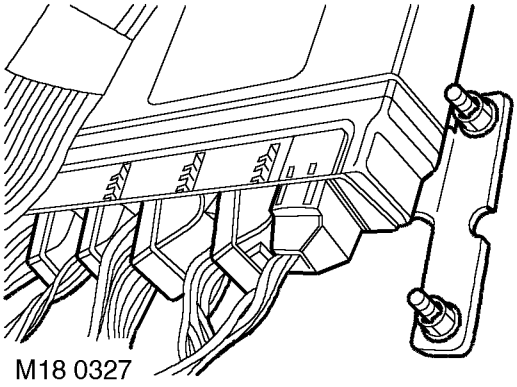
Engine Control Module (ECM)


M18 0327

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 (HO_2S) control and earth. The HO_2S 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_2S 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_2S heater LH bank - downstream	Output	PWM 12-0V
8	HO_2S sensor RH bank - downstream	Earth/ Signal	0V
9	HO_2S sensor LH bank - upstream	Earth/ Signal	0V
10	HO_2S sensor RH bank - upstream	Earth/ Signal	0V
11	HO_2S sensor LH bank - downstream	Earth/ Signal	0V
12	Not used	-	-
13	HO_2S heater RH bank - upstream	Output	PWM 12-0V
14	HO_2S sensor RH bank - downstream	Input/ Signal	Analogue 0-5V
15	HO_2S sensor LH bank - upstream	Input/ Signal	Analogue 0-5V
16	HO_2S sensor RH bank - upstream	Input/ Signal	Analogue 0-5V
17	HO_2S sensor LH bank - downstream	Input/ Signal	Analogue 0-5V
18	Fuel pump relay	Output	Switch to earth
19	HO_2S 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

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	-	-