



HD-41, 41-B

crawler tractors

service manual

TRANSMISSION

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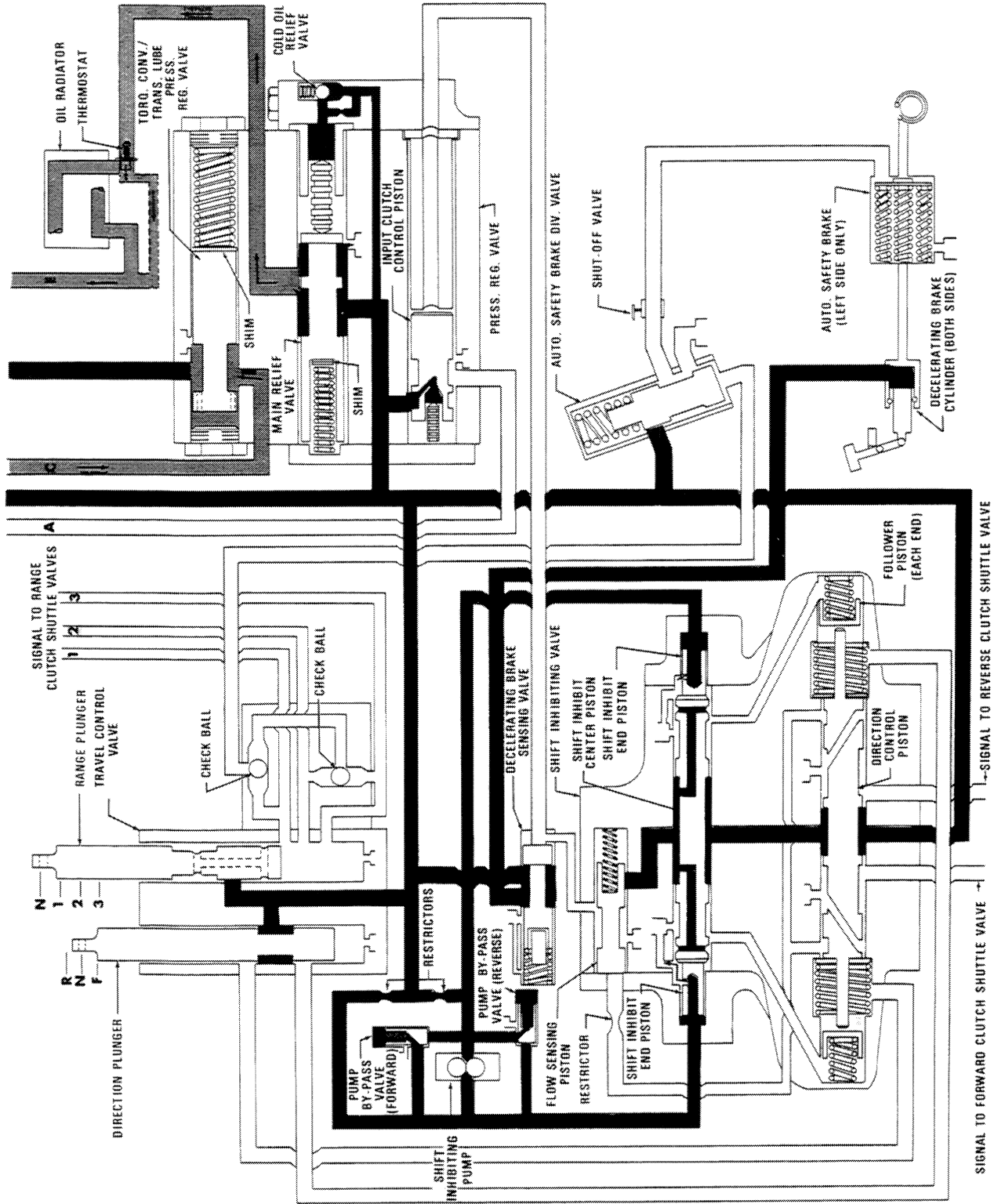
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General Description and Oil Flow Schematics



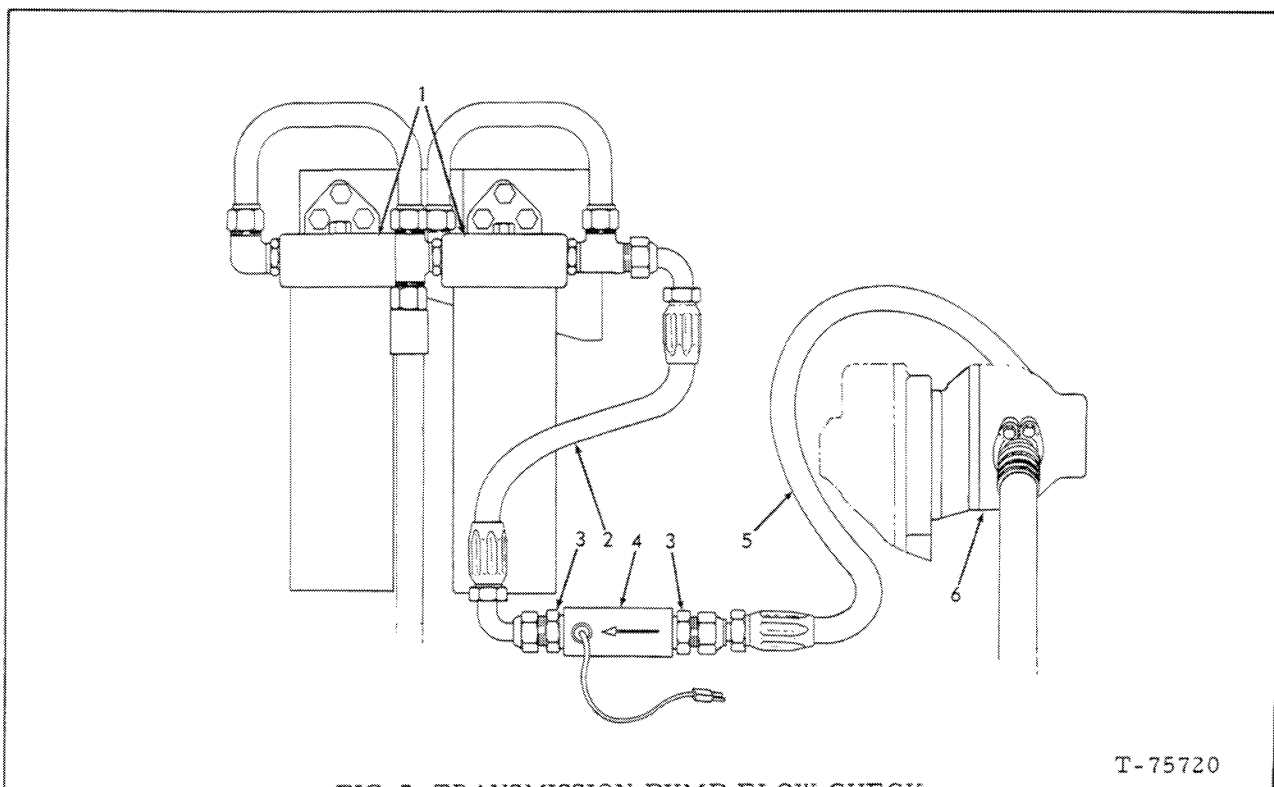
T-75710

FIG. 1 OIL FLOW SCHEMATIC - NEUTRAL

Trouble- Shooting

TROUBLE	POSSIBLE CAUSE	REMEDY
Oil temperature high (Continued)	<p>Oil build-up in input clutch housing</p> <p>Clogged radiator</p> <p>Leak in system allowing oil to sump before going through radiator</p>	<p>Disconnect oil return line under clutch housing and check it for restriction</p> <p>Remove and clean radiator (7.1)</p> <p>Check transmission clutch apply flow (5.3)</p>
Torque converter oil transfers into engine	<p>Torque converter breather hose kinked</p> <p>Transmission breather clogged</p> <p>Crankshaft rear seal faulty</p>	<p>Check hose; replace if necessary</p> <p>Replace or clean breather</p> <p>Replace seal; refer to Engine Service Manual for instructions</p>

Flow Checking



T-75720

FIG. 7 TRANSMISSION PUMP FLOW CHECK

1. Transmission filters
*2. Oil line #0644452-5

*3. Connector #0922988-1
*4. Flow meter flow block

5. Pump to filter oil line
6. Transmission pump
* Added to check flow

5.3.3 Flow check results:

5.3.3.1

High flow in neutral. Blown gasket between one of the clutch shaft shuttle valve bodies and its front cover.

NOTE: This trouble will be accompanied by a noticeable increase in oil temperature and high lube pressure.

5.3.3.2

High flow with range clutches only engaged. If excess flow is the same in all three clutches the trouble is in the only part common to all the clutches -- the automatic safety brake. Close shut-off valve, Fig. 22 (5) and re-check flows. If all flows drop to normal, remove automatic safety brake and check for leakage around piston (6.7); if all three flows remain high, excess oil is sumping through the automatic safety brake diverter valve (6.8).

5.3.3.3

With range clutches only engaged, flow is O.K. in at least one clutch, but high in the other clutch (clutches). Indicates leakage across front sealing rings on affected shaft or a blown gasket between front cover and shuttle valve body. Replace sealing rings and/or gasket

(refer to TRANSMISSION). If flows remain the same the dump valve in affected clutch is at fault; remove and disassemble transmission to make necessary repairs.

NOTE: Apply pressure in the clutch will be low if the dump valve is at fault.

5.3.3.4

Range clutch flows all O.K.; no increase in flow when direction clutches are engaged. Direction control piston in shift inhibiting valve stuck in neutral position; disassemble valve and make necessary repairs.

NOTE: If direction control piston is stuck in one end of its bore, flow will be O.K., in one direction but low in the opposite direction.

5.3.3.5

Flow O.K. in one direction; too high in opposite direction. Excess leakage in affected clutch possibly through the dump valve. Remove transmission and make the necessary repairs.

Hydraulic System Components

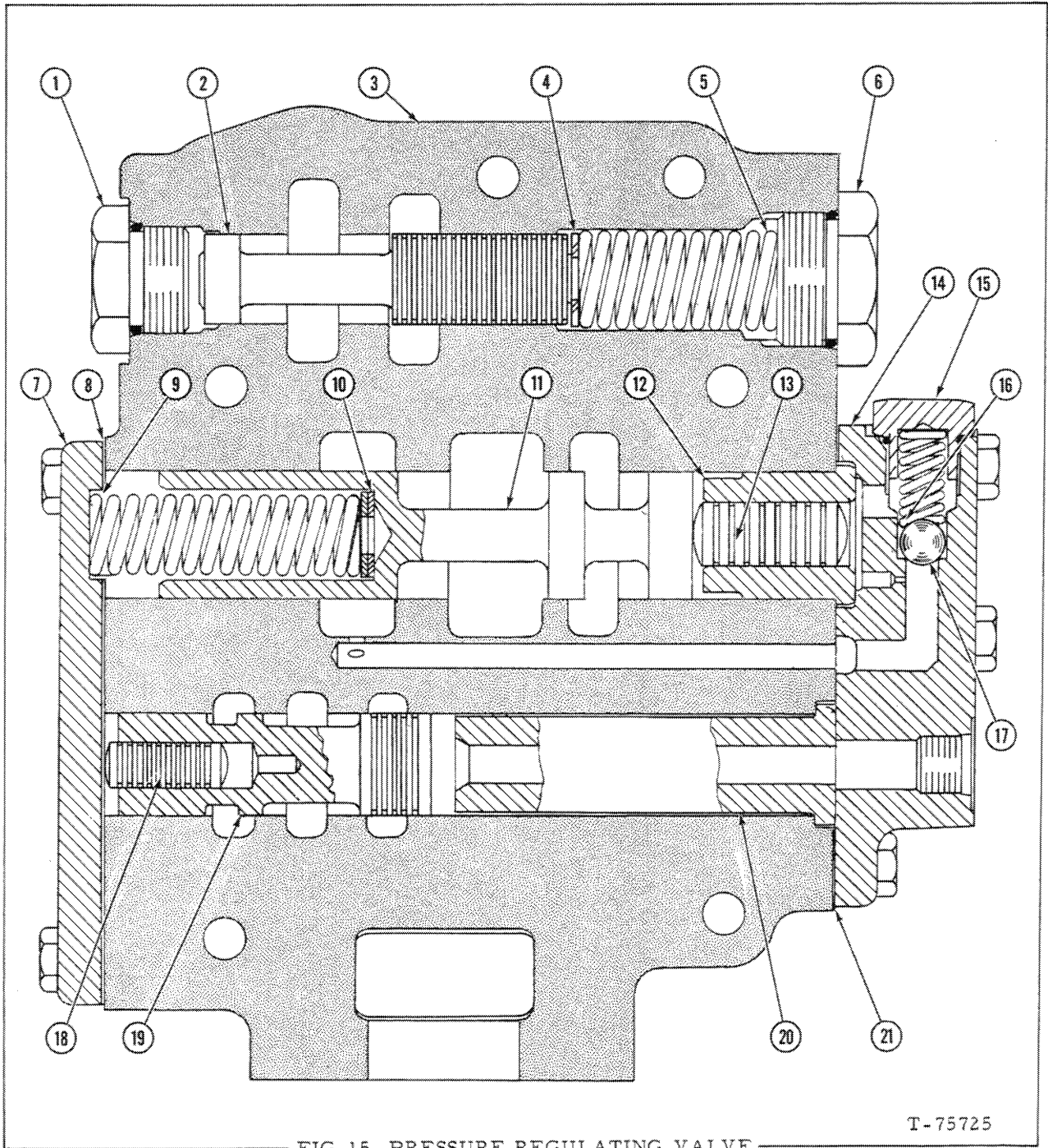
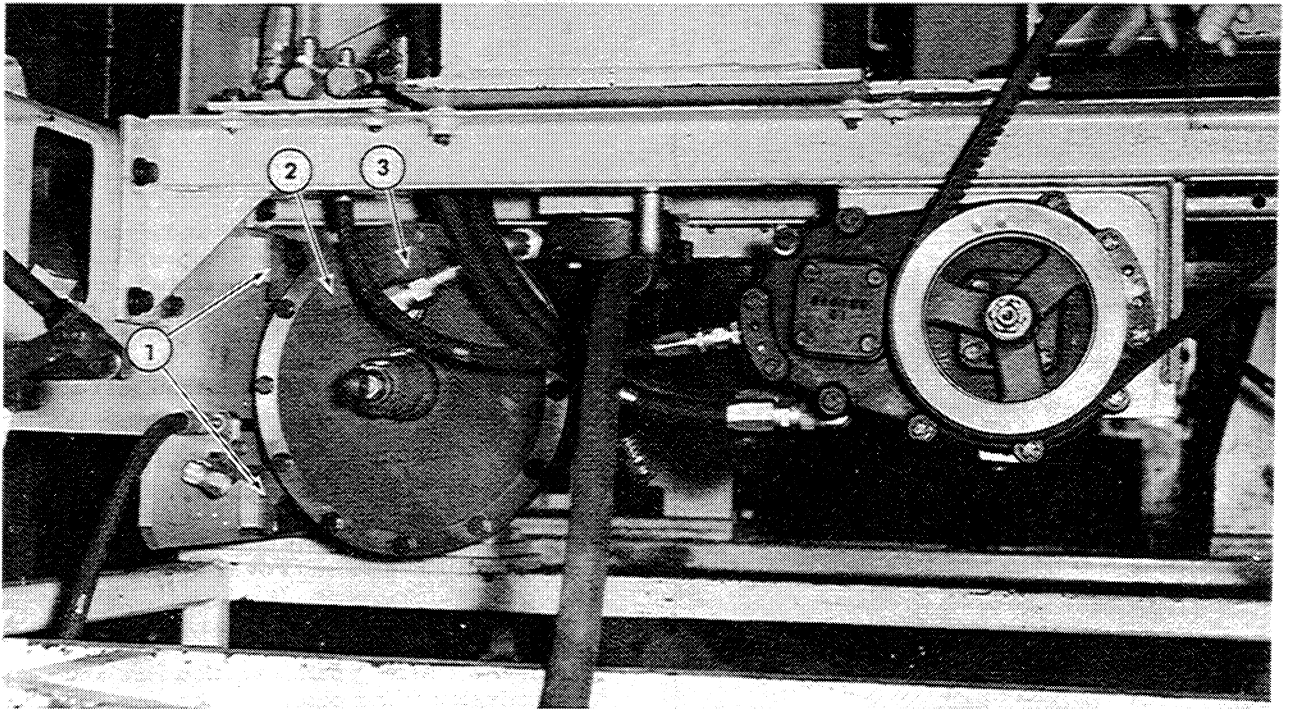


FIG. 15 PRESSURE REGULATING VALVE

T-75725

- | | |
|---|---|
| 1. Plug w/O-ring | 11. Piston |
| 2. Piston | 12. Guide |
| 3. Body | 13. Power piston |
| 4. Shim (if required) | 14. End cover |
| 5. Torque converter/transmission lube
pressure regulating spring | 15. Plug w/O-ring |
| 6. Plug w/O-ring | 16. Cold oil relief spring |
| 7. End cover | 17. Ball |
| 8. Gasket | 18. Power piston |
| 9. Main pressure regulating spring | 19. Input clutch flow regulating piston |
| 10. Shims (if required) | 20. Stop |
| | 21. Gasket |

Hydraulic System Components



T-77404

FIG. 26 AUTOMATIC SAFETY BRAKE INSTALLED

1. Mounting shims 2. Automatic safety brake 3. Supply line from diverter valve

6. 7. 1 REMOVAL AND DISASSEMBLY

6. 7. 1. 1

Brake is located in the left brake linkage, Fig. 22; work through the seat opening and from the belly pan area to remove brakes.

6. 7. 1. 2

Disconnect and remove the upper section of steering suction line and lower section of transmission filler tube.

6. 7. 1. 3

Disconnect oil lines from rear and bottom of brake housing and brake linkage at each end of housing, Fig. 22. Remove housing, Fig. 23, with mounting shims (16).

6. 7. 1. 4

Loosen hose clamps, Fig. 23 (17) (18) and jam nut (19); remove eye (20) and boot (1). Loosen hose clamps (17) (18) and jam nut (21); remove eye (22) and boot (1).

6. 7. 1. 5

Mark position of end cover, Fig. 23 (3), then remove it, Fig. 24. Pull shaft (1) from housing.

6. 7. 1. 6

Pull piston, Fig. 24 (4), springs, Fig. 23 (12), and spring guides (13) (14) from housing.

6. 7. 2 INSPECTION

6. 7. 2. 1

Inspect seal contact areas on shaft and I. D. of housing. Replace either if too rough to dress down with crocus cloth.

6. 7. 2. 2

Check spring tension (12. 6); replace weak springs.

6. 7. 2. 3

Replace seals if stretched out of shape or cut.

6. 7. 3 ASSEMBLY AND INSTALLATION

6. 7. 3. 1

Install spring guides, Fig. 23 (13) (14) and springs (12) in brake housing.

6. 7. 3. 2

Install washer, Fig. 23 (5) and seal (6) in I. D. of piston (11); open end of seal facing away from spring side of piston and washer toward spring side of piston.

Hydraulic Oil Cooling System

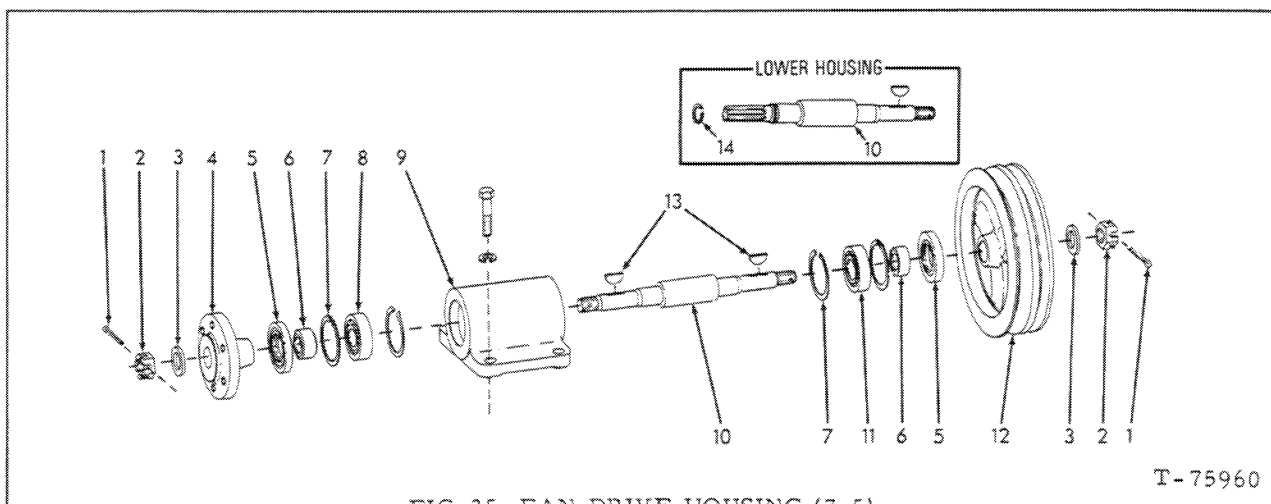


FIG. 35 FAN DRIVE HOUSING (7.5)

T-75960

- | | | |
|--|-----------------|--------------------|
| *1. Cotter pin | 5. Oil seal | 9. Housing |
| *2. Nut | 6. Spacer | 10. Shaft |
| *3. Washer | 7. Snap ring | 11. Roller bearing |
| *4. Fan drive hub | 8. Ball bearing | 12. Pulley |
| | | 13. Woodruff key |
| *Items not used on front end of lower housing shaft. | | 14. Snap ring |

7.3.3.6

Install bearing cap, Fig. 34 (11) without oil seal -- with original shims (5). If old shims are not available, start with a shim pack of approximately .129" (3.27 mm). Torque bearing cap attaching capscrews to 43 -- 47 lbs. ft. (5.9 -- 6.4 m-kG); check shaft end play (bearing adjustment) with a dial indicator. Specified bearing adjustment is .001" (0.02 mm) loose to .002" (0.05 mm) pre-load. Remove shims, Fig. 34 (5) to obtain specified adjustment. Install seal (14) in bearing cap with spring side in. Install retainer and seal on housing; torque attaching capscrews to 43 -- 47 lbs. ft. (5.9 -- 6.4 m-kG).

NOTE: Torque required to turn the shaft must not exceed 10 lbs. in. (11 cm-kG).

Use same method to set steering pump drive gear bearing .003" -- .008" (0.07 -- 0.20 mm) loose but start with a shim pack of approximately .097" (2.46 mm) if original shim pack is not available. Torque bearing cap attaching capscrews to 43 -- 47 lbs. ft. (5.9 -- 6.4 m-kG).

7.3.3.7

Install key, Fig. 34 (10), pulley (6), and washer (7); torque nut (9) to 190 -- 210 lbs. ft. (26.2 -- 29.0 m-kG) and install cotter pin (8).

7.3.3.8

Attach gear box to bracket on cross - member Fig. 30; slide drive shaft rear yoke on splines of gear box shaft while installing. Attach steering pump to front of gear box; install and adjust fan drive belts (refer to 7.7 for adjustment procedure and specified tension).

7.4 FAN DRIVE SHAFT

7.4.1 REMOVAL AND DISASSEMBLY

7.4.1.1

Remove floor plates; turn electrical system master switch off.

7.4.1.2

Remove hardware holding flange, Fig. 32 (1), spacer (2) and yoke (3) together; push drive shaft back to clear the flange. Pull drive shaft forward until rear yoke (9) is free of shaft in drive gear box; remove shaft through the floor plate openings.

7.4.1.3

Put universal joint in a vise; remove snap rings, Fig. 32 (5). Drive spider one direction until opposite bearing cap can be removed; repeat operation on other side and other end to remove all bearing caps.

7.4.2 INSPECTION, ASSEMBLY AND INSTALLATION

7.4.2.1

If bearings or bearing journals on spiders show damage or excessive wear, replace spider and bearings as a complete assembly.

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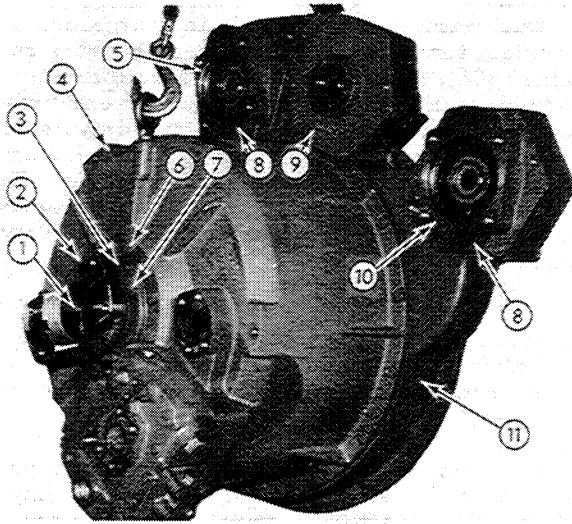
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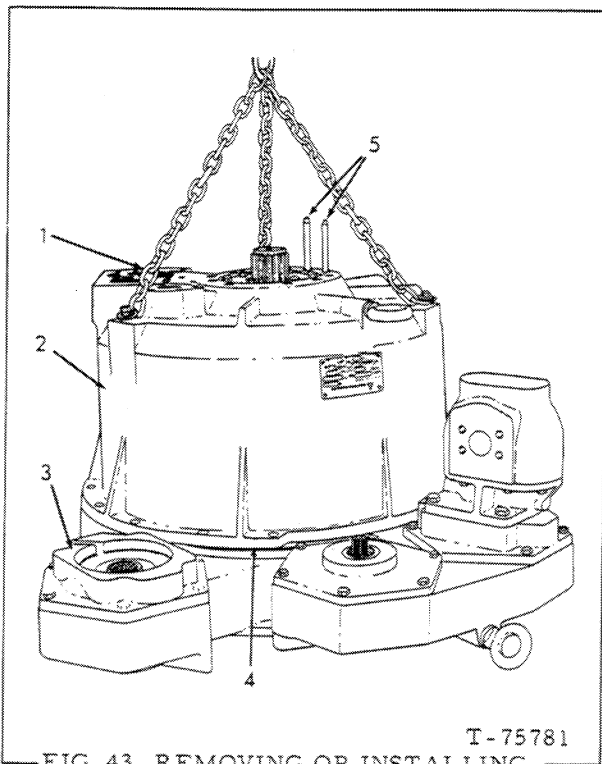
Input Clutch and Torque Converter



1. Yoke retaining cap screw
2. Drive shaft front yoke
3. Rear bearing retainer
4. Torque converter housing
5. Transmission pump mounting plate
6. Cap screw
7. Cap screw
8. Oil drain groove
9. Rear fan drive adapter plate
10. Dozer pump mounting plate
11. Gear housing

T-75779

FIG. 42 TORQUE CONVERTER -- REAR VIEW



T-75781

FIG. 43 REMOVING OR INSTALLING
TORQUE CONVERTER HOUSING

- | | |
|----------------------|--|
| 1. Lifting chain | 4. O-ring |
| 2. Converter housing | 5. Guide studs (used for installation) |
| 3. Gear housing | |

8.6 GEAR HOUSING ASSEMBLY

8.6.1

Gear housing assembly is simply a matter of installing bearing, shafts, and gears. Figs. 44 and 45. Straight roller and ball bearings are used; no adjustment required. Following special instructions are given as an assembly aid.

8.6.1.1

Install oil seals with sealing lips directed toward inside of housing.

8.6.1.2

Install pump mounting plates with oil groove at bottom, Fig. 42.

8.6.1.3

Place gear housing front side down on a work bench with 2" (50,8 mm) blocks under housing flange.

8.7 TORQUE CONVERTER ASSEMBLY

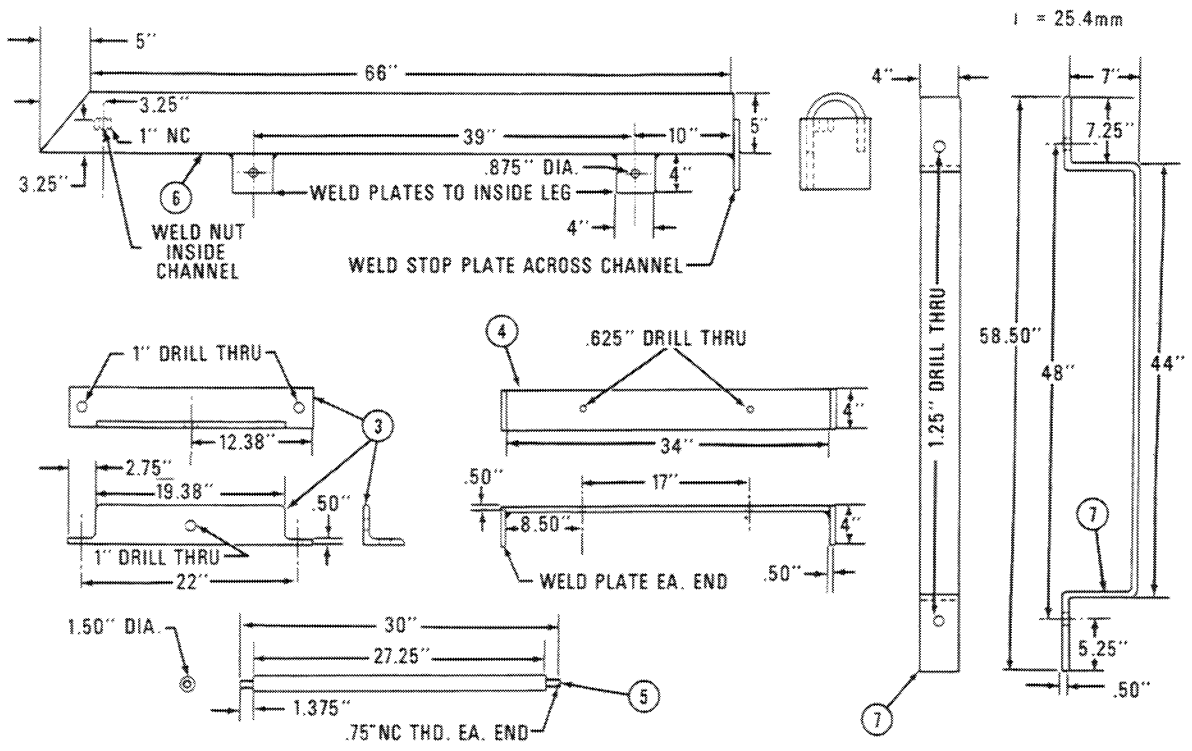
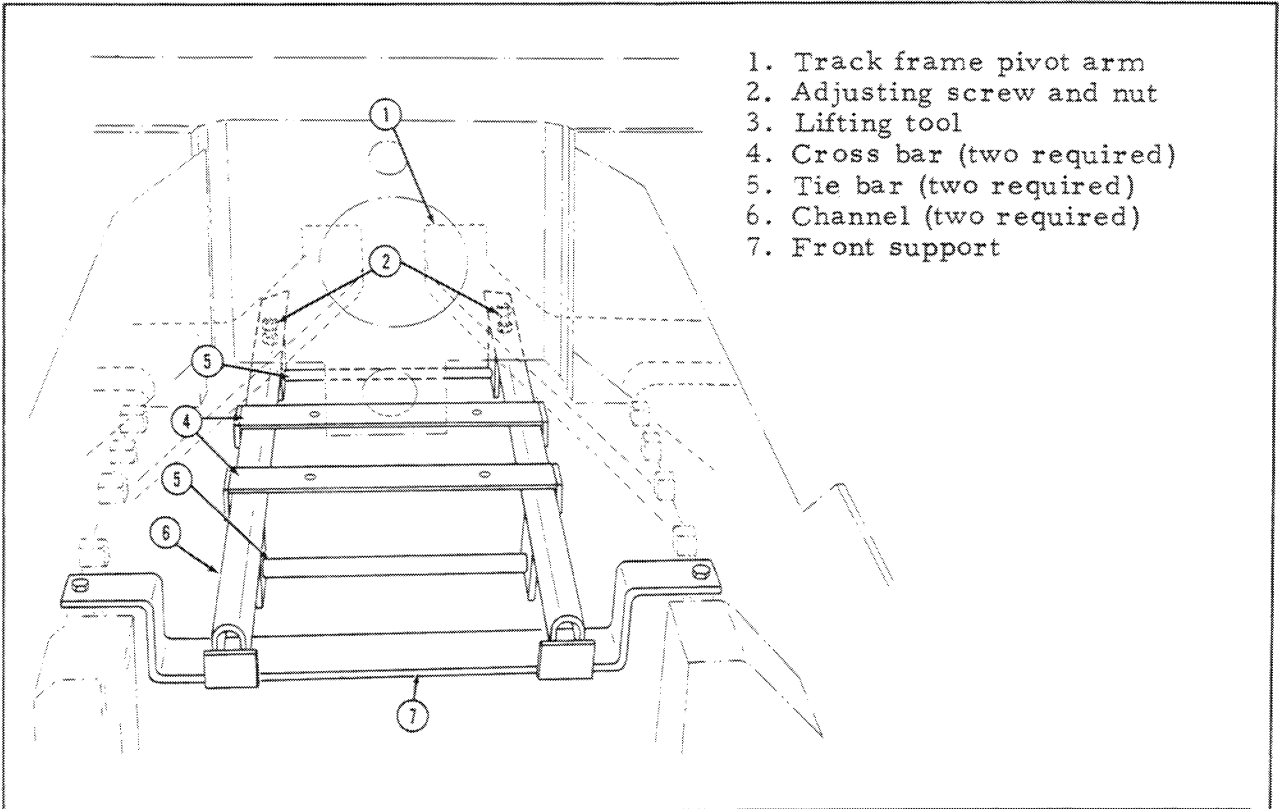
8.7.1

Attach input clutch flange, Fig. 46 (19) to rotating housing; torque attaching cap screws to 77 -- 85 lbs. ft. (10.6 -- 11.7 m-kgr). Lubricate I. D. of flange freely.

8.7.2

Install turbine wheel in rotating housing, Fig. 47 (1)(2), bearing (3) and race (4) in center of housing.

Transmission



T-77445

FIG. 51 TOOLS REQUIRED TO MAKE SLIDE FOR TRANSMISSION REMOVAL

Transmission

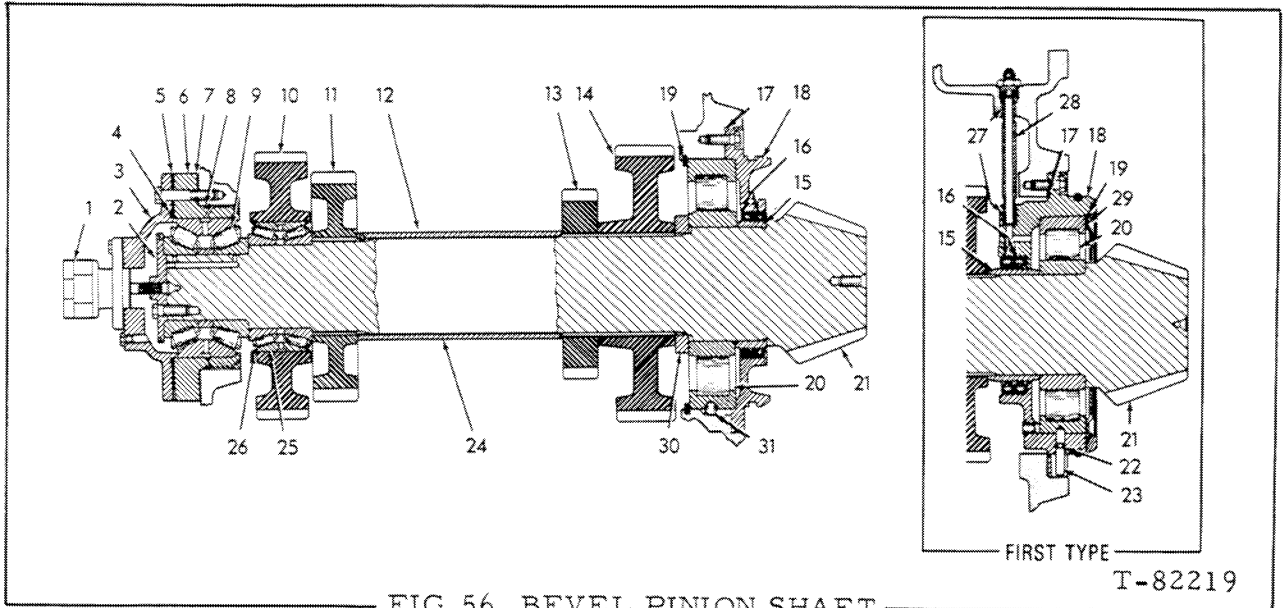


FIG. 56 BEVEL PINION SHAFT

- | | |
|--|---|
| <ul style="list-style-type: none"> 1. Shift inhibiting pump 2. End washer 3. Bearing retainer 4. O-ring 5. Bearing adjustment shims 6. Front bearing support 7. Pinion depth adjustment shims 8. O-ring 9. Front bearing 10. Idler gear 11. 2nd speed gear 12. Pin 13. 3rd speed gear 14. Low speed gear 15. Low speed gear spacer 16. Oil seals | <ul style="list-style-type: none"> 17. O-ring 18. Rear bearing retainer 19. Snap ring 20. Rear bearing 21. Shaft *22. O-ring *23. Bearing locating pin 24. Sleeve 25. Idler gear bearing 26. Snap ring *27. O-ring *28. Rear bearing lube tube *29. Rear bearing shield 30. Spacer 31. Bearing locking pin |
|--|---|
- } Tr. S/N 03671-up
*Prior to Tr. S/N 03671

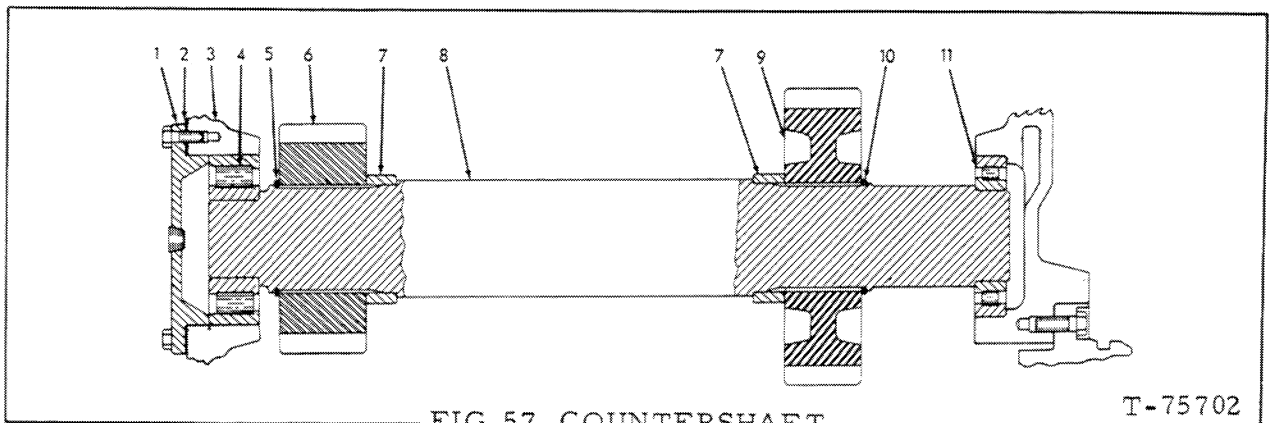
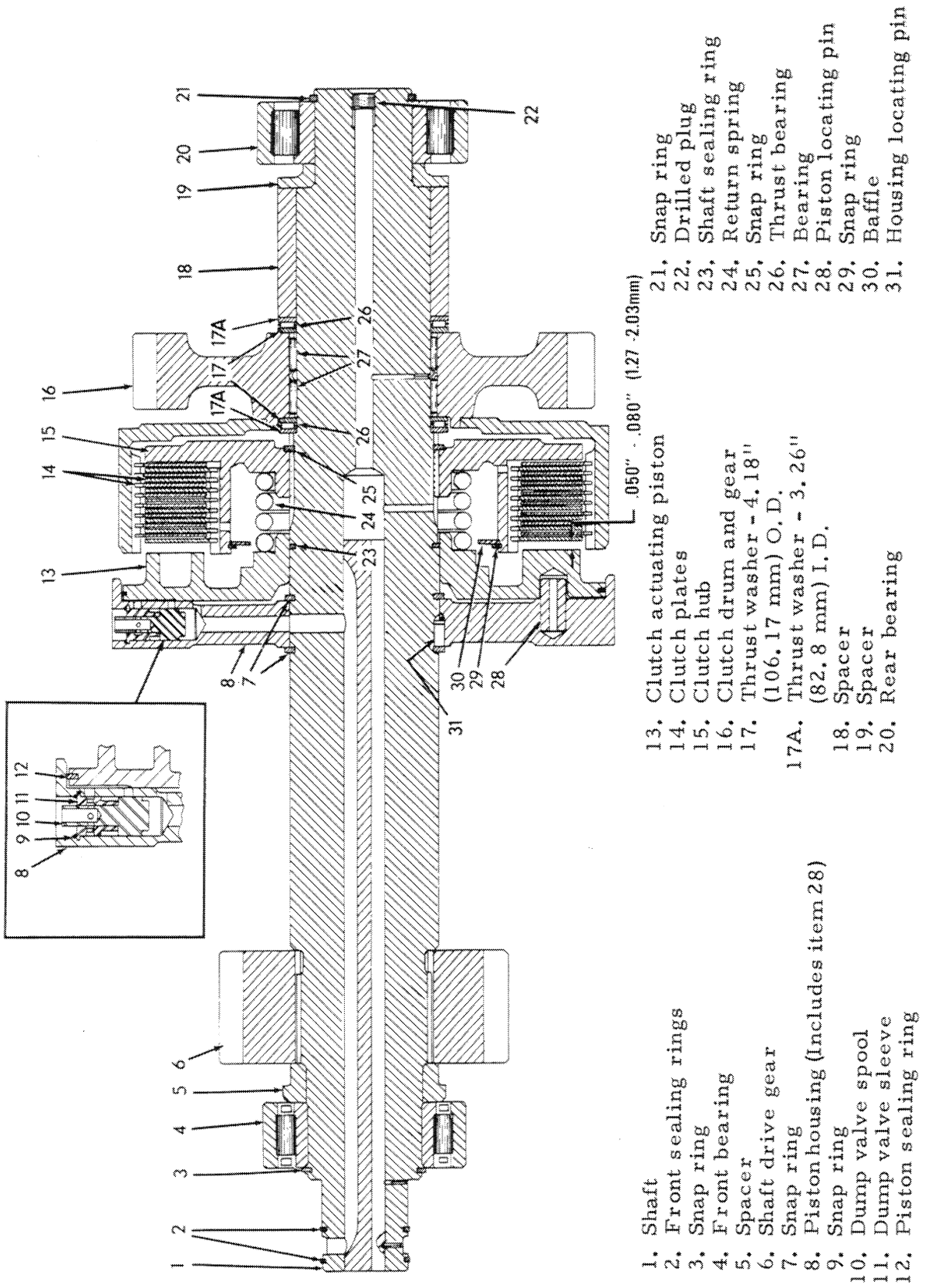


FIG. 57 COUNTERSHAFT

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> 1. Front bearing retainer 2. Gasket 3. Transmission case 4. Front bearing | <ul style="list-style-type: none"> 5. Snap ring 6. Front gear 7. Gear spacer 8. Shaft | <ul style="list-style-type: none"> 9. Rear gear 10. Snap ring 11. Rear bearing |
|--|---|---|

Transmission

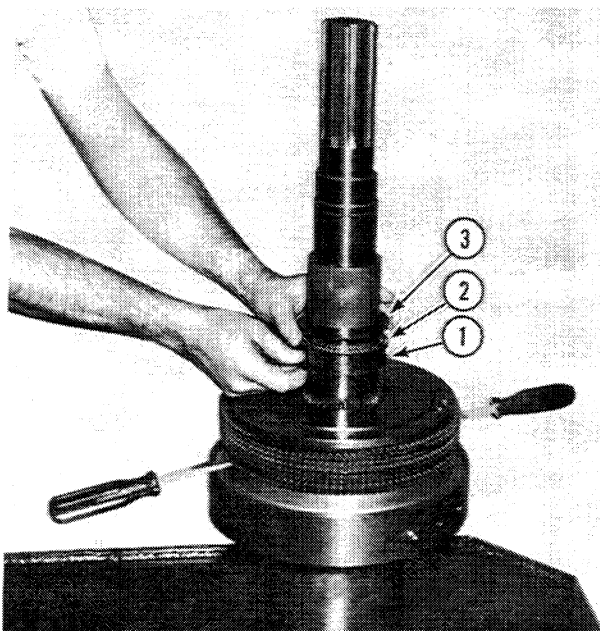


- 1. Shaft
- 2. Front sealing rings
- 3. Snap ring
- 4. Front bearing
- 5. Spacer
- 6. Shaft drive gear
- 7. Snap ring
- 8. Piston housing (Includes item 28)
- 9. Snap ring
- 10. Dump valve spool
- 11. Dump valve sleeve
- 12. Piston sealing ring
- 13. Clutch actuating piston
- 14. Clutch plates
- 15. Clutch hub
- 16. Clutch drum and gear
- 17. Thrust washer - 4.18" (106.17 mm) O.D.
- 17A. Thrust washer - 3.26" (82.8 mm) I.D.
- 18. Spacer
- 19. Spacer
- 20. Rear bearing
- 21. Snap ring
- 22. Drilled plug
- 23. Shaft sealing ring
- 24. Return spring
- 25. Snap ring
- 26. Thrust bearing
- 27. Bearing
- 28. Piston locating pin
- 29. Snap ring
- 30. Baffle
- 31. Housing locating pin

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FIG. 62 THIRD RANGE CLUTCH SHAFT

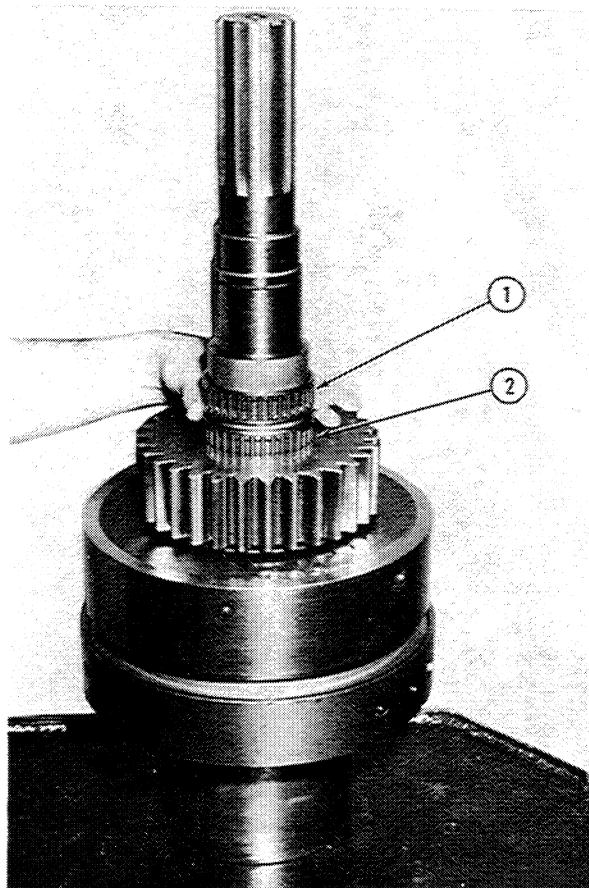
Transmission



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FIG. 65C INSTALLING THRUST BEARING AND WASHERS

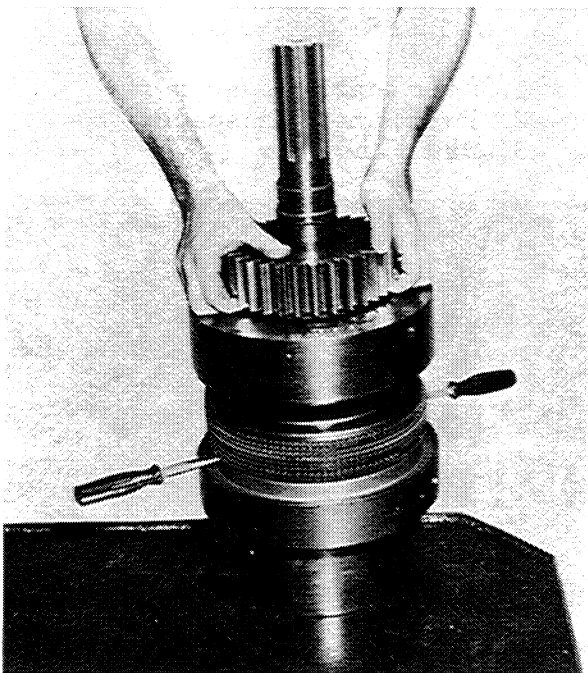
1. Thrust washer; 3. 26"(82.8mm) I. D.
2. Thrust bearing
3. Thrust washer; 4. 18"(106.17mm) O. D.



T-79794

FIG. 65E INSTALLING CLUTCH DRUM AND GEAR BEARINGS

1. Bearing (small)
2. Bearing (large)



T-79793

FIG. 65D INSTALLING CLUTCH DRUM AND GEAR

applied, piston (3) should move out to compress clutch pack and dump valve spool (4) should retract as far as possible. When air pressure is removed the piston and dump valve spool should return to their original position. Repeat this procedure for the opposite piston and dump valve.

IMPORTANT: To prevent possible damage to the seal rings do not exceed 60 psi (4.2 kg/cm²) while checking clutch assemblies.

Transmission

9.5.6.7

Hold bevel pinion shaft front bearing retainer (without shims) firmly against front bearing; measure distance between bearing retainer and front bearing support. Make shim pack .003" -- .005" (.076 -- .127 mm) smaller than measured distance. Remove bearing retainer and tie shim pack to retainer for later use.

NOTE: The above shim pack will allow pinion shaft end play of .0013" -- .0103" (.033 -- .26 mm).

9.5.6.8

Install countershaft front bearing retainer, Fig. 57 (1) with new gasket (2). Secure with attaching capscrews.

9.5.6.9

Install front sealing rings on clutch shafts; interlock ends of rings. Coat sealing rings with clean oil; be certain they turn freely in grooves.

9.5.6.10

Install shuttle valve piston, Fig. 72 (2) and springs (5) in the shuttle valve bodies; secure with plugs (6). Third range shuttle valve body has only one piston and spring.

9.5.6.11

Install O-rings, Fig. 75 (3) in oil transfer tube bores in shuttle valve bodies and in bores in oil supply manifold; lubricate O-rings.

9.5.6.12

Install shuttle valve bodies (with new gaskets) over ends of clutch shafts and attach oil supply manifold, Fig. 75 (16) to front of housing. Install oil transfer tube (4) (8) (15) and shift inhibit system supply line (13) as the valve bodies and manifold are being installed.

9.5.6.13

Install shift inhibit system relief valves, Fig. 73 (11) (13) and springs (10) in bevel pinion shaft front bearing

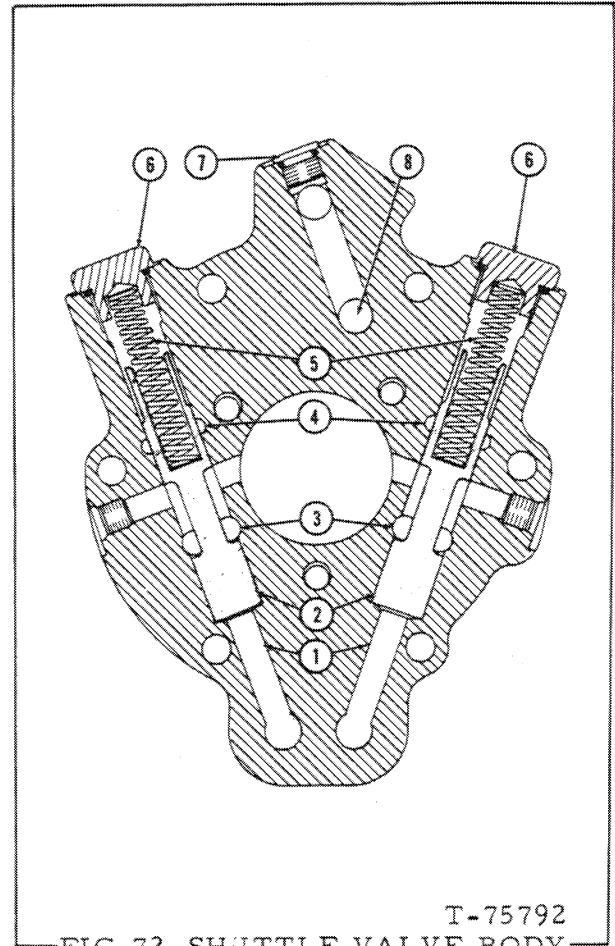


FIG. 72 SHUTTLE VALVE BODY

1. Signal pressure inlet
2. Piston
3. Sump outlet
4. Main pressure inlet
5. Spring
6. Plug w/O-ring
7. Plug w/O-ring
8. Lube oil inlet

retainer. Install original shims (9) over each spring and secure with plugs (8) (15).

NOTE: If original shims were lost, or if no shims were found at disassembly, use three shims with each spring for an initial adjustment. After transmission is in operation, check shift inhibit system pressures (4.9) and make additional adjustments if necessary.

Bevel Gear and Shaft

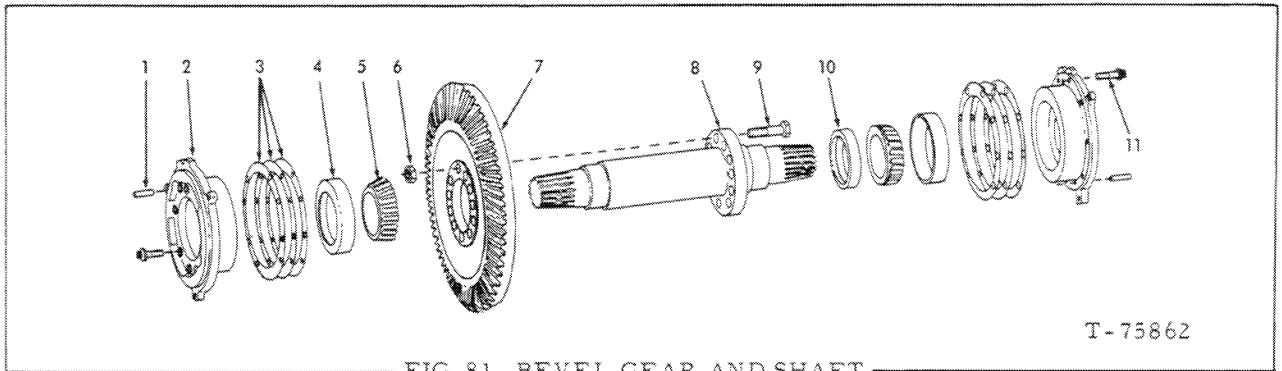
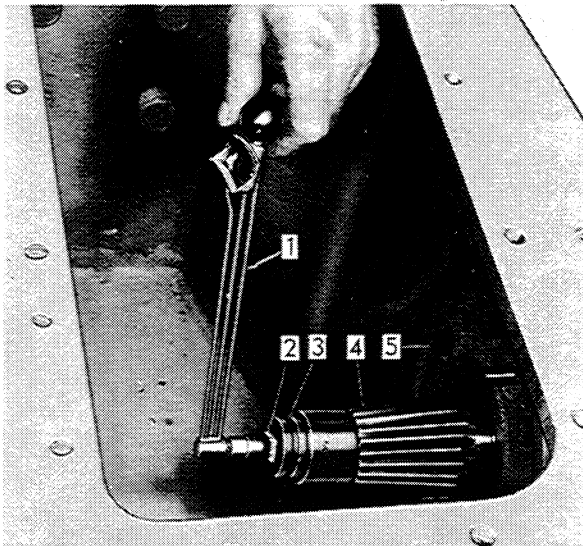


FIG.81 BEVEL GEAR AND SHAFT

- | | | |
|-----------------------------|---------------------|---------------------------|
| 1. Dowel pin | 4. Bearing cup | 8. Bevel gear shaft |
| 2. Bearing cage | 5. Bearing cone | 9. Capscrew |
| 3. Bearing adjustment shims | 6. Elastic stop nut | 10. Capscrew locking ring |
| | 7. Bevel gear | 11. Capscrew |



T-25732

FIG.82 CHECKING PRE-LOAD OF BEVEL GEAR SHAFT BEARINGS

- | | |
|------------------|---------------------|
| 1. Torque wrench | 4. Bevel gear shaft |
| 2. Adapter | 5. Bearing cage |
| 3. Socket | |

capscrews. Tighten nuts until snug. Block under gear and shaft to prevent damage to right bearing.

10.2.3

Block between capscrew heads and right wall of bevel gear compartment, Fig. 80. Start left bearing cone (6) on shaft and press it into position using tools similar to those shown in Fig. 80.

NOTE: It may be possible to install bearing cone without the aid of a hydraulic press if the bearing is pre-heated at 275°F. (135°C) for an hour before being installed.

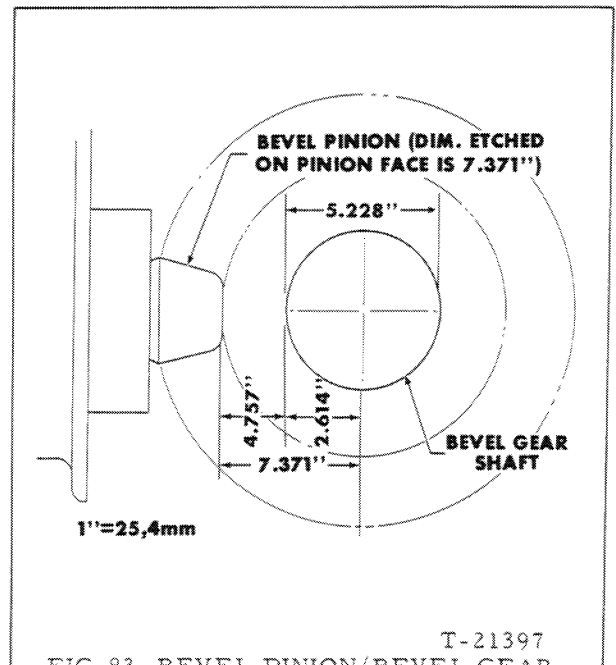


FIG.83 BEVEL PINION/BEVEL GEAR MOUNTING DIMENSIONS

T-21397

10.2.4

Press bearing cups, Fig. 78 (4) into bearing cages (2); be certain cups are seated firmly in cages. Lubricate bearings with clean oil and install each bearing cage (with original bearing adjustment shims) in bore from which it was removed. Make certain dowel pins (11) are in vertical position; start bearing cage attaching capscrews (1) but do not tighten.

10.2.5

Torque nuts, Fig. 78 (7), on bevel gear attaching capscrews to 620 - 700 lbs. ft. (85.7 - 96.7 m-kg).

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