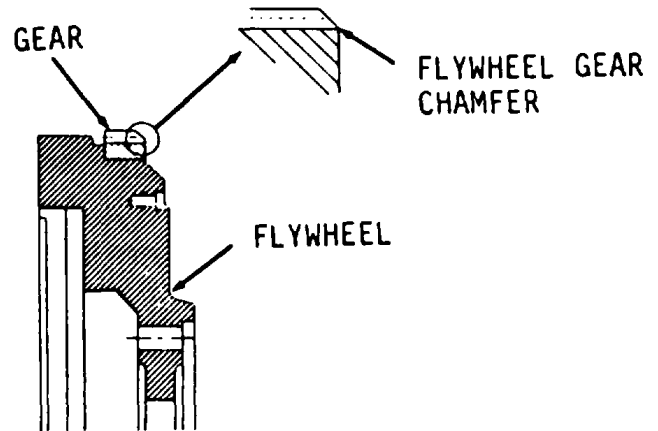


Figure 13-37.

End of Task

13-39

ENGINE MAINTENANCE. (cont)**13-8. Piston and Connecting Rod. (Sheet 1 of 12)****This task covers:**

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

INITIAL SETUP:Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-177-7033)
 Ridge reamer
 Piston ring expander
 Piston ring compressor
 3/4 inch NF bolts
 3/4 inch flat copper washers
 Keystone piston ring groove gage 5P4812
 Micrometer
 Wooden dowel
 Retaining ring pliers
 Groove cleaning tool
 Bore gage
 Press and rod
 Oven
 Boring machine

Test Equipment

None

Materials/Parts

Dry cleaning solvent, Item 15, Appendix C
 Clean cloths, Item 41, Appendix C
 Lubricating oil, Item 36, Appendix C
 Bearing, Item 9
 Piston rings, Items 3, 4
 Oil ring, Item 5
 Pin bearings
 Rod bearings
 Fine steel wool
 Fine wire

Personnel Required

Two construction equipment repairers MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown, all fasteners are tightened to standard torques. Refer to Appendix E.

Go to Sheet 2**13-40**

ENGINE MAINTENANCE.

13-8. Piston and Connecting Rod. (Sheet 2 of 12)

Troubleshooting References
None

Equipment Condition
TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 3-9
Paragraph 3-15

Cylinder head removed.
Oil pan removed.

Go to Sheet 3

13-41

ENGINE MAINTENANCE. (cont)**13-8. Piston and Connecting Rod. (Sheet 3 of 12)****REMOVAL****CAUTION**

A ridge reamer must be used to remove the carbon ridge at the top of the cylinder wall. Use of any other tool may result in damage to the cylinder wall. Failure to remove the ridge could result in piston damage during removal and piston ring damage during installation.

NOTE

The following is a maintenance procedure for one piston and connecting rod set. All pistons and connecting rods are overhauled at the same time. The maintenance procedure for the remaining piston and connecting rod sets is identical.

1. Using ridge reamer, remove ridge from top of four cylinder liners. If a metal ring is deformed, replace cylinder liner and ring. Refer to paragraph 13-2.

Go to Sheet 4

ENGINE MAINTENANCE.

13-8. Piston and Connecting Rod. (Sheet 4 of 12)

REMOVAL

CAUTION

To prevent warping the plate, you must torque the bolts in the following procedure in two steps. Copper washers must be used to prevent damage to the plate.

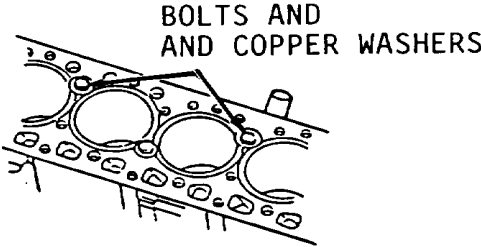


Figure 13-38.

- 2. Install 12 3/4 x 3NF bolts and 24 3/4 inch copper washers (Figure 13-38) in block to secure top plate and cylinder liners. Use two washers for each bolt. Tighten bolts in two steps, 15 ft-lb, then 40 ft-lb torque.
- 3. Rotate crankshaft counterclockwise on front of cylinder block until two connecting rods are bottom, dead center.
- 4. Inspect connecting rod (11) and cap (2, Figure 13-39) on bottom of cylinder block for identifying mark. If no mark is present, scribe or stamp numbers to ensure installation in original location.
- 5. Remove two nuts (1) and items 2 and 12 as an assembly (Figure 13-40).

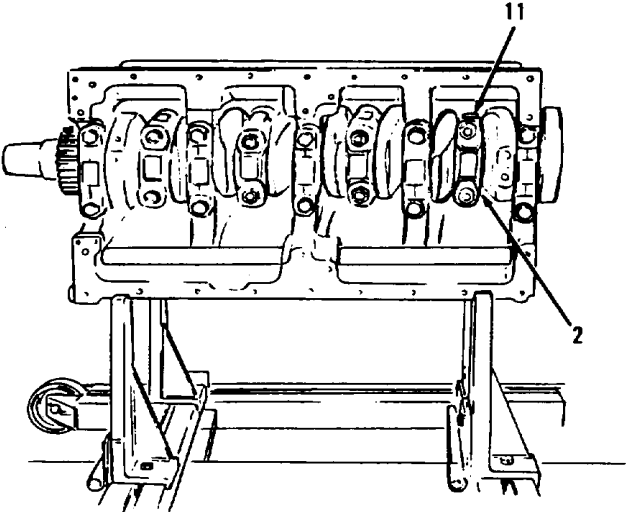


Figure 13-39.

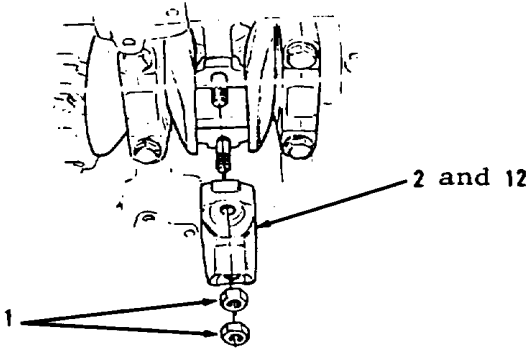


Figure 13-40.

Go to Sheet 5

ENGINE MAINTENANCE. (cont)

13-8. Piston and Connecting Rod. (Sheet 5 of 12)

REMOVAL (cont)

6. Using a wooden dowel to prevent damage to liner, push up items 3 thru 12 as an assembly (Figure 13-41).
7. Remove items 3 thru 12 as an assembly through top of cylinder block.
8. Install items 2 and 12 as an assembly and two nuts (1) on items 3 thru 12 as an assembly (Figure 13-42) to prevent possible mismatching during installation.

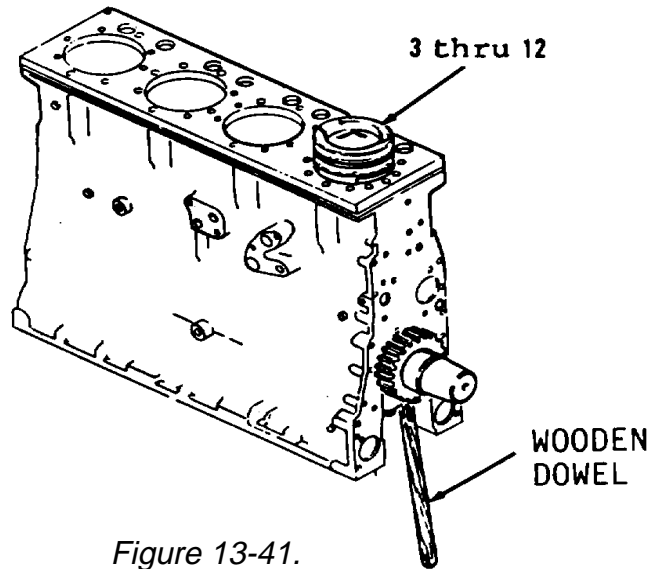


Figure 13-41.

NOTE

Repeat steps 3 thru 8 for remaining connecting rod and piston sets. Keep all sets separated and identified.

CAUTION

Piston ring expander must be used to remove rings. Use of any other tool may result in damage to piston lands.

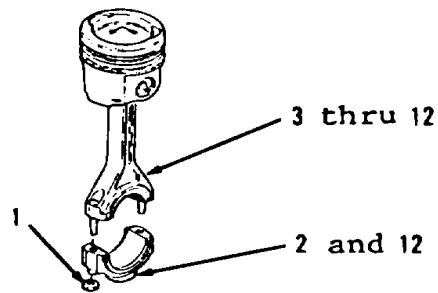


Figure 13-42.

9. Using piston ring expander, remove top piston ring (3), second piston ring (4) and oil ring (5) from piston (8, Figure 13-43).
10. Using retaining ring pliers, remove two retaining rings (6).
11. Remove pin (7).
12. Remove piston (8).

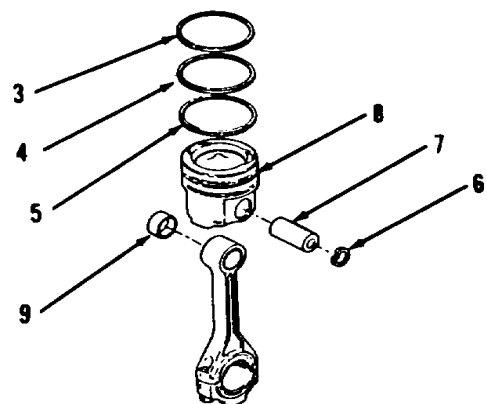


Figure 13-43.

Go to Sheet 6

ENGINE MAINTENANCE. (cont)

13-8. Piston and Connecting Rod. (Sheet 6 of 12)

REMOVAL (cont)

NOTE

Perform the following step only if piston pin bearing needs replacement.

- 13. Using press and rod to press out bearing, remove bearing (9), if necessary.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

NOTE

Sets of bearings, connecting rods and caps must be installed in the same cylinder from which they were removed. Keep each set separate. Inspect one at a time.

- 1. Inspect cap (2) and connecting rod (11, Figure 13-44). Replace as an assembly if cracked, pitted, scored or excessively worn.
- 2. Inspect piston (8). Replace if cracked, scored, grooves damaged or signs of overheating.
- 3. Measure bore diameter of piston pin bearing (9). Use bore gage and measure in two places, 90 degrees apart. The correct dimension is 1.7012 inches. Replace piston pin bearing (9) if dimension is not correct.
- 4. Measure bore diameter in piston (8) for pin (7). Use bore gage and measure in two places, 90 degrees apart. The correct dimension is 1.07006 inches. Replace piston (8) if dimension is not correct.

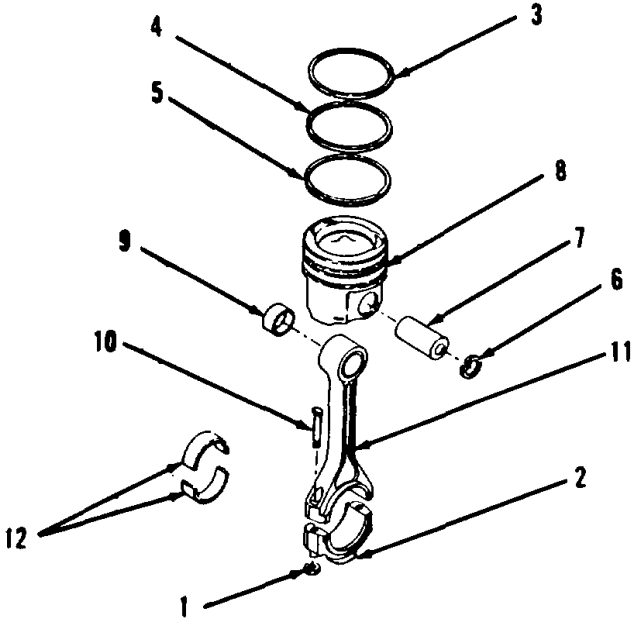


Figure 13-44.

Go to Sheet 7

ENGINE MAINTENANCE. (cont)

13-8. Piston and Connecting Rod. (Sheet 7 of 12)

INSPECTION (cont)

- 5. Using feeler gage, measure clearance between pin (7) and bearing (9). Clearance between new parts should be .0003 to .0013 inch. Maximum clearance permissible for worn parts should not exceed .002 inch.
- 6. Inspect top ring and second ring piston grooves for burrs and wear. Oil holes should be open.
- 7. Using piston ring groove gage (Figure 13-45), measure side clearances. Put pin end of number 2 gage in ring groove at four places around the piston. Check both grooves. Piston is reusable if there is clearance between flat edge of gage and piston. Both grooves must be good to reuse piston. Replace piston if flat edge of groove gage is in contact with piston at any test point.
- 8. Using a micrometer, measure outside diameter of pin (7, Figure 13-44). Correct dimension is 1.6998 inches. Replace if reading is not correct.
- 9. Inspect retaining rings (6). Replace if damaged or if resiliency is lost.
- 10. Remove and inspect nuts (1) and bolts (10). Replace if cracked, broken, distorted or threads damaged.

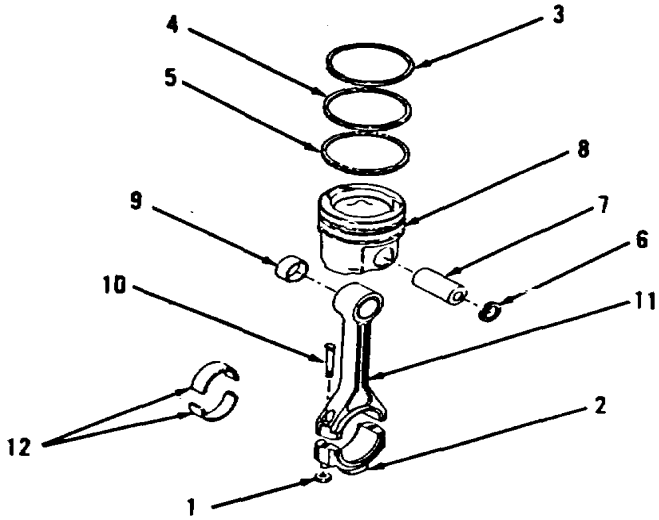


Figure 13-44.

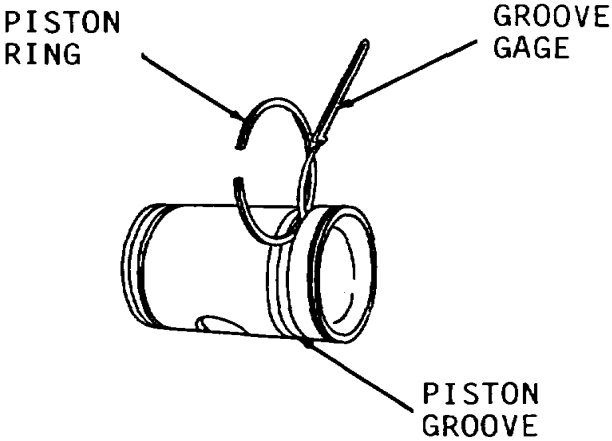


Figure 13-45.

Go to Sheet 8

ENGINE MAINTENANCE.**13-8. Piston and Connecting Rod. (Sheet 8 of 12)****INSPECTION**

11. Remove and inspect two bearings (12). Replace if scored, cracked, pitted, flaked or signs of overheating.
12. Using micrometer, measure crankshaft connecting journal taper from front to rear of journal and for out-of-roundness in connecting rod journals. Refer to paragraph 13-4.

NOTE

Ring gap will increase .003 inch for each .001 inch of cylinder line, bore size increases.

13. Inspect piston rings (3 and 4). Compression rings develop a shiny line around their face as the ring wears and widens. Measure the line. If the top ring measures wider than .100 inch and the second ring measures wider than .050 inch, then discard rings. Also replace rings if signs of deep scratching, chrome chipping or scuffing.
14. Inspect oil ring (5). Discard if worn or evidence of internal spring groove wear.
15. Inspect cylinder liner. Reuse liner if wear step does not exceed .005 inch. Replace if necessary. Refer to paragraph 13-2.

Go to Sheet 9

ENGINE MAINTENANCE. (cont)**13-8. Piston and Connecting Rod. (Sheet 9 of 12)****INSPECTION (cont)**

16. Install piston ring (3) in its assigned cylinder liner. Top of piston ring (3) towards top of liner.
17. Using a feeler gage, measure piston ring (3) gap. Correct gap is .0245 + .0075 inch. Adjust with fine flat file, if necessary.
18. Install second piston ring (4) in its assigned cylinder liner. Top of piston ring (4) towards top of liner.
19. Using a feeler gage, measure ring gap. Correct gap is .0245 + .0075 inch. Adjust with fine flat file, if necessary.
20. Install oil ring (5) in cylinder liner in which it will be used. Top of oil ring (5) towards top of cylinder lines.
21. Using feeler gage, measure ring gap. Correct gage is .0225 inch. Adjust with fine flat file, if necessary.
22. Inspect bore of connecting rod (11) for crankshaft bearing. Use a bore gage and measure in two places 90 degrees apart. Correct dimension is 3.2500 inches.
23. Inspect all other parts. Refer to Chapter 2.

Go to Sheet 10

ENGINE MAINTENANCE.

13-8. Piston and Connecting Rod. (Sheet 10 of 12)

INSTALLATION

NOTE

Connecting rod must be heated for installation of bearing. Do not use a torch.

1. Heat connecting rod (11, Figure 13-46) in oven to 300 to 350 degrees F.

NOTE

Junction of piston pin bearing must be assembled within either area "A" (90 degrees + 10 degrees from centerline through connecting rod bore) as shown. Install bearing so that oil hole in bearing aligns with oil hole in connecting rod.

2. Using rod and press, install new bearing (9), if removed. Align oil holes. Using boring machine, bore to 1.7012 inches.

NOTE

Check piston and connecting rod sets before assembly to ensure that parts are matched correctly.

3. Install items 11 and 9 as an assembly into piston (8, Figure 13-47) with bearing tab groove on same side as valve cutouts in piston head.

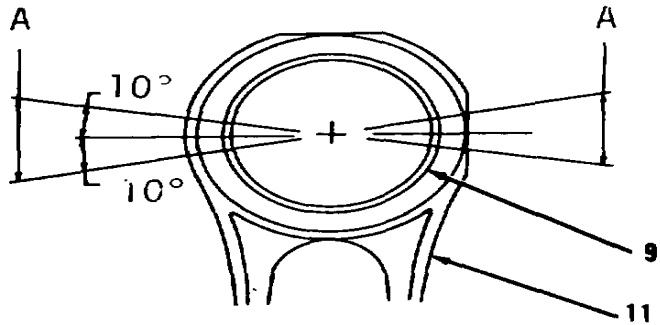


Figure 13-46.

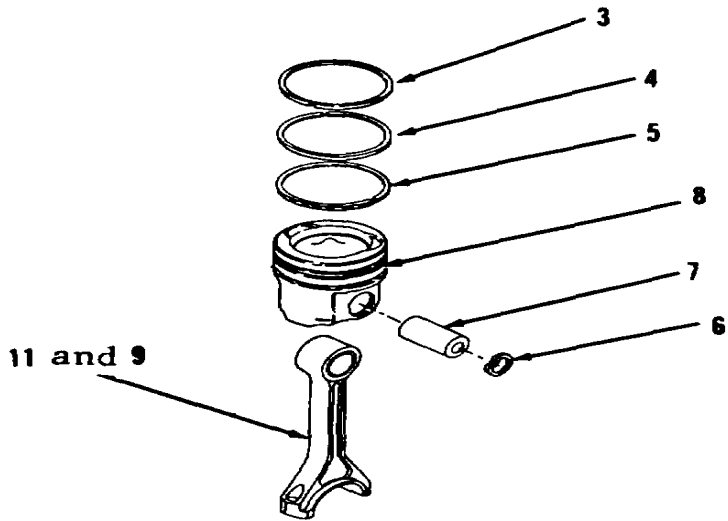


Figure 13-47.

Go to Sheet 11

ENGINE MAINTENANCE. (cont)**13-8. Piston and Connecting Rod. (Sheet 11 of 12)****INSTALLATION (cont)**

4. Install pin (7) and two retaining rings (6) in piston (8).

CAUTION

Piston ring expander must be used to install rings. Use of any other tool may result in damage to piston lands.

5. Install oil ring (5) over spring in lowest groove with ring gage 180 degrees from spring joint.
6. Using ring expander, install piston rings (4 and 3). Stagger ring gaps 120 degrees, making sure the letters UP is toward top of piston rings (4 and 3).
7. Install two bearings (12) into cap (2) and connecting rod (11, Figure 13-48).
8. Install bolts (10) into connecting rod (11).
9. Repeat steps 1 thru 4 for remaining pistons and connecting rod assemblies.
10. Rotate crankshaft counterclockwise on front of cylinder block until bearing journal for piston to be installed is bottom, dead center.
11. Using clean oil, swab cylinder lines and bearing journal on cylinder block.
12. Using clean oil, dip piston (8).
13. Inspect piston rings, making sure that gaps are 120 degrees apart.

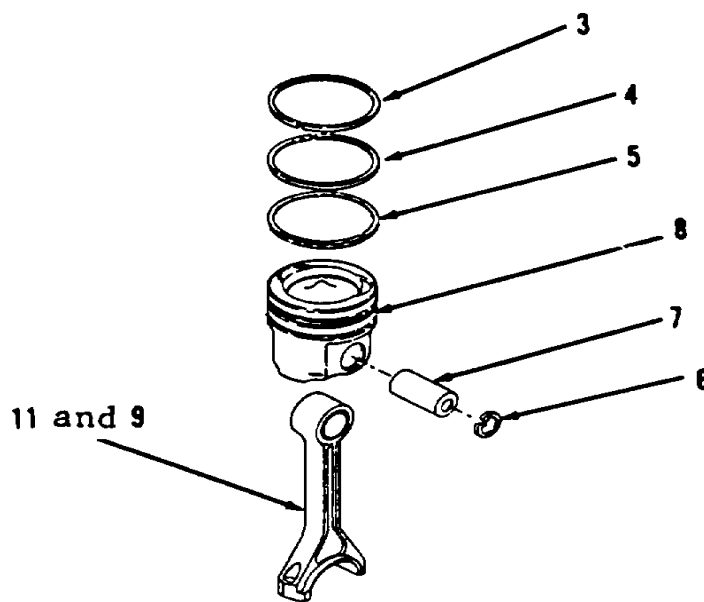


Figure 13-47.

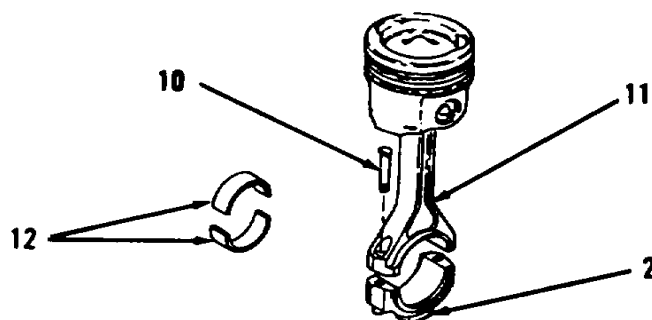


Figure 13-48.

Go to Sheet 12

ENGINE MAINTENANCE.

13-8. Piston and Connecting Rod. (Sheet 12 of 12)

INSTALLATION

CAUTION

Be sure that connecting rod bolts do not damage liner.

14. Insert items 12 thru 3 as an assembly (Figure 13-49) in cylinder liner. "V" mark on piston must be in alignment with "V" mark on cylinder block. Rest piston on oil ring.

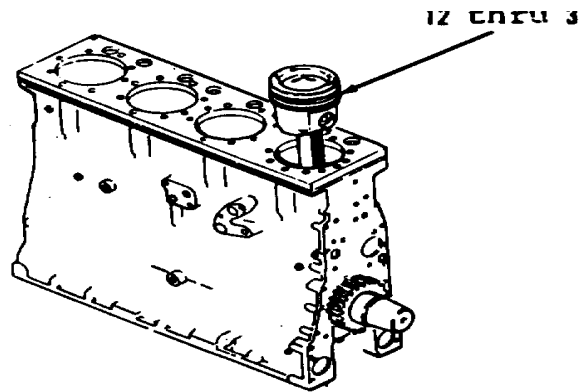


Figure 13-49.

15. Using piston ring compressor, install rings. Put piston into place while assistant guides items 12 thru 3 as an assembly into position on crankshaft.

16. Using clean oil, lubricate two bearings (12, Figure 13-50).

17. Using clean oil, lubricate cap (2), two nuts (1) and bolts (10) threads. Install and tighten to a 30 ft-lb torque.

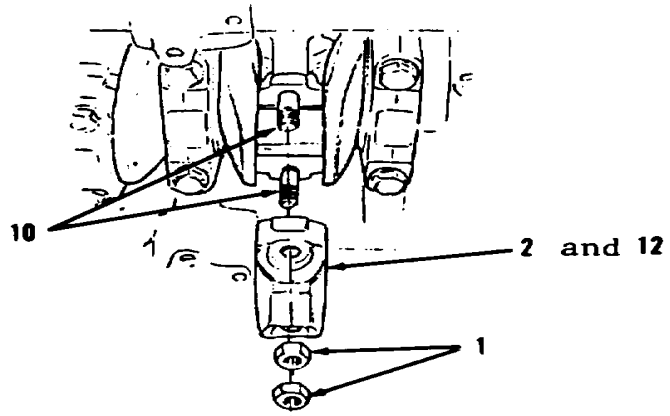


Figure 13-50.

18. Make a mark on each of two nuts (1) and bolts (10, Figure 13-51). Tighten two nuts (1) an additional 90 degrees.

19. Repeat steps 1 thru 8 for remaining piston and connecting rod assemblies.

NOTE

Return 130G Grader to original equipment condition.

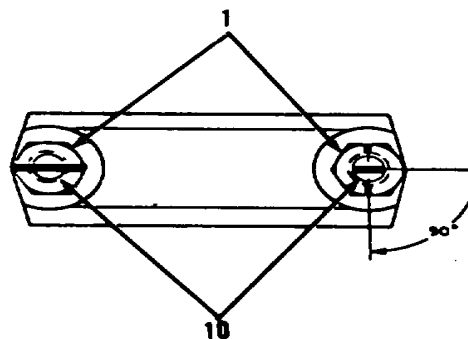


Figure 13-51.

End of Task

ENGINE MAINTENANCE. (cont)

13-9. Camshaft. (Sheet 1 of 5)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
3/8-16NC forged eyebolts
Crowbar

References

TM 5-3805-261-10

Special Environmental Conditions

None

Test Equipment

None

General Safety Instructions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Lubricating oil, Item 33,
Appendix C
Graphite grease, Item 64,
Appendix C

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 3-4
Paragraph 3-6
Paragraph 3-12

Engine removed.
Engine front cover removed.
Remove valve lifters.

Go to Sheet 2

ENGINE MAINTENANCE. (cont)

13-9. Camshaft. (Sheet 2 of 5)

REMOVAL

1. Turn crankshaft until "C" mark on the crankshaft gear is in alignment with the "C" mark on the camshaft gear (2, Figure 13-52).

NOTE

To keep the engine timing correct during removal and installation of the camshaft, follow the next step carefully.

2. Mark injection pump drive gear teeth and idler gear at location A.
3. Mark idler gear teeth and camshaft gear at location B.

NOTE

When the marks are in alignment with the "C" mark on the crankshaft and camshaft, the engine timing will be correct.

4. Remove four bolts (1) from camshaft gear (2, Figure 13-53).
5. Remove camshaft gear (2).
6. Bend two locks (4) away from bolts (3).
7. Remove two bolts (3), locks (4) and thrust plates (5).
8. Install 3/8-16NC forged eyebolt in end of camshaft (6, Figure 13-54).

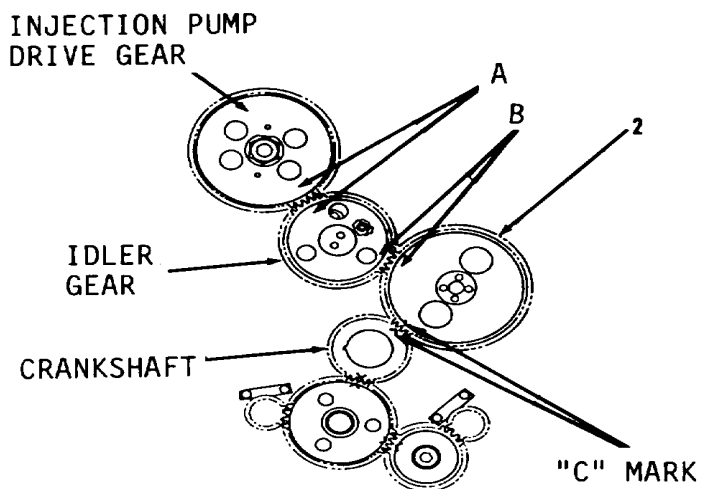


Figure 13-52.

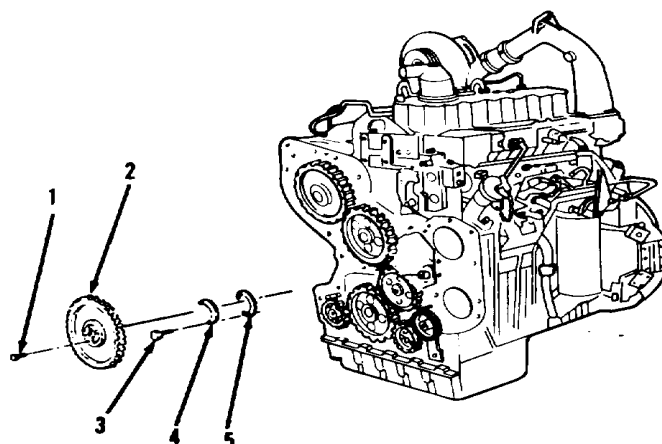


Figure 13-53.

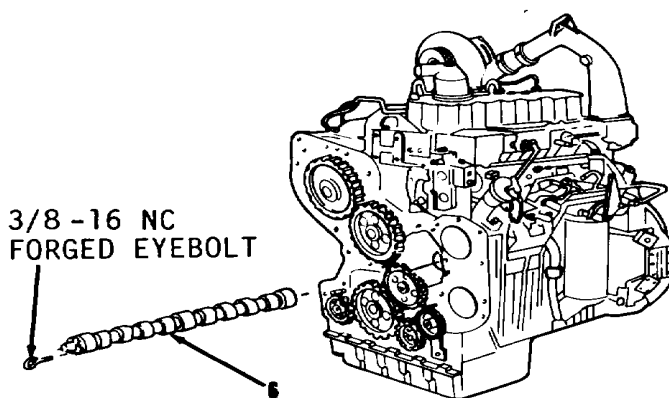


Figure 13-54.

Go to Sheet 3

ENGINE MAINTENANCE. (cont)**13-9. Camshaft. (Sheet 3 of 5)****REMOVAL (cont)****CAUTION**

Use extreme care when removing camshaft. Avoid any movement that could scratch or damage camshaft bearings. Failure to use proper care may cause damage to camshaft bearings.

- Using a crowbar, remove camshaft (6) on eyebolt.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

- Using engine oil, lubricate camshaft bearing journals.
- Using graphite grease, lubricate camshaft lobes.
- Install 3/8-16NC forged eyebolt on end of camshaft (6, Figure 13-54).

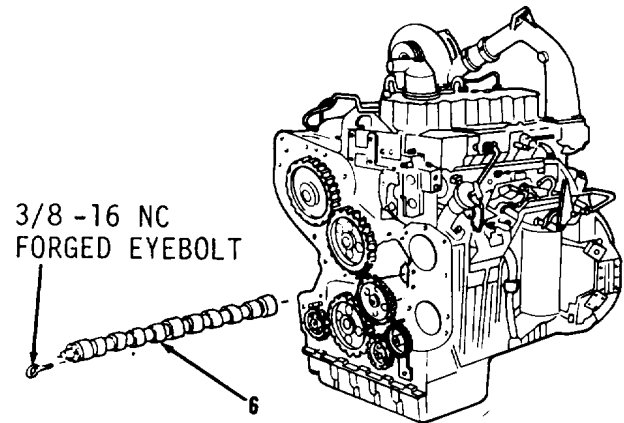


Figure 13-53.

Go to Sheet 4

ENGINE MAINTENANCE.

13-9. Camshaft. (Sheet 4 of 5)

INSTALLATION

CAUTION

Use extreme care when installing camshaft. Avoid any movement that could scratch or damage camshaft bearings. Failure to use proper care will result in damage to camshaft sealings.

4. Using 3/8-16NC forged eyebolt and crowbar, install camshaft (6).
5. Remove 3/8-16NC forged eyebolt.
6. Install thrust plate (5, Figure 13-53).
7. Install two locks (4).
8. Install two bolts (3).
9. Turn camshaft (6, Figure 13-54) so end notch is up.
10. Bend two locks (4) to lock bolts (3, Figure 13-53).
11. Position camshaft gear (2) on camshaft (6, Figure 13-52) so that "C" mark is aligned with "C" mark on crankshaft.

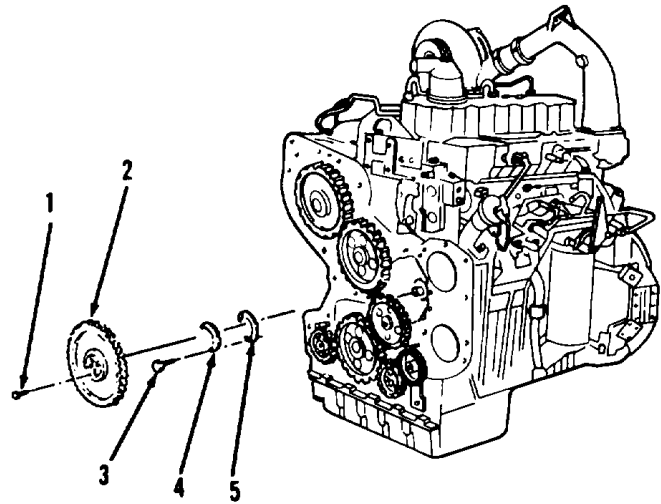


Figure 13-53.

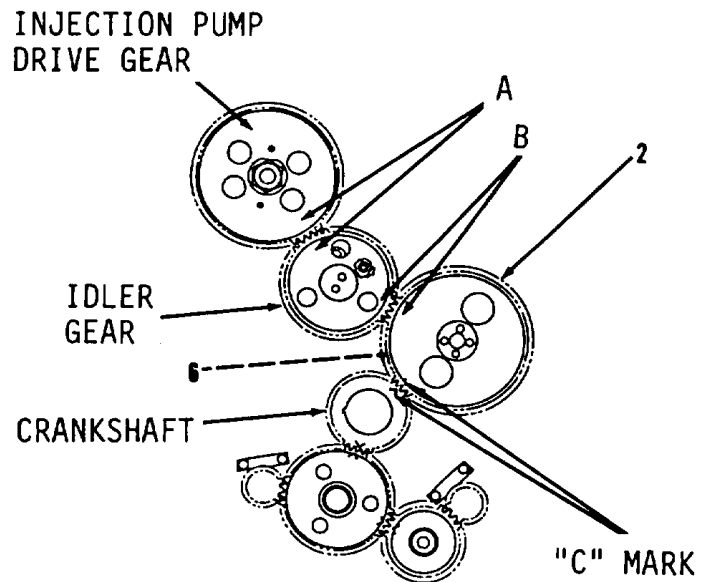


Figure 13-52.

Go to Sheet 5

ENGINE MAINTENANCE. (cont)**13-9. Camshaft. (Sheet 5 of 5)****INSTALLATION (cont)**

12. Install four bolts (1, Figure 13-53) and tighten to 41 ft-lb torque.

NOTE

- If bolts cannot be installed in end of camshaft, remove camshaft gear again. Check engine timing to make sure timing is correct. Refer to paragraph 3-7.
- Return 130G Grader to original equipment condition.

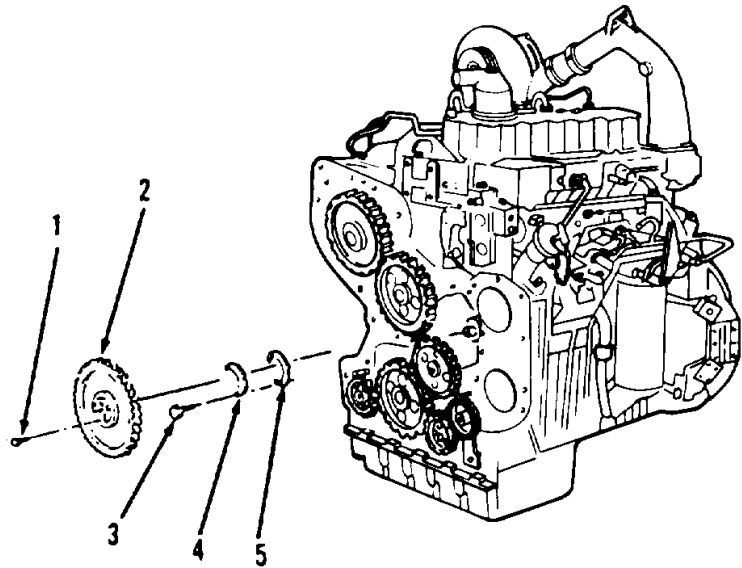


Figure 13-

End of Task

13-56

ENGINE MAINTENANCE.

13-10. Crankshaft Front and Rear Seals and Wear Sleeves. (Sheet 1 of 6)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Puller tool FT530-2
Screw 5N9976
Spacer T774
Bolt 3/8-16NC (4) S1591
Washer (4) 4B5271
Puller assembly 1P3075
Ring 5P7315
Distorter 5P7312
Locator 9S8871
Nut and washer 9S8858
Bolt 9S8890
Installer 5P7298
Seals 536296
Sleeves 2P3859

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Lubricating oil, Item 33,
Appendix C
Quick cure primer, Item xx,
Appendix C
Retaining compound, Item xx,
Appendix C

Go to Sheet 2

ENGINE MAINTENANCE. (cont)**13-10. Crankshaft Front and Rear Seals and Wear Sleeves. (Sheet 2 of 6)**

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 3-4
Paragraph 3-5
Paragraph 3-9
Paragraph 3-10

Engine removed.
Engine front support removed.
Vibration damper removed.
Flywheel assembly removed.

Go to Sheet 3**13-58**

ENGINE MAIENANCE.

13-10. Crankshaft Front and Rear Seals and Wear Sleeves. (Sheet 3 of 6)

REMOVAL

NOTE

When the front seal is replaced, the wear sleeve must be replaced, also.

1. Using puller assembly, remove seal (4, Figure 13-56) from front of crankshaft.
2. Install ring into seal (4) bore in trunnion.
3. Insert distorter between wear sleeve (5) and ring.
4. Turn until distorter creases wear sleeve (5). Do this in two or more places until wear sleeve (5) is loose.
5. Remove distorter and wear sleeve (5) by hand.
6. Remove rear seal (6) and wear sleeve (7, Figure 13-57) from rear-flange on crankshaft. Repeat steps 5 thru 9.

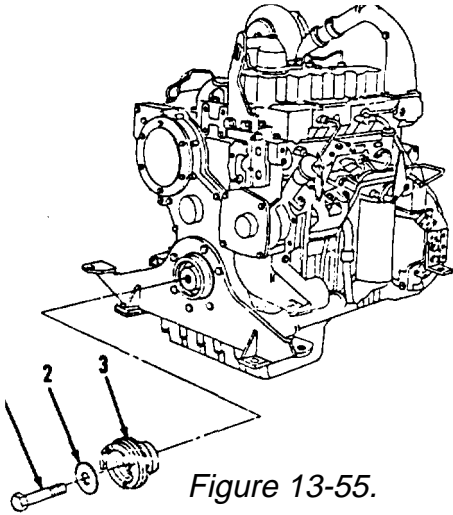


Figure 13-55.

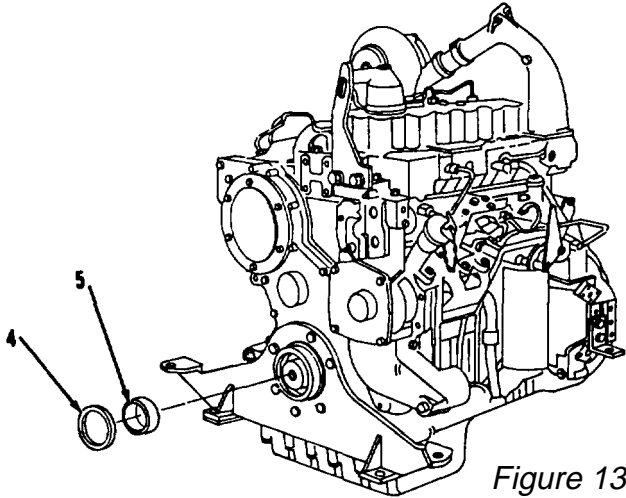


Figure 13-56.

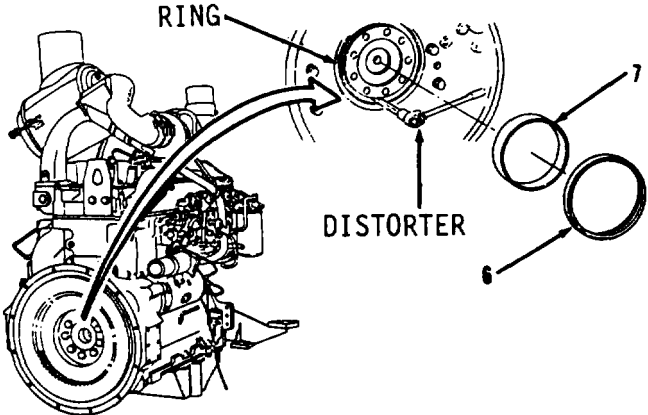


Figure 13-57.

Go to Sheet 4

ENGINE MAINTENANCE. (cont)

13-10. Crankshaft Front and Rear Seals and Wear Sleeves. (Sheet 4 of 6)

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Using clean engine oil, lubricate outside diameter of rear seal (6) lip and wear sleeve (7, Figure 13-58).
2. Install rear seal (6) on bevel end (outside diameter) of wear sleeve (7). Make sure the lip of rear seal (6) is toward inside of engine and outside bevel diameter of wear sleeve (7, Figure 13-59) is toward outside of engine.
3. Position locator (Figure 13-60) on rear flange of crankshaft.
4. Install three bolts securing locator.
5. Apply quick cure primer to outside diameter of crankshaft flange and inside diameter of wear sleeve (7).
6. Apply retaining compound to outside diameter of crankshaft flange and inside diameter of items 7 and 6 as an assembly.
7. Position items 7 and 6 as an assembly and slide on locator. Make sure lip of rear seal (6) is toward engine and bevel of wear sleeve (7) is away from engine.

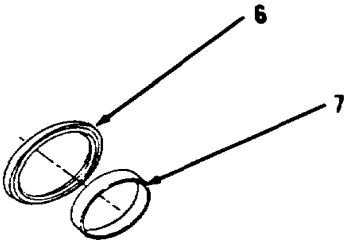


Figure 13-58.

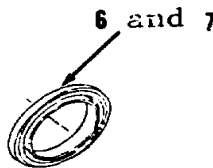


Figure 13-59.

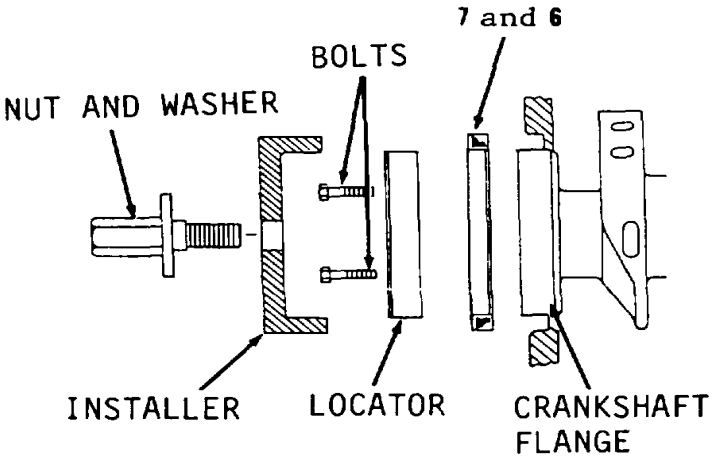


Figure 13-60.

Go to Sheet 5

ENGINE MAINTENANCE.

13-10. Crankshaft Front and Rear Seals and Wear Sleeves. (Sheet 5 of 6)

INSTALLATION

8. Position installer on locator behind items 7 and 6 as an assembly.
9. Apply clean engine oil to contacting surfaces of nut and washer.
10. Install and tighten nut and washer on installer until installer comes in contact with locator and pushes items 7 and 6 as an assembly on crankshaft flange (Figure 13-61).
11. Remove nut and washer, installer, locator and three bolts (Figure 13-62) from crankshaft.
12. Apply clean engine oil to lip of seal (4) and outside diameter of wear sleeve (5, Figure 13-63).
13. Apply quick cure primer to outside diameter of crankshaft and inside diameter of items 5 and 4 as an assembly (Figure 13-64).
14. Apply retaining compound to outside diameter of crankshaft and items 5 and 4 as an assembly.

NOTE

Make sure lip of seal is toward engine and beveled end of sleeve is away from engine.

15. Position items 5 and 4 as an assembly on crankshaft.
16. Position installer on crankshaft.

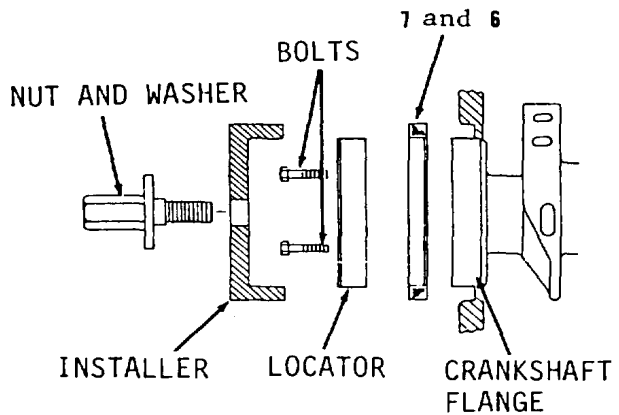


Figure 13-62.

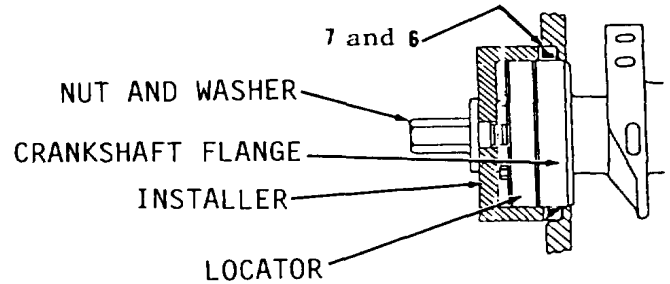


Figure 13-61.

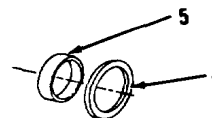


Figure 13-63.

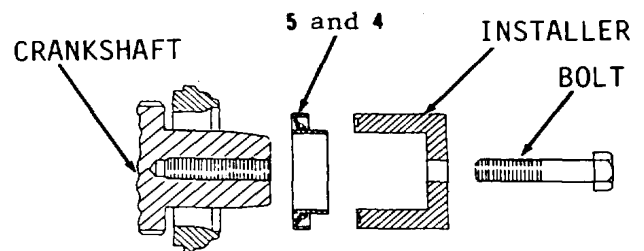


Figure 13-64.

Go to Sheet 6

ENGINE MAINTENANCE. (cont)

13-10. Crankshaft Front and Rear Seals and Wear Sleeves. (Sheet 6 of 6)

INSTALLATION (cont)

- 17. Install bolt on installer and tighten until inside surface on installer comes in contact with end of crankshaft (Figure 13-65).
- 18. Remove bolt and installer (Figure 13-66).
- 19. Install hub (3), washer (2) and bolt (1, Figure 13-55) to front of crankshaft. Tighten bolt (1) to 230 ft-lb torque.

NOTE

Return 13OG Grader to original equipment condition.

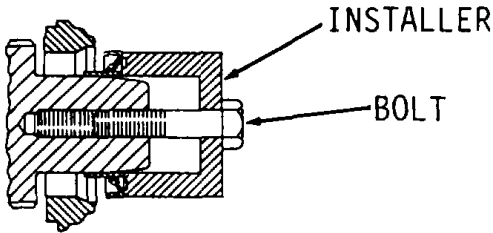


Figure 13-65.

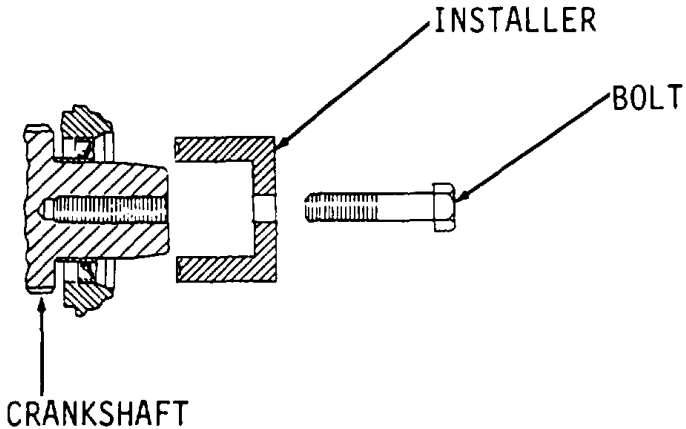


Figure 13-66.

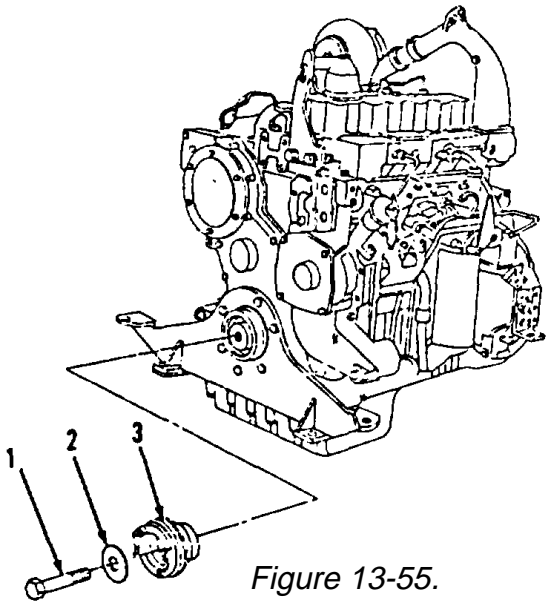


Figure 13-55.

End of Task

CHAPTER 14

**TRANSMISSION, FRONT AXLE AND
REAR AXLE MAINTENANCE**

CHAPTER OVERVIEW

The purpose of this chapter is to help the technician efficiently troubleshoot and repair malfunctioning equipment and to perform authorized general support level maintenance procedures on the 130G Grader transmission, front axle and rear axle.

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Section I. TRANSMISSION MAINTENANCE.

14-1. TRANSMISSION MAINTENANCE PROCEDURES.

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the general support level to keep the transmission and its components in good repair.

b. This section is arranged by functional group code and provides a list of transmission components to be maintained and step-by-step maintenance procedures.

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TRANSMISSION MAINTENANCE.**14-2. Transmission Assembly. (Sheet 1 of 20)**

This task covers:

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

INITIAL SETUP:Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-177-7033)
Puller assembly 8B7548
Ratchet box wrench 8H684
Bearing cup pulling attachment 8B7554
Spanner socket wrench 5P2969
Bearing pulling attachment 8H663
Spacer T774
Hoist and sling
Wood blocks
Two 3/8-16NC forcing screws
Three 1/2-13NC forcing screws
Two 3/8-16NC forged eyebolts
Two 1/2-13NC forged eyebolts
3/4-10NC forged eyebolt
5/8-11NC x 6 bolt
3/8-16NC x 4 bolt
Bar
Crowfoot bar

Test Equipment

Dial test indicator 8S2328

Materials/Parts

Dry cleaning solvent, Item 15, Appendix C
Clean cloths, Item 41, Appendix C
Small tags, Item 43, Appendix C
Anti-seize compound, Item 8, Appendix C
Engine oil SAE 10, Item 67, Appendix C
Engine oil SAE 30, Item 69, Appendix C
Preformed packings, Items 6, 10, 16, 27, 29, 30, 31, 67, 75, 78
Seal rings, Items 13, 38, 66, 79, 80
Dry ice or freezer

Personnel Required

Construction equipment repairer MOS 62B

References

TM 5-3805-261-10
TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown, all fasteners are tightened to standard torques. Refer to Appendix E.

Go to Sheet 2

TRANSMISSION MAINTENANCE. (cont)

14-2. Transmission Assembly. (Sheet 2 of 20)

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

TM 5-3805-261-20

Transmission oil filter base removed.

Paragraph 5-6
Paragraph 5-7
Paragraph 5-10

Transmission removed.
Control and relief valves removed.
Transmission oil scavenging pump removed.

Paragraph 14-3

Planetary group removed.

Go to Sheet 3

14-4

TRANSMISSION MAINTENANCE.

14-2. Transmission Assembly. (Sheet 3 of 20)

DISASSEMBLY

1. Remove bolt (1), retainer (2) and coupling (3, Figure 14-1) from transmission on torque converter side.
2. Install two 1/2-13NC forged eyebolts (Figure 14-2).

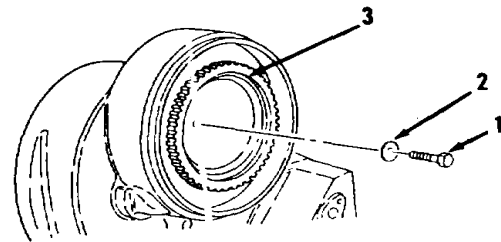


Figure 14-1.

WARNING

Weight of transmission assembly is approximately 1500 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

3. Attach hoist and sling to two 1/2-13NC forged eyebolts and lifting eyes (54) on transmission housing.
4. Lift transmission assembly and place on wood blocks with torque converter side down.

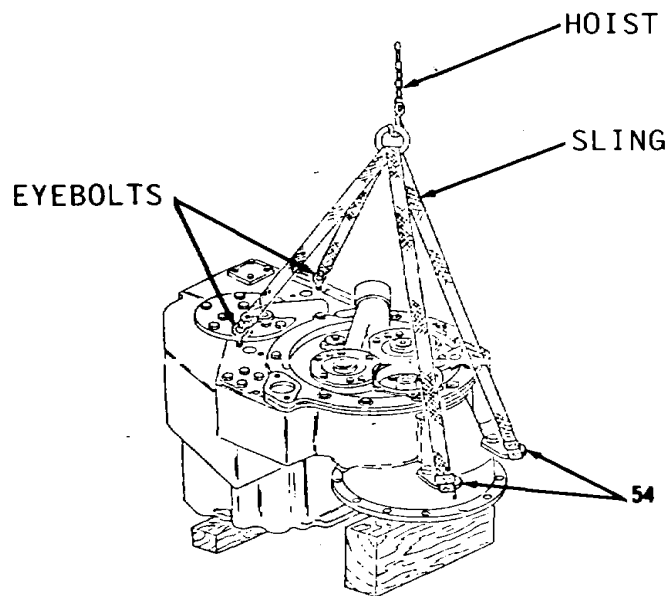


Figure 14-2.

5. Remove hoist and sling.
6. Remove bolt (4), retainer (5) and preformed packing (6, Figure 14-3). Discard preformed packing (6).
7. Remove five bolts (7) and lock-washers (8).
8. Install two 3/8-16NC forcing screws in one of two bearing cages (16).
9. Evenly and gradually tighten two 3/8-16NC forcing screws and remove one of two items 9 thru 16 as an assembly.

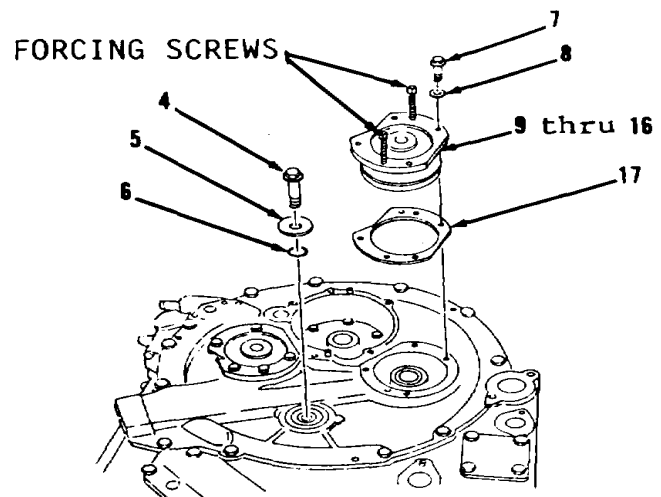


Figure 14-3.

Go to Sheet 4

TRANSMISSION MAINTENANCE. (cont)

14-2. Transmission Assembly. (Sheet 4 of 20)

DISASSEMBLY (cont)

NOTE

To aid in assembly, keep all shim packs together with bearing cages from which they were originally removed.

- 10. Remove shim pack (17).
- 11. Remove two forcing screws.
- 12. Repeat steps 8 thru 11 for remaining items 9 thru 16 as an assembly and shim pack (17).

NOTE

Steps 13 thru 15 cover disassembly of one of two items 9 thru 16 as an assembly. Disassembly of remaining items 9 thru 16 as an assembly is identical.

- 13. Remove two preformed packings (9) and bearing cup (10, Figure 14-4). Discard two preformed packings (9).
- 14. Remove retaining ring (11), carrier ring (12) and seal ring (13). Discard seal ring (13).
- 15. Remove plug (14) and preformed packing (15) from bearing cage (16). Discard preformed packing (15).

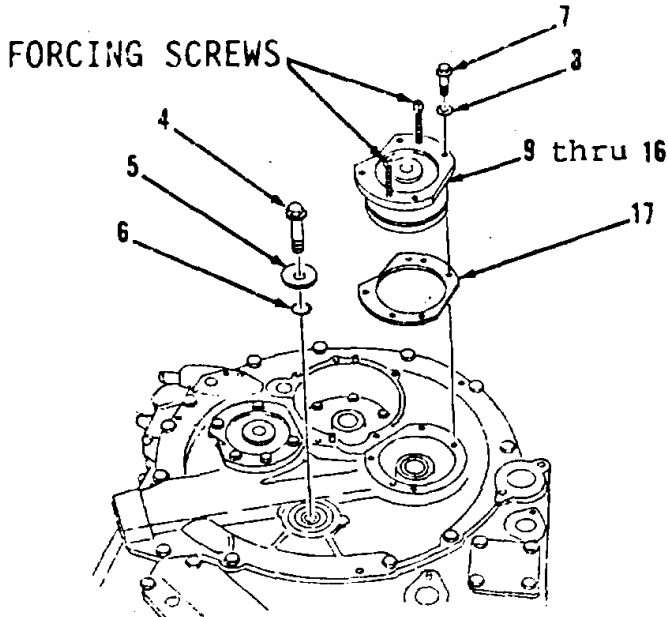


Figure 14-3.

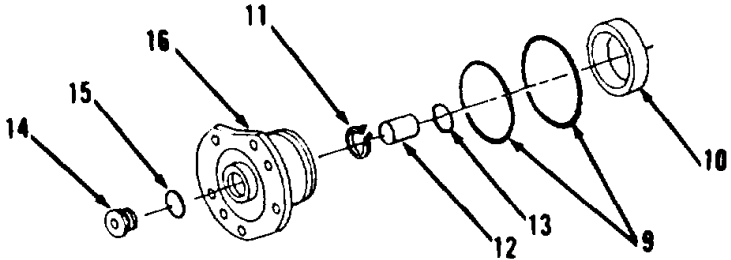


Figure 14-4.

Go to Sheet 5

TRANSMISSION MAINTENANCE.

14-2. Transmission Assembly. (Sheet 5 of 20)

DISASSEMBLY

16. Remove guide (18) from gear (34, Figure 14-5).
17. Remove six bolts (19) and washers (20) from bearing cage (21).
18. Install two 3/8-16NC forcing screws in bearing cage (21).

NOTE

To aid in assembly, keep all shim packs together with bearing cages from which they were originally removed.

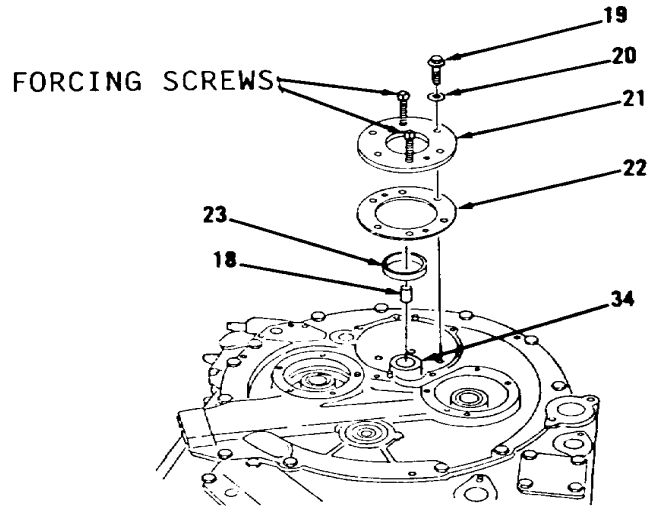


Figure 14-5.

19. Evenly and gradually tighten two 3/8-16NC forcing screws and remove bearing cage (21) and shim pack (22).
20. Remove two 3/8-16NC forcing screws.
21. Remove bearing cup (23).
22. Remove 12 bolts (24) and washers (25, Figure 14-6).
23. Remove two plugs (26) and preformed packings (27) from cover (28). Discard two preformed packings (27).
24. Install three 1/2-13NC forcing screws in cover (28).
25. Install two 3/8-16NC forged eyebolts in cover (28).

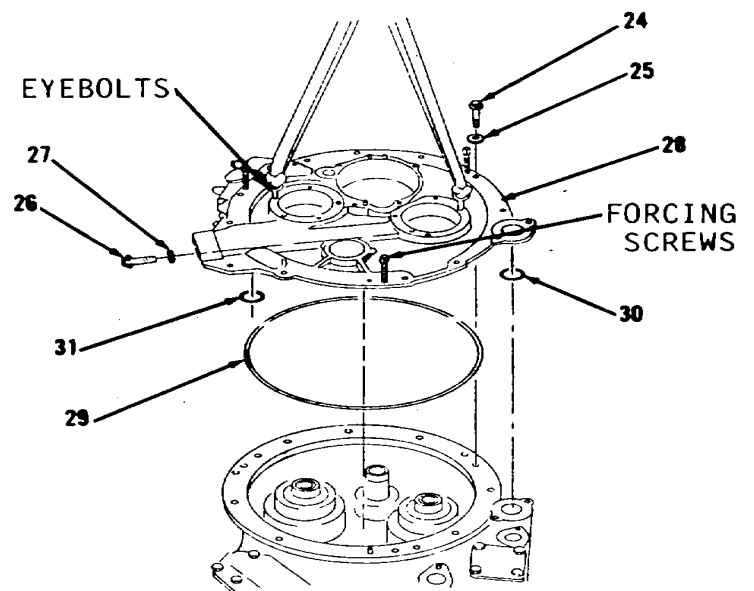


Figure 14-6.

Go to Sheet 6

TRANSMISSION MAINTENANCE. (cont)

14-2. Transmission Assembly. (Sheet 6 of 20)

DISASSEMBLY (cont)

WARNING

Weight of cover is approximately 74 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

- 26. Attach hoist and sling to 3/8-16NC forged eyebolts.
- 27. Evenly and gradually tighten three forcing screws and remove cover (28).
- 28. Remove hoist and sling.
- 29. Remove two 3/8-16NC forged eyebolts.
- 30. Remove three 1/2-13NC forcing screws.
- 31. Remove and discard preformed packings (29, 30 and 31).
- 32. Remove items 32 thru 34 as an assembly (Figure 14-7).
- 33. Using a puller assembly, ratchet box wrench, bearing pulling attachment and drive plate, remove roller bearings (32 and 33) from input gear (34, Figure 14-8).

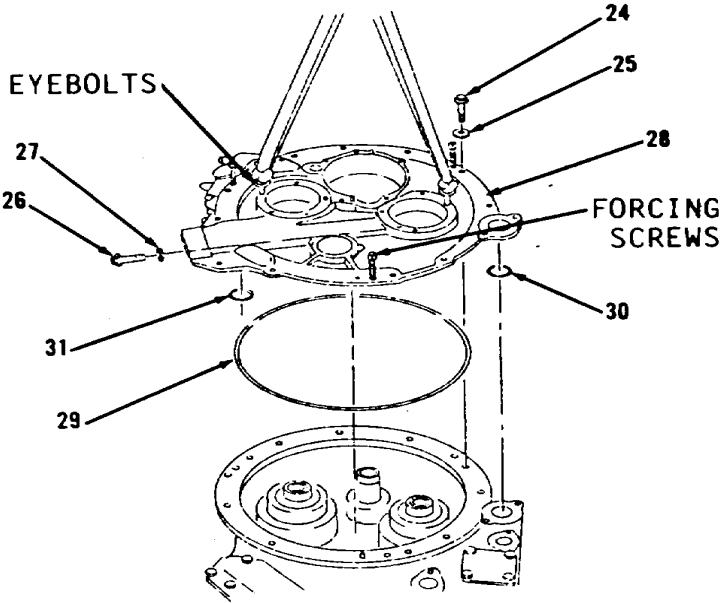


Figure 14-6.

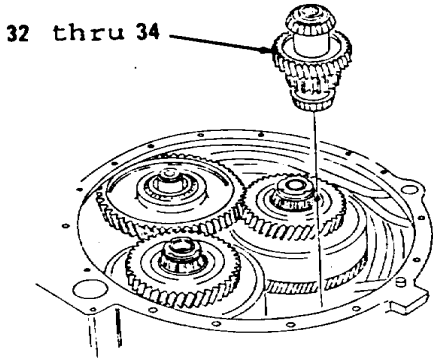


Figure 14-7.

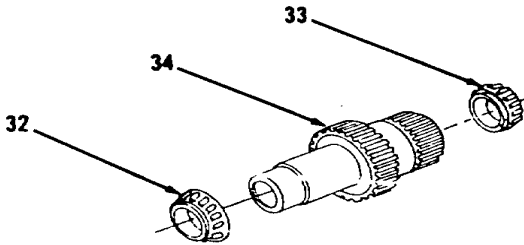


Figure 14-8.

Go to Sheet 7

TRANSMISSION MAINTENANCE.

14-2. Transmission Assembly. (Sheet 7 of 20)

DISASSEMBLY

- 34. Lift up and push down on items 44 thru 46 as an assembly to free roller bearing (35, Figure 14-9).
- 35. Remove roller bearing (35).

NOTE

The following is a maintenance procedure for the removal of the forward directional clutch. The maintenance procedure for the reverse directional clutch is identical.

- 36. Install 3/4-10NC forged eyebolt in items 55 thru 84 as an assembly.

WARNING

Weight of each directional clutch is approximately 80 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

- 37. Attach hoist and sling to 3/4-10NC forged eyebolt.
- 38. Lift up on items 44 thru 46 as an assembly to allow removal of items 55 thru 84 as an assembly.
- 39. Remove items 55 thru 84 as an assembly and place on workbench to be disassembled later.
- 40. Remove hoist and sling.
- 41. Remove 3/4-10NC forged eyebolt.

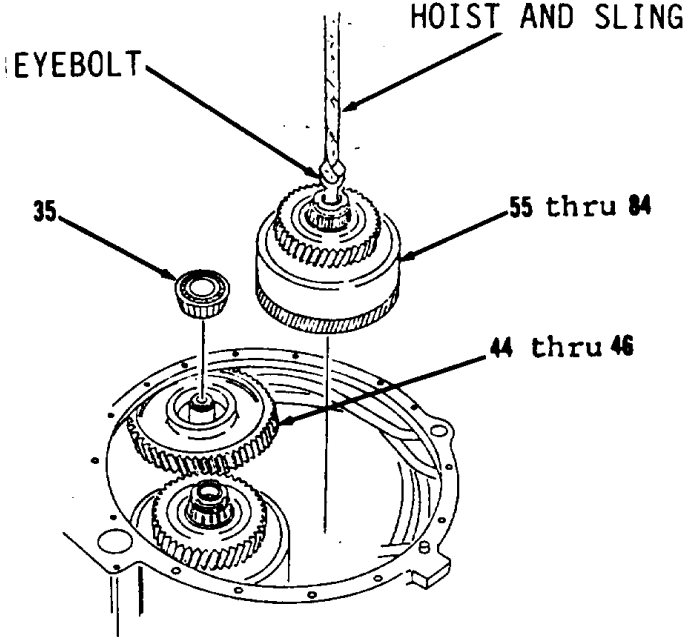


Figure 14-9.

Go to Sheet 8

TRANSMISSION MAINTENANCE. (cont)

14-2. Transmission Assembly. (Sheet 8 of 20)

DISASSEMBLY (cont)

42. Lift and tilt up on front of idler gear (46, Figure 14-10).

43. Lift idler gear shaft (43).

44. Remove items 40 thru 46 as an assembly (Figure 14-11).

45. Remove two snap rings (36), carrier rings (37) and seal rings (38). Discard two seal rings (38).

46. Using puller assembly, ratchet box wrench and bearing cup pulling attachment, remove three bearing cups (39).

47. Remove items 40 thru 43 as an assembly from items 44 thru 46 as an assembly (Figure 14-12).

48. Remove spacer (40), roller bearing (41) and dowel pin (42) from idler gear shaft (43, Figure 14-13).

49. Remove two bearing cups (44) and lock ring (45) from idler gear (46).

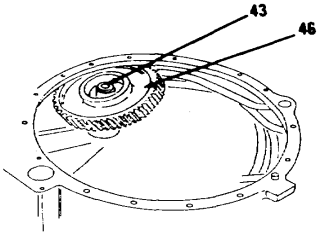


Figure 14-10.

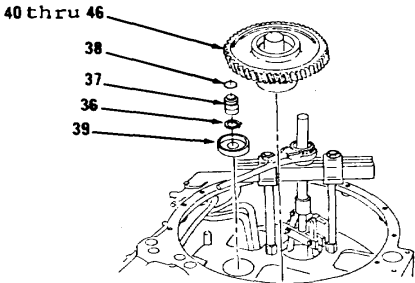


Figure 14-11.
11

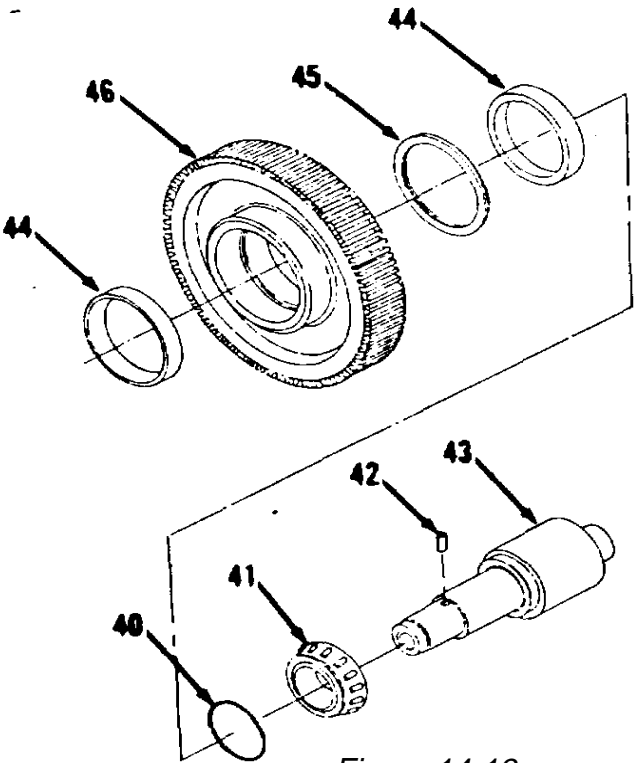


Figure 14-13.

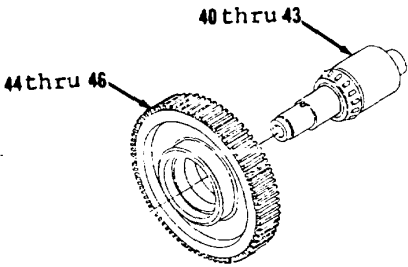


Figure 14-12.

Go to Sheet 9

TRANSMISSION MAINTENANCE.

14-2. Transmission Assembly.

DISASSEMBLY

- 50. Remove two dowel pins (47 and 48) and plug (49, Figure 14-14) from transmission housing.
- 51. Remove breather (50) and elbow (51).
- 52. Remove two bolts (52), lock-washers (53) and lifting eyes (54).

NOTE

The following is a maintenance procedure for the disassembly of the forward directional clutch. The maintenance procedure for the disassembly of the reverse directional clutch is identical.

- 53. Bend nut lock (56) away from lock nut (55, Figure 14-15).
- 54. Using a spanner socket, remove lock nut (55) and nut lock (56).
- 55. Using puller assembly, ratchet box wrench, bearing pulling attachment and spacer, remove roller bearing (57, Figure 14-16).

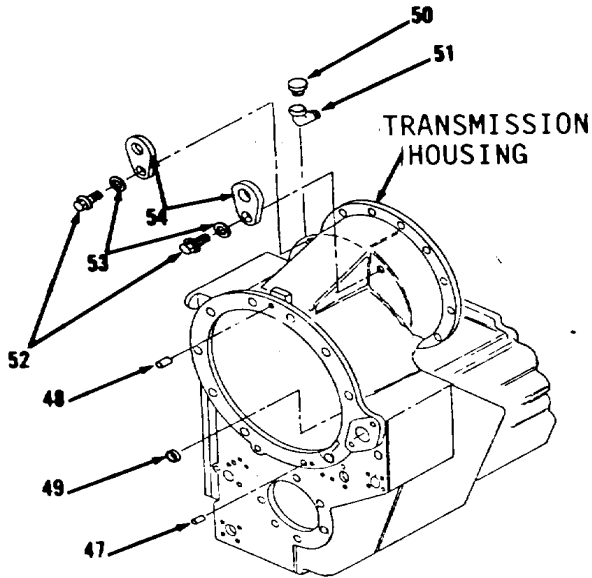


Figure 14-14.

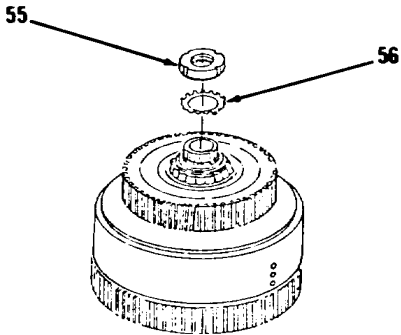


Figure 14-15.

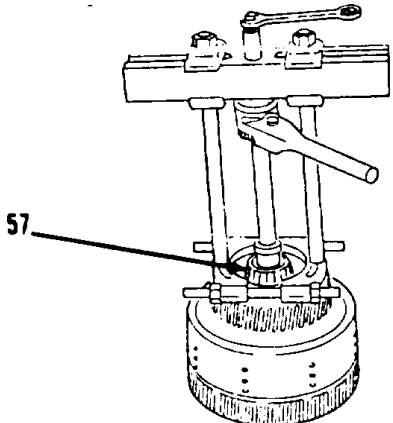


Figure 14-16.

Go to Sheet 10

TRANSMISSION MAINTENANCE. (cont)

14-2. Transmission Assembly. (Sheet 10 of 20)

DISSASSEMBLY (cont)

56. Remove roller bearing (58), spacer (59), two bearing cups (60), spacer (61), retaining ring (62), drum gear (63) and roller bearing (64, Figure 14-17).

57. Remove items 65 thru 68 as an assembly from shaft (84).

58. Remove plate (65) from piston clutch (68, Figure 14-18).

59. Remove and discard seal ring (66) and preformed packing (67).

NOTE

All springs must be tagged before removal to aid in installation.

60. Remove plate (69), six springs (70), discs (71) and plates (72, Figure 14-19).

61. Turn over items 73 thru 84 as an assembly and place on wood blocks.

62. Remove eight bolts (73), transfer gear (74), preformed packing (75) and hub (76, Figure 14-20). Discard preformed packine (75).

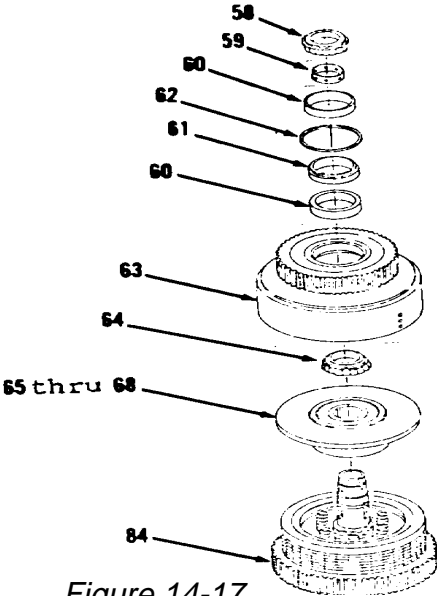


Figure 14-17.

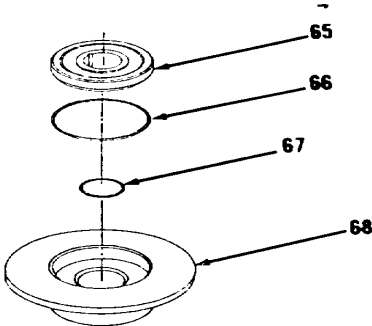


Figure 14-18.

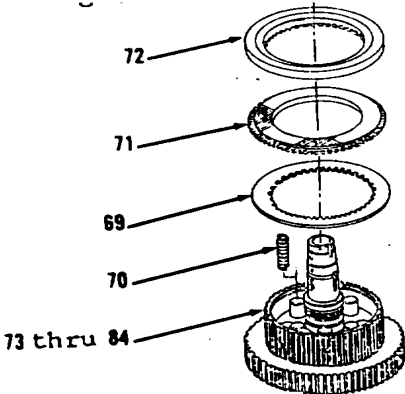


Figure 14-19.

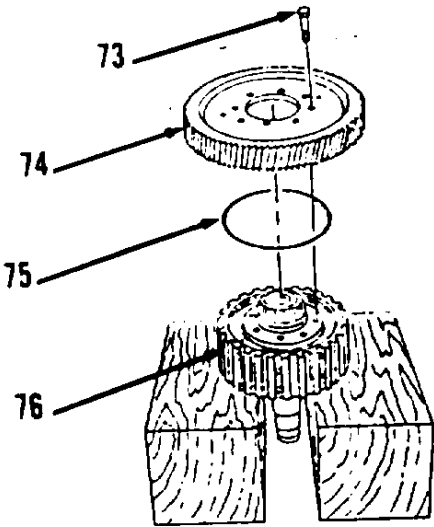
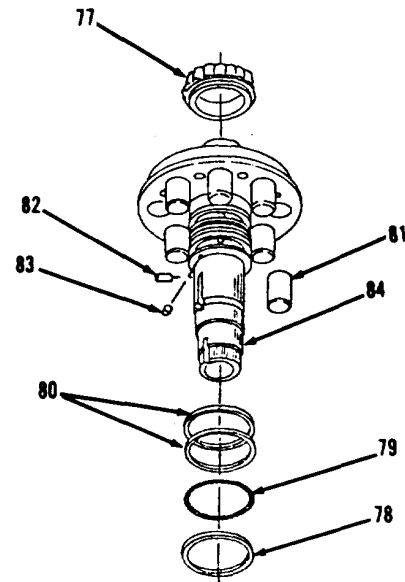


Figure 14-20.

Go to Sheet 11

TRANSMISSION MAINTENANCE.**14-2. Transmission Assembly. (Sheet 11 of 20)****DISASSEMBLY**

63. Using puller assembly, ratchet box wrench, bearing pulling attachment and spacer, remove roller bearing (77, Figure 14-21).
64. Remove preformed packing (78) from shaft (84) and seal ring (79) from under preformed packing (78) on shaft (84). Discard preformed packing (78) and seal ring (79).
65. Remove and discard two seal rings (80).
66. Remove two dowel pins (81), dowel pin (82) and plug (83) from shaft (84).

*Figure 14-21.***CLEANING**

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install plug (83), dowel pin (82) and two dowel pins (81) on shaft (84, Figure 14-21).
2. Install two new seal rings (80).
3. Install new seal ring (79) and new preformed packing (78) over seal ring (79) on shaft (84).
4. Heat roller bearing (77) in engine oil SAE 30 to a temperature of 275 degrees F.
5. Install roller bearing (77) on shaft (84).

Go to Sheet 12

TRANSMISSION MAINTENANCE. (cont)

14-2. Transmission Assembly. (Sheet 12 of 20)

ASSEMBLY (cont)

6. Place items 84 thru 77 as an assembly on wood blocks (Figure 14-20).
7. Install hub (76), new seal ring (75), transfer gear (74) and eight bolts (73).
8. Turn over items 84 thru 73 as an assembly (Figure 14-19).
9. Apply a thin coat of engine oil SAE 10 to six plates (72) and discs (71).
10. Install six plates (72), discs (71), springs (70) and plate (69).

NOTE

Piston clutch fits over seal rings on shaft. Seal rings must be in a center position on shaft before drum gear can be installed.

11. Install piston clutch (68) on shaft (84). Make sure groove slot in piston clutch (68) is alined with dowel pin (82) on shaft (84, Figure 14-22).
12. Install new seal ring (66) and new preformed packing (67) on plate (65).
13. Install plate (65) on shaft (84). Make sure groove slot in plate (65) is alined with dowel pin (82) on shaft (84).
14. Heat roller bearing (64) in engine oil SAE 30 to temperature of 275 degrees F.
15. Install roller bearing (64) and spacer (59) on shaft (84).

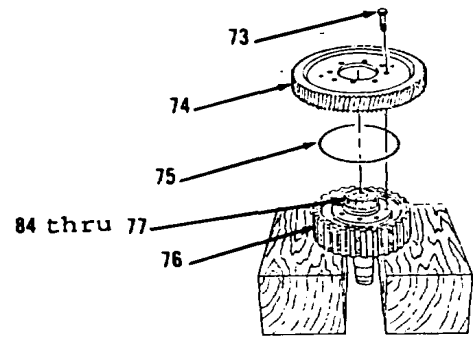


Figure 14-20.

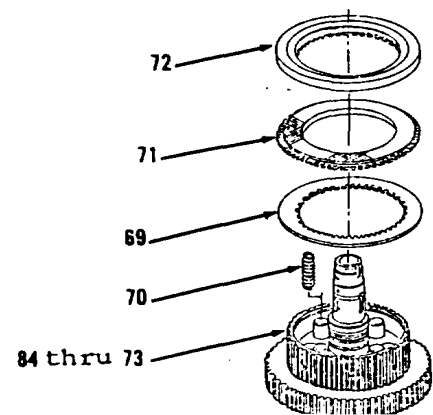


Figure 14-19.

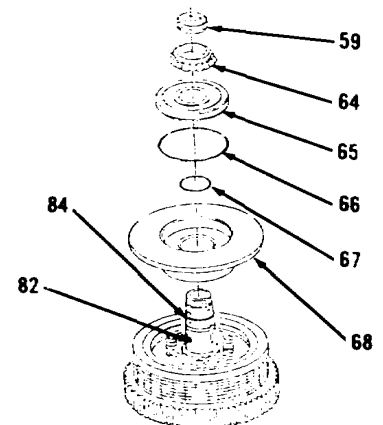


Figure 14-22.

Go to Sheet 13

TRANSMISSION MAINTENANCE.

14-2. Transmission Assembly. (Sheet 13 of 20)

ASSEMBLY

16. Install retaining ring (62), spacer (61) and two bearing cups (60) in drum gear (63, Figure 14-23).
17. Install items 63 thru 60 as an assembly on shaft (84, Figure 14-24).
18. Heat roller bearings (58 and 57) in engine oil SAE 30 to temperature of 275 degrees F.
19. Install roller bearings (58 and 57) on shaft (84).
20. Install 3/8-16NC forged eyebolt on bottom of transfer gear (74, Figure 14-25).
21. Install bar through eyebolt.
22. Apply anti-seize compound to threads and face of nut lock (56) and lock nut (55).
23. Install nut lock (56) and lock nut (55) on shaft (84).
24. Using a spanner socket wrench, tighten lock nut (55) to 80 ft-lb torque.
25. Bend tab of nut lock (56) into groove of lock nut (55).
26. Remove bar and 3/8-16NC forged eyebolt.

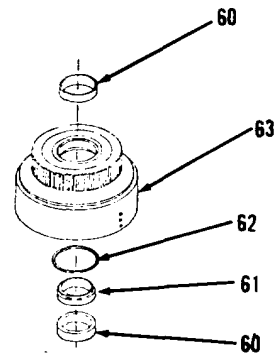


Figure 14-23.

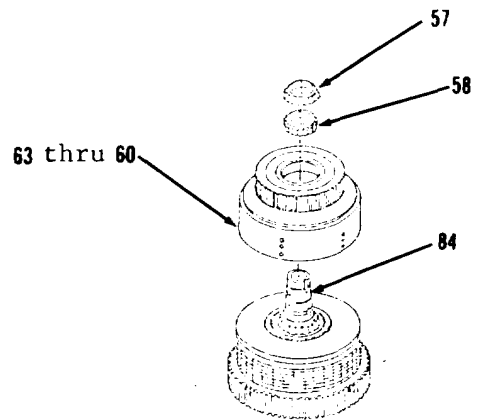


Figure 14-24.

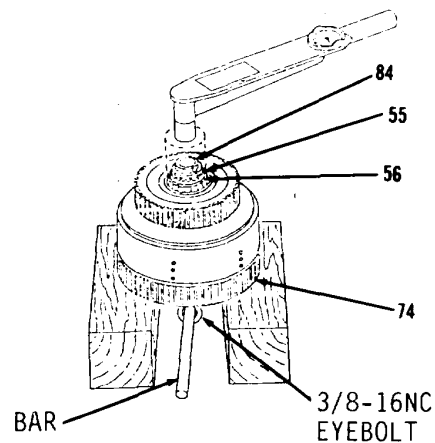


Figure 14-25.

Go to Sheet 14

TRANSMISSION MAINTENANCE. (cont)

14-2. Transmission Assembly. (Sheet 14 of 20)

ASSEMBLY (cont)

27. Using dry ice, lower temperature of two bearing cups (44, Figure 14-13).
28. Install two bearing cups (44) and lock ring (45) in idler gear (46).
29. Install dowel pin (42) on idler gear shaft (43).
30. Heat roller bearing (41) in engine oil SAE 30 to temperature of 275 degrees F.
31. Install roller bearing (41) and spacer (40) on idler gear shaft (43).
32. Install items 46 thru 44 as an assembly on items 43 thru 40 as an assembly (Figure 14-12).

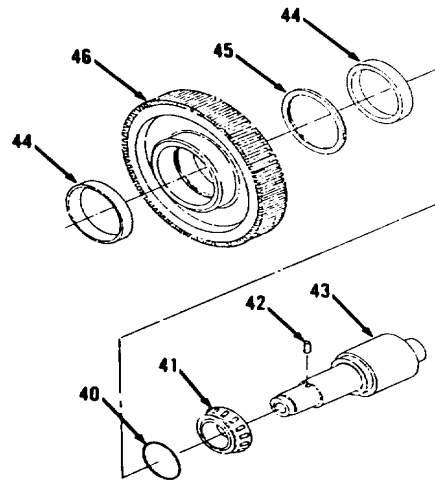


Figure 14-13.

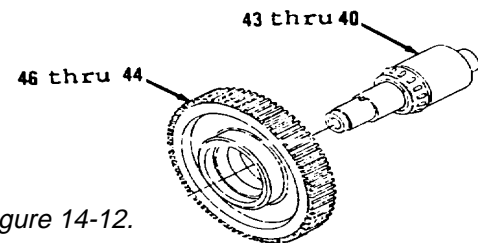


Figure 14-12.

Go to Sheet 15

TRANSMISSION MAINTENANCE.

14-2. Transmission Assembly.

ASSEMBLY

33. Using dry ice, lower temperature of three bearing cups (39, Figure 14-26).
34. Install three bearing cups (39).
35. Install two carrier rings (37), new seal rings (38) and snap rings (36).
36. Tilt and install items 46 thru 40 as an assembly.
37. Install plug (49), two dowel pins (48) and dowel pins (47) in transmission housing.

NOTE

The following is a maintenance procedure for the installation of the forward directional clutch. The maintenance procedure for the reverse directional clutch is identical.

38. Install 3/4-10NC forged eyebolt in items 84 thru 55 as an assembly (Figure 14-9).
39. Lift items 46 thru 44 as an assembly.
40. Using hoist and sling, install items 84 thru 55 as an assembly.
41. Remove hoist and sling.
42. Remove 3/4-10NC forged eyebolt.
43. Heat roller bearing (35) in engine oil SAE 30 to temperature of 275 degrees F.
44. Install roller bearing (35).

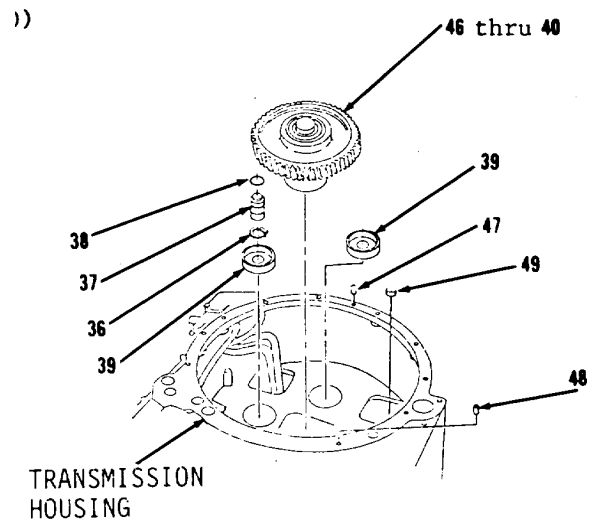


Figure 14-26.

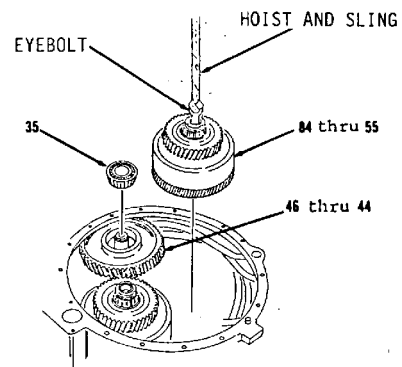


Figure 14-9.

Go to Sheet 16

TRANSMISSION MAINTENANCE. (cont)

14-2. Transmission Assembly. (Sheet 16 of 20)

ASSEMBLY (cont)

45. Heat roller bearings (33 and 32, Figure 14-8) in engine oil SAE 30 to temperature of 275 degrees F.
46. Install roller bearings (33 and 32) on gear (34).
47. Install items 34 thru 32 as an assembly (Figure 14-7).
48. Install two 3/8-16NC forged eyebolts in cover (28, Figure 14-27).
49. Attach hoist and sling.
50. Install new preformed packings (31, 29 and 30) on cover (28).
51. Install cover (28) on transmission housing.

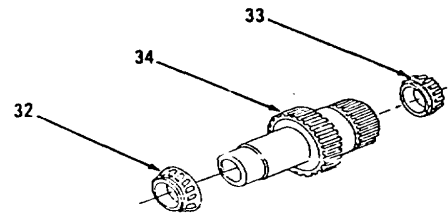


Figure 14-8.

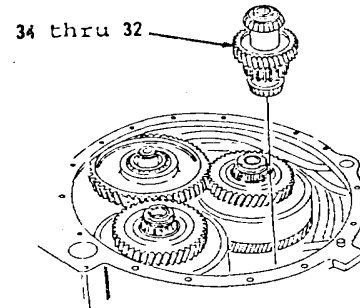


Figure 14-7.

NOTE

Dowel pin in idler gear shaft must be in alignment with groove slot in bottom of cover.

52. Install twelve lockwashers (25) and bolts (24) on cover (28).
53. Install two new preformed packings (27) and plugs (26).

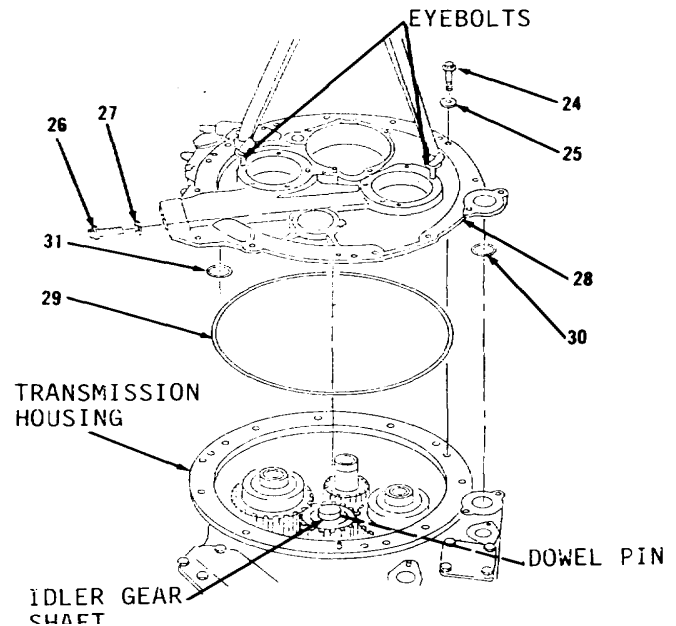


Figure 14-27.

Go to Sheet 17

TRANSMISSION MAINTENANCE.

14-2. Transmission Assembly. (Sheet 17 of 20)

ASSEMBLY

NOTE

Steps 54 thru 57 cover assembly of one of two items 13 thru 9 and 16 as an assembly. Assembly of remaining items 13 thru 9 and 16 as an assembly is identical.

54. Install new seal ring (13), carrier ring (12) and retaining ring (11) in bearing cage (16, Figure 14-28).
55. Using dry ice or freezer, lower temperature of bearing cup (10) and install cup (10) in bearing cage (16).
56. Install two new preformed packings (9).
57. Repeat steps 54 thru 57 for remaining items 13 thru 9 and 16 as an assembly (Figure 14-29).

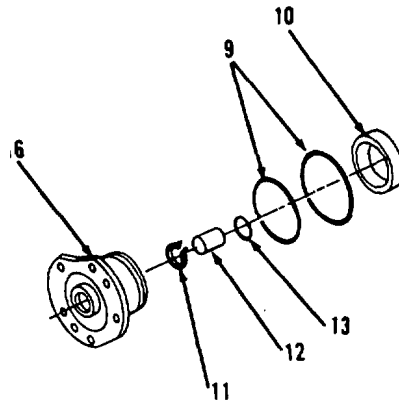


Figure 14-28.

NOTE

Install shim packs in same locations from which they were removed.

58. Install two shim packs (17).
59. Install two items 13 thru 9 and 16 as an assembly.
60. Install five lockwashers (8) and bolts (7).
61. Install new preformed packing (6), retainer (5) and bolt (4). Tighten bolt (4) to 85 ft-lb torque.

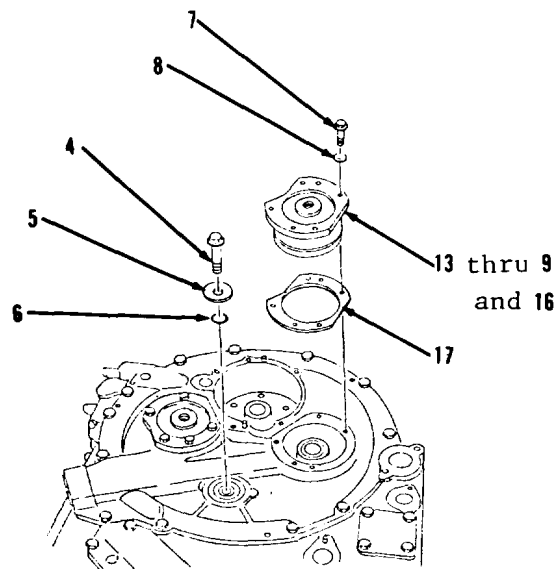


Figure 14-29.

Go to Sheet 18

TRANSMISSION MAINTENANCE. (cont)

14-2. Transmission Assembly. (Sheet 18 of 20)

ASSEMBLY (cont)

- 62. Install 5/8-11NC x 6 bolt through hole in one of two bearing cages (16, Figure 14-30).
- 63. Install dial test indicator group.
- 64. Pry under transfer gear (74) with a crowfoot bar to check end clearance. End clearance must be .002 to .006 inch. Add or remove shim(s) from shim pack (17) to get correct end clearance reading.

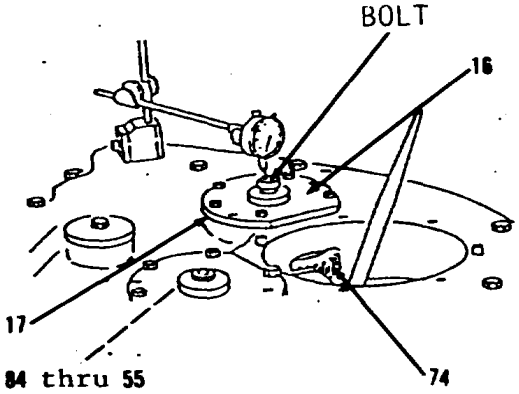


Figure 14-30.

- 65. Remove dial test indicator.
- 66. Remove 5/8-11NC x 6 bolt.
- 67. Check end clearance in remaining set of items 84 thru 55 as an assembly. Repeat steps 62 thru 66.

- 68. Install two new preformed packings (16) and plugs (15, Figure 14-31).

- 69. Using dry ice, lower temperature of bearing cup (23).

- 70. Install bearing cup (23) in bearing cage (21).

- 71. Install shim pack (22).

- 72. Install bearing cage (21) on cover (28).

- 73. Install six washers (20) and bolts (19). Tighten six bolts (19) evenly.

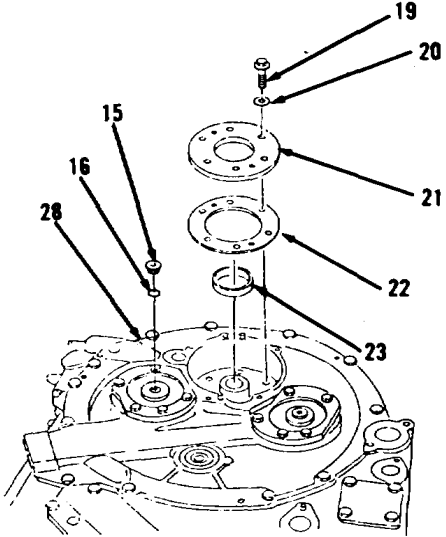


Figure 14-31.

Go to Sheet 19

TRANSMISSION MAINTENANCE.**14-2. Transmission Assembly. (Sheet 19 of 20)****ASSEMBLY**

74. Install 3/8-16NC x 4 bolt in shaft (34, Figure 14-32).
75. Install dial test indicator.
76. Move gear (34) up and down from bottom of transmission housing and check end clearance. End clearance must be .002 to .006 inch. Add or remove shim(s) from shim pack (22) to get correct end clearance.
77. Remove dial test indicator.
78. Remove 3/8-16NC x 4 bolt.
79. Install guide (18) on gear (34, Figure 14-33).
80. Install two lifting eyes (54), lockwashers (53) and bolts (52).
81. Install elbow (51) and breather (50).

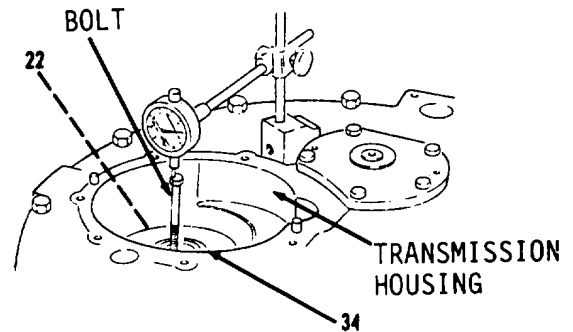


Figure 14-32.

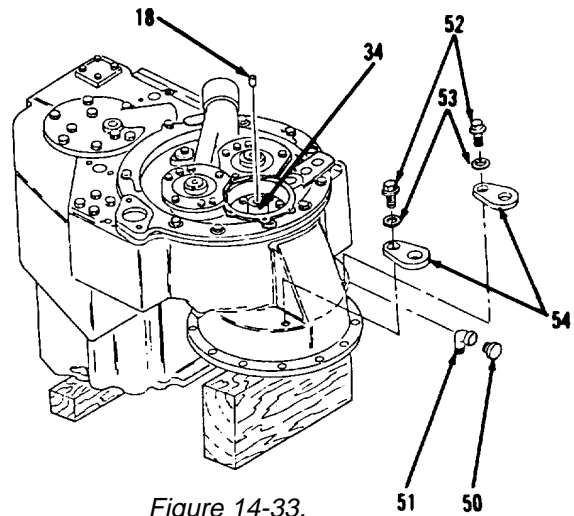


Figure 14-33.

Go to Sheet 20

14-21

TRANSMISSION MAINTENANCE. (cont)**14-2. Transmission Assembly. (Sheet 20 of 20)****ASSEMBLY (cont)**

82. Install two 1/2-13NC forged eyebolts (Figure 14-2).
83. Attach hoist and sling to two 1/2-13NC forged eyebolts and lifting eyes (54).
84. Lift transmission assembly and install on transmission stand.
85. Remove hoist and sling.
86. Remove two 1/2-13NC forged eyebolts.
87. Install coupling (3), retainer (2) and bolt (1, Figure 14-1). Tighten bolt (1) to 85 ft-lb torque.

NOTE

Return 130G Grader to original equipment condition.

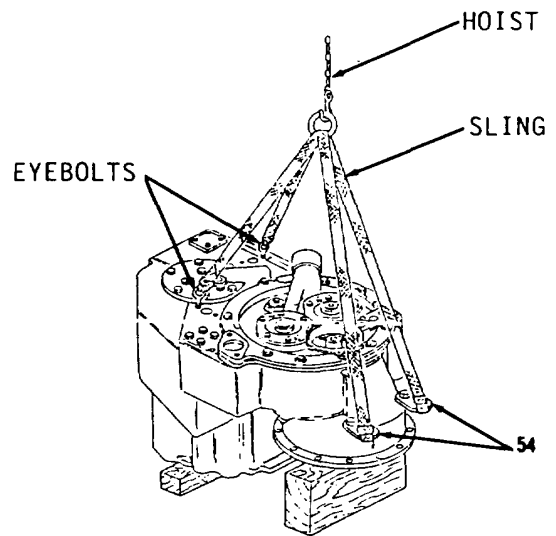


Figure 14-2.

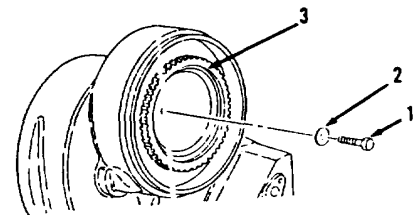


Figure 14-1.

End of Task

14-22

TRANSMISSION MAINTENANCE.

14-3. Planetary Group. (Sheet 1 of 6)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Hoist and sling
Repair stand 1P2426
Two 1/2-13NC eyebolts and nuts
Two 5/8-11NC eyebolts

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Test Equipment

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Preformed packings, Items 3,
9, 10, 11, 12, 13

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 5-6

Transmission removed from vehicle.

Go to Sheet 2

14-23

TRANSMISSION MAINTENANCE. (cont)

14-3. Planetary Group. (Sheet 2 of 6)

REMOVAL

1. Remove four sleeves (1, Figure 14-34) by sliding out from transmission valve. Refer to paragraph 14-5, steps 3 thru 8.
2. Remove plug (2) and preformed packing (3) from lower section of transmission. Discard preformed packing (3).
3. Remove six nuts (4) and lock-washers (5).
4. Remove nine bolts (6) and lock-washers (7).
5. Remove support cover (8).
6. Remove and discard preformed packing (9).
7. Remove and discard three preformed packings (10).
8. Remove four bolts (11), washers (12), cover plate (13), filter screen (14) and magnetic assembly (15) in planetary housing (25, Figure 14-35).
9. Remove four bolts (16), washers (17), cover plate (18), filter screen (19) and magnetic assembly (20).

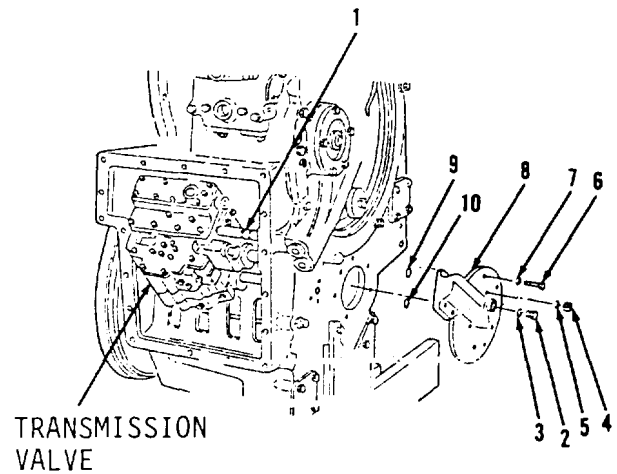


Figure 14-34.

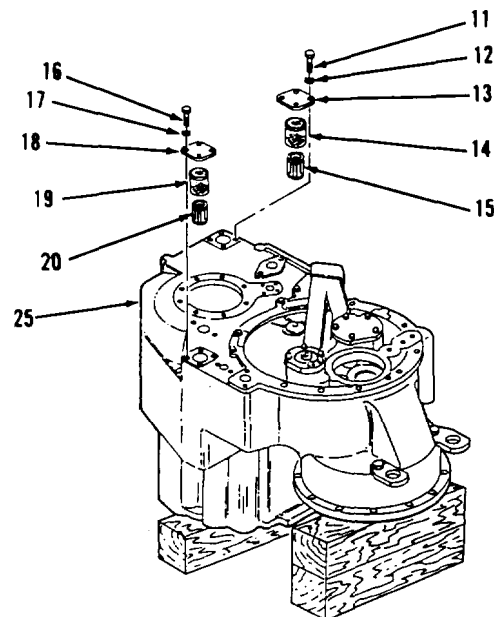


Figure 14-35.

Go to Sheet 3

TRANSMISSION MAINTENANCE.

14-3. Planetary Group. (Sheet 3 of 6)

REMOVAL

10. Install two 1/2-13NC eyebolts and nuts (Figure 14-36) in top of output flange in transmission.

NOTE

Weight of transmission is approximately 1500 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure could cause INJURY. If you are injured, seek medical aid immediately.

11. Install hoist and sling to two 1/2-13NC eyebolts and take up slack in sling.
12. Remove transmission stand mounting bolts.
13. Lift transmission off of transmission stand and position on repair stand with output flange facing upward.
14. Remove hoist and sling.
15. Remove two 1/2-13NC eyebolts and nuts.
16. Remove and discard preformed packings (21, 22 and 23, Figure 14-37) from planetary housing (25).
17. Remove two bolts (24) from planetary housing (25) in transmission case.

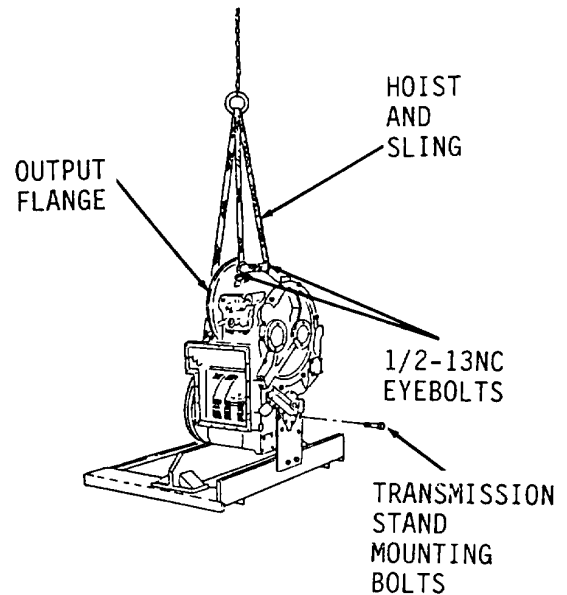


Figure 14-36.

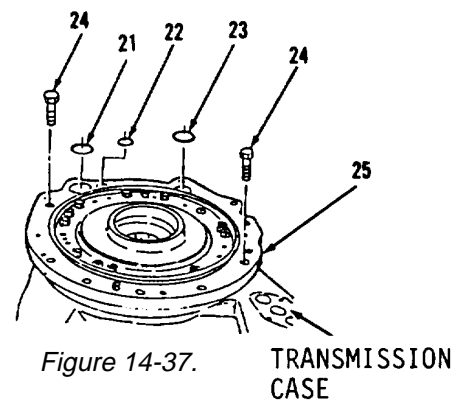


Figure 14-37.

Go to Sheet 4

TRANSMISSION MAINTENANCE. (cont)**14-3. Planetary Group. (Sheet 4 of 6)****REMOVAL (cont)**

18. Install two 5/8-11NC eyebolts in planetary housing (25, Figure 14-38).

WARNING

Weight of planetary housing is approximately 560 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure could cause INJURY. If you are injured, seek medical aid immediately.

19. Install hoist and sling on two 5/8-11NC eyebolts.
20. Rotate planetary housing (25) to disengage parking brake lever from clutch pack.
21. Remove planetary housing (25) and place on three blocks. Make sure planetary input gear is on top of block. Refer to paragraph 14-4 for disassembly.
22. Remove hoist and sling and two 5/8-11NC eyebolts.

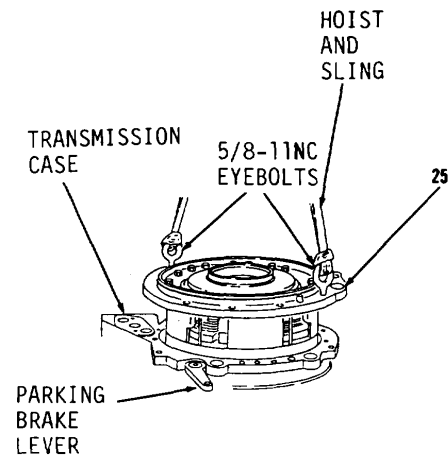


Figure 14-38.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

Go to Sheet 5

14-26

TRANSMISSION MAINTENANCE.

14-3. Planetary Group. (Sheet 5 of 6)

INSTALLATION

1. Install two 5/8-11NC eyebolts in planetary housing (25, Figure 14-38).
2. Install hoist and sling on two 5/8-11NC eyebolts and lift planetary housing (25).

CAUTION

Be sure that the parking brake lever enters the notch in the housing when the transmission is put into position in the transmission case.

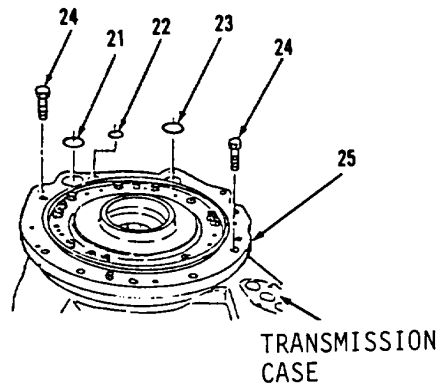


Figure 14-37.

3. Install planetary housing (25) into transmission case being sure parking brake lever on planetary housing (25) enters notch in transmission case.
4. Remove two 5/8-11NC eyebolts and hoist and sling.
5. Install two bolts (24) and new preformed packings (23, 22 and 21, Figure 14-37) in planetary housing (25) of transmission case.
6. Install two 1/2-13NC eyebolts and nuts on output flange in transmission.
7. Install hoist and sling to two 1/2-13NC eyebolts, turn transmission to side and lift and place transmission on transmission stand (Figure 14-36).
8. Install transmission stand mounting bolts to transmission.
9. Remove hoist and sling, two 1/2-13NC eyebolts and nuts.

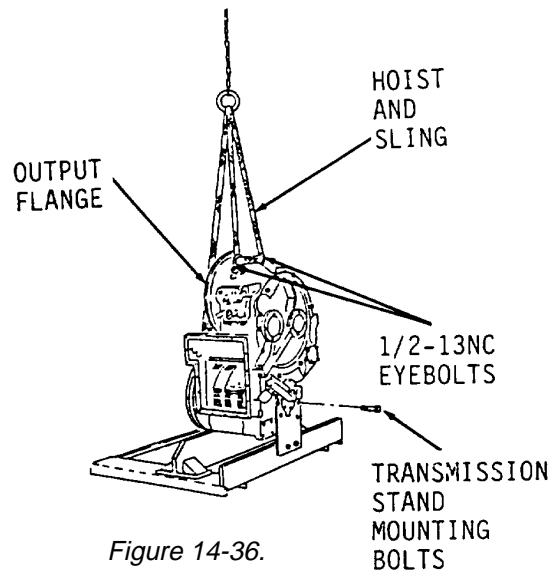


Figure 14-36.

Go to Sheet 6

TRANSMISSION MAINTENANCE. (cont)

14-3. Planetary Group. (Sheet 6 of 6)

INSTALLATION (cont)

10. Install magnetic assembly (20), filter screen (19), cover plate (18), four washers (17) and bolts (16) in planetary housing (25, Figure 14-35).
11. Install magnetic assembly (15), filter screen (14), cover plate (13), four washers (12) and bolts (11).
12. Install three new preformed packings (10) and new preformed packing (9, Figure 14-34) to lower section of transmission.
13. Install support cover (8), lockwashers (7) and bolts (6).
14. Install six lockwashers (5) and nuts (4).
15. Install new preformed packing (3) and plug (2).
16. Install four sleeves (1) by sliding into transmission valve.

NOTE

Return 130G Grader to original equipment condition.

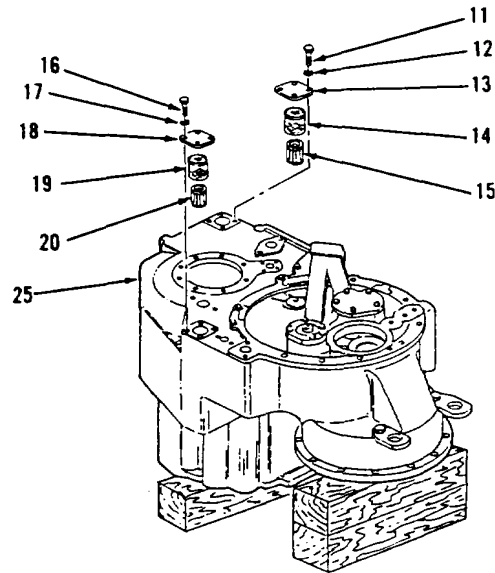


Figure 14-35.

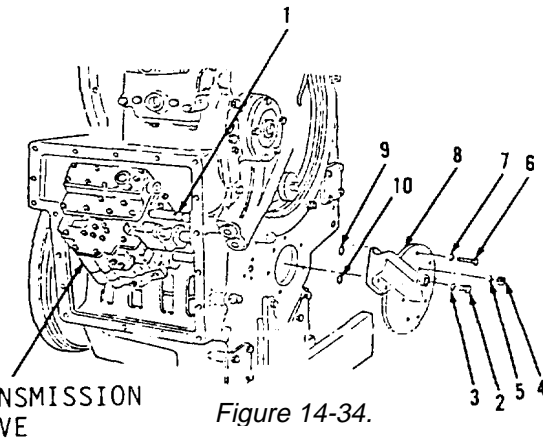


Figure 14-34.

End of Task

14-28

TRANSMISSION MAINTENANCE.

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 1 of 19)

This task covers:

- a. Disassembly**
 - b. Cleaning**
 - c. Inspection**
 - d. Assembly**
-

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Puller assembly 8B7548
Spanner socket CAT 5P2970
Bearing installer 1P471
3/8-16NC eyebolts
Hoist and sling
Long bolts
Press assembly
Drive plate and handle

References

None

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Anti-seize compound, Item 8,
Appendix C
Engine oil, SAE 10, Item 67,
Appendix C
Engine oil, SAE 30, Item 69,
Appendix C
Preformed packings, Items 4,
31, 134
Pins, Items 44, 80
Plugs, Items 50, 86, 114, 121

Troubleshooting References

None

Equipment Condition

Paragraph 14-3

Planetary removed from transmission
housing.

Go to Sheet 2

TRANSMISSION MAINTENANCE. (cont)

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 2 of 19)

DISASSEMBLY

1. Remove 12 bolts (1) and washers (2, Figure 14-39).
2. Remove plug (3), preformed packing (4). Discard preformed packing (4).

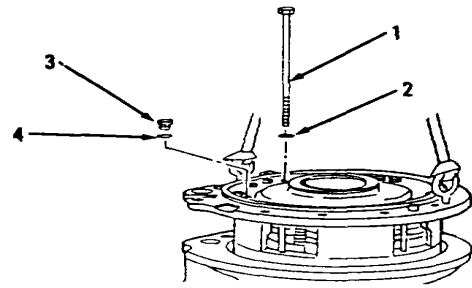


Figure 14-39.

WARNING

Weight of housing is approximately 85 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

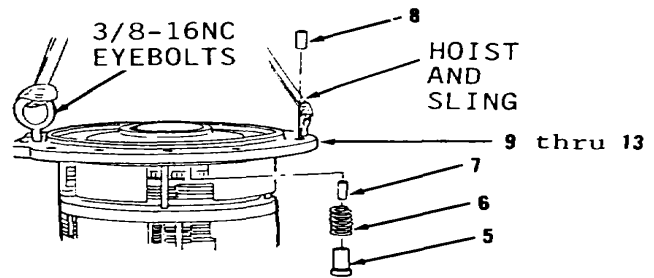


Figure 14-40.

3. Using hoist and sling, lift housing (13) slightly to remove four plungers (5), springs (6) and dowels (7, Figure 14-40).
4. Remove dowel (8) from housing (13).
5. Using hoist and sling, remove items 9 thru 13 as an assembly (Figure 14-41) and position upside down and remove hoist and sling and eyebolt.
6. Remove seal (9) and seal rings (10, 11 and 12) from housing (13, Figure 14-42).

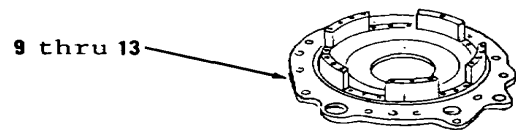


Figure 14-41.

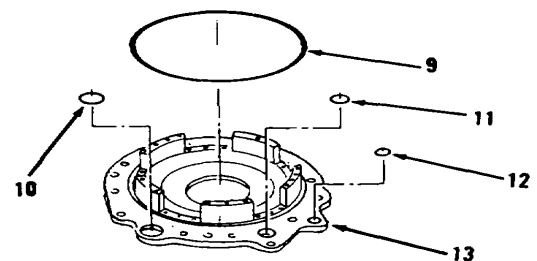


Figure 14-42.

Go to Sheet 3

TRANSMISSION MAINTENANCE.

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 3 of 19)

DISASSEMBLY

7. Remove 14 bolts (14) and washers (15) from hub (18, Figure 14-43).
8. Bend two lock tabs (17) away from four bolts (16) and remove four bolts (16) and two lock tabs (17).
9. Insert two long bolts into outer threaded holes of hub (18) to aid in removal of hub (18, Figure 14-44).
10. Remove hub (18) and long bolts.
11. Remove four discs (19) and three plates (20), gear (21) and piston (22, Figure 14-45).
12. Remove five inserts (23) and balls (24).
13. Remove four aligning pins (25).

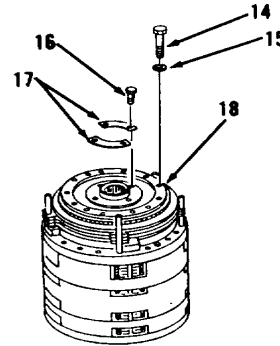


Figure 14-43.

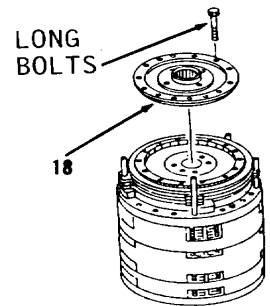


Figure 14-44.

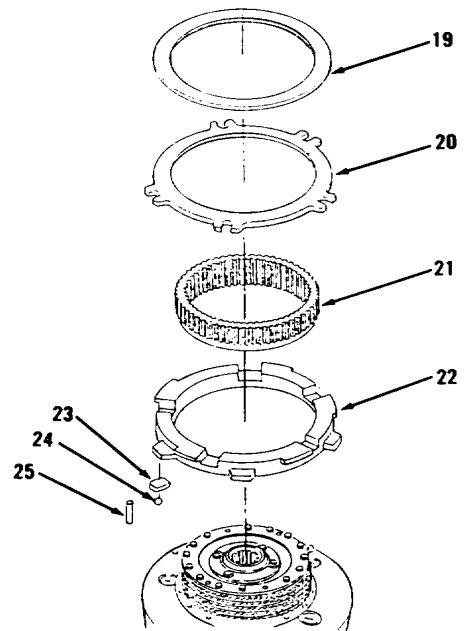


Figure 14-45.

Go to Sheet 4

TRANSMISSION MAINTENANCE. (cont)

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 4 of 19)

DISASSEMBLY (cont)

- 14. Insert two long bolts into hub (37, Figure 14-45) to aid in removal and remove hub (26), five discs (27) and four plates (28, Figure 14-46).
- 15. Install press assembly onto housing (43) and compress to remove seal ring (28.1), snap ring (29), gear (30) and two alining dowels (31, Figure 14-47).
- 16. Insert two long bolts into carrier to aid in removal of items 32 thru 41 as an assembly (Figure 14-48).
- 17. Remove items 32 thru 41 as an assembly and remove two long bolts.
- 18. Remove snap ring (32, Figure 14-49).
- 19. Using suitable bearing puller, remove bearing (33).

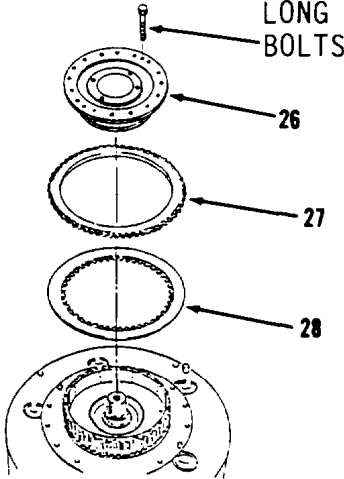


Figure 14-46.

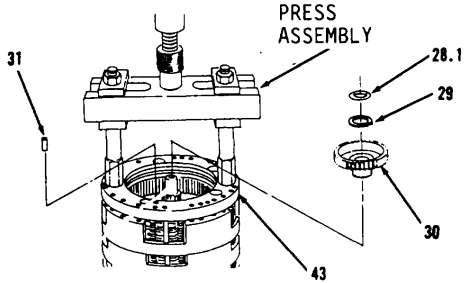


Figure 14-47.

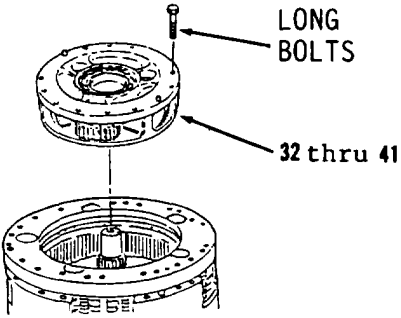


Figure 14-48.

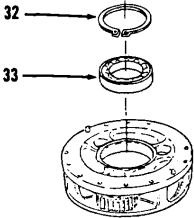


Figure 14-49.

Go to Sheet 5

TRANSMISSION MAINTENANCE.

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 5 of 19)

DISASSEMBLY

20. Using punch and hammer, position three pins (34) and drive into shafts (35, Figure 14-50).
21. Remove three shafts (35), discs (36), gears (37), rollers (38) and discs (39) from carrier (41).

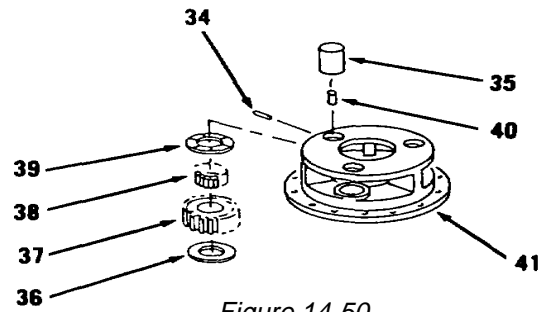


Figure 14-50.

NOTE

Remove pins and plugs only if inspection indicates replacement is necessary.

22. Remove three pins (34) and plugs (40), if necessary, from shafts (35).
23. Remove five inserts (42), housing (43), ten springs (44) and gear (45, Figure 14-51).
24. Remove four discs (46) and three plates (47).
25. Remove items 48 thru 50 as an assembly (Figure 14-52).
26. Remove two dowels (51), housing (52) and ten springs (53).
27. Remove rings (48 and 49) from piston (50, Figure 14-53).

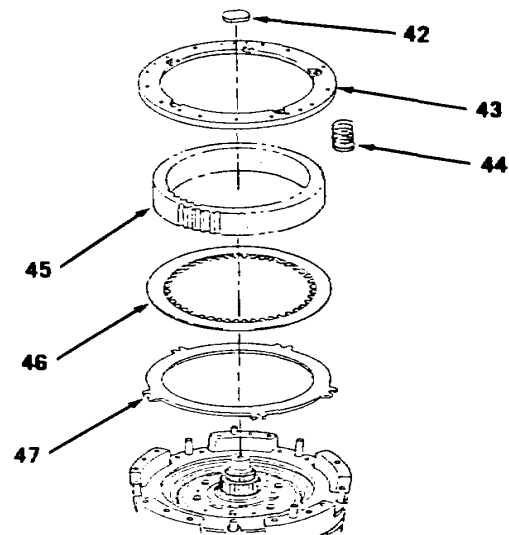


Figure 14-51.

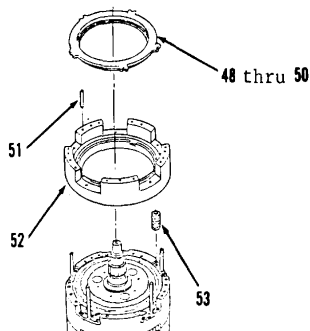


Figure 14-52.

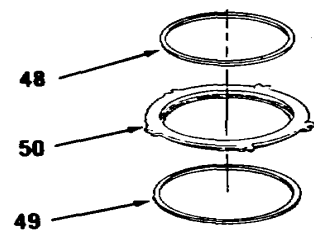


Figure 14-53.

Go to Sheet 6

TRANSMISSION MAINTENANCE. (cont)

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 6 of 19)

DISASSEMBLY (cont)

- 28. Remove gear (54) and five dowels (55, Figure 14-54).
- 29. Remove two discs (56), one plate (57) and gear (58).
- 30. Remove items 59 thru 61 as an assembly.
- 31. Remove rings (59 and 60) from piston (61, Figure 14-55).
- 32. Remove housing (62), items 63 thru 65 as an assembly and ten springs (66, Figure 14-56).
- 33. Remove rings (63 and 64) from piston (65, Figure 14-57).
- 34. Remove six bolts (67), washers (68) and cage (69, Figure 14-58).
- 35. Remove items 70 thru 77 as an assembly.

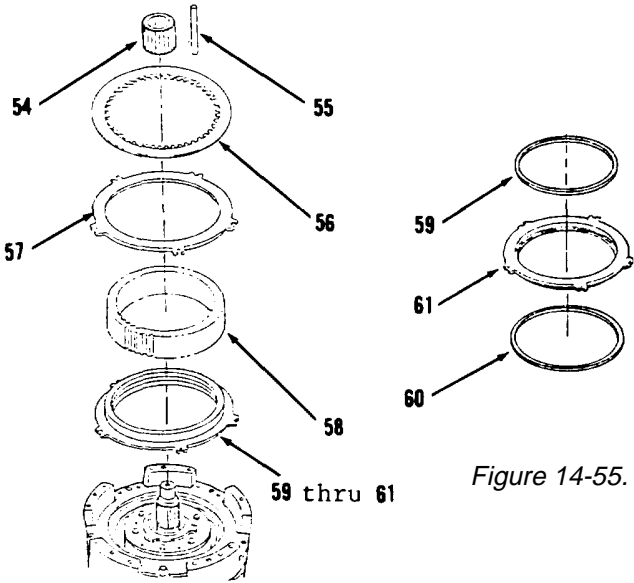


Figure 14-54.

Figure 14-55.

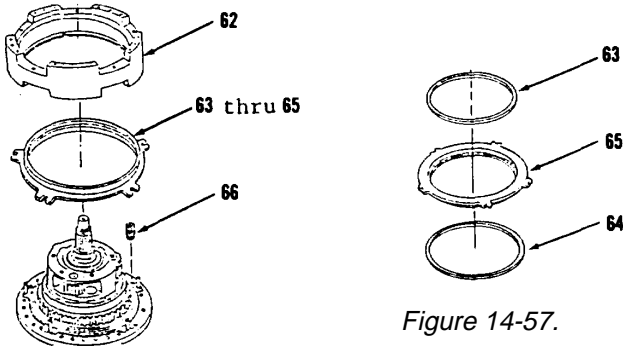


Figure 14-56.

Figure 14-57.

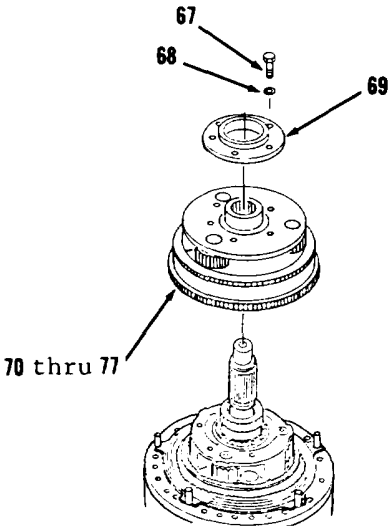


Figure 14-58.

Go to Sheet 7

TRANSMISSION MAINTENANCE.

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 7 of 19)

DISASSEMBLY

- 36. Using punch and hammer, position three pins (71) and drive into shafts (72, Figure 14-59).
- 37. Remove three shafts (72), discs (73), gears (74), rollers (75) and discs (76) from carrier (70).

NOTE

Remove pins and plugs only if inspection indicates replacement is necessary.

- 38. Remove three pins (71) and plugs (77), if necessary, from shafts (72).
- 39. Remove two discs (78), one plate (79), five dowels (80), housing (81) and ten springs (82, Figure 14-60).
- 40. Remove items 83 thru 85 as an assembly.
- 41. Remove rings (83 and 84) from piston (85, Figure 14-61).
- 42. Remove two discs (86), one plate (87) and ring (88, Figure 14-62).
- 43. Remove items 89 and 90 as an assembly.

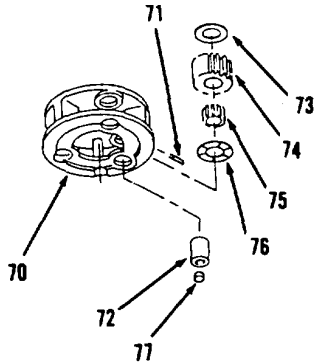


Figure 14-59.

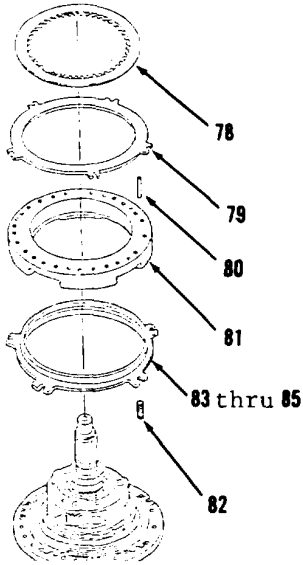


Figure 14-60.

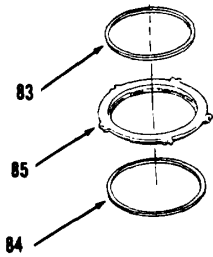


Figure 14-61.

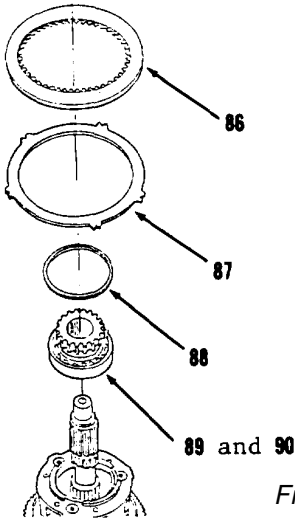


Figure 14-62.

Go to Sheet 8

TRANSMISSION MAINTENANCE. (cont)

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 8 of 19)

DISASSEMBLY (cont)

- 44. Using suitable press, press bearing (89) from gear (90, Figure 14-63).
- 45. Remove gear (91) and items 92 and 93 as an assembly (Figure 14-64).
- 46. Remove gear (92) from shaft (93, Figure 14-65).
- 47. Remove plate (94, Figure 14-66).
- 48. Using punch and hammer, position three pins (96) and remove ring (95).

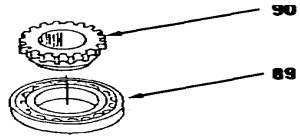


Figure 14-63.

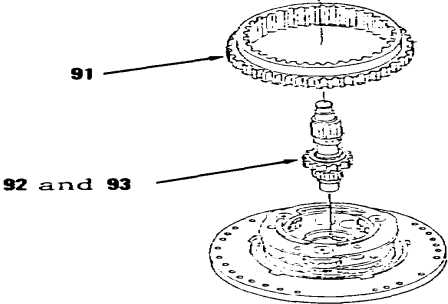


Figure 14-64.

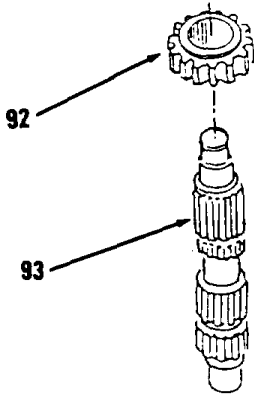


Figure 14-65.

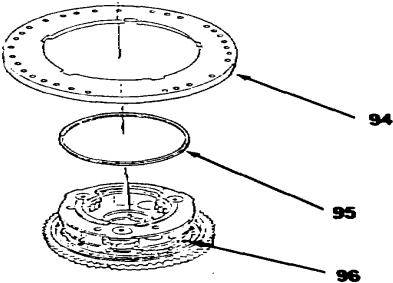


Figure 14-66.

Go to Sheet 9

TRANSMISSION MAINTENANCE.

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 9 of 19)

DISASSEMBLY

49. Remove items 96 thru 112 as an assembly (Figure 14-67).
50. Remove three pins (96, Figure 14-68).
51. Using punch and hammer, position three pins (97) and drive into shafts (98).
52. Remove three shafts (98), washers (99), rollers (100), gears (101), rollers (102) and washers (103).

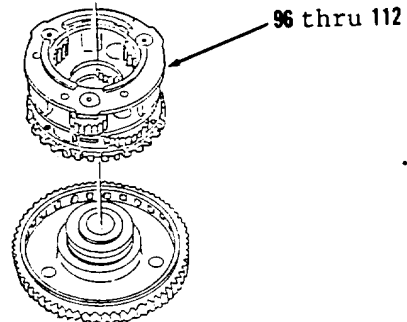


Figure 14-67.

NOTE

Remove plugs only if inspection indicates replacement is necessary.

53. Remove three plugs (104), if necessary, and pins (97) from shafts (98).
54. Using punch and hammer, drive three pins (105) into shafts (106, Figure 14-69).
55. Remove three shafts (106), discs (107), gears (108), rollers (109) and discs (110) from carrier (112).

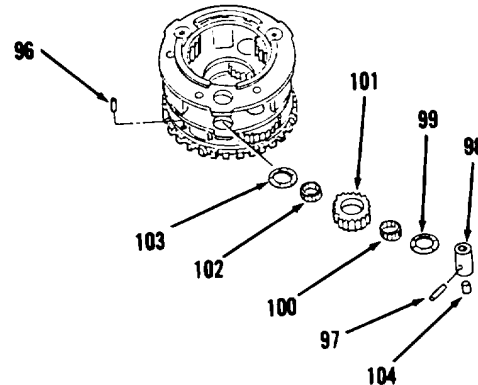


Figure 14-68.

NOTE

Remove plugs only if inspection indicates replacement is necessary.

56. Remove three plugs (111), if necessary, and pins (105) from shafts (106).

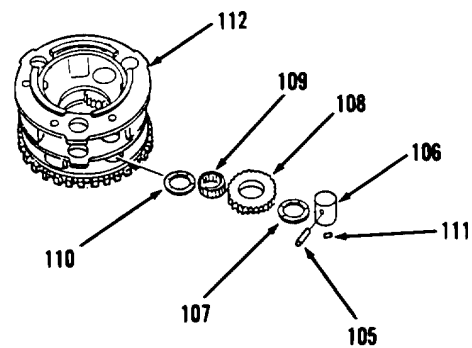


Figure 14-69.

Go to Sheet 10

TRANSMISSION MAINTENANCE. (cont)

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 10 of 19)

DISASSEMBLY (cont)

57. Using spanner socket, remove bearing lock nut (113, Figure 14-70).
58. Remove lock nut (114), roller bearing (115) and roller bearing cup (116).
59. Using screwdriver, remove ring (117).
60. Remove items 118 thru 127 as an assembly.
61. Remove roller bearing (118), cone spacer (119) and roller bearing cup (120) from gear (127, Figure 14-71).
62. Remove seal ring (121), ring carrier (122), sleeve bearing (123), preformed packing (124) and six studs (125) from cage (126). Discard preformed packing (124).

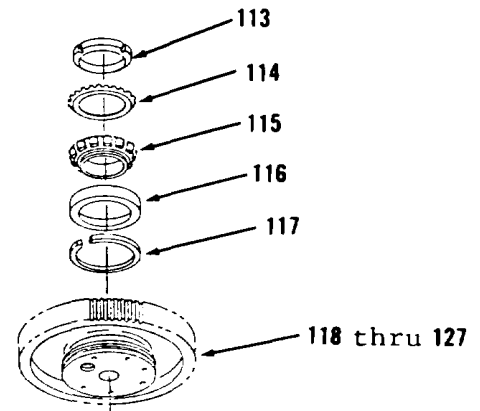


Figure 14-70.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

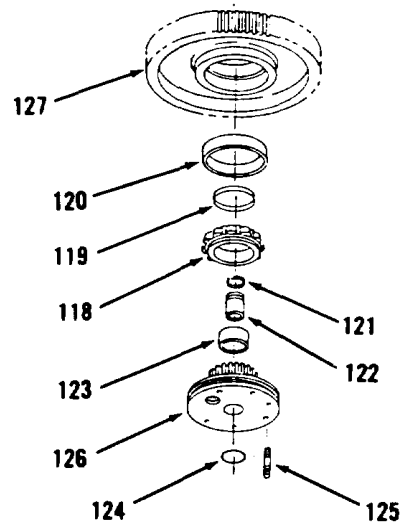


Figure 14-71.

Go to Sheet

TRANSMISSION MAINTENANCE.

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 11 of 19)

ASSEMBLY

1. Install six studs (125), new preformed packing (124), sleeve bearing (123), ring carrier (122) and seal ring (121) in cage (136, Figure 14-71). Use drive plates and handle to install sleeve bearing (123).
2. Install roller bearing cup (120), cone spacer (119) and roller bearing (118) into gear (127).
3. Install items 127 thru 118 as an assembly and ring (117, Figure 14-70).
4. Install roller bearing cup (116), roller bearing (115) and lock nut (114).
5. Using spanner socket, install bearing lock nut (113). Apply anti-seize compound on threads of bearing lock nut (113) and tighten to 170 ft-lb torque and bend tab of lock nut (114) into slot.

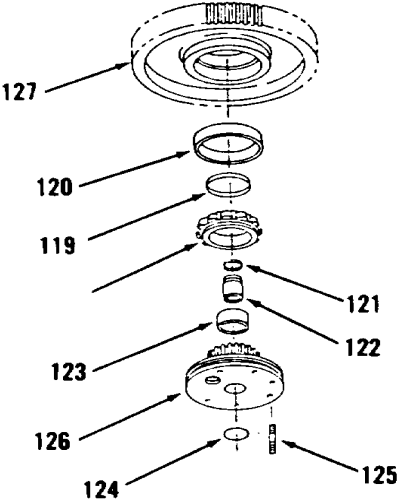


Figure 14-71.

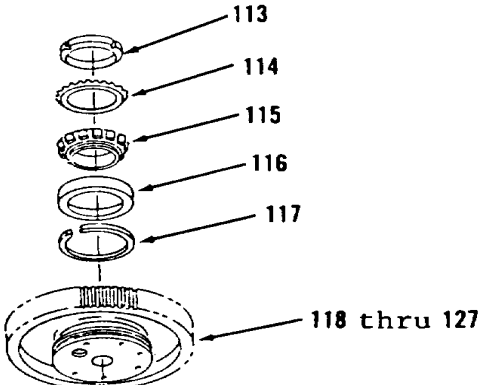


Figure 14-70.

TRANSMISSION MAINTENANCE. (cont)

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 12 of 19)

ASSEMBLY (cont)

6. Install three discs (110), rollers (109), gears (108), discs (107) and shafts (106, Figure 14-69).

CAUTION

Pins that hold shafts to carriers must be installed flush with outer surface of carrier. If they are installed further, they will prevent oil flow for lubrication of the gears.

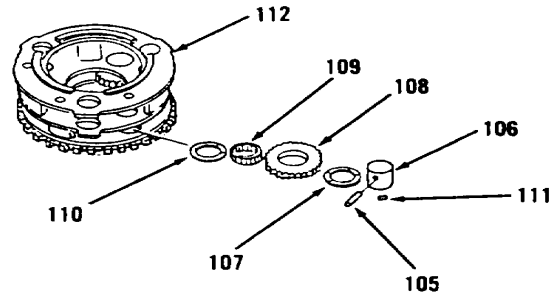


Figure 14-69.

7. Install three shafts (106) and new plugs (111), if removed, in carrier (112).
8. Install three washers (103), rollers (102), gears (101), rollers (100), washers (99) and shafts (98, Figure 14-68).

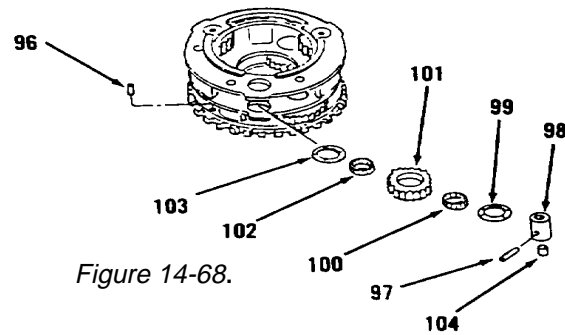


Figure 14-68.

9. Install three pins (97) and new plugs (104), if removed, on shafts (98).
10. Install items 112 thru 96 as an assembly (Figure 14-67).
11. Install ring (95) in groove exposing holes for three pins (96, Figure 14-66).
12. Install three pins (96) and plate (94).

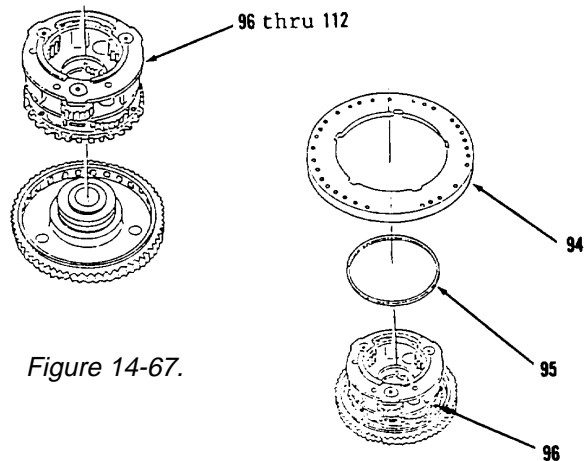


Figure 14-67.

Figure 14-66.

Go to Sheet 13

TRANSMISSION MAINTENANCE.

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 13 of 19)

ASSEMBLY

- 13. Install gear (92) on shaft (93, Figure 14-65).
- 14. Install gear (91) and items 93 and 92 as an assembly (Figure 14-64).
- 15. Using suitable press, press bearing (89) on gear (90, Figure 14-63).
- 16. Install items 90 and 89 as an assembly, ring (88), plate (87) and two discs (86, Figure 14-62).
- 17. Install rings (84 and 83) on piston (85, Figure 14-61).

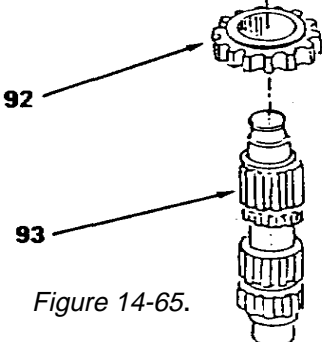


Figure 14-65.

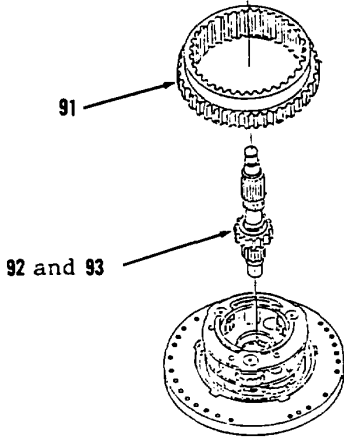


Figure 14-64.

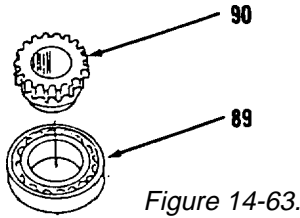


Figure 14-63.

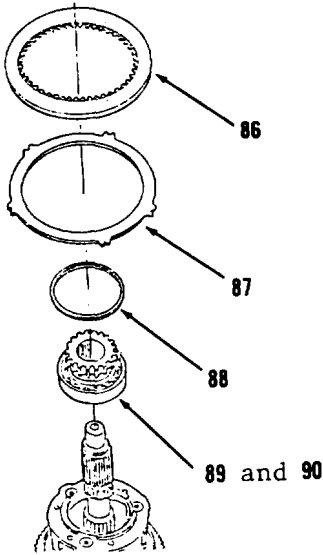


Figure 14-62.

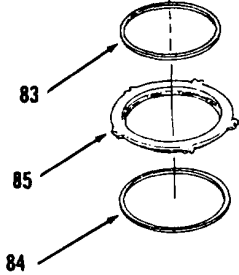


Figure 14-61.

Go to Sheet 14
14-41

TRANSMISSION MAINTENANCE. (cont)

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 14 of 19)

ASSEMBLY (cont)

- 18. Install items 85 thru 83 as an assembly, ten springs (82), housing (81) and five dowels (80), Figure 14-60).
- 19. Install three discs (76), rollers (75), gears (74), discs (73) and shafts (72) in carrier (70), Figure 14-59).

CAUTION

Pins that hold shafts to carriers must be installed flush with outer surface of carrier. If they are installed further, they will prevent oil flow for lubrication of the gears.

- 20. Install three new pins (71) and new plugs (77), if removed, to shafts (72) in carrier (70).
- 21. Install items 77 thru 70 as an assembly (Figure 14-72).
- 22. Install two discs (78), one plate (79), cage (69), six washers (68) and bolts (67).

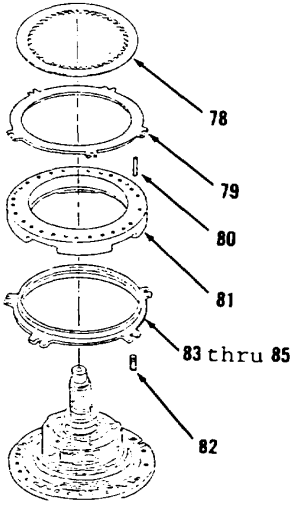


Figure 14-60.

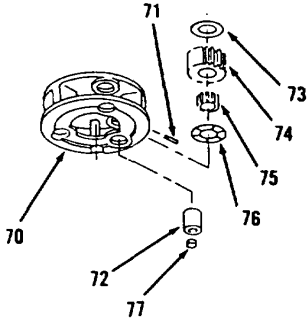


Figure 14-59.

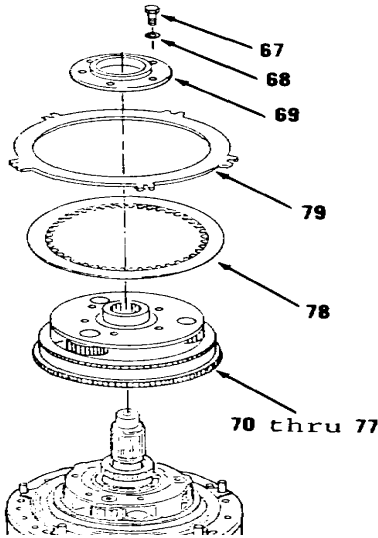


Figure 14-72.

Go to Sheet 15

TRANSMISSION MAINTENANCE.

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 15 of 19)

ASSEMBLY

- 23. Install rings (64 and 63) in piston (65, Figure 14-57).
- 24. Install ten springs (66), items 65 thru 63 as an assembly and housing (62, Figure 14-56).
- 25. Install ring (60 and 59) in piston (61, Figure 14-55).
- 26. Install items 61 thru 59 as an assembly (Figure 14-54).
- 27. Install gear (58), plate (57), two discs (56), five dowels (55) and gear (54).
- 28. Install rings (49 and 48) in piston (50, Figure 14-53).

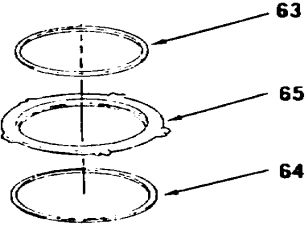


Figure 14-57.

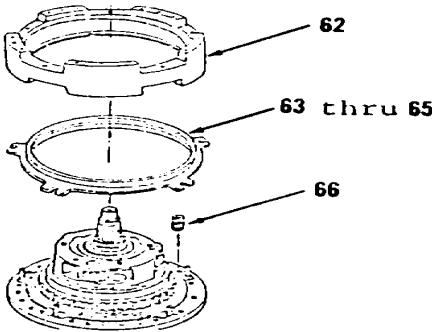


Figure 14-56.

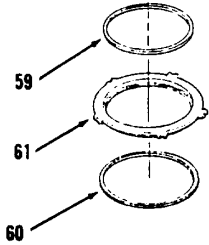


Figure 14-55.

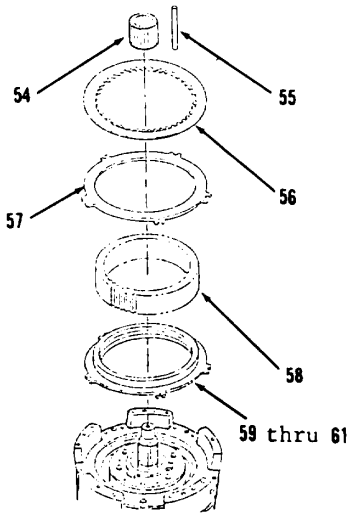


Figure 14-54.

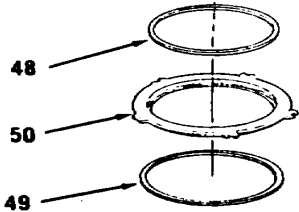


Figure 14-53.

Go to Sheet 16

TRANSMISSION MAINTENANCE. (cont)

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 16 of 19)

ASSEMBLY (cont)

- 29. Install ten springs (53), housing (52), two dowels (51) and items 50 thru 48 as an assembly (Figure 14-52).
- 30. Install gear (45), four discs (46), three plates (47), ten springs (44), housing (43) and five inserts (42, Figure 14-73).
- 31. Install three discs (39), rollers (38), gears (37), discs (36) and shafts (35) in carrier (41, Figure 14-50).
- 32. Install three new plugs (40) and new pins (34), if removed, to shafts (35) and in carrier (41).
- 33. Install bearing (33) and snap ring (32, Figure 14-49).
- 34. Install items 41 thru 32 as an assembly (Figure 14-48).

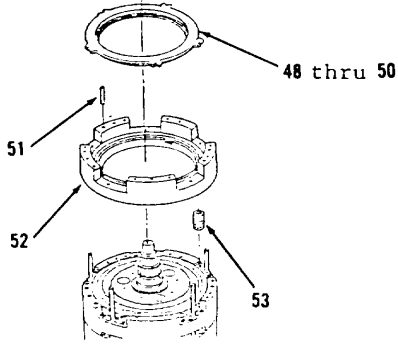


Figure 14-52.

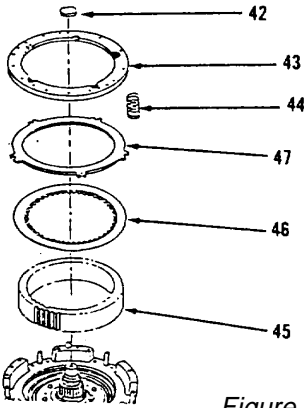


Figure 14-73.

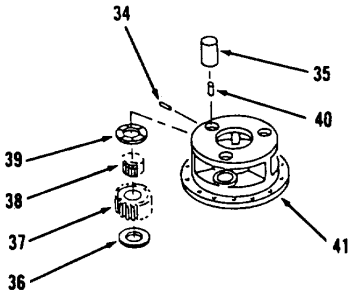


Figure 14-50.

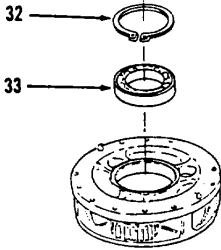


Figure 14-49.

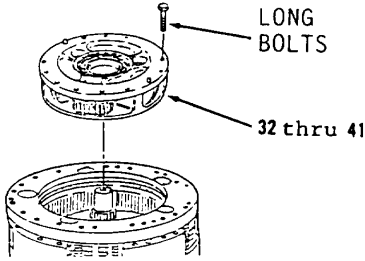


Figure 14-48.

Go to Sheet 17

TRANSMISSION MAINTENANCE.

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 17 of 19)

ASSEMBLY

- 35. Install press assembly and compress to install gear (30), snap ring (29) and seal ring (28.1, Figure 14-47).
- 36. Install two dowels (31) in housing (43).
- 37. Release pressure of the press assembly slowly and remove press assembly.

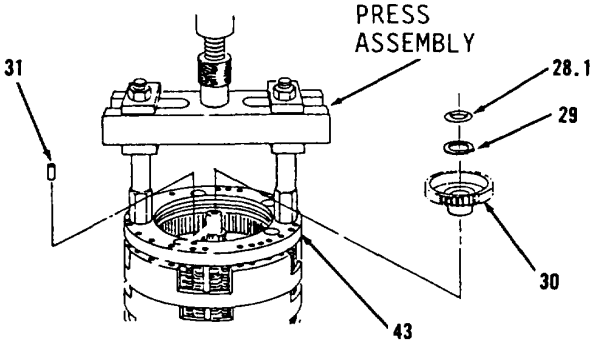


Figure 14-47.

- 38. Install five discs (27) and four plates (28, Figure 14-46).
- 39. Install two long bolts into hub (26) to aid in installing hub (26) using care not to damage seal.
- 40. Install hub (26).
- 41. Install four alining pins (25), five balls (24) and inserts (23, Figure 14-45).
- 42. Install piston (22), gear (21), four discs (19) and three plates (20).

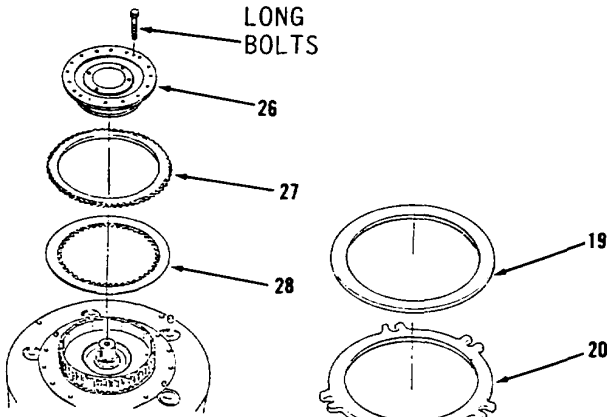


Figure 14-46.

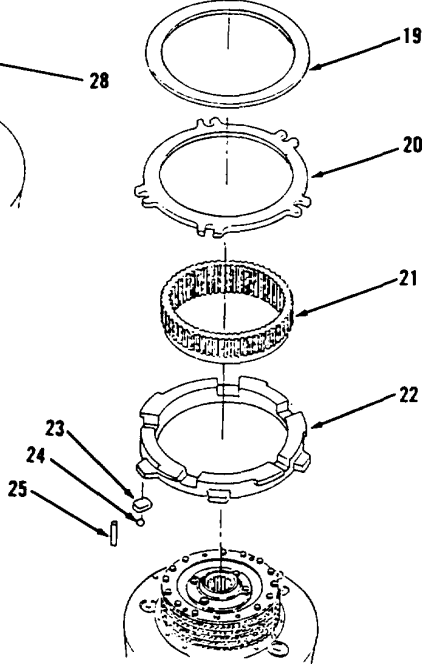


Figure 14-45.

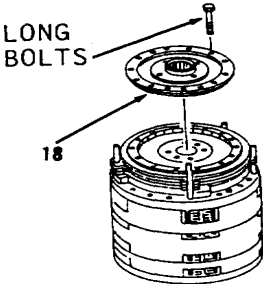
Go to Sheet 18

TRANSMISSION MAINTENANCE. (cont)

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 18 of 19)

ASSEMBLY (cont)

- 43. Install two long bolts in outer threaded holes of hub (18, Figure 14-44) to aid in installing.
- 44. Install hub (18).
- 45. Install two lock tabs (17) and four bolts (16, Figure 14-43).
- 46. Bend two lock tabs (17) up against head of four bolts (16).
- 47. Install 14 washers (15) and bolts (14).
- 48. Install seal rings (12, 11 and 10) in housing (13, Figure 14-42).
- 49. Install seal (9).



Figures 14-44.

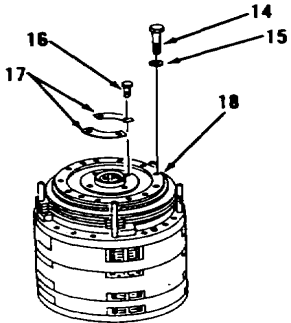


Figure 14-43.

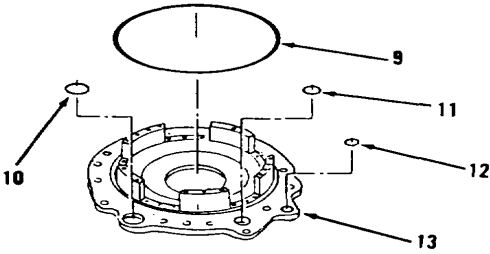


Figure 14-42.

Go to Sheet 19

TRANSMISSION MAINTENANCE.

14-4. Transmission Assembly: Planetary Group, Disassembly/Assembly. (Sheet 19 of 19)

ASSEMBLY

50. Install two eyebolts in housing (13, Figure 14-40) and attach hoist and sling.
51. Position housing on transmission assembly and lift housing (13) slightly to install four dowels (7), springs (6) and plungers (5).
52. Install dowel (8).
53. Install new preformed packing (4) and plug (3, Figure 14-39).
54. Install 12 washers (2) and bolts (1).

NOTE

Return 130G Grader to original equipment condition.

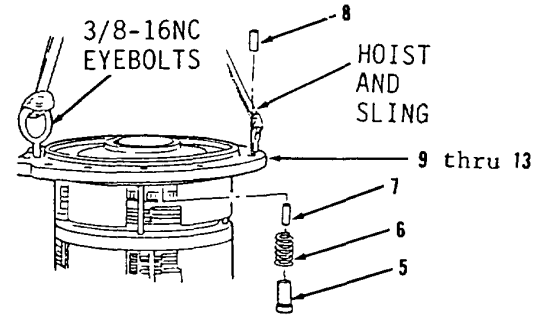


Figure 14-40.

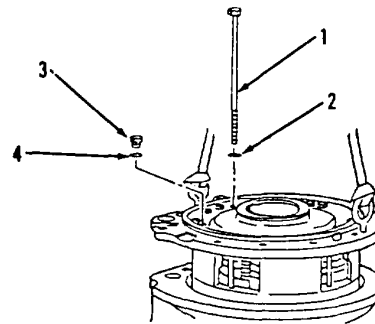


Figure 14-39.

End of Task

TRANSMISSION MAINTENANCE.

14-5. Transmission Hydraulic Control Valve. (Sheet 1 of 4)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Lifting eye 5P2181
Control bracket 5P2184
Lifting bracket 5P2187
Ratchet assembly 8S9906

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Test Equipment

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Gasket, Item 8
Preformed packings, Items 17,
18, 21, 22

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 5-6

Transmission assembly removed.

Go to Sheet 2

TRANSMISSION MAINTENANCE.

14-5. Transmission Hydraulic Control Valve. (Sheet 2 of 4)

REMOVAL

1. Remove 18 bolts (1), lockwashers (2), washers (3), bolt (4), lock-washer (5), washer (6), cover (7) and gasket (8, Figure 14-74) from transmission case. Discard gasket (8). Remove all gasket material from mounting surfaces.
2. Remove links (9 and 10).
3. Remove bolt (11) and plate (12, Figure 14-75).
4. Remove two bolts (13) and plate (14).
5. Slide sleeves (15 and 16) away from hydraulic control group (25).
6. Remove and discard two preformed packings (17 and 18).
7. Slide sleeves (19 and 20) away from hydraulic control group (25).
8. Remove and discard two preformed packings (21 and 22).
9. Attach lifting eye, control bracket, lifting bracket and ratchet assembly to transmission case and hydraulic control group (25).

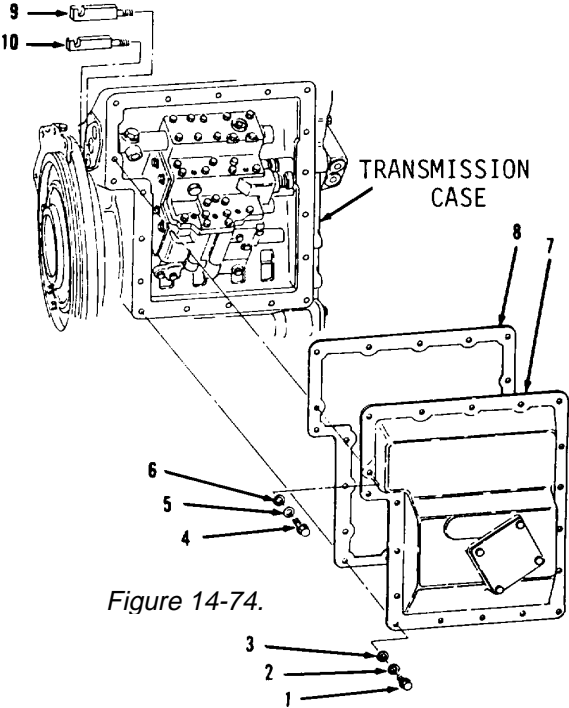


Figure 14-74.

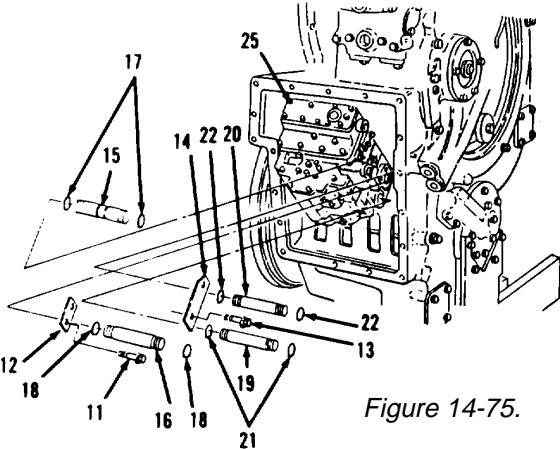


Figure 14-75.

Go to Sheet 3

TRANSMISSION MAINTENANCE. (cont)**14-5. Transmission Hydraulic Control Valve. (Sheet 3 of 4)****REMOVAL (cont)**

10. Remove four bolts (23) and washers (24, Figure 14-76) from transmission case.
11. Remove hydraulic control group (25).
12. Remove lifting eye, control bracket, lifting bracket and ratchet assembly.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Attach lifting eye, control bracket, lifting bracket and ratchet assembly to transmission case and hydraulic control group (25).
2. Using tooling, position hydraulic control group (25, Figure 14-76) and attach to transmission case.
3. Install four washers (24) and bolts (23). Tighten four bolts (23) to 32 to 38 ft-lb torque.
4. Remove lifting eye, control bracket, lifting bracket and ratchet assembly.

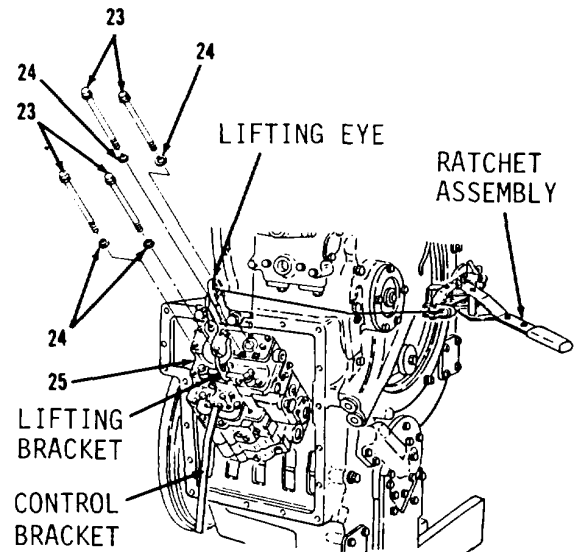


Figure 14-76.

Go to Sheet 4

TRANSMISSION MAINTENANCE.

14-5. Transmission Hydraulic Control Valve. (Sheet 4 of 4)

INSTALLATION

5. Install two new preformed packings (22 and 21) in sleeves (20 and 19, Figure 14-75).
6. Install sleeves (20 and 19) to transmission case.
7. Install two new preformed packings (18 and 17) in sleeves (16 and 15).
8. Install sleeves (16 and 15) to transmission case.
9. Install plate (14) and two bolts (13). Tighten two bolts (13) to 19 to 25 ft-lb torque.
10. Install plate (12) and bolt (11). Tighten bolt (11) to 19 to 25 ft-lb torque.
11. Install links (10 and 9, Figure 14-74).
12. Install new gasket (8), cover (7), washer (6), lockwasher (5), bolt (4), 18 washers (3), lockwashers (2) and bolts (1).

NOTE

Return 130G Grader to original equipment condition.

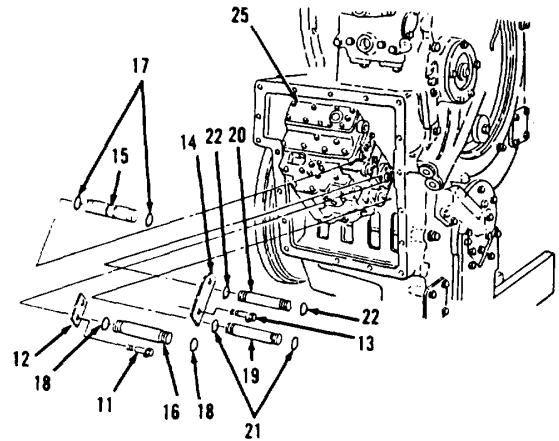


Figure 14-75.

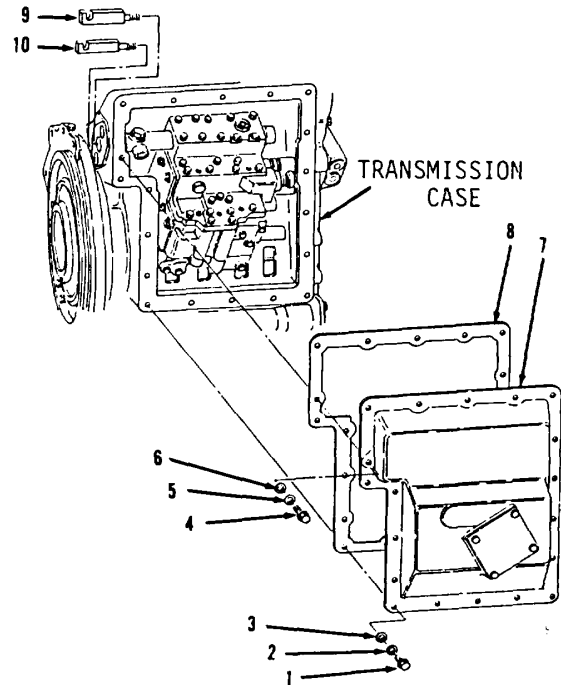


Figure 14-74.

End of Task

TRANSMISSION MAINTENANCE. (cont)

14-6. Transmission Control Relief Valve. (Sheet 1 of 4)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

References

TM 5-3805-261-10

Test Equipment

None

Special Environmental Conditions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Preformed packings, Items 1,
2, 3, 4, 5, 6, 7, 9,
11, 19, 20, 30, 40

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 5-9

Transmission control relief valve
removed.

Go to Sheet 2

14-52

TRANSMISSION MAINTENANCE.

**14-6. Transmission Control Relief Valve. (Sheet 2 of 4)
DISASSEMBLY**

1. Remove and discard preformed packings (1 thru 7) from back of control relief valve (44, Figure 14-77).
2. Remove plug (8) and preformed packing (9) from front of control relief valve (44). Discard preformed packing (9).
3. Remove plug (10), preformed packing (11) and pin (12). Discard preformed packing (11).
4. Remove two bolts (13), lock washers (14) and cover (15) from left side of control relief valve (44, Figure 14-78).
5. Remove two bolts (16), lock-washers (17) and cover (18).
6. Remove and discard preformed packings (19 and 20).
7. Remove spacer (21) from relief valve (26).
8. Remove retaining ring (22), retainer (23), spring (24) and poppet (25).
9. Remove four bolts (27), lock-washers (28) and two covers (29) from bottom of control relief valve (44, Figure 14-79).
10. Remove and discard two preformed packings (30).

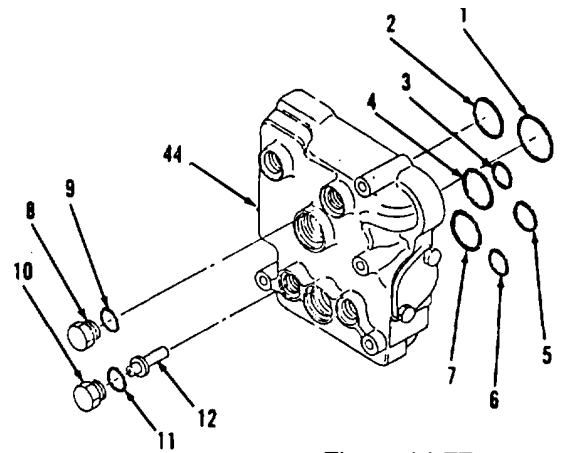


Figure 14-77.

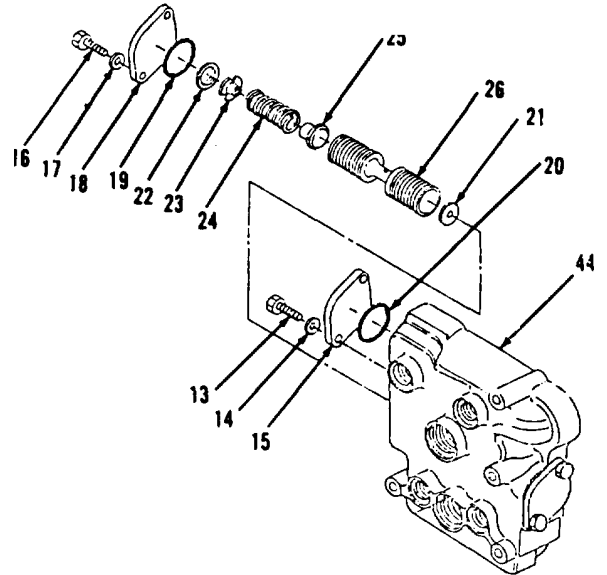


Figure 14-78.

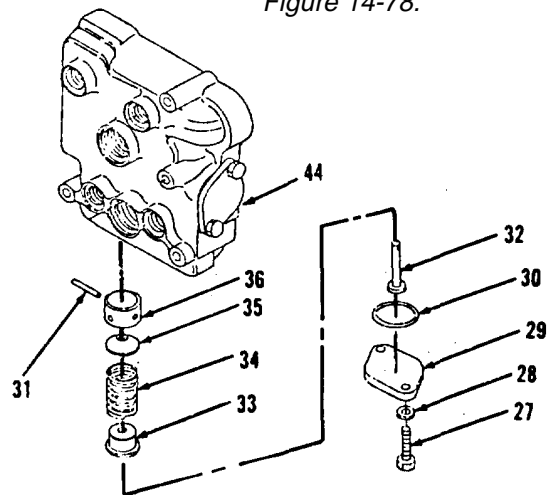


Figure 14-79.

TRANSMISSION MAINTENANCE. (cont.)**14-6. Transmission Control Relief Valve.
(Sheet 3 of 4) DISASSEMBLY (cont.)**

11. Remove two pins (31) from collar (36).
12. Remove two pins (32), retainers (33), springs (34) and check valves (35) from collar (36).
13. Remove two bolts (37), lockwashers (38) and cover (39) from right side of control relief valve (44, Figure 14-80).
14. Remove preformed packing (40) and springs (41 thru 43). Discard preformed pack-ing (40).

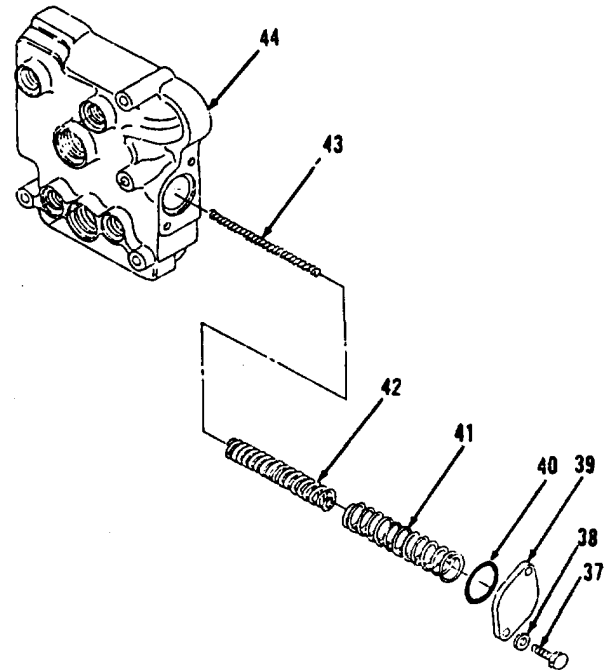


Figure 14-80.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install springs (43 thru 41) and new preformed packing (40, Figure 14-80).
2. Install cover (39), two lockwashers (38) and bolts (37).
3. Install two check valves (35), springs (34), retainers (33) and pins (32) to collar (36, Figure 14-79).
4. Install two pins (31).

**Go to Sheet 4
14-54**

TRANSMISSION MAINTENANCE

**14-6. Transmission Control Relief Valve.
(Sheet 4 of 4)**

ASSEMBLY

5. Install two new preformed packings (30, Figure 14-79) to body.
6. Install two covers (29), four lockwashers (28) and bolts (27).
7. Install poppet (25), spring (24), retainer (23) and retaining ring (22) to control relief valve (44, Figure 14-78).
8. Install spacer (21).
9. Install new preformed packings (20 and 19).
10. Install cover (18), two lockwashers (17) and bolts (16).
11. Install cover (15), two lockwashers (14) and bolts (13).
12. Install pin (12), new preformed packing (11) and plug (10, Figure 14-77).
13. Install new preformed packing (9) and plug (8).
14. Install new preformed packings (7thru 1).

NOTE

Return 130G Grader to original equipment condition.

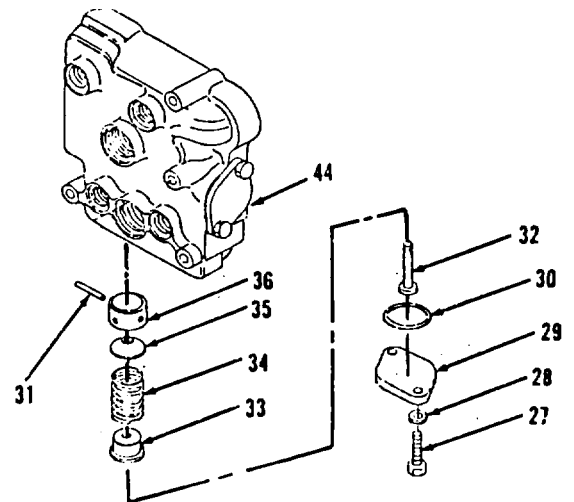


Figure 14-79.

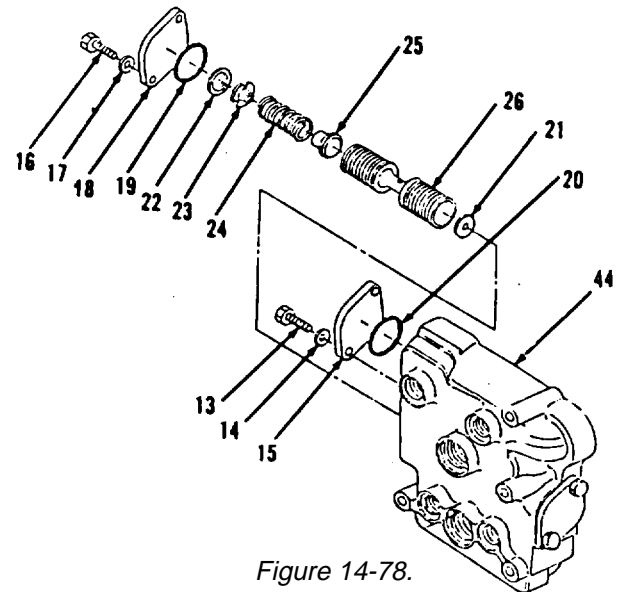


Figure 14-78.

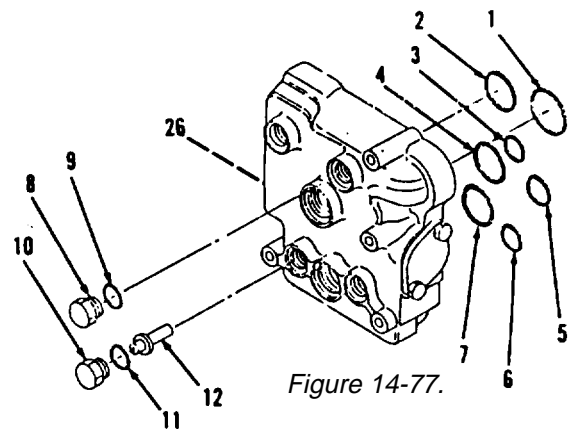


Figure 14-77.

End of Task

TRANSMISSION MAINTENANCE.**14-7. Pilot Valve Cover. (Sheet 1 of 2)**

This task covers a. Removal b. Cleaning c. Inspection
 d. Installation

INITIAL SETUP**Applicable Configurations**

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

Paragraph 5-6
 Paragraph 14-5

Transmission assembly removed.
 Hydraulic control group removed.

Go to Sheet 2**14-56**

TRANSMISSION MAINTENANCE.**14-7. Pilot Valve Cover. (Sheet 2 of 2)****REMOVAL**

1. Remove eight bolts (1), washers (2) and cover (3, Figure 14-81) from control relief valve.
2. Remove plug (4), retainer ring (5), retainer (6), spring (7) and poppet (8) from top of cover (3).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

1. Measure spring (7, Figure 14-81). Free length should be 0.75 inch.
2. Inspect all other parts. Refer to Chapter 2.

INSTALLATION

1. Install poppet (8), spring (7), retainer (6), retainer ring (5) and plug (4) on top of cover (3, Figure 14-81).
2. Install cover (3), eight washers (2) and bolts (1) to control relief valve. Tighten eight bolts (1) to 19 to 25 ft-lb. torque.

NOTE

- Plug must not extend through cover.
- Return 130G Grader to original equipment condition.

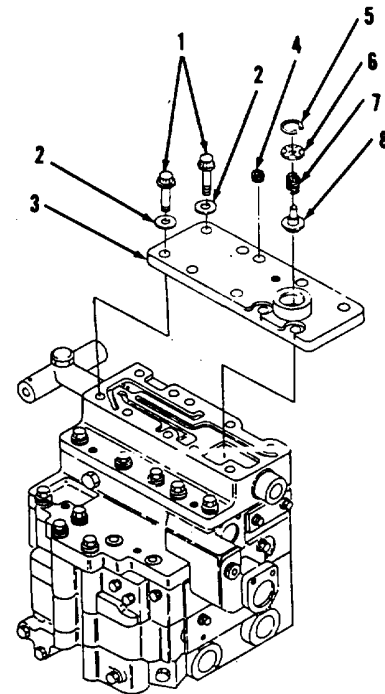


Figure 14-81.

End of Task

TRANSMISSION MAINTENANCE.

14-8. Pilot Valve. (Sheet 2 of 3)

REMOVAL

1. Remove four bolts (1) and items 2 thru 12 as an assembly (Figure 14-82) from control valve.
2. Remove roll pin (2), detent (3), stop (4) and preformed packing (5, Figure 14-83) from pilot valve body (12). Discard preformed packing (5).
3. Remove items 6 thru 9 as an assembly from pilot valve body (12, Figure 14-84).
4. Remove dowel (6), plug (7) and cup plug (8) from spool (9, Figure 14-85).
5. Remove detent (10) and two dowels (11) from pilot valve body (12, Figure 14-86).

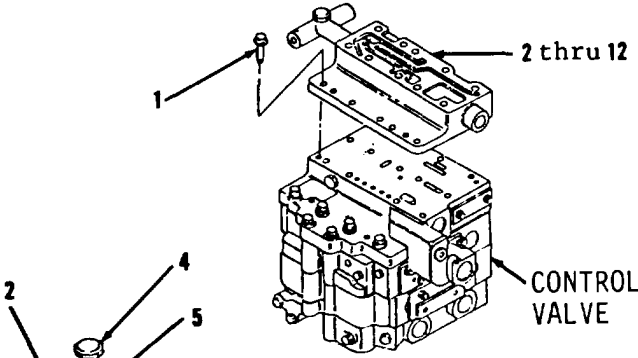


Figure 14-82.

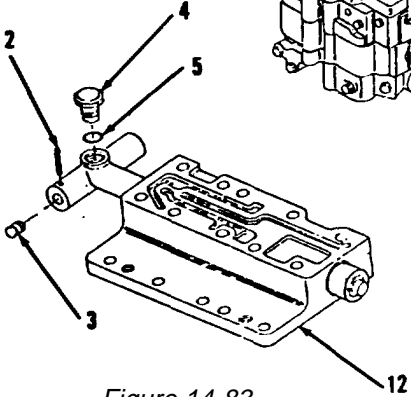


Figure 14-83.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

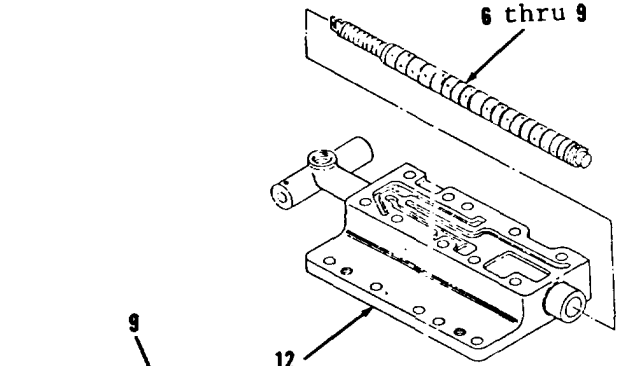


Figure 14-84.

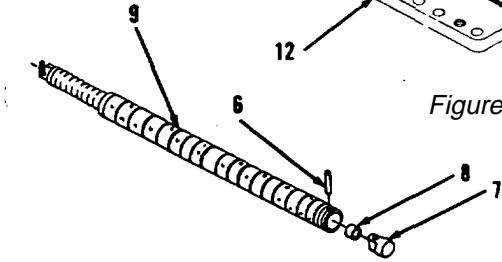


Figure 14-85.

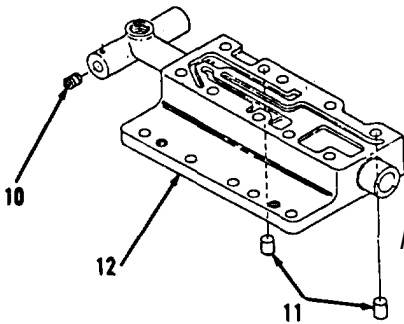


Figure 14-86.

Go to Sheet 3

TRANSMISSION MAINTENANCE. (cont.)

14-8. Pilot Valve. (Sheet 3 of 3)

INSTALLATION

1. Install two dowels (11) and detent (10) in pilot valve body (12, Figure 14-86). Pilot or lead end must face away from pilot valve body (12) and protrude 0.23 to 0.27 inch.
2. Install cup plug (8), plug (7) and dowel (6) in spool (9, Figure 14-85).
3. Install items 9 thru 6 as an assembly to pilot valve body (12, Figure 14-84).
4. Install new preformed packing (5), stop (4), detent (3) and roll pin (2, Figure 14-83).
5. Install items 12 thru 2 as an assembly and four bolts (1, Figure 14-82) on control valve.

NOTE

Return 130G Grader to original equipment condition.

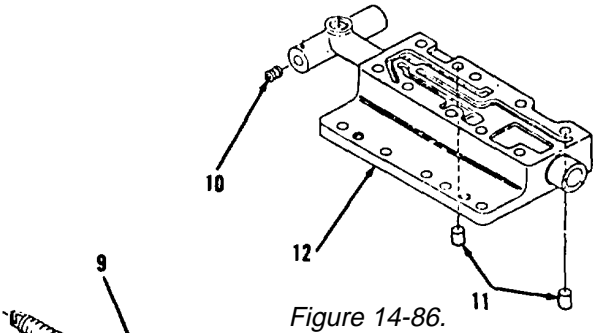


Figure 14-86.

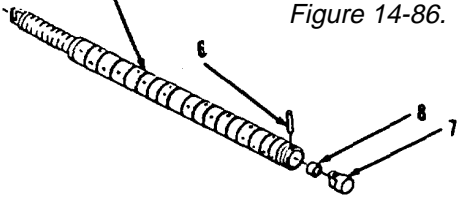


Figure 14-85.

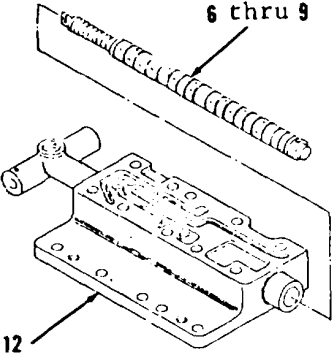


Figure 14-84.

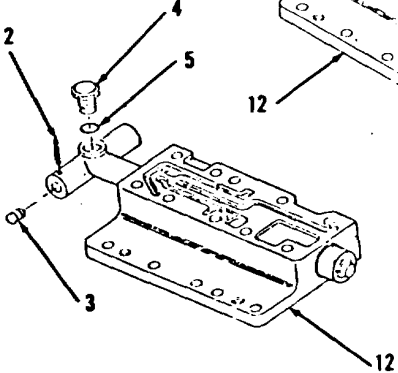


Figure 14-83.

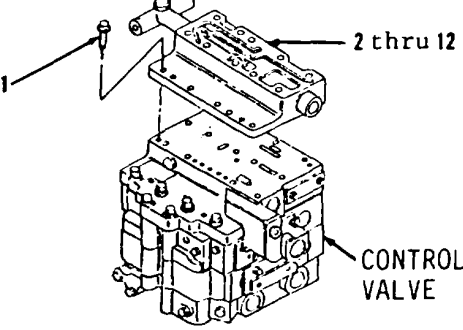


Figure 14-82.

End of Task

TRANSMISSION MAINTENANCE.

14-9. Directional and Pressure Control Valve. (Sheet 1 of 3)

INITIAL SETUP

This task covers:

- | | | |
|-----------------------|----------------------|-------------------------------------|
| a. Removal | c. Inspection | e. Pre-Load Check of Bearing |
| b. Disassembly | d. Reassembly | f. Installation |
-

Applicable Configurations

All
 repairer MOS 62B

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Preformed packing, Item 14

Personnel Required

Construction equipment

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

Paragraph 14-8

Pilot valve removed.

Go to Sheet 2

14-61

TRANSMISSION MAINTENANCE. (cont.)

14-9. Directional and Pressure Control Valve. (Sheet 2 of 3) DISASSEMBLY

WARNING

Plates are under spring tension. Remove bolts slowly and evenly. Failure to follow this procedure may cause INJURY.

- 1. Remove four bolts (1) and items 2 thru 16 as an assembly (Figure 14-87) from control valve.
- 2. Remove two bolts (2) and plate (3) from body (16, Figure 14-88).
- 3. Remove spool (4).
- 4. Remove two bolts (5) and plate (6) from body (16, Figure 14-89).
- 5. Remove springs (7 and 8) and spool (9).
- 6. Remove dowel (10) and stop (11, Figure 14-90).

CAUTION

Do not remove ball (15) unless inspection shows damage.

- 7. Remove plugs (12 and 13), preformed packing (14) and ball (15) from body (16). Discard preformed packing (14).

CLEANING

Clean all parts. Refer to Chapter 2.

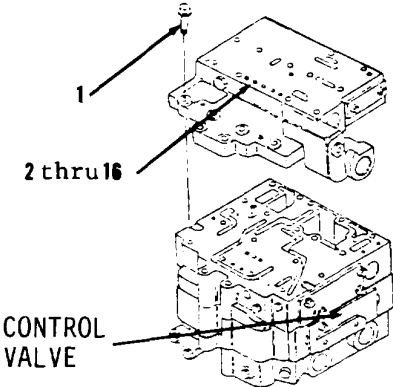


Figure 14-87.

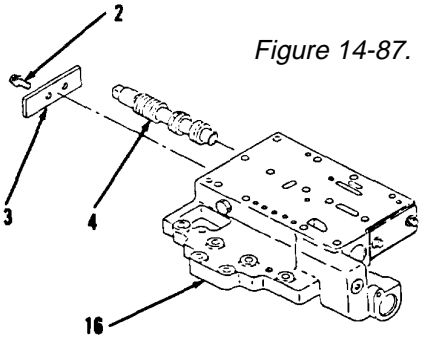


Figure 14-88.

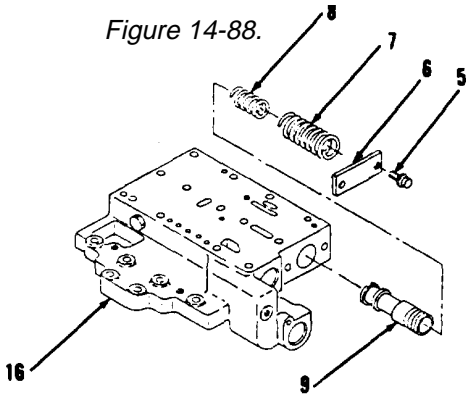


Figure 14-89.

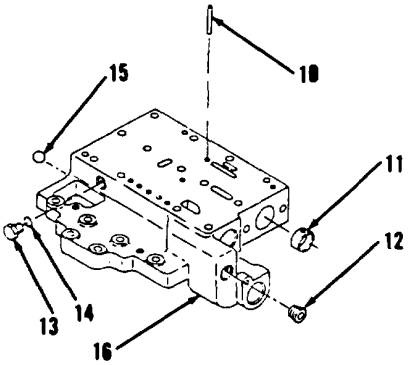


Figure 14-90.

Go to Sheet 3
14-62

TRANSMISSION MAINTENANCE.**14-9. Directional and Pressure Control Valve. (Sheet 3 of 3)****INSPECTION**

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install ball (15), new preformed packing (14) and plugs (13 and 12) in body (16, Figure 14-90).
2. Install stop (11) and dowel (10).
3. Install spool (9) and springs (8 and 7, Figure 14-89).
4. Install plate (6) and two bolts (5). Tighten two bolts (5) to 19-25 ft-lb. torque.
5. Install spool (4, Figure 14-88).
6. Install plate (3) and two bolts (2). Tighten two bolts (2) to 19-25 ft-lb. torque.
7. Install items 16 thru 2 as an assembly and four bolts (1, Figure 14-87) on control valve.

NOTE

Return 130G Grader to original equipment condition.

End of Task
14-63

TRANSMISSION MAINTENANCE.**14-10. Selector and Differential Control Valve. (Sheet 1 of 6)**

This task covers: a. Disassembly b. Cleaning c. Inspection
 d. Assembly

INITIAL SETUP**Applicable Configurations**

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Preformed packings,
 Items 9, 16

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Paragraph 14-9

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

Directional and pressure control
 valve removed.

Go to Sheet 2
14-64

TRANSMISSION MAINTENANCE.

14-10. Selector and Differential Control Valve. (Sheet 2 of 6)

DISASSEMBLY

WARNING

Covers are under spring tension. Remove bolts slowly and evenly. Failure to follow this procedure may cause INJURY.

1. Remove items 1 thru 33 as an assembly (Figure 14-91) from control valve.
2. Remove four bolts (1) and cover (2) from body (33, Figure 14-92).
3. Remove spring (3) and spool (4).
4. Remove plug (5), springs (6 and 7) and washer (8, Figure 14-93).
5. Remove and discard preformed packing (9) from plug (5).
6. Remove ball (10) from body (33).
7. Remove dowel (11) and stop (12).

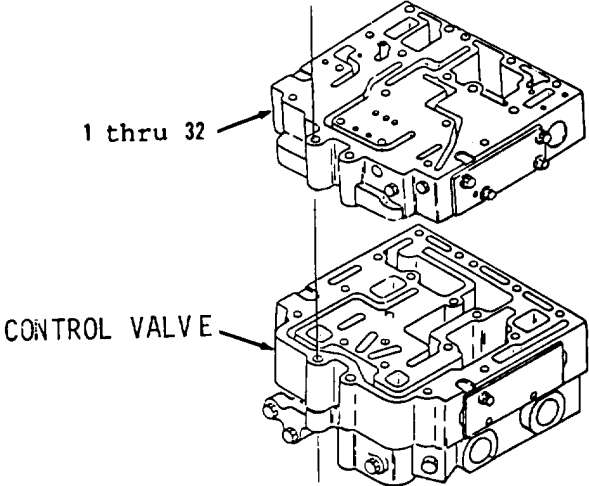


Figure 14-91.

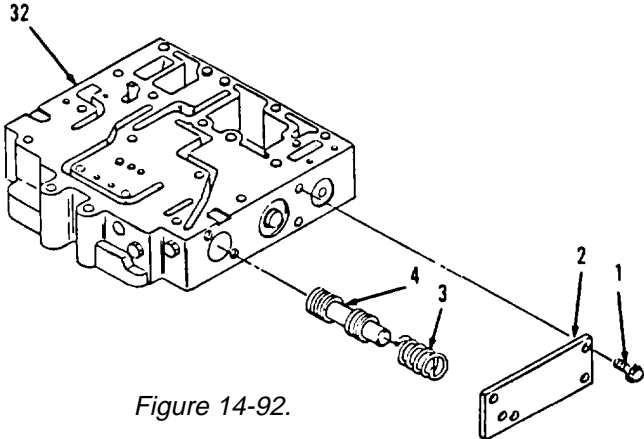


Figure 14-92.

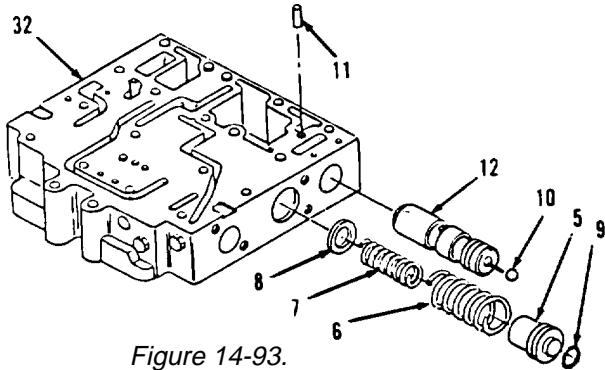


Figure 14-93.

Go to sheet 3
14-65

TRANSMISSION MAINTENANCE. (cont.)

**14-10. Selector and Differential Control Valve. (Sheet 3 of 6)
DISASSEMBLY (cont.)**

8. Remove three bolts (13), cover (14) and pin (15) from body (33, Figure 14-94).
9. Remove and discard preformed packing (16) from cover (14).
10. Remove spring (17) and spool (18).
11. Remove spool (19) and spring (20).
12. Remove spring (21), spool (22), springs (24 and 25) and piston (26, Figure 14-95).
13. Remove slug (27) from piston (26).
14. Remove dowel (28) and stop (29) from body (33, Figure 14-96).
15. Remove two plugs (30), four dowels (31) and eight dampers (32) from body (33).

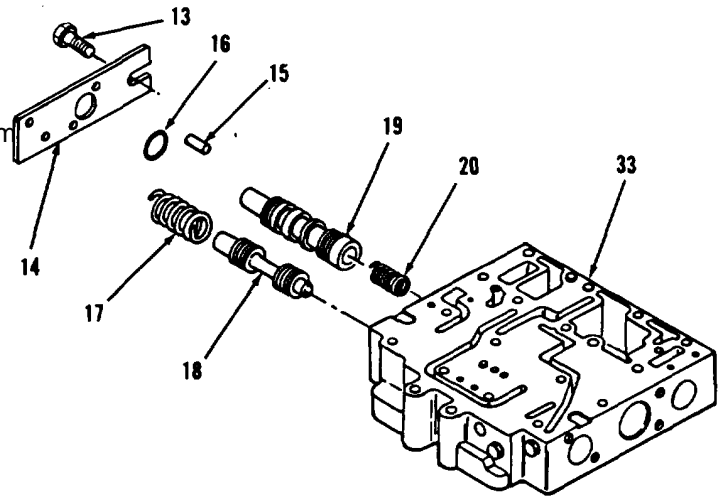


Figure 14-94.

CLEANING

Clean all parts. Refer to Chapter 2.

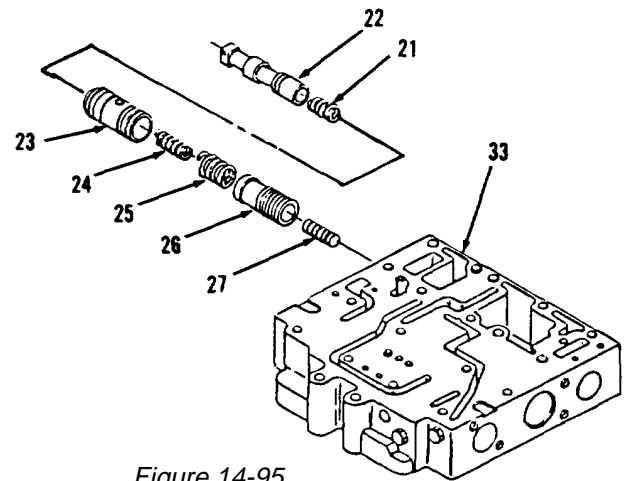


Figure 14-95.

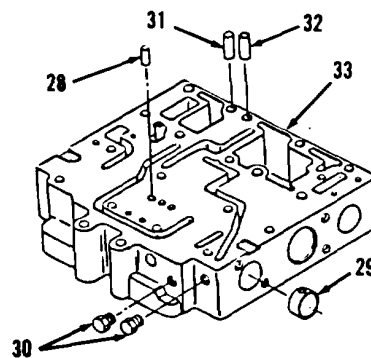


Figure 14-96.

**Go to Sheet 4
14-66**

TRANSMISSION MAINTENANCE.**14-10. Selector and Differential Control Valve. (Sheet 4 of 6)****INSPECTION**

1. Apply compression load of 9.15 to 10.75 lb. to springs (3 and 17, Figure 14-97).
2. Measure springs (3 and 17). Length should be 1.062 inches.
3. Measure springs (3 and 17) free length. Length should be 1.31 inches.
4. Apply compression load of 22.75 to 24.65 lb. to spring (6).
5. Measure spring (6). Length should be 1.426 inches.
6. Measure spring (6) free length. Length should be 2.796 inches.
7. Apply compression load of 11.9 to 12.9 lb. to Spring (7).
8. Measure spring (7). Length should be 2.28 inches.
9. Measure spring (7) free length. Length should be 4.5 inches.
10. Apply compression load of 3.68 to 4.32 lb. to spring (21).
11. Measure spring (21). Length should be 0.25 inch.

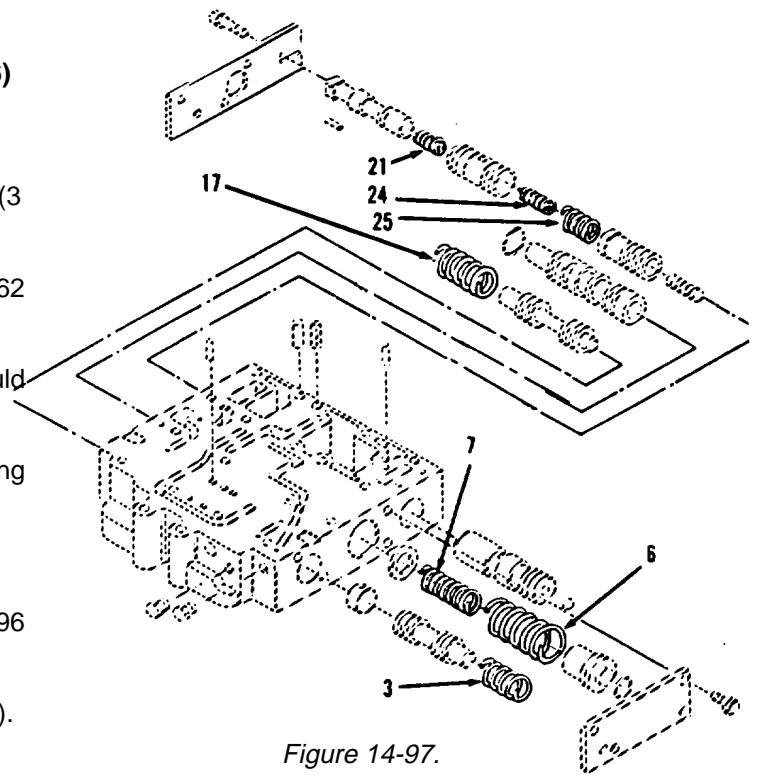


Figure 14-97.

Go to Sheet 5
14-67

TRANSMISSION MAINTENANCE. (cont.)

14-10. Selector and Differential Control Valve. (Sheet 5 of 6)

INSPECTION (cont.)

12. Measure spring (21) free length. Length should be 0.431 inch.
13. Apply compression load of 10.5 to 12.3 lb. to spring (24).
14. Measure spring (24). Length should be 0.686 inch.
15. Measure spring (24) free length. Length should be 0.877 inch.
16. Apply compression load of 2.04 to 2.40 lb. to spring (25).
17. Measure spring (25). Length should be 0.967 inch.
18. Measure spring (25) free length. Length should be 1.139 inches.
19. Inspect all other parts. Refer to Chapter 2.

ASSEMBLY

1. Install eight dampers (32), four dowels (31) and two plugs (30) in body (33, Figure 4-96).
2. Install stop (29) and dowel (28). Dowel (28) must be installed 0.190 inch beneath face of body (33).
3. Install slug (27) in piston (26, Figure 14-95).
4. Install piston (26), springs (25 and 24), sleeve (23), spool (22) and spring (21).
5. Install spring (20) and spool (19, Figure 14-98).

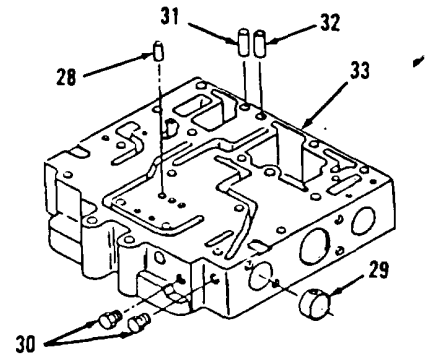


Figure 14-96.

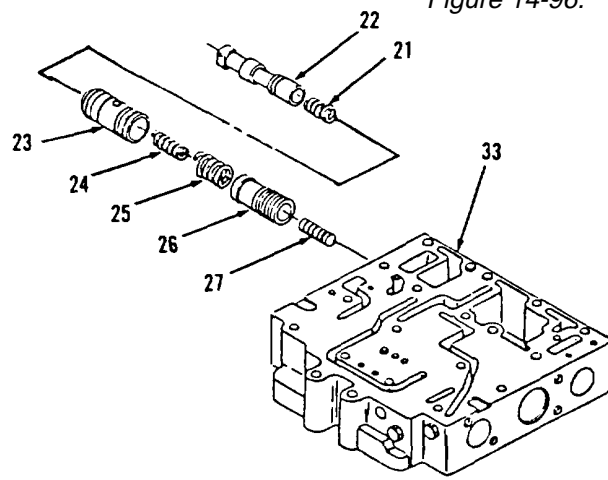


Figure 14-95.

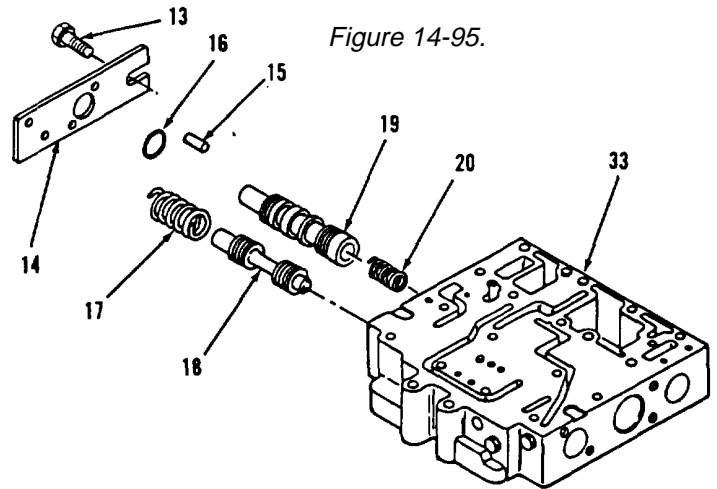


Figure 14-98.

**Go to Sheet 6
14-68**

14-10. Selector and Differential Control Valve. (Sheet 6 of 6)

ASSEMBLY

6. Install spool (18) and spring (17).
7. Install new preformed packing (16) in cover (14).
8. Install pin (15), cover (14) and three bolts (13) in body (33, Figure 14-99). Tighten three bolts (13) to 19 to 25 ft-lb. torque.
9. Install stop (12) and dowel (11, Figure 14-93). Dowel (11) must be installed 0.190 inch beneath face of body (33).
10. Install ball (10) in body (33).
11. Install new preformed packing (9) on plug (5).
12. Install washer (8), springs (7 and 6) and plug (5).
13. Install spool (4) and spring (3, Figure 14-92).
14. Install cover (2) and four bolts (1). Tighten four bolts (1) to 19 to 25 ft-lb. torque.
15. Install items 33 thru 1 as an assembly (Figure 14-91) on control valves.

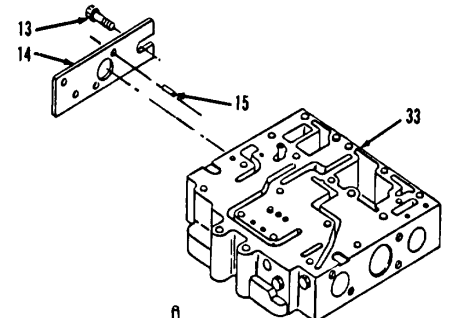


Figure 14-99.

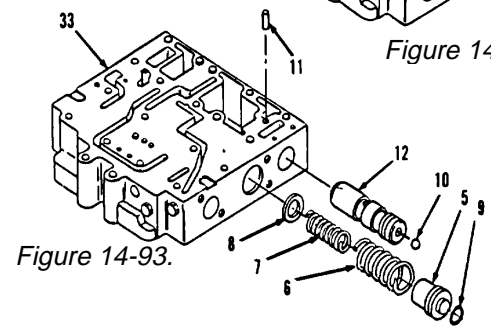


Figure 14-93.

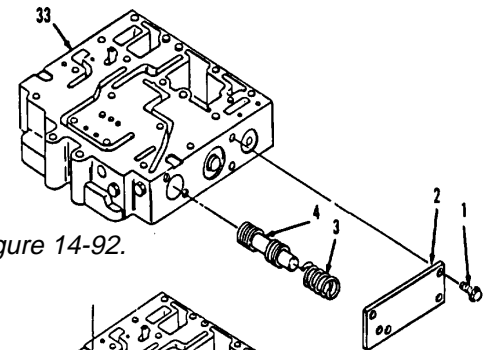


Figure 14-92.

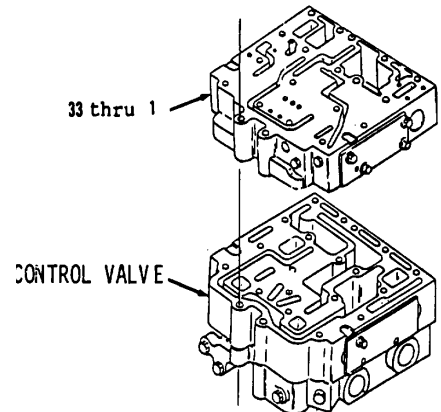


Figure 14-91.

NOTE

Return 130CG Grader to original equipment condition.

End of Task
14-69

TRANSMISSION MAINTENANCE.**14-11. Selector and Modulating Control Valve. (Sheet 1 of 7)**

This task covers: a. Disassembly b. Cleaning c. Inspection
 d. Assembly

INITIAL SETUP**Applicable Configurations**

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)
 Pliers FT1195
 Pliers 1P1856

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Preformed packings, Items 3,
 20, 28
 Spacer 5M3492
 Spacer 7M1396
 Spacer 7M1397

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Paragraph 14-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

Selector and differential control
 valve removed.

Go to Sheet 2
14-70

TRANSMISSION MAINTENANCE.

**14-11. Selector and Modulating Control Valve. (Sheet 2 of 7)
DISASSEMBLY**

1. Remove items 1 thru 32 as an assembly (Figure 14-100) from manifold.

WARNING

Covers are under spring tension. Remove bolts slowly and evenly. Failure to follow this procedure may cause INJURY

- 2. Remove bolt (1) and cover (2) from body (31, Figure 14-101).
- 3. Remove and discard preformed packing (3) from cover (2).
- 4. Remove spring (4) and spool (5) from body (32).
- 5. Remove items 6 thru 10 as an assembly from body (32, Figure 14-102).
- 6. Compress spring (8) on spool (10) and using pliers, remove lock ring (6, Figure 14-103).
- 7. Remove washer (7), spring (8) and washer (9) from spool (10).

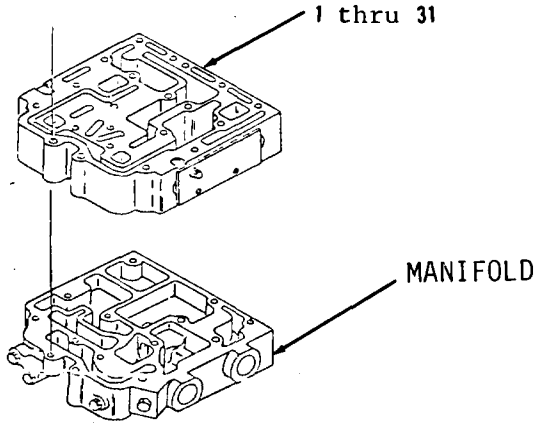


Figure 14-100.

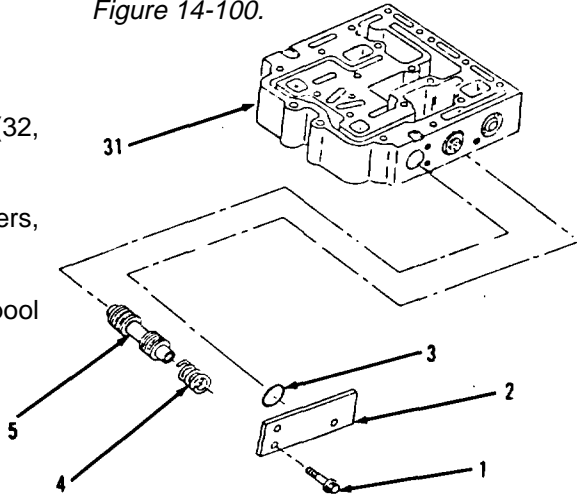


Figure 14-101.

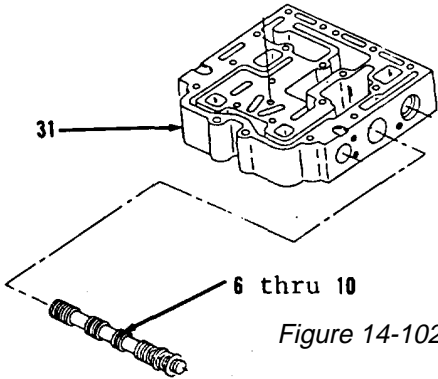


Figure 14-102

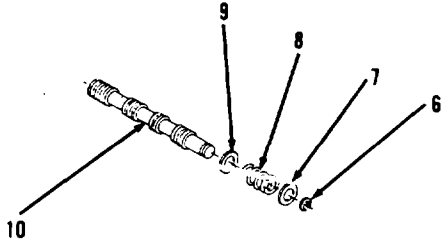


Figure 14-103.

**Go to Sheet 3
14-71**

TRANSMISSION MAINTENANCE. (cont.)

14-11. Selector and Modulating Control Valve.
(Sheet 3 of 7)

DISASSEMBLY (cont.)

8. Remove items 11 thru 18 as an assembly from body (32, Figure 14-104).
9. Remove slug (11) from spool (18, Figure 14-105).
10. Compress spring (14) on spool (18) and using pliers, remove retaining ring (12).
11. Remove retainer (13), spring (14) and plunger (15).
12. Remove seven spacers (16), pin (17) from spool (18).
13. Remove five bolts (19) and cover (20) from body (32, Figure 14-106).
14. Remove and discard preformed packing (21) from cover (20).
15. Remove spring (22) and spool (23) from body (32).
16. Remove piston (24), springs (25 and 26), spacer (27) and six spacers (28, Figure 14-107).
17. Remove preformed packing (29), dowel (30) and stop (31) from body (32, Figure 14-108). Discard preformed packing (29).

CLEANING

Clean all parts. Refer to Chapter 2.

(3 of 7)

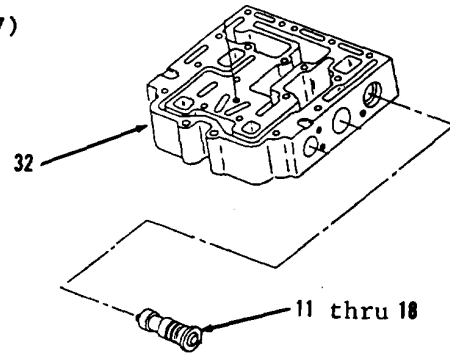


Figure 14-104.

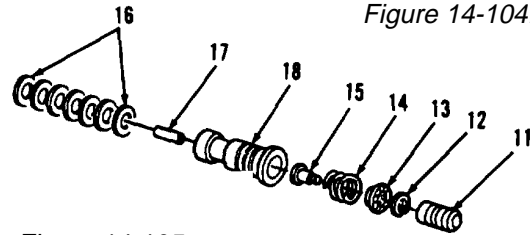


Figure 14-105.

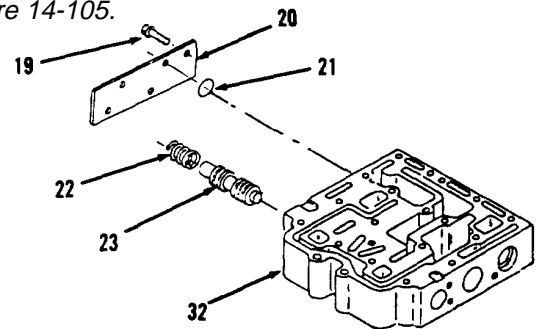


Figure 14-106.

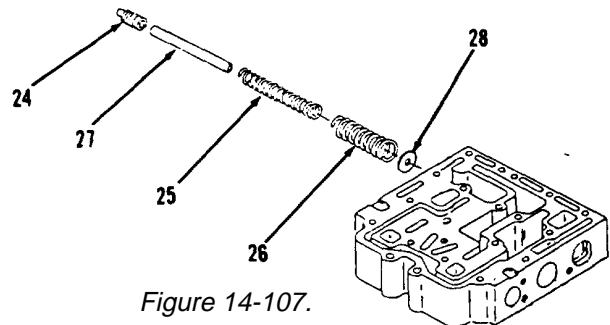


Figure 14-107.

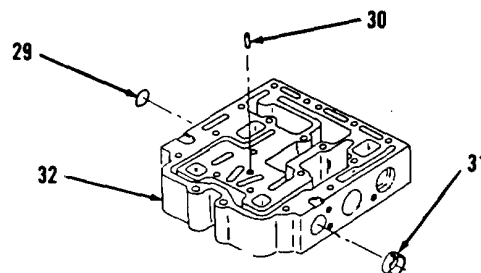


Figure 14-108

Go to Sheet 4
14-72

TRANSMISSION MAINTENANCE.**14-11. Selector and Modulating Control Valve. (Sheet 4 of 7)****INSPECTION**

1. Apply compression load of 9.15 to 10.75 lb. to springs (4, 8 and 22, Figure 14-109).
2. Measure springs (4, 8 and 22). Length should be 1.062 inches.
3. Measure springs (4, 8 and 22) free length. Length should be 1.31 inches.
4. Apply compression load of 0.476 to 0.558 lb. to spring (14).
5. Measure spring (14). Length should be 0.48 inch.
6. Measure spring (14) free length. Length should be 0.89 inch.
7. Apply compression load of 10.49 to 11.59 lb. to spring (25).
8. Measure spring (25). Length should be 4.06 inches.
9. Measure spring (25) free length. Length should be 4.32 to 4.56 inches.
10. Apply compression load of 10.37 to 11.47 lb. to spring (26).
11. Measure spring (26). Length should be 2.98 inches.
12. Measure spring (26) free length. Length should be 3.91 to 4.15 inches.
13. Inspect all other parts. Refer to Chapter 2.

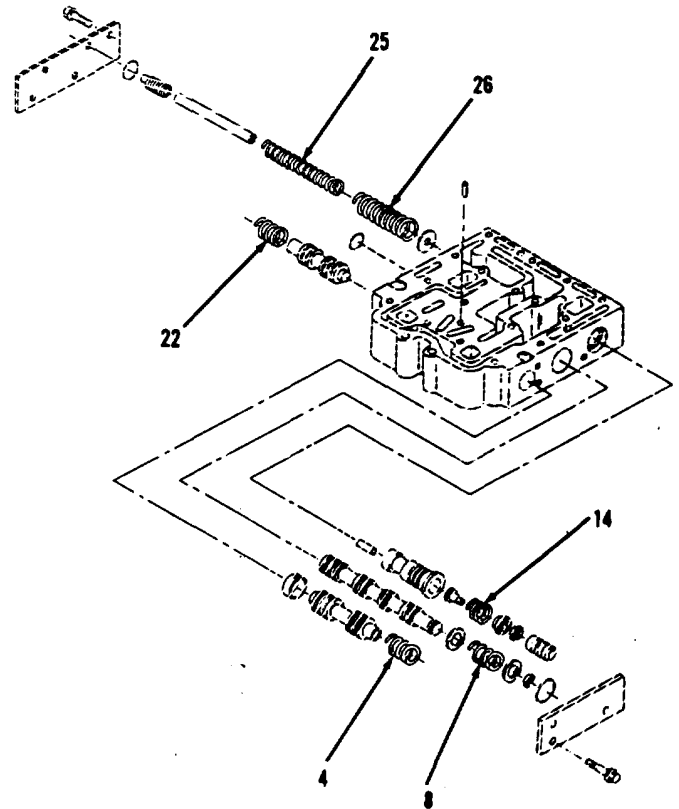


Figure 14-109.

TRANSMISSION MAINTENANCE. (cont.)

14-11. Selector and Modulating Control Valve. (Sheet 5 of 7)

ASSEMBLY (cont.)

1. Install stop (31), dowel (30) and new preformed packing (29) in body (32, Figure 14-108).

NOTE

To change pressure on springs, spacers must be changed. Spacer 5M3492 is 0.010 inch thick and will change pressure 2.01 psi. Spacer 7M1396 is 0.062 inch thick and will change pressure 12.5 psi. Spacer 7M1397 is 0.036 inch thick and will change pressure 7.25 psi. Adding spacers will increase pressure required to open valve and subtracting will reduce pressure requirement.

2. Install six spacers (28), spacer (27), springs (26 and 25) and piston (24, Figure 14-107).
3. Install spool (23) and spring (22, Figure 14-106).
4. Install new preformed packing (21) in cover (20).
5. Install cover (20) and five bolts (19) to body (32). Tighten five bolts (19) to 19 to 25 ft-lb. torque.

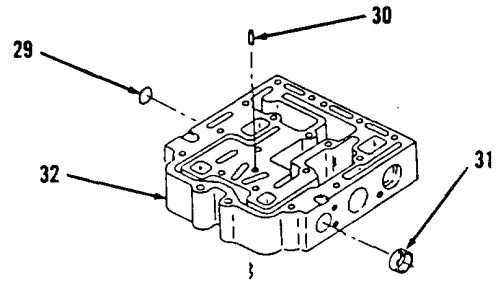


Figure 14-108.

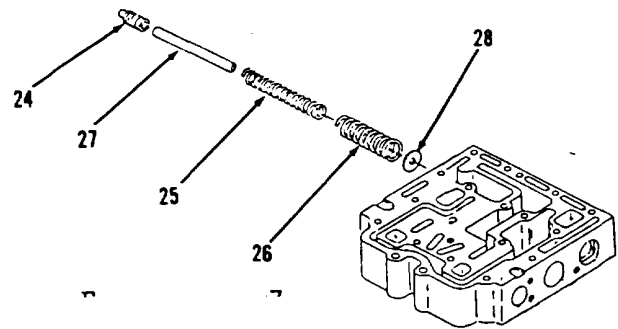


Figure 14-107.

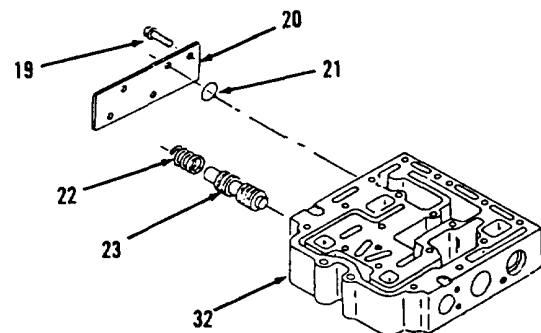


Figure 14-106.

**Go to Sheet 6
14-74**

TRANSMISSION MAINTENANCE.

14-11. Selector and Modulating Control Valve. (Sheet 6 of 7)

ASSEMBLY

- 6. Install pin (17) and seven spacers (16) in spool (18, Figure 14-105).
- 7. Install plunger (15), spring (14), retainer (13) and retaining ring (12) on spool (18).
- 8. Install slug (11) in spool (18).
- 9. Install items 18 thru 11 as an assembly in body (32, Figure 14-104).
- 10. Install washer (9), spring (8), washer (7) and lock ring (6) on spool (10, Figure 14-103).
- 11. Install items 10 thru 6 as an assembly in body (32, Figure 14-102).

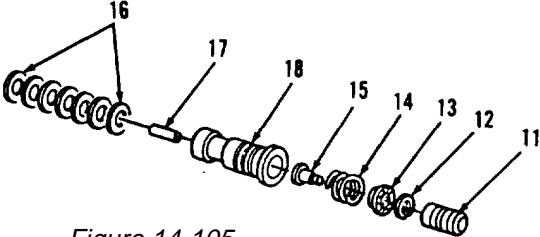


Figure 14-105.

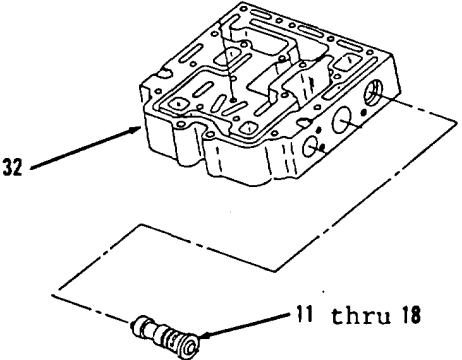


Figure 14-104.

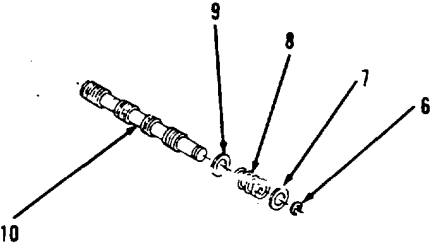


Figure 14-103.

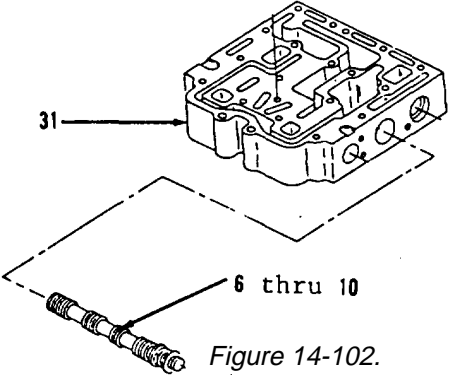


Figure 14-102.

14-11. Selector and Modulating Control Valve. (Sheet 7 of 7)

ASSEMBLY (cont.)

12. Install spool (5) and spring (4, Figure 14-101).
13. Install new preformed packing (3) in cover (2).
14. Install cover (2) and bolt (1) to body (32). Tighten bolt (1) to 19 to 25 ft-lb. torque.
15. Install items 32 thru 1 as an assembly (Figure 14-100) on manifold.

NOTE

Return 13OG Grader to original equipment condition.

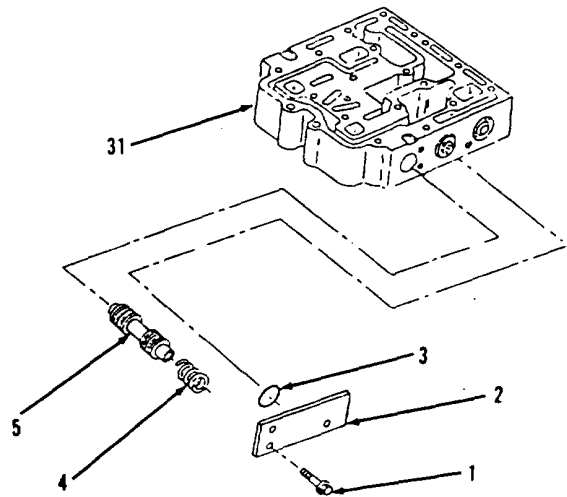


Figure 14-101.

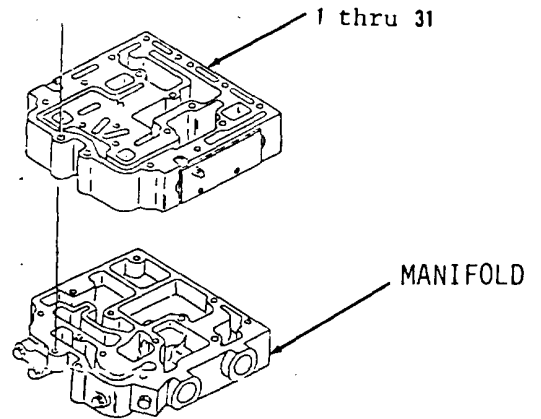


Figure 14-100.

End of Task
14-76

TRANSMISSION MAINTENANCE.

14-12. Transmission Control Valve and Mounting. (Sheet 1 of 2)

This task covers: a. Disassembly b. Cleaning c. Inspection
 d. Assembly

INITIAL SETUP

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

All fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

Paragraph 14-11

Selector and modulating control
 valve removed.

**Go to Sheet 2
 14-77**

TRANSMISSION MAINTENANCE. (cont.)**14-12. Transmission Control Valve and Mounting. (Sheet 2 of 2)****DISASSEMBLY**

Remove two dowels from manifold (Figure 14-110).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

Install two dowels in manifold (Figure 14-110).

NOTE

Return 130G Grader to original equipment condition.

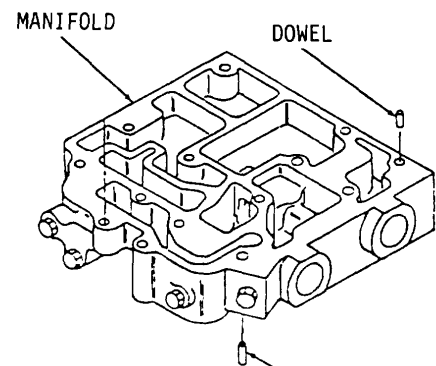


Figure 14-10. DOWEL

**End of Task
14-78**

TRANSMISSION MAINTENANCE.

14-13. Transmission Oil and Scavenge Pump. (Sheet 1 of 4)

This task covers: a. Disassembly b. Cleaning c. Inspection
 d. Assembly

INITIAL SETUP

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Seals, Items 4, 9, 15, 23

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-10
 TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

All fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

TM 5-3805-261-20

Paragraph 5-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

Transmission oil pump pulley removed.

Transmission oil and scavenge pump
 removed.

**Go to Sheet 2
 14-79**

14-13. Transmission Oil and Scavenge Pump.
(Sheet 2 of 4)

DISASSEMBLY (cont.)

1. Remove four bolts (1), washers (2), cage (3) and seal (4) from manifold (28, Figure 14-111). Discard seal (4).
2. Remove ring (5), coupling (6), plug (7), bearing (8) and seal (9) from cage. Discard seal (9).
3. Remove two bolts (10), washers (11), four bolts (12), washers (13) and cover (14) from manifold (28, Figure 14-112).
4. Remove seal (15) and two bearings (16) from cover (14). Discard seal (15).
5. Remove body (17) and four dowels (18) from manifold (28).
6. Remove gear (19, Figure 14-113).
7. Remove manifold (20).
8. Remove key (21) and gear (22).
9. Remove and discard two seals (23).
10. Remove two bearings (24) from manifold (20).

NOTE

Do not remove ball (27) unless inspection shows damage.

11. Remove two gears (25), dowels (26) and ball (27) from manifold (28, Figure 14-114).

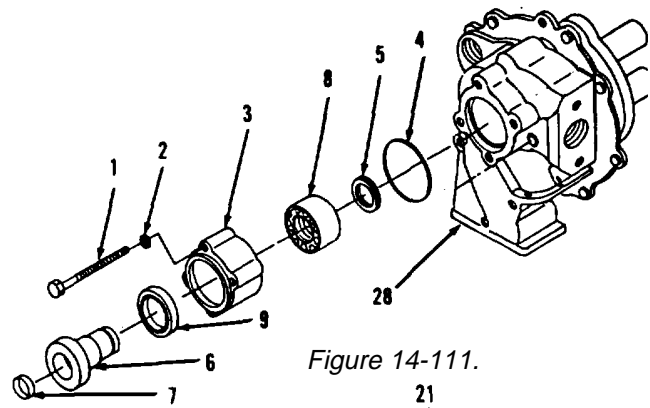


Figure 14-111.

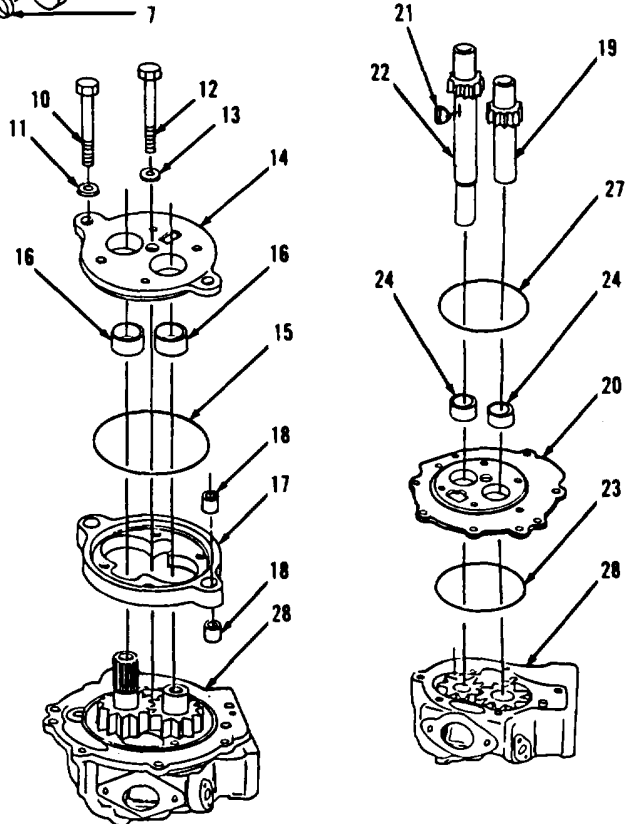


Figure 14-112.

Figure 14-113.

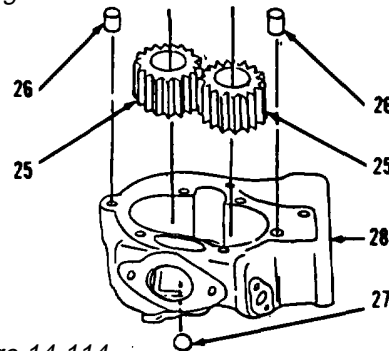


Figure 14-114.

TRANSMISSION MAINTENANCE.

14-13. Transmission Oil and Scavenge Pump. (Sheet 3 of 4)

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install ball (27), two dowels (26) and gears (25) to manifold (28, Figure 14-114).
2. Install two bearings (24) to manifold (20, Figure 14-113). Joint in bearing (24) must be at an angle 15 to 45 degrees to a vertical line through centers of bores for gears and to a depth of 0.062 inch from face of manifold (28).
3. Install two new seals (23).
4. Install gear (22) in manifold (20) and key (21) in gear (22).
5. Install manifold (20) to manifold (28).
6. Install gear (19).
7. Install four dowels (18) and body (17, Figure 14-112).
8. Install two bearings (16) and new seal (15). Joint in bearing (16) must be at an angle 15 to 45 degrees to a vertical line through centers of bores for gears and to a depth of 0.062 inch from face of manifold (28).

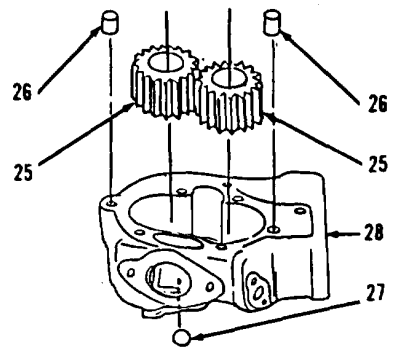


Figure 14-114.

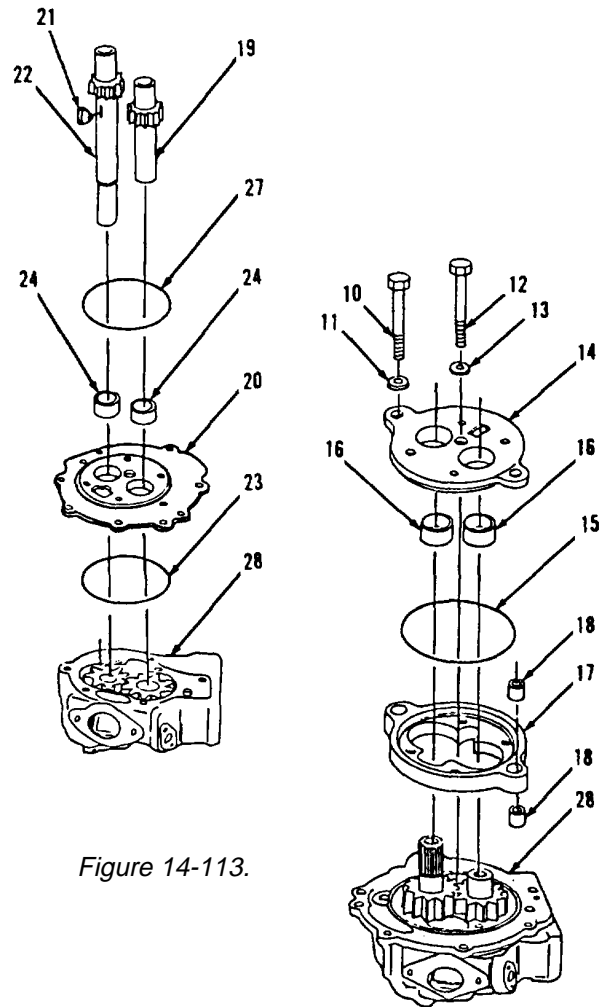


Figure 14-113.

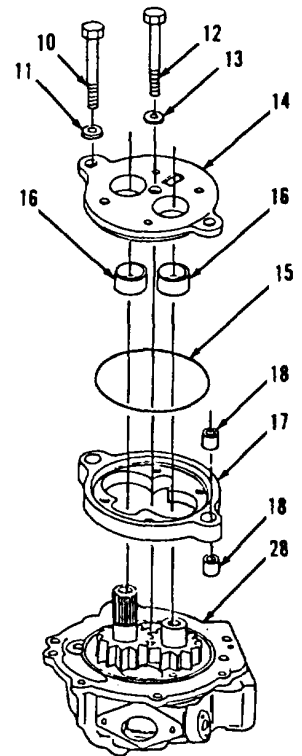
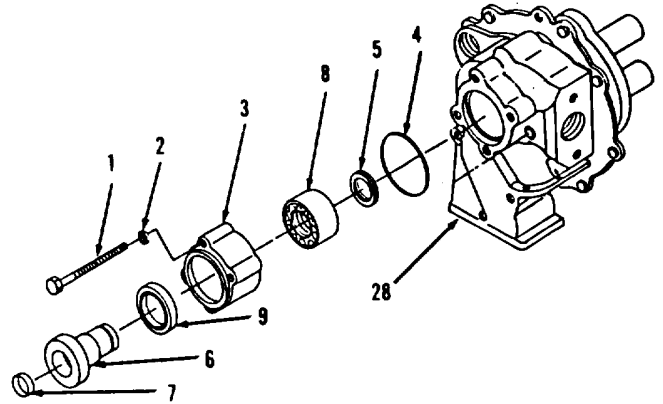


Figure 14-112.

TRANSMISSION MAINTENANCE. (cont.)**14-13. Transmission Oil and Scavenge Pump. (Sheet 4 of 4)****ASSEMBLY (cont.)**

9. Install cover (14), four washers (13), bolts (12), two washers (11) and bolts (10).
10. Install new seal (9, Figure 14-111) on cage. Lip of new seal (9) must face toward inside of cage.
11. Install bearing (8), plug (7), coupling (6) and ring (5).
12. Install new seal (4), cage (3), four washers (2) and bolts (1) on manifold (28).

**NOTE**

Return 130G Grader to original equipment condition.

**End of Task
14-82**

Section II. FRONT AXLE MAINTENANCE.

14-14. FRONT AXLE MAINTENANCE PROCEDURES.

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the general support level to keep the front axle and its components in good repair.

b. This section is arranged by functional group code and provides a list of front axle components to be maintained and step-by-step maintenance procedures.

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| Leaning Wheel Cylinder | 14-15 | 14-84 |

FRONT AXLE MAINTENANCE.

14-15. Leaning Wheel Cylinder. (Sheet 2 of 4)

DISASSEMBLY

NOTE

For convenience, hydraulic cylinder should be mounted on suitable repair stand.

1. Using suitable chain wrench, loosen crown (13) until it is completely disengaged from threads of cylinder (1, Figure 14-115).
2. Remove items 2 thru 14 as an assembly from cylinder (1).
3. Remove bolt (2), washer (3) and items 4 thru 6 as an assembly (Figure 14-116).
4. Remove and discard ring (4) and seal assembly (5) from piston (6, Figure 14-117).
5. Remove items 7 thru 12 as an assembly from rod (14, Figure 14-118).

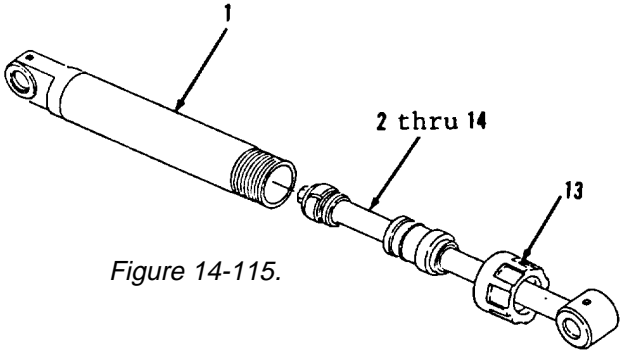


Figure 14-115.

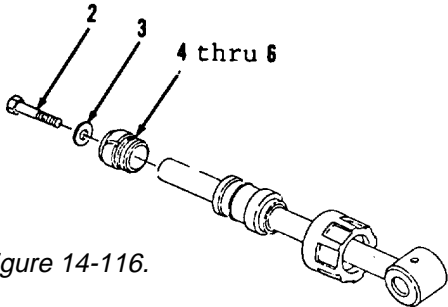


Figure 14-116.

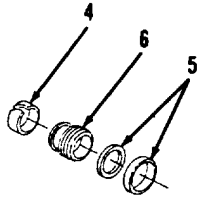


Figure 14-117.

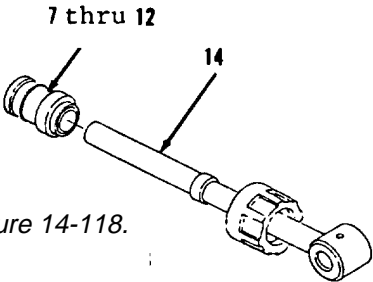


Figure 14-118.

Go to Sheet 3
14-85

FRONT AXLE MAINTENANCE. (cont.)

14-15. Leaning Wheel Cylinder. (Sheet 3 of 4)

DISASSEMBLY (cont.)

- 6. Remove and discard ring (8), preformed packing (9) and seals (10 thru 12) from head (7, Figure 14-119).
- 7. Remove crown (13) from rod (14, Figure 14-120).

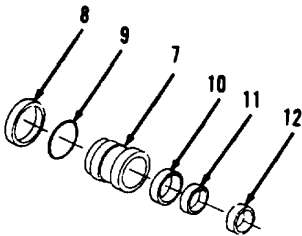


Figure 14-119.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

- 1. Using hydraulic fluid, lubricate inside of crown (13, Figure 14-120).
- 2. Install crown (13) on rod (14).
- 3. Using clean oil, lubricate new seals (12 thru 10), new preformed packing (9) and new ring (8).
- 4. Using seal installer, install new seals (12 thru 10, Figure 14-119) in head (7). Lip of seal (11) is toward inside of head (7). Lip of seal (10) is toward outside of head (7).
- 5. Install new preformed packing (9) and new ring (8) to head (7).

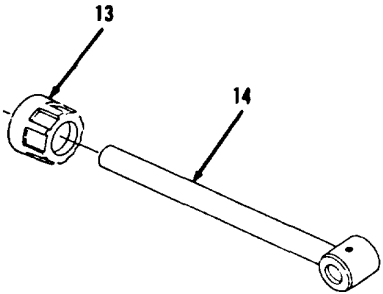


Figure 14-120.

FRONT AXLE MAINTENANCE.

14-15. Leaning Wheel Cylinder. (Sheet 4 of 4)

ASSEMBLY

6. Install items 12 thru 7 as an assembly on rod (14, Figure 14-118).
7. Using seal expander, install new seal assembly (5) and ring (4) on piston (6, Figure 14-117).
8. Install items 6 thru 4 as an assembly to rod (14, Figure 14-116).
9. Using thread lubricant, lubricate threads of bolt (2). Install washer (3) and bolt (2). Tighten to 720 to 880 ft-lb. torque.
10. Using hydraulic fluid, lubricate outside of head (7) and inside of cylinder (1, Figure 14-115).
11. Install cylinder (1).

NOTE

Tighten crown with rod fully extended. This will keep cylinder, piston and head in alignment.

12. Using suitable chain wrench, tighten crown (13) on cylinder (1). Tighten crown (13) to 350 to 550 ft-lb. torque.

NOTE

Return 130C Grader to original equipment condition.

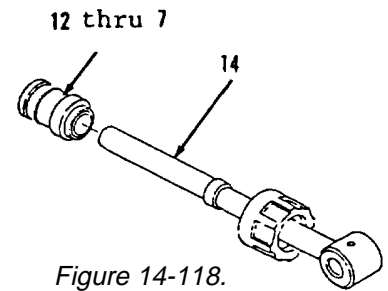


Figure 14-118.

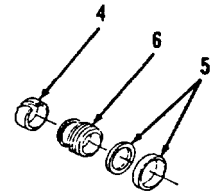


Figure 14-117.

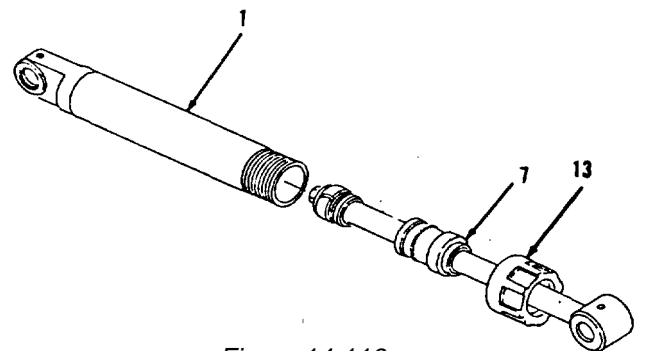
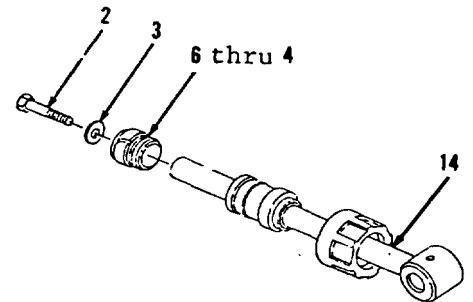


Figure 14-116.

**End of Task
14-87**

Section III. REAR AXLE MAINTENANCE.

14-16. REAR AXLE MAINTENANCE PROCEDURES.

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the rear axle and its components in good repair.

b. This section is arranged by functional group code and provides a list of rear axle components to be maintained and step-by-step maintenance procedures.

INDEX

| Title | Paragraph | <u>Page</u> |
|-----------------------|------------------|--------------------|
| Differential Assembly | 14-17 | 14-89 |
| Differential Carrier | 14-18 | 14-101 |

REAR AXLE MAINTENANCE.**14-17. Differential Assembly. (Sheet 1 of 12)**

This task covers:

| | | |
|---------------|----------------|-----------------|
| a. Removal | b. Disassembly | c. Cleaning |
| d. Inspection | e. Assembly | f. Installation |

INITIAL SETUP**Applicable Configurations**

All

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)

Hoist and sling
Puller attachment 8B7551
Puller group IP820
Two legs 5B7369
Two 5/8-INCH eyebolts
Step plate 8B7560
Step plate 9S9154
Four step plates 3H465
Two nuts 1B4207
Pump group 9S5800
Drive plate 1P466
Drive plate 1P470
Handle 1P529
Spanner wrench 1P2853
Arbor press

Test Equipment

Dial scale indicator

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Engine oil SAE 30,
Item 69, Appendix C
Seals, Items 9, 40, 41
Lock wire
Dry ice or low-humidity freezer

Personnel Required

Construction equipment
repairer MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Go to Sheet 2**14-89**

REAR AXLE MAINTENANCE. (cont.)

14-17. Differential Assembly. (Sheet 2 of 12)

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 5-19

Differential assembly removed.

**Go to Sheet 3
14-90**

REAR AXLE MAINTENANCE.

14-17. Differential Assembly. (Sheet 3 of 12)

REMOVAL

1. Remove four nuts (1) and washers (2, Figure 14-121).
2. Remove two bolts (3) and locks (4 and 5).
3. Remove cap (6) and dowel (7).

WARNING

Weight of items 8 thru 43 as an assembly is 240 lb.. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

4. Attach hoist and sling to items 8 thru 43 as an assembly and remove from items 44 thru 46 as an assembly.

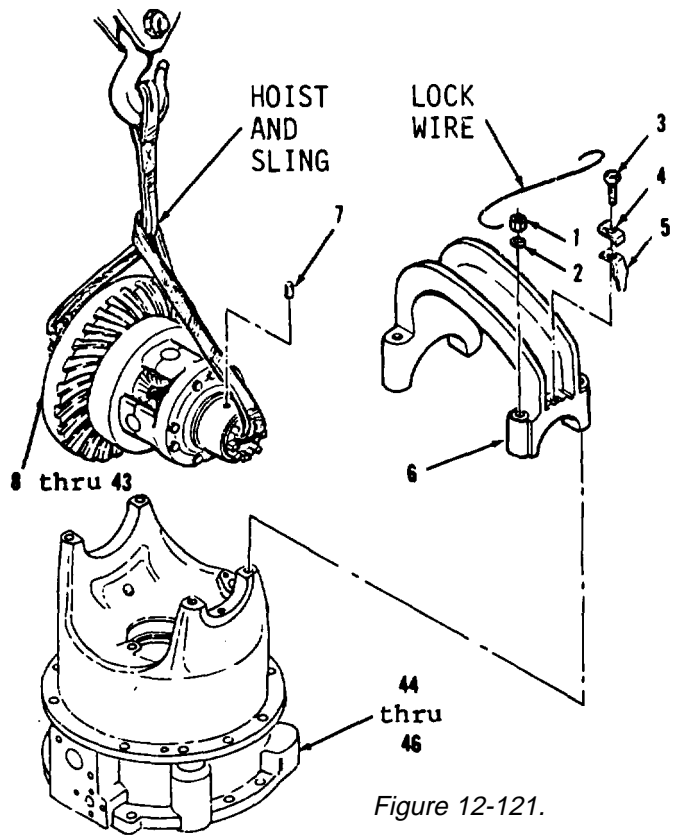


Figure 12-121.

Go to Sheet 4
14-91

REAR AXLE MAINTENANCE. (cont)

14-17. Differential Assembly. (Sheet 4 of 12)

DISASSEMBLY (cont)

NOTE

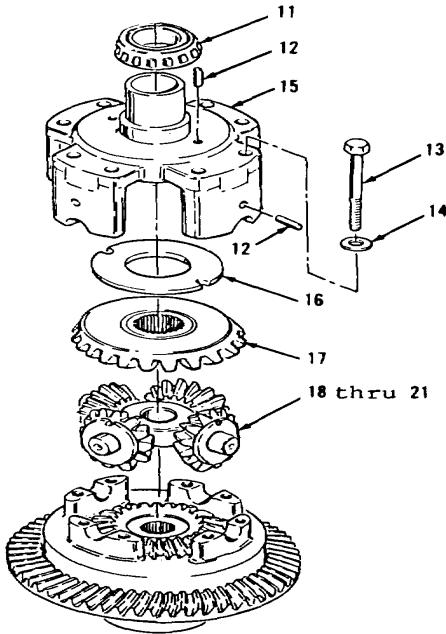
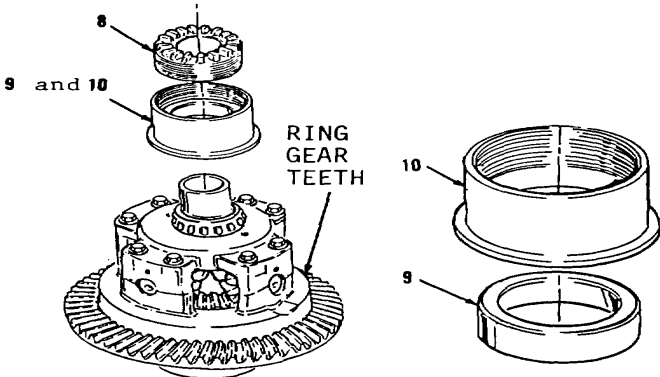
Position items 8 thru 43 as an assembly with ring gear teeth facing up.

- 1. Remove nut (8) and items 9 and 10 as an assembly (Figure 14-122).
- 2. Remove cup (9) from cage (10, Figure 14-123).

NOTE

to Do not remove cone bearings without the proper tools prevent damage to bearings. Do not perform following step unless inspection calls for replacement.

- 3. Using puller attachment, puller group, two legs, step late. Four plates, two nuts and pump group remove cone bearing (11 Figure 14-124).
- 4. Remove six dowels (12) from housing 915).
- 5. Remove eight bolts (13), washers (14) and housing (15).
- 6. Remove washer (16) and gear (17).
- 7. Remove items 18 thru 21 as an assembly.



**Go to Sheet 5
14-92**

REAR AXLE MAINTENANCE.

14-17. Differential Assembly. (Sheet 5 of 12)

DISASSEMBLY

8. Remove four washers (18) and items 19 and 20 as an assembly from spider (21, Figure 14-125).

9. Using drive plate and handle, remove four bearings (19) from pinions (20, Figure 14-126).

10. Remove gear (22, Figure 14-127).

11. Turn items 23 thru 43 as an assembly upside down.

12. Remove items 23 thru 28 as an assembly (Figure 14-128).

13. Remove nut (23), cup (24), two rings (25) and ring (26) from cage (28, Figure 14-129).

14. Check for presence of ball (27) in cage (28). If ball is present, do not remove. If ball is missing, make a note to install new ball (27) during assembly.

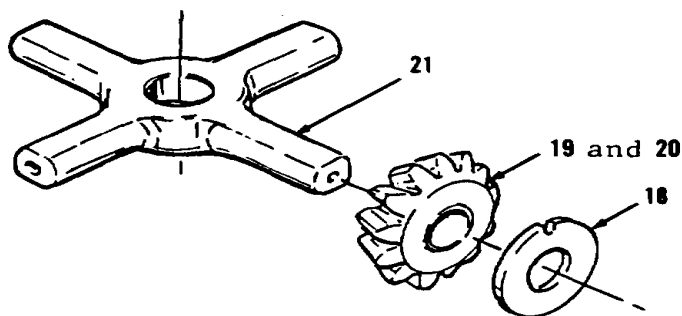


Figure 14-125.

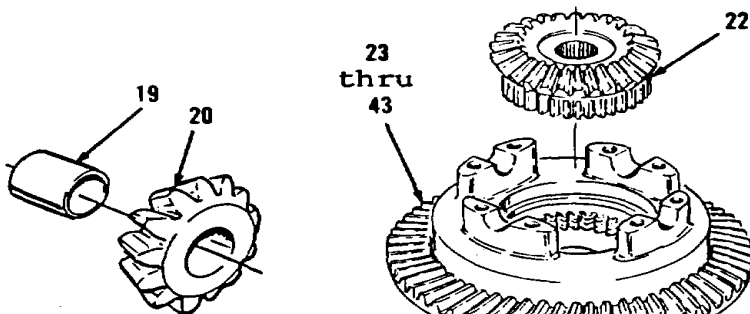


Figure 14-126.

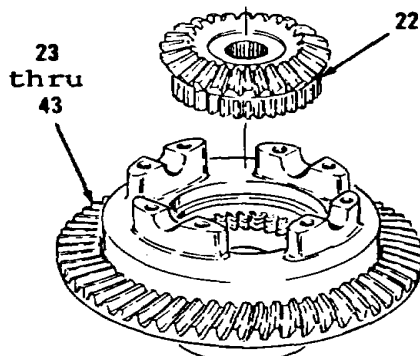


Figure 14-127.

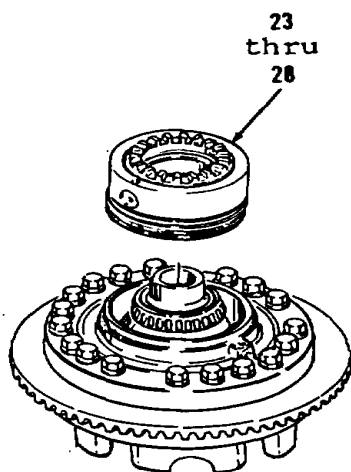


Figure 14-128.

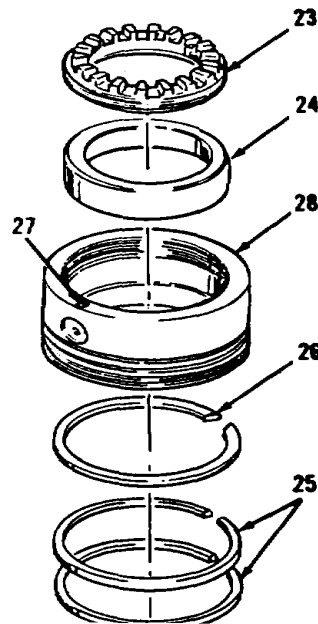


Figure 14-129.

Go to Sheet 6

REAR AXLE MAINTENANCE. (cont)

14-17. Differential Assembly. (Sheet 6 of 12)

DISASSEMBLY (cont)

15. Using puller attachment, puller group, two legs, step plate, four step plates, two nuts and pump group, remove cone bearing (29, Figure 14-130).
16. Check for presence of ball (30) in housing (38). If ball is present, do not remove. If ball is missing, make note to install new ball (30) during assembly.
17. Remove 18 bolts (31) and washers (32) from housing (38).
18. Remove items 33 thru 38 as an assembly (Figure 14-131) and turn upside down.
19. Remove washer (33), two dowels (34) and items 35 thru 37 as an assembly from housing (38).
20. Remove and discard seals (35 and 36) from piston (37, Figure 14-132).
21. Remove ring gear (39), seven discs (40), eight discs (41) and disc (42) from housing (43, Figure 14-133).

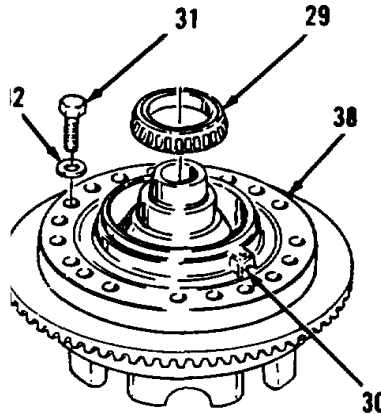


Figure 14-130.

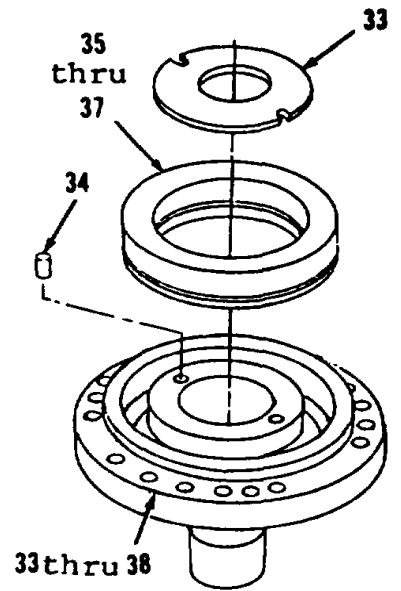


Figure 14-131.

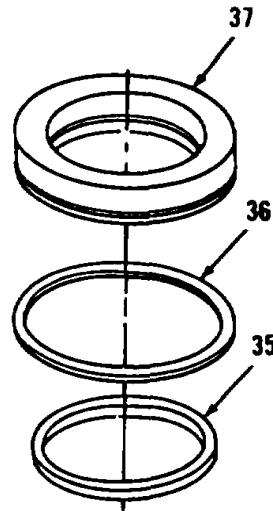


Figure 14-132.

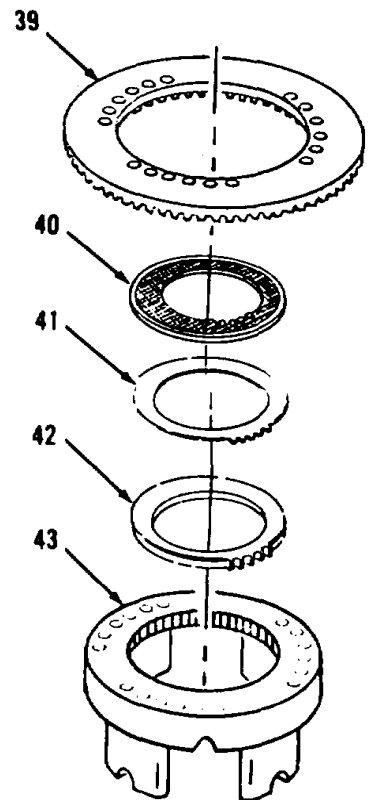


Figure 14-133.

Go to Sheet 8

REAR AXLE MAINTENANCE.

14-17. Differential Assembly. (Sheet 7 of 12)

DISASSEMBLY

- 22. Remove seal (44) and ring (45) from differential carrier (46, Figure 14-134).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

- 1. Install ring (45) and new seal (44) in differential carrier (46, Figure 14-134).
- 2. Using clean engine oil SAE 30, lubricate disc (42), eight discs (41) and seven discs (40) and install into housing (43, Figure 14-133).
- 3. Install ring gear (39) on housing (43).
- 4. Install new seals (36 and 35) on piston (37, Figure 14-132). New seals (36 and 35) should be installed so lips will be toward bottom of bore when piston (37) is installed.

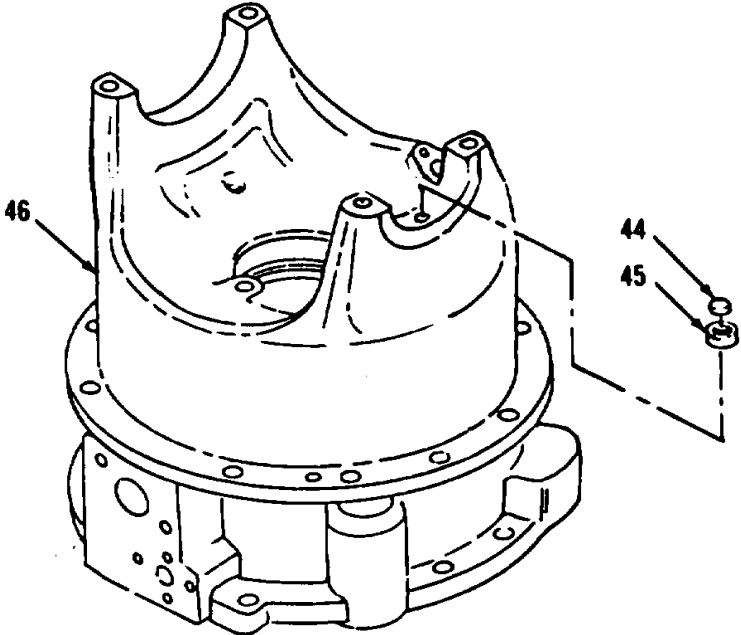


Figure 14-134.

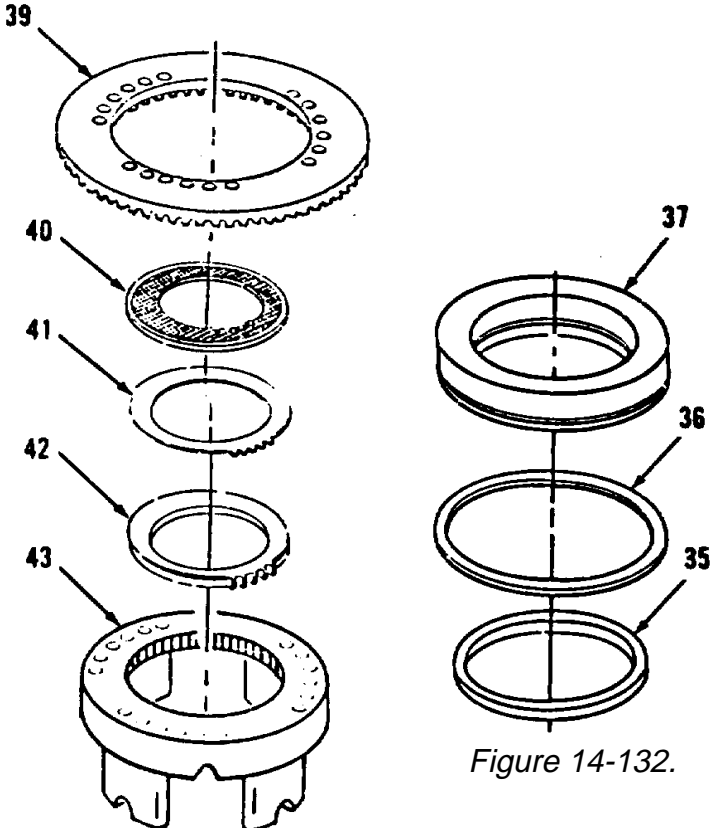


Figure 14-132.

Figure 14-133.

Go to Sheet 8

REAR AXLE MAINTENANCE. (cont)

14-17. Differential Assembly. (Sheet 8 of 12)

ASSEMBLY (cont)

- 5. Using clean engine oil SAE 30, lubricate lips of new seals (36 and 35) and install items 37 thru 35 as an assembly on housing (38, Figure 14-131).

NOTE

Dowels must protrude 0.141 to 0.149 inch from surface of housing to engage slots in washer.

- 6. Install two dowels (34).
- 7. Turn over items 38 thru 33 as an assembly and install on items 43 thru 39 as an assembly (Figure 14-130).
- 8. Install 18 washers (32) and bolts (31). Tighten 18 bolts (31) to 175 to 195 ft-lb torque.
- 9. If absence of ball (30) was noted during disassembly, install new ball (30), peening over edges of housing (38) to be sure ball is securely retained.
- 10. Heat cone bearing (29) in engine oil SAE 30 to 175 degrees F and install.

- 11. Install ring (26), two rings (25) and cup (24) to cage (28, Figure 14-129).
- 12. Install nut (23).

- 13. If absence of ball (27) was noted during disassembly, install new ball (27) in cage (28), peening over edges of cage to be sure ball is securely retained.

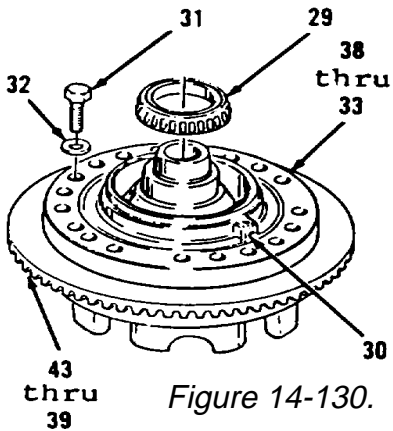


Figure 14-130.

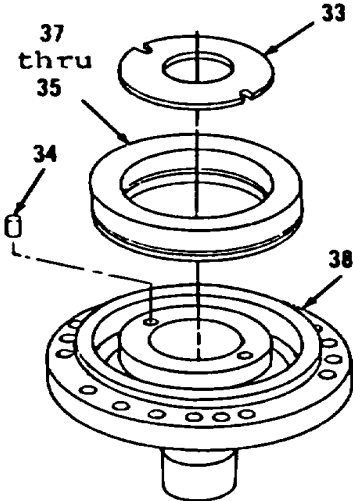


Figure 14-131.

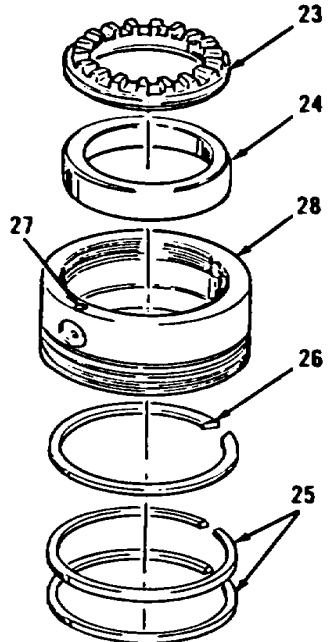


Figure 14-129.

Go to Sheet 9

REAR AXLE MAINTENANCE.

14-17. Differential Assembly. (Sheet 9 of 12)

ASSEMBLY

14. Install items 28 thru 23 as an assembly (Figure 14-128).
15. Turn items 43 thru 42 as an assembly (Figure 14-127) upside down.
16. Install gear (22).
17. Using step plate and arbor press, install four bearings (19) on pinions (20, Figure 14-126).
18. Install four items 20 and 19 as an assembly and washers (18) on spider (21, Figure 14-125). Insure notches in four washers (18) are facing up.

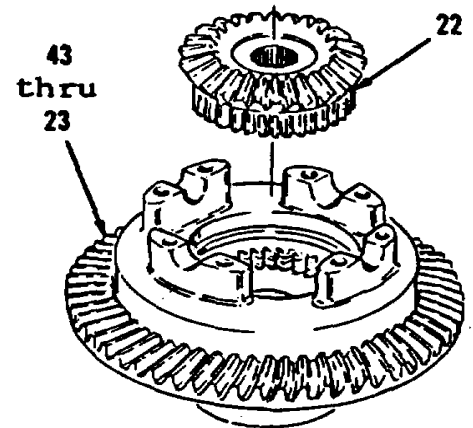


Figure 14-127.

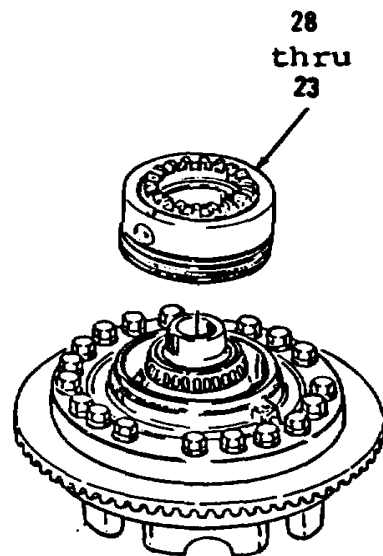


Figure 14-128.

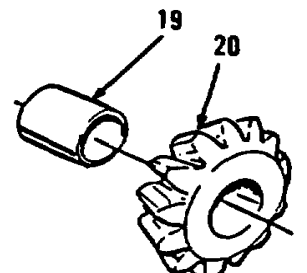


Figure 14-126.

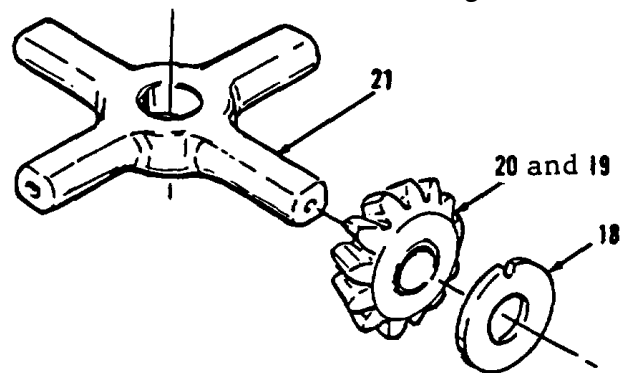


Figure 14-125.

Go to Sheet 10

REAR AXLE MAINTENANCE. (cont)

14-17. Differential Assembly. (Sheet 10 of 12)

ASSEMBLY (cont)

- 19. Install items 21 thru 18 as an assembly in housing (43, Figure 14-124).
- 20. Install gear (17).
- 21. Install washer (16). Notches in washer (16) must be aligned with holes for two dowels (12) in upper surface of housing (15).
- 22. Position housing (15) so that four holes for dowels (12) align with holes in legs of spider (21).
- 23. Install eight washers (14) and bolts (13). Tighten eight bolts (13) to 65 ft-lb torque.
- 24. Install six dowels (12) in housing (15).
- 25. Heat cone bearing (11) in engine oil SAE 30 to 275 degrees F and install.
- 26. Chill cup (9, Figure 14-123) in dry ice or low-humidity freezer and install in cage (10).
- 27. Install items 10 and 9 as an assembly and nut (8, Figure 14-122).

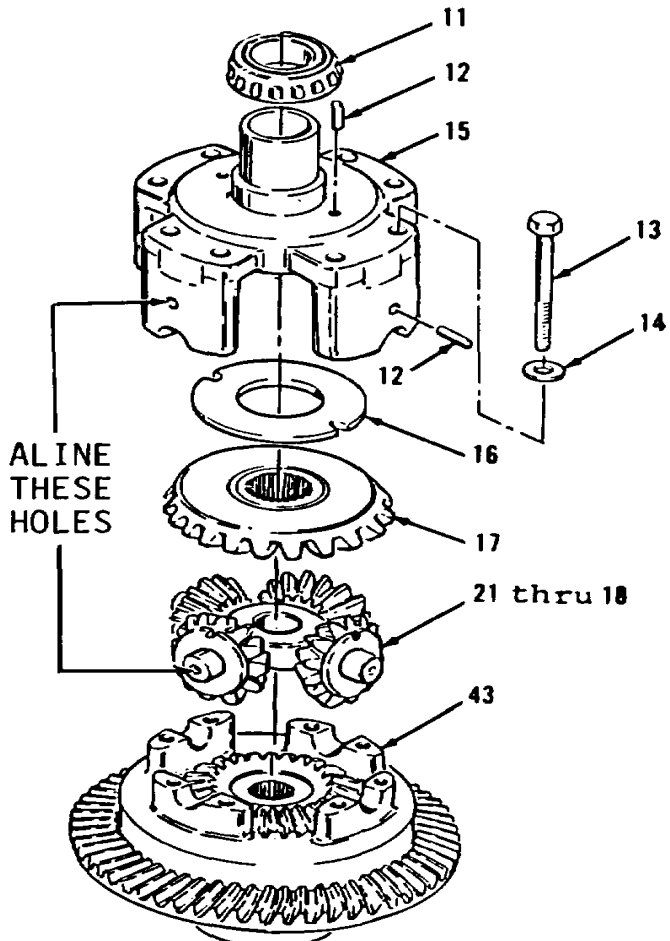


Figure 14-124.

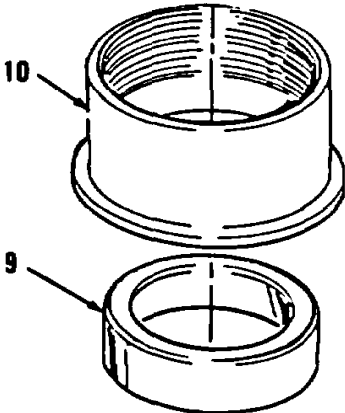


Figure 14-123.

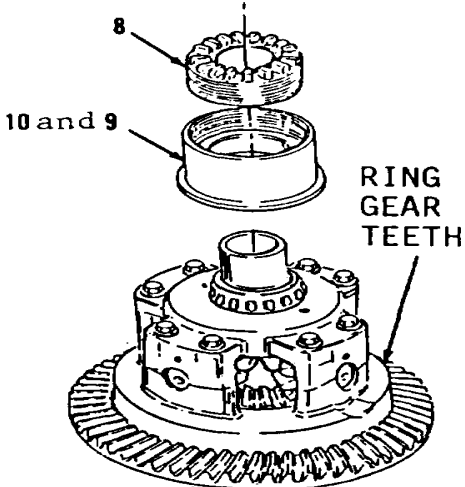


Figure 14-122.

Go to Sheet 11

REAR AXLE MAINTENANCE.

14-17. Differential Assembly. (Sheet 11 of 12)

INSTALLATION

1. Attach hoist and sling to items 43 thru 8 as an assembly (Figure 14-121).
2. Position items 43 thru 8 as an assembly in items 46 thru 44 as an assembly so that opening in cage aligns with ring (45) and seal (46) in carrier assembly (46).
3. Remove hoist and sling.
4. Install dowel (7) and cap (6).
5. Install four washers (2) and nuts (1). Tighten four nuts (1) to 75 ft-lb torque. Do not install two bolts (3) and locks (4 and 5) at this point.

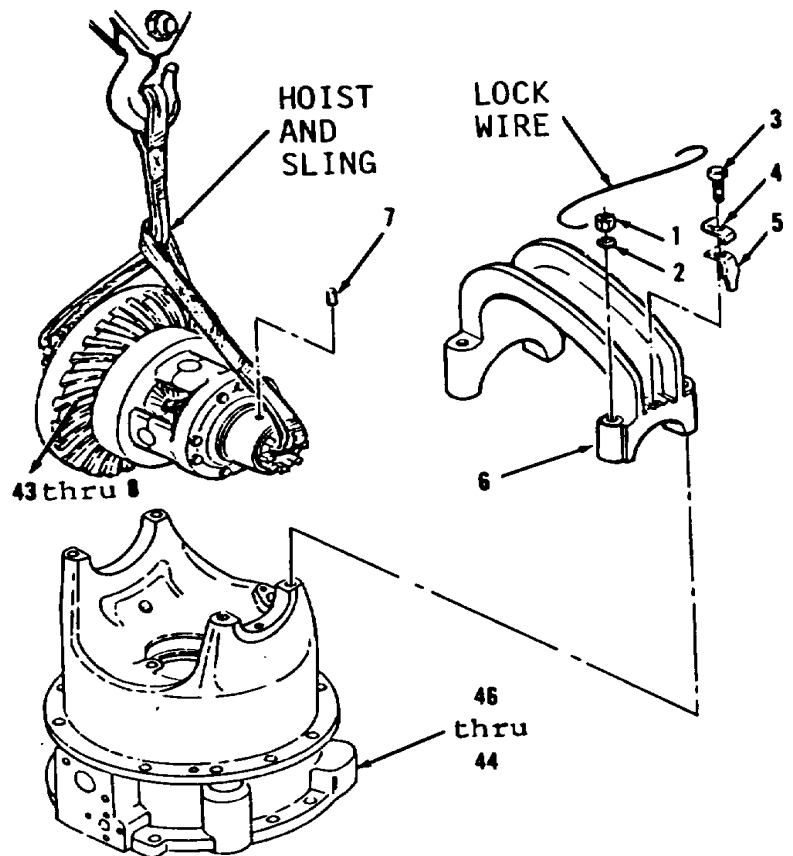


Figure 14-121.

6. Position differential assembly (Figure 14-135).
7. Attach dial scale indicator on cap (6) so indicator contacts any tooth on gear (39). Turn gear and measure backlash, which should be 0.005 to 0.012 inch.
8. Using spanner wrench, adjust nut (23) to obtain 0.005 to 0.012 inch backlash. Nut (8) should be kept finger tight against top bearing during adjustment procedure.
9. Loosen nut (8) and tighten by hand to remove end play.
10. While tightening nut (8) 1 to 1-1/2 notches, use dial scale indicator and measure change in dimension from end of housing (15) to cap (6). Dimension must change by 0.003 to 0.007 inch.

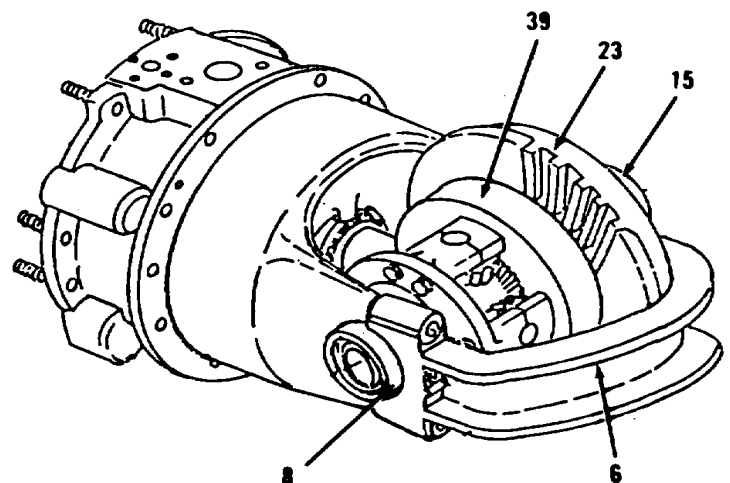


Figure 14-135.

Go to Sheet 12

REAR AXLE MAINTENANCE. (cont)

14-17. Differential Assembly. (Sheet 12 of 12)

INSTALLATION (cont)

- 11. Tighten four nuts (1, Figure 14-136) to 260 to 300 ft-lb torque.
- 12. Repeat steps 7 and 8.
- 13. Install two locks (5 and 4) and bolts (3).
- 14. Install new lock wire through four nuts (1) on each side of cap (6).

NOTE

Return 130C Grader to original equipment condition.

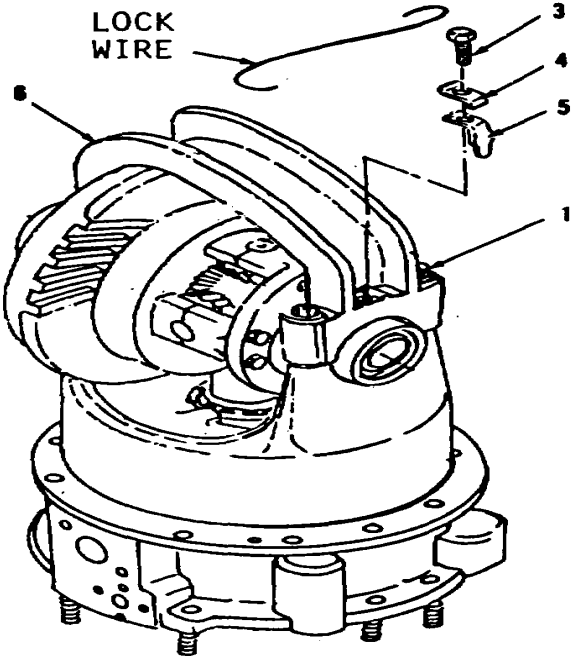


Figure 14-136.

End of Task

REAR AXLE MAINTENANCE.

14-18. Differential Carrier. (Sheet 1 of 7)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-177-7033)

Push pullers and attachments:

Ratchet box wrench 8H684

Screw 5F7366

Nut 5F7351

Six washers 5F7353

Two crossbars 8S7548

Puller attachment 8B7554

Crossbar 1H3107

Four nuts 1B4709

Four plates 3H468

Four plates 3H465

Two nuts 1B4207

Bearing puller attachment
8B7551

Leg 8B7549

Spanner wrench 1P2853

Bracket FT901

Socket 5S6078

Torque wrench 9S7354

Wood block

Hoist and chain

Two dowels

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C

Clean cloths, Item 41,
Appendix C

Small tags, Item 43,
Appendix C

Seals, Item 14, 18

Preformed packings, Items 3, 4,
5, 6, 7, 17, 28

Gasket, Item 30

Caps

Personnel Required

Construction equipment
repairer MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

All fasteners are tightened to
standard torques. Refer to
Appendix E.

Go to Sheet 2

14-101

REAR AXLE MAINTENANCE. (cont)

14-18. Differential Carrier. (Sheet 2 of 7)

Troubleshooting References
None

Equipment Condition
TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 5-19

Differential removed.

Go to Sheet 3

14-102

REAR AXLE MAINTENANCE.

14-18. Differential Carrier. (Sheet 3 of 7)

DISASSEMBLY

1. Remove bearing cap and differential assembly. Refer to paragraph 14-17, steps 1 thru 5.

NOTE

All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends to prevent contamination.

2. Remove tubes (1 and 2, Figure 14-137).
3. Remove and discard preformed packings (3 thru 7) from carrier (31).
4. Bend tabs on lock (9) away from nut (8).
5. Remove nut (8), lock (9) and washer (10).
6. Using push pullers and attachments, remove shaft (11) from carrier (31, Figure 14-138).
7. Using push pullers and attachments, remove cone bearing (12) from shaft (11, Figure 14-139).

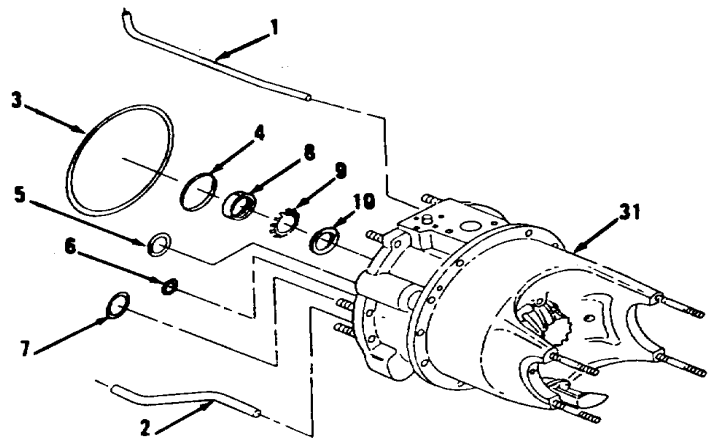


Figure 14-137.

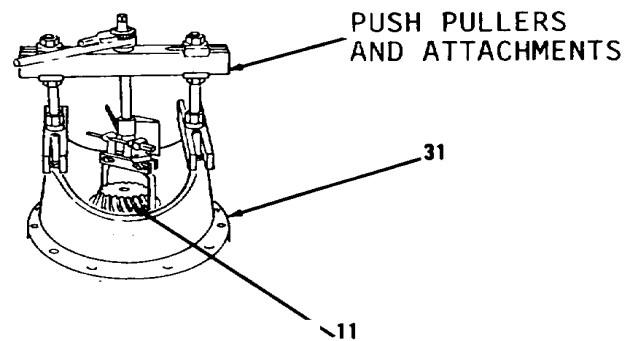


Figure 14-138.

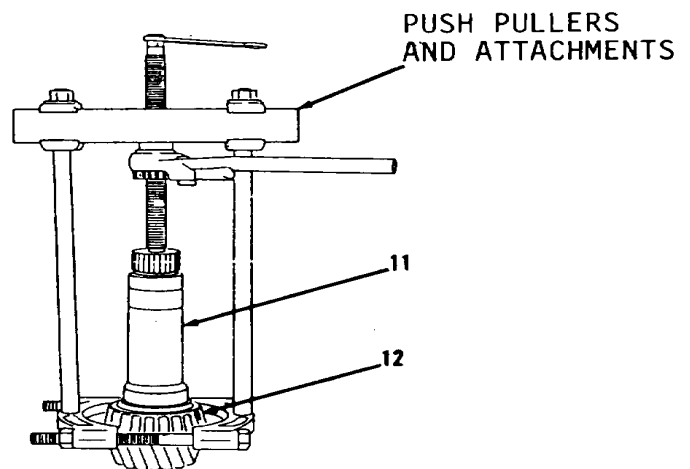


Figure 14-139.

Go to Sheet 4

REAR AXLE MAINTENANCE. (cont)

14-18. Differential Carrier. (Sheet 4 of 7)

DISASSEMBLY (cont)

8. Remove cup (13) and seal (14) from carrier (31, Figure 14-140). Discard seal (14).

NOTE

Do not remove cone bearing without the proper tools to prevent damage to bearing.

9. Remove cone bearing (15) and cup (16).
10. Remove and discard preformed packing (17).
11. Remove seal (18) and ring (19). Discard seal (18).
12. Remove two bolts (20), locks (21) and plate (22) from carrier (31, Figure 14-141).

13. Remove two sleeves (23).
14. Remove ten studs (24).

15. Remove four studs (25) and ferrules (26).

16. Remove plug (27) and preformed packing (28, Figure 14-142). Discard preformed packing (28).

17. Remove plug (29) and gasket (30) from carrier (31). Discard gasket (30). Remove all gasket material from mounting surfaces.

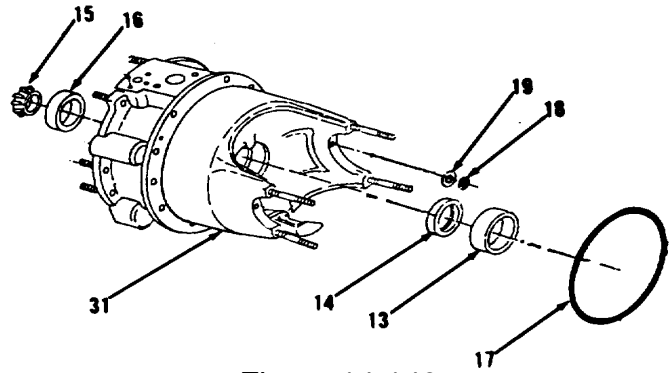


Figure 14-140.

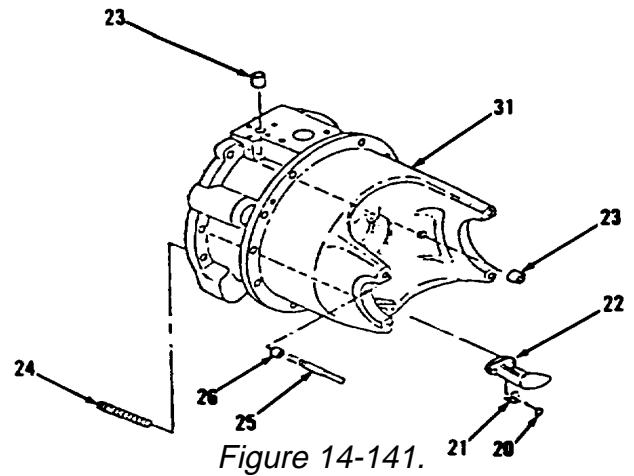


Figure 14-141.

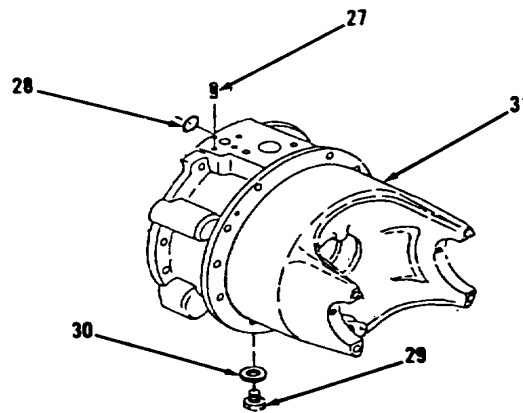


Figure 14-142.

CLEANING

Clean all parts. Refer to Chapter 2.

Go to Sheet 5

REAR AXLE MAINTENANCE.

14-18. Differential Carrier. (Sheet 5 of 7)

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install new gasket (30) and plug (29) in carrier (31, Figure 14-142).
2. Install new preformed packing (28) and plug (27).
3. Install four ferrules (26) and studs (25, Figure 14-141).
4. Install ten studs (24).
5. Install two sleeves (23).
6. Install plate (22), two locks (21) and bolts (20) to carrier (31).
7. Install ring (19) and new seal (18, Figure 14-140).
8. Install new preformed packing (17).
9. Install cups (16 and 13) in carrier (31). Lower temperature of cups (16 and 13) before installation.
10. Lubricate and install new seal (14). Lip of new seal (14) must be toward bevel gear.

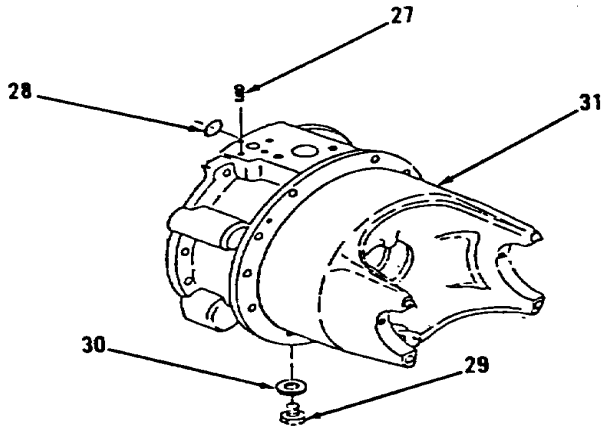


Figure 14-142.

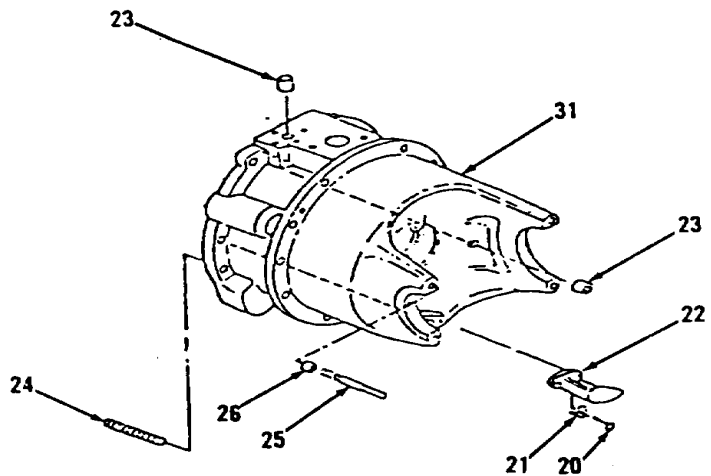


Figure 14-141.

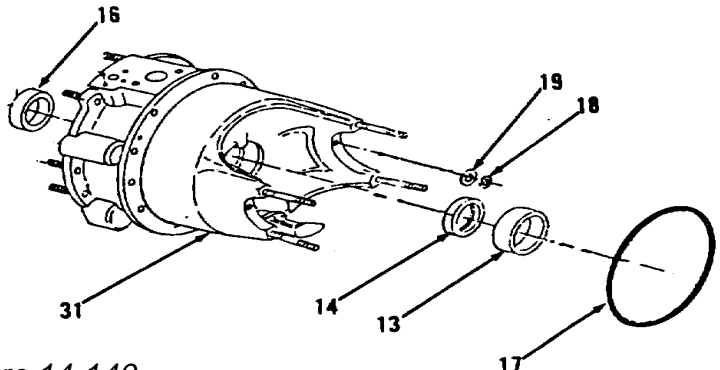


Figure 14-140.

Go to Sheet 6
14-105

REAR AXLE MAINTENANCE. (cont)

14-18. Differential Carrier. (Sheet 6 of 7)

ASSEMBLY (cont)

- 11. Heat cone bearing (12) in oil to 275 degrees F and install on shaft (11, Figure 14-143).
- 12. Position shaft (11, Figure 14-144) on wood block.
- 13. Attach bracket to carrier (31) and hoist and chain to bracket.

WARNING

Use adequate hoist and chain for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

- 14. Using hoist and chain, position carrier (31) on shaft (11), seating in cup (13).
- 15. Heat cone bearing (15) in oil to 275 degrees F and install on shaft (11), seating in cup (16, Figure 14-145).
- 16. Using hoist and chain, raise carrier (31) and remove wood block.
- 17. Remove hoist and chain and bracket from carrier (31).
- 18. Install washer (10), lock (9) and nut (8). Do not tighten nut (8).

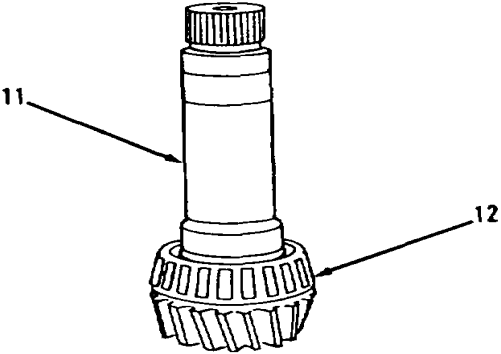


Figure 14-143.

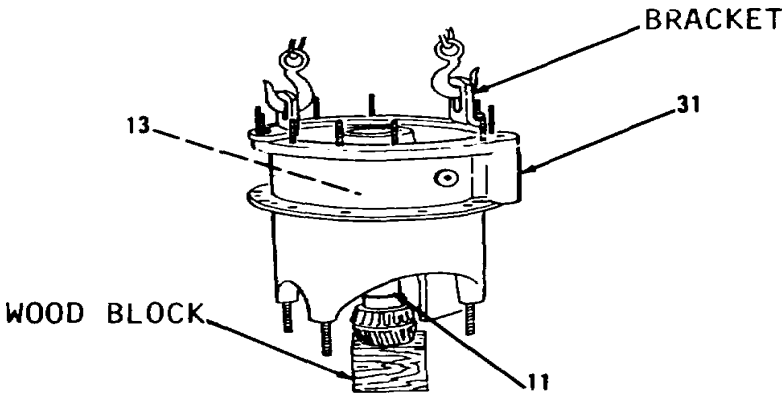


Figure 14-144.

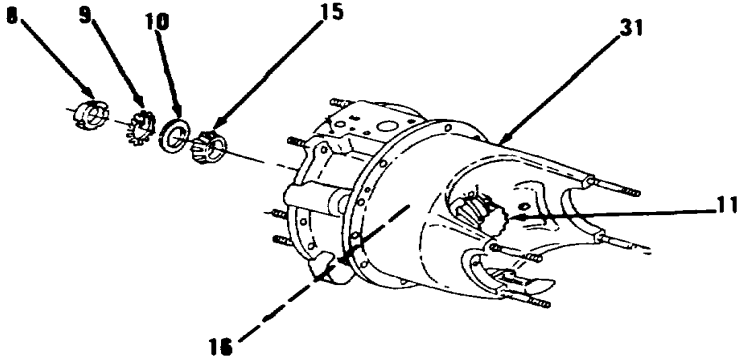


Figure 14-145.

Go to Sheet 7

REAR AXLE MAINTENANCE.

14-18. Differential Carrier. (Sheet 7 of 7)

ASSEMBLY

- 19. Insert two .250 inch dowels in splines of shaft (11) 180 degrees apart. Install socket over shaft (11) and two dowels (Figure 14-146).
- 20. Using socket and torque wrench, check amount of torque needed to move shaft (11, Figure 14-147) without preload.
- 21. Using ratchet, hold shaft (11) while tightening nut (8) to 6 in-lb torque above the measured torque without preload.
- 22. Remove socket from shaft (11).
- 23. Bend tabs of lock (9) over nut (8).
- 24. Install new preformed packings (7 thru 3, Figure 14-148).
- 25. Install tubes (2 and 1) in carrier (31).
- 26. Install differential assembly and bearing cap. Refer to paragraph 14-17, steps 2 thru 13.

NOTE

Return 130G Grader to original equipment condition.

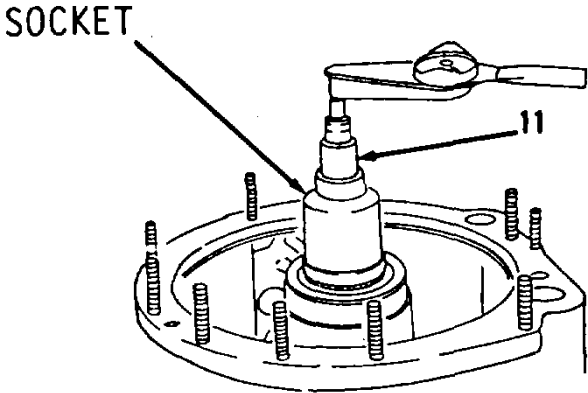


Figure 14-146.

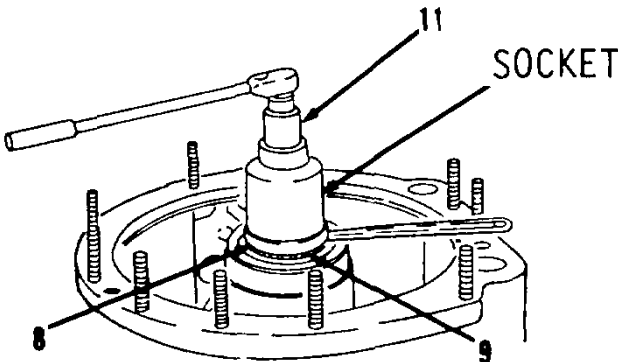


Figure 14-147.

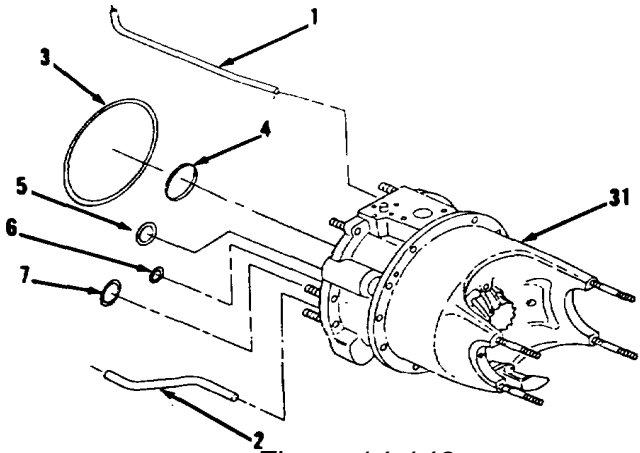


Figure 14-148.

End of Task

Section III. BRAKE MAINTENANCE

14-19. BRAKE MAINTENANCE PROCEDURES.

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the direct support level to keep the brakes and their components in good repair.

b. This section is arranged by functional group code and provides a list of brake components to be maintained and step-by-step maintenance procedures.

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| <u>Title</u> | <u>Paragraph</u> | <u>Page</u> |
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14-108

BRAKE MAINTENANCE.

14-20. Service Brakes. (Sheet 1 of 10)

This task covers:

- a. **Disassembly**
- b. **Cleaning**
- c. **Inspection**
- d. **Assembly**

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Hoist and sling
Two 5/8-11IINC forged eyebolts
Wood blocks
Puller attachment 8B7554
Bearing separator
Seal installer 5S4276
Caliper
Torque wrench
Bearing puller attachment
8B7551

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Engine oil SAE 30, Item 69,
Appendix C
Dry ice or freezer
Seals, Items 6, 12, 21, 22
Seal Assembly, Items 24, 29

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Paragraph 6-7

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Service brake and wheel spindle
housing assembly removed.

Go to Sheet 2

BRAKE MAINTENANCE. (cont)

14-20. Service Brakes. (Sheet 2 of 10)

DISASSEMBLY

1. Remove three bolts (1), retainer (2), shim(s) (3) and sprocket (4), Figure 14-149).
2. Remove cone (5) and seal (6). Discard seal (6).
3. Remove bolt (7), lockwasher (8), plate (9), three bolts (10) and lockwashers (11) from cover (14).
4. Install two 5/8-IINC forged eyebolts in items 12 thru 14 as an assembly (Figure 14-150).

WARNING

Weight of cover is 50 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

5. Install hoist and sling.
6. Remove items 12 thru 14 as an assembly from housing (27) and place on wood blocks.
7. Remove hoist and sling.
8. Remove two 5/8-IINC forged eyebolts.
9. Remove seal (12) and cup (13) from cover (14, Figure 14-151). Discard seal (12).

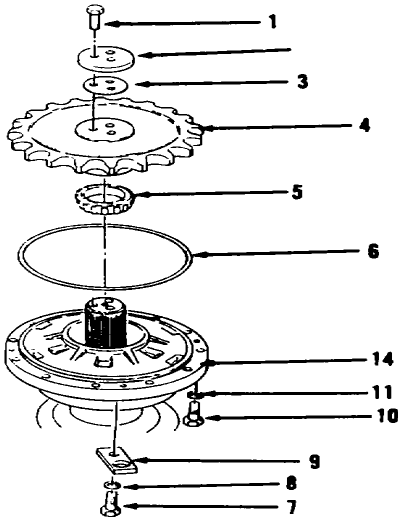


Figure 14-149.

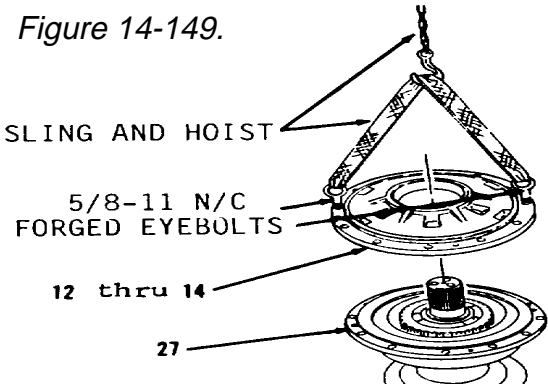


Figure 14-150.

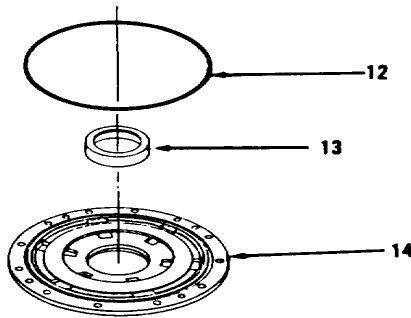


Figure 14-151.

Go to Sheet 3

BRAKE MAINTENANCE.

14-20. Service Brakes. (Sheet 3 of 10)

DISASSEMBLY

10. Remove hub (15) from housing (27, Figure 14-152).
11. Remove first one of ten discs (16) and first one of nine disc assemblies (17) from housing (27).
12. Remove remaining nine discs (16) and eight disc assemblies (17) in the same order as in step 11.

WARNING

Parts under spring tension. Loosen bolts slowly. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

13. Remove six bolts (18), washers (19) and springs (20).
14. Install two 5/8-11NC forged eyebolts in items 21 thru 27 as an assembly (Figure 14-153).

WARNING

Weight of housing is 100 lbs. Use adequate hoist and sling for lifting. Failure to follow this procedure may cause INJURY. If you are injured, seek medical aid immediately.

15. Install hoist and sling to eyebolts.
16. Remove items 21 thru 27 as an assembly from items 28 thru 31.

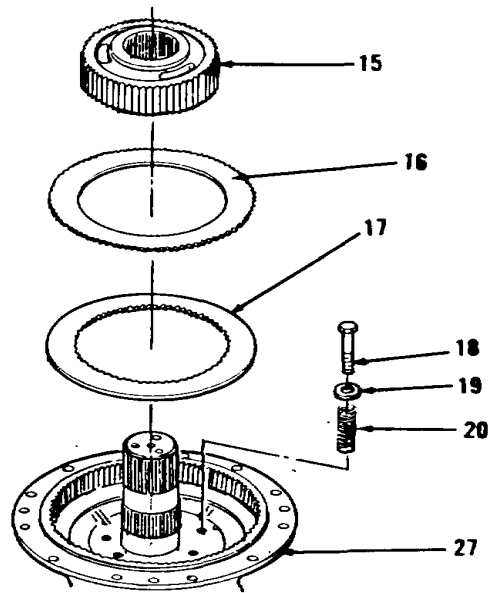


Figure 14-152.

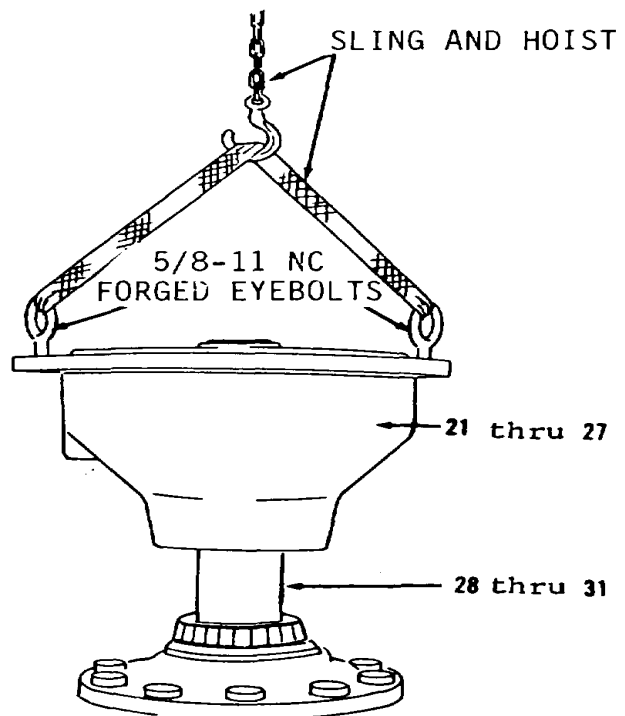


Figure 14-153.

Go to Sheet 4

BRAKE MAINTENANCE. (cont)

14-20. Service Brakes. (Sheet 4 of 10)

DISASSEMBLY (cont)

- 17. Remove hoist and sling.
- 18. Remove two 5/8-IINC forged eyebolts.
- 19. Using wood blocks, bearing cup pulling attachment, ratchet box wrench and puller assembly, remove items 21 thru 23 as an assembly from housing (27, Figure 14-154).
- 20. Remove seals (21 and 22) from piston (23, Figure 14-155). Discard seals (21 and 22).
- 21. Remove seal assembly (24), cup (25) and plug (26) from housing (27, Figure 14-156). Discard seal assembly (24).

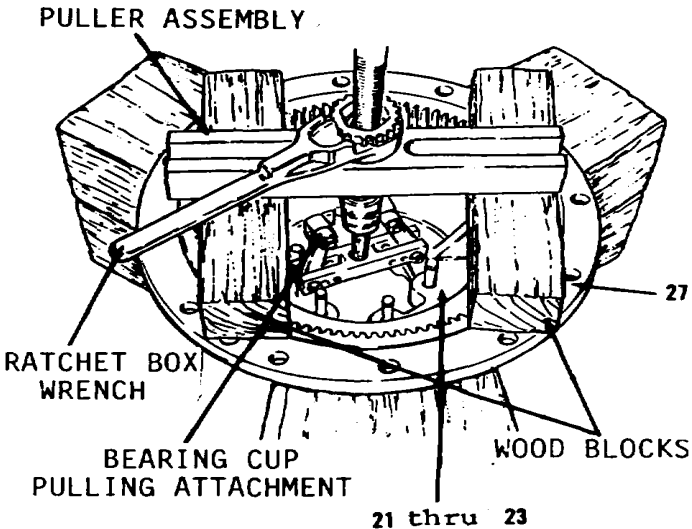


Figure 14-154.

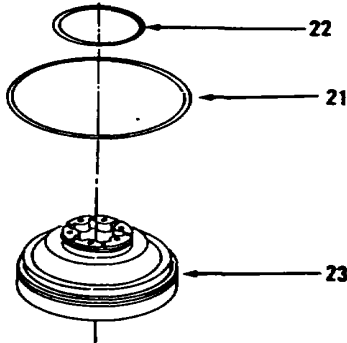


Figure 14-155.

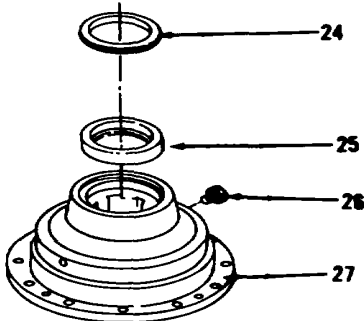


Figure 14-156.

Go to Sheet 5

BRAKE MAINTENANCE.**14-20. Service Brakes. (Sheet 5 of 10)****DISASSEMBLY****NOTE**

The proper tool must be used in removing the cone (28).

22. Using a bearing separator and puller, remove cone (28) from spindle (31, Figure 14-157).
23. Remove seal assembly (29) and ten studs (30) from spindle (31). Discard seal assembly (29).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install ten studs (30) in spindle (31, Figure 14-157).
2. Using seal installer, install seal assembly (29) in spindle (31).
3. Coat metal surface of seal assembly (29) with engine oil SAE 30.
4. Heat cone (28) in engine oil SAE 30 to a maximum temperature of 275 degrees F.
5. Install cone (28) on spindle (31).

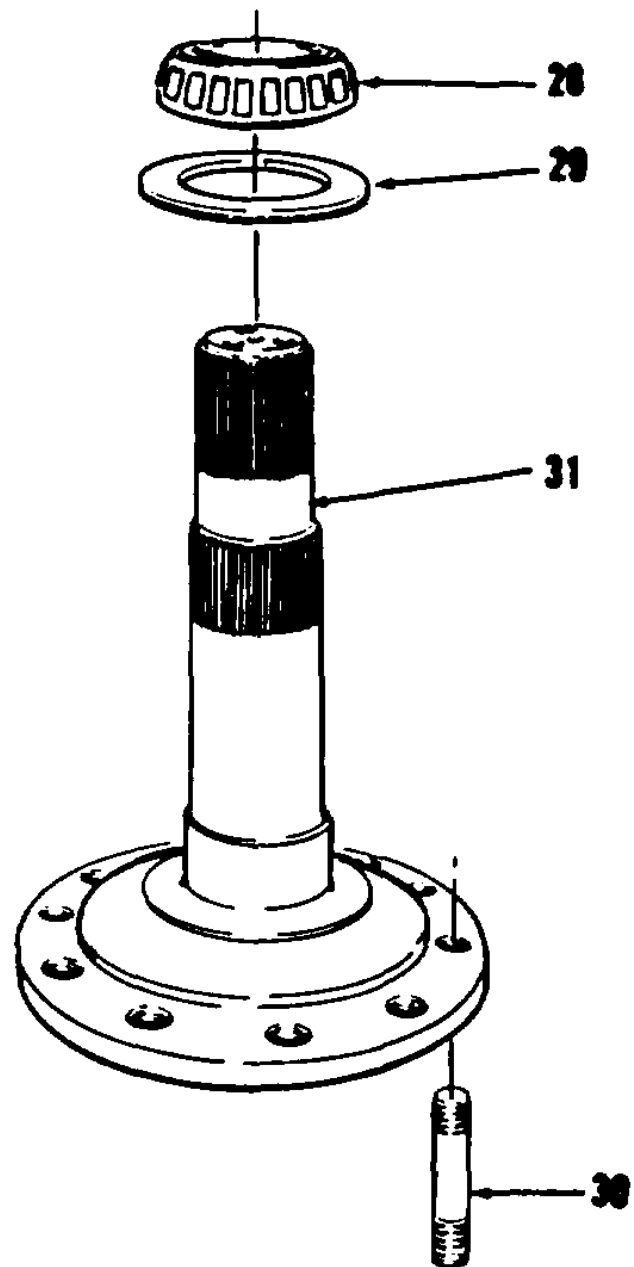


Figure 14-157.

Go to Sheet 6

BRAKE MAINTENANCE. (cont)

14-20. Service Brakes. (Sheet 6 of 10)

ASSEMBLY (cont)

- 6. Install plug (26) in housing (27, Figure 14-156).
- 7. Using dry ice, lower the temperature of cup (25).
- 8. Install cup (25) in housing (27).
- 9. Using seal installer, install seal assembly (24) in housing (27).
- 10. Coat metal surface of seal assembly (24) with engine oil SAE 30.
- 11. Install new seals (22 and 21) on piston (23, Figure 14-155).
- 12. Install items 23 thru 21 as an assembly in housing (27, Figure 14-158).

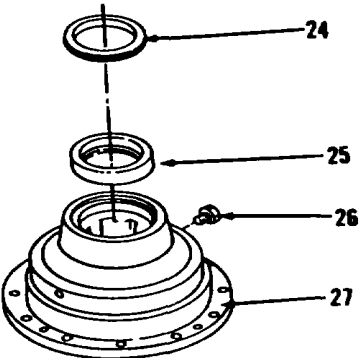


Figure 14-156.

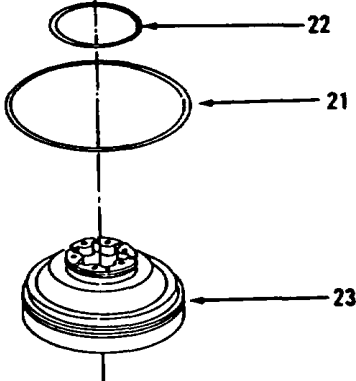


Figure 14-155.

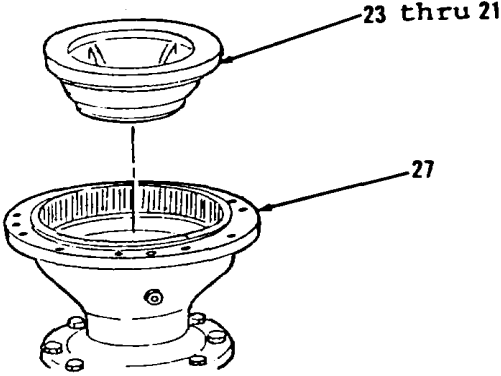


Figure 14-158.

Go to Sheet 7

BRAKE MAINTENANCE.

14-20. Service Brakes. (Sheet 7 of 10)

ASSEMBLY

13. Install two 5/8-11NC forged eyebolts in items 27 thru 21 as an assembly (Figure 14-153).

14. Install hoist and sling.

15. Install items 27 thru 21 as an assembly on items 31 thru 28.

16. Remove hoist and sling.

17. Remove two 5/8-11NC forged eyebolts.

18. Install six springs (20), washers (19) and bolts (18) in housing (27, Figure 14-152).

19. Install hub (15) on spindle (31).

20. Apply a thin coat of engine oil SAE 30 to nine disc assemblies (17) and ten discs (16).

21. Install last one of ten discs (16) and last one of nine disc assemblies (17) in housing (27).

22. Install remaining nine discs (16) and eight disc assemblies (17) in the same order as in step 21.

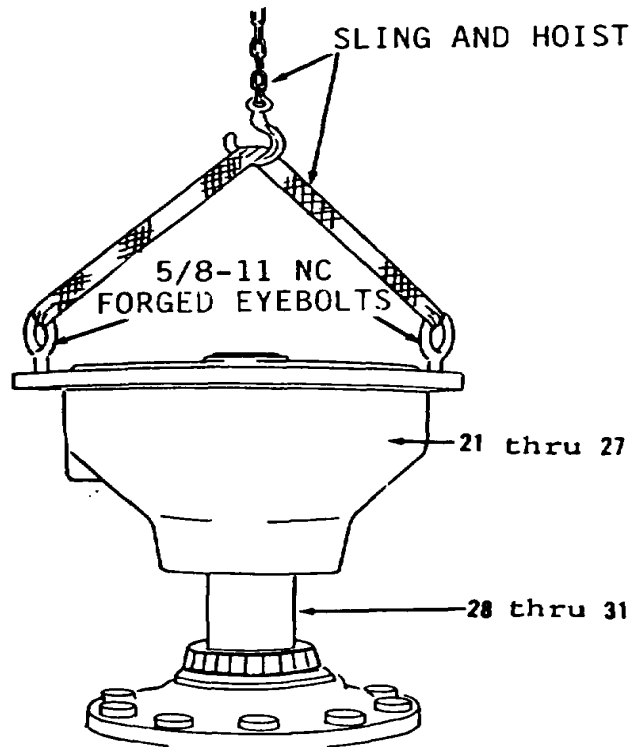


Figure 14-153.

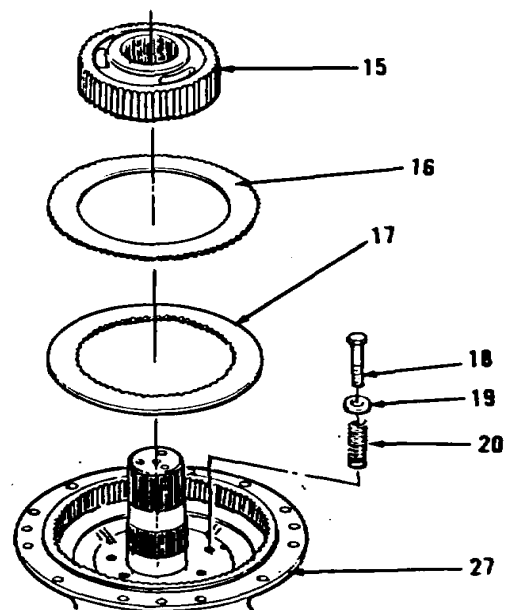


Figure 14-152.

Go to Sheet 8

BRAKE MAINTENANCE. (cont)

14-20. Service Brakes. (Sheet 8 of 10)

ASSEMBLY (cont)

NOTE

Make sure there is a disc assembly between each disc.

23. Install new seal (12) in cover (14, Figure 14-151).
24. Coat seal (12) with grease.
25. Using dry ice, lower temperature of cup (13).
26. Install cup (13) in cover (14).
27. Install two 5/8-IINC forged eyebolts in items 14 thru 12 as an assembly (Figure 14-150).
28. Install hoist and sling.
29. Install items 14 thru 12 as an assembly in housing (27).
30. Remove hoist and sling.
31. Remove two 5/8-IINC forged eyebolts.

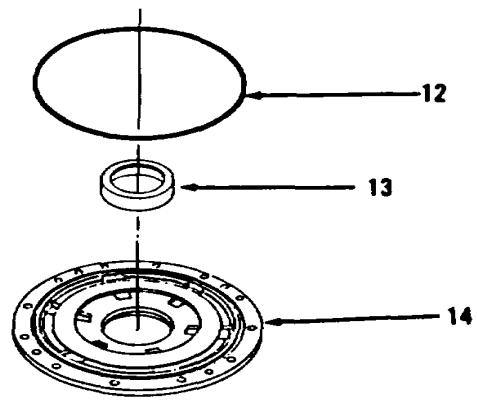


Figure 14-151.

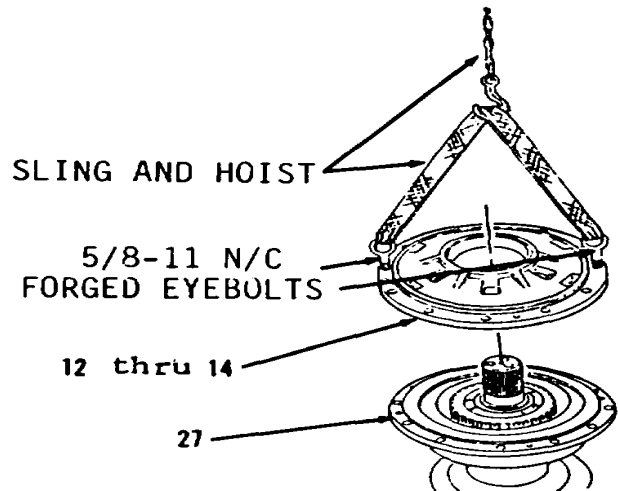


Figure 14-150.

Go to Sheet 9

BRAKE MAINTENANCE.

14-20. Service Brakes. (Sheet 9 of 10)

ASSEMBLY

- 32. Install seal (6) in cover (14, Figure 14-149).
- 33. Coat seal (6) with grease.
- 34. Install three lockwashers (11), bolts (10), plate (9), lockwasher (8) and bolt (7).
- 35. Install cone (5) over spindle (31).

NOTE

The sprocket for the front service brake and wheel spindle housing must be installed with teeth next to cover. The sprocket for the rear service brake and wheel spindle housing must be install with teeth away from cover.

- 36. Install sprocket (4) over splines on spindle (31).

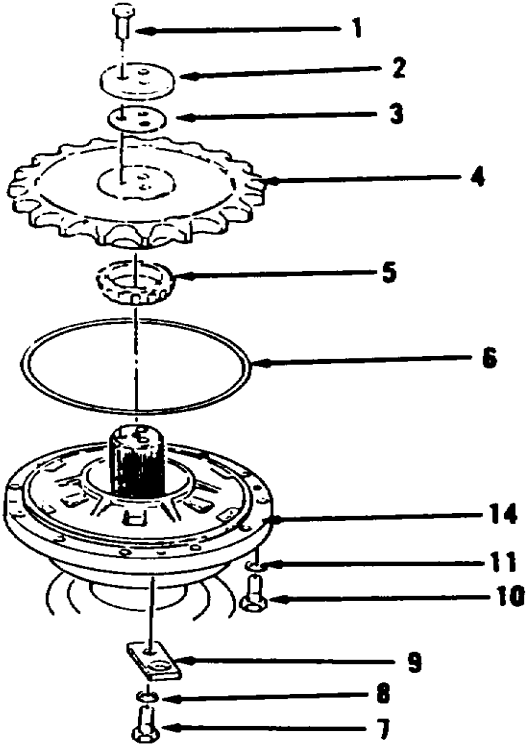


Figure 14-149.

Go to Sheet 10

BRAKE MAINTENANCE. (cont)

14-20. Service Brakes. (Sheet 10 of 10)

ASSEMBLY (cont)

- 37. Install retainer (2) and three bolts (1). Tighten three bolts (1) to 35 ft-lb torque while turning housing (27).
- 38. Remove three bolts (1) and retainer (2).
- 39. Using a caliper, measure distance between end of sprocket (4) and spindle (31).
- 40. Install shim(s) (3) which have total thickness equal to distance measured in step 39 minus 0.010 to 0.015 inch.
- 41. Install retainer (2) and three bolts (1). Tighten three bolts (1) to 192 ft-lb torque.

NOTE

Return 130G Grader to original equipment condition.

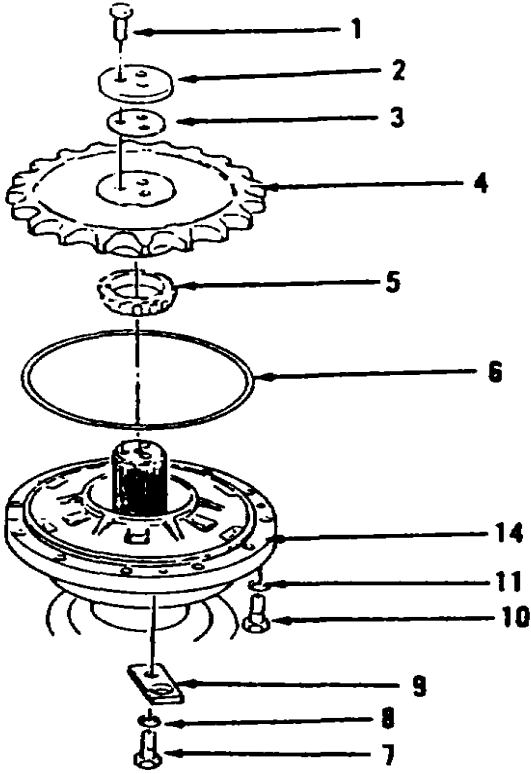


Figure 14-149.

End of Task

14-118

CHAPTER 15

STEERING MAINTENANCE

CHAPTER OVERVIEW

The purpose of this chapter is to help the technician efficiently troubleshoot and repair malfunctioning equipment and to perform authorized general support level maintenance procedures on the 13OG Grader steering system.

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| | Steering Maintenance Procedures | 15-1 | 15-2 |
| | Steering Cylinder | 15-2 | 15-3 |
| | | 15-1 | |

Section I. STEERING MAINTENANCE.

15-1. STEERING MAINTENANCE PROCEDURES.

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the general support level to keep the steering and its components in good repair.

b. This section is arranged by functional group code and provides a list of steering components to be maintained and step-by-step maintenance procedures.

INDEX

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|-------------------|------------------|-------------|
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STEERING MAINTENANCE.

15-2. Steering Cylinder. (Sheet 1 of 5)

This task covers:

- a. **Disassembly**
- b. **Cleaning**
- c. **Inspection**
- d. **Assembly**

INITIAL SETUP:

Applicable Configurations

All

Personnel Required

Construction equipment
repairer MOS 62B

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-
177-7033)
Seal installer
Chain wrench

References

TM 5-3805-261-10

Special Environmental Conditions

None

Test Equipment

None

General Safety Instructions

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Lubricating oil, Item 33,
Appendix C
Hydraulic fluid, Item 30,
Appendix C
Thread lubricant, Item 64,
Appendix C
Seal assembly, Item 8
Seals, Items 10, 11, 15
Preformed packing, Item 12

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 8-5

Steering cylinder removed.

Go to Sheet 2

STEERING MAINTENANCE. (cont)

15-2. Steering Cylinder. (Sheet 2 of 5)

DISASSEMBLY

NOTE

For convenience, hydraulic cylinder should be mounted on a suitable repair stand.

1. Remove two rings (1) and bearing (2, Figure 15-1).
2. Using suitable chain wrench, loosen crown (14).
3. Remove cylinder (3).
4. Remove bolt (4) and washer (5, Figure 15-2).
5. Remove items 6 thru 8 as an assembly.
6. Remove ring (7) and seal assembly (8) from piston (6, Figure 15-3). Discard seal assembly (8).
7. Remove items 9 thru 13 as an assembly (Figure 15-4).
8. Remove seals (10 and 11), preformed packing (12) and ring (13) from head (9, Figure 15-5). Discard seals (10 and 11) and preformed packing (12).

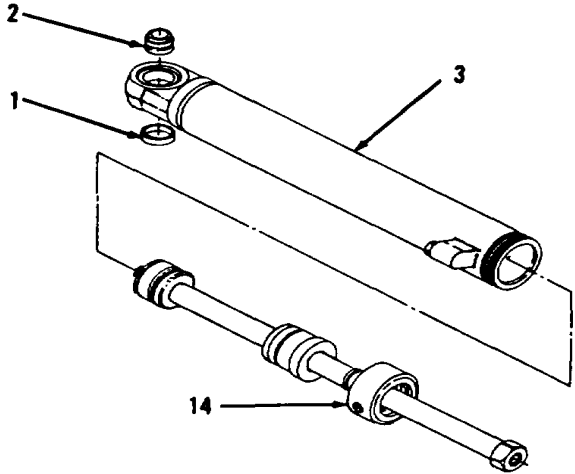


Figure 15-1.

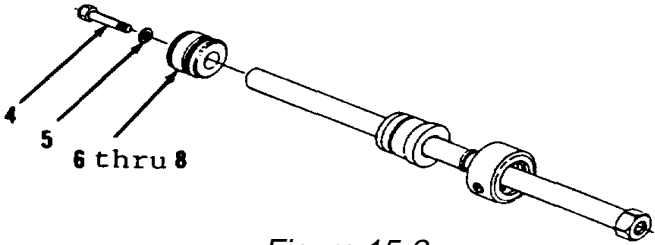


Figure 15-2.

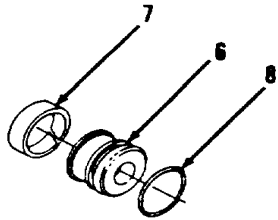


Figure 15-3.

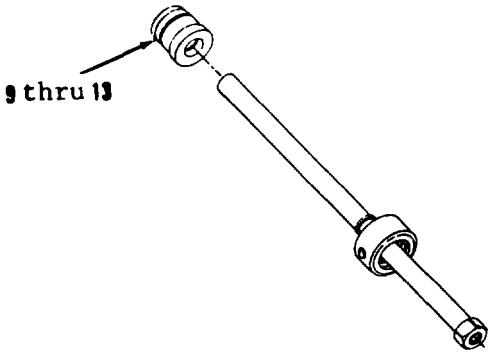


Figure 15-4.

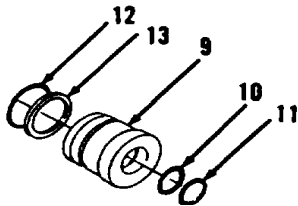


Figure 15-5.

Go to Sheet
3

STEERING MAINTENANCE.**15-2. Steering Cylinder. (Sheet 3 of 5)****DISASSEMBLY**

9. Remove items 14 and 15 as an assembly from rod (16, Figure 15-6).
10. Remove seal (15) from crown (14, Figure 15-7). Discard seal (15).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install seal (15) into crown (14, Figure 15-7).
2. Install items 15 and 14 as an assembly on rod (16, Figure 15-6).
3. Coat ring (13), new preformed packing (12) and new seals (11 and 10, Figure 15-5) with lubricating oil.
4. Using seal installer, install ring (13), new preformed packing (12) and new seals (11 and 10) in head (9). Lip of seal (11) is toward inside of head (9). Lip of seal (10) is toward outside of head (9).

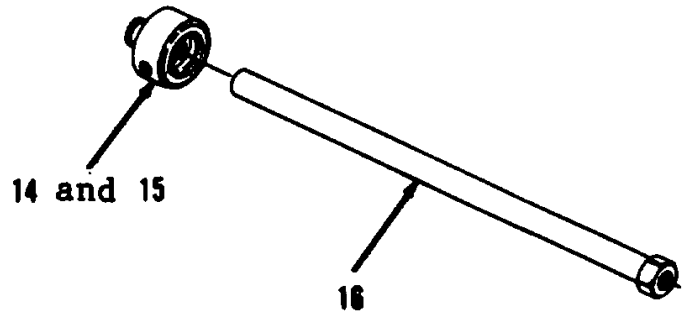


Figure 15-6.

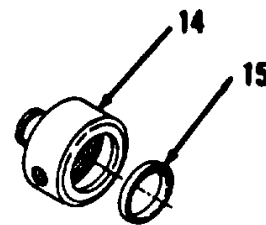


Figure 15-7.

Go to Sheet 4

STEERING MAINTENANCE. (cont)

15-2. Steering Cylinder. (Sheet 4 of 5)

ASSEMBLY (cont)

- 5. Install items 13 thru 9 as an assembly (Figure 15-4).
- 6. Install new seal assembly (8) and ring (7) on piston (6, Figure 15-3).
- 7. Install items 8 thru 6 as an assembly (Figure 15-2).
- 8. Apply thread lubricant to threads of bolt (4).
- 9. Install bolt (4) and washer (5).
- 10. Lubricate outside of head (9), inside of crown (14) and inside of cylinder (3, Figure 15-8) thoroughly with hydraulic fluid.

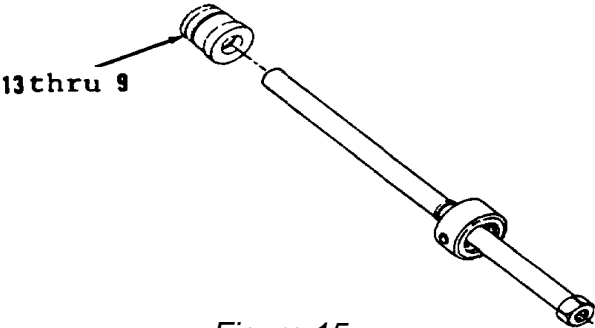


Figure 15-

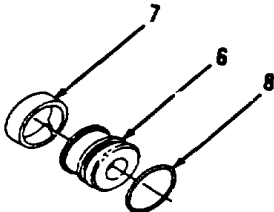


Figure 15-3.

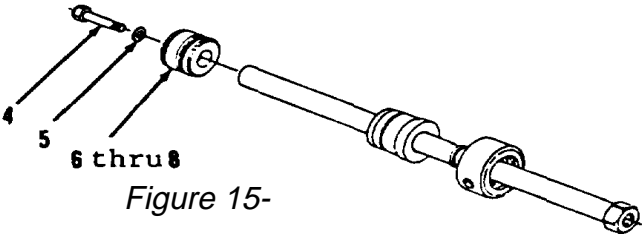


Figure 15-

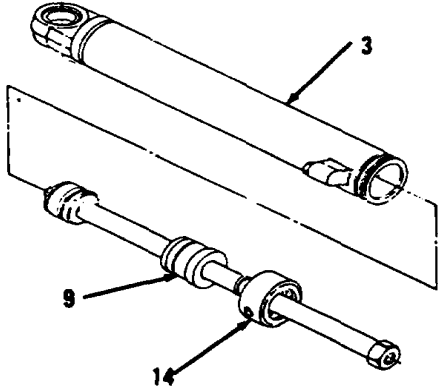


Figure 15-8.

Go to Sheet 5

STEERING MAINTENANCE.

15-2. Steering Cylinder. (Sheet 5 of 5)

ASSEMBLY

11. Install cylinder (3, Figure 15-1).

NOTE

Tighten crown with rod fully extended. This will keep cylinder, piston and head in alignment.

12. Using suitable chain wrench, tighten crown (14) to 450 ft-lb torque on cylinder (3).
13. Install bearing (2) and two rings (1).

NOTE

Return 130G Grader to original equipment condition.

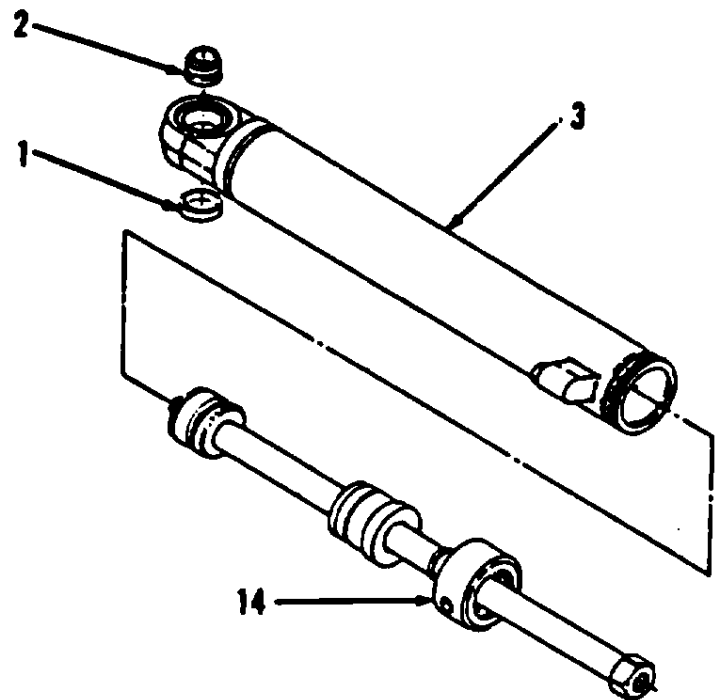


Figure 15-1.

End of Task

45 7/45 0 11-11

CHAPTER 16

FRAME MAINTENANCE

CHAPTER OVERVIEW

The purpose of this chapter is to help the technician efficiently troubleshoot and repair malfunctioning equipment and to perform authorized general support level maintenance procedures on the 130G Grader frame.

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| Frame Separation and Connection | 16-2 | 16-3 |
| Articulation Hitch Bearing | 16-3 | 16-15 |

Section I. FRAME MAINTENANCE.

16-1. FRAME MAINTENANCE PROCEDURES

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the general support level to keep the frame and its components in good repair.

b. This section is arranged by functional group code and provides a list of frame components to be maintained and step-by-step maintenance procedures.

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FRAME MAINTENANCE.

16-2. Frame Separation and Connection. (Sheet 1 of 12)

This task covers:

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

INITIAL SETUP:

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
Automotive (NSN 5180-00-177-7033)
Heavy-duty forklift truck
Hydraulic Jack
Jack stands
Two 5/8-IINC x 6 bolts
Two 3/8-16NC forcing screws
Wood blocks

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
Item 15, Appendix C
Clean cloths, Item 41,
Appendix C
Detergent, Item 9, Appendix C
Small tags, Item 43,
Appendix C
Cotter pin, Item 36
Caps
Dry ice

Personnel Required

To construction equipment
repairers NOS 62B

References

TM 5-3805-261-10
TM 5-3805-261-20

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
all fasteners are tightened to
standard torques. Refer to
Appendix E.

Go to Sheet 2

FRAME MAINTENANCE. (cont)

16-2. Frame Separation and Connection. (Sheet 2 of 12)

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.
Air pressure vented by loosening bleed valves.

TM 5-3805-261-20

Wheel lean lock bolt installed.
Hydraulic pressure relieved.
Positive cable on right side disconnected .
Hydraulic pump drive shaft removed.
Seat removed.
Engine coolant drained.
Supplemental steering to hydraulic tank
Hydraulic hose disconnected at hydraulic tank.
Oil cooler to hydraulic pump relief valve hydraulic line disconnected at relief valve.
Engine compartment side panels and doors removed.
Left and right screen doors open.
Battery to disconnect switch cable disconnected at battery and mounting hardware removed.
Disconnect switch cable disconnected at starting motor and mounting hardware removed.

Paragraph 4-17

Main harness disconnected from all items in engine compartment and mounting hardware removed.

Paragraph 4-18

Blackout light harness disconnected from all items in engine compartment and mounting hardware removed.

Paragraph 4-21

Supplemental steering harness disconnected from all items in engine compartment and mounting hardware removed.

Paragraph 4-22

Monitor harness disconnected from all items in engine compartment and mounting hardware removed.

Paragraph 6-9

Air brake lines disconnected from brake control valve.

FRAME MAINTENANCE.

16-2. Frame Separation and Connection

REMOVAL

1. Remove two nuts (1), washers (2), clip (3), plate (4) and clamp (5, Figure 16-1) from under left, front of engine compartment.
2. Remove two nuts (6), washers (7), clip (8), plate (9) and clamp (10, Figure 16-2) from under left, rear of cab.
3. Remove two nuts (11), washers (12), clip (13), plate (14) and clamp (15, Figure 16-3) from under right, front side of engine compartment.
4. Remove two nuts (16), washers (17), clip (18), plate (19) and clamp (20, Figure 16-4) from under right, rear of cab.

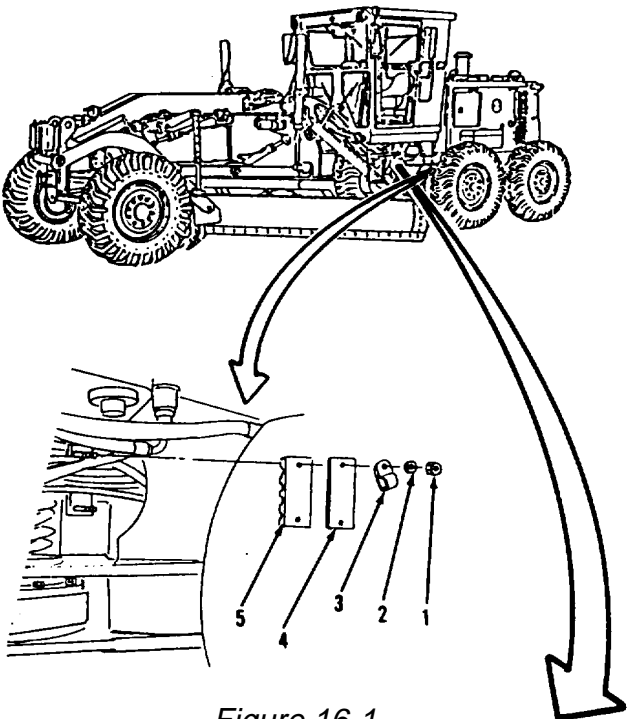


Figure 16-1.

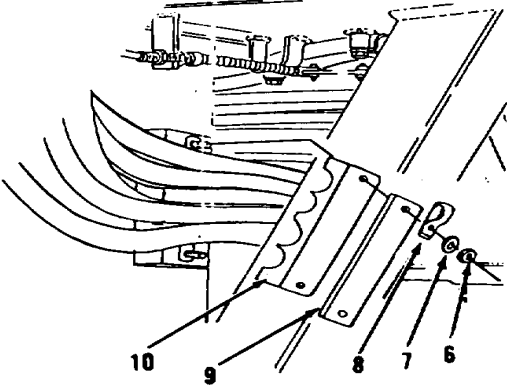


Figure 16-2.

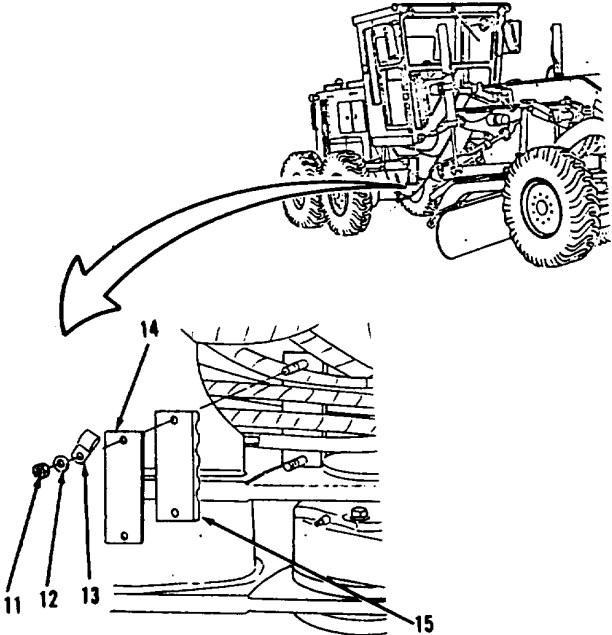


Figure 16-3.

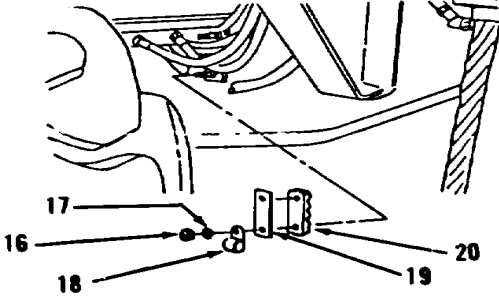


Figure 16-4.

Go to Sheet 4

FRAME MAINTENANCE. (cont)

16-2. Frame Separation and Connection. (Sheet 4 of 12)

Sheet 4 of 12)

REMOVAL (cont)

- 5. Remove two bolts (21) and washers 22, Figure 16-5) from left, front of transmission in engine compartment.
- 6. Loosen three nuts (23) and slide back on control cable assemblies (26, 27 and 28).
- 7. Slide back retainer (24) and three couplings (25) on cable assemblies (26, 27 and 28, Figure 16-6).

NOTE

All wire, cable and harness assemblies must be tagged before disconnecting to aid in installation.

- 8. Separate three cable assemblies (26, 27 and 28) from transmission control valves.
- 9. Pull cable assemblies (26, 27 and 28) forward from engine compartment and position cable assembly (26) alongside left side of cab and cable assemblies (27 and 28) alongside right side of cab.

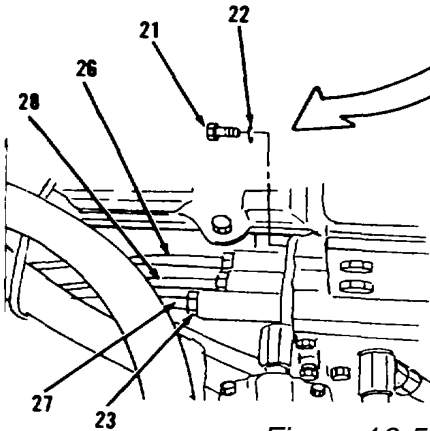
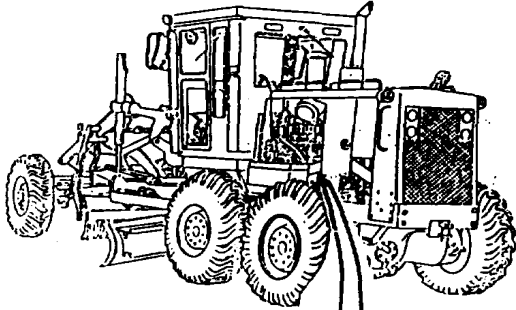


Figure 16-5.

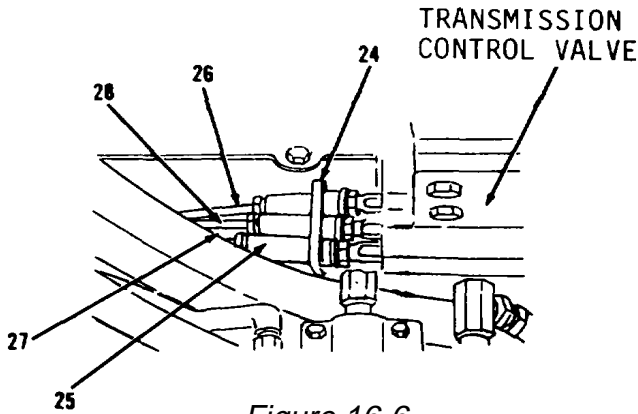


Figure 16-6.

Go to Sheet 5

FRAME MAINTENANCE.

16-2. Frame Separation and Connection. (Sheet 5 of 12)

REMOVAL

- 10. Remove bolt (29), washer (30) and clip (31, Figure 16-7).
- 11. Remove clamp (32) and position heater hose (33) to rear of vehicle.
- 12. Remove clamp (34) and position heater hose (35) to rear of vehicle.
- 13. Remove cotter pin (36) and pin (37, Figure 16-8) from articulation indicator linkage. Discard cotter pin (36).
- 14. Position forklift at rear frame of vehicle.
- 15. Position two jack stands under operator's platform on each side of vehicle.
- 16. Position all wire, cable and harness assemblies to front of vehicle.
- 17. Position all hose assemblies to rear of vehicle.
- 18. Position wood blocks under front wheels so that wheels cannot move.
- 19. Remove four bolts (38) and lockwashers (39) from four corners of plate (42, Figure 16-9).

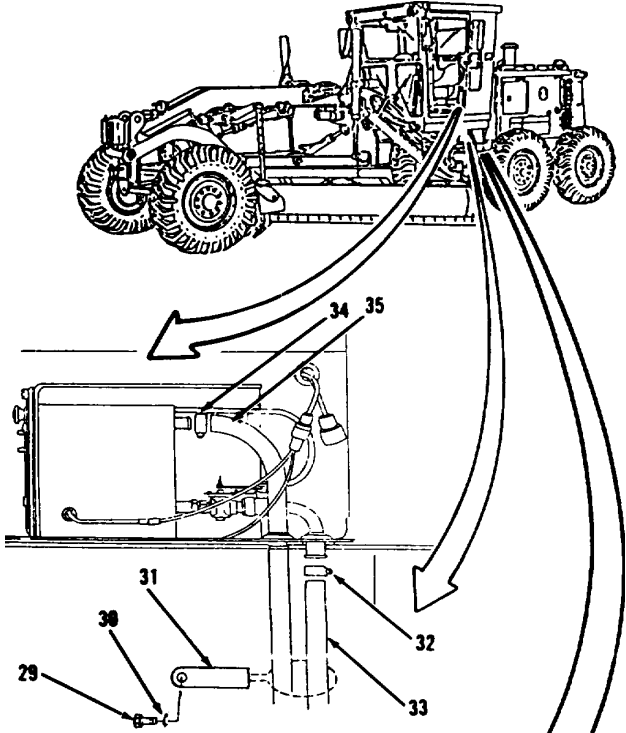


Figure 16-7.

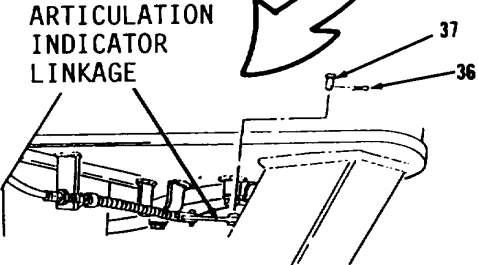


Figure 16-8.

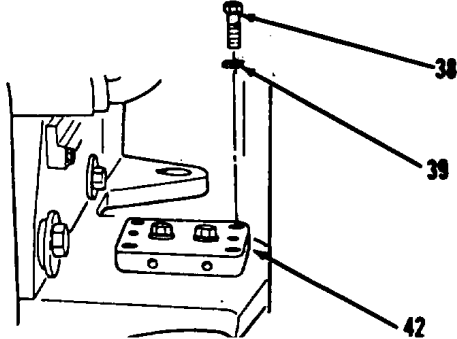


Figure 16-9.

Go to Sheet 6

FRAME MAINTENANCE. (cont)

16-2. Frame Separation and Connection. (Sheet 6 of 12)

REMOVAL (cont)

- 20. Install two 3/8-16NC forcing screws in plate (42) and remove items 40 thru 43 as an assembly (Figure 16-10).

NOTE

Lift or lower rear frame with forklift to remove any pressure from pin assembly.

- 21. Remove two 3/8-16NC forcing screws.
- 22. Remove two bolts (40), lockwashers (41) and plate (42) from pin (43, Figure 16-11).
- 23. Remove four bolts (44), lockwashers (45), six bolts (46), lockwashers (47), plate (48) and shim(s) (49, Figure 16-12). Tie shim(s) (49) together and tag for identification.
- 24. Using a hydraulic jack, remove bottom pin (50, Figure 16-13).

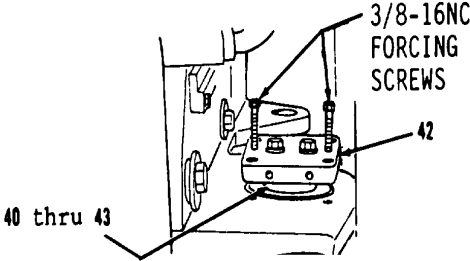


Figure 16-10.

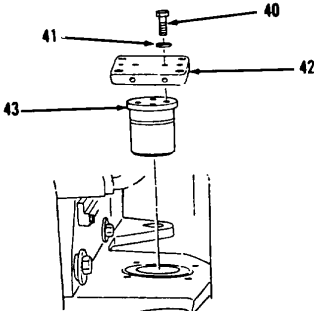


Figure 16-11.

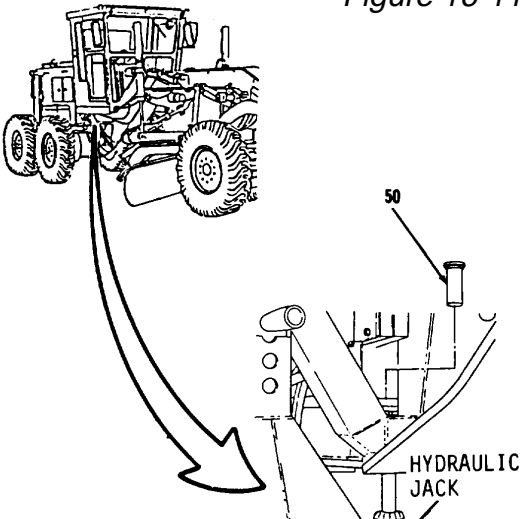


Figure 16-13.

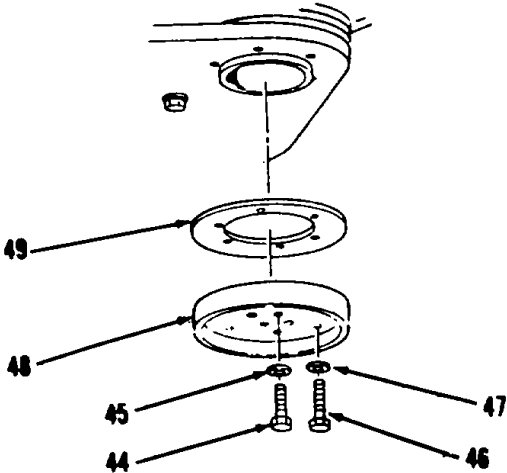


Figure 16-12.

Go to Sheet 7

FRAME MAINTENANCE.

16-2. Frame Separation and Connection. (Sheet 7 of 12)

REMOVAL

- 25. Remove spacer (51, Figure 16-14).

NOTE

- Separation of frames is not possible until spacer has been removed.
 - All hose and tube assemblies must be tagged before disconnecting to aid in installation. Cap all hose and tube ends and plug all open hydraulic ports to prevent contamination.
- 26. Disconnect hose (52, Figure 16-15) and apply shop air supply line to elbow on parking brake actuator.
 - 27. Release parking brake by applying air pressure to parking brake actuator.
 - 28. Separate rear frame (53) from front frame (54) by moving rear frame (53, Figure 16-16) rearward with forklift.
 - 29. Install jack stands under radiator end of rear frame and remove forklift.
 - 30. Remove shop air supply line.

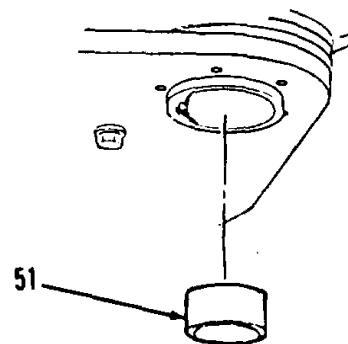


Figure 16-14.

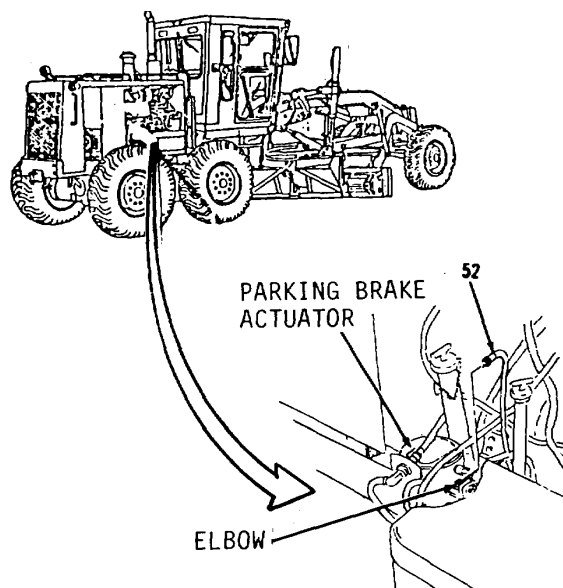


Figure 16-15.

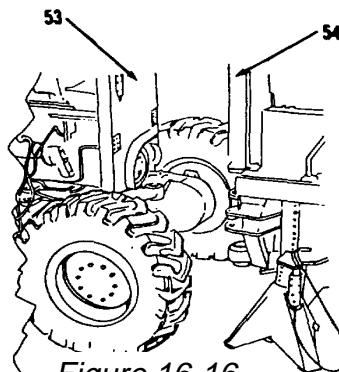


Figure 16-16.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

Go to Sheet 8

FRAME MAINTENANCE. (cont)

16-2. Frame Separation and Connection. (Sheet 8 of 12)

INSTALLATION

1. Position forklift under rear frame and remove jack stands.
2. Apply shop air supply line to elbow on parking brake actuator (Figure 16-15) and release parking brake.
3. Move rear frame (53) into position on front frame (54, Figure 16-16) using forklift.
4. Using forklift to lift or lower rear frame (53) and a hydraulic jack to move it from side to side, align bottom pin bore of rear frame (53) with pin bore of front frame (54).

NOTE

Install plate to hold spacer in place.

5. Install spacer (51), plate (48), six bolts (46) and lockwashers (47, Figure 16-17).

NOTE

Using dry ice, lower temperature of pin to -90 degrees F to aid in installation.

6. Install pin (43), plate (42), two lockwashers (41) and bolts (40, Figure 16-11).

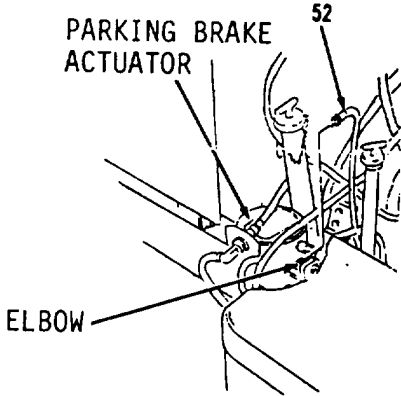


Figure 16-15.

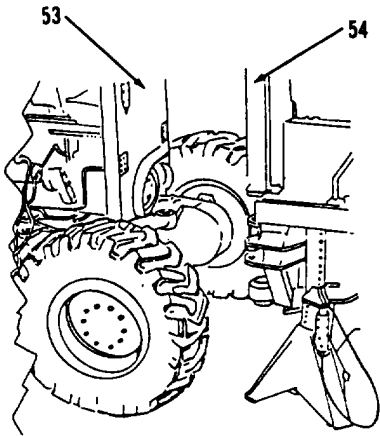


Figure 16-16.

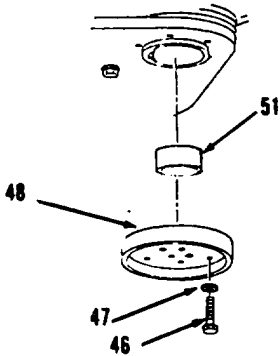


Figure 16-17.

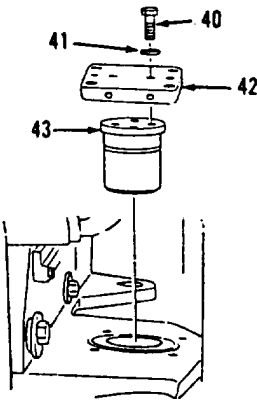


Figure 16-11.

Go to Sheet 9

FRAME MAINTENANCE.

16-2. Frame Separation and Connection. (Sheet 9 of 12)

INSTALLATION

7. Install four lockwashers (39) and bolts (38, Figure 16-9). Cross tighten four bolts (38) to 75 ft-lb torque. Tighten one of four bolts (38) to 75 ft-lb torque. Tighten one of four bolts (38) in the upper right corner of plate (42), then tighten the next of four bolts (38) in the lower left corner. Tighten two remaining of four bolts (38).
8. Position pin (50, Figure 16-18).

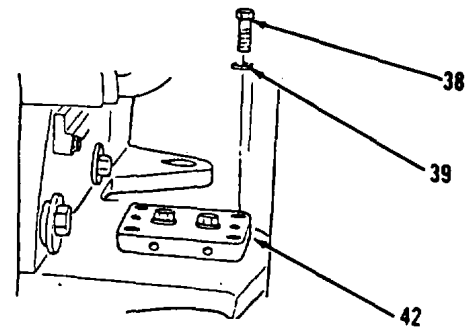


Figure 16-9.

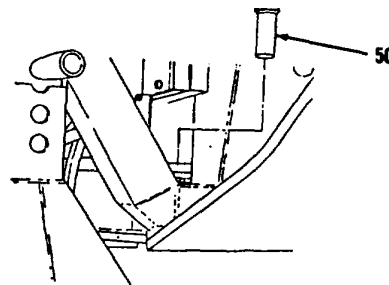


Figure 16-18.

NOTE

Use two 5/8-11NC x 6 bolts to keep holes in bottom of pin in alignment with holes in plate.

9. Install two 5/8-11NC x 6 bolts, through plate (48) and into pin (50, Figure 16-19).
10. Install pin (50) completely.
11. Remove two 5/8-11NC x 6 bolts.
12. Remove six bolts (46), lockwashers (47) and plate (48, Figure 16-20).
13. Install four lockwashers (45), bolts (44) and plate (48). Tighten four bolts (44) to 100 ft-lb torque.

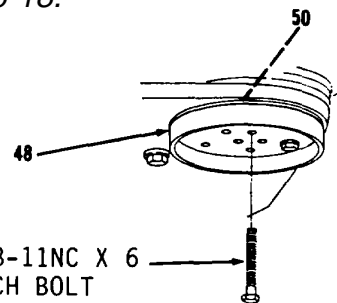


Figure 16-19.

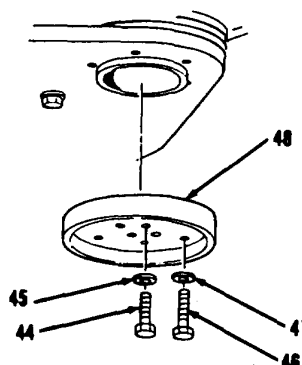


Figure 16-20.

Go to Sheet 10

FRAME MAINTENANCE. (cont)

16-2. Frame Separation and Connection. (Sheet 10 of 12)

INSTALLATION (cont)

- 14. Measure distance between plate (48) and rear frame (53, Figure 16-21) with a feeler gage. Measure distance at each of four bolt (44) locations.
- 15. Remove four bolts (44), lock-washers (45) and plate (48, Figure 16-22).
- 16. Install a thickness of shim(s) (49) same as minimum distance measured in step 14 minus 0.010 inch, plate (48), six lockwashers (47), bolts (46), four lock-washers (45) and bolts (44, Figure 16-12).
- 17. Disconnect air supply line from elbow on parking brake actuator and connect hose (52, Figure 16-15).
- 18. Remove jack stands and forklift from vehicle.
- 19. Install pin (37) and new cotter pin (36, Figure 16-8) on articulation indicator linkage.

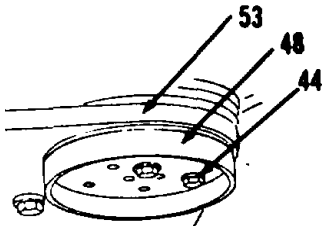


Figure 16-21.

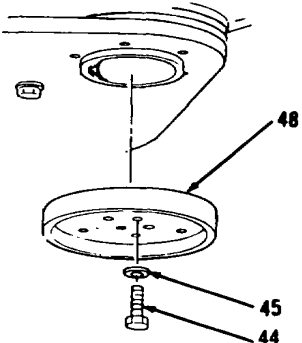


Figure 16-22.

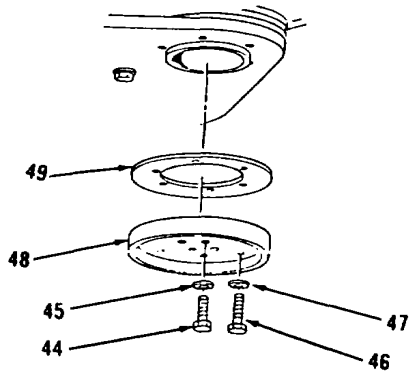


Figure 16-

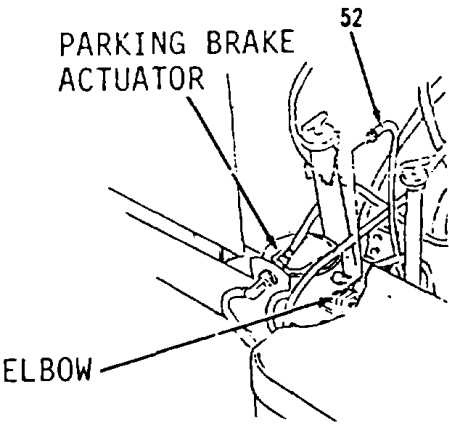


Figure 16-

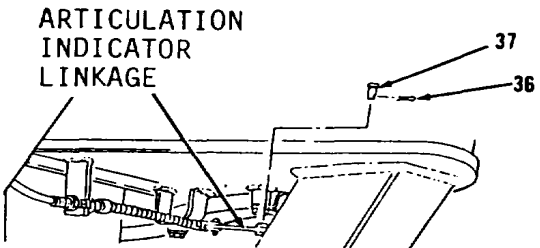


Figure 16-8.

Go to Sheet 11

FRAME MAINTENANCE.

16-2. Frame Separation and Connection. (Sheet 11 of 12)

INSTALLATION

- 20. Position heater hose (35) on heater and install clamp (34, Figure 16-7).
- 21. Position heater hose (33) and install clamp (32).
- 22. Install clip (31), washer (30) and bolt (29).
- 23. Position cable assemblies (28, 27 and 26, Figure 16-5) on vehicle.
- 24. Set cable assemblies (28, 27 and 26, Figure 16-6) into transmission control valves.
- 25. Move three couplings (25) forward on cable assemblies (28, 27 and 26) and position over transmission control valves.
- 26. Slide retainer (24) forward.
- 27. Install three nuts (23, Figure 16-5). Tighten three nuts (23).
- 28. Install two washers (22) and bolts (21).
- 29. Install clamp (20), plate (19), clip (18), two washers (17) and nuts (16, Figure 16-4) under right, rear of cab.

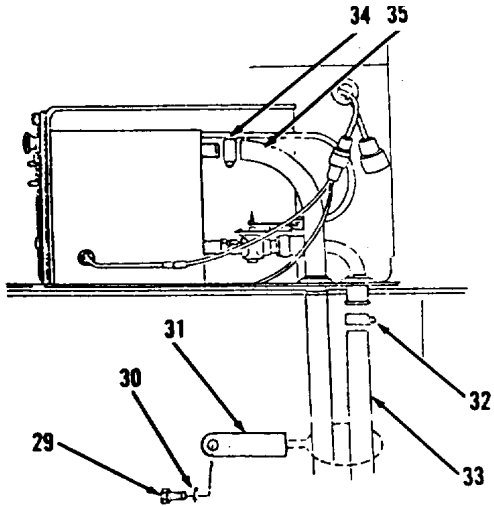


Figure 16-

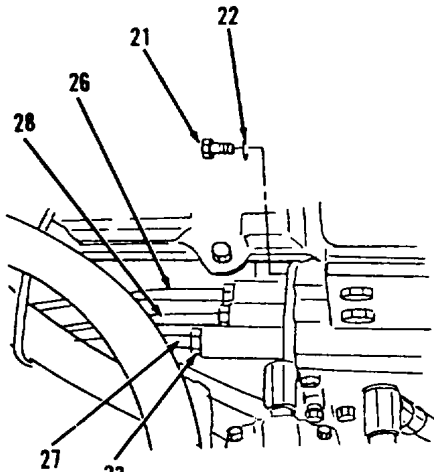


Figure 16-

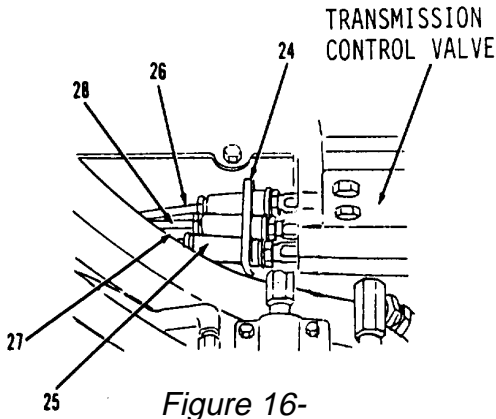


Figure 16-

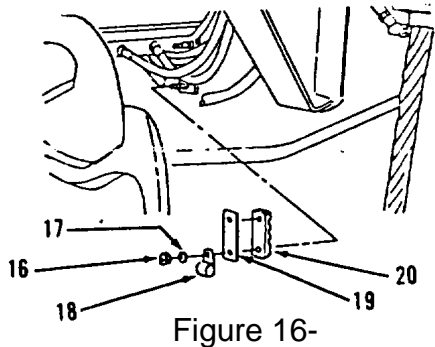


Figure 16-

Go to Sheet 12

FRAME MAINTENANCE. (cont)

16-2. Frame Separation and Connection. (Sheet 12 of 12)

INSTALLATION (cont)

- 30. Install clamp (15), plate (14), clip (13), two washers (12) and nuts (11, Figure 16-3) under right, front of engine compartment.
- 31. Install clamp (10), plate (9), clip (8), two washers (7) and nuts (6, Figure 16-2) under left, rear of cab.
- 32. Install clamp (5), plate (4), clip (3), two washers (2) and nuts (1, Figure 16-1) under left, front of engine compartment.

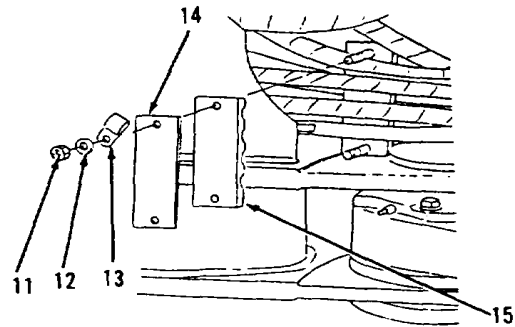


Figure 16-3.

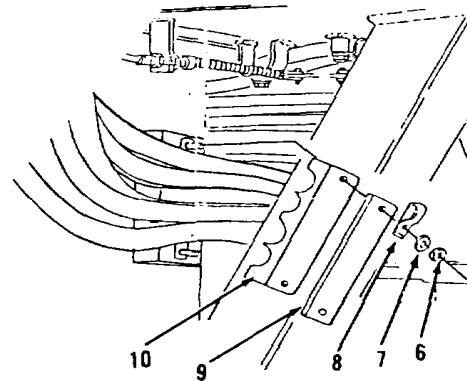


Figure 16-2.

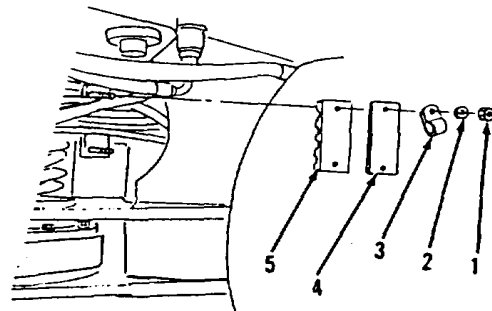


Figure 16-1.

NOTE

Return 130G Grader to original equipment condition.

End of Task

FRAME MAINTENANCE.**16-3. Articulation Hitch Bearing.** (Sheet 1 of 7)

This task covers: **a. Removal** **b. Cleaning** **c. Inspection**
 d. Installation

INITIAL SETUP:Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-177-7033)
 Pulling adapter 1P1837
 Stud 5P4184
 Pump group 5P3100
 Puller assembly 5H9817
 Washer 3H467
 Nut 7B7539
 Pulling adapter 1P1838
 Bolt S1602
 Adapter 8B7555
 Puller group 1S4233
 Ring installer 2P5498
 Chilling device to chill bearings
 Heavy gloves and tongs
 Floor jack

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Grease, Item 25, Appendix C
 Small tags, Item 43, Appendix C
 Bearings, Items 12, 14
 Seals, Items 6, 10, 13
 Dry ice

Personnel Required

Two construction equipment repairers MOS 62B

References

TM 5-3805-261-10
 LO 5-3805-261-12

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown, all fasteners are tightened to standard torques. Refer to Appendix E.

Go to Sheet 2

FRAME MAINTENANCE. (cont)

16-3. Articulation Hitch Bearing. (Sheet 2 of 7)

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Vehicle parked on level ground.
Parking/emergency brake applied.
Equipment lowered to the ground.
Engine stopped.
Master disconnect switch off.

Paragraph 16-2

Frame halves separated.

Go to Sheet 3

16-16

FRAME MAINTENANCE.

16-3. Articulation Hitch Bearing. (Sheet 3 of 7)

REMOVAL

1. Position floor jack under lower pin bore on front frame (Figure 16-23).
2. Remove fitting (1), spacer (2), seven bolts (3), washers (4) and items 5 and 6 as an assembly.
3. Remove and discard seal (6) from cap (5, Figure 16-24).
4. Remove shim(s) (7) and bearing (8, Figure 16-25). Tie shim(s) (7) together and tag for identification.
5. Carefully lower floor jack and remove items 9 and 10 as an assembly from bottom of lower pin bore.
6. Remove and discard seal (10) from cap (9, Figure 16-26).
7. Using pulling adapter, nut, washer, pump group, puller group, stud and ring installer, remove collar (11, Figure 16-27) from upper pin bore of front frame.

NOTE

Inspect bearings before removing. Remove bearings only if inspection indicates replacement is necessary.

8. Inspect bearing (12). Replace if cracked, broken, distorted, gouged or excessively worn.

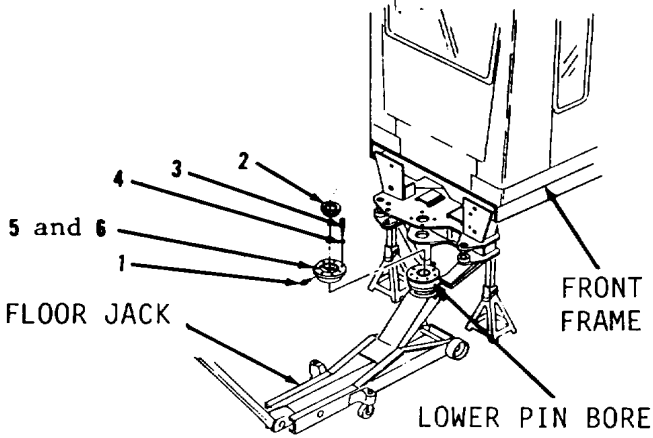


Figure 16-23.

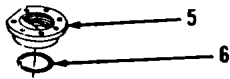


Figure 16-24.

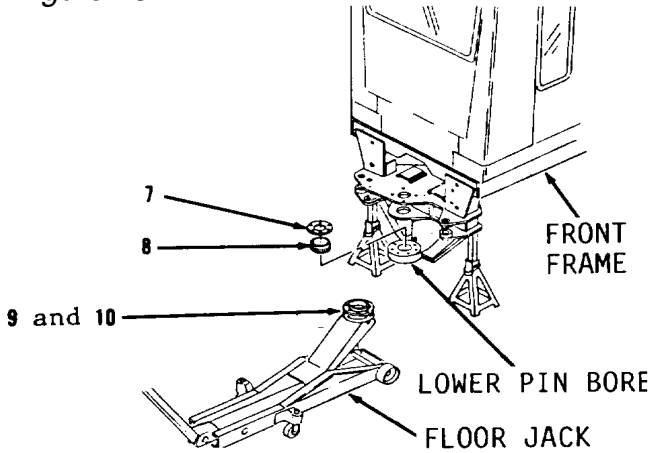


Figure 16-25.

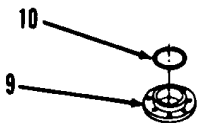


Figure 16-26.

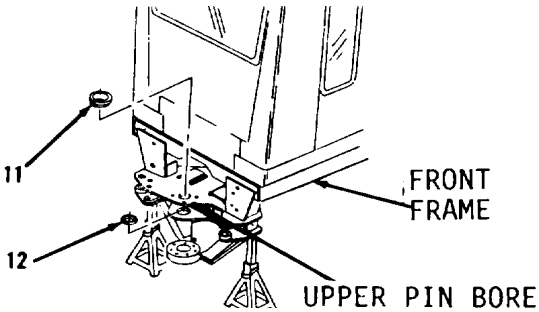
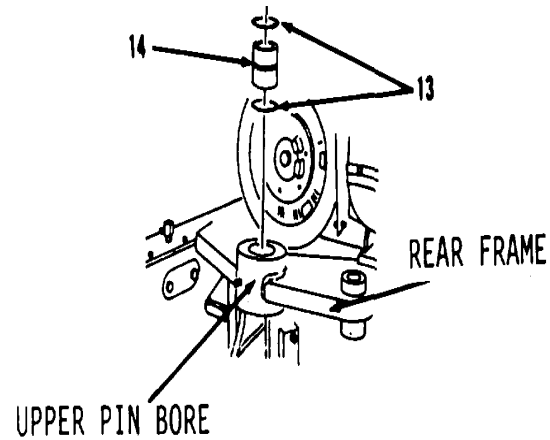


Figure 16-27.

Go to Sheet 4

FRAME MAINTENANCE. (cont)**16-3. Articulation Hitch Bearing.** (Sheet 4 of 7)**REMOVAL (cont)**

9. Using pulling adapter, nut, washer, pump group, stud, two bolts and two adapters, remove bearing (12), if necessary.
10. Remove and discard two seals (13, Figure 16-28) from upper pin bore of rear frame.
11. Inspect bearing (14). Replace if cracked, broken, distorted, gouged or excessively worn.
12. Using nut, washer, pump group, stud, ring installer and puller assembly, remove bearing (14), if necessary.

*Figure 16-28.***CLEANING**

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

INSTALLATION

1. Using pump group and puller assembly, washer and nut, install new bearing (14, Figure 16-28), if removed, to a depth of 0.5 inch from each surface of upper pin bore of rear frame.
2. Using clean grease, lubricate two new seals (13).
3. Using suitable drive plate and hammer, install two new seals (13) with lips toward the outside surface in upper pin bore of rear frame.

Go to Sheet 5

FRAME MAINTENANCE.

16-3. Articulation Hitch Bearing. (Sheet 5 of 7)

INSTALLATION

WARNING

Use gloves or tongs to handle extremely cold parts. Contact with skin may cause INJURY.

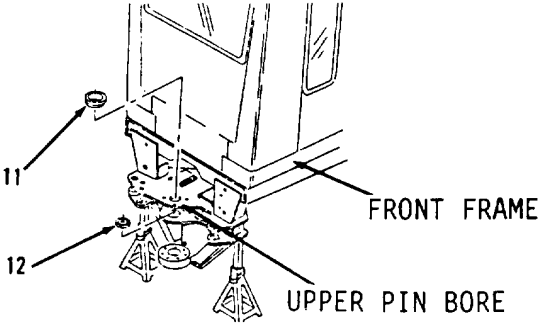


Figure 16-

- 4. If bearing (12) was removed, freeze new bearing (12) to temperature of -70 degrees F with dry ice.
- 5. Using pulling adapter, stud, pump group, washer, nut, two bolts and two adapters, install new bearing (12), if removed, in upper pin bore of front frame.
- 6. Using stud, pump group, puller assembly, washer, nut, two bolts and two adapters, install collar (11, Figure 16-27) in upper pin bore of front frame.
- 7. Using clean grease, lubricate new seal (10, Figure 16-29) and position with lip facing down on cap (9).
- 8. Using suitable drive plates and hammer, install new seal (10) on cap (9).
- 9. Install bearing (8) in items 10 and 9 as an assembly (Figure 16-25) and position on a suitable floor jack positioned under lower pin bore of front frame.

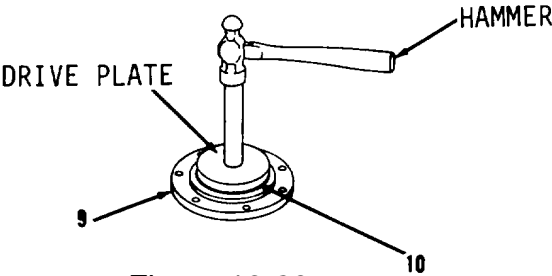


Figure 16-29.

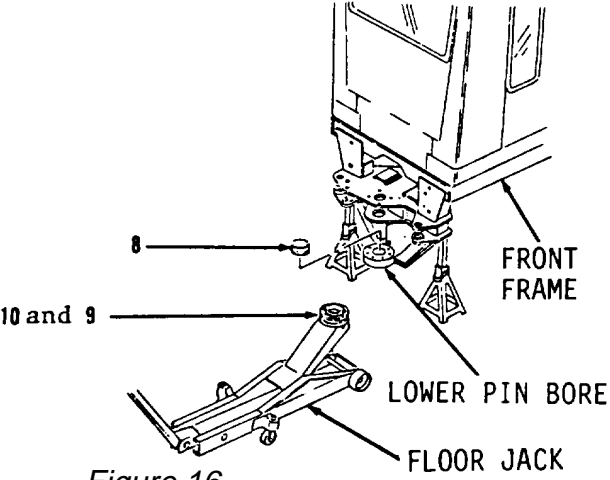


Figure 16-

Go to Sheet 6

FRAME MAINTENANCE. (cont)

16-3. Articulation Hitch Bearing. (Sheet 6 of 7)

INSTALLATION (cont)

- 10. Install items 10 thru 8 as an assembly (Figure 16-30) in lower pin bore by raising floor jack.
- 11. Using clean grease, lubricate new seal (6, Figure 16-34) and position with lip facing down on cap (5).
- 12. Using suitable drive plates and hammer, install new seal (6) on cap (5).
- 13. Position items 6 and 5 as an assembly over bearing (8, Figure 16-31) on top of lower pin bore of front frame.
- 14. Install three of seven lockwashers (4) and three of seven bolts (3), with one but no more than two holes between three bolts (3). Tighten three of seven bolts (3) to 65 ft-lb torque.
- 15. Insert feeler gage between cap (5) and front frame near each of three of seven bolts (3) and measure gap between cap (5, Figure 16-32) and front frame.
- 16. Remove three of seven bolts (3), lockwashers (4) and items 6 and 5 as an assembly (Figure 16-31).

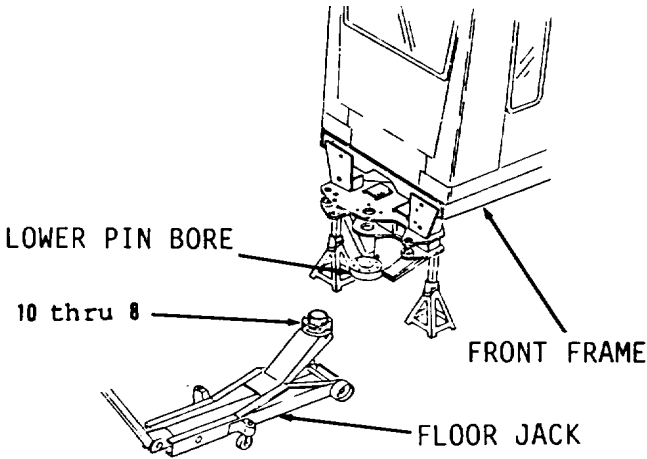


Figure 16-30.

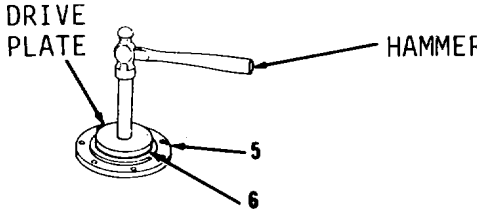


Figure 16-34.

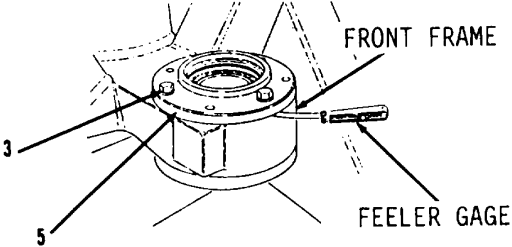


Figure 16-32.

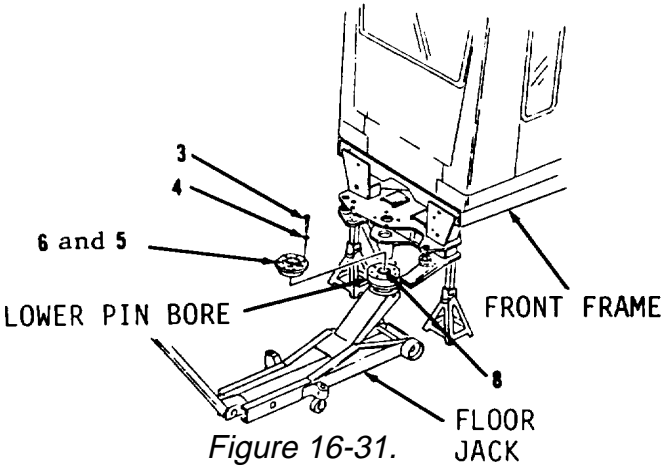
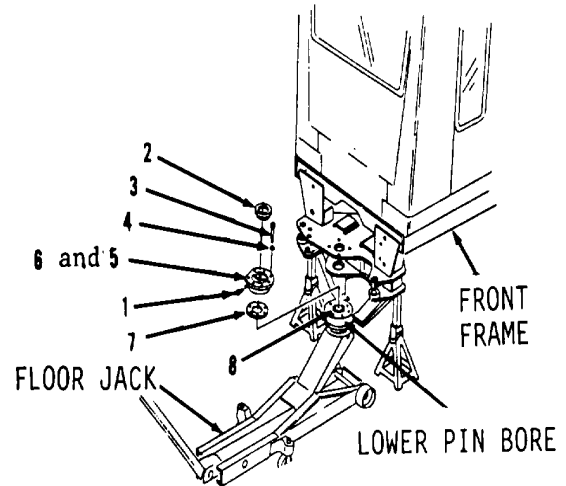


Figure 16-31.

Go to Sheet 7

FRAME MAINTENANCE.**16-3. Articulation Hitch Bearing.** (Sheet 7 of 7)**INSTALLATION**

17. Install shim(s) (7, Figure 16-33). Number of shim(s) (7) is determined by minimum measurement taken in step 15.
18. Position items 6 and 5 as an assembly over bearing (8) on top of lower pin bore of front frame.
19. Install seven bolts (3) and lockwashers (4). Tighten seven bolts (3) to 75 ft-lb torque.
20. Install spacer (2) on bearing (8).
21. Install fitting (1).
22. Remove floor jack.
23. Using clean grease, lubricate fitting (1). Refer to LO 5-3805-261-12.

*Figure 16-33.***NOTE**

Return 130G Grader to original equipment condition.

End of Task

16-21/(16-22

CHAPTER 17

HYDRAULIC SYSTEM MAINTENANCE

CHAPTER OVERVIEW

The purpose of this chapter is to help the technician efficiently troubleshoot and repair malfunctioning equipment and to perform authorized general support level maintenance procedures on the 130G Grader hydraulic system.

| <u>Section</u> | <u>Title</u> | INDEX | <u>Paragraph</u> | <u>Page</u> |
|----------------|---|-------|------------------|-------------|
| | HYDRAULIC SYSTEM MAINTENANCE | | | |
| | Hydraulic System Maintenance Procedures | | 17-1 | 17-2 |
| | Centershift Cylinder | | 17-2 | 17-3 |
| | Blade Tip Cylinder | | 17-3 | 17-7 |
| | Blade Lift Cylinder | | 17-4 | 17-13 |
| | Side Shift Cylinder | | 17-5 | 17-17 |
| | Scarifier Cylinder | | 17-6 | 17-21 |

Section I. HYDRAULIC SYSTEM MAINTENANCE.

17-1. HYDRAULIC SYSTEM MAINTENANCE PROCEDURES.

a. The purpose of this section is to provide you with all needed instructions and additional information to help you at the general support level to keep the engine and its components in good repair.

b. This section is arranged by functional group code and provides a list of engine components to be maintained and step-by-step maintenance procedures.

| <u>Title</u> | INDEX | <u>Paragraph</u> | <u>Page</u> |
|----------------------|-------|------------------|-------------|
| Centershift Cylinder | | 17-2 | 17-3 |
| Blade Tip Cylinder | | 17-3 | 17-7 |
| Blade Lift Cylinder | | 17-4 | 17-13 |
| Side Shift Cylinder | | 17-5 | 17-17 |
| Scarifier Cylinder | | 17-6 | 17-21 |

HYDRAULIC SYSTEM MAINTENANCE.

17-2. Centershift Cylinder. (Sheet 1 of 4)

This task covers: **a. Disassembly** **b. Cleaning** **c. Inspection**
 d. Assembly

INITIAL SETUP:

Applicable Configurations
 All

Personnel Required
 Construction equipment
 repairer MOS 62B

Tools
 General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)
 Chain wrench 3P1535
 Seal installer 5P2980
 Seal expander 4S9181

References
 TM 5-3805-261-10

Special Environmental Conditions
 None

Test Equipment
 None

General Safety Instructions
 None

Materials/Parts
 Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Thread sealant, Item 61,
 Appendix C
 Lubricating oil, Item 33,
 Appendix C
 Hydraulic fluid, Item 30,
 Appendix C
 Seals, Items 10, 11, 12
 Preformed packing, Item 9
 Seal assembly, Item 6

Torques
 Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References
 None

Equipment Condition
 TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

Paragraph 10-15

Centershift cylinder removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE. (cont)

17-2. Centershift Cylinder. (Sheet 2 of 4)

DISASSEMBLY

NOTE

For convenience, hydraulic cylinder should be mounted on a suitable repair stand. Oil openings should be facing down to prevent contamination.

1. Using chain wrench, loosen crown (13, Figure 17-1).
2. Remove cylinder (1).
3. Remove bolt (2) and washer (3, Figure 17-2).
4. Remove items 4 thru 6 as an assembly.
5. Remove ring (5) and seal assembly (6) from piston (4, Figure 17-3). Discard seal assembly (6).
6. Remove items 7 thru 12 as an assembly (Figure 17-4).
7. Remove ring (8), preformed packing (9) and seals (10 thru 12) from head (7, Figure 17-5). Discard preformed packing (9) and seals (10 thru 12).

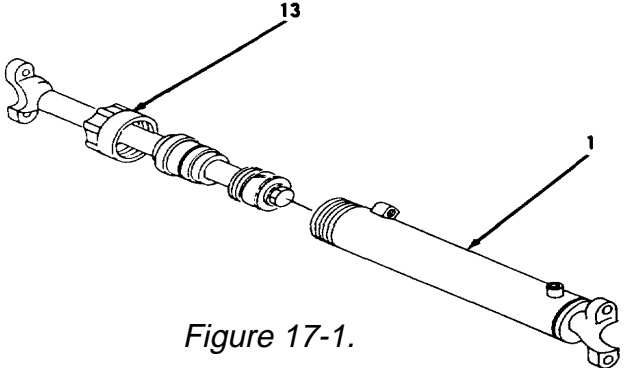


Figure 17-1.

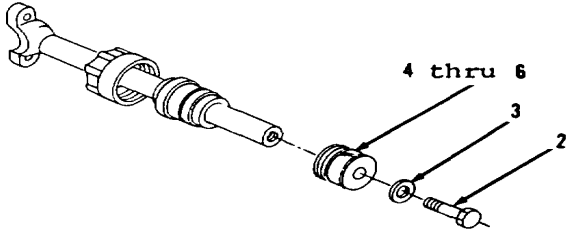


Figure 17-2.

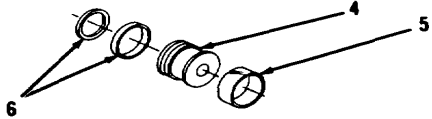


Figure 17-3.

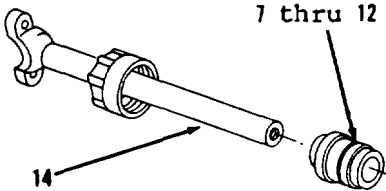


Figure 17-4.

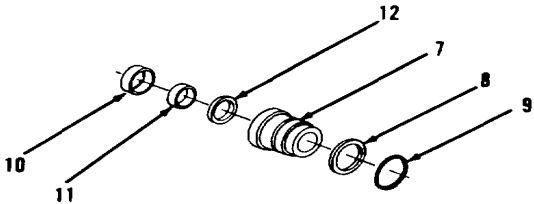


Figure 17-5.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE.**17-2. Centershift Cylinder.** (Sheet 3 of 4)**DISASSEMBLY**

8. Remove crown (13) from rod assembly (14, Figure 17-6).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Position crown (13) on rod assembly (14, Figure 17-6).
2. Using clean oil, lubricate new seals (12 thru 10), new preformed packing (9) and ring (8, Figure 17-5).
3. Using seal installer, install new seals (12 thru 10) in head (7). Lip of seal (11) is toward inside of head (7). Lip of seal (10) is toward outside of head (7).
4. Install items 12 thru 7 as an assembly on rod assembly (14, Figure 17-4).
5. Using seal expander, install new seal assembly (6) and ring (5) on piston (4, Figure 17-3).

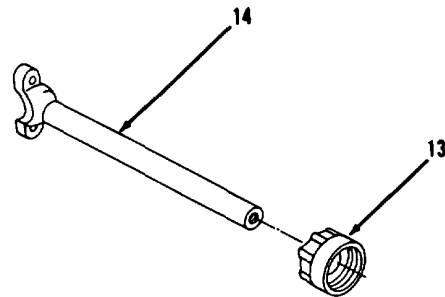


Figure 17-6.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE. (cont)

17-2. Centershift Cylinder. (Sheet 4 of 4)

ASSEMBLY (cont)

- 6. Install items 6 thru 4 as an assembly on rod assembly (14, Figure 17-2).
- 7. Install washer (3) and bolt (2). Apply thread lubricant to threads of bolt (2) and tighten to 800 ft-lb torque.
- 8. Using hydraulic fluid, lubricate outside of head (7), inside of crown (13) and inside of cylinder (1, Figure 17-1).
- 9. Install cylinder (1).

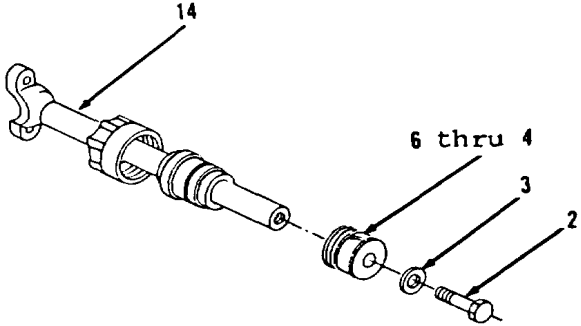


Figure 17-2.

NOTE

When tightening crown, be sure rod assembly is fully extended. This will keep cylinder, piston and head in alignment.

- 10. Using chain wrench, install crown (13) on cylinder (1). Tighten crown (13) to 450 ft-lb torque.

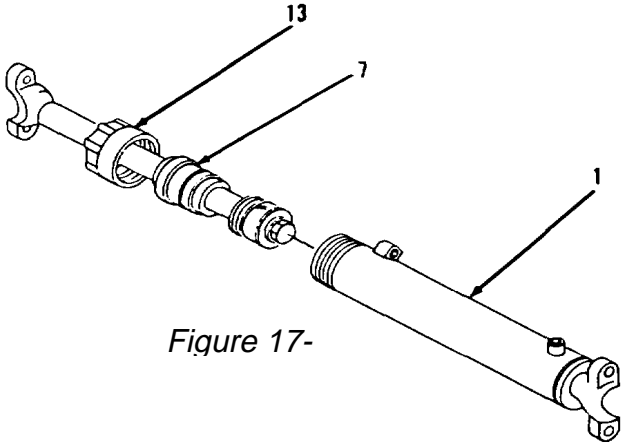


Figure 17-

NOTE

Return 130G Grader to original equipment condition.

End of Task

HYDRAULIC SYSTEM MAINTENANCE.

17-3. Blade Tip Cylinder. (Sheet 1 of 6)

This task covers: **a. Disassembly** **b. Cleaning** **c. Inspection**
 d. Assembly

INITIAL SETUP:

Applicable Configurations
 All

Personnel Required
 Construction equipment
 repairer MOS 62B

Tools
 General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)
 Chain wrench 3P1535
 Seal installer 5P2980
 Seal expander 4S9181

References
 TM 5-3805-261-10

Special Environmental Conditions
 None

Test Equipment
 None

General Safety Instructions
 None

Materials/Parts
 Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Thread lubricant, Item 65,
 Appendix C
 Lubricating oil, Item 33,
 Appendix C
 Seals, Items 12, 13, 14
 Preformed packing, Item 11
 Seal assembly, Item 7
 Bearings, Items 3, 18

Torques
 Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References
 None

Equipment Condition
 TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

Paragraph 10-16

Blade tip cylinder removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE. (cont)

17-3. Blade Tip Cylinder. (Sheet 2 of 6)

DISASSEMBLY

NOTE

For convenience, hydraulic cylinder should be mounted on a suitable repair stand. Oil holes should be facing down to prevent contamination.

1. Using chain wrench, loosen crown (15, Figure 17-7).
2. Remove items 1 thru 3 as an assembly.
3. Using suitable bearing driver, remove two rings (2) and bearing (3) from cylinder (1, Figure 17-8). Discard bearing (3).
4. Remove bolt (4) and washer (5, Figure 17-9).
5. Remove items 6 thru 8 as an assembly.
6. Remove ring (6) and seal assembly (7) from piston (8, Figure 17-10). Discard seal assembly (7).
7. Remove items 9 thru 14 as an assembly (Figure 17-11).

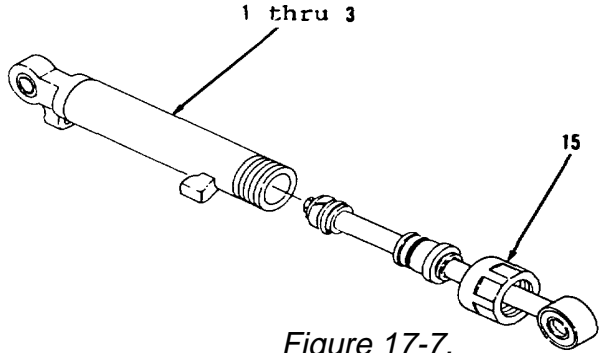


Figure 17-7.

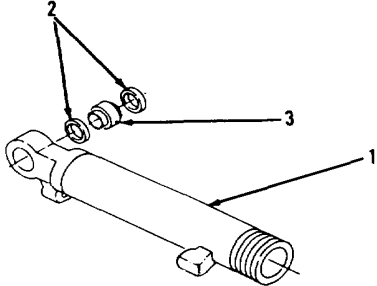


Figure 17-8.

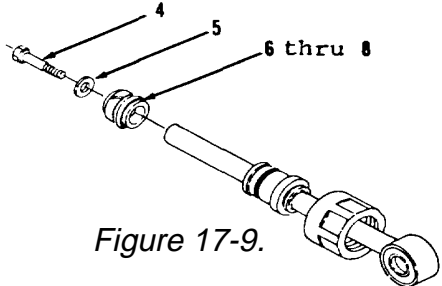


Figure 17-9.

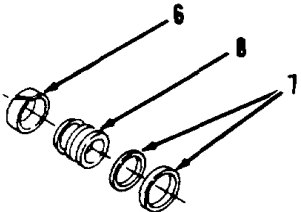


Figure 17-10.

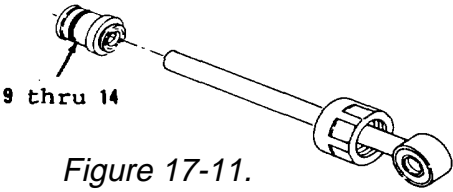


Figure 17-11.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE.

17-3. Blade Tip Cylinder. (Sheet 3 of 6)

DISASSEMBLY

8. Remove ring (10), preformed packing (11) and seals (12 thru 14) from head (9, Figure 17-12). Discard preformed packing (11) and seals (12 thru 14).
9. Remove crown (15) from items 16 thru 18 as an assembly (Figure 17-13).
10. Using suitable bearing driver, remove two rings (17) and bearing (18) from eye of rod assembly (16, Figure 17-14). Place rod assembly (16) in soft jawed vise and discard bearing (18).

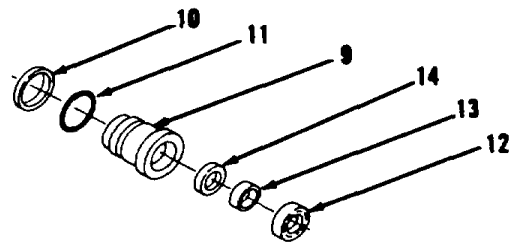


Figure 17-12.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Position rod assembly (16, Figure 17-14) in soft jawed vise.
2. Using suitable driver, install ring (17). Ring (17) is to be installed to a depth of 0.29 inch from the outer surface of rod assembly (16).
3. Using bearing driver, install new bearing (18) in rod assembly (16).

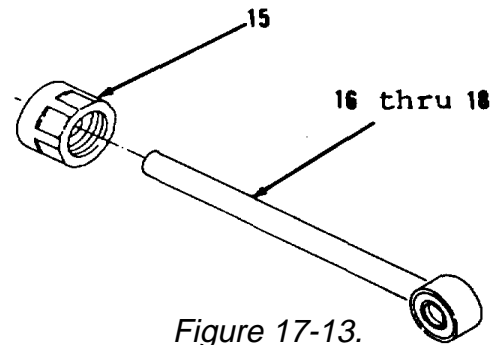


Figure 17-13.

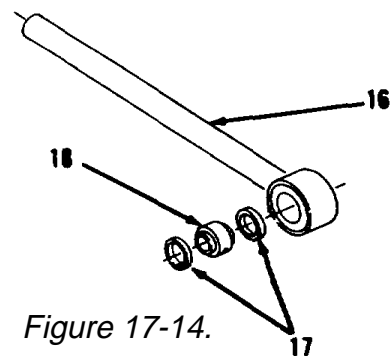


Figure 17-14.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE. (cont)

17-3. Blade Tip Cylinder. (Sheet 4 of 6)

ASSEMBLY (cont)

4. Using bearing driver, install ring (17) immediately next to new bearing (18, Figure 17-15). There should be a depth of 0.29 inch from outer surface of rod assembly (16) to ring (17).

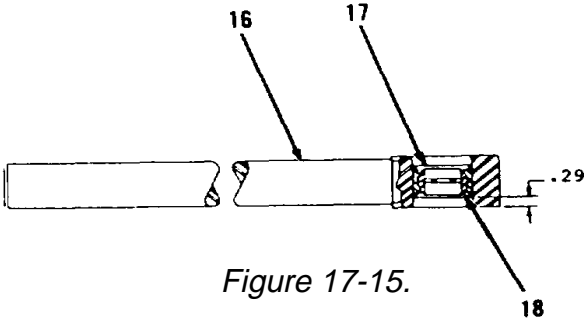


Figure 17-15.

5. Remove items 18 thru 16 as an assembly (Figure 17-13) from vise.

6. Position crown (15) on items 18 thru 16 as an assembly (Figure 17-13).

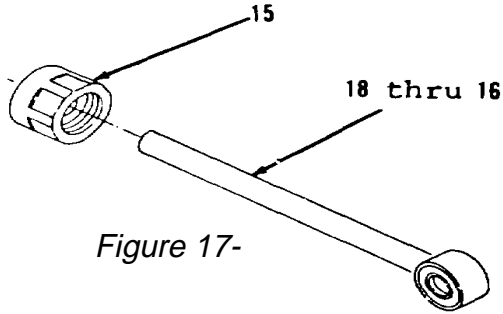


Figure 17-

7. Using clean oil, lubricate new seals (14 thru 12), new preformed packing (11) and ring (10, Figure 17-12).

8. Using seal installer, install new seals (14, 13 and 12), new preformed packing (11) and ring (10) in head (9). Lip of seal (13) is toward inside of head (9). Lip of seal (12) is toward outside of head (9).

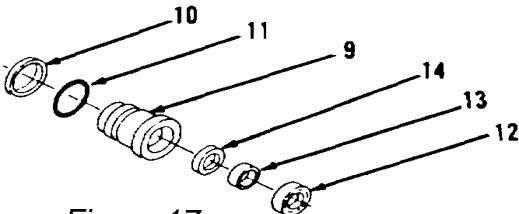


Figure 17-

9. Install items 14 thru 9 as an assembly on items 18 thru 15 as an assembly (Figure 17-11).

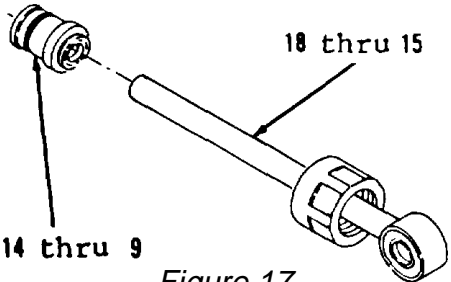


Figure 17-

10. Using seal expander, install new seal assembly (7) and ring (6) on piston (8, Figure 17-10).

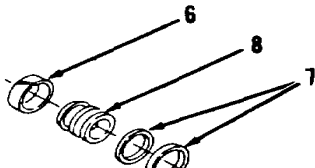


Figure 17-10.

Go to Sheet 5

HYDRAULIC SYSTEM MAINTENANCE.

17-3. Blade Tip Cylinder. (Sheet 5 of 6)

ASSEMBLY

11. Install piston (4) on items 8 thru 6 as an assembly on items 18 thru 9 as an assembly (Figure 17-9).
12. Install washer (5) and bolt (4).
13. Using thread lubricant, lubricate threads of bolt (4) and tighten to 800 ft-lb torque.
14. Position cylinder (1, Figure 17-8) in vise or repair stand with oil holes facing downward.
15. Using bearing driver, install one of two rings (2, Figure 17-16) to a depth of 0.15 inch from outer surface of cylinder (1).
16. Using bearing driver, install new bearing (3) in center of cylinder (1) cap.
17. Using bearing driver, install one of two rings (2) immediately next to bearing (3). There should be a depth of 0.15 inch from outer surface of cylinder (1) to one of two rings (2).

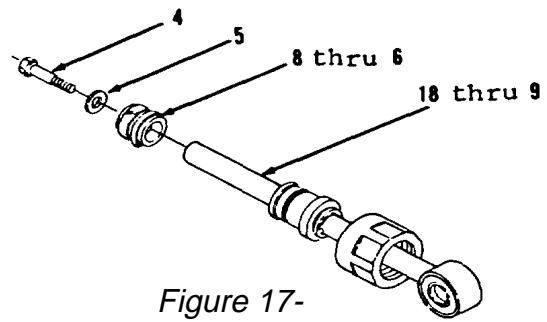


Figure 17-

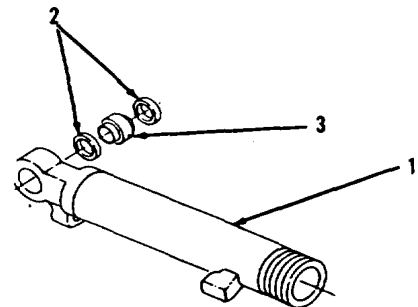


Figure 17-

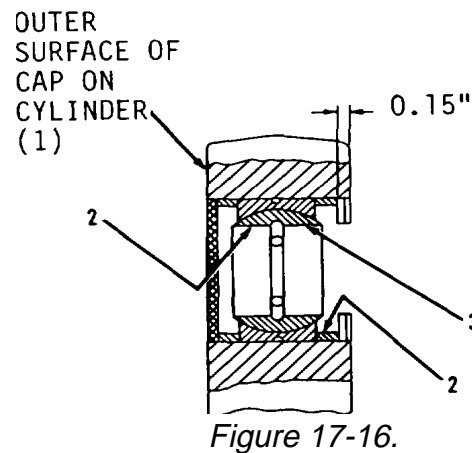


Figure 17-16.

Go to Sheet 6

HYDRAULIC SYSTEM MAINTENANCE. (cont)**17-3. Blade Tip Cylinder. (Sheet 6 of 6)****ASSEMBLY (cont)**

18. Using clean grease, lubricate outside of head (9), inside of crown (15) and inside of cylinder (1, Figure 17-7).
19. Install cylinder (1).
20. Install items 3 thru 1 as an assembly.

NOTE

Tighten crown with rod assembly fully extended.
This will keep cylinder, piston and head in alignment.

21. Using chain wrench, install crown (15) on cylinder (1). Tighten crown (15) to 450 ft-lb torque.

NOTE

Return 130C Grader to original equipment condition.

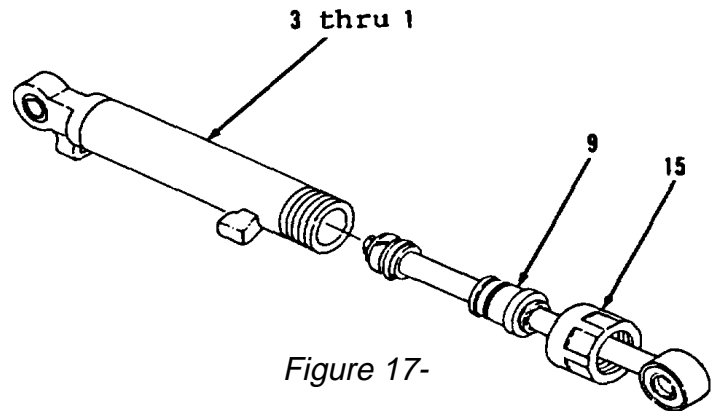


Figure 17-

End of Task**17-12**

HYDRAULIC SYSTEM MAINTENANCE.

17-4. Blade Lift Cylinder. (Sheet 1 of 4)

This task covers: **a. Disassembly** **b. Cleaning** **c. Inspection**
 d. Assembly

INITIAL SETUP:

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-177-7033)
 Chain wrench 3P1535
 Seal installer 5P2980
 Seal expander 4S9181

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Hydraulic fluid, Item 30,
 Appendix C
 Grease, Item 20, Appendix C
 Thread lubricant, Item 65,
 Appendix C
 Preformed packing, Item 8
 Ring, Item 9
 Seals, Items 10, 11, 12
 Seal assembly, Item 6

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Paragraph 10-17

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.
 Blade lift cylinder removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE. (cont)

17-4. Blade Lift Cylinder. (Sheet 2 of 4)

DISASSEMBLY

NOTE

For convenience, hydraulic cylinder should be mounted on a suitable repair stand.

1. Using suitable puller, remove two bearings (1) from trunnion of cylinder (2, Figure 17-17).
2. Using chain wrench, loosen crown (14).
3. Remove items 3 thru 15 as an assembly from cylinder (2).
4. Remove bolt (3) and washer (4, Figure 17-18).
5. Remove items 5 thru 7 as an assembly.
6. Remove seal assembly (6) and ring (7) from piston (5, Figure 17-19). Discard seal assembly (6).

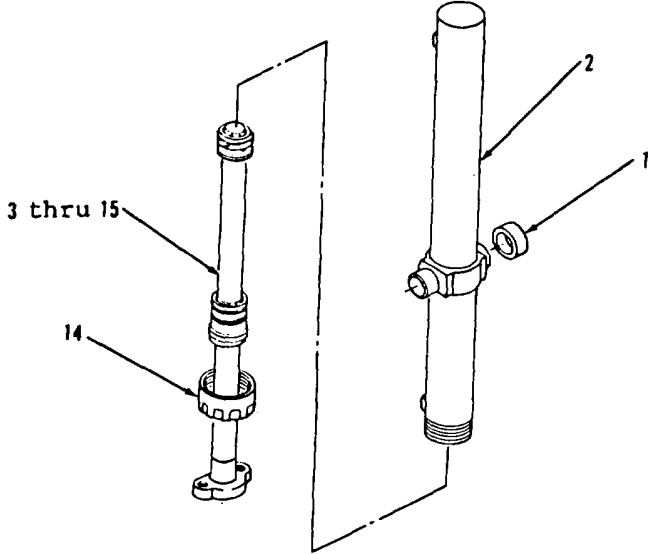


Figure 17-17.

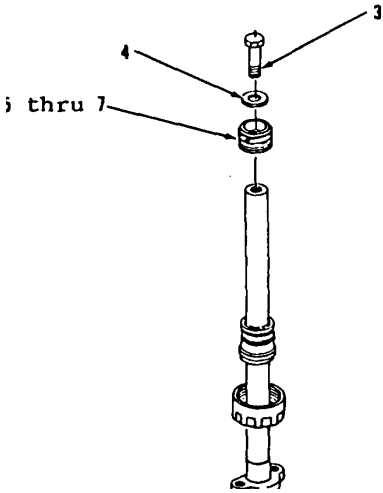


Figure 17-18.

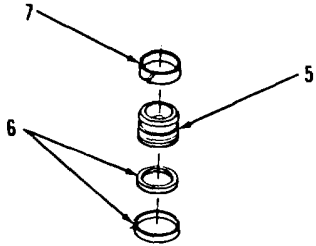


Figure 17-19.

Go to Sheet 3
17-14

HYDRAULIC SYSTEM MAINTENANCE.

17-4. Blade Lift Cylinder. (Sheet 3 of 4)

DISASSEMBLY

- 7. Remove items 8 thru 13 as an assembly (Figure 17-20).
- 8. Remove and discard preformed packing (8), ring (9) and seals (10 thru 12) from head (13, Figure 17-21).
- 9. Separate crown (14) and rod (15, Figure 17-22).

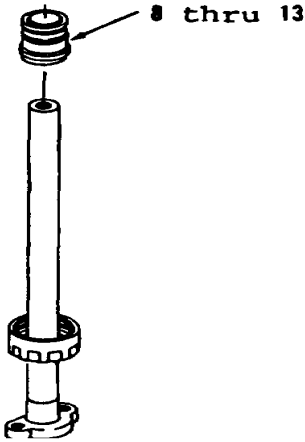


Figure 17-20.

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

- 1. Install crown (14) on rod (15, Figure 17-22).
- 2. Using clean hydraulic fluid, lubricate new seals (12 thru 10, Figure 17-21).
- 3. Using seal installer, install seals (12 thru 10) in head (13). Lip on center seal (11) faces inside head (13). Lip on outside seal (12) faces outside head (13).
- 4. Install new preformed packing (8) and new ring (9) on head (13).

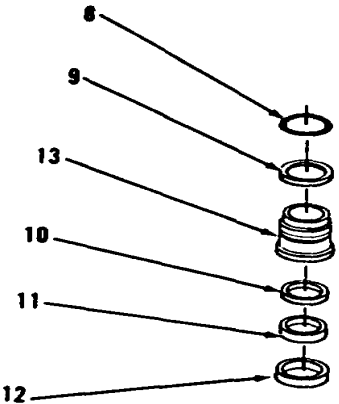


Figure 17-21.

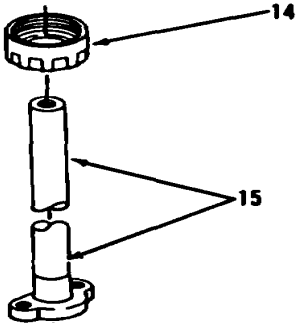


Figure 17-22.

Go to Sheet 4

HYDRAULIC SYSTEM MAINTENANCE. (cont)

17-4. **Blade Lift Cylinder.** (Sheet 4 of 4)

ASSEMBLY (cont)

- 5. Install items 13 thru 8 as an assembly on rod (15, Figure 17-20).
- 6. Using seal expander, install ring (7) and new seal assembly (6) on piston (5, Figure 7-19).
- 7. Install items 7 thru 5 as an assembly on rod (15, Figure 17-18).
- 8. Using thread lubricant, lubricate threads of bolt (3).
- 9. Install washer (4) and bolt (3). Tighten bolt (3) to 800 ft-lb torque.
- 10. Using clean grease, lubricate outside of head (13) and inside of crown (14, Figure 17-17).
- 11. Install items 15 thru 3 as an assembly on cylinder (2).

NOTE

Crown should be tightened with rod fully extended. This is to keep cylinder, piston and head in alignment.

- 12. Install crown (14) and tighten to 450 ft-lb torque.
- 13. Install two bearings (1).

NOTE

Return 130G Grader to original equipment condition.

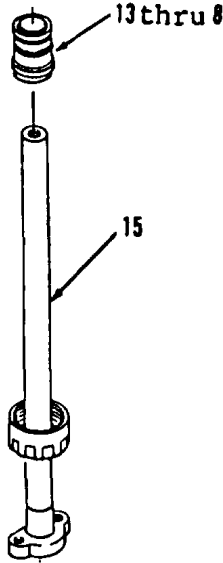


Figure 17-

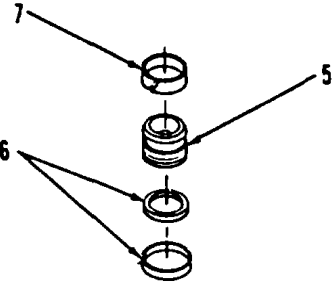


Figure 17-

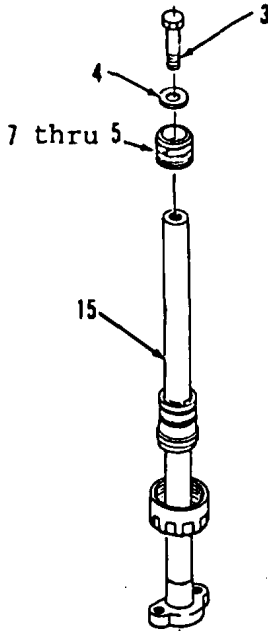


Figure 17-

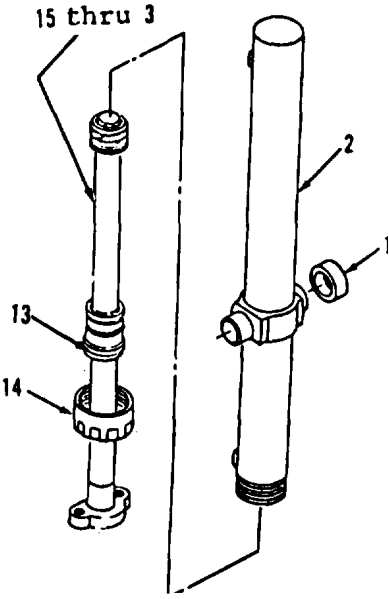


Figure 17-

End of Task

HYDRAULIC SYSTEM MAINTENANCE.

17-5. Side Shift Cylinder. (Sheet 1 of 4)

This task covers: **a. Disassembly** **b. Cleaning** **c. Inspection**
 d. Assembly

INITIAL SETUP:

Applicable Configurations
 All

Personnel Required
 Construction equipment
 repairer MOS 62B

Tools
 General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-
 177-7033)
 Chain wrench 3P1535
 Seal installer 5P2980
 Seal expander 4S9181

References
 TM 5-3805-261-10

Special Environmental Conditions
 None

Test Equipment
 None

General Safety Instructions
 None

Materials/Parts
 Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Lubricating oil, Item 33,
 Appendix C
 Hydraulic fluid, Item 30,
 Appendix C
 Thread lubricant, Item 65,
 Appendix C
 Seals, Items 10, 11, 12
 Seal assembly, Item 6
 Preformed packing, Item 9

Torques
 Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References
 None

Equipment Condition
 TM 5-3805-261-10

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.

Paragraph 10-19

Side shift cylinder removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE. (cont)

17-5. Side Shift Cylinder. (Sheet 2 of 4)

DISASSEMBLY

NOTE

For convenience, hydraulic cylinder should be mounted on a suitable repair stand.

1. Using suitable chain wrench, loosen crown (13, Figure 17-23).
2. Remove items 2 thru 14 as an assembly from cylinder (1).
3. Remove bolt (2) and washer (3, Figure 17-24).
4. Remove items 4 thru 6 as an assembly.
5. Remove ring (5) and seal assembly (6) from piston (4, Figure 17-25). Discard seal assembly (6).
6. Remove items 7 thru 12 as an assembly (Figure 17-26).
7. Remove ring (8), preformed packing (9) and seals (10 thru 12) from head (7, Figure 17-27). Discard preformed packing (9) and seals (10 thru 12).

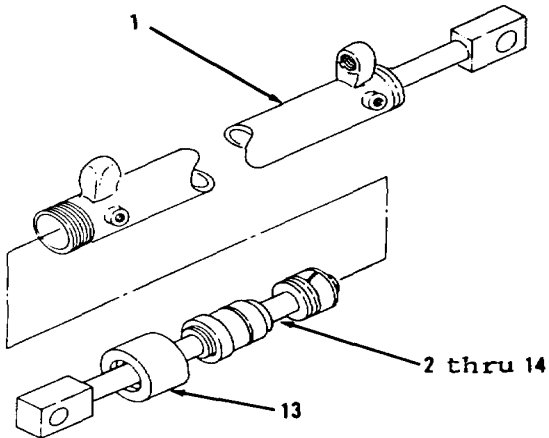


Figure 17-23.

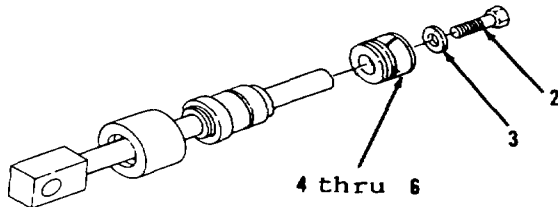


Figure 17-24.

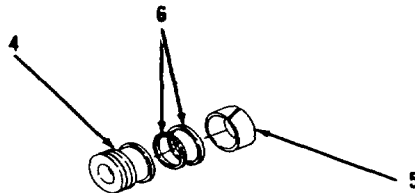


Figure 17-25.

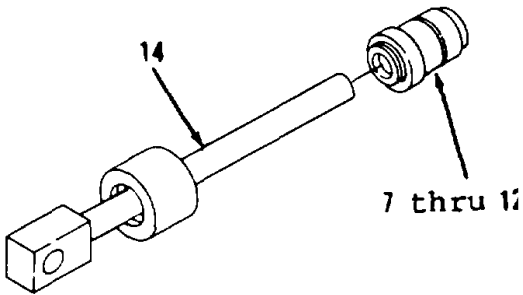


Figure 17-26.

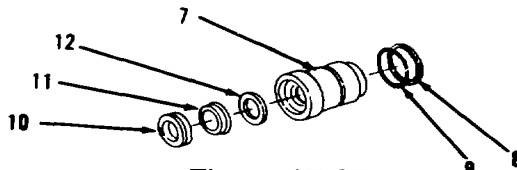


Figure 17-27.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE.**17-5. Side Shift Cylinder.** (Sheet 3 of 4)**DISASSEMBLY**

8. Remove crown (13) from rod assembly (14, Figure 17-28).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Position crown (13) on rod assembly (14, Figure 17-28).
2. Using clean oil, lubricate new seals (12 thru 10), new preformed packing (9) and ring (8, Figure 17-27).
3. Using seal installer, install new seals (12 thru 10) in head (7). Lip of seal (11) is toward inside of head (7). Lip of seal (10) is toward outside of head (7).
4. Install items 12 thru 7 as assembly on rod assembly (14, Figure 17-26).
5. Using seal expander, install new seal assembly (6) and ring (5) on piston (4, Figure 17-25).

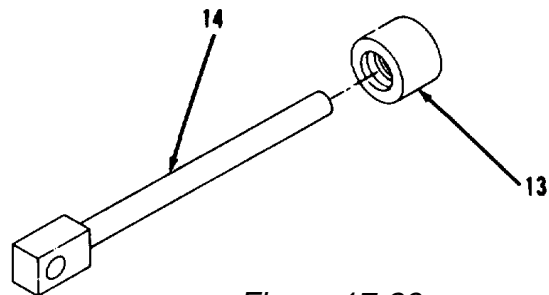


Figure 17-28.

Go to Sheet 4

17-19

HYDRAULIC SYSTEM MAINTENANCE. (cont)

17-5. Side Shift Cylinder. (Sheet 4 of 4)

ASSEMBLY (cont)

6. Install items 6 thru 4 as an assembly on rod assembly (14, Figure 17-24).
7. Install washer (3) and bolt (2). Apply thread lubricant to threads of bolt (2) and tighten bolt (2) to 800 ft-lb torque.
8. Using clean grease, lubricate outside of head (7), inside of crown (13) and inside of cylinder (1, Figure 17-23).
9. Install items 14 thru 2 as an assembly on cylinder (1).

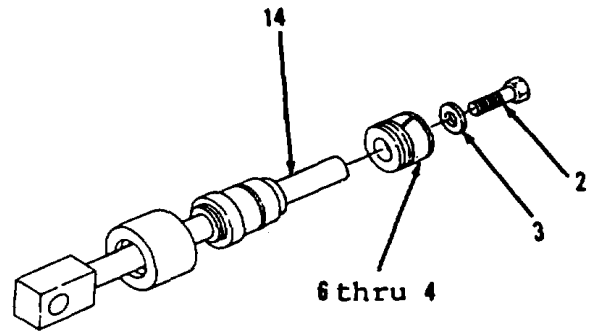


Figure 17-

NOTE

Tighten crown with rod assembly fully extended. This will keep cylinder, piston and head in alignment.

10. Using chain wrench, install crown (13) on cylinder (1). Tighten crown (13) to 450 ft-lb torque.

NOTE

Return 130G Grader to original equipment condition.

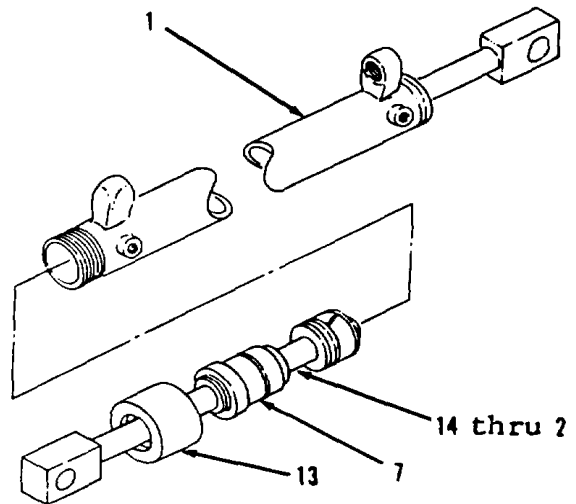


Figure 17-

End of Task

17-20

HYDRAULIC SYSTEM MAINTENANCE.

17-6. Scarifier Cylinder. (Sheet 1 of 4)

This task covers: **a. Disassembly** **b. Cleaning** **c. Inspection**
 d. Assembly

INITIAL SETUP:

Applicable Configurations

All

Tools

General Mechanic's Tool Kit:
 Automotive (NSN 5180-00-177-7033)
 Chain wrench 3P1535
 Seal installer 5P2980
 Seal expander 4S9181

Test Equipment

None

Materials/Parts

Dry cleaning solvent,
 Item 15, Appendix C
 Clean cloths, Item 41,
 Appendix C
 Thread lubricant, Item 65,
 Appendix C
 Hydraulic fluid, Item 30,
 Appendix C
 Grease, Item 20, Appendix C
 Seals, Items 9, 10, 11
 Preformed packing, Item 6, 13
 Ring, Item 12
 Seal assembly, Item 5

Personnel Required

Construction equipment
 repairer MOS 62B

References

TM 5-3805-261-10

Special Environmental Conditions

None

General Safety Instructions

None

Torques

Except for special torques shown,
 all fasteners are tightened to
 standard torques. Refer to
 Appendix E.

Troubleshooting References

None

Equipment Condition

TM 5-3805-261-10

Paragraph 10-20

Vehicle parked on level ground.
 Parking/emergency brake applied.
 Equipment lowered to the ground.
 Engine stopped.
 Master disconnect switch off.
 Scarifier cylinder removed.

Go to Sheet 2

HYDRAULIC SYSTEM MAINTENANCE. (cont)

17-6. Scarifier Cylinder. (Sheet 2 of 4)

DISASSEMBLY

NOTE

For convenience, hydraulic cylinder should be mounted on a suitable repair stand.

1. Using chain wrench, loosen crown (14, Figure 17-29).
2. Remove items 2 thru 15 as an assembly from cylinder (1).
3. Remove bolt (2) and washer (3, Figure 17-30).
4. Remove items 4 thru 6 as an assembly.
5. Remove seal assembly (5), preformed packing (6) and ring (7) from piston (4, Figure 17-31). Discard seal assembly (5) and preformed packing (6).
6. Remove items 8 thru 13 as an assembly (Figure 17-32).
7. Remove and discard seals (9 thru 11), ring (12) and preformed packing (13) from head (8, Figure 17-33).

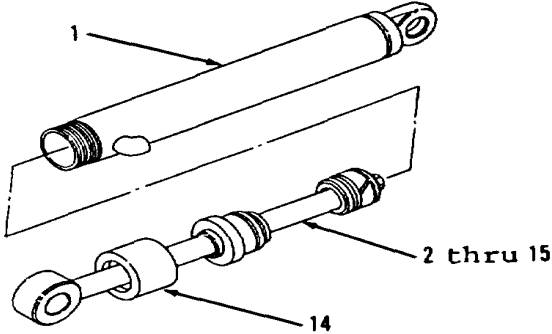


Figure 17-29.

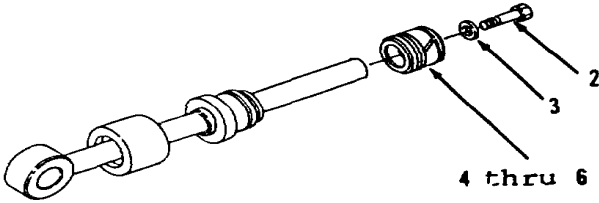


Figure 17-30.

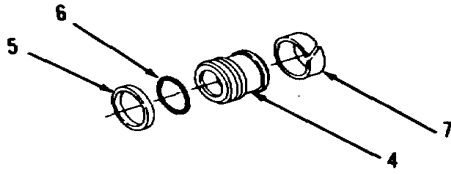


Figure 17-31.

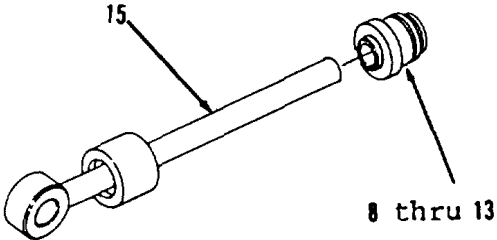


Figure 17-32.

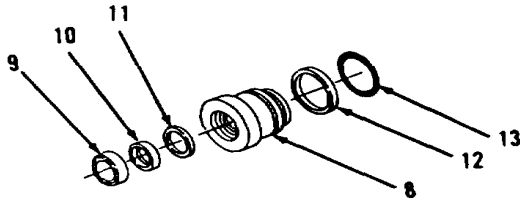


Figure 17-33.

Go to Sheet 3

HYDRAULIC SYSTEM MAINTENANCE.**17-6. Scarifier Cylinder.** (Sheet 3 of 4)**DISASSEMBLY**

8. Separate crown (14) and rod (15, Figure 17-34).

CLEANING

Clean all parts. Refer to Chapter 2.

INSPECTION

Inspect all parts. Refer to Chapter 2.

ASSEMBLY

1. Install crown (14) on rod (15, Figure 17-34).
2. Using clean hydraulic fluid, lubricate new seals (11 thru 9, Figure 17-33).
3. Using seal installer, install new seals (11 thru 9) on head (8). Lip on center seal (10) faces inside head (8). Lip on outside seal (9) faces outside head (8).
4. Install new preformed packing (13) and new ring (12) on head (8).
5. Install items 13 thru 8 as an assembly on rod (15, Figure 17-32).

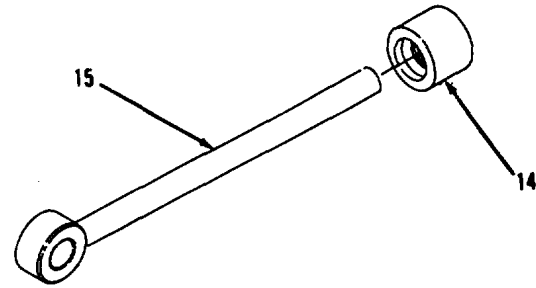


Figure 17-34.

Go to Sheet 4

17-23

HYDRAULIC SYSTEM MAINTENANCE. (cont)

17-6. Scarifier Cylinder. (Sheet 4 of 4)

ASSEMBLY (cont)

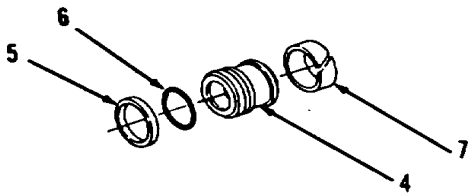


Figure 17-

- 6. Using seal expander, install ring (7), new preformed packing (6) and new seal assembly (5) on piston (4, Figure 17-31).
- 7. Install items 6 thru 4 as an assembly on rod (15, Figure 17-30).
- 8. Using thread lubricant, lubricate threads of bolt (2).
- 9. Install washer (3) and bolt (2) and tighten bolt (2) to 800 ft-lb torque.
- 10. Using clean grease, lubricate outside of head (8) and inside of crown (14, Figure 17-29).
- 11. Install items 15 thru 2 as an assembly in cylinder (1).

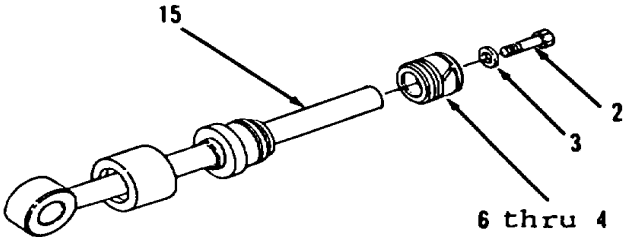


Figure 17-

NOTE

Crown should be tightened with rod fully extended. This is to keep cylinder, piston and head in alignment.

- 12. Install crown (14) on cylinder (1) and tighten to 450 ft-lb torque.

NOTE

Return 130G Grader to original equipment condition.

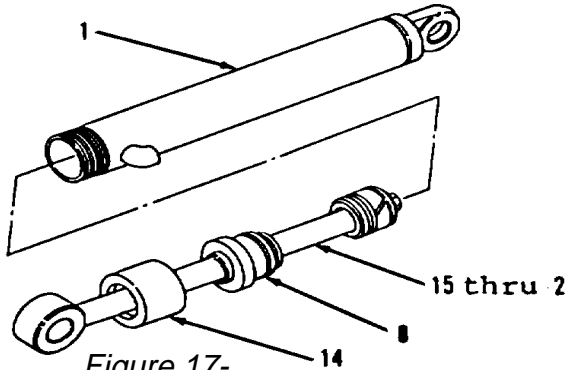


Figure 17-

End of Task

APPENDIX A

REFERENCES

A-1. PUBLICATION INDEXES AND GENERAL REFERENCES.

Indexes should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to material covered in this publication.

- a. MILITARY PUBLICATION INDEXES.
Consolidated Index of Publications and Blank Forms DA PAM 310-1
- b. GENERAL REFERENCES.
Dictionary of United States Army Terms AR 310-25
Authorized Abbreviations and Brevity Codes AR 310-50
Military Training Management TC 21-5-7
How to Prepare and Conduct Military Training FM 21-6
Military Symbols FM 21-30

A-2. OTHER PUBLICATIONS.

The following publications contain information pertinent to the major item materiel and associated equipment.

- a. VEHICLE.
(Caterpillar Model 130G) LO 5-3805-261-12
- b. CAMOUFLAGE.
Camouflage FM 5-20
- c. DECONTAMINATION.
Chemical, Biological, and Radiological (CBR)
Decontamination TM 3-220
Chemical, Biological, Radiological, and Nuclear Defense TM 21-40
- d. GENERAL.
Accident Reporting and Records AR 385-40
Basic Cold Weather Manual FM 31-70
Cooling Systems: Tactical Vehicles TM 750-254
Manual for Wheeled Vehicle Driver RM 21-305
Driver Selection and Training (Wheeled Vehicles) FM 55-30
Mountain Operations FM 90-6
Northern Operations FM 31-71
Operation and Maintenance of Ordnance Materiel in
Cold Weather (0°F. to -65°F.) FM 9-207
Principles of Automotive Vehicles TM 9-8000
Prevention of Motor Vehicle Accidents AR 385-55
Procedures for Destruction of Tank Automotive Equipment
to Prevent Enemy Use TM 750-244-6

APPENDIX A (cont)

REFERENCES (cont)

A-2. OTHER PUBLICATIONS (cont)

- e. FIRST AID.
First Aid for Soldiers FM 21-11
- f. MAINTENANCE AND REPAIR.
Organizational Care Maintenance and Repair:
 Pneumatic Tires, Inner Tubes and Radial
 Tires TM 9-2610-200-20
Description, Use, Bonding Techniques, and
 Properties of Adhesives TB ORD 1032
Inspection, Care, and Maintenance of Antifriction
 Bearings TM 9-214
Materials Used for Cleaning, Preserving, Abrading,
 and Cementing Ordnance Materiel and Related
 Materials Including Chemicals TM 9-247
Metal Body Repair and Related Operations FM 43-2
Operation and Organizational Maintenance Manual for
 Lead-Acid Storage Batteries TM 9-6140-200-14
Organization, Policies, and Responsibilities for
 Army Material Maintenance Concepts and Policies AR 750-1
Use of Antifreeze Solutions and Cleaning Compounds
 in Engine Cooling System TB 750-651
Welding Theory and Application TM 9-237
Color, Marking, and Camouflage Painting of Military
 Vehicles Construction Equipment, and Materials
 Handling Equipment TB 43-0209

APPENDIX A

REFERENCES

A-2. OTHER PUBLICATIONS

- g. SHIPMENT AND LIMITED STORAGE.
 - Administrative Storage of Equipment TM 740-90-1
 - Color Marking, and Preparation of Equipment for Shipment of Army MaterielAR 746-1
 - Preservation and Packing of Military Supplies and Equipment TM 38-230-1 & 2
 - Preservation of USAMECOM Mechanical Equipment for Shipment and Storage TB 740-97-2
 - Preservation, Packaging, Packing and Marking Materials, supplies, and Equipment Used by the Army SB 38-100
 - Shipment and Limited Storage MIL-V-62038
 - Storage and Serviceability Standard: Tracked Vehicles, Wheeled Vehicles and Component PartsSB 40-98-1
 - Storage and Supply Activities: Covered and Open StorageSB 740-1
 - The Army Maintenance Management Systems (TAMMS) DA PAM 738-750

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APPENDIX C

EXPENDABLE SUPPLIES AND MATERIALS

Section I. INTRODUCTION.

C-1. SCOPE. This appendix lists expendable supplies and materials you will need to maintain the 130G Grader. These items are authorized to you by CTA 50-970, Expendable Items (except Medical, Class V, Repair Parts, and Heraldic Items).

C-2. EXPLANATION OF COLUMNS.

a. Column 1 - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use anti-seize graphite, Item 14, App. C").

b. Column 2 - Level. This column identifies the lowest level of maintenance that requires the listed item:

- C - Operator/Crew
- O - Organizational Maintenance
- F - Direct Support Maintenance
- H - General Support Maintenance

c. Column 3 - National Stock Number. This is the National Stock Number assigned to the item; use it to request or requisition the item.

d. Column 4 - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parenthesis, if applicable.

e. Column 5 - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST.

| ITEM NUMBER | LEVEL | NATIONAL STOCK NUMBER | DESCRIPTION | U/M |
|-------------|-------|-----------------------|--|-----|
| 1 | 0 | 8040-00-262-9025 | ADHESIVE: 4 oz tube MIL-A-5092, Type 1 (81349) | OZ |
| 2 | 0 | 8040-00-262-9026 | ADHESIVE: 1/2 pt can MIL-A-5092, Type 1 (81349) | CN |
| 3 | | 8040-00-573-1502 | ADHESIVE, MIL-A-22010A, PVC (81349) | |
| 4 | C | 6850-00-127-7193 | ANTI-FOGGING KIT: 1 kit MIL-S-13550 (81349) | EA |
| 5 | C | 6850-00-181-7929 | ANTIFREEZE, PERM O-A-548, 1 GAL. CAN MIL-A-46153 (81349) | GL |
| 6 | C | 6850-00-181-7933 | ANTIFREEZE, PERM O-A-548, 5 GAL. CAN MIL-A-46153 (81349) | GL |
| 7 | C | 6850-00-174-1806 | ANTIFREEZE, ARCTIC TYPE, 55 GAL. DRUM MIL-A-11755 (81349) | DR |
| 8 | 0 | 8030-00-155-6444 | ANTI-SEIZE COMPOUND MIL-A-907D | |
| 9 | 0 | 6850-00-227-1328 | CLEANING COMPOUND, DETERGENT MIL-C-10597 (81349) | QT |
| 10 | 0 | 6850-00-224-6665 | CLEANING COMPOUND, MIL-C-11090 (81349) | CN |
| 11 | 0 | | CLOTH, ABRASIVE EMERY | |
| 12 | 0 | 5350-00-221-0872 | CLOTH, ABRASIVE CROCUS .50 SHEETS P-C-458 (81348) | PC |
| 13 | | | COMPOUND, RETAINING, MIL-R-46082A | |
| 14 | C | 8030-00-159-8126 | DEICING-DEFROSTING COMPOUND 5 GAL. CAN MIL-A-8243 | CN |
| 15 | 0 | 6850-00-281-3061 | DRY CLEANING SOLVENT 4 OZ CAN P-D-630 (81348) | DR |

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST.

| ITEM NUMBER | LEVEL | NATIONAL STOCK NUMBER | DESCRIPTION | U/M |
|-------------|-------|-----------------------|---|-----|
| 16 | 0 | 8010-00-297-2105 | ENAMEL, SEMIGLOSS, OLIVE DRAB TT-E-485 (81348) | GL |
| 17 | 0 | 8010-00-297-2109 | ENAMEL, SEMIGLOSS, OLIVE DRAB TT-E-485, Type 2 (81348) | PT |
| 18 | 0 | | ENAMEL, SEMIGLOSS, CAMOUFLAGE MIL-P-6884F | GL |
| 19 | 0 | 8040-01-038-5043 | GASKET CEMENT, 5H2471 | |
| 20 | C | 9150-00-935-1017 | GREASE, AUTOMOTIVE, ART. 14 OZ CAN MIL-G-10924D (81349) | CN |
| 21 | C | 9150-00-190-0904 | GREASE, AUTOMOTIVE, ART. 1 LB. CAN MIL-G-1092 | LB |
| 22 | 0 | 9150-00-190-0905 | GREASE, AUTOMOTIVE, ART. 5 LB CAN MIL-G-10924D BRAYCOTE 610 (98308) | LB |
| 23 | C | 9150-00-985-7246 | GREASE, AIRCRAFT AND INSTRUMENT, 1 LB. CAN MIL-G-23827 (81349) | LB |
| 24 | C | 9150-00-985-7247 | GREASE, AIRCRAFT AND INSTRUMENT, 2 LB CAN MIL-G-23827 (81349) | LB |
| 25 | 0 | 9150-00-985-7248 | GREASE, GEAR, MULTI-PURPOSE, 35 LB. CAN MIL-L-2105B | LB |
| 26 | C | 9150-00-985-7316 | GREASE, GENERAL PURPOSE 1-3/4 LB. CAN MIL-G-23549 (81349) | CN |
| 27 | 0 | 9150-00-823-8047 | GREASE, GENERAL PURPOSE 35 LB. CAN MIL-G-23549 (81349) | CN |

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST. (cont)

| ITEM NUMBER | LEVEL | NATIONAL STOCK NUMBER | DESCRIPTION | U/M |
|-------------|-------|-----------------------|---|-----|
| 28 | 0 | 9150-00-231-6689 | GREASE, 12 LITHIUM, MULTI-PURPOSE MIL-G-109240 | |
| 29 | 0 | 6850-00-927-9461 | HEAT TRANSFER COMPOUND | |
| 30 | C | 9150-00-935-9808 | HYDRAULIC FLUID MIL-L-2104B OR MIL-L-46152 | GL |
| 31 | C | 6850-00-753-4967 | INHIBITOR, CORROSION, 6 OZ CAN 0-I-00490B (81348) | CN |
| 32 | 0 | | LOCKTITE 242, GRADE N, TYPE 2 MIL-S-46163 | TU |
| 33 | C | 9150-00-189-6727 | LUBRICATING OIL, 1 QT. CAN MIL-L-2104C (81349) | QT |
| 34 | 0 | 9150-00-188-9858 | LUBRICATING OIL, 5 GAL DRUM MIL-L-2104C (81349) | CN |
| 35 | 0 | 9150-00-186-6668 | LUBRICATING OIL ENG, 5 GAL DRUM MIL-L-2104C (81349) | CN |
| 36 | C | 9150-00-186-6681 | LUBRICATING OIL ENG, 1 QT CAN MIL-L-2104C (81349) | QT |
| 37 | C | | LUBRICATING OIL ENG, SUB-ZERO, 1 QT. CAN MIL-L-46147 | QT |
| 38 | 0 | | LUBRICATING OIL ENG, SUB-ZERO, 5 GAL DRUM MIL-L-46167 | GL |
| 39 | 0 | | LUBRICATING OIL, GEAR MULTI-PURPOSE | CN |
| 40 | 0 | | LUBRICATING OIL, SEMIFLUID | |

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST.

| ITEM NUMBER | LEVEL | NATIONAL STOCK NUMBER | DESCRIPTION | U/M |
|-------------|-------|-----------------------|--|-----|
| 41 | C | 7920-00-205-3570 | RAG, WIPING (AKA CLEAN CLOTHS) DDD-R-30 (81348) A-A-531 (58536) | BE |
| 42 | 0 | 8030-00-159-8176 | SEALANT, SILICONE, 303 TUBE MIL-S-45180 | TU |
| 43 | 0 | | TAGS, SMALL | |
| 44 | 0 | 7510-00-584-5785 | TAPE, PRESSURE SENSITIVE ADHESIVE BLACK (ELECTRICAL) 3/4" W X 60 yds lg PPP-T-97 (81348) TAPE, MASKING | RO |
| 45 | 0 | 8010-00-242-2089 | THINNER, PAINT MIXER TT-T-291 GRI-1GL (81348) | GL |
| 46 | 0 | 8010-00-558-7026 | THINNER, PAINT, MINERAL TT-T-291 (81348) | CN |
| 47 | 0 | 9150-00-231-9062 | LUBRICATING OIL, GEN. 5 GAL. CAN VV-800 (81348) | GL |
| 48 | 0 | 9150-00-231-2361 | LUBRICATING OIL, GEN. MIL-L-3150 (81349) | QT |
| 49 | 0 | 9150-00-231-2356 | LUBRICATING OIL, GEN. 5 GAL. CAN MIL-L-3150 (81349) | CN |
| 50 | 0 | 9150-00-402-2372 | LUBRICATION OIL, OES, 5 GAL/ CAN CONOCO 600 FLUID TYPE 1 (15445) | CN |
| 51 | 0 | 9150-00-402-4478 | LUBRICATION OIL, OES, 1 QT CAN CONOCO 600 FLUID (15445) | QT |
| 52 | 0 | 9150-00-543-7220 | LUBRICATING OIL, MOLYBDENUM AND DISULFIDE, SILICONE, 1 LB CAN DOD-L-25681 (81349) | LB |

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST. (cont)

| ITEM NUMBER | LEVEL | NATIONAL STOCK NUMBER | DESCRIPTION | U/M |
|-------------|-------|-----------------------|---|-----|
| 53 | 0 | 9150-00-250-0926 | PETROLATUM, TECHNICAL: VV-P-236 (81348) | LB |
| 54 | 0 | 9150-00-250-0933 | PETROLATUM, TECHNICAL: 5 LB CAN VV-P-236 (81348) | LB |
| 55 | 0 | 8030-00-159-8176 | SEALING COMPOUND, 303 TUBE MIL-S-45180 (81349) | TU |
| 56 | 0 | 8030-00-252-3391 | SEALING COMPOUND, 11 OZ TUBE A GASKET NO. 2 (77247) | OZ |
| 57 | 0 | 7510-00-584-5785 | TAPE, PRESSURE SENSITIVE ADHESIVE BLACK (ELECTRICAL) 3/4" W X 60 YDS LG PPP-T-97 (81348) | RO |
| 58 | 0 | 8010-00-242-2089 | THINNER, PAINT MIXER TT-T-291 GRI-1GL (81348) | GL |
| 59 | 0 | 8010-00-558-7026 | THINNER, PAINT, MINERAL TT-T-291 (81348) | CN |
| 60 | F | PENDING | SEALANT, THREAD MIL-S-22473 | |
| 61 | F | PENDING | TRICHLOROETHANE, MIL-T-82533 | |
| 62 | G | PENDING | SOLVENT, CLEANING, ALKALI | |
| 63 | F | PENDING | GREASE, GRAPHITE | |
| 64 | G | PENDING | LUBRICANT, THREAD, MIL-T-5544B | |
| 65 | F | PENDING | SANDPAPER, NO. 00 | |
| 66 | F | PENDING | GLYPTAL | |
| 67 | F | PENDING | ENGINE OIL, SAE 10 | |
| 68 | G | PENDING | ENGINE OIL, SAE 20 | |
| 69 | G | PENDING | ENGINE OIL, SAE 30 | |
| 70 | F | PENDING | DIESEL ENGINE FUEL | |

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST.

NATIONAL

| ITEM NUMBER | LEVEL | STOCK NUMBER | DESCRIPTION | U/M |
|----------------|-------|-----------------|-------------|-----|
|----------------|-------|-----------------|-------------|-----|

| | | | | |
|----|--|---------|------------------------------|--|
| 71 | | PENDING | PRIMER 8M8060 | |
| 72 | | PENDING | RETAINING COMPOUND 9S3265 | |
| 73 | | PENDING | DELCO-REMY LUBRICANT 1948791 | |

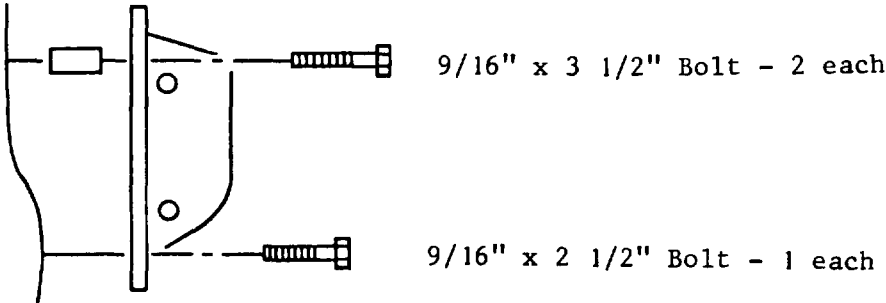
C-7/(C-8 blank)

APPENDIX D

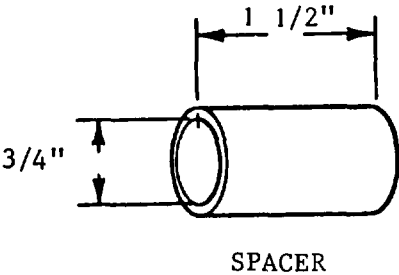
ILLUSTRATED LIST OF MANUFACTURED ITEMS

D-1. INTRODUCTION. This appendix includes complete instructions for making items authorized to be manufactured or fabricated at organizational maintenance. A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the figure which covers fabrication criteria. All bulk materials needed for manufacture of an item are listed in a table with the illustration.

DESCRIPTION: Fabricated Engine Adapter Bracket



MOUNTING BRACKET
(PN - 205060)



SPACER

Figure D-1.

D-1/(D-2 blank)

APPENDIX E

TORQUE LIMITS

E-1. GENERAL INFORMATION. This appendix provides general torque limits for fasteners. Special torque values are indicated in the maintenance procedures for applicable components. The general torque values given in this appendix shall be used when specific torque values are not indicated in the maintenance procedures. When applying torque in tightening direction, check torque when the fastener just begins to turn. Conformance is best determined by checking immediately after assembly.

E-2. TORQUE LIMITS.

a. **TABLE E-1. GENERAL PURPOSE TORQUE LIMITS.** The torque values given in Table E-1 apply to head-treated bolts assembled into tapped holes in steel, cast iron, aluminum, brass, weld nuts, etc., nuts assembled with heat-treated bolts and studs.

TABLE E-1.
GENERAL PURPOSE TORQUE LIMITS

| Thread Size (inch) | Thread per Inch | Torque LB-FT | Thread Size | Thread per Inch | Torque LB-FT |
|--------------------|-----------------|--------------|-------------|-----------------|--------------|
| 1/4 | 20 18 | 6-12 | 3/4 | 10 16 | 230-300 |
| 5/16 | 18 24 | 13-23 | 7/8 | 9 14 | 360-480 |
| 3/8 | 16 24 | 27-37 | 1 | 8 14 | 560-720 |
| 7/16 | 14 20 | 40-60 | 1-1/8 | 7 12 | 700-900 |
| 1/2 | 13 20 | 65-85 | 1-1/4 | 7 12 | 880-1120 |
| 9/16 | 12 18 | 95-125 | 1-3/8 | 6 12 | 1050-1350 |
| 5/8 | 11 18 | 130-170 | 1-1/2 | 6 12 | 1300-1700 |

APPENDIX E (cont)

E-2. TORQUE LIMITS (cont)

b. TABLE E-2. TORQUE LIMITS FOR FASTENERS WITH DIAMETERS LESS THAN .250 INCH. The torque values given in Table E-2 apply to fasteners made of brass or manufacturer's standard steel that may or may not have been heat-treated.

TABLE E-2.

TORQUE LIMITS FOR FASTENERS WITH DIAMETERS
LESS THAN .250 INCH

| Thread No. | Diameter (Inch) | Torque LBS-IN |
|------------|-----------------|---------------|
| 0 | .060 | 0.6-0.8 |
| 1 | .073 | 1.1-1.3 |
| 2 | .086 | 1.8-2.2 |
| 3 | .099 | 2.5-3.5 |
| 4 | .112 | 3.9-4.9 |
| 5 | .125 | 5-7 |
| 6 | .138 | 7-9 |
| 8 | .164 | 13-17 |
| 10 | .190 | 18-22 |
| 12 | .216 | 25-35 |

APPENDIX E

E-2. TORQUE LIMITS

c. TABLE E-3. TORQUE LIMITS FOR FLARED AND PREFORMED PACKING FITTINGS USED WITH STEEL TUBING. The torque values shown in Table E-3 are to be used with 37 degree flared, 45 degree flared and inverted flared fittings (when used with steel tubing), preformed packing plugs and fittings. The torque required for these fittings are based upon thread size.

TABLE E-3.
TORQUE LIMITS FOR FLARED AND PREFORMED FITTINGS
USED WITH STEEL TUBING

| Tube O.D. (Inch) | Thread Size Inch | Torque LB-IN | Tube O.D. (Inch) | Thread Size Inch | Torque LB-FT |
|------------------------|------------------------|-----------------|------------------------|------------------------|-----------------|
| | | | .500 | 7/8 | 35-45 |
| | | | .625 | 7/8 | 35-45 |
| .125 | 5/16 | 35-55 | .750 | 1 1/16 | 50-60 |
| .188 | 3/8 | 90-110 | .875 | 1 3/16 1 1/4 | 60-70 |
| .250 | 7/16 | 125-165 | | | 60-70 |
| .312 | 1/2 | 155-195 | 1.000 | 1 5/16 | 75-85 |
| .375 | 9/16 | 165-245 | 1.250 | 1 5/8 | 90-100 |
| | 5/18 | 165-245 | 1.500 | 1 7/8 | 110-130 |
| | | | 2.000 | 2 1/2 | 210-250 |

APPENDIX E (cont)

E-2. TORQUE LIMITS (cont)

d. TABLE E-4. TORQUE LIMITS FOR AIR FITTINGS, HOSE CLAMPS AND PLUGS.

(1) SAE Flareless Fitting. Bottom tube into fitting body and tighten nut until sleeve grips tube firmly enough to prevent movement. Tighten nut 1 to 1-1/4 additional turn. For reassembly, tighten until a sharp rise in torque is felt, then tighten an additional 1/6 to 1/3 turn.

(2) High-duty (Shear Sleeve) Tube Fittings. Bottom tube into the fitting body and tighten nut until a slight yield is felt, indicating that the sleeve has been sheared from the nut. Tighten nut an additional 1/2 turn.

(3) Flex Fittings. Slide nut and sleeve over tubing. Bottom tube in counterbore of fitting body. Tighten nut until it bottoms on hex part of fitting body.

TABLE E-4.

TORQUE LIMITS FOR FLARELESS FITTINGS

| Tube O.D. (Inch) | Torque for Non-metallic and Copper Tubing LB-IN | Optional Turn Tightening-- Turns After Finger Tightening | |
|---------------------|---|---|------------------|
| | | Tubing Non-Metallic | Tubing Copper |
| .250 | 75-125 | 3 Turns | 2 Turns |
| .350 | 150-200 | 4 Turns | 2 Turns |
| .500 | 250-350 | 4 Turns | 2 Turns |
| .625 | 300-400 | 3 1/2 Turns | 3 Turns |
| .570 | 400-500 | 3 1/2 Turns | 3 Turns |

APPENDIX E

E-2. TORQUE LIMITS

e. TABLE E-5. TORQUE LIMITS FOR PIPE FITTINGS. Sealing is the basis for acceptance of a pipe thread joint. Apply MIL-A-12352A (CE) thread sealant to all pipe threads except:

- (1) Pipe threads in hydraulic components for which MIL-S-224730 is used.
- (2) On grease fittings.

Insure that no thread damage occurs from too high a torque. Also ensure that joint can be disassembled after sealant has set.

TABLE E-5.
TORQUE LIMITS FOR PIPE FITTINGS

| Pipe Thread Size (Inch) | Recommended Torque (LB-FT) | |
|-------------------------|--------------------------------------|-------------------------|
| | Threads with MIL-A12352A(CE) Sealant | Threads Without Sealant |
| 1/16-27 | 10 | 15 |
| 1/8-27 | 15 | 20 |
| 1/4-18 | 20 | 25 |
| 3/4-18 | 25 | 35 |
| 1/2-14 | 35 | 45 |
| 3/4-14 | 45 | 55 |
| 1-11 1/2 | 55 | 65 |
| 1 1/4-11 1/2 | 70 | 80 |
| 1 1/2-11 1/2 | 80 | 95 |
| 2-11 1/2 | 95 | 120 |

f. TABLE E-6. TORQUE LIMITS FOR WORM DRIVE BAND TYPE HOSE CLAMP. Inspect torque on new hose within 10 minutes. Torque should exceed minimum torque after one hour.

TABLE E-6.
TORQUE LIMITS FOR WORM-DRIVE, BAND TYPE HOSE CLAMP

| Clamp Width (Inch) | Reassembly or Tightening Torque (LB-IN) |
|--------------------|---|
| .625 | 35-45 |
| .531 | 20-30 |
| .312 | 4-8 |

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By Order of the Secretary of the Army:

Official:

CARL E. VUONO
General United States Army
Chief of Staff

WILLIAM J. MEEHAN II
Brigadier General, United States Army
The Adjutant General

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*U.S. GOVERNMENT PRINTING OFFICE: 1989 643-025/00003

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THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

- 1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
- 1 Meter = 100 Centimeters = 1,000 Millimeters = 39.37 Inches
- 1 Kilometer = 1,000 Meters = 0.621 Miles

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

- $5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}$
- 212° Fahrenheit is equivalent to 100° Celsius
- 90° Fahrenheit is equivalent to 32.2° Celsius
- 32° Fahrenheit is equivalent to 0° Celsius
- $9/5 \text{ } ^{\circ}\text{C} + 32 = \text{ } ^{\circ}\text{F}$

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 |

