Misfire Detection Monitor

The engine uses a Hall effect crankshaft position (CKP) sensor that processes the edges of a stamped target wheel mounted on the crankshaft. The software gets an edge every set number of degrees and these edges are used for fuel injection timing, fuel quantity control and the calculation of engine speed. A software algorithm corrects for irregularities of the teeth of the target wheel to improve crankshaft signal resolution. A second Hall effect sensor processes the edges of the lobed camshaft target. The camshaft position signal and the window of missing teeth on the crankshaft target wheel indicate correct camshaft to crankshaft position for correct cylinder timing.

The misfire monitor divides two rotations of the crankshaft into a number of segments corresponding to the number of cylinders in the engine. The time for each segment is calculated. The time to complete each segment is compared by the software. If the time to complete one or more segments are sufficiently longer than the others (after correction for irregularities for the target wheel have been applied) then the software infers that a misfire event may have occurred for the relevant cylinder or cylinders. If the number of misfires detected in 1000 engine revolutions exceeds a threshold (roughly 4.5% of potential firing events) for four consecutive 1000 revolution intervals then a misfire concern is reported. The misfire monitor operates at all engine speeds from low idle and higher and all engine loads from the idle load at the current engine speed through full load. All programs have a small regulatory carve out at high engine speed and loads just above idle. The 3.0L further restrict the monitor to engine speeds and loads that do not exceed 75% of the maximum for the engine. Certain engine operating parameters are monitored to ensure misfire operates in a region that yields accurate misfire results.