Low fuel level signal

When the fuel level in the fuel tank becomes low enough to illuminate the low fuel level warning lamp in the instrument cluster, the instrument cluster generates a low fuel level signal. If the low fuel level signal is present during the ECM misfire detection function the ECM can use it to check for a 'false misfire'.

Conditions

The fuel sender generates the low fuel level signal when the fuel sender resistance is greater than 158 ± 8 ohms.

Function

The illumination of the low fuel level warning lamp in the instrument cluster triggers the low fuel level signal to be sent to the ECM. This signal is processed via pin 8 of connector C0637 of the ECM.

Should a misfire occur while the fuel level is low, the following fault code may be evident and can be retrieved by TestBook.

P Code	J2012 Description	Land Rover Description
P1319	Misfire detected at low fuel level	Misfire detected with low fuel level

Coolant temperature gauge signal

The ECM controls the temperature gauge in the instrument cluster. The ECM sends a coolant temperature signal to the temperature gauge in the instrument cluster in the form of a PWM square wave signal.

The frequency of the signal determines the level of the temperature gauge.

Conditions

The ECM operates the PWM signal under the following parameters:

- -40 °C (-40 °F) = a pulse width of 768 µs.
- 140 °C (284 °F) = a pulse width of 4848 µs.

Function

The coolant temperature signal is an output from the ECM to the instrument cluster. The coolant temperature signal is generated via pin 44 of connector C0636 of the ECM.

The coolant temperature signal can fail in the following ways:

- Wiring short circuit to vehicle supply.
- Wiring short circuit to vehicle earth.
- Wiring open circuit.

In the event of a coolant temperature signal failure any of the following symptoms may be observed:

- Coolant temperature gauge will read cold at all times.
- Coolant temperature warning lamp remains on at all times.

Controller Area Network (CAN) system

The controller area network (CAN) system is a high speed serial interface between the ECM and the Electronic Automatic Transmission (EAT) ECU. The CAN system uses a 'data bus' to transmit information messages between the ECM and the EAT ECU. Because there are only two components in this CAN system, one will transmit information messages and the other will receive information messages, and vice-versa.

Conditions

The CAN system is used by the EAT ECU and the ECM for transmission of the following information:

- Gearshift torque control information.
- EAT OBD information.
- MIL request.
- Vehicle speed signal.
- Engine temperature.
- Engine torque and speed.
- Gear selected.
- Gear change information.
- Altitude adaptation factor
- Air intake temperature
- Throttle angle / pedal position

Function

The CAN system uses a twisted pair of wires to form the 'data bus' to minimise electrical interference. This method of serial interface is very reliable and very fast. The information messages are structured so that each of the receivers (ECM or EAT ECU) is able to interpret and react to the messages sent.

The CAN 'data bus' is directly connected between pin 36 of connector C0637 of the ECM and pin 16 of connector C0193 at the EAT ECU, and pin 37 of connector C0637 of the ECM and pin 44 of connector C0193 at the EAT ECU.

The CAN system can fail in the following ways:

- CAN data bus wiring open circuit.
- CAN data bus wiring short circuit.

In the event of a CAN data bus failure any of the following symptoms may be observed:

- MIL illuminated after 2 drive cycles (NAS only).
- EAT defaults to 3rd gear only.
- Harsh gearshifts.
- 'Sport' and 'manual' lights flash alternately.

Should a malfunction of the component occur the following fault codes may be evident and can be retrieved by TestBook.

P Code	J2012 Description	Land Rover Description
P0600	Serial communication link malfunction	CAN time out
P1776	Transmission control system torque interface malfunction	EAT torque interface error

Drive cycles

The following are the TestBook drive cycles:

⇒ Drive cycle A:

1. Switch on the ignition for 30 seconds.
2. Ensure engine coolant temperature is less than 60°C (140°F).
3. Start the engine and allow to idle for 2 minutes.
4. Connect TestBook and check for fault codes.

⇒ Drive cycle B:

1. Switch ignition on for 30 seconds.
2. Ensure engine coolant temperature is less than 60°C (140°F).
3. Start the engine and allow to idle for 2 minutes.
4. Perform 2 light accelerations (0 to 35 mph (0 to 60 km/h) with light pedal pressure).
5. Perform 2 medium accelerations (0 to 45 mph (0 to 70 km/h) with moderate pedal pressure).
6. Perform 2 hard accelerations (0 to 55 mph (0 to 90 km/h) with heavy pedal pressure).
7. Allow engine to idle for 2 minutes.
8. Connect TestBook and with the engine still running, check for fault codes.