SAAB

900

SERVICE MANUAL

3:1 Electrical system, instruments

M 1987–

SAAB 900

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Units

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

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

The following symbols and abbreviations are used:

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

Conversion factors

1 in = 25.4 mm	1 mm = 0.039 in
1 lbf = 4.45 N	1 N = 0.23 lbf
1 lbf ft = 1.36 Nm	1 Nm = 0.74 lbf ft
1 psi = 0.07 bar	1 bar = 14.5 lbf/in^2
1 liq qt = 0.95 l	1 l = 1.05 liq qt
1 US liq qt = 0.83 UKqt	1 USgal = 0.83 UKgal

Market codes

The codes refer to market specifications

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

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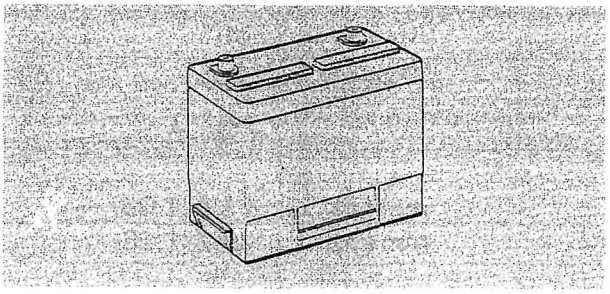
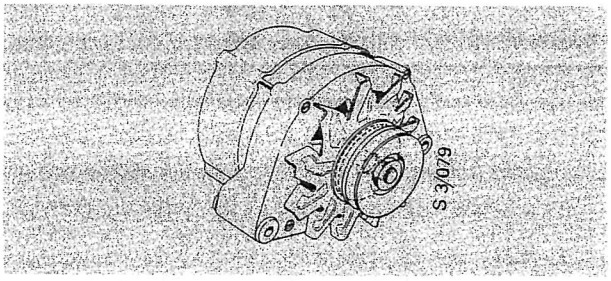
Technical data



Battery

Voltage	V	12
Capacity	Ah	62
Earthing		Negative (-)
Specific gravity of electrolyte: when recharging required when battery fully charged		 1.21 1.28



Alternator

Bosch K1-14V 70A 20

Stator connection		Delta △
Slip-ring diameter, new minimum	 mm (in) mm (in)	 27.8 (1.09) 26.8 (1.06)
Maximum permissible slip-ring runout	mm (in)	0.03 (0.001)
Maximum permissible rotor runout	mm (in)	0.05 (0.002)
Minimum brush length	mm (in)	5 (0.2) (projecting from brush-holder)
Reduction ratio between crankshaft pulley and alternator		1:2.35

Test values

Resistance, rotor winding between stator phases	 ohm ohm	 2.8 ± 10% 0.10 ± 10%
Current output at: 1 500 r/min 2 000 r/min 6 000 r/min	 A A A	 27 46 70

Bosch N1-14V 80A 19

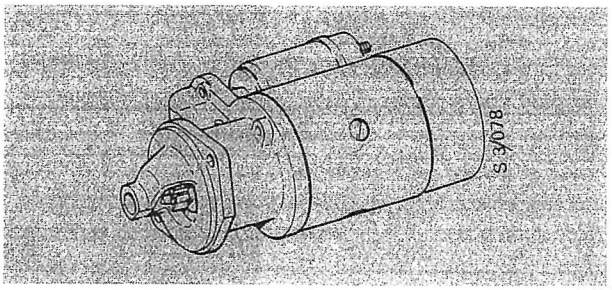
Rated voltage	V	14
Rated speed	r/min	1 900
Stator connection		Star ⅄
Slip-ring diameter,		
new	mm (in)	27.8 (1.09)
minimum	mm (in)	26.8 (1.06)
Maximum permissible slip-ring runout	mm (in)	0.03 (0.001)
Maximum permissible rotor runout	mm (in)	0.05 (0.002)
Minimum brush length	mm (in)	5 (0.2) (projecting from brush-holder)

Test values

Current output at:		
1 500 r/min	A	36
1 900 r/min	A	54
6 000 r/min	A	80

Belt tension

New belt	N (lbf)	535 ± 45 (123 ± 10)
Minimum	N (lbf)	200 (46)
After adjusting	N (lbf)	310 ± 20 (75 ± 5)



Starter motor

Type Bosch 1987-		DW 12V 0 001 108 038
Number of teeth on pinion		9
Number of teeth on ring gear		142
Reduction ratio engine/starter motor		1:15.8
Rating	kW (hp)	1.4 (1.9)

Test values

Mechanical:

Backlash in gear train	mm (in)	0.35 - 0.60 (0.014 - 0.024)
Clearance between pinion and ring gear	mm (in)	2.5 - 3.0 (0.098 - 0.12)
Rotor end float	mm (in)	0.05 - 0.40 (0.002 - 0.016)
Torque of freely rotating pinion	Nm (lbf ft)	0.12 - 0.18 (0.09 - 0.13)

Electrical:

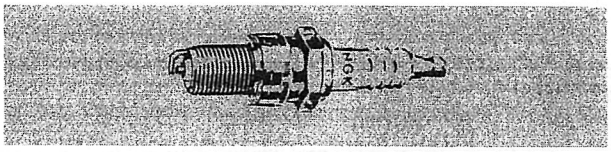
Idling speed, 12V and 70A	r/min	>3 000
Speed under load, 9V and 315A	r/min	>1 700
Starter motor locked		4V, 650-750A
Minimum voltage for solenoid energising	V	7

Tightening torques

Solenoid securing bolts	Nm (lbf ft)	4.5 - 5.5 (3.3 - 4.1)
Commutator end bracket securing bolts (long)	Nm (lbf ft)	2.7 - 3.5 (2.0 - 2.6)

Ignition system

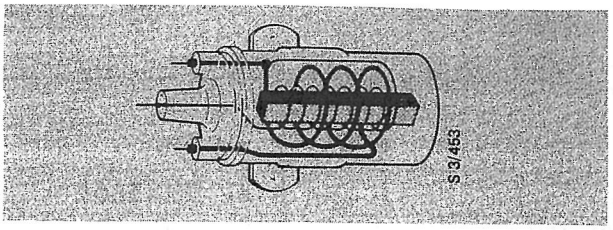
Type	Breakerless incorporating a Hall sensor
Firing order	1-3-4-2



Spark plugs

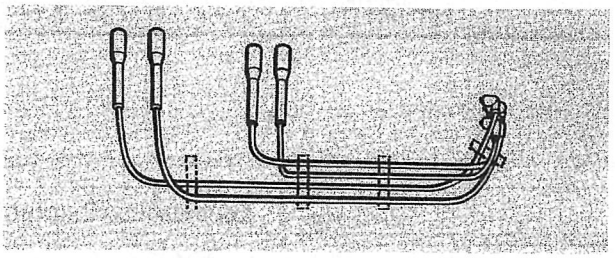
EngineType	
B201, normally-aspirated	NGK BP6ES Champion N9YC Bosch W7DC
B201, Turbo	Champion N7GY NGK BP 7EV NGK BP 7ES Champion N7YC Bosch W6DC
B202, normally-aspirated	NGK BCP 6ES Champion C9YC Bosch F7DC
B202, Turbo	NGK BCP 7EV Champion C7GY NGK BCP 7ES Champion C7YC Bosch F6DC

Replacement interval,		
US	km (miles)	50 000 (30 000)
others	km (miles)	20 000 (12 000)
Electrode gap	mm (in)	0.6 (0.02)
Tightening torque (non-lubricated plug)	Nm (lbf ft)	25 - 29 (18.5 - 21.5)



Ignition coil

Resistance of primary winding measured between terminals 1 and 15	ohm	0.52 - 0.76
Resistance of secondary winding measured between terminal 1 and the HT output terminal	kohm	7.2 - 8.2



HT leads

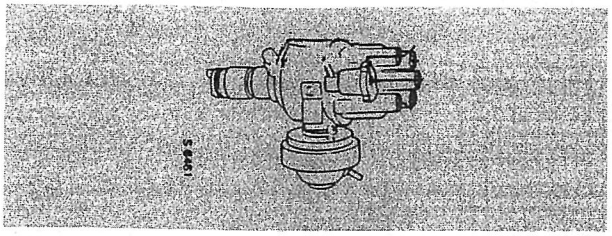
Resistance of lead between distributor and plug	kohm	2 - 4
Resistance of lead (including connectors) between coil and distributor	kohm	0.5 - 1.5

Knocksensor

Tightening torque	Nm (lbf ft)	20 (14.8)

Ignition setting with vacuum control unit disconnected

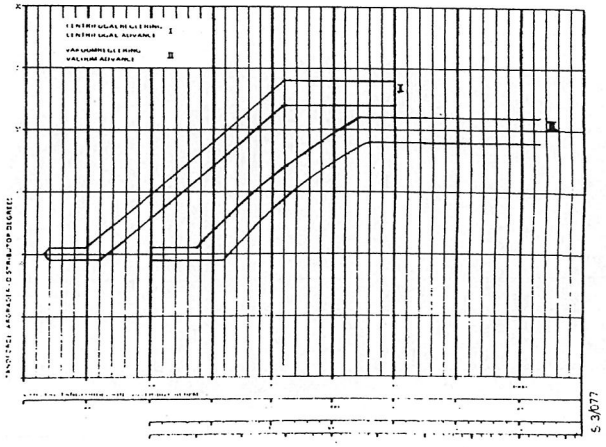
Engine	Timing at r/min	Remarks
Turbo (B201)	20° BTDC/2000	
Turbo 16 (B202)	16° BTDC/850	
Carburetter and Injection (B201)	18° BTDC/2000	SE, CH
Carburetter and Injection (B201)	20° BTDC/2000	Others
Injection (B202)	14° BTDC/850	



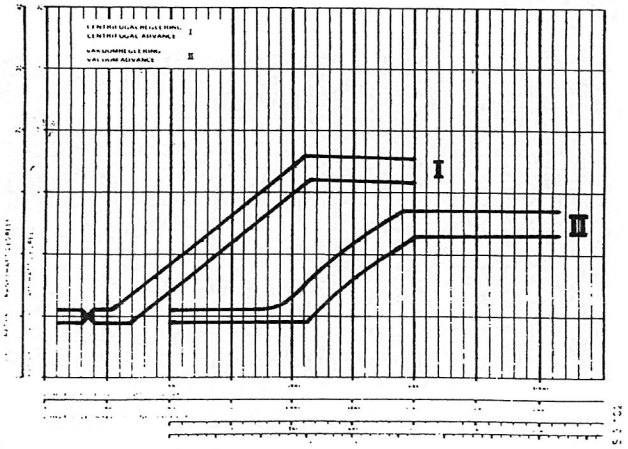
Distributor

Engine type		
B201 Carburetter and Injection		Bosch 0 237 021 024
B201 Injection (with catalytic converter)		Bosch 0 237 021 014
B201 Turbo		Bosch 0 237 026 012
B202 Turbo		Bosch 0 237 507 007
B202 Injection		Bosch 0 237 506 009
Direction of rotation		Anti-clockwise
Rotor arm resistance	kohm	1

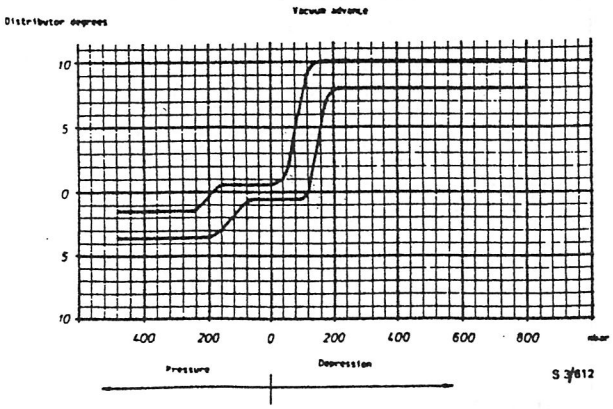
Ignition timing curves



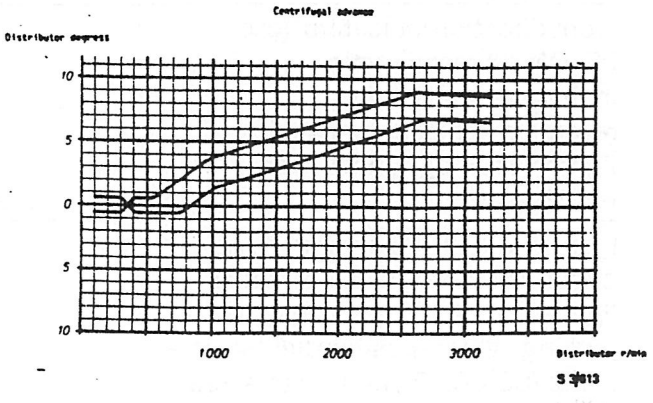
Bosch 0 237 021 024



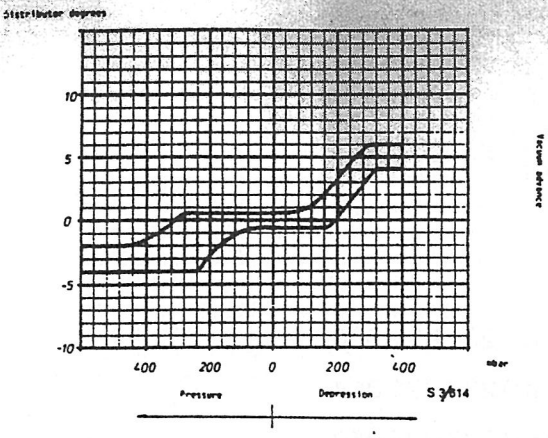
Bosch 0 237 021 014



Bosch 0 237 026 012



Bosch 0 237 026 012

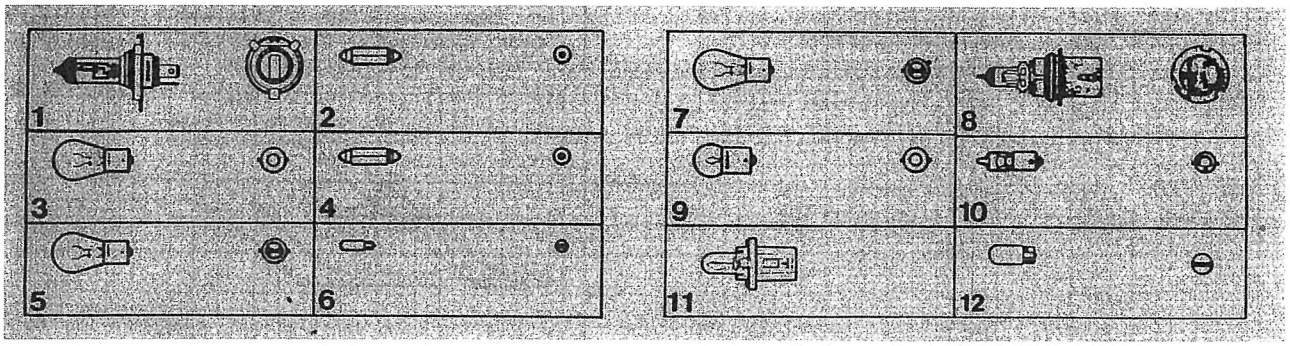


Bosch 0 237 507 007

Amplifier

Turbo	Bosch 0 227 100 139
Injection	Bosch 0 227 100 124

Lighting



	W	Socket	Item
Headlamps	60/55	H4 holder P43t-38	1
Headlamps (US, JP)	70/50	Sylvania 9004 DOT 12V	8
Front direction indicators[2] (exc. US, CA, JP) rear direction indicators, brake lights, reversing lights, side reversing lights*, rear fog lights*, high-level brake light*	21	BA15s	3
Front direction indicators[1], front direction indicators[2]/side marker lights (US, CA, JP), parking lights[1], parking lights[2] - position lights/corner lights (US,CA, JP), brake lights, rear lights	21/5	BAY15d	5
Rear lights, parking lights[2] (exc. US, CA, JP)	5	BA15s	9

Number plate illumination, rear-view mirror lamp, glove compartment lamp	5	SV8.5-8	2
Roof lamp and luggage compartment lamp	10	SV8.5-8	4
Lighting for ignition switch, light switches, cigarette lighter, heater and ventilation controls, ashtray	1.2	W2x4.6d	6
Warning/indicating lamps for oil pressure, brakes, direction indicators, choke, rear-window heater, full beam, handbrake, fuel reserve, shift-up indication*, check engine*, passive seat belts*	1.2	bulb with bulb holder	-
Charging warning lamp	2	bulb with bulb holder	11
Seat-belt warning lamp	2	W2x4.6d	6
Instrument lighting	3	W2.1x9.5d	12
Side direction indicators	5	W2.1x9.5d	12
Convertible: Reading lamps and high-level brake light	5	W10/5 H5 37R	-

*Only on certain markets and models.
[1]) Cars without integrated bumper
[2]) Cars with integrated bumper

Fuses

Red	10A
Blue	15A
Yellow	20A
Transparent	25A
Green	30A

Other electrical equipment

Windscreen wiper motor

Speed (double strokes per minute) and current consumption at 13.5 V			
Dry glass, half-speed	r/min	appr. 43	1,5 - 3,5 A
Dry glass, full speed	r/min	appr. 61	3 - 4,5 A
Motor locked (e.g. wiper blades frozen to glass)	A	appr. 19	

Headlamp wiper motor (exc. US, JP)

Type		Bosch AHO 12V
Speed (double strokes/minute)	r/min	50 - 60
Current consumption	A	0.75 - 1.5
Current consumption, motor locked (e.g. wiper blades frozen to glass)	A	4.0 - 5.5

(The motor is protected from overload by an incorporated PTC resistor connected in series.)

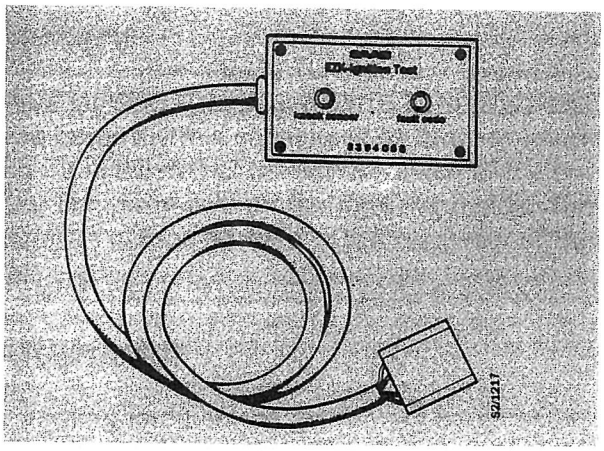
Heated seats

Thermostat closing temperature	°C (°F)	+15 ± 2.8 (+59 ± 5)
Thermostat opening temperature	°C (°F)	+26.5 ± 2.8 (+78 ± 5)
Rating of heating elements:		
1987-	W	approx. 86
1987- with passive seat belts	W	approx. 93

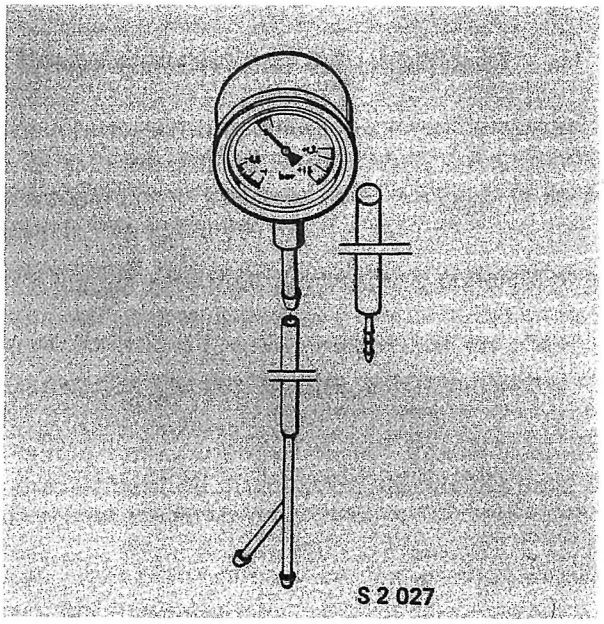
Rear window heater

Rating at 13V:		
Combi Coupé	W	200 ± 20
Sedan and convertible	W	180 ± 20

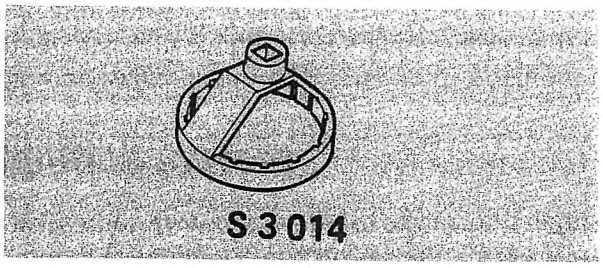
Special tools



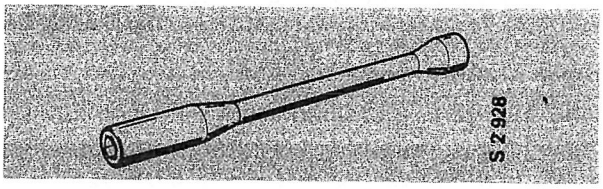
83 94 058 EZK test unit for checking and fault-tracing in the EZK ignition system



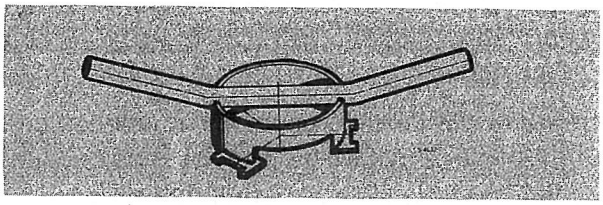
83 93 514 Equipment for measuring the boost pressure on the Turbo APC, and for testing components



83 93 365 Spanner for fuel level transmitter



83 93 902 Spark plug socket, NV 16, 3/8" drive



83 92 433 Spanner for fuel pump bracket

General

Battery

The Saab 900 is equipped with a 12-volt, six-cell lead battery with a capacity of 62 ampere-hours (Ah). It is located at the extreme front of the engine compartment, on the right-hand side. The negative pole is earthed to the bodywork of the car.

Alternator

A warning lamp on the instrument panel shows whether the alternator is charging or not.

Starter motor

The starter motor is rated at 1.4 kW (1.9 hp). The drive pinion is supplied via a solenoid when the ignition switch is turned to the "start" position.

Ignition system

The ignition system consists of a coil and a distributor. It is supplied from the battery, via the ignition switch. All models are equipped with a breakerless ignition system.

Lighting

The lighting on the front of the car consists of the headlamps, direction indicators, side direction indicators and parking lights. The rear lighting comprises the number plate illumination, rear lights, direction indicators, brake lights, and the reversing lights, which light up when reverse gear is selected.

Some variants/market versions are also equipped with fog lamps, corner lights, side marker lights, side reversing lights and position lights.

The headlamp inserts are horizontally and vertically adjustable. The dip switch is incorporated in the direction-indicator stalk. The headlamps can be dipped by moving the direction indicator lever towards the steering wheel. A blue warning lamp on the instrument panel will light up when the full beam is switched on.

The parking lights are switched on along with the full or dipped beams.

A rheostat on the facia can be used to regulate the intensity of the instrument lighting.

Other electrical equipment

The interior lighting includes the roof lamps and a lamp at the ignition switch, which are supplied via a switch on the gear lever housing, or by a switch on each door.

The luggage compartment lighting consists of a lamp which is supplied via a switch at the striker plate of the luggage compartment lid (Combi Coupé). On the Sedan, the switch is located in front of the hinge, on the left-hand side. The convertible has a mercury switch in the luggage compartment lid. In addition, all models have a switch on the lamp.

A self-returning switch under the steering wheel controls the supply to the direction indicators. This switch also serves as the dip switch. Green lamps in the combined instrument flash when the direction indicators are switched on.

The switch for the hazard warning lights is located on the facia. When this switch is closed, all of the direction indicators flash.

The windscreen wiper unit consists of a wiper motor and spindles, which are connected via linkages and cables. This switch also controls the windscreen washers and the headlamp wipers/washers (except US, JP). The windscreen wipers have two speeds and can also be set for intermittent operation.

The horn is controlled by a switch under the steering wheel padding.

The radiator fan is driven by a motor and is located behind the radiator. The fan is controlled by a thermostat, and operates only when the radiator coolant temperatue exceeds the temperature at which the thermostat closes.

The front seats have electrically heated pads in the seat cushions and backrests. See Group 8.

Cables and fuses

The cables from the battery and alternator to the various electrical components are collected in cable harnesses, which are divided into groups. Each cable is colour-coded, to simplify identification. All wiring connections are made by means of solder-free connectors, most of them of splash-proof design. These connectors cannot be repaired, and 200 mm long cables, complete with male or female connectors, are therefore available for repair work. If the cables are used in a system with a conductor area larger than 1.5 mm^2, they should be shortened as much as possible.

The cables should be connected to the existing cables by means of crimped connectors, which should be sealed with silicone.

The electrical system of the car is equipped with a number of fuses to protect the circuits from abnormal surges of current and to reduce the risk of fire due to short-circuiting, etc. The fuse holder is located in the electrical distribution box, on the left-hand wheel housing. The electrical distribution box also houses the fuses, relays, and the Timing Service Instrument (TSI) socket.

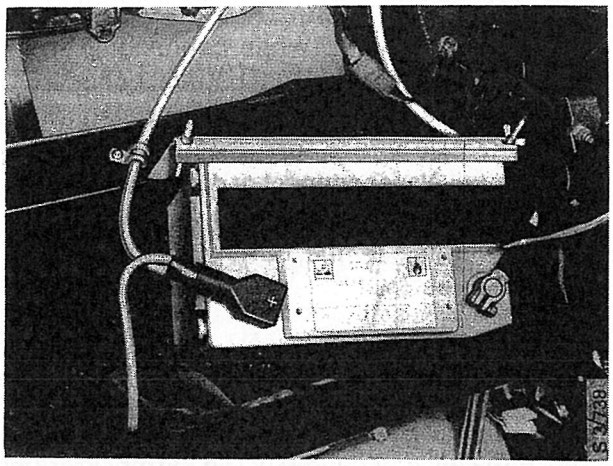
Battery

The Saab 900 is fitted with a sealed-for-life, 12 V battery, with a capacity of 62 Ah.

The battery is located on the right-hand side in the engine compartment and its negative terminal is connected to earth (negative-earth system).

The sealed-for-life battery works in the same way as a conventional battery and also contains an electrolyte consisting of diluted sulphuric acid. The battery must therefore always be kept upright.

The battery has a number of small vent holes, although much less gas is formed in this battery than in a conventional battery. Sealed-for-life batteries hold their charge longer than conventional batteries.



Removal and refitting

Disconnect the negative battery cable first, to prevent short-circuits. Then disconnect the positive cable. Never disconnect the battery when the engine is running, since serious damage to the alternator may result.

Then remove the two wing nuts on the battery bracket, and lift the battery out of the car.

Before replacing the battery, make sure that the outside is clean and that the pole terminals and cable clamps are also clean so that they make proper contact. After connecting the cables, coat the pole terminals and clamps with acid-free vaseline.

Caution:

Never reverse the polarity of the electrical system by fitting the battery cables to the wrong terminals. If the cables are wrongly connected for only an instant, this is sufficient to damage the rectifier in the alternator. Always connect the red, positive (+) cable to the positive (+) terminal of the battery and the negative (-) cable to the negative (-) terminal. When connecting an external battery to the car battery, connect the positive pole to the positive pole and the negative pole to earth (not to the negative pole). Never connect or disconnect the battery when the engine is running. For fast charging of the battery, disconnect both cables.

Battery care

Since the level of charge in the battery is critical to starting of the engine, it is important to check and look after the battery regularly. This is particularly important in winter, when the load on the battery is higher and its capacity is reduced by the low ambient temperatures. A poorly charged battery may also freeze and be damaged in very cold weather.

Testing

The capacity and level of charge of the battery can be tested by connecting a load (equivalent to that on starting) to the battery for 15 seconds and measuring the voltage. Use a battery tester with load resistor for this purpose.

Test procedure:

Apply a load of about 200 A to the battery for 15 seconds, during which time the voltage should not drop below 9.6 V at a battery temperature of 27 °C (80 °F). The following table gives the corresponding voltages at lower temperatures.

Battery temperature	Minimum voltage
27 °C (80 °F)	9.6 V
16 °C (60 °F)	9.5 V
4 °C (40 °F)	9.3 V
-7 °C (20 °F)	8.9 V
-18 °C (0 °F)	8.5 V

If the voltage is lower, the battery is either poorly charged or has insufficient capacity.

Charging

The battery can normally be recharged by means of a conventional battery charger. For fast charging, the charging current must not exceed 50 A.

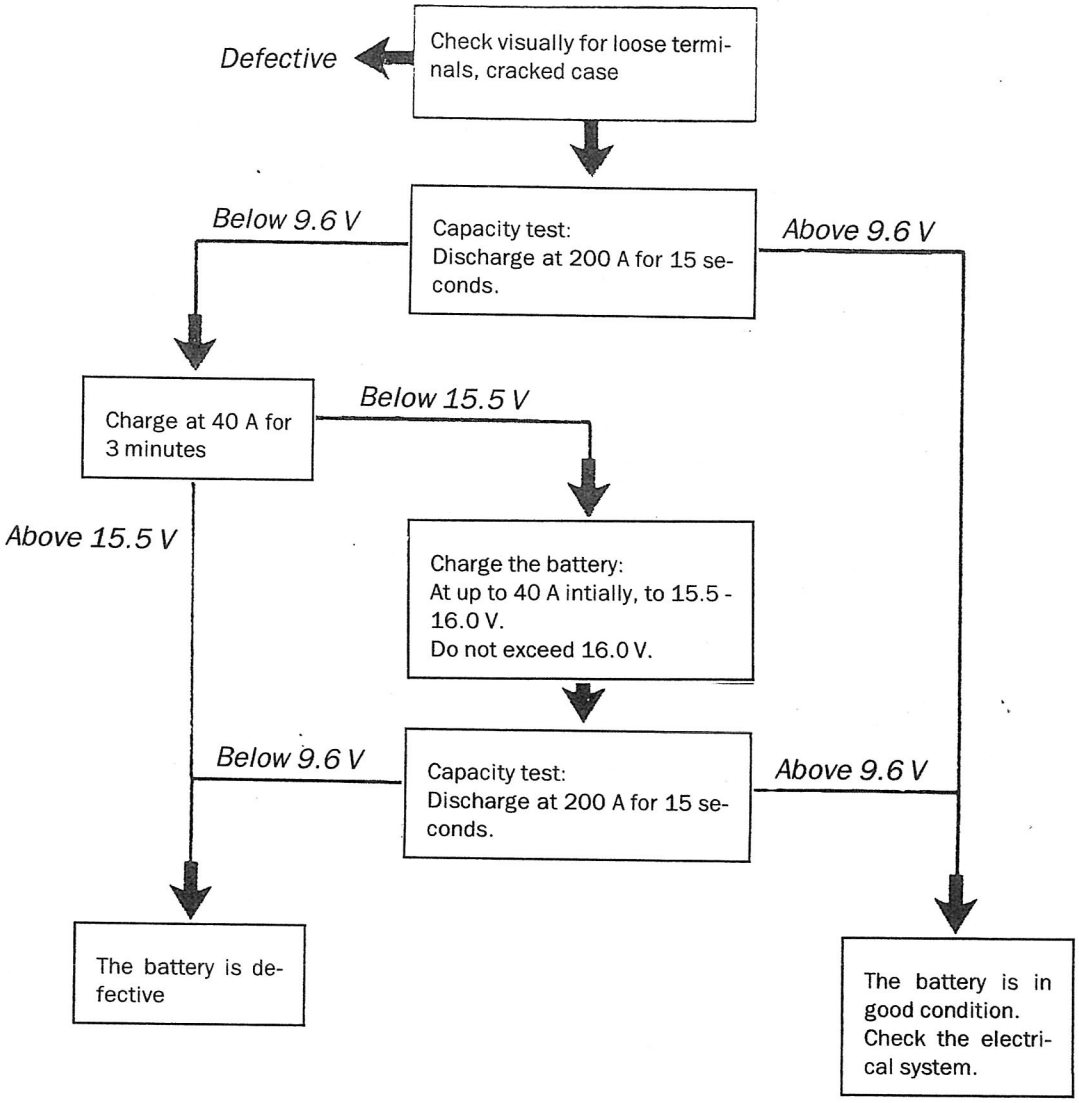
If the battery is almost fully discharged, e.g. because an item of electrical equipment has been left switched on for a relatively long time, a low initial charge is required to start the chemical process in the battery. In such cases, charge the battery at 3 A (5 A max.) for 24 hours or until the charging current has fallen to its lowest stable value. The voltage on charging should not exceed 16 V, since a rapid loss of water would result.

In such cases, a battery charger delivering a pulsating charging current should preferably be used.

Fault-tracing chart

Use the fault-tracing chart to find out why the battery is not performing properly.

If the battery is found to be in good condition, poor performance may be due to abnormally heavy power consumption (e.g. if a power-consuming unit has been left switched on) or to a fault in the electrical system or charging system of the car.



Fault-tracing chart

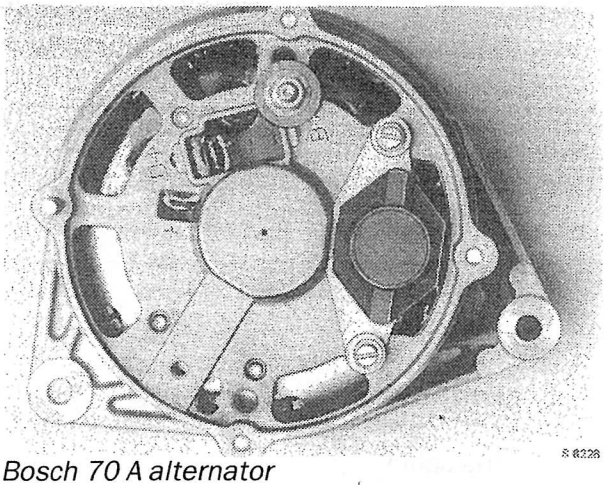
Alternator

When the engine is running, the alternator supplies the various electrical components and also charges the battery.

The pulley is equipped with vanes to dissipate the heat generated in the alternator. When the pulley is rotating, the vanes draw air through the alternator to provide the necessary cooling.

The alternator is mounted on the side of the engine and driven by twin V-belts.

Two alternator models are in use, depending on the variant and market specification: The Bosch 70 A and 80 A.



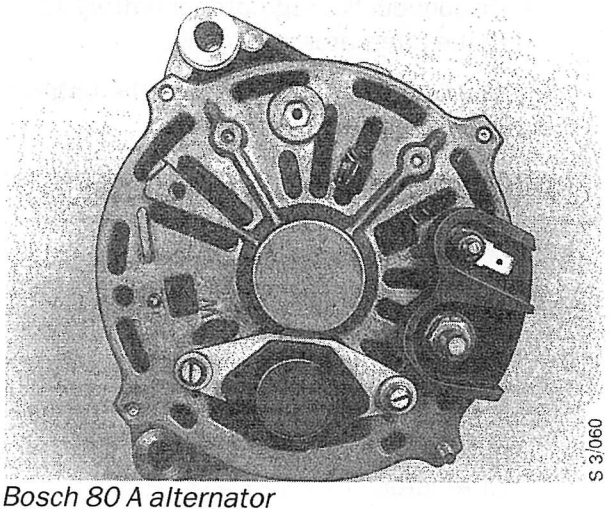
Bosch 70 A alternator

Principle of operation

When the ignition is switched on, the circuit will be closed from the ignition switch via the warning lamp to terminal D+ on the alternator. Current will then flow through the rotor winding and to earth through the voltage regulator.

Current flowing through the rotor generates a magnetic field around the rotor. When the engine is started and the rotor starts to rotate, the magnetic field will also rotate, generating an alternating current in the stator windings. The alternating current is rectified in the rectifier diodes, and the direct current will be supplied to the battery via terminal B+.

The current from the stator windings also flows through the excitation diodes to the voltage regulator, where it is used for controlling the output voltage. When the voltage has risen to about 14 V or above, the regulator will reduce the current flowing through the rotor winding.



Bosch 80 A alternator

This weakens the magnetic field and thus reduces the current generated in the stator windings.

The voltage regulator thus limits the voltage to a maximum of approximately 14 V.

The warning lamp is also affected by the voltage supplied by the stator windings via terminal D+ on the regulator, so that when the voltage on both sides of the warning lamp is the same, the lamp will not be alight. The lamp therefore indicates whether the alternator is charging.

No current limiting relay is required, since the alternator limits the current itself. When the alternator is running at high speed, the frequency of the induced alternating current will also be high, and when the output current has reached a given value, the resulting resistance (impedance) will be of such magnitude that any further current increase would be impossible.

Caution:

Never:

- earth the excitation terminals of the altenator or regulator or the interconnecting cable.
- reverse the polarity of the regulator.
- disconnect the regulator or battery while the alternator is running.
- remove the alternator while the battery is connected.
- run the alternator if the cable between the negative terminals of the alternator and the regulator is not connected.
- test the alternator and regulator as semblies in the car or on a test bench unless the battery is connected.
- reverse the polarity of the battery, as this may result in serious damage to the alternator.

Alternators should be overhauled only by specialist workshops. It is vitally important that they are dismantled and tested correctly, as seemingly minor errors may lead to serious damage.

Caution:

To avoid damage to the alternator, disconnect the negative (-) battery cable and all alternator connections before carrying out any electric welding on the car.

Internal circuitry

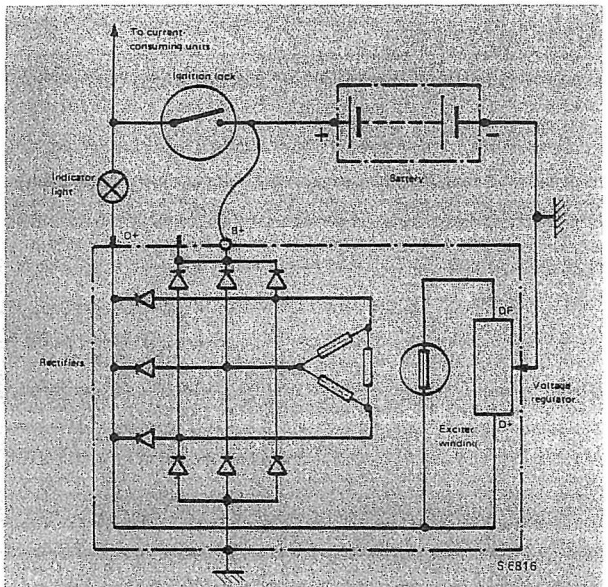
The alternator, which is internally ventilated, has a 12-pole rotor and six silicon diodes for rectification. The 80 A alternator has 12 silicon diodes for rectification and an additional two for the "third circuit".

An excitation diode is connected to each of the three stator windings. The excitation diodes are interconnected at terminal D+. The stator windings form three phases. Those of the Bosch 80 A are star-connected, and those of the Bosch 70 A are delta-connected.

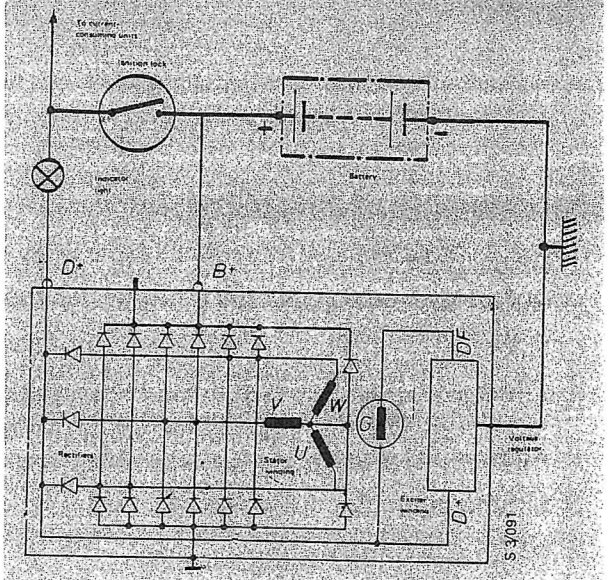
The six (14 on the 80 A) rectifier diodes are connected in the form of a bridge circuit, i.e. three (seven on the 80 A) diodes are connected for normal polarity (anode to the terminal) and three (seven on the 80 A) for reversed polarity (anode to earth).

The diode holder is either insulated from the stator frame (earth) or directly earthed, according to the polarity. The excitation winding is mounted in the rotor, which has claw-type poles, with alternate claws acting as north pole and south pole.

The excitation current is supplied to the rotor coil via slip rings on the rotor.



Wiring diagram for the Bosch 70 A alternator



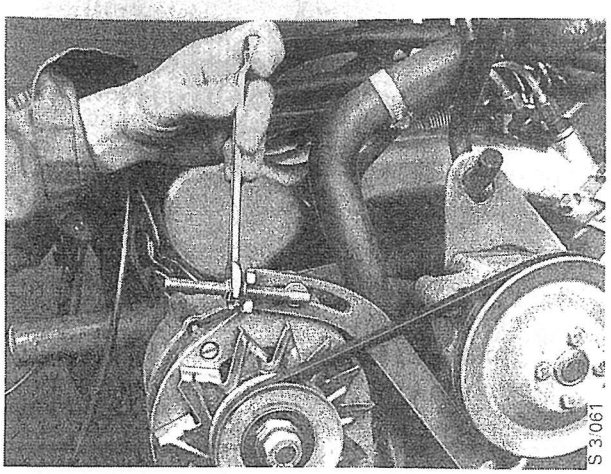
Wiring diagram for the Bosch 80 A alternator

Alternator care

The alternator has fully enclosed ball bearings which do not require lubrication.

The belt tension must be checked at regular intervals.

For particulars of the correct belt tension, see section 023 "Technical data".



Adjusting the belt tension

Regulator

The regulator is integrated in the alternator and requires no adjustment or maintenance.

Removal and refitting

1 Disconnect the negative (-) battery cable. Note: Never disconnect the battery when the engine is running.

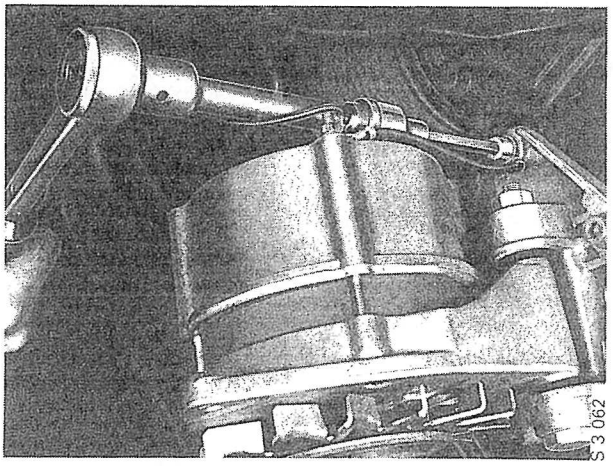
2 Disconnect the alternator leads and remove the bolts holding the alternator mounting. Remove the V-belts.

3 Lift the alternator out of the car.

4 Remove the alternator mounting.

5 Refit in the reverse order.

6 Adjust the belt tension.

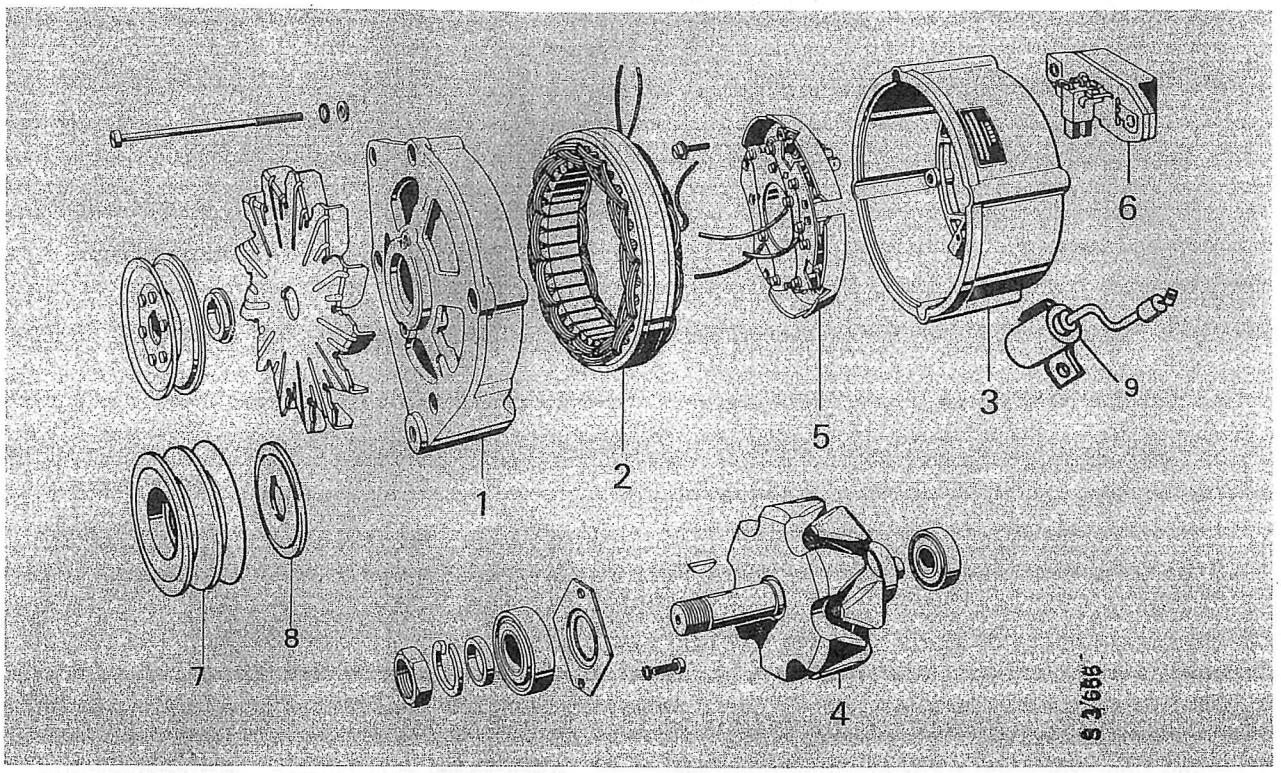


Note:
Observe the following points to protect the diodes from excessive heat when soldering:

a Use a well-heated soldering iron with a fine tip, so that the soldering can be performed as quickly as possible.

b Grip the lead with a pair of pliers, between the diode and the point to be soldered, to conduct as much heat as possible away from the diode.

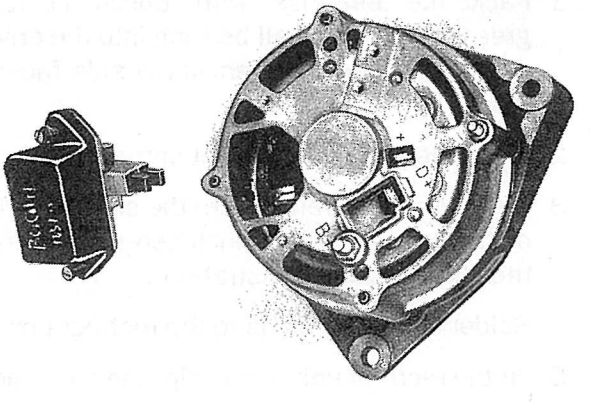
To dismantle



The Bosch 70 A and 80 A alternators
1 Drive end bracket
2 Stator
3 Slip-ring end bracket
4 Rotor 5 Rectifier unit
6 Voltage regulator and brush-holders
7 Pulley
8 Large thrust washer (80 A only)
9 Interference suppressor (capacitor) (80 A only)

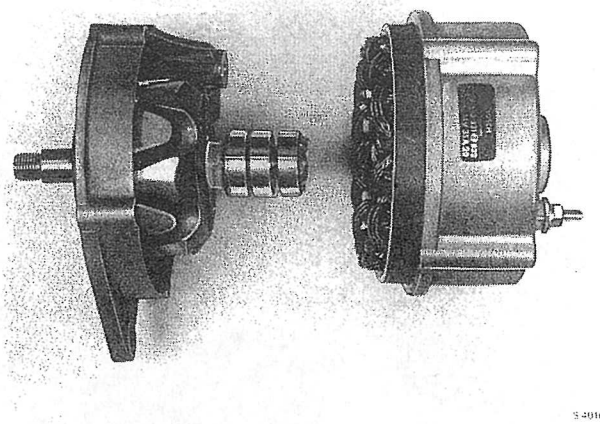
1 Clamp the pulley and remove the pulley nut, using a 22 mm socket. Remove the pulley and fan.

2 Remove the voltage regulator from the alternator.



Voltage regulator removed from alternator

3 Separate the stator and slip-ring end bracket from the drive end bracket and rotor. Mark the position of the drive end relative to the stator ring and slip-ring end bracket.

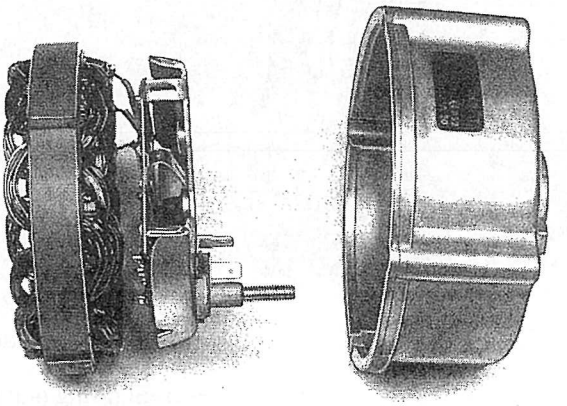


4 Remove the retaining screws and nut for the rectifier unit, and separate the stator and the rectifier unit from the slip-ring end bracket.

5 Unsolder the stator leads from the rectifier unit.

6 Place the drive end bracket on a suitable surface and press the rotor out carefully. The bearing can now be dismantled. To avoid damage, prevent the rotor from falling as it comes free of the bracket.

7 Use an extractor to remove the ball bearing at the slip-ring end.



To assemble

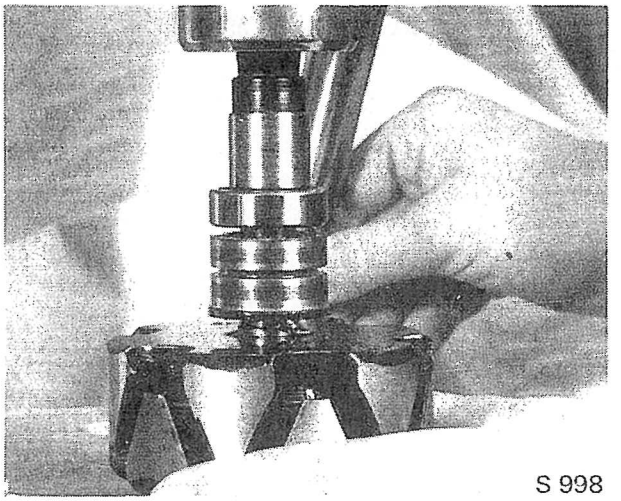
1 Pack the bearings with Bosch Ft1v34 grease. Press the ball bearing into the drive end bracket with the enclosed side facing the drive.

2 Press the drive end bracket onto the rotor.

3 Press the ball bearing onto the slip-ring end of the rotor, with the enclosed side facing the slip rings (see illustration).

4 Solder the stator leads to the rectifier unit.

5 Fit the rectifier unit to the slip-ring end bracket.



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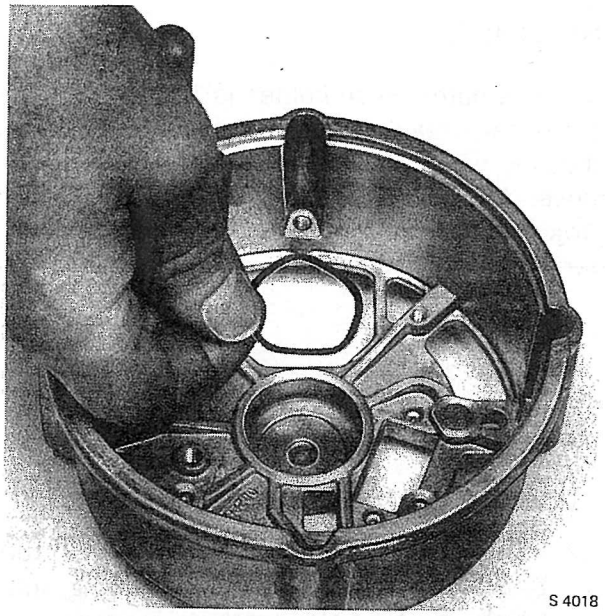
6 Place the snap ring for the bearing in the slip-ring end bracket, and refit the drive end bracket and rotor to the slip-ring end bracket and stator, as described earlier.

7 Check the length of the brushes. With the brush-holder removed, the brushes should project at least 5 mm (0.2 in) from the brush-holder. Refit the brush-holder.



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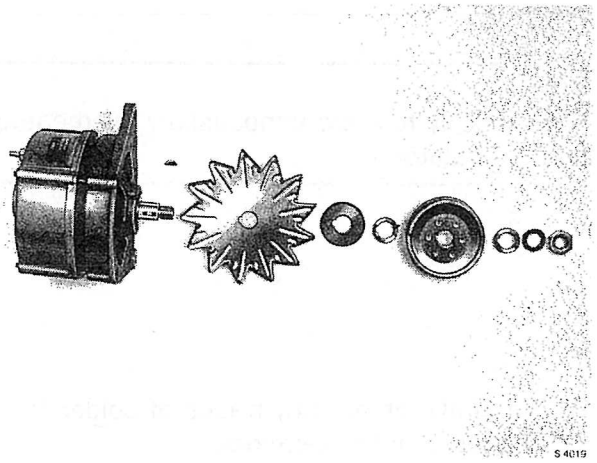
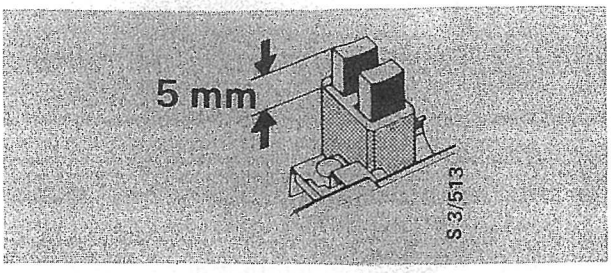
8 Fit the fan and pulley. Make sure that the washers are fitted in the correct order (see illustration). Tighten the nut to a torque of 34 - 39 Nm (25 - 29 lbf ft).

(If the fan has done more than 100 000 km (60 000 miles) at the time of overhaul, it should be replaced.)



S 4019

Brushes

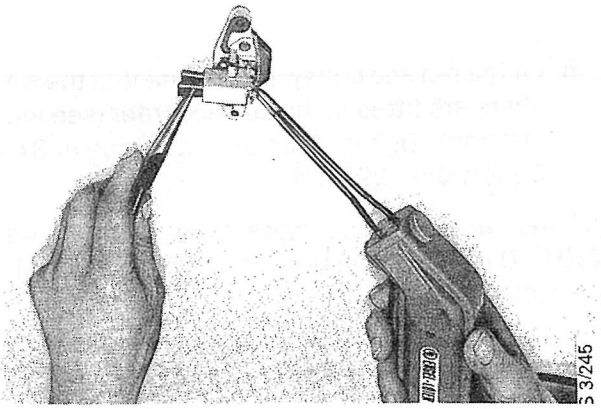


The alternator brush-holder is integrated with the voltage regulator unit. The brushes can be checked when the regulator unit has been removed from the alternator. The brushes should project at least 5 mm (0.2 in) from the brush-holder. If not, fit new brushes.

To change the brushes

1 Remove the voltage regulator unit.

2 Carefully unsolder the brush lead from the brush-holder terminal, withdrawing the brush from the holder at the same time.



Note:
Work quickly to avoid unnecessary overheating of the regulator.

3 Carefully remove any traces of solder from the brush-holder terminal.

4 Fit the new brush into the brush-holder, insert the brush lead into the brush-holder terminal and solder it.

Testing

Read this section carefully before carrying out any tests on the alternator or its components.

For testing the rectifiers, use only d.c. at a maximum voltage of 40 V. For insulation and short-circuit tests on the stator and rotor windings, use a 40 V/40 W a.c. test lamp (do not use 110 V or 220 V mains supply, as this may damage the rectifiers). When measuring the charging current, never disconnect the battery leads while the engine is running.

When soldering or unsoldering the diode terminals, use flat-nose pliers to hold the diode lead, since the pliers will help to dissipate the heat from the semiconductors, which are highly sensitive to heat (work quickly with a hot soldering iron).

Avoid bending the leads or applying pressure to them at the point where they enter the diode case.

Before doing any work on the alternator, either in the car or on the test bench, always disconnect the battery.

Checking the charging capacity

The charging voltage and charging current can be measured with the alternator in the car or mounted on a test bench.

Measure the voltage by means of a voltmeter connected between terminal B+ and earth on the alternator.

Measure the current by means of an ammeter connected in series with the output cable from alternator terminal B+.

Test values

See Section 023 "Technical data" for the reduction ratio between the engine and alternator.

Bosch 70 A and 80 A

Testing at 2/3 of maximum current

Connect the battery and apply an electrical load to the alternator. Run the alternator at the specified rated speed. The alternator current should then be 2/3 of its maximum current:

Bosch 70A	46 A at 2000 r/min
Bosch 80A	54 A at 1900 r/min

Note:
The alternator should be at working temperature (60°C/140°F) during testing.

Testing the alternator on a test bench.

On the test bench, the alternator may only be driven by means of its drive pulley.

All cables must be connected by means of spade terminals or plug-in connectors. This also applies to the battery - never use makeshift connections.

During testing, a 12 V battery must be connected in parallel across the alternator. The battery will serve as a buffer and will smooth out the voltage peaks occurring when loads are switched on or off. If such peaks should exceed the permissible voltage limits, the rectifying function of the diodes will be destroyed. The maximum voltage for silicon diodes is approximately 100 V.

The alternator can be tested in most types of alternator test bench. However, suitable mountings and drives may have to be added in some cases.

Caution

During testing, the alternator must be secured by means of its normal mountings. Never use clamps or the like.

Excitation

Unlike a d.c. generator, an alternator is not self-exciting after it has been idle for some time. A 12 V warning lamp with a rating of at least 2 W must therefore be connected between terminals D+ and B+ (see the wiring diagram). The initial excitation current for the rotor field winding flows across the warning lamp, and through alternator terminal D+, voltage regulator terminal D+, the closed regulator contacts and terminal DF. The rating of the warning lamp must therefore be at least as high as specified above. Self-excitation will start as soon as the alternator voltage has opened the excitation diodes, i.e. at 1 - 2 V. The voltage will then rise rapidly and the voltage differential across the warning lamp will steadily decrease. The lamp will remain alight until the alternator output voltage is equal to the battery voltage.

Checking and inspection of dismantled components

A. Rotor

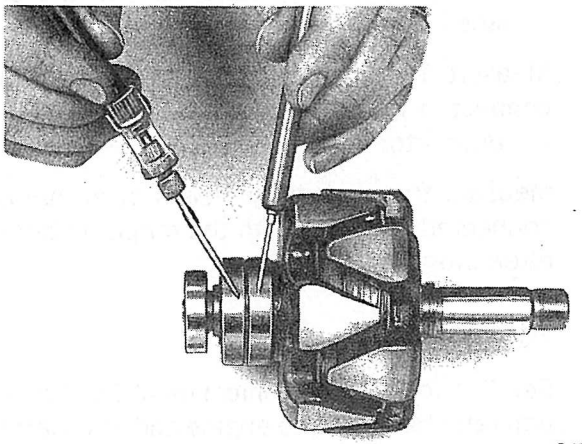
To measure the resistance

Use an ohmmeter to measure the resistance of the winding between the slip rings.

The resistance readings should be:

Bosch 70 A	2.8 ohm ± 10%
Bosch 80 A	2.8 ohm ± 5%

The maximum permissible rotor ovality is 0.05 mm (0.002 in)



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Measuring the resistance of the rotor winding

Short-circuit to earth

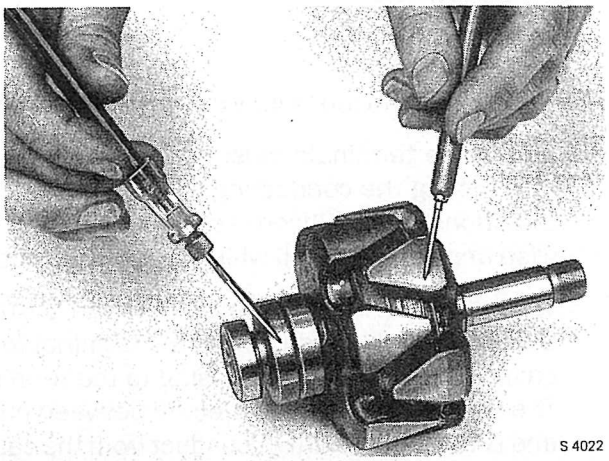
Check the insulation of the exciter winding and the slip rings for short-circuits to earth.

Slip rings

Check the surface of the slip rings for grease, dirt and scoring. Clean them with trichlorethylene. Avoid polishing the surface of the slip rings, as a highly polished surface provides poorer contact with the brushes.

The diameter of the slip rings should be 27.8 mm, +0 mm/-1 mm (1.08 in, +0/-0.04 in).

The maximum permissible slip-ring ovality is 0.03 mm (0.001 in).

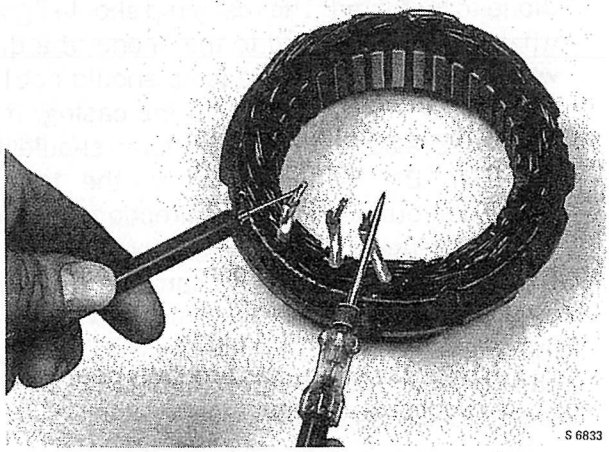


Checking the insulation of the exciter winding and the slip rings

B. Stator

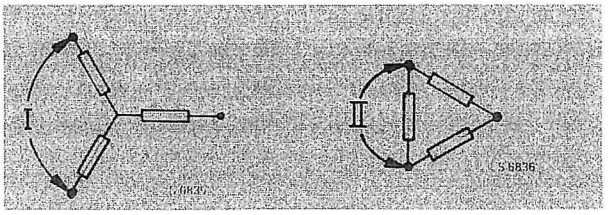
To measure the resistance (rectifiers unsoldered)

A winding tester can be used to measure the resistance of the stator windings. The alternator must be dismantled before this test is performed. It is also possible to measure the common resistance of two phases. Three measurements will reveal any any deviation in the resistance of the stator windings. If the phases are designated U, V and W, the resistance should be measured between U and V, U and W and V and W. The resistance readings at +20°C (+68°F) should be:



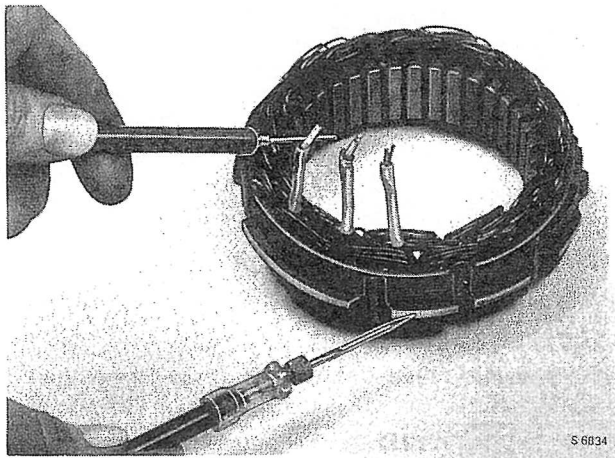
Measuring the resistance across two phases

I Bosch 80 A	0.10 ohm 10%
II Bosch 70 A	0.09 ohm 10%



Short-circuit to earth (rectifiers unsoldered)

A 40 V/40 W a.c. test lamp should be used for this test. Connect the test lamp between the iron core of the stator and each of the unsoldered stator cables.



Checking the stator insulation

C. Rectifiers

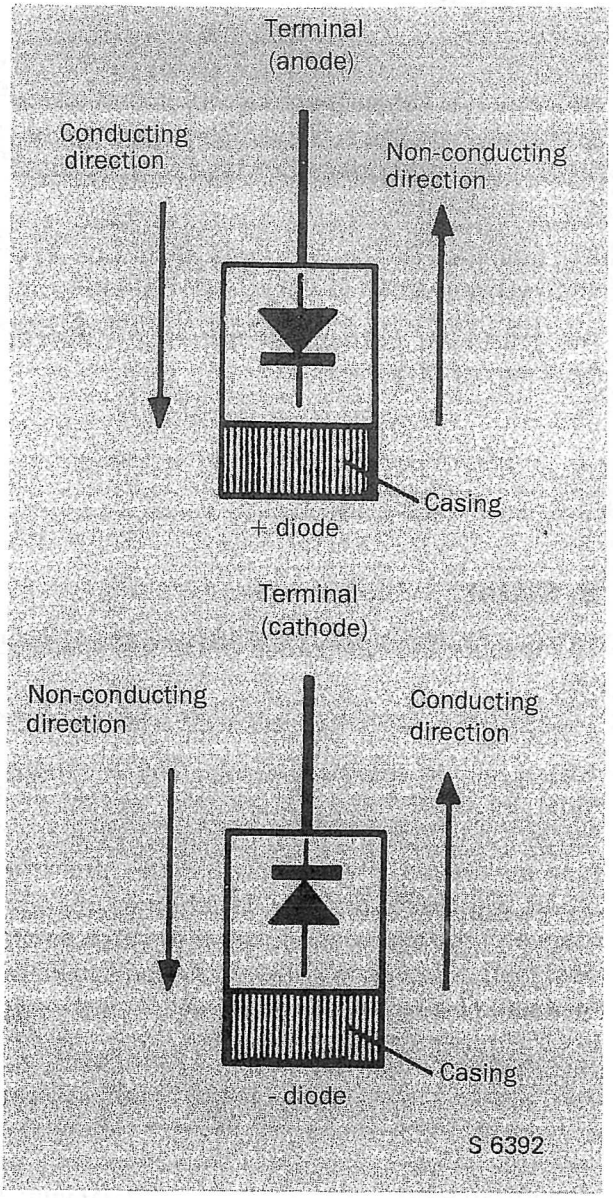
Testing the rectifiers

Use a test lamp (up to 40 V d.c.) or an ohmmeter.

The phase terminals must be disconnected before testing the conducting and non-conducting directions of the silicon rectifiers, as it is otherwise impossible to tell which diode is defective.

The positive diodes, located between terminal B+ and phase, conduct from the terminal to the casing, but not from the casing to the terminal. The negative diodes, connected between phase and B-(reverse polarity), conduct from the casing to the terminal, but not from the terminal to the casing (see illustration).

To test, connect the test lamp in series with the diode to be tested. The test lamp should light up when B+ is connected to the anode of a diode with normal polarity. The lamp should not light up when B+ is connected to the casing. If the diode has reverse polarity, the lamp should light up when B+ is connected to the terminal (cathode), but not when the direction of the current is reversed. A diode may become damaged so that it unable to conduct current in the direction of conduction. This is caused by overheating, i.e. excessive current. A diode that conducts current in both directions has probably been subjected to excessive voltage.



Testing with an ohmmeter

The rectifiers can also be checked with an ohmmeter. If the rectifier is in good condition, the resistance reading should be low (a few ohms) in the direction of conduction, but much greater (several kiloohms) in the non-conducting direction.

D. To check the brush-holder and connections (brush-holder or rotor removed)

1 Check that the brushes move freely in the holder.

2 Check the wear on the brushes. The brushes should project at least 5 mm (0.2 in) from the holder when the holder is fitted.

3 Check that the brushes are well insulated from each other. Measure the resistance between the brushes.

4 Check that the contact between each brush and the "-" or DF terminal is good.

E. Insulation test on assembled alternator

After the alternator has been dismantled and reassembled, check the insulation between terminal B+ and earth by means of an insulation tester.

Fault-tracing

Alternator not charging

Possible causes:

a Alternator drive belt slack
b Charging circuit and/or earth circuit open
c Brushes defective
d Short-circuit in diode
e Excitation circuit open
f Voltage regulator defective
g Rotor winding open
h Stator earthing
i Earth connection of excitation diode unit open or short-circuited

Insufficient or irregular output current

Possible causes:

a Alternator drive belt slack
b Irregular breaking in charging circuit
c Brushes worn
d Voltage regulator defective
e Rectifier diode open or short-circuited
f Rotor partially short-circuited
g Stator connection to earth broken or partially short-circuited

Current too high

Possible causes:

a Voltage regulator defective
b Poor contact between regulator and alternator

Alternator noisy

Possible causes:

a Alternator drive belt very worn
b Pulley incorrectly fitted
c Alternator and crankshaft pulleys misaligned
d Bearings worn or defective
e Rectifier diode short-circuited
f Alternator mountings loose

Starter motor

Principle of operation

The starter motor turns the engine flywheel by means of a pinion which drives a ring gear. When the ignition switch is turned to the start position, a solenoid moves the axially movable pinion into engagement with the ring gear. The solenoid then closes the main contacts and current is supplied to the starter motor.

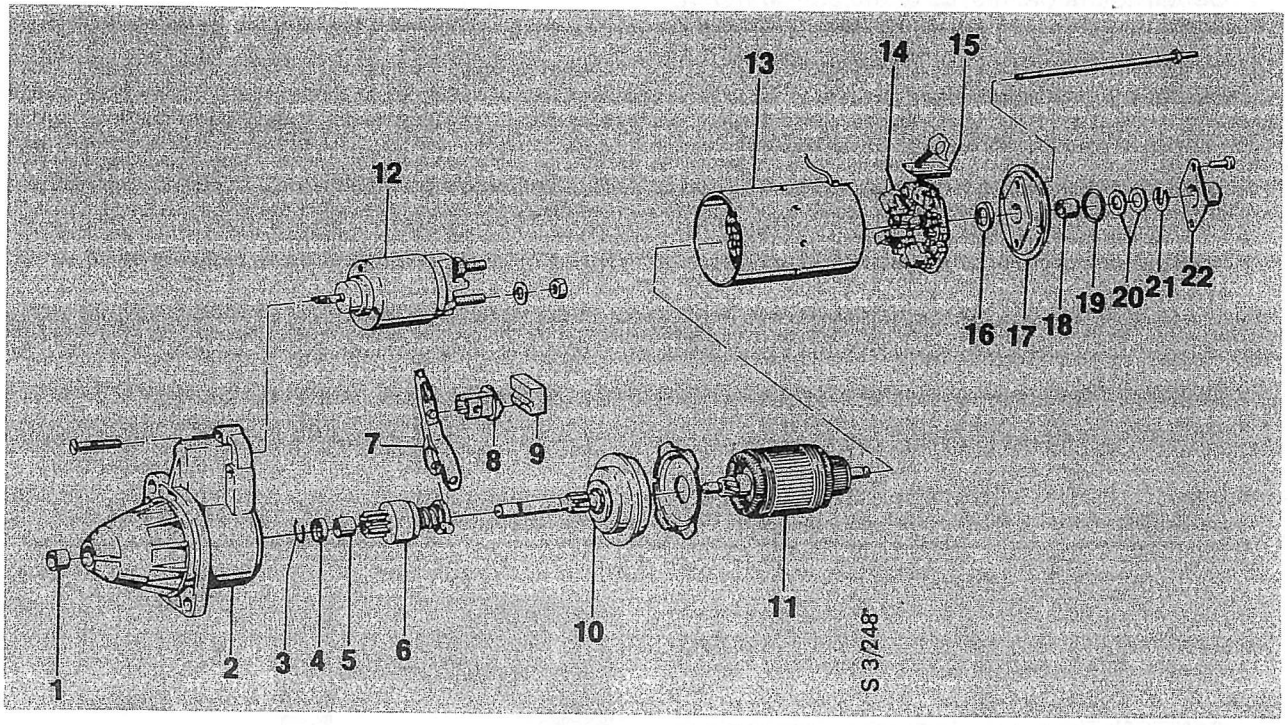
When the engine has started, the flywheel speed will gradually exceed that of the starter motor. This causes the free-wheel to disengage the starter pinion from its shaft, but the pinion remains in engagement with the ring gear as long as the solenoid is energised via the ignition switch.

When the ignition key is released, the supply circuit to the solenoid will be opened and a spring will return the pinion to its rest position.

The starter motor of the Saab 900 is equipped with planetary gears. Compared with conventional types, this starter motor is lighter, more compact and can run at a higher speed.

The starter motor is located on the intake side of the engine.

To remove



1 Drive end bush
2 Pinion bracket assembly
3 Circlip
4 Stop ring
5 Pinion-end bush
6 Starter pinion
7 Pinion-engaging lever
8 Bearing bracket
9 Seal
10 Planetary gear train
11 Armature
12 Solenoid
13 Stator frame
14 Brush-holder assembly
15 Seal
16 Seal
17 Commutator end bracket
18 Commutator end bush
19 Seal
20 Shims
21 Spring washer
22 End cover

1 Disconnect the negative (-) battery cable.

2 Disconnect the electric cables from the starter motor.

3 Remove the two starter motor securing bolts.

4 Move the starter motor towards the rear of the car until it is clear, and then lift it out of the engine compartment.

To dismantle

1 Disconnect the supply cable from the solenoid.

2 Remove the solenoid securing screws.

3 Unhook and remove the solenoid.

4 Remove the two end-cover retaining screws.

5 Remove the end cover, spring washer, shim, seal and bush (items 18-22).

6 Remove the commutator end bracket screws.

7 Separate the two halves of the starter motor by pulling the stator frame complete with armature and brush-holder assembly off the planetary gear housing.

8 Remove the commutator end bracket and seal (items 16-17).

9 Withdraw the armature and brush-holder assembly through the rear of the starter motor stator frame.

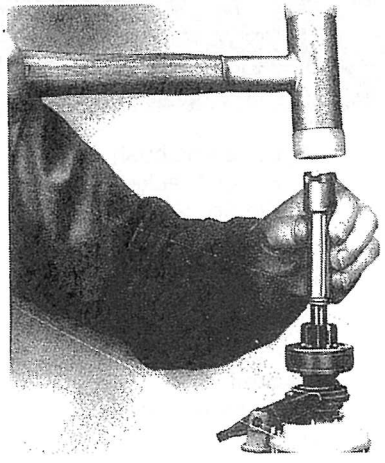
10 Pull the brush-holder assembly off the armature.

11 Remove the bearing bracket seal.

12 Withdraw the planetary gear train, the pinion-engaging lever and the pinion from the pinion bracket assembly. Remove the cover from the annulus.

13 Use a short length of tube against the pinion to drive down the stop ring.

CAUTION: The plastic legs of the annulus are fragile - treat them with great care.



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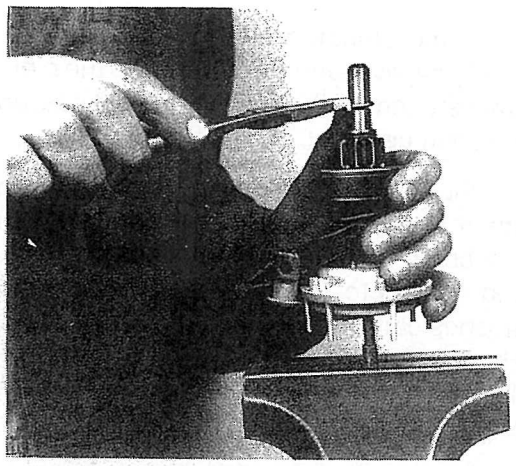
14 Use circlip pliers to remove the circlip, and pull off the pinion.



S 3226

15 Remove the circlip and washer from the annulus and withdraw the planetary gears from the housing.

16 Inspect the helix on the armature shaft for the starter pinion, and file off any burrs.

Check the ring gear, starter pinion, planetary gear pinion and bushes.

Note:
Inspect all parts carefully. Repair or replace any that are damaged. Soak the bushes in warm oil before fitting them.

To assemble

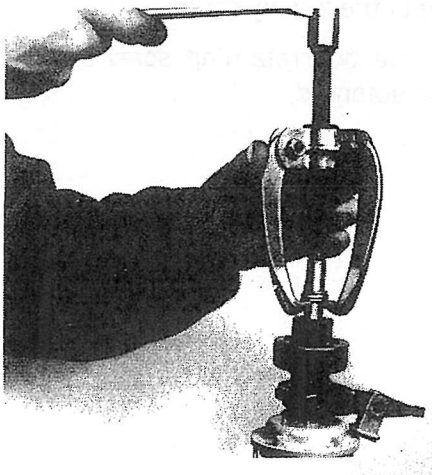
1 Insert the planetary gears into the annulus and fit the washer and circlip.

2 Lubricate the helix and the engagement ring for the starter motor pinion with silicone grease.

3 Slide the starter pinion, stop ring and circlip onto the shaft.

4 Use circlip pliers to fit the circlip into its groove on the armature shaft.

5 Slide the stop ring up against the circlip in a press or by means of a jaw extractor.



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6 Insert the planetary gear train, the pinion-engaging lever and the pinion into the pinion bracket, and fit the bearing bracket seal and the annulus cover.

7 Fit the brush-holder assembly onto the armature shaft. The easiest way is to slide the brush plate without the brush holder part-way onto the armature shaft. The brushes can then be properly centred, after which the brush holders and springs can be fitted over the brushes and guided into their proper positions.

8 Fit the armature and brush holders into the starter motor stator frame.

9 Assemble the starter motor stator frame and pinion assembly, mount the commutator end bracket, and fit the long through-bolts.

NOTE: Before fitting the commutator end bracket, make sure that the seal between the bracket and the armature is in good condition and that it has been fitted correctly.

10 Fit the seal, shim, spring washer and end cover.

11 Check the end float of the armature shaft, which should be between 0.05 and 0.40 mm (0.002 - 0.016 in). Correct with shims as necessary.

12 Hook the solenoid on the pinion-engaging lever and tighten the screws.

13 Connect the supply cable.

14 Test the starter motor.

Solenoid (starter removed from car)

To remove

1 Disconnect the supply cable.

2 Remove the two retaining screws and remove the solenoid.

To fit

1 Hook the solenoid on the pinion-engaging lever and tighten the screws.

2 Connect the supply cable.

3 Test the starter motor.

Brush-holder assembly (starter removed from car)

To remove

1 Remove the two screws retaining the end cover.

2 Remove the end cover, spring washer, shim and seal.

3 Remove the commutator end bracket screws.

4 Remove the commutator end bracket.

5 Withdraw the armature and brush-holder assembly through the rear of the starter motor stator frame.

6 Remove the brush-holder assembly from the armature.

To fit

1 Fit the brush-holder assembly onto the armature shaft. The easiest way is to slide the brush plate without the brush holder part-way onto the armature shaft. The brushes can then be properly centred, after which the brush holders and springs can be fitted over the brushes and guided into their proper positions.

2 Fit the armature and brush holders into the starter motor stator frame.

3 Fit the commutator end bracket and the long through-bolts.

NOTE: Before fitting the commutator end bracket, make sure that the seal between the bracket and the armature is in good condition and that it has been fitted correctly.

4 Fit the seal, shim and spring washer.

5 Fit the end cover and tighten the screws.

6 Fit the bearing bracket and tighten the screws.

7 Test the starter motor.

Starter pinion (starter removed from car)

To remove

1 Disconnect the supply cable from the solenoid.

2 Remove the securing screws for the solenoid.

3 Unhook and remove the solenoid.

4 Remove the bearing bracket seal.

5 Remove the commutator end bracket securing screws.

6 Pull off the pinion assembly and withdraw the planetary gear train, the pinion-engaging lever and the pinion from the pinion bracket.

7 Press the stop ring down against the pinion.

NOTE: The plastic legs of the annulus are fragile - treat them with great care.

8 Use circlip pliers to remove the circlip.

9 Remove the stop ring and pinion.

10 Inspect the helix on the armature shaft for the starter pinion, and file off any burrs.

To fit

1 Lubricate the helix on the armature shaft and the engaging ring with silicone grease.

2 Slide the starter pinion and stop ring onto the armature shaft.

3 Use circlip pliers to fit the circlip into its groove on the armature shaft.

4 Slide the stop ring up against the circlip by means of a jaw extractor.

5 Insert the planetary gear train, the pinion-engaging lever and the pinion into the pinion bracket and fit the bearing bracket seal and annulus cover.

6 Fit and tighten the commutator end bracket through-bolts.

7 Hook the solenoid onto the pinion-engaging lever and tighten the screws.

8 Connect the supply cable.

9 Test the starter motor.

Inspection

External inspection

Inspect the following items with the starter motor removed from the car but not dismantled:

- Check that the stop ring for the starter pinion has been fitted correctly and securely. The distance between the stop ring and the starter-motor mounting face should be between 31.3 and 32.6 mm (1.22 - 1.27 in).
- There is risk of short-circuiting between the braided cable from the solenoid to the brush-holder assembly and earth. Make sure that the cable is well clear of the starter motor stator frame and remove any dirt deposits.
- Make sure that all seals are in good condition and have been fitted correctly.

Armature end float

To check the end float of the armature shaft, remove the end cover and measure the float of the shaft.

The end float should be between 0.05 and 0.40 mm (0.002 - 0.016 in). To adjust the end float, fit new shims under the rear end cover.

Tightening torques

Supply cable/solenoid connection 7-9 Nm (5.2-6.7 lbf ft)

Solenoid securing bolts 4.5-5.5 Nm (3.3-4.1 lbf ft)

Through-bolts in commutator end bracket 2.7-3.5 Nm (2.0-2.6 lbf ft)

Ignition system

Principle of operation

The Saab 900 is fitted with a breakerless ignition system incorporating a Hall sensor.

Instead of mechanical contact-breaker points, the distributor incorporates a semiconductor transducer (Hall sensor) and a slotted rotor.

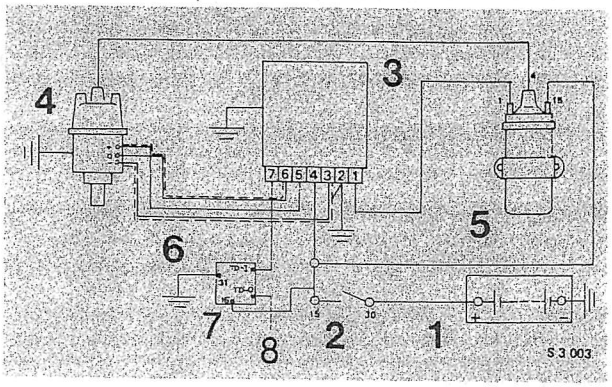
The Hall sensor is connected to an amplifier. The amplifier amplifies and converts the signal from the sensor. This signal is then used to control the charging and discharging of the ignition coil.

Caution

The electronic ignition system has an ignition voltage of over 30 000 V and is within the power range that may be lethal to sensitive persons, such as those who have a pacemaker.

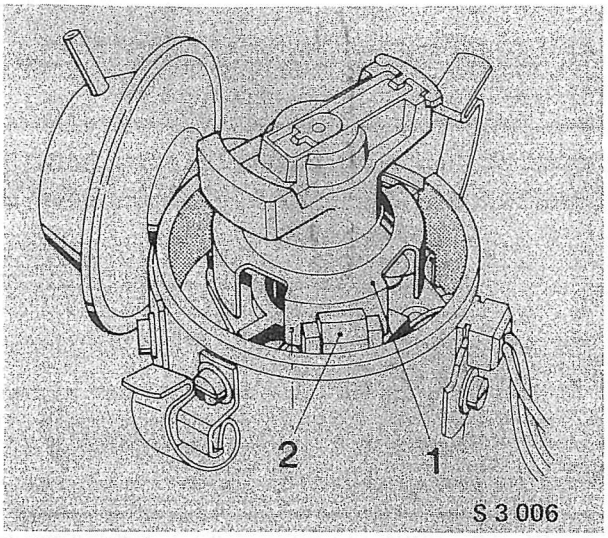
Distributor

The distributor is located on the camshaft cover and incorporates a slotted rotor, which rotates with the distributor shaft, and a Hall sensor fitted to a plate inside the distributor. The sensor consists of a semiconductor element and a magnet which acts on the semiconductor. The slotted rotor alternately interrupts and releases the magnetic field, thereby determining the ignition timing.



1 Battery
2 Ignition switch
3 Amplifier
4 Distributor
5 Ignition coil
6 Shielded cable
7 Ignition pulse amplifier
8 Ignition pulse output

Note:
The Hall sensor and the rotor cannot be removed separately. If the sensor unit is suspected of being defective, the entire distributor must be replaced.



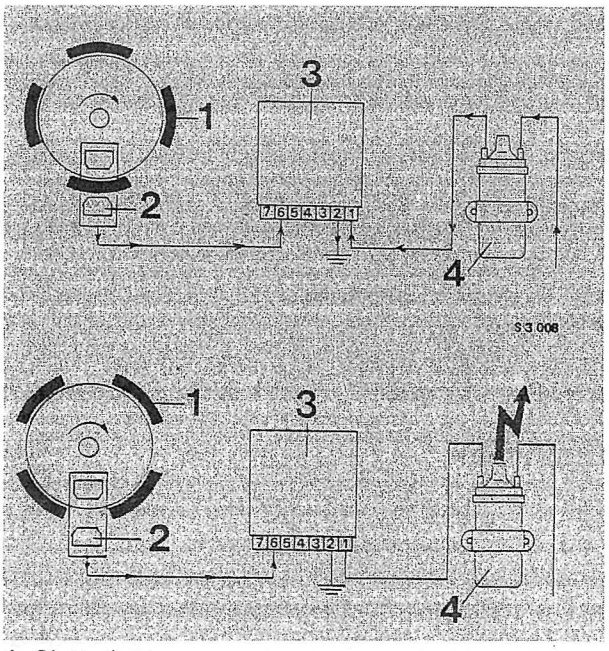
1 Slotted rotor
2 Hall sensor

Charging the ignition coil

The slotted rotor breaks the magnetic field. No voltage is generated in the Hall sensor. The amplifier is energised, the primary circuit is closed and the primary winding charges the ignition coil.

Firing instant

The slot in the rotor is in line with the Hall sensor. The voltage generated in the sensor is sensed by the amplifier, which breaks the primary circuit. The spark-firing voltage is now induced in the secondary winding of the coil.



1 Slotted rotor
2 Hall sensor
3 Amplifier
4 Ignition coil

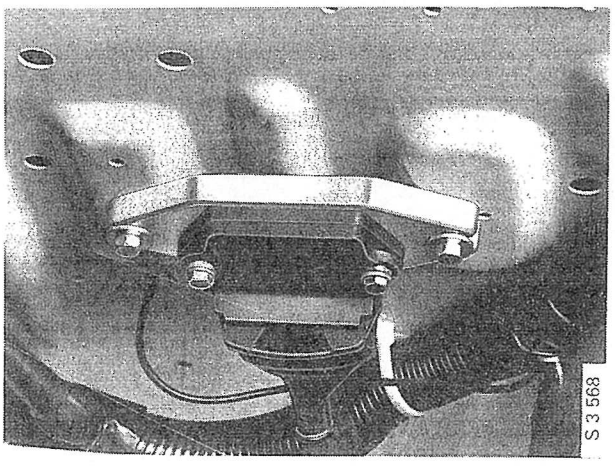
Amplifier

The amplifier is mounted on a cooling plate, forward of the left-hand wheel housing.

The amplifier amplifies and converts the pulse from the distributor. The amplified and converted pulse is then used to control the charging and discharging of the coil.

The amplifier also monitors and controls the dwell angle.

The use of hybrid technology in the design of the module has made it possible to produce an extremely compact amplifier.

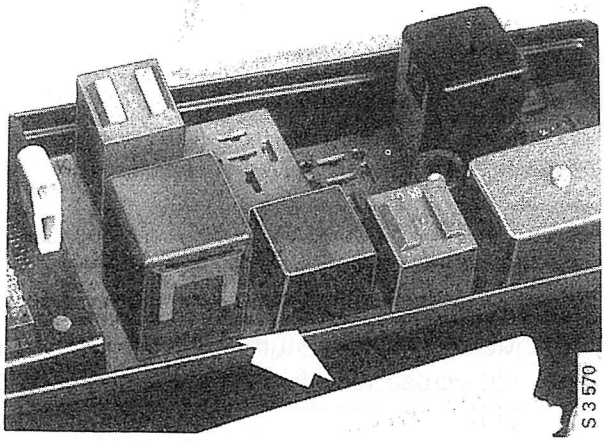


Ignition pulse amplifier

The ignition system is equipped with an ignition pulse amplifier (not included on cars without tachometer), to provide more reliable control of the electronic components affected by the ignition (the APC and LH systems), and to reduce the radio interference.

The ignition pulse amplifier is located in the electrical distribution box, in position D.

The wiring diagram for the ignition pulse amplifier can be found in the Service Manual, Group 3:2.



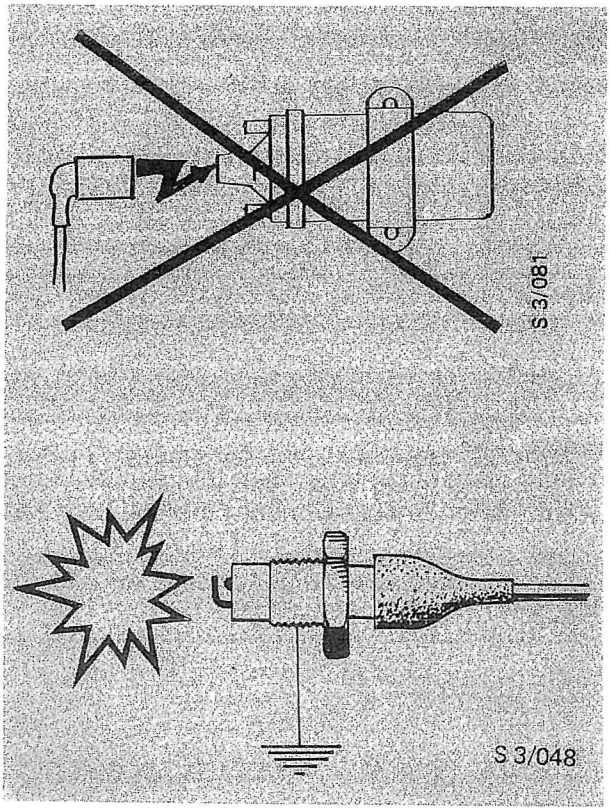
Caution

Because of the damage that may result from flashover at the ignition coil, HT leads, distributor and the amplifier, the following must be observed:

- Never disconnect an HT lead when the engine is running.
- Never attempt to start the engine if any HT lead has been disconnected or if the distributor cap has been removed.
- Before carrying out a compression test or the like, always disconnect the amplifier.

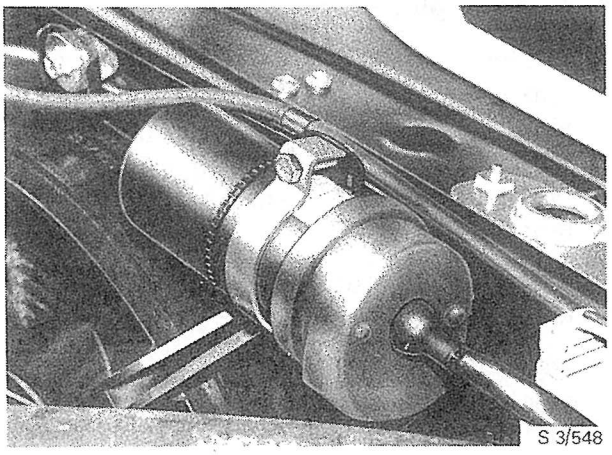
To check the ignition spark, proceed as follows:

- Unscrew the spark plug or use a separate plug.
- Connect the HT lead to the plug.
- Hold the plug against the engine so that it is well earthed.
- Check the spark.



Ignition coil

The ignition coil is mounted on the radiator fan housing.



To check the ignition coil

1 Disconnect the leads.

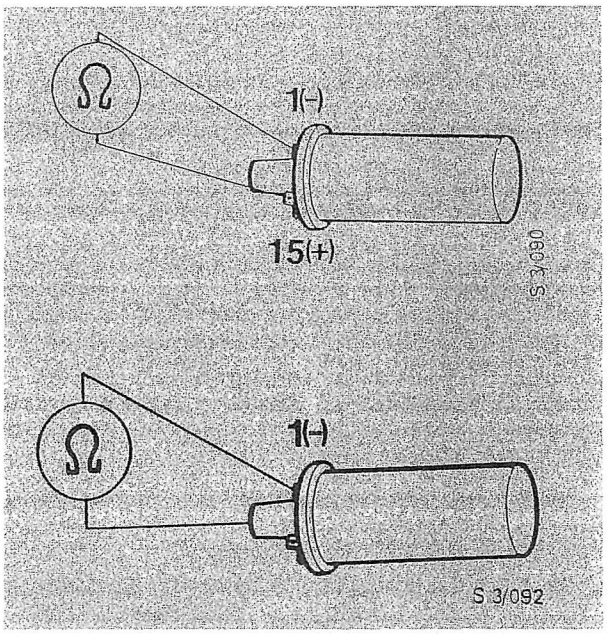
2 Measure the resistance in the primary winding across terminal 1 (-) and terminal 15 (+).

The resistance should be 0.52 - 0.76 ohm.

3 Measure the resistance in the secondary winding across terminal 1 (-) and the HT terminal.

The resistance should be 7.2 - 8.2 kohm.

4 Measure the performance of the coil either in volts or by measuring the length of the spark.



Note:
Faults often occur only when the ignition coil is warm. When in doubt, mount the coil on a test bench and leave it switched on under load for about half an hour. The coil should still operate perfectly after this time.

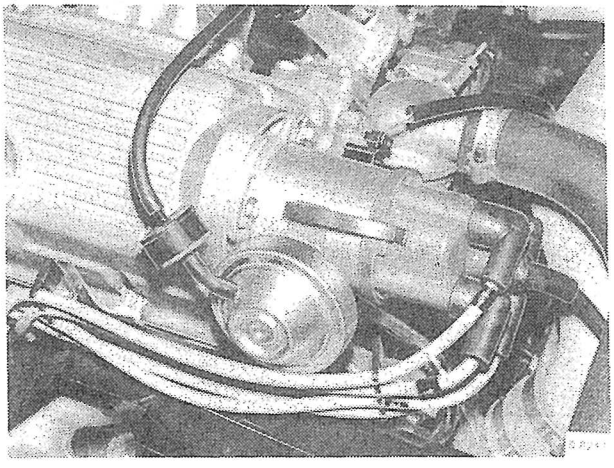
Distributor

The distributor has a centrifugal control and a vacuum control.

The centrifugal control regulates the timing in relation to the engine speed, and the vacuum control regulates it in relation to the engine load.

On Turbo engines, the distributor has a double-acting vacuum timing control. The additional function operates when the turbocharger is boosting the intake air pressure.

The timing is then retarded to prevent knocking.



Replacement of components

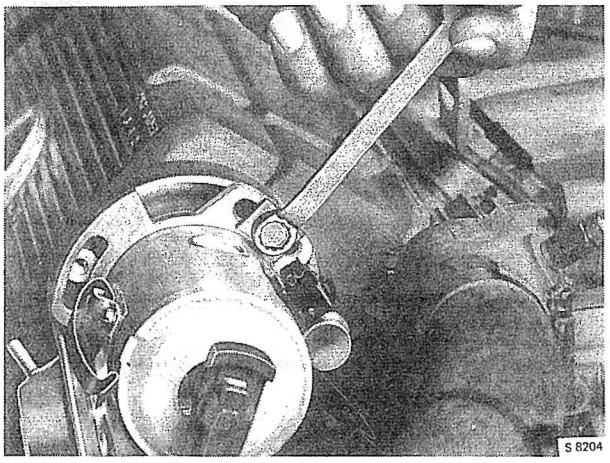
Distributor

1 Remove the distributor cap.

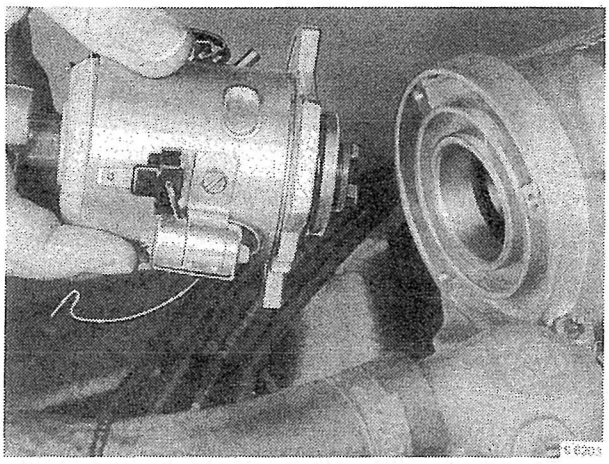
2 Disconnect the low-tension lead from the distributor.

3 Disconnect the vacuum hose.

4 Remove the three retaining bolts from the distributor.

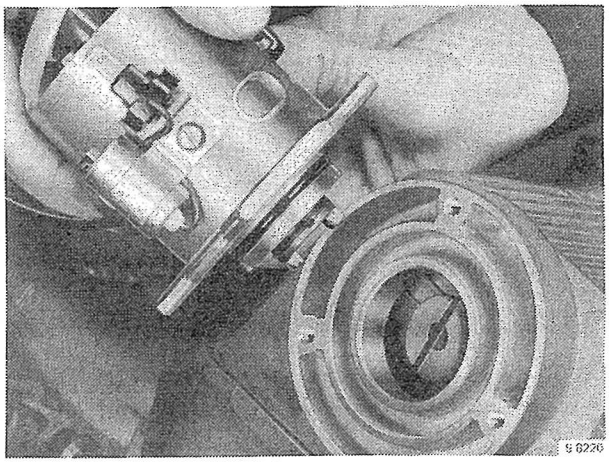


5 Withdraw the distributor from the camshaft cover.



To refit

1 Rotate the distributor shaft until the drive dog engages in the slot in the camshaft (the slot is offset).



2 Press the distributor into position and fit the retaining bolts.

3 Connect the low-tension lead and refit the distributor cap.

4 Adjust the ignition timing.

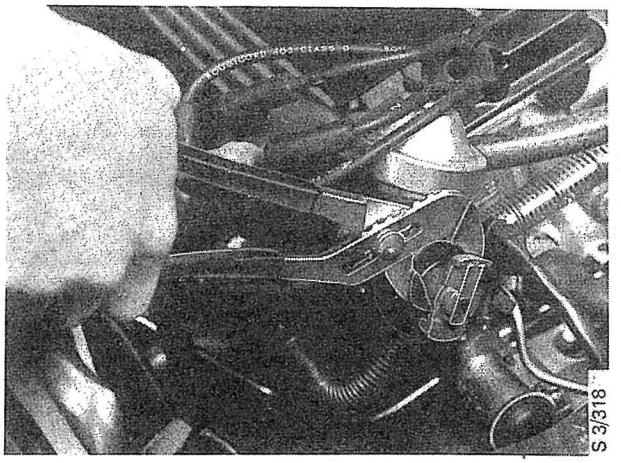
5 Tighten the retaining bolts and connect the vacuum hose.

6 Adjust the idling speed.

Rotor

1 Remove the distributor cap.

2 To remove the rotor, crush it with a pair of sturdy pliers.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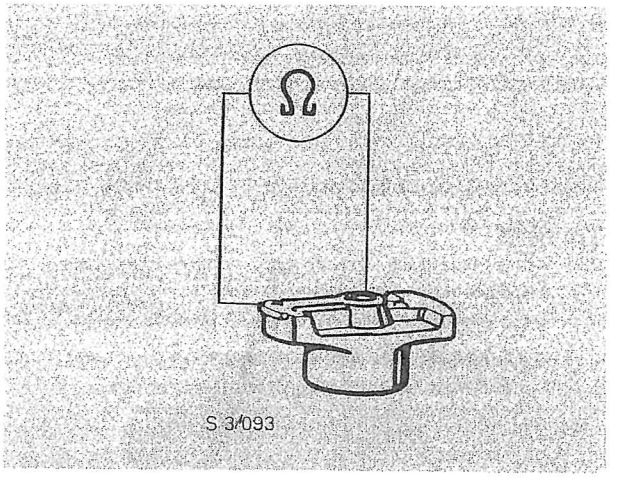
Note:
Make sure that no fragments of the crushed rotor get into the distributor.

Note:
When a new rotor is fitted, it must be locked to the distributor shaft by means of Loctite 601 or the equivalent locking compound.

To check the rotor arm and HT leads

The rotor should have a resistance of 1 kohm.



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The HT leads and connections should have the following resistance values:

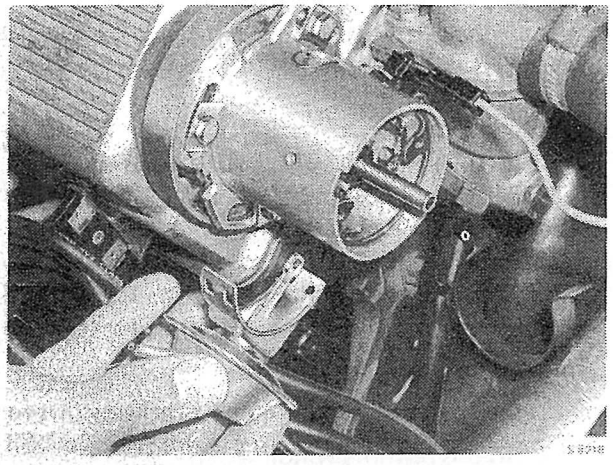
- Lead between ignition coil and distributor: 0.5 - 1.5 kohm
- Lead between distributor and spark plug: 2 - 4 kohm.

Vacuum control unit

1 Remove the distributor cap.

2 Disconnect the vacuum hose and remove the screws securing the vacuum control unit.

3 Unhook the vacuum control unit.



To refit

1 Rotate the Hall sensor clockwise until it butts against its stop.

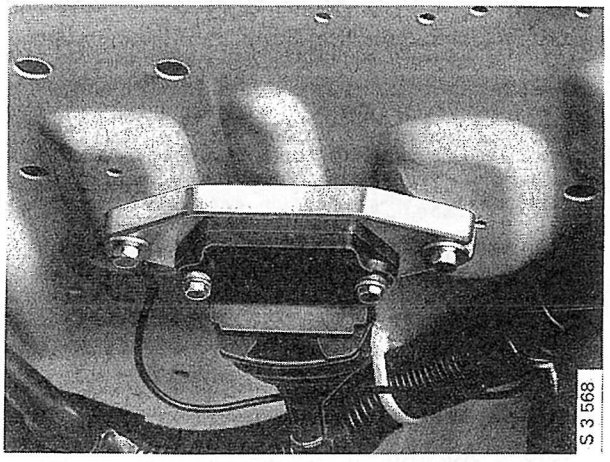
2 Hook the vacuum control unit on the pin.

3 Fit the retaining screws.

4 Fit the dust cover, rotor, distributor cap and vacuum hose.

Amplifier

The amplifier components cannot be replaced. Should a component become defective, the entire unit must be replaced.



Testing the distributor on a test bench

Test in accordance with the instructions for the test equipment. The test values should agree with those specified in the timing curves, Section 023 "Technical data".

Note:
The distributor rotates at half the engine speed.

Bear the following in mind when carrying out work on the electronic ignition system:

1 Because of the high ignition energy, dangerously high voltages may also occur in the primary circuit (terminal 1) of the ignition coil and in the associated cables (including the tachometer connection, the TSI socket and the amplifier connection) when the engine is running.

2 When the ignition is switched on, the current in the primary winding of the ignition coil will always be at maximum. When working on the electrical system with the ignition switched on, disconnect terminal 1 (-) of the ignition coil.

3 When carrying out work on the shielded pulse lead between the pulse winding of the distributor and the control unit, take extreme care not to reverse the polarity. If the polarity is reversed, it will be impossible to achieve a stable basic ignition setting, and the ignition timing sequence will be different.

Fault tracing in the electronic ignition system

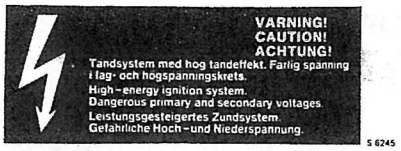
The fault-tracing procedure should be followed step by step, and the necessary checks and action should be taken. If a component is found to be faulty, it should be exchanged before the next step is started.

If, for instance, a fault tends to occur at certain temperatures, always try to trace the fault within this temperature range. Thus, if starting problems occur when the engine is cold, try to trace the fault when the engine is cold. A defective electronic component often performs correctly at normal temperatures before it breaks down completely. Poor contact is also affected by temperature.

Fault-tracing chart

Conditions for testing

Battery fully-charged, fuel in tank, engine and ambient temperatures 32 - 104°F (0 - 40°C). (The temperature has a considerable effect on the values recorded.)



The starter motor turns, but the engine does not fire or starts but has poor drivability.

yes

Check the spark at a gap of 12 mm.*

Ignition spark at 12 mm?*

no → Check the HT part of ignition system: Spark plugs, distributor arm, distributor cap, HT leads and connections.

Ignition spark at 12 mm?*

yes

yes

Check the ignition timing.

Is the ignition timing correct?

no → Adjust the ignition timing.

yes

Check the fuel system.

Is the fuel supply to the engine sufficient?

no → Repair the fuel system.

yes

Rotate the amplifier, which turns on the earthed bolt, so that the plug on the side is visible. Pull back the rubber dust cover on the amplifier plug, but don't disconnect the plug. Connect a voltmeter between terminals 4 and 2, switch on the ignition and measure the voltage, which should be the same as the battery voltage.

Correct voltage reading?

no → Check the wiring from the ignition switch to the amplifier.

Rectify the fault.

yes

Check the ignition coil resistance. Primary winding (15 and 1): 0.52 - 0.76 ohm. Secondary winding (4 and 1): 7.2 - 8.2 kohm.

Correct resistance readings?

no → Fit a new ignition coil.

yes

Disconnect the connector from the distributor. Connect a voltmeter between coil terminals 15 and 1. Switch on the ignition. The voltage reading should drop from about 6 V to 0 V in 1 - 2 seconds.

Correct voltage reading?

no → Fit a new amplifier.

yes

The engine should now start.

Rotate the amplifier and pull back the rubber dust cover from the plug, but don't disconnect the plug. Connect a voltmeter between terminals 4 and 2 and measure the voltage, which should be the same as the battery voltage.

Correct voltage reading?

no → Check the wiring from the ignition switch to the amplifier.

Rectify the fault.

yes

Disconnect the connector from the distributor. Measure the voltage between terminals "+" and "-". It should be the same as the battery voltage.

Correct voltage reading?

no → First determine whether the wiring between the amplifier and the distributor is in good condition. If it is, fit a new amplifier.

yes

Connect a voltmeter between terminals 6 and 3 of the amplifier, but don't remove the plug. Remove the distributor cap and dust cover. Run the starter motor briefly until the slot of the slotted rotor is in the air gap at the Hall sensor. Leave the ignition switched on. The voltage reading should be 0.4 V or less.

Correct voltage reading?

no → Hall sensor faulty. A new distributor must be fitted.

yes

Repeat the above until the slotted rotor closes the gap at the Hall sensor. The voltage reading should now be 5.0 V or more.

Correct voltage reading?

no → Hall sensor faulty. A new distributor must be fitted.

yes

* Concerns the special spark tester. When checking with a separate spark plug, the electrode gap should be about 4 mm (0.16 in).

Breakerless ignition system with knock sensor (EZK)

General

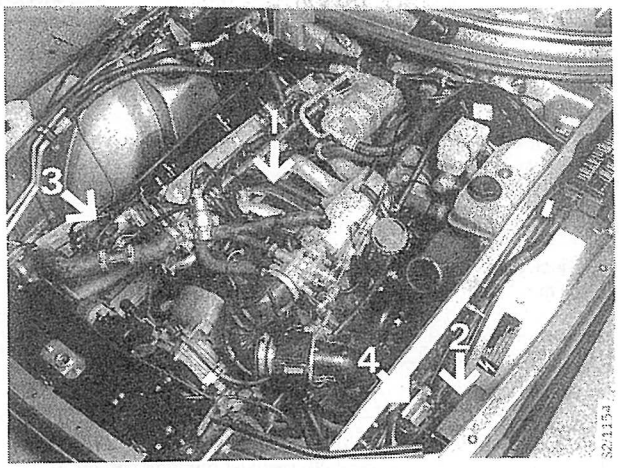
Due to the variations in the fuel quality and the environmental demands, the octane rating may vary widely from one country to the next.

A fuel system incorporating a knock sensor enables the special properties of a given fuel to be utilised to achieve optimum performance and minimised fuel consumption. Knocking will occur when the engine load is high and if the fuel is of poor quality (e.g. with a low octane rating).

Knocking is the result of pre-ignition of the fuel/air mixture and may cause serious damage to the engine if it persists. In addition to the audible knocking occurring when the engine is temporarily overloaded, high-speed knocking which is inaudible to the human ear may also occur. It is this type of knocking which is most detrimental to the engine.

In order to avoid engine damage under such conditions, manufacturers have been obliged to allow generous margins to take into account the variations in fuel quality. As a result, the engine is unable to convert all of the energy in the fuel into propulsion power, and much of the energy is wasted as heat losses.

Note:
Even if a control system incorporating a knock sensor is used, the knocking occurring during normal running of the engine cannot possibly be eliminated. But this knocking is harmless to the engine.



1 Knock sensor
2 Control unit
3 Distributor
4 Amplifier

The ignition system adjusts its timing to suit the load, the engine speed and any knocking tendencies detected.

Since the spark is always fired at the correct instant, the engine performance will always be a maximum, regardless of the fuel grade used at any particular time. This reduces the fuel consumption and minimises the pollutants in the exhaust gases.

Principle of operation

A knock sensor detects any knocking tendencies in the engine and applies a signal to the electronic control unit, which will then automatically adjust the ignition timing in accordance with the programmed parameters, and the engine load and speed input signals received.

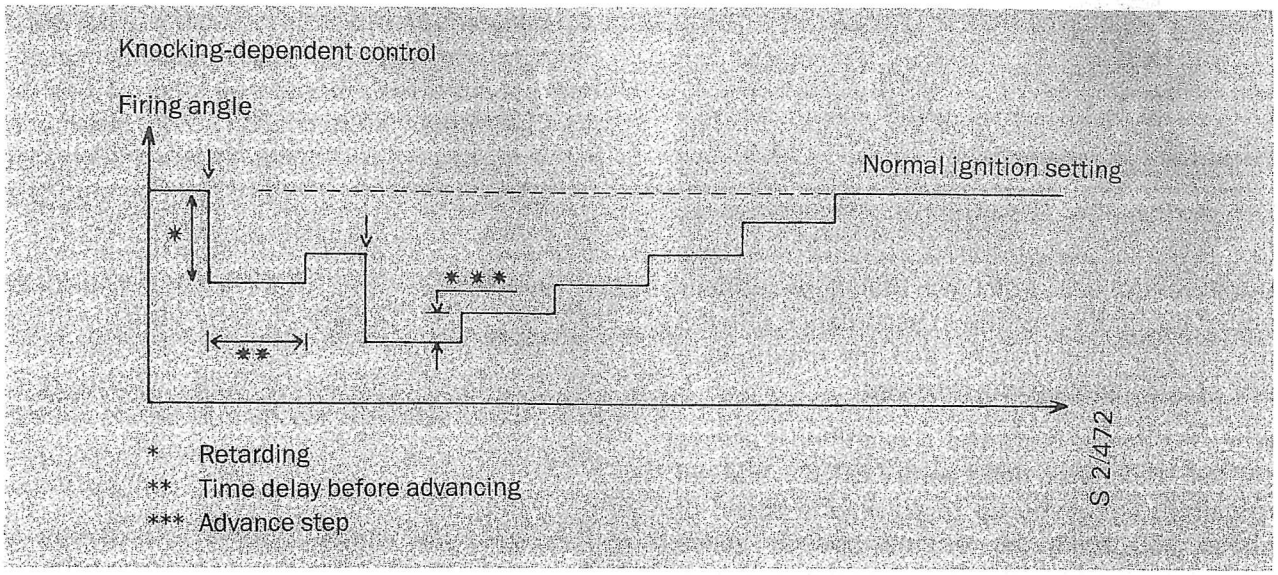
When the engine is started, the ignition is always set to 5° before top dead centre (BTDC), and will remain at this value up to an engine speed of about 700 r/min. At engine speeds above 700 r/min, the system will automatically adjust the ignition timing in accordance with the data programmed into the memory of the electronic control unit. The ignition timing is set to suit the engine load, the engine speed and any knocking tendencies, and is varied between 5° and 22° BTDC.

The knocking-related ignition timing is controlled individually on each of the cylinders. The ignition timing may thus vary from one cylinder to the next.

On the other hand, the load-dependent timing is the same for all cylinders.

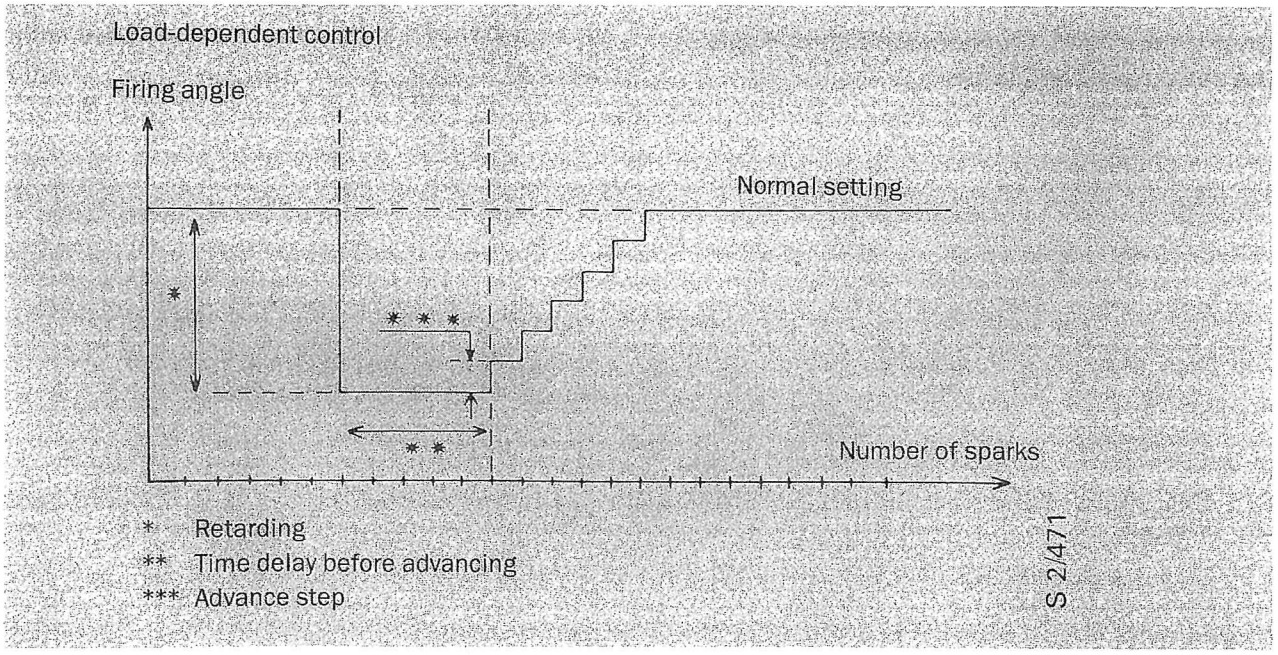
Knocking-dependent control

When knocking is detected in one cylinder, the ignition for that particular cylinder will be retarded in steps of about 3° until knocking has ceased or until the ignition has been retarded by a total of 13°. The ignition timing will revert to normal in steps of 0.35° per speed-dependent period.



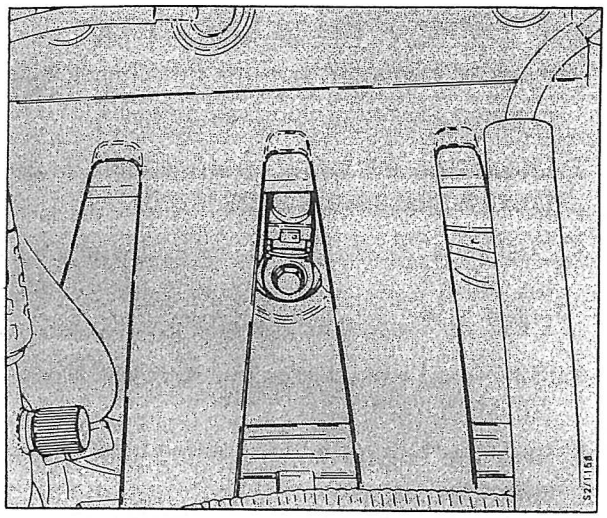
Load-dependent control

If an engine load change should exceed the predetermined value stored in the memory of the electronic control unit, the ignition will be retarded by about 6° on all cylinders simultaneously. When the load has ceased to increase, the ignition will be advanced back to the normal timing in steps of around 1°.



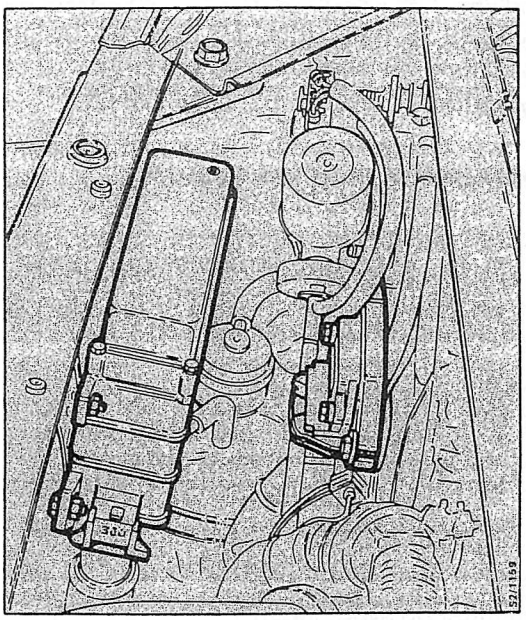
Knock sensor

The knock sensor records any knocking occurring in the engine, converts the resulting vibrations into electrical signals and transmits them to the electronic control unit. The knock sensor is located on the left-hand side of the engine block, below the intake manifold.



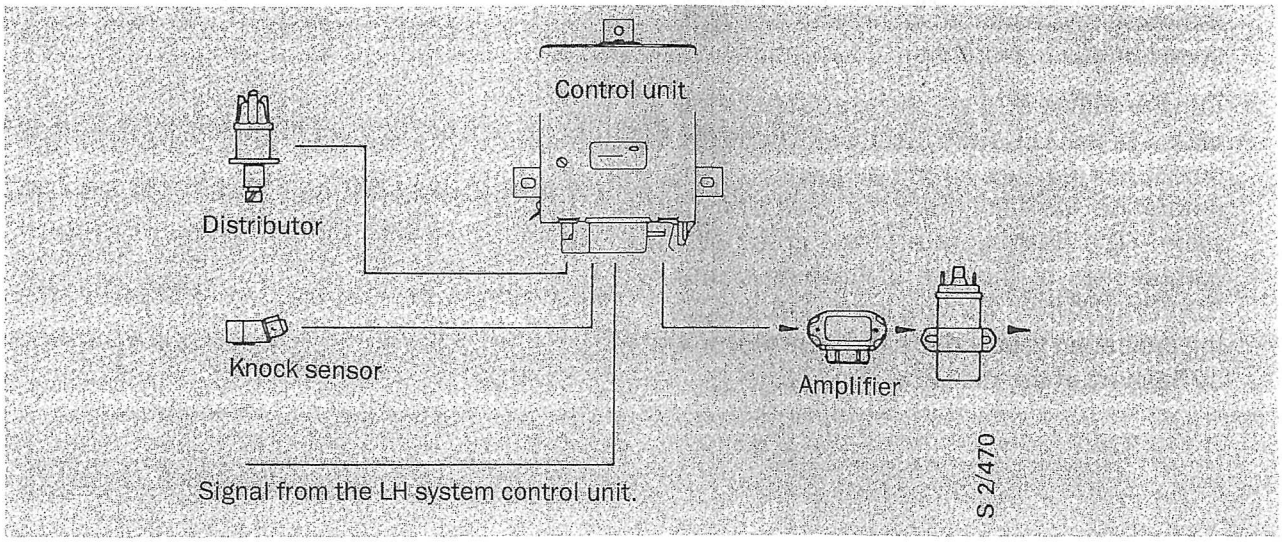
Electronic control unit

The electronic control unit receives signals from the knock sensor, the control unit of the LH system and the Hall sensor in the distributor. The signals are analysed in the electronic control unit and are compared with the information stored in its memory. The control unit then resets the ignition timing by transmitting signals to the ignition system, which opens the primary circuit of the coil and triggers the ignition spark.



Distributor

The distributor is equipped with a Hall sensor and has no centrifugal or vacuum advance mechanism.



Basic setting of the ignition timing

1 Start the engine and run it until it has reached normal working temperature.

2 Check that the idling speed is 850 ± 50 r/min. Adjust as necessary.

3 Check that the throttle switch is closed when the throttle is in the idling position and check that the switch is correctly adjusted.

4 Check that the ignition timing is 14° BTDC. Adjust as necessary.

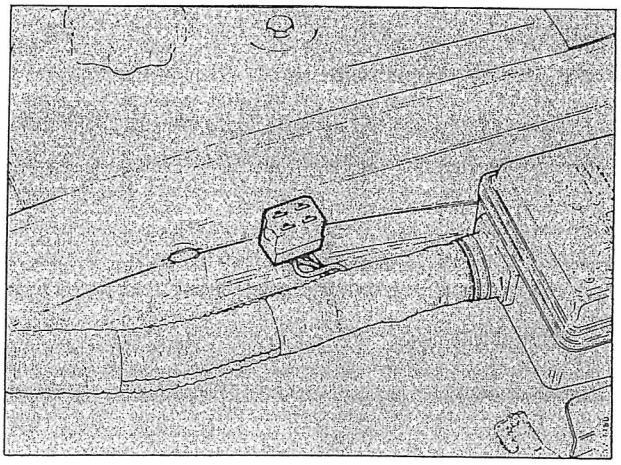
5 Stop the engine if the ignition timing deviates by 7° or more.

6 Restart the engine, let it run at idling speed and check the ignition timing again. If it still deviates by more than 7°, refer to the instructions for checking the performance of the ignition system with knock sensor.

Functional check of the system

(This check should be carried out only if malfunction is suspected, if the engine performance is poor, in the event of rough running, and when adjusting the ignition timing.)

The system incorporates a self-diagnostic function. If this is used for the functional check, a test unit with LEDs must be connected to the test socket, located forward of the electrical distribution box.



1 Connect test unit 83 94 058. Note: The ignition must be switched off.

2 Switch on the ignition and start the engine. Check that the fault indication LED (green) is alight for about 2 seconds while the starter motor is running.

3 Run the engine until it has reached normal operating temperature. At some time during the warming-up period, increase the engine speed briefly to more than 2 300 r/min.

4 Run the engine at idling speed and check the LEDs. If the LEDs are flashing, count the number of flashes in one sequence. Then determine the fault from the fault-tracing table. (The flashing rate of the green LED corresponds to the rate of flashing of the "CHECK ENGINE" warning lamp. But knocking indication is provided only in the test unit by flashing of the red LED.)

Number of flashes			
Green	Red	Fault	Action
1	-	Not applicable	
2	-	Not applicable	
3	-	Not applicable	
4	-	A. Knock sensor and cable	Use an ohmmeter to check the shielded cable between the knock sensor and the electronic control unit. Connect the test lead of the ohmmeter to terminals 12 and 13 of the control unit connector. Note: Viewed from the cable side. If the circuit is in good condition, fit a new cable. If not, connect a jumper across the terminals of the knock sensor. Note: Pull back the rubber cover and connect the jumper on the cable side. Measure between terminals 12 and 13 of the control unit connector. Fit a new cable if the circuit is open. If the circuit is not open, fit a new knock sensor.
	-	B. Inside the control unit	Fit a new control unit
5	-	Incorrect input signal from the LH system	Check the blue/red cable between terminal 24 in the connector and terminal 8 of the electronic control unit in the ignition system. (Note: Remove the covers from the connectors and measure from the cable side.) If the cable is in good condition, fit a new LH system control unit.
	Sporadic	Indicates knocking	Normal
	Conti-nuous	Maximum retardation	Check the engine for extreme vibrations (loose plates, broken engine mountings, etc.). Eliminate the reasons for such vibrations.

For other fault-tracing in the ignition system with Hall sensor, see page 340-8.

To measure the voltage at amplifier terminal 5

1 Disconnect the amplifier connector and pull back the rubber cover.

2 Connect a test cable to terminal 5 on the rear of the connector.

3 Turn the engine so that the Hall sensor is in line with one of the openings in the slotted rotor.

4 Switch on the ignition and measure the voltage at the instant when the ignition is switched on. The instrument reading should be 4 - 5 V.

5 Switch off the ignition and turn the crankshaft so that the Hall sensor is in line with one of the solid segments of the rotor.

6 Switch on the ignition and measure the voltage at the instant when the ignition is switched on. This should now be below 0.1 V.

To replace the knock sensor

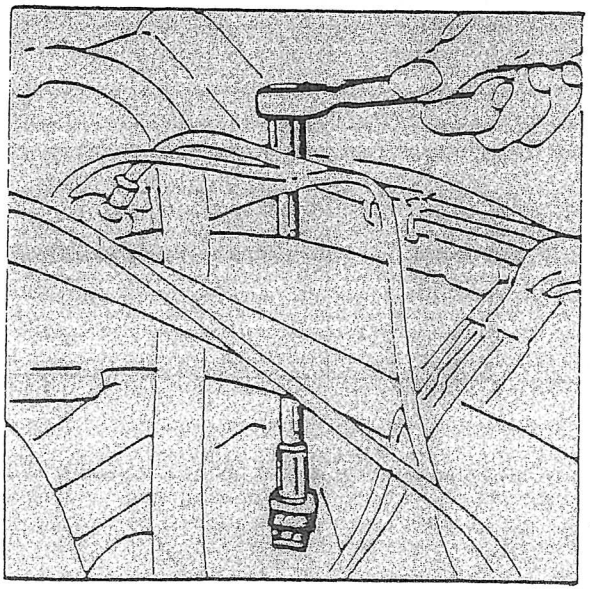
Tools: Long extension with 3/8" drive
13 mm socket
Ratchet handle
Torque spanner

To remove

1 Unplug the connector.

2 Remove the knock sensor mounting bolt.

3 Remove the sensor from the engine block.



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To refit

1 Clean the thread of the bolt and the contact surface on the engine block.

2 Fit the knock sensor.

3 Tighten the knock sensor bolt to a torque of 13 Nm (9.6 lbf ft).

4 Plug in the connector.

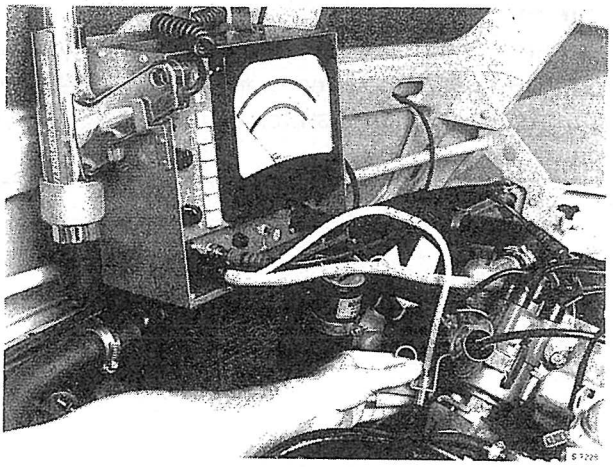
Ignition timing

Using an ignition-timing instrument

The engine includes provision for using an ignition-timing instrument. A special pin is provided on the flywheel and a test socket is incorporated into the flywheel cover. (Graduations are also provided on the flywheel for checking the timing with a conventional stroboscopic lamp.)

The timing instrument has a special plug which fits into the socket in the flywheel cover and a clamp for the HT lead for No. 1 cylinder.

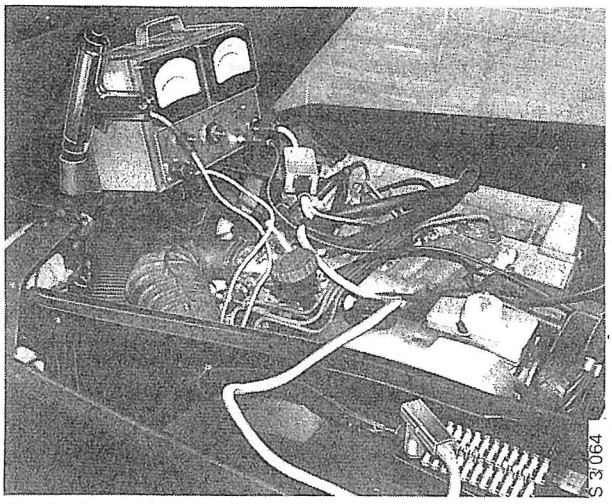
Note:
On cars without tachometer, the ignition pulse amplifier must be fitted before the ignition timing is checked.



Using an ignition-timing instrument

Timing service instrument

The timing service instrument (TSI) can be connected to the ignition service socket, located at the fuse box, and, via a pulse sensor, to the HT lead for No. 1 cylinder. The instrument includes a tachometer, a dwell-angle meter, a stroboscopic lamp, a switch for the starter motor and, in the latest version, an ignition-timing meter with a graduated dial.



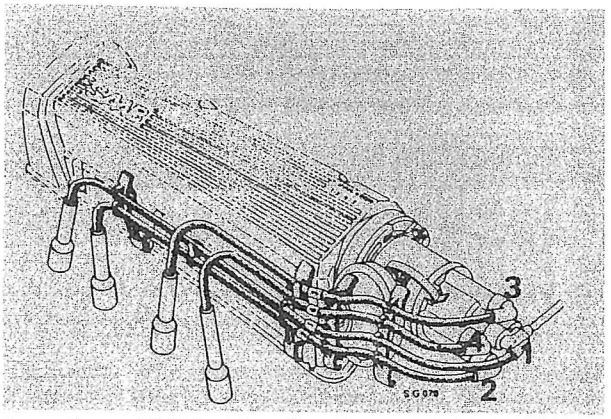
Timing service instrument

Caution

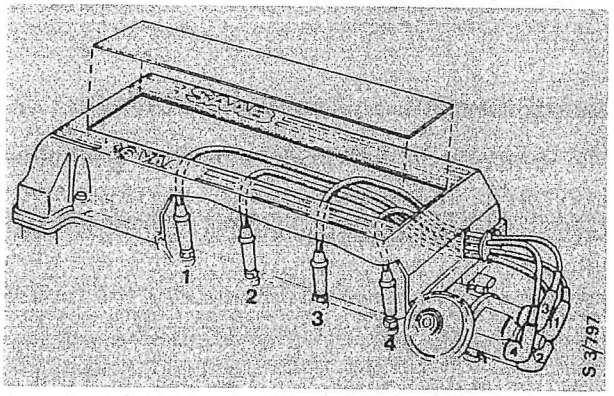
Remember to check that the car is in neutral before switching on the starter motor.

When the engine is being run by means of the TSI, the ignition switch is by-passed, and the radiator fan will therefore not run. So if the engine is run for more than about ten minutes, the ignition system should be switched on by means of the ignition switch, to enable the fan to run. This is necessary because if the engine runs too hot, a faulty reading of the CO content in the exhaust is likely to be obtained.

Note:
Bear in mind that when the ignition is switched on, all other electrical components connected across the ignition switch will also be switched on.



Location of HT leads - 8-valve model



Location of HT leads - 16-valve model

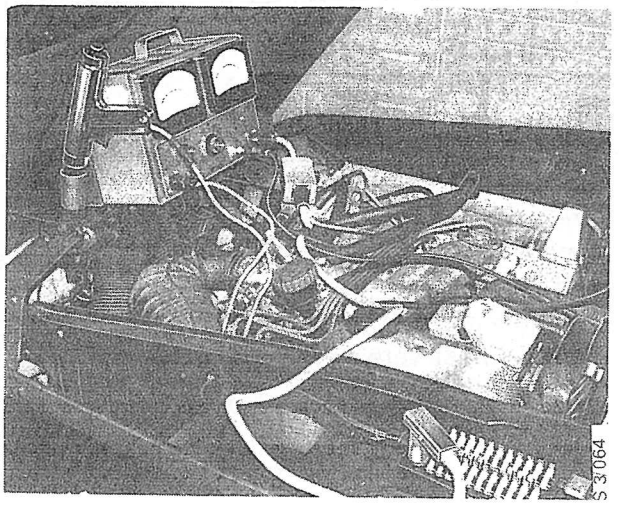
Checking and adjusting the timing

1 Connect the timing service instrument (TSI) or equivalent equipment.

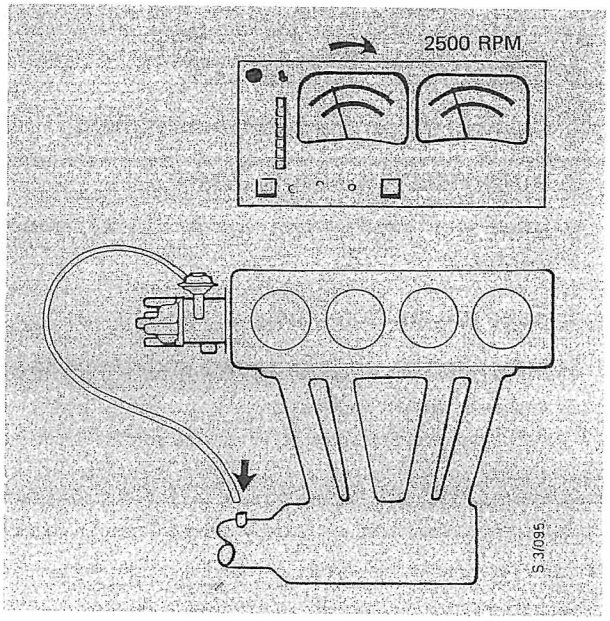
2 Disconnect the vacuum hose from the throttle housing or carbuetter.

3 Start the engine and run it as specified in section 023, "Technical data".

4 Check the timing and adjust as necessary.



To check the vacuum control mechanism in the car



1 Connect the timing service instrument.

2 Disconnect the vacuum hose from the throttle housing or carburetter.

3 Start the engine and run it at approximately 2500 r/min.

4 Read the ignition timing.

5 Connect the vacuum hose to the throttle housing, and check that the timing has now advanced appreciably.

To check the pressure control system (Turbo only)

The function of the pressure control system is to prevent knocking when the turbocharger is boosting the intake air pressure. A fault in the pressure control system may cause a reduction in the boost pressure on a Turbo engine with APC.

1 Disconnect the vacuum hose to the distributor from the throttle housing.

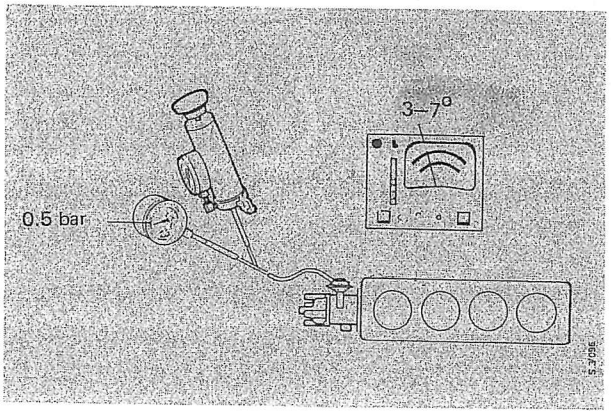
2 Connect instrument 83 93 514 and a suitable pressure tester to the hose.

3 Connect the timing service instrument and start the engine.

4 Read the timing when the engine is idling.

5 Raise the pressure to 0.5 bar.

6 Check that the timing has now retarded by 3 - 7°.



To check the centrifugal control mechanism in the car

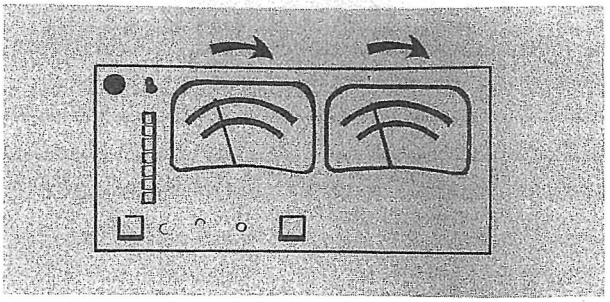
1 Connect the timing service instrument.

2 Disconnect the vacuum hose.

3 Start the engine and let it run at idling speed.

4 Read the ignition timing.

5 Increase the engine speed and check that the timing changes.



Spark plugs

Spark plugs

See section 023 "Technical data".

To remove (B201)

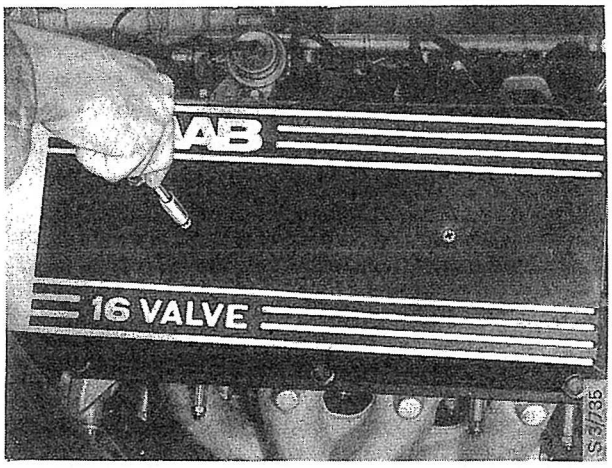
1 Carefully twist off the plug caps - don't pull the leads.

2 Blow compressed air around the plugs to remove any dirt.

3 Unscrew the spark plugs.

To remove (B202)

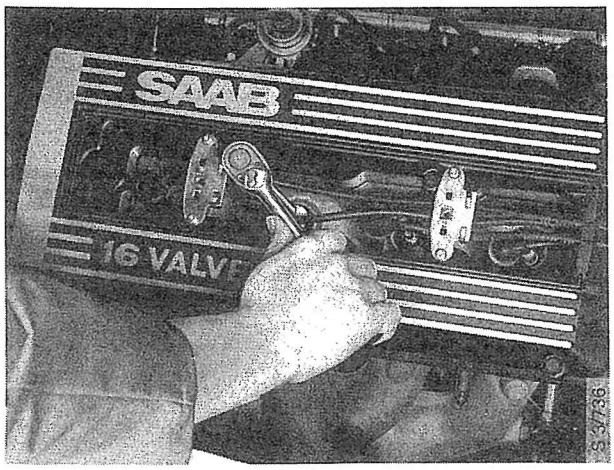
1 Remove the cover over the spark plugs.



2 Pull off the plug caps - don't pull the leads.

3 Blow compressed air around the plugs to remove any dirt.

4 Remove the plugs using spark plug socket 83 93 902.



To check (spark plug removed from engine)

1 Check that the electrode gap is 0.02 in (0.6 mm). Adjust as necessary by bending the side electrode.

To fit

1 Screw in each spark plug by hand.

2 Tighten it to a torque of 18.5 - 21.5 lbf ft (25 - 29 Nm).

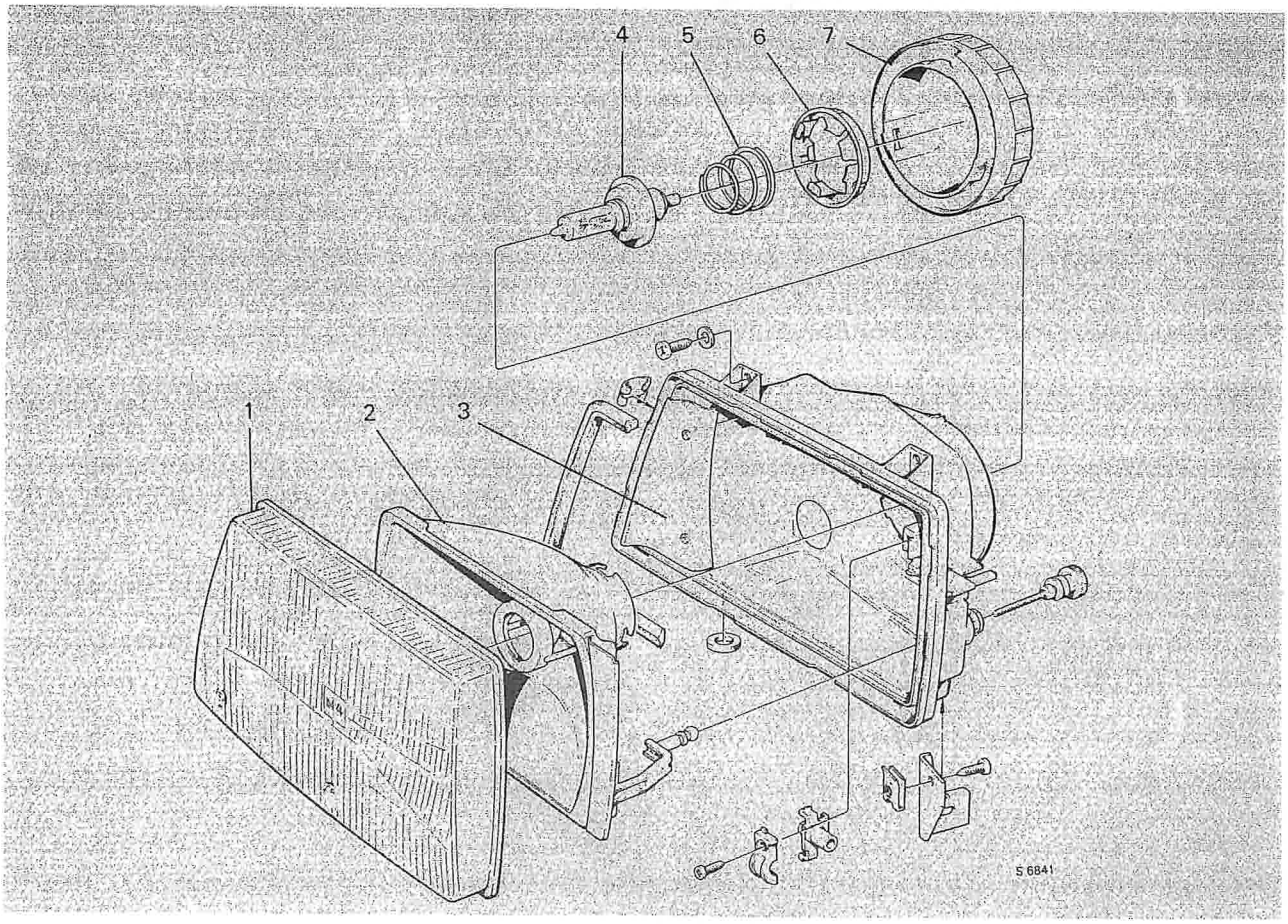
3 Refit the leads.

Lighting

Headlamps

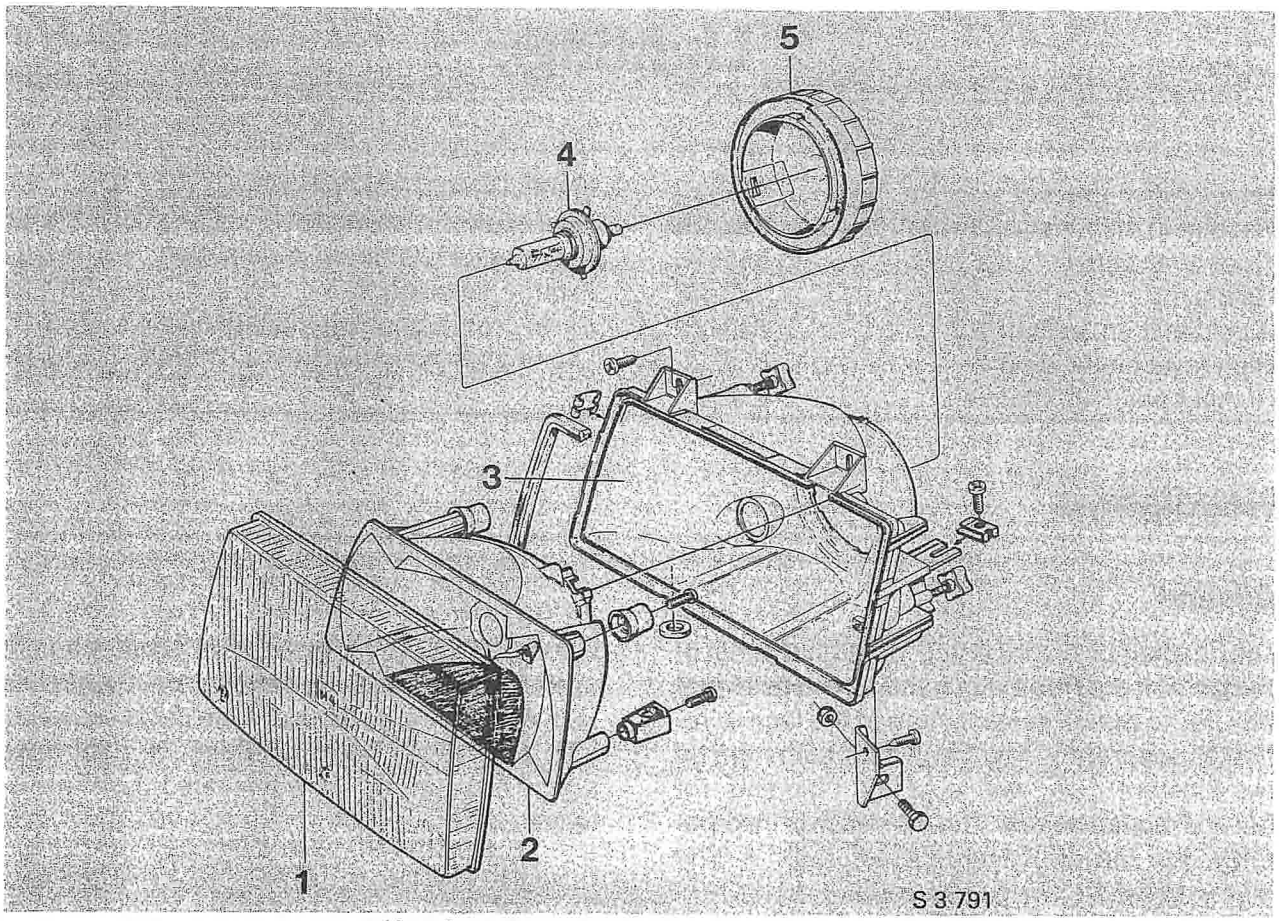
General

The headlamps are mounted in the front panel of the car and are fitted with removable lenses (not US, JP), to permit replacement of the lens or reflector separately. The headlamp bulbs are of two-filament type, with separate filaments for full and dipped beams. The dip switch is incorporated into the direction-indicator stalk. A blue warning lamp on the instrument panel will light up when the full beam is switched on. Depending on the market specification, the car is equipped with headlamps with left-hand or right-hand asymmetric beams, or with sealed-beam headlamps.



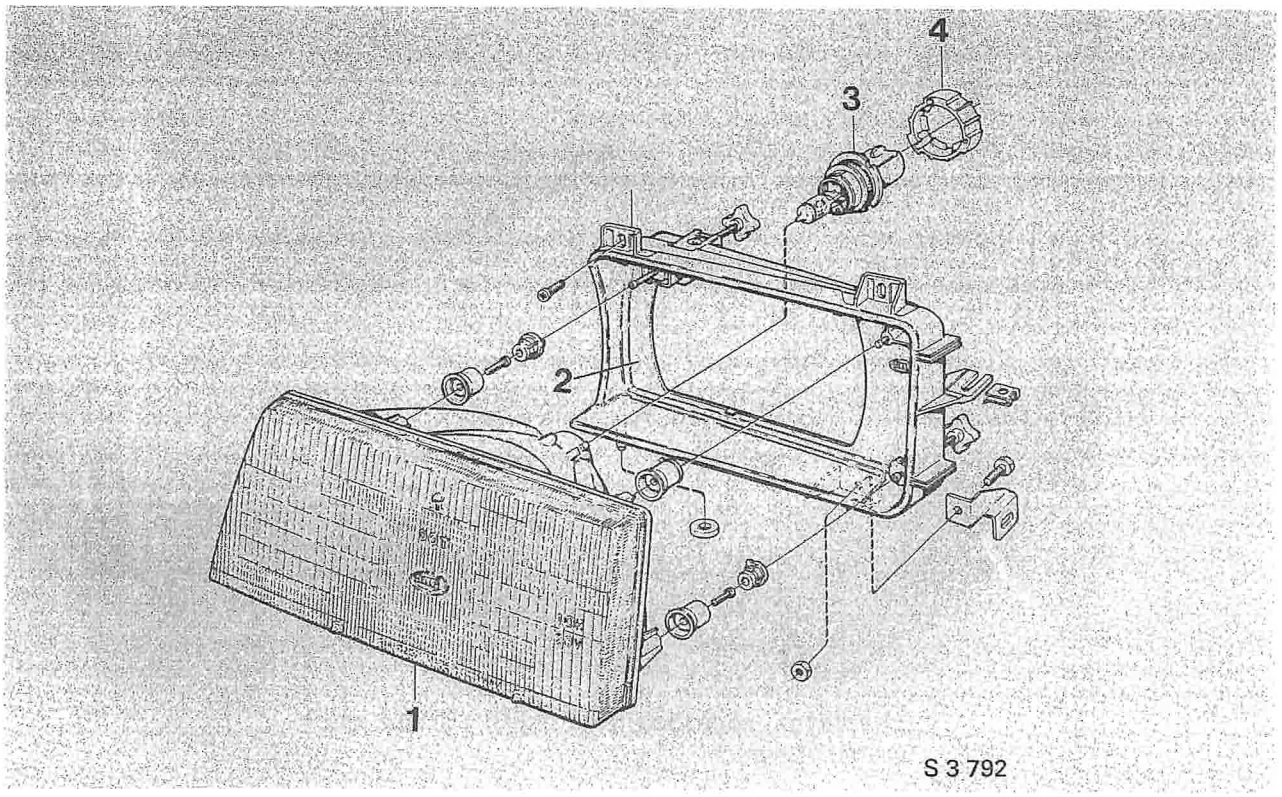
Headlamp, exploded view (cars without integrated bumper)

1 Lens
2 Reflector
3 Fitting
4 Bulb
5 Spring
6 Bulb holder
7 Cover



Headlamp, exploded view (cars with integrated bumper - except US, JP)

1 Lens
2 Reflector
3 Fitting
4 Bulb
5 Cover



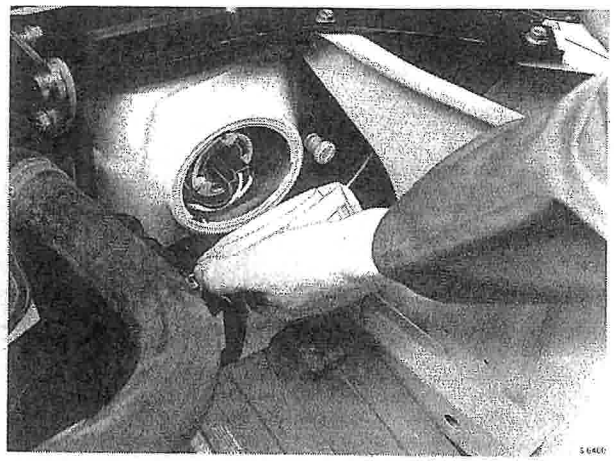
Headlamp, exploded view (cars with integrated bumper - US, JP)

1 Headlamp
2 Frame
3 Bulb
4 Bulb holder

To change the headlamp bulbs (cars without integrated bumper)

1 Open the bonnet and remove the cover from the rear of the headlamp fitting.

2 Disconnect the connector from the bulb.

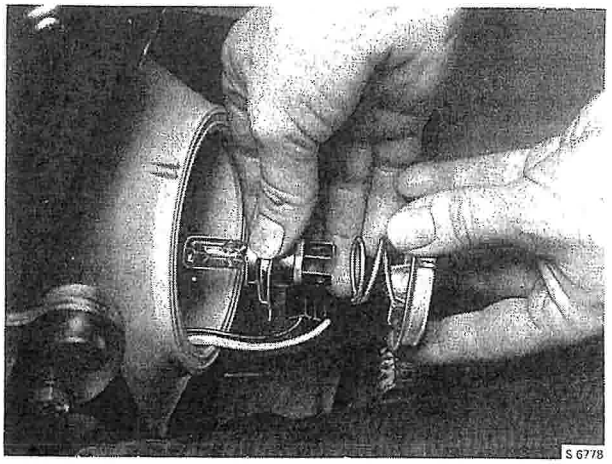


3 Push in on the bulb holder and rotate it anti-clockwise. The bulb can then be removed.

4 Fit a new bulb. Don't touch the glass of the bulb with your fingers. Make sure that the three locating lugs are in the right positions.

5 Fit the bulb holder.

6 Fit the connector and fit the cover on the headlamp fitting.

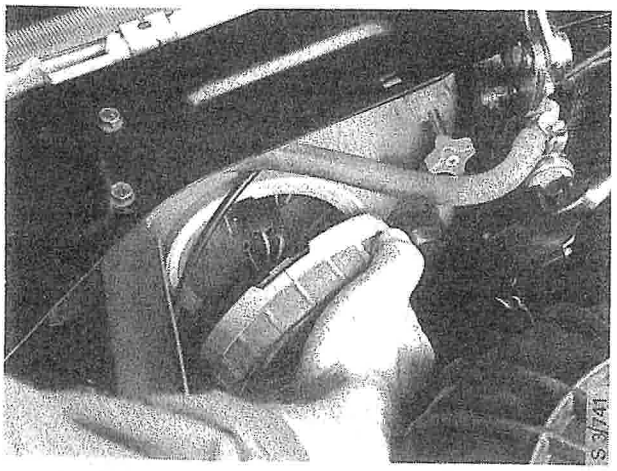


To change the headlamp bulbs (cars with integrated bumper except US, JP)

Note:
On cars with intercooler, the baffle plate must be removed before the left-hand headlamp can be changed.

1 Open the bonnet and remove the cover from the rear of the headlamp fitting.

2 Disconnect the connector from the bulb.

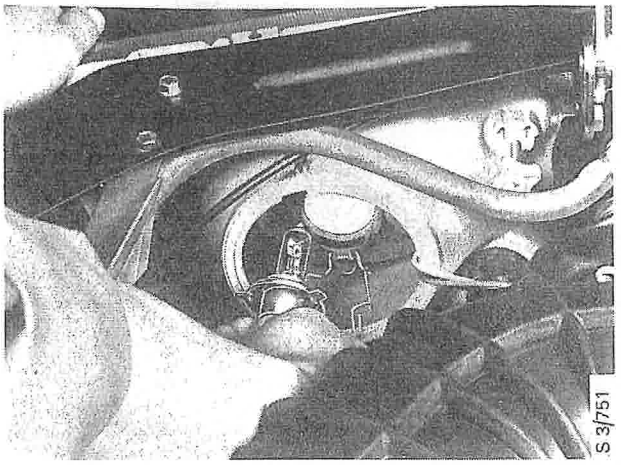


3 Press the spring apart and fold it down. The bulb can then be removed.

4 Fit a new bulb. Don't touch the glass of the bulb with your fingers. Make sure that the three locating lugs are in the right positions.

5 Press the spring back into place.

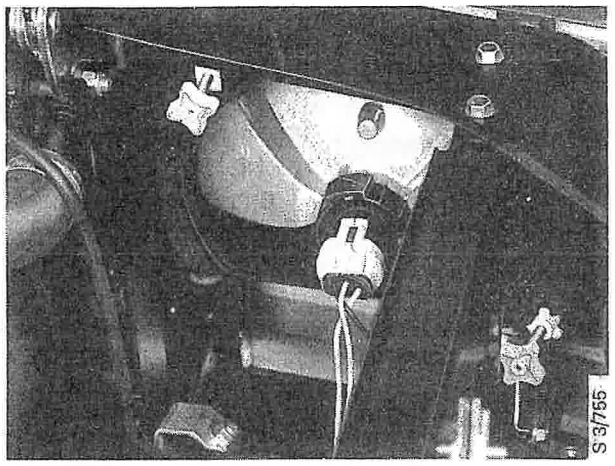
6 Fit the connector and fit the cover on the headlamp fitting.



To change the headlamp bulbs (cars with integrated bumper US, JP only)

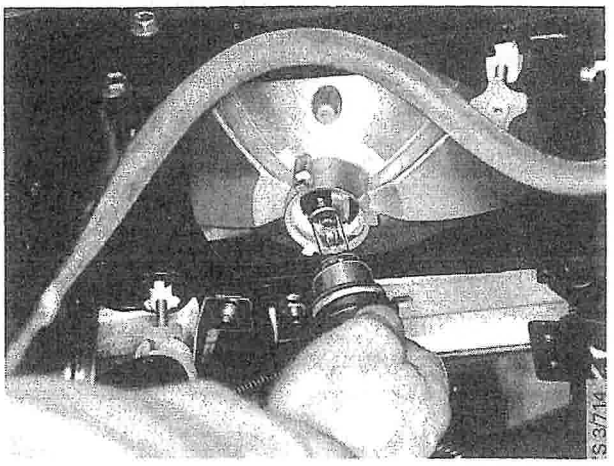
Note:
On cars with intercooler, the baffle plate must be removed before the left-hand headlamp can be changed.

1 Rotate the bulb holder anti-clockwise. The bulb can then be removed.



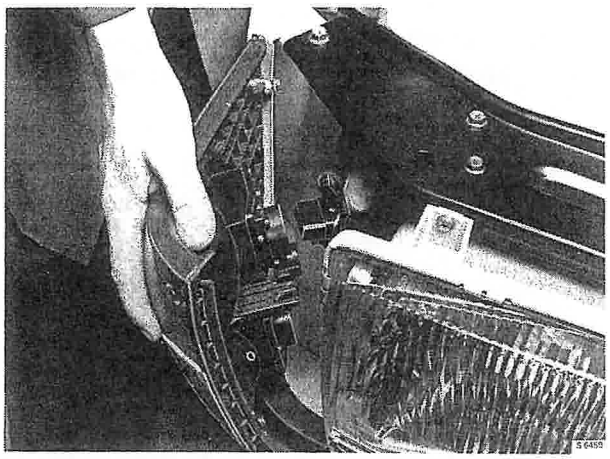
2 Fit a new bulb. Don't touch the glass of the bulb with your fingers. Make sure that the three locating lugs are in the right positions.

3 Fit the bulb holder.

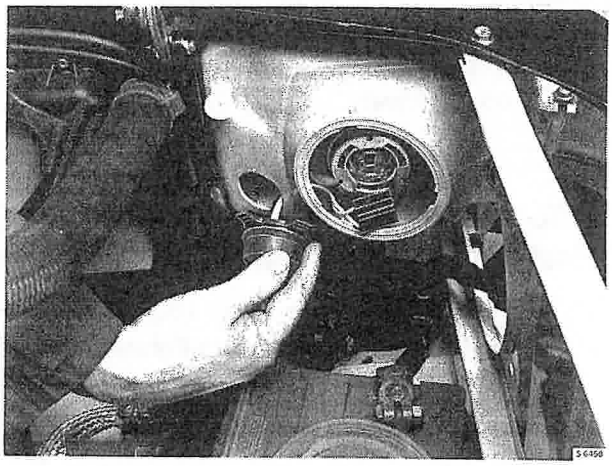


To change the headlamp lenses (cars without integrated bumper)

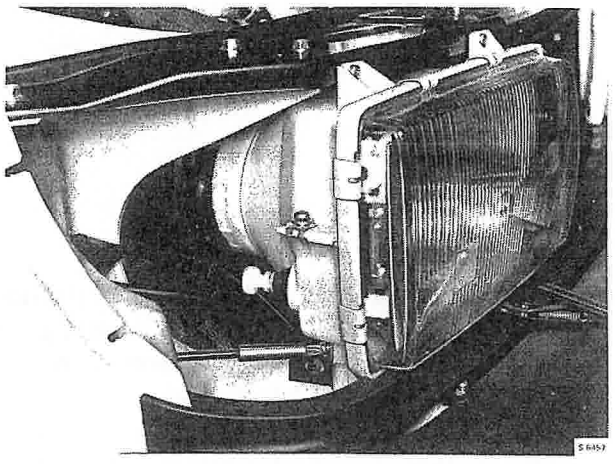
1 Remove the screws and ease out the front edge of the light cluster slightly.



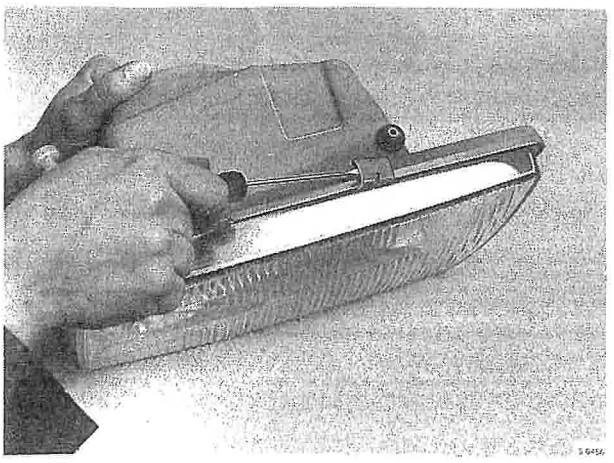
2 Remove the cover from the rear of the headlamp fitting, disconnect the connector and withdraw the lead and grommet from the headlight fitting.



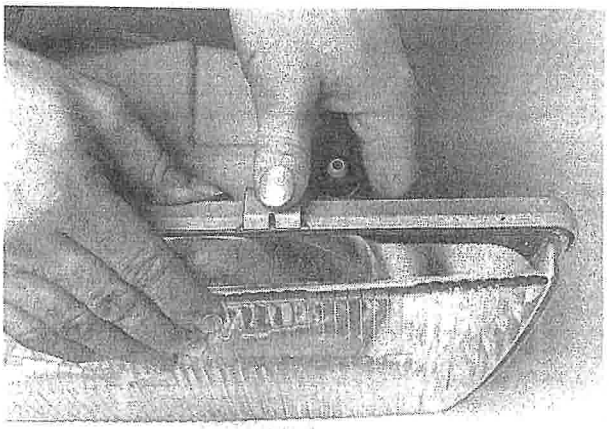
3 Remove the headlamp fitting retaining screws (the two in the upper member from the front, and the one in the lower outer corner from the rear), raise the wiper arm and remove the headlamp insert.



4 With a screwdriver, remove the clip holding the lens and remove the lens from the fitting.



5 Check that the seal is properly seated in the groove, place the new lens in position and fit the clip.

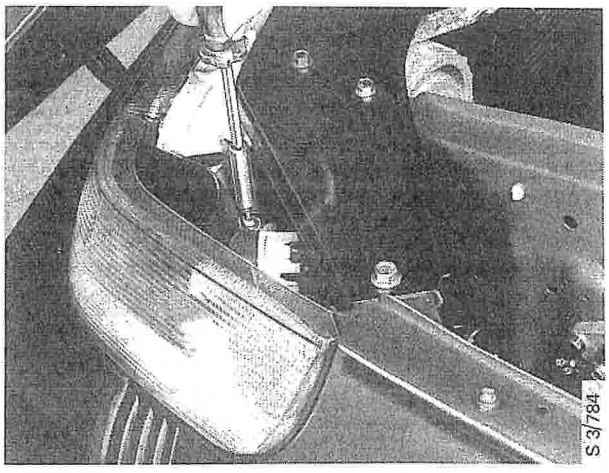


6 Fit in the reverse order.

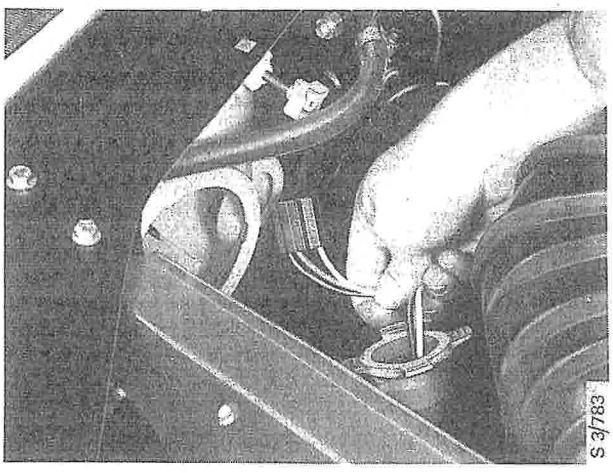
7 Check the headlamp alignment and correct as necessary.

To change the headlamp lenses (cars with integrated bumper except US, JP)

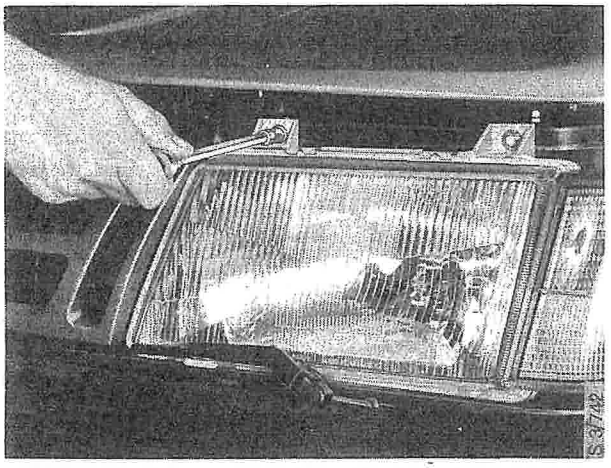
1 Remove the screws and ease out the front edge of the light cluster slightly.

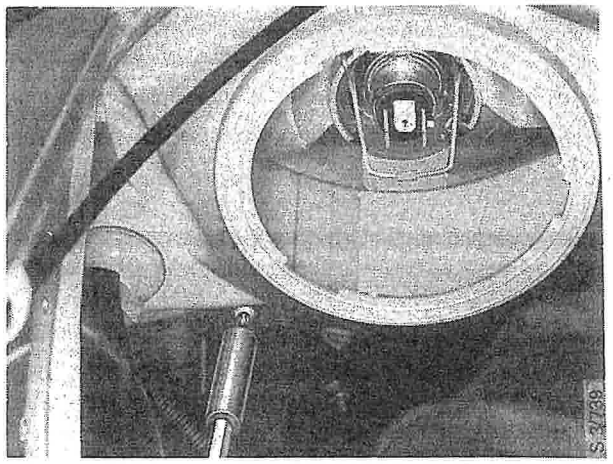


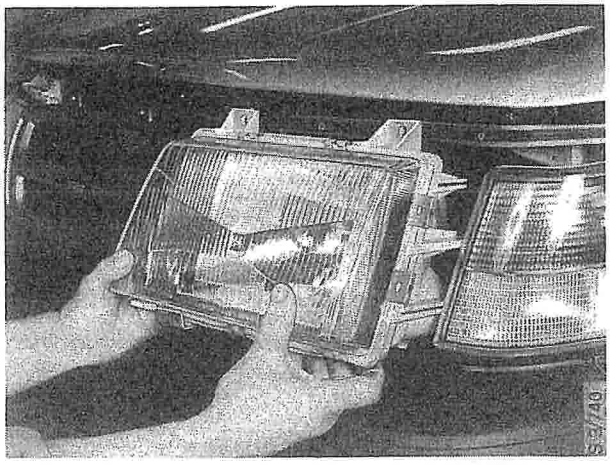
2 Remove the cover from the rear of the headlamp fitting, disconnect the connector and withdraw the lead and grommet from the headlight fitting.



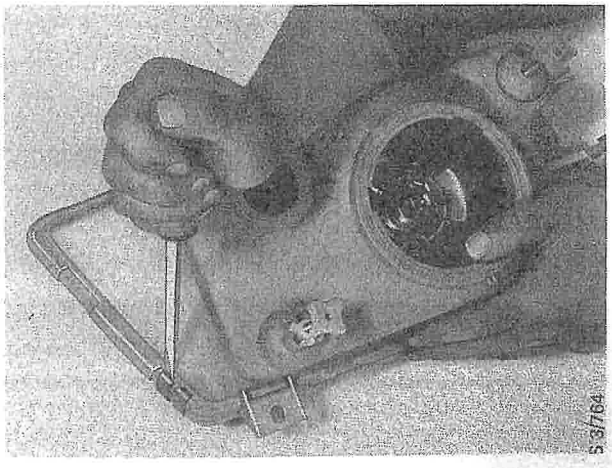
3 Remove the headlamp fitting retaining screws (the two in the upper member from the front, and the one in the lower outer corner from the rear), raise the wiper arm and remove the headlamp insert.



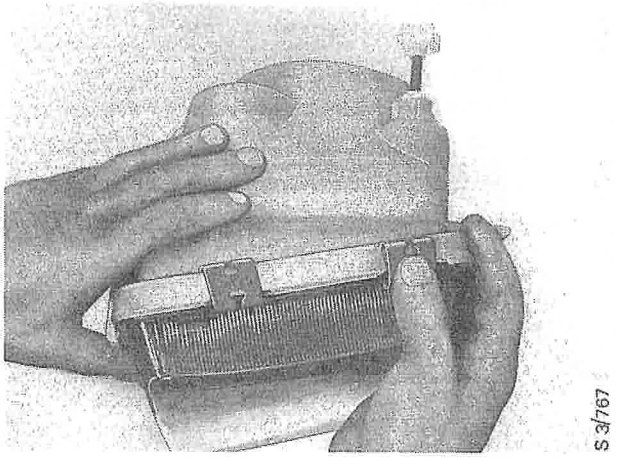




4 With a screwdriver, remove the clip holding the lens and remove the lens from the fitting.



5 Check that the seal is properly seated in the groove, place the new lens in position and fit the clip.

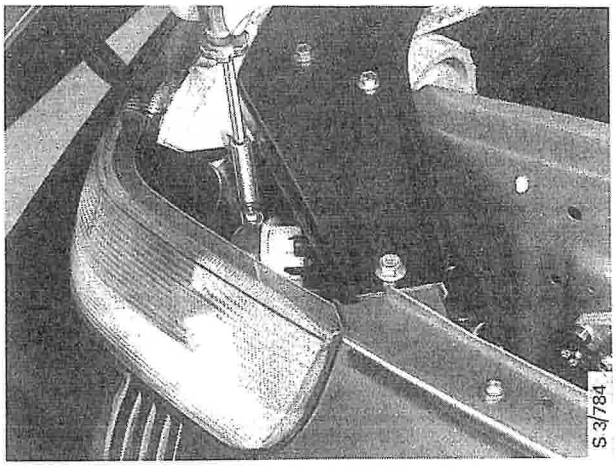


6 Fit in the reverse order.

7 Check the headlamp alignment and correct as necessary.

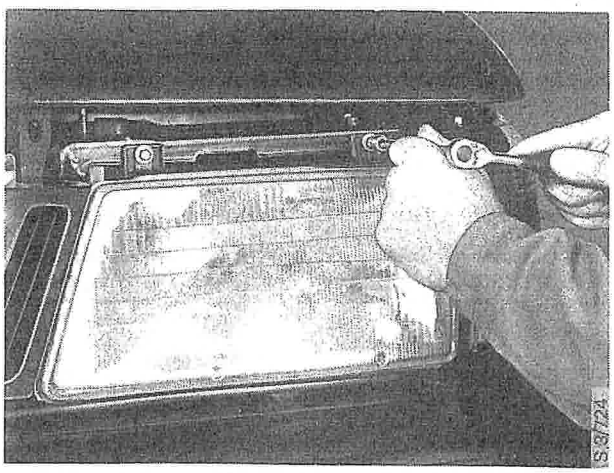
To change the headlamps (US, JP)

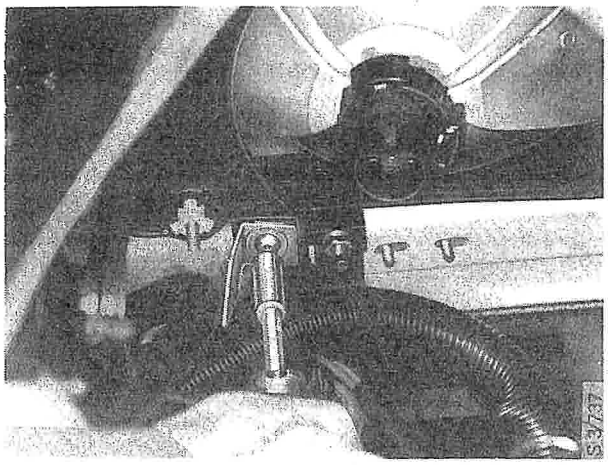
1 Remove the screws and ease out the front edge of the light cluster slightly.

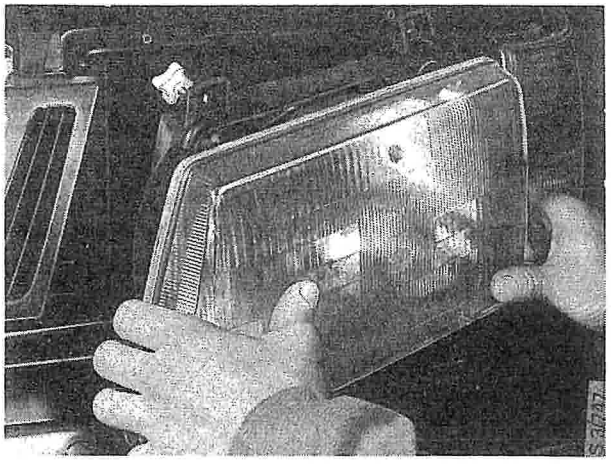


2 Disconnect the connector.

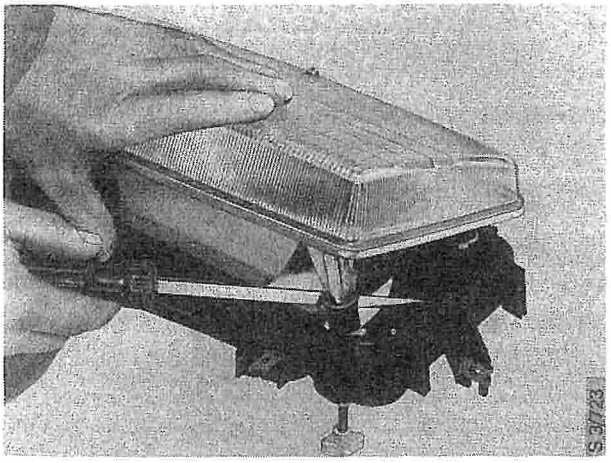
3 Remove the headlamp fitting retaining screws (the two in the upper member from the front, and the one in the lower outer corner from the rear) and remove the headlamp.







4 Remove the headlamp frame by carefully prising it loose.

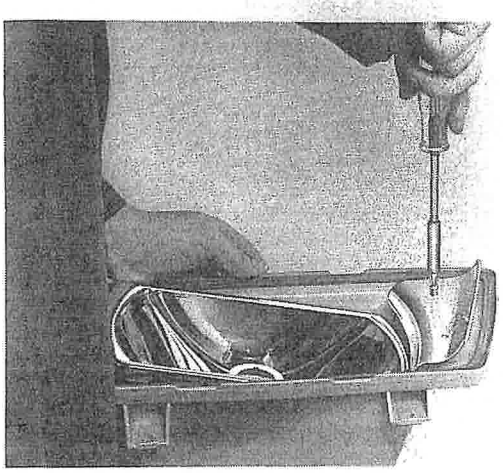


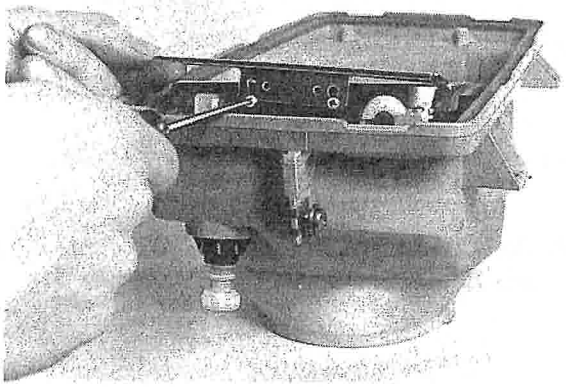
5 Fit in the reverse order.

To change the headlamp reflectors (cars without integrated bumper)

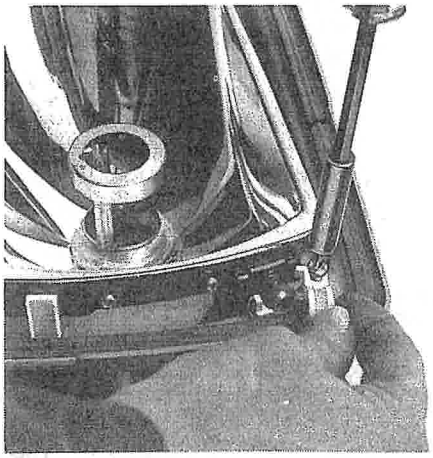
1 Remove the headlamp fitting and lens. See the section entitled "To change the headlamp lenses".

2 Remove the two small reflectors, at the side of the main reflector.

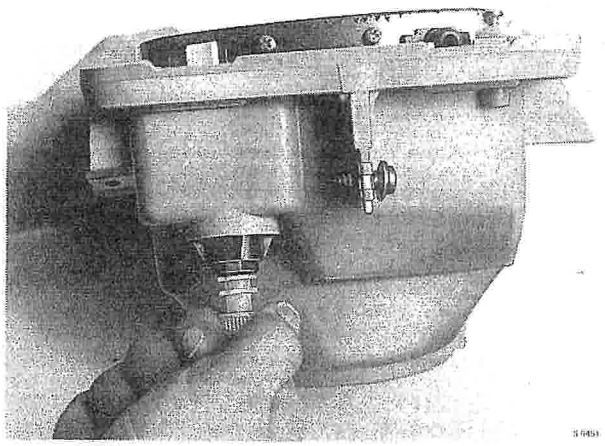


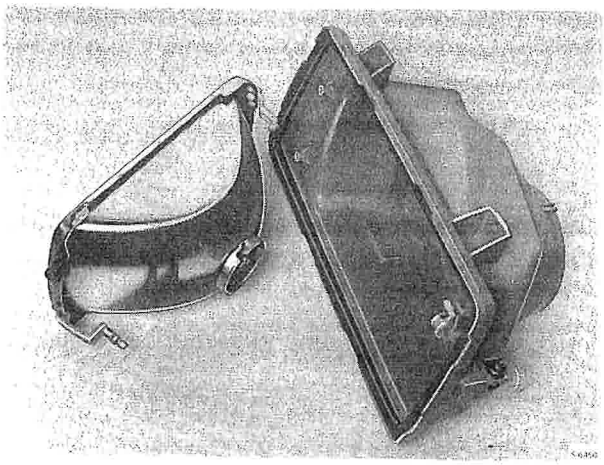


3 Remove the clip on the reflector ball joint.

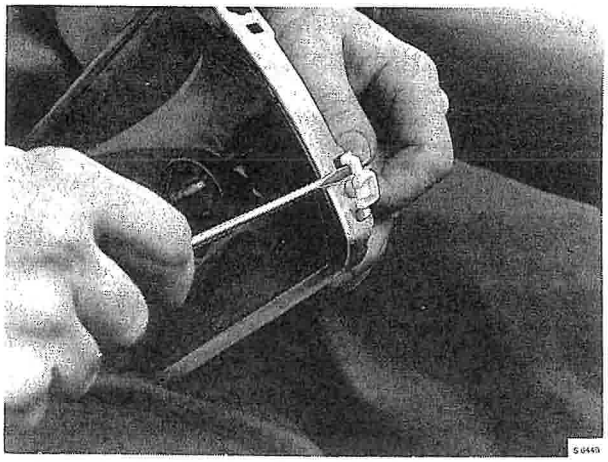


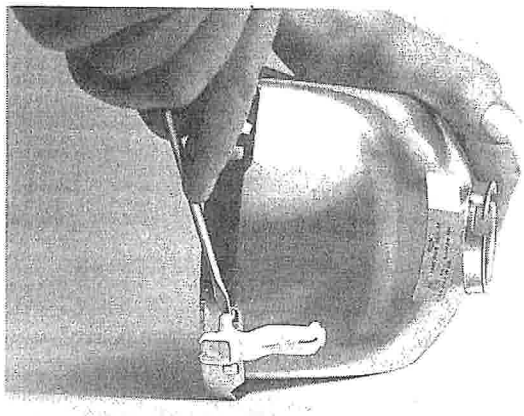
4 Release the reflector from the alignment screws in the headlamp fitting.

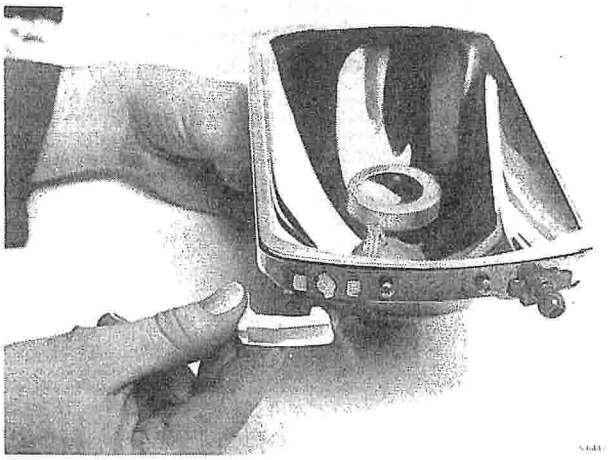




5 Transfer the clip and ball to the new headlamp insert.







6 Fit the new insert by means of the alignment screws in the headlamp fitting, and fit the clip at the ball joint.

7 Fit the two small reflectors at the side of the main reflector.

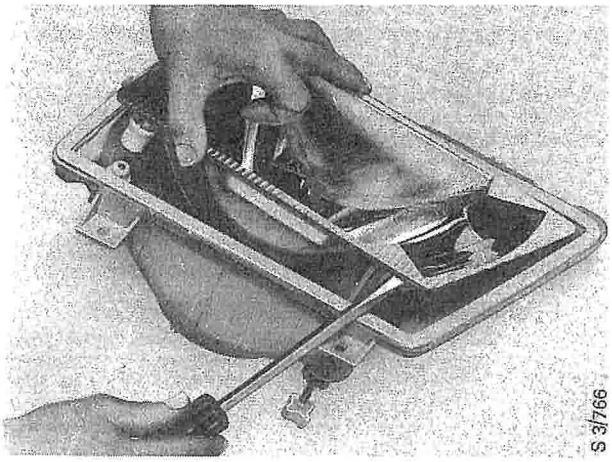
8 Fit the lens and headlamp fitting. See the section entitled "To change the headlamp lenses".

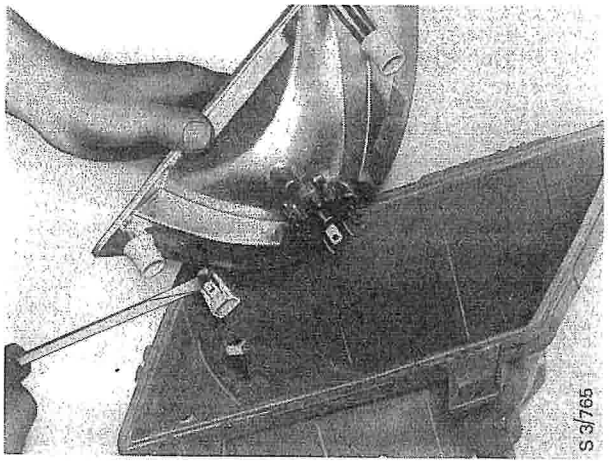
9 Check the headlamp alignment and correct as necessary.

To change the headlamp reflectors (cars with integrated bumper except US, JP)

1 Remove the headlamp fitting and lens. See the section entitled "To change the headlamp lenses".

2 Remove the headlamp frame by carefully prising it loose.





3 Fit the new reflector.

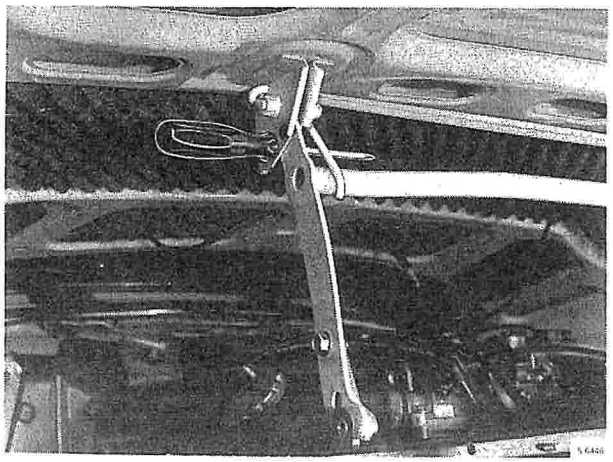
4 Fit the lens and headlamp fitting. See the section entitled "To change the headlamp lenses".

5 Check the headlamp alignment and correct as necessary.

Headlamp alignment (except US, JP)

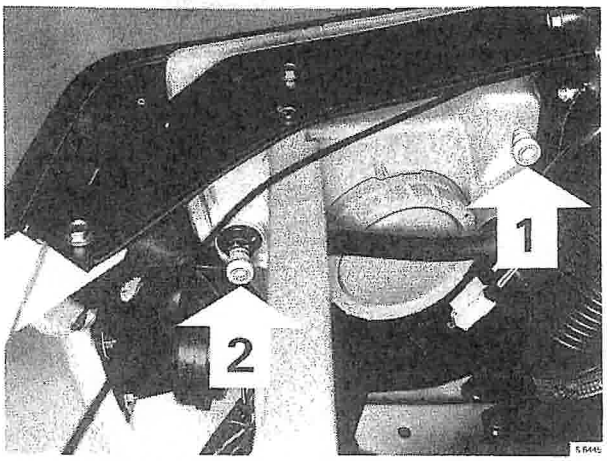
Special aligning equipment should normally be used, but the headlamps can also be aligned by placing the car in front of a wall or panel.

1 Release the bonnet and pull it forward, but do not raise it. To limit the forward movement of the bonnet, insert a screwdriver or other suitable tool in one of the bonnet hinge holes.

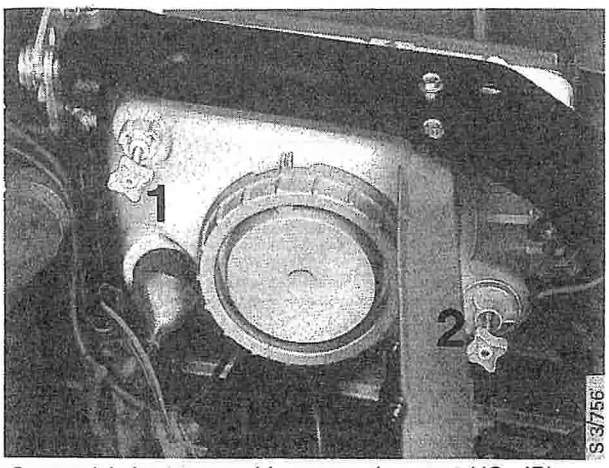


Note:
On cars with intercooler, the baffle plate must be removed before the left-hand headlamp can be aligned.

2 Adjust the headlamps by means of the two adjusting knobs on the rear of the headlamp housing. Insert your arm between the bonnet and the front wing.



Cars without integrated bumper



Cars with integrated bumper (except US, JP)

Adjusting the headlamps
1 Knob for lateral adjustment
2 Knob for vertical adjustment

Align as follows:

- Check the tyre pressures, load the car as it would normally be loaded and position the car at right-angles to the headlamp aligning unit.
- Set the lens of the aligning unit to the correct height in relation to the headlamp and to the correct lateral position in relation to the asymmetric part of the headlamp lens.

Note:
If the lateral position of the aligning unit is set incorrectly, the entire alignment may be incorrect.

a If suspended alignment equipment is used:

Position the car with the left-hand wheels along the reference line. The distance of the front and rear wheels from the line must not differ by more than 3 cm.

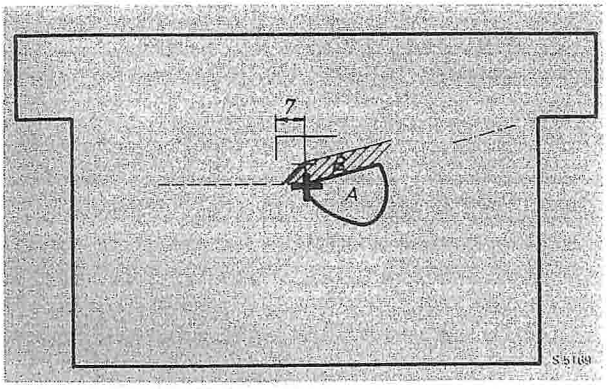
b If alignment equipment with a light aperture is used:

Position the equipment in front of the headlamp, switch on the lamp in the aperture and turn the unit until the beam strikes the same point on both wings (measured from the front of the wing).

Note:
Always follow the manufacturer's instructions for the headlamp alignment equipment.

Switch the headlamps to dipped beam.

a Adjust the height of the beam to the left-hand* horizontal line. Adjust only that part of the light/dark boundary which is within 0 - 30 mm to the left* of the centre line.



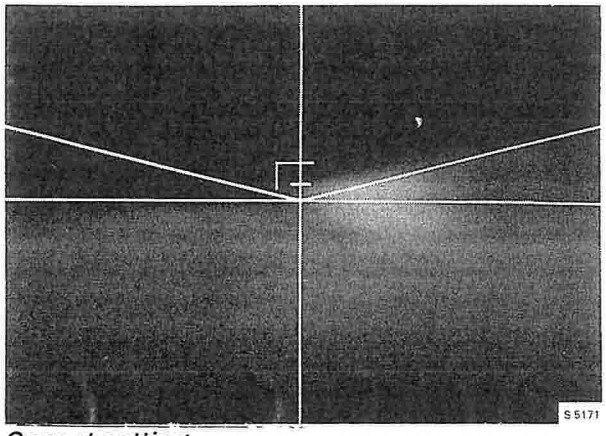
Alignment using aligning equipment
A High-intensity zone
B Tolerance band, light/dark boundary

b Adjust the headlamp sideways so that the high-intensity zone (A) is as close to the centre as possible. For the optimum setting, use the tolerance band (B) for the light/dark boundary.

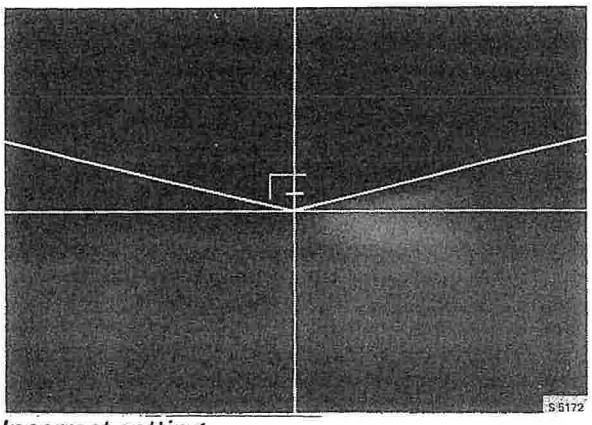
Adjust the setting of the other headlamp in the same way.

If difficulty is experienced in obtaining the correct setting, check the distribution of the main beam (usually slightly too far to the left*) and check that the bulb is fitted correctly.

* Right on right-hand drive cars.



Correct setting



Incorrect setting

Alignment against panel or wall

1 Check the tyre pressures, load the car as it would normally be loaded and position the car on a level surface, 16.5 ft (5m) from the panel.

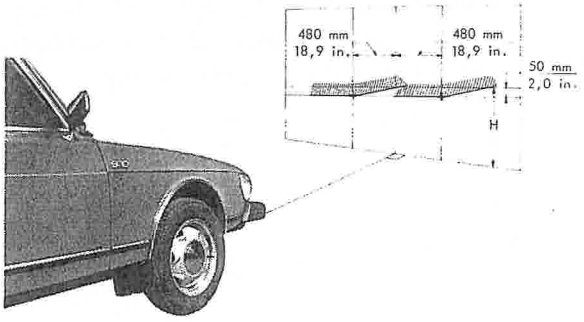
2 Mark on the panel the height of the headlamp centre above the ground.

3 Switch on the dipped beams and cover one lamp.

4 Check and adjust the beam so that the horizontal part of the light/dark boundary lies 2.0 in (50 mm) below and to the left (right for a left asymmetric lamp) of the headlamp centre. See the illustration. The sloping part of the light/dark boundary should lie fully to the right (left for a left asymmetric lamp) of the mark, and should thus meet the horizontal part precisely under the headlamp centre.

5 Align the other headlamp in the same way.

6 Check that the full beam has an even spread. If the light pattern is irregular, of if any difficulty is experienced in setting the dipped beam correctly, check that the bulb is properly seated, or fit a new bulb if necessary.



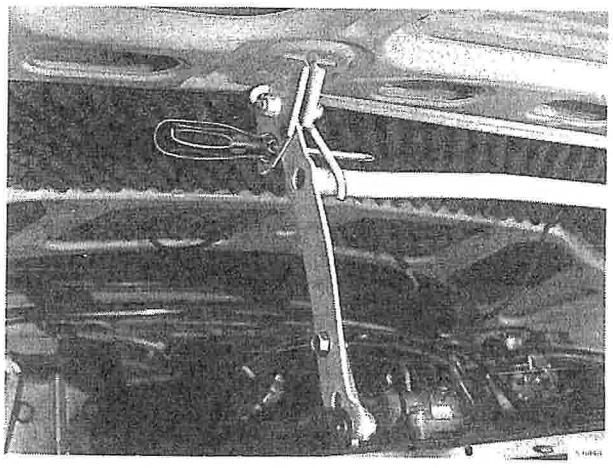
Aligning the lamp against a panel - right asymmetric lamp

H = Height of headlamp centre above the ground

Headlamp alignment (US, JP)

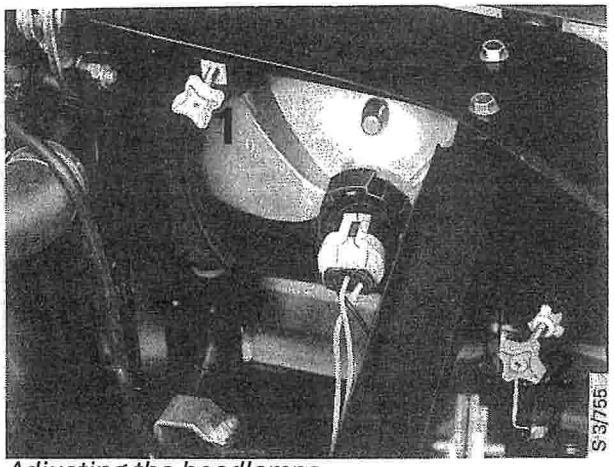
Align the headlamps using special aligning equipment.

1 Release the bonnet and pull it forward, but do not raise it. To limit the forward movement of the bonnet, insert a screwdriver or other suitable tool in one of the bonnet hinge holes.



Note:
On cars with intercooler, the baffle plate must be removed before the left-hand headlamp can be aligned.

2 Adjust the headlamps by means of the two adjusting knobs on the rear of the headlamp housing. Insert your arm between the bonnet and the front wing.



Adjusting the headlamps
1 Knob for lateral adjustment
2 Knob for vertical adjustment

Align as follows:

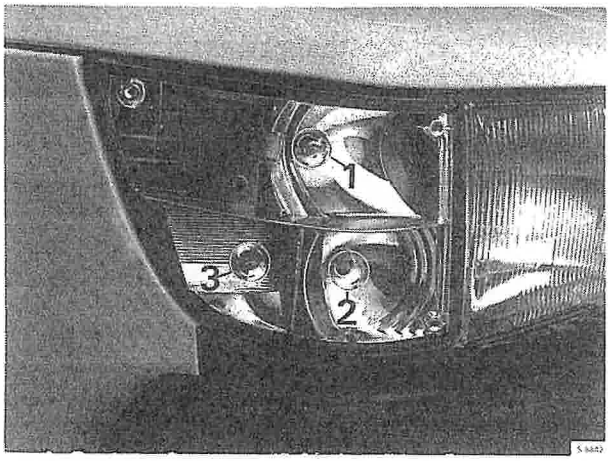
- Check the tyre pressures, load the car as it would normally be loaded and position the car at right-angles to the headlamp aligning unit.
- Set the lens of the aligning unit in accordance with the manufacturer's specifications.

Note:
Always follow the manufacturer's instructions for the headlamp alignment equipment.

Front lamp clusters

General

The front lamp clusters incorporate the direction indicators, parking lights, and, on some variants, side reversing lights, corner lights, position lights and side marker lights.



Front lamp cluster

Cars without integrated bumper

1	Direction indicator	21 W
2	Parking light	5 W

Cars with integrated bumper (The lenses cannot be removed from the fittings.)

1	Direction indicator/side marker light*	21/5 W
2	Parking light-position light light*/Corner light*	5/21 W
3	Side reversing light	21 W

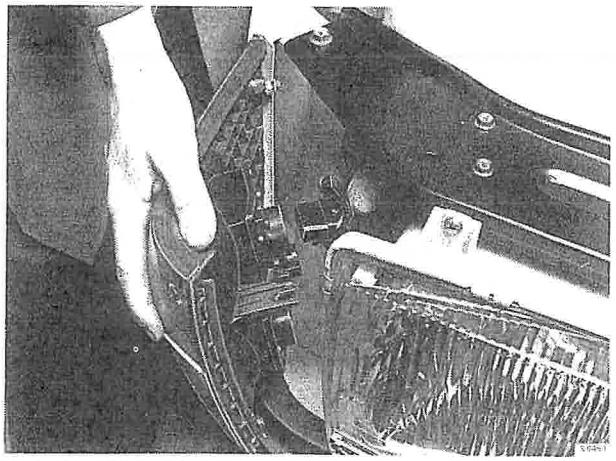
* only on certain markets/variants

To remove the front lamp cluster (cars without integrated bumper)

1 Open the bonnet and remove the screw holding the lamp cluster to the headlamp fitting.

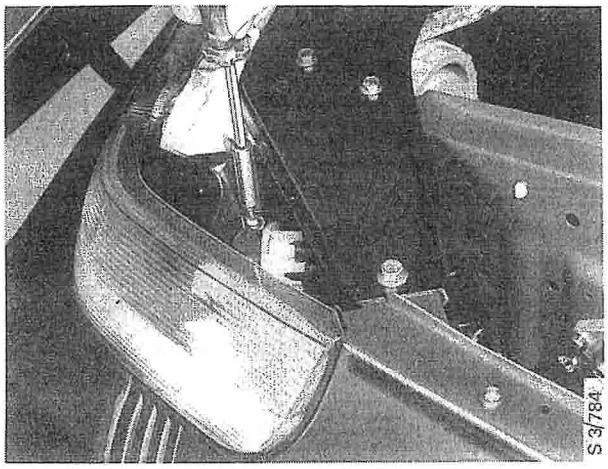
2 Unscrew the two screws at the rear, where the lamp cluster is secured to the side panel.

3 Disconnect the connector and remove the lamp cluster.

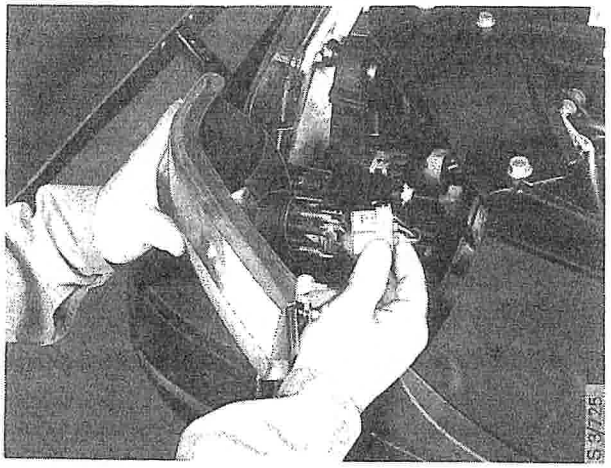


To remove the front lamp cluster (cars with integrated bumper)

1 Open the bonnet and remove the screw holding the lamp cluster to the headlamp fitting.



2 Pull the lamp cluster forward and disconnect the connector.

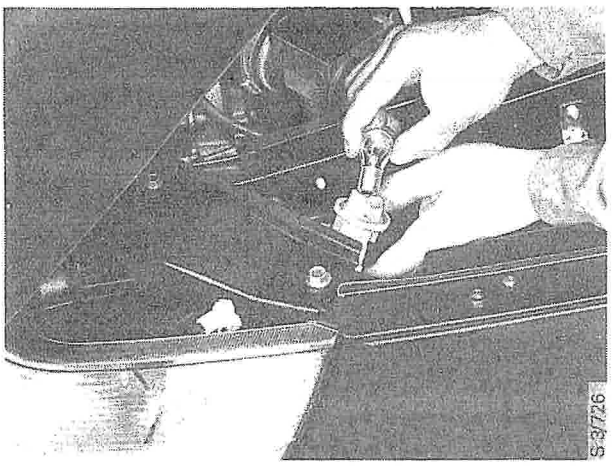


To change the bulbs (cars without integrated bumper)

Remove the screws and then the lens. To release the bulb, press it in and turn it.

To change the bulbs (cars with integrated bumper)

Turn the bulb holder to release it, and change the bulb.



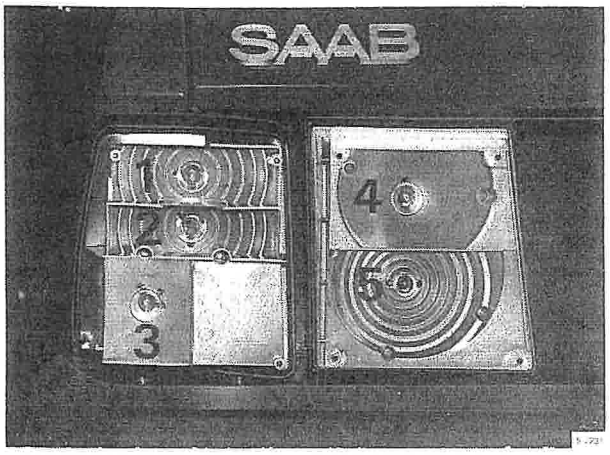
Rear lamp clusters

The rear lamp clusters incorporate the rear lights, direction indicators, brake lights, reversing lights, and on some markets, the rear fog lights.

To change the bulbs - Saab 900 Combi Coupé

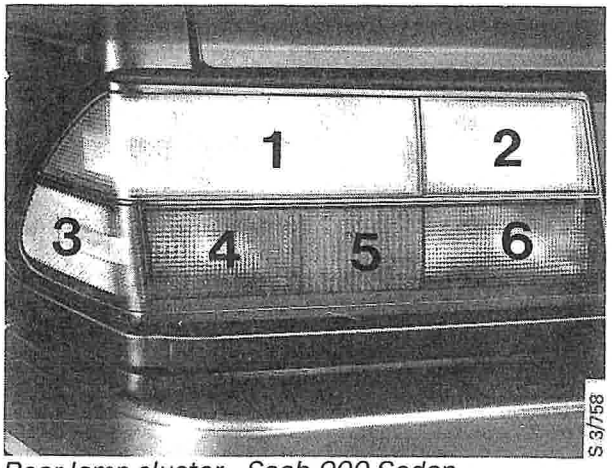
1 Remove the screws and the lens.

2 Press in and turn the bulbs to remove them.



Rear lamp cluster - Saab 900 Combi Coupé

1	Direction indicator	21 W
2	Reversing light	21 W
3	Rear light/brake light	5/21 W
4	Rear fog lamp/brake light (US only)	21 W
5	Rear light	5 W



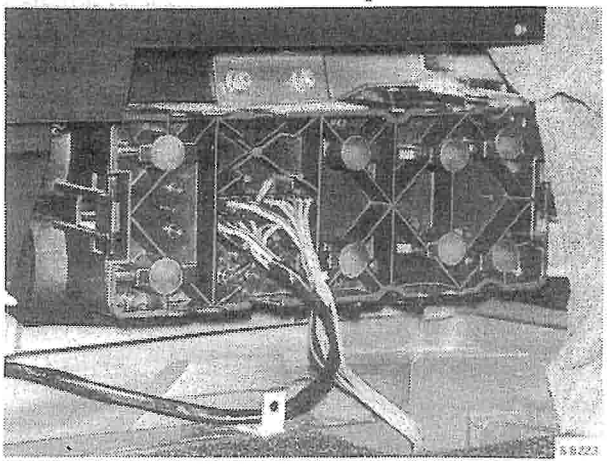
Rear lamp cluster - Saab 900 Sedan

1	Direction indicator	21 W
2	Reversing light	21 W
3	Side marker light/reflector	
4	Rear light/brake light	5/21 W
5	Rear light/reflector	5 W
6	Rear fog lamp/brake light (US only)	21 W

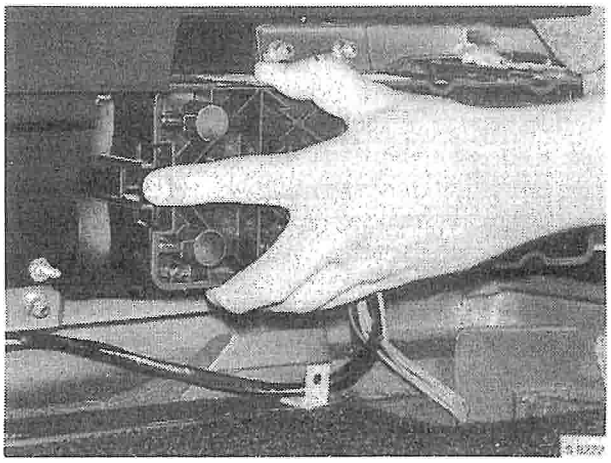
To change the bulbs - Saab 900 Sedan

1 Remove the cardboard covering the rear lamp clusters.

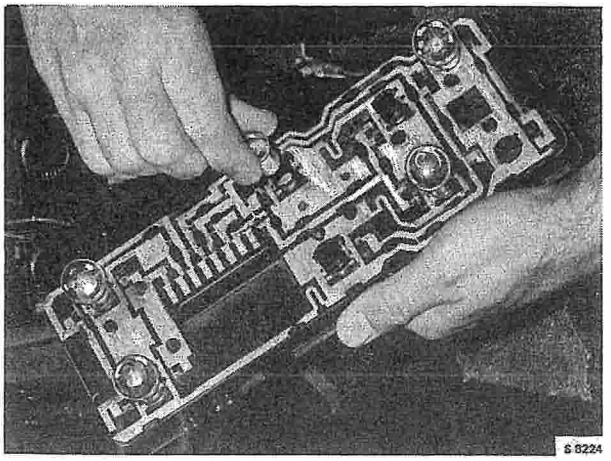
2 Fold back the trim to expose the rear of the lamp cluster.



3 Remove the back of the lamp cluster by pressing the plastic catches (one on each side) towards the centre of the cluster.



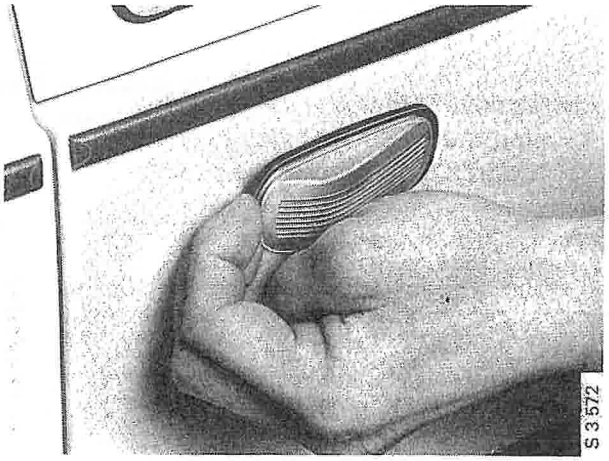
4 Turn the back of the lamp cluster towards you and replace the faulty bulb.



Side direction indicator lamps

A side direction indicator lamp is fitted towards the rear of each front wing.

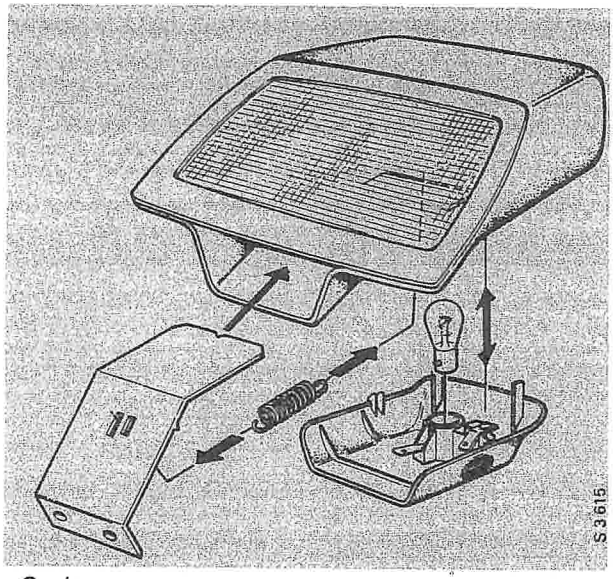
1 Push the lamp housing forward slightly and remove it.



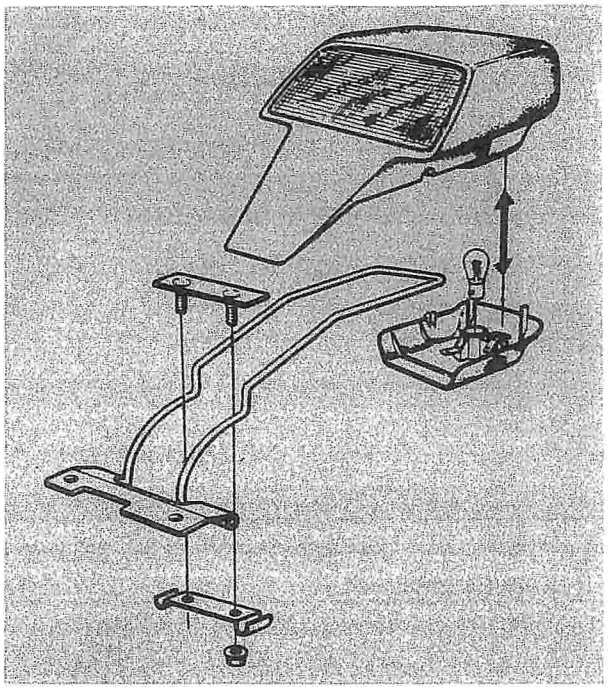
2 Remove the bulb holder and change the bulb.

High-level brake light (US, CA).

The high-level brake light is located in the centre of the rear window, at the bottom edge.

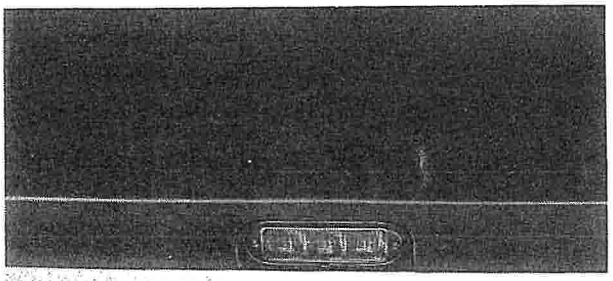


Sedan



Combi Coupé

On the convertible, the high-level brake light is located in the spoiler.



5 3 623

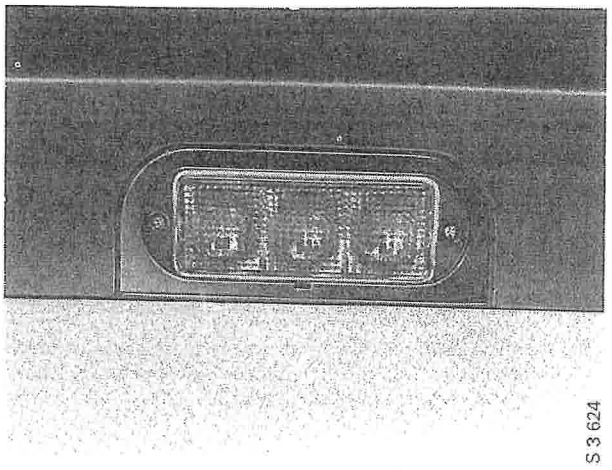
To change the bulb - Sedan and Combi Coupé

1 Pull down the bulb holder.

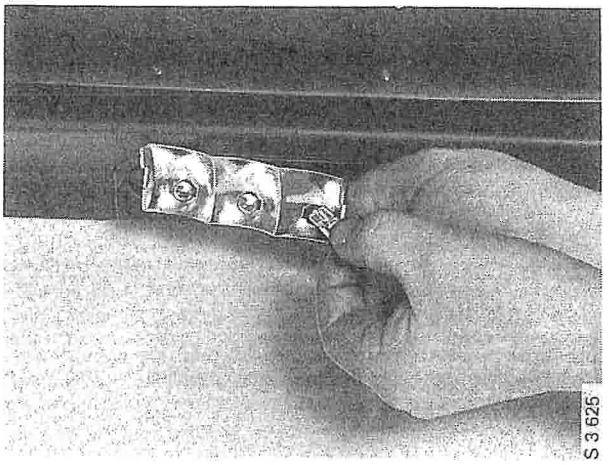
2 Change the bulb.

Convertible

1 Remove the two screws and the lens.

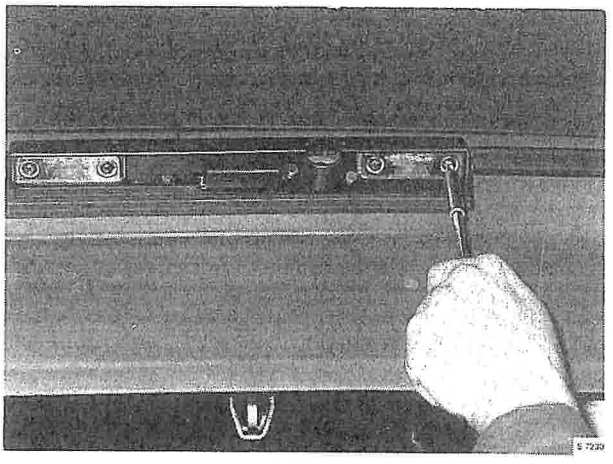

S 3 624

2 Change the bulb.


S 3 625

Number-plate illumination

The number-plate illumination is located in the handle of the luggage compartment lid.



Interior lighting

General

The interior lighting consists of a lamp in the centre of the roof (except convertible), a lamp on the inner rear-view mirror, and a lamp at the ignition switch. The lamps can be operated by the door switches, or by a switch at the gear-lever housing. The convertible is also equipped with reading lamps fitted in the speaker grilles. These lamps can be operated by the interior lighting switch.

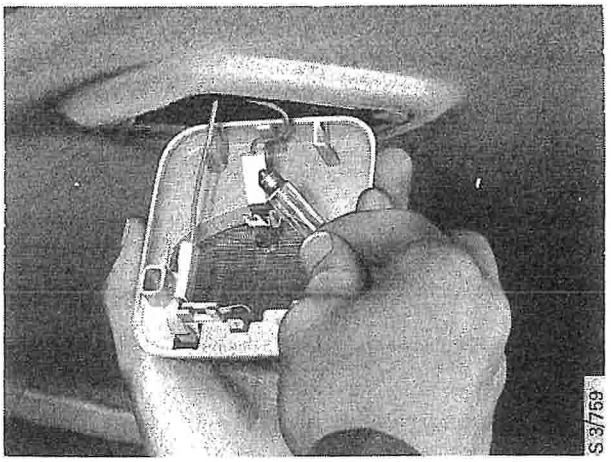
On some models, the interior lighting is wired through a time-delay relay (located under the back seat), and will therefore remain alight for about 15 seconds after the doors have been closed or until the ignition has been switched on.

To change the bulbs

Roof lamp (except convertible)

1 Pull down the rear edge of the lamp fitting.

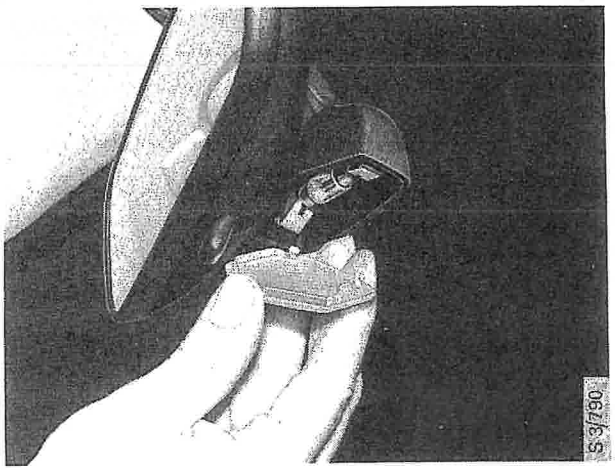
2 Change the bulb.



Lamp on the inner rear-view mirror

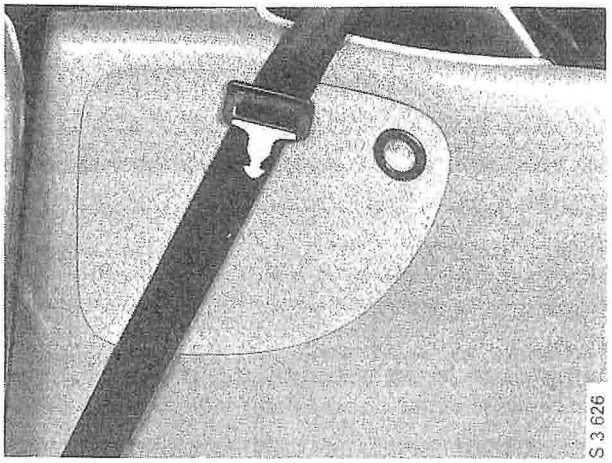
1 Remove the lens.

2 Change the bulb.

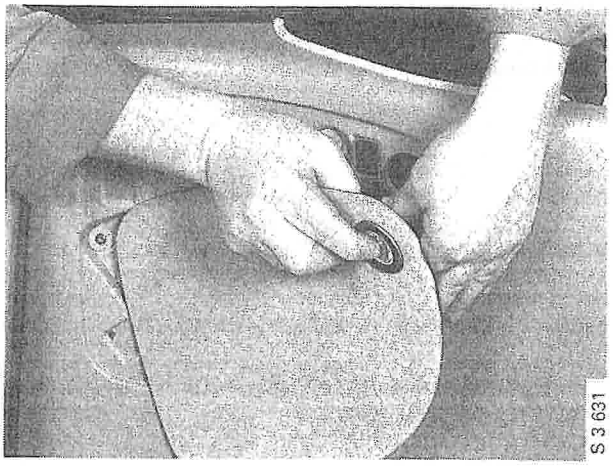


Reading lamps (convertible)

1 Remove the corresponding speaker grille.



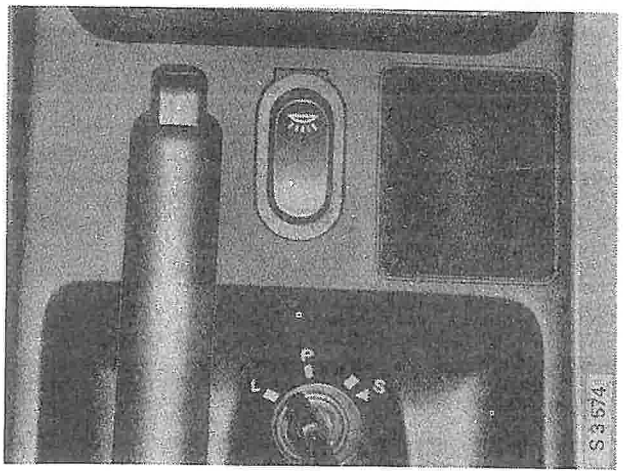
2 Change the bulb.



Lighting for the ignition switch and selector lever scale (cars with automatic transmission only)

General

The lamp at the ignition switch can be operated by the door switches, or by a switch at the gear-lever housing. On cars with automatic transmission, the selector lever scale is illuminated.



To change the bulbs

1 Remove the three screws holding the selector lever cover.

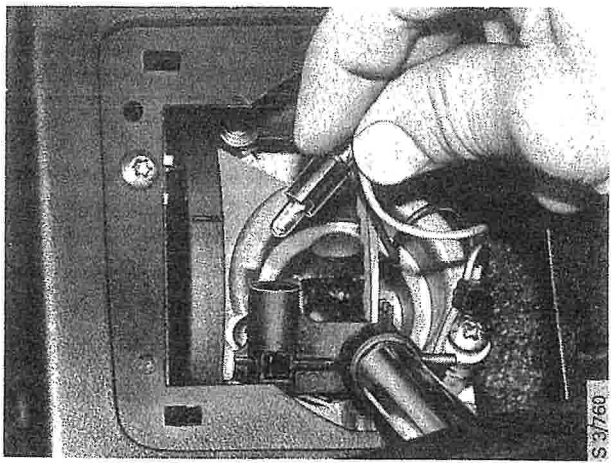
2 Raise the cover as far as possible, insert your hand under the cover and remove the lamp and holder from their bracket on the cover.

3 Withdraw the lamp and holder and change the lamp.

4 Fit the lamp and holder in their bracket on the cover.

5 Fit the three retaining screws for the selector lever cover.

The selector lever scale lamp is accessible when the cover is removed.

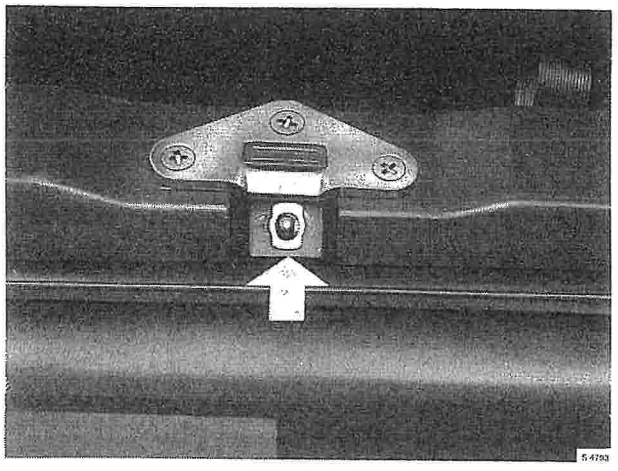


Luggage compartment illumination

General

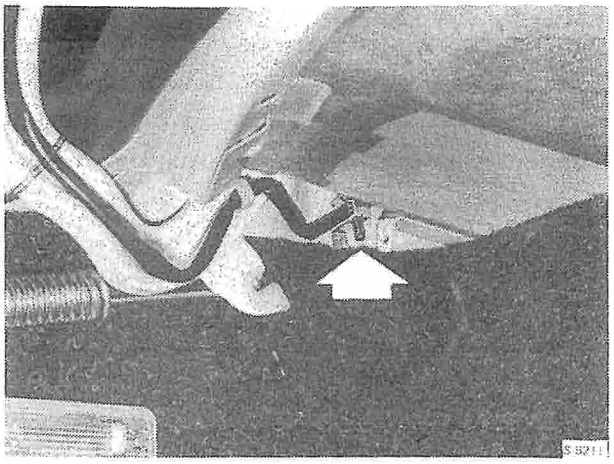
Combi Coupé

The luggage compartment lamp is fitted on the right-hand side of the luggage compartment and is operated by a switch at the striker plate, when the switch incorporated into the lamp is closed. This switch is operated by the lock on the luggage compartment lid.



Sedan

The luggage compartment lamp is fitted on the left-hand side of the luggage compartment and is operated by a switch located forward of the left-hand hinge for the luggage compartment lid, when the switch incorporated into the lamp is closed. This switch is operated by the hinge.



Convertible

The luggage compartment lamp is fitted on the left-hand side of the luggage compartment and is operated by a mercury switch located in the luggage compartment, when the switch incorporated into the lamp is closed.

To change the bulb

1 Remove the two screws holding the bulb holder and remove the bulb holder.

2 Remove the old lamp and insert a new one.

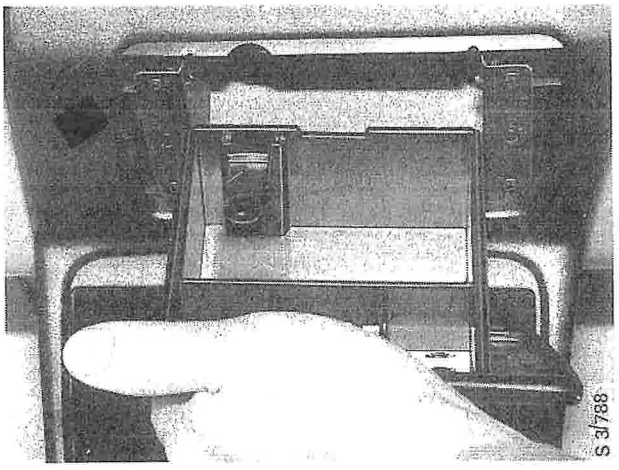
3 Fit the bulb holder.

To change the bulbs in the combined instrument

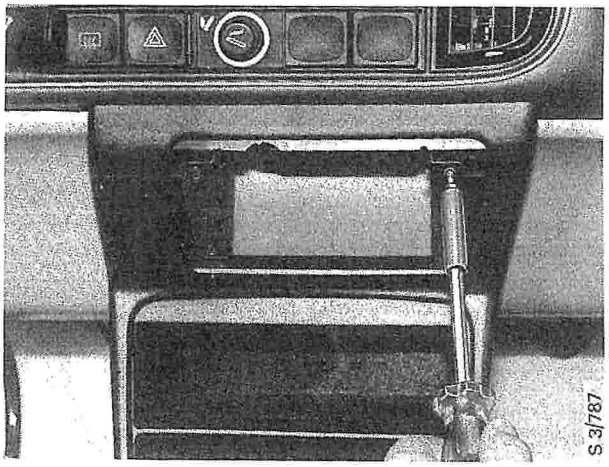
See Section 381, "Instruments".

Ashtray illumination

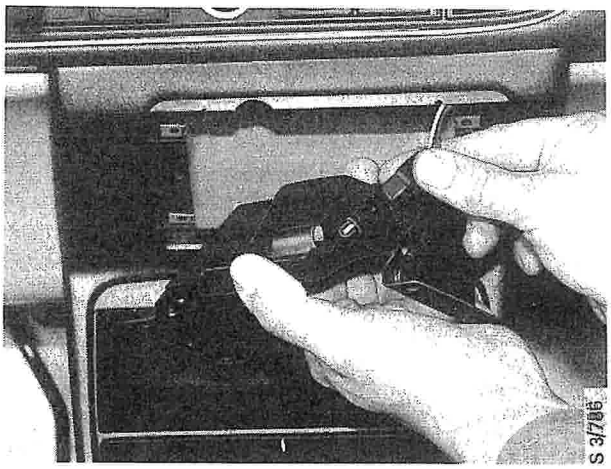
1 Remove the ashtray.



2 Remove the five screws.



3 Withdraw the ashtray holder and change the bulb.

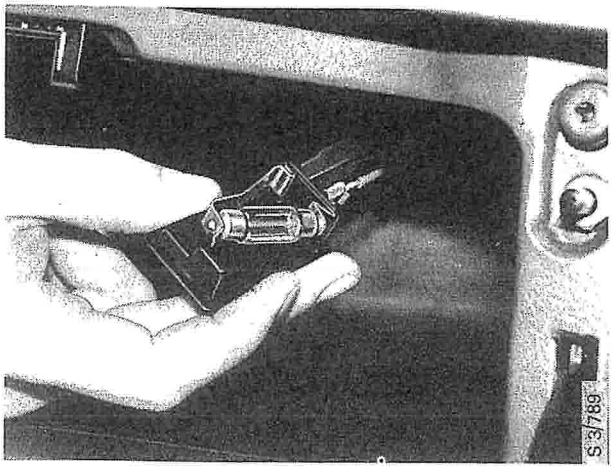


Glove compartment lamp

The glove compartment lamp is operated by a switch located on the right-hand side of the glove compartment.

1 Remove the cover.

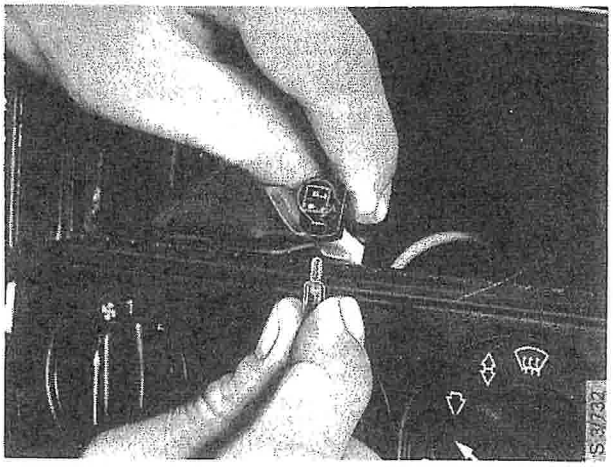
2 Change the bulb.



Illumination of controls

1 Remove the upper storage compartment.

2 Withdraw the bulb and change it.



Direction indicators

General

The direction indicators consist of flashing orange lamps at the front, on the sides and at the rear. On some markets, the front lamp clusters and the side direction indicator lamps are combined. The flasher unit is located under the facia and connected to a relay which indicates, by means of two green warning lamps in the combined instrument, that the direction indicators are switched on and that the lamps are operating. If one of the direction indicator lamps is defective, the warning lamp and other direction indicator lamps will flash at a faster-than-normal rate. If the flasher unit relay is working properly and bulbs of the correct rating are fitted, the flashing frequency should be 60 - 120 flashes per minute.

The flasher unit cannot be adjusted. If the other components (stalk switch, wiring and lamps) are in good condition, and the flashing rate is far from normal, the flasher unit is defective, and should be replaced.

Note:
If bulbs of the wrong rating are fitted, the flasher relay will not operate at the correct frequency.

To change the direction indicator lamps

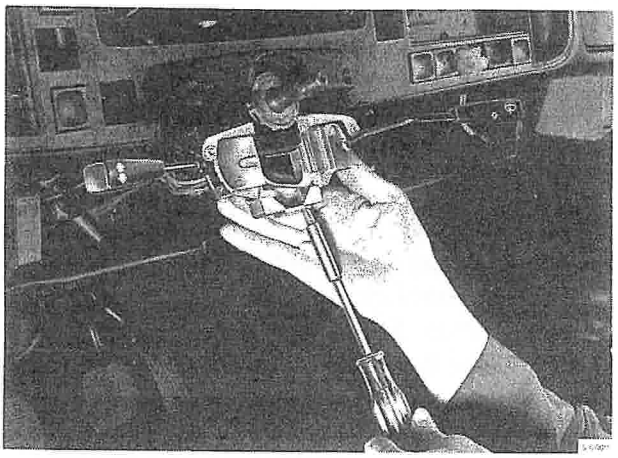
See Section 351, "Lighting".

To change the warning lamps

See Section 381, "Instruments".

To remove the direction indicator stalk switch

The direction indicator/dip switch and wiper/washer switch are located on a bracket fitted on the steering column bearing bracket. The bracket can be removed after removing the steering column bearing bracket.

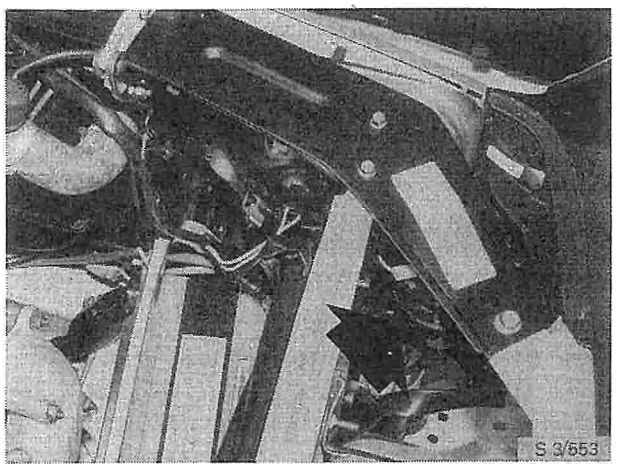


Horn, horn control

General

The Saab 900 is fitted with two windtone horns, one high-pitched and one low-pitched.

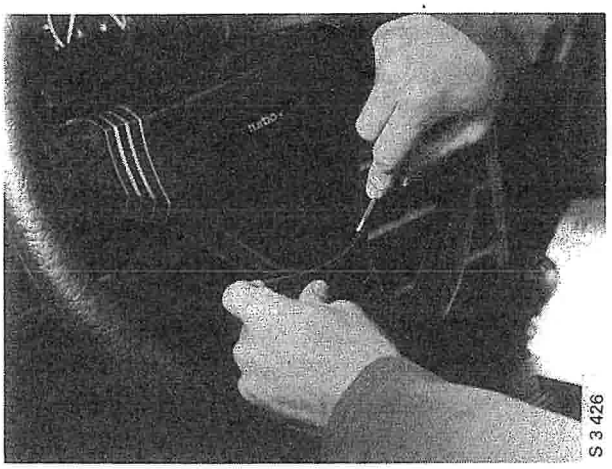
The horn is located on the right-hand side of the engine compartment, at the front, and is operated by means of switches incorporated into the steering wheel.



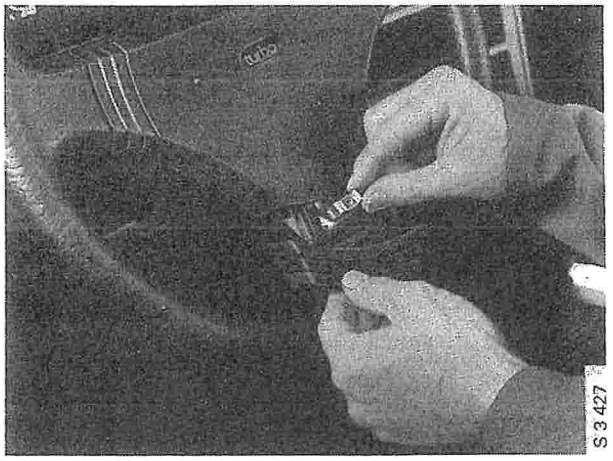
Horn switch (Turbo)

To remove

1 Remove the three horn buttons.

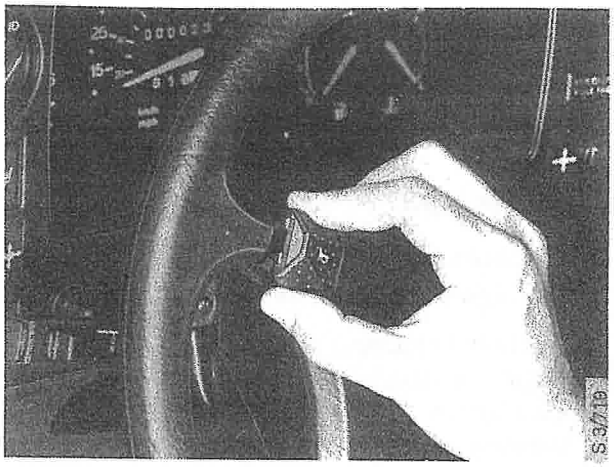


2 Lift out the spring contacts.



Horn switch (Others)

1 Remove the two horn buttons and disconnect the wiring.



Refit in the reverse order.

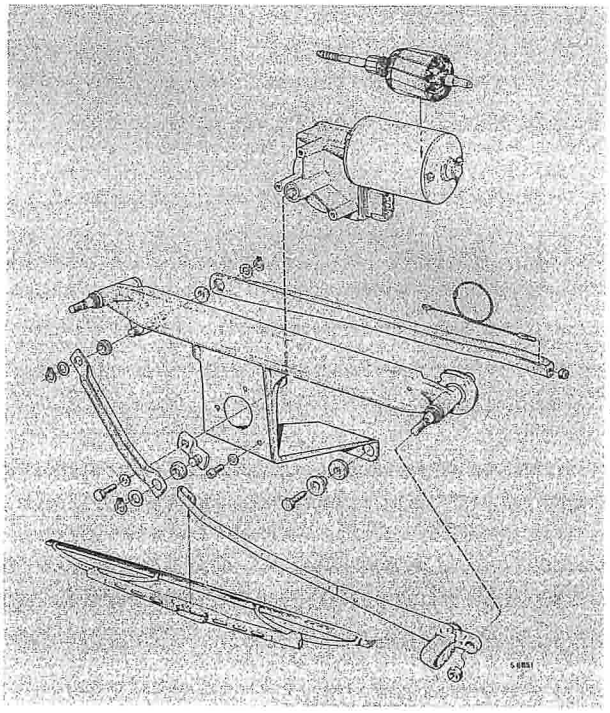
Wipers and washers

General

The windscreen wiper unit is mounted on the bulkhead, in the engine compartment. Two rectangular holes are provided in the bulkhead for the wiper spindles. The holes are sealed with rubber grommets.

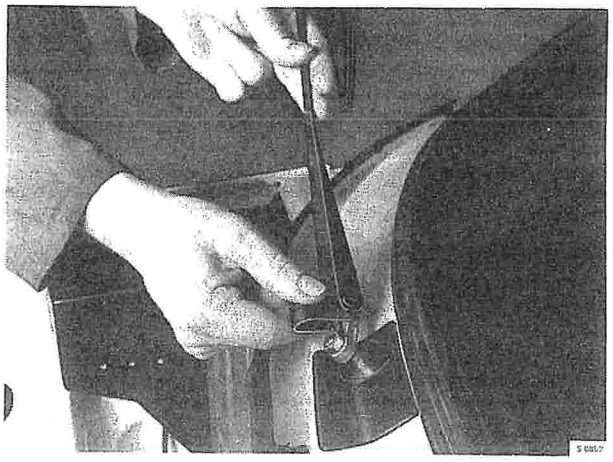
The spindles are driven by the wiper motor, via linkages and cables.

The wiper arms are fitted in splines and retained by nuts.

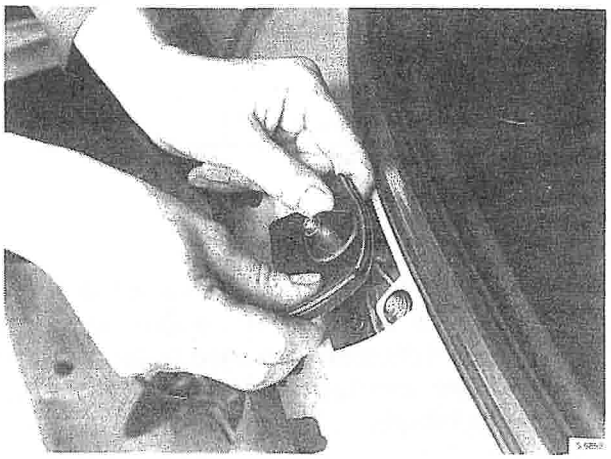


To remove

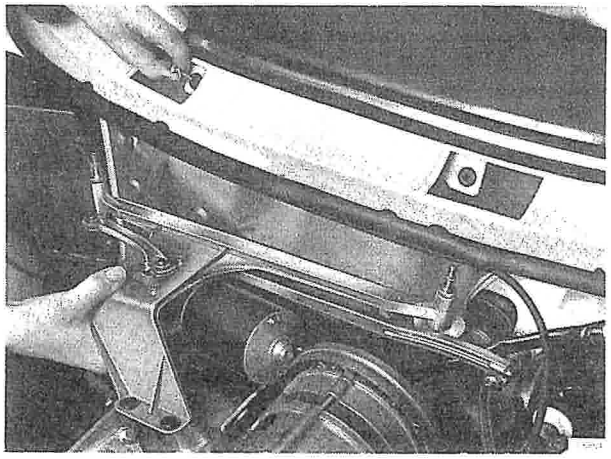
1 Raise the wiper arm from the windscreen, fold back the cover on the arm and remove the nut and the arm.



2 Remove the rubber grommet from the spindle.



3 Remove the four securing bolts, disconnect the connector and lift out the wiper unit.



Refit in the reverse order.

Headlamp wipers (except US, JP)

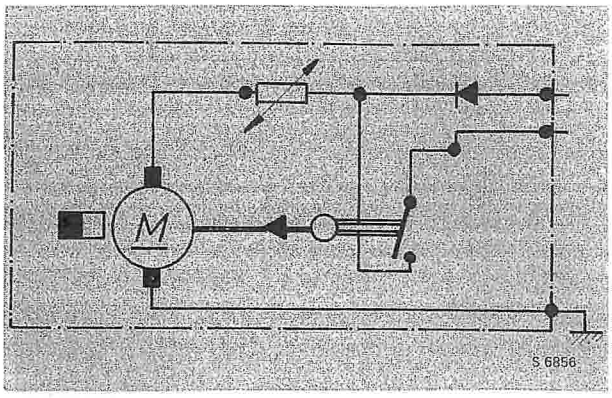
General

The headlamp wiper system consists of a separate motor for each wiper, fitted underneath each headlamp. The nozzles for the headlamp washers are incorporated into the wiper arms.

The wiper arms will automatically sweep the headlamp lenses five times, each time the wiper motors are switched on.

The motors have built-in overload protection (e.g. to avoid damage to the motor if the wiper blade should freeze to the lens), consisting of a switch actuated by a PTC resistor connected in series with the motor.

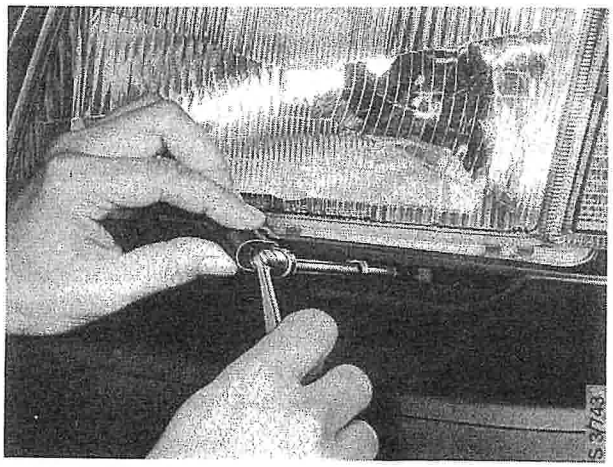
A diode in the supply circuit prevents reverse current being supplied from the motor to the washer pump.



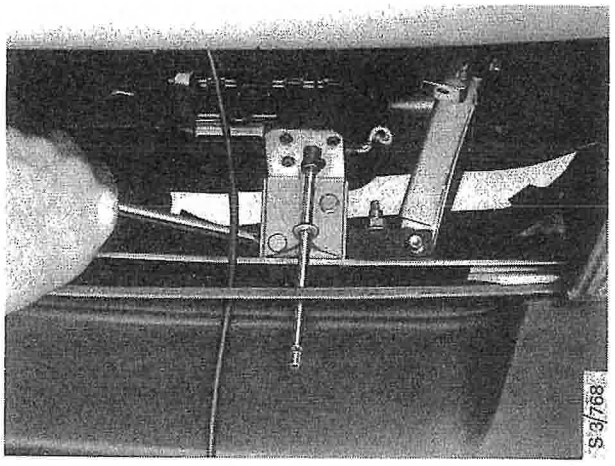
To remove

1 Remove the wiper arm.

2 Remove the headlamp. (See Section 351 "To change the headlamp lenses".)



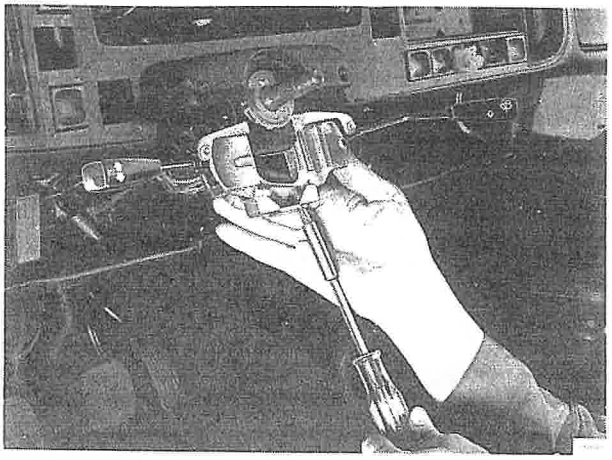
3 Remove the wiper motor.



Refit in the reverse order.

To remove the wiper/washer switch

The direction indicator/dip switch and wiper/washer switch are located on a bracket fitted on the steering column bearing bracket. The bracket can be removed after removing the steering column bearing bracket.



Windscreen and headlamp washers

General

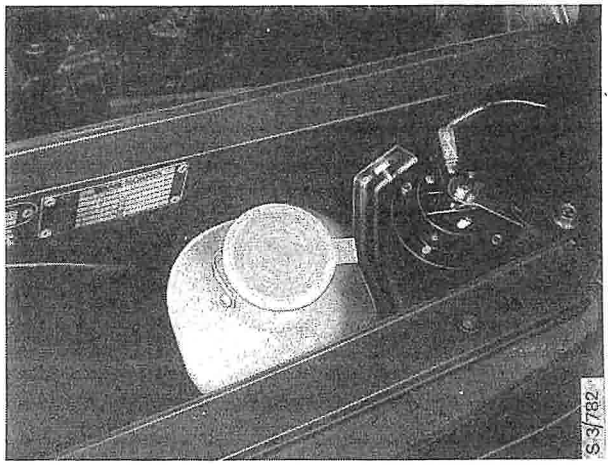
The washer reservoir is located forward of the right-hand wheel housing. The washer pump is located in the bottom of the reservoir.

The hoses run from the pump to the nozzles. The nozzles for the windscreen washers are fitted in the bonnet. The nozzle on the driver's side has two jets and the one on the co-driver's side has one jet. A non-return valve in the hose to the windscreen washer nozzles prevents the hose from draining when the washers are switched off.

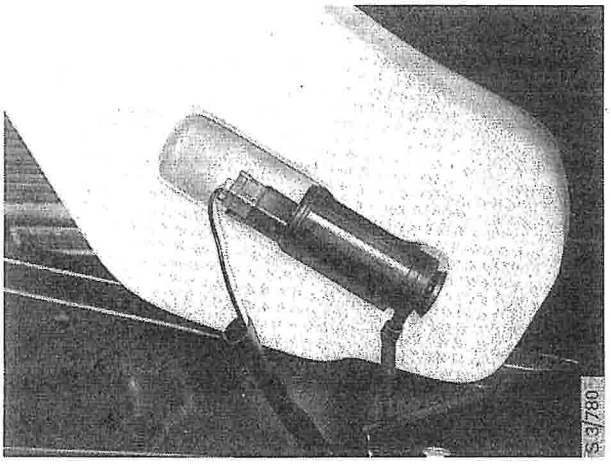
The nozzles for the headlamp washers are incorporated into the wiper arms. A delivery valve in the supply hose to these nozzles opens when the pressure has risen to between 0.35 and 0.50 bar (5.1 - 7.2 psi). The purpose of this is to guarantee a certain supply of fluid to the windscreen washers before the headlamp washers start to operate.

To remove

1 Remove the bracket.

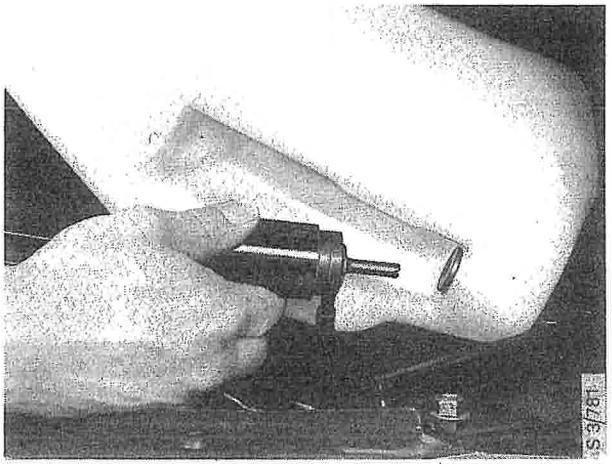


2 Lift out the reservoir.



3 Disconnect the the connector and hose.

4 Remove the pump by easing it out slightly and then lifting it up.



Note:
To avoid spillage when the washer pump is removed, make sure that the washer fluid reservoir contains no more than 0.5 l (0.5 qts) of fluid.

Refit in the reverse order.

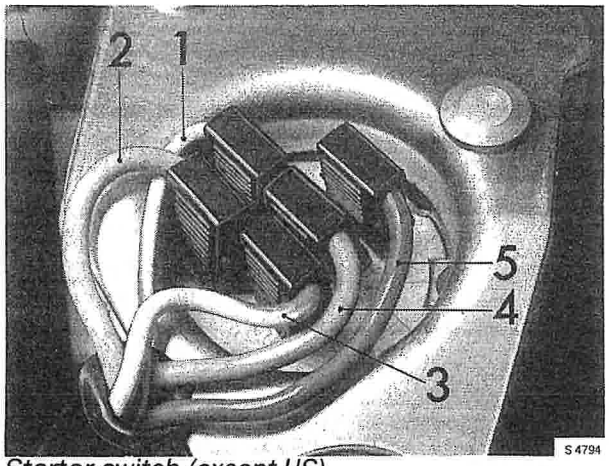
Electrical controls and switches

Ignition/starter switch

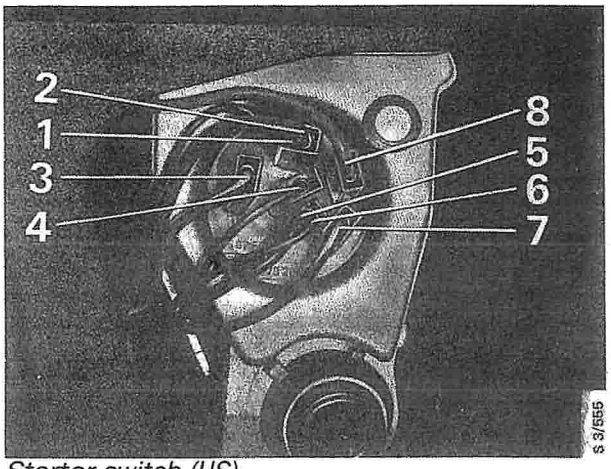
The switch is located in the gear lever housing. It has five (six for US) terminals and is wired as illustrated. Cars with automatic transmission or electric sunroof have an additional green lead connected to terminal 15.

A relay is included in the circuit, to prevent overloading of the ignition switch contacts.

The procedure for replacing the ignition switch is described in section 432, "Transmission control".



Starter switch (except US)
1 Grey/white to 54
2 Yellow/red to 50
3 Green/white to 15
4 Grey to 30
5 Red to X



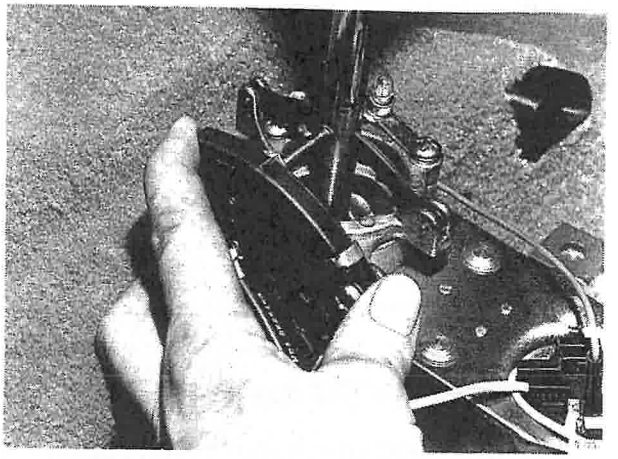
Starter switch (US)
1 Grey to 30
2 Grey/red to 30
3 Green/white to 15
4 Green to S
5 Red to X
6 Red to X
7 White/grey to 54
8 Yellow to 50

Reversing light/starting interlock switch (automatic transmission)

The switch is located in the selector lever housing.

To adjust

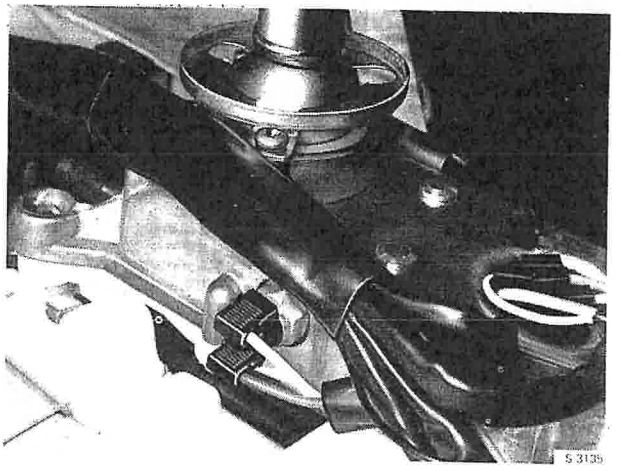
Move the selector lever to neutral (N). Rotate the switch until the lever is in line with the mark on the switch. Tighten the two screws securing the switch.



Reversing light switch (manual gearbox)

On cars with manual gearbox, the reversing light switch is located under the console, to the left of the gear lever. The switch closes when the gear lever is moved to the reverse gear position.

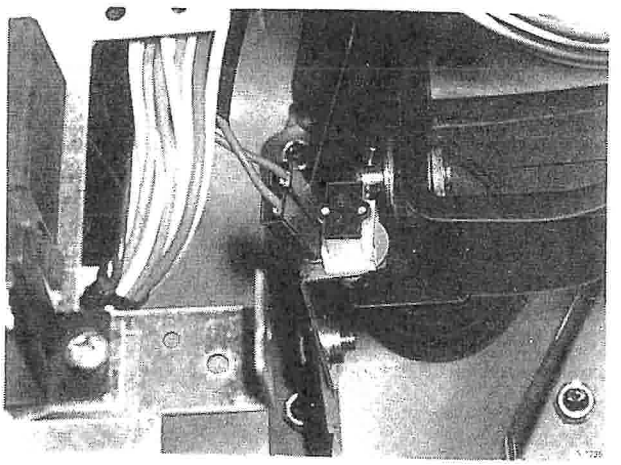
In certain cases, the reversing light switch may enter the gear-lever housing too far when it is screwed in, and be damaged. This can be avoided by fitting a washer (part No. 79 74 686) between the switch and the gear-lever housing.



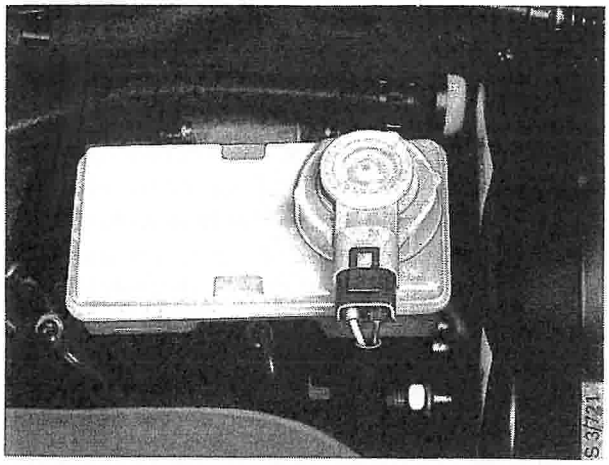
Brake light switch

The brake light switch is actuated mechanically by the brake pedal. The switch is located in the pedal assembly, adjacent to the push-rod to the brake servo unit.

The switch should be adjusted so that the brake lights are switched on when the pedal has been depressed about 0.4 in (10 mm).



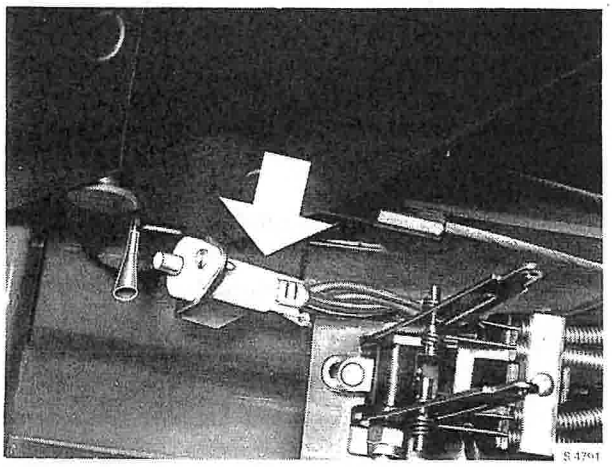
Brake warning lamp switch



The switch for the brake warning lamp is fitted in the filler cap on the brake fluid reservoir. The switch is actuated by a float which senses the fluid level in the reservoir. When the fluid has dropped below a predetermined level, the switch will close and the warning lamp will light up.

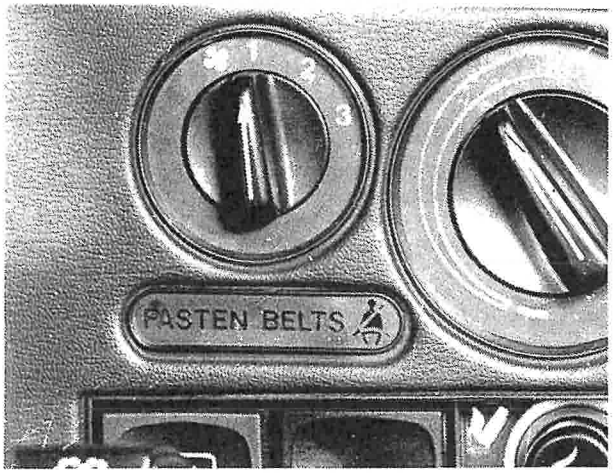
To check the switch, depress the contact in the centre of the filler cap. The warning lamp should then light up.

Switch for handbrake warning lamp



The switch for the handbrake warning lamp is located to the right of the handbrake lever, under a bracket. The switch closes when the handbrake lever is raised.

Seat belt warning lamp



A warning lamp on the facia will be switched on if a front-seat occupant has not fastened his seat belt. (On certain markets, a buzzer will also sound.)

The seat-belt warning system includes the following components:

Warning lamp - in the centre of the facia

Switch - in the co-driver's seat

Contacts - in the seat-belt buckle

Relay for the seat belt/ignition key warning buzzer - under the back seat.

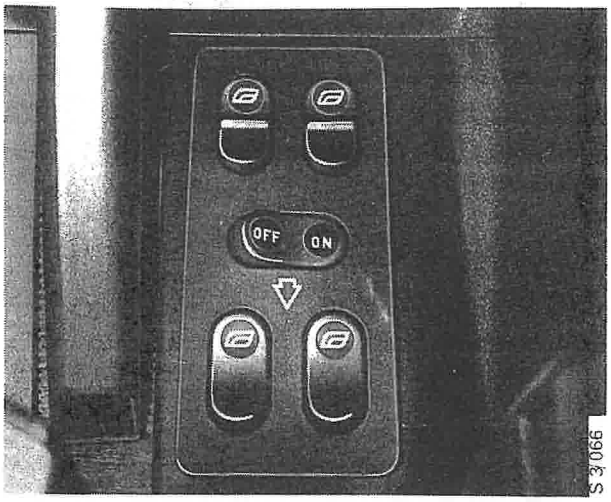
The seat belt warning lamp will be switched on if the ignition is switched on and:

a The driver has not fastened his seat belt, or

b The co-driver has not fastened his seat belt.

Electrically operated windows

The windows are operated by spring-loaded two-position switches (three-position switch for the driver's door) located in the centre console between the front seats. All windows can be operated from this array of switches. An interlock switch on the centre console enables the driver to render inoperative the window control switches on the rear doors. The electric motors include limit switches which will automatically stop the motor when the window has reached the top or bottom limit of its travel. The motor also includes a slipping clutch which will come into operation if the window does not move freely.



Automatic window regulator control

All cars with electric window regulators are equipped with a relay (located under the back seat) for operating the window in the driver's door.

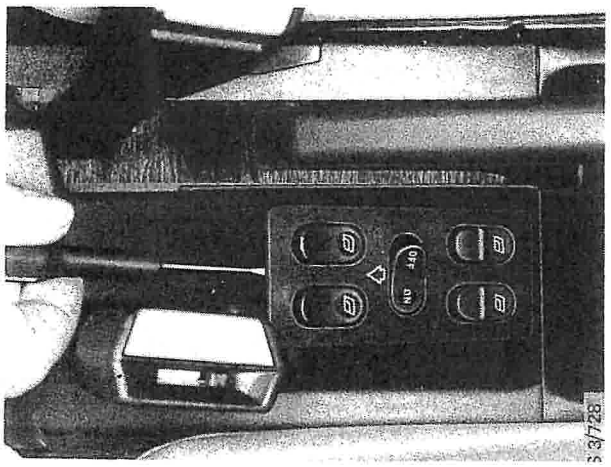
The switch has two contact positions for the downward travel of the window and one contact position for the upward travel.

The window can be opened as follows:

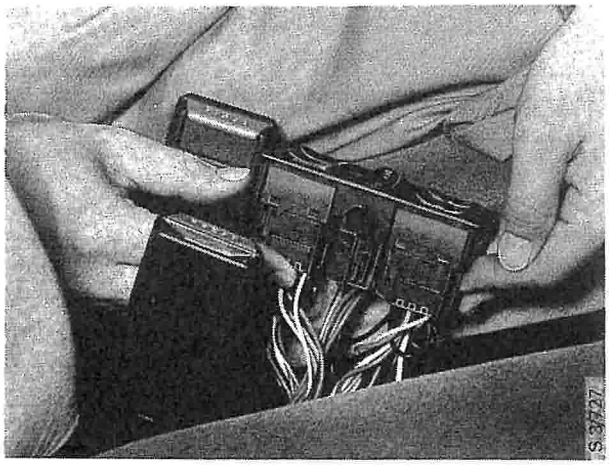
- If the switch is depressed lightly to the first contact position, the window will keep opening as long as the button is kept depressed.
- If the button is depressed more firmly to the second contact position, the relay will be energised and the downward travel of the window will continue even after the switch has been released. The downward travel will be interrupted when the window has reached the bottom limit of its travel or if the switch is actuated for closing the window.

To remove the switches for the electric windows

1 Gently prise up the switch panel using a screwdriver.

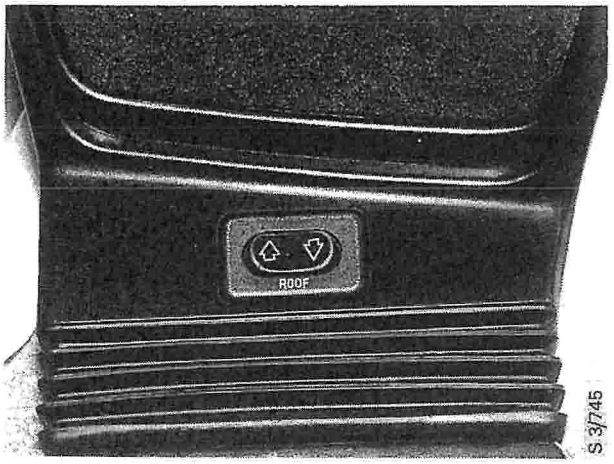


2 Lift off the panel and change the switch.



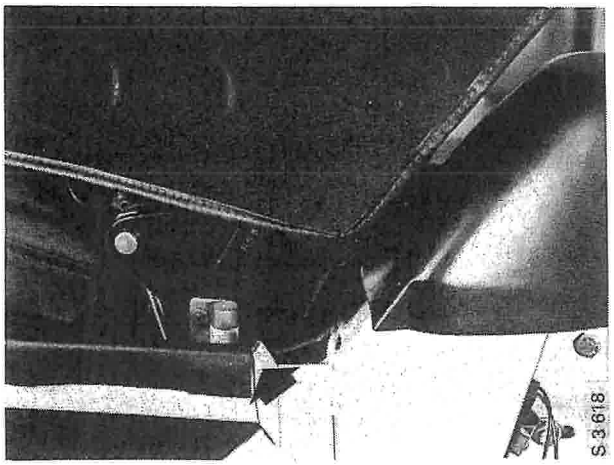
Switch for sunroof/top

On cars equipped with an electrically operated sunroof or top, the corresponding switch is located on the centre console, forward of the gear lever.



Mercury switch

The mercury switch interrupts the supply to the heater for the rear window when the top is lowered. It is located at the top of of the frame member for the convertible top, on the left-hand side.



Rheostat for instrument lighting

The instrument lighting can be steplessly adjusted by means of a rheostat.

The instrument lighting is switched on automatically when the ignition is switched on.

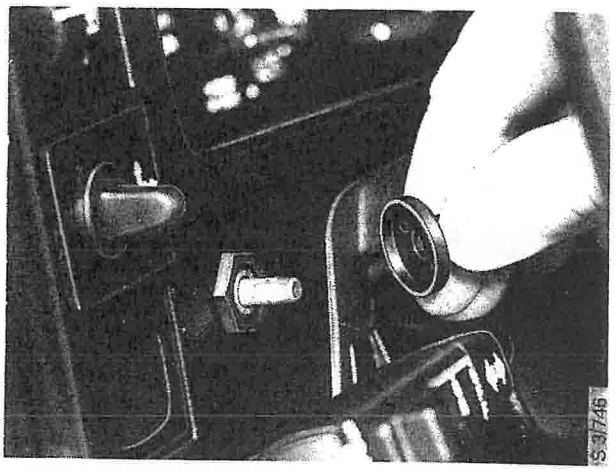
To remove the rheostat

The rheostat can be changed once the combined instrument has been removed.

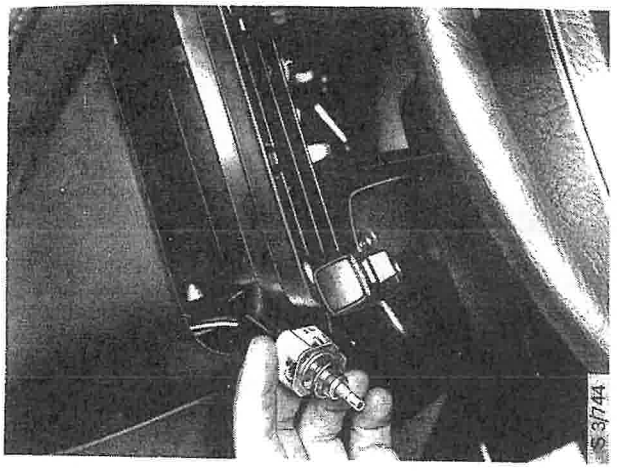
To remove the extra rheostat (US, CA, JP only)

1 Remove the two screws on the left-hand side of the switch panel.

2 Remove the knob and the nut.

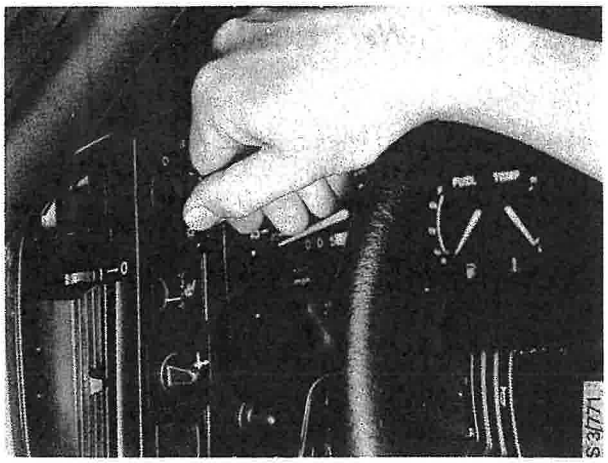


3 Carefully withdraw the panel, then the rheostat, and disconnect the connector.



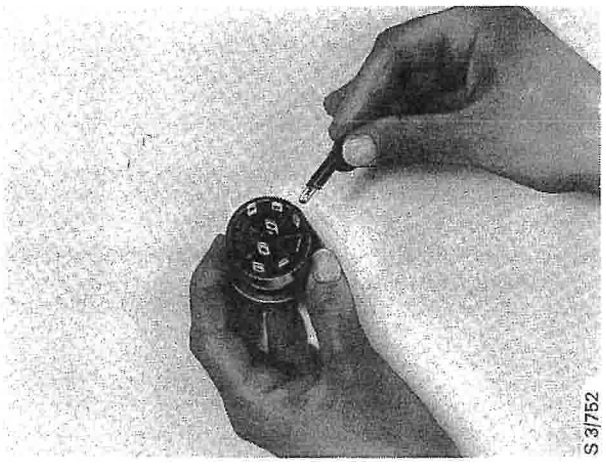
To remove the light switch

1 Withdraw the switch.



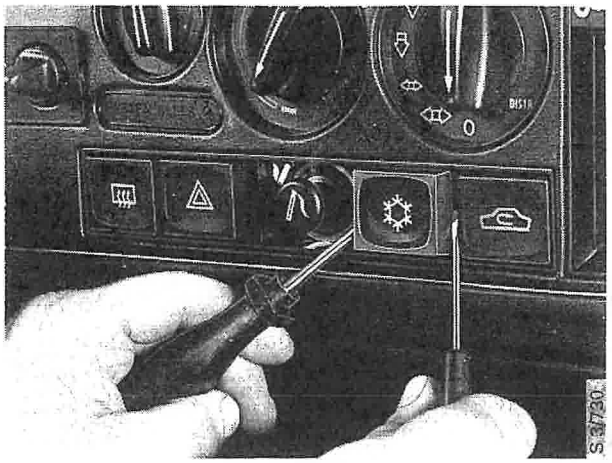
2 Disconnect the connector.

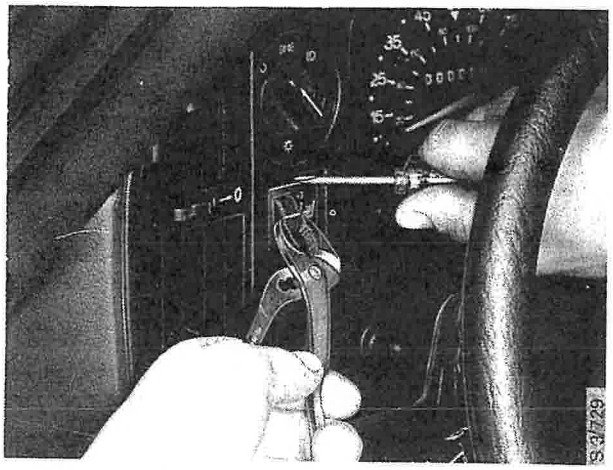
3 Change the bulb or the switch.



To remove the switches for the rear-window heater, hazard warning lights, AC, ventilation fan and variable heating of the front seats.

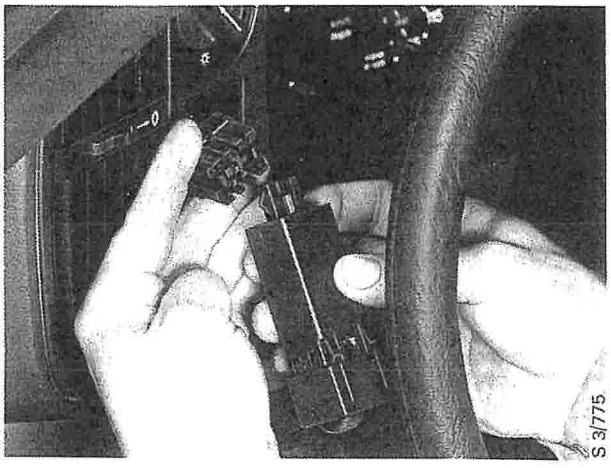
1 Withdraw the switch.





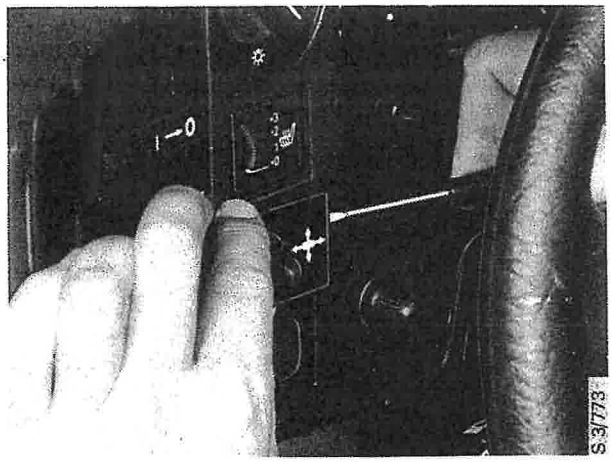
2 Disconnect the connector.

3 Change the switch.

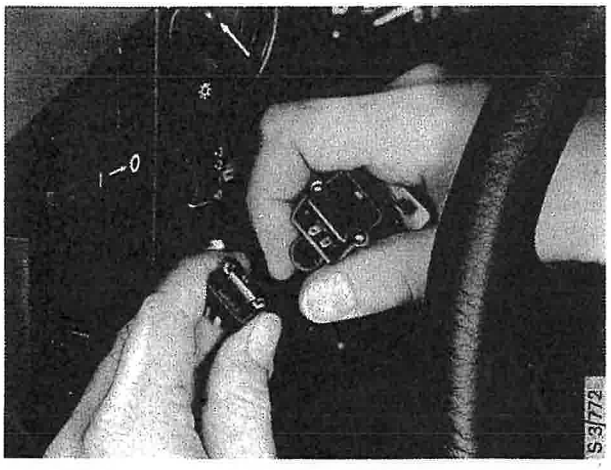


To remove the rear-view mirror switches

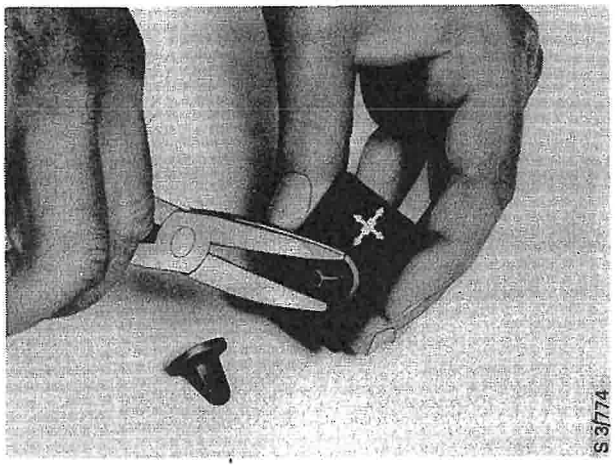
1 Withdraw the switch.



2 Disconnect the connector.

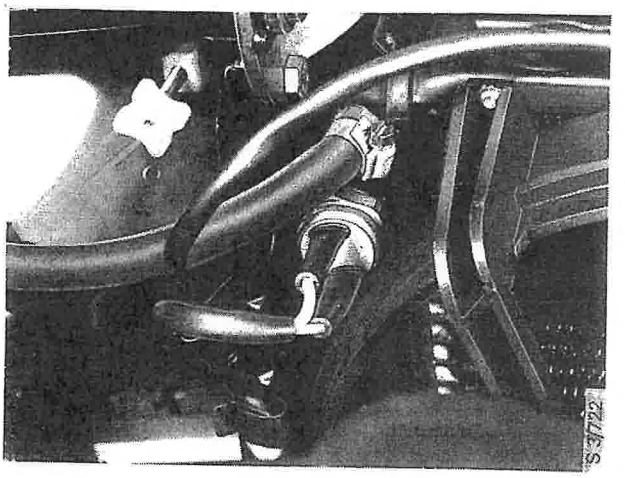


3 Slide the cover plate over.



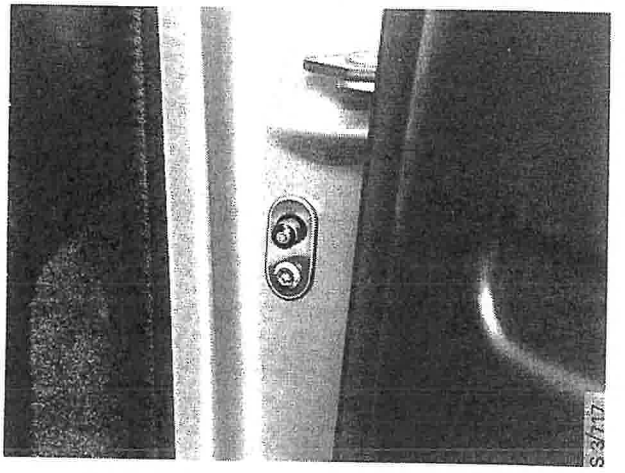
Thermostatic switch for radiator fan

The thermostat for the radiator fan is fitted to the upper left-hand corner of the radiator.



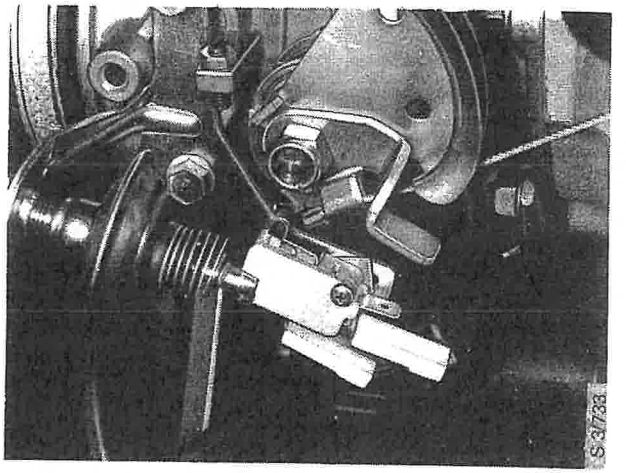
Door switches for interior lighting

The door switches are located in the A and B pillars.



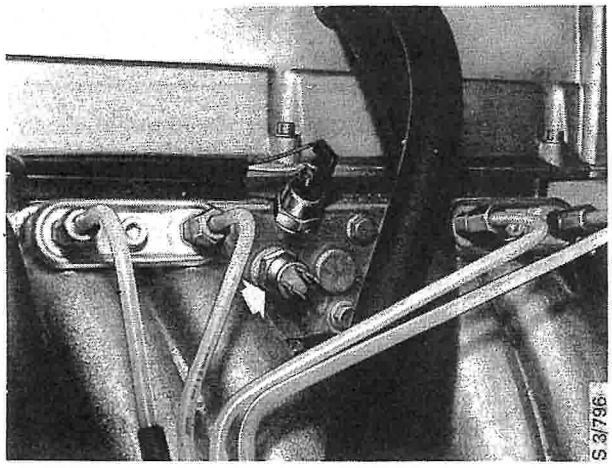
Throttle switch for shift-up indication (US)

The throttle switch is located on the throttle housing.



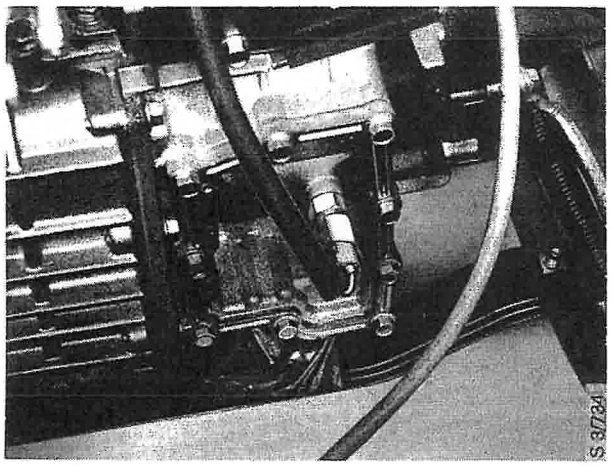
Thermostatic switch for shift-up indication (US)

The thermostatic switch is fitted on the engine, between the two intake ports of the intake manifold.



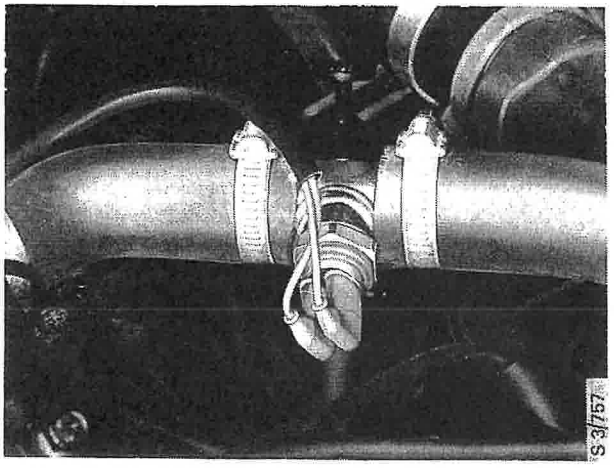
Switch for shift-up indication (US)

The switch is fitted in the front side cover, on the gearbox.



Thermostatic switch for radiator coolant, AC

The thermostatic switch is located in the radiator intake hose.



To replace the direction indicator stalk switch

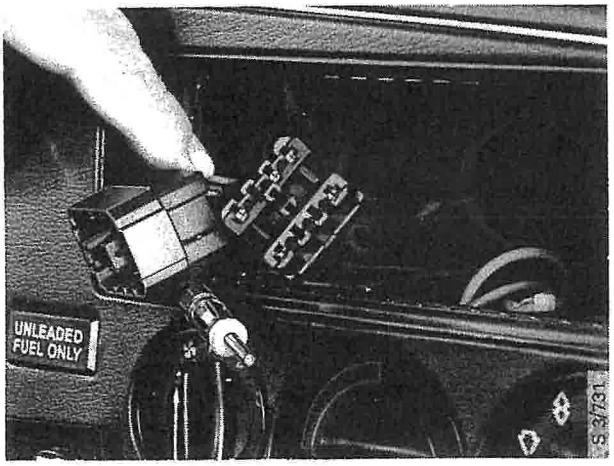
See section 361, "Direction indicators".

To replace the wiper/washer switch

See section 363, "Wipers and washers".

Factory-run wiring for the radio

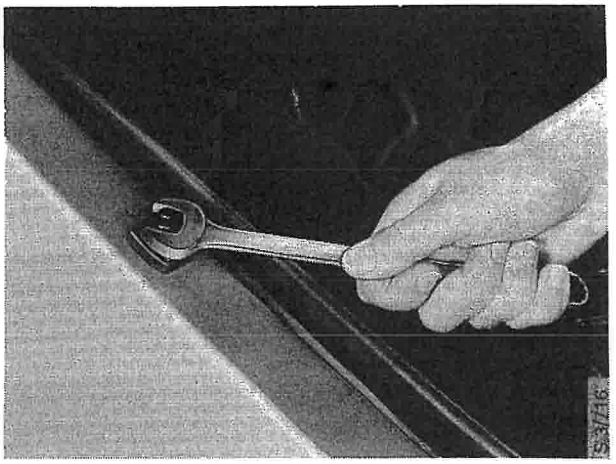
All cars are ready-wired at the factory, with all cables for the front speakers (and, on some variants, also for the rear speakers), and for the power supply to the radio and to the electrically operated aerial. This wiring runs to two 10-pole connectors in the centre console. The aerial cable is also run to the centre console. Some models have factory-fitted front and/or rear speakers, and an electrically operated aerial.



Electrically operated aerial

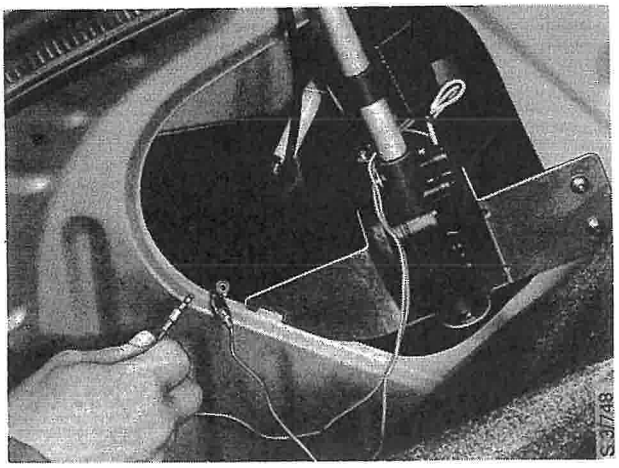
To remove

1 Remove the nut.



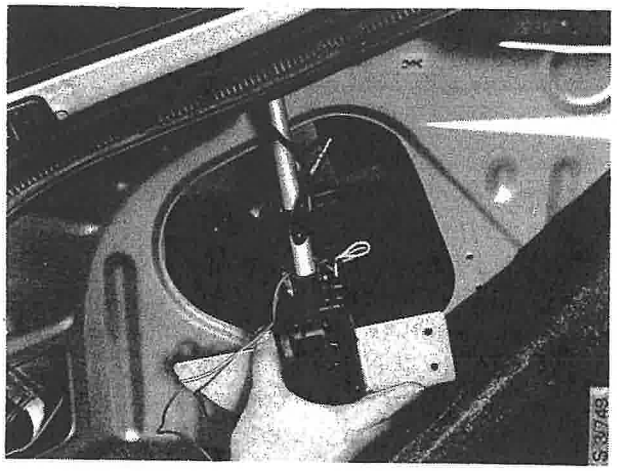
2 Fold back the trim.

3 Disconnect the two-pole connector and the aerial cable.



4 Remove the screws.

5 Remove the aerial downwards.



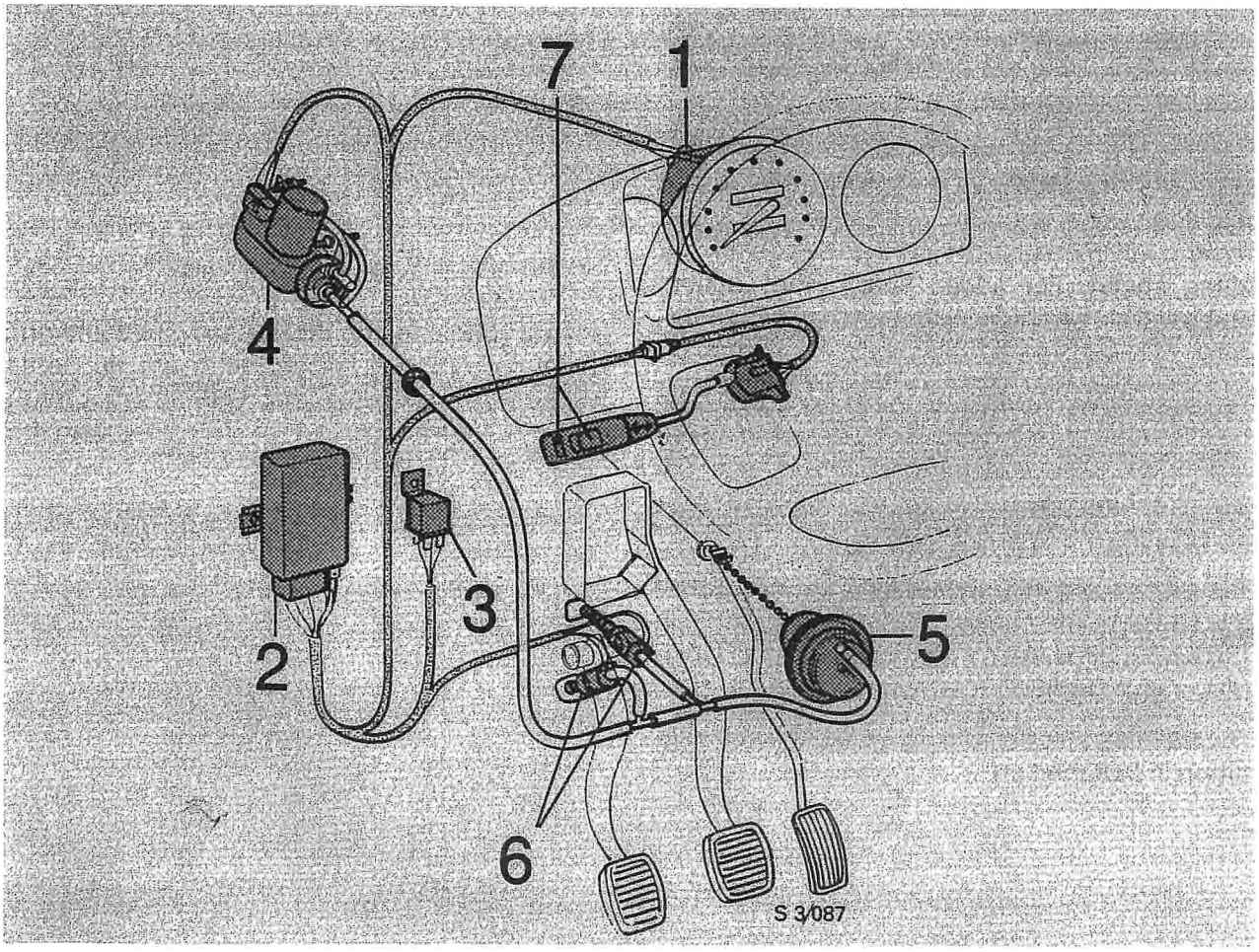
To fit

Refit in the reverse order.

Cruise Control

General

Certain variants are equipped with the Cruise Control system. It enables the driver to preselect the speed of the car and then take his foot off the accelerator pedal, leaving the system to keep the car travelling at the preset speed. The driver sets the system by means of a switch on the direction-indicator stalk. The system will be switched out automatically if either the clutch pedal or brake pedal is depressed or if the switch is moved to the OFF position. The Cruise Control system can be used at speeds above 21 mph (34 km/h).



1 Speed sensor
2 Electronic control unit
3 Relay
4 Vacuum pump
5 Vacuum regulator
6 Pedal switches
7 Selector switch

Principle of operation

The main components of the system are the speed sensor, electronic control unit, relay, vacuum pump, vacuum regulator, pedal switches and the selector switch, incorporating functions for SET SPEED, RESUME, OFF and ON.

When the SET SPEED button is briefly depressed, the signal transmitted by the speed sensor will be stored in the electronic control unit. The vacuum pump will start, drawing in the diaphragm in the vacuum regulator which, in turn, actuates the throttle cable. The throttle will then be set to the correct position for the preset speed.

The speed sensor senses any variations in the speed of the car and, via the electronic control unit, sends signals to the vacuum motor to raise or reduce the vacuum to keep the car travelling at the selected speed.

If the driver touches the accelerator pedal briefly to increase the speed of the car, the system will revert to the selected speed as soon as the accelerator is released.

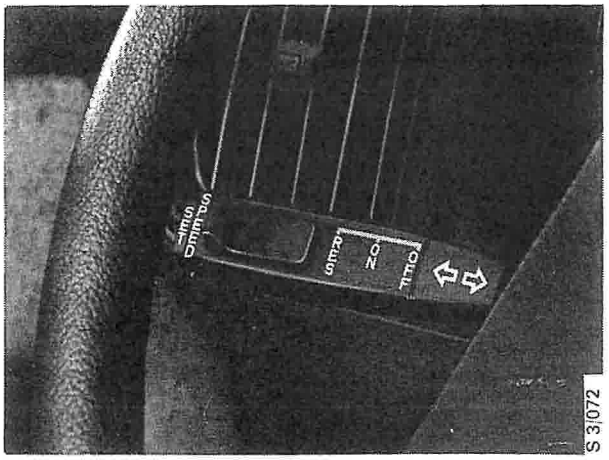
If either the brake pedal or clutch pedal is depressed, the respective pedal switch will break the circuit, the vacuum will collapse and the throttle will immediately return to the position for idling speed. For added safety, the vacuum pump will simultaneously be switched off electrically.

The system has a memory function which enables it to revert to the previously selected speed after it has been disengaged by operation of the clutch or brake pedal. To do this, the driver simply presses the RESUME button.

The system will be automatically switched off if the speed of the car should drop below 21 mph (34 km/h), if the switch is moved to the OFF position or if the ignition is switched off.

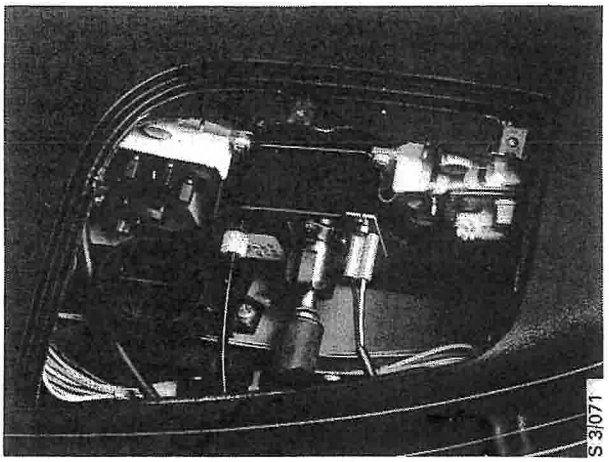
The memory function will be erased when the ignition is switched off.

The switch for the Cruise Control system is incorporated into the direction indicator stalk.

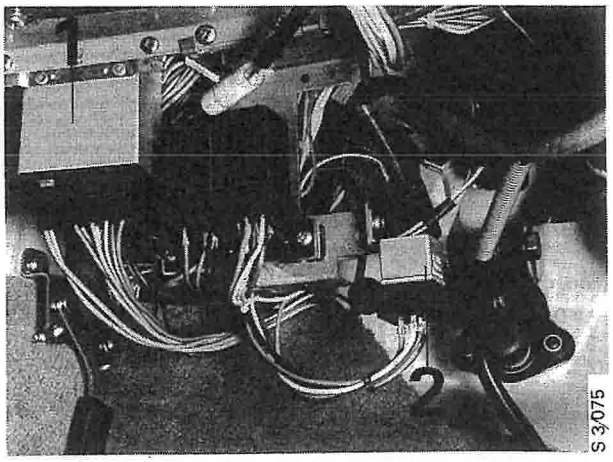


S 3/072

The speed sensor is located on the back of the speedometer. To gain access to the sensor, remove the speaker grille.

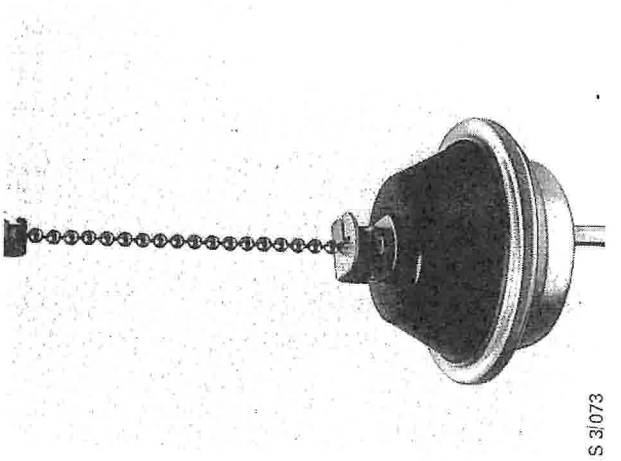

S 3/071

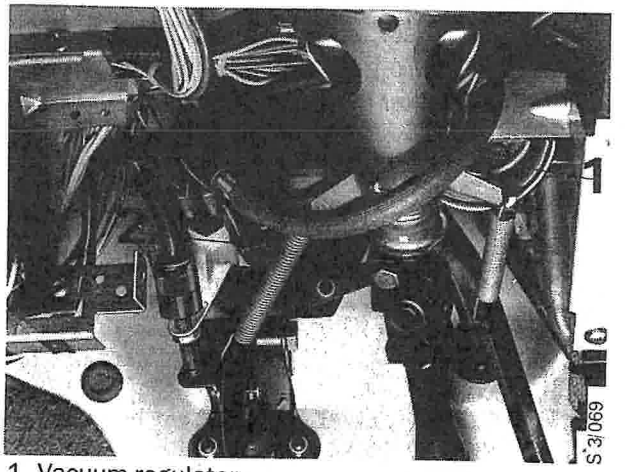
The electronic control unit and one relay are located on the relay bracket, on the left-hand (right-hand on RHD cars) side of the car, under the facia.


S 3/075

1 Electronic control unit
2 Relay

The vacuum regulator is fitted on a bracket in the heater housing. When removing and fitting the regulator, take care not to damage the rubber gaiter. Fit the ball chain between the vacuum regulator and the throttle cable as tightly as possible, but without moving the throttle cable.


S 3/073

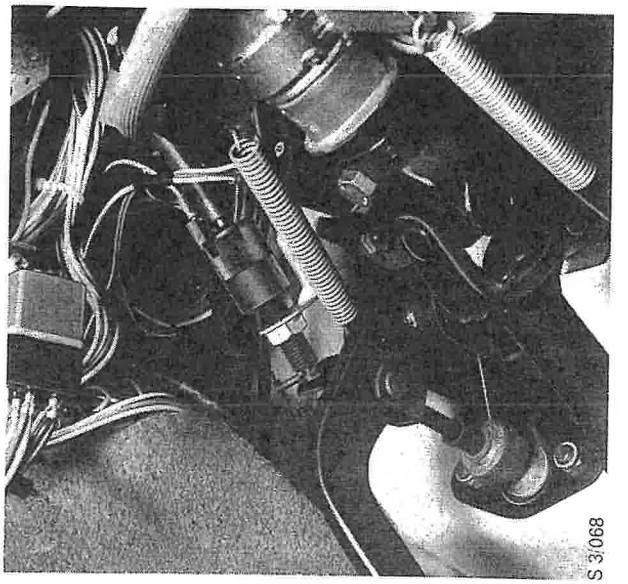

S 3/069

1 Vacuum regulator
2 Pedal switches

The pedal switches are fitted to the same bracket as the brake light switch. Adjust the switches so that there is clearance of 1 mm (0.04 in) between the threaded part of the switch and the actuator button. (See the illustration.)

Make sure that the pedals are in the fully returned position before adjusting the clearance.

Note:
The pedal switches must never be adjusted so that they act as stops for the pedals.


S 3/068

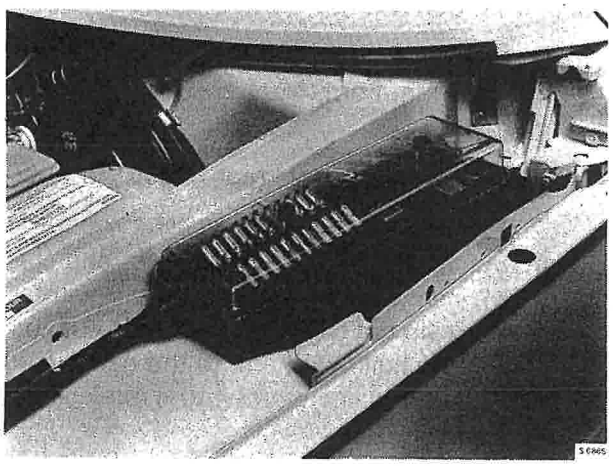
Cables, fuses and relays

Cables

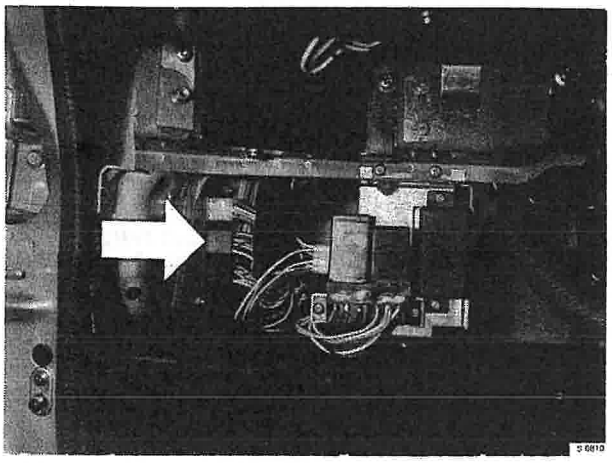
The cable harnesses run to the electrical distribution box, located on the left-hand wheel housing in the engine compartment.

The electrical distribution box also houses the fuses, relays and Timing Service Instrument socket.

The electrical distribution box is sealed by means of a transparent cover. A drain plug is fitted in the bottom to allow any water present to drain out.



The connections between the electrical distribution box and the interior of the car are made via three multi-pin connectors fitted to the bulkhead.



Connectors

The cables are collected in cable harnesses and enclosed in plastic sheaths. The individual cables branch off successively to the various components.

The following major circuits run from the electrical distribution box:

1 Engine compartment, front circuit (to lights, radiator fan, horn, front section of the engine, etc.).

2 Engine compartment, rear circuit (to alternator, wiper motor, etc.).

3 Instrument circuit (to instruments and controls), connected to the electrical distribution box via the two lower multi-pin connectors in the bulkhead, and to the rear circuit via a multi-pin connector at the relay panel, under the facia.

4 Rear circuit (to electrical components in the interior and rear section of the car), connected to the electrical distribution box via the upper multi-pin connector on the bulkhead, and to the instrument circuit via a multi-pole connector at the relay panel, under the facia.

The cables collected in the cable harnesses are colour-coded. All wiring connections are made by means of solder-free AMP connectors, most of them of splash-proof design. These connectors cannot be repaired, and 200 mm long cables, complete with male or female connectors, are therefore available for repair work. If the cables are used in a system with a conductor area larger than 1.5 mm^2, they should be shortened as much as possible.

The cables should be connected to the existing cables by means of crimped connectors, which should be sealed with silicone.

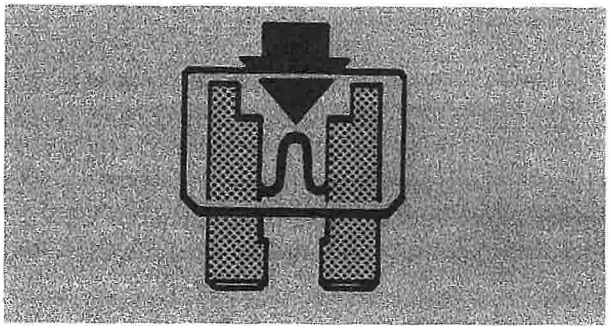
Check that the connections are tight, to avoid unnecessary voltage drops. Should a fuse or fuses blow frequently, or if breakdown of the insulation is suspected, carry out an insulation test on the cable harness.

When fitting new cables, always make sure that the conductor area of the cable is suitable for the current it must carry and that the cable is suitably protected by grommets where it passes through sheet metal and where it is held by clips.

Fuses

The electrical system of the car is equipped with a number of fuses to protect the circuits from abnormal surges of current and to reduce the risk of fire due to short-circuiting, etc. The fuses are located in the electrical distribution box, on the left-hand wheel housing in the engine compartment. All electrical system components are protected by fuses, except certain parts of the ignition system. The lid shows which fuse protects which circuit.

The fuses are of the blade type. The voltage drop across these fuses and the corresponding sockets is lower. In addition, these fuses are more resistant to corrosion.

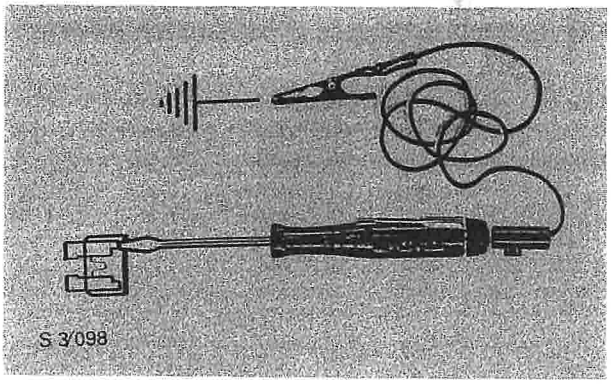


Five ratings are available:

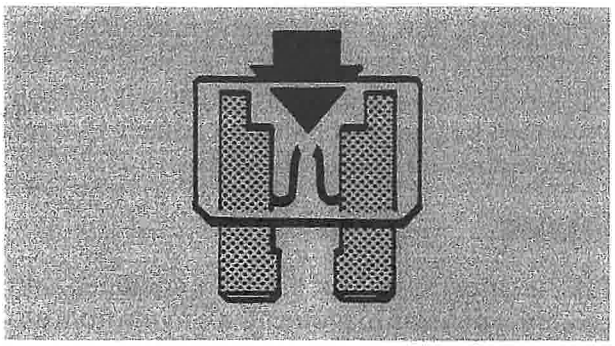
Red	10 A
Blue	15 A
Yellow	20 A
Transparent	25 A
Green	30 A

Checking the blade fuses

Every fuse is provided with two test tappings, to enable the fuse to be tested without the need to remove it. If both tappings are live, the fuse is intact.



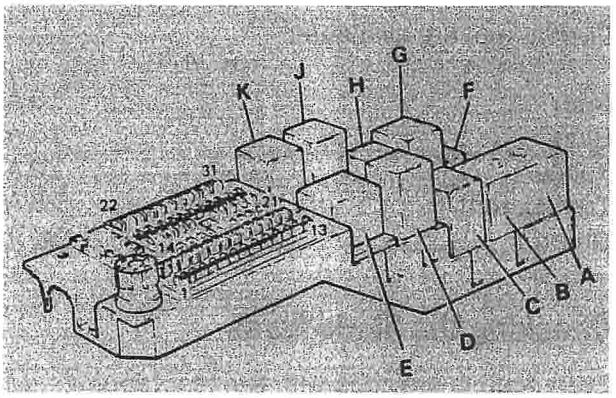
It is also possible to see whether a fuse has blown by removing it from the distribution box and checking the filament.



A special tool is provided in the electrical distribution box, to facilitate the removal and fitting of fuses.

Note:
When fitting a new fuse, always check that it makes proper contact. If a break in the circuit is suspected, check the fuse contact first.

When testing with a voltmeter: The voltage drop may not exceed 0.1 V.

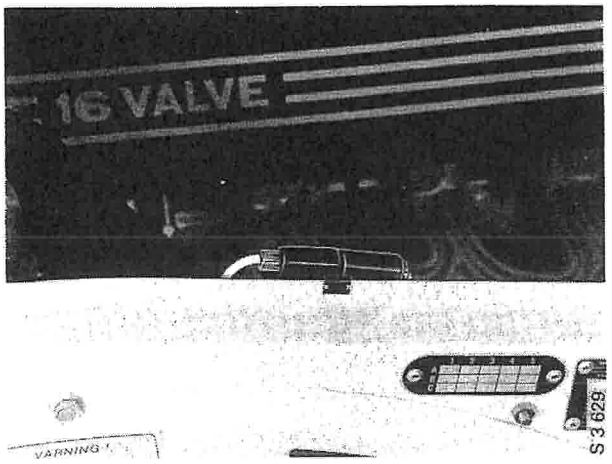


Locations of fuses

Fuse	Rating	Function
1	-	Spare
2	-	Spare
3	-	Spare
4	10 A	Shift-up indication (US), dim dipped beams (GB)
5	15 A	Brake fluid level warning lamp, windscreen wipers, headlamp wipers, seat-belt warning lamp, EXH warning lamp
6	30 A	Air conditioner (AC)
7	15 A	Direction indicators, tachometer, charging and choke warning lamps
8	10 A	Headlamp wipers, rear-view mirrors, Cruise Control
9	30 A	Radiator fan
10	10 A	APC system, instrument lighting, glove compartment illumination
11	30 A	Window regulators, sunroof
12	20 A	Electric heating pads for the front seats, time delay for interior lighting
13	20 A	Reversing lights, cigarette lighter illumination
14	15 A	Headlamp full beam (right-hand)
15	15 A	Headlamp full beam (left-hand), full-beam warning lamp
16	15 A	Headlamp dipped beam (right-hand)
17	15 A	Headlamp dipped beam (left-hand)
18	10 A	Parking lights (right-hand), rear lights (right-hand), number plate illumination
19	10 A	Parking lights (left-hand), rear lights (left-hand)
20	15 A	Radio
21	15 A	Rear fog lights
22	10 A	Fuel system, ignition system, temperature gauge, handbrake warning lamp
23	-	Spare
24	10 A	Central locking
25	30 A	Radiator fan
26	25 A	Horn
27	15 A	Hazard warning lights
28	15 A	Interior lights, clock, radio, electric aerial
29	20 A	Heater element for the rear window
30	20 A	Fuel pump (8-valve injection engine)
31	15 A	Brake lights
310D	25 A	Passive seat belts*
310P	25 A	Passive seat belts*

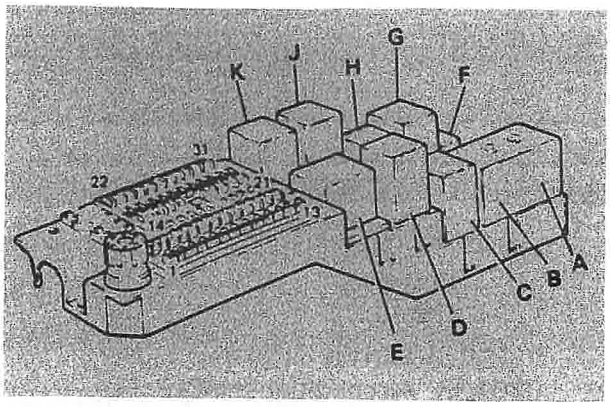
* Located under the back seat, at the relays.

A 30 A cable fuse for the convertible top is located on the right-hand side, at the wheel housing.



Relays

Most of the relays are located on the relay panel.



Locations of relays (except US, CA, JP)

A,B	Full and dipped beams
C	Electric heater element for the rear window
D	Ignition pulse amplifier
E	Ignition switch
F,G	Fuel pump (8-valve injection engine - Turbo)
G	Fuel pump (8-valve injection engine - except Turbo)
H	AC compressor
J	AC radiator fan
K	Horn
-	Dim dipped beams (GB)
-	Dim dipped beams (GB)

Locations of relays (US, CA, JP)

A,B	Full and dipped beams
C	Electric heater element for the rear window
D	Ignition pulse amplifier
E	Ignition switch
F	Shift-up indication, Fuel pump (8-valve injection engine - except Turbo)
G	Extra fog lamps (16-valve engine)
H	AC compressor
J	AC radiator fan
K	Horn

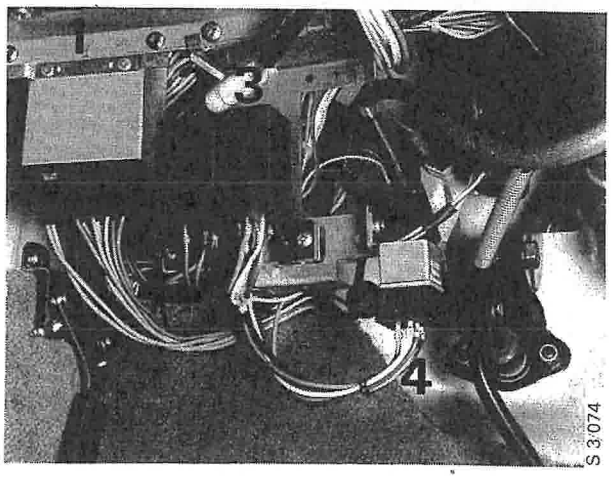
Locations of relays under the facia

1 Electronic unit for Cruise Control

2 Flasher unit

3 Relay for intermittent operation of windscreen wipers

4 Relay for Cruise Control



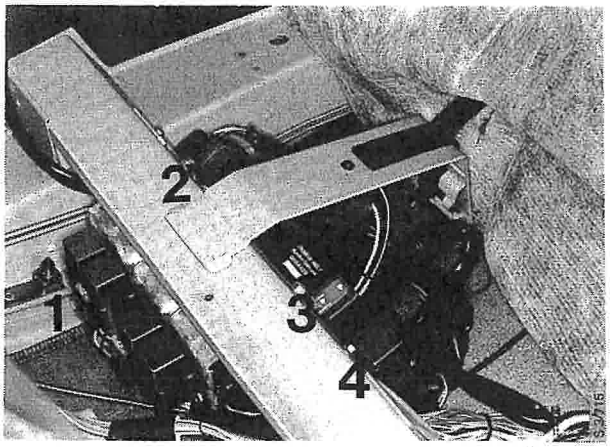
Locations of relays under the back seat

1 Relays, fuses and electronic unit for the passive seat belts

2 Relay for the window regulators

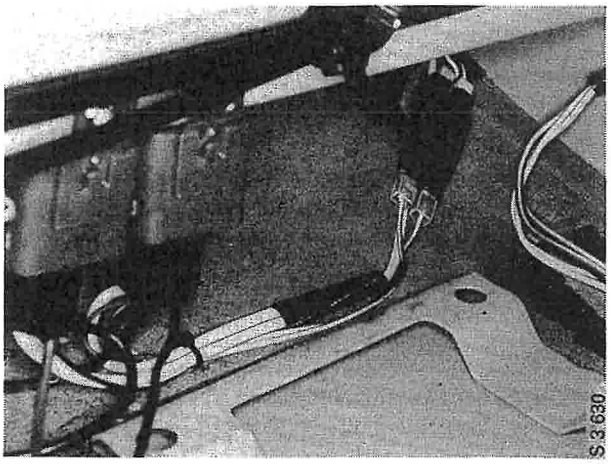
3 Relay for the interior lighting time delay

4 Relay for the key/seat belt warning buzzer



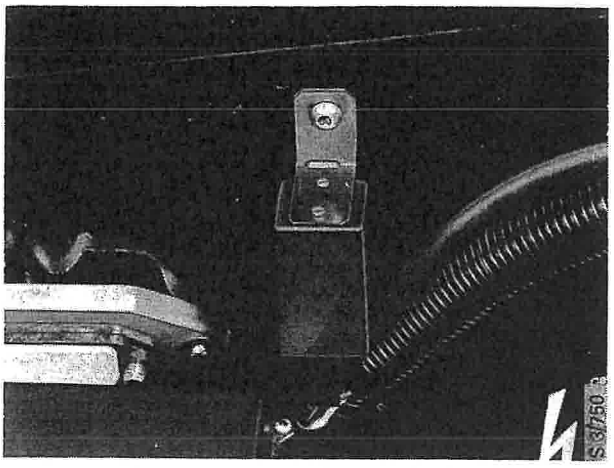
Relays and diodes

Two relays and two diodes, for raising and lowering the convertible top, are located under the back seat, on the right-hand side.



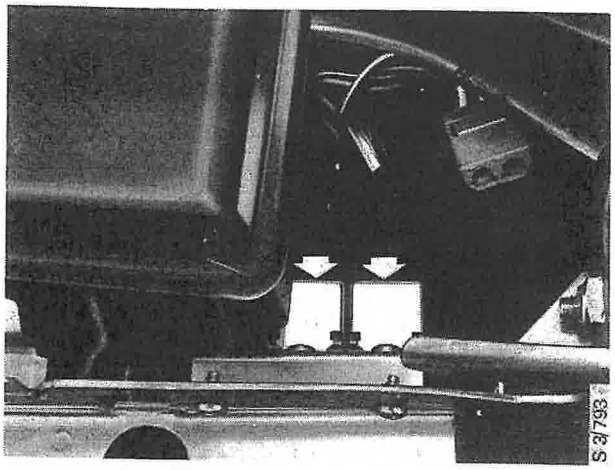
Time delay relay for the radiator fan

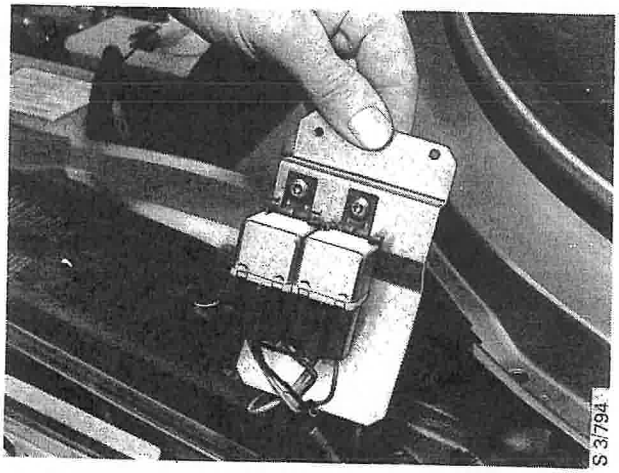
This relay is fitted only to cars for certain markets. It is located forward of the left-hand wheel housing.



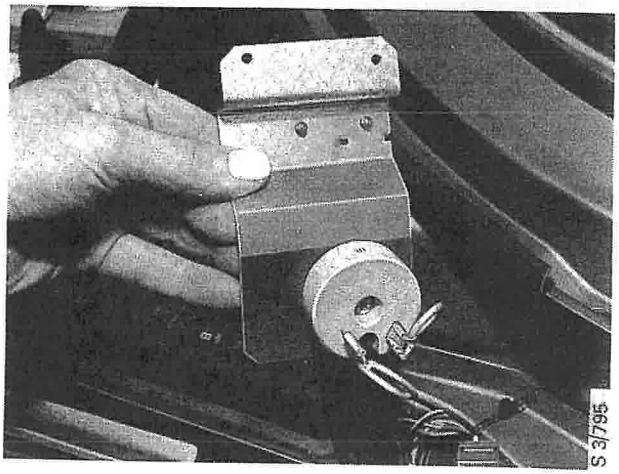
Relays for the dim dipped beams (GB)

The relays are located on a plate, at the electrical distribution box.





The resistor is fitted to the rear side of the plate.



Instruments

Instrument panel illumination

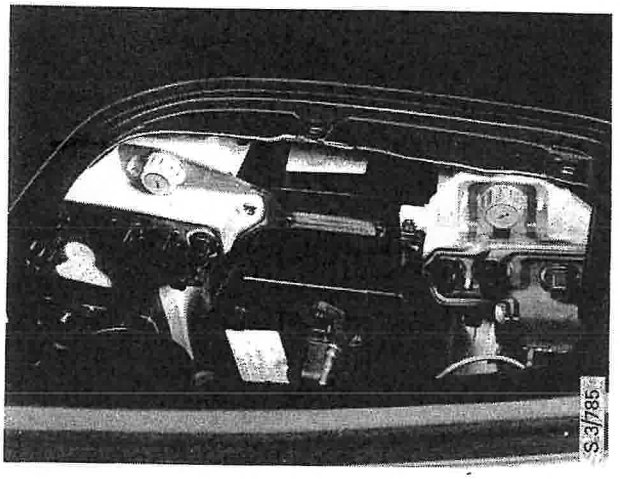
Combined instrument

The combined instrument contains two 3 W bulbs for instrument illumination, and a number of 1.2 W bulbs for the warning lamps. The bulbs are fitted in holders, which, in turn, are mounted in bayonnet sockets in the combined instrument.

The components in the combined instrument are supplied via printed circuit boards, which make direct contact with the bulb holders.

To change the bulbs in the combined instrument

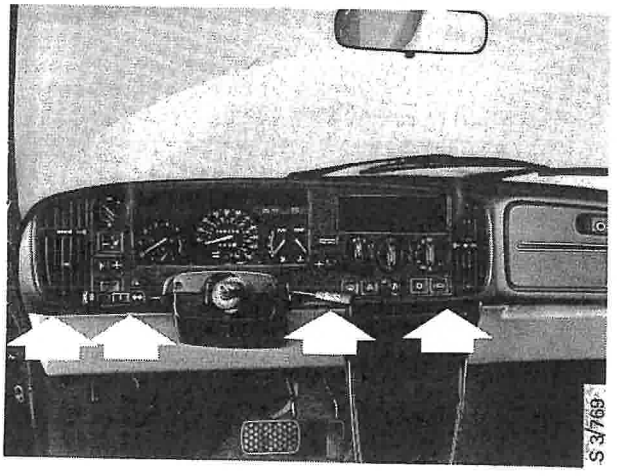
Remove the speaker (and defroster) grille from the facia. The instrument illumination lamps and warning lamps can then be removed. (However, the combined instrument must be removed to reach the fuel warning lamp.)



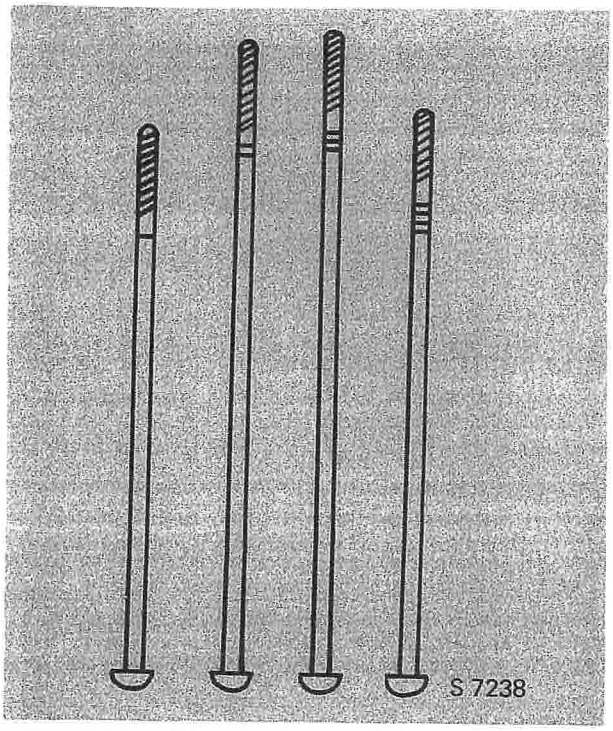
To remove the combined instrument

1 Disconnect the positive (+) battery cable. Remove the steering wheel.

2 Remove the four screws securing the switch panel and tilt the panel back.



Note:
Do not interchange the screws, since they are of different lengths. Fitting them incorrectly will damage the upper section of the panel.



1 2 3 4

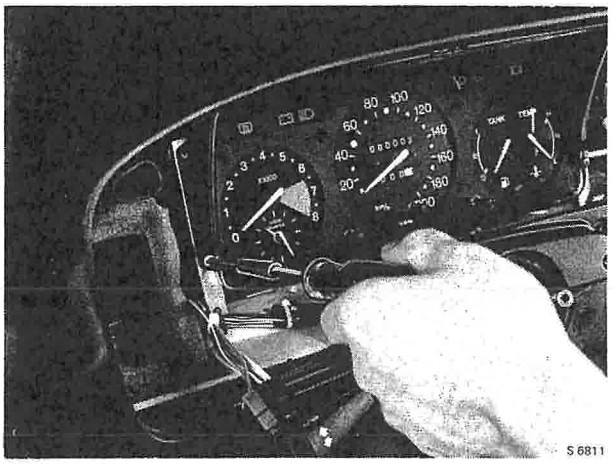
Length of screws
1 - 176 mm
2 - 205 mm
3 - 210 mm
4 - 189 mm

3 Remove the left-hand speaker (defroster) grille.

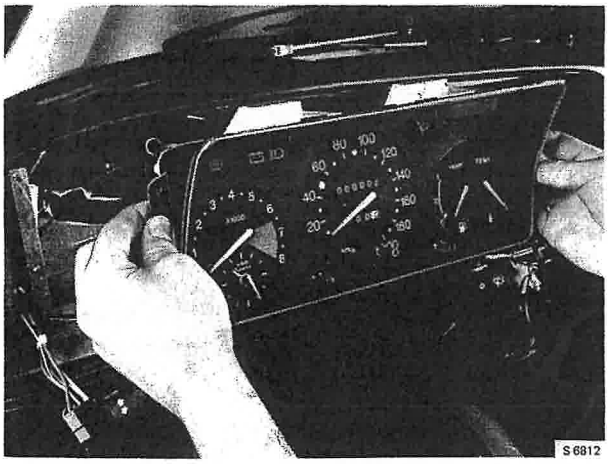
4 Disconnect the connectors from the instrument.

5 Disconnect the speedometer cable.

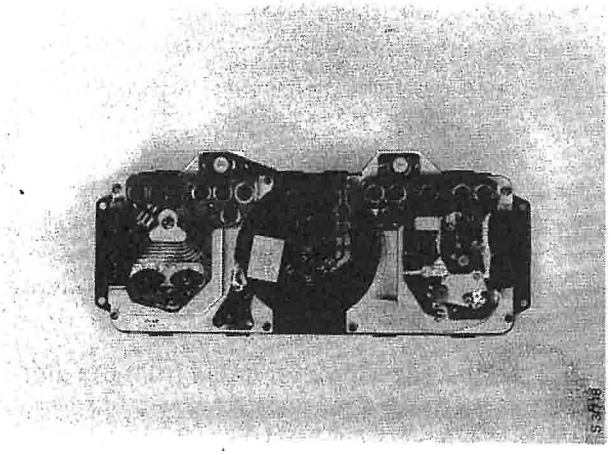
6 Remove the screws securing the instrument.

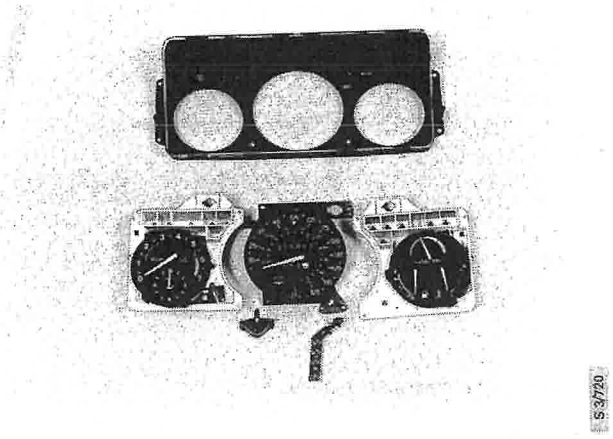


7 Lift out the instrument.



8 The combined instrument can then be removed.



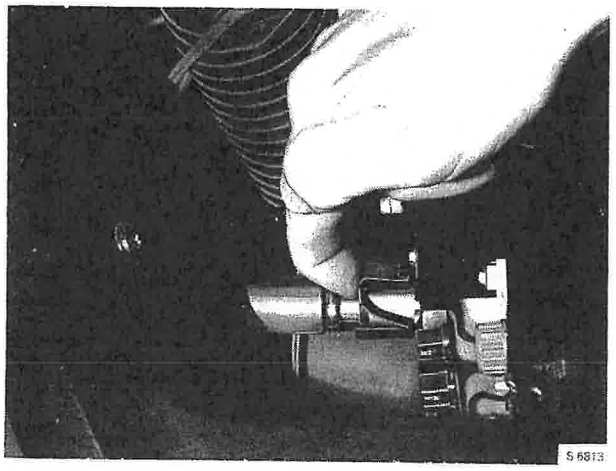


To change the speedometer cable

1 Disconnect the speedometer cable from the gearbox.

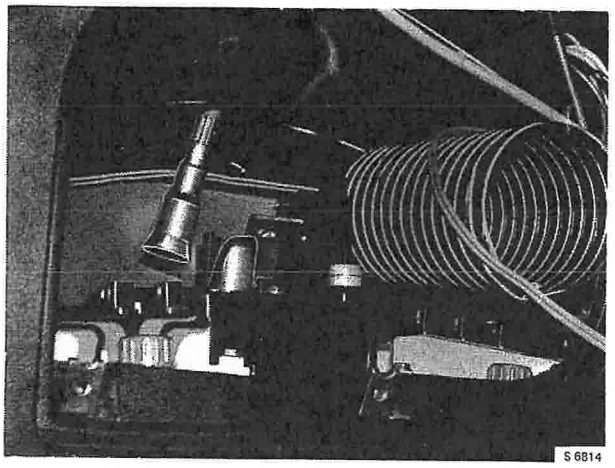
2 Remove the speaker (and defroster) grille from the facia.

3 Bend back the spring at the speedometer cable entry and hang it on the hook provided.


S 6813

4 Disconnect the cable from the speedometer.

5 Free the speedometer cable from the grommet in the bulkhead and remove it.


S 6814

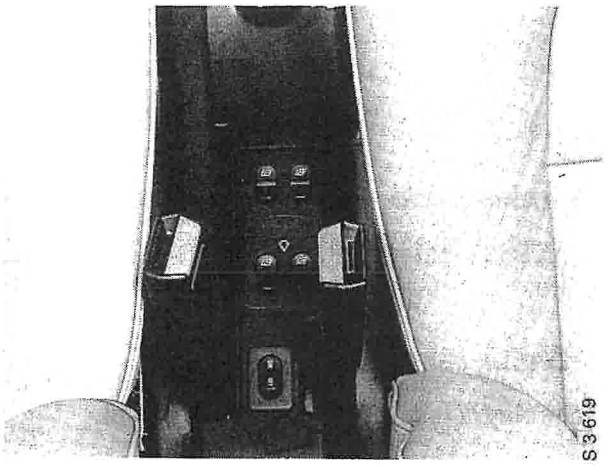
Refit in the reverse order.

Burglar alarm

Burglar alarm (convertible, US)

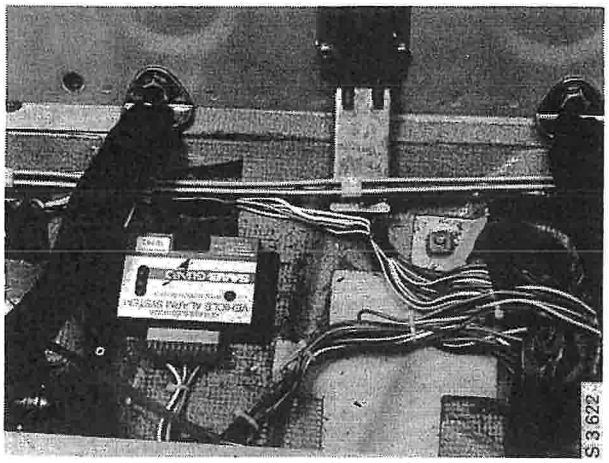
Switch for motion detector

The switch for the motion detector is located at the extreme rear of the centre console.



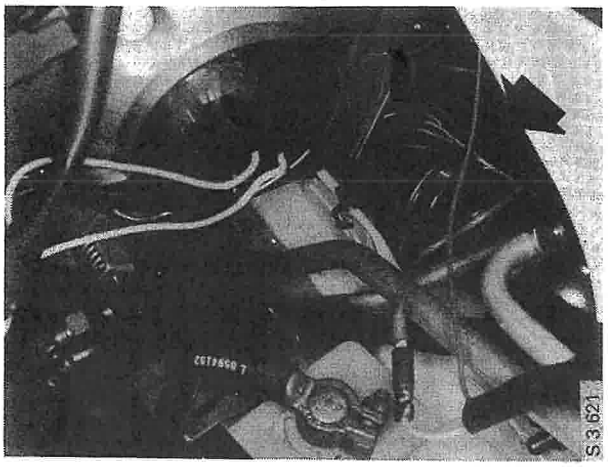
Control unit and motion detector

The control unit, motion detector and a 10 A fuse are located under the back seat.



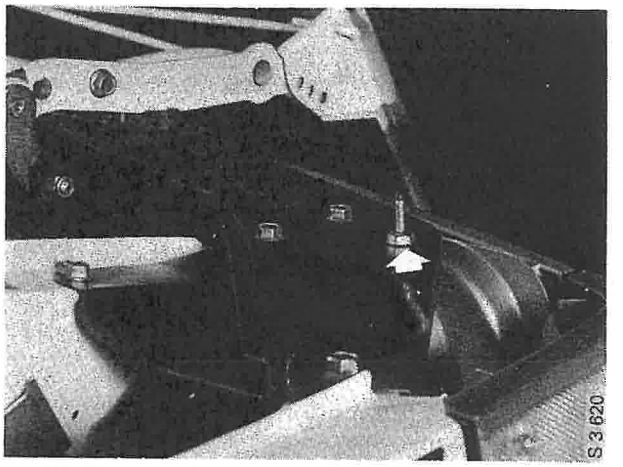
Siren

The siren is located at the extreme front of the engine compartment, on the right-hand side.



Bonnet switch

The bonnet is located on the radiator member, on the right-hand side.



Warning lamp

An LED is located in the front, left-hand speaker grille.

Warning lamp relay

The relay is located under the back seat.

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