SHOP MANUAL

CASE/INTERNATIONAL

MODELS
385—485—585—685—885

Engine serial number is stamped on right side of engine crankcase on all models. Tractor model and serial number are stamped on a plate attached to right side of front axle support. Transmission serial number is stamped on a plate attached to the right rear side of rear main frame. Model and serial number plate for front drive axle is located on left rear of axle housing.

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CONDENSED SERVICE DATA (CONT.)

	385 Diesel	485 Diesel	585 Diesel	685 Diesel	885 Diesel
TUNE-UP					
Compression Pressure	315-340 psi (2) (2172-2344 kPa)				
Firing Order	1-3-2	1-3-2		1-3-4-2	
Valve Tappet Gap (Hot), Intake and Exhaust	0.012 in. (0.304 mm)				
Valve Face Angle	45°				
Valve Seat Angle	44°				
Injection Pump Make	Robert Bosch				
Injection Pump Timing	See Paragraph 61.				
Engine Low Idle — Rpm	725-750				
Engine High Idle — Rpm (No Load)	2340	2480	2590	2705	2650
Engine Full Load — Rpm	2200	2180	2300	2300	2400

(2) Approximate psi (kPa), at sea level, at cranking speed.

SIZES-CLEARANCES-CAPACITIES					
Crankshaft Main Journal Diameter	3.1484-3.1492 in. (79.97-79.99 mm)				
Crankpin Diameter	2.5185-2.5193 in. (63.97-63.99 mm)				
Camshaft Journal Diameter	2.2823-2.2835 in. (57.97-58.00 mm)				
Piston Pin Diameter	1.4172-1.4174 in. (35.997-36.002 mm)				
Valve Stem Diameter, Intake	0.3920-0.3924 in. (9.957-9.967 mm)				
Exhaust	0.3912-0.3915 in. (9.936-9.945 mm)				
Main Bearing Diametral Clearance	0.0028-0.0055 in. (0.071-0.140 mm)				
Rod Bearing Diametral Clearance	0.002-0.004 in. (0.051-0.102 mm)				
Piston Skirt Diametral Clearance	0.0035-0.0050 in. (0.09-0.13 mm)				
Crankshaft End Play	0.006-0.009 in. (0.152-0.229 mm)				
Camshaft Bearing Diametral Clearance	0.0009-0.0033 in. (0.023-0.084 mm)				
Camshaft End Play	0.004-0.018 in. (0.10-0.45 mm)				
Cooling System Capacity	3.0 U.S. gal. (11.4 L)			3.6 U.S. gal. (13.7L)	
Crankcase Oil (With Filter)	8 U.S. qts. (7.5 L)			10 U.S. qts. (9.5 L)	

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rier (15). Remove snap ring (22) from each of the planetary gears. Using a suitable puller, remove the planetary gears. Remove angle ring (19) and roller bearing (21) from each planetary gear (20).

Remove snap ring (13) and thrust washer (11) from stub axle (sun gear) (12). Remove eight cap screws (23), then screw four M10 × 1.5 mm, 60 mm long cap screws into every other hole. Make certain that all four bolt heads are equal distance from inner face of ring gear (10). Using a suitable three legged puller and thrust piece pushing against the bolt heads, remove ring gear. Then, using the same puller and thrust piece, remove hub (6) and outer bearing cone (4). Inspect hollow dowels (9) for wear and if worn or otherwise damaged, thread inside of dowels. Use a screw and slide hammer puller to remove dowels.

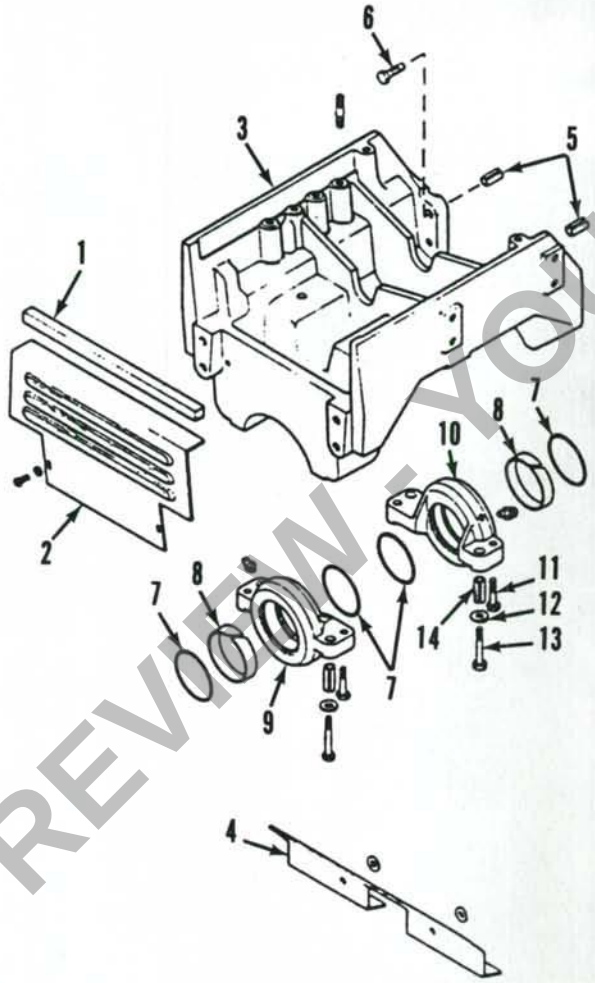


Fig. 10—View of front support and relative components used on four-wheel drive models.

1. Foam seal
2. Front cover
3. Front support
4. Lower air baffle
5. Spring pin dowels
6. Cap screws
7. "O" rings
8. Pivot bearings
9. Bearing cap (front)
10. Bearing cap (rear)
11. Cap screw
12. Washer
13. Cap screw
14. Spring pin dowel

Remove and discard "O" ring (8). Remove scraper ring (2) and oil seal (3) from hub (6), then drive cups for bearings (4) from hub. Using a puller, remove inner bearing cone (4) from swivel housing (32). Check

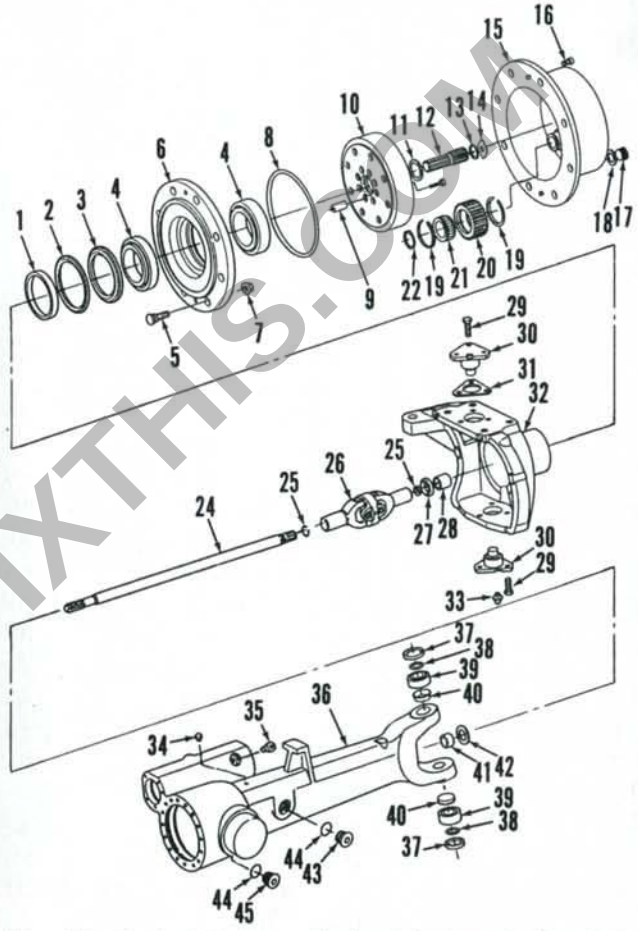


Fig. 11—Exploded view of wheel hub and planetary, swivel housing and axle shaft and left axle housing and relative components. Except for axle housing, right side is similar.

1. Wear ring
2. Scraper ring
3. Oil seal
4. Bearing assemblies
5. Lug bolt
6. Hub
7. Lug nut
8. "O" ring
9. Hollow dowel pin
10. Ring gear
11. Thrust washer
12. Stub shaft (sun gear)
13. Snap ring
14. Shim
15. Planetary carrier
16. Socket head screw
17. Drain/level plug
18. Seal ring
19. Angle rings
20. Planetary gear
21. Roller bearing
22. Snap ring
23. Cap screw
24. Axle shaft
25. Snap rings
26. Double "U" joint
27. Oil seal
28. Sleeve bushing
29. Cap screw
30. King pins
31. Shims (upper & lower)
32. Swivel housing
33. Lube fitting
34. Breather vent
35. Air bleed screw
36. Axle housing (L.H.)
37. Cap ring
38. "O" ring
39. Bearing assy.
40. Cup plug
41. Sleeve bushing
42. Oil seal
43. Level plug
44. "O" rings
45. Drain plug

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coolant. Remove upright muffler and hood. Disconnect upper radiator hose from engine. Unbolt and remove air cleaner assembly. Remove breather pipe from rocker arm cover and remove exhaust elbow. Disconnect, unbolt and remove coolant filter/conditioner, if so equipped. Unbolt and remove exhaust manifold and coolant manifold. Disconnect and remove injector lines from fuel injectors and injection pump. Cap or plug all openings to prevent dirt or other foreign material from entering system. Disconnect return fuel line and ether starting line. Unbolt and remove intake manifold. Remove retaining bolts from rocker arm cover and lift off cover. Unbolt and remove rocker arms and shaft assembly, then remove push rods. Remove head bolts and lift off cylinder head.

CAUTION: The injector nozzle assemblies protrude slightly through the combustion side of cylinder head. Be extremely careful when removing or reinstalling cylinder head with injectors installed, so as not to damage injector ends. DO NOT place cylinder head on bench with combustion side down.

Clean all gasket sealing surfaces of cylinder head and check for cracks or other damage. Using a straightedge and feeler gage, check cylinder head for warpage. If warpage is more than 0.0047 inch (0.12 mm) resurface cylinder head. A maximum of 0.30 inch (0.77 mm) can be removed from cylinder head. If cylinder head height is less than 3.8795 inches (98.54 mm) after head is machined, renew head.

When reinstalling cylinder head, use new head gasket and make sure gasket sealing surfaces of cylinder block and head are clean. Use guide studs when installing head. Tighten cylinder head retaining cap screws in three steps using the sequence shown in Fig. 44 or 45. Tighten the cap screws to a torque of 30 ft.-lbs. (41 N·m) in first step, 60 ft.-lbs. (81 N·m) in second step and 110 ft.-lbs. (149 N·m) in the third step. Adjust valve tappet gap as outlined in paragraph 37.

NOZZLE SLEEVES

All Models

36. REMOVE AND REINSTALL. The cylinder head is fitted with brass injector nozzle sleeves which pass through the coolant passages. The nozzle sleeves are available as service items.

NOTE: Injector nozzle sleeves can be renewed without removing the cylinder head. However, if cylinder head is not removed, be sure to drain coolant below level of cylinder head before removing the sleeves.

To remove nozzle sleeves, disconnect injector lines and remove injectors. Use special bolt PLT-509-11 and turn it into sleeve. Attach a slide hammer puller and remove nozzle sleeve. See Fig. 46. Use caution during this operation not to damage the sealing areas in cylinder head.

NOTE: Under no circumstances should screwdrivers, chisels or other such tools be used in an attempt to remove injector nozzle sleeves.

When installing nozzle sleeves, be sure the sealing areas are completely clean and free of scratches. Apply a light coat of Grade B Loctite on sealing surfaces of nozzle sleeves (Fig. 47). Then, using installing tool 3055344R1 drive nozzle sleeves into their bores until they bottom as shown in Fig. 48. Injector nozzle sleeves have a slight interference fit in their bores. When installing sleeves, make certain sleeve is driven straight with its bore.

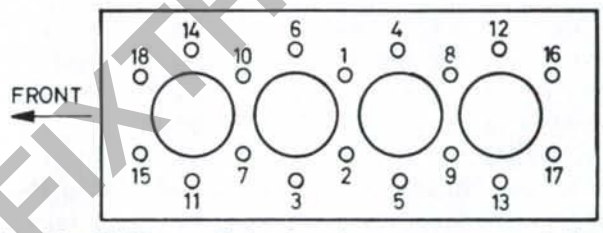


Fig. 44—Tighten cylinder head cap screws on all three cylinder models in the sequence shown.

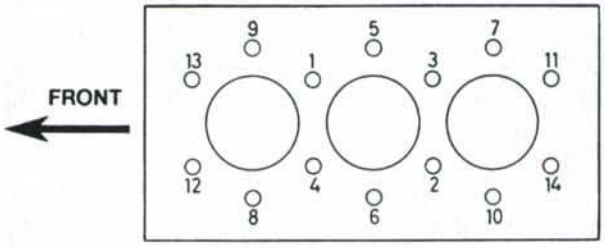


Fig. 45—Tighten cylinder head cap screws on all four cylinder models in the sequence shown.

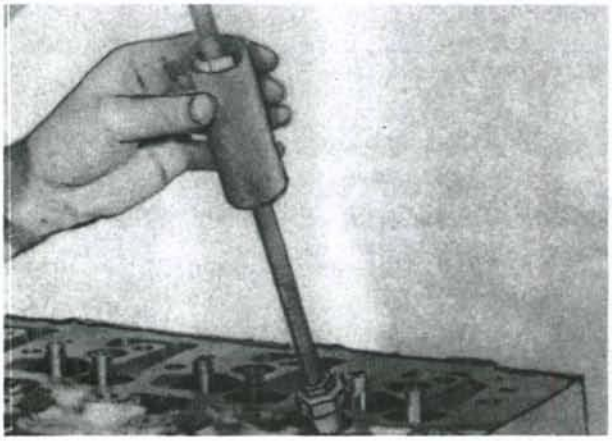


Fig. 46—Use special bolt PLT-509-11 and slide hammer to remove injector nozzle sleeve.

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FRONT AXLE (TWO-WHEEL DRIVE)

FRONT WHEEL BEARING

All Models

1. Refer to Figs. 1 and 2 for typical wheel hub and bearing assemblies.

The tapered inner and outer roller bearings are not interchangeable. Clean and inspect bearing cups (3 and 5) and cones (2 and 6) and renew as necessary.

NOTE: On adjustable axle hubs, if wear ring (12) is excessively worn, renew wear ring.

Install inner seal (1) on spindle and coat lips of seal with grease. Pack bearings and fill hub cavity with No. 2 lithium grease. Install inner bearing cone (2). Install hub assembly (4), outer bearing cone (6), washer (7) and nut (9). Adjust wheel bearing preload as follows: Tighten nut to a torque of 70 ft.-lbs. (95 N·m) while rotating the hub. Then, loosen nut and retorque to 50 ft.-lbs. (68 N·m) on Models 385, 485 and 585 with standard axles or 25 ft.-lbs. (34 N·m) on Models 385, 485 and 585 equipped with heavy duty axles and all Model 685 and 885 tractors. Then, loosen nut 1/4 turn to align slot in nut with hole in spindle and install cotter pin (8). Install lithium grease in end of hub and in cap (10) and install cap.

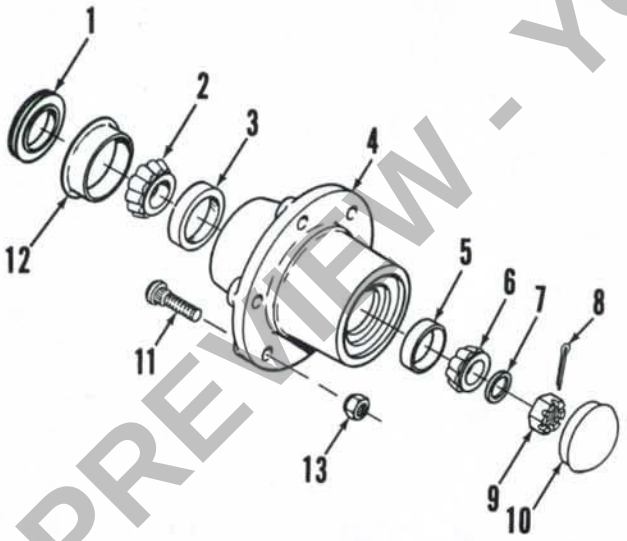


Fig. 1—Exploded view of front wheel hub and bearings used on all two-wheel drive models equipped with adjustable front axles.

1. Oil seal
2. Bearing cone (inner)
3. Bearing cup (inner)
4. Hub
5. Bearing cup (outer)
6. Bearing cone (outer)
7. Washer
8. Cotter pin
9. Castellated nut
10. Cap
11. Lug bolt
12. Wear ring
13. Lug nut

SPINDLES

All Models With Adjustable Axles

2. R&R SPINDLES. To remove either spindle (9—Figs. 3, 4 or 5), block rear wheels securely and apply park brake. Raise front of tractor and install jack stand under axle main member (13). Unbolt and remove front wheel and hub. Disconnect tie rod from steering arm (2 or 6). Remove bolt (1) and nut (3) and lift off steering arm. Remove Woodruff key (11) and lower spindle (9) with thrust bearing (8) and felt ring (10), downward out of axle extension. Remove thrust bearing and felt ring from spindle.

With spindle removed, check spindle bushings (7) in axle extension for excessive wear or other damage and renew as required. Install new bushings (7) so that lubrication grooves are toward the grease fitting. Drive bushings in from top and bottom of extension until each bushing is 0.060 inch (1.5 mm) below the surface.

When reassembling, install new felt ring (10) and thrust bearing (8) as necessary.

NOTE: Thrust bearing (8) is marked TOP for correct installation.

Install spindle assembly, Woodruff key and steering arm. Tighten steering arm clamping bolt to a

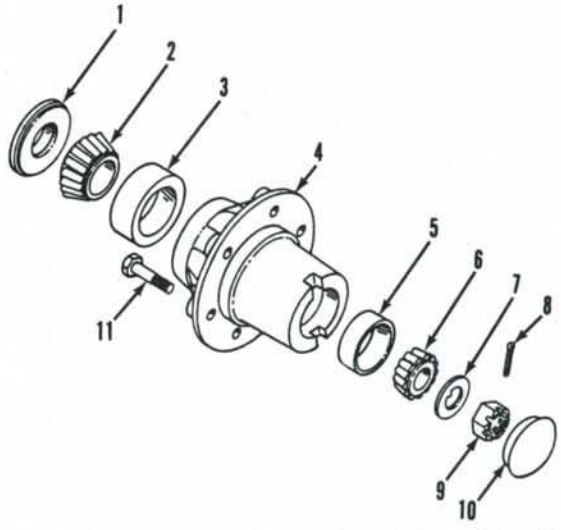


Fig. 2—Exploded view of front wheel hub and bearings used on two-wheel drive models equipped with nonadjustable (cast) front axle. Refer to Fig. 1 for legend.

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HYDRAULIC LIFT SYSTEM

The hydraulic lift system provides load (draft) and position control in conjunction with the 3-point hitch.

The load (draft) control is taken from the third (upper) link and transferred through a bellcrank on the torsion bar and linkage to this draft control valve located in the hydraulic lift housing. The externally mounted torsion bar is located on the rear side of the lift unit.

The hydraulic lift housing, which also serves as the cover for the differential portion of the tractor rear main frame, contains the work cylinder, rockshaft, valves and the necessary linkage. Auxiliary valves (either one, two or three), on tractors so equipped, are mounted on right side of the lift housing. The pump which supplies the hydraulic system is attached to the multiple control valve (MCV) which is mounted on left side of rear frame. Pump is driven by a gear on the rear of pto driven shaft. The oil used in the hydraulic system is drawn from the rear main frame and through a full-flow filter which is a part of the MCV on left side of rear frame.

TROUBLE SHOOTING

All Models

128. The following are symptoms which may occur during operation of the hydraulic lift system. By using this information in conjunction with the TEST and ADJUST information, no trouble should be encountered in servicing the hydraulic system.

1. Hitch will not lift. Could be caused by:
   a. Faulty main relief valve.
   b. Faulty cushion relief valve.
   c. Internal linkage disconnected.

2. Hitch lifts when auxiliary valve is actuated. Could be caused by:
   a. Unloading valve orifice plugged.
   b. Unloading valve piston sticking.
   c. Unloading valve body assembly not seating or body assembly loose.

3. Hitch lifts very slowly. Could be caused by:
   a. Unloading valve leaking.
   b. Excessive load.
   c. Faulty main relief valve.
   d. Faulty cushion relief valve.
   e. Work cylinder or piston scored or "O" ring faulty.
   f. Flow control valve stuck in slow position.
   g. Faulty pump.

4. Hitch will not lower. Could be caused by:
   a. Main control valve spool sticking or spring faulty.
   b. Drop poppet "O" ring is damaged or drop poppet is sticking.

5. Hitch lowers very slowly. Could be caused by:
   a. Action control valve spool or piston sticking.
   b. Action control valve linkage maladjusted.
   c. Drop poppet valve "O" ring damaged.

6. Hitch lowers too fast in action control zone. Could be caused by:
   a. Improper adjustment of action control valve.

7. Hitch will not maintain position. Could be caused by:
   a. Work cylinder or piston scored or piston "O" ring damaged.
   b. Cylinder cushion relief valve leaking.
   c. Drop poppet check valve ball not seated.
   d. Drop poppet ball seat binding in the drop poppet.

8. Hydraulic system stays on high pressure. Could be caused by:
   a. Linkage maladjusted, broken or disconnected.
   b. Auxiliary valve not in neutral.
   c. Mechanical interference.

9. System stays on high pressure after lifting load, but returns to low pressure after slight movement of position control lever toward "LOWER" position. Could be caused by:
   a. Leak in piston side of unloading valve circuit.

10. Hitch senses with load control in "OFF" position. Could be caused by:
    a. Improper adjustment of load sensing linkage.

TEST AND ADJUST

All Models

129. Before proceeding with any testing or adjusting, be sure the hydraulic pump is operating satisfactorily, hydraulic fluid level is correct and filter is in good condition. All tests should be conducted with hydraulic fluid at operating temperature of at least 100° F (38° C). Cycle system, if necessary, to ensure

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DUAL DIMENSIONS

This service manual provides specifications in both the U.S. Customary and Metric (SI) system of measurements. The first specification is given in the measuring system used during manufacture, while the second specification (given in parenthesis) is the converted measurement. (For instance, a specification of "0.011 inch (0.279 mm)" would indicate that the equipment was manufactured using the U.S. system of measurement and the metric equivalent of 0.011 inch is 0.279 mm.

CONDENSED SERVICE DATA

	385 Diesel	485 Diesel	585 Diesel	685 Diesel	885 Diesel
GENERAL					
Engine Make	Case/International				
Engine Model	D-155	D-179	D-206	D-239	D-268
Number of Cylinders	3	3	4	4	4
Bore	3.875 in. (98.4 mm)	3.875 in. (98.4 mm)	3.875 in. (98.4 mm)	3.875 in. (98.4 mm)	3.937 in. (100.0 mm)
Stroke	4.37 in. (111.1 mm)	5.06 in. (128.5 mm)	4.37 in. (111.1 mm)	5.06 in. (128.5 mm)	5.51 in. (140.0 mm)
Displacement	155 cu. in. (2.54 L)	179 cu. in. (2.93 L)	206 cu. in. (3.38 L)	239 cu. in. (3.92 L)	268 cu. in. (4.39 L)
Main Bearings, Number of	4	4	5	5	5
Cylinder Sleeves	Wet	Wet	Wet	Wet	Wet
Forward Speeds, Number of	8 (1)	8 (1)	8 (1)	8 (1)	8 (1)
Alternator/Starter Make	Lucas and Bosch				
Battery Ground	Negative				

(1) Sixteen forward speeds, if equipped with Two-Speed Power Shift.

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