MAINTENANCE CHART

INTERVAL	SERVICE	INSTRUCTIONS
Run-In Period After First 2 Hours	Check fan belt tension. Torque wheel nuts to 80-90 foot-pounds every 2 hours until stable.	Section 8016.
Every 10 Hours or Daily, Whichever Occurs First	Check engine oil level. Check radiator coolant level and check radiator for obstructions. Grease loader pivot points. Grease attachment pivot points. Clean air cleaner dust cup and precleaner. Fill fuel tank. Visually check machine for broken, missing or loose parts. Check for leaks under machine.	Section 2051.
Every 50 Hours or Weekly, Whichever Occurs First	Check fan belt tension. Check battery fluid level. Check tire pressure. Check hydraulic oil level. Oil MUST be cold. Grease control lever cross shaft. Change engine oil.	Section 8016. Section 8014. Section 6024. Section 4011.
Every 100 Hours	Change engine oil filter. Check engine speeds. Clean out spark arresting muffler (if so equipped).	Section 2052.
Every 200 Hours	Check drive chain tension.	Section 6023.
Every 250 Hours	Clean exterior of engine. Replace the points and spark plugs. Replace in-line fuel filter. Inspect ignition wires and connections.	Section 8013. Section 3052.

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or on seat and press seat into head until firmly seated against shoulder in bore. Do not use excessive pressure or cylinder head damage will result.

7. Repeat steps 5 and 6 and install the remaining seat(s).

Grinding Valves and Valve Seats

Valve and valve seat faces are ground at 45°. The intake valve seat face should be .0486" (3/64") wide and the exhaust valve seat face should be .0625" (1/16") wide.

Valves and valve seats should be ground with special grinding equipment designed specifically for this purpose. Refer to the above specifications and use the equipment according to the manufacturer's instructions. Two manufacturers of valve grinding equipment are Thor and Sioux.

To assure a positive seal between the valve and seat, dress the stones before starting the grinding operation and periodically during the grinding process.

When refacing valves and seats, remove only enough material to true up face or remove pits. Thin valve heads run hotter and excessive grinding of valve seats may result in the seats or cylinder head having to be replaced.

When grinding valve seats, a pilot shaft which pilots firmly in the valve guide must be used. A pilot shaft that is loose in the valve guide will result in an out of round (eccentric) valve seat. As this engine is manufactured to metric specifications it may be necessary to machine a special pilot shaft.

Before removing pilot shaft after grinding a valve seat, attach a dial indicator to shaft, Figure 16, and check seat runout. Runout should not exceed .002". Regrind seat if runout is greater than .002".

Any valve that is necked (stretched valve stem below head), cracked or burnt must be replaced.

After valve have been ground, compare head thickness with a new valve as illustrated in Figure 17. If dimension A is less than 50% of a new valve, replace the valve. Then check valve face runout in a fixture similar to the one illustrated in Figure 18. Runout should not exceed .002". If runout is greater than .002", reface valve.



Figure 16 - Checking Valve Seat Runout

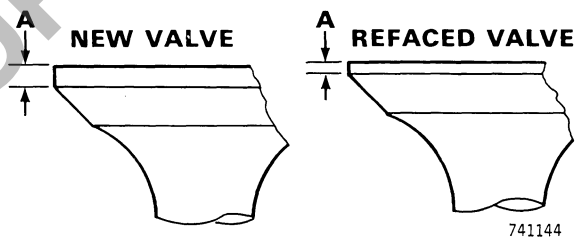


Figure 17 - Checking Valve Head Thickness

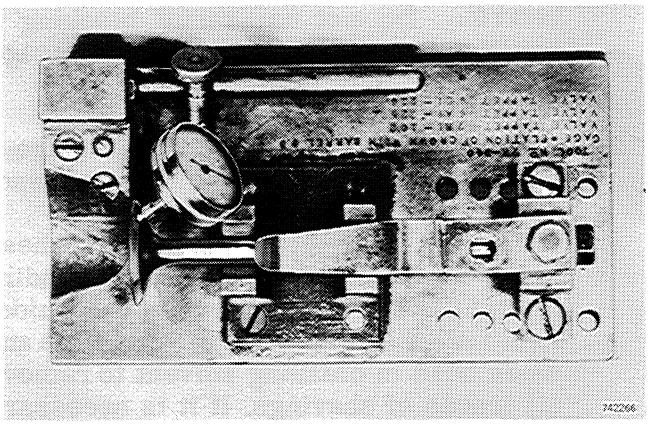


Figure 18 - Checking Valve Face Runout

After the valves and seats have been refaced, it is necessary to check valve seat width and valve position on the seat. Lightly coat each valve seat with Prussian blue.

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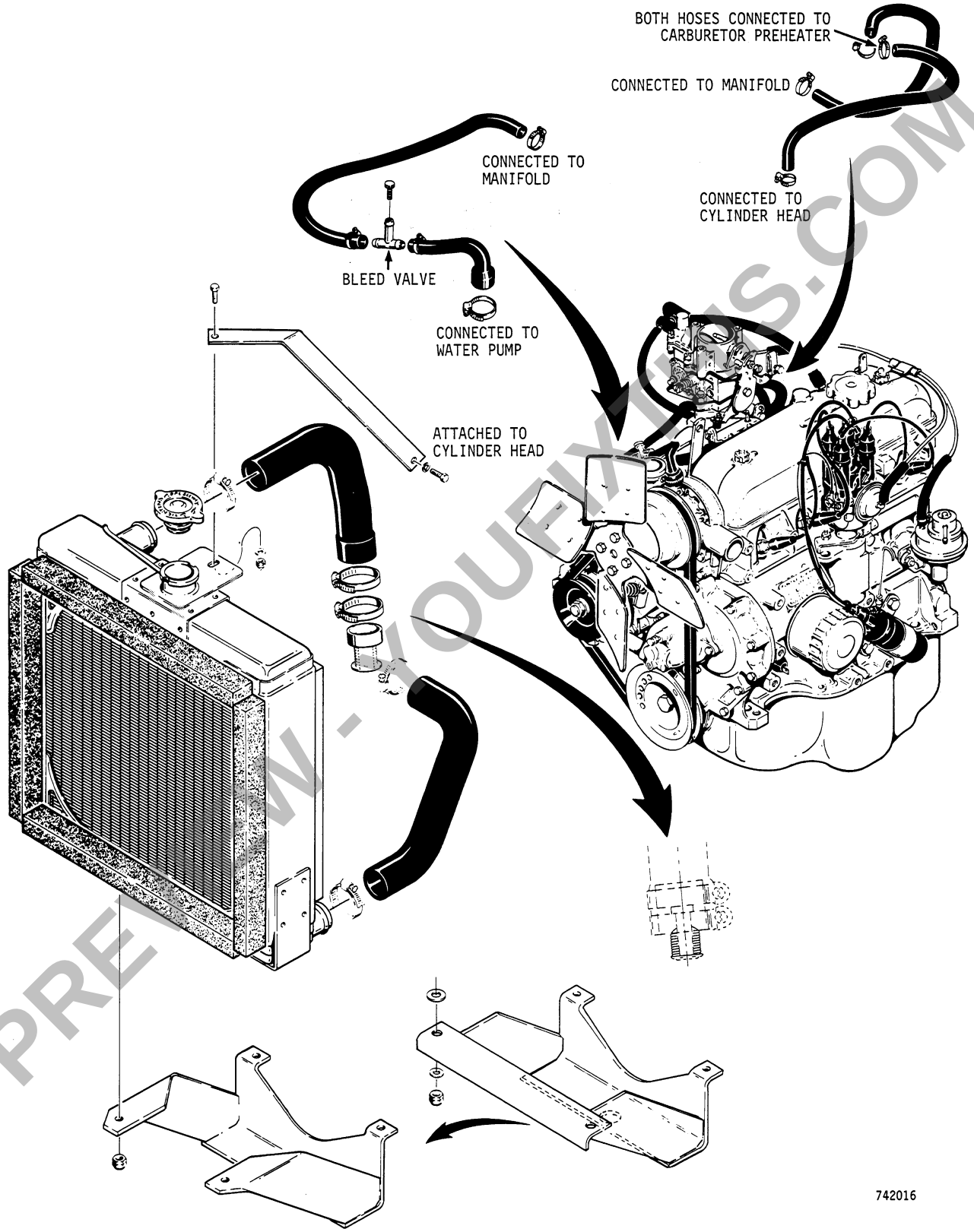


Figure 1 - Cooling System

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Poor Operation of All Circuits

When all circuits perform unsatisfactorily, a worn pump is the most common cause. Before removing the pump, make the checks listed below.

CHECK	DETAILED INSTRUCTIONS
1. Check hydraulic oil level.	
2. Check hydraulic filter.	2. Replace filter if dirty.
3. Check pump intake line.	3. Check the intake line between the reservoir and pump for a loose connection or damaged fitting that could cause air leakage. Tighten or repair.
4. Check setting of main relief valve.	4. See page 4011-17.
5. Check compression and ignition timing.	5. See Section 2052. This test will determine if all or part of the problem is in the engine.
6. Check oil for contamination.	6. Run engine briefly, then draw a sample of oil from the reservoir. Compare the sample with new oil--look for the following signs: a. Feel the oil with your fingers. See if the oil is gritty or contains any particles large enough to be felt. b. Milky color, a sign of water in the oil. c. Foam, a sign that air is entering the system. d. Scorched smell or darkening or thickening, signs of severe overheating. If any of the above signs are found, the oil must be replaced. Depending on how bad the contamination is, the entire system may have to be drained and flushed. After replacing the oil, check pump output with a flowmeter (see following step).
7. Check pump output with flowmeter.	7. See page 4011-12. If output is not at least 80% of the specification on the Flowmeter Check Sheet, repair or replace the pump.

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Excessive Heat

Excessive heat is usually the result of a control valve spool not returning to neutral or a relief valve that is set too low. If the valve spool fails to return to neutral, the pump flow will be dumped continuously and will cause a rapid increase in oil temperature. If the relief valve is set too low, part of the oil will be dumped across the relief valve every cycle. In this case loader operation may be slow.

Excessive Pressure

There are two reasons for excessive pressure: (1) the relief valve fails to function. This produces one extreme surge of pressure and immediate failure. (2) The relief valve pressure setting is too high and failure is the result of repeated excessive pressure peaks.

Both reasons for excessive pressure can result in broken driveshafts or cracked housings.

Assembly

A service kit is available for replacing all the pump seals and gaskets. This kit contains a new diaphragm, gaskets, shaft seal, diaphragm seal, and a steel ball and spring. Refer to the Parts Catalog.

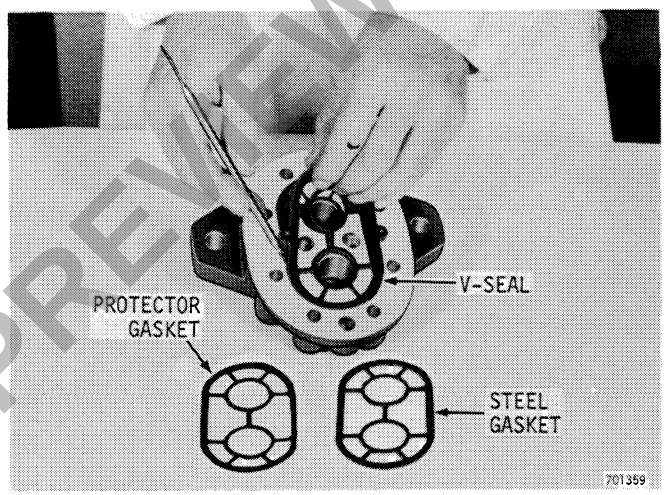


Figure 11 - Installing Seals in Front Cover

1. Place a new V-seal on the front cover with the V down. Use a dull instrument and install the seal in the cover. Install new protector gasket on the V-seal. Install new steel gasket.

2. Place steel ball in hole on suction side of front cover. Then place spring on top of ball.

3. Install new diaphragm (wear plate) with the bronze side up. It must fit inside of the rim on the V-seal. Make sure coils of the spring are not wedged between diaphragm and front cover.

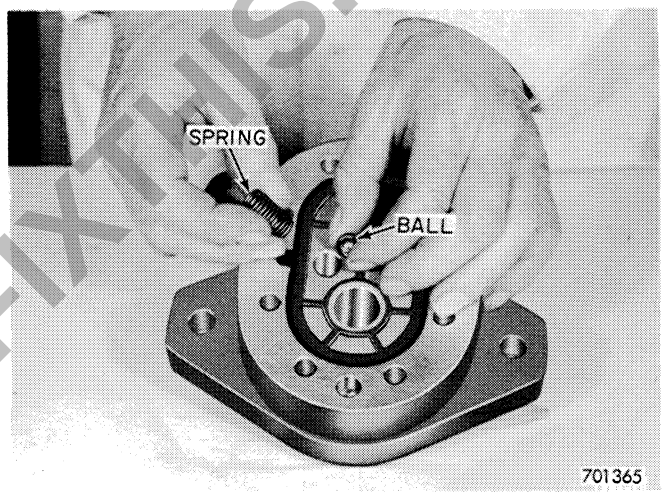


Figure 12 - Installing Ball and Spring

4. Lubricate gear assemblies with hydraulic oil and install gears in front cover.

5. Apply a thin coat of heavy grease on both faces of the gear plate. Place gear plate on front cover with half moon cavities toward the rear cover and marks made during disassembly lined up. Note the small drilled hole in one of the half moon cavities; the hole must be on the outlet (pressure) side when gear plate in installed.

6. Install O-ring in groove in rear cover and install cover.

7. Install the tie bolts and torque evenly to 25-28 foot-pounds. Make sure ferry head bolts are installed in holes they were removed from.

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Section 4057

LIFT AND BUCKET CYLINDERS

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Section 6024

WHEELS AND TIRES

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the pressure gauge for maximum pressure. Pressure should be 3500-3800 psi (24 131 - 26 200 kPa) with the control lever moved between 1/2 and 3/4 of full lever travel. Moving the control lever too far at these pressures will lug the engine down and cause it to stall out completely.

Reverse Relief Valve

1. Install a 0-5000 psi (0-34 473 kPa) pressure gauge in the 1/8" NPT port in the front fitting of either motor, Figure 10 or 11, as required.

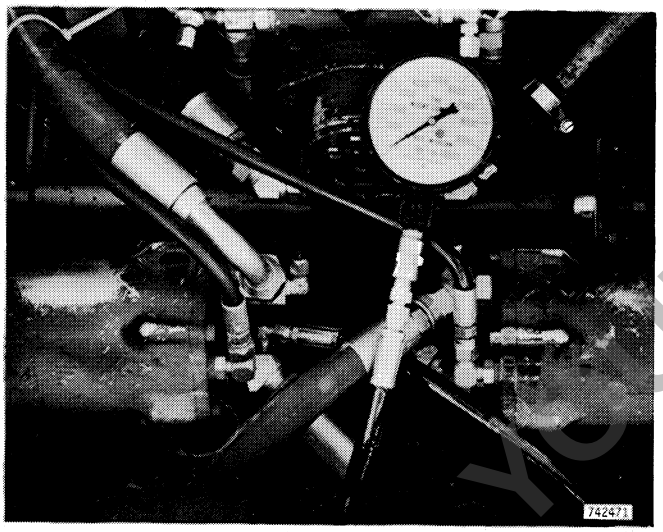


Figure 10 - Pressure Gauge Connected to R.H. Motor

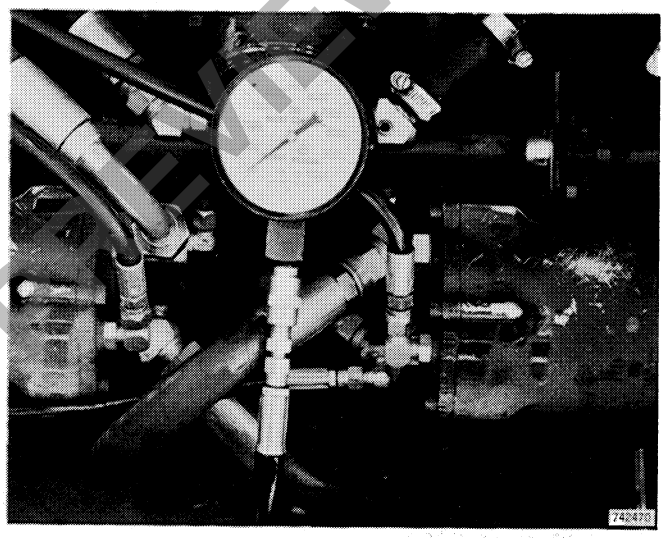


Figure 11 - Pressure Gauge Connected to L.H. Motor

2. Position rear of machine against a solid object (wall, post, etc.) with all wheels on a dry surface, Figure 12.



Figure 12

3. Set hand throttle to the full throttle position.

4. Depress brake pedal and hold until step 5 is completed.

5. Move the control lever (right or left as required) slowly rearward and observe pressure gauge for maximum pressure. Pressure should be 3500-3800 psi (24 131 - 26 26 200 kPa) with the control lever moved between 1/2 and 3/4 of full lever travel. Moving the control lever too far at these pressures will lug the engine down and cause it to stall out completely.

Interpreting Test Results

If the pressure setting cannot be obtained in one direction only, it is probably a defective relief valve. Install a new relief valve or switch relief valves. This should correct the problem or move it to the other circuit.

NOTE: If relief valve has separate seat, be sure to install the new seat or transfer the seat to the other side side when switching valves.

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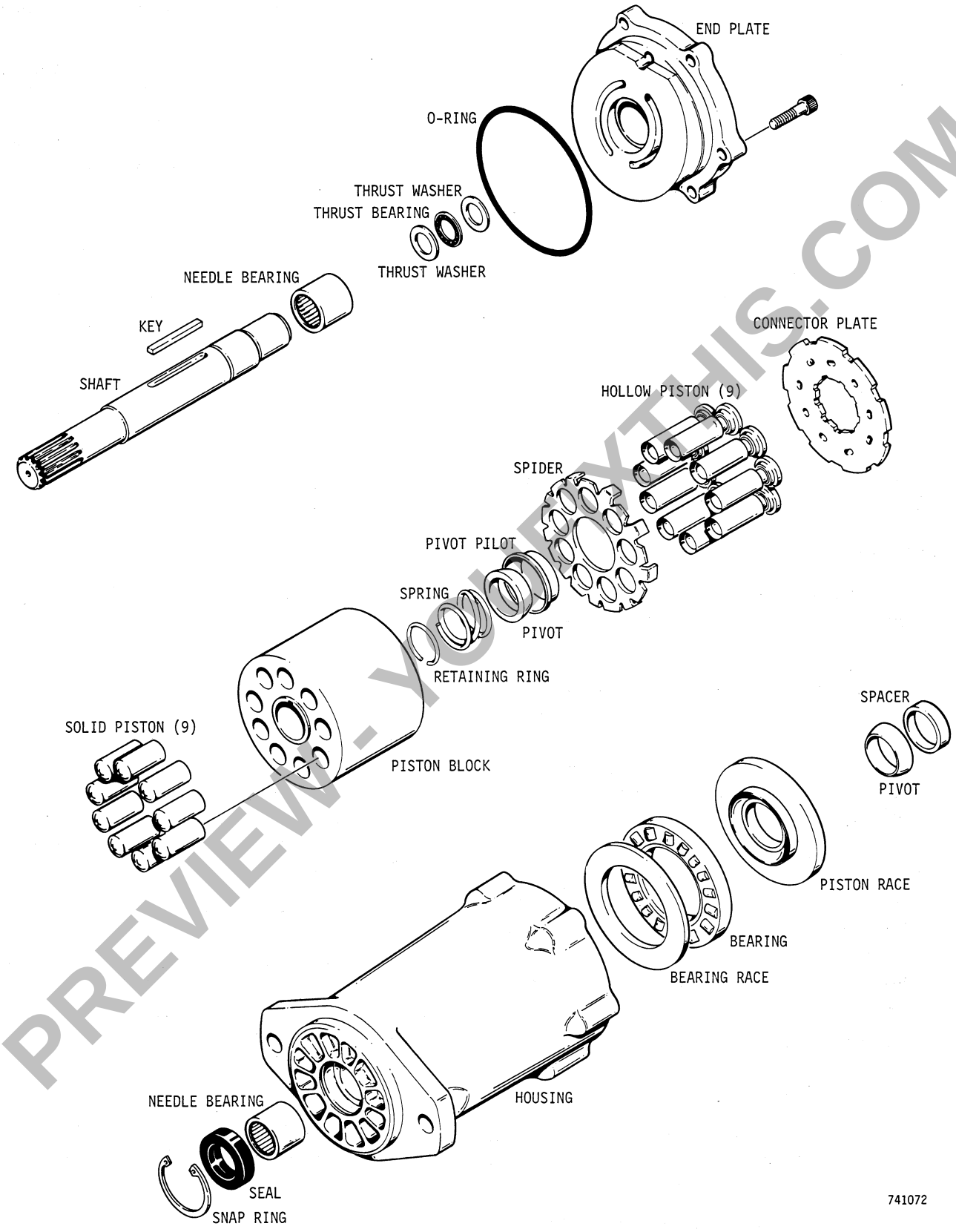


Figure 2 - Hydrostatic Motor

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of an inch away from the spark plug while the engine is idling. Insert the point of a wood lead pencil between the wire end and spark plug.

If the spark flares or feathers and has a slight orange color on the plug side of the pencil, coil polarity is correct. If this occurs on the wire side of the pencil, coil polarity is reversed. Reverse wires at the coil.

Proper ignition coil polarity is very important. Incorrect polarity will require 4000-8000 volts more to fire the spark plug than when connected correctly.

SPARK PLUG

The spark plug provides a gap inside the combustion chamber across which the high voltage can discharge or form a spark to ignite the compressed mixture of fuel vapor and air in the cylinder.

The spark discharge occurs in two steps. The first step of the spark discharge is called the capacitive discharge and is difficult to see. A rapid rise in voltage occurs until the voltage is sufficient to jump the spark plug gap. At this point, the spark plug ionizes (changes from a non-conductor to a conductor of electricity) and heavy current flows across the gap. The capacitive discharge is stored in the spark plug until ionization occurs and is the portion of the spark discharge which starts the combustion process in the cylinder.

The balance of the energy, which causes a noticeable flash, second step, is stored in the remainder of the ignition system and is called the inductive discharge. The inductive discharge contributes nothing to the combustion of the fuel, but is a factor in electrical interference and severe electrode erosion.

Now that the spark discharge has been explained, it can be easily understood that the brightness of the spark discharge does not necessarily mean that the spark plug is more effective in its operation and it can also be realized that a spark plug tester, dependent upon the brightness of the spark discharge could not be considered accurate for testing spark plug quality and condition.

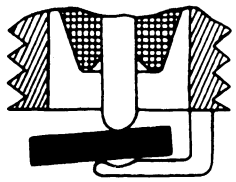
Cleaning and Gap Adjustment

Examine the firing ends of the spark plug, noting the type of deposits and the amount of electrode erosion. Refer to Figure 10 for various types of spark plug conditions and their causes.

Clean the spark plugs on a sand blast cleaner according to the manufacturer's instructions. DO NOT prolong the abrasive blast as it will erode the insulator and electrodes.

Examine each plug carefully for cracked or broken insulators, excessively burned electrodes and other defects. Replace as required.

DO NOT attempt to adjust the spark plug gap as shown in Figure 9.



FLAT FEELER GAUGE CAN GIVE FALSE READING

742299

Figure 9

Before setting the gap on a used spark plug, the center and ground electrodes must be filed to restore the flat surfaces and sharp edges of the electrodes. Adjust the plug gap to .025" using a wire type gauge.

Before installing new spark plugs, check the gap setting and adjust as necessary.

Installation

Make sure the cylinder head threads and gasket seat are clean. Always use a new gasket whenever a spark plug is removed and reinstalled. Screw the spark plug into the cylinder head finger tight and using a socket of the proper size torque the plug to 22 foot-pounds. If a torque wrench is not used, screw the spark plug in until the gasket has just

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15 seconds. Current draw will decrease as the winding temperature increases.

3. Record the ammeter reading, turn the carbon pile off and open the switch.

4. Compare ammeter reading with the test specification.

   a. A high reading indicates a shorted or grounded winding.

   b. A low reading indicates excessive resistance.

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