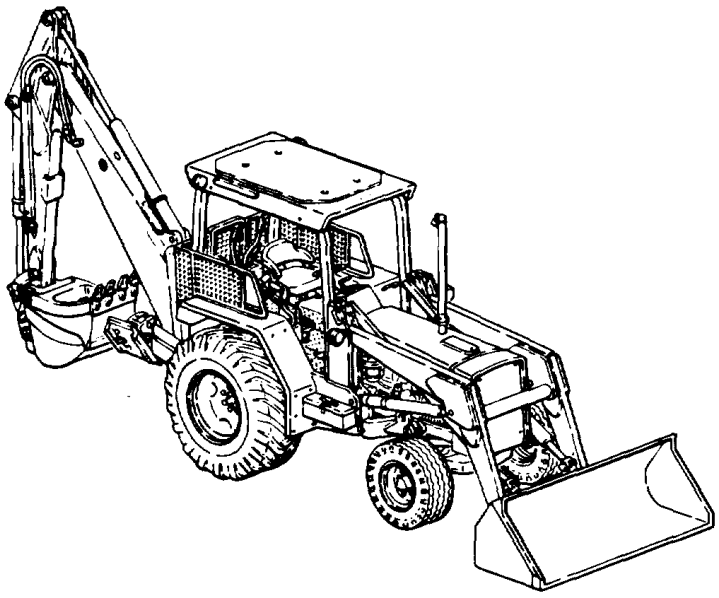
TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

FOR

**TRACTOR, WHEELED,
DED, LOADER BACKHOE:
WITH HYDRAULIC IMPACT TOOL AND
WITH HYDRAULIC EARTH AUGER ATTACHMENT
JOHN DEERE MODEL JD410 (CCE)
WITH BUCKET, IMPACTOR,
AND EARTH DRILL
(NSN 2420-00-567-0135)**



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This manual and LO 5-2420-222-12, TM 5-2420-222-20P, and TM 5-2420-222-34P supersede TM 5-2420-222-14&P-1, dated 1 January 1987, and TM 5-2420-222-14&P-2, dated 1 November 1986, including all changes.

Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

26 AUGUST 1992

Section IV. GENERAL MAINTENANCE INSTRUCTIONS

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1.10. GENERAL.

a. These general maintenance instructions contain general shop practices and specific methods you must be familiar with to properly maintain your loader backhoe. You should read and understand these practices and methods before performing any Direct Support and General Support Maintenance procedures.

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

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

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

(2) Do not remove bearings or bushings unless damaged. If you need to remove them to access parts behind, pull bearings and bushings out carefully.

(3) Replace all gaskets, lockwashers, seals, cotter pins, and preformed packings.

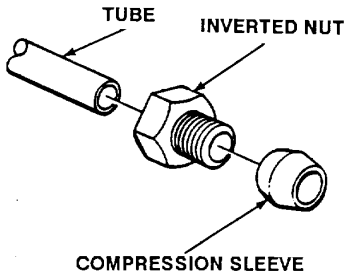
d. The following "Initial Setup" information applies to all procedures:

(1) Resources are not listed unless they apply to the procedure.

(2) "Personnel Required" Is listed only If more than one mechanic Is required to complete the task.

1-27. TUBES AND COMPRESSION FITTINE

c. Assemble new tubes, compression sleeves, and inverted nuts as follows:



(1) Slide inverted nut onto end of tube.

(2) Slide compression sleeve onto end of tube.

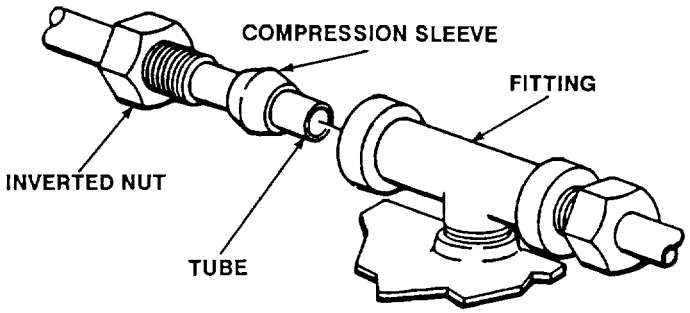
(3) Repeat steps (1) and (2) for other end of tube as required.

d. Install new tube assemblies as follows:

(1) Insert end of tube as far as it will go into fitting to which tube is being Installed.

(2) Install inverted nut into fitting and tighten it against compression sleeve with open end wrench. Compression sleeve will clamp down around tube and conform to internal surface of fitting and inverted nut.

(3) Repeat steps (1) and (2) for other end of tube as required.



1-28. LOCKWIRE.

a. Always use nonelectrical wire (Item 44, Appendix B).

b. Drilled head screws and bolts usually do not require lockwiring if they are installed with self-locking nuts or lockwashers.

c. Three screws or bolts are the maximum number that may be lockwIred in a series when they are spaced 4-6 in. (10.2-15.2 cm) apart. The maximum number of closely-spaced multiple groups of screws or bolts to be lockwired is limited to the number of units that can be lockwired with a 24 in. (61.0 cm) length of wire.

d. Do not secure screws, bolts, or fittings which are spaced more than 6 in. (15.2 cm) apart. Lockwire these fasteners to tiepoints 6 in. (15.2 cm) or less away.

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Table 2-1. Troubleshooting (Con't).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

16. EXCESSIVE GEAR CLASH WHEN SHIFTING.

Step 1. Check for worn or broken shifter levers.

Replace shifter levers (see paragraph 8-14).

Step 2. Remove transmission top cover (see paragraph 8-12 or 8-13). Check to see if gears rotate with clutch pedal depressed.

Replace worn or damaged friction plugs (see paragraph 8-4).

Step 3. Remove transmission top cover (see paragraph 8-12 or 8-13). Check to see if transmission oil pump is working properly.

Repair or replace transmission oil pump (see paragraph 8-19).

17. TRANSMISSION NOISY.

Step 1. Remove transmission top cover (see paragraph 8-12 or 8-13). Check to see if transmission oil pump Is working properly.

Repair or replace transmission oil pump (see paragraph 8-19).

Step 2. Inspect transmission for worn or damaged parts.

Repair or replace transmission (see paragraph 8-2).

Step 3. Check differential assembly for worn or damaged bearings or gears.

Repair differential assembly (see paragraph 8-7).

Repair differential drive shaft assembly (see paragraph 8-6).

Step 4. Check to see if ring gear is out of adjustment or damaged.

Adjust or replace ring gear (see paragraph 8-6).

18. NO DIFFERENTIAL ACTION.

Step 1. Check for worn or damaged bevel pinion gear (see paragraph 8-7).

Replace bevel pinion gear (see paragraph 8-7).

Step 2. Check to see if ring gear is out of adjustment or damaged (see paragraph 8-6).

Adjust or replace ring gear (see paragraph 8-6).

19. DIFFERENTIAL WILL NOT LOCK.

Step 1. Check to see if lock pedal turns on shaft.

Tighten lock pedal (see paragraph 8-8).

3-3. ENGINE ASSEMBLY REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:

- Frame assembly front support removed (see paragraph 12-1).
- Muffler removed (see TM 5-2420-222-20).
- Steering valve oil lines removed (see TM5-2420 222-20).
- Electric horn and bracket removed (see TM5-2420-222-20).
- Accumulator tee-to-steering valve oil line remove (see TM 5-2420-222-20).
- Right inner platform ramp removed (see TM 5-2420-222-20).
- Alternator disconnected (see TM 5-2420-222-20).
- Starter disconnected (see TM 5-2420-222-20).

Tools/Test Equipment:

- General mechanic's tool kit
- Field automotive shop set
- Lifting adapter
- Steam cleaner

Materials/Parts:

- Marker tags (Item 32, Appendix B)
- Adhesive tape (Item 33, Appendix B)
- One cotter pin
- One gasket
- One self-locking nut
- Seventeen lockwashers
- Tie-down bands (as required)

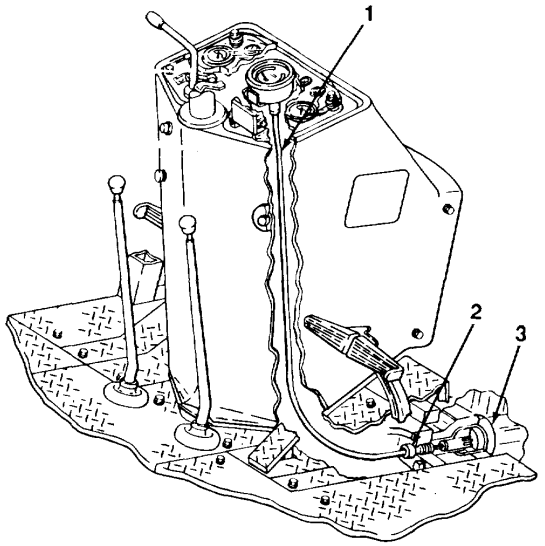
Personnel Required: Two

General Safety Instructions:

- DO NOT use a dry brush or compressed air to clean clutch assembly or clutch components.

a. REMOVAL

1. Remove tachometer drive cable (1) and gasket (2 from reverser housing (3). Discard gasket.



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3-3. ENGINE ASSEMBLY REPLACEMENT (Con't).

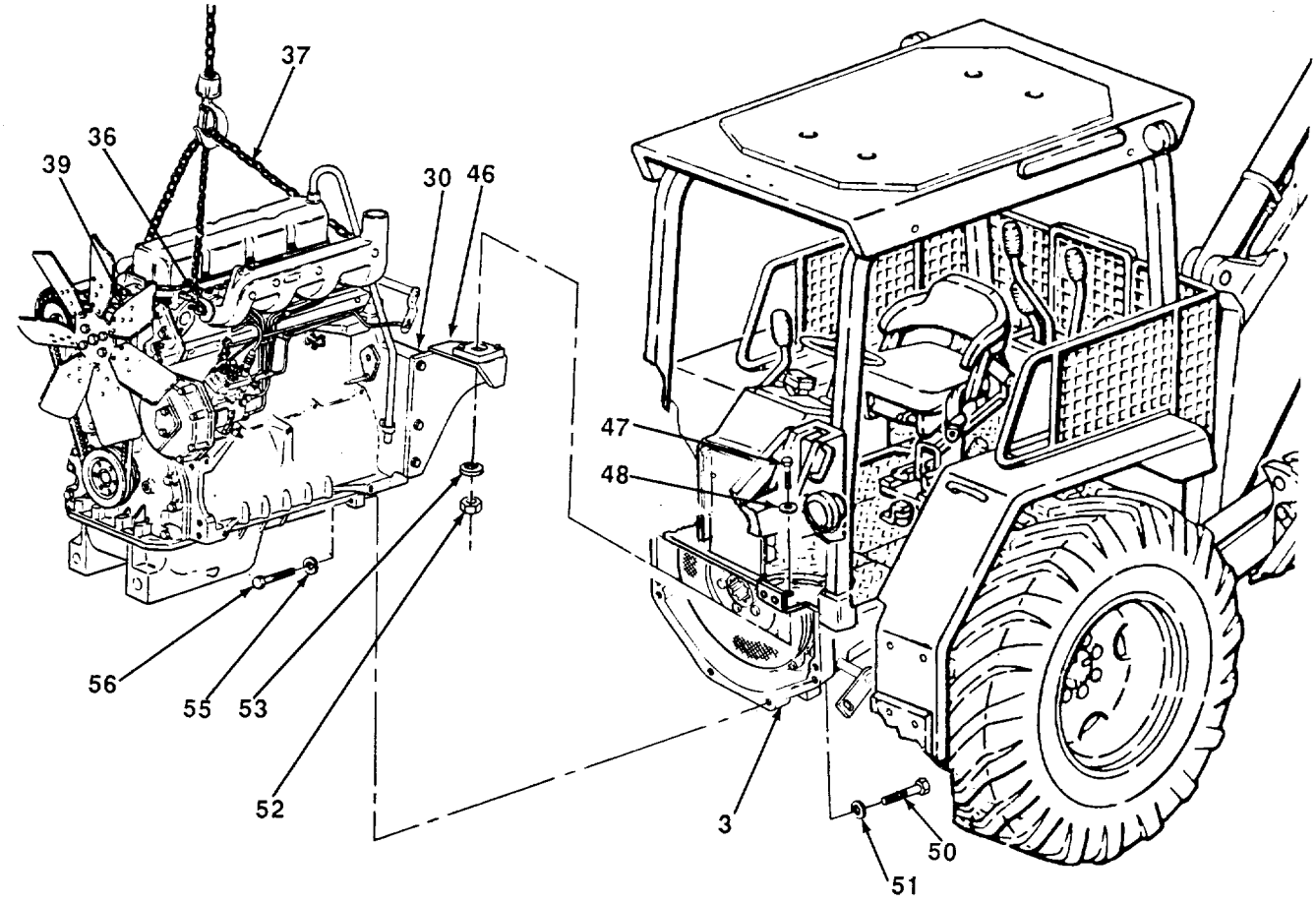
7. With two assistants, lower lifting device until engine assembly (39) is alined with reverser housing (3). Move lifting device rearward until engine assembly engages reverser housing.

8. Install two screws (47), new lockwashers (53), washers (48), and nuts (52) in left and right brackets (46).

9. Install two screws (56) and new lockwashers (55) in engine oil pan, flywheel housing (30) and reverser housing (3). Torque screws to 250 lb.-ft. (339 Nom).

10. Install four screws (50) and washers (51) in flywheel housing (30) and reverser housing (3). Torque screws to 250 lb.-ft. (339 N•m).

11. Position wood block under engine assembly (39). Remove lifting device, engine and transmission sling (37), and three eyebolts (36) from engine assembly.



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3-4. ENGINE BLOCK MAINTENANCE (Con't).

6. Position four pillow block or main bearing caps (15) and rear pillow block cap (19) in place on engine block (1) in correct location as numbered, with pointer arrow facing toward camshaft side of engine block.

7. Coat threads of eight screws (17) with engine oil. Install eight screws and washers (16) in four pillow block or main bearing caps (15) and engine block (1). Torque screws to 85 lb.-ft. (115 N•m).

8. Coat threads of two screws (20) with engine oil. Install two screws and washers (21) in rear pillow block cap (19) and engine block (1). Torque screws to 85 lb.-ft. (115 N•m).

9. Using rod measuring kit, measure inside diameter of five main bearing bores. Inside diameter of each bore must be 3.3250-3.3260 in. (84.4550-84.4804 mm). If any bore is not within specified diameter, replace engine block (1).

10. Remove two screws (20), washers (21), and rear pillow block cap (19) from engine block (1).

11. Remove eight screws (17), washers (16), and four pillow block or main bearing caps (15) from engine block (1).

NOTE

Perform steps 12 through 29 to check engine block main bearing bore alinement. New bearings and a new crankshaft are used to eliminate any error which might exist from using worn bearings or crankshaft.

12. Lubricate four new bearing halves (23) and new rear bearing half (18) with engine oil. Slide bearing halves into position on engine block (1). Ensure that tangs on bearing halves fit in locking grooves in engine block and oil holes in bearings aline with oil passages in engine block.

13. Lubricate four new bearing halves (24) and new rear bearing half (22) with engine oil. Slide bearing halves into position in pillow block or main bearing caps (15) and rear pillow block cap (19). Ensure that tangs on bearing halves fit in locking grooves in pillow block or main bearing caps and rear pillow block cap.

3-6. CYLINDER HEAD MAINTENANCE.

This Task Covers:

a. Removal
b. Disassembly
c. Cleaning and Inspection
d.
d. Repair
e. Assembly
f. Installation

Initial Setup:

Equipment Conditions:

- Rocker arm cover removed (see TM 5-2420-222-20).
- Rocker arm, shaft, and pushrods removed (see paragraph 3-13).
- Engine starting aid fluid injection tube and fittings removed (see TM 5-2420-222-20).
- Air inlet housing removed (see TM 5-2420-222-20).
- Exhaust manifold removed (see TM 5-2420-222-20).
- Fuel injection nozzles removed (see TM 5-2420-222-20).

Tools/Test Equipment:

- General mechanic's tool kit
- Field automotive shop set
- Steam cleaner

Materials/Parts:

- Wire brush (Item 4, Appendix B)
- Carbon removing compound (Item 8, Appendix B)
- Engine oil (Item 25, Appendix B)
- Rags (Item 28, Appendix B)
- Dry cleaning solvent (Item 31, Appendix B)
- One gasket

Personnel Required: Two

General Safety Instructions:

- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).
- Avoid contact with live steam.

a. REMOVAL

1. Remove 18 capscrews (2) and washers (1) from cylinder head (3) and engine block (6).

2. Remove cylinder head (3) and gasket (5) from engine block (6). Discard gasket.

b. DISASSEMBLY

NOTE

Do not remove expansion plugs unless damaged or defective. Removal may damage parts.

Drive two expansion plugs (4) out of cylinder head (3).

3-8. CRANKSHAFT MAINTENANCE (Con't).

CAUTION

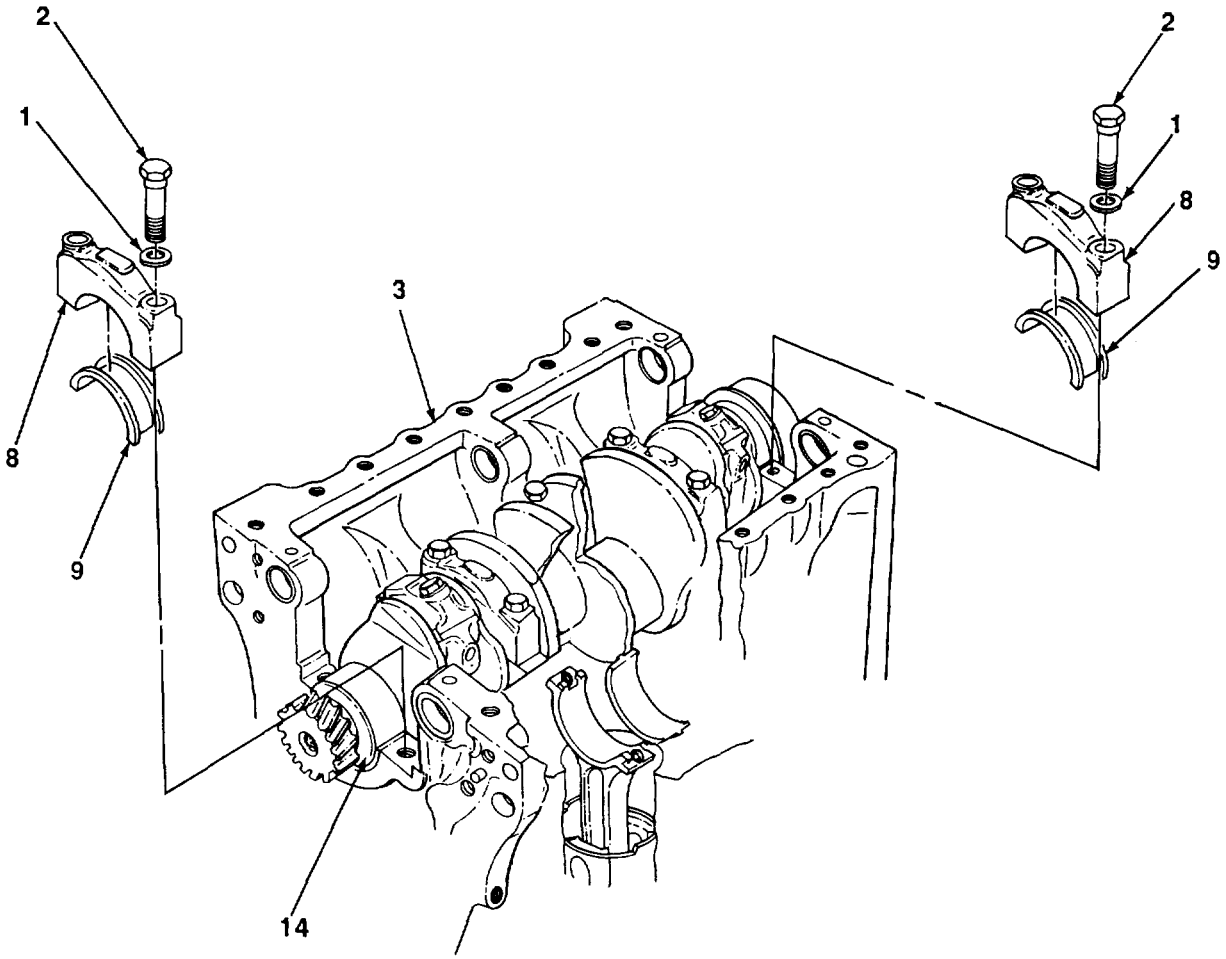
Main bearings and main bearing caps must be Installed In same location from which they are removed. Failure to do so may damage parts.

NOTE

Engine has five main bearing caps. Removal of all five is the same. One Is shown. Repeat steps 11 through 13 for remaining four main bearing caps.

11. Using center punch and hammer, match-mark main bearing cap (8) to engine block (3) to ensure proper installation.

12. Remove two screws (2) and washers (1) from main bearing cap (8) and engine block (3).



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3-8. CRANKSHAFT MAINTENANCE (Con't).

CAUTION

Lower sleeve bearing halves must be Installed in same bearing caps from which they were removed. Failure to do so may damage parts.

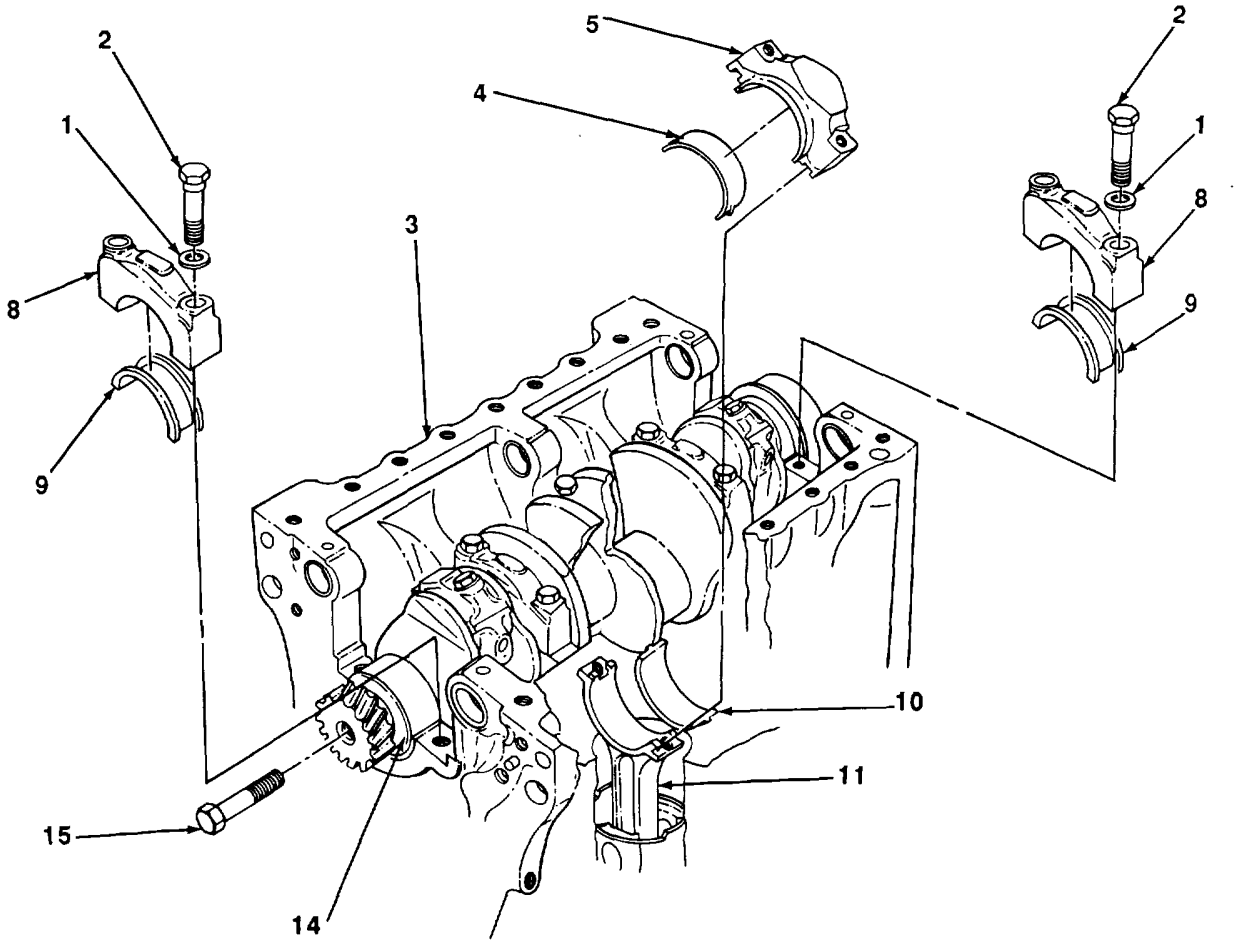
NOTE

Engine has five main bearing caps. Installation of all five Is the same. One is shown. Repeat steps 4 through 6 for remaining main bearing caps.

4. Slide lower sleeve bearing half (9) in place in main bearing cap (8). Ensure that tangs on lower sleeve bearing half fit in locking groove of main bearing cap and oil holes line up with oil passages. Coat parts with engine oil.

5. Position main bearing cap (8) and assembled lower sleeve bearing half (9) in place on engine block (3) and crankshaft (14) with match-marks alined.

6. Coat threads of two screws (2) with engine oil. Install two screws and washers (1) in main bearing cap (8) and engine block (3).



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3-10. FLYWHEEL HOUSING MAINTENANCE (Con't).

e. INSTALLATION

1. Using pilot and driver, install new seal (3) in flywheel housing (2).

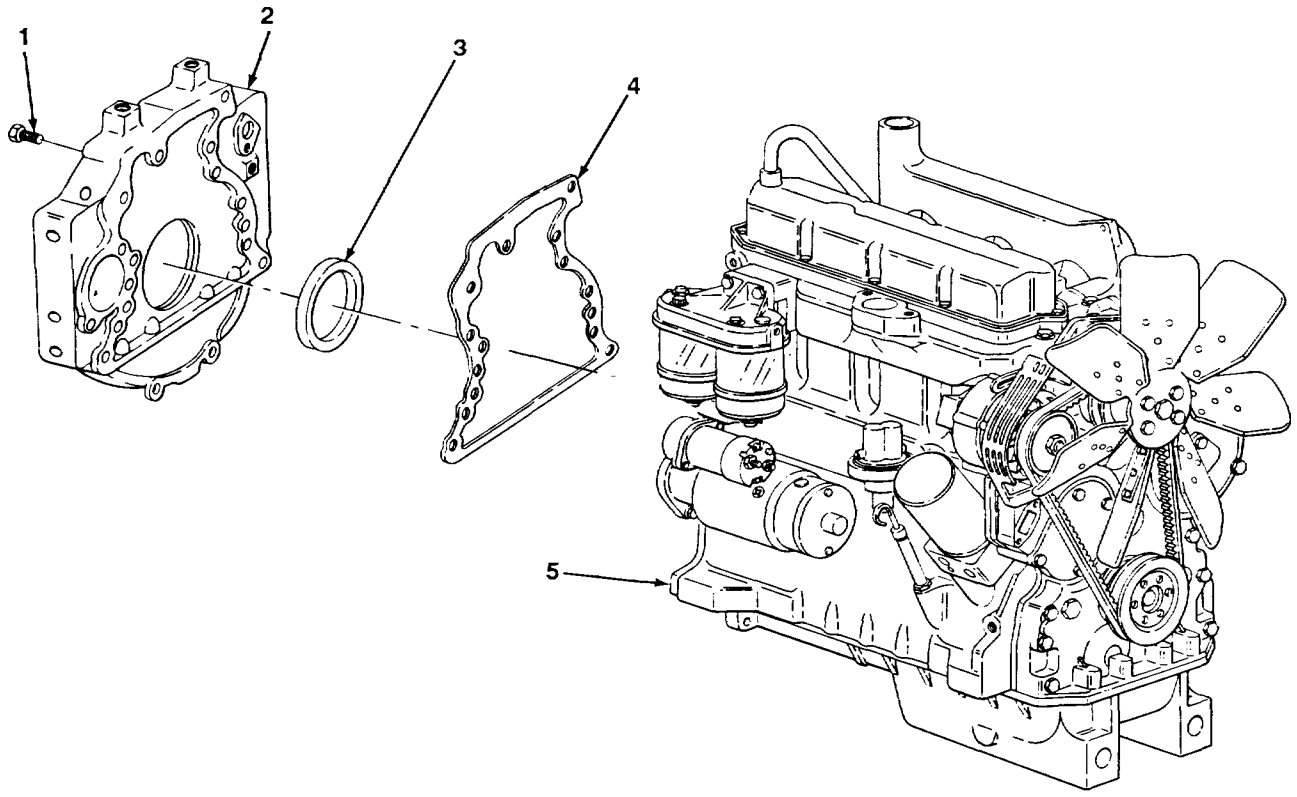
2. Position new gasket (4) in place on engine block (5).

WARNING

Use extreme caution when handling heavy parts. Lifting device Is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious Injury or death to personnel.

3. With the aid of an assistant, lift flywheel housing (2) into position on engine block (5).

4 Install nine screws (1) in flywheel housing (2) and engine block (5).



FOLLOW-ON TASKS:

- Install engine flywheel and ring gear (see paragraph 3-9).
- Install engine oil pressure switch (see TM 5-2420-222-20).
- Install clutch pressure plate, disk, carrier, and bearing (see paragraph 4-1 or 4-2).
- Install engine assembly (see paragraph 3-3).

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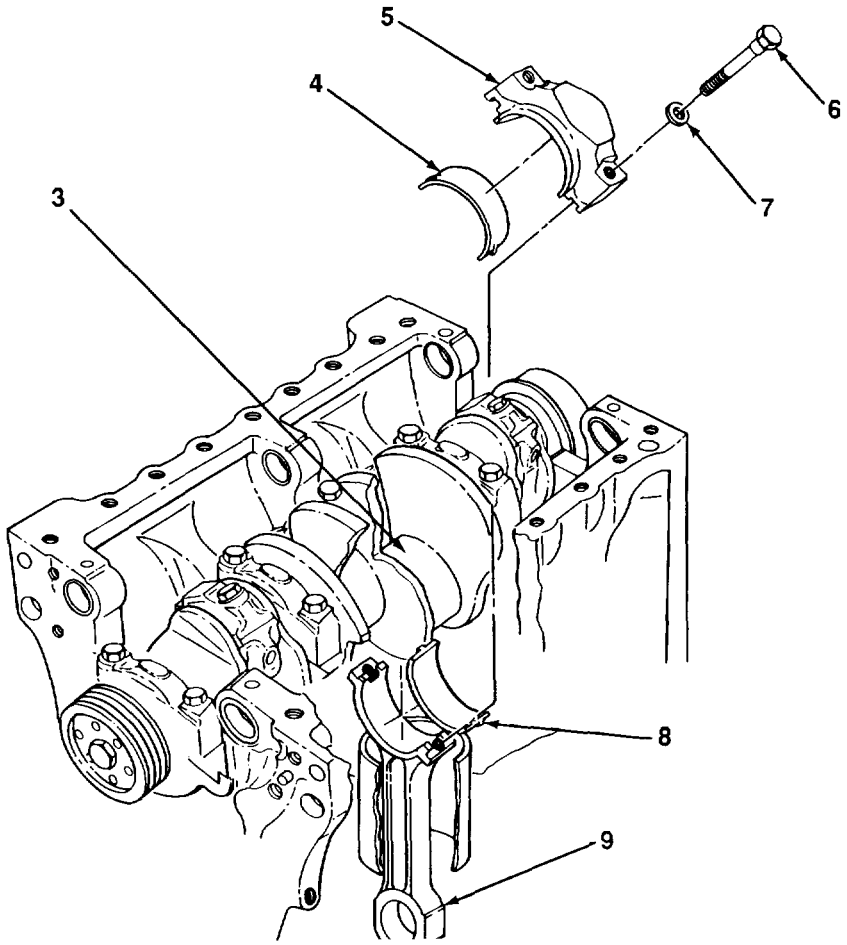
3-11. PISTON, CONNECTING ROD, AND CONNECTING ROD BEARING MAINTENANCE (Con't).



4. Position connecting rod bearing cap (5) with assembled lower sleeve bearing half (4) in place on crankshaft journal (3) and connecting rod (9) and assembled upper sleeve bearing half (8).

5. Coat threads of two bolts (6) with engine oil. Install bolts and washers (7) in connecting rod bearing cap (5) and connecting rod (9). Torque bolts to 65 lb.-ft. (88 N•m).

FOLLOW-ON TASKS:

- Install engine oil pan (see paragraph 3-20).
- Install cylinder head (see paragraph 3-6).
- Install engine assembly (see paragraph 3-3).

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3-14. TAPPET REPLACEMENT.

This Task Covers:

a. Removal
b. Cleaning and Inspection
c. Installation

Initial Setup:

Equipment Conditions:

- Cylinder head removed (see paragraph 3-6).

Tools/Test Equipment:

- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:

- Engine oil (Item 25, Appendix B)
- Dry cleaning solvent (Item 31, Appendix B)
- Marker tags (Item 32, Appendix B)
- Nonelectrical wire (Item 44, Appendix B)

General Safety Instructions:

- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

a. REMOVAL

CAUTION

Tappets must be Installed in same bore from which they are removed. Improper Installation may damage parts.

Using magnetic retrieving tool, remove eight tappets (2) from engine block (1) and camshaft (3).

b. CLEANING AND INSPECTION

WARNING

- **Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.**

- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid injury to personnel.**

1. Clean tappets in dry cleaning solvent and dry with compressed air.

2. Inspect tappets for cracks, bends, breaks, and excessive wear. Replace defective parts.

3-16. ENGINE TIMING.

This Task Covers: Adjustment

Initial Setup:

Equipment Conditions:

- Rocker arm cover removed (see TM 5-2400-222-20).

Tools/Test Equipment:

- General mechanic's tool kit
- Field automotive shop set

NOTE

Timing gears are marked for ease of Installation. Marks on timing gears consist of slash-marks stamped on all faces except the Idler spur gears. When slash-marks on gear faces aline with center of crankshaft, with no. 1 cylinder at top dead center (TDC), as illustrated, gears are timed correctly.

ADJUSTMENT

NOTE

Cylinders are numbered from one to four starting at fan end of engine assembly.

1. Remove pin (1) and cover (2) from flywheel housing (4).
2. Manually crank engine assembly until no. 1 cylinder is at TDC and hole in flywheel (3) is alined with timing hole in flywheel housing (4).
3. Insert pin (1) timing hole in flywheel housing (4) until seated in hole in flywheel (3).
4. Remove timing gear cover (see paragraph 3-18).

NOTE

Steps 5 through 11 are performed with all gears Installed in their proper locations.

5. Using dial indicator, measure upper idler spur gear (6) backlash. Backlash must be 0.0027- 0.0166 in. (0.0686-0.4216 mm). Adjust end play as required (see paragraph 3-15).
6. Using dial indicator, measure camshaft helical gear (11) backlash. Backlash must be 0.0028- 0.0185 in. (0.0711-0.4699 mm). Adjust end play as required (see paragraph 3-17).
7. Using dial indicator, measure fuel metering pump helical gear (5) backlash. Backlash must be 0.0028-0;0185 in. (0.0711-0.4699 mm). Adjust end play as required (see paragraph 5-3).
8. Using dial indicator, measure lower idler spur gear (10) backlash. Backlash must be 0.0027- 0.0187 in. (0.0686-0.4750 mm). Adjust end play as required (see paragraph 3-15).

3-18. TIMING GEAR COVER MAINTENANCE (Con't).

c. CLEANING AND INSPECTION

WARNING

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1. Clean access covers and timing gear cover with dry cleaning solvent and rags. Dry thoroughly with clean, dry rags.

2. Inspect access covers and timing gear cover for cracks, breaks, abnormal bends, or damaged threads. Replace defective parts.

3. Restore damaged threads using screw threading set.

d. ASSEMBLY

CAUTION

When Installing seal, do not press against timing gear cover with excessive force. Timing gear cover Is made of aluminum and excessive force may damage it.

1. Support seal bore area of timing gear cover (11) with wood blocks.

2. Coat outside edge of new seal (23) with sealing compound. Position seal in seal bore of timing gear cover (11) with spring-loaded lip facing rearward.

3. Using remover and installer and hammer, tap seal (23) in place in timing gear cover (11).

4. Position access cover (13) and new gasket (22) in place on timing gear cover (11). Install three screws (20) and new lockwashers (21) in access cover and timing gear cover.

5. Position access cover (17) and new gasket (16) in place on timing gear cover (11). Install two screws (19) and new lockwashers (18) in access cover and timing gear cover.

3-20. ENGINE OIL PAN REPLACEMENT (Con't).

a. REMOVAL

1. Remove two screws (3) and lockwashers (4) from oil pan (22) and frame assembly front support (2). Discard lockwashers.

2. Remove two screws (14) and lockwashers (15) from oil pan (22), flywheel housing (26), and reverser housing (1). Discard lockwashers.

WARNING

Use extreme caution when handling heavy parts. Lifting device is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious Injury or death to personnel.

3. Using hydraulic jack, support oil pan (22) in place on engine block (25) and timing gear cover (24).

NOTE

Screws securing oil pan have different lengths and hardness. Note location of screws during removal to ensure proper placement during Installation.

4. Remove six screws (9) and lockwashers (5) from oil pan (22) and timing gear cover (24). Discard lockwashers.

5. Remove 22 screws (6, 10, 11, 16,17, 18, 20, and 21) and lockwashers (5 and 19) from oil pan (22) and engine block (25). Discard lockwashers.

6. Tap oil pan (22) with hammer to unseat. With the aid of an assistant and hydraulic jack, lower oil pan and gasket (23) from engine block (25) and timing gear cover (24). Discard gasket.

7. Pry spacers (7 and 8) from oil pan (22). Note quantity and location of spacers to ensure proper installation.

8. Remove plug (13) and spring tension washer (12) from oil pan (22).

b. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

1. Clean oil pan and plug with dry cleaning solvent and clean rags. Dry thoroughly with clean, dry rags.

2. Inspect oil pan for cracks, breaks, and abnormal bends. Replace if defective.

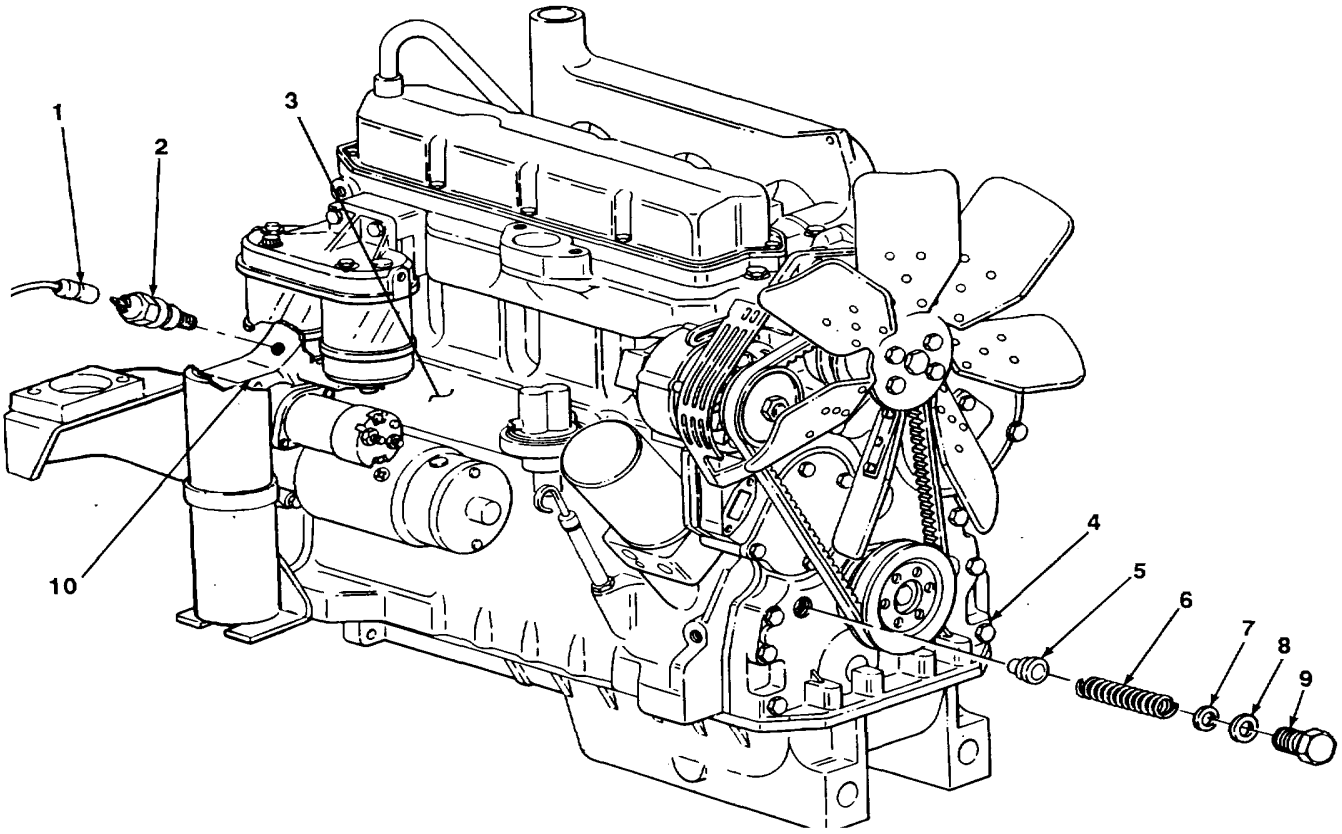
3. Inspect oil pan and plug for damaged threads. Restore damaged threads using screw threading set.

c. INSTALLATION

1. Install spring tension washer (12) and plug (13) in oil pan (22).

3-22. PRESSURE REGULATING VALVE REPLACEMENT (Con't).

1. Remove machine plug (9) and washers (3 and 8) from timing gear cover (4).
2. Remove spring (6) from timing gear cover (4) and engine block (3).
3. Using magnetic retrieving tool, remove directional slide (5) from engine block (3).



b. CLEANING AND INSPECTION

WARNING

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1. Clean all metal parts in dry cleaning solvent, then dry thoroughly with clean, dry rags.

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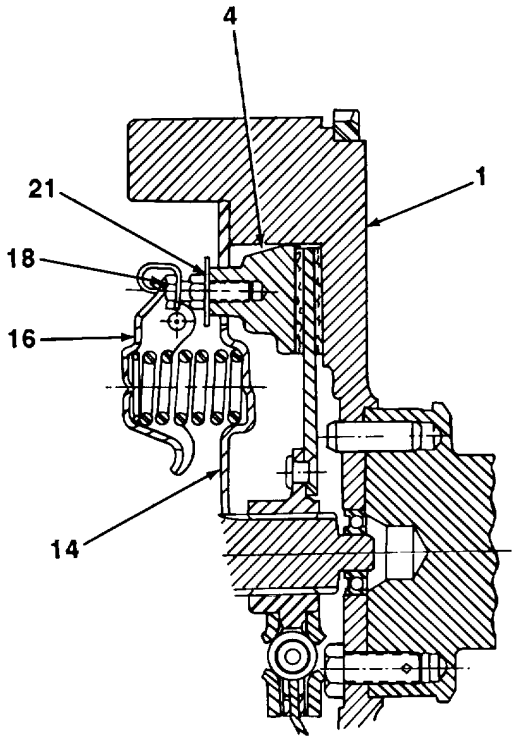
3-22. PRESSURE REGULATING VALVE REPLACEMENT (Con't).

4-1. CLUTCH ASSEMBLY MAINTENANCE (SERIAL NUMBERS 235786-235999) (Con't).

3. Repeat steps 1 and 2 for two remaining remote control levers (16).

4. Using clutch finger alining tool and thickness gage, recheck all three remote control levers (16).

5. To ensure proper clutch functioning, variation in adjusted height of remote control levers (16) should not exceed 0.020 in. (0.508 mm). If remote control levers dropped excessively, repeat steps 1 through 4.

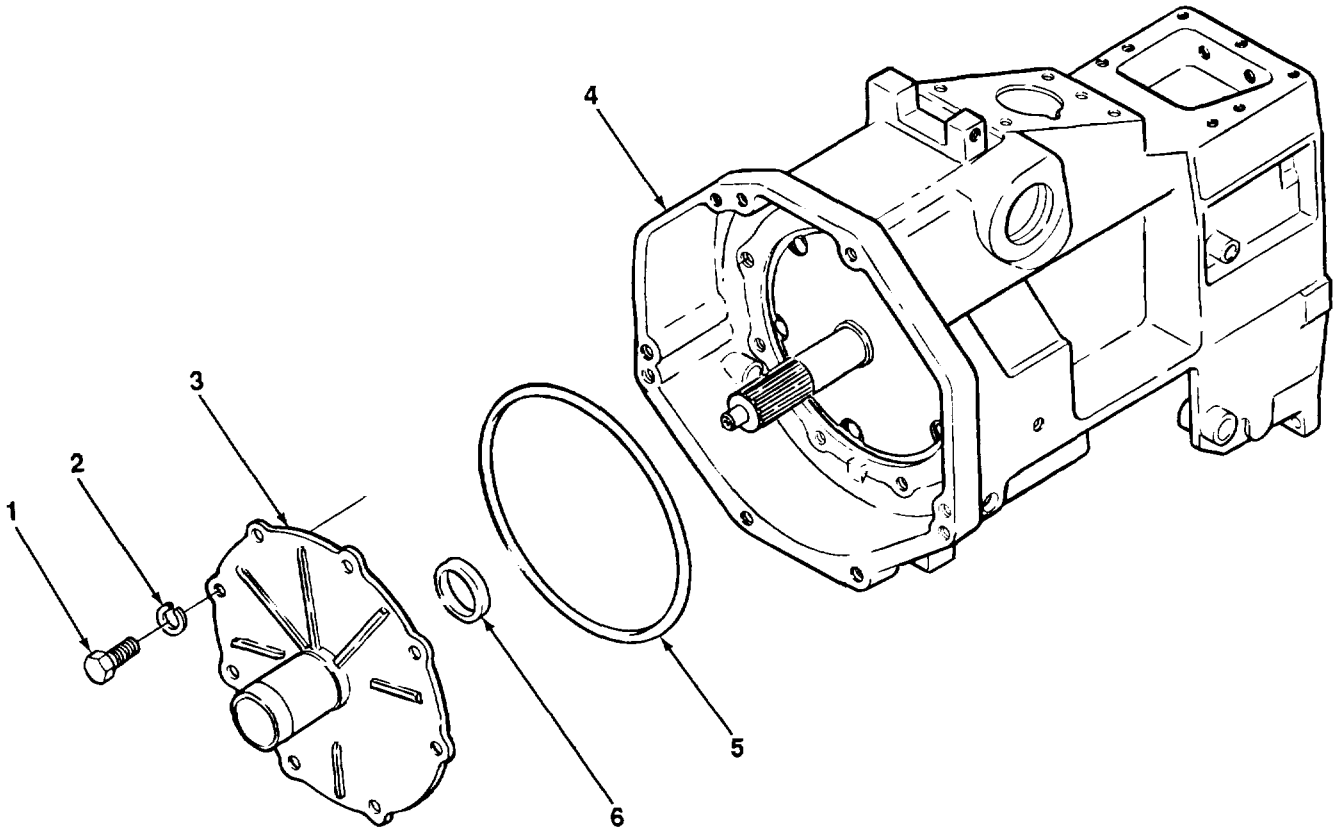


FOLLOW-ON TASKS:

- Install engine assembly (see paragraph 3-3).
- Adjust clutch pedal linkage (see TM 5-2420-222-20).

TA701310

4-4. CLUTCH DISK CARRIER OR CLUTCH SUPPORT BEARING CARRIER MAINTENANCE (Con't).



c. CLEANING AND INSPECTION

1. Use a vacuum cleaner to remove dust particles from parts.

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.

2. Using rags and dry cleaning solvent, wipe carrier clean, then dry thoroughly with clean rags.

3. Inspect carrier for cracks, breaks, and abnormal bends. Replace if defective.

TA701315

5-2. FUEL METERING PUMP REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:

- Hood removed (see TM 5-2420-222-20).
- Battery ground cable disconnected (see TM 5-2420-222-20).

Tools/Test Equipment:

- General mechanic's tool kit
- Automotive fuel and electrical tool kit
- Electrical repair shop set

References:

- TM 5-2420-222-10

Materials/Parts:

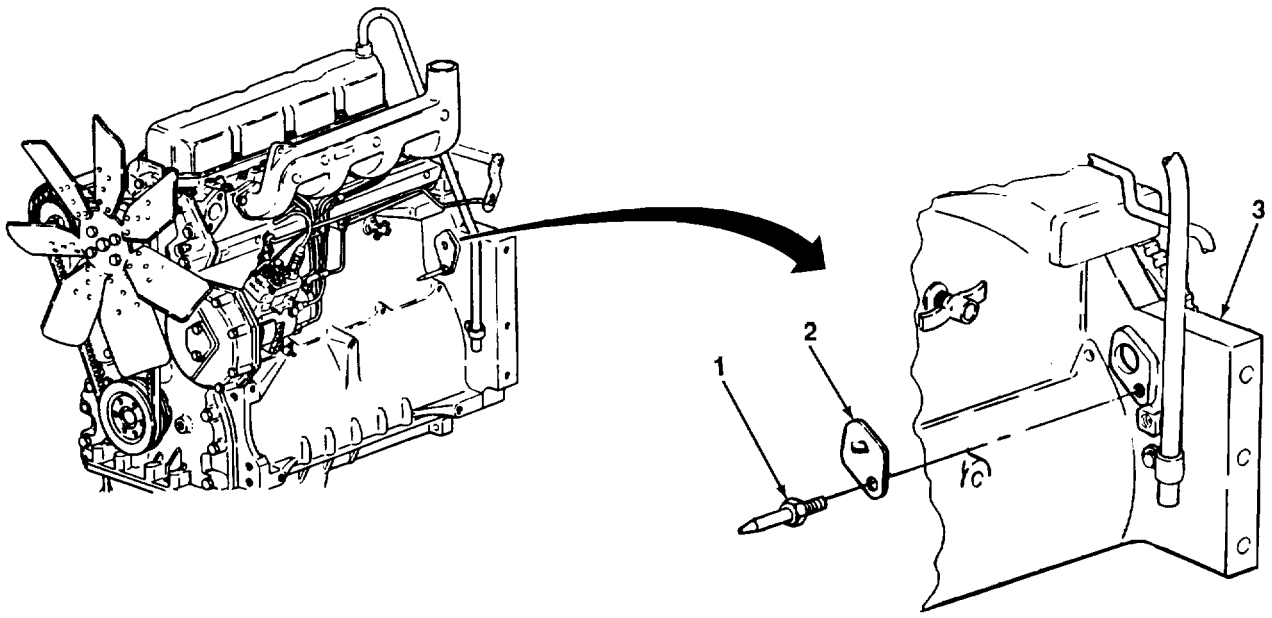
- Grease (Item 22, Appendix B)
- Rags (Item 28, Appendix B)
- Marker tags (Item 32, Appendix B)
- One cotter pin
- One cotter pin
- Two lockwashers
- Eight washers

General Safety Instructions:

- DO NOT perform this procedure near fire, flames, or sparks.

a. REMOVAL

1. Remove pin (1) and cover (2) from flywheel housing (3).



TA701323

5-5. SPEED CONTROL SHAFT REPLACEMENT (Con't).

b. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

1. Clean speed control shaft with dry cleaning solvent. Wipe dry with clean, dry rags.

2. Inspect speed control shaft for cracks, breaks, abnormal bends, and excessive wear at cowl support contact points. Replace if defective.

c. INSTALLATION

1. Apply grease to cowl support contact points on speed control shaft (2).

2. Slide speed control shaft (2) in cowl support (3).

3. Install speed control rod (1), washer (5), and new cotter pin (4) in speed control shaft (2).

FOLLOW-ON TASKS:

- Install cowl support (see paragraph 13-5).
- Install speed control arms (see TM 5-2420-222-20).

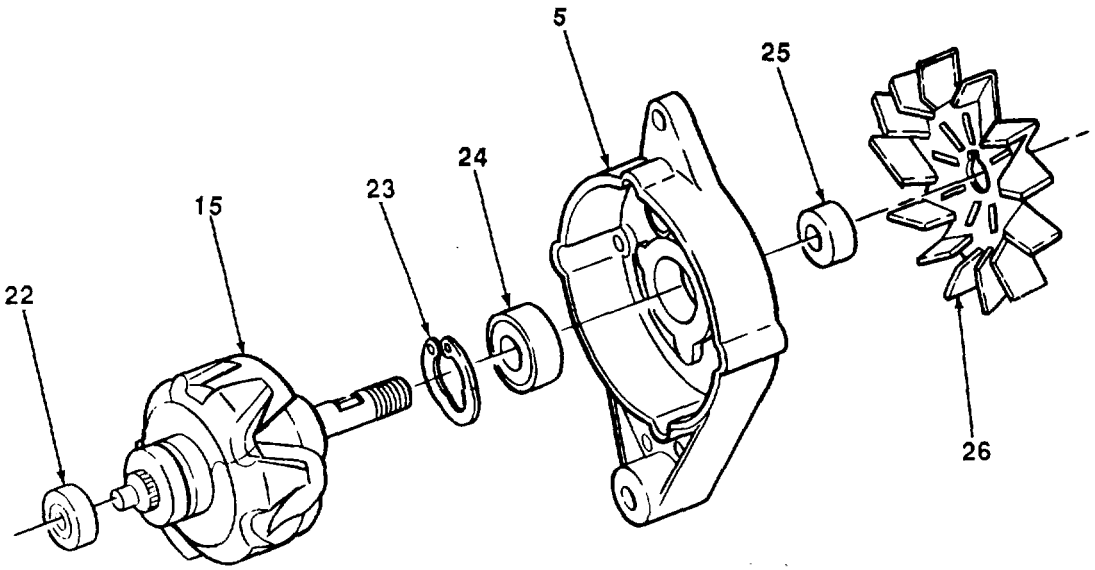
7-1. ENGINE AC GENERATOR REPAIR (Con't).

c. REPAIR

1. If scored, turn slip rings on rotor using engine lathe, then polish lightly with fine abrasive paper.
2. Restore damaged rotor, semiconductor devices, or plate assembly threads using screw threading set.

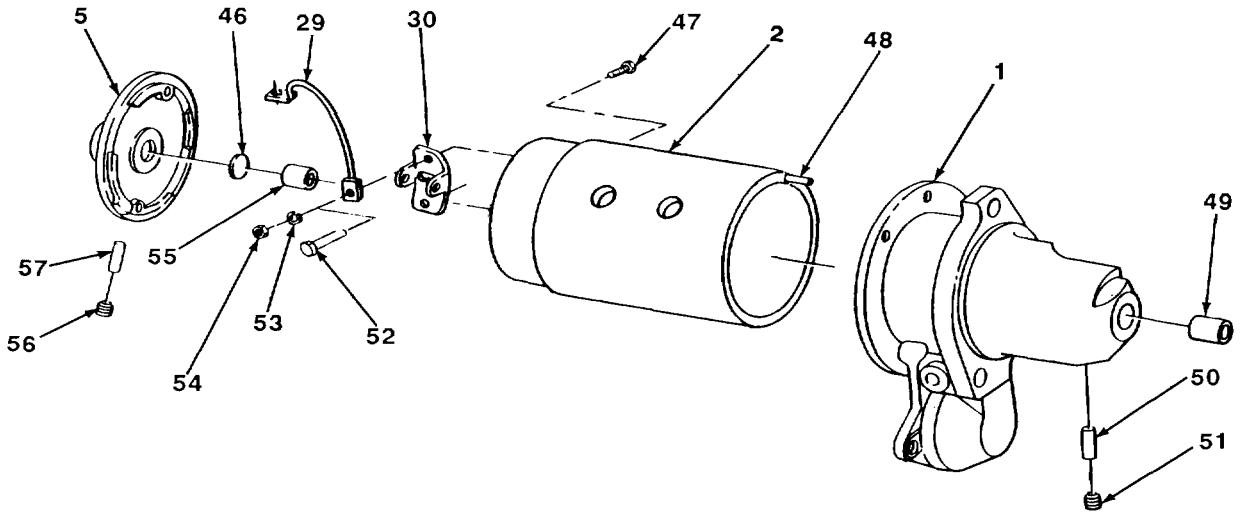
d. ASSEMBLY

1. Using arbor press and inside diameter remover and installer, press ball bearing (22) in place on rotor (15).
2. Using arbor press and outside diameter remover and installer, press ball bearing (24) in front electrical end bell
3. Install retaining ring (23) against ball bearing (24) in front electrical end bell (5).
4. Position front electrical end bell (5) on wood blocks with ball bearing (24) facing up. Install rotor (15) with assembled parts in ball bearing and tap until seated.
5. Slide sleeve bushing (25) in place against ball bearing (24) on rotor (15).
6. Install fan (26) on rotor (15).



TA71339

7-2. ENGINE STARTER REPAIR (Con't).



20. Remove four screws (47), lockwashers (53), and nuts (54) from main housing (2), two supports (30), and leads (29). Discard lockwashers.

21. Remove two supports (30) and leads (29) from main housing (2).

22. Remove wick end (46) from electrical end bell (5).

NOTE

Some loader backhoes do not have pipe plug and wick.

23. Remove pipe plug (56) and wick (57) from electrical end bell (5).

CAUTION

Do not remove sleeve bushing unless damaged. Removal may damage parts.

24. Using gear and bearing mechanical puller, remove sleeve bushing (55) from electrical end bell (5).

25. Remove pipe plug (51) and wick (50) from drive housing (1).

CAUTION

Do not remove sleeve bushing or straight pin unless damaged. Removal may damage parts.

26. Using arbor press and inside diameter remover and installer, drive out sleeve bushing (49) from drive housing (1).

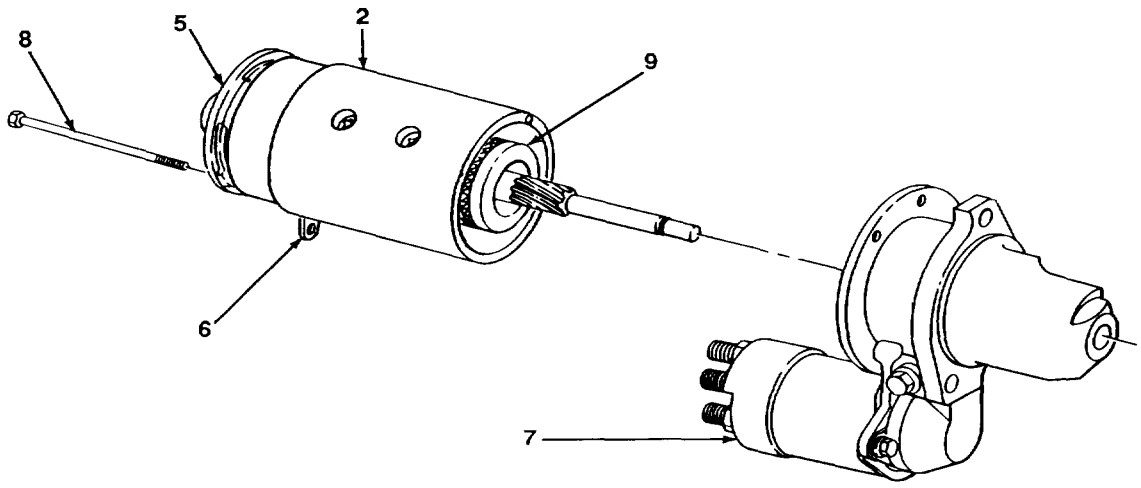
27. Remove straight pin (48) from main housing (2).

TA701348

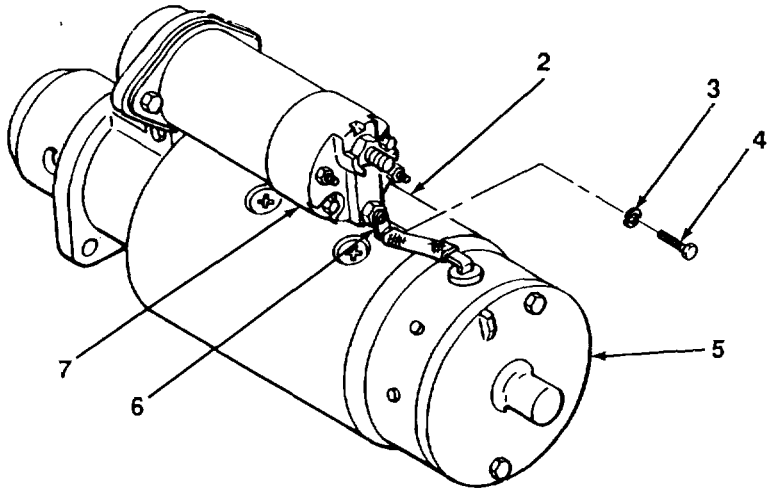
7-2. ENGINE STARTER REPAIR (Con't).

41. Aline match-marks between electrical end bell (5) and main housing (2). Install electrical end bell with assembled parts on main housing and armature (9).

42. Install two capscrews (8) in electrical end bell (5) and main housing (2).



43. Aline hole in angle bracket (6) with hole in electromagnetic relay (7). Install machine screw (4) and new lockwasher (3) in angle bracket and electromagnetic relay.



TA701357

8-2. TRANSMISSION MAINTENANCE (Con't).

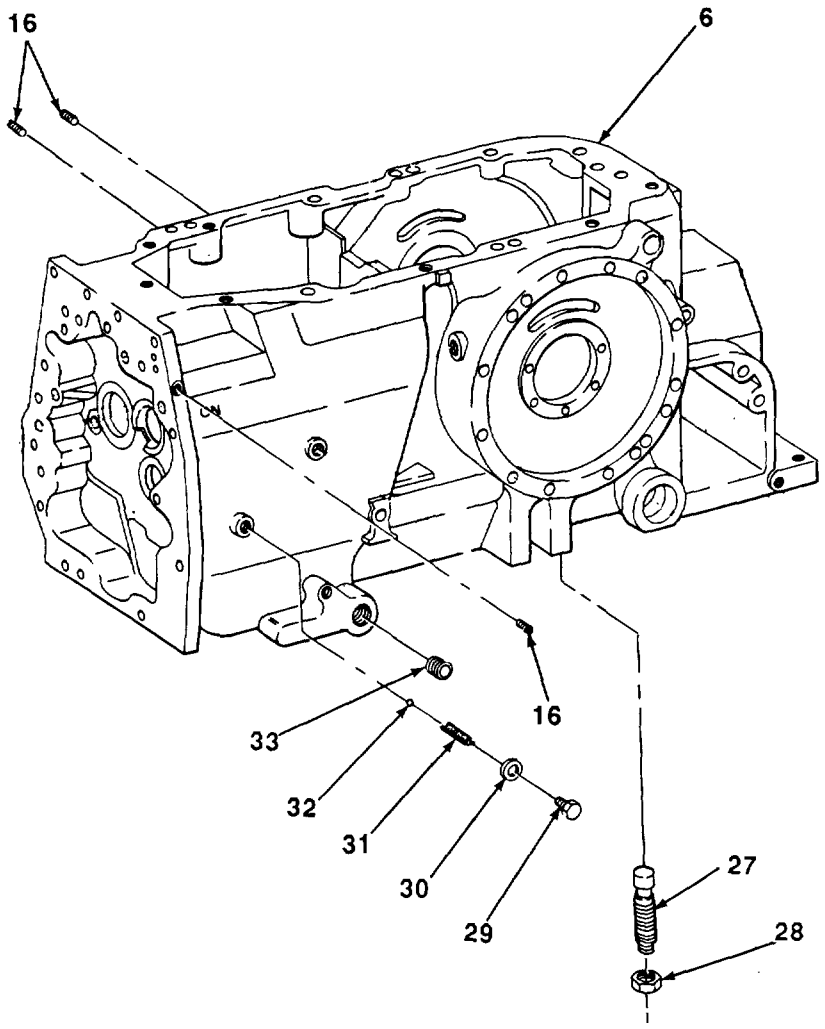
7. Remove transmission oil lines (see paragraph 8-23).

8. Remove capscrew (29), washer (30), and spring (31) from transmission (6).

9. Using magnetic retrieving tool, remove ball bearing (32) from transmission (6).

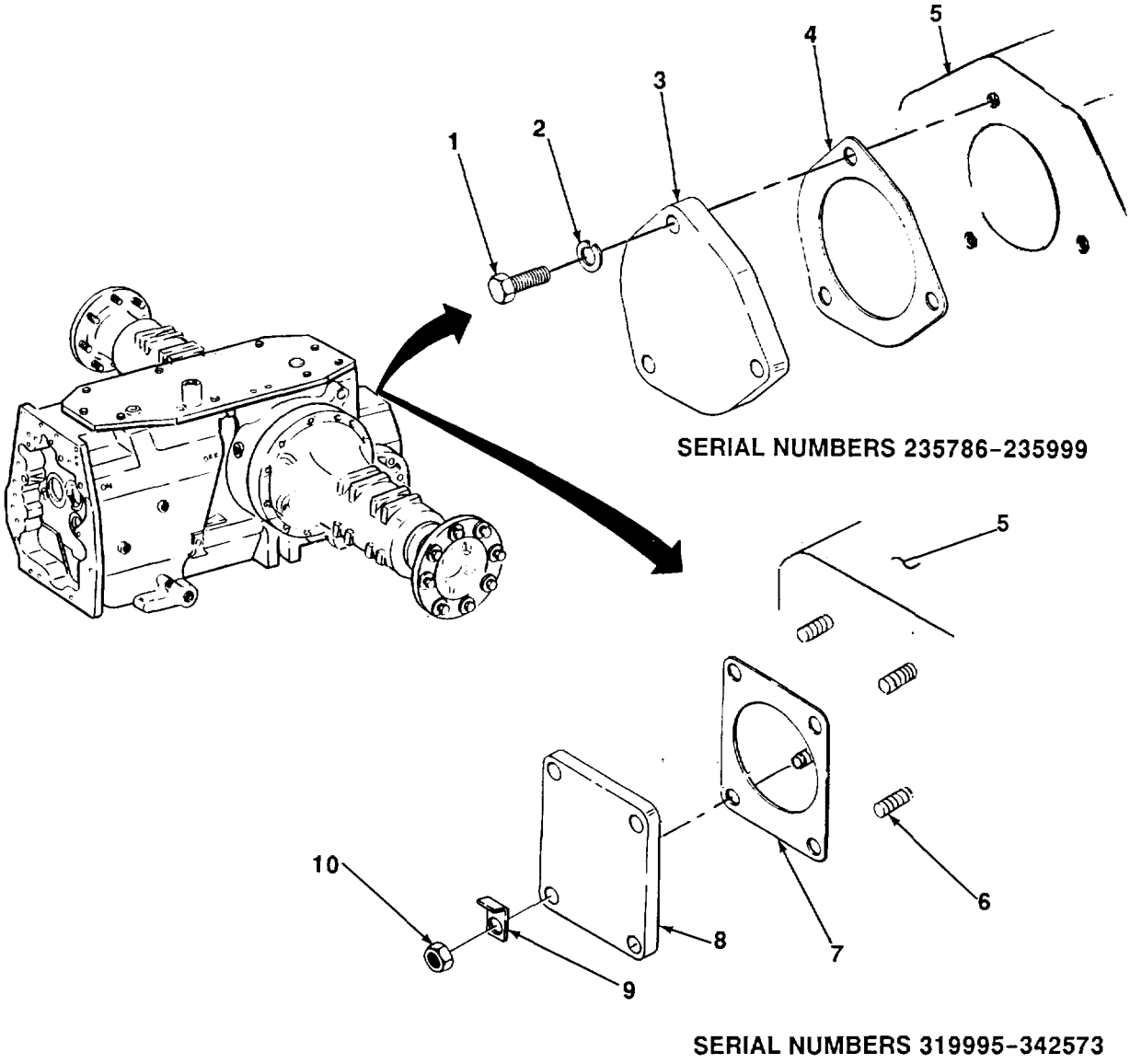
10. Remove straight adapter (33) and three expansion plugs (16) from transmission (6).

11. Remove nut (28) from setscrew (27) and transmission (6).



TA701362

8-3. TRANSMISSION REAR COVER REPLACEMENT (Con't).



TA701368

8-6. DIFFERENTIAL DRIVE SHAFT ASSEMBLY MAINTENANCE.

This Task Covers:

a. Removal
b. Cleaning and Inspection
c. Repair
d. Installation

Initial Setup:

Equipment Conditions:

- Transmission drive shaft removed (see paragraph 8-5).

Tools/Test Equipment:

- General mechanic's tool kit
- Field automotive shop set

References:

- TM 9-214

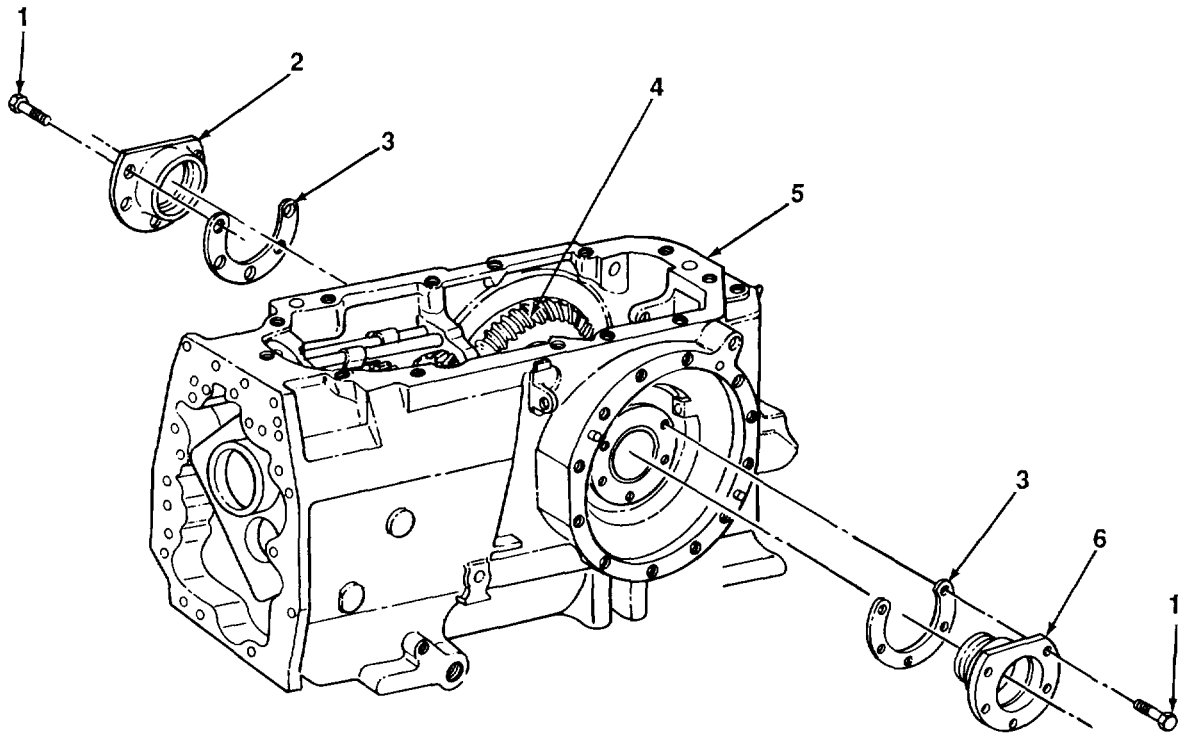
Materials/Parts:

- Rags (Item 28, Appendix B)
- Dry cleaning solvent (Item 31, Appendix B)
- Shim, 0.002 in. thick (as required)
  Shim, 0.005 in. thick (as required)
- Shim, 0.010 in. thick (as required)

General Safety Instructions:

- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.

8-7. DIFFERENTIAL ASSEMBLY MAINTENANCE (Con't).



7. Using lifting device, support differential gear assembly (4) and pry left and right differential quills (2 and 6) and shims (3) from differential gear assembly and transmission (5).

8. If end play noted in step 5 was less than 0.002 in. (0.051 mm), remove one shim (3) from each side. If end play was more than 0.005 in. (0.127 mm), add one shim to each side. Install ten bolts (1) in left and right differential quills (2 and 6) and transmission (5). Torque bolts to 35 lb.-ft. (47 N•m).

TA701380

8-10. GEAR SHIFTERS AND SHIFTER SHAFTS MAINTENANCE. (Con't)

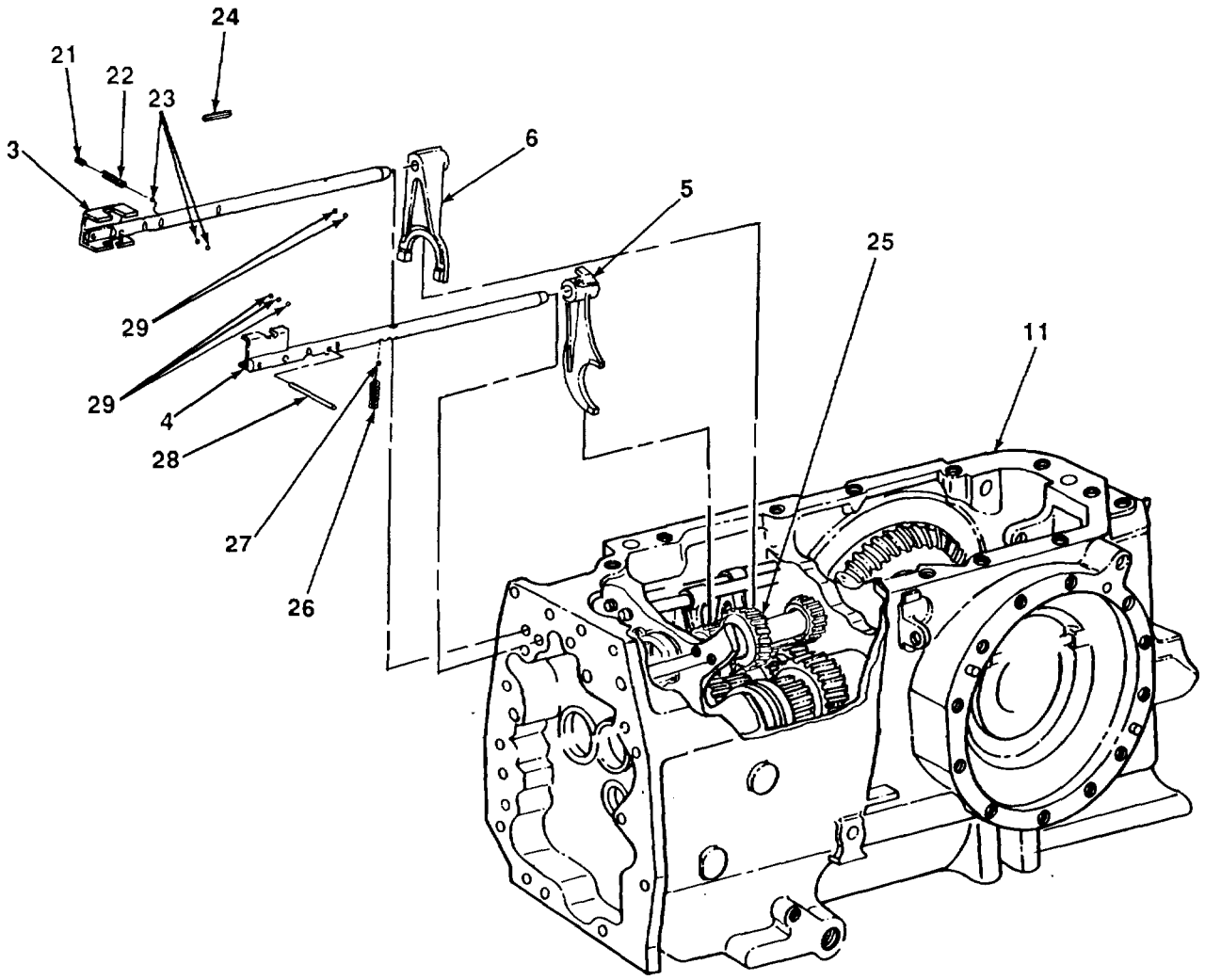
10. While assistant supports shifter fork (6), slide shifter straight shaft (3) out of transmission (11) and shifter fork, and catch five ball bearings (29). Remove three ball bearings (23).

11. Remove shifter fork (6) from collar (25).

12. While assistant supports shifter fork (5), slide remote control lever (4) out of transmission (11) and shifter fork, and catch ball bearing (27) and spring (26). Remove shifter fork.

13. Drive spring pin (24) out of transmission (11) and expansion plug (21). Remove spring (22) and expansion plug from transmission and pin (28). Discard spring pin.

14. Slide pin (28) out of transmission (11).



TA701388

8-12. TRANSMISSION TOP COVER MAINTENANCE (SERIAL NUMBERS 235786- 235999). (Con't)

f. INSTALLATION

1. With the aid of an assistant, position cover (17) and new gasket (16) in place on transmission (15).
2. Install capscrew (8) and sleeve spacer (9) in cover (17) and transmission (15).
3. Install capscrews (3 and 12) in cover (17) and transmission (15).
4. Install ten capscrews (10) in cover (17) and transmission (15). Torque capscrews (3, 10, and 12) to 35 lb.-ft. (47 N•m).
5. Install spring (7) on retaining strap (6) and pedal assembly (11).

FOLLOW-ON TASKS:

- Install transmission liquid level gage rod (see TM5-2420-222-10).
- Install transmission temperature sending unit (see TM5-2420-222-20).
- Install rear crossmember (see TM5-2420-222-20).

8-16. REVERSER HOUSING MAINTENANCE (Con't).

2. Inspect all metal parts for cracks, breaks, and abnormal bends.

3. Inspect reverser housing for cracks, breaks, or damaged threads. Restore damaged threads using screw threading set.

d. ASSEMBLY

NOTE

Perform steps 1 through 4 only if button plug, expansion plug, clutch and sleeve bushings, and bearing sleeve were replaced.

1. Install button plug (23) in reverser housing (1).

2. Install expansion plug (21) in reverser housing (1).

3. Install sleeve bushing (22) and clutch bushing (24) in reverser housing (1).

4. Install bearing sleeve (25) in reverser housing (1).

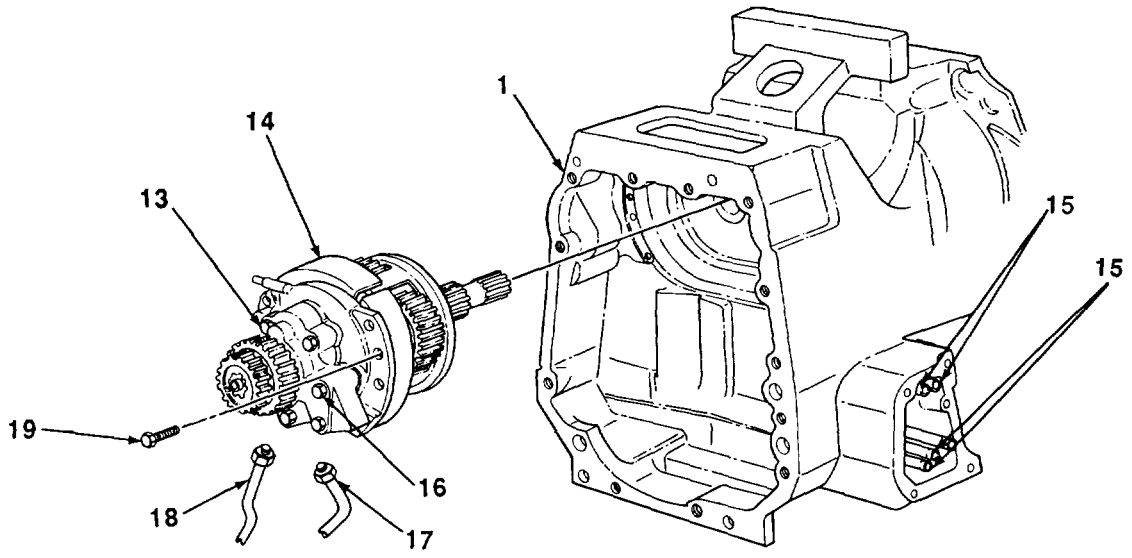
5. Install new preformed packing (20) in reverser housing (1).

6. Install four tubes (15) in reverser brake housing (14).

7. Install reverser brake housing (14) and tubes (15) in reverser housing (1) with seven screws (19). Torque screws to 35 lb.-ft. (47 N•m).

8. Install transmission oil pump (13) on reverser brake housing (14) with six screws (16). Torque screws to 35 lb.-ft. (47 N•m).

9. Install two tubes (17 and 18) in transmission oil pump (13) and reverser housing (1).



TA701401

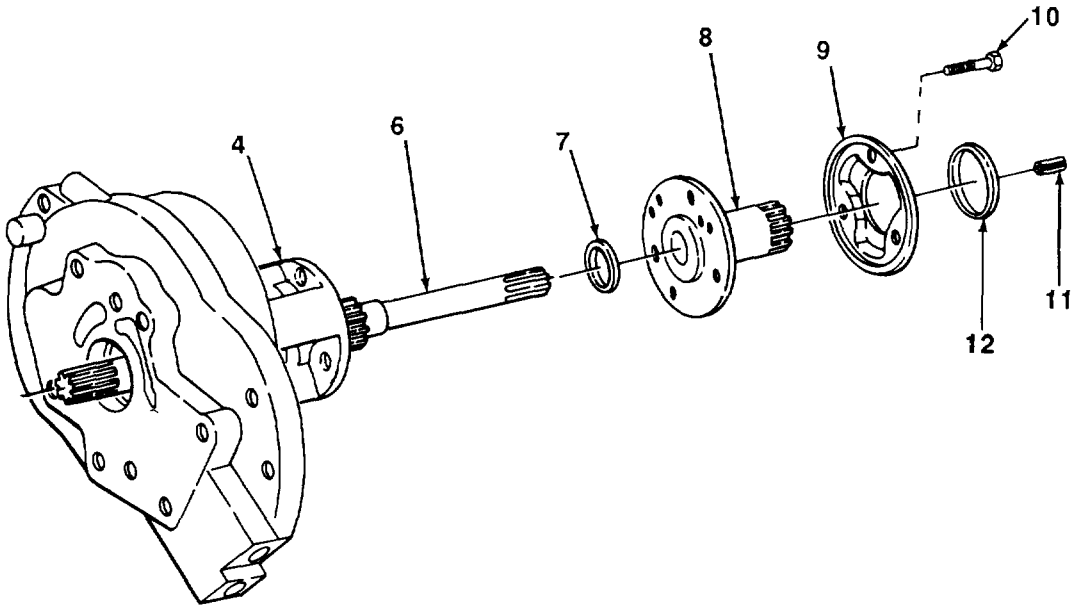
8-17. REVERSER BRAKE HOUSING REPAIR (Con't).

17. Install thrust washer (7) on gearshaft (6).

18. Position hub (8) over gearshaft (6) and on carrier (4).

19. Install deflector (9) and hub (8) on carrier (4) with three screws (10).

20. Install bearing washer (12) and new spring pin (11) through hub (8).

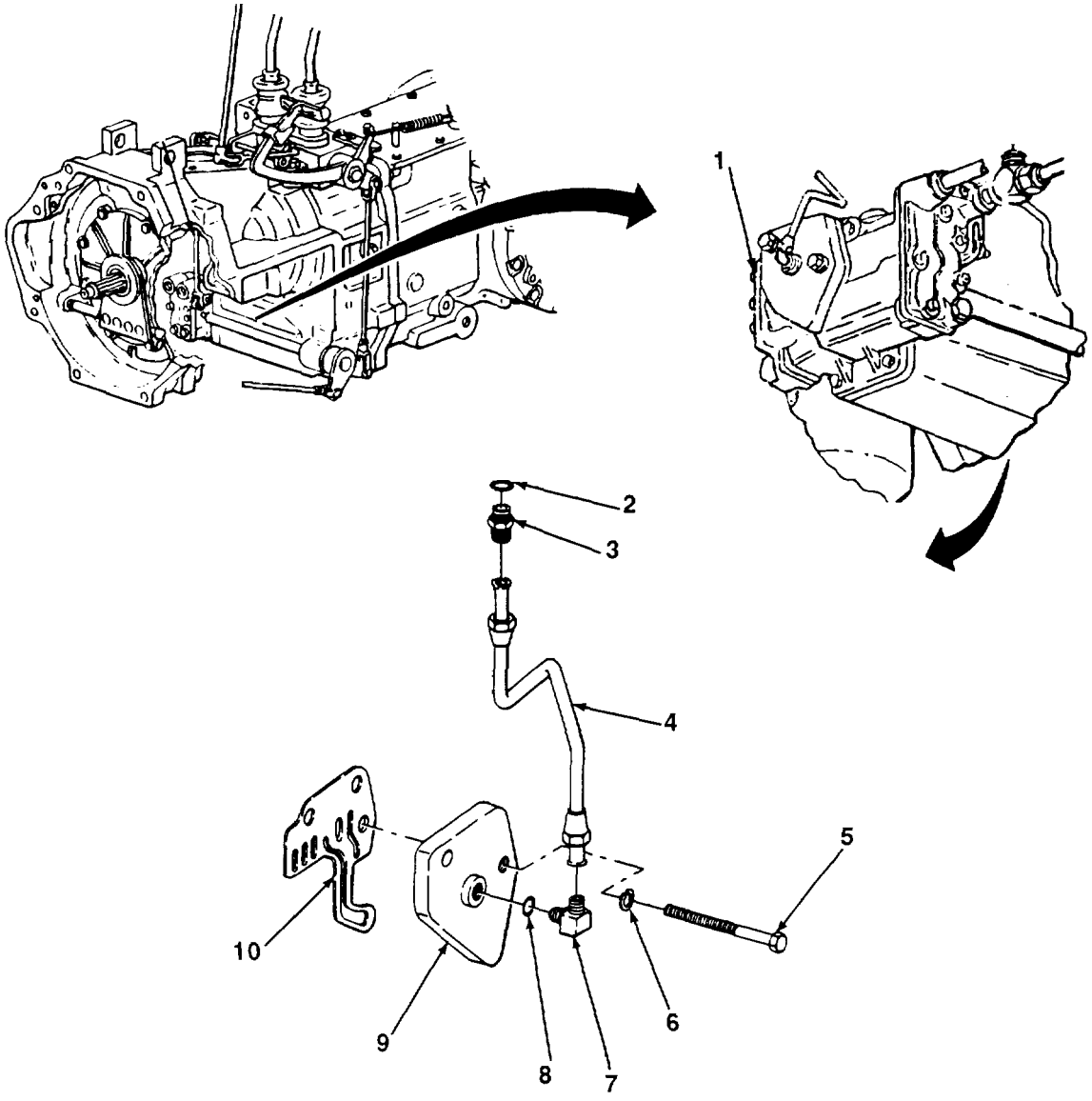


FOLLOW-ON TASKS:

- Install reverser brake housing (see paragraph 8-16).

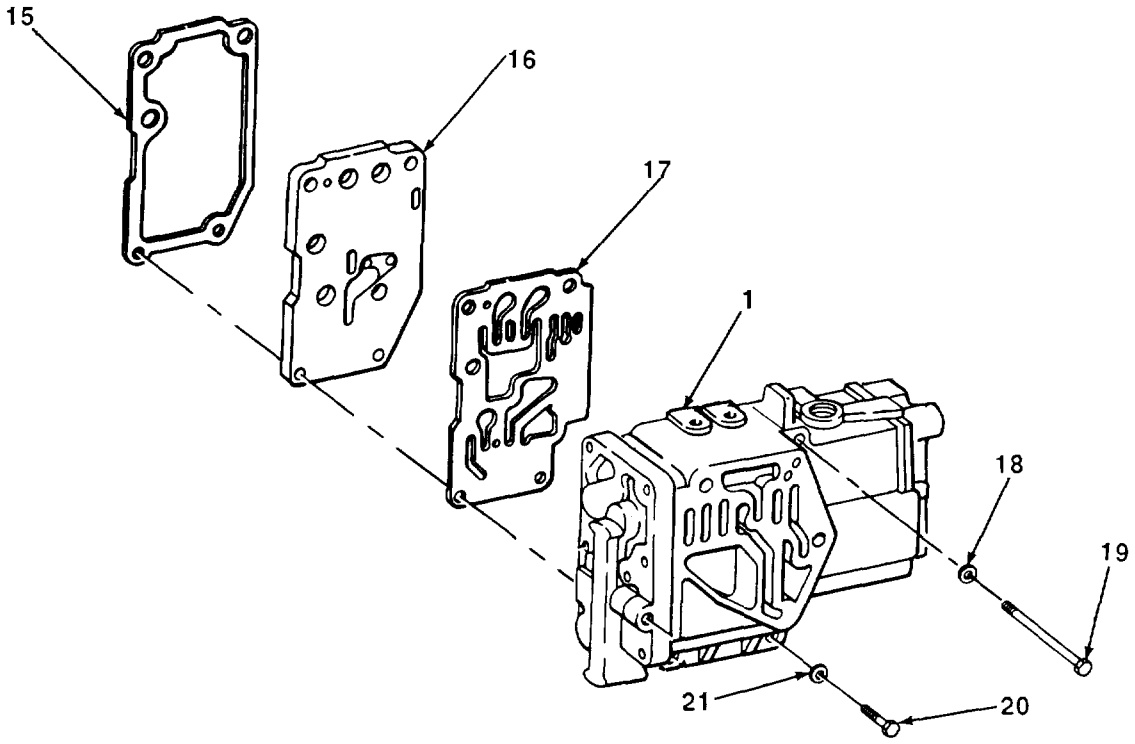
TA701411

8-20. REVERSER CLUTCH CONTROL VALVE ASSEMBLY MAINTENANCE (Con't).



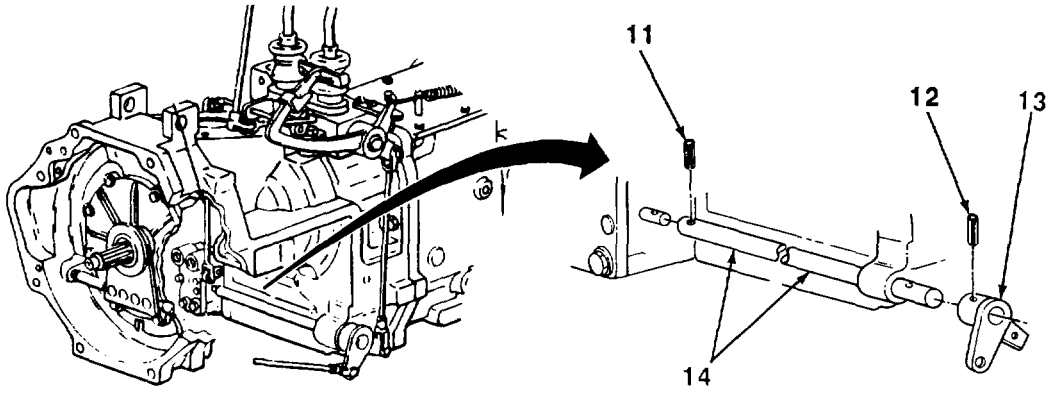
TA701419

8-20. REVERSER CLUTCH CONTROL VALVE ASSEMBLY MAINTENANCE (Con't).



5. Install shaft (14) on valve body (1) and install new spring pin (11).

6. Install lever (13) on other end of shaft (14) with new spring pin (12).



TA701429

9-1. FRONT AXLE ASSEMBLY MAINTENANCE (Con't).

4. If damaged, remove two grease fittings (1) from front axle (4).

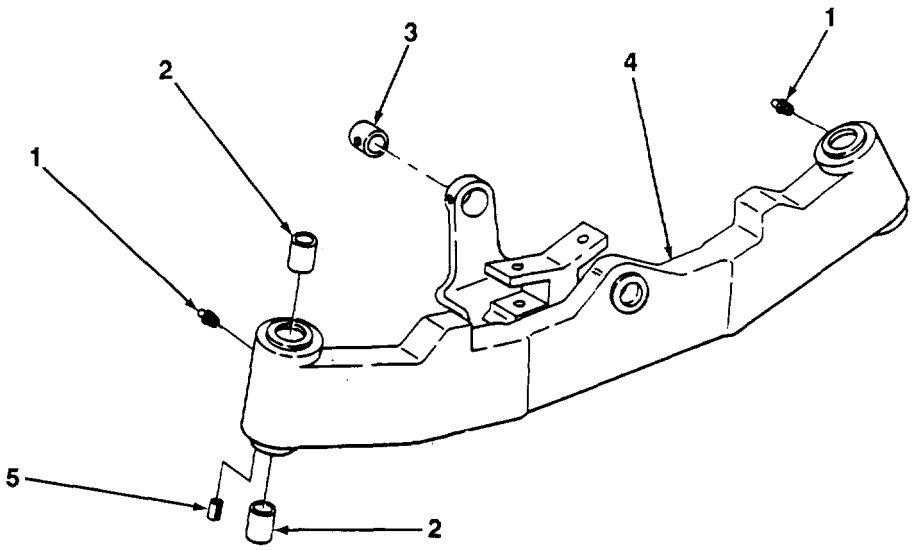
CAUTION

Do not remove spring pins or bushings unless damaged. Removal may damage parts.

5. Remove two spring pins (5) from front axle (4).

6. Using brass drift and hammer, drive bushing (3) out of front axle (4).

7. Using mechanical gear and bearing puller, remove four bushings (2) from front axle (4).



b. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

1. Clean front axle with dry cleaning solvent and rags. Dry thoroughly with clean, dry rags.

2. Clean all other metal parts with dry cleaning solvent. Dry thoroughly with clean, dry rags.

3. Inspect all metal parts for cracks, breaks, abnormal bends, and damaged threads. Replace defective parts that cannot be repaired.

9-3. REAR AXLE HOUSING, SHAFTS, SEALS, BEARINGS, AND PLANETARY PINION CARRIER MAINTENANCE (Con't).

3. Support transmission (9) with wood blocks.

4. Drain transmission (see TM 5-2420-222-20).

NOTE
Steps 5 through 10 apply only to right side rear axle housing.

5. Using lifting device, support rear axle housing (1).

6. Place drain pan under rear axle housing (1).

7. Remove eight screws (10) from rear axle housing (1) and transmission (9).

8. Using lifting device, remove rear axle housing (1) with assembled parts and gasket (6) from transmission (9) and final drive shaft (7) and set on wood blocks. Discard gasket.

9. Remove final drive shaft (7) and assembled brake disk (8) from drive shaft hub and transmission (9).

10. Using center punch and ball-peen hammer, match-mark brake disk (8) and final drive shaft (7). Remove brake disk from final drive shaft.

9-3. REAR AXLE HOUSING, SHAFTS, SEALS, BEARINGS, AND PLANETARY PINION CARRIER MAINTENANCE (Con't).

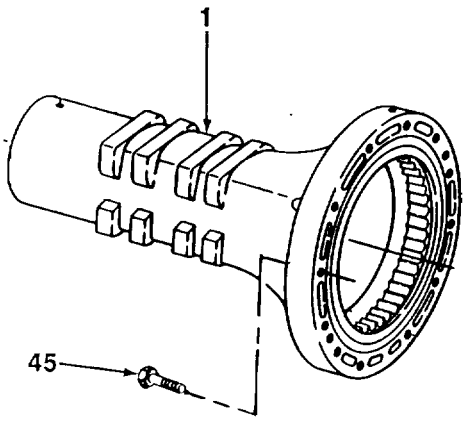
CAUTION

- **Do not torque screw to more than 55 lb.-ft. (75 N•m) during bearing preload adjustment or damage to bearings will result.**
- **Axle shaft must be turned while screw is being tightened, or damage to bearings will result.**

19. Install, but do not tighten screw (30) in washer (31) and axle shaft (15).

NOTE

For loader backhoes with serial numbers 235786-235999, use $^{9}/_{16}$ In. -12 UNC x 5 in. screws. For loader backhoes with serial numbers 319995-342573, use 3/4 in. -10 UNC X 5 in. screws.



20. Install two screws (45) opposite each other in axle housing (1) flange so that 2 in. (5.1 cm) of each screw extends out of flange.

21. While assistant turns axle shaft (15) clockwise, use pinch bar and two screws (45) to tighten screw (30). Torque screw to 55 lb.-ft. (75 N•m).

22. While assistant holds axle shaft (15) from turning, remove screw (30), washer (31), spacer (33), and ½ in. (13 mm) piece of solid tin alloy solder.

23. Using micrometer caliper set, measure thickness across flats pressed in X in. (13 mm) piece of solid tin alloy solder. Subtract 0.005 in. (0.127 mm) from thickness.

24. Add or remove shims (34) from shim pack until thickness of shims is the same as thickness in step 23.

25. Install shims (34), spacer (33), and washer (31) on axle shaft (15) and planetary pinion carrier (32).

CAUTION

Axle shaft must be turned while screw is being tightened, or damage to bearings will result.

26. Install, but do not tighten screw (30) in washer (31) and axle shaft (15).

27. While assistant turns axle shaft (15) clockwise, use pinch bar and two screws (45) to tighten screw (30). Torque screw to 180-240 lb.-ft. (244-325 N•m).

28. Using torque wrench, turn axle shaft (15) by screw (30) three full turns. While turning axle shaft, check bearing preload on torque wrench. Preload should be 8-12 lb.-ft. (11-16 N•m).

NOTE

If bearing preload was within specification In step 28, skip steps 29 and 30.

29. While assistant holds axle shaft (15) from turning, remove screw (30) and washer (31).

10-1. PARKING BRAKE BAND AND LINING MAINTENANCE (Con't).

a. REMOVAL

WARNING

Ensure that loader bucket and backhoe bucket are lowered to ground and wheels are blocked to prevent loader backhoe from moving while performing maintenance on parking brake.

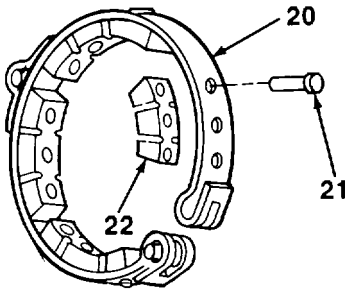
1. Release parking brake lever (see TM 5-2420-222-10).
2. Disconnect auger bleed line (6) from elbow (5). Remove elbow and adapter (7) from transmission (9).
3. Remove special capscrew (8) from brake band and lining (1) and shouldered pin (12).
4. Loosen nut (14) and remove special screw (16) and preformed packing (15) from transmission (9). Discard preformed packing. Remove nut from special screw.
5. Remove cotter pin (19), straight pin (10), and washer (13) from anchor band (11) and brake band and lining (1). Discard cotter pin.
6. Remove spring (2) from grooved pin (4) and spring pin (3).
7. Spread and rotate brake band and lining (1) out of parking brake drum (17) and anchor band (11).

b. DISASSEMBLY

CAUTION

Do not remove linings from brake band unless damaged. Removal will damage parts.

Using electric drill and twist drill set, remove 12 rivets (21) and four linings (22) from brake band (20).



TA701457

10-2. PARKING BRAKE LINKAGE MAINTENANCE (Con't).

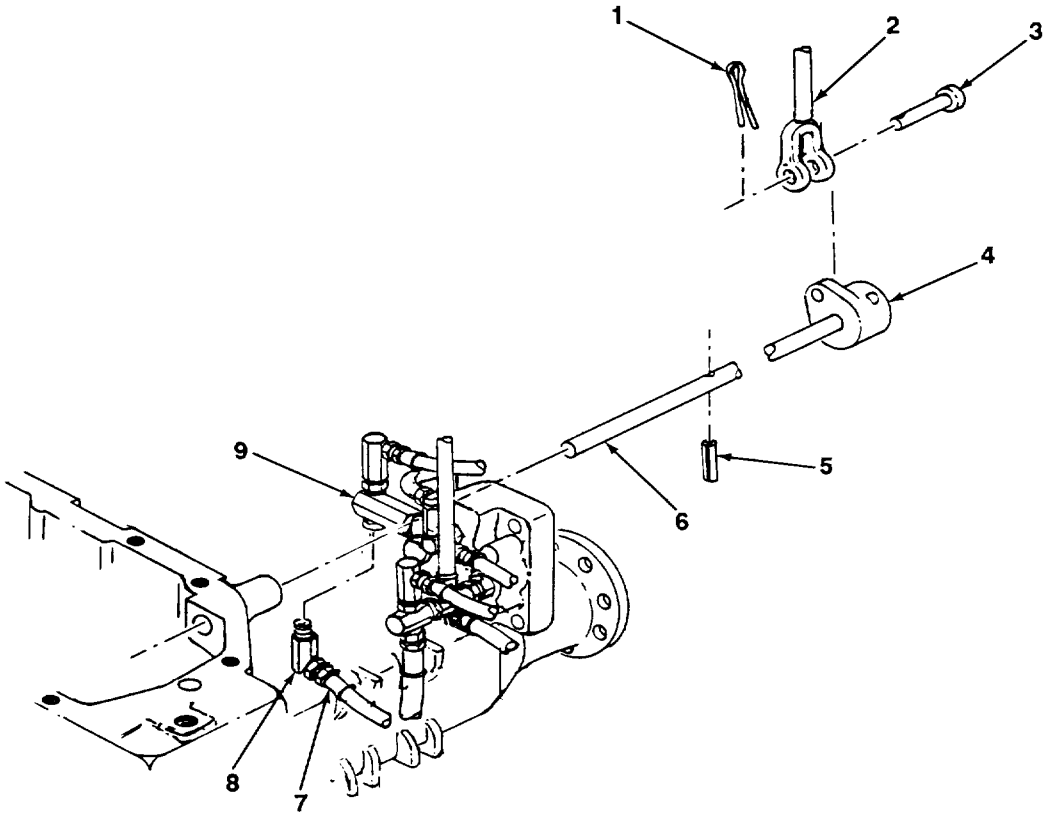
NOTE

When Installing spring pin in shouldered shaft, ensure that top end of spring pin Is flush with top side of shouldered shaft. If not, spring pin will catch on transmission top cover preventing parking brake from working.

12. Drive new spring pin (5) in shouldered shaft (6) until flush with top side of shouldered shaft.

13. Install elbow (8) and hose (7) on tee (9).

14. Aline brake rod 92) with support arm (4) and install straight pin (3) and new cotter pin (1).



NOTE

Loader backhoes with serial numbers 235786-235999 have a canopy. Loader backhoes with serial numbers 319995-342573 have a roll-over protective structures (ROPS).

15. Install roll-over protective structure or canopy right rear support and mounts (see paragraph 13-4).

16. Install backhoe main frame (see paragraph 15-4).

FOLLOW-ON TASKS:

- Install parking brake band and lining (see paragraph 10-1).

TA701464

10-4. HYDRAULIC BRAKE CYLINDER MAINTENANCE (Con't).

b. DISASSEMBLY

1. Remove bushing (11) and preformed packing (10) from hydraulic cylinder (3). Turn hydraulic cylinder over and drain hydraulic fluid into drain pan.
2. Remove preformed packing (10) from bushing (11). Discard preformed packing.
3. Remove elbow (6) and preformed packing (31) from check valve seat (30). Discard preformed packing.
4. Remove elbow (8) and preformed packing (32) from check valve seat (33). Discard preformed packing.
5. Remove check valve seat (30) and preformed packing (29) from hydraulic cylinder (3). Discard preformed packing.
6. Turn hydraulic cylinder (3) on end and remove spring (28), ball bearing (27), and retainer (26).
7. Remove check valve seat (33) and preformed packing (34) from hydraulic cylinder (3). Discard preformed packing.
8. Turn hydraulic cylinder (3) on end and remove spring (35), ball bearing (36), and retainer (37).
9. Push two pistons (24) and springs (25) out from pedal side of hydraulic cylinder (3).
10. Remove two oil seals (19) and preformed packings (18) from hydraulic cylinder (3). Discard oil seals and performed packing.
11. Remove bushing (12) and preformed packing (13) from hydraulic cylinder (3). Discard preformed packing.
12. Remove two check valves and springs (14), preformed packings (15), check valve disks (1 6), and springs (17) from hydraulic cylinder (3). Discard preformed packings.
13. Remove two drain plugs (23), preformed packings (22), springs (21), and ball bearings (20) from hydraulic cylinder (3). Discard preformed packings.
14. Remove pipe plug (38) from hydraulic cylinder (3).

c. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 1000F-1380F (380C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

1. Clean all metal parts with rags and dry cleaning solvent. Dry thoroughly with clean, dry rags.
2. Inspect all metal parts for cracks, breaks, and abnormal bends.
3. Inspect hydraulic cylinder for scoring, wear, cracks in hydraulic cylinder bores, and damage to ball seats.
4. Inspect all threaded parts for damaged threads.

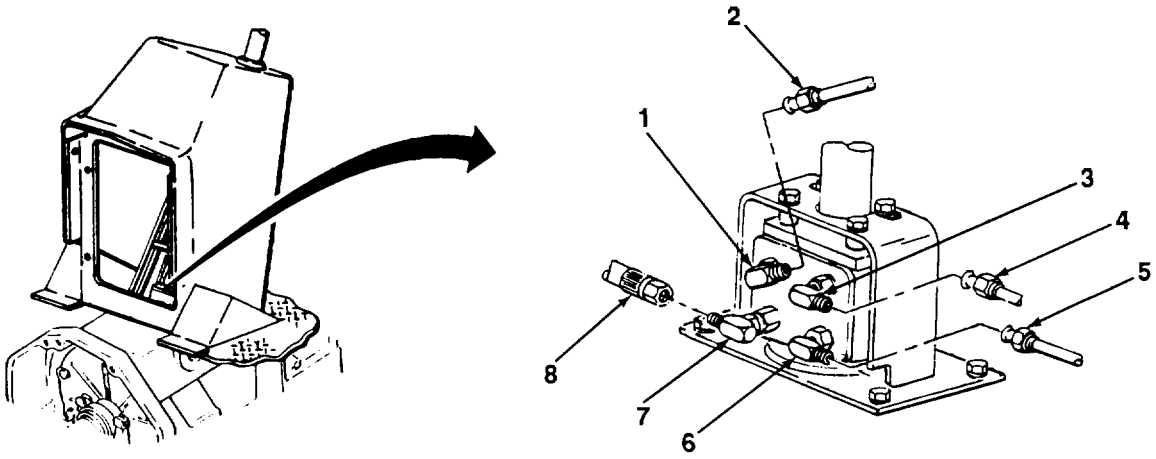
11-1. STEERING COLUMN AND VALVE SUPPORT MAINTENANCE (Con't).

6. Connect right-hand steering line (5) to elbow (6).

7. Connect left-hand steering line (4) to elbow (3).

8. Connect hose (8) to elbow (7).

9. Connect line (2) to elbow (1).



FOLLOW-ON TASKS:

- Install speed gear (reverser) control lever (see TM 5-2420-222-20).
- Install steering wheel (see TM 5-2420-222-20).
- Check transmission fluid level and add fluid as required (see LO 5-2420-222-12).
- Start engine assembly (see TM 5-2420-222-10). Check all steering valve connections for leaks. Tighten any leaking connections.
- Shut down engine assembly (see TM 5-2420-222-10).

TA701477

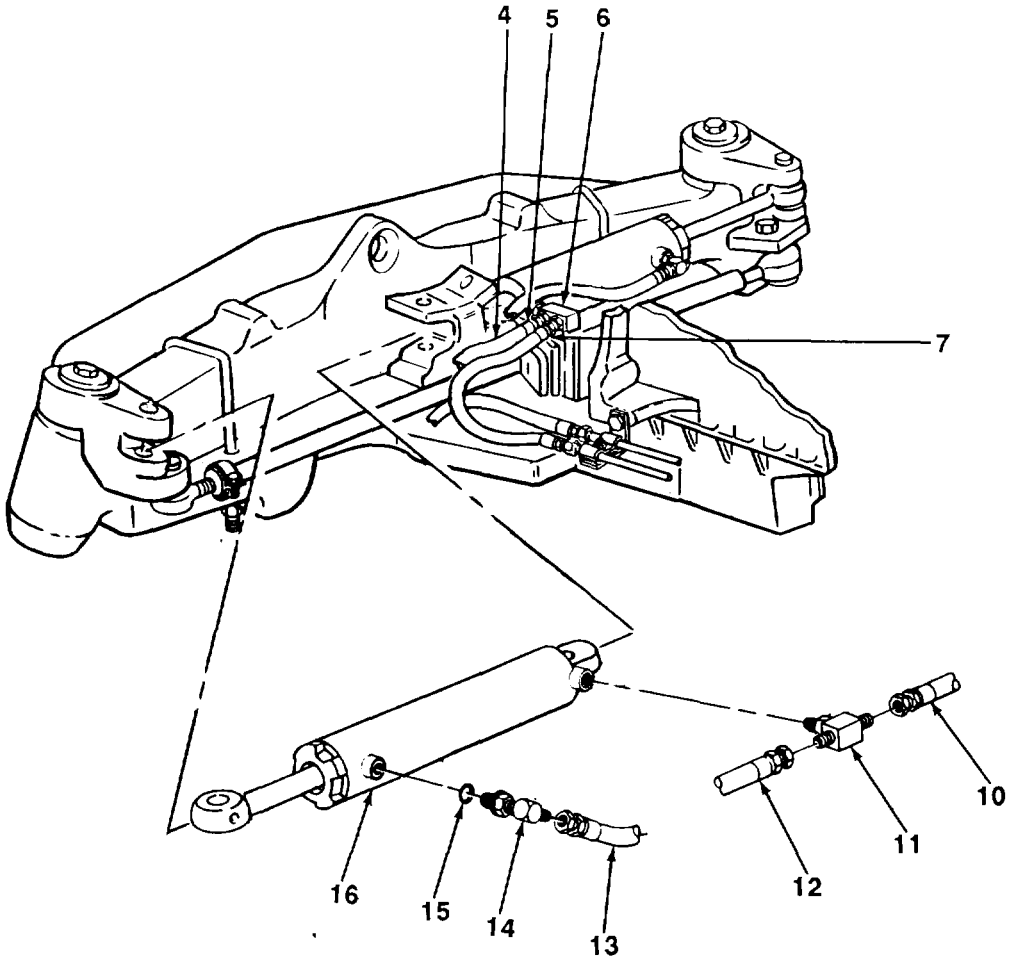
11-2. STEERING CYLINDER ASSEMBLIES MAINTENANCE (Con't).

5. Connect two hoses (10 and 12) to tee (11).

NOTE
Steps 6 and 7 apply only to loader backhoes with serial numbers 235786-235999.

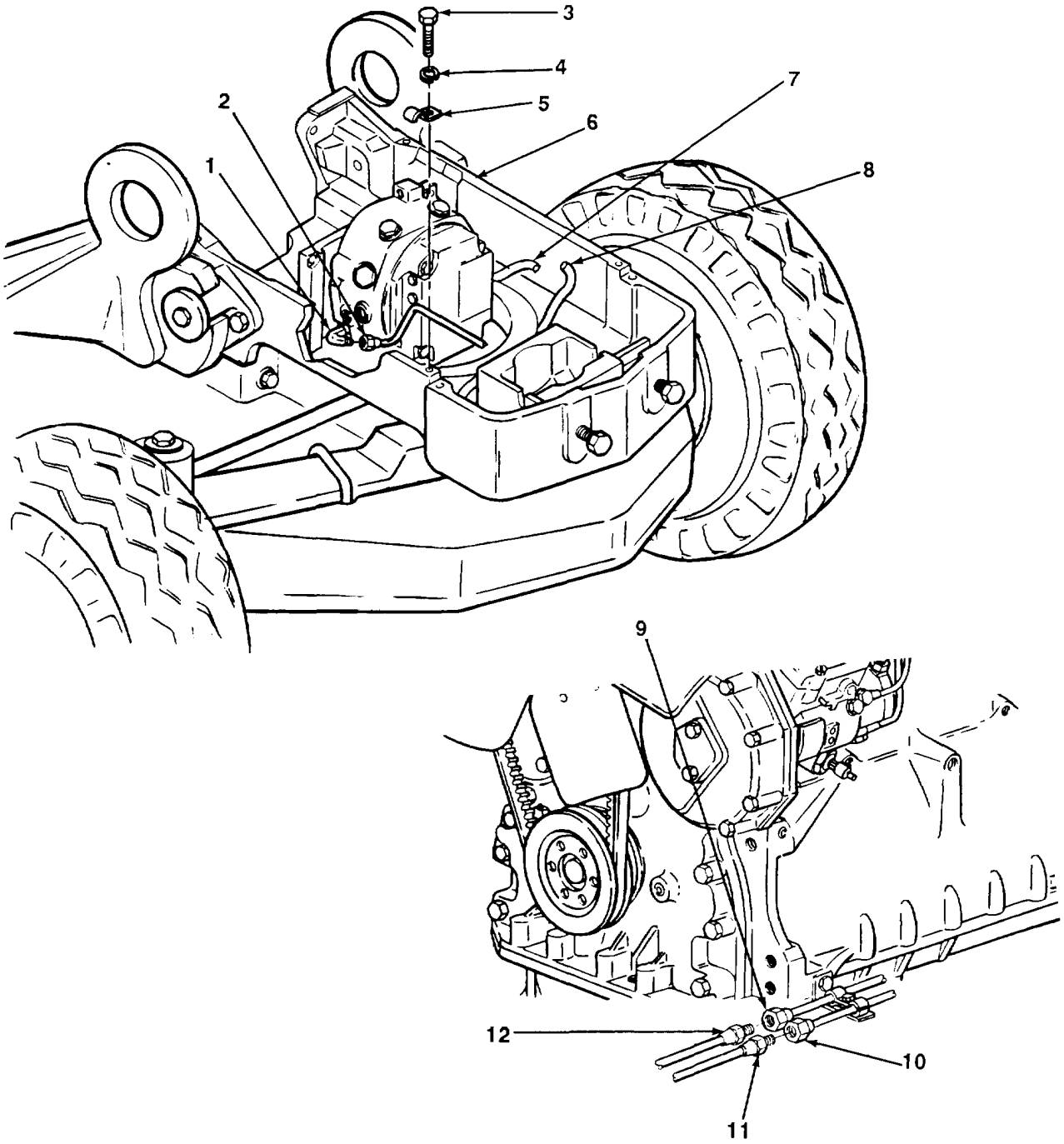
6. Install elbow (6) and new preformed packing (5) in actuating cylinder (16).

7. Connect two hoses (4 and 7) to elbow (4).



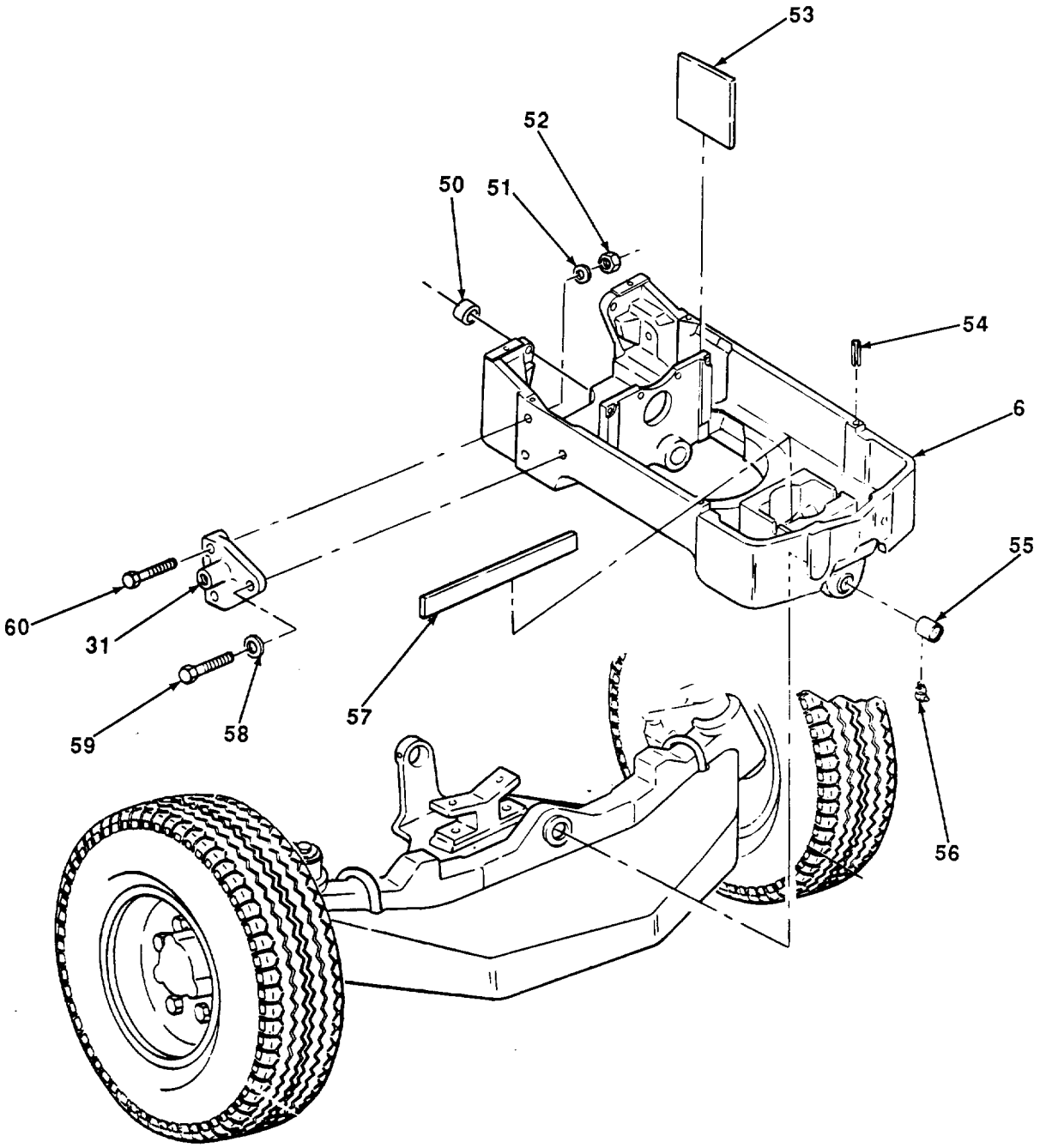
TA701485

12-1. FRAME ASSEMBLY FRONT SUPPORT MAINTENANCE (Con't).



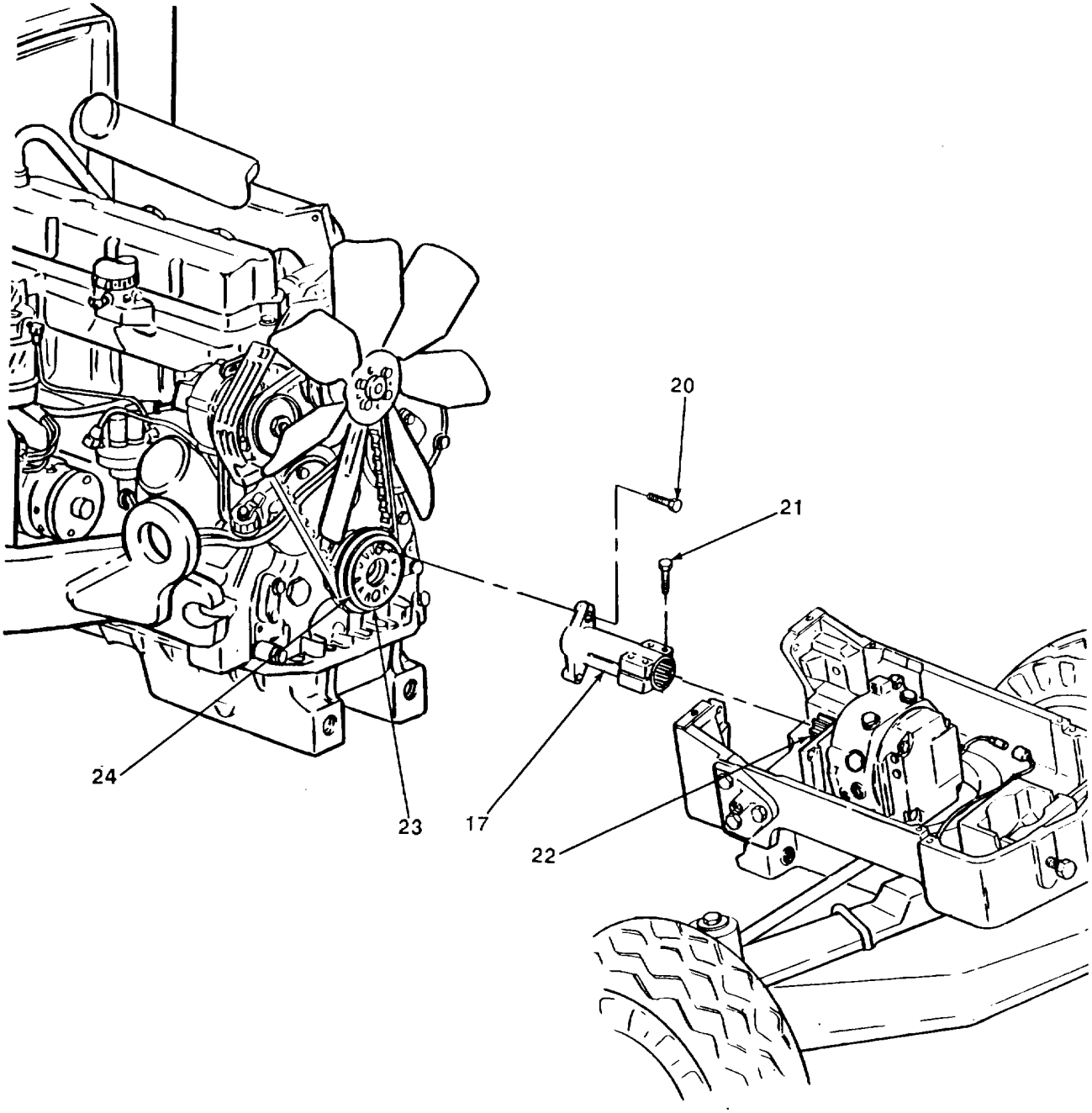
TA701491

12-1. FRAME ASSEMBLY FRONT SUPPORT MAINTENANCE (Con't).



TA701497

12-1. FRAME ASSEMBLY FRONT SUPPORT MAINTENANCE (Con't).



TA701504

SERIAL NUMBERS 319995-342573

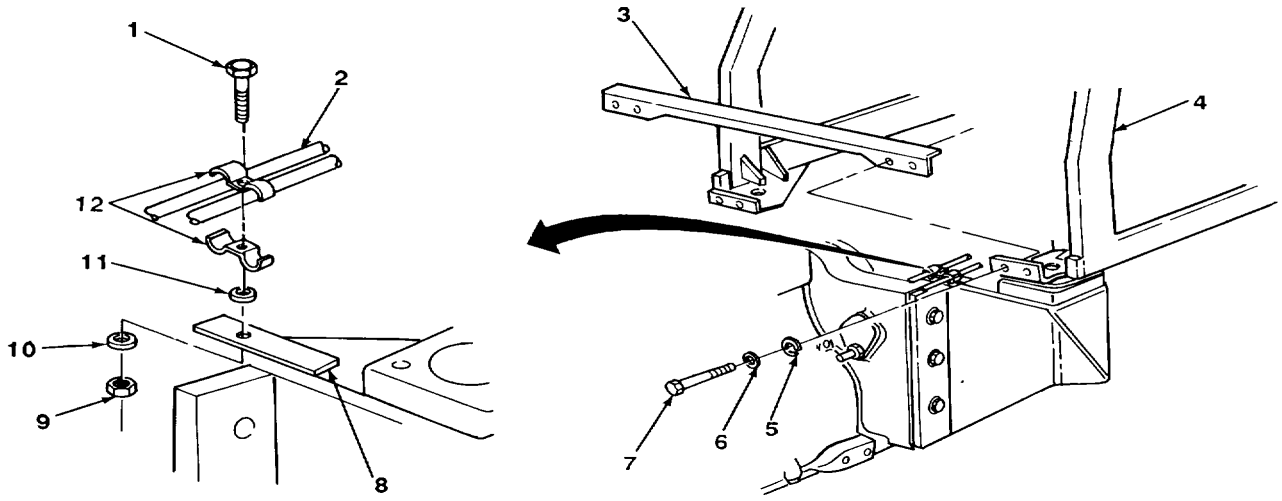
13-1. ROLL-OVER PROTECTIVE STRUCTURE OR CANOPY FRONT MOUNTS AND BRACKETS MAINTENANCE (Con't).

NOTE
If Installing right special bracket and front mounts, skip step 6.

6. Install screw (1), two clamps (12), spacer (11), new lockwasher (10), and nut (9) on two hydraulic lines (2) and special bracket weldment (8).

7. Position front crossmember (3) in place on canopy or ROPS (4) and secure with four screws (7), washers (6), and new lockwashers (5).

8. Remove lifting device from canopy of ROPS (4).



FOLLOW-ON TASKS:

NOTE
Perform the following only if left front mounts were removed.

- Install left platform (see TM 5-2420-222-20).

NOTE
Perform the following only if right front mounts were removed.

- Install accumulator (see TM 5-2420-222-20).
- Install right platform (see TM 5-2420-222-20).

NOTE
Perform the following if right and left front mounts were removed.

- Install left outer platform (see TM 5-2420-222-20).
- Install right inner platform (see TM 5-2420-222-20).

13-4. ROLL-OVER PROTECTIVE STRUCTURE OR CANOPY REAR MOUNTS MAINTENANCE (Con't).

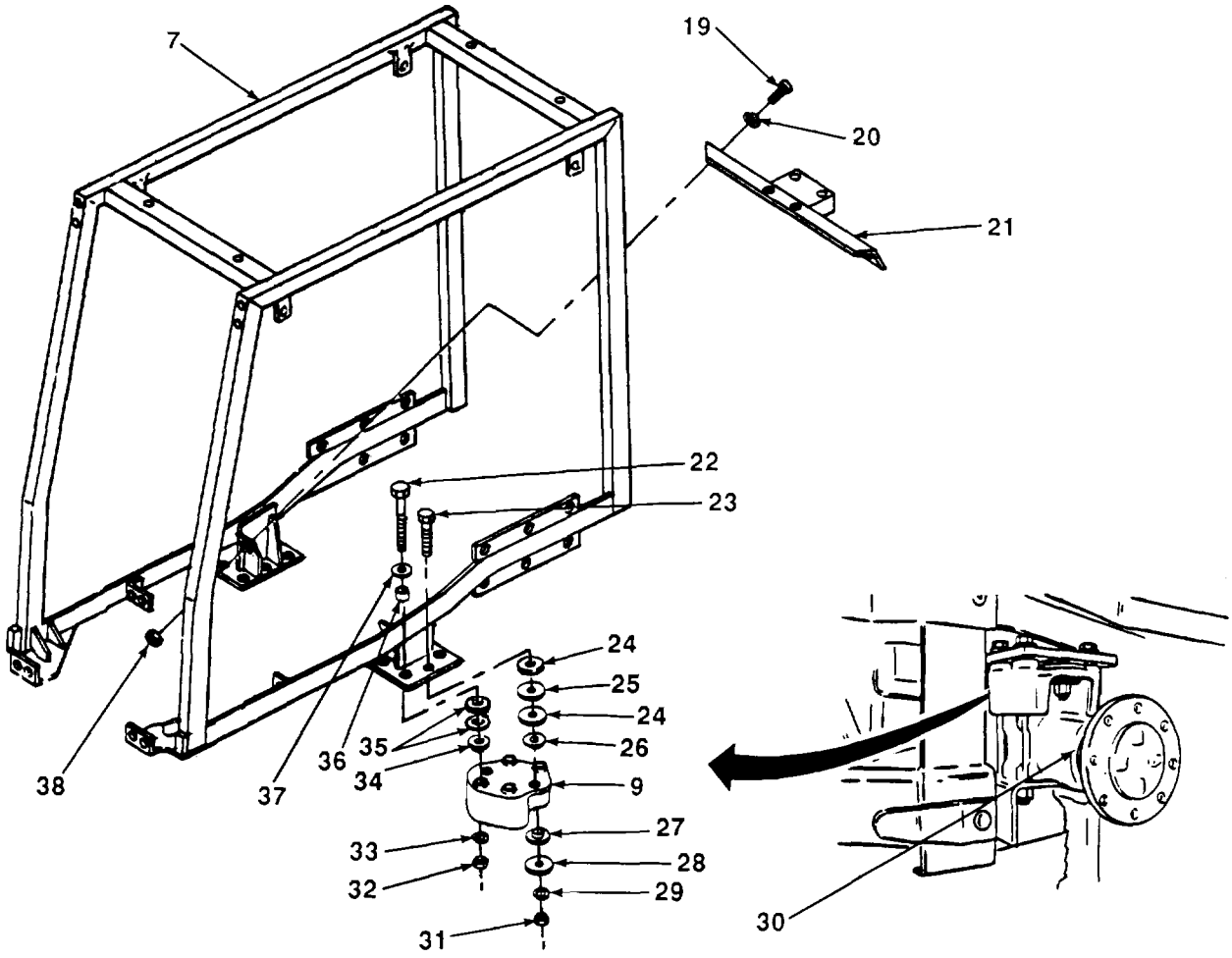
7. Remove two capscrews (19), lockwashers (20), nuts (38), and rear crossmember (21) from canopy or ROPS (7). Discard lockwashers.

8. Remove eight capscrews (22), washers (37), sleeve spacers (36),16 spacers (35), eight spacers (34), lockwashers (33), and nuts (32) from canopy or ROPS (7), two canopy rear supports (9), and rear axle housings (30). Discard lockwashers.

9. Remove four capscrews (23), eight washers (24), four washers (25), upper rear mounts (26), lower rear mounts (27), washers (28), lockwashers (29), and nuts (31) from canopy or ROPS (7) and canopy rear supports (9). Discard lockwashers.

10. With the aid of an assistant and lifting device, remove canopy or ROPS (7).

11. Remove two canopy rear supports (9).



TA701517

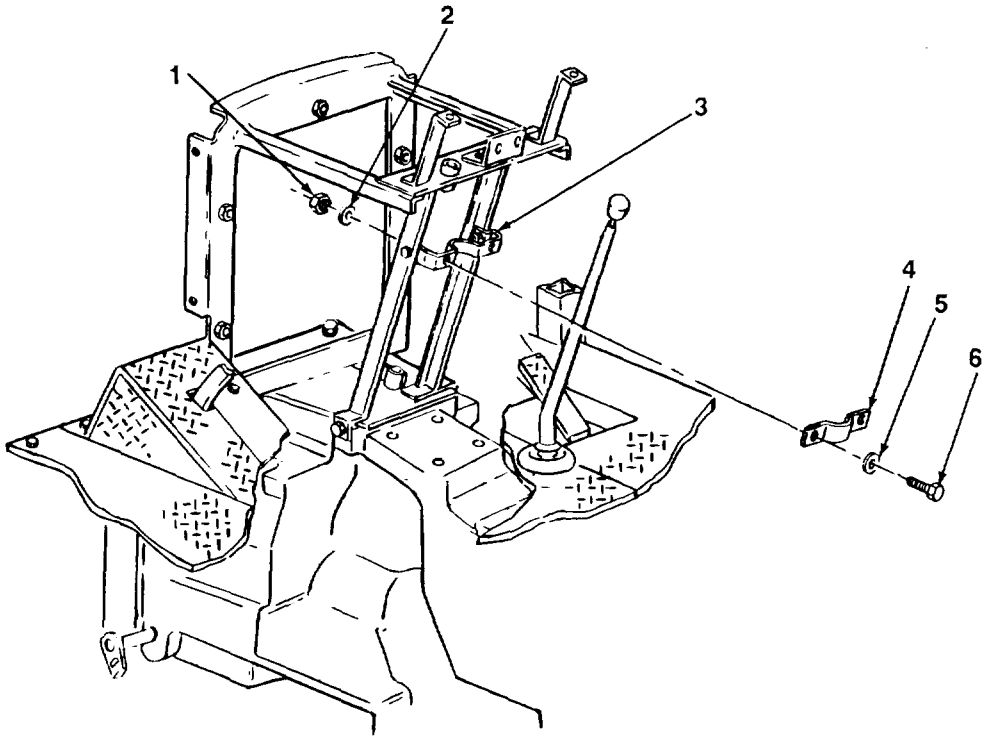
13-5. COWL SUPPORT MAINTENANCE (Con't).

a. REMOVAL

NOTE

Some loader backhoes may not have hanger and retaining strap. If parts are not present, skip steps 1 and 2.

1. Remove two capscrews (6), washers (5), lockwashers (2), nuts (1), and retaining strap (4) from hanger (3). Discard lockwashers.



2. Remove two capscrews (19), washers (18), lockwashers (8), nuts (9), and hanger (3) from steering column (16) and cowl support (7). Discard lockwashers.

3. Remove two nuts (13), lockwashers (14), washers (15), and U-bolt (17) from steering column (16) and angle bracket (11). Discard lockwashers.

4. Remove two screws (12), lockwashers (10), nuts (20), and angle bracket (11) from cowl support (7). Discard lockwashers.

5. Remove cotter pin (22), washer (23), and speed control shaft rod (24) from shaft (21). Discard cotter pin.

6. Remove two screws (28), lockwashers (27), and sleeve spacers (26) from cowl support (7) and reverser housing (25). Discard lockwashers.

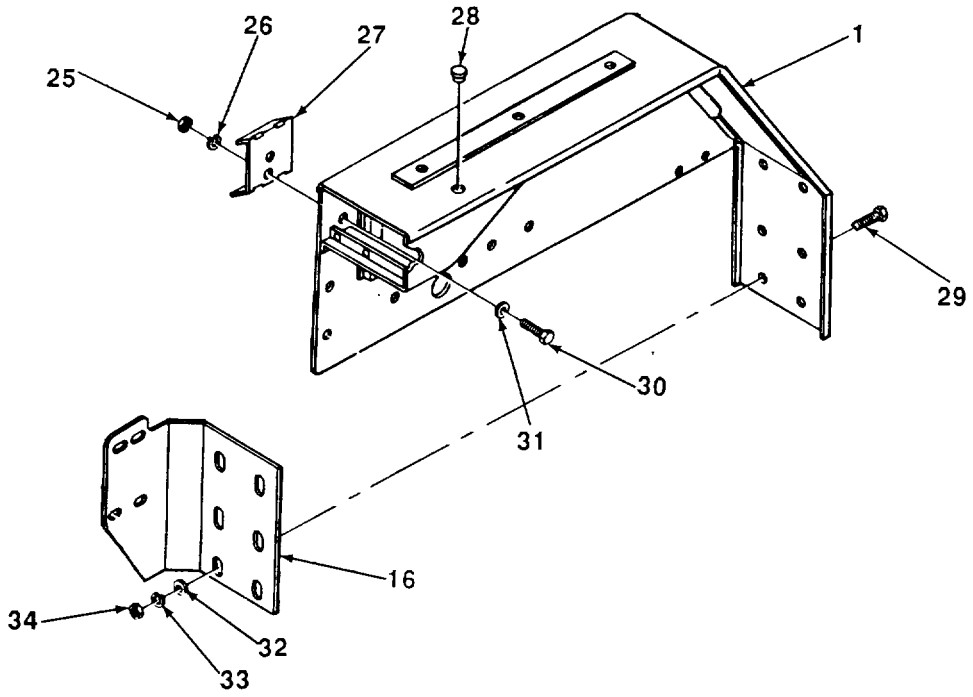
TA701525

13-6 FENDERS AND SUPPORTS MAINTENANCE (Con't).

b. DISASSEMBLY

NOTE
If disassembling left fender, skip step 1.

1. Remove six capscrews (29), lockwashers (33), washers (32), nuts (34), and structural frame (16) from fender (1). Discard lockwashers.



NOTE
If disassembling right fender, skip steps 2 through 4.

2. Remove four capscrews (40), washers (42), lockwashers (43), nuts (44), and step (41) from fender (1). Discard lockwashers.

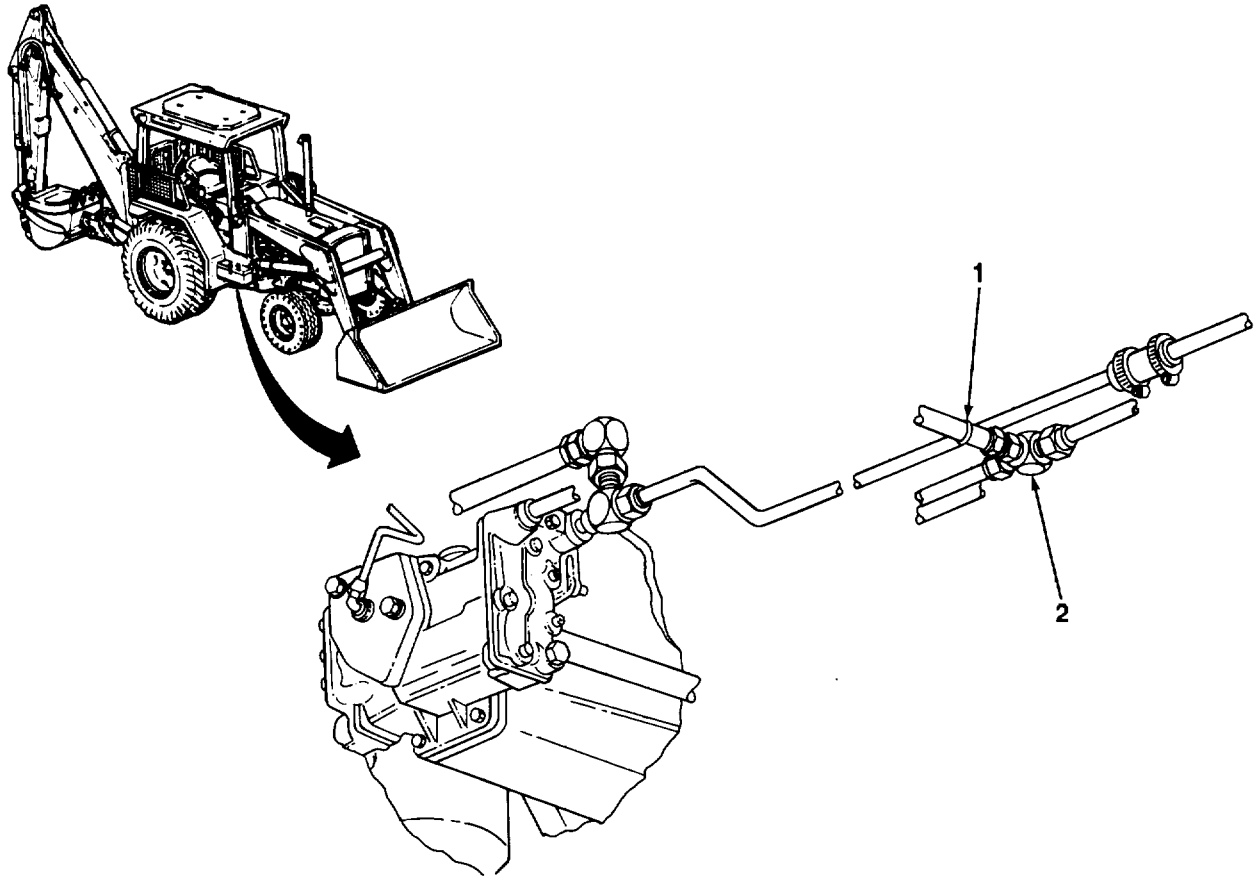
3. Remove two capscrews (39), washers (47), lockwashers (46), nuts (45), and structural frame (16) from fender (1). Discard lockwashers.

4. Remove two capscrews (36), four washers (37), and handle (38) from fender (1).

5. Remove six capscrews (48) and lampholder (35) from fender (1).

TA701533

14-1. HYDRAULIC SYSTEM TEST (Con't).



9. Release hydraulic system pressure (see TM 5-2420-222-20)

10. Disconnect and remove hydraulic system tester from hose (1) and special tee (2).

11. Connect hose (1) to special tee (2).

12. Start engine assembly (see TM 5-2420-222-10) and check hose (1) and special tee (2) for leaks. Tighten any leaking connections.

13. Shut down engine assembly (see TM 5-2420-222-10).

NOTE

Backhoe test may be Isolated by installing hydraulic system tester between pressure and return circuits.

14. Remove backhoe valve box (see TM 5-2420-222-20).

TA701541

14-3. HYDRAULIC PUMP ASSEMBLY MAINTENANCE.

This Task Covers:

a. Removal
b. Disassembly
c. Cleaning and Inspection
d. Assembly
e. Installation
e. Adjustment

Initial Setup:

Equipment Conditions:

- Hood removed (see TM 5-2420-222-20).
- Fuel tank removed (see TM 5-2420-222-20).
- Pressure control valve oil line disconnected (see TM 5-2420-222-20).
- Clutch control valve inlet oil line disconnected (see TM 5-2420-222-20).
- Speed gear assembly (reverser) seal drain line disconnected (see TM 5-2420-222-20).
- Oil cooler line disconnected (see TM 5-2420-222-20).
- Hydraulic pump stroke control valve solenoid removed (see paragraph 14-7).

Tools/Test Equipment:

- General mechanic's tool kit
- Field automotive shop set
- Hydraulic system tester
- Two drivers

Materials/Parts:

- Hydraulic fluid (Item 15, Appendix B)
- Rags (Item 28, Appendix B)
- Dry cleaning solvent (Item 31, Appendix B)
- One parts kit

References:

- LO 5-2420-222-12
- TM 5-2420-222-10
- TM 5-2420-222-20
- TM 9-214

General Safety Instructions:

- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.

14-3. HYDRAULIC PUMP ASSEMBLY MAINTENANCE (Con't).

8. Start engine assembly and operate at high idle (see TM 5-2420-222-10).

9. Check hydraulic pump and oil line connections for hydraulic fluid leaks.

10. Shut down engine assembly (see TM 5-2420-222-10).

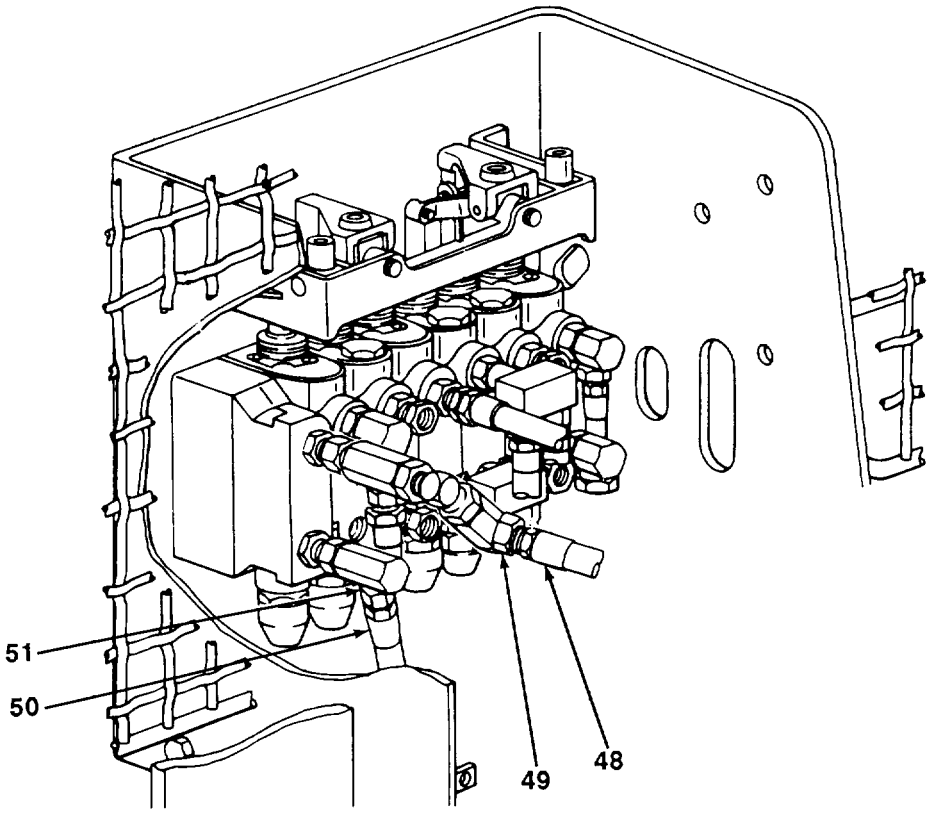
11. Release hydraulic system pressure (see TM 5-2420-222-20).

12. Remove backhoe valve box (see TM 5-2420-222-20).

13. Disconnect oil line (48) from elbow (49).

14. Install hydraulic system tester to elbow (49).

15. Disconnect oil line (50) from adapter (51). Connect second line of hydraulic system tester to adapter.



16. Start engine assembly and run at 1500 rpm until operating temperature is 170°F-190°F (770C-880C) (see TM 5-2420-222-10).

17. Check for leaks at connections. Tighten connections as required. If leaks stop, proceed to step 21.

18. If leaking does not stop, shut down engine assembly (see TM 5-2420-222-10). Release hydraulic system pressure (see TM 5-2420-222-10). Replace leaking elbow (49) or adapter (51).

TA701558

14-6. HYDRAULIC PUMP STROKE CONTROL VALVE REPAIR (Con't).

6. Remove nut (21), screw with washer (20), pre- formed packing (19), and bushing (22) from control valve body (3). Remove preformed pack- ing (23) from bushing. Discard preformed packings.

NOTE

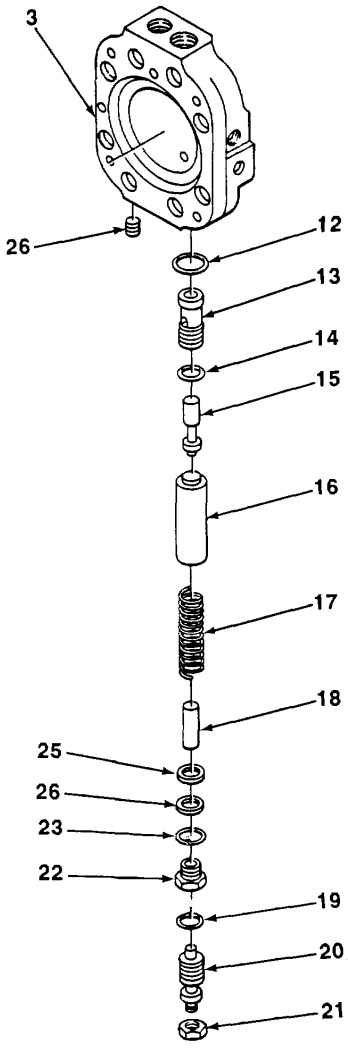
Loader backhoes with serial numbers 235786-235999 are equipped with pins. Loader backhoes with serial numbers 319995-342573 are not.

7. Remove washer (24), washer (25), pin (18), spring (17), seat (16), fluid restrictor (15), preformed packing (14), and sleeve (13) from control valve body (3). Discard preformed packing.

8. Remove preformed packing (12) from control valve body (3). Discard preformed packing.

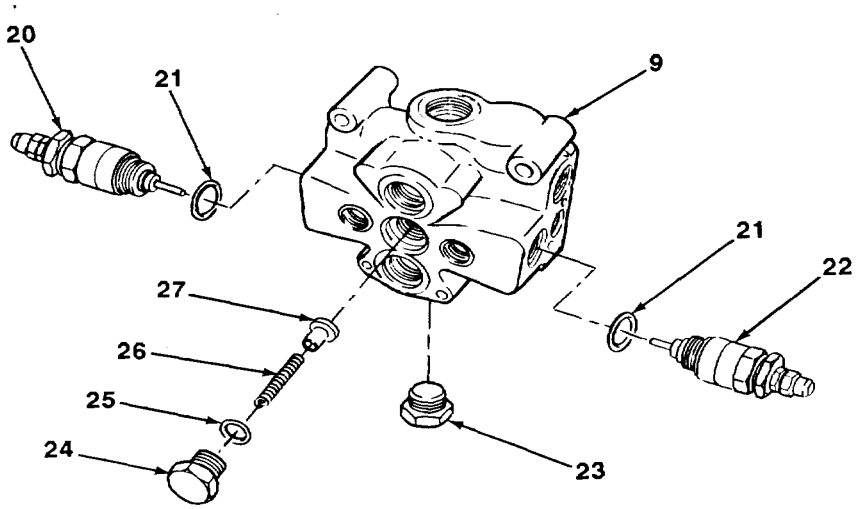
9. Remove pipe plug (26) from control valve body (3).

10. Remove hydraulic pump stroke control valve filter element (see TM 5-2420-222-20).



TA701566

14-8. AW CONTROL VALVE ASSEMBLY REPAIR (Con't)

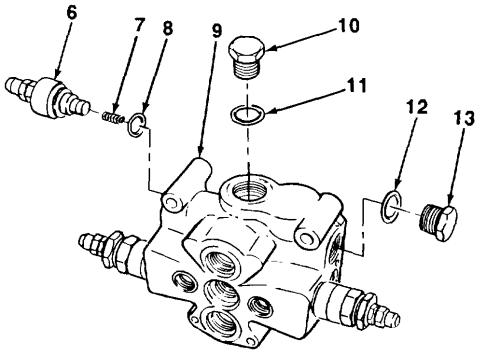


6. Install plug (13) and new preformed packing (12) in valve body (9).

7. Install main relief (6), spring (7), and new pre- formed packing (8) in valve body (9).

8. Install plug (10) and new preformed packing (11) In valve body (9).

9. Remove valve body (9) from vise.



TA701573

14-10. BACKHOE STABILIZER AND BUCKET VALVES REPAIR (Con't).

NOTE

Valve and valve body are a matched set. If either part is damaged, both must be replaced.

7. Inspect valve for burrs and rough spots.

8. Inspect all other metal parts for cracks, breaks, and abnormal bends. Inspect threaded parts for damaged threads.

c. REPAIR

1. Remove rough spots or burrs from valve (12) using 600 grit abrasive cloth.

2. Restore damaged threads using pipe threading or screw threading set.

d. ASSEMBLY

1. Install fluid flow restrictor (22) in place on spring (23).

2. Coat fluid flow restrictor (22) and spring (23) with hydraulic fluid. Install in place on valve (12).

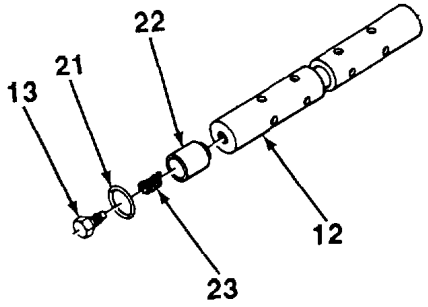
3. Coat new preformed packing (21) with hydraulic fluid and install in place on spool plug (13).

NOTE

Ensure that sealing surfaces are clean before applying thread sealing compound to spool plug.

4. Apply thread sealing compound to threads of spool plug (13).

5. Wrap valve (12) in clean rags and place in vise with caps.

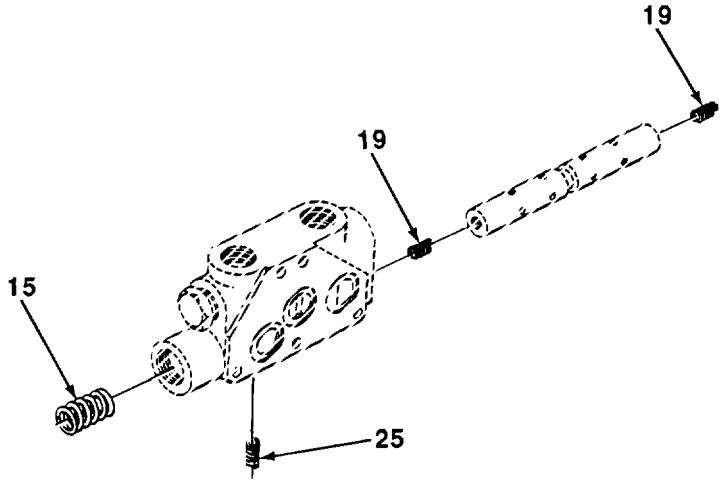


TA701583

14-12. ACKHOE BOOM AND SWING VALVES REPAIR (Con't).

6. Inspect spool spring (15) for cracks, breaks, and abnormal bends. Using spring tester and torque wrench, apply 27 lb (120 N) of force and measure compressed length of spool spring. Compressed length must be 1.1875 in. (30.1625 mm).

7. Inspect spring (25) for cracks, breaks, and abnormal bends. Using spring tester and torque wrench, apply 75 lb (334 N) of force and measure compressed length of spring. Compressed length must be 0.625 in. (15.875 mm).

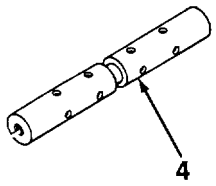


NOTE

Valve body and valve are a matched set. If either part is damaged, both must be replaced.

8. Inspect valve (4) for burrs and rough spots.

9. Inspect all other metal parts for cracks, breaks, and abnormal bends. Inspect threaded parts for damaged threads.



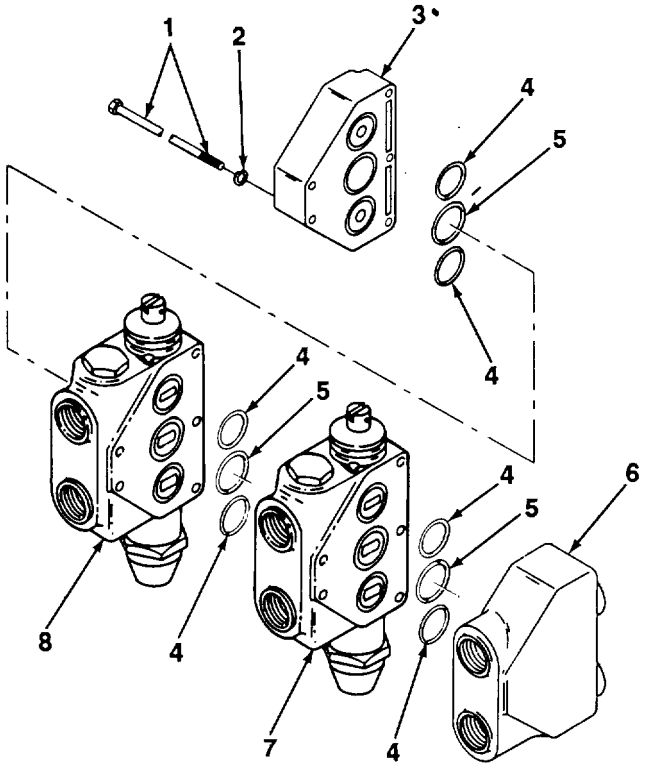
c. REPAIR

1. Remove rough spots or burrs from valve (4) using 600 grit abrasive cloth.

2. Restore damaged threads using pipe threading or screw threading set.

TA701593

14-13. BACKHOE RELIEF VALVES MAINTENANCE (Con't).



c. REPAIR

Restore damaged valve cap (3 or 6) threads using pipe threading or screw threading set.

d. ASSEMBLY

1. Coat two new preformed packings (4) and new preformed packing (5) with hydraulic fluid and install in valve cap (3).
2. Aline match-marks and install boom valve (8) in place on valve cap (3).
3. Coat two new preformed packings (4) and new preformed packing (5) with hydraulic fluid and install in boom valve (8).
4. Aline match-marks and install bucket valve (7) on boom valve (8).
5. Coat two new preformed packings (4) and new preformed packing (5) with hydraulic fluid and install in bucket valve (7).
6. Aline match-marks and install valve cap (6) on bucket valve (7).
7. Install five capscrews (1) and new lockwashers (2) in two valve caps (3 and 6), boom valve (8), and bucket valve (7). Torque capscrews to 20-25 lb.-ft. (27-34 N•m).

FOLLOW-ON TASKS:

- Install loader control valve assembly (see TM 5-2420-222-20).

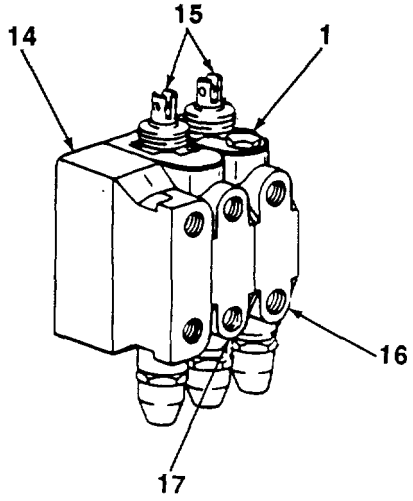
TA701600

14-16. LOADER BUCKET RELIEF VALVES MAINTENANCE (Con't).

g. ADJUSTMENT

1. If installed, remove loader control valve assembly (see TM 5-2420-222-20).

2. Connect proof pressure tester to valve cap (14).



3. Using four 34 in. -14 NPT pipe plugs, plug boom valve (17) and 0bucket valve (16).

4. Using proof pressure tester, pump up hydraulic pressure to 1800 psi (12,411 kPa) and check for leaks. Tighten all leaking connections. If leaking does not stop, release pressure and replace defective part.

NOTE

All relief valves are adjusted the same way. Repeat steps 5 through 9 for other relief valve as required.

5. Push clevis rod end (15) down to check top relief valve (1) or pull up to check bottom relief valve.

WARNING

Relief valves are stamped with pressure limit. Bucket (lower) relief valve pressure limit is 1500 psi (10,343 kPa). Bucket (raise) relief valve pressure limit is 2750 psi (18,961 kPa). Do not exceed stamped pressure limit. Serious injury to personnel may result.

6. Using proof pressure tester, pump up hydraulic pressure until relief valve (1) opens or pressure limit of relief valve is reached.

NOTE

If relief valve opening pressure is correct, skip steps 7 through 9.

7. Remove and disassemble relief valve (see subparagraphs a and b).

8. If opening pressure was more than specified, remove shims (5). If opening pressure was less than specified limit, add shims as required.

9. Assemble, install, and adjust relief valve (see subparagraphs e, f, and g).

FOLLOW-ON TASKS:

- Install loader control valve assembly (see TM 5-2420-222-20).

TA701606

14-19. BACKHOE CROWD CYLINDER ASSEMBLY REPAIR (Con't).

d. ASSEMBLY

NOTE
Perform step 1 only If sleeve bushings were removed.

1. Drive sleeve bushing (18 or 28) in piston rod (19) or actuating cylinder (29).
2. Coat new V-packing (23), new wear ring (22), and wiper seal (20) with hydraulic fluid.
3. Install V-packing (23), wear ring (22), and wiper seal (20) in place on valve stem guide (21).
4. Using retaining ring pliers, install retaining ring (24) in valve stem guide (21).
5. Install valve stem guide (21) with assembled parts in place on piston rod (19).
6. Coat two new preformed packings (12 and 26), piston ring (10) and packing retainer (25) with hydraulic fluid.
7. Install two preformed packings (12 and 26), piston ring (10) and packing retainer (25) in place on piston (11).
8. Place piston rod (19) in vise with caps. Tap piston (11) with assembled parts in place on piston rod.
9. Coat new V-packing (13) and new wear ring (14) with hydraulic fluid.
10. Install V-packing (13) and wear ring (14) in place on piston (15). Tap piston with assembled parts in place on piston rod (19).
11. Install nut (16) on piston rod (19) and remove piston rod from vise.
12. Place actuating cylinder (29) in vise with caps. With the aid of an assistant, install piston rod (19) with assembled parts in actuating cylinder.
13. Using spanner wrench, tighten valve stem guide (21) In actuating cylinder (29). Install setscrew (9).
14. Install lubrication fittings (17 and 27) in piston rod (19) and actuating cylinder (29).

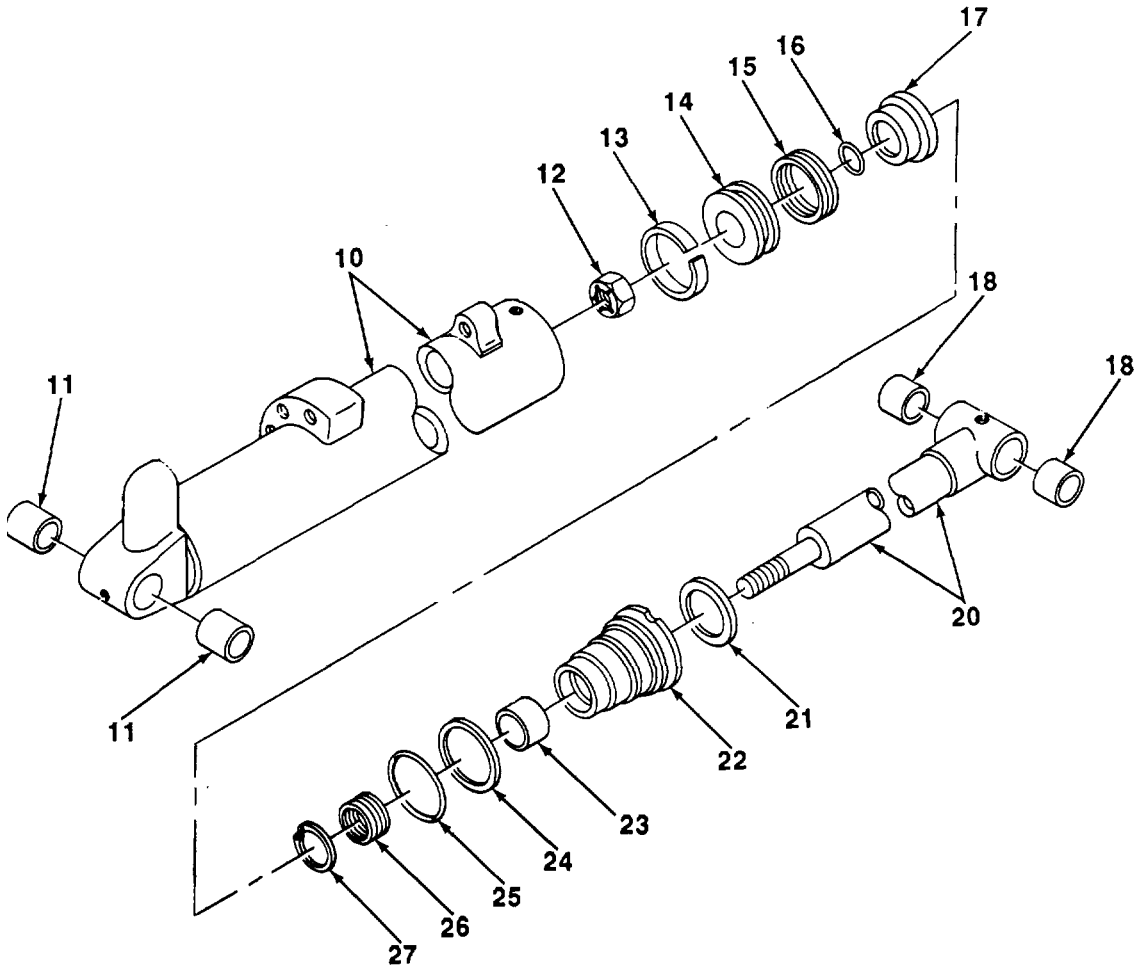
NOTE
Steps 15 through 17 apply only to loader backhoes with serial numbers 235786-235999.

15. Install two tubes and fittings (7) and new preformed packings (8) In actuating cylinder (29).
16. Install two adapters (2) and new preformed packings (1) in actuating cylinder (29).
17. Install two new self-locking nuts (6), preformed packings (3), ferrules (5) and packing retainers (4) on adapters (2).
18. Remove hydraulic cylinder (29) with assembled parts from vise.

FOLLOW-ON TASKS:

- Install backhoe crowd cylinder assembly (see TM 5-2420-222-20).

14-21. BACKHOE BUCKET CYLINDER ASSEMBLY REPAIR.



7. Install preformed packing (16), piston ring (14), piston ring (13), and packing assembly (15) in place on piston (17).

8. Place piston rod (20) in vise with caps. Tap piston (17) with assembled parts in place on piston rod.

9. Install new self-locking nut (12) on piston rod (20). Remove piston rod from vise.

10. Place actuating cylinder (10) in vise with caps. With the aid of an assistant, install piston rod (20) with assembled parts in actuating cylinder.

11. Using spanner wrench, tighten linear actuating cap (22) in actuating cylinder (10).

TA701618

14-23. BACKHOE STABILIZER CYLINDER ASSEMBLIES REPAIR (Con't).

13. Remove packing assembly (5) and preformed packing (6) from piston (7). Discard packing assembly and preformed packing.

11. Using retaining ring pliers, remove retaining ring (8) from rod guide (16).

12. Remove rod packing (18), wear ring (17), two preformed packings (14 and 15), and wiper seal (12) from rod guide (16). Discard rod packing, wear ring, preformed packings, and wiper seal.

CAUTION

Do not remove sleeve bushings unless damaged. Removal may damage parts.

13. Drive sleeve bushings (9 or 19) out of piston rod (10) or actuating cylinder (1).

b. CLEANING AND INSPECTION

WARNING

- **Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.**

- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid injury to personnel.**

1. Clean all metal parts with rags dampened with dry cleaning solvent. Dry thoroughly with compressed air.

2. Inspect actuating cylinder for cracks, breaks, chips, and excessive scoring inside actuating cylinder.

3. Inspect piston rod for cracks, breaks, and excessive scoring.

4. Inspect sleeve bushings for cracks, breaks, and excessive scoring.

5. Inspect all metal parts for cracks, breaks, and abnormal bends.

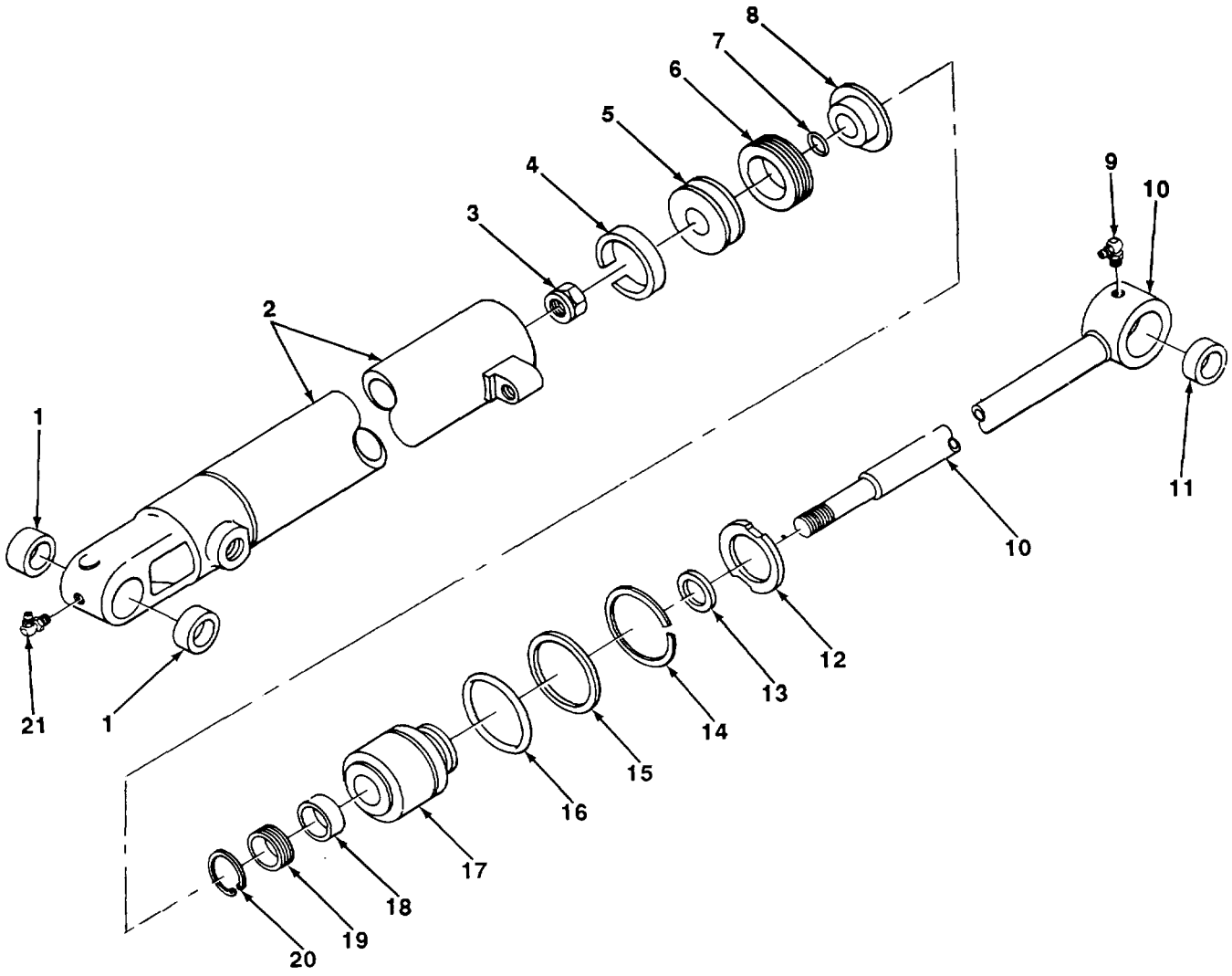
6. Inspect all threaded parts for damaged threads.

c. REPAIR

1. Remove any minor scoring from actuating cylinder (5) or piston rod (11) using 600 grit abrasive cloth.

2. Restore damaged threads using pipe threading or screw threading set.

14-25. LOADER BOOM CYLINDER ASSEMBLIES REPAIR (Con't)



9. Coat new bearing ring (4) with hydraulic fluid.

10. Install bearing ring (4) in place on piston (5). Tap piston with assembled parts in place on piston rod (10).

11. Install new self-locking nut (3) on piston rod (10) and remove piston rod from vise.

12. Place cylinder (2) in vise with caps. With the aid of an assistant, install piston rod (10) with assembled parts in cylinder.

13. Using spanner wrench, tighten nut (12) In cylinder (2).

14. Install lubrication fittings (9 and 21) in piston rod (10) and cylinder (2). Remove cylinder from vise.

FOLLOW-ON TASKS:

- Install loader boom cylinder assembly (see TM 5-2420-222-20).

TA701631

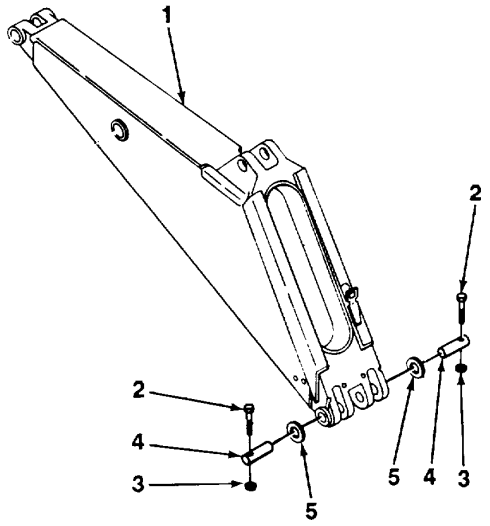
15-2. BACKHOE BOOM MAINTENANCE (Con't).

f. INSTALLATION

WARNING

Use extreme caution when handling heavy parts. Lifting device is required when parts weigh over 50 lb. (23 kg) for a single person lift, over 100 lb. (45 kg) for a two person lift, and over 150 lb. (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious injury or death to personnel.

1. Using lifting device, position backhoe boom (1) in place on swing frame with pin holes alined.
2. Position two washers (5) between backhoe boom (1) and swing frame and install two pins (4) with screw holes alined.
3. Install two screws (2) and nuts (3) in backhoe boom (1) and pins (4).
4. Remove lifting device from backhoe boom (1).



TA701639

FOLLOW-ON TASKS:

- Install backhoe dipperstick (see paragraph 15-1).
- Install crowd cylinder (see TM 5-2420-222-20).
- Install boom cylinder (see TM 5-2420-222-20).

15-4. BACKHOE MAIN FRAME MAINTENANCE (Con't).

3. Install swing cylinders (see TM 5-2420-222-20).

4. Install hydraulic impactor valve (see TM 5-2420-222-20).

5. Install stabilizers (see TM 5-2420-222-20).

6. Install backhoe stabilizer cylinders (see TM 5-2420-222-20).

7. Install backhoe control valve-to-stabilizer cylinder oil lines (see TM 5-2420-222-20).

f. INSTALLATION

1. With the aid of an assistant, position two towbars (6) in place on side frames (11).

2. Install two pins (13) in side frames (11) and towbars (6) with ball-peen hammer and wood block.

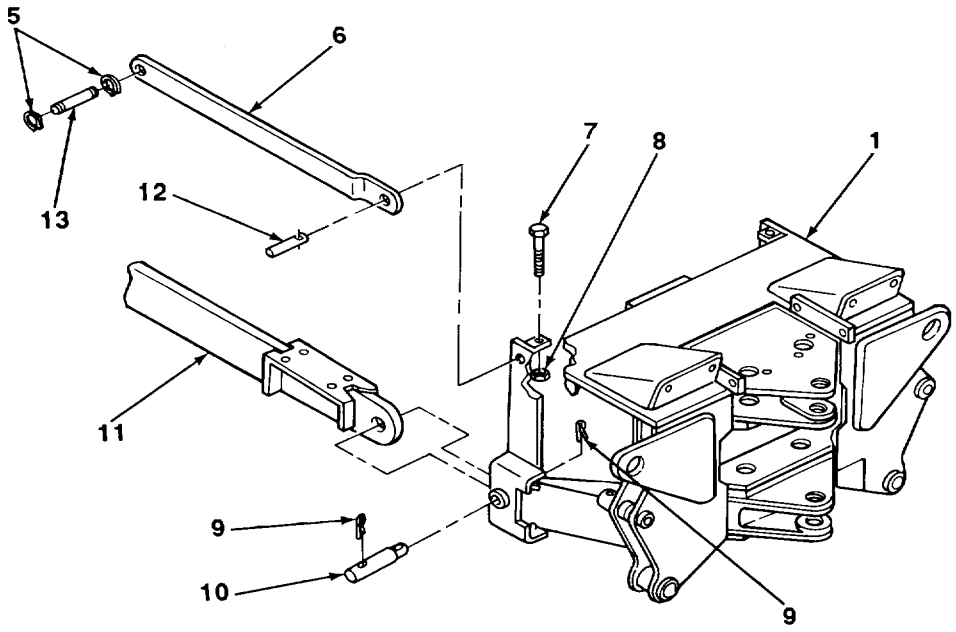
3. Using retaining ring pliers, install four retaining rings (5) on pins (13).

WARNING

Use extreme caution when handling heavy parts. Lifting device is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious injury or death to personnel.

4. Using lifting device and the aid of two assistants, raise and position main frame (1) in place on side frames (11) and towbars (6) with pin holes alined.

5. Install two pins (10) in main frame (1) and two side frames (11). Install four new cotter pins (9) in pins.



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15-6. LOADER SIDE FRAMES MAINTENANCE (Con't).

c. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.

1. Clean side frame and all other metal parts with dry cleaning solvent and rags. Dry thoroughly with clean, dry rags.

2. Inspect side frame and all other metal parts for cracks, breaks, abnormal bends, and damaged threads.

d. REPAIR

1. Restore damaged side frame (3) threads using screw threading set.

2. If cracks, breaks, or broken welds were found, repair by welding (see TM 9-237).

e. ASSEMBLY

If damaged, install identification and name plates (see TM 5-2420-222-20).

f. INSTALLATION

WARNING

Use extreme caution when handling heavy parts. Lifting device Is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious Injury or death to personnel.

1. Using hydraulic floor jack, raise rear axle housing (1) off jackstand, then remove jackstand.

2. Using lifting device, lift side frame (3) into position under rear axle housing (1) and support.

3. Using hydraulic floor jack, lower rear axle housing (1) onto side frame (3).

4. Remove lifting device from side frame (3).

NOTE

If Installing right side frame, skip step 5.

5. Position three hydraulic hoses (8), clamp (5), and bushing (4) in place on side frame (3) Install screw (7) and new lockwasher (6) in clamp, bushing, and side frame.

6. Remove two jackstands from under transmission (2).

16-2 HYDRAULIC EARTH DRILL BORING HEAD MOTOR REPAIR (Con't).

b. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

1. Clean all metal parts with dry cleaning solvent. Dry thoroughly with clean, dry rags.
2. Inspect metal parts for cracks, breaks, or bends.
3. Inspect all threaded parts for damaged or stripped threads.

c. REPAIR

Restore damaged threads using screw threading set.

d. ASSEMBLY

NOTE

Perform steps 1 through 3 only if roller bearings and shaft bearings were removed.

1. Using hammer and brass drift, install two bearing races (24), cones (25), and spacer (26) on shaft (13).
2. Install spacer (23) and retaining ring (22) on shaft (13).
3. Using hammer and brass drift, install two roller bearings (19 and 20) in rear housing (14).
4. Position rear housing (14) in vise. Install two check valves (15) in rear housing.
5. Install spacer (21) in rear housing (14).
6. Tap shaft (13) assembly in rear housing (14).
7. Install collar (12) on shaft (13) assembly and rear housing (14). Stake collar in place.
8. Remove rear housing (14) from vise.
9. Install new preformed packing (18) in center housing (1).
10. Install spacer (17) and six keys (16) on center housing (1).
11. Install center housing (1) and assembled parts on rear housing (14).

16-5. HYDRAULIC IMPACTOR REPAIR.

This Task Covers:

a. Disassembly
b. Cleaning and Inspection
c. Assembly

Initial Setup:

Equipment Conditions:

- Hydraulic impactor working tool removed (see TM 5-2420-222-20).
- Hydraulic impactor motor assembly removed (see paragraph 16-4).

Materials/Parts:

- Impactor lubricant (Item 24, Appendix B)
- Rags (Item 28, Appendix B)
- Dry cleaning solvent (Item 31, Appendix B)
- One repair kit

Tools/Test Equipment:

- General mechanic's tool kit
- Field automotive shop set
- Ball retainer tool
  Spring compression tool (see Appendix C)

Personnel Required: Two

General Safety Instructions:

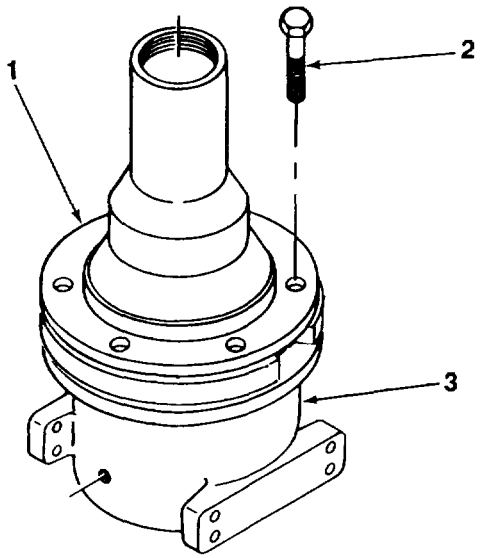
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.

a. DISASSEMBLY

WARNING

Internal spring Is under very high tension. Use a suitable holding device to hold both housings together when removing screws. Failure to follow this warning may result in injury or death to personnel.

1. Place hydraulic impactor in arbor press. Loosen six screws (2) about B in. (9.5 mm).
2. Relieve pressure on arbor press approximately 3/8 in. (9.5 mm). Shake lower housing (1) until lower housing becomes free of upper housing (3). Remove six screws (2) and go to step 4. If lower housing does not shake free, there may be an internal binding problem. Perform step 3.
3. Slowly release pressure on arbor press while loosening six screws (2) until screws are removed and tension is off lower housing (1).
4. Remove lower housing (1) from upper housing (3).



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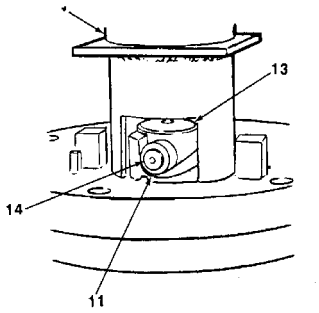
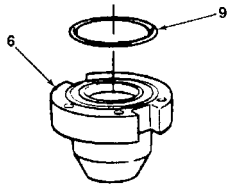
16-5. HYDRAULIC IMPACTOR REPAIR (Con't).

25. Slide two bushings (11) over ends of transport shaft (14).

26. Slowly release pressure on arbor press until bushings (11) come in contact with cam (18). Remove lower housing (1) and spring compression tool from arbor press.

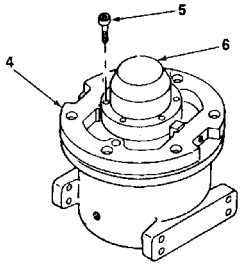
27. Torque two screws (16) to 80 lb.-ft. (108 N•m).





28. Fill striker (6) 1 1/4-1 1/2 in. (3.2-3.8 mm) from top with impactor lubricant.

29. Install new preformed packing (9) in striker (6).



30. Aline striker (6) with grooves in guide ring (4) and install six screws (5). Torque screws to 255 lb.-ft. (346 N•m).

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SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION (CAGE) PART NO.	(5) UNIT OF MEAS.
37	O		TAPE: Lacing and Tying (18876) 9110503	
		4020-00-033-7695	500 Yard Roll	yd
38	O		TAPE: Pressure Sensitive Adhesive, Masking, Flat, 2 Inch Width (81349) MIL-T-2397	
		7510-00-473-9513	60 Yard Roll	yd
39	F		TAPE: Teflon	
			(59364) 722-010-9024	
		2835-01-170-9896	100 Foot Roll	ft
40	O		TRICHLOROTRIFLUOROETHANE: Technical (22527) T-180	
		6830-01-325-5586	4 Liter Cylinder	li
41	F		TUBING: Shrink (06090) TAT-.375X4 INCH	
		4710-01-229-6064	ea	
42	F		VARNISH: Insulating (78580) U-372	
		8010-01-022-3560	55 Gallon Drum	91
43	F		WIPES: Lint-free (28480) 92193W	
		8305-01-301-1031		ea
44	O		WIRE: Nonelectrical (81348) QQ-W-461	
		9505-00-596-0191	5 Pound Roll	lb

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