

Fault code	Fault message
1-1-1	Diagnostic system has not found any faults
1-1-2	Fault in control unit
1-1-3	Injectors
2-2-1	Lambda sond signal absent or faulty
2-3-1	Adaptive Lambda control too lean / rich in part load range
2-3-2	Adaptive lambda control too lean / rich when idling
1-2-1	Pressure sensor signal absent or faulty
1-2-2	Air temp. sensor signal absent or faulty
1-2-3	Engine temp. sensor signal absent or faulty
1-3-2	Battery voltage too high / too low
1-3-3	Throttle switch at idle position
2-1-3	Throttle switch in full load position
2-2-2	System relay signal absent or faulty
2-2-3	Idling control valve signal absent or faulty
2-3-3	Adaptive idling control out of limits
3-1-1	No speedometer signal
3-2-1	Signal to cold start valve short circuited to ground or missing

## REX-1 Trouble Codes

Fault code	Fault message
1-1-1	Diagnostic system has not found any faults
1-4-2	Fault in control unit
1-4-3	Knock sensor signal absent or faulty
1-4-4	No load signal from fuel system
2-2-4	Engine temp. sensor signal absent or faulty

## 1995 850 Models with Bosch Motronic 4.3 System Trouble Codes

DTC	Fault text
5-1-3	Temperature warning level 2
5-1-4	Engine cooling fan, low-speed signal
5-2-1	Front HO2S, preheating
5-2-2	Rear HO2S, preheating
5-3-1	Power stage group A
5-3-2	Power stage group B
5-3-3	Power stage group C
5-3-4	Power stage group D
5-3-5	TC control valve, signal
5-4-1	EVAP-valve, signal
5-4-2	Misfire more than 1 cylinder
5-4-3	Misfire at least 1 cylinder
5-4-4	Misfire more than 1 cylinder. TWC damage
5-4-5	Misfire at least 1 cyl. TWC damage
5-5-1	Misfire cyl. 1. TWC damage
5-5-2	Misfire cyl. 2. TWC damage
5-5-3	Misfire cyl. 3. TWC damage
5-5-4	Misfire cyl. 4. TWC damage
5-5-5	Misfire cyl. 5. TWC damage
	Verification of repair

## OBD II Trouble Codes

OBD-II codes	Fault message
P0100	Mass air flow (MAF) sensor, signal
P0102	Mass air flow (MAF) sensor, signal
P0103	Mass air flow (MAF) sensor, signal
P0115	Engine coolant temperature (ECT) sensor, signal
P0116	Engine coolant temperature (ECT) sensor, signal
P0117	Engine coolant temperature (ECT) sensor, signal
P0118	Engine coolant temperature (ECT) sensor, signal
P0120	Throttle position (TP) sensor, signal
P0122	Throttle position (TP) sensor, signal
P0123	Throttle position (TP) sensor, signal
P0130	Front heated oxygen sensor (HO2S), signal
P0131	Front heated oxygen sensor (HO2S), signal
P0132	Front heated oxygen sensor (HO2S), signal
P0133	Front heated oxygen sensor (HO2S), too slow Rear heated oxygen sensor (HO2S), compensation
P0135	front heated oxygen sensor (HO2S), preheating
P0136	Rear heated oxygen sensor (HO2S), signal
P0137	Rear heated oxygen sensor (HO2S), signal
P0138	Rear heated oxygen sensor (HO2S), signal
P0140	Rear heated oxygen sensor (HO2S), check
P0141	rear heated oxygen sensor (HO2S), preheating
P0170	Long-term fuel trim, part load
P0171	Long-term fuel trim, part load Long-term fuel trim, idling
P0172	Long-term fuel trim, part load Long-term fuel trim, idling
P0201	Injector 1
P0202	Injector 2
P0203	Injector 3
P0204	Injector 4
P0205	Injector 5

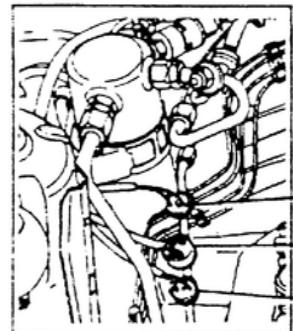
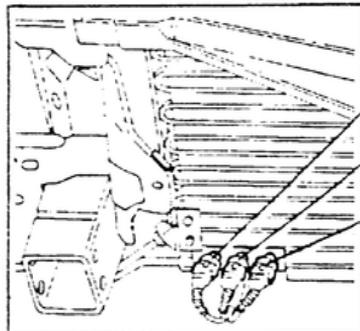
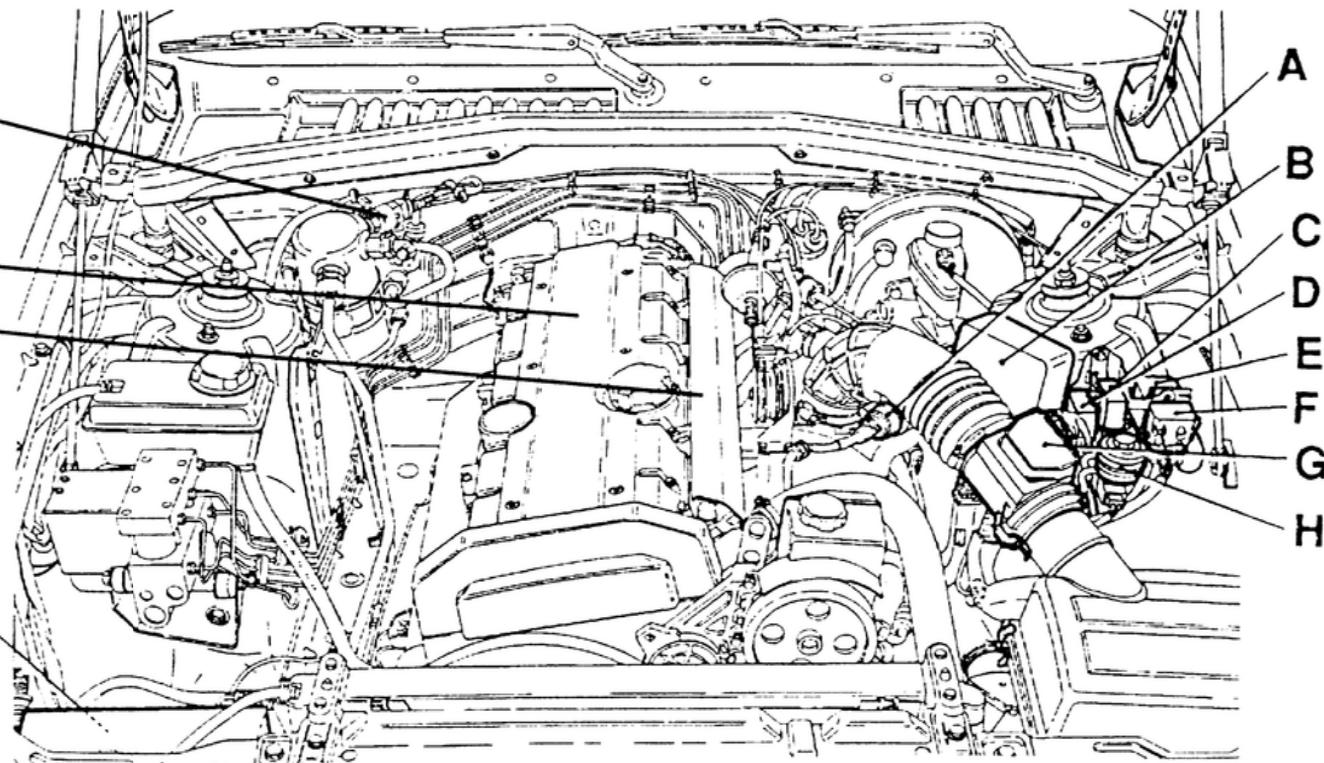
## OBD II Trouble Codes

OBD-II codes	Fault message
P0206	Injector 6
P0300	Misfire emission level from at least 1 cylinder. Misfire with three-way catalytic converter (TWC) damage from at least 1 cylinder
P0301	Misfire emission level cylinder 1 Misfire with three-way catalytic converter (TWC) damage cylinder 1
P0302	Misfire emission level cylinder 2 Misfire with three-way catalytic converter (TWC) damage cylinder 2
P0303	Misfire emission level cylinder 3 Misfire with three-way catalytic converter (TWC) damage cylinder 3
P0304	Misfire emission level cylinder 4 Misfire with three-way catalytic converter (TWC) damage cylinder 4
P0305	Misfire emission level cylinder 5 Misfire with three-way catalytic converter (TWC) damage cylinder 5
P0306	Misfire emission level cylinder 6 Misfire with three-way catalytic converter (TWC) damage cylinder 6
P0325	Front knock sensor (KS), signal
P0330	Rear knock sensor (KS), signal
P0340	Camshaft position (CMP) sensor, signal
P0410	Pulsed secondary air injection system (PAIR), flow fault Pulsed secondary air injection system (PAIR) pump, flow fault Pulsed secondary air injection system (PAIR) valve, leakage Pulsed secondary air injection system (PAIR) pump, signal
P0412	Pulsed secondary air injection system (PAIR) solenoid valve, signal
P0413	Pulsed secondary air injection system (PAIR) solenoid valve, signal
P0414	Pulsed secondary air injection system (PAIR) solenoid valve, signal
P0422	Three-way catalytic converter (TWC) efficiency
P0440	Canister purge (CP) valve, leakage
P0443	Canister purge (CP) valve signal
P0444	Canister purge (CP) valve signal
P0445	Canister purge (CP) valve signal
P0500	Speedometer signal
P0505	Adaptive idle air trim
P0530	Air conditioning (A/C) pressure sensor, signal
P0535	Vehicle speed sensor (VSS), signal
P0560	Battery voltage
P0605	Fault in engine control module (ECM), memory fault
P1307	Accelerometer, signal
P1308	Accelerometer, signal

## OBD II Trouble Codes

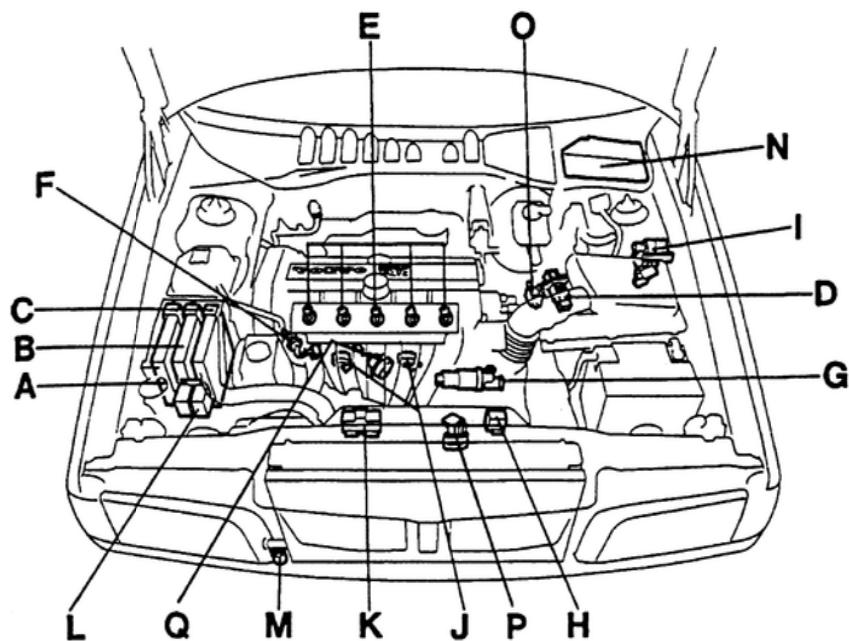
OBD-II codes	Fault message
P1326	Fault in engine control module (ECM), knock control circuit.
P1327	Fault in engine control module (ECM), knock control circuit.
P1328	Fault in engine control module (ECM), knock control circuit.
P1329	Fault in engine control module (ECM), knock control circuit.
P1401	Fault in engine control module (ECM), engine coolant temperature (ECT) sensor circuit NTC switch
P1505	Idle air control (IAC) valve signal opening
P1506	Idle air control (IAC) valve signal opening
P1507	Idle air control (IAC) valve signal closing
P1508	Idle air control (IAC) valve signal closing
P1604	Ignition discharge module (IDM) group D
P1605	Ignition discharge module (IDM) group E
P1617	Cable fault between AW 30–40/43 transmission control module (TCM) and Motronic 4.4 (lamp lights)
P1618	Cable fault between AW 30–40/43 transmission control module (TCM) and Motronic 4.4 (lamp lights)
P1619	engine cooling fan (FC) low-speed
P1620	engine cooling fan (FC) low-speed
P1621	MIL request from another engine control module (ECM)

# 1991-94 960 Models with Bosch Motronic 1.8 Engine Controls

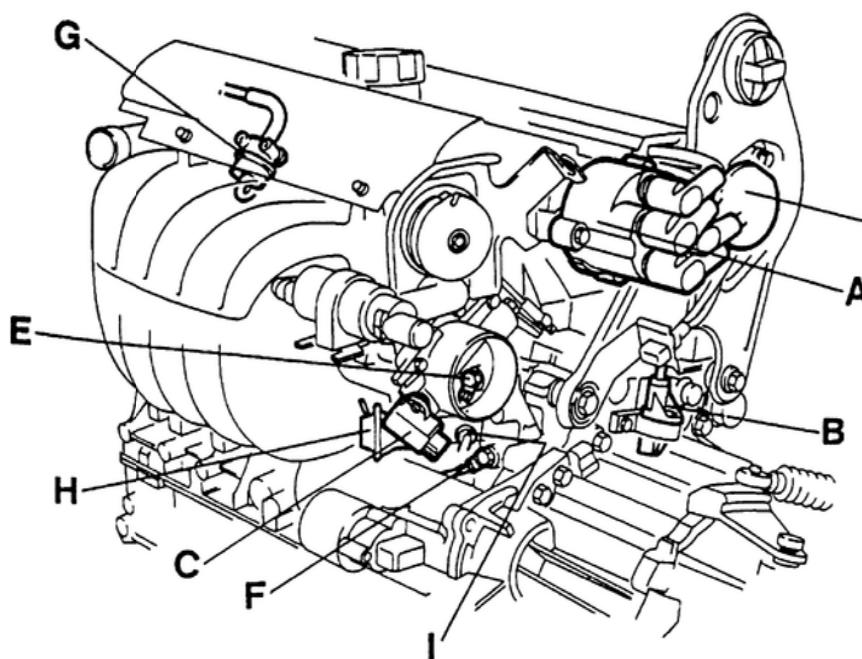


Component	Component
A IAC valve	J2 Pressure switch
B 53-pin connector	J3 Pressure switch engine coolant fan full-speed (92-)
C Main relay	K Engine coolant fan relay
D Ignition coil relay	L1 AC pressure switch (91-)
E DLC B	L2 Pressure switch engine coolant fan 1/2 speed (-91)
F DLC A	L3 Pressure switch engine coolant fan full-speed (-91)
G MAF sensor	M Injection valves
H EGR vacuum controller	N Ignition coils
I AC pressure switch (92-)	P Pressostat

# 1993-94 850 Models with Bosch LH-Jetronic 3.2 Engine Controls

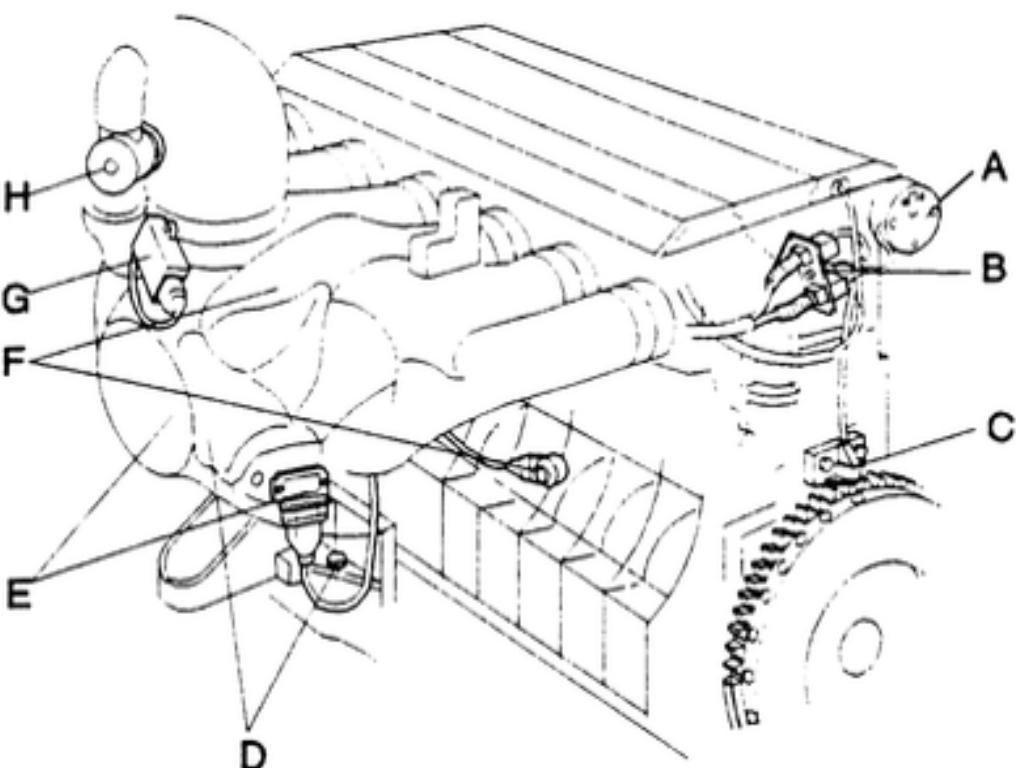


A	TCM
B	MFI module
C	ICM
D	MAF sensor
E	Injectors
F	ECT sensor
G	IAC valve
H	Main relay
I	Ignition coil, power stage
J	KS
K	Relay, engine cooling fan
L	DLC
M	High-pressure switch
N	Electrical distribution unit
O	V-VIS solenoid valve
P	EGR controller
Q	V-VIS vacuum servo



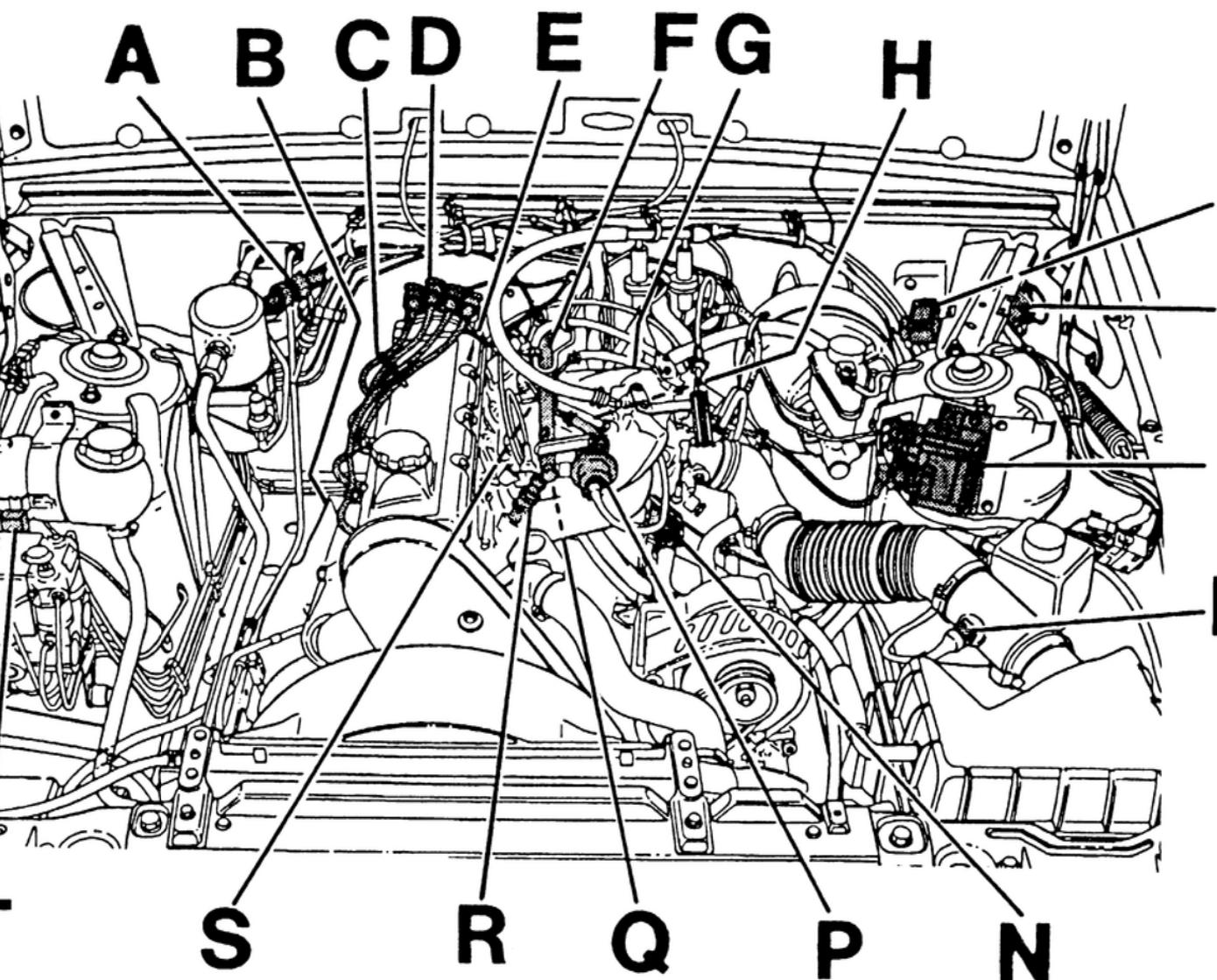
A	Distributor
B	RPM sensor
C	TP potentiometer
D	CMP sensor
E	Power ground
F	Signal ground
G	Pressure regulator
H	EGR valve
I	EGR-temp. sensor

## 1991-94 960 Models with Bosch Motronic 1.8 Engine Controls



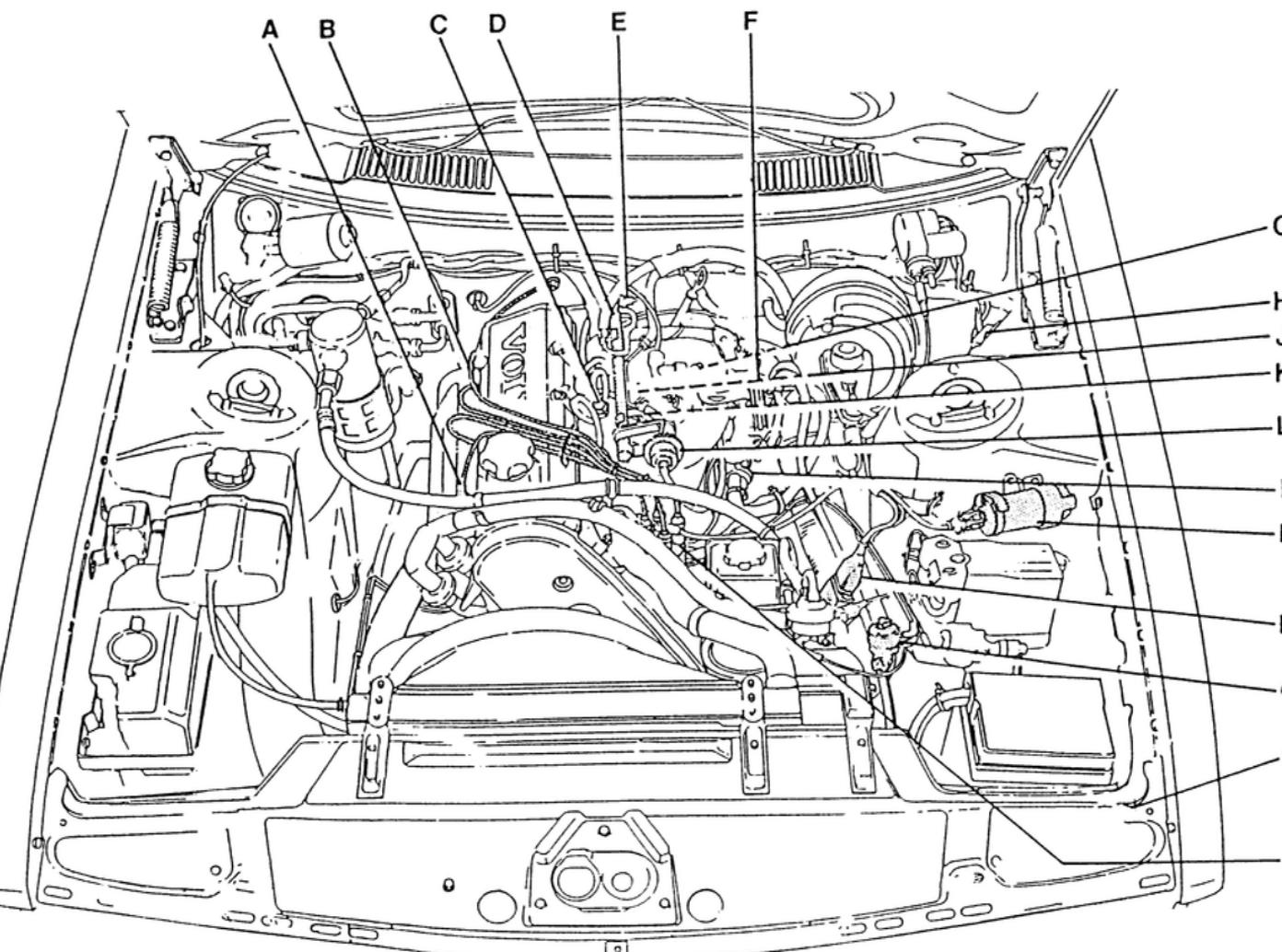
- A Camshaft position sensor
- B Test output ignition coil 1
- C Engine speed (RPM) sensor
- D Ignition discharge module (IDM) ground
- E Ignition discharge module (IDM)
- F Knock sensor (KS)
- G Throttle position (TP) sensor
- H Idle air control (IAC) valve

**1990-91 700 Series with Regina Engine Controls**



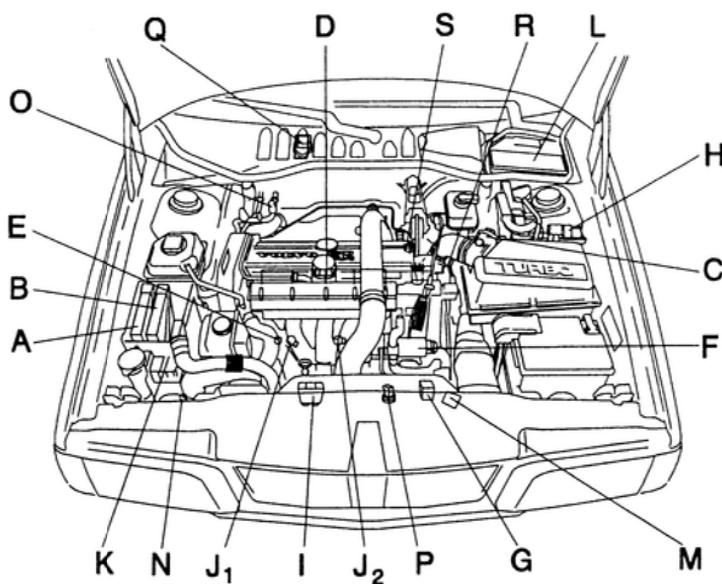
Component	Component
Pressostat A/C	L Power stage / ignition coil
Spark plug	M Air temp. sensor
Ignition cables	N Idle valve
Distributor	P Pressure regulator
Impulse sensor	Q Cold start injector
Fuel distribution pipe	R Injectors
Throttle switch	S Engine temp. sensor
Knock sensor	T Auxiliary relay
Air pressure sensor	
Diagnostic socket	

## 1990-93 240 Series with LH-Jetronic 2.4/3.1 Engine Controls

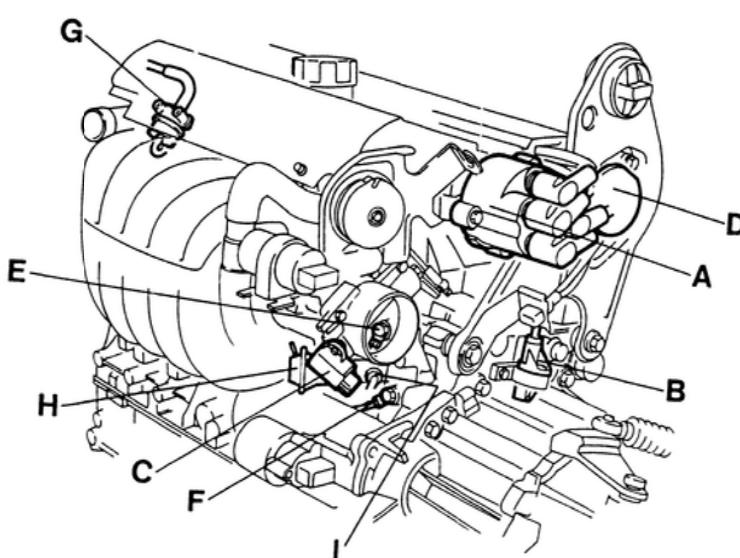


Component	Component
Spark plug	K Knock sensor (KS)
Ignition leads	L Pressure regulator
Injectors	M Idle air control (IAC) valve
Fuel injection manifold	N Ignition coil
RPM sensor	P Mass air flow (MAF) sensor
Throttle switch (MFI LH 2.4)/Throttle position sensor (MFI LH 3.1)	Q Vacuum regulator
EGR valve	R Output stage
Data link connector (DLC)	S Distributor
ECT sensor	

## 1995-98 850/C70/S70/V70 Models with Bosch Motronic 4.3 Engine Controls



A	TCM
B	ECM
C	MAF sensor
D	Injectors
E	ECT sensor
F	IAC valve
G	Main relay
H	Ignition coil, power stage
I	Relay, engine cooling fan
J <sub>1</sub>	Front KS
J <sub>2</sub>	Rear KS
K	DLC
L	Electrical distribution unit
M	EVAP valve
N	A/C pressure sensor
O	Pressostat
P	EGR vacuum controller (certain markets only)
Q	Acceleration sensor (certain markets only)
R	TC control valve (only turbo)
S	Pressure servo wastegate valve (only turbo)

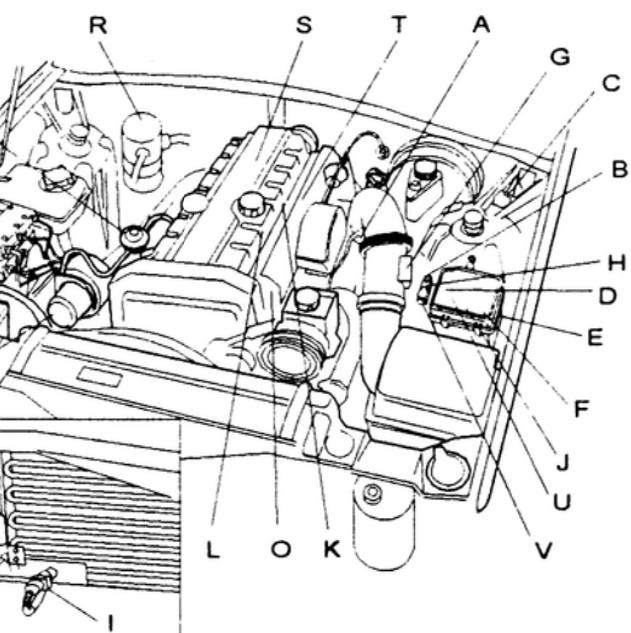


A	Distributor
B	RPM sensor
C	TP potentiometer
D	CMP sensor
E	Power ground
F	Signal ground
G	Pressure regulator
H	EGR valve (certain markets only)
I	EGR temp. sensor (certain markets only)

**1990-95 Coupe, 240, 700, and 940 Series with LH-Jetronic  
2.4 or 3.1 System Trouble Codes**

DTC	Fault message
1-1-1	No fault detected
1-1-2	Control module fault
1-1-3	Short term fuel trim (Lambda control) too lean/rich
1-2-1	MAF sensor signal absent or faulty LH 2.4
1-2-1	MAF sensor signal absent or faulty LH 3.1
1-2-3	ECT signal absent or faulty
1-3-1	Engine speed signal from DI system absent on starting
1-3-2	Battery voltage too low or too high
1-3-3	TP switch signal faulty at idling LH 2.4
2-1-2	HO2S signal absent or faulty
2-1-3	TP switch signal faulty at full load LH 2.4
2-2-1	Adaptive fuel trim too lean in part-load range
2-2-3	IAC valve signal absent or faulty
2-3-1	Adaptive fuel trim too lean or too rich in part-load range
2-3-2	Adaptive fuel trim too lean or too rich at idling
3-1-1	Speedometer signal absent
3-1-2	No knock enrichment signal from DI system
3-2-2	MAF sensor burn off signal absent or faulty LH 2.4
4-1-1	Throttle position sensor signal absent or faulty LH 3.1

# 995-98 960/S90/V90 Models with Bosch Motronic 4.4 Engine Com



- A Idle air control (IAC) valve
- B Canister purge (CP) valve
- C Accelerometer
- D 55-pin connector
- E Integrated relay/fusebox
- F Pulsed secondary air injection s pump relay
- G Mass air flow (MAF) sensor
- H Pulsed secondary air injection s solenoid valve
- I Air conditioning (A/C) pressure s
- J Main relay
- K Signal ground,
- L Power ground
- M Pulsed secondary air injection s pump
- N Blower fan relay
- O Engine coolant temperature (EC
- P Main fusebox
- Q Pulsed secondary air injection s valve
- R Pressure switch (Pressostat)
- S Ignition coils
- T Injectors
- U Ignition coil relay
- V CO potentiometer (certain mark

# 1990-95 Coupe, 240, 700, and 940 Series with EZ-116K Ignition System Trouble Codes

DTC	Fault message
1-1-1	No fault detected
1-4-2	Control module fault
1-4-3	KS signal absent or faulty
1-4-4	Load signal from MFI system absent
1-5-4	EGR system flow too high
2-1-4	RPM sensor signal absent intermittently
2-2-4	ECT sensor signal absent or faulty
2-3-4	TP switch signal in idling position faulty
2-4-1	EGR system flow too low (NTC)
2-4-1	EGR system flow too low (PTC)
4-1-3	EGR temperature sensor signal absent or faulty (NTC)
4-1-3	EGR temperature sensor signal absent or faulty (PTC)

## 1992-95 960 Series with Bosch Motronic 1.8 System Trouble Codes

DTC	Fault text
1-1-1	No fault detected by diagnostic system
1-1-2	ECM fault
1-1-3	Injector group 1
1-1-3	Injector group 2 (earlier models)
1-1-5	Injector group 2 (later models)
1-2-1	MAF sensor signal
1-2-3	ECT sensor signal
1-3-1	RPM sensor signal
1-3-2	Battery voltage
1-4-3	Front KS signal
1-5-4	EGR system, leakage
2-1-2	HO2S signal
2-1-4	RPM sensor signal, intermittent
2-2-1	Long-term fuel trim, part load
2-2-3	IAC valve signal
2-3-1	Long-term fuel trim, part load
2-3-2	Long-term fuel trim, idle
2-3-3	Long-term idle air trim
2-4-1	EGR system
2-4-1	EGR system, flow malfunction
2-4-3	TP sensor signal
3-1-1	VSS signal
3-1-4	CMP signal
3-2-2	MAF sensor burnoff
4-1-1	TP sensor signal
4-1-3	EGR temperature sensor signal
4-3-3	Rear KS signal
5-1-1	Long-term idle air trim, idle
5-1-2	Short-term fuel trim

## 1993-94 850 Models with LH-Jetronic 3.2 System Trouble Codes

DTC	Fault text
1-1-1	No fault detected by diagnostic system
1-1-2	MFI control module fault
1-1-3	Short term fuel trim, upper limit
1-2-1	MAF sensor signal
1-2-3	ECT sensor signal
1-3-1	RPM signal from ICM
1-3-2	Battery voltage
2-1-2	HO2S signal
2-2-1	Long term fuel trim part load, upper limit
2-2-3	IAC valve signal
2-3-1	Long term fuel trim part load, lower limit
2-3-2	Long term fuel trim idling, upper limit
3-1-1	VSS (vehicle speed sensor) signal
4-1-1	TP potentiometer signal
5-1-1	Long term fuel trim idling, lower limit
5-1-2	Short term fuel trim, lower limit

## 1993-94 850 Models with EZ-129K Ignition System Trouble Codes

DTC	Fault text
1-1-1	No fault detected by diagnostic system
1-1-2	Fault in ICM
1-2-3	ECT sensor signal
1-3-1	RPM sensor signal
1-4-3	KS signal front
1-4-4	Load signal
1-5-4	EGR system leakage
2-1-4	RPM sensor signal sporadic
2-4-1	EGR system flow fault
3-1-1	VSS signal
3-1-4	CMP sensor signal
3-2-4	CMP sensor signal sporadic
4-1-1	TP potentiometer signal
4-1-3	EGR temperature sensor signal
4-3-2	Temperature warning level 1
4-3-3	KS sensor signal rear
5-1-3	Temperature warning level 2

## 1993-94 850 Models with EZ-129K Ignition System Trouble Codes

DTC	Fault text
1-1-1	No fault detected by diagnostic system
1-1-2	Fault in ICM
1-2-3	ECT sensor signal
1-3-1	RPM sensor signal
1-4-3	KS signal front
1-4-4	Load signal
1-5-4	EGR system leakage
2-1-4	RPM sensor signal sporadic
2-4-1	EGR system flow fault
3-1-1	VSS signal
3-1-4	CMP sensor signal
3-2-4	CMP sensor signal sporadic
4-1-1	TP potentiometer signal
4-1-3	EGR temperature sensor signal
4-3-2	Temperature warning level 1
4-3-3	KS sensor signal rear
5-1-3	Temperature warning level 2

# 1995 850 Models with Bosch Motronic 4.3 System Trouble Codes

DTC	Fault text
1-1-1	No faults detected by OBD system
1-1-2	Fault in ECM
1-1-5	Injector 1
1-2-1	MAF sensor signal
1-2-3	ECT signal
1-2-5	Injector 2
1-3-1	RPM sensor signal, missing
1-3-2	Battery voltage
1-3-5	Injector 3
1-4-3	Front KS, signal
1-4-5	Injector 4
1-5-3	Rear HO2S signal
1-5-4	EGR system, leakage
1-5-5	Injector 5
2-1-2	Front HO2S, signal (only USA/CDN)
2-1-2	Front HO2S, signal (not USA/CDN)
2-1-4	RPM sensor signal sporadic
2-2-3	IAC valve opening signal
2-2-5	A/C pressure sensor, signal
2-3-1	Long Term Fuel Trim, part load
2-3-2	Long Term Fuel Trim, idling

1995 850 Models with Bosch Motronic 4.3 System Trouble Codes

DTC	Fault text
2-3-3	Long term idle air trim
2-4-1	EGR system, flow malfunction
2-4-5	IAC valve closing signal
3-1-1	VSS signal
3-1-4	CMP sensor signal
3-1-5	EVAP system
3-2-5	Memory failure
3-3-5	Fault in lead between AW 50-42 and Motronic 4.3 (MIL Request)
4-1-1	TP sensor signal
4-1-3	EGR temp. sensor signal
4-1-4	Boost pressure regulation
4-1-6	Boost pressure reduction from TCM
4-2-5	Rear HO2S, regulating
4-3-2	Temperature warning level 1
4-3-3	Rear KS, signal
4-3-5	Front HO2S slow response
4-3-6	Rear HO2S, compensation
4-4-3	TWC efficiency
4-4-4	Acceleration sensor, signal
4-5-1	Misfire cyl. 1
4-5-2	Misfire cyl. 2
4-5-3	Misfire cyl. 3
4-5-4	Misfire cyl. 4
4-5-5	Misfire cyl. 5

## 1992 Volvo 940

**Submodel:** | **Engine Type:** L4 | **Liters:** 2.3

**Fuel Delivery:** FI | **Fuel:** GAS

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### 1990–94 Vehicles

1. Turn the ignition switch to the **ON** position.
2. Read fault codes.
3. Press diagnostic socket button 1 time and hold for approximately 5 seconds. Release button. After 3 seconds the diode light should light up. While the light is still lit, press the button again and hold for approximately 5 seconds. After releasing the button, the diode light should go off.
4. To ensure that the memory is erased, press the button 1 time, for 1 second but not more than 3 seconds. The diode light should flash code 1-1-1.
5. Start and run engine. If engine will not start, correct the problem before proceeding and start over with Step 1.
6. Check to see if new fault codes have been stored in the memory by pressing the diagnostic socket button 1 time, for 1 second but not more than 3 seconds.
7. If fault code 1-1-1 flashes, it indicates that there are no additional fault codes stored in its memory.

### 1995–98 Vehicles

Control module reset procedures are a very important part of OBD-II system diagnostics. This step should be done at the end of any fault code repair and at the end of any driveability repair.

Clearing codes can be performed by any of the methods below:

- Clear the control module memory with the Generic Scan Tool (GST)
- Clear the control module memory with the vehicle manufacturer's specific tester
- Turn the ignition off and remove the negative battery cable for at least 1 minute.

Removing the negative battery cable may cause other systems in the vehicle to lose their memory. Prior to removing the cable, ensure you have the proper reset codes for radios and alarms.

**NOTE:** The MIL will also be de-activated for some codes if the vehicle completes three consecutive trips without a fault detected with vehicle conditions similar to those present during the fault.

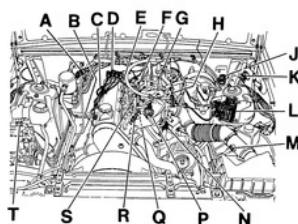
# 1992 Volvo 940

Submodel: | Engine Type: L4 | Liters: 2.3

Fuel Delivery: FI | Fuel: GAS

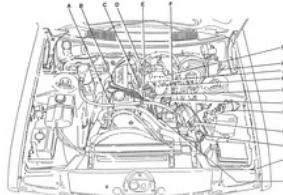


1990-91 700 Series with Regina Engine Controls



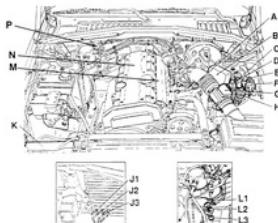
Component	Component
A - Ignition coil	J - Air stage 1 ignition coil
B - Spark plug	M - Idle temp. sensor
C - Ignition cables	N - Idle valve
D - Knock sensor	O - Ignition coil controller
E - Ignition switch	Q - Cold start injector
F - Throttle position	R - Engine temp. sensor
G - Throttle switch	S - Auxiliary relay
H - Knock sensor	T - Knock switch
I - Acceleration sensor	U - Diagnostic socket
K - Diagnostic socket	

1990-91 240 Series with LH-Jetronic 2.4/3.1 Engine Controls



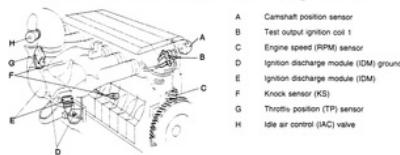
Component	Component
A - Ignition plug	K - Knock sensor (KS)
B - Ignition leads	M - Idle air control (IAC) valve
C - Fuel injection manifold	N - Ignition coil (IMPI) sensor
D - Fuel injection manifold	O - Ignition coil (IMPI) sensor
E - Knock sensor (KS)	P - Vacuum regulator
F - Throttle switch (LH 2.4)/Throttle position	Q - Vacuum regulator
G - Ignit. switch (LH 3.1)	R - Output stage
H - Ignition coil (IMPI)	S - Distributor
Z - EGR sensor	

1991-94 960 Models with Bosch Motronic 1.8 Engine Controls

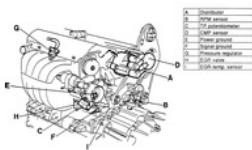
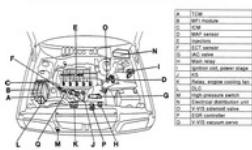


Component	Component
A - AC relay	J2 - Pressure switch
B - 10-pin connector	J3 - Pressure switch engine coolant fan full-speed
C - Main relay	K - Engine coolant fan relay
D - Ignition coil relay	L1 - AC pressure switch (H1)
E - D.C.A.	L2 - Pressure switch engine coolant fan 1/2 speed (H2)
F - D.C.A.	L3 - Pressure switch engine coolant fan full-speed (H3)
G - MAP sensor	M - Idle air valve
H - EGR vacuum controller	N - Ignition coils
J1 - AC pressure switch (H2)	P - Pressurestat

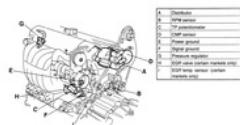
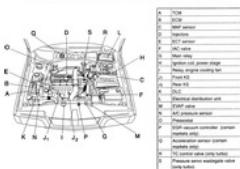
**1991-94 960 Models with Bosch Motronic 1.8 Engine Controls**



**1993-94 850 Models with Bosch LH-Jetronic 3.2 Engine Controls**



**1995-98 850/C70/S70/V70 Models with Bosch Motronic 4.2 Engine Controls**



**1995-98 960/S90/V90 Models with Bosch Motronic 4.4 Engine Controls**



## 1992 Volvo 940

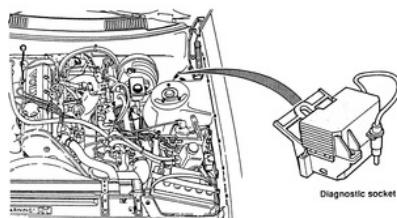
**Submodel:** | **Engine Type:** L4 | **Liters:** 2.3

**Fuel Delivery:** FI | **Fuel:** GAS

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The Data Link Connector (DLC) is located in the engine compartment near the driver's side strut tower on Coupe, 240, 700, and 900 series vehicles without OBD-II. On 850 models the DLC is located in the engine compartment in front of the module box, behind the passenger side headlamp. On OBD-II equipped vehicles, the DLC is located in the interior in center console under a cover.

Fig. 1: DLC location for the Coupe, 240, 700, and 900 series



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Fig. 2: Lift the cover up to access the OBD-II DLC



Fig. 3: The OBD-II connector located in the center console with the cover removed



## 1992 Volvo 940

**Submodel:** | **Engine Type:** L4 | **Liters:** 2.3

**Fuel Delivery:** FI | **Fuel:** GAS

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Volvo vehicles employ the Electronic Engine Control (EEC) system, to manage fuel, ignition and emissions.

The Engine Control Module (ECM) is given responsibility for the operation of the emission control devices, cooling fans, ignition and advance and in some cases, automatic transmission functions. Because the EEC oversees both the ignition timing and the fuel injector operation, a precise air/fuel ratio will be maintained under all operating conditions. The ECM is a microprocessor or small computer which receives electrical inputs from several sensors, switches and relays on and around the engine.

Based on combinations of these inputs, the ECM controls outputs to various devices concerned with engine operation and emissions. The engine control assembly relies on the signals to form a correct picture of current vehicle operation. If any of the input signals is incorrect, the ECM reacts to what ever picture is painted for it. For example, if the coolant temperature sensor is inaccurate and reads too low, the ECM may see a picture of the engine never warming up. Consequently, the engine settings will be maintained as if the engine were cold. Because so many inputs can affect one output, correct diagnostic procedures are essential on these systems.

One part of the ECM is devoted to monitoring both input and output functions within the system. This ability forms the core of the self-diagnostic system. If a problem is detected within a circuit, the controller will recognize the fault, assign it an identification code, and store the code in a memory section. Depending on the year and model, the fault code(s) may be represented by two or three digit numbers. The stored code(s) may be retrieved during diagnosis.

While the EEC system is capable of recognizing many internal faults, certain faults will not be recognized. Because the computer system sees only electrical signals, it cannot sense or react to mechanical or vacuum faults affecting engine operation. Some of these faults may affect another component which will set a code. For example, the ECM monitors the output signal to the fuel injectors, but cannot detect a partially clogged injector. As long as the output driver responds correctly, the computer will read the system as functioning correctly. However, the improper flow of fuel may result in a lean mixture. This would, in turn, be detected by the oxygen sensor and noticed as a constantly lean signal by the ECM. Once the signal falls outside the pre-programmed limits, the engine control assembly would notice the fault and set an identification code.

Additionally, the EEC system employs adaptive fuel logic. This process is used to compensate for normal wear and variability within the fuel system. Once the engine enters steady-state operation, the engine control assembly watches the oxygen sensor signal for a bias or tendency to run slightly rich or lean. If such a bias is detected, the adaptive logic corrects the fuel delivery to bring the air/fuel mixture towards a centered or 14.7:1 ratio. This compensating shift is stored in a non-volatile memory which is retained by battery power even with the ignition switched OFF. The correction factor is then available the next time the vehicle is operated.

**NOTE:** If the battery cable(s) is disconnected for longer than 5 minutes, the adaptive fuel factor will be lost. After repair it will be necessary to drive the vehicle at least 10 miles to allow the processor to relearn the correct factors. The driving period should include steady-throttle open road driving if possible. During the drive, the vehicle may exhibit driveability symptoms not noticed before. These symptoms should clear as the ECM computes the correction factor.

## 1992 Volvo 940

Submodel: | Engine Type: L4 | Liters: 2.3

Fuel Delivery: FI | Fuel: GAS

### 1990–94 Vehicles

1. Open diagnostic socket cover and install selector cable into socket No. 2 for fuel injection codes or socket No. 6 (except Motronic systems) for ignition codes.
2. Turn the ignition switch to the **ON** position.
3. Enter control system 1 by pressing the button once. Hold the button for at least 1 second, but not more than 3.
4. Watch the diode light and count the number of flashes in the 3 flash series indicating a fault code. The flash series are separated by 3 second intervals. Note fault codes. If there are no fault codes in the diagnostic unit, the diode will flash 1-1-1 and the fuel system is operating correctly.
5. If diode light does not flash when button is pressed, or no code is flashed there is a problem with the soft-diagnostic system, proceed as follows:
  - A. Check ground connections on the intake manifold, and the ground connection for the Lambda-sond at the right front mudguard.
  - B. Check the fuses for the pump relay and the primary pump. On 240 models, fuses are located inside the engine compartment on the left side wheel well housing. On 760/780 models, fuses are located in the center console, just below the radio. On 740/940 models, fuses are located behind the ashtray. Access can be gained by removing the ashtray, and pressing upward on the tab marked "electrical fuses press". On 850 models, the fuses are located on the left side of the engine compartment behind the strut mount plate. The fuses on 960 models are located on the far left side of the dashboard. The driver's door must be open to gain access to the fuses.
  - C. Remove glove compartment, and check control unit ground connections.
  - D. Turn the ignition switch to the **OFF** position. Remove control unit connector and connector protective sleeve.
  - E. Check diagnostic socket by connecting a voltmeter between ground and No. 4 connection on the control unit connector. Reading should be 12 volts. If no voltage is present, check lead between control unit connector and fuse No. 1 in the fuse/relay box.
  - F. Turn the ignition to the **ON** position, and install selector cable into the No. 2 socket on the diagnostic socket. Connect a voltmeter between ground and No. 12 connection on the control unit connector. Reading should be 12 volts. Press the button on diagnostic socket and note reading. Reading on the voltmeter should be 0 volts. If no voltage at the control unit is present, take reading at the diagnostic socket connector. If reading remains at 12 volts when button is pressed, check diagnostic socket.
  - G. Connect a voltmeter between ground and the red/black lead on the diagnostic socket connector. Reading should be 12 volts.
  - H. Connect a suitable ohmmeter between ground and the brown/black lead in the diagnostic socket connector. Reading should be 0 ohms.
  - I. Turn the ignition to the **OFF** position. Connect ohmmeter between diagnostic socket selector cable and the pin under selector button. The ohmmeter should read infinity. Press the button and note the reading. The reading should be 0 ohms.
  - J. Connect a suitable diode/multimeter tester, or equivalent, between the diagnostic socket diode light and the selector cable. Connect red test pin from the tester to pin under diode light and black test pin from tester to selector cable. A reading on the tester indicates correct diode light function. With no reading on tester, replace diagnostic socket.
  - K. Check the system relay/primary relay by connecting a voltmeter between ground and the No. 9 connection on the control unit connector, then connect a jumper wire between ground and No. 21 connection on the control unit connector. The relay should activate and the reading should be 12 volts.
6. Press the diagnostic socket button. Note any additional fault codes.

**NOTE: The diagnostic system memory is full when it contains 3 fault codes. Until those codes are corrected and the memory erased, the system cannot give information on any other problems.**

7. Press the diagnostic socket button for the third time to see if a third fault code is stored in the memory. If the diode light flashes the same code 1-1-1, there are no other codes in the memory.

Fig. 4: Push button once for mode 1

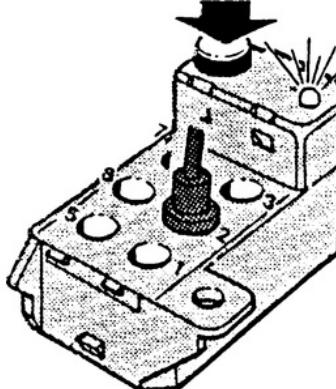


Fig. 5: Push button twice for mode 2

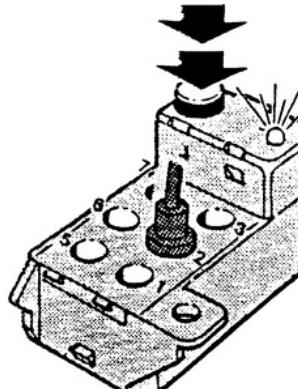
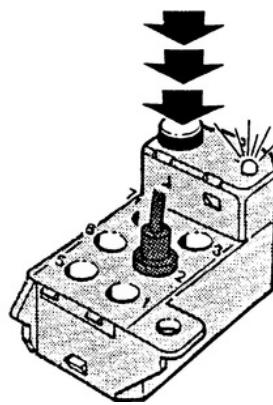


Fig. 6: Push button three times for mode 3



### 1995–98 Vehicles

Reading the control module memory is one of the first steps in OBD-II system diagnostics. This step should be initially performed to determine the general nature of the fault. Subsequent readings will determine if the fault has been cleared.

Reading codes can be performed by any of the methods below:

- Read the control module memory with the Generic Scan Tool (GST)
- Read the control module memory with the vehicle manufacturer's specific tester

To read the fault codes, connect the scan tool or tester according to the manufacturer's instructions. Follow the manufacturer's specified procedure for reading the codes.

1990-91 700 Series with Regina Engine and Rex-1 Ignition Systems Trouble Codes

Fault code	Fault message
1-1-1	Diagnostic system has not found any faults
1-1-2	Fault in control unit
1-1-3	Knock sensor signal absent or faulty
2-2-1	Lambda sond signal absent or faulty
2-2-1	Adaptive Lambda control too lean / rich in part load range
2-2-2	Adaptive lambda control too lean / rich when idling
1-2-1	Pressure sensor signal absent or faulty
1-2-2	Air temp. sensor signal absent or faulty
1-2-3	Engine temp. sensor signal absent or faulty
1-2-2	Battery voltage too high / too low
1-3-2	Throttle switch at idle position
2-1-3	Throttle switch in full load position
2-2-2	System relay signal absent or faulty
2-2-3	Idling control valve signal absent or faulty
2-3-3	Adaptive idling control out of limits
3-1-1	No speedometer signal
3-2-1	Signal to cold start valve short circuited to ground or missing

REX-1 Trouble Codes

Fault code	Fault message
1-1-1	Diagnostic system has not found any faults
1-4-2	Fault in control unit
1-4-3	Knock sensor signal absent or faulty
1-4-4	No load signal from fuel system
2-2-4	Engine temp. sensor signal absent or faulty

1990-95 Coupe, 240, 700, and 940 Series with LH-Jetronic  
2.4 or 3.1 System Trouble Codes

DTC	Fault message
1-1-1	No fault detected
1-1-2	Control module fault
1-1-3	Short term fuel trim (Lambda control) too lean/rich
1-2-1	MAF sensor signal absent or faulty LH 2.4
1-2-1	MAF sensor signal absent or faulty LH 3.1
1-2-3	ECT signal absent or faulty
1-3-1	Engine speed signal from DI system absent on starting
1-3-2	Battery voltage too low or too high
1-3-3	TP switch signal faulty at idling LH 2.4
2-1-2	HO2S signal absent or faulty
2-1-3	TP switch signal faulty at full load LH 2.4
2-2-1	Adaptive fuel trim too lean in part-load range
2-2-3	IAC valve signal absent or faulty
2-3-1	Adaptive fuel trim too lean or too rich in part-load range
2-3-2	Adaptive fuel trim too lean or too rich at idling
3-1-1	Speedometer signal absent
3-1-2	No knock enrichment signal from DI system
3-2-2	MAF sensor burn off signal absent or faulty LH 2.4
4-1-1	Throttle position sensor signal absent or faulty LH 3.1

1990-95 Coupe, 240, 700, and 940 Series with EZ-116K  
Ignition System Trouble Codes

DTC	Fault message
1-1-1	No fault detected
1-4-2	Control module fault
1-4-3	KS signal absent or faulty
1-4-4	Load signal from MFI system absent
1-5-4	EGR system flow too high
2-1-4	RPM sensor signal absent intermittently
2-2-4	ECT sensor signal absent or faulty
2-3-4	TP switch signal in idling position faulty
2-4-1	EGR system flow too low (NTC)
2-4-1	EGR system flow too low (PTC)
4-1-3	EGR temperature sensor signal absent or faulty (NTC)
4-1-3	EGR temperature sensor signal absent or faulty (PTC)

## 1992-95 960 Series with Bosch Motronic 1.8 System Trouble Codes

DTC	Fault text
1-1-1	No fault detected by diagnostic system
1-1-2	ECM fault
1-1-3	Injector group 1
1-1-3	Injector group 9 (earlier models)
1-1-5	Injector group 2 (later models)
1-2-1	MAF sensor signal
1-2-3	ECT sensor signal
1-2-5	RPM sensor signal
1-2-6	Battery voltage
1-4-2	Front KS signal
1-5-4	EGR system, leakage
2-1-2	HQ2S signal
2-1-4	RPM sensor signal, intermittent
2-1-5	Long-term fuel trim, part load
2-2-3	IAC valve signal
2-2-5	Long-term fuel trim, part load
2-2-6	Long-term fuel trim, idle
2-3-3	Long-term idle air trim
2-4-1	EGR system
2-4-2	Load signal, EGR system flow malfunction
2-4-3	TP sensor signal
3-1-1	VSS signal
3-1-4	CMP signal
3-2-2	MAF sensor burnoff
4-1-1	TP sensor signal
4-2-1	SGR temperature sensor signal
4-2-3	Rear KS signal
5-1-1	Long-term idle air trim, idle
5-1-2	Short-term fuel trim

## 1993-94 850 Models with LH-Jetronic 3.2 System Trouble Codes

DTC	Fault text
1-1-1	No fault detected by diagnostic system
1-1-2	MFI control module fault
1-1-3	Short term fuel trim, upper limit
1-2-1	MAF sensor signal
1-2-3	ECT sensor signal
1-3-1	RPM signal from ICM
1-3-2	Battery voltage
2-1-2	HQ2S signal
2-2-1	Long term fuel trim part load, upper limit
2-2-3	IAC valve signal
2-3-1	Long term fuel trim part load, lower limit
2-3-2	Long term fuel trim idling, upper limit
3-1-1	VSS (vehicle speed sensor) signal
4-1-1	TP potentiometer signal
5-1-1	Long term fuel trim idling, lower limit
5-1-2	Short term fuel trim, lower limit

## 1993-94 850 Models with EZ-129K Ignition System Trouble Codes

DTC	Fault text
1-1-1	No fault detected by diagnostic system
1-1-2	Fault in ICM
1-2-3	ECT sensor signal
1-3-1	RPM sensor signal
1-4-3	KS signal front
1-4-4	Load signal
1-5-4	EGR system leakage
2-1-4	RPM sensor signal sporadic
2-4-1	EGR system flow fault
3-1-1	VSS signal
3-1-4	CMP sensor signal
3-2-4	CMP sensor signal sporadic
4-1-1	TP potentiometer signal
4-1-3	EGR temperature sensor signal
4-3-2	Temperature warning level 1
4-3-3	KS sensor signal rear
5-1-3	Temperature warning level 2

## 1995 850 Models with Bosch Motronic 4.3 System Trouble Codes

DTC	Fault text
1-1-1	No faults detected by OBD system
1-1-2	Fault in ECM
1-1-9	Injector 1
1-2-1	MAF sensor signal
1-2-3	ECT signal
1-2-5	Injector 2
1-3-1	RPM sensor signal, missing
1-3-2	Battery voltage
1-3-6	Injector 3
1-4-3	Front KS signal
1-4-5	Injector 4
1-5-3	Rear HQ2S signal
1-5-4	EGR system, leakage
1-5-5	Injector 5
2-1-2	Front HQ2S, signal (only USA/CDN)
2-1-2	Front HQ2S, signal (not USA/CDN)
2-1-4	RPM sensor signal sporadic
2-2-3	IAC valve opening signal
2-2-5	A/C pressure sensor, signal
2-3-1	Long Term Fuel Trim, part load
2-3-2	Long Term Fuel Trim, idling

1994 850 Models with Bosch Motronic 4.3 System Trouble Codes

DTC	Fault text
2-3-3	Long term fuel air lean.
2-4-1	EGR system, flow malfunction
2-4-5	IAC valve closing signal
3-1-1	VSS signal
3-1-4	CMP sensor signal
3-1-5	EVAP system
3-2-5	Memory failure
3-3-5	Fault in lead between AW 50-42 and Motronic 4.3
4-1-1	TP sensor signal
4-1-3	EGR temp. sensor signal
4-1-4	Boost pressure regulation
4-1-6	Boost pressure reduction from TCM
4-2-5	Rear HO2S, regulating
4-3-2	Temperature warning level 1
4-3-3	Rear X3, signal
4-3-5	Front HO2S slow response
4-3-6	Rear HO2S, compensation
4-4-3	TWC efficiency
4-4-4	Acceleration sensor, signal
4-5-1	Malfunction 1
4-5-2	Malfunction 2
4-5-3	Malfunction 3
4-5-4	Malfunction 4
4-5-5	Malfunction 5

1995 850 Models with Bosch Motronic 4.3 System Trouble Codes

DTC	Fault text
5-1-3	Temperature warning level 2
5-1-4	Engine cooling fan, low-speed signal
5-2-1	Front HO2S, preheating
5-2-2	Rear HO2S, preheating
5-3-1	Power stage group A
5-3-2	Power stage group B
5-3-3	Power stage group C
5-3-4	Power stage group D
5-3-5	TC control valve, signal
5-4-1	EVAP-valve, signal
5-4-2	Misfire more than 1 cylinder
5-4-3	Misfire at least 1 cylinder
5-4-4	Misfire more than 1 cylinder. TWC damage
5-4-5	Misfire at least 1 cyl. TWC damage
5-5-1	Misfire cyl. 1. TWC damage
5-5-2	Misfire cyl. 2. TWC damage
5-5-3	Misfire cyl. 3. TWC damage
5-5-4	Misfire cyl. 4. TWC damage
5-5-5	Misfire cyl. 5. TWC damage
	Verification of repair

OBD-II Trouble Codes

OBD-II trouble code	Fault message
P0100	Mass air flow (MAF) sensor, signal
P0102	Mass air flow (MAF) sensor, signal
P0104	Mass air flow (MAF) sensor, signal
P0115	Engine coolant temperature (ECT) sensor, signal
P0116	Engine coolant temperature (ECT) sensor, signal
P0117	Engine coolant temperature (ECT) sensor, signal
P0118	Engine coolant temperature (ECT) sensor, signal
P0120	Throttle position (TP) sensor, signal
P0122	Throttle position (TP) sensor, signal
P0123	Throttle position (TP) sensor, signal
P0124	Throttle position (TP) sensor, signal
P0125	Front heated oxygen sensor (HO2S), signal
P0126	Front heated oxygen sensor (HO2S), signal
P0127	Front heated oxygen sensor (HO2S), signal
P0128	Front heated oxygen sensor (HO2S), signal
P0129	Front heated oxygen sensor (HO2S), too slow. Rear heated oxygen sensor (HO2S), preheating
P0129	Front heated oxygen sensor (HO2S), preheating
P0130	Front heated oxygen sensor (HO2S), signal
P0131	Rear heated oxygen sensor (HO2S), signal
P0132	Rear heated oxygen sensor (HO2S), signal
P0133	Front heated oxygen sensor (HO2S), too slow. Rear heated oxygen sensor (HO2S), preheating
P0134	Front heated oxygen sensor (HO2S), preheating
P0135	Long-term fuel trim, part load
P0171	Long-term fuel trim, part load. Long-term fuel trim, diag
P0172	Long-term fuel trim, part load. Long-term fuel trim, diag
P0201	Injector 1
P0202	Injector 2
P0203	Injector 3
P0204	Injector 4
P0205	Injector 5

OBD-II Trouble Codes

OBD-II trouble code	Fault message
P0300	Injector 6
P0302	Matrix emission level front at least 1 cylinder. Matrix with three-way catalytic converter.
P0303	Matrix emission level front cylinder 1. Matrix with three-way catalytic converter.
P0304	Matrix emission level front cylinder 2. Matrix with three-way catalytic converter.
P0305	Matrix emission level front cylinder 3. Matrix with three-way catalytic converter.
P0306	Matrix emission level front cylinder 4. Matrix with three-way catalytic converter.
P0307	Matrix emission level front cylinder 5. Matrix with three-way catalytic converter.
P0308	Matrix emission level front cylinder 6. Matrix with three-way catalytic converter.
P0309	Front knock sensor (HS) signal
P0310	Front knock sensor (HS) signal
P0311	Front knock sensor (HS) signal
P0410	Pulsed secondary air injection system (PAS), low load. Pulsed secondary air injection system (PAS), high load. Pulsed secondary air injection system (PAS), low load. Pulsed secondary air injection system (PAS), high load. Pulsed secondary air injection system (PAS), low load. Pulsed secondary air injection system (PAS), high load.
P0411	Three way catalytic converter (TWC) efficiency
P0412	Carburetor purge CTW valve signal
P0413	Carburetor purge CTW valve signal
P0414	Carburetor purge CTW valve signal
P0415	Speedometer signal
P0500	Analog/digital air ratio
P0501	Vehicle speed sensor (VSS) signal
P0502	Vehicle speed sensor (VSS) signal
P0503	Battery voltage
P0505	Fault in engine control module (ECM), memory fault
P1101	Airflow meter, signal
P1102	TP sensor, signal

## OBD II Trouble Codes

OBD-II codes	Fault message
P1326	Fault in engine control module (ECM), knock control circuit.
P1327	Fault in engine control module (ECM), knock control circuit.
P1328	Fault in engine control module (ECM), knock control circuit.
P1329	Fault in engine control module (ECM), knock control circuit.
P1401	Fault in engine control module (ECM), engine coolant temperature (ECT) sensor circuit NTC switch.
P1505	Idle air control (IAC) valve signal opening.
P1506	Idle air control (IAC) valve signal opening.
P1507	Idle air control (IAC) valve signal closing.
P1508	Idle air control (IAC) valve signal closing.
P1604	Ignition discharge module (IDM) group D.
P1605	Ignition discharge module (IDM) group E.
P1617	Cable fault between AW 30-40/43 transmission control module (TCM) and Motronic 4.4 (lamp lights).
P1618	Cable fault between AW 30-40/43 transmission control module (TCM) and Motronic 4.4 (lamp lights).
P1619	engine cooling fan (FC) low-speed.
P1620	engine cooling fan (FC) low-speed.
P1621	MIL request from another engine control module (ECM).