

GM'S ACTIVE FUEL MANAGEMENT Camshaft and Valve Lifter Failures

GM's Active Fuel Management (AFM) system allows a V8 engine to turn off half of its cylinders for fuel economy purposes. In doing so the V8 engines RPO: L76, L77, L83, L86, L94, L99, LC9, LFA, LH6, LMG, LS4, LT1, LT4, LY5 and LV3 are developing a history of camshafts and valve lifters being turned into scrap metal.

The symptoms of a cam or lifter failure usually involve a chirping, ticking, squealing or squeaking sound accompanied by a Check Engine light and engine misfire codes stored in memory. The misfire condition may not be evident to the vehicle operator. The symptoms may be the result of a valve lifter or camshaft failure, or both. Pinpointing the source of the noise can be a challenge and the repairs can be costly. Do not confuse the noises with normal engine sounds associated with Gasoline Direct Injection Systems as they produce clicking noises from the injector pulses and the high pressure fuel pump. The symptoms are most audible near a structure such as a building or wall. The system operates under high fuel pressure and those sounds are a normal characteristic.

VALVETRAIN FAILURES

Camshaft and lifter failures have become common with the AFM system. The symptoms usually start with chirping and squeaking noises and then progress to misfire conditions. The noises may occur intermittently or consistently. The noises are usually pronounced at off-idle RPMs and occur at camshaft speed, which is half of crankshaft speed. When these symptoms occur, it is usually the result of one or more of the following:

- 1) Worn camshaft lobe
- 2) Collapsed or stuck AFM lifter
- 3) Broken valve spring
- 4) Sticking valve

5) AFM lifter locking pin damage/failure due to oil aeration

6) Damaged lifter guides allowing valve lifter roller misalignment with a camshaft lobe (Fig 1)

7) Valve leakage

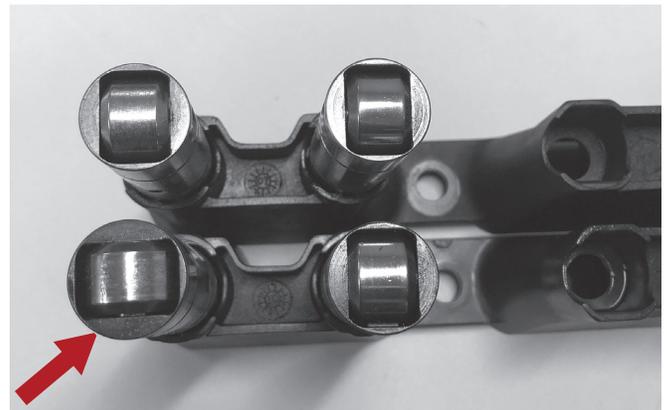


FIG 1: Worn Lifter Guide/Misaligned Roller

A lifter stuck in the compressed position may be the result of cylinder activation during the improper position of the camshaft lobe. Activation should occur when the lifter is at the base of the camshaft lobe and not on the ramp or lobe peak. If the AFM lifter unlocks as soon as the engine is started, low compression will result on that cylinder and a misfire code will be stored. Collapsed or stuck AFM lifters due to oil contamination will result in the same. Contamination/sludge is a major concern, prompting some to re-evaluate mileage service intervals.

VALVE LIFTER OIL MANIFOLD

Located beneath the intake manifold is a Valve Lifter Oil Manifold (VLOM), which contains four electrically operated solenoids, controlled by the PCM (Fig 2). When commanded, these solenoids allow oil to flow to the AFM lifters, thereby

releasing internal locking pins, deactivating the AFM lifters and canceling those cylinders. At this point the engine is operating on four cylinders. When the oil flow is blocked by the solenoids, the

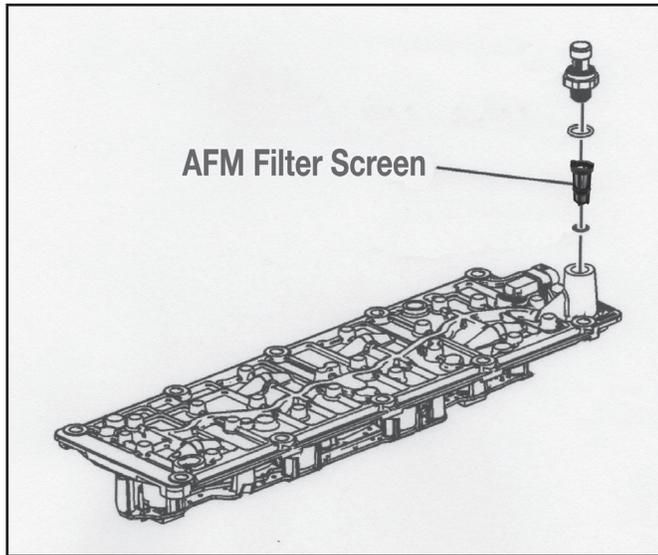


FIG 2: Valve Lifter Oil Manifold

lifter locking pins engage, returning the lifters to normal operation and the cylinders return to their normal function, bringing the four cylinders back online, promoting the full eight cylinder mode. This arrangement utilizes controlled oil pressure via the VLOM to hydraulically modulate the AFM lifter function.

To help control contaminants within the AFM system, a small filter screen is located in the VLOM beneath the oil pressure sensor (see Fig 2). A restriction in the screen can affect AFM operation and give a false indication of actual engine oil pressure.

The incorrect oil viscosity, contaminated oil and oil with depleted anti-foaming agents promoting aeration, can affect AFM system activation.

VISUAL INSPECTION

Should diagnostic procedures fail to identify the source of the noise or reason for the misfire codes, a visual inspection of the camshaft and lifters may be necessary. When making the inspection, it is not uncommon to identify a worn camshaft lobe (Fig 3), stuck or damaged AFM lifters. Look for the following:

- 1) Lifter rollers that are pitted or gouged with a crater like appearance.
- 2) Flat spots on a lifter roller due to lifter guide wear/damage, which allows the lifter to turn in the guide promoting misalignment with the camshaft lobe. Replace any lifter guide that encounters worn or damaged lifters or camshaft lobes.
- 3) Wear on the camshaft lobes may require removal of the camshaft for a thorough visual inspection.

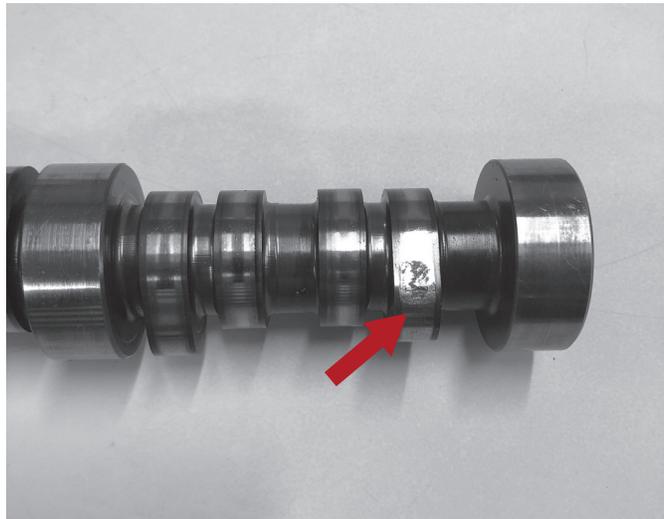


FIG 3: Camshaft Lobe Wear

This system relies on engine oil pressure to control the valve lifter function on those cylinders that modulate. The viscosity and cleanliness of the oil is a major concern. The incorrect viscosity or contaminated oil can affect the performance of the AFM system. This is becoming a major concern especially considering extended mileage service intervals and the presence of deposit formations.

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