Modern Automotive Technology
Chapter 14
Engine Bottom End
Learning Objectives

- Compare the construction of different types of cylinder blocks.
- Explain how piston construction affects engine operation.
- Describe piston ring variations.
- Explain the construction of engine bearings.
- Compare design variations of different engine bottom end components.
- Explain safe practices when working with engine bottom end components.
Engine Bottom End

Includes the block, crankshaft, connecting rods, and piston assemblies
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1. The metal, pipe-shaped inserts that fit into the cylinder block are known as the CYLINDER SLEEVES.

2. Like cam grinding, PISTON TAPER is normally used to maintain the correct piston-to-cylinder clearance.
Cylinder Sleeves

- There are two basic types of sleeves:
  - dry sleeves
  - wet sleeves
Piston Taper
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3. **COMPRESSION RINGS** prevent pressure leakage into the crankcase and wipe some of the oil from the cylinder walls.

4. Located on the head of the piston, the **PISTON NOTCH** is frequently used to indicate piston pin offset.
Compression Rings

- Tapered
- Chamfered
- Counterbored
- Scraper
- Plain
- Grooved
Piston Ring Dimensions
Most piston rings use a butt joint.
Piston Assembly

This piston has a full-floating piston pin
5. When engine parts are chosen and installed in a certain position to improve fit or clearance between parts, this is known as SELECT FIT.

6. THRUST WASHERS are sometimes used to limit crank end play.
Piston Dimensions

- Deck height
- Ring groove width
- Ring groove depth
- Compression distance
- Skirt length
- Pin hole diameter
- Piston diameter
- Cylinder bore diameter
Main Thrust Bearing and Washers

- Main thrust bearing
  - limits crankshaft end play
  - thrust flanges are formed on the main bearing sides, almost touching the thrust surfaces machined on the crankshaft

- Thrust washers
  - used instead of a thrust bearing to limit crank end play
Thrust Washers

Washers slide into place between the crankshaft and block
Main Thrust Bearing and Washers

- Block
- Thrust washer
- Main bearing
- Cap
- Separate thrust washers
- Block
- Main thrust bearing
- Flanges
- Thrust flanges on bearings
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7. BEARING CRUSH helps prevent a bearing from spinning inside its bore during engine operation.

8. Rail-spacer and one-piece are two types of OIL RINGS.
Bearing Crush

Crush height of each bearing half

Rod

Bearing

Cap
Oil Rings

A. Three-piece ring (most common)

B. One-piece ring made from cast iron
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9. VALVE RELIEFS are small indentations either cast or machined in the piston crown.

10. When the portion below the piston pin ends are removed, a SLIPPER SKIRT is produced.
Piston Assembly

Piston notch indicates the front of the piston
Valve reliefs provide piston-to-valve clearance
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11. **LINE BORING** refers to a machining operation that cuts a series of holes through the block for the crankshaft bearings.

12. **A CAM GROUND PISTON** is machined slightly out-of-round when viewed from the top.
Cylinders may be integral parts of the block or formed by pressed-in liners.
Cam-Ground Piston
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