

E 139402

The ECM is installed in the engine compartment, on a bracket attached to the engine bulkhead. Three connectors provide the interface between the **ECM (engine control module)** and the vehicle and engine harnesses.

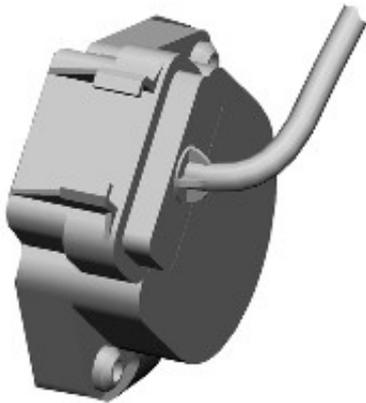
The ECM contains data processors and memory microchips. The output signals to the actuators are in the form of ground paths provided by driver circuits within the ECM. The ECM driver circuits produce heat during normal operation and dissipate this heat via the casing. Some sensors receive a regulated voltage supplied by the ECM. This avoids incorrect signals caused by voltage drop during cranking.

The ECM performs self diagnostic routines and stores fault codes in its memory. These fault codes and diagnostics can be accessed using Land Rover approved diagnostic equipment. If the ECM is to be replaced, the new ECM is supplied 'blank' and must be configured to the vehicle using Land Rover approved diagnostic equipment. A 'flash' electrically erasable programmable read only memory (EEPROM) allows the ECM to be configured with market specific or new tune information up to 14 times. If a fifteenth update is required, the ECM must be replaced. The current engine tune data can be accessed and read using Land Rover approved diagnostic equipment.

When a new ECM is fitted, it must also be synchronized to the anti-theft system module using Land Rover approved diagnostic equipment. An ECM cannot be transferred between vehicles.

The ECM is connected to the engine sensors, which allows it to monitor the engine operating conditions. The ECM processes these signals and decides the actions necessary to maintain optimum engine performance in terms of driveability, fuel efficiency and exhaust emissions. The memory of the ECM is programmed with instructions on how to control the engine. This is known as the strategy. The memory also contains data in the form of maps which the ECM uses as a basis for fueling and emission control. By comparing the information from the sensors to the data in the maps, the ECM is able to calculate the various output requirements. The ECM contains an adaptive strategy, which updates the system when components vary due to production tolerances or ageing.

## ACCELERATOR PEDAL POSITION SENSOR



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The **APP** sensor is a dual rotary potentiometer located on the right side of the accelerator pedal bracket and operated by the accelerator pedal spindle. The potentiometers have independent 5V supply and return connections with the **ECM**, and a common ground connection.

The **ECM** uses the two inputs from the **APP** sensor to determine the position, rate of movement and direction of movement of the accelerator pedal. The **ECM** then uses this data, along with information from other sensors, to achieve the optimum engine response.

If one of the inputs from the **APP** sensor fails, or there is a fault with the ground or supply connections, the **ECM** limits engine response to that produced by the first 28% of accelerator pedal travel.

If both inputs fail, there will be no response to accelerator pedal operation. The engine will idle at a raised value while the brake pedal is released, and at the normal value when the brake pedal is pressed. This allows a restricted limp-home operation.