

SHOP MANUAL

KUBOTA

Models L175-L210-L225-L225DT-L260

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DUAL DIMENSIONS

This service manual provides specifications in both the U.S. Customary and Metric (SI) systems of measurement. The first specification is given in the measuring system perceived by us to be the preferred system when servicing a particular component, while the second specification (given in parenthesis) is the converted measurement. For instance, a specification of "0.011 inch (0.28 mm)" would indicate that we feel the preferred measurement, in this instance, is the U.S. system of measurement and the metric equivalent of 0.011 inch is 0.28 mm.

CONDENSED SERVICE DATA

GENERAL	L175	L210	L225	L225DT	L260
Engine Make	Own	Own	Own	Own	Own
Engine Model	Z750-A	Z1100A	D1100A	D1100A	Z1300
Number of Cylinders	2	2	3	3	2
Bore (mm)	76	88	76	76	90
(Inches)	3	3-15/32	3	3	3-17/32
Stroke (mm)	82	88	82	82	100
(Inches)	3-7/32	3-15/32	3-7/32	3-7/32	3-15/16
Displacement (cc)	743	1070	1115	1115	1272
(Cubic Inches)	45.3	65.3	68.3	68.3	77.7
Compression Ratio	21:1	20:1	21:1	21:1	21.5:1
TUNE-UP					
Valve Tappet Gap (Cold) (mm)	0.18-0.22	0.20-0.25	0.18-0.22	0.18-0.22	0.20-0.25
(Inch)	0.007-0.009	0.008-0.010	0.007-0.009	0.007-0.009	0.008-0.010
Injection Timing (BTDC)	25°	24°	25°	25°	20°
Timing Mark Location	Flywheel	Flywheel	Flywheel	Flywheel	Flywheel
Injection Pressure (MPa)	13.8	13.8	13.8	13.8	11.73
(PSI)	2000	2000	2000	2000	1700

CONDENSED SERVICE DATA, CONT.

TUNE-UP, Cont.	L175	L210	L225	L225DT	L260
Battery—					
Volts	12	12	12	12	12
Capacity Amp/hr	65	....	80	80	110
Ground Polarity	Negative	Negative	Negative	Negative	Negative
Slow Idle Speed (RPM)	600-650	600-650	600-650	600-650	600-650
High Idle Speed (RPM)	2950	2850	2850	2850	2750
Rated Speed (RPM)	2800	2700	2700	2700	2600
Horsepower at pto Shaft	15*	19.10	20.86	20.86	24.11
Hydraulic System—					
Maximum Pressure (MPa)	11.73	9.8	11.73	11.73	13.731
(Psi)	1700	1420	1700	1700	1990
Rated Delivery (Liters/min.)	14.06	10.8	14.06	14.06	17.86
(GPM)	3.7	2.85	3.7	3.7	4.7
*Manufacturer's Rating—Others are Official Nebraska Test.					
SIZES — CAPACITIES — CLEARANCES	L175	L210	L225	L225DT	L260
Crankshaft Main Journal—					
Diameter (mm)	51.99-52.01	See Para. 39	51.99-52.01	51.99-52.01	62.93-62.94
(Inches)	2.0469- 2.0476	See Para. 39	2.0469- 2.0476	2.0469- 2.0476	2.4789- 2.4802
Bearing Clearance (mm)	0.04-0.1	....	0.04-0.1	0.04-0.1	See Para. 40
(Inch)	0.0015-0.004	....	0.0015-0.004	0.0015-0.004	See Para. 40
Crankshaft Crankpin Journal—					
Diameter (mm)	43.88-43.90	53.951- 53.970	43.88-43.90	43.88-43.90	58.76-58.80
(Inches)	1.7284- 1.729	2.1240- 2.1248	1.7284- 1.729	1.7284- 1.729	2.3135- 2.3150
Bearing Clearance (mm)	0.025-0.1	0.02-0.08	0.025-0.1	0.025-0.1	0.02-0.08
(Inch)	0.001-0.004	0.0008-0.003	0.001-0.004	0.001-0.004	0.0008-0.003
Side Clearance (mm)	0.4-0.6	0.4-0.6	0.4-0.6	0.4-0.6	0.4-0.6
(Inch)	0.016-0.024	0.016-0.024	0.016-0.024	0.016-0.024	0.016-0.024
Crankshaft End Play (mm)	0.15-0.3	0.1	0.15-0.3	0.15-0.3	0.2-0.36
(Inch)	0.006-0.012	0.004	0.006-0.012	0.006-0.012	0.008-0.014
Camshaft Journal—					
Diameter (mm)	39.935-39.95	See Para. 28	39.935-39.95	39.935-39.95	See Para. 29
(Inches)	1.572-1.573	See Para. 28	1.572-1.573	1.572-1.573	See Para. 29
Bearing Clearance (mm)	0.05-0.1	....	0.05-0.1	0.05-0.1	See Para. 29
(Inch)	0.002-0.004	....	0.002-0.004	0.002-0.004	See Para. 29
Camshaft End Play (mm)	0.07-0.21	....	0.07-0.21	0.07-0.21	0.07-0.132
(Inch)	0.003-0.009	....	0.003-0.009	0.003-0.009	0.0035-0.005
Valve Stem Diameter—					
Intake and Exhaust (mm)	7.95-7.975	8.96-8.975	7.95-7.975	7.95-7.975	8.96-8.975
(Inch)	0.313-0.314	0.3527-0.3533	0.313-0.314	0.313-0.314	0.3527-0.3533
Valve Face Angle	45°	45°	45°	45°	45°
Valve Seat Angle	45°	45°	45°	45°	45°
Piston Pin—					
Diameter (mm)	23.1	28	23.1	23.1	28
(Inch)	0.911	1.102	0.911	0.911	1.102
Clearance (mm)	0.014-0.04	0.029-0.053	0.014-0.04	0.014-0.04	0.029-0.053
(Inch)	0.0005-0.0015	0.0011-0.002	0.0005-0.0015	0.0005-0.0015	0.0011-0.002
Piston Skirt-to-Cylinder Clearance—					
(mm)	0.08-0.016	0.08-0.12	0.08-0.16	0.08-0.16	0.08-0.12
(Inch)	0.003-0.006	0.003-0.0048	0.003-0.006	0.003-0.006	0.003-0.0048
Crankcase (Liters)	3.5	5.0	5.3	5.3	4.8
(U.S. Quarts)	3.7	5.3	5.6	5.6	5.1
Lubricant Type	DS or DM	DS or DM	DS or DM	DS or DM	DS or DM
Cooling System (Liters)	5.32	6.84	6.84	6.84	6.84
(U.S. Gallons)	1.4	1.8	1.8	1.8	1.8
Transmission (Liters)	22.04	12.16	22.04	22	17.1
(U.S. Gallons)	5.8	3.2	5.8	5.75	4.5
Lubricant Type	SAE 80 Gear Lube	SAE 80 Gear Lube	SAE 80 Gear Lube	SAE 80 Gear Lube	SAE 80 Gear Lube

CONDENSED SERVICE DATA, CONT.

	L175	L210	L225	L225DT	L260
SIZES – CAPACITIES – CLEARANCES, CONT.					
Hydraulic System (Liters)	Trans. Reservoir	7.03	Trans. Reservoir	Trans. Reservoir	6
(U.S. Quarts)	Trans. Reservoir	7.4	Trans. Reservoir	Trans. Reservoir	6.3
Fluid Type	SAE 80 Gear Lube	#140 Turbine Oil	SAE 80 Gear Lube	SAE 80 Gear Lube	#140 Turbine Oil
Front Axle Differential Case—					
(Liters) . . . . .	.....	.....	.....	1.05	.....
(U.S. Quarts) . . . . .	.....	.....	.....	1.1	.....
Fluid Type . . . . .	.....	.....	.....	SAE 90 Gear Lube	.....
Front Axle Gearcase (Liters)					
(U.S. Quarts) . . . . .	.....	.....	.....	0.85	.....
Fluid Type . . . . .	.....	.....	.....	0.9 SAE 90 Gear Lube	.....

FRONT AXLE AND STEERING SYSTEM (Models L175-L210-L225-L260)

FRONT AXLE

All Models

1. Figure 1 shows an exploded view of fixed tread axle type used on Models L175 and L225. Figure 2 is the adjusta-

ble axle used on Model L260, with Model L210 being basically similar. On all models, front axle pivot pin (2) is retained in support housing by set screw (4). When assembling, make sure tapered point of set screw enters locking counterbore in pivot pin, and that

locknut (3) is securely tightened to prevent set screw from loosening.

Renew pivot pin and/or axle pivot bushings whenever diametral clearance exceeds 0.5mm (0.020 inch) for Models L175 and L225, or 0.45mm (0.018 inch) for Models L210 and L260. Provisions are not made for axle pivot end play adjustment; renew thrust washers (6) or install a thin shim washer in FRONT of axle, if end clearance is excessive.

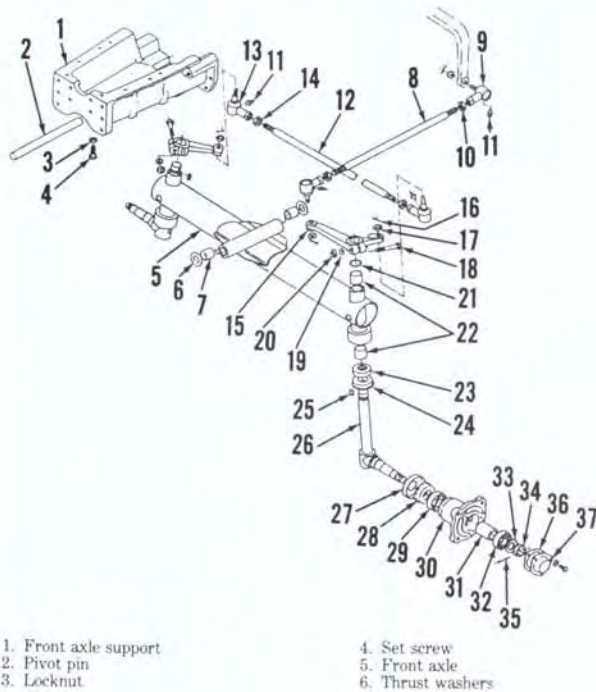


Fig. 1—Exploded view of fixed tread front axle used on Models L175 and L225.

- 7. Rushing
- 8. Drag link
- 9. Drag link end
- 10. Locknut
- 11. Grease fitting
- 12. Tie rod
- 13. Tie rod end
- 14. Locknut
- 15. Steering arm
- 16. Cotter key
- 17. Castle nut
- 18. Bolt
- 19. Lockwasher
- 20. Nut
- 21. "O" ring
- 22. Bushing
- 23. Bearing
- 24. Grease seal
- 25. Key
- 26. Spindle
- 27. Dust cover
- 28. Grease seal
- 29. Bearing
- 30. Hub
- 31. Spacer
- 32. Bearing
- 33. Washer
- 34. Castle nut
- 35. Cotter key
- 36. Gasket
- 37. Cap

- 1. Front axle support
- 2. Pivot pin
- 3. Locknut
- 4. Set screw
- 5. Front axle
- 6. Thrust washers

TIE RODS AND TOE-IN

All Models

2. Tie rod and drag link ends are automotive type. Adjust toe-in to 2-8 mm (1/8-5/16 inch) by shortening or lengthening tie rod. Steering drag link can be adjusted if necessary, to permit a full turn in either direction.

STEERING SPINDLE

All Models

3. Refer to Fig. 1 for exploded view of front axle and associated parts of the type used on Models L175 and L225, and to Fig. 2 for view of front axle used on Model L260. Refer to Fig. 3 for an exploded view of spindle and hub com-

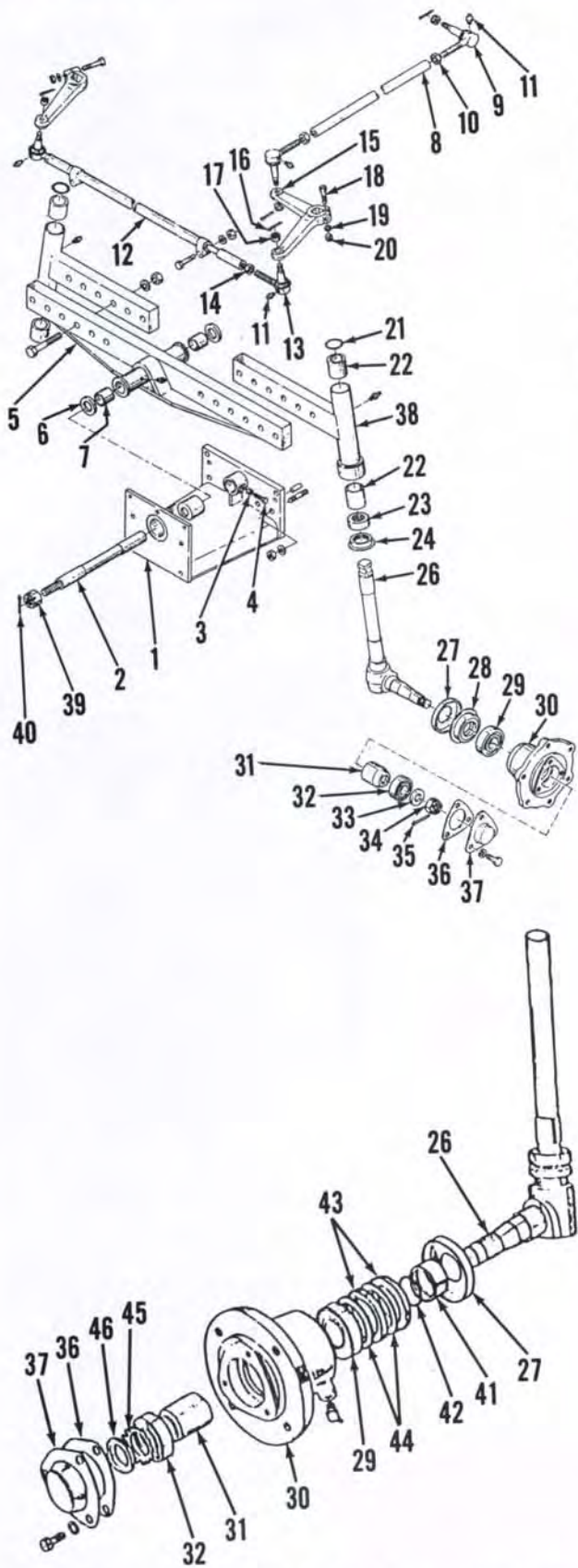


Fig. 2—Exploded view of adjustable tread front axle used on Model L260. Axle used on L210 is basically similar. Refer to Fig. 3 for identification of spindle and hub components used on Model L210. For parts identification refer to legend in Fig. 1 except for the following:

- 38. Axle extension
- 39. Castle nut
- 40. Cotter key

Fig. 3—Exploded view of spindle and hub components used on Model L210. For parts identification, refer to legend in Fig. 1 except for the following:

- 41. Spacer
- 42. "O" ring
- 43. Seal
- 44. Collar
- 45. Tooth washer
- 46. Locknut

ponents used on Model L210. On all models, steering arm upper clamp bolt fits a notch in spindle shaft and clamp bolt must be removed before steering arm and spindle can be removed.

Spindle bushings are pre-sized and can be renewed after spindle is withdrawn. Upper and lower bushings are interchangeable. Maximum recommended diametral clearance is 0.4mm (0.016 inch) for Models L175 and L225, and 0.475mm (0.019 inch) for Models L210 and L260.

STEERING GEAR

All Models

4. All models use a recirculating ball nut steering gear of the type shown in Fig. 4. To remove or disassemble steering gear, first remove hood, instrument panel, cowl and fuel tank.

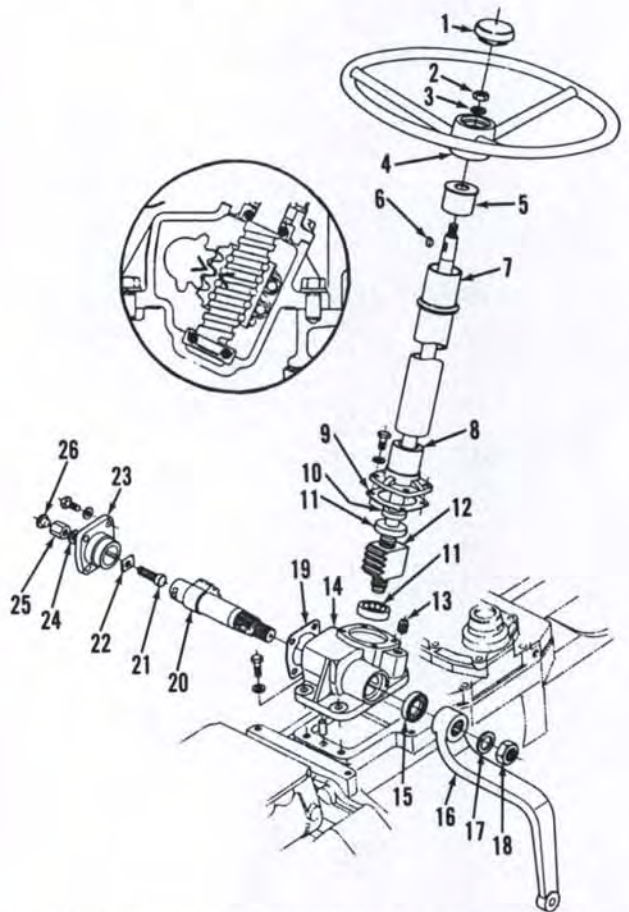


Fig. 4—Exploded view of recirculating ball nut steering used on Models L175, L225 and L225DT. Although details may differ, steering used on Models L210 and L260 is basically similar. During reassembly, align marks on sector shaft teeth (20) and worm gear (12) as shown in inset.

- | | | |
|-------------------|-----------------------|---------------------|
| 1. Cap | 10. Seal | 19. Gasket |
| 2. Nut | 11. Bearing | 20. Sector shaft |
| 3. Lockwasher | 12. Worm gear & shaft | 21. Adjusting screw |
| 4. Steering wheel | 13. Plug | 22. Shim |
| 5. Bushing | 14. Housing | 23. Cover |
| 6. Key | 15. Seal | 24. Gasket |
| 7. Column | 16. Pitman arm | 25. Nut |
| 8. Cover | 17. Lockwasher | 26. Plug |
| 9. Shim | 18. Nut | |

Steering wheel and pitman arm can be removed with suitable pullers. Remove pitman arm, then remove any existing paint, rust or burrs from arm end of pitman shaft. Remove cap screws retaining right side cover and remove cover along with pitman shaft and gear. Steering wheel shaft end play is controlled by thickness of shim pack (9). Add or remove shims as required to limit end play to 0.2mm (0.008 inch). Shaft and ball nut

is available only as an assembled unit and disassembly is not recommended.

End clearance of adjusting screw (21) in slot of pitman shaft (20) is controlled by selective thickness shim (22) which is available in five thicknesses. Use thickest shim which can be installed, when unit is assembled. Make sure center tooth on shaft gear enters center tooth space on ball nut as shown in inset.

Align marked splines on pitman arm (16) and shaft (20). With unit completely assembled and pitman arm (16) pointing straight down, turn adjusting screw (21) clockwise until all backlash is removed from pitman arm shaft and a very slight resistance is felt as pitman arm passes center position. Fill steering gear housing, using 300mL (2/3 pint) SAE 90 gear oil. Complete tractor assembly by reversing disassembly procedure.

FRONT-WHEEL DRIVE (Model L225DT)

Front-wheel drive assembly includes transfer case, drive shaft, front axle, differential, axle shafts and axle hub assemblies. The transfer case bolts to the left side of transmission housing. Transmission oil lubricates transfer case assembly.

TIE RODS AND TOE-IN

4A. Tie rod drag link ends are automotive type. Adjust toe-in to 2-8 mm (1/8-5/16 inch) by shortening or lengthening tie rod. Steering drag link can be adjusted if necessary, to permit a full turn in either direction.

FRONT AXLE

5. REMOVE AND REINSTALL. Support tractor behind front axle and detach front of drag link from steering arm. Support axle level with floor to prevent tipping and move transfer case lever to "disengaged" position. Remove front support center pin, then carefully lower axle assembly until it can be withdrawn from drive shaft splines.

Reinstall in reverse order of removal. Tighten drag link end nut to 29.5-49.2 N·m (21.7-36.2 ft.-lbs.) torque.

NOTE: Add 0.19 liter (0.2 quart) of SAE 90 gear lube to differential case to replace gear lube lost when drive shaft yoke was withdrawn from pinion shaft.

OUTER DRIVE ASSEMBLY

6. R&R AND OVERHAUL. To disassemble outer drive assembly, first remove wheel from side to be serviced. Remove cap screws securing outer cover (69—Fig. 5) to housing (58), then withdraw cover with components (59, 60, 61, 62, 70 and 71) and allow oil to drain into a suitable container. Remove nut (59) from wheel axle (71) to separate components.

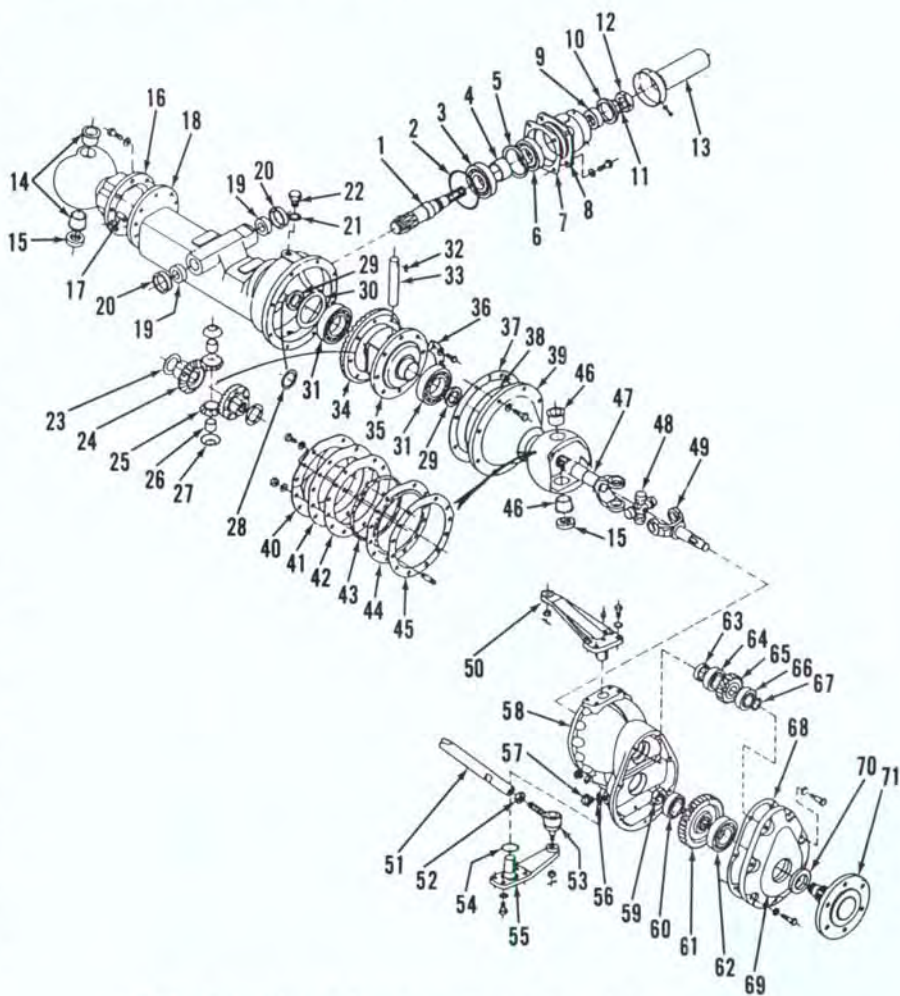


Fig. 5—Exploded view of front-wheel drive axle used on Model L225DT.

- | | | | |
|------------------------|-----------------------|------------------------|-------------------------|
| 1. Bevel pinion | 19. Bearing | 37. Shim | 55. Pin & steering arm |
| 2. "O" ring | 20. Dust seal | 38. "O" ring | 56. Gasket |
| 3. Bearing | 21. Gasket | 39. Spindle housing | 57. Plug |
| 4. Spacer | 22. Plug | 40. Plate | 58. Outer drive housing |
| 5. Snap ring | 23. Thrust washer | 41. Felt seal | 59. Nut |
| 6. Bearing | 24. Side gear | 42. Plate | 60. Bearing |
| 7. Shim | 25. Spider gear | 43. Dust seal | 61. Gear |
| 8. Bearing case | 26. Bushing | 44. Dust seal holder | 62. Bearing |
| 9. Collar | 27. Thrust washer | 45. Gasket | 63. Oil seal |
| 10. Oil seal | 28. Guide plate | 46. Bushing | 64. Bearing |
| 11. "O" ring | 29. Oil seal | 47. Yoke shaft | 65. Gear |
| 12. Nut | 30. Shim | 48. Universal joint | 66. Bearing |
| 13. Cover | 31. Bearing | 49. Yoke shaft | 67. Snap ring |
| 14. Bushing | 32. Key | 50. Pin & steering arm | 68. Gasket |
| 15. Bearing | 33. Cross shaft | 51. Tie rod | 69. Outer cover |
| 16. Spindle housing | 34. Bevel ring gear | 52. Locknut | 70. Oil seal |
| 17. Pin | 35. Differential case | 53. Tie rod end | 71. Wheel axle |
| 18. Front axle housing | 36. Lock plate | 54. "O" ring | |

Examine gears (61 and 65) for chipped, cracked or missing teeth. Inspect all bearings for roughness, cracks, corrosion, excessive wear or any other damage. Inspect cover (69) for cracks or any other damage. Renew all parts as needed.

Reassembly is reverse order of disassembly. Tighten nut (59) to 147-196 N·m (108.5-144.7 ft.-lbs.) torque. Install new gasket (68), then install outer cover (69) with assembled components and tighten securing cap screws to 48-56 N·m (35.4-41.2 ft.-lbs.) torque. Remove plug (57) and fill axle gearcase with 0.85 liter (0.9 quart) of SAE 90 gear lube. Reinstall wheel and tighten lug nuts to 77.4-90.2 N·m (57.1-66.5 ft.-lbs.) torque.

OUTER DRIVE HOUSING, KING PINS, AXLE SHAFTS AND SPINDLE HOUSING

7. R&R AND OVERHAUL. Remove outer drive assembly as outlined in paragraph 6. Detach tie rod end (53-Fig. 5) from steering arm (55). Remove cap screws securing plates, gasket and seal parts (40 through 45) to housing (58), then slide components toward center. Remove snap ring (67), then slide bearing (66) and gear (65) from yoke shaft (49). Unbolt and remove king pins (50 and 55). Lift outer drive housing (58) from spindle housing (39). Slide plates, gasket and seal parts (40 through 45) off spindle housing (39). Withdraw axle shaft assembly (47, 48 and 49). Remove cap screws securing spindle housing (39) to axle housing (18) and separate components, while preventing possible movement of differential away from axle housing.

Inspect all bearings for roughness, corrosion, cracks, excessive wear or any other damage. Examine king pin bushings (46) for excessive wear, standard king pin bushing inner diameter is 25.1-25.133 mm (0.989-0.99 inch). Inspect axle shaft and splines for excessive wear or any other damage. Inspect universal joint (48) for binding, roughness, excessive wear or any other damage. Examine outer drive housing (58) and spindle housing (39) for cracks, excessive wear or any other damage. Renew all parts as needed.

Reassembly is reverse order of disassembly. Renew all gaskets and seals during reassembly. Lubricate king pins with a good quality, multi-purpose, lithium base grease, then slide into position.

NOTE: King pins should slide freely into bushing bores with just hand pressure; DO NOT drive king pins in with a hammer.

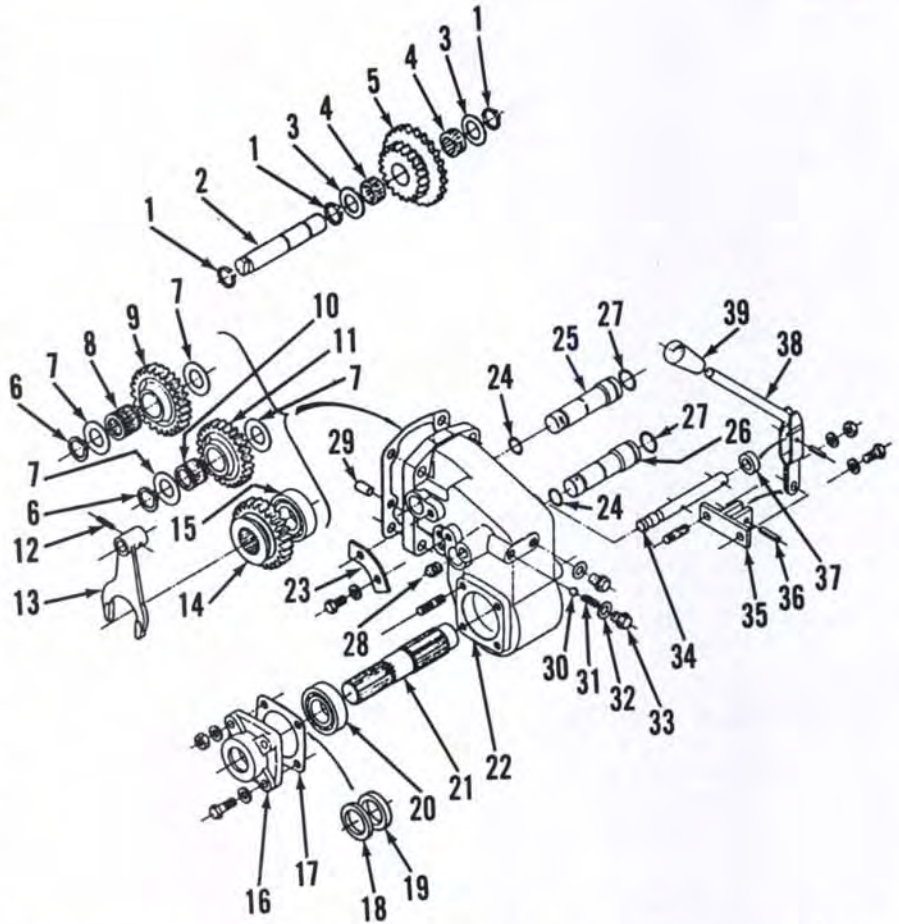


Fig. 6—Exploded view of transfer case assembly and associated components used on Model L225DT.

- | | | | |
|--------------------|------------------|-------------------|------------------------|
| 1. Snap ring | 11. Gear | 21. Splined shaft | 31. Spring |
| 2. Shaft | 12. Pin | 22. Housing | 32. Gasket |
| 3. Collar | 13. Shift fork | 23. Stop plate | 33. Rail |
| 4. Needle bearing | 14. Sliding gear | 24. "O" ring | 34. Plug |
| 5. Gear | 15. Bearing | 25. Shaft | 35. Shift lever holder |
| 6. Snap ring | 16. Front plate | 26. Shaft | 36. Pin |
| 7. Collar | 17. Gasket | 27. "O" ring | 37. Oil seal |
| 8. Needle bearing | 18. Oil seal | 28. Plug | 38. Shift lever |
| 9. Gear | 19. Oil seal | 29. Pin | 39. Grip |
| 10. Needle bearing | 20. Bearing | 30. Ball | |

Tighten cap screws securing spindle housing (39) and king pins (50 and 55) to 48-56 N·m (35.4-41.2 ft.-lbs.). Tighten tie rod end nut to 29.5-49.2 N·m (21.7-36.2 ft.-lbs.). Complete reassembly as outlined in paragraph 6.

DIFFERENTIAL AND BEVEL GEAR ASSEMBLY

8. R&R AND OVERHAUL. Remove outer drive housing, king pins, axle shafts and left spindle housing as outlined in paragraph 7. Lift differential and bevel ring gear assembly (23 through 36-Fig. 5) from axle housing (18). Remove cap screws securing bearing case (8), then withdraw bevel pinion assembly (1 through 13) from axle housing.

To separate bevel pinion assembly,

first remove screws securing cover (13) to bearing case (8) and separate. Place bevel pinion (1) in a suitable holding fixture, then remove nut (12) from pinion shaft. Complete disassembly with reference to Fig. 5.

Inspect bearings (3 and 6) for roughness, corrosion, cracks, excessive wear or any other damage. Inspect bevel pinion (1) for missing or chipped teeth, excessive wear or any other damage. Examine bearing case (8) for cracks, excessive wear or any other damage. Renew all parts as needed.

NOTE: Bevel pinion (1) and bevel ring gear (34) must be renewed as a matched set.

Reassembly is reverse order of disassembly. Renew "O" rings (2 and 11) and oil seal (10). Tighten nut (12) to 196-245 N·m (145-180 ft.-lbs.) torque.

Shim (7) is used to adjust gear mesh position. Recommended gear tooth mesh is more than 2/3 of entire tooth face.

To separate differential and bevel ring gear assembly, first remove cap screws securing bevel ring gear (34) to differential case (35). Use a suitable mallet and tap bevel ring gear (34) from differential case (35). Withdraw key (32) and cross shaft (33) from differential case (35), then separate components (23 through 27) from case (35).

Use a suitable puller and withdraw bearings (31) from case (35). Inspect bearings (31) for roughness, corrosion, cracks, excessive wear or any other damage.

Inspect all gears for missing, cracked, chipped or excessively worn teeth. Examine bushings, thrust washers and differential case for cracks, excessive wear or any other damage. Renew all components as needed.

NOTE: Bevel ring gear (34) and bevel pinion (1) must be renewed as a matched set.

Reassembly is reverse order of disassembly. Lubricate components with a light film of SAE 90 gear lube prior to installation. Shims (30 and 37) are used to adjust bevel ring gear backlash. Recommended backlash is 0.20-0.25 mm (0.0079-0.0098 inch). Reassemble outer drive housing, kingpins, axle shafts and left-hand spindle housing as outlined in paragraph 7. Reassemble outer drive assembly as outlined in paragraph 6.

TRANSFER CASE

9. R&R AND OVERHAUL. Drain oil from transmission case. Raise left rear tire off ground, then remove wheel and tire assembly and left fender. Remove all other components that will obstruct the removal of the transfer case, then remove cap screws securing transfer case and remove transfer case.

Check gear backlash; recommended backlash is 0.10-0.20 mm (0.004-0.008 inch). Disassemble transfer case with

reference to Fig. 6. Inspect bearings for roughness, corrosion, cracks, excessive wear or any other damage. Inspect all shafts for excessive wear or any other damage. Examine all gears and splines for chipped, cracked, missing or excessively worn teeth. Inspect housing (22) for cracks, excessive wear or any other damage. Renew all parts as needed.

Reassembly is reverse order of disassembly. Renew all "O" rings and oil seals during reassembly. Lubricate components with a light film of SAE 80 gear lube prior to installation. Reinstall transfer case, transmission drain plug and refill transmission reservoir with SAE 80 gear lube. Capacity of transmission reservoir is 22 liters (5.75 gallons).

STEERING GEAR

10. The steering system is the same as used on two-wheel drive models. Refer to paragraph 4 for service procedures.

ENGINE AND COMPONENTS

R&R ENGINE WITH CLUTCH

All Models

11. To remove engine and clutch as a unit, first drain cooling system and if engine is to be disassembled, drain oil pan. Drain hydraulic system, transmission, and final drive by removing plugs located under transmission and final drive center housings.

Remove hood. Disconnect battery cables, headlight wires, radiator hoses and air cleaner hose. Disconnect drag link at either end. Solidly support tractor underneath clutch housing, support front end unit from top of radiator, unbolt and remove front axle front support, battery, air cleaner and radiator as a unit. On Model L225DT, place transfer case lever in "disengaged" position, then slide front drive shaft yoke from pinion shaft as assembly is being rolled clear.

Disconnect fuel supply line, bleed line, throttle linkage, tractor meter cable, engine wiring harness and decompression linkage. Unbolt and remove exhaust pipe and muffler. Suitably attach a lifting chain and swing engine from an overhead hoist. Remove cap screws securing flywheel housing to clutch housing and lift off engine. Install by reversing removal procedure.

NOTE: On Model L225DT, add 0.19 liter (0.2 quart) of SAE 90 gear lube to differen-

tial case to replace gear lube lost when drive shaft yoke was withdrawn from pinion shaft.

CYLINDER HEAD

All Models

12. To remove cylinder head, drain cooling system and open or remove hood. Disconnect upper coolant hose. Disconnect decompressor linkage and remove rocker arm cover. Disconnect exhaust pipe and inlet manifold hose. Remove injector lines, capping all exposed fittings to prevent dirt entry.

Remove rocker arms assembly and push rods. Remove retaining cap screws or stud nuts and lift off cylinder head assembly.

One or more 0.2 mm (0.008 inch) thick shims may be installed with cylinder head gasket. Identify and count shims when cylinder head is removed, then install an equal number of shims when head is reinstalled. Shims should be placed on top of gasket, between gasket and cylinder head. If valves, valve seats, rocker arms or head are renewed or if cylinder head is planed, refer to paragraph 13 or 14 for compression release adjustment.

Cylinder head tightening sequence for Model L175 is shown in Fig. 7 and both the cap screws and stud nuts should be

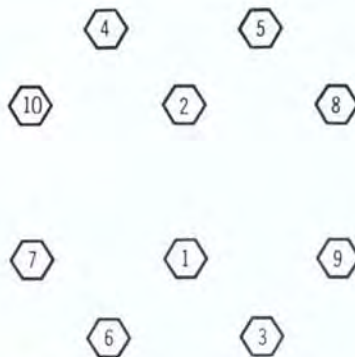


Fig. 7—On Model L175, tighten cylinder head cap screws and stud nuts to a torque of 75-82 N·m (55-60 ft.-lbs.) using sequence shown.



Fig. 8—Cylinder head tightening sequence to be used on Model L210. Refer to paragraph 12 for tightening torques.



Fig. 9—On Models L225 and L225DT tighten cylinder head cap screws and stud nuts in sequence shown. Recommended tightening torque is 75-82 N·m (55-60 ft.-lbs.).



Fig. 10—Cylinder head tightening sequence to be used on Model L260. Recommended tightening torque is 170-184 N·m (125-135 ft.-lbs.).

tightened in stages to a torque of 75-82 N·m (55-60 ft.-lbs.)

On Model L210, tighten the big (14 mm) stud nuts to a torque of 201-210 N·m (148-155 ft.-lbs.) and the small (10 mm) stud nuts to a torque of 49-61 N·m (36-45 ft.-lbs.) Tighten all stud nuts a little at a time, using sequence shown in Fig. 8.

On Models L225 and L225DT, tightening sequence is shown in Fig. 9 and recommended tightening torque is 75-82 N·m (55-60 ft.-lbs.).

Sequence for tightening cylinder head stud nuts on Model L260 is shown in Fig. 10 and recommended tightening torque is 170-184 N·m (125-135 ft.-lbs.).

On all models, snug cap screws and/or stud nuts down evenly, then tighten in

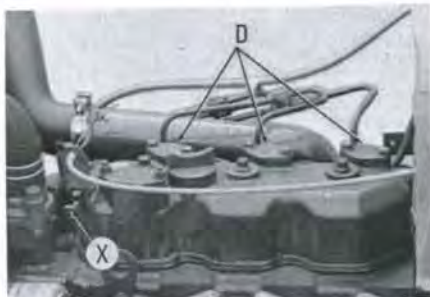


Fig. 12—View of engine on Models L225 and L225DT showing stop stud (X) and decompressor access covers (D).

sequence in three stages until proper torque is reached. Retorque using proper sequence after engine has been thoroughly warmed. Readjust valve lash and compression release mechanism after head has been installed.

COMPRESSION RELEASE

Models L175-L210-L225-L225DT

13. Compression release mechanism is built into valve rocker arm components, and when decompression knob is pulled out, exhaust valves are held open 0.75-1.1 mm (0.030-0.045 inch).

Compression release mechanism must move completely away from rocker arms when control knob (K—Fig. 11) is pushed in and move decompressor arm (A) fully to decompression position when knob is pulled out. To adjust linkage, push knob (K) in to contact control panel. Make sure arm (A) moves to approximately the position shown, and that clamp (C) is in contact with arm. Adjust if necessary, by loosening clamp screw and repositioning clamp. Decompressor arm (A) must contact stop stud (X—Fig. 12) on rocker arm cover when knob is pulled out.



Fig. 11—View of compression release actuating mechanism used on Models L175, L225 and L225DT. Model L210 is similar.

- A. Actuating arm
- C. Cable clamp
- K. Knob

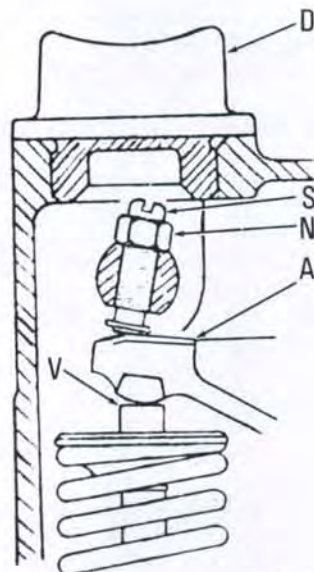


Fig. 13—Cross-sectional view of Model L210 decompressor mechanism showing points and method of adjustment. Models L175, L225 and L225DT are similar.

- A. Rocker arm
- D. Access cover
- N. Locknut
- S. Adjusting screw
- V. Valve stem

To adjust actuators, remove access covers (D). Model L175 has two covers; Model L210 has only one cover with oil filler plug serving as rear access cover. On two cylinder models, both actuator screws can be adjusted when No. 1 piston is at TDC on compression stroke, or when "1 FI" flywheel timing mark is aligned with pointer in timing window. On Models L225 and L225 DT, the two front actuators can be adjusted with No. 1 piston at TDC on compression stroke, but it will be necessary to turn crankshaft 360 degrees to adjust rear actuator.

With access cover removed and exhaust valve closed, pull decompressor

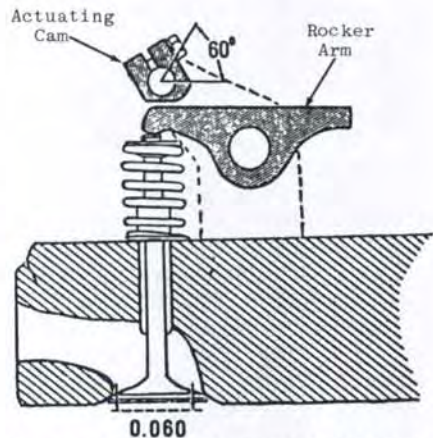


Fig. 14—On Model L260, actuating decompression knob should move exhaust valve 1.5 mm (0.060 inch). Refer to paragraph 14.

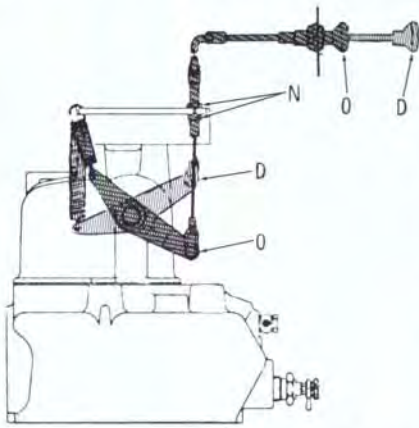


Fig. 15—Cross-sectional view of Model L260 compression release linkage. Refer also to paragraph 14.

D. Decompression position
N. Anchor nuts
O. Operating position

knob until fully applied. Loosen actuator stud locknut (N—Fig. 13) and back out actuator stud (S) until it is clear of rocker arm; turn stud down until it just contacts rocker arm, then turn stud an additional 1½ turns to open valve the specified amount. Tighten locknut (N) securely, checking to be sure stud did not turn as locknut was tightened. All actuators on engine should be adjusted alike. Readjustment may be necessary periodically because of wear, and will be necessary if valves are resealed or renewed, if head gasket is renewed; or if rocker arm cover gasket is renewed or cover retaining stud nuts retightened.

Model L260

14. Compression release mechanism is built into valve rocker arm components, and when decompression knob is pulled,

exhaust valves are held open approximately 1.5mm (0.060 inch) as shown in Fig. 14. Operating lever must move fully to decompression position (D—Fig. 15) and operating position (O). Adjust by repositioning cable housing anchor nuts (N).

An exploded view of decompressor linkage is shown in Fig. 16. When exhaust valves are closed and decompressor linkage is in engine running position, operating flat on actuating cam (A—Fig. 17) must be parallel with top face of rocker arm as shown. Correct, if necessary, by loosening clamping screw and repositioning cam.

When exhaust valves are closed and decompressor linkage is in engine operating position, clearance (C) should measure 0.2 mm (0.008 inch). Clearance will be narrowed when valves are ground and may be altered if new parts are installed. When valves are refaced and resealed, check and adjust decompressor clearance as follows: Before valves are reassembled in cylinder head, reinstall assembled rocker arm shaft, snugging up retaining stud nuts slightly. Insert exhaust valve in guide as shown in Fig. 17, applying pressure to valve (Arrow) to make sure valve is seated. Measure clearance (C) using a feeler gage and correct to 0.2 mm (0.008 inch) as necessary by grinding end of valve stem.

If valves, cylinder head or rocker arm shaft components are renewed, it may be necessary to check decompressed operating clearance between exhaust valve head and piston. With decompression knob pulled out, approximately 1.0 mm (0.040 inch) clearance should exist between valve head and piston crown when crankshaft passes over top dead center. Any one of several methods may be used to measure operating clearance but most accurate and conven-

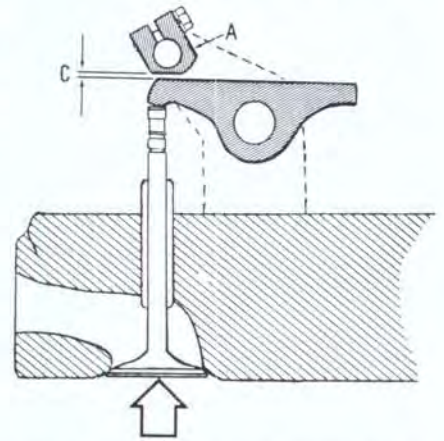


Fig. 17—With exhaust valve closed and flat on actuating cam (A) parallel with rocker arm as shown, grind valve stem if necessary, until clearance (C) equals 0.2 mm (0.008 inch).

ient method is as follows: Install exhaust valves in cylinder head using regular retainers and lightweight coil springs of appropriate size. Install cylinder head using REMOVED (used) head gasket and removed shim pack. Snug retaining stud nuts to properly position head. Insert intake valves in guides from top, stem-end down. Install assembled rocker arms assembly, leaving out push rods and tightening stud nuts snugly. Move decompressor operating shaft to “Decompressed” position. Using a dial indicator and intake valve to find piston position, turn crankshaft until piston is at Top Dead Center; move dial indicator to bear on exhaust valve spring retainer and measure distance exhaust valve can be depressed until it contacts piston crown. Distance between piston crown and valve with compression release engaged should be 0.9-1.1 mm (0.035-0.045 inch). Check both exhaust valves, then correct the clearance of nearest valve if necessary, by adding or removing shims between cylinder head gasket and head. Shims are 0.2 mm (0.008 inch) thick.

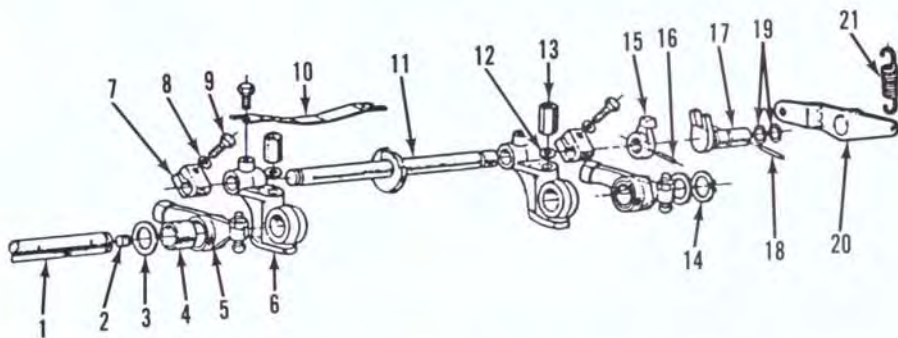


Fig. 16—Exploded view of decompressor linkage used on Model L260.

- | | | | |
|---------------------|------------------|----------------|---------------|
| 1. Rocker arm shaft | 7. Actuating cam | 12. Lockwasher | 17. Shaft |
| 2. Set screw | 8. Lockwasher | 13. Nut | 18. Pin |
| 3. Washer | 9. Cap screw | 14. Snap ring | 19. “O” rings |
| 4. Bushing | 10. Spring plate | 15. Arm | 20. Lever |
| 5. Rocker arm | 11. Cam | 16. Pin | 21. Spring |
| 6. Stand | | | |

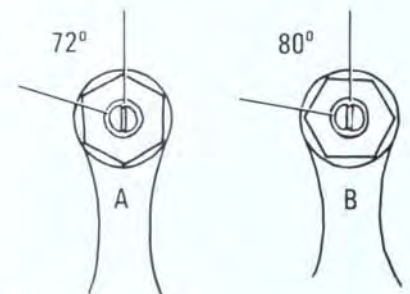


Fig. 18—To adjust valve tappet gap without using a feeler gage, turn adjusting screw down until rocker arm contacts valve stem. On Models L175, L225 and L225DT, back screw out 72 degrees as shown at (A) and lock in place. On other models, back screw out 80 degrees as shown at (B).

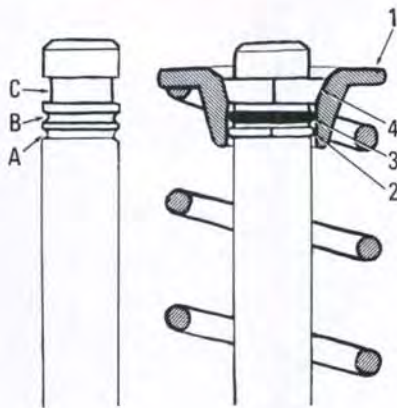


Fig. 19—Cross-sectional views of bare and assembled valves used in Model L260. Refer to paragraph 18 for assembly procedure.

- 1. Retainer
- 2. Circlip
- 3. "O" ring
- 4. Split keepers
- A. Lower groove
- B. Middle groove
- C. Upper groove

TAPPET GAP ADJUSTMENT

All Models

15. Recommended valve tappet gap is 0.18-0.22 mm (0.007-0.009 inch) for all valves on Models L175, L225 and L225DT and 0.2-0.25 mm (0.008-0.010 inch) for all valves on Models L210 and L260. Tappet gap is adjusted cold on all engines. Manufacturer recommends that correct tappet gap can be obtained in absence of a feeler gage by referring to Fig. 18 and proceeding as follows:

Turn crankshaft until appropriate piston is at TDC on compression stroke. Loosen locknut on rocker arm adjusting screw and carefully turn screw until all clearance is just removed. On Models L175, L225 and L225DT, back screw out 72 degrees as shown at (A) and tighten locknut. On Models L210 and L260, back screw out 80 degrees as shown at (B) and tighten locknut.

On Models L175, L225 and L225DT, it will be necessary to recheck compression release mechanism setting after rocker arm cover is reinstalled.

VALVES AND SEATS

All Models

16. Intake and exhaust valves are not interchangeable. All valves seat directly in cylinder head. Valve face and seat angles are 45 degrees for all valves. Recommended valve seat width is 1.5 mm (0.060 inch).

Valve stem diameter is 7.95-7.975 mm (0.313-0.314 inch) on Models L175, L225 and L225DT and 8.96-8.975 mm (0.3527-0.3533 inch) on Models L210 and L260. Valves are adjusted with engine cold and procedure is outlined in previous paragraphs. Whenever valves are renewed or resealed, compression

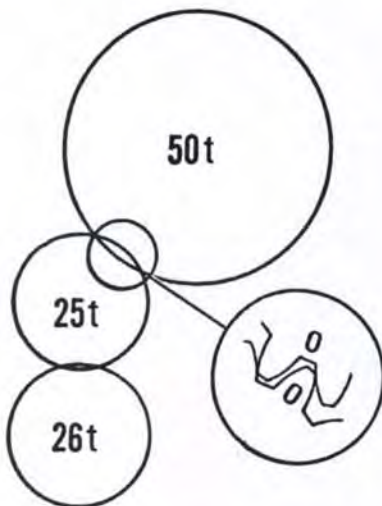


Fig. 20—Schematic view of timing gears used on Model L210, showing timing marks. The 26 tooth oil pump gear is not timed.

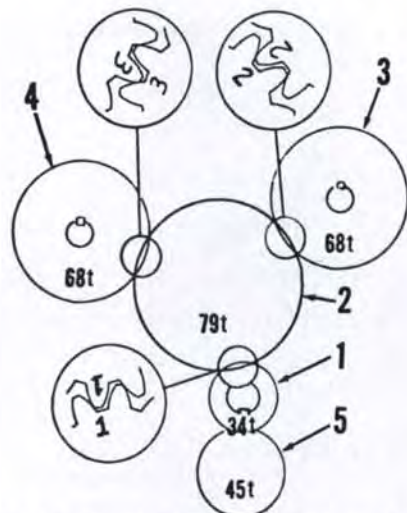


Fig. 21—Schematic view of timing gears used on Models L175, L225 and L225DT showing timing marks.

- 1. Crankshaft gear
- 2. Idler gear
- 3. Camshaft gear
- 4. Injection pump drive gear
- 5. Oil pump drive gear
- 6. Hydraulic pump gear
- 7. Oil pump gear

release mechanism must also be readjusted as previously outlined.

VALVE GUIDES

All Models

17. Intake and exhaust valve guides are semi-finished and must be reamed after installation in cylinder head. Recommended finished diameter is 8.0 mm (0.315 inch) for Models L175, L225 and L225DT and 9.0 mm (0.355 inch) for Models L210 and L260. On Model L260, exhaust valve guide is longer than intake guide and not interchangeable. Guides are positively positioned in cylinder head by snap rings which seat in a machined groove in guide. On other models, guides are shouldered and interchangeable between intake and exhaust valves.

All models are equipped with cup-type stem seals which fit over stem end of valve guide. Renew seals whenever valves are serviced.

VALVE SPRINGS

All Models

18. Valve springs are interchangeable for intake and exhaust valves. Approximate free length is 47.5 mm (1-7/8 inches) for Model L210; 49 mm (1-59/64 inches) for Model L260, and 42 mm (1-21/32 inches) for other models. Renew springs which are distorted, heat discolored, or fail to meet test specifications which follow:

Tractor Model

Test Pressure @ Test Length

L210 14.7 kg @ 40.5 mm
32.4 lbs. @ 1.59 in.

L260 17.9 kg @ 40.5 mm
39.5 lbs. @ 1.59 in.

L175-L225-
L225DT 12.0 kg @ 35.0 mm
26.4 lbs. @ 1.38 in.

On Model L260, valve stems have one wide and two narrow grooves as shown in Fig. 19. When installing valves, first install spring and retainer (1). Compress valve spring and install positioning circlip (2) in lower groove (A), sealing "O" ring (3) in middle groove (B) and split keepers (4) in wide upper groove (C); then release spring pressure after liberally oiling "O" ring. Retainer (1) cannot be installed with "O" ring in place on valve stem.

ROCKER ARMS

All Models

19. Intake and exhaust valve rocker arms are interchangeable on all models. All rocker arms are equipped with renewable bushings which must be final sized after installation, if necessary, to establish recommended shaft clearance of 0.02-0.08 mm (0.0008-0.003 inch). When installing bushing, make sure hole in bushing aligns with corresponding hole in rocker arm.

Rocker arms and valve mechanism are lubricated by oil metered to rocker shaft support bracket by rear camshaft bearing on Models L210 and L260, and by front camshaft bearing on other models. The drilled rocker shaft bracket also contains a locking set screw on lower (cylinder head) side which positively positions rocker shaft to support

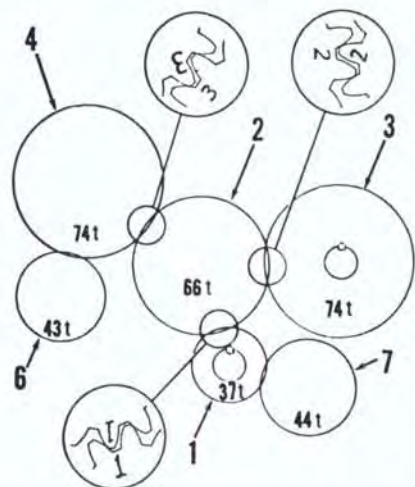
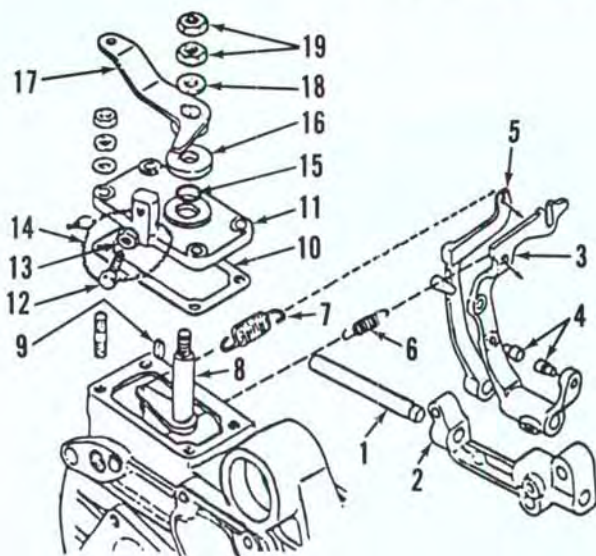


Fig. 22—Schematic view of timing gears used on Model L260, showing timing marks. Refer to Fig. 21 for identification of parts.

Fig. 24—Partially exploded view of governor linkage and component parts used on Models L175, L225 and L225DT.

1. Shaft
2. Fork holder
3. Fork lever
4. Pins
5. Fork lever
6. Spring (start)
7. Spring (governor)
8. Governor lever
9. Key
10. Gasket
11. Cover plate
12. Stop bolt
13. Locknut
14. Retainer
15. "O" ring
16. Friction plate
17. Speed control lever
18. Flat washer
19. Nuts



bracket. When assembling rocker shaft unit, make sure all oil passages are open and properly positioned. Adjust compression release and tappet gap as previously outlined.

VALVE TAPPETS (CAM FOLLOWERS)

All Models

20. Models L210 and L260 are equipped with mushroom type cam followers which can only be removed after removing camshaft. Other models use cylindrical type cam followers which can be removed from top after removing cylinder head.

Check surface of cam follower that contacts camshaft and renew followers if worn. Check and/or renew camshaft at same time if cam follower surface is chipped, broken or scored.

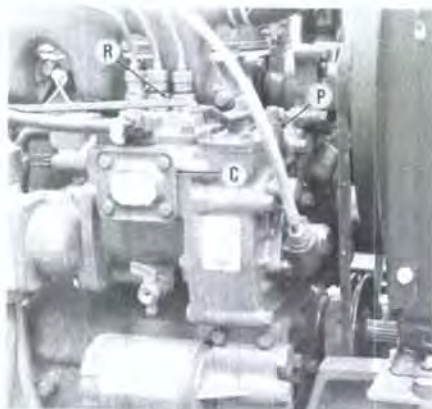


Fig. 23—View of governor linkage used on Models L225 and L225DT. Model L175 is similar.

- C. Access cover
- P. Lever plate
- R. Control rod

VALVE TIMING

All Models

21. Valves are properly timed when timing marks are aligned as shown in Fig. 20, 21 or 22. Due to the odd size of idler gear, marks on that gear will align only occasionally when engine is running, and timing must be verified by removing gear and reinstalling it with timing marks in alignment. As an alternative to removing idler gear, installation can be checked by counting gear teeth between timing marks. Note also the positioning of shaft keyways as an indicator of correct timing.

TIMING GEAR COVER

All Models

22. To remove timing gear cover, first drain cooling system and remove hood. Support tractor underneath clutch housing. Disconnect coolant hoses. On Models L175, L225 and L225DT, disconnect battery cables and air cleaner hose, then remove battery. Disconnect steering drag link. Remove fasteners securing front support to engine block and roll front axle, wheels, radiator and associated parts as a unit forward away from front of engine. On Model L225DT, place transfer case lever in "disengaged" position, then slide front drive shaft yoke from pinion shaft as assembly is being rolled clear.

On all models, remove fan belt, then using a suitable puller, remove crankshaft pulley.

On Models L175, L225 and L225DT, unplug alternator wiring on left side of cylinder block, remove the two cap screws securing alternator mounting bracket to timing gear cover and lift off alternator and bracket as a unit. On right side of engine, disconnect tac-

hometer drive housing and unbolt and remove oil filter housing and filter unit. Remove side access cover (C—Fig. 23) from cylinder block. Using needle-nose pliers, unhook governor spring (7—Fig. 24) from fork lever (5). Disconnect control rod (R—Fig. 23) from governor arm and unbolt and remove lever plate (P) and associated parts, being careful that governor spring is withdrawn with governor arm. Working through top opening, unhook start spring (6—Fig. 24) from timing gear cover. On Model L175, remove fan blades. On Models L225 and L225DT, unbolt and remove water pump and disconnect by-pass elbow leading to thermostat housing. On both models, remove retaining cap screws and lift off timing gear cover.

Crankshaft front oil seal can be renewed at this time. Seal can be installed from either side of cover and should be installed with lip to rear, front edge flush with front of cover bore.

Install cover by reversing removal procedure. On Model L175, MAKE SURE "O" ring on water inlet nipple in cylinder block is in good condition and that inlet nipple is free of rust, scale, burrs or other imperfections which might damage "O" ring. Thoroughly lubricate "O" ring with grease or liquid soap before timing gear cover is installed.

On Model L210, disconnect generator wiring and unbolt and remove generator. Drain hydraulic system, then remove hydraulic system pump and lines leading to connections in area of clutch housing. Disconnect tachometer cable and remove tachometer drive unit. Remove engine oil filter and filter housing. Remove retaining cap screws. Camshaft gear outboard bearing pilots into a bore in hydraulic pump mounting base. It may be necessary to bump timing gear cover forward off of bearing outer race.

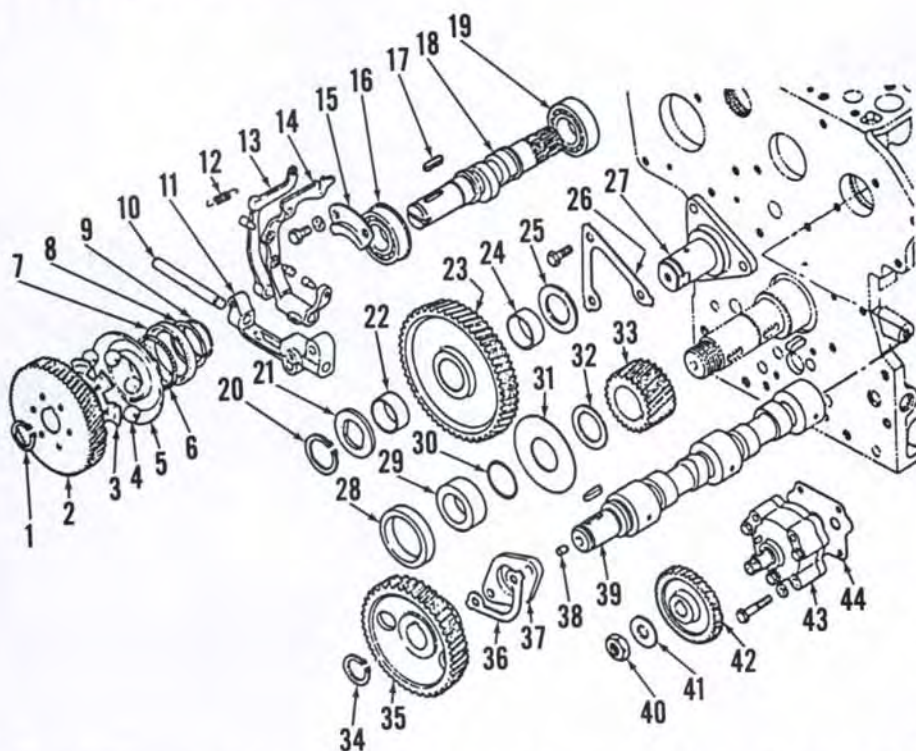


Fig. 25—Exploded view of timing gears and associated parts used on Models L175, L225 and L225DT.

- | | | | |
|------------------------------|-----------------------------|----------------------|--------------------|
| 1. Snap ring | 12. Spring (start) | 23. Idler gear | 34. Snap ring |
| 2. Injection pump drive gear | 13. Fork lever | 24. Bushing | 35. Camshaft gear |
| 3. Guide | 14. Fork lever | 25. Washer | 36. Washer plate |
| 4. Ball | 15. Retainer plate | 26. Lock plate | 37. Thrust plate |
| 5. Sleeve | 16. Bearing | 27. Idler gear shaft | 38. Plug |
| 6. Balls | 17. Key | 28. Seal | 39. Camshaft |
| 7. Case | 18. Injection pump camshaft | 29. Spacer | 40. Nut |
| 8. Circlip | 19. Bearing | 30. "O" ring | 41. Washer |
| 9. Circlip | 20. Snap ring | 31. Deflector | 42. Oil pump gear |
| 10. Shaft | 21. Slotted washer | 32. Washer | 43. Oil pump Assy. |
| 11. Fork lever holder | 22. Bushing | 33. Crankshaft gear | 44. Gasket |

Crankshaft and camshaft front oil seals can be renewed at this time. Camshaft oil seal seats against a snap ring in cover bore and is installed with sealing lip to rear. Crankshaft seal bore is not shouldered, install seal with lip to rear, front edge flush with front of cover bore. Two "O" rings are installed in timing cover flange in passages leading to filter housing, make sure "O" rings are in position and in good condition, and install cover using a new gasket.

On Model L260, disconnect generator wiring and remove generator. Drain hydraulic system and remove hydraulic pump and lines. Disconnect tachometer drive cable and remove drive housing, then unbolt and remove timing gear cover.

Install crankshaft front oil seal with lip to rear, front edge flush with front of cover bore. Install cover by reversing removal procedure.

TIMING GEARS

Models L175-L225-L225DT

23. Refer to Fig. 25 for an exploded view of timing gears and associated

parts. Normal backlash between any two gears in timing gear train is 0.04-0.12 mm (0.0015-0.0045 inch), with a suggested wear limit of 0.3 mm (0.012 inch).

Crankshaft gear (33) is a light press fit on shaft and must be removed before crankshaft or main bearings can be serviced. To install gear, heat gear in oil, water or an oven to a temperature of 175°-200°F and install immediately, making sure marked tooth is forward.

Camshaft gear (35) is a light press fit on shaft. Gear and shaft should be removed from cylinder block as a unit as outlined in CAMSHAFT paragraph.

Injection pump gear (2) is a light press fit on injection pump camshaft and is retained by a snap ring. Gear contains injection pump governor flyball components and service procedures are outlined in DIESEL FUEL SYSTEM section.

Idler gear (23) should have a diametral clearance of 0.02-0.05 mm (0.001-0.002 inch) on idler shaft, and an end clearance of 0.2-0.5 mm (0.008-0.020 inch).

Oil pump drive gear (42) is keyed to drive shaft and retained by a shaft nut.

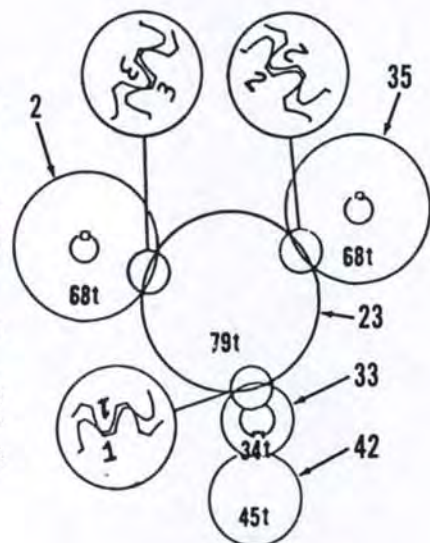


Fig. 26—Schematic view of timing gears on Models L175, L225 and L225DT showing timing marks. Refer to legend in Fig. 25 for identification of gears.

Oil pump drive gear is a part of timing gear train but timing is not required. Time gears as shown in Fig. 26 when tractor is reassembled.

Model L210

24. Refer to Fig. 27 for an exploded view of timing gears and associated parts. Normal backlash between crankshaft gear and camshaft gear is 0.07-0.15 mm (0.003-0.006 inch).

Crankshaft gear (4) is a light thumb-push fit on shaft. Gear hub is machined and drilled to direct pressurized engine oil to drilled crankshaft for connecting rod, cylinder and piston lubrication, as shown in Fig. 29.

Camshaft gear (14—Fig. 27) is a light press fit on shaft and straddle-mounted ball bearings carry camshaft gear load. Camshaft gear also carries governor weights and drives hydraulic system pump through a coupling machined into camshaft gear hub.

Oil pump drive gear (10) is a part of timing gear train but is not timed. Oil pump drive shaft serves as drive member for tachometer drive unit. Oil pump drive gear is keyed to shaft and retained by a shaft nut.

Refer to appropriate service sections for overhaul data of governor unit, oil system and checking of lubricant pressure. When installing gears, make sure "O" marks on camshaft and crankshaft gears are aligned as shown in inset, Fig. 27.

Model L260

25. Refer to Fig. 28 for an exploded view of timing gear train. Normal backlash between any two gears in timing gear train is 0.05-0.11 mm (0.002-0.0043 inch), which a suggested wear limit of 0.3 mm (0.012 inch).

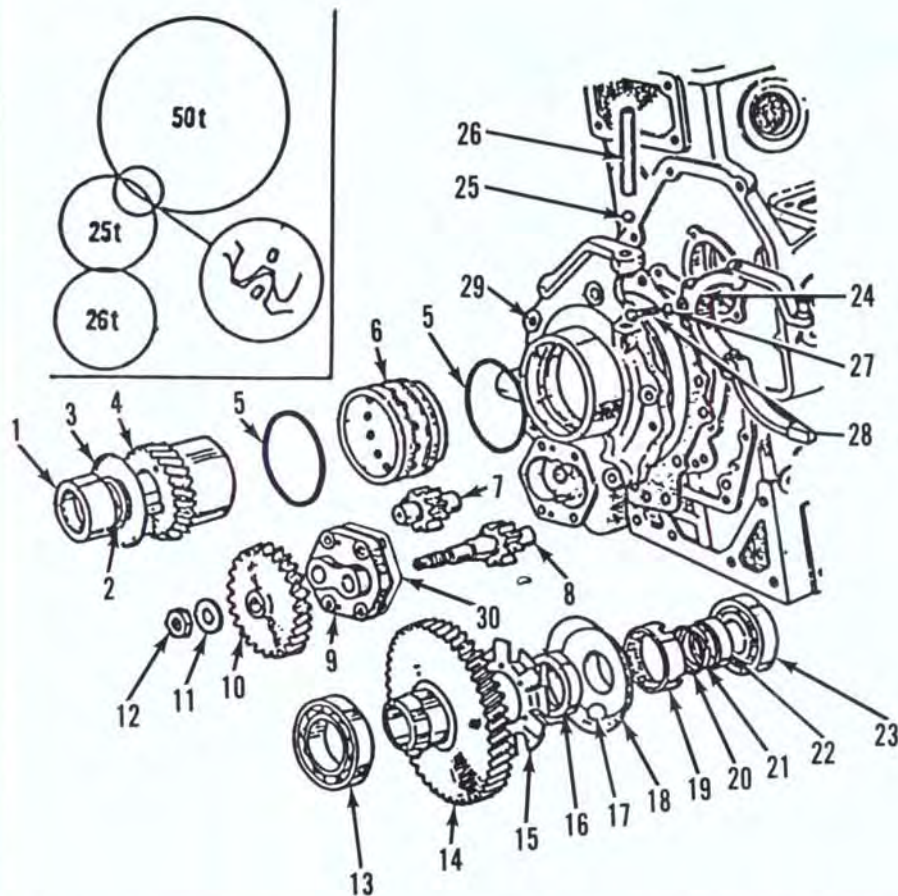


Fig. 27—Exploded view of timing gears and associated parts used on Model L210. Inset shows timing marks correctly aligned.

- | | | | |
|-------------------------|-------------------|------------------------|--------------------------------------|
| 1. Collar | 9. Oil pump cover | 17. Ball | 25. Ball |
| 2. "O" ring | 10. Oil pump gear | 18. Sleeve | 26. Shaft |
| 3. Oil slinger | 11. Washer | 19. Case & balls | 27. Lockwasher |
| 4. Crankshaft gear | 12. Nut | 20. Ball case ring | 28. Cap screw |
| 5. "O" ring | 13. Bearing | 21. Camshaft stop ring | 29. Oil pump housing & support plate |
| 6. Oil distributor ring | 14. Camshaft gear | 22. Bushing | 30. Gasket |
| 7. Oil pump driven gear | 15. Guide | 23. Bearing | |
| 8. Oil pump drive gear | 16. Bushing | 24. Fork | |

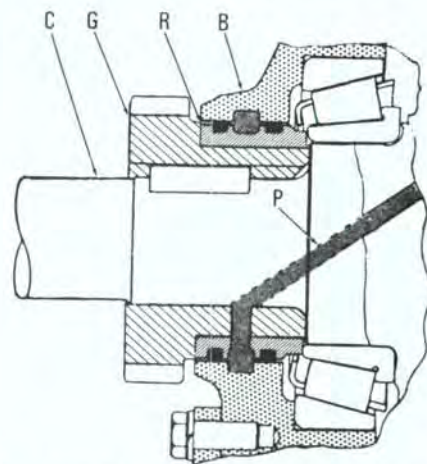


Fig. 29—On Model L210, pressurized oil enters crankshaft through drilled crankshaft gear as shown.

- | | |
|--------------------|---------------------|
| B. Bearing housing | P. Pressure passage |
| C. Crankshaft | R. Collector ring |
| G. Gear | |

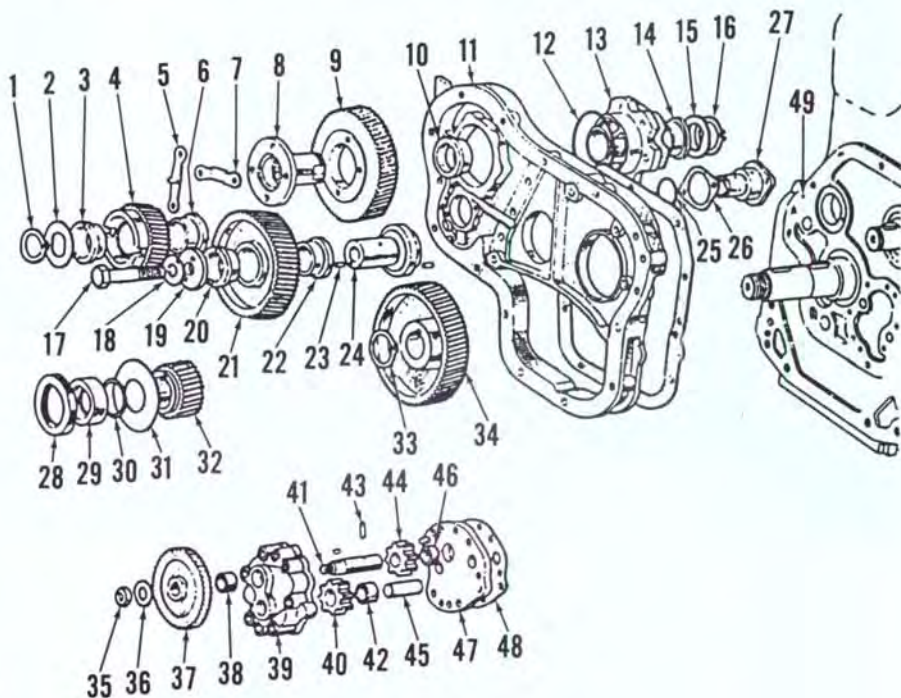
Crankshaft gear (32) is a light press fit on shaft and must be removed before crankshaft or main bearings can be serviced. To install gear, heat gear in oil, water or an oven to a temperature of 175°-200°F and install immediately, making sure marked tooth is forward.

Camshaft gear (34) is a light press fit on shaft. Gear and shaft are removed from cylinder block as a unit with front camshaft bearing as outlined in CAM-SHAFT paragraph.

Injection pump drive gear (9) bolts to drive hub (8) which fits in bushed mount-

Fig. 28—Exploded view of timing gear housing, timing gears and associated parts used on Model L260.

- | | |
|------------------------------|---------------------------------|
| 1. Snap ring | 24. Shaft |
| 2. Flat washer | 25. "O" ring |
| 3. Bushing | 26. Gasket |
| 4. Hydraulic pump drive gear | 27. Hydraulic pump mounting hub |
| 5. Tachometer drive plate | 28. Seal |
| 6. Bushing | 29. Collar |
| 7. Tachometer drive plate | 30. "O" ring |
| 8. Drive hub | 31. Oil deflecting ring |
| 9. Injection pump drive gear | 32. Crankshaft gear |
| 10. Bushing | 33. Snap ring |
| 11. Housing | 34. Camshaft gear |
| 12. "O" ring | 35. Nut |
| 13. Mounting base | 36. Flat washer |
| 14. Bushing | 37. Oil pump gear |
| 15. Washer | 38. Bushing |
| 16. Snap ring | 39. Housing |
| 17. Cap screw | 40. Driven gear |
| 18. Claw washer | 41. Shaft |
| 19. Stop washer | 42. Bushing |
| 20. Bushing | 43. Pin |
| 21. Idler gear | 44. Drive gear |
| 22. Bushing | 45. Shaft |
| 23. Pin | 46. Bushing |
| | 47. End plate |
| | 48. Gasket |
| | 49. Lubrication passage |



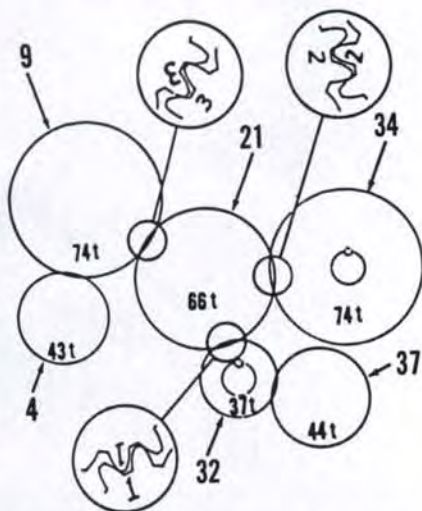


Fig. 30—Schematic view of timing gears on Model L260 showing timing marks. Refer to legend in Fig. 29 for identification of gears.

ing base (13) and is retained by snap ring (16). Tachometer drive plate (5) is secured by flange bolts. Procedure for removing injection pump drive gear and associated parts is covered in DIESEL FUEL SYSTEM Section.

Idler drive gear (21) and drive stud are retained by a cap screw which passes through drive stud and threads into cylinder block. Idler gear should have a diametral clearance of 0.01-0.08 mm (0.0004-0.003 inch) and an end clearance of 0.2-0.5 mm (0.008-0.020 inch). Be sure oil supply holes in stud and gear hub are open and clean. When installing idler gear, tighten retaining cap screw to a torque of 116-129 N·m (85-95 ft.-lbs.).

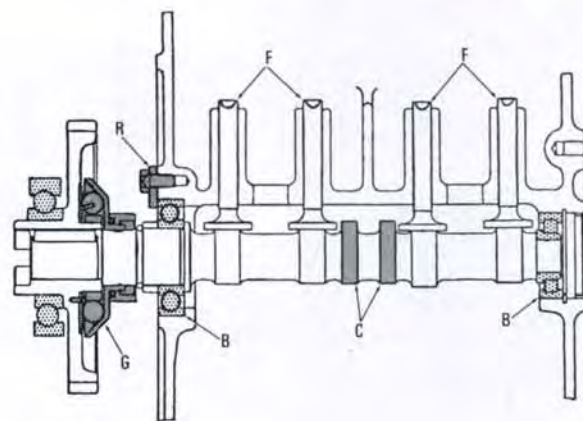
Hydraulic pump drive gear (4) should have a diametral clearance of 0.01-0.08 mm (0.0004-0.003 inch) and an end clearance of 0.25-0.65 mm (0.010-0.025 inch). If hydraulic pump mounting hub (27) is removed from timing gear housing, make sure oil pressure passages in hub and housing are correctly aligned when hub is installed.

Oil pump drive gear (37) is keyed to drive shaft taper and retained by a shaft nut. Oil pump drive gear and hydraulic pump drive gear are a part of timing gear train but timing is not required.

26. TIMING GEAR HOUSING. Timing gear housing can be removed from front face of cylinder block after injection pump and all timing gears have been removed. When installing housing, make sure that lubrication pressure passage (49—Fig. 28) is open and clean and that hydraulic pump mounting hub (27) and injection pump mounting base (13) are both installed with lube passages aligned. Time gears as shown in Fig. 30 when tractor is reassembled.

Fig. 31—Cross-sectional view of camshaft and associated parts used on Model L210.

- B. Bearings
- C. Injection pump cams
- F. Cam followers
- G. Governor
- R. Retainer



CAMSHAFT

Models L175-L225-L225DT

27. To remove camshaft, first remove timing gear cover as previously outlined. Remove cylinder head and lift out cam followers. Turn camshaft until the two cap screws retaining camshaft thrust plate are accessible through holes in camshaft gear, remove cap screws and withdraw camshaft and drive gear as an assembly.

Measure clearance between camshaft thrust plate and gear hub using a feeler gage. Clearance should be 0.07-0.21 mm (0.003-0.009 inch). Gear can be removed using a suitable press after removing retaining snap ring.

The 39.935-39.95 mm (1.572-1.573 inch) diameter camshaft should have 0.05-0.1 mm (0.002-0.004 inch) diametral clearance in unbushed bores in cylinder block. Model L175 has three camshaft journals; Models L225 and L225DT have four journals.

Measured cam height is 33.25 mm (1.31 inches) and cam lift is 5.5 mm (0.22 inch).

Model L210

28. Camshaft and drive gear rides in two ball bearings and one roller bearing,

located in cylinder block and timing gear cover as shown in Fig. 31. Camshaft gear carries governor weight unit and camshaft contains two operating cams for injection pump as well as four engine valve cams.

To remove camshaft and gear as a unit, first remove timing gear cover as previously outlined. Remove rocker arm cover, rocker arms and push rods. Shut off fuel, remove access cover (A—Fig. 32) and disconnect throttle rack link; then unbolt and remove injection pump (P).

Remove crankcase side cover (C—Fig. 33). Remove bearing retainer (R—Fig. 31) from front face of cylinder block, and while holding cam followers clear of shaft, withdraw camshaft, gear and bearings forward out of cylinder block.

Recommended camshaft journal diameter on flywheel side is 19.983-20.11 mm (0.787-0.792 inch) and 35.002-35.013 mm (1.3780-1.3784 inches) on gearcase side.

Measured cam height for engine valves is 36.87 mm (1.4516 inches) and valve lift is 6 mm (0.2362 inch). Measured cam height for injection pump cams (C) is 38.0 mm (1.4961 inches). Refer to appropriate paragraphs for overhaul of



Fig. 32—To remove camshaft on Model L210, first remove access cover (A) and unhook and remove injection pump (P).



Fig. 33—On Model L210, remove crankcase side cover (C) for access to connecting rod caps and bearings.

engine governor, installation of injection pump, and timing of camshaft gear. Install camshaft by reversing removal procedure.

Model L260

29. To remove camshaft, first remove timing gear cover as previously outlined. Remove rocker arm cover, rocker arms and push rods. Shut off fuel and remove primary fuel pump (P—Fig. 34). Remove camshaft front bearing retaining set screw (S). Support cam followers using magnets or by removing crankcase side cover; then withdraw camshaft, gear and front camshaft bearing as an assembly.

Measure clearance between front bearing and rear face of gear hub using a feeler gage. Measured clearance represents camshaft end play and should be 0.07-0.132 mm (0.0028-0.005 inch). Gear can be removed using a suitable press after removing snap ring. Front camshaft bearing journal diameter is 50.0-50.03 mm (1.9685-1.9695 inch) and recommended diametral clearance is 0.05-0.1 mm (0.002-0.004 inch).

Rear camshaft bearing journal diameter is 31.07-32.03 mm (1.2572-1.2579 inch) with a recommended diametral clearance of 0.02-0.101 mm (0.0008-0.004 inch). Rear camshaft bushing is pre-sized and is a tight press fit in cylinder block bore.

Measured cam height is 36.97 mm (1.4516 inch) and cam lift is 6 mm (0.2362 inch).

ROD AND PISTON UNITS

Models L175-L225-L225DT

30. Connecting rod and piston units are removed from above after removing cylinder head and engine oil pan. Be sure cylinder ridge is removed before attempting to push piston out.

Rod and cap are match-marked for correct assembly and rod bolts are secured by a strip-type retainer. Tighten connecting rod cap screws to a torque of 37-41 N·m (27-30 ft.-lbs.) and secure by

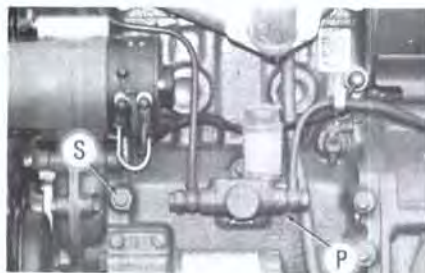


Fig. 34—To remove camshaft on Model L260, first remove fuel pump (P) and front bearing retaining set screw (S).

bending retainer against flats of bolt head.

Models L210-L260

31. Connecting rod and piston units are removed from above after removing cylinder head and crankcase side cover (C—Fig. 33 or 35). On Model L210, it will be necessary to also remove filter. Be sure cylinder ridge is removed before attempting to push piston out.

Connecting rod cap parting line is slanted to offset cap bolts toward crankcase side opening. Parting line is serrated for precise alignment and to remove shear stress from bolt shanks. Tighten connecting rod cap screws to a torque of 58-64 N·m (43-47 ft.-lbs.) and bend tabs of retainer against flats of bolt head.

PISTONS AND RINGS

Models L175-L225-L225DT

32. Three-ring, cam ground aluminum pistons are used. Pistons and rings are available in standard size and 0.5 mm (0.020 inch) oversize.

Piston ring end gap should be 0.3-0.45 mm (0.012-0.018 inch) for compression rings and 0.25-0.4 mm (0.010-0.016 inch) for oil control ring. Maximum wear limit for any ring is 1.25 mm (0.049 inch). Top compression ring is half-keystone type as shown at (A—Fig. 36) and side clearance is not measured. Second compression ring should have a side clearance of 0.065-0.09 mm (0.0025-0.0035 inch) and ring is installed with notched outer edge down as shown at (B). Oil control ring should have a side clearance of 0.02-0.06 mm (0.0008-0.0024 inch).

Piston skirt diameter, measured at bottom, right angles to piston pin, should be 75.9-75.92 mm (2.989-2.990 inches). Piston skirt clearance in cylinder should be 0.08-0.16 mm (0.003-0.006 inch).

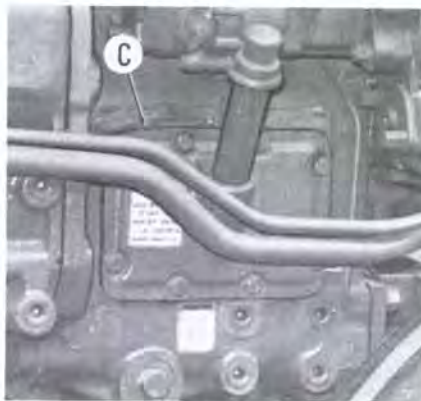


Fig. 35—View of crankcase side cover (C) used on Model L260.

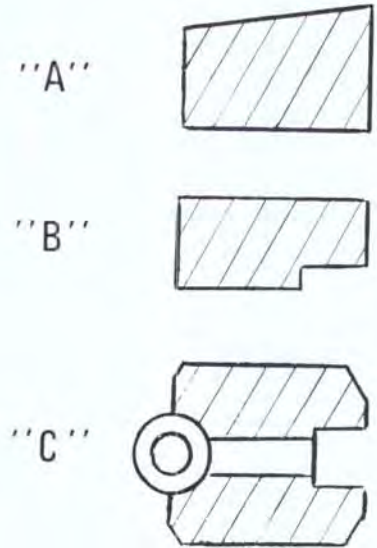


Fig. 36—Cross-sectional view of piston rings of type used on Models L175, L225 and L225DT. Refer to paragraph 32.

Models L210-L260

33. Five-ring cam ground aluminum alloy pistons are used. Pistons and rings are available in standard size only.

Piston skirt diameter is 87.9-87.92 mm (3.460-3.461 inches) for Model L210; and 89.9-89.92 mm (3.539-3.540 inches) for Model L260. Piston to cylinder wall clearance should be 0.08-0.12 mm (0.003-0.0048 inch). Piston skirt diameter should be measured below lower oil ring at right angles to piston pin.

Piston ring end gap should be 0.3-0.5 mm (0.012-0.020 inch) with a maximum wear limit of 1.5 mm (0.060 inch). The half-keystone top ring (all models) and second compression ring (Model L260) have a tapered top land as shown in Fig. 37, and side clearance cannot be measured. Taper face compression rings (B) used in second groove on Model L210 or third groove on Model L260 should have a side clearance in groove of 0.065-0.09 mm (0.0025-0.0035 inch). Ring must be installed with contact area toward bottom as shown in Fig. 37.

Oil control ring (C) should have a side clearance of 0.02-0.06 mm (0.0008-0.0024 inch) and ring may be installed either side up.

PISTON PINS

All Models

34. The full floating piston pin is a transition fit in piston bosses at room temperature. On Models L210 and L260, the 28 mm (1.102 inches) piston pin should have a clearance of 0.029-0.053 mm (0.0011-0.002 inch) in piston pin bushing. On Models L175,

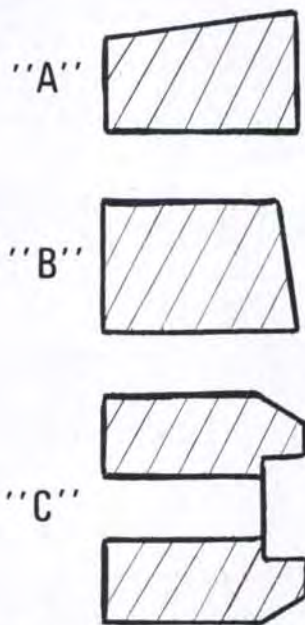


Fig. 37—Cross-sectional view of piston rings of type used in Models L210 and L260. Refer to paragraph 33 for application.

L225 and L225DT, the 23.1 mm (0.911 inch) pin should have a clearance of 0.014-0.04 mm (0.0005-0.0015 inch) clearance in rod.

CYLINDER SLEEVES

Models L175-L225-L225DT

35. Straight, barrel-type dry sleeves are a tight press fit in cylinder block. The semi-finished sleeve should be honed after installation to provide 0.08 mm (0.003 inch) clearance for piston skirt. Nominal finished diameter of sleeve is 79.0-79.03 mm (2.992-2.993 inches), but



Fig. 39—On Models L225 and L225DT, the two intermediate bearing housings are positioned by dowel screws (S).

piston skirt diameter should be checked for accurate fit.

Pistons and rings are available in 0.5 mm (0.020 inch) oversize. If clearances are excessive with new standard parts, sleeve can be bored and honed to a nominal finished diameter of 79.0-79.53 mm (3.012-3.013 inches) and oversize parts installed.

Use a suitable push-puller or a press, and accurately fitting step plates when removing or installing new sleeves. Top of sleeve must be within 0.03 mm (0.001 inch) of flush with gasket surface of cylinder block after installation.

Models L210-L260

36. The wet type cylinder sleeves are sealed at bottom by two sealing "O" rings and at top by cylinder head gasket.

Sealing "O" rings are interchangeable in sleeve grooves. Thoroughly remove all rust and scale from sleeve area of cylinder block and thoroughly clean outside and inside of sleeve using a suitable solvent. Thoroughly lubricate "O" rings and install in sleeve grooves, making sure "O" rings are not twisted. Make sure large counterbore is absolutely clean and install lubricated sleeve by hand. Sleeve should protrude 0.2-0.27 mm (0.008-0.011 inch) above gasket surface of cylinder block.

Standard inner diameter of a new sleeve is 87.9-87.92 mm (3.460-3.461 inches) for Model L210 and 89.88-89.90 mm (3.5384-3.5392 inches) for Model L260.

CONNECTING RODS AND BEARINGS

All Models

37. Connecting rod bearing shells are interchangeable in rod and cap. Standard crankpin diameter is 53.095-53.097 mm (2.1240-2.1248 inches) for Model L210, 58.76-58.80 mm (2.3135-2.3150 inches) for Model L260, and 43.88-43.90 mm (1.7284-1.729 inches) for other models.

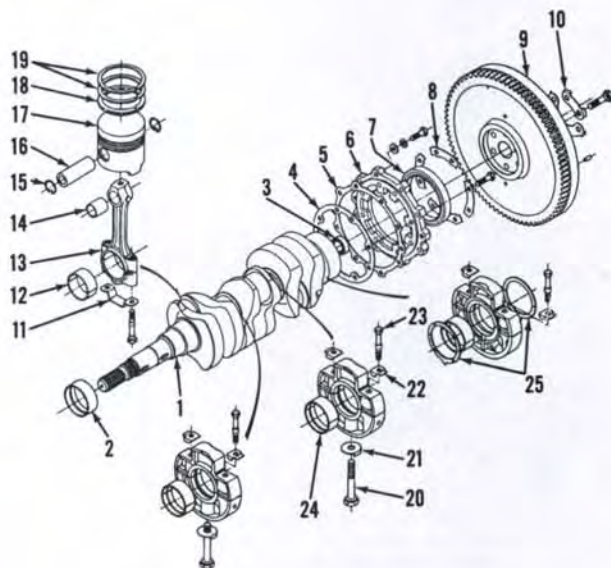
Desired connecting rod bearing clearance for Models L210 and L260 is 0.02-0.08 mm (0.0008-0.003 inch). Desired bearing clearance for Models L175, L225 and L225DT is 0.025-0.1 mm (0.001-0.004 inch). Recommended side clearance is 0.4-0.6 mm (0.016-0.024 inch) for all models. Connecting rod bearings for Models L210 and L260 are available in standard size, 0.25 mm (0.010 inch) undersize and 0.5 mm (0.020 inch) undersize. Connecting rod bearings for Models L175, L225 and L225DT are available in standard size, 0.5 mm



Fig. 38—On Model L175, center bearing housing is positioned by dowel screw (S).

Fig. 40—Exploded view of crankshaft, main bearings, connecting rod and piston of the type used on Models L175, L225 and L225DT.

1. Crankshaft
2. Main bearing
3. Pilot bearing
4. Gasket
5. Gasket
6. Bearing cover
7. Seal
8. Lock plate
9. Flywheel
10. Lock plate
11. Lock plate
12. Bearing insert
13. Connecting rod
14. Bushing
15. Snap ring
16. Piston pin
17. Piston
18. Oil control ring
19. Compression ring
20. Locating cap screw
21. Washer
22. Lock plate
23. Cap screw
24. Main bearing insert
25. Thrust washer



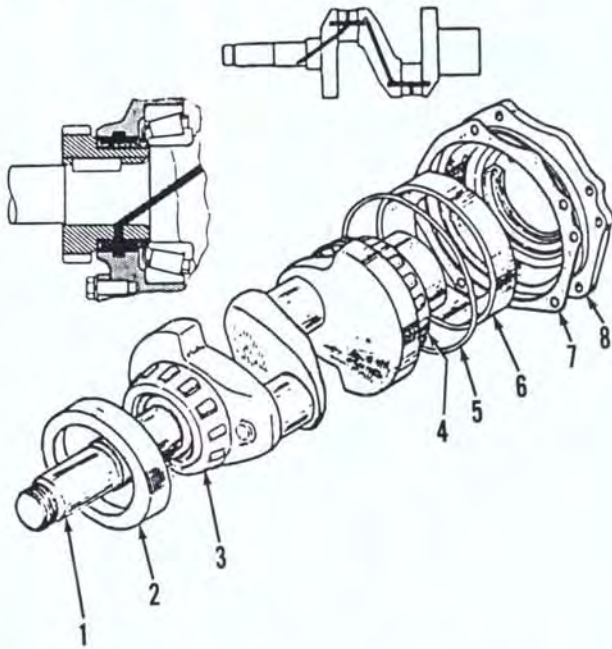


Fig. 41—Exploded view of crankshaft and associated parts used on Model L210. Insets show pressurized oil passages to connecting rods. Crankshaft bearing end play is adjusted by shim pack (7).

1. Crankshaft
2. Bearing cup
3. Bearing cone
4. Bearing cone
5. "O" ring
6. Bearing cup
7. Shim
8. Housing

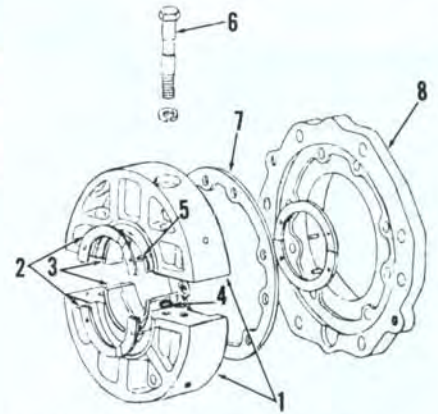


Fig. 42—Exploded view of rear main bearing housing and associated parts used on Model L260.

- | | |
|---------------------|---------------|
| 1. Bearing housings | 5. Dowels |
| 2. Thrust washers | 6. Cap screw |
| 3. Bearing liners | 7. Gasket |
| 4. "O" ring | 8. Rear cover |

(0.020 inch) undersize and 1.0 mm (0.040 inch) undersize.

On Models L210 and L260, cap is installed on crankcase opening side of cylinder block. Machined serrations will allow installation in only one position. On other models, match marks on rod and cap must be aligned.

When installing connecting rod caps, tighten retaining cap screws to a torque of 58-64 N·m (43-47 ft.-lbs.) on Models L210 and L260; and to 37-41 N·m (27-30 ft.-lbs.) on other models. On all models, secure by bending retainer against flats of bolt head.

CRANKSHAFT AND MAIN BEARINGS

On all models, crankshaft and bearing assemblies are removed from rear of cylinder block after removing engine; then removing rod and piston units, timing gear cover, crank gear, flywheel and rear bearing case cover. On all models except L210, front main bearing is a one-piece bushing type, pressed into front face of cylinder block.

Models L175-L225-L225DT

38. Model L175 has three main bearings; Models L225 and L225DT have four. Intermediate main bearings are retained by dowel screws (S—Fig. 38 or 39) as well as by cap screws (20—Fig. 40) which enter main bearing housing lower half from underneath. To remove crankshaft and bearing assembly after removing crankshaft gear, flywheel and connecting rod and piston units, remove dowel screws and cap screws; then bump crankshaft and bearings rearward out of cylinder block. Note that bearing

housings are minimum clearance in cylinder block bores to provide oil pressure transfer to drillings in bearing housings.

Upper and lower bearing shells are interchangeable in intermediate and rear bearings. All crankpin journals are pressurized from main journal immediately forward of crankpin.

Standard main journal diameter is 51.99-52.01 mm (2.0469-2.0476 inches). Desired main bearing diametral clearance is 0.04-0.1 mm (0.0015-0.004 inch). Main bearings are available in standard size only.

Crankshaft end play of 0.15-0.3 mm (0.006-0.012 inch) is controlled by thrust washers (25—Fig. 40). Thrust washers are 1.97-2.0 mm (0.0775-0.0787 inch) thick and available in standard size only.

Tighten cap screws (23) retaining case halves to a torque of 34-41 N·m (25-30 ft.-lbs.) and cap screws (20) securing intermediate bearings to a torque of 64-68 N·m (47-50 ft.-lbs.). Make sure oil passages in bearing housings and crankcase align when crankshaft assembly is installed. Install dowel screws (S—Fig. 38 or 39) using new sealing washers and tighten securely. Complete assembly by reversing disassembly procedure.

Model L210

39. Crankshaft is supported in two tapered roller bearings as shown in Fig. 41. Shaft is drilled and pressure fed (to lubricate both connecting rod bearing journals) through front of shaft as shown in inset.

Recommended crankshaft main journal diameter at flywheel end is 80.020-80.039 mm (3.1504-3.1511 inches) and

60.011-60.024 mm (2.3626-2.3631 inches) at timing gear end. Recommended inside diameter of tapered bearing race is 79.981-80.004 mm (3.1488-3.1497 inches) at flywheel end and 59.981-60.004 mm (2.3614-2.3623 inches) at timing gear end.

Crankshaft bearings should be adjusted to provide minimum end play but shaft must not be preloaded. Recommended end play is 0.1 mm (0.004 inch). To adjust end play, add or remove shims (7), which are available in thicknesses of 0.1, 0.2 and 0.5 mm (0.004, 0.008 and 0.020 inch).

Model L260

40. Rear main bearing housing is shown exploded in Fig. 42. Bearing housing halves bolt together around shaft, then bolt to rear bearing case cover (8). Be sure sealing "O" ring (4) is in position in oil passage. Dowels (5) which position crankshaft thrust washers (2) must be fully seated and must not extend through washers to scratch shaft when installed.

Both main bearing journals are 62.93-62.94 mm (2.4789-2.4802 inches) in diameter. Recommended diametral clearance is 0.05-0.114 mm (0.002-0.0045 inch) for rear bearing and 0.009-0.107 mm (0.0004-0.0042 inch) for front bearing.

Crankshaft end play is controlled by thrust washer halves (2) which are doweled to front and rear of bearing housing halves. Specified end play is 0.2-0.36 mm (0.008-0.014 inch). Standard thrust washers are 2.47-2.49 mm (0.097-0.098 inch) in thickness and washers are available in oversizes of 0.25 and 0.5 mm (0.010 and 0.020 inch). Standard and oversize thickness washers can be intermixed provided

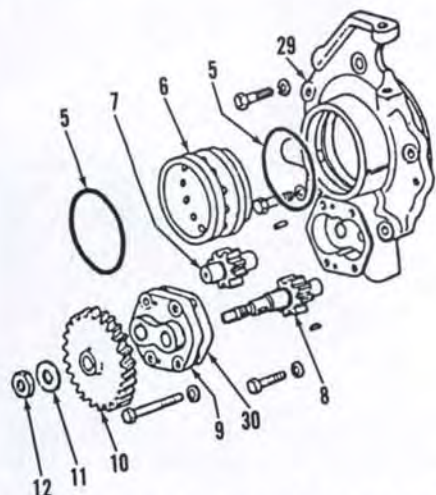


Fig. 43—Exploded view of engine oil pump and associated parts used on Model L210. Oil distributor ring (6) floats in housing and is sealed by “O” rings (5) at front and rear.

- | | |
|-------------------------|-----------------------------|
| 5. “O” rings | 11. Washer |
| 6. Oil distributor ring | 12. Nut |
| 7. Driven gear | 29. Housing & support plate |
| 8. Drive gear | 30. Gasket |
| 9. Cover | |
| 10. Gear | |

they are used in pairs, with upper and lower washer being the same thickness.

When assembling main bearing halves, tighten retaining bolts (6) to a torque of 64-68 N·m (47-50 ft.-lbs.).

CRANKSHAFT REAR OIL SEAL

All Models

41. The lip type crankshaft rear oil seal is contained in rear bearing case cover and can be renewed after splitting tractor between engine and clutch housing and removing clutch and flywheel. Coat outer surface of new seal and install with lip toward inside. Refer to following paragraphs when installing flywheel.

FLYWHEEL

Models L175-L225-L225DT

42. Flywheel is retained to crankshaft flange by six evenly spaced cap screws and can be installed in any of six positions. To be sure flywheel is correctly installed when removed for minor repairs, remove one of the retaining cap screws and spray flywheel and exposed cap screw hole with one shot of quick-drying paint, then reinstall flywheel with paint marks in register. Punch mark parts before cleaning if cleaning will endanger paint marks.

Flywheel ring gear is a shrink fit on front of flywheel. Heat gear evenly and install with beveled end of gear teeth facing toward front of tractor when flywheel is installed.

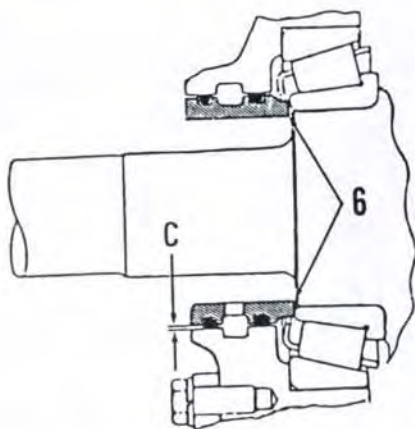


Fig. 44—Installed view of oil distributor ring (6). Clearance (C) should be 0.3-0.5 mm (0.012-0.020 in.). Refer to paragraph 46.

Make sure mating surfaces of flywheel and crankshaft flange are clean and free of dirt, rust or burrs, and lubricate lightly with engine oil. Tighten retaining cap screws evenly to a torque of 54-58 N·m (40-43 ft.-lbs.) and secure cap screws by bending retainer against flats of cap screw heads.

Models L210-L260

43. Flywheel is positively located on crankshaft flange by a dowel pin and retained by four cap screws. Make sure mating surfaces of flywheel and shaft are clean and free of dirt, rust or burrs, and lubricate lightly with engine oil. Tighten retaining cap screws evenly to a torque of 109-116 N·m (80-85 ft.-lbs.) and secure by bending retainer against flats of cap screw heads.

Flywheel ring gear is a shrink fit on front of flywheel. Heat gear evenly and install with beveled end of gear teeth facing toward front of tractor when flywheel is installed.

OIL PUMP

Models L175-L225-L225DT

44. The rotary type engine oil pump mounts on front face of engine block and is gear driven by crankshaft timing gear.

Specified pump volume at operating speed and temperature is 16 L/min (4.23 gpm) and regulated pressure is 441.6 kPa (64 psi).

Oil pump is available only as an assembled unit. If pump delivery is not as specified, renew pump assembly.

Model L210

45. The gear-type engine oil pump is built into crankcase front cover as shown in Fig. 43, and is driven by crankshaft timing gear.

Pressurized oil from pump flows through internal passages and full flow

filter to floating oil ring (6), where it is distributed to drilled crankshaft and connecting rod bearings; and to main oil gallery leading to valve train. Main crankshaft bearings and camshaft bearings are splash lubricated as are cylinder walls and camshaft.

Regulated oil pressure at operating speed and temperature is 490.6-540.3 kPa (71.1-78.3 psi) for early models with renewable element filter, or 441.6 kPa (64 psi) for late models with spin-on filter. Warning light switch is designed to open at a pressure of 147.7 kPa (21.4 psi).

Pump gear teeth should have a radial clearance of 0.025-0.075 mm (0.001-0.003 inch) and an end clearance of 0.046-0.092 mm (0.0018-0.0036 inch) in pump body.

46. OIL DISTRIBUTOR RING.

Floating oil ring (6—Fig. 43) should have 0.3-0.5 mm (0.012-0.020 inch) RADIAL clearance in end plate housing bore as shown in Fig. 44. Sealing “O” rings must be soft and in good condition as must mating surfaces of oil ring and crankshaft gear hub. Renew “O” rings whenever engine is disassembled and other parts if their condition is questionable.

Model L260

47. The gear-type engine oil pump mounts on front face of engine block and is gear driven by crankshaft timing gear.

Specified pump volume at operating speed and temperature is 30 L/min (8 gpm) and regulated pressure is 441.6 kPa (64 psi). Oil pressure warning lamp sending unit switch is designed to open at 147.7 kPa (21.4 psi).

Pump gear teeth should have a radial clearance of 0.25-0.75 mm (0.001-0.003 inch) and an end clearance of 0.046-0.092 mm (0.0018-0.0036 inch) in pump body.



Fig. 45—View of installed relief valve and filter housing of type used on most units.

PRESSURE RELIEF VALVE & FILTER

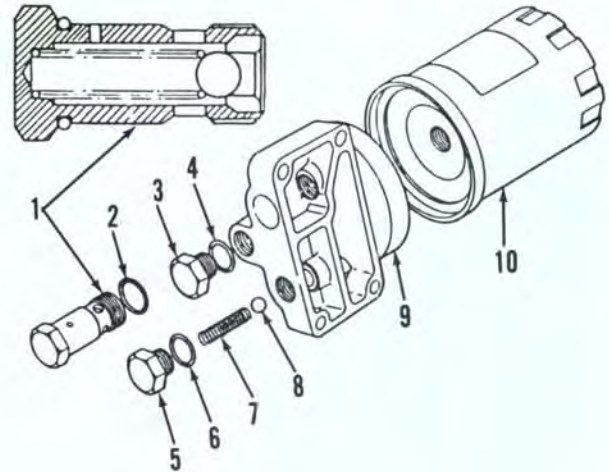
All Models

48. Refer to Fig. 45 for a view of installed relief valve and filter housing and to Fig. 46 for an exploded view. Some early models used a housing with renewable element type filter instead of spin-on filter, but complete units are interchangeable.

Regulating valve (1) is cartridge type as shown and is not adjustable. Renew cartridge if operating pressure is low. Safety valve (7 and 8) does not normally open, but is present to protect pump in the event of filter blockage or similar malfunction. Safety valve is designed to open at 979.8 kPa (142 psi) but cannot be easily tested.

Fig. 46—Exploded view of relief valve and filter housing showing regulating valve (1) and safety valve (7 and 8).

1. Regulating valve
2. "O" ring
3. Plug
4. "O" ring
5. Plug
6. "O" ring
7. Spring
8. Check ball
9. Housing
10. Filter



DIESEL FUEL SYSTEM

All models are equipped with a multiple plunger type injection pump, pintle nozzles and a swirl chamber combustion chamber. Recommended fuel is No.2 Diesel Fuel.

Because of extremely close tolerances and precise requirements of all diesel components, it is of utmost importance that clean fuel and careful maintenance be practiced at all times. Unless necessary special tools are available, service on injectors and injection pumps should be limited to removal, installation and exchange of complete assemblies. It is impossible to re-calibrate an injection pump or reset an injector without proper specifications, equipment and training.

FUEL FILTERS AND LINES

All Models

49. OPERATION AND MAINTENANCE. On Models L210 and L260,

fuel filter is of the renewable element type shown in Fig. 47.

On all models, filter life depends more on careful maintenance than it does on hours or conditions of operation. Necessity for careful filling with CLEAN fuel cannot be over-stressed. To minimize contamination of diesel fuel system, the following precautions are recommended:

Be sure strainer screen in filler opening is always present and in good condition.

When danger of condensation exists, fill fuel tank after use and before storage, to eliminate presence of humid air.

Loosen drain plug in bottom of fuel tank once a month (or more frequent if trouble is suspected) and allow fuel to drain until clean fuel flows.

Renew filter (or element) twice a year, or IMMEDIATELY if water contamination is discovered, then bleed filter and

lines after new filter is installed.

On models with renewable element type, tighten clamp screws (C—Fig. 47) in a criss-cross pattern a quarter turn at a time until all are tight and leaks stop. Uneven tightening could break retainer flange.

50. BLEEDING. To air-bleed fuel system, open shut-off valve on fuel tank,

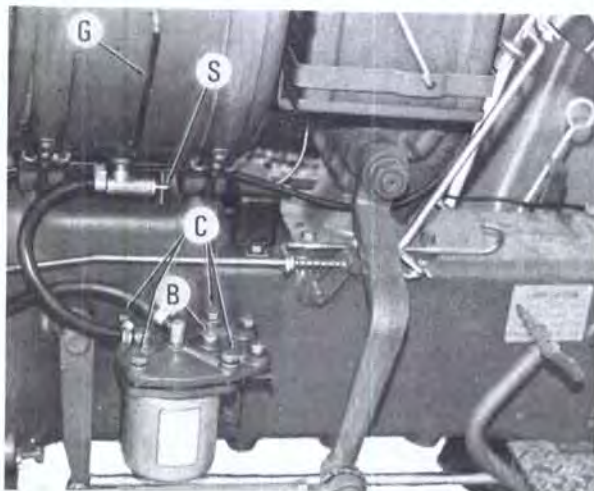


Fig. 47—Installed view of fuel tank, fuel filter and lines used on Model L210.

- B. Bleed screws
- C. Clamp screws
- G. Fuel gage
- S. Shut-off valve

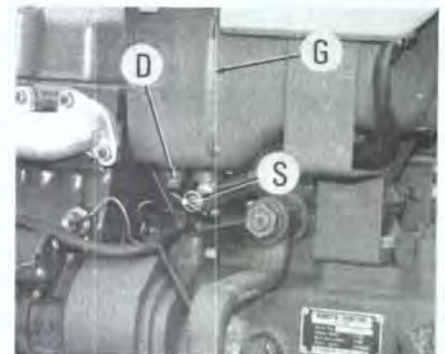


Fig. 48—Left side view of fuel tank on Model L175. Models L225 and L225DT are similar.

- D. Drain plug
- G. Fuel gage
- S. Shut-off valve

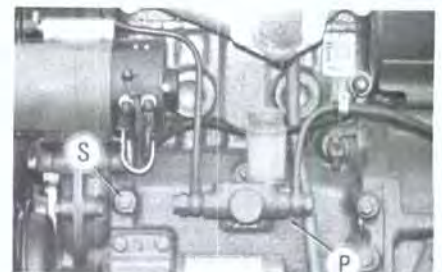


Fig. 49—Installed view of cam driven fuel transfer pump (P) used on Model L260.

INJECTION PUMP

The injection pump is a completely sealed unit and no service work or disassembly other than that specified should be attempted without necessary special equipment and training. Specified jobs must be performed under conditions of strict cleanliness. Minute dust particles can damage the diesel fuel system.

Models L175-L225-L225DT

51. TIMING TO ENGINE. Start of injection should occur at 25° BTDC, or when "1 FI", "2 FI" or "3 FI" flywheel timing marks align with timing window as shown in Fig. 51.

To check timing, disconnect fuel pressure lines (F—Fig. 52) leading to injectors. Make sure fuel system is properly bled. Pull decompressor knob out and turn engine slowly until wetness appears at one of the disconnected fittings. The appropriate timing mark ("1 FI" etc.) should align with pointer in flywheel timing window at this time.

Remove shims (S) between injection pump mounting flange and cylinder block to advance timing, or add shims to retard timing. Adding or removing ONE shim will change timing 1½ crankshaft degrees; or about 4.76 mm (3/16-inch) on flywheel rim.

52. REMOVE AND REINSTALL.

To remove injection pump, first shut off fuel and disconnect fuel supply line at injection pump. Remove high pressure lines leading to injectors. Remove the four mounting stud nuts and lift pump assembly straight up out of cylinder block. Do not lose or damage shim pack located between engine block and mounting flange. Shims control injection timing and same number of shims must be reinstalled unless timing is to be changed.

To reinstall pump, remove access cover (C—Fig. 53), then guide rack control pin (P—Fig. 52) into notch in gover-

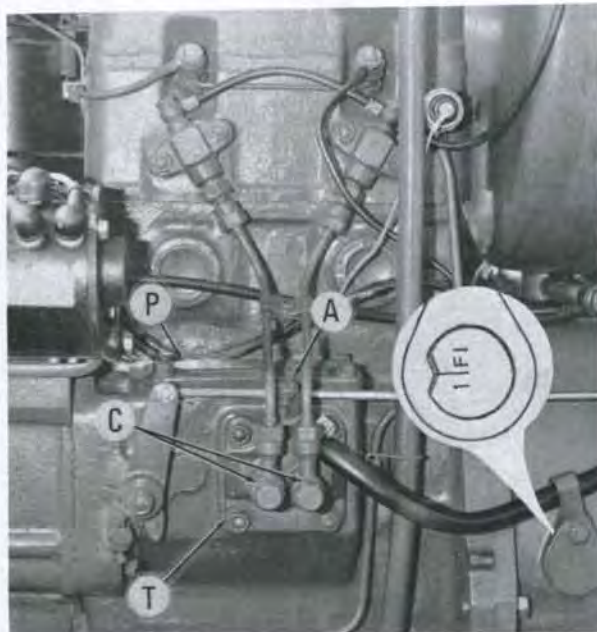


Fig. 50—Installed view of injection pump on Model L210. Inset shows flywheel timing mark for number 1 piston firing position.

- A. Bleed screw
- C. Pressure line fittings
- P. Access plate
- T. Timing shim pack



Fig. 51—View of flywheel timing window on Models L175, L225 and L225DT. Inset shows timing marks aligned for number 1 piston firing position. Bleed screw (B) on filter housing is also shown.

open bleed screw on top of filter and allow fuel to flow until air-bubbles disappear and fuel is clear. Note that Model L260 is equipped with a fuel transfer pump as shown at (P—Fig. 49). On this model, it will be necessary to actuate hand pump during bleeding process, all other models are gravity feed and a hand pump is not provided.

Close bleed screw on filter housing while fuel is flowing; open bleed screw on injection pump and allow fuel to flow until air bubbles disappear, then close bleed screw. Injection pump bleed screw is shown at (A—Fig. 50) for Model L210; at (B—Fig. 59) for Model L260; and at (B—Fig. 52) for other models.

Partially open throttle and attempt to start engine. If engine does not start, loosen high pressure fuel lines at injectors and continue to crank engine until fuel escapes from all loosened connections. Tighten compression nuts and start engine.

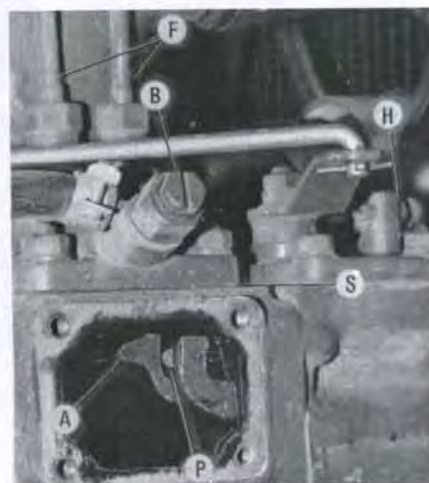


Fig. 52—With access cover (C—Fig. 53) removed, governor arm (A) and rack control pin (P) can be seen. Also shown are pump bleed screw (B), fuel pressure lines (F), high speed stop screw (H) and timing shim pack (S).



Fig. 53—Right side view of Model L175 tractor showing throttle linkage and points of adjustment or service. Models L225 and L225DT are similar.

- B. Bleed screws
- C. Access cover
- F. Foot throttle
- H. High speed stop screw
- L. Locknuts
- M. Maximum fuel limiting stop
- S. Stop lever
- T. Hand throttle

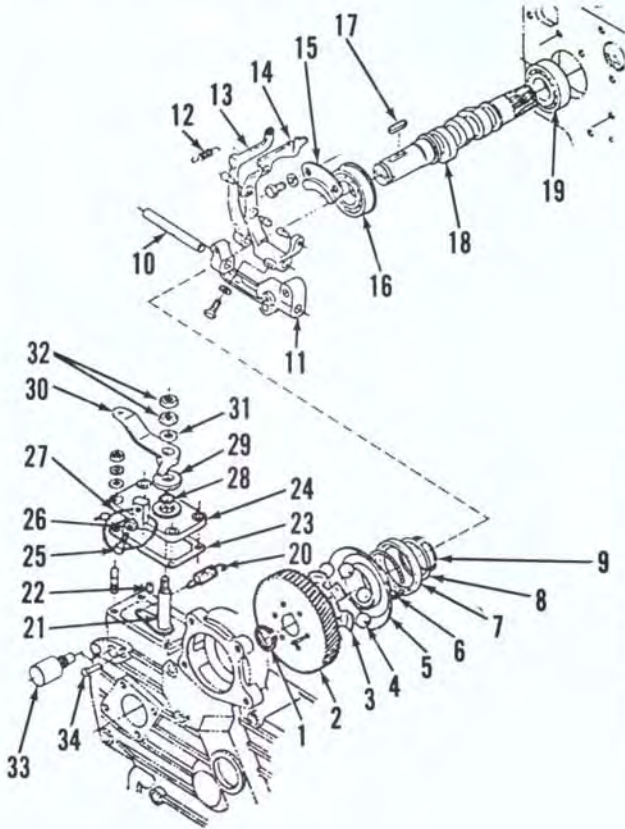


Fig. 54—Exploded view of injection pump drive, governor and associated parts used on Models L175, L225 and L225DT.

1. Snap ring
2. Injection pump drive gear
3. Guide
4. Ball
5. Sleeve
6. Balls
7. Case
8. Circlip
9. Circlip
10. Shaft
11. Fork lever holder
12. Spring (start)
13. Fork lever
14. Fork lever
15. Retainer plate
16. Bearing
17. Key
18. Injection pump camshaft
19. Bearing
20. Spring (governor)
21. Governor lever
22. Key
23. Gasket
24. Cover plate
25. Stop bolt
26. Locknut
27. Retainer
28. "O" ring
29. Friction plate
30. Speed control lever
31. Flat washer
32. Nuts
33. Maximum fuel limiting stop
34. Pin

bearing contains 39 loose balls. Be careful that none are lost if weight unit is disassembled. Examine cupped race and ball travel surface on back of gear for furrowing or pitting and renew if damaged.

To remove operating camshaft (18) remove gear and weight unit, injection pump, hydraulic pump and hydraulic pump drive housing. Remove bearing retainer (15) and bump shaft and bearing unit forward out of engine block. Refer to Fig. 55 for a cross-sectional view of injection pump governor and shaft unit.

Model L210

55. TIMING TO ENGINE. Start of injection should occur at 24° BTDC, or when "1 FI" and "2 FI" flywheel timing marks align as shown in inset, Fig. 50. To check timing, disconnect pressure lines (C). Make sure fuel system is properly bled. Pull decompressor knob out

nor arm (A) as shown. Use removed shim pack (S) unless timing is to be checked or changed. Bleed system after installation, as previously outlined.

53. GOVERNOR LINKAGE ADJUSTMENT. High speed adjustment screw (H—Fig. 53) and maximum limit stop (smoke stop) (M) are sealed adjustments and should not normally be changed unless governor is overhauled or trouble exists.

Rated engine speed is 2700 rpm which requires a high idle setting of approximately 2850 rpm with engine at operating temperature. Recommended slow idle speed adjustment of 600-650 rpm is made at the two nuts (L) at rear end of governor control rod.

Maximum fuel limiting stop (M) should be set to prevent excessive smoke level at slight overload. An altitude adjustment may be required if tractor is used at 3000 ft. or more. To make adjustment, remove seal cap; loosen jam nut and turn spring housing IN to lower smoke level or OUT to raise smoke level.

54. INJECTION PUMP GOVERNOR AND CAMSHAFT. Governor weight (flyball) unit can be removed with the gear after removing timing gear cover as outlined in ENGINE Section.

Remove snap ring (1—Fig. 54) from front end of shaft and remove gear and weight assembly (2 through 9) using a suitable puller. Governor weight thrust

Fig. 55—Injection pump cross-sectional view of the type used on Models L175, L225 and L225DT. View shows injection pump drive and governor components.

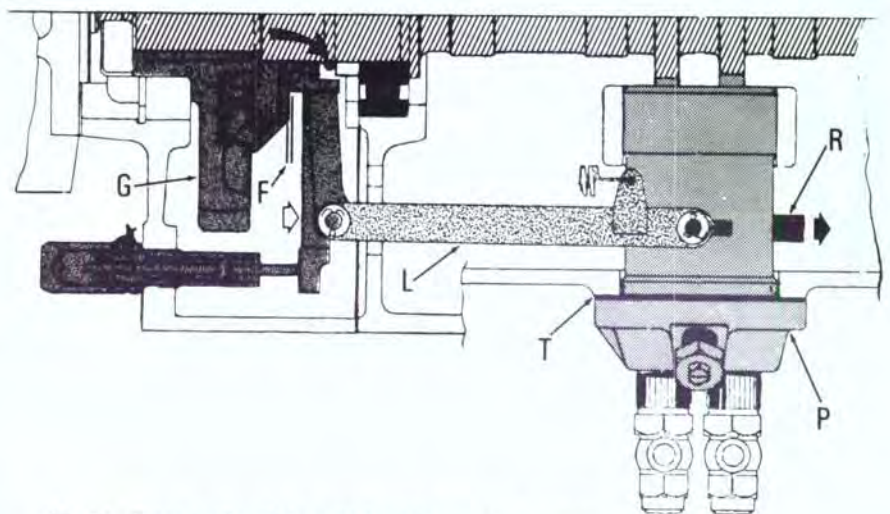
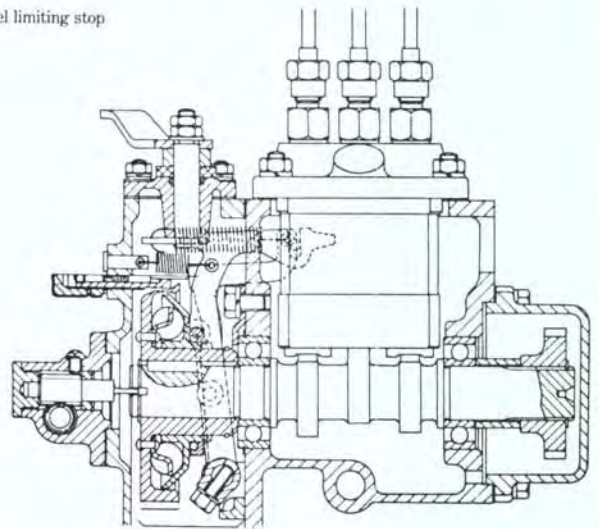


Fig. 56—Cross-sectional view of injection pump and governor used on Model L210.

F. Free play
G. Governor

L. Link
P. Pump

R. Rack
T. Timing shims

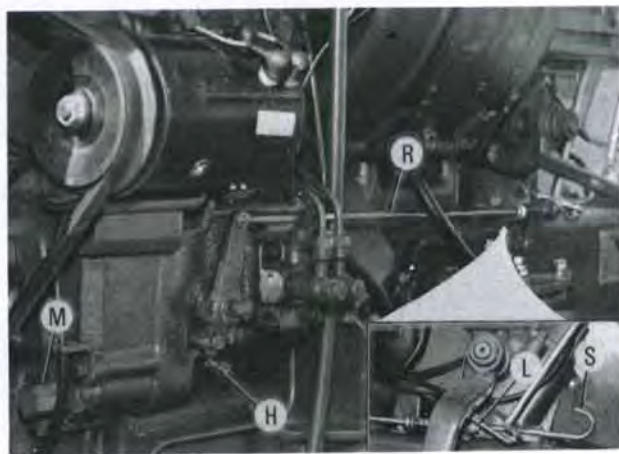


Fig. 57—Installed view of Model L210 injection pump and governor showing external points of adjustment.

- H. High speed stop screw
- L. Low idle speed adjustment
- M. Maximum fuel limit stop
- R. Control rod
- S. Stop lever

and turn engine slowly until wetness appears at disconnected fittings. Appropriate timing mark (1 FI or 2 FI) should align with pointer in timing window at this time.

Remove shims (T) to advance timing or add shims to retard timing. Adding or removing ONE shim will change timing 1½ crankshaft degrees; or about 4.76 mm (3/16-inch) on flywheel rim.

56. REMOVE AND REINSTALL. To remove injection pump, first shut off fuel and disconnect fuel supply line at pump. Remove high pressure lines leading to injectors. Remove top access plate (P—Fig. 50). Disconnect link (L—Fig. 56) from injection pump; then unbolt and lift out pump.

If a different pump is installed when unit is reassembled, install pump with removed shim pack and check timing as previously outlined. With proper shim pack determined, move rack (R) and governor arm fully rearward (arrows) and select a link (L) of proper length to move upper governor race 0.5-1.0 mm

(0.020-0.040 inch) forward from stop ring (Arrow) on camshaft. Governor links (L) are available in lengths of 134, 136 and 138 mm (5.28, 5.35 and 5.43 inches).

57. GOVERNOR LINKAGE ADJUSTMENT. High speed adjustment screw (H—Fig. 57) and maximum fuel limit stop (smoke stop) (M) are sealed adjustments and should not normally be changed unless governor is overhauled or trouble exists.

Rated engine speed is 2700 rpm which requires a high idle setting of approximately 2850 rpm with engine at operating temperature. Recommended slow idle speed adjustment of 600-650 rpm is made at nuts (L) at rear end of governor rod (R).

Maximum fuel limiting stop (M) should be set to prevent excessive smoke level at slight overload. An altitude adjustment may be required if tractor is used at 3000 ft. or more. To make adjustment, it is necessary to break seal wire and remove cap nut. Loosen jam nut on stop spindle. Back nuts off on spindle to decrease smoke level or turn nuts farther on spindle to increase maximum fuel delivery.

Model L260

58. TIMING TO ENGINE. Start of injection should occur at 20° BTDC, or when “1 FI” and “2 FI” flywheel timing marks align with timing window on left side of clutch housing.

To spill time injection pump, remove injector lines and pull out on decompressor knob. Remove either of the two delivery valve holders (1 or 2—Fig. 58) and extract spring (3) and delivery valve (5) using needle nose pliers. Reinstall delivery valve holder and attach a spill pipe if available. Turn crankshaft until appropriate flywheel timing mark appears in top of timing window. Actuate hand primer pump, then turn flywheel slowly in normal direction of rotation until fuel just ceases to flow through removed delivery valve. Timing mark should align with cast pointer in center of flywheel timing pointer at this time. Minor adjustment can be made by loosening the four flange nuts (F—Fig. 59) and rocking injection pump in attaching slots.

NOTE: If fuel flow does not stop, piston may be on exhaust stroke, rather than compression stroke, or timing gears may be incorrectly installed.

When reinstalling delivery valve, tighten valve holder (1 or 2—Fig. 58) to a torque of 24-34 N·m (18-25 ft.-lbs.). Tighten flange nuts (F—Fig. 59) to 23-27 N·m (17-20 ft.-lbs.).

59. REMOVE AND REINSTALL. To remove injection pump, shut off fuel and thoroughly clean pump and surrounding area. Disconnect governor link, stop link and all fuel lines, capping lines as they are disconnected to prevent dirt entry. Remove the four flange nuts (F—Fig. 59) and slide pump straight to rear until drive spline is disconnected.

Injection pump drive shaft and drive gear hub are equipped with a master spline, and pump is automatically timed

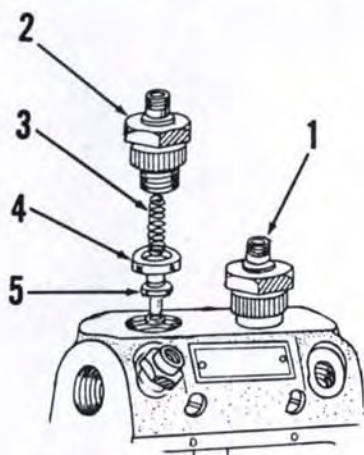
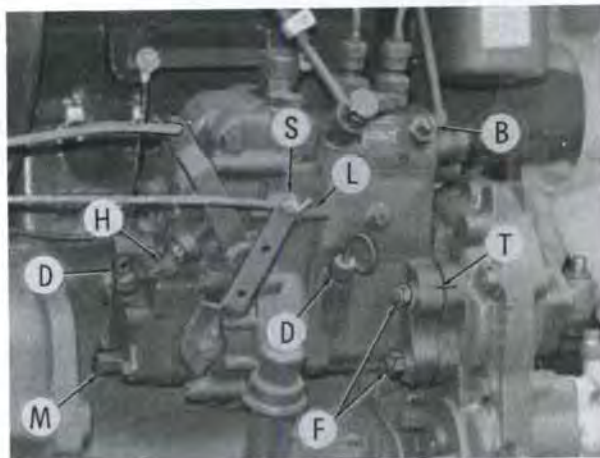


Fig. 58—Exploded view of one delivery valve type used on Model L260.

- 1 & 2. Delivery valves
- 3. Spring
- 4. Washer
- 5. Valve

Fig. 59—Installed view of injection pump on Model L260, showing points of adjustment.

- B. Bleed screw
- D. Dipsticks
- F. Flange nuts
- H. High speed stop screw
- L. Low speed screw
- M. Maximum fuel limiting stop
- S. Stop lever
- T. Timing scribe marks



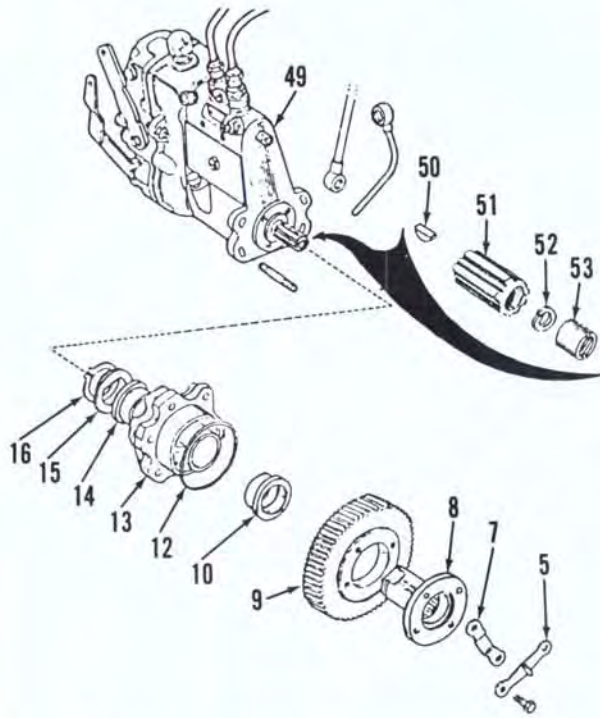


Fig. 60—Exploded view of injection pump and drive used on Model L260.

- 5. Tachometer drive plate
- 7. Tachometer drive plate
- 8. Drive hub
- 9. Gear
- 10. Bushing
- 12. "O" ring
- 13. Mounting base
- 14. Bushing
- 15. Washer
- 16. Snap ring
- 49. Injection pump
- 50. Key
- 51. Drive sleeve
- 52. Lockwasher
- 53. Round nut

if gear and hub are correctly installed. Align timing scribe marks (T) and tighten flange nuts (F) to a torque of 23-27 N·m (17-20 ft.-lbs.) or spill time as previously outlined. Bleed system as outlined in paragraph 50 and lubricate installed pump as follows.

60. PUMP LUBRICATION. Check lubricant level in injection pump cam housing and governor housing every 50 operating hours using the two dipsticks (D—Fig. 59). Oil level should be maintained between two scribe marks on dipsticks, fill to upper mark if necessary, using same oil used in engine.

Lubricant contained in camshaft housing is diluted during operation by fuel leakby, and housing is equipped with a spill tube on engine side. Manufacturer recommends that oil in both reservoirs be drained each 200 hours and refilled with new oil. Capacity of camshaft housing is approximately one pint, governor reservoir holds about 1/4-pint.

61. GOVERNOR LINKAGE ADJUSTMENT. High speed adjustment screw (H—Fig. 59) is sealed and should not normally be altered.

Rated engine speed is 2600 rpm, which requires a high idle setting of approximately 2750 rpm with engine at operating temperature. Recommended slow idle speed of 600-650 rpm is obtained by turning slow idle screw (L) in or out as required.

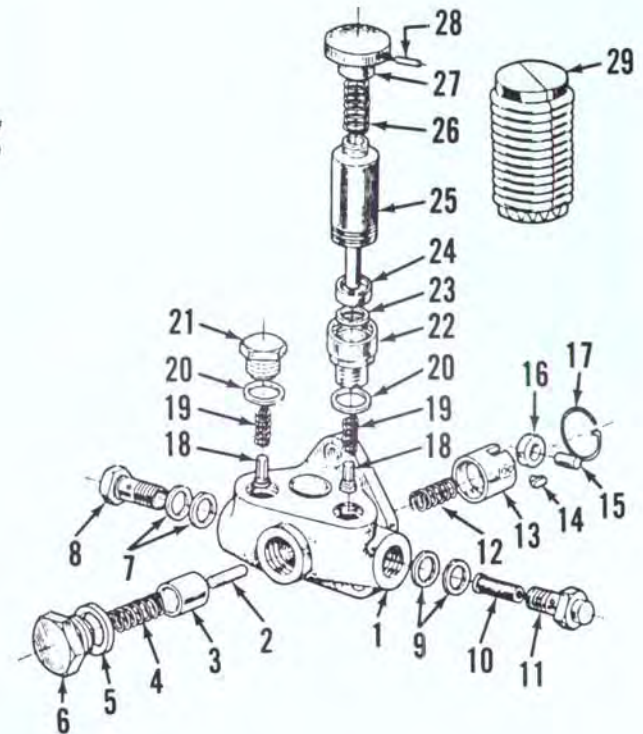
62. INJECTION PUMP DRIVE. An exploded view of injection pump drive gear and associated parts is shown in

Fig. 60. Splined drive sleeve (51) is keyed to tapered injection pump camshaft and retained by a round nut (53). It will remain with pump unless pump is renewed.

To remove drive gear (9) and hub (8), first remove injection pump and timing gear cover. Remove snap ring (16) and washer (15), then withdraw gear and hub assembly forward out of housing.

Fig. 61—Exploded view of fuel transfer pump used on Model L260.

- 1. Pump body
- 2. Rod
- 3. Piston
- 4. Spring
- 5. Washer
- 6. Plug
- 7. Washer
- 8. Fitting screw
- 9. Washer
- 10. Filter
- 11. Fitting screw
- 12. Spring
- 13. Tappet
- 14. Shoe
- 15. Pin
- 16. Roller
- 17. Circlip
- 18. Check valve
- 19. Spring
- 20. Washer
- 21. Plug
- 22. Valve holder
- 23. Packing
- 24. Priming piston
- 25. Cylinder
- 26. Spring
- 27. Knob
- 28. Pin
- 29. Cover



If gear and hub are to be separated, scribe a line on both parts as an assembly guide, and transfer the marks if parts are renewed. Hub must be correctly installed in gear if timing marks are to properly align.

Timing gear housing and injection pump drive housing (13) are internally drilled to provide pressure lubrication to bushings (10 and 14) and drive hub (8). Make sure drive housing is correctly installed with drilled passages aligned. Hub (8) should have a diametral clearance of 0.015-0.1 mm (0.0006-0.004 inch) in drive housing bushings, and an end play of 0.19-0.81 mm (0.0075-0.032 inch) with washer (15) and snap ring (16) installed. Renew bushings if clearance or end play is excessive.

FUEL TRANSFER PUMP

Model L260

63. Model L260 tractors are equipped with a camshaft operated, piston type transfer pump of the type shown in Fig. 61.

Pump attempts to maintain a pressure of 124.2 kPa (18 psi) at injection pump. All pump parts are available individually.

INJECTOR NOZZLES

Although outer configuration is different, all models use a straight pintle nozzle of the type shown in cross section in Fig. 62, combined with indirect injection as shown in Fig. 63.

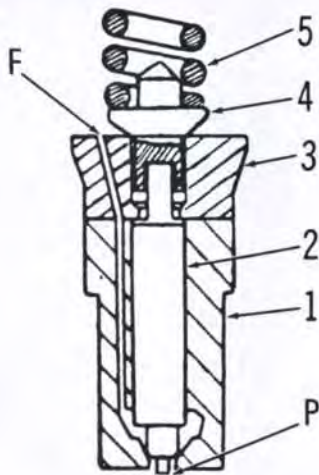


Fig. 62—Cross-sectional view of pintle nozzle showing component parts.

- | | |
|-----------------|-----------------|
| 1. Nozzle body | 5. Spring |
| 2. Nozzle valve | F. Fuel passage |
| 3. Spacer | P. Pintle |
| 4. Pressure pin | |

64. TESTING AND LOCATING A FAULTY NOZZLE. If engine is missing and fuel system is suspected as being the cause of trouble, system can be checked by loosening each injector line connection in turn, while engine is running at slow idle speed. If engine operation is not materially affected when injector line is loosened, that cylinder is missing. Remove and test (or install a new or reconditioned unit) as outlined in appropriate following paragraphs.

65. REMOVE AND REINSTALL. Before removing an injector or loosening injector lines, thoroughly clean injector, lines and surrounding area using compressed air and a suitable solvent.

66. MODELS L175, L225 AND L225DT. To remove injector unit, first remove high pressure line leading from injection pump to injector. Disconnect bleed line by removing nut and banjo fit-

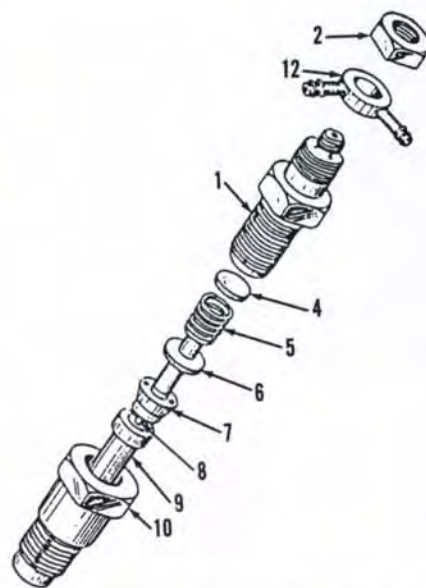


Fig. 64—Exploded view of injector unit used on Models L175, L225 and L225DT.

- | | |
|-----------------|-------------------|
| 1. Body | 7. Spacer |
| 2. Nut | 8. Nozzle valve |
| 4. Shim | 9. Nozzle body |
| 5. Spring | 10. Nozzle nut |
| 6. Pressure pin | 12. Bleed fitting |

ting, or by pulling line(s) from banjo nipple fitting (12—Fig. 64). With pressure and bleed-back lines removed, unscrew injector from its mounting position on cylinder head.

When installing injector, make sure that machined seating surface in cylinder head is completely clean and free from carbon build-up. Use a new copper washer underneath injector nozzle and tighten injector carefully.

67. MODEL L210. To remove injector unit, first remove high pressure line leading from pump to injector. Disconnect bleed line by removing banjo bolt or by pulling line from banjo nipple fitting (12—Fig. 65). Remove two stud nuts securing ears of injector body to left side

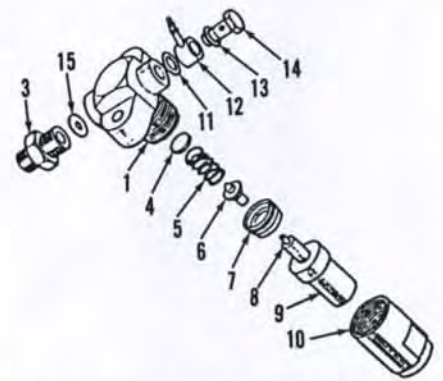


Fig. 65—Exploded view of injector unit used on Model L210. Refer to Fig. 64 for parts identification except for the following.

- | | |
|------------|-------------------|
| 3. Fitting | 14. Fitting screw |
| 11. Washer | 15. Washer |
| 13. Washer | |

of cylinder head and withdraw injector unit.

When installing injector, make sure machined seating surface in cylinder head bore is completely clean and free from carbon build-up. Use a new copper washer underneath injector nozzle. Turn retaining stud nuts both finger tight, then tighten alternately and evenly one-sixth turn at a time to a torque of 20 N·m (15 ft.-lbs.). Start and run engine, listening for pressure leaks around nozzle seating washer. Correct for pressure leaks by checking to be sure stud nuts are tightened evenly and injector unit is not cocked.

68. MODEL L260. To remove injector unit, first remove high pressure line leading from injection pump to injector.

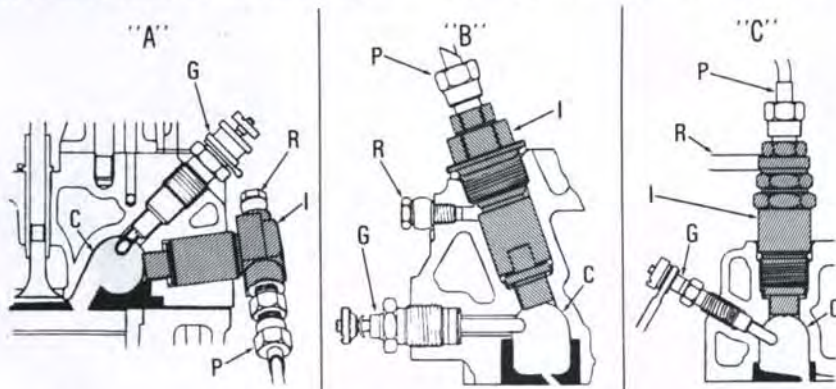


Fig. 63—Cross-sectional views of installed injector and associated parts on "A" Model L210; "B" Model L260 and "C" Models L175, L225 and L225DT.

- | | | |
|--------------------------|--------------|------------------------|
| C. Precombustion chamber | G. Glow plug | P. Pressure line |
| | I. Injector | R. Bleed (return) line |

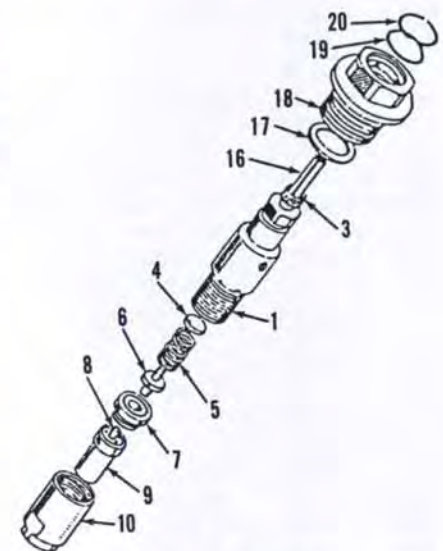


Fig. 66—Exploded view of injector unit used on Model L260. Refer to Fig. 64 for parts identification except for the following:

- | | |
|-----------------|--------------|
| 16. Edge filter | 19. "U" ring |
| 17. Washer | 20. Circlip |
| 18. Nut | |

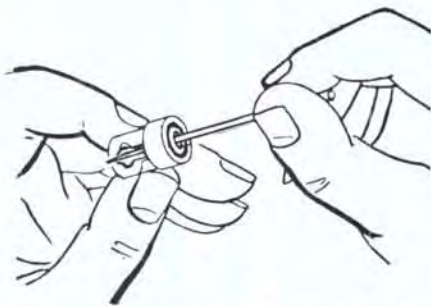


Fig. 67—Use a pointed hardwood stick to clean spray hole as shown.

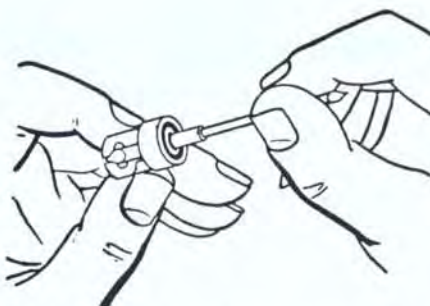


Fig. 69—Clean valve seat using brass scraper as shown.

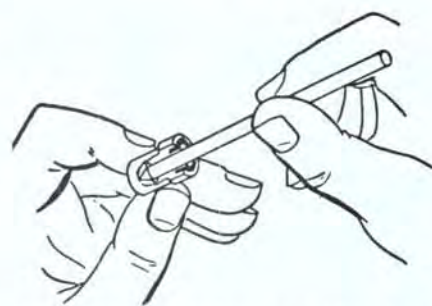


Fig. 70—Polish seat using polishing stick and mutton tallow.

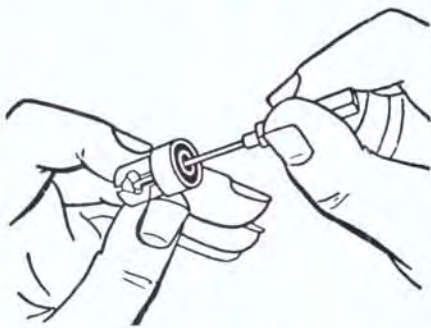


Fig. 68—Use hooked scraper to clean carbon from pressure chamber.

Remove flanged compression nut (18—Fig. 66) retaining injector in cylinder head and withdraw unit.

When installing injector, make sure that machined seating surface in cylinder head bore is completely clean and free from carbon build-up. Make sure bleed-back passage in cylinder head is open and clean. Use a new copper washer underneath injector nozzle and a new "O" ring on flange of compression nut. Tighten compression nut carefully.

69. TESTING. A complete job of testing and adjusting the injector requires use of special test equipment. Only clean, approved testing oil should be used in tester tank. Nozzle should be tested for opening pressure, seat leakage, back leakage and spray pattern. When tested, nozzle should open with a high-pitched buzzing sound, and cut off quickly at end of injection with a minimum of seat leakage and a controlled amount of back leakage.

Before conducting test, operate tester lever until fuel flows, then attach injector. Close valve to tester gage and pump tester lever a few quick strokes to be sure nozzle valve is not stuck, and that possibilities are good that injector can be returned to service without disassembly.

WARNING: Fuel leaves injector nozzle with sufficient force to penetrate the skin.

Keep exposed portions of your body clear of nozzle spray when testing.

70. OPENING PRESSURE. Open valve to tester gage and operate tester lever slowly while observing gage reading. Opening pressure should be 11.73 MPa (1700 psi) for Model L260, or 13.8 MPa (2000 psi) for other models.

Opening pressure is adjusted by adding or removing shims in shim pack (4—Fig. 64, 65 or 66). Adding or removing one 0.1 mm (0.004 inch) thickness shim will change opening pressure approximately 966 kPa (140 psi).

71. SEAT LEAKAGE. Nozzle tip should not leak at a pressure less than 10.70 MPa (1550 psi) for Model L260, or 12.77 MPa (1850 psi) for other models. To check for leakage, actuate tester lever slowly and as gage needle approaches suggested test pressure, observe nozzle tip. Hold pressure for 10 seconds; if drops appear or nozzle tip becomes wet, valve is not seating, and injector must be disassembled and overhauled as later outlined.

72. BACK LEAKAGE. If nozzle seat was satisfactory as previously tested, check injector and connections for wetness which would indicate external leakage. If no leaks are found, bring gage pressure up to 10.70 MPa (1550 psi), release lever and observe the time required for gage needle to drop from 10.70 MPa (1550 psi) to 3.80 MPa (550 psi). For a nozzle in good condition, this time should not be less than six seconds. A faster drop would indicate a worn or scored nozzle valve piston or body, and nozzle valve should be renewed.

NOTE: Leakage of tester check valve or connections will cause a false reading, showing up in this test as fast leakback. If a series of injectors fail to pass this test, the tester rather than injector units should be suspected.

73. SPRAY PATTERN. Spray pattern should be well atomized and slightly

conical, emerging in a straight axis from nozzle tip. If pattern is wet, ragged or intermittent, nozzle must be overhauled or renewed.

74. OVERHAUL. Hard or sharp tools, emery cloth, grinding compound or other than approved solvents or lapping compounds must never be used. An approved nozzle cleaning kit is available through a number of specialized sources.

Wipe all dirt and loose carbon from exterior of nozzle and holder assembly. Refer to Fig. 64, 65 or 66 for exploded views and proceed as follows:

Secure nozzle in a soft-jawed vise or holding fixture and remove nozzle nut (10). Place all parts in clean calibrating oil or diesel fuel as they are removed, using a compartmented pan and using extra care to keep parts from each injector together and separate from other units which are disassembled at the time.

Clean exterior surfaces with a brass wire brush, soaking in an approved carbon solvent if necessary, to loosen hard carbon deposits. Rinse parts in clean diesel fuel or calibrating oil immediately after cleaning to neutralize the solvent and prevent etching of polished surfaces.

Clean nozzle spray hole from inside using a pointed hardwood stick or wood splinter as shown in Fig. 67. Scrape carbon from pressure chamber using hooked scraper as shown in Fig. 68. Clean valve seat using brass scraper as shown in Fig. 69, then polish seat using wood polishing stick and mutton tallow as in Fig. 70.

Back flush nozzle using reverse flusher adapter. Reclean all parts by rinsing thoroughly in clean diesel fuel or calibrating oil and assemble while parts are immersed in cleaning fluid. Make sure adjusting shim pack is intact. Tighten nozzle nut (10—Fig. 64, 65 or 66) to a torque of 61-75 N·m (45-55 ft.-lbs.). Do not overtighten, distortion may cause valve to stick and no amount of overtightening can stop a leak caused by scratches or dirt. Retest assembled injector as previously outlined.

GLOW PLUGS

All Models

75. Glow plugs are series connected in Model L210 and parallel connected in other models, with each individual glow plug grounding through mounting threads like a spark plug.

On Models L210, indicator light will glow after about 30 seconds if unit is operating satisfactorily and will fail to glow if circuit is open. Glow plugs are rated at 1.5 volt, 40 ampere capacity and circuit is equipped with a resistor. If indicator light fails to glow when start switch is held in "Heat" position an appropriate length of time, check for loose connections at switch, indicator lamp, resistor connections, glow plug connections and ground. Using a battery



Fig. 71—Right side view of Model L210 engine showing series connected glow plugs. On other models, glow plugs are parallel.

powered continuity light or ohmmeter, check continuity of resistor and each glow plug in turn, and renew defective

part or parts. Be extremely careful when reinstalling resistor cover, that cover does not touch resistor coil and short out system. If indicator lamp is burned out, or glows immediately when energized, check for short circuit at resistor cover or wiring leading from switch to resistor.

On all other models, indicator light will glow after about 10 seconds if unit is operating satisfactorily. Glow plugs are connected in parallel. If one plug is burned out, other plug(s) will heat and engine will probably start and run on one cylinder momentarily. Using a battery powered continuity light or ohmmeter, check for continuity between connector terminal of each glow plug and ground and renew plug which is open.

All models use a pressurized cooling system which raises coolant boiling point. Models L225, L225DT and L260 use an impeller type centrifugal pump to provide forced circulation, and a thermostat to stabilize operating temperature.

Models L175 and L210 use a "Thermo-Siphon" cooling system in which the relative density of hot and cold liquid provides the means of circulation. No coolant pump or thermostat is used, but remainder of system is a conventional vertical flow type.

When engine is started, coolant temperature is stable throughout system and corresponds to outside air temperature. Coolant contained in cylinder head immediately starts to heat from the running engine, and becoming lighter due to expansion, rises through water manifold and upper coolant hose to upper radiator tank. Cooler liquid present in upper part of radiator is thus displaced downward through radiator core and lower radiator hose creating a temperature generated circulation which increases or decreases in relation to amount of heat to be removed.

needed to radiator, because system provides no advance notice of overheating.

On models with thermo-siphon cooling, it is of utmost importance that coolant level be checked regularly and maintained at a level which fully covers upper coolant hose inlet elbow.

To remove radiator, first drain coolant and remove hood. Remove air cleaner

hose on Models L175, L225 and L225DT. On all models, disconnect coolant hoses and remove radiator and fan shroud as an assembly. Install by reversing removal procedure.

COOLING SYSTEM

THERMOSTAT

Models L225-L225DT-L260

77. On models so equipped, the bypass type thermostat is located in outlet elbow. Thermostat should begin to open at 88°C (190°F) and be completely open at 100°C (212°F).



Fig. 72—Whistle (W) on coolant overflow pipe warns of overheating.

WATER PUMP

Models L225-L225DT

78. Refer to Fig. 73 for an exploded view of water pump. To remove pump, first remove radiator as previously outlined. Remove fan blades and fan belt, then unbolt and remove pump from timing gear cover.

RADIATOR

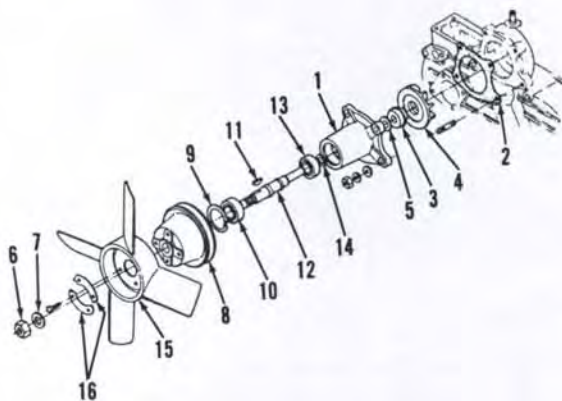
All Models

76. Radiator cap pressure valve is set to open at 78.66 kPa (11.4 psi) on Model L210, and 88.32 kPa (12.8 psi) on other models. Cooling system capacity is 5.32 liters (1.4 gal.) for Model L175 and 6.84 liters (1.8 gal.) for other models.

Most models are equipped with a whistle-type temperature warning device attached to radiator overflow pipe as shown in Fig. 72. Make sure whistle is operative and properly con-

Fig. 73—Exploded view of water pump assembly used on Models L225 and L225DT.

1. Body
2. Gasket
3. Seal Assy.
4. Impeller
5. Slinger
6. Nut
7. Lockwasher
8. Pulley
9. Snap ring
10. Bearing
11. Key
12. Shaft
13. Bearing
14. Snap ring
15. Fan
16. Lock plates



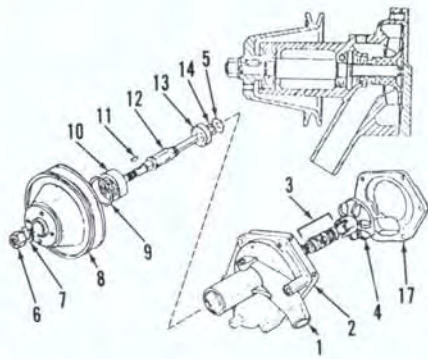


Fig. 74—Exploded and cross-sectional views of water pump assembly used on Model L260. Refer to Fig. 73 for identification of parts except for cover (17).

To disassemble removed pump, remove shaft nut (6) then remove fan pulley (8) using a suitable puller. Unseat snap ring (9) retaining front bearing (10). Push shaft (12) and bearing assembly (10 and 13) forward out of body (1) and impeller (4) using a press.

All water pump parts are available individually. When assembling pump, install bearings (10 and 13), rear snap ring (14) and slinger (5) on shaft. Install new seal (3) in body (1). Press bearing and shaft assembly in from front until front bearing bottoms. Install front snap ring (9). Install fan pulley (8), tightening shaft nut (6) to a torque of 68-79 N·m (50-58 ft.-lbs.). Lightly lubricate seal (3) with waterproof grease and install impeller (4), using a press. Back of impeller should clear bearing housing by 0.5mm (0.020 inch). Install pump by reversing removal procedure.

Model L260

79. Refer to Fig. 74 for an exploded view of water pump. To remove pump, first remove radiator as previously outlined. Remove fan blades and fan belt. Disconnect by-pass hose, then unbolt and remove water pump.

To disassemble removed pump, remove shaft nut (6), then remove fan

pulley (8) using a suitable puller. Remove cover (17). Unseat snap ring (9) retaining front bearing (10), then push shaft (12) and bearings (10 and 13) forward out of water pump body (1) and impeller (4) using a press.

All parts of water pump seal are provided in a seal kit. All other parts are available individually. When assembling pump, install bearings (10 and 13), rear snap ring (14) and slinger (5) on shaft. Install new seal seat in housing, then press bearing and shaft assembly into housing until front bearing bottoms. Install front snap ring (9) then install fan pulley (8), tightening shaft nut (6) to a torque of 68-79 N·m (50-58 ft.-lbs.). Assemble seal units into impeller. Lightly lubricate carbon seal with a waterproof grease, then carefully press impeller onto shaft until 0.5mm (0.020 inch) clearance exists between impeller blades and nearest point of housing. Install new gasket (2) and cover (17). Install pump by reversing removal procedure.

ELECTRICAL SYSTEM

GENERATOR AND REGULATOR

Models L210-L260

80. **GENERATOR.** Nippon Denso generators are used. Rated output is 10 amperes. Negative battery terminal is grounded and, where a letter code is

used for terminal designation, "E" (Earth) is used for ground.

Installed brush length is 24mm (15/16-inch) and brushes should be renewed when worn to 16mm (5/8-inch). Brush spring tension should be 800-1000 grams (28-35 oz.). Field coil resistance should be 5 ohms.

Generator should motor at 1000-1400 rpm with a current draw of 4-5 amperes. Brushes mount in frame rather than end plate and an inspection port is not present. To inspect brushes or commutator, remove through-bolts and tap off brush end plate, holding drive end plate firmly on frame. If drive pulley is removed, tighten to a torque 34-48 N·m (25-35 ft.-lb.) when reinstalling.

81. **REGULATOR.** Unit consists of a voltage regulator and cut-out relay. Regulated voltage is 14-15 volts when no current load is present and over 13 volts at 6 ampere load. Cut-in voltage is 12.5-13.5 volts and reverse current amperage to open the cutout is 8 amps. Voltage regulator is a sealed unit and renewal is recommended if performance is unsatisfactory.

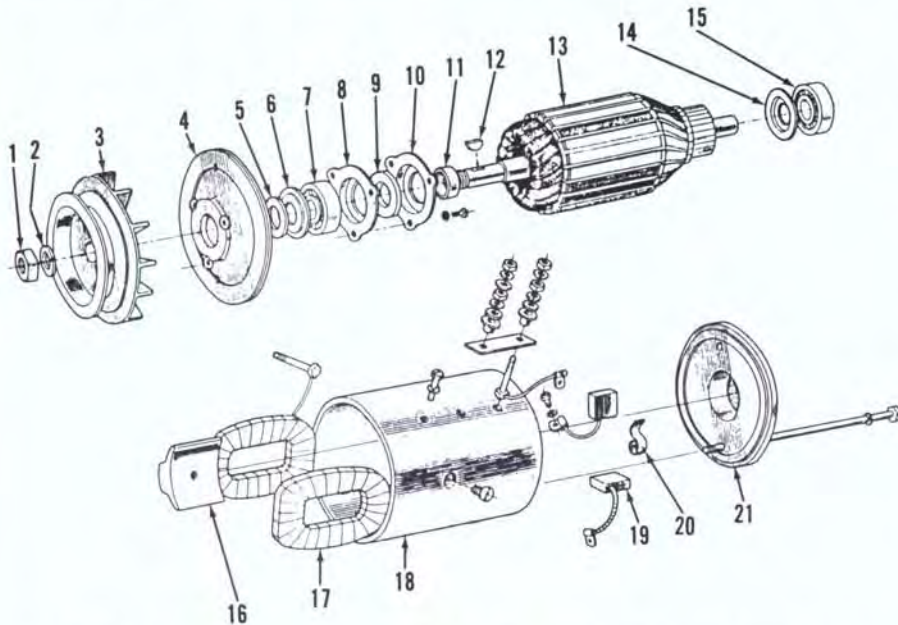


Fig. 75—Exploded view of DC generator of the type used on Models L210 and L260.

- | | | | |
|----------------|------------------|------------------|----------------|
| 1. Nut | 7. Bearing | 12. Key | 17. Field coil |
| 2. Lockwasher | 8. Bearing cover | 13. Armature | 18. Frame |
| 3. Pulley | 9. Felt washer | 14. Ring | 19. Brush |
| 4. Front plate | 10. Cover | 15. Bearing | 20. Clip |
| 5. Felt washer | 11. Spacer | 16. Field magnet | 21. End cover |

ALTERNATOR AND REGULATOR

Models L175-L225-L225DT

82. **ALTERNATOR.** A Nippon-Denso alternator is used. Rated output is 10 amperes.

CAUTION: Alternator output wire is in direct circuit with positive battery terminal and is "hot" at all times that battery is connected. Use caution when disconnecting or connecting terminals that output wire is not grounded.

83. **OPERATION AND TESTING.** The two-unit regulator assembly con-

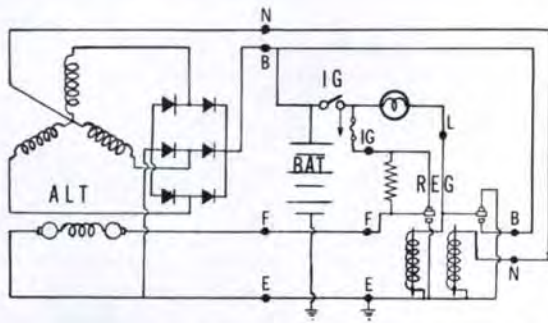


Fig. 76—Schematic wiring diagram of alternator and regulator used on Models L175, L225 and L225DT. Refer to paragraph 83 for details of operation.

controls maximum output voltage and the switch operating the "charge indicator" lamp. Control of reverse current flow through alternator with engine not running is accomplished by alternator diodes and control of maximum current output is accomplished by alternator design.

When ignition switch (IG—Fig. 76) is closed, current from battery flows through indicator lamp (L) and "L" terminal on regulator, through one set of closed points to grounded (E) terminal, causing lamp to light. Current also flows through "IG" terminal on regulator, through other set of points, then through "F" terminals on regulator and alternator to energize alternator field coils.

When engine is started and alternator commences to charge, main current flow is from the "B" terminal on alternator direct to battery. A second minor charging current flows through the "N" terminals on alternator and regulator where it energizes the indicator lamp relay winding, opening points in indicator lamp circuit and closing points to voltage control relay shunt windings.

When battery is fully charged and alternator output voltage rises above regulator setting (which should be 13.6-14.6 volts), current in voltage control relay windings opens upper set of points in voltage control unit. Field current from battery must then flow through built-in resistor in regulator and charging rate is reduced. In actual operation, points oscillate rapidly between closed (upper) setting and open (resistor) setting at slower operating speeds; and between open (resistor) setting and lower (grounded) point at higher operating speeds.

Rated output should be 10 amperes and regulated voltage should be 13.6-14.6 volts.

84. OVERHAUL. Refer to Fig. 77 for an exploded view of alternator unit. Renew brushes if worn to scribe line and brush springs if heat damaged. Only the brushes and springs are available separately; if any other damage is present, renew alternator assembly.

85. REGULATOR. Voltage regulator is available only as an assembly and adjustment is not normally required.

STARTER AND CONNECTIONS

All Models

86. An exploded view of starter assembly is shown in Fig. 78. To disassemble removed starter, first unbolt and remove solenoid (3), unhooking plunger from drive lever (2) after solenoid body is removed. Remove pivot bolt for drive lever (2). Remove through-bolts and drive-end housing (1). To remove armature (8), first remove bearing cap (13) and retaining ring (12).

Renew brushes when worn to 2/3 new brush length. Do not remove field coils from starter frame (9) unless starter overhaul equipment is available. When starter is assembled, check to see that solenoid switch bottoms at the time drive pinion contacts stop collar (6).

87. STARTER SAFETY SWITCH. Models L175, L225 and L225DT are equipped with a starter safety switch actuated by clutch pedal, which prevents current reaching starter solenoid unless clutch pedal is depressed.

With clutch pedal fully released, actuating stop on clutch rod should clear button on safety switch by 17mm (5/8-inch) as shown in Fig. 79. Clutch linkage must be correctly adjusted as outlined in paragraph 89. Adjust starter safety switch by repositioning locknuts on switch mounting base threads. Starter safety switch should have continuity when button is depressed and no continuity when button is released.

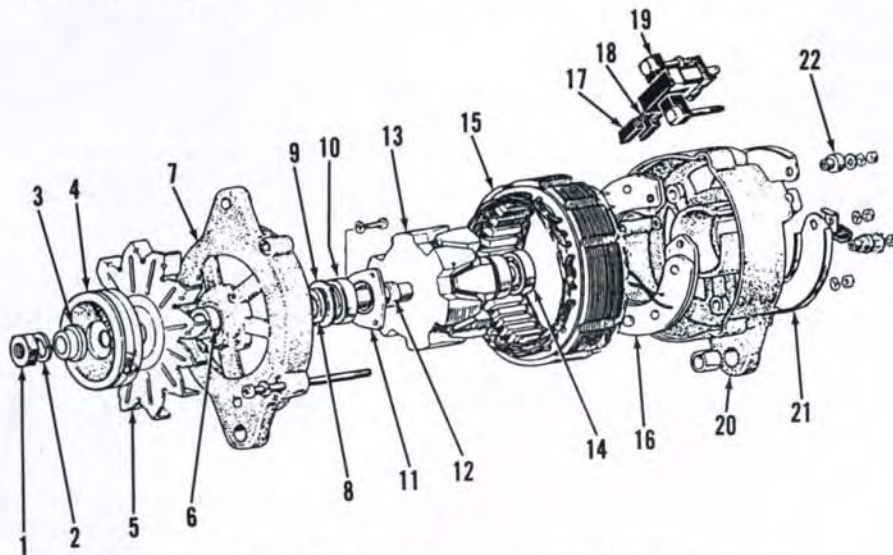


Fig. 77—Exploded view of alternator typical of type used.

- | | | | |
|---------------|--------------------|-----------------|------------------|
| 1. Nut | 7. Front cover | 12. Spacer | 17. Brush |
| 2. Lockwasher | 8. Felt washer | 13. Rotor | 18. Brush spring |
| 3. Spacer | 9. Cover | 14. Bearing | 19. Brush holder |
| 4. Pulley | 10. Bearing | 15. Stator | 20. Housing |
| 5. Fan | 11. Retainer plate | 16. Diode plate | 21. End cover |
| 6. Spacer | | | 22. Insulator |

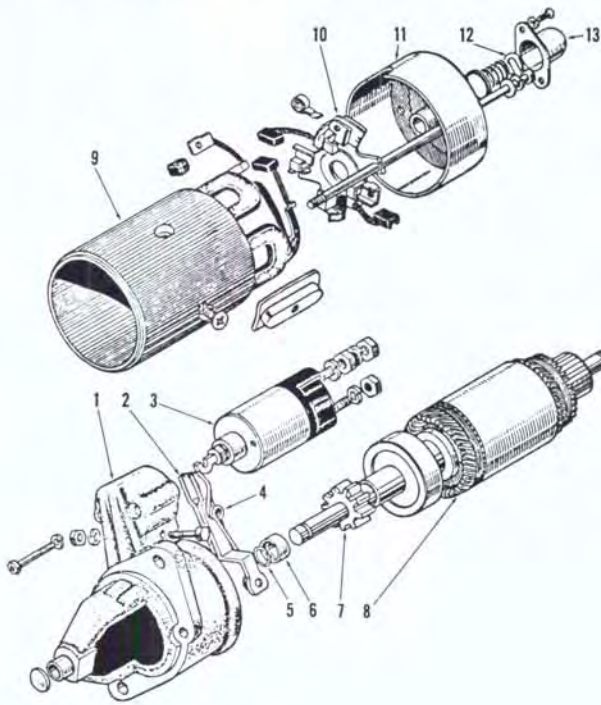


Fig. 78—Exploded view of starter motor of type used.

1. Drive end housing
2. Drive lever
3. Solenoid
4. Spring
5. Snap ring
6. Stop collar
7. Drive gear
8. Armature
9. Stator
10. Brushes & plate
11. Brush end housing
12. Retaining ring
13. Bearing cap

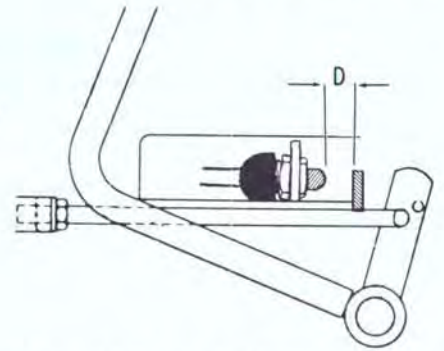


Fig. 79—Safety switch should be adjusted to clear actuating stop on clutch rod by 17 mm ($\frac{5}{8}$ inch) as shown at (D).

CIRCUIT DESCRIPTION

All Models

88. Refer to rear of service manual for wiring schematic. Negative battery terminal is grounded on all models.

CLUTCH

ADJUSTMENT

Models L175-L225-L225DT

89. Clutch pedal free play should be 20-30 mm ($\frac{3}{4}$ - $1\frac{3}{16}$ inches) when measured at pedal pad as shown at (F—Fig. 82). If a small amount of adjustment is required, correction may be made by disconnecting pedal link (L) and shortening link until free play is correct. The manufacturer recommends removing access plate (P—Fig. 83) and adjusting clutch release levers individually until clearance (C—Fig. 84) between release bearing and lever is 2.5-3.0 mm (0.098-0.118 inch). Adjustment is made by removing cotter pin and turning adjusting nut (N) at outer end of lever on

Model L175 or lever pivot on Models L225 and L225DT. Clearance should be equal to within 0.3 mm (0.012 inch) for any two levers.

Total pedal travel (T—Fig. 82) should be 135 mm (5-5/16 inches) and weldment (W) should contact and apply starter safety switch (S) when pedal is fully depressed.

Models L210-L260

90. Clutch pedal free play should be 26-31 mm (1-1/4 inches) on Model L210, and 33-40 mm (1-5/15 - 1-9/16 inches) on Model L260. To adjust clutch free play, remove access cover (C—Fig. 85). Remove cotter pin and adjust each release lever in turn until levers clear release bearing thrust surface by

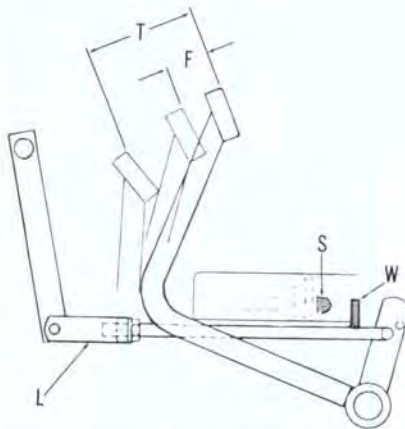


Fig. 82—Schematic view of clutch adjustment on Models L175, L225 and L225DT.

- F. Free play
- L. Pedal link
- S. Safety switch
- T. Total movement
- W. Welded stop

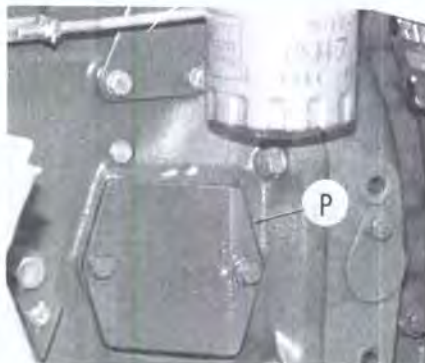


Fig. 83—Access plate (P) can be removed for individual clutch finger adjustment.

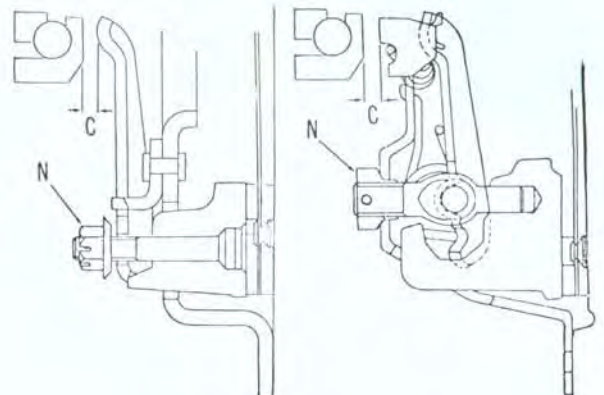


Fig. 84—Clutch finger clearance (C) is adjusted by turning adjusting nut (N). Model L175 is shown at left, Models L225 and L225DT at right.



Fig. 85 - Clutch finger height can be adjusted by removing access cover (C).

2.5-3mm (0.098-0.118 inch). Clearance should be equal to within 0.3mm (0.012 inch) for any two levers.

Free play when measured at pedal pad (F - Fig. 86) should be 26-31mm (1-1/4 inches) for Model L210 and 33-40mm (1-5/16 - 1-9/16 inches) for Model L260. Total pedal movement (R), to disengage clutch, is 64-74mm (2-9/16 - 2-7/8 inches) for Model L210 and 80-87 mm (3-1/8 - 3-7/16 inches) for Model L260. On Model L210, a limiting stop screw (S - Fig. 87) should be adjusted to stop pedal movement just below full disengagement point. Model L260 has no limit stop and pedal movement to full limit is 120 mm (4.8 inches).

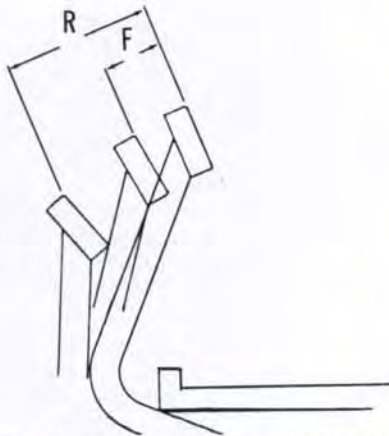


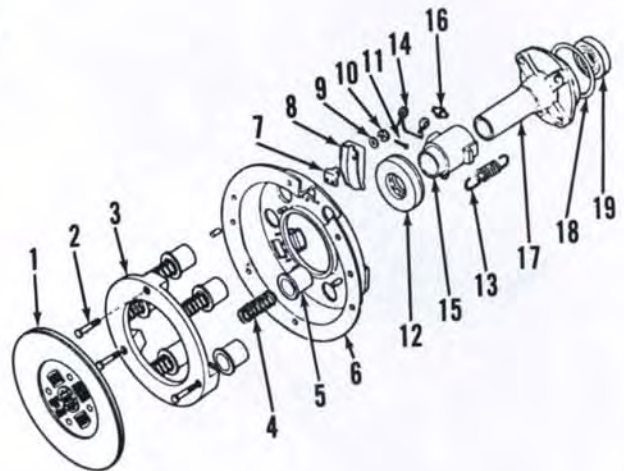
Fig. 86 - On Models L210 and L260, refer to paragraph 90 for recommended free play (F) and total pedal movement to release clutch (R).



Fig. 87 - On Model L210, stop screw (S) should be adjusted to stop pedal movement just below full disengagement point (F - Fig. 86).

Fig. 88 - Exploded view of clutch assembly used on Models L175 and L210.

1. Clutch disc
2. Lever bolt
3. Pressure plate
4. Pressure spring
5. Cap
6. Cover
7. Seat
8. Release lever
9. Washer
10. Castle nut
11. Cotter key
12. Release bearing
13. Spring
14. Return spring
15. Hub
16. Grease fitting
17. Retainer
18. "O" ring
19. Oil seal



REMOVE AND REINSTALL

All Models

91. **CLUTCH SPLIT.** To detach (split) tractor between engine and clutch housing, first remove hood. Drain hydraulic system reservoir on Models L210 or L260, or transmission housing on Models L175, L225 or L225DT; then remove inlet and pressure lines leading to hydraulic pump. Disconnect fuel lines, throttle linkage, decompressor linkage, wiring and tachometer linkage after first making sure battery ground cable is removed to prevent an electrical short.

Disconnect steering drag link at either end. If tractor is equipped with an underslung muffler, remove exhaust pipe and muffler.

Support front of tractor by attaching a hoist to engine lifting brackets. Solidly support tractor underneath transmission housing. Unbolt and remove starter. Remove cap screws securing clutch housing to cylinder block and separate tractor. Reconnect by reversing split procedure. Tighten retaining cap screws to a torque of 68 N·m (50 ft.-lbs.).

OVERHAUL

Models L175-L210

92. Refer to Fig. 88 for an exploded view of clutch. Clutch cover and pressure plate are available only in the complete clutch assembly; all other parts are available individually.

Clutch cover may be disassembled in a suitable press by removing adjusting nuts from ends of release levers and releasing spring pressure slowly. If a press is not to be used, remove adjusting nuts while clutch is still attached to flywheel, then unbolt and remove clutch,

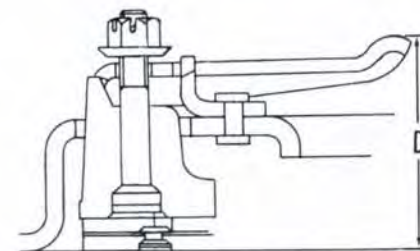
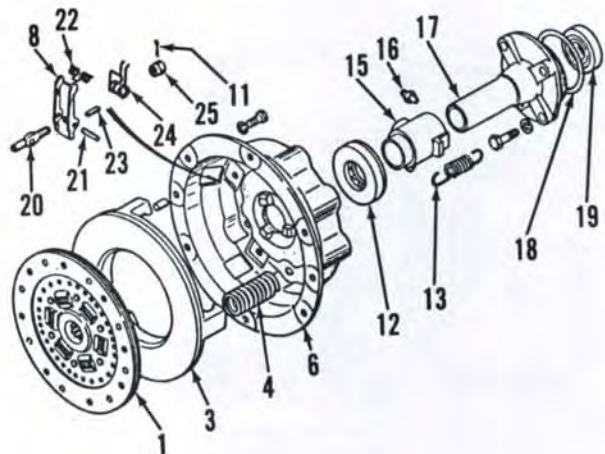


Fig. 89 - On Models L175 and L210, distance (D) from contact surface of release lever to friction surface of flywheel should be 45.7 mm (1.8 inch).

Fig. 90 - Exploded view of clutch assembly of the type used on Models L225, L225DT and L260. Refer to Fig. 88 for identification of parts except for the following.

20. Stud
21. Pin
22. Spring
23. Strut
24. Spring
25. Centering nut



holding assembly together as it is removed.

Clutch springs have a free length of approximately 48mm (1-7/8 inches). Renew springs if warped, distorted or heat discolored. Check pressure plate friction surface for scoring, warpage or heat checks. Check friction faces of clutch disc. If less than 0.3mm (0.012 inch) of facing remains beyond rivet heads, renew clutch disc.

When assembling clutch, reverse disassembly procedure and adjust clutch levers equally using clutch disc to be installed so distance (D—Fig. 89) from contact surface of lever to friction surface of flywheel equals 45.0-46.5mm (1.77-1.83 inches). Lever height should be equal to within 0.3mm (0.012 inch).

Models L225-L225DT-L260

93. Refer to Fig. 90 for an exploded view of clutch and associated parts. Clutch cover is available only as an assembly which includes pressure plate and all attaching parts. All other parts are available individually.

Clutch cover may be disassembled in a press by removing adjusting nuts from release lever pivots and releasing spring pressure slowly. If a press is not available, remove adjusting nuts while cover is still attached to flywheel, then remove individual cover components after attaching cap screws are removed.

Clutch springs have a free length of approximately 63mm (2½ inches). Renew springs if warped, distorted or heat discolored. Check pressure plate friction surface for scoring, warpage or heat checks. Check friction faces of clutch disc. If less than 0.3mm (0.012 inch) of facing remains beyond rivet heads, renew clutch disc.

When assembling clutch, reverse

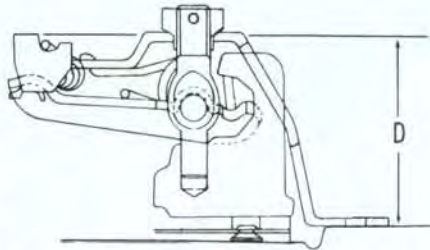


Fig. 91—On Models L225, L225DT and L260, distance (D) from contact surface of lever plate to MOUNTING surface of clutch cover should be 57 mm (2¼ inches).

disassembly procedure and adjust clutch levers equally using clutch disc to be installed, so distance (D—Fig. 91) from contact surface of lever plate to MOUNTING surface of flywheel is 57mm (2¼ inches). Lever plate height should be parallel throughout its circumference.

CLUTCH LINKAGE

All Models

94. Clutch linkage can be overhauled from front after clutch split. Release fork (F—Fig. 92) is positioned on shaft by a key/washer (K) which can be pried out after removing cap screw (S).

CLUTCH SHAFT

Models L175-L225-L225DT

95. Clutch shaft is part of transmission main shaft and removal procedure is outlined in TRANSMISSION overhaul section. Clutch shaft oil seal is carried in shaft bearing housing and is shown exploded in Fig. 88 for Model L175; or Fig. 90 for Models L225 and

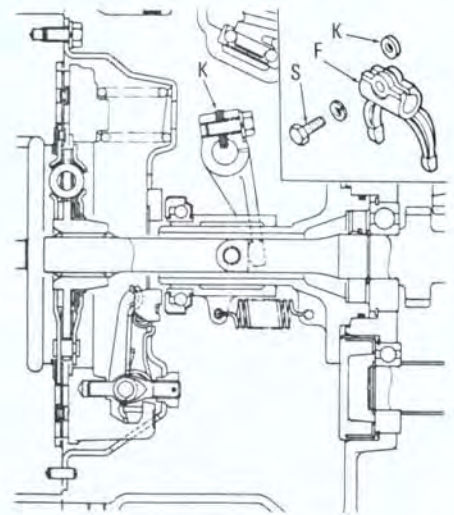


Fig. 92—Clutch fork (F) is positioned on lever shaft by key/washer (K), which fits in slot in shaft and is retained by cap screw (S).

L225DT. Housing can be removed and seal renewed after removing clutch release linkage.

Models L210-L260

96. Clutch shaft attaches to transmission input shaft by a flange coupling and attaching bolts on Model L210; and by a splined coupling clamp on Model L260. To remove shaft on Model L210, first remove gear shift lever and housing. On all models split tractor between transmission and clutch housing and disconnect coupling while shaft is still supported at front end.

Shaft oil seal is contained in transmission housing and leakage at this point cannot affect clutch. Install clutch shaft by reversing removal procedure.

**TRANSMISSION
(Models L175-L225-L225DT)**

A four-speed sliding gear unit is combined with a range transmission to provide eight forward and two reverse speeds. The two-speed power take-off is contained in transmission housing and is driven by a gear which meshes with input shaft cluster gear.

REMOVE AND REINSTALL

97. **FRONT TRANSMISSION.** To remove front transmission assembly as a unit, first disconnect engine from clutch housing as outlined in paragraph 91. Solidly support front transmission housing and rear tractor axle separately. Remove step plates. Disconnect

brake rods, rear wiring harness and other interfering linkage. Remove cap screws and stud nuts securing front transmission housing to rear axle center housing and remove front housing unit.

When reconnecting front transmission assembly, make sure couplings (21 and 37—Fig. 97) are installed on transmission and pto countershafts. Turn shafts if necessary, until splines engage. Tighten flange cap screws and stud nuts to a torque of 61-75 N·m (45-55 ft.-lbs.) and complete installation by reversing removal procedure.

98. **REAR AXLE CENTER HOUSING.** To remove rear axle center housing (R—Fig. 93), first drain transmission

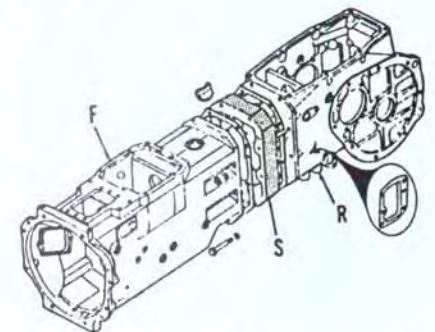
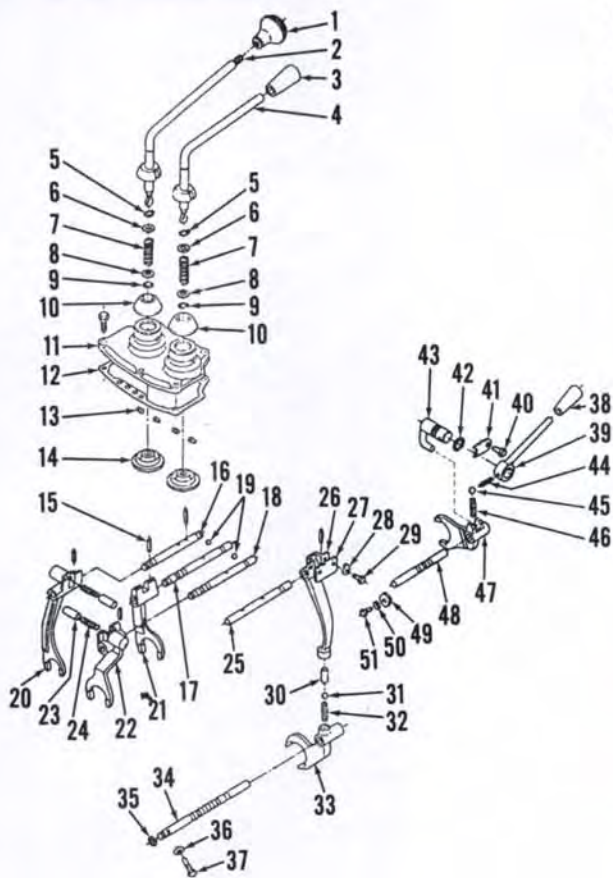


Fig. 93—On Models L175, L225 and L225DT, a short spacer (S) is installed between front transmission (F) and rear axle center housing (R) as shown. Inset identifies transfer case mounting position used on Model L225DT.



- 1. Knob
- 2. Shift lever
- 3. Grip
- 4. Shift lever
- 5. Snap ring
- 6. Washer

Fig. 94—Exploded view of transmission shifter rails and forks of the type used on Models L175, L225 and L225DT. In disassembly, the shift levers (2 and 4) are withdrawn from underneath lever housing.

- 7. Spring
- 8. Washer
- 9. "O" ring
- 10. Shield
- 11. Lever housing
- 12. Gasket
- 13. Pin
- 14. Seal
- 15. Pin
- 16. Rail
- 17. Rail
- 18. Rail
- 19. Interlock ball
- 20. Shift fork
- 21. Shift fork
- 22. Shift fork
- 23. Cap
- 24. Spring
- 25. Rail
- 26. Pto fork lever
- 27. Plate
- 28. Lock tab
- 29. Cap screw
- 30. Pin
- 31. Ball
- 32. Spring
- 33. Shift fork
- 34. Rail
- 35. "O" ring
- 36. Seal washer
- 37. Set screw
- 38. Grip
- 39. Lever
- 40. Cap screw
- 41. Plate
- 42. "O" ring
- 43. Shift lever
- 44. Pin
- 45. Ball
- 46. Spring
- 47. Shift fork
- 48. Rail
- 49. Plate
- 50. Lockwasher
- 51. Cap screw

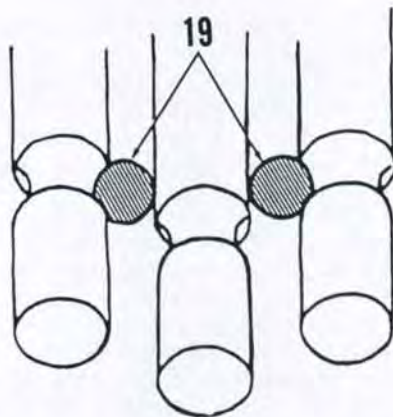


Fig. 95—Interlock balls (19) are positioned in a cross drilling between rails as shown and lock adjacent rail from moving whenever any rail is moved from neutral position.

and remove hydraulic pressure and intake lines leading to pump. Remove rear wheels, fenders and final drive units as outlined in paragraph 133. Wedge front axle to prevent unit from tipping. Remove seat and hydraulic housing. If center housing is to be disassembled, remove differential at this time as outlined in paragraph 119.

Support tractor under front transmission housing and swing center housing from a hoist. Remove attaching cap screws and stud nuts and swing rear axle center housing away from front transmission.

When reinstalling center housing, make sure couplings (21 and 37—Fig. 97) are installed on transmission and pto countershafts. Turn shafts if necessary until splines engage. Tighten flange cap screws to a torque of 61-75 N·m (45-55 ft.-lbs.) and complete installation by reversing removal procedure.

OVERHAUL

99. SHIFTER RAILS AND FORKS. Shift rails, forks and associated parts are shown exploded in Fig. 94. Top cover and main shift mechanism can be

removed without other disassembly or draining transmission. To remove range shift fork and rail, it is necessary to detach (split) tractor between transmission and rear axle center housing and remove rockshaft housing (center housing top cover). Remove retaining cap screw and lock plate and push range shift rail out forward, catching detent ball and spring (located in shift fork) as rail is removed. Drive out lever spring pin and remove lock plate to disassemble range shift lever mechanism.

To disassemble main shift cover, unbolt and remove lever housing and dump out shift rail detent balls and springs. Drive spring pins down out of shift forks then bump rails rearward out of cover, removing expansion plugs with rails.

Note that interlock balls (19—Fig. 95) occupy a cross drilling between rails. When one rail is moved from neutral, balls enter grooves in adjoining rails, thus locking rails and preventing shift forks from moving into two gears at one time. A suggested method of disassembly is to remove center rail first, then dump both interlock balls out through hole where center rail was removed. Do not fail to reinstall interlock balls when cover is reassembled.

Main shift lever and pto shift lever mounted on lever housing are withdrawn from below after removing lever knob, snap ring, retaining spring and spring seats. Positioning pins for each lever can be punched out and renewed, if worn or damaged.

To install shift mechanism, remove lever housing from top of shift housing if not already done. Carefully position all shift forks and sliding gears to neutral position, then install shift cover making sure each fork correctly meshes with its respective slot in sliding gear and that pto shift arm engages pin in pto shift fork. Tighten shift cover retaining cap screws and move all shift forks to be sure they operate properly. Install lever housing, guiding ends of levers into proper position as housing is lowered. Check to be sure that all levers work properly before releasing tractor for service.

100. TRANSMISSION INPUT SHAFT. Transmission input shaft (17—Fig. 96) can be removed after removing front transmission as outlined in paragraph 97 and shift cover as in paragraph 99. To remove shaft, remove clutch release mechanism and oil seal retainer. Using a brass or aluminum drift, bump shaft forward until bearings are free of bores in housing walls. Guide rear bearing around transmission and pto sliding gears and withdraw shaft from front.

Bearings can be removed using a press, after removing retaining snap rings. Input shaft cluster is a one-piece unit except for high gear which is pressed and keyed on shaft. Install input shaft by reversing removal procedure.

101. TRANSMISSION AND PTO COUNTERSHAFTS. To remove countershaft (6—Fig. 96), first remove front transmission as outlined in paragraph 97 and transmission input

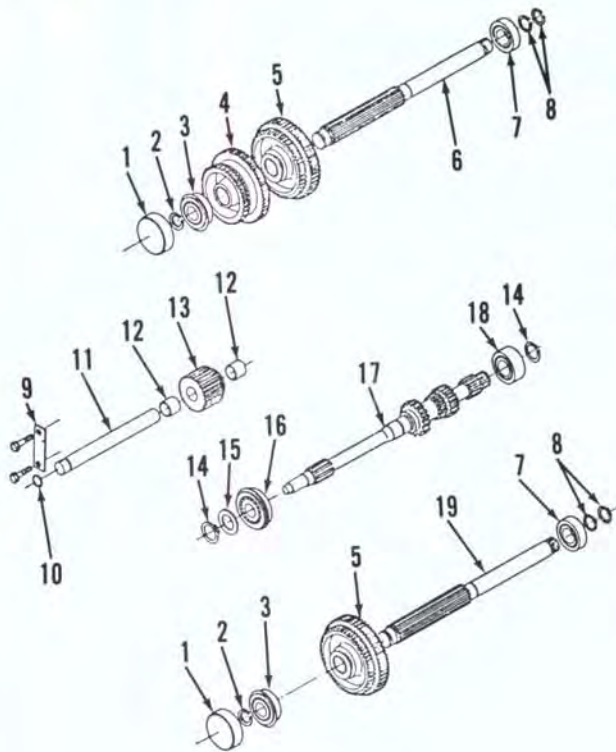


Fig. 96—Exploded view of transmission gears and shafts located in front transmission housing on Models L175, L225 and L225DT.

1. Cover
2. Snap ring
3. Bearing
4. Gear
5. Gear
6. Transmission countershaft
7. Bearing
8. Snap ring
9. Plate
10. "O" ring
11. Reverse idler shaft
12. Bushing
13. Reverse idler gear
14. Snap ring
15. Spacer
16. Bearing
17. Input shaft
18. Bearing
19. Pto countershaft

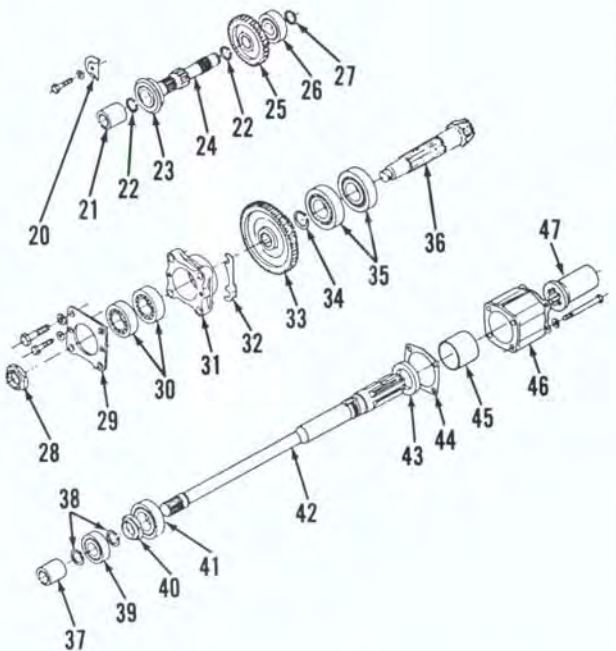


Fig. 97—Exploded view of transmission gears and shafts located in rear axle center housing on Models L175, L225 and L225DT. Components (1 through 5—Fig. 6) are used on Model L225DT.

20. Retainer
21. Coupler
22. Snap ring
23. Bearing
24. Rear countershaft
25. Gear
26. Bearing
27. Snap ring
28. Nut
29. Cover
30. Bearings
31. Bearing housing
32. Adjusting shims
33. Gear
34. Snap ring
35. Bearings
36. Bevel pinion
37. Coupler
38. Snap ring
39. Bearing
40. Nut
41. Bearing
42. Pto output shaft
43. Seal
44. Gasket
45. Collar
46. Bearing housing
47. Shaft cover

shaft as in paragraph 100. Remove front bearing cover and shaft snap ring; then using a brass or aluminum drift, bump shaft rearward out of front bearing. Lift out sliding gears through top opening while shaft is being withdrawn from rear.

Procedure for removing pto countershaft (19) is identical to removal of transmission countershaft except that pto shift fork and rail should first be removed.

Pto sliding gear is identical to rear sliding gear on transmission countershaft. Install either shaft by reversing removal procedure, making sure that smaller gear on each sliding cluster is installed to front as shown in Fig. 96.

102. REVERSE IDLER. Reverse idler shaft (11—Fig. 96) can be removed after removing transmission input shaft as outlined in paragraph 100. Remove retaining plate and push shaft forward

out of housing while withdrawing gear out input shaft opening.

Maximum allowable clearance between reverse idler gear and shaft is 0.3 mm (0.012 inch). Renew bushings and/or shaft if clearance is excessive.

103. RANGE COUNTERSHAFT. To remove range countershaft (24—Fig. 97), first split tractor between front transmission and rear axle center housing using general procedure outlined in paragraph 97.

Remove bearing retainer clip at front end of shaft and snap ring at rear end. Using a brass or aluminum drift, bump shaft forward out of rear bearing, lifting large gear out top opening as shaft is removed from front. Install by reversing removal procedure, using Fig. 97 as a guide.

104. OUTPUT (BEVEL PINION) SHAFT. To remove output (bevel pinion) shaft (36—Fig. 97), first remove rear axle center housing (rear transmission) as outlined in paragraph 98 and differential assembly as in paragraph 119. Remove clip retaining range shift rail and push rail forward out of housing, catching detent ball as rail leaves shift fork. Lift out range shift fork. Remove range countershaft as in paragraph 103. Hold pinion shaft from turning and remove self-locking nut from front of shaft; then bump shaft and rear bearings rearward out of front bearings and housing. Lift range sliding gear out top opening as pinion shaft is withdrawn.

If front bearing retainer is removed, identify and save shim pack (32) as unit is disassembled. Shim pack adjusts mesh position of main drive bevel gears and a shim pack of identical thickness must be reinstalled or mesh position checked as outlined in paragraph 125.

Output (bevel pinion) shaft is only available in a matched set with bevel ring gear. If parts are renewed, backlash and mesh position must be checked and adjusted when reassembling. Refer to paragraphs 120 and 125 for procedure.

105. PTO OUTPUT SHAFT. To remove pto output shaft (42—Fig. 97), split tractor between transmission and rear axle center housing following general procedure outlined in paragraph 97. If only pto shaft is to be removed, shift range transmission into High Range. Remove four cap screws securing output shaft housing at rear of tractor and bump pto shaft rearward using a brass or aluminum drift.

Output shaft oil seal is located in rear bearing housing and should be installed with sealing lip forward. A pipe spacer (not shown) holds rear bearing bottomed in bearing housing when unit is installed.

TRANSMISSION (Model L210)

A three-speed sliding gear unit is combined with a range transmission to provide six forward and two reverse gears. Input (upper) shaft extends rearward to drive the two-speed power take-off.

REMOVE AND REINSTALL

106. TRACTOR SPLIT. To detach (split) tractor between clutch housing and transmission, wedge front axle to prevent front unit from tipping. Remove running boards and disconnect both brake rods. Drain hydraulic system and remove pressure and return lines running to rear. Unbolt and remove shift lever (L—Fig. 98). Support both halves of tractor separately and remove flange cap screws. Separate tractor halves a



Fig. 98—Before separating Model L210 tractor between clutch housing and transmission, unbolt and lift off shift lever (L).

slight amount and remove bolts securing retainer (2—Fig. 102) to input shaft flange; slide clutch shaft forward into clutch housing then complete separation of tractor halves.

When reconnecting tractor, make sure halves are perfectly aligned. Bring the two halves closely together when reconnecting clutch shaft and turn shaft if necessary as splines re-enter clutch disc. Complete reconnection by reversing split procedure.

107. TRANSMISSION REMOVAL.

To remove complete transmission housing, prepare tractor for transmission split as outlined in paragraph 106. Drain transmission. Securely support rear of tractor and remove rear wheels, fenders, seat and hydraulic housing. Remove brakes as outlined in paragraph 144 and final drive units as outlined in paragraph 133.

Attach a hoist to transmission housing and remove cap screws attaching transmission to clutch housing. Detach clutch shaft as outlined in paragraph 106.

Install transmission housing by reversing removal procedure. Fill transmission to level of dipstick using 12.16 liters (3.2 gal.) of SAE 80 gear oil.

OVERHAUL

108. SHIFTER RAILS AND FORKS.

Shifter rails and forks (Fig. 99)

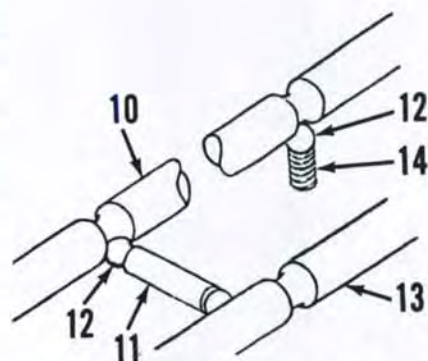


Fig. 100—Interlock (11) moves ball (12) into groove in rail (10 or 13) when either rail is moved from neutral detent. Detent ball (12) and spring (14) also hold rail in selected position.

can be removed after splitting transmission from clutch housing as outlined in paragraph 106, and removing transmission housing top covers.

To disassemble range shift mechanism, loosen locking screw (26—Fig. 99) and bump rail forward out of fork and housing, dislodging expansion plug (23) in front housing wall as rail is removed. Try to capture detent ball (27) in range fork (28) as rail moves out of fork bore. Lever shaft and lever can be removed after driving out retaining spring pin.

Speed shift rails are equipped with an interlock mechanism (11) which locks one rail in neutral when other rail is moved. Interlock mechanism is installed between rails in a cross drilling which ends externally at plug (I—Fig. 101). To disassemble shift mechanism, unwire and loosen two set screws in shift forks (15—Fig. 99) until forks can be moved independently on rails. Make sure both rails are in neutral, then withdraw either rail, capturing both detent and in-

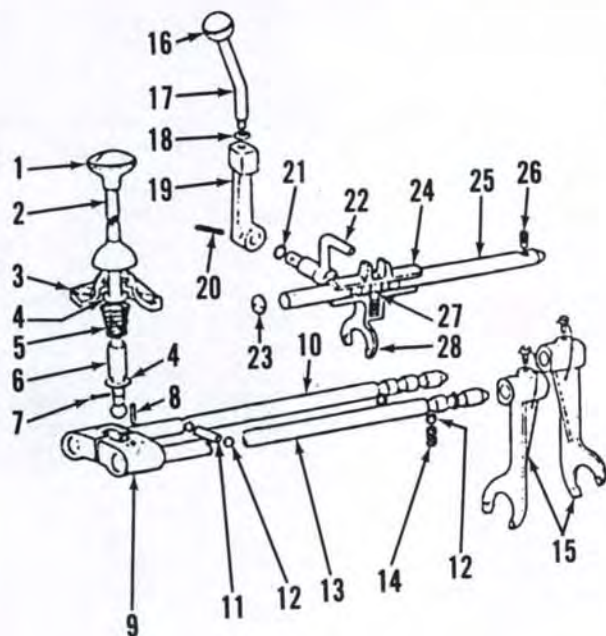


Fig. 99—Exploded view of shifters, rails and forks used on Model L210.

1. Knob
2. Shift lever
3. Base
4. Flat washer
5. Spring
6. Collar
7. Cotter key
8. Pin
9. Holder
10. Speed shift rail
11. Interlock
12. Ball
13. Speed shift rail
14. Spring
15. Speed shift forks
16. Knob
17. Shift lever
18. Locknut
19. Lever
20. Pin
21. "O" ring
22. Fork lever
23. Expansion plug
24. Range shift fork
25. Range shift rail
26. Set screw
27. Ball
28. Range fork



Fig. 101—Interlock pin (Fig. 100) is installed in housing wall through plug hole (I).

terlock ball as rail is withdrawn. Forks (15) are identical but face in opposite directions with flat surfaces mating.

When assembling shift mechanism, install right rail and place in neutral detent position; then be sure interlock is correctly assembled with pin between the two balls as shown. Edge of ball should clear bore for remaining rail with little or no excess clearance. Install detent balls and springs by dropping into blind hole from top and depressing with a small pin punch while rail is started in bore. Use Figs. 99 and 100 as a guide when reassembling.

109. TRANSMISSION INPUT SHAFT. Transmission input shaft (14—Fig. 102) can be removed from front after tractor split as outlined in paragraph 106 and removal of both transmission top covers. Coupling retaining cap screw (4) is left-hand thread. Remove screw and coupling then pry out input shaft front oil seal. Remove range shift fork and rail as outlined in paragraph 108. Unseat snap rings at front of bearings and withdraw input shaft forward out of housing. Install by reversing removal procedure.

110. OUTPUT (BEVEL PINION) SHAFT. To remove output shaft (56—Fig. 102), first remove transmission as outlined in paragraph 107, differential as in paragraph 121, shift rails and forks as in paragraph 108 and transmission input shaft as in paragraph 109. Remove output shaft front cover and shaft nut, then using a brass or aluminum drift, bump output shaft rearward and out of housing bore and gears. Be careful not to damage needle bearings in range cluster gear as shaft is drifted rearward. Keep shim pack (46) together and protect from damage as parts are removed. Shim pack controls mesh position of bevel gears and removed shim pack must be reinstalled or mesh position adjusted as outlined in paragraph 125. Check needle bearing races on pinion shaft and range cluster gear for chatter wear or scoring and front and rear bearings for roughness. Range cluster gear should not have more than 1.0mm (0.040 inch) end play when installed. Renew front and/or rear thrust spacers if clearance is excessive.

Install output shaft assembly by reversing removal procedure. Tighten output shaft nut securely and bend retaining washer against flats of nut.

111. COUNTERSHAFT. Countershaft (70—Fig. 102) can be removed from rear after first removing output shaft as outlined in paragraph 110 or countershaft as in paragraph 111. Remove locking cap screw, retainer and headless set screw from rear shaft boss and bump shaft forward out of gear. Assemble by reversing disassembly procedure.

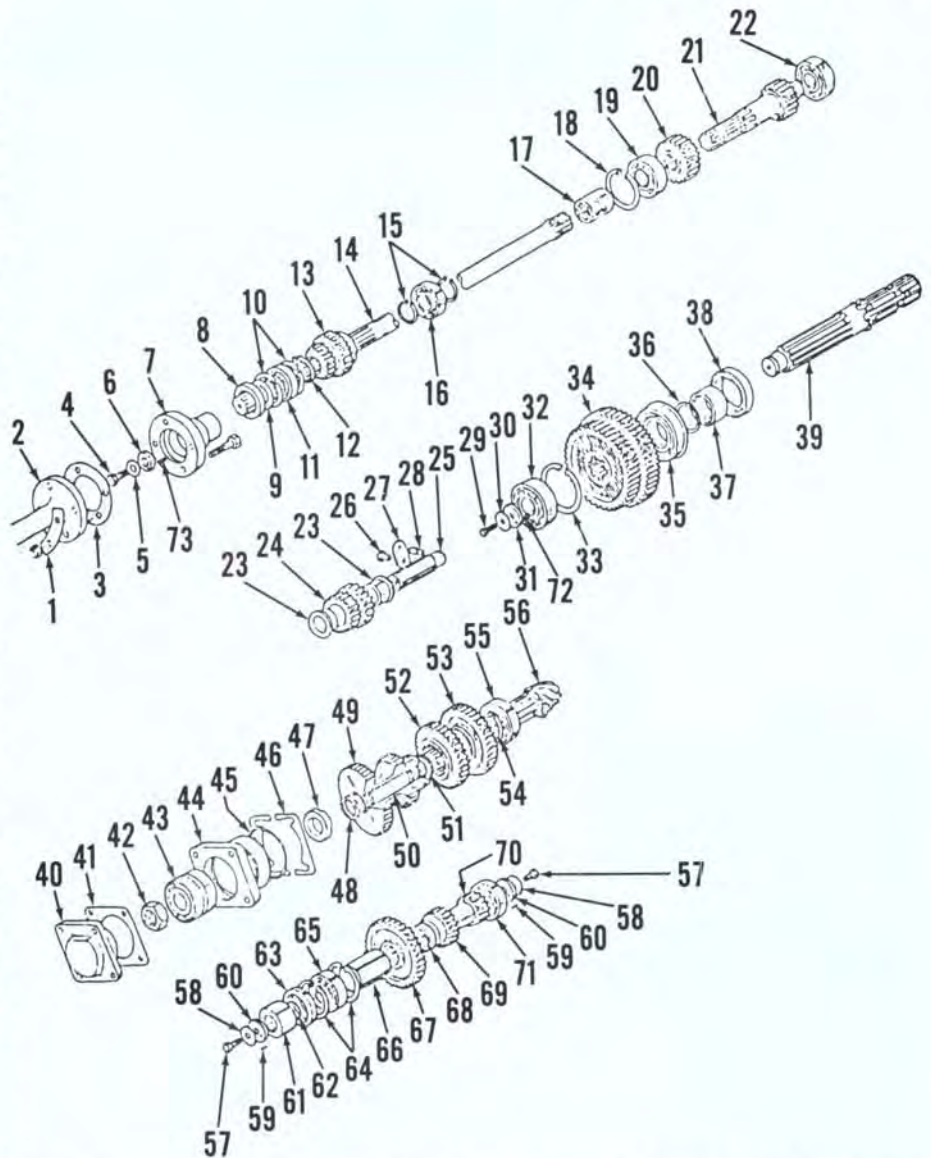


Fig. 102—Exploded view of transmission gears and shafts of the type used on Model L210. View shows relative installed position.

- | | | | |
|-----------------|--------------------------|--------------------|------------------|
| 1. Lock plate | 20. Gear | 37. Spacer | 55. Bearing |
| 2. Retainer | 21. Splined shaft & gear | 38. Oil seal | 56. Bevel pinion |
| 3. Gasket | 22. Bearing | 39. Pto shaft | 57. Cap screw |
| 4. Cap screw | 23. Bushing | 40. Cover | 58. Washer |
| 5. Washer | 24. Reverse idler gear | 41. Gasket | 59. Pin |
| 6. Washer | 25. Reverse idler shaft | 42. Nut | 60. Washer |
| 7. Flange | 26. Cap screw | 43. Bearing | 61. Spacer |
| 8. Oil seal | 27. Plate | 44. Housing | 62. "O" ring |
| 9. Spacer | 28. Set screw | 45. "O" ring | 63. Oil seal |
| 10. Snap ring | 29. Cap screw | 46. Shims | 64. Snap ring |
| 11. Bearing | 30. Washer | 47. Needle bearing | 65. Bearing |
| 12. Snap ring | 31. Washer | 48. Housing | 66. Spacer |
| 13. Gear | 32. Bearing | 49. Cluster gear | 67. Gear |
| 14. Input shaft | 33. Snap ring | 50. Collar | 68. Spacer |
| 15. Snap ring | 34. Pto gear | 51. Thrust washer | 69. Gear |
| 16. Bearing | 35. Bearing | 52. Gear | 70. Countershaft |
| 17. Coupling | 36. "O" ring | 53. Gear | 71. Bearing |
| 18. Snap ring | | 54. Snap ring | 72. Pin |
| 19. Bearing | | | 73. Pin |

ing a brass or aluminum drift until free of front bearing. Withdraw shaft toward rear, lifting gears and spacers out top opening as they are free. Assemble by reversing disassembly procedure.

112. REVERSE IDLER. Reverse idler assembly (24 and 25—Fig. 102) can

be removed from front after removing output shaft as outlined in paragraph 110 or countershaft as in paragraph 111. Remove locking cap screw, retainer and headless set screw from rear shaft boss and bump shaft forward out of gear. Assemble by reversing disassembly procedure.

TRANSMISSION (Model L260)

A four-speed sliding gear unit is combined with a range transmission to provide eight forward and two reverse speeds. Input (upper) shaft extends rearward to drive the four-speed power take-off.

REMOVE AND REINSTALL

113. TRACTOR SPLIT. To detach (split) tractor between clutch housing and transmission, wedge front axle to prevent front unit from tipping. Disconnect clutch release rod. Drain hydraulic system reservoir and remove pressure and return lines running to hydraulic pump. Support both halves of tractor separately and remove flange cap screws. Separate tractor a slight amount and disconnect clutch shaft coupling. Slide clutch shaft forward into clutch housing, then separate tractor halves.

When reconnecting tractor, make sure halves are perfectly aligned. Bring the two halves closely together and reconnect clutch shaft, then turn shaft if necessary as splines re-enter clutch disc. Complete connection by reversing split procedure.

114. TRANSMISSION REMOVAL. To remove complete transmission housing, proceed as follows: Drain transmission and hydraulic system reservoir. Remove hydraulic system pressure and return lines. Securely support rear of tractor and remove rear wheels, seat

and hydraulic housing. Remove brakes as outlined in paragraph 144 and final drive units as in paragraph 133. Remove brake and clutch pedals.

Attach a hoist to transmission housing and remove cap screws attaching transmission to clutch housing. Move transmission rearward a slight amount, disconnect clutch shaft clamp, then swing transmission housing away from front housing units.

Install transmission by reversing removal procedure. Fill transmission reservoir using 17.1 liters (4.5 gal.) of SAE 80 gear oil. Fill and bleed hydraulic system as outlined in paragraph 152.

OVERHAUL

115. SHIFTER RAILS AND FORKS. Shift rails, forks and associated parts are shown exploded in Fig. 103. Top cover and main shift mechanism can be removed without other disassembly or without draining transmission. To remove range shift fork or lever, it is first necessary to remove transmission input shaft as outlined in paragraph 116. Push range shift rail out forward, catching detent ball and spring (located in shift fork) as rail is removed.

To disassemble main shift cover, unbolt and remove lever cover and lever guide plate. Remove detent balls and springs. Drive spring pins down out of shift forks, then bump rails forward out

of cover, removing expansion plugs with rails.

Note that interlock balls (16—Fig. 104) occupy a cross drilling between rails. Balls prevent movement of any adjoining rail when one rail is moved from neutral, thus preventing shift forks from moving into two gears at one time. A suggested method of disassembly is to remove center rail first, then dump both interlock balls out through hole where center rail was removed. Do not fail to reinstall interlock balls when cover is reassembled.

116. TRANSMISSION INPUT SHAFT. Input shaft (10—Fig. 105), can be removed after splitting tractor as outlined in paragraph 113, removing pto drive shaft as in paragraph 149 and removing transmission shift cover. To remove shaft, unbolt front bearing retainer and using a brass or aluminum drift, bump shaft forward and out of gears and housing. Install by reversing removal procedure, using Fig. 105 as a guide for correct location of parts.

117. OUTPUT (BEVEL PINION) SHAFT. To remove output shaft (61—Fig. 105), first remove transmission as outlined in paragraph 114, differential as in paragraph 123, and transmission input shaft as in paragraph 116. Remove front cover and shaft nut. Remove stud nuts securing output shaft front bearing housing. Thread M8 cap screws in two threaded holes in bearing housing to serve as forcing screws, and remove bearing housing and shaft front bearing assembly by turning cap screws alternately a little at a time. Withdraw range shift rail, catching detent ball as rail is removed, then lift out range shift fork. Output shaft can now be pushed rearward out of housing and gears.

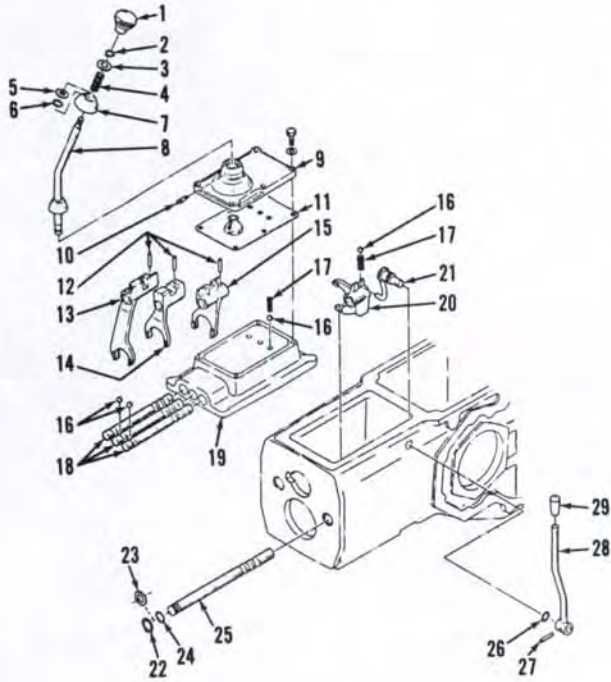


Fig. 103—Exploded view of shifter mechanism used on Model L260.

1. Knob
2. Snap ring
3. Flat washer
4. Spring
5. Flat washer
6. "O" ring
7. Shield
8. Shift lever
9. Top cover
10. Pin
11. Gasket
12. Pin
13. Shift fork
14. Shift fork
15. Shift fork
16. Interlock ball
17. Spring
18. Rail
19. Base
20. Shift fork
21. Fork lever
22. Snap ring
23. Spacer
24. "O" ring
25. Rail
26. "O" ring
27. Pin
28. Shift lever
29. Knob

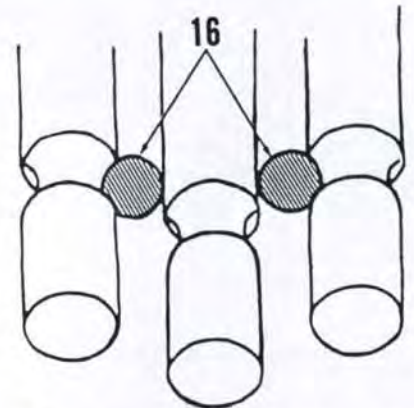


Fig. 104—Interlock balls (16) lie in a cross drilling between shift rails and prevent adjacent rail from moving whenever any rail is moved from neutral position.

- | | |
|--------------------|--------------------|
| 1. Snap ring | 31. Snap ring |
| 2. Reverse shaft | 32. Gear |
| 3. "O" ring | 33. Spacer |
| 4. Bushing | 34. Bearing |
| 5. Reverse gear | 35. Bearing |
| 6. Coupling | 36. Spacer |
| 7. Snap ring | 37. Needle bearing |
| 8. Bearing | 38. Snap ring |
| 9. Gear | 39. Cluster gear |
| 10. Shaft | 40. Pto shaft |
| 11. Snap ring | 41. Gear |
| 12. Spacer | 42. Bearing |
| 13. Needle bearing | 43. Oil seal |
| 14. Inner race | 44. Gasket |
| 15. Spacer | 45. Rear cover |
| 16. Gear | 46. Cap |
| 17. Spacer | 47. Cover |
| 18. Bearing | 48. Gasket |
| 19. Shim | 49. Nut |
| 20. Cover | 50. Bearing |
| 21. "O" ring | 51. Housing |
| 22. Oil seal | 52. Shims |
| 23. Cover | 53. "O" ring |
| 24. Gasket | 54. Spacer |
| 25. Bearing | 55. Needle bearing |
| 26. Gear | 56. Snap ring |
| 27. Gear | 57. Cluster gear |
| 28. Input shaft | 58. Gear |
| 29. Spacer | 59. Snap ring |
| 30. Needle bearing | 60. Bearing |
| | 61. Bevel pinion |

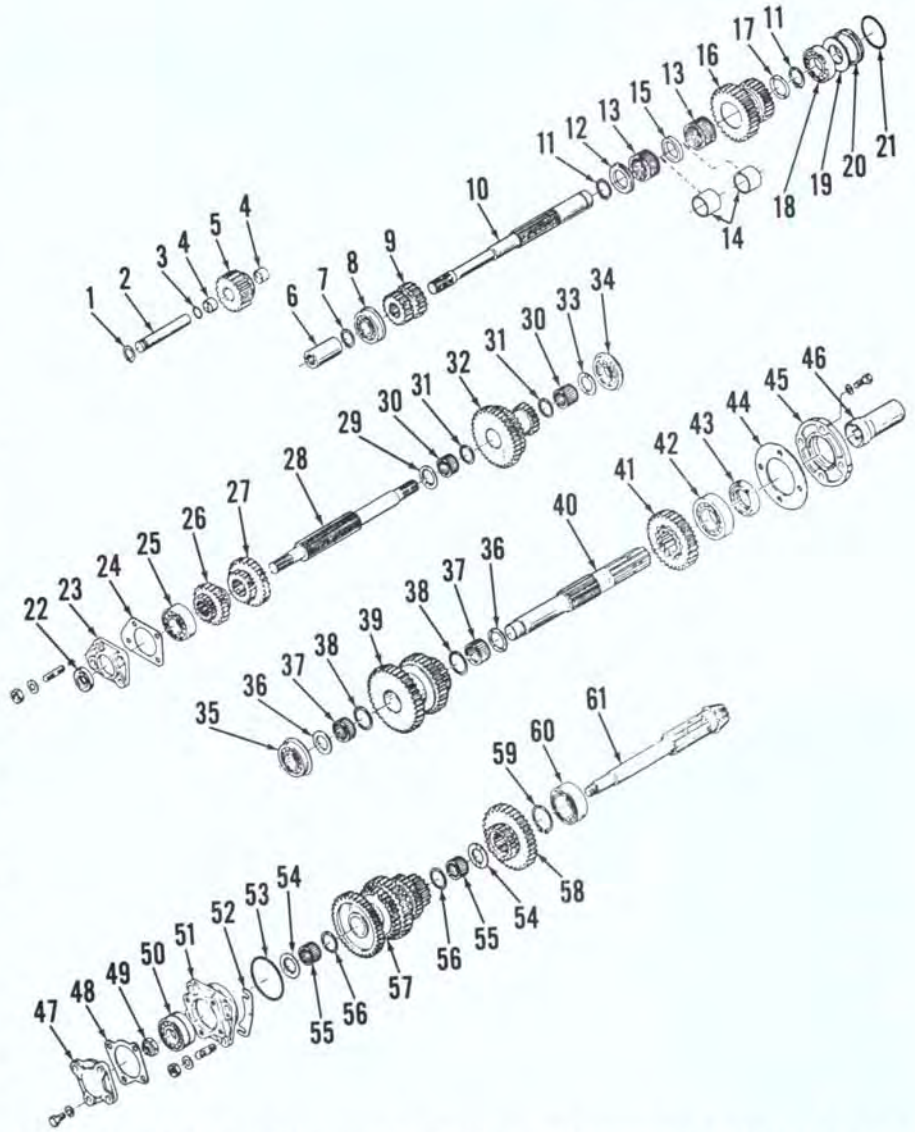


Fig. 105—Exploded view of transmission gears and shafts of the type used on Model L260. View shows relative installed position.

Keep shim pack (52) together and protect from damage. Shim pack controls mesh position of bevel gears and removed shim pack must be reinstalled or mesh position adjusted as outlined in paragraph 125. Check needle bearing races on pinion shaft and main cluster gear for chatter wear or scoring. Check thrust washers at front and rear of cluster gear.

Install output shaft assembly by reversing removal procedure. Install a new self-locking pinion shaft nut or degrease and install with "Loctite." Tighten pinion shaft nut securely.

118. **REVERSE IDLER.** Reverse idler shaft is retained by clutch housing flange and shaft can be withdrawn after split. Reverse idler gear bushings are renewable. Bushings and/or shaft should be renewed if diametral clearance exceeds 0.2mm (0.008 inch).

DIFFERENTIAL AND BEVEL GEARS

For the purposes of this manual, the term "DIFFERENTIAL" consists only of the case, side gears and differential pinions which provide independent motion to rear wheels. Bevel ring gear which attaches to and drives differential case is separately referred to (along with drive pinion) as the "Main Drive Bevel Gears".

REMOVE AND REINSTALL

Models L175-L225-L225DT

119. To remove differential and main drive bevel ring gear, first drain transmission. Wedge front axle to keep tractor from tipping, securely block up

rear of tractor and remove both final drive units as outlined in paragraph 133.

Remove seat and rockshaft housing. On models equipped with differential lock, drive out spring pin retaining differential lock cam. Withdraw pedal shaft while lifting out cam, shift fork and spring from top.

Remove three cap screws (X—Fig. 106) retaining each differential carrier bearing housing. Thread M8 cap screws in threaded holes (H) to serve as jack screws and tighten screws evenly to remove bearing housings. Tap housing gently to bounce it out if it binds. Save shim packs (3 and 12—Fig. 107) under each bearing housing flange and keep them identified. Shims control backlash of main drive bevel gears.



Fig. 106—To remove differential carrier bearing housings, remove three retaining screws (X) and thread two jack screws in holes (H).

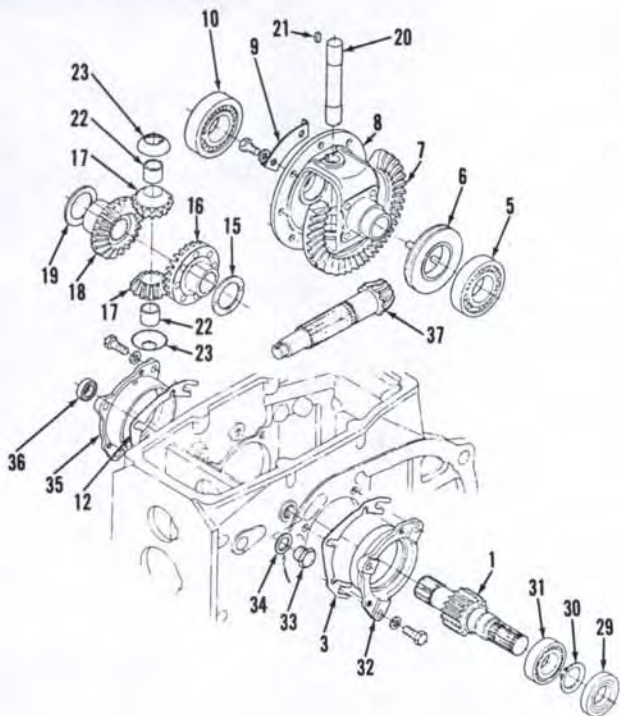


Fig. 107—Exploded view of main drive bevel gears, differential and associated parts used on Models L175, L225 and L225DT.

1. Bull pinion
3. Shims
5. Bearing
6. Differential lock coupler
7. Bevel ring gear
8. Differential case
9. Locking plate
10. Bearing
12. Shims
15. Thrust washer
16. Axle gear
17. Spider gear
18. Axle gear
19. Thrust washer
20. Cross shaft
21. Key
22. Bushing
23. Thrust washer
29. Oil seal
30. Snap ring
31. Bearing
32. Bearing housing
33. Plug
34. Gasket washer
35. Bearing housing
36. Oil seal
37. Bevel pinion

With bearing housings removed, lift differential and main drive bevel ring gear assembly straight up out of rear axle center housing.

Refer to paragraph 126 for overhaul procedure and to paragraph 104 for removal procedure of bevel pinion (transmission output shaft).

When reinstalling differential unit, use removed shim packs for routine reassembly, or check and adjust bevel gear backlash as outlined in paragraph 120. Complete tractor assembly by reversing disassembly procedure.

120. BACKLASH ADJUSTMENT.

Main drive bevel gear backlash should be 0.2-0.25mm (0.008-0.010 inch). Backlash is controlled by thickness of shim pack (12—Fig. 107) located under RIGHT bearing housing flange. Shims (3) on left side provide zero side play for the thrust type ball bearings, but bearings should not be preloaded.

If correct shim pack thickness is not approximately known, install differential unit and bearing housings (32 and 35), omitting shims. Tighten left bearing housing cap screws first until considerable backlash exists, then back off cap screws. Install a dial indicator with contact point bearing on side of bevel gear tooth and continue to check backlash as left bearing housing cap screws are tightened. When backlash is correct, measure shim gap between right bearing housing and center housing to measured gap. Shims (3 and 12) are available in thicknesses of 0.1, 0.2 and

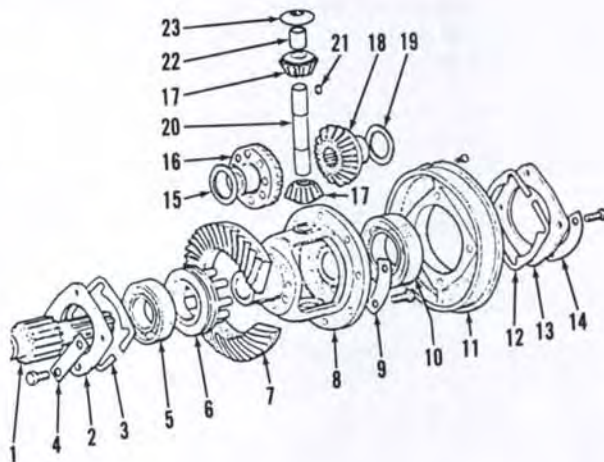
0.5mm (0.004, 0.008 and 0.020 inch). With right shim pack installed, tighten right cap screws (X—Fig. 106) to a torque of 48-54 N·m (35-40 ft.-lbs.). Tighten the opposite cap screws (X) on LEFT side to a torque of approximately 5.6 N·m (50 inch-pounds) to be sure bearings are seated in housings and recheck backlash. If backlash is still within limits, measure shim gap on left side, install shim pack of appropriate thickness and tighten left cap screws (X) to 48-54 N·m (35-40 ft.-lbs.).

Model L210

121. To remove differential and main drive bevel ring gear, first drain transmission and hydraulic system reservoir.

Fig. 108—Exploded view of final drive bevel gear, differential and associated parts used on Model L210.

1. Bull pinion
2. Retainer
3. Shims
4. Lock plate
5. Bearing
6. Differential lock coupler
7. Bevel ring gear
8. Differential case
9. Lock plate
10. Bearing
11. Bearing plate
12. Adjusting shims
13. Retainer
14. Lock plate
15. Thrust washer
16. Axle gear
17. Spider gear
18. Axle gear
19. Thrust washer
20. Cross shaft
21. Key
22. Bushing
23. Thrust washer



Remove seat and rockshaft housing, both brakes as in paragraph 144, both brake housings and both final drive bull pinions. Remove left final drive housing as outlined in paragraph 133.

Extract differential lock return spring, drive spring pin out of differential lock shift fork, withdraw shaft and lift out shift fork.

Remove screw retaining bearing plate (11—Fig. 108) in left side of transmission housing and remove differential and attached bevel ring gear along with bearing plate (11).

Refer to paragraph 126 for overhaul procedure, and to paragraph 110 for removal of bevel pinion (transmission output shaft).

When installing differential, first remove left bearing retainer (13) and shim pack (12). Install differential unit and bearing plate, adjust backlash as outlined in paragraph 122, then complete tractor assembly by reversing disassembly procedure.

122. BACKLASH ADJUSTMENT.

Main drive bevel gear backlash should be 0.15-0.2 mm (0.006-0.008 inch). Backlash is controlled by the 0.2 mm (0.008 inch) shims (3 and 12—Fig. 108) located behind each differential carrier bearing. Easiest way to check backlash is by using a dial indicator with pointer centered on one ring gear tooth, then measuring gear movement when ring gear is gently rocked. Another method is by running a lead wire through teeth then measuring thickness of wire.

When bevel gear has been removed as outlined in paragraph 121, install differential assembly and left bearing plate (11); then bump differential unit against right shim pack. To increase backlash, add shims (3) on right side; reduce backlash by removing shims. When backlash adjustment is correct, install left retainer (13) without shims and tighten two opposite cap screws finger

tight; then measure clearance between bearing plate (11) and retainer (13) using a feeler gage. Insert a shim pack equal in thickness to measured clearance, tighten all cap screws securely and lock in place by bending retainers against cap screw heads.

Model L260

123. To remove differential and main drive bevel ring gear, first drain transmission and hydraulic system reservoir. Wedge front axle to keep tractor from tipping, securely block up rear of tractor and remove both final drive units as outlined in paragraph 133.

Remove seat and hydraulic system reservoir. Remove differential lock pedal and bracket. Drive out spring pin securing differential lock shift fork to shaft and withdraw shaft about half way. Grasp differential lock return spring using a rag or heavy glove to prevent injury; then complete shaft removal, pulling partially compressed spring up out of housing as shaft is removed. Lift out differential lock shift fork.

Remove stud nuts securing bearing housings (28-Fig. 109) to transmission housing. Thread M8 cap screws in threaded holes at top and bottom of bearing housings to serve as forcing screws and remove housings by turning forcing screws alternately a little at a time. Remove shims (3) when they are free and keep in proper order for reassembly. Shims control backlash of bevel gears. Lift differential unit out top opening when bearing housings are removed.

Refer to paragraph 126 for overhaul procedure, and to paragraph 117 for removal of bevel pinion (transmission output shaft).

It is recommended that differential carrier bearing preload be checked and adjusted with main drive bevel pinion (transmission output shaft) removed. To check preload, install differential unit and right bearing housing (28) using removed shim pack (3). Install left bearing housing (28) without shims, tightening retaining stud nuts alternately and evenly a little at a time, turning differential assembly as housing retaining nuts are tightened. When correct preload (a slight rotational drag) is obtained, measure gap between left bearing housing and transmission housing using a feeler gage. Measure in four places, top, bottom, front and rear, then average the readings. Slack off stud nuts a slight amount and insert equal shim packs corresponding to the reading, at front and rear of bearing housing. Tighten stud nuts securely and recheck, making minor adjustments by adding or removing shims as required. Shims (3) are

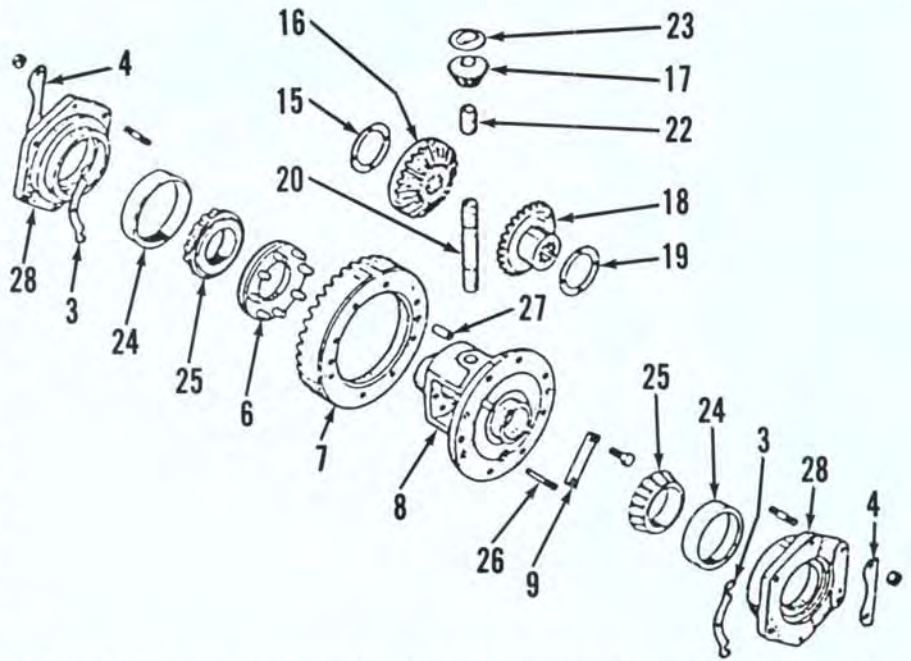


Fig. 109—Exploded view of differential and bevel ring gear used on Model L260. Refer to Fig. 108 for identification of parts except for the following.

- 24. Bearing cup
- 25. Bearing cone

27. Pin

28. Bearing housing

available in thicknesses of 0.1, 0.2 and 0.5 mm (0.004, 0.008 and 0.020 inch) and shims are interchangeable on right and left sides.

When bearing preload is established, shims (3) may be transferred from one side to the other to adjust backlash, but TOTAL shim pack thickness must not be changed. Reinstall main drive bevel pinion as outlined in paragraph 117 and proceed as outlined in paragraph 124. When backlash is adjusted, complete assembly by reversing disassembly procedure.

124. **BACKLASH ADJUSTMENT.** Main drive bevel gear backlash should be 0.2-0.25 mm (0.008-0.010 inch) and is controlled by thickness of shim pack (3-Fig. 109) located under LEFT carrier bearing retainer. Shims must be obtained from total shim pack established in adjusting carrier bearing preload. Shims (3) are available in thicknesses of 0.1, 0.2 and 0.5 mm (0.004, 0.008 and 0.020 inch).

If correct shim pack thickness is not approximately known, install differential unit and bearing housings (28), omitting shims. Tighten right bearing housing stud nuts first until considerable backlash exists, then back off nuts. Install a dial indicator with contact point bearing on side of bevel ring gear tooth and continue to check backlash as left bearing housing stud nuts are evenly tightened. When backlash is correct, fill gap between left bearing housing flange and transmission housing with shims.

Put all of remaining shims on right side, tighten all stud nuts securely and recheck. Make minor adjustments as necessary by transferring shims.

MESH POSITION

All Models

125. Proper meshing of main drive bevel gears depends on position of drive pinion as well as ring gear backlash. Pinion adjustment is controlled by thickness of shim pack (32-Fig. 97), (46-Fig. 102) or (52-Fig. 105). Shims are available in thickness of 0.2 mm (0.008 inch) only, for Model L210; or thicknesses of 0.1, 0.2 or 0.5 mm (0.004, 0.008 or 0.020 inch) for other models.

If no parts are changed when reassembling transmission, assemble tractor using removed shim pack. If parts are changed, make a trial

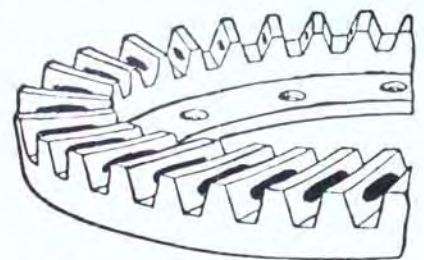


Fig. 110—Tooth contact pattern should center on tooth profile as shown.

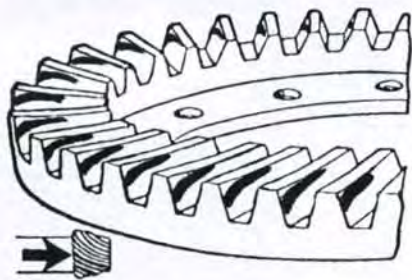


Fig. 111—If heavy contact area is at heel or tip of tooth, remove shims as shown.

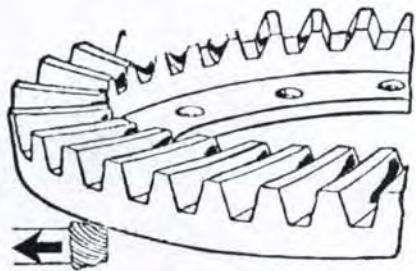


Fig. 112—If heavy contact area is at base or toe of tooth, add shims as shown.

assembly using removed shim pack or one of equal thickness. Temporarily install bevel ring gear, adjusting backlash as outlined in paragraph 120, 122 or 124. Paint pressure side of ten ring gear teeth and turn past pinion in normal direction of rotation; then check tooth contact pattern using Figs. 110, 111 and 112 as a guide. Contact should center on tooth profile as shown in Fig. 110. If heavy contact area is at heel or tip of tooth as shown in Fig. 111, move drive pinion toward ring gear by removing shims, then reset backlash. If heavy contact area is at base or toe of tooth as shown in Fig. 112, move drive pinion away from ring gear by adding shims, then reset backlash.

With tooth contact pattern and backlash both correctly adjusted, complete assembly as outlined in appropriate paragraphs.

OVERHAUL

All Models

126. An exploded view of differential and main drive bevel ring gear is shown in Fig. 107, 108, or 109. To disassemble, first unbolt and lift off main drive bevel gear (7). On Model L260, it is necessary to remove locking screw pin (26—Fig. 109) before cross shaft (20) can be removed. On other models, shaft can be bumped out toward keyed side when ring gear is removed. Differential spider gears (17) and axle side gears (16 and 18)

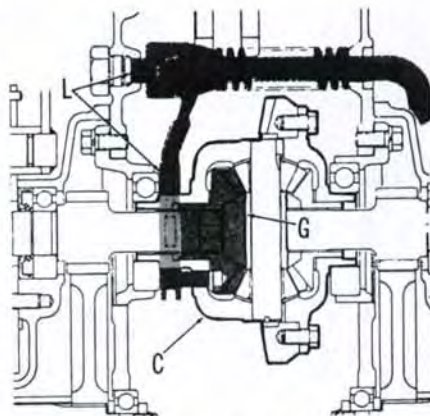


Fig. 113—Differential lock secures one axle gear to case as shown, causing differential and both final drives to turn together as a unit.

- C. Differential case
- G. Axle gear
- L. Differential lock coupler & linkage

can be removed when cross shaft is out. Maximum allowable clearance of side gear (16 or 18) in differential case is 0.4 mm (0.016 inch) for Models L210 or L260; or 0.3 mm (0.012 inch) for other models. Maximum allowable clearance of differential spider gears (17) on cross shaft (20) is 0.4 mm (0.016 inch) for Models L210 or L260; or 0.3 mm (0.012 inch) for other models. Correct by renewing parts concerned. Check also for wear or scoring of thrust washers, wear or scoring of differential case (8) or wear or chipping of any gears.

Tighten ring gear retaining cap screws to a torque of 61-68 N·m (45-50 ft.-lbs.) for Model L260; or 48-54 N·m (35-40 ft.-lbs.) for other models. On all models, lock in place by bending locks against flats of cap screw heads.

Fig. 115—Exploded view of differential lock mechanism used on Model L210.

- 1. Bellcrank
- 2. Bushing
- 3. Pin
- 4. Bellcrank holder
- 5. "O" ring
- 6. Differential lock coupler
- 7. Rail
- 8. Differential case
- 9. Fork
- 10. Pin
- 11. Spring
- 12. Gasket
- 13. Bearing housing
- 14. Gasket
- 15. Plug
- 16. Axle gear
- 17. Gasket
- 18. Cap screw
- 19. Rod
- 20. Turnbuckle
- 21. Locknut
- 22. Rod
- 23. Snap ring
- 24. Washer
- 25. Lock pedal
- 26. Flat washer
- 27. Cotter key
- 28. Bushing
- 29. Shaft
- 30. Tab washer

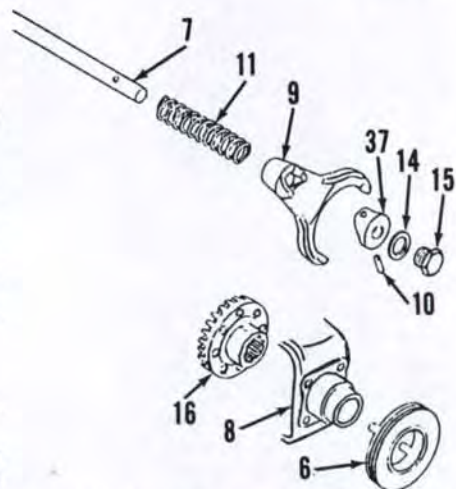


Fig. 114—Exploded view of differential lock mechanism used on Models L175, L225 and L225DT so equipped.

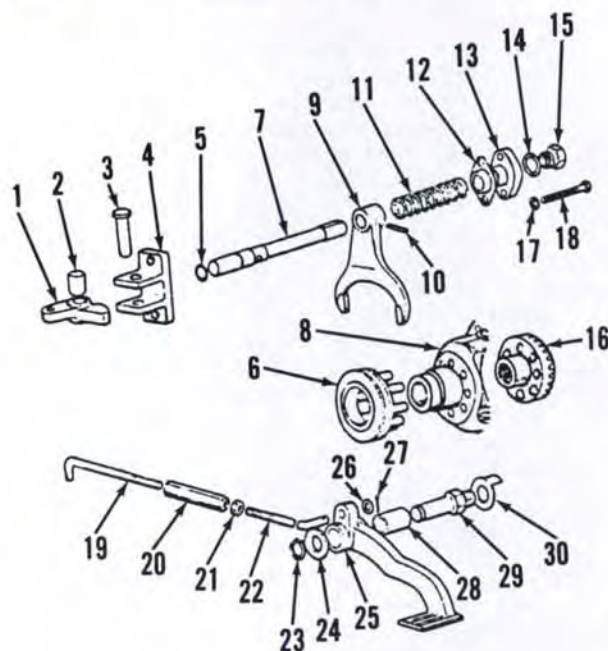
- 6. Differential lock coupler
- 7. Rail
- 8. Differential case
- 9. Fork
- 10. Pin
- 11. Spring
- 14. Gasket
- 15. Plug
- 16. Axle gear
- 37. Cam

DIFFERENTIAL LOCK

On all models, differential lock coupler mounts on differential case and, when pedal is pushed, axle gear is locked to differential case by pins machined on differential lock coupler. With one axle gear locked, differential turns as a unit and rear wheels turn together regardless of traction. Refer to Fig. 113.

Models L175-L225-L225DT

127. **ADJUSTMENT.** Differential lock mechanism is not adjustable.



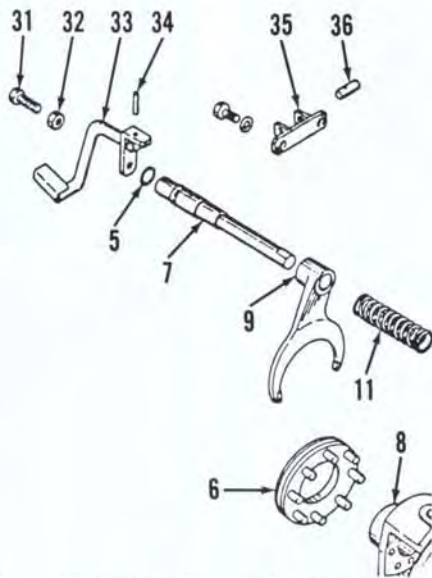


Fig. 116—Exploded view of differential lock mechanism used on Model L260. Refer to Fig. 115 for identification of parts except for the following.

31. Adjusting screw	34. Pin
32. Locknut	35. Pedal holder
33. Actuating pedal	36. Pin

128. REMOVE AND REINSTALL. To remove differential lock actuating mechanism, first remove seat and rockshaft housing. Remove plug (15—Fig. 114) from left side of rear axle center housing. Extract retaining spring pin (10) from actuating cam (37) and withdraw actuating rail (7) from left side, lifting out cam (37), fork (9) and

spring (11) as they are free. Differential lock coupler (6) is mounted on differential case and can only be removed after differential unit is removed as outlined in paragraph 119.

To install differential lock actuating mechanism, reverse removal procedure.

Model L210

129. ADJUSTMENT. Refer to Fig. 115 for exploded view. Pedal pad should clear step plate by 45-50 mm (1-13/16 - 2 inches) when differential lock is released. Adjust by turning turnbuckle (20) until pedal height is correct.

130. REMOVE AND REINSTALL. External linkage can be disassembled at any time without interference with other tractor components.

To remove shift fork (9—Fig. 115) or rail, first drain hydraulic system and remove seat and rockshaft housing. Remove spring pin retaining fork to rail while rail is solidly supported; unbolt and lift off left bearing housing (13) and extract return spring. Disconnect pedal linkage and rock actuating bellcrank (1) out of the way, then push rail (7) out right side of housing while lifting fork out top opening. Differential lock coupling (6) is mounted on differential case and can only be removed after differential unit is removed as outlined in paragraph 123.

To install differential lock mechanism, reverse removal procedure. After tractor is assembled, adjust pedal height as outlined in paragraph 129.

Model L260

131. ADJUSTMENT. No operating adjustment is required, but when unit is installed, adjusting screw (31—Fig. 116) must be turned in until spring load is removed from fork (9) and coupler (6).

If adjustment is required with tractor assembled, back out locknut on adjusting screw (31). Back out adjusting screw until some pedal free play exists; turn adjusting screw in until all free play is removed, turn screw in one more full turn, then secure by tightening locknut.

132. REMOVE AND REINSTALL. To remove differential lock actuating shaft, fork and associated parts, first drain hydraulic system and remove seat and hydraulic system reservoir (rockshaft housing). Unbolt and remove actuating pedal and mounting bracket as a unit. Grasp spring (11—Fig. 116) with gloved hand or a rag, then withdraw rail (7) out right side of housing while lifting spring and fork out top opening. Differential lock coupler (6) is mounted on differential case and can only be removed after differential unit is removed as outlined in paragraph 123.

To install differential lock actuating mechanism after differential is installed, position fork in coupling and insert rail through right side opening until it extends a short distance through installed fork. Tip spring and install right end over protruding rail, then compress spring by hand until left end enters housing. Slide rail fully into position and install pedal and bracket assembly. Adjust pedal if necessary as outlined in paragraph 131.

FINAL DRIVE

REMOVE AND REINSTALL

All Models

133. To remove either final drive assembly, suitably support rear of tractor and remove rear wheel and fender. Drain transmission. Remove interfering lift links. Remove brake as outlined in paragraph 143 or 144. On Model L210 left final drive, remove differential lock left bearing housing and extract spring. On all models except L260, withdraw final drive bull pinion. On Model L260, bull pinion will remain with final drive housing and inner bearing is pulled from differential carrier bearing housing as final drive housing is removed.

On all models, support final drive housing from a hoist, remove attaching cap screws and stud nuts and swing final drive housing, rear axle and bull gear

away from tractor frame. On Models L175, L225 and L225DT, inner bearing runs in a bore (B—Fig. 117) in transmission housing. It may be necessary to remove rockshaft housing to push axle out if bearing sticks, or to realign bearing with bore when reinstalling.

Install final drive unit by reversing removal procedure. Tighten flange cap screws and stud nuts to a torque of 75-88 N·m (55-65 ft.-lbs.).

bull gear, first remove final drive unit as outlined in paragraph 133. Remove nut from inner end of axle shaft, then

OVERHAUL

Models L175-L225-L225DT

134. FINAL DRIVE BULL GEARS. Refer to Fig. 118 for an exploded view. Bull pinion and bearing can be withdrawn after removing brake as outlined in paragraph 143. To remove



Fig. 117—On Models L175, L225 and L225DT, rear axle inner bearing runs in bore (B) in rear axle center housing.

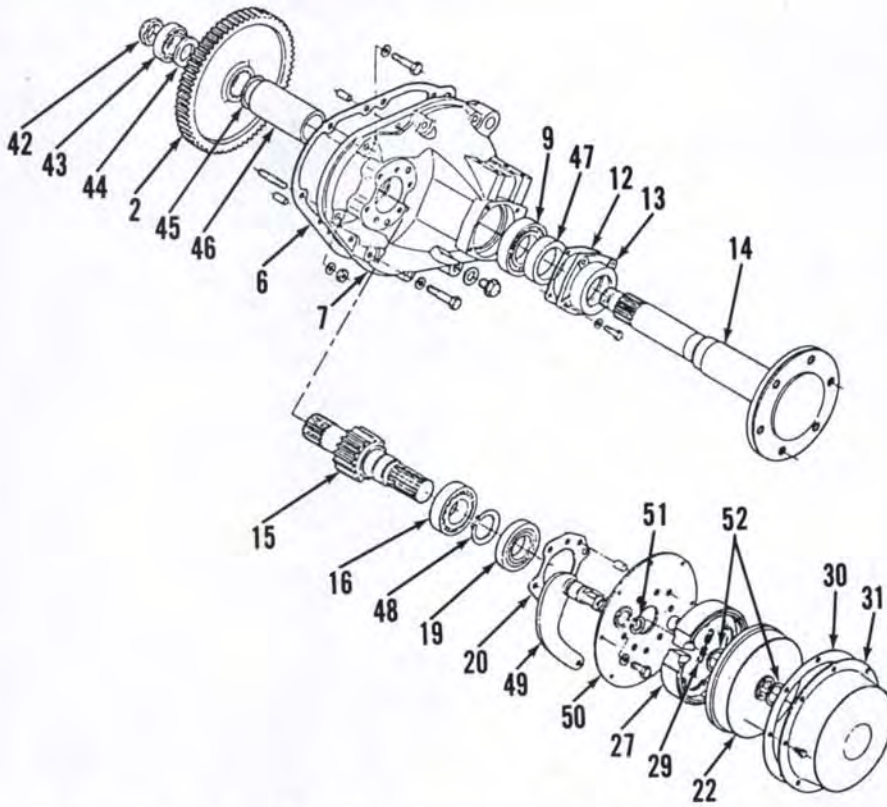


Fig. 118—Exploded view of final drive assembly used on Models L175, L225 and L225DT.

- | | | | |
|----------------|-----------------|-------------|---------------------------|
| 2. Gear | 15. Bull pinion | 30. Gasket | 47. Oil seal |
| 6. Gasket | 16. Bearing | 31. Cover | 48. Snap ring |
| 7. Case | 19. Oil seal | 42. Nut | 49. Actuating lever & cam |
| 9. Bearing | 20. Gasket | 43. Bearing | 50. Backing plate |
| 12. Gasket | 22. Drum | 44. Washer | 51. Snap ring |
| 13. Cover | 27. Brake shoe | 45. Shim | 52. Snap ring |
| 14. Axle shaft | 29. Spring | 46. Spacer | |

remove inner bearing and gear. When installing bull gear, tighten axle nut to a torque of 197-224 N·m (145-165 ft.-lbs.) and lock in place by bending washer against flat of axle nut.

135. AXLE SHAFT AND BEARINGS. Refer to Fig. 118 for exploded view. To remove rear axle shaft and bearings, first remove final drive unit as outlined in paragraph 133 and final drive bull gear as in paragraph 134. Unbolt outer retainer cap and bump axle outward out of housing.

Press axle shaft out of outer bearing and remove seal housing and seal. Install new seal in retainer with spring-loaded lip toward bearing. Both wheel axle bearings are lubricated by the transmission fluid.

Model L210

136. FINAL DRIVE BULL GEARS. Bull pinion and bearing can be withdrawn after removing brake as outlined in paragraph 144. To remove bull gear, first remove final drive unit as outlined in paragraph 133, remove retaining snap ring and slide gear from splined inner end of axle shaft. Refer to Fig. 119 for an exploded view of final drive unit.

137. AXLE SHAFT AND BEARINGS. To remove rear axle shaft and bearings, first remove final drive unit as outlined in paragraph 133 and final drive bull gear as in paragraph 136. Refer to Fig. 119 for exploded view. Unbolt outer retainer cap and bump axle outward out of housing. Press axle shaft out of outer bearing. Remove snap ring and inner bearing from housing, and renew the three shaft seals. Inner seal is installed with lip towards inner bearing and outer seals are installed back-to-back with lips to outside as shown in Fig. 120.

Outer wheel bearing should be packed with a suitable non-fibrous wheel bearing grease when installed; inner bearing is lubricated with transmission fluid.

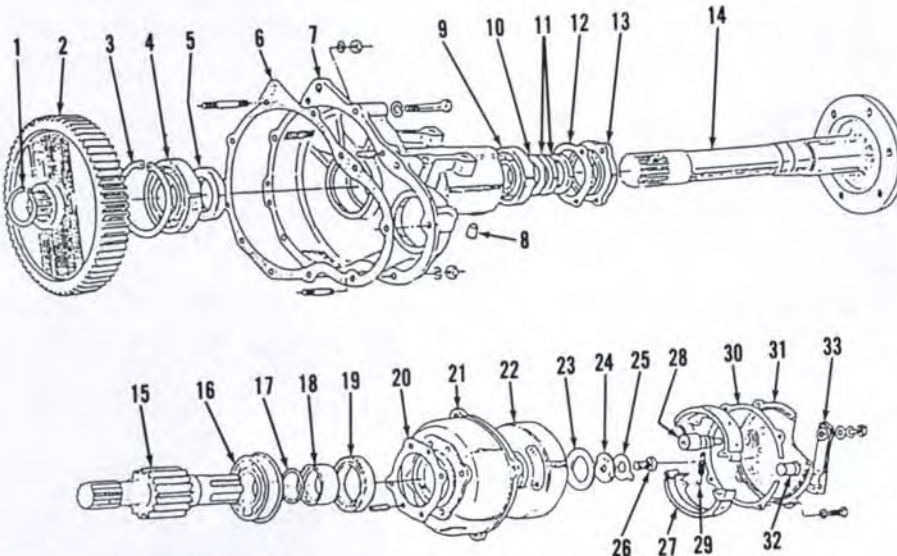


Fig. 119—Exploded view of final drive unit and associated parts used on Model L210.

- | | | | |
|--------------|-----------------|--------------------|---------------------|
| 1. Snap ring | 10. Spacer | 18. Sleeve | 26. Cap screw |
| 2. Gear | 11. Seals | 19. Oil seal | 27. Brake shoe |
| 3. Snap ring | 12. Gasket | 20. Gasket | 28. Brake cam |
| 4. Bearing | 13. Cover | 21. Brake case | 29. Spring |
| 5. Oil seal | 14. Axle shaft | 22. Drum | 30. Gasket |
| 6. Gasket | 15. Bull pinion | 23. Washer | 31. Cover |
| 7. Case | 16. Bearing | 24. Locking washer | 32. Anchor pin |
| 8. Plug | 17. "O" ring | 25. Tab washer | 33. Actuating lever |

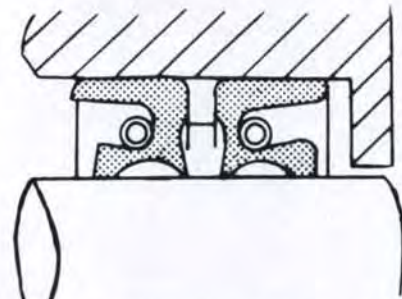


Fig. 120—On Models L210 and L260, the two outer axle seals (11—Fig. 119 or 121) are installed back to back as shown in cross-sectional view.

Model L260

138. FINAL DRIVE BULL GEARS. Refer to Fig. 121 for an exploded view of final drive assembly. To remove final drive bull gears, first remove final drive assembly as outlined in paragraph 133. Remove cap screws securing bull pinion outer bearing retainer to final drive housing and bump bull pinion and bearings to inside and out of housing bore.

Bull gear can be removed after bull pinion is out. Bend down tab of locking washer and remove nut, then remove gear from splined inner end of main axle shaft. When installing bull gear, tighten axle nut to a torque of 197-224 N·m (145-165 ft.-lbs.) and lock in place by bending washer against flat side of nut.

139. AXLE SHAFT AND BEARINGS. Refer to Fig. 121 for an exploded view of final drive assembly. To remove rear axle shaft and bearings, first remove final drive unit as outlined in paragraph 133 and final drive bull gear as in paragraph 138. Unbolt outer retainer cap and bump axle outward out of housing.

Press axle shaft out of outer bearing and remove seal housing and seals. Inner bearing will not need to be removed from housing unless renewal is indicated. Seals are installed in outer retainer back-to-back as shown in Fig. 120, with spacer collar placed between seals. Both wheel axle bearings are lubricated by transmission fluid.

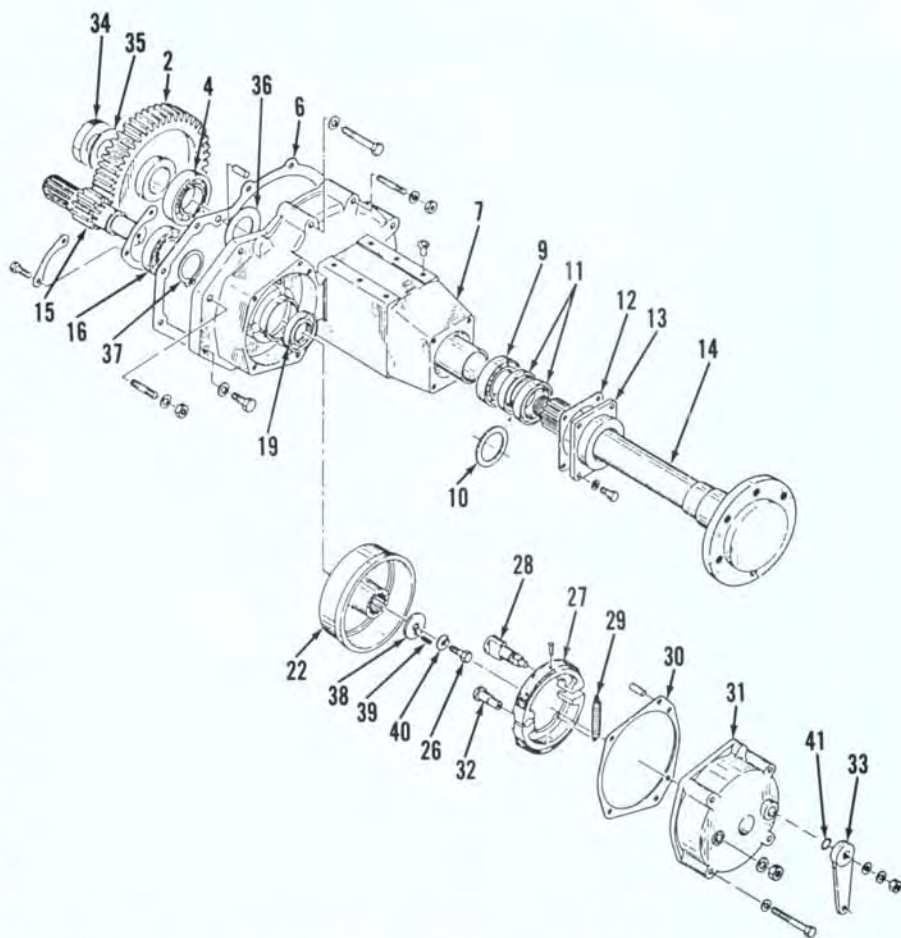


Fig. 121 — Exploded view of final drive assembly used on model L260. Refer to Fig. 119 for identification of parts except for the following.

- | | | | |
|------------|------------|---------------|----------------|
| 34. Nut | 38. Washer | 36. Washer | 40. Lockwasher |
| 35. Washer | 39. Pin | 37. Snap ring | 41. "O" ring |

BRAKES

ADJUST

Models L175-L225-L225DT

140. Individual shoe-type brakes should fully apply when pedals are depressed 15-30 mm (5/8-1 1/8 inches). Adjustment is made by turning turnbuckle (T—Fig. 122) located on each brake rod.

Both brakes must engage equally when pedals are depressed at same time or when pedals are locked together.

Model L210

141. Individual shoe-type brakes should fully apply when total movement measured at pedal pad is 15-20 mm (5/8-3/4 inch). Adjustment is made by turning adjusting nut at rear of brake rod until adjustment is correct.

Both brakes must engage equally

when pedals are depressed at same time or when both pedals are locked together.

Model L260

142. Individual shoe-type brakes should fully apply when pedals are depressed 15-20 mm (5/8-3/4 inch) measured at pedal pad. Adjust by turning turnbuckle located on each brake rod.

Both brakes must engage equally when pedals are depressed at same time or when pedals are locked together.

REMOVE AND REINSTALL

Models L175-L225-L225DT

143. To remove either brake assembly, remove brake cover (31—Fig. 118). Remove outer snap ring (52) and lift off

brake drum (22). Brake shoes and actuator can be examined at this time. Backing plate (50) must be removed for access to seal (19); or bull pinion shaft and bearing.

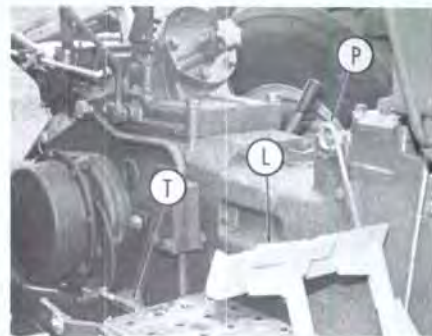


Fig. 122 — View of brake pedals and linkage used on Models L175, L225 and L225DT, showing lock (L), park lock (P) and adjusting turnbuckle (T).

Overhaul removed brake as outlined in paragraph 145 and reinstall by reversing removal procedure. Adjust brakes as outlined in paragraph 141 or 142.

Models L210-L260

144. To remove either brake assembly, disconnect link rod and remove cap screws retaining brake cover. Brake shoes and actuator will be removed with brake cover, and can be examined or renewed at this time. Drain down transmission or elevate side of tractor before removing brake drum.

On Model L210, brake housing and bull pinion shaft can be removed after brake drum is removed. Housing is doweled in place and retained by four cap screws. It may be necessary to bump housing off of final drive housing after cap screws are removed. On Model L260, bull pinion shaft can only be removed after removing final drive assembly as outlined in paragraph 133; however oil seal can be pried out of final drive housing and renewed, with brake drum off.

On all models, overhaul brake as outlined in paragraph 145 and reinstall

by reversing removal procedure. Adjust brakes as outlined in paragraph 141 or 142.

OVERHAUL

All Models

145. Brake lining should be renewed when worn to within 0.3 mm (0.012 inch) of rivet heads. Maximum allowable worn diameter of brake drum is 142 mm (5.590 inch) for Model L210, 152 mm (5.984 inch) for Model L260; or 147 mm (5.787 inch) for other models. Check actuating cam and contact area of shoes for wear or scoring. Upper and lower brake shoes are not interchangeable.

POWER TAKE-OFF

Models L175-L225-L225DT

146. REMOVE AND REINSTALL. Procedure for removing pto countershaft is given in paragraph 101. Procedure for removing pto output shaft is given in paragraph 105. Refer to paragraph 99 for removal or overhaul of pto shift mechanism.

147. **OVERRUNNING CLUTCH.** Models L225 and L225DT tractors are equipped with an overrunning clutch assembly which is used in place of splined coupler and which allows pto output shaft to continue to turn without pushing tractor forward when clutch is depressed. Overrunning clutch can be removed after splitting tractor between transmission and rear axle center housing. Refer to Fig. 123 for exploded view.

With clutch installed on pto countershaft spline, body and hub assembly should turn freely and smoothly in a clockwise direction but should not turn counterclockwise. If trouble is experienced, disassemble and thoroughly

Fig. 124—Exploded view of power take-off gears, shafts and associated parts used on Model L210.

- 14. Input shaft
- 17. Coupling
- 18. Snap ring
- 19. Bearing
- 20. Gear
- 21. Splined shaft & gear
- 22. Bearing
- 29. Cap screw
- 30. Washer
- 31. Washer
- 32. Bearing
- 33. Snap ring
- 34. Pto gear
- 35. Bearing
- 36. "O" ring
- 37. Sleeve
- 38. Oil seal
- 39. Pto shaft
- 72. Pin
- 73. "O" ring
- 74. Plug
- 75. Gasket
- 76. Bearing retainer
- 77. Shield
- 78. Protective cap

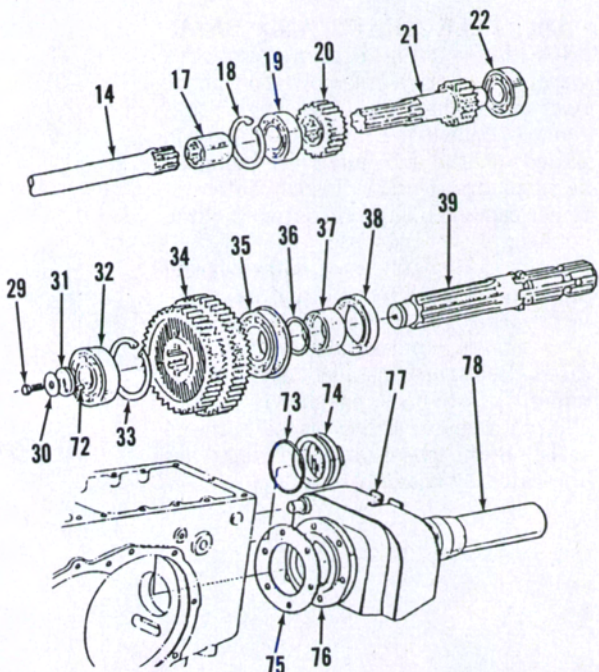


Fig. 125—Exploded view of pto shift mechanism used on Model L210.

- 1. Knob
- 2. Shift lever
- 3. Locknut
- 4. Retainer
- 5. Ball
- 6. Spring
- 7. Shift arm
- 8. Bushing
- 9. Pivot shaft
- 10. Cotter key
- 11. Flat washer
- 12. Clevis
- 13. Pin
- 14. Locknut
- 15. Rod
- 16. "O" ring
- 17. Pin
- 18. Lever
- 19. Flat washer
- 20. Cotter key
- 21. Shift fork
- 22. Spring
- 23. Ball
- 24. Fork lever
- 25. Rail
- 26. Set screw
- 27. "O" ring

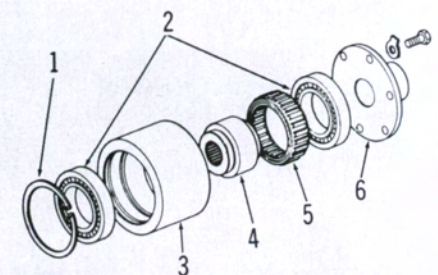
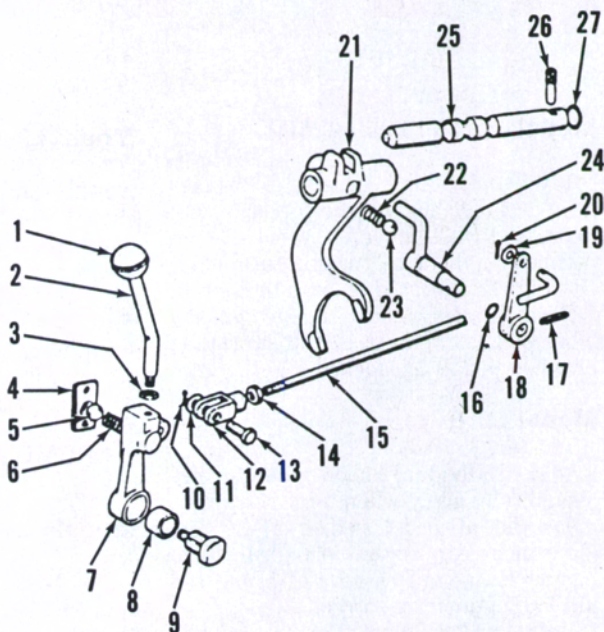


Fig. 123—Exploded view of pto over-running clutch which takes the place of coupling (37—Fig. 97) on tractor Models L225 and L225DT.

- 1. Snap ring
- 2. Bearing
- 3. Housing
- 4. Floating hub
- 5. Sprag clutch
- 6. Fixed hub

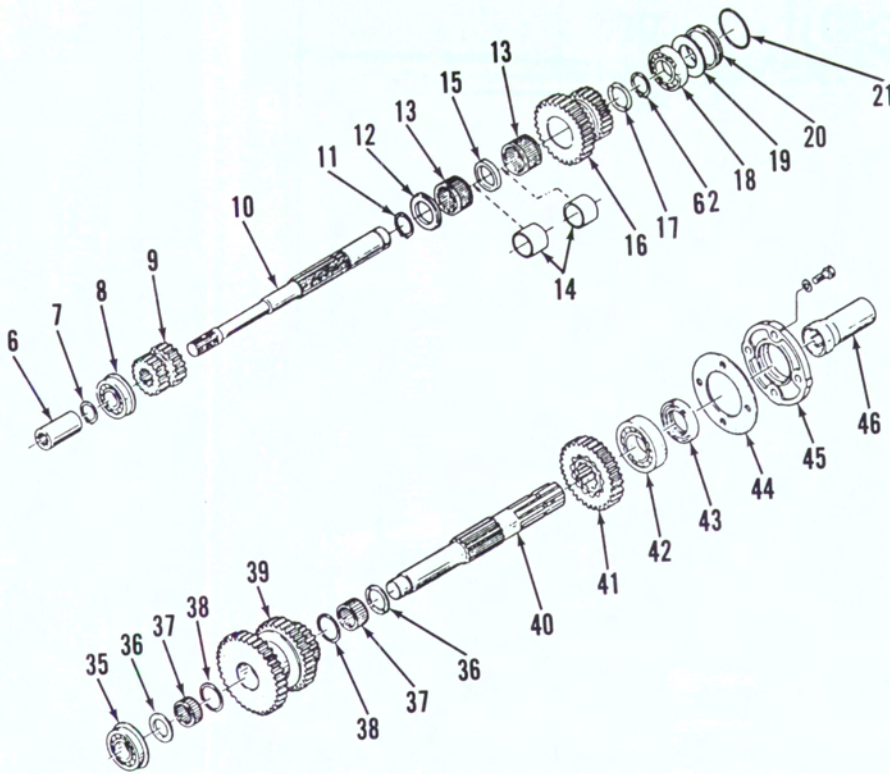


Fig. 126—Exploded view of pto gears, shafts and associated parts used on Model L260. Unseat snap rings (7 and 11) in sequence given in paragraph 149 when disassembling unit.

- | | | |
|--------------------|--------------------|------------------|
| 6. Coupling | 16. Gear | 39. Cluster gear |
| 7. Snap ring | 17. Spacer | 40. Pto shaft |
| 8. Bearing | 18. Bearing | 41. Gear |
| 9. Gear | 19. Shim | 42. Bearing |
| 10. Shaft | 20. Cover | 43. Oil seal |
| 11. Snap ring | 21. "O" ring | 44. Gasket |
| 12. Spacer | 35. Bearing | 45. Rear cover |
| 13. Needle bearing | 36. Spacer | 46. Cap |
| 14. Inner race | 37. Needle bearing | 62. Snap ring |
| 15. Spacer | 38. Snap ring | |

clean unit. Examine internal clutch surface of housing and outer surface of floating splined hub for ridging or scoring. Renew sprag unit, hub and housing if damage is found. Engaging action will be reversed if sprag unit is reversed. Check for correct rotation as previously outlined when unit is reassembled.

Model L210

148. REMOVE AND REINSTALL. To remove pto gears, shafts or shift mechanism, first drain hydraulic system reservoir and transmission housing. Remove rockshaft housing and pto output shaft seal retainer.

Remove dog-point set screw retaining pto shift rail and move rail rearward out of transmission housing, capturing detent ball and spring as rail is removed. Lift out shift fork.

Using a plastic drift and hammer, bump pto input shaft rearward forcing plug from housing bore. Withdraw shaft from rear while lifting large input gear out top opening.

Remove cap screw and washer from front end of pto output shaft, then bump shaft rearward out of housing, lifting sliding gear out top opening as shaft is removed.

Renew oil seal, sealing "O" rings and any other parts that are worn, damaged or questionable, and assemble by reversing removal procedure.

Model L260

149. REMOVE AND REINSTALL. To remove pto gears, shafts or shift mechanism, first drain hydraulic system reservoir and transmission housing. Remove rockshaft housing and pto output shaft seal retainer.

Unseat snap ring (11—Fig. 126) in front of pto output counter gear, then bump pto input shaft rearward until rear bearing is unseated from housing bore and front bearing is unseated from shaft. Remove front snap ring (7) and withdraw shaft rearward while lifting gears out top opening.

Bump pto output shaft rearward until rear bearing is unseated from housing and front bearing is unseated from shaft, then withdraw shaft rearward, lifting gears out top opening.

To remove shift rail or forks, it is first necessary to remove left final drive housing for access to locating screw (10—Fig. 127).

Renew oil seal, sealing "O" rings and any other parts that are worn, damaged or questionable, and assemble by reversing removal procedure.

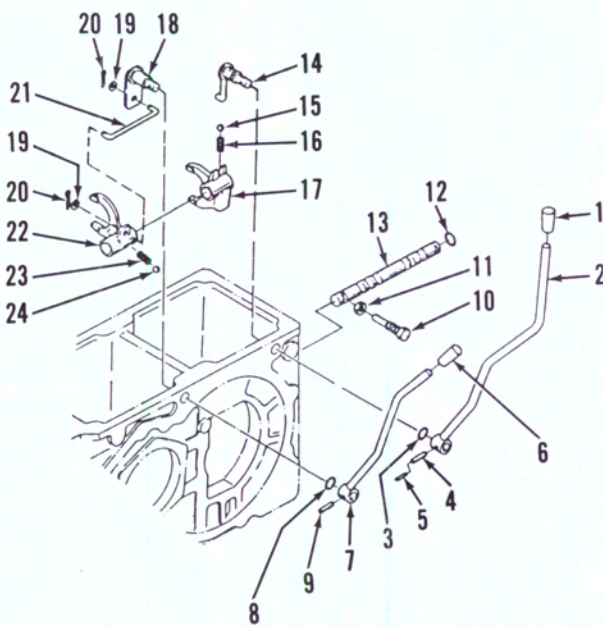


Fig. 127—Exploded view of dual pto shift levers used on Model L260. Locating set screw (10) is situated inside left final drive housing.

1. Grip
2. Shift lever
3. "O" ring
4. Pin
5. Pin
6. Grip
7. Shift lever
8. "O" ring
9. Pin
10. Locating set screw
11. Locknut
12. "O" ring
13. Rail
14. Fork lever
15. Ball
16. Spring
17. Fork
18. Lever
19. Washer
20. Cotter key
21. Linkage rod
22. Fork
23. Spring
24. Ball

HYDRAULIC LIFT SYSTEM

FLUID AND FILTERS

inlet strainer removed and cleaned at each fluid change.

changed every 300 hours and inlet strainer cleaned at each fluid change. Make sure all "O" rings are in perfect shape when reinstalling filter screen to prevent air leaks in intake line.

Models L175-L225-L225DT

150. Transmission and differential lubricant serves as hydraulic fluid and transmission housing is fluid reservoir. Reservoir capacity is 22.04 liters (5.8 gallons) on Models L175 and L225 and 22 liters (5.75 gallons) on Model L225DT and recommended fluid is SAE 80 transmission and hydraulic fluid. An intake strainer is located beneath access plate (F—Fig. 128) on left side of final drive housing directly opposite pump intake line and a fluid level plug (L) is located on left side of transmission housing. Transmission and hydraulic fluid should be changed every 300 hours and

Model L210

151. Hydraulic system reservoir is located in front compartment of fuel tank as shown at (H—Fig. 129). Fluid capacity is 7.03 liters (7.39 qt.) and recommended operating fluid is #140 Turbine Oil, Automatic Transmission Fluid, Type A, or a branded hydraulic oil of approximately SAE 20 weight. An intake strainer screen is located in filler plug opening and a fluid level line is marked on screen. Hydraulic fluid should be changed every 300 hours and inlet strainer cleaned at each fluid change.

Model L260

152. Hydraulic system reservoir is located in rockshaft housing. Fluid capacity is 6 liters (6.3 qt.) and recommended operating fluid is #140 Turbine Oil, Automatic Transmission Fluid, Type A, or a branded hydraulic oil of approximately SAE 20 weight. Correct level is 40 mm (approx. 1 1/2 inches) below top of ram cylinder when viewed through filler plug hole. An intake strainer is located beneath an access plate on top of reservoir as shown in Fig. 130. Hydraulic fluid should be

ADJUSTMENT

Models L175-L225-L225DT

153. **POSITIONING STOPS.** Positioning stops (U & D—Fig. 131) can be moved on linkage rod to manually return control lever to neutral at preset rockshaft position. Transport stop (U) should be set to neutralize valve when ends of rockshaft lift arms are 5-10 mm (1/4–1/2 inch) below full lift limit. Transport stop should not normally be moved. Working depth stop (D) can be moved as desired. System provides no automatic (feedback) correction to compensate for leakage.

154. **SYSTEM PRESSURE.** Hydraulic system operates under a normal back pressure of 296.7 kPa (43 psi). System relief pressure should be 11.73 MPa (1700 psi). To check relief pressure, install a suitable pressure gage in port plug on hydraulic cylinder head as

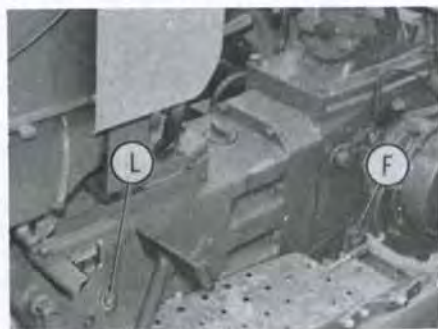


Fig. 128—On Models L175, L225 and L225DT, inlet oil filter is located beneath access plate (F). Fluid level plug is shown at (L).



Fig. 129—On Model L210, hydraulic fluid reservoir is built into front of fuel tank as shown at (H).



Fig. 130—On Model L260, inlet oil pipe and filter is located beneath plate enclosed in circle. Refer to Fig. 151 for cross-sectional view.



Fig. 132—To check relief pressure, a pressure gage can be installed in hydraulic cylinder head as shown.



Fig. 131—View of rockshaft linkage rod used on Models L175, L225 and L225DT. Transport stop (U) is permanently set for most jobs; depth stop (D) is adjusted to required working depth.



Fig. 133—View of rockshaft linkage rod used on Model L210, showing transport stop (U) and adjustable depth stop (D).

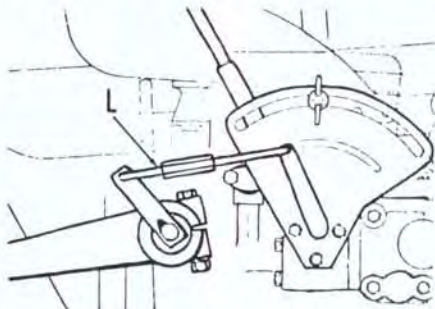


Fig. 134—On Model L260, rockshaft feedback linkage is adjusted at turnbuckle on link (L).

shown in Fig. 132. Temporarily loosen transport stop (U—Fig. 131). Run engine at about half throttle and move hand lever to raising position; rockshaft should raise and gage pressure should rise to specified relief pressure. Hold hand lever in RAISE position for ten seconds. Gage pressure should remain steady; a substantial drop in pressure would indicate a worn pump or serious pressure leak. If a pressure gage is not available, lifting capacity at tip of lower links should be 600 kg (1325 pounds).

To adjust relief pressure, it is first necessary to remove lift cover and turn adjusting screw (46—Fig. 148) on control valve body. DO NOT hold relief valve open longer than 15 seconds. Reset transport stop after pressure has been adjusted or checked.

Model L210

155. LIFT POSITIONING STOPS.

Positioning stops (U & D—Fig. 133) can be moved on linkage rod to manually return control lever to neutral at a preset rockshaft position. Transport stop (U) should be set to neutralize valve just before rockshaft piston reaches end of its stroke and should not normally be moved. Working depth stop (D) can be moved as desired. System provides no automatic (feedback) correction to compensate for leakage.



Fig. 135—On Models L175, L225 and L225DT, hydraulic system pump is mounted on right side of cylinder block as shown.

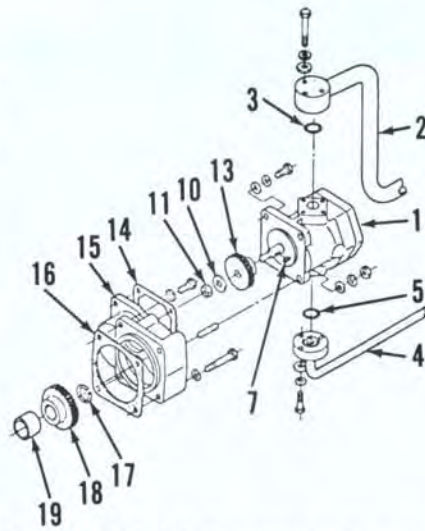


Fig. 136—Exploded view of hydraulic pump, drive housing and lines used on Models L175, L225 and L225DT. The assembly is viewed from engine side.

- | | |
|------------------|----------------------|
| 1. Pump assy. | 13. Driven pump gear |
| 2. Supply line | 14. Gasket |
| 3. "O" ring | 15. Drive housing |
| 4. Pressure line | 16. Gasket |
| 5. "O" ring | 17. Snap ring |
| 7. Key | 18. Drive gear |
| 10. Washer | 19. Spacer |
| 11. Nut | |

156. SYSTEM PRESSURE. Hydraulic system pressure should be 9.8 MPa (1420 psi). To check pressure, install a suitable pressure gage in plug port (P—Fig. 143) on top of control valve. Temporarily loosen transport stop (U—Fig. 133). Run engine at about half throttle and move hand lever to raising position; rockshaft should raise and gage pressure should rise to specified relief pressure. Hold hand lever in RAISE position for ten seconds. Gage pressure should hold steady; a substantial drop in pressure would indicate a worn pump or serious pressure leak. If a pressure gage is not available, lifting capacity at tip of lower links should be 855 kg (1885 pounds). Normal lifting speed to transport position at full throttle is approximately 1 3/4 seconds.

A low or high relief pressure can be corrected by adding or removing shims (15—Fig. 144) as required. One 0.5 mm shim will change relief pressure about 483 kPa (70 psi). DO NOT hold relief valve open longer than 15 seconds when testing pressure. Reset transport stop (U—Fig. 133) after pressure has been checked.

Model L260

157. FEEDBACK LINKAGE. Automatic height control feedback linkage should be adjusted to return control valve to neutral JUST BEFORE ram cylinder reaches end of its stroke. If link

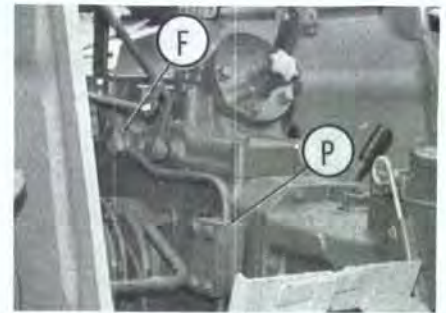


Fig. 137—If hydraulic pump will not prime, loosen accessory plate (P) or pressure line fitting (F) to relieve vapor lock at back pressure valve.

(L—Fig. 134) is too long, rockshaft will not fully raise. If link is too short, ram piston will bottom before control valve returns to neutral and relief valve will open. To adjust linkage, proceed as follows:

With nothing attached to lower links and engine running at slow idle speed, move control lever to fully raised position. Lift arms should raise and engine should not pull down. Loosen locknut and turn turnbuckle on feedback link (L) to shorten link until relief valve opens and engine labors. Back turnbuckle up (lengthen link) until relief valve closes; lengthen link an additional turn and lock in place by tightening locknut.

158. SYSTEM PRESSURE. Hydraulic system pressure should be 13.731 MPa (1990 psi). To check pressure, install a suitable pressure gage in plug port (P—Fig. 146) on top of control valve. Shorten feedback link (L—Fig. 134) three full turns. Run engine at about half throttle and move hand lever to transport position; rockshaft should raise and gage pressure should rise to specified relief pressure. Pressure should hold steady without dropping for ten seconds; a substantial drop in pressure would indicate a worn pump or serious pressure leak. If a pressure gage is not available, lifting capacity at tip of lower links should be 1200 kg (2650 pounds).



Fig. 138—Installed view of front mounted hydraulic pump used on Model L210.

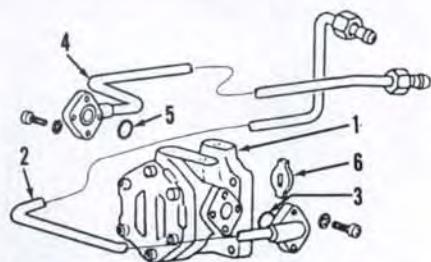


Fig. 139—Exploded view of hydraulic pump, lines and coupling used on Model L210.

- 1. Pump assy.
- 2. Supply line
- 3. "O" ring
- 4. Pressure line
- 5. "O" ring
- 6. Drive joint

A low or high relief pressure can be corrected by adding or removing shims in relief valve (4—Fig. 146). One 1 mm (0.040 inch) shim will change relief pressure approximately 2346 kPa (340 psi). DO NOT hold relief valve open longer than 15 seconds. Reset feedback link after relief pressure has been checked.

PUMP

Models L175-L225-L225DT

159. **TESTING.** Gear-type hydraulic system pump is mounted on right side of engine and gear driven from rear of injection pump camshaft as shown in Fig. 135. Specified pump delivery is 14.06 L/min (3.7 gpm) at 2700 engine rpm. Pump parts are not serviced and disassembly is not recommended.

160. **REMOVE AND REINSTALL.** Pump mounting location is higher than reservoir fluid level, and it is not necessary to drain system to remove pump if care is used. To remove pump, remove flange cap screws at intake and pressure lines. Remove pump mounting stud nuts and cap screws and slide pump straight to rear off drive housing flange. Cover exposed pressure line opening while pump is removed to prevent dirt entry.



Fig. 140—Installed view of hydraulic pump used on Model L260.

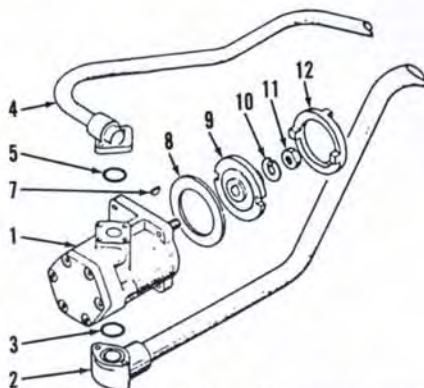


Fig. 141—Exploded view of hydraulic pump, lines and coupling used on Model L260.

- 1. Pump assy.
- 2. Supply line
- 3. "O" ring
- 4. Pressure line
- 5. "O" ring
- 7. Key
- 8. Spacer
- 9. Slotted drive joint
- 10. Washer
- 11. Nut
- 12. Nipped drive joint

When installing pump, install new "O" rings in pressure and intake line flanges, using clean grease to retain intake flange "O" ring. Install and securely tighten pump mounting cap screws and stud nuts. Install and tighten lower pressure line flange, checking first to be sure "O" ring is properly installed. Before installing intake line, pour top opening of pump full of clean oil. Check intake flange "O" ring, then install intake line. A well lubricated pump should pick up prime within a few seconds. If pump fails to prime, loosen accessory plate (P—Fig. 137) or pressure line fitting (F) to release trapped air. Restart and accelerate engine, but be ready to stop engine immediately when pump primes. Main purpose of back-pressure valve installed in system is to keep lines full and prevent loss of prime when tractor is stopped. Valve can trap air in pressure line, however, and make it difficult to prime a newly installed pump.

161. **PUMP DRIVE HOUSING AND GEARS.** One gear of pump drive train is splined to injection pump camshaft and retained by a snap ring. Mating gear is keyed to pump shaft and retained by a shaft nut. Drive housing can be removed after removing injection pump and forward gear can be removed after removing housing. Use a suitable puller if it is necessary to remove gear from hydraulic pump shaft. Do not attempt to remove gear by prying against housing or driving against threaded end of shaft, or internal pump gear bushings or seals may be damaged.

Models L210-L260

162. **TESTING.** Camshaft mounted gear-type hydraulic system pump on Model L210 should deliver 10.8 L/min

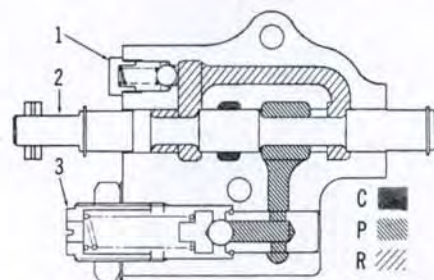


Fig. 142—Cross-sectional view of control valve of type used on Models L175, L225 and L225DT. Shaded portions indicate hydraulic pressure ports as follows: (C) Ram cylinder pressure; (P) pump pressure and (R) return pressure.

- 1. Back pressure valve
- 2. Control valve
- 3. Relief valve

(2.85 gpm) at 2700 engine rpm. The only sure test method is by use of a flow meter. Check inlet screen in reservoir if pump delivery is slow.

On Model L260, front mounted hydraulic pump is driven by a special gear in timing gear train. Specified pump delivery is 17.86 L/min (4.7 gpm) at 2600 engine rpm.

163. **REMOVE AND REINSTALL.** To remove pump, first drain hydraulic system and tilt hood forward out of the way. Disconnect intake and pressure lines from pump body, remove mounting stud nuts and lift pump off mounting studs on timing gear cover.

Refer to Fig. 139 for exploded view of pump and coupling used on Model L210, and to Fig. 141 for pump and coupling used on Model L260. When reinstalling pump, make sure coupling units are correctly installed, and complete installation by reversing removal procedure. Pump parts are not serviced and disassembly is not recommended.

CONTROL VALVE

Models L175-L225-L225DT

164. **REMOVE AND REINSTALL.** System control valve is mounted on bot-



Fig. 143—Installed view of control valve on Model L210, showing pressure port plug (P).

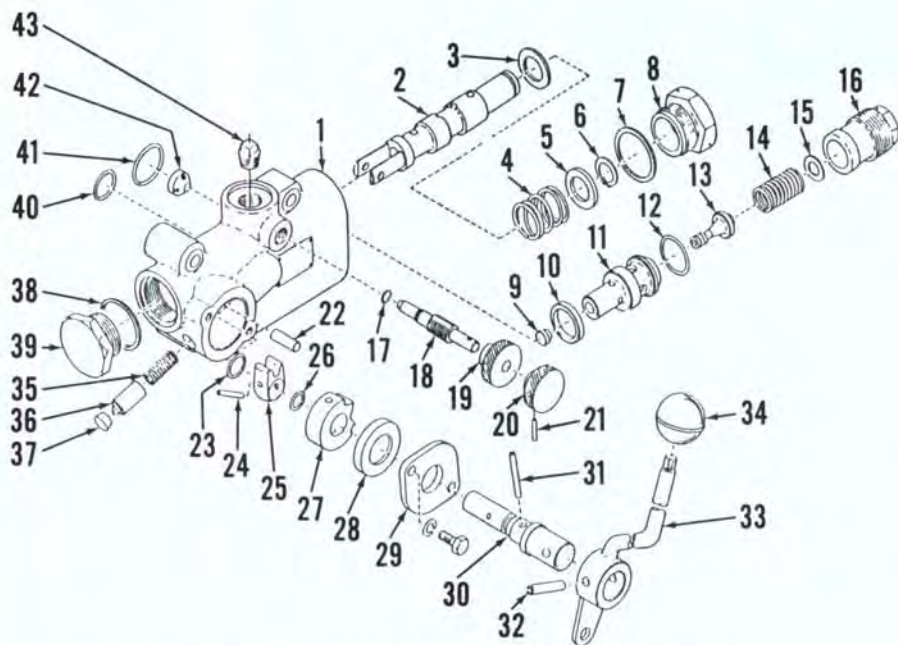


Fig. 144—Exploded view of control valve used on Model L210.

- | | | |
|--------------------------|---------------------------|--------------------|
| 1. Housing | 12. "O" ring | 23. "O" ring |
| 2. Valve spool | 13. Relief valve | 24. Pin |
| 3. Spring seat | 14. Spring | 25. Operating fork |
| 4. Spring | 15. Shim | 26. "O" ring |
| 5. Spring seat | 16. Plug | 27. Detent cam |
| 6. Snap ring | 17. "O" ring | 28. Rubber bushing |
| 7. Gasket | 18. Flow control adjuster | 29. Cover plate |
| 8. Plug | 19. Lock knob | 30. Shaft |
| 9. Plug | 20. Adjuster knob | 31. Pin |
| 10. Seat | 21. Pin | 32. Pin |
| 11. Relief valve housing | 22. Pin | 33. Shift lever |
| | | 34. Knob |
| | | 35. Spring |
| | | 36. Detent pin |
| | | 37. Plug |
| | | 38. Gasket |
| | | 39. Plug |
| | | 40. "O" ring |
| | | 41. "O" ring |
| | | 42. Check valve |
| | | 43. Plug |

tom of rockshaft housing. To remove valve, first remove rockshaft as outlined in paragraph 169, remove retaining cap screws and lift off valve housing.

Component parts of valve are not listed. Valve spool must move smoothly

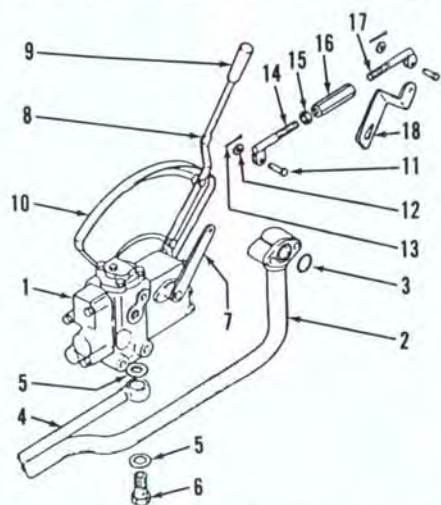


Fig. 145—Partially exploded view of control valve, lines and linkage used on Model L260, viewed from housing side.

- | | |
|---------------------------|----------------|
| 1. Control valve assy. | 10. Quadrant |
| 2. Supply line | 11. Pin |
| 3. "O" ring | 12. Washer |
| 4. Pressure line | 13. Cotter key |
| 5. Seal ring | 14. Rod |
| 6. Fitting screw | 15. Locknut |
| 7. Position control lever | 16. Turnbuckle |
| 8. Control lever | 17. Rod |
| 9. Grip | 18. Lever |

in housing bore. Relief valve (3—Fig. 142) is adjusted by loosening locknut and turning threaded spring retainer. Ball type back pressure valve (1) is located in return passage and is not adjustable.

When reinstalling valve, use new "O" rings between valve body and rockshaft housing. Make sure steel return baffle is installed on the two cap screws below valve and that spring pin in control valve spool properly engages notch in control lever. Tighten retaining cap screws securely.

Model L210

165. REMOVE AND REINSTALL. Refer to Fig. 143 for an installed view of control valve and to Fig. 144 for explod-

ed view. Valve mounts on side of rockshaft housing and internal passage ports are sealed with "O" rings.

To remove valve, disconnect pressure line fitting and linkage rod. Remove retaining cap screws and lift off valve body and lever as a unit.

Refer to paragraph 166 for overhaul data. Install valve by reversing removal procedure. Check hydraulic system fluid as outlined in paragraph 151 and lift positioning stops as in paragraph 155.

166. OVERHAUL. Refer to Fig. 144 for an exploded view of valve. With the exception of spool and body which are matched, all parts are available individually. To remove valve spool, remove lever and plug (39) and pull spring pin (24) from operating fork (25). Unbolt and remove operating lever. Spool can now be withdrawn from opposite end of bore after removing opposite end cap.

Spool must slide easily in body bore without binding or excessive looseness. Relief valve pressure is adjusted by thickness of shim pack (15). Renew "O" rings and any other parts which are worn, scored or otherwise damaged. Assemble valve by reversing disassembly procedure.

Model L260

167. REMOVE AND REINSTALL.

Fig. 145 shows an assembled view of feedback control type valve and Fig. 146 shows an exploded view. To remove control valve, fully lower lift arms. Disconnect pressure line fitting and feedback link. Remove attaching cap screws and lift off valve and lever quadrant as an assembly.

Refer to paragraph 168 for overhaul data. Install valve by reversing removal procedure. Check hydraulic system fluid as outlined in paragraph 152 and adjust feedback linkage as in paragraph 157.

168. OVERHAUL. Fig. 146 shows an exploded view of valve assembly. Component parts are not catalogued and

Fig. 146—Exploded view of feedback control type valve used on Model L260.

- | |
|-----------------------|
| 1. Control cover |
| 2. Unloading valve |
| 3. Accessory cover |
| 4. Relief valve |
| 5. Check valve |
| 6. End cover |
| 7. Control valve |
| 8. Valve housing |
| P. Pressure port plug |

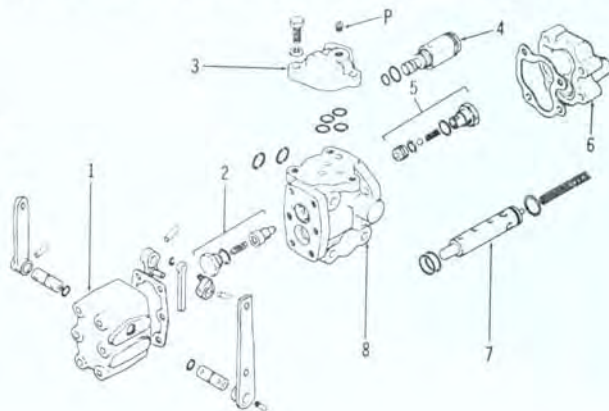




Fig. 147 — Rear view of Model L175 tractor showing rockshaft linkage correctly installed.

disassembly except for cleaning or inspection is not advised. Control valve (7) is spring loaded in lowering position and is moved toward neutral or raise position by feedback linkage in control cover (1). Adjustments are fixed. Unloading valve (2) is open to by pass pump flow to reservoir except in raising position, when it is seated by fluid admitted to larger area behind valve. Check valve (5) opens to permit fluid flow to ram cylinder and seats to block return flow at all other times. Pressure relief valve (4) is shim adjusted. Tighten plug in end of relief valve (4) to a torque of 20-27 N·m (15-20 ft.-lbs.). Tighten relief valve (4), check valve (5) and unloading valve (2) into housing to a torque of 61-68 N·m (45-50 ft.-lbs.). Tighten cap retaining screws to a torque of 20 N·m (15 ft.-lbs.).

ROCKSHAFT HOUSING

Model L175-L225-L225DT

169. REMOVE AND REINSTALL. To remove rockshaft housing, first disconnect pressure line fitting on right side of housing flange. Remove seat and disconnect lower links. Move control valve to lowering position and with engine stopped, push lift arms down until piston bottoms. Remove retaining cap screws, attach a suitable hoist and lift housing unit up off of rear axle center housing.

When installing rockshaft housing, coat new gasket on both sides with a suitable sealant and install by reversing removal procedure. Tighten retaining cap screws to a torque of 48-54 N·m (35-40 ft.-lbs.).

170. OVERHAUL. Rockshaft housing is shown exploded in Fig. 148. Rockshaft and components, cylinder and piston can be serviced without removing rockshaft housing if desired. Housing must be removed for service on control valve or linkage.

To remove cylinder head, cylinder or piston, first remove cylinder head re-

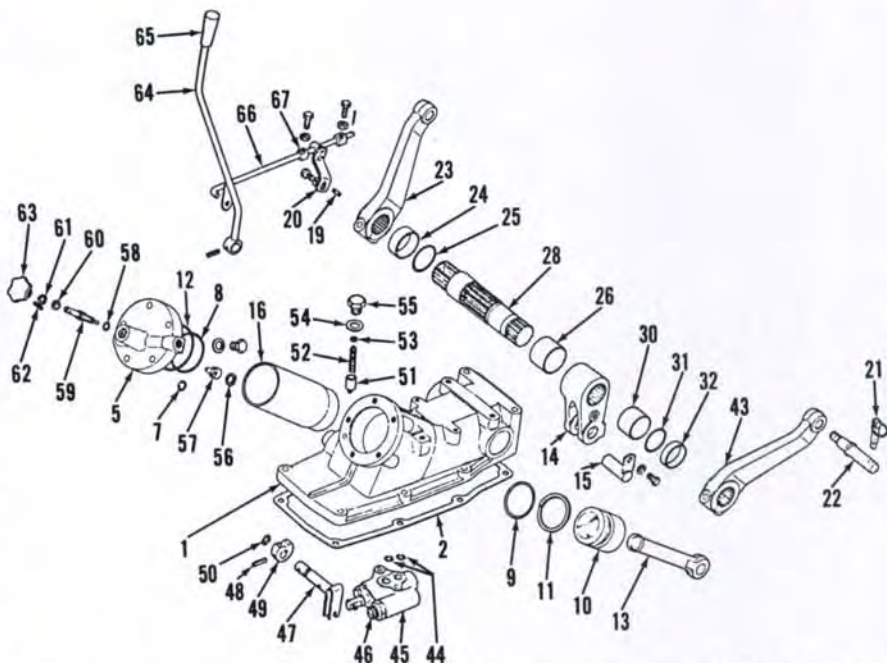


Fig. 148 — Exploded view of rockshaft housing, ram cylinder, control valve, rockshaft and associated parts used on Models L175, L225 and L225DT.

- | | | | |
|--------------------|------------------|-------------------------|---------------------------------|
| 1. Housing | 19. Pin | 44. "O" ring | 57. Adjusting collar |
| 2. Gasket | 20. Lever | 45. Control valve assy. | 58. "O" ring |
| 5. Cover | 21. Set pin | 46. Relief valve screw | 59. Flow control valve adjuster |
| 7. "O" ring | 22. Lift rod pin | 47. Actuator shaft | 60. Flat washer |
| 8. "O" ring | 23. Lift arm | 48. Pin | 61. Snap ring |
| 9. "O" ring | 24. Collar | 49. Detent cam | 62. Pin |
| 10. Piston | 25. "O" ring | 50. "O" ring | 63. Knob |
| 11. Back-up ring | 26. Bushing | 51. Detent plunger | 64. Control lever |
| 12. "O" ring | 28. Rockshaft | 52. Spring | 65. Grip |
| 13. Rod | 30. Bushing | 53. Flat washer | 66. Rod |
| 14. Arm | 31. "O" ring | 54. Gasket | 67. Stop |
| 15. Pin | 32. Collar | 55. Plug | |
| 16. Cylinder liner | 43. Lift arm | 56. Snap ring | |

taining cap screws. Apply down pressure to lift arms to force off cylinder head. Cylinder and piston may be removed with cylinder head. If they are not, push piston out using rockshaft then reach down through cylinder to remove sleeve. Install by reversing removal procedure, lubricating "O" rings thoroughly as they are installed. Tighten cylinder head retaining cap screws to a torque of 48-54 N·m (35-40 ft.-lbs.).

To remove rockshaft and components, first remove cylinder head, cylinder and piston. Check to see that lift arm and shaft splines are punch marked for alignment at reinstallation, then remove lift arms. Reach through cylinder opening and support ram arm, then bump rockshaft toward right out of housing bore. Withdraw ram arm and connecting rod out cylinder opening. Rockshaft bushings and "O" rings can be renewed at this time. Lubricate "O" rings thoroughly with grease as they are installed to prevent twisting as shaft is installed. Tighten lift arm clamp screws to torque of 48-54 N·m (35-40 ft.-lbs.).

To remove valve control linkage, first remove rockshaft housing as outlined in paragraph 169 and unbolt and remove control valve. Tap out spring pin secur-

ing control lever to operating shaft. Remove detent (51), then tap operating shaft inward out of housing flange. When installing, insert operating shaft from inside, omitting sealing "O" ring, until "O" ring groove appears on outside of housing. Lubricate and install "O" ring on outside, then pull operating shaft back into proper position.

Model L210

171. REMOVE AND REINSTALL. To remove rockshaft housing, first drain hydraulic system and disconnect pressure and return lines at housing and valve. Remove seat and disconnect lower links. Remove retaining cap screws. Attach a hoist to rockshaft housing and lift unit straight up off transmission housing.

Install by reversing removal procedure. Fill hydraulic system as outlined in paragraph 151 and readjust positioning stops as in paragraph 155 after unit is installed.

172. OVERHAUL. Refer to Fig. 149 for an exploded view. Rockshaft may be withdrawn from either side after removing opposite cap screw. If housing is not

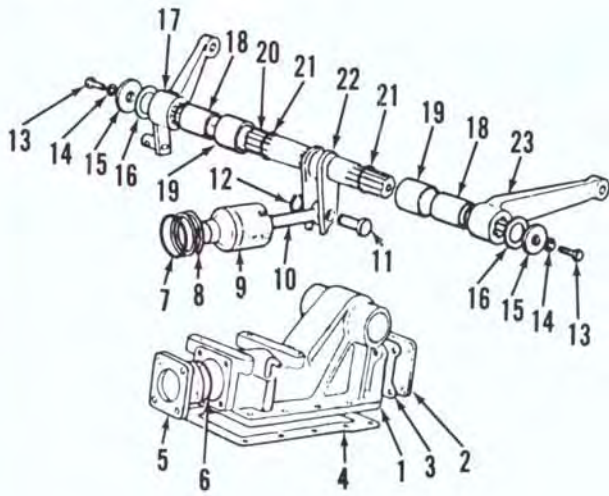


Fig. 149—Exploded view of rockshaft housing, rockshaft and ram cylinder used on Model L210.

1. Housing
2. Rear cover
3. Gasket
4. Gasket
5. Front cover
6. "O" ring
7. "O" ring
8. Back-up ring
9. Piston
10. Rod
11. Pin
12. Snap ring
13. Cap screw
14. Lockwasher
15. Flat washer
16. Spacer
17. Lift arm
18. Collar
19. Bushing
20. Rockshaft
21. "O" ring
22. Arm
23. Lift arm

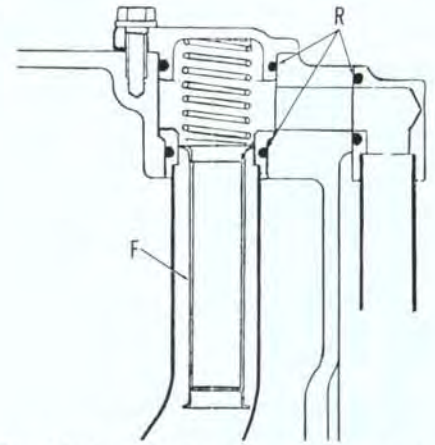


Fig. 151—Cross-sectional view of intake tube, filter and associated parts used on Model L260. If "O" rings (R) leak, filter (F) is plugged, or tubes or lines are damaged, pump may be noisy or lose prime.

removed for rockshaft overhaul, first remove rear plate and support ram arm as rockshaft is withdrawn. Bushings, spacers and "O" rings will be removed with shaft on side from which shaft is withdrawn. Piston may be pushed out to front after removing cylinder head.

Model L260

173. REMOVE AND REINSTALL.

To remove rockshaft housing and hydraulic system reservoir, first drain system and disconnect pressure and intake lines leading to pump. Remove seat and disconnect lower links. Remove transmission filler cap and dipstick. Remove cap screws and stud nuts securing rockshaft housing to transmission housing, attach a hoist to housing and lift unit straight up off of transmission housing. Place unit on a clean, flat surface, being careful not to damage oil pan.

Install by reversing removal procedure. Fill hydraulic system as outlined in paragraph 152.

174. OVERHAUL. Most service work on rockshaft and components can be accomplished without removal of unit from tractor. To remove piston and sleeve, remove cylinder head retaining cap screw. Push down on rockshaft lift arms to force off cylinder head. Cylinder and piston may come out with cylinder head. They can be lifted out later if they do not.

Remove feedback arm from right end of rockshaft. Remove clamping screws and pull off both lift arms after first checking to be sure that timing punch marks on arm casting and shaft spline are present and indicate correct installed position. Reach through cylinder opening and support ram arm, then bump rockshaft out toward right side of

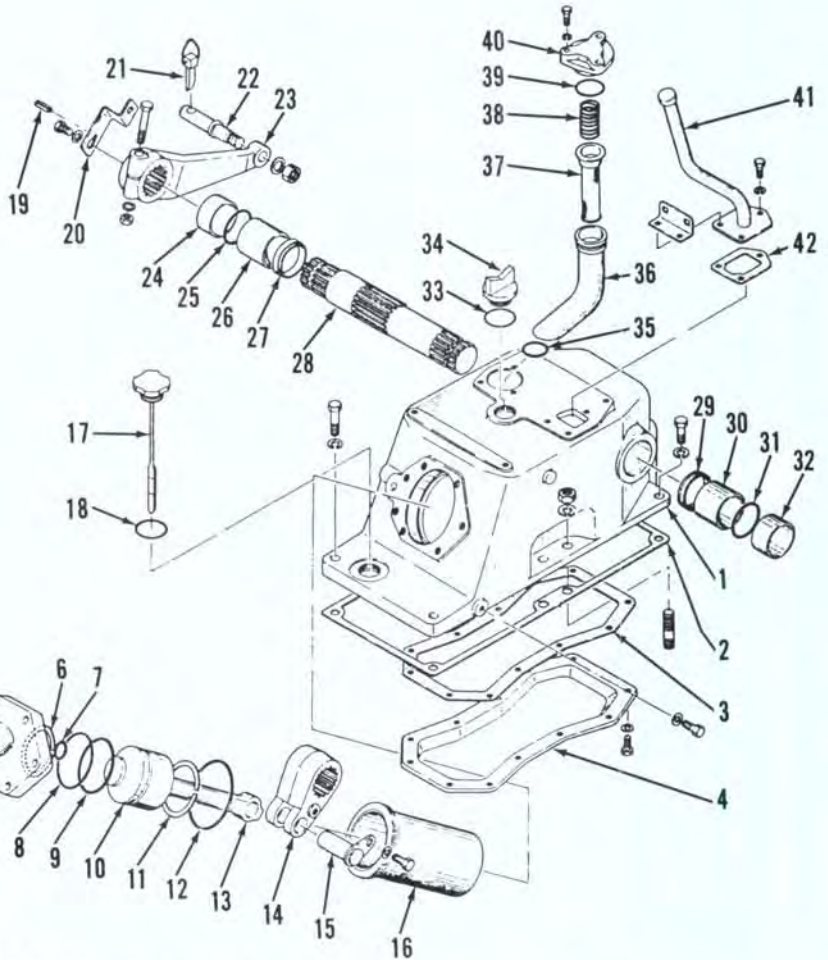


Fig. 150—Exploded view of rockshaft housing, reservoir and associated parts used on Model L260.

- | | | | |
|------------------|--------------------|------------------|----------------|
| 1. Housing | 12. "O" ring | 22. Lift rod pin | 32. Collar |
| 2. Gasket | 13. Rod | 23. Lift arm | 33. "O" ring |
| 3. Gasket | 14. Arm | 24. Collar | 34. Plug |
| 4. Cover | 15. Pin | 25. "O" ring | 35. "O" ring |
| 5. Cover | 16. Cylinder liner | 26. Bushing | 36. Sleeve |
| 6. Support ring | 17. Dipstick | 27. Collar | 37. Oil filter |
| 7. "O" ring | 18. "O" ring | 28. Rockshaft | 38. Spring |
| 8. "O" ring | 19. Pin | 29. Collar | 39. "O" ring |
| 9. "O" ring | 20. Lever | 30. Bushing | 40. Cover |
| 10. Piston | 21. Set pin | 31. "O" ring | 41. Breather |
| 11. Back-up ring | | | 42. Gasket |

housing. Ram arm and connecting rod can now be withdrawn through cylinder opening. Ram arm splines are also punch marked. Ram arm is installed with centerline 120 degrees from centerline of lift arms.

Pump intake tube elbow must hook forward as shown in Fig. 150. Make sure "O" rings (R-Fig. 151) are in good condition and do not leak. Air leaks will cause pump to be noisy or lose prime. If oil pan is removed, be careful not to

bend or scratch gasket surface. Leaks will cause loss of fluid and contamination of transmission lubricant. Coat oil pan gasket on both sides with a suitable non-hardening sealant and tighten flange screws evenly.

WIRING DIAGRAMS

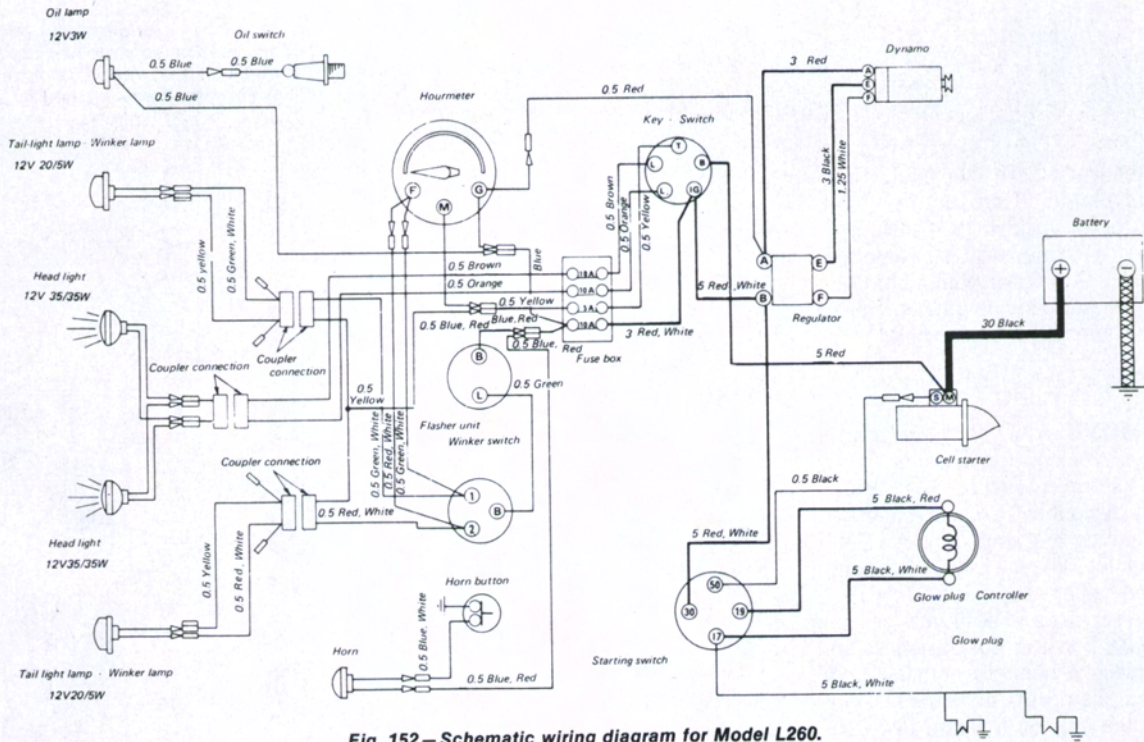


Fig. 152 - Schematic wiring diagram for Model L260.

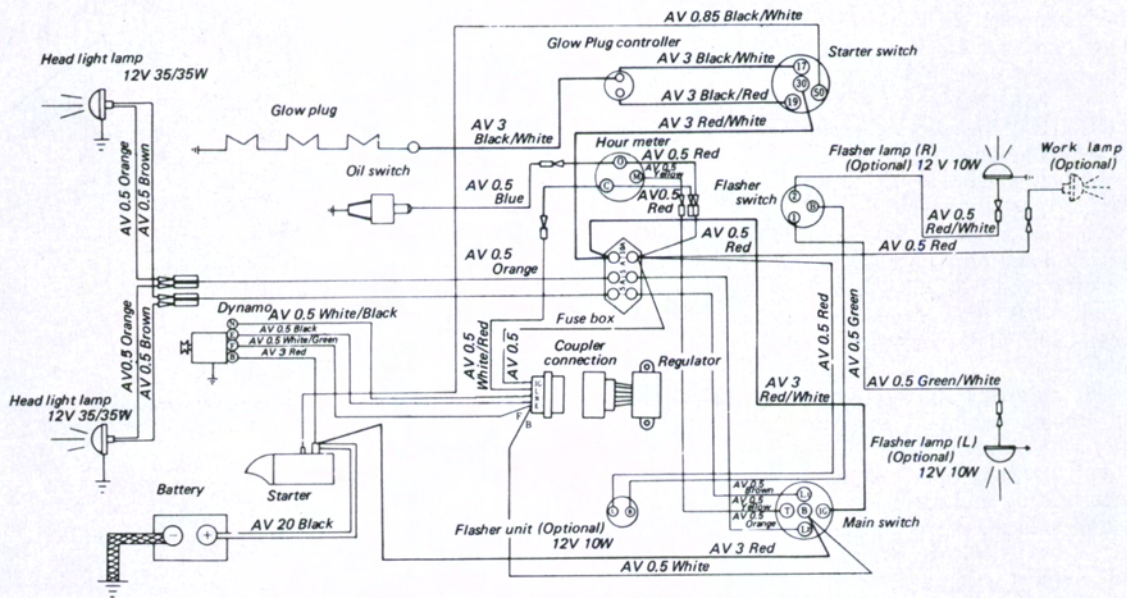


Fig. 153 - Schematic wiring diagram for Models L225 and L225DT.