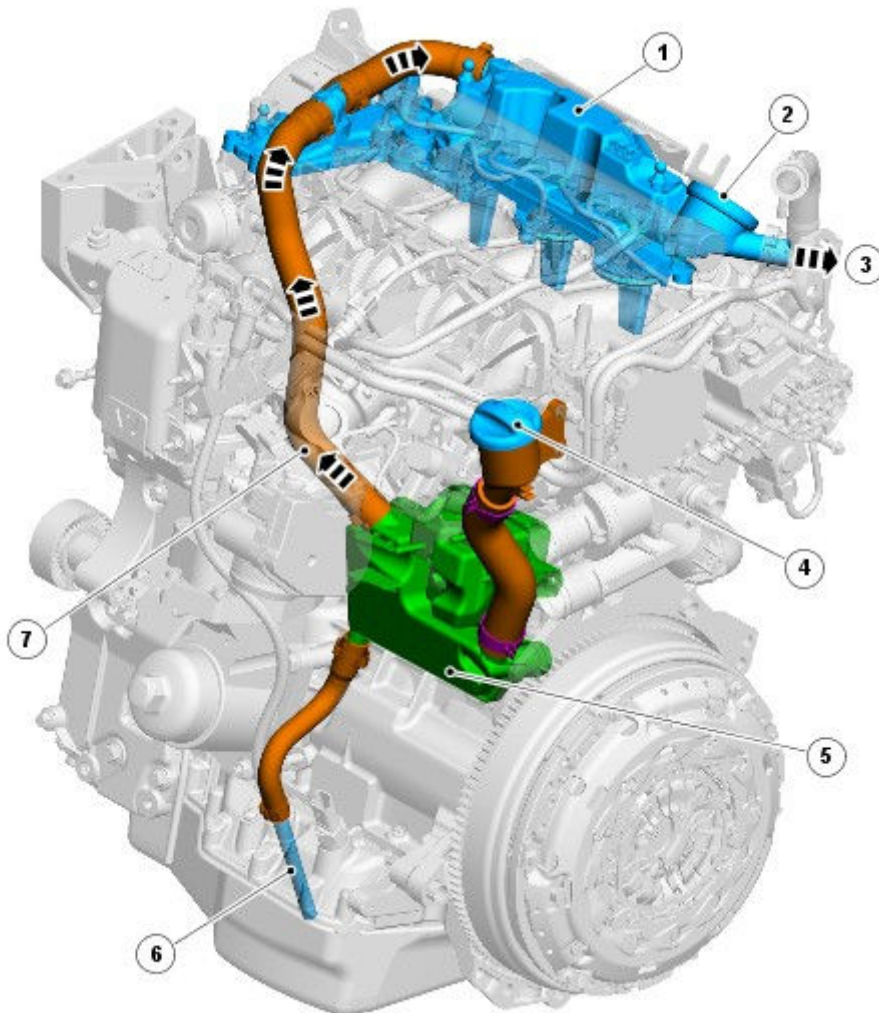


Engine Emission Control - 2.2L Diesel

CRANKCASE VENTILATION SYSTEM

COMPONENT LOCATION



E85244

Item	Part Number	Description
1		Camshaft cover
2		Positive crankcase ventilation (PCV) valve
3		Crankcase gas vent to air intake duct
4		Oil filler cap
5		Crankcase vent oil separator
6		Oil return tube
7		Crankcase gas ventilation tube - showing flow direction

OVERVIEW

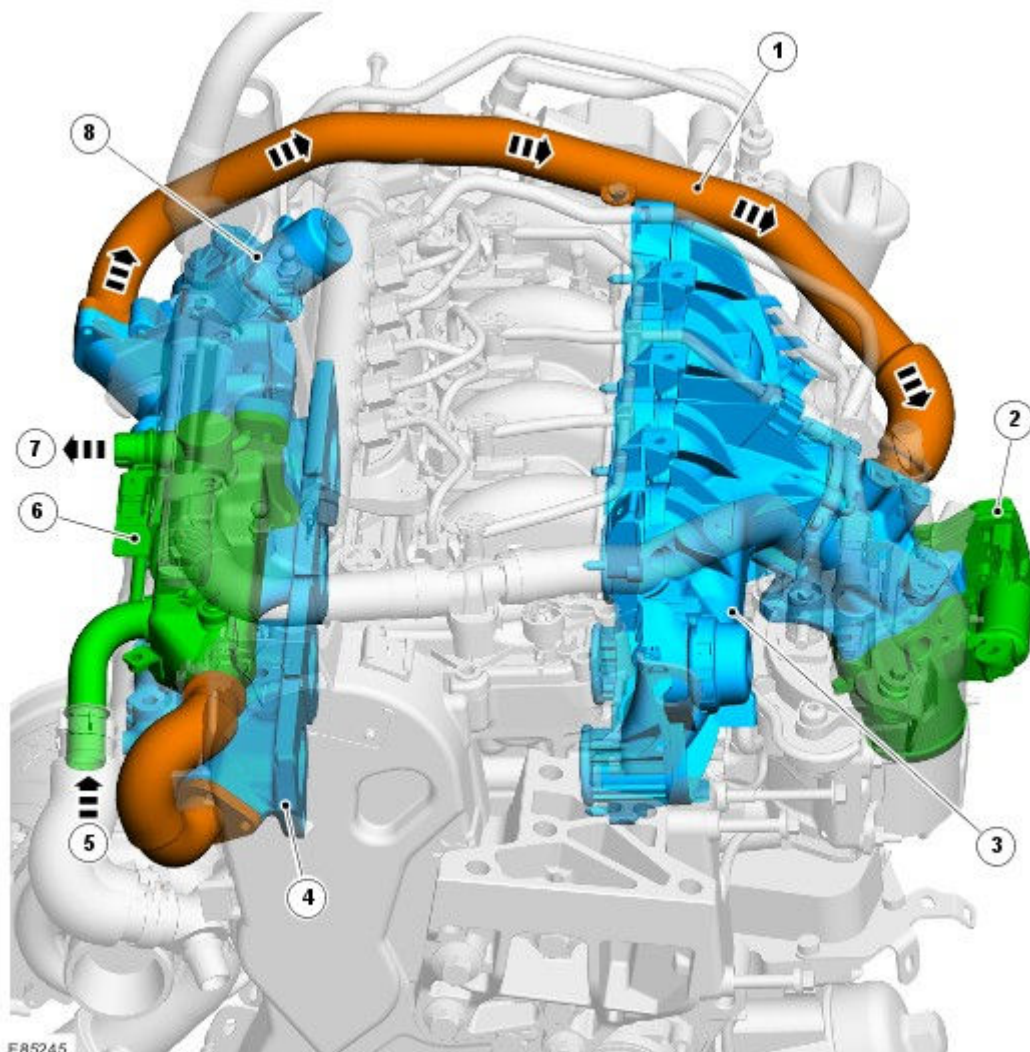
To prevent the build-up of gases in the engine's crankcase, the crankcase gases are drawn into the oil separator where oil particles are removed from the gases. The oil is then drained down to the engine's oil pan and the gases are directed into the engine's air intake system.

Prior to the oil-free gases entering the air intake system, a positive crankcase ventilation (PCV) valve operates to

minimize crankcase pressure variations caused by engine air demand and engine operating conditions.

EXHAUST GAS RECIRCULATION SYSTEM

COMPONENT LOCATION



Item	Part Number	Description
1		Exhaust gas transfer tube - showing flow direction
2		Throttle body
3		Intake manifold
4		Exhaust manifold
5		Coolant inlet
6		Exhaust gas recirculation (EGR) cooler
7		Coolant outlet
8		Exhaust gas recirculation (EGR) Valve and Actuator

OVERVIEW

Harmful nitrogen oxides (NOx) a constituent of the exhaust gases, are formed by the reaction between oxygen and nitrogen at high temperatures. Reducing the engine's combustion temperature and therefore the amount of NOx produced is achieved by recirculating a proportion of the exhaust gases. The recirculated exhaust gases replace some of the engine's intake air as this reduces the oxygen content within the cylinders and lowers the peak combustion temperature by several hundred degrees.

To reduce the temperature as well as increase the density of the inducted fuel charge, the recirculated exhaust gases are passed through the Exhaust Gas Recirculation (EGR) cooler. The EGR cooler utilizes coolant from the engine cooling system to reduce the exhaust gas temperature. Exhaust gases entering the EGR cooler reach temperatures of approximately 500C; the EGR cooler lowers the temperature of the gases, to 250-300C before they exit the cooler.

PRINCIPLES OF OPERATION

An electrically actuated valve, mounted on the outlet side of the EGR cooler and controlled by the Powertrain Control Module (PCM), regulates the amount of exhaust gases recirculated into the air intake system. The PCM uses signals from various engine sensors and calculates a response based on the embedded software algorithm to control exhaust gas recirculation. The PCM transmits this control signal to the valve's actuator, which is closed-loop controlled with the mass air flow (MAF) sensor providing the feedback to the PCM.