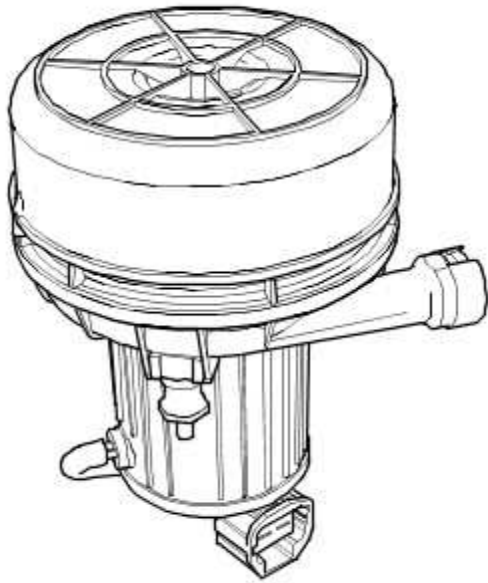


AIR Pump



E62274

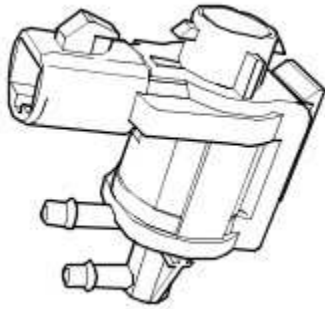
The AIR pump is located behind the right-hand side of the front bumper cover. The pump is fitted on rubber mountings to help prevent noise which is generated by AIR pump operation. The AIR pump is powered from the vehicle battery by a dedicated relay and supplies approximately 10 to 15 kg/hr (22 to 33 lb/hr) of air when the engine is at idle speed and the ambient temperature is below 20°C (68°F).

Air is drawn into the AIR pump through vents in its front cover and is then passed through a foam filter. The air is delivered to the exhaust manifold on each side of the engine through a combination of plastic pipes and stainless steel tubes.

One second after the AIR pump is energised, the ECM switches on the AIR switching valve, which opens to allow vacuum from the AIR vacuum reservoir to be applied to the vacuum operated AIR control valve. When the vacuum is applied to the AIR control valve, it opens to allow the air from the AIR pump through to the exhaust manifolds.

When the ECM switches off the AIR switching valve, the vacuum supply to the AIR control valve is cut-off and the valve closes to prevent further air being injected into the exhaust manifolds. With an approximate five second delay after as the AIR switching valve is closed, the ECM removes power from the AIR pump relay, and this in turn stops the AIR pump from operating.

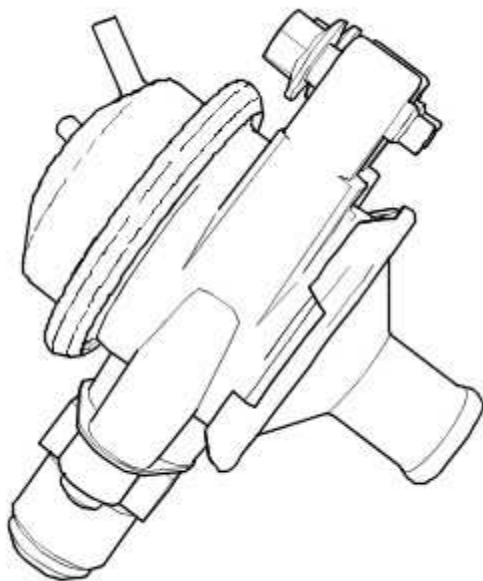
AIR Switching Valve



The ECM switches on the AIR switching valve with a one second delay after initiating AIR pump operation. When the AIR switching valve is open, a steady vacuum supply is allowed through to open the vacuum operated AIR control valve. When the ECM switches off the AIR switching valve, the valve closes and immediately shuts off the vacuum supply to the AIR control valve. The pump continues to operate for a further five seconds for system diagnostic purposes.

When the AIR switching valve is switched off, the vacuum supply line opens to atmosphere, and this causes the AIR switching valve to close automatically to prevent any further injection of air.

AIR Control Valve



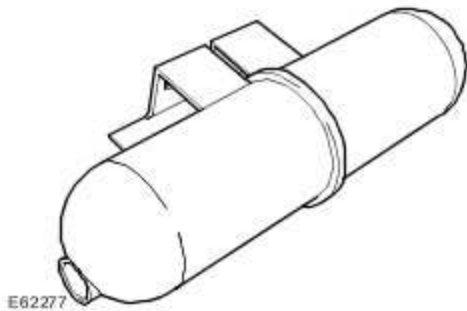
The injected air from the AIR pump is controlled by the AIR control valve. This allows the correct amount of air to be injected directly into the exhaust manifolds. The AIR control valve prevents exhaust gasses from blowing back into the AIR pump.

The AIR control valve is assisted in operation by a vacuum source from the AIR vacuum reservoir located in the right-hand side of the engine bay. This assistance allows the actuation of the AIR control valve independently from the intake manifold vacuum levels available.

When the pressure in the exhaust system is higher than in the AIR system, the AIR control valve closes the circuit, and this protects the AIR system from exhaust gasses blowing back into the AIR system.

Vacuum to the AIR switching valve is provided from the intake manifold vacuum by the AIR vacuum reservoir. A small bore vacuum hose provides the vacuum route between the AIR vacuum reservoir and AIR switching valve. A further small bore vacuum hose is used to connect the AIR switching valve to the AIR control valve.

AIR Vacuum Reservoir



The AIR vacuum reservoir is located on the right-hand side of the engine bay.

The AIR vacuum reservoir is included in the vacuum supply line between the intake manifold and the AIR switching valve.

The AIR vacuum reservoir contains a one-way valve to stop vacuum leaking back towards the intake manifold side. The AIR vacuum reservoir holds a constant vacuum so that the AIR control valve opens as soon as the AIR switching valve is switched on.

AIR Pump Relay

The AIR pump relay is located on the AIR pump mounting bracket. The ECM is used to control the operation of the AIR pump by the AIR pump relay.

The AIR system receives its voltage supply through the AIR pump relay. The ECM monitors the state of the relay for correct operation as part of its system diagnostic.

AIR Pressure Sensor - North American specification vehicles only

The AIR system is monitored by measuring the system pressure by using the AIR pressure sensor at several instances during its cycle of operation.

The AIR system pressure is measured before operation of the AIR pump. The AIR pump is then switched on and with a one second delay, the AIR switching valve is opened. After a stabilizing period, the system pressure is measured again, this time by taking the average of a one second duration of readings, and normalising for variations in battery voltage and atmospheric pressure. If the system pressure measured at this time has not risen enough with respect to the initial AIR

pressure reading then a failure will be flagged.

A second pressure measurement is made after the requirement for AIR into the exhaust system has expired, but continuing on from the same period of AIR pump operation, i.e. the pump is left running, against a closed AIR switching valve. Again this pressure measurement is the average of a one second duration of readings normalised for variations in battery voltage and atmospheric pressure. If the system pressure measured at this time has not risen enough or has risen too much with respect to the system pressure during normal operation of AIR then a failure will be flagged.

A final pressure reading is taken after the AIR system has been switched off to ensure the system shuts down.