Saab 9000

SERVICE MANUAL

SAAB

0 News

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Preface

This manual contains brief descriptions of the most important modifications which will be made to the 1990 Saab 9000 series.

The information contained here is not binding. The company reserves the right to undertake modifications without prior notice.

Saab-Scania AB
Saab Car Division

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 English 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 = 14.7 lbf/in^2
1 US qt = 0.95 l	1 l = 1.06 US qt
°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

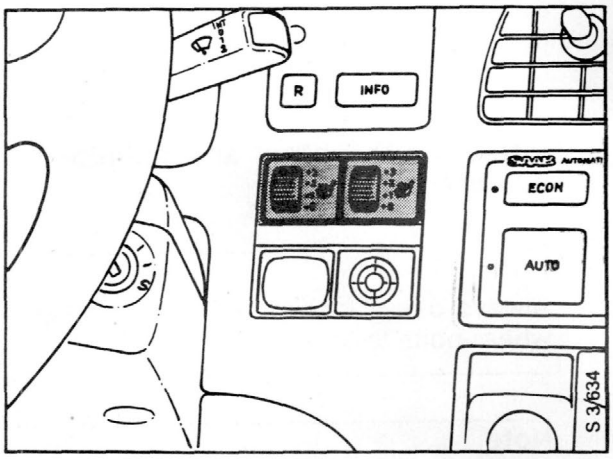
Production: Technical Publications, Saab-Scania, Trollhättan, Sweden

Pre-delivery inspection and warranty service

Pre-delivery service

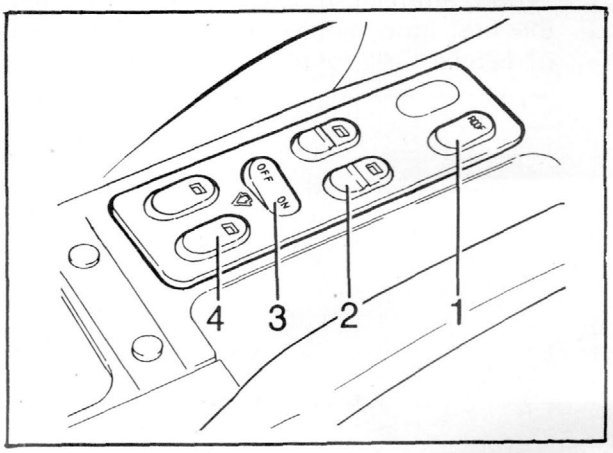
Fascia

Check the electrically heated front seats.



Window regulators

Check the automatic opening function of the front windows, whereby the window will open fully if the switch is pressed hard down. If the switch is depressed half-way, the window will keep opening only as long as the switch is kept depressed.

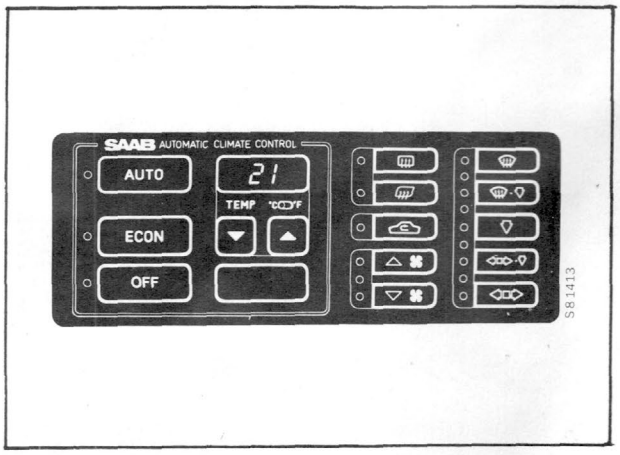


Switches

1 Sunroof
2 Front window regulators
3 Interlock switch for the rear window regulators
4 Rear window regulators

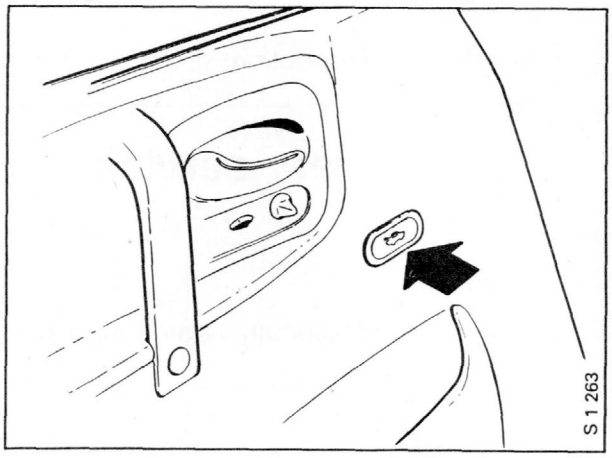
Automatic Climate Control - ACC

The Automatic Climate Control system has been redesigned and now also includes the rear-door fans.



Locks

On the 4-door model, check that the lock for the luggage compartment lid can be unlocked by means of the switch on the inside of the driver's side door or by means of the key from the outside of the car.



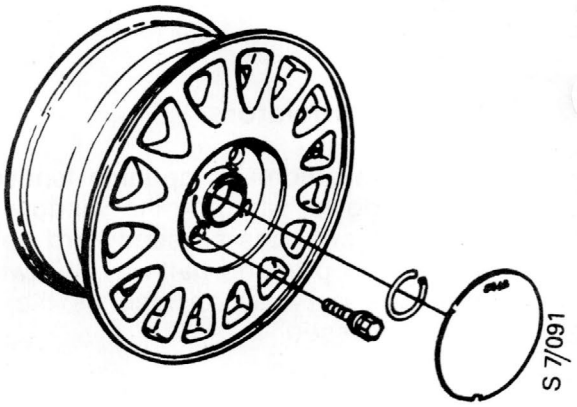
Wheel bolts - steel and aluminium alloy wheels

Note

Always use a torque spanner to retighten the wheel bolts to the correct torque.

Note

When aluminium alloy wheels are fitted for the first time, tighten to the maximum torque of 125 Nm (92 lbf ft).



Tyres

Recommended tyre pressures for cold tyres

Tyre	Load conditions	Tyre pressure Front bar (psi)	Rear bar (psi)
195/65 TR15	L1	1.9 (28)	1.9 (28)
	L2	2.2 (32)	2.2 (32)
	L5	2.2 (32)	2.2 (32)
195/65 VR15	L1	1.9 (28)	1.9 (28)
	L2	2.2 (32)	2.2 (32)
	L3	2.2 (32)	2.2 (32)
205/50 ZR16	L1	2.1 (30)	2.1 (30)
	L2	2.5 (36)	2.5 (36)
	L3	2.5 (36)	2.5 (36)

L1	Up to 3 pers.	0 - 160 km/h	All tyres
L2	Max. load	0 - 160 km/h	All tyres
L3	Max. load	160 km/h to top speed	V and Z tyres
L4	Max. load	160 - 210 km/h	H tyres
L5	Max. load	160 - 190 km/h	T tyres

Load conditions 3 - 5 are applicable to countries where there are no speed limits and when the car is on a long journey at top speed and maximum load. However, for every one passenger less in the car, the tyre pressure may be reduced by 0.1 bar. The maximum load is 5 persons and their luggage.

Retightening the front assembly joints

Certain operations in the retightening of the front assembly joints have been altered.

Tighten all mounting points as shown in the figure.

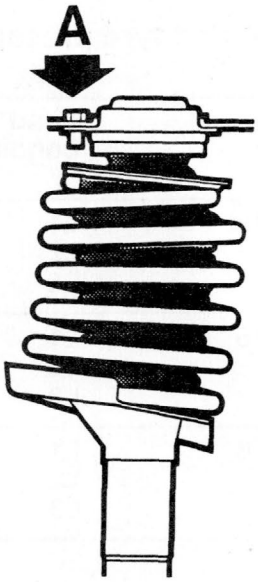
A McPherson strut to body
40 - 54 Nm (30 - 40 lbf ft)

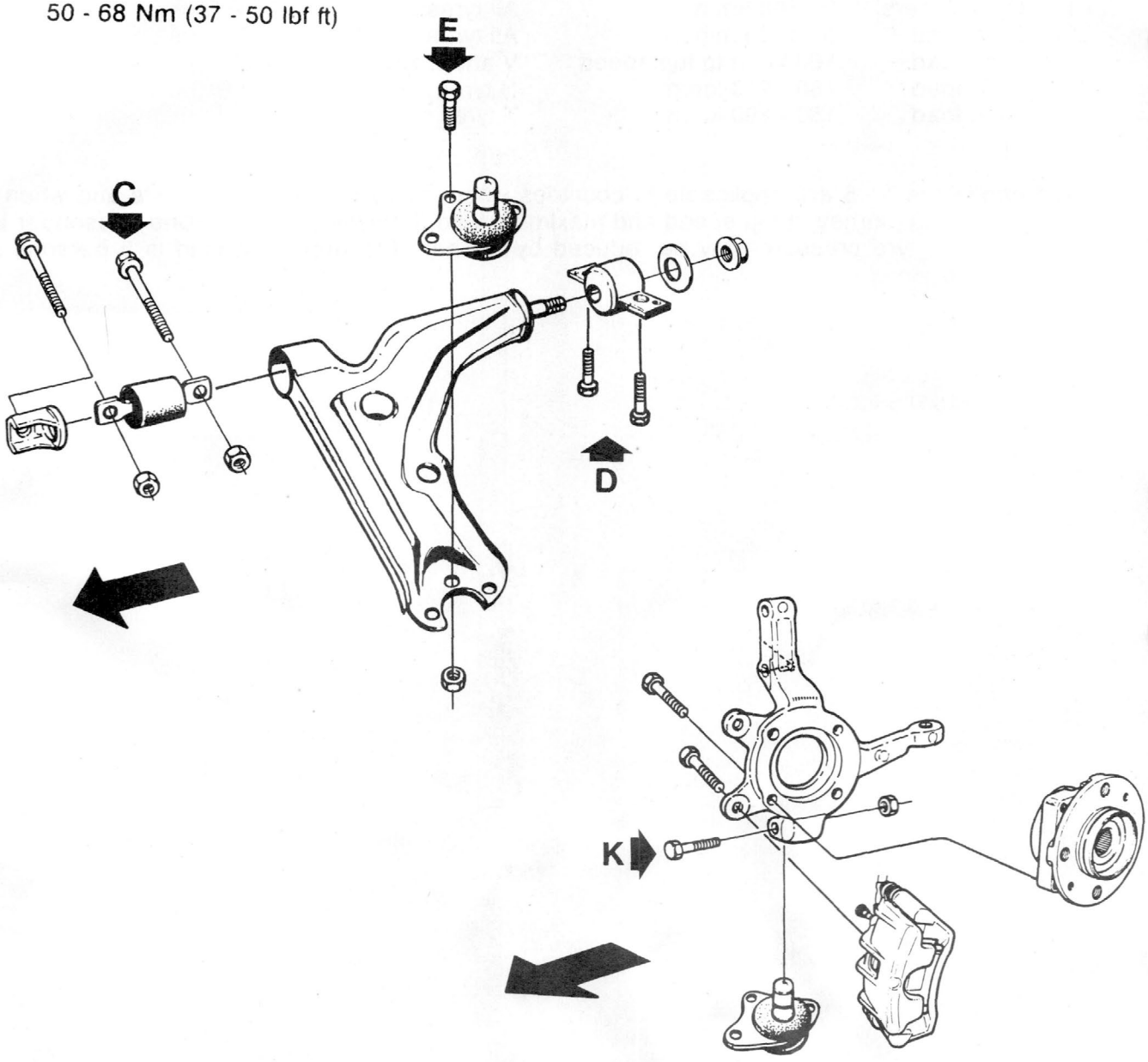
C Suspension arm front bearing to sub-frame
45 - 54 Nm (33 - 40 lbf ft)

D Suspension arm rear bearing to sub-frame
45 - 54 Nm (33 - 40 lbf ft)

E Suspension arm ball joint to suspension arm
25 - 34 Nm (18 - 25 lbf ft)

K Suspension arm ball joint to steering swivel member
50 - 68 Nm (37 - 50 lbf ft)

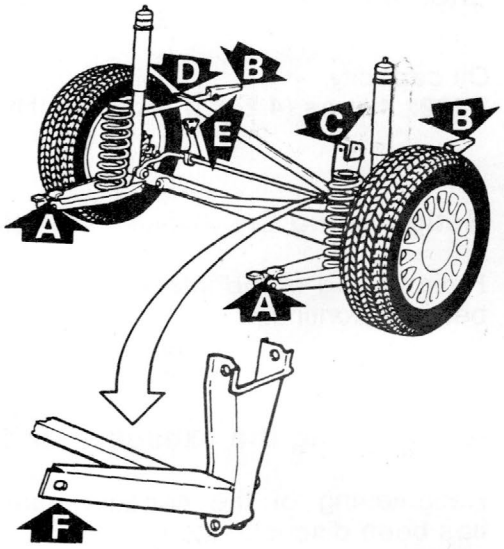




Retightening the rear-axle mountings to the body

Certain operations in the retightening of the rear axle have been altered.

Tighten all mounting points as shown in the figure.



A Spring link to body
40-64 Nm (30-47 lbf ft)

B Torque arm to body
20-27 Nm (15-20 lbf ft)

C Panhard rod mounting to body
40-54 Nm (30-40 lbf ft)

D Panhard rod stay mounting to body
30-70 Nm (22-52 lbf ft). Lubricated joint.

E Anti-roll bar link to body (two)
20-27 Nm (15-20 lbf ft)

F Support for Panhard rod mounting to body
10-26 Nm (8-19 lbf ft)

Equipment

Note
When fitting blanking-off covers to the extra lamp openings in the front spoiler of the 9000 CD, drill the holes before fitting the spoiler.

Final dismantling and finishing work

A new operation has been added under final dismantling and finishing work.

- Blow away water paste under the rear window and windscreen decorative strip.

Warranty service

To be carried out after 1000 km (600 miles)

Engine oil change

Oil capacity
B202: 4 litres (4.2 qts), including filter

Retightening the intake manifold bolts

Retightening of the intake manifold bolts has been discontinued.

Retightening the exhaust manifold nuts

Retightening of the exhaust manifold bolts has been discontinued.

Retightening the front assembly joints

Certain operations in the retightening of the front assembly joints have been altered.

Tighten all mounting points as shown in the figure.

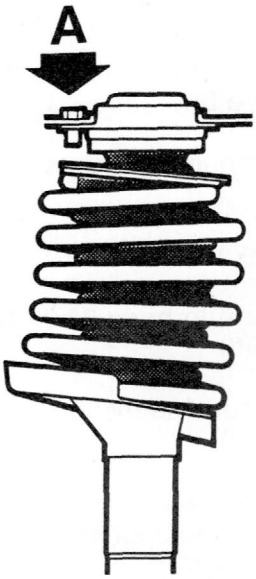
A McPherson strut to body
40-54 Nm (30-40 lbf ft)

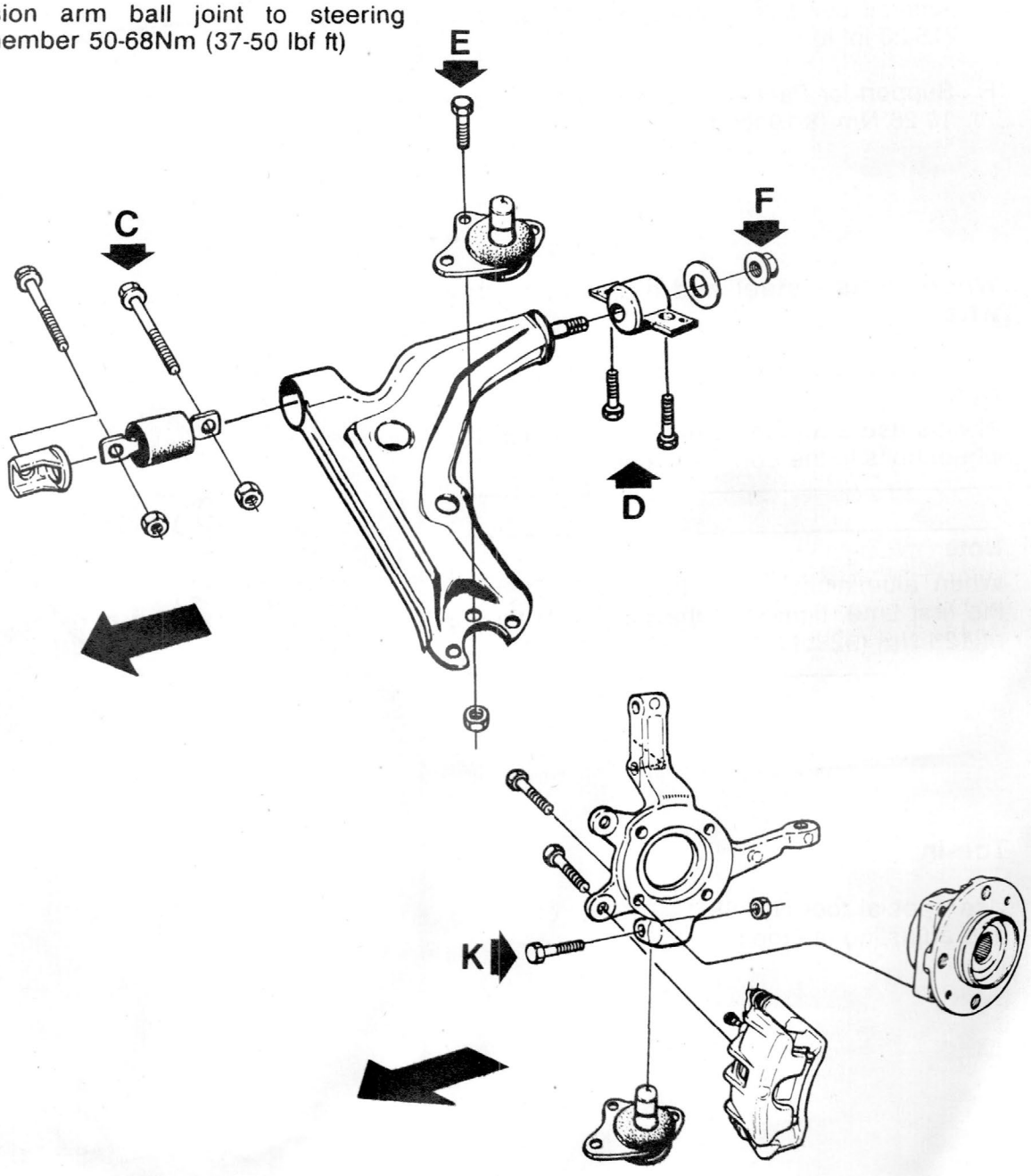
C Suspension arm front bearing to subframe - 45-54 Nm (33-40 lbf ft)

D Suspension arm rear bearing to subframe 45-54 Nm (33-40 lbf ft)

E Suspension arm ball joint to suspension arm 25-34 Nm (18-25 lbf ft)

K Suspension arm ball joint to steering swivel member 50-68Nm (37-50 lbf ft)

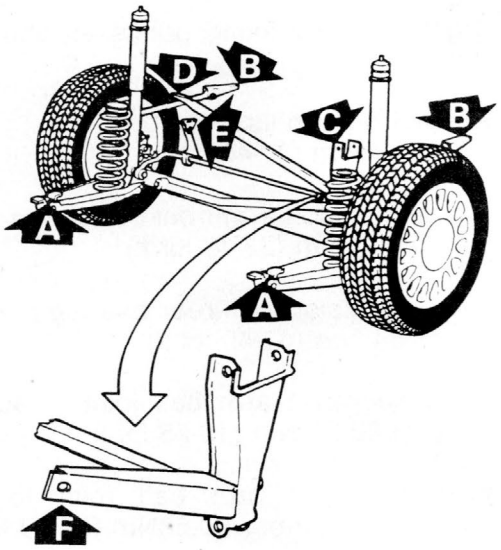




Retightening the rear-axle mountings to the body

Certain operations in the retightening of the rear axle have been altered.

Tighten all mounting points as shown in the figure.



A Spring link to body 40-64 Nm (30-47 lbf ft)

B Torque arm to body 20-27 Nm (15-20 lbf ft)

C Panhard rod mounting to body 40-54 Nm (30-40 lbf ft)

D Panhard rod stay mounting to body 30-70 Nm (22-52 lbf ft). Lubricated joint.

E Anti-roll bar link to body (two) 20-27 Nm (15-20 lbf ft)

F Support for Panhard rod mounting to body 10-26 Nm (8-19 lbf ft)

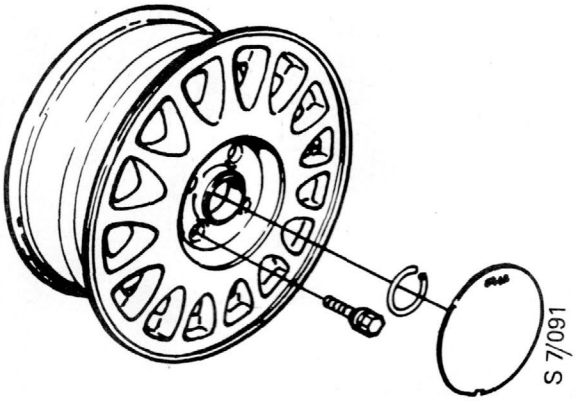
Wheel bolts - steel and aluminium alloy wheels

Note

Always use a torque spanner to retighten the wheel bolts to the correct torque.

Note

When aluminium alloy wheels are fitted for the first time, tighten to the maximum torque of 125 Nm (92 lbf ft).



Toe-in

Use special tool No. 88 19 013 for checking and adjusting the toe-in.

Service

Safety and functional service

To be carried out at 10 000, 30 000, 50 000, 70 000, 90 000 km (6 000, 18 000, 30 000, 42 000, 54 000 miles) and so on.

Brake pads

When fitting the wheels after changing the brake pads, note the following:

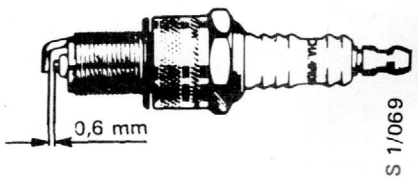
Always use a torque spanner set to the appropriate torque for retightening the wheel bolts.

Fuel lines

Note
As from the 1990 model, the fuel filter is located at the fuel tank.

Spark plugs

the engine is not fitted with the spark plugs specified for it, the plugs must be changed.



Electrode gap:	0.6 + 0.1 mm (0.023 + 0.004 in)
Tightening torque:	25 - 29 Nm (18.5 - 21.5 lbf ft)

Engine	Designation
Turbo	NGK BCP 7ES
	Champion C7YC
	Bosch F6DC

For particulars of changing of other spark plugs, see "Full service" and "Maintenance programme".

Full service

To be carried out at intervals of 20 000 km (12 000 miles) (at 20 000, 40 000, 60 000, 80 000, 100 000 km etc.)

Engine oil change

Oil capacity
B202: 4 litres (4.2 qts), including filter

Brake pads

When fitting the wheels after changing the brake pads, note the following:

Always use a torque spanner set to the appropriate torque for retightening the wheel bolts.

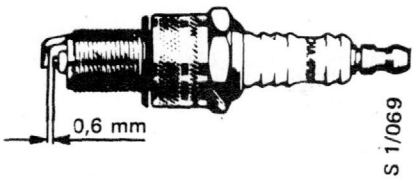
Fuel lines

Note
As from the 1990 model, the fuel filter is located at the fuel tank.

Changing the plugs

Changing on all variants.

Engine	Designation
B202I	NGK BCP 5ES Champion RC12YC Bosch FR8DCX
B202 Turbo	NGK BCP 7EV Precious metal Champion C7GY Precious metal
B202 Turbo DI	NGK BCPR 7ES



Electrode gap (not DI):	0,6 + 0,1 mm (0.023 + 0.004 in)
Electrode gap Saab DI:	1,0 + 0,1/-0,2 mm (0.039 + 0.0004/ -0.0008 in)
Tightening torque:	25-29 Nm (18.5-21.5 lbf ft)

EGR-system

Check in accordance with the diagram

1 Start the engine, let it warm up and leave it running at idling speed.

2 Disconnect the hose running to the signal converter (connection from tapping 2 on the throttle housing).

3 Disconnect the hose from connection C of the signal converter. (Blank off the hole with your finger or seal the hose so that air will not leak into the intake manifold.)

4 Raise a vacuum in hose A disconnected earlier, using a vacuum pump or by sucking on the end of the hose. If the system operates correctly, the idling speed should now drop, or the engine may even stall.

5 Reconnect the hose to connection C of the signal converter.

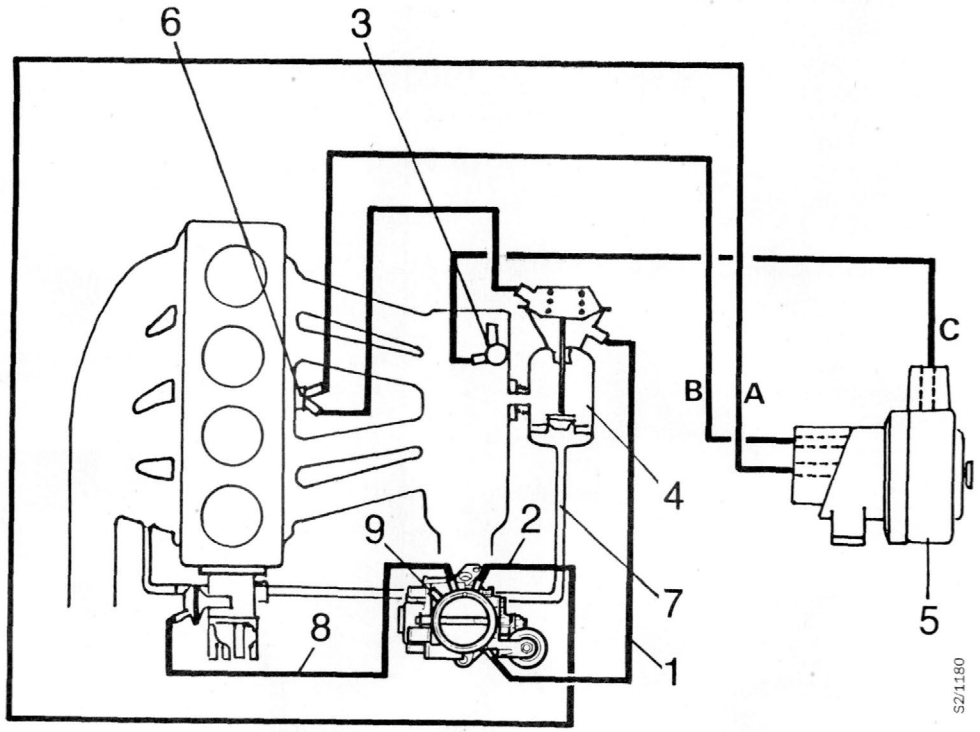
6 Once again, raise a vacuum in the hose disconnected earlier. If the system performs correctly, the idling speed of the engine should not be affected.

EGR valve

1 Signal tapping upstream of the throttle butterfly
2 Signal tapping at the throttle butterfly
3 Signal tapping at the intake manifold
4 EGR valve
5 Signal converter
6 Thermostatic valve
7 EGR pipe

Marking of hose connections

A = to throttle housing
B = via the thermostatic valve to the EGR valve (spring side)
C = to the intake manifold (at the brake servo connection)



Toe-in

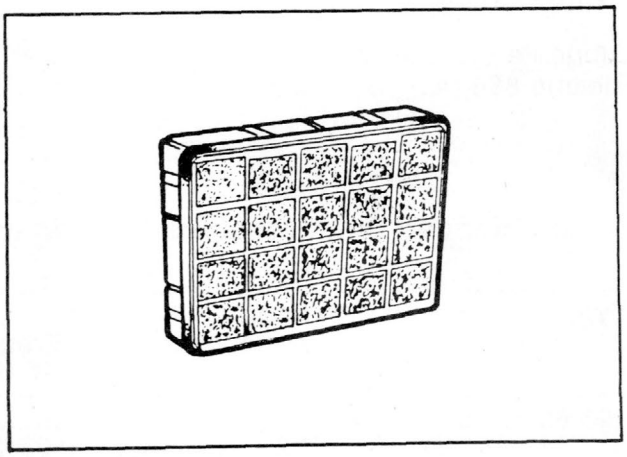
Use special tool No. 88 19 013 to check and adjust the toe-in.

Maintenance programme

To be carried out at intervals of 40 000 km (24 000 miles)

Ventilation air filter

A new, standard ventilation air filter has been introduced as from the 1990 model. Change the filter at the same intervals as in the past.



To be carried out at intervals of 80 000 km (48 000 miles)

Cars with catalytic converter

Changing of the oxygen sensor and carbon canister has been discontinued.

To be carried out at intervals of 100 000 km (60 000 miles)

Alternator drive belt

If the car has an automatic belt tensioner, change the drive belt.

Fuel filter

Note
As from the 1990 model, the fuel filter is located at the fuel tank.

Owner's programme

Every 10 000 km (6 000 miles)

Lubrication

New lubricants.

Lubricate the door stops and door locks with Gleitmo 880 (45) 30 06 582.

Recommended tyre pressures for cold tyres

Tyre	Load conditions	Tyre pressure Front bar (psi)	Rear bar (psi)
195/65 TR15	L1	1.9 (28)	1.9 (28)
	L2	2.2 (32)	2.2 (32)
	L5	2.2 (32)	2.2 (32)
195/65 VR15	L1	1.9 (28)	1.9 (28)
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	L3	2.2 (32)	2.2 (32)
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	L2	2.5 (36)	2.5 (36)
	L3	2.5 (36)	2.5 (36)

L1	Up to 3 pers.	0 - 160 km/h	All tyres
L2	Max. load	0 - 160 km/h	All tyres
L3	Max. load	160 km/h to top speed	V and Z tyres
L4	Max. load	160 - 210 km/h	H tyres
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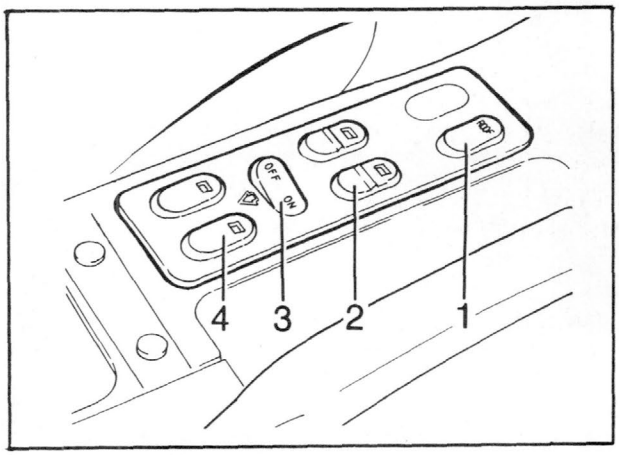
Load conditions 3 - 5 are applicable to countries where there are no speed limits and when the car is on a long journey at top speed and maximum load. However, for every one passenger less in the car, the tyre pressure may be reduced by 0.1 bar. The maximum load is 5 persons and their luggage.

Window regulators

Check the automatic opening function of the front windows, whereby the window will open fully if the switch is pressed hard down. If the switch is depressed half-way, the window will keep opening only as long as the switch is kept depressed.

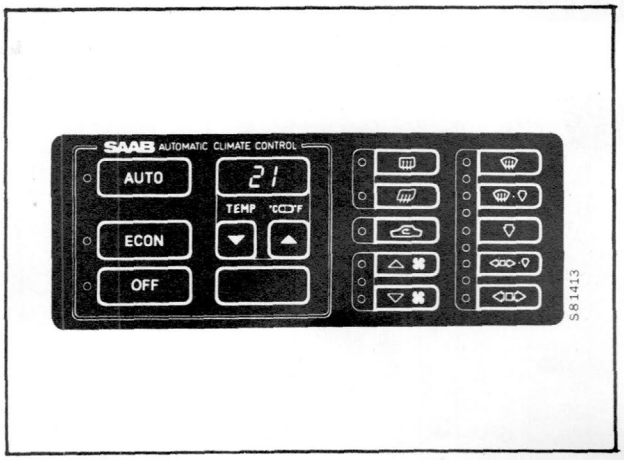


Switches

1 Sunroof
2 Front window regulators
3 Interlock switch for the rear window regulators
4 Rear window regulators

Automatic Climate Control - ACC

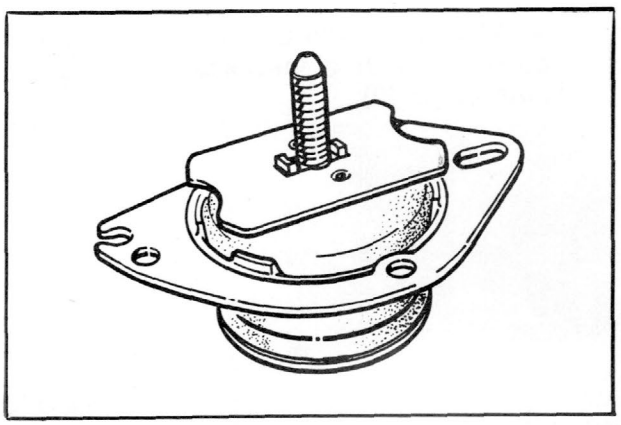
The Automatic Climate Control system has been redesigned and now also includes the rear-door fans.



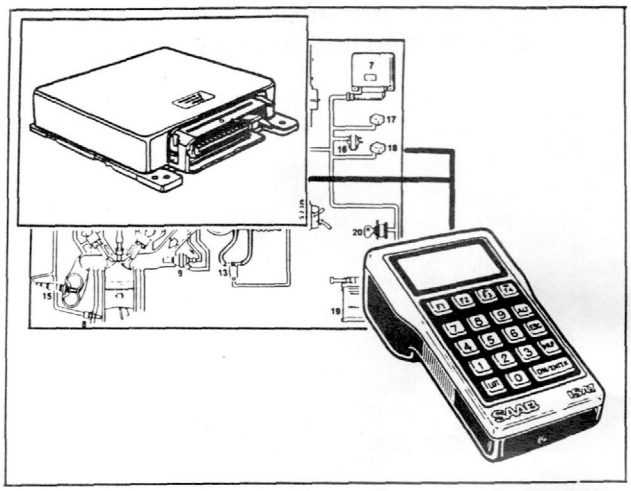
Engine

Summary of new features M1990

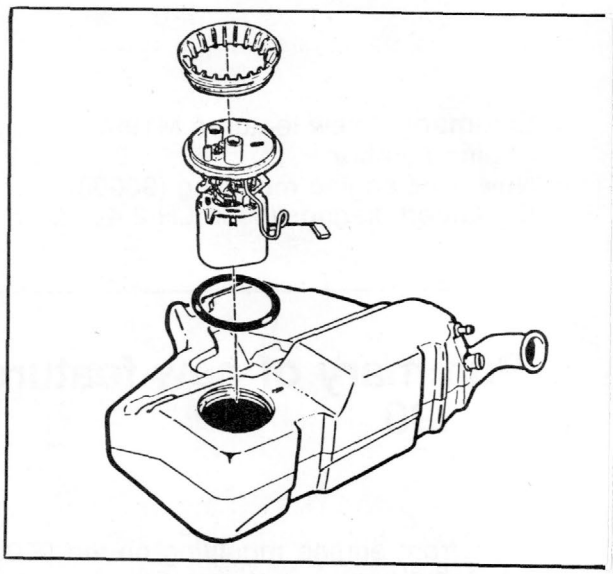
New front engine mounting on the 9000i (see page 7).



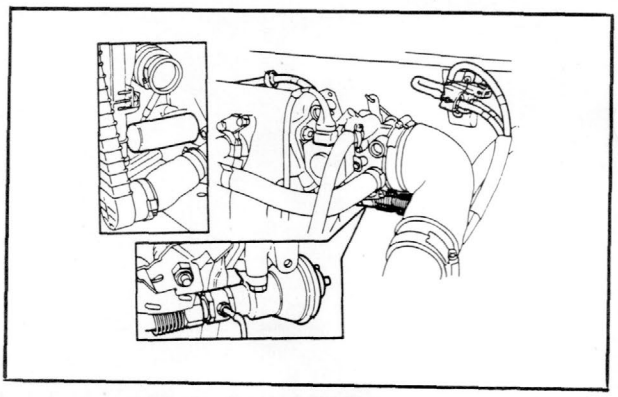
Enhanced diagnostics in the LH 2.4 fuel-injection system on all 9000 cars fitted with LH 2.4 (see page 8).



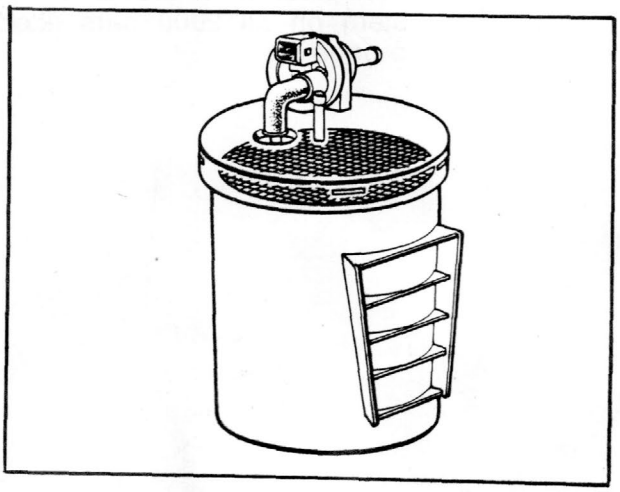
All variants are fitted with a new fuel pump incorporating an integral fuel-gauge sender unit, and a new fuel tank. The fuel filter has also been resited (see page 24).



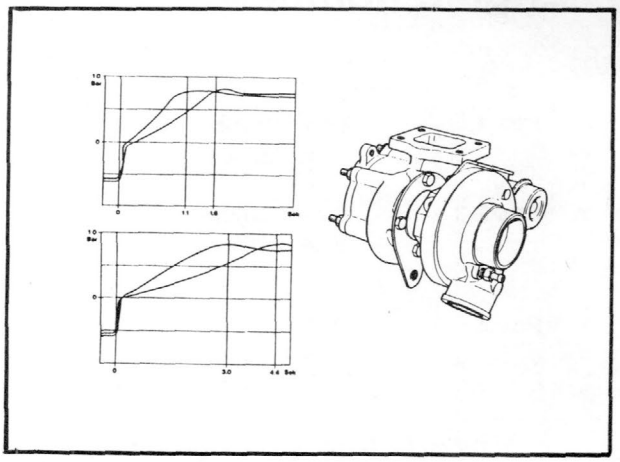
All 9000 cars with LH2.4 (US-west spec.) are equipped with electronically controlled EGR (see page 30).



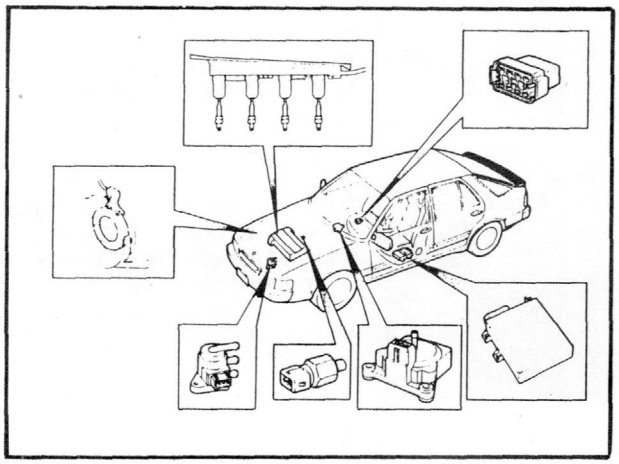
The charcoal canister for the ELCD system has been modified (see page 41).



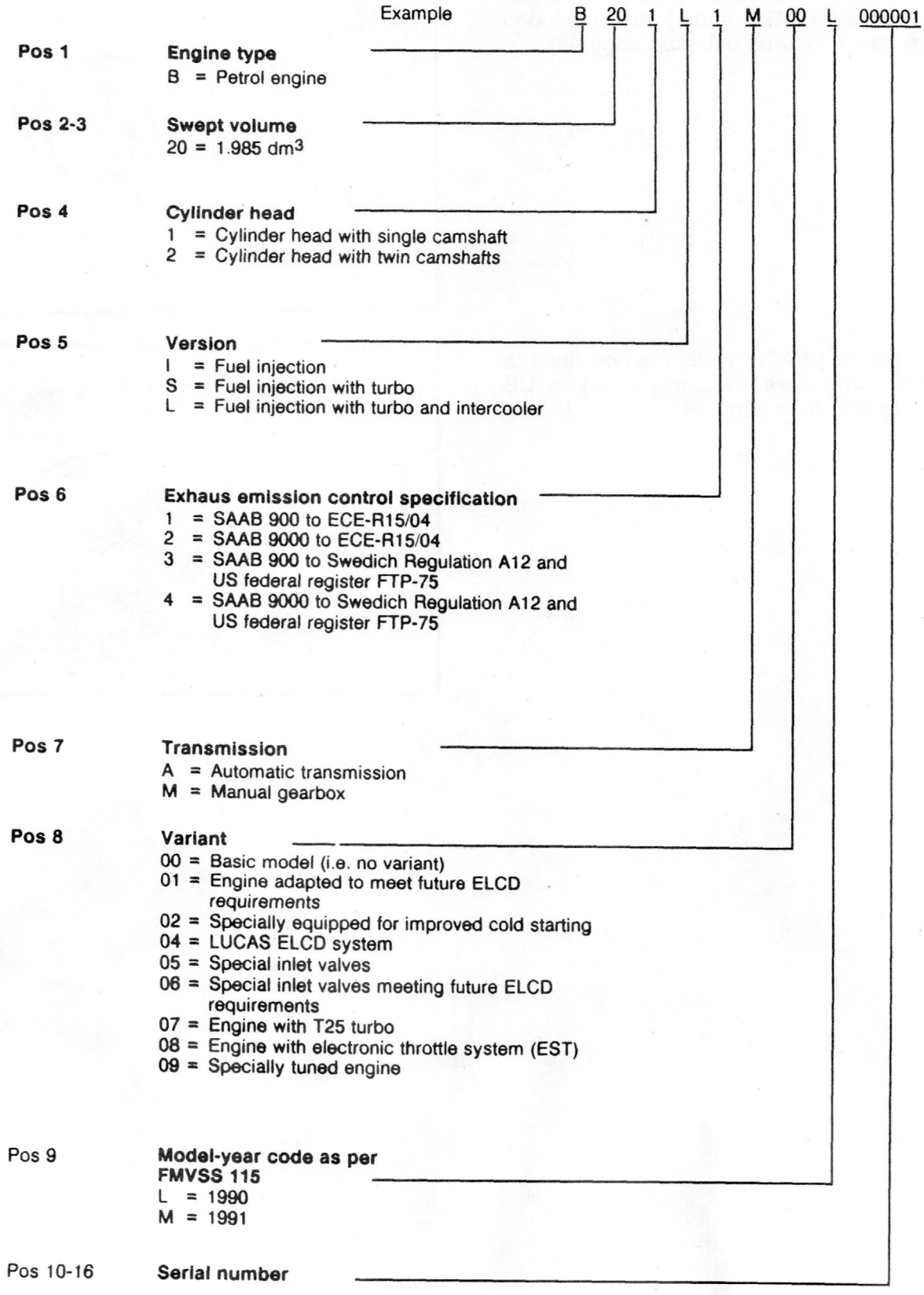
All 9000 Turbos with catalytic converter (EU and US specs.) and 9000 Turbos without catalytic converter (GB spec.) are equipped with the new T25 turbo unit (see page 42).



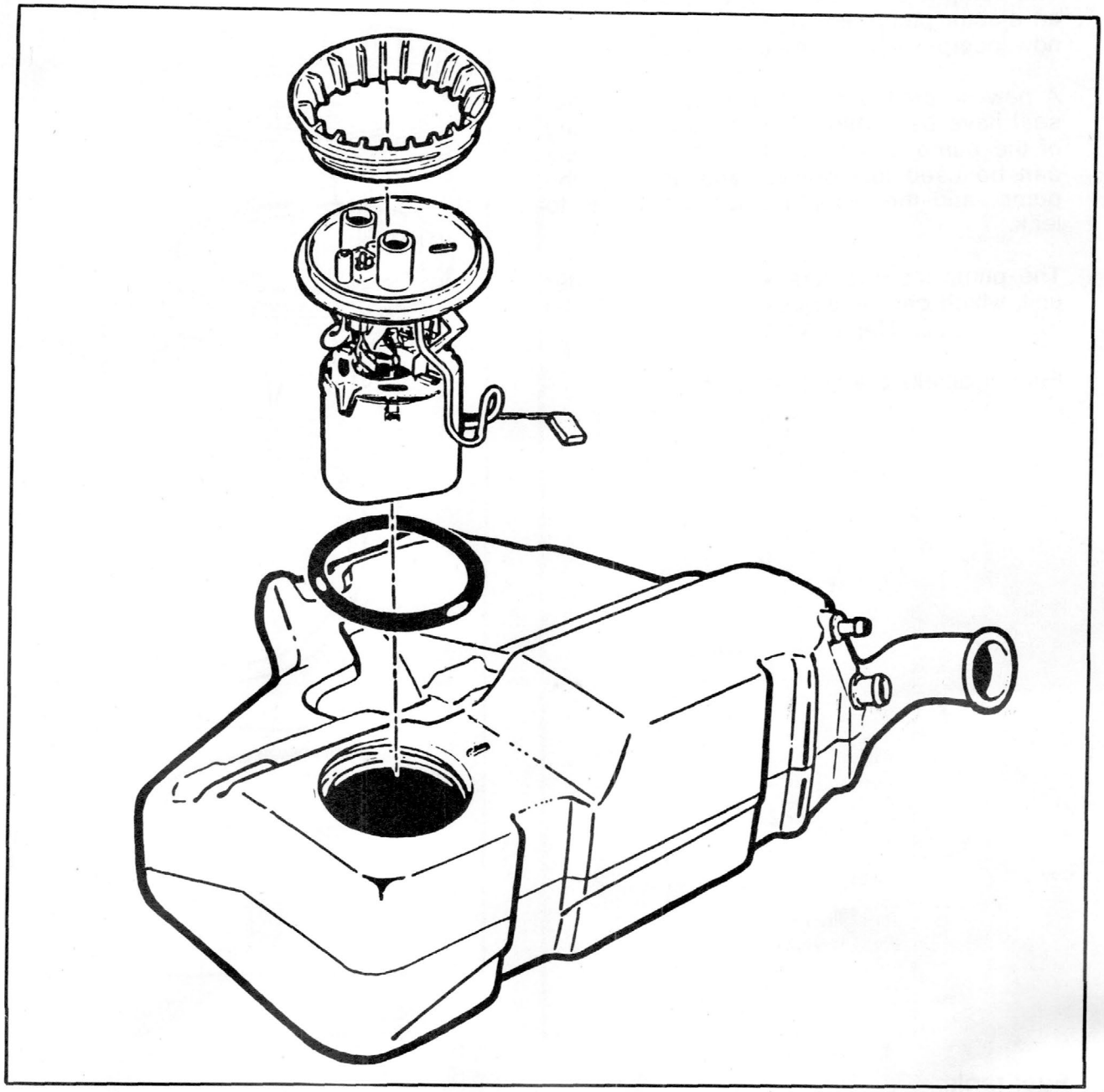
The integrated DI/APC system is now fitted to all 9000 Turbo cars, including those to US and CA specs. (see page 44).



Engine number



Fuel pump and fuel tank



Fuel pump and fuel tank, M1990

The new fuel pump fitted to all 9000 cars.

A new fuel tank, modified to accommodate the new pump, the new location of the fuel filter and the integral fuel-gauge sender unit (no separate aperture in the tank) has also been introduced.

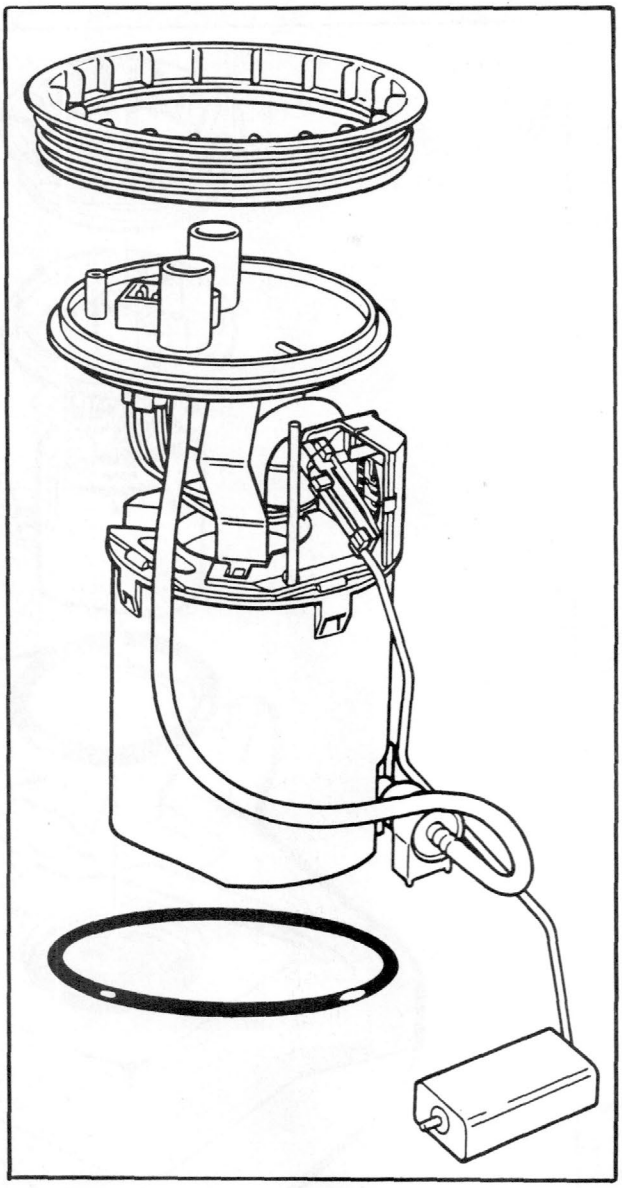
Fuel pump

The pump is of the same type as before, with an ejector pump feeding the main pump, but now incorporates a number of modifications.

A new screw top and a new type of rubber seal have been introduced to facilitate fitting of the pump inside the tank. Simpler tools can be used for removal and fitting of the pump, and the pump is also less likely to leak.

The pump incorporates a fuel-gauge sender unit, which can be adjusted by the new EDU trip computer fitted to M90 cars.

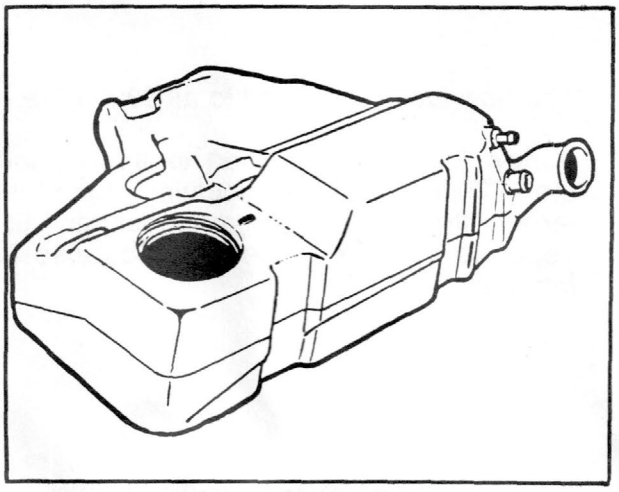
Further details are given on page 24.



Fuel tank

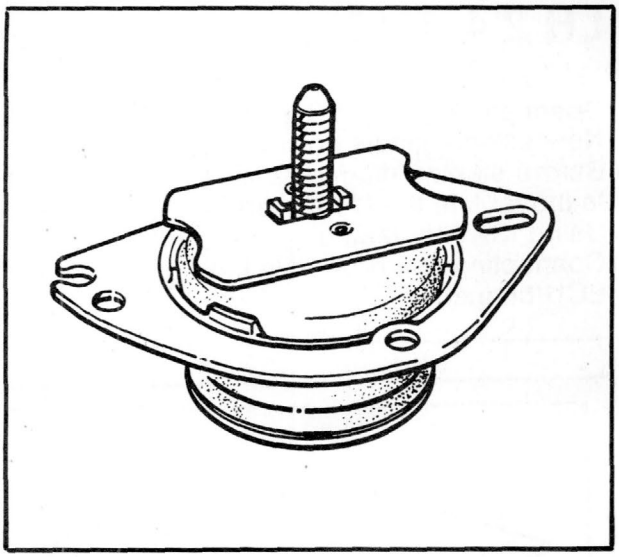
Modifications to the tank to accommodate the new pump include a new reinforcement ring. The aperture for the earlier fuel-gauge sender unit has been discontinued, and all outlets are now welded to the tank. Modifications have also been made as a result of the fuel filter having been moved from the engine bay.

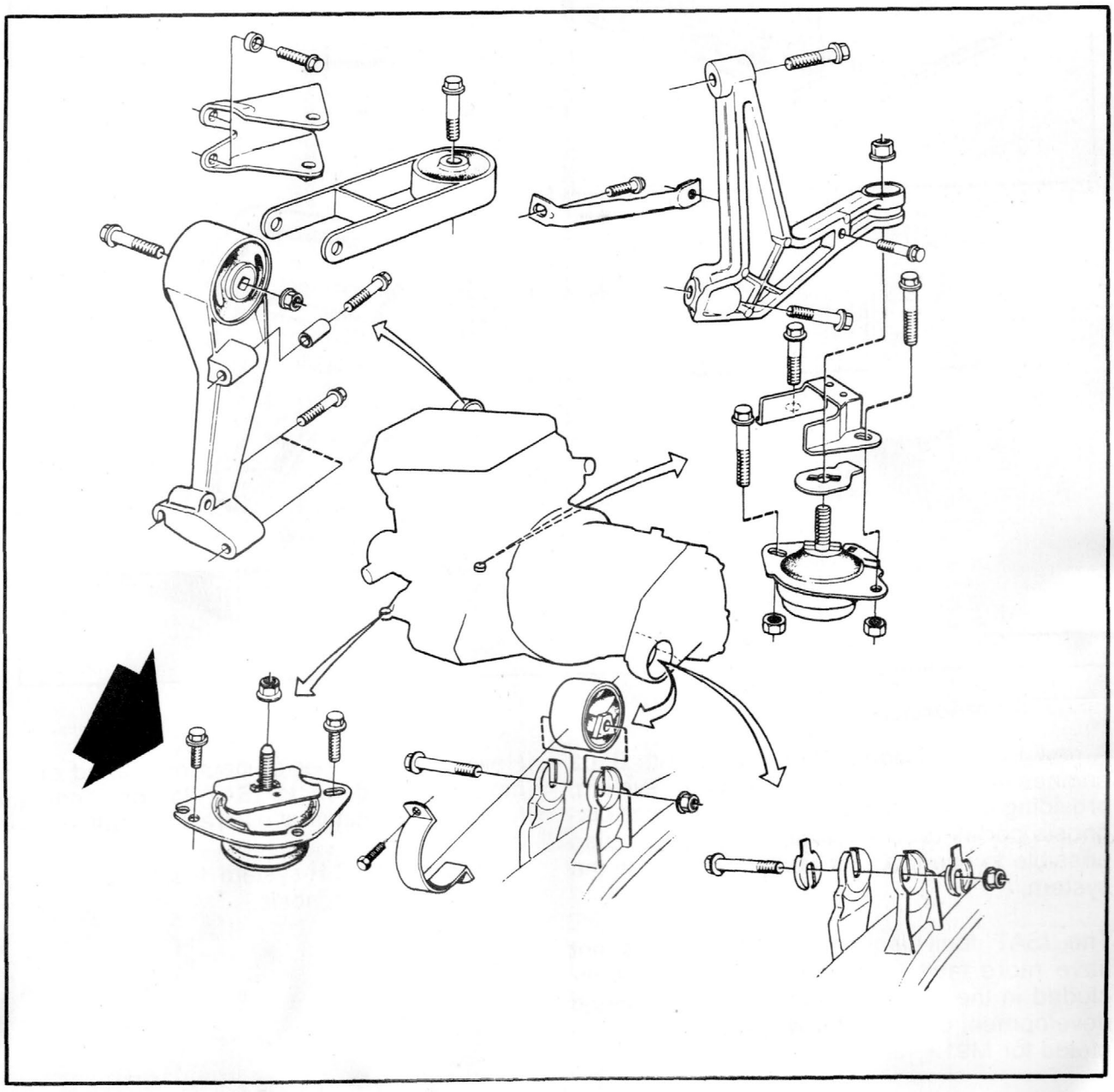
Further details are given on page 24.



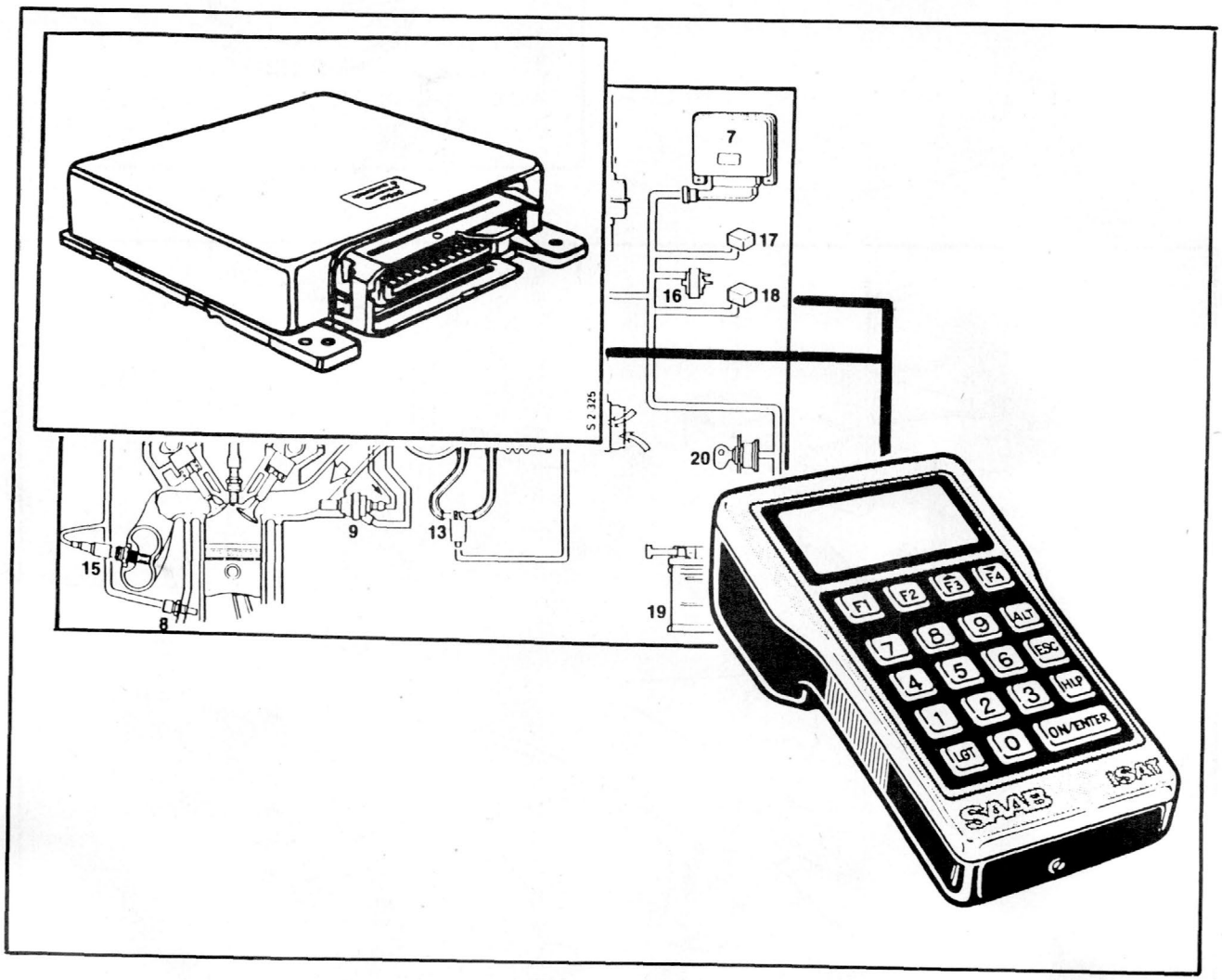
New front engine mounting (9000i)

A new front engine mounting is now fitted to all 9000i/S cars with B202 engines.





Enhanced diagnostics in LH 2.4, M1990



A new ECU has been fitted in cars with B202 engines and the LH2.4 fuel-injection system, providing enhanced diagnostics. New self-diagnosis codes are now available and it is also possible to use ISAT for fault diagnosis on the system.

The ISAT fault-diagnosis program does not have more fault (error) codes than those included in the self-diagnosis function, although development of the tester will have been completed for M91.

However, a number of input command codes have been added to ISAT for checking the function and status of different components.

As before, the LH-system tester can still be used for fault diagnosis.

New self-diagnosis error codes

Error-code	CHECK	Malfunction indicated	Action
12243	Off	No signal from road speed sensor (US-West)	A With ECU connector plugged in: check the voltage across ECU pin 34 and earth. With one of the front road wheels spinning, the reading should oscillate between 1 and 11V. If not: Check the green lead between pin 132 on the speed sensor and ECU pin 34. Also check the black lead between the sensor and earthing point 3, and the green/white lead to pin 15 on the ignition switch (20). B Try a known good road speed sensor. C Try a known good LH-system ECU.
12245	On	EGR function faulty (USA-West)	A Check the yellow/white lead between ECU pin 19 and connector 394, and the white lead between the connector and the modulating valve (390). Also check the green/white lead between the modulating valve and the pin for the green/red lead in the connector to the injectors. B Try a known good modulating valve. C Check the yellow/white lead between the thermostatic switch (389) and ECU pin 23, and the black lead between the thermostatic switch and earthing point 201. D Try a known good thermostatic switch. E Try a known good LH-system ECU.

Before starting diagnosis work

Caution
Never unplug the connector from the ECU nor disconnect either of the battery leads before the faults stored in the ECU memory have been transferred to ISAT.

Successful fault diagnosis on the LH system requires not only in-depth knowledge of the system on the part of the technician but also access to either the LH-system tester or the ISAT tester.

ISAT makes a valuable contribution to efficient and reliable fault diagnosis

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

This integrated self-diagnostics function in the system combined with the capabilities of the ISAT tester make 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 LH 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 LH system, therefore, always check the following first:

- Battery condition
- Engine condition (compression, inlet manifold pressure, etc.)
- Charging system
- Other auxiliary systems
- Electrical connections
- Earthing points

Using ISAT for fault diagnosis

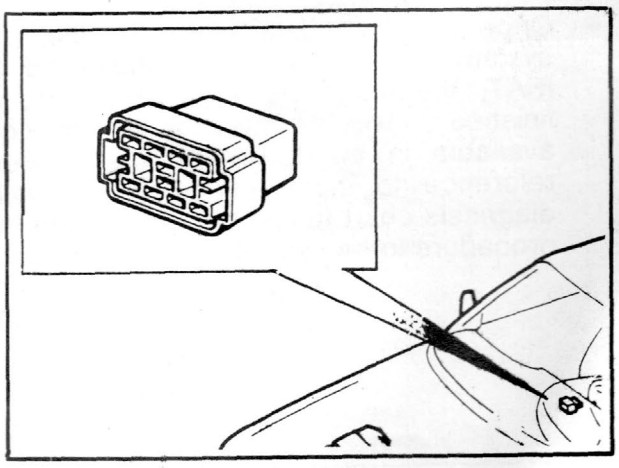
Instructions on the use of ISAT are contained in the special ISAT supplement, Section 1:4 of the Workshop Service Manual.

Fault diagnosis

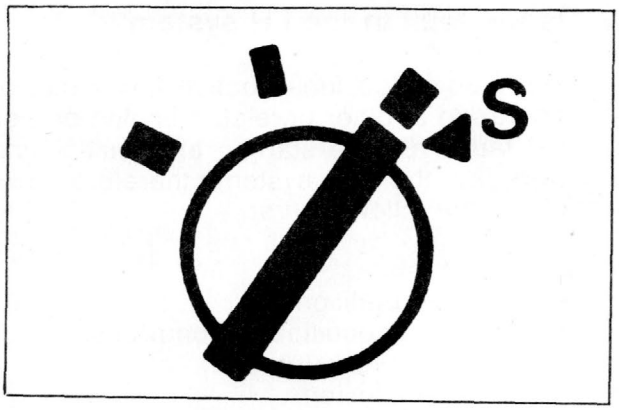
Note the following:

- Never unplug the connector from the ECU nor disconnect either of the battery leads before the faults stored in the ECU memory have been transferred to ISAT.

- The diagnostics socket is a 10-pin socket, located at the front, underneath the RH seat. The socket is protected by a plastic cover held in place by a quick-release screw.



- Turn the ignition key to the Drive position.



- The identification number for the LH system in ISAT is system no. 1.

LH = # 1

- If communication cannot be established between ISAT and the LH-system ECU, check first the leads between ECU pins 12 and 16 and the diagnostics socket (347).

  Also check the live feed to the diagnostics socket, that the socket has a good earth and that the connector pins are not damaged.

- Once the fault data stored in the LH-system ECU have been transferred to ISAT, the diagnosis work, as such, is finished. The detected faults are now available in the form of 5-digit codes; reference to these codes in the fault-diagnosis chart (page 18) will indicate the procedure to be followed.

Connecting test probes to the ECU connector

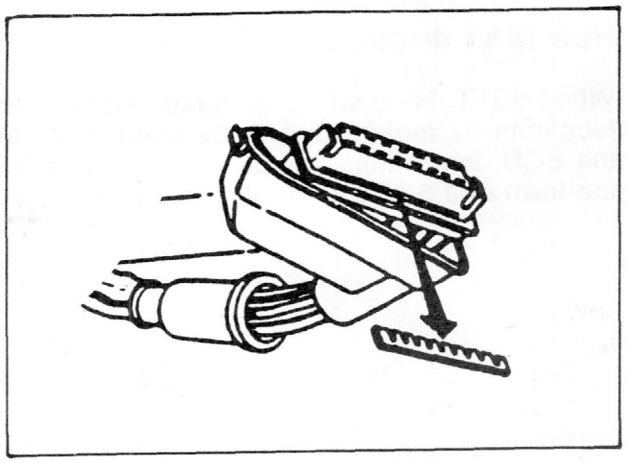
Before starting any fault-diagnosis work on the LH system, you must first gain access to the ECU connector block. Test probes and the like must be connected to the back of the wiring-loom half of the connector.

1. Remove the ECU, located in the space before the intermediate wall.

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

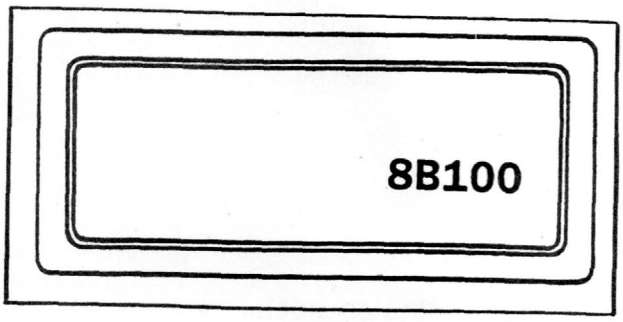
The words, 'Check the wiring between xx and yy', are used frequently in the fault-diagnosis charts. Sometimes the wiring may be run through different types of connector and, by implication, these must also be checked for circuit continuity and short circuiting.

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.

How ISAT displays the results

When ISAT is used to simulate signals or functions by means of special commands to the ECU, the results appear on the display in the form of a 5-character alphanumeric code.



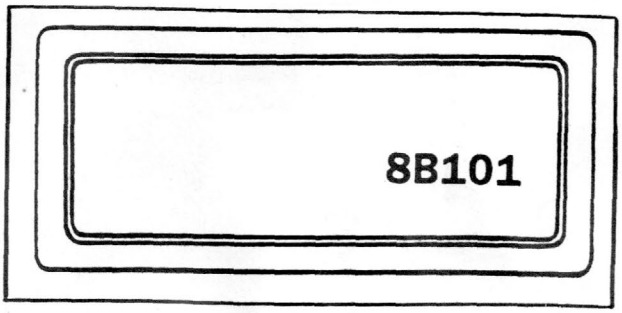
The result for a code entered is displayed in the form of a 5-character alphanumeric code.

Example 1:

To check the position of the throttle butterfly, we enter code 201 via the ISAT keypad.

With the engine idling, the code appearing on the display should be 8B101.

Further details are given under the heading, 'ISAT input command codes (LH 2.4, M1990)', on page 17.

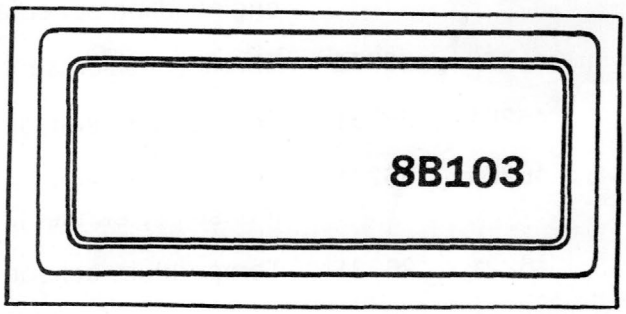


Example 2:

Sometimes we may want to determine whether a signal is high or low. To check the DRIVE signal, enter code 203 via the ISAT keypad.

If the signal has not been activated, 8B000 will appear on the display, indicating that the signal is low.

If the signal has been activated, the voltage should be high and 8B103 should appear on the display.



Further details are given under the heading, 'ISAT input command codes (L2.4, M1990)', on page 17.

ISAT error codes (LH 2.4 M1990)

Permanent fault	Intermittent fault	Faulty component/signal
67192		ROM (microprocessor chip)
45771	25771	Throttle-position sensor idling contacts not breaking circuit on increase in engine idling speed and load (constantly earthed).
45772	25772	Throttle-position sensor full-load contacts constantly closed.
46261	26261	Temperature sensor signal showing constant value.
46271	26271	Temperature sensor indicating temperature above 160°C (constantly earthed).
46221	26221	Temperature sensor indicating temperature below -90°C (break in circuit).
42291	22291	Voltage at ECU pin 4 not within 10 - 16V range.
42251	22251	Voltage at ECU pin 4 too low (< 1V).
58121	38121	Air mass meter: no filament burn-off function .
45691	25691	Air mass meter signal faulty (too high or too low).
42491	22491	Prolonged fault in fuel-air mixture (additive idling fault).
42492	22492	Prolonged fault in fuel-air mixture (multiplicative fault in conjunction with driving).
42450	22450	Mixture too lean.
42440	22440	Mixture too rich.
42460	22460	Faulty signal from Lambda sensor.
58321	38321	AIC valve faulty.
44261	24261	Road speed sensor signal faulty.
45723	25723	DRIVE signal faulty.
46391	26391	EGR system malfunction (temperature too high or too low).
58371	38371	Injectors: injection pulses faulty.

ISAT Input command codes (LH 2.4, M1990)

Code	Function	Display
550	Activates AC function (0.2 Hz)	8A550
200	Checks status of AC	8B100 (= activated) 8B000 (= not activated)
201	Checks position of throttle butterfly	8B101 (= idling position) 8B001 (= normal position) 8B301 (= full-load position) 8B103 (= idling + full load)
552	Activates injectors (15 Hz or 1.5 ms opening duration). Fuel pump isolated.	8A552
553	Activates AIC valve (1 Hz)	8A553
554	Activates ELCD valve (1 Hz)	8A554
202	Checks status of ELCD valve	8B002 (= open) 8B102 (= closed)
555	Activates EGR valve (1 Hz) (US-West only)	8A555
203	Checks status of DRIVE signal	8B103 (= activated) 8B000 (= not activated)
205	Checks status of Lambda sensor	8B105 (= lean) 8B305 (= rich) 8B005 (= inoperative)
900	Deletes all error codes and resets all adaptive values to basic settings	11111
930	Resets all adapted values to basic settings	11011
100	Transfers all error codes from the LH-system ECU to ISAT	
207	Ignition pulses	8B107 (= pulses present) 8B005 (= no pulses)
382	ECU identification code (last four digits of Bosch part no.)	(To be entered only when requested by Saab-Scania AB.)

ISAT fault-diagnosis chart (LH 2.4, M1990)

Permanent fault	Intermittent fault	Malfunction	Action
67192		ROM fault (ECU faulty)	Try a known good ECU.
45771	25771	Throttle-position sensor (203): idling contacts constantly open	A Enter code 201 on ISAT. Depress the accelerator slowly to the full-throttle position. The following should now appear on the display: 8B101 → 8B001 → 8B301. If 8B001 is displayed continuously, a break in the wiring to the throttle-position sensor is indicated. Go on to steps C and D. If 8B103 is displayed, the codes are shown in a different position or do not change: Unplug the connector from the throttle-position sensor. 8B001 should now show on the display. If not, go to step c), d) or e) as appropriate. B If 8B001 is displayed, try a known good throttle-position sensor. C If 8B101 is shown, check the wiring between pin2 of the ECU (200) and pin1 of the throttle-position sensor (203), and the wiring between ECU pin2 and pin7 of the EZK-system ECU (176). D If 8B301 is shown, check the wiring between pin3 of the ECU (200) and pin3 of the throttle-position sensor (203) and also terminal TK on the AC relay (156). Also check that terminal TK is not earthed. E If 8B103 is displayed, check the wiring as detailed in steps C and D. F Try a known good LH-system ECU
45772	25772	Throttle-position sensor (203) full-load contacts constantly closed	Same procedure as for 45771/25771 above.
46261	26261	Constant signal from temperature sensor (202)	A Check the wiring between pin13 of the ECU (200) and pin 1 on the temperature sensor (202). B Check the wiring between pin2 of the temperature sensor and earthing point 201. C Check that a good earth is obtained at the earthing point. D Check the temperature sensor. E Try a known good LH-system ECU.

Permanent fault	Intermittent fault	Malfunction	Action
46271	26271	Temperature sensor (202) indicating temp. above 160°C	Check the resistance of the NTC resistor, and between pin 13 on the ECU and earth. Should be 2280-2720 ohm at 20°C or 290-356 ohm at 80°C, measured with ECU connector unplugged.
46221	26221	Temperature sensor (202) indicating temp below -90°C	Same procedure as for 46271/26271 above.
42291	22291	Voltage at ECU pin4 not within 10-16V range	Check the condition of the battery, charging system, earthing points, etc.
42251	22251	Voltage too low at ECU pin 4 (< 1V)	Check the condition of the battery, charging system, earthing points, etc.
58121	38121	No filament burn-off function at air mass meter (205)	A Check the wiring between pin 8 on the ECU (200) and pin 4 on the air mass meter (205) B Check the wiring between pin 5 on the air mass meter and pin87B on the system relay (229) C Try a known good air mass meter D Try a known good LH-system
45691	25691	Faulty signal from air mass meter	A Check for leaks in induction system between air mass meter and inlet manifold. B Check air mass meter pin 1 for good earth and pin 5 for live feed. C Try a known good air mass meter. D Try a known good LH-system ECU.

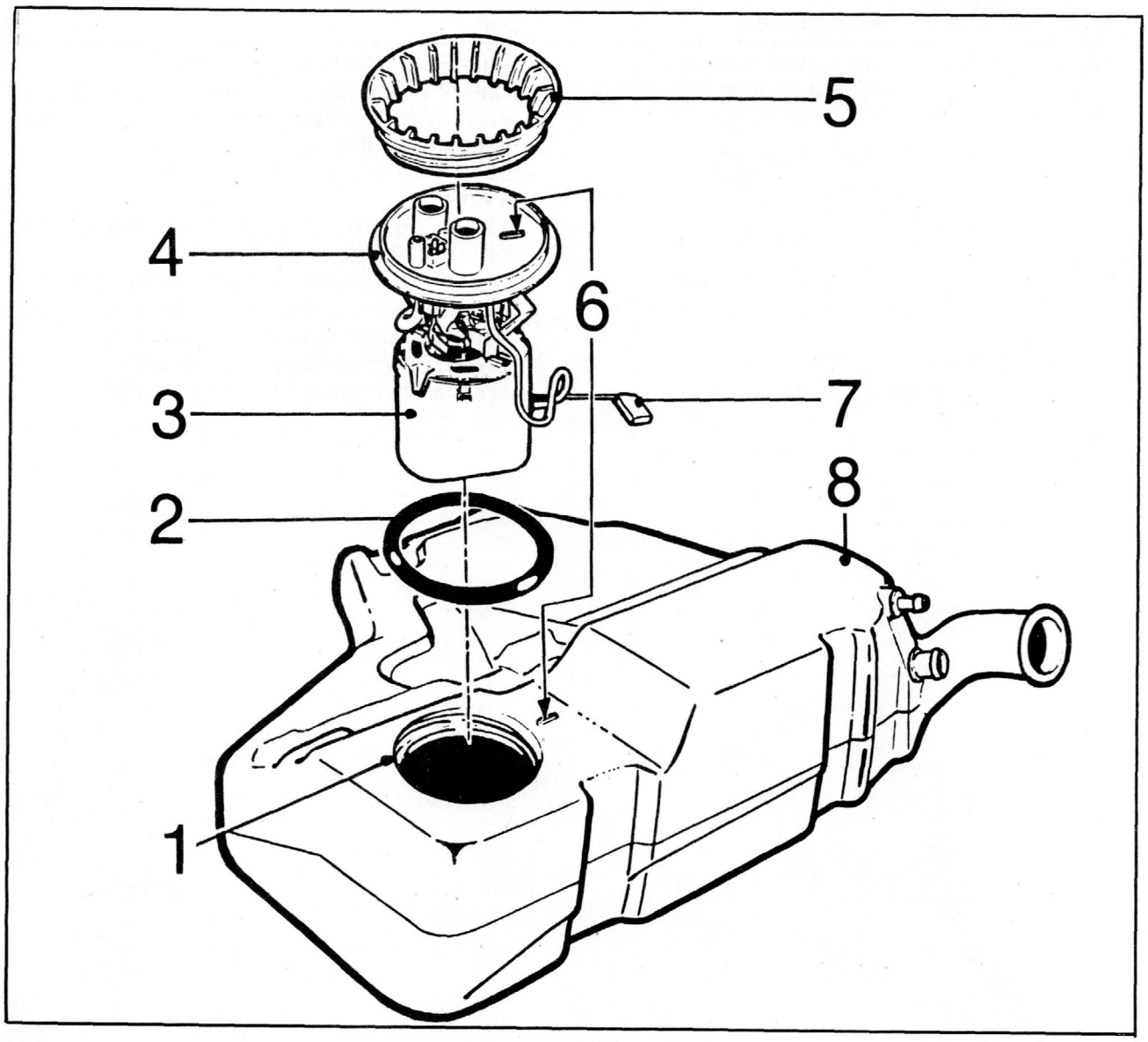
Permanent fault	Intermittent fault	Malfunction	Action
42491	22491	Prolonged fault in fuel-air mixture on idling (= additive adaptive error in Lambda system)	A Check for leaks in induction and fuel systems and the Lambda-sensor preheater function. B Check the operation of the induction system. C Try a known good LH-system
42492	22492	Prolonged fault in fuel-air mixture when driving (= multiplicative adaptive error in Lambda system)	A Check for leaks in induction and fuel systems and the Lambda-sensor preheater function. B Check the operation of the induction system. C Try a known good LH-system
42440	22440	Rich mixture	A Check for loose screws or hose clips and for leaks in hoses or around 'O' rings. B Check for leaks in the induction system and that it is operating properly. C Check that voltage is present across the pins on the Lambda-sensor connector. D Check the fuse for the Lambda-sensor preheating. E Check that the Lambda sensor signal fluctuates between 0 and 1.5V (sensor warm). F Replace the Lambda sensor. G Try a known good LH-system ECU. Test: enter code 205 on ISAT. During the warm-up phase, 8B105 (lean) and 8B305 (rich) should alternate on the display (changing about every 20 seconds).
42450	22450	Lean mixture	Same procedure as for 42440/22440 above.

Permanent fault	Intermittent fault	Malfunction	Action
45723	25723	Faulty DRIVE signal	A Check fuse 9 B Check that battery voltage is present in pin3 of the shift-up switch (239) with the ignition switch in the Drive position. If not: check the wiring between the +54 supply terminal (231) and pin3 on the shift-up switch. C Check that the shift-up switch is working. D Check the wiring between pin4 on the shift-up switch and pin30 on the ECU (200) Test: enter code 203 on ISAT. Move the selector lever slowly from P to D. 8B003 shown on the display (P & N positions) should now change to 8B103 (DRIVE position).
46391	26391	EGR function faulty (US-West)	A With ignition in the Drive position (engine off), enter code 555 on ISAT. Check that the modulating valve is operating. If not: Check the yellow/white lead between ECU pin 19 and connector 394, and the white lead between the connector and the modulating valve (390). Also check the green/white lead between the modulating valve and the pin for the green/red lead in the connector to the injectors. B Try a known good modulating valve. C Check the yellow/white lead between the thermostatic switch (389) and ECU pin 23, and the black lead between the thermostatic switch and earthing point 201. D Try a known good thermostatic switch. E Try a known good LH-system
42460	22460	Faulty signal from Lambda sensor (136)	A Check that the preheater function for the Lambda sensor is working (check for voltage across pins1 and 2 of connector 59). B Check the wiring between pin24 on the ECU (200) and connector 60. C Check the wiring between pin5 on the ECU and the screening around the Lambda-sensor lead. D Run the engine up to normal temperature. Disconnect the lead from the Lambda sensor at connector 60 and measure the signal voltage. This should be 0.5V (approx.). E Try a known good Lambda sensor. F Try a known good LH-system ECU. Test: enter code 205 on ISAT. Run the engine up to normal temperature and check that the display alternates between 8B105 (lean) and 8B305 (rich) within 20 seconds. If 8B005 is displayed, the Lambda sensor is not actuated.

Permanent fault	Intermittent fault	Malfunction	Action
58321	38321	No signal from pin 33 of the AIC valve	A With the ignition in the Drive position (engine off), enter code 553 on ISAT. The valve should now pulse about once every second. B Check that battery voltage is available from the + 30 supply terminal. C Check the wiring between the + 30 supply terminal and pin 30 on the system relay (229). D Check the wiring between pin87 on the system relay and pin1 on the AIC valve (272). E Check that battery voltage is present across pin 1 on the AIC valve (272) and earth. F Check the wiring between pin 33 of the ECU and pin 2 of the AIC valve. G Check the setting and operation of the throttle-position sensor (203). H Check that the throttle-butterfly is correctly adjusted (as near to closed as possible without binding). I Try a known good system relay. J Try a known good AIC valve. K Fit a new LH-system ECU.
58371	38371	Faulty injection pulses to injectors (206)	A With the ignition in the Drive position (engine off), enter code 552 on ISAT. The injectors should now pulsate about 15 times a second. B Check that battery voltage is present at pin 30 of the system relay (229). C Check the wiring between pin 87 of the system relay and pin1 on the injectors (206). D Check the wiring between pin 18 of the ECU (200) and pin 2 on the injectors. E Try a known good system relay. F Try a known good LH-system ECU.

Permanent fault	Intermittent fault	Malfunction	Action
44261	24261	No signal from road speed sensor (US-West)	A With ECU connector plug on: Check the voltage across ECU pin 34 and earth. When either of the front road wheels is spinning, the value should oscillate between 1 and11 V. If not: Check the green lead between the speed sensor (132) and ECU pin 34. Check the black lead from the sensor to earthing point 3, and the green/white lead to terminal 15 on the ignition switch (20). B Try a known good speed sensor. C Try a known good LH-system ECU.

Fuel tank and fuel pump



Fuel tank and fuel pump M1990

1 Reinforcement ring
2 Seal
3 Fuel pump
4 Top
5 Screw top
6 Alignment marks
7 Float for fuel-gauge sender unit
8 Fuel tank

A new fuel pump has been fitted to all 9000 cars.

The pump is of the same type as before, with an ejector pump feeding the main pump, but now incorporates a number of modifications.

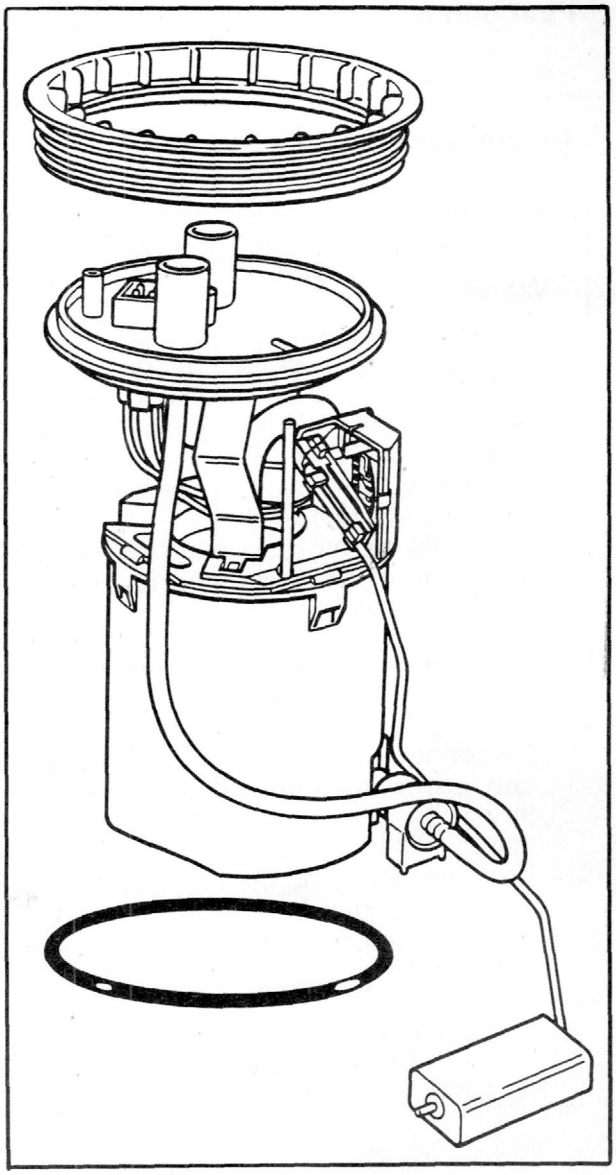
A new screw top and a new type of rubber seal have been introduced to facilitate fitting of the pump inside the tank. Simpler tools can be used for removal and fitting of the pump, and the pump is also less likely to leak.

The pump incorporates the fuel-gauge sender unit, which can be adjusted by the new EDU trip computer fitted in M1990 cars. In addition to adjustment of the fuel-gauge reading, it is also possible to adjust the amount of fuel remaining to match a range of zero miles.

The resistance of the sender unit is 35 ohm when the tank is empty and 350 ohm when the tank is full.

Further details are given in the electrical section of this supplement.

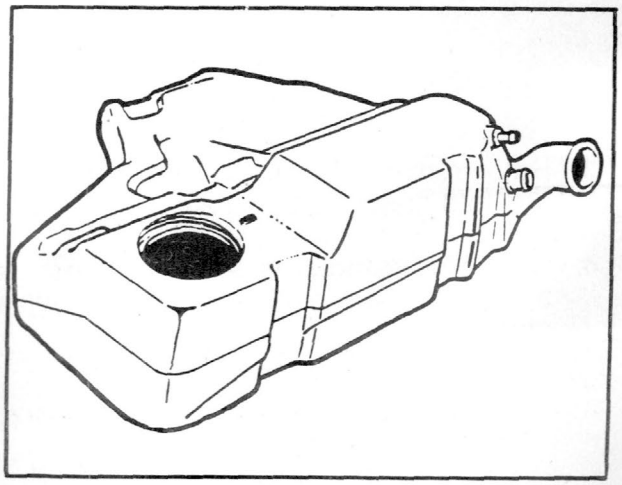
A breather pipe is incorporated in the fuel-pump strainer to evacuate any vapour.



Modifications to the tank to accommodate the new pump include a new reinforcement ring. The aperture for the earlier fuel-gauge sender unit has been discontinued, and all outlets are now welded to the tank. Modifications have also been made as a result of the fuel filter having been moved from the engine bay.

A tube inside the filler pipe leads fuel being added down to the bottom of the tank to prevent foaming.

The fuel-tank capacity is 66 litres (17.4 US gal).



Fuel pump

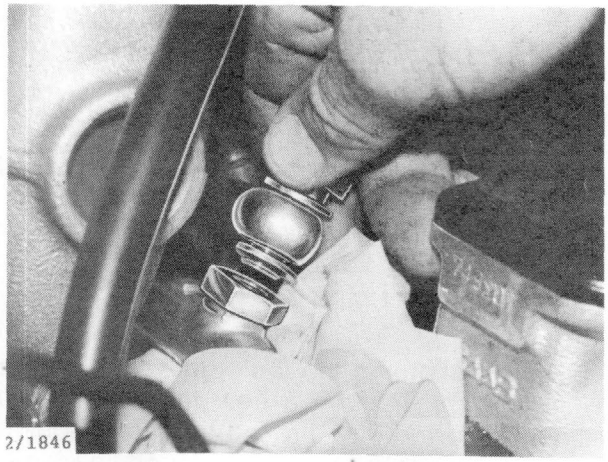
To remove

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

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.

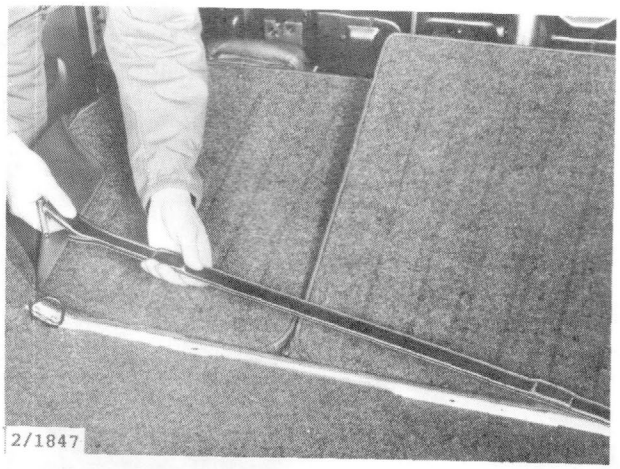


3. Hatchbacks only: lift out the parcel shelf and fold down the backrest.

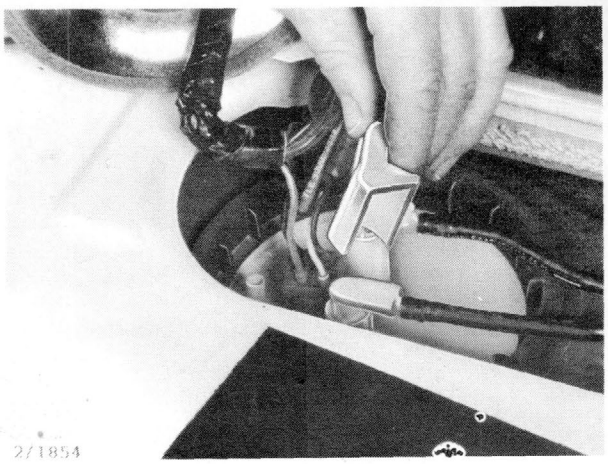
4. Remove the metal finisher. CD cars: use a hexagon bit adaptor and a small adjustable spanner.

5. Fold back the rear section of the luggage compartment floor. Undo the two screws and remove the floor panel.

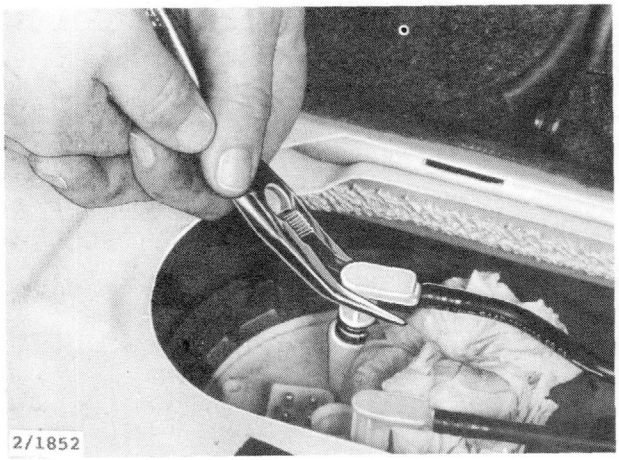
6. Undo and move aside the pump cover.



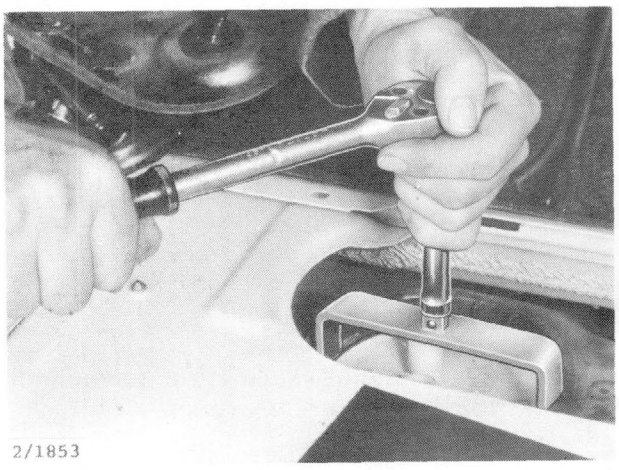
7. Release the clip and unplug the connector.



8. Disconnect the fuel lines from the pump. Push them aside and wedge them under the edge of the panel.

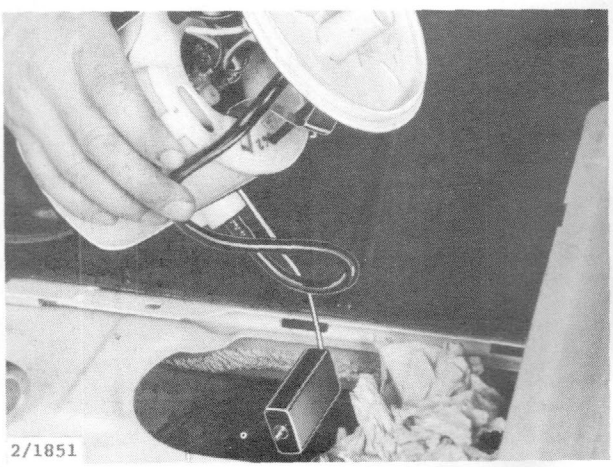


9. Undo the screw top using special tool 83 94 462.



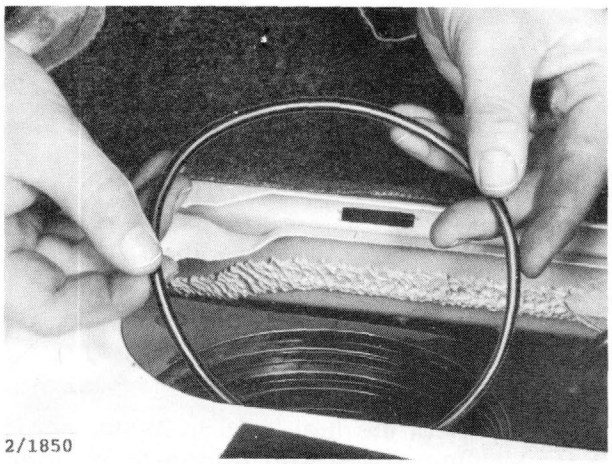
10. Lift the pump carefully, tilting the top to the right. Have some absorbent paper or rags handy to soak up any spilt fuel.

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



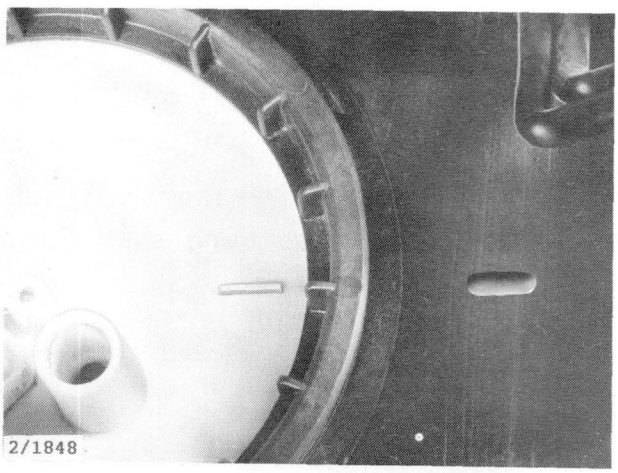
To fit

1. Fit a new 'O' ring in the groove in the tank fitting.


2/1850

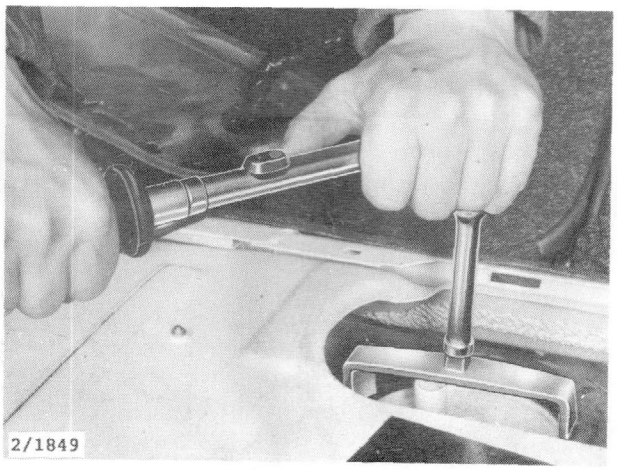
Caution
For the fuel-gauge sender unit to operate properly, the pump assembly must be correctly orientated.

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


2/1848

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

   Tightening torque: 55 Nm (40 lbf ft)

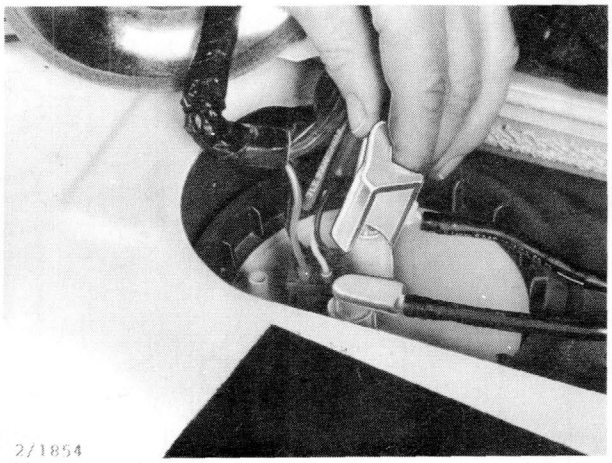

2/1849

Check that the aligning marks are still in line.

Tolerance: ± 5°.

4. Fit new 'O' rings inside the fuel line fittings and then connect the fittings to the pump.

5. Plug on the connector and secure the clip.



6. Reconnect the battery.

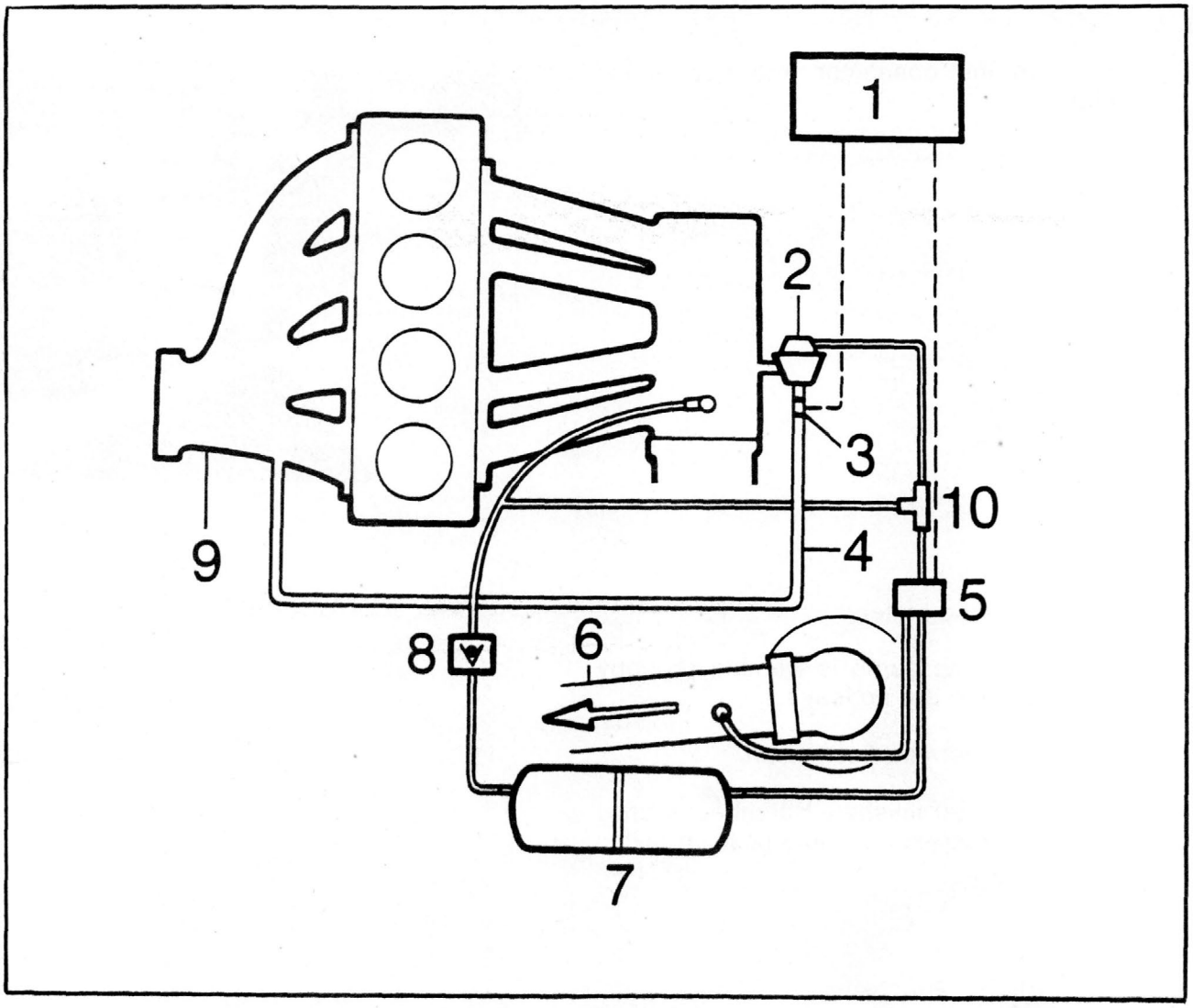
   Check that the pump is working properly and that there are no leaks.

7. Refit the cover and floor panel.

8. Refit the metal finisher. Hatchbacks only: Fold the backrest back into position.

The procedures for dismantling the pump, and replacing the ejector pump and hoses are the same as before. Section 2:3 of the Workshop Service Manual (LH fuel-injection system) refers.

Electronically controlled EGR (US-West)



Electronically controlled EGR, (Turbo) (Schematic diagram)

1. LH-system ECU
2. EGR valve
3. Thermostatic switch
4. EGR pipe
5. Modulating valve with vacuum regulator
6. Turbo delivery pipe
7. Vacuum tank
8. Non-return valve
9. Exhaust manifold
10. Overflow valve

All cars to US-West specification equipped with the LH2.4 system have an electronically controlled EGR system.

The principle of exhaust-gas recirculation (EGR) for reducing emissions of oxides of nitrogen has previously been employed on cars to EU1 specification without catalytic converter.

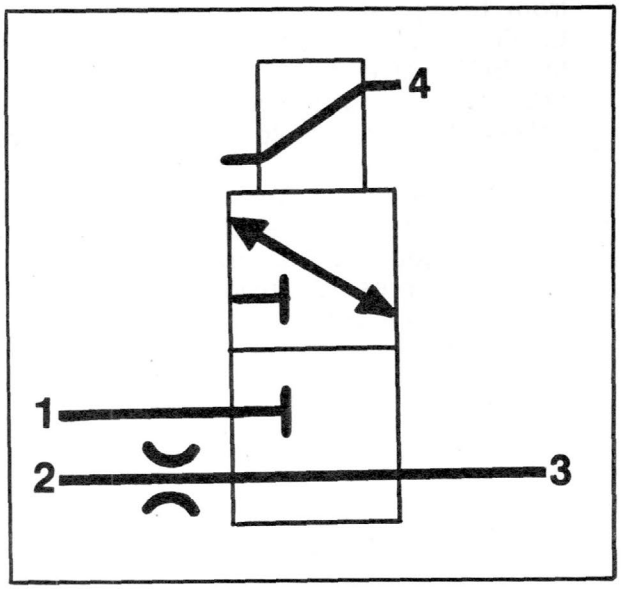
To meet the stricter regulations for California, an EGR system is now also being fitted to cars already equipped with catalytic converters. To maintain drivebility, and high precision in the EGR system combined with catalytic converter, the system is electronically controlled.

Description of operation

On cruising or gentle acceleration

Under normal conditions, the LH-system ECU collects information on the engine load, speed and temperature, and then computes the pulse ratio open/close cycle for the modulating valve to provide the required level of exhaust-gas recirculation.

The modulating valve functions like a three-way valve. A variation in the pulse ratio of the valve effects a similar variation in the control pressure to the EGR valve.



The valve is normally closed and opens when current is applied to the coil. The level of the control pressure is governed by the relationship between the time the valve is open and the time it is closed.

1 Vacuum tank
2 Venting
3 EGR valve
4 Coil

To ensure that a given pulse ratio will always provide the same control pressure, a vacuum regulator (incorporated in the modulating valve) is fitted in the line from the vacuum tank. The regulator maintains the vacuum acting on the modulating valve at a constant –200mbar.

On acceleration

During acceleration, when exhaust-gas recirculation is needed most, the pressure in the inlet manifold approaches zero and the control pressure is therefore lost.

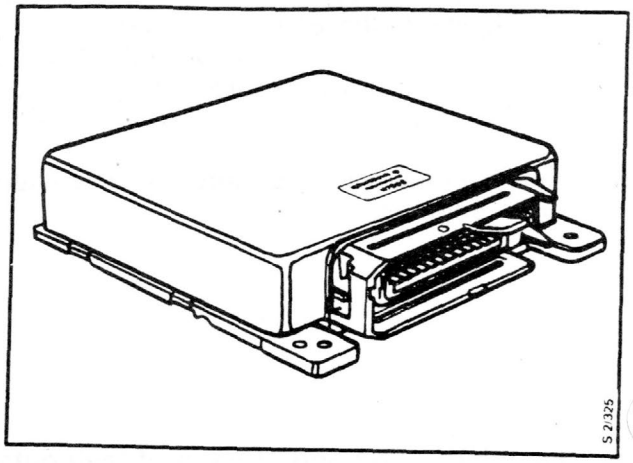
To maintain the necessary level of exhaust-gas recirculation, the control pressure for the EGR valve must be kept at about -120 mbar (the working range of the valve is between -50 and -150 mbar). This is where the vacuum tank and non-return valve come into play.

EGR system components

LH-system ECU

The LH-system ECU processes the data it receives on engine load, speed and temperature to compute the optimum pulse ratio for the modulating valve to produce the required level of exhaust gas recirculation.

In the event of a fault in the EGR system, the integrated fault-diagnosis function of the ECU will store an error code (12245) in its memory that can subsequently be identified by means of the CHECK ENGINE light.

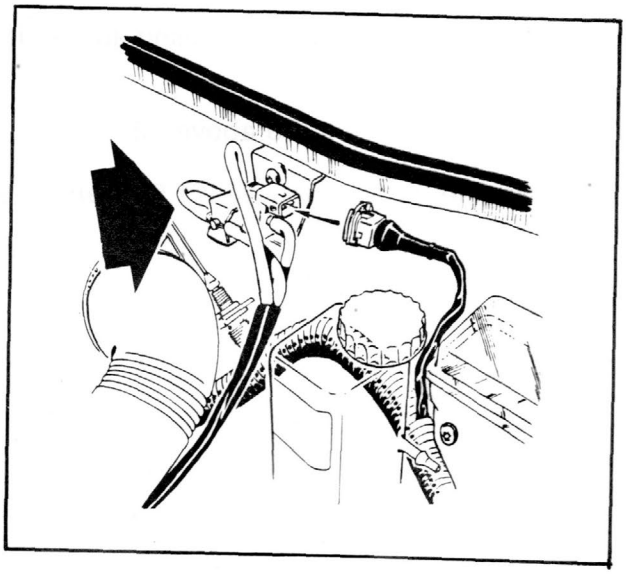


Modulating valve with vacuum regulator

The pulse ratio of the modulating valve, which functions like a three-way valve, controls the line pressure to the
EGR valve.

All the ports on the modulating valve are colour coded to obviate hoses being misconnected in conjunction with fitting or servicing of the valve.

The modulating valve is fitted behind the throttle-housing, intermediate wall.



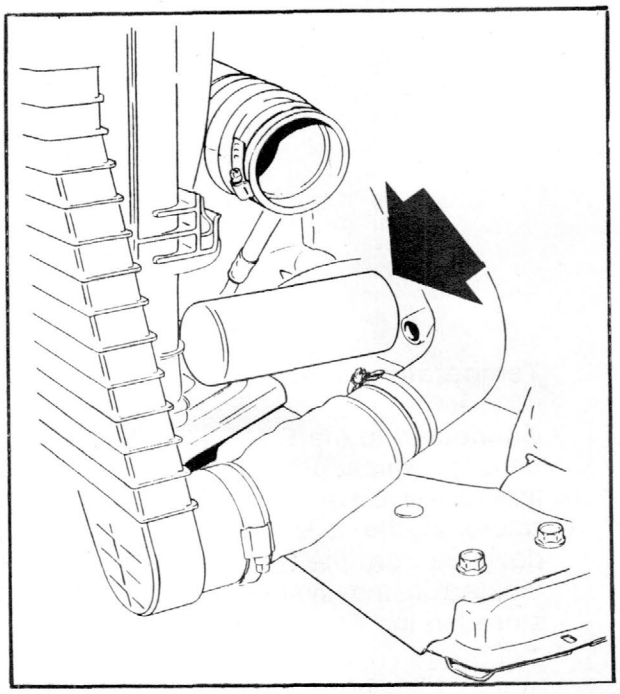
Vacuum regulator

A vacuum regulator is incorporated in the modulating valve to maintain a constant vacuum to the valve.

The regulator maintains a vacuum of -200 mbar.

Vacuum tank

The vacuum tank is connected via a non-return valve to the inlet manifold, which creates a vacuum in the tank under normal driving conditions. The vacuum will not exceed -400mbar.



Non-return valve

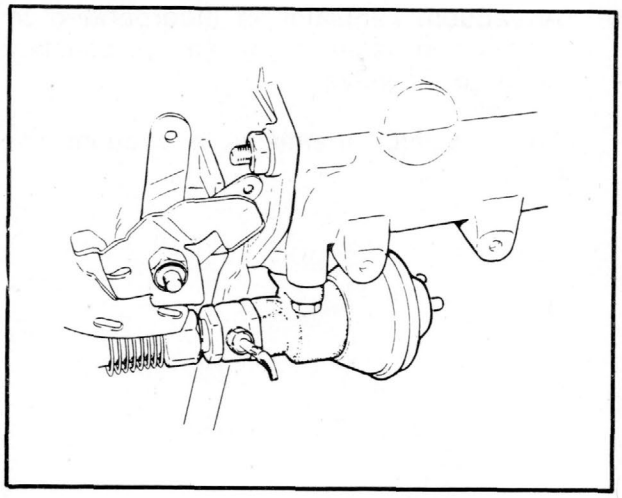
The non-return valve is fitted in the line between the vacuum tank and the inlet manifold. The purpose of the valve is to prevent the vacuum in the tank from being exhausted during acceleration.

EGR valve

The function of the EGR valve, which is controlled by the modulating valve, is to open or cut off the flow of exhaust gases from the exhaust manifold via the EGR pipe to the inlet manifold.

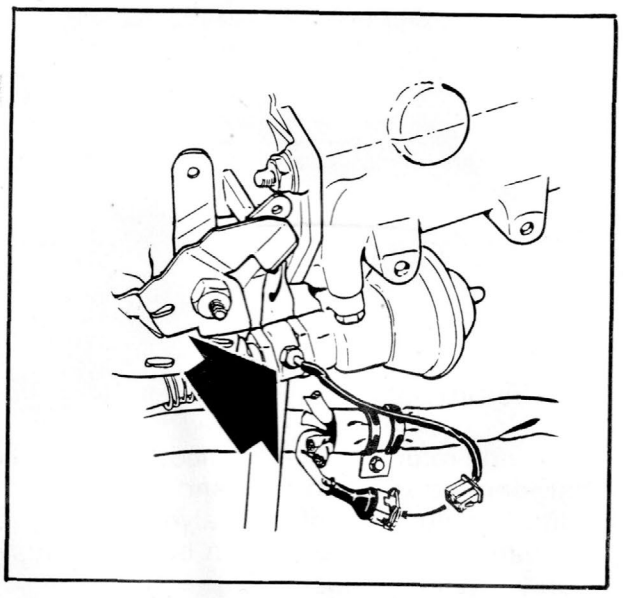
The EGR valve is opened by the control pressure (vacuum) acting on the diaphragm in the valve.

The valve is closed by means of a spring, assisted, when the engine is under full load, by the pressure from the overflow valve acting on the diaphragm.



Temperature sensor

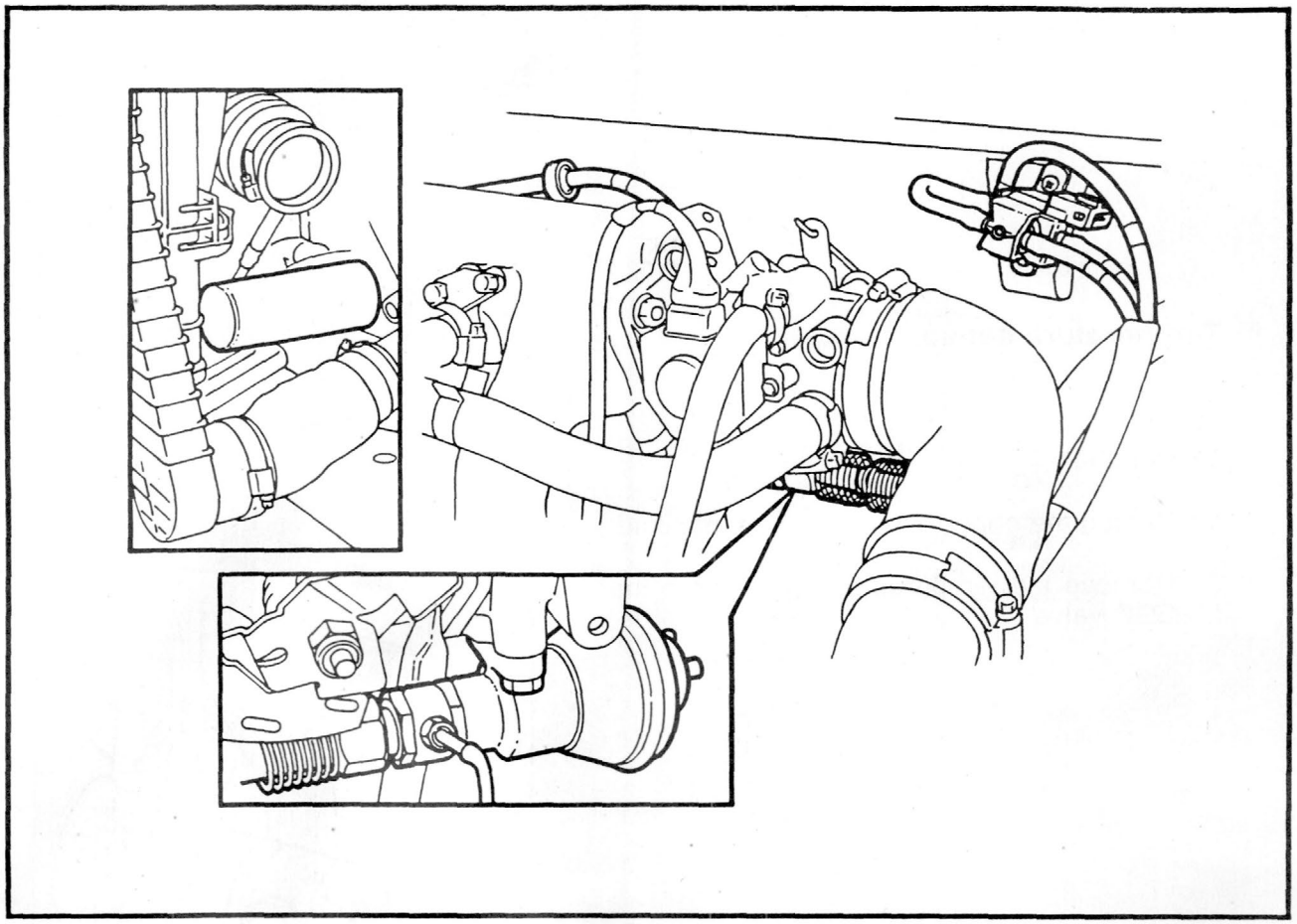
Connected to the EGR valve is a temperature sensor, which provides continuous information to the LH-system ECU about the temperature in the EGR pipe. If the temperature deviates from the nominal range, a fault is indicated in the system and an error code is stored in the ECU memory.



Overflow valve (Turbo)

When the engine is running at full load (> 400 mbar in the inlet manifold), the force of the spring in the EGR valve is not sufficient to keep the valve closed. To provide assistance to the spring, the overflow valve opens the line between the inlet manifold and the EGR valve, applying pressure to the diaphragm and keeping the valve closed.

The overflow valve is only fitted to turbo engines.

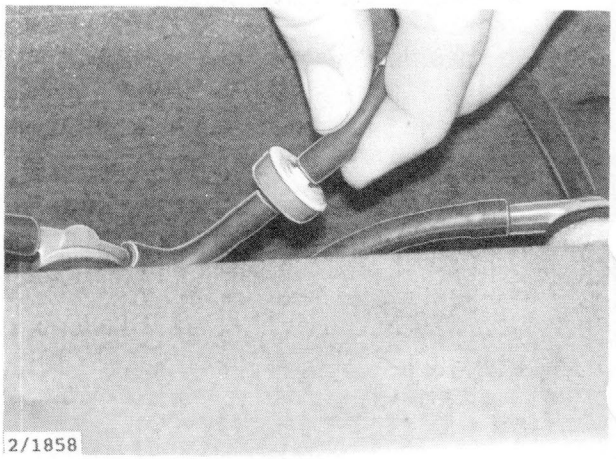


Component replacement

Non-return valve

To replace

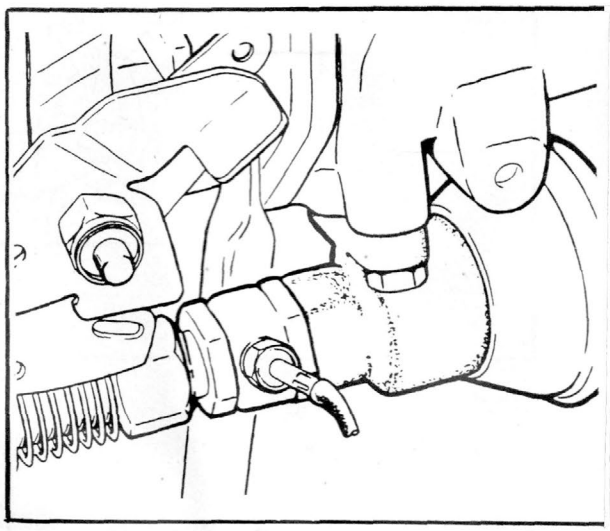
1. Disconnect the valve from the hose.
2. Fit the new valve, with the arrow pointing towards the vacuum tank.



Temperature sensor

To remove

1. Unplug the connector at the inlet manifold.
2. Remove the temperature sensor from the EGR valve.



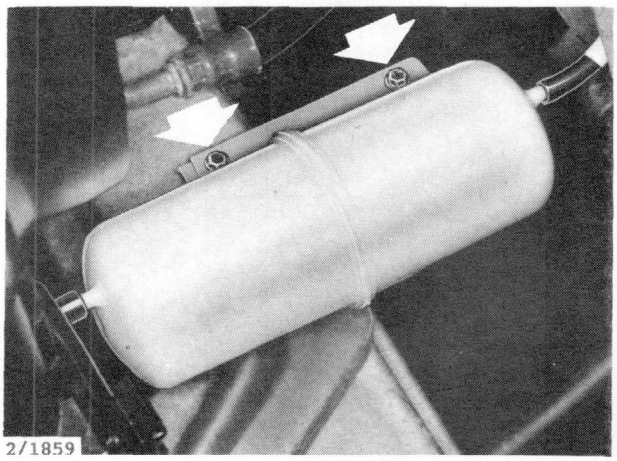
To fit

Fit in the reverse order.

Vacuum tank

To remove

1. Remove the air mass meter and tuck the air hose out of the way.
2. Disconnect the two vacuum hoses from the vacuum tank.
3. Unscrew (two screws) and remove the vacuum tank.


2/1859

4. Remove the bracket from the tank.

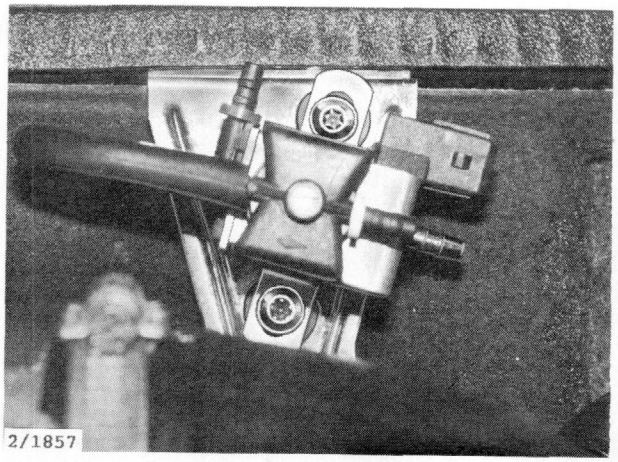
To fit

Fit in the reverse order.

Modulating valve

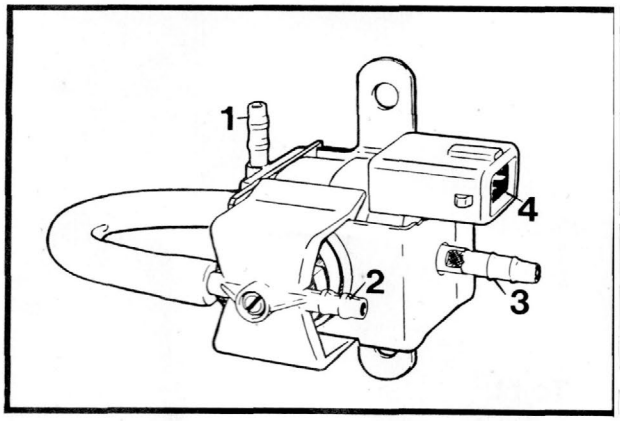
To remove

1. Unplug the connector and disconnect the three hose connections.
2. Remove the valve.



To fit

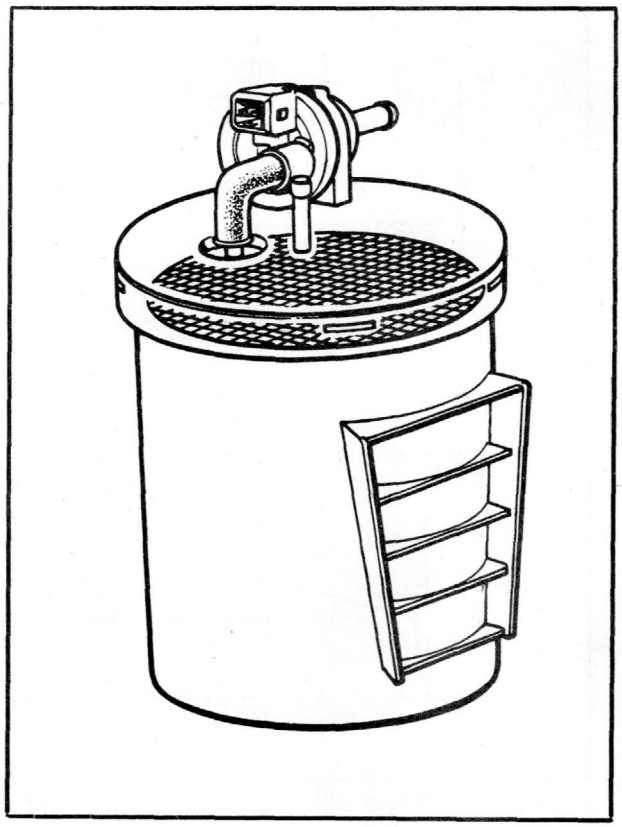
Fit in the reverse order, taking care to ensure that the hoses are fitted to the right connections (as shown).



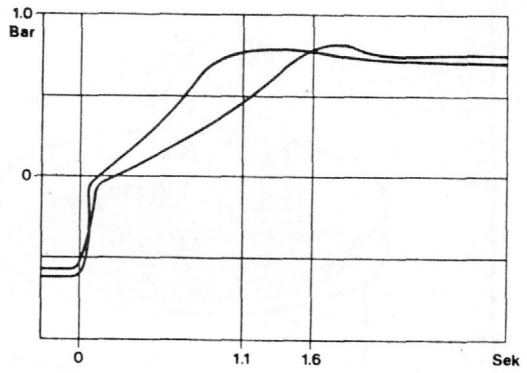
1 To EGR valve
2 To inlet manifold via vacuum tank
3 Turbo: to air hose between air mass meter and turbo compressor
Non-Turbo: to air hose between air mass meter and throttle housing
4 Two-pin connector (signal from LH-system ECU)

Modified charcoal canister (ELCD)

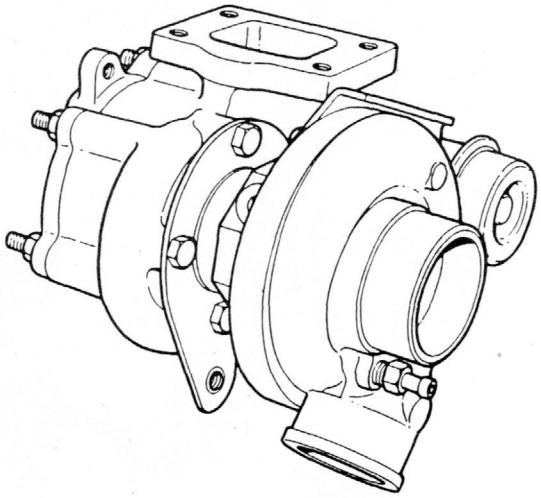
To prevent charcoal granules from being drawn into the ELCD valve and causing it to stick, a fine-mesh filter is now incorporated in the top of the canister.

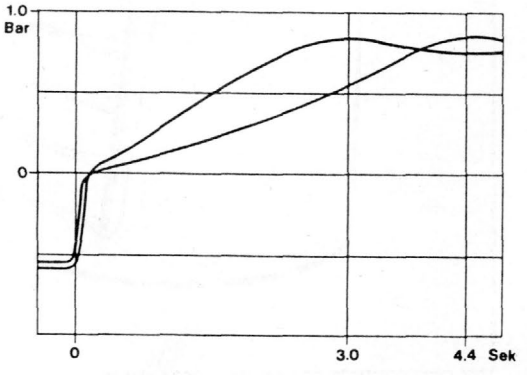


New T25 turbo unit T25 (GARRET)



Acceleration from 70 to 90 km/h in 3rd gear
Acceleration time with T25: 2.2 s
Acceleration time with T3: 3.0 s





Acceleration from 60 to 95 km/h in 4th gear
Acceleration time with T25: 5.0 s
Acceleration time with T3: 5.7 s

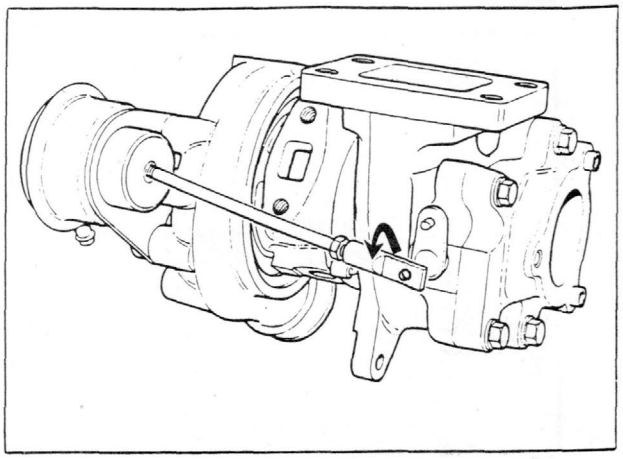
The T25 turbo is the first in a new generation of turbochargers. Thanks to the compact size of the unit and the reduced mass in the turbine wheel, response is much faster than on earlier models. In addition, boosting now starts at lower engine speeds, and the rapid boost of pressure characteristic of other turbochargers has been superseded by a smoother build-up of pressure.

The T25 turbo is fitted to cars with US, EU (cat.) and GB (non-cat.) specifications.

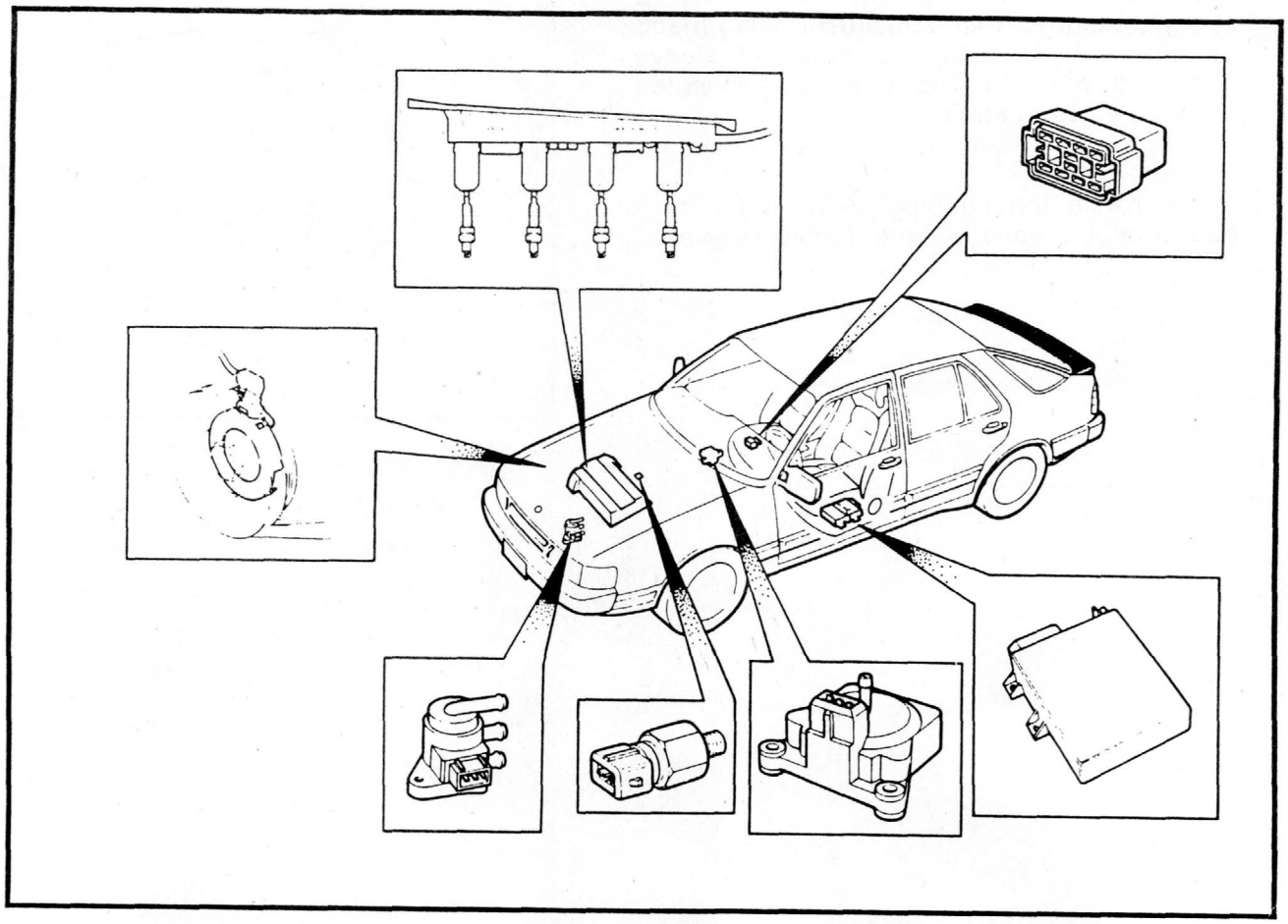
Adjusting the basic pressure

The T25 has a waste-gate valve has a straight pushrod, with adjustment being made as before by rotating the threaded sleeve once the pushrod has been disconnected from the valve actuator.

Caution
Never rotate the pushrod. Adjustment must be made by means of the threaded sleeve.



Integrated DI/APC system now also on US & CA specs.



The integrated DI/APC system is now fitted to all Turbo models.

Full details of the system are contained in the DI/APC system supplement, Section 2:6 of the Workshop Service Manual.

Electrical system

To change the bulbs in the control panel (ACC 2)

1 Disconnect the negative cable from the battery.

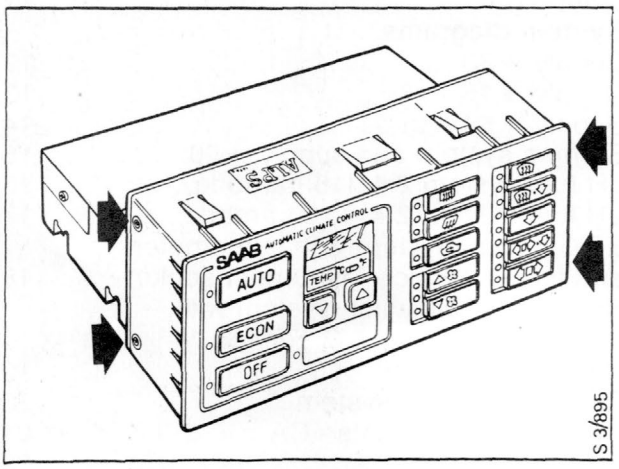
2 Remove the ashtray.

3 Bend down the two upper locking tabs and withdraw the ashtray holder forward.

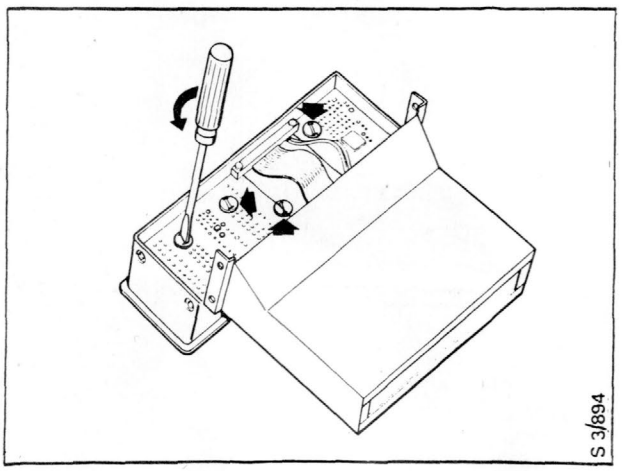
4 Press out and remove the control panel.

5 Disconnect the electric cables.

6 Remove the four screws for the front section.



7 Use a screwdriver to turn the bulb holder about 1/4 turn to release it.



8 Fit a new bulb and twist it to lock it in position.

9 Assemble in the reverse order.

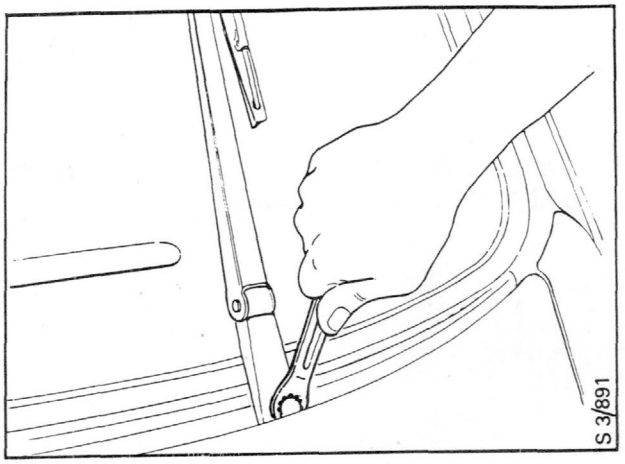
New windscreen wiper unit

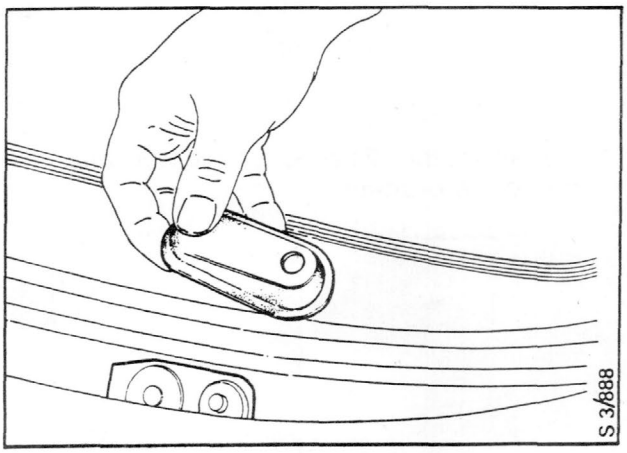
A new, sturdier windscreeen wiper unit has been introduced.

To remove the wiper spindles with bracket (LH drive cars)

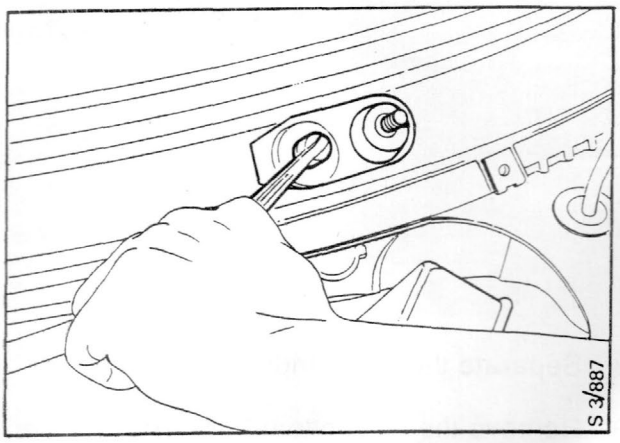
1 Start the windscreen wipers and switch off the ignition when the wiper blades are in the vertical position.

2 Remove the wiper arms and the rubber covers.



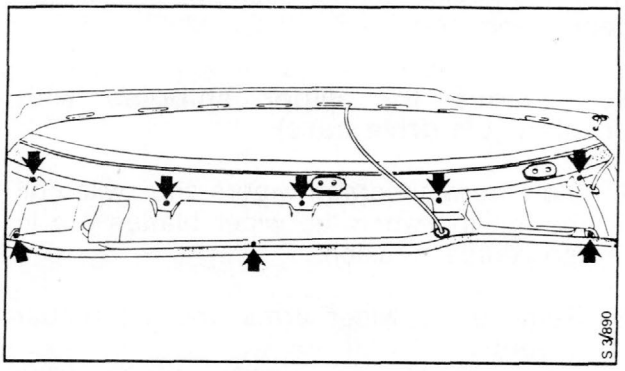


3 Remove the two upper bolts for the wiper motor mounting plate.

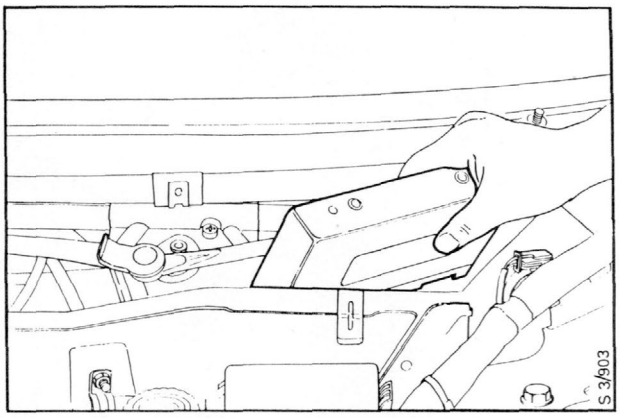


4 Disconnect the negative cable from the battery.

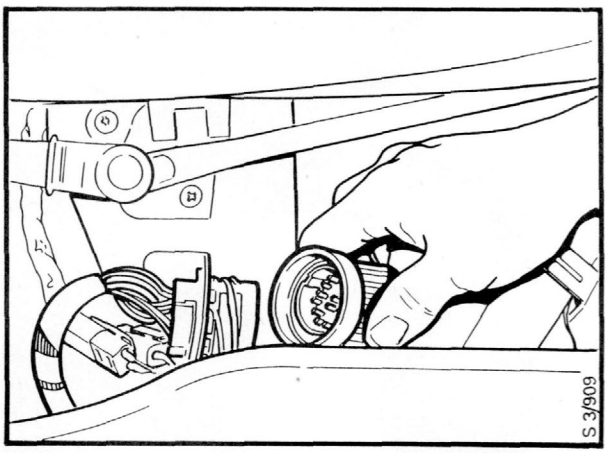
5 Remove the bonnet seal and cover (8 bolts), and separate the washer hose.



6 Remove the LH (and ABS, if any) control unit and remove the bracket.

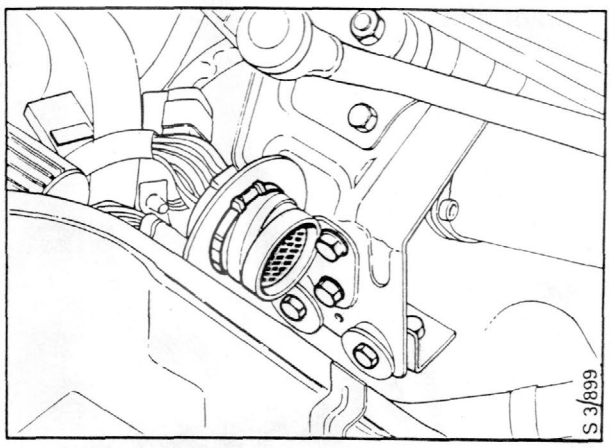


7 Separate the 24-pole connector and remove the bracket.

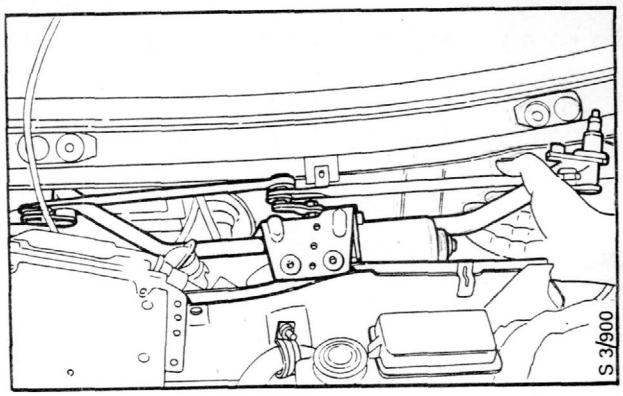


8 Separate the wiper motor connector.

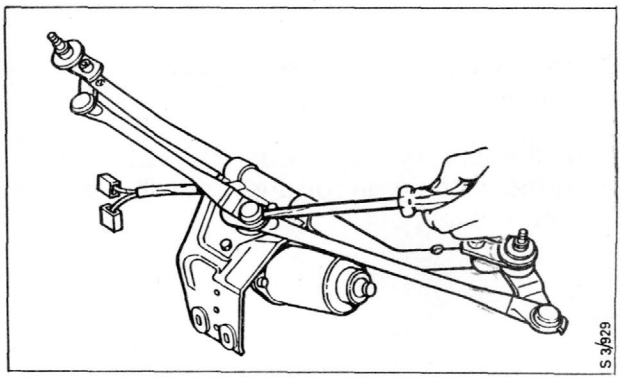
9 Remove the two bottom bolts for the wiper motor mounting plate.



10 Press down the wiper spindles, move the unit slightly to the right, and withdraw it with the left-hand wiper spindle first.



11 Use a screwdriver to prise off the arms and remove the motor



To fit

1 Fit the motor and arms.

2 Insert the wiper unit with the right-hand wiper spindle first, and fit the two top bolts.

3 Fit the bottom bolts and tighten the top bolts.

4 Connect the wiper motor connector and check that the colours of the cables correspond.

5 Fit the bracket for the 24-pole connector and twist the connector to connect it.

6 Fit the bracket and the LH (and ABS, if any) control unit.

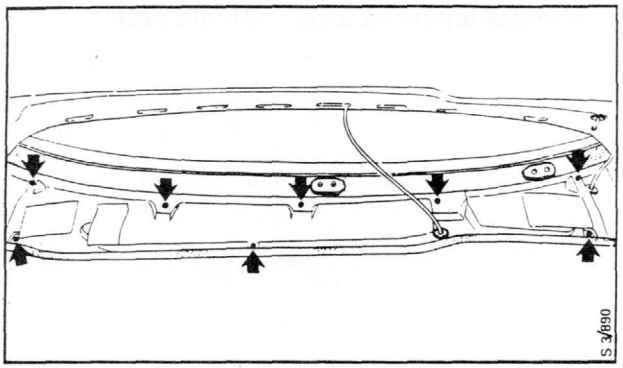
7 Connect the wiper hose, and fit the cover and the bonnet seal.

8 Connect the battery cable.

9 Switch on the ignition and let the wiper motor run for one revolution before fitting the rubber covers and the wiper arms, to make sure that the motor is in the parked position.

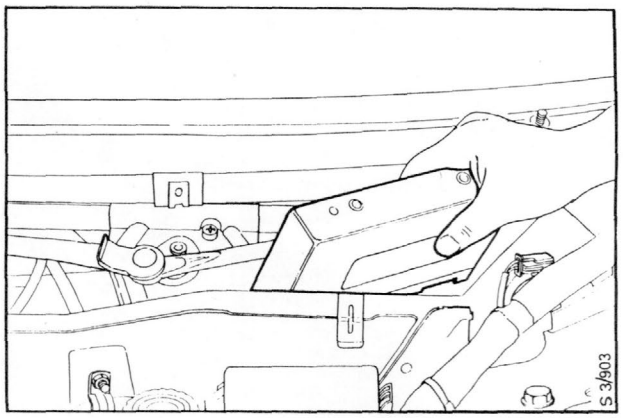
To remove the windscreen wiper moto

1 Remove the bonnet seal and cover (8 bolts), and separate the washer hose.

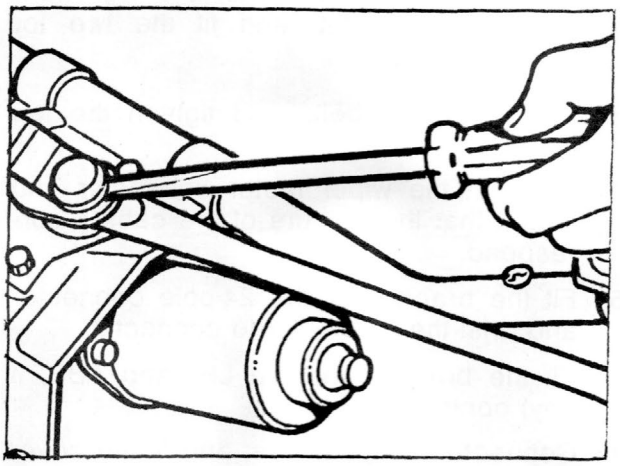


2 Disconnect the negative cable from the battery.

3 If the car is equipped with ABS brakes, remove the control unit from the bracket and move it out of the way.



4 Use a screwdriver to prise off the arms.



5 Separate the wiper motor connector.

6 Remove the motor (3 bolts) and withdraw it forward.

To fit

Fit in the reverse order

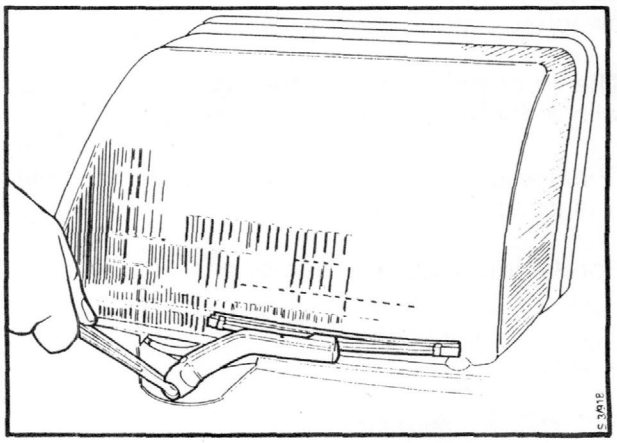
Headlamp wipers (US)

Four-door cars for the US market are equipped with headlamp wipers.

To remove

1 Disconnect the negative cable from the battery.

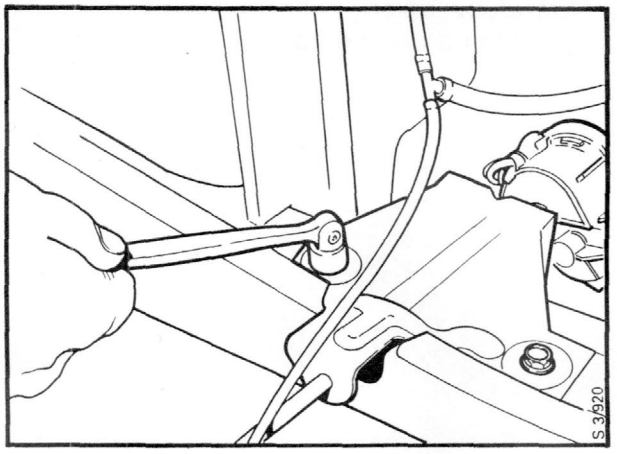
2 Raise the cap and remove the nut. Remove the wiper arm.

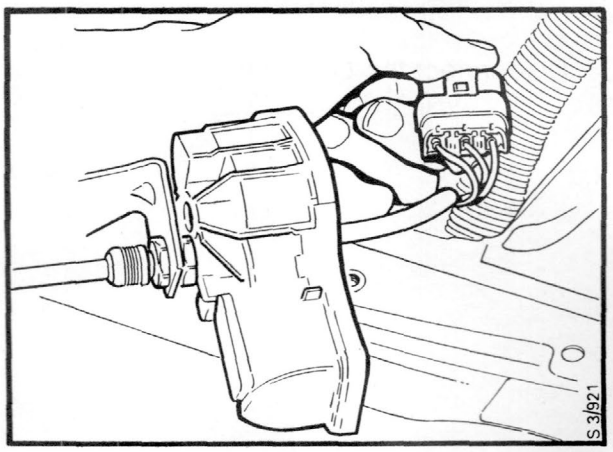


3 Remove the grille.

4 Remove the front lamp cluster and remove the headlamp (see section 351 in Service Manual 3:1).

5 Remove the wiper motor (2 bolts) and disconnect the electric cables.





To fit

Switch on the ignition and let the motor run for one revolution before fitting the wiper arm, to make sure that the motor is in the parked position.
Fit in the reverse order.

Switches for electric windows and sunroof

A new switch panel, with built-in switches and relays for automatic control of the windows, has been introduced.

The switch panel must therefore be replaced as a complete unit, although the bulbs in the switches can be changed separately.

The front passenger's door is also equipped with automatic control of the window.

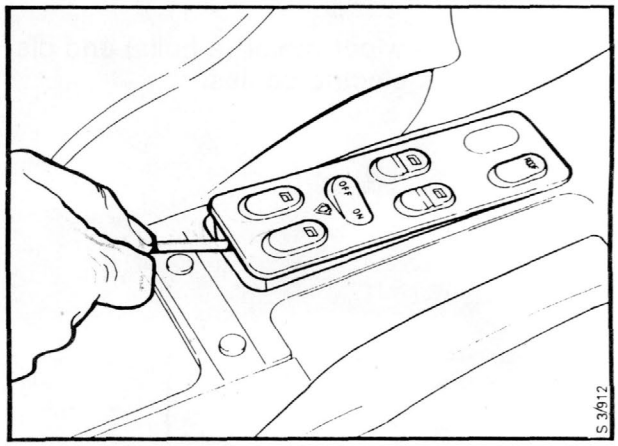
The switch for the rear door fans has been moved to the ACC 2.

For system diagram, see pages 44 and 47.

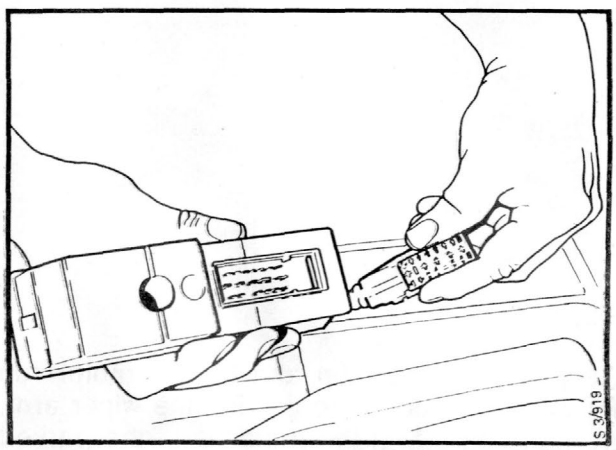
To remove

1 Raise the centre console cover.

2 Carefully insert a screwdriver under the panel and prise it up.



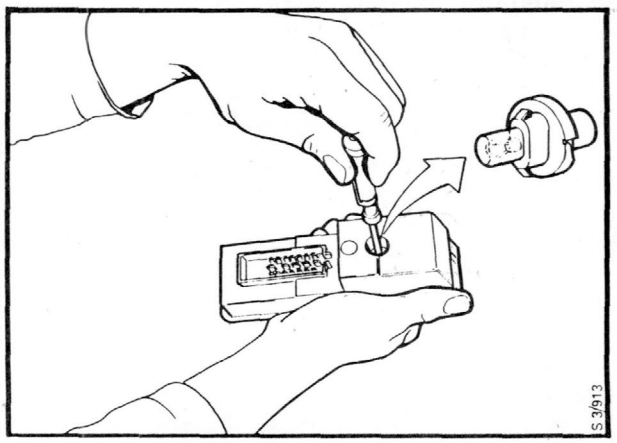
3 Disconnect the connector.



To change a bulb

1 Remove the switch panel.

2 Use a screwdriver to turn the bulb holder about 1/4 turn to release it.

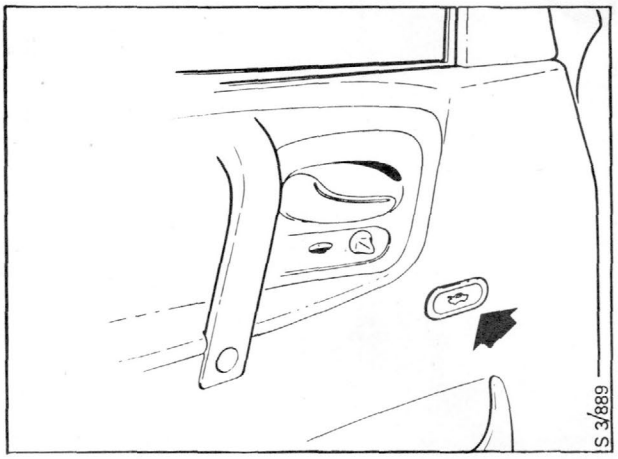


3 Fit a new bulb and twist it to lock it in position. Fit the panel.

Switch for luggage compartment lid

Four-door cars are equipped with a switch located in the driver's side door, to enable the luggage compartment lid to be opened from the inside of the car, instead of having to use the key to open it.

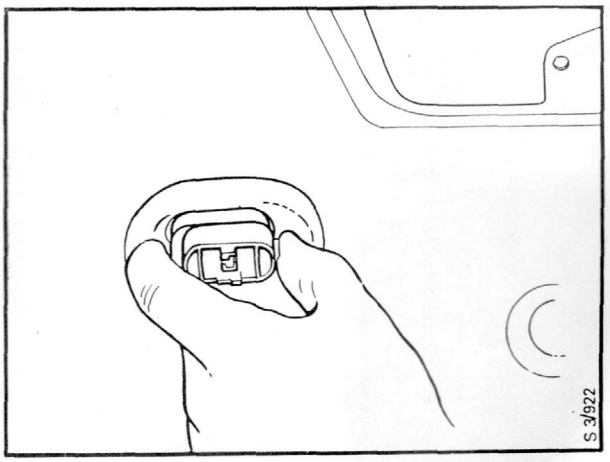
For system diagram, see page 45.



To remove

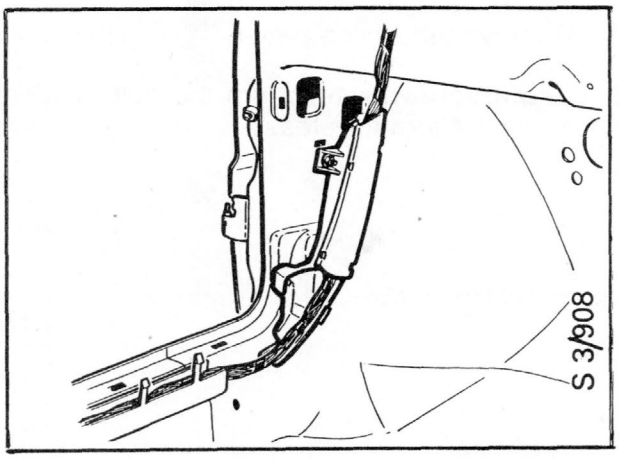
1 Remove the door panel (see section 851 in Service Manual 8:2) and disconnect the electrical connection.

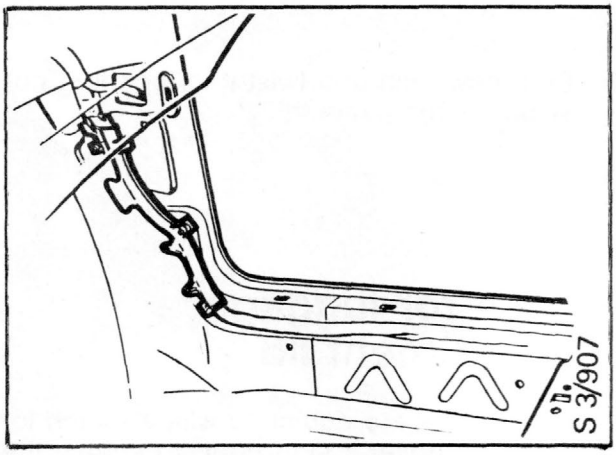
2 Compress the hooks and press the switch out.

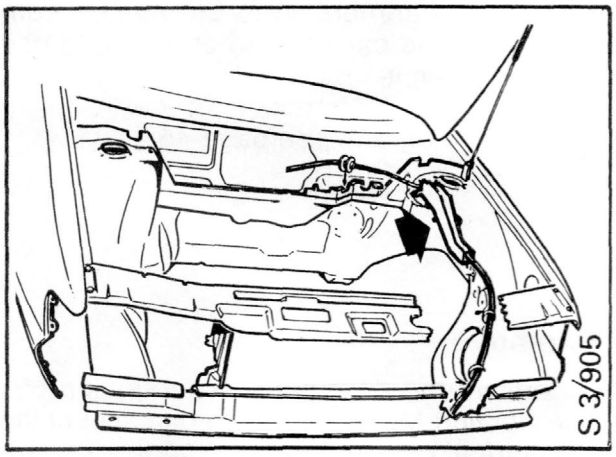


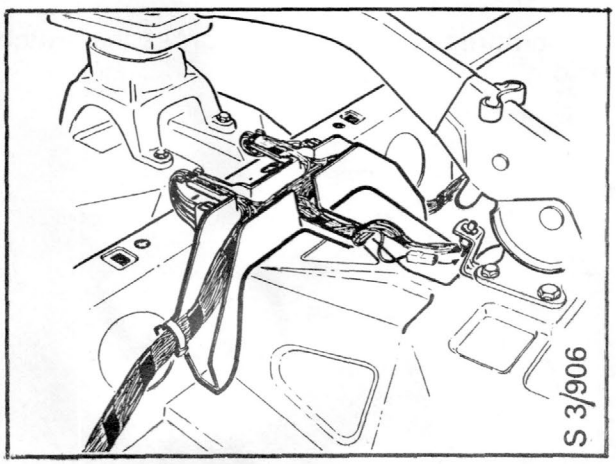
Cable conduits

New cable conduits have been introduced at the left-hand and right-hand A pillars, at the battery tray and at the handbrake.



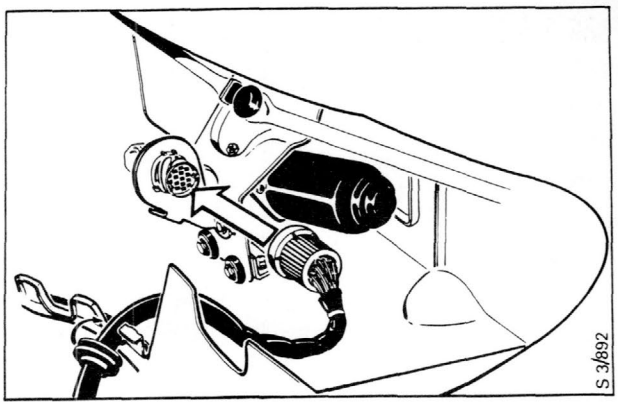






24-pole connector

A new 24-pole screw-on connector located at the windscreen wiper motor has been introduced.



EDU 1 and 2 programmable trip computers

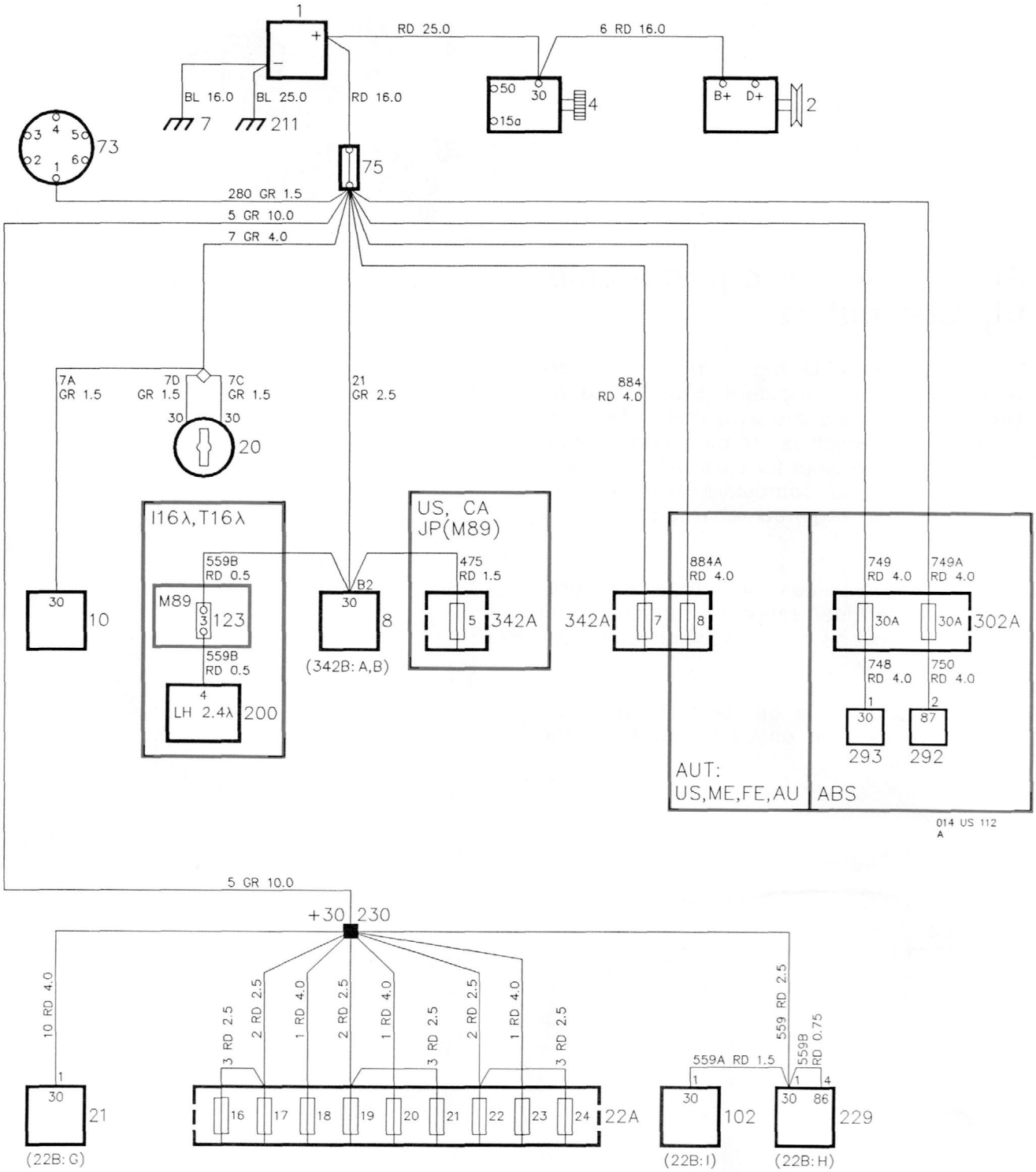
New, programmable trip computers supersede the earlier computers (EDU 1 and 2). The trip computers are available in two versions, one of which is for cars with manual gearbox and the other for cars with automatic transmission. The computers are programmed with the required characteristics by means of the ISAT.

In addition, the values for outdoor temperature, remaining fuel, range on remaining fuel and battery voltage can be calibrated (adjusted).

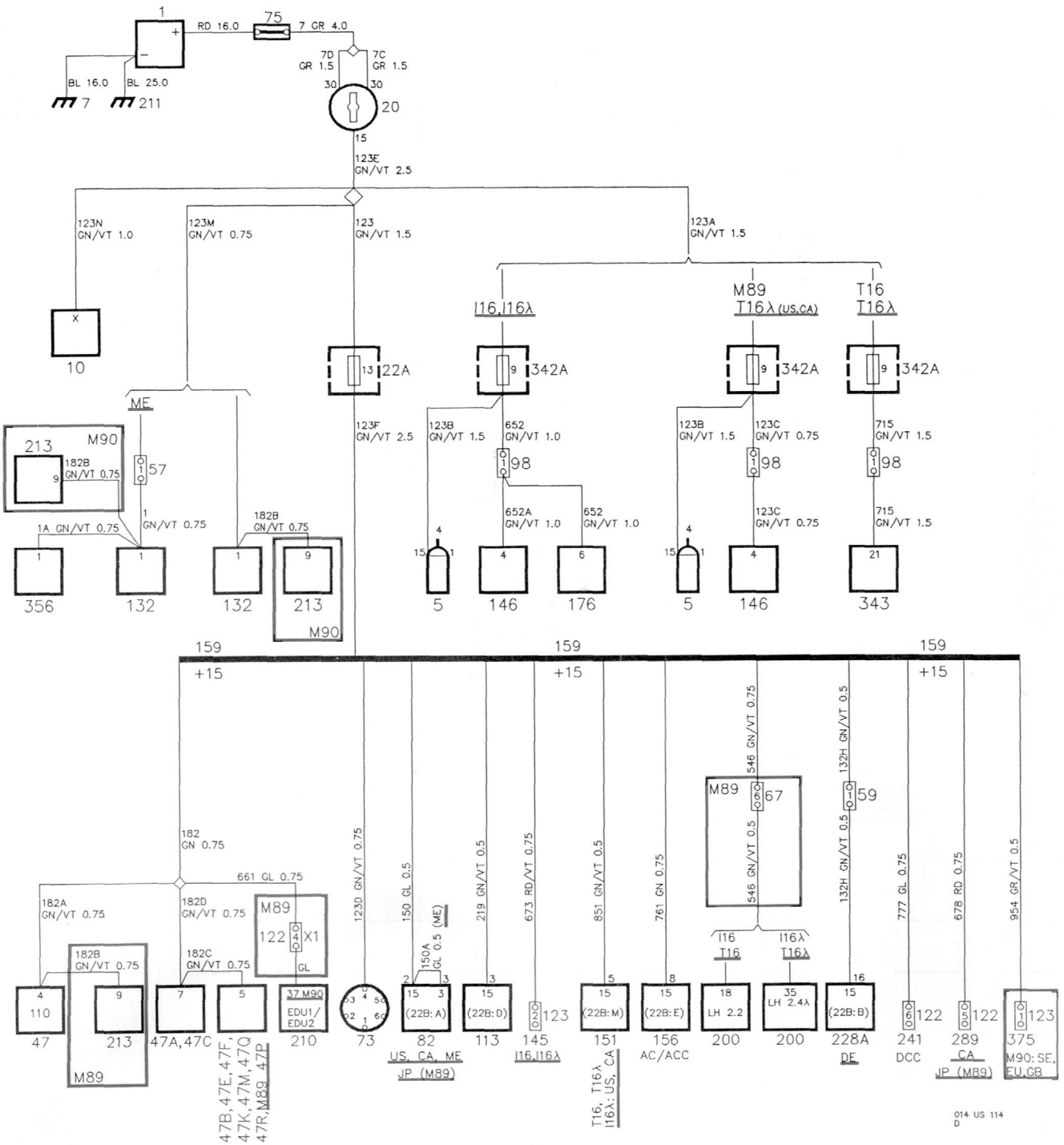
The new EDU 1 trip computer is equipped with gear indication on cars with automatic transmission.

For system diagram, see page 32.

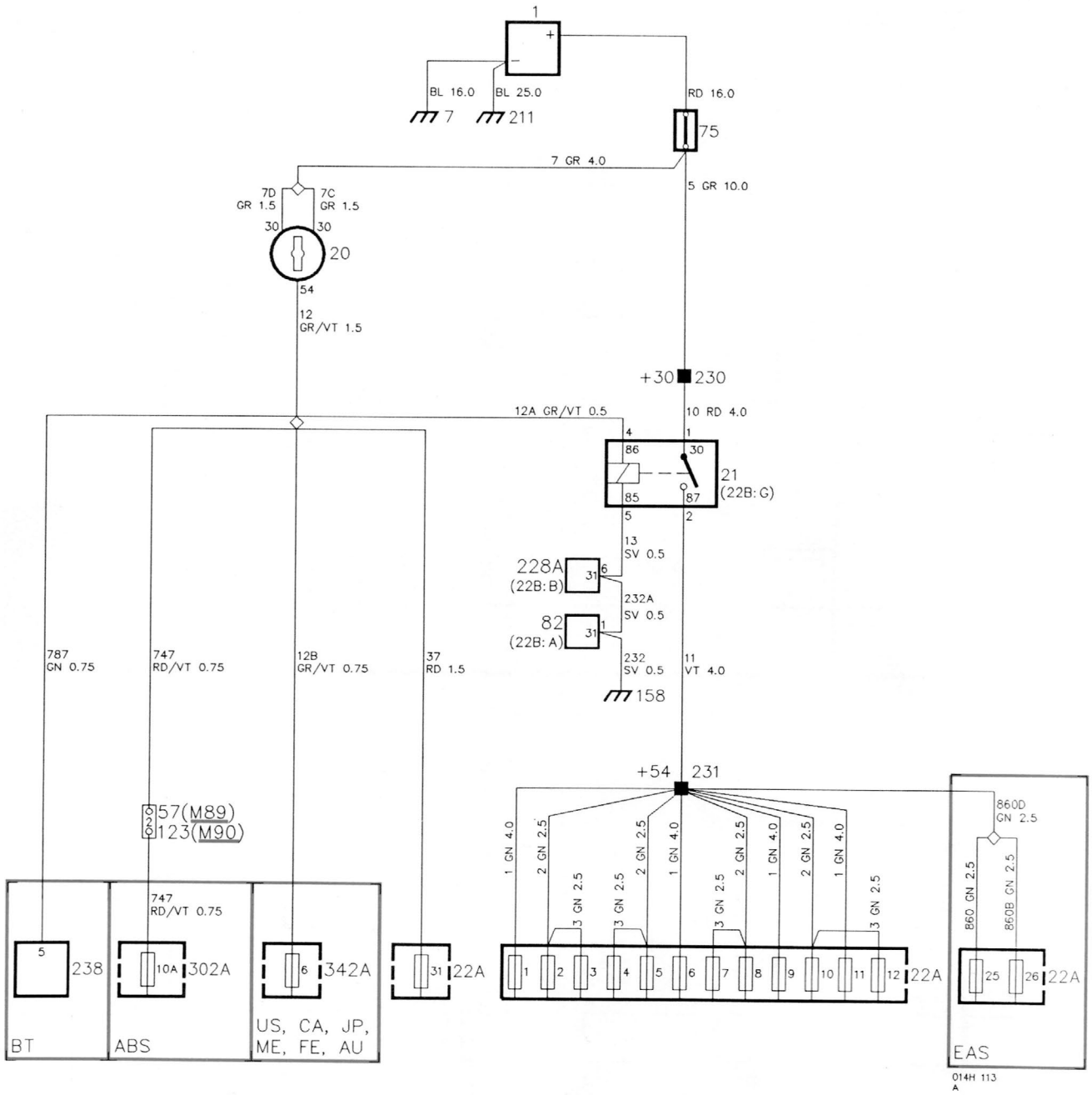
Supply +30


1
RD 25.0
6 RD 16.0
BL 16.0
BL 25.0
RD 16.0
7
211
50
30
15a
4
B+
D+
2
73
75
280 GR 1.5
5 GR 10.0
7 GR 4.0
7A GR 1.5
7D GR 1.5
7C GR 1.5
30
30
20
21 GR 2.5
884 RD 4.0
I16λ,T16λ
559B RD 0.5
M89
123
559B RD 0.5
4
LH 2.4λ
200
US, CA JP(M89)
475 RD 1.5
B2
30
8
(342B: A,B)
5
342A
342A
7
8
884A RD 4.0
749 RD 4.0
749A RD 4.0
30A
30A
302A
748 RD 4.0
750 RD 4.0
1
2
30
87
293
292
AUT: US,ME,FE,AU
ABS
014 US 112 A
10
30
5 GR 10.0
+30
230
10 RD 4.0
3 RD 2.5
2 RD 2.5
1 RD 4.0
2 RD 2.5
1 RD 4.0
3 RD 2.5
2 RD 2.5
1 RD 4.0
3 RD 2.5
559 RD 2.5
559A RD 1.5
559B RD 0.75
1
30
21
(22B: G)
16
17
18
19
20
21
22
23
24
22A
1
30
102
(22B: I)
1
4
30
86
229
(22B: H)

Supply +15

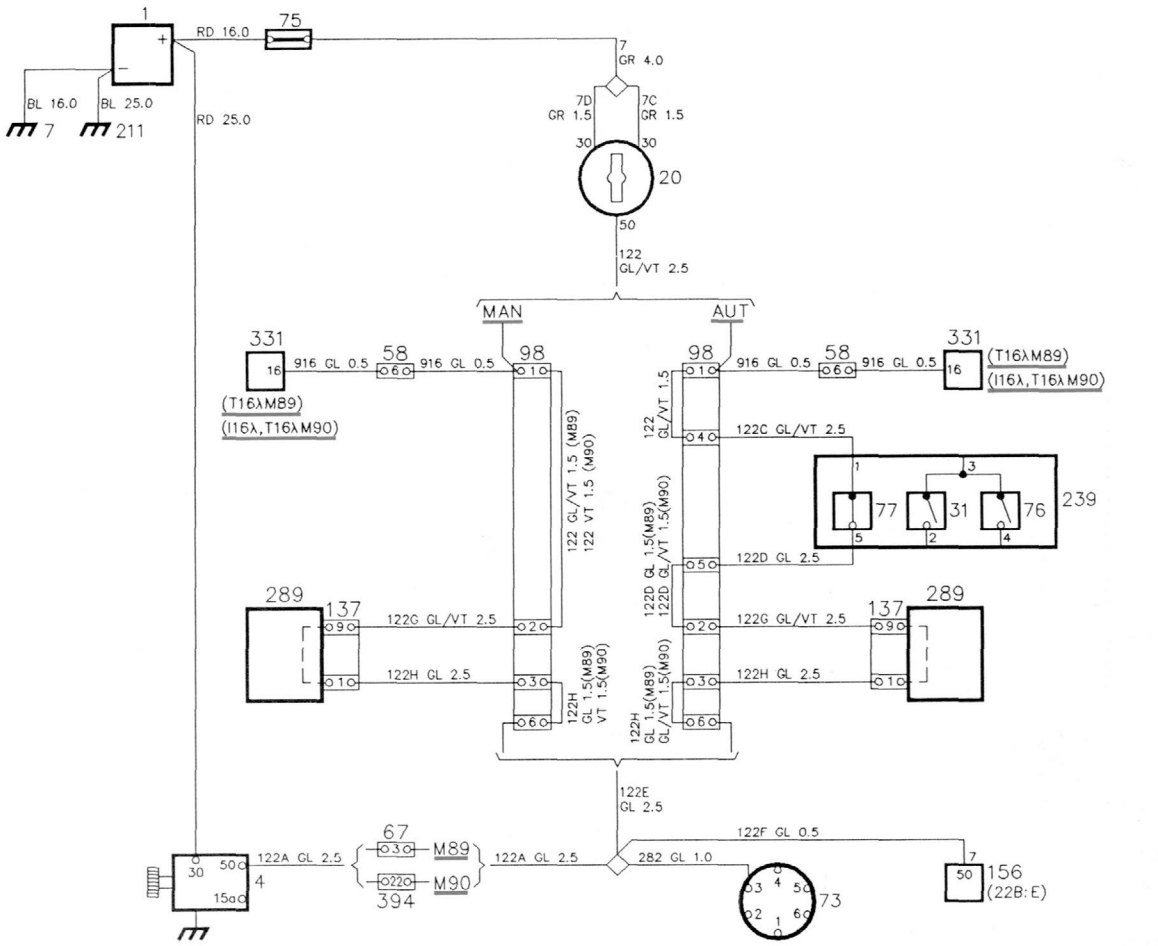

1
RD 16.0
75
7 GR 4.0
7D GR 1.5
7C GR 1.5
BL 16.0
BL 25.0
7
211
30
30
20
15
123E GN/VT 2.5
123N GN/VT 1.0
123M GN/VT 0.75
123 GN/VT 1.5
123A GN/VT 1.5
X
10
13
22A
I16,I16λ
9
342A
M89
T16λ (US,CA)
T16
T16λ
ME
213
M90
182B GN/VT 0.75
57
1
GN/VT 0.75
1A GN/VT 0.75
182B GN/VT 0.75
123F GN/VT 2.5
123B GN/VT 1.5
652 GN/VT 1.0
98
652A GN/VT 1.0
652 GN/VT 1.0
123C GN/VT 0.75
715 GN/VT 1.5
356
132
132
213
M90
5
146
176
5
146
343
159
+15
182 GN 0.75
661 GL 0.75
182A GN/VT 0.75
182D GN/VT 0.75
182C GN/VT 0.75
M89
122
X1
GL
37 M90
EDU1/ EDU2
123D GN/VT 0.75
150 GL 0.5
150A GL 0.5 (ME)
219 GN/VT 0.5
673 RD/VT 0.75
851 GN/VT 0.5
761 GN 0.75
546 GN/VT 0.75
546 GN/VT 0.5
67
132H GN/VT 0.5
59
777 GL 0.75
678 RD 0.75
954 GR/VT 0.5
I16
T16
I16λ
T16λ
110
47
213
M89
47A,47C
47B,47E,47F,
47K,47M,47Q
47R,M89 47P
210
73
82
US, CA, ME
JP (M89)
113
145
I16,I16λ
151
T16, T16λ
I16λ: US, CA
156
AC/ACC
200
200
228A
DE
241
DCC
289
CA
JP (M89)
375
M90: SE, EU,CB
014 US 114
D

Supply +54


1
BL 16.0
BL 25.0
RD 16.0
7
211
75
7 GR 4.0
5 GR 10.0
7D
GR 1.5
7C
GR 1.5
30
30
20
54
12
GR/VT 1.5
+30
230
12A GR/VT 0.5
10 RD 4.0
4
1
86
30
21
(22B:G)
85
87
5
2
13
SV 0.5
228A
(22B:B)
31
6
232A
SV 0.5
82
(22B:A)
31
1
232
SV 0.5
158
11
VT 4.0
787
GN 0.75
747
RD/VT 0.75
12B
GR/VT 0.75
37
RD 1.5
+54
231
57(M89)
123(M90)
747
RD/VT 0.75
5
238
10A
302A
6
342A
31
22A
BT
ABS
US, CA, JP,
ME, FE, AU
1 GN 4.0
2 GN 2.5
3 GN 2.5
1
2
3
4
5
6
7
8
9
10
11
12
22A
860D
GN 2.5
860 GN 2.5
860B GN 2.5
25
26
22A
EAS
014H 113
A

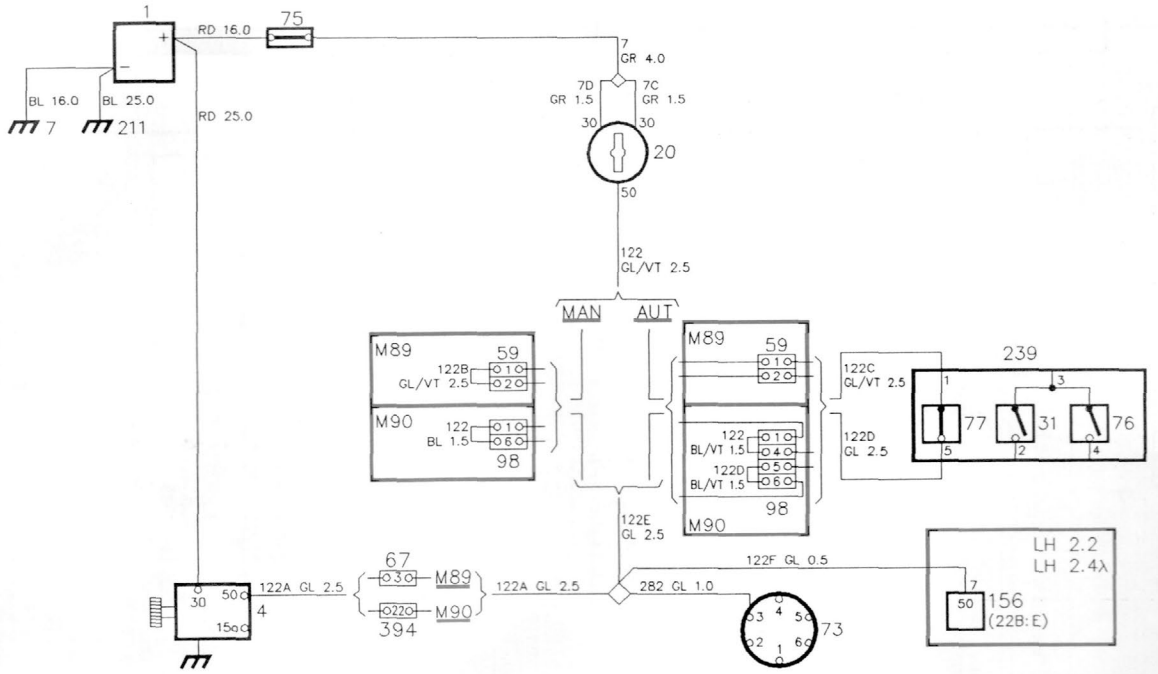
Starting system and supply +50

US

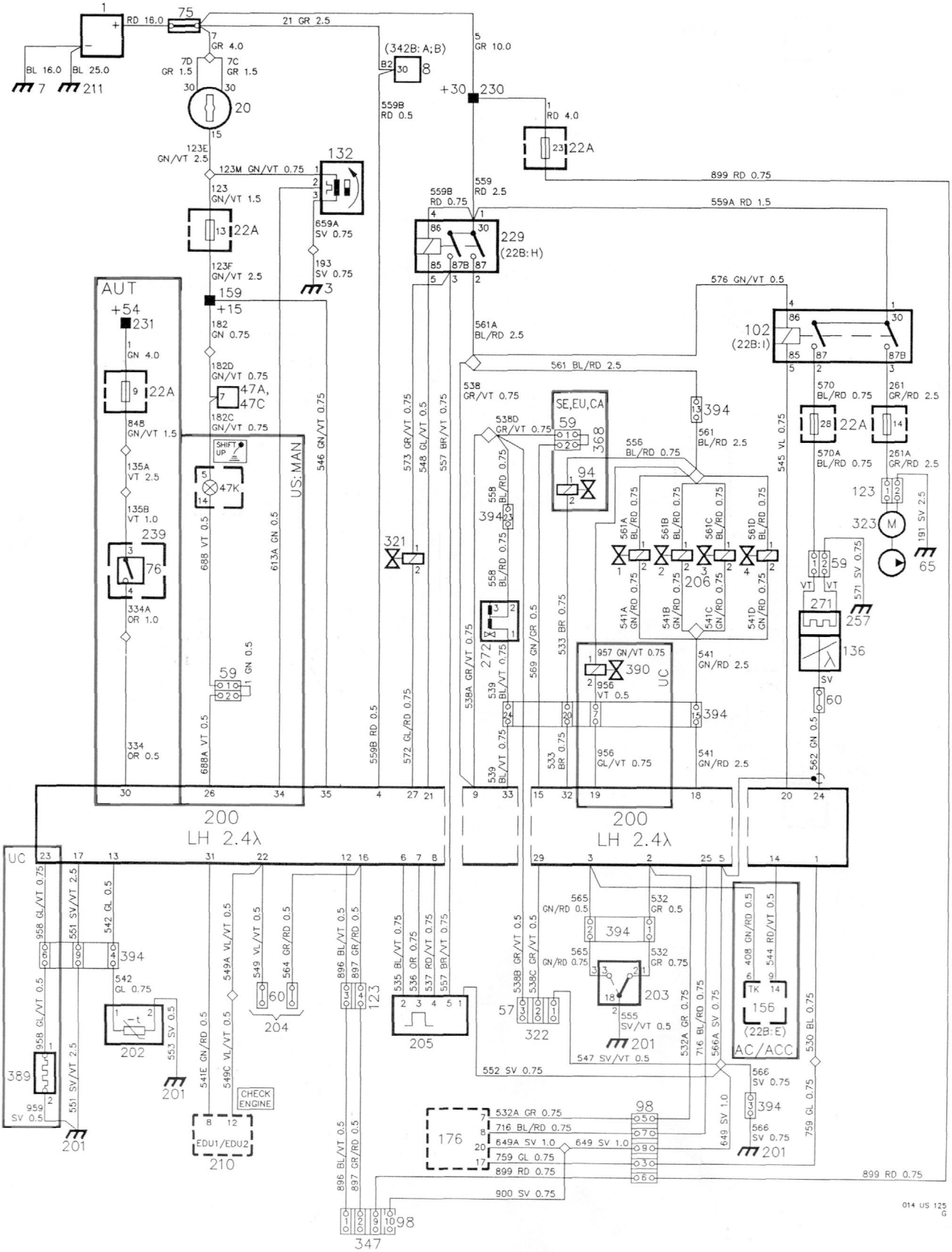


014H 123
A

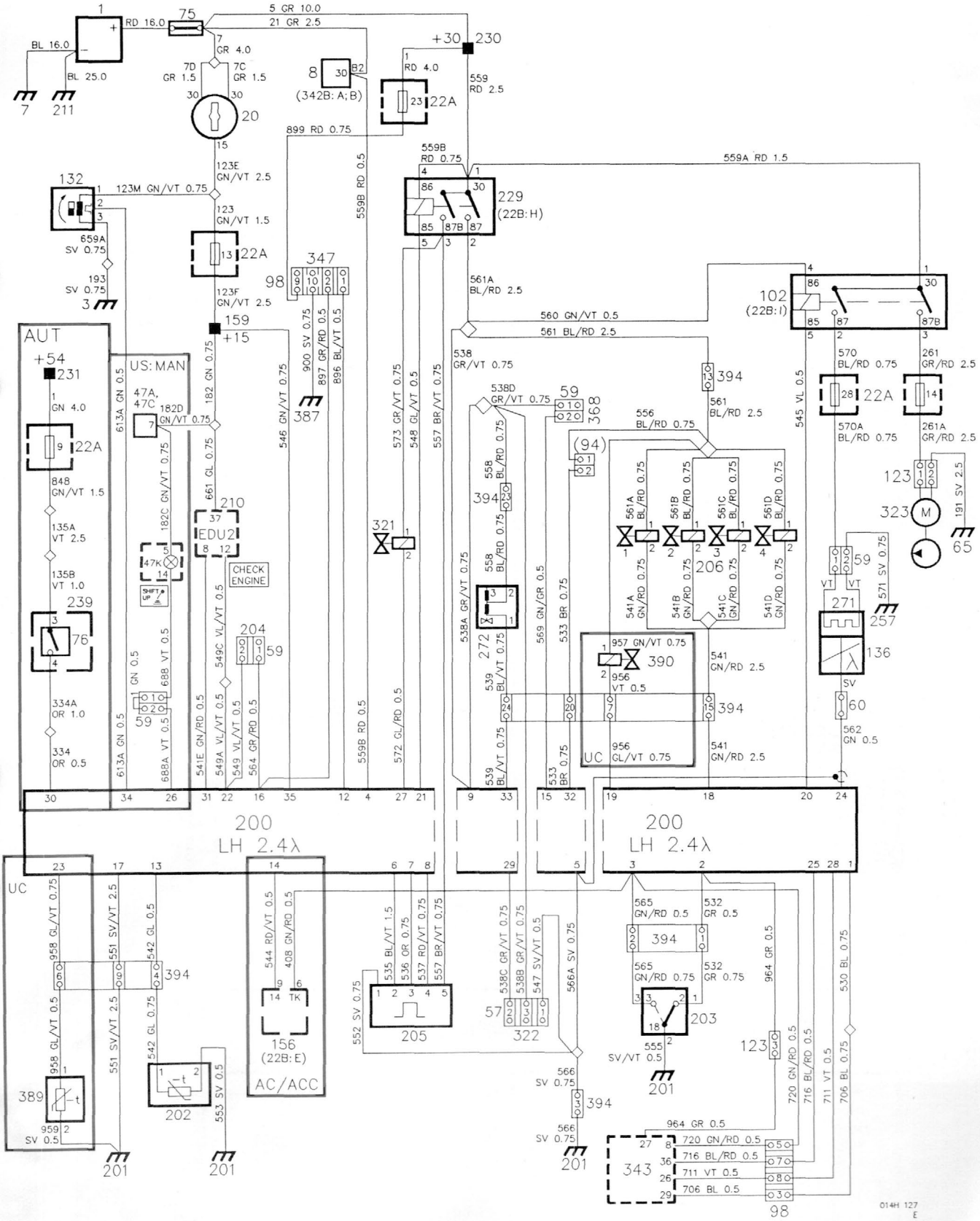
SE, FI, EU, GB, ME, FE, AU, CA, JP



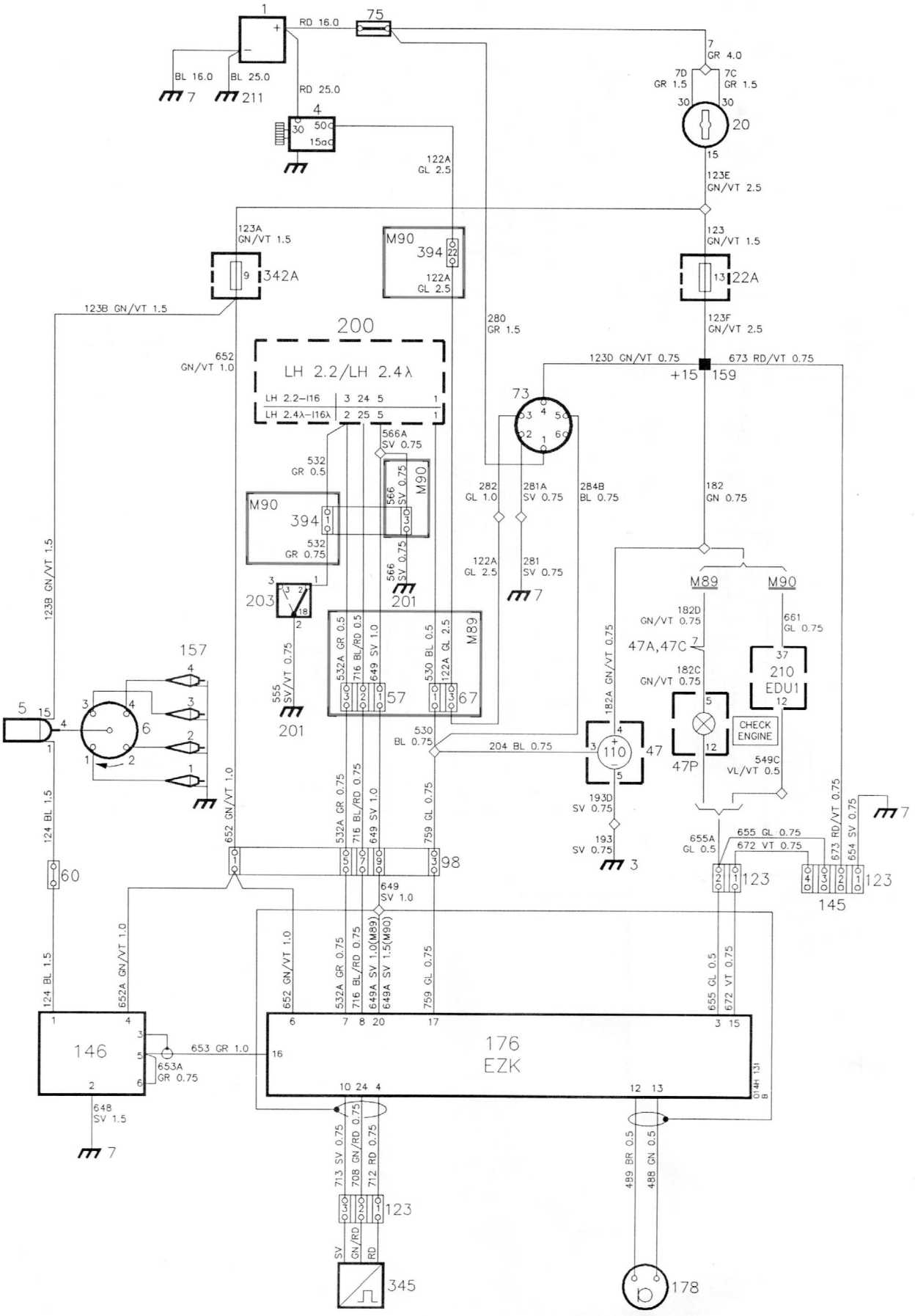
LH fuel system: LH 2.4: I16 lambda



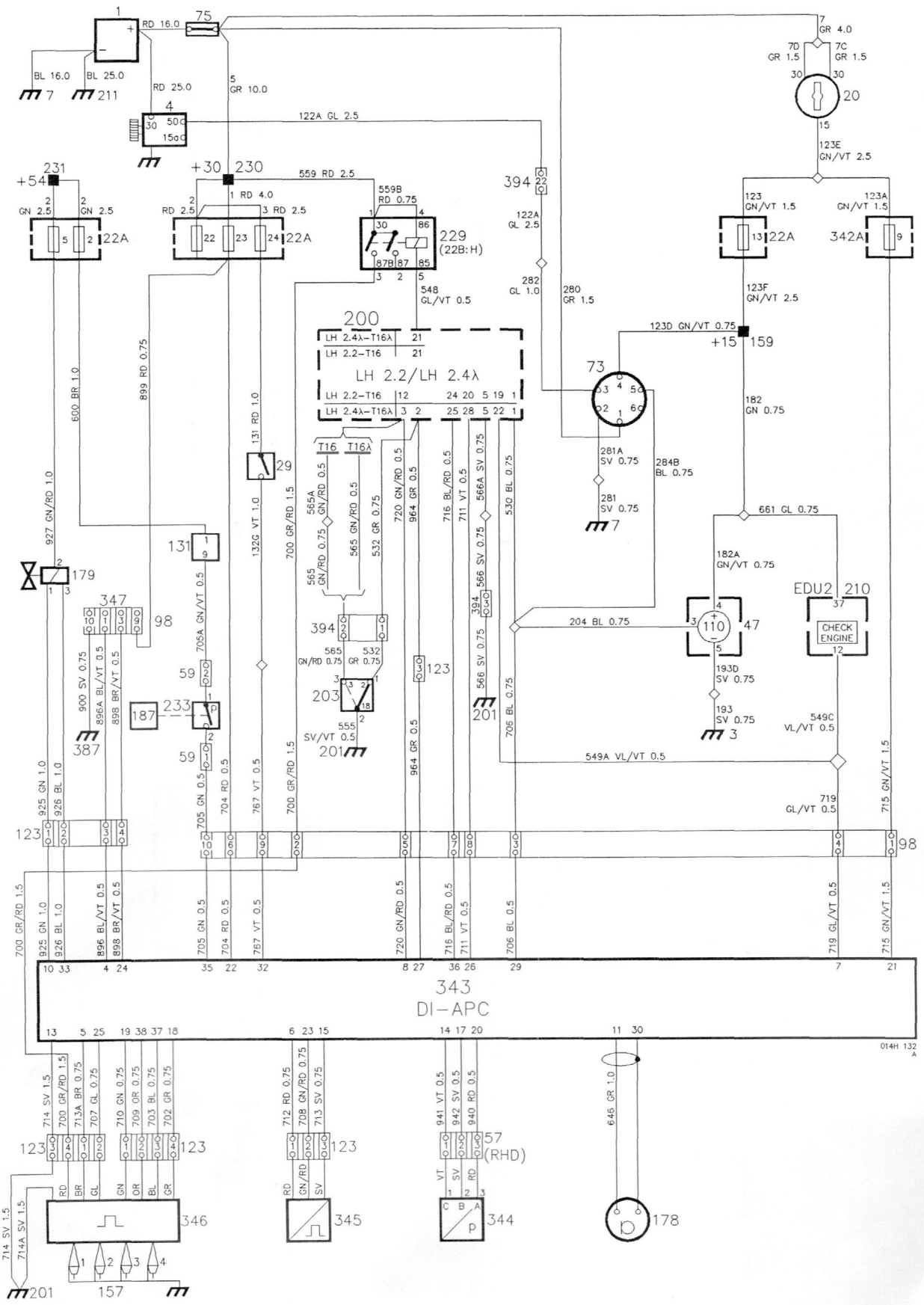
LH fuel system: 2.4: T16 lambda



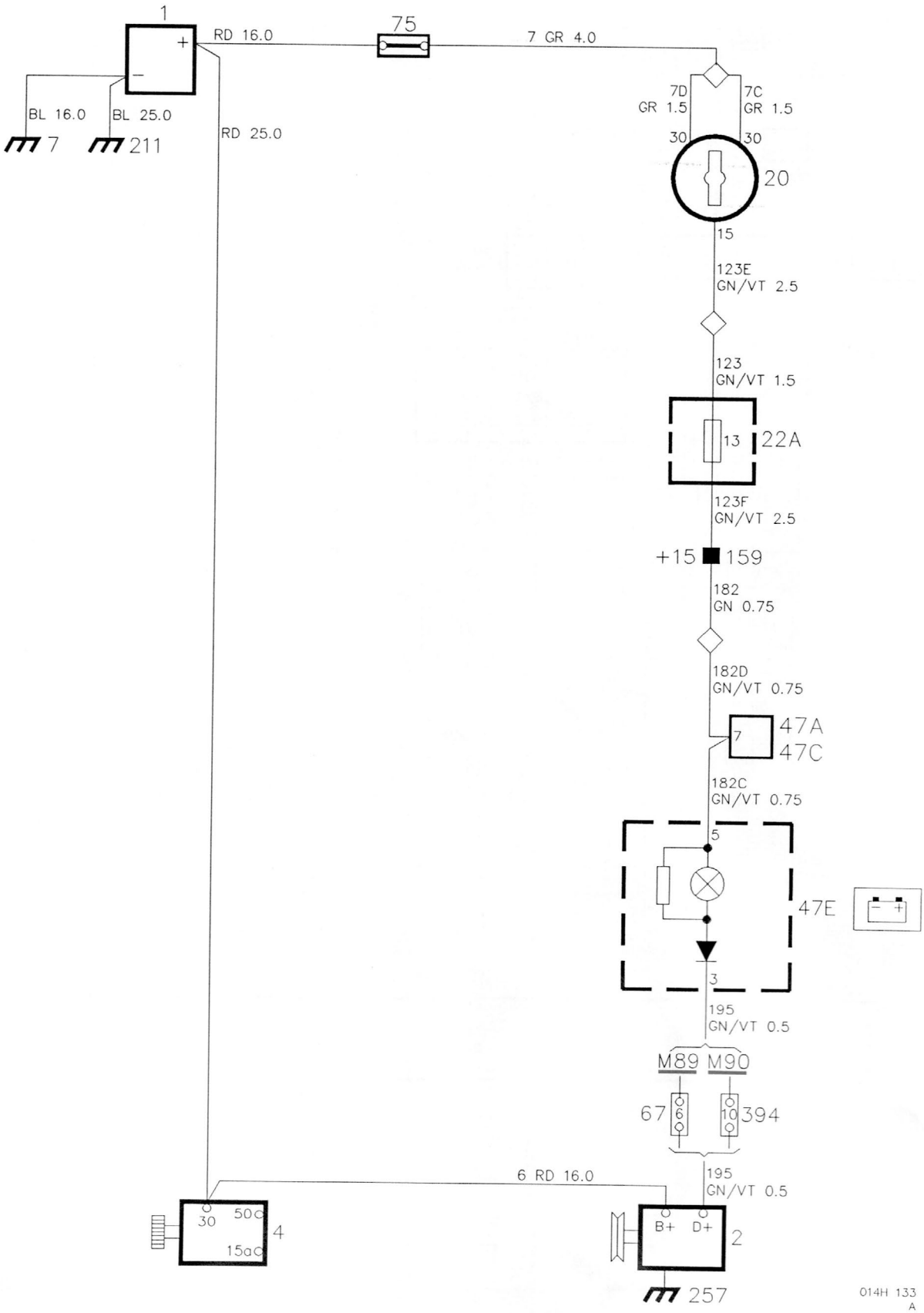
EZK ignition system with tachometer and timing service instrument socket



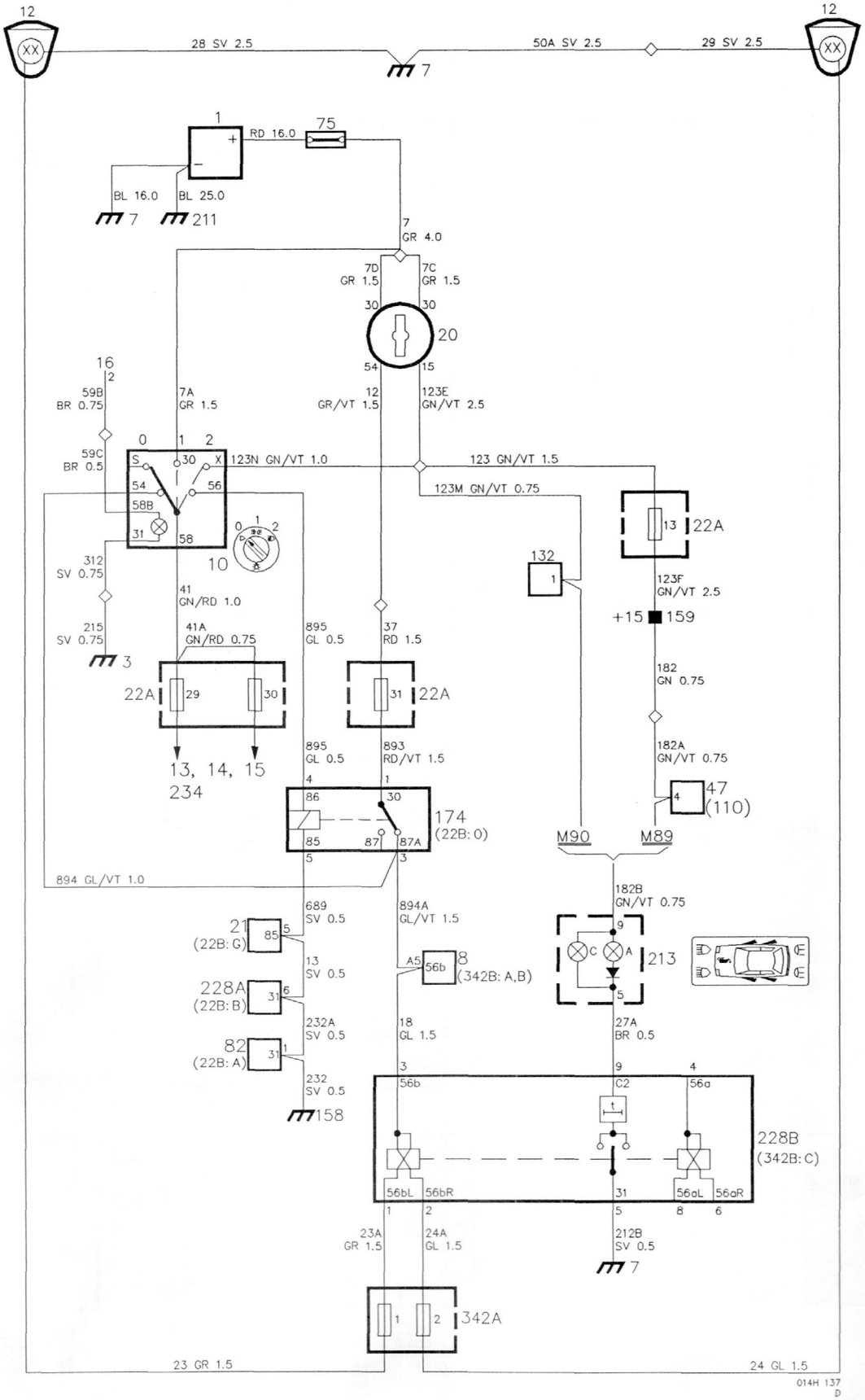
Saab DI/APC ignition system with tachometer and timing service instrument socket



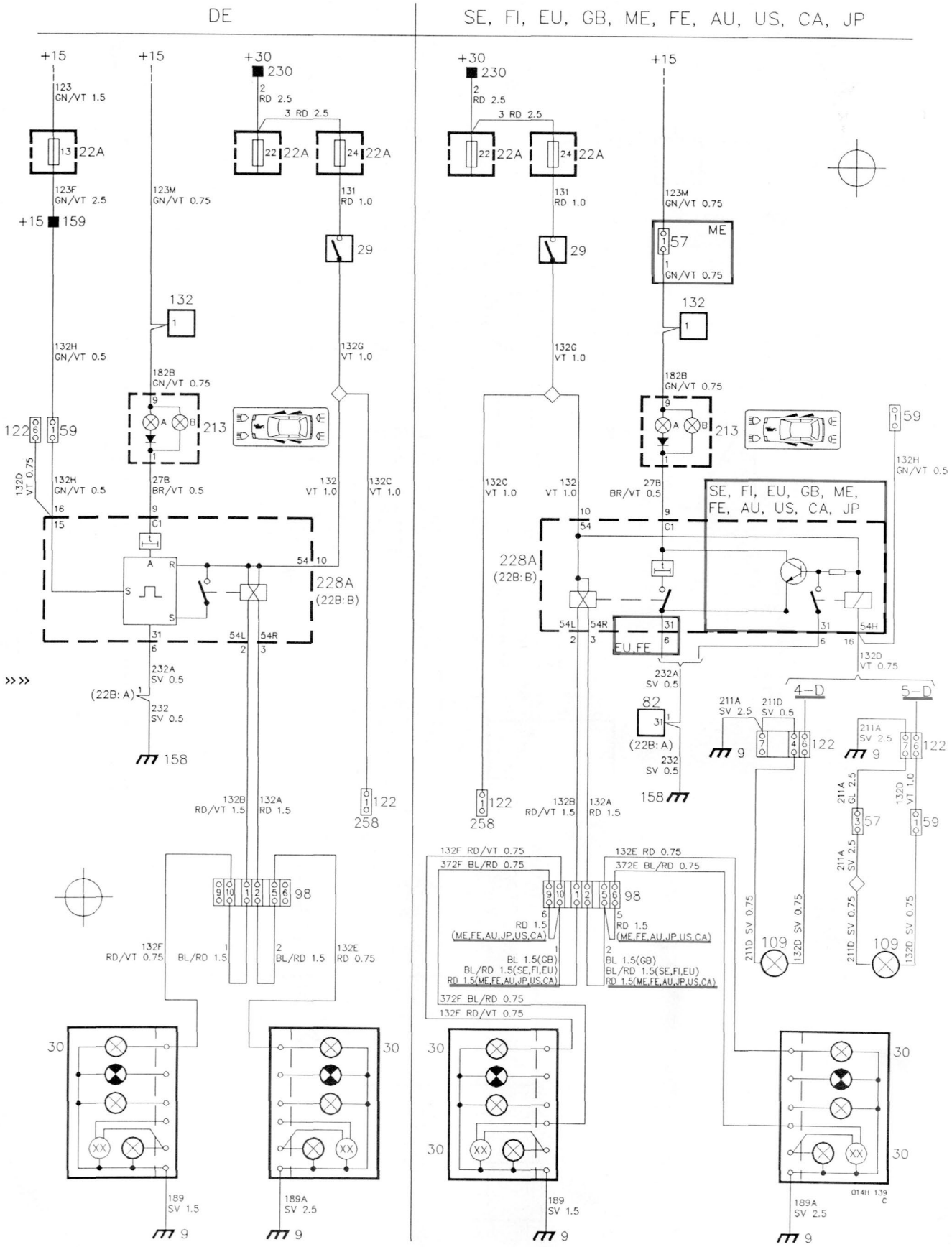
Battery charging system



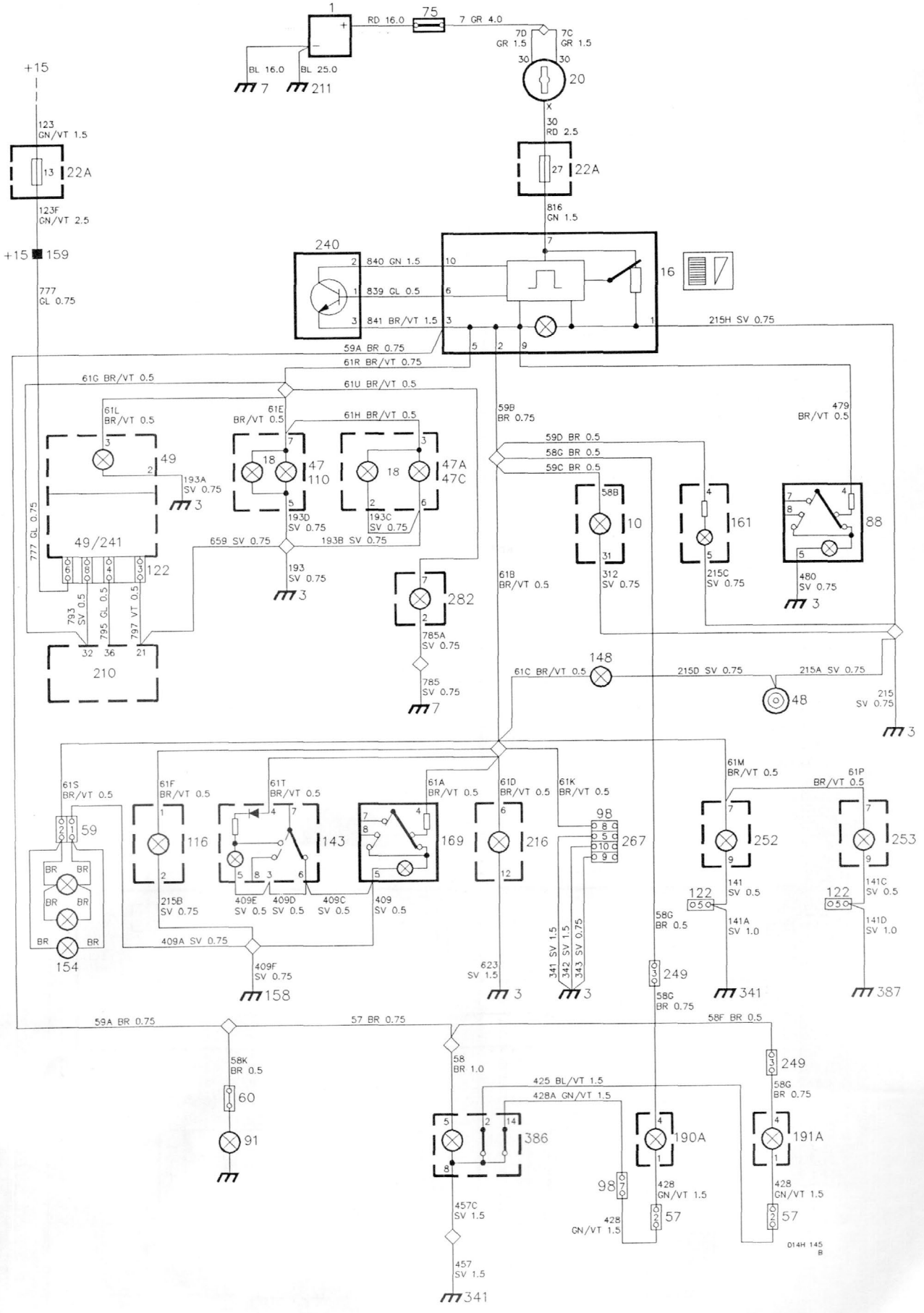
Daylight driving lights - CA



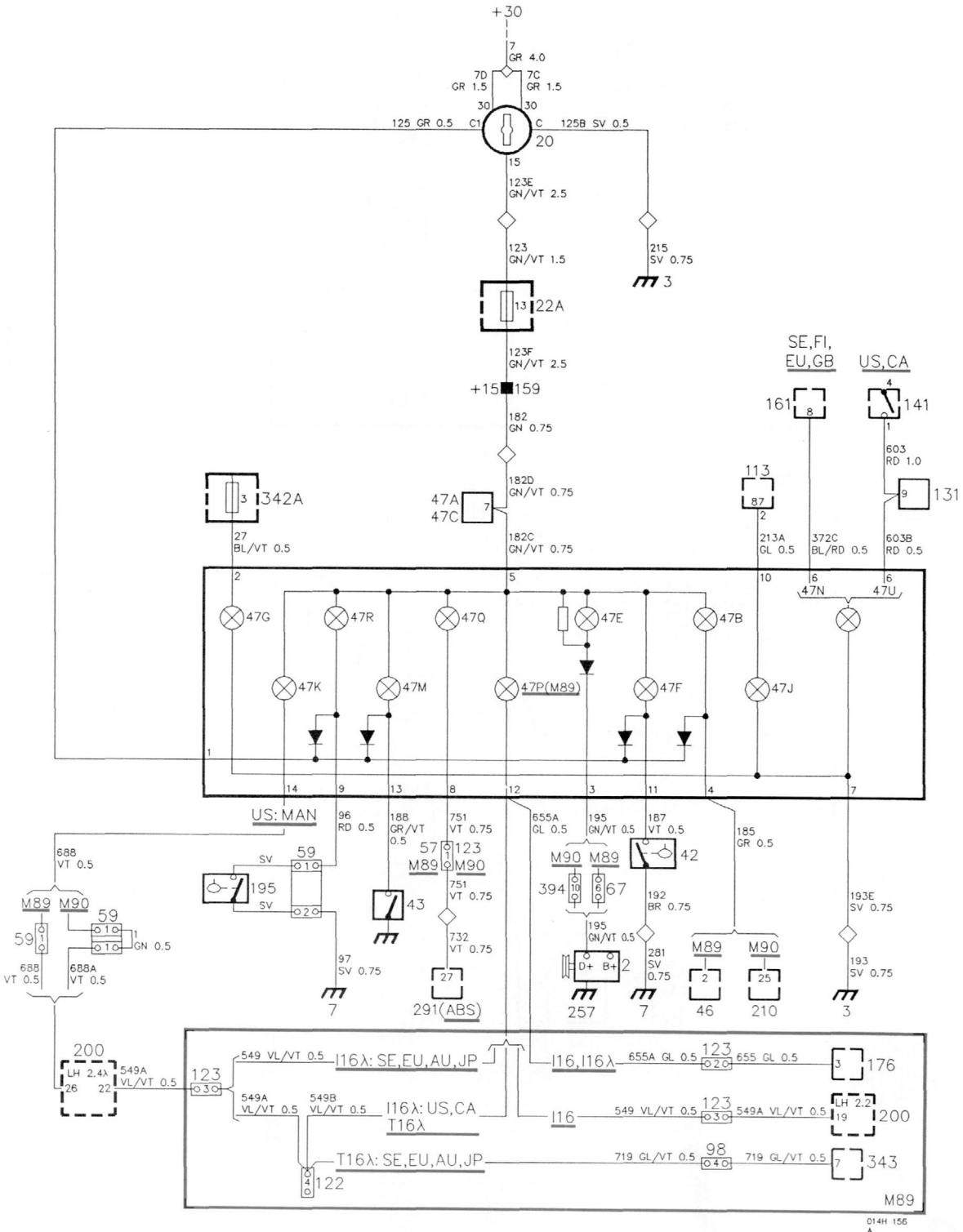
Brake lights



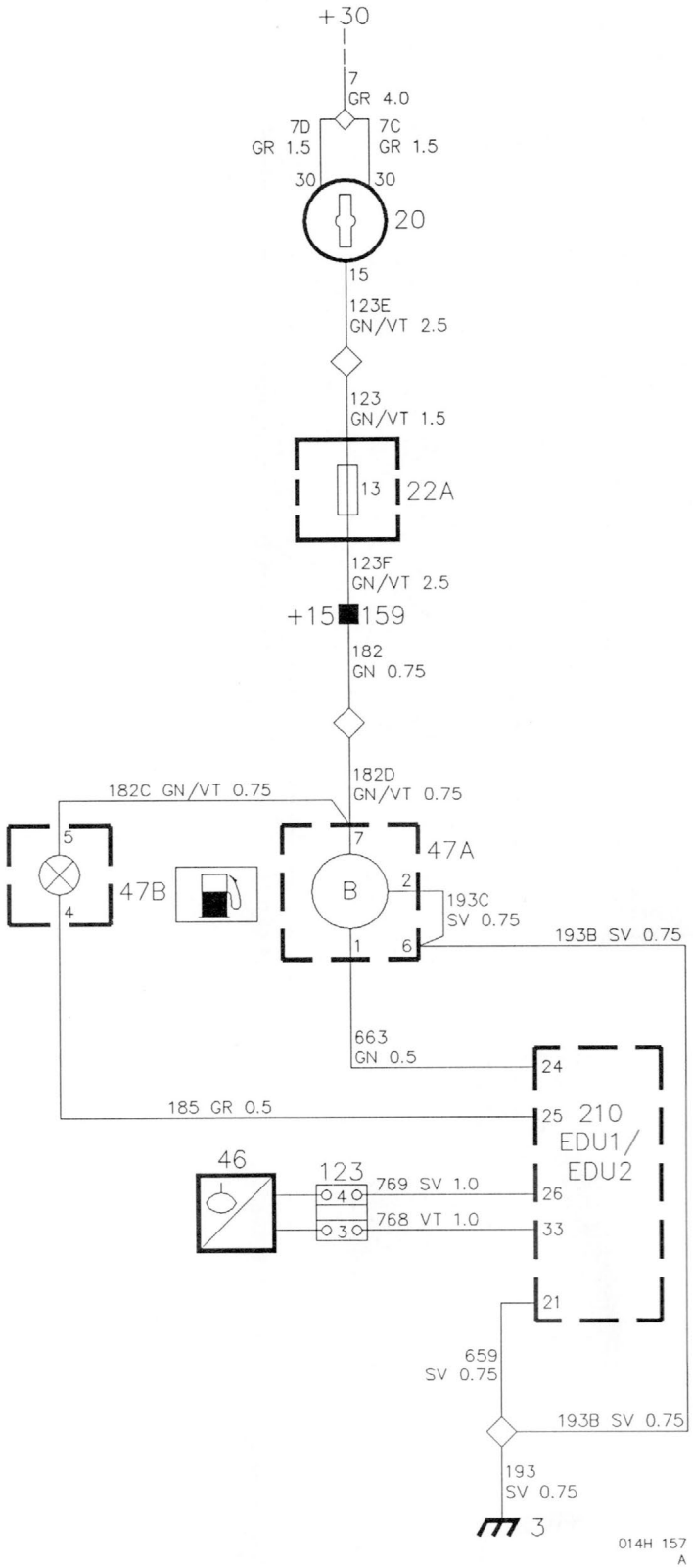
Lighting for instruments and controls



Indicator and warning lamps



Fuel gauge and warning lamp



Operation

The fuel gauge and the warning lamp for the fuel reserve keep the driver informed of how much fuel is left in the tank.

When the ignition switch is in the drive position, a positive supply is taken across fuse 13 and terminal +15 in the electrical distribution box to:

- fuel gauge 47A in the combined instrument
- warning lamp for fuel reserve 47B

Level transmitter 46 adjusts the voltage so that the fuel gauge reading will correspond to the level sensed by the transmitter float in the tank.

Since the level transmitter must also provide the EDU trip computer with information, the cable between the transmitter and the fuel gauge is connected via the trip computer (jumpered between pins 7 and 8).

Level transmitter 46 has a variable resistance, the value of which corresponds to the position of the transmitter float in the tank.

The level transmitter is connected to the EDU 1 or 2 trip computer which senses the resistance of the level transmitter and controls the current through the fuel gauge so that the position of the needle will correspond to the resistance of the level transmitter.

The trip computer also uses this information to calculate the fuel consumption.

When the fuel content of the tank has dropped to about 10 litres, fuel reserve warning lamp 47B will be earthed through the transmitter and the lamp will light up.

The reading of the fuel gauge can be adjusted by means of the ISAT. The procedure is described in a Service Information which will be issued.

Fault-tracing hints

The fuel level transmitter is monitored by the EDU 1 or 2 trip computer. In the event of a fault, "Err" may light up on the trip computer display (see EDU 1 or 2 trip computer and clock).

The fuel gauge and warning lamp will not be operative until the ignition switch has been set to the drive position.

1 Check fuse 13 and check that the supply to it is live.

2 Check the bulb and check that the terminals on the circuit board for the warning and indicating lamps are live.

3 Check that the fuel gauge and fuel level transmitter terminals are live.

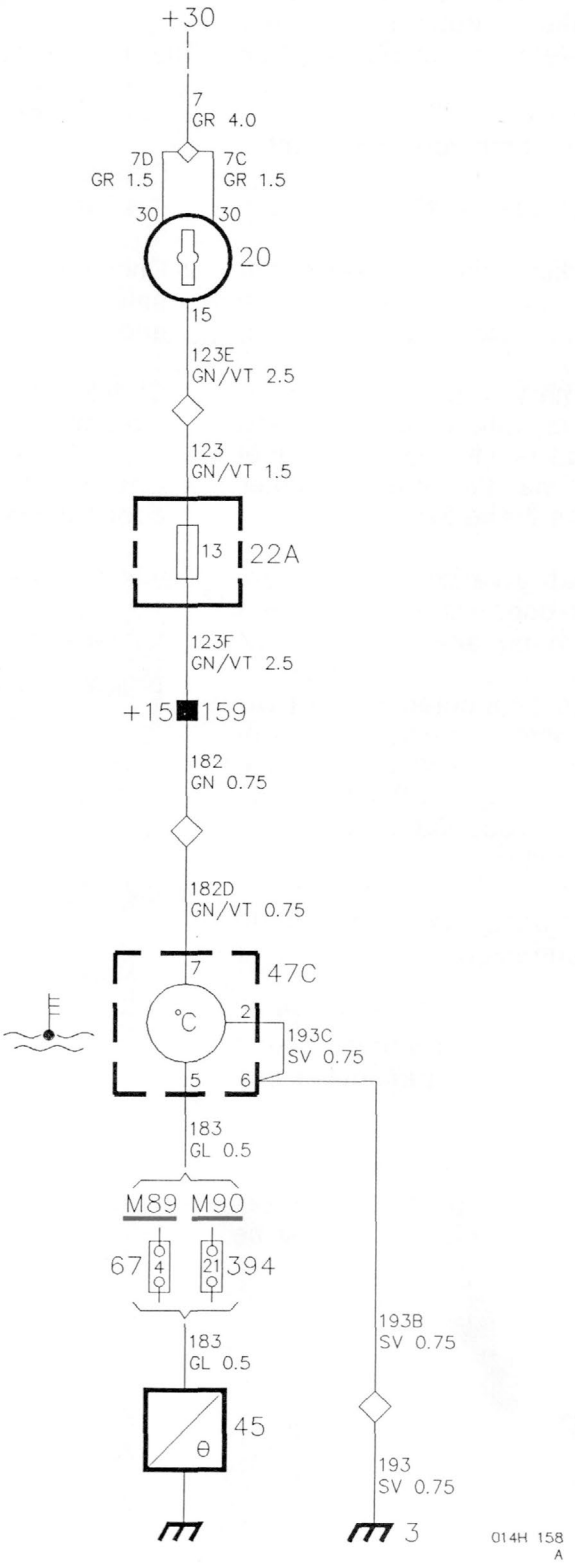
4 Check the connectors, wiring and earth connections.

Resistance readings for fuel level transmitter:

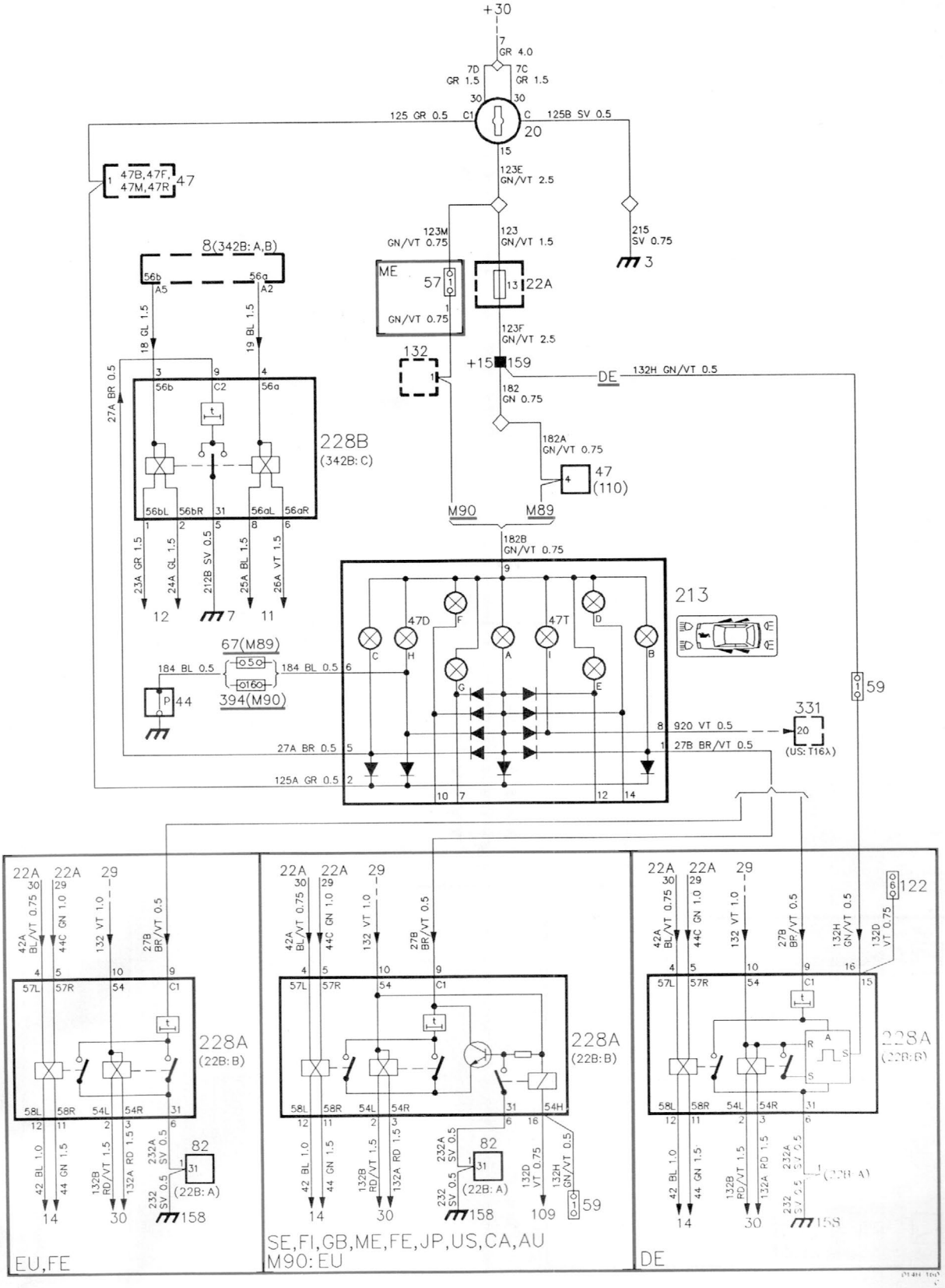
full tank: 350 ohm

empty tank: 25 ohm

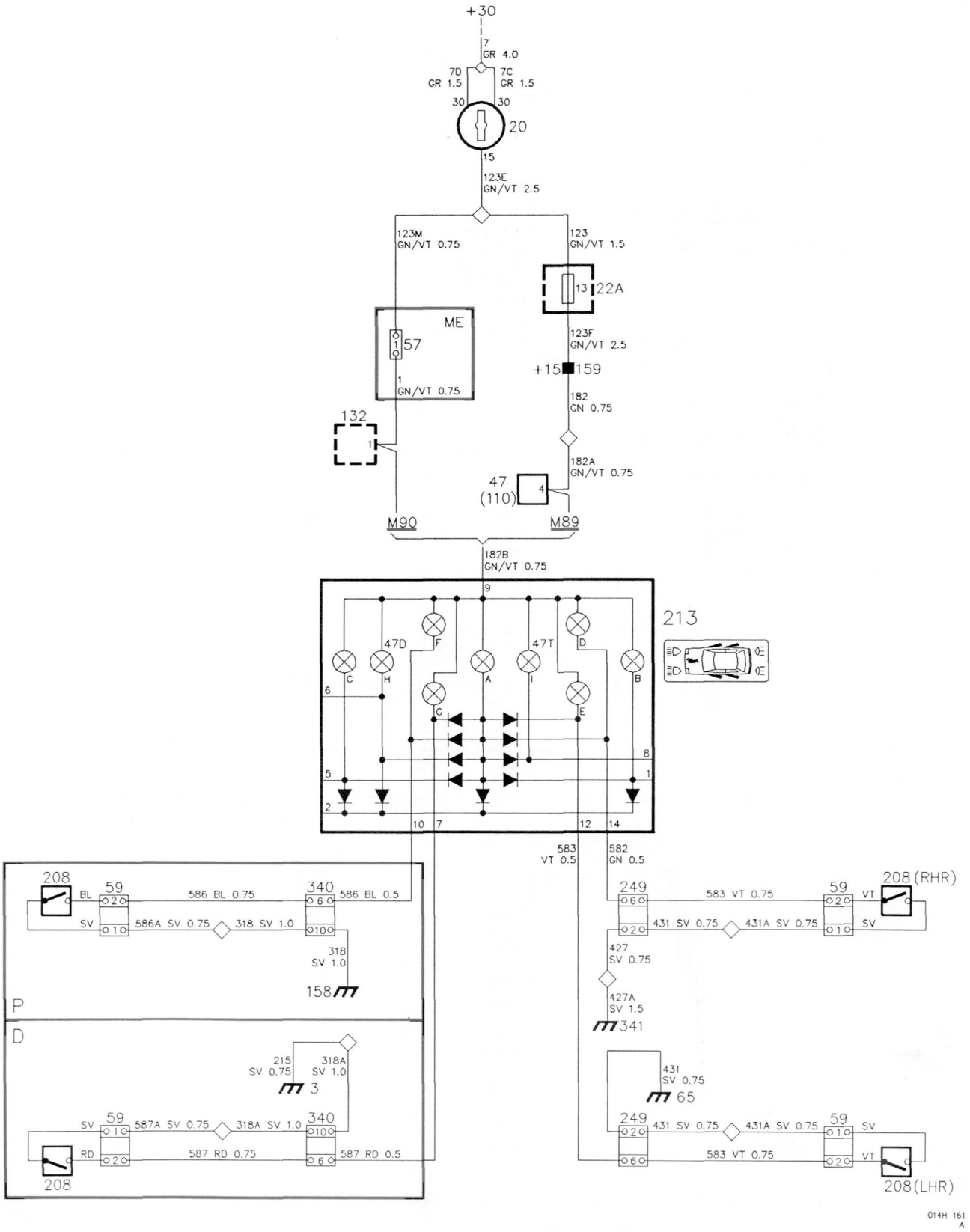
Temperature gauge



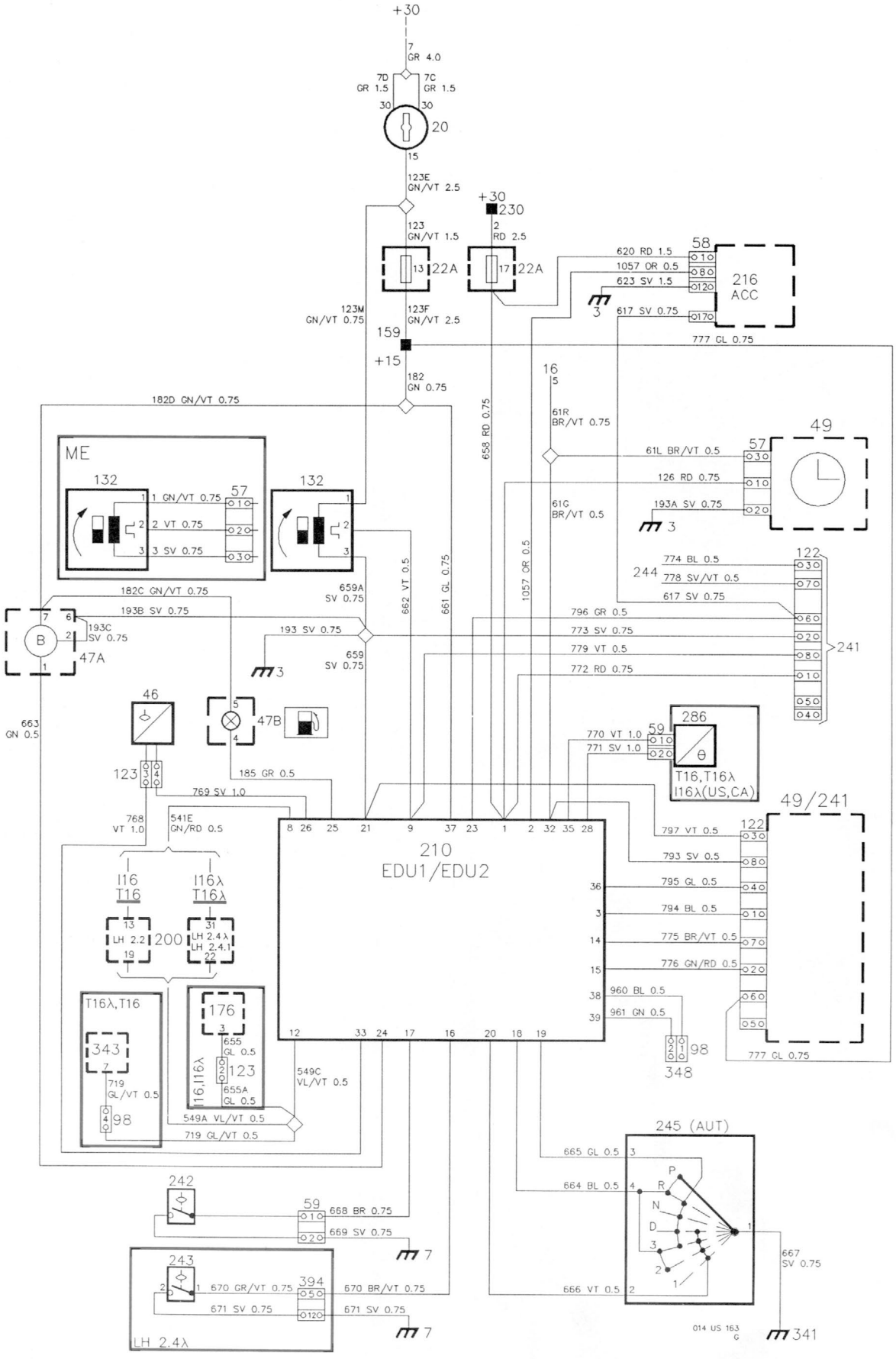
Pictogram - Filament monitor Oil pressure warning lamp



Pictogram - Door indication



EDU trip computer

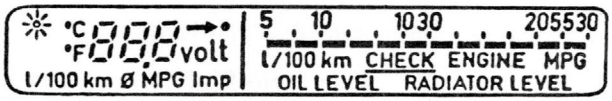


Operation

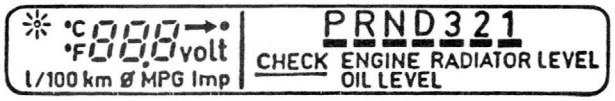
The EDU 1 and 2 (Electronic Display Unit) trip computers are programmable. Spare computers are thus delivered in the basic version and must be programmed for the appropriate type (EDU 1 or EDU 2), the car variant, etc.

Programming is carried out by means of the ISAT.
In addition, the ISAT can be used for carrying out adjustments and functional checks, and for retrieving fault codes stored in the EDU.

The trip computer is available in two basic versions, one of which is for cars with manual gearbox and the other for cars with automatic transmission.



Cars with manual gearbox



Cars with automatic transmission

Depending on the programmed version, the trip computer can display a maximum of the following information:

In the left-hand part of the display

- Instantaneous and average fuel consumption
- Range on remaining fuel
- Battery voltage
- Ambient temperature

In the right-hand part of the display

- Selector lever position (car with automatic transmission)
- Instantaneous fuel consumption (horizontal scale)
- CHECK ENGINE warning text in the event of faults in the fuel injection system or ignition system
- CHECK OIL LEVEL warning text in the event of low engine oil level
- CHECK RADIATOR LEVEL warning text in the event of low coolant level

The various computer functions and the units, e.g. km or miles, can be selected by means of the R and INFO buttons. The buttons are located on the clock (49) or on the DCC computer (241).

The trip computer (210) receives a constant supply from fuse 17, and is also supplied from fuse 13 when the ignition switch is in the drive position.

The brightness of the display under daylight conditions is controlled automatically by a sensor on the DCC unit or the clock. In darkness, the brightness can be controlled by means of the instrument lighting thermostat 16.

To display the instantaneous or average fuel consumption, the trip computer requires information on:

- the road speed from speed sensor 132
- the current fuel consumption from control unit 200 for the fuel injection system. The frequency of the control pulses supplied from the control unit to the fuel injection valves (terminal 13 or 31) corresponds to the instantaneous fuel consumption.

Fuel level transmitter 46 is connected to the trip computer to show the range on the fuel remaining in the tank.

The trip computer delivers signals which control the reading of fuel gauge 47A and light up the low fuel warning lamp 47B when 10 litres of fuel remain in the tank.

Information on the ambient temperature is provided by the outdoor temperature sensor (286) located behind the front spoiler. The outdoor temperature is not displayed on the EDU if the car is equipped with a DCC trip computer.

Warning signals for low oil level and low coolant level are obtained from lever switches 243 and 242 which close if the level should drop below a predetermined level.

If a fault should occur in the fuel system, a signal will be obtained from terminal 19 or 22 of control unit 200.

In the event of a fault on the DI/APC system, a signal will be obtained from terminal 7 of electronic unit 343.

Faults on the LH 2.4 system or the DI/APC system with LH 2.4 fuel system are shown as flashing codes on the trip computer.

On cars with automatic transmission, the trip computer is connected to selector lever switch 245.

Fault diagnosis

The microprocessor of the EDU enclose a special self-test program which checks the program and certain functions at regular intervals while the car is travelling. Every fault detected is stored in the form of a fault code in the memory of the microprocessor.

When a fault code is stored in the memory, this is indicated by "Err" on the EDU display every time the ignition is switched on. The "Err" message can be cleared by depressing the INFO or RESET button or after the car has covered a distance of 10 - 15 m.

The ISAT is used for erasing the fault codes stored in the memory. The fault codes will also be erased if the battery cable is disconnected.

A maximum of five fault codes can be stored simultaneously.

To check the fault codes

Use the ISAT to check the fault codes as follows:

- Connect the ISAT to the test socket for EDU and ACC (348).
- Switch on the ignition.
- Press the function key for DIAGNOSIS (F1).
- Press the function key for ONE (F2).
- Press the "1" key and then the "ON/ENTER" key.
- The ISAT will now display the fault codes.
- If more than two fault codes are stored in the memory, the next pair can be obtained by depressing "F3". "F4" shows the preceding fault codes.

Erase as follows:

- Press the "ALT" key.
- Press the function key for CODE (F3).
- Press the command "900" and then "ON/ENTER".

Check that the information has been erased from the memory as follows:

- Press the function key for CODE (F3).
- Press the command "100".
- If no fault codes remain, "11111" will be shown on the display. If not, the remaining fault codes will be displayed.

Terminate as follows:

- Press the function key for CODE (F3).
- Press the command "900" and then "ON/ENTER" or switch off the ignition.

Fault codes

The fault codes show that there are faults in the circuit comprising the EDU, cable harnesses and sensors, etc. Further study by means of a universal instrument is necessary to localise the fault. The fault codes also show whether the fault is constant or intermittent (such as a loose contact).

Fault codes

Constant	Intermittent	Fault type
11111		No faults in the system
45362	25362	Selector lever sensor
45522	25522	Open circuit in fuel level sensor
45532	25532	Short-circuit in fuel level sensor
46322	26322	Open-circuit in ambient temperature sensor
69992		Internal fault in the EDU

Command codes

Command codes for programming and adjustment are described in more detail in the Service Information dispatched separately.

Fault-tracing hints

The trip computer will become operative when the ignition switch is turned to the drive position.

If no information at all is shown on the trip computer display, carry out checks 1 - 4 described below.

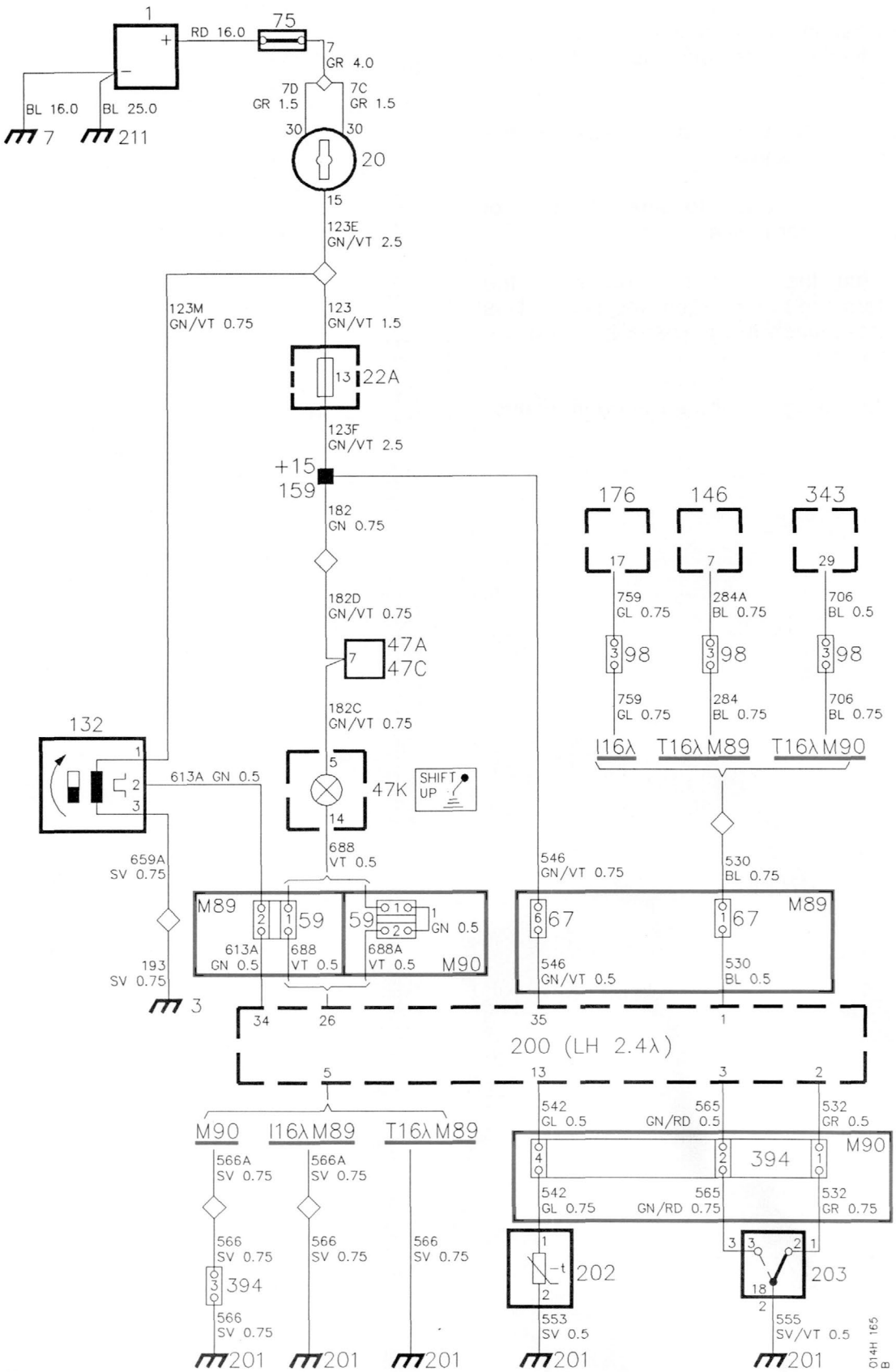
1 Check fuses 13 and 17 and check that the supply to them is live.

2 Check that the supply to pins 37 and 1 of the trip computer is live.

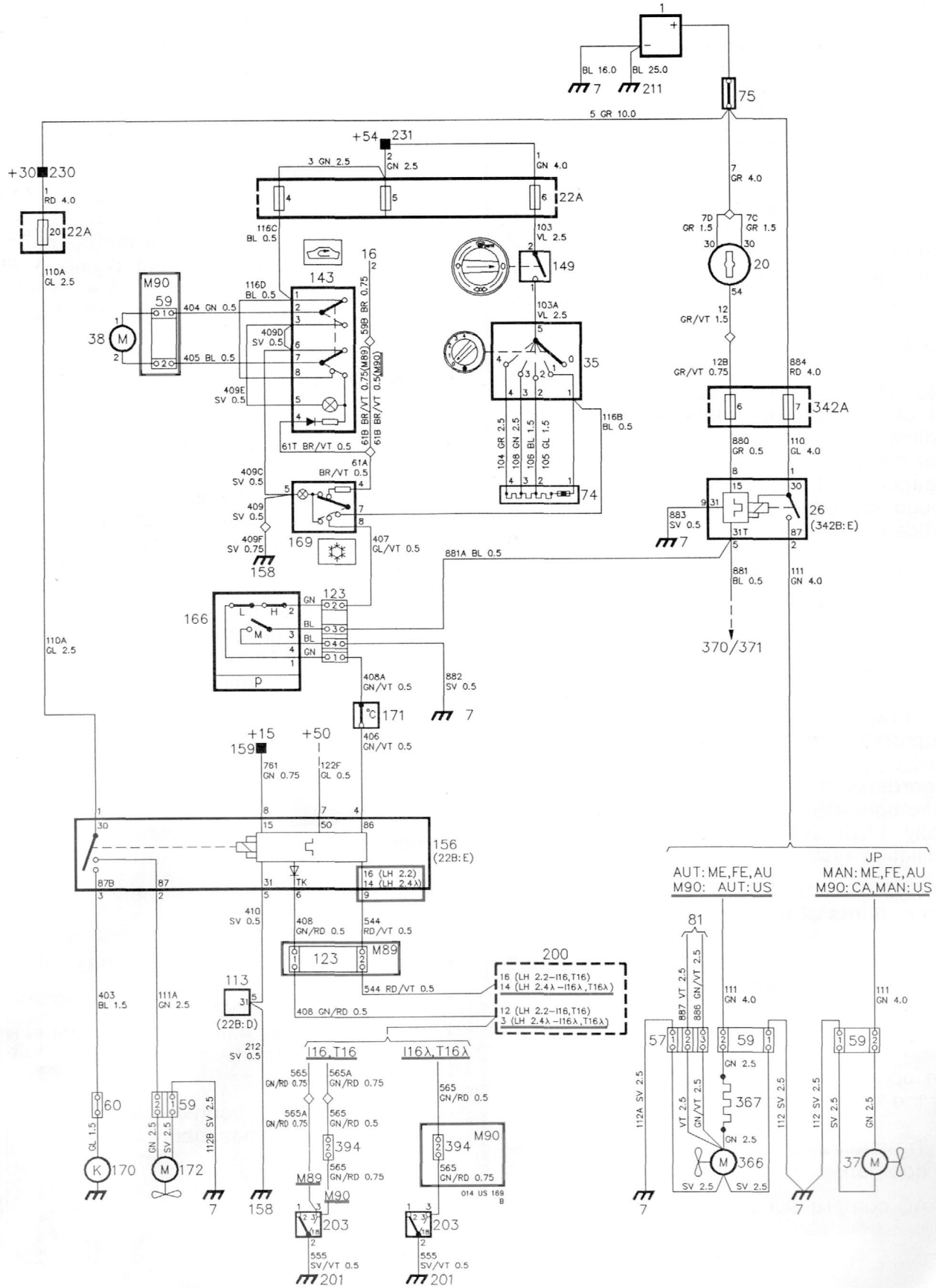
3 Check that the contact surfaces of the connectors are undamaged and clean. This is important since the currents involved are low.

4 Check the wiring and the earth connections.

Shift-up indication



Air Conditioner (AC)
US, CA, JP, ME, FE, AU



Automatic Climate Control (ACC 2)

General

Some cars are equipped with Automatic Climate Control (ACC). The heating and ventilation system is then controlled automatically, so that the required temperature will be maintained in the interior of the car, regardless of the ambient temperature. The system always includes an air conditioner (AC) with recirculation facilities.

This description deals only with the electrical function of the ACC system and is thus a supplement to Group 8, Body, in the Service Manual. The method of using the ACC is also described in more detail in the Service Manual.

The ACC unit includes the following functions:

Automatic temperature control, including control of recirculation, rear-door fans, electric heating of the rear window and heating of the door mirrors. The AC compressor can be disengaged by depressing the ECON button, although the other functions will still be automatically controlled.

The system can be switched off by means of the OFF button.

If one of the buttons on the right-hand side of the unit is depressed, the corresponding function will be switched in manually. If the button is depressed again, the function will revert to the program-controlled mode.

Regardless of whether the system is on automatic operation or whether it is controlled manually, LEDs will indicate which parts of the ventilation system are in operation.

Components of the ACC system

To enable the system to maintain the required climate in the interior of the car, it must be supplied with information from a number of transmitters, damper actuating motors, etc.

The operation of the system is described under the following two headings:

- Transmitters, damper motors and rear door fans
- AC compressor and radiator fans

Fault-tracing hints

To avoid damage to the climate control unit, the following actions must always be taken before any work is started on the ACC system:

- Disconnect the negative cable from the battery.
- Disconnect the two connectors (one 39-pole and one 12-pole) before carrying out any measurements and fault tracing. Carry out all measurements at the connector and not at the climate control unit. Apart from replacement of bulbs, no work must be carried out on the climate control unit.

Self-diagnosis

The microprocessor of the climate control unit includes a special self-testing program.

While the car is travelling, the program checks certain functions at regular intervals. An emergency program will be switched in if a fault should occur on any of the sensors.

If faults are detected by the program, the information will be stored as fault codes in the microprocessor memory. The fault codes can be retrieved by means of the ISAT.

The number of fault codes stored is displayed for about 6 seconds after the ignition has been switched on.

Calibration

The damper motors must be calibrated on the following occasions:

- After replacement of the control panel
- After replacement of the damper motors
- If the battery has been disconnected within 30 seconds of the ignition being switched off.
- If the battery has been discharged or if the battery voltage has been higher than 16 volt.

Calibration is carried out either by depressing AUTO and ⇐ = ⇒ buttons simultaneously, or by means of the ISAT.

A self-test is run together with the calibration. The total time for calibration and self-test is about 30 seconds. The number of faults detected (1 - 5) is shown in the display for the first 15 seconds.

How fault codes are obtained by means of the ISAT, how these are interpreted and how calibration is carried out is described in more detail in the Body section.

Other fault-tracing

1 Check the relevant fuses and check that the supplies to them are live.

2 Check the relevant earth connections.

3 Check that the connectors are making satisfactory contact. Check also the connector for the climate control unit. Clean the contact surfaces by disconnecting and then reconnecting the connectors.

The suction fan of the interior temperature transmitter can be checked by allowing a piece of thin paper to be drawn against its inlet.

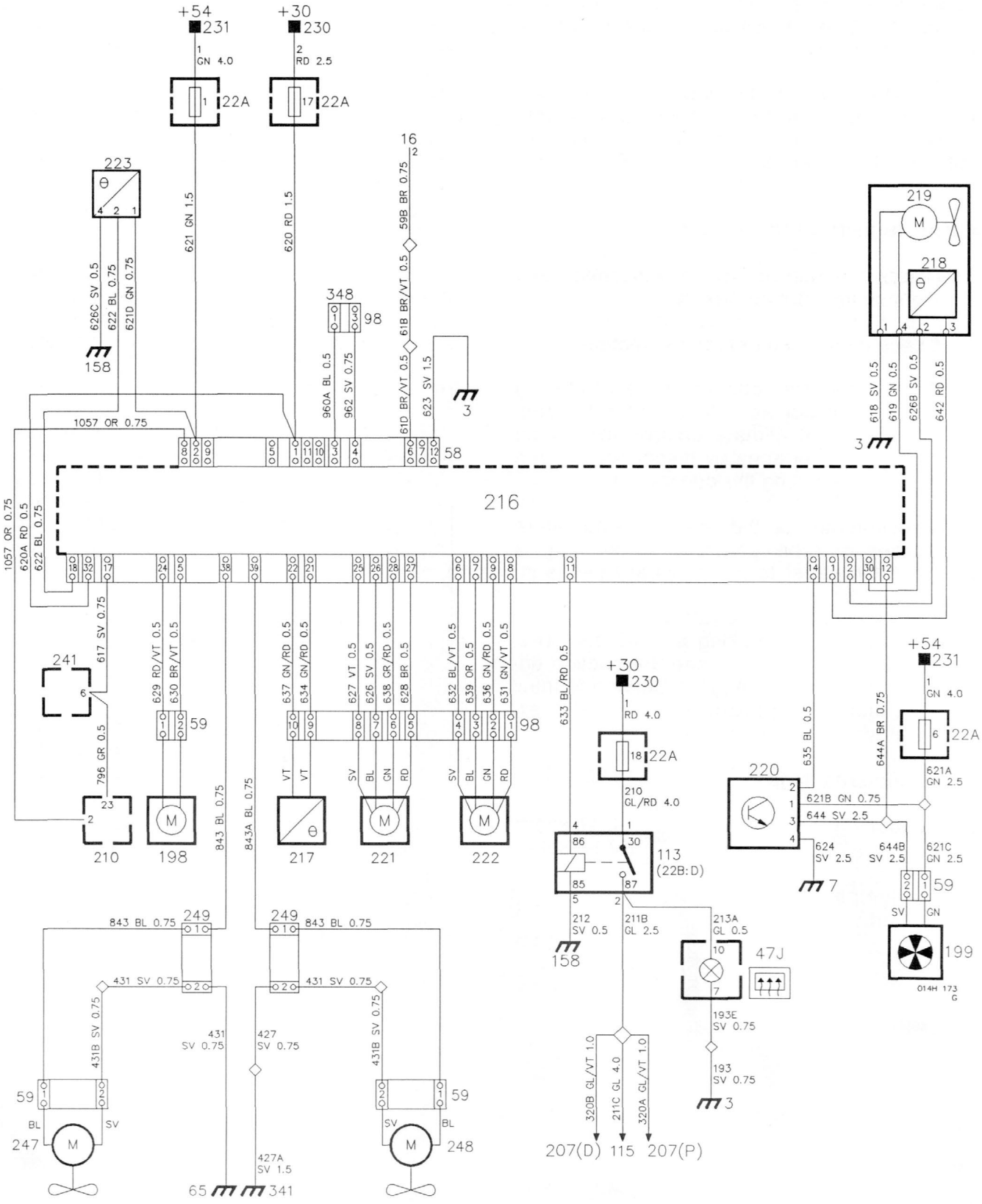
For particulars of checking the AC compressor and the radiator fans, see the section entitled "Air conditioner (AC)" in Service Manual 3:2. The fault-tracing instructions are valid, except that fuse 6 is not involved.

Resistance readings

Air-mixing transmitter	Engine cold	2-17 kohm
	Engine warm	0.79-2 kohm

Interior temperature transmitter	+ 0°C (+ 32°F)	32.5-37.7 kohm
	+ 20°C (+ 68°F)	12.0-13.4 kohm
	+ 25°C (+ 77°F)	9.5-10.5 kohm

Transmitters, damper motorsand rear door fans



Transmitters, damper motors and rear door fans

The climate control unit receives information from the control panel and from the following transmitters:

- Outdoor temperature in the form of digital pulses from the EDU trip computer (210) to pin 17 of the ACC.
- Mixing temperature transmitter 217, which senses the temperature immediately downstream of the air-mixing damper. The transmitter is connected across pins 21 and 22.
- Interior temperature transmitter 218, which senses the temperature of the air in the interior. The transmitter is integrated into suction fan 219, which provides a uniform air flow around the transmitter. The transmitter is connected across pins 1 and 2.
- Sun transmitter 223, which senses the azimuth angle of the sun in relation to the car, the elevation of the sun and the intensity of sunlight.

The sun transmitter consists of five cells arranged in the form of a cube under the black housing. Digital pulses are sent via an amplifier to pin 18 of the ACC.

The interior and mixing temperature transmitters are of NTC type and their electrical resistance varies with the temperature.

Power supply

The supply to the climate control unit is taken across fuses 17 and 1.

The unit always receives a supply directly from the battery across fuse 17.

When the ignition switch has been set to the drive position, the unit will also receive a supply across fuse 1. At the same time, suction fan 219 for interior temperature transmitter 218 will start.

Pin 6 of the unit is connected to the instrument lighting rheostat (16).

Cars for the AU market

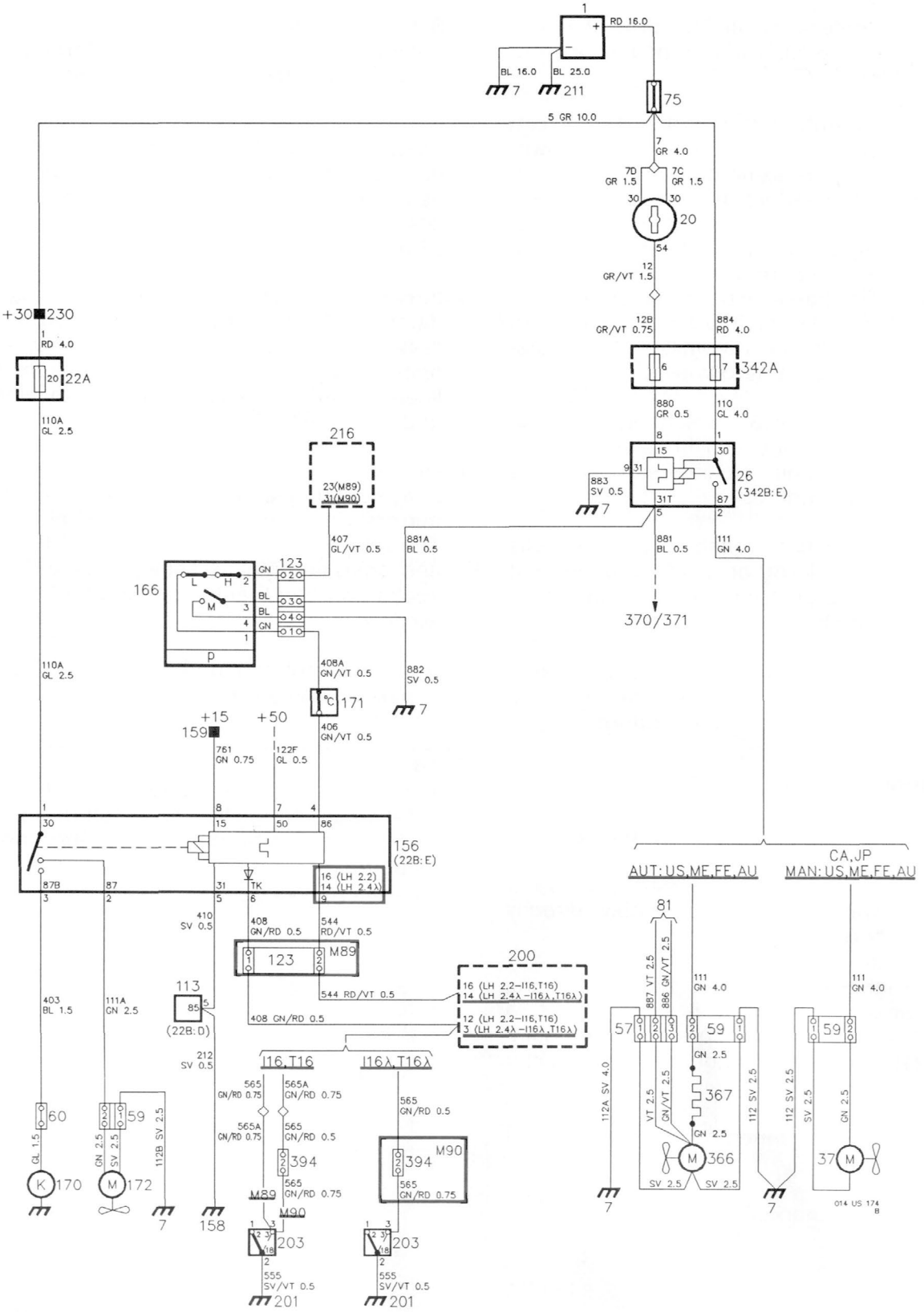
Sun transmitter 223 is of special design and cannot be replaced by transmitters intended for cars destined for other markets.

The climate control unit controls the following functions and units:

- Ventilation fan 199 via speed control 220. The fan speed is controlled steplessly, and the control is connected to pins 12 and 14.
- Stepping motor (222) for the air mixing damper which guides the air through or past the heat exchanger. The motor is connected to pins 6, 7, 8 and 9.
- Stepping motor (221) for the air distribution damper which guides the air through the defroster outlets and/or the ventilation outlets. The motor is connected to pins 25, 26, 27 and 28.
- Servo motor (198) for the recirculation damper. When the damper is closed, air is drawn from outside the car and when it is open (recirculation) air is drawn from the interior. The motor is connected to pins 5 and 24 of the unit.
- Heater element 115 for the rear window and heater elements 207 for the door mirrors which are controlled via relay 113. The relay is connected to pin 11. The connection to the relay is shown in detail in the section entitled Electric heating for the rear window.
- Rear-door fans 247 and 248 are connected to pins 38 and 39 respectively.

Note
The cooling fin of the speed control is live (+12V) when the ignition is switched on. The speed control will be destroyed if the cooling fin is earthed.

AC compressor and radiator fans US, CA, JP, ME, FE, AU



AC compressor and radiator fans

The AC compressor and radiator fan are switched on and off from output 23 (1989) or 31 (1990).

Cars for certain markets are equipped with an auxiliary radiator fan (172) for the AC. Ordinary radiator fan 37/366 is switched in by relay 26. The control signals from the climate control unit will not be operative until the following conditions are met:

- Contacts H and L in pressure switch 166 must be closed (normal setting). Contacts L will open if the temperature should drop below 0°C (32°F) (refrigerant pressure approx. 2 bar), and safety contacts H will open if the pressure should exceed 27 bar.
- The contacts of anti-freeze thermostat 171 must be closed, i.e. the ambient temperature must be at least approx. +6°C (43°F).
- The control signals will then be supplied to pin 86 of relay 156.

LH 2.2 and LH 2.4 Lambda fuel injection systems

From pin 16 (pin 14 of LH 2.4 Lambda) of relay 156, control unit 200 of the fuel injection system receives information on when the time delay function of the relay has been activated, so that compensation can be started.

After a certain delay, the relay will be energised and compressor 170 and the auxiliary radiator fan 172 for the AC are switched in. The relay electronics are energised (in the drive position) across pin 15.

To ensure that the engine speed will not drop when the compressor is switched in and the engine is running at idling speed, switching in of the compressor is delayed so that the electronic unit of the fuel injection system will have time to raise the idling speed.

When the engine is running at full throttle, pin TK of the relay will be earthed by throttle angle transmitter 203. The relay then switches off the compressor in order to relieve the engine of the compressor load, and thus enable it to deliver maximum power.

The relay is provided with a further time-delay function which is activated each time the engine is started, i.e. when pin 50 is supplied from ignition switch 20 (in the start position). If the ECON switch of the ACC unit is not depressed at this stage (i.e. the green LED is not alight), the AC function will delay relay operation and compressor switching-in by 10 seconds to prevent overloading of the battery.

Ordinary radiator fan 37/366 is controlled by contacts M in pressure switch 166. The contacts are normally open when the unit is started. When the refrigerant pressure has reached 15 bar, the contacts will close and relay 26 will be energised. Fan motor 37/366 will then be supplied across fuse 7 and will start.

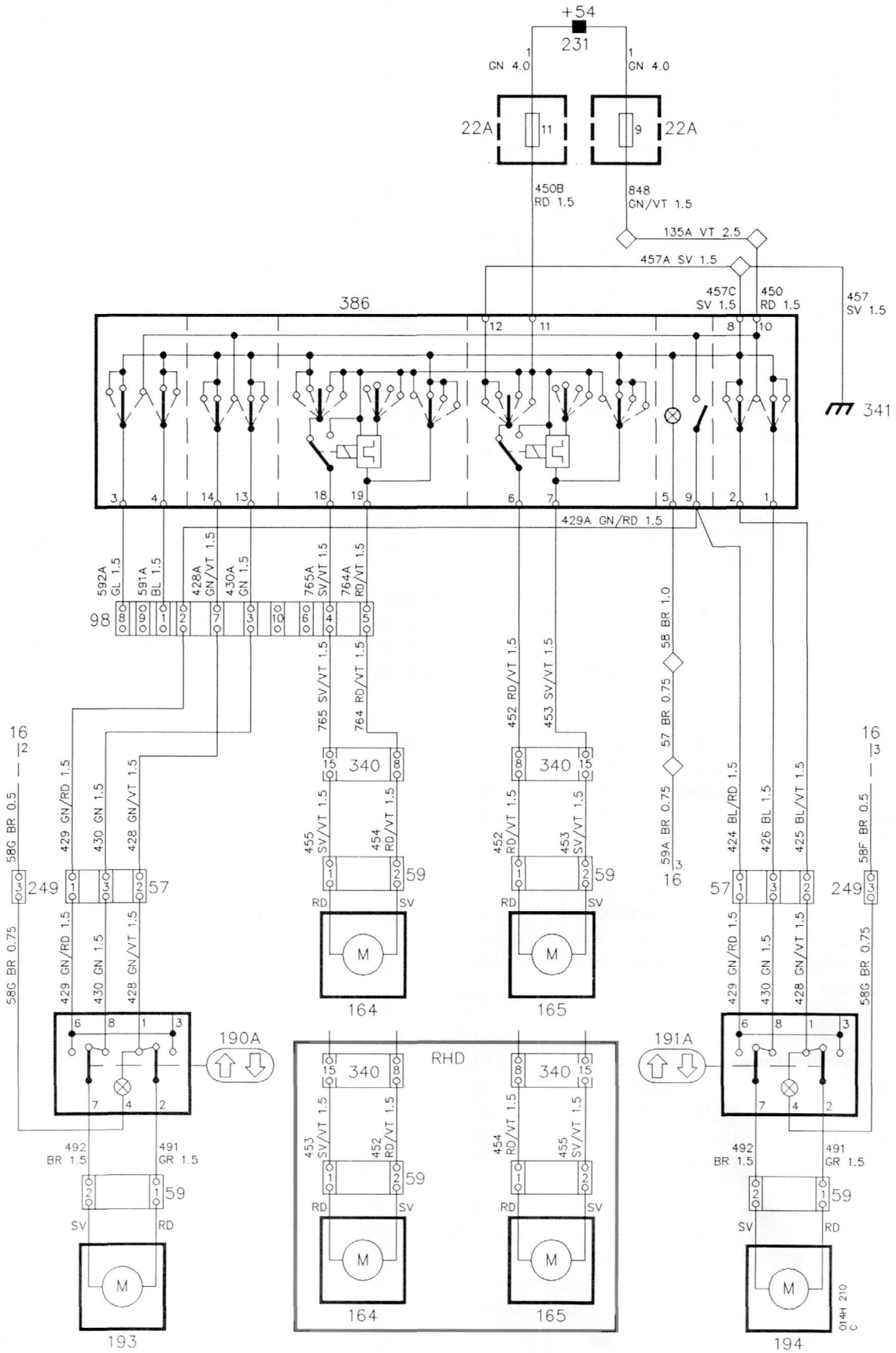
The contacts open and close in response to the amount of cooling necessary. The contacts open at 11 bar.

Cars for the US, ME, FE and AU markets

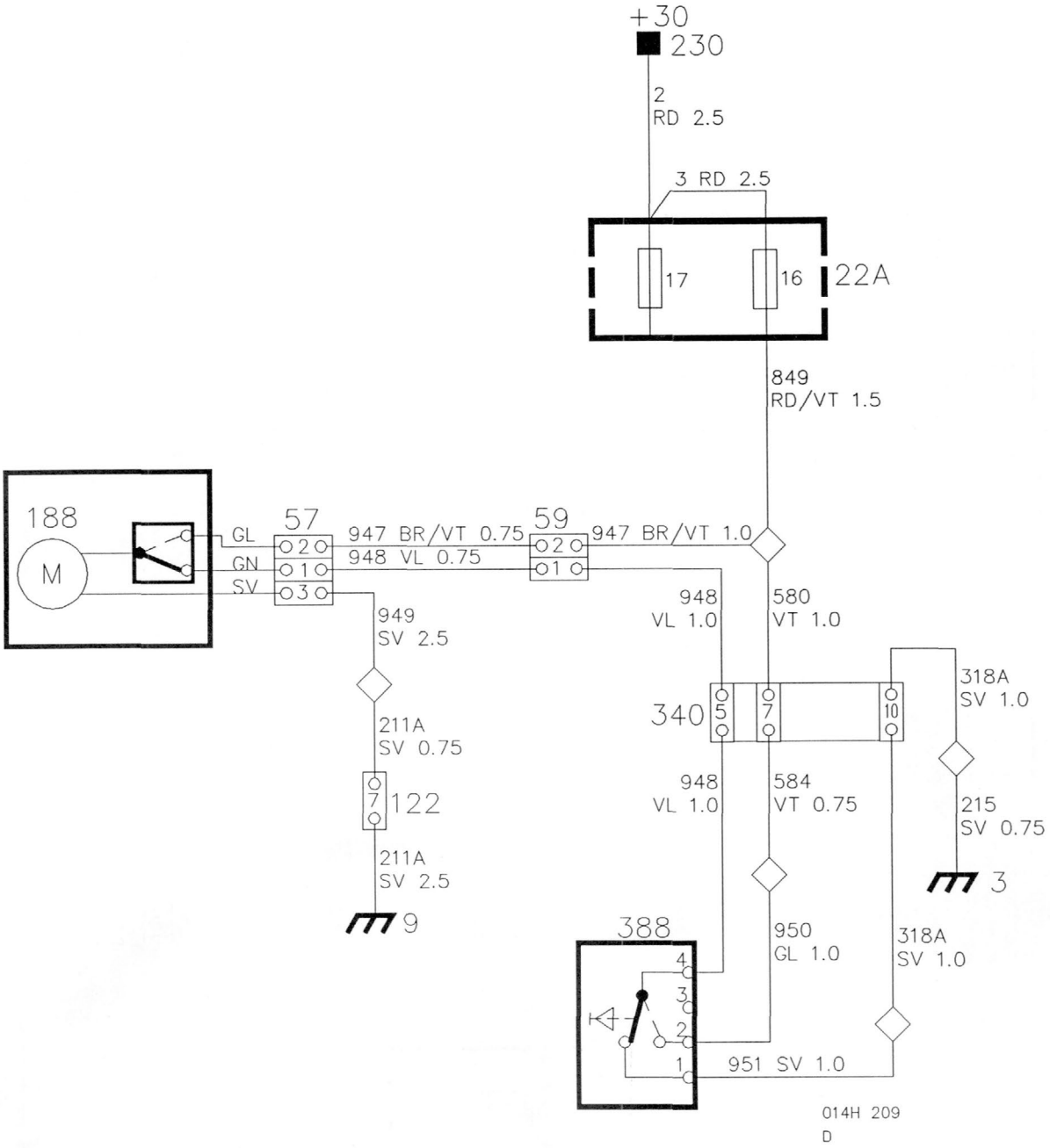
Cars with automatic transmission intended for warm-climate markets are equipped with a two-speed radiator fan. This is described in the section entitled "Cooling system fan".

For fault-tracing hints, also see the section entitled "Air Conditioner (AC)".

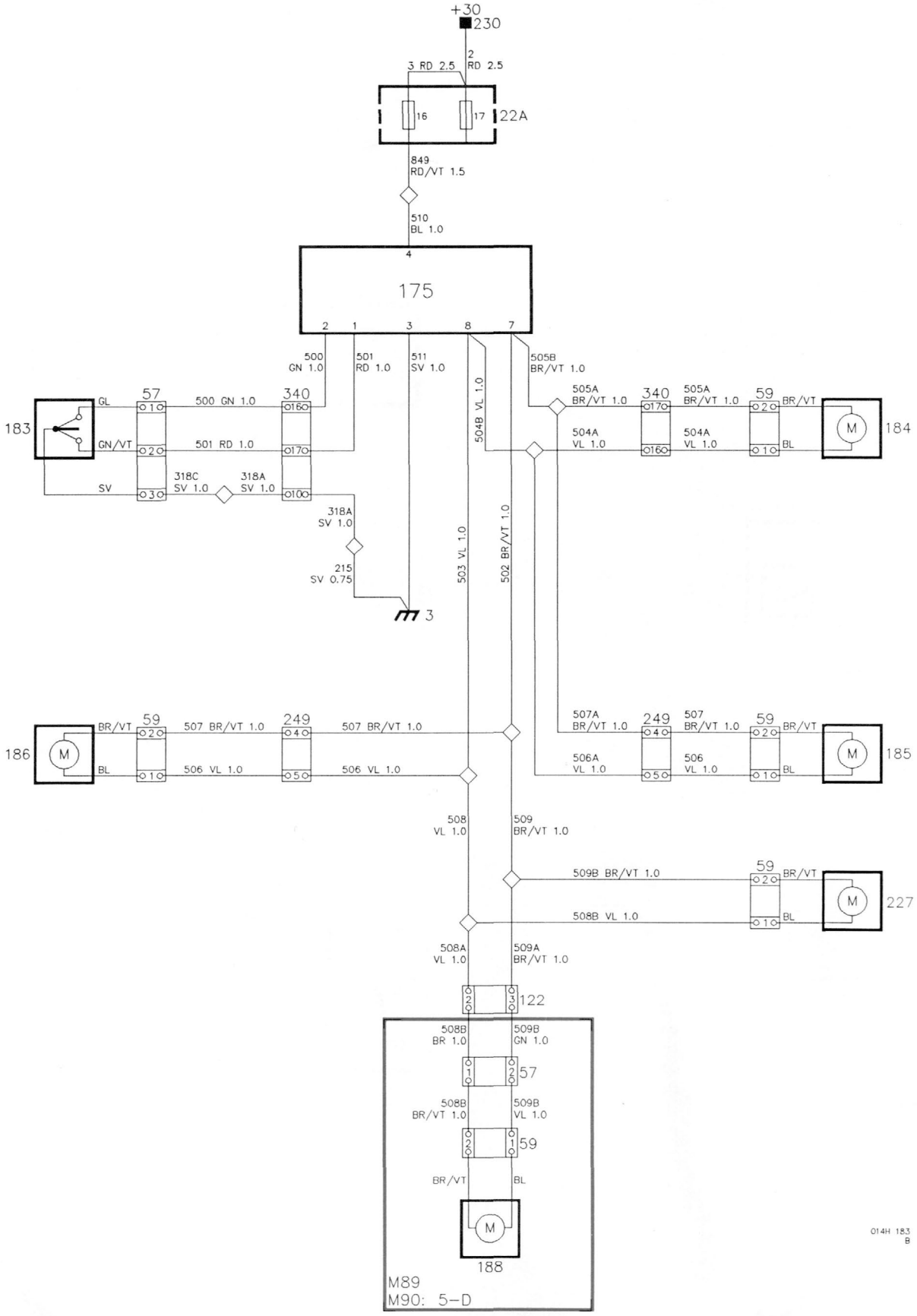
Electrically operated windows



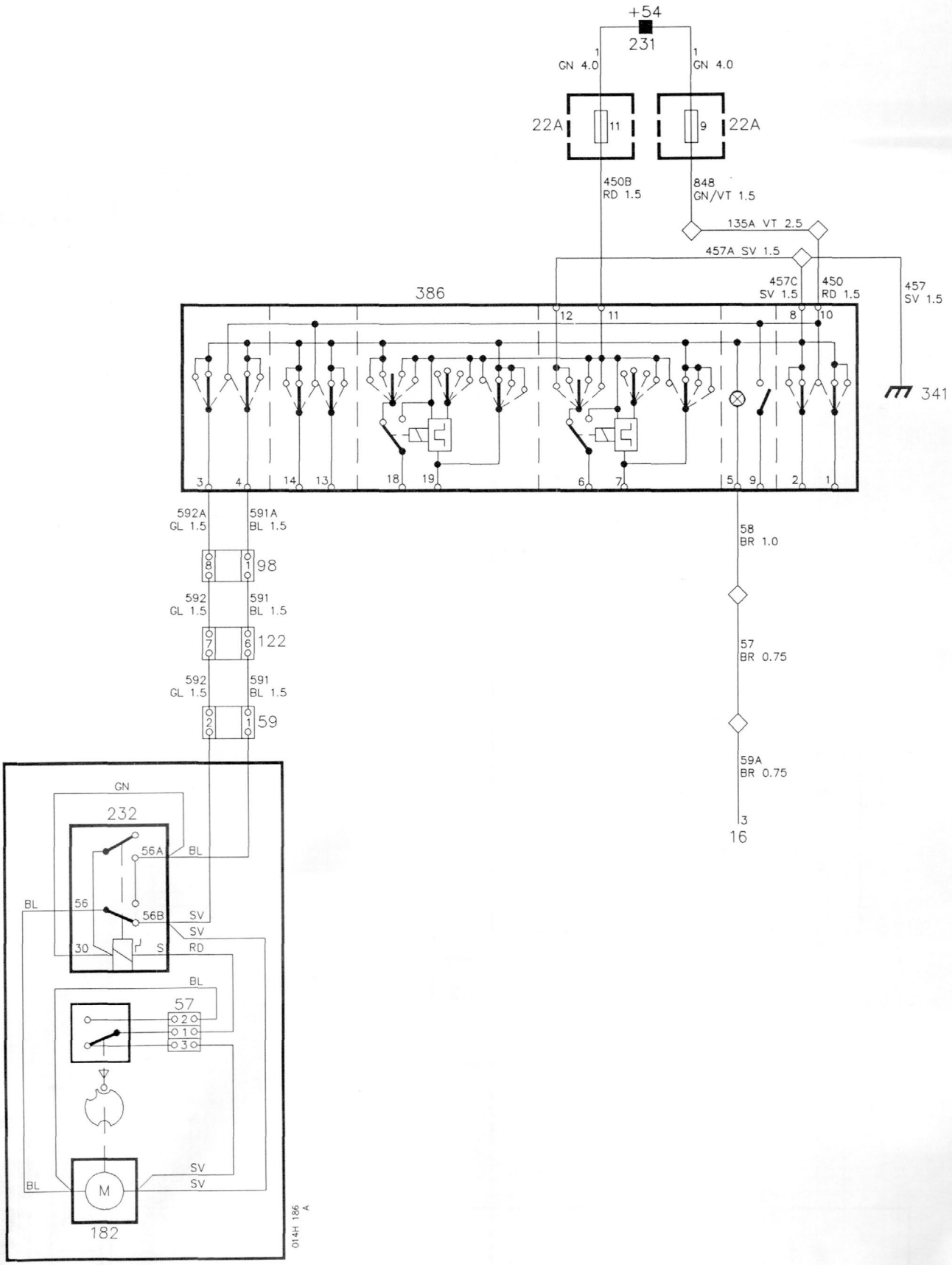
Electrically operated lock for the compartment lid



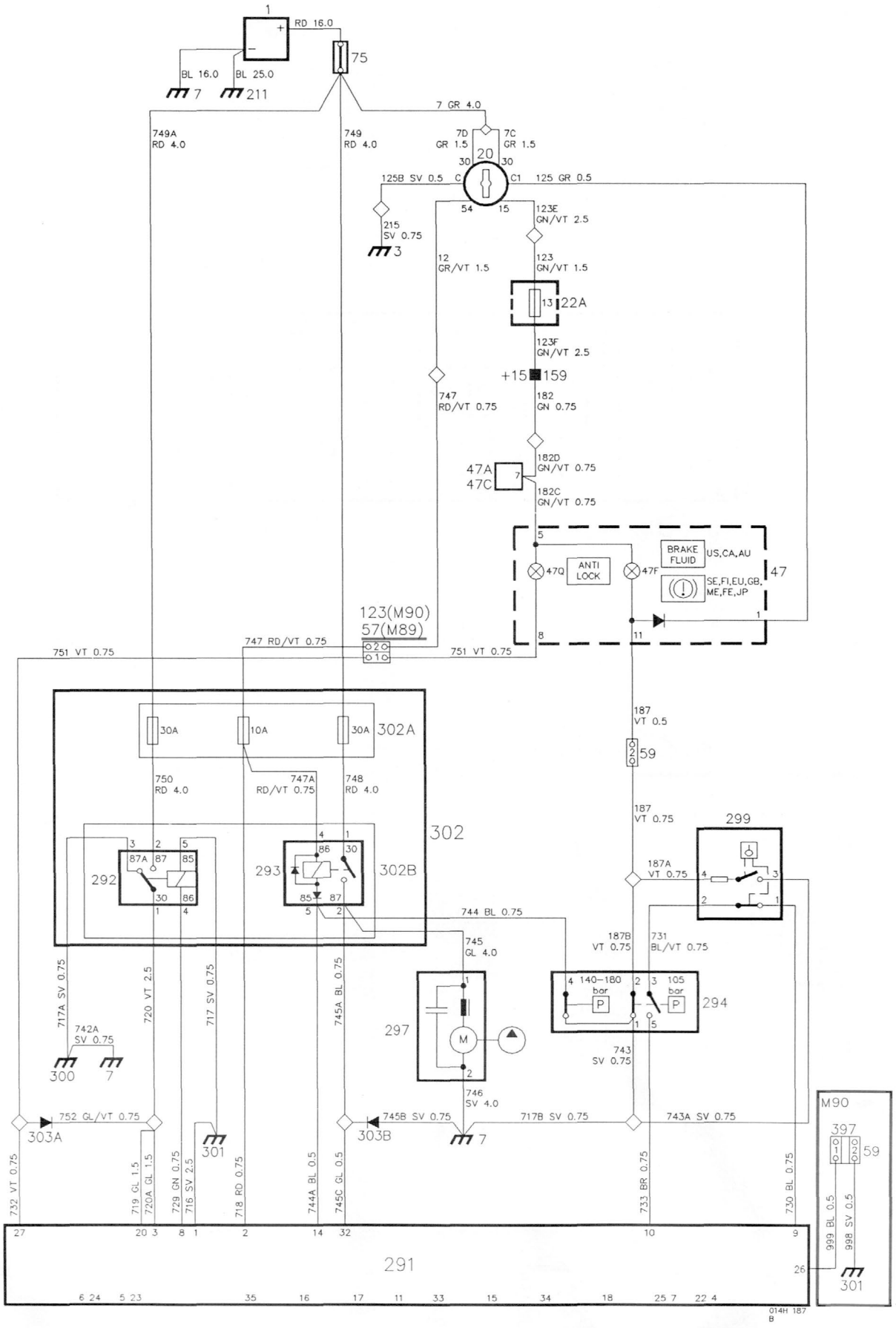
Central locking



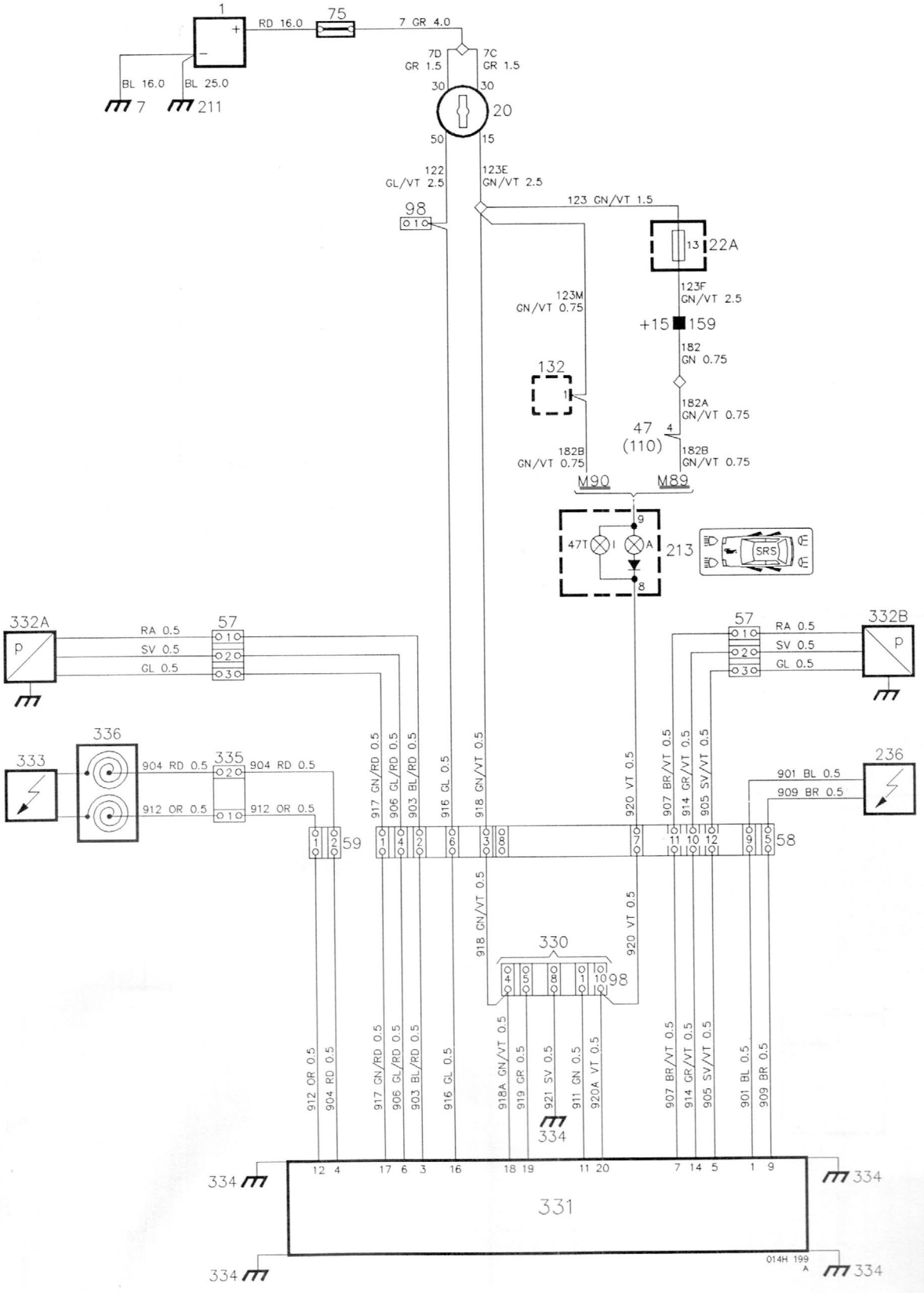
Electrically operated sunroof



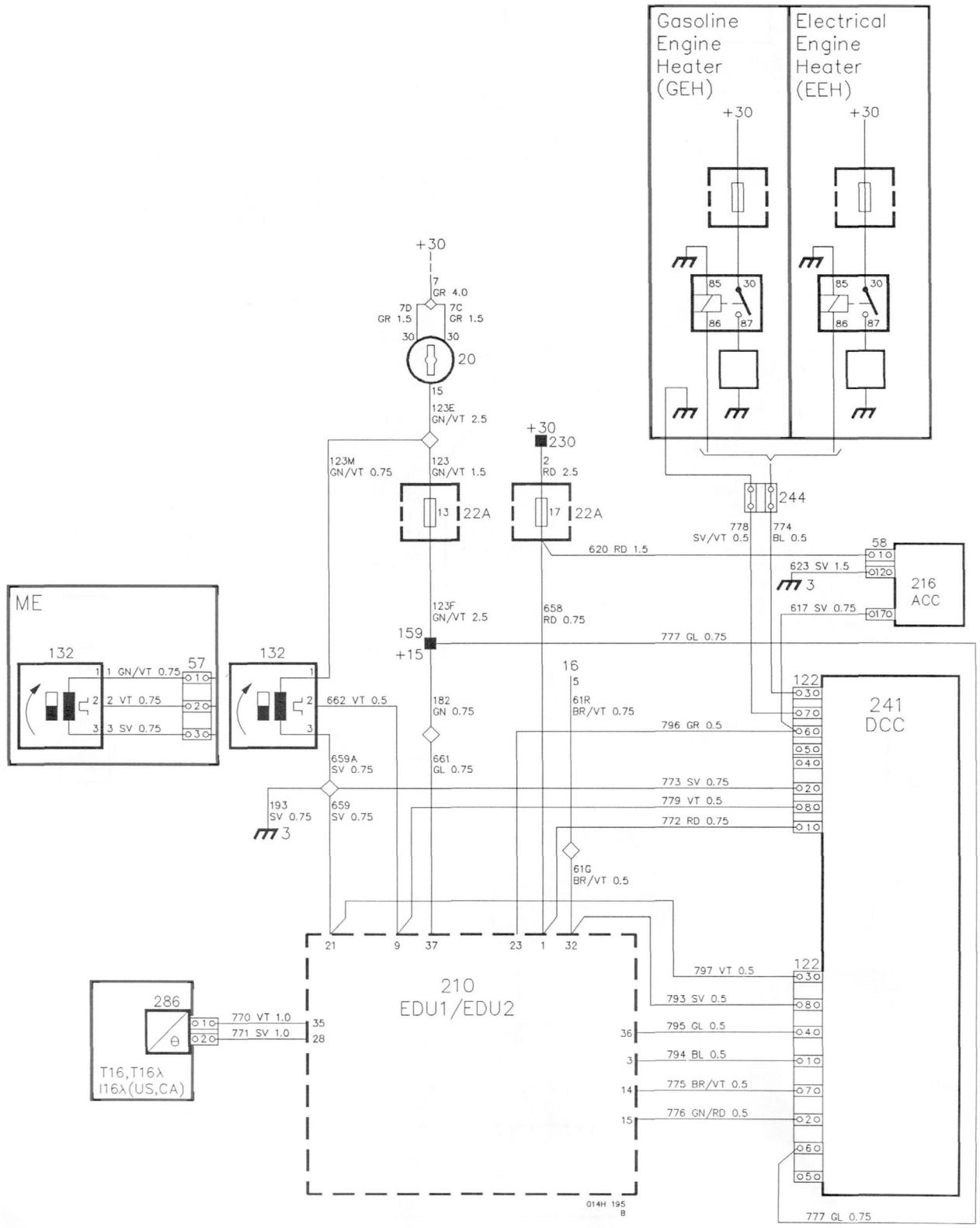
Anti-lock brakes (ABS)



Airbag


1
RD 16.0
75
7 GR 4.0
7D
GR 1.5
7C
GR 1.5
BL 16.0
BL 25.0
7
211
30
30
20
50
15
122
GL/VT 2.5
123E
GN/VT 2.5
98
123 GN/VT 1.5
13
22A
123M
GN/VT 0.75
123F
GN/VT 2.5
+15
159
182
GN 0.75
132
182A
GN/VT 0.75
47
(110)
4
182B
GN/VT 0.75
182B
GN/VT 0.75
M90
M89
9
47T
I
A
213
8
SRS
332A
RA 0.5
SV 0.5
GL 0.5
57
57
RA 0.5
SV 0.5
GL 0.5
332B
336
333
904 RD 0.5
335
904 RD 0.5
912 OR 0.5
912 OR 0.5
917 GN/RD 0.5
906 GL/RD 0.5
903 BL/RD 0.5
916 GL 0.5
918 GN/VT 0.5
920 VT 0.5
907 BR/VT 0.5
914 GR/VT 0.5
905 SV/VT 0.5
901 BL 0.5
909 BR 0.5
236
59
58
330
98
918 GN/VT 0.5
920 VT 0.5
912 OR 0.5
904 RD 0.5
917 GN/RD 0.5
906 GL/RD 0.5
903 BL/RD 0.5
916 GL 0.5
918A GN/VT 0.5
919 GR 0.5
921 SV 0.5
911 GN 0.5
920A VT 0.5
907 BR/VT 0.5
914 GR/VT 0.5
905 SV/VT 0.5
901 BL 0.5
909 BR 0.5
334
12 4
17 6 3
16
18 19
11 20
7 14 5
1 9
334
331
334
334
014H 199
A

DCC trip computer



Operation

A DCC (Driver/Co-driver Computer) provides the following functions:

Time functions
Clock
Elapsed time from starting
Stopwatch
Alarm

Trip functions
Average speed
Trip meter
Distance to destination
Speed warning

Temperature functions
Outdoor temperature
Timer for interior heater

The trip computer is operated by means of the following buttons located below the display.

The buttons are also used to select the units (e.g. km or miles) to be used for displaying information. The operation of the DCC trip computer and other information are contained in Service Manual 3:1, Electrical system, Instruments.

A light sensor and two buttons - R and INFO - are provided in the bottom row of the trip computer.

The purpose of the sensor is to control the brightness of the displays of the DCC and the EDU trip computer automatically under daylight conditions. Under conditions of darkness, the brightness can be controlled by means of the instrument lighting rheostat, located on the fascia. Buttons R and INFO are used for the EDU trip computer. These are connected to the EDU (210), together with the brightness control wiring, across a separate connector 122.

The DCC trip computer (241) is supplied from fuse 17 (constant supply) and from fuse 13 when the ignition switch is in the drive position.

The trip computer requires information from terminal 2 of speed sensor 132 to calculate and display the trip functions. The signal is fed across connector 122, to which the EDU trip computer is connected.

Information for the temperature functions is obtained from outdoor temperature sensor 286 located behind the front spoiler. The sensor is connected to the EDU 2. A digital temperature signal is transmitted from pin 23 of the EDU 2 to pin 6 of the DCC and to pin 17 of the ACC (216). Note that the prevailing outdoor temperature is not displayed on the EDU 2 if the car is equipped with the DCC.

If the DCC is fitted to the car after delivery, the EDU must be reprogrammed to obtain a temperature reading on the DCC.

An interior heater can be started automatically, for example in the morning and evening, using the two timer functions of the trip computer. The heater is controlled across a special connector unit which is connected to pins 3 and 7 of the trip computer via 2-pole connector 244. The time displayed on the DCC is the time at which the interior of the car will be heated to the desired temperature.

Fault-tracing hints

The trip computer is activated by turning the ignition switch to the drive position.

1 Check fuses 13 and 17 and check that the supply to them is live.

2 Check that the supply to pins 1 and 6 of the trip computer is live.

3 Check that the contact surfaces of the connectors are undamaged and clean. This is important since the currents flowing through the connectors are low.

4 Check the wiring and earth connections.

The DCC includes a self-test function, and the following fault codes will be shown on the display in the event of a fault:

F1 Internal fault in the DCC
F2 No temperature signal from the EDU (A fault on the outdoor temperature sensor is indicated on the EDU.)

Note
Earth cable 778 SV/VT when fitting a petrol-fired (GEH) heater. Do **not** earth cable 778 SV/VT when fitting an electric (EEH) heater.

Do not earth cable 774 BL under any circumstances.

List of components

Numerical index

1 Battery
2 Alternator
3 Earthing point, facia
4 Starter motor
5 Ignition coil
6 Ignition distributor
7 Earthing point, left-hand wheel housing
8 Lighting relay
9 Earthing point, luggage compartment
10 Light switch
11 Full beam filament
12 Dipped beam filament
13 Parking lights
14 Rear lights
15 Number plate illumination
16 Instrument lighting rheostat
18 Combined instrument lighting
19 Glove compartment lamp
20 Ignition switch
21 Ignition switch relay
22 Electrical distribution box, glove compartment
22A Fuse board, glove compartment
22B Relay board, glove compartment
23 Flasher relay
24 Direction indicator stalk switch
25 Switch for hazard warning lights
26 Time delay relay for the radiator fan
27 Direction indicator lamps, left-hand side
28 Direction indicator lamps, right-hand side
29 Brake light switch
30 Brake lamps
31 Reversing light switch
32 Reversing lights
33 Rear fog lights
35 Selector switch for the ventilation fan
36 Motor for the ventilation fan, AC
37 Radiator fan motor
38 Recirculation damper motor
40 Horns
41 Horn switch
42 Brake fluid level warning switch
43 Handbrake switch
44 Oil pressure transmitter
45 Coolant temperature transmitter
46 Fuel level transmitter
47 Combined instrument
47A Fuel gauge
47B Fuel reserve warning lamp
47C Coolant temperature gauge
47D Oil pressure warning lamp
47E Charging warning lamp
47F Brake fluid level warning lamp
47G Full-beam warning lamp
47H Direction indicator warning lamp, left-hand
47I Direction indicator warning lamp, right-hand
47J Indicating lamp for the rear-window electric heater
47K Lamp for shift-up indication
47M Handbrake warning lamp
47N Warning lamp for the rear fog lights
47P CHECK ENGINE warning lamp
47Q Warning lamp, ABS
47R Washer fluid level warning lamp
47T Warning lamp, airbag
47U Cruise control indicating lamp
47V 'Headlamp on' warning lamp
47X TCS indicating lamp (as from 1990)
47Y TCS warning lamp (as from 1990)
48 Cigarette lighter
49 Clock
50 Roof lamp, centre
51 Roof lamp, front
53 Switch, interior lighting
54 Door switch for the interior lighting
55 Luggage compartment light fitting
56 Luggage compartment light switch
57 3-pole connector
58 12-pole connector
59 2-pole connector
60 Single-pole connector
61 Windscreen wiper stalk switch
62 Windscreen wiper motor
63 Washer motor
64 Heating pad
65 Earthing point, under back seat
66 Headlamp wiper motor
67 6-pole connector
68 Horn relay
69 Seat switch for the co-driver's seat-belt warning lamp
70 Seat-belt switch for the driver
71 Seat-belt switch for the co-driver
72 Seat-belt warning lamp
73 Timing service instrument (TSI) socket
74 Resistor for radiator fan
75 Distribution block, positive battery supply
76 Switch for raising the engine idling speed, auto
77 Starting interlock contacts, automatic transmission
78 Dim dipped beam relay (up to and incl. 1989)
80 Dim dipped beam resistor (up to and incl. 1989)
81 Relay for 2-speed radiator fan
82 Seat belt/ignition switch warning relay
83 Relay for intermittent operation of the wipers
85 Extra fog lights

87 Engine compartment light fitting and switch
88 Switch for extra fog lights
89 Side direction indicator lamp, left-hand side
90 Side direction indicator lamp, right-hand side
91 Selector lever lamp (automatic transmission)
94 Cold starting valve
98 10-pole connector
101 Fuel feed pump (up to and incl. 1989)
102 Fuel pump relay
103 Fuel pump (up to and incl. 1989)
107 Relay for the extra fog lights
109 High-level brake light
110 Tachometer
111 Electronic speedometer
112 Transmitter for electronic speedometer
113 Relay for the rear window heater
115 Electric heater for the rear window
116 Switch for the rear window heating
117 Spare
118 Corner lights
119 Side reversing light
122 8-pole connector
123 4-pole connector
124 Switch for the rear-view mirrors
125 Left/right selector switch for the rear-view mirrors
126 Motor for the left-hand rear-view mirror
127 Motor for the right-hand rear-view mirror
131 Control unit for the Cruise Control
132 Sensor for the speed transmitter
133 Clutch switch for the Cruise Control
134 Brake switch for the Cruise Control
136 Lambda sensor
137 16-pole connector
141 Selector for the Cruise Control
143 Recirculation switch for the AC
144 Pressure switch, Turbo
145 Test tapping, EZK
146 Amplifier of the electronic ignition system
147 Discontinued
148 Front ashtray and cigarette lighter illumination
149 Main switch for the ventilation fan
151 Time-delay relay for the interior lighting
153 Lamp for centre console and rear ashtray
154 Lighting for the heater controls
155 Relay for the AC radiator fan
156 Time-delay relay for the AC and ACC radiator fan
157 Spark plugs
158 Negative distribution terminal
159 Distribution terminal + 15
160 Switch for glove compartment illumination
161 Switch for the rear fog lights
162 Switch for the left-hand front electric window regulator (up to and incl. 1989)
163 Switch for the right-hand front electric window regulator (up to and incl. 1989)
164 Motor for the left-hand front electric window regulator
165 Motor for the right-hand front electric window regulator
166 Pressure switch for the radiator fan, AC and ACC
167 Spare
169 Switch for the AC
170 Compressor for the AC and ACC
171 Anti-freeze thermostat (cycling clutch switch), AC and ACC
172 Radiator fan for the AC and ACC
173 Discontinued
174 Relay for daylight driving lights (CA)
175 Control unit for the central locking system
176 Control unit for the EZK ignition system
177 Control unit for the APC system
178 Knock sensor for the APC/EZK system
179 Solenoid valve for the APC system
180 Pressure transmitter for the APC system
181 Switch for the electrically-operated sunroof (up to and incl. 1989)
182 Motor for the electrically-operated sunroof
183 Selector switch for central locking system, driver's door
184 Motor for central locking system, co-driver's door
185 Motor for the central locking system, right-hand rear door
186 Motor for the central locking system, left-hand rear door
187 Vacuum pump for the Cruise Control
188 Motor for the central locking system, luggage compartment lid
189 Interlock switch for the rear-door electric window regulators (up to and incl. 1989)
190 Switch for the left-hand rear electric window regulator (up to and incl. 1989)
190A Switch for the left-hand rear electric window regulator
191 Switch for the right-hand rear electric window regulator (up to and incl. 1989)
191A Switch for the right-hand rear electric window regulator
192 Distribution block
193 Motor for the electric window regulator, left-hand rear door
194 Motor for the electric window regulator, right-hand rear door
195 Level switch for windscreen washer fluid

197 Outdoor temperature sensor - ACC (up to and incl. 1989)
198 Recirculation damper motor - ACC
199 Motor for the ventilation fan - ACC
200 Control unit for the LH fuel injection system
201 Engine earthing point
202 Engine temperature transmitter for the LH fuel injection system
203 Throttle angle transmitter for the LH fuel injection system
204 Test connector for the LH fuel injection system
205 Air mass meter for the LH fuel injection system
206 Fuel injection valves for the LH fuel injection system
207 Heating element for the electrically-operated rear-view mirrors
208 Door lock indication
209 Courtesy lights
210 EDU trip computer (voltmeter, fuel consumption instrument)
211 Earthing point, gearbox
213 Pictogram in the combined instrument
213A Central lamp in pictogram
213B Rear lights indication in pictogram
213C Front lights indication in pictogram
213D Right-hand rear door indication in pictogram
213E Left-hand rear door indication in pictogram
213F Right-hand front door indication in pictogram
213G Left-hand front door indication in pictogram
215 Dip switch
216 Automatic climate control (ACC) unit
217 Air mixture temperature transmitter - ACC
218 Interior temperature transmitter - ACC
219 Suction fan for the interior temperature transmitter - ACC
220 Speed control for the ventilation fan - ACC
221 Air distribution damper motor - ACC
222 Temperature control damper motor - ACC
223 Sun transmitter - ACC
224 Seat-belt lock illumination
225 Reading lamp
226 Co-driver's lamp
227 Motor for the central locking system, fuel tank lid
228A Filament monitor (in the glove compartment)
228B Filament monitor (in the engine compartment)
229 Main relay for the LH fuel injection system
230 Distribution terminal + 30
231 Distribution terminal + 54
232 Stepping relay for the electrically operated sunroof
233 Vacuum switch, Cruise Control/APC
234 Side marker lights
235 Seat-belt tensioner, left-hand
236 Seat-belt tensioner, right-hand
237 Test tapping for the seat-belt tensioner
238 Electronic control unit for the seat-belt tensioners
239 Gear selector switch (automatic transmission)
240 Electronic unit for instrument lighting rheostat
241 DCC trip computer
242 Coolant level switch
243 Engine oil level switch
244 Connection for heater
245 Selector lever switch (automatic transmission), EDU2
246 Switch for rear door fans (up to and incl. 1989)
247 Fan, left-hand rear door
248 Fan, right-hand rear door
249 7-pole connector
252 Rheostat for the heating pad, driver's seat
253 Rheostat for the heating pad, co-driver's seat
254 Thermostat for the heating pad, driver's seat
255 Thermostat for the heating pad, co-driver's seat
256 Buzzer for speed warning
257 Earthing point on the alternator bracket
258 Connector for trailer lighting
259 Reverse current protection relay, dim dipped beam (up to and incl. 1989)
265 Electrically-operated aerial
266 Speakers
267 Radio connection
269 2-pole connector
271 Lambda sensor preheater
272 Engine idling speed adjustment, LH fuel injection system
275 Connection for siren, burglar alarm
276 Connection for bonnet switch, burglar alarm
280 Headlamp beam control motor, left-hand
281 Headlamp beam control motor, right-hand
282 Headlamp beam control switch
286 Outdoor temperature sensor for the trip computer
287 Relay, automatic window regulator controls
288 Connection for the ON/OFF switch
289 Connection for the burglar alarm control unit
291 Control unit, ABS

292 Main relay, ABS
293 Pump relay, ABS
294 Pressure switch, ABS
295 Main valve, ABS
296 Valve block, ABS
297 Hydraulic pump motor, ABS
298A Left-hand front wheel sensor, ABS
298B Right-hand front wheel sensor, ABS
298C Left-hand rear wheel sensor, ABS
298D Right-hand rear wheel sensor, ABS
299 Brake fluid level sensor, ABS
300 Earthing point for the brake unit, ABS
301 Earthing point for the control unit, ABS
302 Relay and fuse board, ABS
302A Fuses, ABS
302B Relays, ABS
303A Diode, ABS
303B Diode, ABS
304 Spare
305 LED for burglar alarm
318 Bass amplifier, 5D
318A Bass amplifier, 4D
318B Filter, 4D
319 Resistor for door fans (up to and incl. 1989)
321 Valve for charcoal canister
322 Connector, auto./man., LH 2.4
323 Fuel pump with integrated feed pump
324 Earthing point for the electric aerial
330 Airbag test connector
331 Electronic unit for the airbag
332A Sensor for airbag, left-hand
332B Sensor for airbag, righ-hand
333 Airbag
334 Earthing point for electronic control unit and airbag test connector
335 2-pole connector for the airbag
336 Slip-ring contact for the airbag
340 22-pole connector
341 Earthing point, left-hand front seat member
342 Electrical distribution box in the engine compartment
342A Fuse board in the engine compartment
342B Relay board in the engine compartment
343 Control unit for the DI, DI-APC system
343 Control unit for the DI-APC system
344 Pressure sensor for the DI-APC system
345 Crankshaft sensor for the DI-APC system
346 Ignition cartridge for the DI, DI-APC system
347 Test socket for diagnostic testing of DI, DI/APC and LH systems
348 Test socket for diagnostic testing of EDU and ACC (as from 1990)
349 Radio contact box with amplifier
350 Contact box for CD player/equalizer
351 13-pole connector
352 Slip-ring contacts, horn
353 Radio/cassette player
354 Amplifier
355 Earthing point at right-hand C-pillar
356 Control unit for speed warning
357 Switch for left-hand electrically operated front seat
357A Fore-and-aft adjustment motor for electrically operated front seat, left-hand
357B Front height adjustment motor for electrically operated front seat, left-hand
357C Rear height adjustment motor for electrically operated front seat, left-hand
357D Backrest rake adjustment motor for electrically operated front seat, left-hand
358 Switch for right-hand electrically operated front seat
358A Fore-and-aft adjustment motor for electrically operated front seat, right-hand
358B Front height adjustment motor for electrically operated front seat, right-hand
358C Rear height adjustment motor for electrically operated front seat, right-hand
358D Backrest rake adjustment motor for electrically operated front seat, right-hand
359 Make-up mirror, left-hand
360 Make-up mirror, right-hand
363 Microswitch for burglar alarm (US)
366 Motor for two-speed radiator fan
367 Resistor for two-speed radiator fan
368 Coding connector for cold-starting valve, LH 2.4 Lambda
369 Microswitch for front-seat backrest
370 Temperature switch, one-position for radiator fan
371 Temperature switch, two-position for two-speed radiator fan
373 Main switch for make-up mirror, left-hand
374 Main switch for make-up mirror, right-hand
375 Connector for mobile telephone (as from 1990)
376 Control unit for ETC (as from 1990)
377 Main relay for ETC (as from 1990)
378 Motor for ETC (as from 1990)
379 Pedal position sensor for ETC (as from 1990)
380 Dump valve for ETC (as from 1990)
381 By-pass valve for ETC (as from 1990)
382 Control unit for ABS/TCS (as from 1990)
383 Valve unit for ABS/TCS (as from 1990)

384 Test connector for ABS/TCS (as from 1990)
385 Diode for ABS/TCS (as from 1990)
386 Switch for electric window regulators/electrically operated sunroof (as from 1990)
387 Earthing point on right-hand front seat member (as from 1990)
388 Switch for boot lid lock, 4-door (as from 1990)
389 NTC resistor for LH 2.4 (as from 1990)
390 Modulating valve for LH 2.4 (as from 1990)
394 24-pole connector (as from 1990)
397 Test connector for ABS diagnostics (as from 1990)

Alphabetic register

Washer motor	63
Windscreen wiper stalk switch	61
Windscreen wiper motor	62
2-pole connector	59
2-pole connector	269
3-pole connector	57
4-pole connector	123
6-pole connector	67
7-pole connector	249
8-pole connector	122
10-pole connector	98
12-pole connector	58
13-pole connector	351
22-pole connector	340
24-pole connector (as from 1990)	394

Transmission

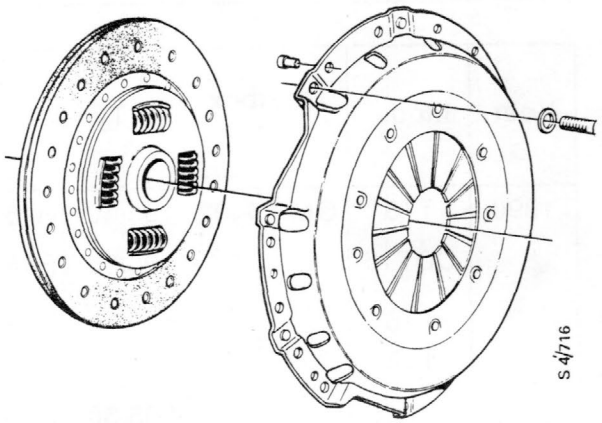
Contents
Manual gearbox

Contents
Automatic transmission

Manual gearbox

Pressure plate

A new pressure plate with a new clutch plate has been introduced on cars with Turbo engines. The pressure plate has a higher clamping force of 6150 N and is of "Low-Lift" type.



Modified final drive of the 9000 Turbo

The final drive ratio on cars with Turbo engines has been increased. The tooth module has been modified to a finer type, and the ratio is consequently modified, although only the third decimal is altered.

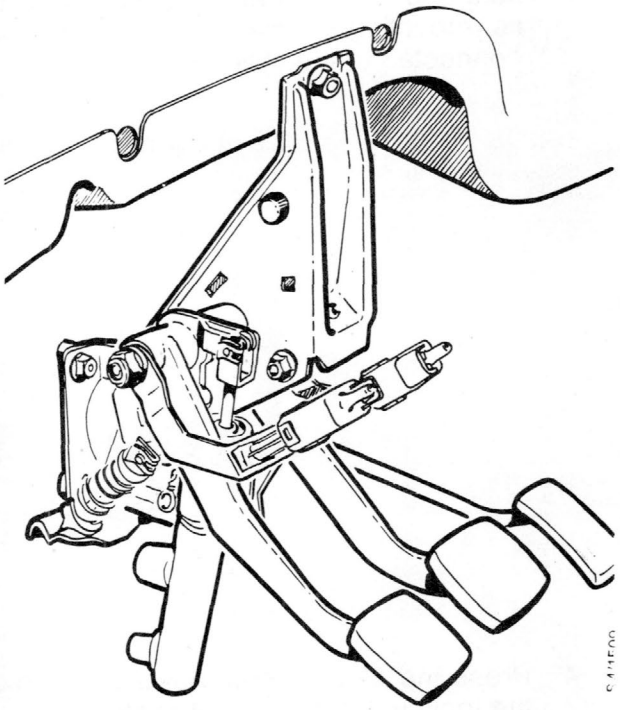
Year	Model	Gearbox nr.	Final ratio	Overall ratio					
				1	2	3	4	5	R
1990	T16 CD T16 T16 Sport	GM75402	85:21	13.70	7.12	4.77	3.62	2.85	13.01

Year	Model	Gearbox nr.	Tyres	Dyna-mic rolling radius	Speed, km/h per 1000 engine r/min					
					1	2	3	4	5	R
1990	T16	GM 75402	195/60 VR15	299	8.2	15.8	23.6	31.2	39.6	8.7
	CDT16		195/65 VR15	306	8.4	16.2	24.2	31.9	40.5	8.9
	T16		205/55 VR15	295	8.1	15.6	23.3	30.7	39.0	8.5
	T16 Sport		205/50 ZR16	297	8.2	15.7	23.4	31.0	39.3	8.6

Clutch pedal

A new clutch pedal has been introduced to suit the new location of the master cylinder on the pedal bracket in the interior.

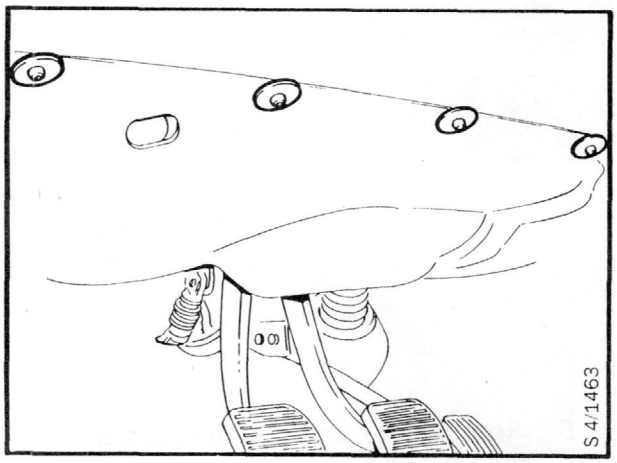
The clutch pedal has been equipped with a new auxiliary spring which has different spring rates on the 9000 Turbo and the 9000i.



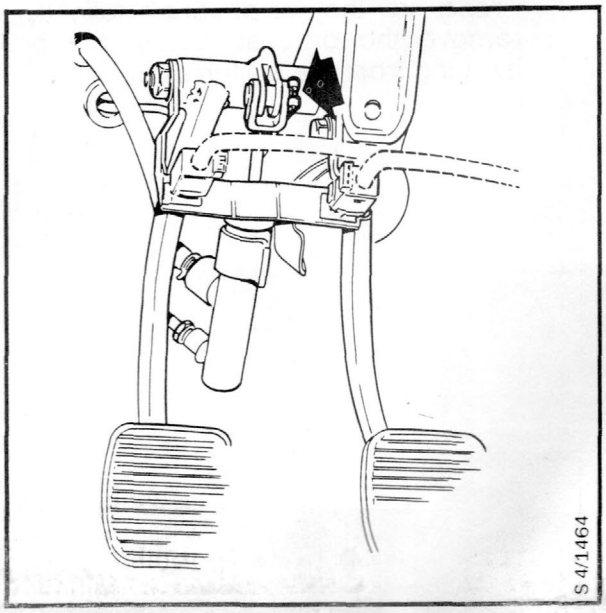
Clutch pedal

To remove

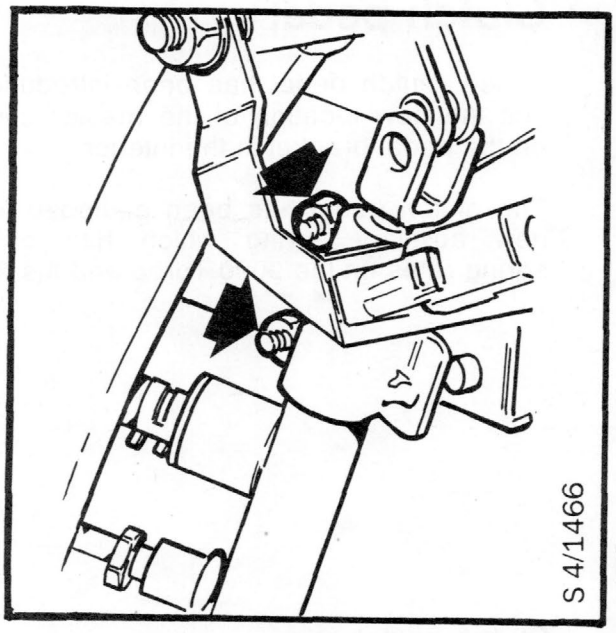
1 Remove the sound baffle.



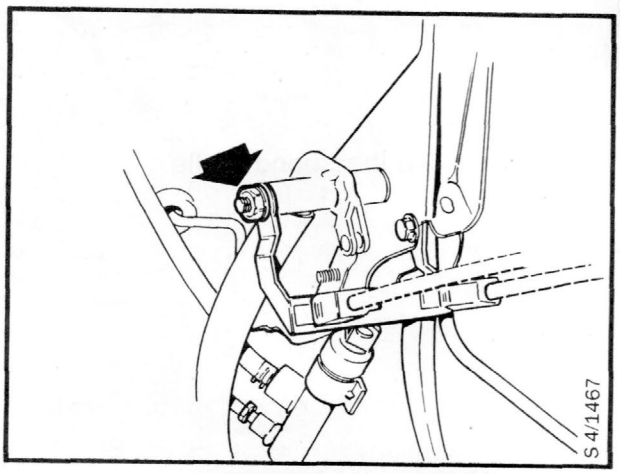
2 Remove the clip and withdraw the clevis pin from the master cylinder pushrod.



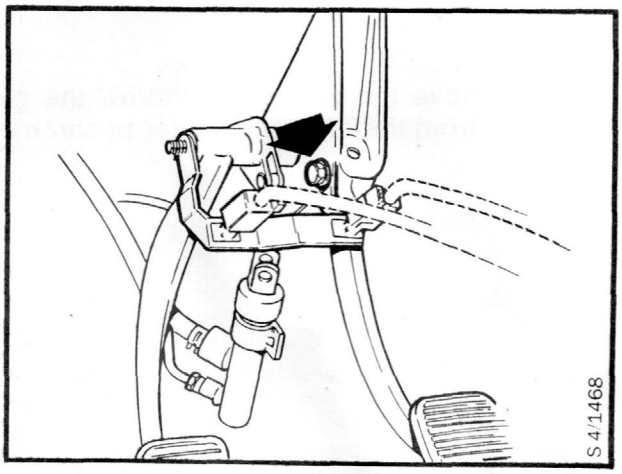
3 Remove the master cylinder retaining nuts and remove the master cylinder from its mounting. Leave the hydraulic lines connected to the cylinder.



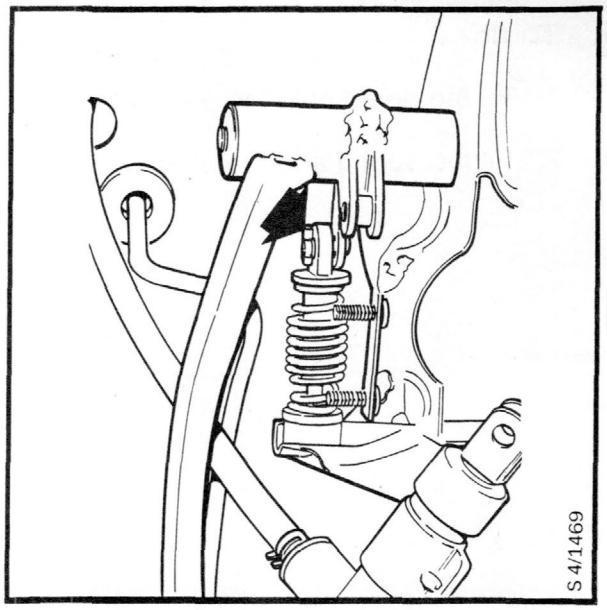
4 Press the clutch pedal down and remove the locknut from the pivot shaft.



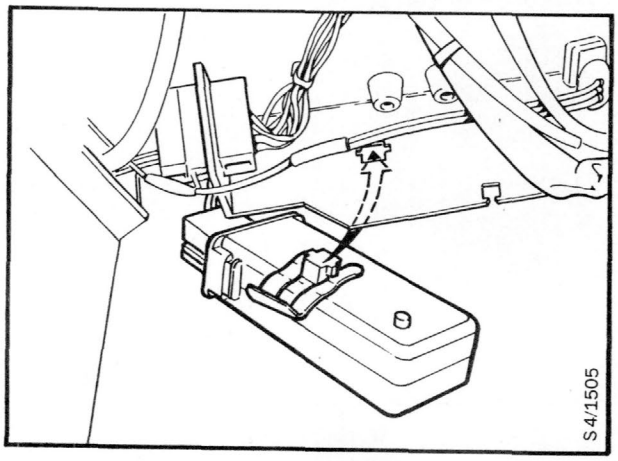
5 Remove the bolt retaining the bracket with the Cruise.transmission Control switches. Press in the pivot shaft slightly and remove the bracket. Leave the bracket hanging from the switch cables.



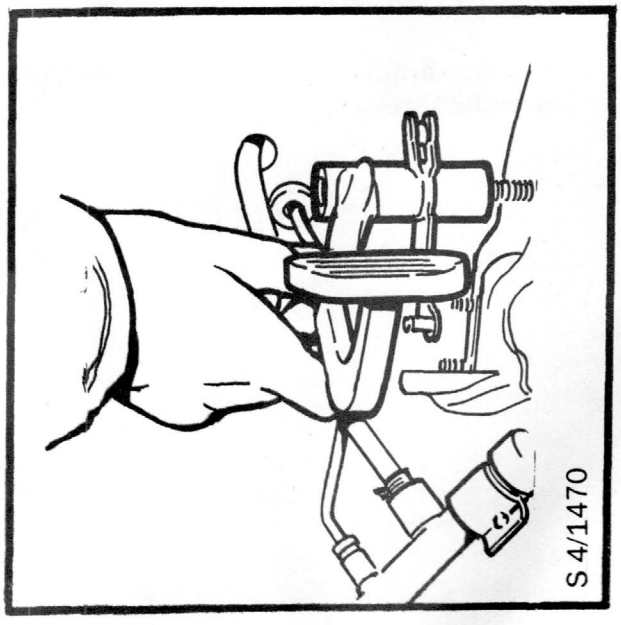
6 Remove the clip for the spring and remove the spring with the bracket.



7 Remove the central locking control unit by removing the clip. Leave the control unit hanging from the cables.



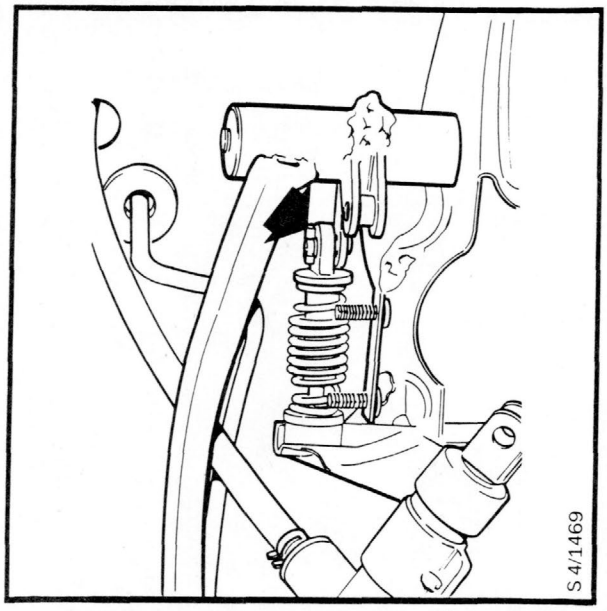
8 Lift the pedal and withdraw it from the pivot shaft.



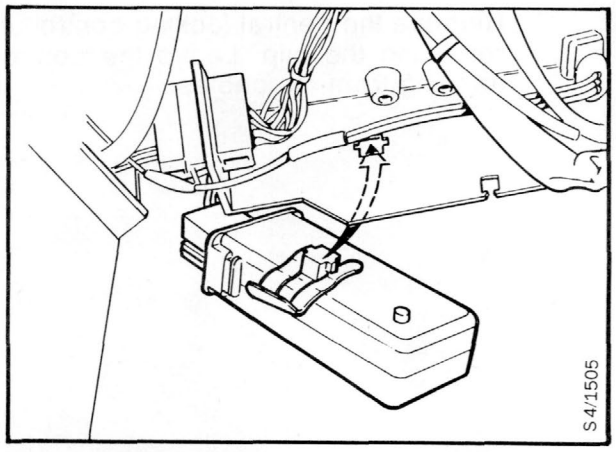
To fit

1 Fit the pedal onto the pivot shaft.

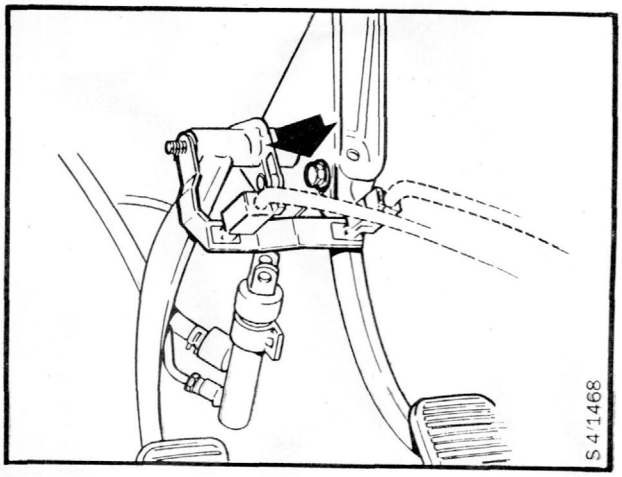
2 Fit the spring and the clip.



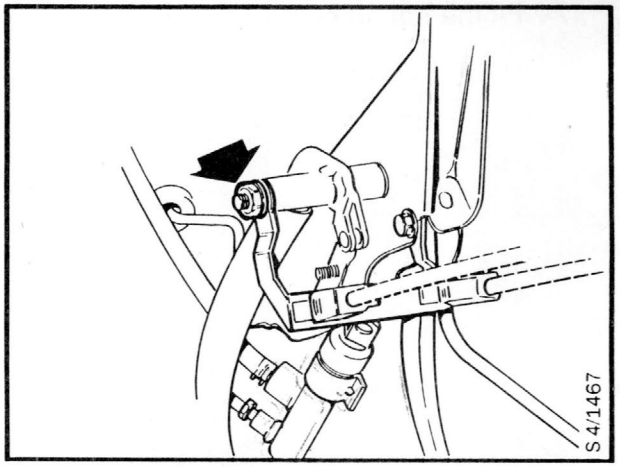
3 Secure the control unit to the switch housing.



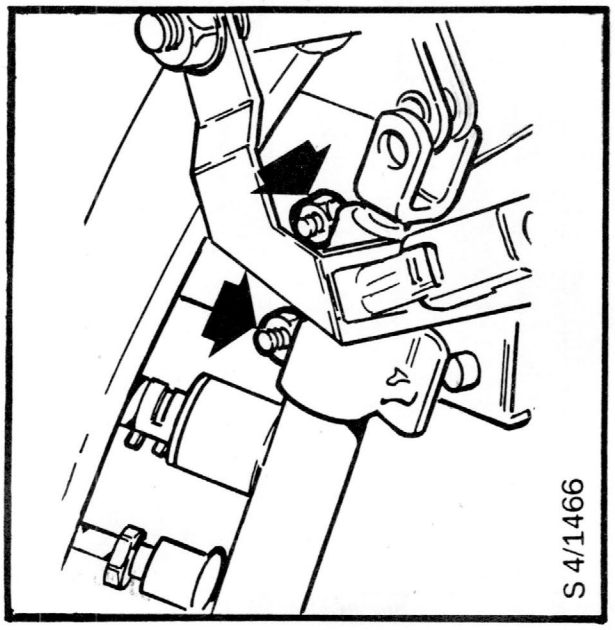
4 Fit the bracket with the Cruise Control switches.

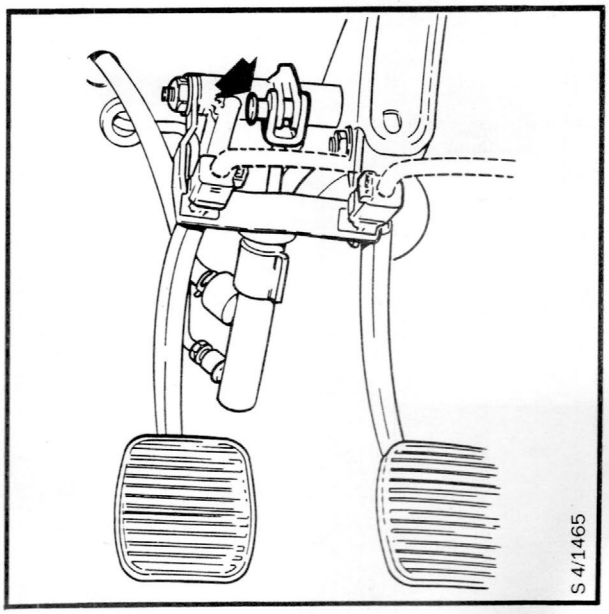


5 Fit the locknut to the pivot shaft.

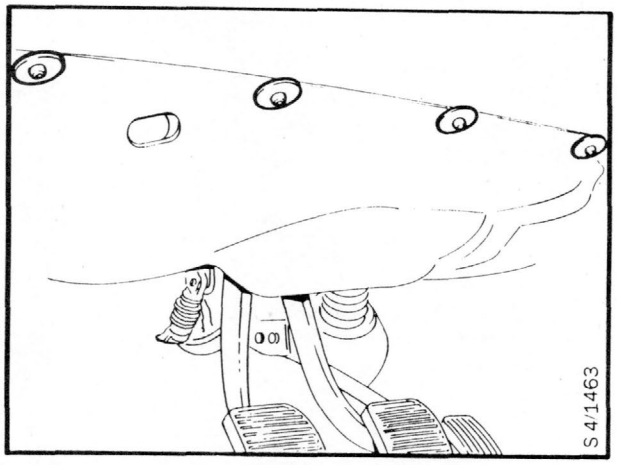


6 Fit the master cylinder and fit the clevis pin to the master cylinder pushrod.





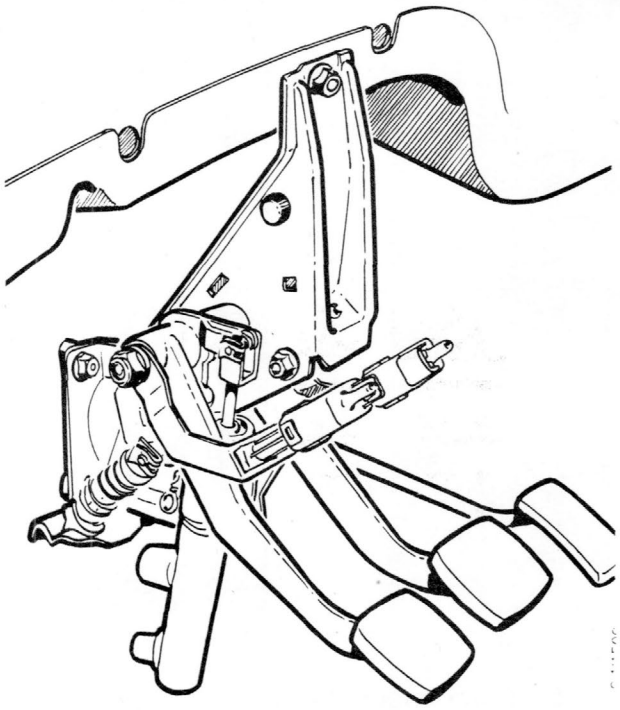
7 Fit the sound baffle.



Clutch master cylinder

As from the 1990 model, the master cylinder is moved from the bulkhead floor to the pedal bracket in the interior, and the pedal bracket is equipped with a mounting for the master cylinder.

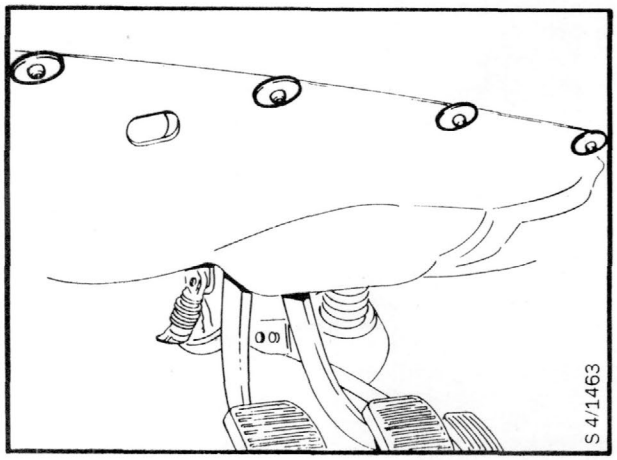
As a result, a new supply hose is fitted between the brake fluid reservoir and the master cylinder, and a new pressure pipe is fitted between the master cylinder and the slave cylinder.



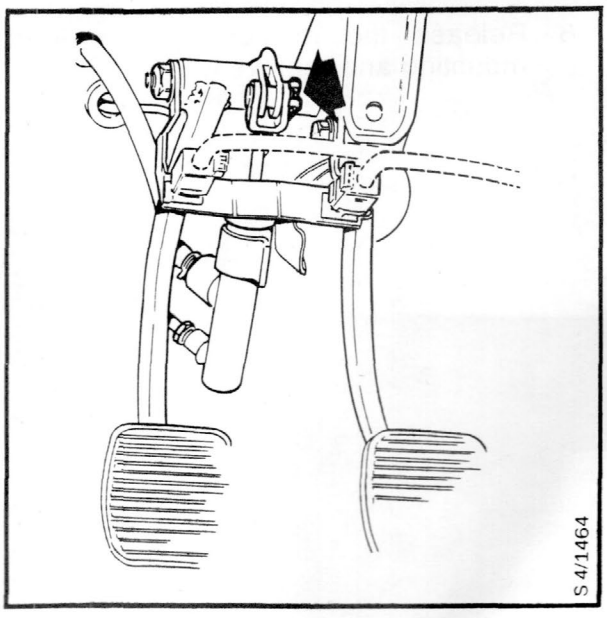
To change the master cylinder

To remove

1 Remove the sound baffle.

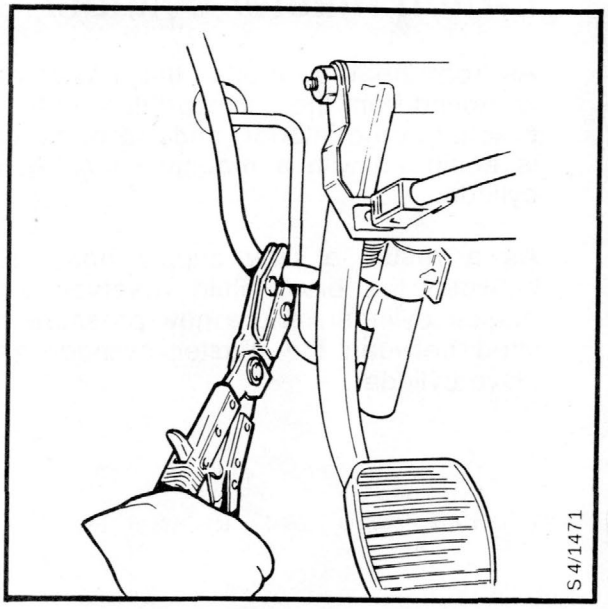


2 Remove the clip and withdraw the clevis pin from the master cylinder pushrod.

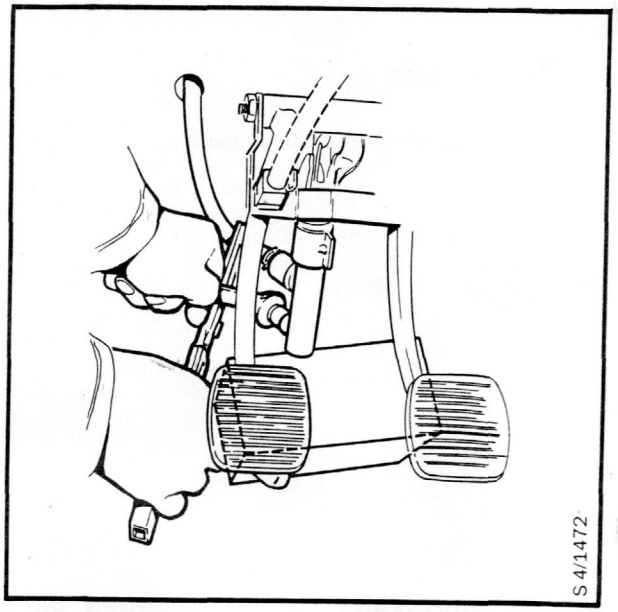


3 Place a suitable drip tray under the pressure pipe.

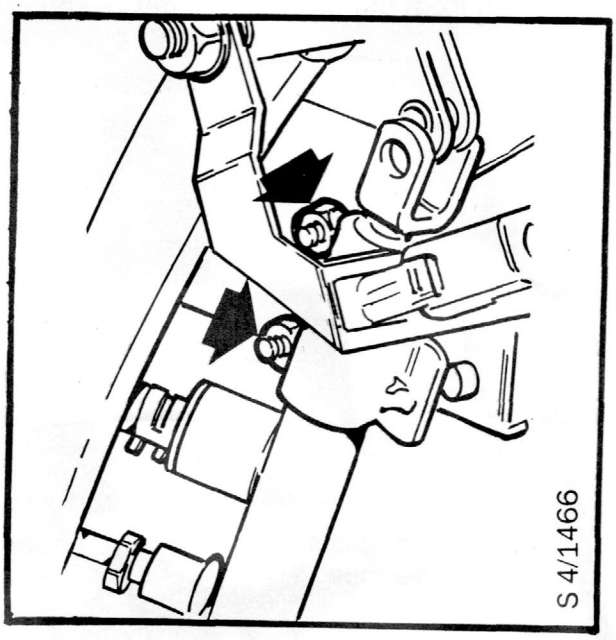
4 Pinch the supply hose with clamping tongs.



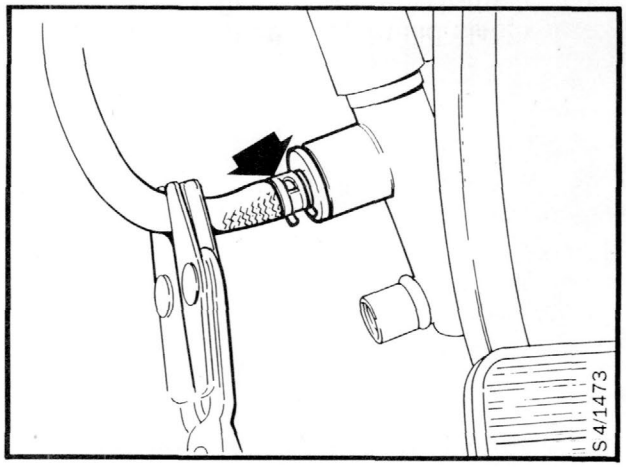
5 Disconnect the pressure pipe from the master cylinder.



6 Release the master cylinder from its mounting and remove it.



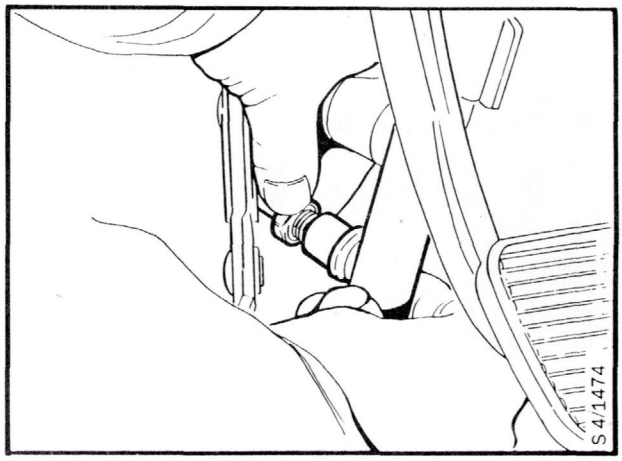
7 Release the clamping tongs and disconnect the supply hose from the master cylinder.



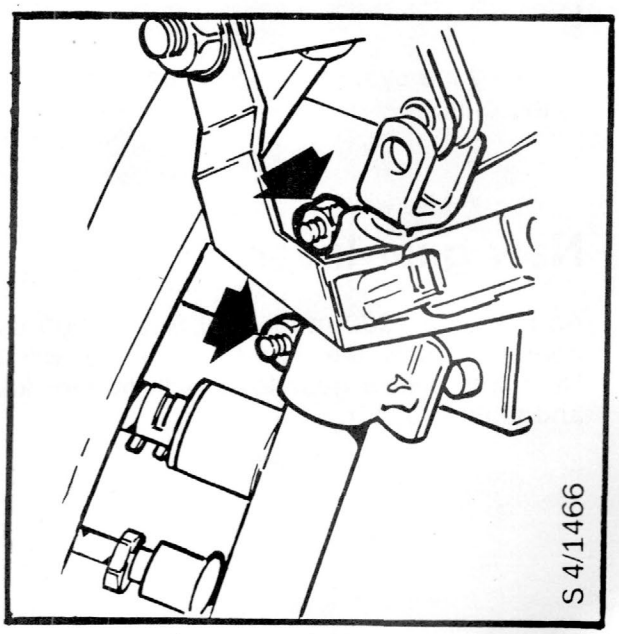
To fit

1 Fit the supply hose to the cylinder.

2 Fit the pressure pipe nipple into the master cylinder.

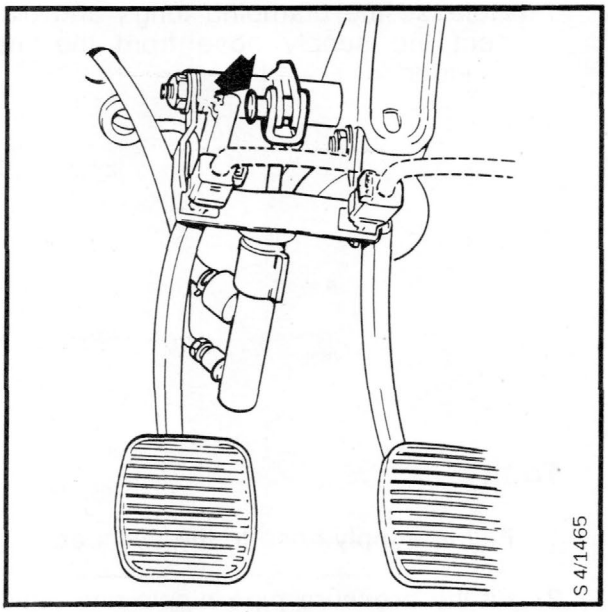


3 Fit the master cylinder to its mounting.

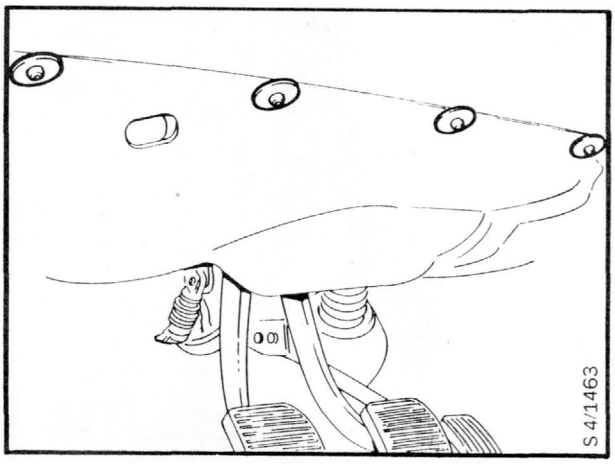


4 Tighten the pressure pipe nipple.

5 Remove the clamping tongs and fit the clevis pin to the master cylinder pushrod.



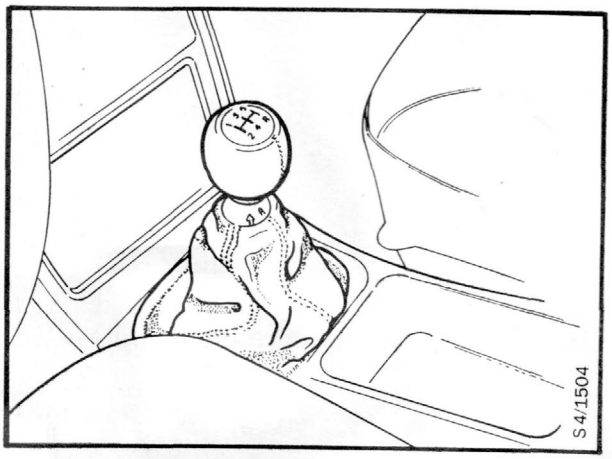
6 Fit the sound baffle.



7 Bleed the system and test the operation of the clutch.

New gear lever

As from the 1990 model, all Saab 9000 cars equipped with the sports package will be fitted with a new gear lever with leather knob and leather gaiter.



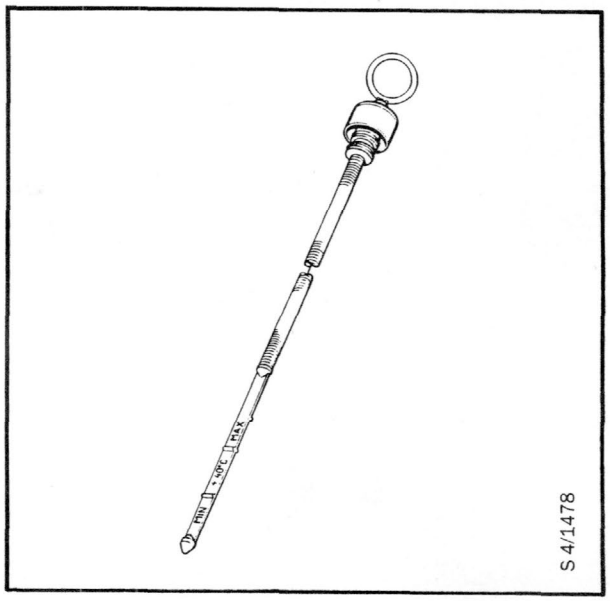
Automatic gearbox

Oil capacity

Oil capacity: 8.7 litres (including torque converter and oil cooler).

Oil dipstick

New oil dipstick with a handle of ergonomic design.



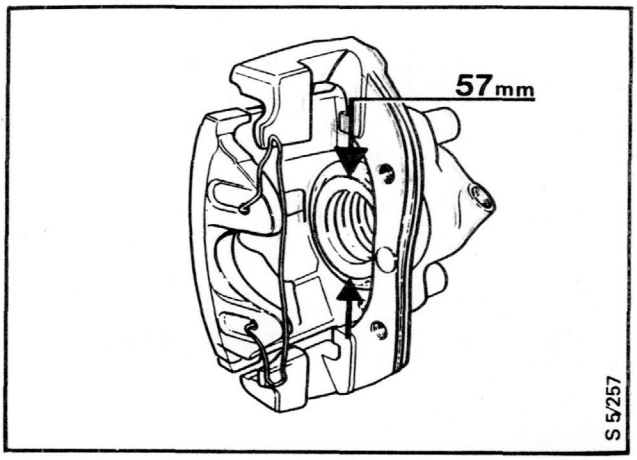
Brakes

Turbo brakes on all 9000 cars

Brake calipers

The front brake calipers (ATE) are of the same basic design as the rear calipers, previously fitted only to Turbo variants. The diameter of the brake piston is 57 mm (2.24 in).

This caliper has improved performance, a longer useful life and is better balanced for high-speed driving.

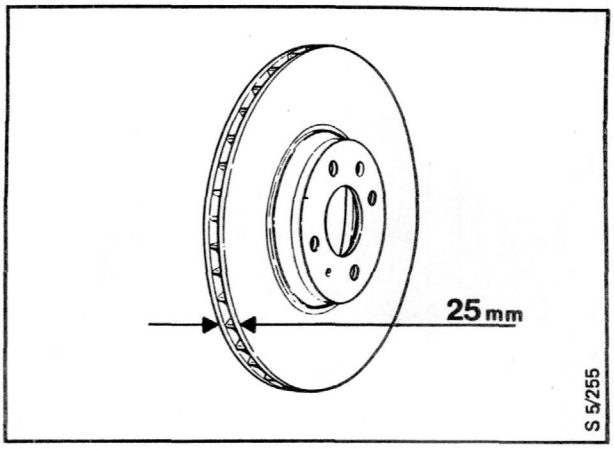


Larger brake-disc diameter

Brake discs

The thickness of the brake disc is now 25 mm (0.98 in), with the minimum permissible thickness after wear being 23 mm (0.91 in) as against the earlier 21 mm (0.83 in).

The diameter of the disc is unchanged at 278 mm (10.95 in).



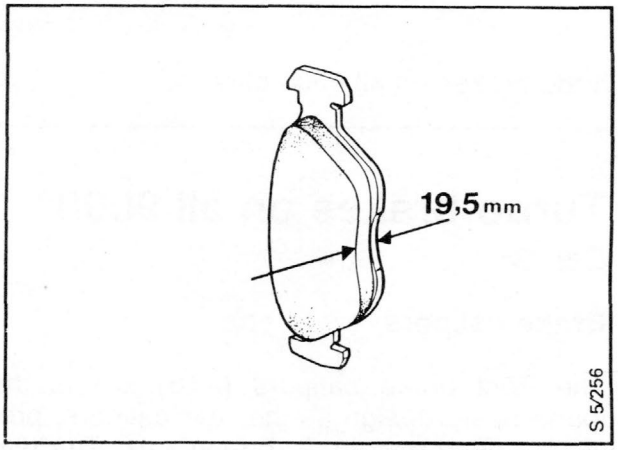
Brake-disc thickness increased

Brake pads

The area of friction material has been increased from 35 mm^2 to 48 mm^2 (0.05 & 0.07 in^2) and the lining thickness from 16.7 mm (0.66 in) to 19.5 mm (0.77 in).

The make and materials are the same as before: Textar 474.

The new pads perform better in high-speed driving and have a longer useful life.



Thicker linings and larger area of friction material

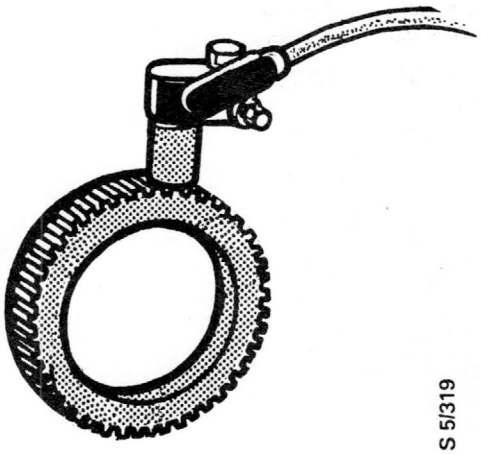
Anti-locking brakes (ABS)

New ABS sensor wheels and wheel sensors

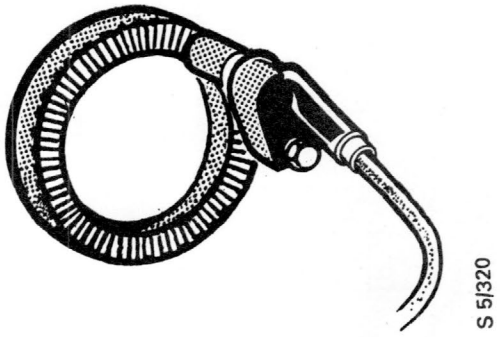
New sensors and wheel-bearing units complete with toothed sensor wheels are now fitted to all cars equipped with ABS brakes. The new sensor wheels have 46 teeth as opposed to the earlier 94. The new sensors eliminate the need for sensor adjustment, simplifying servicing work substantially.

When using the ABS-system tester for fault diagnosis, ABS type 2 should now be selected.

The ABS-system tester must be used for all fault-diagnosis work on the ABS system (with the error codes being flashed by means . of the ABS (ANTI LOCK) light inside the car)



Toothed sensor wheel and sensor for front wheel



Toothed sensor wheel and sensor for rear wheel

Front assembly, steering device

Upgraded steering swivel members and wheel bearings

The steering swivel member casting is thicker around the bearing housing and where the top arm joins the bearing housing.

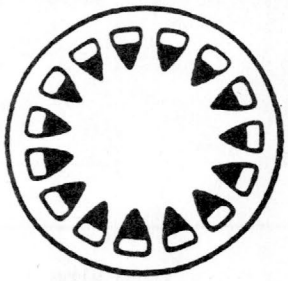
Larger wheel-bearings have also been introduced.

Suspension and wheels

Tyres and wheels programme

Table of wheels, tyres and hubcaps/wheel covers

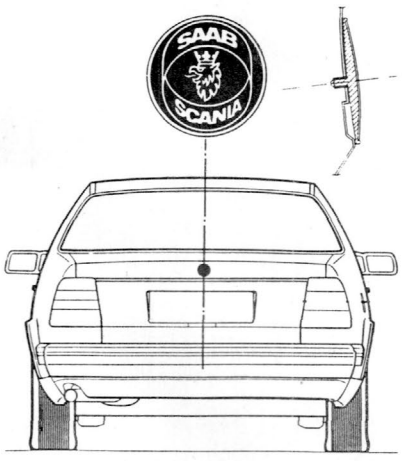
Model	Wheel 6 x 15"	Hubcap/ wheel cover	Tyre size	Option or market specification
9000S	Light-alloy, 15-spokes	Hubcap	195/65 TR	
9000T	Light-alloy, 15-spokes	Hubcap	195/65 VR	
9000T Sport	Light-alloy, 3-spokes (Aero design)	Hubcap	205/50 ZR	
9000i CD	Light-alloy, 15-spokes	Hubcap	195/65 TR	
9000 CD T	Light-alloy, 15-spokes	Hubcap	195/65 VR	

9000T Sport		6,5 x 16" Light-alloy (Aero design)
9000T 9000CD T 9000S		6 x 15" Light-alloy 15-spokes

Body

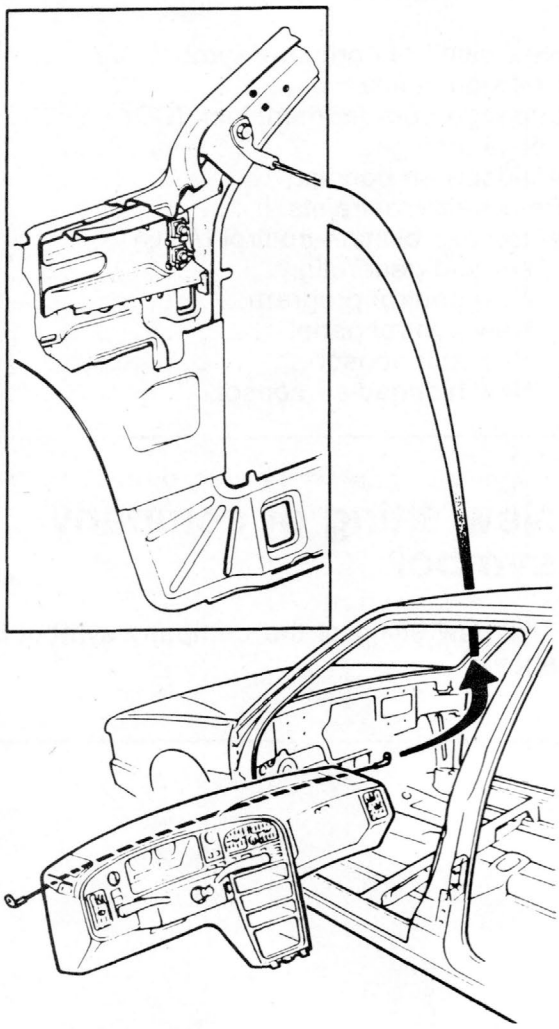
New siting of company symbol

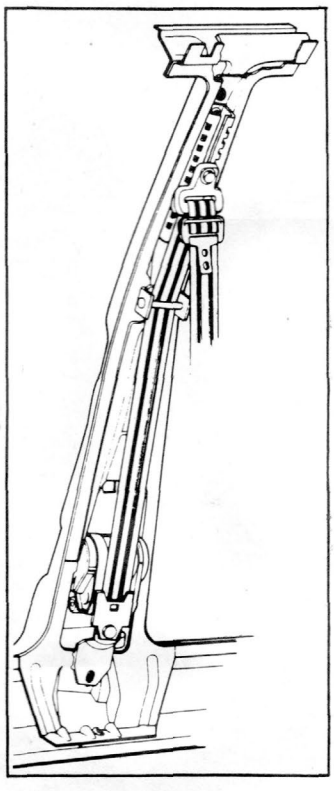
The new siting of the company symbol is as shown.



Collision safety

The body has been strengthened in a number of places to provide even greater protection for the occupants of the car in the event of a collision.
Both the front-door hinges and the A & B pillars have been strengthened. A steel cable is stretched between the A pillars to prevent their being forced apart in a front-end collision. As a result, the doors, being in line with the A pillars at the time of a collision, will also absorb energy. The cable is bolted to the pillars and is run in guides attached to the underside of the fascia top section.
The height of the seat-belt guide has been raised 30 mm (1.2 in).





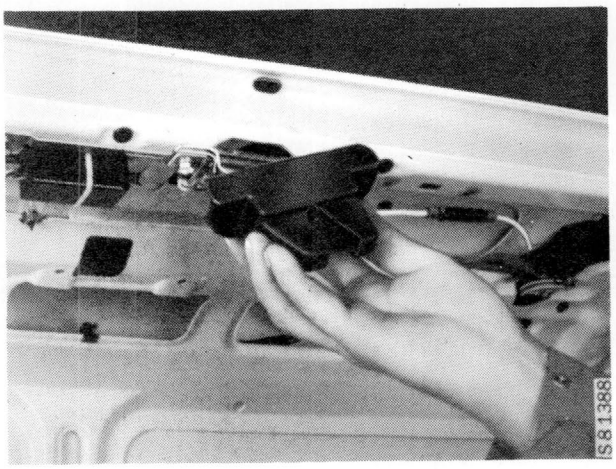
Luggage compartment lock (CD)

A new lock for the luggage-compartment lid is now fitted to all CD variants. The lock is fitted on the RH side of the lid and can be opened either by key from the outside or by means of a switch on the driver's door.

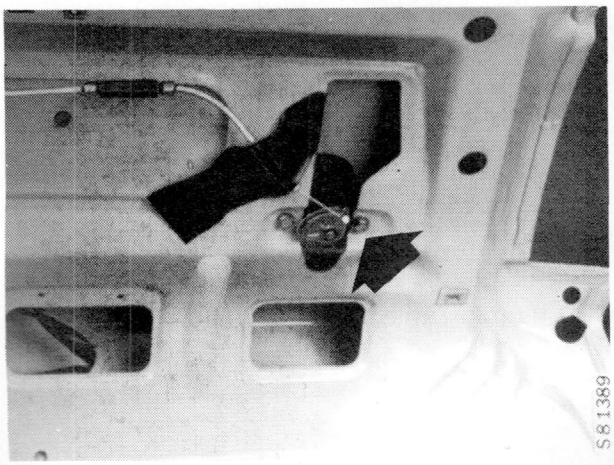
To remove

1 Remove the handle on the inside and the luggage compartment lid trim. (The M88 'News' Supplement of the Workshop Manual for the 9000 CD refers.)

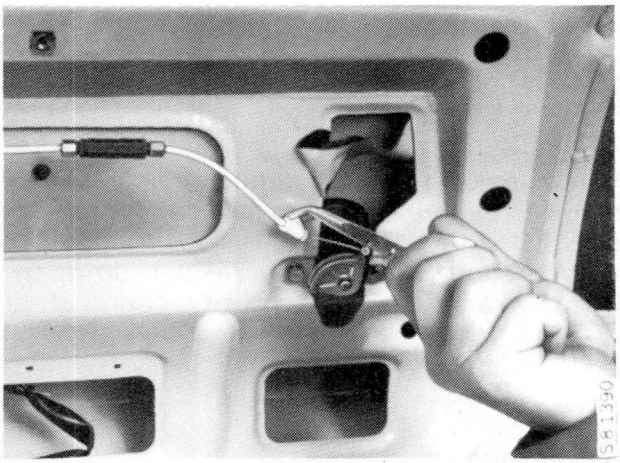
2 Remove the cover.



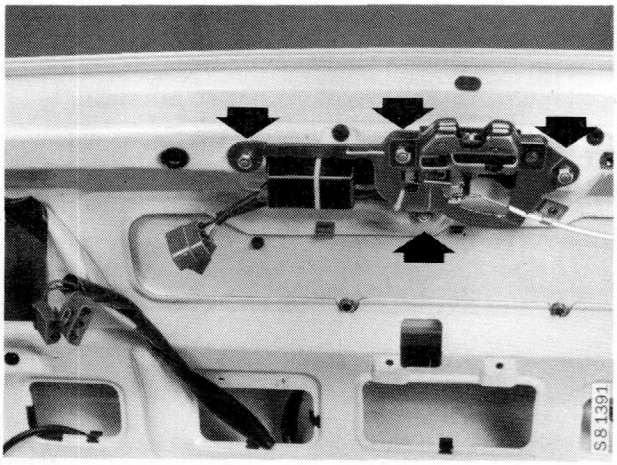
3 Disconnect the cable from the lock-cylinder actuator.



4 Remove the cable clip from the lid.

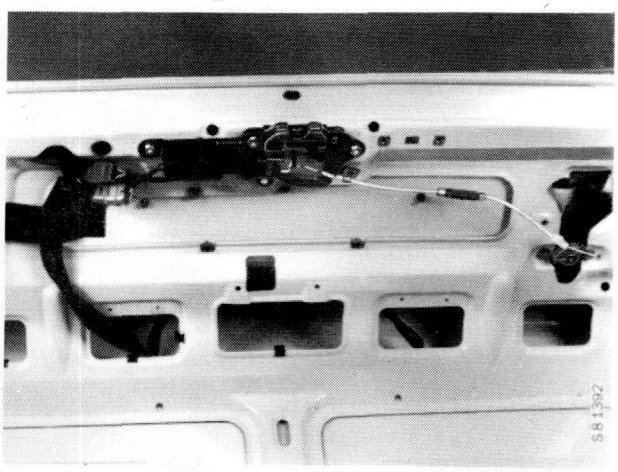


5 Unplug the electrical connector and remove the lock.

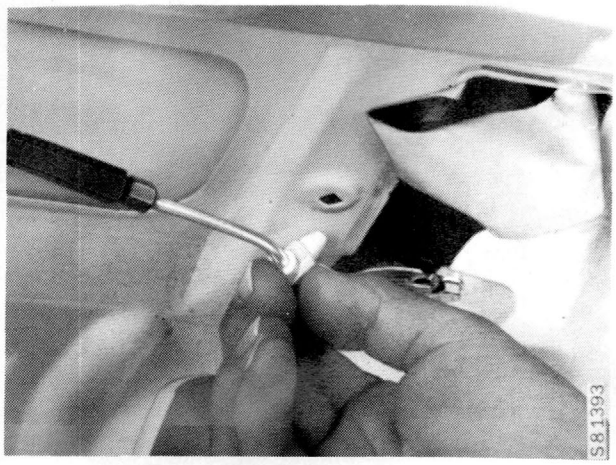


To fit

1 Fit the lock to the lid and plug in the connector.

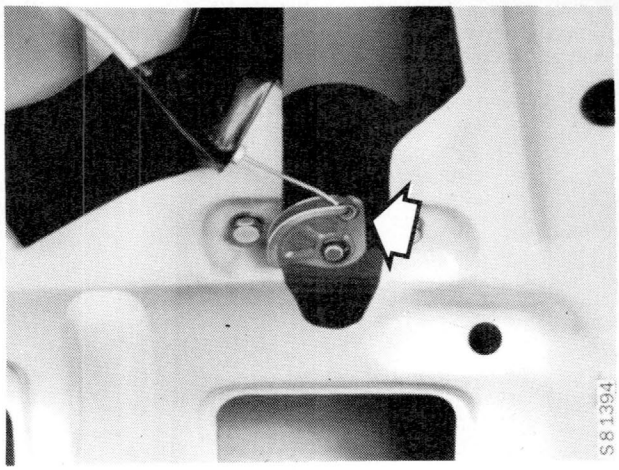


2 Refit the cable clip on the lid.



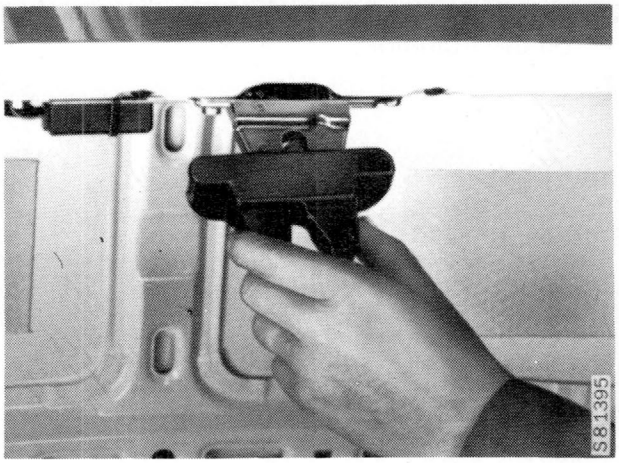
3 Reconnect the cable to the lock-cylinder actuator.

4. Check the length of the cable and the operation of the lock.



5 Refit the cover.

6 Refit the trim and closing handle. (The M88 'News' Supplement of the Workshop Manual for the 9000 CD refers.)

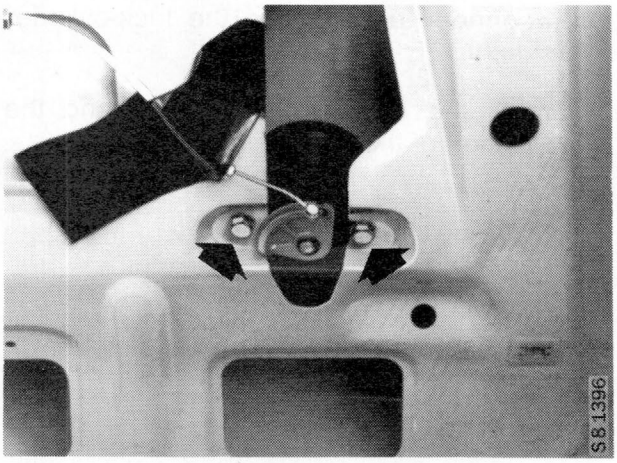


To remove the lock cylinder

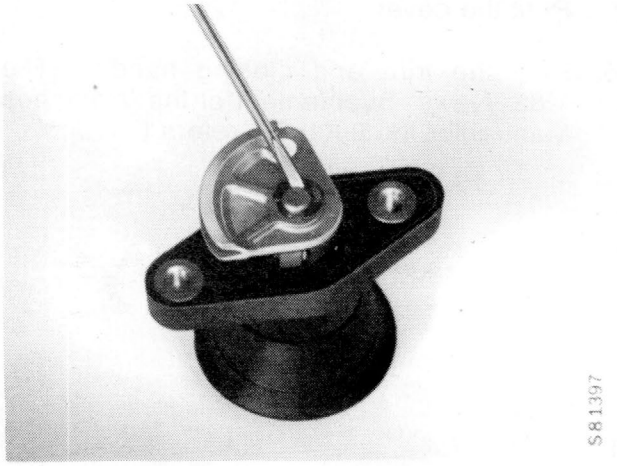
1 Remove the handle on the inside and the luggage compartment lid trim. (The M88 'News' Supplement of the Workshop Manual for the 9000 CD refers.)

2 Disconnect the cable from the lock-cylinder actuator.

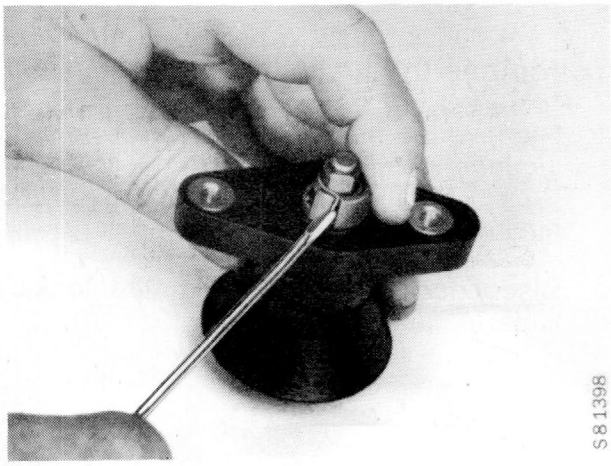
3 Undo the two screws, turn the unit a quarter-turn and remove it. Take care to save the seal on the outside of the lid.



4 Remove the circlip on the actuator and lift off the actuator.



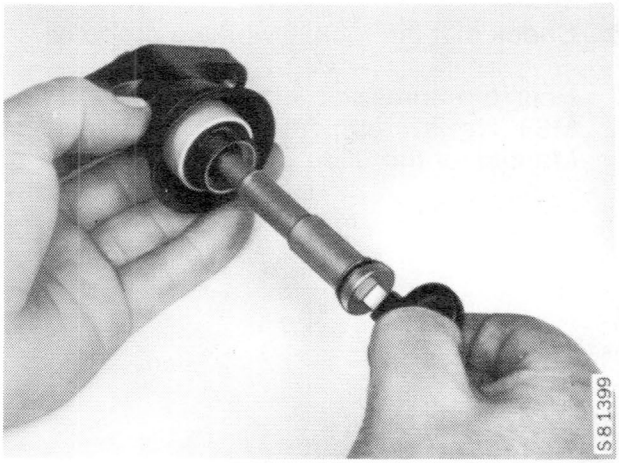
5 Remove the spring.



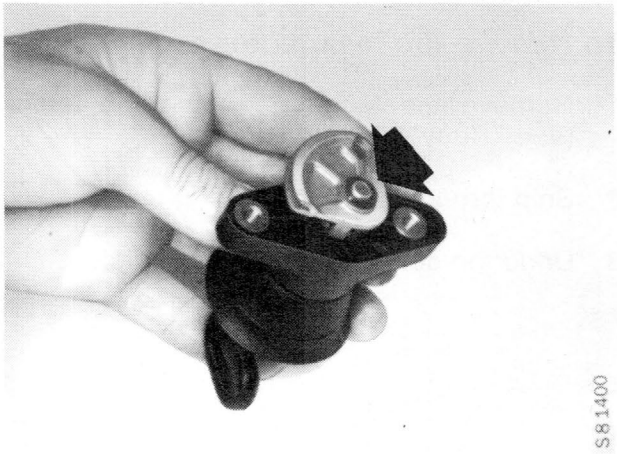
6 Press out the lock cylinder.

To fit

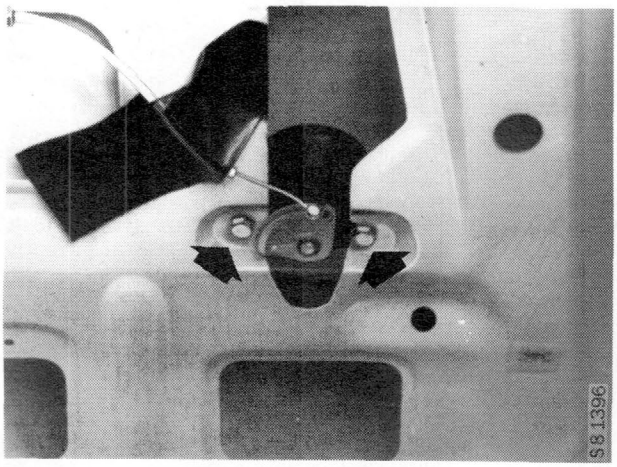
1 Insert the lock cylinder into position.



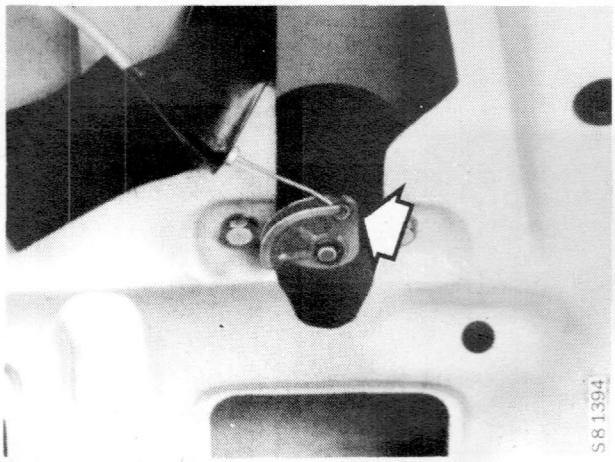
2 Refit the spring, actuator and circlip.



3 Refit the unit, tightening the screws and making sure that the actuator is correctly orientated.



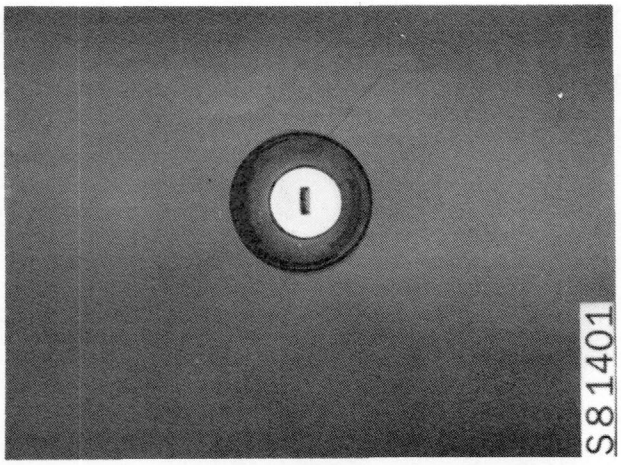
4 Reconnect the cable to the actuator.



5 Refit the exterior seal.

6 Check that the lock is working properly.

7 Refit the trim and closing handle. (The M88 'News' Supplement of the Workshop Manual for the 9000 CD refers.)

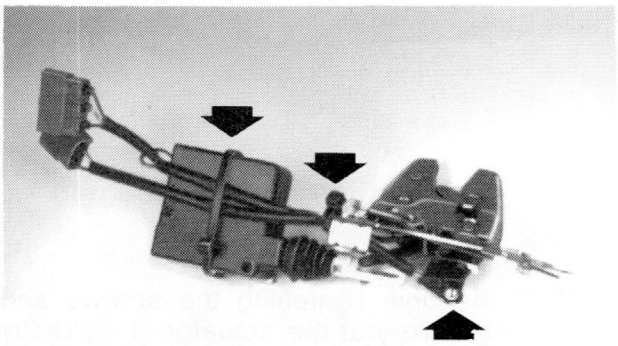


To remove the lock motor

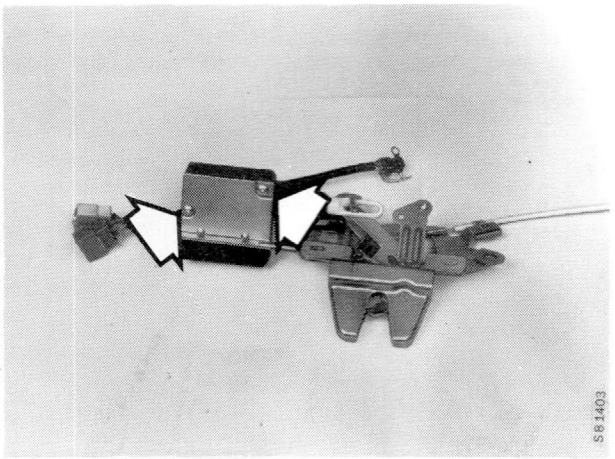
1 Remove the luggage compartment lock (see "Body" section page 3).

2 Snip through the cable ties.

3 Undo the screw for the microswitch.

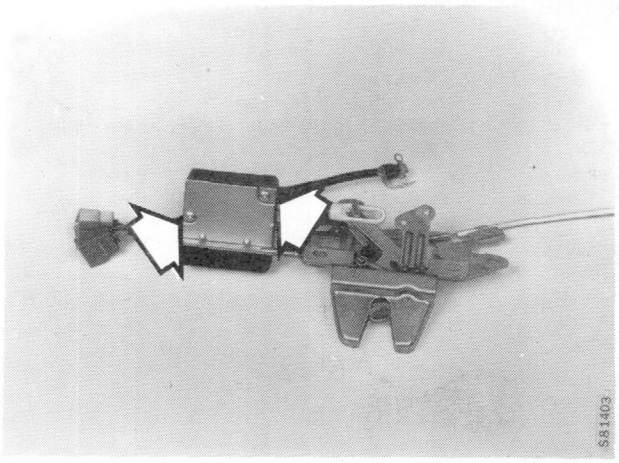


4 Undo the two screws for the motor and remove the motor.



To fit the lock motor

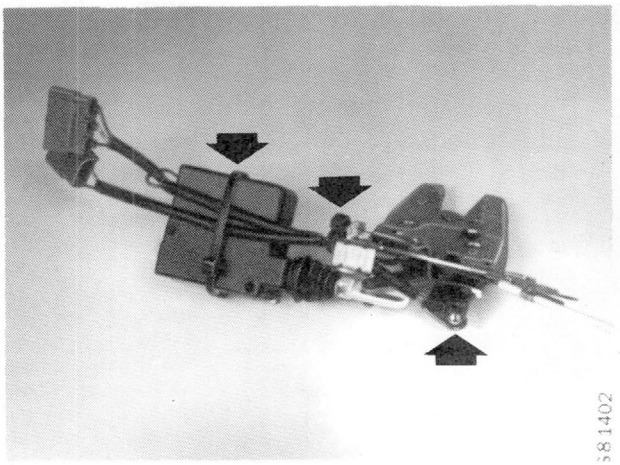
1 Fit the motor, tightening the two screws.



2 Refit the screw for the microswitch.

3 Fit and secure new cable ties.

4 Refit the lock (see "Body" section page 4).



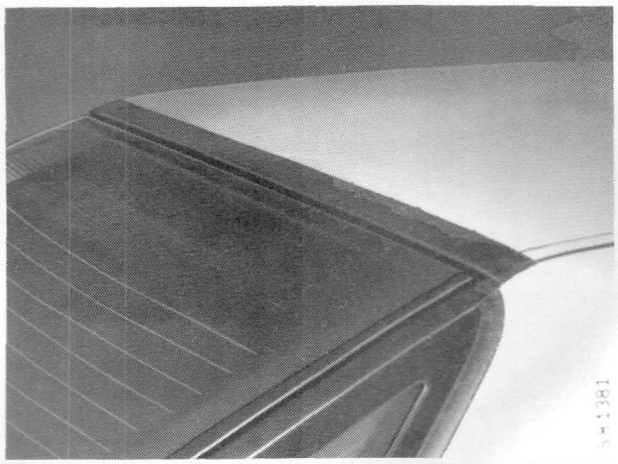
Tailgate hinges

Single-link hinges have been introduced on all 5-door models (9000). The new hinges are secured to the roof member and the top of the tailgate.

To replace

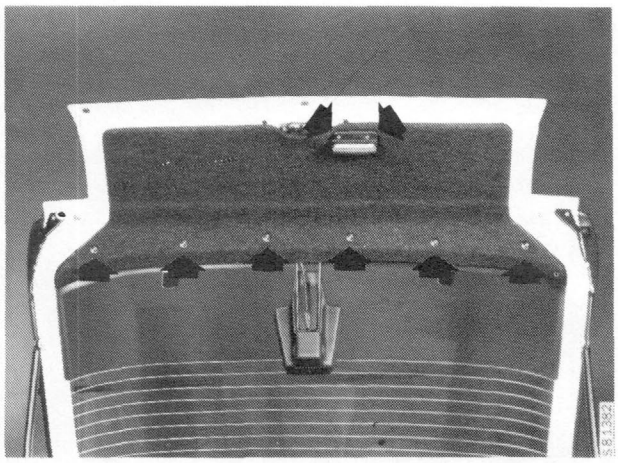
1 Remove the headlining (Section 8:2, sub-section 851 of the Workshop Manual refers).

2 Fix a length of adhesive tape along the edge of the roof to protect the paintwork.



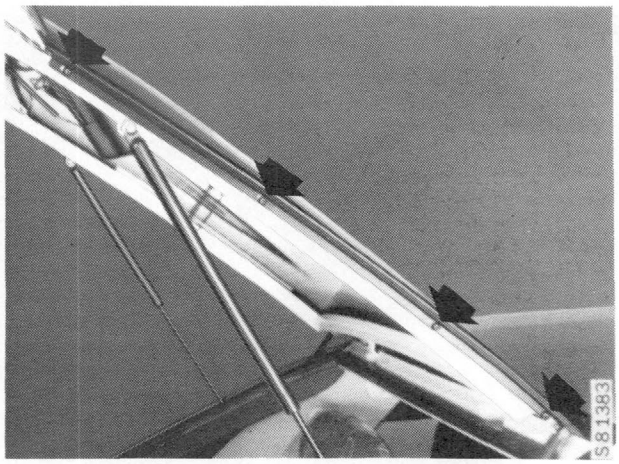
3 Open the tailgate.

4 Remove the tailgate trim.



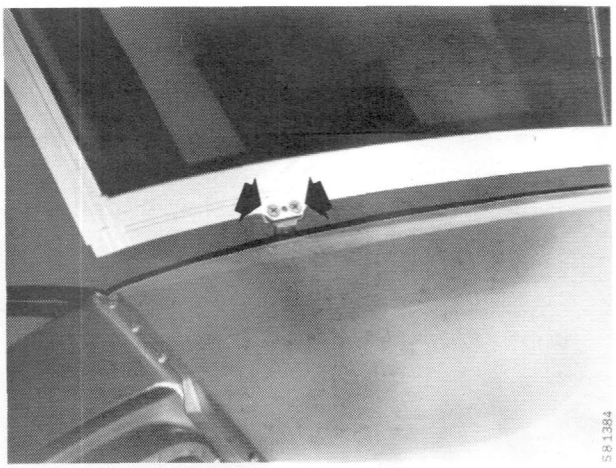
5 Remove the finishers from either side of the tailgate.

6 Remove the tailgate glass (Section 8:1, subsection 843 of the Workshop Manual refers).

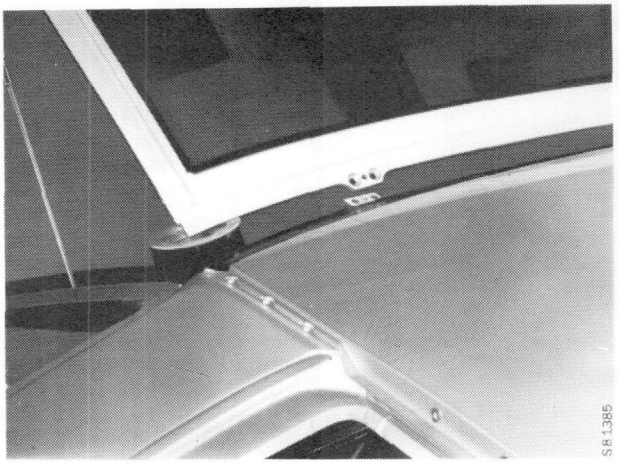


Caution
Replace one hinge at a time.

7 Undo the screws securing the hinge to the tailgate.

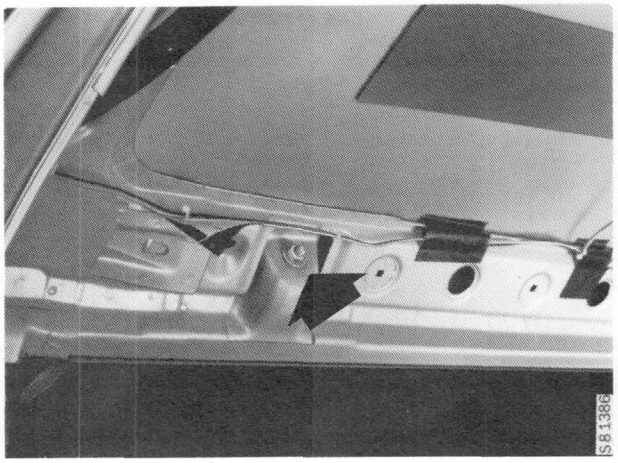


8 Prop up the tailgate using a reel of tape, block of wood or the like.



9 Undo the nut securing the hinge to the roof and remove the hinge.

10 Offer up the new hinge, and fit but leave slack the nut securing it to the roof.

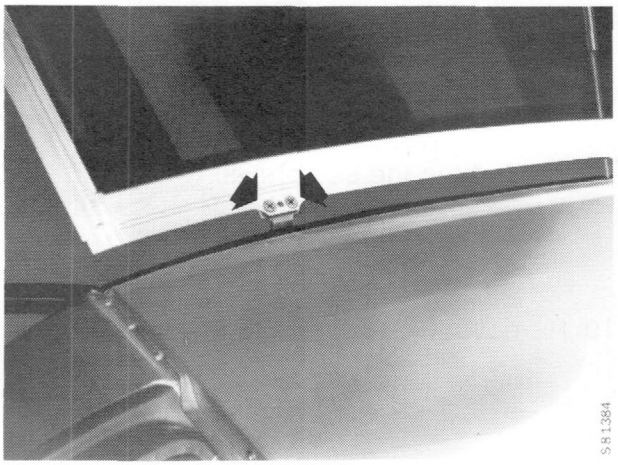


11 Fit but leave slack the screws securing the hinge to the tailgate.

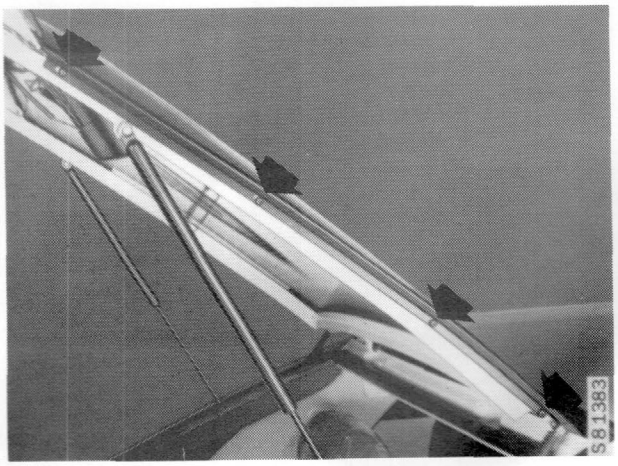
12 Repeat steps 7 - 11 inclusive on the other side.

13 Roughly adjust the fit of the tailgate and tighten the nuts and screws for both hinges.

14 Refit the tailgate glass (Section 8:1, sub-section 843 of the Workshop Manual refers).

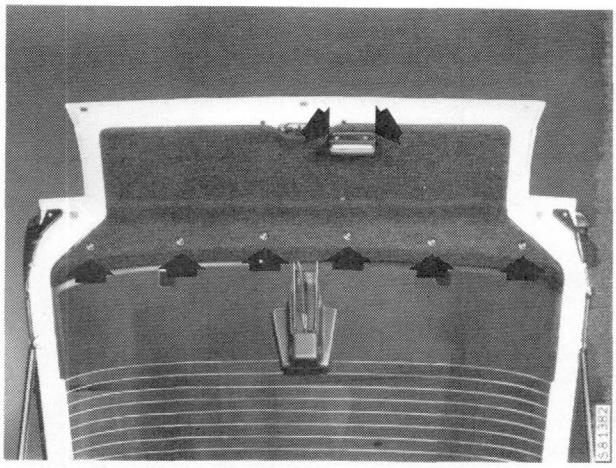


15 Refit the finishers on either side.



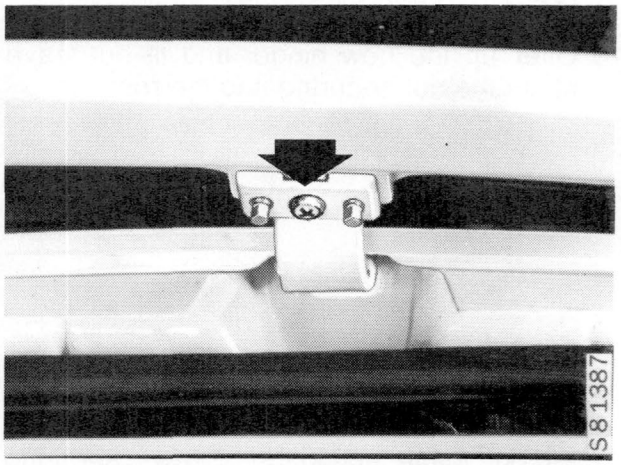
16 Refit the tailgate trim.

17 Refit the headlining.



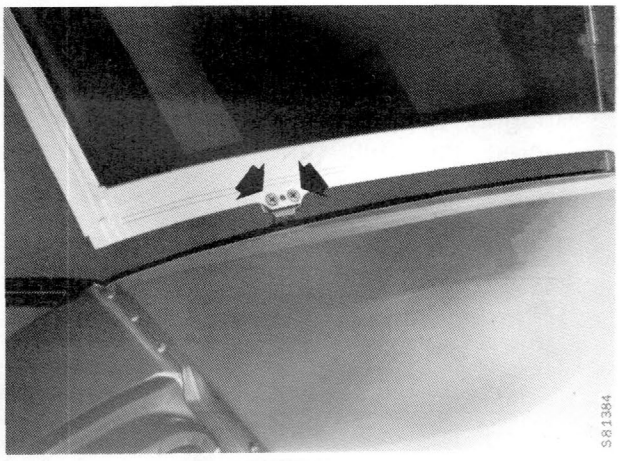
18 Adjust the fit of the tailgate as follows:

- Slacken off the hinge setscrews.



- Slacken the hinge securing screws and adjust the fit.
- Tighten the setscrews.
- Tighten the securing screws.

19 Remove the adhesive tape from the roof.



Windscreen bonding

In conjunction with fitting of the windscreen, the entire retaining strip is now coated with primer.
To complement the existing working method, a new tool for removing the windscreen has also been introduced.
The tool consists of a reel, part no. 82 92 823, and a cutting wire, 82 92 831.

To remove

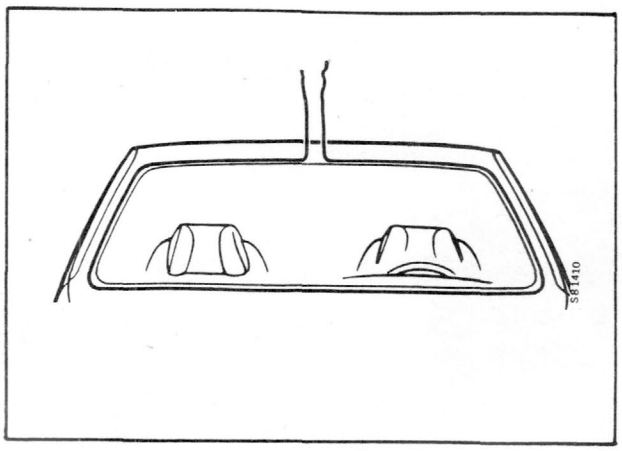
1 Remove the windscreen wipers (Section 3:1, subsection 363 of the Workshop Manual refers).

2 Remove the windscreen moulding (Section 8:1, subsection 843 of the Workshop Manual refers).

3 Remove the A-pillar trim and release the leading edge of the headlining (Section 8:2, Subsection 851 of the Workshop Manual refers).

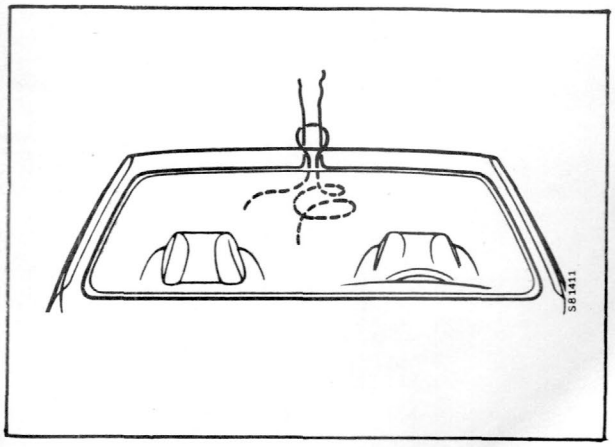
4 Open the door windows to avoid the windscreen being pushed out by the pressure that would otherwise be caused by closing a door.

5 Insert the cutting wire (82 92 831) in the groove around the windscreen, with the ends of the wire meeting midway along the top edge of the screen.



6 From inside the car, use a piece of music wire to pierce a hole in the bead of adhesive, and pull the ends of the cutting wire through to the inside.

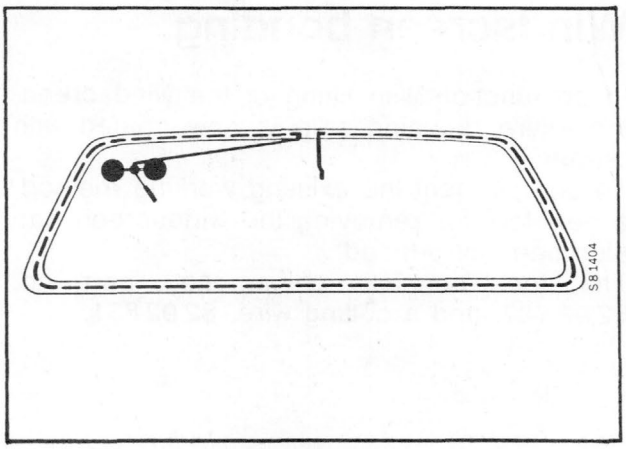
7 Pull the ends to stretch the wire around the screen.



8 Attach the reel, 82 92 823 to the top LH corner of the screen.

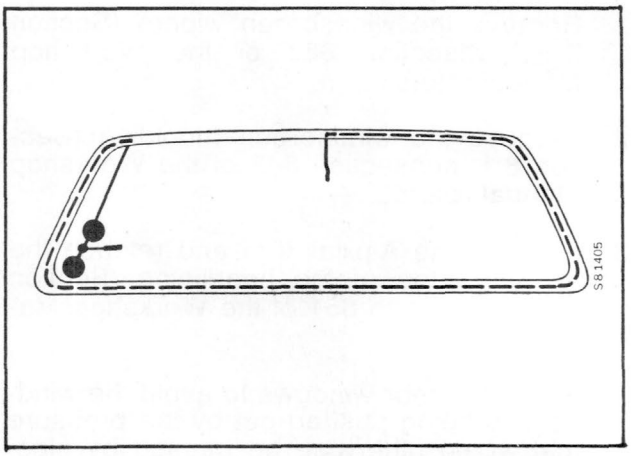
9 Fasten the end of the cutting wire running round the LH side of the screen to the take-up reel on the tool.

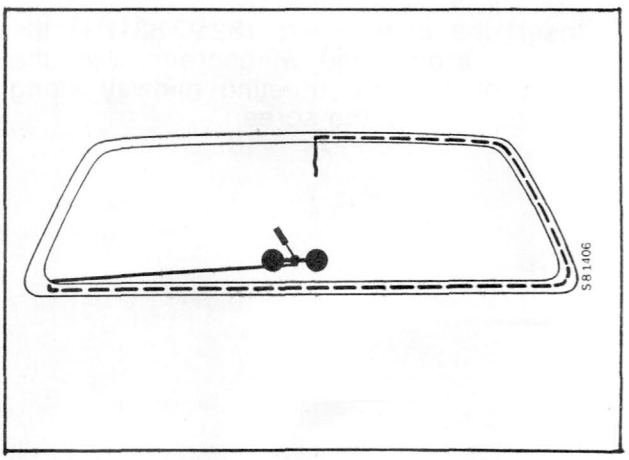
10 Hold the other end of the wire (or make it fast, e.g. to the steering wheel).

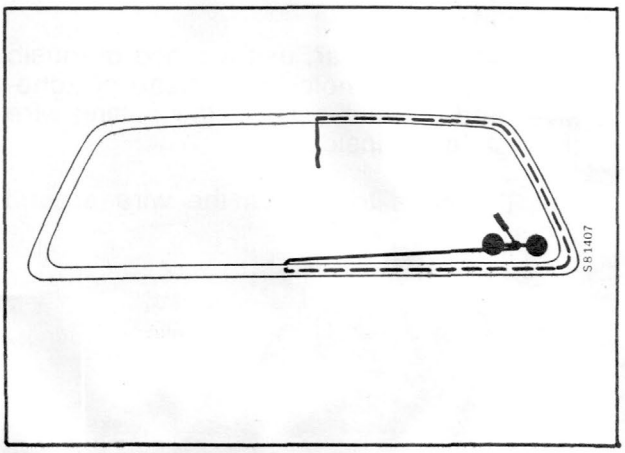


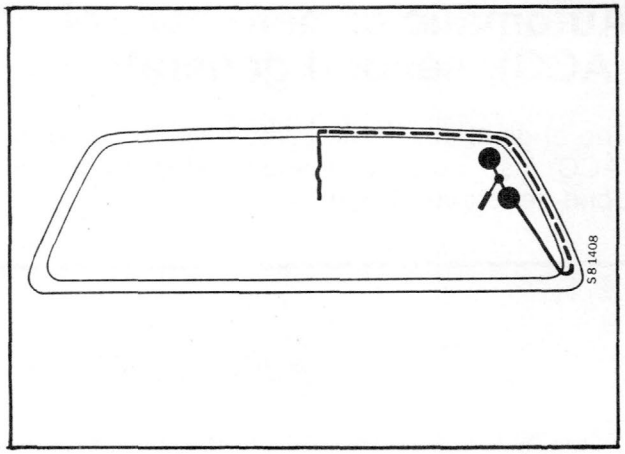
11 Using a ratchet handle, cut through the adhesive by reeling in the wire. Move the tool along, as shown, as the screen is cut free. Make sure that the wire is cutting through the adhesive all the time, and not just being pulled through it.

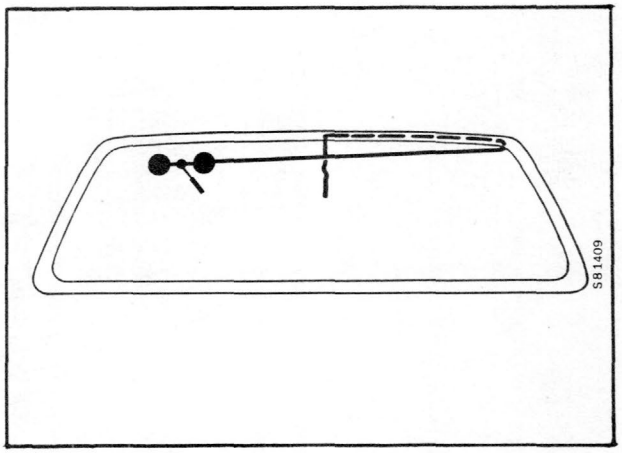
12 Remove the screen.











To fit

Fit the screen (Section 8:1, subsection 843 of the Service Manual refers).

Note

The entire moulding-retaining strip must be primed.

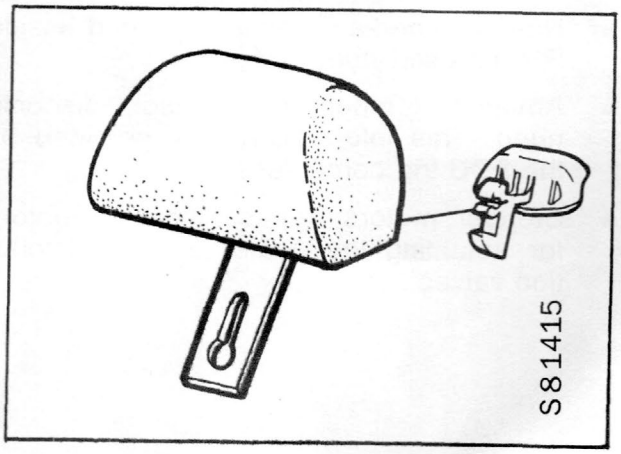
Rear head restraints

Adjustment of the rear head restraints has been discontinued on all variants. In 5-door models, this means that the head restraints must be removed before the backrest can be folded forward.

Replacing the rear head restraint

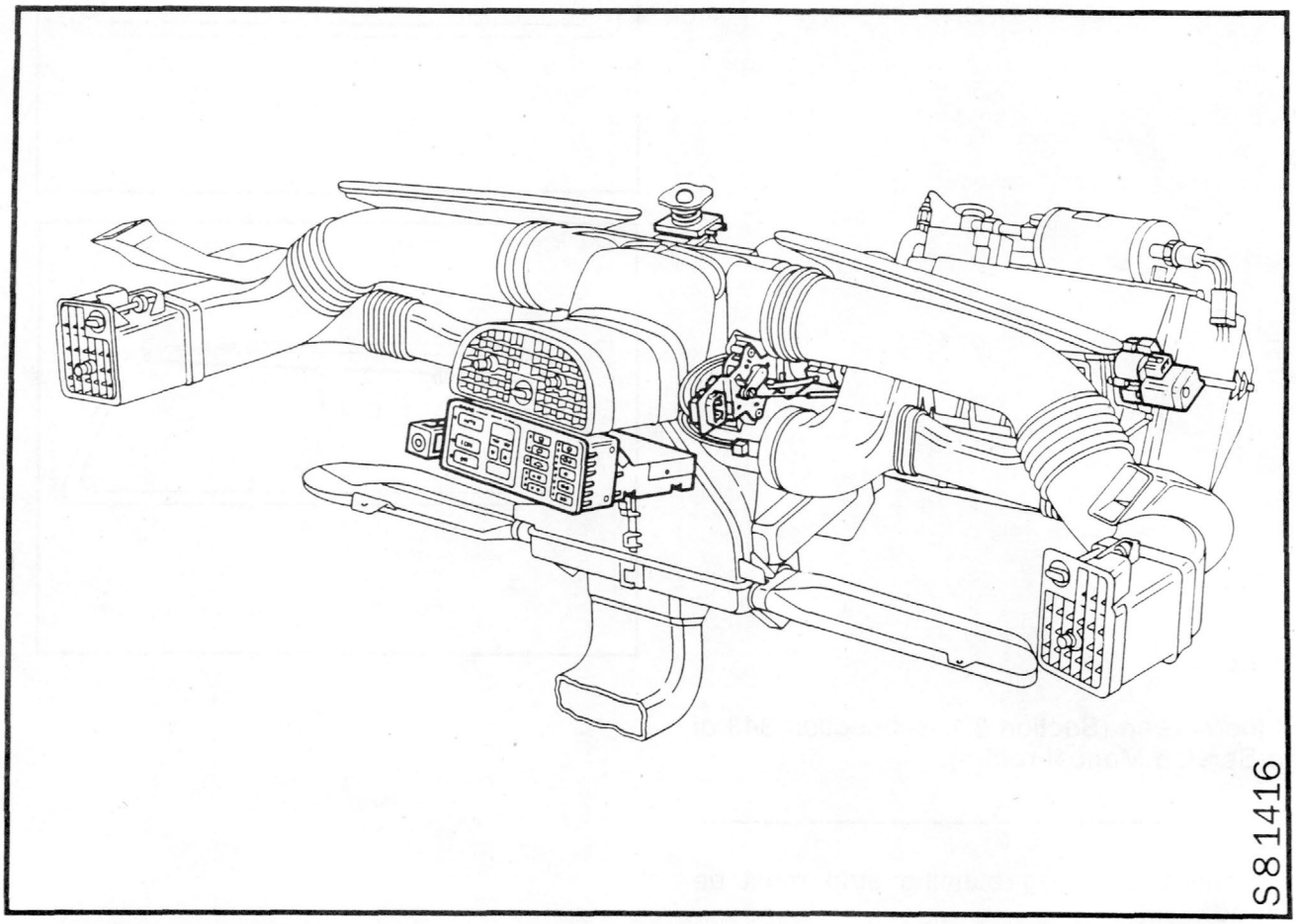
1 Release the catch on the back of the head restraint and slide the restraint up and out.

2 Insert the head restraint and push in the catch. Make sure that the catch is engaged.



Automatic climate control (ACC), second generation

The original automatic climate control system (ACC) has now been superseded by a second-generation system.



The main features of the new ACC are as follows:

- New control program in microprocessor (ECU).
- New control panel.
- New sun sensor, fitted between the defroster vents on the fascia top.
- New blended-air sensor, located inside RH defroster duct.
- Ambient temperature sensor discontinued. This information now provided by the EDU trip computer.
- Stepper motors replace the d.c. motors for actuating the heater and air-distribution valves.

New control program

The main features of the new control program are as follows:

- Greater precision in controlling the cabin temperature.
- System switch-off function.
- Control of rear-door demister fans.
- Stepless fan control.
- Memory function for settings selected manually.
- Calibration and autotesting.
- Fault codes.
- Control of parking heater operation (when fitted).

Greater precision in controlling the cabin temperature

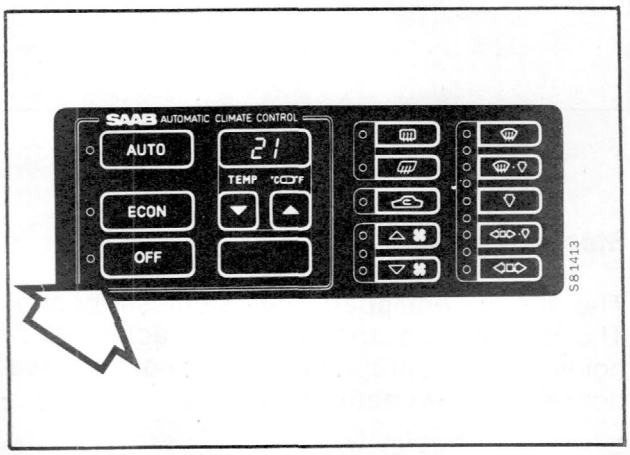
The control program incorporates many improvements, the principal ones being the speed and precision of control immediately after the system has been switched on, the effectiveness of the system in maintaining the selected temperature, and the speed at which a newly selected temperature can be attained.

The new system has enhanced the comfort inside the car considerably, particularly in hot, humid climates.

System switch-off function

The entire system can be switched off by pressing the OFF button on the control panel. The system then adopts the following status:

- Heater valve closed.
- Setting of air-distribution valve remains unaltered.
- Recirculation valve set to fresh-air position.
- ISO RX/TX actuated (for communication with ISAT).
- Fan off.
- AC off.
- Rear-window heating off.
- Rear-door demister fans off.
- Control panel lights extinguished. Only OFF button indicator and switch illumination on.



To resume normal operation of the system, press either the AUTO button or the OFF button again.

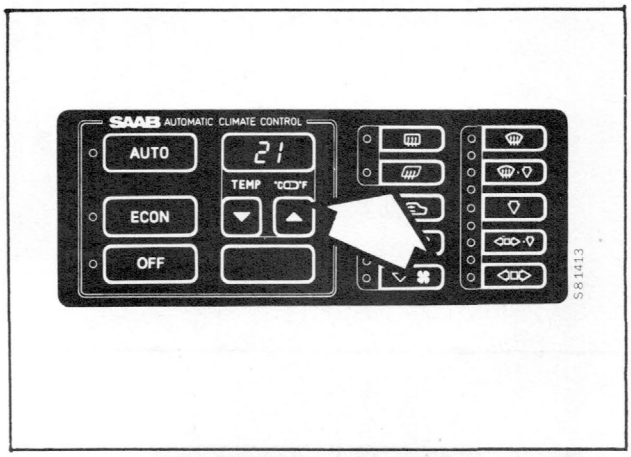
Pressing the AUTO button will put the system in the AUTO mode.

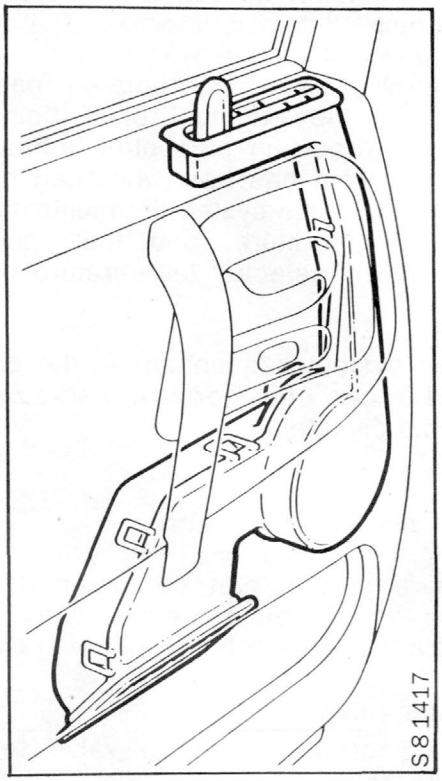
Pressing the OFF button will switch the system on again, with the status of all manual settings being the same as immediately before the system was switched off. If no functions have been selected manually, the system will automatically go into the AUTO mode.

Control of rear-door demister fans

The rear-door demister fans run at the same speed as the ACC fan. The demister fans can also be switched off manually.

If the rear-window heating function is selected manually, the demister fans will automatically be set to run at maximum speed.



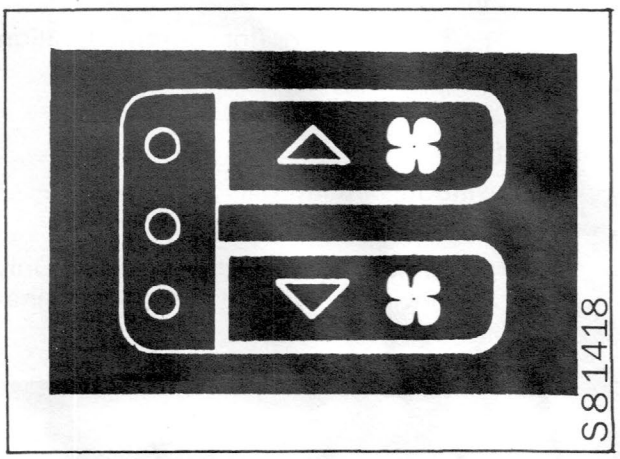


Stepless fan control

The fan is equipped with stepless control. The desired fan speed can be achieved by holding the appropriate button (to increase/decrease the speed) depressed.

The middle LED indicates the fan speed is that selected by the AUTO mode.

The top LED indicates that the manually selected speed is higher than would be selected by the AUTO mode.



The bottom LED indicates that the manually selected speed is lower than would be slected by the AUTO mode.

Thus, the middle LED will always be on in AUTO mode, even if the fan speed has been changed.

In AUTO mode, the control current to the fan changes at a rate of ≈1A a second. If the speed is altered manually, the control current changes at a rate of ≈2A a second.

Memory function for settings selected manually

Note

After the ignition has been switched off, it takes about 30 seconds for the ACC to store the manual settings in the memory. The settings can therefore only be checked after this time has elapsed.

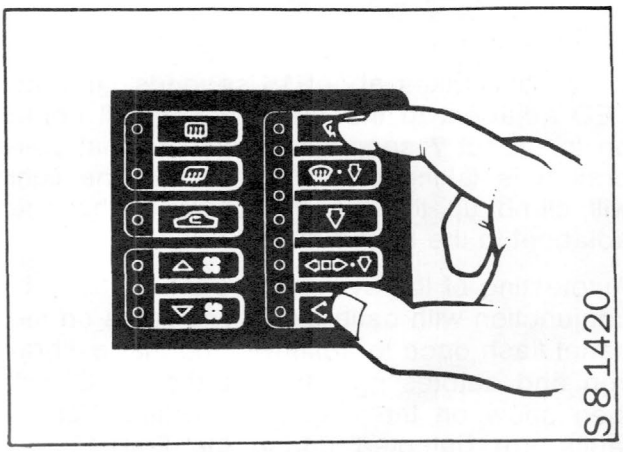
The manual settings can be stored so that each time the ignition is switched on, the ACC system will select these settings instead of going into the AUTO mode.

To program the manual settings:

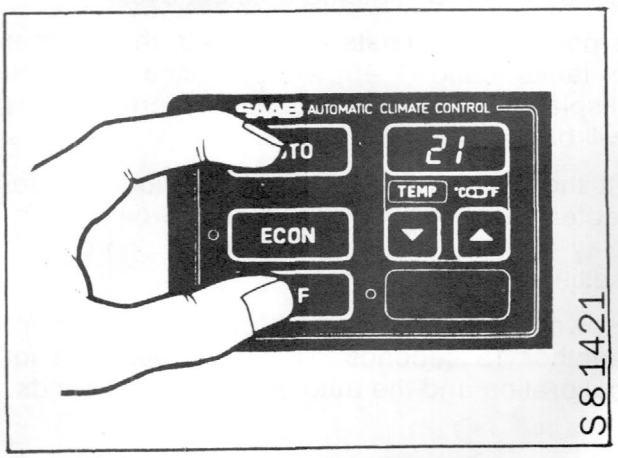
1 Adjust the settings manually.

2 Press the defroster and vent buttons simultaneously.
The LEDs on the control panel will flash to acknowledge that these settings have been stored in the memory.

To change the stored settings, repeat steps 1 and 2.



The stored settings can be cancelled by pressing the OFF and AUTO buttons simultaneously. The LEDs on the control panel will then flash to acknowledge that the stored settings have been cancelled.



Calibration and autotesting

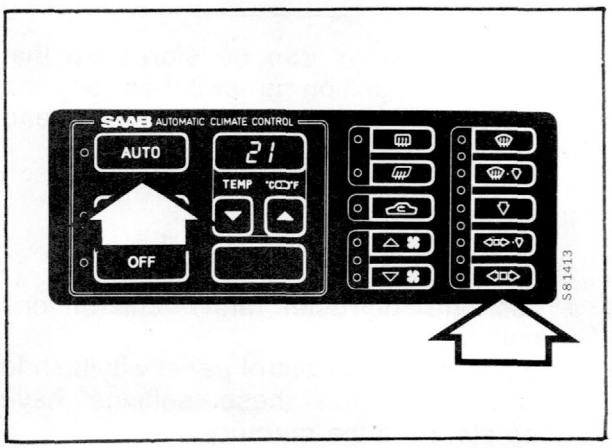
Caution

All stored codes will be deleted during calibration.
Recall and note all error codes before starting calibration.

Calibration of the system (valve motors) must be done:

- After replacement of a valve motor.
- After replacement of the control panel.
- If the battery has been disconnected within 30 seconds of the ignition having been switched off.
- If the battery has run flat or the battery voltage has exceeded 16V.

Calibration is initiated either by pressing the AUTO and VENT buttons simultaneously or by means of ISAT.



Calibration takes about 15 seconds, and the LED adjacent to the VENT button will come on for about 7 seconds to indicate that calibration is taking place. Thereafter, the light will climb up through the LEDs to the one adjacent to the DEF button.

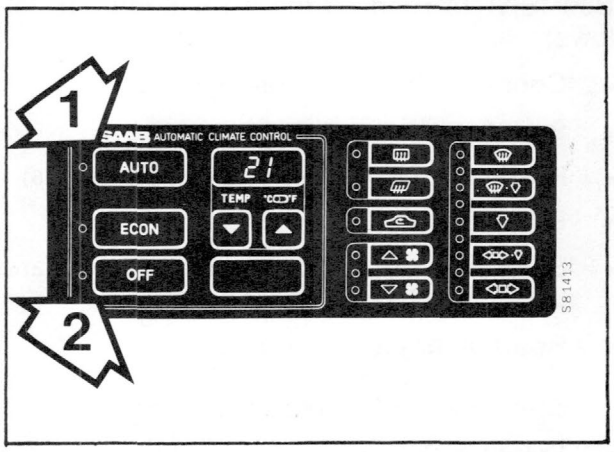
Autotesting of the system also takes place in conjunction with calibration. The lights on the panel flash once to acknowledge that calibration and autotesting have started. A 'O' will then show on the display, provided that no faults are detected during the first 15 seconds of the 30-second autotest cycle.

If one or more faults is detected, the number of faults found (1 - 5) will be indicated on the display. Note, however, that no error codes will be displayed.

At the end of this 15-second period, the selected temperature will be shown on the display and the ACC will select the appropriate settings.

However, the autotest will continue to run for another 15 seconds. Thus, the total time for calibration and the autotesting is 30 seconds.

At the end of this 30-second cycle, it is possible to identify the number of fault codes (if any) by pressing AUTO and OFF. The number of faults detected will then be displayed for about 5 seconds, after which the display will revert to showing the selected temperature. If no faults have been detected, the display will revert to the selected temperature immediately.



Calibration using ISAT is done as follows:

- Connect ISAT to the test socket.
- Switch on the ignition.
- Press the F1 button for DIAG (diagnosis).
- Press the F2 button for ONE.
- Enter system no. '2' via the keypad and press the ON/ENTER button.
- Read off any error codes.

ISAT is now ready to initiate calibration Proceed as follows:

- Select ALT.
- Press the F3 button (CODE).
- Enter code 960 and press ON/ENTER.

To end the routine:

- Press the F3 button (CODE)
- Key in 800 and press ON/ENTER.

Alternatively,

- Switch off the ignition and leave the system for at least 30 seconds.

Error codes

The error codes indicate a fault somewhere in the circuitry between the ACC-system ECU and the actuating motors and sensors, and whether the fault is of a permanent or intermittent nature. Additional fault-diagnosis work using a multimeter and oscilloscope will be necessary to pinpoint the fault.

Use ISAT to read off the error codes as follows:

- Connect ISAT to the test socket.
- Switch on the ignition.
- Press the F1 button for DIAG (diagnosis).
- Press the F2 button for ONE.
- Enter system no. '2' via the keypad and press the ON/ENTER button.
- Read off any error codes.

To delete the codes, proceed as follows:

- Select ALT.
- Press the F3 button (CODE).
- Enter code 900 and press ON/ENTER.

To end the routine:

- Press the F3 button (CODE).
- Key in 800 and press ON/ENTER.

Alternatively,

- Switch off the ignition and leave the system for at least 30 seconds before using ISAT to communicate with any other system.

Permanent fault	Intermittent fault	Malfunction indicated
41021	21021	Ambient air temperature: no signal from EDU
41321	21321	Heater-valve motor: excessive power consumption
41421	21421	Distribution-valve motor: excessive power consumption
41621	21621	No signals from sun sensor to ACC-system ECU
41631	21631	Sun sensor faulty
41D21	21D21	Blended-air sensor and inside-air temperature sensor: break in sensor earth circuit continuity or shorting to battery positive
41E21	21E21	Blended-air sensor: break in circuit to ACC-system ECU or shorting to battery positive
41F21	21F21	Inside-air temperature sensor: break in circuit to ACC-system ECU or shorting to battery positive

Control of parking heater operation (when fitted)

When the parking heater has been switched on by the trip computer or timer, the ACC system is also switched on to control the heating inside the car. Control of the climate inside the car is then carried out in the usual way. Apart from OFF, all manual selections can be made, although it should be borne in mind that excessive power consumption can run down the battery.

New control panel

The new control panel incorporates an OFF switch and a switch for the rear-door demister fans.

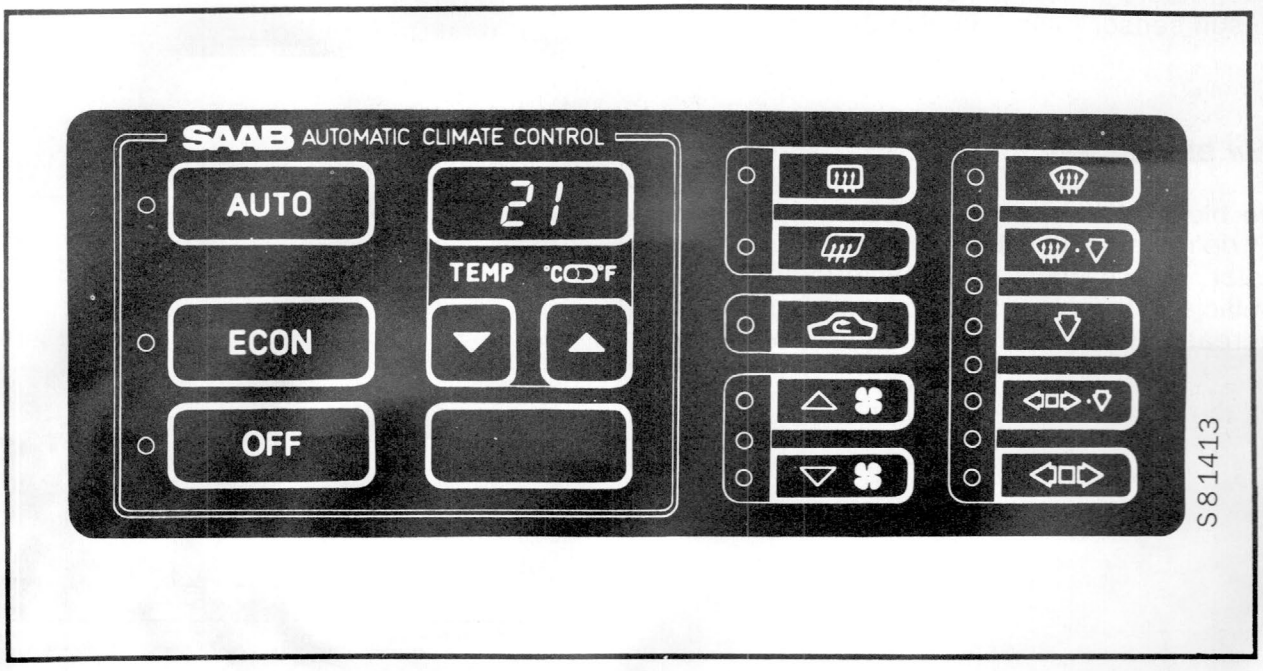
Two new switches provide stepless operation of the fan speed, instead of the three fixed speeds earlier.

The lettering on the HEAT, FLOOR, BI-LEV and VENT buttons has been replaced by symbols.

The control panel has one 12-pin and one 39-pin connector.

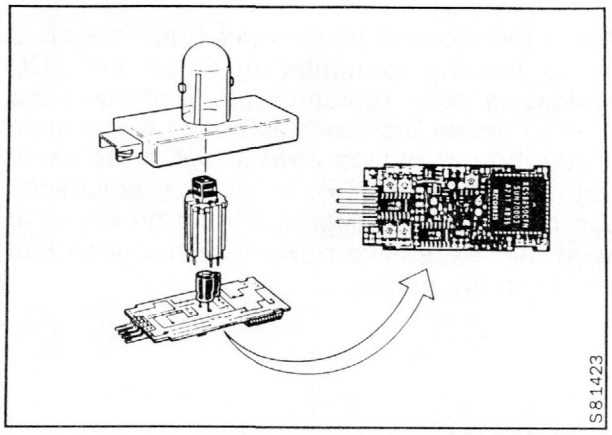
If the control panel is replaced, calibration of the valve motors must be carried out.

The method for replacing bulbs has been changed. Details of this are given in the Electrical section.



New sun sensor

The sun sensor is located between the defroster vents on the facsia top panel and is secured by means of a bayonet fitting and a spring.



The sun sensor consists of five solar cells, arranged in a cubic formation inside the top of the black sphere. They are connected to the microprocessor in the ECU via a signal amplifier.

On the basis of the signals received from the solar cells, the ECU computes the azimuth of the sun relative to the car, and the altitude and intensity of the sun.

The azimuth is the horizontal angle of the bearing of the sun, measured clockwise from a point straight ahead (0°) up to an angle of 360°.

The altitude of the sun is calculated on a scale from 0 to 90°, with 90° being vertically above the car (the zenith).

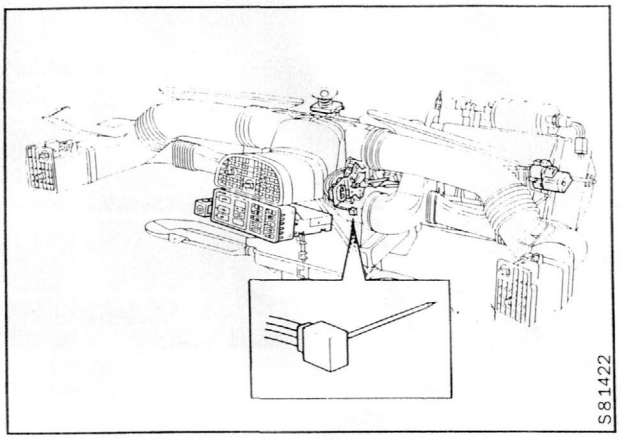
The intensity of the sun is calculated on a scale of 0-1,200W per square metre, with 1,200W/m^2 being about the highest value that can be recorded on earth.

The sun sensor has been permanently calibrated at the factory and cannot be adjusted. If the sensor fails to perform satisfactorily it must be replaced.

Spare fascia top panels come with provision in the form of a hole in the metal frame made for the sun sensor, but fully clad in trim. Thus, before a new panel is fitted, a hole for the sun sensor must be cut in the trim.

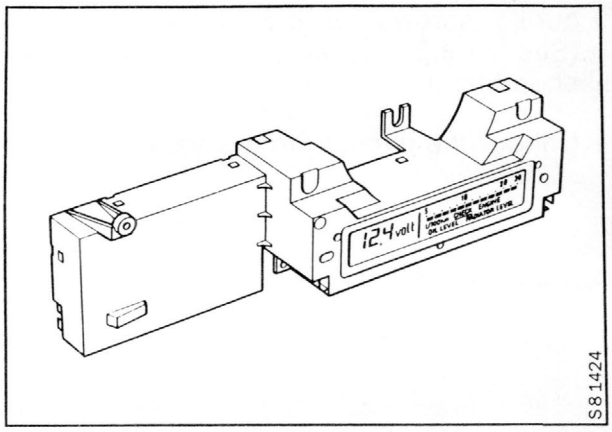
New blended-air sensor

The blended-air sensor is located inside the RH defroster duct. The sensor is a rod thermistor, which has a negative temperature coefficient, the electrical resistance of which decreases with increasing temperature.



Ambient-air temperature data from EDU

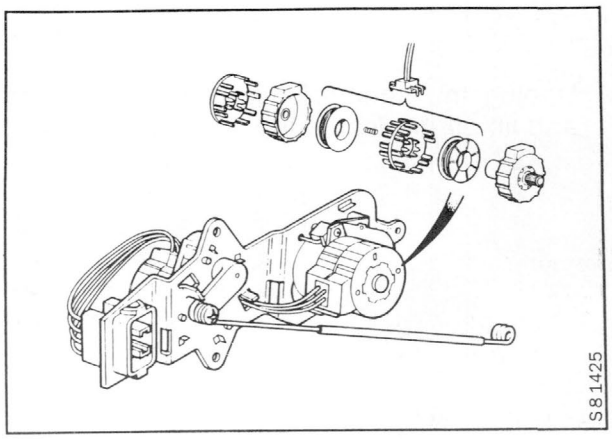
The special ambient-air temperature sensor has been discontinued. This data is now provided by the trip computer.



Stepper motors instead of d.c. motors

The actuator motors for the heater and air-distribution valves are now stepper motors. Not only are these motors quieter in operation, they give much greater precision in positioning the valves.

After a motor has been replaced, the ACC system must be recalibrated before use.



Sun sensor

To remove

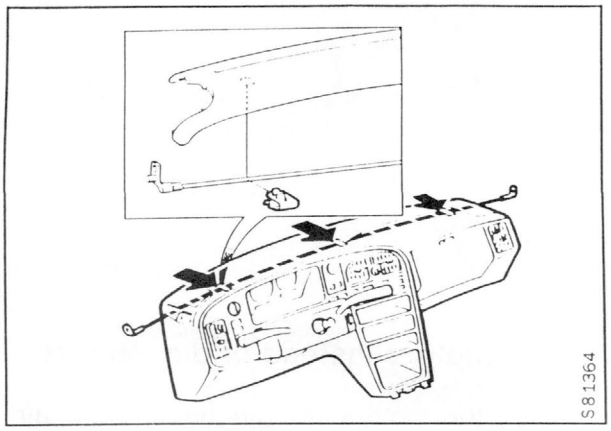
Caution

Before starting work on any ACC component, wait at least 30 seconds after switching off the ignition to give the system time to reset the valve motors and to store any fault codes.

1 Remove the A-pillar trim (Section 8:2, subsection 851 of the Service Manual refers).

2 Remove the speaker grilles and the securing screws for the fascia top panel (Section 8:2, subsection 853 of the Workshop Manual refers).

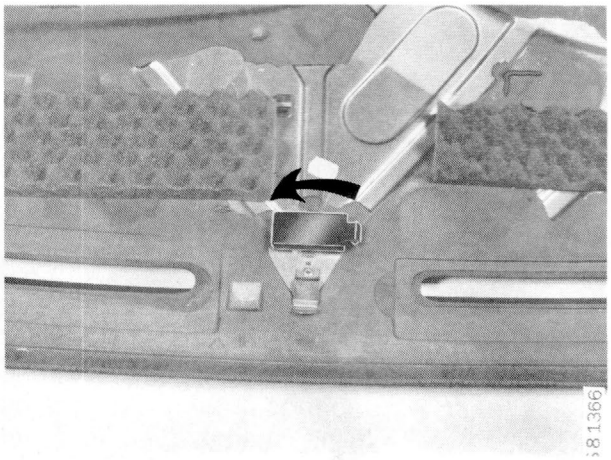
3 Unhook the panel from the steel cable.



4 Unplug the connector for the sun sensor and lift off the fascia top panel.

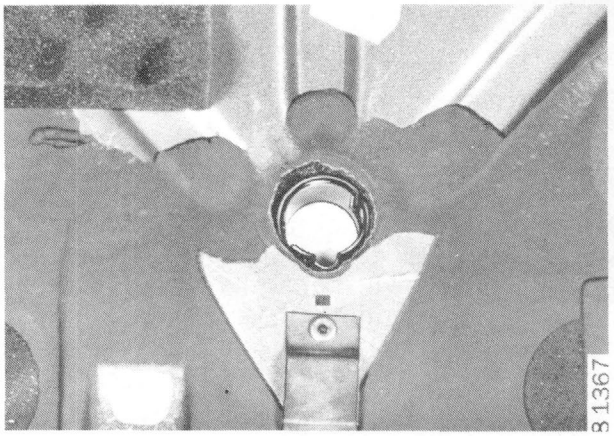
5 To remove the sensor, push it in, twisting it anticlockwise at the same time (bayonet fitting).

Save the holder.



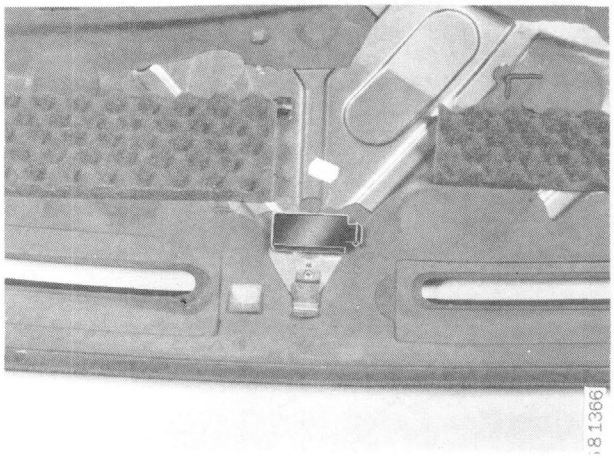
To fit

1 Put back the holder, positioning it as shown.



2 Fit the sensor into the holder, positioning it as shown.

3 Put back the fascia top panel.

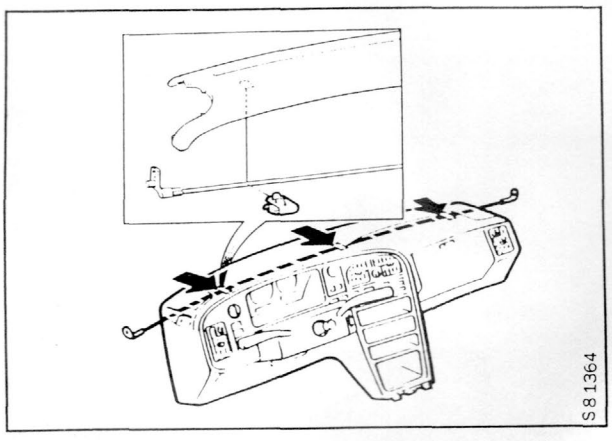


4 Plug in the sensor connector.

5 Hook the steel cable onto the panel.

6 Screw the fascia top back in position, reconnect and fit the speakers (Section 8:2, subsection 853 of the Workshop Manual refers).

7 Refit the A-pillar trim (Section 8:2, subsection 851 of the Workshop Manual refers).



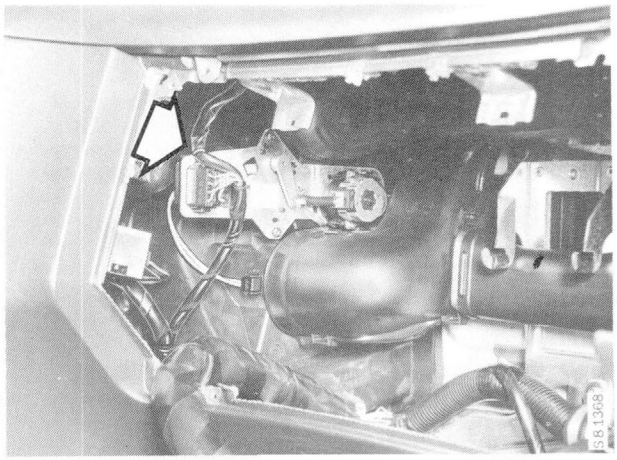
Blended-air sensor

To remove

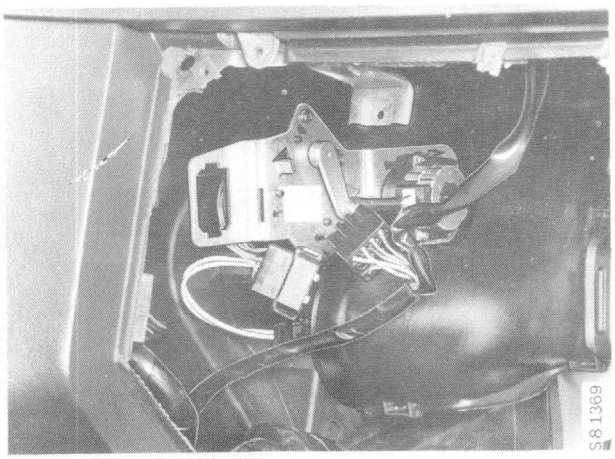
Caution
Before starting work on any ACC component, wait at least 30 seconds after switching off the ignition to give the system time to reset the valve motors and to store any fault codes.

1 Remove the glove compartment and drop the fuse/relay panel forward (Section 8:2, subsection 853 of the Service Manual refers).

2 Snip off the cable tie securing the connector lead.

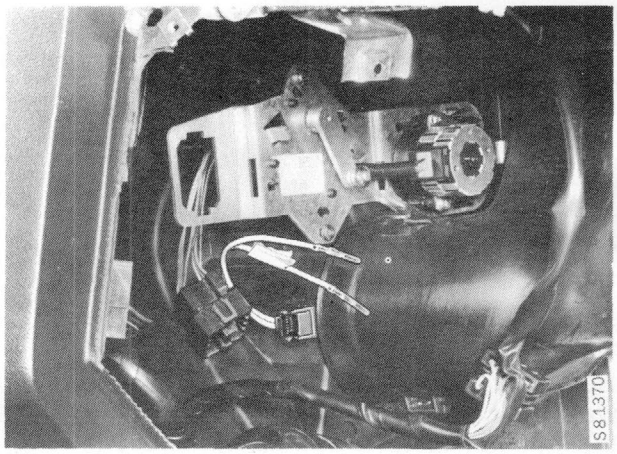


3 Unplug the connector and push it through the bracket for the actuating motor.



4 Push the sensor leads out of the connector (there is no need to label the leads as the poles are reversible).

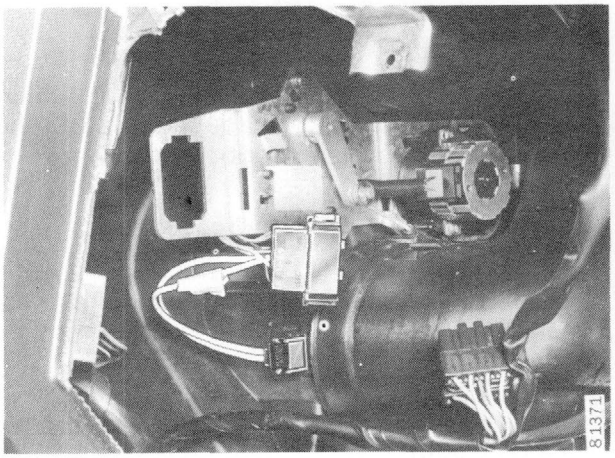
5 Withdraw the sensor.



To fit

1 Put the sensor into position.

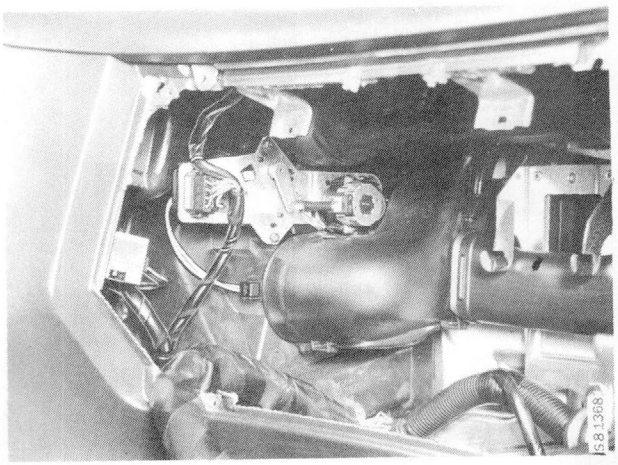
2 Connect the two leads.



3 Push one half of the connector inside the bracket for the motor.

4 Plug in the connector and secure to the bracket by means of a cable tie.

5 Put back the fuse/relay panel and fit the glove compartment (Section 8:2, subsection 853 of the Service Manual refers).



Actuating motors

Each motor is a sealed unit and must be replaced complete.

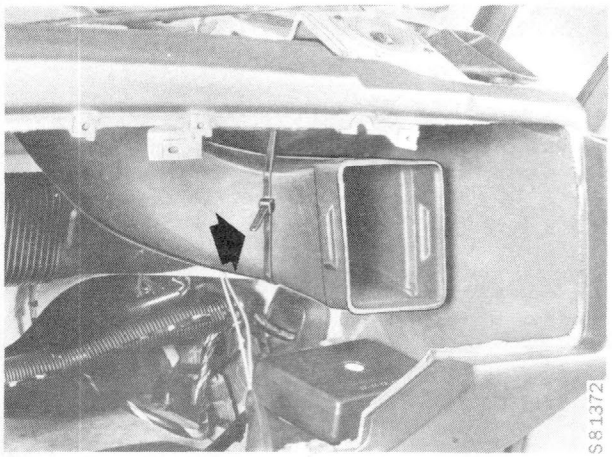
To remove

Caution
Before starting work on any ACC component, wait at least 30 seconds after switching off the ignition to give the system time to reset the valve motors and to store any fault codes.

1 Remove the fascia top panel and speaker grilles (Section 8:2, Subsection 853 of the Workshop Manual refers).

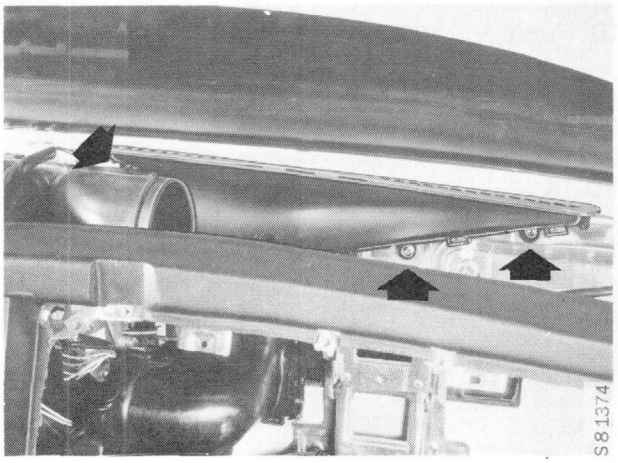
2 Remove the glove compartment and drop forward the fuse/relay panel (Section 8:2, Subsection 853 of the Workshop Manual refers).

3 Snip through the cable tie and remove the RH air duct.

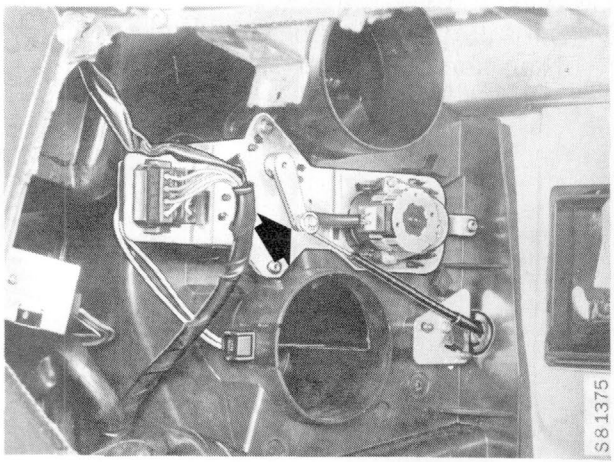


4 Undo the screws and remove the RH side-defroster duct.

5 Undo the three screws and remove the RH defroster duct.

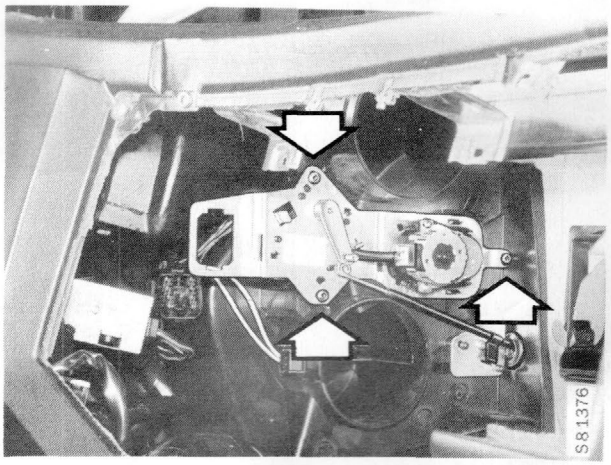


6 Remove the clip and disconnect the operating cable.

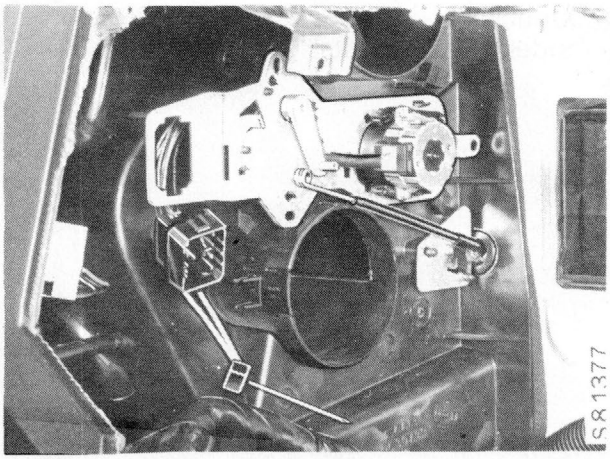


7 Snip through the cable tie, unplug the connector and push it through the motor bracket.

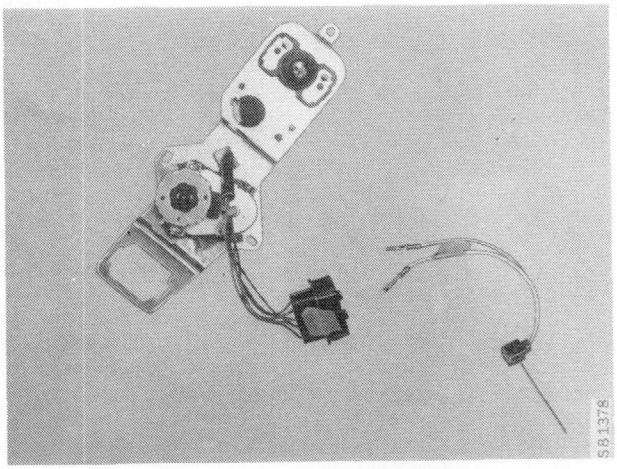
8 Undo the three bracket securing screws.



9 Withdraw the sensor and lift out the bracket complete with sensor.



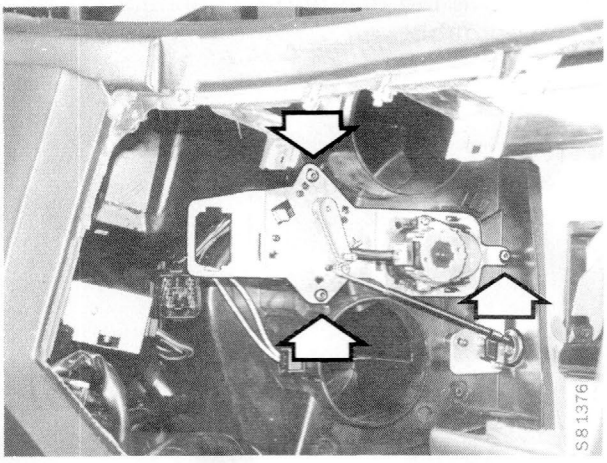
10 Push the sensor leads out of the connector (there is no need to label the leads).



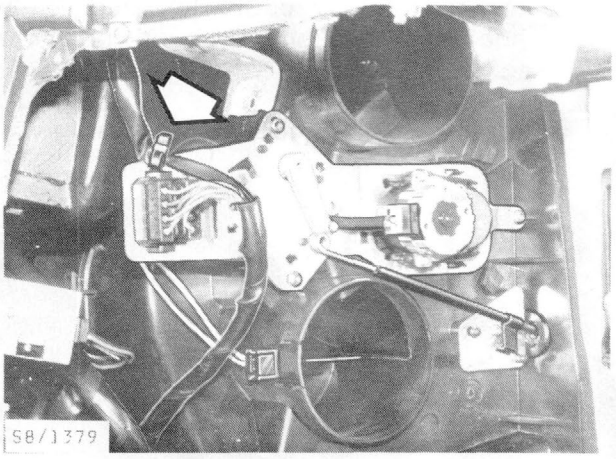
To fit

1 Push the sensor leads back into the connector.

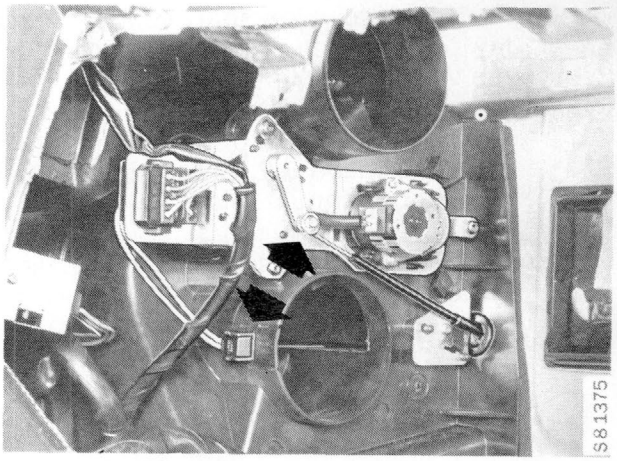
2 Offer up the motor bracket and tighten the three securing screws.



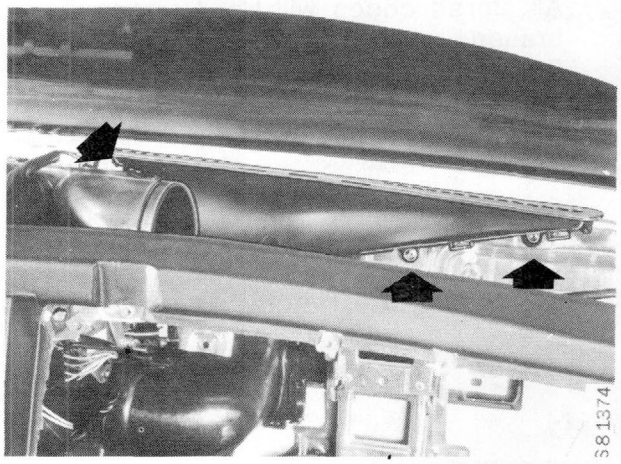
3 Plug in the connector and secure to the bracket by means of a cable tie.



4 Insert the sensor, reconnect the operating cable and fit the clip.

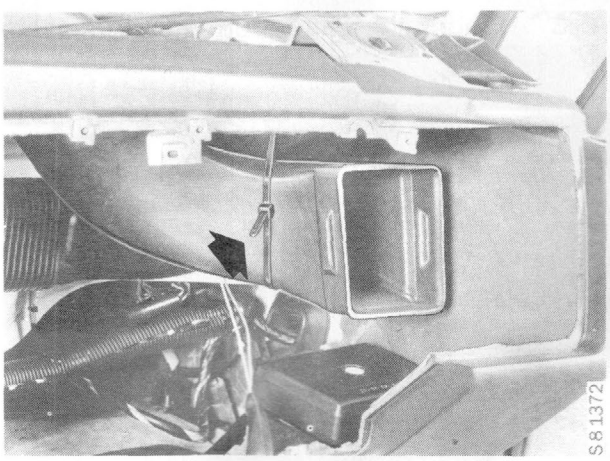


5 Put back the RH defroster duct and tighten the three securing screws.



6 Put back the RH side-defroster duct and tighten the screw.

7 Put back the RH air duct and secure with a cable tie.



8 Refit the glove compartment and fuse/relay panel (Section 8:2, Subsection 853 of the Workshop Manual refers).

9 Refit the fascia top panel and speaker grilles (Section 8:2, Subsection 853 of the Workshop Manual refers).

10 Recalibrate the system as detailed on page 20 in section Body.

Caution
All stored codes will be deleted during calibration.
Recall and note all error codes before starting calibration.

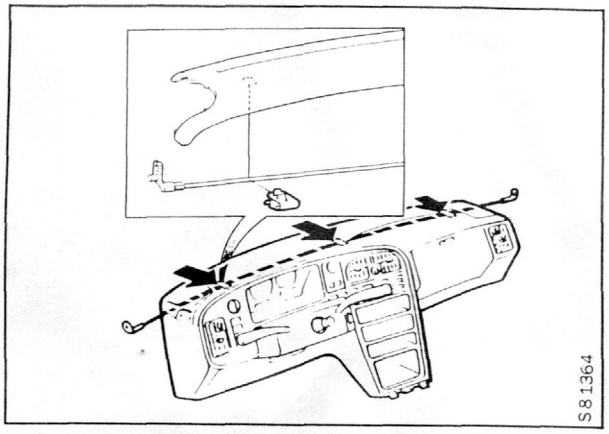
Replacing the fascia top panel

Caution
Before starting work on any ACC component, wait at least 30 seconds after switching off the ignition to give the system time to reset the valve motors and to store any fault codes.

1 Remove the A-pillar trim (Section 8:2, subsection 851 of the Workshop Manual refers).

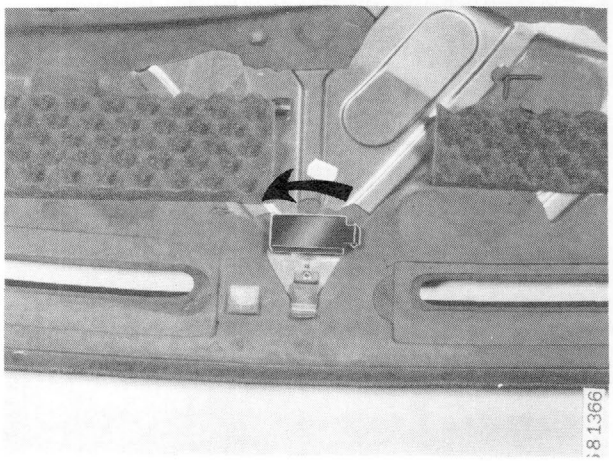
2 Remove the speaker grilles and the securing screws for the fascia top panel (Section 8:2, subsection 853 of the Workshop Manual refers).

3 Unhook the panel from the steel cable.

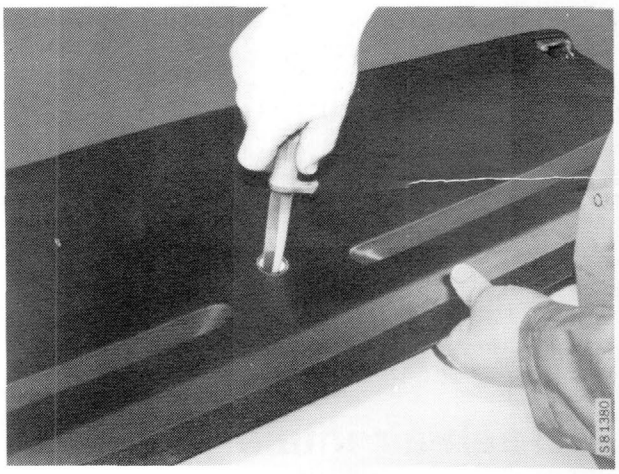


4 Unplug the connector for the sun sensor and lift off the fascia top panel.

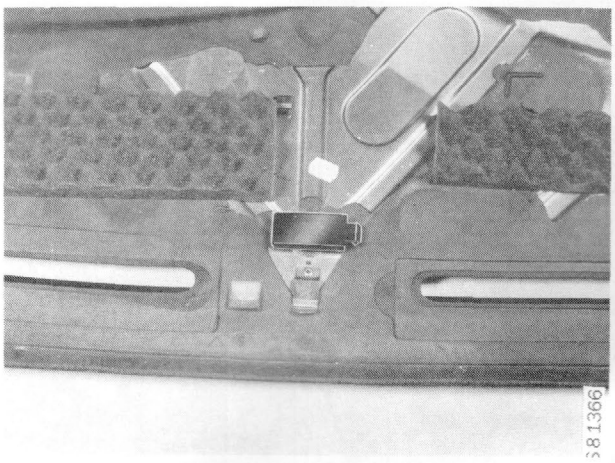
5 Note the position of the sun sensor and remove it.



6 Cut a hole for the sun sensor through the trim in the new panel.



7 Fit the sun sensor in the holder (positioning it as shown).

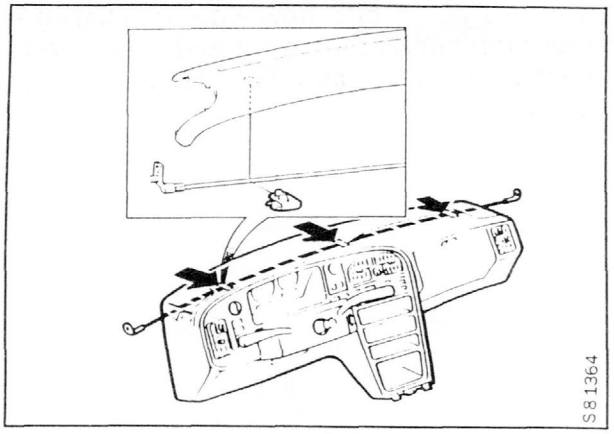


8 Put the top panel into position and plug in the sun sensor connector.

9 Hook the steel cable onto the panel.

10 Screw the fascia top back in position, reconnect and fit the speakers (Section 8:2, subsection 853 of the Workshop Manual refers).

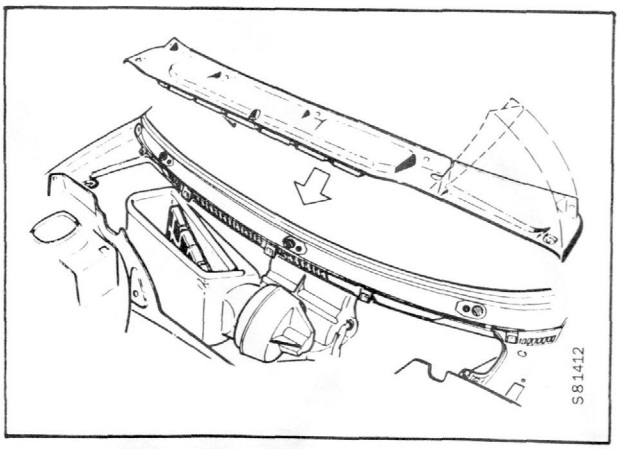
11 Refit the A-pillar trim (Section 8:2, subsection 851 of the Workshop Manual refers).



Fresh-air intake

To obviate hot air from the engine being drawn into the car, a new fresh-air intake has been introduced on cars with manual climate control without ACC. The filter incorporated in the intake is of the same type as that fitted to 900 cars.

A new one-piece cover has also been introduced on all 9000 models. The cover is in the form of a shroud, with a hinged panel in the LH side.



Body colours

Two new colours have been introduced:

219 Talladega red (clear-red, solid enamel)

220 Iridium blue (light blue metallic)

203, Platinum blue, has been discontinued.

Talladega red will only be available on sports versions of the 9000 and on the 900 Aero and Convertible.

The enamel is of a new type, consisting of a more-transparent top coat and a coloured intermediate coat, affording the finish greater depth.

Workshop information
User feedback

To

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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.

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