

TRANSFER CASE (DORR-MILLER DIFFERENTIAL)

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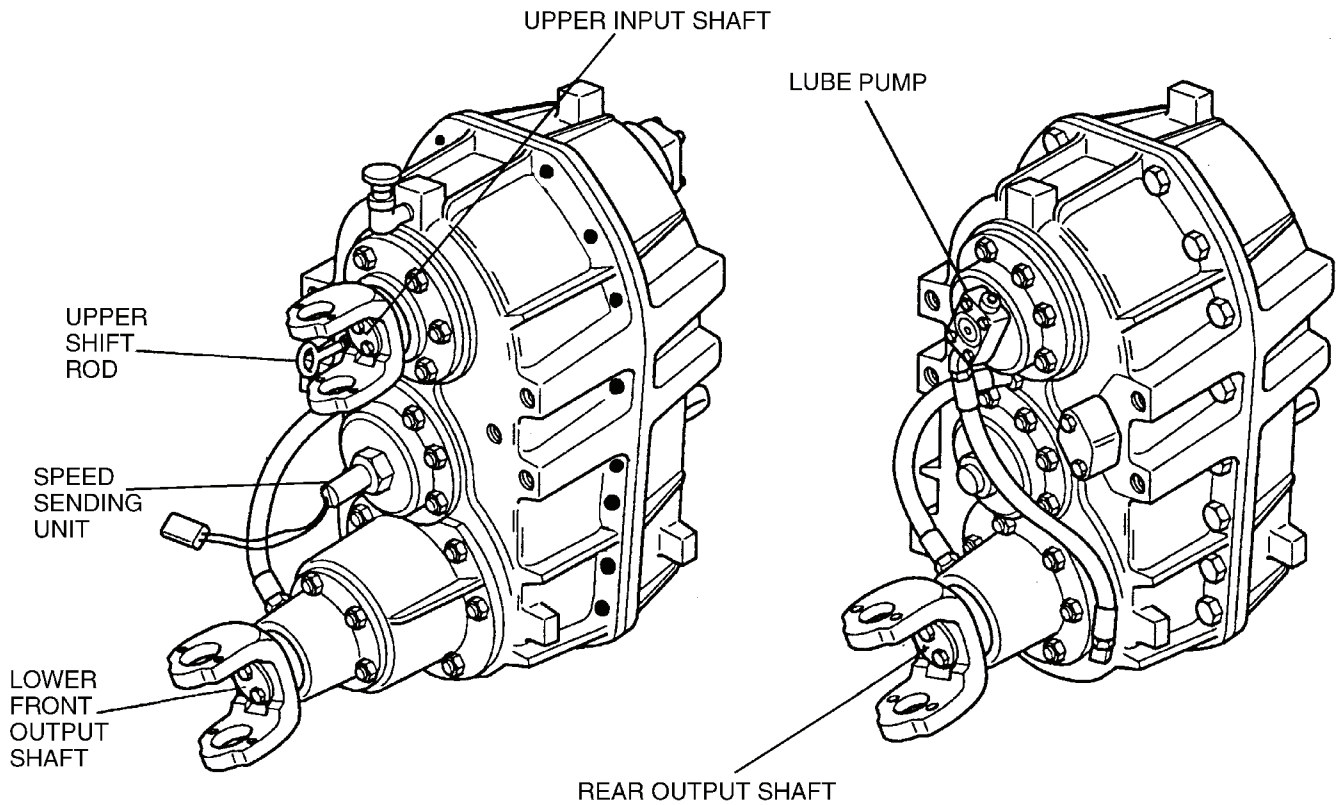


Figure 1. Transfer Case.

1. INTRODUCTION.

The transfer case is a three shaft 2-speed unit. The top shaft receives engine power from the transmission through the use of a driven shaft. The power is then transferred to the center shaft and bottom shaft. The bottom shaft provides power to the front and rear axles via drive shafts. All wheel drive and prevention of driveline windup is accomplished through the use of a Dorr - Miller automatic locking differential. Selection of high or low range is accomplished by a shift lever and connecting rod to the transfer case shift rod.

2. SPECIFICATIONS.

Make Oshkosh
 Model 55000 Series
 Speed 2
 Shaft 3
 Type of Gear Helical
 Method of Speed Selection .. Operator Control Lever

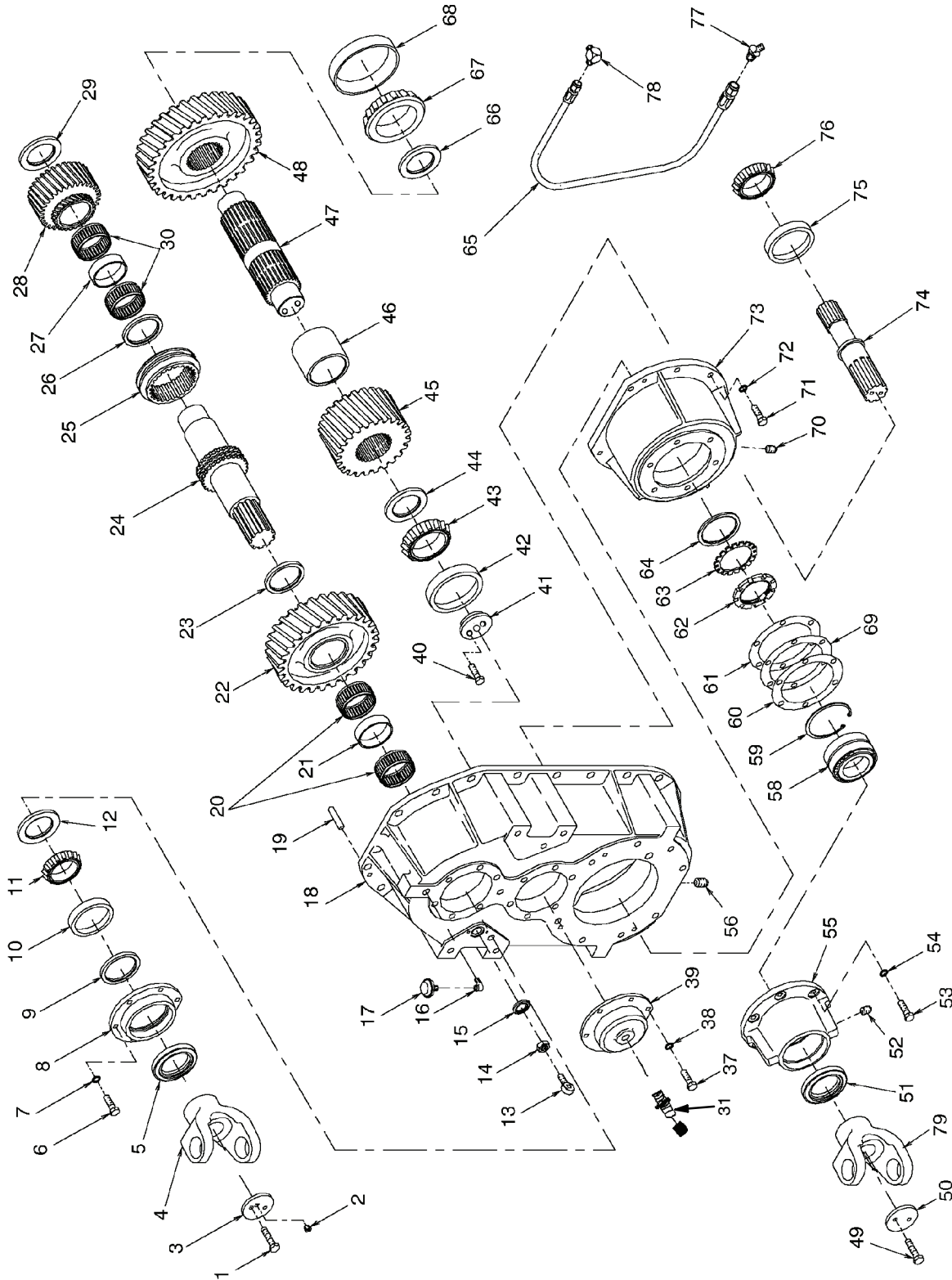


Figure 2. Transfer Case Assembly.

NOTE

Refer to page 5 of this group for legend.

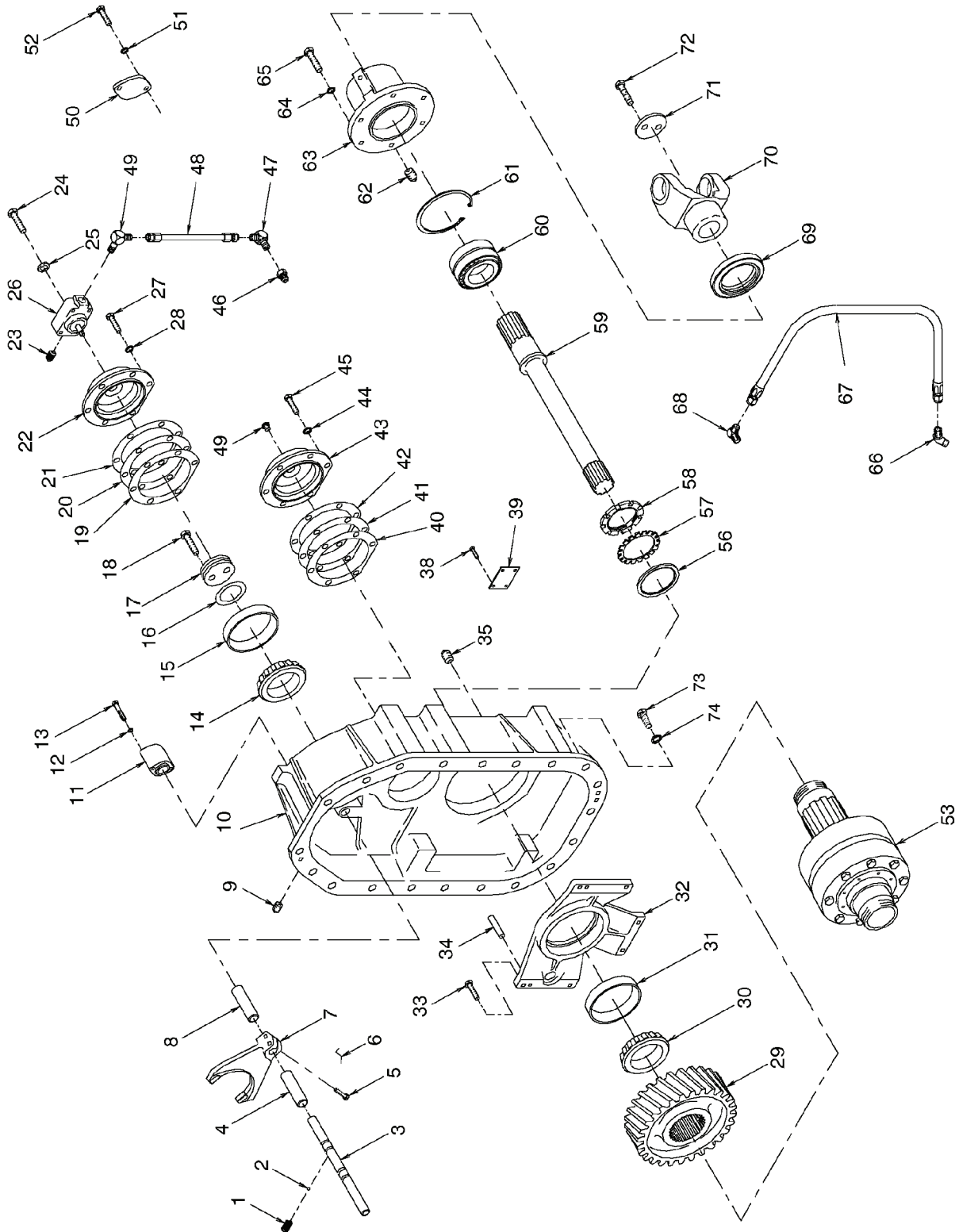


Figure 3. Transfer Case Assembly.

NOTE

Refer to page 5 of this group for legend.

Legend for Figure 2.

1. Capscrew	21. Spacer	41. Pulse wheel	61. Shim
2. Pipe Plug	22. Gear	42. Bearing Cup	62. Pat Locknut
3. Retainer, Washer	23. Spacer	43. Bearing Cone	63. Lockwasher
4. Yoke	24. Upper Shaft	44. Spacer	64. Spacer
5. Oil Seal	25. Clutch Collar	45. Gear	65. Hose
6. Capscrew	26. Spacer	46. Spacer	66. Spacer
7. Lockwasher	27. Spacer	47. Center Shaft	67. Bearing Cone
8. End Cap	28. Gear	48. Gear	68. Bearing Cup
9. Spacer	29. Spacer	49. Capscrew	69. Shim
10. Bearing Cup	30. Caged Roller	50. Lock Plate	70. Plug
11. Bearing Cone	31. Sending Unit	51. Oil Seal	71. Capscrew
12. Spacer	32. Deleted	52. Plug	72. Lockwasher
13. Rod End	33. Deleted	53. Cap Screw	73. Enclosure
14. Jam Nut	34. Deleted	54. Lockwasher	74. Shaft
15. Oil Seal	35. Deleted	55. Bearing Cap	75. Bearing Cup
16. Elbow	36. Deleted	56. Plug	76. Bearing Cone
17. Breather	37. Capscrew	57. Capscrews	77. Adapter
18. Front Housing	38. Lockwasher	58. Bearing Assembly	78. Adapter
19. Dowel Pin	39. End Cap	59. Retaining Ring	79. Yoke
20. Caged Roller	40. Capscrew	60. Shim	

Legend for Figure 3.

1. Spring	20. Shim	39. Plate	57. Washer
2. Ball	21. Shim	40. Shim	58. Locknut
3. Upper Shift Rod	22. Bearing Cover	41. Shim	59. Shaft
4. Spacer	23. Plug	42. Shim	60. Bearing Assembly
5. Capscrew	24. Capscrew	43. End Cap	61. Retaining Ring
6. Wire, Soft	25. Lockwasher	44. Lockwasher	62. Plug
7. Upper Shift Fork	26. Hydraulic Pump	45. Capscrew	63. Bearing Cap
8. Spacer	27. Capscrew	46. Strainer	64. Lockwasher
9. Outer Detent Plug	28. Lockwasher	47. Adapter	65. Capscrew
10. Rear Housing	29. Gear	48. Hose	66. Adapter
11. Upper Shift Cover	30. Bearing Cone	49. Adapter	67. Hose
12. Lockwasher	31. Bearing Cup	50. Declutch Opening Cover	68. Adapter
13. Capscrew	32. Bearing Support	51. Lockwasher	69. Oil Seal
14. Bearing Cone	33. Capscrew	52. Screw	70. Yoke
15. Bearing Cup	34. Dowel Pin	53. Differential Assembly	71. Lock Plate
16. Piston Ring	35. Plug	54. Lockwasher	72. Capscrew
17. Drive Plate	36. Capscrew	55. Nut	73. Capscrew
18. Capscrews	37. Retainer Washer	56. Spacer	74. Washer
19. Shim	38. Metal Tack		

3. TRANSFER CASE REMOVAL.

Remove drain plug at bottom of case. Drain oil. disconnect speedometer sending unit, air lines, shift linkage and bracket, and prop shafts. Unfasten mounting bolts and biscuits from mounting brackets. Using a suitable lifting device remove transfer case from vehicle and install it on a suitable maintenance stand.

4. TRANSFER CASE DISASSEMBLY.

- (1) Position transfer case in maintenance stand, with front housing (Figure 2, Item 18) facing up.
- (2) Remove two capscrews (Figure 2, Item 1), retainer washer (3) from upper shaft (24).
- (3) Using a puller, remove yoke (Figure 2, Item 4) from upper shaft (24).
- (4) Remove two capscrews (Figure 2, Item 49), lock plate (50) from shaft (74).
- (5) Using a puller, remove yoke (Figure 2, Item 79) from shaft (74).
- (6) Tag and disconnect hose (figure 2, Item 65) from adapters (77 and 78).
- (7) Remove six capscrews (Figure 2, Item 53), lockwashers (54), bearing cup (55), three shims (60, 69 and 61), and lower output shaft assembly from differential assembly (Figure 3, Item 53) and enclosure (Figure 2, Item 73).
- (8) Remove eight capscrews (Figure 2, Item 71), lockwashers (72) from enclosure (73) and front housing (18).
- (9) Install jack bolts in holes on enclosure (Figure 2, Item 73) and tighten alternately to separate enclosure from front housing (18) and dowel pin. Remove enclosure (73).

WARNING

Stay clear of differential assembly when supported with lifting device. Differential assembly may fall and cause injury to personnel.

- (10) Using a suitable lifting device, remove differential assembly (Figure 3, Item 53) from transfer case.
- (11) Remove sending unit (Figure 2, Item 31), from end cap (39).
- (12) Remove six capscrews (Figure 2, Item 37), lockwashers (38), and end cap (39) from front housing (18).

- (13) Remove oil seal (Figure 2, Item 5), six capscrews (6), lockwasher (7) and end cap (8) from front housing (18).
- (14) Loosen jam nut (Figure 2, Item 14) and remove rod end (13) and oil seal (15) from upper shift rod (Figure 3, Item 3) and front housing (Figure 2, Item 18).
- (15) Remove elbow (Figure 2, Item 16), breather (17), plug (56), and adapters (77 and 78) from front housing (18).
- (16) Position transfer case in maintenance stand with rear housing (Figure 3, Item 10) facing up.
- (17) Tag and disconnect hoses (Figure 3, Items 67 and 48) from adapters (66,68,47 and 49).
- (18) Remove outer detent plug (Figure 3, Item 9), spring (1) and ball (2) from rear housing (10).
- (19) Remove two capscrews (Figure 3, Item 13), lockwashers (12) and upper shift cover (11) from rear housing (10).
- (20) Remove two capscrews (Figure 3, Item, 72), lock plate (71) from shaft (59).
- (21) Using a puller, remove yoke (Figure 3, Item 70) from shaft (59).
- (22) Remove six capscrews (Figure 3, Item 65), lockwashers (64), bearing cap (63) and lower rear output shaft assembly from transfer case and rear housing (10).
- (23) Remove six capscrews (Figure 3, Item 45), lockwasher (44), end cap (43), shims (42, 41, and 40) from housing (10).
- (24) Remove two adapters (Figure 3, Items 66 and 68), Plug (35), screw (52), lockwasher (51), declutch opening cover (50) and adapter (47), strainer (46) from rear housing (10).
- (25) Remove adapter (Figure 3, Item 49) and plug (23) from hydraulic pump (26).
- (26) Remove four capscrews (Figure 3, Item 24), lockwashers (25) and hydraulic pump (26) from bearing cover (22).
- (27) Remove six capscrews (Figure 3, Item 27), lockwashers (28), bearing cover (22) and shims (21, 20 and 19) from rear housing (10).
- (28) With rear housing (Figure 3, Item 10) facing up, remove 20 capscrews (Figure 3, Item 73), and washers (Figure 3, Item 74) from front housing (Figure 2, Item 18) and rear housing (Figure 3, Item 10).

NOTE

Inner detent ball will fall out of rear housing case when separated from shifting rod.

⚠ WARNING

Stay clear of rear housing when supported with lifting device. Rear housing may fall and cause injury to personnel.

- (29) Using a suitable lifting device separate transfer case halves using jack bolts locations provided at top and bottom. Remove rear housing (Figure 3, Item 10) from front housing (Figure 2, Item 18) keeping it parallel to prevent binding of the shift rod assembly and dowel pins in the transfer case.

⚠ WARNING

Stay clear of center shaft assembly when supported with lifting device. Center shaft assembly may fall and cause injury to personnel.

- (30) Using a suitable lifting device, remove center shaft assembly from front housing (Figure 2, Item 18).

⚠ WARNING

Stay clear of upper input shaft when supported with lifting device. Upper input shaft may fall and cause injury to personnel.

- (31) Using a suitable lifting device, remove upper input shaft and shift rod assembly from front housing (Figure 2, Item 18).
- (32) Remove six capscrews (Figure 3, Item 33), bearing support (32) from front housing (Figure 2, Item 18).

NOTE

Do Steps 34, 35, 36 and 37 if bearing or race fail inspection.

- (33) Remove bearing cup (Figure 2, Items 10 and 42) from front housing (18).
- (34) Remove bearing cup (Figure 3, Item 15) and (Figure 1, Item 68) from rear housing (Figure 3, Item 10).

- (35) Remove bearing cup (Figure 2, Items 75 and 68) from enclosure (73) and front housing (18).

- (36) Remove bearing cup (Figure 3, Item 31) from bearing support (32).

4.1 Disassembly - Upper Input Shaft Assembly.

- (1) Remove spacer (Figure 2, Item 9) from upper shaft (24).
- (2) Using a puller, remove gear (Figure 2, Item 22), spacer (12) and bearing cone (11)
- (3) Remove clutch collar (Figure 2, Item 25), spacer (23), caged roller (20) and spacer (21) from upper shaft (24).
- (4) Remove two capscrews (Figure 3, Item 18), drive plate (17) and piston ring (16) from upper shaft (24).
- (5) Using a puller, remove bearing cone (Figure 3, Item 14), spacer (Figure 2, Item 29), and gear (28) from upper shaft (24)
- (6) Remove caged rollers (Figure 2, Item 30), spacers (27 and 26) from upper shaft (24).

4.1.1 Cleaning and Inspection.**⚠ WARNING**

Adhesives, solvents and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well ventilated area. If adhesive, solvent or sealing compound gets on skin or clothing, wash immediately with soap and water.

- (1) Clean all metal parts in dry cleaning solvent.
- (2) Inspect all parts for wear or damage.
- (3) Remove all nicks and burrs from machine surfaces.
- (4) Replace all worn or damaged parts.

4.2 Disassembly - Lower Front Output Shaft.

- (1) Remove oil seal (Figure 2, Item 51) and plug (52) from bearing cap (55).

⚠ WARNING

When using a hydraulic press for removal or installation of bearings, bushings, and gears, wear a face shield to prevent possible injury to personnel.

- (2) Position lower front output shaft assembly in a press and support by bearing cap (Figure 2, Item 55).

CAUTION

Properly support shaft during removal. Shaft may drop suddenly. Failure to comply may result in damage to equipment.

- (3) Press lower front output shaft (Figure 2, Item 74) out of bearing assembly (58), retaining ring (59) and bearing cap (55).
- (4) Press bearing assembly (Figure 2, Item 58) and retainer ring (59) from bearing cap (55).

4.2.1 Cleaning and Inspection.

WARNING

Adhesives, solvents and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well ventilated area. If adhesive, solvent or sealing compound gets on skin or clothing, wash immediately with soap and water.

- (1) Clean all metal parts in dry cleaning solvent.
- (2) Inspect all parts for wear or damage.
- (3) Remove all nicks and burrs from machined surfaces.
- (4) Replace all worn or damaged parts.

4.3 Disassembly - Lower Rear Output Shaft.

- (1) Remove oil seal (Figure 3, Item 69), plug (62) from bearing cap (63).

WARNING

When using a hydraulic press for removal or installation of bearings, bushings, and gears, wear a face shield to prevent possible injury to personnel.

- (2) Position lower rear output assembly in a press and support by bearing cup (63).

CAUTION

Properly support shaft during removal. Shaft may drop suddenly. Failure to comply may result in damage to equipment.

- (3) Press lower rear output shaft (Figure 2, Item 59) out of bearing assembly (60), retainer ring (61) and bearing cap (63).

- (4) Press bearing assembly (Figure 2, Item 60), and retainer ring (61) from bearing cap (63).

4.3.1 Cleaning and Inspection.

WARNING

Adhesives, solvents and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well ventilated area. If adhesive, solvent or sealing compound gets on skin or clothing, wash immediately with soap and water.

- (1) Clean all metal parts in dry cleaning solvent.
- (2) Inspect all parts for wear or damage.
- (3) Remove all nicks and burrs from machined surfaces.
- (4) Replace all worn or damaged parts.

4.4 Disassembly - Center Shaft Assembly.

- (1) Using a puller, remove gear (Figure 2, Item 48), spacer (66) and bearing cone (67) from center shaft (47).
- (2) Remove two capscrews (Figure 2, Item 40) and pulse wheel (41) from center shaft (47).
- (3) Using a puller, remove gear (Figure 2, Item 45), spacers (44 and 46), and bearing cone (43) from center shaft (47).

4.4.1 Cleaning and Inspection.

⚠ WARNING

Adhesives, solvents and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well ventilated area. If adhesive, solvent or sealing compound gets on skin or clothing, wash immediately with soap and water.

- (1) Clean all metal parts in dry cleaning solvent.
- (2) Inspect all parts for wear or damage.
- (3) Remove all nicks and burrs from machined surfaces.
- (4) Replace all worn or damaged parts.

4.5 Disassembly - Upper Shift Rod.

- (1) Remove two spacers (Figure 3, Items 4 and 8) from shift rod (3).
- (2) Cut lockwire (Figure 3, Item 6) holding two cap screws (5).

- (3) Remove two capscrews (Figure 3, Item 5) from upper shift fork (7).

- (4) Remove shift rod (Figure 3, Item 3) from upper shift fork (7).

4.5.1 Cleaning and Inspection.

⚠ WARNING

Adhesives, solvents and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well ventilated area. If adhesive, solvent or sealing compound gets on skin or clothing, wash immediately with soap and water.

- (1) Clean all metal parts in dry cleaning solvent.
- (2) Inspect all parts for wear or damage.
- (3) Remove all nicks and burrs from machined surfaces.
- (4) Replace all worn or damaged parts.

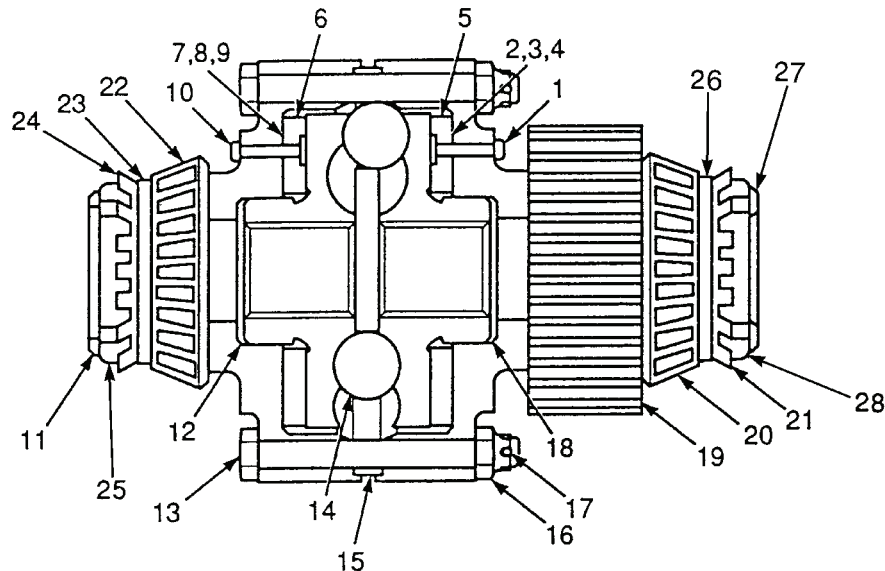


Figure 4. Dorr-Miller Differential.

NOTE

Refer to page 10 of this group for legend.

Legend for Figure 4.

1. Rivet	11. Differential Case	21. Lockwasher
2. Shim	12. Cam	22. Bearing Cone
3. Shim	13. Capscrew	23. Spacer
4. Shim	14. Steel Ball	24. Lockwasher
5. Thrustwasher	15. Plate	25. Pat Locknut
6. Thrustwasher	16. Castle Nut	26. Spacer
7. Shim	17. Cotter Pin	27. Differential Case
8. Shim	18. Cam	28. Pat Locknut
9. Shim	19. Gear	
10. Rivet	20. Bearing Cone	

4.6 Disassembly - Dorr-Miller Differential.

- (1) Straighten tangs of lockwashers (Figure 4, Items 24 and 21), remove pat locknuts (25 and 28), and spacers (23 and 26) from differential cases (11 and 27).
- (2) With the use of a puller, remove bearing cones (Figure 4, Items 22 and 20), and gear (19) from differential cases (11 and 27).

NOTE

Match mark differential cases prior to disassembly.

- (3) Remove cotter pins (Figure 4, Item 17), eight capscrews (13) and castle nuts (16) from differential cases (11 and 27).
- (4) Separate differential cases (Figure 4, Items 11 and 27), and remove plate (15), and steel balls (14) from the two cams (12 and 18).
- (5) Remove cams (Figure 4, Items 12 and 18) from differential cases (11 and 27).
- (6) If thrustwashers (Figure 4, Items 5 and 6) need replacement or shim pack (2,3,4 and 7,8,9) need adjustment, remove eight rivets (10 and 1) on each case half.

4.6.1 Cleaning and Inspection.

WARNING

Adhesives, solvents and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well ventilated area. If adhesive, solvent or sealing compound gets on skin or clothing, wash immediately with soap and water.

- (1) Clean all metal parts in dry cleaning solvent.
- (2) Inspect all parts for wear or damage.

- (3) Remove all nicks and burrs from machined surfaces.
- (4) Replace all worn or damaged parts.

5. CLEANING, INSPECTION AND REPAIR.

CAUTION

Exercise care to avoid skin rashes, fire hazard and inhalation of vapors when using solvent type cleaners.

WARNING

GASOLINE SHOULD BE AVOIDED! DO NOT clean these parts in a hot solution tank or with water and alkaline solutions, such as sodium hydroxide, orthosilicates or phosphates.

5.1 Cleaning Ground/Polished Surfaces. Parts having ground and polished surfaces, such as gears, bearings, shafts and collars, should be cleaned in a suitable solvent, such as kerosene, diesel fuel oil or dry cleaning solvent.

5.1.1 Gasket Removal. Clean all mating surfaces where fiber or liquid gasket material is used. It may be necessary to use a scraper to completely remove gasket materials. Be careful not to damage mating surfaces.

5.1.2 Steam Cleaning. Steam cleaning is not recommended for assembled drive units after they have been removed from the housing. When this method of cleaning is used, water is trapped in cored passages of castings and in close clearances between parts, as well as on parts. This can lead to corrosion (rust) of critical parts of the assembly and possibility of circulating rust particles in the lubricant. Premature failure of bearings, gears and other parts can be caused by this practice. Assembled drive units cannot be properly cleaned by steam cleaning, dipping or slushing. Complete drive unit disassembly is a necessary requisite to thorough cleaning.

5.2 Clean Rough Parts.

⚠ CAUTION

Exercise care to avoid skin rashes and inhalation of vapors when using alkali cleaners.

Rough parts, such as castings, cast brackets and some brake parts may be cleaned in hot solution tanks with mild alkali solutions providing these parts are not ground or polished. The parts should remain in the tank long enough to be thoroughly cleaned and heated through. This will aid the evaporation of the rinse water. The parts should be thoroughly rinsed after cleaning to remove all traces of alkali.

5.2.1 Complete Assemblies. Completely assembled transfer cases may be steam cleaned on the outside only, to facilitate initial removal or disassembly, providing all openings are closed. Breathers and all other openings should be tightly covered or closed to prevent the possibility of water entering the assembly.

5.2.2 Drying. Parts should be completely dried immediately after cleaning. Use soft, clean, lintless absorbent paper towels or cloth free of abrasive material such as lapping compound, metal filings or contaminated oil. Bearings should never be dried by spinning with compressed air.

5.2.3 Corrosion Prevention. Parts that have been cleaned, dried, inspected and are to be immediately reassembled should be coated with light oil to prevent corrosion. If these parts are to be stored for any length of time, they should be treated with a good rust preventive and wrapped in special paper or other material designed to prevent corrosion.

5.3 Inspection. Inspect all bearings cups and cones, including those not removed from parts of the drive unit, and replace if rollers or cups are worn, pitted or damaged in any way. Remove parts needing replacement with a suitable puller or in a press with sleeves. Avoid use of drifts and hammers. They may easily mutilate or distort component parts.

If any of the following bearing conditions exist, bearings must be replaced:

- (1) Large ends of roller worn flush to the recess, or the radii at the large ends of the rollers worn sharp. Refer to Figure 5.

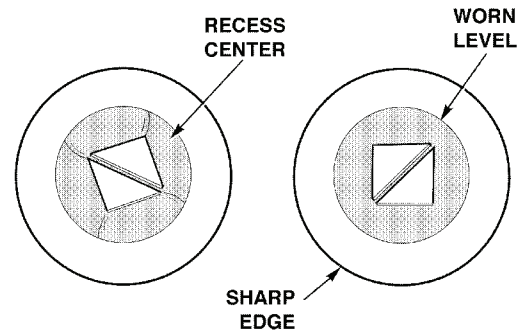


Figure 5.

- (2) Visible step wear, particularly at the small end of the roller track or deep indentations, cracks or breaks in the bearing cup and/or cone surfaces. Refer to Figure 6.

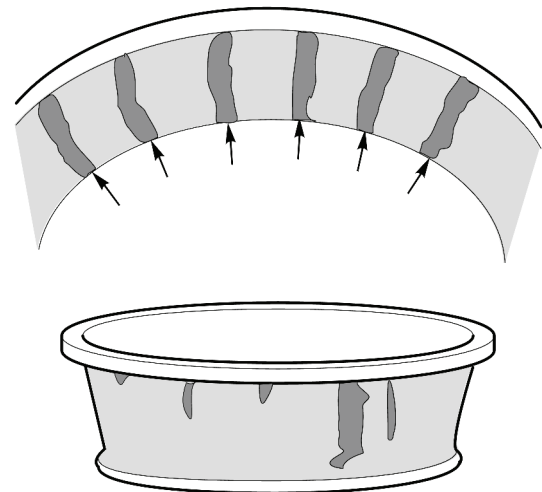


Figure 6.

- (3) Bright rubbing marks on the dark phosphate surface of the bearing cage. Refer to Figure 7.

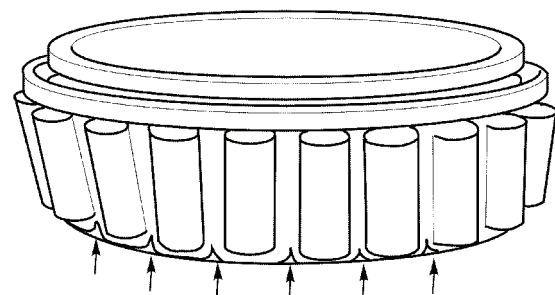


Figure 7.

- (4) Etching or pitting on functioning surface. Refer to Figure 8

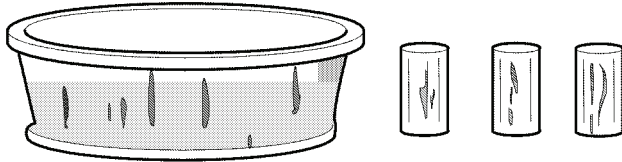


Figure 8.

- (5) Spalling or flaking on the bearing cup and/or cone surfaces. Refer to Figure 9.

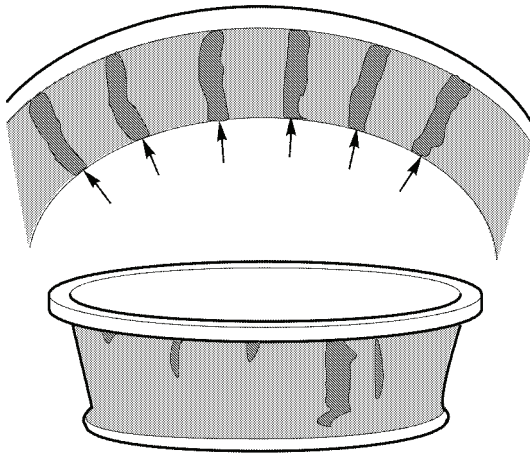


Figure 9.

- (6) Inspect hypoid/generoid gears for wear or damage. Gears which are worn, ridged, pitted or scored should be replaced. When it is necessary to replace either the pinion or gear of a set, the entire gear set must be replaced.

5.4 Repair.

- (1) Replace all worn or damaged parts. Hex nuts with rounded corners, all washers if damaged, oil seals and gaskets or silicone RTV 732 or Loctite 515 gasket material should be replaced at the time of overhaul.
- (2) Remove nicks and burrs from machined or ground surfaces. Threads must be clean and free of burrs to obtain accurate adjustment and correct torque. A fine mill file or India stone is suitable for this purpose. Studs must be tight prior to reassembling the parts.
- (3) When assembling component parts, use a press where possible.
- (4) Tighten all nuts and capscrews to specified torque when a torque is specified, otherwise

refer to Group 9-11 for the standard torque table.

- (5) **DO NOT REPAIR WELD.** In the interest of safety and preserving the service life of transfer cases, we recommend that they NOT be repair welded. Repair welding can detract from the structural integrity of a component, particularly with heat-treated parts. The benefit of heat-treatment may be nullified by welding.

5.5 Silicone (RTV) Gasket and Loctite 515.

5.5.1 Service. Removal of all gaskets including silicone RTV 732 and Loctite 515 is accomplished by peeling or scraping the used gasket off both mating surfaces.

5.5.2 Application. Application of silicone RTV 732 or Loctite 515 gasket material is as follows:

- (1) Remove dirt, grease or moisture from both mating surfaces.
- (2) Dry both surfaces.

CAUTION

Minor concentration of acetic acid vapor may be produced during application of silicone RTV. Adequate ventilation should be provided when silicone (RTV) is applied in confined areas.

Further, eye contact with silicone (RTV) gasket materials may cause irritation; if eye contact takes place, flush eyes with water for 15 minutes and have eyes examined by a doctor.

- (3) Apply a continuous thin bead, approximately 3/16" diameter completely around one mating surface and around the edge of all fastener holes to assure complete sealing and prevent leakage.
- (4) Assemble the components immediately to permit silicone RTV 732 or Loctite 515 gasket material to spread evenly. Wait 20 minutes before refilling with lubricant.

NOTE

Failure to use appropriate gasket material/sealants will cause leaks.

6. REASSEMBLY PROCEDURES.**6.1 Assembly - Upper Input Shaft Assembly.**

- (1) Coat caged rollers (Figure 2, Item 20) with Lubriplate.
- (2) Install spacer (Figure 2, Item 23), caged rollers (20), and spacer (21) on upper shaft (24).

⚠ WARNING

When using a hydraulic press for removal or installation of bearings, bushings, and gears, wear a face shield to prevent possible injury to personnel.

- (3) Press gear (Figure 2, Item 22) on upper shaft (24).
- (4) Install spacer (Figure 2, Item 12) and press bearing cone (11) on upper shaft (24).
- (5) Install clutch collar (Figure 2, Item 25) and spacer (26) on upper shaft (24).
- (6) Coat caged rollers (Figure 2, Item 30) with Lubriplate.
- (7) Install caged rollers (Figure 2, Item 30), spacers (29) on upper shaft (24).
- (8) Press gear (Figure 2, Item 28) and bearing cone (14) on upper shaft (24).
- (9) Install piston ring (Figure 3, Item 16), and drive plate (17) on upper shaft (Figure 2, Item 24).

⚠ WARNING

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- (10) Coat threads of two capscrews (Figure 3, Item 18) with Loctite 242.

- (11) Install two capscrews (Figure 3, Item 18) on upper shaft (Figure 2, Item 24). Tighten to 60 ft. lbs. (81 N·m).

6.2 Assembly - Lower Front Output Shaft.**NOTE**

During assembly make sure the tapered bearing cones are properly seated.

⚠ WARNING

Use care when removing snap and retaining rings. Snap and retaining rings are under spring tension and can act as projectiles when released and could cause severe eye injury.

- (1) Install plug (Figure 2, Item 52) and retainer ring (59) in bearing cap (55).

⚠ CAUTION

These two bearing cups and cones with spacer must be a matched pair.

- (2) Install two bearing cups (Figure 2, Item 58) in bearing end (55).
- (3) Coat two bearing cones (Figure 2, Item 58) with Lubriplate.

⚠ WARNING

When using a hydraulic press for removal or installation of bearings, bushings, and gears, wear a face shield to prevent possible injury to personnel.

- (4) Press bearing cone (Figure 2, Item 58) on shaft (74) until seated against shaft shoulder.
- (5) Install bearing ring from the matched set over end of shaft.
- (6) Press bearing cone (Figure 2, Item 58) and bearing cup on shaft (74) until seated against bearing cup.
- (7) Install oil seal (Figure 2, Item 51) in bearing cap (55).

6.3 Assembly - Lower Rear Output Shaft.**⚠ WARNING**

Use care when removing snap and retaining rings. Snap and retaining rings are under spring tension and can act as projectiles when released and could cause severe eye injury.

- (1) Install plug (Figure 3, Item 62) and retaining ring (61) in bearing cap (63).

CAUTION

These two bearing cups and cones with spacer must be a matched pair.

- (2) Install two bearing cups (Figure 3, Item 60) in bearing cap (63) until seated against retaining ring (61).

WARNING

When using a hydraulic press for removal or installation of bearings, bushings, and gears, wear a face shield to prevent possible injury to personnel.

- (3) Press bearing cone (Figure 3, Item 60) on shaft (59) until seated against shaft shoulder.
- (4) Install retaining ring (Figure 3, Item 61), and press bearing cone (60) and bearing cap (63) on shaft (59).
- (5) Install oil seal (Figure 3, Item 69) in bearing cap (63).

6.4 Assembly - Center Shaft Assembly.

WARNING

When using a hydraulic press for removal or installation of bearings, bushings, and gears, wear a face shield to prevent possible injury to personnel.

- (1) Press center shaft (Figure 2, Item 47) on gear (45) until shaft bearing shoulder is protruding through gear face.
- (2) Install spacer (Figure 2, Item 44) and press bearing cone (43) on center shaft (47).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

- (3) Coat threads of two capscrews (Figure 2, Item 40) with Loctite 242.
- (4) Install pulse wheel (Figure 2, Item 41) and two capscrews (40) on center shaft (47). Tighten capscrews to 40 ft. lbs. (54 N·m).
- (5) Install spacer (Figure 2, Item 46) and press on gear (48) on center shaft (47).
- (6) Install spacer (Figure 2, Item 66) and press bearing cone on center shaft (47).

6.5 Assembly - Upper Shift Rod.

- (1) Slide shift rod (Figure 3, Item 3) in fork (7).
- (2) Apply Loctite 242 to two capscrews (Figure 3, Item 5) and install in shift fork. Tighten to 40 ft. lbs. (54 N·m).
- (3) Secure two capscrews (Figure 3, Item 5) together with lockwire (6).
- (4) Install two spacers (Figure 3, Items 4 and 8) on shift rod (3).

6.6 Assembly - Dorr-Miller Differential.

NOTE

Make sure bearings are properly seated to assure correct bearing adjustment.

If thrustwashers and shim packs are replaced, do Step 1. If not start with Step 2.

- (1) If thrustwashers and shim packs were removed from differential case halves, thrustwashers must be reshimmed for proper differential action. Replace thrustwashers in each case half with .015 shim pack held in place with two 3/16" x 1-1/2" round head machine screws and nuts (for differential action torque testing

purposes). The round head of the machine screw must be in the thrustwasher. After torque testing has been completed, replace the two round head machine screws and nuts in each differential case half with 8 rivets.

- (2) Install cam (Figure 4, Item 12) into front differential case (11).
- (3) Install plate (Figure 4, Item 15) and eight steel balls (14) over cam (12).

NOTE

Apply a film of SAE 50 motor oil to the plates, cams and steel balls at this time. This is necessary to ensure proper component lubrication during the differential bench tests.

- (4) Install cam (Figure 4, Item 18) over steel balls (14) and plate (15).
- (5) Align match-mark and install differential case (Figure 4, Item 27) over cam (18)
- (6) Install eight capscrews (Figure 4, Item 13) and castle nuts (16) in differential cases (11 and 17). Tighten to 180 ft. lbs. (244 N·m).

NOTE

If thrustwashers and shim packs are replaced, do Step 7. If not continue on with Step 8.

The correct size of the shim pack is essential for proper differential action which in turn delivers the necessary driving force to both the front and rear axles during periods when vehicle is operating on a poor tractive surface.

- (7) Bench test for proper differential action. Install both front and rear output shafts into splines of differential cams. Place rear output shaft into large vise. Tightness of the differential is measured with a torque wrench, by attaching wrench to splined end of the front output shaft and then making one complete 360° revolution of the shaft. Torque rating should be 680–960 ft. lbs. (922–1,300 N·m). While turning, four high or resistive places will be noticed every 90° of the 360° revolution. This slight humping or ratcheting effect is caused by the rolling steel balls wedging the two cams apart forcing them against the thrustwashers. If the differential action is too loose, (easy to turn),

add shims between cam and thrustwasher accordingly and test again.

NOTE

When using a “click” type torque wrench, the wrench should click above the 680 ft. lb (922 N.m) setting and hold at this point for the complete 360° revolution. A resistive force on the torque wrench in the 750–900 ft. lb. range is considered ideal.

- (8) Install eight cotter pins (Figure 4, Item 17) in castle nuts (16).

NOTE

When using a hydraulic press for removal or installation of bearings, bushings, and gears, wear a face shield to prevent possible injury to personnel.

- (9) Press gear (Figure 4, Item 19) and bearing cone (20) on differential case (27).
- (10) Press bearing cone (Figure 4, Item 22) on differential case (11).
- (11) Install spacers (Figure 4, Item 23 and 26), lockwashers (24 and 21) and pat locknuts (25 and 28), on differential cases (11 and 27).
- (12) Bend locking tangs on lockwashers (Figure 4, Items 24 and 21) into recess pat locknuts (24 and 28).

7. TRANSFER CASE ASSEMBLY PROCEDURE.

- (1) With front housing (Figure 2, Item 18) installed maintenance stand install bearing cups (10 and 42) in front housing (18).

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

- (2) Apply Loctite 242 to six capscrews (Figure 2, Item 18) and install bearing support (Figure 3, Item 32) in front housing.

- (3) Install bearing cup (Figure 3, Item 31) in bearing support (32).
- (4) With rear housing (Figure 3, Item 10) positioned on a work bench install bearing cups (Figure 2, Items 15 and 68).
- (5) Rotate front housing (Figure 3, Item 18) so the front is facing up.
- (6) Coat bearing cone (Figure 3, Item 30) on differential assembly (53) with Lubriplate.

NOTE

Make sure bearing cone is properly seated in bearing cup of support bracket.

- (7) Using a suitable lifting device, install differential assembly (Figure 3, Item 53) in front housing (Figure 2, Item 18) and support bracket (Figure 3, Item 32).

WARNING

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- (8) Apply Loctite 515 to the face of enclosure (Figure 2, Item 73).
- (9) Install enclosure (Figure 2, Item 73) while aligning dowel pins on front housing (18).
- (10) Apply Loctite 242 to eight capscrews (71). Install eight lockwashers (Figure 2, Item 72), capscrews (71) on enclosure (73) and front housing (18). Tighten to 60 ft. lbs. (81 N·m).
- (11) Coat threads of plug (Figure 2, Item 70) with sealing compound and install on enclosure (73).
- (12) Position lower front output shaft assembly on enclosure (Figure 2, Item 73).
- (13) Install two lockwashers (Figure 2, Item 54) and capscrews (53) on enclosure (73).
- (14) Rotate front housing (Figure 2, Item 18) over so bottom is facing up.

- (15) Position dial indicator on milled surface of front housing (Figure 2, Item 18)

NOTE

End play must be 0.003 - 0.006 in. (0.076 - 0.15 mm). If end play is less than 0.003 in. (0.075 mm), shims must be added. If end play is greater than 0.006 in. (0.15), shims must be removed.

- (16) Check and record end play measurements on dial indicator.
- (17) Remove dial indicator from front housing (Figure 2, Item 18).
- (18) Rotate front housing (Figure 2, Item 18) so the front is facing up.
- (19) Remove two capscrews (Figure 2, Item 53) and lockwashers (54) from enclosure (73).

WARNING

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- (20) Coat shims (Figure 2, Items 60, 61, and 69) and six capscrews (53) with Loctite 242.

NOTE

The number of shims installed is amount required to obtain correct end play.

- (21) Install three shims (Figure 2, Items 60, 61 and 69) and lower front output assembly in enclosure (73).
- (22) Install six lockwashers (Figure 2, Item 54) and capscrews (53) on enclosure (73).
- (23) Rotate front housing (Figure 2, Item 18) so bottom is facing up.
- (24) Coat bearing cone (Figure 2, Item 11) with Lubriplate.

NOTE

End of fork shift rod with threaded hole must be face up.

Fork assembly and shaft assembly must be installed simultaneously to prevent binding.

- (25) With the use of a suitable lifting device, install upper shaft assembly, and shift rod assembly in front housing (Figure 2, Item 18).
- (26) Coat bearing cone (Figure 2, Item 43) with Lubriplate.
- (27) With the use of a suitable lifting device, install center shaft assembly in front housing (Figure 2, Item 18). Keep parallel to the top input shaft assembly to allow proper meshing of gears.
- (28) Coat bearing cones (Figure 2, Item 14 and Figure 3, Item 67) and upper shaft rod assembly with Lubriplate.

⚠ WARNING

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- (29) Coat inner edge of flange on front housing (Figure 2, Item 18) just inside holes, with Loctite 515.

NOTE

Do step (30) if two dowel pins were removed.

- (30) Install two dowel pins (Figure 2, Item 19) on front housing (18).

⚠ CAUTION

Lower transfer case rear housing straight down to prevent possible damage to shift rod.

- (31) With a suitable lifting device, lower rear housing (Figure 3, Item 10) onto shift rod assembly (3) to the point where the shift rod (3) is positioned just below the detent passage.
- (32) Install inner detent spring (Figure 3, Item 1) and ball (2), then lower rear housing (10) to retain spring and ball, while aligning with two dowel pins (19) at each end.

- (33) Apply Loctite 242 to 20 capscrews (Figure 3, Item 73). Install 20 washers (Figure 3, Item 74) and capscrews (73) in front housing (Figure 2, Item 18) and rear housing (Figure 3, Item 10). Tighten capscrews to 88 ft. lbs. (119 N.m).

⚠ WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

- (34) Coat original three shims (Figure 3, Items 40, 41 and 42) and six capscrews (45) with Loctite 242.
- (35) Coat original three shims (Figure 3, Items 19, 20 and 21) and six capscrews (27) with Loctite 242.
- (36) Install three shims (Figure 3, Items 40, 41 and 42), end cap (43), six lockwashers (44) and capscrews (45). Tighten capscrews (45) to 60 ft. lbs. (81 N.m).
- (37) Install three shims (Figure 3, Items 19, 20 and 21), bearing cover (22) six lockwashers (28) and capscrews (27). Tighten capscrews (27) to 60 ft. lbs. (81 N.m).
- (38) Apply Loctite 242 to four capscrews (Figure 3, Item 24). Install hydraulic pump (Figure 3, Item 26) with four lockwashers (25) and capscrews (24). Tighten capscrews (24) to 15 ft. lbs. (20 N.m).
- (39) Rotate transfer case that front housing (Figure 2, Item 18) is facing up.

⚠ WARNING

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- (40) Apply Loctite 515 to the flange of end cap (Figure 2, Item 39). Apply Loctite 242 to six

capscrews (37). Install end cap (39), with six lockwashers (38) and capscrews (37) on front housing (18).

- (41) Apply Loctite 515 to the flange of end cap (Figure 2, Item 8). Apply Loctite 242 to six capscrews (6). Install end cap (8), with six lockwashers (7) and capscrews (6).
- (42) Apply sealing compound to plug (Figure 2, Item 56), elbow (16), breather (7), adapters (77 and 78) and install on front housing (18).

CAUTION

Do not overtighten the speedometer sending unit. Torques over 35 ft. lbs. (47 N.m) will damage the sending unit.

- (43) Coat threads of speedometer sending unit (Figure 2, Item 31) with pipe thread sealant and install in end cap (39). Thread sending unit in until it bottoms out, then back it out one turn. Tighten jam nut to 25 to 35 ft. lbs. (34 to 47 N.m).
- (44) Connect hose (Figure 2, Item 65) to adapters (77 and 78).
- (45) Rotate transfer case so rear housing is facing up.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

- (46) Coat the flange of upper shift cover (Figure 3, Item 11) with Loctite 515.
- (47) Apply Loctite 242 to two capscrews (Figure 3, Item 13). Install upper shift cover (11), with two lockwashers (12) and capscrews (13) on rear housing (10). Tighten capscrews to 14 ft. lbs. (19 N.m).
- (48) Coat detent plug (Figure 3, Item 9) with sealing compound.
- (49) Install outer detent ball (Figure 3, Item 2) and spring (1) in rear housing (10).
- (50) Coat threads of plug (Figure 3, Item 23), plug (35), adapters (68, 66, 47 and 49) and

strainer (46) with sealing compound and install on rear housing (10).

- (51) Connect hoses (Figure 3, Item 48 and 67) to adapters (47, 49, 66 and 68).
- (52) Apply Loctite 515 to face of declutch opening cover (Figure 3, Item 50). Apply Loctite 242 to two capscrews (52) and install declutch opening cover (50) with two lockwashers (51) and capscrews (52) on rear housing (10).
- (53) Rotate transfer case so breather is facing up.

WARNING

Adhesives, solvents, and sealing compounds can burn easily, can give off harmful vapors, and are harmful to skin and clothing. To avoid injury or death, keep away from open fire and use in well ventilated area. If adhesive, solvent, or sealing compound gets on skin or clothing, wash immediately with soap and water.

- (54) Coat threads of six capscrews (Figure 2 Items 1 and 49) and (Figure 3, Item 72) with Loctite 271.
- (55) Coat retainer washer (Figure 2, Item 3), lock plates (Figure 2, Item 50) and (Figure 3, Item 71) with sealant RTV 732.
- (56) Coat end of splines of shafts (Figure 2, Items 24, 74 and 59) with sealant RTV 732.
- (57) Install upper shaft yoke (Figure 2, Item 4), retaining washer (3) and two capscrews (1) on upper shaft (24). Tighten capscrews (1) to 88 ft. lbs. (119 N·m).
- (58) Install lower front shaft yoke (Figure 2, Item 79), lock plate (50) and two capscrews (49) on shaft (74). Tighten capscrews (49) to 88 ft. lbs. (119 N·m).
- (59) Install lower rear yoke (Figure 3, Item 70), locking plate (71) and two capscrews (72) on lower rear shaft (74). Tighten capscrews (72) to 88 ft. lbs. (119 N·m).

8. INSTALLATION.

- (1) Attach mounting brackets to transfer case. Fasten transfer case to vehicle frame with mounting bolts and biscuits. Connect prop shafts, air lines and shift linkage.

 CAUTION

NEVER use any type of synthetic oil in this transfer case. The Dorr - Miller locking differential is not designed to use these types of oil.

- (2) Refill with motor oil conforming to API service SE-CC, SAE 50, (MIL-L-2104C). Do not use hypoid or E.P. gear lubricants. Avoid mixing different brands. For subzero arctic operation 0° to -65°F use arctic oil MIL-L-46167. Check oil level every 2500 miles or 125 hours of operation. Every 5000 miles or 250 hours drain housing while hot.