CONDENSED SERVICE DATA

	274 Diesel	284 Non-Diesel	284 Diesel
GENERAL			
Engine Make	Nissan	Toyo-Kogyo	Nissan
Engine Model	SD-16	M471G	SD-16
Number of Cylinders	3	4	3
Bore – mm	83	70	83
Stroke – mm	100	76	100
Displacement – Cubic centimeters	1623	1169	1623
Main Bearing, Number of	4	5	4
Cylinder Sleeves	Dry	Wet	Dry
Forward Speeds	8	8	8
Alternator and Starter Make	Hitachi	Mitsubishi	Hitachi
TUNE-UP			
Compression Pressure (2)	2944	1165	2944
Firing Order	1-3-2	1-3-4-2	1-3-2
Valve Tappet Gap (Hot) mm			
Intake	0.3-0.4	0.25	0.3-0.4
Exhaust	0.3-0.4	0.25	0.3-0.4
Valve Seat Angle (Degrees)			
Intake	45	45	45
Exhaust	45	45	45
Timing Mark Location	See Para. 93	Crankshaft Pulley	See Para. 93
Ignition Distributor Make	.....	Mitsubishi	.....
Breaker Contact Gap (mm)	.....	0.45 ± 0.05	.....
Distributor Timing	.....	See Para. 119	.....
Spark Plug Electrode Gap (mm)	.....	0.8	.....
Carburetor Make (Gasoline)	.....	Nihon Kikakki	.....
Injection Pump Make	Bosch "A"	.....	Bosch "A"
Injection Pump Timing	See Para. 93	.....	See Para. 93
Battery Terminal Grounded		Negative	
Engine Low Idle Rpm	700	650 ± 50	700
Engine High Idle Rpm, No Load	2760	2950 ± 50	2760
Engine Full Load Rpm	2600	2600	2600
(2) Approximate kPa, at sea level, at cranking speed			
SIZES – CAPACITIES – CLEARANCES			
Crankshaft Main Journal Diameter, mm	70.90-70.92	55.944-55.959	70.90-70.92
Crankpin Diameter, mm	52.91-52.93	44.940-44.955	52.91-52.93
Camshaft Journal Diameter, mm			
No. 1 (Front)	45.45	47.899	45.45
No. 2	43.91	45.899	43.91
No. 3	41.23	44.899	41.23
No. 4	.....	43.899	.....
No. 5	.....	42.899	.....
Piston Pin Diameter, mm	25.99	19.984-19.993	25.99
Valve Stem Diameter, mm			
Intake	7.97-7.99	6.95	7.97-7.99
Exhaust	7.94-7.96	6.95	7.94-7.96
Main Bearing Diametral Clearance, mm	0.15	0.025-0.050	0.15
Rod Bearing Diametral Clearance, mm	0.15	0.027-0.073	0.15
Piston Skirt Diametral Clearance, mm	0.29	0.030-0.069	0.29
Crankshaft End Play, mm	0.06-0.14	0.110-0.274	0.06-0.14
Camshaft Bearing Diametral Clearance, mm	0.03-0.09	0.15	0.03-0.09
Camshaft End Play, mm	0.08-0.28	0.02-0.18	0.08-0.28
Cooling System Capacity – Liters	7	5	7
Crankcase Oil – Liters	5	3	5
Transmission and Differential – Liters	13	13	13
Front Differential Housing (All Wheel Drive Tractor) – Liters	.....	.....	2.7
Clutch Housing Case (All Wheel Drive Tractor) – Liters	.....	.....	2.7
Front Final Drive Housing (All Wheel Drive Tractor) – Liters	.....	.....	0.9
Rear Axle Final Drive – Liters	1.4	.....	.....

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FRONT AXLE SYSTEM

AXLE MAIN MEMBER

Model 274

1. The axle main member pivots on pin (23–Fig. 1) which is retained in the mounting bracket (front sub-frame) by set bolt (24). The two pre-sized axle pivot pin bushings (25 and 26) pressed into axle main member can be renewed after removing axle main member from tractor. To remove the axle assembly turn front wheels all the way to the left, then disconnect tie rods from pitman arm (9). Raise front of tractor until front wheels are clear of ground. Support tractor under side rails with suitable jack stands. Remove front wheels. Loosen locknut on set bolt (24) then remove set bolt. Place rolling floor jack under center of axle. Drive pivot pin (23) forward with a brass drift and remove from axle. Lower axle assembly enough to clear sub-frame, then roll axle forward away from tractor.

Renew pivot bushings (25 and 26) if clearance between pivot pin (23) and bushings exceeds 0.3 mm. Reinstall by reversing the removal procedure.

Torque set bolt (24) in pivot pin mounting to 58-73 N·m. Torque tie rod slotted nuts (11) on pitman arm to 49-69 N·m. Torque wheel mounting bolts to 98-123 N·m. Adjust toe-in if necessary as outlined in paragraph 3.

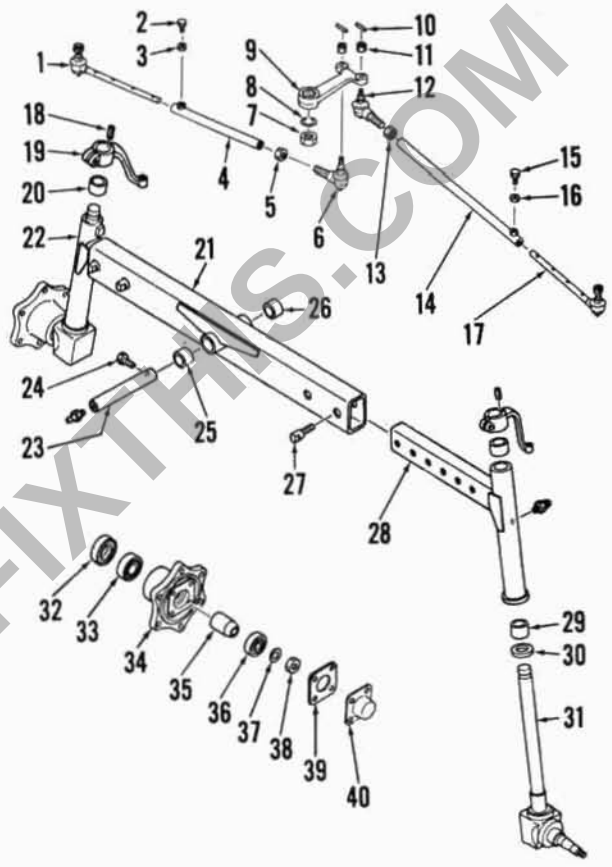


Fig. 1–Exploded view of front axle assembly used on Model 274 Offset tractors.

1. Tie rod extension R.H.
2. Set bolt
3. Locknut
4. Tie rod tube R.H.
5. Jam nut
6. Tie rod end R.H.
7. Nut
8. Washer
9. Pitman arm
10. Pin
11. Nut
12. Tie rod end L.H.
13. Jam nut
14. Tie rod tube L.H.
15. Set bolt
16. Locknut
17. Tie rod extension L.H.
18. Key
19. Steering lever R.H.
20. Bushing (upper)
21. Axle center section
22. Axle extension R.H.
23. Pivot pin
24. Set bolt
25. Bushing
26. Bushing
27. Bolt
28. Axle extension L.H.
29. Bushing (lower)
30. Thrust bearing
31. Knuckle
32. Seal
33. Bearing (inner)
34. Hub
35. Collar
36. Bearing (outer)
37. Washer
38. Nut
39. Gasket
40. Cap

Model 284

2. The axle main member pivots on pin (3–Figs. 2 and 3) which is retained in the mounting bracket (front sub-frame) by set bolt (4). The two pre-sized axle pivot pin bushings (10 and 11) pressed into axle main member can be renewed after removing axle main member from tractor.

To remove the axle assembly, raise front of tractor until front wheels are clear of ground. Support tractor under side rails with suitable jack stands. Remove front wheels. Disconnect steering link from steering arm (15). Loosen locknut on set bolt (4) and remove bolt. On Models (S.N. 011793 and above) remove grease fittings (13 and 14–Fig. 3). Install a slide hammer in pivot pin (3–Figs. 2 and 3) and pull pin from axle assembly. Lower axle assembly enough to clear sub-frame, then roll axle forward away from tractor.

Renew pivot pin bushings (10 and 11–Figs. 2 and 3) if clearance between pivot pin and bushings exceeds 0.3 mm. Reinstall by reversing removal procedure. Torque set bolt (4) to 58-73 N·m. Torque steering link slotted nut to 49-69 N·m. Torque wheel mounting bolts to 98-122 N·m. Adjust toe-in if necessary as outlined in paragraph 3.

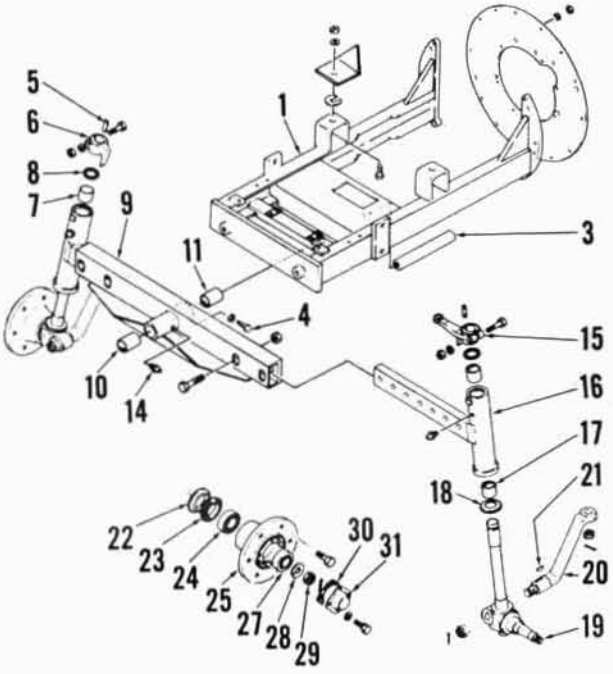


Fig. 2–Exploded view of front axle assembly used on Model 284 tractors (S.N. 011793 and below) equipped with non-diesel engine.

1. Sub frame
3. Pivot pin
4. Set bolt
5. Key
6. Stopper
7. Bushing (upper)
8. Seal
9. Axle center section
10. Bushing
11. Bushing
14. Grease fitting
15. Steering lever
16. Axle extension (L.H.)
17. Bushing (lower)
18. Thrust bearing
19. Knuckle L.H.
20. Steering arm L.H.
21. Key
22. Seal
23. Seal
24. Bearing (inner)
25. Hub
27. Bearing (outer)
28. Washer
29. Nut
30. Gasket
31. Cover

TIE RODS AND TOE-IN

All Models Except All-Wheel Drive

3. The procedure for removal and disassembly of tie rods on all models is

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FRONT SYSTEM ALL-WHEEL DRIVE

Model 284 tractors equipped with diesel engines are available as 4-wheel drive (All-Wheel Drive) units.

DROP HOUSING ASSEMBLY AND STEERING KNUCKLE

Models So Equipped

6. **R&R AND OVERHAUL.** Any service to either drop housing assembly may be performed without removal of complete axle assembly. If axle is mounted on tractor, raise front of tractor and support axle under side to be worked on. Remove wheel, then drain oil from bottom plug on rear of housing. If working on L.H. housing, disconnect steering link (84 – Fig. 6) from knuckle arm (56). Disconnect tie rod (85) from tie rod arm (66). Remove bolts and separate cover plates (55), packing (54) and back plates (53), noting their locations. Unbolt and remove tie rod arm (66) along with its needle bearing and rings. Unbolt and remove knuckle arm (56). Retain shims (57) noting number and positions. Attach suitable hoist and remove housing.

With drop housing assembly removed, unbolt and separate pinion drive cover (80) from drop housing (60). Pry lock tab (68) from bolts (67), then unbolt and remove bolt lock and bearing retainer (69). Press outer axle shaft (83) out of pinion drive cover (80) from the inside. Remove inner bearing (70), collar (71) and spur gear (75) from cover. Remove pinion shaft (74) and bearings (73 and 76) as an assembly. Remove snap ring (52) from pinion shaft and press off inner and outer pinion bearings (73 and 76). Press outer bearing (77) from cover. Remove and discard oil seals (72, 81 and 82).

Slide ball joint (51) from inner shaft and inspect for excessive wear or other damage. If ball joint is defective, unit must be renewed as an assembly. However if disassembly for cleaning is desired, proceed as follows: Using a brass drift, tilt bearing cage until one

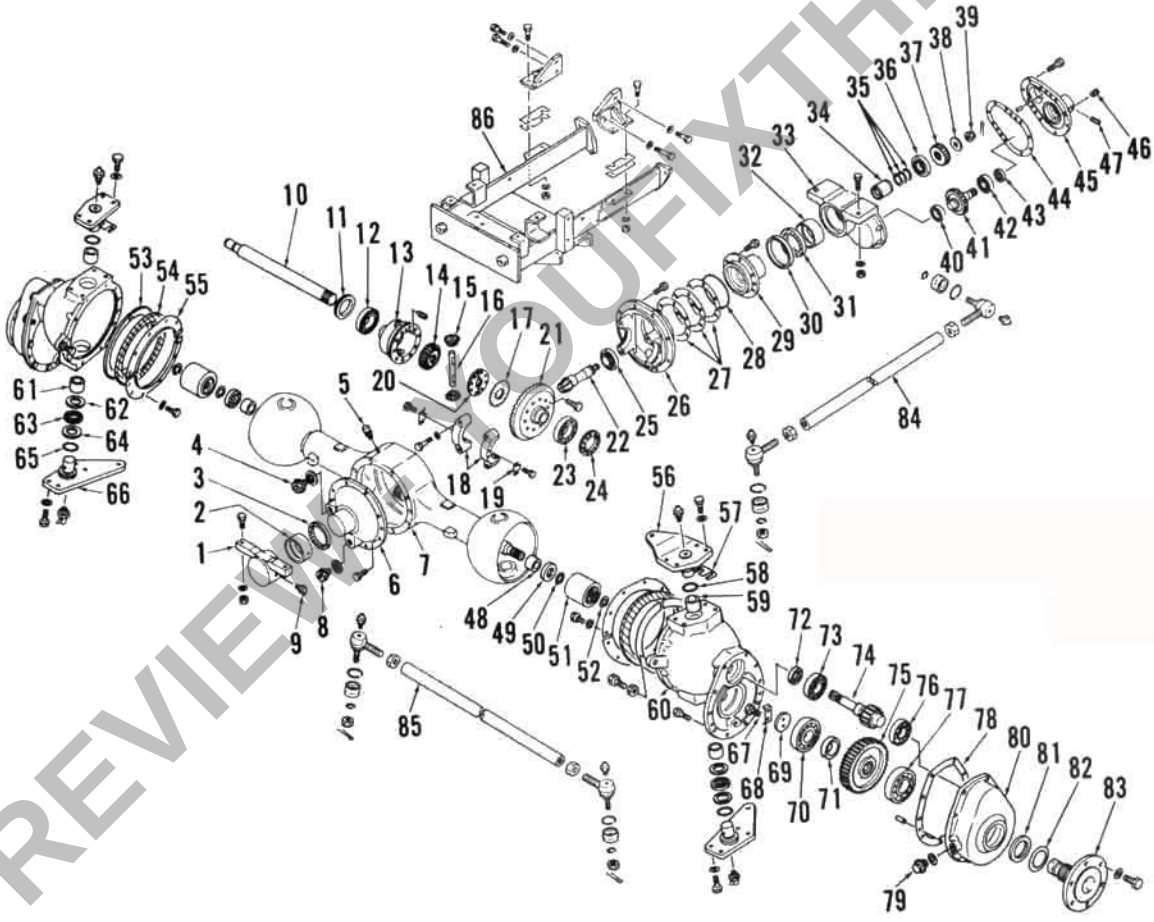


Fig. 6 – Exploded view of "ALL WHEEL DRIVE" front axle assembly available on Model 284 tractors equipped with diesel engines.

1. Front pivot housing
2. Pivot bushing
3. Dust seal
4. Plug
5. Breather
6. Cover
7. Axle housing
8. Plug
9. Grease fitting
10. Shaft
11. Adjusting ring
12. Bearing
13. Differential carrier
14. Side gear
15. Pinion gear
16. Pin
17. Thrust washer
18. Bearing caps
19. Ring locks
20. Side gear
21. Ring gear
22. Pinion shaft
23. Bearing
24. Adjusting ring
25. Bearing cone
26. Carrier
27. Shims
28. "O" ring
29. Pinion cage
30. Collar
31. Oil seal
32. Bushing
33. Rear pivot housing
34. Collar
35. Shims (0.5 mm)
36. Bearing
37. Gear
38. Washer
39. Nut
40. Bearing
41. Gear
42. Bearing
43. Oil seal
44. Gasket
45. Cover
46. Plug
47. Set screw
48. Bushing
49. Oil seal
50. Snap ring
51. Ball joint
52. Snap ring
53. Back plates
54. Packing
55. Cover plates
56. Knuckle arm
57. Shim (0.2 mm)
58. "O" ring
59. Bushing
60. Drop housing
61. Bushing
62. Bearing ring
63. Needle bearing
64. Bearing ring
65. "O" ring
66. Tie rod arm
67. Bolt
68. Lock tab
69. Holder
70. Bearing
71. Collar
72. Oil seal
73. Bearing
74. Shaft
75. Gear
76. Bearing
77. Bearing
78. Gasket
79. Plug
80. Cover
81. Oil seal
82. Seal
83. Shaft
84. Drag link
85. Tie rod

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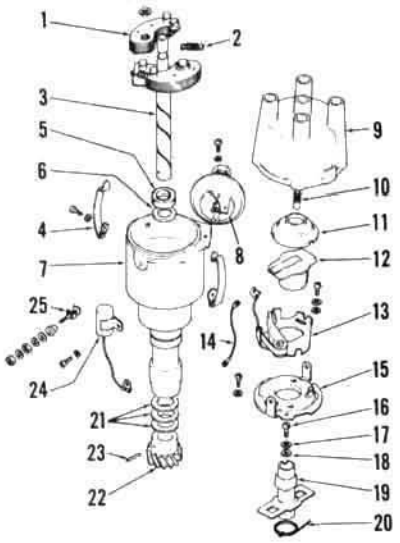


Fig. 92—Exploded view of distributor used on non-diesel Model 284 tractors.

1. Governor weight
2. Spring
3. Shaft
4. Cap clamp
5. Oil seal
6. Washer
7. Housing
8. Vacuum control
9. Cap
10. Contact
11. Cover
12. Rotor
13. Breaker points
14. Lead wire
15. Breaker base
16. Screw
17. Spring washer
18. Washer
19. Cam
20. Hair pin spring
21. Shims
22. Gear
23. Pin
24. Condenser
25. Terminal

ing motors are used on Model 284 non-diesel tractors and Hitachi S13-46 starting motors are used on Model 274 and 284 diesel tractors. Specification data for these units is as follows:

Mitsubishi 028040-28

Volts 12
No-load test,
Amperes (max) 50
Rpm (max) 5000

Hitachi S13-46

Volts 12
No-load test,
Amperes (max) 150
Rpm (min) 3500

STANDARD IGNITION

Model 284 Non-Diesel

118. The M4-71C non-diesel engine is equipped with standard ignition distributor and the firing order is 1-3-4-2. Overhaul procedure for the distributor is obvious after an examination of the unit and reference to Fig. 92. Breaker contact gap is 0.40-0.50 mm. Dwell angle is 55°-61°.

119. **DISTRIBUTOR INSTALLATION AND TIMING.** Position number one piston at top dead center of compression stroke so that TDC mark on crankshaft pulley (left notch facing pulley) aligns with timing pointer. Align punch mark on the distributor drive gear with groove on housing, then install distributor in timing chain cover.

NOTE: When distributor gear meshes with the camshaft drive gear, punch mark on the gear will move approximately 49 degrees counter-clockwise due to the helical angle of the gears.

Rotate distributor housing until points just break. Use a tachometer and timing light, with engine running at 550-650 rpm, timing should be set at 13 degrees BTDC, (right notch facing pulley).

CIRCUIT DESCRIPTION

120. Refer to Figs. 93 and 94 for wiring diagram typical of all models. Negative terminal of battery is grounded on all models.

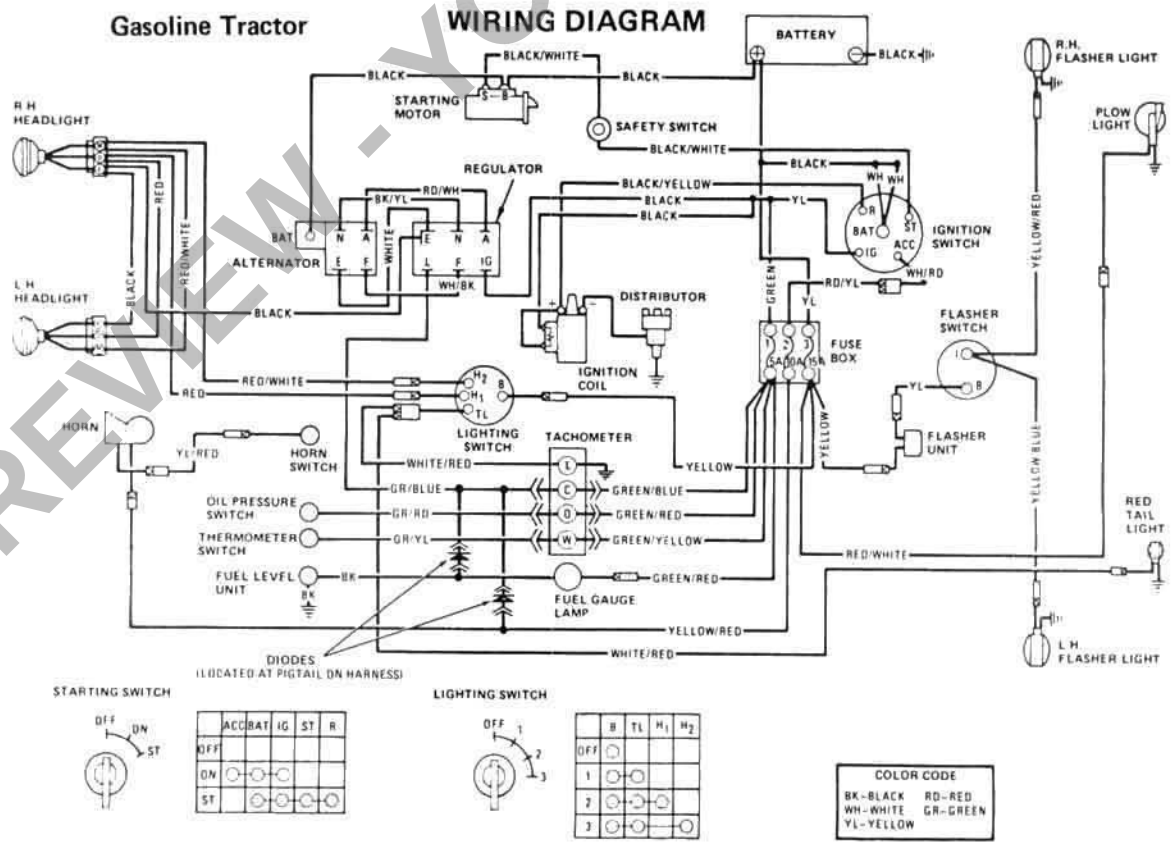


Fig. 93—Wiring diagram for Model 284 non-diesel tractors.

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filter (3–Fig. 24), IH part No. 1004 366 C1, should be renewed at 10 hours, 50 hours, 100 hours, and every 200 hours thereafter. Tractor rear frame should be drained and new fluid added every 1000 hours, or once a year, whichever occurs first.

Only IH "Hy-Tran" fluid should be used. Full capacity of rear frame should be 13.0 liters.

Whenever power steering lines have been disconnected, or fluid drained, start engine and cycle power steering system from stop to stop several times to bleed air from the system, then if necessary, check and add fluid to reservoir.

OPERATING PRESSURE AND RELIEF VALVES

Model 284

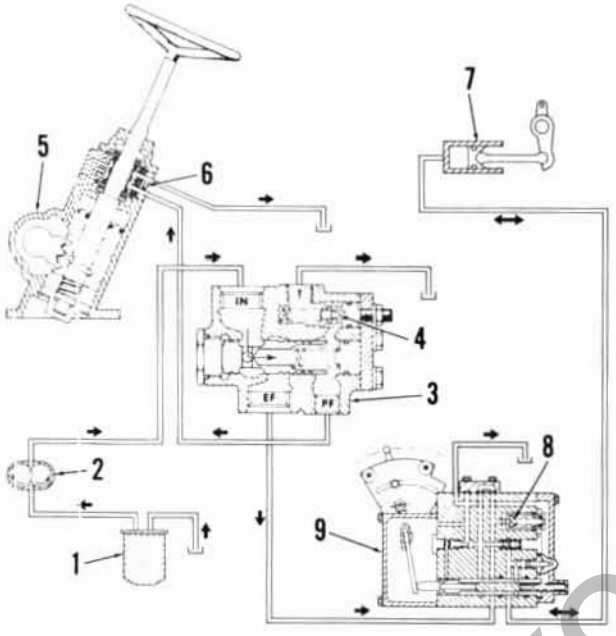


Fig. 23–Schematic diagram of hydraulic system on Model 284 tractors equipped with power steering.

1. Filter
2. Pump
3. Flow divider
4. Steering circuit relief valve
5. Steering gear
6. Steering relief valve
7. Hitch cylinder
8. Hitch circuit relief valve
9. Control valve assembly

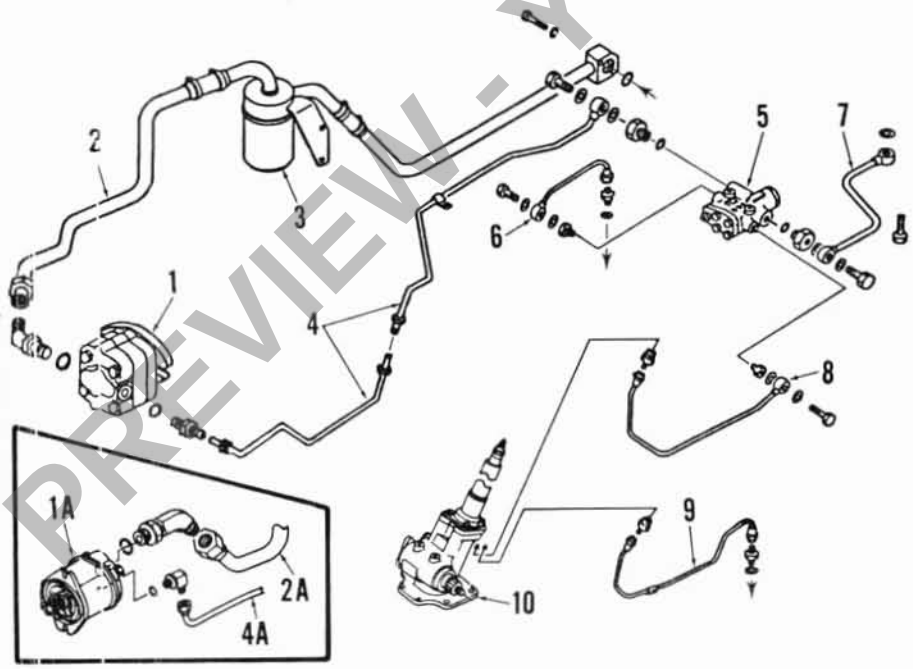


Fig. 24–Exploded view of hydraulic and power steering systems for all Model 284 tractors so equipped.

1. Hydraulic pump (non-diesel engine)
1A. Hydraulic pump (diesel engine)
2. Low pressure line (non-diesel engine)
2A. Low pressure line (diesel engine)
3. Filter
4. High pressure line (non-diesel engine)
4A. High pressure line (diesel engine)
5. Priority valve
6. Relief by-pass return
7. Hitch control supply
8. Steering supply
9. Steering return
10. Integral steering gear

27. System operating pressure and relief valve operation can be checked as follows: Refer to Fig. 25 and remove the banjo bolt connecting power steering supply line (4) to flow divider. Remove reducer connection (2) from the port in the flow divider. Install a ⅜-inch NPT (male-female-female) service tee (5) into the port as shown. Use Teflon tape to seal the threads. Connect power steering supply line (4) to the tee using the removed reducer fitting and banjo bolt. Using suitable fittings, connect inlet line of a 14-51D Flo-Rater or equivalent to the service tee as shown. Place outlet line of Flo-Rater into the filler hole in hitch cover. Secure outlet hose in hole with wire. Open restrictor valve on Flo-Rater, start tractor and set engine speed to 2600 rpm. Run tractor until hydraulic fluid reaches temperature of 50°C. Hold steering wheel against one of its stops and note steering circuit flow. Flow should be 2.6 liters/min. (0.7 gpm) minimum. With steering wheel held against stop, close Flo-Rater restrictor valve and note steering circuit relief pressure of relief valve in flow divider. Allowable relief pressure for two-wheel drive tractors is 6867 to 7357 kPa (996 to 1067 psi) and for "All-Wheel Drive" tractors allowable relief pressure is 11,770 to 12,259 kPa (1707 to 1778 psi). The steering relief valve in the flow divider has provision for adjustment. If adjustment is necessary, loosen locknut on Allen head set screw at the front of the flow divider, and turn screw in or out as necessary to obtain correct relief pressure. After adjustment, tighten locknut. If relief pressure and flow can-

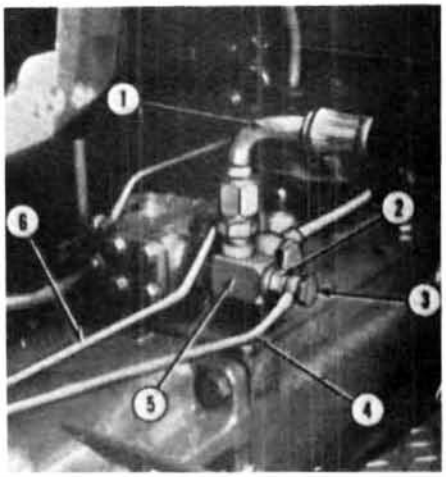


Fig. 25–View showing priority valve with Flo-Rater installed to check system operating and relief pressure on Model 284 tractors equipped with power steering.

1. Flo-Rater inlet line
2. Reducer
3. Banjo bolt
4. Power steering supply line
5. Service tee
6. Power steering return line

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SHOP MANUAL

INTERNATIONAL HARVESTER

SERIES
274 – 284

Engine serial number is stamped on right side of engine crankcase on diesel series and on left side of engine crankcase on non-diesel series. Tractor serial number is stamped on name plate attached to right side of clutch housing of all series.

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in Fig. 65. When installing rod and piston assembly in cylinder block, double leaf pattern on piston top should face camshaft side of engine and marks on rod ends should face manifold side of engine.

PISTONS, SLEEVES AND RINGS

Models 274 and 284 Diesel

78. Pistons are available only in sets of three. New pistons have a diametral clearance in new sleeves of 0.09-0.20 mm when measured at a right angle to the piston pin, 50.5 mm down from top of piston. Diameter of piston should be 82.84-82.89 mm when measured at a right angle from piston pin, 50.5 mm down from piston top. If piston pin bore exceeds 26.00 mm, renew piston.

The dry type, pressed in cylinder liners should be renewed when I.D., out-of-round or taper exceeds 0.20 mm. Inside diameter of new liner is 82.98-83.04 mm. If greater than 83.20, renew liner.

Remove dry type cylinder liners using a 17-22 Hydraulic Cylinder Sleeve Puller/Installer or equivalent. With liners removed check cylinder block warp. If warpage exceeds 0.10 mm, grind cylinder block surface not to exceed 0.30 mm. Cylinder block height is 322.70 mm. If cylinder block specifications are exceeded, renew cylinder block. If cylinder liner bore in cylinder block exceeds 87.02 mm or taper and out-of-roundness exceeds 0.02 mm, renew cylinder block. Install new cylinder liners using 17-22 Hydraulic Cylinder Sleeve Puller/Installer or equivalent. Cylinder liner protrusion above cylinder block should be 0.02-0.09 mm.

Pistons are fitted with three compression rings and two oil control rings. Prior to installing new rings, check clearance between rings and ring grooves in piston against the following specifications:

Maximum Ring Clearance in Groove:
- Top Compression ..... 0.50 mm
- Second and Third Compression ..... 0.30 mm
- Oil Control (2) ..... 0.15 mm

Check ring end gap with ring inserted in cylinder liner against the following specifications:

Ring Gap in Cylinder:
- Top Compression ..... 0.30-0.45 mm
- Second and Third Compression ..... 0.20-0.35 mm
- Oil Control (2) ..... 0.15-0.30 mm

Maximum Allowable Ring Gap in Cylinder:
- All Rings ..... 1.50 mm

Install rings with gaps positioned as shown in Fig. 67.

PISTON PINS

Models 274 and 284 Diesel

79. The full floating type piston pins are retained in piston by snap rings. Piston can be heated to 50-60° C for pin removal and installation. Check piston, piston pin and rod bushings against the following specifications:
- Piston pin diameter ..... 25.99 mm
- Piston pin diametral clearance in rod bushing ..... 0.03-0.05 mm
- Maximum clearance in rod bushing ..... 0.10 mm
- Piston pin bushing in rod inside diameter .... 26.03-26.04 mm

Piston pins are furnished semi-finished and must be honed or reamed to an inside diameter of 26.03-26.04 mm after installation in connecting rods.

CONNECTING RODS AND BEARINGS

Models 274 and 284 Diesel

80. Connecting rod bearings are of the slip-in precision type, renewable from below after removing oil pan, oil pump and connecting rod caps. Mark connecting rod and cap with corresponding cylinder number on manifold side of rod and cap. When installing new bearing inserts, make certain projections on same engage slots in connecting rod. Connecting rod bearings are available in standard size and undersizes of 0.25, 0.50, 0.75 and 1.00 mm. Check crankpins and connecting rod bearings against the following specifications:
- Crankpin diameter ... 52.91-52.93 mm
- Rod bearing diametral clearance ..... 0.04-0.10 mm
- Rod side clearance .... 0.10-0.20 mm
- Rod bolt torque ..... 50-55 N·m

If bearing clearance is not within specifications, the crankshaft must be reground and undersize bearings installed. Refer to Figs. 68 and 69 for regrind and undersize specifications.

CRANKSHAFT AND MAIN BEARINGS

Models 274 and 284 Diesel

81. Crankshaft is supported in four main bearings and crankshaft end play is controlled by thrust washers (8 and 23 – Fig. 66) on each side of the third main bearing (25). Thrust washer sets are available in sizes of 2.325, 2.350 and 2.375 mm.

NOTE: When installing thrust washers, oil grooves must face away from the bearing inserts.

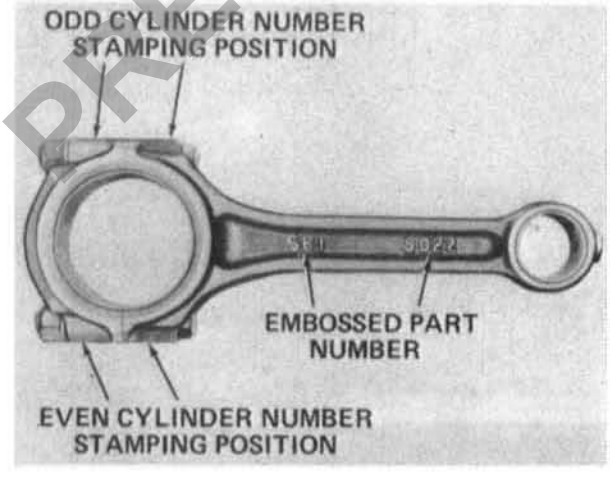


Fig. 64 – View showing correct locations for indexing connecting rods on Models 274 and 284 diesel equipped tractors. Refer to text.

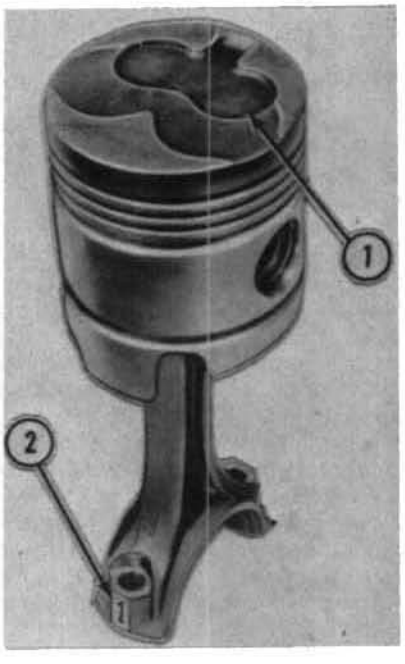


Fig. 65 – View showing correct position of piston to connecting rod index marks. Refer to text.

1. Double leaf pattern
2. Connecting rod large end mark

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