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BMW 3-Series and Z4 (99-05) Includes 2006 325ci/330ci Coupe and Convertible models Haynes Online Manual.

7 Fuel injection system - general information

1 An integrated engine management system known as DME (Digital Motor Electronics) is used for all models. The system controls all fuel injection and ignition system functions using a central ECM (Electronic Control Module).

2 On all models, the system incorporates a closed-loop catalytic converter and an evaporative emission control system, and complies with the very latest emission control standards. Refer to [Chapter 5](#) for information on the ignition side of the system; the fuel side of the system operates as follows.

3 The fuel pump (which is immersed in the fuel tank) supplies fuel from the tank to the fuel rail, via a filter. A pressure regulator controls fuel pressure. When the optimum operating pressure of the fuel system is exceeded, the regulator allows excess fuel to return to the tank.

4 The electrical control system consists of the ECM, along with the following sensors:

A. Hot film air mass meter - informs the ECM of the quantity and temperature of air entering the engine.

B. Coolant temperature sensor(s) - informs the ECM of engine temperature.

C. Crankshaft position sensor - informs the ECM of the crankshaft position and speed of rotation.

D. Camshaft position sensor(s) - informs the ECM of the camshaft(s) position.

E. Oxygen sensor(s) - informs the ECM of the oxygen content of the exhaust gases (explained in greater detail in [Chapter 6](#)).

F. Vehicle speed sensor - informs the ECM of the vehicle's road speed.

G. Intake air temperature sensor - informs the ECM of the temperature of the air entering the engine (M52TU and M54 engines).

H. Oil temperature - informs the ECM of the engine oil temperature.

5 All the above signals are analyzed by the ECM, which selects the fueling response appropriate to those values. The ECM controls the fuel injectors (varying the pulse width - the length of time the injectors are held open - to provide a richer or weaker mixture, as appropriate). The mixture is constantly varied by the ECM, to provide the best setting for cranking, starting (with a hot or cold engine), warm-up, idle, cruising and acceleration. See [Chapter 6](#) for more information on the engine management system sensors.

6 The ECM also has full control over the engine idle speed, via an auxiliary air valve that bypasses the throttle valve. When the throttle valve is closed, the ECM controls the opening of the valve, which in turn regulates the amount of air entering the manifold, and so controls the idle speed.

7 The ECM controls the exhaust and evaporative emission control systems, which are described in [Chapter 6](#) .

8 On all engines, a Differential Air Inlet System (DISA) is installed. Variable length inlet tracts incorporated in the inlet manifold are operated by a butterfly valve according to engine speed and load. This improves engine torque at low and medium engine speeds. The butterfly valve is installed under the manifold and operated by a vacuum actuator.

9 If there is an abnormality in any of the readings obtained from the sensors, the ECM enters its back-up mode. In this event, it ignores the abnormal sensor signal and assumes a preprogrammed value that will allow the engine to continue running (at reduced efficiency). If the ECM enters this back-up mode, the relevant fault code will be stored in the ECM memory.

10 If a fault is suspected, the vehicle should be taken to a BMW dealer at the earliest opportunity. A complete test of the engine management system can then be carried out, using a special electronic diagnostic test unit connected to the system's diagnostic connector. The OBD-II 16-pin socket is located under the dash on the driver's side, while the BMW diagnostic socket is located in the right-hand corner of the engine compartment or under the dash on the driver's side; Refer to [Section 10](#) of this Chapter for further details regarding testing.

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