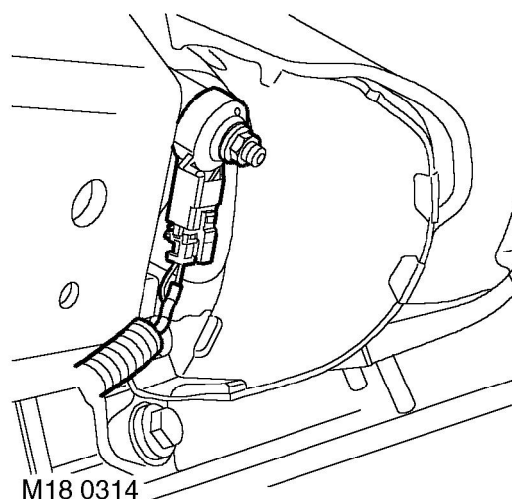


ENGINE MANAGEMENT SYSTEM - V8

Knock Sensor (KS)



The ECM uses two knock sensors located between the centre two cylinders of each bank to detect pre-ignition. The knock sensors consist of piezo ceramic crystals that oscillate to create a voltage signal. During pre-ignition the frequency of crystal oscillation increases, which alters the signal output to the ECM. The ECM compares the signal to known signal profiles in its memory. If pre-ignition is detected the ECM retards ignition timing for a number of cycles. If no more pre-ignition is detected, the timing is gradually advanced to the original setting.

The ignition is calibrated to run on 95 RON premium fuel, but the system will run satisfactorily on 91 RON regular fuel. If the vehicle is refuelled with a lower grade fuel, some audible detonation will initially be heard. This is non-damaging and ceases when the system adaption is completed.

Input/Output

Because of the nature of its operation, the knock sensors do not require any electrical input source. The KS output for LH bank (cylinders 1, 3, 5, 7) is measured via pin 49 of connector C0636 of the ECM. The KS output for RH bank (cylinders 2, 4, 6, 8) is measured via pin 36 of connector C0636 of the ECM. Both knock sensors have a screened earth to protect the integrity of the sensor signals. The KS earth for LH bank (cylinders 1, 3, 5, 7) is via pin 48 of connector C0636 of the ECM. The KS earth for RH bank (cylinders 2, 4, 6, 8) is via pin 35 of connector C0636 of the ECM.

The connector and sensor terminals are gold plated for corrosion and temperature resistance, care must be exercised while probing the connector and sensor terminals.

The KS can fail the following ways or supply incorrect signal:

- Sensor open circuit.
- Short circuit to vehicle battery supply.
- Short circuit to vehicle earth.
- Faulty component.
- Incorrectly tightened sensor.

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

- KS disabled, the ECM refers to a 'safe ignition map'.
- Rough running.
- Engine performance concern.



The ECM performs the following diagnostic checks to confirm correct knock sensor operation:

- KS signal level is less than the minimum threshold (dependent on engine speed) – the engine must be running, coolant temperature above 60°C (140°F), number of camshaft revolutions since start greater than 50 and the KS signal profile must be less than the threshold value at a given engine speed for a fault condition to be flagged
- KS signal is greater than the maximum threshold (dependent on engine speed) – the engine must be running, coolant temperature above 60°C (140°F), number of camshaft revolutions since start greater than 50 and the KS signal profile must be greater than the threshold value at a given engine speed for a fault condition to be flagged
- Error counter for verification of knock internal circuitry exceeded – the engine must be running, coolant temperature above 60°C (140°F), number of camshaft revolutions since start greater than 50 and the error counter greater than the threshold value at a given engine speed for a fault condition to be flagged

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
P0327	Knock sensor 1 circuit low input (bank 1 or single sensor)	LH bank signal less than threshold determined from ECM model above 2200 rev/min
P0328	Knock sensor 1 circuit high input (bank 1 or single sensor)	LH bank signal greater than threshold determined from ECM model above 2200 rev/min
P0332	Knock sensor 2 circuit low input (bank 2)	RH bank signal less than threshold determined from ECM model above 2200 rev/min
P0333	Knock sensor 2 circuit high input (bank 2)	RH bank signal greater than threshold determined from ECM model above 2200 rev/min

Spark plugs

The spark plugs are platinum tipped on both centre and earth electrodes. The platinum tips give a long maintenance free life.

Cleaning or resetting the spark plug gap is not recommended as this could result in damaging the platinum tips and thereby reducing reliability.

The misfire detection system will malfunction and store erroneous codes if the incorrect spark plugs are used.

Input/Output

The ignition coils provide a voltage to the spark plugs via the ht leads. The cylinder head via the individual thread of each spark plug provides the earth path.

The spark plugs can fail in the following ways:

- Faulty component.
- Connector or wiring fault.
- Breakdown of high tension lead causing tracking to chassis earth.
- Incorrect spark plugs fitted.

In the event of a spark plug failure, misfire on specific cylinder may be observed: