

Single oil-relief valve (arrow) system schematic.

OIL-CONTROL VALVES

Air-cooled VWs have valves that regulate oil pressure, routing and supply. Up to 1970, one valve was used, after that two were fitted. Understanding the operation of these valves is important in diagnosing and servicing the oil system.

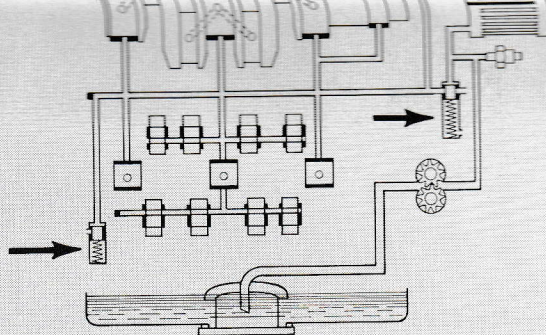
The first valve is the *oil-pressure-relief valve*. It is located at the oil-pump end of the left case half and controls passages leading from the oil pump to the oil cooler, oil gallery and sump return.

When the engine is cold and the oil thick, oil pressure is high. Such high pressure can rupture the oil cooler, and when oil is cold, no cooling is desired. Therefore, the relief-valve spring is designed to yield under excess oil pressure; it releases some oil through the sump return and lets the rest lubricate the engine via the oil gallery. The cooler is completely bypassed when the valve is fully open.

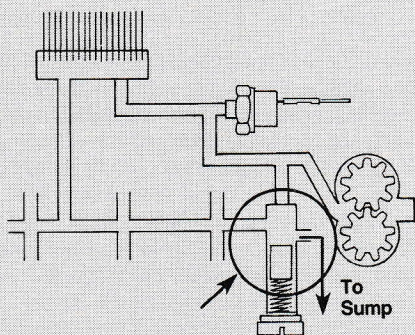
As oil temperature rises, oil pressure drops. The valve begins to close from its spring tension. The first passage closed is the sump return. Now all oil must pass through the oil gallery to the bearings, or through the cooler to the bearings. Most oil passes through the gallery because it's a less restrictive path than the cooler. If the oil continues to heat, the relief valve closes farther. Now it must flow through the cooler on its way to the bearings.

What isn't controlled with this design is ultimate oil pressure when the oil is warm. With cold oil, the relief valve lowers pressure by venting the excess through the sump return. But when the oil is hot, the only path is through the gallery or cooler. At high engine speeds too much oil is supplied by the pump. This causes increased oil consumption due to overloaded piston rings, horsepower losses to the pump, unnecessary oil heating and bearing wear.

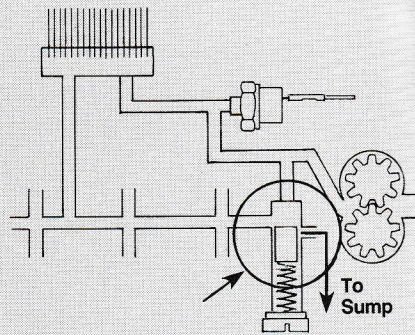
These problems were eliminated with the addition of the *oil-pressure-control valve* in '70. The valve is located at the flywheel-end of the left case half—at the far end of the oil



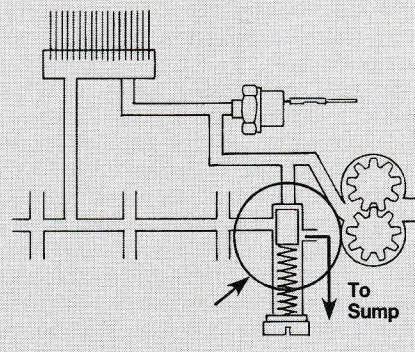
Dual oil-relief valve system schematic. Pressure-relief valve is at right, pressure-control valve at left.



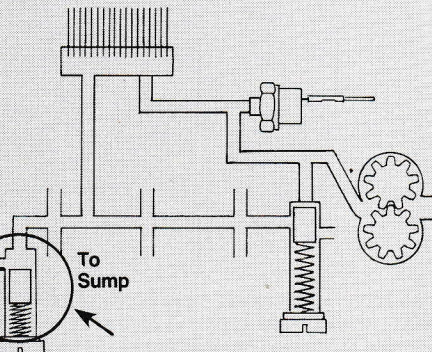
High pressure from cold, thick oil forces relief valve fully open, bypassing oil cooler.



As oil warms, relief valve partially closes. Some oil flows through cooler, some directly to bearings through main oil gallery.



Hot, thin oil lets relief valve close completely. All oil must pass through cooler before reaching main oil gallery.



Dual oil-relief valve system functions at high engine speeds with hot oil. Oil-control valve at left opens to vent oil to sump at pressures above 42 psi.

gallery. Thus, when pressure rises too high, the control valve opens and vents the excess to the sump.

Spring pressures are set for 42 psi operation when using 30W oil at 158F (70C) at 2,500 rpm. A wear limit of 28 psi is specified, but you have to hook up a gage at the oil-pressure sending unit hole to accurately read it. The sending unit is calibrated to warn you of oil pressure at 2.1—6.4 psi (0.15—0.45

kg/cm sq.), so when its warning light comes on, it's all over but the check writing.

During rebuilding, check the relief- and control-valve spring specifications. Checking tension is not the easiest job as the loads are so light. Read the valve spring section on page 112 for tips on checking springs. Don't swap the springs or use sealing compound on the threaded valve covers. They are tight enough as is.