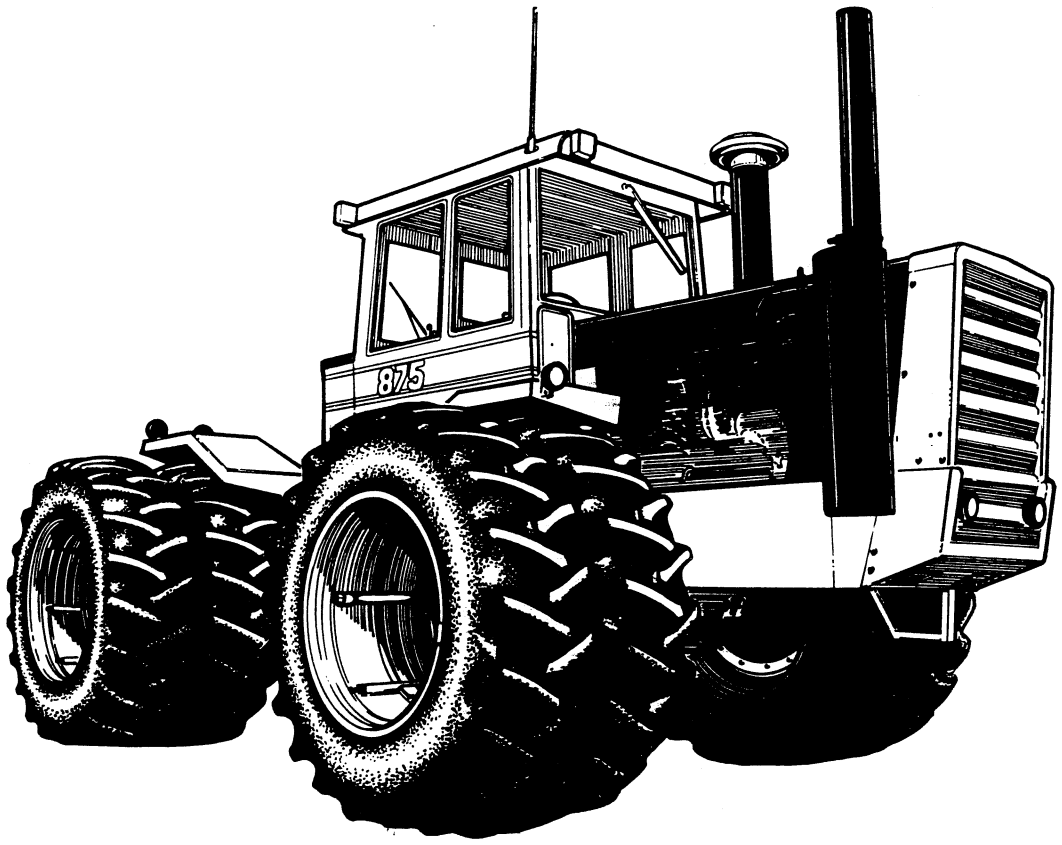
VERSATILE

Service Manual

FORD
NEW HOLLAND

Tractors
835, 855, 875, 895, 935, and 950

1977 – 1980



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SECTION 1: SERVICING

Table of Contents

Model 895 — 15.5 in. (395 mm) two plate dry type, self-adjusting with 5/8 in. (16 mm) release. Pull type with angle spring.

All models:

Hub — 1.75 in. (45 mm) × 10 spline, spring loaded hub discs

Greasable shaft bearing with slinger and greasable release bearing

Foot operated, mechanically actuated with spring assist

Integral disc type torque limiting transmission brake

Safety start switch, located on clutch pedal. Clutch pedal must be depressed before engine cranking motor can be energized.

4.13 BRAKES

All models — 17.0 in. (432 mm) disc and caliper, self-adjusting, driveline mounted

Twin piston, non-floating caliper hydraulically actuated by a single foot pedal

Parkbrake integral with hydraulic brake, self-adjusting, actuated by over-center lever

4.14 TRANSMISSION

All models:

12-speed constant mesh with sliding collar shifting

4 horizontal shafts, vertically arranged, 3 in. (76 mm) dia. drilled for lubrication, except bottom countershaft.

Independent lubrication system with pump, 10 micron filter, cooler, steel lines and wire braid hose, dash-mounted oil pressure warning light.

Oil capacity — 21.5 qt US (20.3 L)

Helical forward gears with straight cut (spur) reverse gears

One dash mounted, incline shift, range lever

One floor mounted gearshift lever

Models 835, 855, 875 and 895 — Five field speeds between 4.1 and 7.3 mph (6.6 and 11.7 km/h)

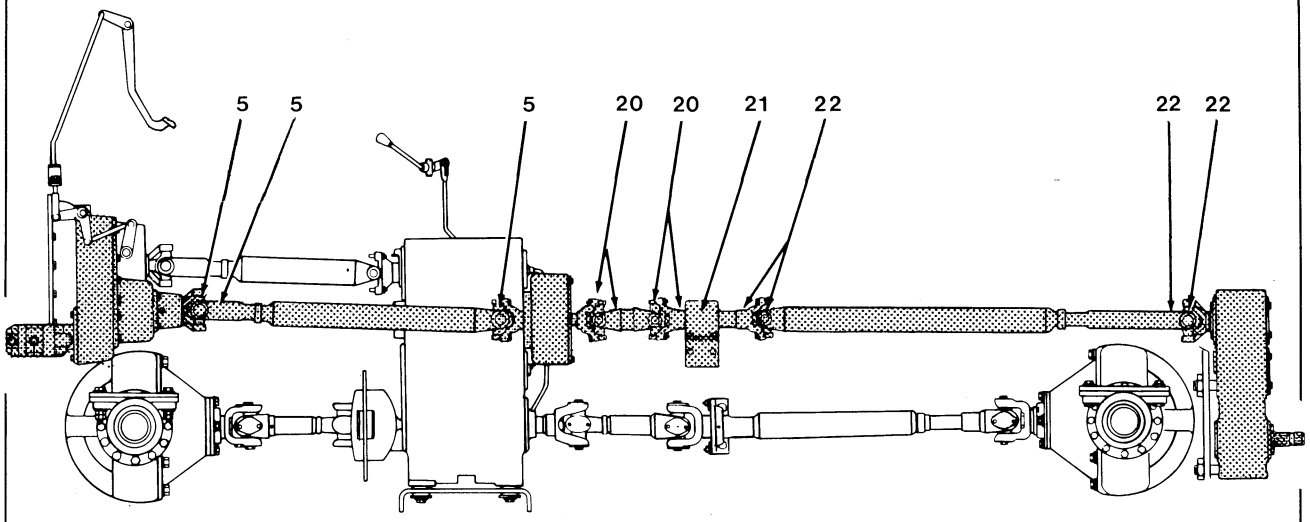
Models 835, 855, 875 and 895 — Speeds at 2 100 r/min and 24.5 x 32 tires, 31.5 in (800 mm) loaded radius tires (Ref. Table 1-4).

Models 935 and 950 — five field speeds between 40 and 7.2 mph (6.4 and 11.6 km/h).

Model 935 — Speeds at 2 400 r/min and 2 600 r/min and 24.5 x 32 tires, 31.5 in. (800 mm) loaded radius tires (Ref. Tables 1-5 and 1-6).

TABLE 1-4: (835, 855, 875, 895 — 2 100 r/min)

	RANGE 1		RANGE 2		RANGE 3		RANGE 4	
	mph	km/h	mph	km/h	mph	km/h	mph	km/h
Gear 1	2.6	4.2	3.0	4.8	3.5	5.7	4.1	6.6
Gear 2	4.7	7.6	5.5	8.9	6.3	10.1	7.3	11.7
Gear 3	9.2	14.8	10.7	17.2	12.3	19.8	14.3	23.0
Reverse	3.4	5.5	3.9	6.2	4.5	7.2	5.2	8.4



PTO Lubrication Points

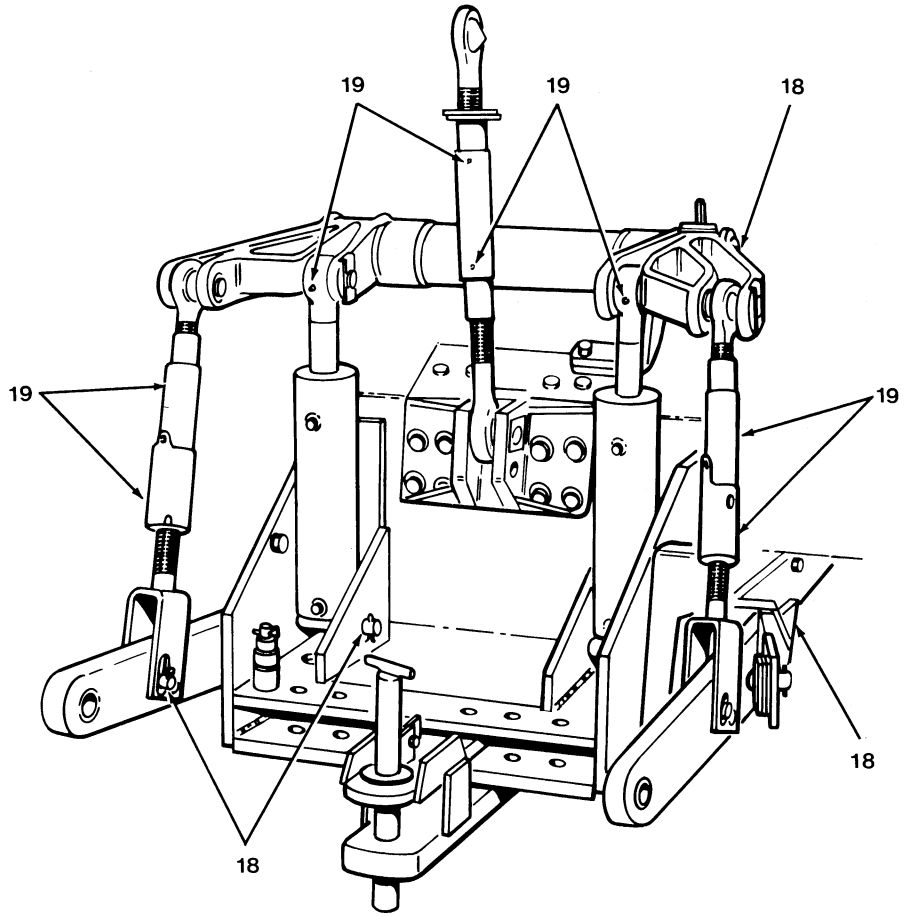


FIGURE 1-1: (Sheet 2) Lubrication Points

TABLE 1-14: Steering and Implement Control

TROUBLE	PROBABLE CAUSE	REMEDY	REFERENCE
		Steering	
Noisy or erratic steering	Cold oil	Allow system to warm up	
	Low oil level	Fill	
	Clogged suction filter	Clean	
	Air in system	Check suction hose connections and filter gasket	Section 5
	Collapsed suction hose	Replace	Section 5
	Faulty relief valve	Check and/or replace	Section 5
Hard steering	Engine idle set too low	Set idle to 1000 rpm	Cummins Operation and Maintenance Manual
	Clogged suction filter	Clean and/or replace	
	System air leaks	Check suction hose connections and filter gasket	Section 5
Freewheeling steering	Faulty seals in steering cylinders	Replace seals	
No steering	Low oil level	Fill to proper level	
	Plugged suction filter	Replace filter	
Faulty relief valve	Repair or replace	Section 5	
	Faulty steering cylinder	Repair cylinder	Section 5
	Ruptured hose	Replace hose	Section 5
	Faulty hydraulic pump	Repair or replace	Section 5

SECTION 2: ENGINE SYSTEMS

1 Introduction

This section contains description, operation, troubleshooting and maintenance information on the support systems serving the engine. It does not deal with the engine proper. Consult the Cummins Maintenance and Shop Manuals for detailed information on any particular engine used in VERSATILE® tractors.

2 Description and Operation

2.1 ENGINE

The engines in VERSATILE® large tractors are all turbocharged, liquid cooled units of in-line 6 and V-8 configuration. The engine in the 895 tractor is aftercooled. Refer to Table 2-1 for a listing of engines used in these tractors. The isolator engine mounts are discussed in Section 8, STRUCTURES.

2.2 FUEL SYSTEM

Description

The fuel system (Ref. Figure 2-1) consists of diesel fuel tanks suspended on the front frame behind the front axle, a pair of filters mounted within the engine compartment, and the hoses which connect these parts to the engine.

The fuel tanks are connected together, near the bottom, by an interconnecting fuel hose and, near the top, by a breather hose. Another breather hose connects the right tank to a dust resistant breather mounted in the rear compartment of the cab.

The left tank contains the float-operated fuel gauge which controls the indicator on the instrument panel. Both tanks have a draincock in the bottom and a filler neck with unvented cap.

Operation

The fuel pump draws fuel from the left tank and forces it through metering orifices into drilled passages within the engine, where it is distributed to the injectors (Ref. Figure 2-2). An excess amount of fuel is pumped to the injectors so that about four times the amount consumed is returned to the left fuel tank through the fuel return hose, after circulating through the injectors.

The fuel flows through the components of the system as follows: tank suction pipe, fuel supply hose, filters, supply hose, fuel pump gear chamber, magnetic screen, throttle orifices, fuel shutoff valve, fuel line, fuel manifold, injector screen, injectors, return manifolds, return hose, tank.

TABLE 2-1: Engine Types in Tractors by Model

TRACTOR MODEL NO.	ENGINE TYPE	DISPLACEMENT	hp/kW	CUMMINS NAME PLATE
835	in-line 6	855 in^3/14.0 L	230/171	NT855C230
855	in-line 6	855 in^3/14.0 L	250/186	NT855C250
875	in-line 6	855 in^3/14.0 L	280/209	NT855C280
895	in-line 6	855 in^3/14.0 L	310/231	NTA855C310
935	V-8	903 in^3/14.8 L	330/246	VT903C330
950	V-8	903 in^3/14.8 L	348/260	VT903C350

TABLE 2-6: Lubrication System

TROUBLE	PROBABLE CAUSE	REMEDY
Low oil pressure	Wrong grade of oil	Change oil
	Faulty oil pressure regulator	Refer to Cummins Shop Manual
	Suction screen in oil pan plugged	Refer to Cummins Shop Manual
	Plugged full flow filter (oil routed through relief)	Change filter
Crankcase sludges	Plugged oil filters and passages	Change filters; test circulation
	Leak in oil system	Repair leak
Excess oil consumption	Wrong grade oil	Change oil
	High oil level	Reduce oil level and check for dilution
Loss of power/low power	High oil level	Reduce oil level and check for dilution
High operating temperature	High oil level	Reduce oil level and check for dilution

TABLE 2-7: Cold Start System

TROUBLE	PROBABLE CAUSE	REMEDY
Failure of engine to start when cranked	Cylinder not fully seated	Screw cylinder down, hand tight
	Cable clamp loose	Check cable clamp on mechanical valve
	Defective valve	Hand actuate the valve and observe ether release. Replace if not working
	Capillary tube or atomizer plugged	Examine tube for damage, replace. Remove and clean atomizer.
	Atomizer directed wrong	Aim spray against intake air flow

7. Install atomizer with orifice directed against intake air stream.

For more detailed information on cold start maintenance, consult Ether Start Instruction Booklet supplied with each tractor.

5 Maintenance

5.1 GENERAL

This subsection covers procedures called for in preceding subsections 3 and 4. Removal and installation of engine system components are covered, excluding those that are an integral part of the engine. Refer to Cummins Shop Manuals for instructions and procedures regarding engine maintenance.

The procedures outlined here are for the purpose of aiding the serviceman in removing a faulty part and installing a working part. Where a simple inspection is feasible, and appropriate to the procedure, it is discussed here, but otherwise disassembly and inspection is included in Overhaul. Refer to Cummins Shop Manuals.

5.2 SERVICING

For servicing information on the Engine Systems refer to Section 1, SERVICING.

5.3 REPLACEMENT OF FUEL HOSES

To replace the fuel system hoses, proceed as follows (Ref. Figure 2-15):

Supply and Return Hoses

1. Disconnect engine end (10) of suction hose (1), supply hose (3) or return hose (4) to allow fuel in hose to drain into tank.

NOTE

Suction and fuel supply hoses have fittings with 7/8-14 straight thread. Fuel return hose has fittings with 3/4-16 straight thread fittings.

2. Disconnect tank end of hose.

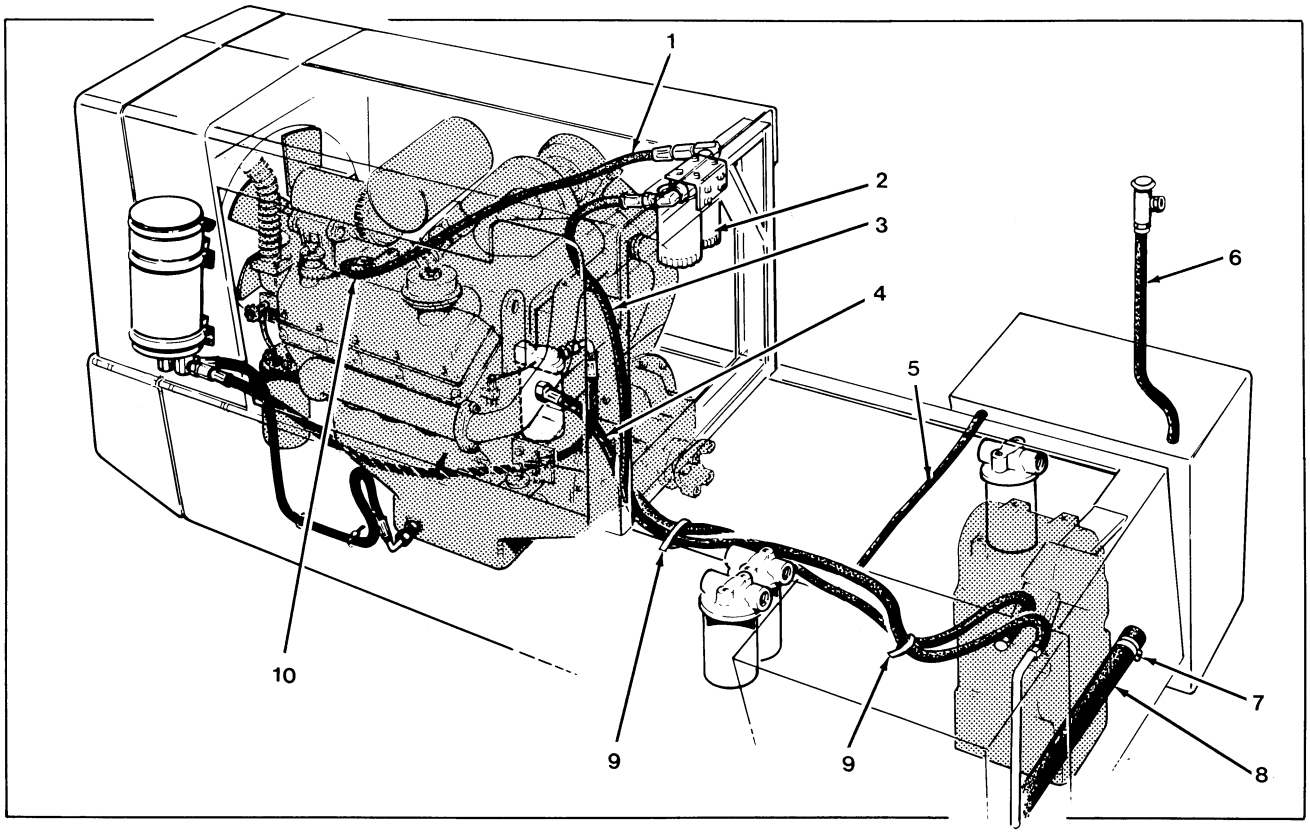


FIGURE 2-15: Replacement of Fuel System Hoses

3. Remove mounting screws (2) connecting muffler to muffler bracket (1).

4. Retract muffler from exhausts, using hand pressure and tapping with a soft head mallet. Do not dent or distort the connections.

Installation

To install the mufffler, proceed as follows (Ref. Figure 2-22):

1. Connect exhausts (6) to muffler inlet with muffler mounts oriented toward hood.

2. Align holes of muffler bracket with holes of muffler and bolt together, using 3/8 × 1 in. (9.5 × 25 mm) hex serrated flange screws.

3. Tighten muffler clamps (5).

4. Connect aspirator hose to muffler and tighten clamp.

5.12 REMOVAL AND INSTALLATION OF BYPASS OIL FILTER ELEMENT

General

The bypass oil filter is located on the inside face of the front left section of the tractor frame for V-8 engines and front right section for in-line 6 engines.

The filter element is a spin-on, throw-away type.

Special Tools and Equipment

1. Strap wrench for REMOVAL ONLY

Removal

To change the filter element proceed as follows:

1. Using strap wrench, rotate element counter-clockwise, as viewed from under tractor, until element is loose enough to be rotated by hand.

2. Complete removal by hand rotation of element.

Installation

To install a filter element proceed as follows:

1. Clean mating surface for filter element gasket and the gasket itself.

IMPORTANT

Do NOT overtighten the element.

2. Thread on the filter element until the gasket contacts its mating surface.

3. HAND TURN the element a further 90 degrees.

4. Start the engine and run for five minutes.

5. Stop the engine and inspect filter for a leak.

6. Check oil level. Fill as required.

5.13 REPLACEMENT OF COLD START CYLINDER

When the cold start cylinder is discharged, it must be replaced with a new cylinder.

Removal

To remove the cylinder, proceed as follows (Ref. Figure 2-23):

1. Back off the two wing nuts (2) of saddle clamp (3) holding cylinder (1).

2. Turn cylinder counterclockwise until threads are free of mechanical valve (4).

3. Remove cylinder carefully to avoid dropping foreign matter into valve connection. Use cap (5) attached to valve for covering the opening.

Installation

NOTE

Do not use thread sealant.

1. Replace with full cylinder, threading it hand tight into mechanical valve against sealing gasket.

8. Remove fan guards and remove the twelve hex serrated flange screws (22) fastening front hood and grill channel to tractor frame.

9. Remove capscrews fastening hood to rear hood support.

10. Hinge grill to horizontal plane and support it.

11. Unlatch cooler frame, draw cotterpin from each hingepin and remove hingepins. Separate cooler chain and let cooler assembly rest on grill.

12. Use hoist to lift hood assembly together with surge tank, muffler and all hoses free of the tractor (Ref. Figure 2-28).

13. Remove air intake tube (7) along with rubber parts. Cover openings in engine and air cleaner.

14. Remove air conditioner hoses from clamps (25) on fan shroud and fuel supply hose (19).

WARNING

DO NOT DISCONNECT ANY AIR CONDITIONER HOSES.

BE ALERT

15. Dismount air conditioner compressor (26) and tie to left frame of tractor (Detail A). Avoid kinking air conditioner hoses.

16. Remove capscrews (10) anchoring bottom mounts of radiator and unbolt radiator brace (11) on each side.

17. Release radiator hose clamps (12) and work hoses free without damaging them.

18. Remove radiator together with its frame, braces and fan shroud.

19. Remove hydraulic pump mounting bolts and pry both pumps off gently. Let hang under the engine.

20. Remove cold start (27), oil pressure gauge (13) and coolant temperature gauge (8) capillaries from their locations in engine block. Coil them neatly out of the way avoiding kinking or crimping.

21. Remove tachometer cable (24) and fuel solenoid wire (23) from fuel pump.

22. Remove charge relay wire from alternator.

23. Separate fuel supply hose (19) at fuel filters and fuel return hose (18) at junction of engine lines.

24. Remove throttle rod between bellcrank and engine.

25. Disassemble clutch linkage at clevis (16) on clutch rod, and unbolt brake cable clamp (15) from underside of clutch housing.

26. Disconnect driveline at first universal joint (14) by removing retainer plate screws and striking the cross to drive out bearing cups.

27. Remove mounting bolts from all three engine mounts.

Removal

1. Attach hoist and carrier to engine lift points for 30° nose up. Lift and raise engine until oilpan clears frame cross member (Ref. Figure 2-29).

IMPORTANT

Constantly check clearance of clutch housing to front axle, cab and steering valve during this manoeuver.

2. Transport engine out over front cross member and lower it to an engine stand or platform designed for this engine.

Installation

To install the engine, proceed as follows (Ref. Figure 2-29):

2. Clutch will not engage	Any of the above	Perform above in listed sequence
	Release sleeve movement restricted	Refer to para 3.3.6
3. Clutch will not disengage	Clutch out of adjustment	Refer to para 4.3.2
	Clutch linkage out of adjustment or disconnected/broken	Refer to para 4.3.3
	Clutch fork not engaged with release bearing housing or slipping on transverse shaft	Refer to para 3.3.6
	Warped disc and/or intermediate plate cracked	Refer to para 3.3.8
4. Clutch chatters when engaging	Clutch disc pads worn beyond limits	Refer to para 3.3.7
	Oil, grease or dirt on disc pads and/or friction surface on flywheel, intermediate plate or pressure plate	Refer to 3.3.8
5. Clutch grabs	Clutch release fork motion not smooth	Refer to para 3.3.6
	Both parts of 4 above apply	Both parts of 4 above apply
6. Clutch noisy when disengaged	Clutch release bearing worn	Refer to para 3.3.6
	Release sleeve and/or output shaft	Refer to para 3.3.6
	Pilot bearing in flywheel worn	Refer to para 3.3.10

5. Ensure tubing is in shown position. Use arbor press to force release sleeve retainer down until it bottoms on the assembly case. Tighten the nuts to hold pressure springs compressed.

6. Remove unit from arbor press. Remove the wooden blocks.

7. Push release bearing housing (14) toward assembly case (9); refer to Figure 3-8. Remove two release sleeve rings (5, 6) and release bearing housing.

8. Support unit in arbor press with blocks (Ref. Figure 3-12). Press release sleeve retainer down. Remove top nuts from three threaded rods.

9. Slowly release pressure of arbor press. Remove pressure springs and spring pivots.

10. Put assembly on arbor press supported on wooden blocks (Ref. Figure 3-13). Apply pressure to top of release sleeve retainer.

Cleaning

1. Clean all exterior surfaces of release bearing housing assembly with a dry cloth.

IMPORTANT

Do not use solvent to clean bearing.

2. Thoroughly clean all remaining parts with solvent.

3. Use a wire brush to thoroughly clean the threads of the adjusting ring and the assembly case. Ensure old anti-seize compound is removed.

4. Wipe all parts with a clean dry cloth.

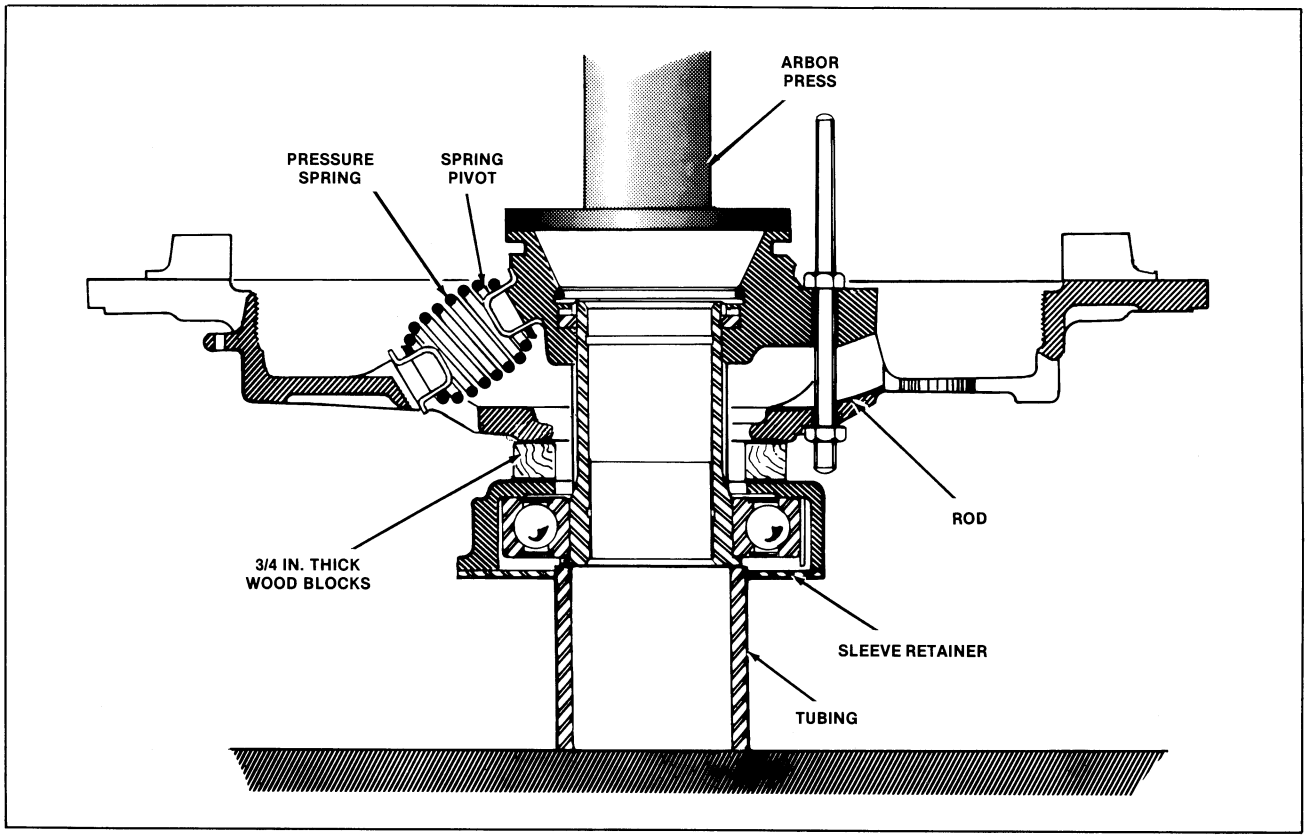


FIGURE 3-12: Disassembly of Release Sleeve from Retainer

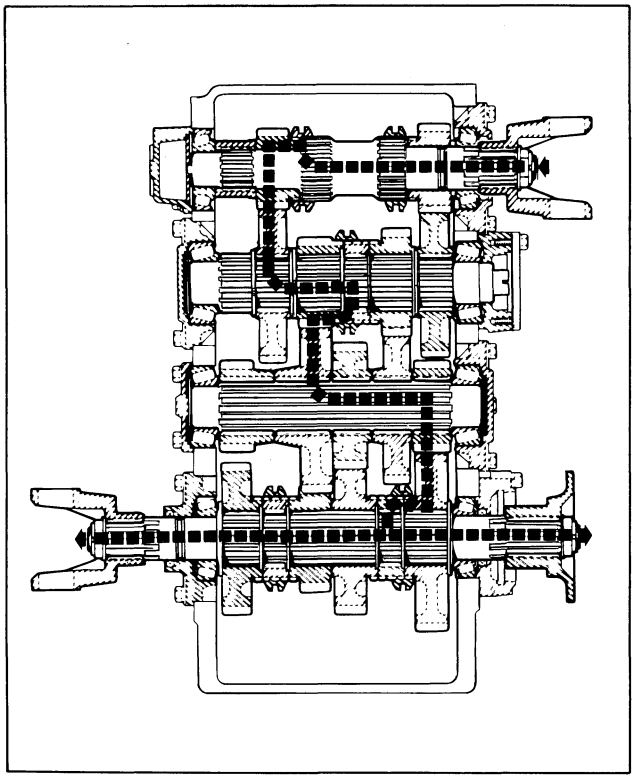


FIGURE 3-24: Power Flow - Range 1, Gear 1

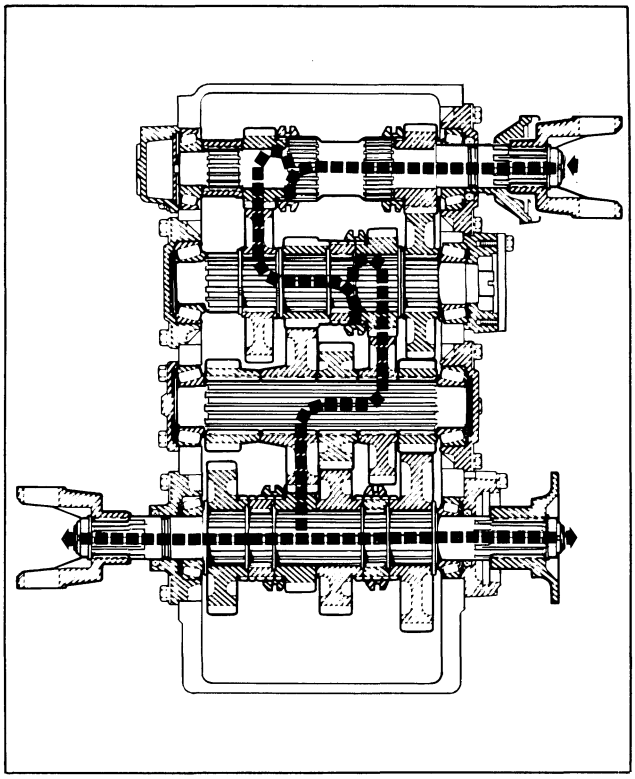


FIGURE 3-26: Power Flow - Range 3, Gear 3

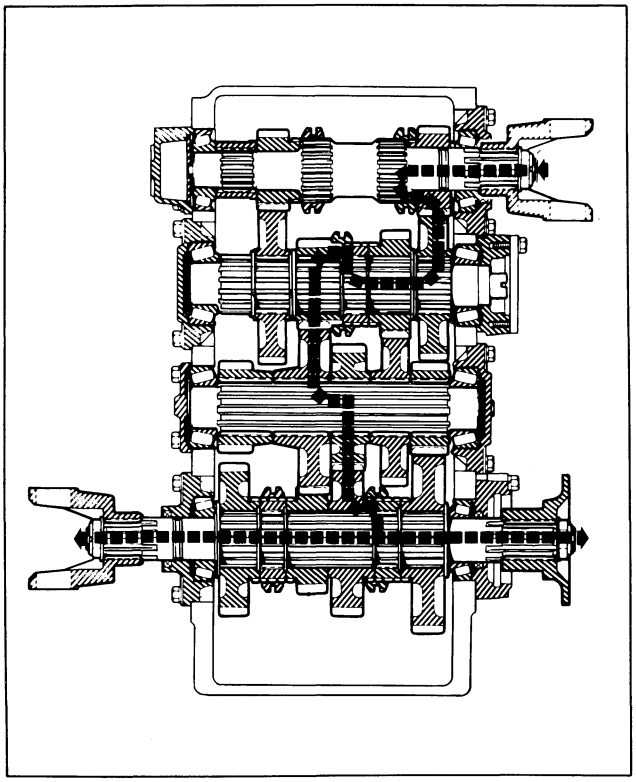


FIGURE 3-25: Power Flow - Range 2, Gear 2

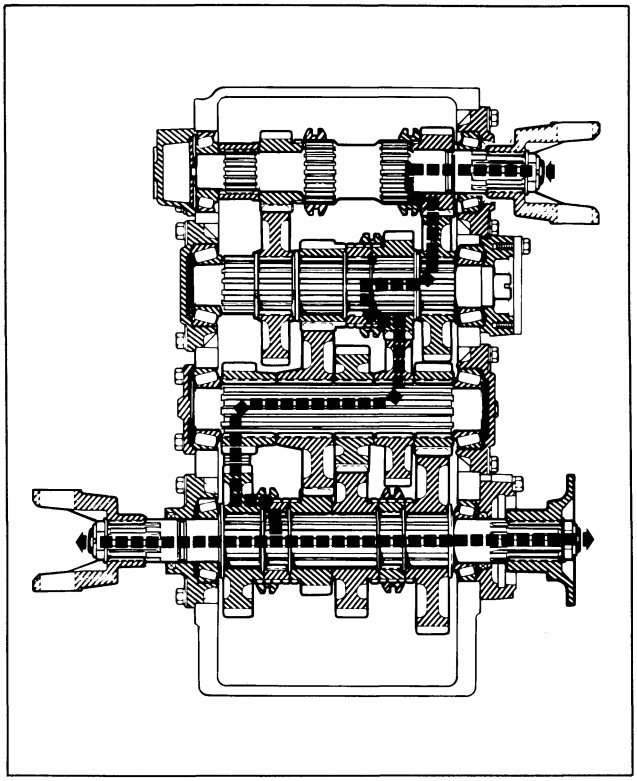


FIGURE 3-27: Power Flow - Range 4, Reverse Gear

4.3.4 INPUT SHAFT BEARING SEAL REPLACEMENT

Park tractor on a level surface. Stop engine and put transmission in gear.

Special Tools and Equipment

1. Torque wrench, 300 lbf ft (450 N·m) capacity

- CAUTION

SET PARKBRAKE AND CHOCK WHEELS.

1. Disconnect input driveline universal joint. Tape or otherwise secure bearings to the cross. Compress driveline. Secure driveline out of the way.
2. Remove cotterpin, nut and washer at yoke (Ref. Figure 3-36). Remove yoke. Remove oil line at bearing cover plate. Remove capscrews and lockwashers securing end plate. Remove end plate.
3. Remove and discard oil seal. Clean and inspect plate mounting surface and mating surface of transmission case. There are to be no marks.
4. Install new oil seal in end plate.
5. Put new gasket and end plate over shaft end and fasten with capscrews and lockwashers.
6. Connect oil line to end plate.
7. Put yoke on shaft splines. Put washer and nut on shaft threads. Torque nut to 400 lbf ft (540 N·m). Secure nut with new cotterpin.
8. Connect driveline universal to yoke.
9. Start engine and run for five min. with gearshift in neutral and clutch engaged. Stop engine. Inspect transmission for oil leaks.

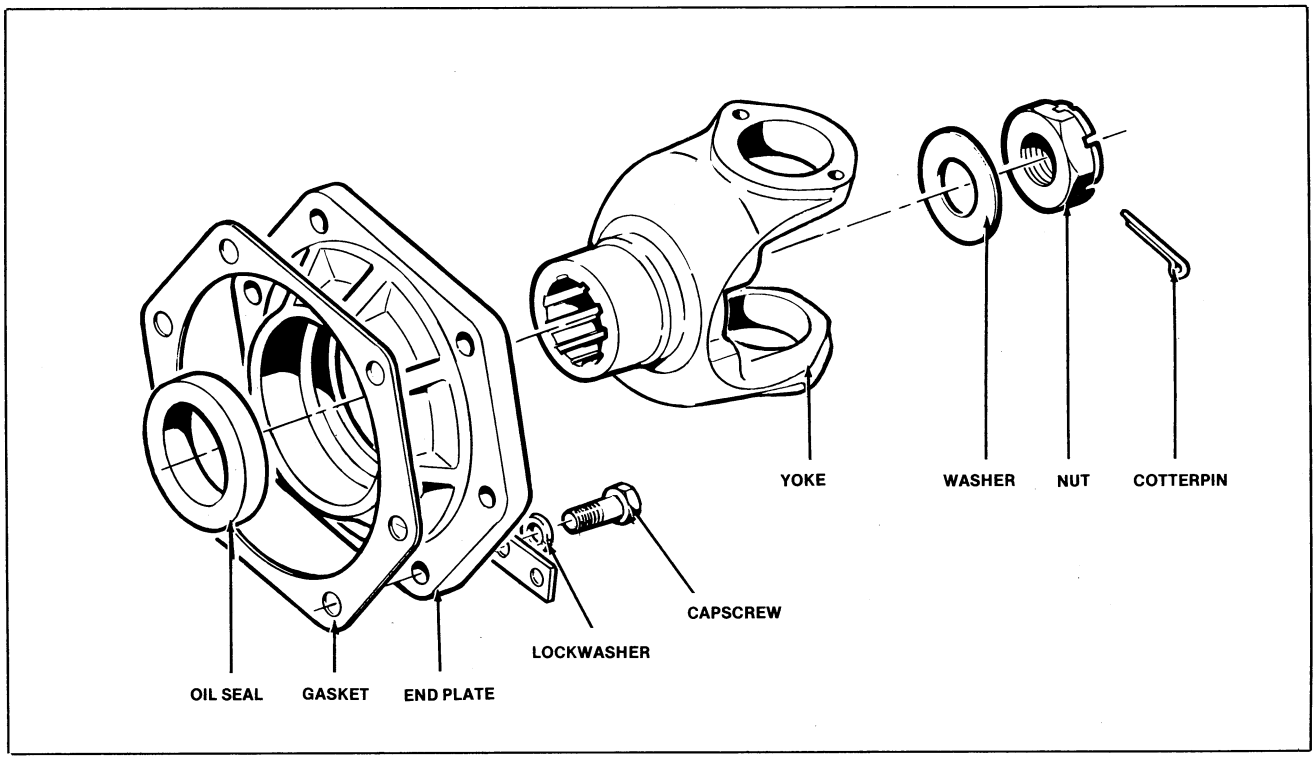


FIGURE 3-36: Input Shaft Bearing Seal Replacement

3. Enter front end of shaft through rear end of case and place gears on shaft in sequence as shaft enters case.

4. Install front bearing cone on shaft using a brass drift and hammer.

5. Press bearing cup into front end cap. Place exact number and thickness of shims and end cap over shaft end. Secure with capscrews and lockwashers.

6. Install rear bearing cup and end cap over shaft end. Secure with capscrews and lockwashers.

7. Install oil seal, gasket, and brake mounting flange at front end of output shaft. Secure with capscrews and lockwashers.

8. Remove hose fitting from center of bearing cap of bottom countershaft. Enter probe of dial indicator into hole in bearing cap. At the opposite side of the case, pry gear (8) back and forth to measure shaft end clearance. It is to be 0.001 to 0.004 in. Add or remove shims to get the tolerance end clearance.

9. Position dial indicator at either end of output shaft. Pry shaft back and forth to measure end clearance. It is to be 0.001 to 0.004 in. Add or remove shims to get the toleranced end clearance.

Input Shaft

1. Install interior components on shaft including bearing cones (Ref. Figure 3-38).

2. Install shaft assembly into case through front of case.

3. Place exact number and thickness of shims that were removed over rear end of shaft. Put bearing cup and end cap (manifold) on rear of shaft. Secure with capscrews and lockwashers.

4. Position new gasket, bearing cup and end plate over the front end of shaft. Secure with capscrews and lockwashers.

5. Place dial indicator so that probe contacts front end of the shaft. Pry shaft back and forth to measure end clearance. It is to be 0.001 to 0.004 in. Add or remove shims to get the toleranced clearance.

Finalization of Assembly

1. Install shift rods and forks.

2. Install side cover and new gasket, refer to para 4.3.2.

3. Install pump to adaptor at front end of top countershaft.

4. Cap or plug all ports of the transmission.

5. Move gearshift levers (lower two) to jam transmission. Place yoke on input shaft and rear output shaft and flange on front output shaft. Put washer and nut on each shaft end. Torque nuts on both shafts to 400 lbf ft (540 N·m). Secure nuts with new cotterpin. Move gearshift levers to remove gear jamming.

6. Refer to para 4.3.1 for transmission installation.

4.5 Transmission Lubrication Pump Overhaul

4.5.1 DISASSEMBLY

With pump removed from transmission, proceed as follows (Figure 3-42):

1. Remove capscrews (15) and lockwashers (14).

2. Separate pump cover (3) from pump body (9).

3. Remove wear plate (6), load seal (12), preload seal (13), sealing ring (5), retaining ring (1) and oil seal (2) from pump cover.

4. Inspect gear (7, 11) teeth for chipping or blueing and bearings (4, 8) for wear. Replace if necessary.

Replace planet gears, as follows (Ref. Figure 3-52):

1. Tap rollpin into housing as far as it will go.

NOTE

The drilling in the planet carrier housing does not pass completely through the casting; however, the length of the rollpin is such that it is shorter than the diameter of the planet gear pin. In the assembled position, the rollpin only protrudes part way into the pin.

2. Push out planet gear pin. Remove and discard O-ring.

3. Withdraw planet gear and thrust washers taking care not to lose needle rollers. Remove needle rollers and spacer.

4. Similarly remove remaining planet gears.

5. Check needle rollers for wear. Replace needle rollers if measured diameter is less than 0.2495 in. (.633 mm).

NOTE

It is recommended that needle rollers be replaced whenever the planet gears are replaced.

5.3.5 INSTALLATION OF PLANET GEARS

1. Using grease to hold needle rollers in place assemble two rows of 87 needle rollers each, separated by one bearing spacer, in each planet gear.

2. Insert a shaft of same diameter as planet gear pin but a length just slightly less than the thickness of the planet gear into the center of the assembled needle rollers to hold them in place.

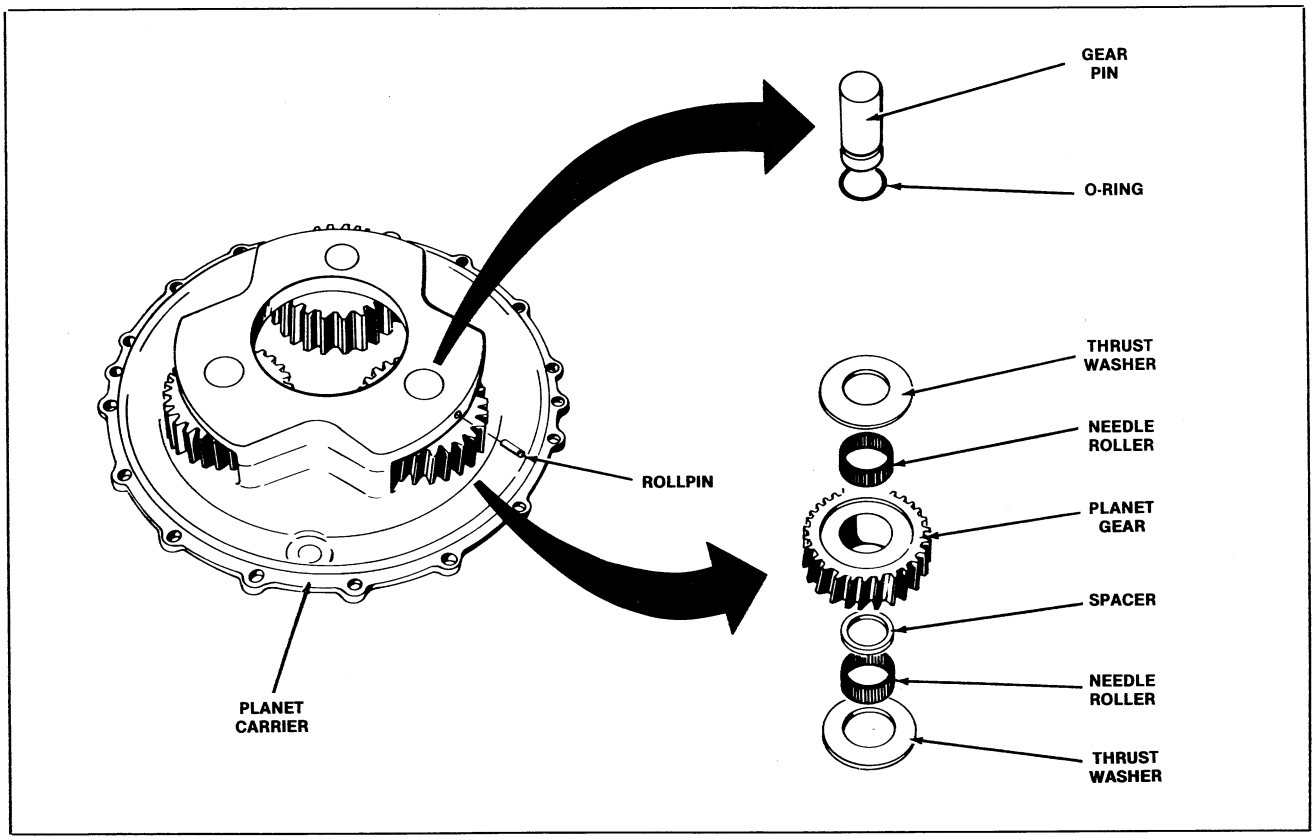
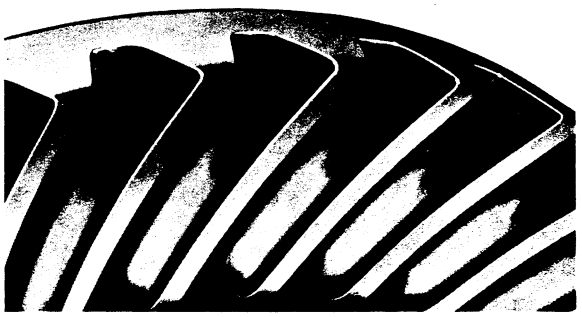


FIGURE 3-52: Replacement of Planet Gears

The ring gear tooth contact patterns illustrated are approximate shapes. Actual contact may vary, however the same general shape should be obtained. When adjusting gear sets that have been in service, tooth contact may vary because of wear. To obtain best results, strive to obtain a pattern coinciding with original patterns.

Pattern "A"
CORRECT TOOTH CONTACT

Correct adjustment is obtained when pattern of tooth bearing *(both lengthwise and profile)* appear as shown.



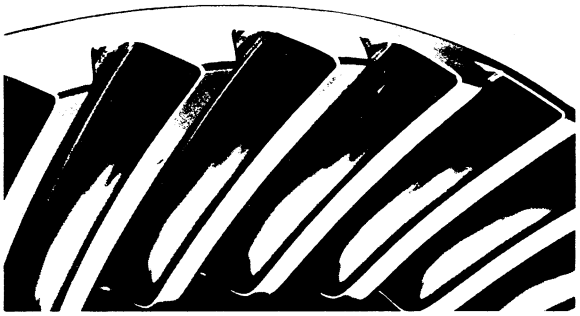
Pattern "A"

Pattern "B"
CONCENTRATED BEARING AT TOE

Not enough backlash . . . move ring gear *away* from drive pinion to increase lengthwise bearing. This may change the profile bearing to some extent and an adjustment of the pinion may be required.

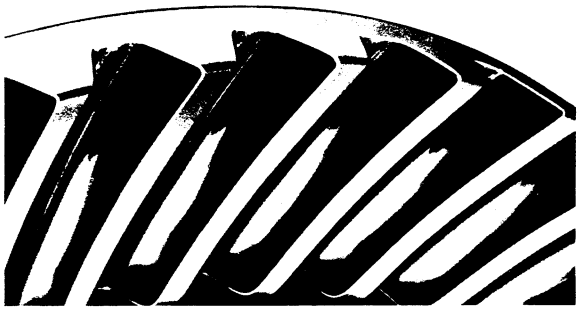
Pattern "C"
CONCENTRATED BEARING AT HEEL

Too much backlash . . . move ring gear *toward* drive pinion to obtain correct lengthwise bearing. This may change the profile bearing to some extent and an adjustment of the pinion may be required.



Pattern "D"
PROFILE BEARING HIGH

Pinion is out too far . . . remove shims to move drive pinion *toward* ring gear. Then move ring gear *away* from pinion to obtain correct lengthwise bearing.



Pattern "E"
PROFILE BEARING LOW

Pinion is in too far . . . add shims to move drive pinion *away* from ring gear. Then move ring gear *toward* pinion to obtain correct lengthwise bearing.

FIGURE 3-59: Tooth Contact Patterns on Ring Gear and Pinion

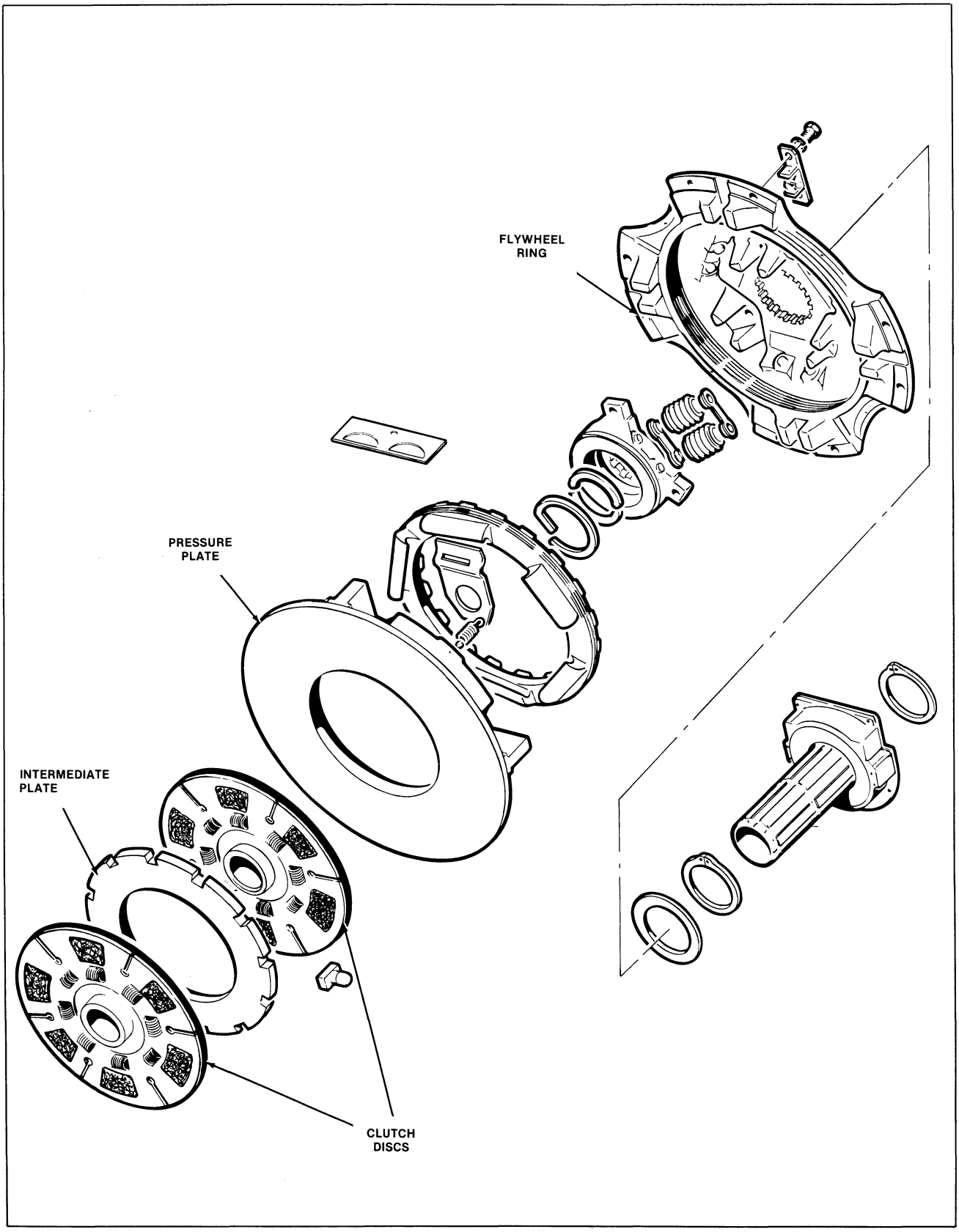


FIGURE 3-55: Clutch Assembly

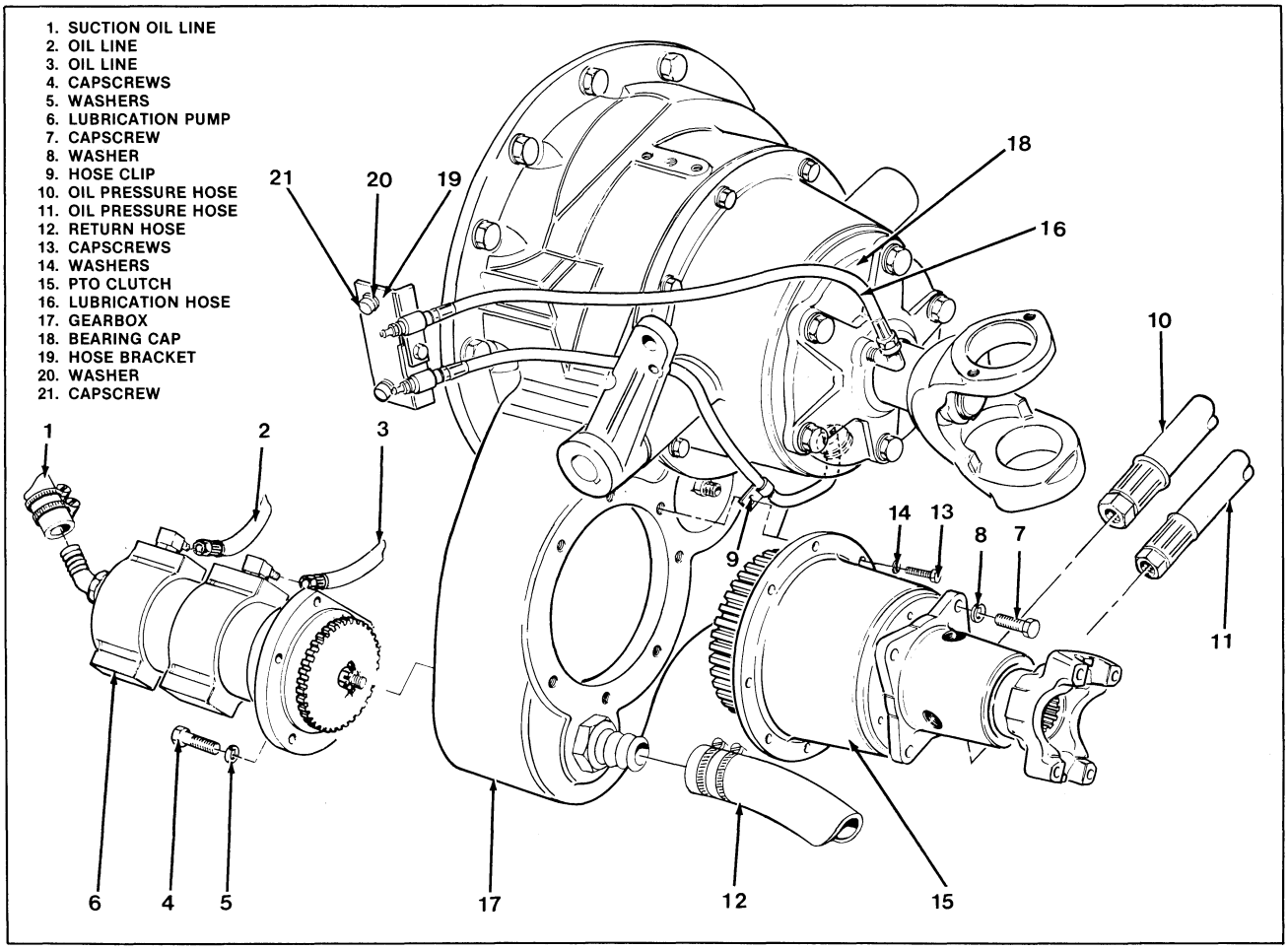


FIGURE 3-63: PTO Clutch and Pump Removal and Installation

14. Remove capscrews (13) and washers (12) and lift release bearing cover (11) upward while manipulating clutch release arm (24) to clear release bearing (9).

15. Remove retaining ring (10) from release sleeve. Install bearing puller support into release sleeve and using a bearing puller, remove release bearing.

16. Remove top two capscrews (8) and washers (7) and install steady rods.

17. Loosen remaining capscrews and washers.

18. Attach gearbox lifting hook to gearbox at pivot bracket (4). Secure with capscrews (6) and washers (5); tighten. Attach block and tackle to lifting hook and lift gearbox.

19. Remove remaining capscrews and washers. Move gearbox from engine while still taking up the weight to prevent gearbox binding on clutch release shaft.

20. Lift gearbox clear of tractor.

NOTE

Retain all parts of the gearbox assembly for cleaning, inspection and overhaul.

4.2.2 INSTALLATION

Install the engine gearbox and PTO clutch as follows:

1. Attach gearbox lifting hook to gearbox housing at pivot bracket (4) with capscrews (6) and washers (5); tighten (Ref. Figure 3-64).

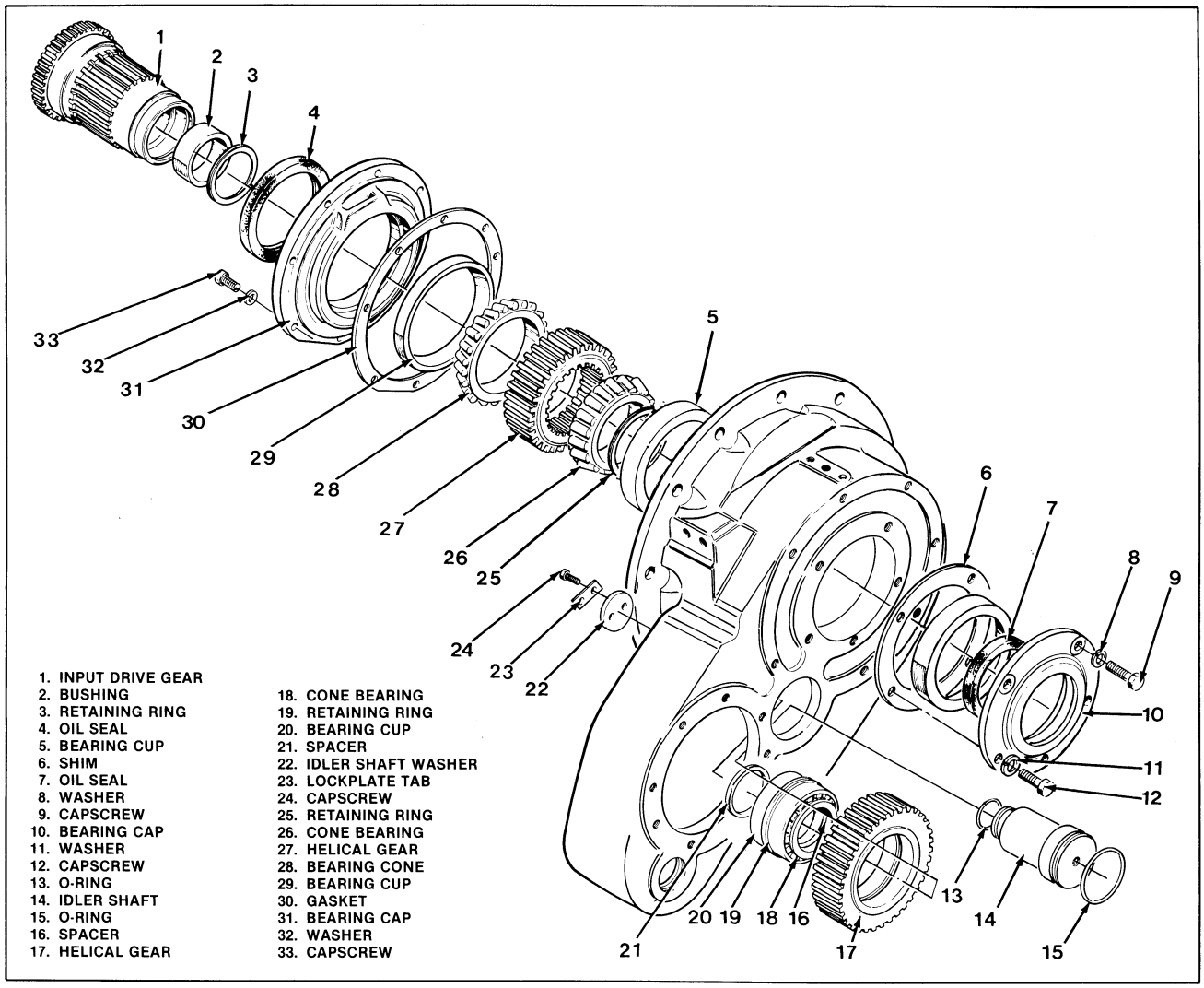


FIGURE 3-72: Gearbox Overhaul

9. Remove capscrews (9,12), washers (8,11) and bearing cap (10). Remove shims (6), bearing cup (5) and oil seal (7) from bearing cap (Ref. Figure 3-72).

10. Remove capscrews (33), washers (32) bearing cap (31) and input drive gear (1).

11. Remove retaining ring (25), cone bearing (26), helical gear (27) and bearing cone (28) from input drive gear.

12. Press bearing cap (31) from input drive gear (1). Remove bearing cup (29), gasket (30) and oil seal (4) from bearing cap.

13. Remove retaining ring (3) and bushing (2) from inside input drive gear (1).

14. Bend lockplate tabs (23) down and remove capscrews (24), lockplate and idler shaft washer (22).

15. Press out idler shaft (14) and remove O-rings (13,15).

16. Remove idler helical gear (17) and spacer (21) from inside the housing. Remove cone bearings (18), spacer (16) bearing cups (20) and retaining ring (19) from inside idler helical gear.

17. Remove clutch brake from spline shaft. Remove capscrews and the clutch brake backing plate from bearing cap (Ref. Figure 3-73).

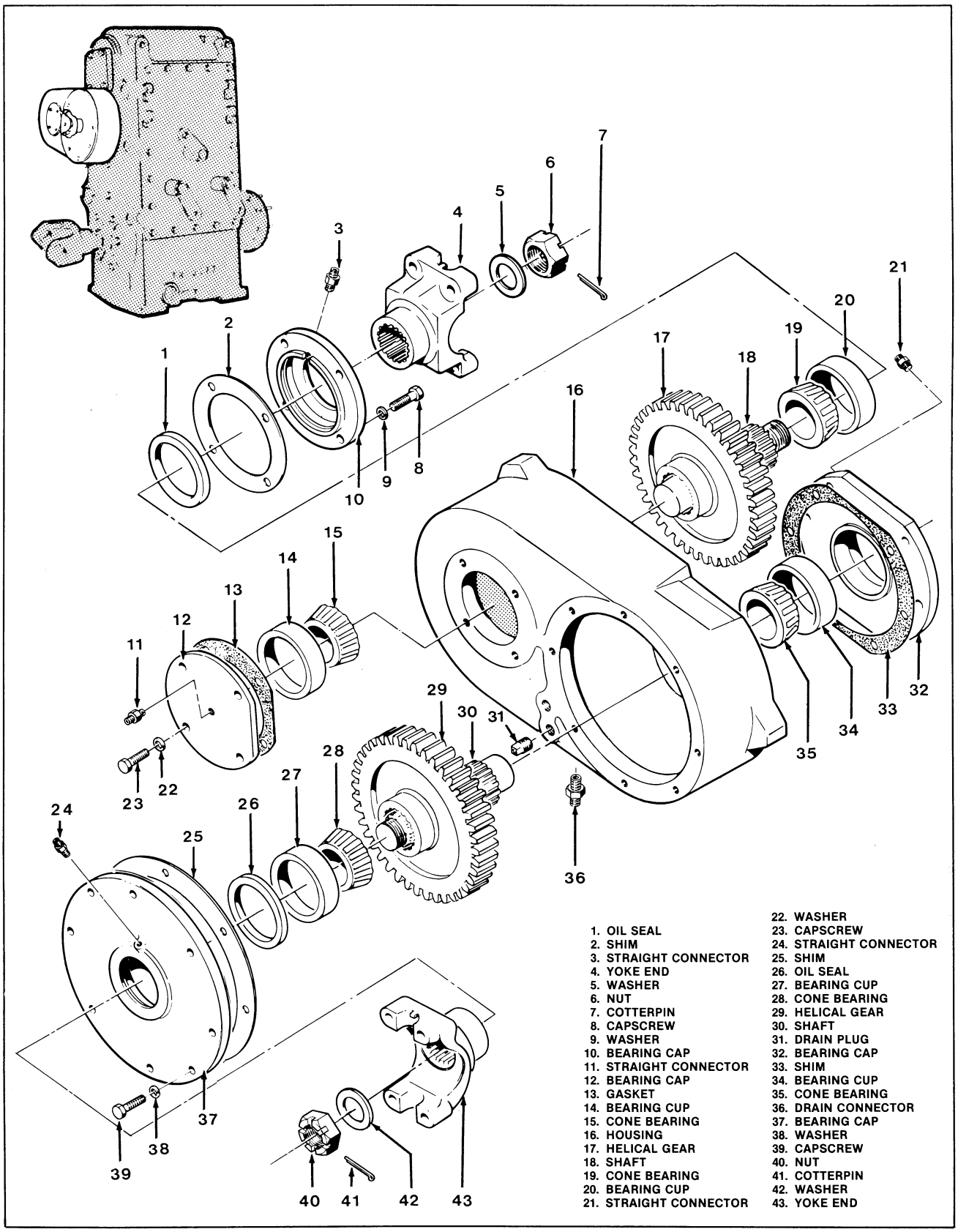


FIGURE 3-77: PTO Gearbox Overhaul

SECTION 4: CONTROLS

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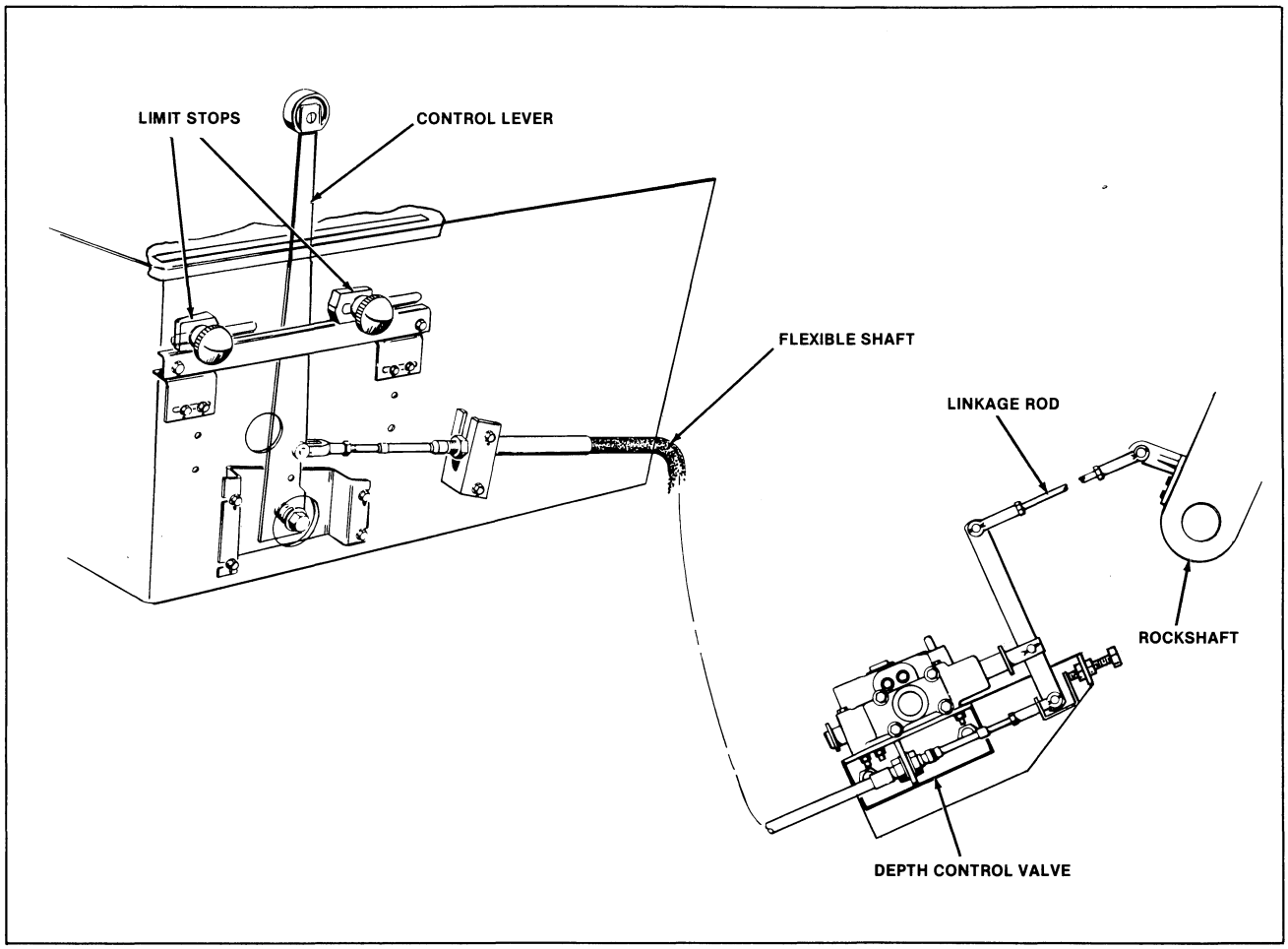

FIGURE 4-11: Depth Control Valve Linkage

tion opens the modulator valve which distributes oil through the regulator valve which engages the PTO clutch.

2.4 TRANSMISSION LUBRICATION SYSTEM

The transmission lubrication system (Ref. Figure 4-12) begins at the gear-driven pump located on the front of the transmission housing and driven by the top countershaft of the transmission itself. The transmission oil proceeds from the pump to the transmission oil cooler at the front of the tractor. After circulating through the cooler, the returning oil passes through the return line filter, past the pressure-sensing switch of the transmission oil pressure sender and into the oil distributor manifold located at the top of the rear face of the transmission housing.

From the manifold the oil proceeds through several routes into the transmission, pressure-lubricating the gears and bearings. The oil drains into a sump at the bottom of the transmission housing, from which it is recovered by a suction line returning to the pump. On its way to the pump, the oil is filtered a second time by an oil strainer in the pump.

The second transmission housing is vented to the atmosphere by a breather system, located high on the front face, which is connected by a hose to the filler neck at the rear of the housing. The filler neck also holds the dipstick. The transmission housing is drained by a plug at the bottom of the filler tube.

Inclusion of the PTO involves rerouting the transmission oil flow, refer to Section 3A, PTO. Repair and Overhaul of the transmission lubrication pump is contained in Section 3, DRIVE TRAIN.

NOTE

Bleeding the system requires two people; one at the caliper and one in the cab.

Proceed as follows (Ref. Figure 4-20):

1. Remove filler cap from reservoir.

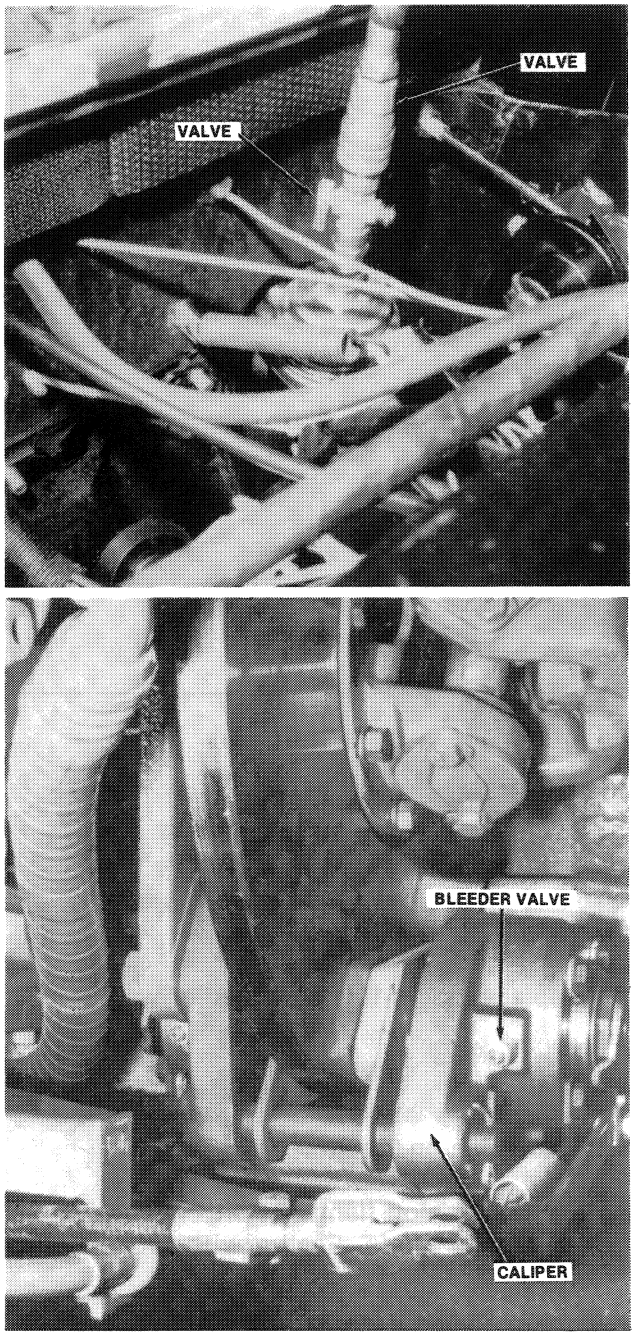

FIGURE 4-20: Bleeding Brake System

2. Attach a flexible tube to the bleeder valve.

3. Place the other end of the flexible tube in an open container holding a small amount of clean fluid. See that end of tube is below surface to prevent air breathing back into system.

NOTE

Both pistons on either side of caliper must be bled for proper operation.

4. Open one bleeder valve to permit bleeding.

5. Attach valve to filler opening of the master brake cylinder.

6. Open valve and let fluid into master brake cylinder and to brake.

7. Pump brake several times to allow fluid through brake system to one side of caliper.

8. On down strokes of brake pedal observe fluid until it flows bubble-free from hose.

9. Tighten bleeding fitting; remove flexible hose and discard fluid in container. This fluid contains air and should not be used.

10. Use steps 3, 4, 6, 7, 8 to bleed other side of caliper.

11. Remove valve from filler opening and top up to within 1/8 in. of top.

12. Road test brake for satisfactory operation.

3.12 REMOVAL AND INSTALLATION OF BRAKE DISC

Removal

Proceed as follows (Ref. Figure 4-21):

1. Disconnect brake tubing or hose from caliper housing.

2. Plug tubing to stop loss of brake fluid.

3. Disconnect cable from parkbrake.

SECTION 5: HYDRAULIC SYSTEM

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4 Maintenance

4.1 GENERAL

The following paragraphs detail the recommended step-by-step procedure for removal and installation of various subsystems/components of the hydraulic system. They do not contain any information regarding disassembly, inspection or assembly of the individual items which may require removal from the tractor for repair or overhaul purposes. Refer to subsection 5: REPAIR AND OVERHAUL for those procedures. The following procedures are presented in the sequence in which the removal/installation process is the easiest to perform. Unnecessary disturbance of other items can be avoided if the listed steps are followed. Perform the procedure in the listed sequence. Working on machinery, especially mobile machinery, need not be dangerous IF simple safety precautions are observed. The following is a partial list of the most obvious precautions which should be observed and taken whenever work is to be performed on the tractor.

General Safety

DO stop the engine when it is listed in the procedure.

DO wear a face shield when loosening or disconnecting hydraulic plumbing which MAY have a residual pressure. This pressurized fluid can penetrate the skin and possibly cause serious injury and/or infection.

DO see a doctor at once if the skin is penetrated by hydraulic fluid.

DO NOT attempt to trace high pressure line leaks with bare hands. Hold a clean piece of wood or cardboard against suspected lines with gloved hands to discover leak location.

DO NOT start or run the engine if ANY hydraulic union is loosened or disconnected.

DO NOT approach the three-point hitch, if fitted, when engine is running unless it is required in the procedure and then approach with CARE.

4.2 INSPECTION OF HYDRAULIC SYSTEM PLUMBING

This procedure details the visual and physical inspection of a complete hydraulic system. Dismantling is not necessary unless inspection reveals a fault/malfunction. For corrective action refer to relevant section of Maintenance and/or Repair and Overhaul.

Inspect progressively (Ref. Table 5-2). Inspect lines/hoses connecting the components for clamping, routing, kinks, rubbing, nicks, rupture or near rupture and general good condition. Replace as required (Refer to Operator's Manual).

4.3 REMOVAL AND INSTALLATION OF HYDRAULIC LINES AND FITTINGS

General

Repairs to a hose, fitting or lines, other than minor straightening, is not advisable. Any of the following conditions make a hose, fitting or line unserviceable for further use: crack of any size, kink or collapsed wall, frictional chafing, damaged threads, deformed fitting or a nick or permanent twist in the wall.

When installing a line, maintain the original routing and place in the clamps. Tie back hoses and lines to prevent chafing or tangling with other components and to reduce noise.

Always apply a quality thread sealant sparingly to the last few male threads of PIPE THREADED CONNECTORS ONLY. Do not apply sealant in a manner such that it could possibly get to the bore of the hose/fitting/line or on the flanged surfaces. When installing a new hose or line, connect and finger tighten both connectors before final tightening to allow the hose or line to take up a normal position. Always use a backup wrench when tightening or loosening a connection.

Removal

IMPORTANT

Stop engine. Put transmission in any gear. Set parkbrake. Chock wheels.

4.11 REMOVAL AND INSTALLATION OF HYDRAULIC FLUID COOLER

General

The cooler core is immediately behind the radiator grill at the front of the tractor. The lower section on the frame is a combination finned cooler for the transmission lubricant and the hydraulic fluid. It is necessary to disconnect both the transmission and the hydraulic lines. The transmission lines are connected to the manifolds on the right side of the cooler as viewed from the cab.

Hydraulic fluid from the hydraulic circuits is directed via hoses and lines to a manifold on the left side of the cooler core. After passing through the core, the cooled fluid is piped to the reservoir.

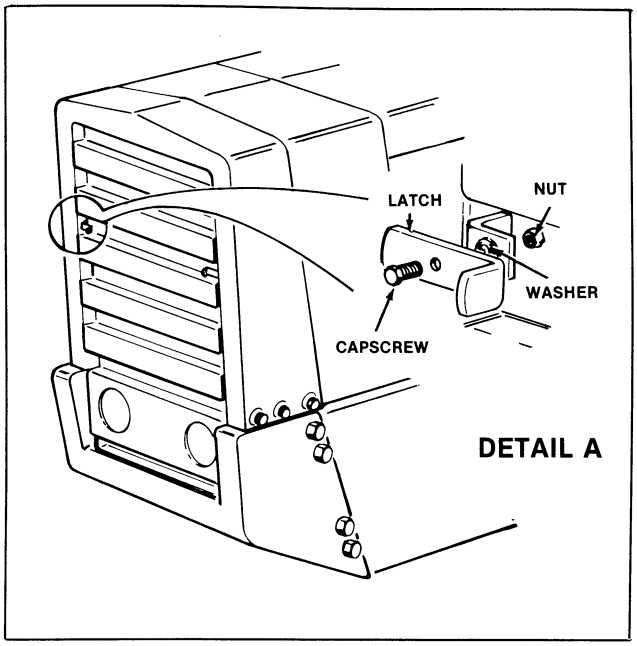

FIGURE 5-12: Radiator Grill and Latches

Removal

CAUTION

BE ALERT

STOP ENGINE. SET PARKBRAKE. CHOCK FRONT AND REAR OF WHEELS.

To remove hydraulic fluid cooler, proceed as follows:

1. Rotate grill latches (Ref. Figure 5-12, Detail A) until both latches are clear of the grill.
2. Hinge the top of the grill forward until it is in a horizontal plane.
3. Rotate latches on the front radiator core until both latches are clear of the radiator (Ref. Figure 5-13).
4. Hinge front radiator frame top forward until chain bears frame weight.
5. Using a back-up wrench, disconnect hose unions from the four manifold unions of the lower section of the radiator. Cap or plug the end of the hoses and the manifold unions. Tie the ends of the hoses to hold them vertical with unions up.

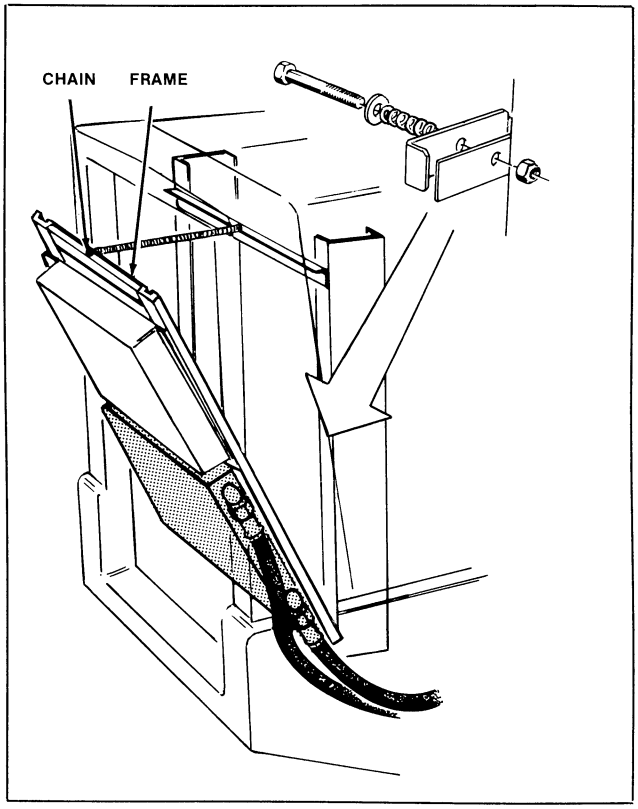

FIGURE 5-13: Cooler Core Frame and Latches

6. Remove the two lower capscrews on each side of the radiator frame. Remove lower radiator from frame.

5. Remove preload seals (3, 15) and ring seals (4, 17).

6. Remove oil seal (1) from pump body (2).

INSPECTION

1. Inspect all machined parts for burrs and marks. Inspect the gear teeth (7, 8) for chipping or cracking and excessive wear. Use a fine stone and cutting oil to remove any metal buildup from gear end faces. Wash all cutting oil off gears and shafts.

2. Inspect pump body (2) and gear plate (5) and pump assembly (12) for cracks and burrs. All mating faces are to be unmarked. Remove any metal buildup with a fine stone and cutting oil. Use petroleum base solvent to wash off all traces of cutting oil and blow dry.

3. Inspect pump body (8) and end plates (3) and (16) for cracks and burrs. All mating faces are to be unmarked. Remove any metal build up with a fine stone and cutting oil. Use petroleum base solvent to wash off all traces of cutting oil and blow dry.

4. Remove and discard shaft oil seal (1) from end plate (3). Clean the counter bore and install a new oil seal (1).

ASSEMBLY

1. Lightly oil all parts and interior surfaces with clean hydraulic fluid.

2. Install new seals (1, 3, 4, 11, 15, 16, 17).

3. Install wear plates (10, 18) with brass side facing gears.

4. Align pump body (2) and pump assembly (12) over dowel pins (6, 9). Fasten with capscrews (13, 14).

NOTE

Do not use pliers or any other clamping device on shaft splines to turn shaft.

5. Turn shaft by hand. It must turn without any catching and requires even torque for a full shaft revolution.

Tractor Models 935 and 950

DISASSEMBLY

The work area is to be very clean. Repair or overhaul the pumps as follows (Ref. Figure 5-20):

1. Remove capscrews (14).

2. Remove front cover (2) and gear plate (7).

3. Remove rear cover (25) and gear plate (27).

4. Remove idler gears (13, 26). Separate drive gear (20) from drive gear (8). Remove gears.

5. Remove wear plates (6, 9, 19, 21).

6. Remove ring seals (5, 10, 18, 22), load seals (4, 11, 17, 23) and preload seals (3, 12, 16, 24).

7. Remove oil seal (1) from front cover.

NOTE

All parts from each pump section must remain as a separate unit. Do not mix section parts.

INSPECTION

1. Inspect all machined parts for burrs and marks. Inspect gear teeth for chipping or cracking and excessive wear. Use a fine stone and cutting oil to remove any metal buildup from gear end faces. Wash all cutting oil off gears and shafts.

2. Inspect gear plates (7, 27), front and rear covers (2, 25) and bearing plate (15) for cracks and burrs. All mating faces are to be unmarked. Remove any metal buildup with a fine stone and cutting oil. Use petroleum base solvent to wash off all traces of cutting oil and blow dry.

ASSEMBLY

1. Lightly oil all parts and interior surfaces with clean hydraulic fluid.

3. Clamp bearing end of shaft in a vise and remove nut (4) and all remaining parts of piston assembly. Discard seals (5, 7, 8, 9 and 11) and wiper (12).

Inspection

1. Clean inside of cylinder (3) and ports and shaft (13), piston (6) and headplate (10), flushing with petroleum base solvent and blow dry with compressed air.

2. Inspect interior cylinder wall and all machined surfaces for scores or pitting. Surfaces must be unmarked. The threads of the ports must be unmarked.

3. Inspect the piston (6) for nicks and burrs. Burnish off any marks from piston surface that can be removed without spoiling the fit of the piston in the cylinder. Replace cylinder if damaged or if fit is so loose that fluid escapes when cylinder is in use.

4. Ensure there are no marks in the bore of the headplate and that the threads are unmarked.

5. Check self-aligning ball bushings (2) in the mounts. Inspect for wear and scoring. Replace as required by removing retaining rings (1, 14).

Assembly

1. Install new seals (9, 11) and new wiper (12) at headplate (10). Put headplate on shaft. Install new seals (5, 7 and 8) and piston (6) on shaft in proper sequence and orientation and fasten in position with locknut (4). Tighten locknut.

2. Using hydraulic fluid, wet all parts of piston assembly and inside of cylinder. Install shaft assembly into cylinder being careful that piston assembly seals are not twisted or damaged. Fasten in position by screwing headplate (10) into cylinder threads. Tighten headplate.

3. Push shaft (13) into cylinder and with a finger over the cylinder port at the mounting end of the cylinder there should be a pressure build-up. Pull shaft outwards and there should be a pressure build-up at the port for the shaft end of the cylinder.

4. Install and connect cylinder, refer to Section 8.

WARNING

KEEP PERSONNEL WELL CLEAR OF ARTICULATED JOINT OF TRACTOR WHEN STEERING CYLINDERS ARE BEING TESTED.

BE ALERT

5. Run engine. Put transmission in gear and set parkbrake. Inspect cylinders and hose connections for leaks. Tighten loose fitting if leaks are found.

Serviceman should instruct operator to check connections again after several days' use.

5.5 OVERHAUL OF IMPLEMENT CONTROL VALVE

General

IMPORTANT

Handle all parts carefully to avoid nicks, burrs, scratches and dirt. Any damage requires the complete section to be replaced.

The valve assembly should not be dismantled to individual sections unless there is a leak at the mating surfaces of sections or inspection reveals scoring or other damage which requires the section to be replaced.

The spools for the three knock-out detent sections are identical (Ref. Figure 5-34). The spool for the float detent section (Ref. Figure 5-35) is different to the other spools. The procedures for all four spools are identical except for assembly. Discard all O-rings on a removed part and replace with new O-rings regardless of reason for removal.

SECTION 6: ELECTRICAL SYSTEM

1 Introduction

This section contains information on the circuitry and operation, maintenance, circuit testing and repair of the electrical system. For routine servicing information refer to Section 1, SERVICING.

2 Description and Operation

2.1 GENERAL

The circuitry and operation of the electrical system is described circuit by circuit. A schematic diagram is presented with each circuit, illustrating it in the simplest possible terms and employing the standard symbols given in Table 6-1. Further and more detailed information on all circuits is given in the component location charts; refer to para 4.2; and in the wiring and routing diagrams; refer to para 6.1.

2.2 CHARGING/STORAGE CIRCUIT

Description

The circuit (Ref. Figure 6-1) basically consists of the batteries, alternator, voltmeter, keyswitch, and the alternator warning lamp.

Operation

When the engine is running, the engine-driven alternator produces DC current which charges the batteries. The three-phase alternating current produced by the alternator is converted by an internal rectifier system and an internal solid-state voltage regulator to a regulated direct current, which is fed to the batteries. From the alternator onward, the electrical system is a nominal 12-volt DC system with the negative side grounded to the tractor frame. The true operating voltage of the system is 14 volts DC.

Once the alternator is turning at approximately 1 000 r/min, the voltage regulator energizes the field coil, producing an immediate output of 14 volts DC to the batteries. At the same time, an output of approximately eight volts DC at the (R) terminal energizes the coil of the charge relay. When this occurs, the normally closed relay contacts open, breaking the path to ground for the alternator warning lamp, which then goes out.

If the alternator output ceases for any reason, the charge relay coil becomes deenergized. When this occurs the relay contacts again close, reestablishing the broken path to ground, illuminating the warning lamp.

The contacts of the charge relay also form a part of the engine starting circuit (Ref. Figure 6-1). The role of the charge relay in the operation of that circuit is explained in para 2.3.

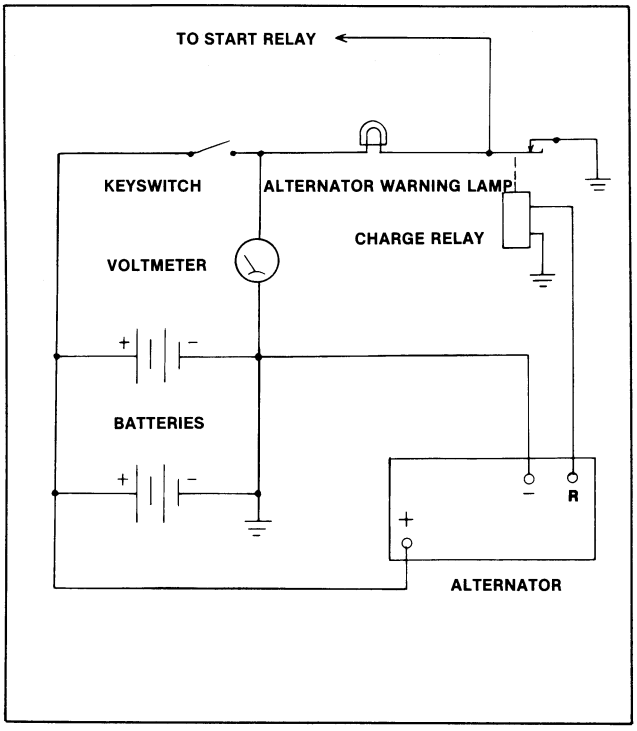

FIGURE 6-1: Charging/Storage Circuit

17. Transmission oil pressure warning lamp does not go out when clutch is released	Blown fuse	Replace fuse
	Low oil level	Check transmission; refer to Sections 3, 4
	Defective sensor switch (should open at 4 psi)	Test switch; refer to para 5.5. Replace if defective
18. Air conditioning compressor magnetic clutch does not operate.	Open connection	Inspect and correct
	Open circuit breaker (5-ampere, in roof compartment or 30-ampere in console	Check breakers; replace if defective
	Defective thermostat	Check thermostat; replace if defective
	Open field coil in clutch (Resistance should be approximately 3 ohms)	Check coil; replace if defective
	Open high pressure or low pressure switch	Troubleshoot air conditioning system; refer to Section 7
19. Magnetic clutch slips	Low voltage due to high resistance in circuit	Inspect and correct
	Defective clutch	Check clutch; replace if defective
20. Blower motor does not operate	Defective wiring	Check wiring; replace if defective
	Defective blower switch	Check switch; replace if defective
	Defective keyswitch	Check switch; replace if defective
	Defective 30-ampere circuit breaker	Check breaker; replace if defective
	Environmental systems relay coil open circuit (Resistance should be about 16 ohms)	Test relay; refer to para 5.7. Replace relay if defective
	Relay contacts held open by dirt, corrosion, etc.	Test relay, refer to para 5.7. Replace relay if defective
	Open motor winding	Replace motor

4.12 ADJUSTMENT OF RADIO RECEPTION

Weak radio reception can usually be corrected by adjusting the antenna trimmer capacitor (Ref. Figure 6-16). Remove the cab roof cover plate and proceed as follows:

1. With the radio set for AM reception and the volume set high, tune in a weak station in the 1200 - 1400 range on the dial.

2. Using a small screwdriver, adjust the trimmer capacitor for maximum volume.

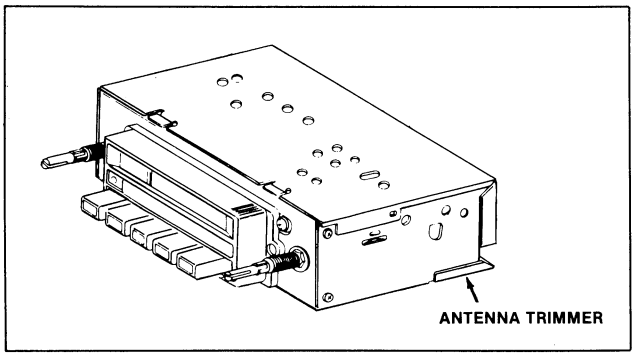

FIGURE 6-16: Radio Antenna Trimmer Location

5 Testing

- CAUTION

FOR ALL TESTS REQUIRING RUNNING OF THE ENGINE, ENSURE THAT TRANSMISSION IS IN NEUTRAL AND THAT PARK-BRAKE IS ENGAGED.

5.1 BATTERY TESTING

Specific Gravity Test

A specific gravity test can sometimes verify a battery defect. The specific gravity of each cell is measured and the six readings are recorded. A difference between cells of 50 points (0.050) in specific gravity is generally a sign of trouble. Such a difference in charge could be due to lost acid, a condition easily corrected. It could also be due to a shorted cell, or to old age, in which case battery replacement may be necessary. A high-rate discharge test of battery condition should be carried out before a decision to replace the battery is made.

High Rate Discharge Test

This test, which is conducted with both batteries installed in the tractor, requires a voltmeter with a zero to 15 volts DC range. The procedure is as follows:

1. Push starter button, without holding manual override button, to crank engine without starting it. Crank engine for at least 30 seconds. Turn keyswitch OFF.

2. Separate the two batteries electrically by disconnecting the two negative (-) leads from battery terminals.

3. Measure voltage at terminals of each battery. If suspect battery reads 9 volts or less, it may be defective.

4. Charge both batteries.

5. Repeat this test. If voltage of suspect battery is again 9 volts or less, replace battery.

5.2 ALTERNATOR TESTING

Special Tools and Equipment

The alternator can be tested without removing it from the tractor. The following items are required (Ref. Figure 6-17 and 6-18):

1. Voltmeter, range 0 - 15 VDC, reading to 0.1 volts

2. Ammeter, range 0 - 100 amperes, series-type with internal shunt

3. Carbon pile resistor, capacity 1000 amperes

4. Adaptor clip to connect ammeter to alternator output terminal

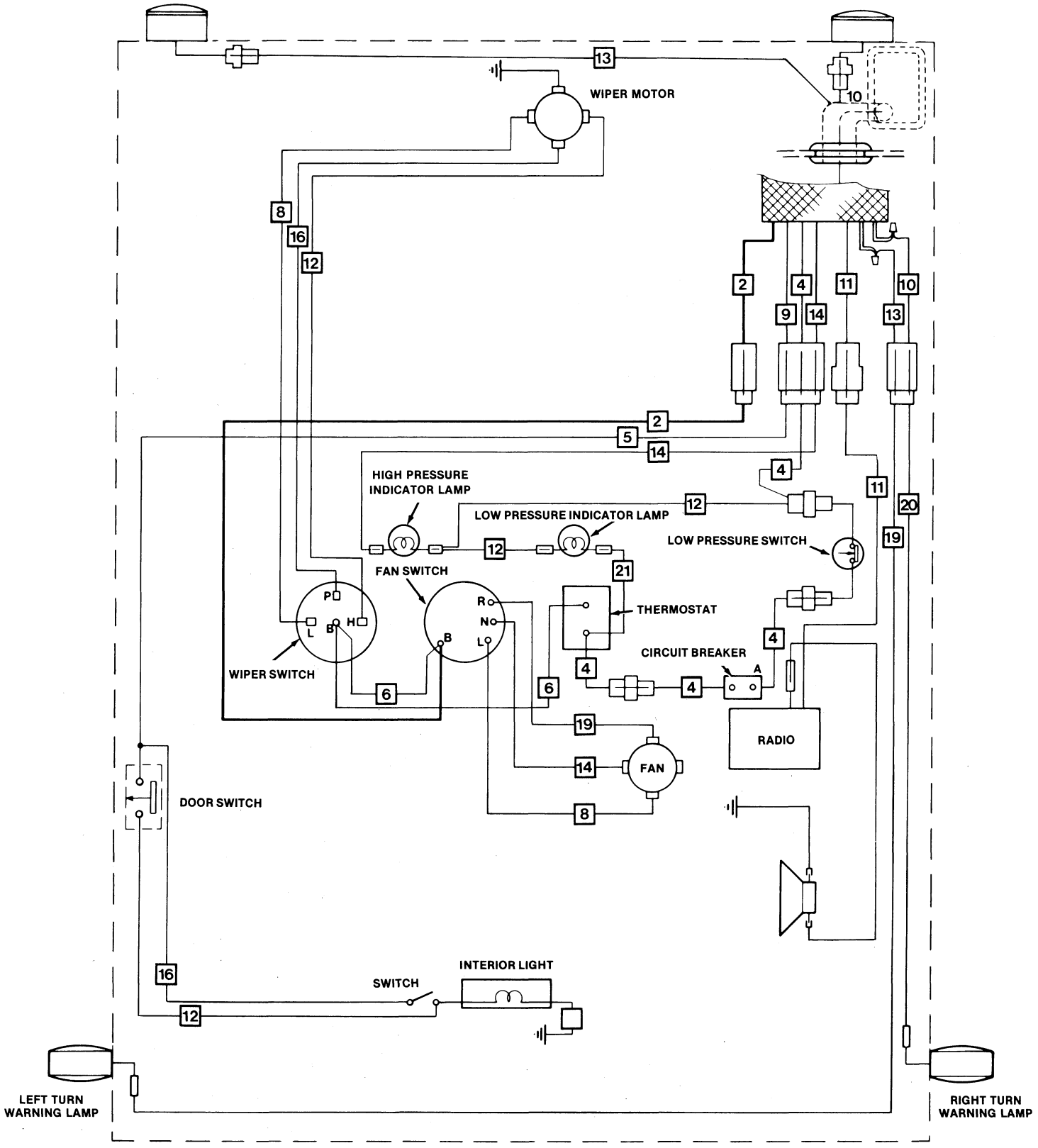

FIGURE 6-24: (Sheet 3 of 4): Wiring Diagram — Cab Roof

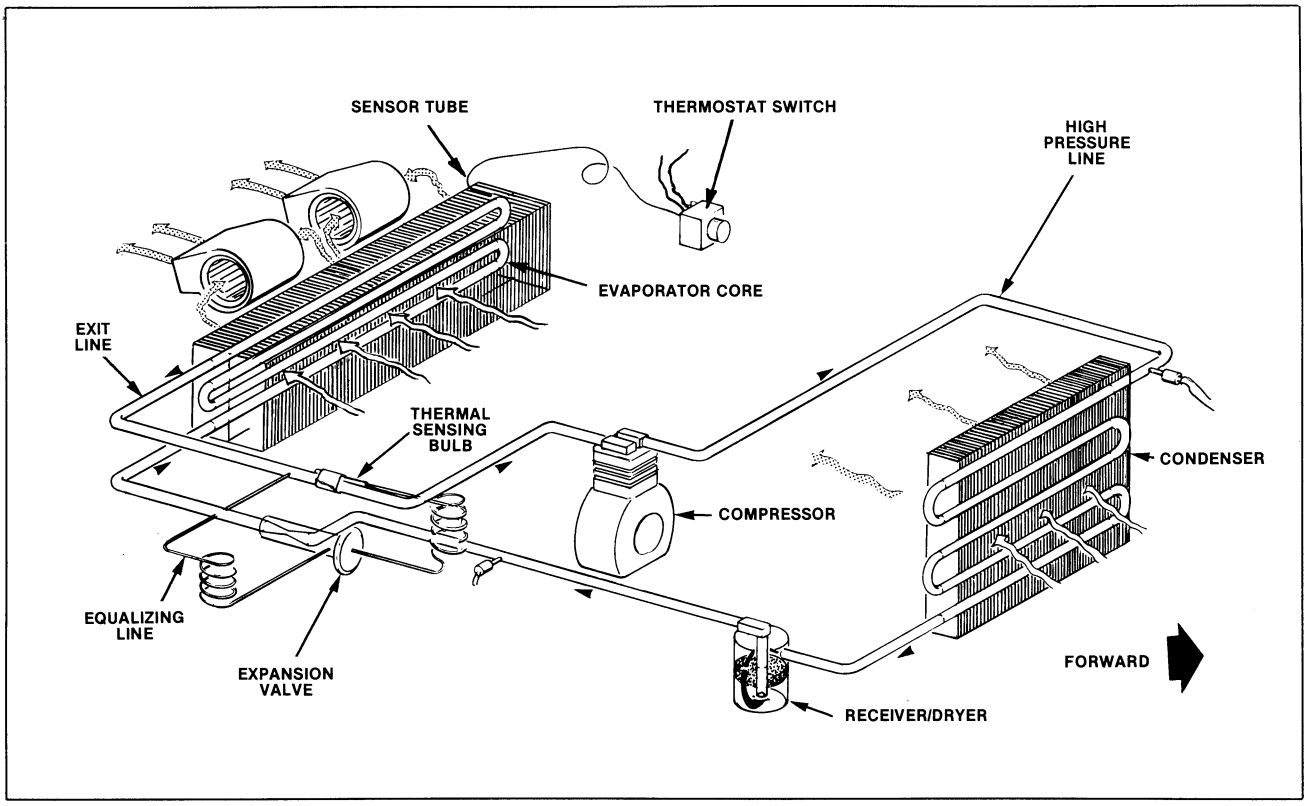

FIGURE 7-5: Air Conditioning Schematic Diagram

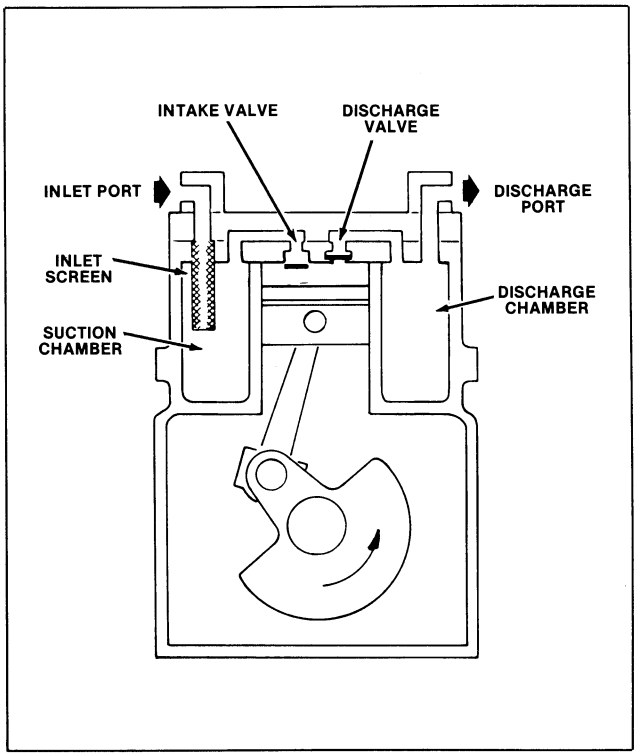

FIGURE 7-6: Compressor Cutaway View

The compressor (Ref. Figure 7-6) is a dual-cylinder, in-line, reciprocating piston type. A single cylinder head is used for both cylinders with high and low side service valves mounted on the head directly above each piston. A valve plate assembly is mounted between the cylinder head and crankcase and contains uni-directional reed-type valves which control the direction of gas flow. Compressor lubrication from the oil sump in the crankcase is by a positive pressure system utilizing the pressure differential between the suction intake and crankcase plus centrifugal force so that no oil pump is required.

The electromagnetic clutch (Ref. Figure 7-7) consists essentially of a stationary field coil mounted on the body of the compressor, a hub and armature assembly attached to the compressor drive shaft, and a bearing-mounted pulley which is driven by the tractor engine. The armature is attached to the hub by means of a spring plate which allows it to move axially into contact with the pulley when the field coil is energized. Thus the armature effectively acts as a clutch which is electromagnetically actuated.

Gauge and Manifold Set

The gauge and manifold set (Ref. Figure 7-13) must consist basically of a high vacuum manifold, a low pressure compound (or vacuum) gauge, a high pressure gauge, a valve for each gauge and a hose connected to each of the three ports. The valve arrangement must be such that, with the valve closed, the gauge is connected to its respective service port but not to the central port. With either gauge opened, the center gauge must be connected to the thermistor vacuum gauge as shown. Any fabricated test set that meets these requirements is acceptable.

The compound gauge must be able to show both vacuum and pressure. The vacuum side of the gauge must be calibrated to show 0 to 30 inches Hg (101.3 kPa). The pressure side of the gauge must be calibrated to register from 0 to a minimum of 60 psi (414 kPa).

The high pressure gauge is used to determine pressures in the high side of the system and is calibrated to register from 0 to a minimum of 300 psi (2068 kPa).

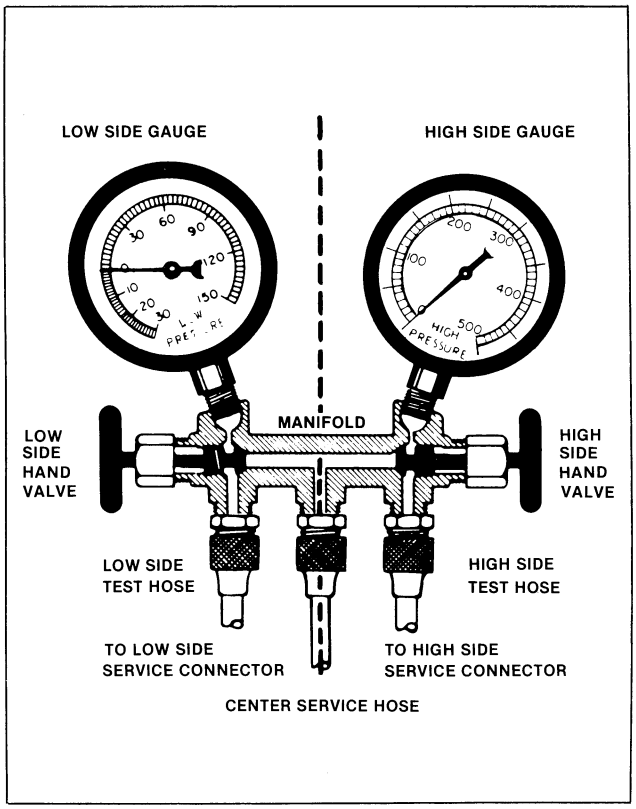

FIGURE 7-13: Gauge and Manifold Arrangement

Vacuum Pump and Motor

The vacuum pump should, preferably, be a two-stage type and must have a minimum capacity of 3 cu ft/min (.35 m^3/min).

Leak Detector Kit

Any of the several basic types of leak detector kits are acceptable. For high accuracy, the electronic type is preferable.

Charging Station Setup

The recommended charging station setup permits all service procedures to be performed with a single setup. (Ref Figure 7-14). In addition to the basic items, refer to para 4.2, this setup includes the addition of a thermistor vacuum gauge and a dial-a-charge cylinder. The basic arrangement for the gauge and manifold is the same as shown (Ref. Figure 7-13), but with the addition of a manifold extension and three additional valves.

The thermistor vacuum gauge is connected to the manifold via a thermistor valve and thermistor gauge vacuum tube. When used in conjunction with the low pressure compound gauge, the thermistor gauge is used to provide extreme accuracy in monitoring of high vacuum and will readily indicate leaks in the system by showing minute decreases in vacuum.

Commercially available dial-a-charge cylinders, such as the one illustrated, are used to accurately control the amount of charge added to the system. These cylinders generally have a heating element of sufficient wattage to amplify the pressure sufficiently in a short period of time, but will not overheat the cylinder and build up excessive pressure if accidently left switched on. The cylinder is heated in order to overcome the equalization of pressure in the cylinder and the system being charged. Fifteen minutes of heat will generally increase the pressure in the cylinder by 20 to 25 psi (138 to 172 kPa).

If this setup is not used, it will be necessary to alternately connect the vacuum pump and refrigerant can to the center port of the manifold on the gauge and manifold set, depending upon the particular service operation being performed.

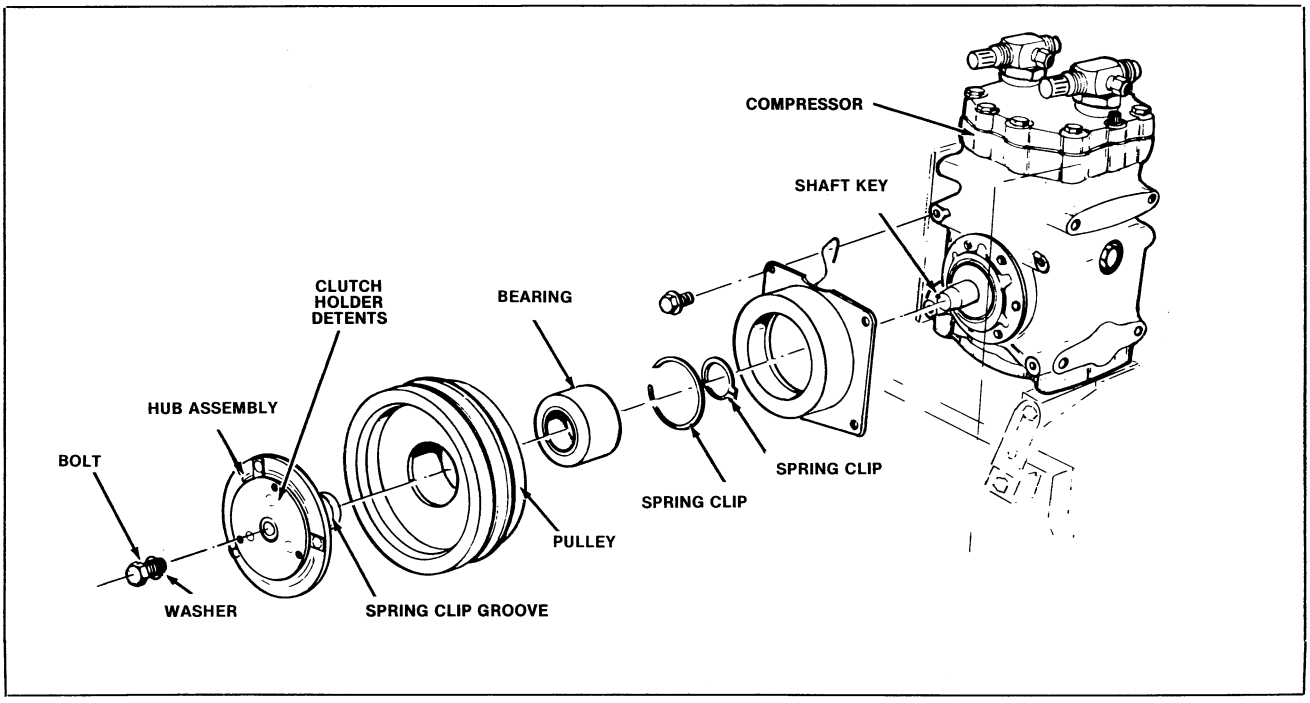

FIGURE 7-20: Replacement of Compressor Clutch Bearing

3. Remove pulley assembly from compressor driveshaft using a puller. Do not remove shaft key unless damaged.

4. Remove spring clip from groove in hub of armature and hub assembly. Slide pulley and bearing from hub.

5. Remove spring clip from pulley groove. Slide bearing out.

6. Slide replacement bearing into place. Install spring clips.

7. Slide pulley onto armature hub. Install spring clip.

8. Ensure shaft key is in place, then slide pulley assembly onto compressor driveshaft. Ensure that shaft key fits into pulley groove.

9. Install washer and bolt. Tighten finger tight.

10. Using clutch holder, torque bolt to 25 to 30 lbf ft (35 to 40 N·m).

11. Rotate pulley to check that it rotates freely without binding.

12. Install fan belt. Tighten belt to 100 pounds (45.3 kg). Check with a belt tension gauge.

5.8 REPLACEMENT OF AIR CONDITIONER THERMOSTAT

To replace the air conditioner thermostat, proceed as follows (Ref. Figure 7-21):

1. Remove access panel from top of cab to gain access to thermostat; refer to Section 8.

2. Pry off control knob. Remove nut from control shaft.

3. Tag electrical wires to prevent mixup, then pry off electrical connectors.

4. Push grommet out of partition, remove thermostat.

5. Push sensor tube forward into heater/evaporator core until its looped end clears core at front.

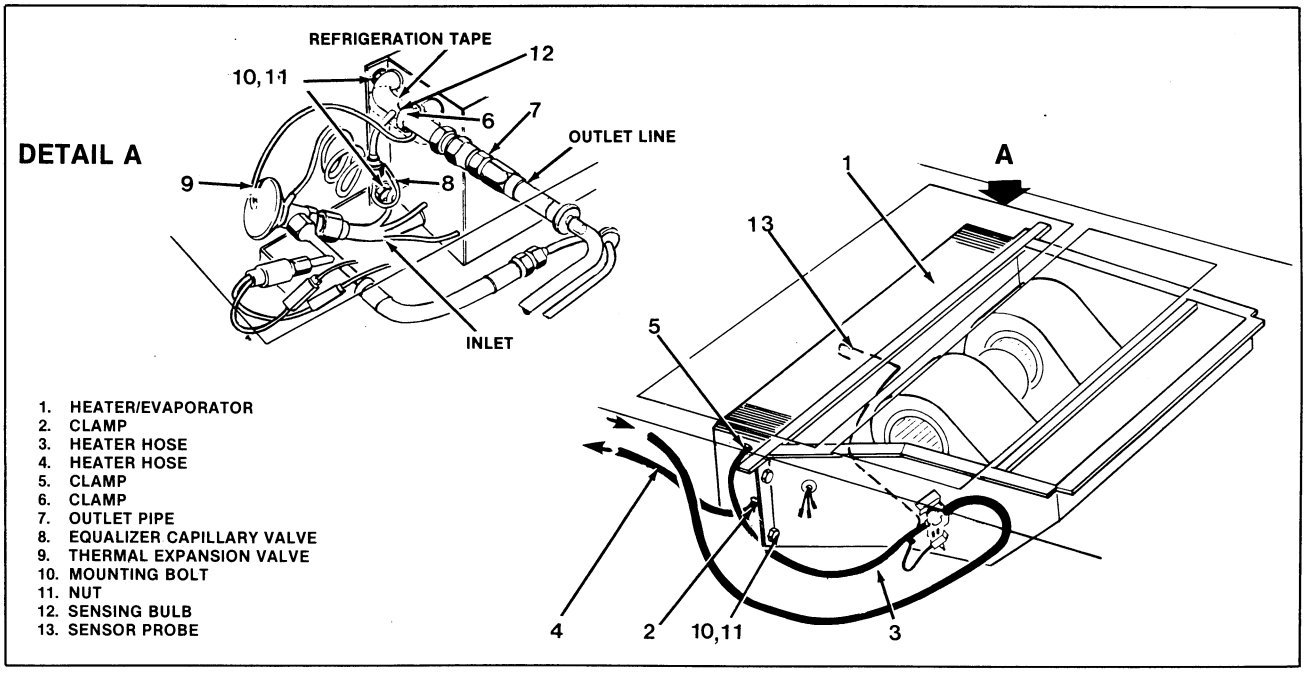

FIGURE 7-27: Replacing Heater/Evaporator

14. Carry out air conditioner servicing and perform functional test of both air conditioning and heating systems.

15. Install access cover.

6.10 REPLACEMENT OF RECEIVER/DRYER

General

The desiccant in the receiver/dryer can only absorb a limited amount of moisture before it becomes saturated. An indication that this has occurred is when the sight glass becomes clouded over with a milky substance. This is an indication that the desiccant is escaping from the receiver/dryer. When this condition exists, the receiver/dryer should be replaced.

Recommended Replacement Intervals

The receiver/dryer cannot be serviced and should be replaced whenever there is reason to believe the desiccant has become saturated with moisture, or if there is any doubt as to correct functioning. In general, the receiver/dryer should be replaced as follows:

1. Every third time the system is opened for repair
2. If the system has been opened for a long period and moisture may have entered
3. Whenever the receiver/dryer inlet and outlet hoses are cool to the touch

NOTE

A quick check of the receiver/dryer can be made by feeling the inlet and outlet lines with the system operating. These should be HOT to the touch. A cool receiver/dryer or lines indicate a malfunction.

4. Whenever the thermostatic expansion valve is replaced
5. Whenever cloudiness is observed in the sight glass

Replacement Procedure

To replace the receiver/dryer, proceed as follows:

1. Discharge system; refer to para 6.4.
2. Disconnect inlet and outlet lines. Disconnect mounting clamp, and remove receiver/dryer.

3 Maintenance

3.1 SERVICING

Servicing of structural components is restricted to lubrication of the main pivot points, including steering cylinder pivots, door and window hinges, and door lock mechanism. For servicing information, refer to Section 1, SERVICING.

3.2 REPLACEMENT OF ENGINE MOUNTS

General

Replacement of the engine mounts will be required when a loss of resilience becomes evident. Several symptoms can indicate the need to replace the engine mounts: excessive engine vibration, excessive engine counter-rotation when the clutch is engaged, surging of controls (throttle, for example). Too much engine movement can even cause the fan to rub against the shroud.

Special Tools and Materials

1. Jack, wooden block
2. Wheel chocks
3. Exact replacement isolator pads and sleeves
4. Soft drift and hammer
5. Torque wrench, 500 lbf ft (700 N·m) capacity

NOTE

Before starting work, determine which mounting arrangement is applicable. (Ref. Figure 8-2) Consult Parts Manual for appropriate replacement parts.

Replacement of Rear Engine Mounts

Replace rear engine mounts as follows (Ref. Figure 8-2, Detail A):

1. Engage parkbrake and chock wheels to prevent tractor movement in either direction.
2. Place jack under rear end of engine crankcase. Install wooden block between jack and crankcase. Raise jack until just snug.
3. From each mounting bracket, remove the two rear engine mounting bolts, nuts, washers, upper isolator pads, spacers and rubber sleves. Discard isolator pads and sleeves.
4. Jack engine up 1/2 in. (15 mm).

WARNING

MAKE SURE JACK IS SECURE AND STABLE. DO NOT USE FINGERS TO CHANGE LOWER ISOLATOR PADS.

BE ALERT

5. With a thin piece of wood, push out lower isolator pads and discard.
6. Push new isolator pads into place and carefully check for proper centering, to ensure maximum vibration damping efficiency.
7. Lower jack until engine rests on rear mounts.
8. Install spacer, new sleeves, new upper isolator pads, washers and bolts. Start nuts on bolts. Torque bolts to 265 lbf ft (360 N·m). Exception: If front engine mount is also to be replaced, leave these bolts slack until front mount replacement is complete.

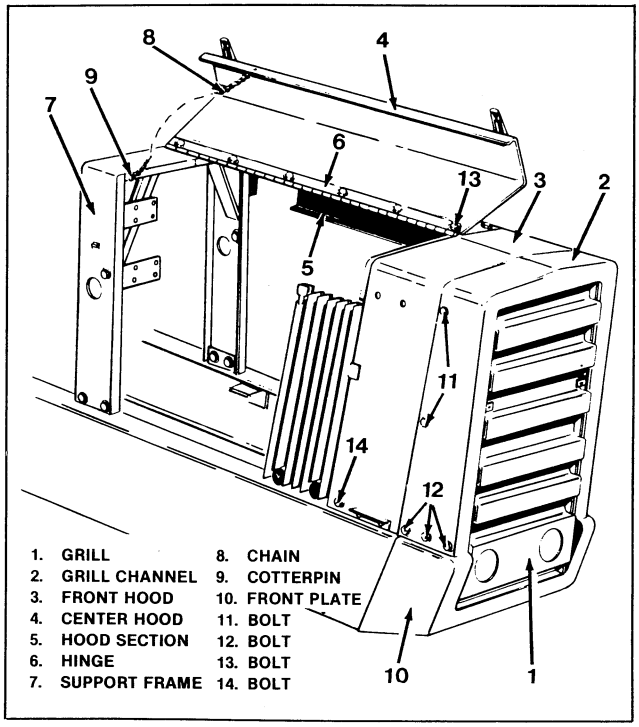

FIGURE 8-8: Engine Hood Assembly

6. Remove cotterpin (9) from either end of chain (8).

7. Remove the six bolts (13) securing hinged hood section to hinge (6). Remove hinged section.

8. Remove the two bolts securing hose support brackets (if present) to fixed center hood section (5).

NOTE

On some models a hose support bracket is welded to fixed center section. Remove hose from bracket.

9. Remove clips securing capillary lead to fixed center hood section.

10. Remove bolts which secure radiator surge tank to fixed center hood section. Allow surge tank to rest on engine.

11. Remove all remaining nuts and bolts which secure fixed center hood section to front hood (3) and rear support frame (7). Remove fixed center hood section from tractor.

12. Disconnect aspirator hose from muffler. Disconnect exhaust pipe from muffler.

13. Connect hoist to front hood section. Remove the six bolts (14) which secure front hood and main frame.

14. Carefully lift and remove front hood from tractor.

Installation of Hood Assembly

1. Before installing engine hoods, inspect the three sealant strips on fan shroud. Replace if worn.

2. Install front hood (3) with the six bolts (14). Torque bolts to 25 lbf ft (35 N·m).

3. Connect exhaust pipe to muffler. Connect aspirator hose to muffler.

4. Install fixed center hood section (5), leaving bolts just slack.

5. Install surge tank under fixed center hood section. Torque bolts to 25 lbf ft (35 N·m).

6. Clip capillary tube to fixed center hood section.

7. Bolt hinged center hood section (4) to hinge (6). Torque the six bolts to 25 lbf ft (35 N·m).

8. Raise and lower hinged center hood section several times, checking for fit of latching toggles, and for clearance between hinged section and front hood. Check also for clearance to air conditioning hoses, coolant and air intake hoses. When satisfactory, torque the slack bolts on fixed center hood section to 25 lbf ft (35 N·m).

9. Attach free end of chain. Secure with a new cotterpin.

10. Before installing grill assembly, inspect the four weatherseal strips. Replace if worn.

11. Install grill channel. Torque all bolts to 25 lbf ft (35 N·m).

12. Install grill, if previously removed. Connect lead to headlights.

Reassemble torsion bar in the reverse of assembly procedure.

22. If bearing assembly in fork needs replacing, clamp fork assembly in vise and spread the fork claws using a screwdriver and hammer to free bearing. (Ref. Figure 8-24). Place new bearing assembly in fork claws, then secure bearing in place by removing assembly from vise and squeezing claw tips in vise.

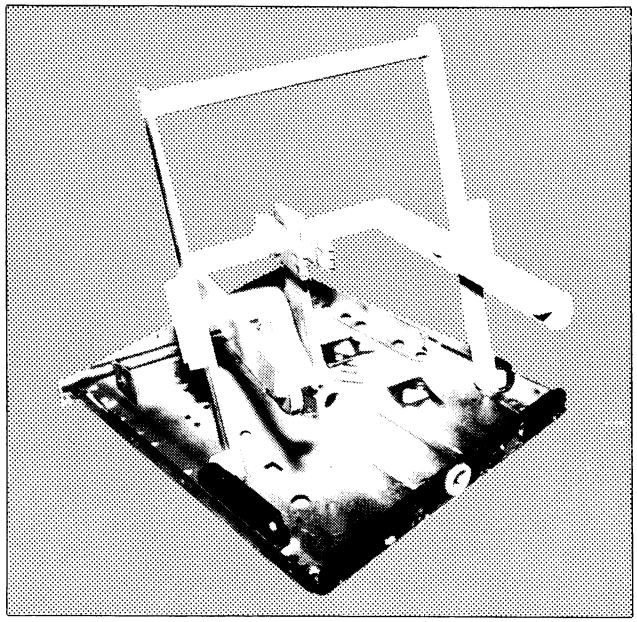

FIGURE 8-22: Removal of Torsion Bars from Bottom Plate

23. To replace U-track on bottom plate, chisel off the two pop rivets and install a new one. Also the two rubber bumpers in bottom plate may be replaced by pulling out the old and pushing in the new.

Assembly of Torsion Suspension and Swivel Base

Assemble the torsion suspension and swivel base in the reverse order of disassembly.

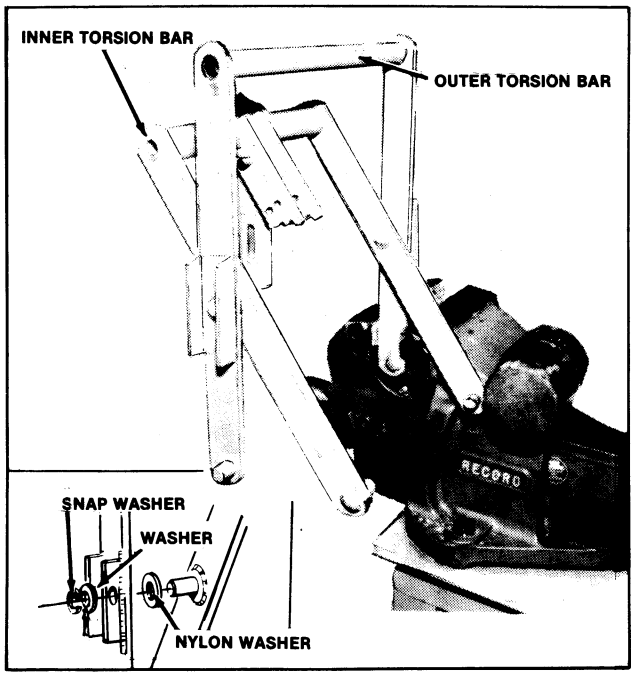

FIGURE 8-23: Disassembly of Torsion Bars

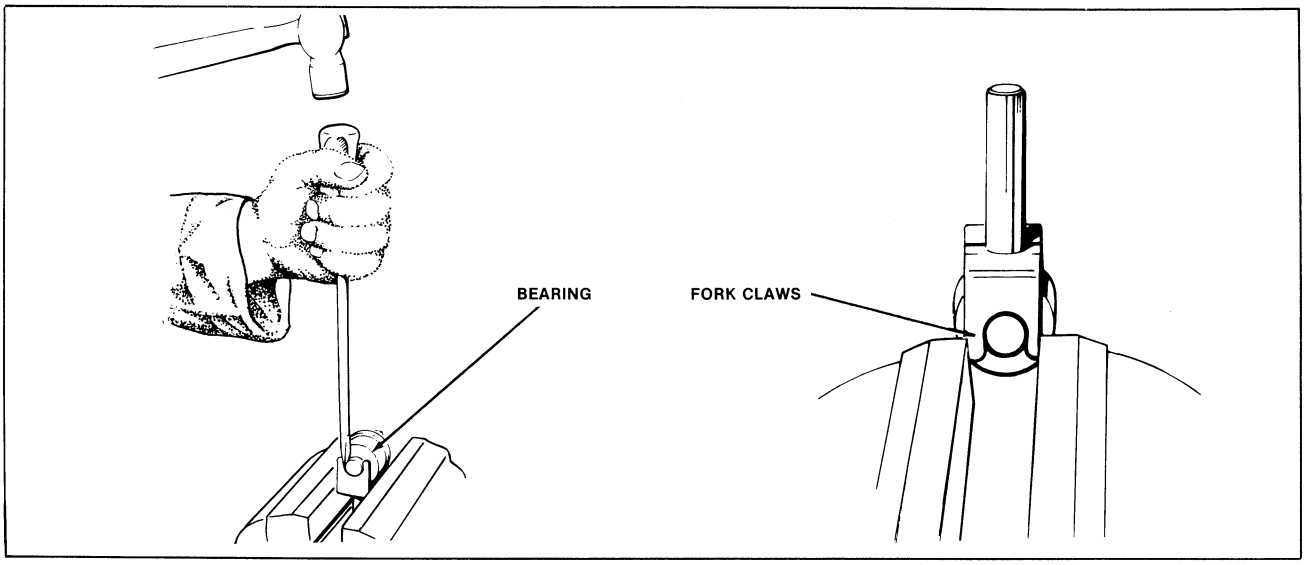

FIGURE 8-24: Removal and Installation of Bearing in Fork Assembly

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SECTION 6: ELECTRICAL SYSTEM