

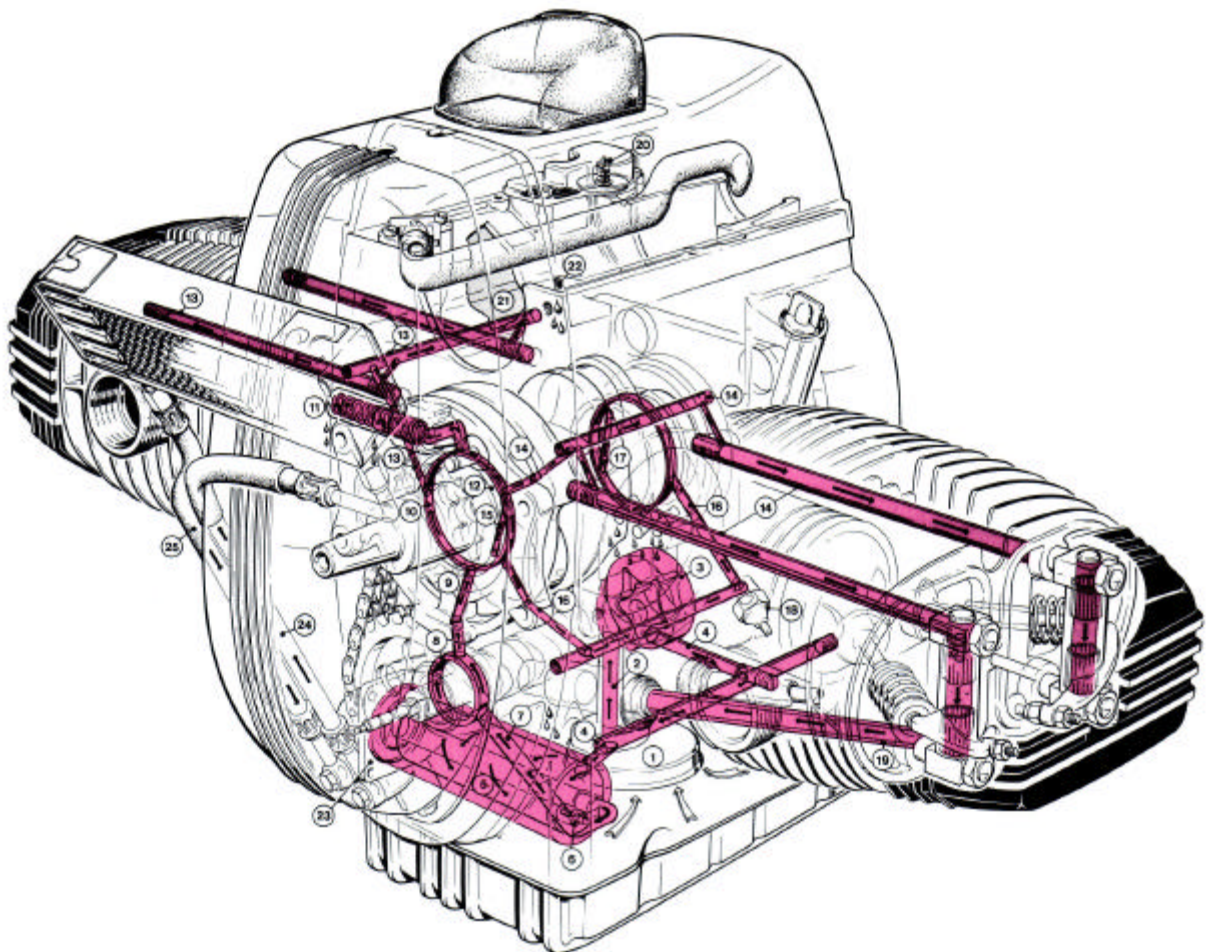
BMW Engine Lubrication: Key to Reliability

Vital to the legendary durability of the BMW motorcycle powerplant is its extraordinary lubrication system. Bearing surfaces are bathed in a continuously recirculating oil supply, which also helps to cool them. At 60 mph, today's BMW R100RT in top gear is turning about 3400 rpm. Its oil pump is delivering freshly filtered oil to the bearings at a rate of about 212 gallons per hour. Which means the entire oil supply of the engine is recirculated about six times every minute, once every ten seconds, or once every 880 ft. of highway travelled.

That's a lot of lubrication, especially when you consider the circuitous path oil must travel. The diagram at right outlines the basic system. Oil is drawn in from the

sump through a pick-up screen (1), pumped by the Eaton-type trochoidal oil pump (3) to the full-flow oil filter chamber (5), and then to the camshaft front bearing (8). In case the oil filter is clogged, a bypass valve (6) guarantees that engine components will nevertheless get a continuous oil supply.

From the front camshaft bearing, the oil goes directly to an oil distribution gallery in the front mainbearing cap (10). Two sets of channels (13, 14) carry oil from this point to hollow cylindersecuring bolts and thus to the rocker arm pivots and valve stems. After lubricating the valve gear, this oil drains through the pushrod tubes to the cam followers, cam lobes, and then back to the crankcase and pump.



There are three other oil takeoffs at the front mainbearing cap. One applies oil pressure to a spring-loaded pressure relief valve (11) which limits oil pressure to a maximum of 74 psi at high rpm. Another feeds the oil-pressure pickup sensor (18) and then the rear mainbearing. The third is a drilled oil gallery (15) in the crankshaft itself which feeds the lower-end bearing of the left connecting rod. A similar gallery (17) from the rear main bearing feeds the right lower-end bearing.

The cylinder walls and wristpin (upper-end) bearings are lubricated generously by splash oil from the rotating crankshaft; the rear camshaft bearing is lubricated by seepage from the oil pump mounted at the rear of the camshaft. On those models equipped with an oil cooler, a thermostatically controlled pickup (23) in a special oil-filter cap bleeds off a certain amount of oil under pressure for circulation through the oil filter. The higher the temperature, the more oil gets routed through this heat radiator located directly in the airstream.

Oil that has been vaporized by the activity and heat of engine operation rises to a special condensation chamber and breather valve (20) at the top of the crankcase. Oil condensed here flows back through a drain (22) into the crankcase.

Although seemingly intricate, the BMW pressurized oil system is both positive and simple in comparison to most other systems. More important, it is precise. Each oil gallery is dimensionally engineered for the correct flow and pressure throughout the system. Galleries are precision drilled in castings, forgings and other components. If a rider were to replace the minimum-pressure warning sensor with an oil pressure gauge, he would find pressure measuring 14.5 to 29 psi at 800-1000 rpm (idle) and measuring 60-74 psi at 4000 rpm and up. Tolerances are set within wide margins because the BMW engine delivers *so much* life preserving oil.

Even the best lubrication system cannot function well if the proper lubricants are not used. Riders are especially warned against the prolonged use of oils that have seen much stop-start riding. Such oils accumulate water, acids, particulate matter and other wastes that can significantly reduce their bearing strength. Change oil frequently if stop-start, short-run riding is your predominant mode. And *be sure* to change if you're about to set out on a long, high-speed run.

After break-in, the same oil selection is recommended for all BMW motorcycle engines since 1949. Use only major-brand mineral-based four-cycle oil of no less than SE rating. If you know you will be travelling almost exclusively at high speeds in temperatures above 65°F, use SAE 40. For mixed general riding at temperatures above freezing (32°F), use SAE 20W50 multigrade. For riding when temperatures are likely to dip below freezing, use SAE 10W50 or SAE 10W40. For riding in extreme cold, use an SAE 10W30 multigrade.

With proper maintenance, including the right lubricants and oil-change frequency, your BMW engine will power for longer than most motorcycle engines and even conservatively tuned auto engines. Many engineering considerations go into that longevity, but a highly-advanced fully-filtered, pressurized lubrication system is one of the most important.