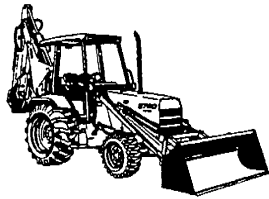


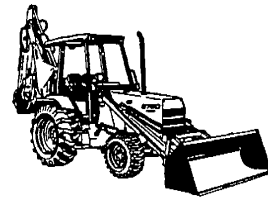
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# **D SERIES BACKHOE LOADER REPAIR MANUAL CONTENTS**

**SECTION 1 -- ENGINE**

**SECTION 2 -- FUEL SYSTEMS**

**SECTION 3 -- ELECTRICAL SYSTEM**

**SECTION 4 -- TRANSMISSION**

**SECTION 5 -- REAR AXLE AND BRAKES**

**SECTION 6 -- POWER TAKE-OFF**

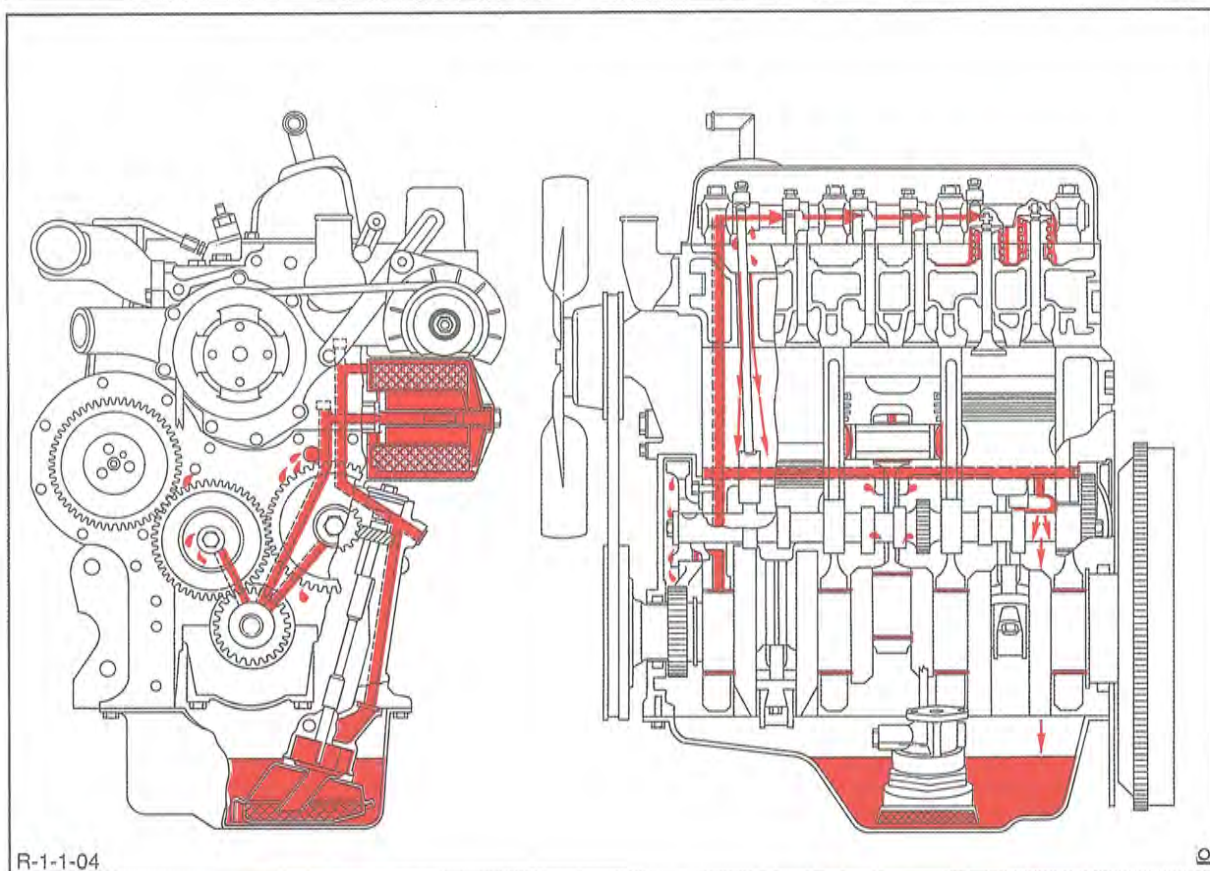
**SECTION 7 -- STEERING AND FRONT AXLE**


**SECTION 8 -- HYDRAULIC SYSTEM, CONTROLS AND FRAME**

**SECTION 9 -- CAB**

**SECTION 10 -- SEPARATING THE TRACTOR**

**SECTION 11 -- ACCESSORIES**



 Lubrication Oil

**FIGURE 1-3**

### 3-Cylinder Engine Lubrication System

#### LUBRICATION SYSTEM

##### Figure 1-3

Lubrication of the engine is maintained by a rotary oil pump mounted at the base of the engine block. The oil pump is driven from the camshaft and draws oil from the engine sump through a wire mesh screen.

A spring-loaded relief valve in the pump body limits the pressure in the system by directing excess oil back to the intake side of the pump.

Oil passes from the pump to an external, throw-away, spin-on type filter incorporating a relief valve which permits oil to be bypassed, if filter blockage occurs, and ensures engine lubrication at all times.

Oil flows from the filter to the main oil gallery which runs the length of the cylinder block and intersects the camshaft follower chambers.

## SECTION 1 - ENGINE

The main gallery also supplies oil to the crankshaft main bearing and to the connecting rod journals via drillings in the crankshaft. Drilled passages from each main bearing direct oil to the camshaft bearings.

The camshaft drive gear bushing is pressure lubricated through a drilled passage from the front main bearing. The gear has small oil passages machined on both sides which allow the oil to escape.

The timing gears are lubricated by oil from the cam follower chamber and the pressure lubricated camshaft drive gear bushing.

Cylinder walls, piston and piston pins are splash lubricated by the connecting rods and rotating crankshaft.

An intermittent flow of oil is directed to the valve rocker arm shaft assembly via a drilled passage in the cylinder block located vertically above No. 1 camshaft bearing. This drilling aligns with a corresponding hole in the cylinder head.

As the camshaft turns, holes in the camshaft and camshaft bearing align and a regulated stream of oil is directed to the cylinder head and on up the rocker arm shaft support bolt to the rocker shaft.

The oil flows from the shaft through drilled holes in each rocker arm bushing to lubricate both ends of the arms. Excess oil flows down the push rods and assists in lubricating the cam followers before draining back into the sump through cored openings in the block.

<b>ENGINE OIL CAPACITIES (Less Oil Filter)</b>	<b>U.S. qts.</b>	<b>Liters</b>
455D	6	5.65

<b>ENGINE OIL CAPACITIES (With Oil Filter)</b>	<b>U.S. qts.</b>	<b>Liters</b>
455D	7	6.6

## OVERHAUL

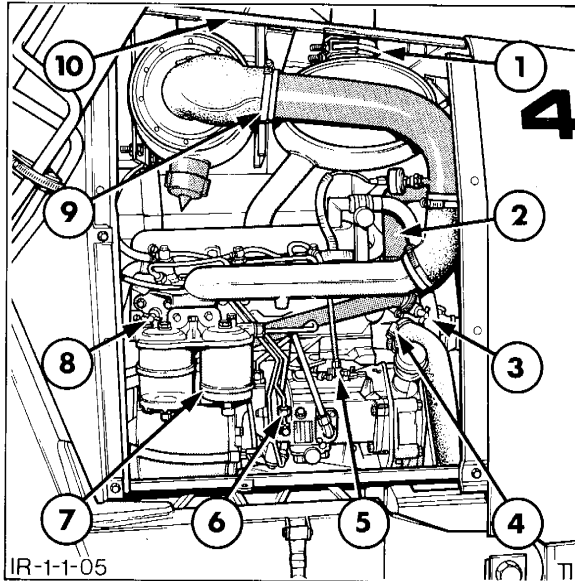


FIGURE 1-4

## Engine Installation Right-Hand

- 1 Muffler pipe
- 2 Top radiator hose
- 3 Front heater tap
- 4 Bottom radiator hose
- 5 Fuel return pipe
- 6 High pressure pipe
- 7 Fuel filters
- 8 Rear heater tap
- 9 Air cleaner tube and pipe
- 10 Top hood panel

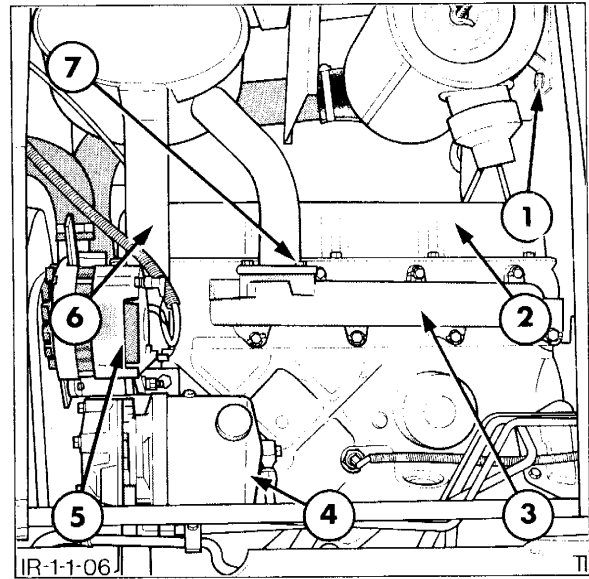


FIGURE 1-5

## Engine Installation Left-Hand

- 1 Air cleaner retaining bolts
- 2 Rocker cover
- 3 Exhaust manifold
- 4 Steering pump
- 5 Alternator
- 6 Exhaust muffler bracket
- 7 Exhaust muffler pipe

## CYLINDER HEAD, VALVES AND RELATED PARTS

## Figures 1-4 and 1-5

**NOTE:** The cylinder head can be removed with the engine installed in the tractor.

1. Disconnect the battery.
2. Remove the engine side panels.
3. Drain the coolant from the radiator and engine cylinder block.
4. Shut off the heater hose taps, then disconnect and plug the heater hoses.
5. Remove the radiator top hose.
6. Remove the exhaust muffler extension pipe.
7. Remove the air cleaner pre-cleaner.
8. Remove the air cleaner to intake manifold tube and hoses.
9. Remove the top hood panel.
10. Remove the exhaust muffler.
11. Shut off the fuel tank tap, then disconnect the low pressure fuel lines, remove the fuel filters from the inlet manifold, and cap the exposed openings.
12. Disconnect and remove the injector fuel pipes from the fuel injection pump and the injectors. Cap the exposed openings in the pump, injectors and tubes.

13. Disconnect the thermostart fuel pipe at the intake manifold and plug the exposed openings.
14. Disconnect and remove the rocker cover ventilation tube.
15. Disconnect the optional cold start equipment and plug the exposed openings.
16. Disconnect the alternator, oil pressure, coolant temperature sender, air cleaner restriction indicator, fuel injection pump solenoid, horn and cold start wiring harness connections.
17. Remove the front engine harness and secure with tape clear of the engine.
18. Remove the alternator.
19. Bend back the lock tabs, withdraw the attaching bolts and remove the exhaust manifold and gasket.
20. Remove the air cleaner assembly.
21. Remove the retaining bolts and lock washers and remove the intake manifold and gasket.
22. Clean the area surrounding the fuel injectors. Hold the leak-off pipe at each injector and carefully disconnect the fuel injector leak-off pipes, then remove the bolts and carefully remove the fuel injectors and washers, Figure 1-6.
23. Withdraw the securing bolts and remove the rocker cover and gasket from the cylinder head.
24. Check the push rods for straightness by rotating the rods with the valve closed and identify any bent rods.
25. Loosen the rocker shaft retaining bolts, which also serve as cylinder head bolts, evenly and alternately. Remove the rocker shaft assembly.

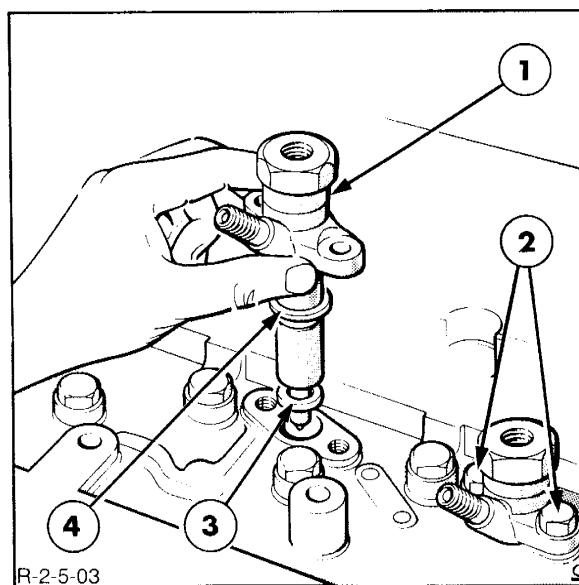


FIGURE 1-6

## Fuel Injector Removal

- 1 Fuel injector assembly
- 2 Fuel injector mounting bolts
- 3 Copper washer
- 4 Cork washer

**NOTE: Leave the bolts in the rocker shaft supports during removal as they retain the support on the shaft.**

26. Remove each push rod in turn and place in a numbered rack so that it can be replaced in the same position when assembling the engine.
27. Remove the remaining cylinder head bolts and washers working inward from the ends to the center of the head.
28. Lift the cylinder head from the block. If necessary, pry the head off on the pads provided, taking care not to damage the cylinder head or block faces.

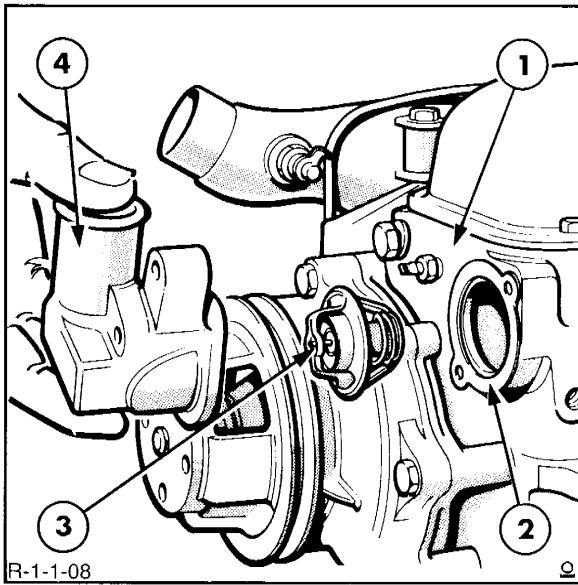


FIGURE 1-7

#### Coolant Outlet and Thermostat Removal

- 1 Cylinder head
- 2 Gasket
- 3 Thermostat
- 4 Coolant outlet connection

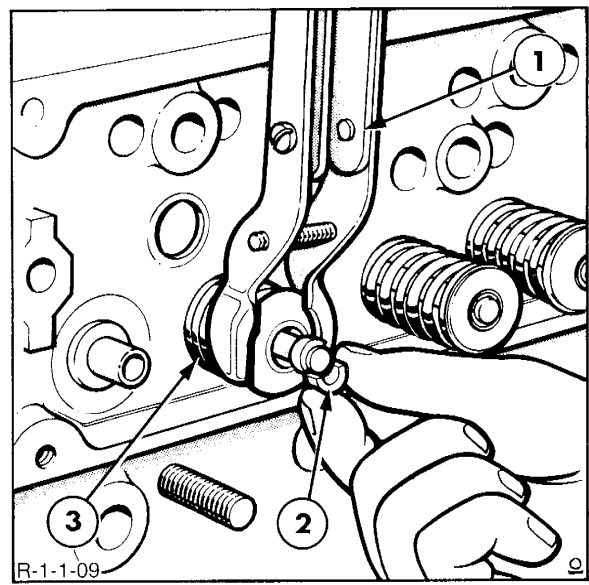


FIGURE 1-8

#### Valve Removal

- 1 Valve spring compressor
- 2 Retainer locks
- 3 Valve spring

## DISASSEMBLY

### Thermostat

Remove the coolant outlet connection and the thermostat and gasket, Figure 1- 7.

### Cylinder Head

1. Clean the head and remove carbon deposits from around the valve heads.

2. Using a valve spring compressor, Figure 1-8, remove the retainer locks, spring retainers/rotators, springs and seals from each valve, Figure 1- 9.

3. Withdraw the valves and place in a numbered rack.

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