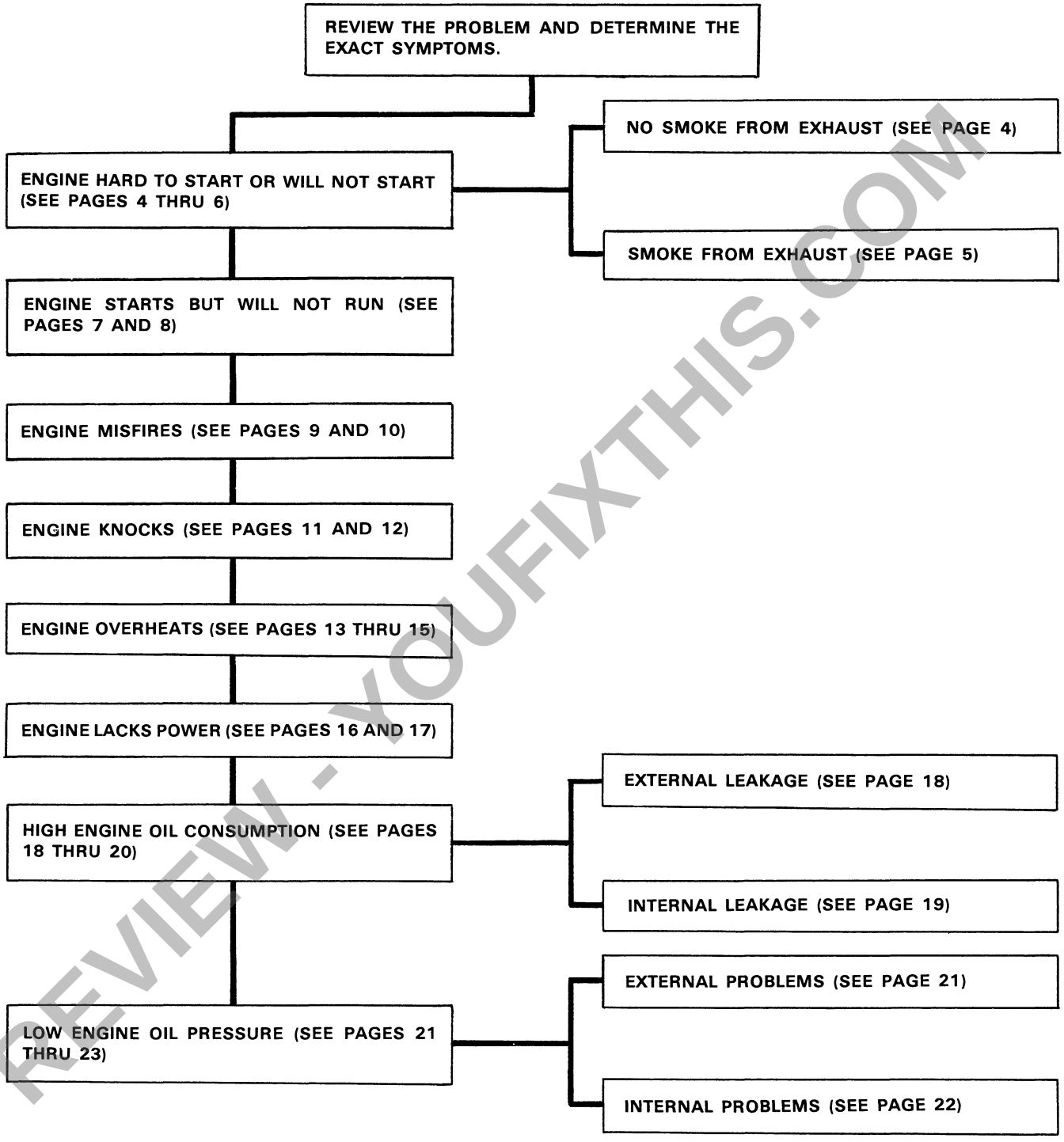
ENGINE DIAGNOSIS CHART



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880 EXCAVATOR

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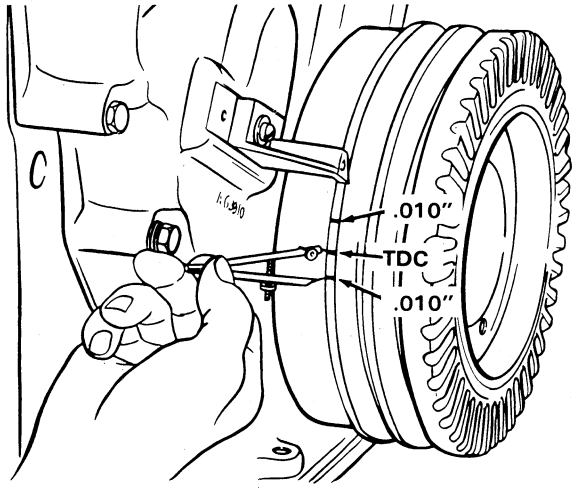
SERIES/SECTION	SECTION NO.	FORM NO.
10 SERIES - GENERAL		
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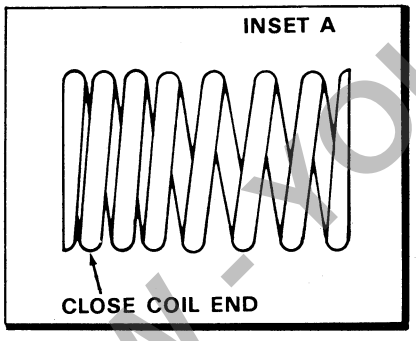
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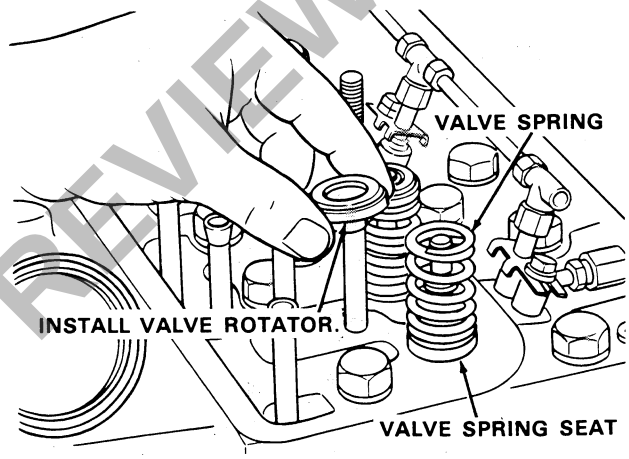
STEP 11



HALF THE DISTANCE BETWEEN THESE TWO SCRIBE MARKS ON CRANKSHAFT PULLEY WILL BE THE TOP DEAD CENTER (TDC) MARK. IF THE SCRIBE MARKS ARE NOT THE SAME AS ORIGINAL MARKS ON PULLEY CHECK DAMPER.

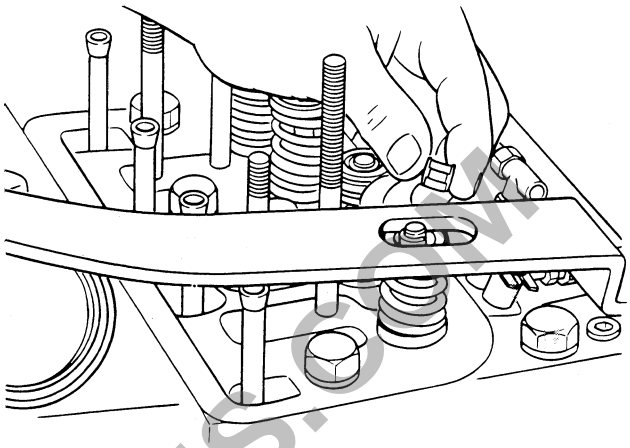
STEP 12





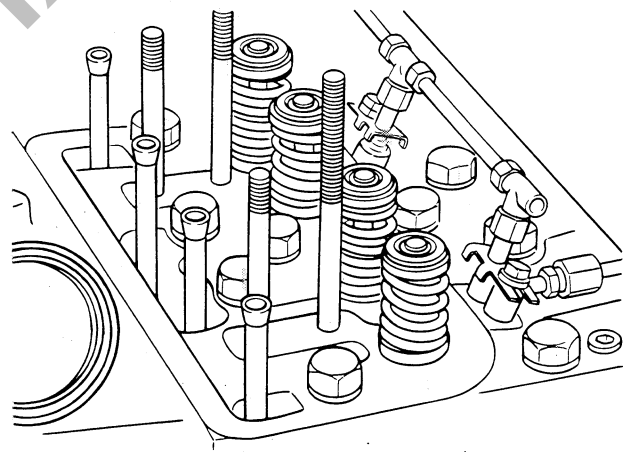
INSTALL SPRING SEAT AND VALVE SPRING. *NOTE:* IF EQUIPPED WITH VALVE SPRING HAVING ONLY ONE CLOSE COIL END, PLACE THIS END TOWARD CYLINDER HEAD, SEE INSET A.

STEP 13



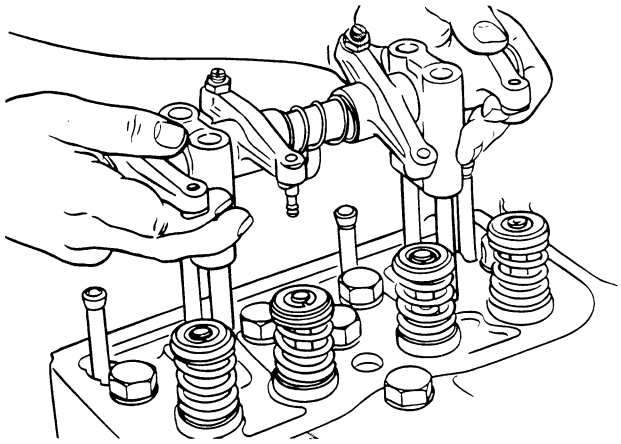
COMPRESS VALVE SPRING USING FABRICATED TOOL. INSTALL SEAL IN LOWER VALVE STEM GROOVE. INSTALL VALVE KEEPERS IN OUTER VALVE STEM GROOVE.

STEP 14



REMOVE SPRING COMPRESSING TOOL. TAP END OF VALVE STEM TO SEAT KEEPERS.

STEP 15



INSTALL ROCKER ARM ASSEMBLY ONTO CYLINDER HEAD.

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SAFETY PRECAUTIONS



CAUTION: Care should be exercised to avoid expelled steam and coolant when servicing components of the cooling system or draining the system. The system is pressurized and there is a danger of being sprayed by hot coolant when opening drains or removing the radiator cap.

Relieve the system pressure by turning the radiator cap counter-clockwise to the FIRST stop. This will allow a gradual reduction in pressure and minimize coolant loss.

NEVER pour cold coolant into a hot engine. The engine block or cylinder heads may crack by the sudden contraction caused by the difference in temperature between the metal and the coolant.

CLEANING THE COOLING SYSTEM

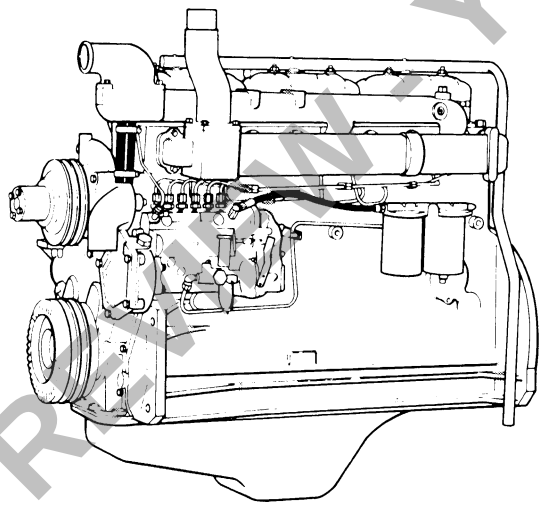
It is recommended that the cooling system be cleaned at least once a year. In areas where water containing scale forming minerals is all that is available, clean the system more often.

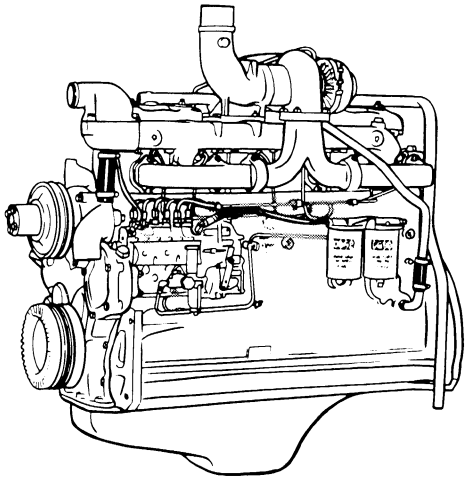
1. While the coolant is still hot, open the radiator drain valve, the engine block drain valve and the heat exchanger drain valve.

2. Add any nationally known commercial brand cleaner marketed by a reputable manufacturer. Follow the directions provided with the cleaner.

3. After draining the cleaning solution, flush the system with clean water before refilling for operation.

NOTE: If water is used in the cooling system during the summer months, always add a reputable brand rust (or corrosion) inhibitor.





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THIS SAFETY ALERT SYMBOL INDICATES IMPORTANT SAFETY MESSAGES IN THIS MANUAL. WHEN YOU SEE THIS SYMBOL, CAREFULLY READ THE MESSAGE THAT FOLLOWS AND BE ALERT TO THE POSSIBILITY OF PERSONAL INJURY OR DEATH.



WARNING ***When testing or adjusting fuel injectors, do not place your hands or arms in front of the injector nozzle.***

The fuel spray from an injector has sufficient penetrating power to puncture the flesh and destroy tissue. Should the fuel enter the blood stream, it may cause blood poisoning.

In the event the skin is punctured from the discharge of an injector, apply the following first aid immediately and then have the injury examined by a physician as quickly as possible.

Wash the injured part with boric acid solution. Support the injured finger or hand with a splint and sling so the injured part will remain absolutely at rest until a physician can examine it.

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By - passing:

All cylinders work in a similar manner. The piston moves when oil is pumped into one end of the cylinder and exhausted from the other. Failure of the packing around the piston will cause oil to by-pass the piston, instead of moving it. Packing failure will also allow a loaded piston to move through the cylinder when control valve is in "hold" position.

When a cylinder work circuit is sluggish or will not hold a load, or both, isolate the cylinder and check it out as follows:

1. Set the machine up so that a load may be applied to the suspected cylinder. DO NOT apply load at this time.

2. Shut off the engine, and relieve pressure in the suspected circuit by working it's control lever back and forth several times. Remove hoses from cylinder and cover ports with threaded metal caps or plugs.

   WARNING: Do not attempt to disconnect hoses from a cylinder that is pressurized by pump or load.

3. Apply load (DO NOT apply overload) to suspected cylinder. If load causes cylinder to move or collapse, piston packing is defective and should be replaced. If cylinder holds against the load, suspect the Port Reliefs for that circuit, or the control valve itself.

   WARNING: Glands and Heads have been torn out of cylinders by overtightening and dried up cylinder head packing.

If you do not plan on installing cylinder on machine immediately after overhaul, collapse it until rod is completely retracted into cylinder and plug ports to keep out dirt.

TOLERANCES IN HYDRAULIC CYLINDERS MUST BE EXTREMELY CLOSE.

For this reason, always use genuine Case Parts and order carefully to be sure of getting the right part.

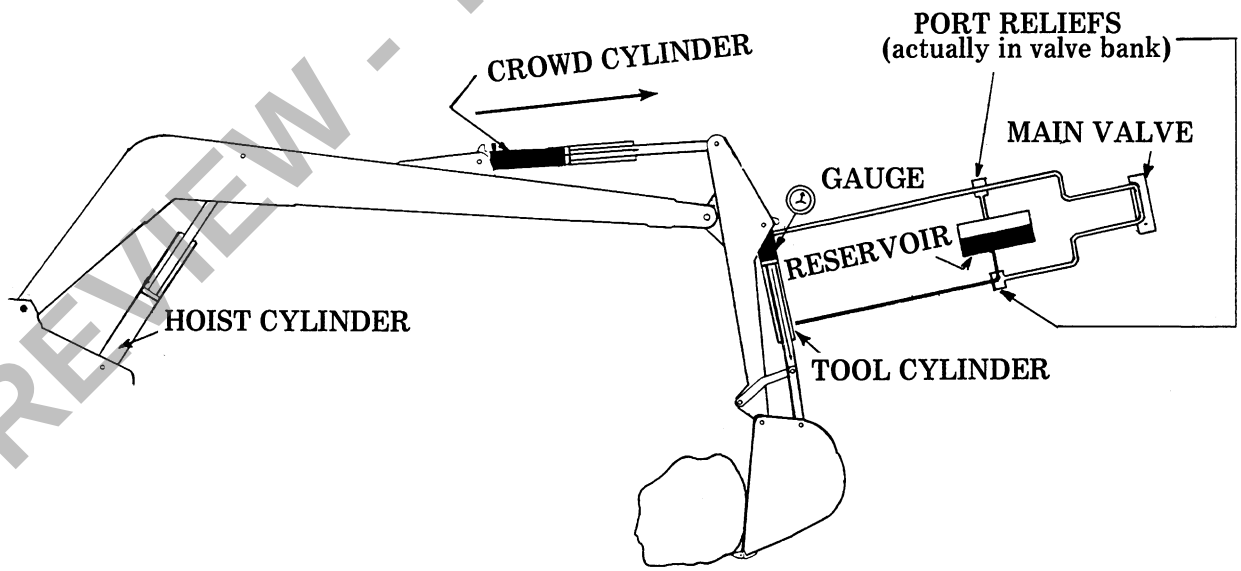


Figure 2. Proper Procedure for Checking Port Relief Pressures in the Field.

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ENGINE OVERHEATS (Cont'd)

24. Engine Preignition

Preignition is the igniting of the fuel before the normal ignition occurs. This causes wild pinging, severe knock, and power loss. High temperature and pressure from preignition usually burns a hole through the center of the piston. The following are causes of preignition:

A. Carbon deposits that remain incandescent.
B. Valves operating at higher than normal temperature because of excessive guide clearance or improper seal with valve seats.
C. Hot spots caused by an inefficient or damaged cooling system.
D. Nozzles set at wrong cracking pressure.
E. Detonation or conditions leading to it.
F. Sharp edges in combustion chamber.
G. Wrong or contaminated fuel.

25. Water Temperature Gauge Malfunction

The water temperature gauge, wiring, resistor or sending bulb could give false or no temperature readings. To diagnose, remove wire at sending unit and ground to tractor. Turn key switch on, if gauge comes up, sending unit is malfunctioning. If gauge does not come up, use voltmeter and ohmeter to check wiring circuit.

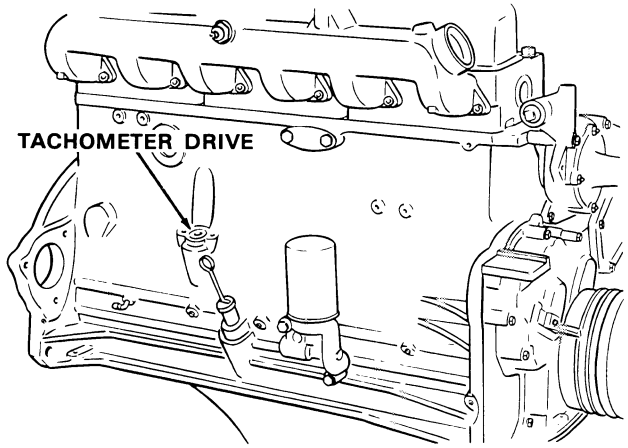
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CAMSHAFT, VALVE TRAIN AND BACKLASH

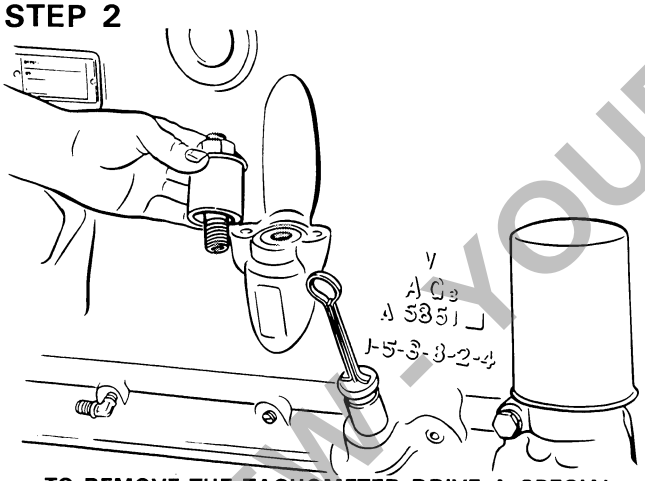
Removal

STEP 1



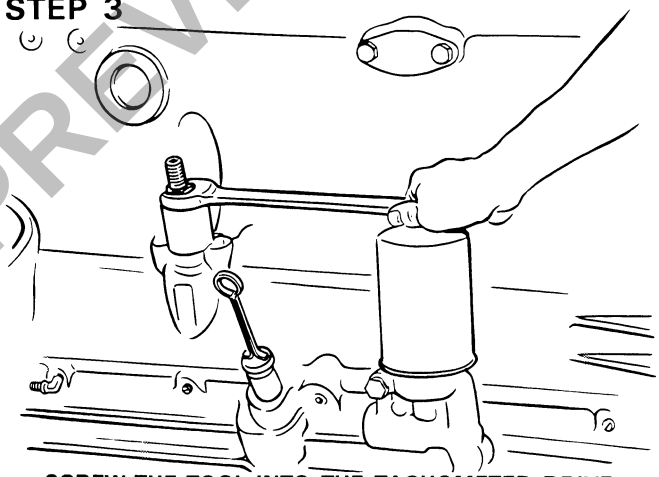
BEFORE THE CAMSHAFT CAN BE REMOVED FROM THE ENGINE, THE TACHOMETER DRIVE MUST BE REMOVED.

STEP 2



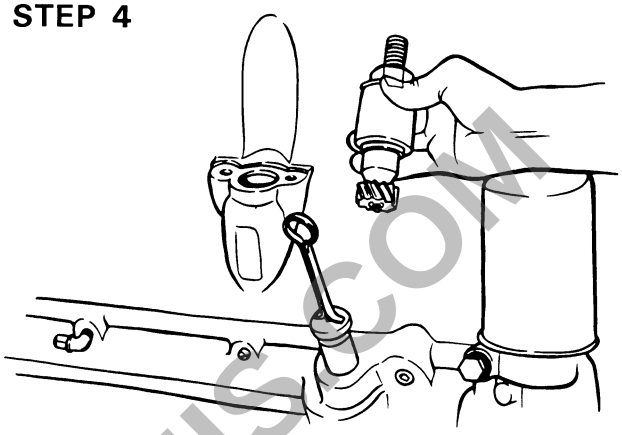
TO REMOVE THE TACHOMETER DRIVE A SPECIAL TOOL MUST BE MADE. REFER TO SPECIFICATION FOR MAKING SPECIAL TOOLS PAGE 4.

STEP 3



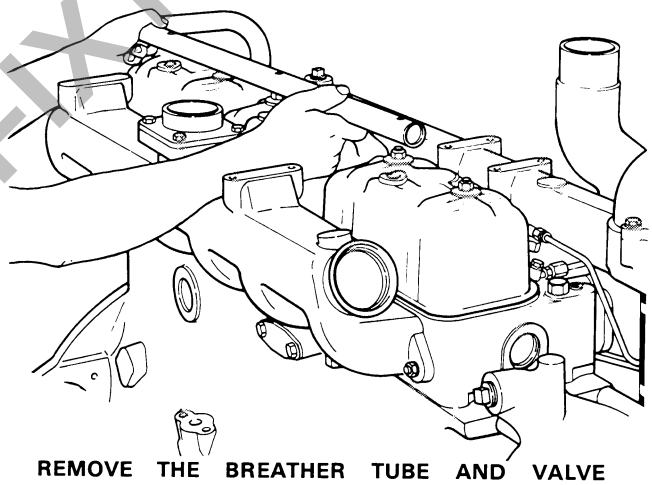
SCREW THE TOOL INTO THE TACHOMETER DRIVE AND PULL DRIVE FROM ENGINE.

STEP 4



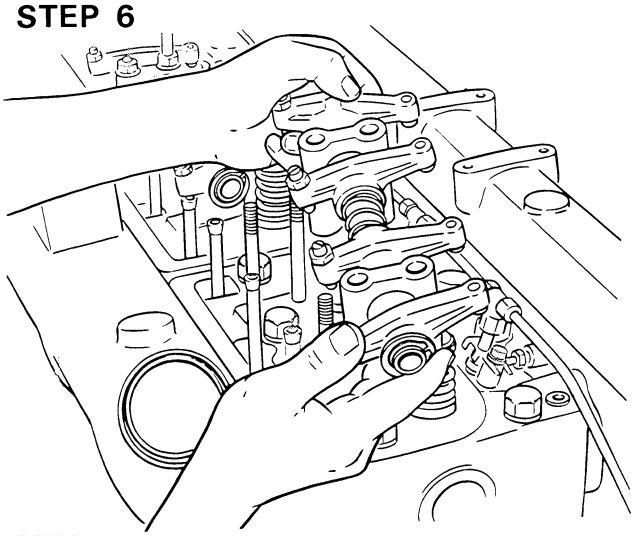
REMOVE THE TACHOMETER DRIVE FROM THE SPECIAL TOOL.

STEP 5



REMOVE THE BREATHER TUBE AND VALVE COVERS.

STEP 6



REMOVE THE ROCKER ARM ASSEMBLIES FROM THE CYLINDER HEADS.

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Disassembly, Inspection and Re-assembly Procedures for 7-Port Hydraulic Swivel and with Reference to Drive Motors

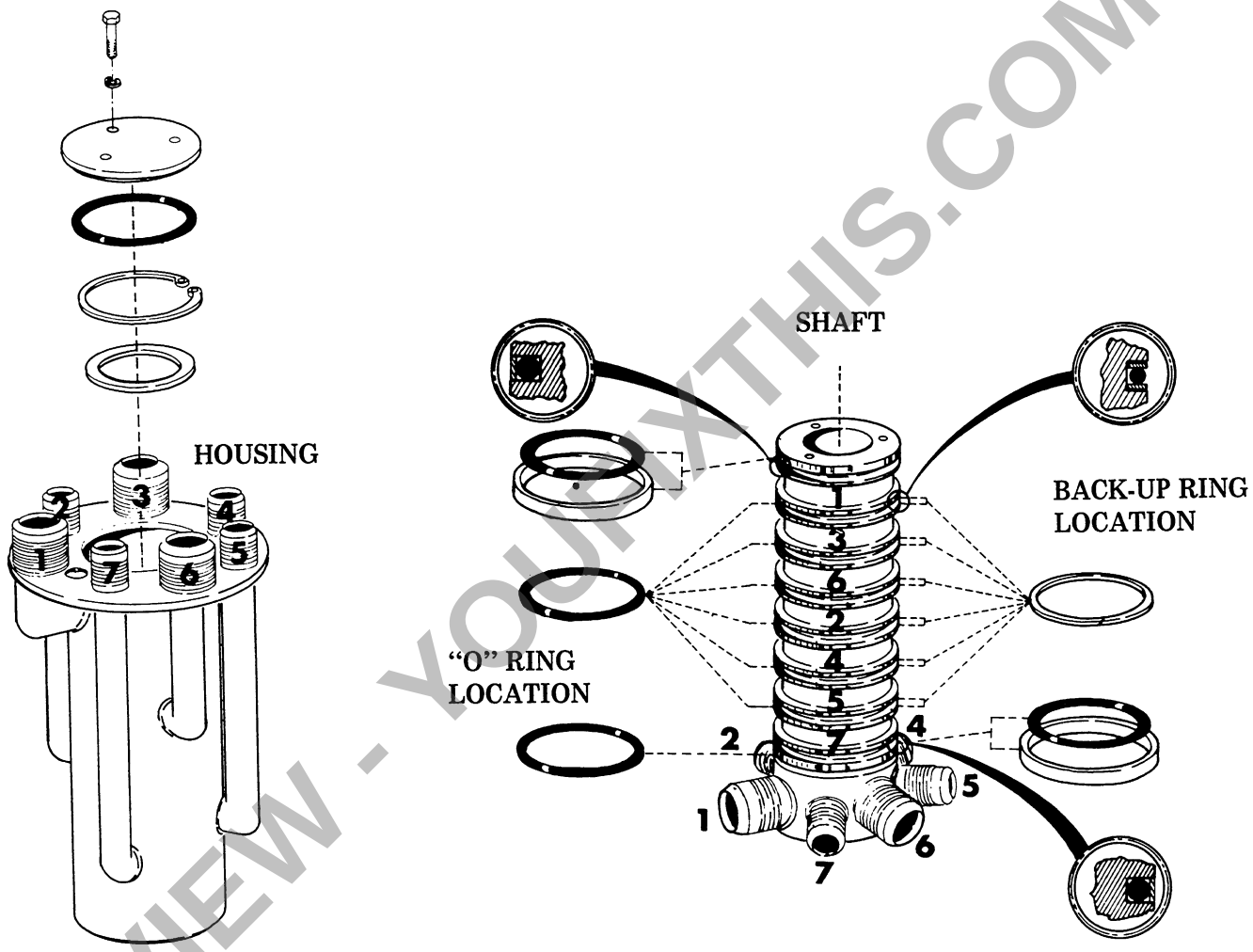


Figure 1. Hydraulic Center Swivel

HYDRAULIC SWIVEL REPAIR

In the event your Hydraulic Swivel should develop a leak, or is damaged during operation, the following steps will allow you to remove it, inspect and repair it, and replace it in the machine. When installing new rings in a swivel, we have found it necessary to change all the O-rings and the back up rings. The part number of the kit that includes all necessary rings is S 210212.

To change the back up rings and the O-rings, the complete swivel must be removed from the unit. The area around the swivel must be thoroughly cleaned before removing the swivel to prevent the entry of foreign material into the hydraulic system.

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