



**Haynes**  
shows you how

BMW 3-Series (92-98) & Z3 (96-98) Haynes Online Manual

## 12 Fuel injection system components - removal and installation

### Engine Control Module (ECM)

1 Proceed as described in Part B of this Chapter, but note that for access to the ECM, the battery must be removed (see [Chapter 5A](#) ).

### Fuel rail and injectors

**Warning:**

Refer to the **Warning** in Section 1 before proceeding.

**Note:**

New fuel injector O-rings should be used on installation.

### Removal

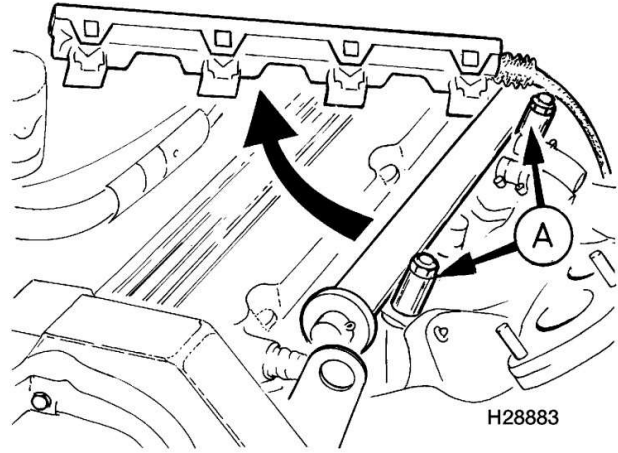
2 Depressurize the fuel system (see [Section 7](#) ), then disconnect the battery negative cable. **Caution:** *If the stereo in your vehicle is equipped with an anti-theft system, make sure you have the correct activation code before disconnecting the battery.*

3 Remove the upper section of the intake manifold (see [Section 13](#) ).

4 Pull up the wiring ducting to release the wiring plugs from the fuel injectors (see illustration) .

## 12.4 Detach the wiring ducting from the fuel rail

### A Fuel rail securing bolts



5 Loosen the hose clamps and disconnect the fuel feed and return hoses from the fuel rail. Be prepared for fuel spillage and take adequate fire precautions. Plug the open ends of the pipes and hoses to prevent dirt entry and further fuel spillage.

6 Disconnect the vacuum hose from the fuel pressure regulator.

7 Unscrew the two bolts securing the fuel rail to the intake manifold.

8 Carefully pull the fuel rail upwards to release the fuel injectors from the cylinder head, then withdraw the complete fuel rail/fuel injector assembly.

9 To remove a fuel injector from the fuel rail, proceed as follows.

A. Pry off the metal securing clip, using a screwdriver.

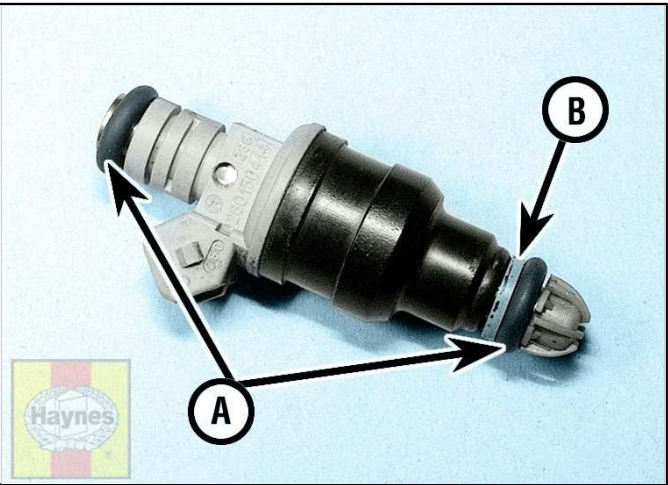
B. Pull the fuel injector from the fuel rail.

## Installation

10 Before installation, it is wise to replace all the fuel injector O-rings as a matter of course.

11 Check that the plastic washer at the bottom of each injector is positioned above the lower O-ring (see illustration) .

### 12.11 Fuel injector O-rings (A) and plastic washer (B)



12 Lightly lubricate the fuel injector O-rings with a little petroleum jelly or clean engine oil.

13 Where applicable, install the fuel injectors to the fuel rail, ensuring that the securing clips are correctly fitted. Note that the injectors should be positioned so that the wiring sockets are uppermost when the assembly is reinstalled.

14 Slide the fuel rail/fuel injector assembly into position, ensuring that the injectors engage with their bores in the intake manifold.

15 Further installation is a reversal of removal, but install the upper section of the intake manifold (see [Section 13](#)), and pressurize the fuel system (install the fuel pump fuse and switch on the ignition) and check for leaks before starting the engine.

## Fuel pressure regulator

### Warning:

Refer to the **Warning** notes in Section 1 before proceeding.

### Note:

New O-rings may be required on installation.

## Removal

16 Depressurize the fuel system (see [Section 7](#)), then disconnect the battery negative cable. **Caution:** *If the stereo in your vehicle is equipped with an anti-theft system, make sure you have the correct activation code before disconnecting the battery.*

17 Pull the vacuum hose from the pressure regulator.

18 Where applicable, to improve access, disconnect the breather hose from the front of the valve cover.

19 Note the angle of the vacuum intake on the pressure regulator, so that it can be reinstalled in the same position.

20 Where applicable, to give sufficient clearance to remove the pressure regulator, unbolt the engine lifting bracket from the cylinder head.

21 On models where the pressure regulator is secured by a clamping ring, unscrew the clamp bolt and remove the clamping ring and lift off the thrustwasher.

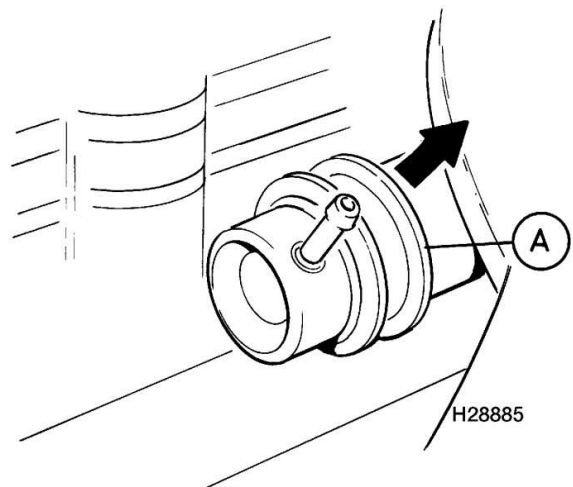
22 On models where the regulator is secured by a clamping bracket retained by a nut, unscrew the securing nut and withdraw the clamping bracket (see illustration) .

**12.22 Unscrewing the pressure regulator clamping bracket nut (arrow)**



23 On models where the regulator is secured by a retaining ring retained by a locking clip, pull out the locking clip and remove the retaining ring (see illustration) .

**12.23 Pull out the pressure regulator retaining ring locking clip (A)**



24 Twist and pull the regulator from the fuel rail. Note that it will be difficult to pull the regulator from the fuel rail due to the tight-fitting O-rings.

## Installation

25 Before installation, check the condition of the O-rings, and replace if necessary (see illustration) .

**12.25 Check the condition of the O-rings (arrows)**



26 Installation is a reversal of removal, bearing in mind the following points.

- A. Ensure that the regulator is pushed firmly into position in the end of the fuel rail.
- B. Make sure that the regulator vacuum intake is positioned as noted before removal.
- C. Where applicable, ensure that the thrustwasher is correctly positioned.
- D. On models where the regulator is retained by a ring and locking clip, make sure that the cut-out in the retaining ring is aligned with the regulator vacuum intake (to avoid damage to the vacuum hose).
- E. On completion, pressurize the fuel system (install the fuel pump fuse and switch on the ignition) and check for leaks before starting the engine.

## Airflow meter

### Note:

A new airflow meter seal will be required on installation.

## Removal

27 Disconnect the battery negative cable. **Caution:** *If the stereo in your vehicle is equipped with an anti-theft system, make sure you have the correct activation code before disconnecting the battery.*

28 Turn the locking collar, and disconnect the wiring plug from the airflow meter (see illustrations) .



**12.28a Disconnecting the electrical connector from an air-volume type airflow meter, which is used on 1992 through 1995 M42 (1.8L) engines**



**12.28b Electrical connector (arrow) on a hot-film (air mass) airflow meter, which is used on 1996 and later M44 (1.9L) engines**



29 Remove the screw securing the carbon canister hose to the airflow meter.

30 Loosen the hose clamp and disconnect the air ducting from the airflow meter.

31 Release the securing clips, and lift off the air cleaner cover, complete with the airflow meter.

32 Disconnect the breather hose(s) from the air ducting, and the airflow meter (as applicable), and release any wires or hoses from the clips on the air ducting.

33 Working inside the air cleaner cover, unscrew the four securing nuts, and withdraw the airflow meter from the air cleaner cover. Recover the seal.

## Installation

34 Installation is a reversal of removal, but use a new seal between the airflow meter and the air cleaner cover, and ensure that any wire/hoses are securely positioned in their clips.

## Throttle position sensor

**Note:**

A new O-ring may be required on installation.

## Removal

35 Disconnect the battery negative cable. **Caution:** *If the stereo in your vehicle is equipped with an anti-theft system, make sure you have the correct activation code before disconnecting the battery.*

36 Disconnect the wiring plug from the sensor (see illustration) .

### 12.36 Disconnecting the throttle position sensor electrical connector



37 Unscrew the two securing screws and withdraw the sensor from the throttle body. Where applicable, recover the O-ring.

## Installation

38 Installation is a reversal of removal, but where applicable, check the condition of the O-ring and replace if necessary, and ensure that the O-ring is correctly positioned.

## Coolant temperature sensor

39 The sensor is located in the left-hand side of the cylinder head. Refer to [Chapter 3](#) for removal and installation details.

## Crankshaft position sensor

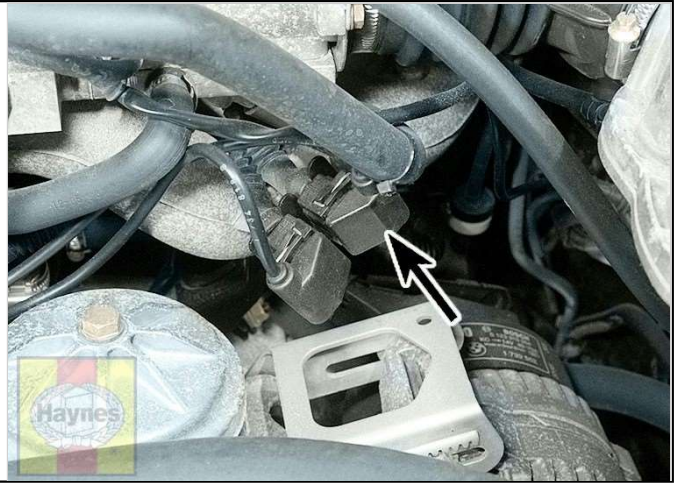
### Removal

40 To improve access, remove the viscous cooling fan and fan shroud assembly (see [Chapter 3](#) ).

41 Remove the upper section of the intake manifold (see [Section 13](#) ), and release the wiring ducting from the manifold.

42 Trace the wiring back from the sensor to the connector, located on a bracket behind the oil filter. Note that there are two wiring connectors, and the crankshaft position sensor is the lower connector - if both connectors are to be disconnected, mark them to avoid confusion on installation (see illustration) .

**12.42 Crankshaft position sensor electrical connector (arrow) - pre-1994 model**



43 Release the wiring from any clips and brackets on the engine.

44 Unscrew the sensor securing bolt, then withdraw the sensor from its mounting bracket (see illustration) .

**12.44 Crankshaft position sensor securing bolt (arrow)**



## Installation

45 Installation is a reversal of removal, bearing in mind the following points.

- A. Ensure that the sensor wiring is securely refitted to its securing clips to avoid the wiring from rubbing on the drivebelt.
- B. Ensure that the sensor wiring connector is correctly reconnected as noted before removal.
- C. Where applicable, install the upper section of the intake manifold (see [Section 13](#) ).
- D. Install the viscous cooling fan and fan shroud assembly (see [Chapter 3](#) ).



## Camshaft position sensor

### Removal

46 The sensor is located in the front of the upper timing chain cover.

47 Disconnect the battery negative cable. **Caution:** *If the stereo in your vehicle is equipped with an anti-theft system, make sure you have the correct activation code before disconnecting the battery.*

48 On 1994 and later models, remove the upper section of the intake manifold (see [Section 13](#)), and release the wiring ducting from the manifold.

49 Trace the wiring back from the sensor, and locate the wiring connector attached to the bracket behind the oil filter. Note that there are two connectors, and the camshaft position sensor connector is the top connector - if both connectors are to be disconnected, mark them to avoid confusion on installation. Disconnect the wiring connector.

50 Remove the screw, and/or release the clips securing the wiring ducting to the front of the engine, then release the sensor wiring from the ducting.

51 Unscrew the sensor securing bolt, and withdraw the sensor (see illustration) . Recover the O-ring if it is loose.

**12.51 Camshaft position sensor securing bolt (arrow)**



### Installation

52 Installation is a reversal of removal, bearing in mind the following points.

- A. Make sure that the sensor O-ring is correctly seated.
- B. Ensure that the wiring connector is correctly reconnected as noted before removal.
- C. Where applicable, install the upper section of the intake manifold (see [Section 13](#)).

## Oxygen sensor

53 Refer to [Chapter 6](#) .

## Idle speed control valve

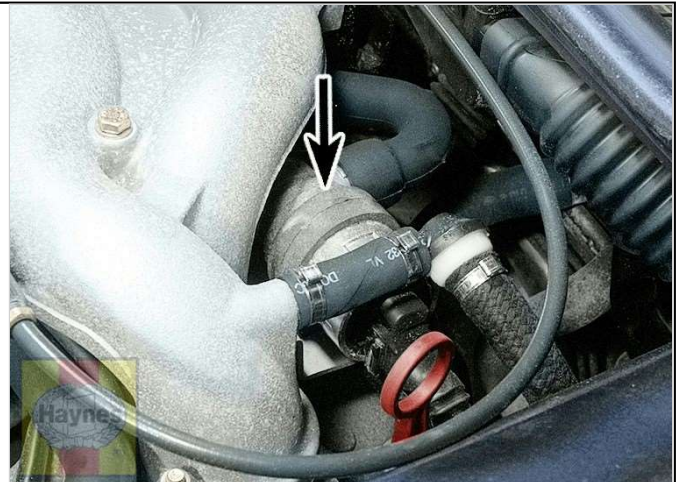
### Removal

54 Disconnect the battery negative cable. **Caution:** *If the stereo in your vehicle is equipped with an anti-theft system, make sure you have the correct activation code before disconnecting the battery.*

55 Disconnect the wiring plug from the valve.

56 Pull the valve, complete with its rubber mounting, from the retaining bracket (see illustration) .

**12.56 Idle speed control valve location (arrow)**



57 Disconnect the hoses from the valve, noting their locations to ensure correct installation.

58 Withdraw the valve.

### Installation

59 Installation is a reversal of removal, but make sure that the hoses are correctly reconnected.