



MISFIRE DETECTION

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One of the most important diagnostic changes to come out of On-Board Diagnostics Generation II (OBDII) is that of **Misfire Detection**. The Misfire Monitor is one of several tasks that the PCM conducts on a regular basis. The general purpose of this monitoring system is to catch any irregularity in vehicles Emission System operation and alert the driver via the Check Engine Light to the possibility that his or her car is polluting. The standard that is set by the Federal EPA is that of 1 and ½ times the Federal Test Procedure, (FTP) which is the standard that determines a given vehicles maximum emission output level.

Cylinder misfire is calculated by the PCM through the Crankshaft Sensor input. Crankshaft rotational velocity is affected during each power stroke of the engine. When misfire occurs the crankshaft actually slows down and this change in RPM is sensed by the PCM, which also uses the Camshaft sensor for cylinder identification. Through these inputs the computer can then determine exactly which cylinder is the culprit, set a corresponding code and turn the Check Engine Light on to alert the driver. During diagnosis the technician may find a code P0300, Multiple Cylinder Misfire or specific codes for each cylinder, for example P0304, Misfire Cylinder #4 or P0306 for #6, etc.

The extent of the misfire or overall misfire events during a preprogrammed number of revolutions is what the PCM uses to determine whether the misfire is only effecting emissions or could possibly be damaging the converter. Emission threatening misfires are detected within 1000 – 4000 revolutions however; catalyst damaging events are detected in a much tighter window, 200 – 1000 revolutions.

When a cylinder misfires, the air/fuel mixture in that cylinder either burns incompletely or not at all. On the exhaust stroke this unburned or partially burned mixture flows downstream towards the converter. The initial effect may be a cooling of the catalyst by the raw fuel. If this cooling drops the temperature below the light-off temp of 400°C the converter becomes inefficient at reducing emissions.

The more devastating problem occurs when this mixture is ignited in the converter. This will cause temperatures to rise, which in turn creates a scenario that will permanently damage the catalyst. Even though the PCM is programmed to detect misfire, set a code and enable the Check Engine Light, the possibility of catalyst damage from an extended misfiring of one or more cylinders caused the EPA to mandate that every manufacturer “Flash” the Check Engine Light when a misfire occurs that could be “Catalyst Damaging”. The extent of this damage could be complete catalyst failure due to meltdown. The purpose here of course, is to alert the driver that they need to get the vehicle to an authorized repair facility...ASAP!

Cleaning up the environment...one converter at a time

Gary