Mass Air Flow/Air Intake Temperature (MAF/IAT) Sensor

The MAF/IAT sensor is located in the air intake ducting, between the air cleaner and the throttle body. The sensor outputs intake air flow and temperature signals to the ECM to enable calculation of the mass of the air entering the engine.

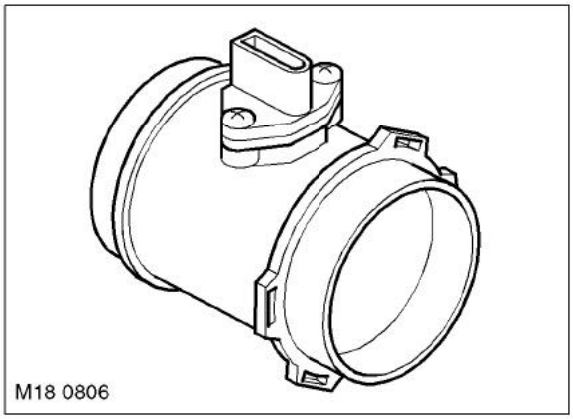
In addition to the air flow and temperature outputs, a regulated 5 V feed and an earth are connected between the sensor and the ECM, and the sensor receives a battery power feed from the main relay.

Air flow: The air flow signal is produced from a hot film element in the sensor. The film is connected between the 5 V feed and the air flow output to the ECM. The film is also heated by the battery power feed and cooled by the air flow into the engine. The greater the air flow, the greater the cooling effect and the lower the electrical resistance across the sensor. So the air flow output voltage varies with changes in air flow and, from voltage/air flow maps stored in memory, the ECM determines the mass of air entering the engine.

Air intake temperature: The air intake temperature signal is produced by a NTC thermistor connected between the 5 V feed and earth to complete a voltage divider circuit. The ECM monitors the voltage drop across the thermistor and, from voltage/temperature maps stored in memory, determines the temperature of the intake air.

The MAF/IAT sensor is sensitive to sudden shocks and changes in its orientation. It should, therefore, be handled carefully. It is also important that the intake ducting between the air cleaner and the throttle body is not altered in diameter or modified in any way. The air mass flow meter contains electronic circuitry, so never attempt to supply it directly from the battery. The terminals have a silver coating to provide a superior quality of connection over many years. If, at any time, a probe is used to measure the output directly from the sensor, then care must be taken to ensure this coating is not damaged.

MAF/IAT Sensor



If the air flow signal fails the ECM adopts a default value for air flow volume based on throttle position and engine speed. The following engine symptoms will be noticeable:

- The engine speed might 'dip' before the default strategy enables continued running
- The engine may be difficult to start and prone to stalling
- The overall performance of the engine will be adversely affected (throttle response in particular)
- Exhaust emissions will be out of tolerance, because the air/fuel ratio value is now assumed, not calculated; no closed loop fuelling
- Idle speed control disabled, leading to rough idle and possible engine stall.

At the time of failure, the ECM will store details of the engine speed, coolant temperature and throttle angle.

If the intake air temperature signal fails, the ECM adopts a default value of 45 °C. This default value is then used within all the calculations involving intake air temperature. The effect on the vehicle of a failed air temperature signal will not be so noticeable to the driver, who may notice a reduction in engine performance when operating the vehicle at high altitudes or in hot ambient temperatures. The occurrence of this fault will also disable fuelling adaptions.

The ECM will store details of the engine speed, engine load and battery voltage when this fault is first detected.