threshold is exceeded and the catalyst temperature model calculates a catalyst mid-bed temperature that exceeds the catalyst damage threshold, the MIL blinks at a 1 Hz rate while the misfire is present. If the threshold is again exceeded on a subsequent driving cycle, the MIL is illuminated.

At high engine speed and load operating conditions the monitor continuously evaluates the misfire rate during each 200 revolution period. If a calibrated number of misfire events have been accumulated within a 200 revolution block such that the misfire threshold is already exceeded before the end of the block has been reached, the monitor will declare a fault immediately rather than wait for the end of the block. This improves the capability of the monitor to prevent damage to the catalyst.

If a single cylinder is determined to be consistently misfiring in excess of the catalyst damage criteria, the monitor will initiate failure mode effects management (FMEM) to prevent catalyst damage. The fuel injector to that cylinder is disabled for a calibrated period of time, typically 30 to 60 seconds. Up to 2 cylinders may be disabled at the same time on 6, 8 and 10 cylinder engines and 1 cylinder on 3 and 4 cylinder engines. The fuel control will go open loop and target lambda as slightly lean. The software may also use the throttle to limit the airflow (limit boost) on GTDI engines for additional exhaust component protection. After the calibrated period of time, typically 30 seconds, the injector is enabled and the system returns to normal operation. On some vehicles, the software may continue FMEM beyond 30 seconds if the engine is operating at high speed or load at the end of the 30 second period. The software will wait for a low airflow condition to exit from FMEM. This protects the catalyst should the misfire fault still be present when the fuel injector is turned back on. If a misfire is detected on that cylinder again after 200 revolutions (about 5 to 10 seconds), the fuel injector is disabled again and the process repeats until the misfire is no longer present. Note that ignition coil primary circuit failures trigger the same type of fuel injector disablement. For additional information, refer to COMPREHENSIVE COMPONENT MONITOR (CCM) in this service information.

If fuel level is below 15%, the misfire monitor continues to evaluate misfire over every 200 revolution period to determine if catalyst damaging misfire is present so that the fuel shut off FMEM can be utilized to control catalyst temperatures. When a misfire occurs at low fuel levels, DTC P0313 will set in place of DTCs P0300 to P0310.

The misfire rate is also evaluated every 1, 000 revolution period and compared to a single (type B) threshold value to indicate an emission threshold concern, which can be either a single 1, 000 over revolution event from startup or 4 subsequent 1, 000 over revolution events on a drive cycle after startup. Many vehicles set DTC P0316 if the type B threshold is exceeded during the first 1, 000 revolutions after engine startup. This DTC P0316 is stored in addition to the normal P03xx DTC that indicates the misfiring cylinder. If the misfire is detected but it can not be attributed to a specific cylinder, DTC P0300 is stored.

MISFIRE DETECTION MONITOR > ROUGH ROAD DETECTION

The misfire detection monitor may include a rough road detection system to eliminate false misfire indications due to rough road conditions. The rough road detection system uses data from the anti-lock brake system (ABS) wheel speed sensors for estimating the severity of rough road conditions. This is a more direct measurement of rough road over other methods which are based on drive line feedback via crankshaft velocity measurements. It improves accuracy over these other methods since it eliminates interactions with actual misfire.

In the event of a rough road detection system failure, the rough road detection output is ignored and the misfire detection monitor remains active. A rough road detection system failure could be caused by a failure in any of the input signals to the algorithm. This includes the ABS wheel speed sensors, brake pedal position (BPP) switch, or controller area network (CAN) hardware concerns. Specific DTCs