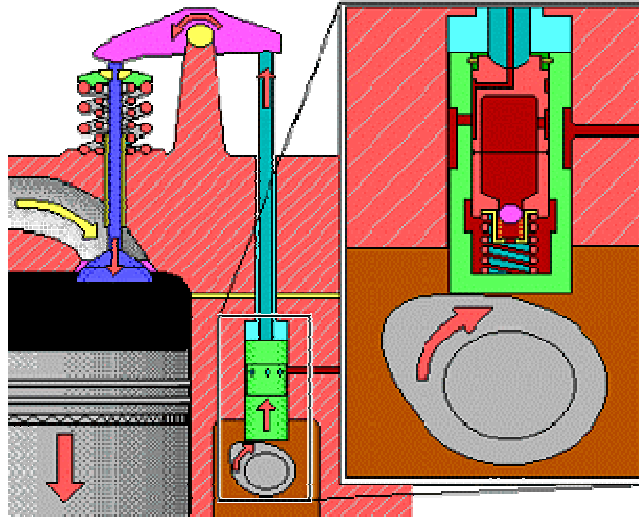


Valve System Operation



Below is information on the valvetrain and camshaft

Valve Lifter (Tappet)

The valve lifter is the unit that makes contact with the valve stem and the camshaft. It rides on the camshaft. When the cam lobes push it upwards, it opens the valve.

The engine oil comes into the lifter body under pressure. It passes through a little opening at the bottom of an inner piston to a cavity underneath the piston. The oil forces the piston upward until it contacts the push rod. When the cam raises the valve lifter, the pressure is placed on the inner piston which tries to push the oil back through the little opening. It can't do this, because the opening is sealed by a small check valve.

When the cam goes upward, the lifter solidifies and lifts the valve. Then, when the cam goes down, the lifter is pushed down by the push rod. It adjusts automatically to remove clearances.

Lifter Body

The valve lifter body houses the valve lifter mechanism. The valve lifter is the unit that makes contact with the valve stem and the camshaft. It rides on the camshaft. When the cam lobes push it upwards, it opens the valve.

Valve Cover

The valve cover covers the valve train. The valve train consists of rocker arms, valve springs, push rods, lifters and cam (in an overhead cam engine). The valve cover can be removed to adjust the valves. Oil is pumped up through the pushrods and dispersed underneath the valve cover, which keeps the rocker arms lubricated. Holes are located in various places in the engine head so that the oil recirculates back down to the oil pan. For this reason, the valve cover must be oil-tight; it is often the source of oil leaks.

The valve cover is often distorted on older cars, because at some point the valve cover screws were over-tightened, bending the valve cover. This happens because the valve cover is made of very thin sheet metal and cannot withstand the force of an over-tightened bolt.

One way to determine if your valve cover is bent is to remove the gasket and put the valve cover back on to the cylinder head. When the valve cover and cylinder head come into contact, the cover should sit flat. If it rocks, it is bent. Cast aluminum valve covers cannot be straightened, they need to be replaced. Sheet metal valve covers can be straightened.

A symptom of a bent or leaking valve cover is a pinching of the valve cover gasket. This means that the gasket is sealing one area and not sealing another area. This condition produces a leak; oil could be leaking down the side of the engine. Some valve covers are hard to access, because they are covered with other engine parts.

Chronic valve cover leakage can sometimes be fixed by using two gaskets glued together instead of using just one.

Valve Ports

Valve ports are openings in the cylinder head. Intake ports let the fuel mixture into the cylinder head, and exhaust ports let the exhaust out.

Valves

The valve's job is to open and close the valve ports. If the ports were always open, the fuel exploded in the combustion chamber would leave through the ports. The explosion has to be kept in the combustion chamber to push the piston down. The valves are set up to open and close at exactly the right moment. One lets the fuel mixture

in and closes. After the fuel explodes and pushes the piston down, the other valve lets the exhaust out.

Valve Guides

The valves are usually held in an upright position by the valve stem. The valve stem is the long straight side of the valve, like the stem of a flower. Holes are bored in the cylinder head for the valve stems. Worn valve guides allow oil to enter the combustion chamber and cause blue smoke in the exhaust.

Valve Springs

The valve springs keep the valves closed tightly against their seats until the valve is opened by the cam. After the cam turns (releasing pressure), the valve springs close the valves.

Valve Seals

The valve seal is a unit that goes over the end of the valve stem. It keeps excess oil from getting between the valve guide and the valve stem.

Camshaft

The camshaft is a round shaft with "lobes" (specially formed bumps) which is driven by the timing belt or timing chain. It, directly or through "lifters" and "pushrods" opens and closes the fuel and exhaust valves. The camshaft turns at one-half of the crankshaft speed. It is supported by bearings located in the front and rear of the crankcase.

Rocker arms

Rocker arms are used to transmit force from cam to valve. Riding on a cam on the camshaft, rocker arms direct the upward motion of the lobe of the cam into an opening motion of the valve stem.

Push Rods

Push Rods attach the valve lifter to the rocker arm. Through their centers, oil is pumped to lubricate the valves and rocker arms.