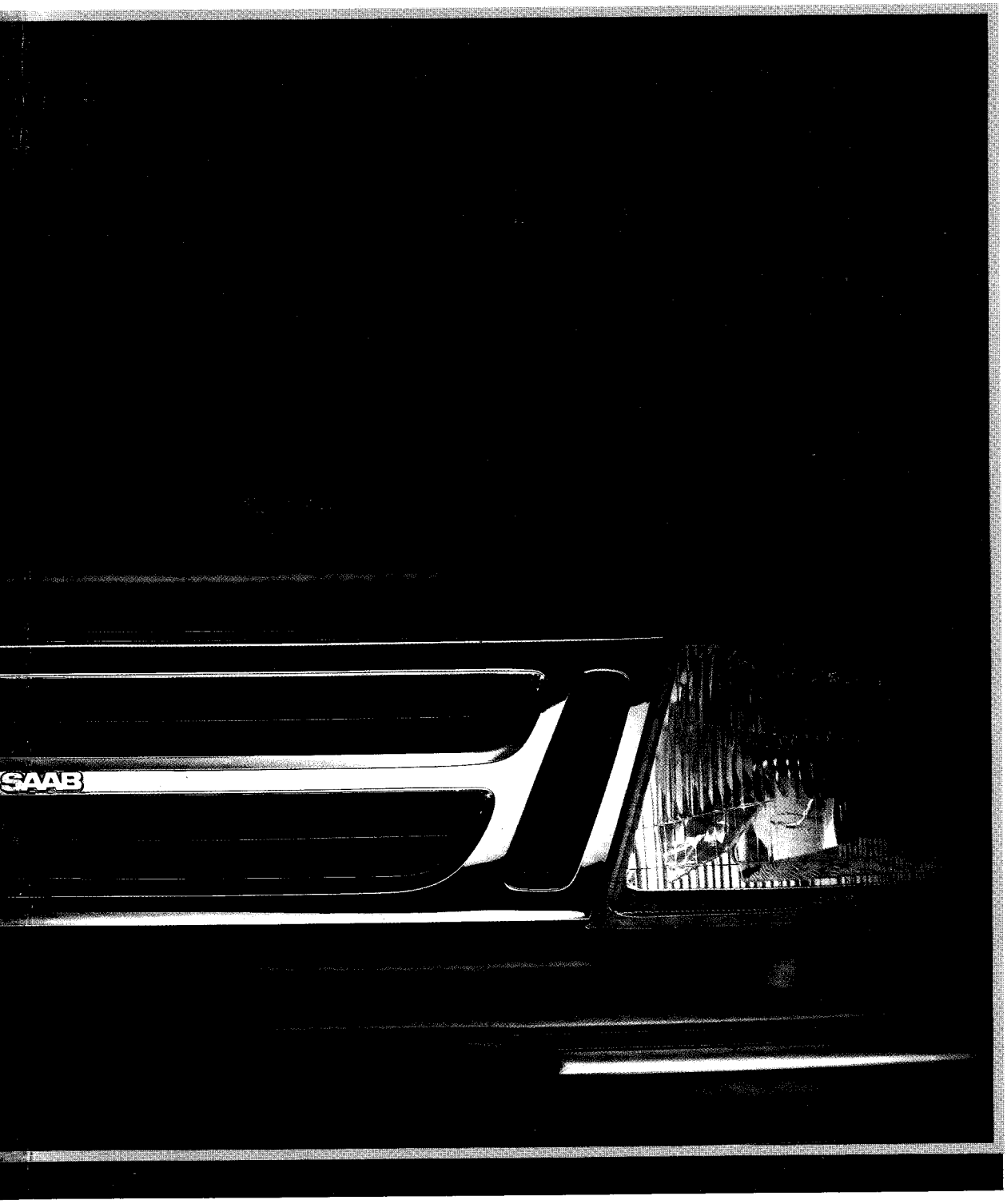
Saab 900

SERVICE MANUAL



SAAB

2:3 CU14 Fuel-injection system

M 1990-

Saab 900

SERVICE MANUAL

2:3 CU14 Fuel-injection system

M 1990–

Units

The basic and derived units used throughout the Service Manual are in accordance with the SI system.

For users not familiar with the SI units, some non-Continental units are given in brackets after the respective SI unit.

The following symbols and abbreviations are used:

SI unit	Equivalent unit and symbol
mm	inch (in)
kg	pound (lb)
N	pound-force (lbf)
Nm	pound-force foot (lbf ft)
bar	pound-force per square inch (lbf/in^2) (Also abbreviated: psi)
l (liter)	US liquid quart (liq qt) (Also abbreviated: qts) US gallon (USgal)
°C	°F

Conversion factors

1 in = 25.4 mm	1 mm = 0.039 in
1 lbf = 4.45 N	1 N = 0.23 lbf
1 lbf ft = 1.36 Nm	1 Nm = 0.74 lbf ft
1 psi = 0.07 bar	1 bar = 14.5 lbf/in^2
1 liq qt = 0.95 l	1 l = 1.05 liq qt
1 US liq qt = 0.83 UKqt	1 USgal = 0.83 UKgal
°F = °C x 9/5 + 32	°C = (°F − 32) x 5/9

Market codes

The codes refer to market specifications

		FR	France
AT	Austria	GB	Great Britain
AU	Australia	GR	Greece
BE	Belgium	IS	Iceland
CA	Canada	IT	Italy
CH	Switzerland	JP	Japan
DE	Germany	ME	Middle East
DK	Denmark	NL	Netherlands
ES	Spain	NO	Norway
EU	Europe	SE	Sweden
FE	Far East	US	USA
FI	Finland	UC	US California

Production: Technical Publications, Saab-Scania, Trollhättan, Sweden

Technical data

Fuel system

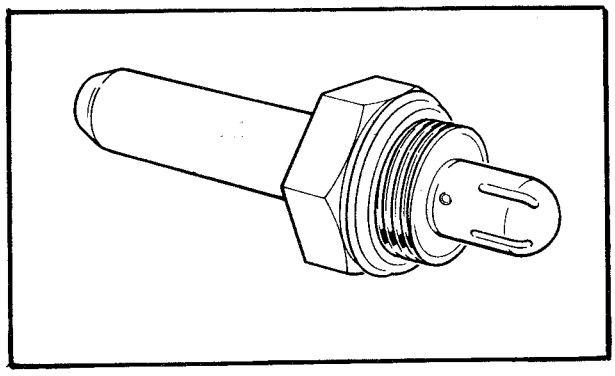
System pressure	bar (psi)	3.0 (43) above pressure in inlet manifold
Residual pressure (engine off)	bar (psi)	2.8 (40)

Temperature sensor (NTC resistor)

Resistance at: 0°C (32°F)	ohm	5700 - 5900
20°C (68°F)	ohm	2400 - 2600
40°C (104°F)	ohm	1100 - 1300
60°C (140°F)	ohm	500 - 700
80°C (176°F)	ohm	300 - 400

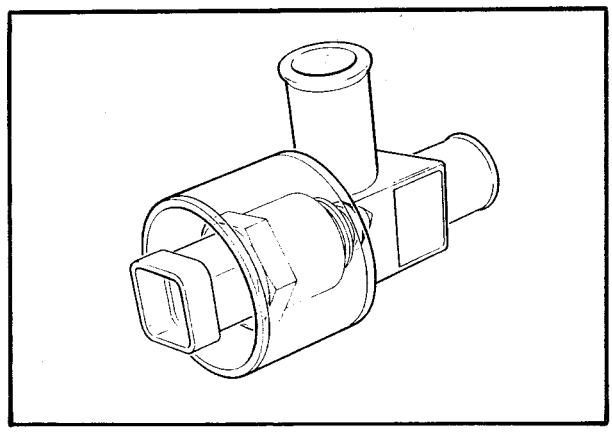
Road speed sensor

Signal voltage	V	0.5 - 11



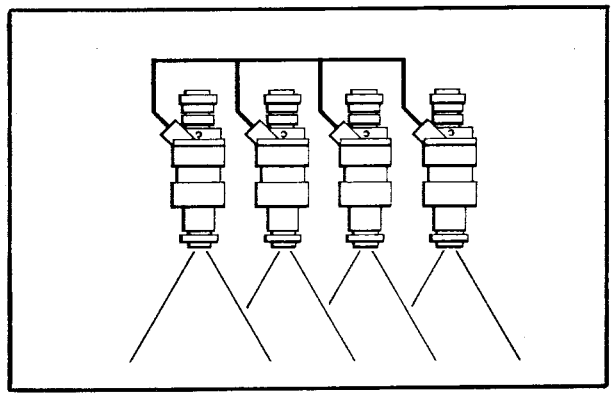
Lambda sensor

Resistance of preheater resistor	ohm	<10
Signal voltage	V	0-1



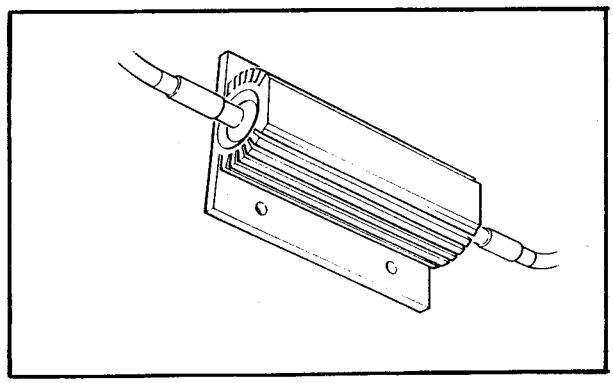
AIC valve

Resistance in winding (pins 1 - 26)	ohm	40 - 60
in winding (pins 28 - 29)	ohm	40 - 60



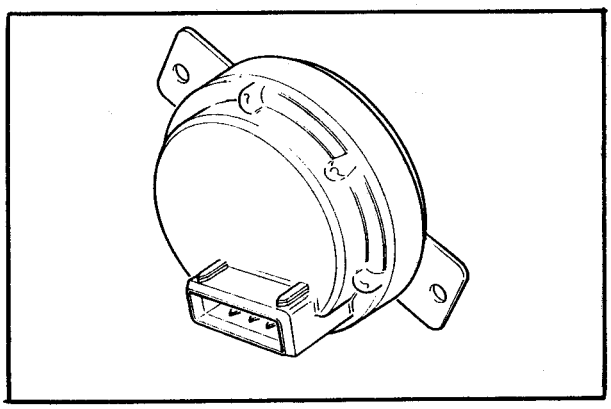
Injectors

Resistance at 20°C (68°F)	ohm	2.0 - 2.8
Delivery flow	ml/30s	108 - 132



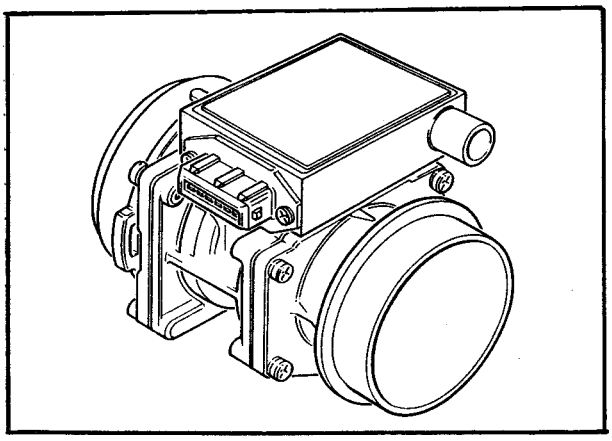
Ballast resistor

Resistance	ohm	2 - 3



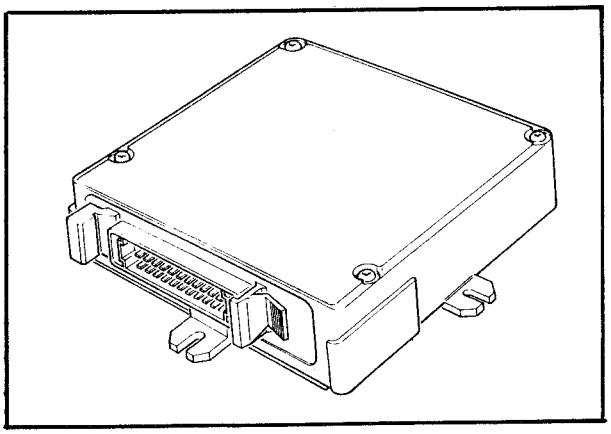
Throttle potentiometer

Resistance (across pins 1 - 3)	kohm	4 - 6



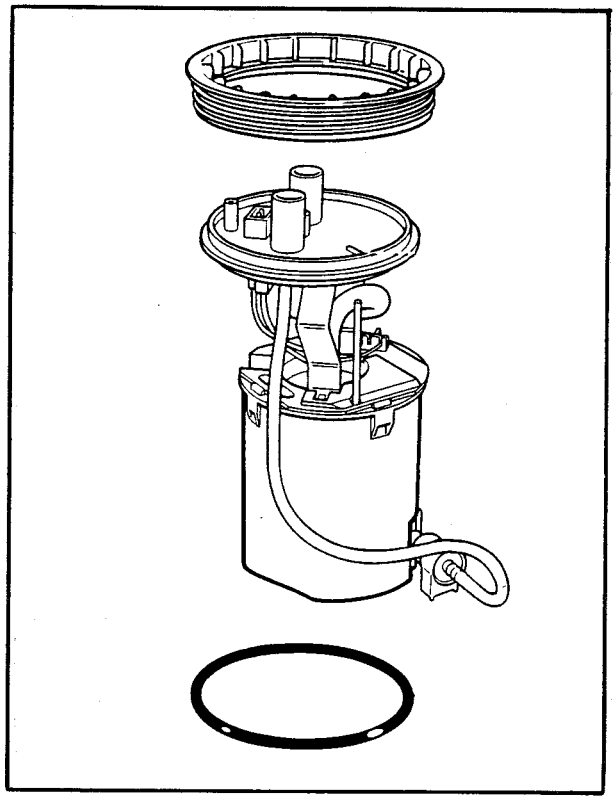
Air mass meter

Signal voltage at pin 3	V	0.2 - 0.7
Basic resistance (across pins 1 - 6)	ohm	331 - 341
CO value at idling speed	%	1.0 - 1.6



Electronic control unit (ECU)

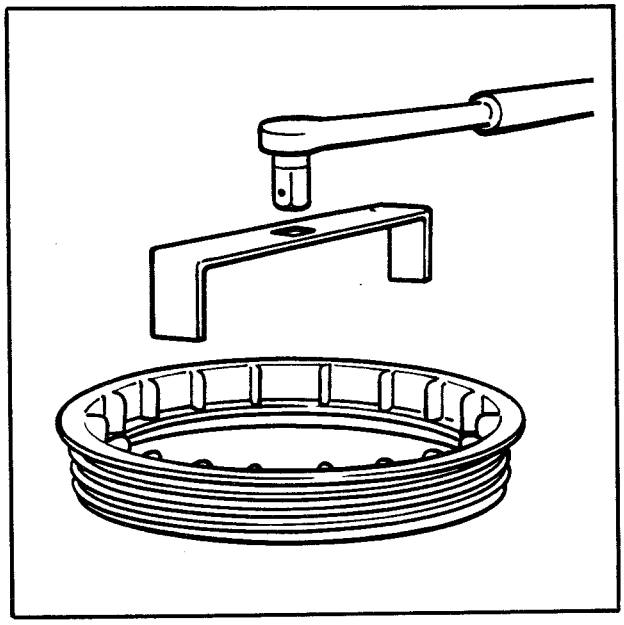
Number of connector pins	40



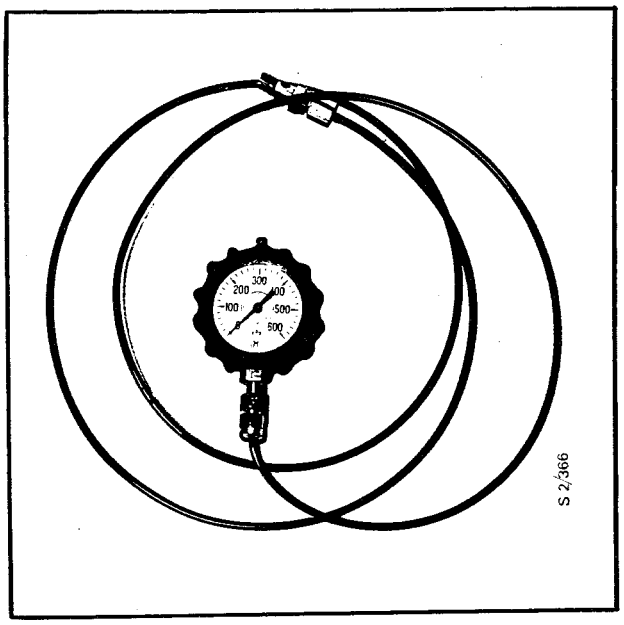
Fuel pump

Screw top tightening torque	Nm (lbf ft)	55 (40)

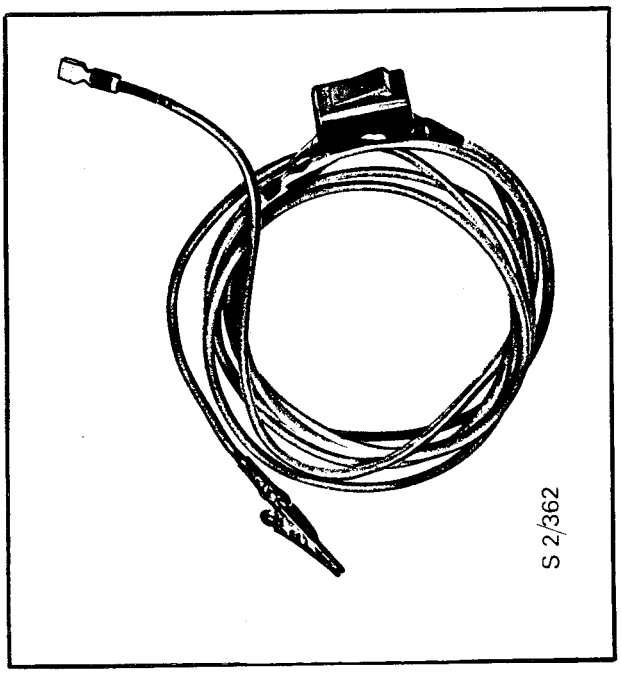
Special tools



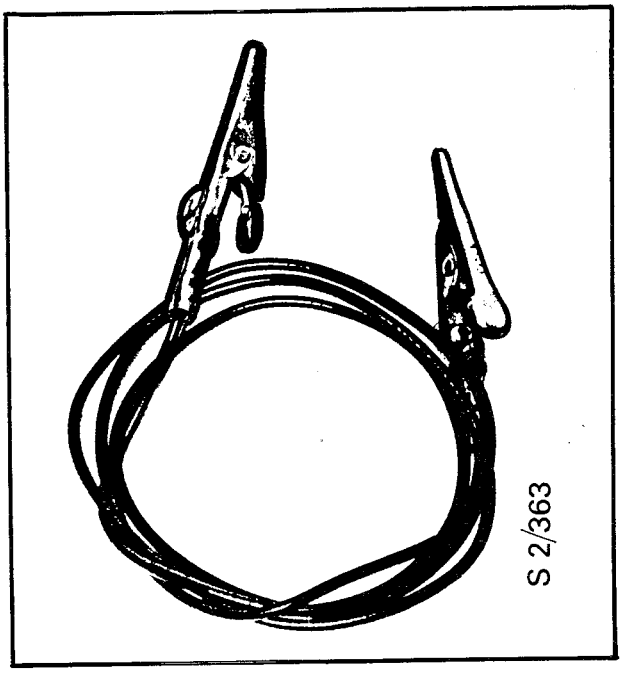
83 94 462 Key for fuel pump screw top



83 93 852 Pressure gauge for measuring fuel pressure

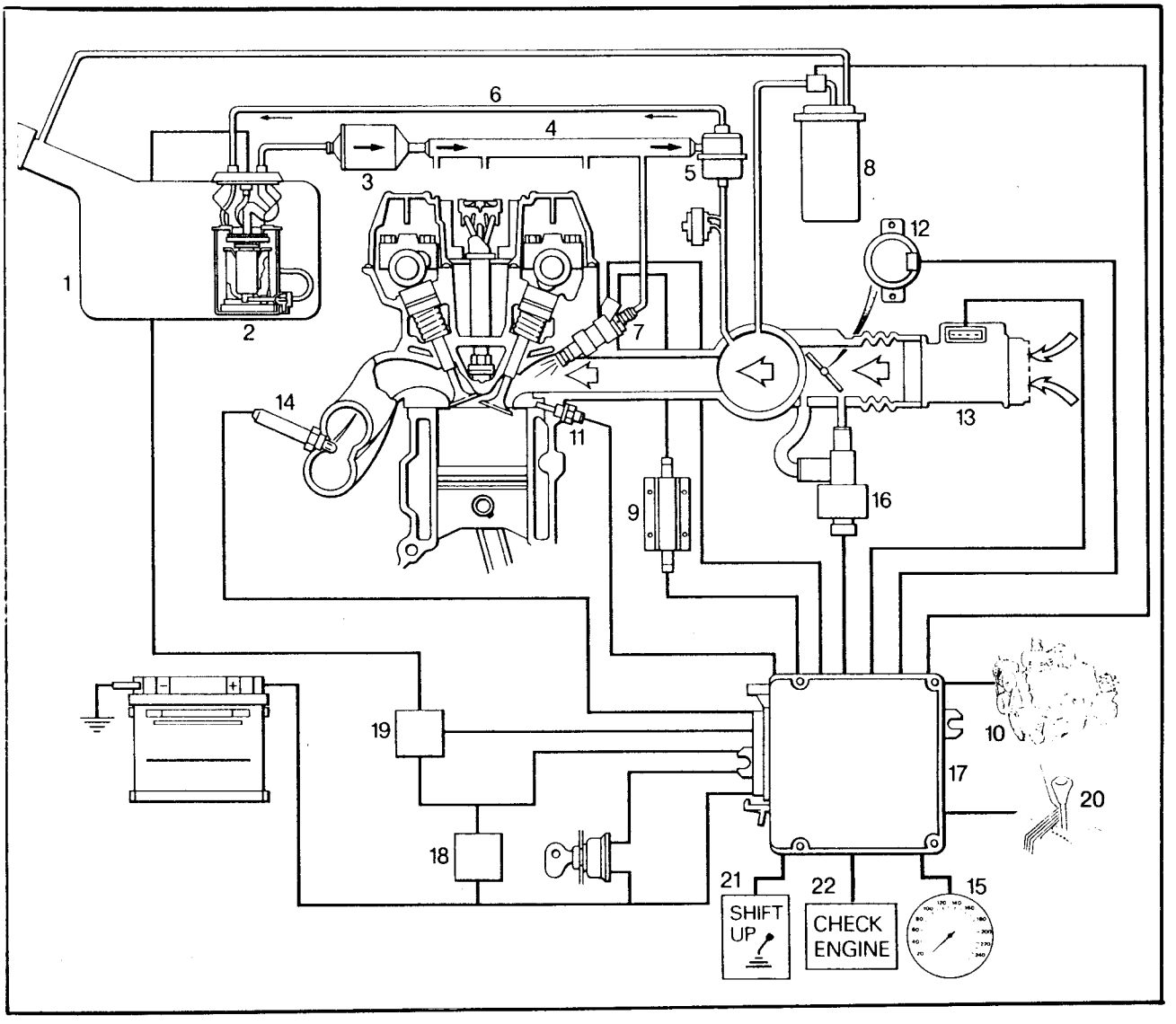


83 93 886 Switched test lead



83 93 894 Test lead with clips

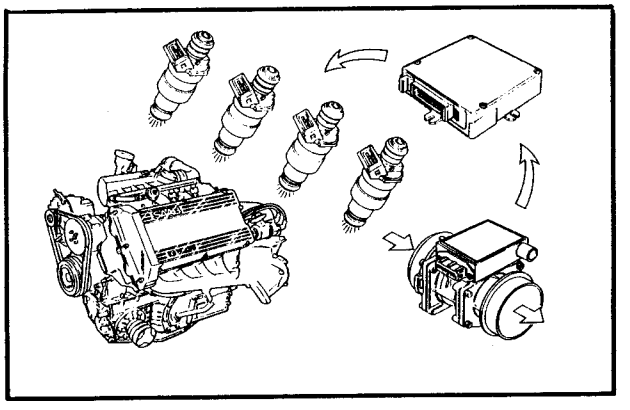
Technical description



CU14 Fuel-injection system

1 Fuel tank
2 Fuel pump
3 Fuel filter
4 Fuel-injection rail
5 Fuel-pressure regulator
6 Fuel return line
7 Injectors
8 ELCD system
9 Ballast resistor (injectors)
10 Engine rpm signal
11 Temperature sensor
12 Throttle potentiometer
13 Air mass meter
14 Lambda sensor
15 Road speed sensor
16 AIC valve
17 ECU
18 Main relay
19 Pump relay
20 Drive signal
21 Shift-up signal
22 CHECK ENGINE

Function



The quantity of fuel to be injected is determined by the ECU, which continuously regulates the length of time that the injectors are open, allowing fuel under pressure to be injected into the inlet ports.

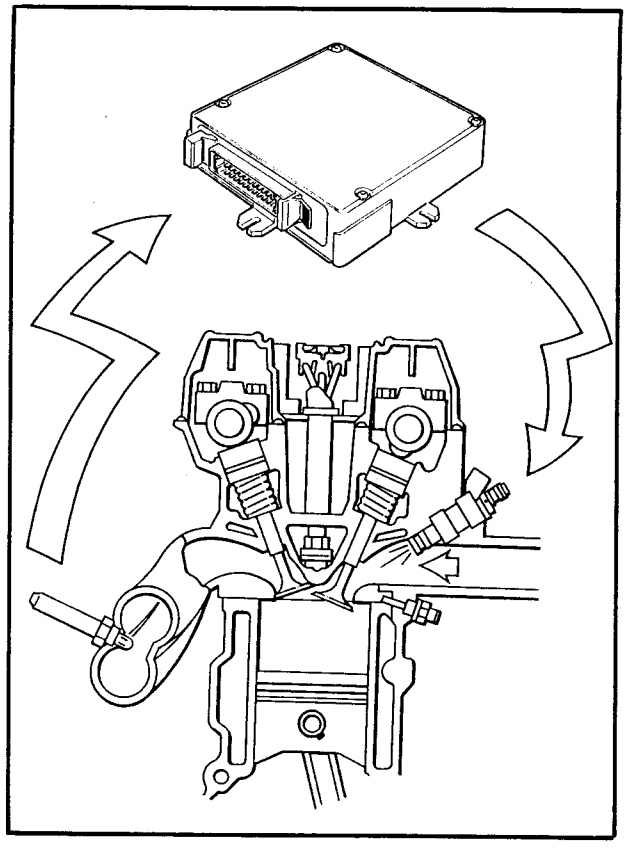
The ECU determines the length of time the injectors are open by comparing the engine speed and intake air mass with the fuel map in its memory.

The function for controlling the mixture is based on the signal from the Lambda sensor.

If the signals received by the ECU from the sensor deviate from a value in the middle of the control range, this is corrected by an adaptive factor programmed into the ECU.

Such correction only takes place when the engine is idling, although it influences the mixture in all driving conditions and right across the engine-rpm range.

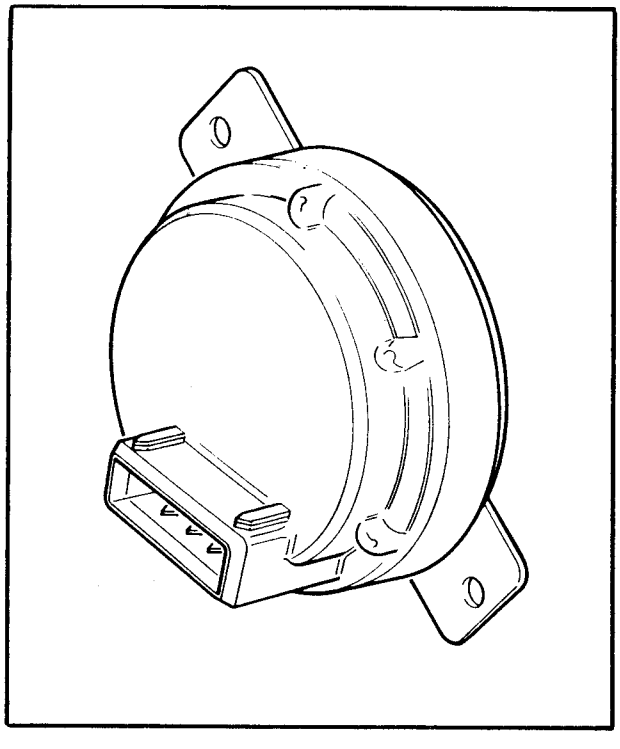
This function, together with corrections for a number of other factors, guarantees supply of the optimum amount of fuel under all driving conditions.



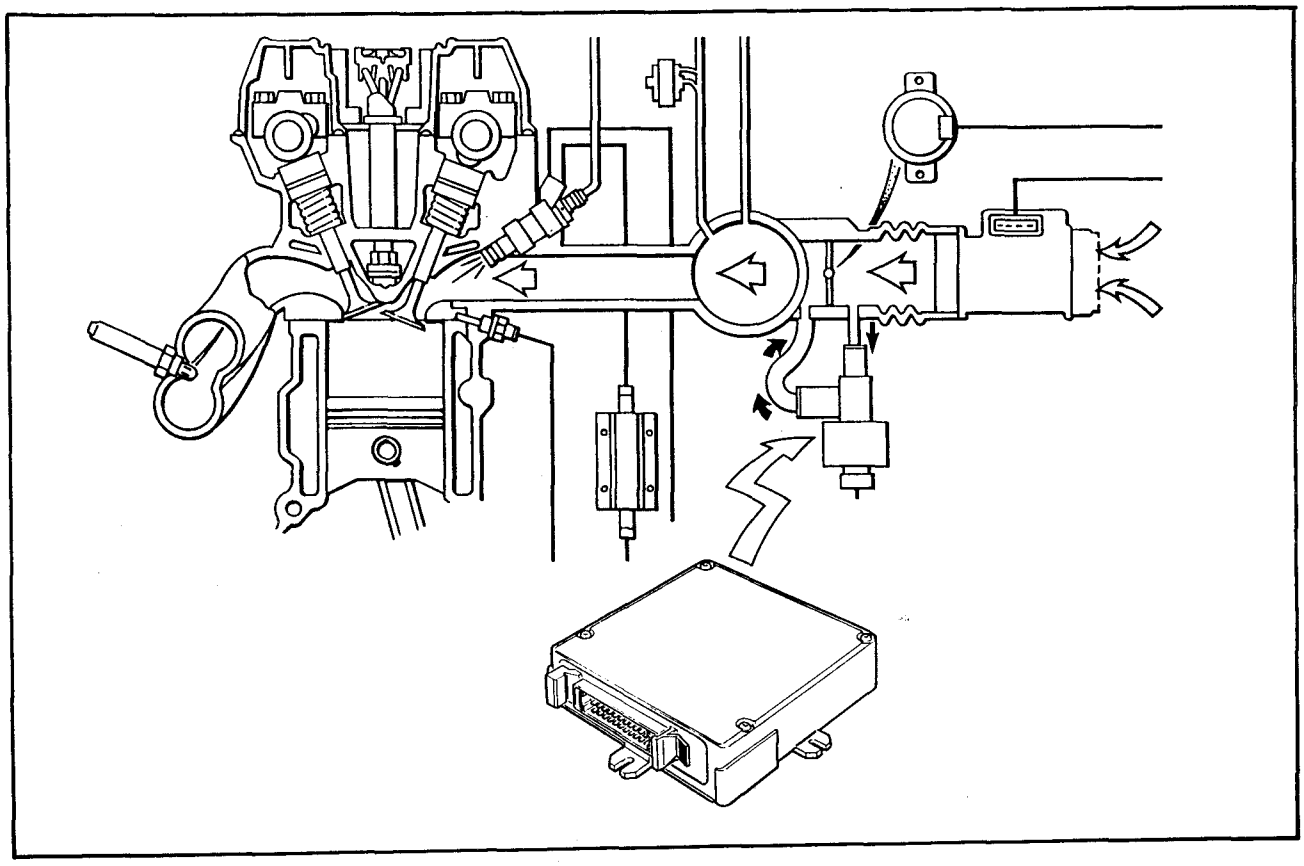
In addition to control of the air-fuel mixture, the ECU also controls the ELCD valve, for purging of the charcoal canister, and for idling.

The throttle potentiometer provided a continuous signal to the ECU with information on the position of the throttle butterfly. The lowest signal voltage is interpreted by the ECU as idling and a much higher signal voltage as full throttle, i.e. throttle butterfly open wide.

A sharp rise in the signal voltage indicates acceleration, whereupon enrichment takes place to match the prevailing driving conditions.



Enrichment when the engine is cold is governed not only by the coolant temperature but also by the engine speed and load. This function usually stops when the coolant temperature reaches 72°C (162°F).



The idling function is adaptive and controlled by the ECU. When the signal from the throttle potentiometer indicates idling, a signal from the ECU sets the AIC valve stepper motor in the position that last gave the correct idling speed. The system therefore starts with the best position from which to make any further adjustment necessary.

Idling control is thus effected by the automatic idling control (AIC) valve, fitted to the front of the cylinder head.

The AIC valve is fitted in the throttle-butterfly air bypass, and the position of the valve regulates the amount of air bypassing the butterfly. The valve itself is regulated by a stepper motor in response to control signals from the ECU.

Via the AIC valve, the ECU can compensate continuously for different conditions when the engine is idling, e.g. starter motor running, engine cold or hot, selection of the Drive position in Automatics, cut-in of the AC compressor, etc.

Idling control takes place under the following conditions:

- Road speed below 5 mph (8 km/h)
- Throttle butterfly in position for idling (closed)

As well as idling control, the signal from the road speed sensor is also taken into account by the ECU when determining when to trigger the shift-up signal (certain variants only), and for control of fuel shut-off during deceleration (engine over-run). This latter function is necessary to ensure that fuel shut-off does not take place at low speeds.

In the event of a break in the signal from the air mass meter, throttle potentiometer or temperature sensor, the ECU goes into the Limp-home mode, in which standard values are assumed for the signals.

The Limp-home mode can also be initiated by a break in the signal from the Drive function or engine-rpm sensor.

If there should be a break in the signal from the temperature sensor, the ECU simulates a signal corresponding to 10°C (50°F) on starting or 35°C (95°F) during driving.

The ECU sends a signal via pin 21 to switch on the AC compressor when the AC function is selected by means of the switch on the dash panel.

However, before the AC compressor cuts in, the ECU opens the AIC valve to compensate for the increased load applied by the AC compressor cutting in. This improves the behaviour of the engine when the AC is switched on.

On starting, cut-in of the AC system is delayed by about 10 seconds to give the engine time to settle into a steady tick-over.

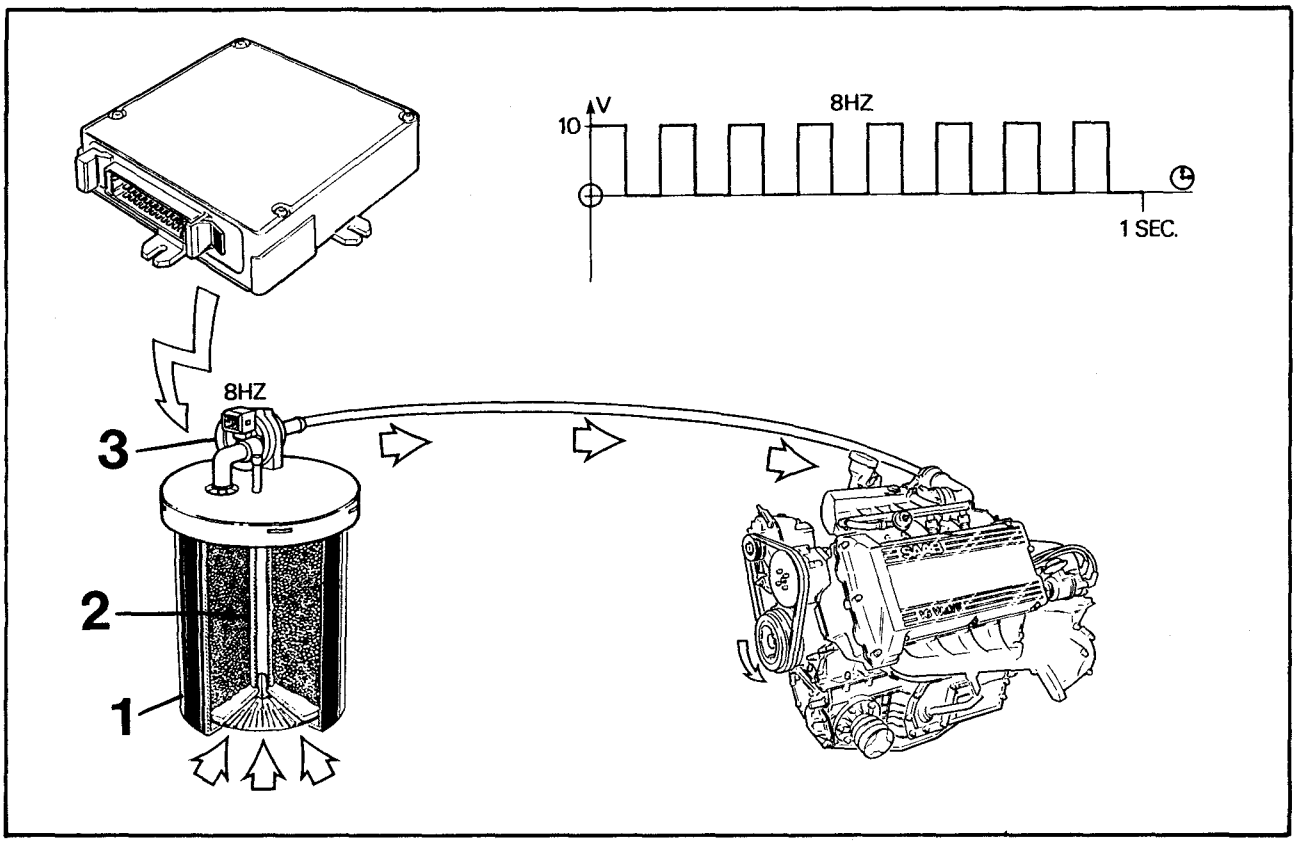
The ECU activates the AC system by earthing the circuit from the AC relay via pin 36.

Purging of fuel vapour from the charcoal canister is controlled by the ECU via the ELCD valve, located on top of the canister, in the line to the inlet manifold.

The ECU opens the valve when the coolant temperature is higher than 20°C (68°F).

When the engine is running faster than idling speed, the valve operates continuously, with the ECU controlling the pulse ratio (open/close cycle) on the basis of engine load and speed. Under some conditions, the valve will also operates when the engine is idling.

During engine overrun, no purging of the ELCD valve takes place. The valve also remains closed on starting, opening only after the Lambda sensor has become operative.



Evaporative loss control device (ELCD)

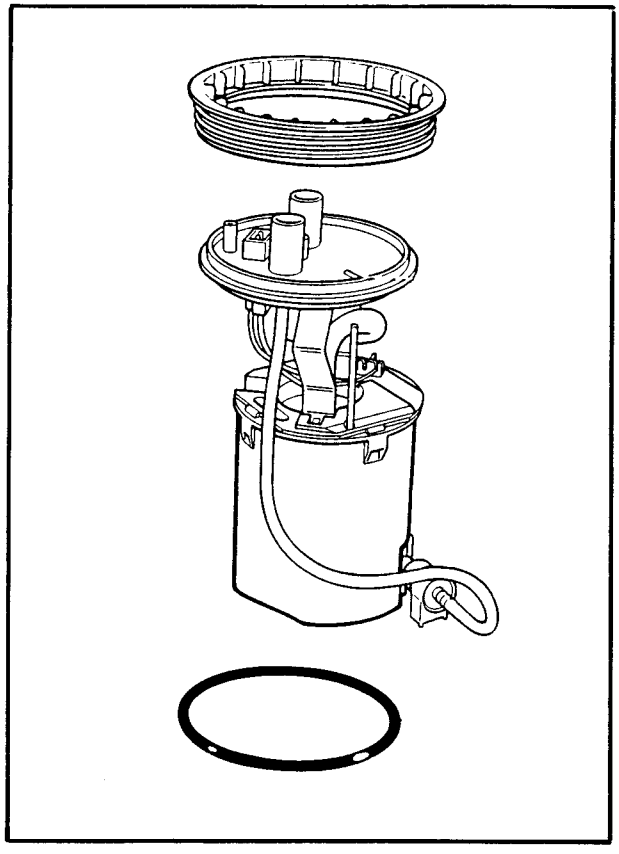
1 Charcoal canister
2 Charcoal
3 ELCD valve

The fuel pump starts running for about two seconds in conjunction with starting, to raise the fuel pressure. The pump will not start running continuously until the ECU receives engine-speed signals from the ignition coil.

Components

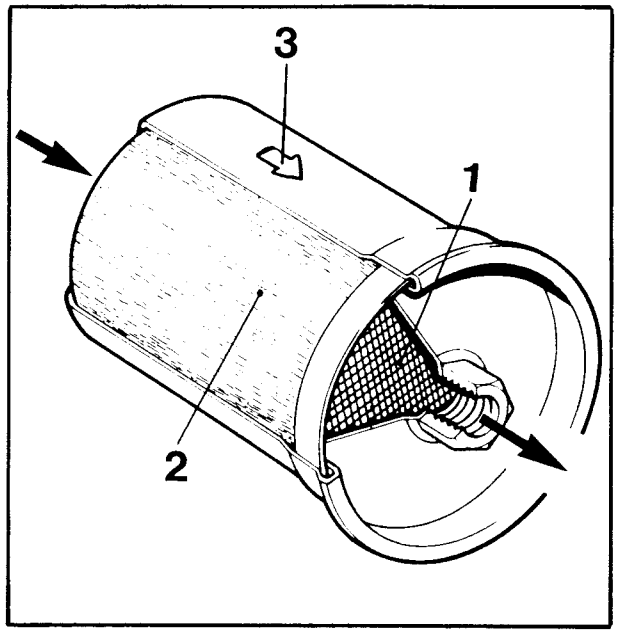
Fuel pump

The fuel pump has an ejector pump feeding the main pump and is fitted inside the fuel tank



Fuel filter

The fuel filter is of the same design as in the LH system but is made by Lucas.



Fuel filter

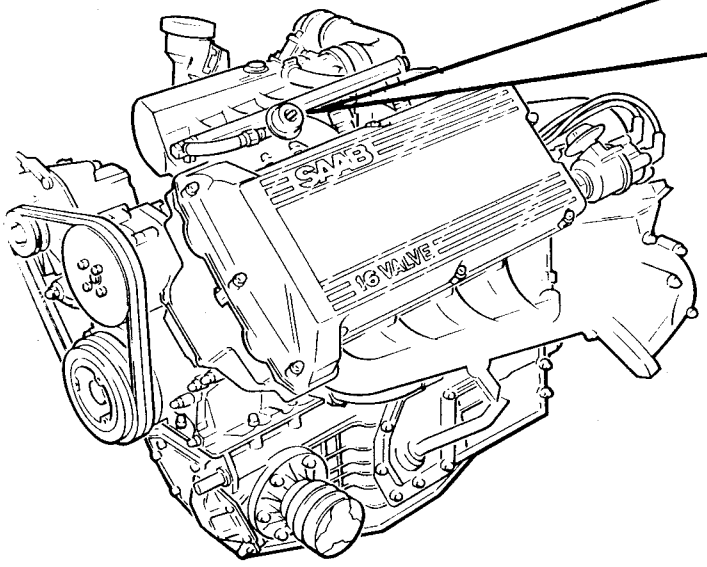
1 Nylon strainer
2 Paper element
3 Arrow indicating direction of flow

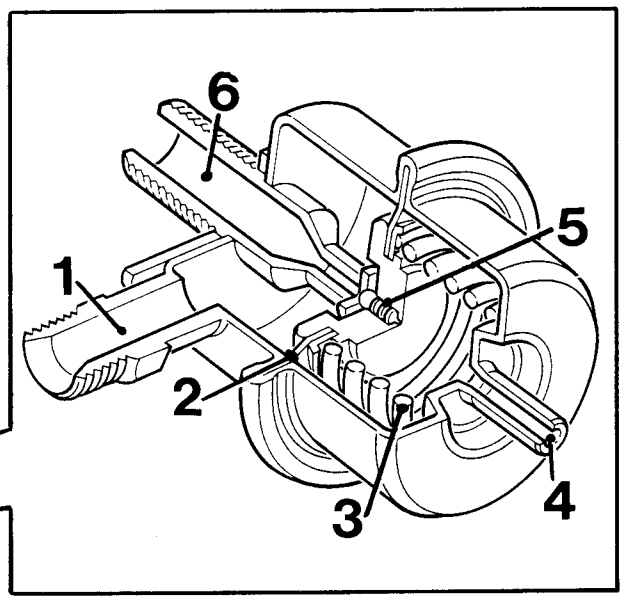
Fuel-pressure regulator

The fuel-pressure regulator maintains the fuel pressure across the injectors at a constant value in relation to the pressure in the inlet manifold.

The regulator is mounted on a special bracket and connected by a hose to the fuel-injection rail.

The fuel pressure is 3.0 bar (44 psi).





Fuel-pressure regulator

1 From fuel filter
2 Diaphragm
3 Spring
4 To inlet manifold
5 Valve
6 To fuel-injection rail

Injectors

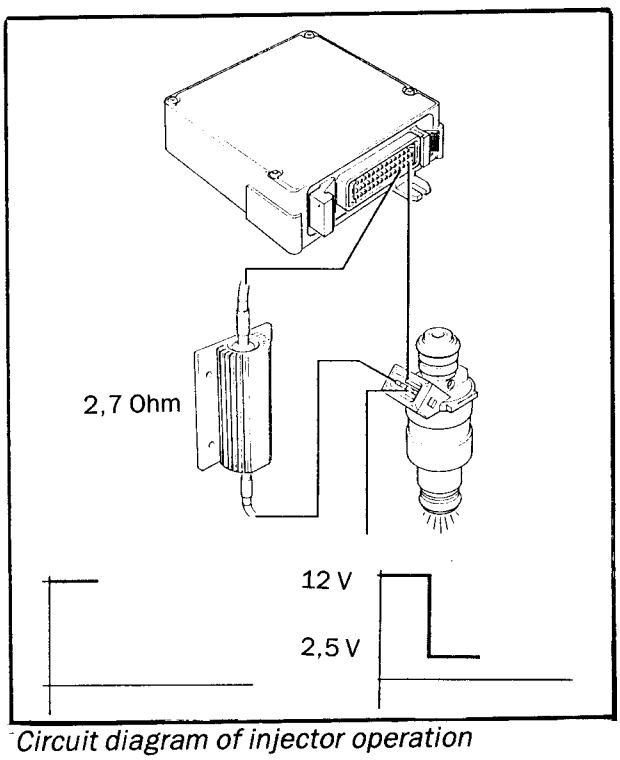
The injectors are of the low-impedance type and must never be connected direct to battery voltage, e.g. to test the flow.

The injector pulse comprises two phases, an open phase and a hold phase.

During the open phase, full battery voltage is applied to the injector solenoids, with the injectors being earthed via ECU pin 13.

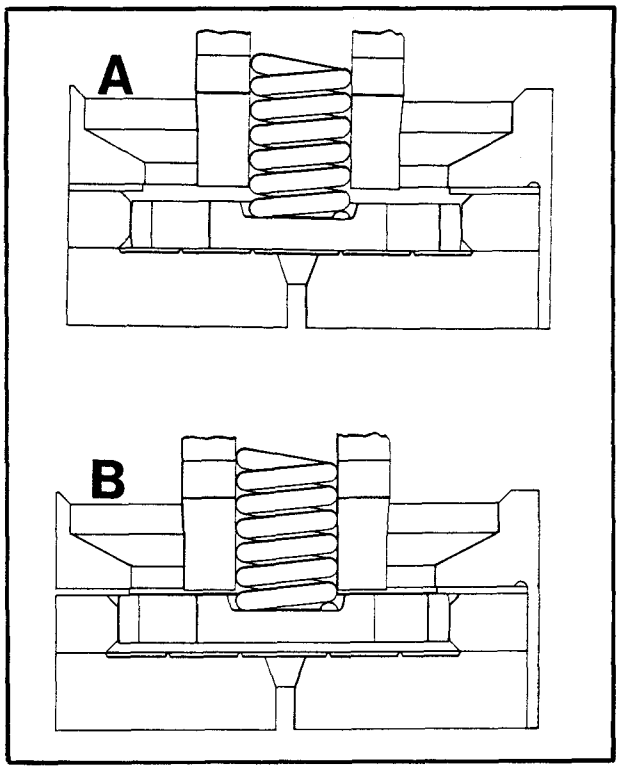
Thereafter, for the remainder of the pulse, the ECU switches to the hold phase, with the injectors being earthed by ECU pin 11, via a ballast resistor. The voltage across the injectors thereby drops to about 2.5 V.

The use of the open and hold phases enables the opening and closing of the injectors to be controlled more efficiently and thus permits more precise metering of the quantity of fuel injected.



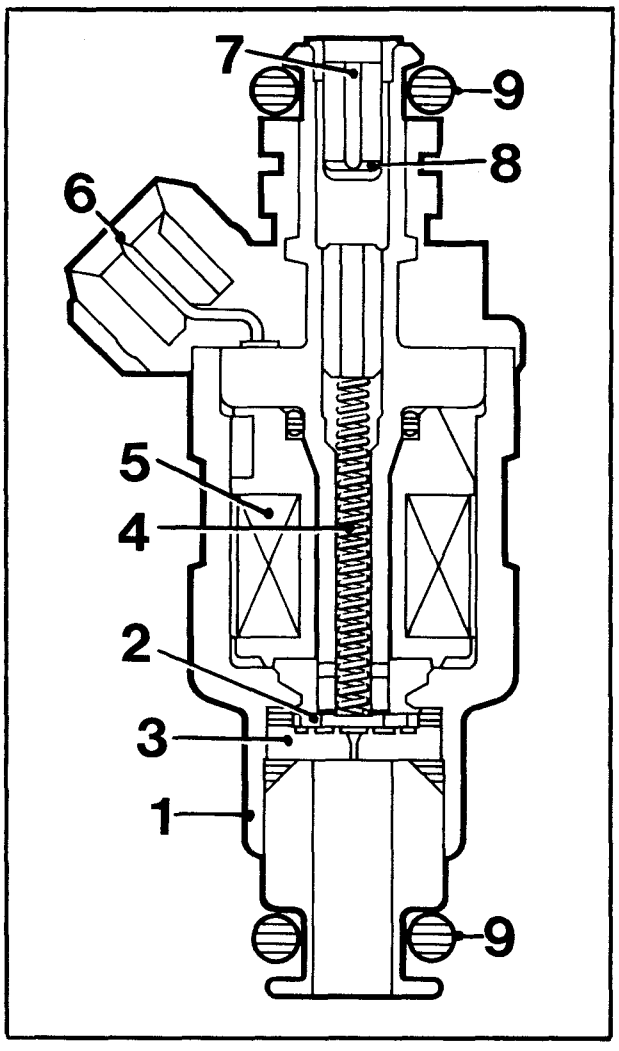
Circuit diagram of injector operation

The injectors are of a different design to those in the LH system. Instead of a needle valve, the injectors in the CU14 system incorporate a disc valve to regulate the amount of fuel injected.



The injectors incorporate a disc valve or armature to regulate the amount of fuel injected

A = Valve open
B = Valve closed



Injector

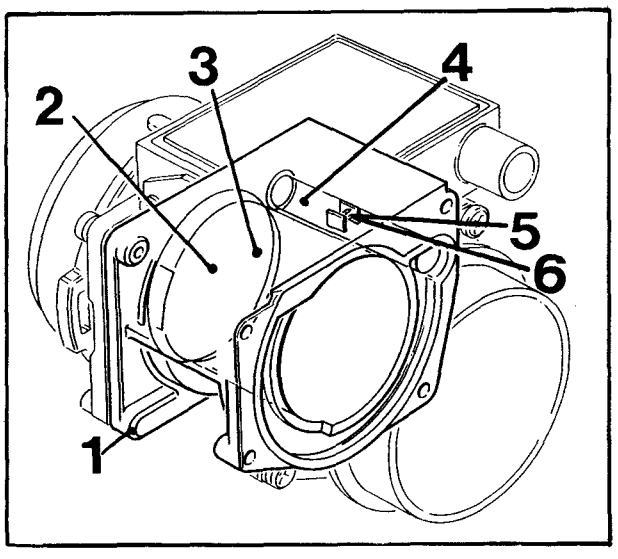
1 Valve body
2 Disc valve
3 Valve seat
4 Spring
5 Solenoid winding
6 Connector pins
7 Fuel inlet (from fuel injection ra
8 Filter
9 'O' rings

Air mass meter

The air mass meter in the CU14 system measures the air mass flowing through a separate measuring duct parallel to the main air duct. Because of the small proportion of the intake air flowing through the measuring duct, there is little danger of the filament becoming fouled, for which reason no burn-off function like that in the LH system is included.

The measured air mass is proportional to the total mass of air drawn into the inlet manifold.

A bridge circuit incorporating a detector resistor regulates the electrical current needed to keep the hot wire at a constant temperature above the temperature of the incoming air as sensed by the detector resistor. From the variations in this current, the ECU can deduce the mass of the air flowing through the meter.



Air mass meter

1 Cast alloy body
2 Fine-mesh screen
3 Main air duct
4 Air-mass measuring duct
5 Filament (hot wire)
6 Detector resistor

In the event of a break in the signal to the ECU, the Limp-home function will be actuated to enable the car to continue its journey with somewhat diminished performance.

On cars fitted with a catalytic converter, the screw for adjusting the CO content on idling is not operative.

To adjust the CO setting on cars not fitted with a catalytic converter, see page 240-23.

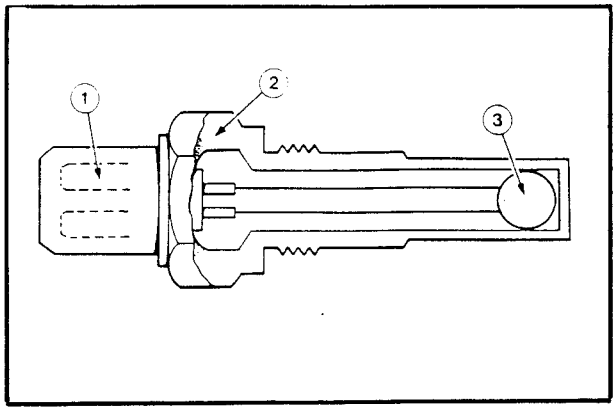
Temperature sensor

The purpose of the temperature sensor, fitted in the inlet manifold flange, is to send the ECU information on engine temperature, so that the correct amount of fuel can be injected.

On cold starting and early on in the warm-up phase, the engine requires a much higher fuel-to-air ratio, owing to losses due to condensation in the combustion chamber and inlet manifold. The fuel/air ratio is gradually reduced as the engine temperature rises.

The temperature sensor consists of a plastic body housing an NTC (negative temperature coefficient) resistor, the resistance of which decreases as the temperature rises.

In the event of a break in the signal from the temperature sensor, the ECU simulates a temperature of 10°C on starting or 35°C during driving.



Temperature sensor

1 Connector pins
2 Plastic body
3 NTC resistor

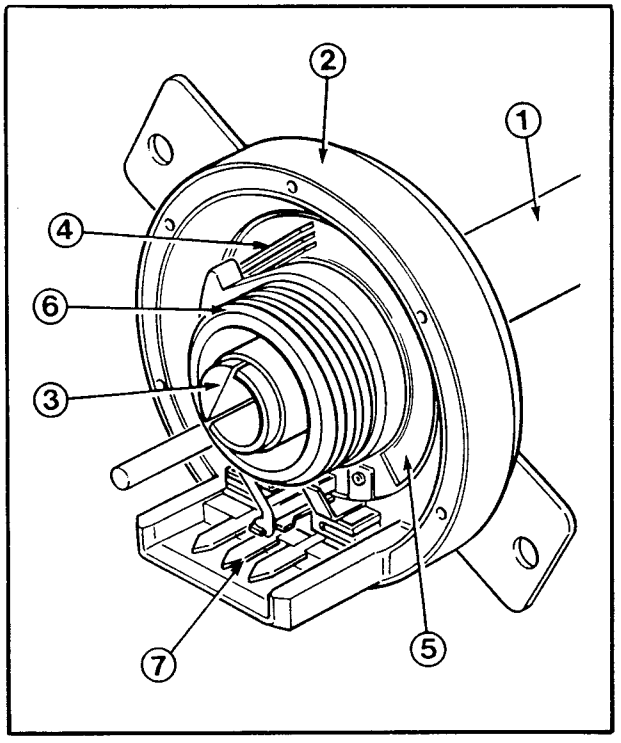
Main and fuel-pump relays

The main relay and fuel-pump relay are of the same design and perform the same function as in the LH system.

Throttle potentiometer

The throttle potentiometer is fitted to the throttle housing and connected mechanically to the throttle-butterfly spindle. A constant voltage is supplied to the potentiometer, and as the throttle butterfly moves, it changes the resistance of the potentiometer track and thus the analogue signal to the ECU.

The ECU takes into account the position of the throttle for controlling, e.g. idling, enrichment during acceleration and fuel shut-off during engine overrun.



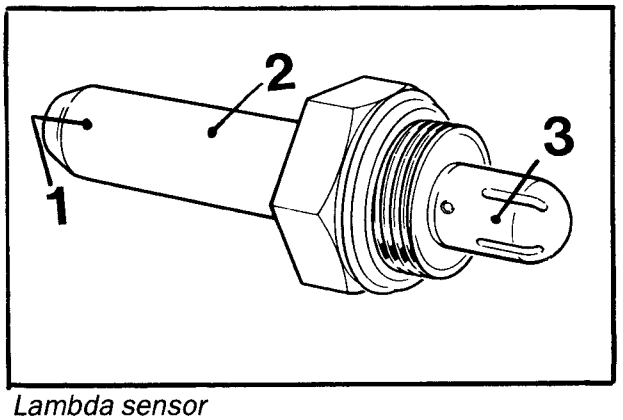
Throttle potentiometer

1 Throttle spindle
2 Throttle potentiometer
3 Drive spindle
4 Wipers
5 Resistor tracks
6 Return spring
7 Connector pins

Lambda sensor

The Lambda sensor contains a titanium dioxide thick-film resistor, the resistance of which changes with variations in the exhaust-gas composition.

The sensor is connected into an electrical circuit, which enables the ECU to deduce the composition of the exhaust gases from variations in the signal voltage. A PTC (positive temperature coefficient) heating element preheats the sensor to enable it to reach operating temperature quickly.



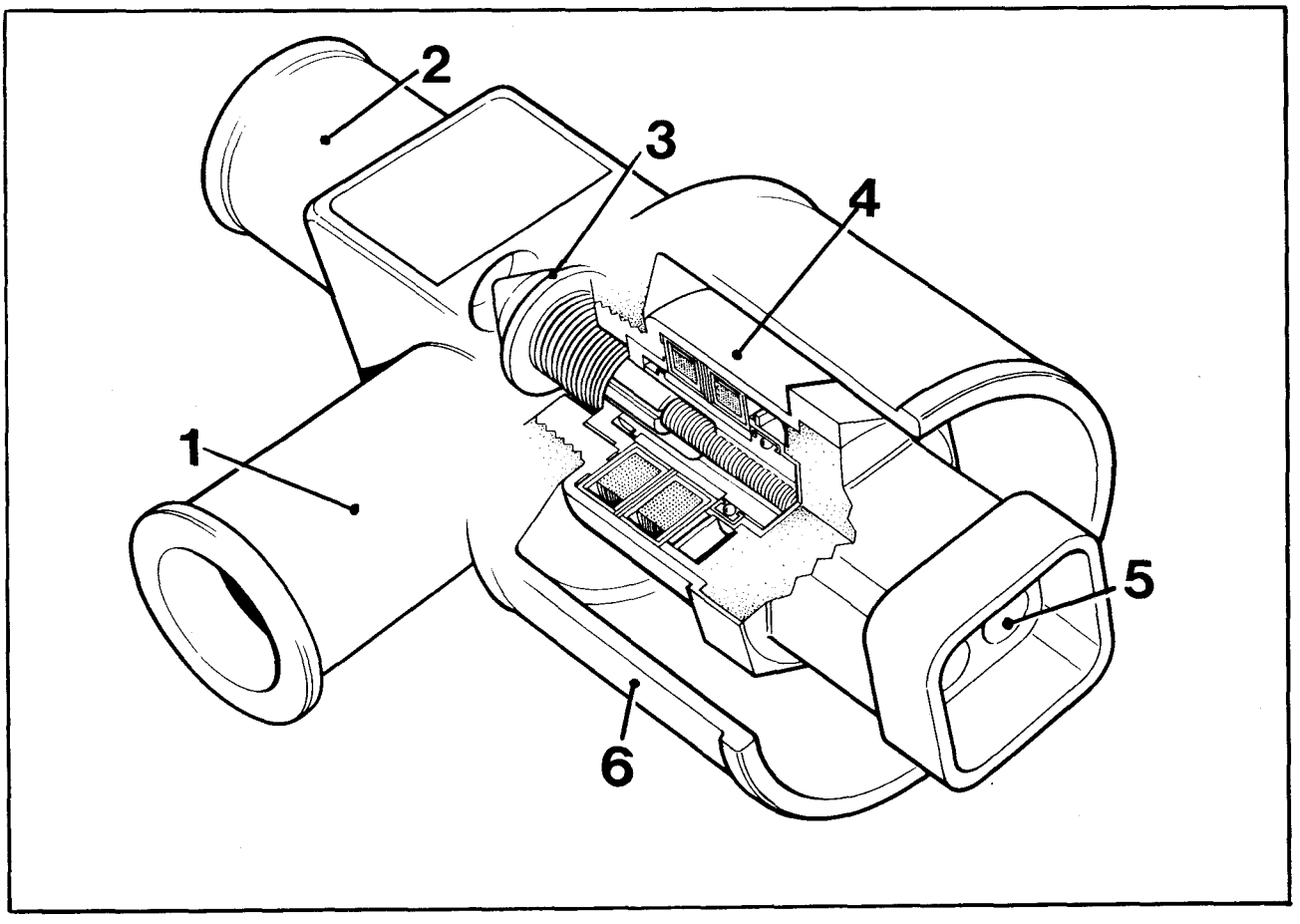
Lambda sensor

1 Connector pins
2 Casing
3 Probe

AIC valve

The AIC valve has two main functions: it gradually compensates for changes due to mechanical wear etc., thus eliminating the need for readjustment of the basic idling setting; and it also compensates for momentary drops in the idling speed caused by additional loads imposed, e.g. by the AC compressor or steering servo pump cutting in.

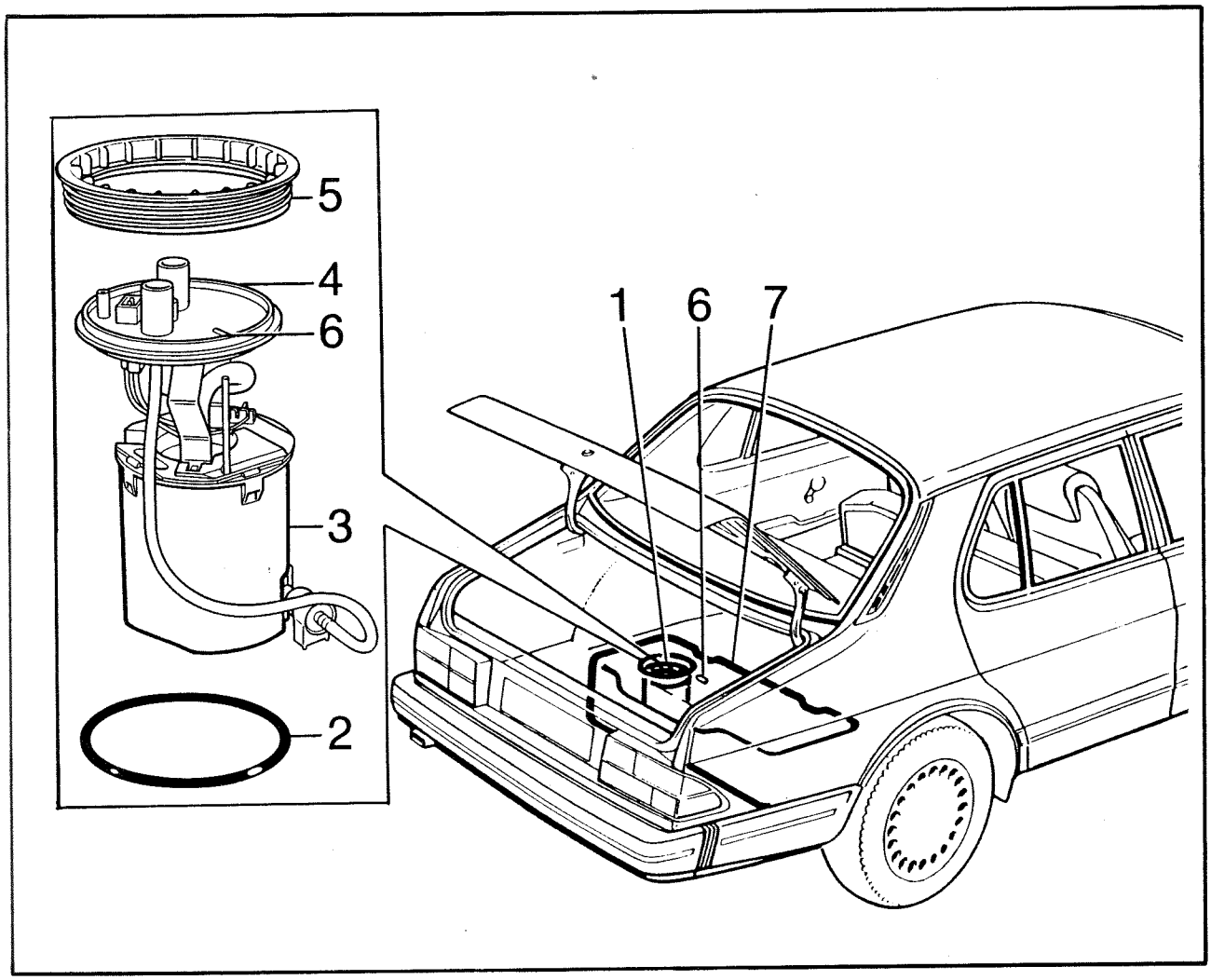
The AIC valve is actuated by a two-phase stepper motor controlled by the ECU. After comparing the input signals with preprogrammed values, the ECU sends electric pulses to the motor to set the valve in the correct position.



AIC valve

1 To inlet manifold
2 From throttle housing
3 Valve
4 Stepper motor
5 Connector pins
6 Valve body

Fuel tank and fuel pump



Fuel tank and fuel pump

1 Reinforcement ring
2 Seal
3 Fuel pump
4 Top
5 Screw top
6 Alignment mark
7 Fuel tank

The fuel pump is of the same type as that fitted to cars with the LH fuel-injection system, i.e. with an ejector pump feeding the main pump.

The design of the screw top and rubber seal, together with the way in which the pump fits inside the tank, enables simple tools to be used for removal and refitting, and also makes the pump more proof against leakage.

A breather pipe is incorporated in the fuel-pump strainer to evacuate any vapour.

The tank differs from early models in that it has been modified, e.g. it incorporates a new reinforcement ring, to accommodate the pump.

Fuel pump

Object code: 24110

Warning

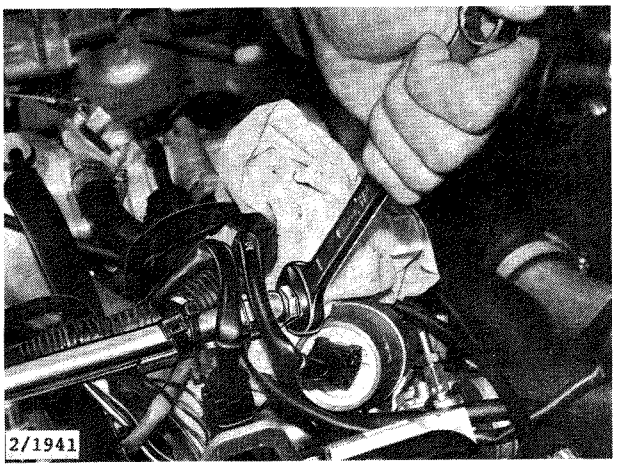
No smoking anywhere in vicinity.
Take care not to cause sparks, e.g. from short-circuiting, circuit-breaking, etc.
Have a suitable fire extinguisher on hand.
Work only in a well-ventilated area.
If approved extraction equipment for fuel vapour is available, use it.
Wear suitable gloves, as prolonged contact with fuel can cause dermatitis.

To remove

1 Disconnect the negative (-) battery lead and cover the terminal pole on the battery.

2 Undo the fitting on the fuel-injection rail to release the pressure in the system. Soak up any escaping fuel with absorbent paper or a rag.

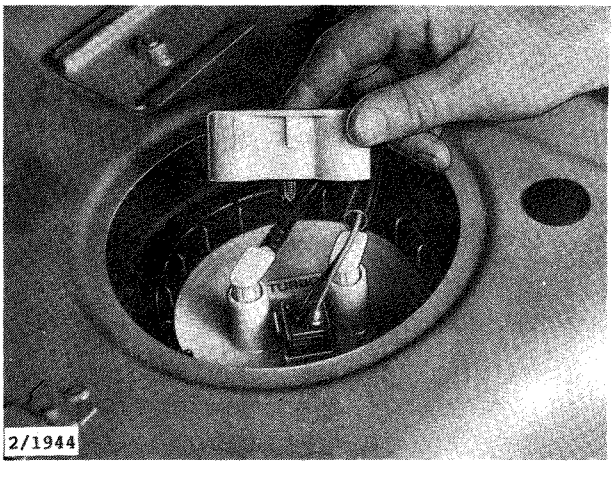
Tighten the fitting.



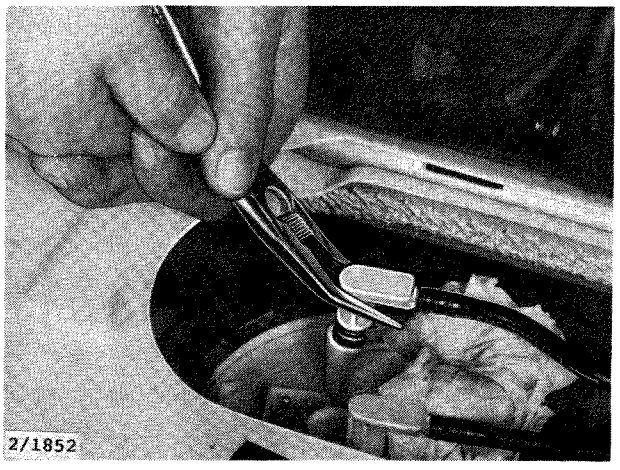
3 Remove the luggage-compartment floor panel.

4 Undo and move aside the pump cover.

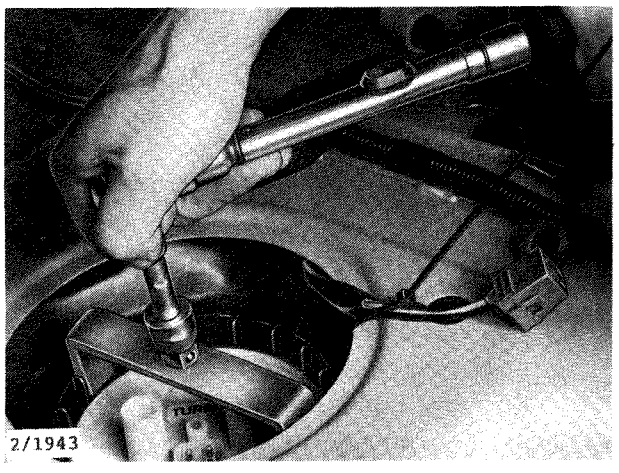
5 Release the clamp and unplug the connector.



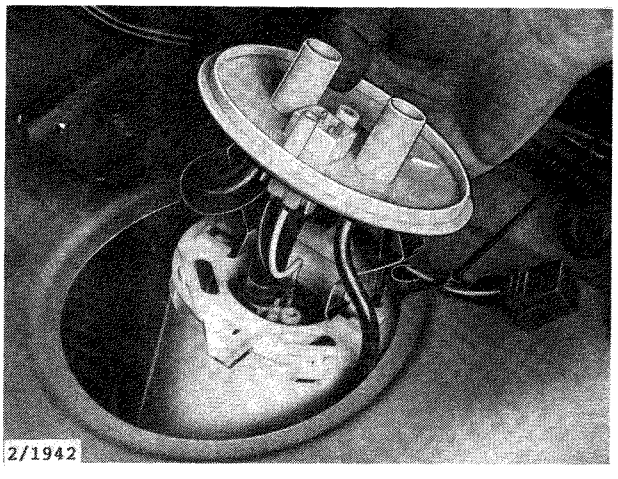
6 Disconnect the fuel lines from the pump. Push them aside and tie them back out of the way.



7 Undo the screw top using special tool 83 94 462.



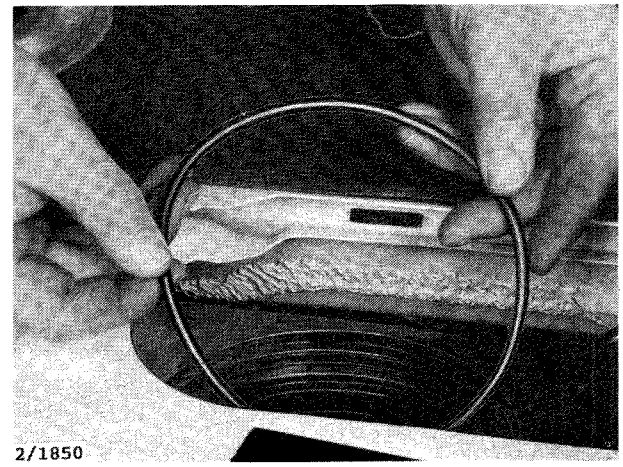
8 Lift the pump carefully. Have some absorbent paper or rags handy to soak up any spilt fuel.



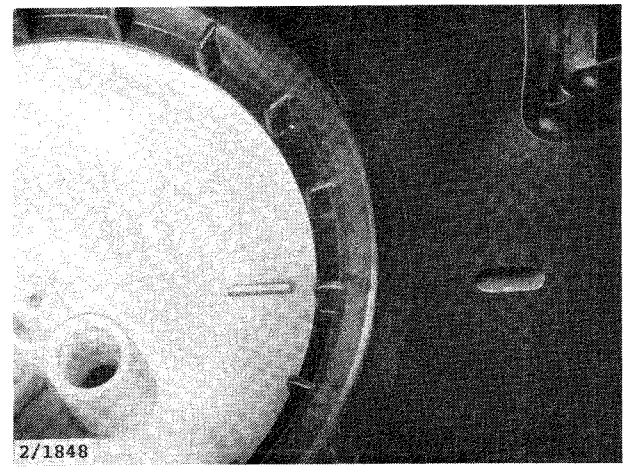
9 Transfer the pump to a suitable receptacle and tip out the fuel.

To fit

1 Fit a new 'O' ring for the pump.

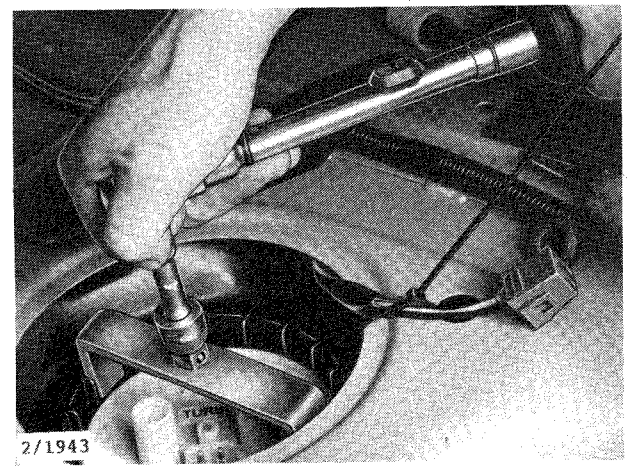


2 Place the pump inside the tank with the marks in line.



3 Fit and tighten the screw top using tool 83 94 462 and a torque wrench.

Tightening torque:
55 Nm (40 lbf ft)



Check that the aligning marks are still in line.

CU14 fuel-injection system

Fault diagnosis: general

Before starting fault-diagnosis work

Caution
Never unplug the connector from the ECU or disconnect either of the battery leads before the faults stored in the ECU memory have been recalled and noted by means of the flashing codes via the CHECK ENGINE light.

Successful fault diagnosis on the CU14 system requires not only in-depth knowledge of the system on the part of the technician but also familiarity with the procedure for recalling the error codes from the system's self-diagnostics function (see page 240-4).

Thanks to the self-diagnostics incorporated in the CU14 system, which continuously monitors and records the majority of conceivable faults, be they permanent or intermittent, it is easy using the error codes to pinpoint a fault, rectify it and then check that the system is functioning properly again.

This integrated self-diagnostics function in the system makes not only for quicker fault-diagnosis work but, above all, much more reliable diagnosis. It is therefore far less likely that a sound component will be replaced, having mistakenly been judged to be faulty, and service costs should benefit considerably as a result.

Is the fault in the CU14 system?

Many so-called fuel-injection faults can often be traced to other unrelated engine or electrical faults. Before starting any fault-diagnosis work on the CU14 system, therefore, always check the following first:

- Battery condition
- Engine condition (compression, inlet manifold pressure, etc.)
- Electrical connections
- Earthing points
- Ignition system

Connecting test probes to the ECU connector

Note
Make sure that all error codes have been recalled from the ECU and noted before you unplug the ECU connector. As soon as the connector is unplugged, all error codes for intermittent faults will be lost.
Even if a fault has not been rectified, it may be necessary to start the engine or test drive the car before the fault can be identified again.

Before starting any fault-diagnosis work on the CU14-system, you must first gain access to the ECU connector block. Test probes and the like must be connected to the back of the wiring-loom half of the connector.

1 Make sure you have adequate access to the ECU to carry out the following steps.

Safety precautions

Read and observe these precautions before starting any work on the CU14 system.

1 Always make sure that the battery is properly connected to the electrical system of the car before attempting to start the engine.

2 Never attempt to start the engine using an external power source, such as batteries connected in series (24 V) or a boost charger (16 V), with the battery connected to the electrical system of the car.

3 If using a boost charger, make sure that both battery leads are disconnected.

4 Never disconnect the battery while the engine is running.

5 Make sure that all electrical connections are making good contact.

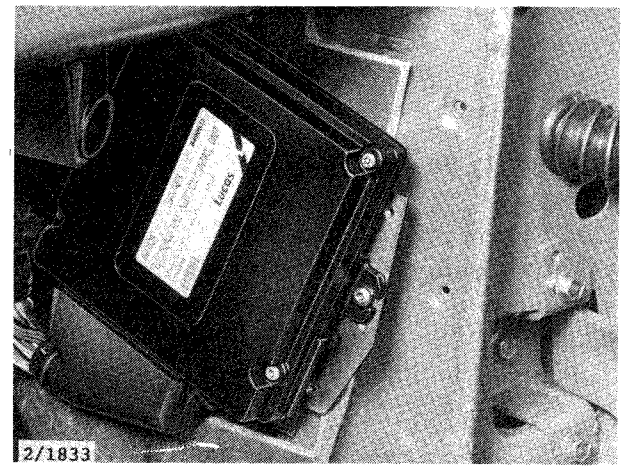
6 Never unplug or plug in the ECU connector with the ignition switched on.

7 Before conducting a compression test, unplug the output module for the ignition system.

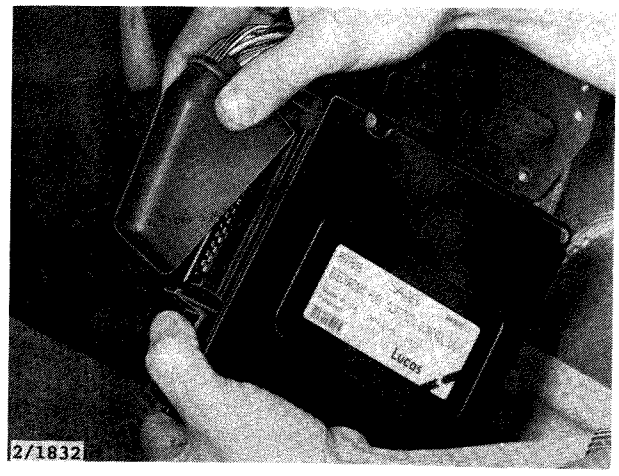
8 Always remove the ECU from the car if the temperature is likely to exceed 80°C/176°F (e.g. for stove drying of paintwork).

9 Always remove the ECU before starting any electric welding.

10 Take care never to reverse the polarity of the fuel pump.

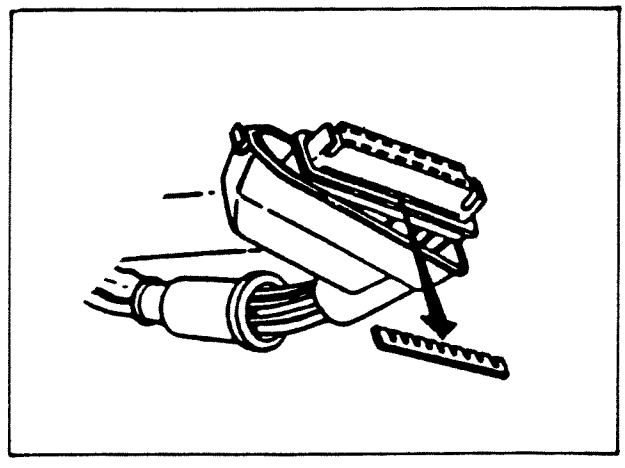


2 Unplug the connector.



3 Undo the cover and peel back the rubber gaiter.

4 Pull out the rubber seal and lift out the connector block.



5 Plug in the connector.

Checking the wiring

The words, 'Check the wiring between xx and yy', are used frequently in the fault-diagnosis charts. Sometimes the wiring may be run through different types of connector and, by implication, these must also be checked for circuit continuity and short circuiting.

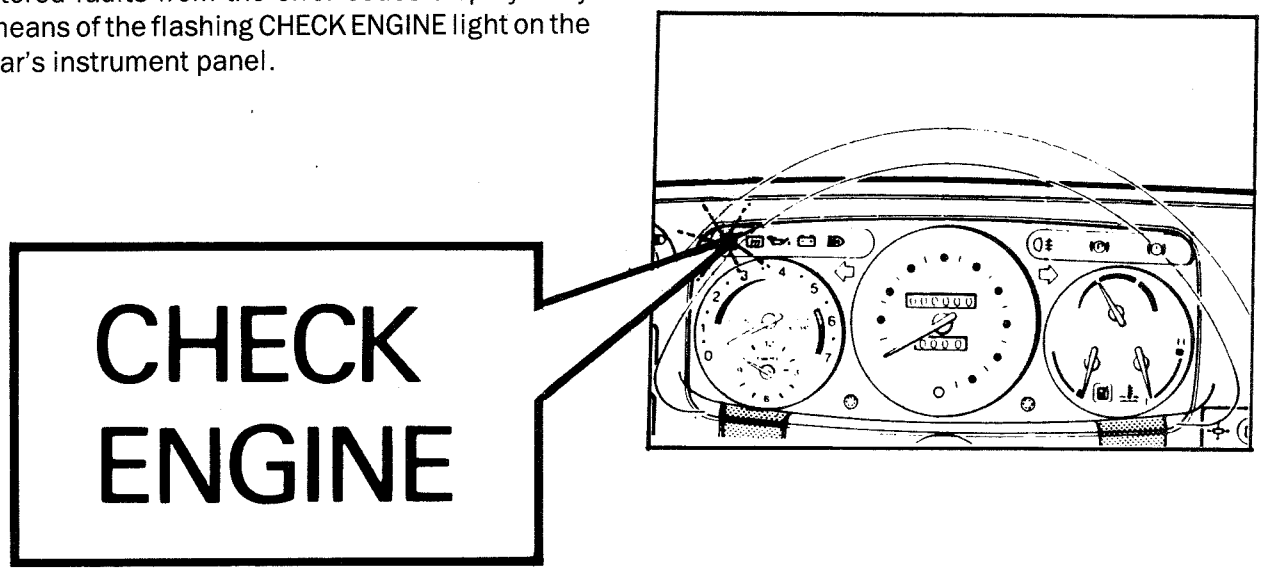
Also make a visual check to ensure that there is no damage to wiring or connectors.

Be alert to the possibility of crosstalk or interference from other components.

Using the self-diagnostics function

Faults occurring only now and again (intermittent faults) are often difficult to find. The CU14 system therefore incorporates a self-diagnostics function, which stores data on all faults occurring whilst the engine is running. Later on, these data can be retrieved to enable the fault to be pinpointed and rectified.

The specified fault-diagnosis procedures describe how information can be obtained on stored faults from the error codes displayed by means of the flashing CHECK ENGINE light on the car's instrument panel.



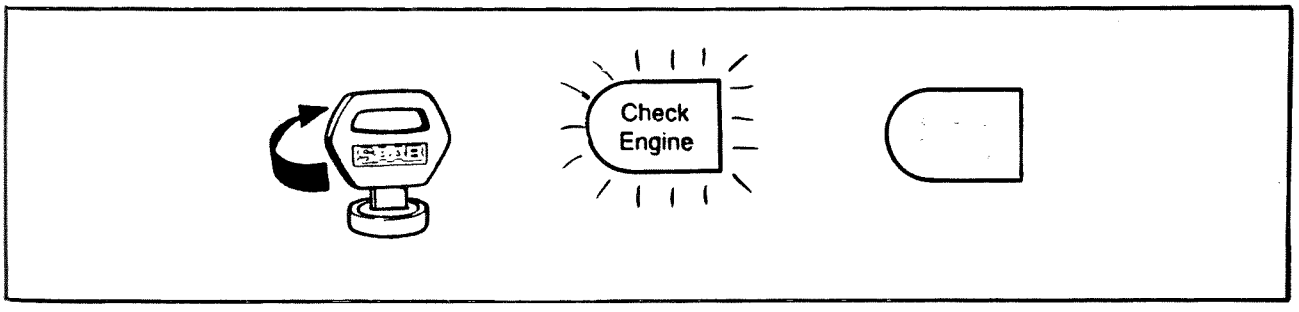
The codes are given in a series of brief flashes, e.g. 1+3+2+2+2. Reference to the error-code table will show that this example indicates a faulty AIC valve. The action to be taken can then be found in the section on test procedures.

The same procedure can then be repeated for any additional faults, by noting the code flashed by the CHECK ENGINE light and then finding the fault indicated in the table of error codes.

All error codes for the CU14 system have the same first two digits: 13XXX.

If the system detects a fault affecting exhaust emission, the CHECK ENGINE light will come on while the car is being driven. The light should go off again if the fault disappears or is rectified.

To ensure that the CHECK ENGINE light is working properly, turn the ignition switch to the Drive position. The light should come on for about two seconds and then go off again (even if a fault is present).



All of the faults shown in the list of error codes can be stored in the CU14-system ECU simultaneously, for recall later during fault-diagnosis work.

Note
If a serious, recurring fault is present, the fault will be stored in the memory each time it occurs, and the CHECK ENGINE warning will come on. Once the fault has been rectified, it may therefore be necessary to delete the contents of the memory to ensure that all the error codes for the same fault have been erased. If there is any doubt, always test drive the car.

Intermittent faults

If an intermittent fault of a serious nature is detected, the CHECK ENGINE light will come on.

The warning will remain on until the ignition has been switched off, regardless of whether the fault persists or not.

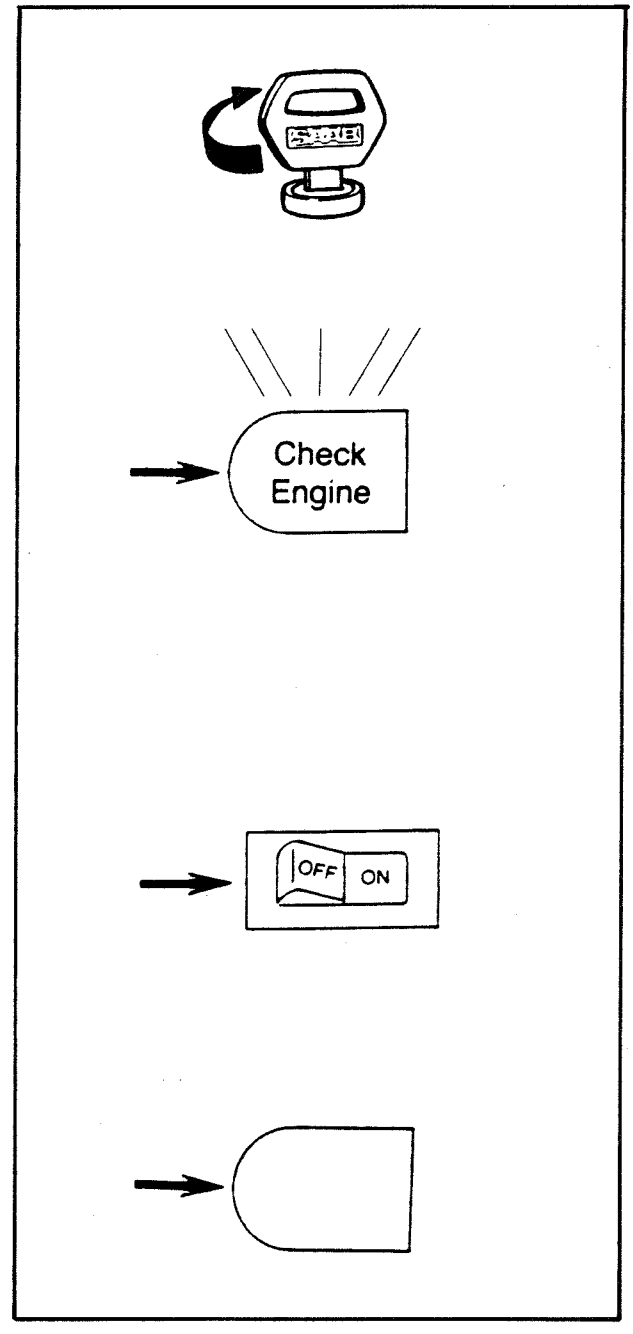
Although the fault will remain stored in the memory, the CHECK ENGINE warning will only come on again, after the ignition has been switched on, if the fault recurs.

Fault diagnosis - stored faults

1 Using switched jumper lead, 83 93 886, connect to earth the yellow/white lead in the 3-pin test socket in the connector adjacent to the fresh-air intake.

Note
Read through the following instructions carefully **before** you switch on the ignition.

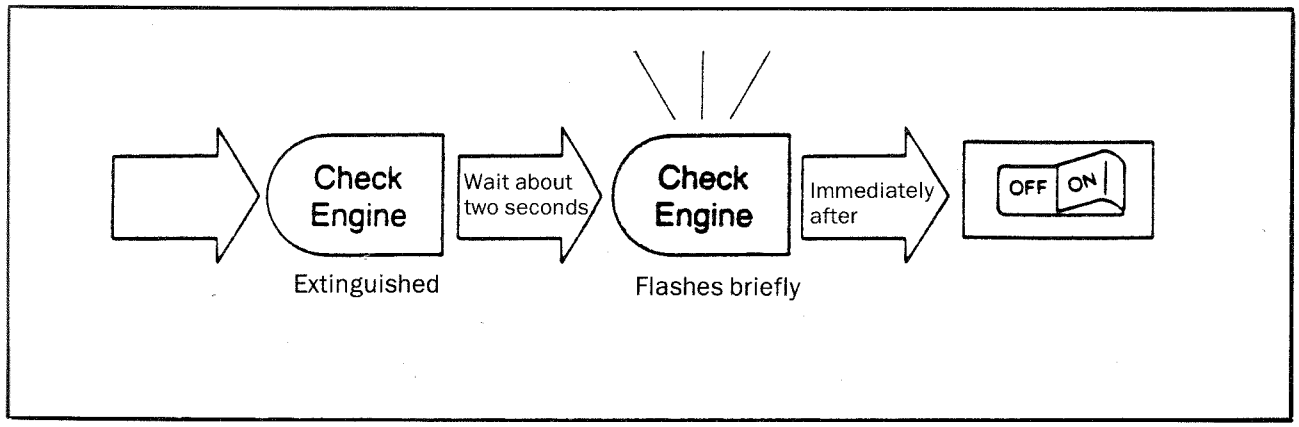
2 Switch on the ignition.
The CHECK ENGINE light will now come on.



3 Set the switch to ON.
The CHECK ENGINE light will now be extinguished.

4 Watch the CHECK ENGINE light carefully. After about two seconds, it will **flash briefly,** signifying that the first error code is to be displayed.

As soon as the light has flashed, move the switch immediately to the OFF position.

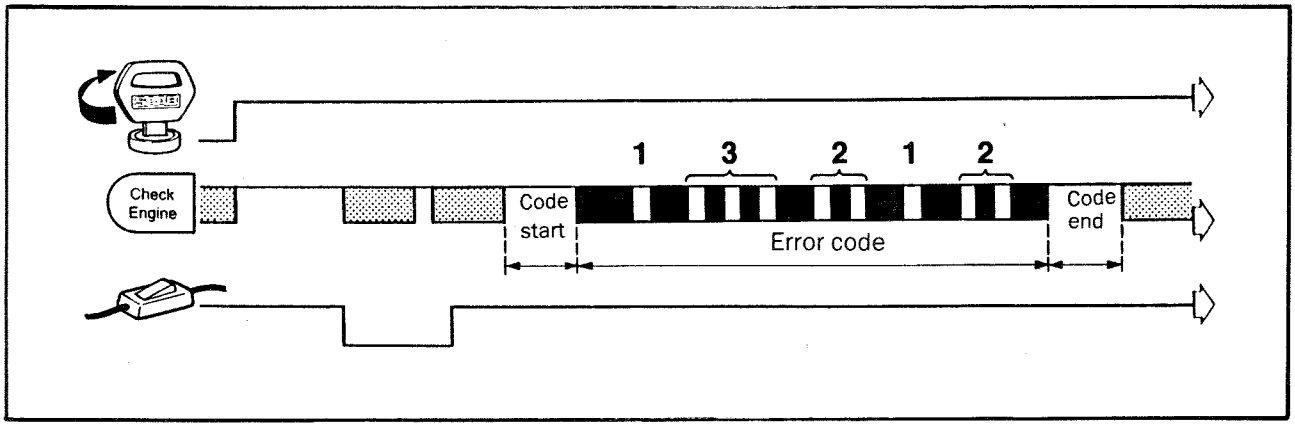


5 The first error code will now be displayed by a series of short flashes of the CHECK ENGINE light.

Note
The error code starts and finishes with a long flash of the CHECK ENGINE light.
These long flashes are not part of the code itself but serve merely to indicate the beginning and end of the code.

Error code

The entire procedure will therefore be as shown below.



In the example shown, the error code is 13212. Reference to the table of error codes on page 240-11 shows that the signal voltage from the throttle potentiometer at full load is low.

When the switch is set to OFF, error code 13231 will be flashed repeatedly - the next error code cannot be displayed until the switch has been operated as detailed in the next section, 'Next error code'.

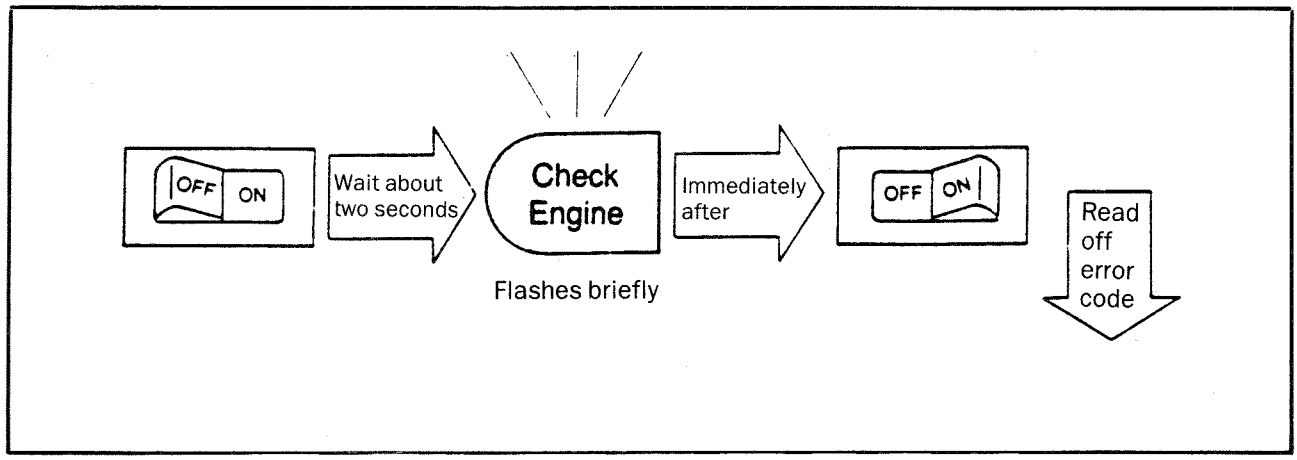
Note
The first code displayed during the test will always be 13231 (no ignition signal).
When this code is displayed, run the starter motor for about five seconds: if there is a good ignition signal, the error code will disappear when the ignition key is released.
Error codes cannot be accessed while the engine is running.

Next error code

To check if there are any additional faults that have been detected and stored in the memory, proceed as follows.

1 Set the switch to ON.

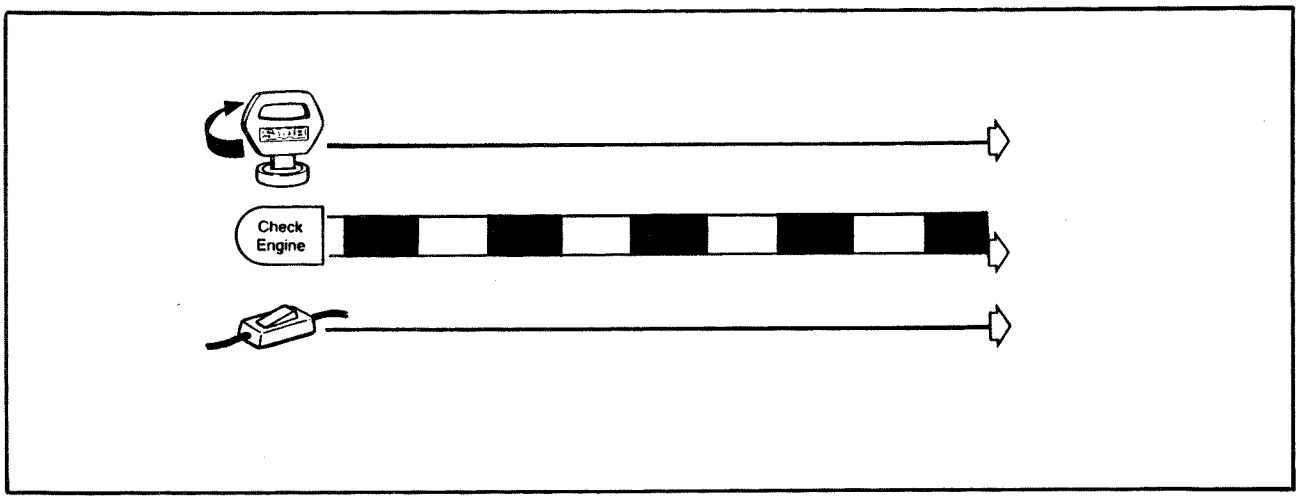
2 After a **short flash of the light,** set the switch to OFF.



The next error code (if any) will now be displayed in the same way as the first one.

Follow the same procedure to display the error codes for any additional faults.

When there are no more faults or all the faults have been rectified, the system will indicate this by a continuous series of long flashes.

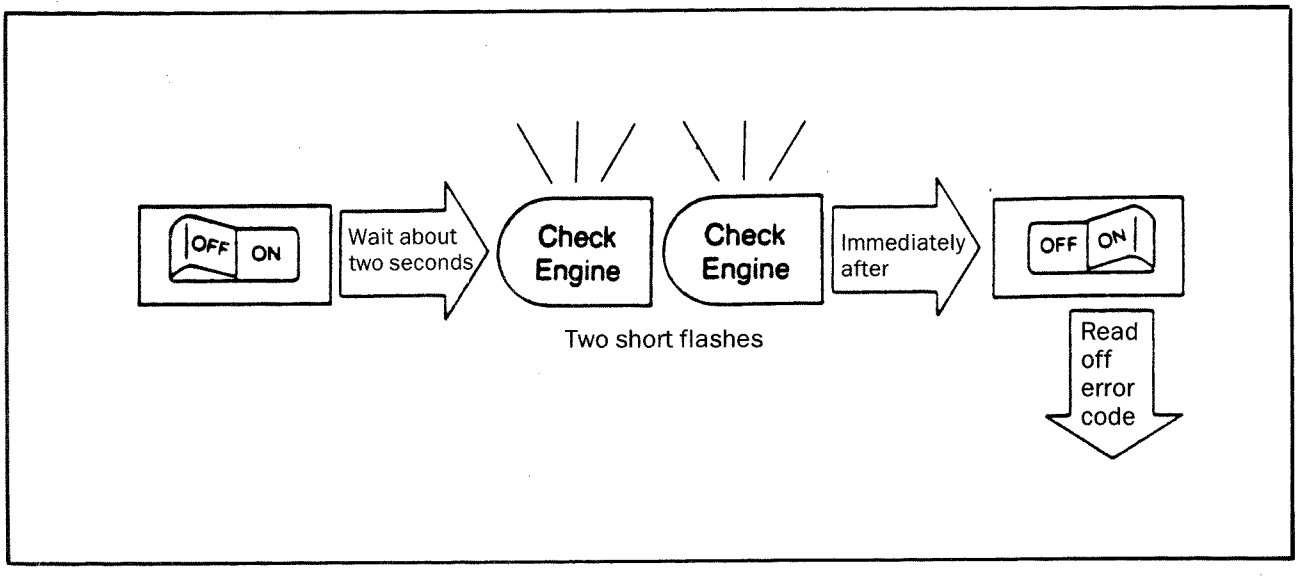


To restart the test procedure

If for any reason you want to display the error codes again, starting from the first fault, proceed as follows:

1 Set the switch to ON.

2 After **two short flashes,** set the switch to OFF, whereupon the error code for No. 1 fault will be displayed.



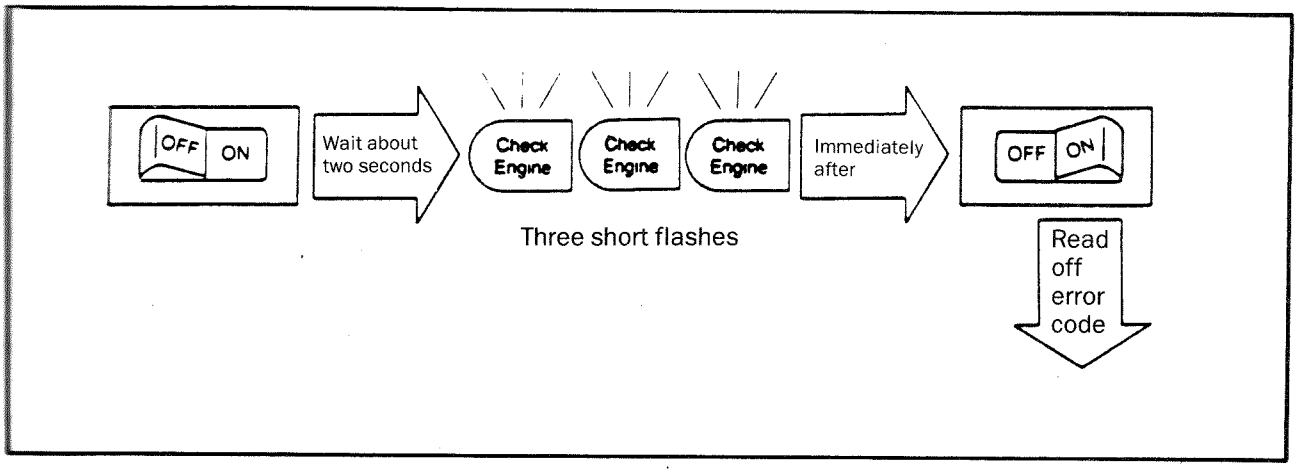
Move the switch to OFF immediately after the second flash of the CHECK ENGINE light.

To delete the contents of the memory

1 Set the switch to ON.

2 After **three short flashes,** set the switch to OFF.

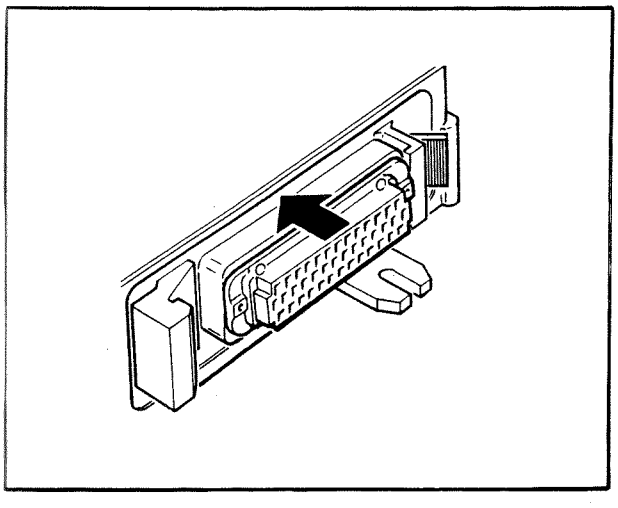
The memory has now been erased.



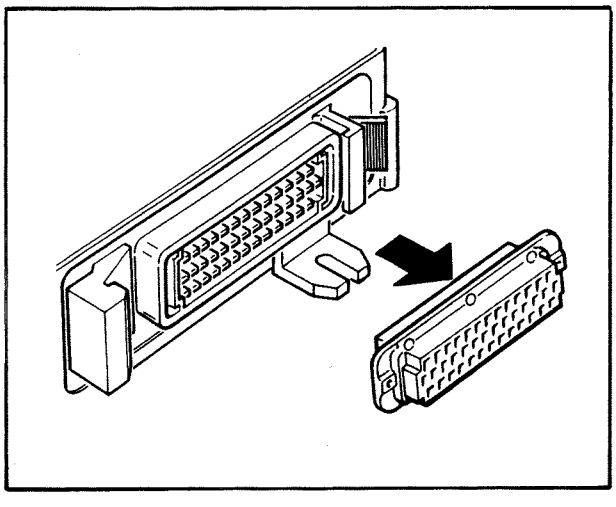
Note
The contents of the memory cannot be deleted before code 00000 has been displayed (indicating end of error codes).

Table of error codes

Error code	CHECK ENGINE	Malfunction indicated	Action: See page ...
13212	Off	Throttle potentiometer: low signal at full load	240-14
13213	Off	Throttle potentiometer: high signal at partial load	240-16
13214	On	Signal from temperature sensor faulty	240-18
13215	Off	Throttle potentiometer faulty	240-20
13221	On	Air mass meter: no signal; malfunction Limp-home mode actuated	240-22
13222	Off	Idling control or AIC valve faulty	240-24
13223	Off	Mixture lean	240-26
13224	Off	Mixture rich	240-27
13225	On	Lambda sensor: faulty signal or preheater malfunction	240-28
13231	Off	Testing of ignition-pulse signal: signal absent. This will always be the first error code when the engine is not running.	240-12
13233	Off	Fault in ECU (ROM fault)	240-30
13234	Off	No signal from road speed sensor	240-30
13235	Off	No DRIVE signal	240-32



Denotes connector plugged in



Denotes connector unplugged

Self-diagnostics: test procedures and circuit diagrams

Error code: 13231

No ignition signal

CHECK ENGINE: Off

Fault symptom: Engine fails to start

Note
When the engine is off, this will always be the first error code.

Test procedure

Run the starter motor for about five seconds. If the code (13231) disappears, the ignition signal is good and the fault is elsewhere in the system.

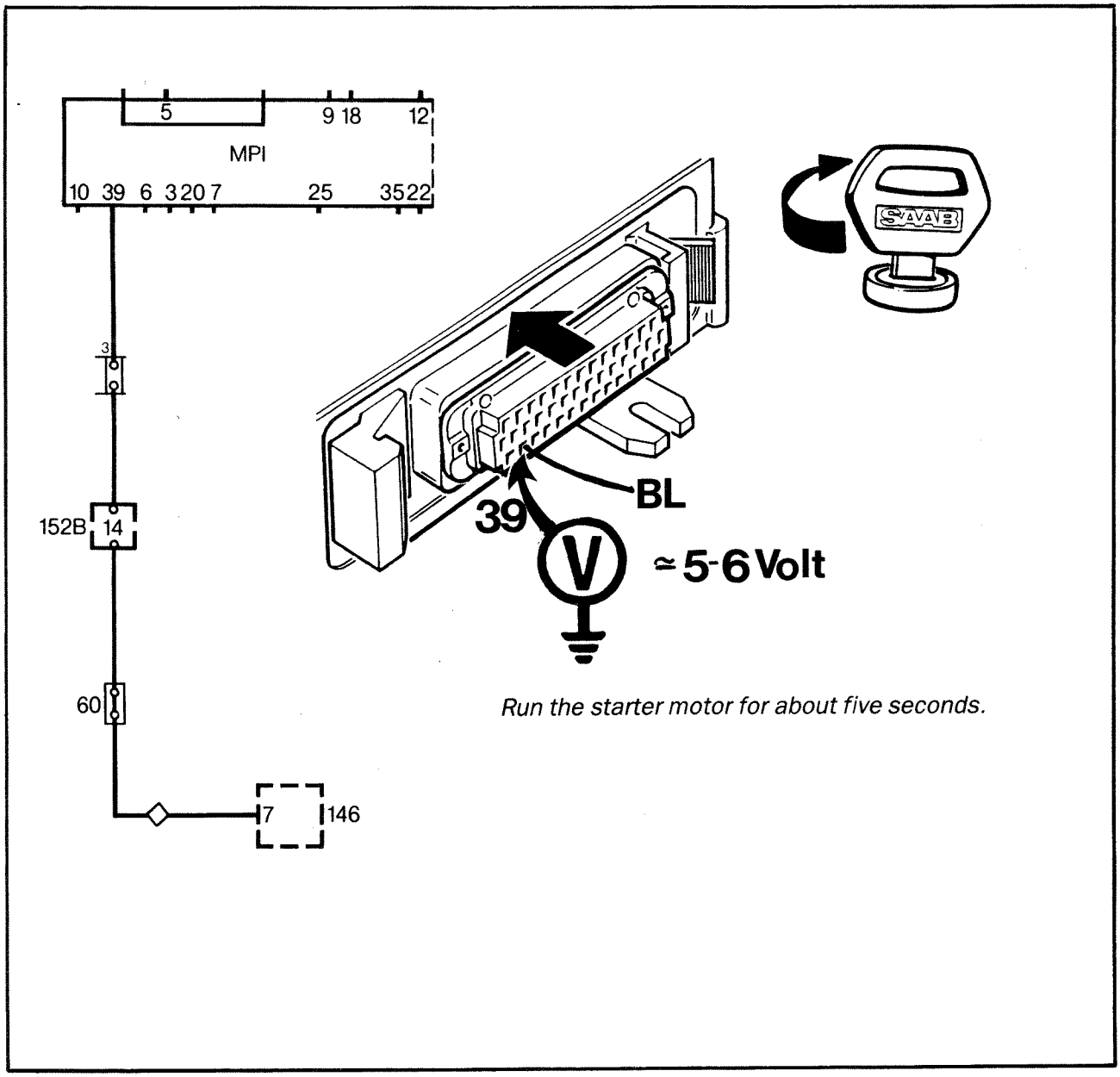
Note
When the ignition key is allowed to spring back from the Start to the Drive position, CHECK ENGINE will come on again.

A) Check the voltage across ECU pin 39 and earth whilst the starter motor is running. After about five seconds, a reading of 5 or 6V should be obtained.

   If not:

   Check for faults in the ignition system and rectify any found (Section 3:2 of the Workshop Manual refers).

B) Try a known good ECU.



Run the starter motor for about five seconds.

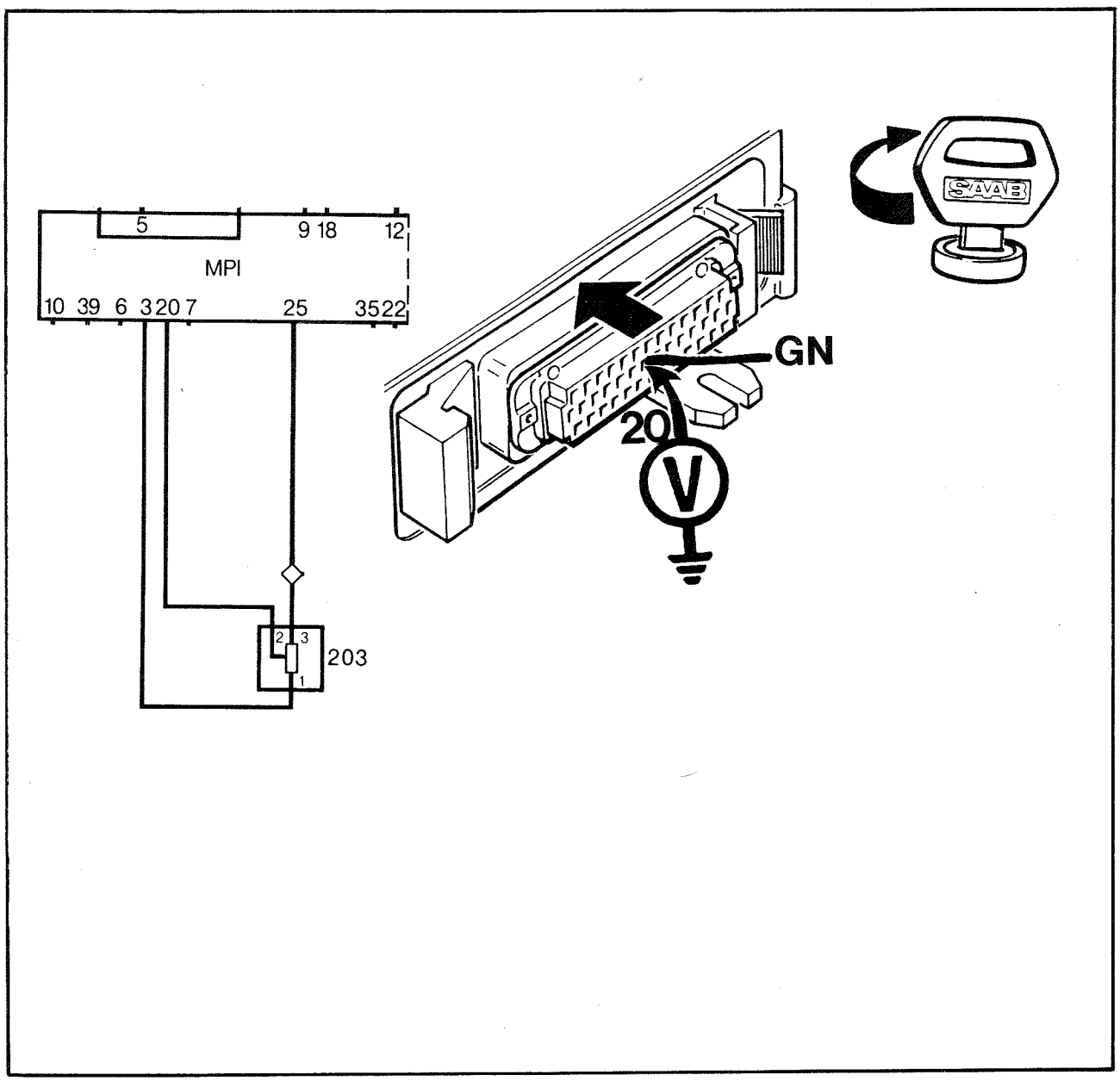
Error code: 13212

Throttle potentiometer: low signal at full load

CHECK ENGINE: Off

Test procedure

Same procedure as for code 13215.


5
9 18
12
MPI
10 39 6 3 20 7
25
35 22
2
3
1
203
GN
20
V
SAAB

Error code: 13213

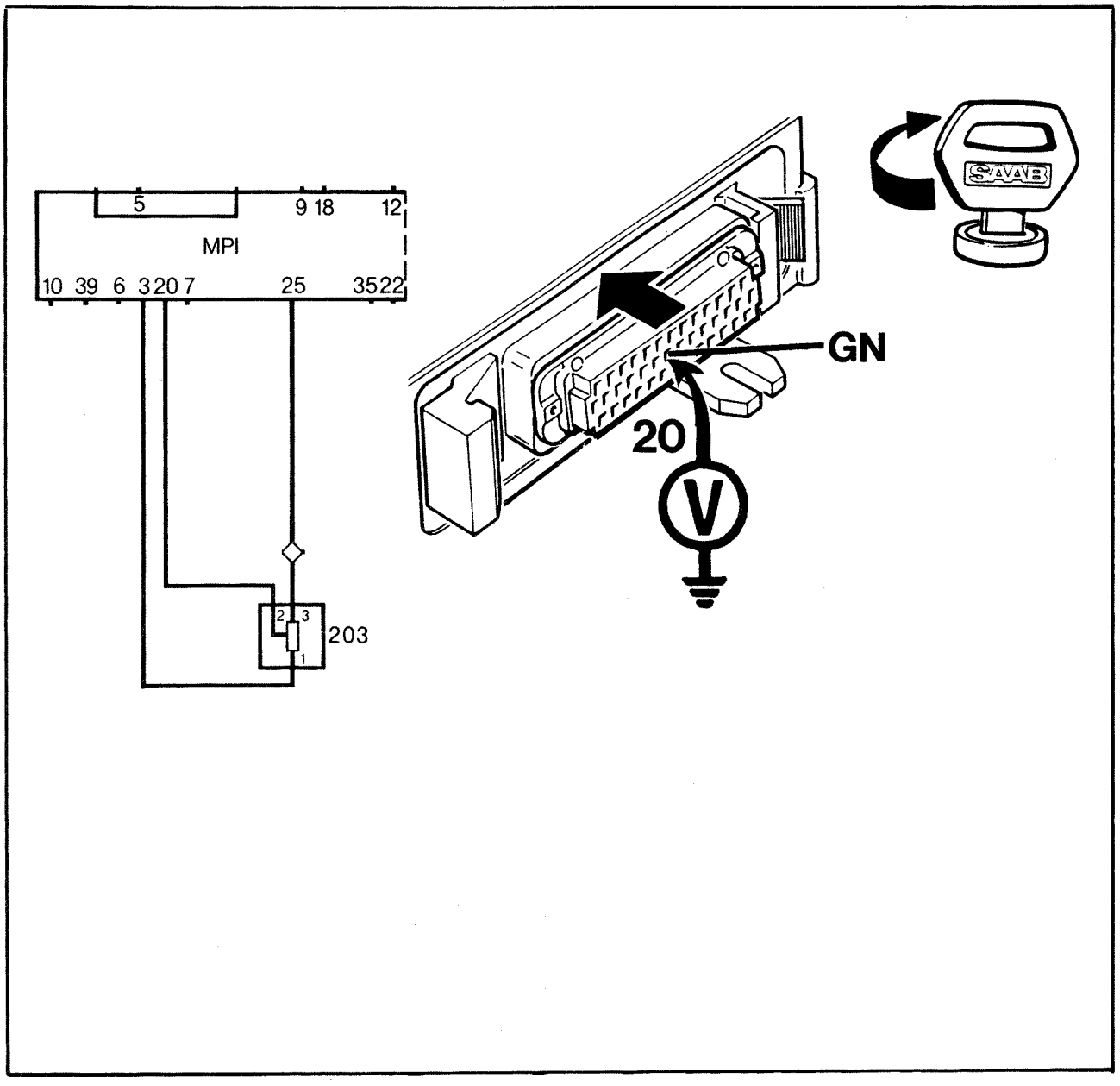
Throttle potentiometer: high signal at partial load

CHECK ENGINE: Off

Fault symptom: Engine erratic at all speeds

Test procedure

Same procedure as for code 13215.


5
9 18
12
MPI
10 39 6 3 20 7
25
35 22
2
3
1
203
GN
20
V

Error code: 13214

Signal from temperature sensor faulty (below -44°C or higher than +140°C)

CHECK ENGINE: On

Fault symptom: Fast idling speed; engine difficult to start; poor drivability during warm-up phase

Test procedure

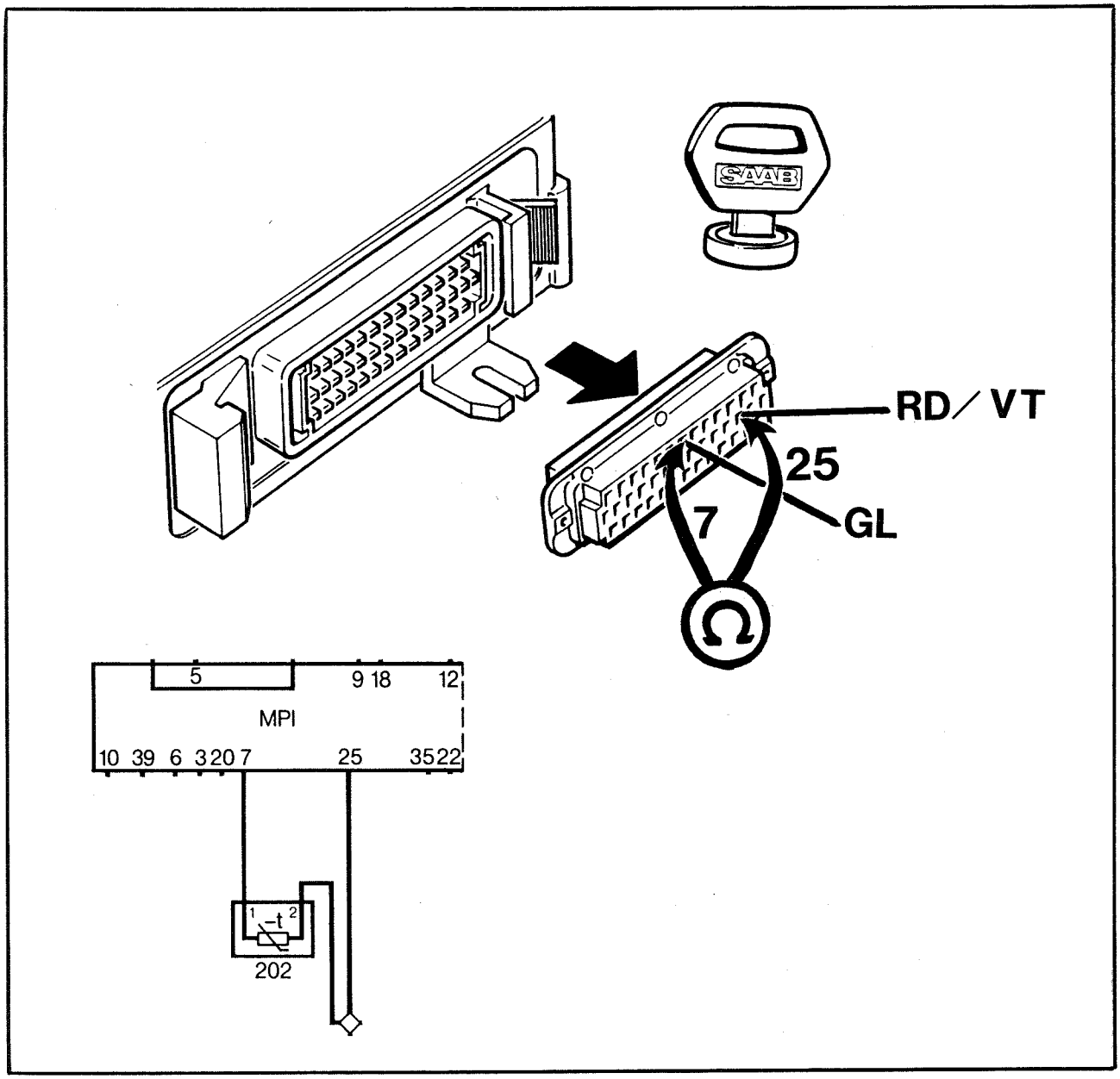
A) With the ECU connector unplugged, check the resistance across ECU pin 7 (yellow) and pin 25 (red/white). The reading should be within the range shown in the table on the next page.

If not:

Check the yellow lead between pin 1 of the temperature sensor and pin 7 of the ECU, and the red/white lead between pin 2 of the temperature sensor and pin 25 of the ECU.

B) Try a known good temperature sensor.

C) Try a known good ECU.



Resistance values

°C	°F	Ohm
-10	14	9100-9300
0	32	5700-5900
20	68	2400-2600
40	104	1100-1300
60	140	500-700
80	176	300-400
100	212	150-200

Error code: 13215

Throttle potentiometer faulty

CHECK ENGINE: Off

Fault symptom: No enrichment during acceleration; engine hesitant on abrupt opening of the throttle; idling speed too fast or too slow

Test procedure

A) With the ECU connector unplugged, measure the resistance across pin 3 (grey) of the ECU and pin 25 (red/white).
Correct reading: 51 kohm.

If not:

Check the grey lead between pin 1 of the throttle potentiometer and pin 3 of the ECU, and the red/white lead between pin 3 of the throttle potentiometer and pin 25 of the ECU.

B) Try a known good throttle potentiometer.

C) With the ECU connector plugged in and the ignition switch in the Drive position: check the voltage across ECU pin 20 (green/red) and earth.

Correct value:

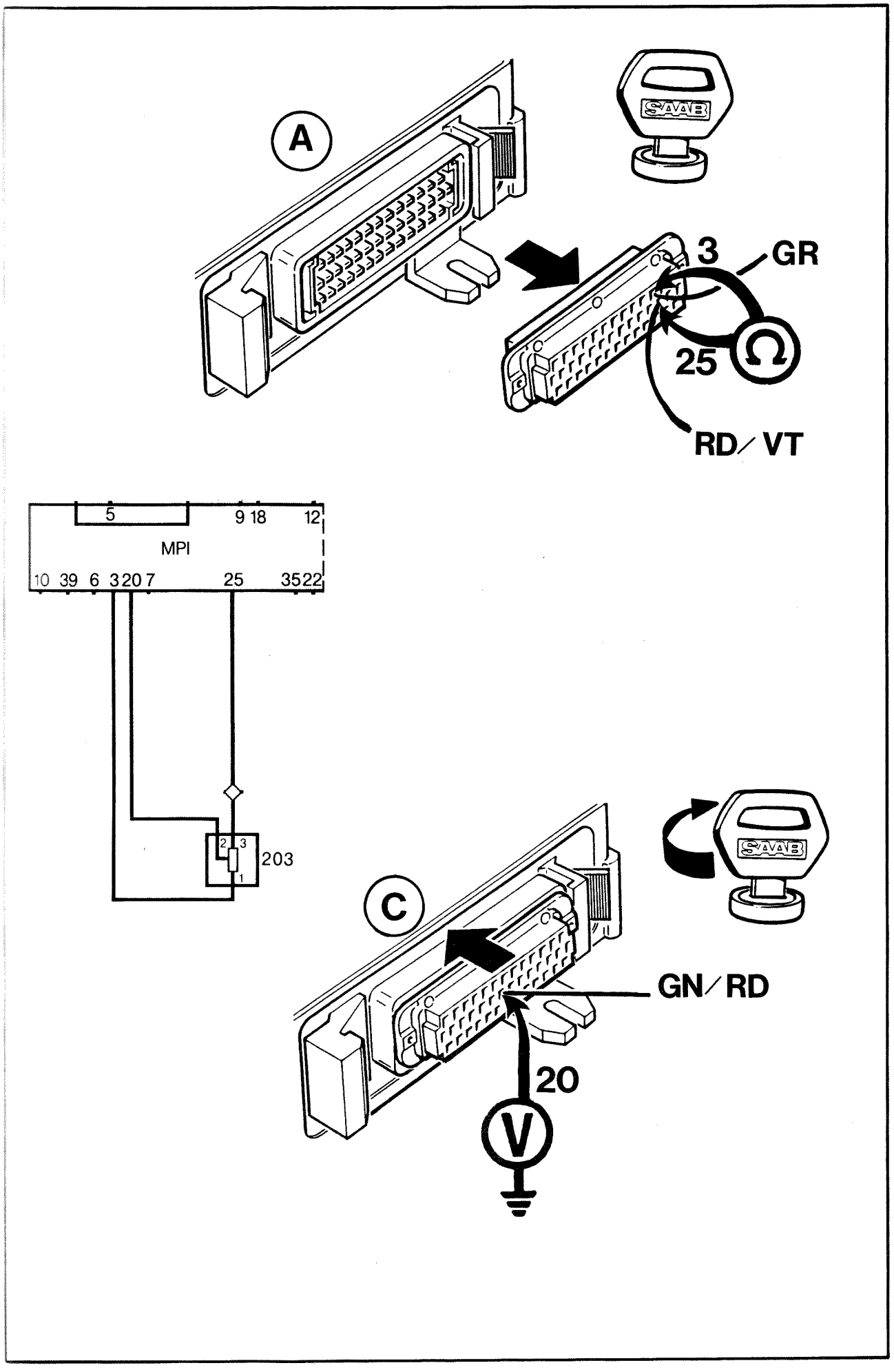
Throttle-butterfly closed:	0.08 - 0.56 V
Throttle wide open:	4.2 - 4.9 V

If not:

Check the green/red lead between pin 2 on the throttle potentiometer and pin 20 of the ECU.

Also check the black/white lead between pin 27 of the ECU and earthing point 201.

D) Try a known good ECU.


A
3
GR
25
Ω
RD/VT
5
9 18
12
MPI
10 39 6 3 20 7
25
35 22
2 3
1
203
C
GN/RD
20
V

Error code: 13221

Air mass meter signal faulty (no live feed)

CHECK ENGINE: On

Fault symptom: Engine dies on idling; misfiring during acceleration

Test procedure

A) With the ignition switch in the Drive position: check that battery voltage is present across pin 5 (brown/white) of the air mass meter and earth.

If not:

Check the brown/white lead between pin 5 of the air mass meter and pin 87B of the main relay.

Check, and if necessary, replace the main relay.

B) With the ignition switch in the Drive position: check the signal voltage across pin 35 (orange) of the ECU and earth. Reading should be 0.2 - 0.7 V.

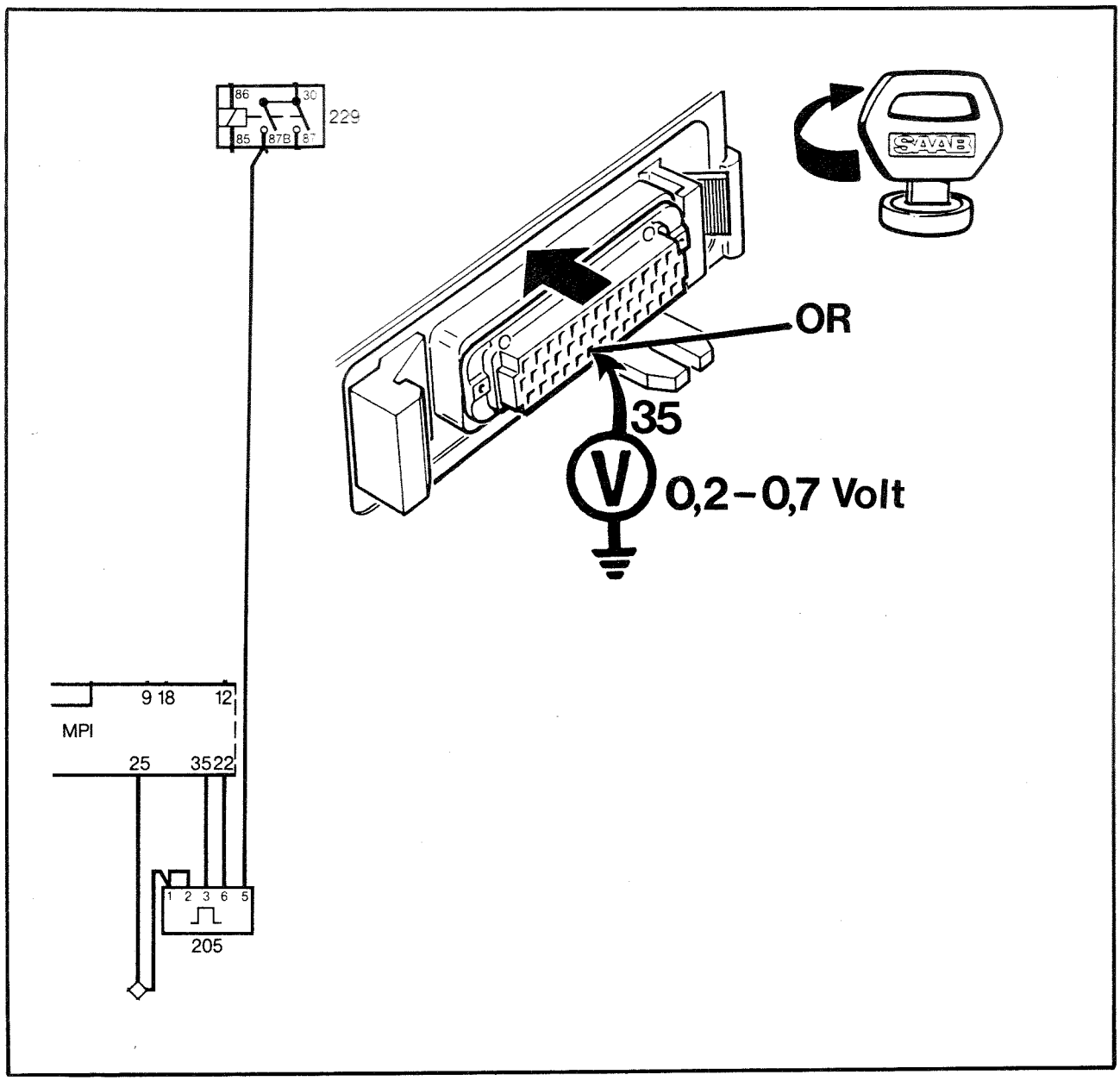
If not:

Check the orange lead between pin 3 of the air mass meter and pin 35 of the ECU.

Check the red/white lead between pin 1 of the air mass meter and pin 25 of the ECU.

C) Try a known good air mass meter.

D) Try a known good ECU.



To adjust the CO content (non-cat.)

1 Run the engine up to normal temperature.

2 Connect the CO meter.

3 Check the idling speed and CO content.

Correct CO content: 1.0 - 1.6%

4 If necessary, adjust the CO setting by means of the screw on the air mass meter.

Note
If you cannot bring the CO reading into spec. using the adjusting screw, switch off the engine. Unplug the connector from the air mass meter and connect an ohmmeter across pins 1 and 6. Set the resistance to 336 ± 5 ohm by turning the adjusting screw. Plug in the connector, start the engine and adjust the setting again.

Error code: 13222

Idling control or AIC valve faulty

CHECK ENGINE: Off

Fault symptom: Idling too fast or too slow

Test procedure

A) Check for air leaks in the induction system and inspect the setting of the throttle butterfly, adjusting as necessary.

B) With the ECU connector unplugged: check the resistance across pin 1 (grey/white) and pin 26 (blue/red) of the ECU. The reading should be 40 - 60 ohm.

   Also check the resistance across pin 28 (yellow/red) and pin 29 (blue/white). The reading should be 40 - 60 ohm.

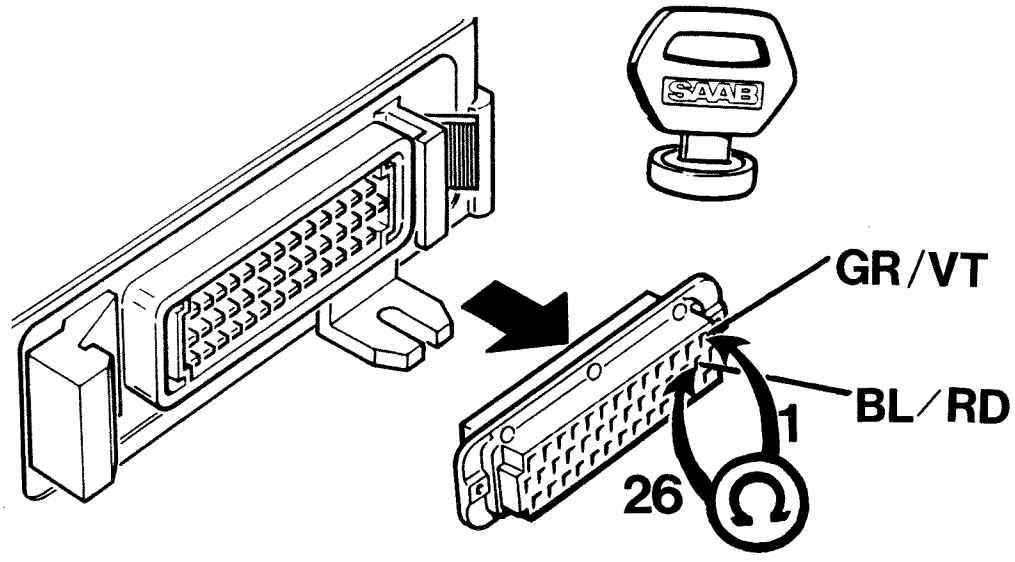
   If not:

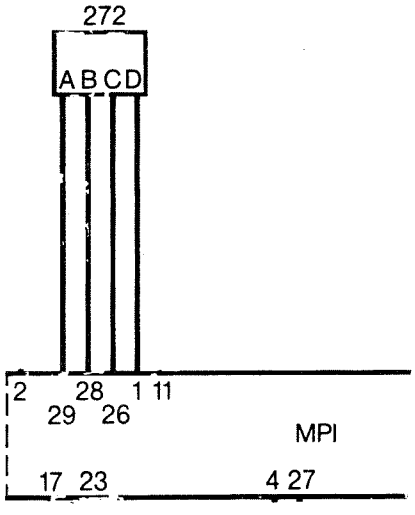
   Check all wiring between the AIC valve and the ECU connector.

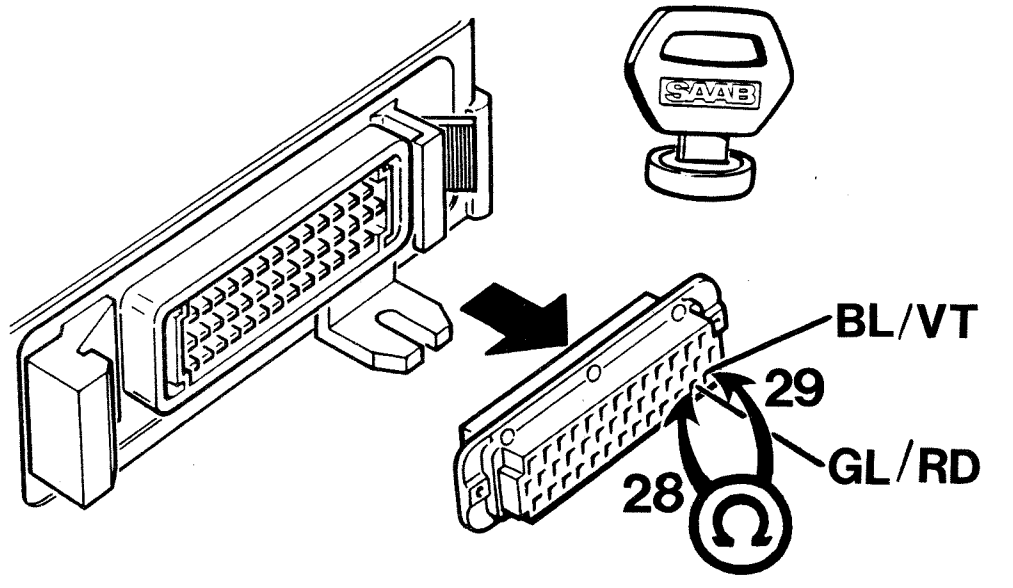
C) Try a known good AIC valve.

D) Try a known good ECU.

Note
Also check the signal from the road speed sensor (code 13234). The absence of this signal can by itself cause an AIC malfunction.


GR/VT
BL/RD
1
26


272
A B C D
2
29
28
26
1
11
MPI
17
23
4
27


BL/VT
29
GL/RD
28

Error code: 13223

Mixture lean

CHECK ENGINE: Off

Fault symptom: -

Test procedure

A) Check for air leaks in the induction system.

If no leaks are found:

Check that the Lambda sensor is working properly (see the test procedure for code 13225).

Note
After the fault has been rectified, the ECU connector must be unplugged or the power supply from the battery isolated to deactivate the Limp-home function (which inhibits the Lambda-control function).

Error code: 13224

Mixture rich

CHECK ENGINE: Off

Fault symptom: -

Test procedure

A) Check that the fuel pressure is as per specification. If the pressure is high, check for a blockage in the fuel return line.

If not:

Try a known good fuel-pressure regulator.

B) Check for leakage at the injectors (page 240-50 refers).

C) Check that the Lambda sensor is working properly (see the test procedure for code 13225).

Note
After the fault has been rectified, the ECU connector must be unplugged or the power supply from the battery isolated to deactivate the Limp-home function (which inhabits the Lambda-control function).

Error code: 13225

Lambda sensor: faulty signal

CHECK ENGINE: On

Fault symptom: -

Test procedure

A) Check for leaks in the induction system.

B) Check fuse 1.

C) Unplug the connector for the Lambda sensor preheater.

Start the engine and check that battery voltage is present across the connector pins.

(If the pins are removed, note the polarity: blue/red lead to red on sensor.)

If not:

Check the grey/red lead between the connector and pin 87B on the fuel-pump relay.

Check the black lead between the connector and earthing point 201.

D) Measure the resistance across the two-pin Lambda-sensor connector. The reading should be <10 ohm (sensor cold). Having checked the resistance, plug in the Lambda-sensor preheater connector.

Start the engine and measure the voltage across pin 23 of the ECU and earth.

The reading should fluctuate between 0 and 1 V.

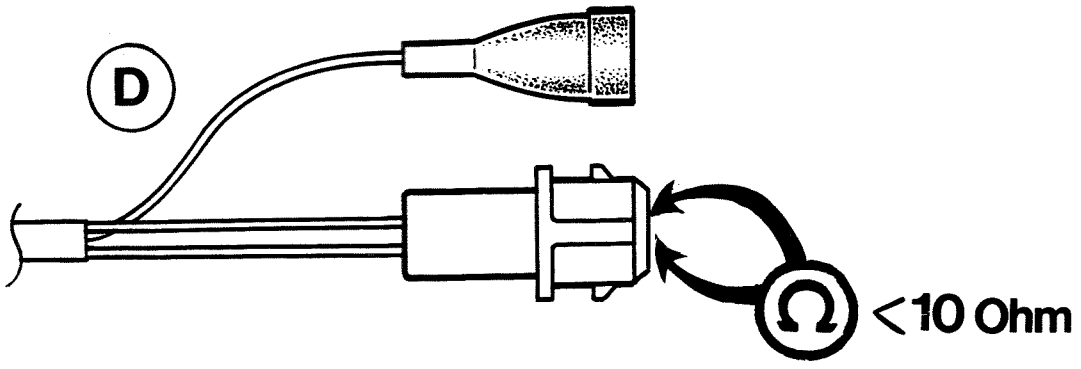
If not:

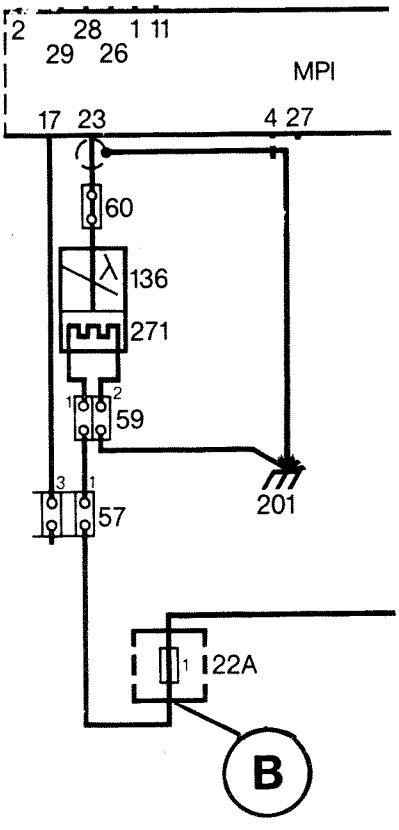
Check the black lead between the Lambda sensor and ECU pin 23.

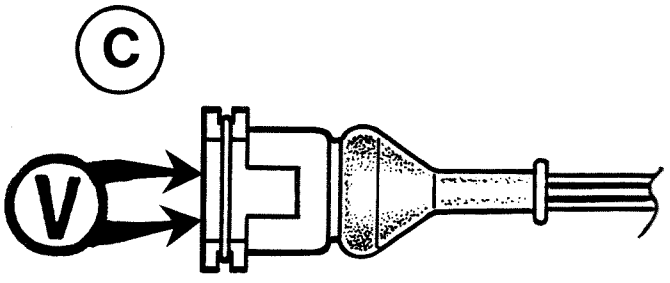
Also check the black lead from pin 4 of the ECU to earthing point 201.

E) Try a known good Lambda sensor.

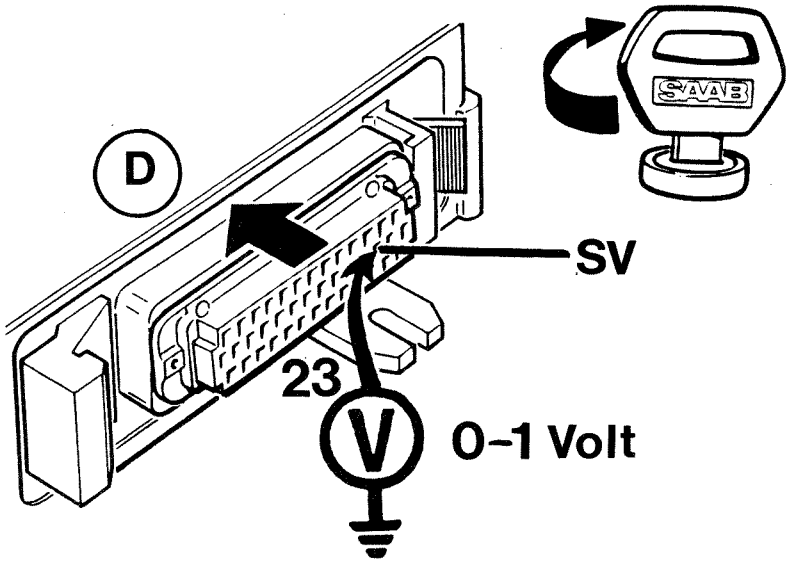
F) Try a known good ECU.







Start the engine



Error code: 13233

Fault in ECU (ROM-chip faulty)

CHECK ENGINE: Off

Test procedure

Try a known good ECU.

Error code: 13234

No signal from road-speed sensor

CHECK ENGINE: Off

Fault symptom: Idling slow or engine dies.

Test procedure

A) With the ECU connector unplugged: measure the voltage across pin 6 of the ECU and earth. With one of the front wheels spinning slowly, the reading should fluctuate between 0.5 and 5 V.

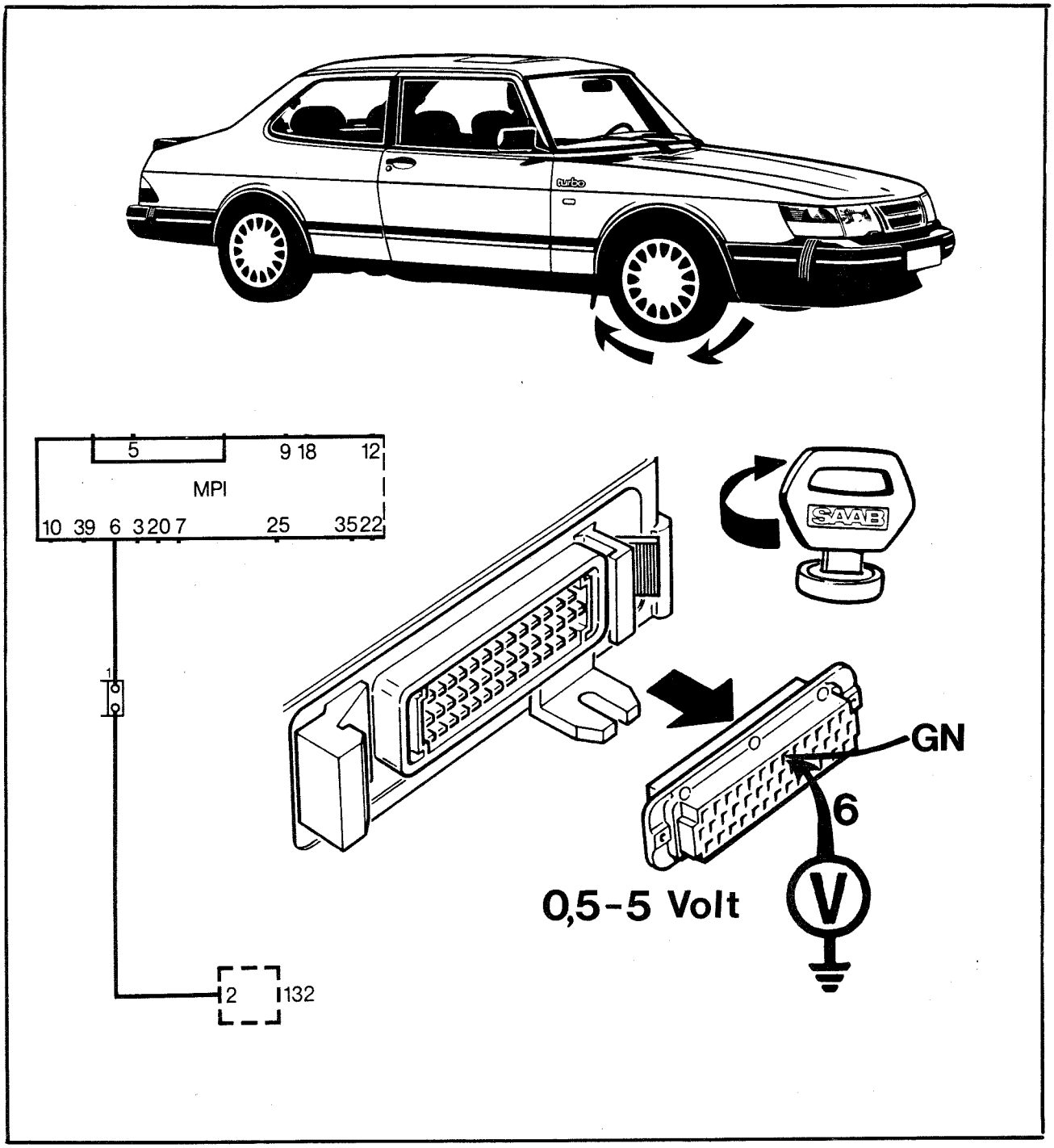
   If not:

   Check the grey lead between the road-speed sensor and ECU pin 6.

B) Check that the cruise control system is functioning properly (when fitted). (The road-speed signal for this function comes from the same sensor in the speedometer.)

C) Try a known good speedometer.

D) Try a known good ECU.


5
9 18
12
MPI
10 39 6 3 20 7
25
35 22
1
2
132
GN
6
0,5-5 Volt
V

Error code: 13235

No DRIVE signal

CHECK ENGINE: Off

Fault symptom: Momentary drop in engine rpm when R or D selected

Test procedure

A) With the ignition switch in the Drive position: check that battery voltage is present across pin 5 of the ECU and earth when the selector lever is in positions R, D and 2.

If not:

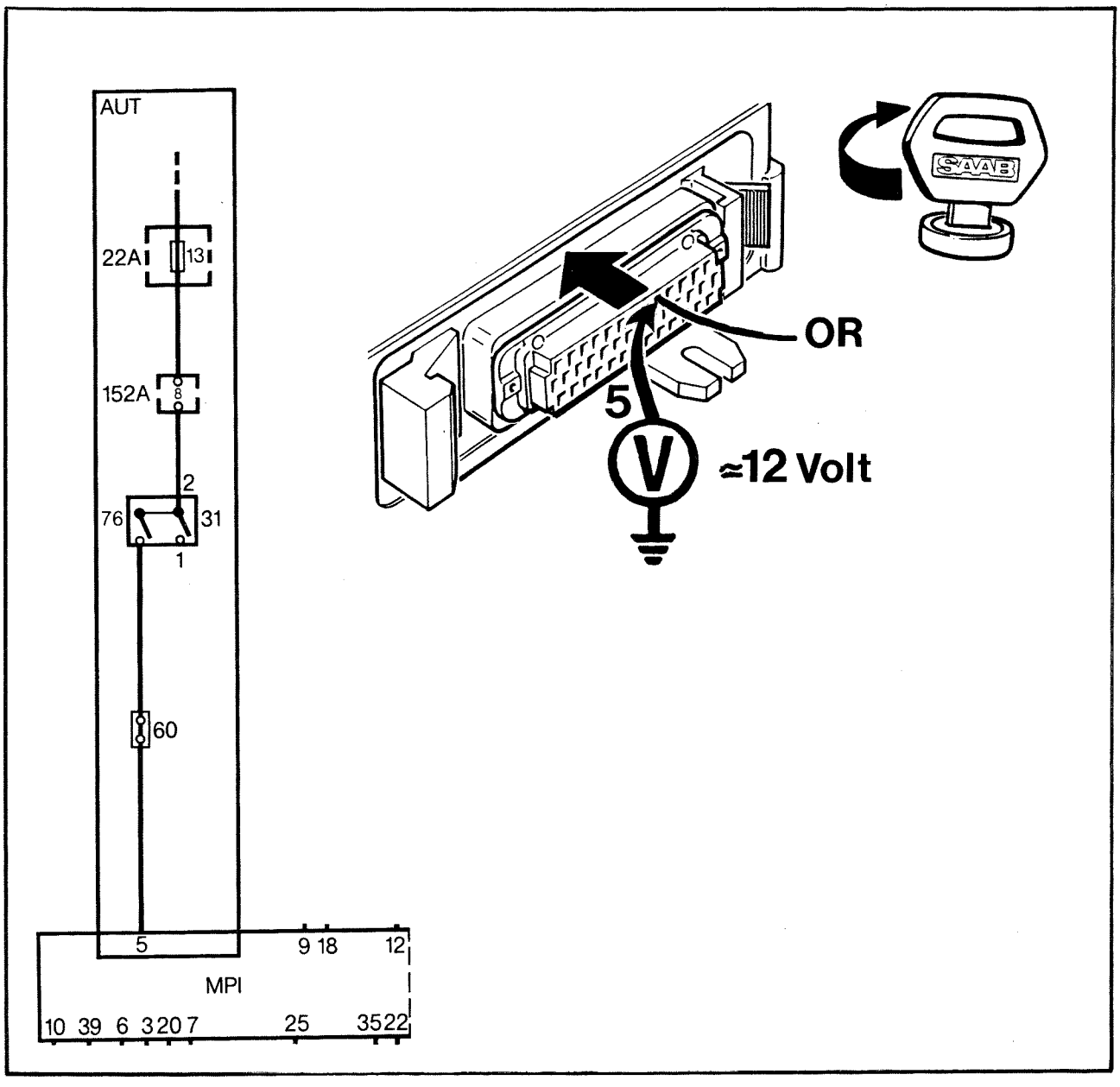
Check fuse 13.

Check the white lead between fuse 13 and the selector-lever switch.

Check the gear-selector switch and replace if faulty.

Check the orange lead between the gear-selector switch and pin 5 on the ECU.

B) Try a known good ECU.


AUT
22A
13
152A
8
2
76
31
1
60
5
9 18
12
MPI
10 39 6 32 20 7
25
35 22
OR
5
V
≈12 Volt
SAAB

Fault symptoms: quick-reference chart

Defective component/ or function	Engine won't run	Engine won't run; pump relay chatters	Engine stalls on idling	Engine erratic; lean mixture indicated	Engine erratic in all speed ranges except during acceleration	Engine checks momentarily on hard acceleration	Idling speed fast or slow	Idling speed fast or slow	Starting problems	Poor drivability during warm-up phase; engine hunts on idling				Action See page:
ECU pin 27 not earthing x	x													
ECU pins 40 & 14 not earthing		x												
Air mass meter			x	x										240-22
Trottle potentiometer			x			x	x	x						240-20
Lambda sensor			x	x										240-28
Temperature sensor							x	x	x	x				240-18
Main relay	x													240-44
Fuel-pump relay	x													240-42
+15 supply	x													240-40
AIC valve							x	x						240-24
DRIVE signal							x	x						240-32
Earthing (air mass meter, temperature sensor, throttle potentiometer)					x									

Manual fault diagnosis

The self-diagnostics function in the CU14 system is not fully comprehensive, and some complementary manual diagnosis work is therefore required.

The quick-reference chart of fault symptoms on page 240-34 provides useful guidance to the appropriate test procedure.

Manual diagnosis: test procedures and circuit diagrams

ELCD valve

CHECK ENGINE: Off

Fault symptom: Idling fast or erratic

Test procedure

A) Disconnect the ELCD valve vacuum hose from the inlet manifold and connect a vacuum pump in its place.

Turn the ignition key to the Drive position. Raise a vacuum using the pump.

The ELCD valve should now be closed and the vacuum maintained.

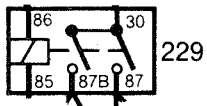
B) Switch off the ignition. The ELCD valve should open after about five seconds.

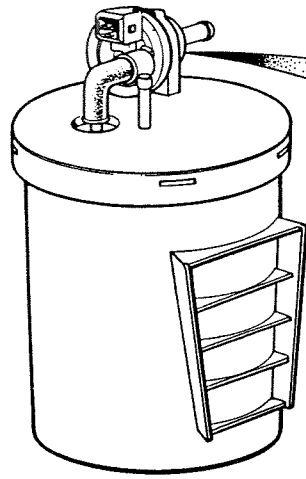
If not:

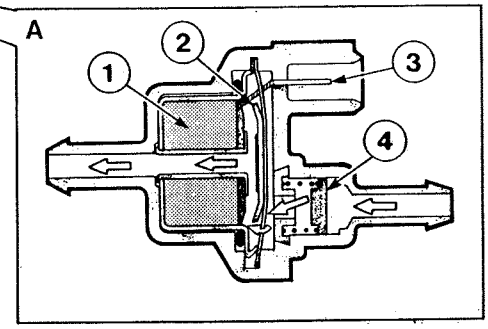
Check the grey/white lead from pin 87B of the main relay to the valve, and the yellow/red lead between the valve and ECU pin 17.

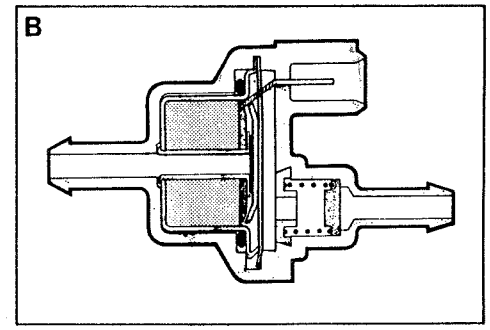
C) Try a known good ELCD valve.

D) Try a known good ECU.



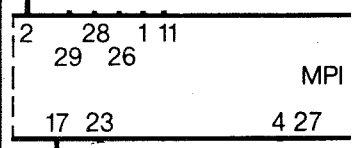


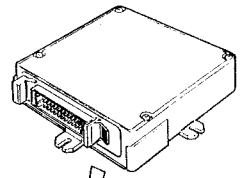


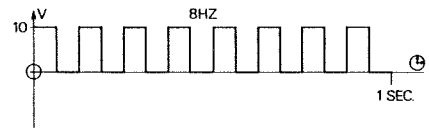


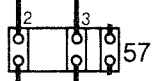
A = Valve open *B = Valveclosed*

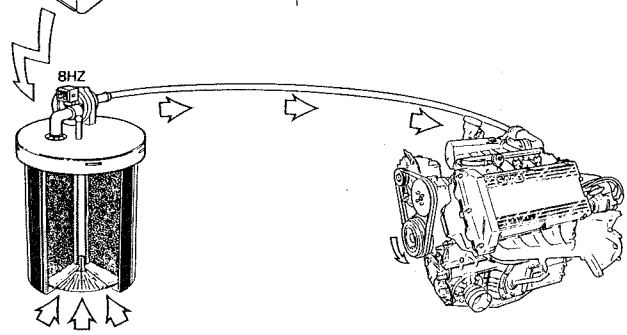
1 Windings
2 Valve
3 Electrical connections
4 Check valve











ECU battery voltage

Test procedure

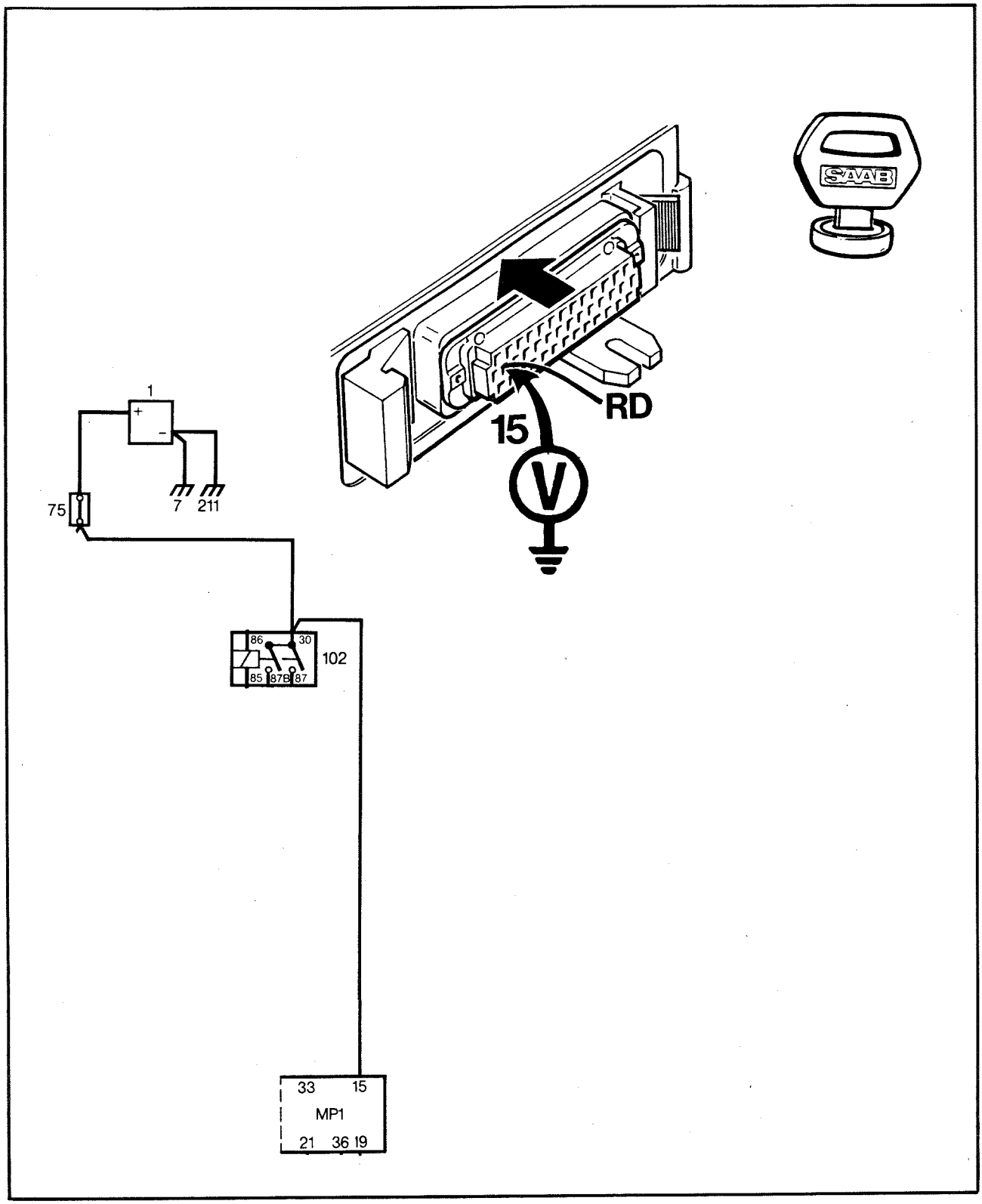
A) With the ignition off: check that battery voltage is reaching ECU pin 15.

If not:

Check the condition of the battery (voltage and capacity).

Check the red lead between the battery and connector 75.

Check the red lead between the connector and pin 30 on the fuel-pump relay and thence to ECU pin 15.


SAAB
RD
15
V
1
+
-
7
211
75
86
30
85
87B
87
102
33
15
MP1
21
36
19

Current from +15 supply terminal (159)

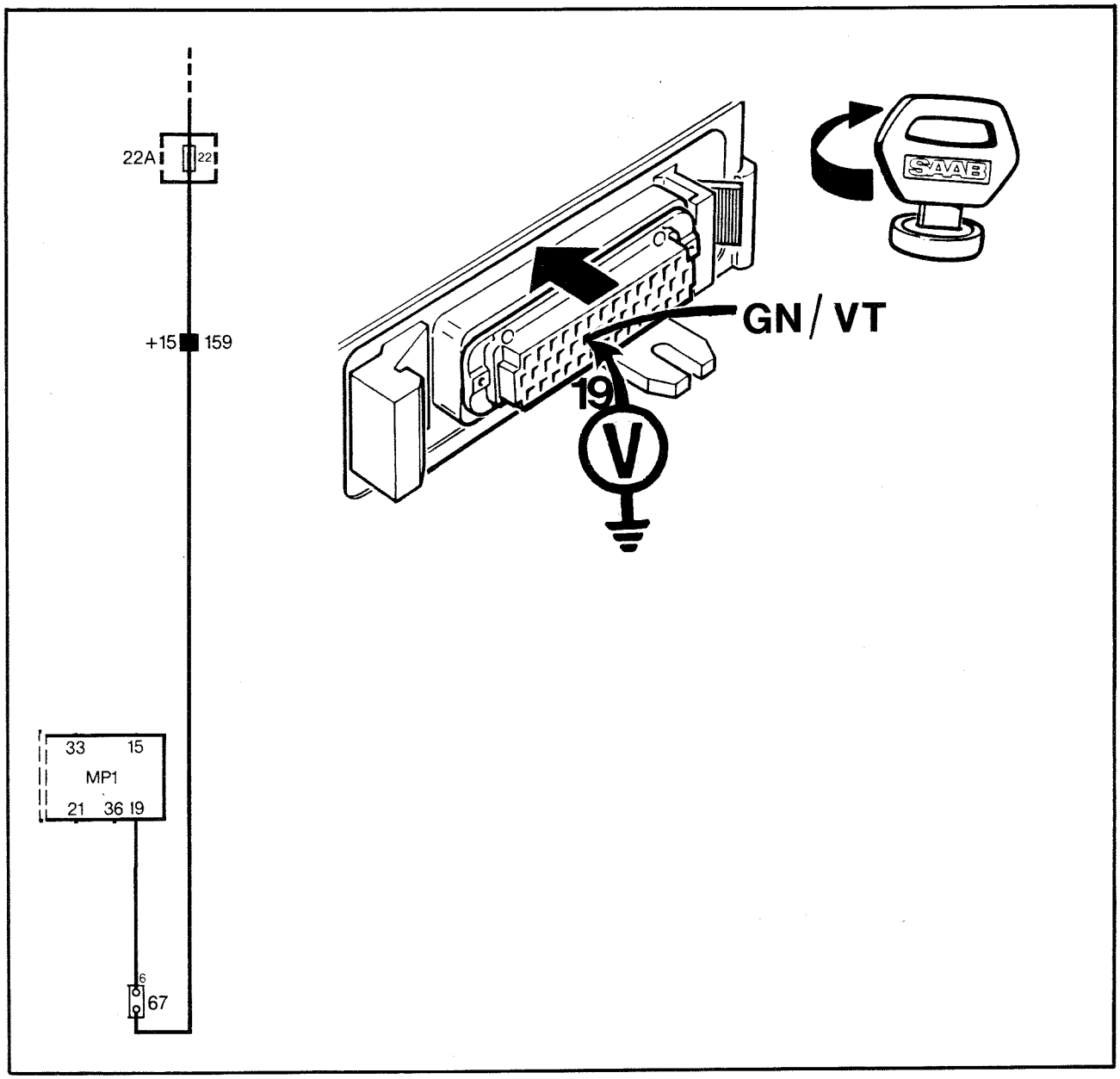
Test procedure

A) With the ignition switch in the Drive position: check the voltage across ECU pin 19 and earth. This should be battery voltage.

If not:

Check fuse 22.

Check the green/white lead from the +15 supply terminal to ECU pin 19.


22A
22
+15
159
33
15
MP1
21
36
19
6
67
GN/VT
19
V

Fuel-pump relay (102)

Test procedure

A) Check that voltage is available at the +15 supply terminal (see page 240-40).

B) With the ECU connector plugged in: connect a test lamp across pin 87 of the pump relay and earth. Turn the ignition key to the Drive position. The test lamp should now come on for about two seconds.

If not:

Check the brown/white lead between pin 87 of the main relay and ECU pin 2.

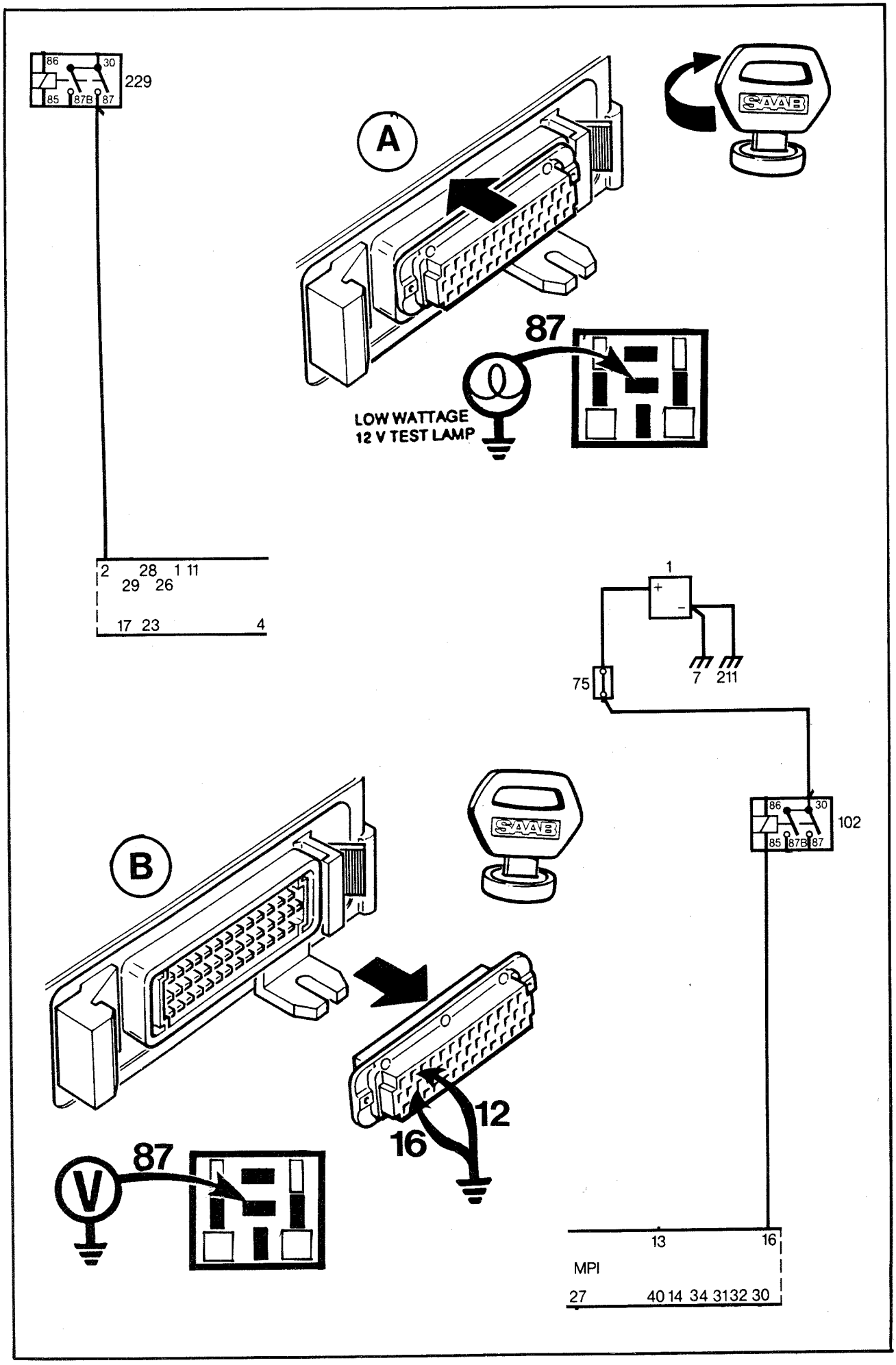
C) With the ECU connector unplugged and the ignition off: connect ECU pins 12 and 16 to earth.

Check the voltage across pin 87 on the pump relay and earth.

If battery voltage is present, try a known good ECU.

If battery voltage is not present, check the red lead from the positive (+) battery pole via connector (75) to pin 30 on the pump relay.

Also check the brown/white lead running from pin 87 of the main relay via the pressure switch to pin 86 of the pump relay; and the violet lead from pin 85 of the pump relay to pin 16 of the ECU.


86
30
229
85
87B
87
A
87
LOW WATTAGE
12 V TEST LAMP
2
28
1
11
29
26
17
23
4
1
+
-
7
211
75
B
86
30
102
85
87B
87
12
16
87
V
13
16
MPI
27
40
14
34
31
32
30

Main relay (229)

Test procedure

A) Check that voltage is available at the +15 supply terminal (see page 240-40).

B) With the ignition switch in the Drive position: check that battery voltage is present across ECU pin 2 and earth.

If not:

With the ECU connector unplugged and the ignition off: check that battery voltage is present across ECU pin 12 and earth.

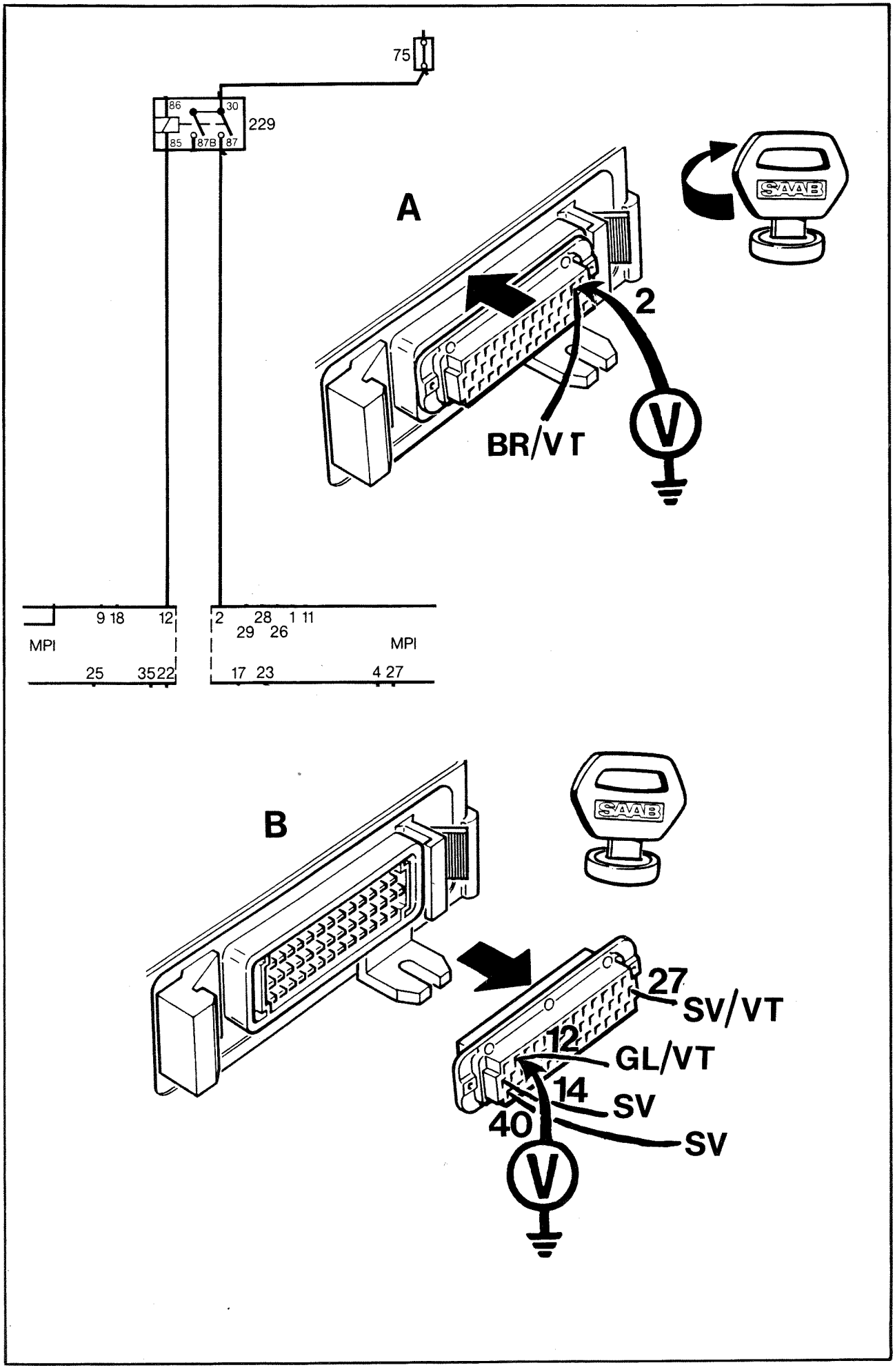
Check for good earthing at:

- ECU pin 27
- ECU pin 14
- ECU pin 40

C) Check the red lead running from connector (75) to pin 30 of the main relay and thence to pin 86.

Also check the yellow/white lead from pin 85 of the main relay to ECU pin 12.

D) Try a known good ECU.


75
86
30
229
85
87B
87
A
2
BR/VT
9 18
12
MPI
25
35 22
2
28
1 11
29
26
MPI
17
23
4 27
B
27
SV/VT
12
GL/VT
14
SV
40
SV

Fuel pump

Test procedure

With the ECU connector unplugged and the ignition off: connect ECU pins 12 and 16 to earth.

A) Check that battery voltage is present across the pin (grey lead) on the fuel pump and earth.

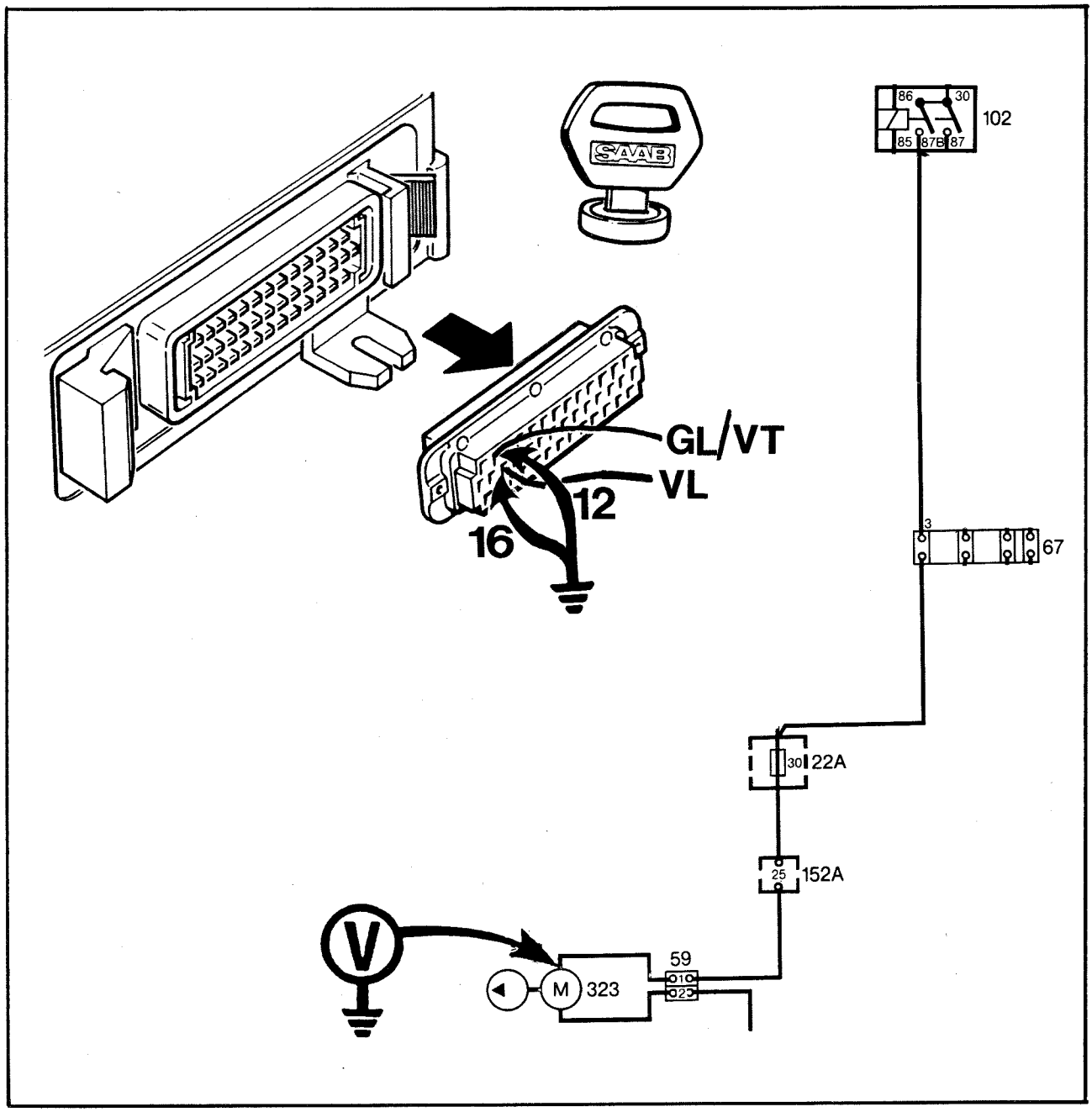
If not:

Check fuse 30.

Check the grey/red lead running from pin 87B on the pump relay via fuse 30 to connector 59.

Check the grey lead from connector 59 to the fuel pump.

If battery voltage is reaching the pump but the pump is not working, fit a new pump.


86
30
102
85
87B
87
GL/VT
VL
12
16
3
67
30
22A
25
152A
59
M
323

Injector electrics

Test procedure

Caution
The injectors must never be connected direct to battery voltage.

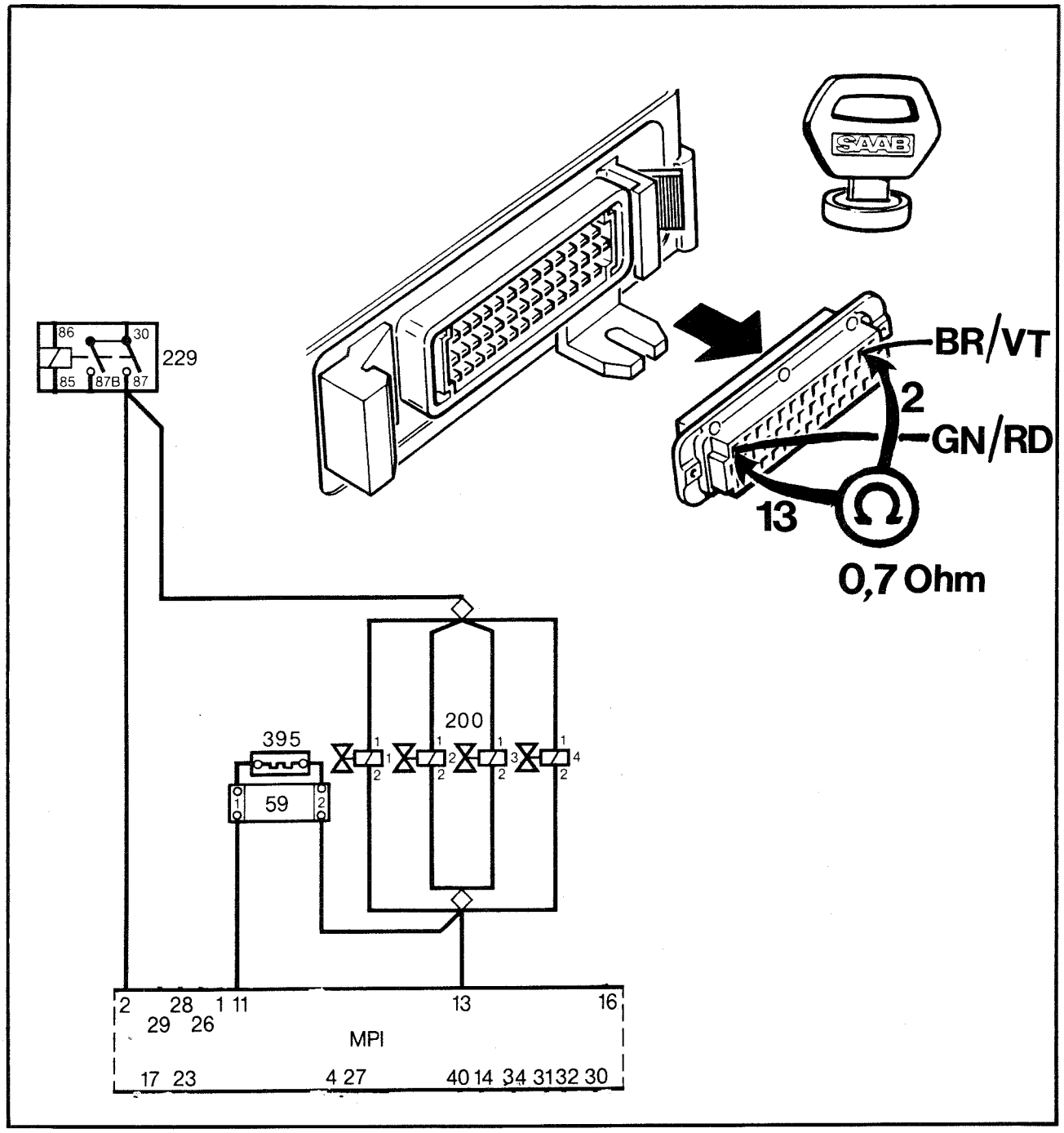
A) With the ECU connector unplugged and the ignition off: check the resistance across ECU pins 2 and 13. The reading should be 0.7 ohm.

If not:

Check the resistance of each injector individually.

Correct reading: 2.0 - 2.8 ohm.

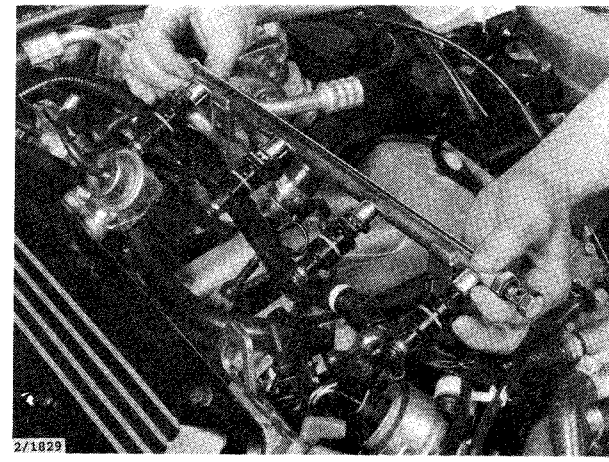
B) Check the blue/red leads between pin 87 of the main relay and each injector, and the green/red leads between the injectors and ECU pin 13.


86
30
229
85
87B
87
BR/VT
2
GN/RD
13
0,7 Ohm
200
395
59
2
28
1
11
13
16
29
26
MPI
17
23
4
27
40
14
34
31
32
30

Injector leakage

Test procedure

A) Remove the fuel-injection rail complete with injectors.

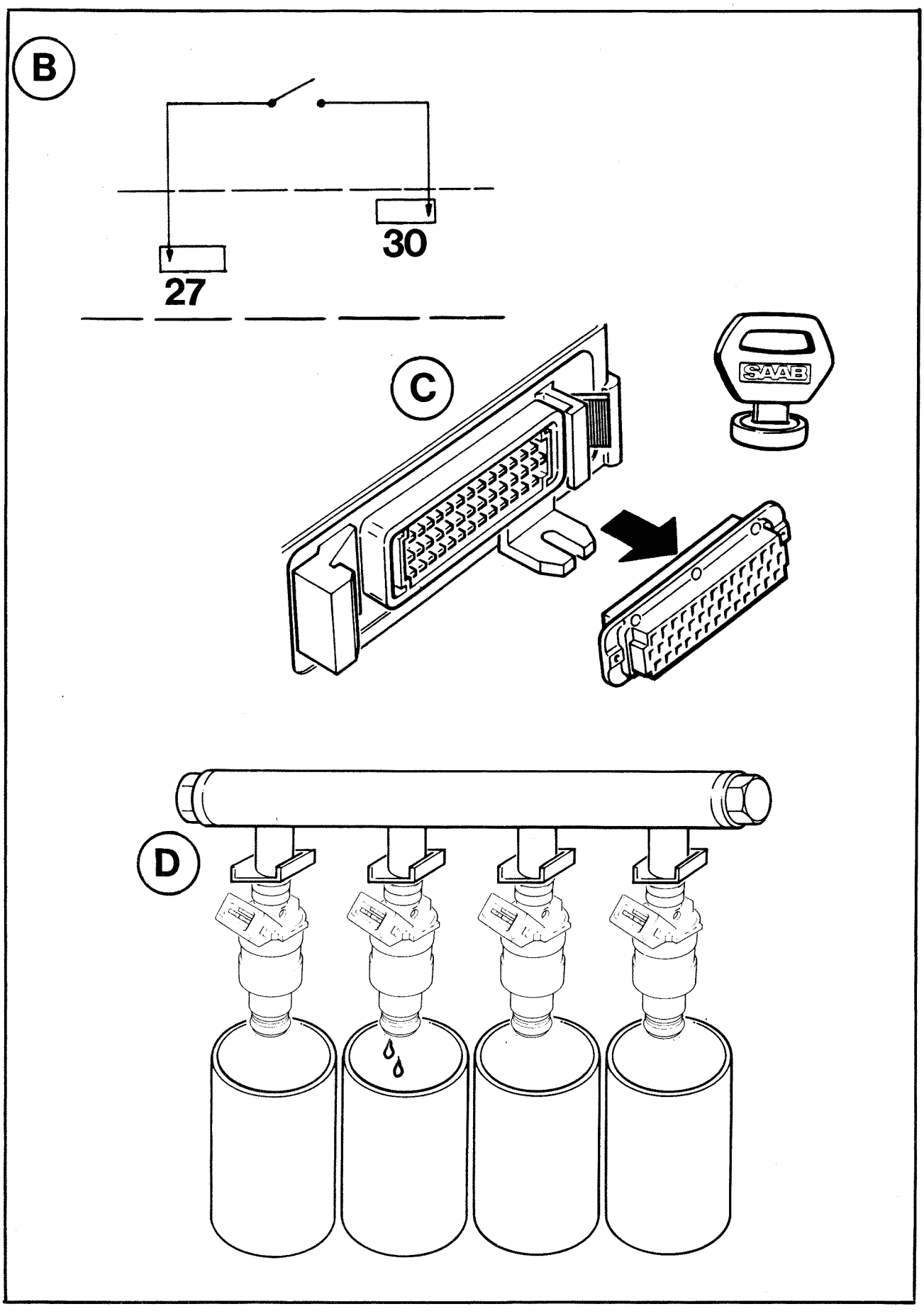


B) Remove fuses 27 and 30, and connect switched test lead 83 93 886 across the fuse contacts to provide power for the pump.

   The switch must be OFF.

C) Unplug the ECU connector.

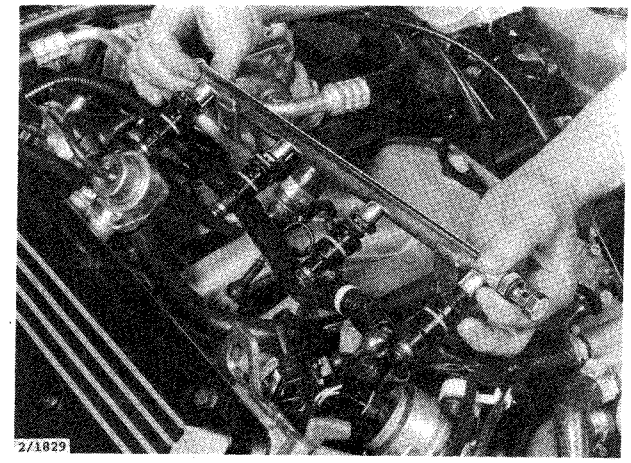
D) Turn the switch ON and leave it on for about 30 seconds, checking at the same time to ensure that there is no sign of leakage at any of the injectors.


B
30
27
C
SAAB
D

Injector delivery flow

Test procedure

A) Remove the fuel-injection rail complete with injectors and place a measuring cylinder under each injector.



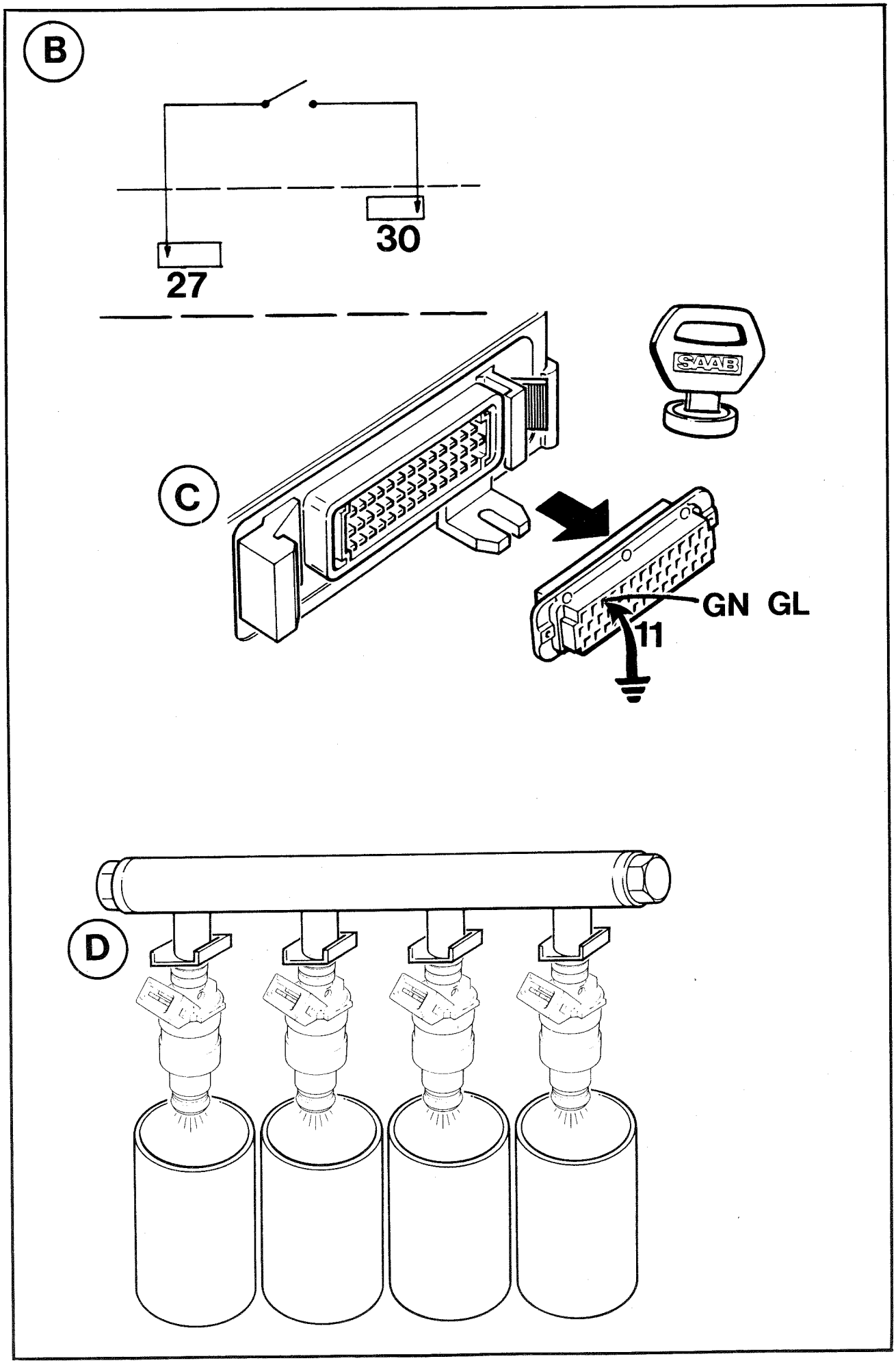
B) Remove fuses 27 and 30, and connect switched test lead 83 93 886 across the fuse contacts to provide power to the fuel pump.

   The switch must be OFF.

C) Unplug the ECU connector and connect pin 11 to earth.

D) Turn the switch to ON and let the pump run for 30 seconds. Read off the amount of fuel collected in the measuring cylinders.

   Check to see that this amount is as per specification (see section 022).


B
30
27
C
SAAB
GN GL
11
D

Fuel pressure

Test procedure

A) Connect pressure gauge 83 93 852 to the fuel-injection rail using the existing banjo fitting.

B) Remove fuse 27 (hazard warning lights) and fuse 30 (fuel pump), and connect switched test lead 83 93 886 across the fuse contacts to provide power to the pump.

The switch must be OFF.

C) Start the pump by turning the switch ON and check the reading on the gauge to see whether the fuel pressure is within the specified limits (see section 022).

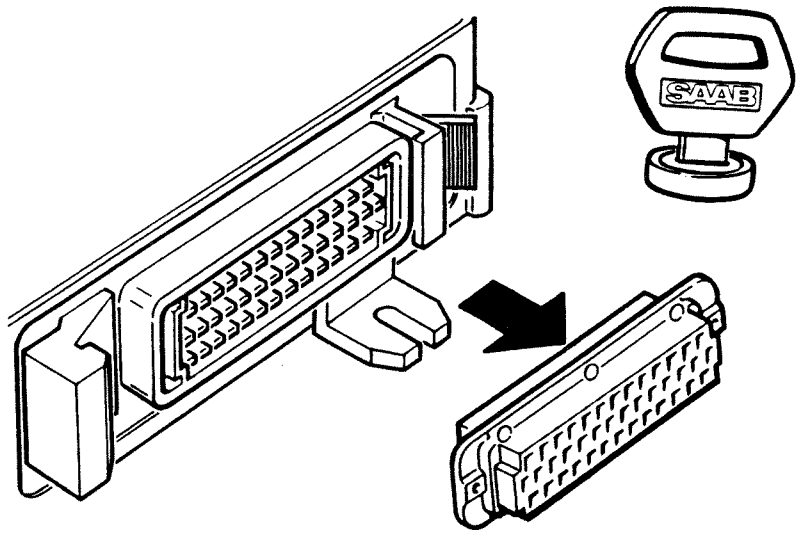
If the pressure is high:

Check for a blockage in the fuel-pressure regulator or fuel return line.

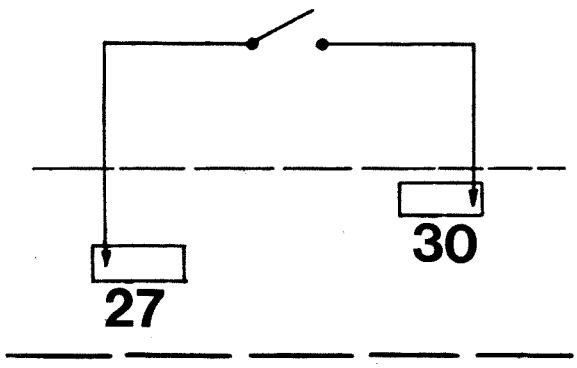
If the pressure is low:

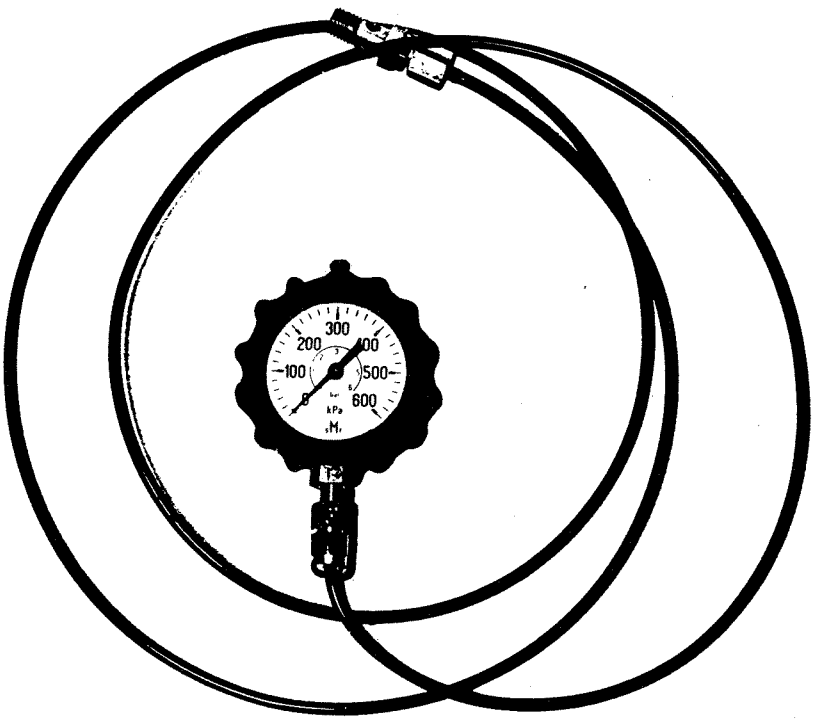
Check for leaks in the system.

D) Check the pressure regulator and replace if faulty.



B





Ballast resistor (injector circuitry)

Test procedure

A) With the ECU connector unplugged and the ignition off: measure the resistance across ECU pins 11 and 13.

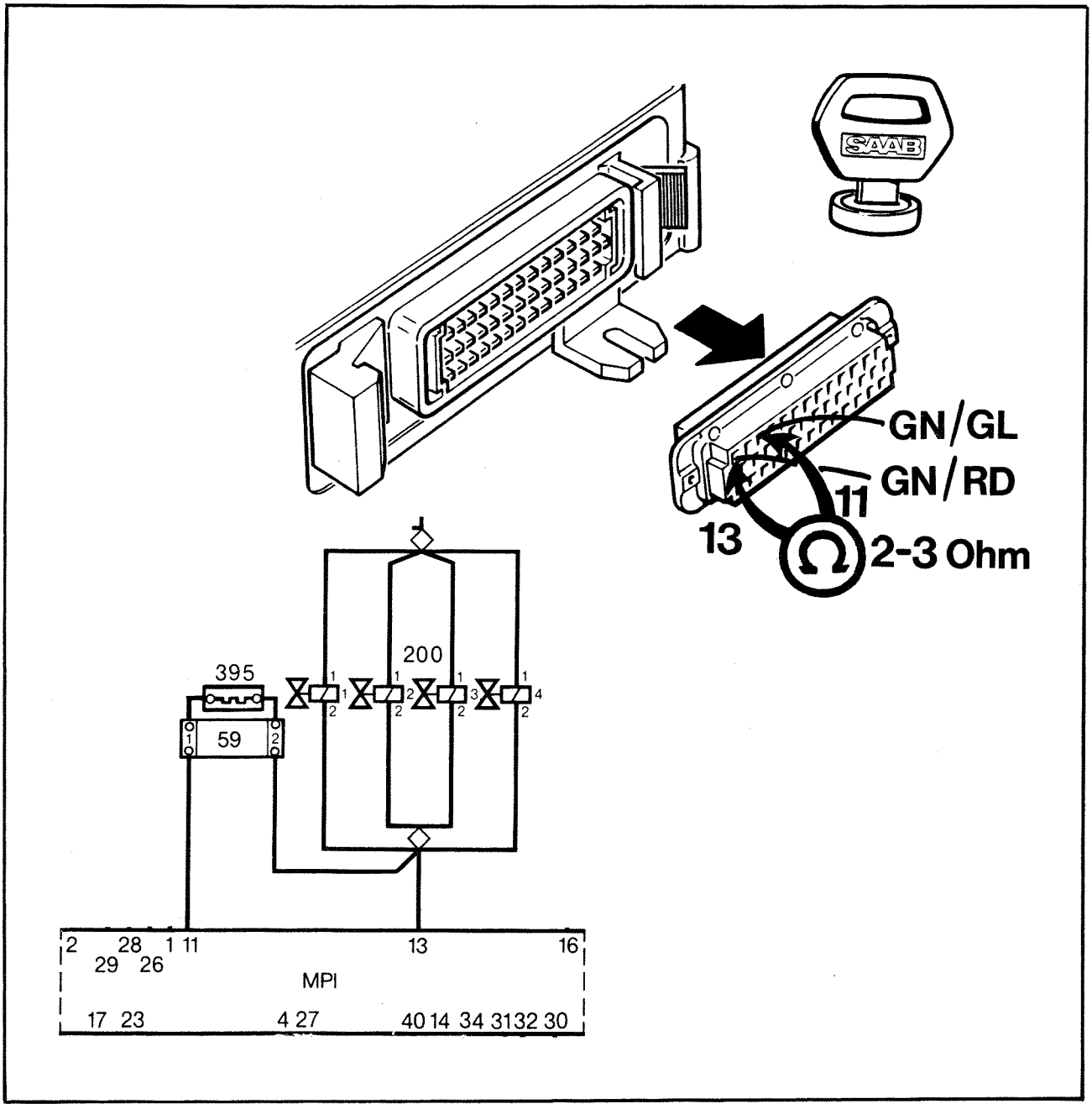
The reading should be 2 - 3 ohm.

If not:

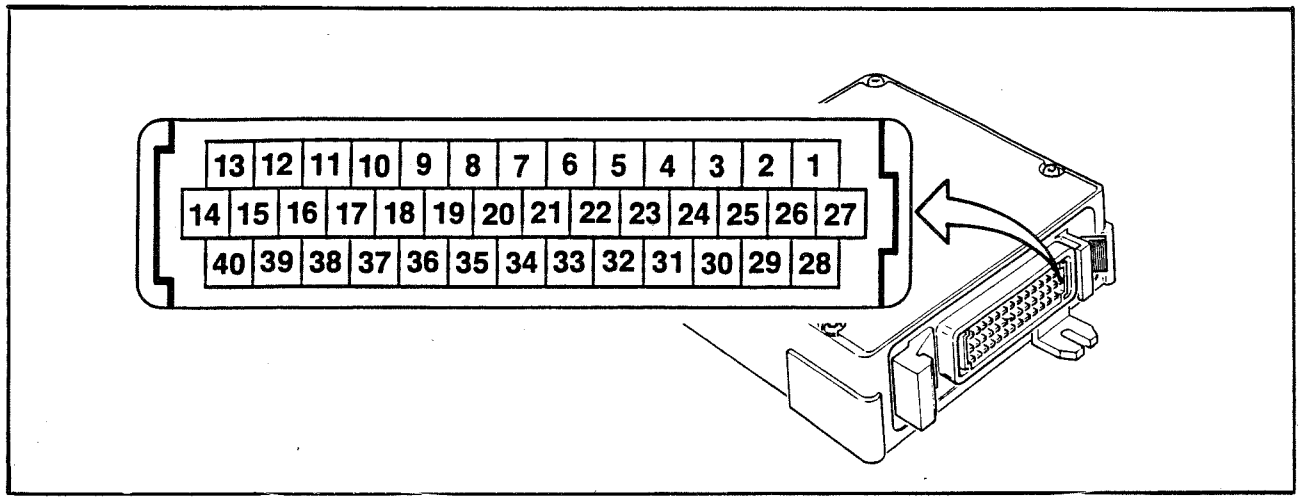
Check the green/yellow lead between the ballast resistor and ECU pin 11, and the green/red lead between the resistor and ECU pin 13.

B) Fit a new resistor.

Caution
The engine must never be started with the ballast resistor disconnected, as this is likely to damage the ECU.

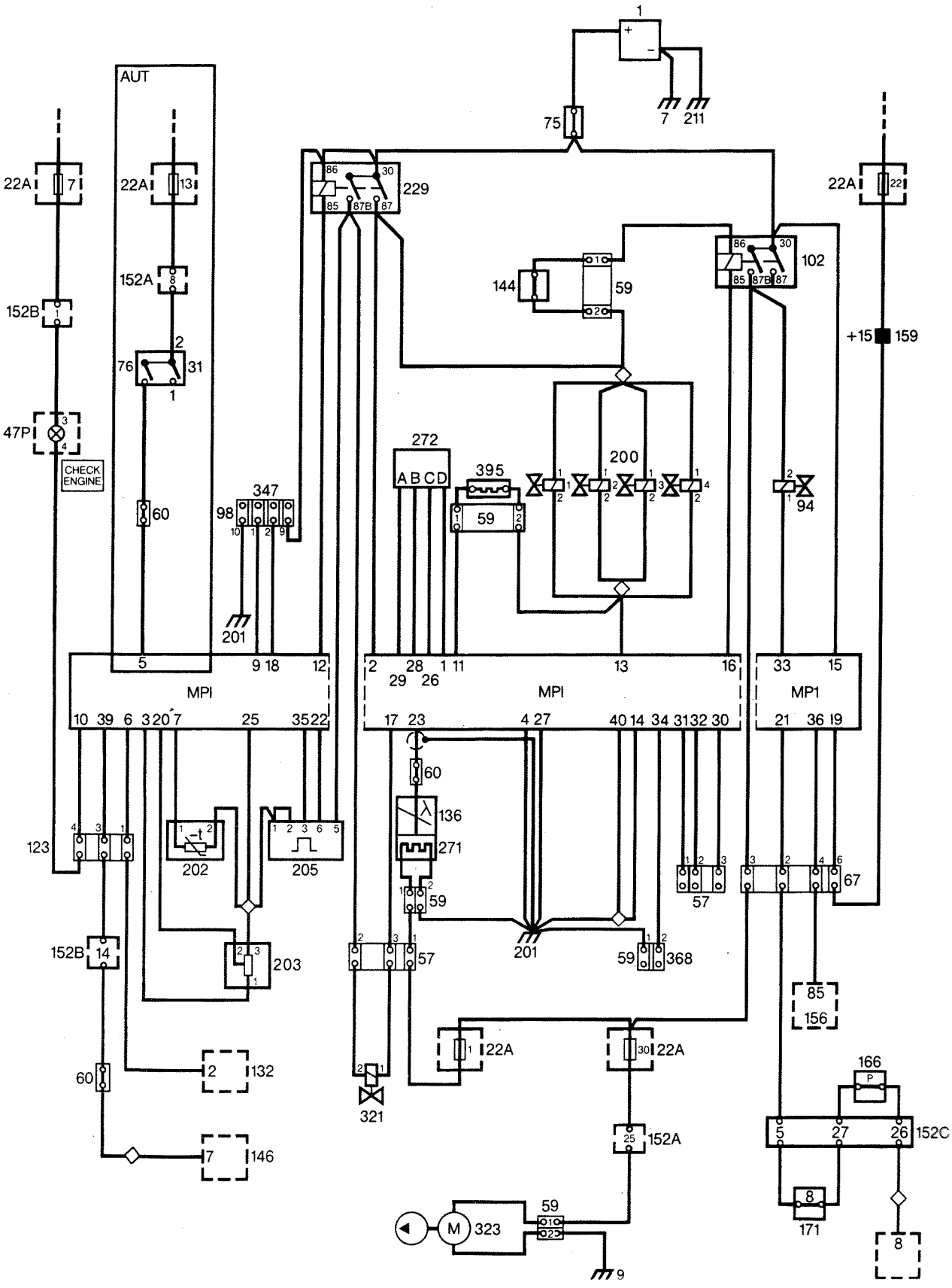

GN/GL
GN/RD
11
13
2-3 Ohm
200
395
59
2 28 1 11 13 16
29 26
MPI
17 23 4 27 40 14 34 31 32 30

ECU connector pins



Pin no.	Circuit to:	Remarks
1	AIC stepper motor	
2	Main relay	Positive
3	Throttle potentiometer	+5 V
4	Lambda	Signalearth
5	DRIVE signal	
6	Road speed signal	From (132)
7	Temperature sensor	From (202) pin 1
8		
9		
10	CHECK ENGINE light	Off = 12 V; On = 3 V
11	Ballast resistor	In injector earth circuit
12	Main relay	Relay earth
13	Injectors	Injector earth
14	Earthing point 201	
15	Permanent positive feed	
16	Pump relay	Relay earth circuit
17	ELCD valve	
19	+15	
20	Throttle potentiometer	Signal
21	AC input signal	Battery voltage when AC energized
22	Air mass meter	Idling setting (N/A cat.)
23	Lambda sensor	Input signal
25	Common earth	Temperature sensor, throttle potentiometer and air mass meter
26	AIC stepper motor	
27	Signal earth	Earthing point 201
28	AIC stepper motor	
29	AIC stepper motor	
31	Test socket for flashing codes	
33	Cold-start valve	When fitted
34	Coding	Earthed when cold-start valve connected
35	Air mass meter	Signal from pin 3
36	AC output signal	12 V earthed via ECU
39	Ignition pulse	
40	Earth	Earthing point 201

Wiring diagram



CU14 wiring diagram

Component replacement

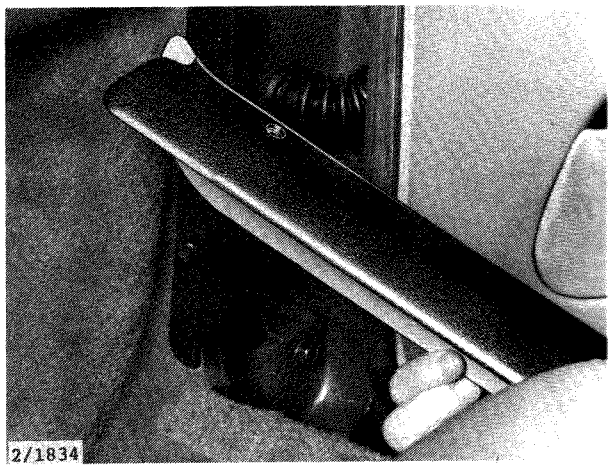
ECU

Object code: 24810

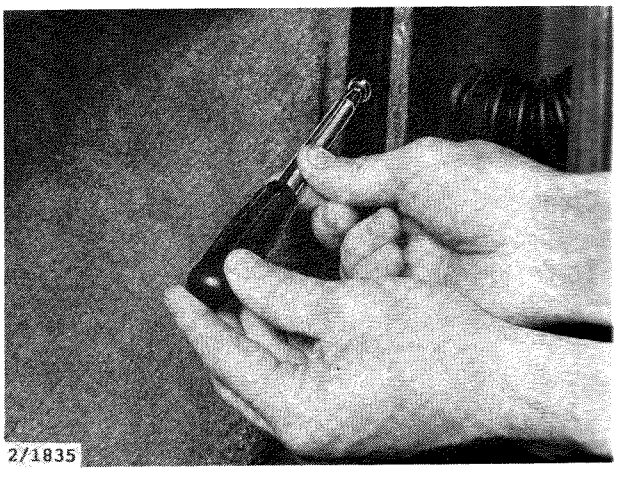
To remove

1 Disconnect the negative (-) battery lead and cover the terminal pole on the battery.

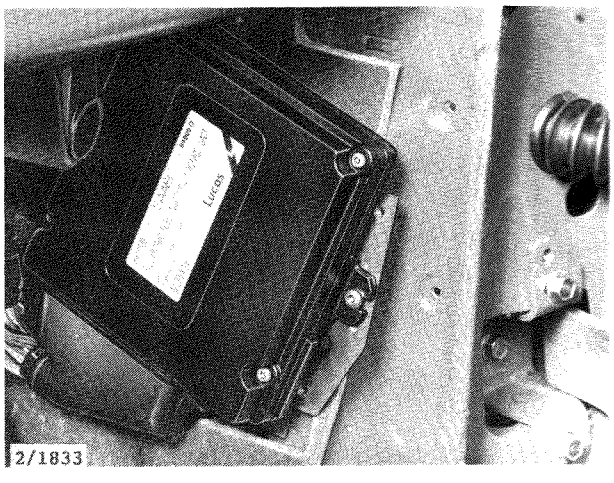
2 Remove the front sill scuff plate on the RH side.



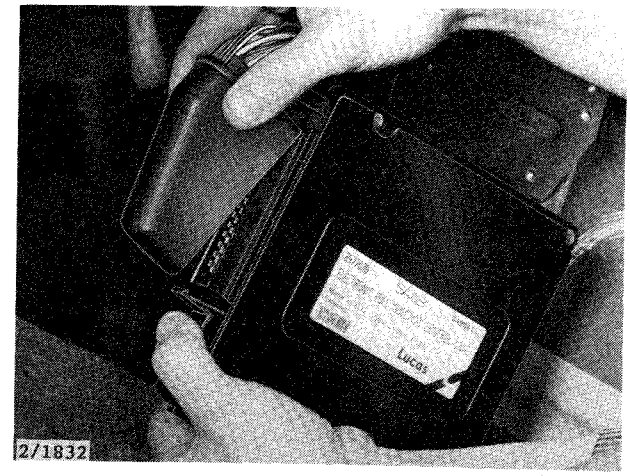
3 Undo the carpet retainer and fold back the carpeting.



4 Undo the three screws securing the ECU to the bracket.



5 Unplug the ECU connector: first release the clip and then pull the connector down and off.



To fit

Refit in the reverse order.

Main and fuel-pump relays

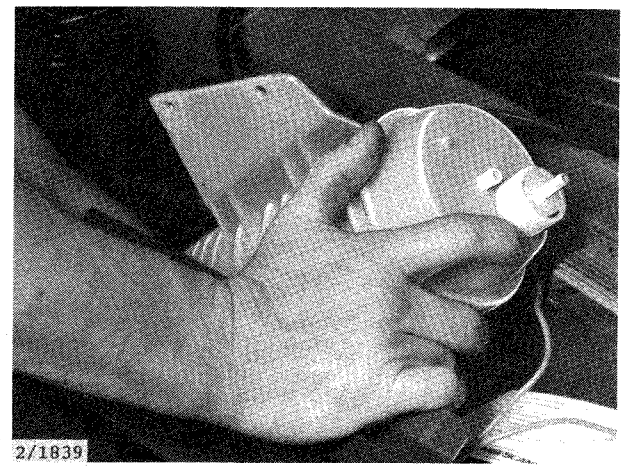
Object code: 36538

To remove

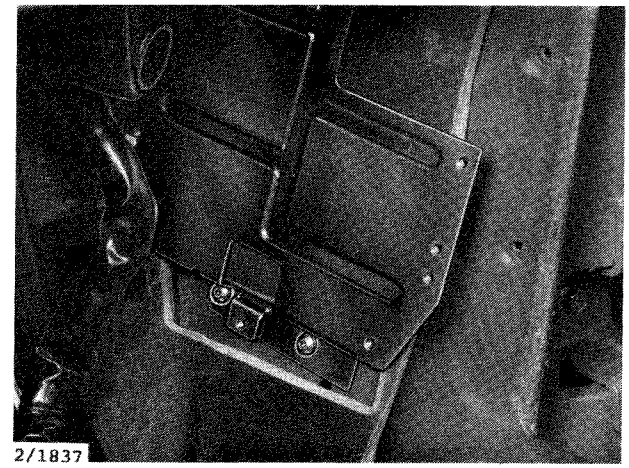
1 Unplug the ECU connector (as detailed in steps 1 - 5 under 'ECU').

2 Drain the fluid from the power steering fluid reservoir. Disconnect the hoses and remove the reservoir. Pull through and place the ends of the hoses in a position that will prevent fluid being spilt unnecessarily.

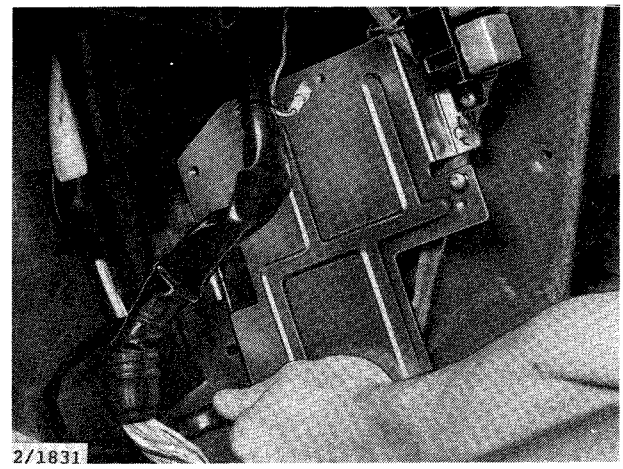
3 Remove the nuts and lift up the vacuum tank with the bracket towards the front.



4 Undo the securing screws and swivel the relay panel to gain access to the relays.


2/1837

5 Remove the main and fuel-pump relays.


2/1831

To fit

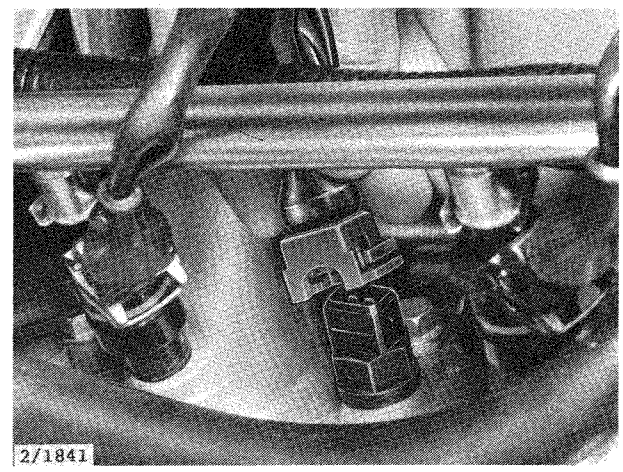
Fit in the reverse order.

Temperature sensor

Object code: 24831

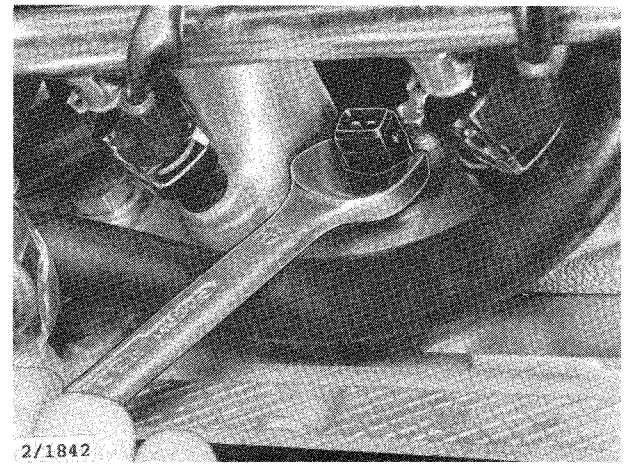
To remove

1 Unplug the temperature sensor connector.



2 Drain off about four litres of coolant to obviate spillage when removing the sensor.

3 Remove the temperature sensor.



To fit

Before fitting the sensor, thoroughly clean the mating surfaces.

Inspect the copper seal for signs of damage and replace if necessary.

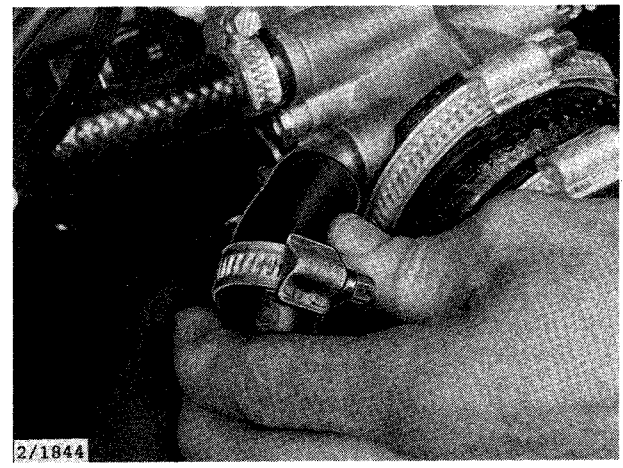
Fit the sensor in the reverse order.

Throttle potentiometer

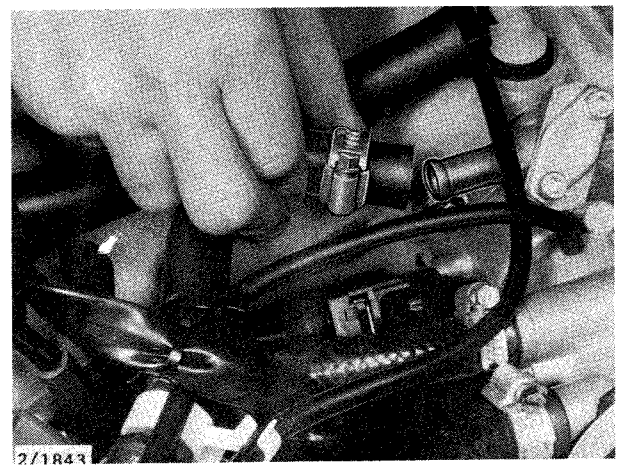
Object code: 24830

To remove

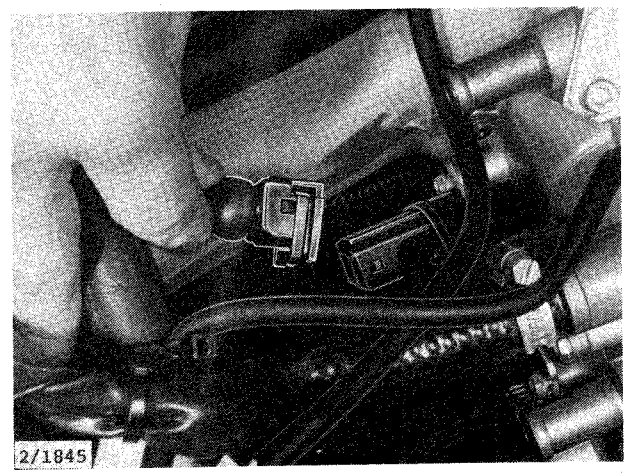
1 Disconnect the hose to the AIC valve from the underside of the throttle housing.



2 Disconnect the large-bore hose for the bypass valve from the throttle housing.



3 Unplug the connector from the potentiometer.



4 Undo the securing screws and remove the potentiometer.

To fit

On fitting, adjust the position of the throttle potentiometer correctly.

Otherwise fit in the reverse order.

Fuel-injection rail and injectors

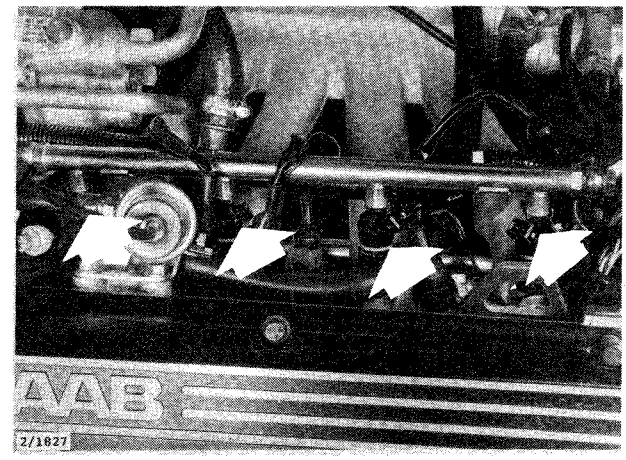
Object code: 24131

To remove

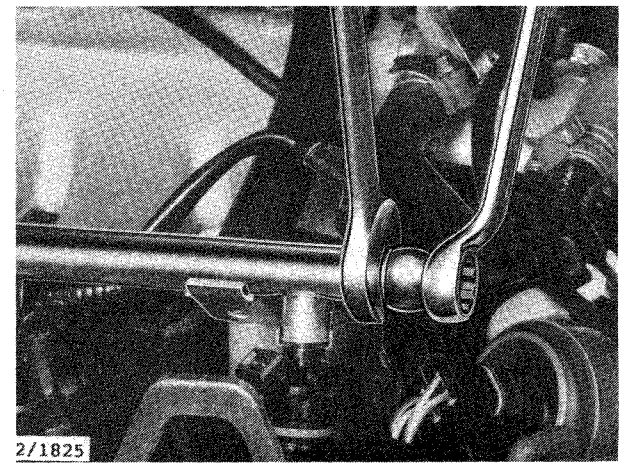
Caution
The utmost cleanliness must be observed in all work on the fuel-injection rail and injectors. Before removal, clean the areas surrounding the injectors, fuel-distribution rail and inlet manifold, and blow clean using an air gun.

1 Snip through the tie securing the wiring loom to the fuel-injection rail.

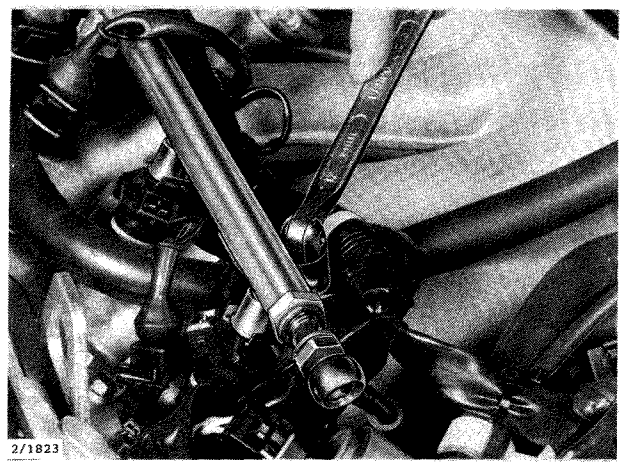
2 Unplug the injector connectors.



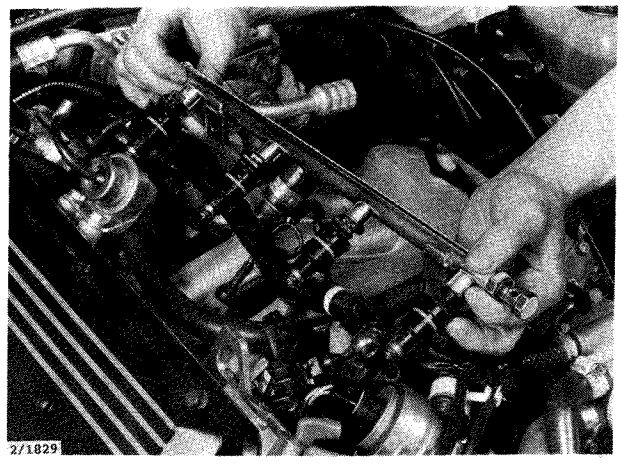
3 Disconnect the hoses (banjo fittings) from either end of the fuel-injection rail. Use a spanner to stop the rail turning and soak up any spilt fuel using absorbent paper or a rag.



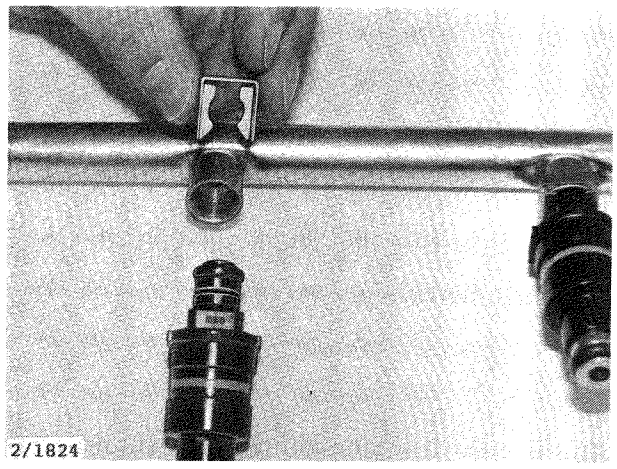
4 Remove the securing bolts for the rail.



5 Lift off the fuel-injection rail complete with injectors.



6 Remove the clip from each injector.



7 Remove the injectors from the rail by twisting them and pulling them free.

To fit

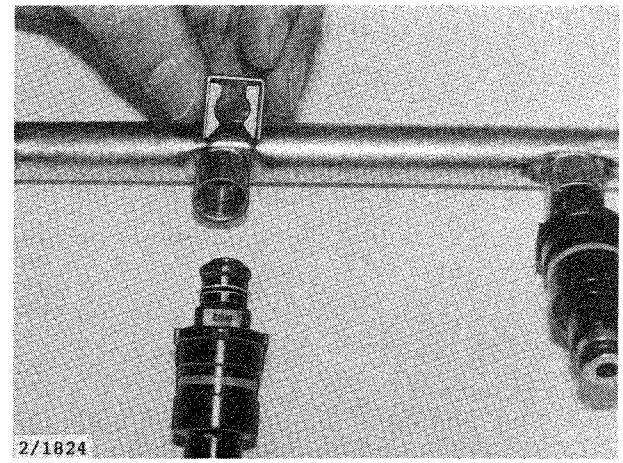
Before fitting, inspect the 'O' rings and replace any that are damaged.

To facilitate fitting and to obviate damage, lightly lubricate the 'O' rings with Vaseline.

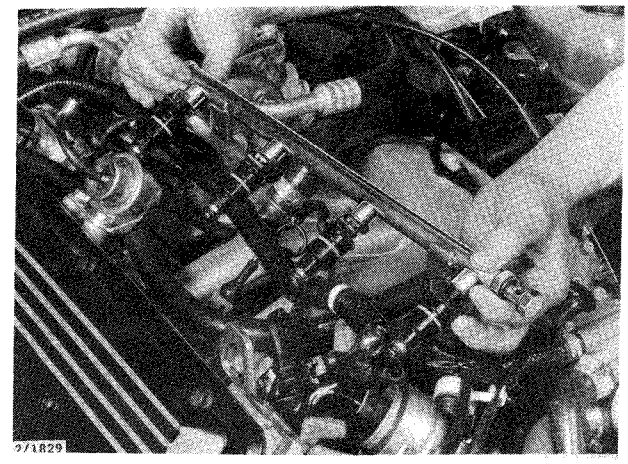
1 Fit the injectors onto the fuel-injection rail.

Check that the injectors are correctly positioned and firmly seated in the rail. Make sure that the flange on the fuel-injection rail is lined up with the groove for the securing clip in the injectors.

Fit the clips.



2 Fit the fuel-injection rail with injectors to the inlet manifold.



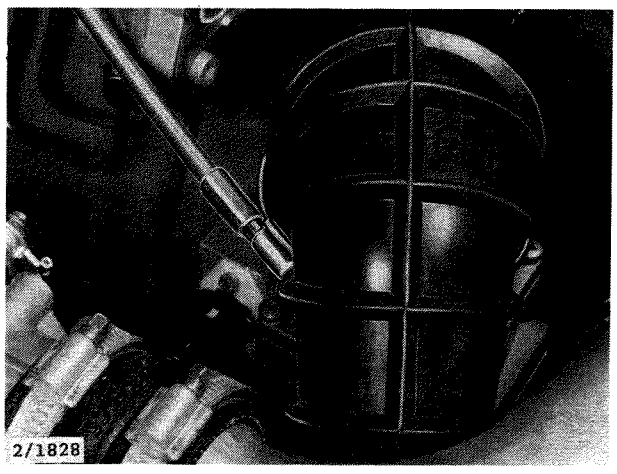
Continue by reversing the order of removal.

Air mass meter

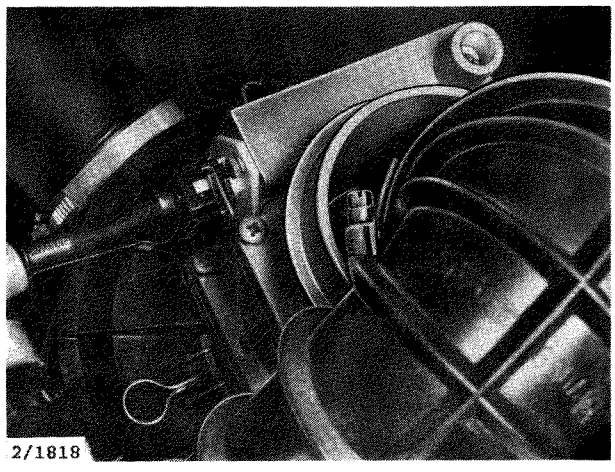
Object code: 24820

To remove

1 Undo the hose clips securing the rubber elbow to the air mass meter.



2 Unplug the connector from the air mass meter and release the two toggle fasteners.

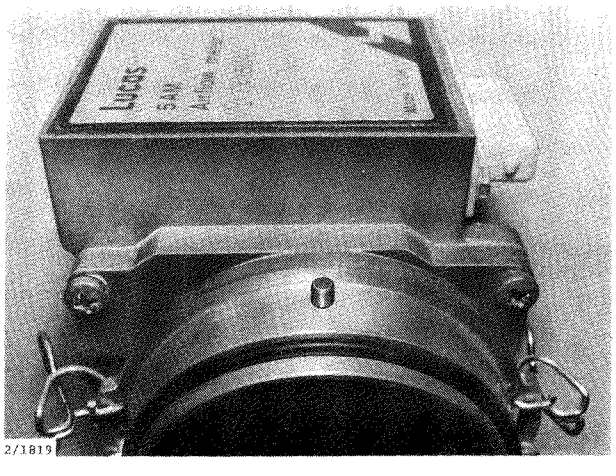


3 Lift out the air mass meter.

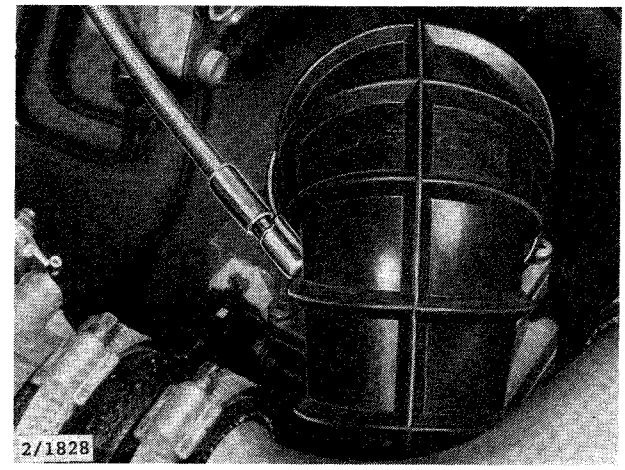
To fit

1 Fit the air mass meter, ensuring that the dog on the air mass meter engages the slot in the top of the air cleaner.

Note the position of the 'O' ring (as shown).



2 Tighten the hose clip on the rubber elbow.



3 Plug on the connector.

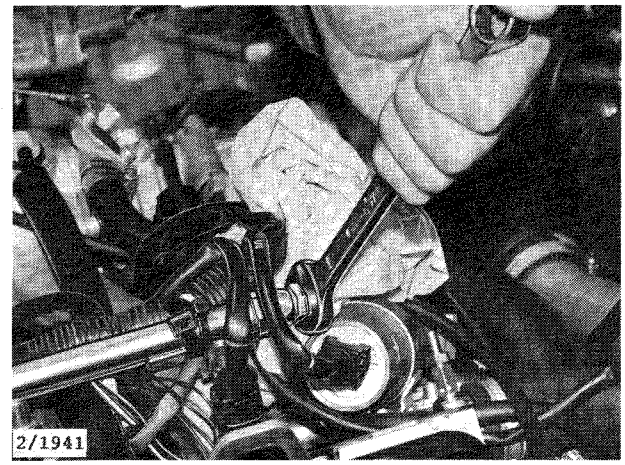
Fuel filter

Object code: 24151

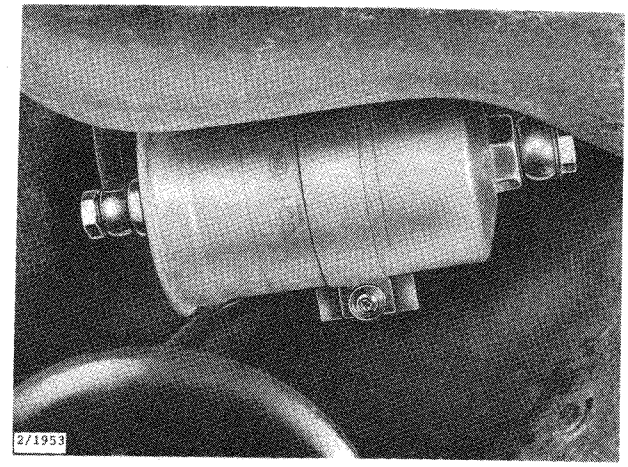
To remove

1 Undo the banjo fitting on the fuel-injection rail to release the pressure in the fuel system. Catch any escaping fuel in a piece of absorbent paper or a rag.

Retighten the fitting.



2 Clean the areas around the fuel-line fittings at the filter.



3 With a spanner across the flats on the filter to stop it turning, undo the fuel-line fittings.

4 Undo the filter securing bolt and remove the filter.

To fit

Fit in the reverse order.

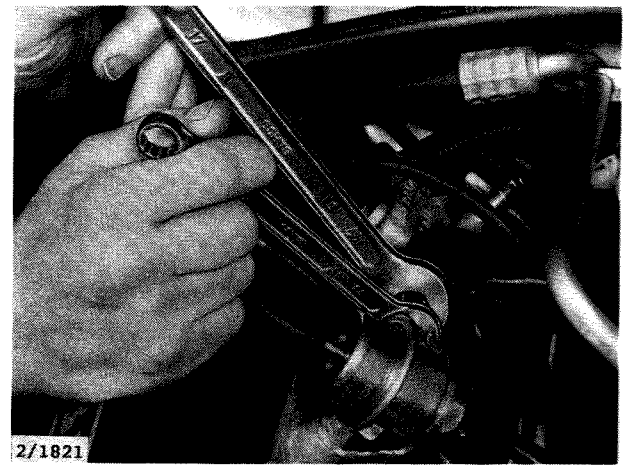
Fuel-pressure regulator

Object code: 24120

To remove

Note
Remember the system is pressurized. Catch any escaping fuel in a piece of absorbent paper or a rag.

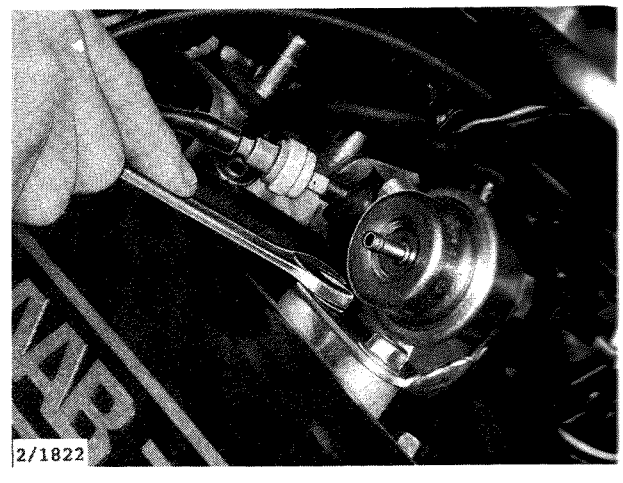
1 Undo the banjo fitting on the fuel-pressure regulator (hose from fuel-injection rail).



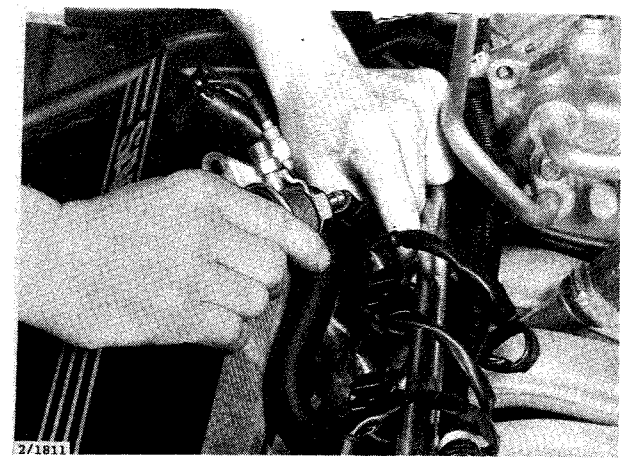
2 Disconnect the vacuum hose to the inlet manifold from the pressure regulator.

3 Undo the bolts securing the fuel-pressure regulator to the bracket.

4 Remove the bracket complete with fuel-pressure regulator from the cylinder head.



5 Disconnect the fuel-pressure regulator from the fuel return hose.



To fit

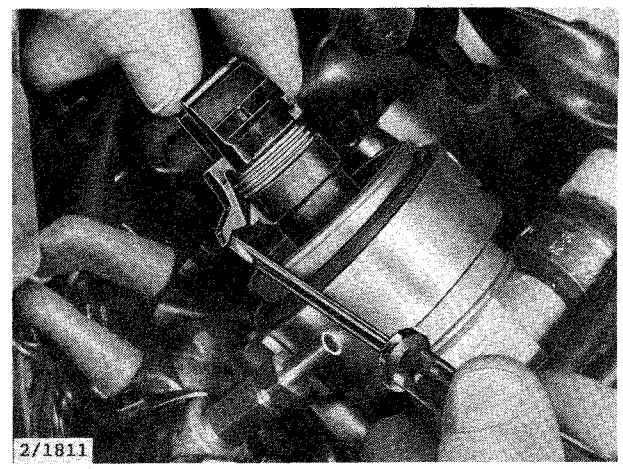
Fit in the reverse order.

AIC valve

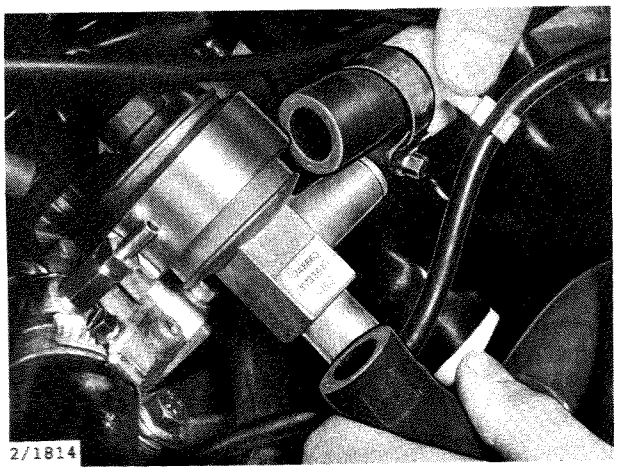
Object code: 24641

To remove

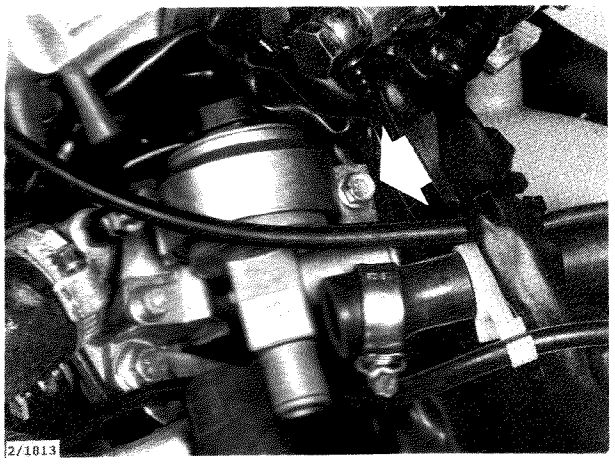
1 Unplug the connector.



2 Undo the hose clips and disconnect the hoses.



3 Undo the valve securing bolts and lower the valve off the bracket.



To fit

Fit in the reverse order.

Air cleaner

Object code: 23213

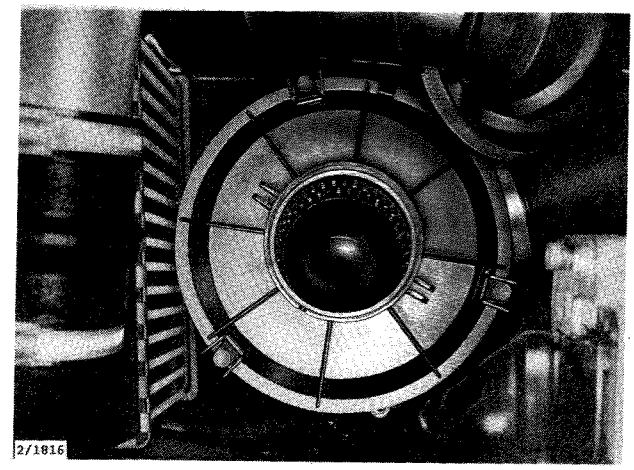
To remove

1 Undo the hose clip and remove the rubber elbow.

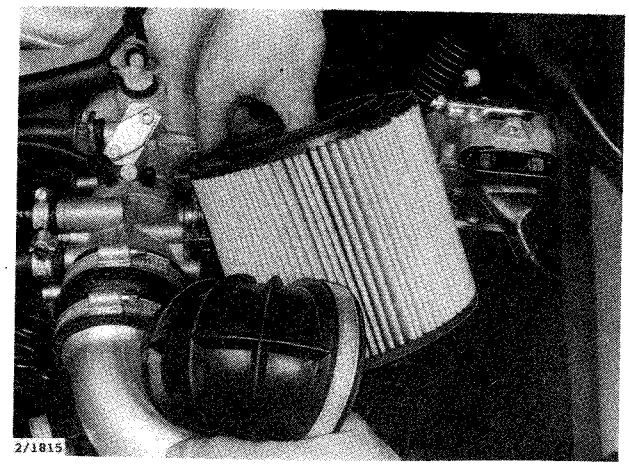
2 Unplug the connector from the air mass meter.

3 Undo the three fasteners on the air-cleaner top.

4 Lift off the top complete with air mass meter.

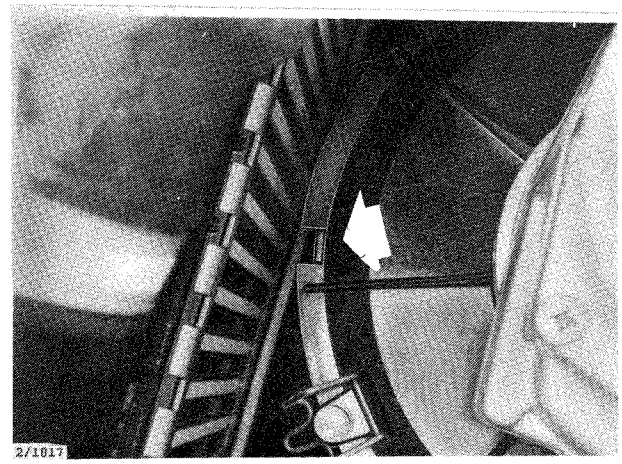


5 Remove the filter element.



To fit

On fitting, make sure that the recess in the air-cleaner top is in line with the dog on the body.



Continue fitting in the reverse order of removal.

Alphabetical section guide

Workshop information
User feedback

To

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Saab Car Division
Workshop Information, AFSVE
S–461 80 TROLLHÄTTAN, Sweden

Telefax phone no.: +46 520 84370

From

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Comments/suggestions

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Manual concerned: .....

It is important that Saab technicians in the field regard the Workshop Service Manual as their bible, and we therefore strive to make the manual easy to use and to provide accurate information.

By letting us have your views on this manual you will be helping us to maintain a high standard in our literature.

Note down any comments or suggestions you may have on a sheet of paper or take a copy of this page and send us your views at the above address. For greater convenience, you are also welcome to send your comments by fax, using the telephone number shown.