

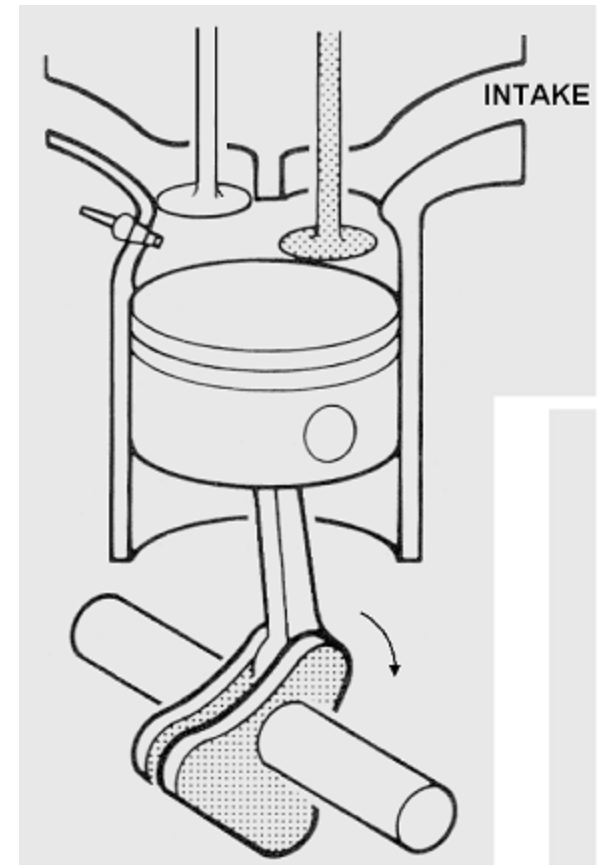
Four stroke cycle theory

Intake stroke

Piston moving down

Intake valve open

Exhaust valve closed



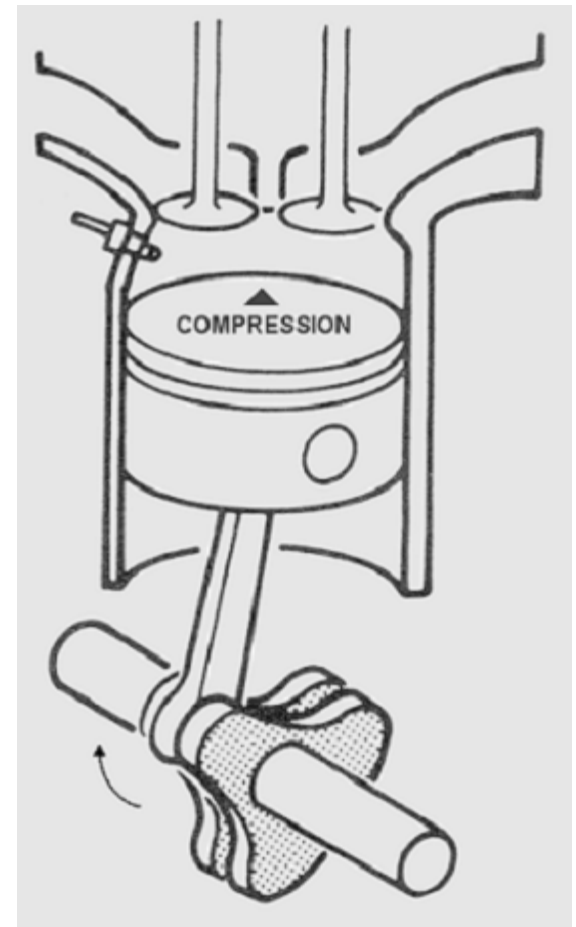
Four stroke cycle theory

Compression stroke

Piston moving up

Intake valve closed

Exhaust valve closed



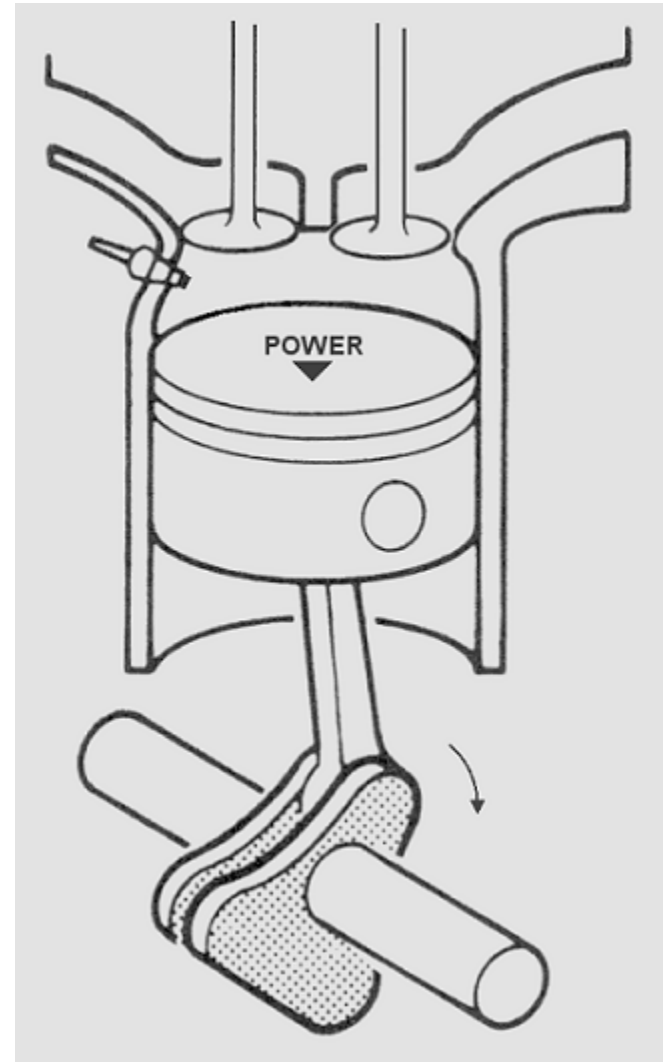
Four stroke cycle theory

Power stroke

Piston moving down

Intake valve closed

Exhaust valve closed



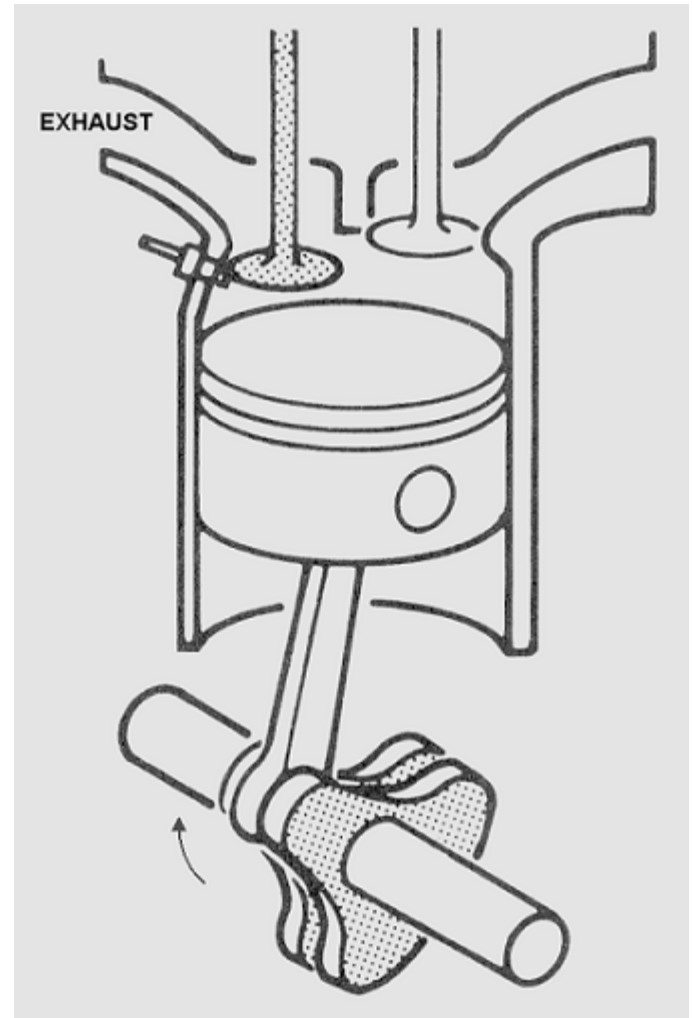
Four stroke cycle theory

Exhaust stroke

Piston moving up

Intake valve closed

Exhaust valve open



Other engine cycles

Overlap

Both valves are open

End of exhaust & start of intake

Low pressure in exhaust port

Blowdown

Exhaust valve opens before BDC

To help evacuate cylinder before piston reverses

Pumping losses at end of exhaust stroke

Valve events

Intake valve opening

BTDC

Low pressure in cylinder

Intake valve closing

ABDC

Cylinder pressure is effected by timing

Exhaust valve opening

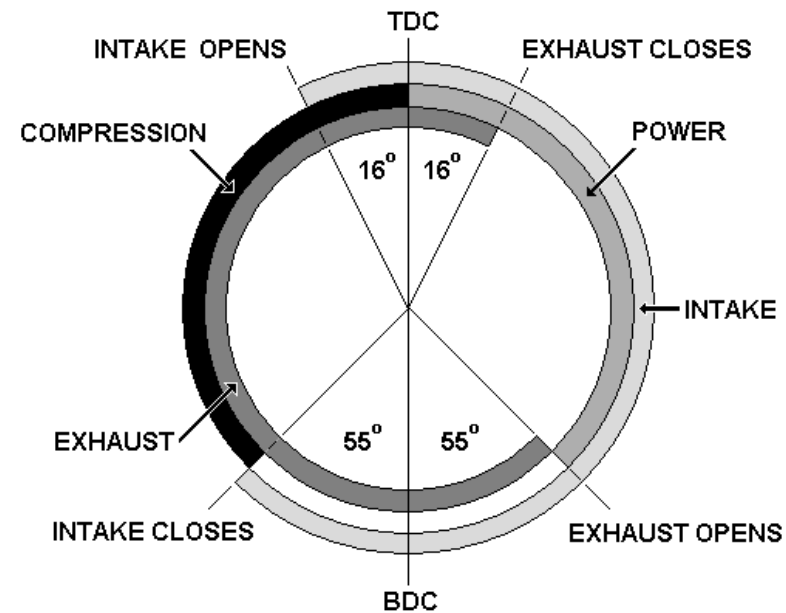
BBDC

Residual pressure helps blowdown

Exhaust valve closing

ATDC

Low pressure in exhaust port draws air in



Effects on valve timing

Intake valve opening

Late – Reduced VE

Early – Dilution of intake with exhaust

Intake valve closing

Late – Reduces cylinder pressure

Early – Increases cylinder pressure

Exhaust valve opening

Late – Pumping losses

Early – Power reduction

Exhaust valve closing

Late – Reduces vacuum

Early – Reduces VE

Four stroke cycle theory

Each stroke takes 180° of crankshaft rotation to complete

All cylinders fire in 720° of crankshaft rotation

720 divided by number of cylinders = firing interval