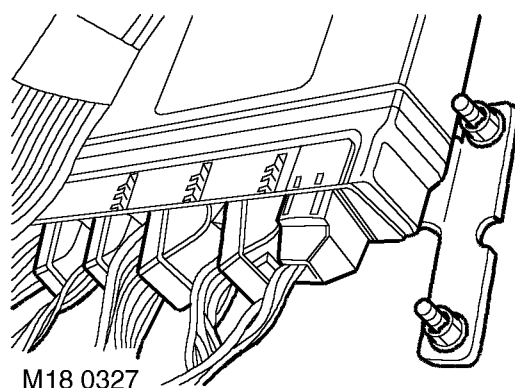


ENGINE MANAGEMENT SYSTEM - V8

Engine Control Module (ECM)



The engine control module (ECM) is located on the RH side A post below the face panel inside the vehicle. It has a cast aluminium case and is mounted on a bracket. The ECM has 5 independent connectors totalling 134 pins.

The ECM is available in 4 variants:

- NAS.
- NAS low emission vehicles.
- UK/ Europe/ Japan/ Australia.
- ROW/ Gulf.

The ECM uses a 'flash' electronic erasable programmable read only memory (EEPROM). This enables the ECM to be externally configured, to ensure that the ECM can be updated with any new information, this also allows the ECM to be configured with market specific data. TestBook must be used to configure replacement ECM's. The ECM can be reprogrammed, using TestBook/T4, with new engine tunes up to 16 times to meet changing specifications and legislation. The current engine tune data can be accessed and read using TestBook/T4.

The ECM memorises the positions of the crankshaft and the camshaft when the engine has stopped via the CKP and CMP sensors. This allows immediate sequential fuel injection and ignition timing during cranking. This information is lost if battery voltage is too low (i.e. flat battery). So the facility will be disabled for the first engine start.

Input/Output

The ECM has various sensors fitted to the engine to allow it to monitor engine condition. The ECM processes these signals and decides what actions to carry out to maintain optimum engine operation by comparing the information from these signals to mapped data within its memory.

Connector 1 (C0634): This connector contains 9 pins and is used primarily for ECM power input and earth. The ECM requires a permanent battery supply, if this permanent feed is lost i.e. the battery discharges or is disconnected the ECM will lose its adapted values and its Diagnostic Trouble Codes (DTC). These adapted values are a vital part of the engine management's rolling adaptive strategy. Without an adaptive strategy, driveability, performance, emission control, and fuel consumption are adversely affected. The ECM can be damaged by high voltage inputs, so care must be taken when removing and replacing the ECM.



Pin out details connector C0634

Pin No.	Function	Signal type	Reading
1	Ignition position II	Input	12 V
2	Not used	-	-
3	Not used	-	-
4	Chassis earth	Earth	0V
5	Fuel injectors earth	Earth	0V
6	Power stage earth	Earth	0V
7	Permanent battery supply	Input battery supply	12V
8	Switched relay positive	Input switched	0-12V
9	Not used	-	-

Connector 2 (C0635): This connector contains 24 pins and is primarily used for Heated Oxygen Sensors (HO₂S) control and earth. The HO₂S sensors require a heater circuit to assist in heating the tip of the sensors to enable closed loop fuelling to be implemented quickly after cold starting.

Pin out details connector C0635

Pin No.	Function	Signal type	Reading
1	HO ₂ S heater RH bank - downstream	Output	PWM 12-0V
2	Not used	-	-
3	Not used	-	-
4	Not used	-	-
5	Thermostat monitoring sensor	Earth	0V
6	Not used	-	-
7	HO ₂ S heater LH bank - downstream	Output	PWM 12-0V
8	HO ₂ S sensor RH bank - downstream	Earth/ Signal	0V
9	HO ₂ S sensor LH bank - upstream	Earth/ Signal	0V
10	HO ₂ S sensor RH bank - upstream	Earth/ Signal	0V
11	HO ₂ S sensor LH bank - downstream	Earth/ Signal	0V
12	Not used	-	-
13	HO ₂ S heater RH bank - upstream	Output	PWM 12-0V
14	HO ₂ S sensor RH bank - downstream	Input/ Signal	Analogue 0-5V
15	HO ₂ S sensor LH bank - upstream	Input/ Signal	Analogue 0-5V
16	HO ₂ S sensor RH bank - upstream	Input/ Signal	Analogue 0-5V
17	HO ₂ S sensor LH bank - downstream	Input/ Signal	Analogue 0-5V
18	Fuel pump relay	Output	Switch to earth
19	HO ₂ S heater LH bank - upstream	Output	PWM 12-0V
20	Not used	-	-
21	Thermostat monitoring sensor	Signal	Analogue 0-5V
22	Not used	-	-
23	Main relay	Output	Switch to earth
24	EVAP system leak detection pump motor (NAS vehicles with positive pressure type, EVAP system leak detection capability only)	Output	Switch to earth

ENGINE MANAGEMENT SYSTEM - V8

Connector 3 (C0636): This connector contains 52 pins and is used for most sensor and actuator inputs and outputs. Sensor and actuator control is vital to ensure that the ECM maintains adaptive strategy

Pin out details connector C0636

Pin No.	Function	Signal type	Reading
1	Injector cylinder number 2	Output	Switch to earth
2	Injector cylinder number 5	Output	Switch to earth
3	Purge valve	Output, signal	PWM 12-0V
4	SAI vacuum solenoid valve (NAS vehicles from 2000MY only)	Output	Switch to earth
5	Not used	-	-
6	Fuel tank pressure sensor (NAS vehicles with vacuum type, EVAP system leak detection only)	Earth	0V
7	MAF sensor 5V supply	Output, reference	5V
8	Not used	-	-
9	MAF sensor earth	Earth	0V
10	TP sensor 5V supply	Output, reference	5V
11	Not used	-	-
12	Not used	-	-
13	Not used	-	-
14	Injector cylinder number 7	Output	Switch to earth
15	Injector cylinder number 6	Output	Switch to earth
16	SAI pump relay (NAS vehicles from 2000MY only)	Output	Switch to earth
17	CMP sensor	Earth	0V
18	Low range switch (manual transmission only)	Input, signal	Active low
19	Not used	-	-
20	CMP signal	Input, signal	Digital switch 0-12V
21	ECT sensor	Earth	0V
22	Coolant temperature signal	Input, signal	Analogue 0-5V
23	MAF sensor signal	Input, signal	Analogue 0-5V
24	TP sensor signal	Input, signal	Analogue 0-5V
25	TP sensor earth	Earth	0V
26	Not used	-	-
27	Injector cylinder number 3	Output	Switch to earth
28	Injector cylinder number 8	Output	Switch to earth
29	Hill decent control output	Output, signal	PWM 0-12V
30	EVAP canister vent solenoid (CVS) valve (NAS vehicles with vacuum type, EVAP system leak detection only)	Output	Switch to earth
30	Leak detection pump solenoid (NAS vehicles with positive pressure type, EVAP system leak detection only)	Output	Switch to earth
31	A/C condenser fan	Output	Switch to earth
32	CKP sensor signal	Input, signal	Analogue, 0-300V peak
33	Not used	-	-
34	IAT sensor signal	Input, signal	Analogue 0-5V
35	KS, RH bank earth	Earth	0V
36	KS, RH bank signal	Input, signal	Analogue
37	Not used	-	-
38	Not used	-	-
39	Not used	-	-
40	Injector cylinder number 4	Output	Switch to earth
41	Injector cylinder number 1	Output	Switch to earth
42	Idle air control valve open	Output, signal	PWM 12-0V
43	Idle air control valve close	Output, signal	PWM 12-0V
44	ECT sensor signal	Output, signal	PWM 0-12V



Pin No.	Function	Signal type	Reading
45	CKP sensor earth screen	Earth	0V
46	CKP sensor signal	Earth reference	0V
47	Not used	-	-
48	KS, LH bank earth	Earth	0V
49	KS, LH bank signal	Input, signal	Analogue
50	Not used	-	-
51	Not used	-	-
52	Not used	-	-

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Connector 4 (C0637): This connector contains 40 pins and facilitates use of TestBook via the Diagnostic connector. Also contained in this connector is the Malfunction Indicator Lamp (MIL), this instrument panel lamp informs the driver of concerns within the engine management system.

Pin out details connector C0637

Pin No.	Function	Signal type	Reading
1	Not used	-	-
2	Not used	-	-
3	Not used	-	-
4	Not used	-	-
5	Not used	-	-
6	Not used	-	-
7	Not used	-	-
8	Low fuel level	Input, signal	Active high
9	Fuel tank pressure sensor (NAS vehicles with vacuum type, EVAP system leak detection capability only)	Output, reference	5V
10	Not used	-	-
11	Not used	-	-
12	Analogue fuel level (NAS vehicles with positive pressure type, EVAP system leak detection only)	Input, signal	0-5V
13	Not used	-	-
14	Fuel tank pressure sensor (NAS vehicles with vacuum type, EVAP system leak detection capability only)	Input, signal	Analogue 0-5V
15	Not used	-	-
16	ATC compressor request	Input, signal	Active low
17	Engine speed output	Output, signal	PWM 0-5V
18	Not used	-	-
19	Not used	-	-
20	Malfunction indicator lamp 'ON'	Output	Switched earth
21	Not used	-	-
22	Vehicle speed signal (VSS)	Input, signal	PWM 0-12V
23	Not used	-	-
24	Not used	-	-
25	Not used	-	-
26	Not used	-	-
27	Not used	-	-
28	Not used	-	-
29	ATC compressor relay	Output	Switched earth
30	Not used	-	-
31	Positive pressure type EVAP system heater (02MY vehicles only)	Output, drive	Switched earth
32	Diagnostic connector K-line	Bi-directional	Serial 0-12V
33	Immobiliser serial W link	Input, signal	Serial 0-12V
34	Rough road signal	Input, signal	PWM 0-12V
35	Not used	-	-
36	CAN data bus 'high line'	Bi-directional	5-2.5V
37	CAN data bus 'low line'	Bi-directional	0-2.5V
38	ATC stand by	Input, signal	Active low
39	Not used	-	-
40	Not used	-	-



Connector 5 (C0638): This connector contains 9 pins and is used to control the ignition system. The ignition coils are supplied with power and a switching earth completes the circuit.

Pin out details connector C0638

Pin No.	Function	Signal type	Reading
1	Not used	-	-
2	Ignition , Cylinders 2 and 3	Output	Switch to earth
3	Not used	-	-
4	Not used	-	-
5	Ignition coil earth	Earth	0V
6	Ignition , Cylinders 1 and 6	Output	Switch to earth
7	Ignition , Cylinders 4 and 7	Output	Switch to earth
8	Ignition , Cylinders 5 and 8	Output	Switch to earth
9	Not used	-	-