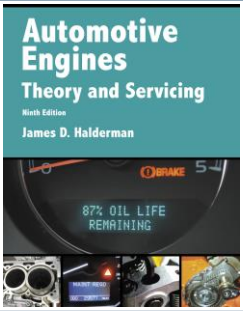
Automotive Engines Theory and Servicing

Ninth Edition



Chapter 24

Engine Removal and Disassembly

OBJECTIVES

24.1 Discuss the different engine repair options.

24.2 Explain the engine removal procedure.

24.3 Explain the engine disassembly procedure.

24.4 Explain disassembly of the short block, rotating engine assemblies removal, and cylinder head disassembly.

ENGINE REPAIR OPTIONS (1 OF 3)

- Repairing an engine should be based on all the information about the engine that is available to the service technician and the vehicle owner.
  - The customer, who is paying for the repair, must make the final decision on the reconditioning procedure to be used.

ENGINE REPAIR OPTIONS (2 OF 3)

- Component replacement
- Valve job
- Minor overhaul
- Major overhaul
- Short block

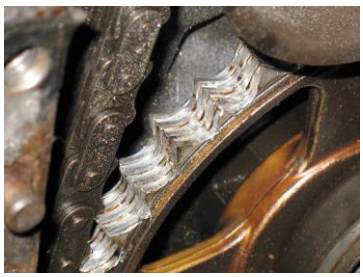
PEARSON

ENGINE REPAIR OPTIONS (3 OF 3)

- Long block
- Crate engines
- Remanufactured engines

PEARSON

FIGURE 24–1 A worn timing sprocket that resulted in a retarded valve timing and reduced engine performance.



PEARSON

FIGURE 24–2 A crate engine from Chrysler to be used in a restored muscle car. Using a complete new engine costs more than rebuilding an existing engine, but it has a warranty and uses all new parts.

PEARSON

ENGINE REMOVAL (1 OF 3)

- Check Service Information
- Usual Engine Removal Procedures
  - Remove the hood
  - Clean the engine area
  - Disconnect the negative (−) battery cable
  - Remove the air cleaner assembly
  - Remove all accessories

PEARSON

ENGINE REMOVAL (2 OF 3)

  - Drain the coolant
  - Remove the radiator
  - Disconnect the exhaust system
  - Recover the air-conditioning refrigerant
- Usual Engine Removal Procedures
  - Remove the power steering pump
  - Drain the engine oil
  - Disconnect fuel lines
  - Disconnect wiring and vacuum hoses

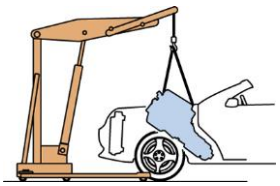
PEARSON

ENGINE REMOVAL (3 OF 3)

- Procedure For Engine Removal
  - There are two ways to remove the engine.
    - The engine can be lifted out of the chassis with the transmission/transaxle attached.
    - The transmission/transaxle can be separated from the engine and left in the chassis.
  - Rear-wheel-drive vehicle
  - Front-wheel-drive vehicle

PEARSON

FIGURE 24–3 An engine must be tipped as it is pulled from the chassis.



PEARSON

FIGURE 24–4 When removing just the engine from a front-wheel-drive vehicle, the transaxle must be supported. Shown here is a typical fixture that can be used to hold the engine if the transaxle is removed or to hold the transaxle if the engine is removed.

PEARSON

FIGURE 24–5 The entire cradle, which included the engine, transaxle, and steering gear, was removed and placed onto a stand. The rear cylinder head has been removed to check for the root cause of a coolant leak.

PEARSON

ENGINE DISASSEMBLY

- Mounting the Engine On a Stand
- Disassembling A Cam-in-block (OHV) Engine
- Overhead Camshaft (OHC) Engine Disassembly

FIGURE 24–6 Always use graded bolts—either grade 5 or 8 bolts—whenever mounting an engine to a stand.

PEARSON

FIGURE 24–7 Keeping the pushrods and the lifters sorted by cylinder, including the spark plugs, is a wise way to proceed when disassembling the cylinder heads.

PEARSON

FIGURE 24–8 Sometimes after the cylinder head has been removed, the engine condition is discovered to be so major that the entire engine may need to be replaced rather than overhauled.

PEARSON

DISASSEMBLY OF THE SHORT BLOCK

- Removing The Oil Pan
- Marking Connecting Rods And Caps
- Removing The Cylinder Ridge
- Piston Removal

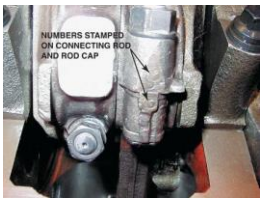
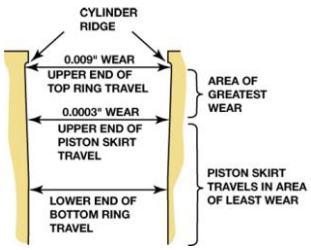


FIGURE 24–9 These connecting rods were numbered from the factory. If they are not, then they should be marked.

PEARSON

FIGURE 24–10 Most of the cylinder wear is on the top inch just below the cylinder ridge. This wear is due to the heat and combustion pressures that occur when the piston is near the top of the cylinder.



PEARSON

FIGURE 24–11 This ridge is being removed with one type of ridge reamer before the piston assemblies are removed from the engine.

PEARSON

ROTATING ENGINE ASSEMBLIES REMOVAL

- Harmonic Balancer Removal
- Camshaft Removal
- Crankshaft and Main Bearing Removal
- Block Inspection

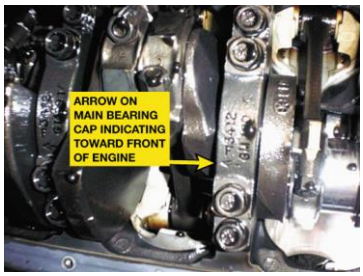
FIGURE 24–12 Puller being used to pull the vibration damper from the crankshaft.

PEARSON

FIGURE 24–13 When the timing chain cover was removed, the broken timing gear explained why this GM 4.3 liter V-6 engine stopped running.

PEARSON

FIGURE 24–14 Most engines such as this Chevrolet V-8 with four-bolt main bearing caps have arrows marked on the bearing caps which should point to the front of the engine.



PEARSON

FIGURE 24–15 This small block Chevrolet V-8 had water standing in the cylinders, causing a lot of rust, which was discovered as soon as the head was removed.

PEARSON

CYLINDER HEAD DISASSEMBLY

- OHV Engine Cylinder Heads
- OHC Engine Cylinder Heads

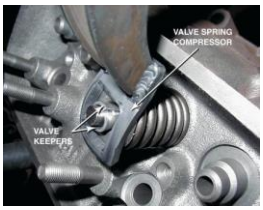


FIGURE 24–17 A valve spring compressor is used to compress the valve spring before removing the keepers (locks).

PEARSON

1 Before beginning work on removing the engine, mark and remove the hood and place it in a safe location.

PEARSON

2 For safety, remove the negative battery cable to avoid any possible electrical problems from occurring.

PEARSON

3 Drain the coolant and dispose of properly.

PEARSON

4 Disconnect all cooling system and heater hoses and remove the radiator.

PEARSON

5 Remove the accessory drive belt(s) and set the alternator, power steering pump, and air-conditioning compressor aside.

PEARSON

6 Remove the air intake system including the air filter housing as needed.

PEARSON

7 Remove the electrical connector from all sensors and label.

8 Disconnect the engine wiring harness connector at the bulkhead.

9 Safely hoist the vehicle and disconnect the exhaust system from the exhaust manifolds.

10 Mark and then remove the fasteners connecting the flex plate to the torque converter.

PEARSON

11 Lower the vehicle and remove the engine mount bolts and transaxle bell housing fasteners.

PEARSON

12 Secure the lifting chain to the engine hooks and carefully remove the engine from the vehicle.

PEARSON

SUMMARY (1 OF 3)

- A repair, valve job, overhaul, and entire engine replacement are some of the solution options for an engine failure.
- A short block is the block assembly with pistons and crankshaft. A long block also includes the cylinder head(s).

SUMMARY (2 OF 3)

- Cylinder heads should only be removed when the engine is cold.
  - Always follow the torque table backwards, starting with the highest-number head bolt and working toward the lowest number.
- Factory lifting hooks should be used when hoisting an engine.

SUMMARY (3 OF 3)

- The ridge at the top of the cylinder should be removed before removing the piston(s) from the cylinder.
- The connecting rod and main bearing caps should be marked before being removed.
- The tip of the valve stem should be filed before removing valves from the cylinder head to help prevent damage to the valve guide.