



E131040

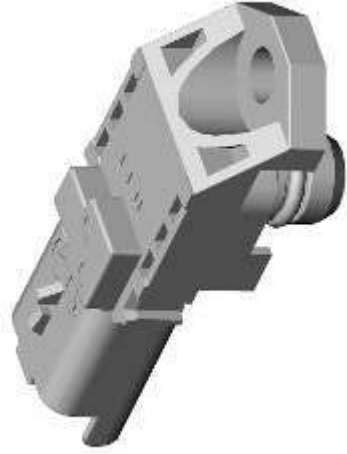
The boost air pressure sensor is located on a bracket on the upper LH rear of the fan cowl. The sensor is connected via a hose to the secondary fixed vane turbocharger compressor outlet duct. The hose allows the sensor to measure the turbocharger compressor outlet pressure. The sensor provides a voltage signal to the ECM relative to the output charge air pressure from the secondary fixed vane turbocharger.

The boost air pressure sensor has a 3 pin connector which is connected to the ECM and provides a 5V reference voltage from the ECM , a signal input to the ECM and a ground connection.

The boost pressure sensor uses a diaphragm transducer to measure pressure. The ECM uses the boost pressure sensor signal for the following functions:

- Maintain manifold boost pressure
- Reduce exhaust smoke emissions when driving at high altitude
- Control of the EGR system
- To help smooth control of the mono to bi and bi to mono turbocharger transitions
- To aid the air path diagnostics.

Manifold Absolute Pressure (MAP) Sensor



E131041

A single MAP sensor is located after the electric throttle. The sensor provides a voltage signal to the ECM relative to the intake manifold pressure and temperature.

The MAP sensor has a 3 pin connector which is connected to the ECM and provides a 5V reference voltage from the ECM , a signal input to the ECM and a ground connection.

The MAP sensor uses a diaphragm transducer to measure the air pressure.

The ECM uses the MAP sensor signal for the following functions:

- Maintain manifold boost pressure.
- Reduce exhaust smoke emissions when driving at high altitude.
- Control of the EGR system.
- Control of the vacuum control module.

If the MAP sensor fails, the ECM uses a default pressure of 1013 mbar (14 lbf/in²). In the event of a MAP sensor failure, the following symptoms may be observed:

- Altitude compensation inoperative (black smoke emitted from the exhaust).
- Active boost control inoperative.

FUEL RAIL PRESSURE CONTROL VALVE



E130970

The fuel pressure control valve is incorporated into the forward end of the common fuel rail for the **RH (right-hand)** cylinder bank. The control valve regulates the fuel pressure within the fuel rails and is controlled by the ECM. The control valve is a **PWM** controlled solenoid valve.

When the solenoid is de-energized, an internal spring holds an internal valve closed. At fuel pressure of 100 bar (1450 lbf/in²) or higher, the force of the spring is overcome, opening the valve and allowing fuel pressure to decay into the fuel return pipe. When the pressure in the fuel rail decays to approximately 100 bar (1450 lbf/in²) or less, the spring force overcomes the fuel pressure and closes the valve. When the ECM energizes the solenoid, the valve is closed allowing the fuel pressure to build. The pressure in the fuel rail in this condition can reach approximately 2000 bar (29000 lbf/in²).

The ECM constantly monitors the fuel pressure and activates the fuel pressure control valve accordingly to control the fuel rail pressure within the required parameters. Relieved fuel from the fuel rails is directed through the fuel rail leak-off pipe to the low pressure fuel filter return circuit.

The ECM controls the fuel rail pressure by operating the control valve solenoid using a **PWM** signal. By varying the duty cycle of the **PWM** signal, the ECM can accurately control the fuel rail pressure and hence the pressure delivered to the injectors according to engine load. This is achieved by the control valve allowing a greater or lesser volume of fuel to pass from the high pressure side of the pump to the un-pressurized fuel return line, regulating the pressure on the high pressure side.

The fuel pressure control valve receives a **PWM** signal from the ECM of between 0 and 12V. The ECM controls the operation of the control valve using the following information to determine the required fuel pressure

- Fuel rail pressure
- Engine load
- **APP** sensor position
- Engine coolant temperature
- Engine speed.

In the event of a total failure of the fuel pressure control valve, the engine will not start. In the event of a partial failure of the fuel pressure control valve, the ECM will activate the solenoid with the minimum duty cycle which results in the injection quantity being limited.

FUEL RAIL PRESSURE SENSOR



E1 30971

The fuel rail pressure sensor is located in the forward end of the common fuel rail for the **LH** cylinder bank. The sensor is screwed into a threaded port in the end of the fuel rail.

The fuel pressure sensor is a piezo-resistive type sensor containing an actuating diaphragm. Deflection of the diaphragm provides a proportional signal (output) voltage to the ECM, dependant on the fuel pressure within the fuel rails.

INJECTORS