4 On-Board Diagnostics - general information

03:35

Caution:
This video is for familiarization purposes only. Read below for specific information on your vehicle.

1 All models covered by this manual are equipped with an engine management system. The engine management system consists of an array of information sensors, an Engine Control Module (ECM) and various output actuators. The information sensors collect data from various parts of the engine (exhaust gas oxygen content, intake air temperature, throttle position, engine speed, etc.) and transmit this data to the ECM in the form of analog voltage signals. The ECM converts this analog information into digital data and “processes” it, i.e. compares it to a program built into the computer. If the incoming data doesn’t agree with the program, the ECM produces a digital output command (which is converted back to an analog voltage signal) to the appropriate output actuator, which alters the air-fuel ratio, the ignition advance, etc. The ECM is capable of processing the data from a dozen information sensors simultaneously and issuing just as many simultaneous commands to the actuators many times a second. The end result is a smooth-running engine which produces good power, gets good fuel economy and produces very low emissions.

2 But as a vehicle ages, its emission control, fuel injection and ignition systems can occasionally malfunction, causing driveability problems. Because these systems are all highly interrelated, and because the problems are often intermittent, it isn't always easy to track down the real cause of a problem. That's why, in addition to its control function, the ECM also has the ability to monitor itself (on-board diagnostics). Each information sensor circuit operates at a certain voltage and each sensor is designed to produce a specified number of voltage signals per second. When the engine is running, the ECM constantly monitors the operating characteristics of each sensor circuit and compares its monitoring data with the program. If a circuit operates outside its operating range (too slow, too weak, intermittent, nonexistent, etc.), the ECM notes this anomaly. The program has certain thresholds for each sensor circuit: a sensor circuit must not produce an intermittent or poor signal more than a specified number of times, or it must not produce an intermittent or poor signal even once that lasts more than a specified interval. There are different thresholds for different sensor circuits, but when a circuit exceeds its threshold, the ECM stores a diagnostic trouble code (DTC). A DTC doesn't necessarily tell you exactly what the problem is. But it does indicate the sensor circuit where a problem is occurring, if it is occurring in a monitored circuit. (Not all circuits are monitored; problems occurring in unmonitored circuits will go unnoticed by the ECM, or will cause it to store a code for a related circuit that is affected by the problems) This self-monitoring capability is known as On-Board Diagnostics (OBD).

3 The vehicles covered in this manual are equipped with one of the two versions of OBD, depending on the model year: 1992 through 1995 models are equipped with OBD I; 1996 and later models are equipped with OBD II. The two systems are similar in concept, but the OBD II system is capable of storing many more DTCs than an OBD I system.

4 The DTCs can only be accessed by a special BMW diagnostic device known as a scanner. There are also a few aftermarket scanners capable of accessing BMW DTCs. If the Malfunction Indicator Light (MIL) on the dash comes on, take the vehicle to a dealer service department or other qualified repair shop and have it diagnosed with the special equipment needed to do the job.