



Modern Automotive Technology Chapter 12

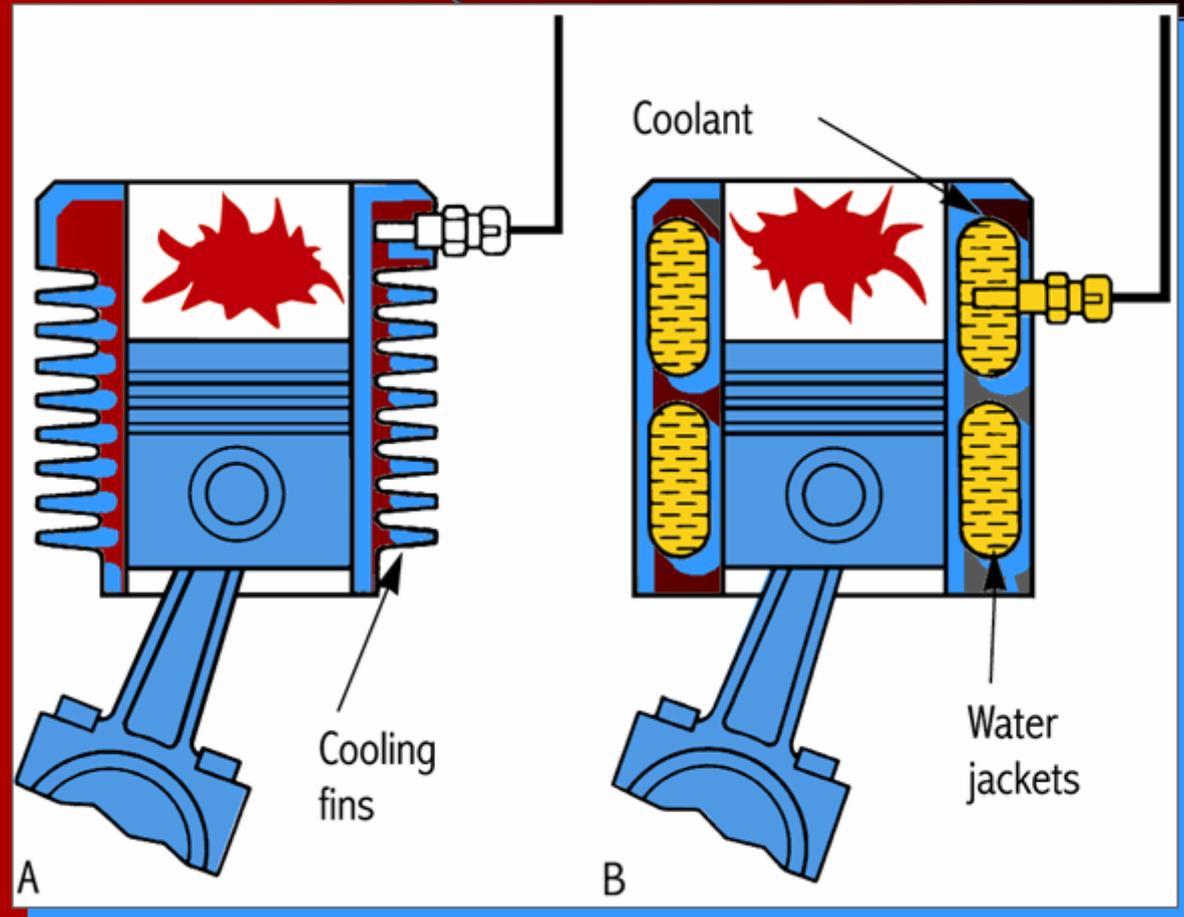
Engine Design Classifications

Learning Objectives

- Describe basic automotive engine classifications
- Compare gasoline and diesel engines
- Contrast combustion chamber designs
- Discuss alternative engine types
- Compare two- and four-stroke cycle engines
- Correctly answer ASE certification test questions

Engine Design Classifications

- A. Air cooling
- B. Liquid cooling

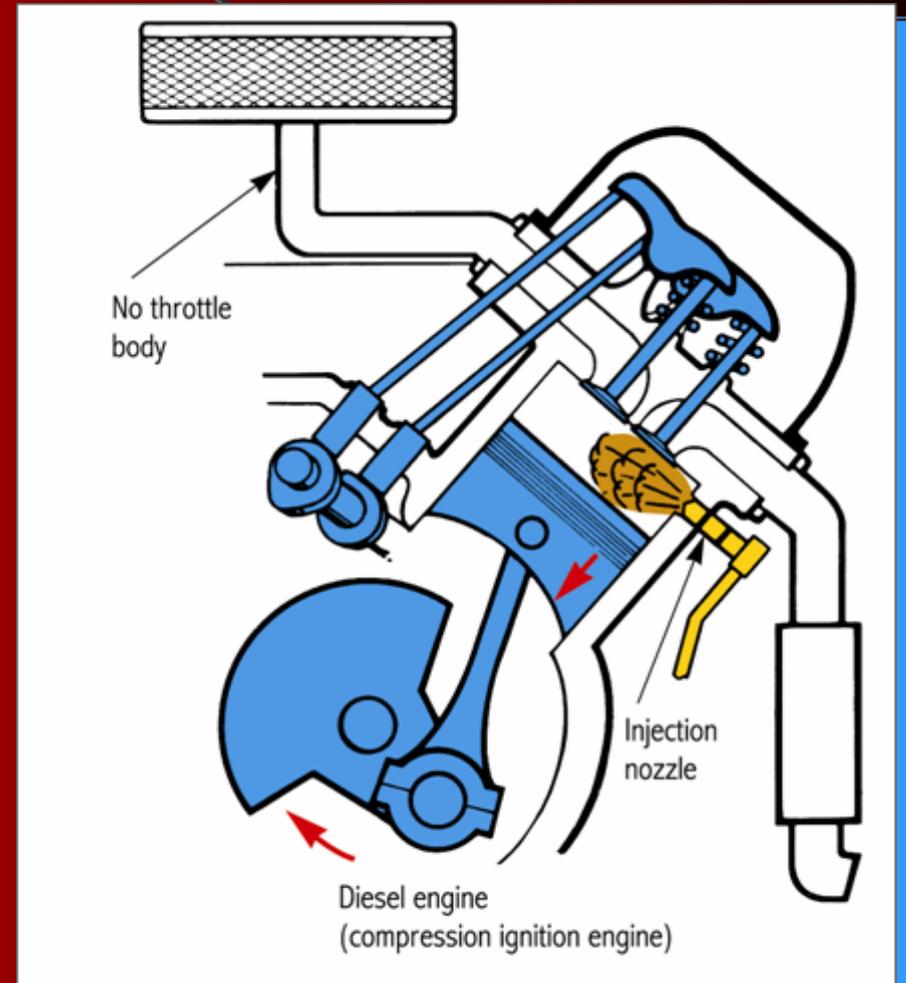


Engine Design Classifications

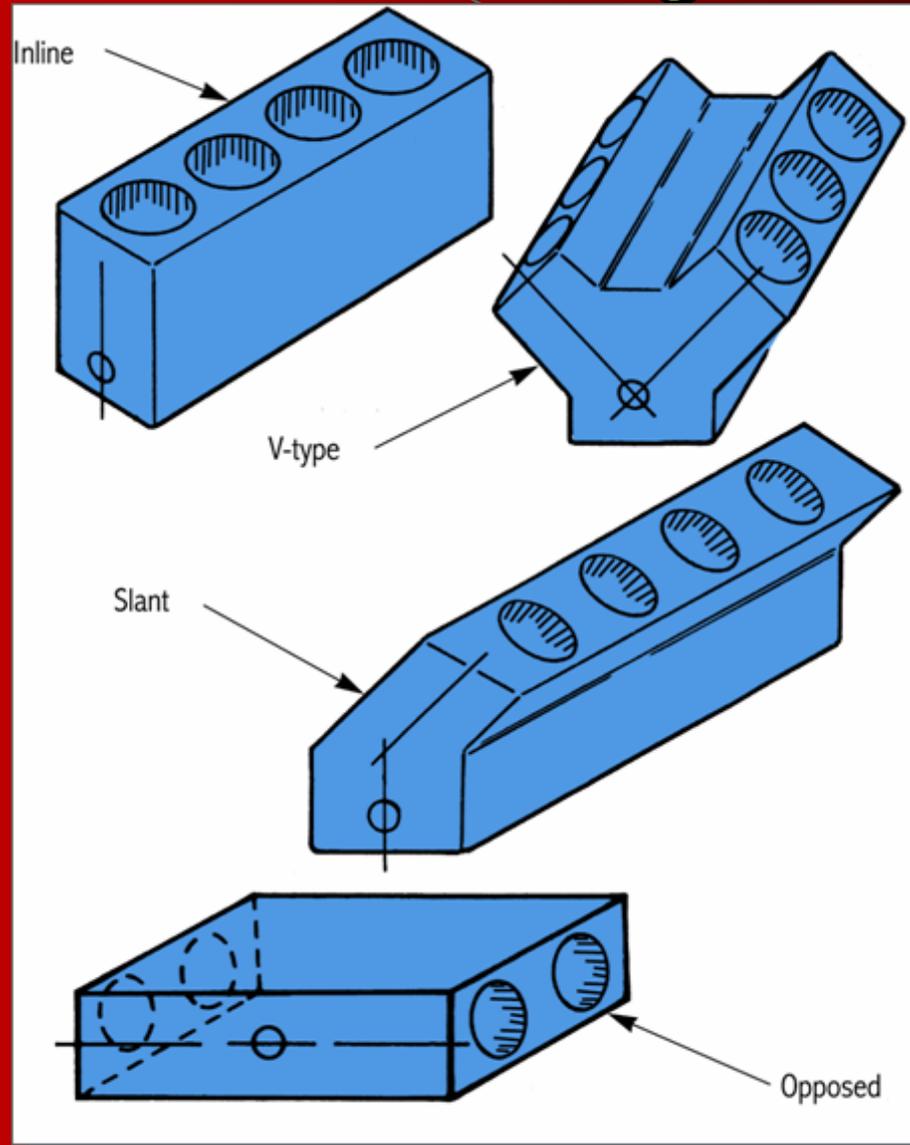
1. A Compression Ignition Engine squeezes the air in the combustion chamber until it is hot enough to ignite the fuel.
2. A Steam Engine heats water to make vapor, which operates the pistons.
3. A Stratified Charge Combustion Chamber uses a small flame to ignite and burn the fuel in the main combustion chamber.

Compression Ignition Engine

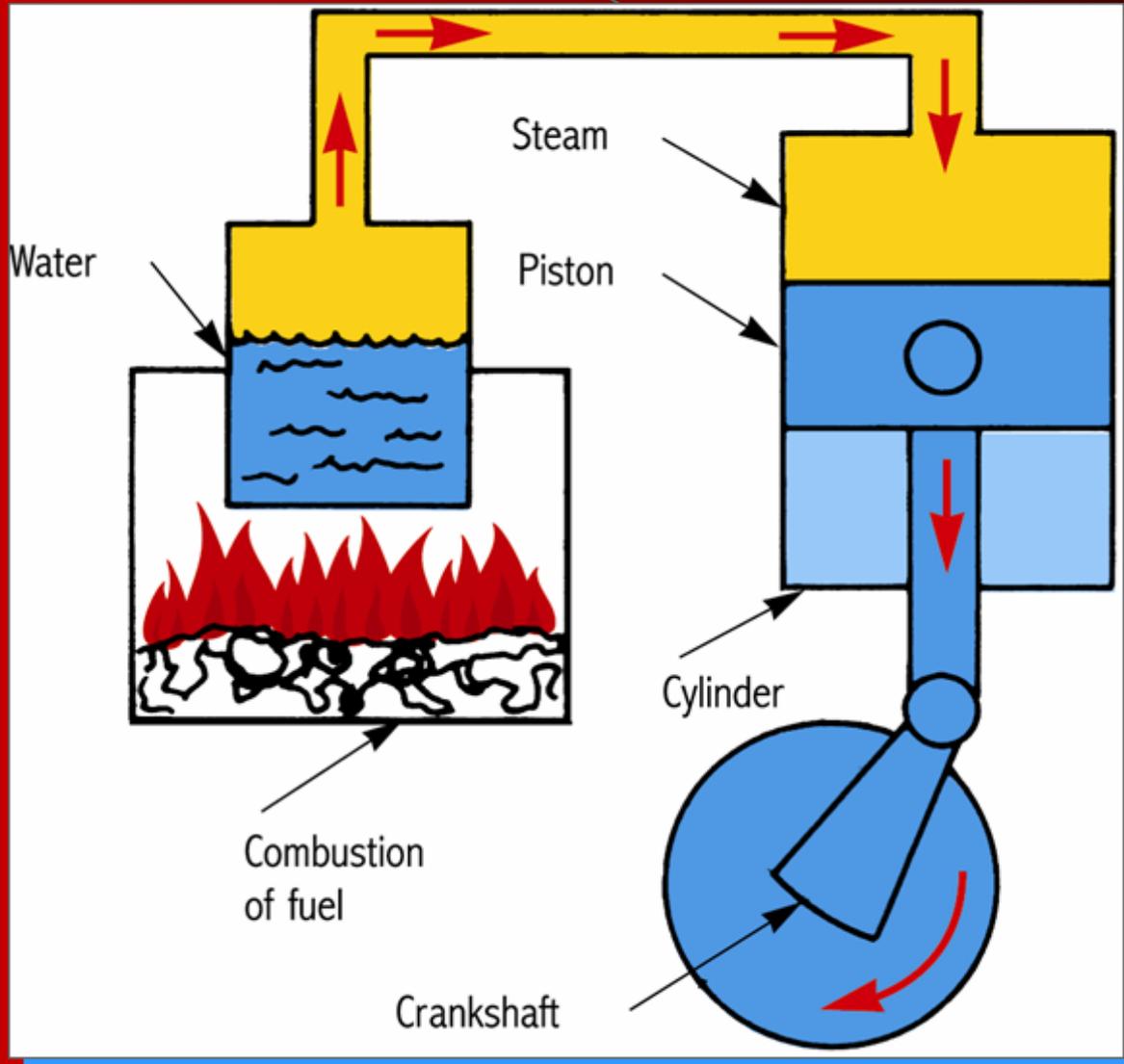
Squeezes the air in the combustion chamber until it is hot enough to ignite the fuel.



Cylinder Arrangement



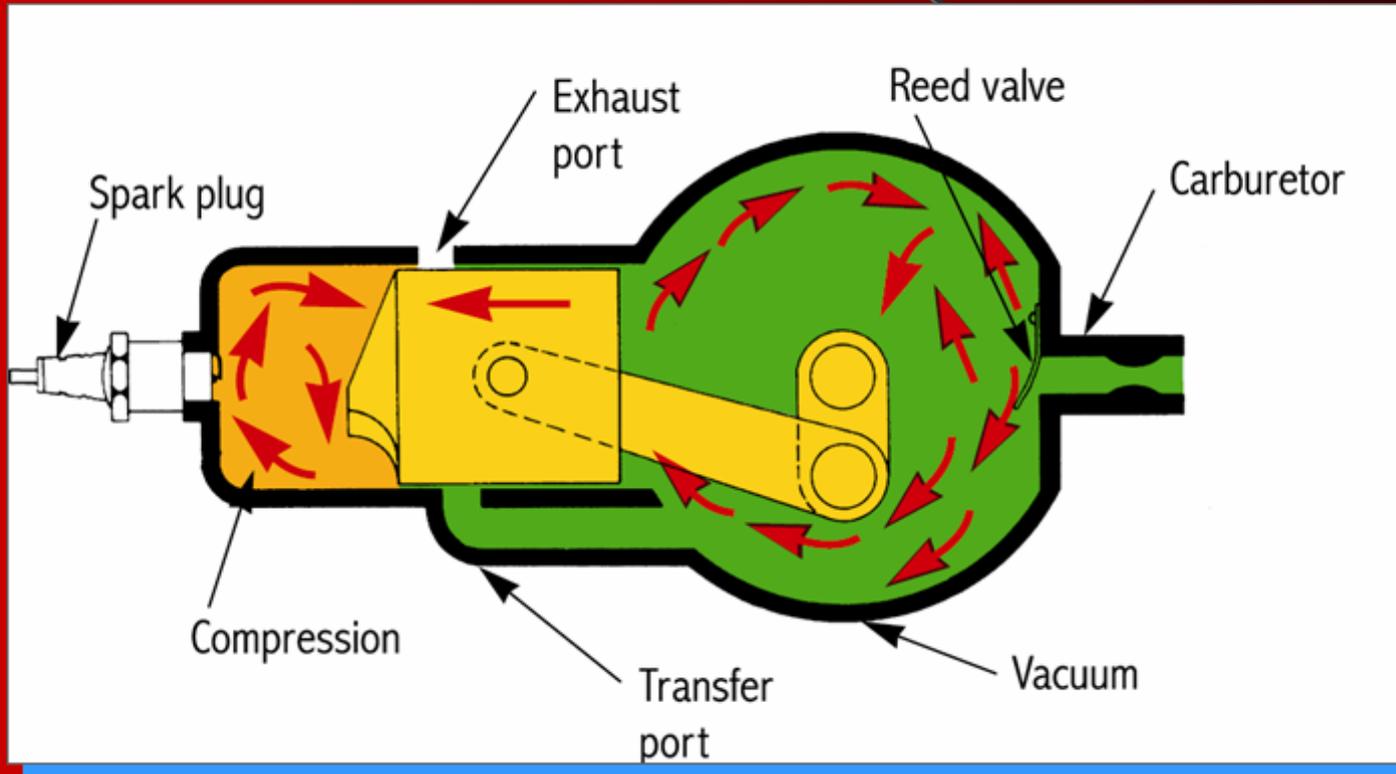
Steam Engine



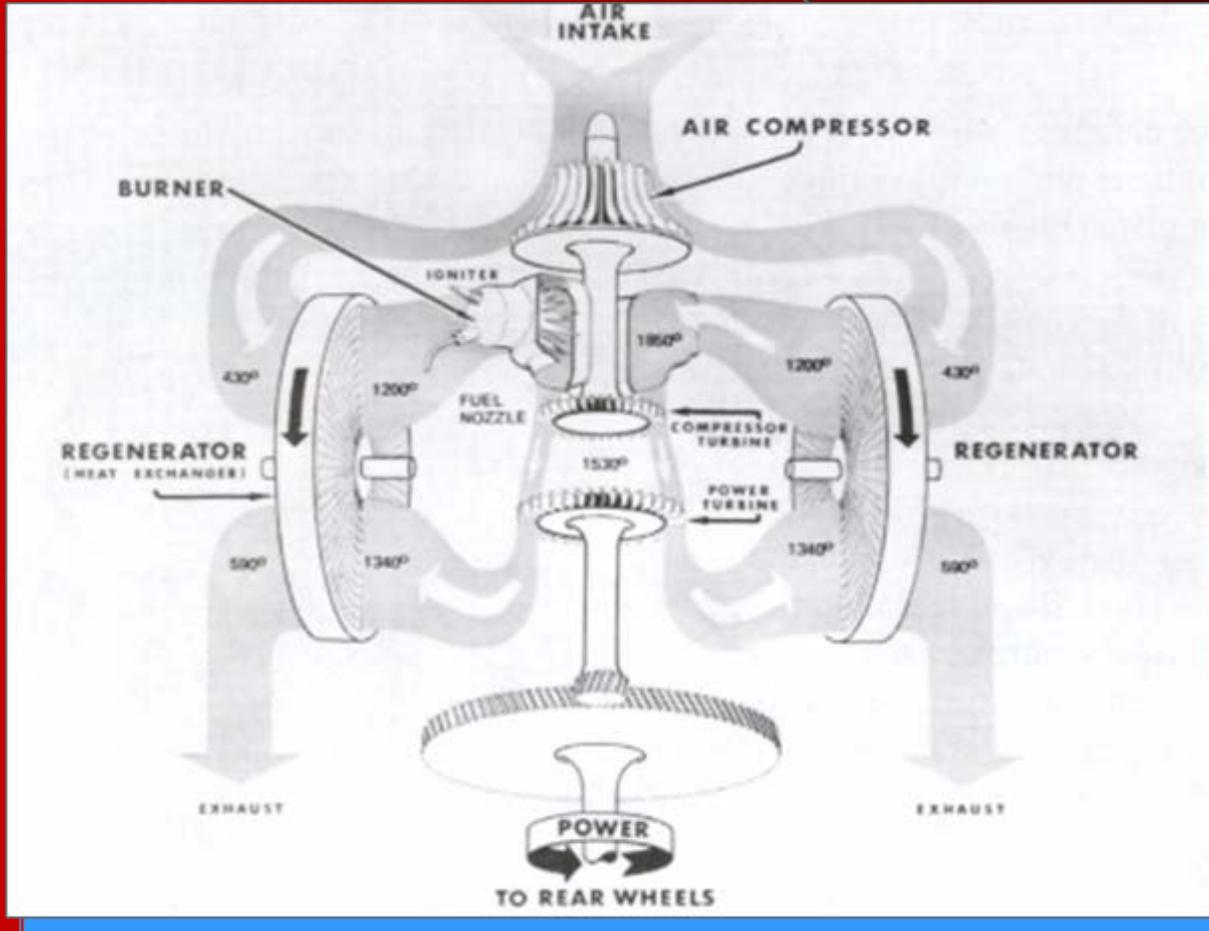
Engine

4. A Two-Stroke Cycle Engine only requires one revolution of the crankshaft for a complete power-producing cycle.
5. A Gas Turbine engine uses burning and expanding fuel vapor to spin fan-type blades.
6. A Miller-Cycle Engine is designed with a shorter compression stroke and a longer power stroke to increase efficiency.

2-Cycle Engine Operation

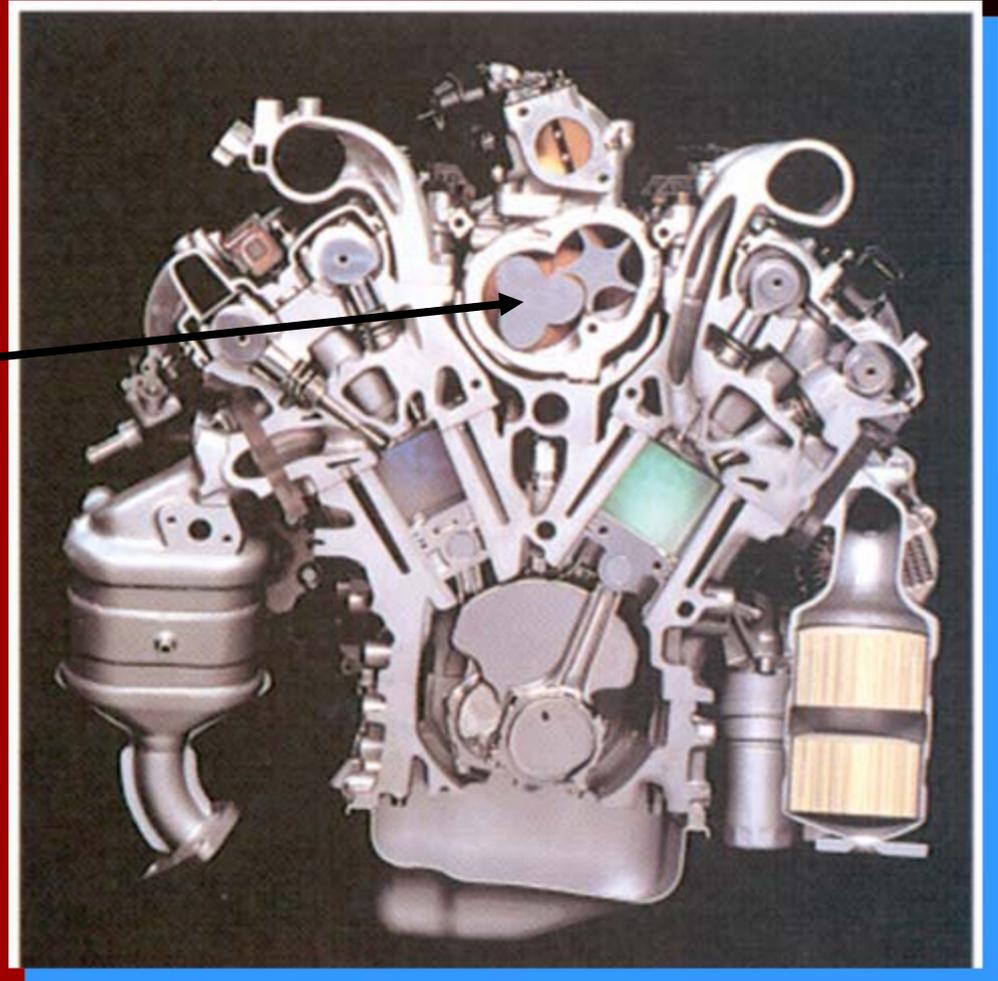


Gas Turbine



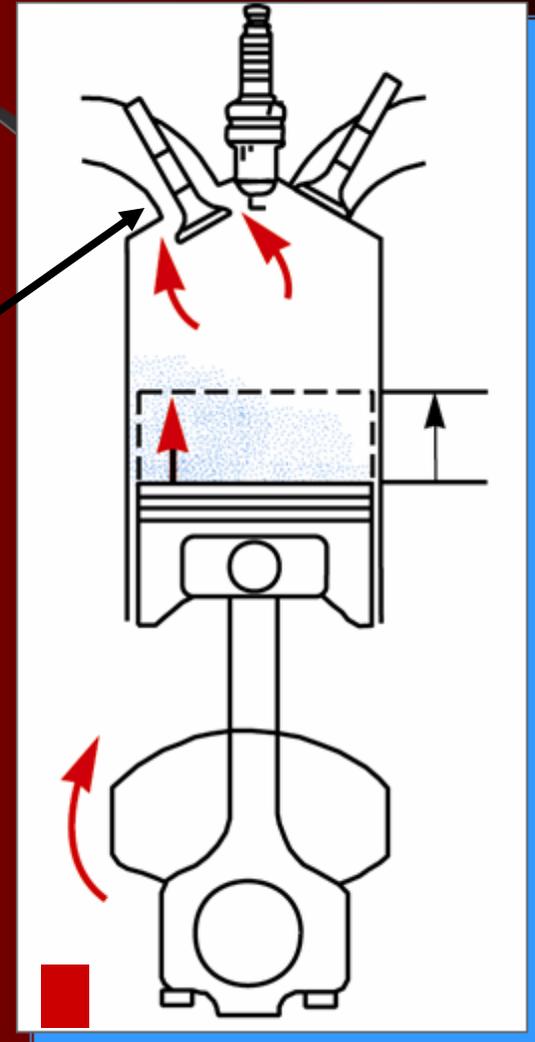
Miller-Cycle Engine

Super-Charger



Miller-Cycle Engine

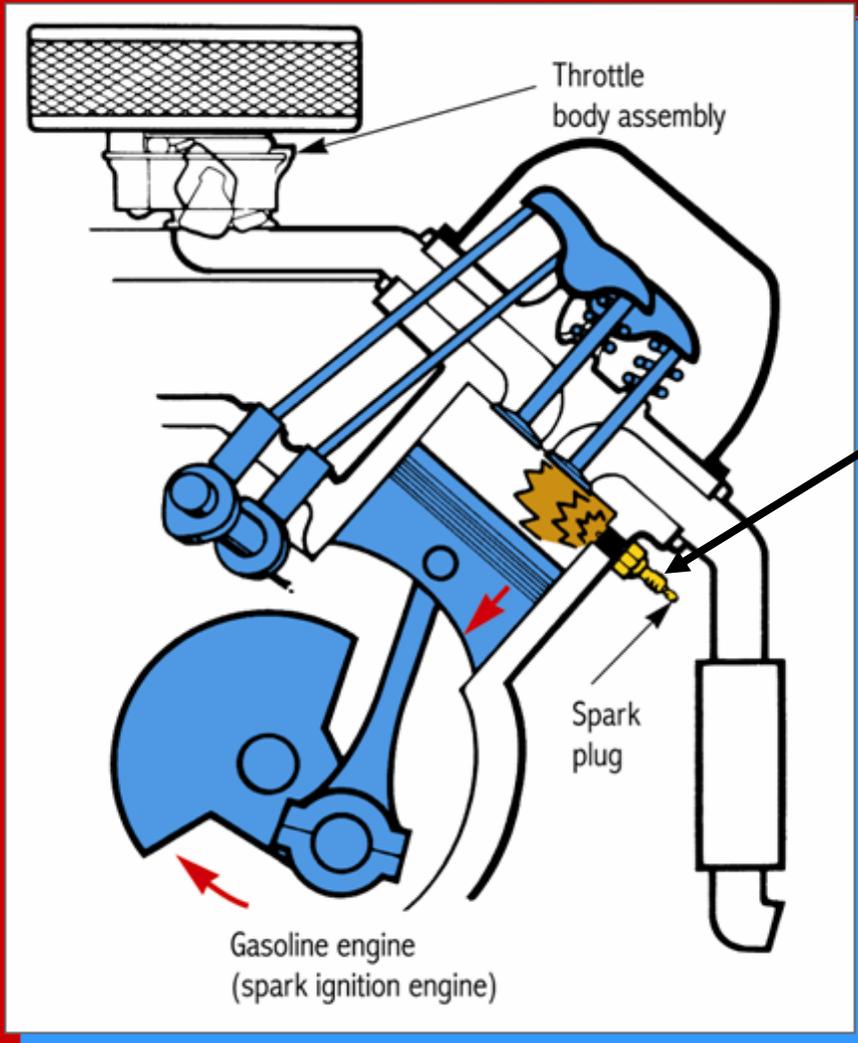
Intake valve remains open as the piston starts up the bore. Supercharger pressurizes the intake to prevent back flow.



Engine Design Classification

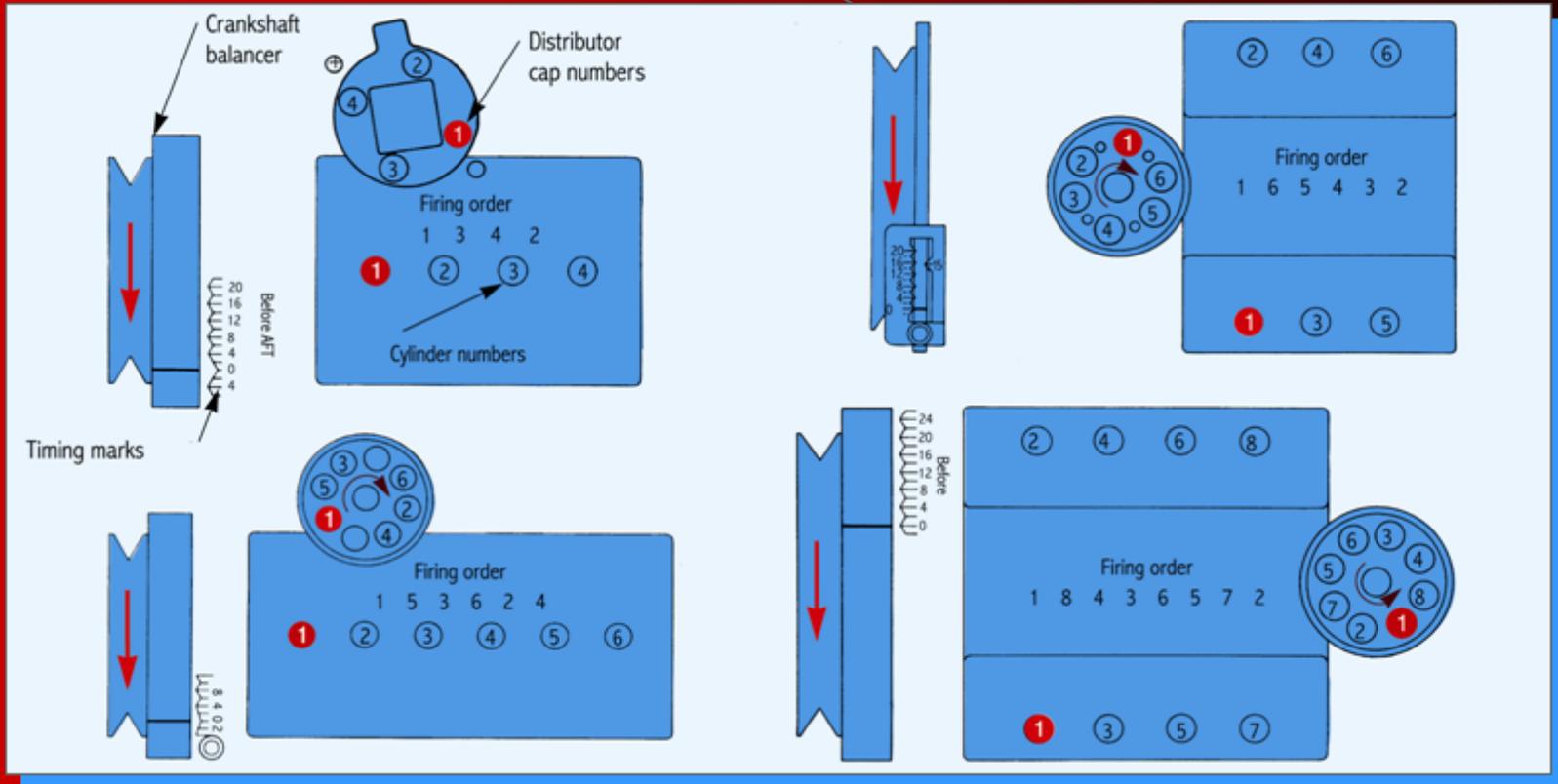
7. A Spark Ignition Engine uses an electric arc at the spark plug to start the fuel burning.
8. The Firing Order is the sequence in which combustion occurs in each engine cylinder.

Spark Ignition Engine



Uses an electric arc at the spark plug to ignite the fuel.

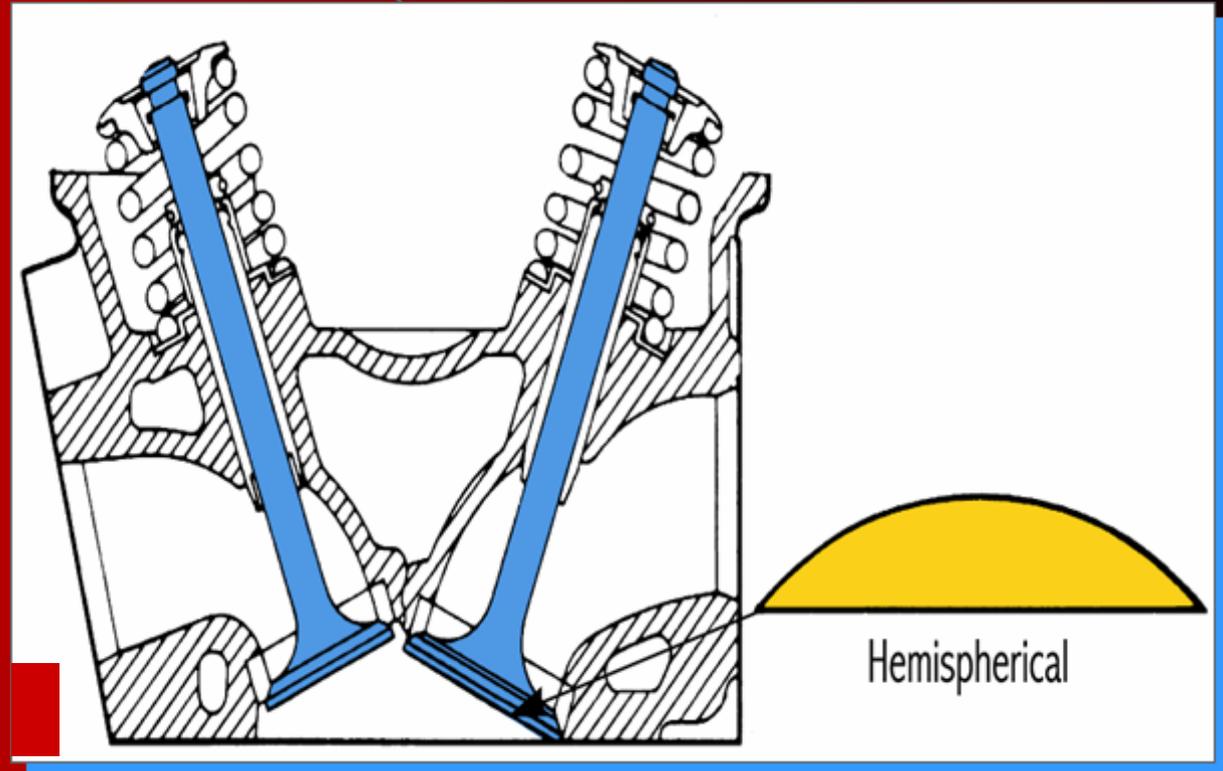
Engine Design Classification



Cylinder Numbering and Firing Order

Engine Design Classification

Hemi-Engine



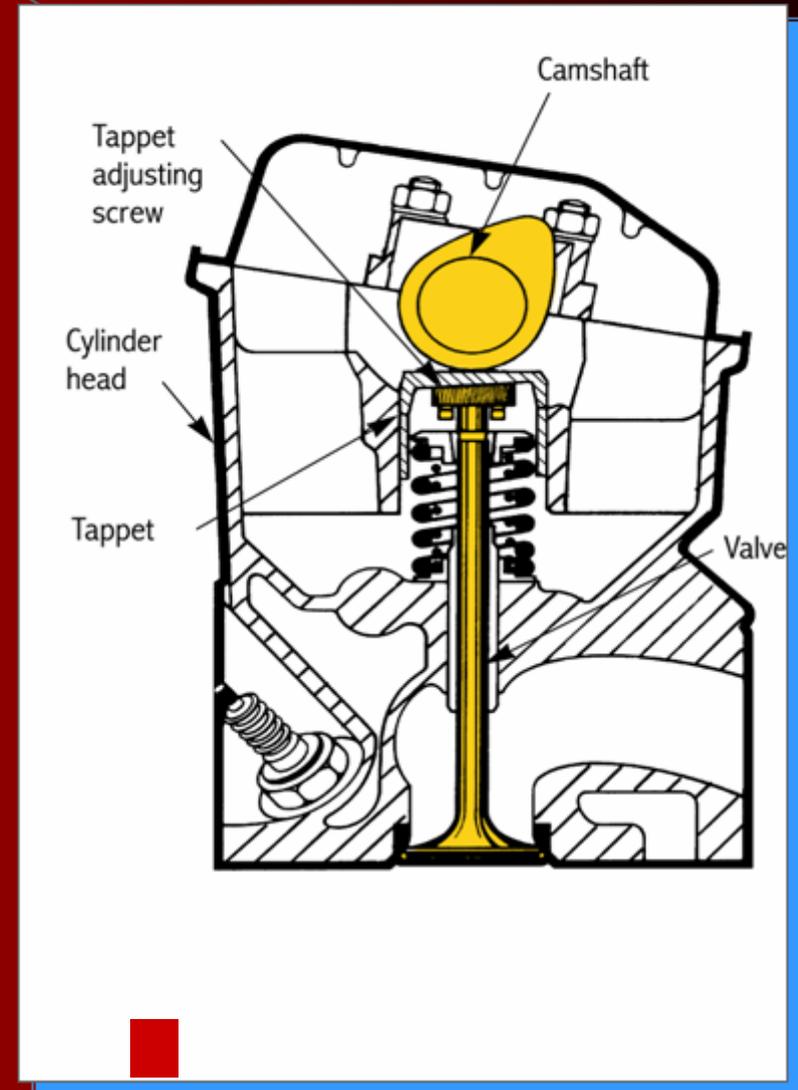
First used in high-horsepower racing engines. Excellent design for high-rpm use.

Engine Design Classification

9. An Overhead Cam Engine is a type of engine that is a refinement of the overhead valve engine.
10. A Wankel Engine uses a triangular rotor instead of conventional pistons.

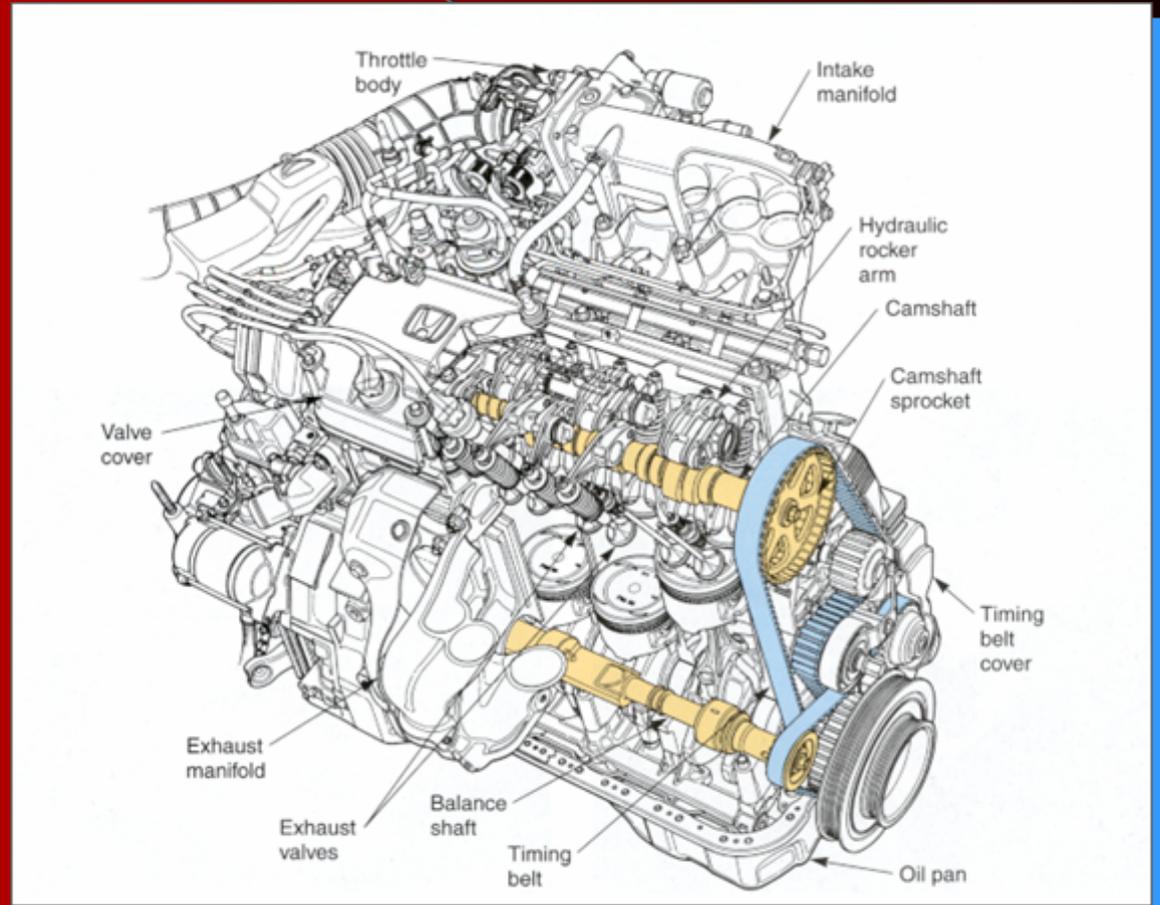
Overhead Camshaft Engine

Camshaft is located in the top of the cylinder head

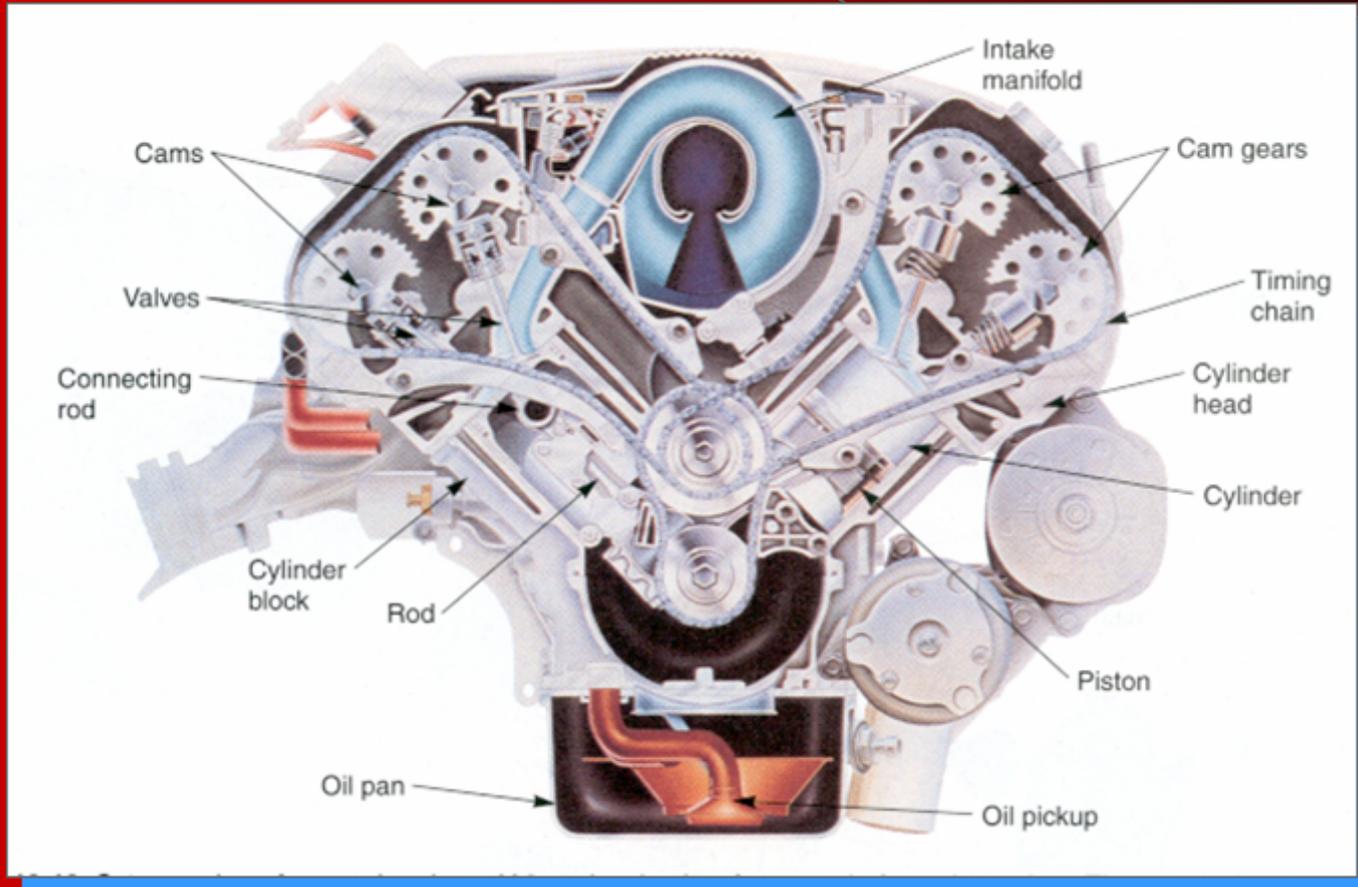


SOHC In-Line Engine

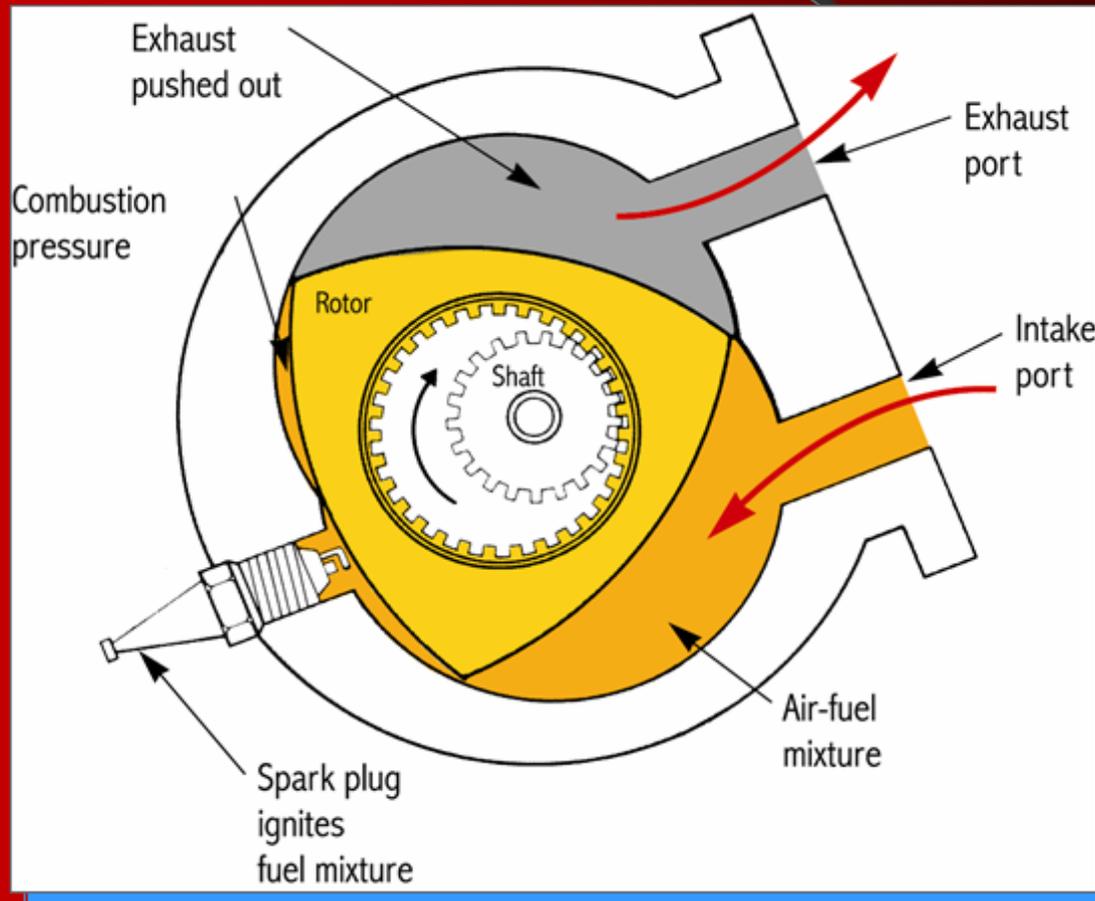
16 valve, four cylinder engine with a belt driven camshaft and balance shaft.



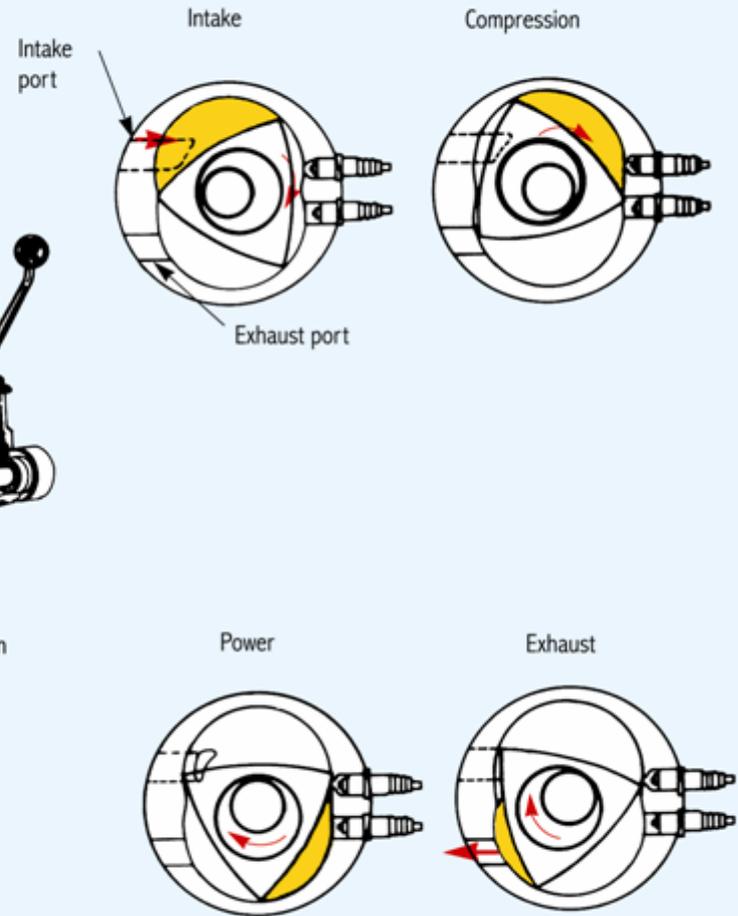
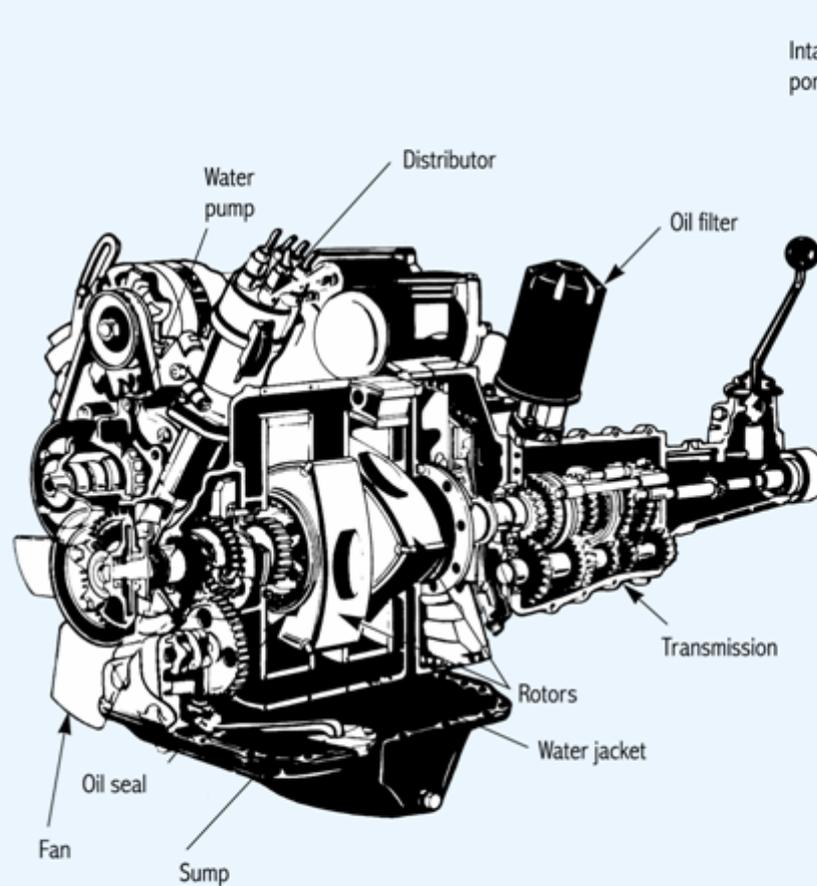
Overhead Camshaft Engine



Wankel (Rotary) Engine



Wankel (Rotary) Engine



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