

1530, 1630, 1725, 1925, TC25, TC25D, TC29, TC29D, TC33, TC33D REPAIR MANUAL CONTENTS

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SECTION 1 ENGINE SYSTEMS

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GENERAL INFORMATION

DESCRIPTION AND OPERATION

This chapter describes the engine overhaul and repair procedures of the Models 1530, 1630, 1725, 1925, TC25, TC29, TC33, TC25D, TC29D, and TC33D tractors. Repair procedures are essentially the same for all models except as noted in the repair procedures.

The tractors are equipped with three-cylinder in-line engines. They are all four cycle, overhead valve, liquid cooled engines. The engines are identified by a code, 1, cast into the lower right side of the cylinder block.

NOTE: Numeric value, 2, under the Engine Code indicates displacement of the engine in liters.

| Engine Identification | Tractor Model | Engine Power Hp (Kw) |
|-----------------------|---------------|-------------------------|
| J843 | 1530 | 25 (18.7) |
| J843 | 1630 | 27.3 (20.5) |
| J843 | 1725 | 29 (21.6) |
| N843 | 1925 | 34 (25.5) |
| J843 | TC25 | 25 (18.7) |
| J843 | TC25D | 25 (18.7) |
| J843 | TC29 | 29 (21.6) |
| J843 | TC29D | 29 (21.6) |
| N843 | TC33 | 33 (24.6) |
| N843 | TC33D | 33 (24.6) |

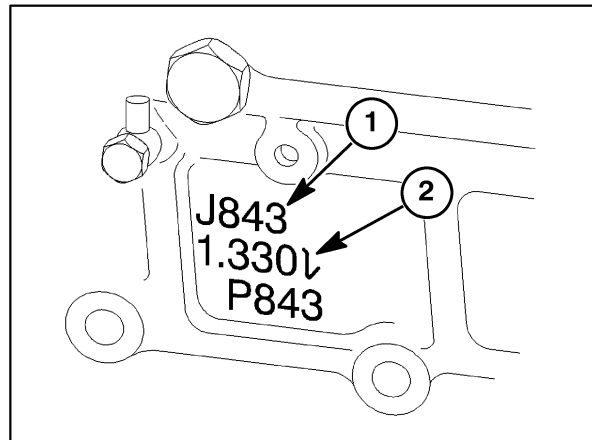


Figure 1-1

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CYLINDER HEAD AND VALVE TRAIN COMPONENTS

The cylinder head incorporates the valve assemblies, rocker arms, rocker shaft, push rods, and lifters. A swirl chamber located between the injector assembly and the main combustion chamber of the cylinders provides improved starting and greater fuel efficiency. Initial combustion starts in the precombustion chamber and as the expansion occurs a strong swirl pattern is created in the main combustion chamber for more complete combustion of the air-fuel mixture. The air intake manifold is separate from the cast aluminum valve cover on all these engines. The exhaust manifold is bolted on the left-hand side of the cylinder head on each of the models. Cylinder heads have integral valve guides. Standard size valves only are used. Figure 1-2 provides a cut-away front view of an engine.

CYLINDER BLOCK ASSEMBLY

The cylinder block assembly contains the pistons, connecting rods, crankshaft, timing gears, and engine oil pump. The crankshaft is supported on four main bearings. The front bearing is positioned in a bore in front of the block. The second, third, and fourth bearings are split liners located in holders bolted to the block. The camshaft is supported on two ball bearings located on each end of the block. Figure 1-3 provides a cutaway side view of the engine.

SECTION 1 - ENGINE SYSTEMS

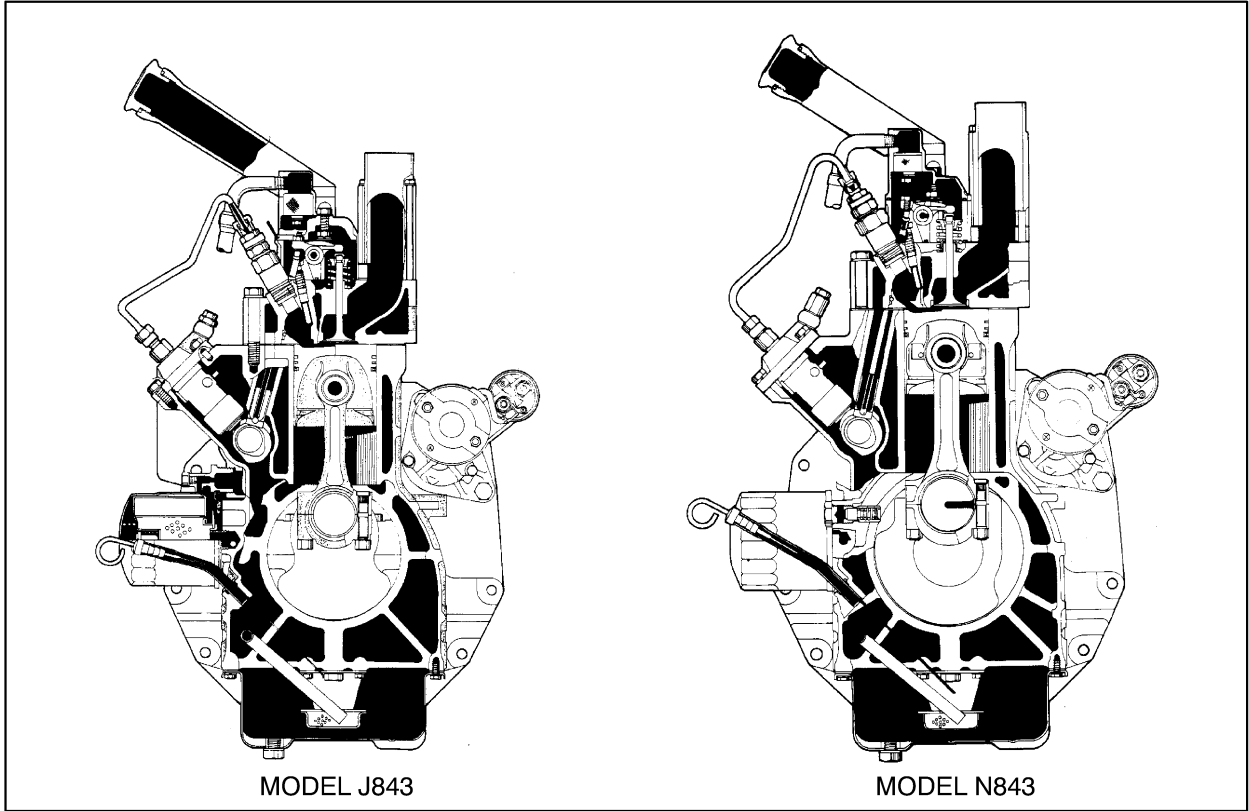


Figure 1-2

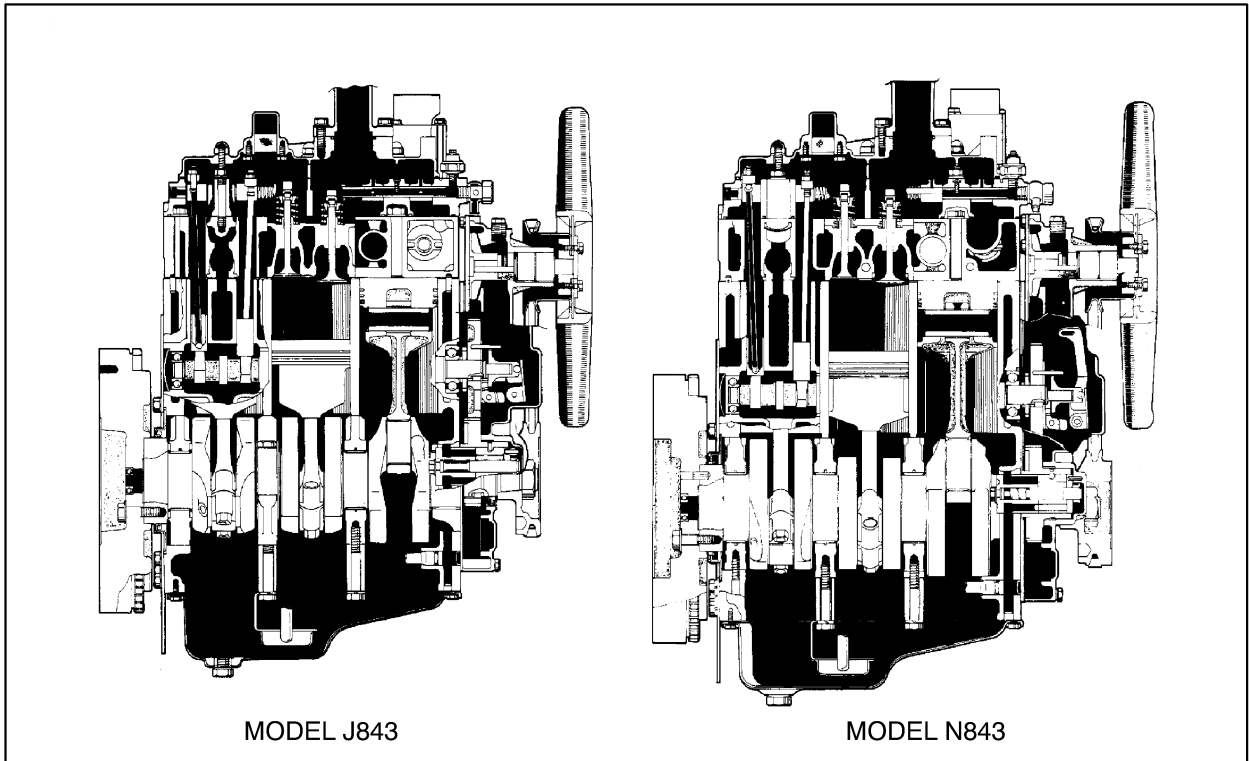


Figure 1-3

ENGINE OVERHAUL

ENGINE DISASSEMBLY

1. Turn coolant tap bolt, 1, counterclockwise to drain fluid. Remove the radiator assembly. See "Radiator Removal", discussed later in this section.

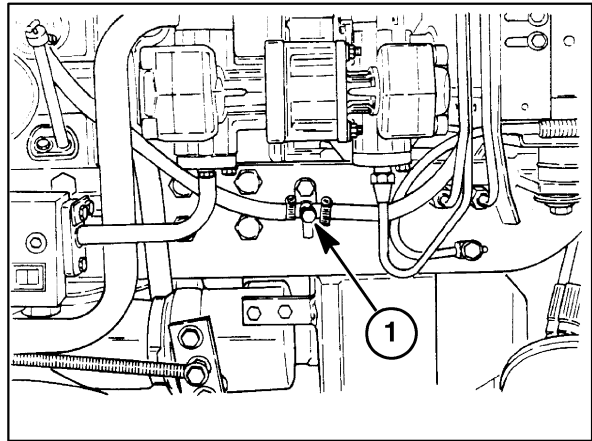


Figure 1-4

2. Remove the air cleaner assembly, 1, along with the air cleaner hoses. Push in on assembly, 1, and turn counterclockwise to remove.

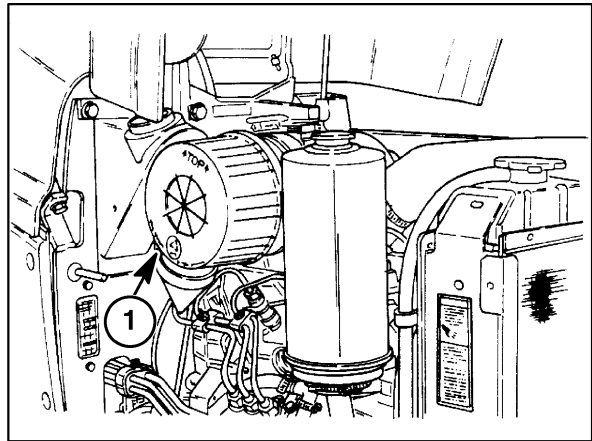


Figure 1-5

3. Remove bolts, 1, for final removal of air cleaner assembly.

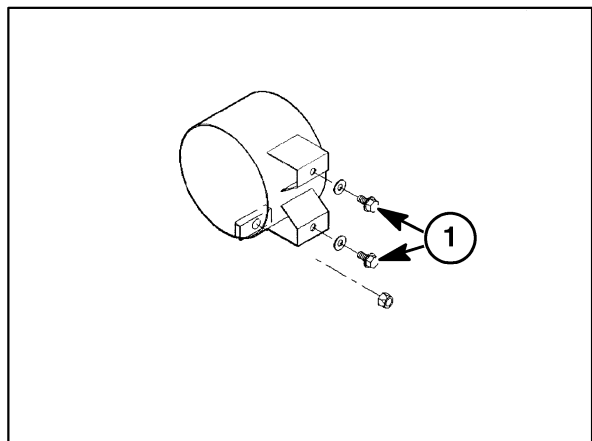


Figure 1-6

4. Remove the exhaust muffler, 1, and manifold assembly, 2. Loosen bolt, 3, and bolt, 4, Figure 1-8, to remove exhaust muffler. Loosen six bolts, 5, to remove exhaust manifold.

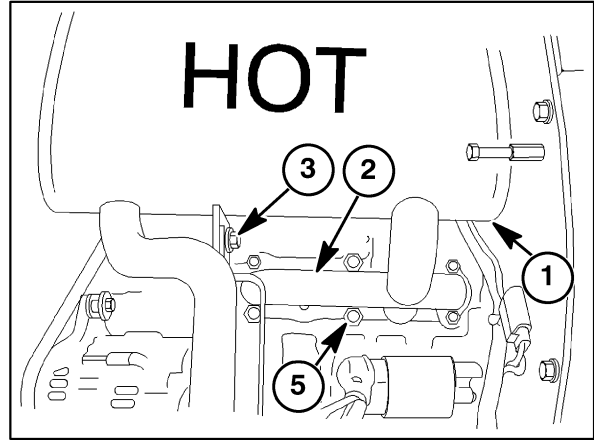


Figure 1-7

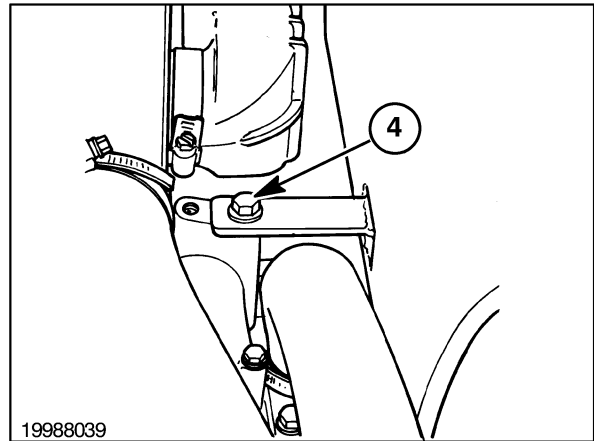


Figure 1-8

FUEL INJECTOR AND GLOW PLUG REMOVAL

1. Clean all dirt and oil from the injectors and surrounding areas.
2. Disconnect the fuel lines, 1, from the injectors and cap all openings.
3. Remove the injector fuel leak-off line, 3.
4. Remove the injector assemblies, 2.
5. Remove the glow plug bus connector, 5, and remove the glow plugs, 4.

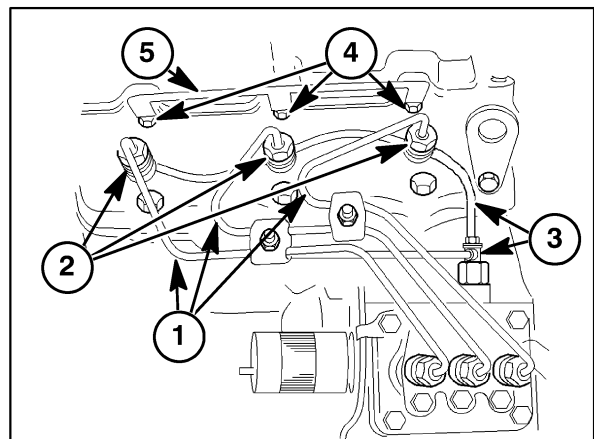


Figure 1-9

OIL PRESSURE SWITCH

Remove the oil pressure switch, 1.

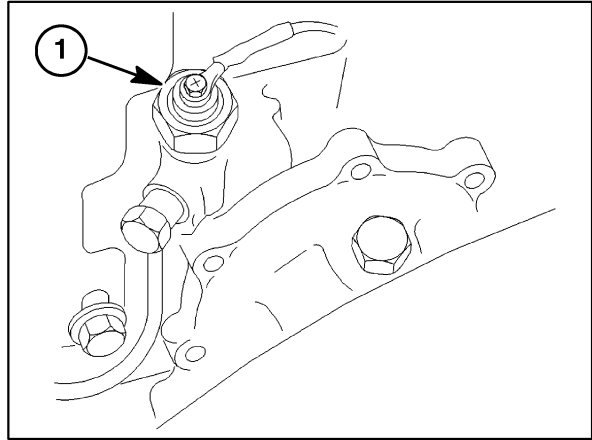


Figure 1-10

TEMPERATURE SENDING SWITCH AND ALTERNATOR REMOVAL

1. Remove the temperature sending switch, 1, from the front of the cylinder head.
2. Loosen the alternator mounting bolts, 2, and remove the V-belt, 3, from the drive pulley.
3. Disconnect the alternator wires from the back of alternator, 4.
4. Remove the alternator mounting bolts, 2, and remove the alternator.

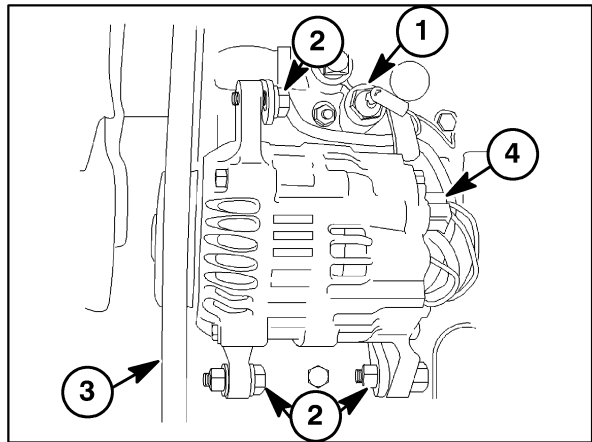


Figure 1-11

FAN, WATER PUMP, AND EXTERNAL OIL TUBE REMOVAL

1. Remove the fan and water pump assembly. See "Fan Removal" and "Water Pump Removal" discussed later in this section.
2. Remove the external oil transfer tube banjo bolt, 1, from the front of the cylinder head. Figure 1-12 illustrates the 25 and 30 Series and Figure 1-13 illustrates the TC models.

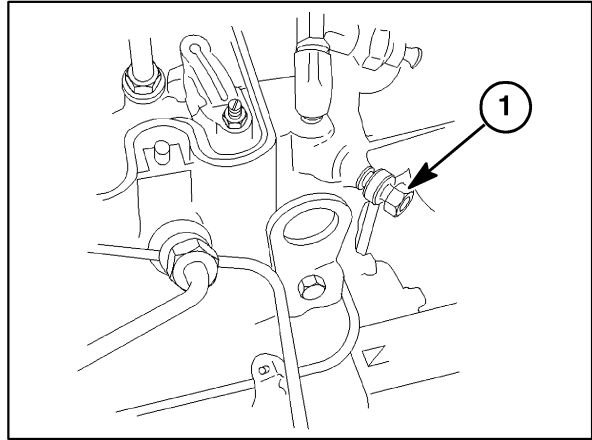


Figure 1-12

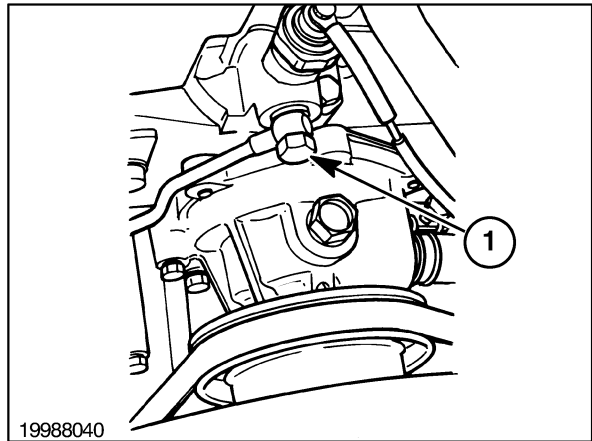


Figure 1-13

AIR INLET MANIFOLD REMOVAL

Remove the six retaining bolts, 1, and remove the air inlet manifold assembly, 2.

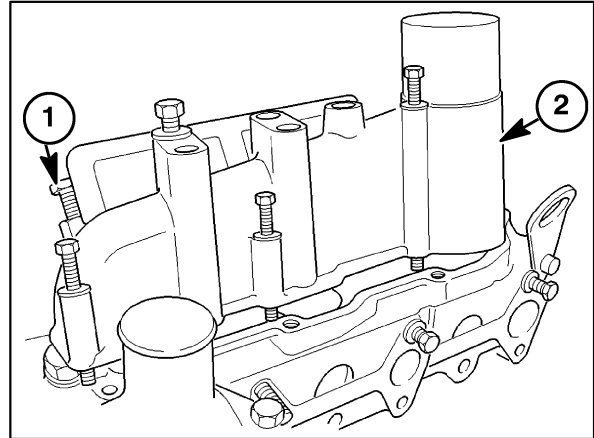


Figure 1-14

VALVE COVER REMOVAL

Loosen the three bolts, 1, to remove the valve cover, 2.

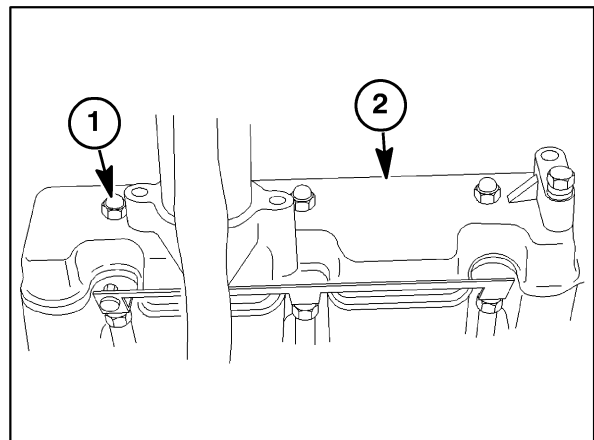


Figure 1-15

ROCKER ARM SHAFT AND SUPPORT BRACKET REMOVAL

Remove the rocker arm shaft and support bracket as an assembly, 1.

NOTE: Alternately loosen the rocker support bolts a turn at a time to prevent distorting the rocker shaft.

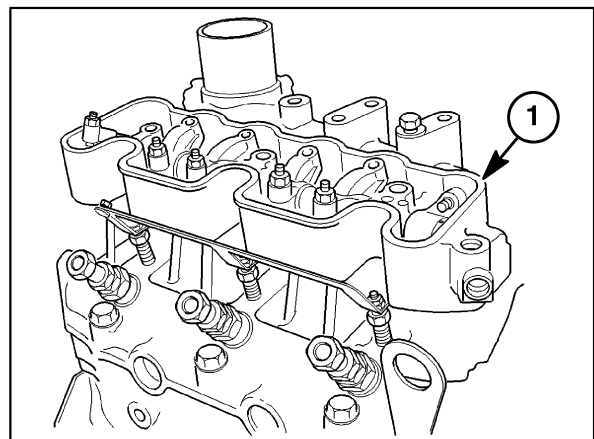


Figure 1-16

CYLINDER HEAD REMOVAL

1. Remove the valve stem caps, 1, and push rods, 2.

NOTE: Keep all valve components in separately marked containers for re-assembly in their original location.

2. To remove the cylinder head, remove the cylinder head bolts, 3, by alternately loosening a half turn at a time to prevent warping the head.

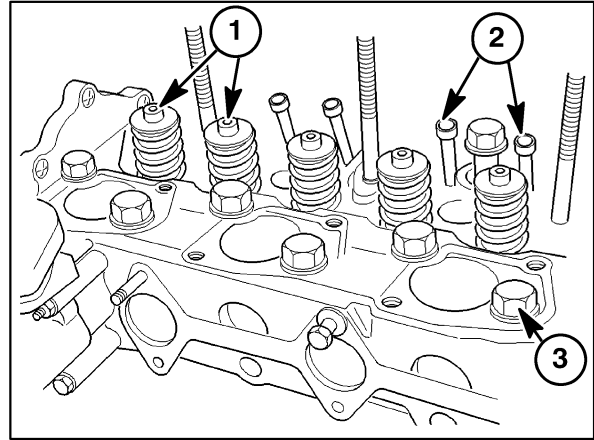


Figure 1-17

VALVE TAPPET REMOVAL

Remove the valve tappets, 1, from the machined bore in the cylinder block.

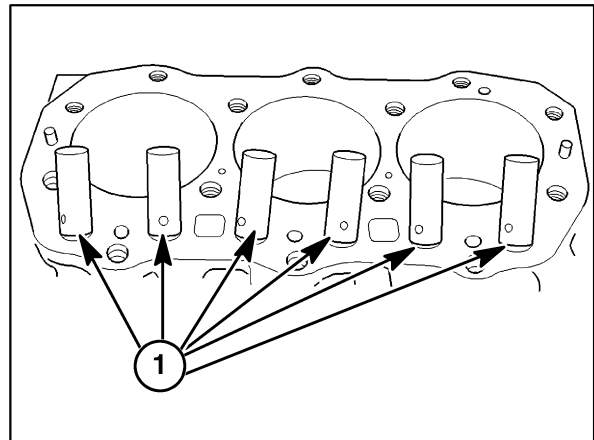


Figure 1-18

FUEL SHUTOFF SOLENOID REMOVAL

Remove the wire connector and unscrew the fuel shutoff solenoid, 1.

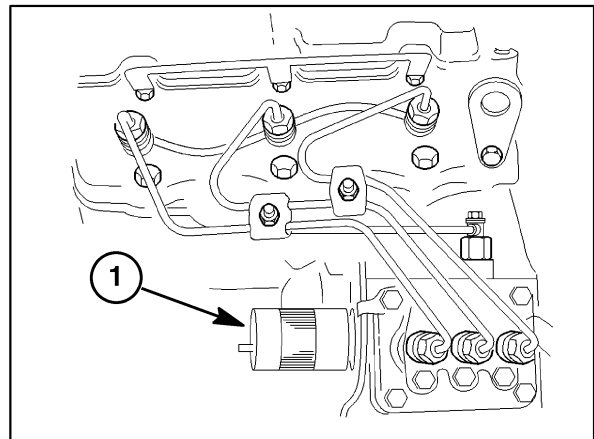


Figure 1-19

ENGINE TIMING GEAR COVER, TIMING GEARS, AND CAM SHAFT

Timing Gear Cover Removal

1. Drain the engine crankcase oil.
2. Remove the crankshaft pulley.
3. Disconnect the throttle control rod at the injection pump.
4. Loosen the four injection pump mounting bolts, 2, and raise the injection pump, 3, enough to remove the spring pin, 1, and separate the governor link from the control rack. Remove the injection pump.

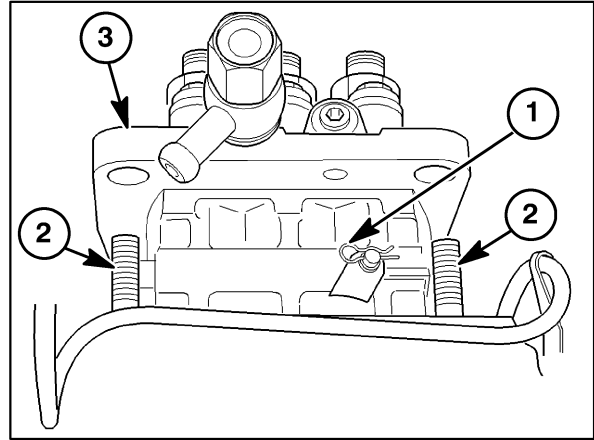


Figure 1-20

5. Remove the power steering pump reservoir tank dipstick-filler cap, 2.

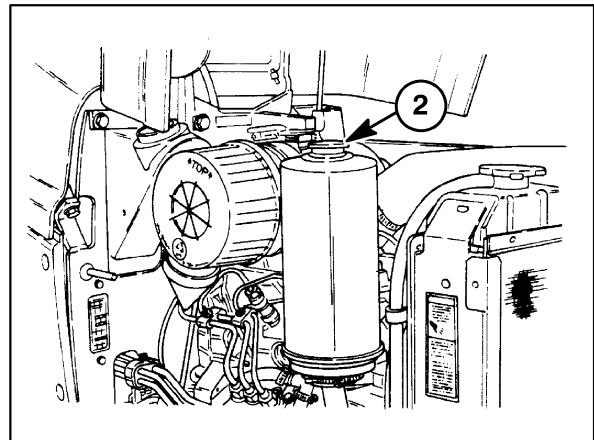
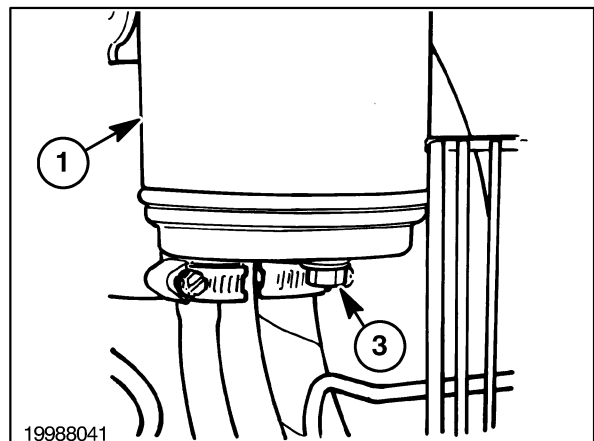


Figure 1-21

6. Remove the reservoir drain plug, 3, and drain the hydraulic fluid out of the reservoir tank, 1, into a suitable container.



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Figure 1-22

SECTION 1 - ENGINE SYSTEMS

7. Loosen the hose clamp, 2, on the suction tube, 3, and remove the suction hose from the steering pump, 5.
8. Remove the pressure tube, 1, from the bottom of the steering pump.
9. Remove the through bolts, 4, and remove the steering pump from the front cover. Cap the lines and pump openings.

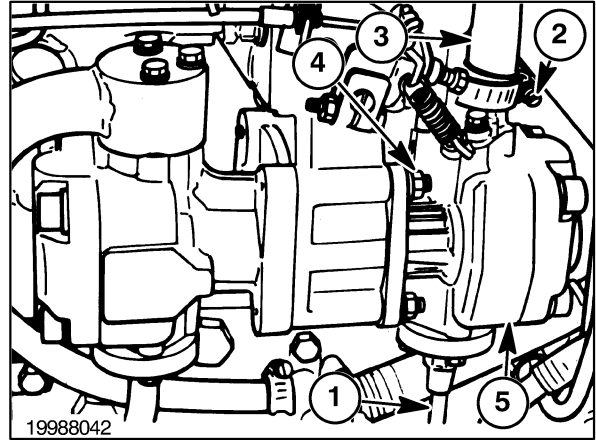


Figure 1-23

10. Remove retaining nut and washer, 1. Pull crankshaft pulley, 2, off of crankshaft, 3.

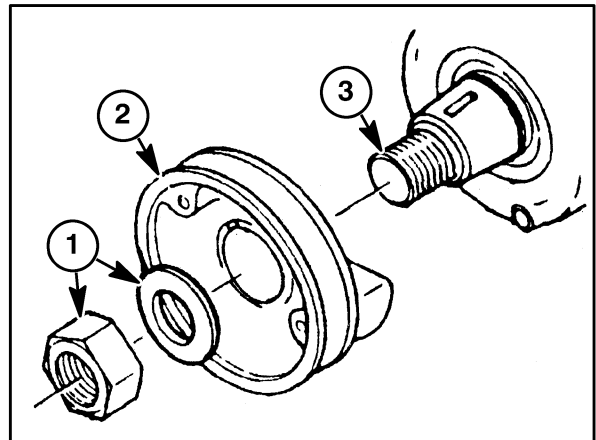


Figure 1-24

11. Remove the retaining bolts, 1, and lift the cover, 2, off the locating dowels.

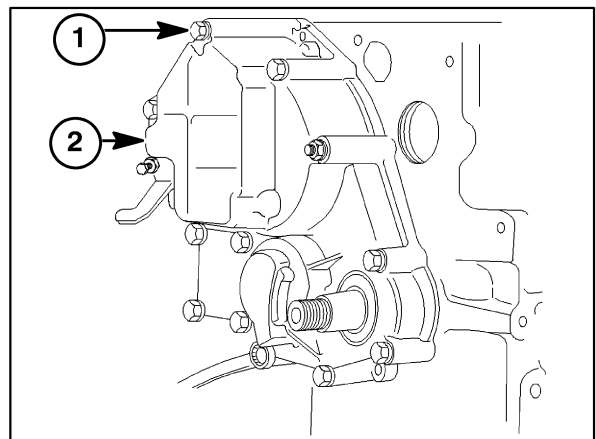


Figure 1-25

Timing Gears and Camshaft Removal

1. Remove retaining ring, 1, and remove the idler gear, 3, and oil pump assembly, 2.

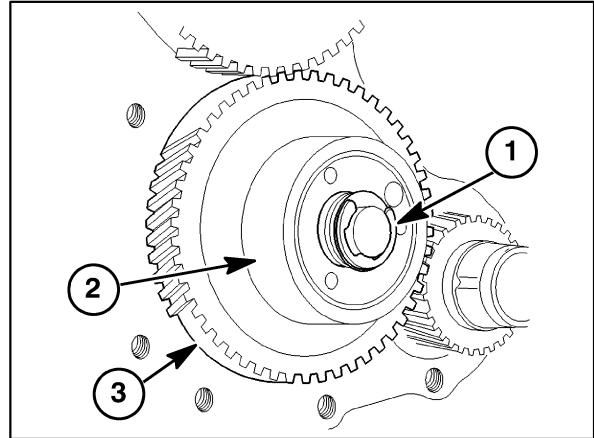


Figure 1-26

2. Remove the two bolts, 1, securing the keeper plate, 3. One must be accessed using the access hole, 2, in the cam gear.
3. Slide the camshaft and gear out of the camshaft bore.

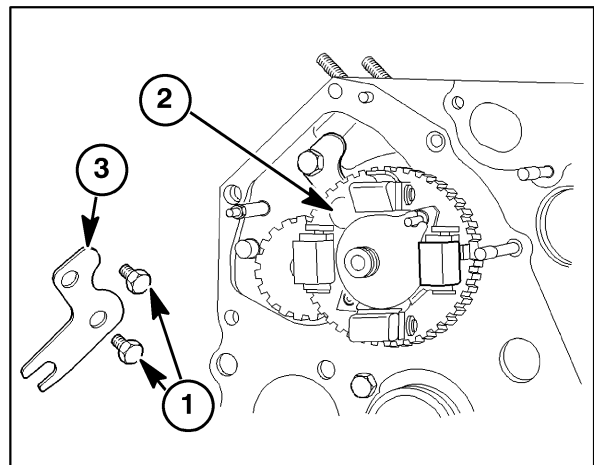


Figure 1-27

Oil Sump Removal

1. Remove the oil sump retainer bolts, 1.
2. Remove the oil sump and discard gasket.

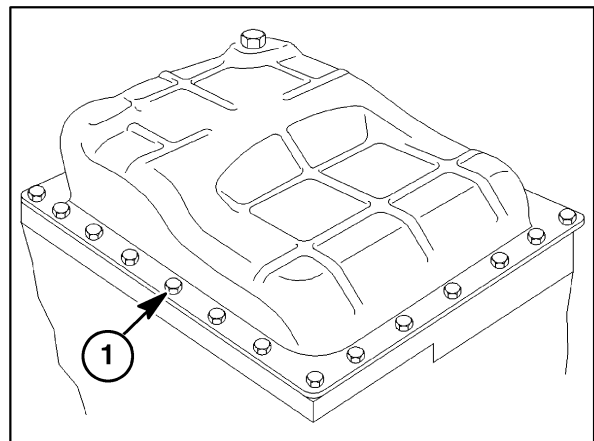


Figure 1-28

Oil Suction Pipe and Strainer Removal

1. Remove the two retaining bolts, 1.
2. Remove the oil strainer, 2, and rotate the oil suction pipe, 3, out of its bore. Remove from the front side of the block.

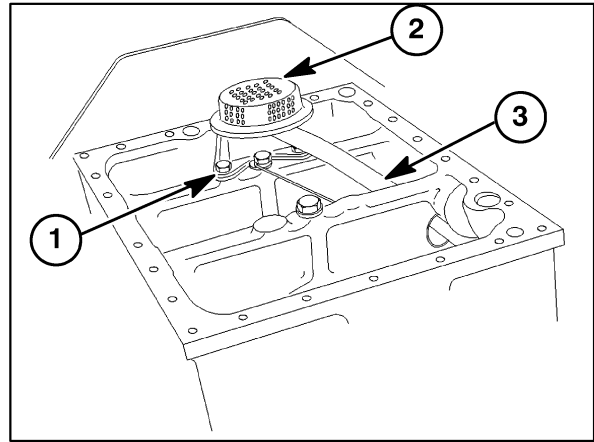


Figure 1-29

Connecting Rods, Bearings, and Pistons, Rings Removal

1. Remove the two bolts, 1, retaining the connecting rod caps, 2.
2. Remove the connecting rod caps and lower half of connecting rod bearing.
3. If necessary, remove any ridge from the top of the cylinder bores using a suitable ridge reamer.

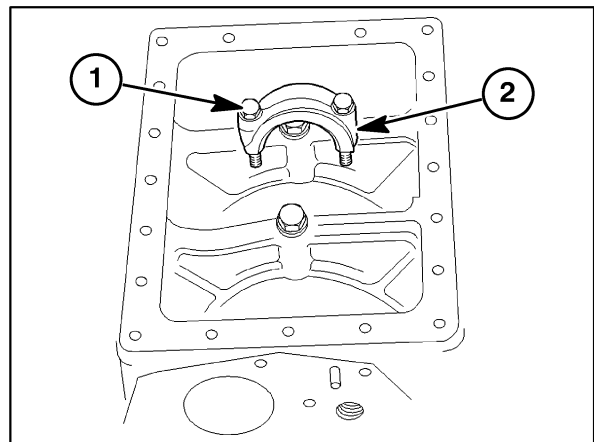


Figure 1-30

4. Push the piston and connecting rod out of the cylinder block.
5. Replace the connecting rod cap to the piston assembly it was removed from. Keep together in cylinder sequence.

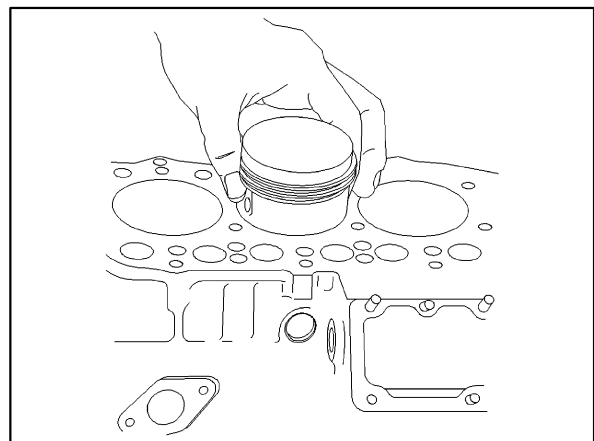


Figure 1-31

Flywheel Removal

1. Loosen the flywheel retaining bolts.
2. Using a brass drift and hammer, tap the end of the crankshaft, 1, to loosen the flywheel, 2, from the shaft.

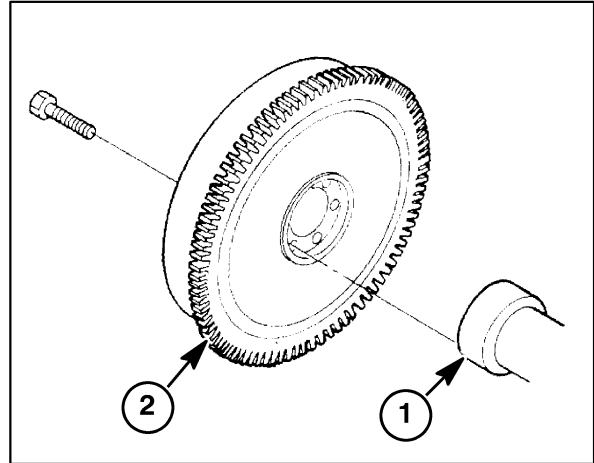


Figure 1-32

Backplate and Oil Seal

1. Remove the backplate retaining bolts and remove the backplate.
2. Remove the rear oil seal, 1.

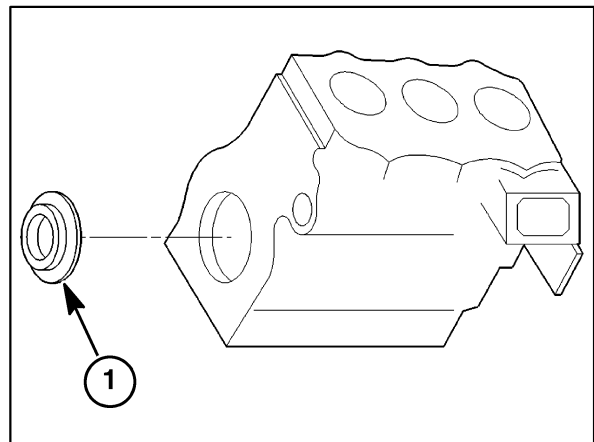


Figure 1-33

Crankshaft and Main Bearings Removal

1. Remove the crankshaft bearing holder retaining bolts, 1.
2. Slide the crankshaft and main bearing assembly through the rear of the engine.

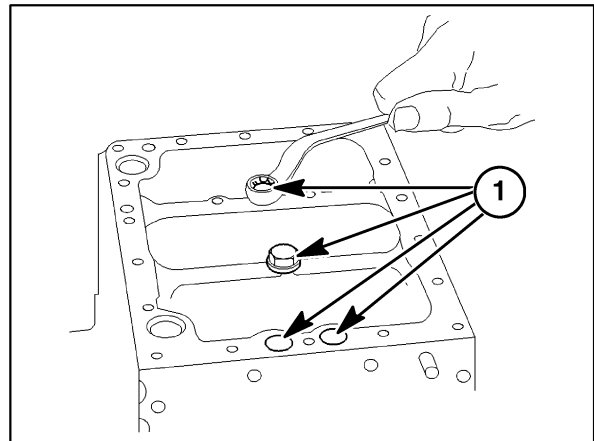


Figure 1-34



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DISASSEMBLY, INSPECTION, FITS, CLEARANCES, AND ASSEMBLY OF COMPONENT ASSEMBLIES

CYLINDER HEAD DISASSEMBLY

1. Clean the cylinder head and remove any carbon deposits from around the valve heads.
2. Use a valve spring compressor and remove the valve spring retainer locks, 1, spring, 2, and spring retainer, 3, from each valve, 4.
3. Remove the valves and place the valve components together in separately marked containers for reassembly in their original position.

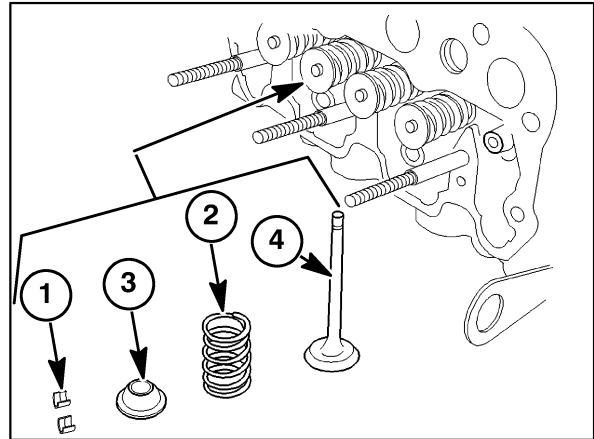


Figure 1-35

CYLINDER HEAD INSPECTION AND REPAIR

1. Clean all carbon deposits from the combustion chamber and valve ports using a wire brush and scraper.
2. Clean all dirt and residue from the gasket surface using care not to scratch or nick the machined surface.
3. Clean the cylinder head in solvent and air dry.
4. Inspect the head for cracks or damage in the following areas:
 - Valve ports
 - Valve seats, 2
 - Prechamber, 3
 - External cracks in the water jackets, 1
5. Inspect the gasket surfaces for scratches or nicks, which could cause leakage.
6. Examine the core hole plugs for rust or signs of leakage. If a plug shows signs of damaging rust or leakage, replace all plugs in the head.
7. Inspect the prechamber for carbon deposits and looseness. Remove any carbon deposits found. If prechamber is found to be loose, cylinder head may be warped.

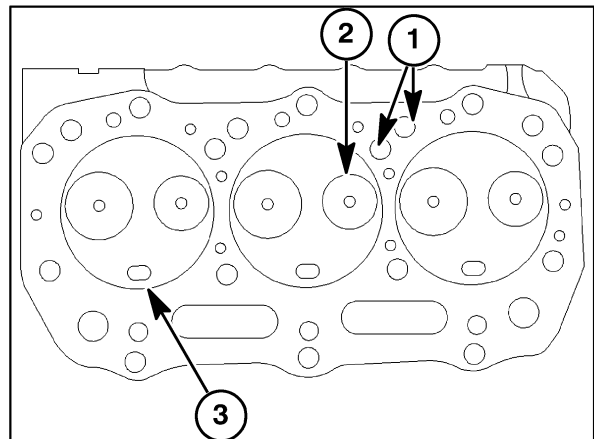


Figure 1-36

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