MAINTENANCE CHART

NOTE: This chart is based on maximum intervals. Increase intervals if machine operates in severe conditions.

INTERVAL	SERVICE	INSTRUCTIONS
Run-In Period After First 2 Hours	Change engine oil. Check wheel nut torque until stable (40 to 50 foot-pounds).	Section 2052
Run-In Period After First 25 Hours	Change hydraulic oil. Change hydraulic oil filter.	Section 4011 Section 4011
Every 5 Hours or Twice Daily	Check engine oil level.	Section 2052
Daily	Grease loader pivot points. Fill the fuel tank. Inspect air cleaner element, clean if required. Clean oil cooler of all obstructions. Visually check machine for broken missing or loose parts. Also check for leaks under machine.	
Twice a Week or Every 25 Hours	Change engine crankcase oil.	Section 2052
Weekly	Grease control lever pivots. Check hydraulic oil level. Check battery electrolyte level. Check tire pressure. Inspect all pump drive belts.	 Section 4011 Section 6024
Every 200 Hours	Check and adjust valve clearance.	Section 2052
Twice a Year	Lubricate shaft spline on two hydrostatic motors.	Section 6033

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U.S. AND METRIC TORQUE SPECIFICATIONS

Torque values for all situations unless special torque is specified.

Grade 5 Bolts, Nuts, Studs (Dry)

Thread Size	Torque ft. lbs.	Torque m-kg	Thread Size	Torque ft. lbs.	Torque m-kg
1/4" - 20 NC	5-10	0,7-1,4	3/4" - 10 NC	235-285	32-39
1/4" - 28 NF	10-15	1,4-2,1	3/4" - 16 NF	270-330	37-46
5/16" - 18 NC	15-20	2,1-2,8	7/8" - 9 NC	360-440	50-61
5/16" - 24 NF	15-20	2,1-2,8	7/8" - 14 NF	395-490	55-68
3/8" - 16 NC	25-35	3,5-4,8	1" - 8 NC	520-640	72-88
3/8" - 24 NF	30-40	4,1-5,5	1" - 12 NF	575-705	79-97
7/16" - 14 NC	45-55	6,2-7,6	1-1/8" - 7 NC	720-820	99-113
7/16" - 20 NF	50-60	6,9-8,3	1-1/8" - 12 NF	790-970	109-134
1/2" - 13 NC	65-85	9,0-12,0	1-1/4" - 7 NC	1010-1240	139-171
1/2" - 20 NF	80-100	11-14	1-1/4" - 12 NF	1115-1365	154-188
9/16" - 12 NC	100-120	14-17	1-3/8" - 6 NC	1315-1610	181-222
9/16" - 18 NF	110-130	15-18	1-3/8" - 12 NF	1510-1850	208-255
5/8" - 11 NC	135-165	19-23	1-1/2" - 6 NC	1745-2135	241-295
5/8" - 18 NF	160-200	22-28	1-1/2" - 12 NF	1880-2420	259-334

Grade 8 Bolts, Nuts, Studs (Dry)

Thread Size	Torque ft. lbs.	Torque m-kg	Thread Size	Torque ft. lbs.	Torque m-kg
1/4" - 20 NC	10-15	1,4-2,1	3/4" - 10 NC	340-420	47-58
1/4" - 28 NF	15-20	2,1-2,8	3/4" - 16 NF	380-460	52-63
5/16" - 18 NC	20-30	2,8-4,1	7/8" - 9 NC	540-660	75-91
5/16" - 24 NF	25-30	3,5-4,1	7/8" - 14 NF	595-725	82-100
3/8" - 16 NC	40-50	5,5-6,9	1" - 8 NC	810-990	112-137
3/8" - 24 NF	45-55	6,2-7,6	1" - 12 NF	900-1100	124-152
7/16" - 14 NC	60-80	8,3-11,0	1-1/8" - 7 NC	1150-1400	159-193
7/16" - 20 NF	70-90	9,7-12,0	1-1/8" - 12 NF	1295-1585	179-219
1/2" - 13 NC	100-120	14-17	1-1/4" - 7 NC	1640-2000	226-276
1/2" - 20 NF	110-130	15-18	1-1/4" - 12 NF	1800-2200	248-304
9/16" - 12 NC	135-165	19-23	1-3/8" - 6 NC	2140-2620	295-362
9/16" - 18 NF	155-190	21-26	1-3/8" - 12 NF	2450-3000	338-414
5/8" - 11 NC	200-240	28-33	1-1/2" - 6 NC	2845-3475	393-480
5/8" - 18 NF	215-265	30-37	1-1/2" - 12 NF	3200-3900	442-538

Hydraulic Fittings (Steel)

Dash Size	Tube O.D.	Thread Size	37° Flare Female Swivel Torque ft. lbs.	37° Flare Female Swivel Torque m-kg	Straight Thread O-Ring Torque ft. lbs.	Straight Thread O-Ring Torque m-kg
4	1/4"	7/16" - 20	6-12	0,8-1,7	12-19	1,7-2,6
5	5/16"	1/2" - 20	8-16	1,1-2,2	16-25	2,2-3,5
6	3/8"	9/16" - 18	10-25	1,4-3,5	25-40	3,5-5,5
8	1/2"	3/4" - 16	15-42	2,1-5,8	42-67	5,8-9,2
10	5/8"	7/8" - 14	25-58	3,5-8,0	58-92	8,0-12,7
12	3/4"	1-1/16" - 12	40-80	5,5-11,0	80-128	11-18
14	7/8"	1-3/16" - 12	60-100	8,3-14,0	100-160	14-22
16	1"	1-5/16" - 12	75-117	10-16	117-187	16-26
20	1-1/4"	1-5/8" - 12	125-165	17-23	165-264	23-36
24	1-1/2"	1-7/8" - 12	210-250	29-35	250-400	35-55

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ENGINE REMOVAL

1. Remove seat/heat shield assembly. Then loosen the hydrostatic pump adapter plate mounting bolts and equipment pump mounting bolts and remove belts from pump sheaves.

2. Swing oil cooler out of way. Remove ground cable from engine (below starter) and tape cable end to prevent accidental grounding.

3. Remove cable from starter and disconnect harness at plug from engine.

4. Disconnect choke and throttle cables at carburetor and position out of way.

5. Disconnect fuel line at fuel pump, remove hose from supporting clamp and secure loose end of hose above fuel tank to prevent siphoning fuel tank.

6. Remove four engine mounting bolts and remove engine.

NOTE: All late production bolts have been installed with Loctite.

ENGINE INSTALLATION

1. If a new engine or a new crankshaft was installed, refer to Section 6021 clutch installation.

2. If original engine is being installed and clutch was removed, align clutch set screws with drill spots on crankshaft and torque set screws to 11-13 foot-pounds.

3. Place drive belts on clutch and set engine on mounting pads. As the engine is slid into place, install belts on pump sheaves.

NOTE: Early production machines used lock washers with the engine mounting bolts. Discard lock washers and replace with hardened flat washers. Refer to parts catalog.

4. Position engine in original position as close as possible. Coat engine mounting bolt threads with 242 (blue) Loctite and install bolts. When clutch is parallel to and about 1/8" from pump mounting plate, torque mounting bolts to 40 foot-pounds.

5. Connect fuel line to fuel pump. Install fuel line support clamp.

6. Connect choke and throttle cables to carburetor.

7. Connect wiring harness and starter cable to starter.

8. Connect ground cable to engine below starter.

9. Tighten drive belts as instructed in this section.

10. If crankcase was drained, fill with oil specified in Section 1050.

11. Swing oil cooler into place and secure with nuts and bolts.

12. Install seat/heat shield assembly.

DRIVE BELTS

Vickers Hydrostatic Pump and Equipment Pump Belts

Due to the time required to replace a belt, careful consideration should be given to replace all belts at the same time.

Removal

1. Remove seat/heat shield assembly. Then loosen the hydrostatic pump adapter plate mounting bolts and equipment pump mounting bolts and remove belts from pump sheaves.

2. Swing oil cooler out of way. Remove ground cable from engine (below starter) and tape end of cable to prevent accidental grounding.

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SYMPTOM	POSSIBLE CAUSE	REMEDY
Excessive cylinder packing wear	Contaminated oil.	Flush the complete hydraulic system as instructed on page 4011-8.
	Excessive relief valve pressure setting.	Check and adjust main relief valve as instructed in this section.
Bent piston rod	Failure to lubricate pivot pins as specified.	Lubricate fittings daily or more often if operating in severe conditions.
	Excessive relief valve pressure setting.	Check and adjust main relief valve as instructed in this section.

HOSES AND FITTINGS

SYMPTOM	POSSIBLE CAUSE	REMEDY
Hose cover separated from wire braid	Hose twisted.	Install hose properly; connect hose at swivel fitting last and make sure hose does not twist when fitting is tightened.
Fitting pulled from hose or burst hose	Hose twisted.	Install hose properly; connect hose at swivel fitting last and make sure hose does not twist when fitting is tightened.
	Improperly adjusted or faulty main relief valve.	Adjust valve as instructed in this section. If valve cannot be repaired, replace valve.
Damaged threads	Over torqued.	Torque to specifications, Section 1051.

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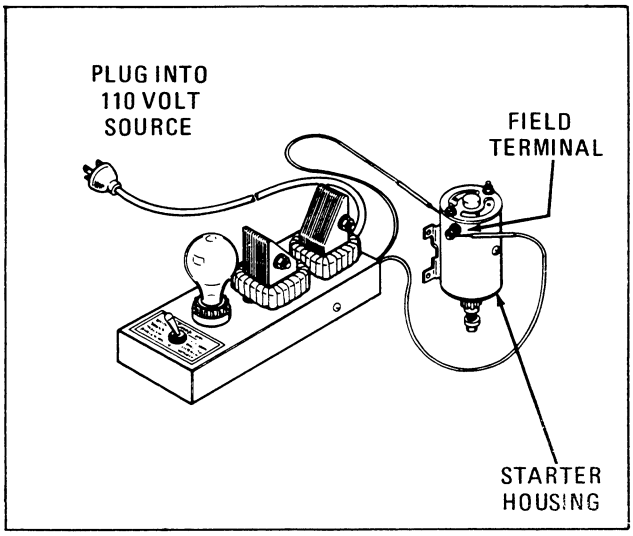


Figure 7 - Checking for Grounded Starter

GROUNDED STARTER, STARTER ASSEMBLED

Using a continuity tester (example shown: Light on growler, Figure 7), place one probe of tester on starter housing and the other probe on the terminal post. If tester shows continuity the copper portion of the starter is grounded. To further isolate the problem, perform the following tests.

NOTE: Do not attempt to service field coils, unless cause is a broken lead or brush wire or bad connection. Replace complete starter or housing assembly if field is defective.

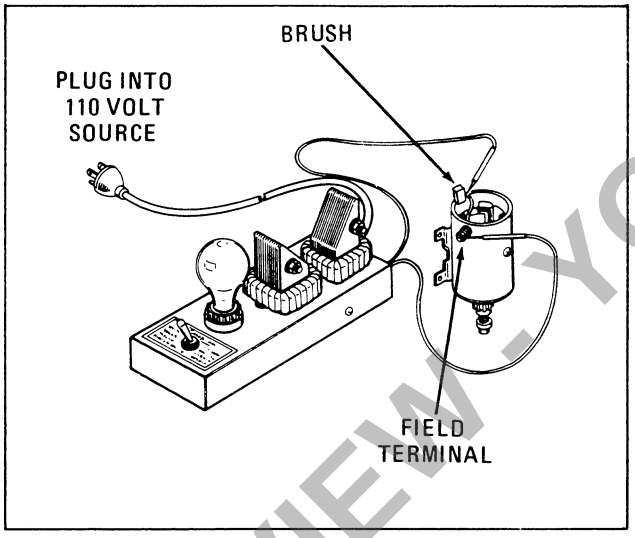


Figure 8 - Checking for Open Field Coils

OPEN FIELD COILS, END CAP REMOVED

Remove brushes from holders. Use a continuity tester (example shown: Light on growler, Figure 8). Place one probe of tester on brush and other probe on the terminal post. No continuity indicates an open field coil.

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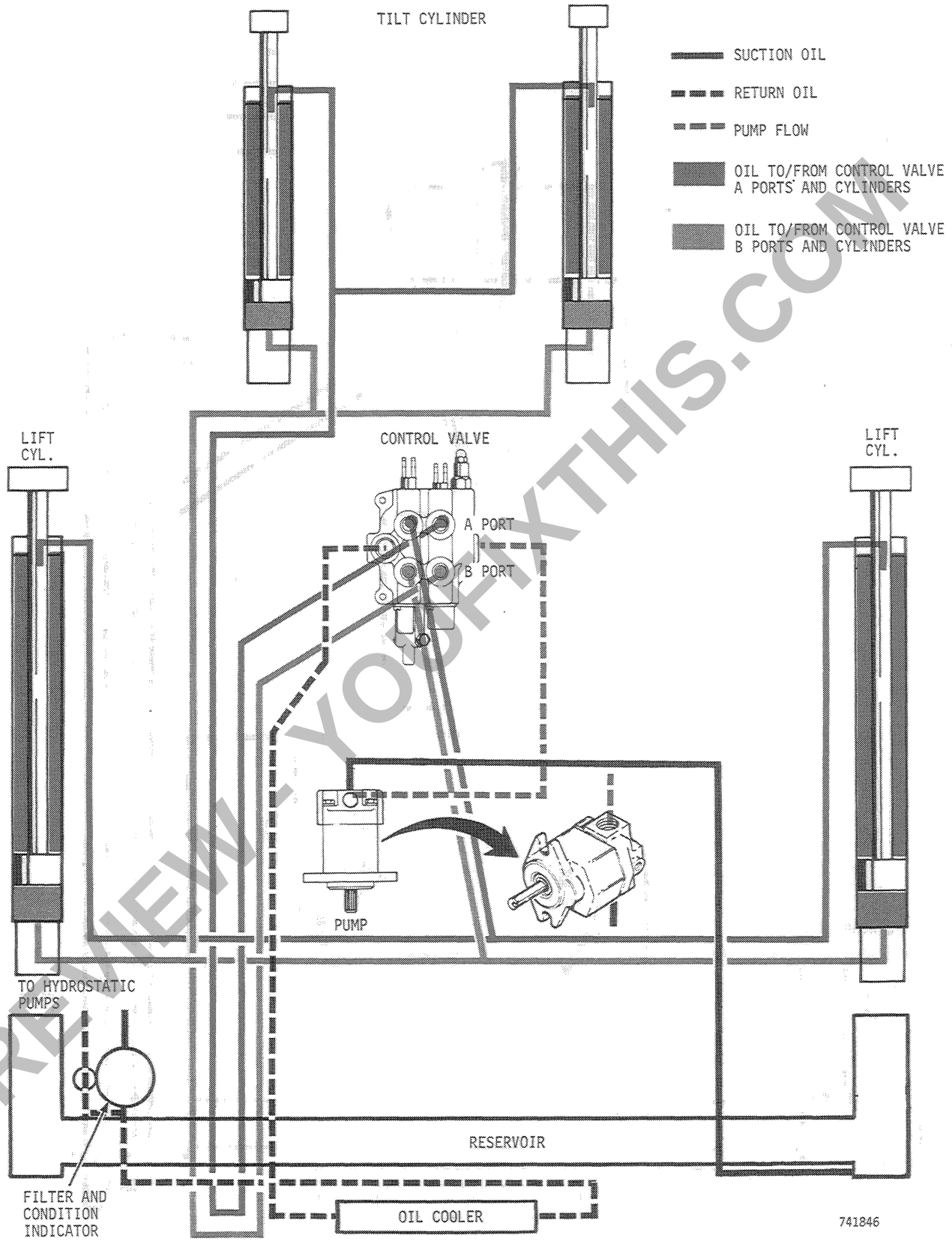


Figure 2 - Loader Hydraulic Diagram, Late Production

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3. Remove cable from starter and disconnect wiring harness at plug from engine.

4. Disconnect choke and throttle cables at carburetor. Slide engine to rear and remove belts.

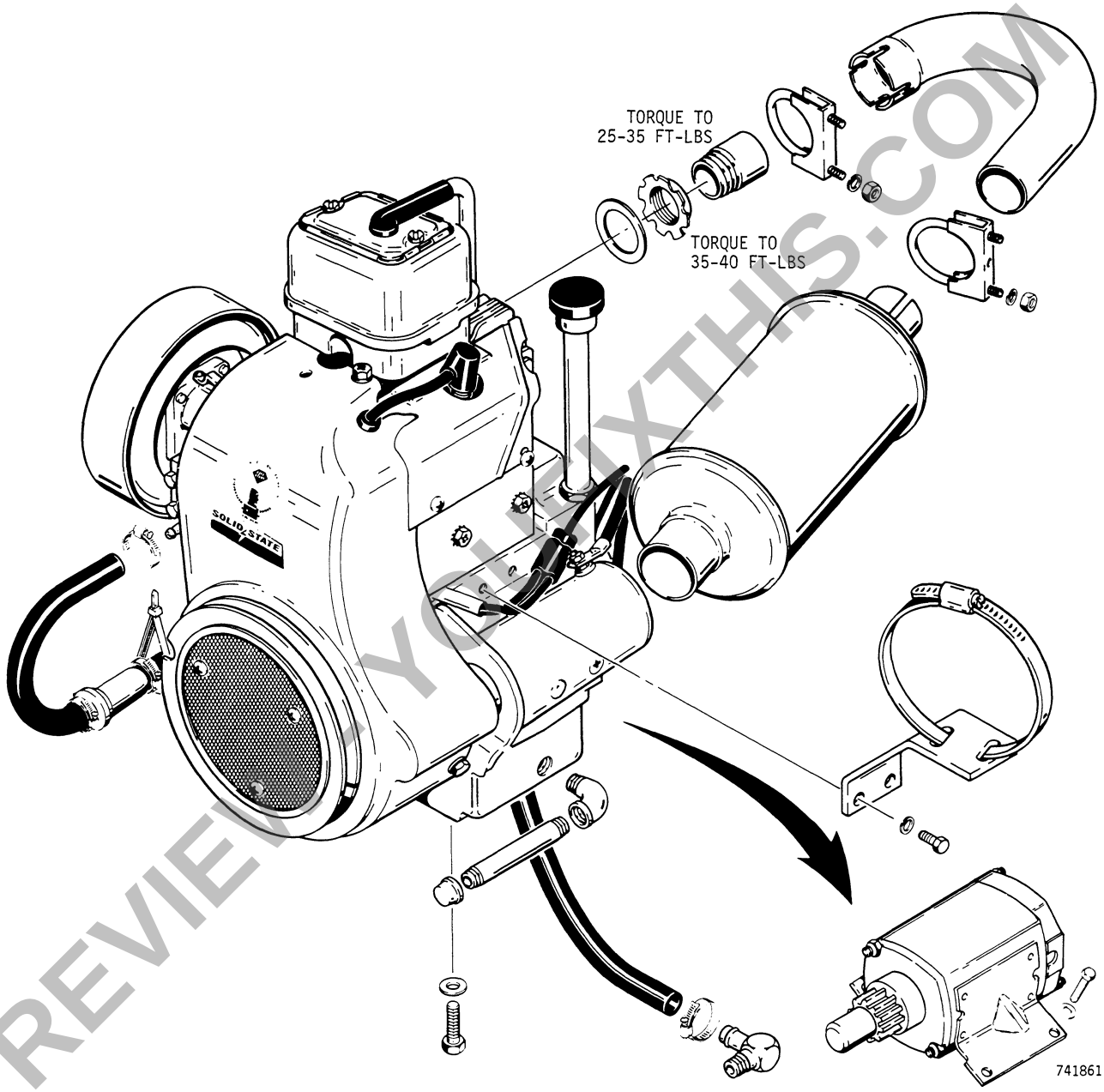


Figure 1 - Engine

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CAMSHAFT

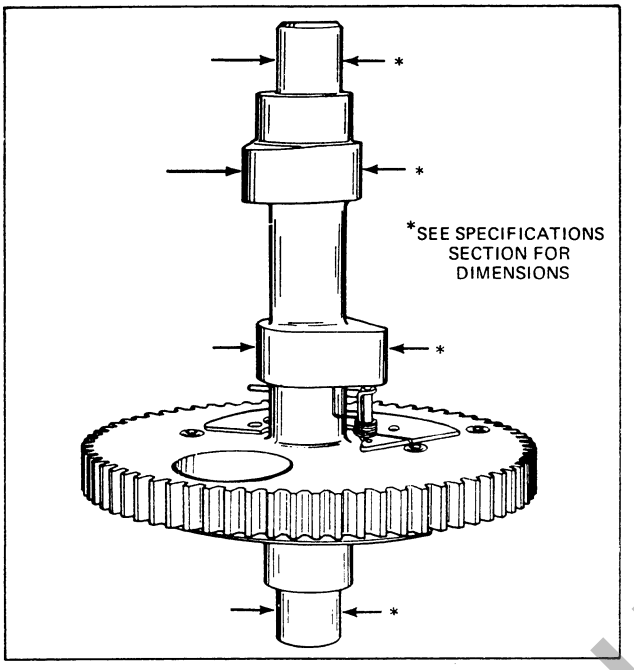


Figure 4-1

4-A-1 CAMSHAFT GEAR TEETH WEAR

When servicing engines check the camshaft at the points indicated by the asterisks in Figure 4-1. Examine the gear teeth for wear and damage. See Specifications Section 9.

NOTE: If a damaged gear is replaced, the mating gear should also be replaced.
Example: If the camshaft is damaged and replaced, the crankshaft gear should be replaced.

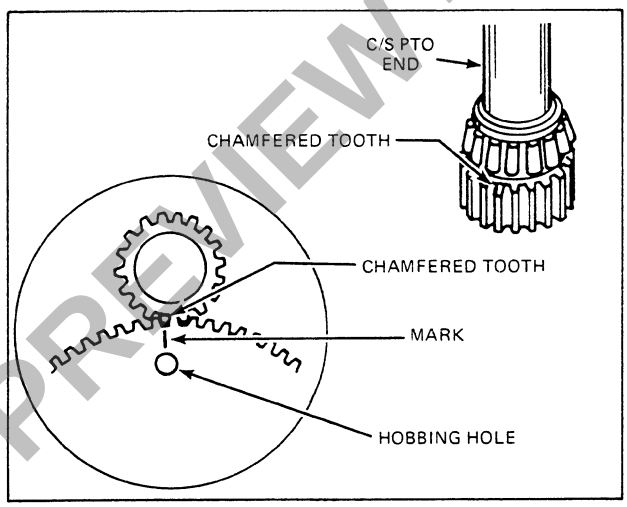


Figure 4-2

4-A-2 MECHANICAL COMPRESSION RELEASE

Clean the mechanism in a conventional parts cleaner and dry thoroughly. Individual component parts are not available as service replacement parts and cannot be obtained from the factory. New replacement camshafts with the compression relief mechanism are available.

4-A-3 VALVE TIMING

Match chamfered gear tooth on crankshaft with mark and hobbing hole on camshaft gear. See Figure 4-2.

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HYDRAULIC SYSTEM TROUBLE SHOOTING

Poor Operation of a Single Circuit Only

If only one circuit is performing poorly, the problem is in that circuit; worn cylinder packing or valve spool leakage.

CHECK	DETAILED INSTRUCTIONS
1. Check cylinder packing.	1. a. If checking lift cylinders, drive front wheels onto blocks that will permit loader to be lowered against stops. Completely retract the lift cylinders and disconnect a hose to the closed end of one of the cylinders. b. If checking tilt cylinders, completely roll the bucket back and disconnect a hose at the closed end of one of the cylinders. c. Start engine and run at full throttle. Slowly move the control lever into the same position as in step 1a or 1b and hold in place. Check for leakage through the open line. Any leakage indicates worn packing and repair of that cylinder. d. Repeat steps 1a, b and c at rod end of cylinder. e. Remove defective cylinder for repair and recheck circuit operation. If the problem is not remedied, control valve leakage is suspect. Remove control valve for inspection.

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Section 6024

WHEELS AND TIRES

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12. Connect spark plug wire and start engine. With engine running at low idle, crack both lines (one at a time) at each motor to bleed air from lines.

13. With engine running at low idle, slowly move each control lever completely forward and rearward. Increase engine speed to full throttle and move control levers completely forward and rearward.

14. Stop engine and check for leaks, and check reservoir oil level.

15. Install seat/heat shield assembly and floorboard.

Left Hand (Bottom) Pump

METHOD NO. 1

1. Make sure drain hose is installed on pump.

2. Install adapter plate on pump and torque capscrews to 25-35 foot-pounds. Slotted end of plate must be to the right viewing pump from drive end.

3. Install key in pump shaft and start pump into mounting plate. Block pump in place and install pump sheave with hub toward engine.

4. Install belt and secure pump to mounting plate and align pump sheave with drive sheave. Tighten sheave set screws and install snap ring.

5. Adjust belt tension as instructed in Section 2050.

6. Connect drain hose to manifold and install control rod.

7. Install elbows with new O-rings in left hand pump: short elbow in right hand port and long elbow in remaining port. Do not tighten lock nuts until hoses have been connected.

8. Connect hoses to left hand pump. Hose from left motor front port to long elbow and remaining hose to short elbow. Position hoses and tighten lock nuts.

9. Connect hoses to right hand pump. Hose from right motor front port to long elbow and remaining hose to short elbow.

10. Connect inlet hose to pump. Then connect equipment pump outlet hose.

11. Route throttle cable through hole in pump mounting plate and connect to carburetor.

12. Fill hydraulic reservoirs with oil specified in Section 1050.

13. Fill pumps before starting engine. Remove spark plug wire and operate starter for 30 seconds, wait one minute and operate starter again for 30 seconds.

14. Raise all wheels off the floor and block machine in place.

15. Connect spark plug wire and start engine. With engine running at low idle, crack both lines at each motor to bleed air from lines.

16. With engine running at low idle, slowly move each control lever completely forward and rearward. Increase engine speed to full throttle and move control levers completely forward and rearward.

17. Stop engine, check for leaks and check reservoir oil level.

18. Install floorboard and seat/heat shield assembly.

METHOD NO. 2

1. Make sure drain hose is installed on pump.

2. Install adapter plate on pump and torque capscrews to 25-35 foot-pounds. Slotted end of plate must be to the right viewing pump from drive end.

3. Install pump on mounting plate and tighten mounting bolts. Then install sheave on driveshaft with long end of hub away from pump. Position sheave on shaft until space between pump mounting plate and sheave measures .100"; then tighten sheave set screws and install snap ring.

4. Install pump mounting plate in machine. As mounting plate is being positioned, have someone place hydrostatic belts on sheaves. Install mounting hardware and

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