Unit 2
Engine Designs

Refresher • 4 Stroke Process & Parts • L Head Design • OHV Design • Multiple-Cylinder Engine Systems

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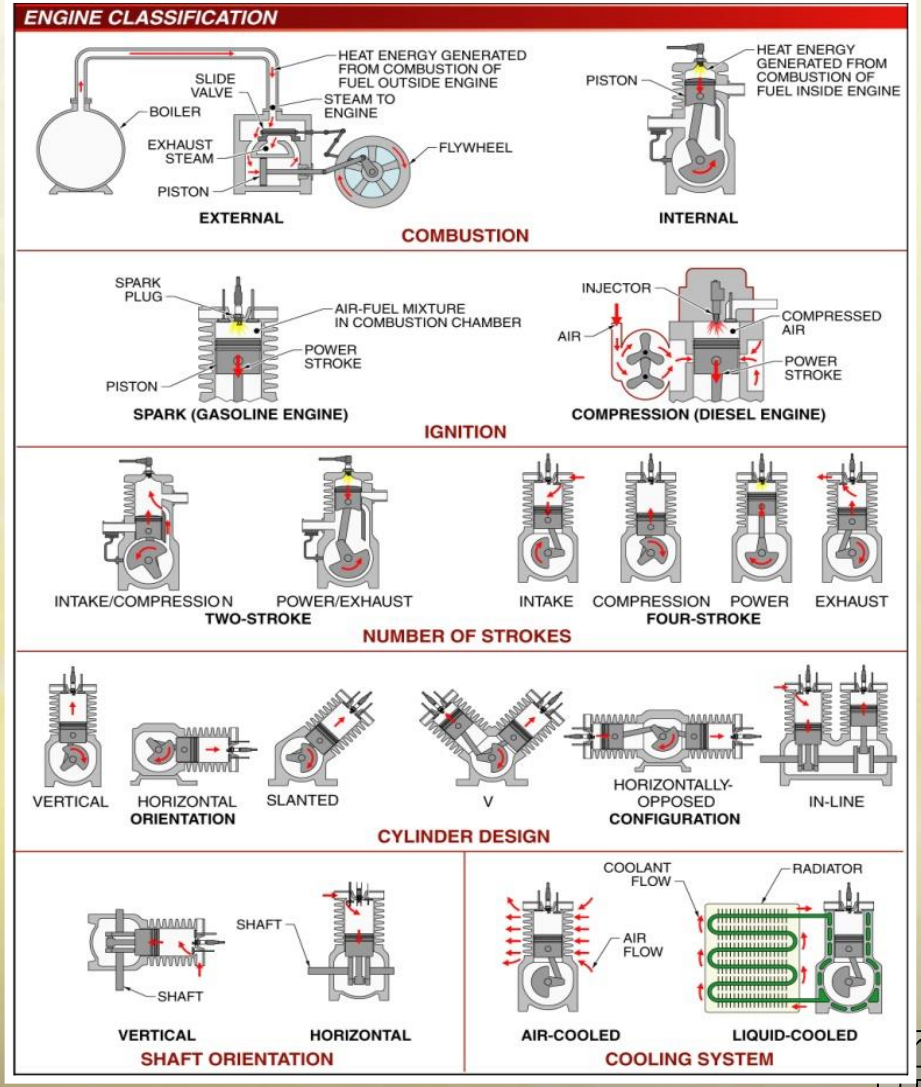
A small engine is an internal combustion engine that is generally rated up to 25 HP.



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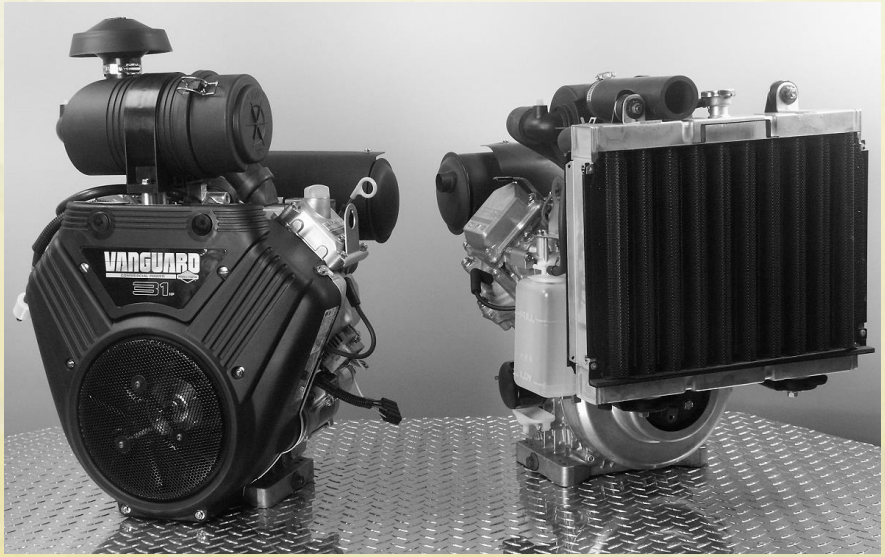
- Lower production costs
  - Less parts
- Less room required for installation
- Higher operating temperatures
- Liquid-Cooled has greater longevity



Air Cooled Verses Liquid Cooled

Crankshaft PTO comes out the side

Uses include

- Generators
- Pumps
- Log Splitters
- Tillers
- Snow blowers
- Go karts!
- Desks, Coolers

Horizontal Configuration

Crankshaft PTO comes out the bottom

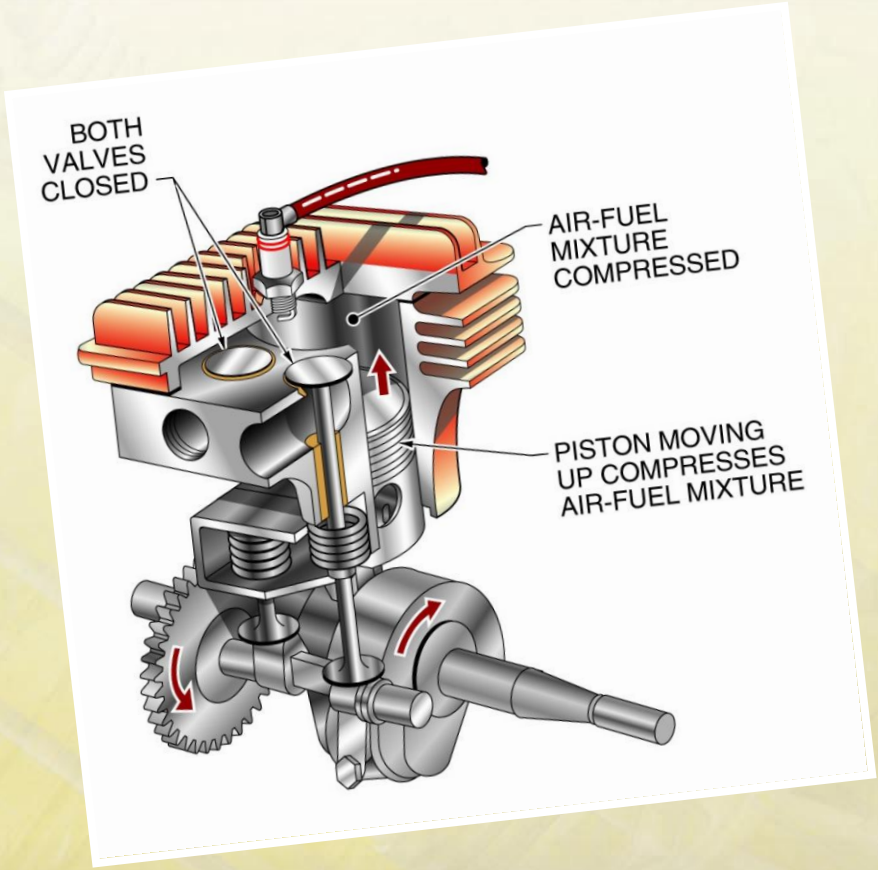
Uses include

- Walk behind lawn mowers
- Rear Engine Riders
- Tractors

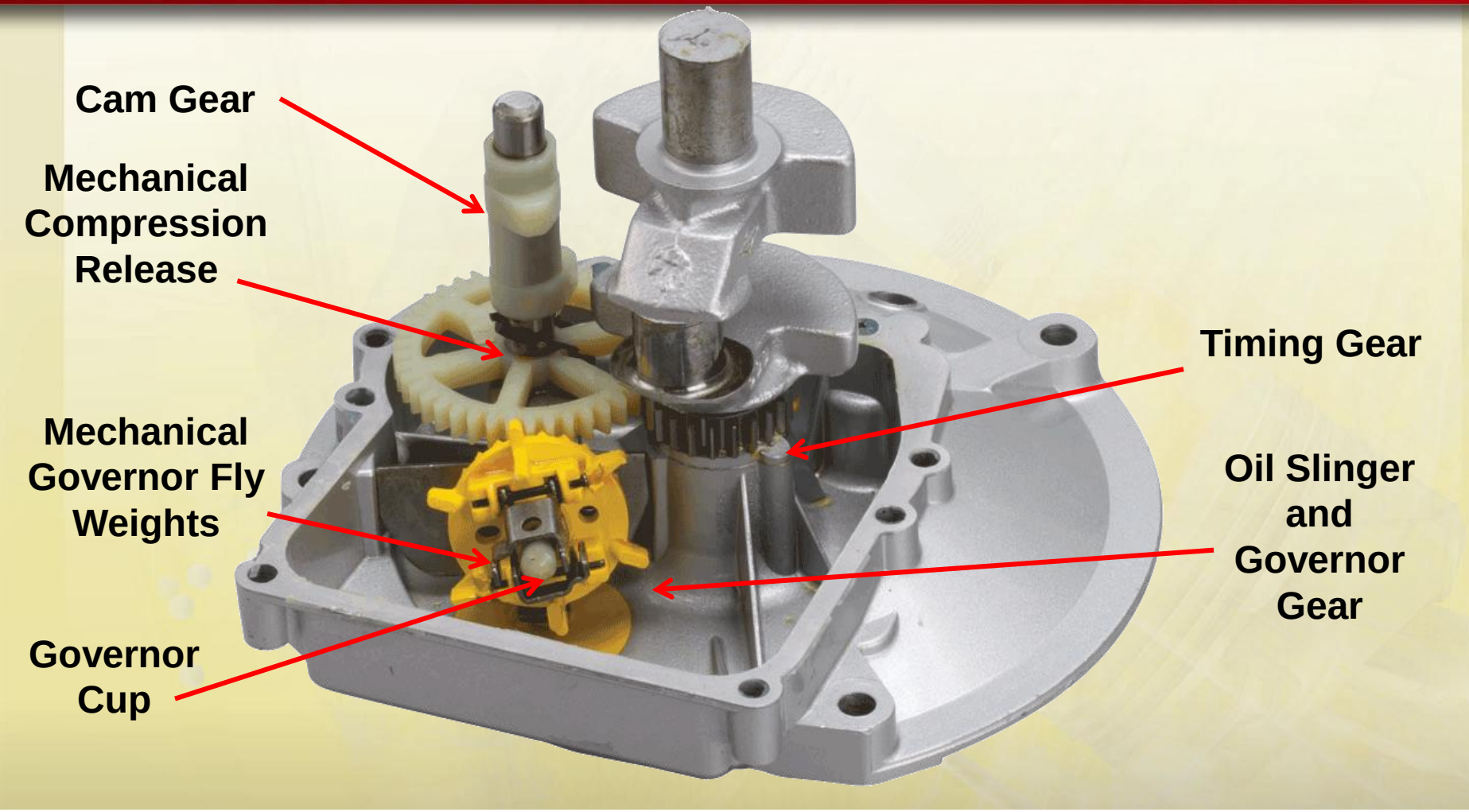
Vertical Configuration

Should look familiar!

- Lower production
- Costs Less parts
- Lower compression ratio
- Valves and springs are inside the block.
- The combustion chamber resembles a L



L Head Engine



Single Cylinder "L-Head"

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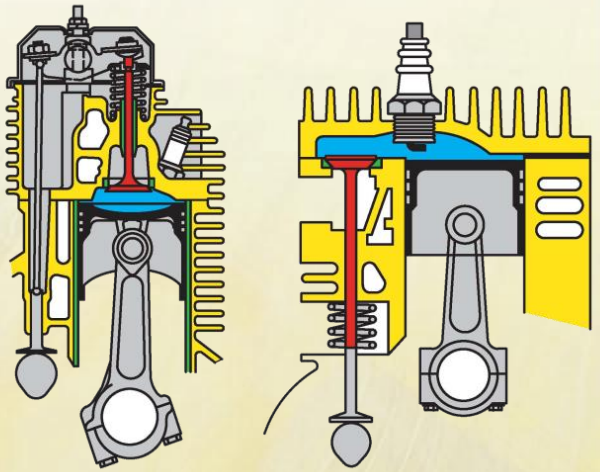
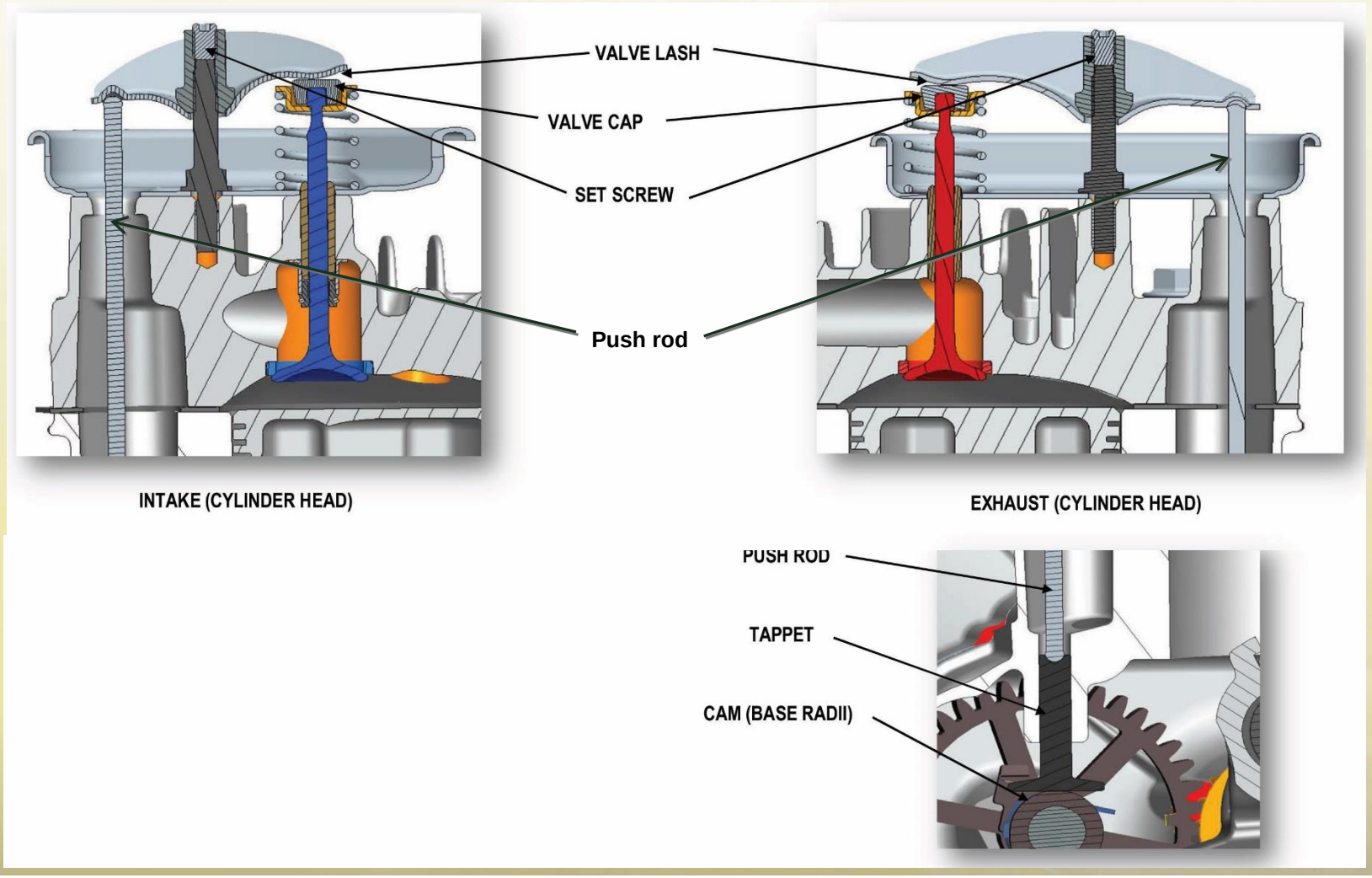
- Valves on top of piston
- Runs cooler
- Greater longevity
- Higher compression ratio – More power



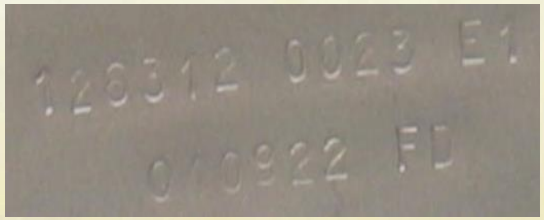
OHV Engine (Over Head Valve)



OHV Engine (Over Head Valve)

Engine Identification

- Model Number
- Type Number
- Code Number
- Stamped in metal
- New units also have a decal with individualized number



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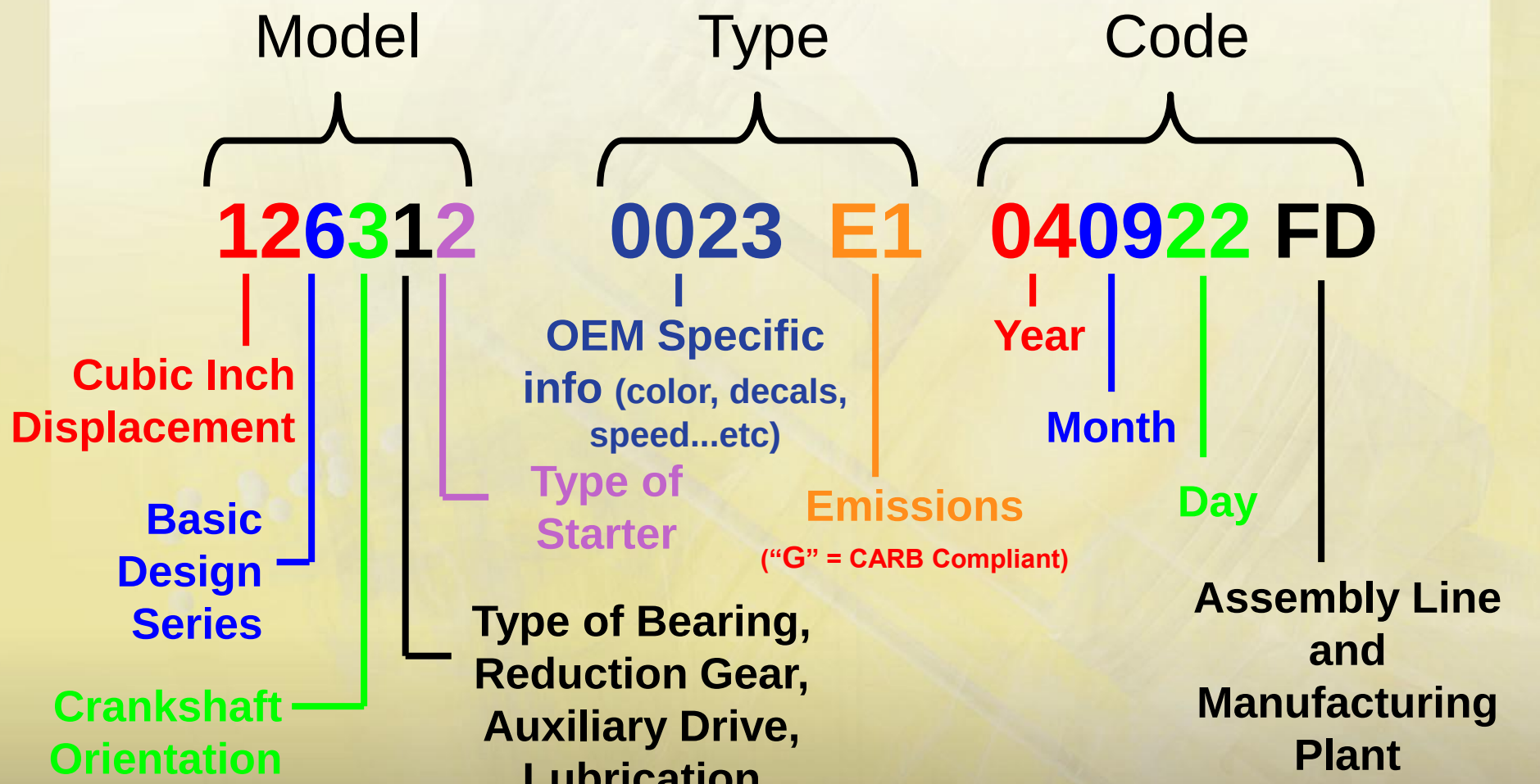

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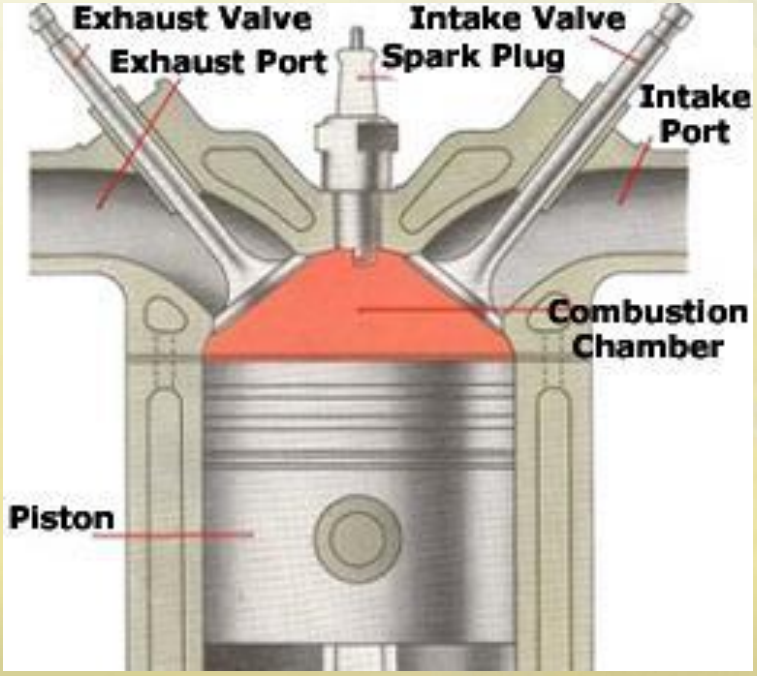
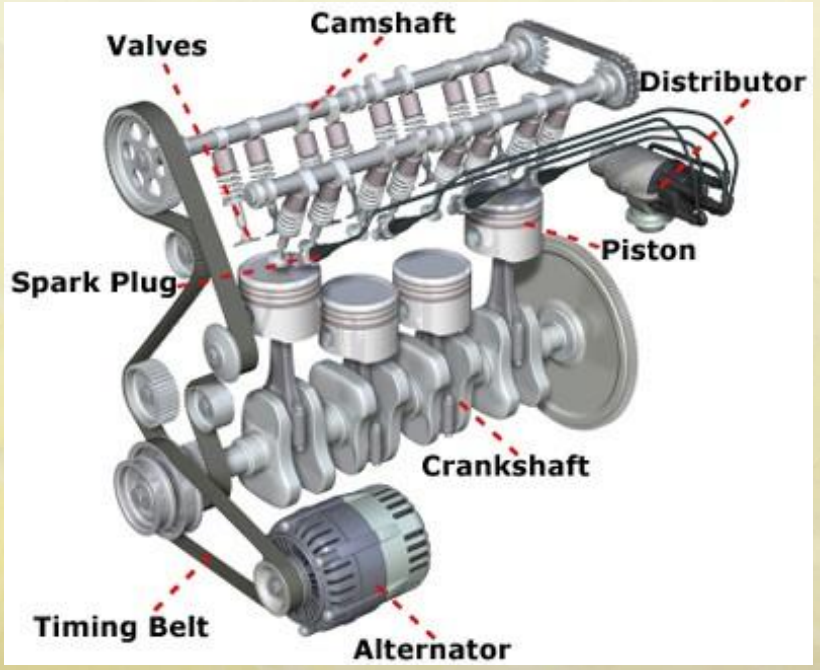
Lets Refresh our Minds





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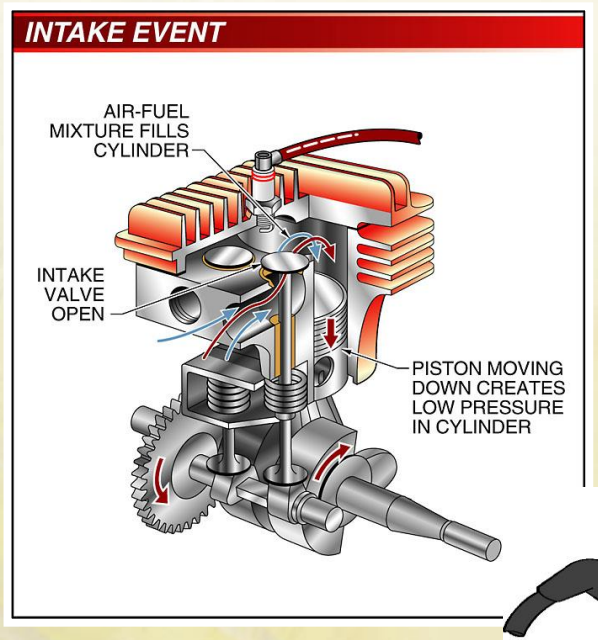
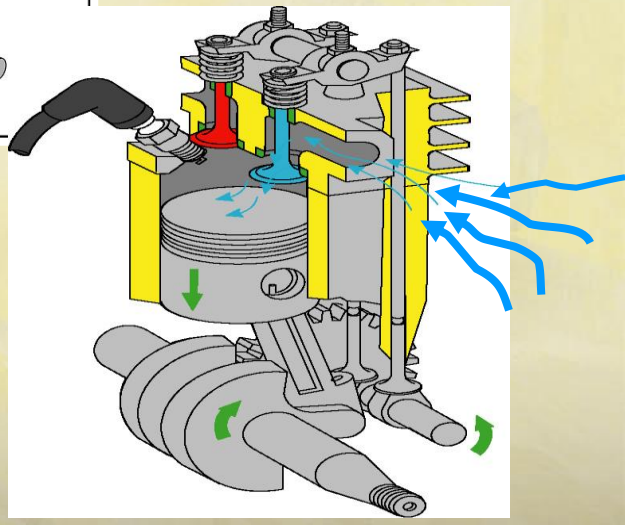
1st

The intake event occurs when the air-fuel mixture is introduced into the combustion chamber as the piston moves from TDC to BDC.

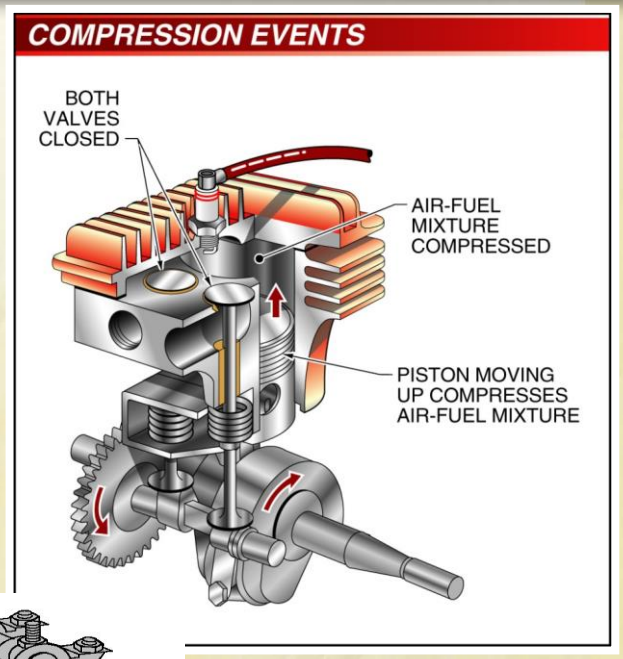


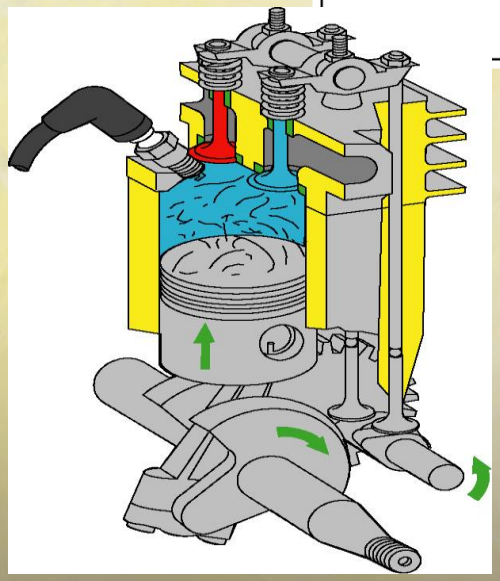


The 4 Stroke Process

2nd

The compression event is an engine operation event in which the trapped air-fuel mixture is compressed becoming more volatile.





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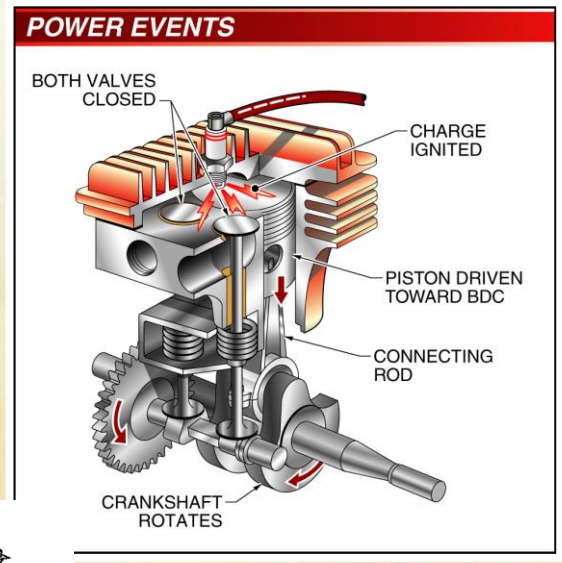
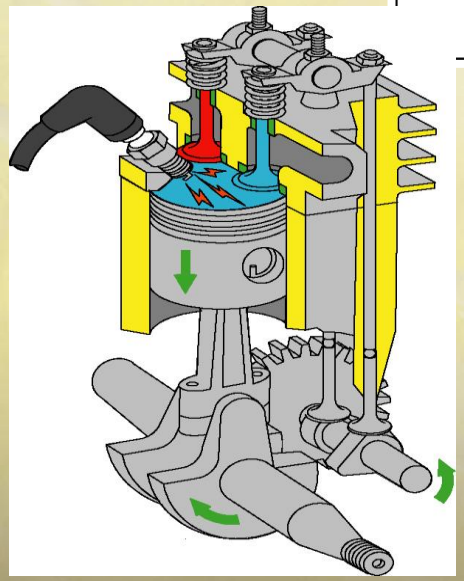
3rd

During the power event, the spark plug fires, hot expanding gases from the explosion force the piston head away from the cylinder head in a downward position.





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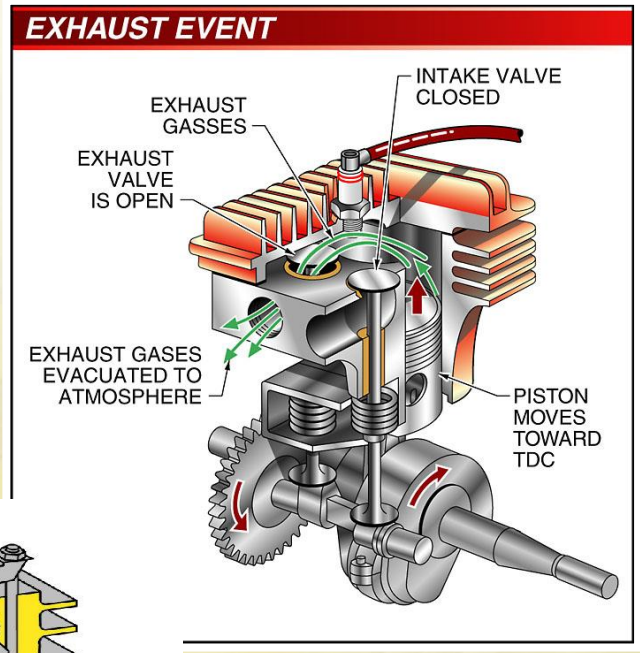
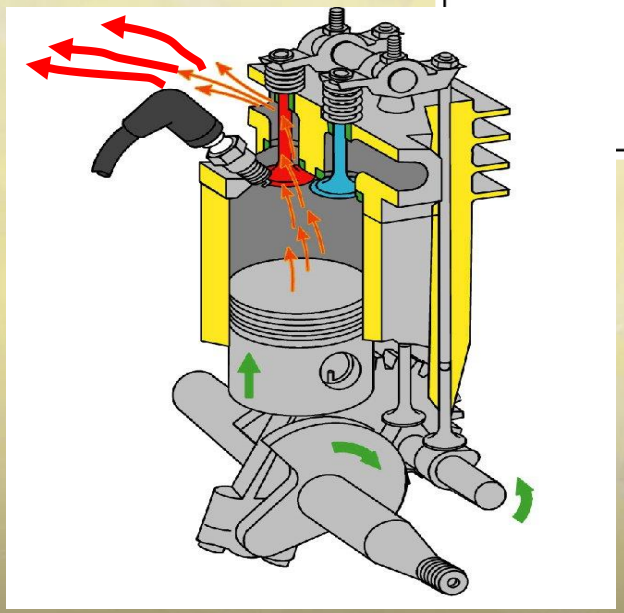
4th

During the exhaust event, piston movement evacuates exhaust gases to the atmosphere.





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Multiple Cylinder Engine

Work on the same principles, just more explosions taking place.

180° OPPOSED-TWIN

Common multiple-cylinder small engine designs include the 180° horizontally opposed-twin, the in-line, and the 60° V-twin.

VANGUARD™ THREE-CYLINDER

VANGUARD™ V-TWIN

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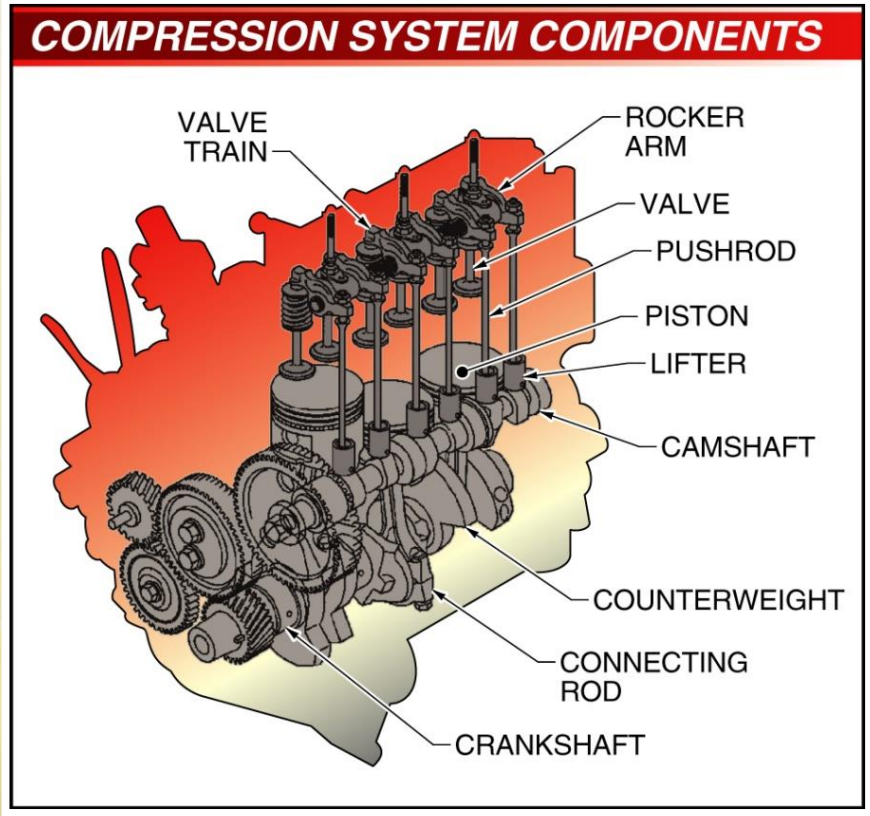
Component design in a multiple-cylinder engine varies with engine design and number of cylinders.

Multiple crank journals accommodate multiple connecting rods. Longer/heavier cranks require more support from multiple combustion forces. More than 2 bearings.



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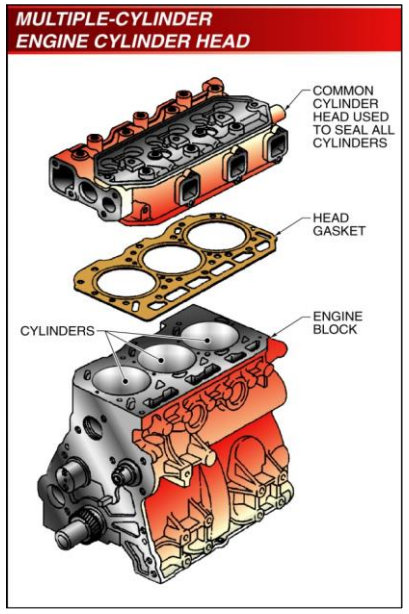
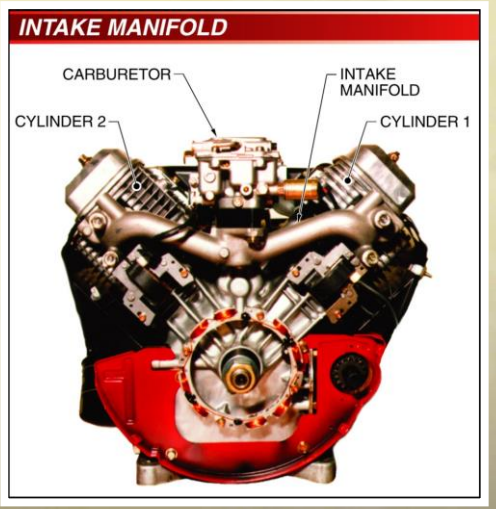
Multiple Cylinder Engines:

A common cylinder head and head gasket are used to seal all cylinders in an in-line engine.

Intake manifold:

Distributes the air-fuel mixture on a multiple-cylinder engine from the carburetor to the cylinder**(s).**





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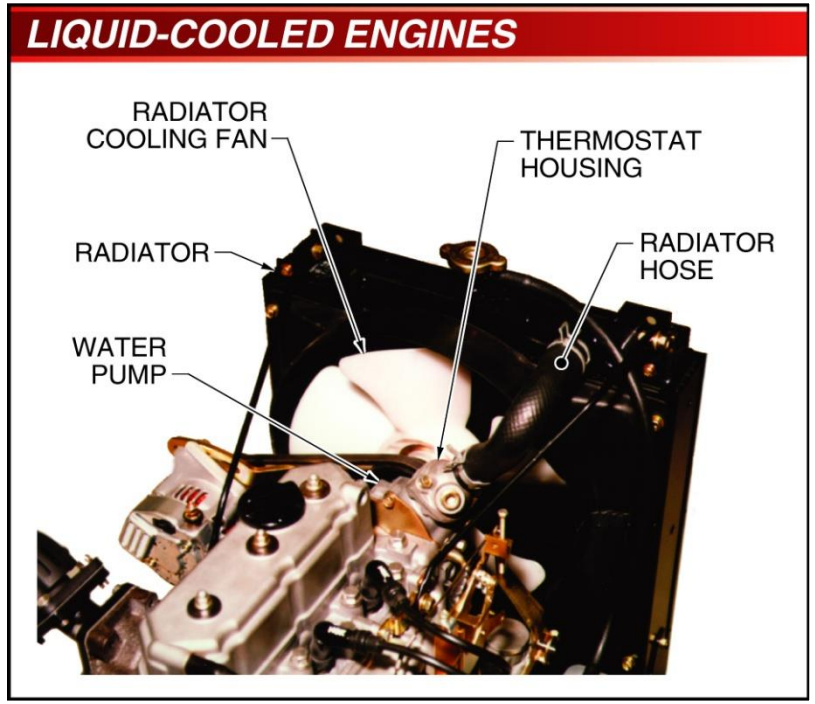
Liquid-cooled engines require more components than air-cooled engines, but have a more consistent engine operating temperature to increase overall engine life.



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