

Service Manual

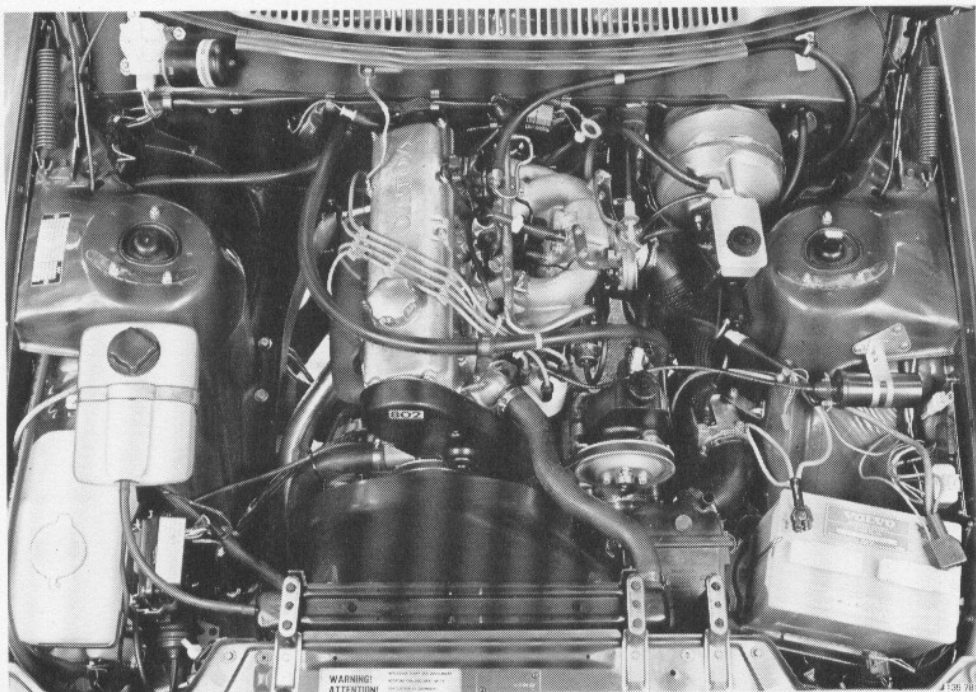
● Repairs and maintenance

Section 2 (23)

Fuel System,
LH-Jetronic II
B23F

240 1983-19 . .

VOLVO



Engine B23F:

- only for cars intended for USA market
- introduced 1983, replaces B21F LH-Jetronic engine
- is equipped with LH-Jetronic II fuel injection system. Designation II stands for "second generation". System is further developed compared with the system used on B21F LH-Jetronic engine.

Volvos are sold in versions adapted for different markets. These adaptations depend on many factors including legal, taxation and market requirements.

This manual may therefore show illustrations and text which do not apply to cars in your country.

TP 30427/1 US
6000. 10.82
Printed in U.S.A.

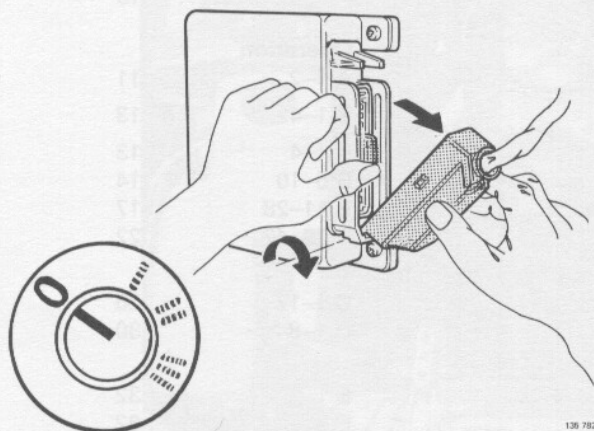
Contents

		Page
Important/Cautions		2
Specifications		4
Special tools		7
System function (brief)		8
Component location in vehicle		10
Fault tracing	Operation	
	A 1-2	11
Complete inspection of system	B 1-42	13
Fuses, connectors, grounds, throttle switch	B 1-4	13
Pumps, line pressure, line pressure regulator	B 5-10	14
Components, wiring	B 11-28	17
Check of function	B 29-42	22
Checks/adjustments		
Idle speed and CO-content	C 1-17	26
Throttle valve, throttle control, throttle switch	D 1-8	30
Components		
Injectors, quick check	E 1	32
removal/installation	E 2	32
Evaporative system	F 1	33
Wiring diagram (fold-out page at end of manual)		

Order number: TP 30427/1

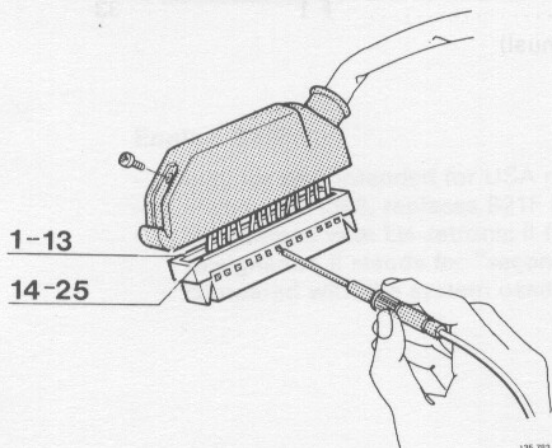
We reserve the right to make alterations.

Important/Cautions

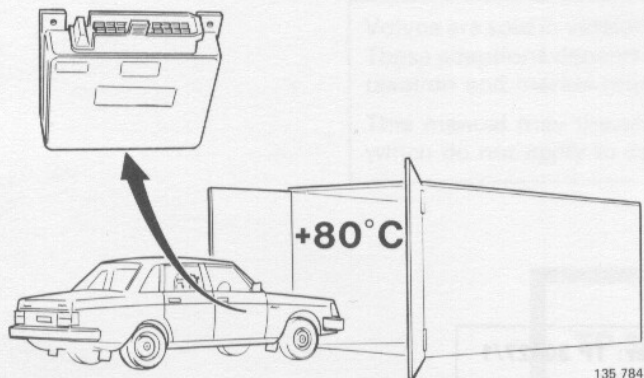


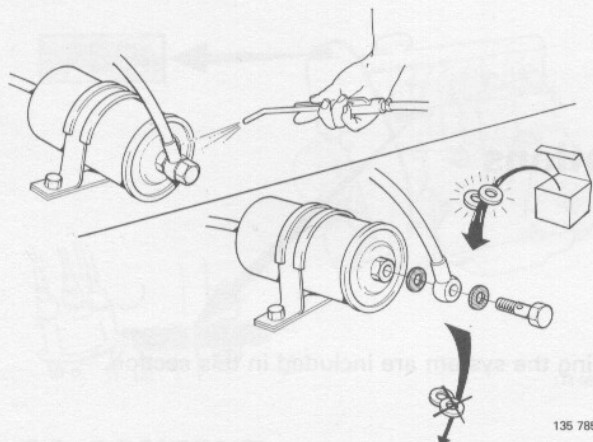
Control unit

- Ignition must be switched off when connector is removed/installed.
- Do not replace control unit without checking wiring and components. A fault may otherwise damage the new control unit in the same way as the old.



- **Never** check connector terminals from front. Experience has shown that connector terminals can be damaged and cause other faults. Remove connector cover and check terminals through the holes in side of connector. Do not use excessive force. Terminal numbers are stamped on connector side.





135 785

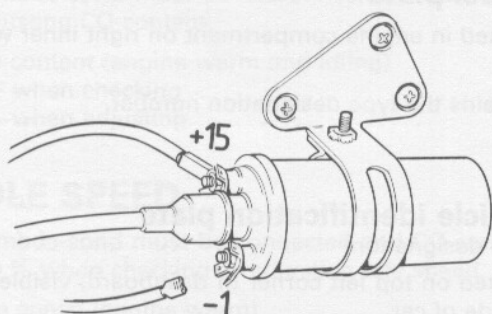
Cleanliness

Utmost cleanliness should be observed when working on system.

All fuel connections should be carefully cleaned before removal.

Gaskets, seals

Always use new gaskets/seals.



135 786

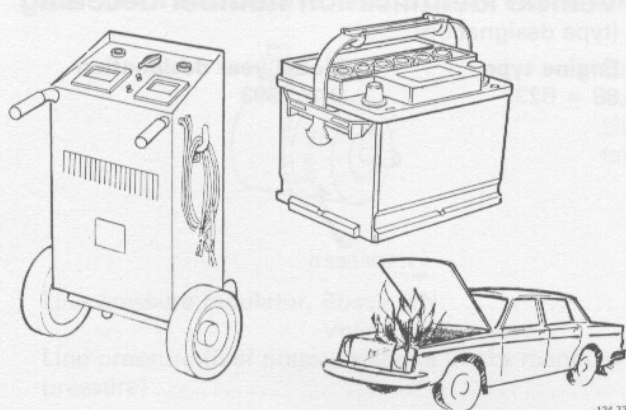
Ignition system

Ignition system must be disconnected when checking compression or performing similar work.

If ignition system is not disconnected, there is risk for arcing.

Arcing to injectors or injector wiring can damage the control unit.

Arcing to ignition coil low tension side can damage Hall IC-chip in distributor.



134 731

Battery

When checking components it is important that battery voltage is not too low.

A battery charger can be connected if necessary. Max. charging current **15 A**.

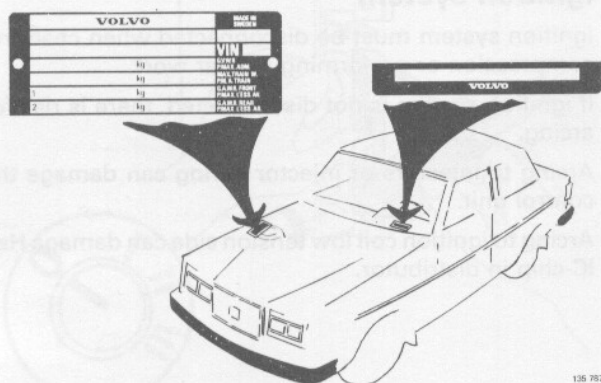
WARNING

Extreme care should be taken to avoid causing sparks especially when checking injectors.

Specifications

PLATES AND DECALS

Only those plates/decals which contain information concerning the system are included in this section.



Model plate

Located in engine compartment on right inner wheel-arch.

Contains the type designation number.

Vehicle identification plate

(type designation)

Located on top left corner of dashboard, visible from outside of car.

YV1 AX 88 4X D1 000000

Engine type

Chassis number

Model year designation

Vehicle identification number decoding

(type designation)

Engine type

88 = B23F

Model year designation

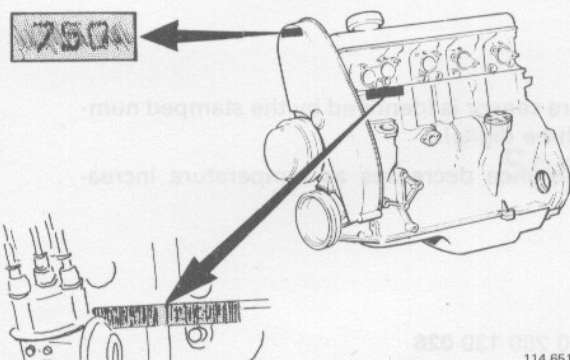
D = 1983



Exhaust emissions plate

Located in engine compartment on left inner wheel-arch.

Contains information on valve clearance and ignition timing.



Engine serial and part numbers

Stamped in left side of cylinder block, behind distributor.

Decal showing last three digits of part number is attached to top of timing belt cover.

Engine identification numbers:

- manual transmission 499 802
- automatic transmission 499 803

CO-CONTENT

Lambda-sond must be disconnected when checking or adjusting CO-content.

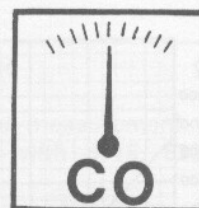
CO-content (engine warm and idling)

- when checking 0.4–0.8 %
- when adjusting 0.6 %

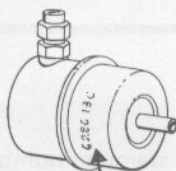
IDLE SPEED

Lambda-sond must be connected and CO-content under 1.0 % when checking or adjusting idle speed.

- Idle speed (engine warm) 12.5 r/s (750±20 r/min)
- When A/C system is connected idle speed increases to... 15.0 r/s (900 r/min)



LINE PRESSURE REGULATOR. LINE PRESSURE



0 280 160 ...
135 789

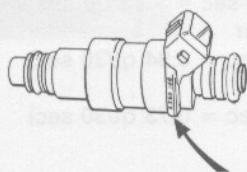
Line pressure regulator is identified by the stamped numbers (last three digits).

Line pressure regulator maintains fuel pressure at a certain level above pressure in intake manifold.

- Line pressure regulator, Bosch P/N 0 280 160 214
- Volvo P/N 1306935-6

- Line pressure (fuel pressure above intake manifold pressure) 250 kPa (35.5 psi)

INJECTORS



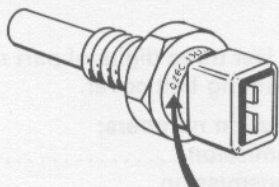
0 280 150 ...
135 790

Injectors are identified by the stamped numbers (last three digits).

- Injectors, Bosch P/N 0 280 150 209
- Volvo P/N 1326427-9
- Injected quantity of fuel at fuel pressure 250 kPa (35.5 psi) 167 cm³/min

Specifications

TEMPERATURE SENSOR



Temperature sensor is identified by the stamped numbers (last three digits).

Sensor resistance decreases as temperature increases.

Temperature sensor, Bosch P/N	0 280 130 026
Volvo P/N	1332396-2

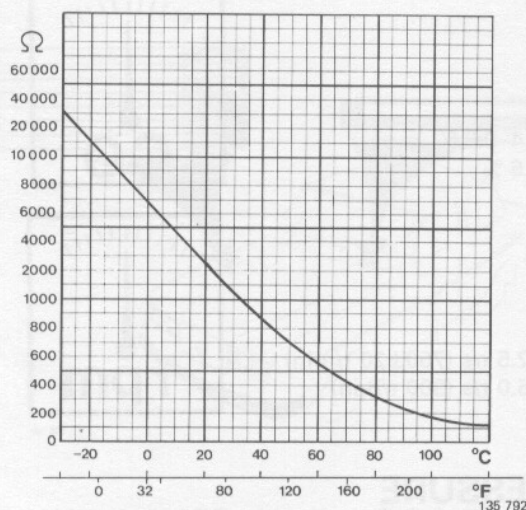
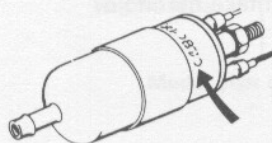


Diagram showing sensor resistance at different temperatures.

Example test values from diagram:

-10°C	9.41 kΩ (8.26–10.56 kΩ)
+20°C	2.5 kΩ (2.28–2.72 kΩ)
+80°C	0.327 kΩ (0.290–0.364 kΩ)

FUEL PUMP



Fuel pump is identified by the stamped numbers (last three digits).

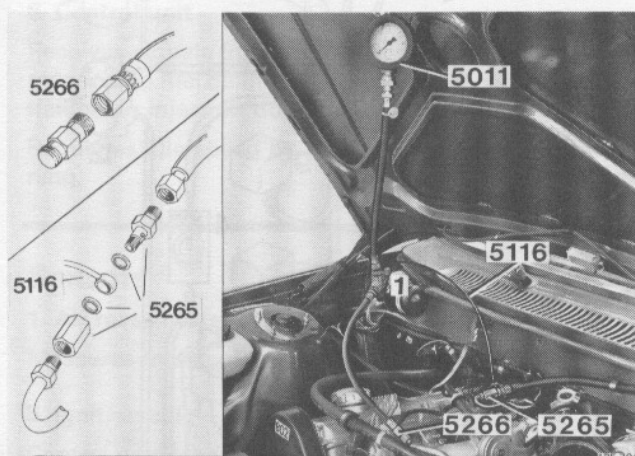
Note! Pump capacity varies greatly depending on voltage.

Fuel pump, Bosch P/N	0 580 464 022
Volvo P/N	1 306 932-3
Pump capacity at 300 kPa (42.6 psi), +20°C and 12V	130 liters/hour (1.08 liters/30 sec = 1.13 qt/30 sec)
11V	110 liters/hour (0.9 liter/30 sec = 0.94 qt/30 sec)
10V	85 liters/hour (0.7 liter/30 sec = 0.73 qt/30 sec)
Current consumption, max	6.5 A

TANK PUMP

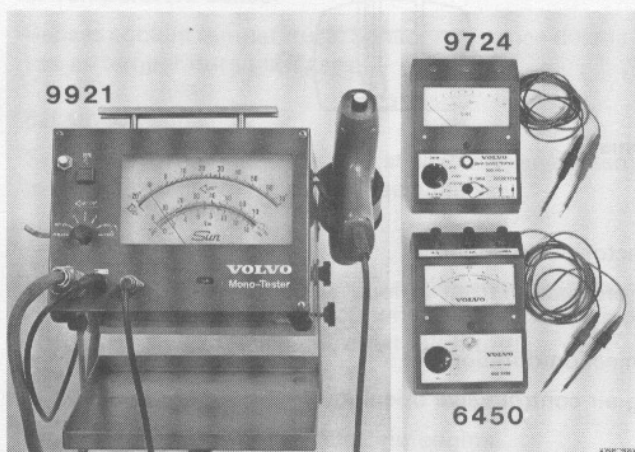
Current consumption	1–2 A
---------------------------	-------

Special tools



5011, 5116, 5265, 5266

999	Description – use
5011-5	Pressure gauge: measurement of fuel pressure. Used with 5116, 5265 and 5266
5116-2	Hose: pressure gauge connector 5011
5265-7	Nipple: pressure gauge connector 5011
5266-5	Plug: to plug pressure gauge 5011

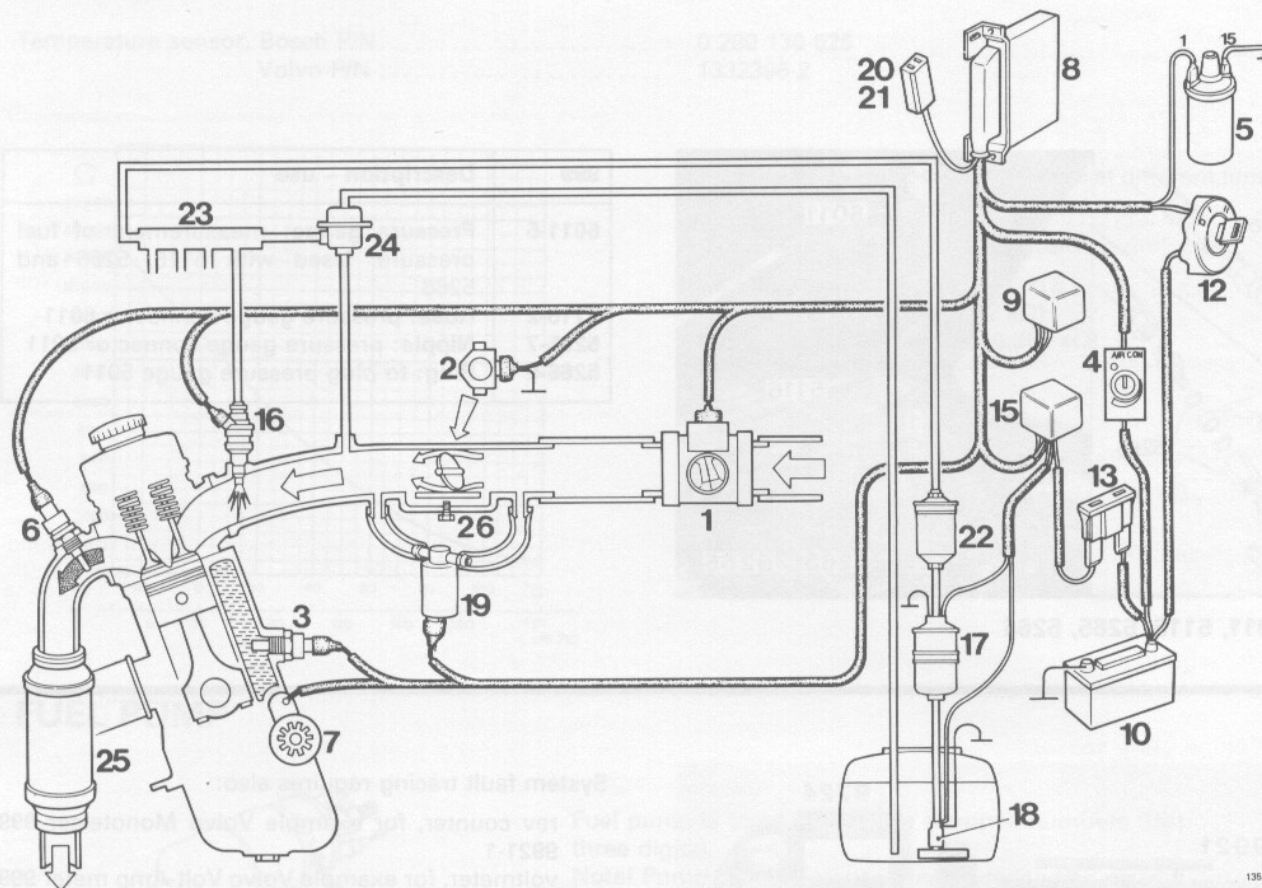


System fault tracing requires also:

- rev counter, for example Volvo Monotester 999 9921-1
- voltmeter, for example Volvo Volt-Amp meter 999 6450-4
- ohmmeter, for example Volvo Ohm-Diode meter 999 9724-0

LH-Jetronic II function

See also wiring diagram, fold-out page at end of manual.



System schematic

135 796

LH-Jetronic is an electronic system with one injector per cylinder.

System consists of a control unit which receives information from various sensors and calculates accordingly quantity of fuel injected.

Control unit regulates fuel quantity by varying injection duration.

Control unit also regulates idle speed by varying air control valve opening.

LH is an abbreviation of Luft-Hitzdracht = hot-air wire. The name comes from the fact that engine intake air flow is measured by an air mass meter consisting of an electrically heated wire.

The wire is cooled by the intake air flow. Control unit constantly regulates wire heating current so that wire maintains a constant temperature. Heating current is therefore a measure of intake air mass.

Because intake air mass (kg/h) is measured the system is not affected by ambient air pressure or temperature.

Relay

9. System relay

Provides control unit and air mass meter with current.

Control unit senses battery voltage via system relay.

15. Fuel pump relay

Provides current to injectors, fuel pump, tank pump and air control valve.

Control unit

8. Control unit

Receives signals from various sensors. Calculates corresponding fuel quantity. Regulates fuel quantity by variations in injection duration.

Regulates idle speed by varying air control valve opening.

Sensors

1. Air mass meter

Measures intake air mass.

5. Ignition coil

Control unit senses engine speed via ignition coil connection 1.

Ignition pulses give information on both engine speed and when injection should begin.

3. Temperature sensor

Senses coolant temperature. Sensor resistance decreases as temperature increases.

6. Lambda-sond

Senses oxygen content in exhaust gas. Oxygen content is a measure of combustion effectiveness.

2. Throttle valve switch

Senses throttle valve position. Throttle valve switch has two functions, a micro-switch which closes at engine idle and a switch which closes at full-throttle.

7. Starter motor

Signals control unit when starting engine.

Idling system

19. Air control valve

Bypasses air around throttle valve. Regulated by control unit.

4. Micro-switch, air conditioning (A/C)

Switch closes when A/C system engaged. Control unit then increases idle speed.

26. Idle adjustment screw

For basic setting idle speed.

Test point

20. Test point, idle speed

When test point is grounded air control valve is fixed in min. position. Intended for use when basic setting idle speed.

21. Test point, Lambda-sond

Fuel system

18. Tank pump

Pumps fuel from tank to main fuel pump and maintains fuel line to main pump under pressure. Therefore eliminates risk for vapor lock.

17. Fuel pump

Supplies system with fuel and builds-up line pressure.

22. Fuel filter

23. Injection manifold

24. Line pressure regulator

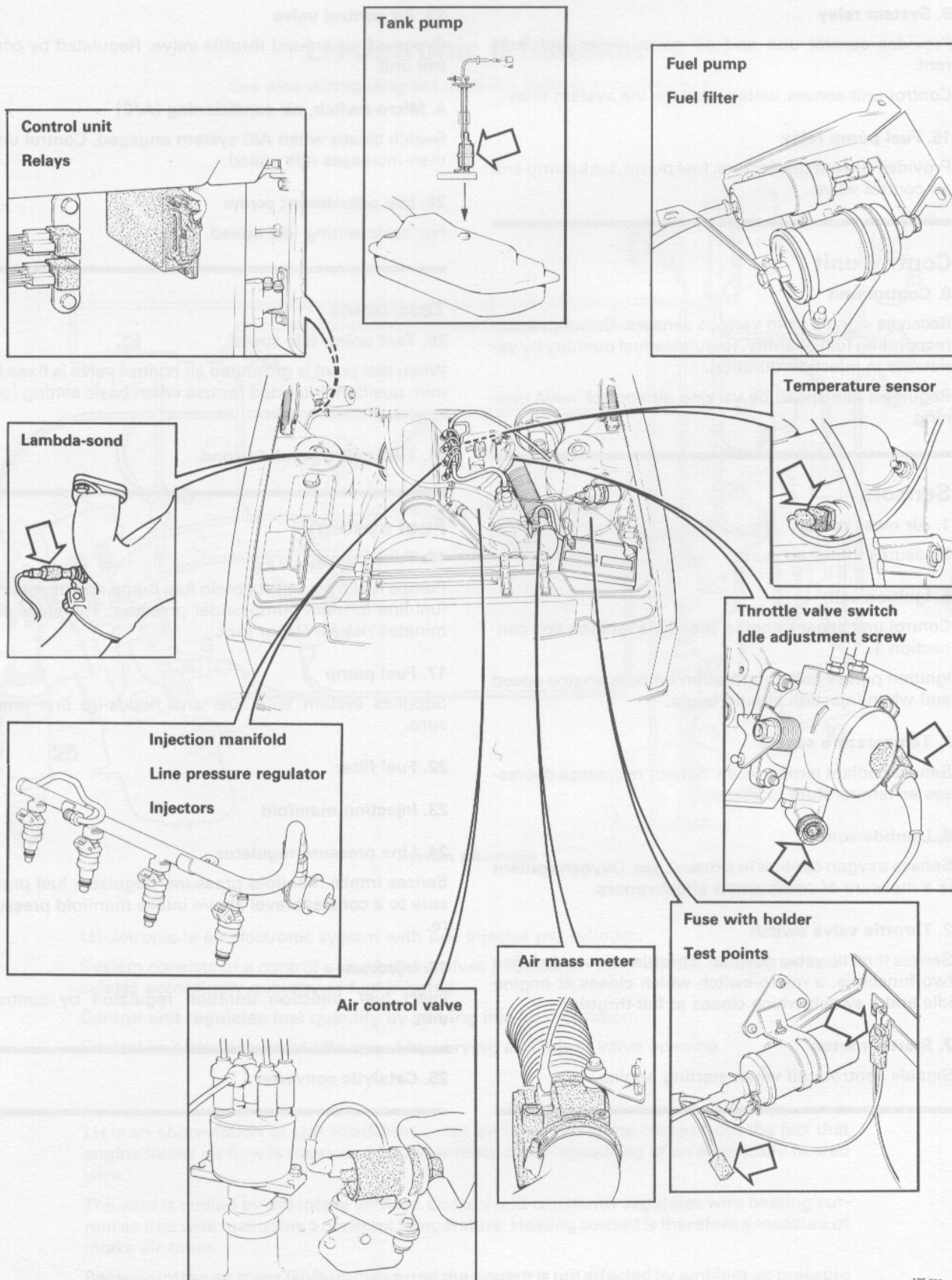
Senses intake manifold pressure. Regulates fuel pressure to a constant level above intake manifold pressure.

16. Injectors

Inject fuel. Injection duration regulated by control unit.

25. Catalytic converter

Location of components



Engine does not start

Operation	Probable cause
81	Blade fuse defective
-	No spark (ignition system)
-	Fuse no. 15 defective
-	Connectors not connected
82	Air intake system, leakage
83	Fuel pump, defective
84-85	Line pressure, incorrect
86-87	Port pressure, incorrect
88-89	No current
90-91	Pump system relay, defective
92	Starter motor wiring, defective
93	Ignition coil wiring, defective

Engine low top speed, poor performance

Operation	Probable cause
81	Throttle valve incorrectly adjusted
82	Valve does not open completely
83	Air intake system, leakage
84	Tank pump, defective
85	Line pressure, incorrect
86-87	Throttle valve switch, defective
88-89	Full throttle function, incorrect
90-91	CO adjustment, incorrect

Engine difficult to start (cold/warm)

Operation	Probable cause
81	Connectors not connected
82	Air intake system, leakage
83	Fuel pump, defective
84-85	Line pressure, incorrect
86-87	Port pressure, incorrect
88-89	No current
90-91	Pump system relay, defective
92	Starter motor wiring, defective
93	Ignition coil wiring, defective

Symptoms, probable faults/remedies

Fold out this section while performing the fault tracing procedures.

Excessively high idle speed

Operation	Probable cause
81	Temperature sensor connector, loose
82	Throttle valve switch, adjustment
83	Throttle valve sensor, defective
84-85	Throttle valve switch, defective
86-87	Throttle control incorrectly adjusted
88-89	Idle speed, incorrectly adjusted

Excessive running

Operation	Probable cause
81	Air intake system, leakage
82	Fuel pump, defective
83	Line pressure, incorrect
84-85	Port pressure, incorrect
86-87	No current
88-89	Pump system relay, defective
90-91	Starter motor wiring, defective
92	Ignition coil wiring, defective

Excessively low idle speed, cold engine

Operation	Probable cause
81	Fast idle function
82	Temperature sensor, defective
83	Air control valve, defective

Excessive fuel consumption

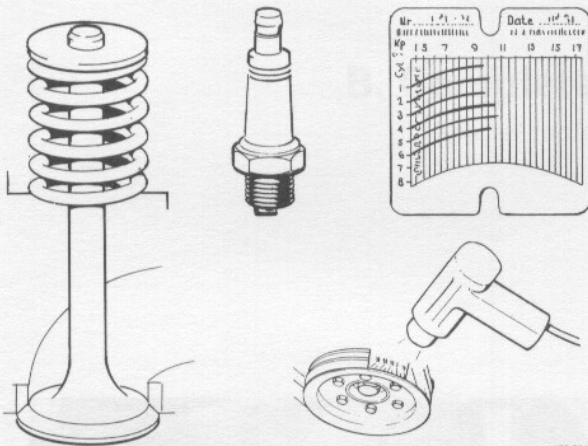
Operation	Probable cause
81	Fuel leakage
82	Throttle valve switch, no margin
83	Line pressure, incorrect
84-85	Port pressure, incorrect
86-87	Throttle valve switch, defective
88-89	CO adjustment, incorrect

Poor acceleration, jerking

Operation	Probable cause
81	Acceleration sensor, defective

A. Fault tracing

A1



123 264

General

The instructions in this section apply only if engine is free from any other mechanical or electrical faults. Correct octane fuel supplied by well known companies must be used.

The following points should always be checked before following fault tracing procedures.

Mechanical

- compression
- valve clearance
- vacuum hoses and connections
- throttle control, kick-down control (auto. transmission)
- air cleaner
- intake manifold (air leakage)

Electrical

- spark plugs and HT leads
- distributor cap
- ignition coil
- timing (incl. ignition advance)
- all electrical connections

Emission controls

- crankcase ventilation
- evaporative system
- catalytic converter



123 265

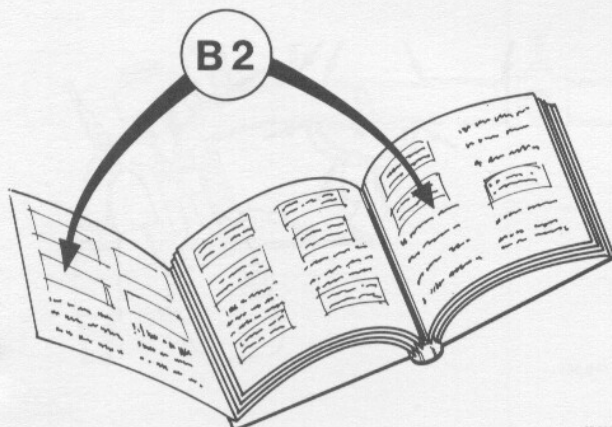
A2

Description:

Only the most common and easily detected fault symptoms are included in this section.

Perform a complete inspection of system (see page 13):

- if no faults are found when fault tracing
- if no easily detected symptoms are found
- if several components malfunction



135 798

The fold-out section overleaf contains a list of the most common symptoms and related checks:

The letter and number (e.g. B2) after each check refer to operations in the "Inspection of system".

Refer also to wiring diagram on page 35.

Engine does not start

A1

f engine is
faults. Cor-
companies
ked before

Probable cause	Operation
Blade fuse defective	B1
No spark (ignition system)	—
Fuse no. 12, defective	—
Connectors not connected	B1
Air intake system, leakage	B2
Fuel pump, defective	B5
Line pressure, incorrect	B6-10
Poor grounds	B11-14
No current	B15
Pump/system relay, defective	B17-18
Starter motor wiring, defective	B20
Ignition coil wiring, defective	B21

Engine difficult to start (cold/warm)

Probable cause	Operation
Connectors not connected	B1
Air intake system, leakage	B2
Line pressure, incorrect	B5-10
Starter motor wiring, defective	B11-13, 20
Temperature sensor, defective	B23
Starting system function, defective	B27-29

A2

ult symp-

Erratic running

Poor or no idle

Probable cause	Operation
Air intake system, leakage	B2
Injectors, defective	E1
Line pressure, incorrect	B5-10
Air mass meter, no current or ground	B11-13, 19
Air mass meter wiring, defective	B24, 27
Air mass meter, defective	B34

Excessive fuel consumption

Probable cause	Operation
Fuel leakage	—
Throttle valve switch, incorrectly adjusted	B3
Line pressure, incorrect	B5-10
Throttle valve switch, defective	B11-13, 25, 27
CO-adjustment, incorrect	C1-17

Low top speed, poor performance

Probable cause	Operation
Throttle valve incorrectly adjusted, valve does not open completely	D5
Air intake system, leakage	B2
Tank pump, defective	B5
Line pressure, incorrect	B6-10
Throttle valve switch, defective	B11-13, 25, 27
Full throttle function, incorrect	B28, 31, 37
CO-adjustment, incorrect	C1-17

Erratic idle

Probable cause	Operation
Air intake system, leakage	B2
Engine does not run on all cylinders	E1
Air control valve hose blocked/disconnected	—
Throttle valve, loose/incorrectly adjusted	D1-8

Excessively high idle speed

Probable cause	Operation
Temperature sensor connector, loose	B1
Throttle valve switch, adjustment	B3
Temperature sensor, defective	B11-13, 23
Throttle valve switch, defective	B25, 27
Throttle control incorrectly adjusted	D1-8
Idle speed, incorrectly adjusted	C3-17

Excessively low idle speed, cold engine

Probable cause	Operation
Fast idle function	B31, 33
Temperature sensor, defective	B11-13, 23
Air control valve, defective	B25, 27

Poor acceleration, jerking

Probable cause	Operation
Acceleration enrichment, defective	B28, 34-35

Tracing for each system

General fault tracing

System	Operation
General	11
Ignition	12
Injection	13
Exhaust	14
Oil pressure	15
Water pump	16
Brake	17
Steering	18
Electrical	19
Body	20
Engine	21
Transmission	22
Drivetrain	23
Chassis	24
Exhaust	25
Oil pressure	26
Water pump	27
Brake	28
Steering	29
Electrical	30
Body	31
Engine	32
Transmission	33
Drivetrain	34
Chassis	35
Exhaust	36
Oil pressure	37
Water pump	38
Brake	39
Steering	40
Electrical	41
Body	42
Engine	43
Transmission	44
Drivetrain	45
Chassis	46
Exhaust	47
Oil pressure	48
Water pump	49
Brake	50
Steering	51
Electrical	52
Body	53
Engine	54
Transmission	55
Drivetrain	56
Chassis	57
Exhaust	58
Oil pressure	59
Water pump	60
Brake	61
Steering	62
Electrical	63
Body	64
Engine	65
Transmission	66
Drivetrain	67
Chassis	68
Exhaust	69
Oil pressure	70
Water pump	71
Brake	72
Steering	73
Electrical	74
Body	75
Engine	76
Transmission	77
Drivetrain	78
Chassis	79
Exhaust	80
Oil pressure	81
Water pump	82
Brake	83
Steering	84
Electrical	85
Body	86
Engine	87
Transmission	88
Drivetrain	89
Chassis	90
Exhaust	91
Oil pressure	92
Water pump	93
Brake	94
Steering	95
Electrical	96
Body	97
Engine	98
Transmission	99
Drivetrain	100
Chassis	101
Exhaust	102
Oil pressure	103
Water pump	104
Brake	105
Steering	106
Electrical	107
Body	108
Engine	109
Transmission	110
Drivetrain	111
Chassis	112
Exhaust	113
Oil pressure	114
Water pump	115
Brake	116
Steering	117
Electrical	118
Body	119
Engine	120
Transmission	121
Drivetrain	122
Chassis	123
Exhaust	124
Oil pressure	125
Water pump	126
Brake	127
Steering	128
Electrical	129
Body	130
Engine	131
Transmission	132
Drivetrain	133
Chassis	134
Exhaust	135
Oil pressure	136
Water pump	137
Brake	138
Steering	139
Electrical	140
Body	141
Engine	142
Transmission	143
Drivetrain	144
Chassis	145
Exhaust	146
Oil pressure	147
Water pump	148
Brake	149
Steering	150
Electrical	151
Body	152
Engine	153
Transmission	154
Drivetrain	155
Chassis	156
Exhaust	157
Oil pressure	158
Water pump	159
Brake	160
Steering	161
Electrical	162
Body	163
Engine	164
Transmission	165
Drivetrain	166
Chassis	167
Exhaust	168
Oil pressure	169
Water pump	170
Brake	171
Steering	172
Electrical	173
Body	174
Engine	175
Transmission	176
Drivetrain	177
Chassis	178
Exhaust	179
Oil pressure	180
Water pump	181
Brake	182
Steering	183
Electrical	184
Body	185
Engine	186
Transmission	187
Drivetrain	188
Chassis	189
Exhaust	190
Oil pressure	191
Water pump	192
Brake	193
Steering	194
Electrical	195
Body	196
Engine	197
Transmission	198
Drivetrain	199
Chassis	200



Erratic idle

Probable cause	Operation
Electrical	11
Mechanical	12
Ignition	13
Injection	14
Exhaust	15
Oil pressure	16
Water pump	17
Brake	18
Steering	19
Electrical	20
Body	21
Engine	22
Transmission	23
Drivetrain	24
Chassis	25
Exhaust	26
Oil pressure	27
Water pump	28
Brake	29
Steering	30
Electrical	31
Body	32
Engine	33
Transmission	34
Drivetrain	35
Chassis	36
Exhaust	37
Oil pressure	38
Water pump	39
Brake	40
Steering	41
Electrical	42
Body	43
Engine	44
Transmission	45
Drivetrain	46
Chassis	47
Exhaust	48
Oil pressure	49
Water pump	50
Brake	51
Steering	52
Electrical	53
Body	54
Engine	55
Transmission	56
Drivetrain	57
Chassis	58
Exhaust	59
Oil pressure	60
Water pump	61
Brake	62
Steering	63
Electrical	64
Body	65
Engine	66
Transmission	67
Drivetrain	68
Chassis	69
Exhaust	70
Oil pressure	71
Water pump	72
Brake	73
Steering	74
Electrical	75
Body	76
Engine	77
Transmission	78
Drivetrain	79
Chassis	80
Exhaust	81
Oil pressure	82
Water pump	83
Brake	84
Steering	85
Electrical	86
Body	87
Engine	88
Transmission	89
Drivetrain	90
Chassis	91
Exhaust	92
Oil pressure	93
Water pump	94
Brake	95
Steering	96
Electrical	97
Body	98
Engine	99
Transmission	100
Drivetrain	101
Chassis	102
Exhaust	103
Oil pressure	104
Water pump	105
Brake	106
Steering	107
Electrical	108
Body	109
Engine	110
Transmission	111
Drivetrain	112
Chassis	113
Exhaust	114
Oil pressure	115
Water pump	116
Brake	117
Steering	118
Electrical	119
Body	120
Engine	121
Transmission	122
Drivetrain	123
Chassis	124
Exhaust	125
Oil pressure	126
Water pump	127
Brake	128
Steering	129
Electrical	130
Body	131
Engine	132
Transmission	133
Drivetrain	134
Chassis	135
Exhaust	136
Oil pressure	137
Water pump	138
Brake	139
Steering	140
Electrical	141
Body	142
Engine	143
Transmission	144
Drivetrain	145
Chassis	146
Exhaust	147
Oil pressure	148
Water pump	149
Brake	150
Steering	151
Electrical	152
Body	153
Engine	154
Transmission	155
Drivetrain	156
Chassis	157
Exhaust	158
Oil pressure	159
Water pump	160
Brake	161
Steering	162
Electrical	163
Body	164
Engine	165
Transmission	166
Drivetrain	167
Chassis	168
Exhaust	169
Oil pressure	170
Water pump	171
Brake	172
Steering	173
Electrical	174
Body	175
Engine	176
Transmission	177
Drivetrain	178
Chassis	179
Exhaust	180
Oil pressure	181
Water pump	182
Brake	183
Steering	184
Electrical	185
Body	186
Engine	187
Transmission	188
Drivetrain	189
Chassis	190
Exhaust	191
Oil pressure	192
Water pump	193
Brake	194
Steering	195
Electrical	196
Body	197
Engine	198
Transmission	199
Drivetrain	200

Excessive high idle

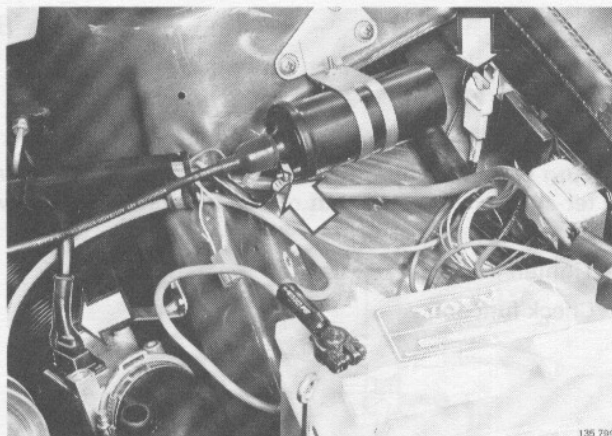
Probable cause	Operation
Electrical	11
Mechanical	12
Ignition	13
Injection	14
Exhaust	15
Oil pressure	16
Water pump	17
Brake	18
Steering	19
Electrical	20
Body	21
Engine	22
Transmission	23
Drivetrain	24
Chassis	25
Exhaust	26
Oil pressure	27
Water pump	28
Brake	29
Steering	30
Electrical	31
Body	32
Engine	33
Transmission	34
Drivetrain	35
Chassis	36
Exhaust	37
Oil pressure	38
Water pump	39
Brake	40
Steering	41
Electrical	42
Body	43
Engine	44
Transmission	45
Drivetrain	46
Chassis	47
Exhaust	48
Oil pressure	49
Water pump	50
Brake	51
Steering	52
Electrical	53
Body	54
Engine	55
Transmission	56
Drivetrain	57
Chassis	58
Exhaust	59
Oil pressure	60
Water pump	61
Brake	62
Steering	63
Electrical	64
Body	65
Engine	66
Transmission	67
Drivetrain	68
Chassis	69
Exhaust	70
Oil pressure	71
Water pump	72
Brake	73
Steering	74
Electrical	75
Body	76
Engine	77
Transmission	78
Drivetrain	79
Chassis	80
Exhaust	81
Oil pressure	82
Water pump	83
Brake	84
Steering	85
Electrical	86
Body	87
Engine	88
Transmission	89
Drivetrain	90
Chassis	91
Exhaust	92
Oil pressure	93
Water pump	94
Brake	95
Steering	96
Electrical	97
Body	98
Engine	99
Transmission	100
Drivetrain	101
Chassis	102
Exhaust	103
Oil pressure	104
Water pump	105
Brake	106
Steering	107
Electrical	108
Body	109
Engine	110
Transmission	111
Drivetrain	112
Chassis	113
Exhaust	114
Oil pressure	115
Water pump	116
Brake	117
Steering	118
Electrical	119
Body	120
Engine	121
Transmission	122
Drivetrain	123
Chassis	124
Exhaust	125
Oil pressure	126
Water pump	127
Brake	128
Steering	129
Electrical	130
Body	131
Engine	132
Transmission	133
Drivetrain	134
Chassis	135
Exhaust	136
Oil pressure	137
Water pump	138
Brake	139
Steering	140
Electrical	141
Body	142
Engine	143
Transmission	144
Drivetrain	145
Chassis	146
Exhaust	147
Oil pressure	148
Water pump	149
Brake	150
Steering	151
Electrical	152
Body	153
Engine	154
Transmission	155
Drivetrain	156
Chassis	157
Exhaust	158
Oil pressure	159
Water pump	160
Brake	161
Steering	162
Electrical	163
Body	164
Engine	165
Transmission	166
Drivetrain	167
Chassis	168
Exhaust	169
Oil pressure	170
Water pump	171
Brake	172
Steering	173
Electrical	174
Body	175
Engine	176
Transmission	177
Drivetrain	178
Chassis	179
Exhaust	180
Oil pressure	181
Water pump	182
Brake	183
Steering	184
Electrical	185
Body	186
Engine	187
Transmission	188
Drivetrain	189
Chassis	190
Exhaust	191
Oil pressure	192
Water pump	193
Brake	194
Steering	195
Electrical	196
Body	197
Engine	198
Transmission	199
Drivetrain	200

Excessive low idle

Probable cause	Operation
Electrical	11
Mechanical	12
Ignition	13
Injection	14
Exhaust	15
Oil pressure	16
Water pump	17
Brake	18
Steering	19

B. Complete system inspection

Special tools: 5011, 5116, 5265, 5266



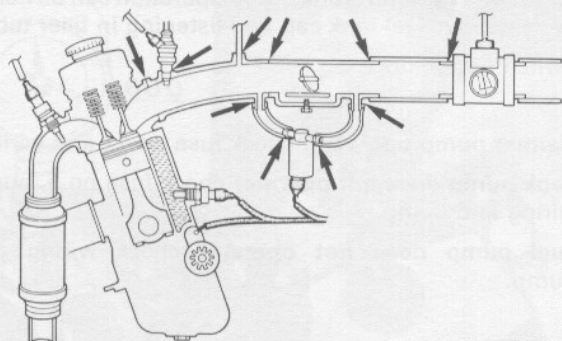
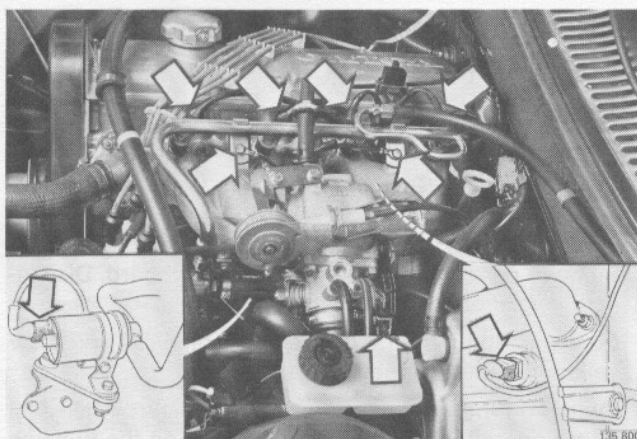
Check of fuses, connectors, grounds, air leakage, throttle valve switch

Operations B1-4

B1

Check that:

- blade fuse in engine compartment OK. Fuse should be 25A
- wire (gray) to ignition coil terminal 1 is connected
- wiring connectors for injectors, temperature sensor, air control valve, throttle valve switch and air mass meter are connected
- grounds are properly tightened and have good contact



B2

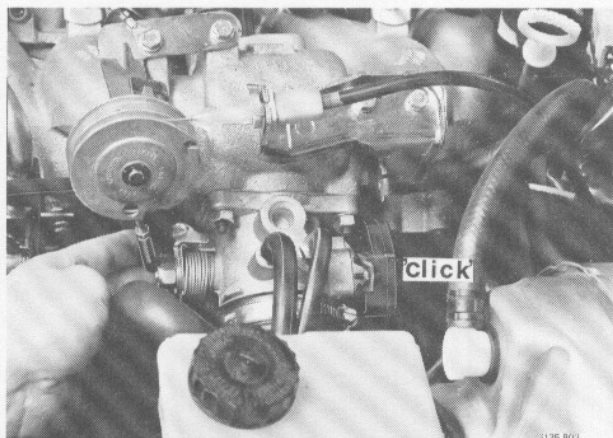
Check air intake system leakage

Air leakage between air mass meter and engine means that fuel-air mixture is too lean.

Check:

- hose between air mass meter and intake manifold
- all hoses and connections to intake manifold
- joints for intake manifold and throttle valve housing, etc.

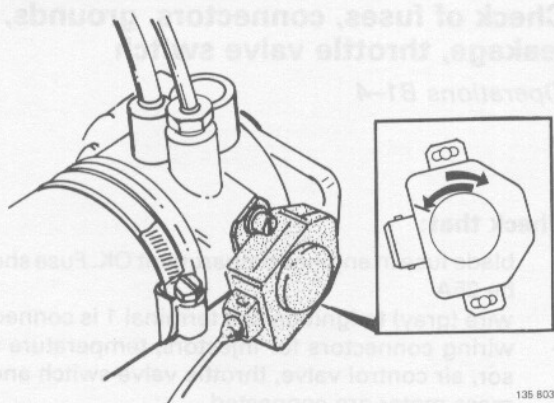
Inspection



B3

Check throttle valve switch adjustment

Open throttle valve slightly and listen to switch. A "click" (idle switch opens) should be heard immediately when throttle valve moves.



B4

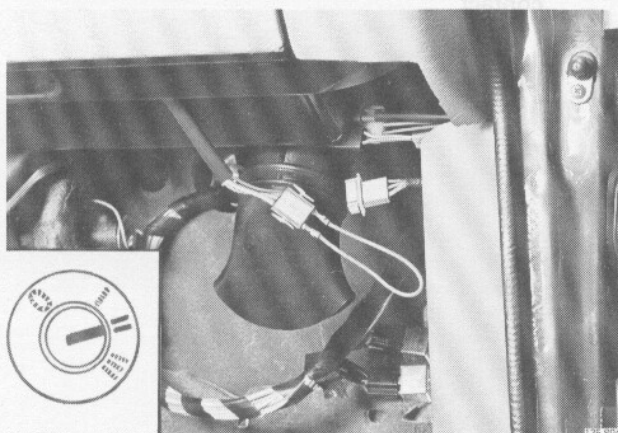
Adjustment of throttle valve switch (if required):

Loosen switch screws (inhex 3 mm).

Turn switch slightly clockwise. Then turn switch counter-clockwise to stop, but not so far that throttle valve begins to open.

Tighten screws.

Check function.



B5

Check of pumps, line pressure, pressure regulator

Operations B5-10

Check that fuel pump and tank pump function

Remove panel on right side under dashboard. Disconnect the 3-pole connector.

Connect a jumper wire between the blue/red and blue/yellow wires in connector.

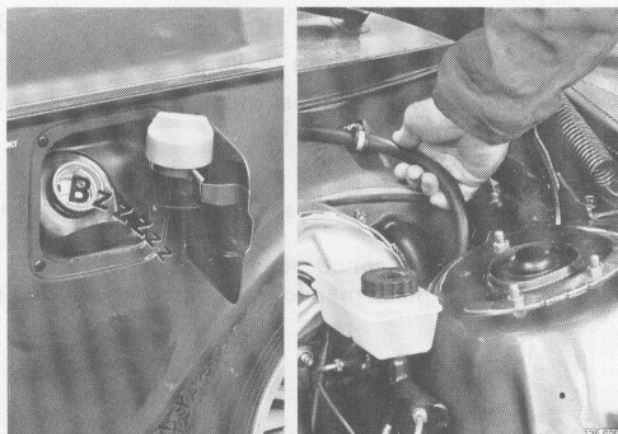
Switch on the ignition, pumps should start. Main fuel pump operation can be sensed by feeling the fuel line pulsations by hand. Tank pump operation can be heard by removing fuel tank cap and listening in filler tube.

Switch off ignition.

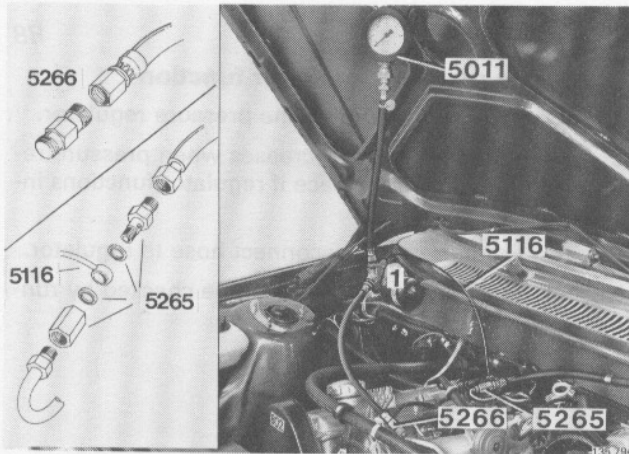
Neither pump operates: check fuse no 12 and wiring.

Tank pump does not operate: check fuse no 5, pump wiring and pump.

Fuel pump does not operate: check wiring and pump.



B6

**Connect pressure meter 5011**

Ignition switched off.

Connect meter between fuel line and injection manifold. Use hose **5116** and nipple **5265**.

Plug unused meter hose with plug **5266**.

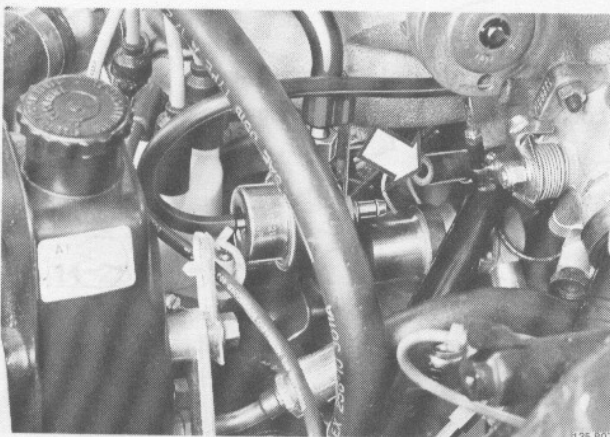
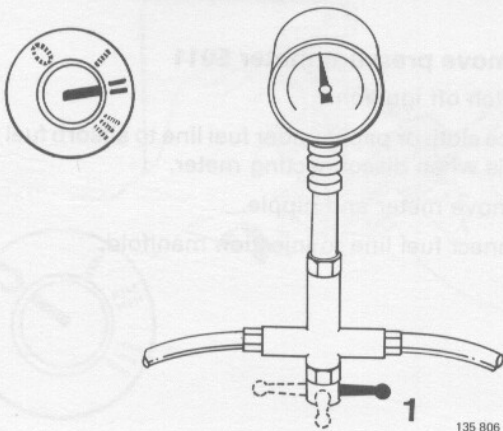
Move handle on 5011 to position 1.

B7

Measure line pressure

Switch on ignition so fuel pumps start.

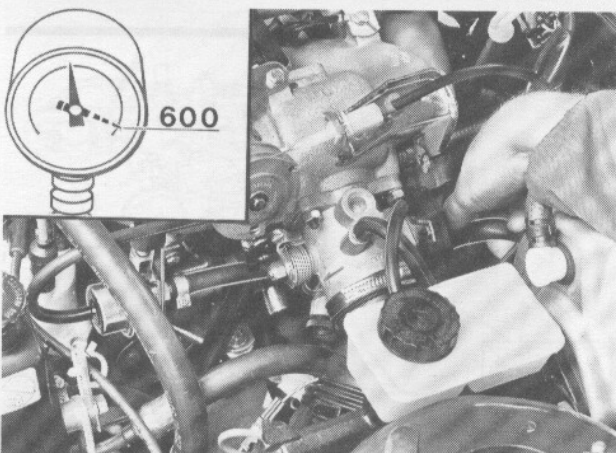
Line pressure should be **250 kPa (35.5 psi)**.

**Line pressure too high:**

Switch off ignition.

Disconnect fuel return line from pressure regulator and blow in line.

If line is open pressure regulator is defective. Replace regulator and measure pressure again.

**Line pressure too low:**

Pinch off fuel return line by hand and check if pressure rises.

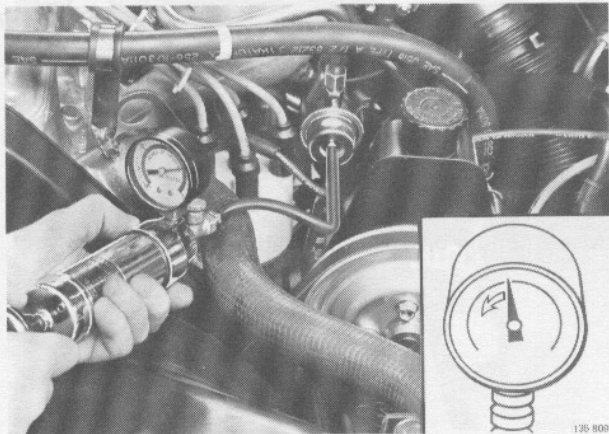
CAUTION. Do not let pressure exceed 600 kPa (85.2 psi).

If pressure **quickly rises** pump and lines are OK. Replace regulator and measure pressure again.

If pressure **slowly rises** this means that fuel filter, tank pump filter or line is blocked.

If pressure **does not rise** fuel pump is defective.

Inspection



B8

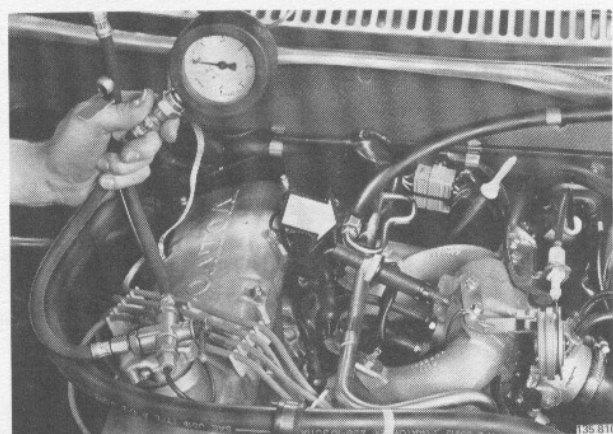
Check line pressure regulator function

Connect a vacuum pump to line pressure regulator.

Check that line pressure decreases when pressure regulator is evacuated. Replace if regulator functions incorrectly.

Remove vacuum pump, reconnect hose to regulator.

Note! Regulator function can also be checked by running engine.



B9

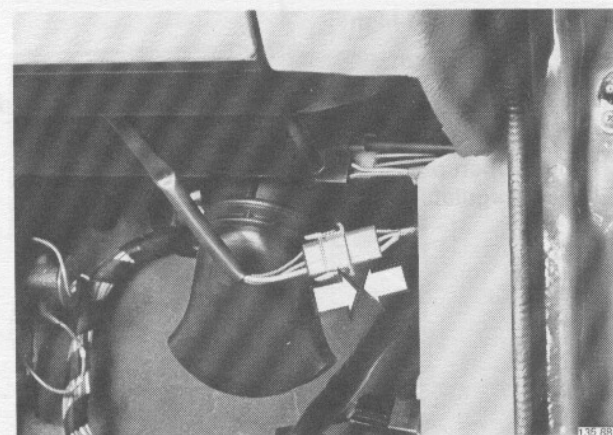
Remove pressure meter 5011

Switch off ignition.

Place cloth or paper under fuel line to absorb fuel which spills when disconnecting meter.

Remove meter and nipple.

Connect fuel line to injection manifold.



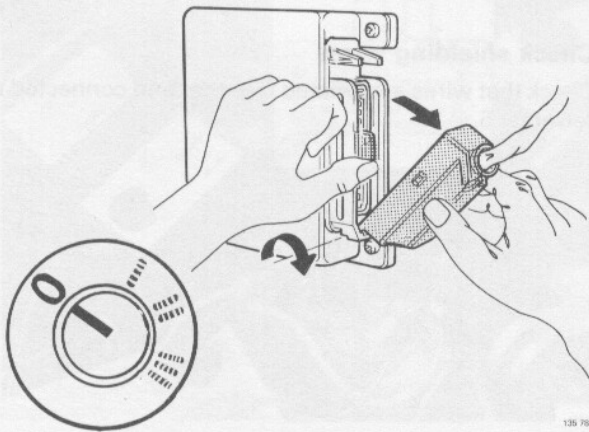
B10

Connect three-pole connector

Located on right side under dashboard.

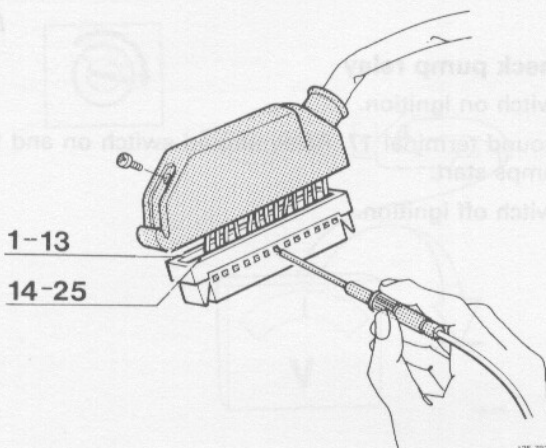
Check of components and wiring**Operations B11-28**

Fold out wiring diagram for reference while working.

**B11****Switch off the ignition****B12**

Remove panel in front of right front door
Remove connector from control unit

Push catch to side and fold out connector.

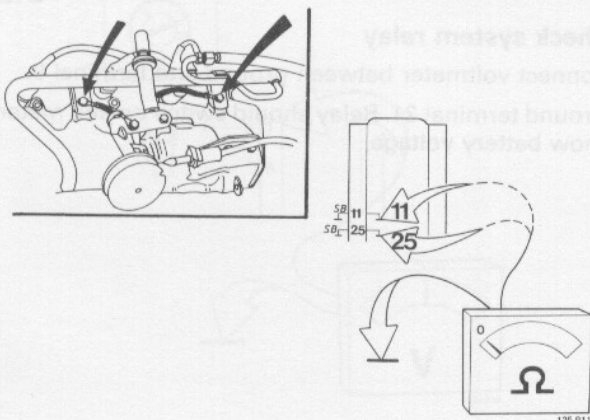
**B13****Remove connector cover**

CAUTION. Never check terminals from front.

Experience has shown that terminals are easily damaged causing further faults.

Check terminals through the holes in side of connector. Do not use excessive force.

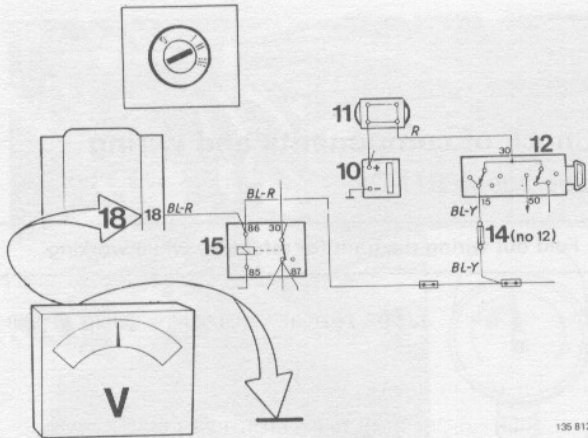
Terminal numbers are stamped on connector.

**B14****Check grounds**

Connect ohmmeter between ground and terminals 11, 25. Resistance should be zero for both terminals. Wires are grounded at intake manifold.

Inspection

B15



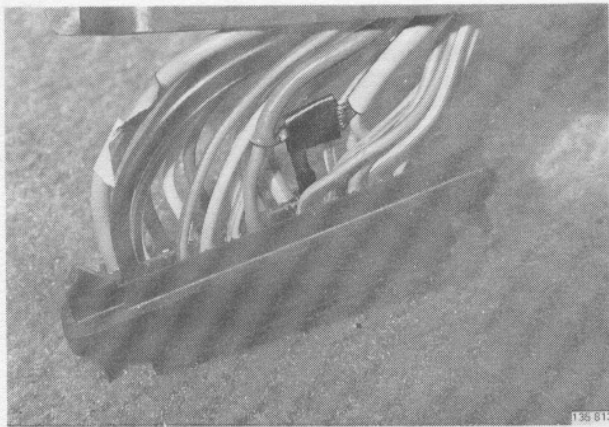
Check current supply

Switch on ignition.

Connect voltmeter between ground and terminal 18. Meter should show battery voltage.

Switch off ignition.

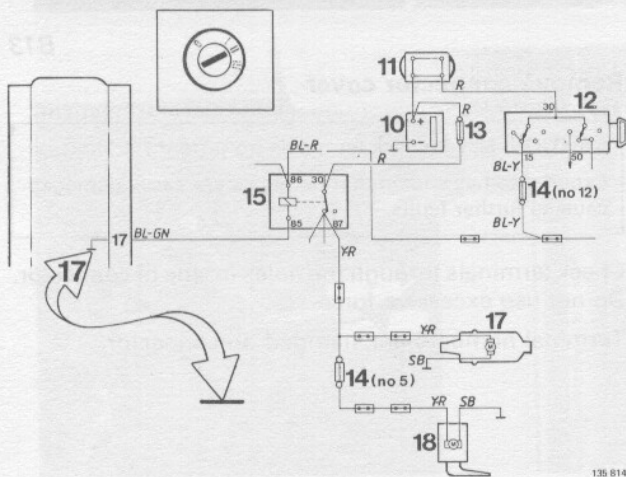
B16



Check shielding wires

Check that wires are twisted together and connected to terminal 5.

B17



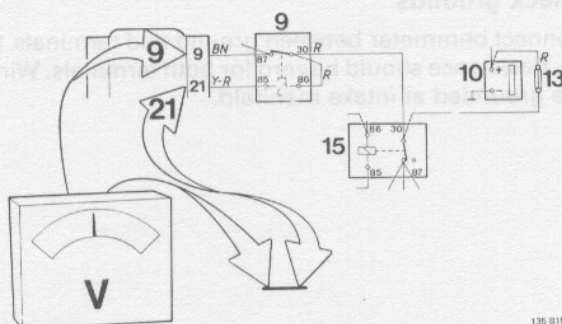
Check pump relay

Switch on ignition.

Ground terminal 17. Relay should switch on and fuel pumps start.

Switch off ignition.

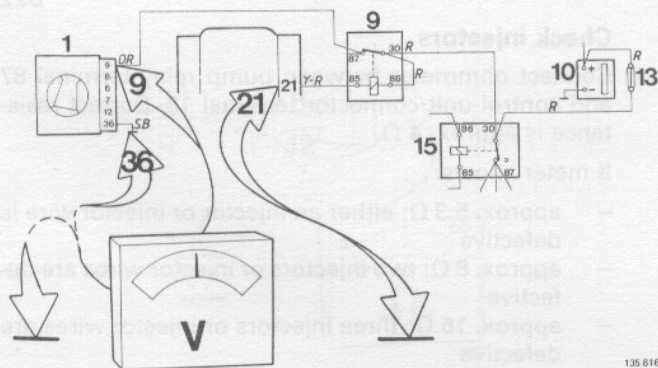
B18



Check system relay

Connect voltmeter between ground and terminal 9.

Ground terminal 21. Relay should switch on and meter show battery voltage.



B19

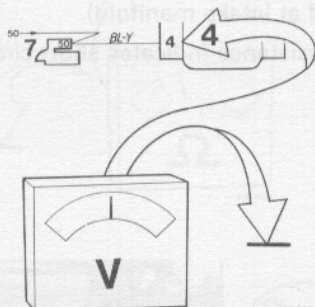
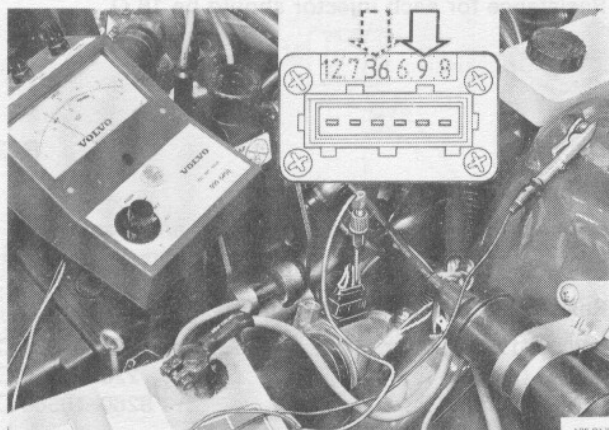
Check air mass meter current supply and ground

Ground terminal 21.

Peel back rubber boot from around air mass meter wiring connector.

Connect voltmeter between terminal 9 and ground and then between terminals 9 and 36. Meter should show battery voltage in both cases. (Air mass meter is grounded at intake manifold).

Reposition rubber boot around wiring connector.



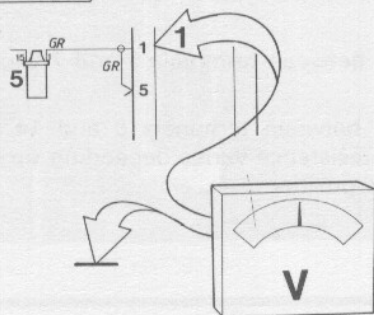
135 816

B20

Check wiring from starter motor

Connect voltmeter between ground and terminal 4.

Crank engine. Meter should show battery voltage.



135 819

B21

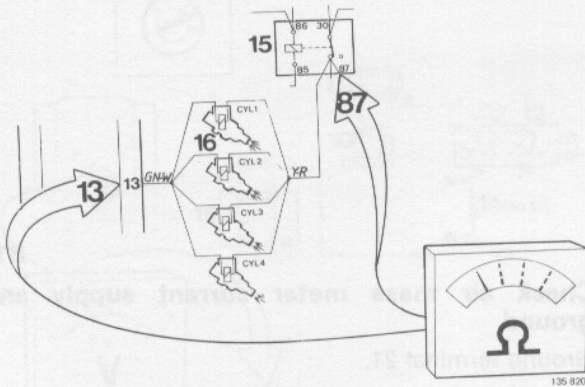
Check wiring from ignition coil

Switch on ignition.

Connect voltmeter between ground and terminal 1. Meter should deflect.

Switch off ignition.

B22

**Check injectors**

Connect ohmmeter between pump relay terminal 87 and control unit connector terminal 13. Correct resistance is approx. 4 Ω.

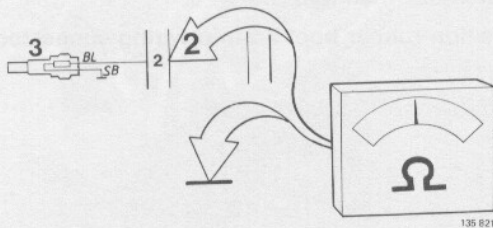
If meter shows:

- approx. 5.3 Ω: either an injector or injector wire is defective
- approx. 8 Ω: two injectors or injector wires are defective
- approx. 16 Ω: three injectors or injector wires are defective

If defective remove injector connectors and check each injector separately.

Resistance for each injector should be 16 Ω.

B23

**Check temperature sensor**

Connect ohmmeter between ground and terminal 2.

Resistance depends on temperature (see diagram).

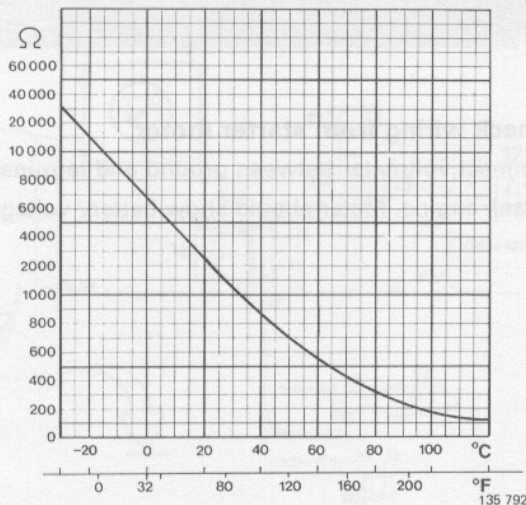
Resistance at certain temperatures:

+80°C (175°F)	290–364 Ω
+20°C (68°F)	2280–2720 Ω
–10°C (14°F)	8260–10560 Ω

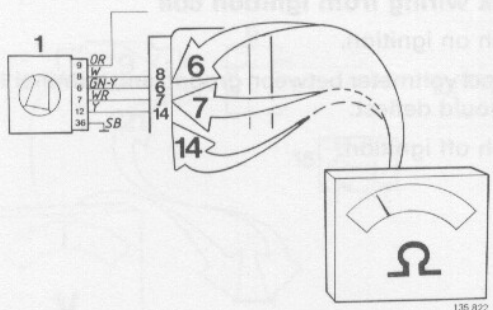
Incorrect test values mean defective temperature sensor.

Extremely high test values indicates open circuit in temperature sensor or wiring (check temperature sensor ground at intake manifold).

Zero resistance indicates short circuit.



B24

**Check air mass meter**

Connect ohmmeter between terminals 6 and 7 and then 6 and 14.

Resistance between terminals 6 and 7 should be 3.7 Ω.

Resistance between terminals 6 and 14 should be 0–1000 Ω (resistance varies depending on CO-adjustment screw position).

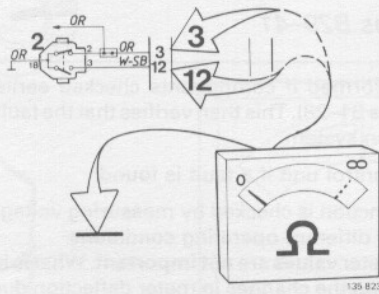
B25

Check throttle valve switch

Connect ohmmeter between ground and terminal 3. Depress accelerator pedal. Meter should show zero resistance in idle position and infinite resistance in other positions.

Connect ohmmeter between ground and terminal 12. Depress accelerator pedal. Meter should show zero resistance in full throttle position and infinite resistance in other positions.

If incorrect, check throttle valve switch ground at intake manifold. If ground connection is OK replace throttle valve switch.

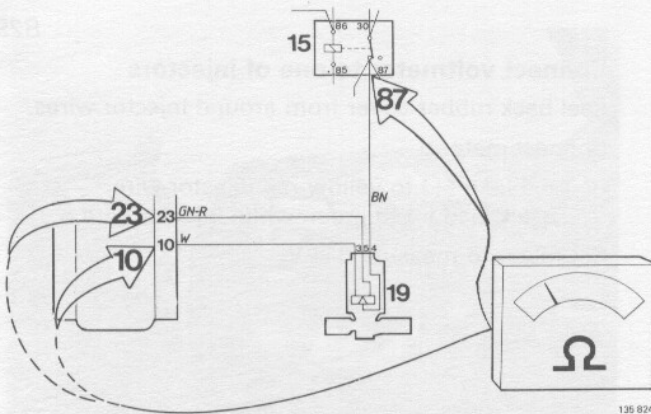


135 823

B26

Check air control valve

Connect ohmmeter between pump relay terminal 87 and control unit connector terminal 10 and then between pump relay terminal 87 and control unit connector terminal 23. Resistance should be approx. 20 Ω in both cases.

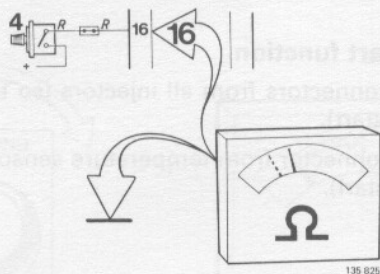


135 824

B27

Check micro-switch for air conditioning

Connect ohmmeter between ground and terminal 16. Turn knob on air conditioning control panel. Resistance should decrease.

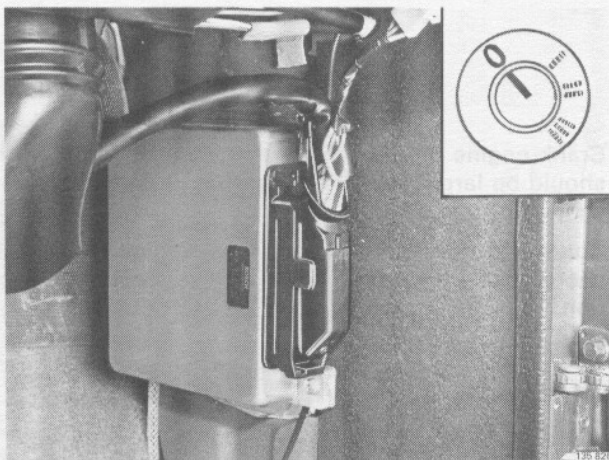


135 825

B28

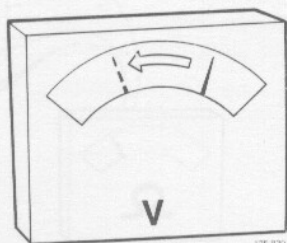
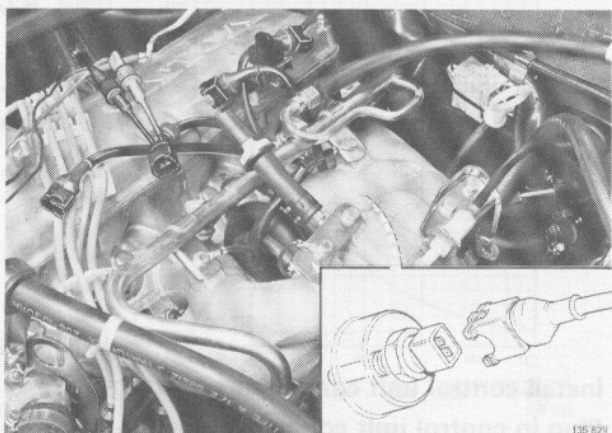
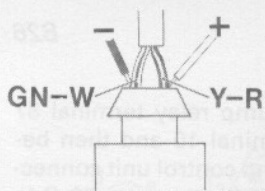
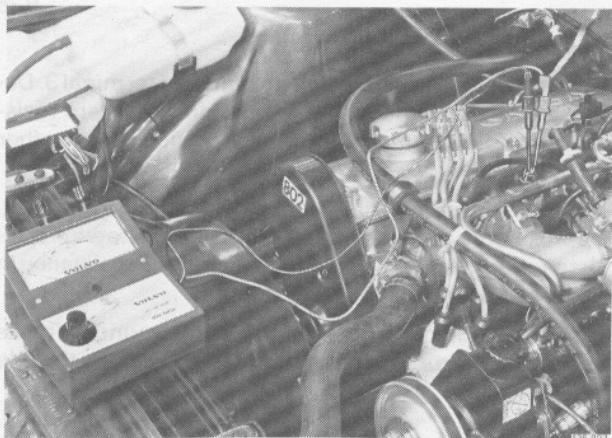
Install control unit connector cover**Plug in control unit connector**

Ignition should be switched off.



135 826

Inspection



Check of system function

Operations B29-41

To be performed if components checked earlier are OK (operations B1-28). This then verifies that the faults depend on injection system.

Replace control unit if a fault is found.

System function is checked by measuring voltage at injectors under different operating conditions.

Specific meter **values** are **not important**. What is important, however, are the changes in meter deflection during different operating conditions.

B29

Connect voltmeter to one of injectors

Peel back rubber cover from around injector wires.

Connect meter,

- red lead (+) to yellow-red injector wire
- black lead (-) to green-white injector wire.

Set meter to measure **0-4 V**.

B30

Check start function

Remove connectors from all injectors (so that engine does not start).

Remove connector from temperature sensor (to simulate cold start).

Crank engine and check meter deflection. Deflection should be large when first cranking and then decrease.

Connect temperature sensor. Crank engine. Voltmeter should deflect as before but with decreased deflection.

Connect injectors.

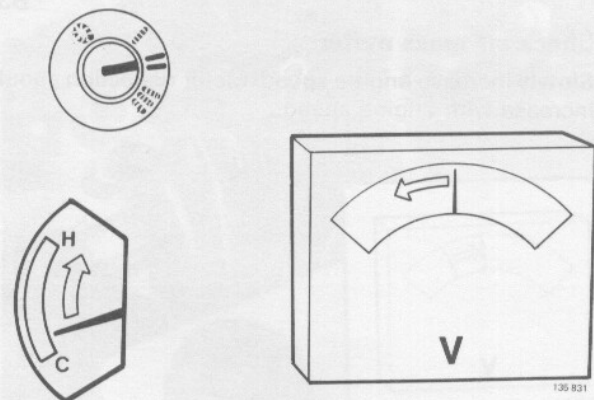
B31

Check enrichment during warm-up

Start engine.

Warm-up engine and read meter.

As engine warms up meter deflection should decrease slightly.



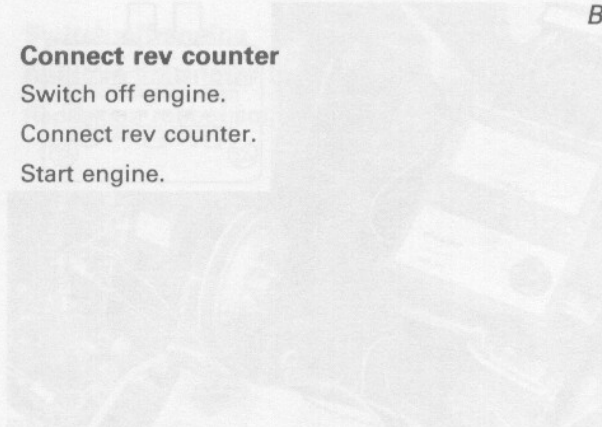
B32

Connect rev counter

Switch off engine.

Connect rev counter.

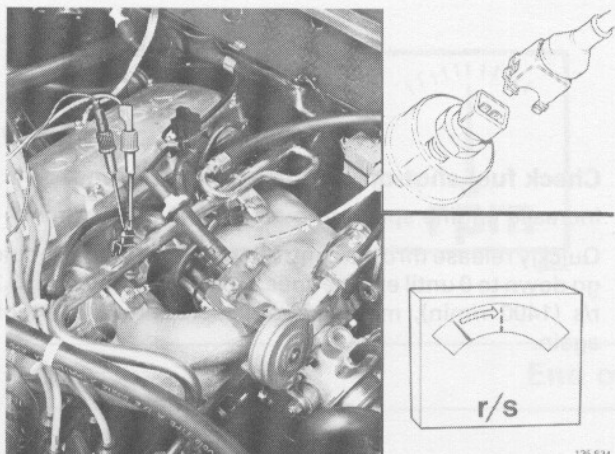
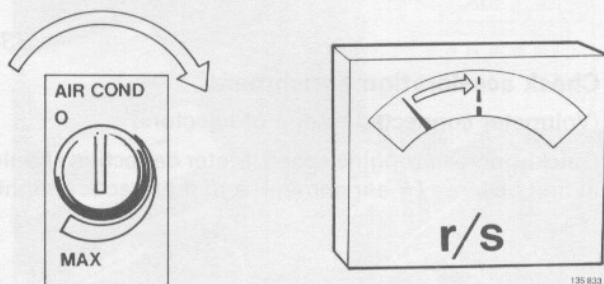
Start engine.



B33

Check idle speedIdle speed should be **12.5 r/s** (750 r/min).Engage air conditioning. Engine speed should increase to **15.0 r/s** (900 r/min).

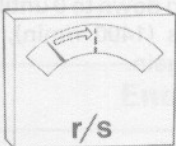
Disengage air conditioning.

If engine speed does not increase: check that air control valve does not stick. Replace and test with a new air control valve.**If engine does not idle:** check air mass meter, see operation B35.

B34

Check fast idleRemove connector from temperature sensor (simulates cold engine). Engine speed should increase to **26.7–41.7 r/s** (1600–2500 r/min).

Reconnect temperature sensor. Engine speed should return to normal idle.

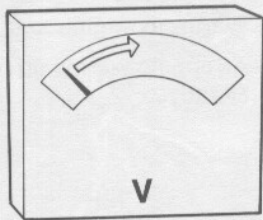
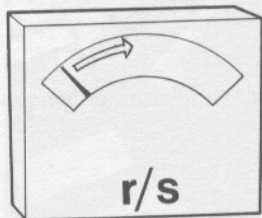


Inspection

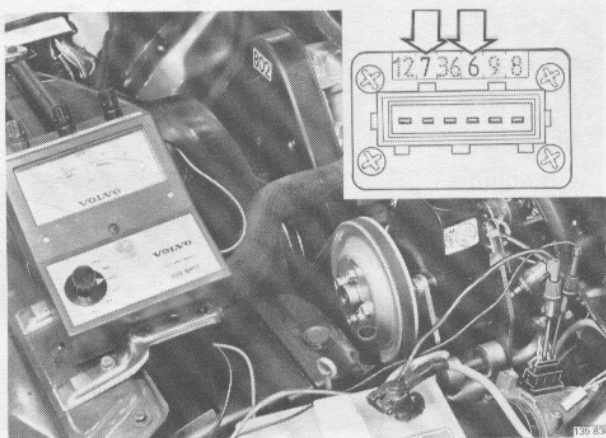
B35

Check air mass meter

Slowly increase engine speed. Meter deflection should increase with engine speed.



135 835



If incorrect, check voltage from air mass meter:

Switch off engine.

Peel back rubber cover from air mass meter connector.

Connect voltmeter between terminal 7 (+) and terminal 6 (-).

Start engine.

Voltage should increase as engine speed increases.

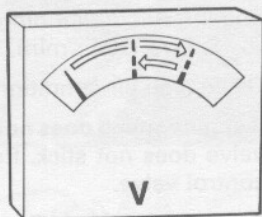
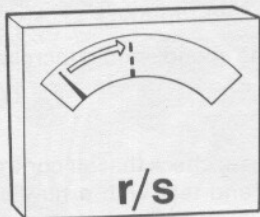
Replace and test with new control unit if air mass meter is OK.

B36

Check acceleration enrichment

(Voltmeter connected to one of injectors)

Quickly increase engine speed. Meter deflection should at first be large (= enrichment) and then reduce slightly.



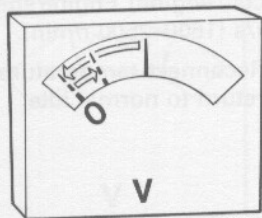
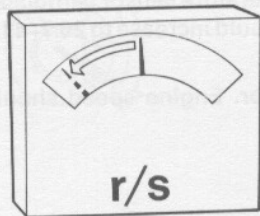
135 837

B37

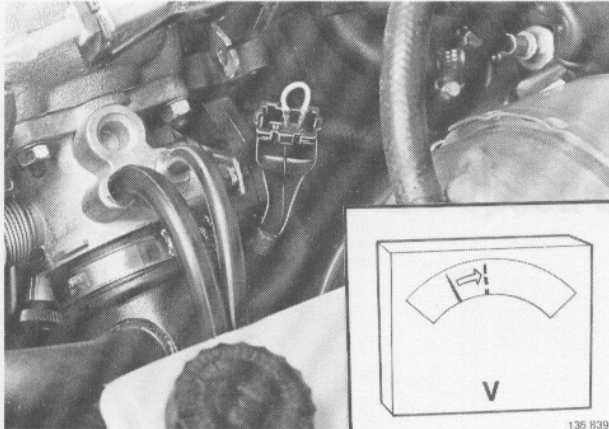
Check fuel shut-off during engine braking

Increase engine speed to over 33.3 r/s (2000 r/min).

Quickly release throttle control. Meter deflection should go down to 0 until engine speed reduces to approx. 23.2 r/s (1400 r/min), meter should then show deflection again.



135 838



135 839

B38

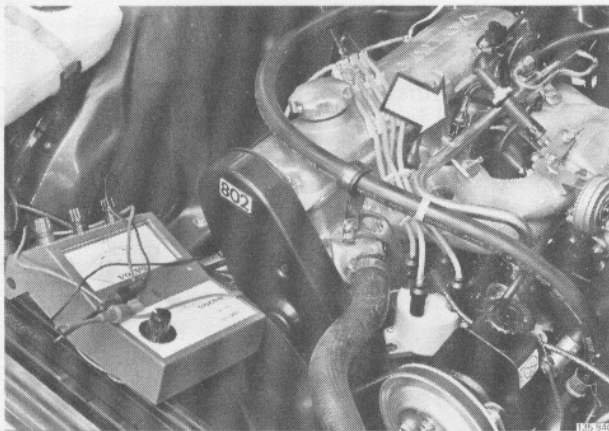
Check full throttle enrichment

Remove connector from throttle valve switch (engine speed increases slightly).

Increase engine speed to at least 58.3 r/s (3500 r/min) during check.

Connect a jumper wire between connector terminals 18 and 3. Meter deflection should increase slightly (= enrichment).

Reconnect throttle valve switch.

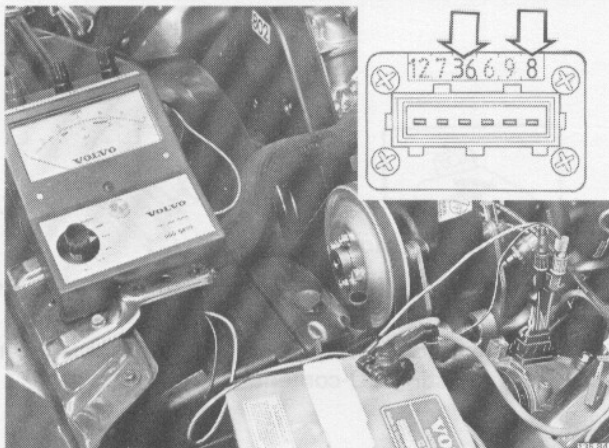


135 840

B39

Switch off engine**Remove voltmeter from injector**

Reposition rubber connector cover.



135 841

B40

Check air mass meter measuring wire dirt burn-off

Peel back rubber cover from around air mass meter wiring connector.

Connect a voltmeter between terminals 8 (+) and 36 (-).

Start engine. Increase engine speed to over 33.3 r/s (2000 r/min).

Switch off engine. After approx. 5 seconds voltmeter should show approx. 1V for 1 second.

Remove voltmeter. Reposition rubber cover around air mass meter connector.



135 828

B41

Install panels

Under dashboard.

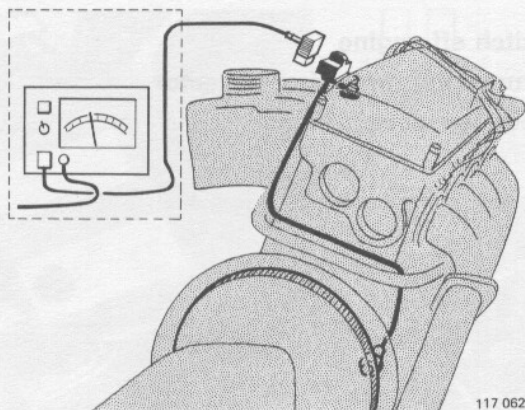
B42

Check/adjust idle speed and CO-content

See C1-17.

End of inspection

C. Idle speed and CO-content, checking/adjusting



C1

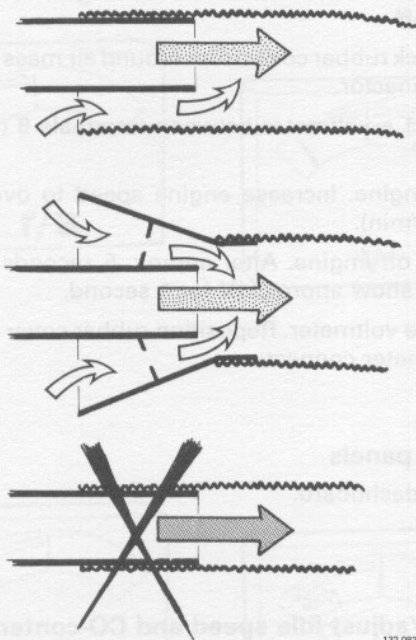
General

It is important that the other engine settings are correctly adjusted (e.g., timing) if valid results are to be obtained.

The engine should be warm and idling.

Warm-up the engine at 25 r/s (1500 r/min).

Check/adjust the CO-content approx. 5 minutes (no earlier), after the radiator thermostat has opened.



C2

Exhaust gas extraction

Use an exhaust gas extractor that fits loosely over the exhaust pipe.

Excessive extraction may yield incorrect results when checking/adjusting CO-content.

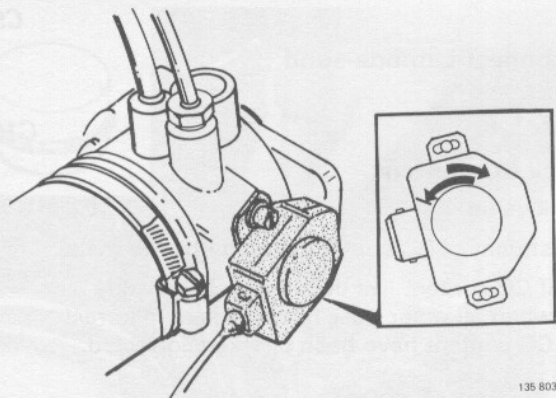
Idle speed and CO-content



C3

Check throttle valve switch adjustment

Slightly open throttle and listen to switch. A "click" (idle switch opens) should be heard immediately when throttle valve moves.



C4

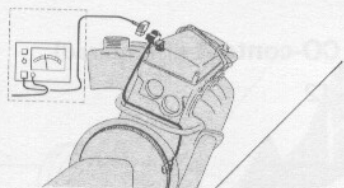
Adjustment of throttle valve switch (if required)

Loosen switch screws (in hex 3 mm).

Turn switch slightly clockwise. Then turn counter-clockwise to stop, but not so far that throttle valve begins to open.

Tighten screws.

Check function.



C5

Connect test instruments

- rev counter
- CO-meter. Connect meter to nipple in exhaust pipe ahead of catalytic converter

WARNING! Connecting nipple for CO-meter may be very hot.

C6

Start and warm up engine

C7

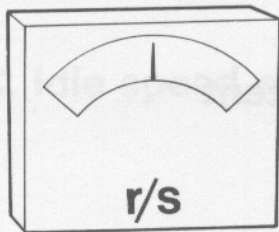
Check idle speed

Idle speed should be **12.5 r/s** (750 ± 20 r/min).

Note! Air conditioning should be disengaged.

Adjust idle speed if required.

If idle speed varies excessively check that air control valve hoses are not blocked.



135 842

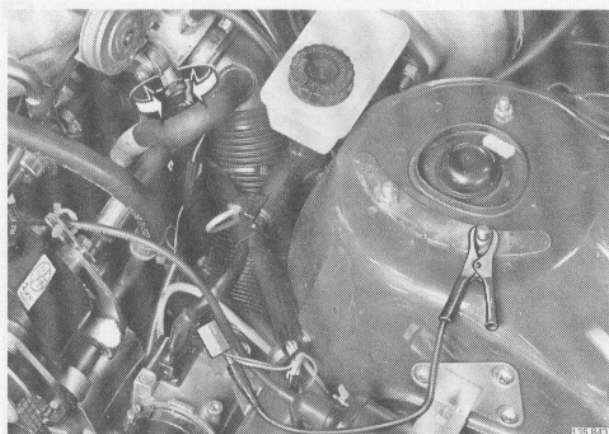
C8

Adjustment of idle speed (if required)

Ground test point (blue-white wire).

Adjust engine speed with idle screw to **12 r/s** (720 r/min). If engine speed cannot be adjusted to correct value, adjust throttle valve and control, see D1-7.

Remove test point ground. Engine speed should increase to **12.5 r/s** (750 ± 20 r/min).



135 843

C9

Disconnect Lambda-sond

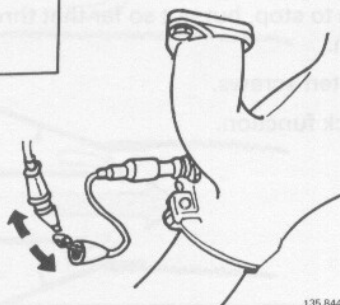
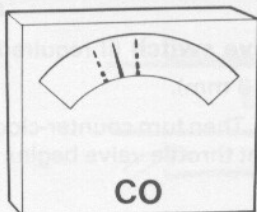
C10

Check CO-content

Check value..... **0.4-0.8 %**

Adjustment of CO-content should only be made:

- if CO-content lies outside of check value
- when all other possible causes of incorrect CO-content have been checked/corrected.



135 844

C11

Adjustment of CO-content (if required)

Operation C11-12

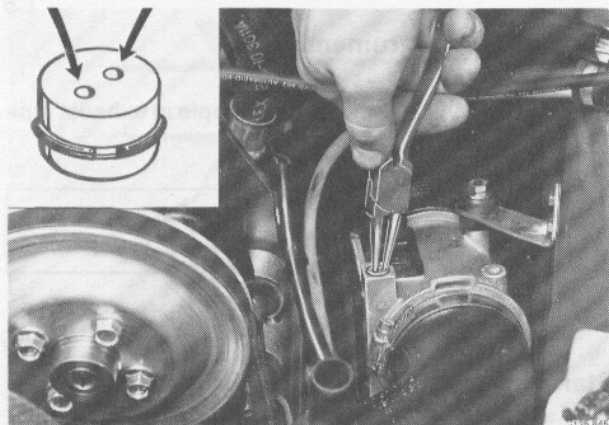
Remove adjustment seal

Switch off engine.

Drill two 2 mm (5/64 in) holes in seal.

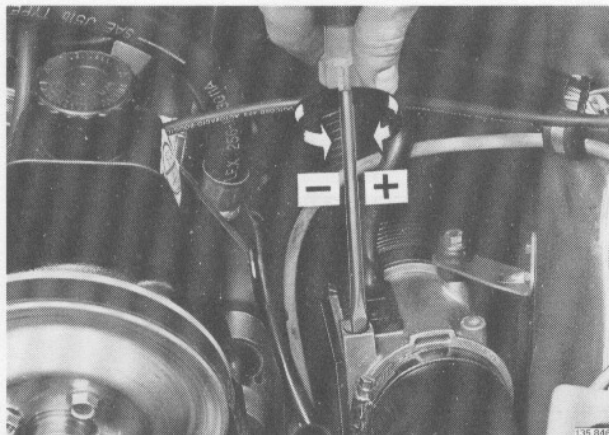
Pull out plug with snap-ring pliers.

Start engine.



135 845

C12



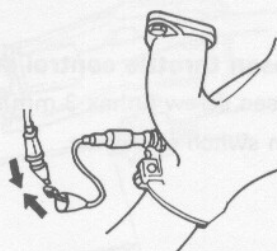
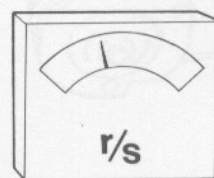
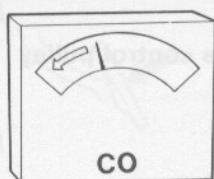
Adjust CO-content

Adjustment value 0.6 %

Adjustment screw has a range of 15 turns and lacks distinct end stops.

- Turning **counter-clockwise decreases** CO-content
- Turning **clockwise increases** CO-content

C13



Connect/check Lambda-sond

When Lambda-sond is connected CO-content should decrease.

C14

Check/adjust idle speed

Idle speed should be 12.5 r/s (750 r/min).

Adjust if required, see C8.

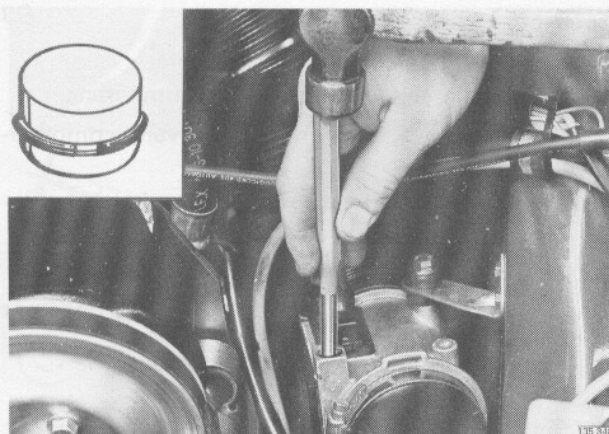
C15

Switch off engine

C16

Seal CO-adjustment (if adjustment performed)

Use a **new** plug. Tap in place.

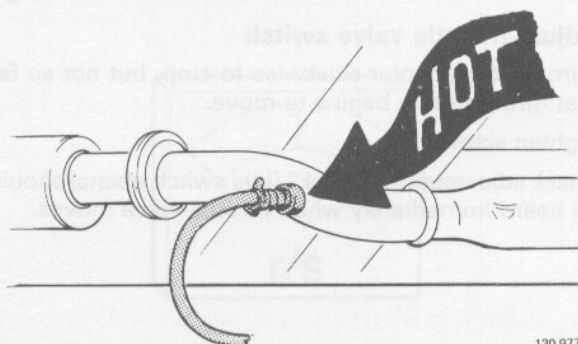


C17

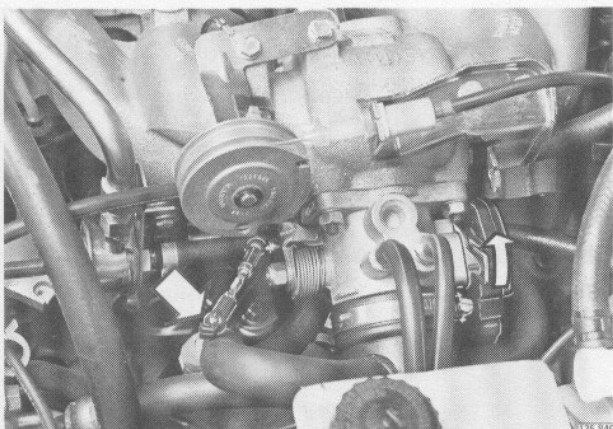
Remove test meter

WARNING! Connecting nipple for CO-meter is very hot.

Install plug.



D. Throttle valve, throttle control and throttle valve switch adjustment



Remove link rod from throttle control pulley

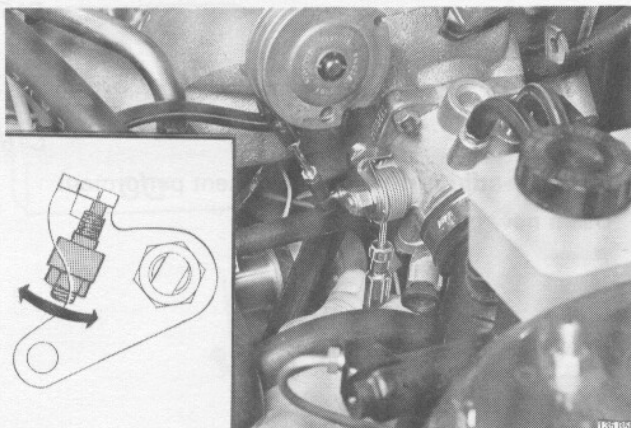
D1

Loosen throttle control switch

Loosen screw (inhex 3 mm).

Turn switch clockwise.

D2



Adjust throttle valve

Loosen adjustment screw lock nut (8 mm wrench).

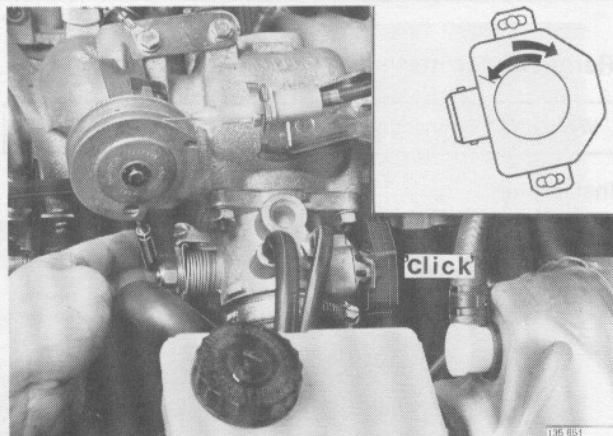
Loosen adjustment screw until throttle valve completely closes.

Tighten screw until it **just touches** throttle valve lever.

Tighten screw additionally **1/4 turn**. Tighten lock nut.

Check that throttle valve moves easily and does not bind.

D3



Adjust throttle valve switch

Turn switch counter-clockwise to stop, but not so far that throttle valve begins to move.

Tighten screws.

Check adjustment. A "click" (idle switch opens) should be heard immediately when throttle valve moves.

D4

D5



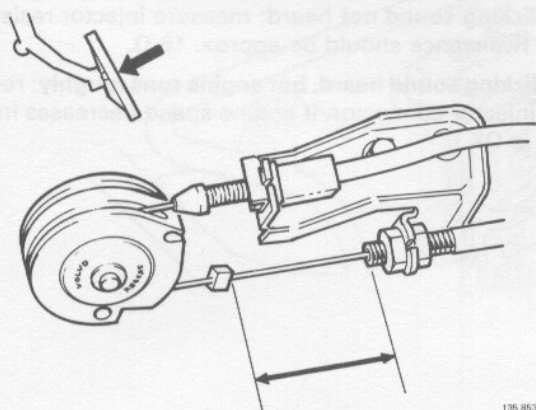
Check throttle control pulley Adjust throttle cable

Pulley should move easily without binding.

Cable should be stretched but should not influence pulley position. Pulley should touch idle stop.

Depress accelerator pedal to floor and check that throttle control pulley touches full throttle stop.

D6



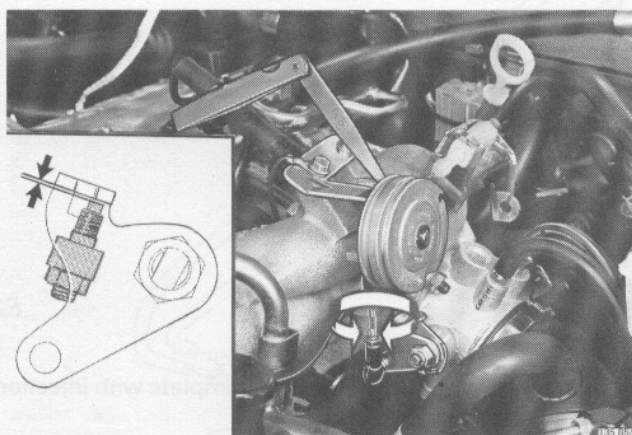
Check/adjust kick-down cable (automatic transmission)

Depress accelerator pedal to floor.

Caution. Do not operate throttle control by hand as incorrect adjustment can result.

At full throttle distance from cable sheath to clip should be **50.4–52.6 mm (1.98–2.07 in.)**.

D7

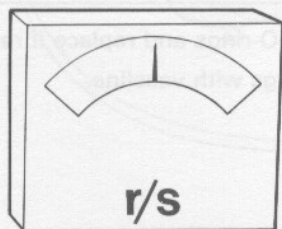


Connect and adjust link rod

Position a **1 mm** thick feeler gauge between throttle control pulley and idle stop.

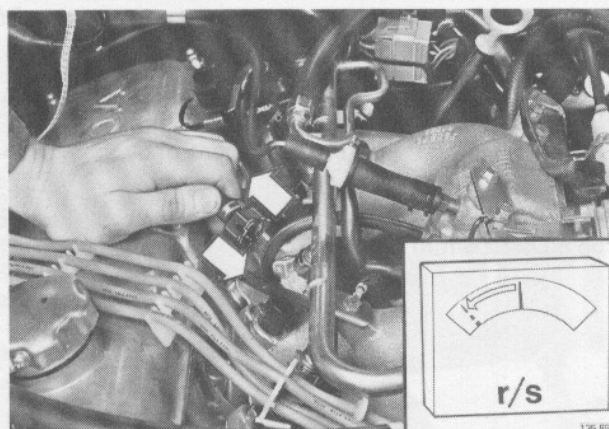
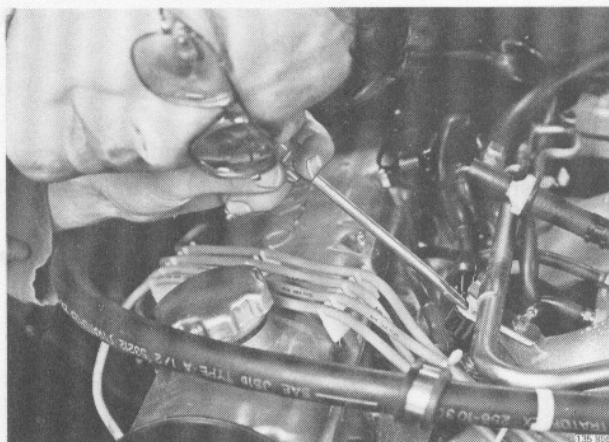
Adjust link rod so clearance between throttle valve lever and adjustment screw is **0.1 mm (0.004 in.)**.

D8



Check idle speed

See C3-17.



E. Injectors

E1

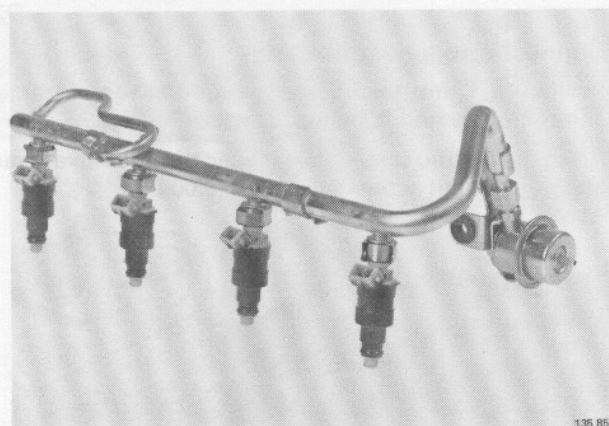
Quick check of injectors

Start engine.

Listen to each injector separately with a screwdriver. Obvious clicking sounds will be heard if valve functions.

If clicking sound not heard: measure injector resistance. Resistance should be approx. 16 Ω .

If clicking sound heard, but engine runs roughly: remove injector connector. If engine speed decreases injector is OK.



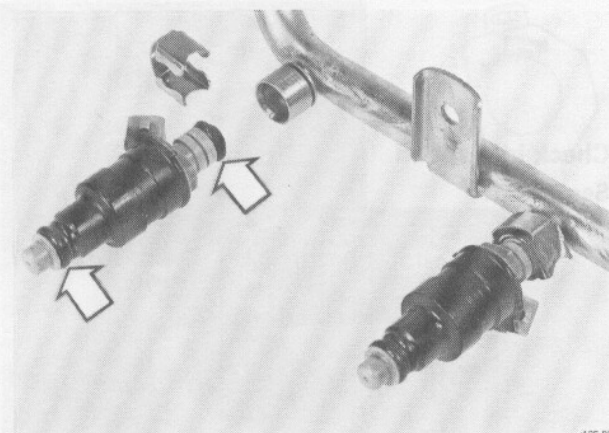
E2

Removing/installing injectors

Injectors are removed/installed complete with injection manifold.

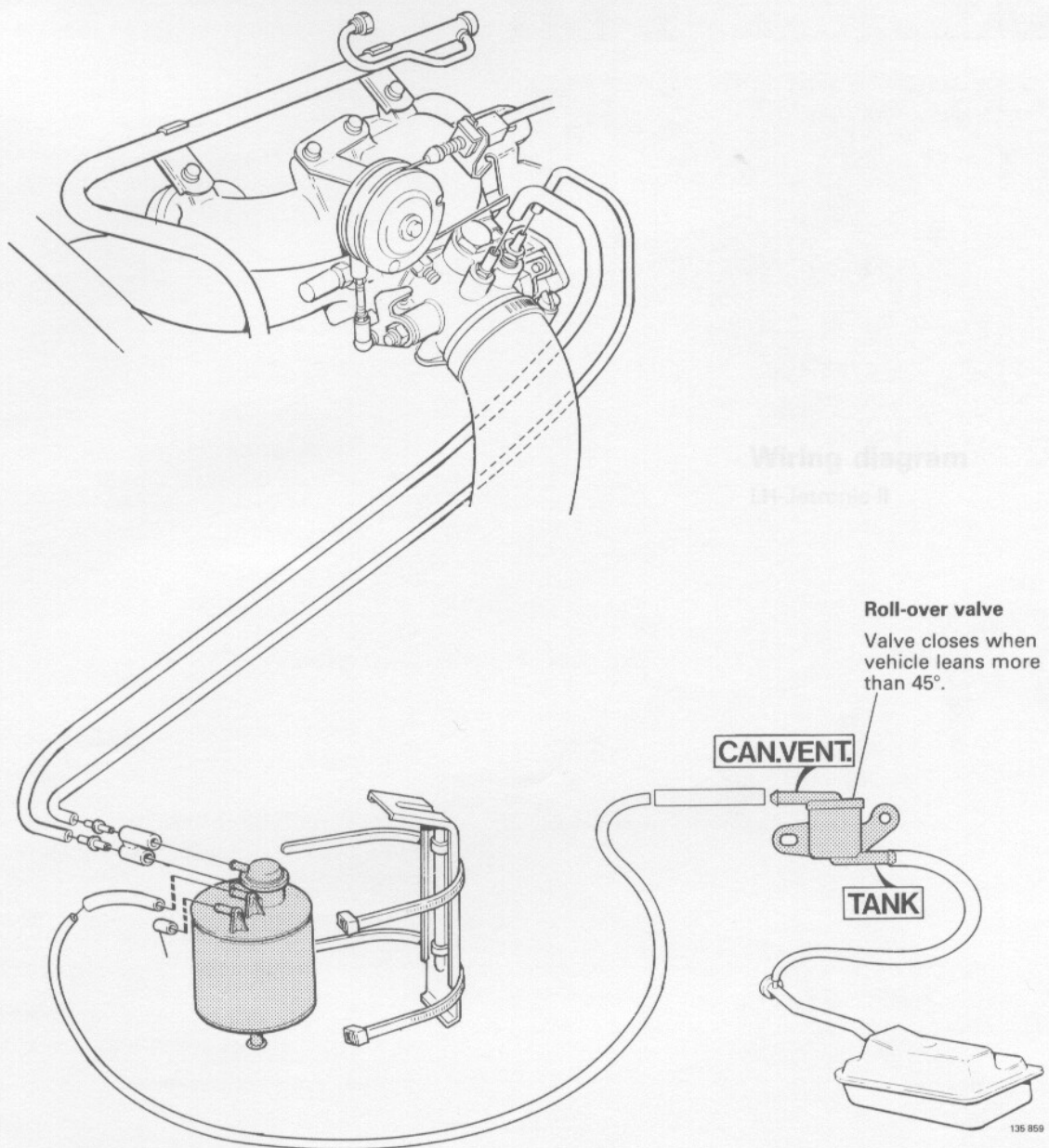
WARNING. Injection manifold is filled with fuel. Use extreme caution when removing injectors from injection manifold.

Check injector O-rings and replace if required. Lubricate O-rings with vaseline.



F. Evaporative system

F1



Injectors

F. Evaporative System

Check to make sure

that engine

is running at the correct speed with a tachometer

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

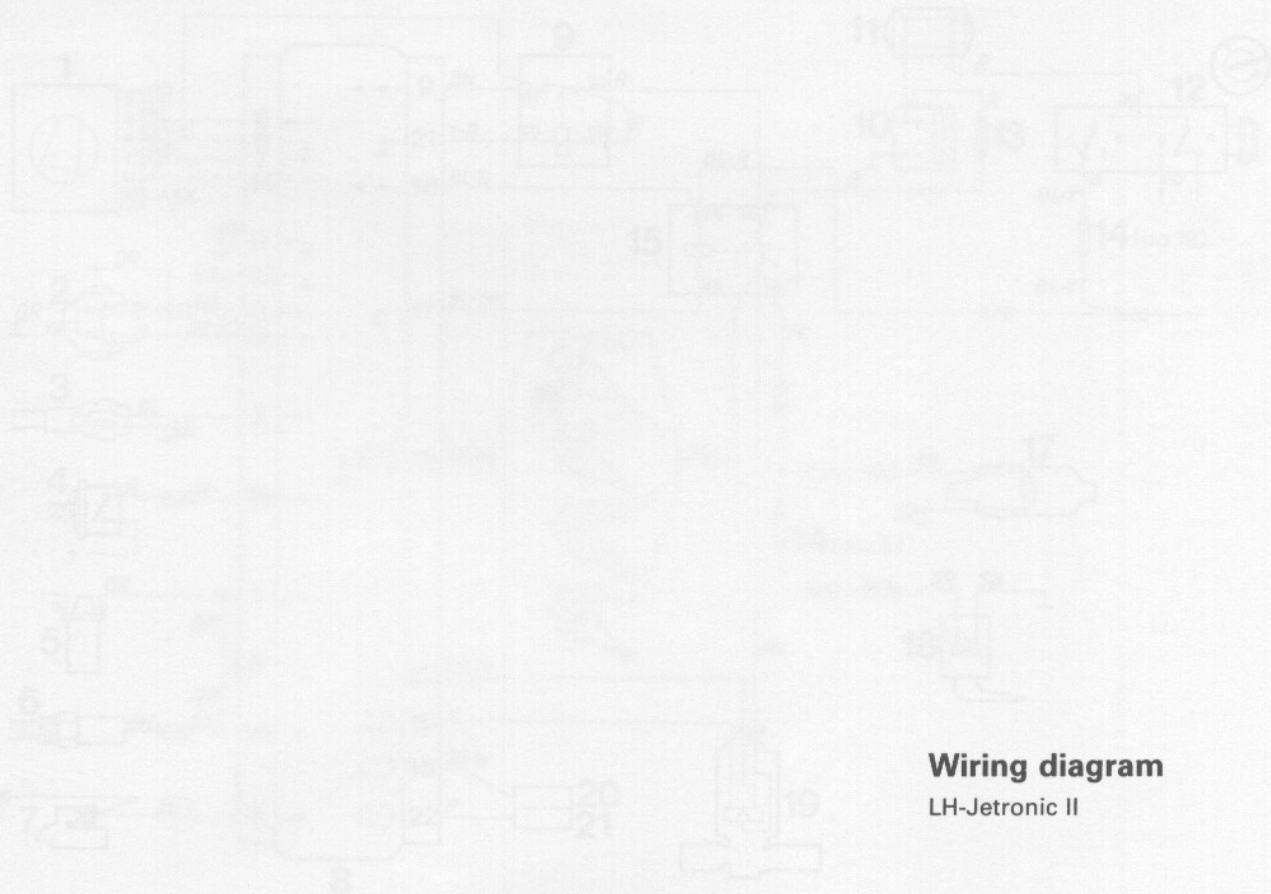
to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed

to make sure the engine is running at the correct speed



Wiring diagram
LH-Jetronic II

Wiring diagram LH-Jetronic II

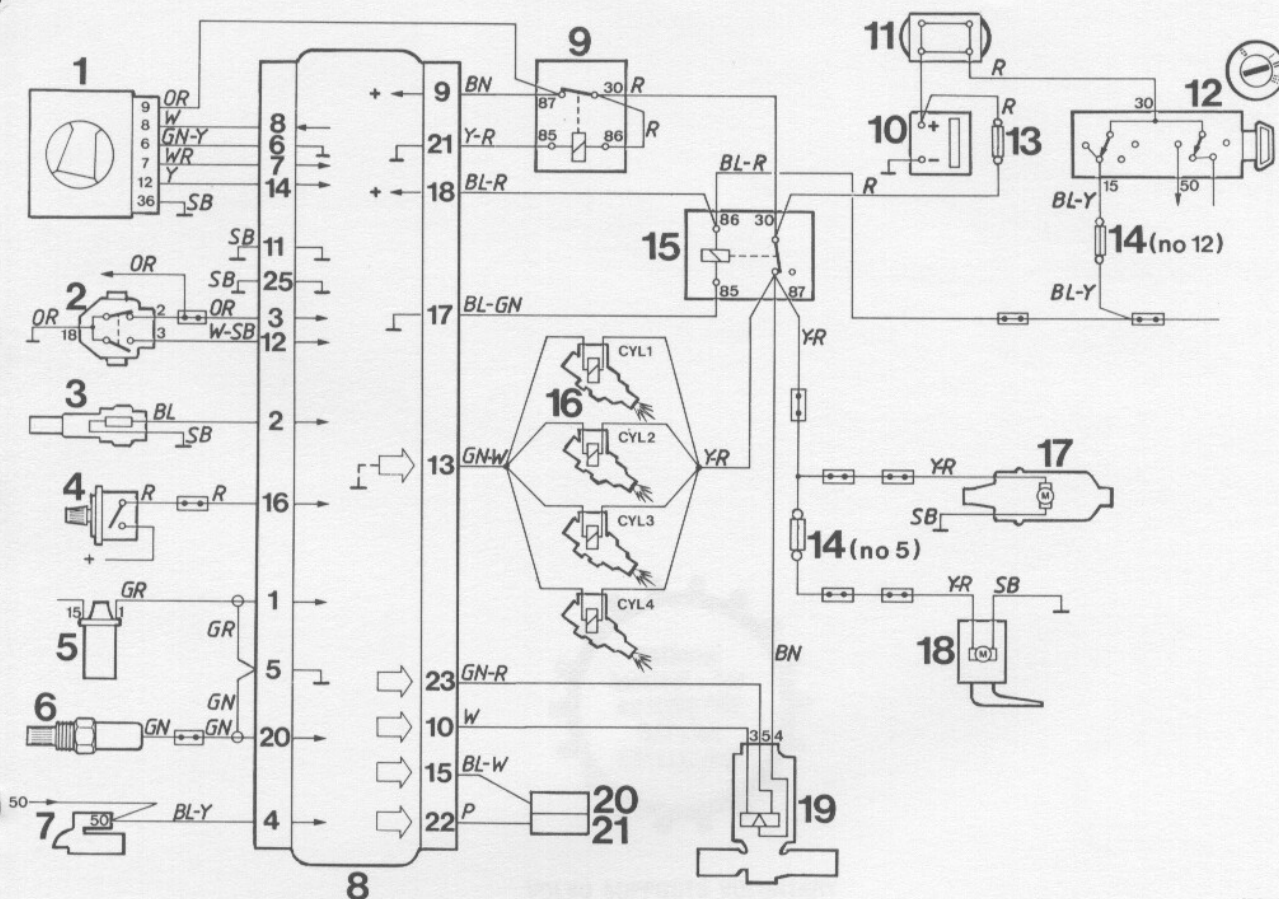
Component designation:

1. Air mass meter
2. Throttle valve switch
3. Sensor, coolant temperature
4. Micro-switch, air conditioning
5. Ignition coil
6. Lambda-sensor
7. Diesel motor
8. Control unit
9. System relay
10. Battery
11. Junction box

12. Ignition switch
13. Fuse and holder
14. Fuse box, fuses 5 and 12
15. Pump-relay
16. Injectors
17. Fuel pump
18. Test pump
19. Air control valve
20. Test point, idle speed
21. Test point, Lambda-sensor

Color code:

- BL = blue
BR = brown
GR = green
GN = grey
OR = orange
P = pink
R = red
W = white
Y = yellow



Wiring diagram LH-Jetronic II

Component designation:

1. Air mass meter
2. Throttle valve switch
3. Sensor, coolant temperature
4. Micro-switch, air conditioning
5. Ignition coil
6. Lambda-sensor
7. Starter motor
8. Control unit
9. System relay
10. Battery
11. Junction box

12. Ignition switch
13. Fuse and holder
14. Fuse box, fuses 5 and 12
15. Pump relay
16. Injectors
17. Fuel pump
18. Tank pump
19. Air control valve
20. Test point, idle speed
21. Test point, Lambda-sensor

Color code:

- BL = blue
 BN = brown
 GN = green
 GR = grey
 OR = orange
 P = pink
 R = red
 SB = black
 Y = yellow
 W = white



**VOLVO SUPPORTS VOLUNTARY
MECHANIC CERTIFICATION
BY THE N.I.A.S.E.**

(U.S.A. only)

Service literature

*Your
most important
special tool*

VOLVO

TP 30427/1 US
6000. 10.82
Printed in U.S.A.