**Service Manual Fault tracing Design**

**Repairs Function**

**Maintenance**

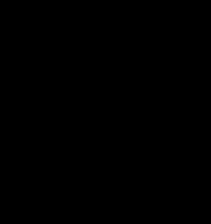
TP 31361/1; 12.88

Section 2 (23)

lH-Jetronic 2.4 fuel system

Engine B 230 F 240 1989-19 ..

**This manual covers the following:**

B 230 F 

Gasoline engine with fuel injection and catalytic con

erter system.

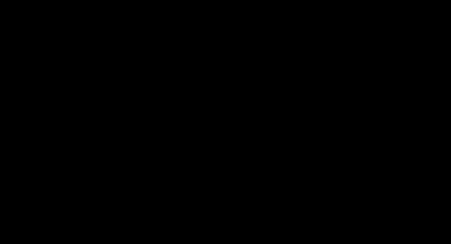
2.3 titer cylinder volume.

Two valves per cylinder.

**LH** 2.4 fuel system

To identify the system with certainty, look for the

following item (see illustration) :

" -­ 

Diagnostic socket



*Contents* 

Fuel system LH2.4 - 240

**Contents** *Page*

Specifications.. .. ,., ..... ... . ....... 2 Special tools ..... .. .. .. ... 5

Design and function

- System overview ............ , . ........ .. , ............ , ............... , .. .. ... 6 - Control unit ...... , .... .. .. ...... ..\_ .... ........... ..... , .... ...... .. 8 - Sensors ....................................................... , ............ .. ............ .. ........... 11 - Catalytic converter, pressure regulator.... ......... .. ............ .... ......... .. ... .. ............... . 13 - Injectors, coldl start valve, fuel pumps. .......... ... ............. ................ .. ...... \_....... ... 14 - Fuel filter, idle valve. .... .. ...... .. ........ \_ . ......... ...\_ .. .. ...... . ..... .. 15 - System relay, fuses .. . ....... ..... ......... \_.... .............. ............. .. ......... \_..... .. ... 16 - EVAP system....... \_. ..... .. ........... .\_ ...... , \_ . ... \_ ... .. .. ............ . . .. 16 - Diagnostic system...... ........ ...... .. ........ \_\_ ................ ..........\_... ............................ 17

Fault tracing, repairs, maintenance

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lihe first section of this manual covers the Design and

Function of the fuel system, Reading it will provide

the necessary background for understanding the

second section - Fault tracing, Repairs and Mainte

nance,

Order No.: TP 31361/1

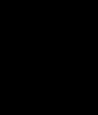
We reserve the right to make alterations

©VOLVO NORTH AMERfCA CORPORATION

**Specifications**

Fuel system LH2.4 - 240

**Specifications**

****

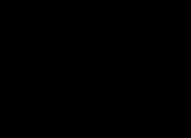
Gasoline, unleaded

Octane requirements:

- RON (Researct1 Octane Number) 91 -95

- AKI Rt M ................................ 87

2



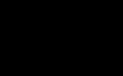
Air mass meter

Volvo *PIN* .. 3517020

Bosch *PIN.* .. ..... ............ 0280212016

Resistance between connectors

2 and 3 ... . .. ............ ......... 25-4.0 n



Throttle switch

Volvo *PIN* ................ ........ .............. 3517068-7

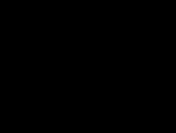
Bosch *PIN* ........... .. . .. .......... 0 280120 325 

Conlrol unit (part numbers)

Wilh EGR (California)

Volvo PIN .................... .. ... 3501687-2 Bosch *PIN .* ..... ...... .. ..... 0 280 000 556

Without EGR (remainder of USA, Europe): Volvo *PIN* .... ............ ............... .... 3517407-7 Bosch *PIN* ........... ....................... 0 280 000 561

**0 280 160 ...**

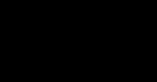
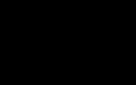
Fuel pressure regulator

VolVO *PIN* ...... ........... .................. 3517064-6 Bosch *PIN* .................. ................... 0 280 160 294

Syslem pressure (fuel pressure above intake manifold pressure): .. ............. 300 kPa (42 psi)

**Specifications**

Fuel svstem LH2.4 - 240

t 

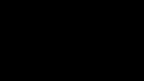
**o 280 150**

Injectors

- Volvo PIN .................. .. . . .... 3517572-8 - Bosch PIN .................. . ..... 0280150762

Injeclion capacity 214 cm'lmin at 300 kPa (42 psi) system pressure.

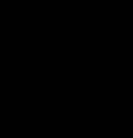
(Note: use only spedal equipment to test disas­ sembled injector)



Cold start valve Icertain models)

Volvo PIN ....................................... 3517130-5 Bosch PIN ............... .. ........... ... 0 280 170 264

Injection capacity around 165 cmJ/min.



Tank pump

Volvo PIN .. ........................ ...... ..... 1389721-0 (13 17671)

Current consumption ..................... 3-4 amp

~

**0580464**

Fuel pump

Volvo PIN .......... . .. .. ......... .... .. .. 1389449-8 Bosch PIN ..... .......... 0 580 464 039 

Pump capacity al 300 kPa (42 psi) and +20°C (68e F): - 12 V ..... .. ... .. .. .............. .. .. .... 130 liters/hour 1.0 litersl 30 sec

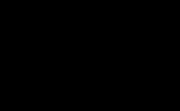
- 11 V .. .. .. .. 108 liters/h our 0.8litersl30 sec

- 10 V .. ... .. ........... ....... 65 Utersthour 0.6 lilers/30 sec

Current consumption at 300 kPa (42 psi). +20· C (68°F) and 12 V

- maximum ......... ............. .. ........... 6. 5 amp

**Safety screen**

****

Fuel filter

Volvo PIN .. .................. 1389450-6 Filters particles down to min. of: ... 0.002 IRll Tightening torque ...... ...... 20-35 Nm (15-25 n.I!»

3

**Specifications**

Fuel system LH2.4 240 o

40000 20000

**10000 8000 6000**

**4000** 2000

**1000**

800

600

400

200

100

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|  |
| --- |

| r-... |
| --- |

~~.....~~ r-..... i'-..

Coolant temperature sensor

- Volvo PIN.""".""." " " ."",, .,,' ", 1346030-8 - Bosch PIN ,"""""'" .",,'"'' '' ,, 0280130032

Resistance in !ls at:

-10°C (14°F) """""" "",,,,, 8260- 10560 +20°C (68°F) ... " .. ' '''' '' ''' """.2280-2720 +80°C (176°F) ",,"""" """""",290-364

For other values, see chart,

**-30 -20 0 20 40 60 IKt 100 120 'C -22 -4 32 68 104 140 176 212 248 -F l!!!2!**

****

Idle valve

- Volvo PIN" " .. ,... " .. """."",,.,, 1389618-8 - Bosch PIN ."""",,...,," ",, 0280140516 Resistance between terminals

1 and 2 """ " """"""""""""""",,,. 8 n

4



•"' Q 

1I~-----!!.!. [) l' **JP=.'::::::I**

**0258 003 ...**

Lambda-sand

- Volvo PIN ", """"""" .,, """ ,3501753-2 - Bosch PIN " " ".""" """"""" """", 0258 003 034

Resistance pre-heating resistor

- cold sond. +20°C (68°F) ".".,,""" 3 n

- hot sond, over 350°C (660°F) "",, 13 n

Tightening torque """."" ,55 Nm (40 IUb )

Apply "Never Seez" paste (PIN 1 161 035-9) to the threaded section 01 the sond,

Special tools

*Fuel system LH2.4 240*

Special tools

999­ Description-use

5011-5 Pressure gauge: indicating fu e l pressure. Used with 5116, 5265, 5266.

5116-2 Hose: connecting pressure gauge 5011.

5151-9 Adaptor: CO-meter. 

5843-1 Vacuum pump: check ing pressure regu lator.

6450-4 Volt Amp meter: fault tracing.

6525-3 Multimeter: volt, amp , ohm. diode.

9724-0 Ohm-diode meter: fault tracing.

9921-0 Volvo Mono-Tester: setting ignition, idli ng speed.

| ~  ~''''~  ~-'<V  ; ,  1/  ~  " |
| --- |



515 --= -'" CO

6450 9724

5

Design and Function LH-Jetronic 2.4 ­ LH2.4

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Idlellll ive @ 

Coolant

romp\_

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Fuel Jystam 

control

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\) 'ON!

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The circled numbers til the drawing reter to the same numbers in the following listing,

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~ml.'

."""~'17' ~\:.V  vRO....

Primary 

pump

®

**Design and function**

Fuel system LH2.4 - 240

**Characteristics of LH2.4 fuel system for Volvo 240:**

It is used together with the EZ116K ignition sys

tem.

It is an adaptive system. being capable of multiple

adjustments based on driving experience.

It is monitored by a self-diagnostic system that

lights up a warning lamp on the instrument panel. 

It has a memory capability of up to three fault

codes (Scandinavia/USA Federal) plus seven

teen additional codes (USA/California). Subse

quent fault tracing can be carried out by actively

utilizing the diagnostic program.

It measures intake air mass via air mass meter

supplied with a hot wire.

It utilizes a primary pump in the fuel tank and a fuel

pump with fuel filter on the fuel line to the engine.

II works on a fuel pressure of 300 kPa (42 psi).

It utilizes a separate cold slart valve which sup

plies extra fuel at. or below 15°C (60"F) or cotder.

It provides a richer fuel mixture to counteract

knock when the fuel system's anti-knock control

system has been unsuccesslul at reducing knock

by adjusting downward several degrees .



•

It requires no adjustment of CO because of the adaptive function.

It has a "limp home" se Ming at the idle valve In case ofloss of current. the idle valve remains open to provide emergency air intake.

In the USA: It has an integrated shift Indicator refated to vehicle speed and engine rpm. The indicator famp lights up if the rpm for the next gear are higher than the pre-programmed limits.

- It uses an induction sensor on the flywheet to indicate rpm and crankshaft position via the igni tion system control unit.

It is fitted with the same model Lambda-sond as for previous l H fuel systems. The resistance of the Lambda-sond is affected by the eXhaust-gasl oxygen concentration The Lambda-sond is mounted on the exhaust manifold between tile engine and Ihe catalytic conver1er.

It is fi tted WIth a three-way catalylJc conver1er .

It utilizes an EVAP system to handle fuel vapors in the fuel tank .

7 

**Design and function**

Fuel system L H2.4 - 240

**Control unit**

The control unit has a microprocessor that receives signals from the various sensors regarding operational conditions, evaluates them in relation to pre-programmed valuas and calculates the correct injector opening durations (in mil/i-seconds per revo

lution).

The conlrol unit governs idling rpm by regulating the amount of aIr by-passing th e throttle valve. It also controls other functions, such as the cold start valve, the fuel pump and the relay. One important function is monitoring fault fracing via the diagnostic socket.

**Self-adjusting functions**

The control unit is adaptive in that it adjusts its calcu lations according to assimilated input.

**temperature** 

**sensor**

**Lambda­**

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.A9'J1riJ 

~@ff;; ---1

I I + ­

**Ttuoule**

**swilt::h**

**Sell-adjusting Idle speed regu lation** In time, wear and coatings will affect the operation of the throHle valve, causing less aIr to enter the intake system. Instead 01 working from a pre-programmed value the idle valve receives a signal that is adapted to the experiences which the control unit has learned from previous driving periods.

**Self-adjusting Lambda-sand**

The Lambda-sond operates in a similar fas hion . It senses if the fuel mixture is rich or lean and adjusts the control unit's Lambda regulator accordingly. The self-regulating mechanism keeps the control unit function at midpoint. This does away with the need to adjust the CO content and automatically compen sates for the effects of tolerances and wear in the in jection system.

Whenever the vehicle is started and driven, the con trol unit will use the value that has been learned from previous driving periods.

**Cold surt**

****

****h **Auxiliary** '-- -W **rela'y**

**Ignition** 

**control**

8

The control unit microprocessor receives:

Exhaust gas oxygen content information from the Lambda-sand.

Rpm and crankshaft position information from the ignition system control unit. If this information is not forthcoming, the fuel system control unit will not function.

Engine temperature information from the coolant temperature sensor.

Engine load information from the air mass meter. Information from the shutter switch as to whether the throttle shutter is closed or wide open. Electrical system voltage from the battery current. The signal from the AC switch informs if it is on, and the signal from the compressor connection indicates that the compressor is operating.

Emergency program

There is a "limp home" function provided if the signal from the air mass meter ceases for some reason, such as the hot wire burning off. A pre-programmed value is used for Injection duration, allowing the vehicle to be driven slowly to the garage.

Design and function 

Fuel system LH2.4 - 240

The control unit microprocessor: Sets the voltage of Ihe system by grounding the system relay.

Breaks the system relay ground if engine turns ovartoo slowly (engine has stopped). This keeps the battery trom being drained and cuts off fuel flow from the fuel pump when the engine isn't in operation.

Grounds Ihe injectors, which regulates opening, liming and injection duration.

Control s air valve tor constant idle speed (CIS). Is connected to the diagnostic unit and provides fault information about the various functions. Provides the ignition system control unit with load intormation.

Protects against too high rpm by shutting oH fuel injection until the engine has stowed down. USA/Canada: governs CH ECK ENGINE warning lamps and shift indicator lamp.

r-----------------------------------------4 .

~~:~m 2 !Ir-------- 15 I ~ =-- r-,-d,-.-""""L..J- Rpm ---­..... r:':lJ Ignition 5Y5tem

r------;:;:;:=~=== ·

control unit 0..".-----'~,I 20 I 3 "'-- Full load --. 0 "'*31*12*/ 1"'--* ~ \_ 21 1 41'"\_ ........"'Sattery + ~

\_--, 1 L-\_\_\_\_\_\_\_

Throttlll

K - --e lZ I 5 • ; .... 1 switch ~KIJ!....I ....... • 23 1 \_ ';;~="=-==':!.~ -I =-O}o 24 1 6 . • 2 ..r=.. 

• 25 1 7 ' • 3 (\'¥-,---, L.\_\_Cr&nksh!tfl position \_ , \.?\_\_ Shift indicator n -------e 2ti I 8 **I • 4** Air mati Diagnotti,

S,m.,/so 4

I, L...I • 21 1 9 ~ r 5 meter un t ... "' .. .

L-\_ \_ Knock enflchm6"' ~ 10 •

~:: 1 12 11 ~ "'- 1 b---­' -- ~ Coolant ~ ¥ 30 ,~' AC <omp""'o, 113 **•** . '\_I I tem peratu rlr

*V*

Cold start **f .** 31 1 sensor ~ ",.. t , 321: :: : ' tAC r=;':":'::..:::::~.:.::::'1 ,.': ~ ,1 16 .\_\\~\.---+\---+-, :." . :,117 :J "' \.~, @",/ , r- 118 k.::......'E-x.,,­ Idie waive ---....: -~ -­

, . • 331 :r~

9

**Design and function**

Fuel system LH2.4 - 240



The start-up program provides for two injection durations per revolution.

The cold-start valve is activated when the tem­ perature is at -15°C (5°F) or below, and the engine speed is under approximately 900 rpm. Once the rpm exceed the pre-programmed limit, the cold­ start valve Is turned off.

======> '"

----------- During normal driving conditions, injection dura tion is regulated mostly with reference to signals trom the air mass meter.



The choke provides a richer fuel mi xture to the engine up to an engine temperature of 60°C (140"F).



Injection duration increases during acceleration.

Knock enrichment provides a richer fuel mixture to counteract knock when the fuel system's anti knock control system has been unsuccessful at reducing knock by adjusting downward severat degrees on all cylinders. Knock cause high combustion temperatures. When knock occurs, the control unit increases the amount of fuel in order bring the combustion temperature down and reduce the knock.

Excess rpm is prevented via a rotation speed limiter which turns 011 the injectors. They are turned on again when the engine rotation is re duced.



At full load, a richer airlluel mixture is used to provide maximum engine power and to lessen the el1ects of combustion heat on the engine and the catalytic converter.

10

During deceleration, fuel injection is discontin ued above 1,800 rpm in all gears. It is resumed at 1,400 to 2,000 rpm, depending on engine tem perature.



**Protect ive** 

**grille**

****

Design and function

Fuel system I.H2.4 - 240

Air mass meter

Measures engine inlake air mass. Those factors which affect air density , such as temp rature, humid· ity and ptessute (altitude) elc. are laken inlo consId eration during measurement.

The measurement sensor inside Ihe air mass meter consists of a wire which Is maintained at 12.0"C (2.S0DF) (previously IOO"C -(215'F) higher tllan tile ambient air entering the engine. As the air mass passing over the wire increases. more currenl is required to maintain the correct temperature. The amount of current required Is used to catculate the air mass taken In.

When the engine is turned oN, any dirt on the wire is burned oN electrically by heating the wire to over 1000' C (tBOO' F). Any dirt remaining on the wire would cause it to send incorrect information to the control unit and result In an Incorrect fueUair mixture.

Earlier models of the air mass meter were provided wi1h an adjustment screw for CO seNings. However. because the LH2..4 Lambda-sand is self-adjusting this screw is no longer necessary.



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Coolant temperature sensor

Provides the control unit with information regarding the engine temperature necessary for proper adjust­ ment of injection duration.



11

**Design and function**

Fuel system LH2. 4 - 240

**Obt009 mount!", bol.- tor**

**adjun ino Iwheh Mtting**

**Fuiliolid** 

**switch** ~

**Throttle** \_\_-- ~-"i~r&2])IS

**spindle**

**C.m disc**

**Idle switch**

**(micro SWiTCh)**

****

**Heatin':..-.Jt...-H­** 

n.m

**Sensor**

**=**

The exhaust gases reach the outer surface of the Lambda"sond sensor via slits in the protective sleeve . Ambient air reaches the sensor's inner surface via channels. The sensor itself consists of a pfatinum covered zirconium-oxide pipe.

The Lambda-sond signal strength is in direcf propor tion to the amount of oxygen in the exhaust gases. This depends on the airlfuel ratio. A Lambda value of 1 represents the theoretically perfect ratio. A rich mixture results in a higher voltage and a lean mixture gives the opposite result.

The current sent by the Lambda-sond to the control unit varies between 0.1 and 1.0 volt.

The shift between high and low voltage occurs when the Lambda value is at 1. The control unit uses this information to adjust the amount of fuel injected.

12

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**Throttle switch**

Tells the fuel system and ignition system control units whether the throttle valve is closed or fully open.



o

**Lambda-sond**

Under normal conditions, the optimum mixture ratio is 14.7kg air to 1kg fuel. The ratio is monitored by post-combustion measurement of the oxygen con tent in the exhaust gas using the Lambda-sond.

This particular model of Lambda-sond is known as a "comparing Lambda-sond'. It produces a measure able current by comparing the amount of oxygen in the exhaust gas with the amount in the ambient air.

The Larnbda-sondoperates only within a certaintem perature range - approx. 285-850°C, (545-1530°F). It is electrically heated to enable it to reach operat ing temperature quickly. When the ignition is turned on, current is sent to a PTC resistor (Positive Tem perature Coefficient) whose resistance increases with rising temperature. Because of this system, the Lambda-sond quickly reaches correct operating temperature, even at low exhaust gas temperatures.



**The Lambda·sond is mounted in the exhaust gas mani fold about 15 cm (6 in.) in front of the catalytic converter.**

****

The catatytic converter cleans the exhaust gases in three ways:

1 - by incinerating unburned hydrocarbons (HC) at high temperature, releasing the residue as steam (H,O).

2 - by converting carbon oxide (CO) to carbon diox ide (CO,) through oxidation.

3 - by reducing nitrogen oxides (NO,) to gaseous nitrogen (N).

90 to 95% of the dangerous gases are rendered hamnless.

o

**Distribution pipe**

Theincoming fuel feed line, pressure regulator, injec tors and cold start valve are connected to the distri bution pipe.

**Design and function**

*Fuel system LH2.4* - *240*

**Catalytic converter**

In order to be able to operate as intended, the catalytic converter is dependent on correct informa tion from the Lambda-sand. The air/fuel mixture must be adjusted so that fuel is completely burned in the engine prior to the exhaust gases reaching the cata lytic converter.

The converter can be damaged through overheating if unburnt fuel is emitted in the exhaust where oxygen is present.

This can happen if a large amount of unburnt fuel reaches the catalytic converter prior to starting. It can also happen if there is a loose ignition cable, and a cylinder pumps unburned fuel into the exhaust. 

Lead in the fuel will quickly aHect the Lambda-sond and cause the exhaust gas cleaning function to stop working. If tllis happens, the Lambda-sond will stop providing the information needed by the control unit to set the fuel mixture and the cataly~c oonverterwill then be destroyed.

The active area is about 20,000 sq. m (2 15.000 sq. ft.). (California EGR converter approx, 32.000 sq. m ~ 345,000 sq, fl.) The precious metal content is about 2 grams (.07 oz) of platinumlrhodlum,

®

Fuel pressure **regulator**

The fuel pressure regulator ensures that the fuel pressure remains constant at the Injectors. Using a vacuum tube connected to the engine Intake mani fold, the fuel pressure is kept at 300kPa (42 psi) above (below) the intake manifold pressure . In this way the pressure over the injectors is kepi constant, regardless of throttle pOSition. The amount of fuel injected depends entirely on the Injection duration. Excess fuel is returned to the fuel lank via a return pipe.

( 13

**Design and function**

Fuel system LH2.4 - 240 o

**Injectors**

The injector is fined with a solenoid, a magnetic 

actuator and a fuel needte which opens or shuts a

nozzle. 

The control unit feeds current to the injectors

in ca lculated time units. This ensures that all

the injectors spray a fine fuel mist simultane·

ously .

While the starter motor is opem ting, there are two

injeclions per rotalion. This is reduced to one for

normal ri~ ng. Injection occurs in the intake manifold

near the intake ~alves.

Disa ssembled injectors should only be inspected

using specially designed equipment in order to mini

mize the risk of explosion from fhe fu el mist.

**Cold start valve** (eenail! models) 

At cold start, a lot 01 fuel condenses on the cold

surfaces in the lorm of droplels . Having a separate

cold start valve improves cold starting. It's placed

farther away from the engine block than the ordinary

injectors and delivers the fuel more as a gas Ihan as

drops. The cold slart valve is controlled directly by the

conlrol unit, ralher than by the thermal time swifCh. It

culS in when the temperature is aboul -15c C (5°F)

and when Ihe engine rolation is below approx. 900

rpm. It culs out permanently if the rpm exceed the

permissible limit.

®

**Fuel pump**

The fuel pump is an eleclric roller pump, cooled by the

fuel which flows through it. It has a non-return valve

and an overflow valve which opens if the pressure

gels 100 high.

Both the primary pump and Ihe fuel pump operate

when either the starter motor or Ihe engine is running . 

However, should the engine stop while Ihe ignition

remains on, the conlrol unll wi ll cut off the current to

the pumps in order 10 eliminate Ihe risk of fire in Ihe

even! of an accidenl.

@

**Tank pump (pre-pump)**

The electric Impeller pump in the fuel tank keeps

pressure in the fuel lTne prior to the (main) fuel pump

to prevenl vapor lock.

The pump has a coarse, slralner Iype filter and a non

return valve to maintain a certain amounl of pressure

in the system even if the main pump is not in

operation.

14

**o 280 150** ... 

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**Vi!llve**

**pump**

**Tank**

**pump**

**Safety scre8n**

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**Des;gn and funct;ol].**

Fuel system LH2.4 - 240

@

**Fuel filter**

The luel filter is adjaoentto the fuel pump and both are mounted on a plate below the veh icle under the back seat.

Itconsists of a paper filter and asafety screen to catch any pieces of the paper filter which come loose.

**Idle valve**

,In order to set the correct air valve opening and thus achieve constant idte speed, the control unit uses in formation from the air mass meter regarding the amount of air entering the engine and from the ignition system control unit regarding rpm. This means that the idle valve is not affected by air leaks or a jammed throttle valve.

When the current is off, a spnng sets the idle valve opening for an idle speed between 1.000 and 1,100 rpm .

Once the engine is running, the control uni t ensures that the idle valve is more or less open al all rotation speeds in order to prevent the development of unnec essarily high negative pressure in the intake manifofd when the throttle shutter closes suddenly during deceleration.

The control unit receives a signal from the AC control when the AC is tumed on or off to enable it to adjust the idle valve. Signals are also sent to the control unit from the AC compressor so that the idle valve can be adjusted each time the compressor turns on or off .

.~~.~~  There is no signal to the control unit when the shuNer

When the throNle valve switch is closed during idling, the control unit receives a signal, enabling it to send current to the air valve electric motor to keep the idle rpm at the correct level.

switch is open. When driving, the control unit keeps the idle valve partially open so that the negalive pressure in the intake manifold is reduced when the gas pedal is released.

15

**Design and function**

Fuel system LH2.4 - 240



**Ignition system**

**contol unil**

**FUIII system**

**co ntrol unit**

**SYl tem relay**

**System relay**

Governed by the control unit, it provides current to the fuel pump, the injectors, the cold start valve, the air mass meter and to certain control unit functions . The system relay and its functions are protected by a 20 amp fuse.

**Fuses**

The system relay is protected by a 25 amp fuse and the tank pump by a 15 amp fuse .

**Evaporative Control System (EVAP)** This system handles the gases that result Irom nor mal fuel lank evaporation, keeping Ihem from escap ing and pollu1ing the air.

Via a hose system, the luel vapor passes from the filler opening through a roll-over valve to a reservoir ("canister', "carbon IIfter-). The fuel vapor is absorbed here. n 1e reservoir is provided with an EVAP valve which prevents leakage of fuel vapor while the engine is not in operaHon.

®

Reservoir (carbon IIIter)

The fuel vapors from the fuel tank enter the top of the

active carbon filter and are absorbed. Air is pushed

out through a channel in the bottom of the filter. 

Depending on temperature and other conditions, the

filter can bind approx. 90 grams of fuel.

®

Roll-over valve

If the vehicle leans sideways at more than a 45'

angle, this valve closes, helping to prevent fuel spills

during accidents.

@)

EVAP valve

This valve is located at the top of the carbon filter and

is closed when the engine is turned off. It's also

closed during idling in order not to interfere with the 

automatic idle settings or make the fuel mi xture too

rich. The valve is closed using vacuum pressure

taken Irom the intake manifold and through being

connected to the throttle shutter positive terminal.

Increased engine load opens the EVAP valve, allow

ing fuel vapor to flow from the carbon filter into the

engine intake manifold . Air is drawn in at the same

time through the bottom channel. Under normal

conditions, the filter is emptied of fuel in 15 to 20

minutes.

16

iQ:::='J Stl,-=== ~~/ fJ 

I) **Carbon**

. **fihM**

**Design and function**

Fuel system LH2.4 - 240

®

**Fuel system diagnostics**

The fuel system has a built-in self-diagnostic system and a funclions testing system\_ It uses the same diagnostic socket as the ignition system and Is lo cated behind the Ie" spring strut tower in the engine

compartment.

The diagnostic system uses socket 2 for the fuel sys­ tem and socket 6 for the ignition system. 

There are eighteen different fault codes in the diag­ nostic system. It is capable of storing up to three fuel system faults.

The fuel system control unit carries out continuous checks of the following functions while the engine is running:

- The control unit's own internal functions. - Lambda-sond and Lambda settings.

- Coolant temperature sensor.

- Air mass meter.

- Battery voltage.

- Throttle shutter. 

- Ignition settings and engine rpm (through Ihe ignition system control unit).

- Speedometer.

- Knock indicator.

- Idle speed air valve.

- Injectors.

Faults in any of these funclions are registered in the diagnostic system memory.

17

The Design and Function 01 the luel system has been

described on the preceding pages. II is important to read

them il you are to have a dear understanding 01 the next

section.

**Fault tracing - Repairs - Maintenance**

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Complete overview 01 the luel system . - Fuses, grounding connections, connectors ..... 32 · Air leakage and throttle shutters ...................... 33-34 • Pumps, pressure regulator, fuel lines ....... ....... 35·37 · Components, cabling. .. ............. .. ... 38·50

A I·A 15

81 -84 Cl·C6 Dl·D6 E l-E28

· Quick check of injectors ... 51 Fl

• Injectors, luel distribution pipe

and pressure regulator .... ...... . . ......... ........ 52

18



( 

*Important*

Fuel system LH2.4 - 240

Important

Warni ng!

The ignition system o perates at ve ry high voltages.

Extreme tare must be taken when working On th o igni­ tion system, even w hen removing connectors etc.

The following instruct ions must be followed to prevent damage to the con trol unit.

Compression test:

- dtsconnect w ire from terminal 1 on tho Ignition cOil (to prevent arcing affecting tho olOCHIcal system's control units}

- remove connectors from injectors (to aVOId flooding the engine. ddUTlon of 011 etc )

Turn off ignition when:

- connecung/dlsconnectlng les equlpm nt

- connectmg/dlsconneCl ing conuol unit connector - connecllng/ dlsconnoctlng leads to Ign1llon cotl and plug

Banery:

- do not runmng

disc onnect battery w hon the

engine IS

- djseonn c

baHary when boost cha rging

- do nor use boost chargers with a voltage rating of more than 1SV when Jump starting engine .

19

Important

Fuel system LH2.4 - 240

Control unit: 

- remove control IJnII when the ve hicle is p.xposed to

high temperaLUr s for example heat trealmeniS for

baking on paln1. The control unll must not be ex~

U po sed to a tem peraturo In excess of 80'" C (176 F)

- dlsconnecl control unit whf!n carrying out welding

ro palrs

- remove control unll jf w elding IS to be ca rned out

near Ii

- do not Insen a new control unll wit hout haVing firs t

checked all wIring and cornponenls Otherwise a

faul! can d<lmage the new control unit in the same

way as the old.

Cleanliness 

The utmost cleanli ness must be obs erved when work ~

In9 with tho fuel system

Clean all con ne ct ions before removal

Gasket, seals

Install new gasket /se al If a fuel pIpe connec tion IS

loosened.

Battery 

I[ is important w nen te sti ng the differe nt components

to ensure that the battery volt age IS w ithin pecif ca ~

tlons. If necess ary , a battery charg er can be connected

dUring testing M ax. charging current: 15 A at max .

charging vohage o f 1 6 V.

Fire hazard 

Extreme care should be taken to avoid cau sing sparks,

especially when tes ting injectors

20

G.ntlrs/

Fuel *svstem* LH2.4 - 240

Group 20 General

When tracing engine malfunctions alw ays perform the following checks before carr ying out any fault diagnosis of the LH-Jetronic system:

• 

Mechanical

- compressi on

- valve clearance

~~...~~~~..~~ /.\_ ' ."....~~..~~ " ~~.~~.....,~~.•.~~,.~~.~~ - throUle control

- vacuum hoses *ana* connections '/ ~~w..~~ : .1 -,1 .

• , it 

- air cleane r

(Electrica l

----- 





- spark pl ugs and HT leads

di stributor cap

- ali electrical 'connect ions

Emission controls

- crankcase ve ntilation

- evapora te control system

21 

**Group 23 Fuel system**

Placement 01 components .......... .... .. Fault tracing .... ..... ... .... ...

Complete overview of the fuel system,

Function

. .....Al -A15

*Page* 22

24-31

- Fuses, grounding connections, connectors .. ... 81 -84 32 - Air leakage and throHle shut1ers .... G l-G6 33-34 - Pumps, pressure regulator, fuel Rnes ..... 0 1-06 35-37 - Components, cabling ... . ..... E l -E28 38-50 

Quick check of injectors ........ " ........ . ............ .. Fl 51

Injectors, fuel dislribution pipe

and pressure regulator ....................... . 52

Placement of components



Ignition system

**lI:onlol** unlt

The Lambda-sond is mounted in the exhaust gas man i fold about 15 cm (Sin .) in front of the catalyti c converter.

22

System reley

Fuel synem

control unit



The fuel syslem control unit and system relay and !he tgnition syslem control unit are located inside the panel In front of the right door plOar.



P/8Cllmenr Df components

Fuel system LH2.4 - 240

Tank pump

Tank pump (pre-pump):

Inside fuel tank (Iuel level sensor section).

Fuel pump and fuel filler: 

On a shelf below the vehicle. under the backseat. Fuel distribution Co ld ttart Thr ottle

•

.---

/'

pipe 

Prusur.

ragulator

switch

Idle'lilve Airmass EG R 

temperature met.... (Ca llforni.) ,.nsor

23



Fuel system LH2.4 - 240

**Fault tracing**

The fuel syslem has a built-In fault tracing system. It

is mounted In the control unit and has three dillerent

control functions, one 10 read fault codes stored in the

memory and two for continuous testing of the compo

nents included in the system.

Communication with the diagnostic system is carried

out through the dlagnoslicsocket, (which is also used

by the ignition system). The socket is located behind

the left spring strut tower In the engine compar1ment.

The diagnostic socket has a button, a light diode and

a selector cable. When carrying out tault tracing tor

the fuel system, the selector cable is placed in socket 

2 of Ihe 6 available, Depressing the button once,

twice or three times chooses the desired fault trating

function.

Faults stored in IIle memory are read via a system of

flashes from the diagnostic socket light diode. **All**

lault codes have three numbers, each one capable of

ranging trom 1-9. The codes relating to the luel

system range only between 1 and 4.

The fault code figure is read tram the series at nashes

delivered by the diode. Since the codes all have three

numbers, each code requires three series of

uninterrupted flashes.

There is a three second interval between each series

of flashes to make the codes easy to read.

**Here Is a fault code example:**

****=**fault code 213**

24

***Fault tracing***

Fuel sysrem LH2.4 - 240

**Control function 1**

The diagnostic system carries out continuous ctlecks 

of the fuel system during engine operation.

Any fuet system fau lts are stored in the diagnostic

system's memory as a fault code. The system can

identify and store seventeen different fault codes.

There is also a code to indicate that the fuel system

is co mpletely OK.

,

Up to three fault codes can be stored in the memory

simultaneously.

Once the engine stops, the fault codes can be read by

counting the flash series at the diagnostic socket

diode.

**Control function** 2 

This tunction tests the various fuel system breakers .

As each one is activ ted. functions information is

provided by the diagnostic socket diode in the form of

ftash series.

The functions test is generally used aHer such activi

ties as repairs to check that certain controls are

connected and operating correctly .

•

**Control function** 3 

This test is carried with the engine off. It tes ts the

adjustment functions of the fuel system.

In this case, the test consists of initiating an functions

cycle whereby the diagnostic system activates cer

tain control components.

You find out if the component is operating correctly

either by placing YOtI, hand on the component or by

listening for the click which occurs when the compo

nent is activated.

25

***Fault tracing***

Fuel system LH2.4 - 240

**Control function 1**

A1

Open the diagnostic socket cover and connect the 

selector cable to pin no.2.

Turn on the ignition.

Enter control system 1 by depressing the button

**once.**

Depress the button lor at least 1 second, but not more 

than 3.

Watch t~e light diode and count the number of flashes 

in the three flash series indicating a lault code. The

flash series are separated by a three second interval,

making them easy to read.

Make a note 01 the fault codes.

If no fault codes are received by the diagnostic

unit, the diode will flash 1-1-1 and the luel system

is operating correctly.

Continue at A7.

II the light diode doesn't flash when the button is de

pressed or il no code is flashed, reler 1081-82, El

E4 and Ell.

***A2***

Check to see if any lault codes are stored in the

memory.

Depress the button again. Make a note 01 any

additional lault codes.

Depress the button a third time to see if a third ·fault

code is stored in the memory.

If the code received when the button was depressed

the first time is repeated, there are no other codes in

the memory.

NOTE! The diagnostic system memory is lull when

it contains three fault codes. Unlil those three are

rectified and the memory is erased, the system can

not give inlormation on any other problems.

26

t:t *--0=--0=* 1 1 1 



***Fault tracing***

*Fuel system LH2.4 240*

**A3**

**The fault code key below shows the fault indication**

**codes.**

**Information on how to correct the faults is in the third col­**

**umn.**

**Fault code key**

1-1-1

No faults

**1-1-2**

**Fault in control unit**

**Change control unit**

1-1-3 Fault in injector (Break in lead. clogged. etc.)

E17, 01-5, Fl

**1-2-1 1-2-3 1-3-1**

**Signal to/from air mass me ter is faulty**

**Signal missing tolfrom coolant temperature sensor, possi ble grounding short Ignition system rpm SlgnaJ missing**

E10, E27 E14

E6

1-3-2 BaHery potential too low or leo high

Check battery

**and charging system**

TI1rottleswitch; Idle setting faulty, possible grounding short

Lambda-sand signal mi. ing or is faulty

Throttleswitch; full load setting faufty. possible groundlllg short

Lambda-sond not operating

**Signal missing tol trol'l'l KlIe valve**

**Self-adjusting Lambda-sand not operating**

Sell-adjusting Lambda-sand not operating

Idle valve closed. possibly leaking air

**Signal missing from speedometer**

**Signal missing for knock related fuel enrichment**

**Burn-off cleaning of hot wire in air mass meter not operating**

•

1-3-3 2-1-2

2-1 -3 2-2-1 **2-2-3**

**2-3- 1** 2-3-2 2-3-3

**3-1-1 3-1 -2 3-2-2**

C4, E9

E12, E2S-27

C4,E9

C1,Ol-5

E20

C1 , 01-5

C1 , 01-5

C1, E20

E21

E19

E27

27

***Fault tracing***

Fuel sy.tem LH2.4 - 240



C:--C:

1 1 1





28

**A4** 

Erasing diagnostic system memory Once all fault codes have been read and the faults corrected, the diagnostic system memory is erased as follows : @ 1. Switch on the ignition.

2. Read the fault codes again .

3. Depress the button more than 5 seconds. Release the button. After 3 seconds the diode should light up.

4. While the diode is still lit: depress the button again for more than 5 seconds. After releasing the button the diode should stop shining.

**A5**

To check that the memory is erased, depress the button once for more than 1 second but not more than 3 seconds.

Flash series 1-1-1 denotes erased memory.

Start and run engine

If the engine won't start, see control function 2, A 7-8 and All .

(NOTE! The throttle control does not have to be turned to full load position.)

Turn off engine

**A6**

Check if new fault codes have been stored in the memory @ Turn on ignition.

Depress the button once for more than 1 second but not more than 3 seconds.

If the flash series 1-1-1 comes up, there are no additional fault codes. Continue at A7.

If there are more fault codes, retum to A2 and continue fault traCing.

Turn off ignition.

•





**Fault tracing**

Fuel system LH2.4 - 240

**Control function 2**

***Al*** 

******Turn on the ignition\_

Open the diagnostic socket cover and connect

the selector cable to **pin** no. 2.

Turn the throllie control to full load position . 

**A8**

Depress the bullon in the diagnostic socket

twice.

Each time the button is depressed. it should be kept

in for at least 1 second, but not more than 3,

The lighl diode should begin to flash.

C: - - fJ: nn - -0: no:

fJ: C: 333 

**A9**

Release throttle control

II the flash series 3·3·3 comes up, the function of the shutter switch is correct in full load position.

lithe light diode continues to flash rapidly. see C4 and E9,

29

*Fault tracing*

Fuel system LH2.4 - 240

:(tc=c=-- c=nc=--c=n 3 3 2

331

~n- ~nn--n 

n --nn n *--c=* n n n 1 3 4



30

*Al0*

Turn the throttle control slightly

If the light diode turns off and then flashes the 3-3·2 code series, the throttle shutter switch function is correct in Idle position.

II the light diode continues to flash rapidly, see C4 and E9.

*A11*

Check the rpm signal from the fgnltlon system Start the engine.

If Ihe fight diode turns off and then Dashes the 3' 3- 1 code series. Ihe rpm signal from Ihe ignition system is correct,

II the engine won't start, run the starter molO( until the diode turns off.

II the diode continues to flash rapidly the ignition system must be checked.

If the ignition system is faultfree, see A 13 and E1-12,

A12

Vehicles with AC

Check the onloff funcllon of the compressor Place the AC controls in the on position,

If the light diode turns off an d then " ashes the ' · 1·4 code series, the switch is OK.

II the light diode continues to flash rapidly, see E16.

The light diode will now retum to rapid flashes prior to the AC compressor turning on.

When the compressor turns on, the light diode should turn off and then flash the 1-3-4 code series,

If the light diode continues to flash rapidly, see E15.

Turn engine off.

***Fault tracing***

Fuel svstem LH2.4 - 240

.0 - - 0 (I: --(I: C (I: C

1 2 4 **A13**

**Vehicles with automatic transmission**

(Testing idte speed compensation.)

Depress the brake pedal. Ptace the gear setector

tever in position D and then in position N again. 

The light diode should turn off and tllen flash the 1-2­

4 code seri es.

II the light diode continues to flash rapidly,

see E22\_

Turn engine olf.

**Control function 3**

**A14** 

****Turn on ignition.

Open the diagnostic socket cover and connect

the selector cable **10 pin**

no. 2.

**A15**

Depre ss the **button In** the diagnostic socket **three** Urnes.

Each time ttle button is depressed, it should be kept in for at least 1 second, but not more than 3. 

While the light diode continues to flash with the same frequency, each of the tollowing should hegin to operate:

- Injectors

If they don't operate, but the lighl diode flashes , see E17 .

- Idle valve

If it doesn't operate, but the light diode flash es, seeE20.

31

***Fuses***

*Fuel system L H2.4* - *240*

**Complete overview of the fuel system**

Functions Bl -E28 constitute acomplete examination

01 Ihe IUllI system.

Fuses, **ground connections and connectors**

**B1** 

Check all ground connections

Make sure tile ground connections on the intake

manifold make good contact

Poor contact can be the cause of many diHerent fault

symptoms.

Check the grounding connection lor I.he lambda

sond althe right Iront mudguard.

***B2***

~ 

iJ

1!14

IJ

IJ

0

m:m

32

Check Ihat the luses for the pump relay and the primary pump are OK

Pump relay fuse: In-line fuse In !he engine compart ment

Tank pump fuse: fuse No. 4 in luse box.

**B3**

Check connectors lOt:

- air mass meter

- idle valve

- knock sensor

- coolant temperature sensor

Check for installation and connection.

*B4*

Check that the connectors are correct Knock sensor connector = black sleeve; Coolant lemperature sensor = white sleeve; Cold start valve = blue sleeve.

Ajr leakage

*Fuel system LH2.4* - *240*

**Air leaks and throttle shutter**

**Cf** 

Check Intake system lor leaks

Intake system air teaks would make the mixture too

lean.

Check:

- Intake manllold between the air filter and Ihe mani­

fold.

- All hoses and hose connecllons to the intake manl­

lold.

- Intake manifold bolted joints and seals, throttle

shutter housing, etc.

*C2*

Throttle housing

Check housing for dirt.

II necessary, clean throttle housing 

Disconnect throttle switch connector.

Remove housing. Clean with solvent, but ensure that

none enters the throttle switch.

Important! A clogged, incorrectly mounted or

damaged air filler will result in a dirty throttle

housing.

Install throttle housing

Use new gasket.

Connect air hoses and throWe swilch connector.

Basic throtlle selling C3 

Loosen locknut.

Loosen adjuslment screw until throttle Is oompletely

closed.

Tighten adjustment screw until It lust touches the

linkarrn. Turn a hall turn further.

Tighien locknut without changing the adjustment

screw position.

(It may be necessary to loosen the throttle switch

before setting the throtUe.)

33

***Air leakage***

*Fue/ system LH2.4 240*

*C4* 

Check throttle switch setting

Open the throttle slightly and listen to the switch. 

There should be a click when Ihe shutter opens (idle

switch).

Adjustment:

Loosen mounting bolts (3 mm hex.)

Turn switch stightly clockwise.

Turn switch counter-ctockwise untit the switch clicks.

nghten mounting bolts.

Check setting .

**C5** 

Checkladjusl control pulley and ttuoltle cable

The control pulley should move smoothly.

The throttle cable should be extended in idle

position without affecting the pulley position. The

pulley should abut the idle stop. Adjust cable

where necessary.

Depress gas pedal all the way and check that the

pulley abuts the full throttle stop.

**C6** 

Connect and check/adjust lInkarm

Install a 1 mm leeler gauge between the control

pulley and the idle stop.

The play between the throttle lever and the adjust

ment screw should O.2-+{).1 mm.

Adjust link arm where necessary.

34

***System pressure***

Fuel system LH2.4 - 240

**Fuel pump, pressure regulator and** fuel lines **(system pressure)**

**D1** 

Connect pressure gauge 5011

Hold a paper towel under the fuel line to absorb any

fuel spill when the fuel line is disconnected.

Connect gauge between fuel line and distribution

pipe. Use hose 5116 and nipple 5265.

Block the free end of the gauge hose with plug 5266.

Set the gauge cock in position 1 (pointing to hose

511 6).

**D2**

Start fuel pumps 

Remove panel under right side of instrument panel.

Remove system relay.

Disconnect syslem relay connector. Connect an

eleclrical lead between terminals 30 and *87/2.*

The fuel pumps should start. To check if the main luel

pump is operating, remove cap from the filler pipe and

listen.

II fuel pumps don'I start

Remove lead between tenninals 30 and *87/2.*

Ched< for voltage atlermlnal3O. Iflhere is none,

check lead between relay and battery .

Connect an electrical lead between terminals 30 

and *87/2* on Ihe relay base. Pumps should now

start. If nol, check lead between pump and re

lay.

" 30 85 I '~.IIII,J

Check lead between *87/1* and 85 for breaks . Use ohm meIer or buzzer.

35

SYS~m ***pressure***

Fuel system LH2.4 - 240

**D3**

Chll(:k sYStem pressure

System pressure should be 300 kPa (42 psi).

1

Too high system pressure:

Remove lead between terminals 30 and 8712 on the

relay base.

Remove retum hose from pressure regulator. Blow 

in the pipe.

Remove vacuum hose from pressure regulator. Blow

in pipe

If both hoses are open, the pressure regulator is

faulty . Replace it and recheck pressure.

Too low system pressure:

Squeeze relurn hose by hand and check if pressure

... rises .

Important ! Do not allow the pressure to 

exceed 600 kPa (84 psi). 

If the pressure rises rapidly the pump and ,hoses are

OK. Replace pressure regulator and recheck pres

**sure.**

If the pressure rises slowly, the fuel filter, fuel pump

strainer or the fuel lines are dogged or blocked.

If the pressure doesn 't rise the fuel pump is faulty.

36



86/ 1 87 / 2 



***System pressure***

*Fuel system U/2.4* - *240*

**D4**

Check funcllon of pressure regulafor Connect a vacuum pump to the pressure regulator. Vacuum pump 5843 may be used.

Pump air Irom the regulator and check that system pressure falls.

The system pressure should lall as much as the pressure in the regulator lalls.

• 300 kPa (42 psi) minus pressure drop equals system pressure.

**D5**

Turn oU fuel pumps

Remove lead bAtween terminals 30 and 8712 on the relay base. Install system relay.

**D6** Remove pressure meter 50' ,

Hold a paper under the luel line to soak up any luel which comes out when the meter is removed.

Important! Any plastic tie bands removed from the luellines must be reinstalled.

37

Checks

Fuel system LH2.4 - 240

Components, electrical cables

C..,tllor codf!

SII \_ Urm:k U' !: Bl'o\\ JI r;N - {;ri'£n

Gl{ -= Grey Y =- \ 0.:1 low OR - Or;H1l!e

\\ ;: W hitt: P -= Pink \. 0 ~ Q " ltt 

R =- Red 131. = Brut Cl ! -= Copper

*E1*

Remove panels under instrument panel right side

and in front of right firewall side.

Remove glove compartment.

Check control unit ground connections

They should make good contact and fit tightly.

*E2*

**Turn off Ignition 

Remove control unit connector

Important! Ignition must be off before remov

ing or installing the connector.

Press up catch and fold out connector.

*E3* 

Remove connector protective sleeve

Important!

Never check connections from the front.

Experience has shown that they can be

damaged and any faults made worse.

Check connections through the holes on

the connector side. Don't use unneces

sary strength.

The connection numbers are printed on

the connector side.

38

4 

R <?=:) V

**..,.................** 

**GN - 58 **<?=:) V

~ 

V

*Checks*

*Fuel system LH2.4 240*

**E4**

Check diagnostic socket

1.

Connect voltmeter between ground and no. 4 con nection on con trot unit connector. Reading should be 12 V.

II there is no voltage. check lead between control unit connector and tuse no. 1 (30 strip) in the electric dis· tribution unit.

2.

@ Turn on ignition.

Connect selector cable to position 2 on diagnostic socket.

3.

Connect voltmeter betweon ground and no . 12 con nection on controlunilconnector. Reading should be 12 V.

Derress button on diagnostic socket. Reading should be 0 V.

II there is no voltage allhe conlrol unit. take reading at diagnostic socket connector.

II voltmeler reading remains at 12 V when buNon is depressed. check diagnostic socket.

4.

Connect voltmeter between ground and red-black lead 011 diagnostic socket connector. Reading shoutd be 12 V.

39

Checks

Fuel system L H2.4 - 240

"--\_\_\_--' 1m,· "--\_\_---I EEE

**35** 

**R-sa** 0=:0

V

40

5.

Connect ohm meter between ground and brown · black lead in diagnostic socket connector. Reading should be approx.O n.

Turn off ignition.

6.

Connect ohm meter between diagnostic socket se· lector cable and pin under selector buHon. Reading should be ~ resistance.

Oepress button. Reading should be 0 n.

7.

Connect diode tester between diagnostic socket tight diode and selector cable.

Connect red test pin on diode tester to pin under tight diode and black test pin to selector cable.

A reading on the diode tester indicates correct light diode function.

With no reading, replace diagnostic socket.

**£5**

Check ignition lock voltage

; Turn on ignition . . -&

CO ct voltmeter between ground and no. 35 con­ nection on control unit connector. Reading should be 12 V.

Check that voltage exists when starter motor is run­ ning. @ Turn off ignition.

**III·** 

5

17

Checks

Fuel system LH2.4 - 240

**E6**

Check ground connections 

Connect ohm meIer between ground and connec­

tions

S8

5 17 19 29

**29** S8 0===0

**19** BL -SB

*SL*

**8N-~8.

1 

8N <?=0 V

2 

Y\_w 0===0 *SL*

on control unit

should be on. connector. Reading in all cases  Leads are grounded to engine intake manifold.

**E7**

Check Lambda-sond screening lead

Should be connected to no. 5 connection on control unit connector.

**E8**

Check rpm sensor lead from Ignition system control unit

Connect voltmeter between ground and no. 1 con­ nection on fuel system control unit connector.

@ Run starter motor.

Reading = battery voltage.

**E9**

Check throttle switch

1.

Connect ohm meter between ground and no. 2 con­ nection on control unit connector. Reading'should be 0/0 (switch closed).

2.

Depress gas pedal slighlly.

Resistance should increase to 2-3 kohm (throttle sWitch opens)

41

*Checks*

*Fuel system L H2.4* - *240*

3 

**BL-W**

****42

3.

Connect ohm meter between ground and no. 3 con nection on control unit connector. Reading should be = resistance (full load switch open).

4.

Depress gas pedal all the way

Reading should be 0 n.

If fault occurs:

Measure at throttle switch to see if fault is in throttle switch or in leads.

Check ground connection at intake manifold.

**E10**

Check air mass meter

Connect ohm meter between connections 6 and 7 on control unit connector. Reading should be 2.5·4.00.

(See also E 13 and E27 for checking air mass meter.)

**E11**

Check system relay primary relay

Connect voltmeter between ground and no. 9 con­ nection on control unit connector.

Connect lead between ground and no.21 connection on control unit connector.

Relay should activate. Reading should be battery voltage (approx 12 V).

Do not remove ground connection to no. 21 connec­ tion.

y:'II~ 21..1. 

20

9

OR v 

Checks

Fuel system LH2.4 - 240

E12

Check system relay pump relay

Connect lead between ground and no. 20 connection on conlrol unil connector.

Pump relay should close and start fuel pumps.

Remove ground conneclion lrom no. 20 connection, bul leave conneclion 10 no. 21.

E13

ChlM:k air mass meter

1.

Remove rubber sleeve from air mass meier connec· lor to Iree leads.

Colour COOl!



!l!!!!'-\_\_\_v ...

S8 s Blll ch fl N :II Brown (; , \_ Grecn

(;R = (; rl' ~ V = Vdlow OR ~ () J1l \!

W = " hit c P = Pink VO = Viu fc l

R . Red nr. .. Blu r ell .. ( opper

2.

Connect vollmeter between ground and no. 5 con·

nection on alr mass meter connector. Reading

should be approx. 12 V.

43

~I~- 

216 ')

**20**

9

OR v 

Checks

Fuel system LH2.4 - 240

**E12**

Check system relay pump relay

Connecllead belween ground and no. 20 connection on control unit connector.

Pump relay should close and start fuel pumps.

Remove ground connection from no. 20 connection, but leave connection to no. 21 .

**E13**

Check air mass meter

1.

Remove rubber sleeve from air mass meter connec tor to free leads.

**Colour cOfle**

****,

**~~su~~ = Dlurk UN =. Drown G\\ ::: Green OR =** (; e~ Y **z:; Yl.'lIuw OR -= Orange W ;- Wllite P = Pink VU =Vinle t R !! Red RL** n Ulu~ **CU = Coppe r**

J

G-0.  ~1

.

2. 

Connect voltmeter between ground and no. 5 con

nection on air mass meter connector. Reading

should be approx. 12 V. **21**

~~~~~

!ill!!**\I** V **I**

43

Checks

Fuel system LH2.4 240 0=::> V

uu~ \_\_\_\_\_\_\_\_\_\_~

**13** 

**BL- R**

**14 **

3. 

Connect voltmeter between no. 1 connection (ground) and no. 5 connection (current feed from system relay) on air mass meter connector.

Reading should be approx. 12 v.

Remove ground connection to no. 21 connection on control unit connector.

**E14**

Check coolant temperature sensor

Connect ohm meter between ground and no. 13 con­ nection in control unit connector.

Resistance depends on temperature. Guide line values :

Resistance at -10°C (WF) 8,260- 10,560n +20°C (68°F) 2,280- 2,720n

+80°C (176°F) 290- 364n

See Specifications for chart.

If fault occurs :

Measure at sensor to see if fault is in sensor or in leads.

Check ground connection to intake manifold.

**E15**

Check lead **10 AC** compressor

Connect ohm meter between ground and no. 14 con

ON nection on control unit connector. Reading should be 0-5IH.

44



**18** 

OR

9

OR

X-\_\_\_\_\_\_\_\_-J ~

Checks

Fuel sysrcm LH2.4 240

***E1B***

Check lead Irom AC control unit

Connect ohm meier between ground and no. 15

connection on conlrol unit connector.

Reading at AC oH should be approx. 1 k!l.

Reading at AC on should be approx . to U .

;-;..---.-\_ (uJ r cu **-.-:-:::-:­ SO .= Ohu:k Ul\ = Uru\\ n** ( ; ~ **= t; reen**

**(i N :: l;tpy r • Yellow OR . O rdnge**

W - **Wh ile I' . Pink \10 .:. VllJtl!t**

U **.:. Red HI ::a IHue CU :: CIJPpcr**

**Ell**

Check Injectors

Connect ohm meter between connections 9 and 18

on conlrol unit connector. Reading should be 4 U. If

the reading is higher, current is not going through the 

Injeclors.

If resistance is :

Approx . 5.3 n Faull in one injector or ils teads .

Approx . 8 n Faull in two injectors or their leads.

Approx. 16 n Faull in three injectors or their teads.

If the measured resistance is wrong :

Remove injector connectors and test them sepa­

rately. Reading tor individual injectors should be

16H.

45

Checks

Fuel system LH2.4 240

E18 

Check COld slarl valve

Connect ohm meter between connections 9 and 32

on control unit connector. Read,ng should be approx.

10n.

E19 

Check knock enrichment sIgnal trom Ignltron

system 

Tum on Ignilion .

Connect voltmeter between ground and no. 28 con

neelion on control unit connector. Reading should be

28

approx. 0.7 V.

**BN-W** 

Turn 011 Ignilion.

*E20* 

Check Idle valve

Conneel ohm meIer between connections 9 and 33

on control unH connector.

Reading should be approx. 8 n.

46

34 

BL



2~~ **20:1** 

**BL- GN**

Checks

Fllel system LH2.4 - 240

*E21*

Check speedometer signal

Remove panel under instrument panel on driverside.

Disconnect 12 terminal connector from speedome ter. Connect ohm meter between blue (BL) cable and no. 34 connection on control unit connector. Reading should be 0 U\_

If fault code series 3-1-' has flashed and resistance is 0 the speedometer signal is missing.

Reconnec! speedometer cable and remount panel under instrument panel.

*E22*

Automatic transmission:

Check gear selector signal

Put gear selector in position N (Neutral). Connect ohm meter between ground and no. 30 connection on conlrol unit conneclor. Reading should be 0 U. Move gear selector 10 position D (Drive). Reading should be - resistance.

The reading should be 0 in all gears for vehicles with manual lransmission.

*E23*

Check Lambda-sand current feed and pre-heat Ing resistance

1.

Ground connections 20 and 21 on control unit con nector in order to slart fuel pumps.

47

*Checks*

*Fuel system LH2.4* - *240*

2. 

Connect voltmeter between ground and the yellow

red (V-R) cable in the two-terminal connector at right

wheel house. Reading should be 12 V.

3.

Connect ohmmeter between ground and the yellow­

red (V-R) cable in the two-terminal connector at righl

wheel house . .

Lambda-sond temperature:

Cold: +20"C (68"F) approx. 3 n

Hoi: + 350°C (660"F) approx. 13 n

(Hot temperature achieved on idle with hot engine.)

E24

Final check of control unit 

Important!

~ The ignition must always

~ stalling connector.

be oft when removinglin­

Connect connector. Be sure the connector's rubber

gasket is reinstalled before connecting to conlrol unit.

Start engIne

If englne does not start after preceding fuel system

check, test with a new conlrol uni\.

48

Checks

Fuel system LH2.4 - 240

***E25***

Connect CO meter 

Connect CO meter to CO connection on catalytic

converter using 5151 connector.

Run engine

Check CO content.

If unsatis factory. check again after checking

Lambda-sond in next step.

***E26*** 

Check Lambda-sond

1.

Disconnect Lambda-sand connector.

\

2. 

Ground lead to control unit.

CO content reading should "se. indicating that con­

trol unit and its connections are OK.

3. 

Connect vollmeterto Lambda-sond. Indicator should

swing back and forth \0 show function 01 Lambda

sond.

(Reading at correct CO content should be approx. 0.5

V.)

Connect Lambda-sand connector.

49

0=::> **CO**

*Checks*

*Fue(system LH2. 4 240*

*E27*

Check burn-off cleaning of air mass meter hot 

wi re

NOTE ! Engine must be hot. Coolant tempera

ture must exceed 60°C (140"F).

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BL \_ W BL\_ R -lil '" 0 ~

BN Bl\_ GN

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(~ BL- Y ­ -- 111

1.

Remove protective rubber sleeve from air mass meter connector without disconnecting it from the unit.

2.

Connect voltmeter between connections 1 and 4.

/ 0 l

~

"1 (<~.r \ .

Rev engine to approx. 35 *rls* (2,100 rpm). Turn off

engine. After approx. 4 seconds, the voltmeter indi

~~!~~

cator should swing back and forth for approx. 1

second (burn-off cleaning).

Remove voltmeter.

Install rubber sleeve over connector.

**l!:!:1**

*E28*

Check CO content

" the engine does not run satisfactorily even 

though no faults have been found, or If faults that

have been found have been rectified, try using a

new confrol unit.

Remove all test equipment.

Reinstall electrical distribution unit. panels, etc.

50

I ~.' 1

~ V

<J=:::)

**CO**

****

****'---------~~

Checks

Fuel sysrem L H2.4 - 240

**Quick check of injectors**

**F1**

1. @ Turn on ignition

Depress diagnostic socket button three times. Each

press should last for alleast one seoond but nol more

than three.

At this poinl the injectors will begin 10 operate, fol

lowed by Ihe idle valve, etc. The diagnostic socket

lighl diode will lIash in a oontinuous pattern.

The conlrol function will repeat itself until interrupted,

either by turning 0" the Ignilion or by changing oontrol

function via the selector button.

2.

listen to and feel by hand each injector to make sure

they all work.

If one does not function (no click can be heard),

change connector to a valve Ihal does work. It the

fault moves to one Ihal was O.K. before tilen the faull

Is in the connector lead.

3,

It Ihe injeclor still doesn'l wOrk. Ihe fault is probably in

the injector.

Check the injector separalely by connecting an ohm

meter between the injector pins.

Reading (depending somewhat on temperature)

should be approx. 16!U .

4. finish **up**

Turn 0"ignition and remove 

all equipment.

51

Checks

Fuel system L H2.4 - 240

**Injectors, fuel distribution pipe and**

**pressure regulator, remove/install**

Removelinstall fuel distribution pipe, injectors and 

cold stare valve as one unit.

**NOTE!** Check that all ground connections are cor rectly grounded when reconnecting ,them.



Place pressure regulator against fuel distribution pipe and bolt it to the bracket.

Check vacuum hose and return hose.

52

Use brace to loosenltighten fuel lines and all other fasteners.

Check O-rings, Lubricate

them with vaseline or a

similar substance.

PAGE 53

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LH-Jetronic 2.4 (B230F)

3

7

10

32

95

97

100 112 129

Ignition switch

Starter motor

Fuse box

Connection at instrument Cold start injector

Tank pump

Fuel pump

Joint

AC Relay

131 132 162 21 1

212 214

215

Diagnostic unit

Idle valve

Lambda .ond

Electronic control unit, EZl16K

In-line fuse

Electronic control unit, LH2.4

Air mass meter

217 218 221 223 225

Main relay

Throttle switch

Coolant temperature sensor AC pressure switch

Injectors

R D- R-sa

2 11

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8 1

218



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**LH-Jetronic 2.4 (B 230 F)** 

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