2006 Corvette Z06: Dry Sump Oiling System

The Corvette Z06's LS7 engine (fig. 1) has a dry sump oiling system designed to keep the engine fully lubricated during the high cornering loads the Corvette Z06 is capable of producing. Ths LS7's dry sump system was developed and tested on racetracks in the U.S. and Europe, including Germany's famed Nürburgring. And while dry sump oiling is common in racing cars, the Corvette Z06 is one of just a handful of production vehicles -- and the only production Corvette -- to incorporate such a high-performance oiling system.

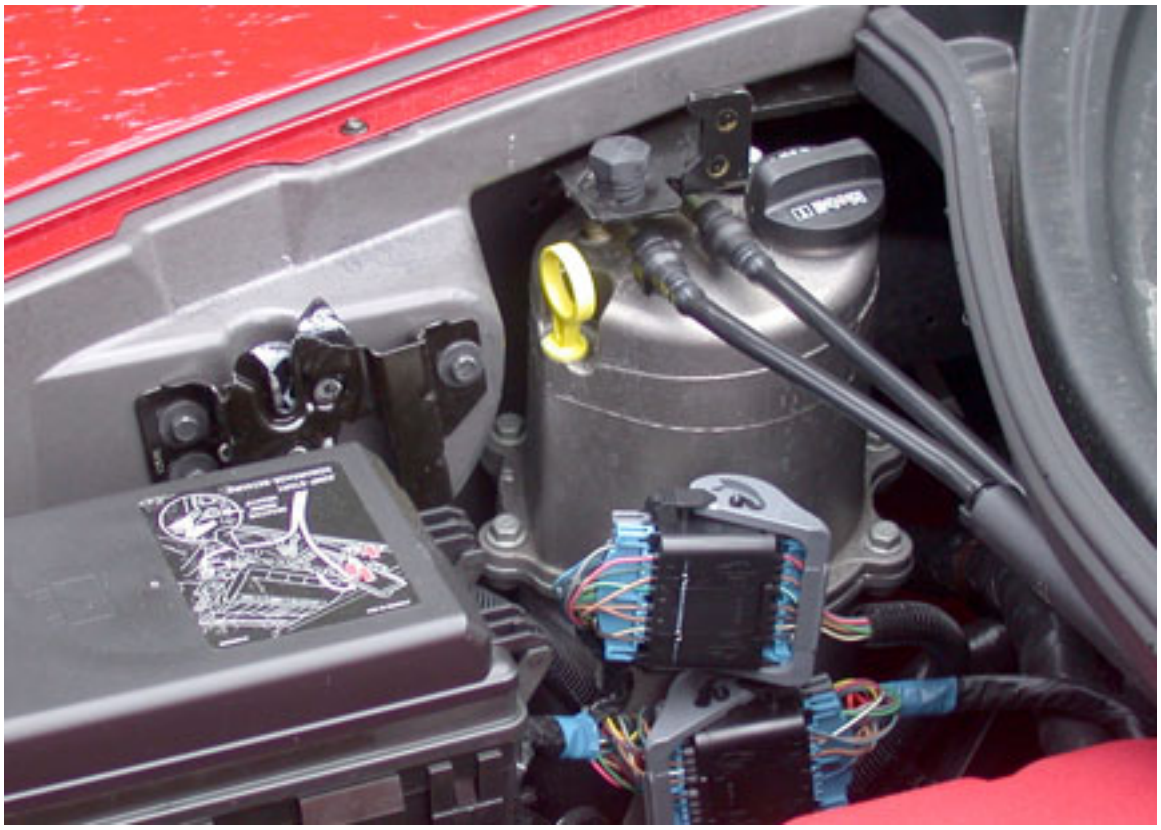
What is a Dry Sump Oiling System?

Most automotive engines use a wet sump sytem, in which all of the engine oil is stored inside the crankcase in the oil pan. In a dry sump oiling system (fig.2) , engine oil is stored in a reservoir external to the engine, so the crankcase contains only a minimal amount of oil at all times.

What are the Advantages of a Dry Sump System?

In an engine with a conventional wet sump oil pan, the oil can slosh away from the oil pump pickup tube during high dynamic maneuvers like cornering, braking and accelerating. This starves the engine of oil, causing bearing damage or catastrophic engine failure.

The dry sump system stores engine oil in a tall and narrow oil reservoir (fig. 3) . This shape prevents oil from sloshing away from, or uncovering, the oil pickup, even under extremely high dynamic maneuvers. The dry sump system enables increases to the dynamic capabilities of the vehicle, which is why racing cars and exotic sports cars use this type of oil system.



Additionally, oil aeration is lower in a dry sump system, because the oil spends less time in the presence of the crankcase windage. Oil delivered to the bearings is typically superior to that of a wet sump system.

Finally, without the need for a conventional sump, the engine can be placed lower in the vehicle, effectively lowering the center of gravity of the vehicle.

How Does a Dry Sump System Work?

In the LS7 engine, two oil pump sets (scavenge pump and supply pump) are located in the same housing on the nose of the crankshaft. The location is common with the oil pump in other small block engines.

The scavenge pump removes engine oil and air from the sump and pumps both to an external reservoir for conditioning and storage (fig. 4) .

The oil is directed to the top of the reservoir, where it is allowed to spill onto a spiral-shaped baffle. Crankcase gases and air are separated from the oil and are returned by the PCV system to the engine, where they are burned. The deaerated and conditioned oil collects in the bottom of the reservoir, ready for use.

The supply pump (fig. 5) draws the conditioned oil from the reservoir,

pressurizes it, and feeds it to the engine by way of the oil filter and oil cooler. After the oil passes through the engine, it again flows into the sump to be returned by the scavenge pump to the reservoir once again.

Checking the Oil Level

The engine must be warmed up. Cold oil will not give a correct oil level reading.

After the engine is warmed up to at least 175°F (80°C), shut off the engine. Checking the oil with the engine running will result in an incorrect reading.

Wait for 5 minutes (but not more than 20 minutes), to allow the oil to drain and settle.

Pull the dipstick with the yellow handle (fig. 6) from the reservoir, and clean it with a lint-free cloth. Then push it back in all the way until it stops. Remove it again, keeping the tip down, and note the oil level on the crosshatched area.

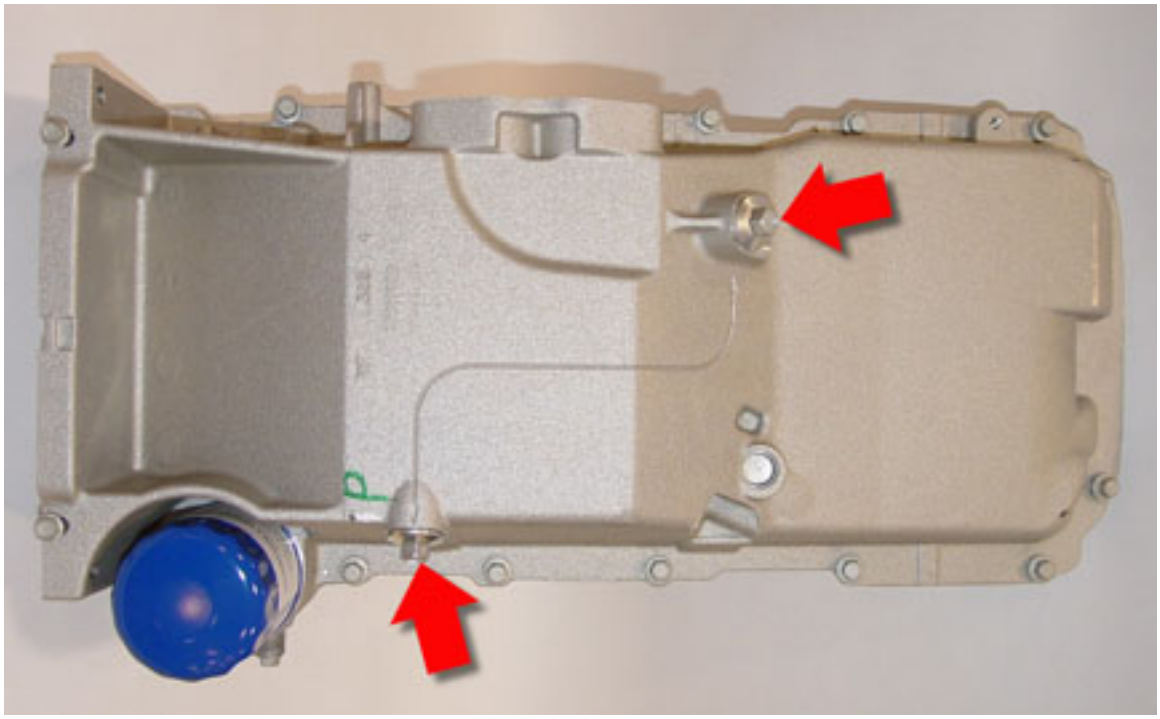
An oil level within the crosshatched area is normal. If the level is below the crosshatched area, add 1 quart (0.96 L) of 5W30 Mobil 1 synthetic oil through the black oil reservoir fill cap (fig. 6) and take another reading.

TIP: Do not overfill the reservoir, as this may result in excessive oil consumption. Oil levels above the crosshatched area may degrade lubrication

system performance.

Oil Change Procedure

Remove the two drain plugs from the engine oil pan (fig. 7) . One is located on the left side of the oil pan near the oil filter. This plug drains the small amount of residual oil from the engine oil pan, approximately 1 quart (0.96 L). The other drain plug is located on the front of the oil pan. This plug drains the external reservoir and hose assembly. Also remove the engine oil filter.



Once the oil has been drained from the engine and reservoir, replace the engine oil filter with a new PF48 oil filter and tighten to 25 Nm (18 lb ft).

Replace both oil drain plugs and tighten to 25 Nm (18 lb ft).

Fill the oil through the oil fill cap in the top of the dry sump reservoir. The total service fill, with a dry filter, is 8 quarts (7.57 L) of 5W30 Mobil 1 synthetic engine oil.

Replace the oil fill cap and start the engine. Let it run at idle for at least 15 seconds to circulate the fresh engine oil through the lubrication system. (This is similar to running an engine after a radiator fill, to purge air from the system.)

Check the oil level according to the instructions above. The oil change is now complete.

TIP: The owner's manual may contain a slightly different procedure, which calls for filling 7 quarts, running the engine then shutting off, and finally filling 1 additional quart. This procedure may be used, although it is not necessary.

TIP: There is a cap on the right valve cover under the decorative cover. Attempting to remove this cap can break the retaining tabs, requiring removal of the valve cover to retrieve broken pieces. Under no circumstances should you attempt to fill the engine oil system through this cap.

- Thanks to Dan Hommes and Ron Minoletti, GM Techlink, August, 2005