How Hydraulic Valve Lifters Work

The Purpose of Hydraulic Valve Lifters

Most engines have hydraulic valve lifters in one form or another. The most common type of engine that has them is your vehicle's engine. They were created to get rid of the need for combustion engines to have mechanical clearance in the engine's valve train. The reason that clearance is required is to keep the valve from being held open and thus destroyed as the valve train goes through its process of thermal expansion. So, in effect, hydraulic valve lifters keep the valve healthy and protected from an engine's normal thermal expansion process.

How Hydraulic Valve Lifters Actually Work

A hydraulic valve lifter has four distinct parts, the check ball mechanism, body, socket and plunger. The plunger and socket move along with the push rod, and the body moves in conjunction with the cam. Riding in between the plunger and the socket is a spring and an oil cushion. The hydraulic valve lifter is pressurized by the oil gallery right at the start of motion in the engine. The pressure from the oil is only just enough to remove whatever clearance there is in the valve train, but not enough to actually open the hydraulic valve itself. The cam pushes on the hydraulic valve lifter's body in order to actually open the valve. The spring holds the check ball in its place, and the hydraulic valve lifter's motion opens the check ball cavity. leaving the check ball behind, but only for a second or so. Then, the cam pushes the hydraulic valve lifter body forward, and the push rod holds the plunger in place while the check ball cavity gets smaller. The check ball is held in place by the support spring, and oil pressure in the cavity forces the check ball to move forward, and that closes the check ball cavity. This traps oil in the check ball cavity and makes the plunger assembly move with the hydraulic valve lifter body, and then that moves the push rod and opens the hydraulic valve. The oil pressure inside the check ball cavity prevents the spring inside from compressing further. The cam then finishes its rotation, and the spring makes the hydraulic valve lifter body go back to the rest position on the base circle of the cam. The check ball isn't under a lot of pressure then and is ready to be shoved into the spring by the oil pressure, which lets in oil into the check ball cavity and starts the whole cycle again.

What Happens When Hydraulic Valve Lifters Aren't Working

Generally speaking, when hydraulic valve lifters aren't working properly, you may hear a knocking noise when you start the engine. If this happens every time you start the engine, then it can mean that the oil in the engine is too heavy for the current temperatures, or that there is too much varnish in the lifter. Another indication that the hydraulic valve lifters aren't working is intermittent knocking, which can be caused by leakage at the check ball seat, which can be due to varnish or just particles getting in there that don't belong there.