Learning Objectives

- Identify the major parts of a typical automotive engine.
- Describe the four-stroke cycle. Define common engine terms.
- Explain the basic function of the major parts of an automotive engine.
- Cite and demonstrate safe working practices related to engines.
- Correctly answer ASE certification test questions that require knowledge of the basic operation of piston engines.
Engine Fundamentals

1. The **piston stroke** is the distance of up and down movement from TDC to BDC

2. The **crankshaft** harnesses the force produced by the downward thrust of the pistons.

3. The **exhaust stroke** removes the burned gases from the engine and readies the cylinder for a fresh charge of air and fuel.
Piston Stroke

Bottom dead center (BDC)

Connecting rod

One stroke

TDC

BDC

Top dead center (TDC)

Piston

Crankshaft

One-half revolution 180°
Crankshaft

- Rod journal
- Main journal
- Rod journal
- Counterweight
Engine Fundamentals

Four-Stroke Cycle
4. The *valve lifter* usually rides on the cam lobes and transfers motion to the rest of the valve train.

5. The *connecting rod* fastens the piston to the crankshaft.

6. *The flywheel* is mounted on the rear of the crankshaft.
Engine Fundamentals

Connecting Rod

- Connecting rod
- Rod small end
- Rod bushing
- I-beam
- Rod bolt
- Rod cap
- Rod bearing inserts
- Rod nut
Engine Fundamentals

Valve Train

- Rocker arms
- Push rods
- Lifter
- Camshaft
- Valve spring
- Valves
7. The *engine block* forms the main body of the engine.

8. The *compression stroke* squeezes the air-fuel mixture to prepare it for combustion.
Engine Fundamentals

9. The *intake stroke* draws fuel and air into the engine.

10. The *power stroke* burns the air-fuel mixture and pushes the piston down with tremendous force.
Two timing gears are used to drive the camshaft
  - one on the crankshaft and one on the camshaft
Cam gear is twice the size of the crank gear
  - provides a 2:1 reduction
Timing Gears

Timing marks show the technician how to install the gears properly.
Piston Rings
Engine Fundamentals

Camshaft
Engine Manifolds
DOHC Timing Chain
11. Main bearing
12. Connecting rod
13. Crankcase
14. Piston assembly
15. Head bolt hole
16. Deck
17. Cylinder
18. Cylinder block
19. Water jacket
20. Camshaft bore
21. Main cap
22. Crankshaft
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