Saab 900

SERVICE MANUAL



SAAB

3:2 Electrical system, system diagrams, operation and fault tracing

M 1989 - 1990

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3:2 Electrical system, system diagrams, operation and fault-tracing

M 1989 - 1990

Power supply

Engine electronics

Lighting systems

Windscreen and headlamp wipers

Instruments and warning systems

Heating and ventilation systems

Other systems

Accessories

List of components

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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)
l (liter)	(Also abbreviated: psi)
°C	US liquid quart (liq qt)
	(Also abbreviated: qts)
	US gallon (USgal)
	°F

Conversion factors

1 in = 25.4 mm	1 kg = 2.20 lb
1 lb = 0.45 kg	1 N = 0.23 lbf
1 lbf = 4.45 N	1 Nm = 0.74 lbf ft
1 lbf ft = 1.36 Nm	1 bar = 14.5 lbf/in^2
1 psi = 0.07 bar	1 l = 1.05 liq qt
1 US liq qt = 0.83 UKqt	1 USgal = 0.83 UKgal
°F = °C x 9/5 + 32	°C = (°F - 32) x 5/9
1 mm = 0.039 in	

Market codes

The codes refer to market specifications

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

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Introduction

This Service Manual deals with the electrical systems of the 1989 and 1990 models of the Saab 900. This Manual is a supplement to the Service Manual, Group 3:1, Electrical system, Instruments.

This Manual also deals with the Saab 900 Convertible, for which some of the functions are described separately. Other functions are the same as on the 2-door and 4-door models.

The purpose of this Manual is to facilitate fault tracing and service work on the electrical system of the car. So each electrical sub-system, such as the ignition system, hazard warning lights, etc., is described individually, and a separate wiring diagram is shown for each sub-system. Each such diagram is an extract from the comprehensive wiring diagram for the car.

A list of the electrical components of the car is included at the end of this Manual.

The comprehensive diagram for the entire electrical system of the car is presented in a separate book – Group 3:4.

This Manual is applicable to cars delivered to all markets. Note that certain cars delivered to the European market, for instance, may be equipped in accordance with the "USA specification". This Manual should not be used for the Saab 90, Saab 99 and earlier models of the Saab 900, even though many of the electrical systems may be very similar.

Note
Follow carefully the installation instructions for extra equipment, since electronic and control units may otherwise maloperate or may sustain serious damage.

Safety instructions

Caution – arcing may cause injuries.
Although the system voltage is only 12 V, injuries may be caused by flash-over or fire in the car, since the energy content of the battery is very high. Short-circuit may give rise to very high currents.

Caution – high voltage.
The ignition system of the car is of electronic type, operating at voltages of more than 30 000 V. This voltage may be fatal to persons with a weak heart and persons who have a pacemaker. So treat the entire ignition system with great caution.

Before starting work on the electrical system:

- Take off your wrist-watch and any rings you may be wearing.
- Disconnect the cable from one terminal of the battery if any electrical components are to be removed.
- Always follow the instructions and recommendations in the Service Manual, Group 3:1, Electrical system, Instruments.

Wiring diagrams

Each wiring diagram generally consists of two spreads, i.e. a total of four pages. A typical example of a wiring diagram, explanations of the symbols used, etc. are shown on the next spread.

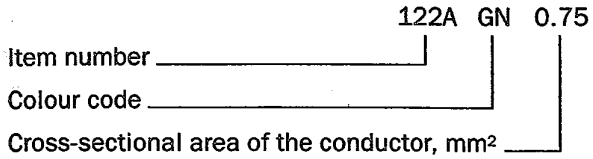
On the first spread, the wiring diagram for the relevant sub-system is shown on the left-hand side, and a brief description of the operation as well as fault-tracing hints are given on the right-hand side.

The second spread shows how the relevant cables are run in the car and where the electrical components are located. In addition, a picture is shown of each of the electrical components involved in the sub-system. A supplementary description of the location of each component is given on the left-hand side of the spread.

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Cable codes

As a general rule, each cable in the electrical system of the car has a code consisting of three parts, as illustrated by the example below:



Item number. Every cable is designated by a unique number, which is usually followed by a letter designation. Cables designated with the same number, e.g. 122, 122A, 122B, etc. usually belong to the same sub-system.

Colour code. The following colour codes are used in the wiring diagrams as well as in the comprehensive wiring diagrams. The colour codes can also be used in various combinations, e.g. BL/RD, GL/VT, etc.

Code	Colour
BL	Blue
BR	Brown
GL	Yellow
GN	Green
GR	Grey
OR	Orange
RA	Pink
RD	Red
SV	Black
VL	Violet
VT	White

Cross-sectional area of the conductor. The cross-sectional area of the conductor is specified in square millimetres (mm²). The current that the cable is capable of carrying is dependent on the cross-sectional area of the conductor.

Abbreviations

The Manual includes the following abbreviations:

ABS	Anti-lock Brake System
AC	Air Conditioning
AIC	(Automatic Idling Control) Automatic adjustment of the engine idling speed
APC	(Automatic Performance Control) Automatic control of the turbocharger boost pressure
AUT	Automatic transmission
C	Carburettor
CAB	Cabriolet (Convertible)
CC	Cruise Control
CI	Continuous Injection
CONV	Convertible (Cabriolet)
D	(Driver) Driver's side
EZK	(Elektronische Zündung mit Klopfkontrolle) Breakerless ignition system with knock sensor
I	Injection engine
ISAT	Intelligent SAAB Tester
LH	(Luftmassenmesser Hitzdraht) Air mass measurement by means of a hot filament
LHD	Left-hand drive
LHF	Left-hand front
LHR	Left-hand rear
LHS	Left-hand side
MAN	Manual gearbox
P	Passenger side, co-driver's side
T	Turbocharged engine
TSI	Timing Service Instrument
RHD	Right-hand drive
RHF	Right-hand front
RHR	Right-hand rear
RHS	Right-hand side

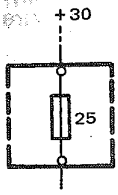
Example: T8 indicates that the engine is turbocharged and has 8 valves
I16 = 16-valve injection engine
3-D = two-door hatchback (Combi Coupé)

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Using the wiring diagram

An example of two spreads for a sub-system – in this case the interior lighting – is shown below, together with explanations of the designations used, etc.

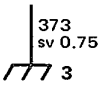
Unless otherwise specified, switches are shown in un-actuated condition and relays in de-energised condition.



In the wiring diagrams, every sub-system is generally shown from the appropriate fuse in the electrical distribution box, up to each consumer or sub-system, and then to the appropriate earthing point (chassis connection).

The supply to each fuse is shown separately in the section entitled Positive supply, which also deals with the electrical distribution box, ignition switch, etc. of the car.

If "+30" for instance, is shown above a fuse, this denotes that the supply from the battery to the relevant fuse is described in the section entitled "Positive supply, Distribution terminal +30".

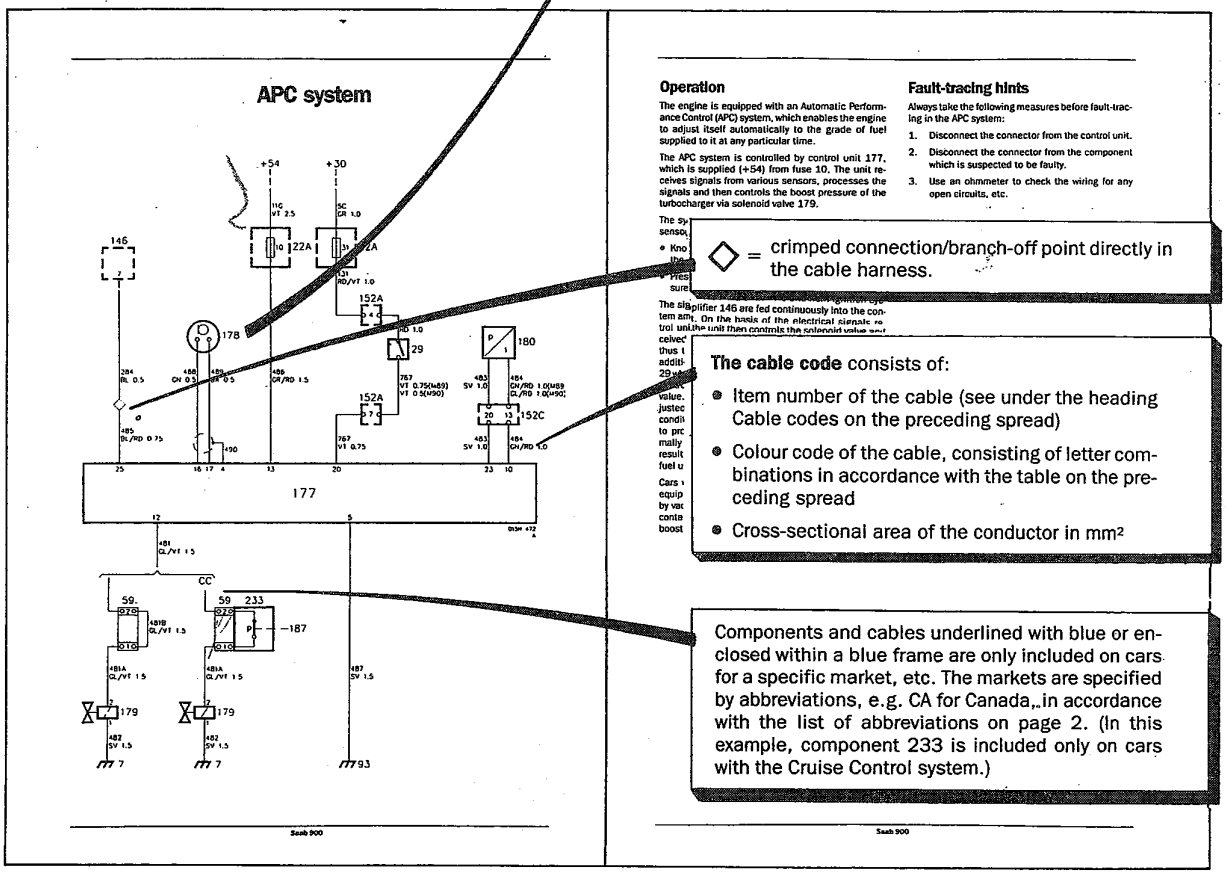


Most of the earthing points in the car have a component number, and each of the various earthing points in each diagram is marked with the appropriate number. The locations of the earthing points with component numbers are specified in the section of this Manual entitled "Earth connections".

Component number. Every component has an identity number adjacent to the symbol for that particular component on the wiring diagram. The same number is also used in the comprehensive wiring diagram for the car. In addition, the component number is given:

- in the description of the location of the component
- at the place in the car where the component is located
- on the appropriate exterior picture of the component.

Spread 1



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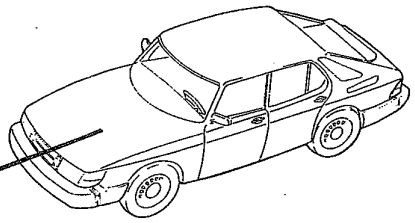
Spread 2

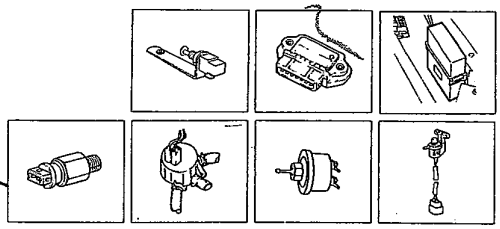
Locations of components

7	Earthing point on the radiator cross-member
22A	Fuse holder in the electrical distribution box, in the engine compartment, on the left-hand wheel housing
29	Brake light switch at the brake pedal
59	2-pole connector in the engine compartment, on the left-hand wheel housing
93	Earthing point on the left-hand wheel housing member
146	Amplifier for the electronic ignition system in the engine compartment, forward of the left-hand wheel housing
152A 152C	29-pole white connector 29-pole black connector in the electrical distribution box, in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car
177	Control unit for the APC system in the engine compartment, forward of the left-hand wheel housing
178	Knock sensor on the engine, below the intake manifold
179	Solenoid valve on the radiator fan casing
180	Pressure transmitter under the fascia, to the left of the steering column (behind the knee shield)
187	Vacuum pump for Cruise Control in the engine compartment, forward of the left-hand wheel housing
233	Vacuum switch in the engine compartment, on the left-hand wheel housing

Saab 900

Components





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Using a universal instrument for fault-tracing

Measuring equipment

A voltmeter and an ohmmeter are suitable instruments for fault-tracing in the car.

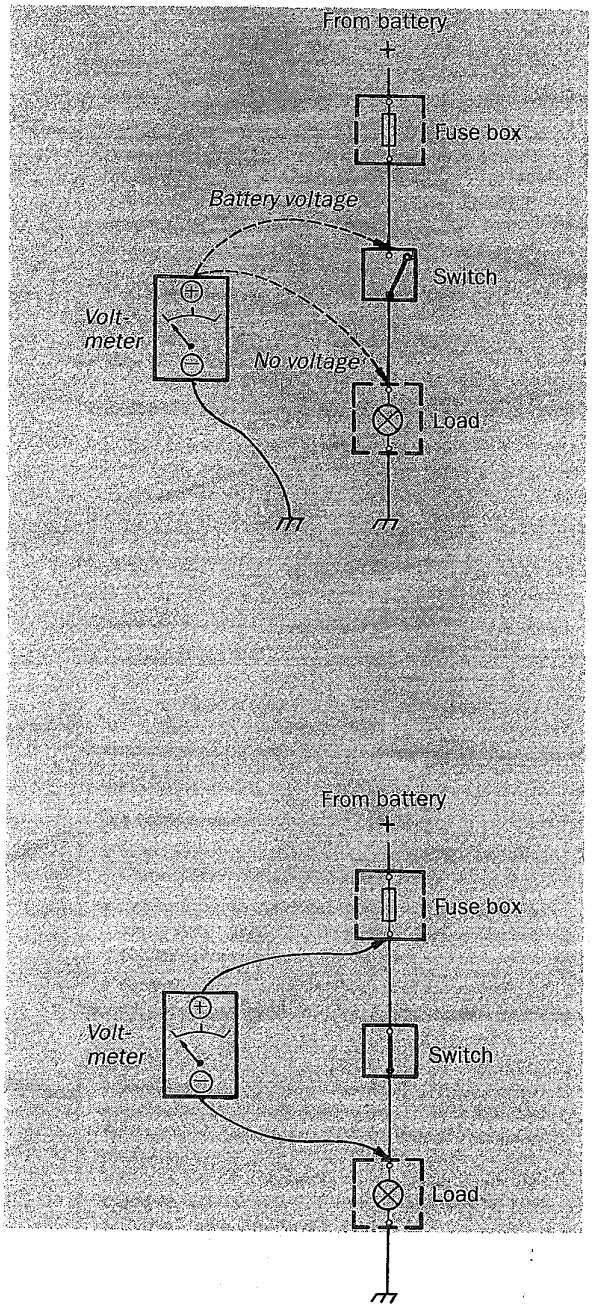
Use a voltmeter for measuring the voltage at various points in a circuit. If the voltmeter is of analog type, it should have an internal resistance of at least 20 000 ohm/V.

The ohmmeter is used for carrying out measurements in cable harnesses and on connectors, switches and contacts. An ohmmeter must not be used for measurements on components or relays containing semiconductors, such as control units, time delay relays, etc.

Since the ohmmeter incorporates a battery which energises the circuit to be measured, the battery of the car should be disconnected while measurement is in progress. This will ensure that no current is already flowing through the relevant circuit and that the correct reading will be obtained.

Voltage measurement

1. Connect the negative lead of the voltmeter to a reliable earthing point on the car or directly to the negative pole of the battery.
2. Connect the positive lead of the voltmeter to the point in the circuit at which you wish to measure the voltage.
3. If a reading is obtained on the voltmeter, this indicates that current is flowing to the relevant point. The voltage reading should not deviate by more than 1 volt from the measured battery voltage. A deviation greater than 1 volt indicates a fault. One of the reasons may be poor contact at a connection to some component or in a connector. Carry out further measurements in the circuit to pin-point the location of the fault.



Checking the voltage drop

This measurement is carried out to determine whether the voltage drop is too high, e.g. along a cable or across a switch.

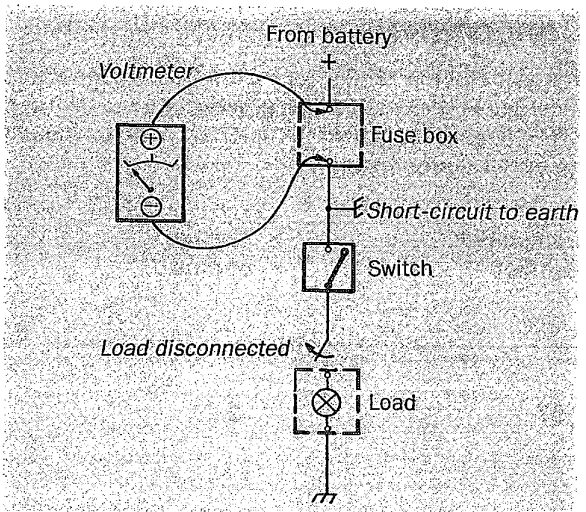
1. Connect the positive lead of the voltmeter to the end of the cable or the side of the switch which is nearest to the battery.
2. Connect the negative lead of the voltmeter to the other end of the cable.
3. When the circuit is energised, i.e. when current flows through it, the voltmeter will show the difference in voltage between the two points. If the circuit is in good condition, the voltage drop should not be greater than about 1 V. In simple circuits, such as across connectors and short cables, the voltage drop should not exceed about 0.5 V.

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Checking for short-circuit to earth

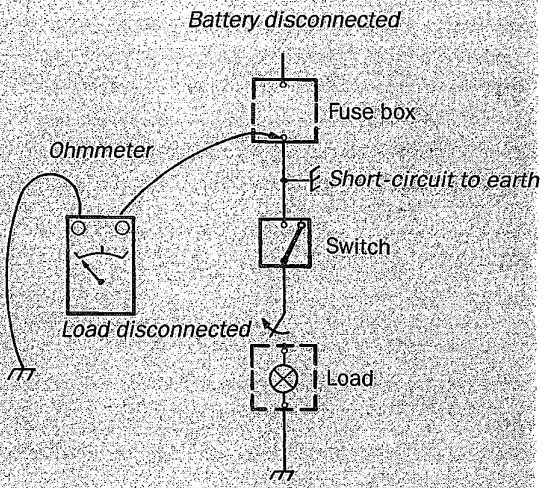
Using a voltmeter

1. Remove the fuse which has blown and disconnect the load.
2. Connect the voltmeter across the fuse terminal pins in the fuse box.
3. Move the relevant cable harness while observing the voltmeter. Start at the electrical distribution box and then continue out towards the relevant components/load. If a voltmeter reading is obtained, this indicates that the cable is short-circuited to earth.



Using an ohmmete

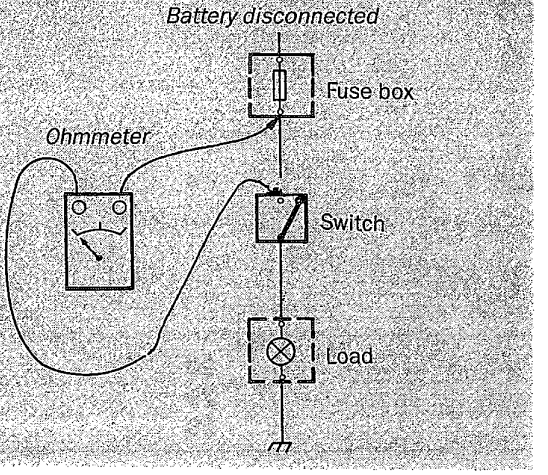
1. Hold the ohmmeter cables in contact with one another. Adjust the ohmmeter until the reading is 0 ohm.
2. Remove the fuse which has blown, and disconnect the load and the battery.
3. Connect one of the ohmmeter leads to the fuse terminal pin on the load side.
4. Connect the other ohmmeter lead to a reliable earthing point in the car.
5. Move the relevant cable harness while observing the ohmmeter. Start at the electrical distribution box and then move out towards the appropriate components/load. If the ohmmeter reads infinite resistance, there is no short circuit. On the other hand, if it reads low resistance or none at all, this indicates that the cable is short-circuited to earth.



Checking for open-circuit

Use an ohmmeter

1. Hold the ohmmeter cables in contact with one another. Adjust the ohmmeter until the reading is 0 ohm.
2. Disconnect the battery of the car.
3. Connect one lead of the ohmmeter to one end of the cable to be tested.
4. Connect the other ohmmeter lead to the other end of the cable.
5. If the ohmmeter reads a low resistance or none at all, this indicates that the cable is in good condition.

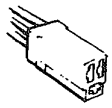
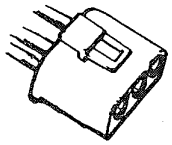
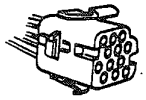
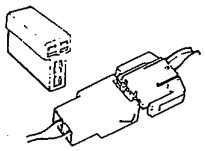
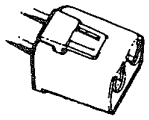
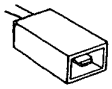
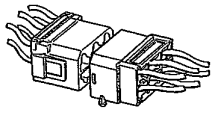
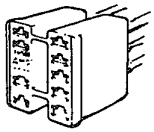
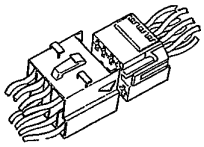
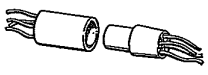
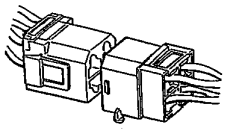
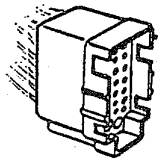


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Connectors

The table below shows examples of the connectors included in the car. If a new connector must be fitted in the engine compartment, bear in mind that it must be of hose-proof design.

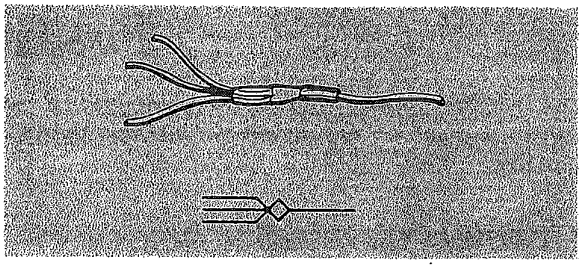
The three connectors designated 152A, 152B and 152C are discussed under the heading Positive supply, Electrical distribution box.

Component number	Number of pins	Appearance	
		Not hose-proof	Hose-proof
57	3		
58	12		
59	2		
60	1		
67	6		
98	10		
122	8		
123	4		
	29 29 29		

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Crimped connections

To reduce the number of connectors and improve the contact properties, many connections are crimped (distribution block 192). An illustration of the appearance of a crimped connector and the symbol used for it on the wiring diagrams are shown to the right.



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Positive supply

The +12 V supply of the car is distributed to the various consumers, etc. across an electrical distribution box.

Electrical distribution box

The electrical distribution box is easily accessible and is located under the bonnet, on the left-hand wheel housing. All of the fuses and most of the relays are located in the electrical distribution box.

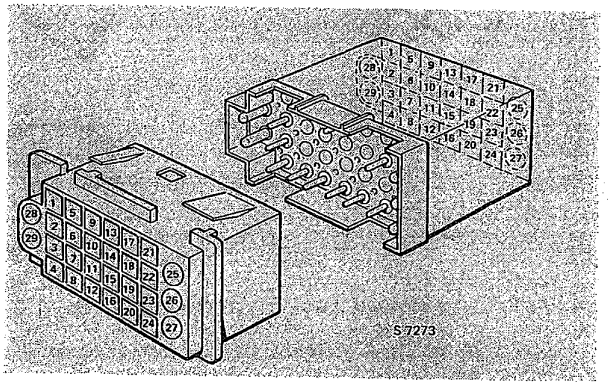
Item L in the drawing of the electrical distribution box is the socket for the Timing Service Instrument (TSI) and item M is the holder for spare fuses.

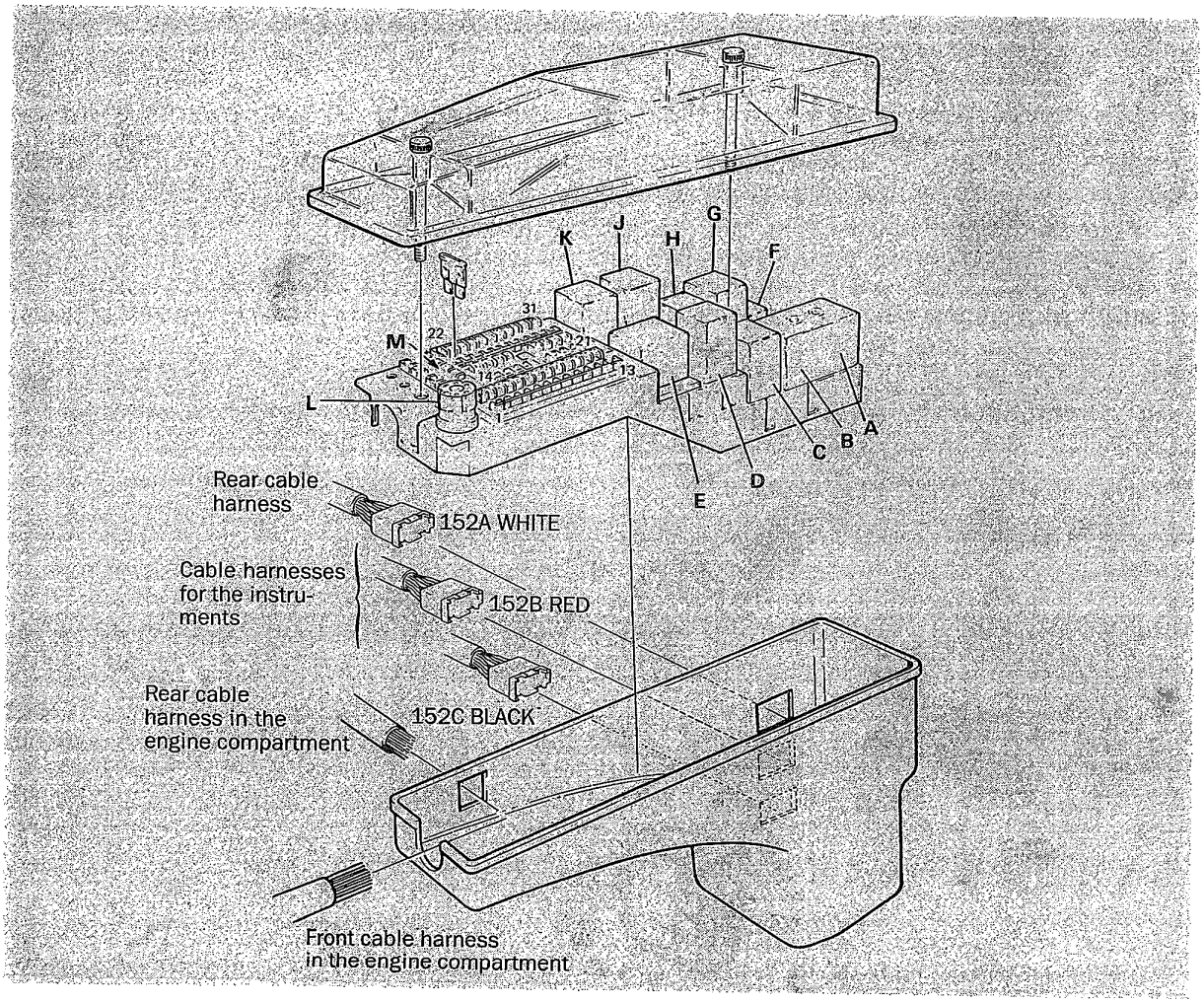
Five cable harnesses are connected to the electrical distribution box. The front and rear cable harnesses in the engine compartment are connected directly to the electrical distribution box, whereas the cables to the fascia and to the rear of the car are connected across three 29-pole connectors designated 152A, 152B and 152C. These are permanently mounted on the bulkhead between the engine compartment and the interior of the car.

To enable these three connectors to be easily distinguished, they are colour-coded.

152A = White
152B = Red
152C = Black

The picture below shows the locations of the pins in the connectors, viewed from the interior of the car.





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Relays

The following tables show the locations of the relays in the electrical distribution box. In addition to the relays in the electrical distribution box, several other relays are located in different places in the car. The locations of these relays are specified in the corresponding sub-system descriptions.

Europe and other markets

Relay location	Component number	Function	Remarks
A, B	8	Headlamp full beam and dipped beam	
C	113	Heater element for the rear window	With timing function on certain markets
D	–	–	
E	21	Ignition switch	
F, G	102	Fuel pump	T8, T8 Lambda (1989 model) I8, I8 Lambda (1990 model)
G	102	Fuel pump (1989 model) Radiator fan (1990 model)	I8, I8 Lambda (M1989) With timing function for certain markets (1990 model)
H	156	AC compressor	Air conditioning
J	155	Radiator fan for AC	Air conditioning
K	68	Horn	

USA, Canada and 1989 for Japan

Relay location	Component number	Function	Remarks
A, B	8	Headlamp full beam and dipped beam	
C	113	Heater element for the rear window	With timing function on certain markets
D	107	Extra fog lamps	
E	21	Ignition switch	
F	174	Daylight driving lights (CA)	
H	156	AC compressor	Air conditioning
J	155	Radiator fan for AC	Air conditioning
K	68	Horn	

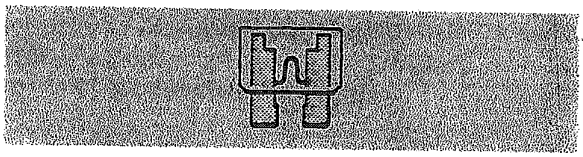
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Fuses

The locations of the fuses are shown in the illustration of the electrical distribution box.

Fuse No.	Rating	Function
1	10 A	Lambda sensor preheating
2	30 A	Rear window regulators, Convertible
3	15 A	Ignition system
4	10 A	Dim dipped beam (GB) (1989 model)
4	20 A	Daylight driving lights (CA)
5	15 A	Windscreen wipers, headlamp wipers, seat belt reminder lamp, buzzer for coolant temperature
6	30 A	Air conditioner (AC)
7	15 A	Direction indicators, tachometer, warning lamps for battery charging and choke/check engine, oil pressure warning lamps and (1990 model) SRS Airbag
8	10 A	Headlamp wipers, rear-view mirrors, Cruise Control
9	30 A	Ventilation fan
10	10 A	APC system, ABS system (1989 model), headlamp beam control (1990 model)
11	30 A	Window regulators, sunroof
12	20 A	Electric heating pads for the front seats, delayed interior lights, top actuation (Conv.), seat-belt warning (buzzer)
13	20 A	Reversing lights, cigarette lighter lighting, passive seat belts (1989 model)
14	15 A	Right-hand headlamp, full beam
15	15 A	Left-hand headlamp, full beam and full beam warning lamp
16	15 A	Right-hand headlamp, dipped beam
17	15 A	Left-hand headlamp, dipped beam
18	10 A	Right-hand parking light, right-hand rear light, number plate illumination, right-hand side marker lights
19	10 A	Left-hand parking light, left-hand rear light, left-hand side marker light
20	15 A	Radio, corner lights (US, CA, 1989 model JP), burglar alarm (1990 model), burglar alarm for Conv. (1989/90 model)
21	15 A	Rear fog lights, rear fog-light warning lamp, extra fog lamps (US, CA, 1989 model JP)
22	10 A	Fuel system, temperature gauge, handbrake warning lamp, warning lamp for foot brake and ABS, fuel level gauge, speed sensor
23	10 A	Lighting for controls, glove compartment illumination
24	10 A	Central locking, burglar alarm
25	30 A	Radiator fan
26	25 A	Horn
27	15 A	Hazard warning lights
28	15 A	Interior lighting, clock, radio, electrically operated aerial, luggage compartment illumination
29	20 A	Heater element for the rear window
30	20 A	Fuel pump
31	15 A	Brake lights, ABS system (1990 model)
310D	25 A	Passive seat belts (1989 model)
310P	25 A	Passive seat belts (1989 model)

The fuses are of blade type and, together with the connectors used, cause a lower voltage drop in the system than the earlier fuse type. In addition, the fuses are more resistant to corrosion.

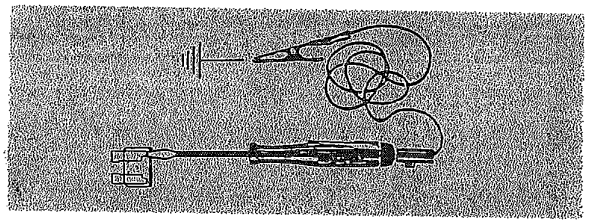


Colour-coding of the blade fuses:

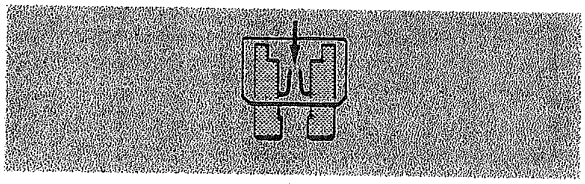
Colour	Rating
Red	10 A
Blue	15 A
Yellow	20 A
Transparent	25 A
Green	30 A

Checking the blade fuses

Every blade fuse has test tappings, so that it can be checked without the need for removing it from the fuse box. If both tappings are live, the fuse is intact.



When the fuse has been removed, it will be clearly visible whether or not the fuse wire has melted.



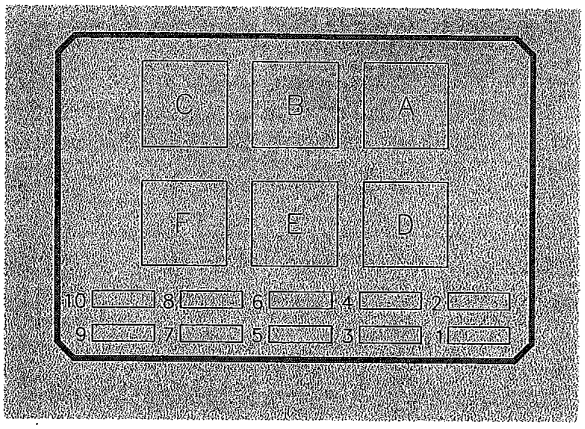
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Extra electrical distribution box (Convertible)

The Saab 900 Convertible is equipped with an extra electrical distribution box on the left-hand side, under the back seat.

Relay locations

A Relay for automatic window-regulator function (287)
B Relay for delayed interior lighting (151)
C Relay for Convertible top operation (277)
D Relay for Convertible top operation (278)
E Relay for seat belt/ignition key warning buzzer (82)
F Relay for burglar alarm (313)



Ignition switch and positive supplies

The supplies provided in the car are designated "+", followed by a digit combination. Some of these supplies are live only on certain occasions, such as when the engine is being started or when the car is travelling.

The positive supplies are as follows: +30, +X, +15, +54, +50 and +S. The +30 supply is taken directly from the battery, and the components supplied from "+30" are therefore permanently energised. The other supplies are taken from the ignition switch and are dependent on the ignition switch setting. **Note that the numerals in the designations have nothing to do with the system voltage.**

Ignition switch

The ignition switch has four positions:

L Locked position
P Parked position
□ Drive position
S Start position

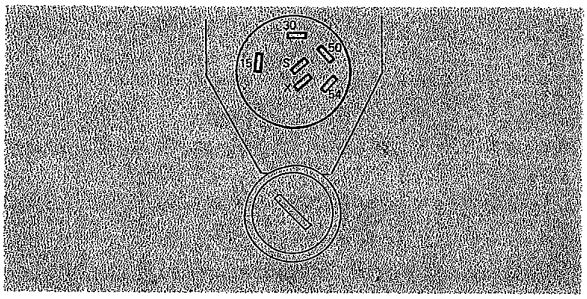
The table below shows the ignition switch terminals which are live in the various positions of the ignition switch. The incoming supply (+30) from the battery is connected to terminal 30.

Circuit closed between...	Position			
	L	P	□	S
30–X			▬	▬
30–15			▬	
30–54			▬	
30–50				▬
30–S[1)]				▬

1) Although all ignition switches have terminal S, this terminal is only used on cars destined for the U.S.A. and Canadian markets.

Example: Terminal 15 is live in the drive and start (S) positions.

The picture below shows the terminals of the ignition switch.



U.S.A. and Canadian markets

On these cars, terminal S is used for the ignition key warning system. The terminal is always energised when the key is in the ignition switch, regardless of its position.

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Distribution terminals

The following four spreads show the consumers/components that are supplied from the following distribution terminals:

- Distribution terminal +30
- Distribution terminal +X
- Distribution terminal +15
- Distribution terminal +54

The various consumers are supplied either directly or across fuses.

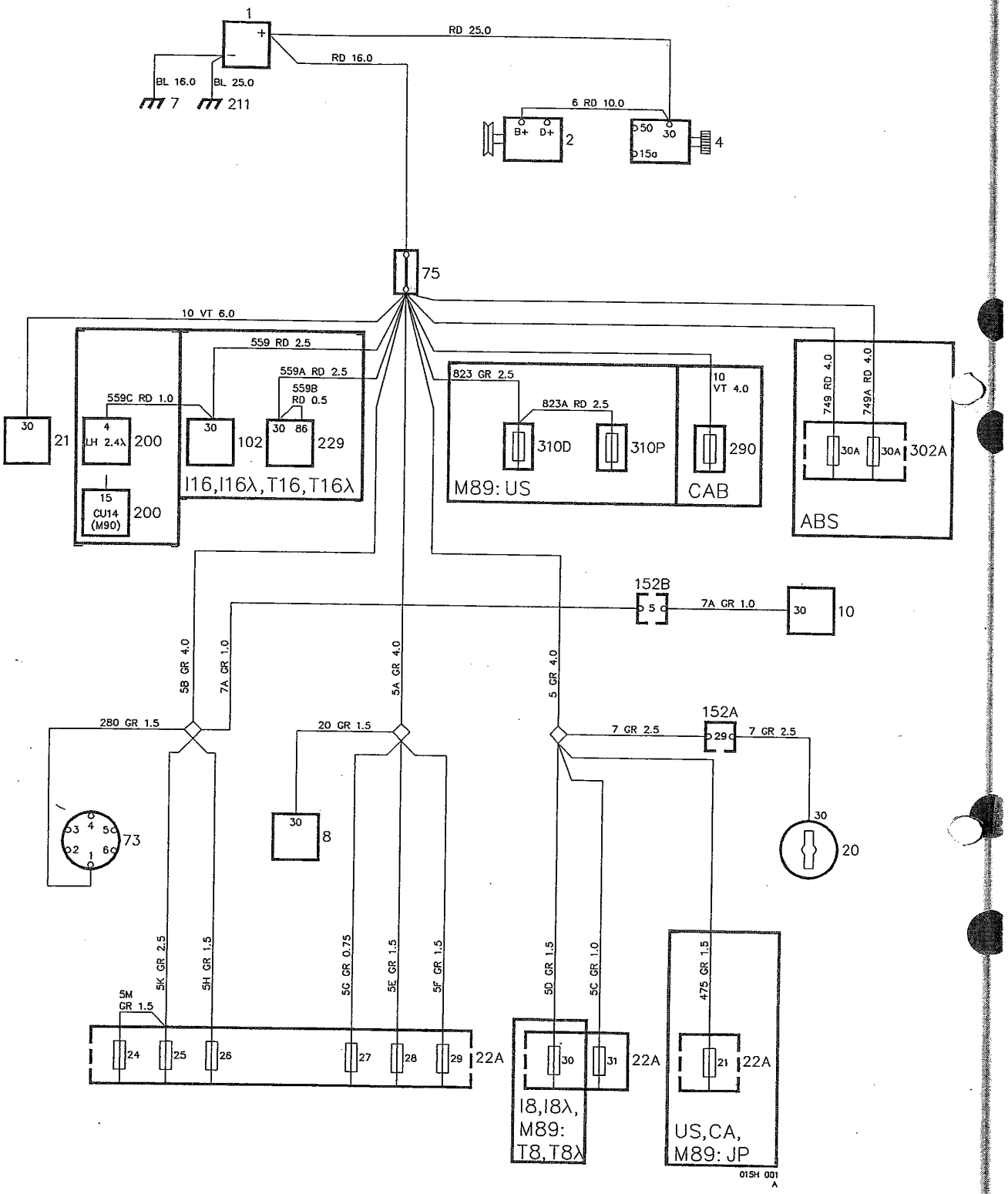
The wiring diagrams show all components which are supplied from each distribution terminal. Some components are thus not included on certain markets/versions.

No wiring diagram is shown for distribution terminal +50, since this is used only for a few sub-systems. The terminal is live only when the ignition switch is in the start position, and this is described in the corresponding sub-system description. For particulars of distribution terminal +S, see the section entitled "Instruments and warning systems – Seat-belt and ignition switch warning".

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Distribution terminal +30



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Operation

The positive supply is taken from battery 1 directly to starter motor 4, and then further to B+ on alternator 2 and to distribution block 75.

From distribution block 75, supplies are then taken to the following components and to fuses 24 – 31.

- Ignition switch relay 21
- Timing service instrument socket 73
- Fuel pump relay 102, control unit 200 and main relay 229 for the LH fuel injection system on cars powered by the 16-valve engine. (On cars with the 8-valve fuel injection engine, fuel pump relay 102 is connected instead to fuse 30.)
- Lighting relay 8
- Light switch 10, across 29-pole red connector 152B
- Ignition switch 20, across 29-pole white connector 152A.
- Fuses for the anti-lock brakes (ABS) 302 A.
- Fuses 310P and 310D for the passive seat belts on cars destined for the US market (1989 model)
- Fuse 290 (for the Convertible top)

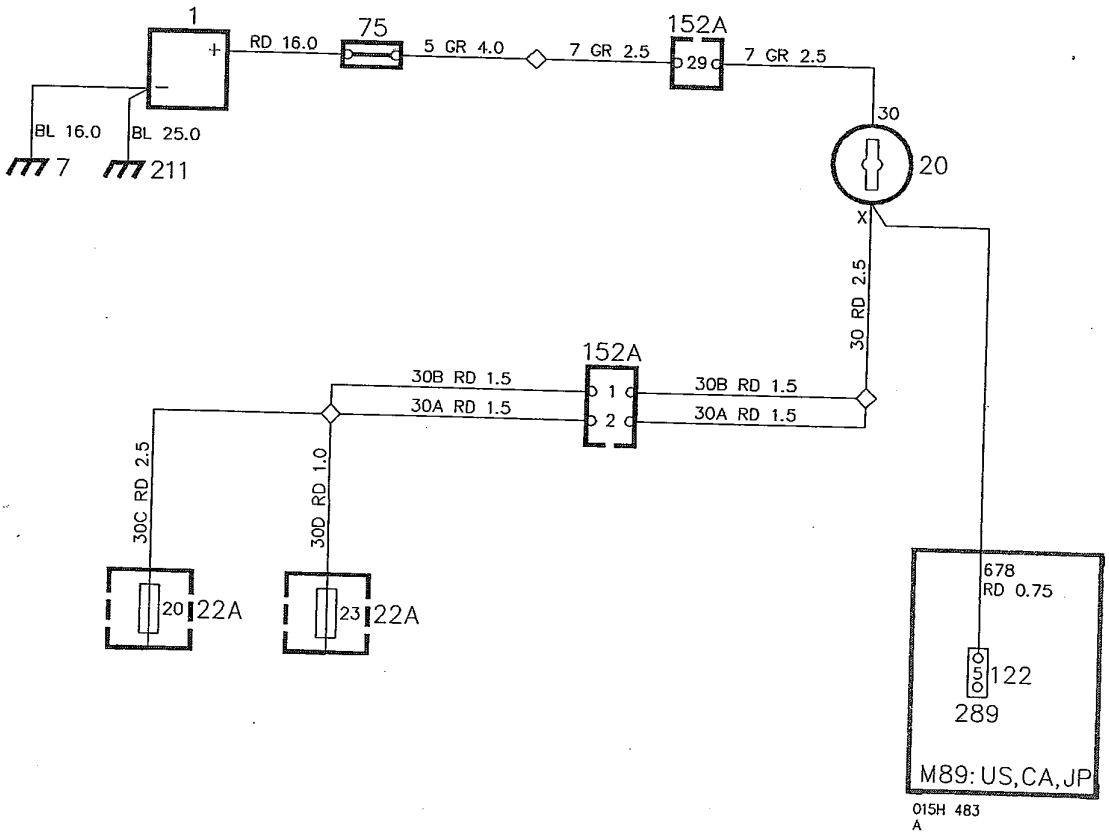
On cars destined for the USA, Canada and Japan (1989 model), fuse 21 for the extra fog lamps is also connected to this distribution block.

Fault-tracing hints

1. Check the battery voltage.
2. Check the terminals of distribution block 75 and 29-pole connectors 152.
3. Check that the supply to each component is live.
4. Check the relevant wiring.

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Distribution terminal +X



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Operation

The positive supply is taken from battery 1 to ignition switch 20, across distribution block 75 and 29-pole white connector 152A.

When the ignition switch is set to the parked, drive or start position, terminals 30 and X of the ignition switch will be interconnected. The +X supply will then be connected to fuses 20 and 23.

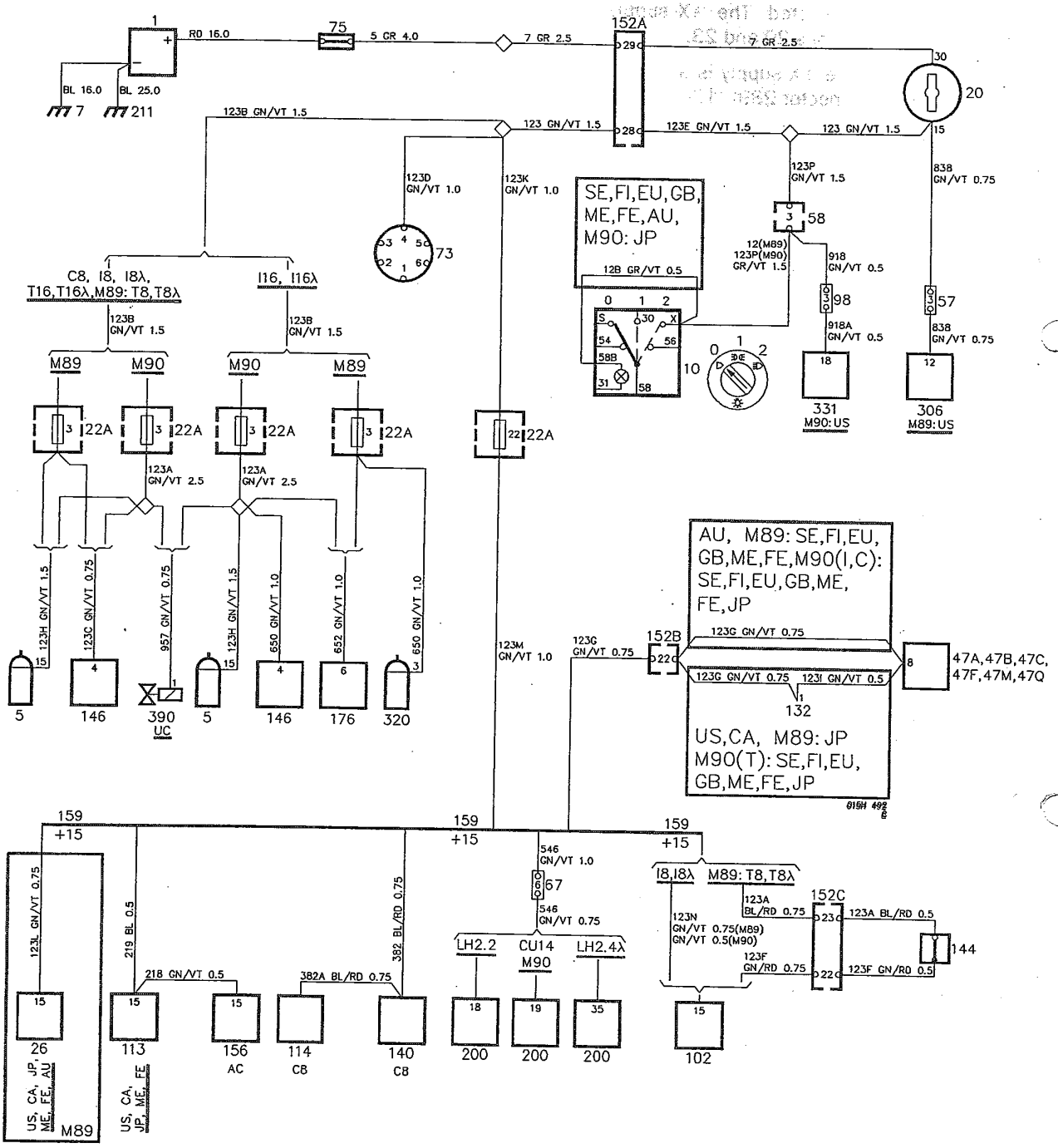
On certain markets, the +X supply is also used for the burglar alarm (connector 289) (1989 model).

Fault-tracing hints

1. Check the battery voltage.
2. Check the terminals of distribution block 75.
3. Check the terminals in 29-pole connector 152.
4. Check that the supply to each component is live.
5. Check the relevant wiring.

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Distribution terminal +15



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Operation

The positive supply is taken from battery 1 to ignition switch 20, across distribution block 75 and 29-pole white connector 152A in the electrical distribution box.

When the ignition switch is in the drive or start position, the +15 supply will be taken from terminal 15 of the ignition switch to the following components:

- Light switch 10, across 12-pole connector 58
- Fuses 3 and 22 in fuse holder 22A
- Timing service instrument socket 73
- Control unit 306 for the passive seat belts, across 3-pole connector 57 (1989 cars for the USA market).

The following components are then supplied from fuse 3. Some of the components are included only on certain car variants.

5	Ignition coil
146	Amplifier for the electronic ignition system
176	Control unit for the EZK ignition system
320	Ignition coil with integrated amplifier (1989 model)
390	Modulating valve, LH 2.4 Lambda (1990 model: UC)

The following components are then supplied from fuse 22, across distribution terminal 159. Some of the components are included only on cars for certain markets, on cars with 8 or 16 valve engines, etc.

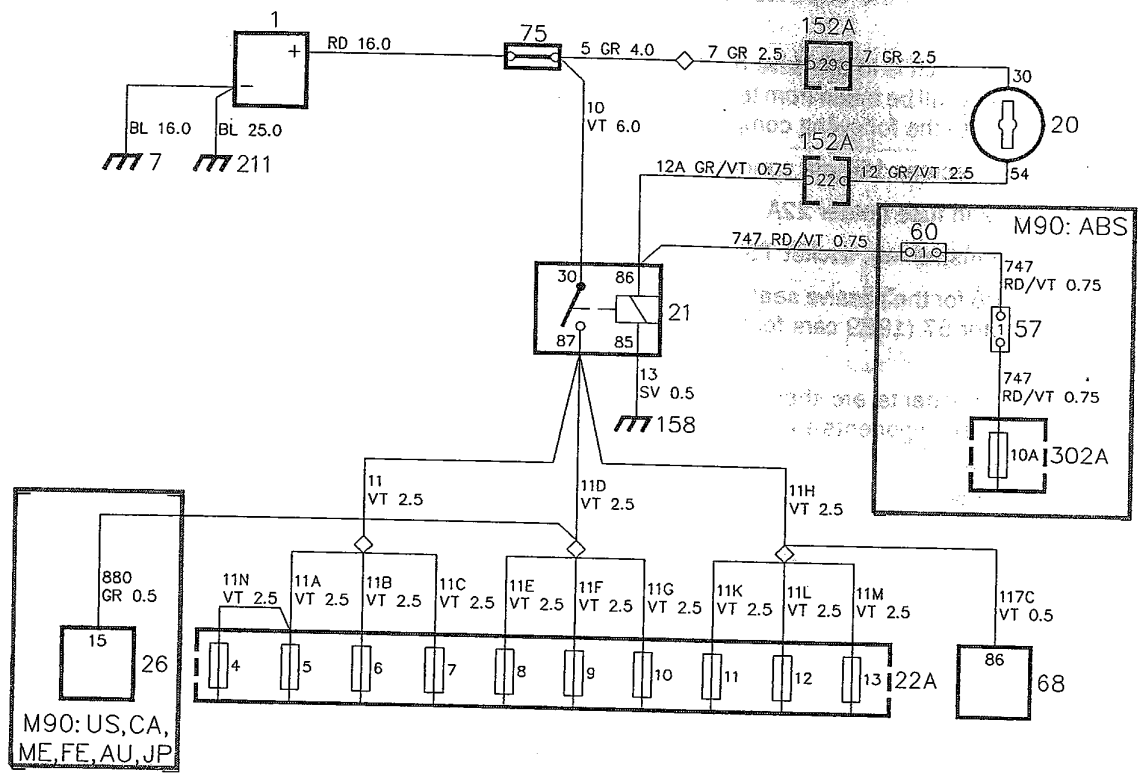
- Time-delay relay 26 for the radiator fan (1989 model)
- One half of the combined instrument 47 across the red 29-pole connector 152B in the electrical distribution box
- Relay 156 for the AC compressor
- Time-delay relay 113 for the electrically heated rear window
- Carburettor float chamber valve 114
- Carburettor fuel shut-off valve 140
- Control unit 200 for the LH fuel system (6-pole connector 67 in the engine compartment, to the right beside the air intake)
- Fuel pump relay 102 (I8, 1989 T8). On turbocharged cars, the relay is connected across boost pressure switch 144.

Fault-tracing hints

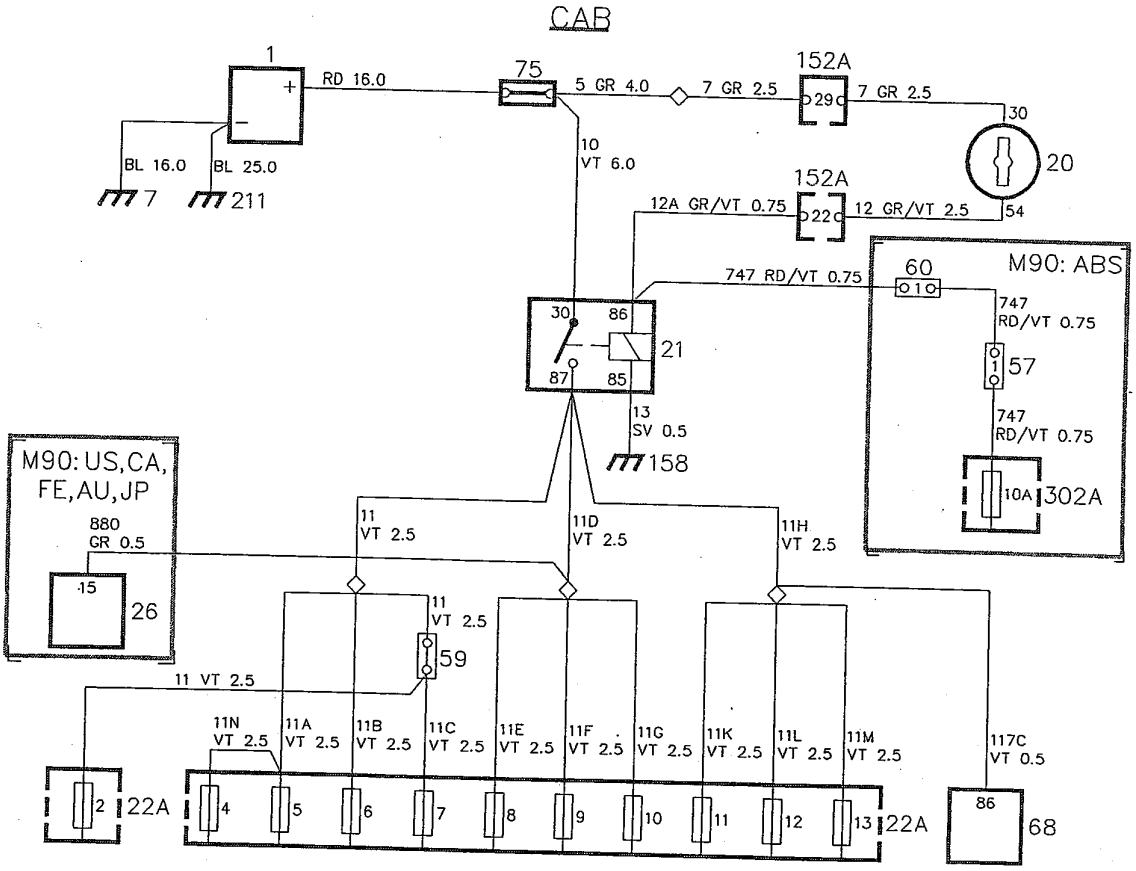
1. Check the battery voltage.
2. Check the terminals of distribution block 75 and 29-pole connectors 152.
3. Set the ignition switch to the drive position and check that the supply from fuse 22 is live.
4. Check the relevant wiring.

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Distribution terminal +54



015H 503
B



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Operation

The positive supply is taken from battery 1 across distribution block 75 to:

- the contacts (terminal 30) of ignition switch relay 21
- terminal 30 of ignition switch 20, across white 29-pole connector 152A.

When the ignition switch is set to the drive position, terminals 30 and 54 of the ignition switch will be interconnected. Current will then flow through the coil of ignition switch relay 21 across white 29-pole connector 152A, and the relay will be energised. The relay contacts will close, and current will flow through the three distribution blocks (crimped connections) to fuses 4 – 13 in fuse holder 22A (fuses 2 and 4 – 13 on the Convertible).

The contacts of horn relay 68 and (1990 model) time-delay relay 26 for the radiator fan will also be energised when the ignition switch relay has been energised.

Anti-lock brakes (ABS) on the 1990 models

On cars with the ABS anti-lock brakes, fuse 10A in ABS fuse holder 302A will also be energised from the white 29-pole connector 152A when the ignition switch is set to the drive position.

Fault-tracing hints

1. Check the battery voltage.
2. Check the terminals of distribution block 75, and check that terminal 30 of ignition switch relay 21 is live.
3. Set the ignition switch to the drive position and check that ignition switch relay 21 operates. Terminal 87 of the relay should then be live.
4. Check that fuses 4 – 13 in fuse holder 22A are live (fuses 2 and 4 – 13 on the Convertible).
5. Check the relevant wiring.

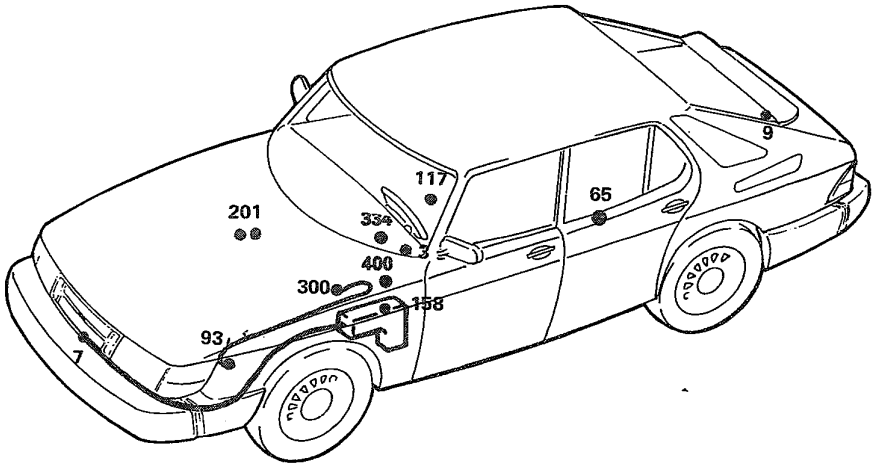
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Earth connections

General

The car has certain earthing points which have "component numbers" and other earthing points at which the component is earthed directly to the chassis, such as temperature transmitters, oil pressure transmitters, etc. The locations of the earthing points with component numbers are the same in the Combi Coupé, the Sedan and the Convertible.



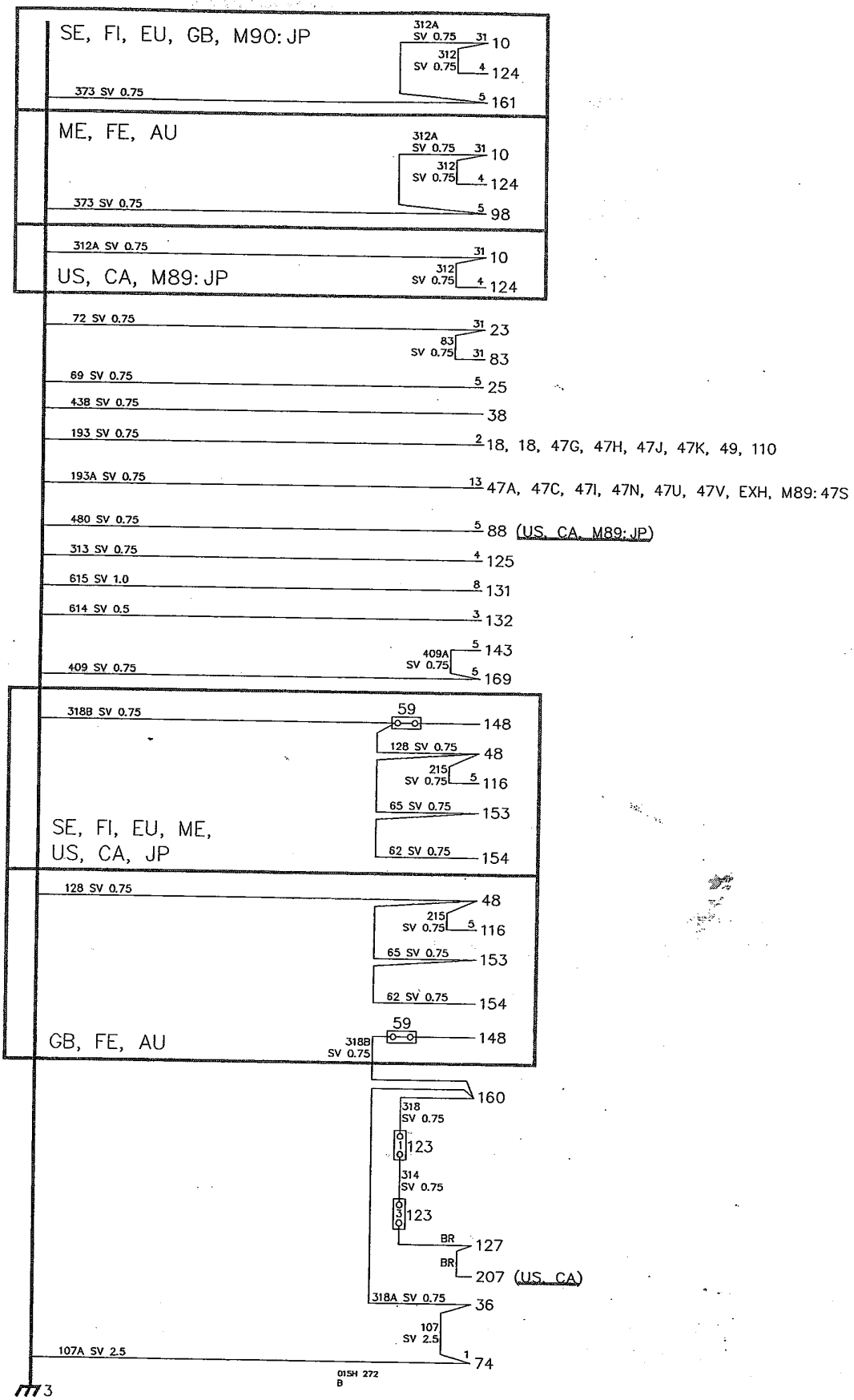
3	Earthing point in the fascia
7	Earthing point on the radiator cross-member
9	Earthing point in the luggage compartment
65	Earthing point under the back seat
93	Earthing point on the amplifier
117	Earthing point between the ignition switch and the handbrake lever
158	Negative distribution terminal in the electrical distribution box
201	Earthing point, engine (two)
211	Earthing point, gearbox
257	Earthing point, alternator bracket
300	Earthing point, brake unit
334	Earthing point for the airbag electronic unit
400	Redudndant earthing point for the airbag electronic unit

The battery is earthed by means of a 16 mm² conductor to earthing point 7. The engine is connected directly to the negative pole of the battery by means of a 25 mm² conductor.

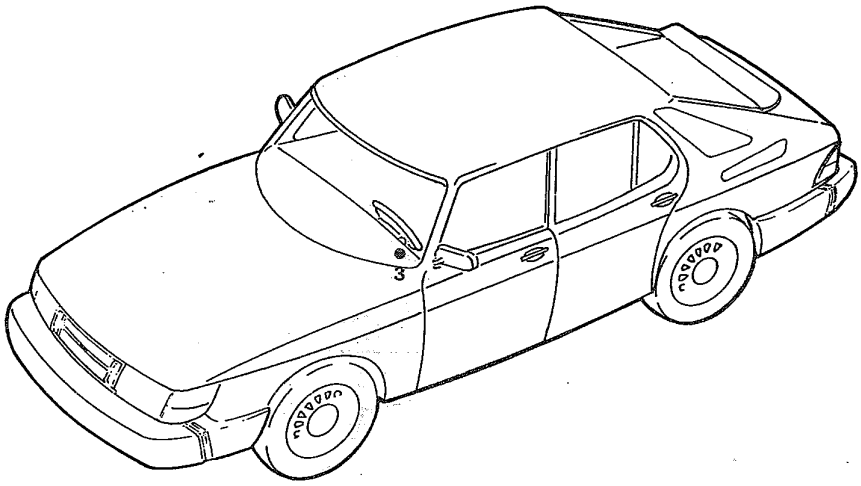
From earthing point 7, a cable then runs to distribution terminal 158 in the electrical distribution box on the left-hand front wheel housing.

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Earthing point 3, fascia



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Components connected

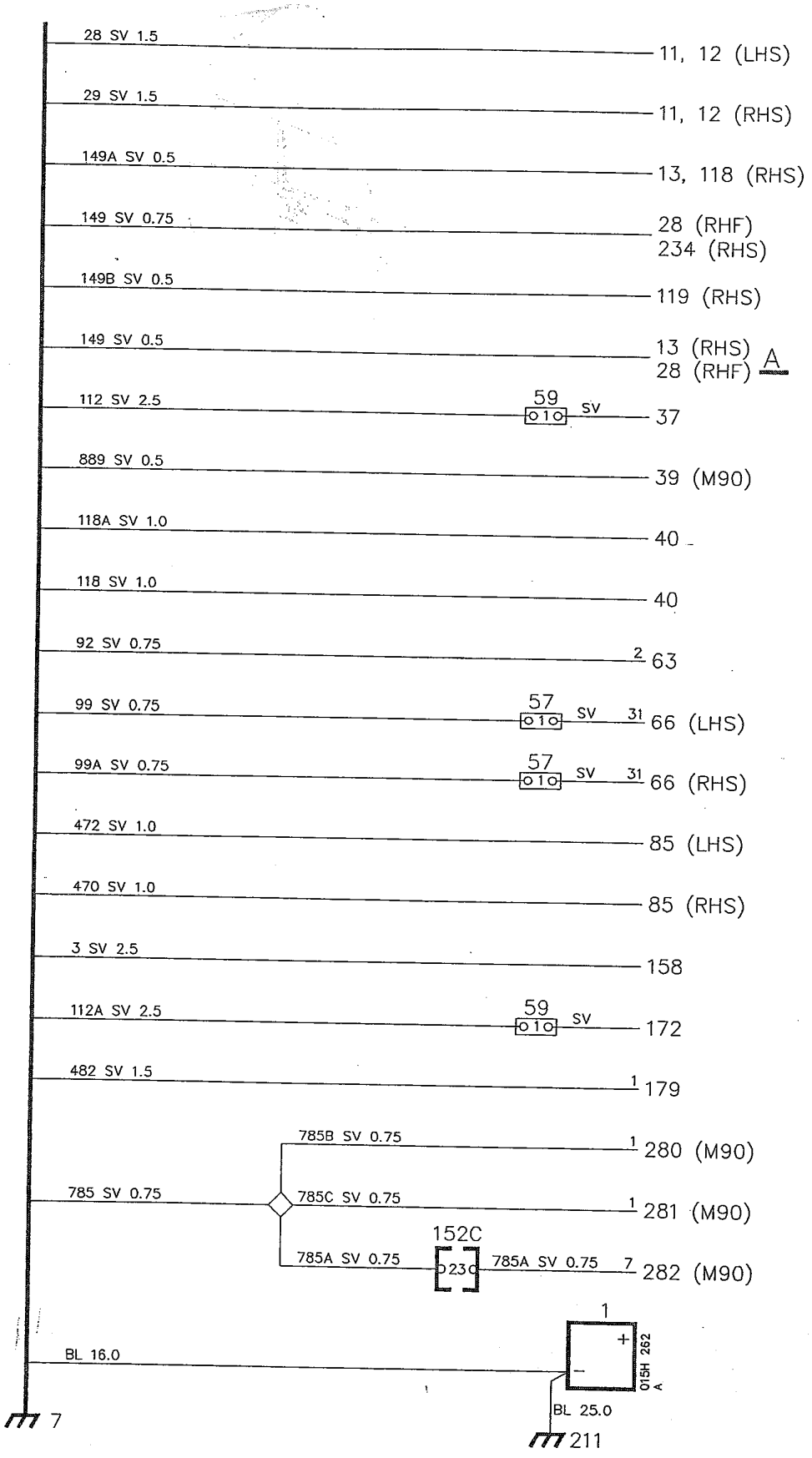
Earthing point 3 is located to the left of the steering wheel, below the fascia, behind the knee shield (on the front side of the instrument cross-member, behind the flasher relay).

The following components are connected (by means of screw terminals) to this earthing point. Some of the components listed below are fitted only to cars of certain versions or for certain markets.

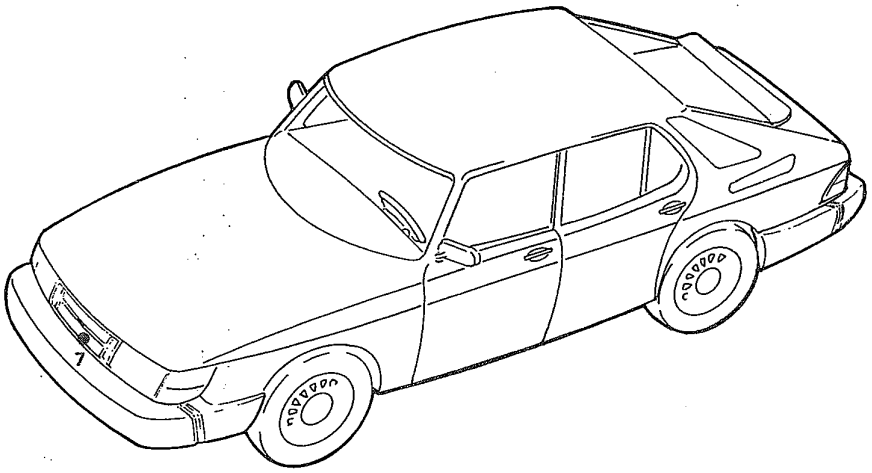
10 Light switch
18 Combined instrument lighting
23 Flasher relay
25 Hazard warning light switch
36 Motor for the ventilation fan
38 Motor for the AC recirculation valve
47 Combined instrument
48 Cigarette lighter
49 Clock
74 Resistor (half-speed) for the ventilation fan
83 Relay for intermittent operation of the windscreen wipers
88 Switch for extra fog lamps (US, CA)
98 10-pole connector
110 Tachometer
116 Switch for the electrically heated rear window
124 Switch for the left-hand electrically operated rear-view mirror
125 Switch for the right-hand electrically operated rear-view mirror
127 Motor for the right-hand electrically operated rear-view mirror (across 4-pole connector 123 in the engine compartment at the right-hand door pillar and in the right-hand door)
131 Electronic control unit for Cruise Control
132 Sensor for the speed transmitter
143 Recirculation switch, AC
148 Ashtray illumination (across a 2-pole connector)
153 Lighting for the cigarette lighter
154 Lighting for the heater controls
160 Switch for glove compartment illumination
161 Switch for the rear fog lights
169 Switch, AC
207 Electrically-heated rear-view mirrors (US, CA)

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Earthing point 7, radiator cross-member



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Components connected

Earthing point 7 is located below the radiator, on the right-hand side of the radiator cross-member. The following components are connected (by means of screw terminals) to this earthing point. Some of the components listed below are fitted only to cars of certain versions or for certain markets.

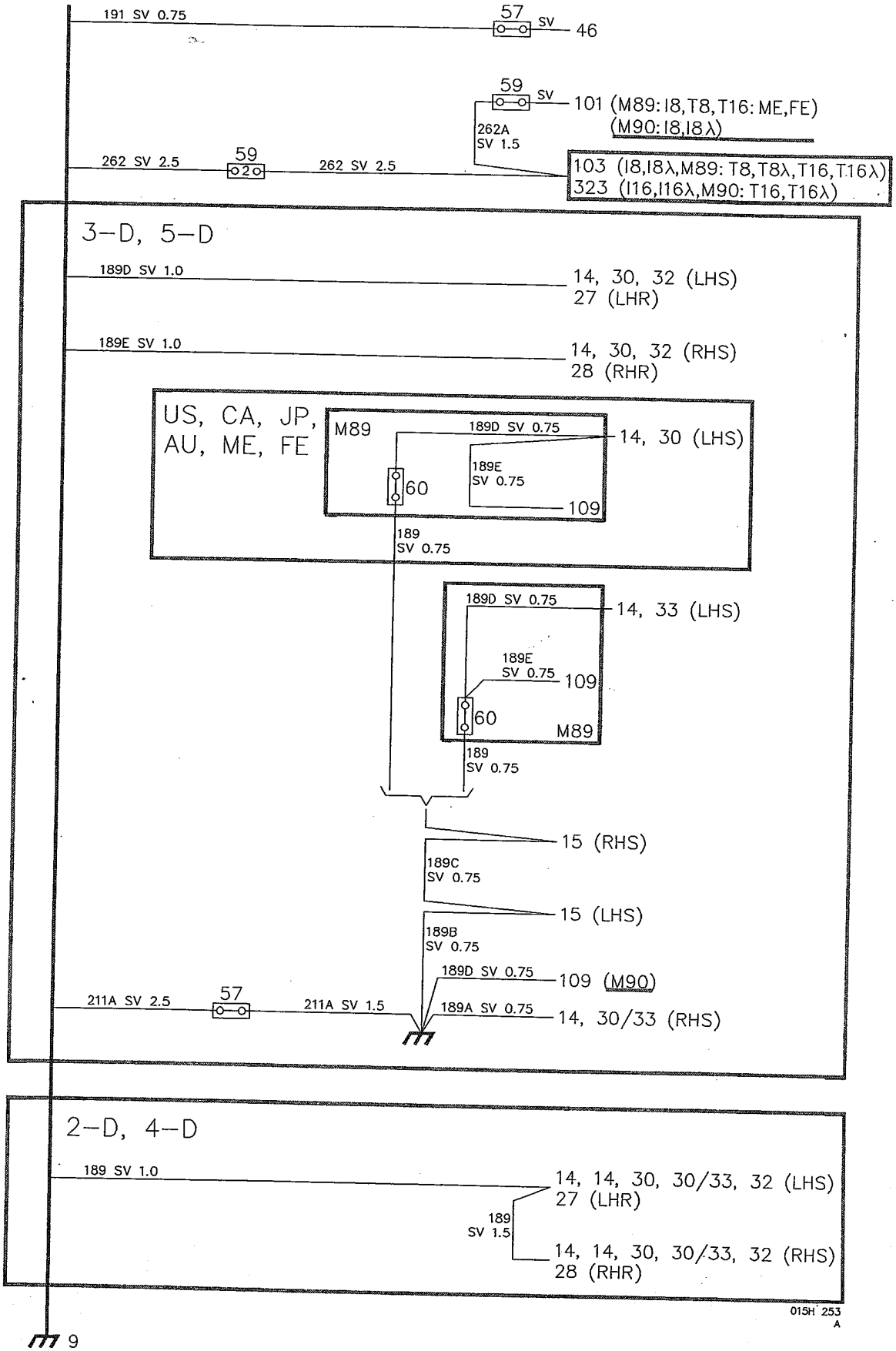
Negative distribution terminal 158 in the electrical distribution box is also connected to earthing point 7.

Connections marked with "A" apply to cars without integrated bumpers.

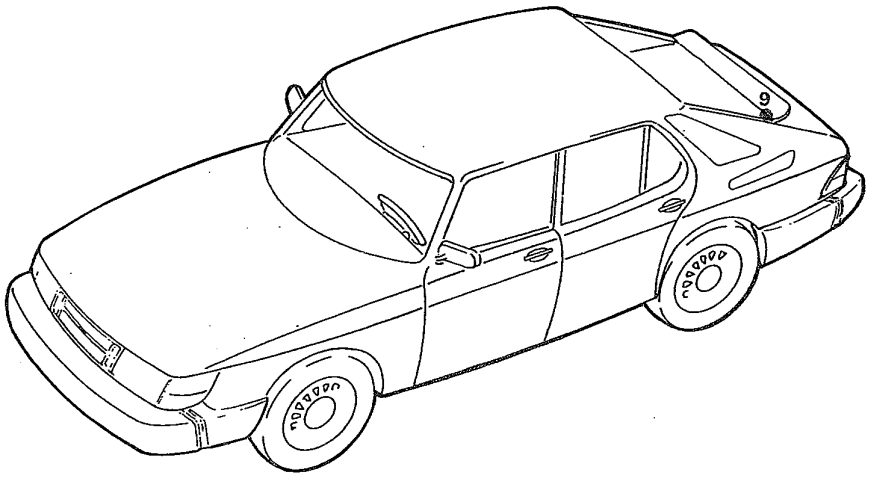
1 Battery
11 Headlamp full beam
12 Headlamp dipped beam
13 Parking lights
28 Direction indicator lamp, right-hand front
37 Radiator fan motor (across 2-pole connector 59 at the radiator)
39 Temperature switch for radiator fan (1990 model)
40 Horn
63 Washer motor
66 Headlamp wiper motor (across 3-pole connector 57 in the engine compartment at the corresponding motor)
85 Extra fog lamps
118 Corner lights
119 Side reversing light (RHS)
158 Negative distribution terminal
172 Radiator fan for the AC (across 2-pole connector 59 at the radiator fan motor)
179 Solenoid valve for the APC system
211 Earthing point on the gearbox
234 Side marker lights (RHS)
280 Motor for left-hand headlamp beam control (1990 model)
281 Motor for left-hand headlamp beam control (1990 model)
282 Switch for headlamp beam control (across black 29-pole connector 152C in the electrical distribution box in the engine compartment) (1990 model)

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Earthing point 9, luggage compartment



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Components connected

Earthing point 9 is located under the spare wheel hatch in the luggage compartment, at the extreme rear on the centre member. The following components are connected (by means of screw terminals) to this earthing point. Some of the components listed below are fitted only to cars of certain versions or for certain markets.

46 Fuel level transmitter (across 3-pole connector 57, under the luggage compartment floor, beside the transmitter)
101 Fuel feed pump (across 2-pole connector 59 under the luggage compartment floor)
103 Fuel pump (across 2-pole connector 59 under the luggage compartment floor)
323 Fuel pump with integrated feed pump

3-D and 5-D cars

The tailgate lighting is earthed to the tailgate which, in turn, is earthed to earthing point 9 across cable 211A SV 2.5 (across 3-pole connector 57 in the luggage compartment, at the left-hand air outlet).

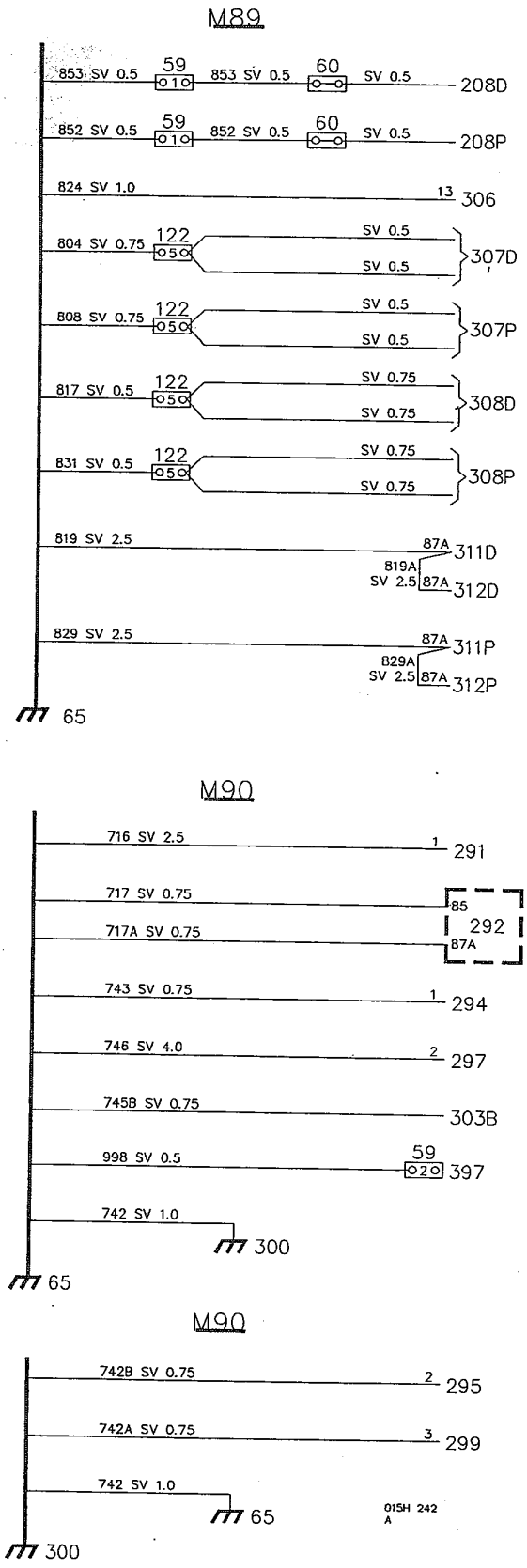
14 Rear lights
15 Number plate illumination
27 Direction indicator lamps, left-hand
28 Direction indicator lamps, right-hand
30 Brake lamps
32 Reversing lamps
33 Rear fog lights
109 High-level brake light (across single-pole connector 60 in the tailgate, at the left-hand rear light cluster) (1989 model)

2-D and 4-D cars

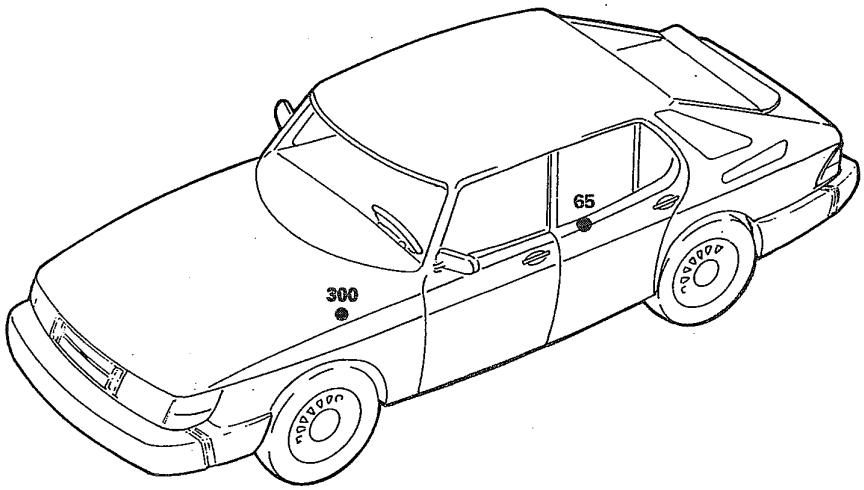
14 Rear lights
27 Direction indicator lamps, left-hand
28 Direction indicator lamps, right-hand
30 Brake lamps
32 Reversing lamps
33 Rear fog lights

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Earthing point 65, back seat and earthing point 300, brake unit (1990 model)



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Components connected

Earthing point 65 is located under the back seat, in the centre. The following components are connected to this earthing point. For passive seat belts (1989 model).

208D Door lock, reed switch, driver's door
208P Door lock, reed switch, co-driver's door
306 Logic box for passive seat belts
307D Belt reel for passive seat belts, driver's side
307P Belt reel for passive seat belts, co-driver's side
308D Motor with limit switches for passive seat belts, driver's side
308P Motor with limit switches for passive seat belts, co-driver's side
311D Motor relay for passive seat belts, driver's side
311P Motor relay for passive seat belts, co-driver's side
312D Motor relay for passive seat belts, driver's side
312P Motor relay for passive seat belts, co-driver's side

For ABS anti-lock brakes (1990 model)

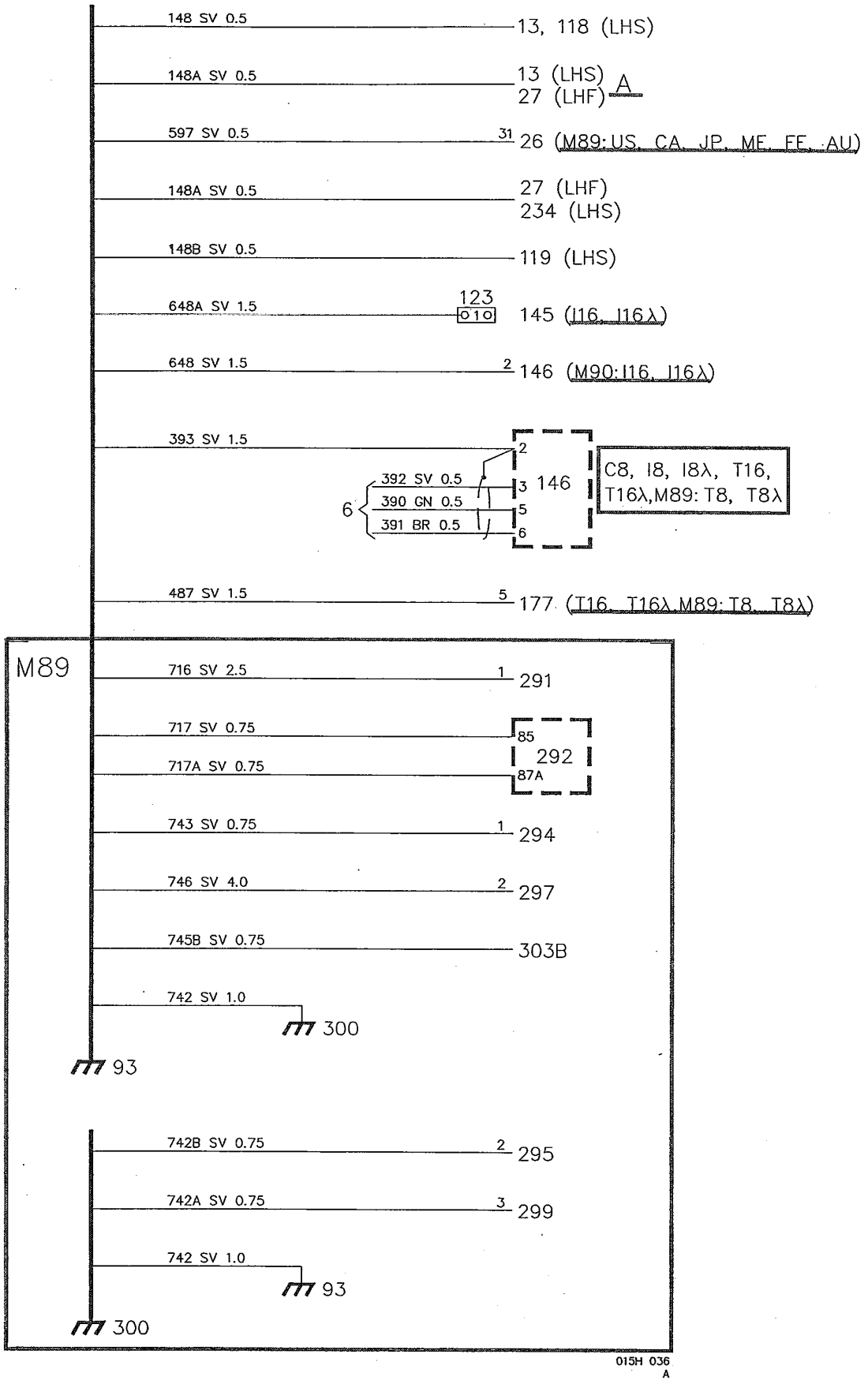
291 Control unit
292 System relay
294 Pressure switch
297 Hydraulic pump motor
303B Diode
397 Diagnostic test socket

Earthing point 300 is located on the front of the brake unit and, in turn, is earthed at earthing point 65 (1990 model). The following components are connected to this earthing point:

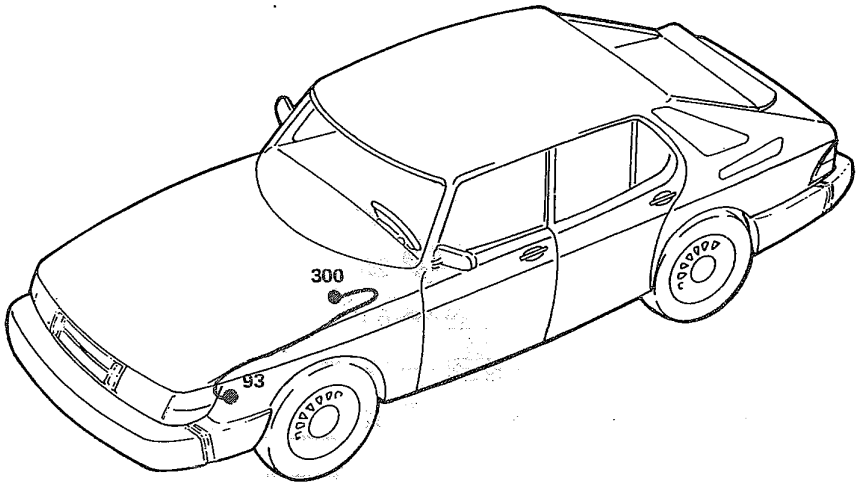
295 ABS master valve
299 ABS brake fluid level sensor

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Earthing point 93, amplifier and earthing point 300, brake unit (1989 model)



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Components connected

Earthing point 93 is located at the left-hand wheel housing, beside the amplifier for the electronic ignition system.

The following components are connected to this earthing point. Some of the components are only fitted to cars of certain versions or for certain markets.

Connections marked with "A" apply to cars without integrated bumpers.

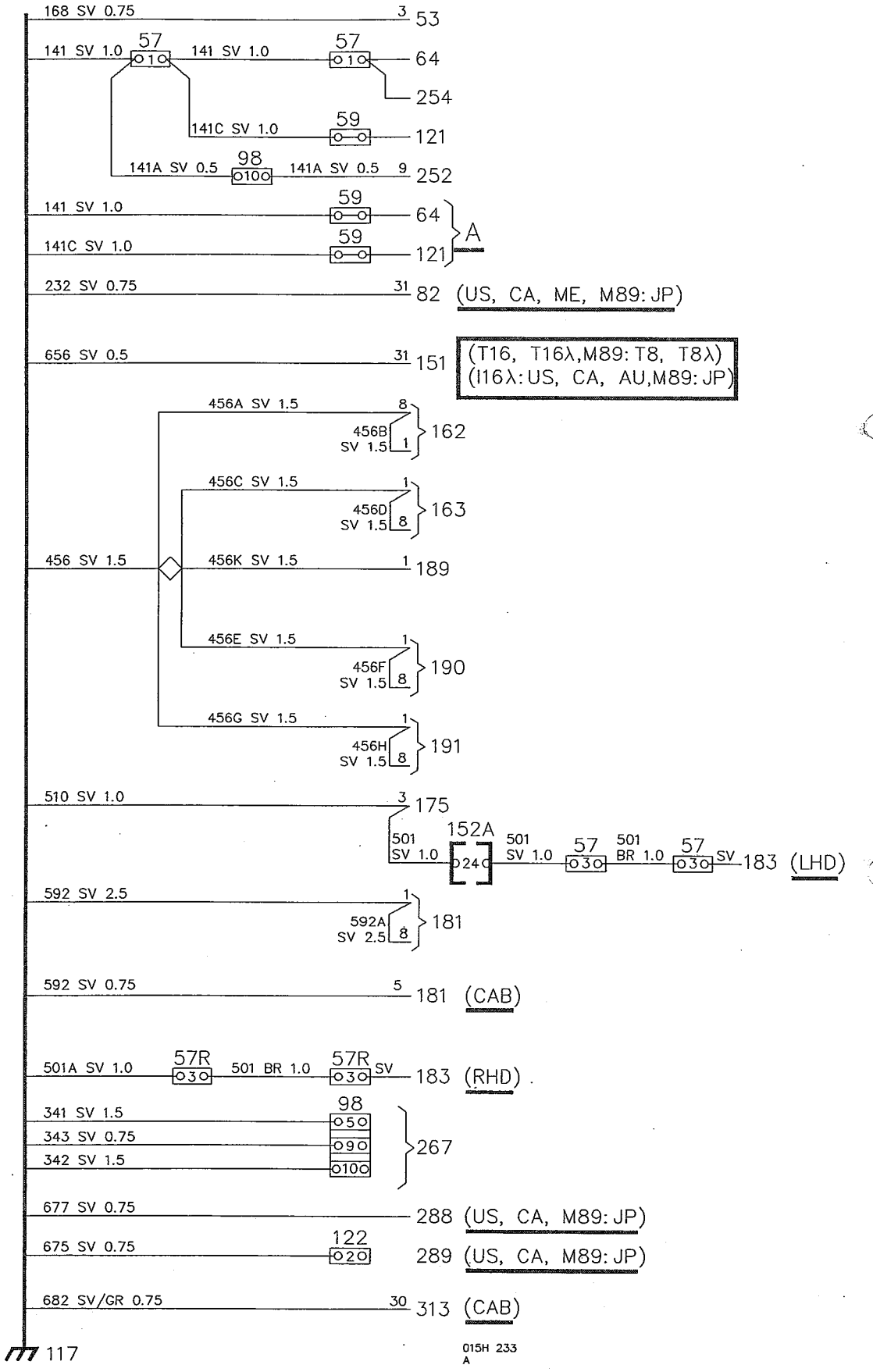
13	Parking lights, LHS
26	Time-delay relay for radiator fan
27	Direction indicator lamp, LHF
118	Corner lamp, LHS
119	Side reversing lamp, LHS
145	EZK test tapping
146	Amplifier for electronic ignition system
177	Control unit for APC system
234	Side marker lights, LHS
291	Control unit for the ABS system (1989 model)
292	ABS system relay (1989 model)
294	ABS pressure switch (1989 model)
297	ABS hydraulic pump motor (1989 model)
303B	Diode for the ABS system (1989 model)

Earthing point 300 is located on the front of the brake unit and is connected to earthing point 93 (1989 model). The following components are connected to this earthing point:

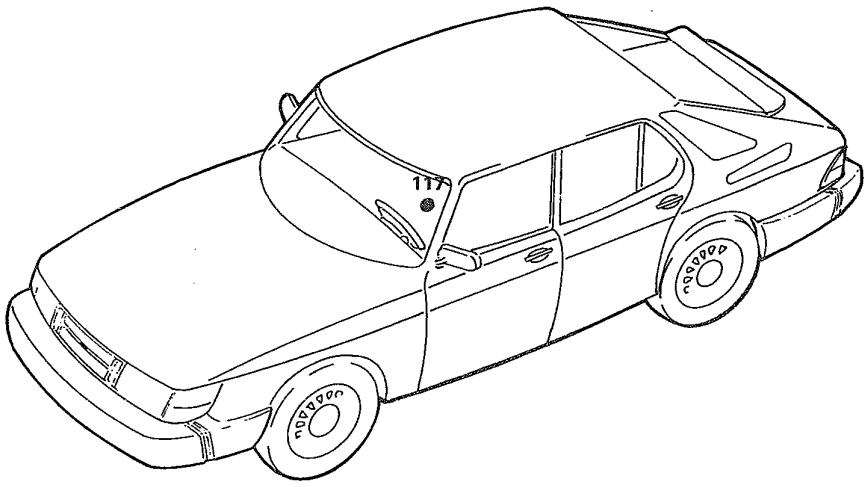
295	ABS master valve
299	ABS brake fluid level sensor

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Earthing point 117, between the ignition switch and the handbrake lever



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Components connected

Earthing point 117 is located between the ignition switch and the handbrake lever.

The front seat must be removed before access can be gained to the earthing point.

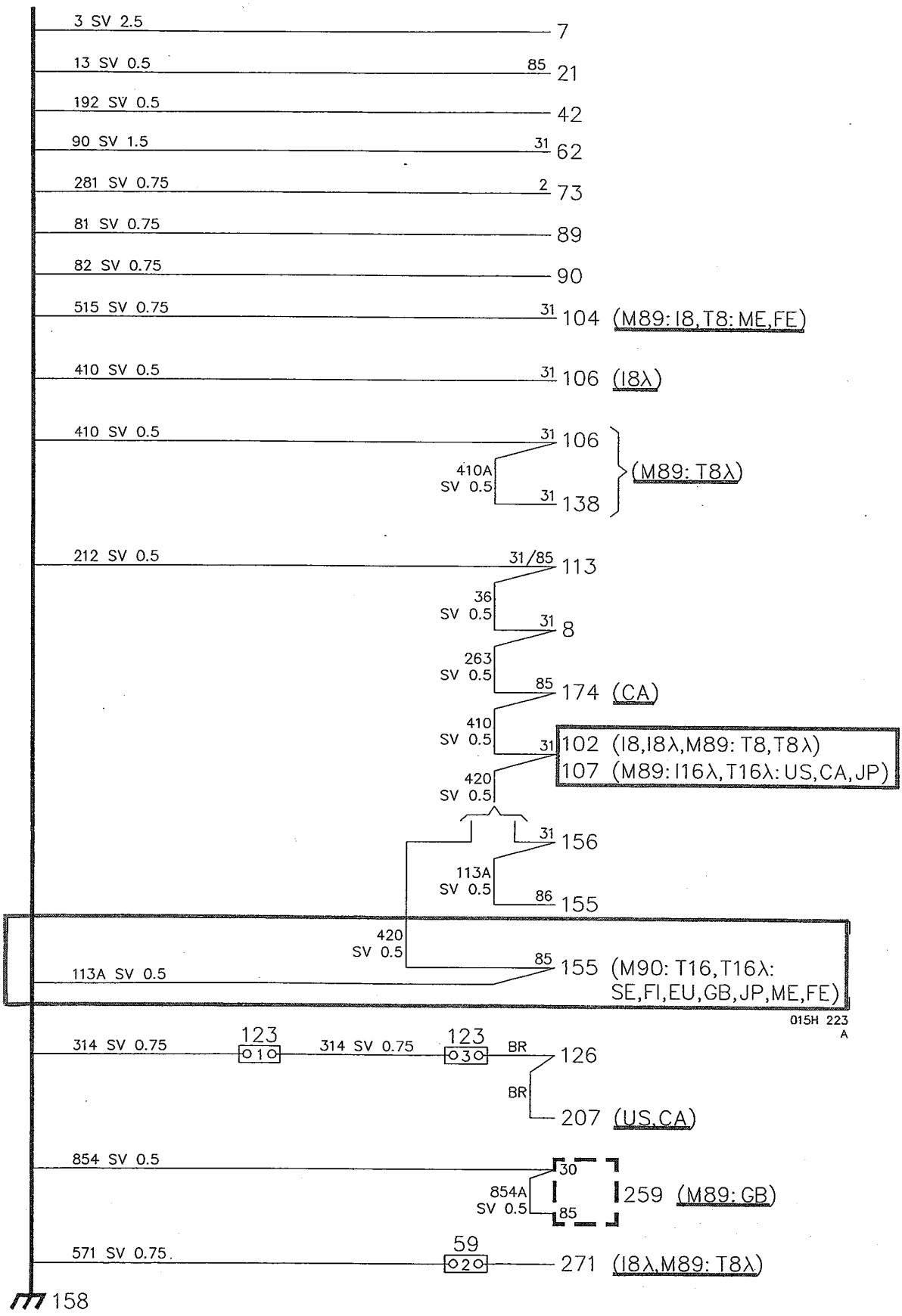
The following components are connected to this earthing point (at the rear gear-lever mounting). Some of the components are only fitted to cars of certain versions or for certain markets.

Connections marked with "A" apply to non-adjustable, electrically-heated front seats.

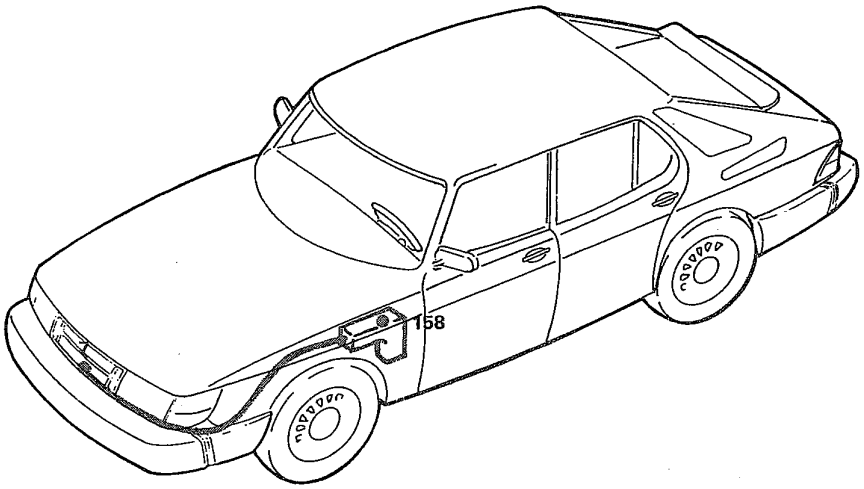
53 Interior lighting switch
57 3-pole connector
57R 3-pole connector for the central locking system (RHD)
59 2-pole connector
64 Heating pad with thermostat (across 2-pole connector 59 under the corresponding front seat)
82 Seat belt/ignition key warning relay
98 10-pole connector
121 Seat switch for the heating pad (across 2-pole connector 59, under the right-hand front seat)
122 8-pole connector
151 Time-delay relay for delayed interior lighting
152A White 29-pole connector
162 Switch for the driver's door electric window regulator
163 Switch for the co-driver's door electric window regulator
175 Electronic unit for the central locking system
181 Switch for the electrically operated top/sunroof
183 Key switch for the central locking system, RH drive cars (across 3-pole connectors 57R in the right-hand front door and forward of the right-hand A-pillar, beside the upper hinge)
189 Switch for the rear-door electric window regulators
190 Switch for the left-hand rear electric window regulator
191 Switch for the right-hand rear electric window regulator
252 Rheostat for the driver's seat heating pad
254 Temperature sensor for the driver's seat heating pad
267 Radio connections (10-pole connector 98)
288 Burglar alarm switch (US)
289 Burglar alarm connector (US) (8-pole connector 122)
313 Burglar alarm relay (CAB)

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Negative distribution terminal 158, in the electrical distribution box



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Components connected

Distribution terminal 158 consists of a ring of flat pins and is connected to earthing point 7 on the radiator cross-member by means of cable 3 SV.

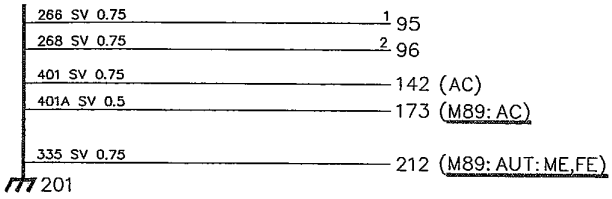
The terminal is located on the underside of the electrical distribution box. The following components are connected to the terminal. Some of the components listed below are fitted only to cars of certain versions or for certain markets.

7 Earthing point on the radiator cross-member
8 Lighting relay
21 Ignition switch relay
42 Brake warning switch
62 Windscreen wiper motor
73 Timing service instrument socket
89 Side direction indicator, left-hand
90 Side direction indicator, right-hand
102 Fuel pump relay
104 Hot start relay (1989 model)
106 Time-delay relay
107 Relay for extra fog lamps (US, CA, JP) (1989 model). (Note: Relay 107 is not earthed at distribution terminal 158. It is only the other terminals of the relay socket that are used.)
113 Relay for the electrically heated rear window
126 Motor for the left-hand electrically operated rear-view mirror (across 4-pole connectors 123 in the engine compartment at the left-hand door upper hinge and in the left-hand front door)
138 Engine speed relay, Turbo with manual gearbox (1989 model)
155 Relay for the AC radiator fan
156 Relay for the AC compressor
174 Relay for daylight driving lights (CA)
207 Electrically-heated rear-view mirrors
259 Reverse-current protection relay (GB) (1989 model)
271 Preheater for the Lambda sensor (across 2-pole connector 59 under distribution block 75, on the right-hand side of the engine compartment)

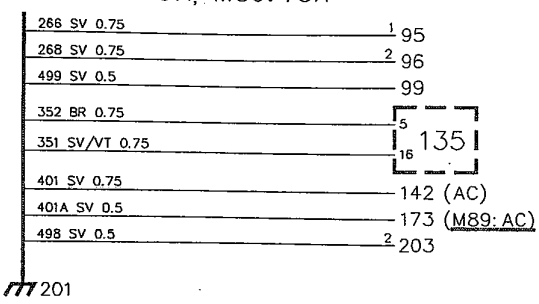
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Earthing point 201, engine

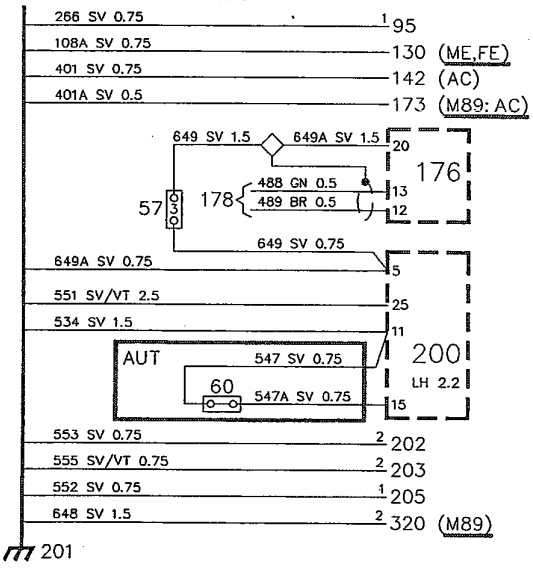
I8, M89: T8



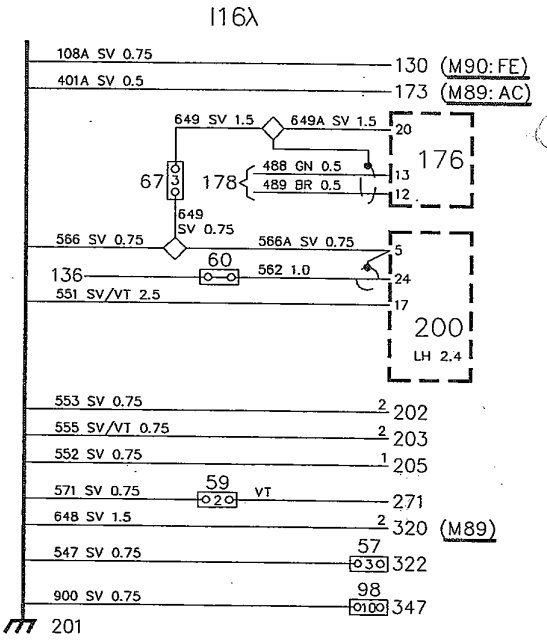
I8λ, M89: T8λ



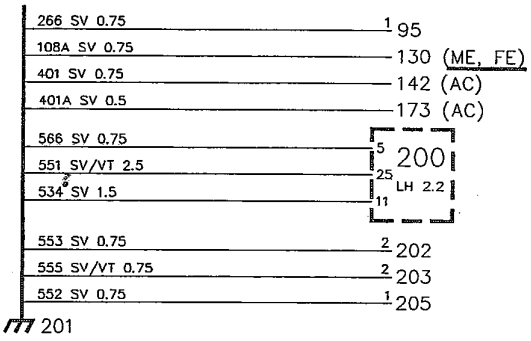
I16



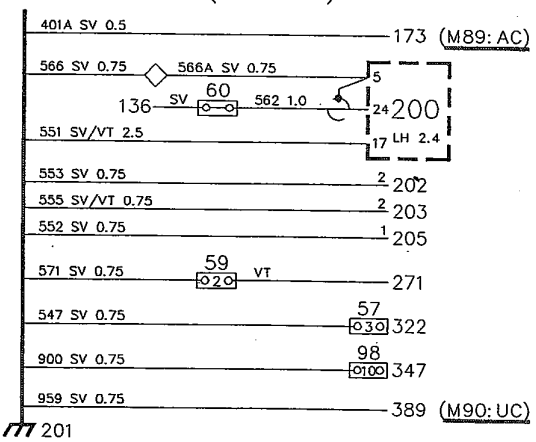
I16λ



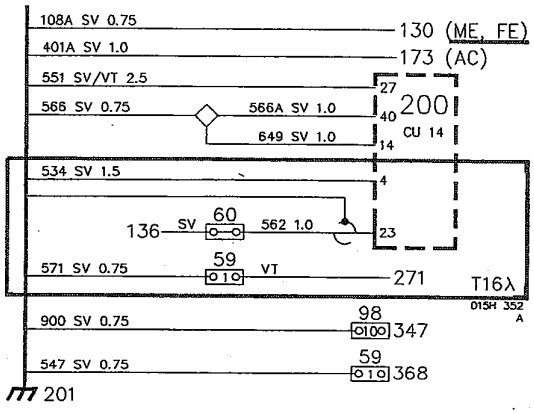
M89: T16



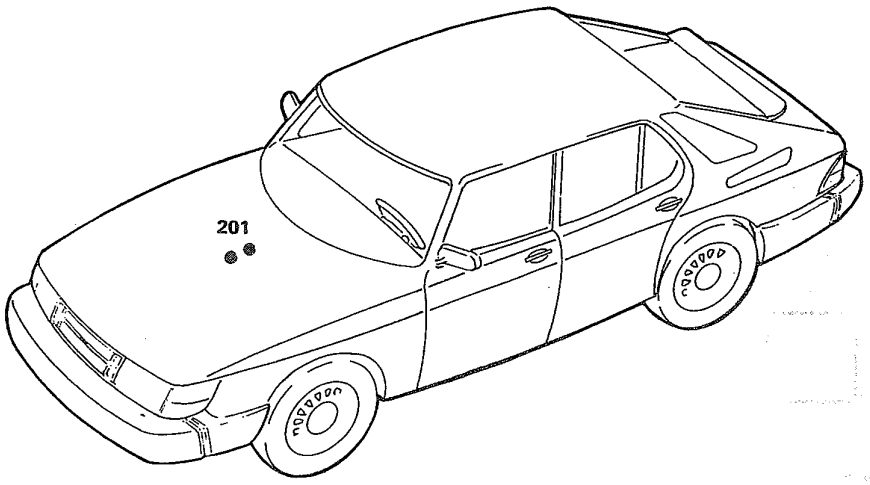
T16λ (LH 2.4λ)



M90: T16, T16λ (CU14)



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Components connected

Earthing points 201 (two) are located on the engine cylinder head at the lifting lug. The following components are connected to this earthing point. Some of the components are only fitted to cars of certain versions or for certain markets.

Cars with 8-valve engine

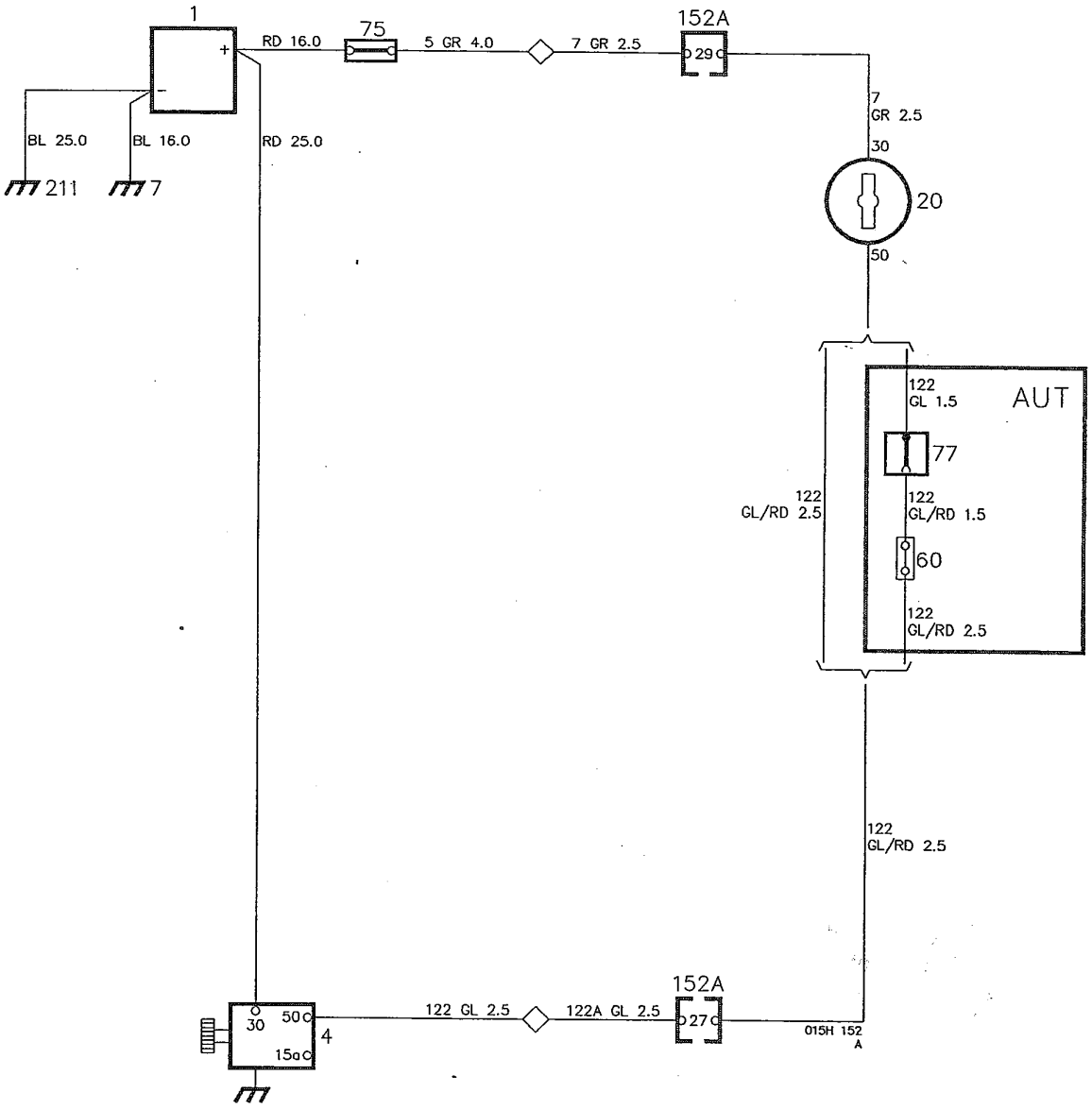
95 Auxiliary air valve
96 Control pressure valve
99 Temperature switch II, Lambda
135 Lambda control unit
142 Solenoid valve for raising the idling speed, AC
173 Diode for the AC compressor (1989 model)
203 Throttle angle transmitter for the CI fuel injection system, Lambda
212 Solenoid valve for raising the idling speed, cars with auto. transmission (1989 model)

Cars with 16-valve engine

95 Auxiliary air valve
130 Radiator coolant temperature warning switch (ME, FE)
142 Solenoid valve for raising the idling speed, AC
173 Diode for the AC compressor
176 Control unit for EZK ignition system (across 3-pole connector 57/6-pole connector 67 in the engine compartment, on the right-hand side at the air intake)
200 Control unit for the fuel injection system
202 Engine temperature transmitter for the fuel injection system
203 Throttle angle transmitter for the fuel injection system
205 Air mass meter for the fuel injection system
271 Preheater for the Lambda sensor
320 Ignition coil with integrated amplifier (1989 model)
322 Connector, Auto/Man, LH 2.4 fuel injection system
347 Test connector, diagnostics
368 Connector, cold-starting valve, LH 2.4
389 NTC resistor, LH 2.4 Lambda (1990 model: UC)

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Starting system



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Operation

The supply to ignition switch 20 is taken from battery 1 across white 29-pole connector 152A, and a supply cable is also run directly from the battery to terminal 30 of starter motor 4.

When the ignition switch is turned to the start position, the solenoid coil in the starter motor will be energised (+50). The coil will close the starting contacts, so that current will flow from the battery through the starter motor, and the starter motor will start to rotate.

Automatic tranmission

Cars with automatic transmission are also equipped with start inhibitor switch 77 which prevents the engine from being started when one of the gears is engaged.

Fault-tracing hints

1. Check that terminal 30 of starter motor 4 is live.
2. Check the energising voltage to the starter motor solenoid when the ignition switch is in the start position.
3. Check start inhibitor switch 77 on cars with automatic transmission.
4. Check that the engine is earthed to the chassis of the car.
5. Check the connectors and the wiring.

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Locations of components

1 Battery
on the right-hand side of the engine compartment

4 Starter motor
on the left-hand side of the engine (intake side)

7 Earthing point, radiator cross-member

20 Ignition switch
on the centre console between the front seats

60 Single-pole connector (only on cars with automatic transmission)
under the centre console, between the front seats

75 Distribution block
in the engine compartment, on the right-hand side

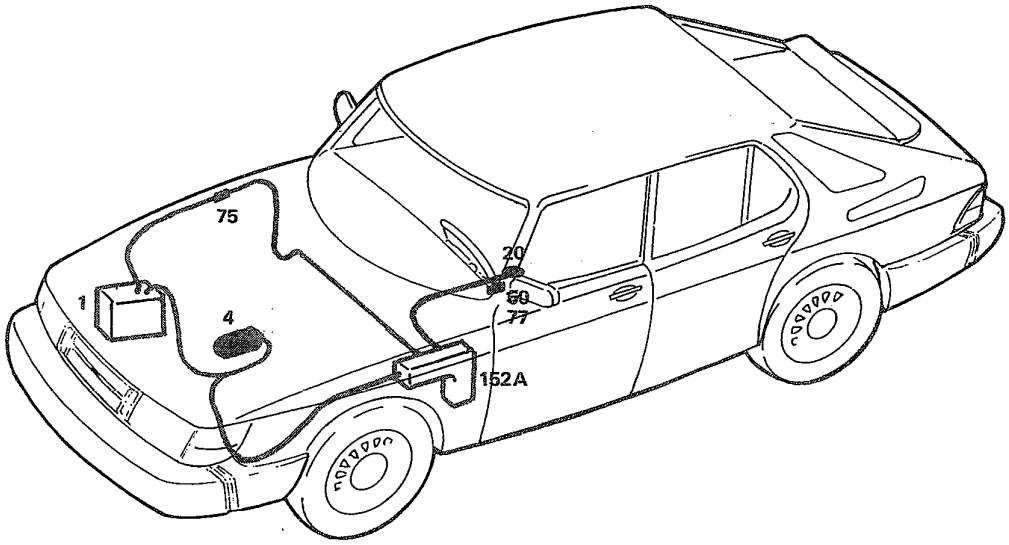
77 Start inhibitor switch (only on cars with automatic transmission)
at the selector lever

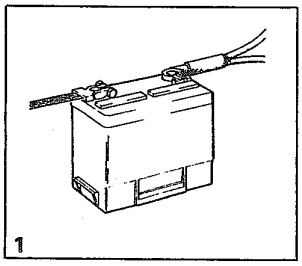
152A 29-pole white connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connector is accessible from the interior of the car.

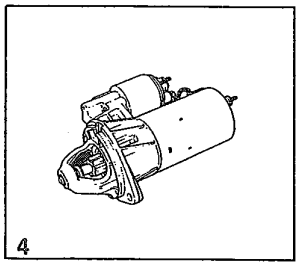
211 Earthing point on the gearbox

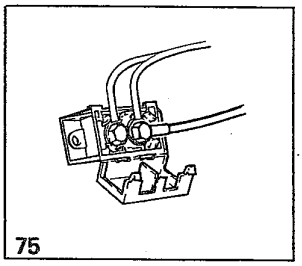
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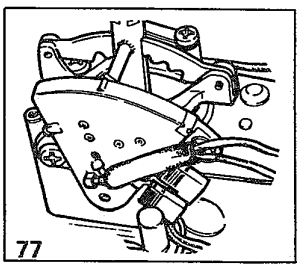
Components











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Locations of components

1 Battery
on the right-hand side of the engine compartment

4 Starter motor
on the left-hand side of the engine (intake side)

7 Earthing point, radiator cross-member

20 Ignition switch
on the centre console between the front seats

60 Single-pole connector (only on cars with automatic transmission)
under the centre console, between the front seats

75 Distribution block
in the engine compartment, on the right-hand side

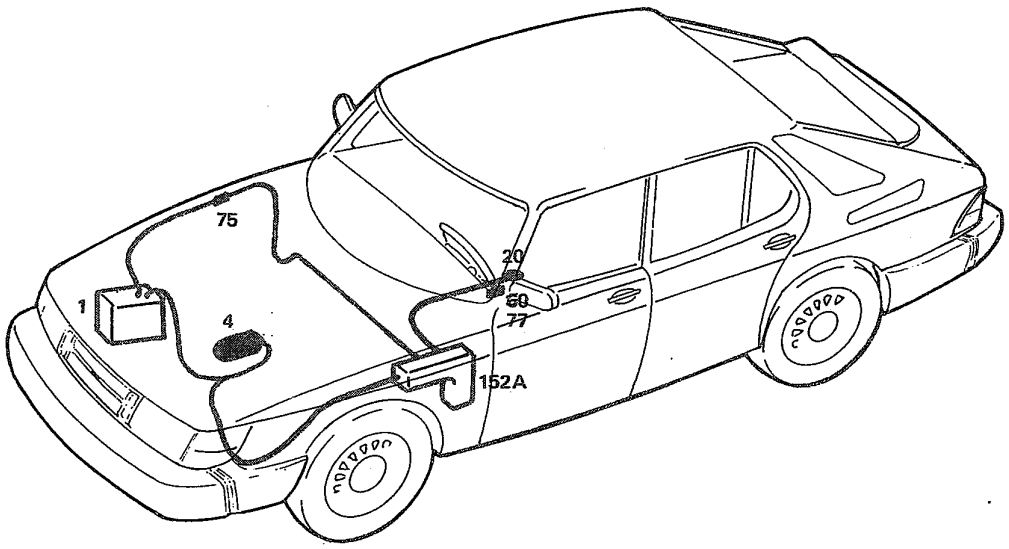
77 Start inhibitor switch (only on cars with automatic transmission)
at the selector lever

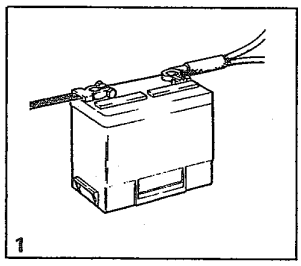
152A 29-pole white connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connector is accessible from the interior of the car.

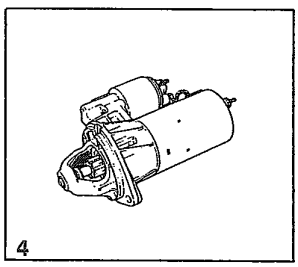
211 Earthing point on the gearbox

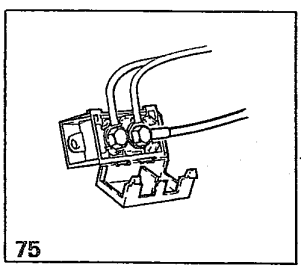
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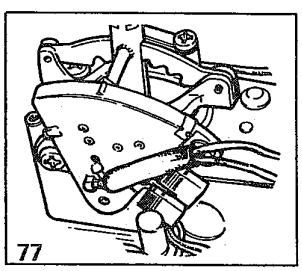
Components





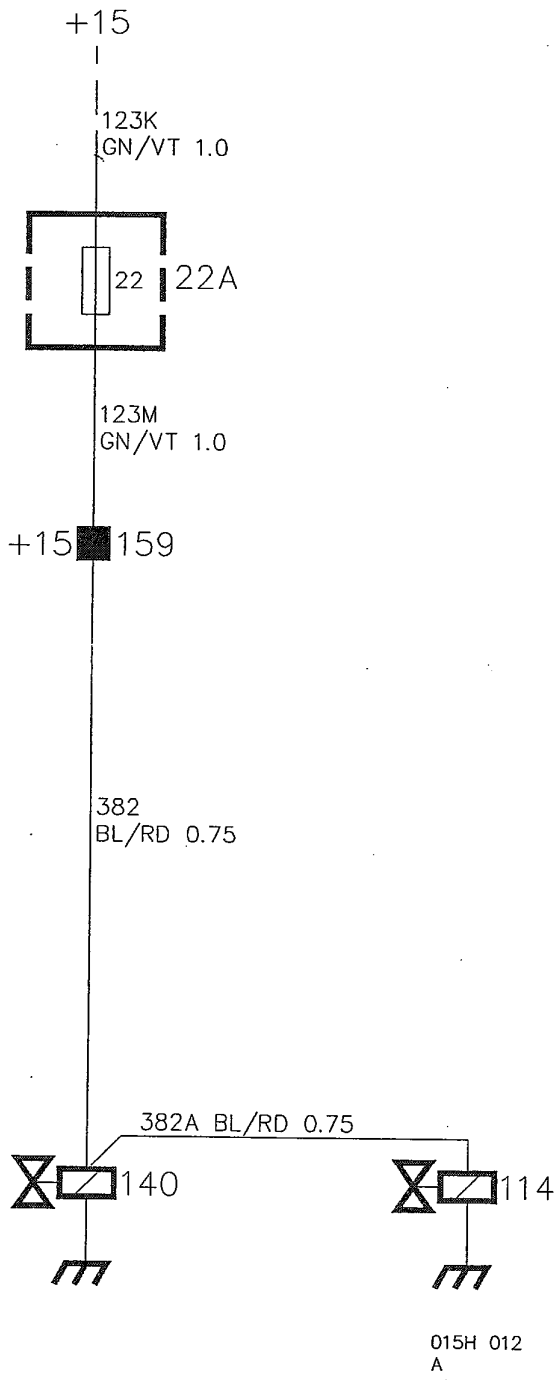






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Fuel system, carburettor engine



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Operation

The fuel system of a car powered by a carburettor engine comprises fuel shut-off valve 140 and float chamber valve 114. The fuel shut-off valve prevents the engine from running on and the float valve prevents fuel vapour from escaping when the ignition is switched off.

The valves are energised across fuse 22 when the ignition switch is in the start or drive position, i.e. the valves are open when the engine is running.

Fault-tracing hints

The valves should open when the ignition switch is set to the drive position.

1. Check fuse 22 and check that the supply to it is live.
2. Check that the supply to the fuel shut-off valve and the float chamber valve is live.
3. Check the connectors, wiring and earth connections.

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Locations of components

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

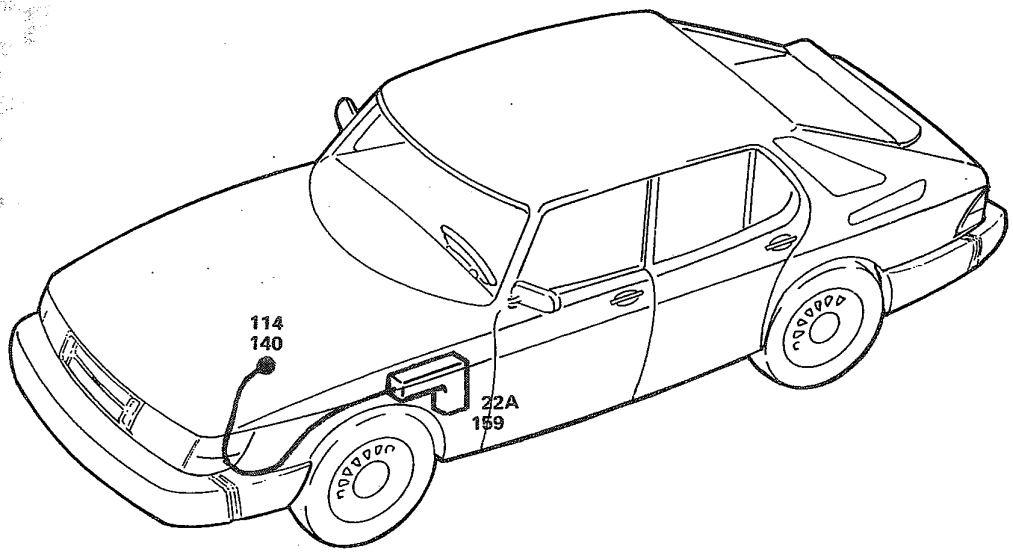
114 Float chamber valve
on the left-hand side of the float chamber

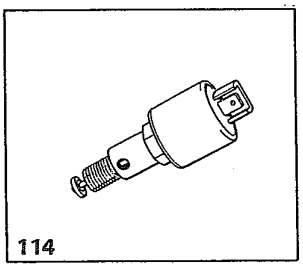
140 Fuel shut-off valve
on the intake manifold

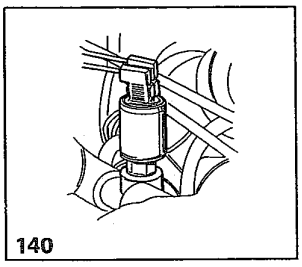
159 Distribution terminal +15
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

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Components

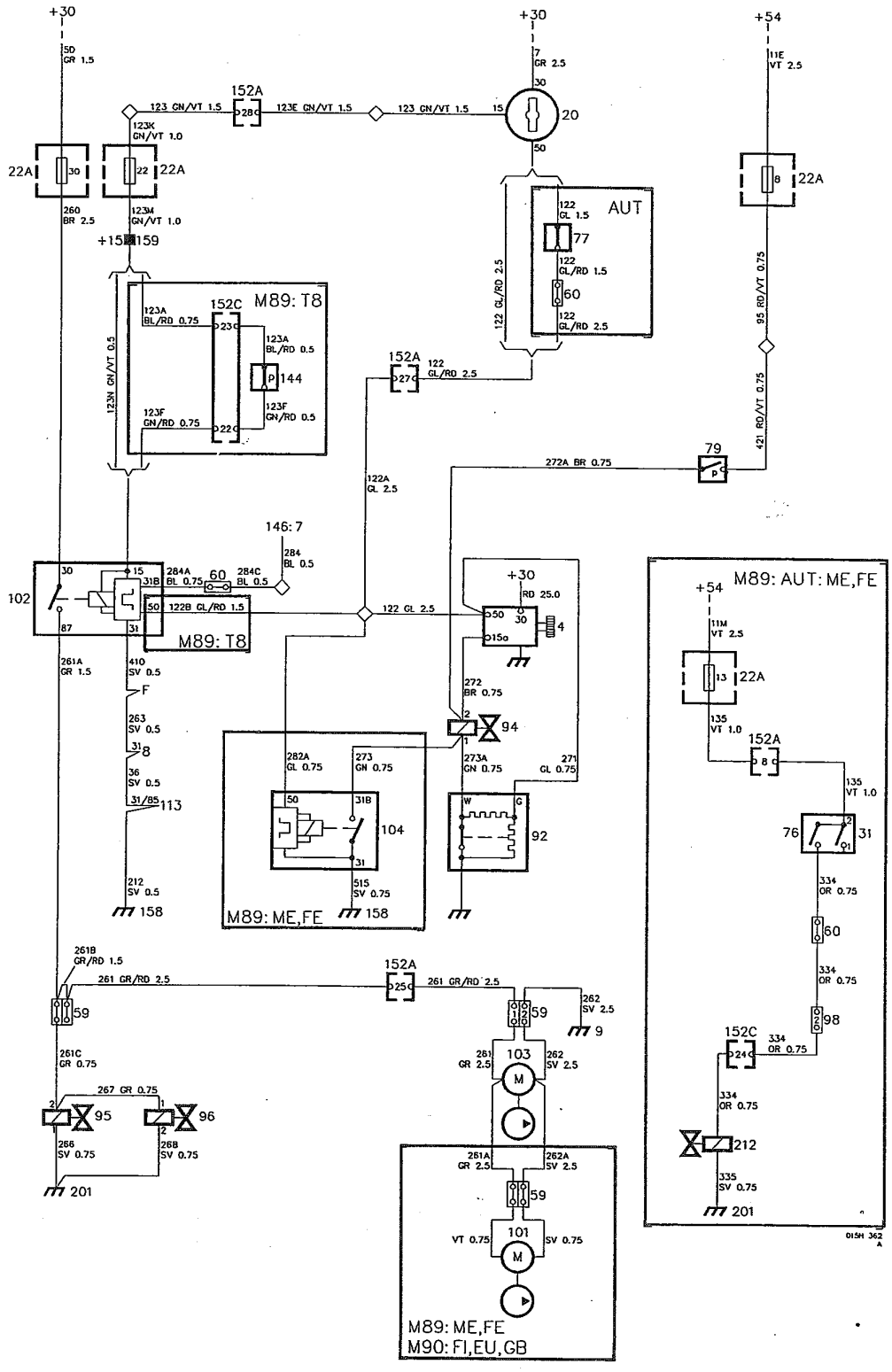






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CI fuel system: I8 1990 model, 1989 model – ME, FE CI: T8 1989 model – FI, EU, GB



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Operation

The CI (Continuous Injection) fuel injection system is of mechanical type and is used for 8-valve engines.

The system is permanently energised across fuse 30 from distribution terminal +30, and is also supplied from distribution terminal +15 when ignition switch 20 is in the start or drive position.

Start position

When the ignition key is turned to the start position, the following components will be energised across the white 29-pole connector 152A:

- Fuel pump relay 102
- Starter motor 4
- Temperature time switch 92

Relay 102 will be energised and fuel pump 103, which is supplied across fuse 30, will start to run (on cars for certain markets (1989 model), also fuel feed pump 101). At the same time, the heating coils in auxiliary air valve 95 and control pressure valve 96 will also be energised.

If the engine is cold, i.e. if its temperature is below +45 °C (113°F), temperature time switch 92 will be closed. Starting valve 94, which is energised from terminal 15a of starter motor 4, will then be earthed. The valve will thus be open, and the engine will be supplied with additional fuel during the period when the starter motor is energised (although no longer than about 9 seconds).

Vacuum switch (79) is used for controlling the fuel enrichment during acceleration.

Cars for the Middle East and Far East (1989 model)

Cars delivered to these markets are equipped with hot start relay 104. The relay will be energised when the ignition switch is in the start position and will pulse starting valve 94, even if the engine temperature is above +45 °C (113°F) (temperature time switch 92 is open).

Cars with automatic transmission for these markets are also equipped with solenoid valve 212, which raises the engine idling speed. The valve opens when the selector lever is set to position D and switch 76 is thus closed.

Drive position

If the ignition switch is in the drive position, fuel pump relay 102 will be energised (+15) only across fuse 22.

The relay is supplied with ignition pulses from ignition system amplifier 146. If the engine should stop, the pulses will cease, and the relay will then trip, thus interrupting the supply to the fuel system components.

Turbo (1989 model)

On cars powered by the Turbo engine, an additional function of the relay is to trip the fuel pump relay if the frequency of the ignition pulses should be higher than that corresponding to an engine speed of about 6000 r/min. (The relay includes additional pin 50.)

On these cars, the control signal for the fuel pump relay is not connected directly to the relay, but is wired across boost pressure switch 144. The switch will open if the boost pressure is too high, thus interrupting the supply to the relay and tripping the fuel pump.

Fault-tracing hints

For further particulars of fault-tracing in the fuel system, see the Service Manual, Group 2:3, Fuel system, injection engine.

The fuel system will be energised as soon as the ignition switch is set to the drive or start position.

1. Check fuses 22 and 30 and check that the supply to them is live (also fuse 13 on cars with automatic transmission for the FE and ME markets (1989 model)).
2. Check that the supply to each component is live when the ignition switch is in the start or drive position. Note the differences between cars with and without turbocharger (1989 model).

   On cars intended for the ME and FE markets, the hot start relay must be energised when the ignition switch is in the start position (1989 model).
3. Check the connectors, wiring and earth connections.

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Locations of components

4 Starter motor
on the left-hand side of the engine (intake side)

8 Lighting relay
in the electrical distribution box in the engine compartment, relay positions A, B.

9 Earthing point in the luggage compartment

20 Ignition switch
on the centre console between the front seats

22A Fuse holder
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

31 Reversing light switch (1989 model)
under the centre console, at the selector lever

59 2-pole connector
one in the electrical distribution box in the engine compartment, on the left-hand wheel housing
two at the fuel pumps under the luggage compartment floor

60 Single-pole connector
one in the electrical distribution box in the engine compartment, on the left-hand wheel housing
two (1990 model) or one (1989 model) under the centre console, at the selector lever (auto.)

76 Switch for raising the idling speed, auto. transm. (1989 model)
under the centre console, at the selector lever

77 Start inhibitor switch (auto.)
under the centre console, at the selector lever

79 Vacuum switch
in the engine compartment on the inside of the left-hand inner wheel housing, at the fuel filter

92 Temperature time switch
at the extreme front of the engine thermostat housing

94 Starting valve
on top of the engine throttle housing

95 Auxiliary air valve
at the front of the engine, beside the thermostat housing

96 Control pressure valve
at the front of the engine, on the thermostat housing

98 10-pole connector (1989 model)
to the left of the steering column, under the fascia (behind the knee shield)

101 Fuel feed pump (ME, FE)
in the fuel tank, under the luggage compartment floor

102 Fuel pump relay
in the electrical distribution box in the engine compartment, relay positions F, G (T8) or relay position G (I8)

103 Fuel pump
in the fuel tank, under the luggage compartment floor

104 Hot start relay (ME, FE) (1989 model)
in the engine compartment, on the left-hand wheel housing

113 Relay/time delay relay for the electrically heated rear window
in the electrical distribution box in the engine compartment, relay position C

144 Boost pressure switch (T8) (1989 model)
under the fascia, to the left of the steering wheel, behind the knee shield (behind the flasher relay holder)

146 Amplifier for the electronic ignition system
in the engine compartment, forward of the left-hand wheel housing

152A 29-pole white connector
152C 29-pole black connector (1989 model)
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car.

158 Negative distribution terminal
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

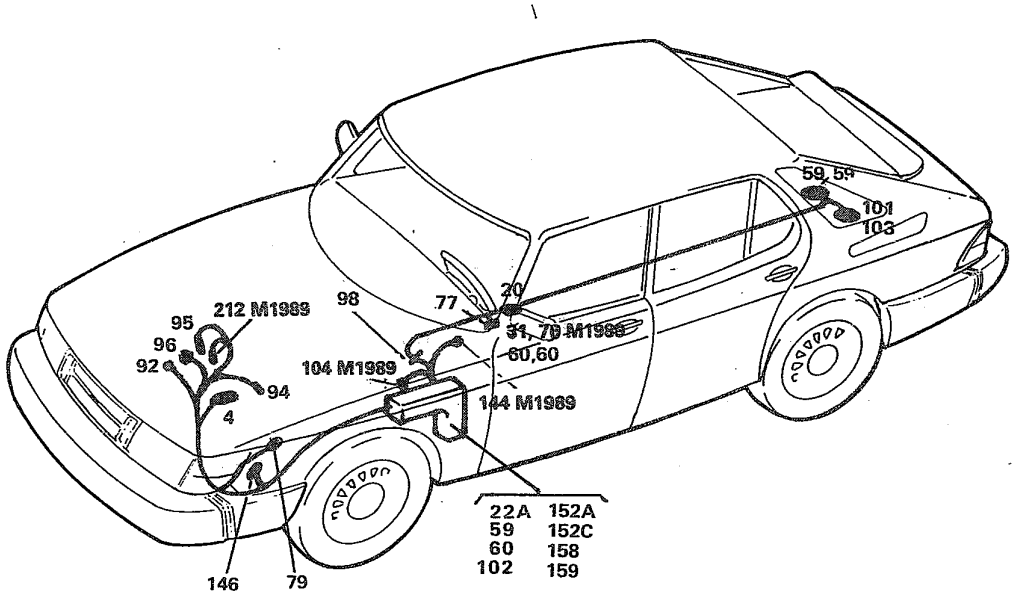
159 Distribution terminal +15
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

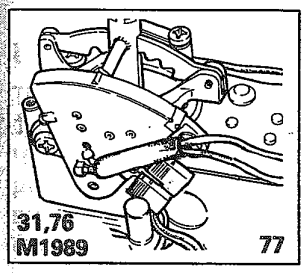
212 Solenoid valve for raising the idling speed (auto.) (1989 model)
at the engine throttle housing, in the hose for the auxiliary air valve

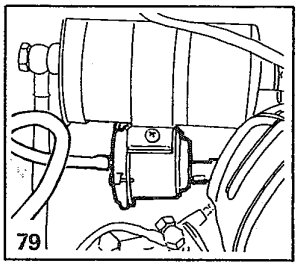
F Relay position F
in the electrical distribution box in the engine compartment

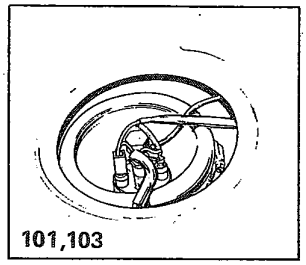
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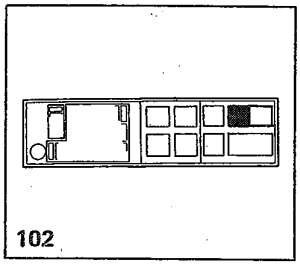
Components

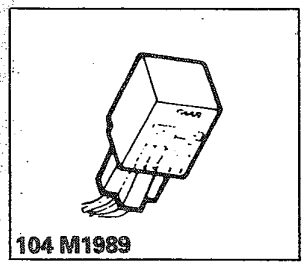


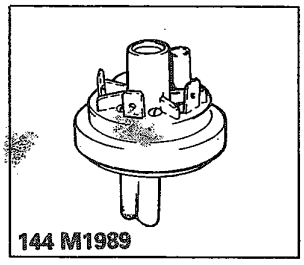


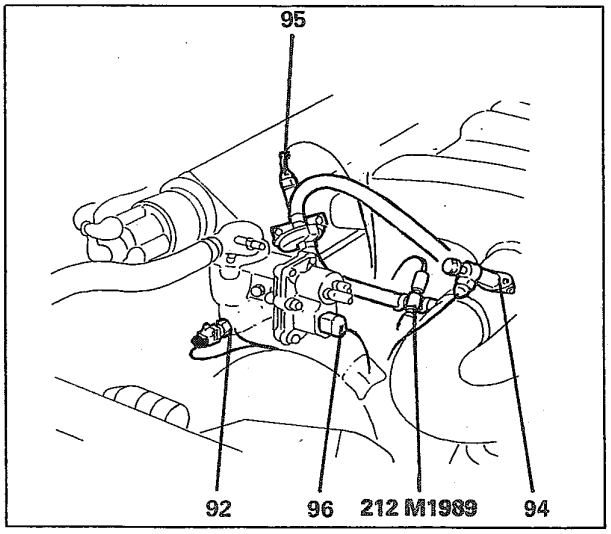


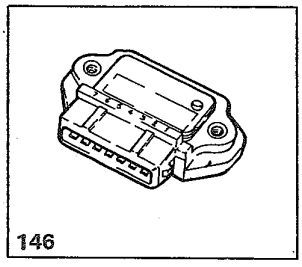


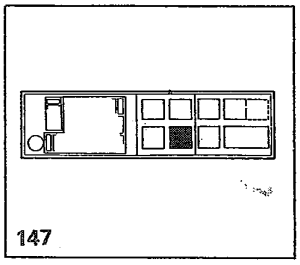






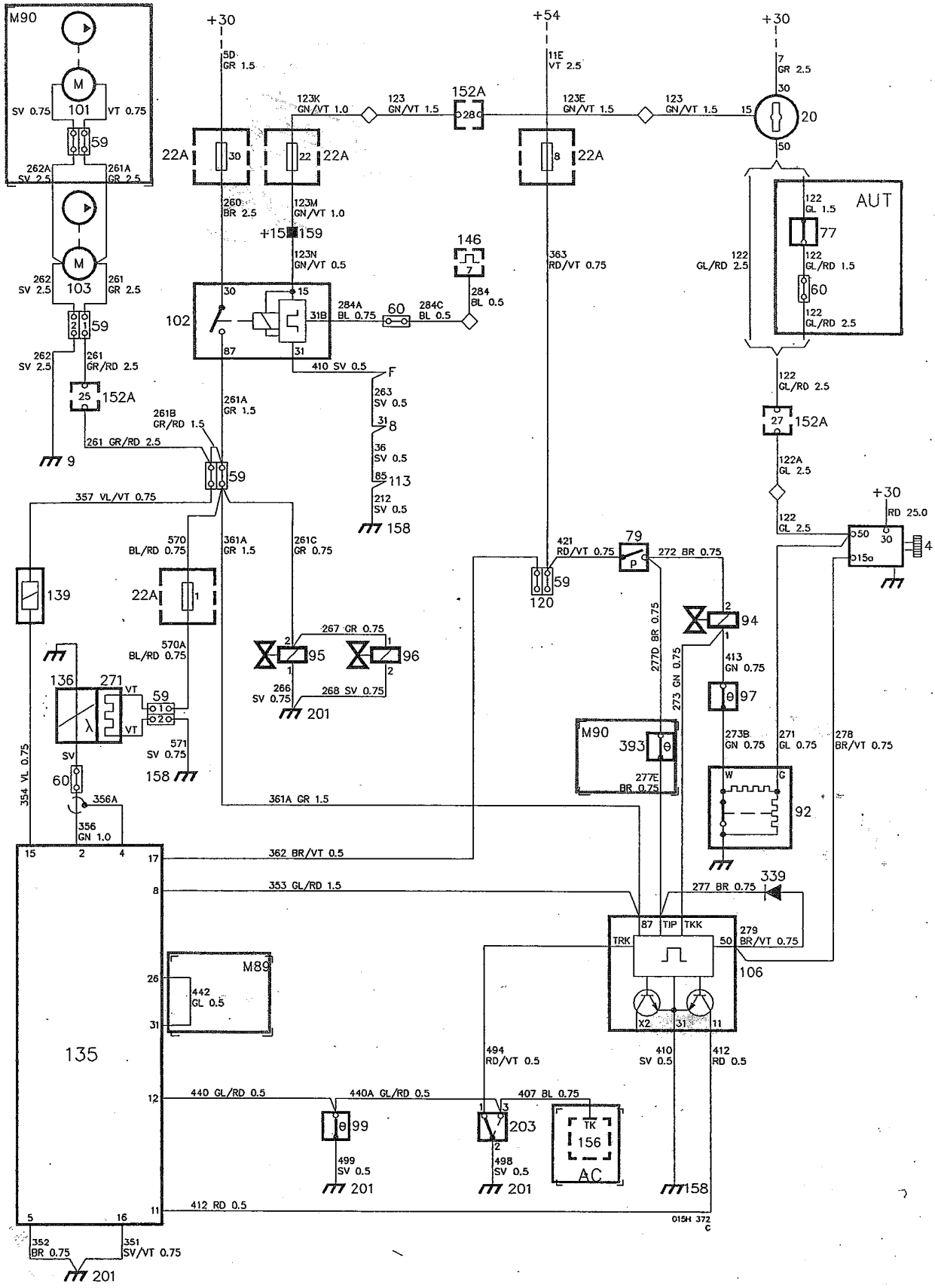






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CI fuel system: I8 Lambda – SE, EU. 1990 model – FI, GB



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Operation

The CI (Continuous Injection) fuel injection system with exhaust emission control (Lambda) for EU is of mechanical type and is used for 8-valve engines for Europe. It consists basically of the conventional Saab CI system, although it is supplemented with equipment for more accurate adjustment of the fuel/air mixture.

The CI system

When the ignition switch is turned to the start position, starter motor 4 and temperature time switch 92 will be energised (+50).

If the engine is cold, i.e. if its temperature is below +45 °C (113 °F), temperature time switch 92 will be closed. Starting valve 94, which is energised from terminal 15a of starter motor 4, will then be earthed. The valve will thus be open, and the engine will be supplied with additional fuel during the period when the starter motor is energised (although no longer than about 9 seconds).

When the ignition switch is in the start or drive position, fuel pump relay 102 will be energised (+15) across fuse 22. Relay 102 will be energised and fuel pump 103, which is supplied across fuse 30, will start to run. At the same time, the heating coils in auxiliary air valve 95 and control pressure valve 96 will also be energised.

The fuel pump relay and the Lambda system are both supplied with ignition pulses from ignition pulse amplifier 146. If the engine should stop, the pulses will cease, and the relay will then trip, thus interrupting the supply to the fuel system components.

Lambda

The Lambda equipment includes a Lambda sensor 136 which continuously supplies information to control unit 135 on the oxygen content of the exhaust gases. On the basis of this information, and the signals received by the control unit from the various sensors and relays of the Lambda system, the control unit adjusts the quantity of fuel injected through timing valve 139. (The valve is controlled by earthing of terminal 15.) The Lambda sensor is heated by preheater 271, across fuse 1.

Control unit 135 and relay 106 are supplied across the contacts of relay 102, from terminal 87.

Time-delay relay 106 is used during the starting stage and is energised (+50) when ignition switch 20 is in the start position. The time-delay relay actuates the control unit and timing valve 139, to increase the fuel supply to the engine.

1989 model

Temperature switch 97 senses the engine temperature. It opens at a temperature above +45 °C (113 °F) and closes at +38 °C (100 °F). The switch is connected in series with the temperature time switch.

1990 model

Temperature switch 97 senses the engine temperature. It opens at a temperature above +25 °C (77 °F) and closes at +19 °C (66 °F). The switch is connected in series with the temperature time switch.

Vacuum switch 79 is used for controlling the fuel enrichment during acceleration. When the engine is cold, the switch will open starting valve 94. When the engine is hot, a signal is applied instead to time-delay relay 106 which actuates the control unit to increase the fuel supply (active up to 2 minutes after starting). Diode 339 prevents energising of relay 106:50 when switch 79 is closed.

1990 model

Temperature switch 393 opens at a temperature of 55 °C (131 °F) and closes at +48 °C (118 °F). The function of the switch is switch out time-delay relay 106 at a temperature above 55 °C (131 °F).

Full-load enrichment is provided when the throttle angle is the greater than 72°. In this case, pin 12 of control unit 135 is earthed and provides a fixed timing ratio of 60%. At the same time, the AC compressor is disconnected to provide maximum engine power. Throttle angle transmitter 203 closes the circuit between pins 1 and 2 only when the throttle is in the idling position (throttle angle of 0°), and closes the circuit between pins 2 and 3 when the throttle angle is greater than 72°.

Temperature switch 99 opens at +25 °C (77 °F) and closes at +19 °C (66 °F). One of its functions is to improve the fuel enrichment.

Connector 120 is intended for a special instrument and is used for adjusting the timing ratio. The connector is energised when the ignition switch is in the drive position.

Fault-tracing hints

For particulars of fault-tracing in the fuel system with the Lambda system, see the Service Manual, Group 2:3, Fuel system, injection engine.

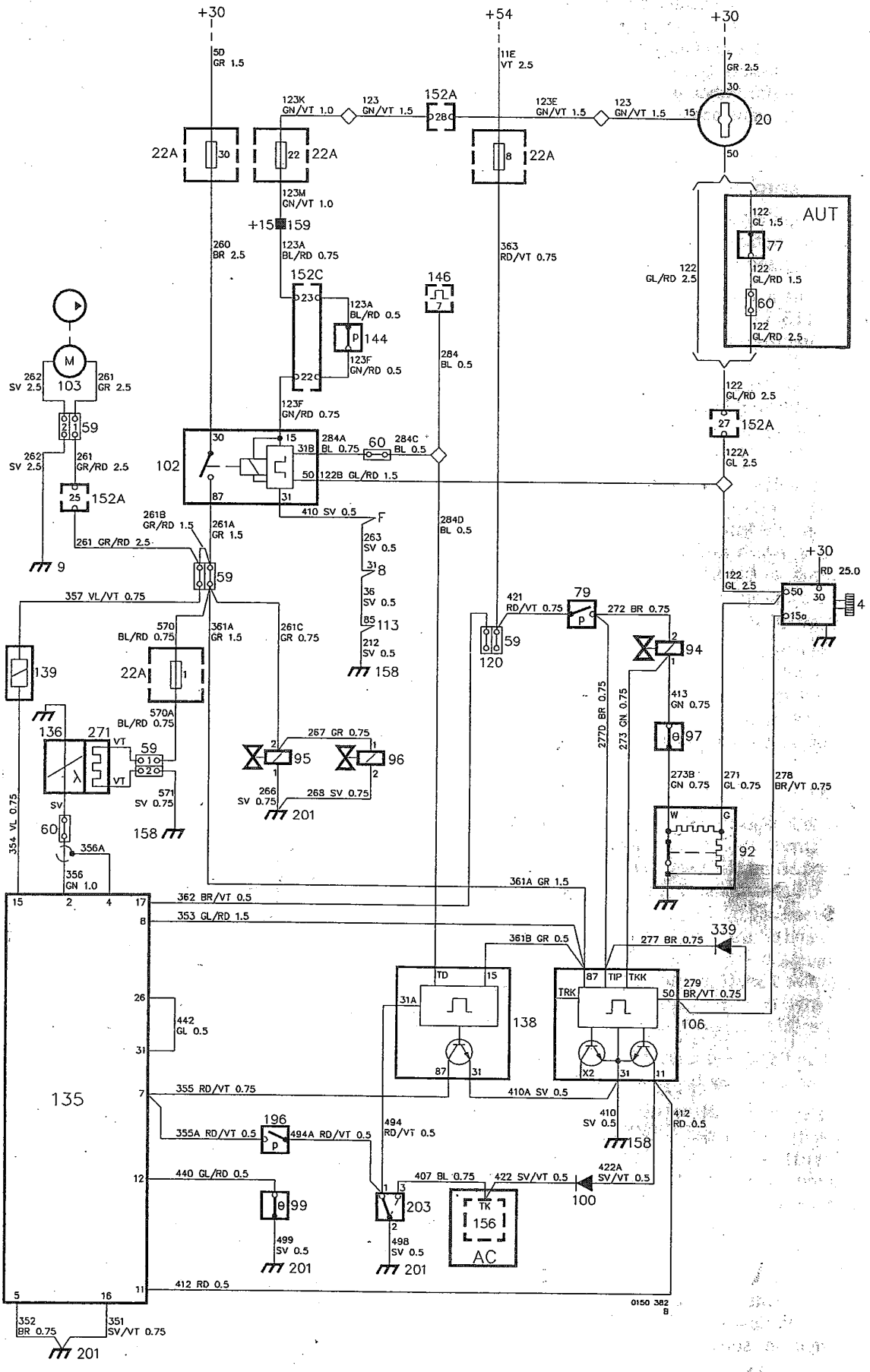
The system includes several components that demand special care during fault-tracing and replacement. So read all of the instructions in the Service Manual before carrying out fault-tracing work on the components and in the wiring.

Locations of components

The locations of the components are the same for 1990 model I8 Lambda SE, EU as for 1989 model T8 Lambda EU (see pages 62 – 63).

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CI fuel system: 1989 model T8 Lambda – EU



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Operation

The CI (Continuous Injection) fuel injection system with exhaust emission control (Lambda) for EU is of mechanical type and is used for 8-valve engines for Europe. It consists basically of the conventional Saab CI system, although it is supplemented with equipment for more accurate adjustment of the fuel/air mixture.

The CI system

When the ignition switch is turned to the start position, starter motor 4, temperature time switch 92 and fuel pump relay 102 will be energised (+50).

If the engine is cold, i.e. if its temperature is below +45 °C (113 °F), temperature time switch 92 will be closed. Starting valve 94, which is energised from terminal 15a of starter motor 4, will then be earthed. The valve will thus be open, and the engine will be supplied with additional fuel during the period when the starter motor is energised (although no longer than about 9 seconds).

When the ignition switch is in the start or drive position, fuel pump relay 102 will be energised (+15) across fuse 22. Relay 102 will be energised and fuel pump 103, which is supplied across fuse 30, will start to run. At the same time, the heating coils in auxiliary air valve 95 and control pressure valve 96 will also be energised.

The fuel pump relay and the Lambda system are both supplied with ignition pulses from ignition pulse amplifier 146. If the engine should stop, the pulses will cease, and the relay will then trip, thus interrupting the supply to the fuel system components.

The fuel pump relay includes a function which will trip it if the frequency of the ignition pulses should be higher than that corresponding to an engine speed of about 6000 r/min. The energising supply to the fuel pump relay is routed through pressure switch 144. The pressure switch will open if the boost pressure should exceed a predetermined value, thus deenergising the relay and stopping the fuel pump.

Lambda

The Lambda equipment includes a Lambda sensor 136 which continuously supplies information to control unit 135 on the oxygen content in the exhaust gases. On the basis of this information, and the signals received by the control unit from the various sensors and relays of the Lambda system, the control unit adjusts the quantity of fuel injected through timing valve 139. The Lambda sensor is heated by preheater 271, across fuse 1.

Control unit 135 and relays 106 and 138 are supplied across the contacts of relay 102, from terminal 87.

Time-delay relay 106 is used during the starting stage and is energised (+50) when ignition switch 20 is in the start position. The time-delay relay actuates the control unit and timing valve 139 to increase the fuel supply to the engine.

Temperature switch 97 senses the engine temperature. It opens at a temperature above +45 °C (113 °F) and closes at +38 °C (100 °F). The switch is connected in series with temperature time switch 92.

Vacuum switch 79 is used for controlling the fuel enrichment during acceleration. When the engine is cold, the switch will open starting valve 94. When the engine is hot, a signal is applied instead to time-delay relay 106 which actuates the control unit to increase the fuel supply (active up to 2 minutes after starting). Diode 339 prevents energising of relay 106:50 when switch 79 is closed.

Engine speed relay 138 and throttle angle transmitter 203 are used for fuel enrichment controlled by the engine speed. The engine speed must be above 4600 r/min and the throttle angle must be smaller than 72°. Pin 7 of control unit 135 is then earthed across relay 138 and provides a fixed timing ratio of 85%. At the same time, the AC compressor is disconnected to provide maximum engine power.

Pressure switch 196 and throttle angle transmitter 203 are used for fuel enrichment controlled by the boost pressure. The boost pressure must be between 0.25 and 0.30 bar and the throttle angle must be smaller than 72°. Pin 7 of control unit 135 is then earthed across pressure switch 196 and throttle angle transmitter 203 and provides a fixed timing ratio of 85%. When the throttle angle is greater than 72°, pin 11 of control unit 135 is earthed across throttle angle transmitter 203 and provides a fixed timing ratio of 92%.

Throttle angle transmitter 203 closes the circuit between pins 1 and 2 when the throttle angle is smaller than 72°, and closes the circuit between pins 2 and 3 when the throttle angle is greater than 72°.

Temperature switch 99 opens at +25 °C (77 °F) and closes at +19 °C (66 °F). One of its functions is to improve the fuel enrichment.

Connector 120 is intended for a special instrument and is used for adjusting the timing ratio. The connector is energised when the ignition switch is in the drive position.

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Fault-tracing hints

For particulars of fault-tracing in the fuel system with the Lambda system, see the Service Manual, Group 2:3, Fuel system, injection engine.

The system includes several components that demand special care during fault-tracing and replacement. So read all of the instructions in the Service Manual before carrying out fault-tracing work on the components and in the wiring.

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Locations of components

4 Starter motor
on the left-hand side of the engine (intake side)

7 Earthing point on the radiator cross-member

8 Lighting relay
in the electrical distribution box in the engine compartment, relay positions A and B

9 Earthing point in the luggage compartment

20 Ignition switch
on the centre console between the front seats

22A Fuse holder
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

59 2-pole connector
one in the electrical distribution box in the engine compartment, on the left-hand wheel housing
one in the luggage compartment, adjacent to the fuel pump
one connector 120 in the engine compartment, at the left-hand wheel housing
one for the Lambda sensor, under distribution block 75, on the right-hand side of the engine compartment

60 Single-pole connector
one in the electrical distribution box in the engine compartment, on the left-hand wheel housing
one in the engine compartment, on the right-hand side, beside the air intake
one under the centre console, at the selector lever (auto.)

77 Start inhibitor switch (auto.)
under the centre console, at the selector lever

79 Vacuum switch
in the engine compartment, on the inside of the left-hand wheel housing member, at the fuel filter

92 Temperature time switch
on the engine thermostat housing

94 Starting valve
on top of the engine throttle housing

95 Auxiliary air valve
at the front of the engine, beside the thermostat housing

96 Control pressure valve
at the front of the engine, on the thermostat housing

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97 Temperature switch I, Lambda
on the engine thermostat housing (1989 model)
Temperature switch II, Lambda (1990 model)
on the engine intake manifold

99 Temperature switch II, Lambda
on the engine intake manifold

100 Diode, T8 Lambda
forward of the right-hand front door, behind the trim

102 Fuel pump relay
in the electrical distribution box in the engine compartment, relay positions F and G (T8 Lambda) or relay position G (I8 Lambda)

103 Fuel pump
in the fuel tank, under the luggage compartment floor

106 Time-delay relay
forward of the right-hand front door, behind the trim

113 Relay/time delay relay for the electrically heated rear window
in the electrical distribution box in the engine compartment, relay position C

120 Test connector, Lambda

135 Lambda control unit
under the back seat, on the right-hand side

136 Lambda sensor
on the exhaust manifold

138 Engine speed relay for T8 Lambda (1989 model)
forward of the right-hand front door, behind the trim

139 Timing valve, Lambda
in the engine compartment, on the inside of the left-hand wheel housing member

144 Boost pressure switch for T8 Lambda (1989 model)
under the fascia, to the left of the steering wheel, behind the knee shield (behind the flasher relay holder)

146 Amplifier for the electronic ignition system
in the engine compartment, on the left-hand wheel housing

152A 29-pole white connector
152C 29-pole black connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior.

156 Relay for the AC compressor
in the electrical distribution box in the engine compartment, relay position H

158 Negative distribution terminal

159 Distribution terminal +15
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

196 Pressure switch for T8 Lambda (1989 model)
in the engine compartment, at the left-hand wheel housing member

201 Earthing point on the engine

203 Throttle angle transmitter
on the engine throttle housing

271 Preheater for the Lambda sensor
in the Lambda sensor, on the exhaust manifold

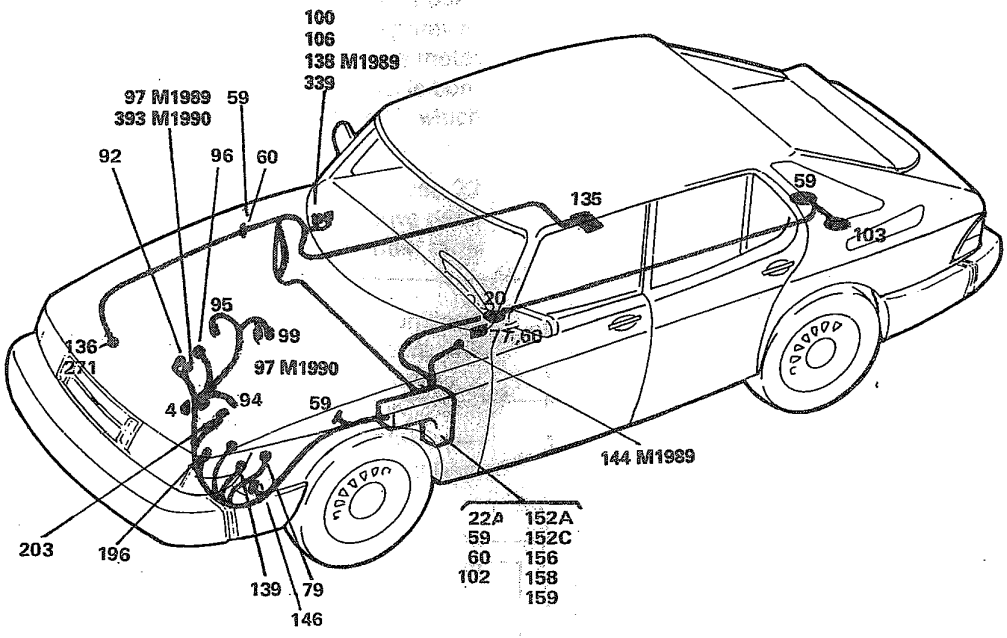
339 Diode
forward of the right-hand front door, behind the trim

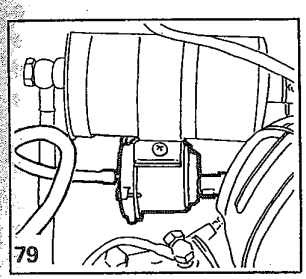
393 Temperature switch III, Lambda (1990 model)
on the engine thermostat housing

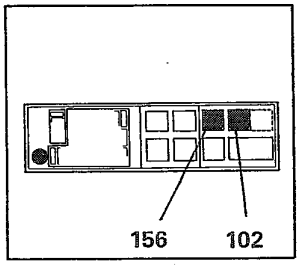
F Relay position F
in the electrical distribution box in the engine compartment

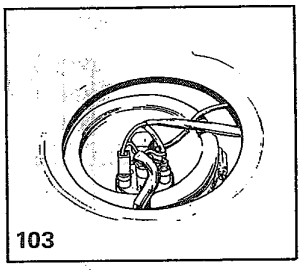
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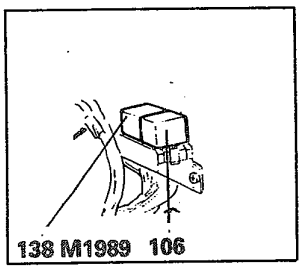
Components

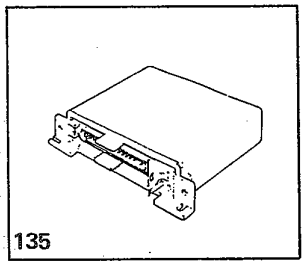


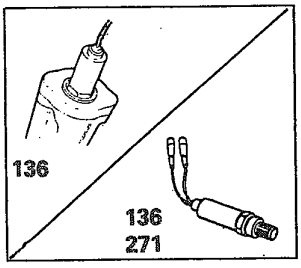


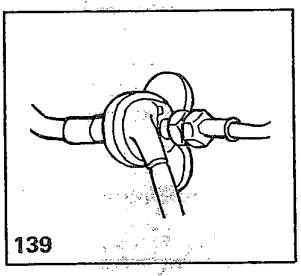


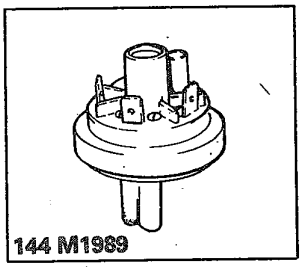


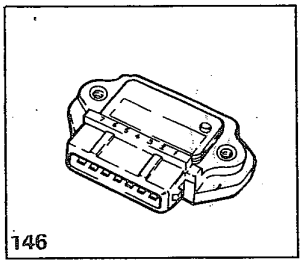


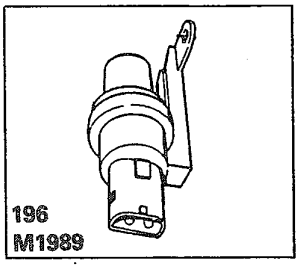


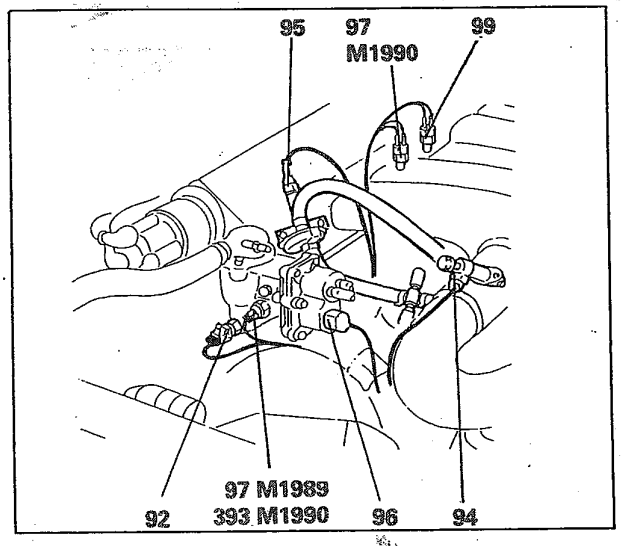


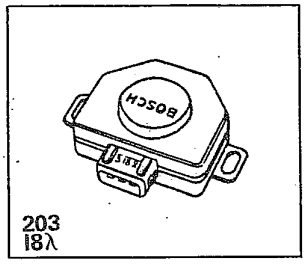


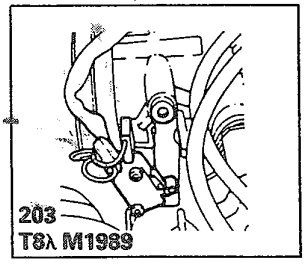






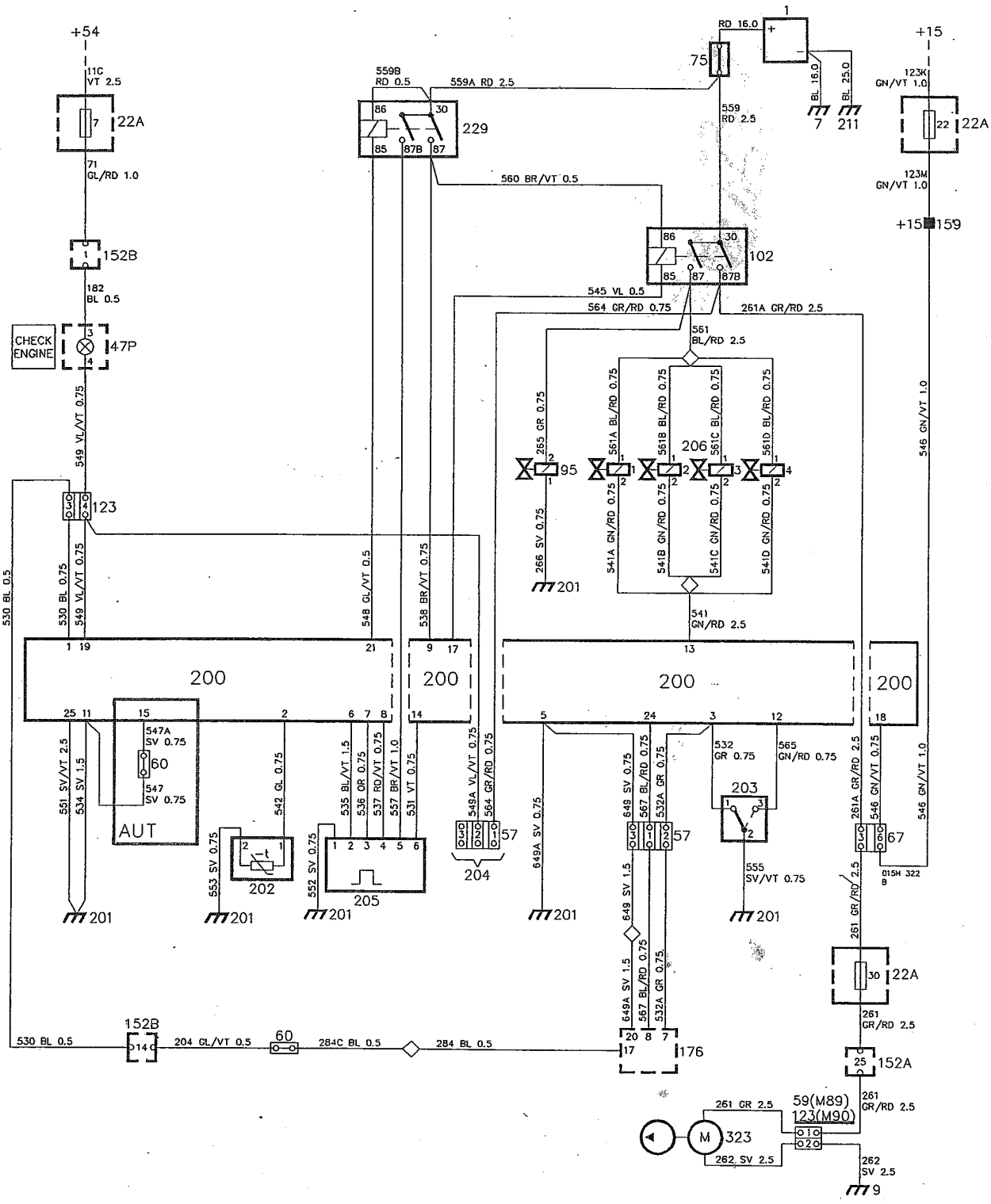






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LH 2.2 fuel system: I16 – FI, EU, GB, ME, FE



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Operation

The Bosch LH Jetronic fuel injection system is used for cars with the 16-valve engine. LH is an abbreviation of Luftmassenmesser Hitzdraht (air mass meter with hot filament). The fuel injection system is controlled and supervised by control unit 200, which includes a microprocessor.

The system receives a positive supply from fuse 22 when the ignition switch is in the start or drive position, and a constant supply from +30 to main relay 229 and fuel pump relay 102.

22A On the basis of the data stored in the control unit and the incoming information from various sensors, the control unit calculates and controls the opening times of the electrically operated fuel injection valves (206). The control unit receives information on the engine speed by sensing the pulses from ignition system.

Throttle angle transmitter 203 provides information on the throttle angle. The transmitter has two contact positions, i.e. 0° (idling speed) and 72° throttle angle.

Temperature transmitter 202 is of Negative Temperature Coefficient (NTC) type and provides continuous engine temperature information to the control unit. In the event of loss of this signal, the control unit will simulate, by default, an engine temperature of +20 °C (68 °F).

Air mass meter 205 includes a platinum filament known as the hot filament. Regardless of the composition of the air and the air flow, the temperature of the filament is maintained constant at about 100 °C above the temperature of the intake air.

The current necessary for maintaining the temperature of the filament constant is controlled by means of a bridge circuit and a sensing resistor, the voltage variation of which is directly proportional to the intake air mass flow.

Since the filament is located in the intake air, it will gradually become fouled, which affects the measurement results. To keep the filament clean, its temperature is raised to about 1000 °C (1800 °F) for one second. This takes place four seconds after the engine has been stopped, provided that the engine speed has earlier been in excess of 2000 r/min. This process is controlled by the control unit.

In the event of a loss of signal from the air mass meter, e.g. if the filament should fail, an emergency system known as the "Limp home" function in the control unit will come into operation. The car can then be driven, although its drivability will be limited. When the "Limp home" function is operative, warning lamp 47P, CHECK ENGINE, will light up. The lamp is located in the combined instrument, and is supplied from fuse 7. (The lamp can also be energised from the EZK ignition system.)

The engine is supplied with fuel by electrically driven fuel pump 323 with integrated feed pump drawing fuel from the fuel tank and building up a pressure in the fuel system. When fuel pump relay 102 is energised, the heating coil in auxiliary air valve 95 will be energised. (The valve increases the air flow when the engine is cold.)

Test connector 204 has the following terminals:

1 Voltage to the test connector
2 "Limp home" (CHECK ENGINE)

Fault-tracing hints

When fault-tracing in the wiring for the fuel system, always observe the following:

1. Always disconnect the 25-pole connector on the control unit and the connector on the air mass meter. N.B. These two components can easily be seriously damaged if measurements are carried out on their terminal pins.
2. Always disconnect the connection to the suspected component.
3. Use an ohmmeter – not a buzzer – for checking the wiring.

Before checking the wiring, always start by checking fuses 7 and 22, and checking that the supply to them is live.

For comprehensive fault-tracing instructions for the system, see the Service Manual, Group 2:3, Fuel system, injection engine.

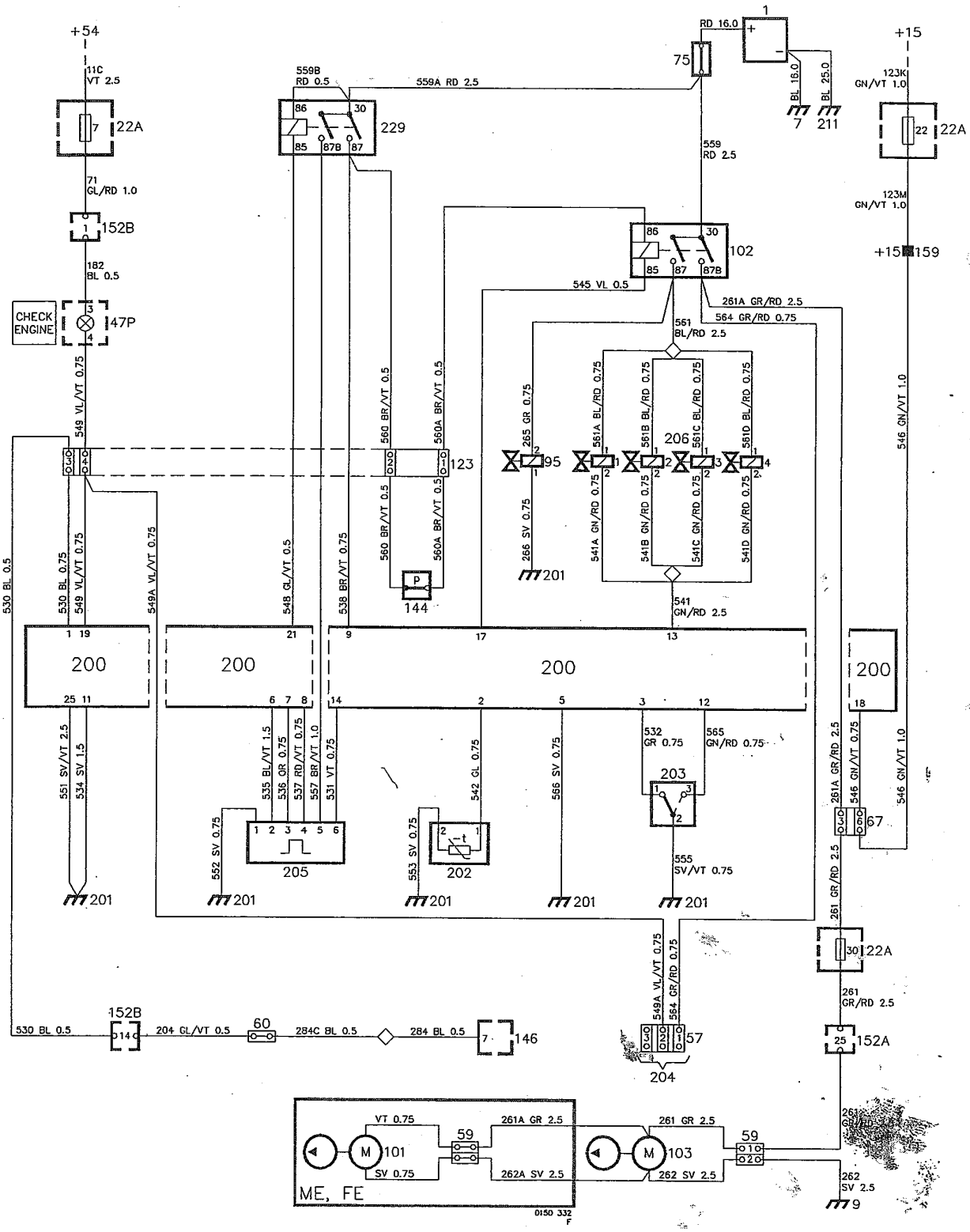
Earthing point 201 on the engine lifting lug is important for correct operation of the fuel system. If the location of the earthing point is altered, such as when other work is being carried out on the engine, the performance of the system may be disturbed.

Locations of components

The locations of the components are the same for all variants of LH 2.2 fuel system (see pages 70 – 71).

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LH 2.2 fuel system: 1989 model T16 – FI, EU, GB, ME, FE



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Operation

The Bosch LH Jetronic fuel injection system is used for cars with the 16-valve engine. LH is an abbreviation of Luftmassenmesser Hitzdraht (air mass meter with hot filament). The fuel injection system is controlled and supervised by control unit 200, which includes a microprocessor.

The system receives a positive supply from fuse 22 when the ignition switch is in the start or drive position, and a constant supply from +30 to main relay 229 and fuel pump relay 102.

On the basis of the data stored in the control unit and the incoming information from various sensors, the control unit calculates and controls the opening times of the electrically operated fuel injection valves (206). The control unit receives information on the engine speed by sensing the pulses from ignition system.

Throttle angle transmitter 203 provides information on the throttle angle, i.e. the engine load. The transmitter has two contact positions, i.e. 0° (idling speed) and 72° throttle angle.

Temperature transmitter 202 is of Negative Temperature Coefficient (NTC) type and provides continuous engine temperature information to the control unit. In the event of loss of this signal, the control unit will simulate, by default, an engine temperature of +20 °C (68 °F).

Air mass meter 205 includes a platinum filament known as the hot filament. Regardless of the composition of the air and the air flow, the temperature of the filament is maintained constant at about 100 °C above the temperature of the intake air.

The current necessary for maintaining the temperature of the filament constant is controlled by means of a bridge circuit and a sensing resistor, the voltage variation of which is directly proportional to the intake air mass flow.

Since the filament is located in the intake air, it will gradually become fouled, which affects the measurement results. To keep the filament clean, its temperature is raised to about 1000 °C (1800 °F) for one second. This takes place four seconds after the engine has been stopped, provided that the engine speed has earlier been in excess of 2000 r/min. This process is controlled by the control unit.

In the event of a loss of signal from the air mass meter, e.g. if the filament should fail, an emergency system known as the "Limp home" function in the control unit will come into operation. The car can then be driven, although its drivability will be limited. When the "Limp home" function is operative, warning lamp 47P, CHECK ENGINE, will light up. The lamp is located in the combined instrument, and is supplied from fuse 7. (The lamp can also be energised from the EZK ignition system.)

The engine is supplied with fuel by electrically driven fuel pump 103 and feed pump 101 drawing fuel from the fuel tank and building up a pressure in the fuel system. The fuel pump circuit includes a boost pressure switch (144) which will trip the fuel pumps if the turbocharger boost pressure should exceed a predetermined value.

When fuel pump relay 102 is energised, the heating coil in auxiliary air valve 95 will be energised. (The valve increases the air flow when the engine is cold.)

Test connector 204 has the following terminals:

1 Voltage to the test connector
2 "Limp home" (CHECK ENGINE)

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Fault-tracing hints

When fault-tracing in the wiring for the fuel system, always observe the following:

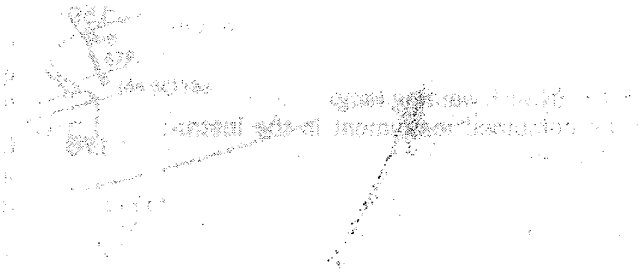
1. Always disconnect the 25-pole connector on the control unit and the connector on the air mass meter. N.B. These two components can easily be seriously damaged if measurements are carried out on their terminal pins.
2. Always disconnect the connection to the suspected component.
3. Use an ohmmeter – not a buzzer – for checking the wiring.

Before checking the wiring, always start by checking fuses 7 and 22, and checking that the supply to them is live.

For comprehensive fault-tracing instructions for the system, see the Service Manual, Group 2:3, Fuel system, injection engine.

Earthing point 201 on the engine lifting lug is important for correct operation of the fuel system. If the location of the earthing point is altered, such as when other work is being carried out on the engine, the performance of the system may be disturbed.

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Locations of components

The locations of the components presented below are the same for all variants of LH 2.2 fuel system.

1 Battery
on the right-hand side of the engine compartment

7 Earthing point on the radiator cross-member

9 Earthing point in the luggage compartment

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

47P CHECK ENGINE warning lamp
in the combined instrument in the instrument panel

57 3-pole connector
in the engine compartment, behind the right-hand headlamp (test connector 204)
in the engine compartment, on the right-hand side, at the air intake (I16)

59 2-pole connector (1989 model)
at the fuel pump, under the luggage compartment floor

60 Single-pole connector
one in the electrical distribution box
one (for the automatic transmission) at the control unit, forward of the right-hand front door, below the fascia (behind the trim)

67 6-pole connector
in the engine compartment, on the right-hand side at the air intake

75 Distribution block, positive supply from battery
in the engine compartment, on the right-hand side

95 Auxiliary air valve
at the extreme front of the engine intake manifold

101 Fuel feed pump (ME, FE) (1989 model)
in the fuel tank, under the luggage compartment floor

102 Fuel pump relay
at the control unit, forward of the right-hand front door, below the fascia (behind the trim)

103 Fuel pump (1989 model)
in the fuel tank, under the luggage compartment floor

123 4-pole connector (1990 model)
at the control unit, forward of the right-hand front door, below the fascia (behind the trim)

144 Boost pressure switch (T16) (1989 model)
under the fascia, to the left of the steering column (behind the knee shield)

146 Amplifier for the electronic ignition system (T16) (1989 model)
in the engine compartment, forward of the left-hand wheel housing

152A 29-pole white connector
152B 29-pole red connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing.
The connectors are accessible from the interior of the car

159 Distribution terminal +15
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

176 Control unit for EZK ignition system (I16)
in the engine compartment, forward of the left-hand wheel housing

200 Control unit for the LH system
forward of the right-hand front door, below the fascia (behind the trim)

201 Engine earthing point
at the engine lifting lug

202 Engine temperature transmitter
on the intake manifold flange, between cylinders 2 and 3

203 Throttle angle transmitter
on the engine throttle housing

204 Test connector
in the engine compartment, behind the right-hand wheel housing

205 Air mass meter
on the air cleaner

206 Fuel injection valves
on the engine intake manifold

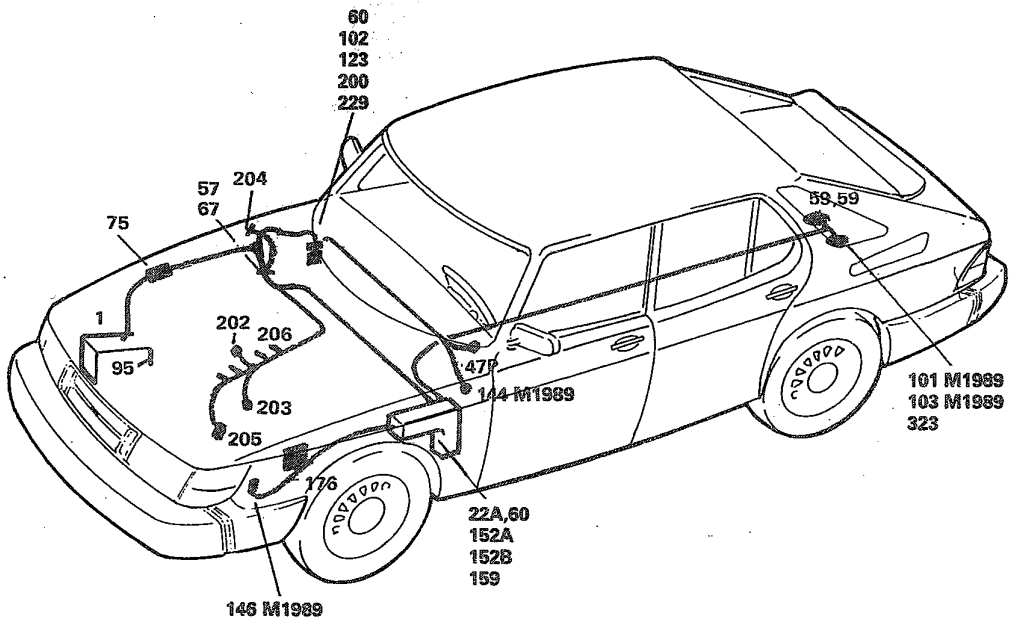
211 Earthing point on the gearbox

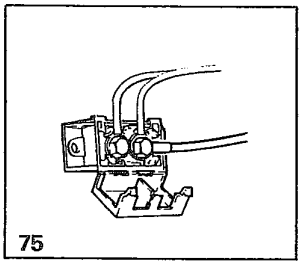
229 Main relay for the fuel injection system
at the control unit, forward of the right-hand front door, below the fascia (behind the trim)

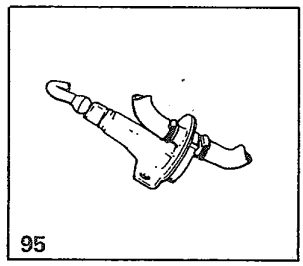
323 Fuel pump with integrated feed pump
in the fuel tank, below the luggage compartment floor

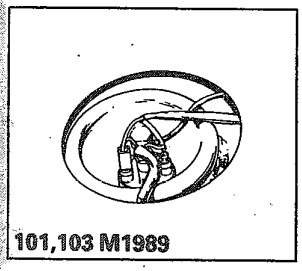
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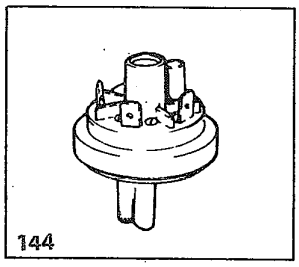
Components

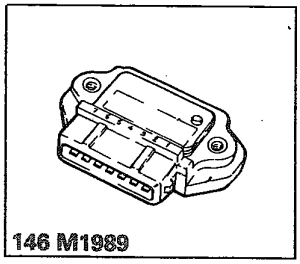


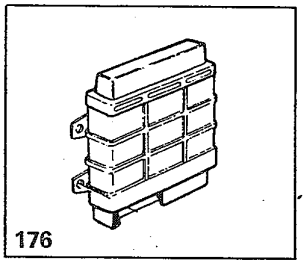

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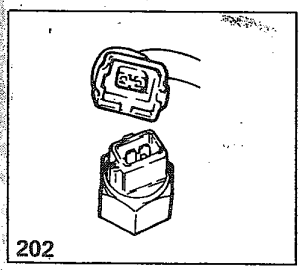

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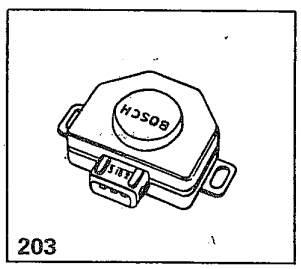

101,103 M1989


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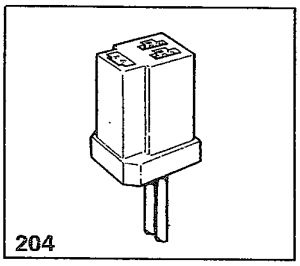

146 M1989

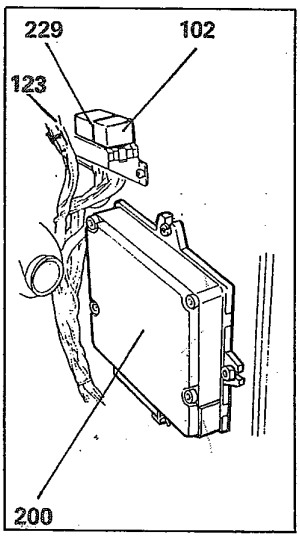

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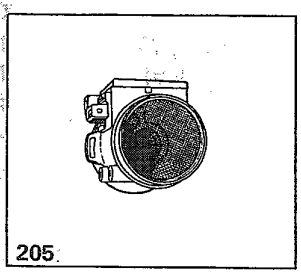

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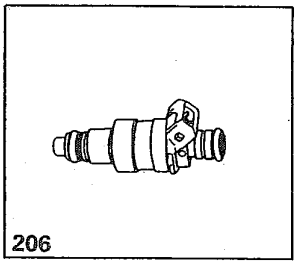


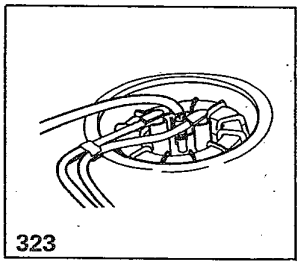
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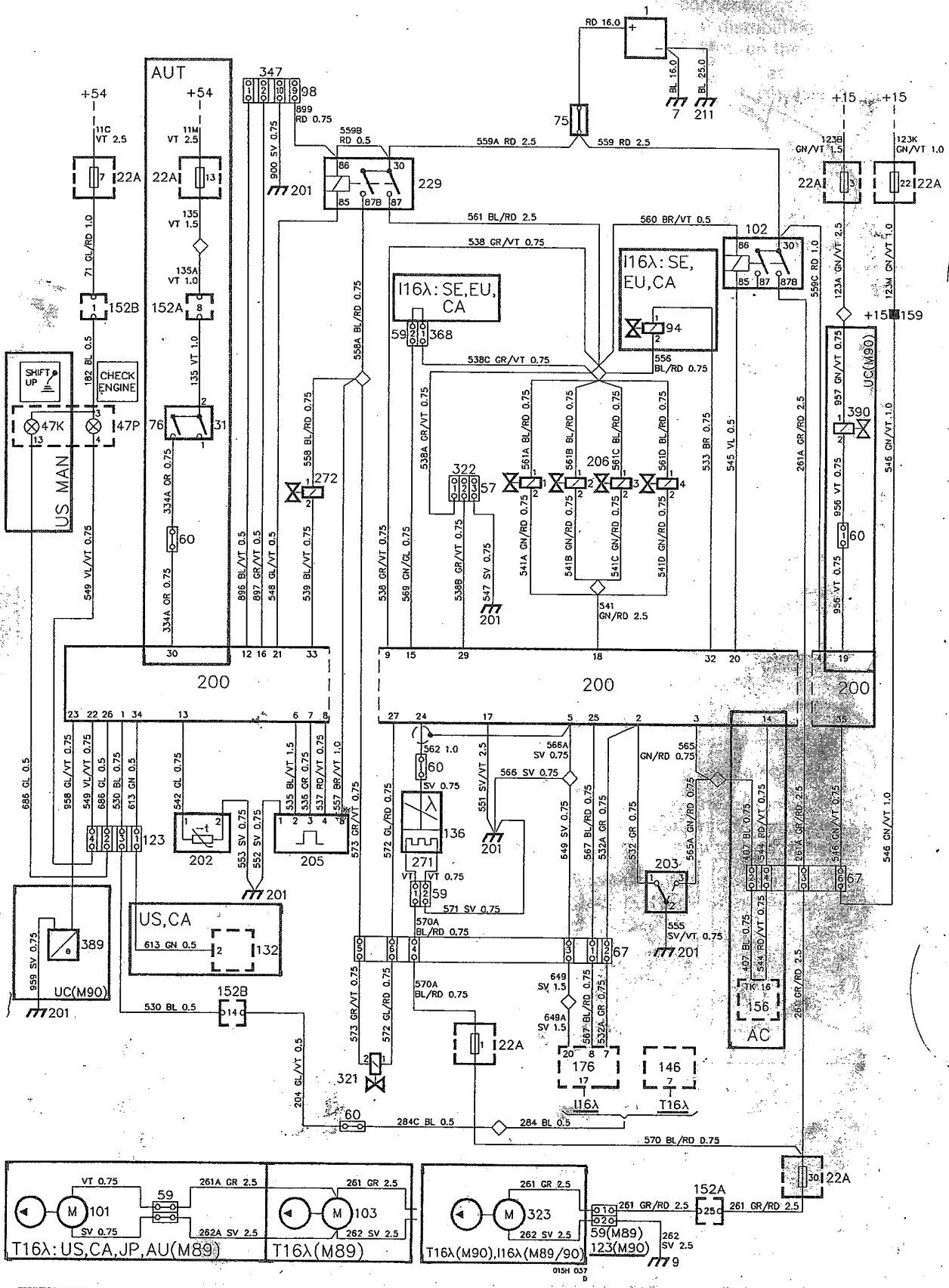

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LH 2.4 fuel system: T16 Lambda – US, CA, AU 1989 model – SE, EU, JP. I16 Lambda – US, CA, AU, JP, SE, EU



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Operation

Cars with 16-valve engines and Lambda are equipped with the Bosch LH Jetronic 2.4 fuel injection system, which is an updated version of the LH Jetronic 2.2 system. LH is an abbreviation of Luftmassenmesser Hitzdraht (air mass meter with hot filament). The fuel injection system is controlled and supervised by control unit 200, which includes a microprocessor.

A number of new features have been introduced, such as:

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- Adaptive Lambda control system
- AIC (Automatic Idling Control) valve with built-in "Limp home" function. When necessary, the valve provides a high, fixed idling speed of approximately 1200 r/min.
- Adaptive idling control system. Normal changes are compensated for automatically. The idling speed is controlled by means of valve 272.

9

- Built-in deceleration function. During overrun braking, it shuts off the fuel supply within a certain engine speed range.
- A new, electrically-operated vent valve (321) for the charcoal canister. Controlled by signals from the control unit. The charcoal in the canister absorbs fuel fumes in the vent line from the tank.
- Built-in fault diagnosis system. Gives fault codes via the CHECK ENGINE lamp or the ISAT test instrument.
- The pressure monitoring function is built into the control unit. If a fault should occur on the turbocharger pressure control system (T16 Lambda), the LH control unit will interrupt the signals to the injection valves.
- The gear indication function is built into the control unit (US only).

The system receives a positive supply from fuse 22 when the ignition switch is in the start or drive position, and a constant supply from +30 to relays 229 and 102.

On the basis of the data stored in the control unit and the incoming information from various sensors, the control unit calculates and controls the opening times of the electrically operated fuel injection valves (206). Control unit 200 receives information on the engine speed by sensing the pulses from the ignition system.

Throttle angle transmitter 203 provides information to the control unit on the throttle angle. The transmitter has two contact positions, i.e. 0° (idling speed) and 72° throttle angle.

Temperature transmitter 202 is of Negative Temperature Coefficient (NTC) type and provides continuous engine temperature information to the control unit. In the event of loss of this signal, the control unit will simulate, by default, an engine temperature of +45 °C (113 °F).

Air mass meter 205 is built into a plastic housing. In the event of a loss of signal from the air mass meter, e.g. if the filament should fail, an emergency system known as the "Limp home" function in the control unit will come into operation. The car can then be driven, although its drivability will be limited. When the "Limp home" function is operative, warning lamp 47P, CHECK ENGINE, will light up. The lamp is located in the combined instrument, and is supplied from fuse 7. (The lamp can also be energised from the EZK ignition system.)

If a fault affecting the exhaust emissions should occur, the CHECK ENGINE lamp will light up. For particulars of checking the fault code, see Group 2:3 of the Service Manual.

The engine is supplied with fuel either by electrically driven fuel pump 103 and feed pump 101 or by fuel pump 323 with integrated feed pump. In both cases, the pumps draw fuel from the fuel tank and pressurise the fuel system.

The control unit 200 is connected to the air-conditioning system via pin 14 (AC compressor relay 156, pin 16). When the AC compressor is running, the control unit will compensate for the increased load applied by the compressor at engine idling speed. A signal (earth) is applied from pin 3 at full throttle, which disconnects the AC compressor.

Test connector 347 is used for fault tracing. When pin 2 in the connector is earthed, flashing codes will be obtained on the CHECK ENGINE lamp.

Exhaust gas emission control, Lambda

The car is equipped with an adaptive Lambda system, which compensates for variations in the fuel/air mixture caused by changes in the fuel system.

Lambda sensor 136 continually measures the oxygen content of the exhaust gases, thus enabling the control unit to adjust the mixture to as close to Lambda = 1 as possible. The sensor is heated by preheater 271 (protected by fuse 1).

Automatic transmission

Cars with automatic transmission are also equipped with switch 76 which will close when the selector lever is set to "Drive", and the control unit will then compensate for the increased load applied by the automatic transmission when the engine is running at idling speed.

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Fault-tracing hints

When fault tracing in the wiring for the fuel system, always observe the following:

1. Read the fault codes that have been stored before disconnecting the control unit. (The fault codes are erased when the control unit is de-energised.) Use a test cable or the ISAT as described in Group 2:3 of the Service Manual.
2. Always disconnect the 35-pole connector on the control unit and the connector on the air mass meter. N.B. These two components can easily be seriously damaged if measurements are carried out on their terminal pins.
3. Always disconnect the connection to the suspected component.
4. Use an ohmmeter – not a buzzer – for checking the wiring.

Before checking the wiring, always start by checking fuse 22 and checking that the supply to it is live. Also check fuse 7 and fuse 1 for the Lambda sensor pre-heater.

For comprehensive fault-tracing instructions for the system, see the Service Manual, Group 2:3, Fuel system, injection engine.

Earthing point 201 on the engine lifting lug is important for correct operation of the fuel system. If the location of the earthing point is altered, such as when other work is being carried out on the engine, the performance of the system may be disturbed.

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Locations of components

1 Battery
on the right-hand side of the engine compartment

7 Earthing point on the radiator cross-member

9 Earthing point in the luggage compartment

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

31 Reversing light switch
under the centre console, at the selector lever

47K SHIFT UP warning lamp
in the combined instrument in the instrument panel

47P CHECK ENGINE warning lamp
in the combined instrument in the instrument panel

57 (322) 3-pole connector
at the control unit, forward of the right-hand front door, below the fascia (behind the trim)

59 2-pole connector
one at the fuel pump, under the luggage compartment floor (1989 model)
(368) one at the control unit, forward of the right-hand front door, below the fascia (behind the trim)
one (for the Lambda sensor) in the engine compartment, on the right-hand wheel housing, next to the distribution block for the positive supply from the battery

60 Single-pole connector
one (for the Lambda sensor) in the engine compartment, on the right-hand wheel housing, next to the distribution block for the positive supply from the battery
one (for the automatic transmission) at the control unit, forward of the right-hand front door, below the fascia (behind the trim)
one in the electrical distribution box
one on the right-hand side of the engine compartment, at the air intake (1990 model)

67 6-pole connector
two in the engine compartment, on the right-hand side at the air intake

75 Distribution block, positive supply from battery
in the engine compartment, on the right-hand side

76 Switch for raising the idling speed, auto. transm.
under the centre console, at the selector lever

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94 Cold starting valve
on the engine throttle housing

101 Fuel feed pump (1989 model)
in the fuel tank, under the luggage compartment floor

102 Fuel pump relay
at the control unit, forward of the right-hand front door, below the fascia (behind the trim)

103 Fuel pump (1989 model)
in the fuel tank, under the luggage compartment floor 76

123 4-pole connector
at the control unit, forward of the right-hand front door, below the fascia (behind the trim)
one at the fuel pump, below the luggage compartment floor (1990 model)

132 Speed transmitter
on the rear of the combined instrument

136 Lambda sensor
on the exhaust manifold

152A 29-pole white connector
152B 29-pole red connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car

156 Relay for the AC compressor
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

159 Distribution terminal +15
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

176 Control unit for EZK ignition system
in the engine compartment, forward of the left-hand wheel housing

200 Control unit for the LH system
forward of the right-hand front door, below the fascia (behind the trim)

201 Engine earthing point
at the engine lifting lug

202 Engine temperature transmitter
on the intake manifold flange, between cylinders 2 and 3

203 Throttle angle transmitter
on the engine throttle housing

205 Air mass meter
on the air hose at the air cleaner

206 Fuel injection valves
on the engine intake manifold

211 Earthing point on the gearbox

229 Main relay for the fuel injection system
forward of the right-hand front door, below the fascia (behind the trim)

271 Preheater
in the Lambda sensor, on the exhaust manifold

272 Idling speed adjustment motor
at the extreme front, on the left-hand side of the cylinder head

321 Valve for charcoal cannister
in the engine compartment, forward of the left-hand wheel housing, between the wheel housing member and the outer wing

322 Connector, Auto/Man, LH 2.4
at the control unit, forward of the right-hand front door, below the fascia (behind the trim)

323 Fuel pump with integrated feed pump
in the fuel tank, below the luggage compartment floor

347 Test connector, diagnostics
on the right-hand side, under the back seat
under the rubber bellows, behind the centre console (Convertible)
under the bellows (Convertible)

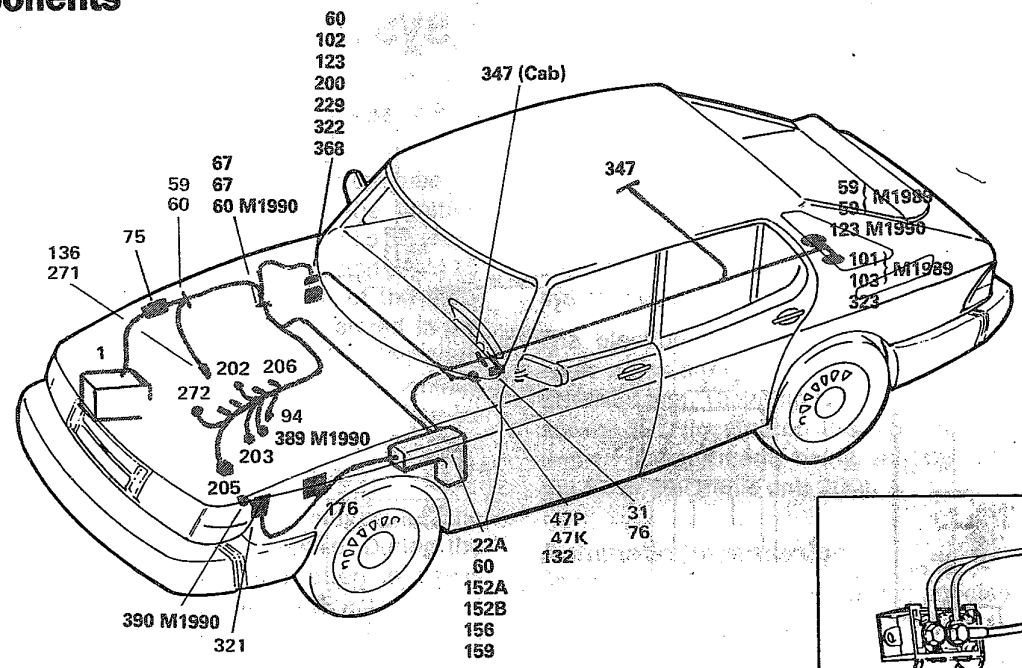
368 Connector, cold-starting valve
at the control unit, forward of the right-hand front door, below the fascia (behind the trim)

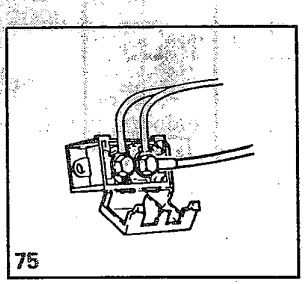
389 NTC resistor
in the engine compartment, under the throttle housing (1990 model)

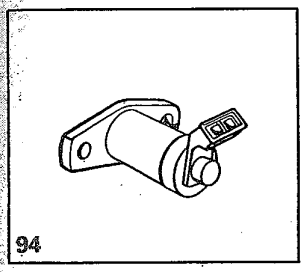
390 Modulating valve
in the engine compartment, forward of the left-hand wheel housing (1990 model)

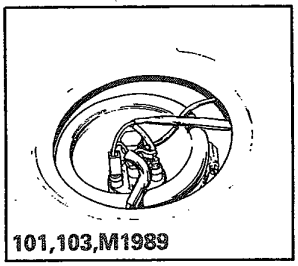
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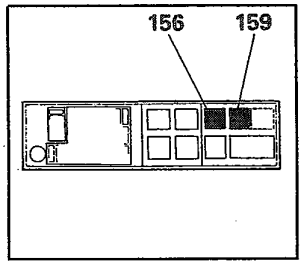
Components

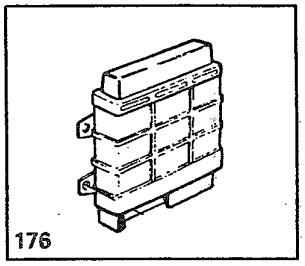


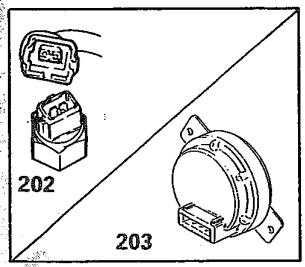


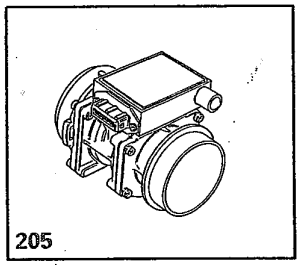


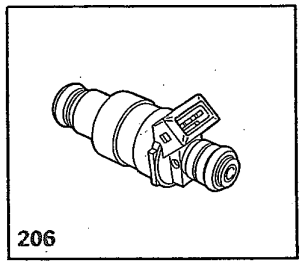


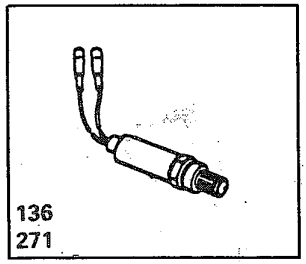


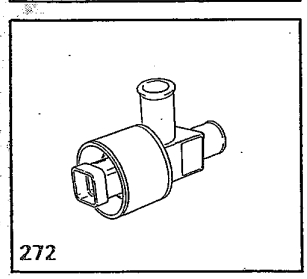


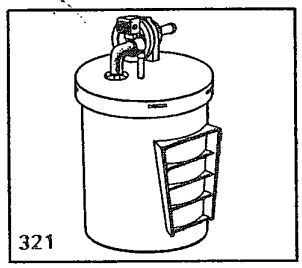


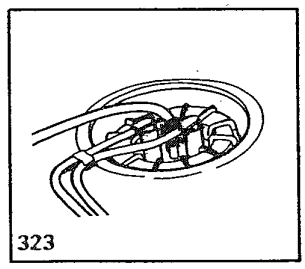


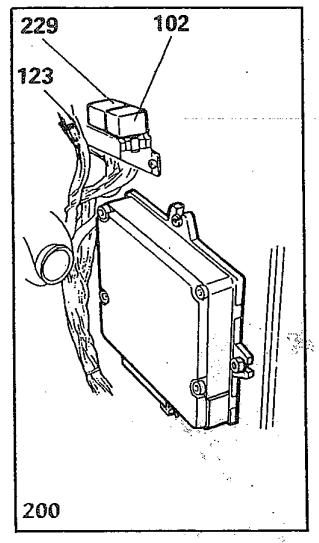


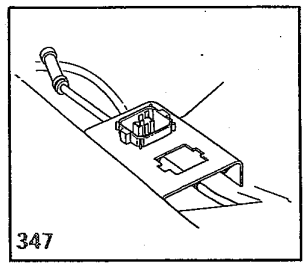


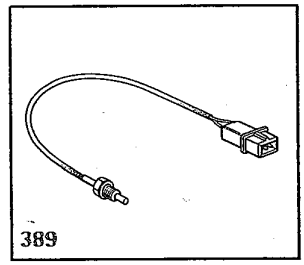


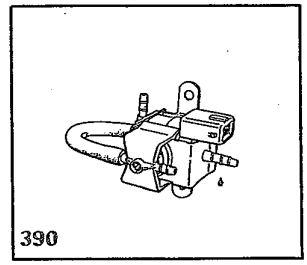






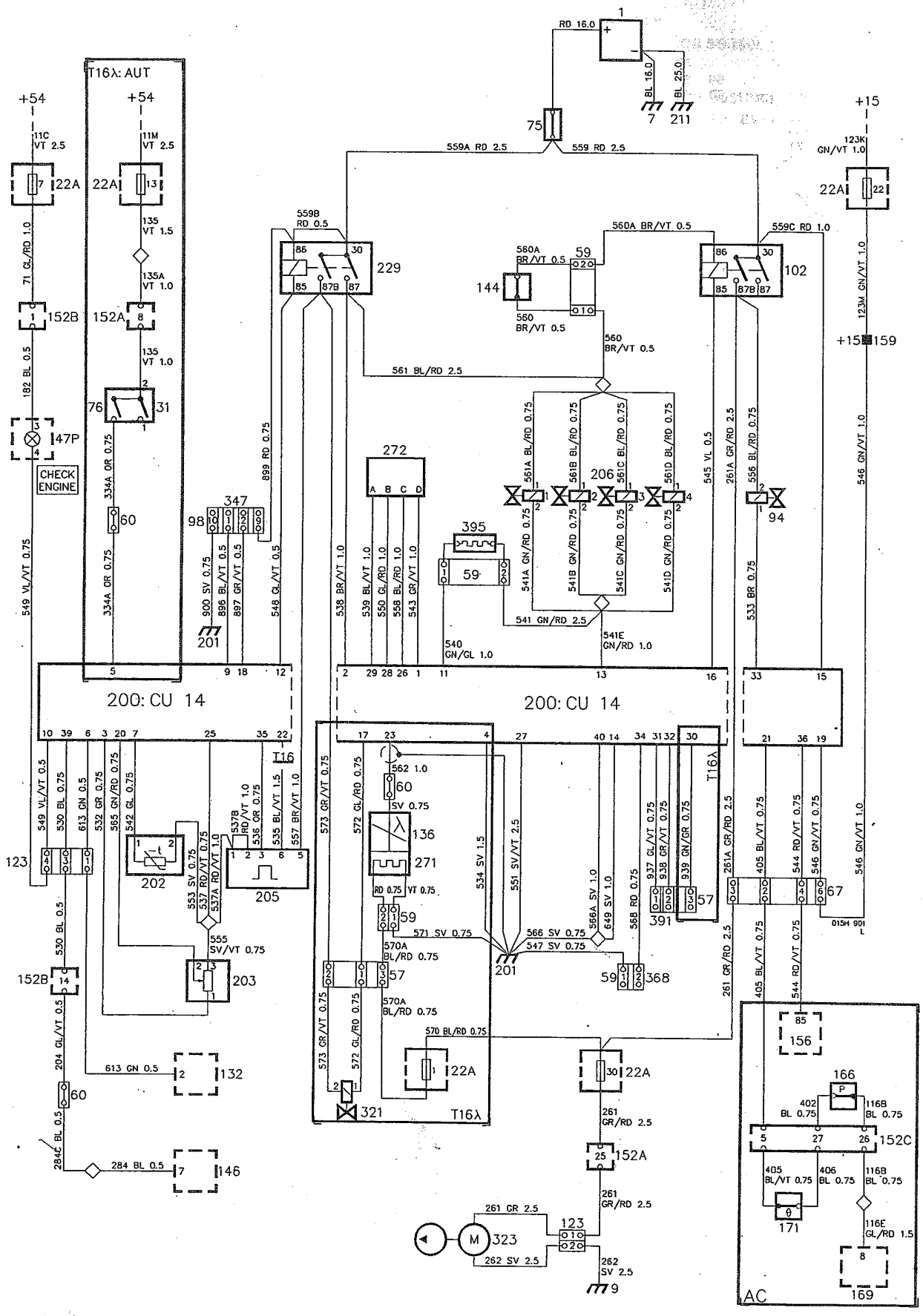






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CU14 fuel system



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Operation

The engine is equipped with a CU14 electronic fuel injection system. The injection system is controlled and supervised by control unit 200 which includes a microprocessor.

The system receives a positive supply from fuse 22 via distribution terminal +15 when the ignition switch is in the start or drive position, and a constant supply from +30 to relays 229 and 102 and to pin 15 of the RAM (random access memory) of the electronic unit. On the basis of the data stored in the control unit and the incoming information from various sensors, the control unit calculates and controls the opening times of injection valves 206. The injection valves are of low-impedance type and must never be connected to the battery voltage.

The injection pulse consists of two stages, i.e. the opening phase and the holding phase. During the opening phase (short time) the full battery voltage is applied across the injection valves. Electronic unit 200 then earths the valves via pin 11. During the remainder of the injection pulse duration (i.e. the holding phase), the valves are earthed instead across a series resistor at pin 13 of electronic unit 200. The voltage across the valves is then reduced to about 2.5 volt.

This method provides accurate fuel metering, even during short opening times.

Via pin 39, electronic unit 200 receives information on the engine speed in the form of pulses from the ignition system. Via pin 20, the electronic unit receives information on the throttle angle from throttle angle transmitter 203. (Analog signal between 0.1 and 4.9 V.)

Temperature transmitter 202 is of Negative Temperature Coefficient (NTC) type and provides continuous engine temperature information to the control unit. Air mass meter 205 in the CU14 system measures the air mass flowing through a separate air passage in parallel with the main air path. This minimises the risk of fouling of the hot filament and no burning-off, such as in the LH system, is therefore necessary.

In the event of loss of signal to the electronic unit, an emergency system known as the "Limp home" function will come into operation, which enables the car to be driven, although the engine performance will be restricted. At the same time, the CHECK ENGINE warning lamp will light up.

Signals to and from air mass meter 205:

Pins 1 and 2: earth
Pin 3: air mass signal to pin 35 of electronic unit 200
Pin 5: positive supply from relay 229
Pin 6: idling CO adjustment to pin 22 of electronic unit 200 (only cars without catalytic converter)
The system for cars with catalytic converter is adaptive.

The engine is supplied with fuel by electrically driven fuel pump 323 which draws fuel from the fuel tank and pressurises the fuel system.

Automatic Idling Control (AIC) motor 272 is a two-phase stepping motor which is controlled by electronic unit 200 via pins 1, 26, 28 and 29. This control circuit is adaptive (remembers the setting during the immediately preceding idling period).

Electronic unit 200 controls the air conditioning (AC) system via pin 21 and the AC relay via pin 36.

The electronic unit incorporates fault diagnosis. Fault codes are obtained by flashing of the CHECK ENGINE lamp. The lamp is activated by pin 1 of test socket 391 (located on the right-hand side of the engine compartment) being earthed (connected to pin 31 of electronic unit 200).

Automatic transmission

Cars with automatic transmission are also equipped with switch 76. When the selector lever is set to the drive position, the switch will close, which will apply a signal to pin 5 of the electronic unit. The AIC motor will then compensate for the increased load applied by the automatic transmission when the engine is running at idling speed.

Exhaust emission control, Lambda

On cars destined for markets on which catalytic emission control is mandatory, the system also includes components for refined fuel control. Lambda sensor 136 continually measures the oxygen content of the exhaust gases, thus enabling the electronic unit to correct the fuel/air mixture to its optimum value. The sensor is heated by preheater 271 which is protected by fuse 1.

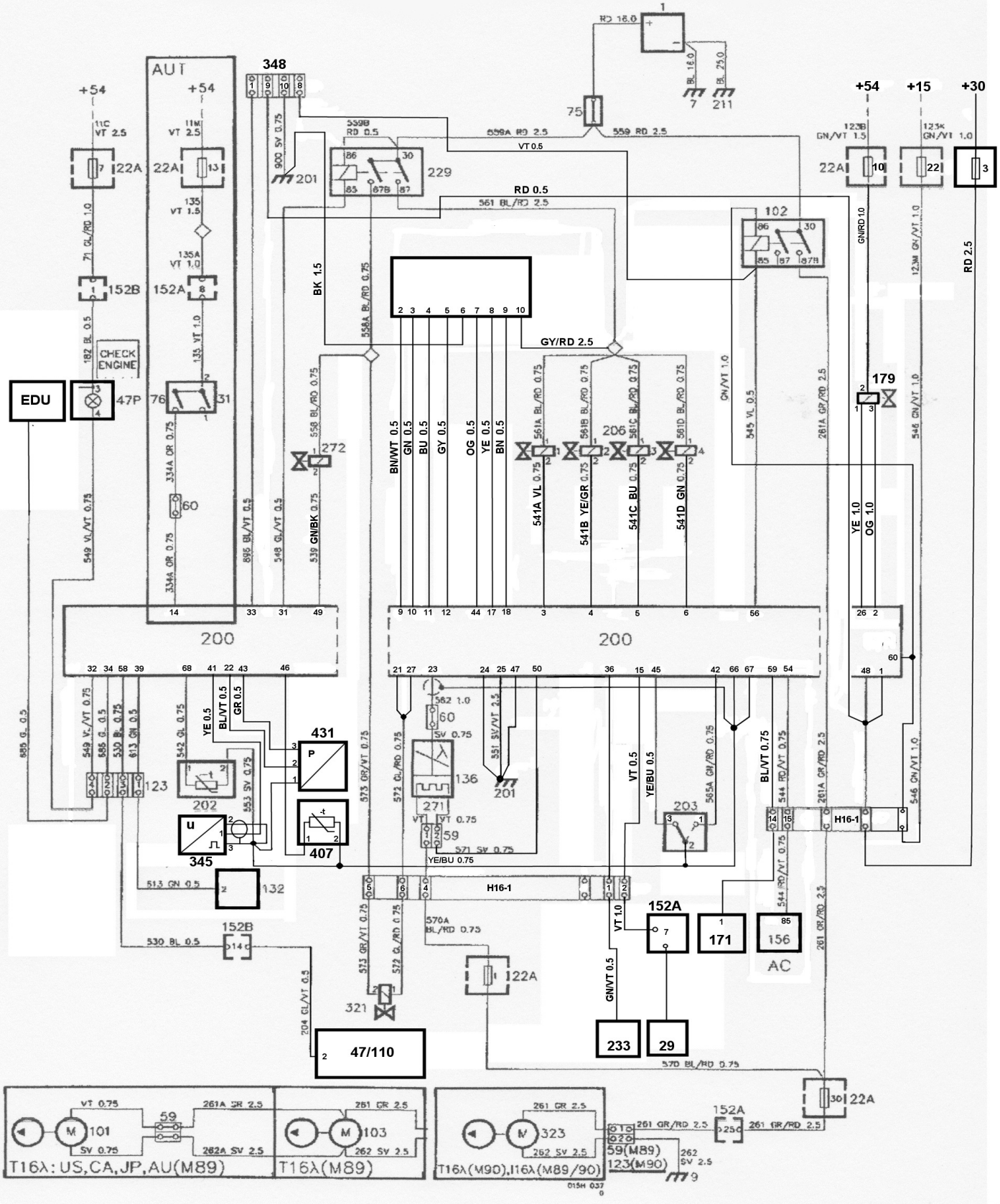
The gaseous hydrocarbons (fuel fumes) vented from the fuel tank are discharged to a charcoal canister and are dumped into the engine for burning. This is controlled by ELCD valve 321 which is controlled from pin 17 of electronic unit 200.

Fault tracing

See the Service Manual, Group 2:3, CU14 injection system.

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Saab 900 CV 1991 Trionic 5.5
by Misu



LH 2.4 Fuel System Diagrams

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Locations of components

1 Battery
on the right-hand side of the engine compartment

7 Earthing point on the radiator cross-member

9 Earthing point in the luggage compartment

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

31 Reversing light switch
under the centre console, at the selector lever

47P CHECK ENGINE warning lamp
in the combined instrument in the instrument panel

57 3-pole connector
in the engine compartment, on the right-hand side, at the air intake

59 2-pole connector
one at the fuel pump, under the luggage compartment floor
one at the control unit, forward of the right-hand front door, below the fascia (behind the trim)
one (for the Lambda sensor) in the engine compartment, on the right-hand wheel housing, next to the distribution block for the positive supply from the battery
one at the expansion tank, on the right-hand side of the engine compartment

60 Single-pole connector
one in the electrical distribution box in the engine compartment, on the left-hand wheel housing
one (for the Lambda sensor) in the engine compartment, on the right-hand wheel housing, next to the distribution block for the positive supply from the battery
one (for the automatic transmission) at the control unit, forward of the right-hand front door, below the fascia (behind the trim)
one (for the automatic transmission) under the centre console, at the selector lever

67 6-pole connector
in the engine compartment, on the right-hand side at the air intake

75 Distribution block, positive supply from battery
in the engine compartment, on the right-hand side

76 Switch for raising the idling speed, auto. transm.
under the centre console, at the selector lever

94 Cold starting valve
on the engine throttle housing

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102 Fuel pump relay
at the control unit, forward of the right-hand front door, below the fascia (behind the trim)

123 4-pole connector
at the control unit, forward of the right-hand front door, below the fascia (behind the trim)
one at the fuel pump, below the luggage compartment floor (1990 model)

132 Speed transmitter
on the rear of the combined instrument

136 Lambda sensor
on the exhaust manifold

144 Boost pressure switch (T8)
under the fascia, to the left of the steering wheel, behind the knee shield (behind the flasher relay holder)

146 Amplifier for the electronic ignition system
in the engine compartment, forward of the left-hand wheel housing

152A 29-pole white connector
152B 29-pole red connector
152C 29-pole black connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car

156 Relay for the AC compressor
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

159 Distribution terminal +15
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

166 Pressure switch for the AC radiator fan
in the engine compartment, on the drying agent container, forward of the right-hand wheel housing

169 Switch, AC
on the fascia

171 Anti-freeze thermostat (cycling clutch contact) for the AC
in the engine compartment, on the right-hand side of the air conditioner housing

176 Control unit for EZK ignition system
in the engine compartment, forward of the left-hand wheel housing

200 Control unit for the CU14 system
forward of the right-hand front door, below the fascia (behind the trim)

201 Engine earthing point
at the engine lifting lug

202 Engine temperature transmitter
on the intake manifold flange, between cylinders 2 and 3

203 Throttle angle transmitter
on the engine throttle housing

205 Air mass meter
on the air hose at the air cleaner

206 Fuel injection valves
on the engine intake manifold

211 Earthing point on the gearbox

229 Main relay for the fuel injection system
forward of the right-hand front door, below the fascia (behind the trim)

271 Preheater
in the Lambda sensor, on the exhaust manifold

272 Idling speed adjustment motor
at the extreme front, on the left-hand side of the cylinder head

321 Valve for charcoal canister
in the engine compartment, forward of the left-hand wheel housing, between the wheel housing member and the outer wing

323 Fuel pump with integrated feed pump
in the fuel tank, below the luggage compartment floor

347 Test connector, diagnostics
on the right-hand side, under the back seat

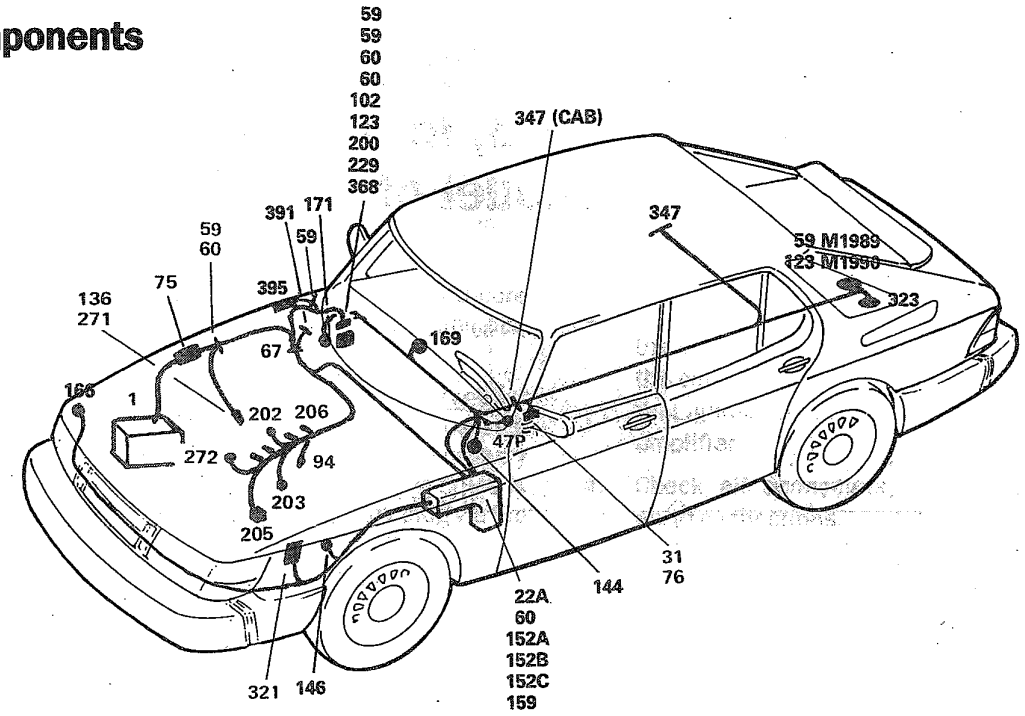
368 Connector, cold-starting valve
at the control unit, forward of the right-hand front door, below the fascia (behind the trim)

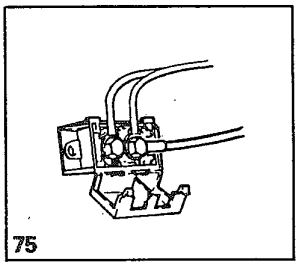
391 CU14 test socket, flashing codes
in the engine compartment, on the right-hand side, at the fresh air intake

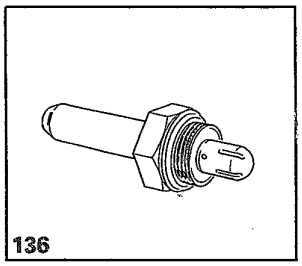
395 Series resistor for the CU14 system
in the engine compartment, behind the right-hand wheel housing

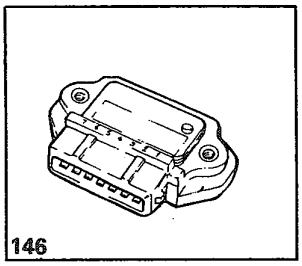
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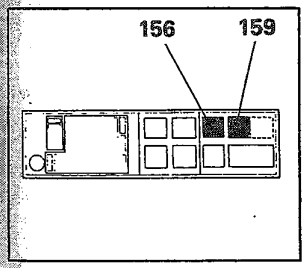
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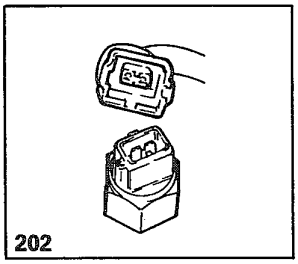


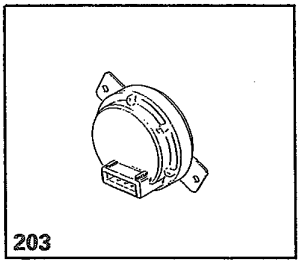


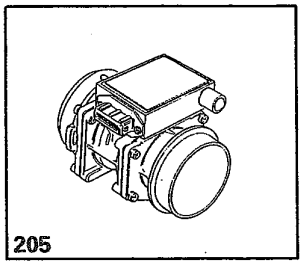


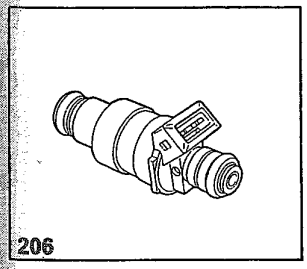


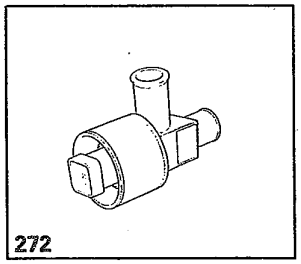


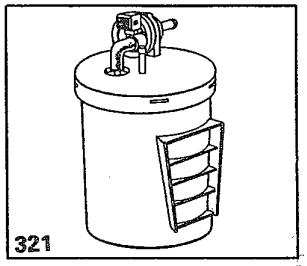


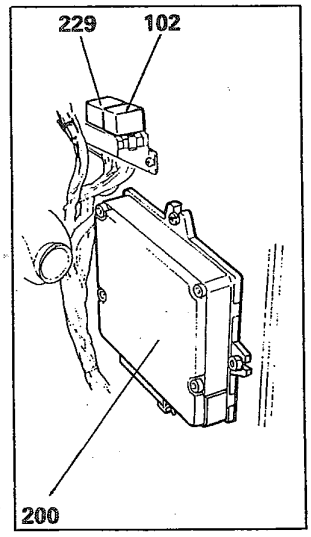


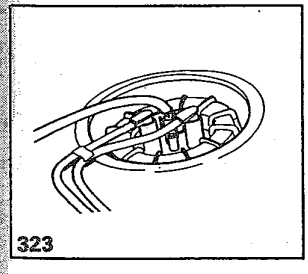


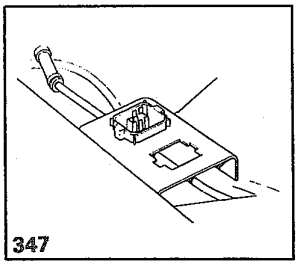


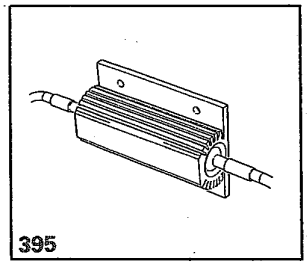






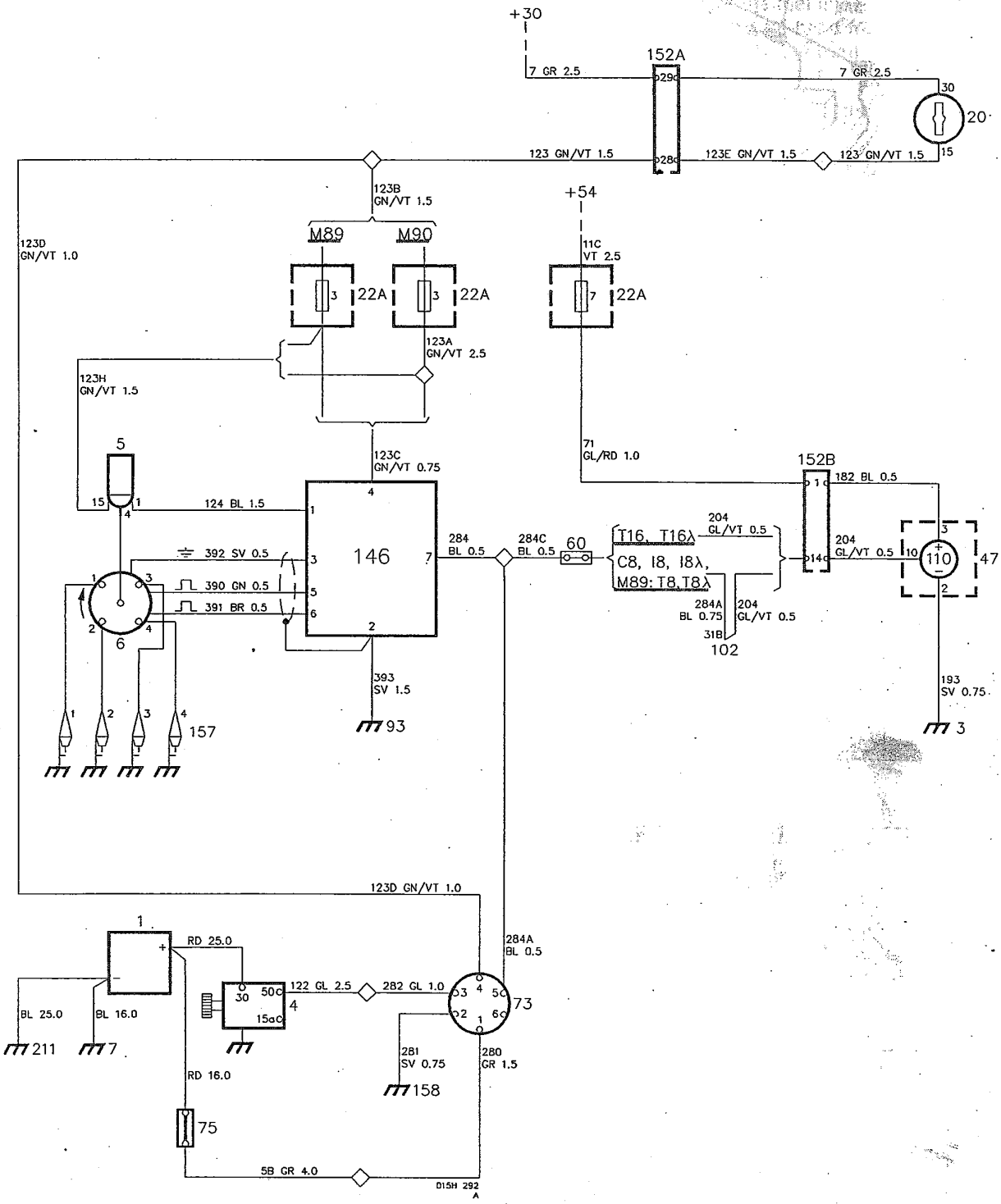






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Ignition system with tachometer and timing service instrument socket for C8, I8, I8 Lambda, T16, T16 Lambda 1989 model of T8, T8 Lambda



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Operation

This breakerless ignition system is equipped with a Hall sensor. (The EZK ignition system is discussed in a separate section.)

When ignition switch 20 is in the start or drive position, ignition coil 5 and amplifier 146 will be energised (+15).

The amplifier receives ignition pulses (via a 3-core shielded cable) from the Hall sensor in ignition distributor 6.

The pulses are amplified and adapted in amplifier 146. A high-tension pulse is generated in the secondary winding each time a pulse breaks the primary circuit of the ignition coil. The high-tension pulse is then supplied to the corresponding spark plug via the distributor.

Tachometer 110 is supplied across fuse 7. The control pulses required for displaying the engine speed are supplied from the ignition amplifier.

Timing service instrument (TSI) socket 73 is intended for a special ignition service instrument and has the following terminals:

1. Positive supply direct from battery 1
2. Earth
3. Solenoid (terminal 50) on starter motor 4
4. Positive supply (+15) from the ignition switch when the latter is in the start or drive position
5. Ignition pulses from ignition system amplifier 146
6. Not used

For a more detailed description of each component in the ignition system, see the Service Manual, 3:1, Electrical system, Instruments.

Fault-tracing hints

The ignition system will be energised when the ignition switch is in the drive position.

1. Check fuse 3, and check that terminal 15 of the ignition coil and terminal 4 on the timing service instrument socket are live.
2. Check that terminal 4 of amplifier 146 is live.
3. Tachometer: First check fuse 7, and check that the supply to it is live. Check that terminal 3 on the circuit board for tachometer 110 is live, and that ignition pulses are being supplied from the amplifier.
4. Check all connectors, cable harnesses and earth connections.

See also the fault-tracing section for each component in the Service Manual, Group 3:1, Electrical system, Instruments.

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Locations of components

1 Battery
on the right-hand side of the engine compartment

3 Earthing point in the fascia

4 Starter motor
on the left-hand side of the engine (intake side)

5 Ignition coil
on the cross-member above the radiator

6 Ignition distributor
at the front of the engine

7 Earthing point on the radiator cross-member

20 Ignition switch
on the centre console between the front seats

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

47 Combined instrument
on the fascia

60 Single-pole connector
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

73 Timing service instrument socket
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

75 Distribution block
in the engine compartment, on the right-hand side

93 Earthing point on the left-hand wheel housing member

102 Fuel pump relay
in the electrical distribution box in the engine compartment, relay positions F and G (T8 and T8 Lambda) or relay position G (I8 and I8 Lambda)

110 Tachometer
in combined instrument 47 on the fascia

146 Amplifier for the electronic ignition system
in the engine compartment, on the left-hand wheel housing

152A 29-pole white connector
152B 29-pole red connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connectors are accessible from the interior of the car.

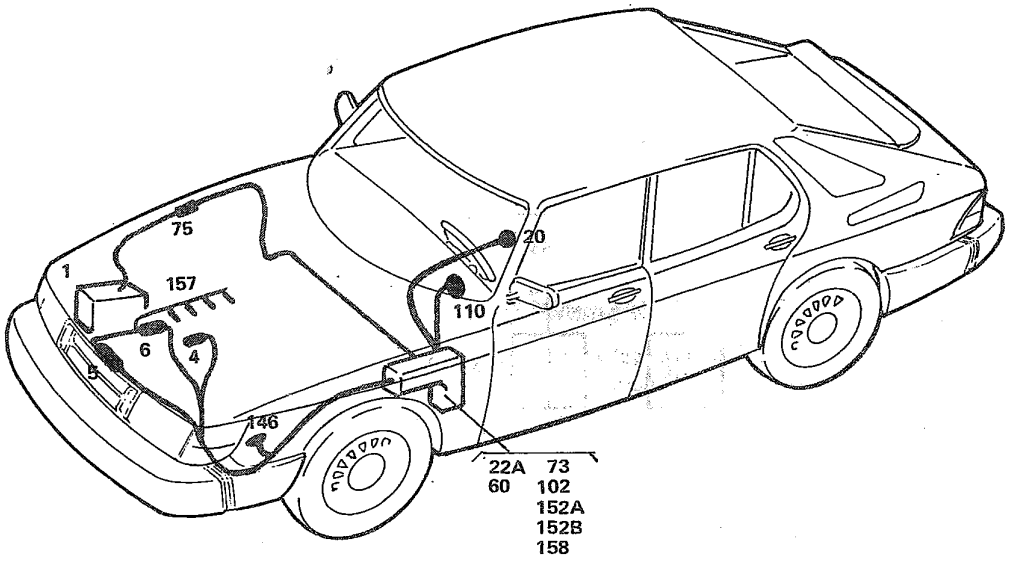
157 Spark plug
on the engine

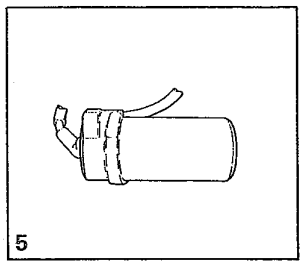
158 Negative distribution terminal
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

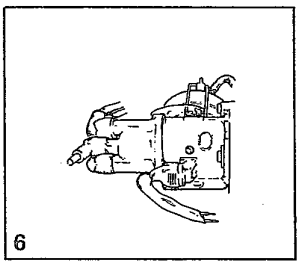
211 Earthing point on the gearbox

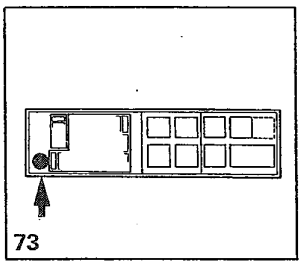
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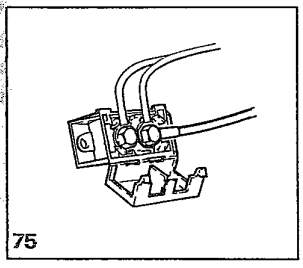
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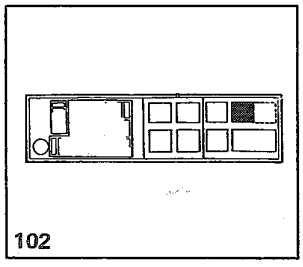


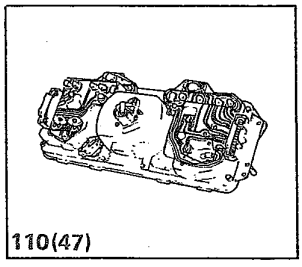


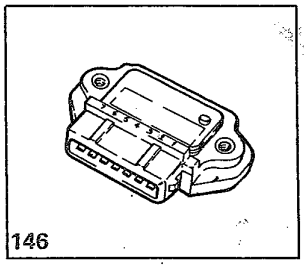






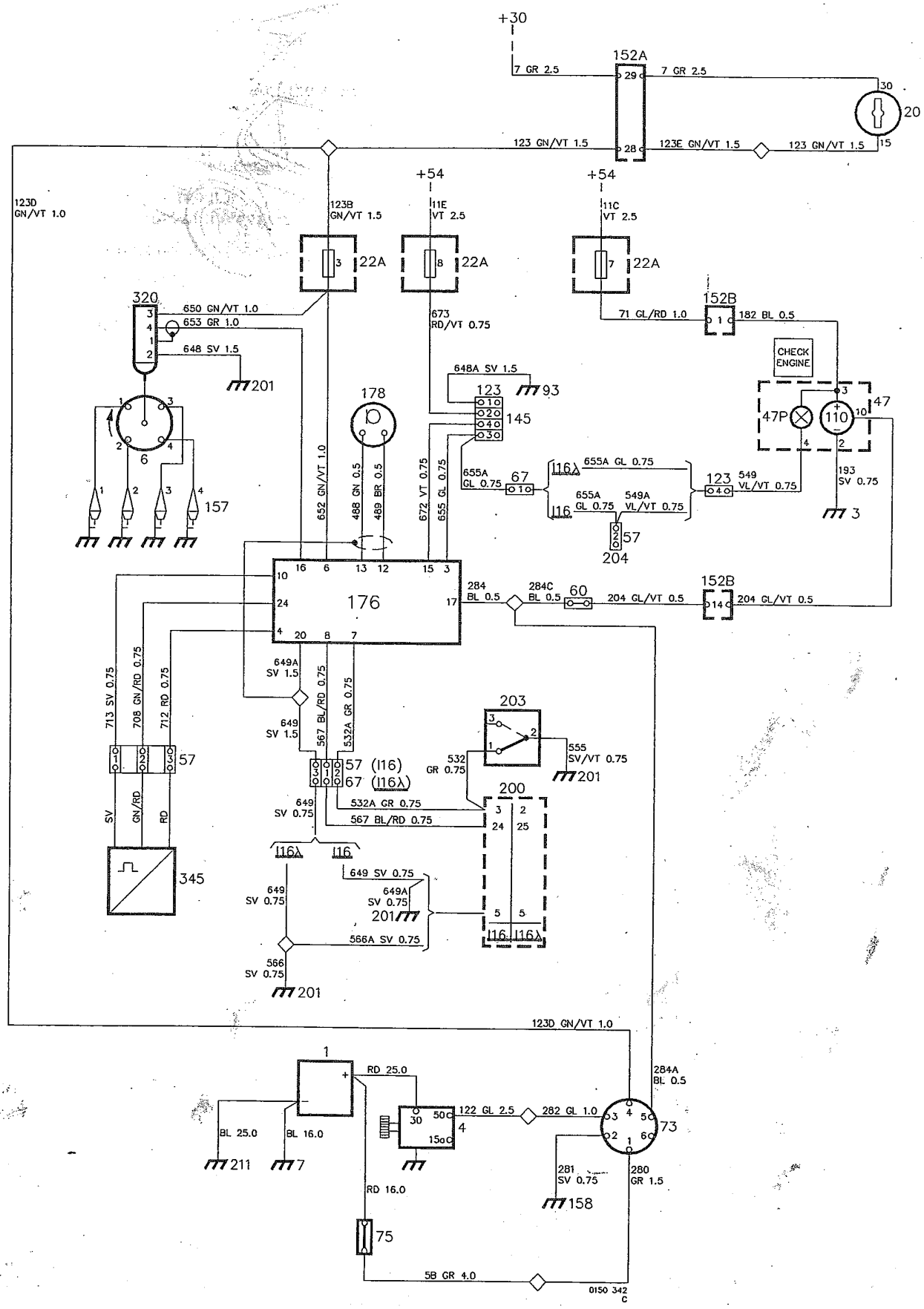






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EZK ignition system with tachometer and timing service instrument socket, 1989 model



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Operation

The EZK ignition system is fitted only to 16-valve engines without turbocharger. This breakerless ignition system is equipped with a Hall sensor. It is controlled by a knock sensor, which provides the highest possible engine performance on any grade of fuel. This provides good fuel economy and cleaner exhaust gases.

When the ignition switch is in the start or drive position, ignition coil 320 with integrated amplifier and EZK control unit 176 will be energised (+15).

Control unit 176 receives ignition pulses via a three-core shielded cable from crankshaft sensor 345. The frequency of the pulses is proportional to the engine speed. The control unit then adjusts the timing on the basis of the following factors:

- engine speed
- engine load
- any knocking tendencies

The ignition pulses supplied from terminal 16 of the control unit are amplified and adjusted in ignition coil 320 with integrated amplifier. A high-tension pulse is generated in the secondary winding each time a pulse breaks the primary circuit of the ignition coil. The high-tension pulse is then supplied to the corresponding spark plug (157) via distributor 6.

The ignition is set at 5° when the engine is started. This ignition setting is dependent on the speed of the engine, and adjustment starts at around 700 r/min. It is adjusted in accordance with the values stored in the control unit. (The distributor has no centrifugal or vacuum advance mechanisms.)

Fuel system control unit 200 provides the ignition system with information on the engine load. Throttle angle transmitter 203 is closed (earthed) when the throttle is closed, i.e. when the engine is idling. When the load has exceeded the value stored in the control unit, the timing will be retarded by about 6° on all cylinders. The timing will return to normal in steps of around 1° after the load has ceased to increase.

The control unit receives information on knocking in any of the cylinders via knock sensor 178. The timing is then retarded only in the cylinder in which knocking was detected (in steps of around 3°). This will continue until knocking has ceased or until the timing has been retarded by a total of about 13°. The timing returns to normal in steps of 0.35°.

EZK test tapping 145 is intended for special test equipment. Terminal 15 of the control unit delivers a pulse for each knock detected. (Positive voltage is supplied to the connector when the ignition switch is in the drive position.)

If a fault should occur in the control unit, a signal (earth) will be delivered from terminal 3, which will cause CHECK ENGINE warning lamp 47P to flash. (This lamp can also be activated by the fuel injection system.)

Ignition pulses are supplied from terminal 16 of the control unit to timing service instrument socket 73, tachometer 110 and other systems that are dependent on ignition pulses.

Tachometer

Tachometer 110, located in combined instrument 47, is supplied across fuse 7 and red 29-pole connector 152B. The control pulses required for displaying the engine speed are supplied from EZK control unit 176.

Timing service instrument socket

Timing service instrument (TSI) socket 73 is intended for a special ignition service instrument and has the following terminals:

1. Positive supply direct from battery 1
2. Earth
3. Solenoid (terminal 50) of starter motor 4
4. Positive supply from the ignition switch when the latter is in the start or drive position
5. Ignition pulses from EZK control unit 176
6. Not used

For a more detailed description of each component in the ignition system, see the Service Manual, 3:1, Electrical system, Instruments.

Fault-tracing hints

As a general rule, the connector to the control unit should always be disconnected when measurements are made on the ignition system cable harness. Use an ohmmeter, not a buzzer.

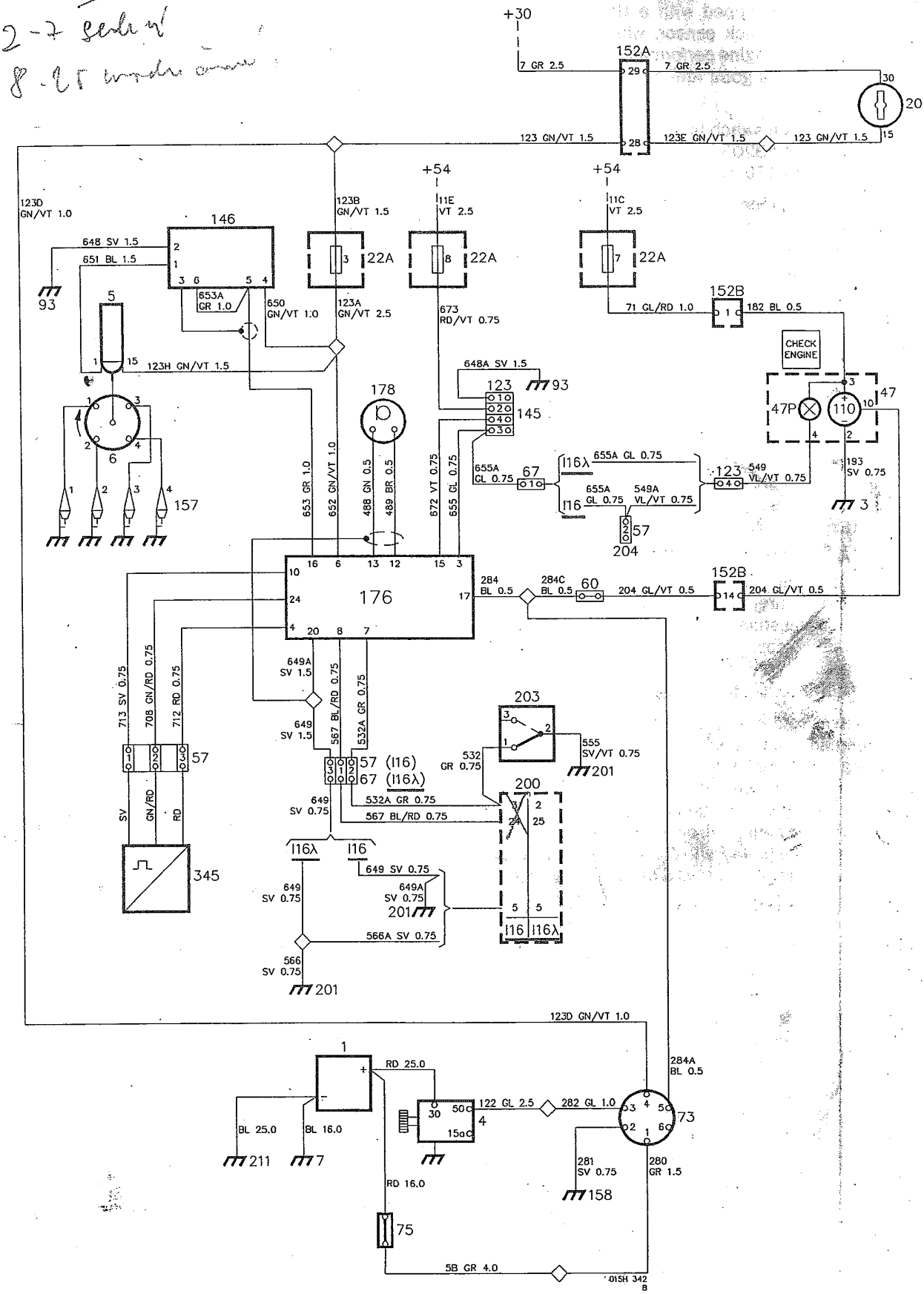
The ignition system will be energised when the ignition switch is in the drive position.

1. Check fuse 3, and check that terminal 3 of the ignition coil and terminal 4 of the timing service instrument socket are live.
2. Check that terminal 6 of control unit 176 is live.
3. **Tachometer:** First check fuse 7 and check that the supply to it is live. Check that terminal 3 of the circuit board for tachometer 110 is live, and that ignition pulses are being supplied from control unit 176.
4. Check all connectors, cable harnesses and earth connections.

See also the fault-tracing section for each component in the Service Manual, Group 3:1, Electrical system, Instruments.

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EZK ignition system with tachometer and timing service instrument socket, 1990 model



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Operation

The EZK ignition system is fitted only to 16-valve engines **without** turbocharger. This breakerless ignition system is equipped with a Hall sensor. It is controlled by a knock sensor, which provides the highest possible engine performance on any grade of fuel. This provides good fuel economy and cleaner exhaust gases.

When the ignition switch is in the start or drive position, amplifier 146 and EZK control unit 176 will be energised (+15).

Control unit 176 receives ignition pulses via a three-core shielded cable from crankshaft sensor 345. The frequency of the pulses is proportional to the engine speed. The control unit then adjusts the timing on the basis of the following factors:

- engine speed
- engine load
- any knocking tendencies

The ignition pulses supplied from terminal 16 of the control unit are amplified and adjusted in amplifier 146. A high-tension pulse is generated in the secondary winding each time a pulse breaks the primary circuit of the ignition coil. The high-tension pulse is then supplied to the corresponding spark plug (157) via distributor 6.

The ignition is set at 10° when the engine is started. This ignition setting is dependent on the speed of the engine, and adjustment starts at around 700 r/min. It is adjusted in accordance with the values stored in the control unit. (The distributor has no centrifugal or vacuum advance mechanisms.) The basic setting is 14° at 850 r/min, with the throttle switch closed.

Fuel system control unit 200 provides the ignition system with information on the engine load (load signal). Throttle angle transmitter 203 is closed (earthed) when the throttle is closed, i.e. when the engine is idling. When the load has exceeded a certain value stored in the control unit, the timing will be retarded by about 5° – 8° (engine speed-dependent) on all cylinders. The timing will return to normal in steps of around 0.7° (1.4° per engine revolution) after the load has ceased to increase.

The control unit receives information on knocking in any of the cylinders via knock sensor 178. The timing is then retarded only in the cylinder in which knocking was detected (in steps of around 3°). This will continue until knocking has ceased or until the timing has been retarded by a total of about 13°. The timing returns to normal in steps of 0.7° per spark firing (1.4° per engine revolution).

Test tapping 145 is intended for special test equipment. Terminal 15 of the control unit delivers a pulse for each knock detected. (Positive voltage is supplied to the connector when the ignition switch is in the drive position.)

If a fault should occur in the control unit, a signal (earth) will be delivered from terminal 3, which will cause CHECK ENGINE warning lamp 47P to flash. (This lamp can also be activated by the fuel injection system.)

Ignition pulses are supplied from terminal 16 of the control unit to timing service instrument socket 73, tachometer 110 and other systems that are dependent on ignition pulses.

Tachometer

Tachometer 110, located in combined instrument 47, is supplied across fuse 7 and red 29-pole connector 152B. The control pulses required for displaying the engine speed are supplied from EZK control unit 176.

Timing service instrument socket

Timing service instrument (TSI) socket 73 is intended for a special ignition service instrument and has the following terminals:

1. Positive supply direct from battery 1
2. Earth
3. Solenoid (terminal 50) on starter motor 4
4. Positive supply from the ignition switch when the latter is in the start or drive position
5. Ignition pulses from EZK control unit 176
6. Not used

For a more detailed description of each component in the ignition system, see the Service Manual, Group 3:1, Electrical system, Instruments.

Fault-tracing hints

As a general rule, the connector to the control unit should always be disconnected when measurements are made on the ignition system cable harness. Use an ohmmeter, not a buzzer.

The ignition system will be energised when the ignition switch is in the drive position.

1. Check fuse 3, and check that terminal 3 of the ignition coil and terminal 4 of the timing service instrument socket are live.
2. Check that terminal 6 of control unit 176 is live.
3. **Tachometer:** First check fuse 7 and check that the supply to it is live. Check that terminal 3 of the circuit board for tachometer 110 is live, and that ignition pulses are being supplied from control unit 176.
4. Check all connectors, cable harnesses and earth connections.

See also the fault-tracing section for each component in the Service Manual, Group 3:1, Electrical system, Instruments.

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Locations of components

1 Battery
on the right-hand side of the engine compartment

3 Earthing point in the fascia

4 Starter motor
on the left-hand side of the engine (intake side)

6 Ignition distributor
at the front of the engine

7 Earthing point on the radiator cross-member

20 Ignition switch
on the centre console between the front seats

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

47 Combined instrument
on the fascia

47P CHECK ENGINE warning lamp
in combined instrument 47 on the fascia

57 3-pole connector (I16)
in the engine compartment, on the right-hand side, at the air intake

60 Single-pole connector
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

67 6-pole connector
two in the engine compartment, on the right-hand side, at the air intake (one is for the I16 Lambda)

73 Timing service instrument socket
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

75 Distribution block
in the engine compartment, on the right-hand side

93 Earthing point on the left-hand wheel housing member

110 Tachometer
in combined instrument 47 on the fascia

123 4-pole connector
in the engine compartment on the left-hand wheel housing, forward of the electrical distribution box (EZK test tapping)

145 Test tapping, EZK
in the engine compartment, on the left-hand wheel housing, forward of the electrical distribution box

146 Amplifier for the electronic ignition system (1990 model)
in the engine compartment, forward of the left-hand wheel housing

152A 29-pole white connector
152B 29-pole red connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connectors are accessible from the interior of the car.

157 Spark plug
on the engine

158 Negative distribution terminal
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

176 Control unit for the EZK ignition system
in the engine compartment, forward of the left-hand wheel housing

178 Knock sensor for the EZK system
on the engine, between the two centre intake ports

200 Control unit for the LH fuel injection system
forward of the right-hand front door, below the fascia (behind the trim)

201 Earthing point on the engine
at the engine lifting lug

203 Throttle angle transmitter – LH fuel injection system
on the throttle housing

204 Test connector – LH fuel injection system
in the engine compartment, behind the right-hand wheel housing

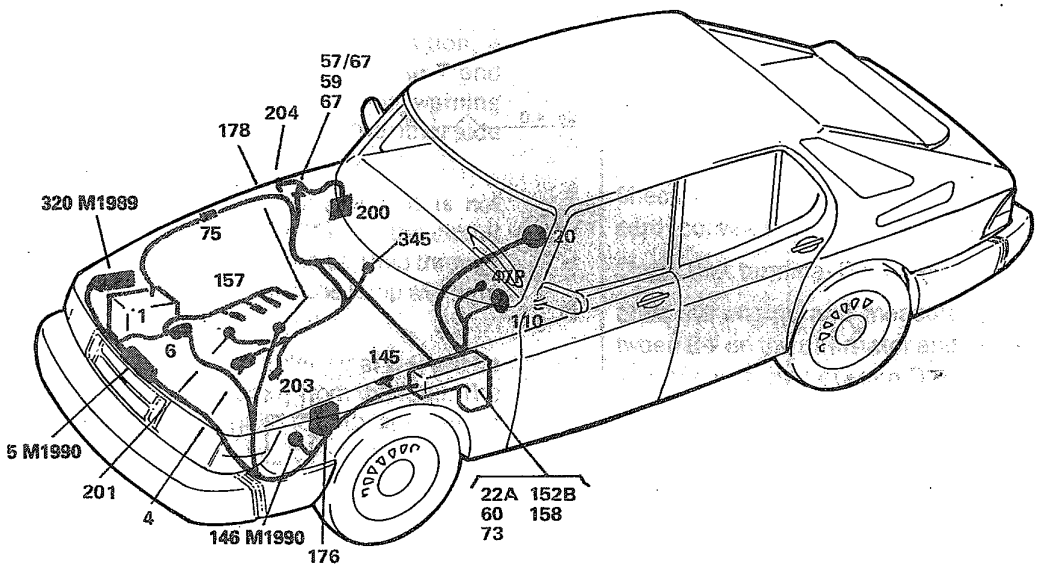
211 Earthing point on the gearbox

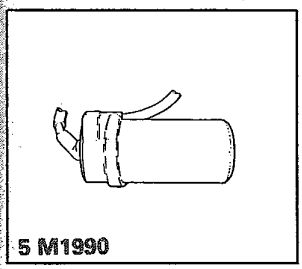
320 Ignition coil with integrated amplifier (1989 model)
in the engine compartment on the right-hand side, above the battery

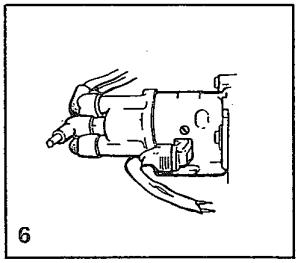
345 Crankshaft sensor
behind the crankshaft pulley

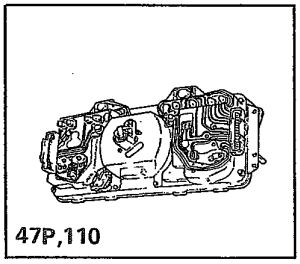
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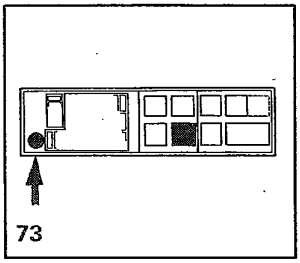
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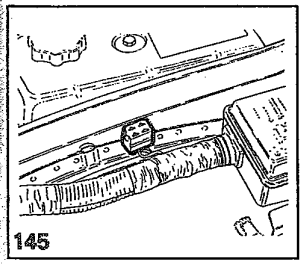


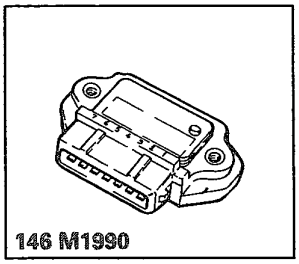

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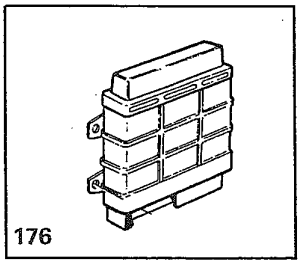

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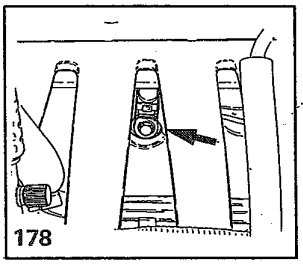

47P,110

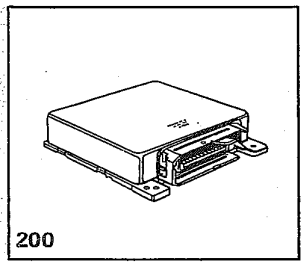

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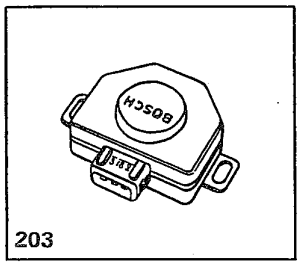

145


146 M1990

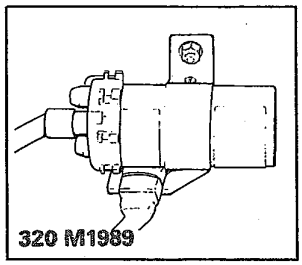

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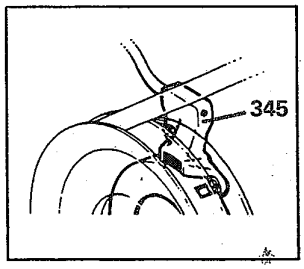

178


200



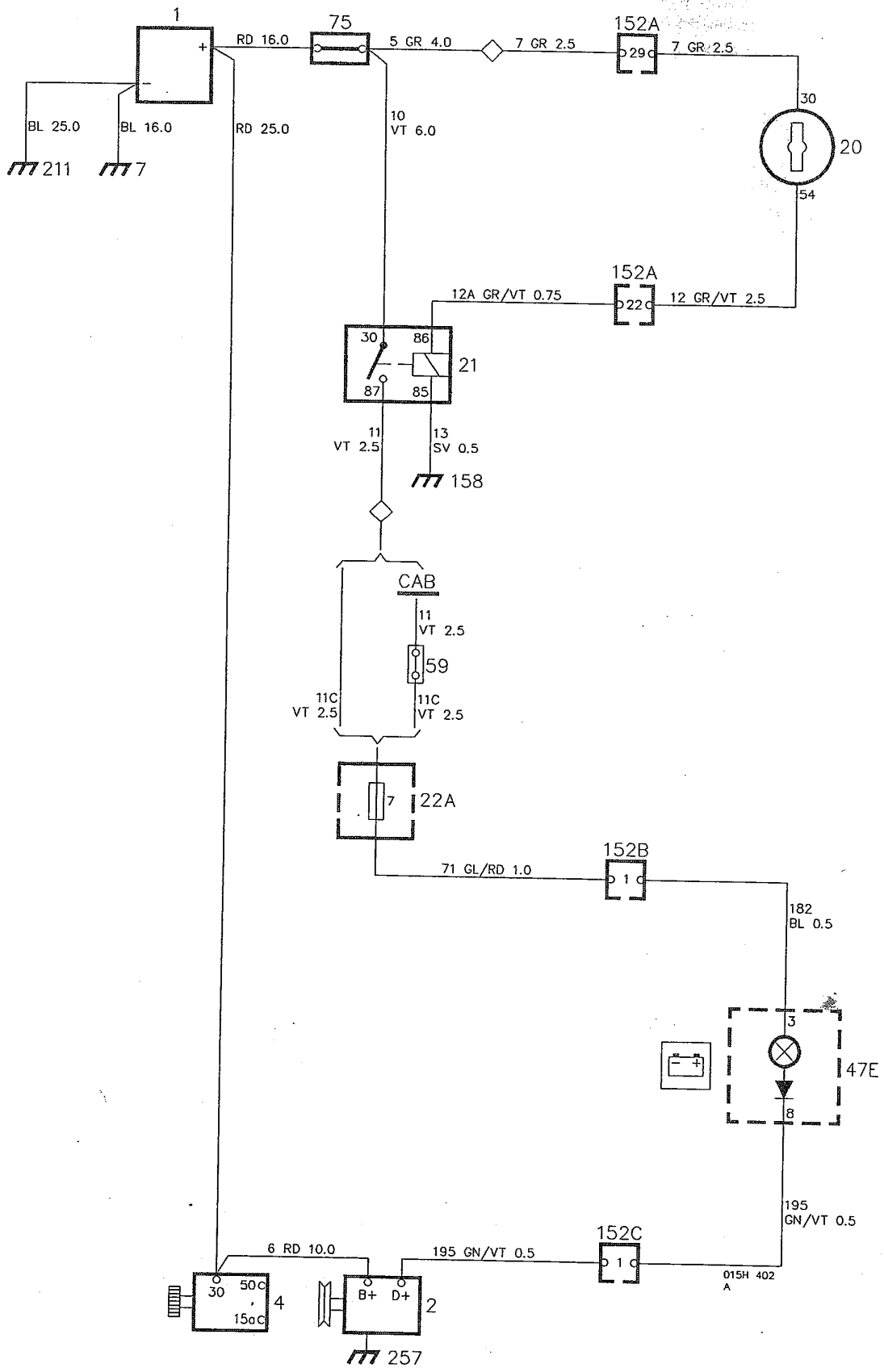
203


320 M1989



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Battery-charging system



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Operation

The charging warning lamp informs the driver of whether or not the alternator is charging.

When the ignition switch is in the drive position, a positive voltage will be supplied across fuse 7 and red 29-pole connector 152B to charging warning lamp 47E in the combined instrument. The other side of the lamp is connected to alternator 2.

When the alternator is not rotating or if it is not charging the battery for any other reason, the circuit for the charging warning lamp will be earthed through terminal D+ on the alternator, and the lamp will light up.

When the alternator is charging, terminal D+ will be at the same voltage as the supply from the fuse. The same voltage will then be applied to both terminals of the warning lamp, and the lamp will therefore be extinguished.

Fault-tracing hints

1. Check the battery voltage at terminal B+ of the alternator.
2. Check fuse 7 and check that the supply to it is live.
3. Check that the bulb in the warning lamp is intact.
4. Check the connectors, cable harnesses and the earth connection of the alternator.
5. Check that terminal D+ of the alternator is live.
6. Start the engine and measure the voltage between B+ on the alternator and earth. Also measure the voltage between D+ on the alternator and earth. The difference between these two voltages should not be greater than 0.7 V.

NOTE
If the charging warning lamp bulb should blow, the alternator will cease charging.

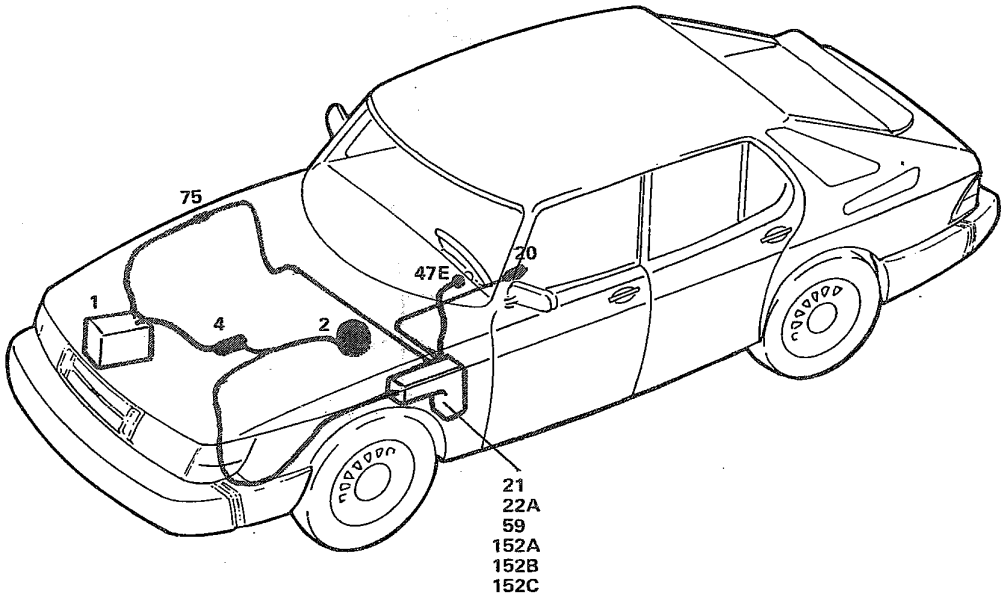
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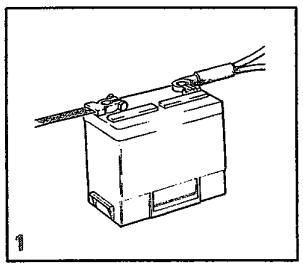
Locations of components

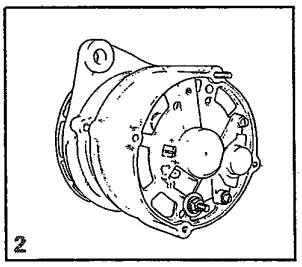
1	Battery on the right-hand side of the engine compartment
2	Alternator on the left-hand side of the engine
4	Starter motor on the left-hand side of the engine (intake side)
7	Earthing point on the radiator cross-member
20	Ignition switch on the centre console between the front seats
21	Ignition switch relay in the electrical distribution box, in the engine compartment, relay position E
22A	Fuse holder in the electrical distribution box, in the engine compartment, on the left-hand wheel housing
47E	Charging warning lamp in the combined instrument
59	2-pole connector (CAB) in the electrical distribution box in the engine compartment, on the left-hand wheel housing
75	Distribution block in the engine compartment, on the right-hand side
152A 152B 152C	29-pole white connector 29-pole red connector 29-pole black connector in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car.
158	Negative distribution terminal in the electrical distribution box in the engine compartment, on the left-hand wheel housing
211	Earthing point on the gearbox
257	Earthing point on the alternator bracket

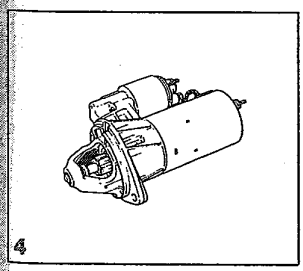
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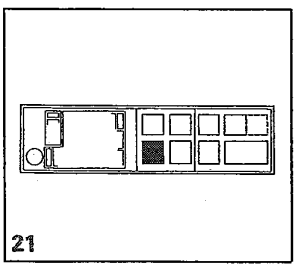
Components

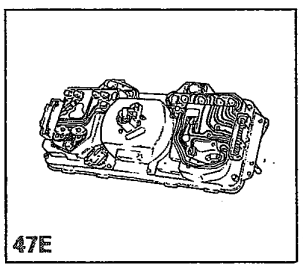


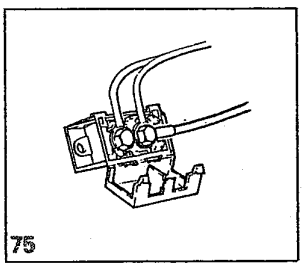






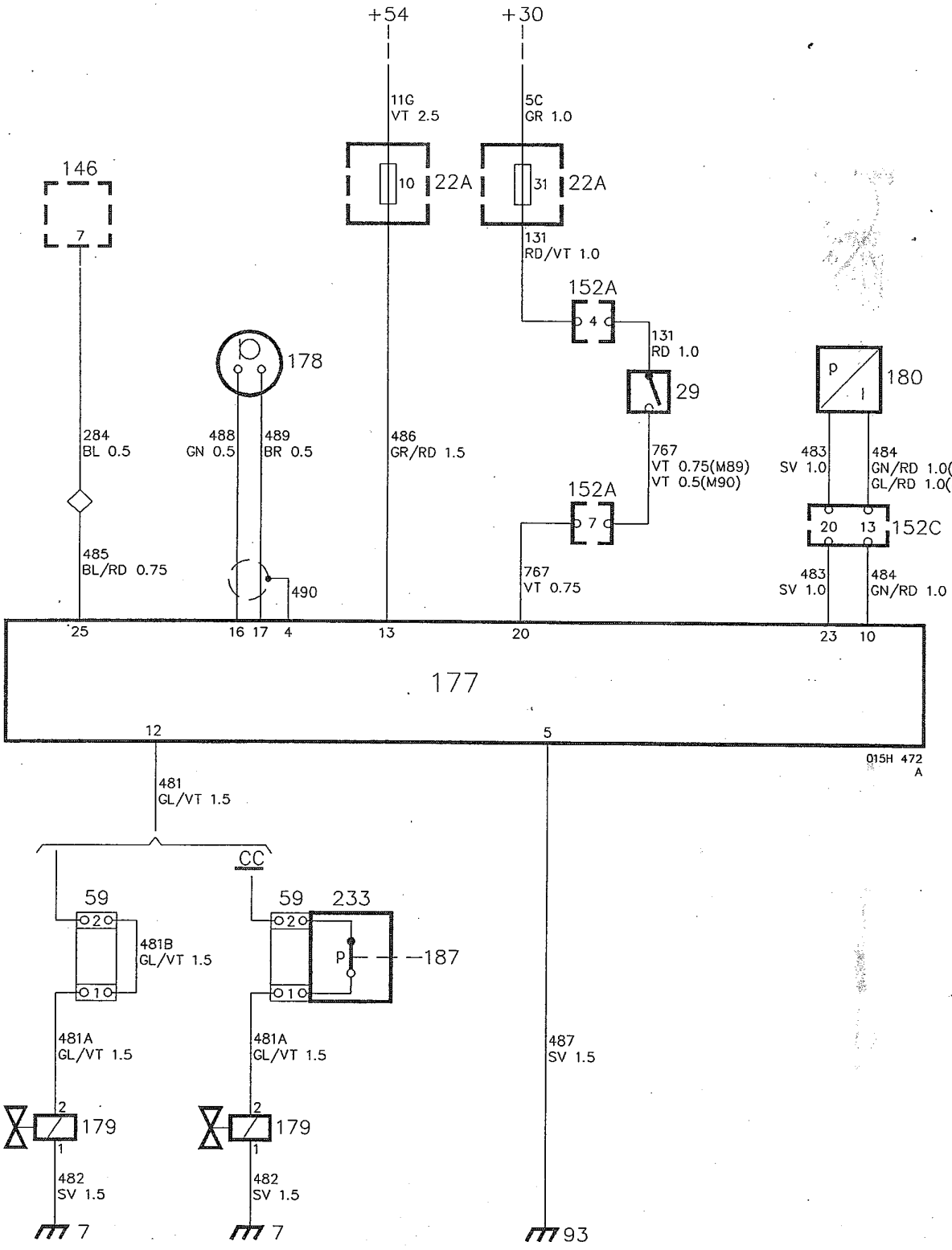






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APC system



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Operation

The engine is equipped with an Automatic Performance Control (APC) system, which enables the engine to adjust itself automatically to the grade of fuel supplied to it at any particular time.

The APC system is controlled by control unit 177, which is supplied (+54) from fuse 10. The unit receives signals from various sensors, processes the signals and then controls the boost pressure of the turbocharger via solenoid valve 179.

The system receives information from the following sensors:

- Knock sensor 178, which senses any knocking in the engine
- Pressure transmitter 180 which senses the pressure in the intake pipe upstream of the throttle.

The signals from the sensors and from ignition system amplifier 146 are fed continuously into the control unit. On the basis of the electrical signals received, the unit then controls the solenoid valve and thus the boost pressure from the turbocharger. In addition, it receives a signal from brake light switch 29 when the foot brake is applied, which enables the control unit to reduce the boost pressure to the basic value. Since the boost pressure is continuously adjusted to the octane rating of the fuel and the running conditions of the engine, it has proved unnecessary to provide the adjustment margins that must normally be allowed to avoid damage to the engine. As a result, maximum energy can be extracted from the fuel used on any particular occasion.

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C

1.0

Cars with the Turbo engine and Cruise Control are equipped with vacuum switch 233, which is actuated by vacuum pump 187 via a vacuum hose. When the contacts have opened, the control unit reduces the boost pressure to the basic value.

Fault-tracing hints

Always take the following measures before fault-tracing in the APC system:

1. Disconnect the connector from the control unit.
2. Disconnect the connector from the component which is suspected to be faulty.
3. Use an ohmmeter to check the wiring for any open circuits, etc.

The resistance of the pressure transmitter (measured at atmospheric pressure) is 5 – 13 ohm.

For other particulars, see the fault-tracing section in the Service Manual, Group 2:3, Fuel system, injection engine.

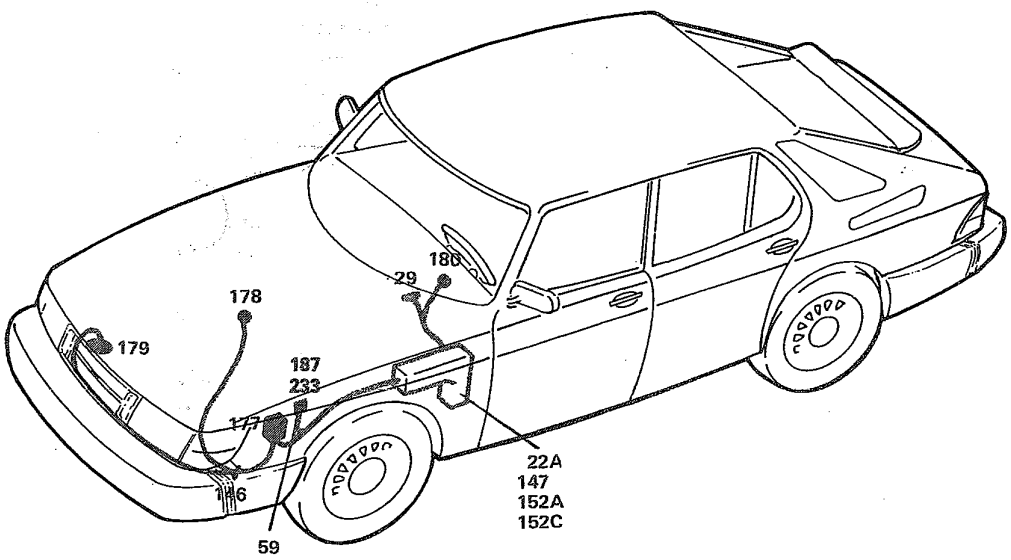
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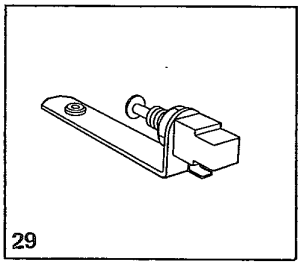
Locations of components

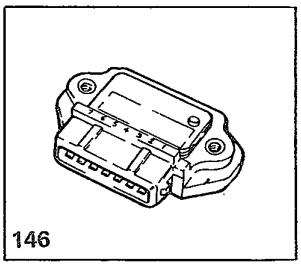
7	Earthing point on the radiator cross-member
22A	Fuse holder in the electrical distribution box, in the engine compartment, on the left-hand wheel housing
29	Brake light switch at the brake pedal
59	2-pole connector in the engine compartment, on the left-hand wheel housing
93	Earthing point on the left-hand wheel housing member
146	Amplifier for the electronic ignition system in the engine compartment, forward of the left-hand wheel housing
152A 152C	29-pole white connector 29-pole black connector in the electrical distribution box, in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car.
177	Control unit for the APC system in the engine compartment, forward of the left-hand wheel housing
178	Knock sensor on the engine, below the intake manifold
179	Solenoid valve on the radiator fan casing
180	Pressure transmitter under the fascia, to the left of the steering column (behind the knee shield)
187	Vacuum pump for Cruise Control in the engine compartment, forward of the left-hand wheel housing
233	Vacuum switch in the engine compartment, on the left-hand wheel housing

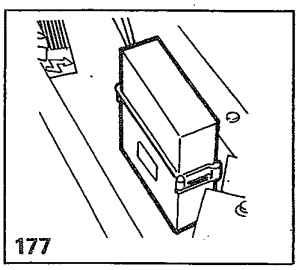
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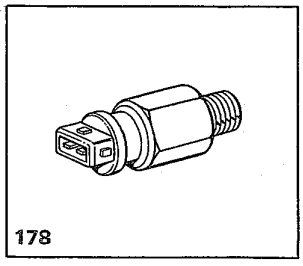
Components

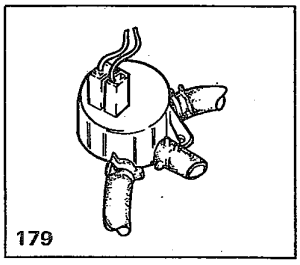


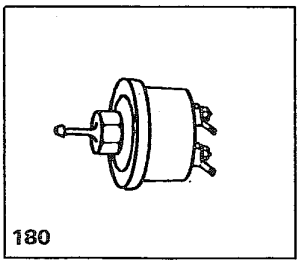


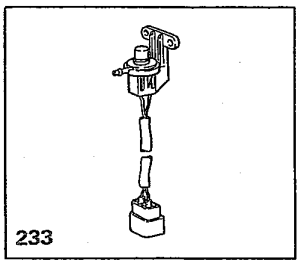






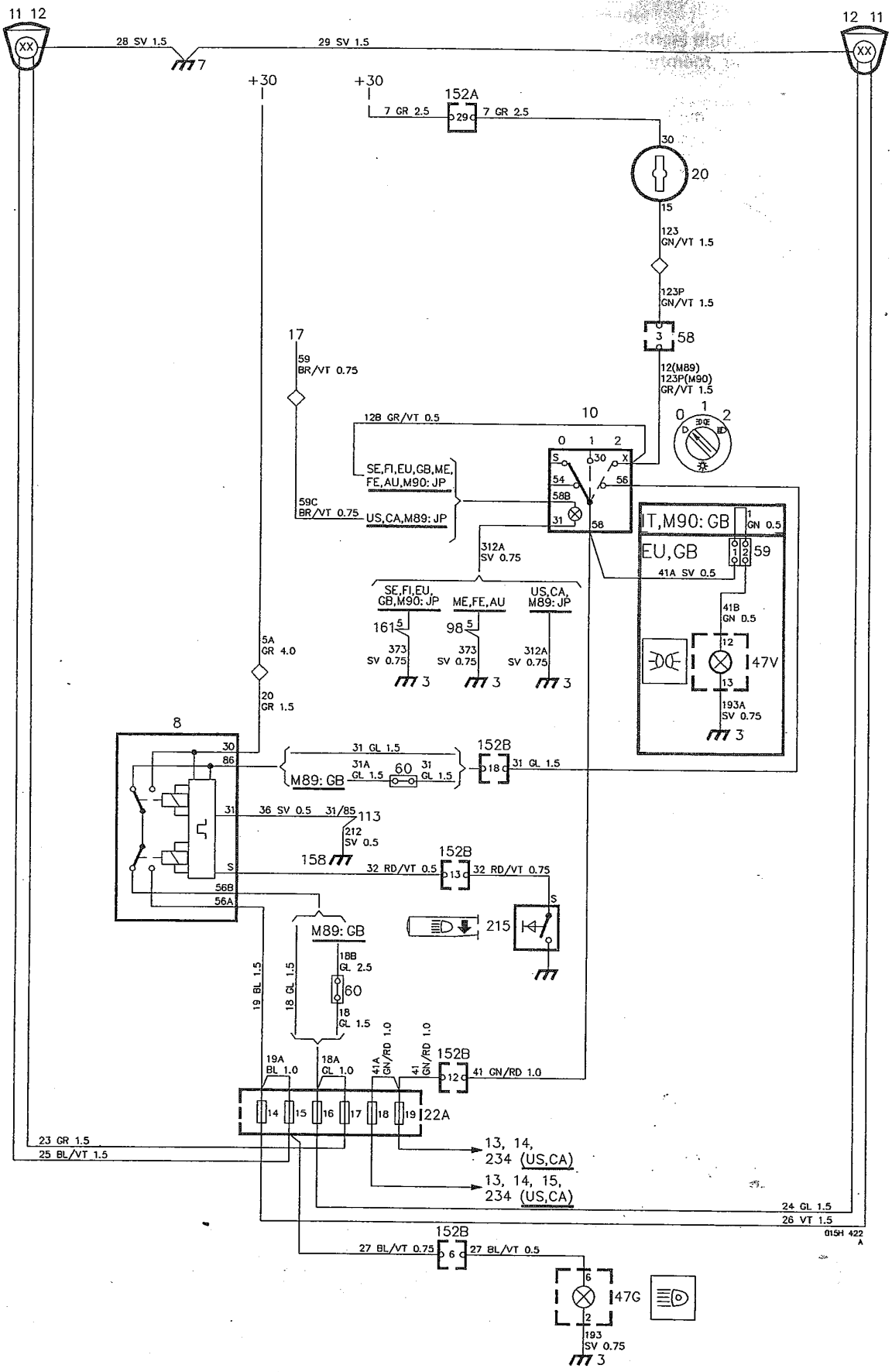






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Headlamps



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Operation

The headlamps can be switched on only when ignition switch 20 is in the parked or drive position. Current will then flow to terminal X of light switch 10.

Full beams

When the light switch is in position 2, the supply will be taken from terminal 56 to the "upper" coil in lighting relay 8, via red 29-pole connector 152B. The relay coil will be energised and the contacts will be set to their "right-hand" position. Full beam filaments 11 are supplied (+30) via the contacts of the "lower" coil and terminal 56A, across fuses 14 and 15.

The "lower" coil is used for switching between full beam and dipped beam. Each time the coil is energised by operation of dip switch 215, the contacts change position and remain there until the dip switch is operated again.

The supply from fuse 15 is also taken to full beam warning lamp 47G in the combined instrument.

For particulars of the lighting wiring in light switch 10 on cars destined for the US and CA markets and the 1989 model for JP, see the section entitled "Lighting for controls, US, CA and 1989 model for JP".

Headlamp flasher

The full beams can also be switched on by means of dip switch 215, regardless of the setting of the ignition switch and the light switch.

When the dip switch is operated, both coils in the lighting relay will be energised. Full beam filaments 11 are then supplied (+30) from terminal 30 of lighting relay 8, via the relay contacts and terminal 56A.

Dipped beams

When the light switch is in position 2, the supply will be taken from terminal 56 to the "upper" coil in lighting relay 8, via 29-pole red connector 152B. The relay coil will be energised and the contacts will be set to their "right-hand" position. Dipped beam filaments 12 are supplied (+30) via the contacts of the "lower" coil and terminal 56B, across fuses 16 and 17.

Parking lights

When the headlamps are switched on, parking lights 13, which also include rear lights 14 and number plate illumination 15, will also be alight. (On certain markets, side marker lights 234 are also included.)

When the headlamps are switched on, the supply to the parking lights is taken from light switch 10 in position 2 via terminals X and 58. The parking lights are discussed in a separate section.

GB market (1989 model)

Cars delivered to the GB market also have dim dipped beams. These cars are fitted with two single-pole connectors (60) in the electrical distribution box.

Cars for Italian market and 1990 models for GB

Cars delivered to these market are fitted with warning lamp 47V which shows when the headlamps are switched on.

Fault-tracing hints

The headlamps will be operative when ignition switch 20 is in the drive position and when light switch 10 is in position 2.

1. Check fuses 14 and 15 (full beams) and fuses 16 and 17 (dipped beams) and check that the supply to them is live.
2. Check the bulbs and check that the supply to them is live. Check the earthing at each lamp.
3. Check the light switch, the lighting relay and the terminals of the dip switch.
4. Check the connectors, cable harnesses and earth connections.

For particulars of fault-tracing on the parking lights, see the section entitled "Parking lights".

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Locations of components

3 Earthing point in the fascia

7 Earthing point on the radiator cross-member

8 Lighting relay
in the electrical distribution box in the engine compartment, relay positions A and B

10 Light switch
on the left-hand side of the fascia

11 Full beam filament
in the left-hand and right-hand headlamps

12 Dipped beam filament
in the left-hand and right-hand headlamps

13 Parking lights
in the front light clusters

14 Rear lights, 3-D and 5-D
in the rear light clusters and on the tailgate
Rear lights, 2-D and 4-D
in the rear light clusters

15 Number plate illumination
on the tailgate (3-D and 5-D)
on the rear sill (2-D and 4-D)

17 Extra rheostat for the lighting of switches and controls
on the left-hand side of the fascia

20 Ignition switch
on the centre console between the front seats

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

47G Full beam warning lamp
in the combined instrument in the instrument panel

47V Warning lamp, headlamps switched on
in the combined instrument in the instrument panel

58 12-pole connector
on the angle bracket, under the fascia on the left-hand side (behind the knee shield)

59 2-pole connector
in the fascia, beside light switch 10

60 Single-pole connector (GB) (1989 model)
two in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

113 Relay for the electrically heated rear window
in the electrical distribution box in the engine compartment, relay position C

152A 29-pole white connector
152B 29-pole red connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car

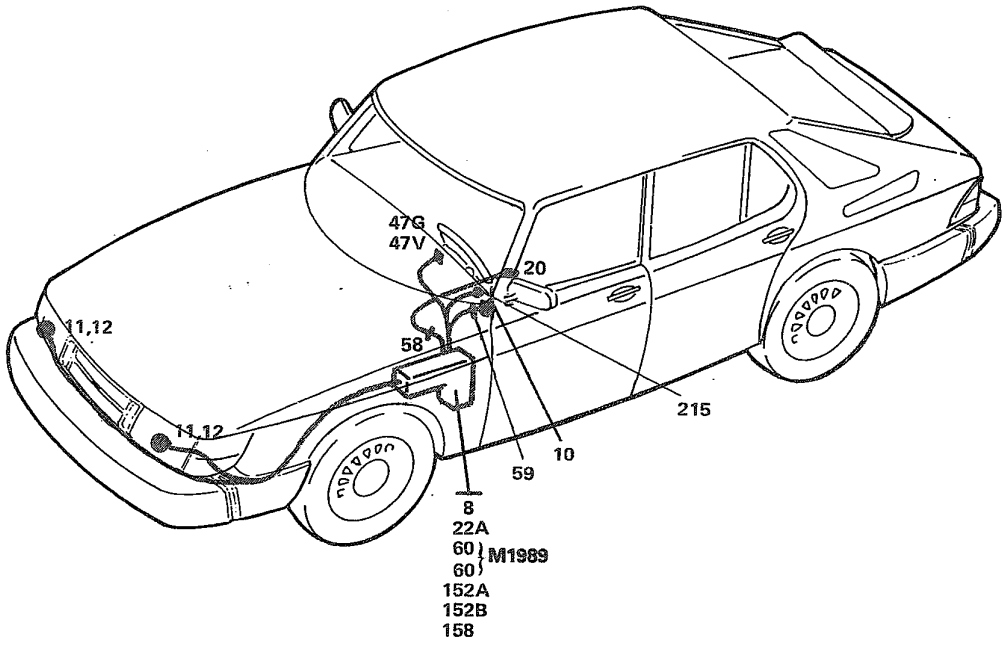
158 Negative distribution terminal
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

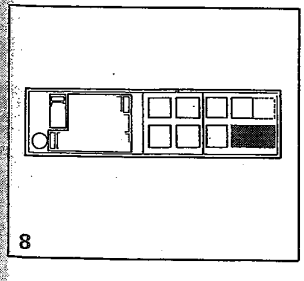
215 Dip switch
on the left-hand side of the steering column

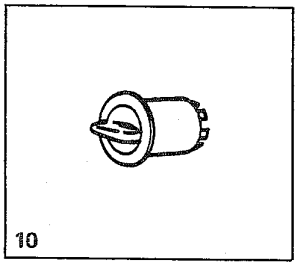
234 Side marker lights
in the front light clusters

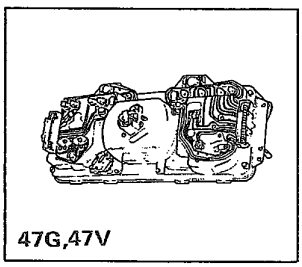
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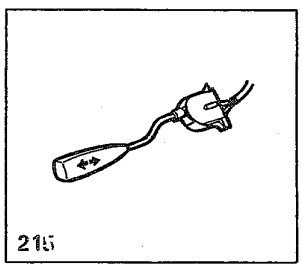
Components





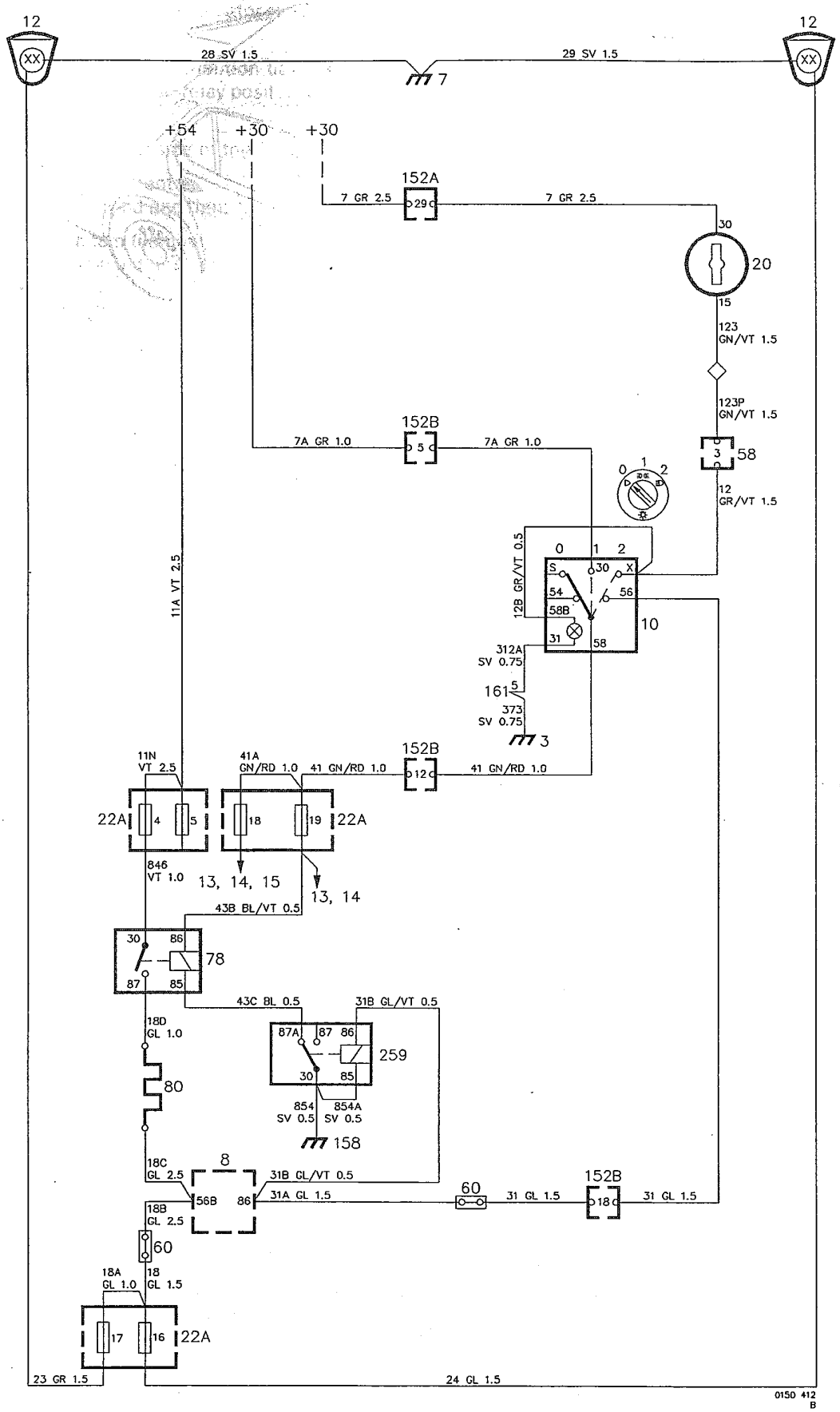






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Dim dipped beam – GB, 1989 model



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Operation

Dim dipped beams are fitted only to cars for the GB market.

When the dim dipped beams are switched on, the dipped beams will be alight at 10% intensity, and the parking lights will also be switched on.

When the parking lights are switched on:
Light switch 10 is in position 1, the coil of relay 78 is energised across fuse 19 and the relay is energised. The circuit is earthed across relay 259. When relay 78 is energised, the dipped beam filaments will be supplied from fuse 4, across the relay contacts and resistor 80.
From the relay, dipped beam filaments 12 are supplied across fuses 16 and 17.

When the headlamps are switched to dipped beam:
Light switch 10 is in position 2, and the bulbs are supplied across the lighting relay 8. The coil of relay 78 is not energised, and the relay contacts open the circuit across resistor 80.

Fault-tracing hints

1. Set the ignition switch to the parked position.
2. Check fuse 4 and check that the supply to it is live.
3. Check the headlamp bulbs and check that the supply to them is live.
4. Check fuses 16 and 17.
5. Check the operation of light switch 10 and relays 78 and 259 by measuring at their terminals.
6. Check resistor 80.
7. Check the cable harnesses and earth connections.

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Locations of components

3 Earthing point in the fascia

7 Earthing point on the radiator cross-member

8 Lighting relay
in the electrical distribution box in the engine compartment, relay positions A and B

10 Light switch
on the left-hand side of the fascia

12 Dipped beam filament
in the left-hand and right-hand headlamps

13 Parking lights
in the front light clusters

14 Rear lights, 3-D and 5-D
in the rear light clusters and on the tailgate
Rear lights, 2-D and 4-D
in the rear light clusters

15 Number plate illumination
on the tailgate (3-D and 5-D)
on the rear sill (2-D and 4-D)

20 Ignition switch
on the centre console between the front seats

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

58 12-pole connector
on the angle bracket, under the fascia on the left-hand side (behind the knee shield)

60 Single-pole connector
two in the electrical distribution box in the engine compartment, on the left-hand wheel housing

78 Relay
behind the electrical distribution box in the engine compartment

80 Resistor
behind the electrical distribution box in the engine compartment

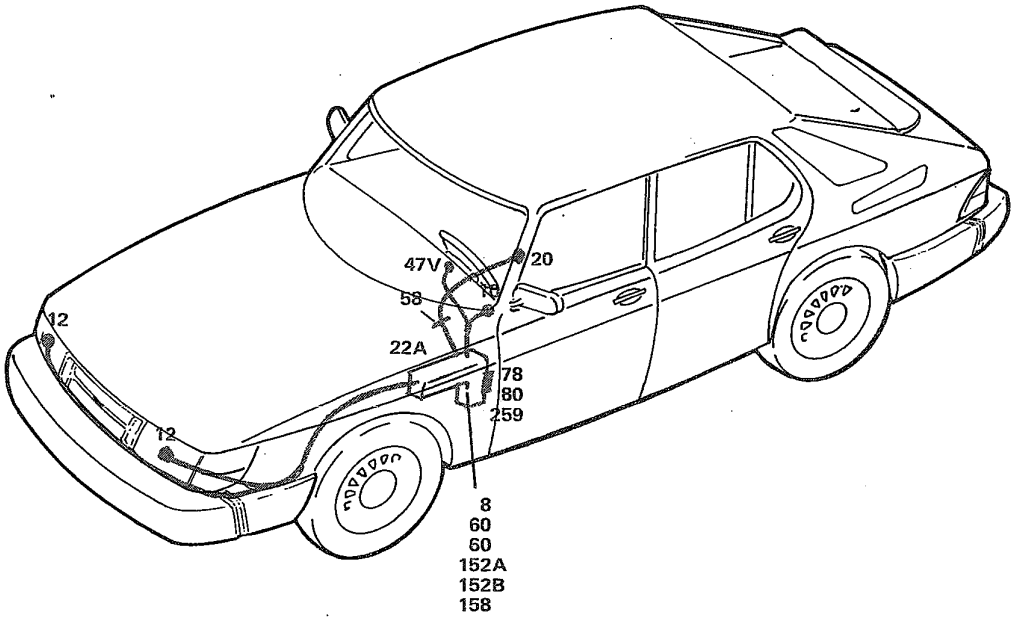
152A 29-pole white connector
152B 29-pole red connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connectors are accessible from the interior of the car.

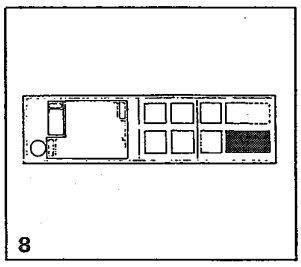
158 Negative distribution terminal
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

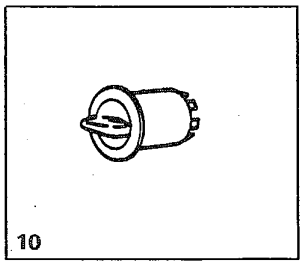
259 Reverse current protection relay
behind the electrical distribution box, in the engine compartment, on the left-hand wheel housing

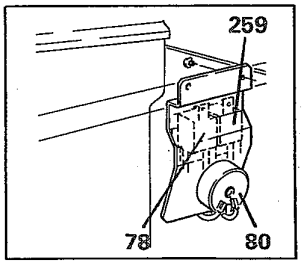
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Components



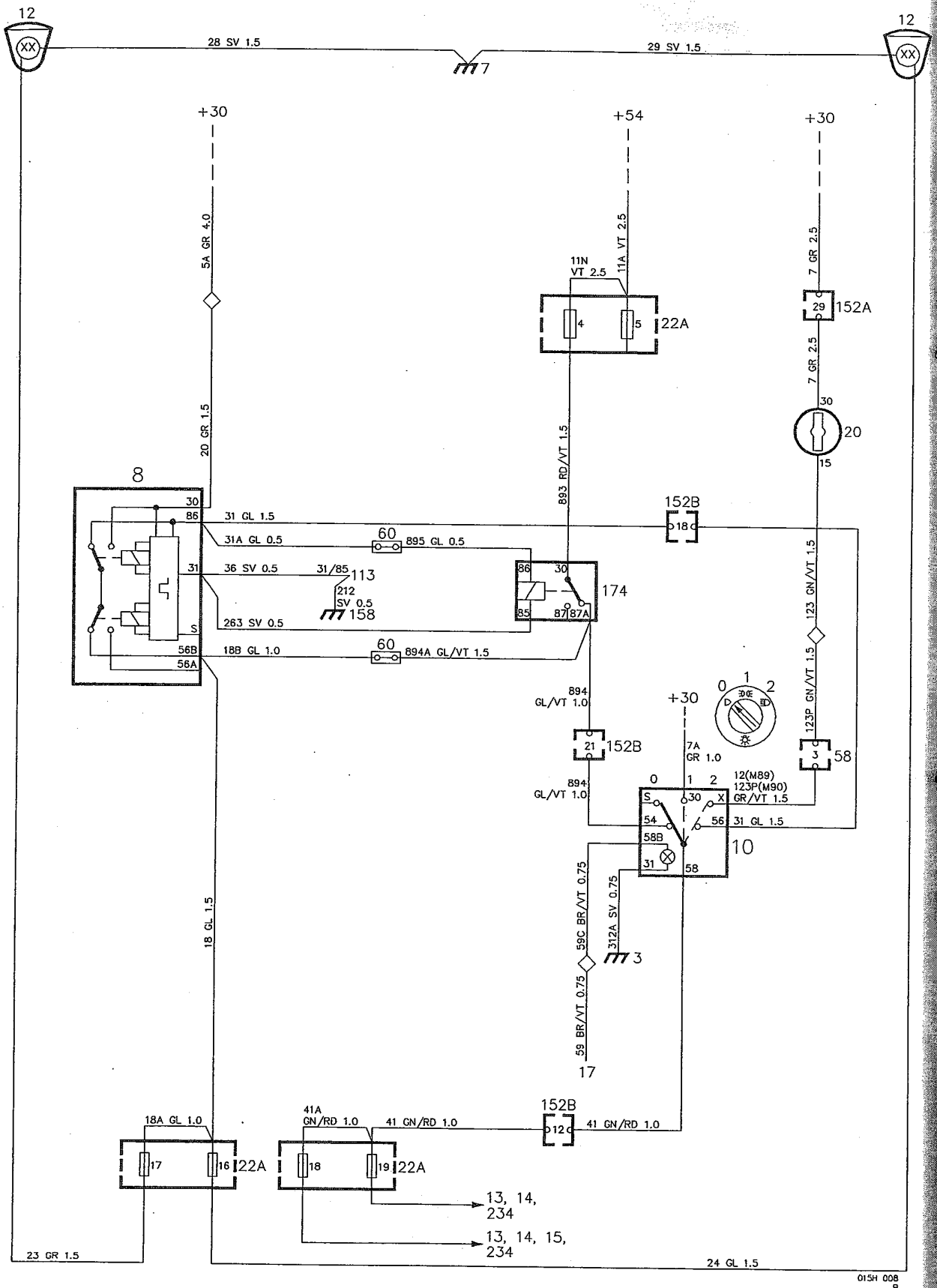






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Daylight driving lights – CA



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12

Operation

On cars for the CA market, the headlamp dipped beams also serve as daylight driving lights. The lights will be switched on when the ignition switch is in the drive position and the light switch is set to 0 or 1. The parking lights, rear lights, number plate illumination and side marker lights will also be alight.

When ignition switch 20 is in the drive position and light switch 10 is in position 0 or 1, terminal 87A of relay 174 will supply dipped beam filaments 12 across fuses 16 and 17.

When the light switch is in position 2, relay 174 will be energised from terminal 56 of light switch 10. The relay will be energised, thus switching out the daylight driving lights, in order to avoid reverse currents.

Fault-tracing hints

The daylight driving lights will be operative when ignition switch 20 is in the drive position and light switch 10 is in position 0 or 1.

1. Check fuses 16 and 17 (dipped beams) and check that the supply to them is live.
2. Check the bulbs and check that the supply to them is live. Check the earthing.
3. Check light switch 10 and relay 174.
4. Check the connectors, cable harnesses and earth connections.

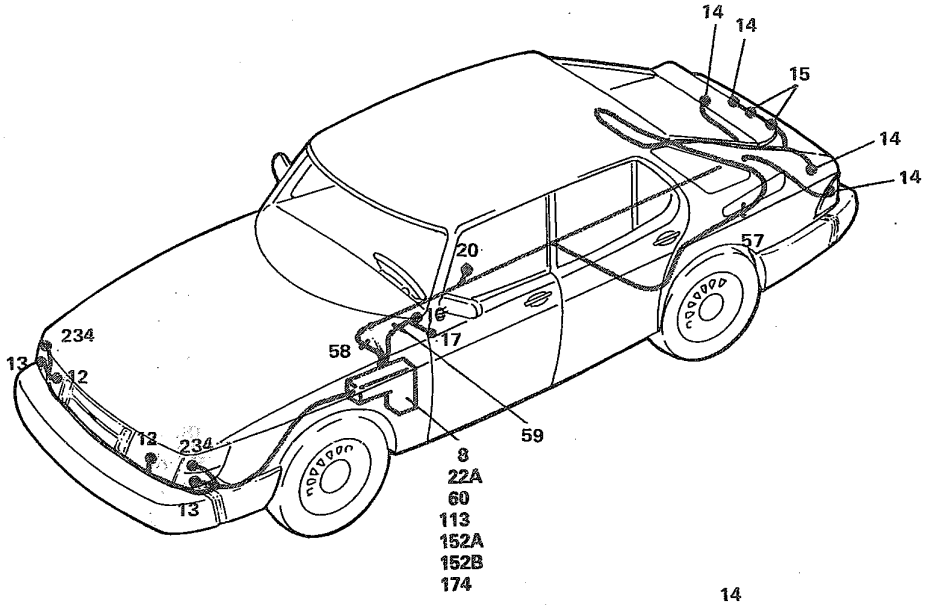
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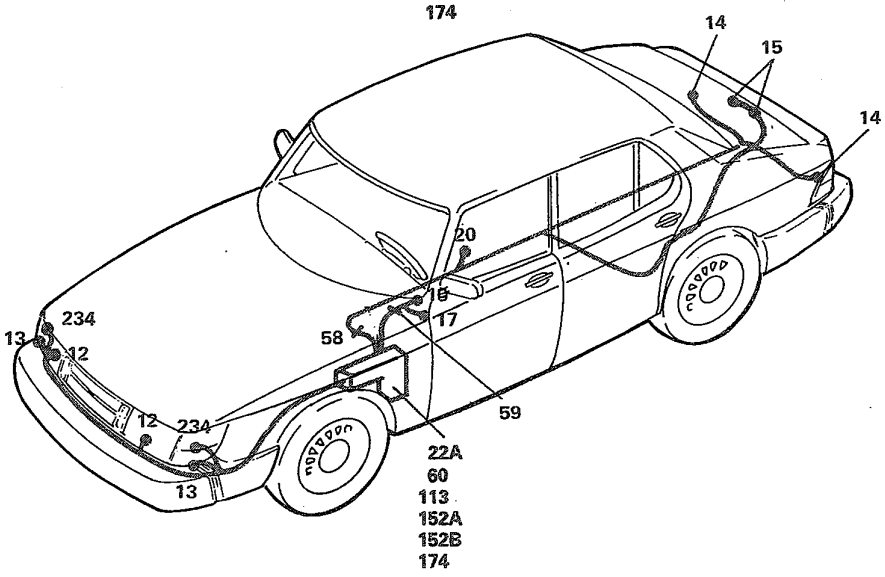
Locations of components

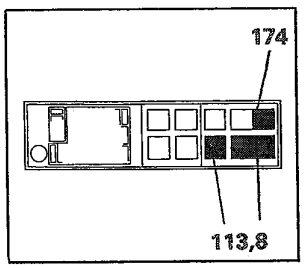
3	Earthing point in the fascia
7	Earthing point on the radiator cross-member
8	Lighting relay in the electrical distribution box in the engine compartment, relay positions A and B
10	Light switch on the left-hand side of the fascia
12	Dipped beam filament in the left-hand and right-hand headlamps
13	Parking lights in the front light clusters
14	Rear lights, 3-D and 5-D in the rear light clusters and on the tailgate Rear lights, 2-D and 4-D in the rear light clusters
15	Number plate illumination on the tailgate (3-D and 5-D) on the rear sill (2-D and 4-D)
17	Extra rheostat for the lighting of switches and controls on the left-hand side of the fascia
20	Ignition switch on the centre console between the front seats
22A	Fuse holder in the electrical distribution box, in the engine compartment, on the left-hand wheel housing
58	12-pole connector on the angle bracket, under the fascia on the left-hand side (behind the knee shield)
60	Single-pole connector two in the electrical distribution box, in the engine compartment, on the left-hand wheel housing
113	Relay for the electrically heated rear window in the electrical distribution box in the engine compartment, relay position C
152A 152B	29-pole white connector 29-pole red connector in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car
158	Negative distribution terminal in the electrical distribution box in the engine compartment, on the left-hand wheel housing
174	Relay for daylight driving lights (CA) in the electrical distribution box in the engine compartment, relay position F
234	Side marker lights in the front light clusters

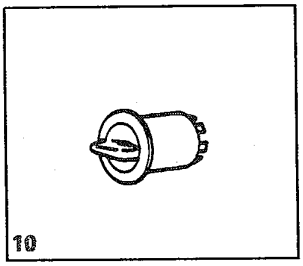
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Components



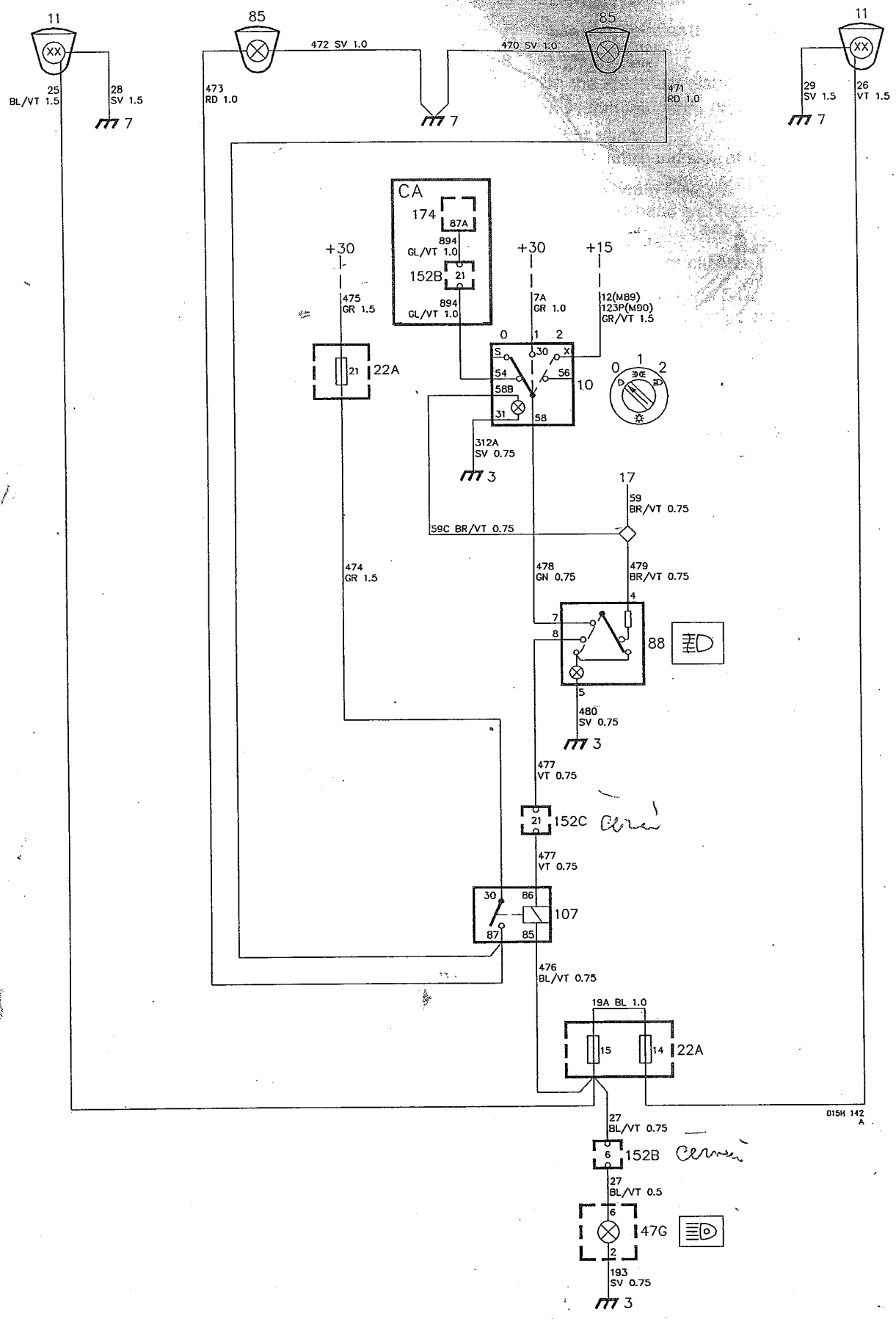






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Extra fog lamps



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Operation

Extra fog lamps are fitted only to cars destined for the USA and Canada, and to the 1989 models for JP.

The fog lamps are wired so that they can be switched on only when the parking lights or dipped beams are switched on.

On cars supplied to Canada, the extra fog lamps can be switched on regardless of the position of light switch 10.

When light switch 10 is in position 1 (parking lights) or 2 (full beam/dipped beam), switch 88 for the extra fog lamps will be supplied via terminal 30 or terminal X of light switch 10.

When the switch is depressed, relay 107 will be energised, since its coil will be earthed across filaments 11 for the left-hand and right-hand full beams, and across full beam warning lamp 47G. The lamp in the switch will then light up with full brightness.

Both extra fog lamps 85 then receive a positive supply from fuse 21, across the relay contacts, which are closed.

When the full beams are switched on, the relay will be de-energised, and the fog lamps will be switched off, even if the switch is depressed. This is due to the fact that a positive voltage is then being supplied to both sides of the relay coil.

Cars for the CA market

Cars for this market are equipped with daylight driving lights. Relay 174 for the daylight driving lights gives a positive supply to the extra fog lamps when the light switch is in position 0.

Fault-tracing hints

The extra fog lamps can be switched on by setting light switch 10 to position 1 or 2 and depressing switch 88.

1. Check fuse 21 and check that the supply to it is live.
2. Check full beam filaments 11 and full beam warning lamp 47G.
3. Check each fog lamp and check that the supply to it is live. Check the earthing at the lamp.
4. Check fuse 15. If the fuse has blown, the fog lamps will not be extinguished when the full beams are switched on.
5. Check relay 107, light switch 10 and switch 88, by measuring at their terminals.
6. Check the relevant cable harness and earth connections.

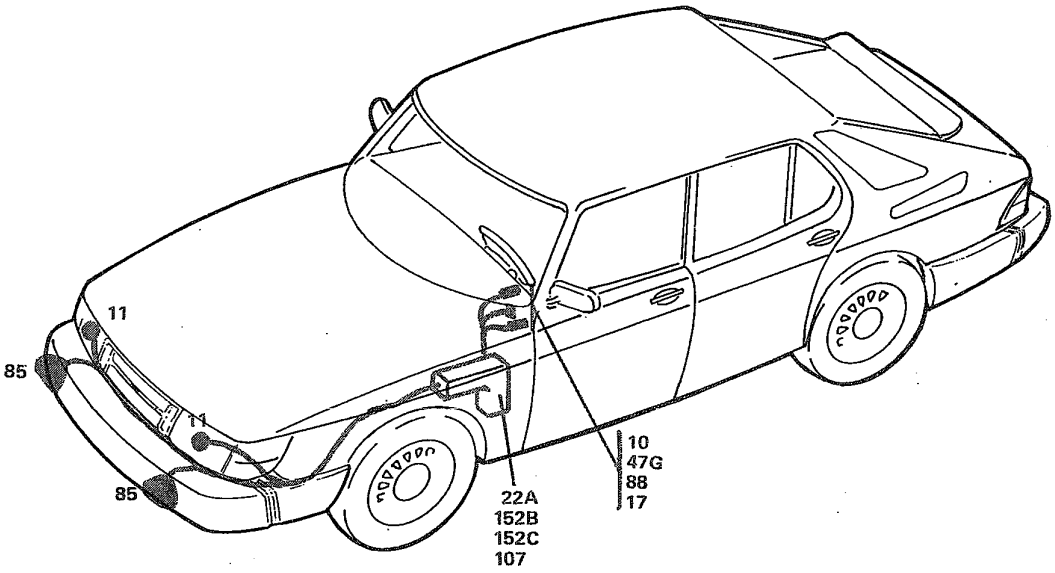
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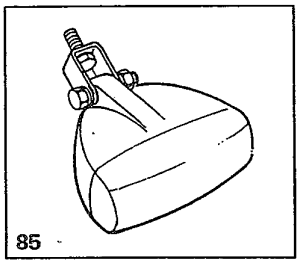
Locations of components

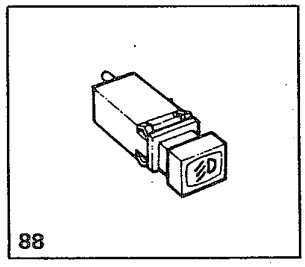
3	Earthing point in the fascia
7	Earthing point on the radiator cross-member
10	Light switch on the left-hand side of the fascia
11	Full beam filament in the left-hand and right-hand headlamps
17	Extra rheostat for the lighting of switches and controls on the fascia
22A	Fuse holder in the electrical distribution box, in the engine compartment, on the left-hand wheel housing
47G	Full beam warning lamp in the combined instrument in the instrument panel
85	Extra fog lamps under the front bumper
88	Switch for extra fog lamps on the fascia
107	Relay for extra fog lamps in the electrical distribution box in the engine compartment, relay position D
152B 152C	29-pole red connector 29-pole black connector in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car.

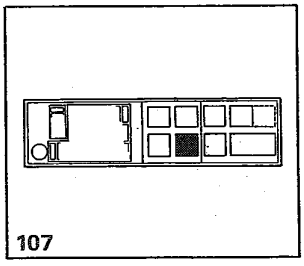
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Components



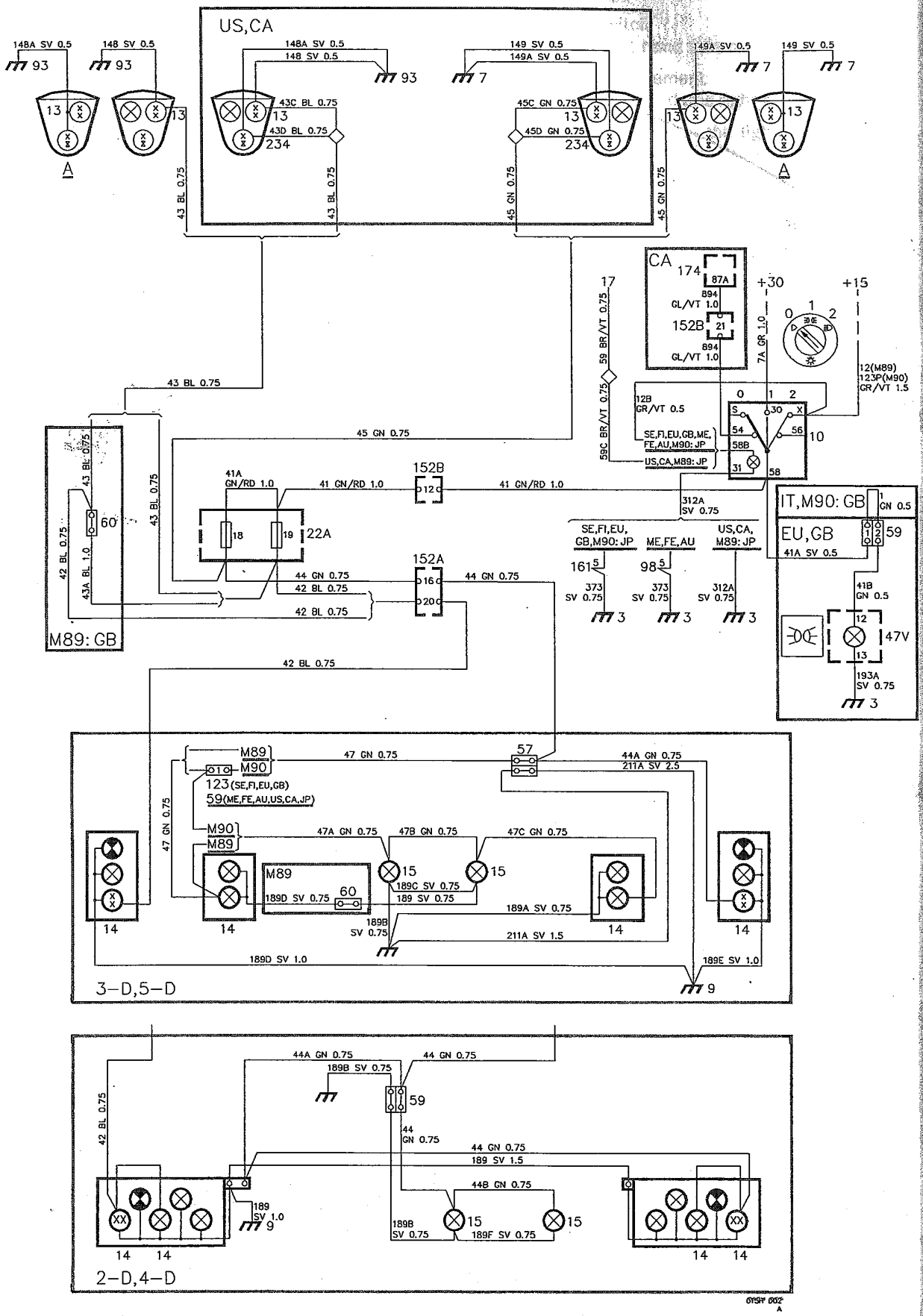






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Parking lights



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Operation

The parking lights can be switched on and off by means of light switch 10, to which the supply (+30) is always live, regardless of the position of the ignition switch.

When the light switch is to position 1 – "Parking lights" the supply to parking lights 13 is taken across the red 29-pole connector 152B and fuses 18 and 19. The left-hand side of the car is supplied across fuse 19 and the right-hand side across fuse 18.

Rear lights 14 are also supplied across fuses 18 and 19 and the white 29-pole connector 152A. Number plate illumination 15 is supplied across fuse 18.

The rear-light supplies of the 3-D and 5-D models differ somewhat from each those of the 2-D and 4-D models. The 3-D and 5-D models are equipped with two additional rear lights (14) on the tailgate.

For particulars of the lighting wiring in light switch 10 on cars destined for US, CA and JP, see the section entitled "Lighting for controls, US, CA, JP".

Light fittings marked "A" are for cars without integrated bumpers.

US and CA markets

Cars for the US and CA markets are also equipped with side marker lights 234, which are supplied via parking lights 13. One-half of the bulb for each direction indicator is used for the corresponding side marker light.

GB market (1989 model)

Cars delivered to the GB market also have dim dipped beams. These cars are also provided with a single-pole connector 60 in the electrical distribution box.

CA market

On cars for the CA market, the parking lights will be switched on when the light switch is in position 0 and the ignition is switched on.

Italian market and 1989 cars for GB

Cars for these market are equipped with warning lamp 47V which lights up when the parking lights are switched on.

Fault-tracing hints

The parking lights are switched on when light switch 10 is set to position 1.

1. Check fuses 18 and 19 and check that the supply to them is live.
2. Check the bulbs and check that the supply to them is live. Check the earthing at each lamp.
3. Check the operation of light switch 10 by measuring at the light switch terminals.
4. Check the connectors, cable harnesses and earth connections.

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Locations of components

3 Earthing point in the fascia

7 Earthing point on the radiator cross-member

9 Earthing point in the luggage compartment

10 Light switch
on the left-hand side of the fascia

13 Parking lights
in the front light clusters

14 Rear lights, 3-D and 5-D
in the rear light clusters and on the tailgate
Rear lights, 2-D and 4-D
in the rear light clusters

15 Number plate illumination
on the tailgate (3-D and 5-D)
on the rear sill (2-D and 4-D)

17 Extra rheostat for the lighting of switches and controls
on the left-hand side of the fascia

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

47V Warning lamp, headlamps switched on
in the combined instrument in the instrument panel

57 3-pole connector (3-D and 5-D)
in the luggage compartment, at the left-hand air outlet

59 2-pole connector (2-D and 4-D)
in the boot lid
in the fascia, beside light switch 10

59 2-pole connector (3-D and 5-D) (1990 model)
in the boot lid, on the left-hand side

60 Single-pole connector
two in the electrical distribution box, in the engine compartment, on the left-hand wheel housing (GB) (1989 model)
in the tailgate (3-D and 5-D)

93 Earthing point on the left-hand wheel housing member

123 4-pole connector (3-D and 5-D) (1990 model)
in the luggage compartment, on the left-hand side

152A 29-pole white connector
152B 29-pole red connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car

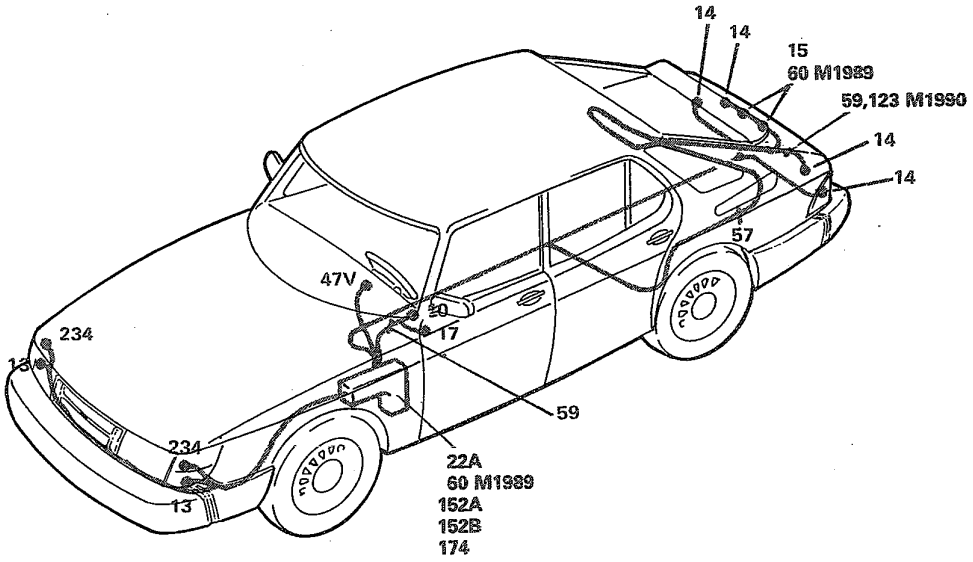
174 Relay for daylight driving lights (CA)
in the electrical distribution box in the engine compartment, relay position F

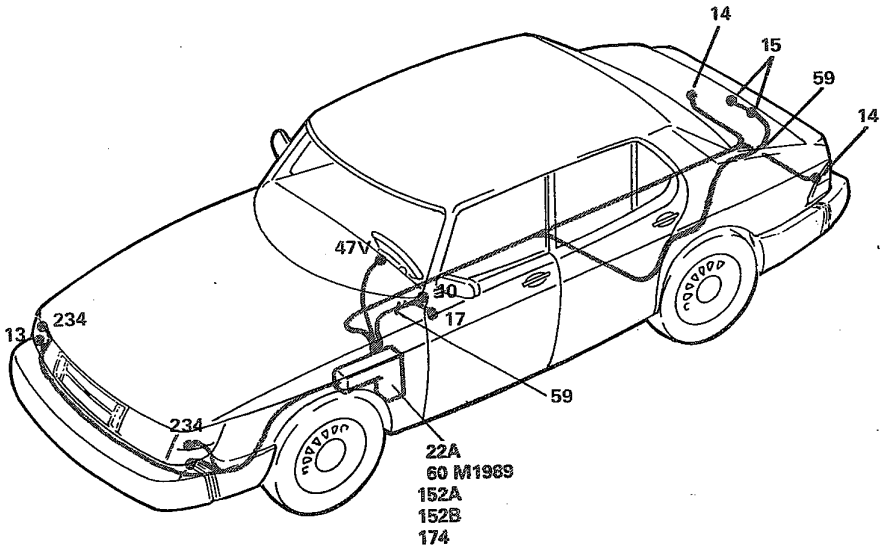
234 Side marker lights
in the front light clusters

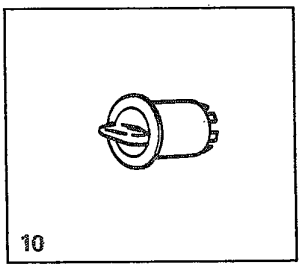
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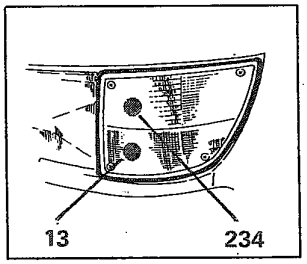
Components

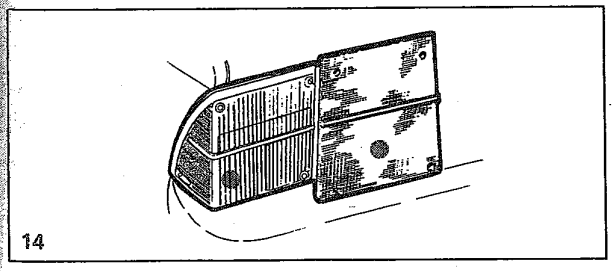
en-

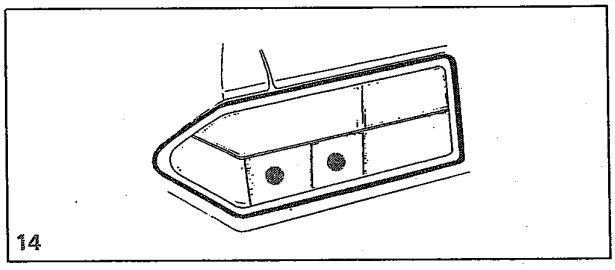






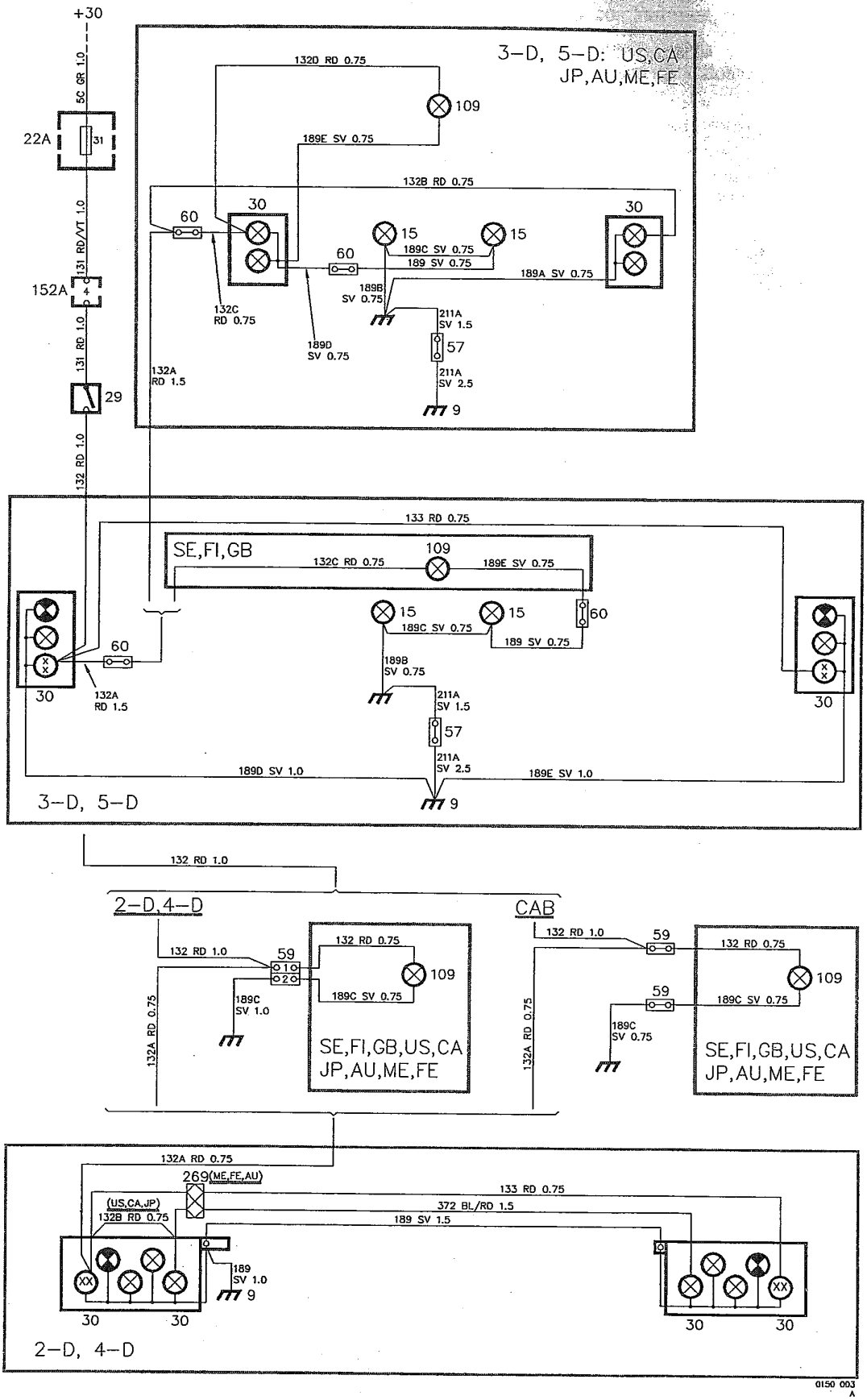






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Brake lights, 1989 model



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Operation

The supply to brake light switch 29 is taken from fuse 31, across the white 29-pole connector 152A. When the brakes are applied, the contacts will close and brake lamps 30 will be energised.

Depending on the market, one or two lamps (30) are used on each side for the brake lights. If two lamps are used, the second lamp is connected by means of cable 132A (3-D and 5-D) or cable 132B with connector 269 (2-D and 4-D).

European market

Cable 132A (3-D and 5-D) is not used and connector 269 (2-D and 4-D) is not fitted. Only one lamp on each side will light up when the brakes are applied. (The extra lamps are used for the rear fog lights instead.)

Cars for the SE, FI and GB markets are fitted with high-level brake light at the bottom of the rear window. On 3-D and 5-D cars, the brake light is connected across two single-pole connectors (one in the luggage compartment at the left-hand air outlet and one in the tailgate), whereas on the 2-D and 4-D models, it is connected across two-pole connector 59.

Australian, Middle East and Far East markets

Cable 132A (3-D and 5-D) is used. Connector 269 (2-D and 4-D) is fitted, and two lamps will therefore light up on each side of the car.

In addition, cars for these markets are equipped with high-level brake light 109 at the bottom of the rear window. On 3-D and 5-D cars, the brake light is connected to the left-hand light cluster in the tailgate by means of two single-pole connectors, whereas on the 2-D and 4-D models, it is connected across two-pole connector 59.

USA, Canadian and Japanese markets

On cars for these markets, cable 132A (3-D) and cable 138B (2-D and 4-D) is used, and two lamps thus light up on each side of the car.

In addition, cars for these markets are equipped with high-level brake light 109 at the bottom of the rear window. On 3-D cars, the brake light is connected to the left-hand light cluster in the tailgate by means of two single-pole connectors, whereas on the 2-D and 4-D models, it is connected across two-pole connector 59.

Convertible

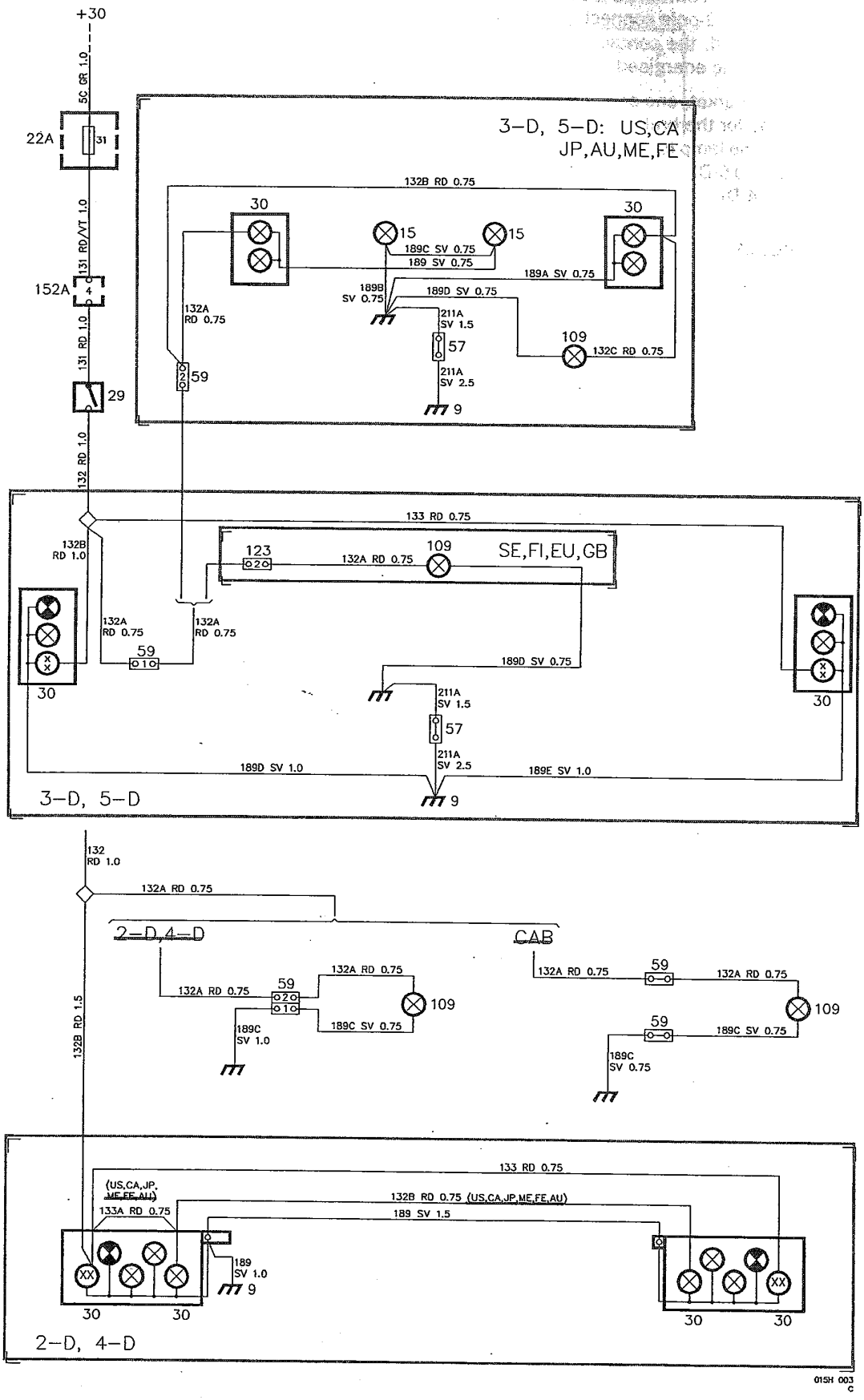
On the Convertible, high-level brake light 109 is located in the spoiler and is connected by means of two 2-pole connectors 59. The connectors are located at the left-hand hinge of the boot lid.

Fault-tracing hints

1. Check fuse 31 and check that the supply to it is live.
2. Check that the supply to brake light switch 29 is live.
3. Operate the brake light switch. Check the bulbs and check that the supplies to them are live. Check the earthing at each lamp.
4. Check the connectors, cable harnesses and earth connections.

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Brake lights, 1990 model



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Operation

The supply to brake light switch 29 is taken from fuse 31, across the white 29-pole connector 152A. When the brakes are applied, the contacts will close and brake lamps 30 will be energised.

Depending on the market, one or two lamps (30) are used on each side for the brake lights. If two lamps are used, the second lamp is connected by means of cable 132A (3-D and 5-D) or cable 132B and cable 133A (2-D and 4-D).

European market

Only one lamp on each side will light up when the brakes are applied. (The extra lamps are used for the rear fog lights instead.)

Cars for the SE, FI, EU and GB markets are fitted with high-level brake light at the bottom of the rear window. On 3-D and 5-D cars, the brake light is connected across a two-pole connector in the luggage compartment at the left-hand air outlet and a 4-pole connector in the tailgate, whereas on the 2-D and 4-D models, it is connected across two-pole connector 59.

Australian, Middle East, Far East, USA, Canadian and Japanese markets

On cars for these markets, two lamps will light up on each side of the car when the brakes are applied.

In addition, cars for these markets are equipped with high-level brake light 109 at the bottom of the rear window. On 3-D and 5-D cars, the brake light is connected to the right-hand light cluster in the tailgate, whereas on the 2-D and 4-D models, it is connected across two-pole connector 59.

Convertible

On the Convertible, high-level brake light 109 is located in the spoiler and is connected by means of two 2-pole connectors 59. The connectors are located at the left-hand hinge of the boot lid.

Fault-tracing hints

1. Check fuse 31 and check that the supply to it is live.
2. Check that the supply to brake light switch 29 is live.
3. Operate the brake light switch. Check the bulbs and check that the supplies to them are live. Check the earthing at each lamp.
4. Check the connectors, cable harnesses and earth connections.

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Locations of components

9 Earthing point in the luggage compartment

15 Number plate illumination
on the tailgate (3-D and 5-D)
on the rear sill (2-D and 4-D)

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

29 Brake light switch
at the brake pedal

30 Brake lamps
in the rear light clusters
on certain markets, also in the tailgate (3-D and 5-D)

57 3-pole connector (3-D and 5-D only)
in the luggage compartment, at the left-hand air outlet

59 2-pole connector
one in the boot, to the left, under the parcel shelf (2-D and 4-D)
two in the boot, at the left-hand boot lid hinge, behind the trim (Convertible)

59 2-pole connector (3-D and 5-D) (1990 model)
one in the luggage compartment, at the left-hand air outlet
one in the tailgate, on the left-hand side

60 Single-pole connector (3-D and 5-D only) (1989 model)
one in the luggage compartment, at the left-hand air outlet
two in the tailgate, at the left-hand light cluster (US, CA, JP, AU, ME, FE)
one in the tailgate, at the left-hand light cluster (SE, FI, GB)

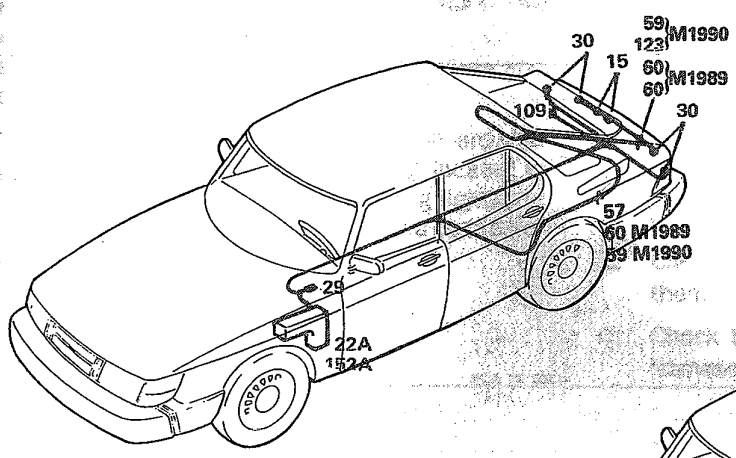
109 High-level brake light
at the bottom of the rear window
in the spoiler, on the boot lid (Convertible)

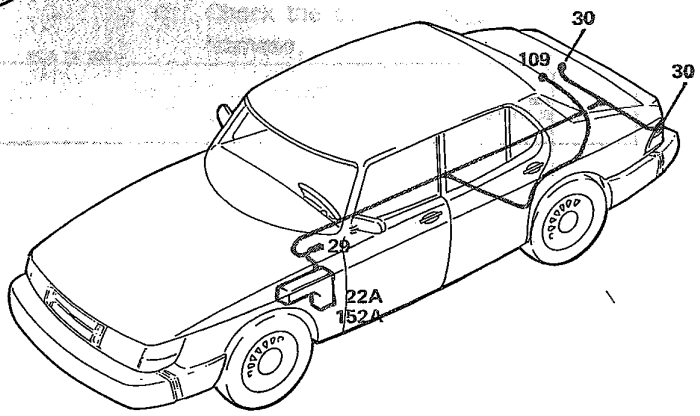
123 4-pole connector (3-D and 5-D) (1990 model)
in the tailgate, on the left-hand side

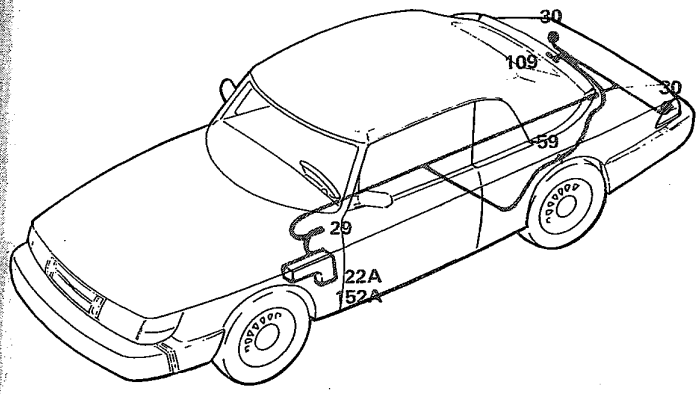
152A 29-pole white connector
in the electrical distribution box in the engine compartment on the left-hand wheel housing. The connector is accessible from the interior of the car.

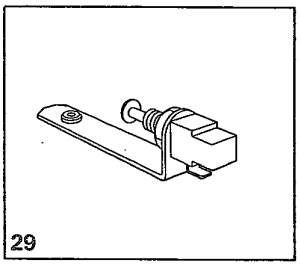
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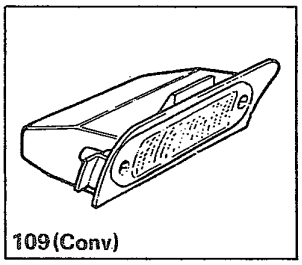
Components

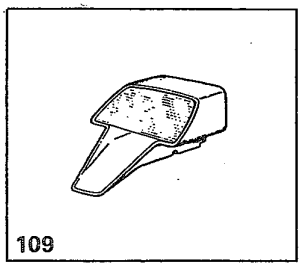


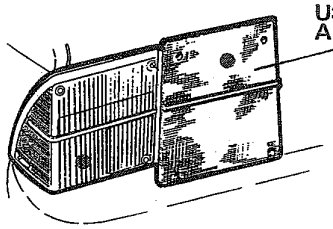




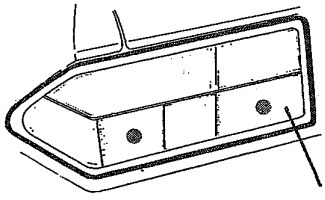

29


109 (Conv)


109



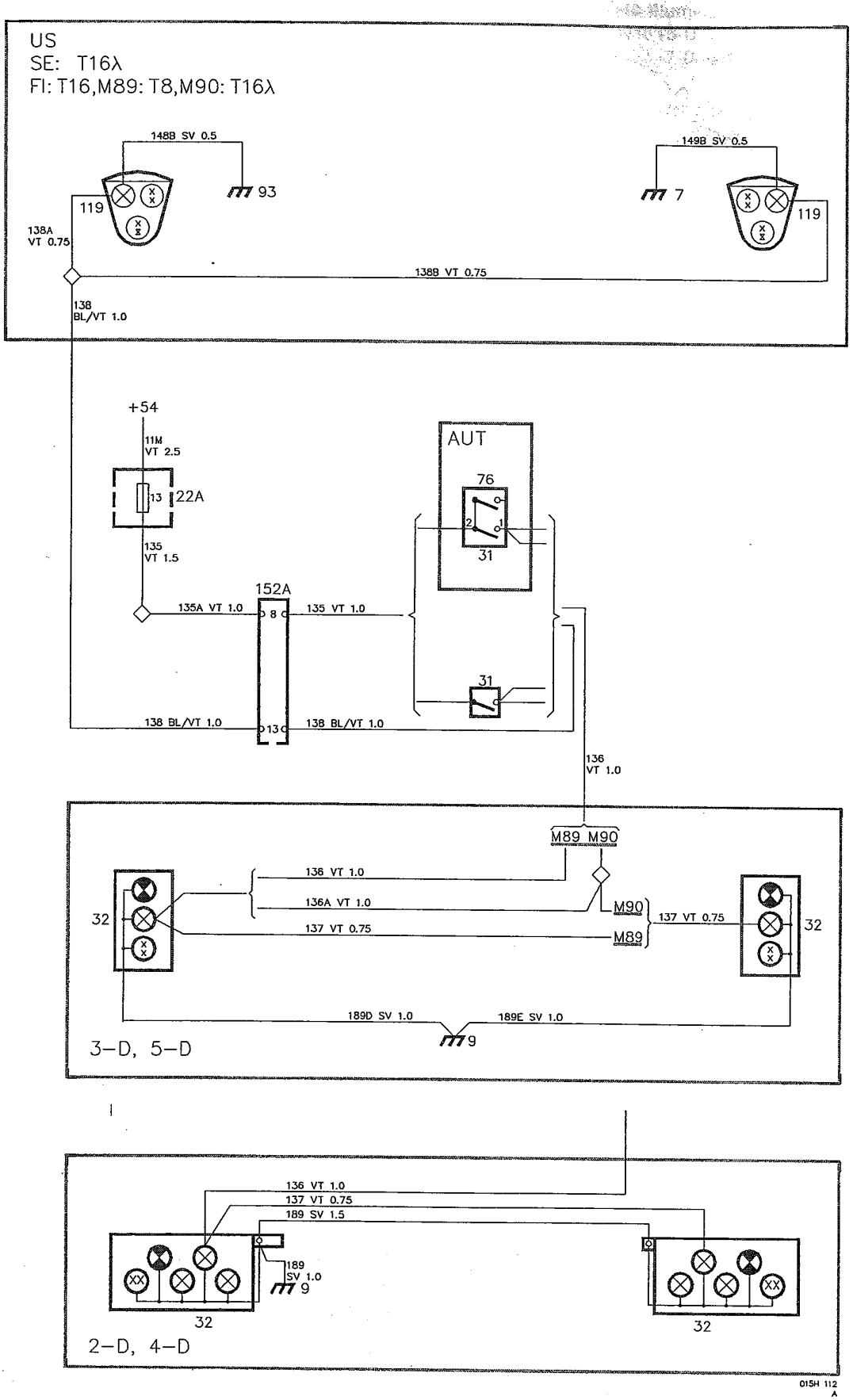
30



30

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Reversing lights



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Operation

The supply to reversing light switch 31 is taken from fuse 13, across 29-pole white connector 152A. When reverse gear is engaged, the contacts will close and reversing lamps 32 will light up.

Certain models destined for certain markets are also equipped with side reversing lights 119, located in the front light clusters. The side reversing lights are supplied from the reversing light switch via connector 152A.

Fault-tracing hints

The reversing lights are switched on when reverse gear is engaged and the ignition switch is in the drive position.

1. Check fuse 13 and check that the supply to it is live.
2. Check that the reversing light switch terminals are live.
3. Check the bulbs and check that the supplies to them are live. Check the earthing at each lamp.
4. Check the connectors and the relevant cable harness.

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Locations of components

7 Earthing point on the radiator cross-member

9 Earthing point in the luggage compartment

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

31 Reversing light switch
under the centre console, to the left of the selector lever

32 Reversing lamps
in the rear light clusters

76 Switch for raising the idling speed, auto. transm.
under the centre console, at the selector lever

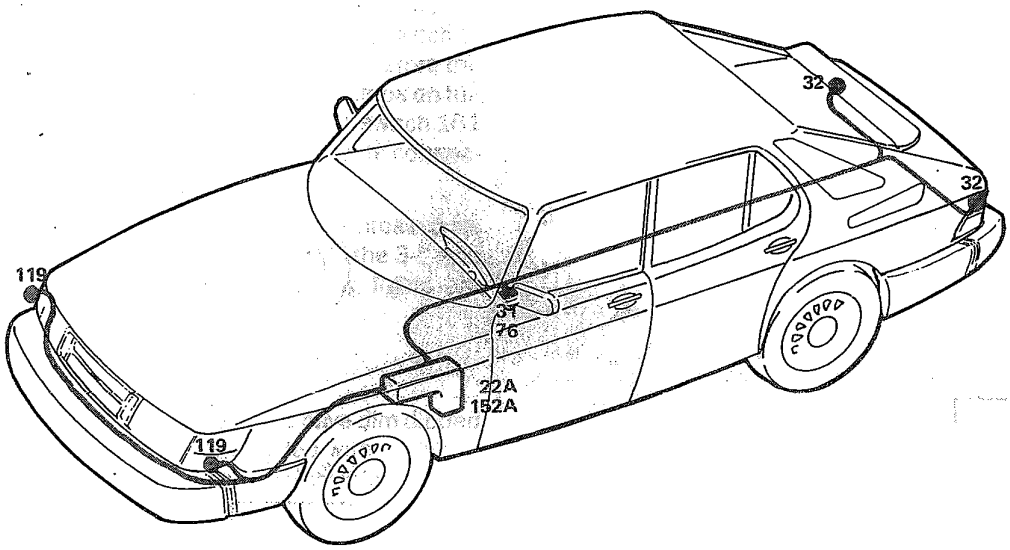
93 Earthing point on the left-hand wheel housing member

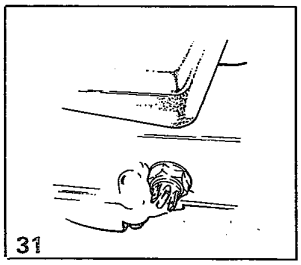
119 Side reversing lights
in the front light clusters

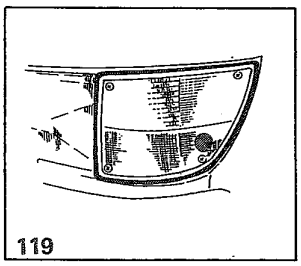
152A 29-pole white connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connector is accessible from the interior of the car

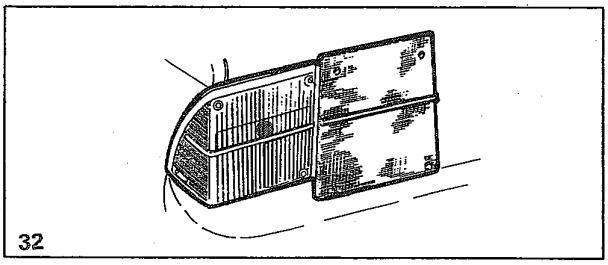
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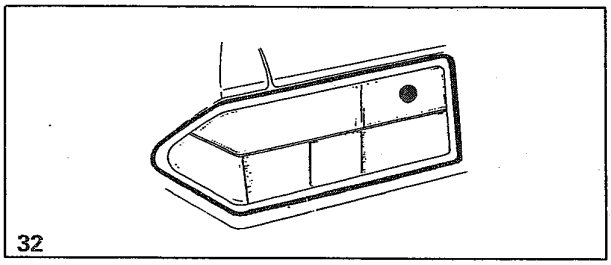
Components





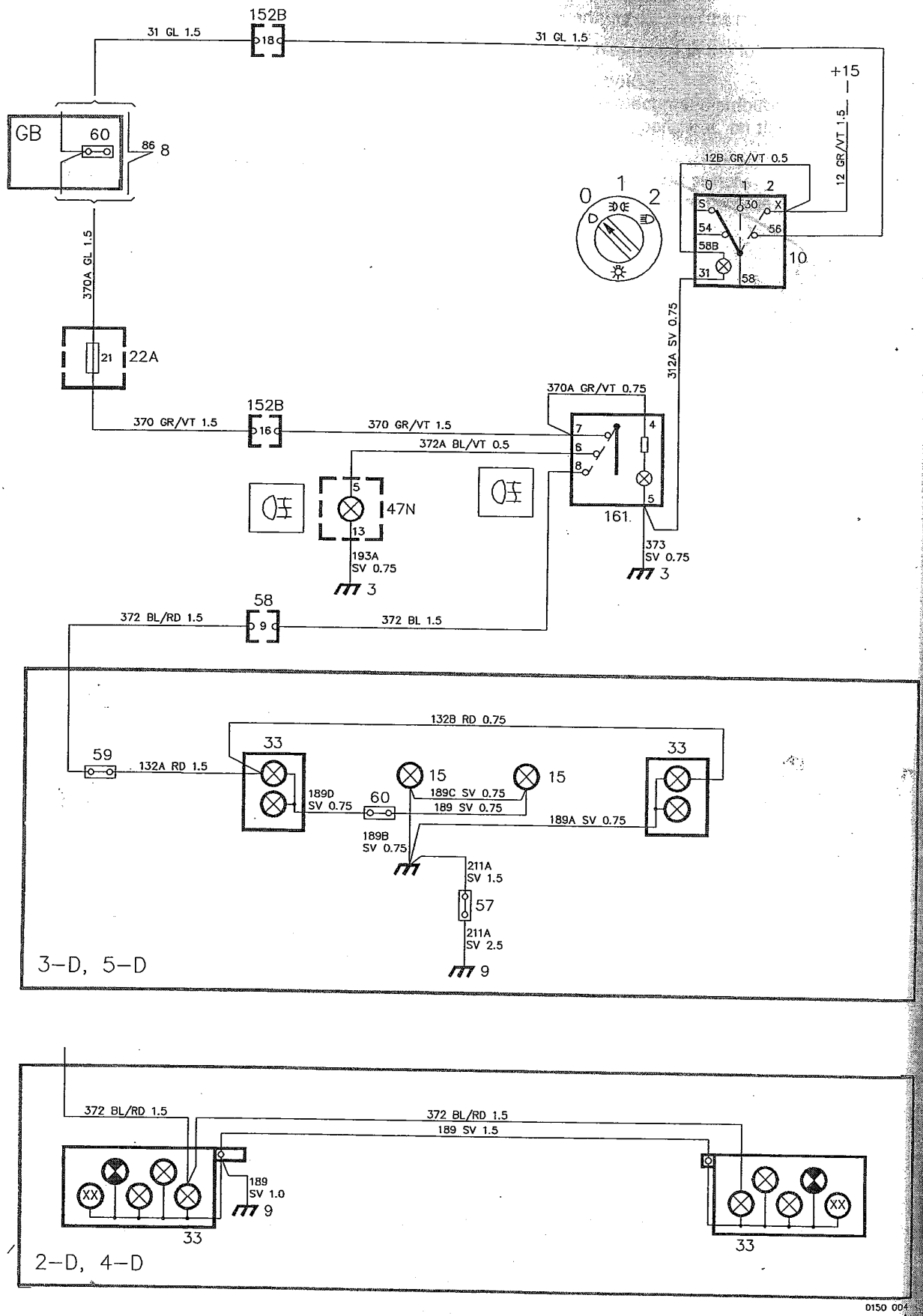






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Rear fog lights, 1989 model



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Operation

Cars for certain markets only, including the European market, are equipped with rear fog lights.

The supply (+15) is taken from the ignition switch to light switch 10. This must be in position 2 before the rear fog lights can be switched on (headlamps on full or dipped beam). The supply is then run to switch 161 for the rear fog lights across the red 29-pole connector 152B and fuse 21.

When the switch for the rear fog lights is pressed in, the two rear fog lights 33 will light up. On the 3-D and 5-D models, the lamps for the rear fog lights are located in the tailgate.

GB market

Cars delivered to the GB market also have dim dipped beams. These cars are also provided with a single-pole connector 60 in the electrical distribution box.

FI market

On cars for the FI market, only the left-hand rear fog light is connected.

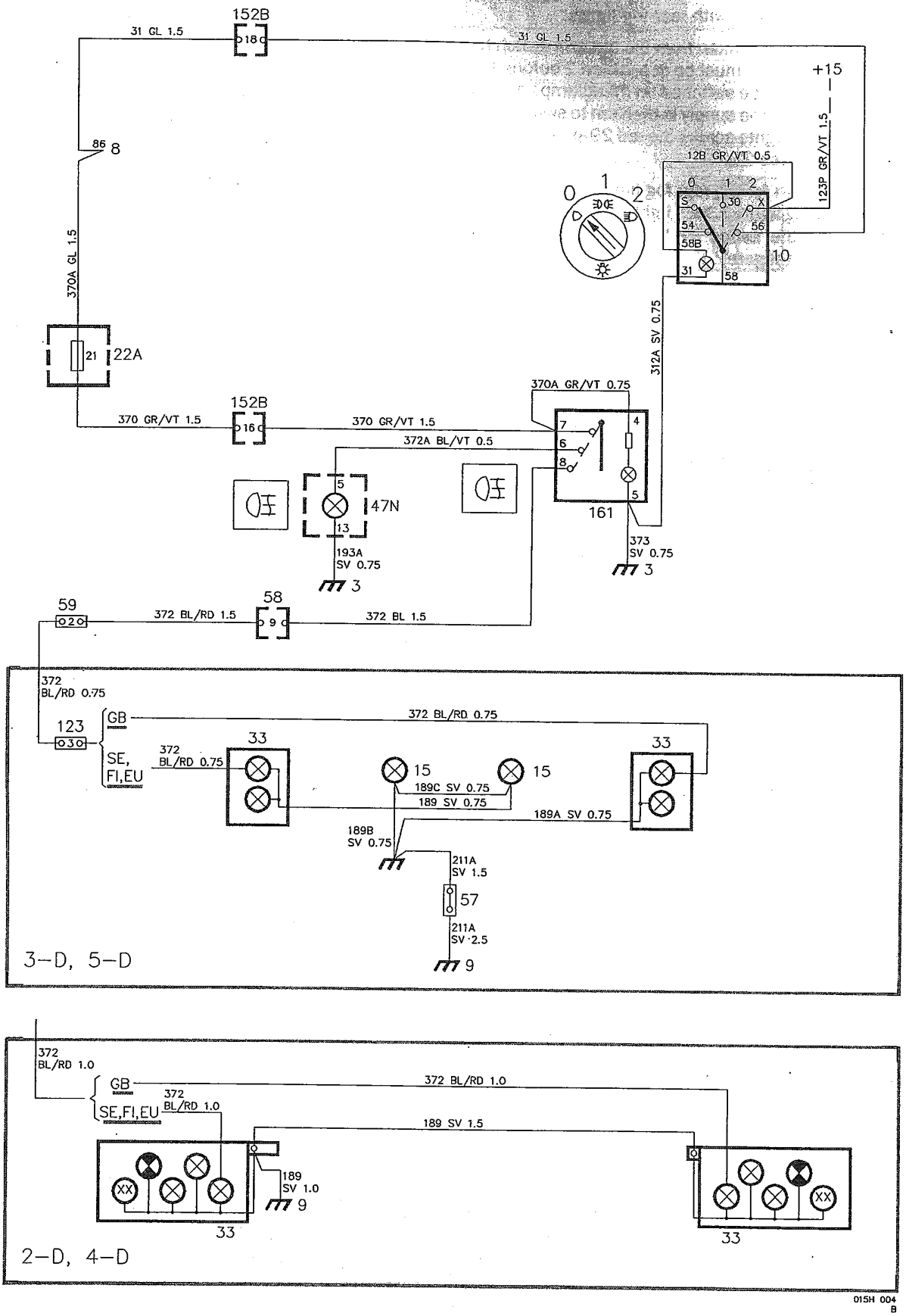
Fault-tracing hints

The rear fog lights can only be switched on when light switch 10 is in position 2 and the ignition switch is in the drive position.

1. Check fuse 21 and check that the supply to it is live.
2. Check the bulbs and check that the supplies to them are live. Check the earthing at each lamp.
3. Check the relevant cable harness.

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Rear fog lights, 1990 model



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Operation

Cars for certain markets only, including the European market, are equipped with rear fog lights.

The supply (+15) is taken from the ignition switch to light switch 10. This must be in position 2 before the rear fog lights can be switched on (headlamps on full or dipped beam). The supply is then run to switch 161 for the rear fog lights across the red 29-pole connector 152B and fuse 21.

When the switch for the rear fog lights is pressed in, the two rear fog lights 33 will light up. On the 3-D and 5-D models, the lamps for the rear fog lights are located in the tailgate.

GB market

Cars delivered to the GB market also have dim dipped beams. These cars are also provided with a single-pole connector 60 in the electrical distribution box.

FI market

On cars for the SE, FI and EU markets, only the left-hand rear fog light is connected. On cars for the GB market, only the right-hand rear fog light is connected.

Fault-tracing hints

The rear fog lights can only be switched on when light switch 10 is in position 2 and the ignition switch is in the drive position.

1. Check fuse 21 and check that the supply to it is live.
2. Check the bulbs and check that the supplies to them are live. Check the earthing at each lamp.
3. Check the relevant cable harness.

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Locations of components

3 Earthing point in the fascia

8 Lighting relay
in the electrical distribution box in the engine compartment, relay positions A and B

9 Earthing point in the luggage compartment

10 Light switch
on the left-hand side of the fascia

15 Number plate illumination
on the tailgate (3-D and 5-D)
on the rear sill (2-D and 4-D)

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

33 Rear fog lights
in the tailgate light clusters (3-D and 5-D)
in the rear light clusters (2-D and 4-D)

47N Rear fog light warning lamp
in the combined instrument in the fascia

57 3-pole connector (3-D and 5-D)
in the luggage compartment, at the left-hand air outlet

58 12-pole connector
on the angle bracket, under the fascia on the left-hand side (behind the knee shield)

59 2-pole connector
in the luggage compartment, at the left-hand air outlet (3-D and 5-D)

60 Single-pole connector (1989 model)
one in the luggage compartment, at the left-hand light cluster (3-D and 5-D)
one in the electrical distribution box, in the engine compartment, on the left-hand wheel housing (GB)

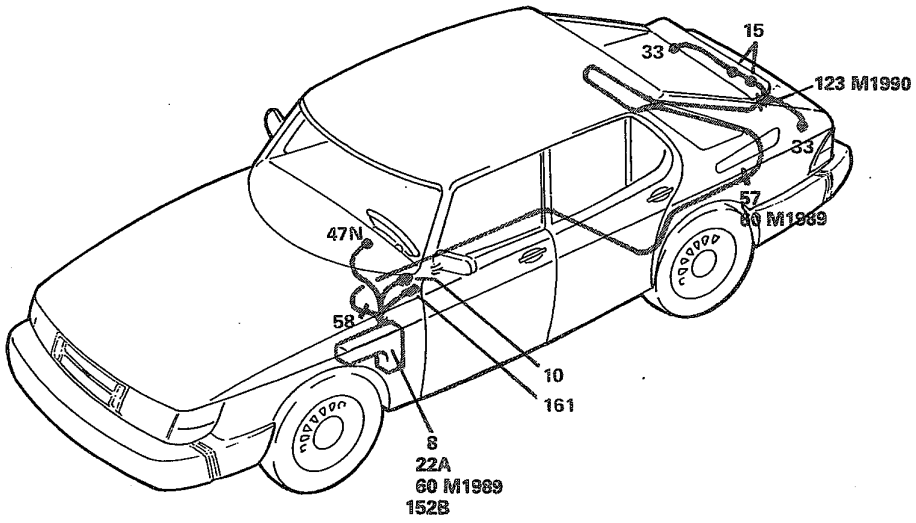
123 4-pole connector (3-D and 5-D) (1990 model)
in the luggage compartment, on the left-hand side

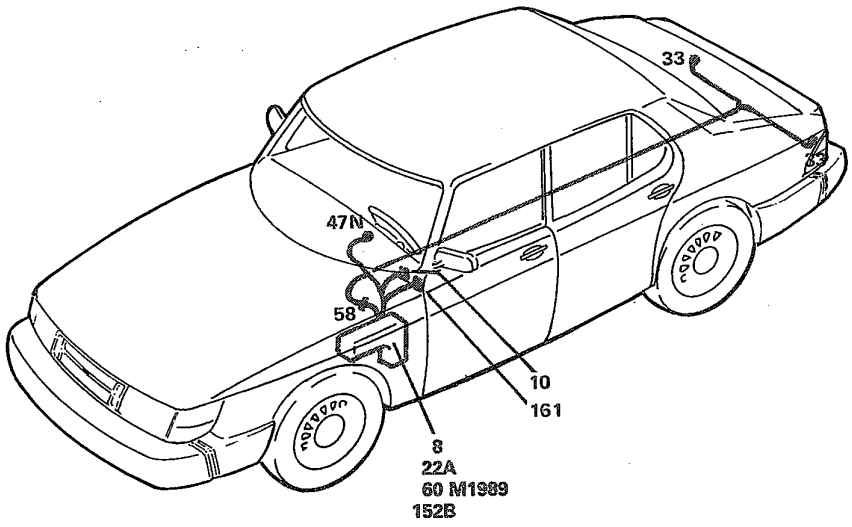
152B 29-pole red connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connector is accessible from the interior of the car.

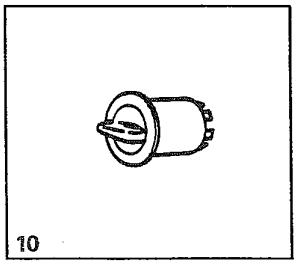
161 Switch for the rear fog lights
on the left-hand side of the fascia 137

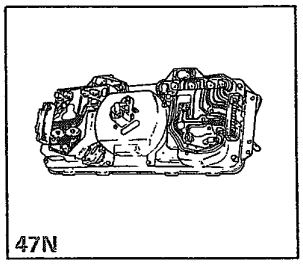
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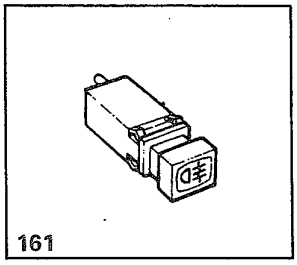
Components

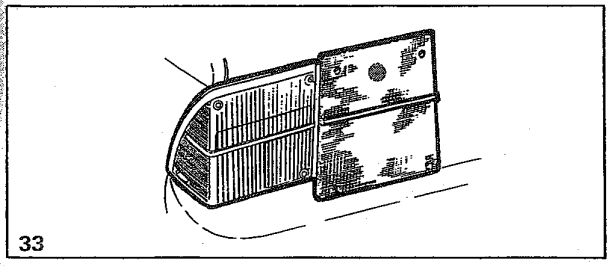


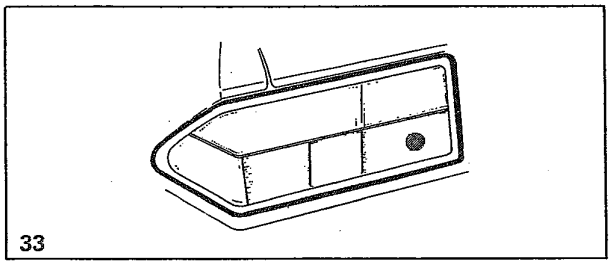






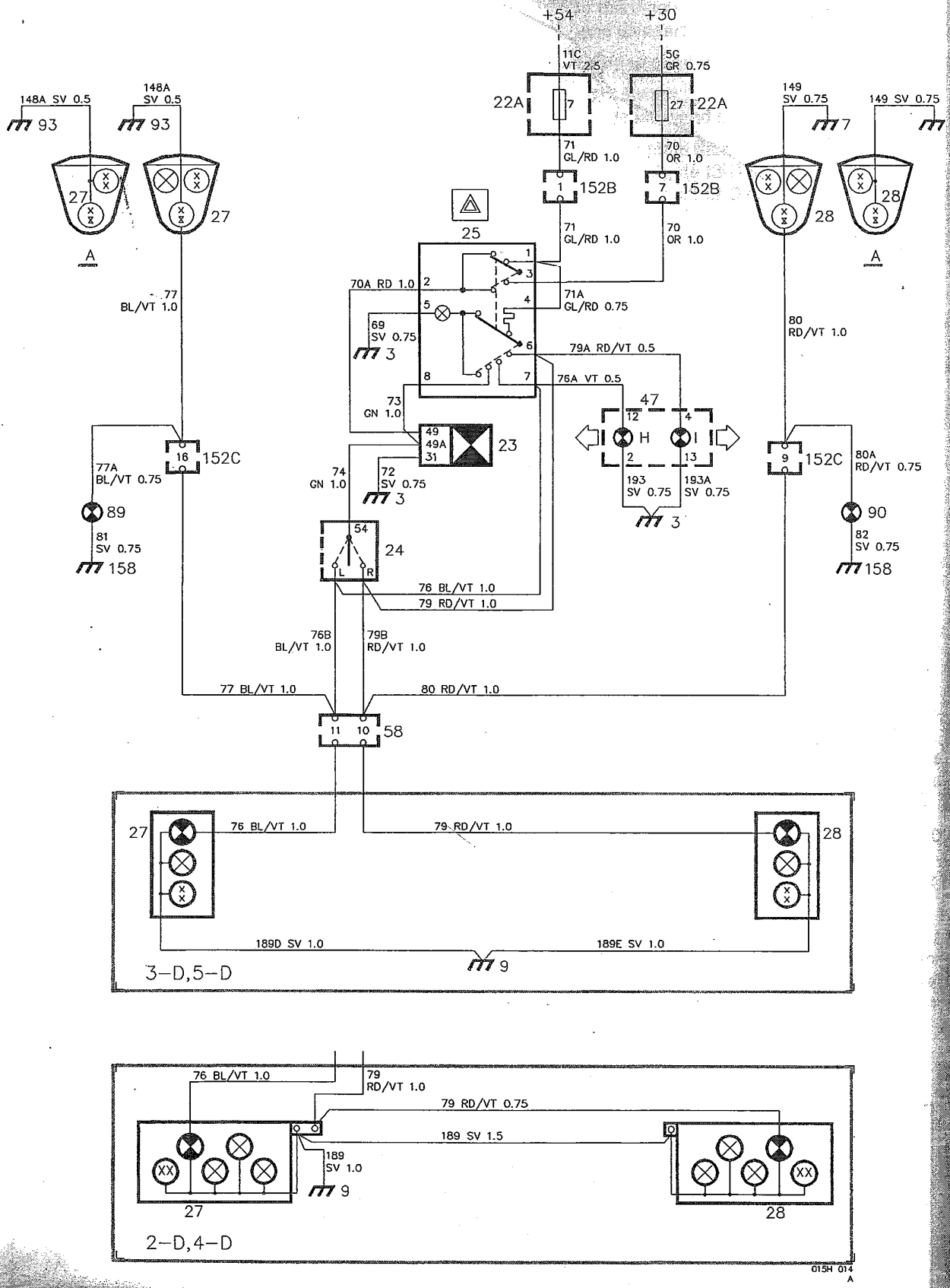






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Direction indicators, hazard warning lights – SE, FI, EU, GB, ME, FE, AU



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Operation

Direction indicators

Cars for the USA and Canadian markets and 1989 models for the Japanese market are covered in a separate section.

The supply is taken from fuse 7 to hazard warning light switch 25 via the red 29-pole connector 152B. It is then taken through this switch (in the unactuated position) to flasher relay 23.

When direction indicator stalk switch 24 is moved from the neutral position, current pulses will be supplied from flasher relay 23 to left-hand direction indicator lamps 27 or right-hand direction indicator lamps 28 (terminal L or R), via connector 58, and pin 11 (left) or pin 10 (right). The front lamps are also supplied via the black 29-pole connector 152C.

In addition, the two direction indicator warning lamps, 47H (left) and 47I (right) are connected in parallel with the direction indicator lamps for the respective side of the car.

Side direction indicators 89 and 90 are located on the left-hand and right-hand front wings respectively. The lamps are supplied in parallel with the direction indicator lamps in the front light clusters.

Light fittings marked "A" are for cars without integrated bumpers.

Hazard warning lights

The supply is taken from fuse 27 to hazard warning light switch 25 via the red 29-pole connector 152B. When this switch is depressed, current is supplied to flasher relay 23 via terminal 2.

From the flasher relay, the current pulses return to switch 25. Since the switch is closed, the current pulses continue to terminals 7 (left-hand) and 6 (right-hand). Current pulses will be obtained only when the flasher relay is energised.

Front and rear left-hand direction indicator lamps 27 are then supplied with current pulses via terminal L of direction indicator stalk switch 24, across pin 11 of connector 58.

Lamps 28 on the right-hand side of the car are supplied in the same way from terminal R of direction indicator stalk switch 24, across pin 10 of connector 58.

The two direction indicator warning lamps 47H (left-hand) and 47I (right-hand) will also flash.

Since switch 25 is closed, the lamp in the switch will also flash.

Fault-tracing hints

Direction indicators

The direction indicators are operative when the ignition switch is in the drive position.

1. Check fuse 7 and check that the supply to it is live.
2. Check that terminals 1 and 2 of hazard warning light switch 25 are live.
3. Check that terminals 49 and 49A of flasher relay 23 are live.
4. Check that terminal 54 of direction indicator stalk switch 24 is live.
5. Operate the direction indicator stalk switch. Check the bulbs and check that the supply to them is live.
6. Check the relevant cable harness and earth connections.

Hazard warning lights

The supply to the hazard warning lights is always live.

1. Check fuse 27 and check that the supply to it is live.
2. Check that the supply to hazard warning light switch 25 is live.
3. Press the switch and check that terminal 2 is live.
4. Check that terminals 49 and 49A of flasher relay 23 are live.
5. Check the bulbs and check that the supply to them is live.
6. Check the connectors, cable harnesses and earth connections.

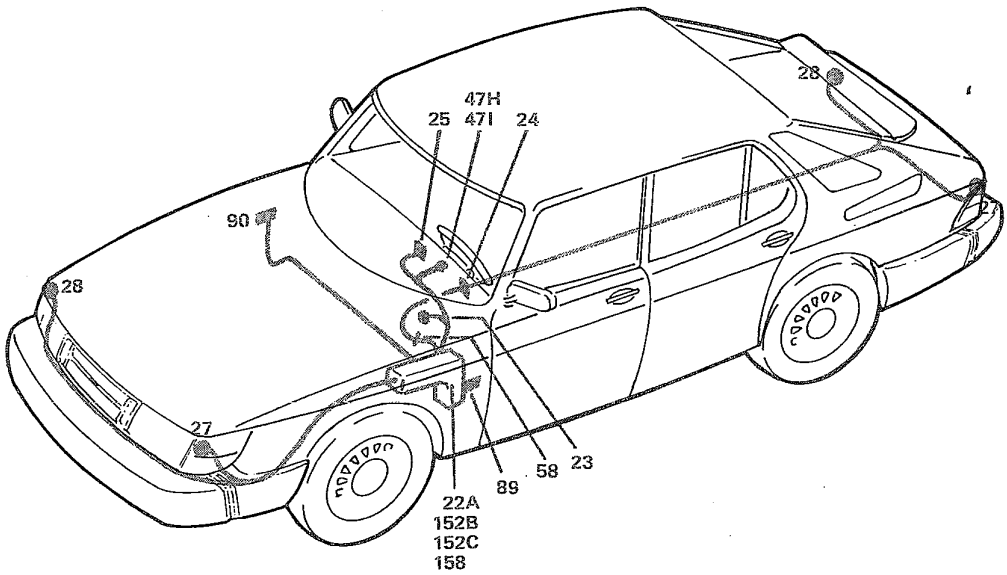
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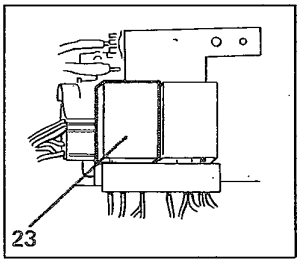
Locations of components

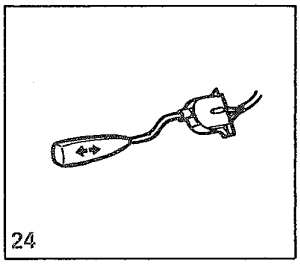
3	Earthing point in the fascia
7	Earthing point on the radiator cross-member
9	Earthing point in the luggage compartment
22A	Fuse holder in the electrical distribution box, in the engine compartment, on the left-hand wheel housing
23	Flasher relay under the fascia on the left-hand side, behind the knee shield
24	Direction indicator stalk switch on the left-hand side of the steering column
25	Hazard warning light switch on the right-hand side of the fascia
27	Direction indicator lamps, left-hand in the front and rear light clusters on left-hand side of the car
28	Direction indicator lamps, right-hand in the front and rear light clusters on the right-hand side of the car
47H	Left-hand direction indicator warning lamp in the combined instrument in the fascia
47I	Right-hand direction indicator warning lamp in the combined instrument in the fascia
58	12-pole connector on the angle bracket, under the fascia on the left-hand side (behind the knee shield)
89	Side direction indicator, left-hand on the left-hand front wing
90	Side direction indicator, right-hand on the right-hand front wing
93	Earthing point on the left-hand wheel ho ing member
152B 152C	29-pole red connector 29-pole black connector in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car.
158	Negative distribution terminal in the electrical distribution box in the engine compartment, on the left-hand wheel housing 141

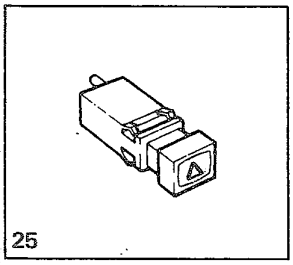
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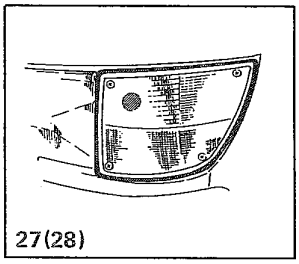
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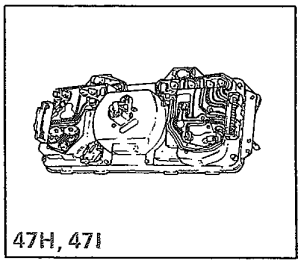


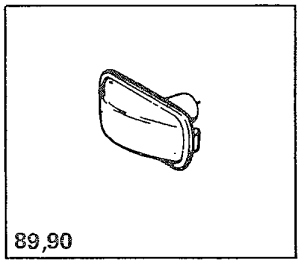


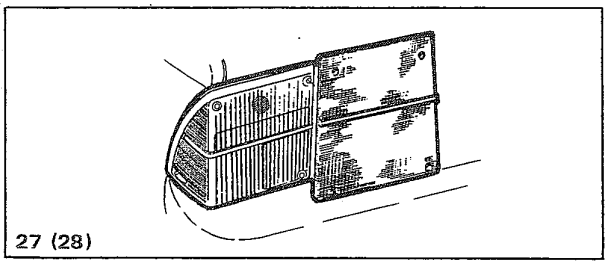


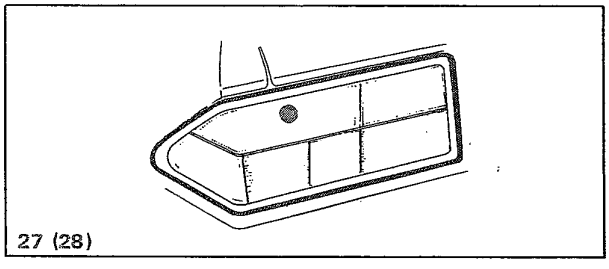






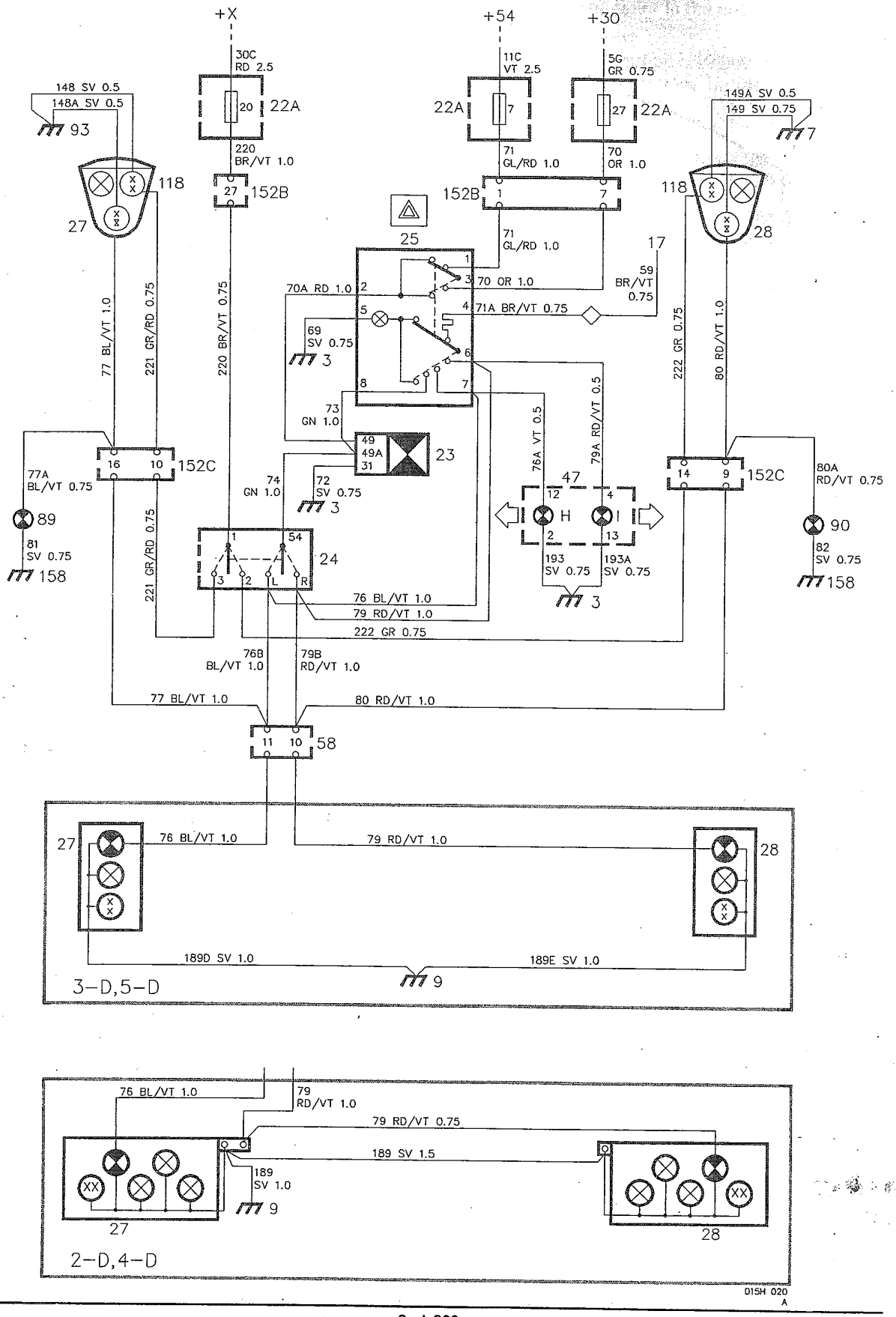






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Direction indicators, hazard warning lights – US, CA and 1989 JP



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Operation

Direction indicators

This section covers only cars for the USA and Canadian markets and 1989 models for the Japanese market.

The supply is taken from fuse 7 to hazard warning light switch 25 via the red 29-pole connector 152B. It is then taken through this switch (in the unactuated position) to flasher relay 23.

When direction indicator stalk switch 24 is moved from the neutral position, current pulses will be supplied from flasher relay 23 to left-hand direction indicator lamps 27 or right-hand direction indicator lamps 28 (terminal L or R), via connector 58, and pin 11 (left) or pin 10 (right). The front lamps are also supplied via the black 29-pole connector 152C.

In addition, the two direction indicator warning lamps, 47H (left) and 47I (right) are connected in parallel with the direction indicator lamps for the relevant side of the car.

The front light clusters of cars for these markets are also equipped with corner lights 118, which light up with a steady white light when the corresponding direction indicator flashes. The corner lights are is supplied directly from fuse 20 (not through the flasher relay). Fuse 20 is live when the ignition switch is in the parked or drive position.

The respective lamp 118 is supplied from terminal 3 (left-hand) or 2 (right-hand) of direction indicator stalk switch 24, via the black 29-pole connector 152C.

Side direction indicators 89 and 90 are located on the left-hand and right-hand front wings respectively. The lamps are supplied in parallel with the direction indicator lamps in the front light clusters.

Hazard warning lights

The supply is taken from fuse 27 to hazard warning light switch 25 via the red 29-pole connector 152B. When this switch is depressed, current will be supplied to flasher relay 23 via terminal 2.

From the flasher relay, the current pulses return to switch 25. Since the switch is closed, the current pulses continue to terminals 7 (left-hand) and 6 (right-hand). Current pulses will be obtained only when the flasher relay is energised.

Front and rear left-hand direction indicator lamps 27 are then supplied with current pulses via terminal L of direction indicator stalk switch 24, across pin 11 of connector 58.

Lamps 28 on the right-hand side of the car are supplied in the same way from terminal R of direction indicator switch 24, across pin 10 of connector 58. The two direction indicator warning lamps 47H (left-hand) and 47I (right-hand) will also flash. Since switch 25 is closed, the lamp in the switch will also flash.

Fault-tracing hints

Direction indicators

The direction indicators are operative when the ignition switch is in the drive position.

1. Check fuse 7 and check that the supply to it is live.
2. Check that terminals 1 and 2 of hazard warning light switch 25 are live.
3. Check that terminals 49 and 49A of flasher relay 23 are live.
4. Check that terminal 54 of direction indicator stalk switch 24 is live.
5. Operate the direction indicator stalk switch. Check the bulbs and check that the supply to them is live.
6. Check the relevant cable harness and earth connections.

Hazard warning lights

The supply to the hazard warning lights is always live.

1. Check fuse 27 and check that the supply to it is live.
2. Check that the supply to hazard warning light switch 25 is live.
3. Press the switch and check that terminal 2 is live.
4. Check that terminals 49 and 49A of flasher relay 23 are live.
5. Check the bulbs and check that the supply to them is live.
6. Check the connectors, cable harnesses and earth connections.

To check the corner lights

Activate this system by turning the ignition switch to the drive position.

1. Check fuse 20 and check that the supply to it is live.
2. Check that terminal 1 of switch 24 is live.
3. Operate the direction indicator stalk switch. Check the bulbs and check that the supply to them is live.
4. Check the relevant cable harness and earth connections.

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Locations of components

3 Earthing point in the fascia

7 Earthing point on the radiator cross-member

9 Earthing point in the luggage compartment

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

23 Flasher relay
under the fascia on the left-hand side, behind the knee shield

24 Direction indicator stalk switch
on the left-hand side of the steering column

25 Hazard warning light switch
on the right-hand side of the fascia

27 Direction indicator lamps, left-hand
in the front and rear light clusters on the left-hand side of the car

28 Direction indicator lamps, right-hand
in the front and rear light clusters on the right-hand side of the car

47H Left-hand direction indicator warning lamp
in the combined instrument in the fascia

47I Right-hand direction indicator warning lamp
in the combined instrument in the fascia

58 12-pole connector
on the angle bracket, under the fascia on the left-hand side (behind the knee shield)

89 Side direction indicator, left-hand
on the left-hand front wing

90 Side direction indicator, right-hand
on the right-hand front wing

93 Earthing point on the left-hand wheel housing member

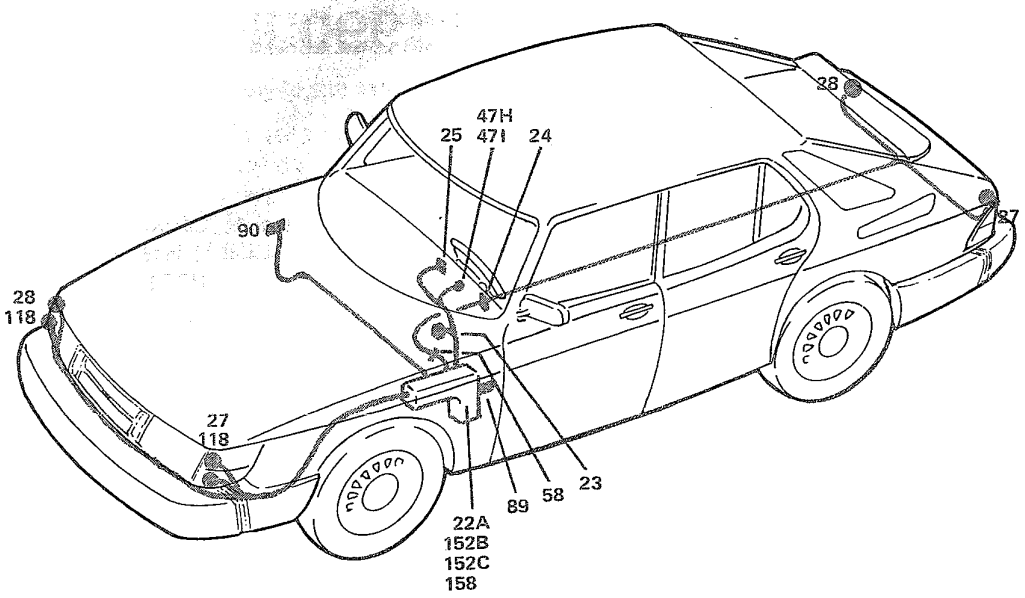
118 Corner lights
in the front light clusters

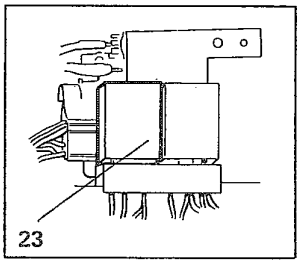
152B 29-pole red connector
152C 29-pole black connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car

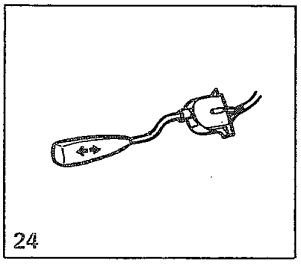
158 Negative distribution terminal
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

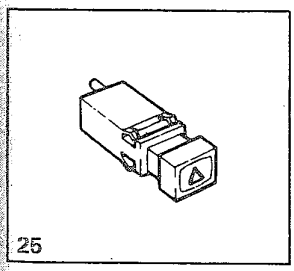
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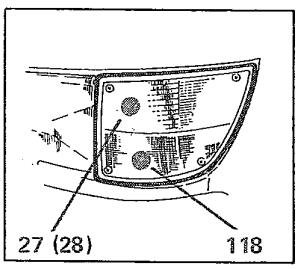
Components

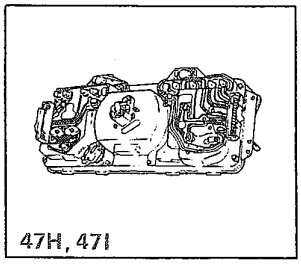


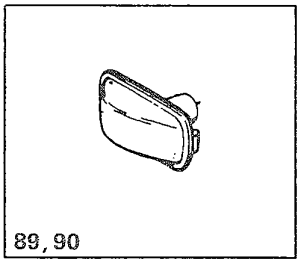

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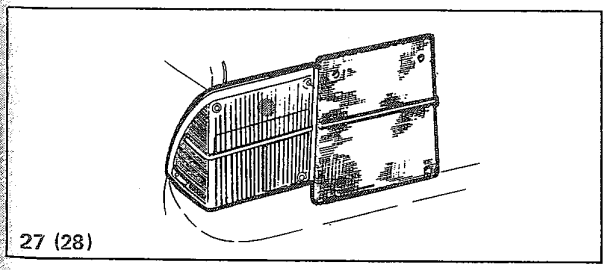

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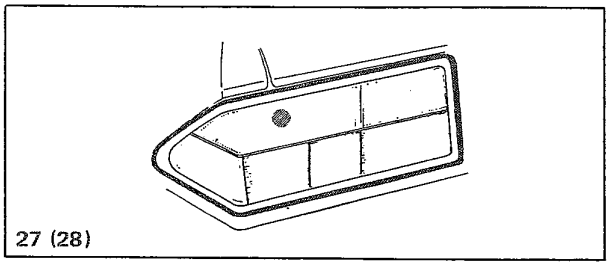

25


27 (28) 118


47H, 47I


89, 90

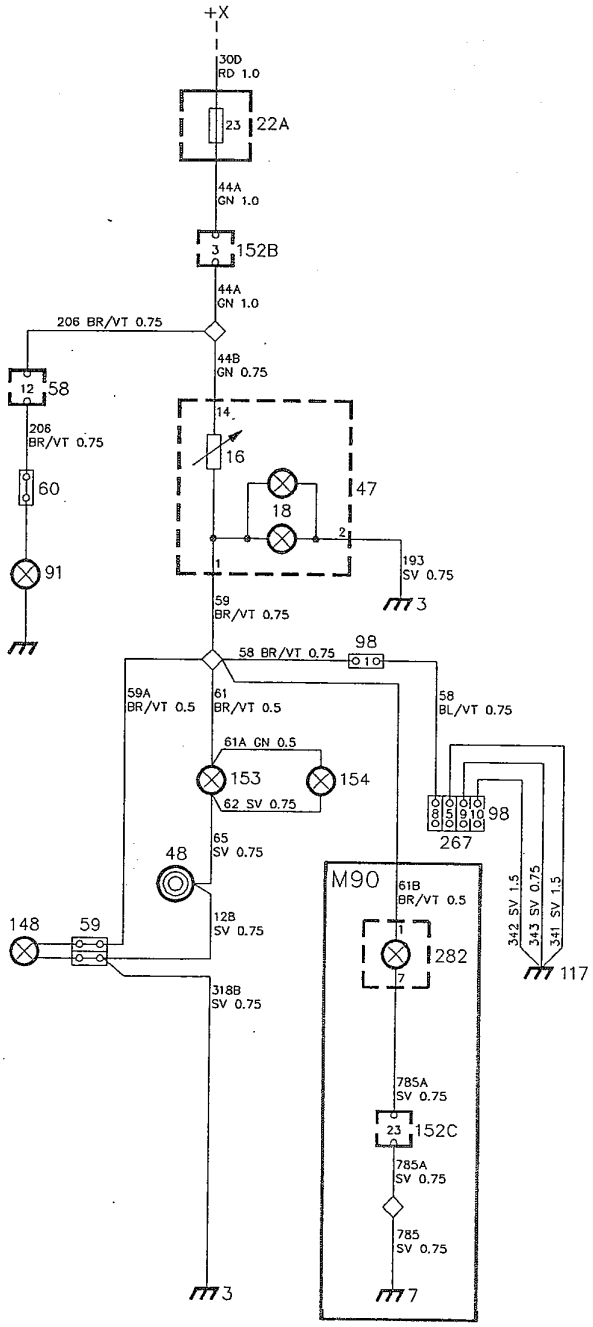

27 (28)


27 (28)

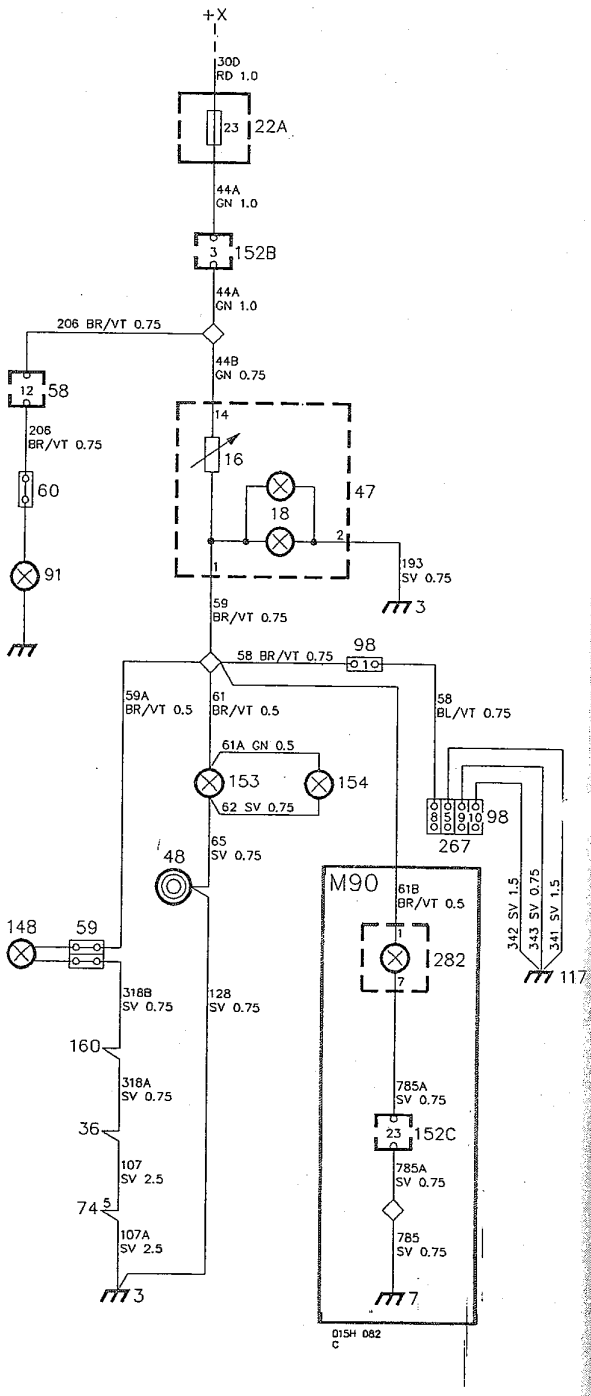
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Lighting for controls – SE, FI, EU, GB, ME, FE, AU and 1990 JP

SE, FI, EU, ME, M90: JP



GB, FE, AU



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Operation

There are several market versions of the lighting for the controls. This section covers all markets except the USA and Canada, and the 1989 models for Japan.

The diagram shows the supply to the switches, etc. on cars with built-in lamps.

Rheostat 16

When the ignition switch is in the parked, drive or start position, rheostat 16 will be supplied via the red 29-pole connector 152B and fuse 23.

The brightness of the following instrument lighting can be steplessly adjusted by means of rheostat 16 in combined instrument 47:

18 Combined instrument lighting
148 Ashtray illumination
153 Lighting for the cigarette lighter
154 Lighting for the heater controls
[illegible]2 Headlamp beam control lighting (1990 model)

Switches on the centre console

If the car is equipped with electric windows, the brightness of the built-in lamps in the electric window regulator switches will remain constant.

For particulars of the wiring, see the section entitled "Electric window regulators".

162 Switch for driver's door electric window regulator
163 Switch for co-driver's door electric window regulator
189 Switch for the rear-door electric window regulators
190 Switch for left-hand rear electric window regulator
190A Switch for left-hand rear electric window regulator
191 Switch for right-hand rear electric window regulator
191A Switch for right-hand rear electric window regulator

(190A and 191A are located in the respective rear door.)

Switch 181 for the electrically operated sunroof (or Convertible top) and gear indicating light 91 (on cars with automatic transmission) are also supplied via fuse 23.

Other switches

When the ignition switch is in the drive position, the lamps in the following switches will be supplied (+54) via a resistor in the corresponding switch, which reduces the brightness of the light. When the switch is depressed, the resistor will be by-passed, and the lamp will light up with full brightness.

25 Hazard warning light switch
116 Switch for the electrically heated rear window
143 Recirculation switch, AC
169 AC switch
252 Driver's seat heating rheostat (not via resistor)

For particulars of the wiring for the lighting in these switches, see the section dealing with the corresponding function.

In addition, the dial lighting for the radio (267) connected to connector 98 is adjusted via rheostat 16.

Fault-tracing hints

1. Check the appropriate fuses and check that the supply to them is live.
2. Check the bulbs and check that the supply to them is live.
3. Check the connectors, cable harnesses and earth connections.

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Locations of components

3 Earthing point in the fascia

7 Earthing point on the radiator cross-member (1990 model)

16 Instrument lighting rheostat
in the combined instrument

18 Combined instrument lighting
in the combined instrument on the fascia

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

25 Hazard warning light switch
on the right-hand side of the fascia

36 Motor for the ventilation fan
behind the right-hand speaker grille

47 Combined instrument
on the fascia

48 Cigarette lighter
on the fascia

58 12-pole connector
on the angle bracket, under the fascia, to the left of the steering column (behind the knee shield)

59 2-pole connector
on the fascia, behind the cigarette lighter

60 Single-pole connector
between the front seats, under the front section of the centre console

74 Resistor for ventilation fan
accessible under the left-hand speaker grille

91 Gear indicating light
between the front seats, at the gear selector (auto.)

98 10-pole connector (for radio 267)
one in the fascia, behind the panel for the radio
one to the left of the steering column, behind the fascia knee shield

116 Switch for the electrically heated rear window
on the fascia

117 Earthing point
between the ignition switch and the handbrake lever

143 Recirculation switch, AC
on the fascia

148 Ashtray illumination
on the fascia, in the ashtray

152B 29-pole red connector
152C 29-pole black connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car

153 Lighting for the cigarette lighter
on the fascia, at the cigarette lighter

154 Lighting for heater controls
on the fascia, at the respective heater control

160 Switch for glove compartment illumination
on the right-hand side of the glove compartment

162 Switch for driver's door electric window regulator
between the front seats, on the centre console

163 Switch for co-driver's door electric window regulator
between the front seats, on the centre console

169 Switch, AC
on the fascia

181 Switch for the electrically operated sunroof (or Convertible top)
between the front seats, at the front of the centre console

189 Switch for the rear-door electric window regulators
between the front seats, on the centre console

190 Switch for left-hand rear electric window regulator
between the front seats, on the centre console

190A Switch for left-hand rear electric window regulator
in the left-hand rear door

191 Switch for right-hand rear electric window regulator
between the front seats, on the centre console

191A Switch for right-hand rear electric window regulator
in the right-hand rear door

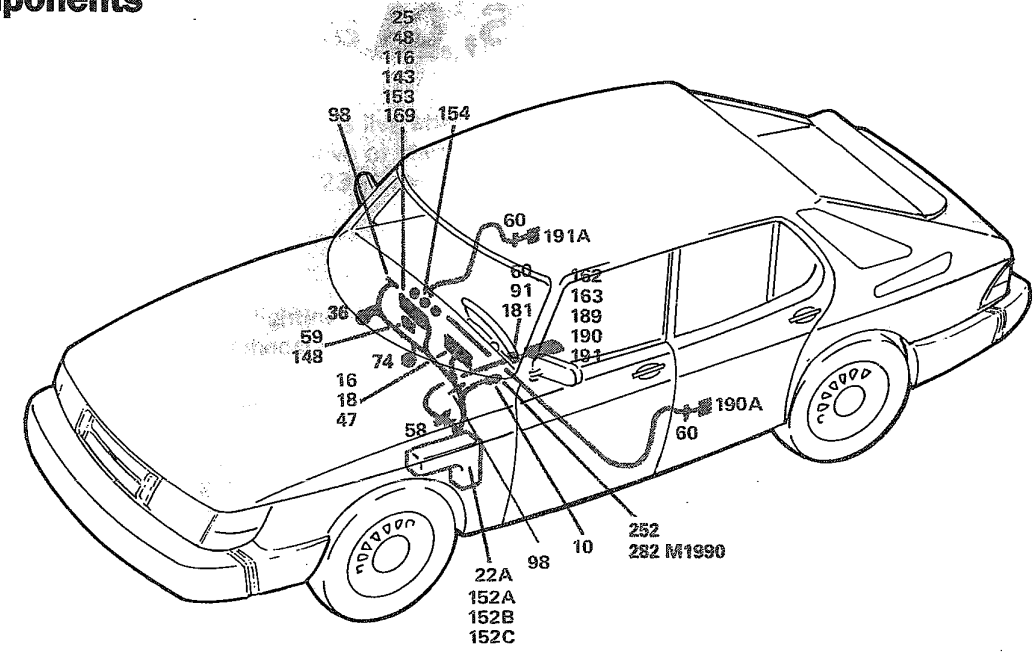
252 Driver's seat heating rheostat
on the fascia

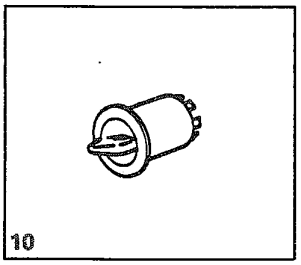
267 Radio connector
one in the fascia, behind the radio panel

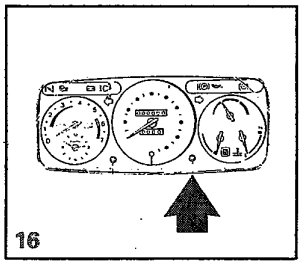
282 Headlamp beam control switch (1990 model)
on the fascia

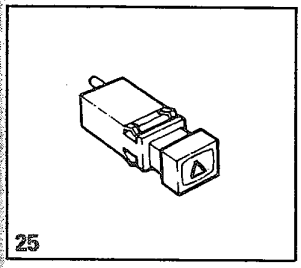
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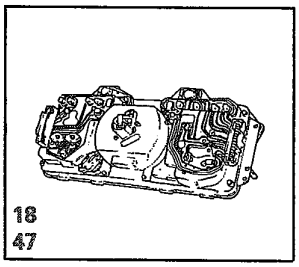
Components

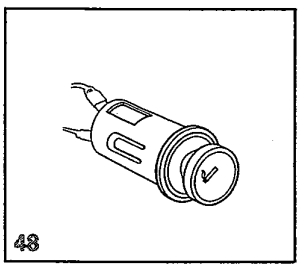


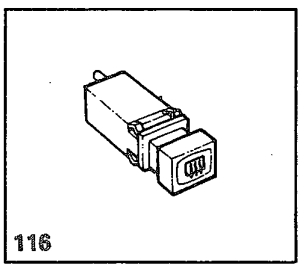

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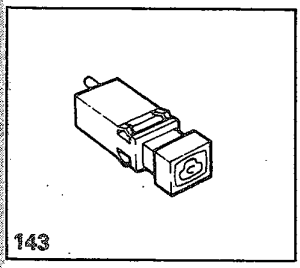

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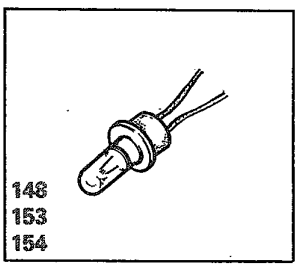

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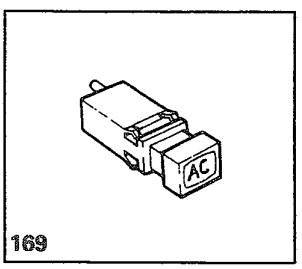

18
47

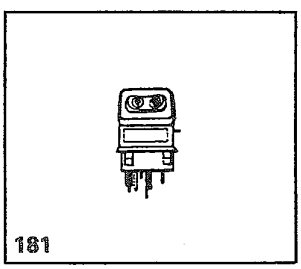

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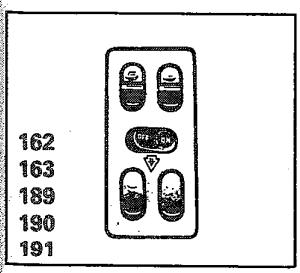

116

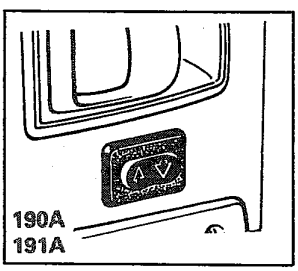

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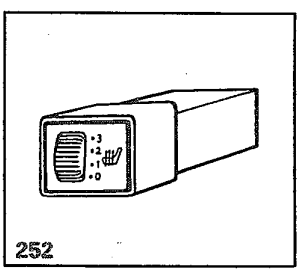

148
153
154

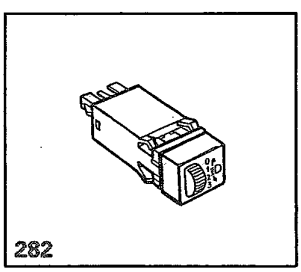

169


181


162
163
189
190
191

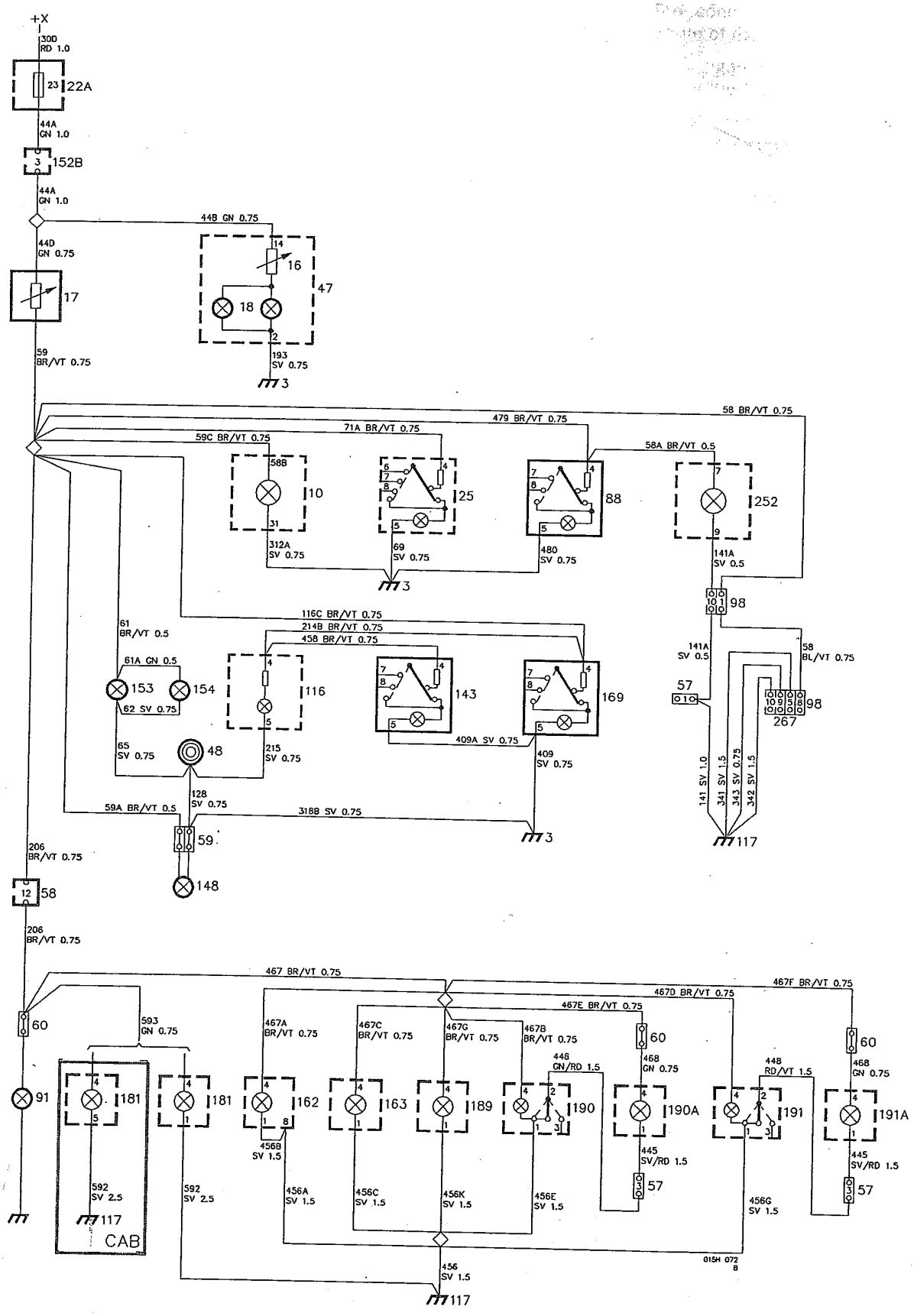

190A
191A


252


282

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Lighting for controls – US, CA and 1989 for JP



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Operation

The diagram shows the supply to the switches, etc. which have built-in lamps.

The supply to rheostats 16 and 17 is live when the ignition switch is in the parked, drive or start position. The supply is taken from fuse 23 across the red 29-pole connector 152B.

Rheostat 16

The brightness of instrument lighting 18 can be steplessly adjusted by means of rheostat 16 in combined instrument 47.

Rheostat 17

In addition, the following instrument lighting can be controlled by means of rheostat 17:

Switches and lighting on the centre console

91	Gear indicating light (cars with automatic transmission)
162	Switch for driver's door electric window regulator
163	Switch for co-driver's door electric window regulator
181	Switch for the electrically operated sunroof (or Convertible top)
189	Switch for the rear-door electric window regulators
190	Switch for left-hand rear electric window regulator
190A	Switch for left-hand rear electric window regulator
191	Switch for right-hand rear electric window regulator
191A	Switch for right-hand rear electric window regulator

Switches and lighting on the fascia

10	Light switch
25	Hazard warning light switch
88	Switch for extra fog lamps
116	Switch for the electrically heated rear window
143	Recirculation switch, AC
148	Ashtray illumination
153	Lighting for the cigarette lighter
154	Lighting for the heater controls
169	Switch, AC
252	Driver's seat heating rheostat (not via resistor)

For particulars of the wiring for the lighting in these switches, see the section dealing with the corresponding function.

In addition, the dial lighting for the radio (267) connected to connector 98 is adjusted via rheostat 16.

Fault-tracing hints

The supply to the lighting for the controls is live when the ignition switch is in the parked, drive or start position.

1. Check fuse 23 and check that the supply to it is live.
2. Check that the input and output of rheostat 17 are live.
3. Check the bulbs and check that the supply to them is live.
4. Check the connectors, cable harnesses and earth connections.

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Locations of components

3 Earthing point in the fascia

10 Light switch
on the left-hand side of the fascia

16 Instrument lighting rheostat
in the combined instrument

17 Extra rheostat for the lighting of switches and controls
on the left-hand side of the fascia

18 Combined instrument lighting
in the combined instrument on the fascia

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

25 Hazard warning light switch
on the right-hand side of the facia

47 Combined instrument
on the fascia

48 Cigarette lighter
on the fascia

57 3-pole connector
one at the left-hand B pillar, behind the trim
one at the right-hand B pillar, behind the trim
one one under the driver's seat

58 12-pole connector
on the angle bracket, under the fascia, to the left of the steering column (behind the knee shield)

59 2-pole connector
one on the fascia, behind the cigarette lighter

60 Single-pole connector
one in each rear door
one between the front seats, under the front section of the centre console

88 Switch for extra fog lamps
on the fascia

91 Gear indicating light
between the front seats, at the gear selector

98 10-pole connector (for radio 267)
one in the fascia, in the radio contact box
one to the left of the steering column, behind the fascia knee shield

116 Switch for the electrically heated rear window
on the fascia

117 Earthing point
between the ignition switch and the handbrake lever

143 Recirculation switch, AC
on the fascia

148 Ashtray illumination
on the fascia, in the ashtray

152B 29-pole red connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connector is accessible from the interior of the car.

153 Lighting for the cigarette lighter
on the fascia, at the cigarette lighter

154 Lighting for heater controls
on the fascia, at the respective heater control

162 Switch for driver's door electric window regulator
between the front seats, on the centre console

163 Switch for co-driver's door electric window regulator
between the front seats, on the centre console

169 Switch, AC
on the fascia

181 Switch for the electrically operated sunroof (or Convertible top)
between the front seats, at the front of the centre console

189 Switch for the rear-door electric window regulators
between the front seats, on the centre console

190 Switch for left-hand rear electric window regulator
between the front seats, on the centre console

190A Switch for left-hand rear electric window regulator
in the left-hand rear door

191 Switch for right-hand rear electric window regulator
between the front seats, on the centre console

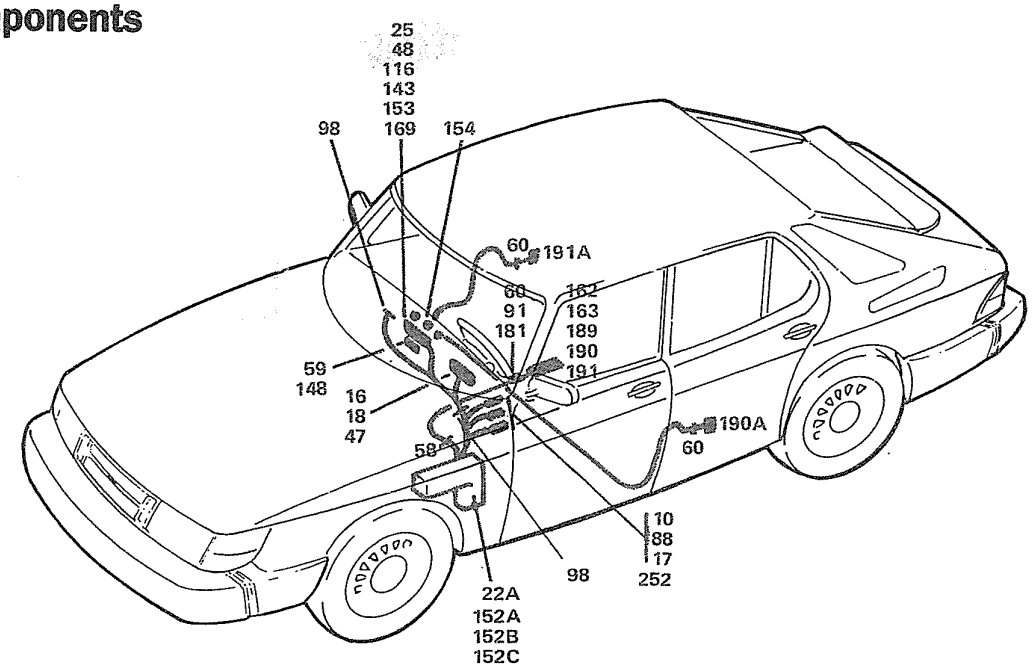
191A Switch for right-hand rear electric window regulator
in the right-hand rear door

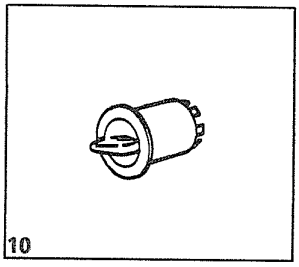
252 Driver's seat heating rheostat
on the fascia

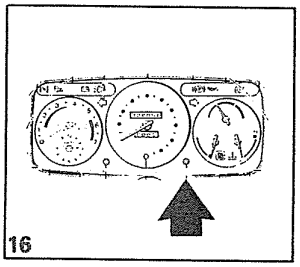
267 Radio connector
one in the fascia, behind the radio panel

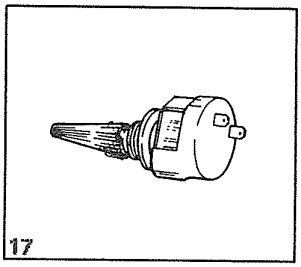
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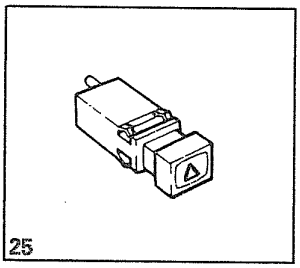
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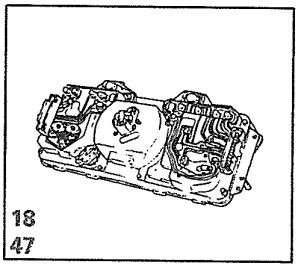


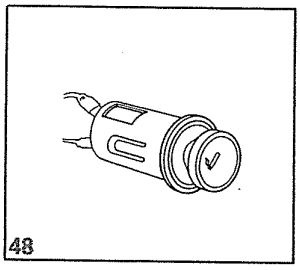


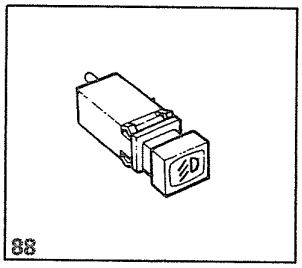


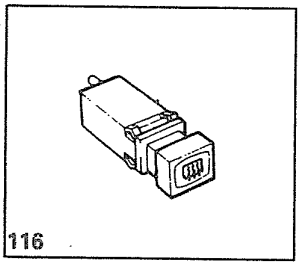


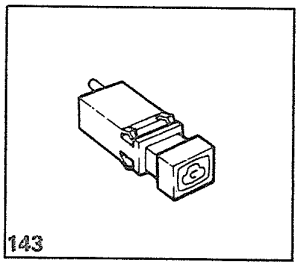


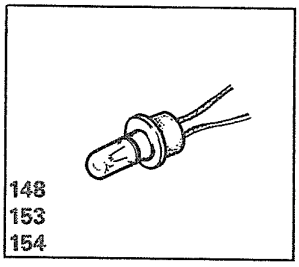


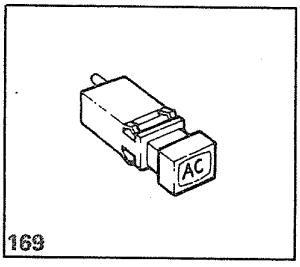


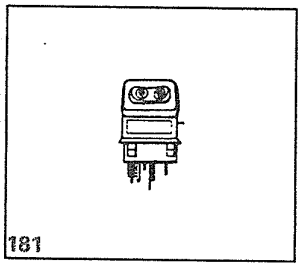


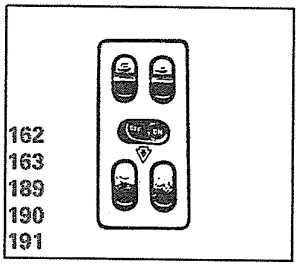


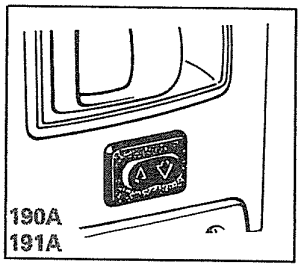


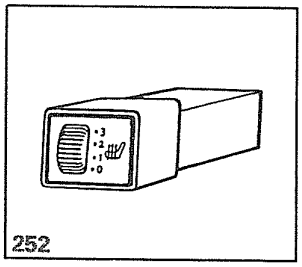






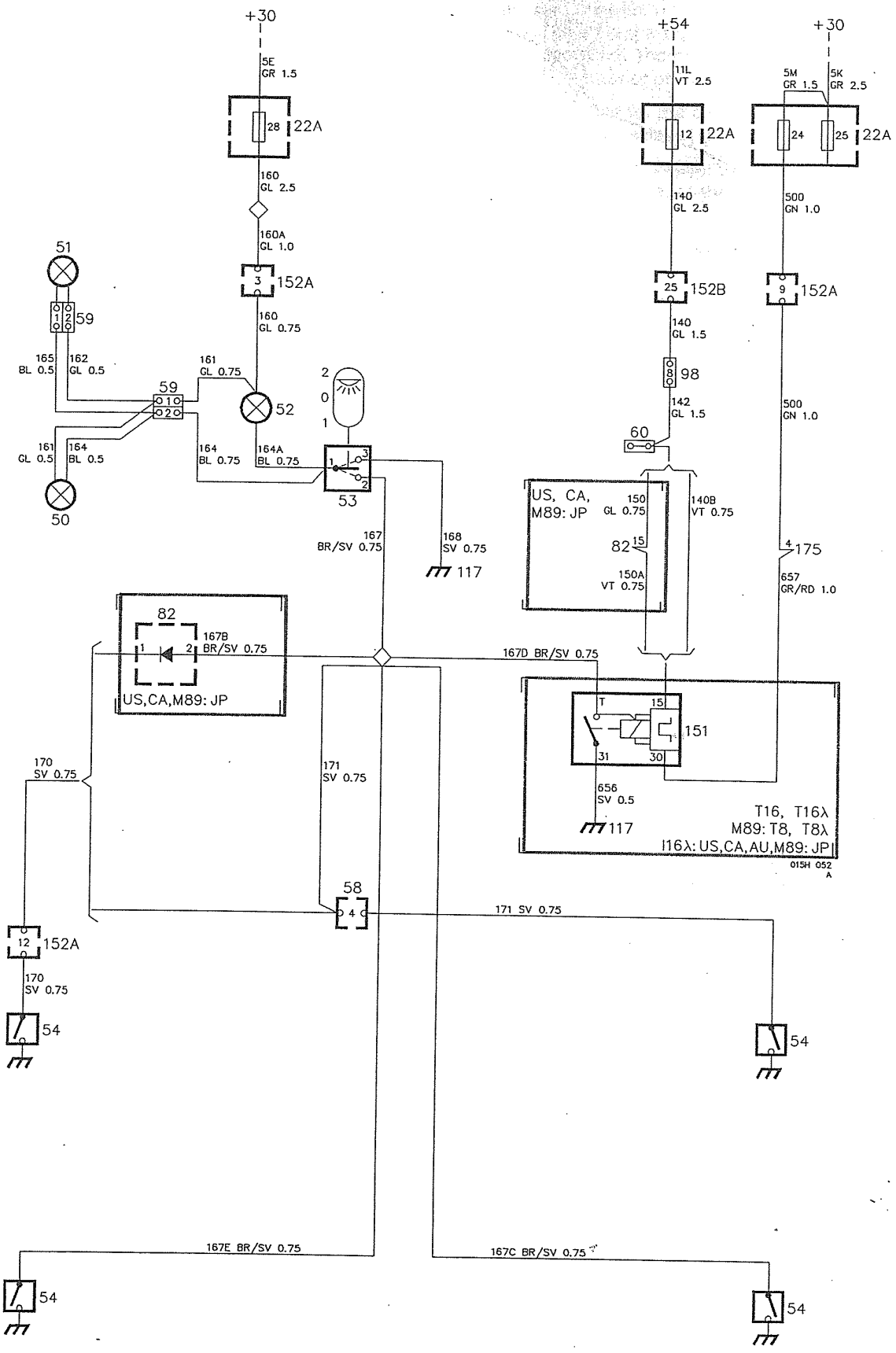






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Interior lighting



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Operation

There are two versions of the interior lighting system – one with a time delay and one without. Cars with delayed extinguishing of the interior lighting are equipped with an extra relay 151 (see the special section below).

The lights are supplied across fuse 28 and 29-pole white connector 152A, regardless of the position of the ignition switch.

The interior lights can be switched on and off by means of interior lighting switch 53, at the ignition switch.

When switch 53 is in position 2 (forward position), centre roof lamp 50, front roof lamp 51 and ignition switch lamp 52 are always switched on.

In position 1 (rear position), the interior lighting will be switched on if one of the door switches (54) is closed, i.e. if a door is opened. In position 0 (centre position), the interior lights are always off.

On cars for the USA and Canadian markets, and 1989 models for Japan, door switch 54 for the left-hand front door is supplied via seat belt/ignition switch warning relay 82.

Time delay

Cars with the interior lighting delay are equipped with time-delay relay 151 which is supplied across fuse 12 when the ignition switch is in the drive position, and with a constant supply from distribution terminal +30, regardless of the position of the ignition switch.

When the interior lighting is switched on, by a door being opened or a switch being operated, terminal T will be earthed and relay 151 will be energised.

When the circuit is subsequently broken, by the door being closed or the switch being operated, the interior lighting will remain switched on, since the timing circuit of the relay will keep the earth circuit closed across terminals T and 31.

The time delay is around 15 seconds, but will be interrupted if the ignition switch is turned to the drive position. A positive voltage (from +54) will then be supplied to terminal 15 of the relay. Both terminals – 15 and 30 – will then receive a positive supply. The relay will thus be de-energised and the earth circuit across terminals T and 31 will be broken.

Fault-tracing hints

1. Check fuse 28 and check that the supply to it is live.
2. Check the bulbs for the interior lighting and check that the supply to them is live.
3. Check the switches and door switches.
4. Check the connectors, cable harnesses and earth connections.

Time delay

On cars with time delay, check also the following points:

1. Turn the ignition switch to the drive position. Check fuse 12 and check that the supply to it is live.
2. Check that terminals 15 and 30 of relay 151 are live.

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Locations of components

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

50 Roof lamp, centre
in the centre of the roof lining

51 Roof lamp, front
on the roof, behind the inner rear-view mirror

52 Ignition switch lighting
between the front seats, at the ignition switch

53 Interior lighting switch
between the front seats, at the gear lever

54 Door switches, interior lighting
in each door pillar

58 12-pole connector
on the angle bracket, under the fascia on the left-hand side (behind the knee shield)

59 2-pole connector
one in the luggage compartment, above the left-hand wheel housing, behind the trim
one behind the roof lining, at the rear-view mirror

60 Single-pole connector
between the front seats, under the centre console

82 Seat belt/ignition switch warning relay
under the back seat, on the left-hand side

98 10-pole connector
to the left of the steering column, behind the knee shield below the fascia

117 Earthing point
between the ignition switch and the handbrake lever

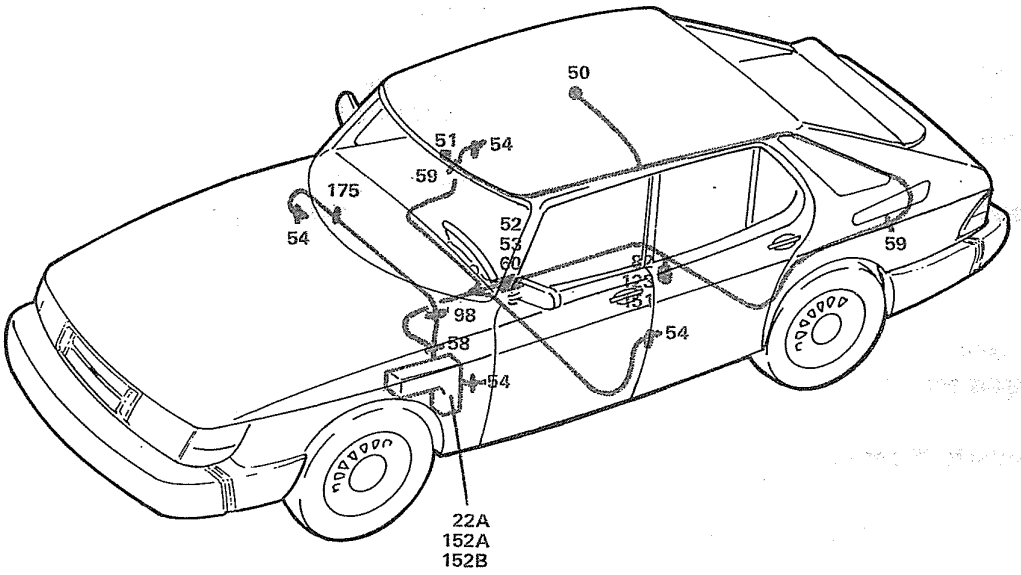
151 Time-delay relay for the interior lighting
under the back seat, on the left-hand side

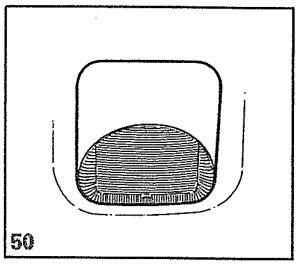
152A 29-pole white connector
152B 29-pole red connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connectors are accessible from the interior of the car.

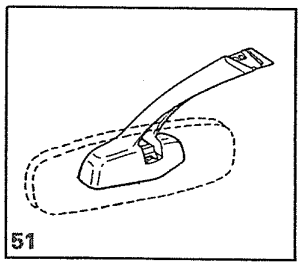
175 Control unit for the central locking system
under the fascia on the right-hand side, behind the knee shield

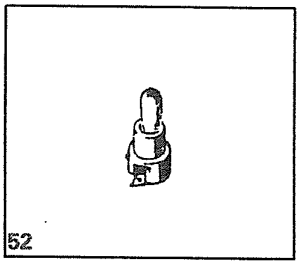
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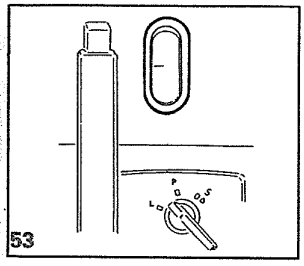
Components

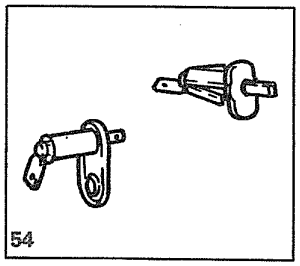


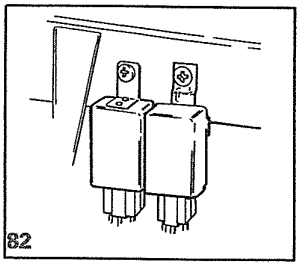


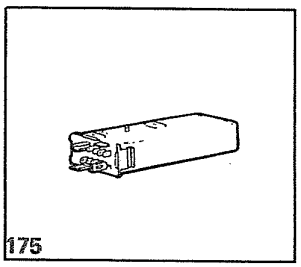






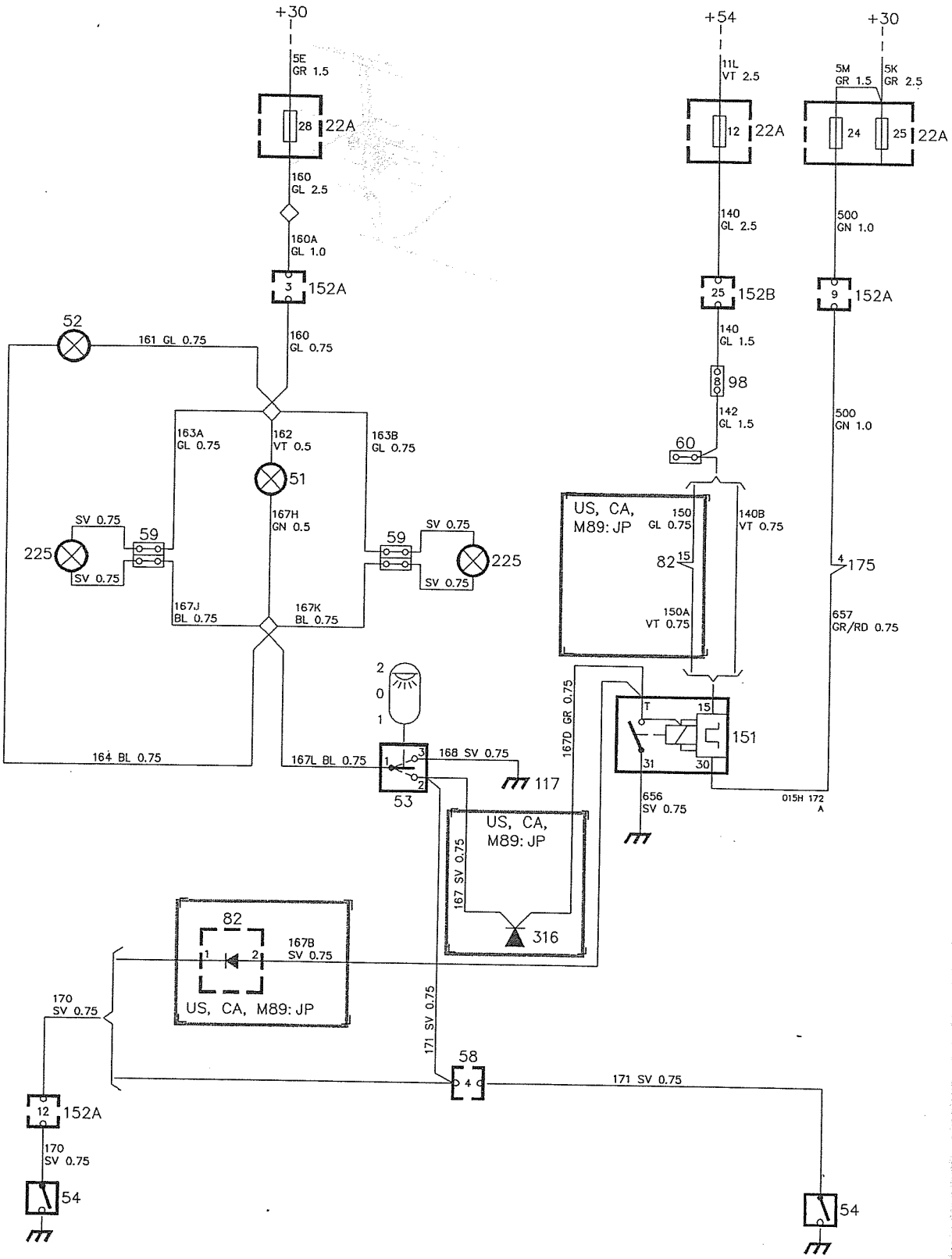






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Interior lighting – Convertible



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Operation

The lighting is supplied across fuse 28 and 29-pole white connector 152A, regardless of the position of the ignition switch.

The interior lights can be switched on and off by means of interior lighting switch 53, at the ignition switch.

When the switch is in the front position (2), front lamp 51 at the rear-view mirror, ignition switch lamp 52 and reading lamps 225 are always switched on.

In the rear position (1), the interior lighting will be switched on if one of the door switches 54 is closed, i.e. if a door is opened. In the centre position (0), the interior lights are always off.

On cars for the USA and Canadian markets, and the 1989 model for Japan, door switch 54 for the left-hand front door is supplied via seat belt/ignition switch warning relay 82.

Time delay

Time-delay relay 151 for the delayed interior lighting is supplied across fuse 12 when the ignition switch is in the drive position, and with a constant supply from distribution terminal +30, regardless of the position of the ignition switch.

When the interior lighting is switched on by a door being opened, terminal T will be earthed and relay 151 will be energised.

When the circuit is subsequently broken by the door being closed, the interior lighting will remain switched on, since the timing circuit of the relay will keep the earth circuit closed across terminals T and 31.

The time delay is around 15 seconds, but will be interrupted if the ignition switch is turned to the drive position. A positive voltage (from +54) will then be supplied to terminal 15 of the relay. Both terminals – 15 and 30 – will then receive a positive supply. The relay will thus be de-energised and the earth circuit across terminals T and 31 will be broken.

Fault-tracing hints

1. Check fuse 28 and check that the supply to it is live.
2. Check the bulbs for the interior lighting and check that the supply to them is live.
3. Check the interior lighting switch and the door switches.
4. Check the connectors, cable harnesses and earth connections.

Time delay

1. Turn the ignition switch to the drive position. Check fuse 12 and check that the supply to it is live.
2. Check that terminals 15 and 30 of relay 151 are live.

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Locations of components

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

51 Roof lamp, front
behind the inner rear-view mirror

52 Ignition switch lighting
between the front seats, at the ignition switch

53 Interior lighting switch
between the front seats, at the gear lever

54 Door switches, interior lighting
in each door pillar

58 12-pole connector
on the angle bracket, under the fascia on the left-hand side (behind the knee shield)

59 2-pole connector
behind the trim, at each reading lamp

60 Single-pole connector
between the front seats, under the centre console

82 Seat belt/ignition switch warning relay
in the electrical distribution box under the back seat, relay position E

98 10-pole connector
to the left of the steering column, behind the knee shield below the fascia

117 Earthing point
between the ignition switch and the handbrake lever

151 Time-delay relay for the interior lighting
in the electrical distribution box under the back seat, relay position B

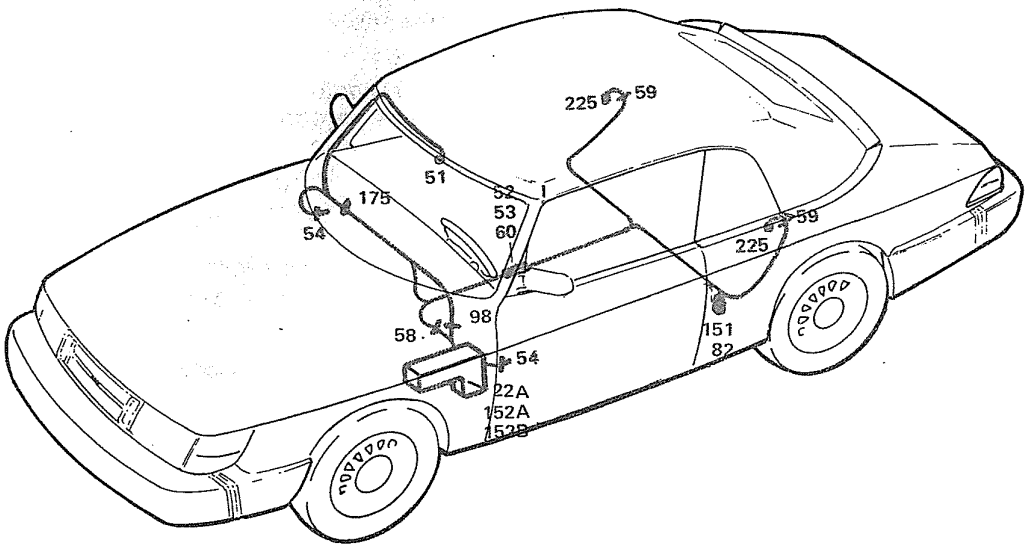
152A 29-pole white connector
152B 29-pole red connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connectors are accessible from the interior of the car.

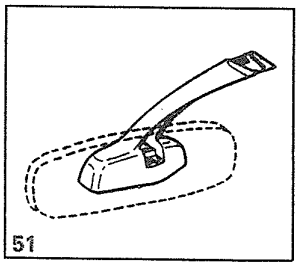
175 Electronic unit for the central locking system
under the fascia on the right-hand side, behind the knee shield

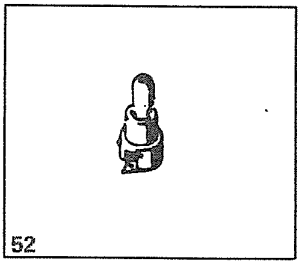
225 Reading lamp
one on each side of the back seat

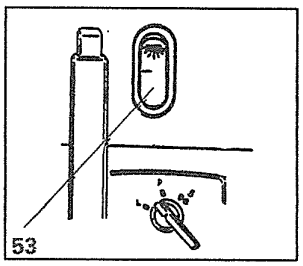
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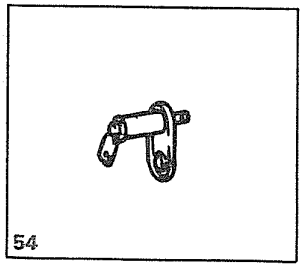
Components

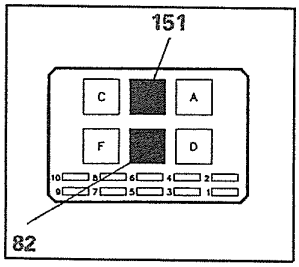


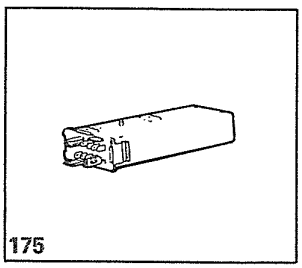


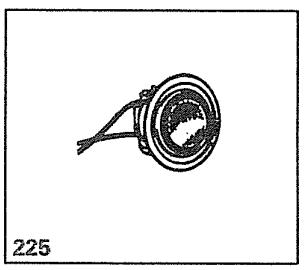






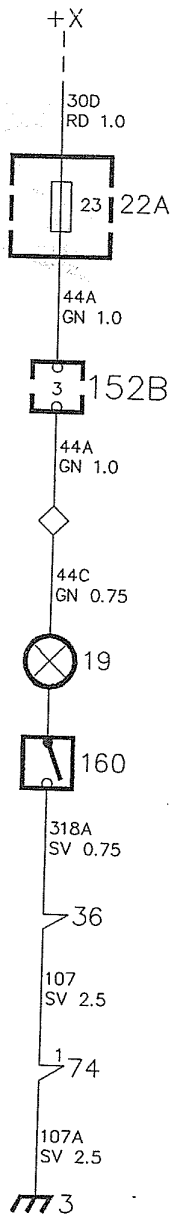






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Glove compartment illumination



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A

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Operation

The supply for the glove compartment illumination is taken from fuse 23, via 29-pole red connector 152B, when the ignition switch is in the parked, drive or start position.

When the glove compartment lid is opened, switch 160 will close, earthing glove compartment lamp 19 and causing it to light up.

Fault-tracing hints

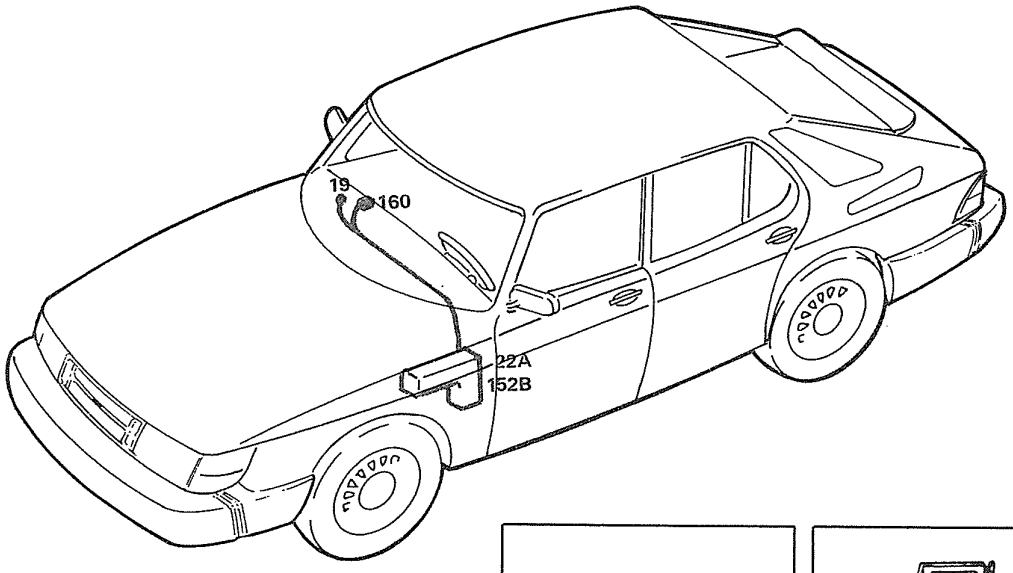
The glove compartment illumination is operative when the ignition switch is in the parked, drive or start position.

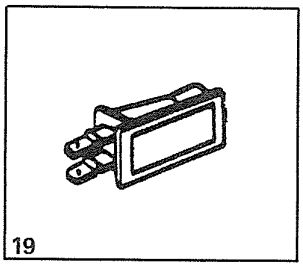
1. Check fuse 23 and check that the supply to it is live.
2. Check the bulb and check that the supply to it is live.
3. Check the switch.
4. Check the connectors, cable harnesses and earth connections.

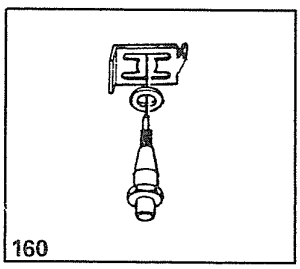
Locations of components

3	Earthing point in the fascia
19	Glove compartment lamp in the glove compartment, on the right-hand side of the fascia
22A	Fuse holder in the electrical distribution box, in the engine compartment, on the left-hand wheel housing
36	Motor for the ventilation fan under the right-hand speaker grille
74	Resistor for ventilation fan to the right, under the left-hand speaker grille
152B	29-pole red connector in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connector is accessible from the interior of the car.
160	Switch for glove compartment illumination on the right-hand side of the glove compartment

Components

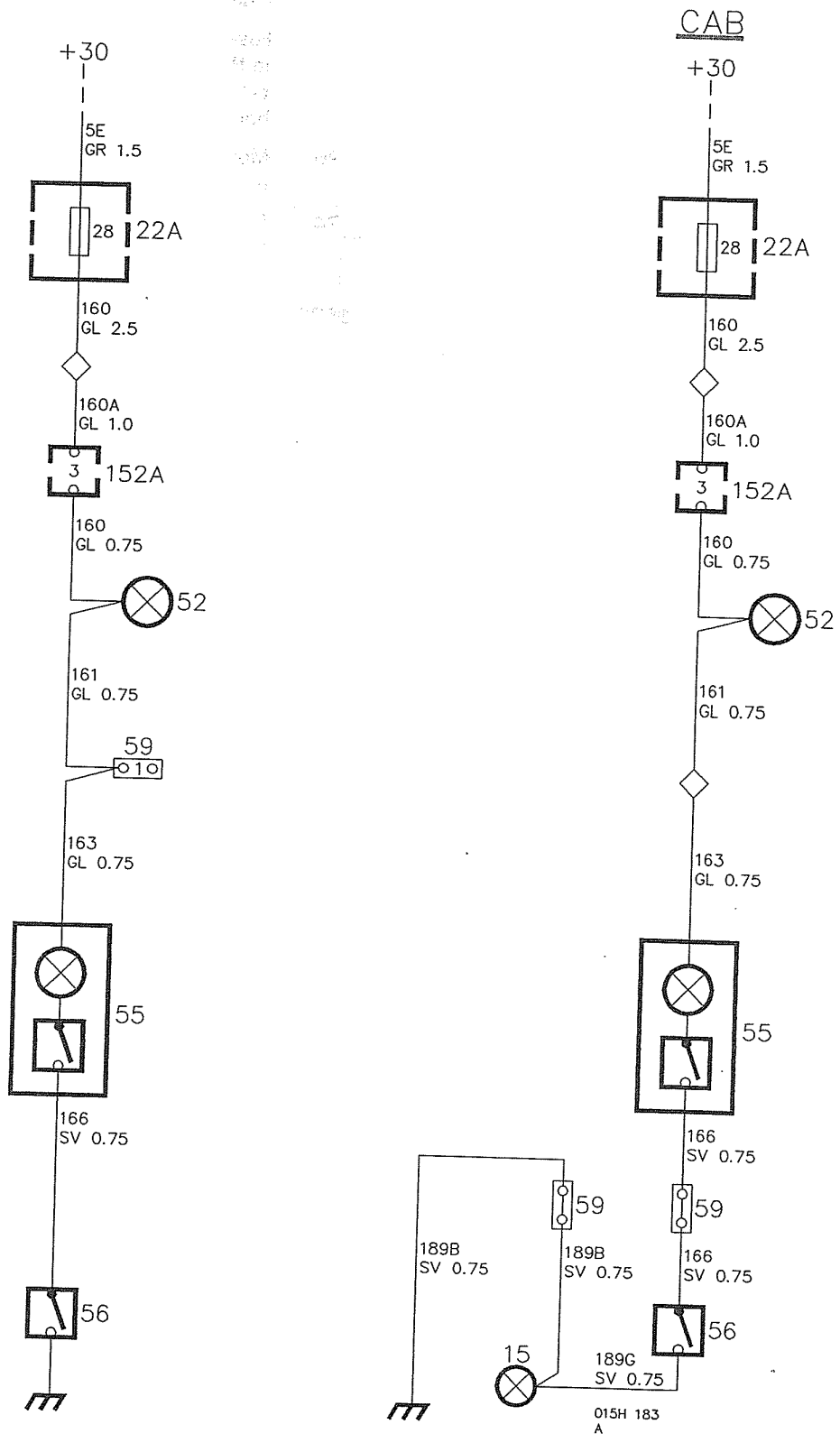






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Luggage compartment illumination



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Operation

The supply to luggage compartment lamp 55 is taken from fuse 28 and then on to switch 56. When the luggage compartment lid is opened, the switch will close the circuit to earth and the lamp will light up.

The luggage compartment illumination can be switched off manually by means of the switch in the lamp fitting.

Convertible

On the Saab 900 Convertible, the luggage compartment lamp is switched on and off by means of a mercury switch (56) which closes the supply circuit when the lid is opened.

Fault-tracing hints

1. Check fuse 28 and check that the supply to it is live.
2. Check the bulb and check that the supply to it is live.
3. Check the switch.
4. Check the connectors, cable harnesses and earth connections.

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Locations of components

15 Number plate illumination
on the tailgate (3-D and 5-D)
on the rear sill (2-D and 4-D)

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

52 Ignition switch lighting
between the front seats, under the centre console

55 Luggage compartment lamp
in the luggage compartment, on the left-hand side
in the luggage compartment, in the centre of the roof (CAB)

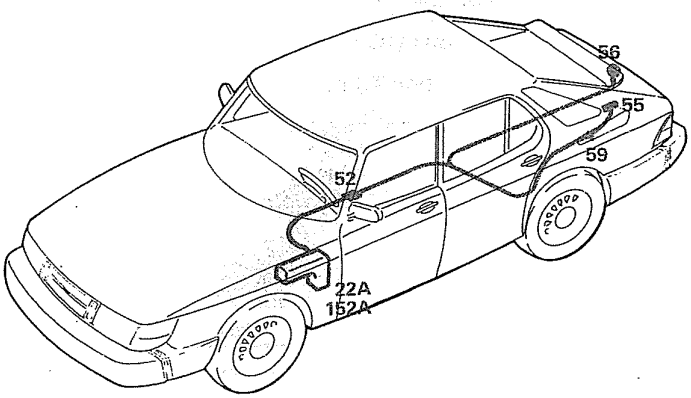
56 Luggage compartment light switch 3-D and 5-D
in the luggage compartment, at the tailgate striker plate.
2-D and 4-D
in the luggage compartment, forward of the left hinge of the luggage compartment lid
Convertible
in the luggage compartment lid (mercury switch)

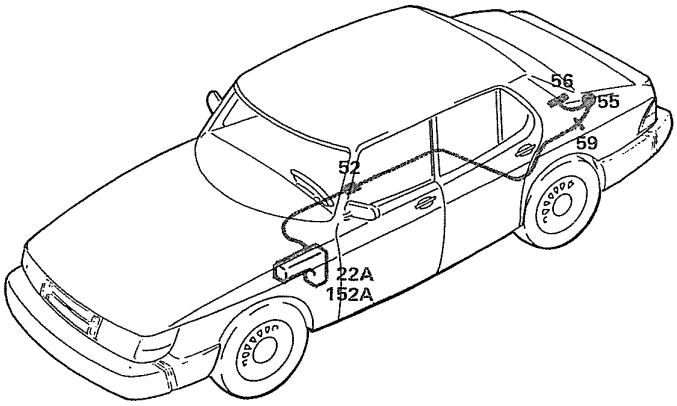
59 2-pole connector
in the luggage compartment, on the left-hand side
two in the luggage compartment at the left-hand lid hinge, behind the trim (Convertible)

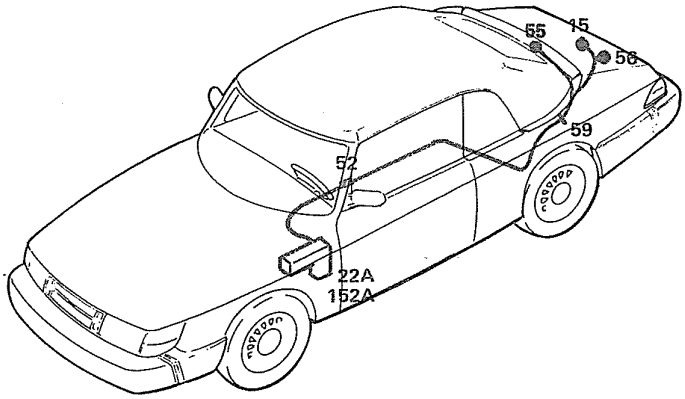
152A 29-pole white connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connector is accessible from the interior of the car

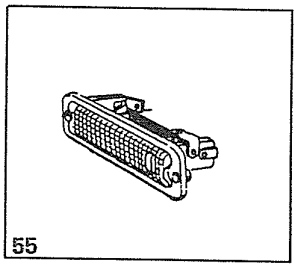
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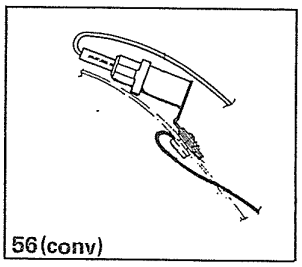
Components

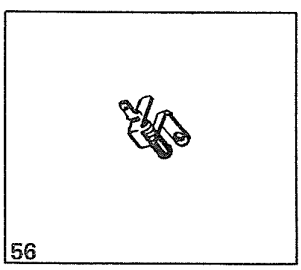






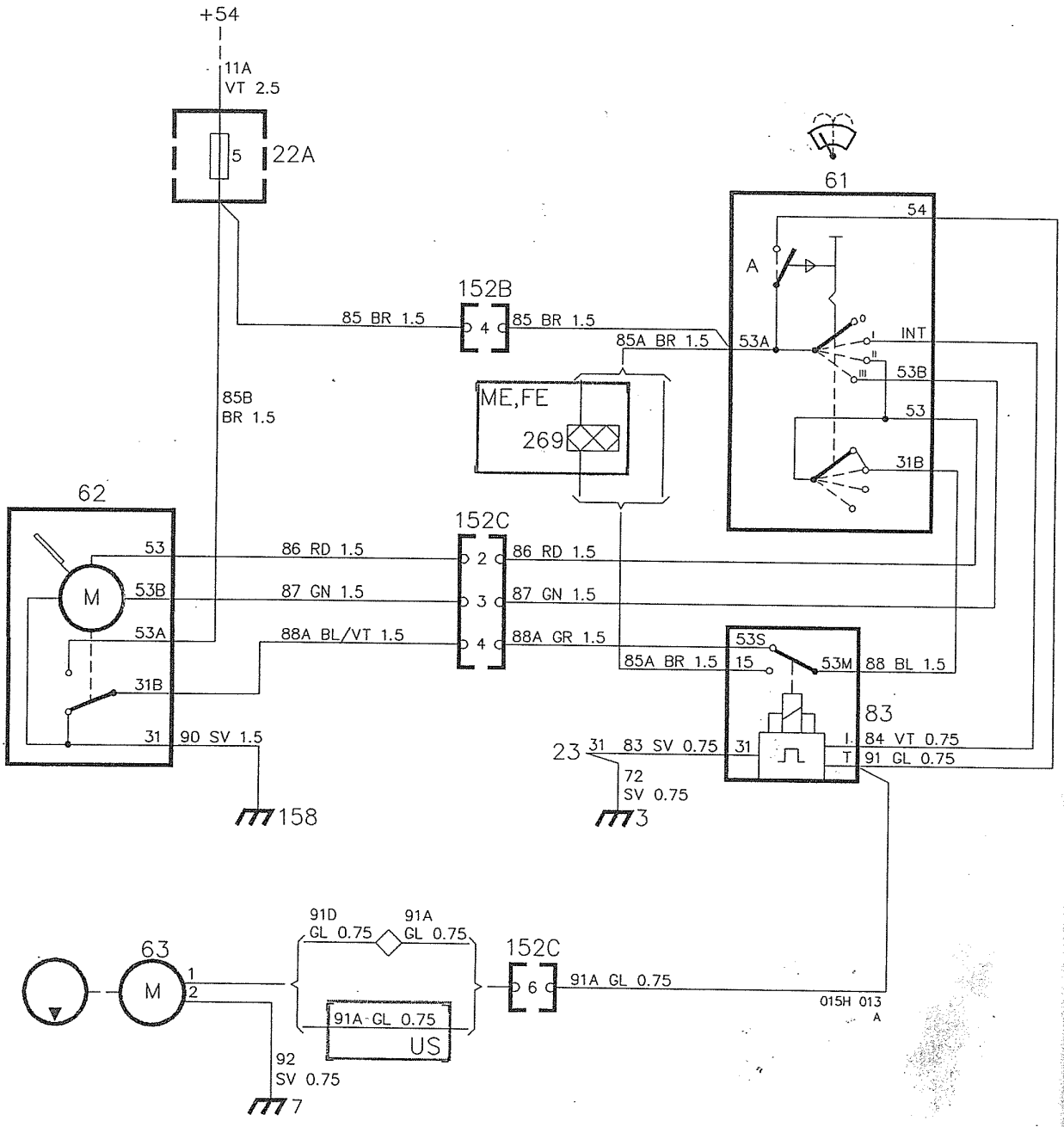

55


56(conv)


56

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Windscreen wipers



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Operation

The windscreen wipers of the car can run at two speeds and have an intermittent operation function. The system also includes the windscreen washers.

When the ignition switch is in the drive position,

- windscreen wiper stalk switch 61 and
- relay 83 for intermittent operation of the windscreen wipers

are supplied via fuse 5 and 29-pole red connector 152B.

When the switch is in position II (low speed), terminal 53 of the wiper motor is supplied from terminal 53 of the switch, and the motor will run at low speed.

When the switch is in position III, terminal 53B of the wiper motor is supplied from terminal 53B of the switch. The motor will now run at high speed.

When the switch is in position I (intermittent operation), current will flow from terminal INT to intermittent operation relay 83, which will thus be energised.

The relay contacts will close, and current will flow from terminal 53M to terminal 31B of the switch, through the switch and from terminal 53 of the switch to terminal 53 of the wiper motor. The wiper motor will now run intermittently. The frequency of the intermittent operation of the wiper motor is determined by the relay.

The wiper motor incorporates a mechanically actuated switch, to which the supply is live regardless of the position of the stalk switch. The switch controls the supply so that the wiper motor unit will always return to the parked position after the circuit has been opened by the stalk switch.

This is due to the fact that the wiper motor is then supplied from terminal 53A, and from terminal 31B, across the built-in switch. The current flows through the intermittent operation relay and the stalk switch, and then back to terminal 53 of the windscreen wiper motor.

When the wiper motor unit reaches the parked position, the mechanically actuated switch will open and the motor will stop.

Windscreen washers

Washing will start when the stalk switch is moved towards the steering wheel rim, regardless of whether switch 61 is in position I, II or III.

When the stalk switch is moved towards the steering wheel, contacts "A" will close. Washer motor 63 is then supplied from terminal 54 of the stalk switch and will run as long as the switch remains closed. After the stalk switch has been released, the wipers will sweep the windscreen five times before they stop.

Fault-tracing hints

The windscreen wipers will be operative when the ignition switch is in the drive position.

1. Check fuse 5 and check that the supply to it is live.
2. Check that motor 62, switch 61 and relay 83 are live.
3. Operate the switch and check that the windscreen wiper motor and the washer motor are live.
4. Check the connectors, cable harnesses and earth connections.

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Locations of components

3 Earthing point in the fascia

7 Earthing point on the radiator cross-member

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

23 Flasher relay
under the fascia on the left-hand side, behind the knee shield

61 Windscreen wiper stalk switch
on the right-hand side of the steering column

62 Windscreen wiper motor
in the engine compartment, on the bulkhead

63 Washer motor
in the washer fluid container, forward of t
right-hand wheel housing

83 Relay for intermittent operation of the windscreen wipers
under the fascia, to the left of the steering column (behind the knee shield)

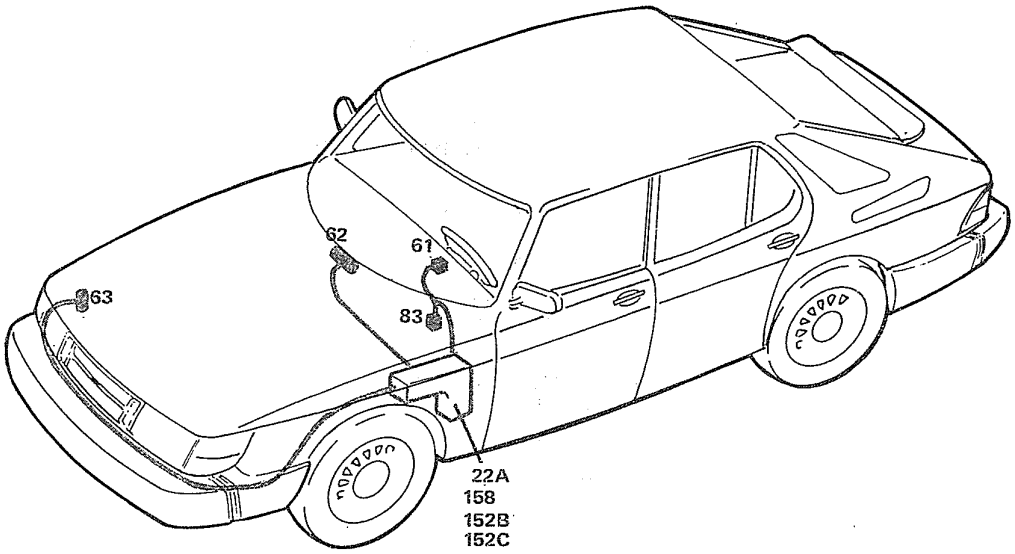
152B 29-pole red connector
152C 29-pole black connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car.

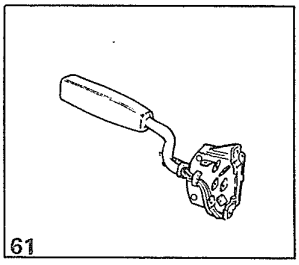
158 Negative distribution terminal
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

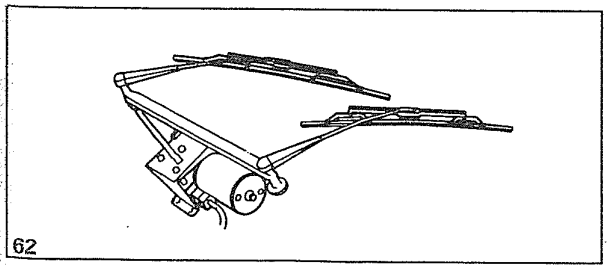
269 Two-pole connector (ME and FE only)

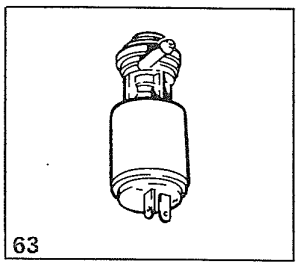
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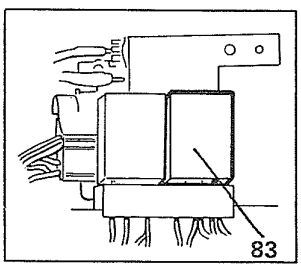
Components





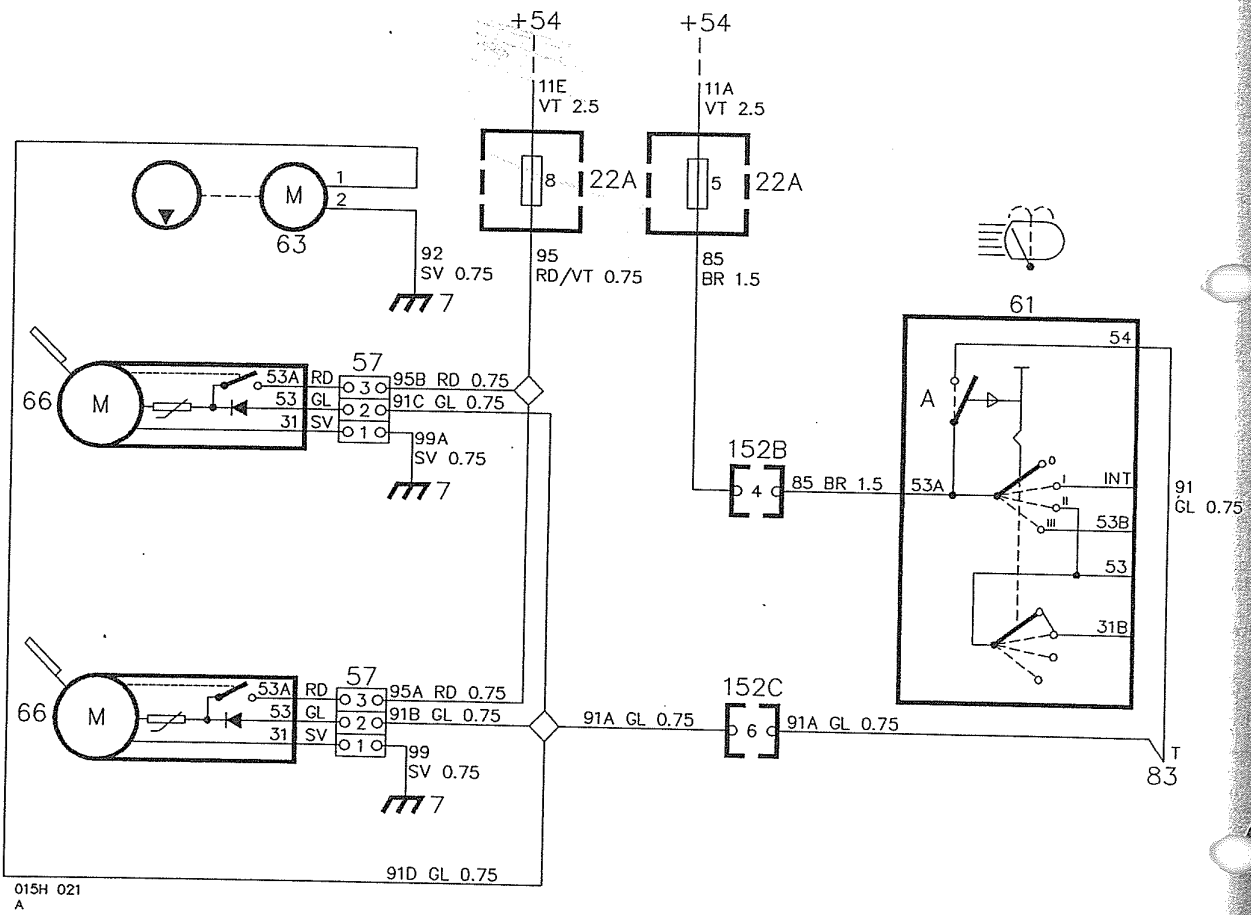






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Headlamp wipers



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Operation

Headlamp wipers are available on cars for certain markets only.

When the ignition switch is in the drive position, current will flow:

- from fuse 5, via 29-pole red connector 152B, to switch 61 for the headlamp wipers and washers, and
- from fuse 8 to each headlamp wiper motor 66.

When the stalk switch is moved towards the steering wheel rim, contacts "A" will close. Headlamp wiper motors 66 and and washer motor 63 will start simultaneously.

When the stalk is released and the circuit is opened, the wiper motors will still be energised (across fuse 8). When the wiper motors have completed five strokes, the limit switches incorporated into the motors will open the circuit and the wipers will stop in the parked position.

A diode in each motor prevents the current from the feedback circuit of the motor from flowing back to the washer motor.

Each wiper motor incorporates overload protection with a protective switch which is actuated by a resistor. The switch is in series with the motor and will trip if the load should exceed a predetermined value (e.g. if the wiper blades have frozen to the lenses).

Fault-tracing hints

The headlamp wipers and the washer motor will be operative when the ignition switch is in the drive position.

1. Check fuses 5 and 8 and check that the supply to them is live.
2. Check that terminal 53A of the switch is live, and that the supply is reaching the wiper motors.
3. Move the stalk switch towards the steering wheel rim and check that the wiper motors and the washer motor are live.
4. Check the connectors, cable harnesses and earth connections.

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Locations of components

7 Earthing point on the radiator cross-member

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

57 3-pole connector
one at each wiper motor, at the front of the engine compartment.

61 Windscreen wiper stalk switch
on the right-hand side of the steering column

63 Washer motor
in the washer fluid container, forward of the right-hand wheel housing

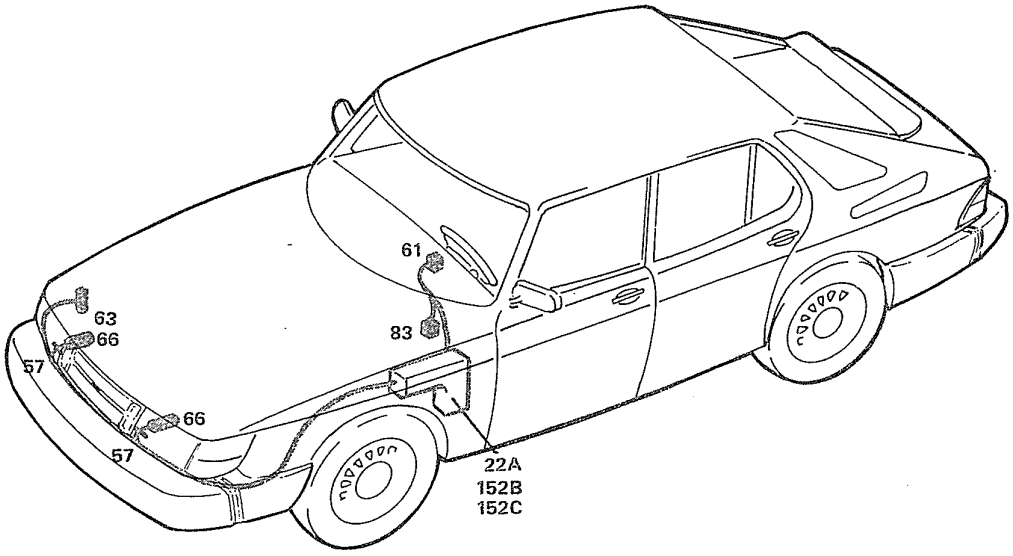
66 Headlamp wiper motor
on the left-hand and right-hand sides of the grille

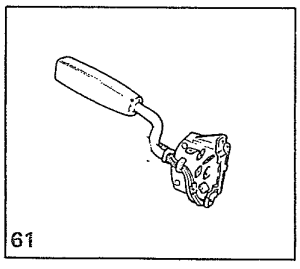
83 Relay for intermittent operation of the windscreen wipers
under the fascia, to the left of the steering column (behind the knee shield)

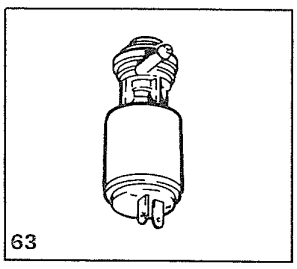
152B 29-pole red connector
152C 29-pole black connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car.

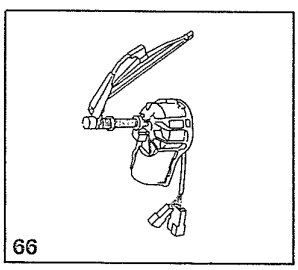
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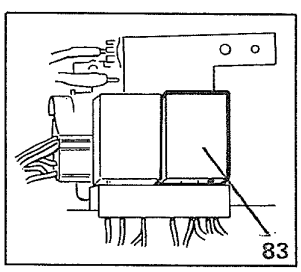
Components





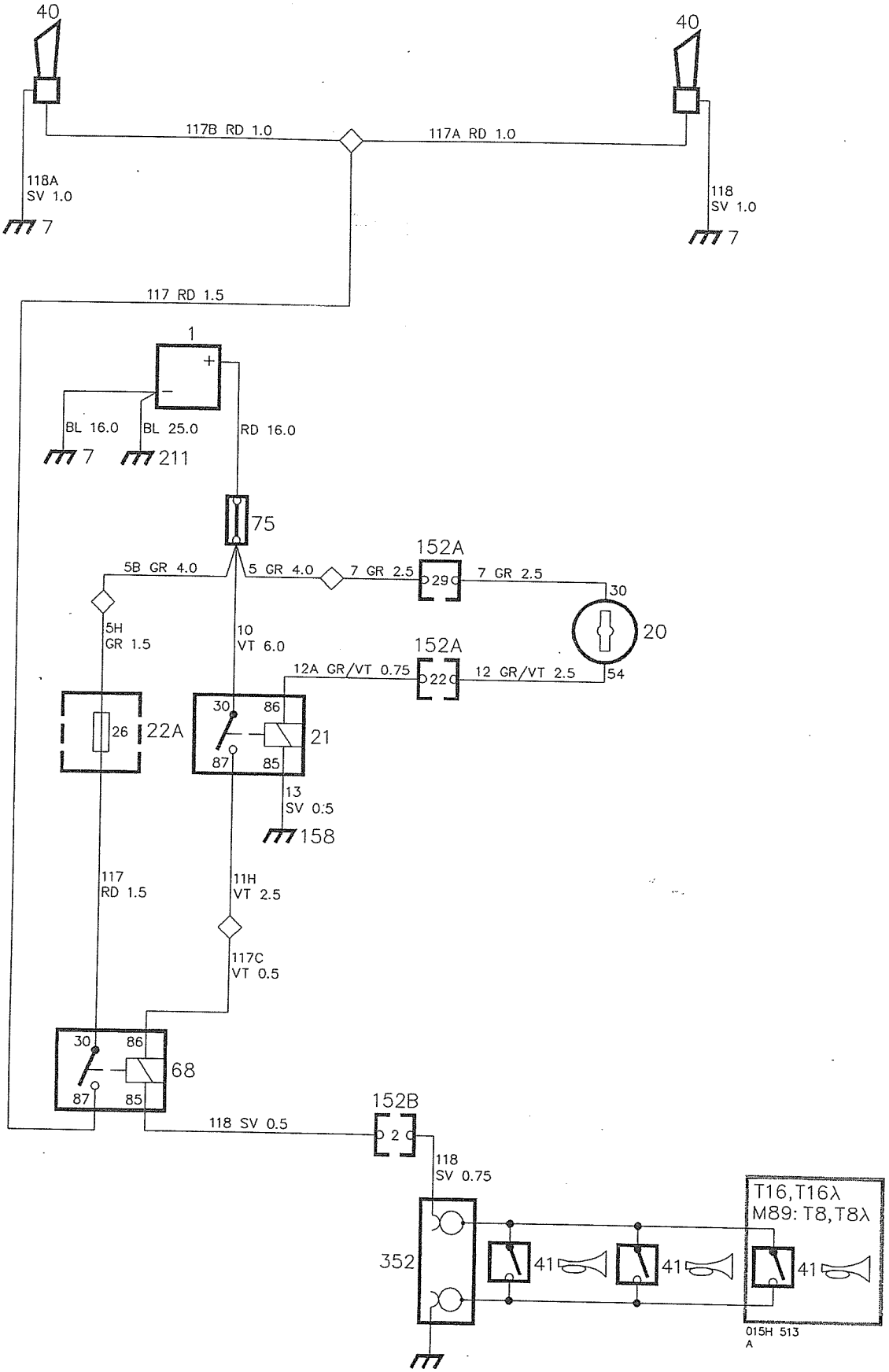






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Horn



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Operation

The horn system includes two tuned loud-tone horns, one of them high-pitched and the other low-pitched.

When the ignition switch is in the drive position, a positive voltage (+54) is taken via the actuating coil in horn relay 68 and slip ring switch 352 to the horn switches on the steering wheel.

When one of the horn switches is closed, the relay will be energised and horn 40 will be supplied via fuse 26 and the relay contacts.

Fault-tracing hints

The horn will be operative when the ignition switch is in the drive position.

1. Check fuse 26 and check that the supply to it is live.
2. Check the relay by earthing relay terminal 85. The horn should then sound.
3. Check the cable harnesses and earth connections.

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Locations of components

1 Battery
on the right-hand side of the engine compartment

7 Earthing point on the radiator cross-member

20 Ignition switch
on the centre console between the front seats

21 Ignition switch relay
in the electrical distribution box, in the engine compartment, relay position E

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

40 Horn
two on the right-hand side, behind the headlamp

41 Horn switch
behind the steering wheel hub pad

59 2-pole connector
one at each horn

68 Horn relay
in the electrical distribution box in the engine compartment, relay position K

75 Distribution block
in the engine compartment, on the right-hand side

152A 29-pole white connector
152B 29-pole red connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car.

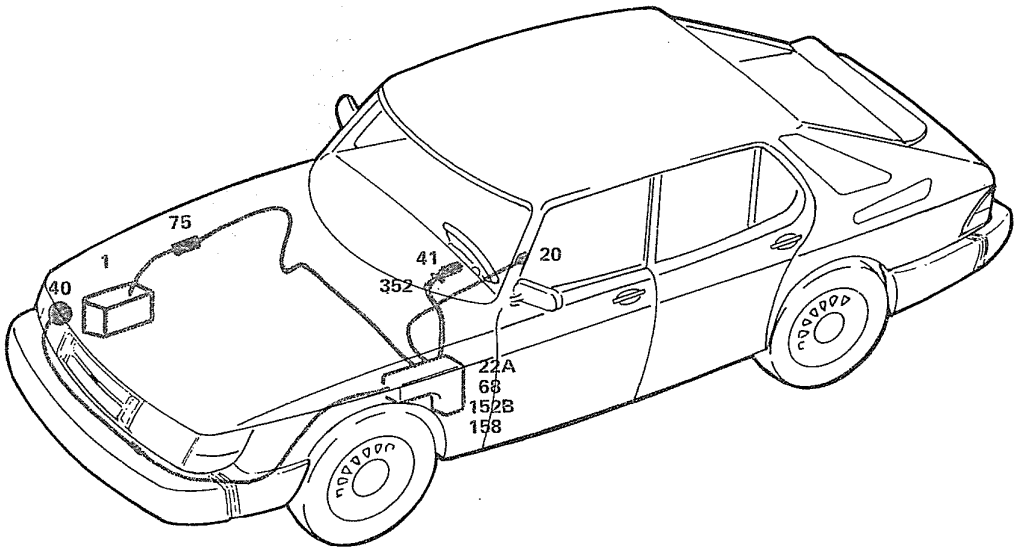
158 Negative distribution terminal
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

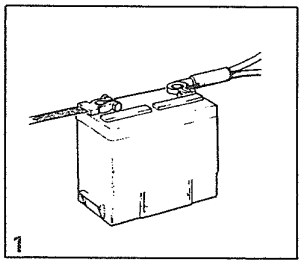
211 Earthing point on the gearbox

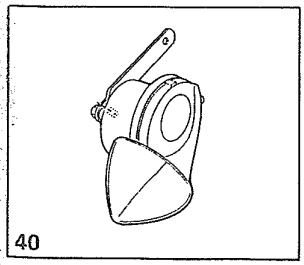
352 Slip ring switch
at the steering column

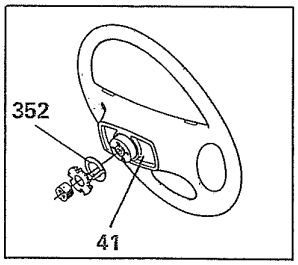
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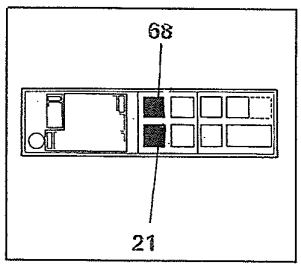
Components

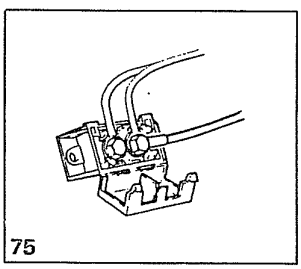








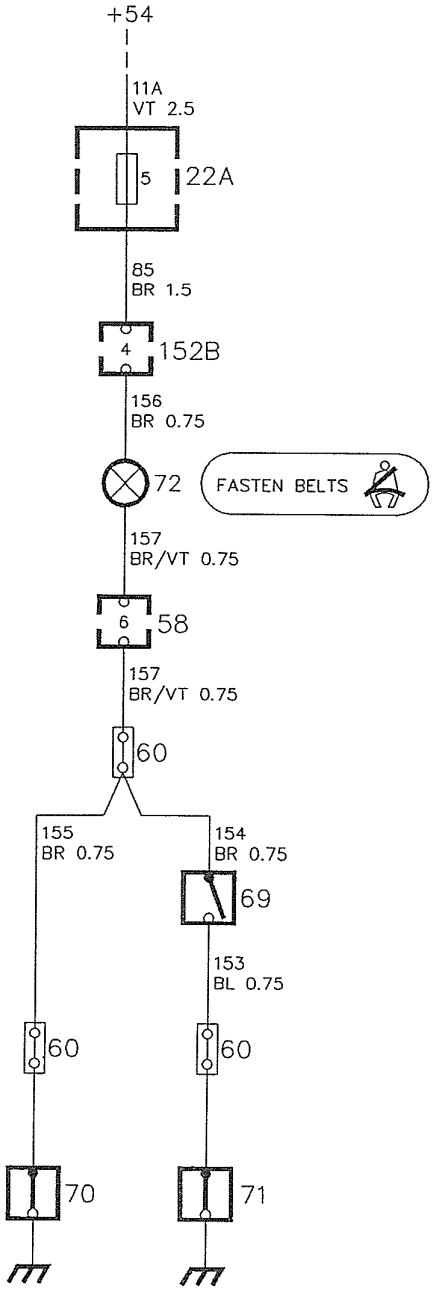




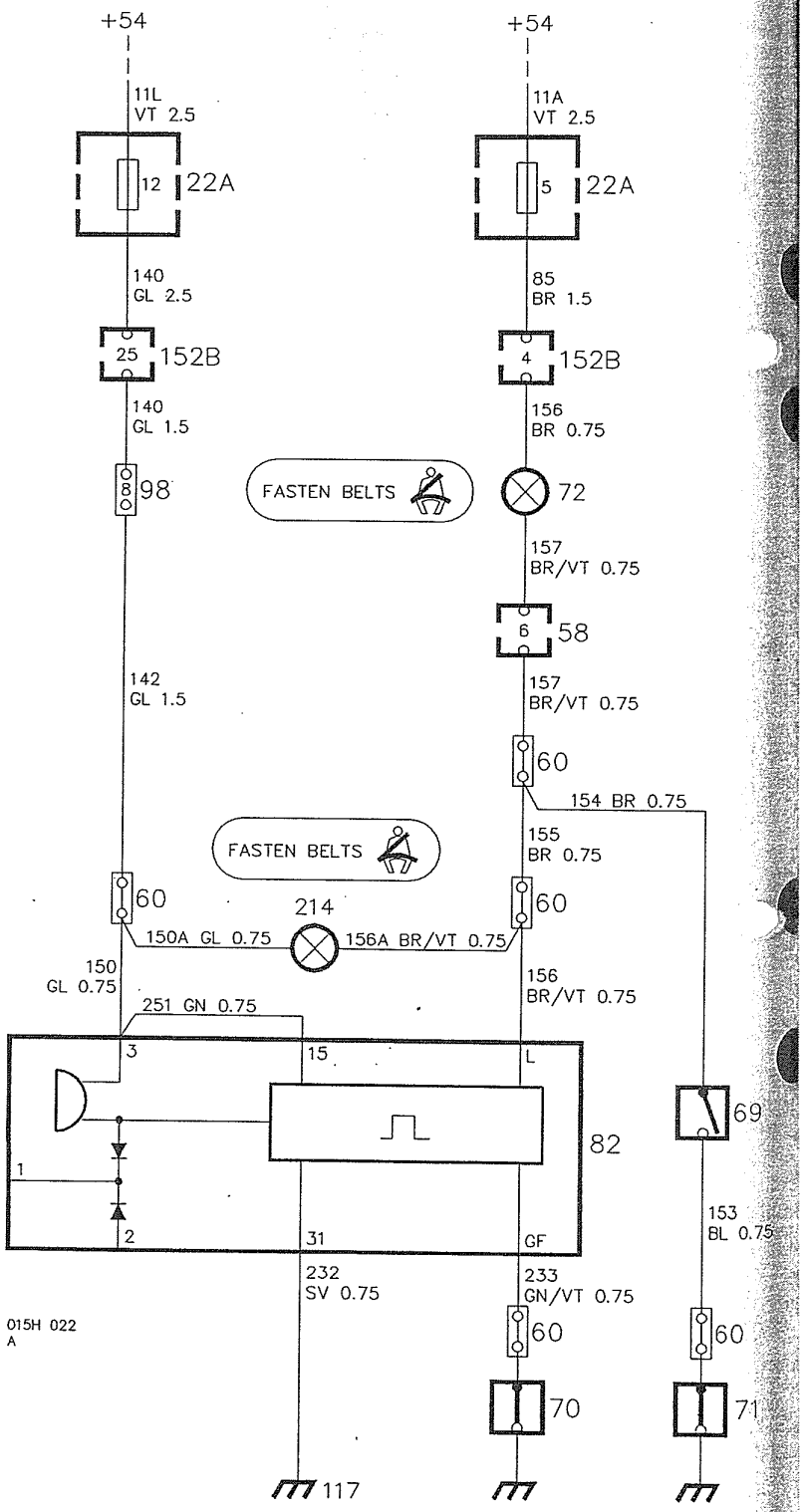
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Seat-belt warning lamp

SE,FI,EU,GB,FE,AU,M90: JP



ME



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Operation

The supply is taken from fuse 5 via 29-pole red connector 152B and seat-belt warning lamp 72 to the driver's seat-belt switch 70. The switch connects the warning lamp to earth, and the warning lamp will thus light up. When the seat-belt buckle is inserted into the lock, the switch will open the circuit and the lamp will be extinguished.

Seat switch 69 is connected in series with seat-belt switch 71 on the co-driver's side. The seat switch will close when a load is applied to the seat. The warning lamp will thus light up only if a person is seated in the co-driver's seat and the seat belt is not fastened.

Cars for the ME market

Cars for this market are equipped with warning relay 82 and an extra seat-belt warning lamp 214, which is fitted on the centre console.

The driver's seat-belt switch 70 connects terminal GF of the relay to earth, causing the warning lamps to light up and the buzzer to sound. When the seat-belt buckle is inserted into the lock, the switch will open, the lamps will be extinguished and the buzzer will be silenced.

Fault-tracing hints

The seat-belt warning lamp will be operative when the ignition switch is in the drive position.

1. Check fuse 5 (and fuse 12, if fitted) and check that the supply to them is live.
2. Check seat-belt warning lamp 72 (and 214, if fitted).
3. Check seat-belt switches 70 and 71, and seat switch 69.
4. Check the connectors, cable harnesses and earth connections.

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Locations of components

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

58 12-pole connector
to the left of the steering column, behind the knee shield, below the fascia

60 Single-pole connector
one at the corresponding seat-belt lock
one between the front seats, under the centre console
three between the front seats, under the centre console (ME)

69 Co-driver's seat switch for seat-belt warning lamp
under the co-driver's seat

70 Seat-belt switch – driver's side
between the driver's seat and the co-driver's seat

71 Seat-belt switch – co-driver's side
between the driver's seat and the co-driver's seat

72 Seat-belt warning lamp
in the centre of the fascia

82 Seat belt/ignition switch warning relay
under the back seat, on the left-hand side
in the electrical distribution box under the back seat, relay position E (Convertible)

98 10-pole connector
to the left of the steering column, behind the knee shield, below the fascia

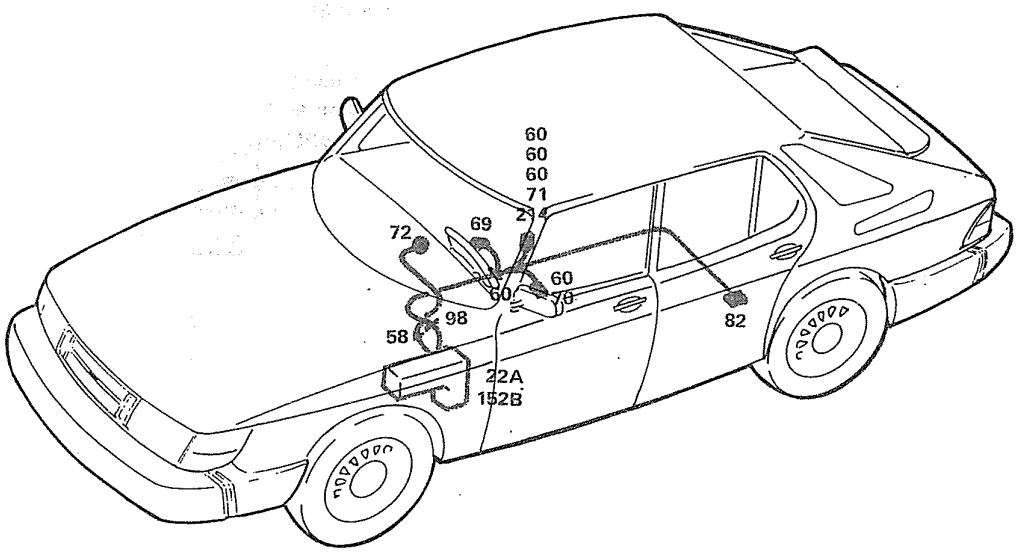
117 Earthing point
between the ignition switch and the handbrake lever

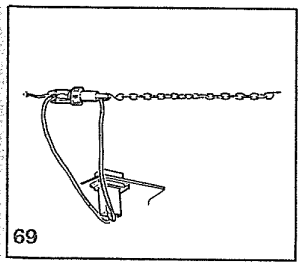
152B 29-pole red connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connector is accessible from the interior of the car.

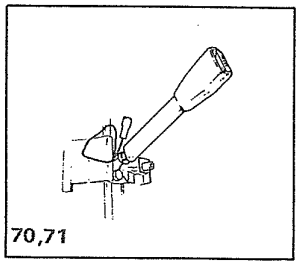
214 Seat-belt warning lamp on the centre console (ME)
on the centre console, between the front seats

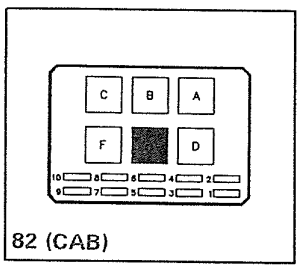
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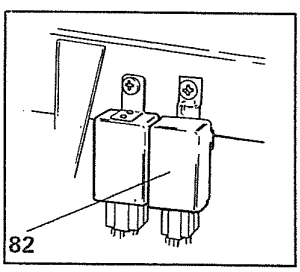
Components





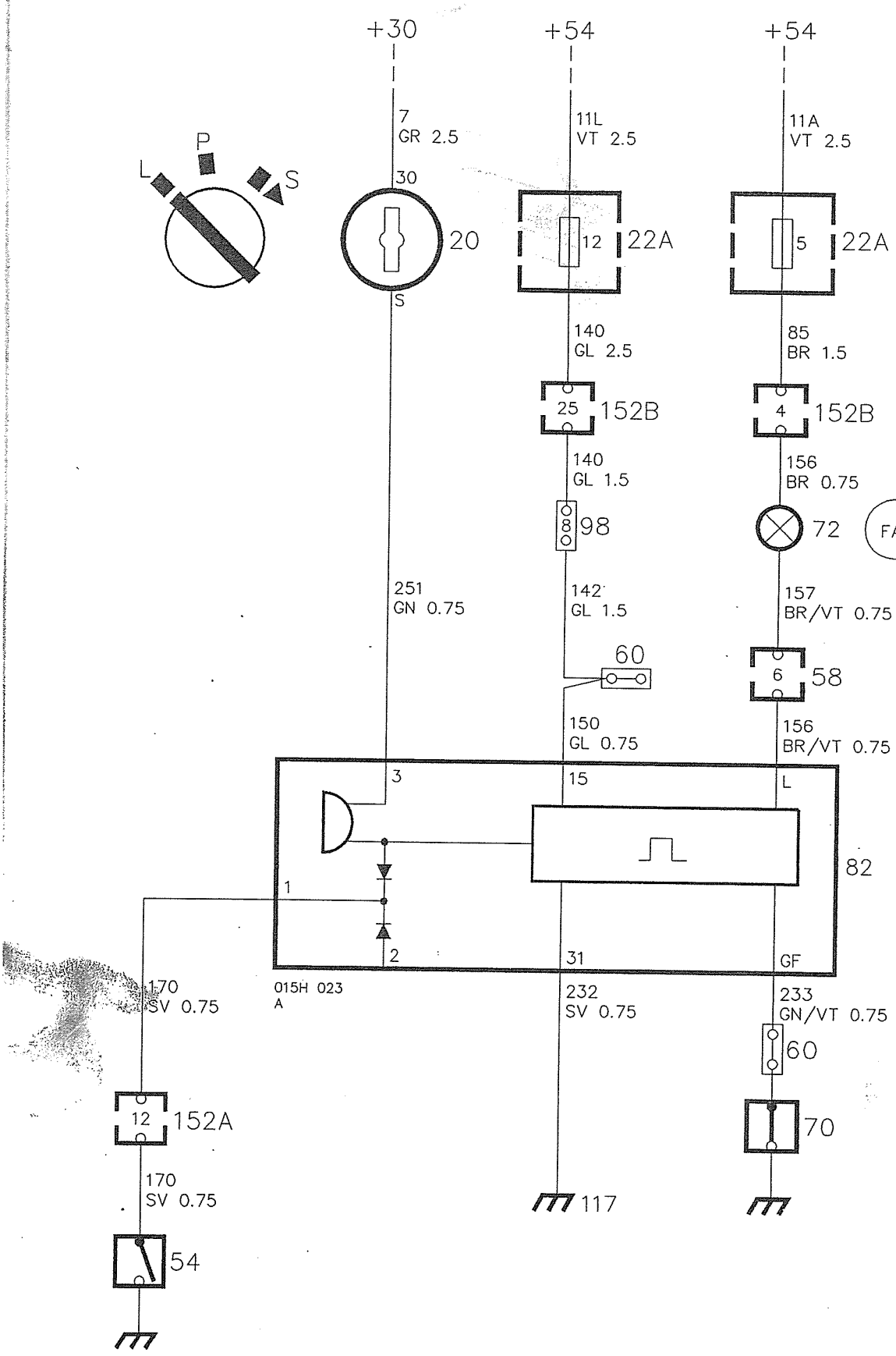






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Seat-belt and ignition key warning



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Operation

The seat-belt and ignition switch warning system is fitted only to cars for the USA and Canadian markets, and 1989 models for Japan.

The warning system reminds the driver that he has not fastened his seat belt, or that he has left the key in the ignition switch when leaving the car.

The system includes warning relay 82 which has a buzzer. When the ignition switch is in the drive position, the relay is supplied (+54) from fuse 12, via red 29-pole connector 152B.

Seat-belt warning

The warning relay is supplied (+54) from fuse 5, via red 29-pole connector 152B and seat-belt warning lamp 72.

Driver's seat-belt switch 70 connects terminal GF of the relay to earth. The warning lamp will then light up and the buzzer will sound. When the seat-belt buckle is inserted into the lock, the switch will open, the lamp will be extinguished and the buzzer will be silenced.

Ignition switch warning

As long as the key remains in the ignition switch, the supply will be live from terminal S of the ignition switch to the warning relay.

If the key is in the ignition switch and the driver's door is opened, door switch 54 will close. Terminal 1 of the relay will then be earthed and the buzzer will sound.

Fault-tracing hints

The seat-belt and ignition switch warning system will be operative when the ignition switch is in the drive position.

1. Check fuses 5 and 12 and check that the supply to them is live.
2. Check seat-belt warning lamp 72 and check that the supply to relay 82 is live.
3. Check the door switches, connectors, cable harnesses and earth connections.

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Locations of components

20 Ignition switch
on the centre console between the front seats

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

54 Door switches, interior lighting
in each door frame, between the hinges

58 12-pole connector
to the left of the steering column, behind the knee shield, below the fascia

60 Single-pole connector
one between the front seats, under the centre console
one at the driver's seat-belt lock

70 Seat-belt switch – driver's side
between the driver's seat and the co-driver's seat

72 Seat-belt warning lamp
in the centre of the fascia

82 Seat-belt/ignition switch warning relay
under the back seat, on the left-hand side
in the electrical distribution box under the back seat, relay position E (Convertible)

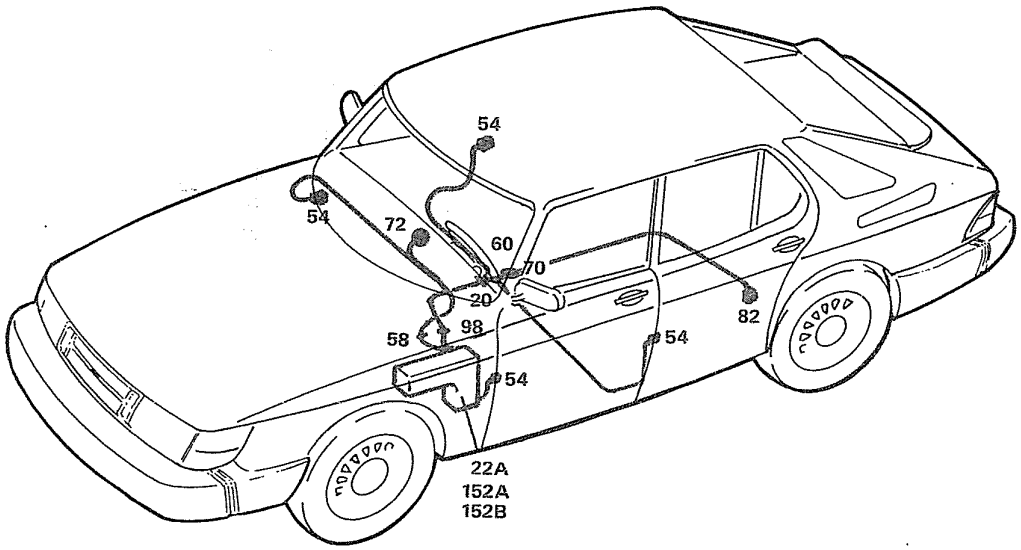
98 10-pole connector
to the left of the steering column, behind the knee shield, below the fascia

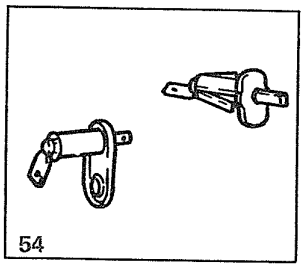
117 Earthing point
between the ignition switch and the handbrake lever

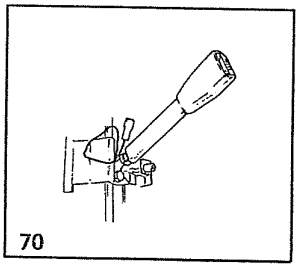
152A 29-pole white connector
152B 29-pole red connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car.

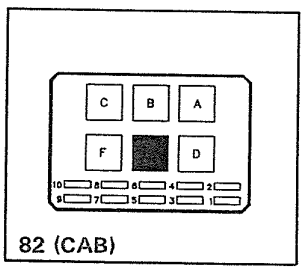
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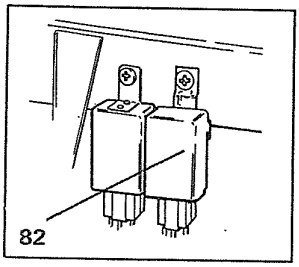
Components





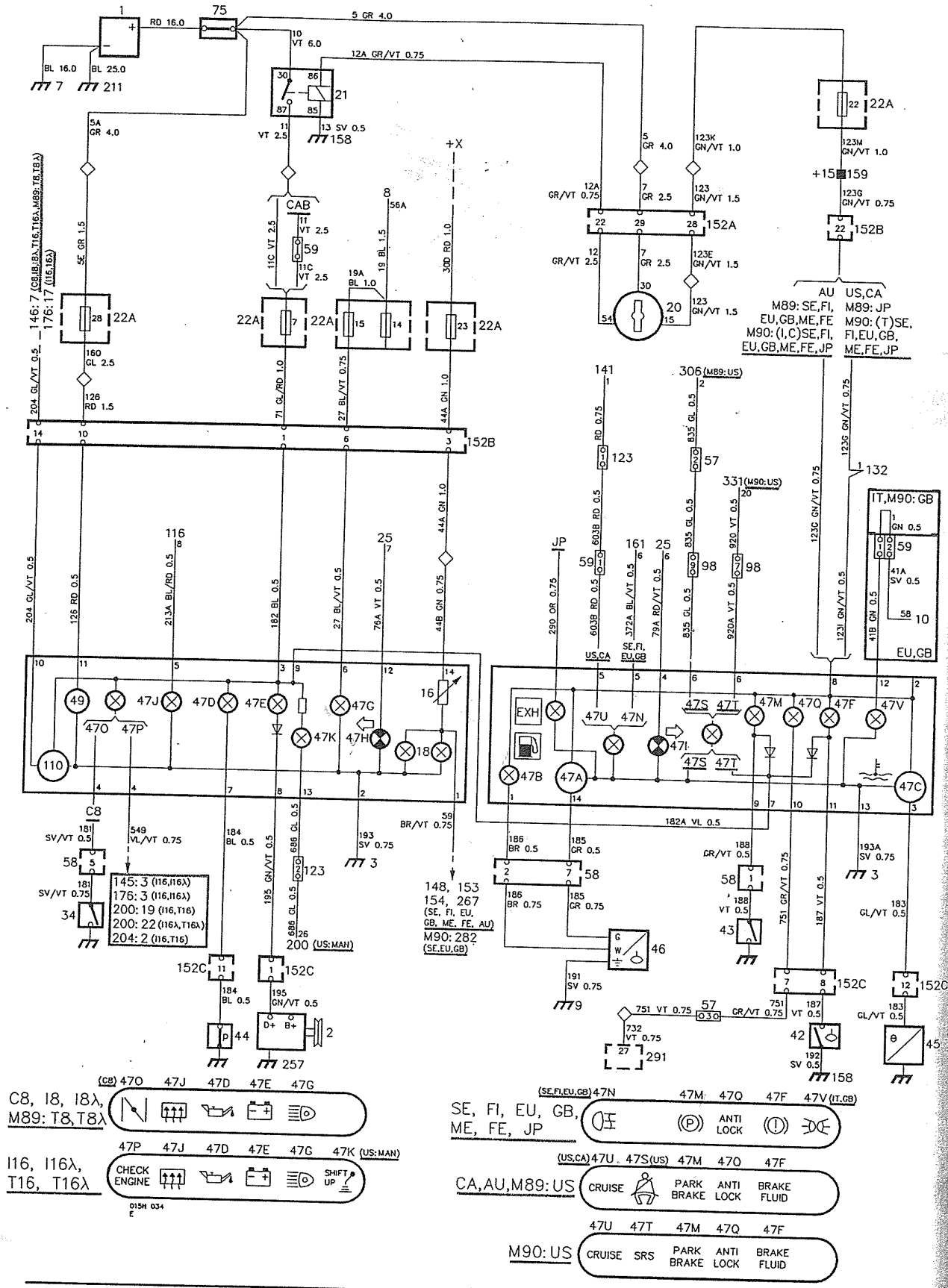






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Combined instrument



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Contents

16 Rheostat 189
47A Fuel gauge and
47B Fuel reserve warning lamp 189
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16 Rheostat

Operation

When the ignition switch is in the drive position, rheostat 16 is supplied via 29-pole red connector 152B and fuse 23.

The brightness of the following instrument lighting can be steplessly adjusted by means of rheostat 16 in combined instrument 47:

18	Combined instrument lighting
148	Ashtray illumination
153	Lighting for the cigarette lighter
154	Lighting for the heater controls

In addition, the dial lighting for the radio (267) connected to connector 98 is adjusted via rheostat 16.

(For complete information, see the section entitled "Lighting systems, Lighting for controls".)

Fault-tracing hints

1. Check the appropriate fuses and check that the supply to them is live.
2. Check the bulbs and check that the supply to them is live.
3. Check the connectors, cable harnesses and earth connections.

47A Fuel gauge and 47B Fuel reserve warning lamp

Operation

The fuel gauge and the fuel reserve warning lamp keep the driver informed of the fuel level in the tank.

When the ignition switch is in the drive position, a positive supply (+15) is taken from fuse 22 to:

- Fuel level gauge 47A in the combined instrument and then through a 3-pole connector (57) to fuel level transmitter 46 in the fuel tank to earth, and
- Fuel reserve warning lamp 47B and then through the fuel level transmitter in the fuel tank to earth.

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

When the fuel content of the tank has dropped to about 7 dm¡3 (litres) or less, the fuel reserve warning lamp will be earthed through the transmitter and the lamp will light up.

Fault-tracing hints

The fuel gauge and the warning lamp for the fuel reserve will be operative when the ignition switch is in the drive position.

1. Check fuse 22 and check that the supply to it is live.
2. Check the bulb and check that the supply to its terminals in the combined instrument is live.
3. Check that the terminals of the fuel gauge and the fuel level transmitter are live.
4. Check the connectors, cable harnesses and the earth connection of the fuel level transmitter.

Resistance of the fuel level transmitter

– 2.4 – 8.0 ohm when the tank is full
– 63.3 – 67.5 ohm when the tank is empty

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47C Temperature gauge

Operation

The temperature gauge shows the engine coolant temperature.

When the ignition switch is in the drive position, coolant temperature gauge 47C is supplied (+15) from fuse 22. The other terminal of the gauge is earthed via coolant temperature transmitter 45.

Changes in the coolant temperature will affect the resistance of the transmitter, and the gauge will thus show the prevailing engine temperature.

Fault-tracing hints

The temperature gauge will be operative when the ignition switch is in the drive position.

1. Check fuse 22 and check that the supply to it is live.
2. Check that the supply to the temperature gauge is live.
3. Check that there is no open circuit in transmitter 45.
4. Check the connectors, cable harnesses and earth connections.

Resistance of the temperature transmitter:

51.2 ± 4.3 ohm at +90 °C (194 °F)

47D Oil pressure warning lamp

Operation

The oil pressure warning lamp is intended to warn the driver that the engine oil pressure is below the predetermined value.

Lamp 47D in the combined instrument is supplied (+54) from fuse 7, via red 29-pole connector 152B.

If the lubricating oil pressure should drop below 0.3–0.5 bar, oil pressure transmitter 44 will close and the lamp will light up.

Fault-tracing hints

The oil pressure warning lamp will be operative when the ignition switch is in the drive position.

1. Check fuse 7 and check that the supply to it is live.
2. Check the bulb and check that the supply to it terminals in the combined instrument is live.
3. Disconnect the cable from the oil pressure transmitter and earth it. If the lamp lights up, the circuit is unbroken.
4. Check the connectors, cable harnesses and the earth connection of the oil pressure transmitter.

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47E Charging warning lamp

Operation

The charging warning lamp informs the driver of whether or not the alternator is charging.

When the ignition switch is in the drive position, a positive voltage will be supplied via fuse 7 and red 29-pole connector 152B to charging warning lamp 47E in the combined instrument. The other side of the lamp is connected to alternator 2.

When the alternator is not rotating or when it is not charging the battery for any other reason, the circuit for the charging warning lamp will be earthed through terminal D+ on the alternator, and the lamp will light up.

When the alternator is charging, terminal D+ will be at the same voltage as the supply from the fuse. The same voltage will then be applied to both terminals of the warning lamp, and the lamp will therefore be extinguished.

(For complete information, see the section entitled "Engine electronics, Battery-charging system".)

Fault-tracing hints

1. Check fuse 7 and check that the supply to it is live.
2. Check the bulb in the warning lamp.
3. Check the connectors, cable harnesses and the earth connections of the alternator.
4. Check that terminal D+ of the alternator is live.

47F Brake fluid level warning lamp

Operation

The brake fluid level warning lamp is intended to warn the driver that the brake fluid level in the reservoir is low. Its operation can be checked by means of a button on the brake fluid reservoir.

When the ignition switch is in the drive position, lamp 47F is supplied (+15) from fuse 22, via red 29-pole connector 152B.

The other side of the lamp is connected to brake warning switch 42, via black 29-pole connector 152C.

If the fluid in the brake fluid reservoir should drop to an inadmissibly low level, switch 42 will close and the warning lamp will light up.

Lamp test

When the ignition switch is turned to the start position, terminal 15 of ignition switch 20 supplies pin 9 of lamp 47F, and the anode of the diode in the combined instrument.

In the start position, the supply from +54 will be open, so that the cathode of the diode in the combined instrument will be earthed via pins 7, 9 and 8 of lamp 47E, and via alternator 2. The diode prevents reverse flow of current.

Fault-tracing hints

The brake fluid level warning lamp will be operative when the ignition switch is in the drive position.

1. Check the brake fluid level warning circuit by pressing the button on the brake fluid reservoir. The circuit should close and the lamp should light up.
2. Check fuse 22 and check that the supply to it is live.
3. Check the bulb and check that the supply to its terminals in the combined instrument is live.
4. Check the connectors, cable harnesses and the earth connection.

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47G Full beam warning lamp

See the description in the section entitled "Lighting systems, Headlamps".

47H, 47I Direction indicator warning lamps (left-hand and right-hand)

See the description in the section entitled "Lighting systems, Direction indicators".

47J Rear window heater warning lamp

See the description in the section entitled "Heating and ventilation systems, Electric heating for the rear window".

47K Shift-up warning lamp

See the description in the section entitled "Engine electronics, LH 2.4 fuel system."

47M Handbrake warning lamp

Operation

The handbrake warning lamp warns the driver that the handbrake is applied.

Lamp 47M in the combined instrument is supplied (+15) from fuse 22 via red 29-pole connector 152B.

As long as the handbrake is applied, handbrake switch 43 will be closed and the lamp will stay alight.

Lamp test

When the ignition switch is turned to the start position, terminal 15 of ignition switch 20 will be live. Current will flow to pin 11 of lamp 47M and the anode of the diode in the combined instrument.

When the switch is in the start position, the supply from +54 is opened, and the cathode of the diode in the combined instrument is therefore earthed via pins 7, 9 and 8 of lamp 47E and alternator 2.

If lamp 47M is in good condition, it should then light up. Correct indication will be obtained only if the handbrake is not applied. The diode prevents reverse flow of current.

Fault-tracing hints

The handbrake warning lamp will be operative when the ignition switch is in the drive position.

1. Check fuse 22 and check that the supply to it is live. Check also fuse 7.
2. Check the bulb and check that the supply to its terminals in the combined instrument is live.
3. Disconnect the cable from the handbrake switch and earth it. If the lamp lights up, the circuit is unbroken.
4. Check the connectors, cable harnesses and the earth connection of the handbrake switch.

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47N Rear fog light warning lamp

See the description in the section entitled "Lighting systems, Rear fog lights".

47O Choke warning lamp

Operation

The choke warning lamp lights up when the choke is partially or totally withdrawn. This lamp is fitted only to cars with carburettor engines.

When the ignition switch is in the drive position, choke warning lamp 47O is supplied (+54) from fuse 7, via red 29-pole connector 152B.

When the choke control is withdrawn, switch 34 will close, and the lamp will light up.

Fault-tracing hints

Choke warning lamp 47O will be operative when the ignition switch is in the drive position.

1. Check fuse 7 and check that the supply to it is live.
2. Check the bulb and check that the supply to its terminals in the combined instrument is live.
3. Disconnect the cable from the choke control switch and earth it. If the lamp lights up, the circuit is unbroken.
4. Check the connectors, cable harnesses and earth connections.

47P CHECK ENGINE warning lamp

Operation

If a fault should occur in the fuel system and/or ignition system, flashing codes will be obtained on warning lamp 47P. This lamp is fitted only to cars with 16-valve engines.

When the ignition switch is in the drive position, warning lamp 47P is supplied (+54) from fuse 7, via red 29-pole connector 152B. Warning lamp 47P then supplies control unit 200 for the LH system and/or control unit 176 for the EZK ignition system.

Warning lamp 47P lights up with a steady light when the ignition switch is in the drive position, before the engine is started.

For complete information, see the section entitled "Engine electronics", "LH fuel system" and "EZK ignition system".

Fault-tracing hints

Warning lamp 47P will be operative when the ignition switch is in the drive position.

1. Check fuse 7 and check that the supply to it is live.
2. Check the bulb and check that the supply to its terminals in the combined instrument is live.
3. Check the connectors, cable harnesses and earth connections.

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47Q ABS warning lamp

See the description in the section entitled "Anti-lock brakes (ABS)"

47S Passive seat-belt warning lamp (1989 models)

See the description in the section entitled "Other systems, passive seat belts".

47T SRS Airbag warning lamp (1990 models)

Operation

See the section entitled "Other systems, Airbag".

EXH warning lamp (JP)

Cars destined for the Japanese market are equipped with an EXH warning lamp to warn the driver of overheating of the catalytic converter.

47U Cruise Control operative warning lamp

See the description in the section entitled "Other systems, Cruise Control".

47V Warning lamp for headlamps switched on

See the description in the section entitled "Lighting systems, Headlamps and Parking lights"

49 Clock

Operation

Clock 49 is located in combined instrument 47. The positive supply to the clock is taken from fuse 28, via red 29-pole connector 152B. The supply to the clock is live (+30) regardless of the position of the ignition switch.

Fault-tracing hints

1. Check fuse 28 and check that the supply to it is live.
2. Check that the positive terminal of the clock is live, and that the negative terminal is earthed.
3. Check the connectors, cable harnesses and earth connection.

110 Tachometer

See the description in the section entitled "Engine electronics, Ignition systems".

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Locations of components

1 Battery
on the right-hand side of the engine compartment

2 Alternator
on the left-hand side of the engine

3 Earthing point in the fascia

7 Earthing point on the radiator cross-member

8 Lighting relay
in the electrical distribution box in the engine compartment, relay positions A and B

9 Earthing point in the luggage compartment

10 Light switch
on the left-hand side of the fascia

16 Instrument lighting rheostat
in the combined instrument

18 Combined instrument lighting
in the combined instrument on the fascia

20 Ignition switch
on the centre console between the front seats

21 Ignition switch relay
in the electrical distribution box, in the engine compartment, relay position E

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

25 Hazard warning light switch
on the fascia

34 Choke control switch
on the centre console between the front seats

42 Brake warning switch
on the brake fluid reservoir

43 Handbrake switch
under the plastic cover at the handbrake lever, between the front seats

44 Oil pressure transmitter
on the left-hand side of the engine block, above the oil filter

45 Coolant temperature transmitter
on the right-hand side of the thermostat

46 Fuel level transmitter
in the fuel tank – the terminals are accessible from the luggage compartment

47A Fuel level gauge
47B Fuel reserve warning lamp
47C Coolant temperature gauge
47D Oil pressure warning lamp
47E Charging warning lamp
47F Brake warning lamp
47G Full beam warning lamp
47H Left-hand direction indicator warning lamp

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47I Right-hand direction indicator warning lamp
47J Rear window heater warning lamp
47K Shift-up warning lamp (US, manual)
47M Handbrake warning lamp
47N Rear fog light warning lamp (SE, FI, EU, GB)
47O Choke warning lamp (C8)
47P Check engine warning lamp (I16, I16 Lambda, T16, T16 Lambda)
47Q ABS warning lamp
47S Passive seat-belt warning lamp (1989 models)
47T SRS Airbag warning lamp (1990 models)
47U Cruise Control warning lamp
47V Warning lamp for headlamps switched on in the combined instrument on the fascia

49 Clock on the fascia

57 3-pole connector
one under the back seat, on the left-hand side
one on the left-hand side in the engine compartment, at the electrical distribution box

58 12-pole connector
to the left of the steering column, under the fascia, behind the knee shield

59 2-pole connector
one to the left of the fascia, at the lighting switch
one under the fascia, to the left of the steering column, behind the knee shield
one in the electrical distribution box in the engine compartment, on the left-hand wheel housing (Convertible)

60 Single-pole connector (auto.)
under the centre console, at the selector lever

75 Distribution block
in the engine compartment, on the right-hand side

98 10-pole connector
to the left of the steering column, under the fascia (behind the knee shield)

110 Tachometer
in the combined instrument

116 Switch for the electrically heated rear window
on the fascia

117 Earthing point
between the ignition switch and the handbrake lever

123 4-pole connector
one forward of the right-hand front door, below the fascia (behind the trim)
one on the left-hand side, under the fascia (behind the knee shield)

132 Speed transmitter
in the combined instrument

141 Selector for Cruise Control
in the direction indicator stalk switch, on the left-hand side of the steering column

146 Amplifier for the electronic ignition system
in the engine compartment, on the left-hand wheel housing

148 Ashtray illumination
on the fascia, in the ashtray

152A 29-pole white connector
152B 29-pole red connector
152C 29-pole black connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car.

153 Lighting for the cigarette lighter
on the fascia, at the cigarette lighter

154 Lighting for heater controls
on the fascia, at the respective heater control

158 Negative distribution terminal
159 Distribution terminal +15
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

161 Switch for the rear fog lights
on the left-hand side of the fascia

176 Control unit for EZK ignition system
in the engine compartment, forward of the left-hand wheel housing

200 Control unit for the LH system
forward of the right-hand front door, below the fascia, behind the trim

211 Earthing point on the gearbox

257 Earthing point on the alternator bracket

267 Radio connector
in the radio compartment in the fascia

282 Headlamp beam control switch (1990 model)
on the fascia

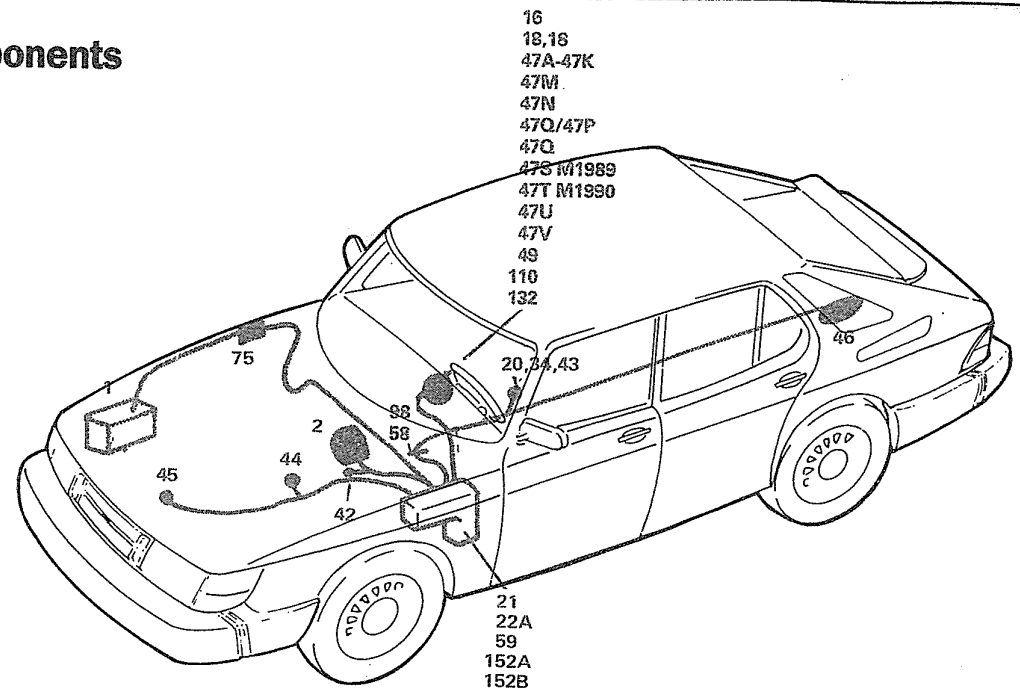
291 ABS control unit
on the left-hand side of the engine compartment, forward of the wheel housing (1989 models)
under the right-hand side of the back seat

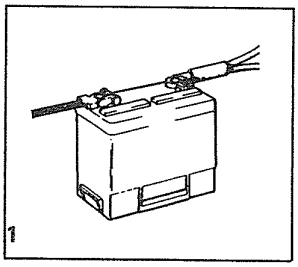
306 Logic box for passive seat belts
under the back seat, on the left-hand side

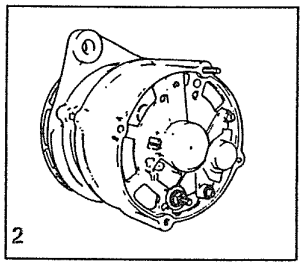
331 Electronic unit for the Airbag (1990 models)
in the fascia, under the left-hand speaker grille

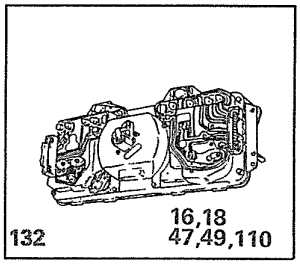
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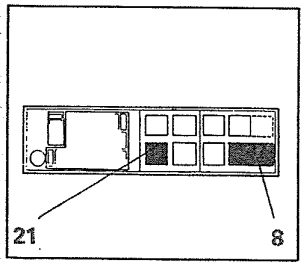
Components

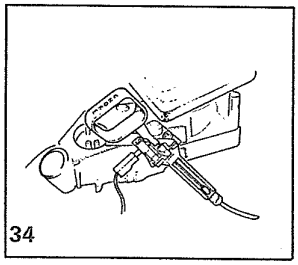


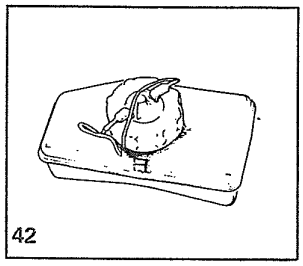


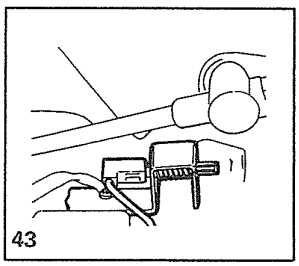


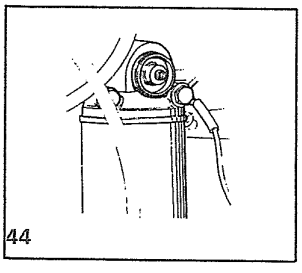


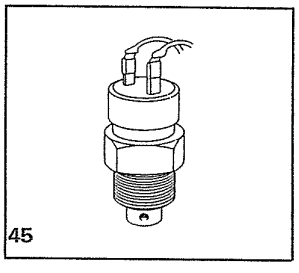


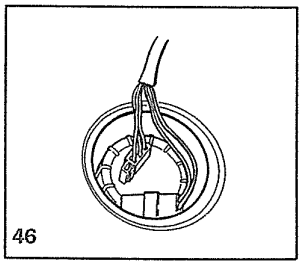


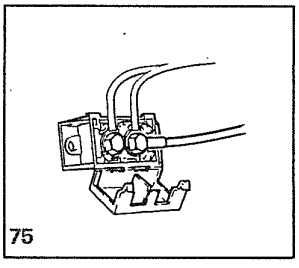






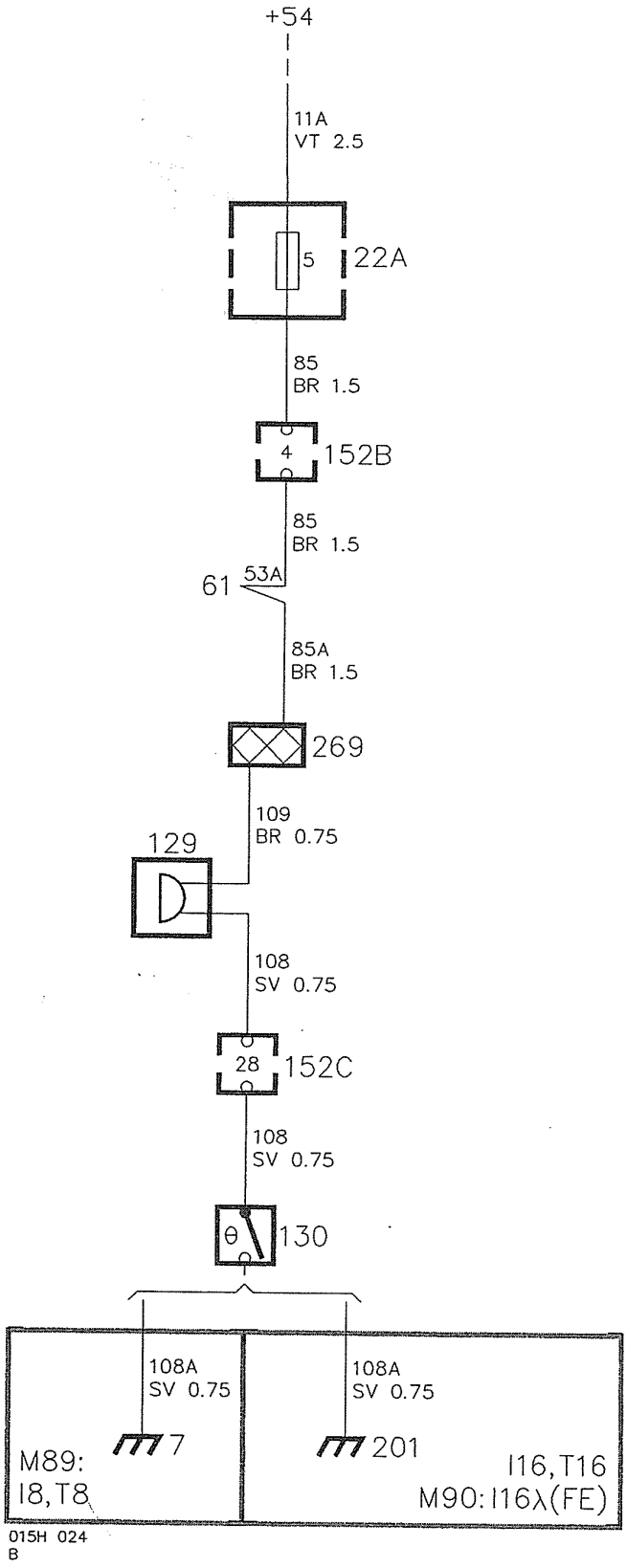






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Coolant temperature warning buzzer



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Operation

Cars for the Middle East and Far East markets are equipped with a coolant temperature warning buzzer.

When the ignition switch is in the drive position, buzzer 129 will be supplied from fuse 5, via red 29-pole connector 152B. If the coolant temperature should exceed about +120 °C (250 °F), coolant temperature warning switch 130 will close and the buzzer will sound. The switch will open again at about +115 °C (240 °F).

Fault-tracing hints

The buzzer will be operative when the ignition switch is in the drive position.

1. Check fuse 5 and check that the supply to it is live.
2. Check that the supply to the buzzer is live. The buzzer should sound when the cable to the temperature switch is earthed.
3. Check the temperature switch.
4. Check the connectors, cable harnesses and earth connections.

Locations of components

7 Earthing point on the radiator cross-member (I8, T8) (1989 models)

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

61 Windscreen wiper stalk switch
on the right-hand side of the steering column

129 Buzzer for coolant temperature
under the fascia, to the left of the steering column, behind the knee shield

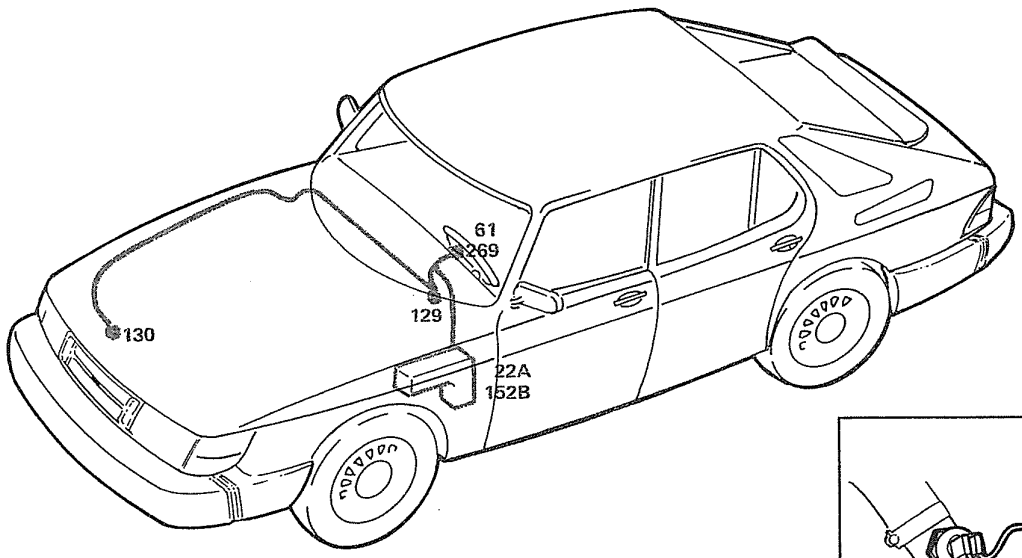
130 Coolant temperature warning switch
in the engine compartment, on the radiator hose

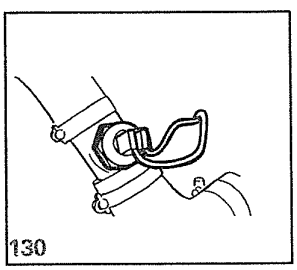
152B 29-pole red connector
152C 29-pole black connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car.

201 Earthing point on the engine (I16, T16)

269 Two-pole connector
under the fascia, behind the knee shield

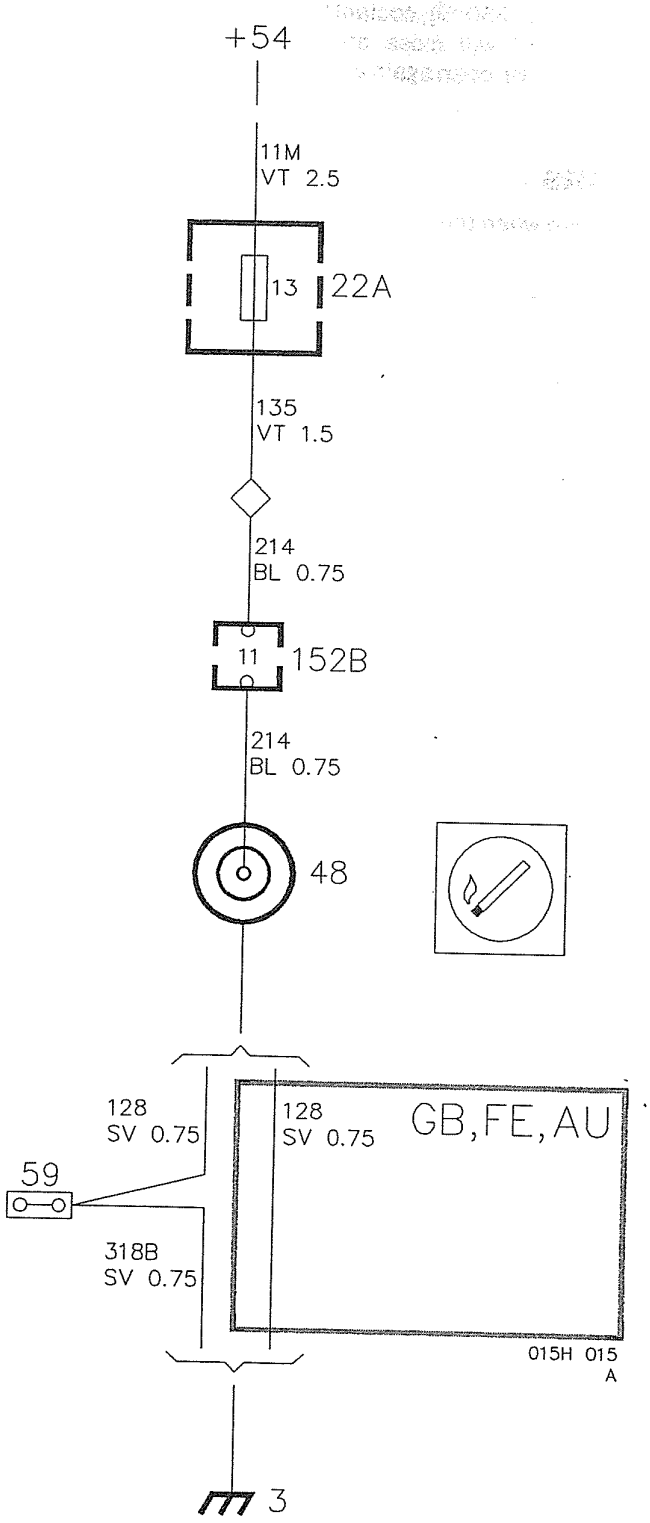
Components





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Cigarette lighter



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Operation

When the ignition switch is in the drive position, the cigarette lighter is supplied from fuse 13, via red 29-pole connector 152B. The circuit will be closed when the cigarette lighter is depressed.

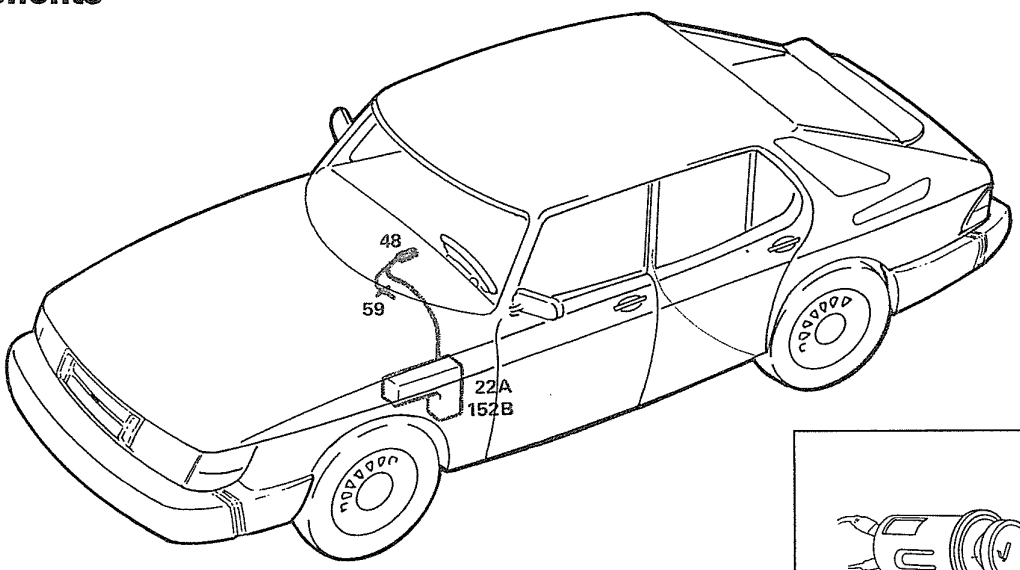
Fault-tracing hints

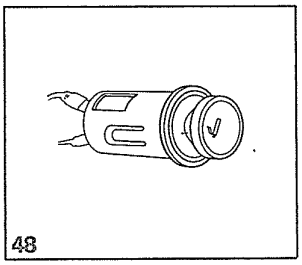
1. Check fuse 13 and check that the supply to it is live.
2. Check that the filament of the cigarette lighter is unbroken.
3. Check the earth connection.

Locations of components

3	Earthing point in the fascia
22A	Fuse holder in the electrical distribution box, in the engine compartment, on the left-hand wheel housing
48	Cigarette lighter on the right-hand side of the fascia
59	2-pole connector behind the fascia
152B	29-pole red connector in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connector is accessible from the interior of the car.

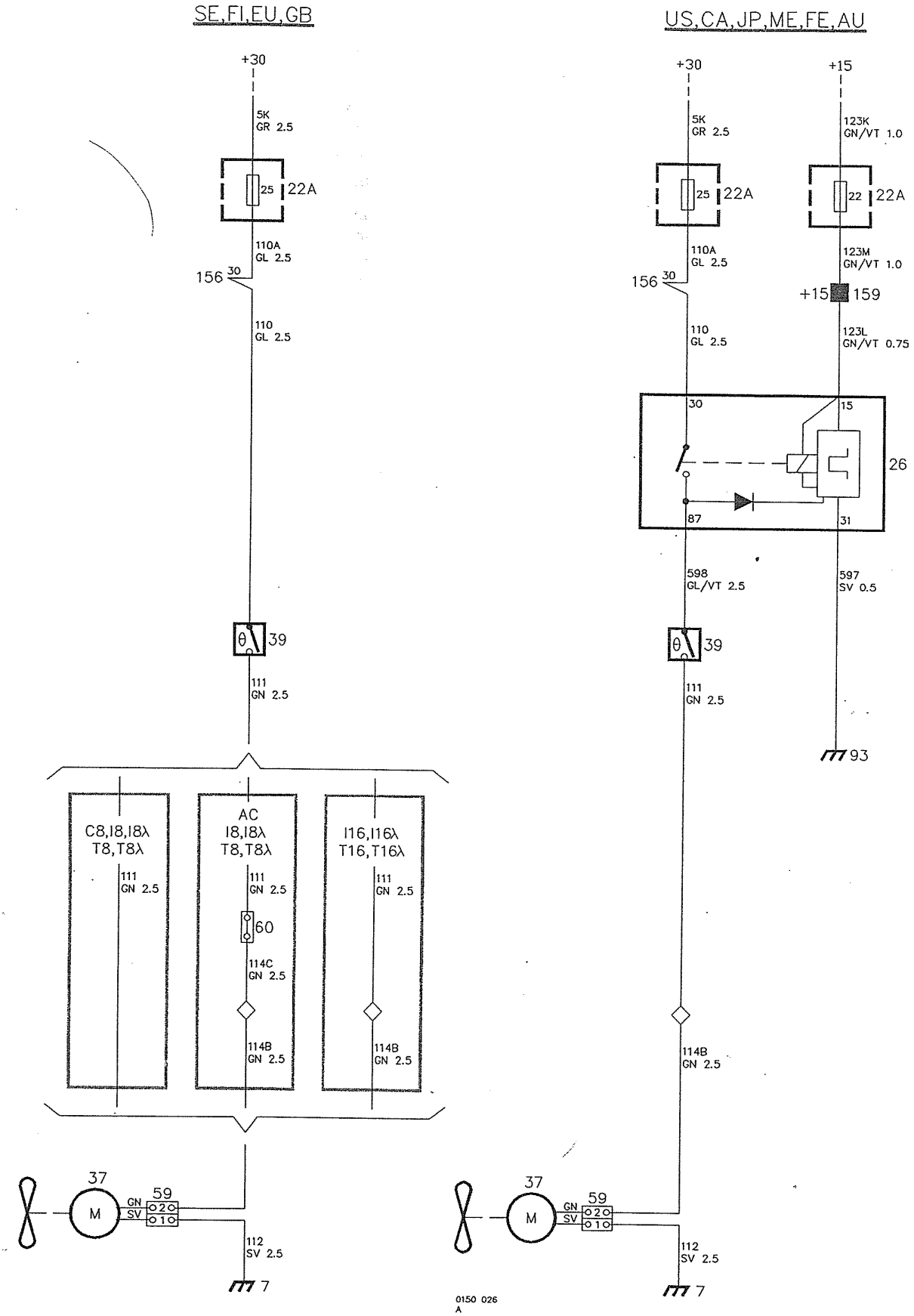
Components





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Cooling system fan, 1989 models



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Operation

The supply is taken from fuse 25 to temperature switch 39, regardless of the ignition switch position.

When the engine coolant temperature has reached about 92 °C (198 °F), the temperature switch will close and radiator fan motor 37 will start.

Cars with air conditioning (AC) are equipped with a crimped branch connection, since the fan is also controlled by the AC unit.

Time-delay relay

Cars for "hot-weather markets" are also equipped with a time-delay relay, which limits the time the radiator fan will run after the engine has been switched off.

Relay 26 is always energised when the engine is running, i.e. when the ignition switch is in the drive position. The fan is controlled by switch 39.

When the engine is switched off, the +15 supply to the relay coil will be interrupted. After about 10 minutes, the relay will trip the supply to the fan motor, even if temperature switch 39 is still closed.

Cars for SE, FI, EU and GB markets

On these markets, the wiring for the AC is not fitted as standard to cars with I8 and T8 engines. An AC cable harness must be fitted when the AC is installed.

Fault-tracing hints

1. Check fuse 25 and check that the supply to it is live.
2. Check that the supply to temperature switch 39 is live.
3. Check the radiator fan by connecting a jumper across the temperature switch.
4. Run the engine until it reaches normal operating temperature and check the performance of the temperature switch.
5. Check the connectors, cable harnesses and earth connections.

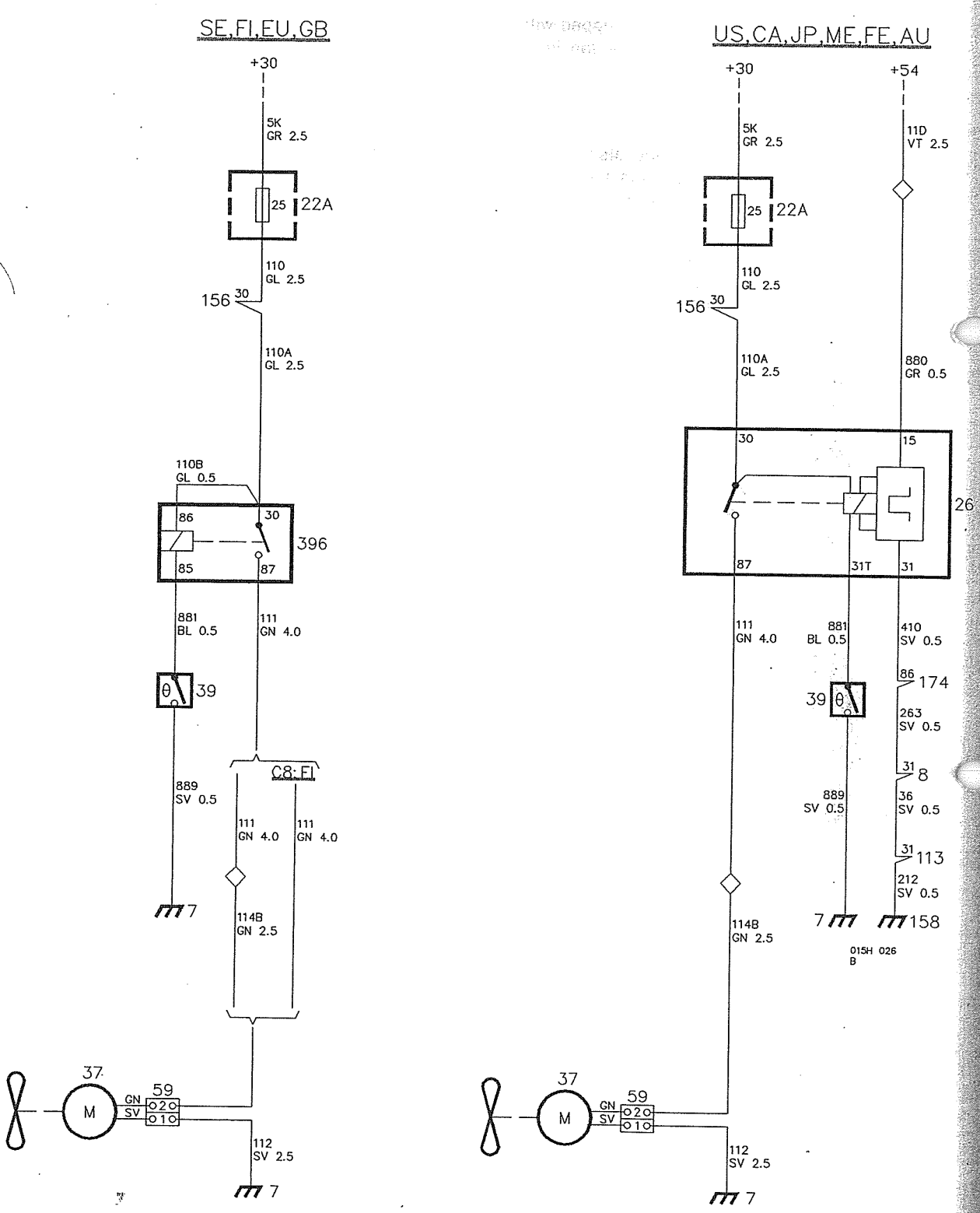
If the car is equipped with a time-delay relay, check the relay and fuse 22.

Locations of components

See the section entitled "Cooling system fan, 1990 models" on pages 206 – 207.

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Cooling system fan, 1990 models



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Operation

The supply is taken from fuse 25 to relay 396, regardless of the ignition switch position.

When the engine coolant temperature has reached about 92 °C (198 °F), temperature switch 39 will close, relay 396 will be energised and power will be supplied to the radiator fan motor.

Cars with air conditioning (AC) are equipped with a crimped branch connection, since the fan is also controlled by the AC unit.

Time-delay relay

Cars for "hot-weather markets" are also equipped with a time-delay relay, which limits the time the radiator fan will run after the engine has been switched off.

Relay 26 will be energised when temperature switch 39 has closed.

When the engine is switched off, the +15 supply to the relay coil will be interrupted. After about 10 minutes, the relay will trip the supply to the fan motor, even if temperature switch 39 is still closed.

Cars for SE, FI, EU and GB markets

26

On these markets, the wiring for the AC is not fitted as standard to cars with I8 and T8 engines. An AC cable harness must be fitted when the AC is installed.

Fault-tracing hints

1. Check fuse 25 and check that the supply to it is live.
2. Check that the supply to relay 396 is live.
3. Check the operation of the relay and the radiator fan by connecting a jumper across the temperature switch.
4. Run the engine until it reaches normal operating temperature and check the performance of the temperature switch.
5. Check the connectors, cable harnesses and earth connections.

If the car is equipped with a time-delay relay, check the relay and fuse 22.

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Locations of components

7 Earthing point on the radiator cross-member

8 Lighting relay (1990 models)
in the electrical distribution box in the engine compartment, relay positions A and B.

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

26 Time delay relay for the radiator fan
in the engine compartment, at the front of the left-hand wheel housing member (1989 models)
in the electrical distribution box, relay position G (1990 models)

37 Radiator fan motor
at the front of the engine compartment

39 Temperature switch for radiator fan
on the left-hand side of the radiator

59 2-pole connector
at the radiator fan motor

60 Single-pole connector (AC)
in the engine compartment, behind the radiator

93 Earthing point on the left-hand wheel housing member (1989 models)

113 Relay/time delay relay for the electrically heated rear window (1990 models)
in the electrical distribution box in the engine compartment, relay position C

156 Relay for the AC compressor
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

158 Negative distribution terminal (1990 models)
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

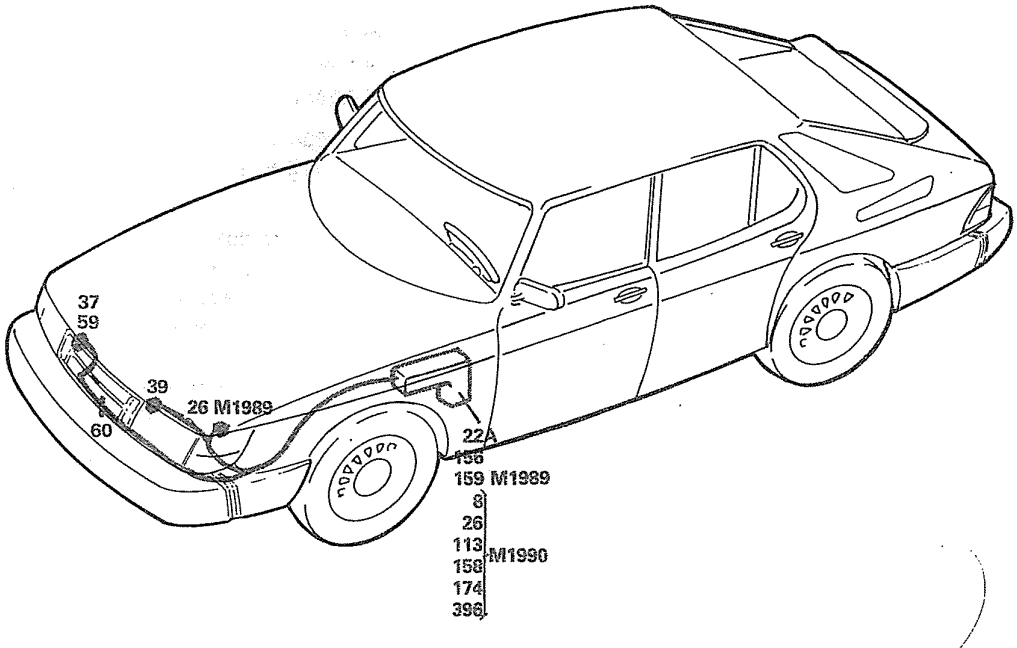
159 Distribution terminal +15 (1989 models)
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

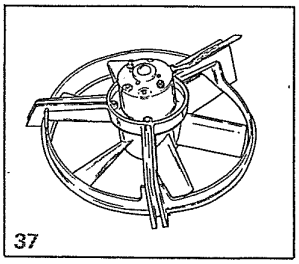
174 Relay for daylight driving lights (CA) (1990 models)
in the electrical distribution box in the engine compartment, relay position F

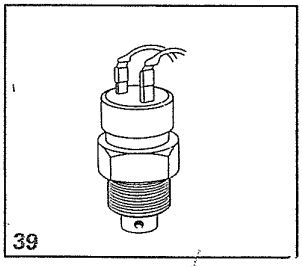
396 Radiator fan relay (1990 models)
in the electrical distribution box, relay position G

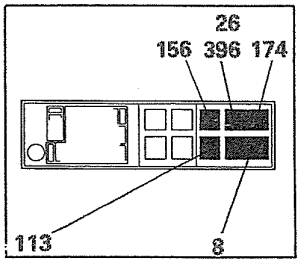
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Components



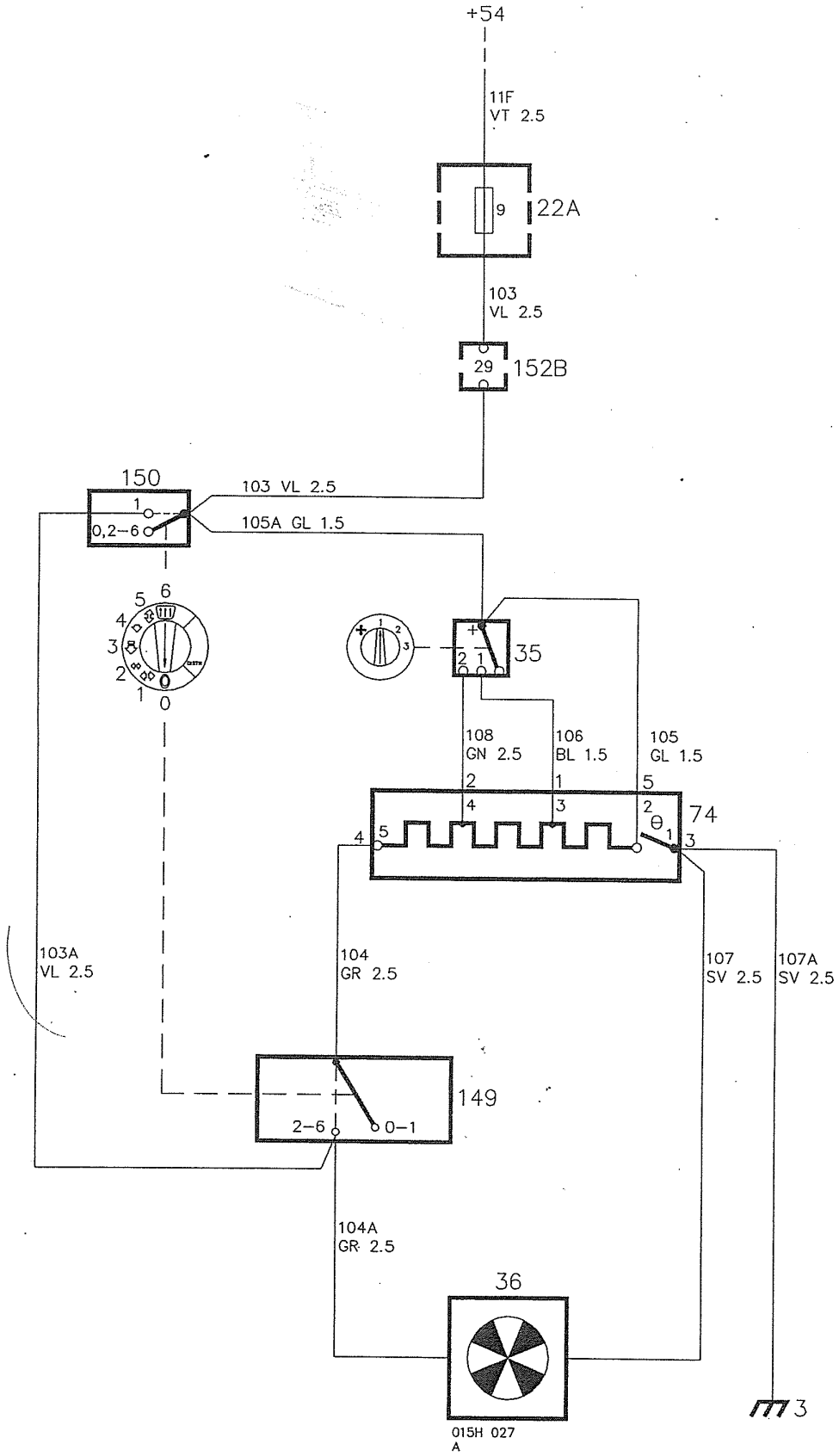






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Ventilation fan



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Operation

Ventilation fan motor 36 has three speeds and is controlled from fan selector switch 35.

Switch 35 is supplied from fuse 9, via red 29-pole connector 152B. The fan speed can be varied by taking the supply from different points on resistor 74.

When main fan switch 149 is closed, the fan will always be running, regardless of the position of the fan selector switch.

Main switch 149 and AC switch 150 are controlled by the air distribution control. Switch 149 is closed when the control is in any position except positions 0 and ⧫ ⧫, when it is open (the control is closed). Switch 150 is closed when the control is in position ⧫ ⧫. The fan motor will then receive the full supply voltage and will run at the highest speed.

If resistor 74 is overloaded, the resulting heat will cause the bimetal switch to close. The positive supply will be earthed, and fuse 9 will blow. The bimetal switch will open when it has cooled.

Fault-tracing hints

The ventilation fan will be operative when the ignition switch is in the drive position.

1. Check fuse 9 and check that the supply to it is live.
2. Check that the supplies to switch 150 and switch 35 are live.
3. Turn the switch to different positions and check that the voltage to the fan motor changes.
4. Check the connectors, cable harnesses and earth connections.

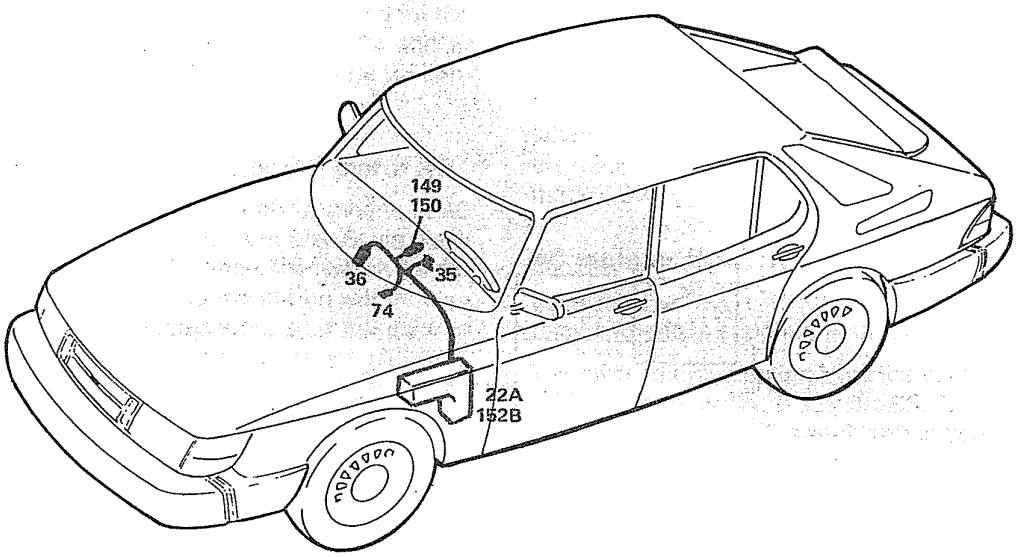
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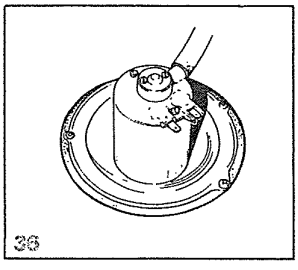
Locations of components

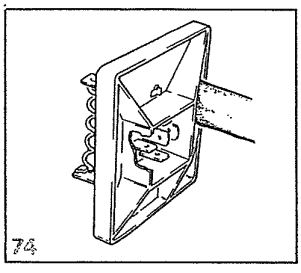
3	Earthing point in the fascia
22A	Fuse holder in the electrical distribution box, in the engine compartment, on the left-hand wheel housing
35	Selector switch for the ventilation fan in the centre of the fascia
36	Motor for the ventilation fan under the right-hand speaker grille
74	Resistor for the ventilation fan to the right, under the left-hand speaker grille
149	Main switch for ventilation fan on the fascia, in the air distribution control (upper contact)
150	Air distribution switch, AC position on the fascia, in the air distribution control (lower contact)
152B	29-pole red connector in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connector is accessible from the interior of the car.

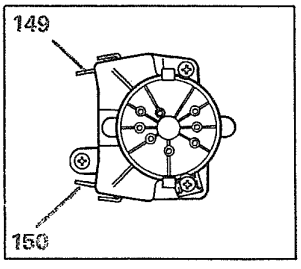
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Components



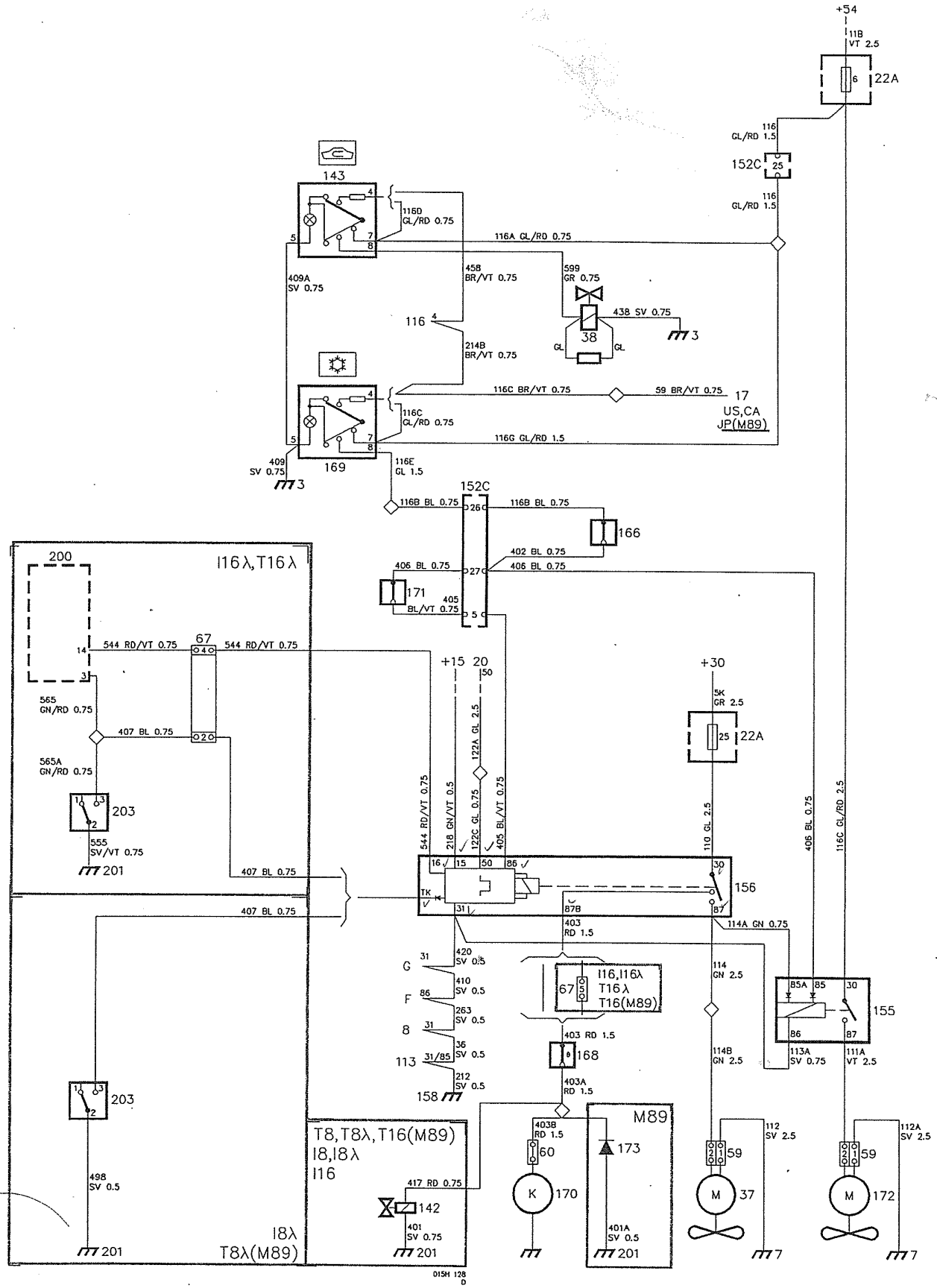






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Air Conditioner (AC) with time-delay relay



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Operation

Certain cars are equipped with an Air Conditioner (AC). For a complete description of the wiring for the lighting of switches on cars for the US, CA and JP markets, see the section entitled "Lighting for controls – US, CA, JP".

Compressor 170 and radiator fan motor 37

The AC can be switched on and off by means of AC switch 169, which is supplied from fuse 6, via black 29-pole connector 152C. When the switch is depressed, the lamp built into the button will be supplied directly (not via the resistor), so it will light up with full intensity. (When the switch is not activated, the lamp is supplied via fuse 6.)

Compressor 170 and ordinary radiator fan 37 are connected via relay 156, whose contacts are supplied from fuse 25. The relay will be energised when the following conditions have been satisfied:

- Pressure switch 166 is closed, i.e. the refrigerant pressure is at least 2.8 bar.
- Anti-freeze thermostat (cycling clutch contact) 171 is closed, i.e. the ambient temperature is at least about +6 °C.

When the relay is energised, power will be supplied to the compressor only if temperature switch 168 is closed. (The switch will open if the engine temperature should exceed about +115 °C.)

Diode 173, which is connected in parallel with the compressor, reduces the voltage transients at the instant when the compressor is switched off (1989 model).

Delayed connection when starting

Relay 156 is equipped with two time delay functions. One of these is activated whenever the engine is started. Ignition switch 20 (in the start position) supplies pin 50, and if switch 169 is then depressed, the energising of the relay and thus starting of the compressor will be delayed by about 10 – 20 seconds (depending on the engine variant), to ensure that combustion in the engine will be stable after starting, before the the AC load is applied.

Idling speed compensation and cut-out at full load

Cars without AIC valve

Solenoid valve 142, which is kept open when the compressor is running, is used for idling speed compensation for the increased load caused by the AC.

Cars with AIC valve

On certain variants, the auxiliary air valve is replaced by an Automatic Idling Control (AIC) valve which also compensates for instantaneous load increases at idling speed.

The control unit receives a signal via relay pin 16 when the time delay of the relay is activated, and it then starts idling speed compensation. After 0.3 seconds, the relay will be energised and the compressor will start. The relay electronics receive their supply (in the drive position) via pin 15.

When the engine is running at full throttle, pin TK of the relay will be earthed through throttle angle transmitter 203, and the relay will trip the compressor.

AC radiator fan 172

Extra radiator fan 172 for the AC is connected via relay 155 and is supplied from fuse 6.

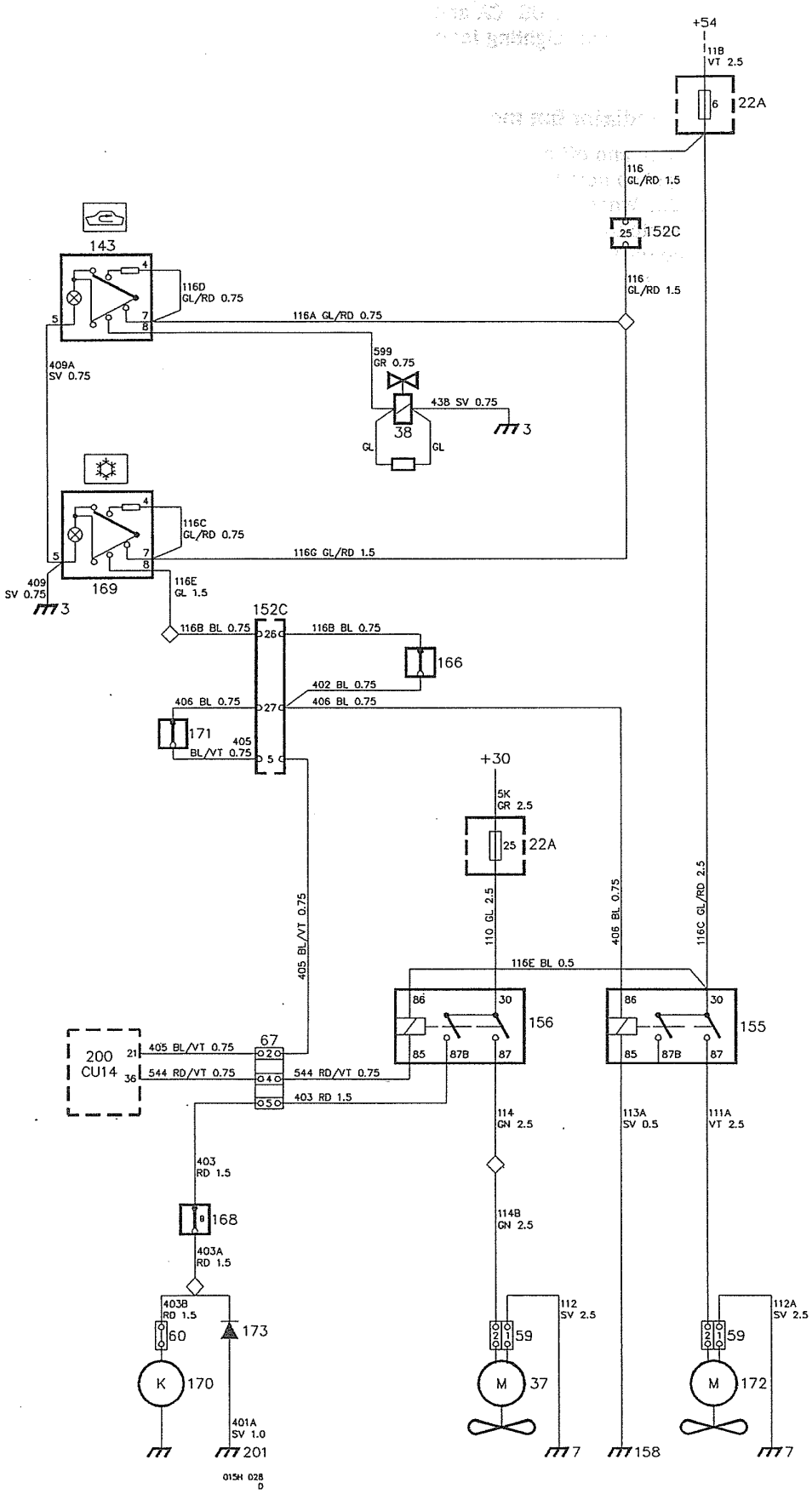
The relay coil is supplied from the contacts of relay 156 and from pressure switch 166. The AC radiator fan thus runs when AC switch 169 is depressed and pressure switch 166 is closed.

Recirculation valve 38

Recirculation valve 38, which controls the recirculation damper, will be switched on when recirculation switch 143 is depressed. The switch is supplied from fuse 6. When the switch is depressed, the lamp built into the switch will light up with full intensity.

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Air Conditioner (AC) (CU14)



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Operation

Certain cars are equipped with an Air Conditioner (AC).

Compressor 170 and radiator fan motor 37

The AC can be switched on and off by means of AC switch 169, which is supplied from fuse 6, via black 29-pole connector 152C. When the switch is depressed, the lamp built into the button will be supplied directly (not via the resistor), so it will light up with full intensity. (When the switch is not activated, the lamp is supplied via fuse 6.)

Compressor 170 and ordinary radiator fan are connected via relay 156. The relay will be energised when the following conditions have been satisfied:

- Pressure switch 166 is closed, i.e. the refrigerant pressure is at least 2.8 bar.
- Anti-freeze thermostat (cycling clutch contact) 171 is closed, i.e. the ambient temperature is at least about +6 °C.

Pin 21 of control unit 200 will then be energised. Relay 156 will be energised when it is earthed via pin 36 of the control unit. When the relay is energised, the compressor will be supplied only if temperature switch 168 is closed. (The switch will open if the engine temperature should exceed about +115 °C.) Diode 173, which is connected in parallel with the compressor, reduces the voltage transients at the instant when the compressor is switched off.

Delayed connection when starting

The delay and idling speed compensation when the AC is switched in are controlled by control unit 200.

AC radiator fan 172

Extra radiator fan 172 for the AC is connected via relay 155 and is supplied from fuse 6. The relay coil is supplied from pressure switch 166. The AC radiator fan thus runs when AC switch 169 is depressed and pressure switch 166 is closed.

Recirculation valve 38

Recirculation valve 38, which controls the recirculation damper, will be switched on when recirculation switch 143 is depressed. The switch is supplied from fuse 6. When the switch is depressed, the lamp built into it will light up with full intensity.

Fault-tracing hints

As a general rule, the supply to the unit is live when the ignition switch is in the drive position. If none of the components is faulty, check the cable harnesses, connectors and earth connections.

Compressor 170 and radiator fan motor 37

1. Check fuses 6 and 25 and check that the supplies to AC switch 169 and relay 156 are live.
2. Press the AC switch. Measure the voltage across pressure switch 166 (the pressure switch should be closed). Note that refrigerant will spray out when the pressure switch is disconnected. Caution: Risk of frostbite.
3. Check cycling clutch contact 171. (It should close at +6 °C or 43 °F.)
4. Check that the relay is energised and that the relay contacts (87 and 87A) are live. If not, check that the coil/electronics are being supplied from thermostat 171 and from the +15 distribution terminal. When the relay is energised, terminal 16 should be live. At full throttle, terminal TK should be earthed.
5. Check that the supplies to the compressor and the radiator fan are live. (Temperature switch 168 should be closed.)

CU14 fuel system

4. Check that pin 21 of control unit 200 is live and that relay 156 is earthed from pin 36 of the control unit.
5. Check that the supplies to the compressor and the radiator fan are live. (Temperature switch 168 should be closed.)

AC radiator fan 172

1. Check fuse 6 and check that the supplies to the AC switch and to relay 155 are live.
2. Press the AC switch. Measure the voltage across pressure switch 166 (the pressure switch should be closed). Note that refrigerant will spray out when the pressure switch is disconnected. Caution: Risk of frostbite.
3. Check that relay 155 is energised and that the supply to the AC radiator fan is live.

Recirculation

1. Check fuse 6 and check that the supply to recirculation switch 143 is live.
2. Press the switch and check that the recirculation valve is activated.

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Locations of components

3 Earthing point in the fascia

7 Earthing point, radiator cross-member

8 Lighting relay
in the electrical distribution box in the engine compartment, relay positions A and B.

17 Extra rheostat for the lighting of switches and controls
on the left-hand side of the fascia

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

37 Radiator fan motor (ordinary)
on the right-hand side of the radiator package

38 Recirculation valve
under the fascia on the right-hand side, forward of the right-hand A pillar

59 2-pole connector
one adjacent to radiator fan 37
one adjacent to AC radiator fan 172

60 Single-pole connector
one at the extreme rear of the engine compartment, at the compressor
one at the back seat, for connecting the AC

67 6-pole connector
in the engine compartment, on the right-hand side, at the air intake

113 Relay/time delay relay for the electrically heated rear window
in the electrical distribution box in the engine compartment, relay position C

116 Switch for the electrically heated rear window
on the fascia

142 Solenoid valve for raising the idling speed, AC
on the engine, on the by-pass hose of the throttle housing

143 Recirculation switch, AC
in the centre of the fascia

152C 29-pole black connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connector is accessible from the interior of the car.

155 Relay for the AC radiator fan
in the electrical distribution box in the engine compartment, relay position J

156 Relay for the AC compressor
in the electrical distribution box in the engine compartment, relay position H

158 Negative distribution terminal
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

166 Pressure switch for the AC radiator fan
in the engine compartment, on the drying agent container, forward of the right-hand wheel housing

168 Coolant temperature switch, AC
on the radiator inlet hose, near the distributor

169 Switch, AC
in the centre of the fascia

170 Compressor for the AC
at the rear of the engine compartment

171 Anti-freeze thermostat (cycling clutch contact) for the AC
under the fascia, forward of the right-hand A pillar

172 Radiator fan for the AC
on the left-hand side of the radiator package

173 Diode for the AC compressor
in the cable harness, at the rear of the valve cover

200 Control unit for the LH/CU14 fuel system
forward of the right-hand front door, below the fascia (behind the trim)

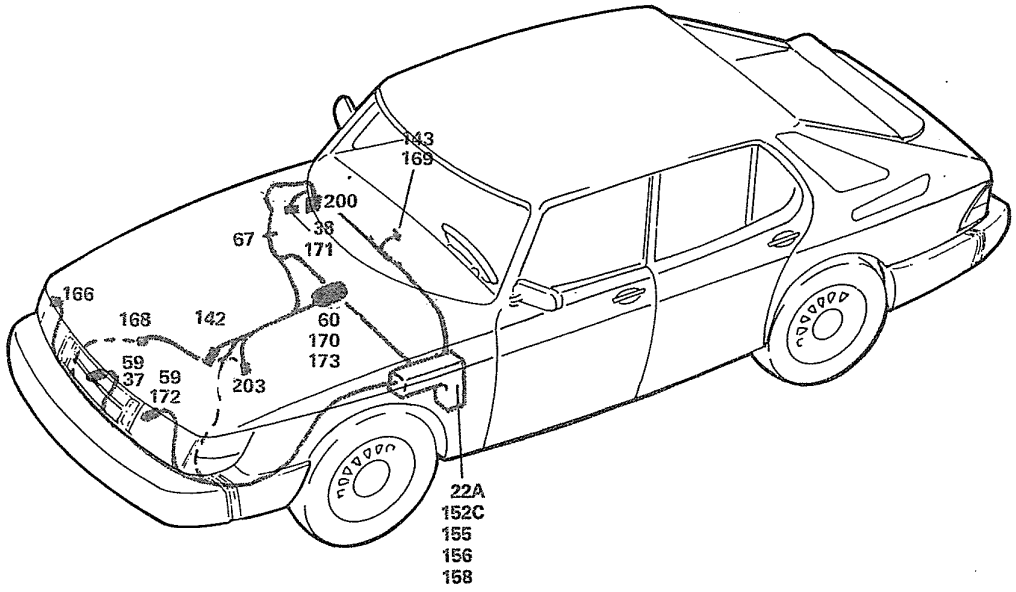
201 Engine earthing point
at the engine lifting lug

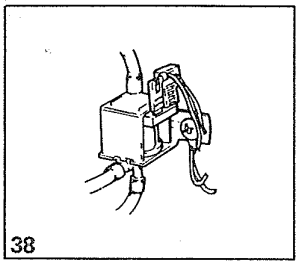
203 Throttle angle transmitter for the LH fuel injection system
on the engine throttle housing

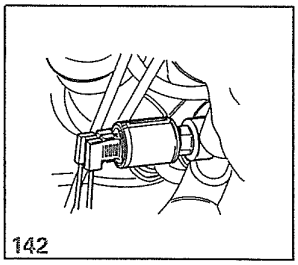
F Relay position F
G Relay position G
in the engine compartment, in the electrical distribution box

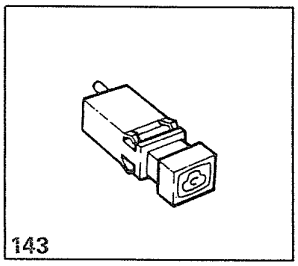
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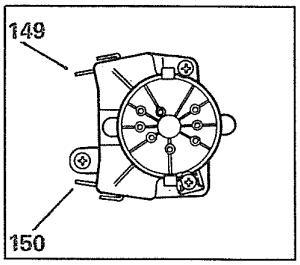
Components

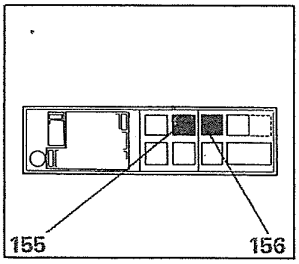


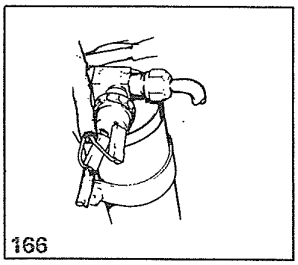


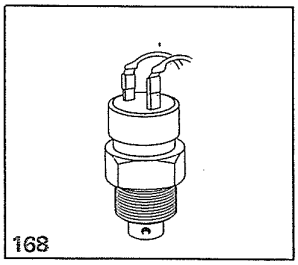


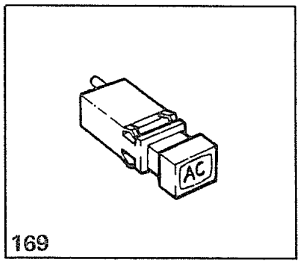


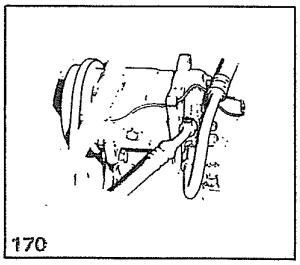


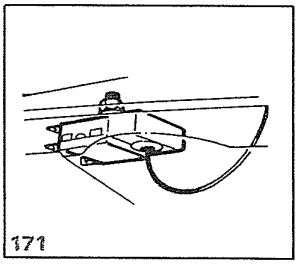


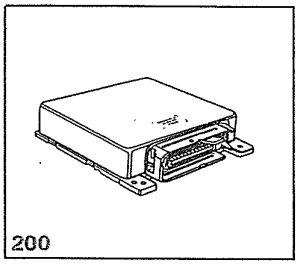


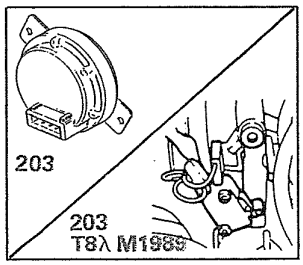






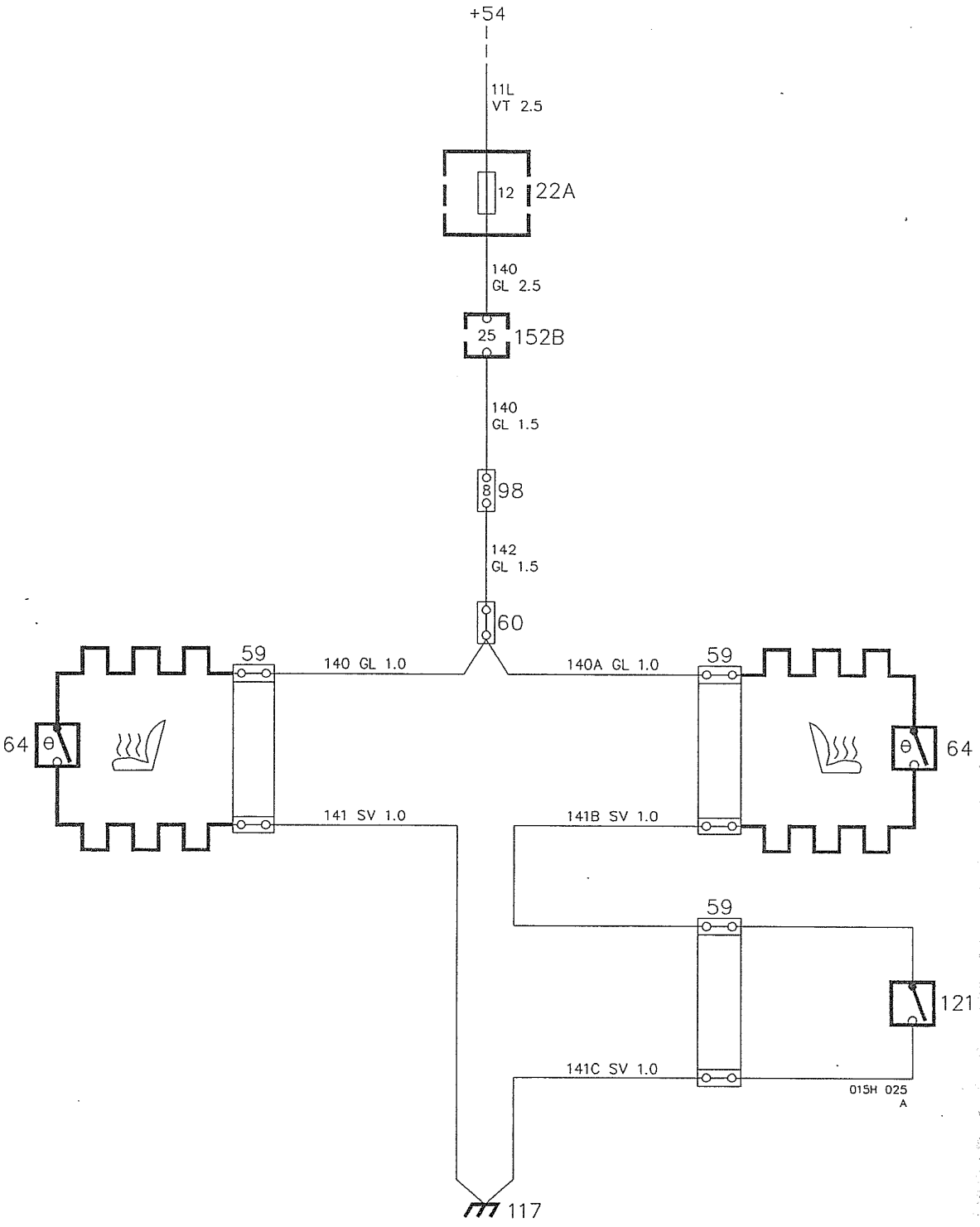






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Electrically heated front seats



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Operation

Both front seats of the car are electrically heated.

The heating pads are supplied from fuse 12, via red 29-pole connector 152B. The heating pads are switched on and off by thermostats 64. These close the circuit at about +14 °C (57 °F) and open it at about +28 °C (82 °F).

The heating pad of the co-driver's seat is earthed via seat switch 121. When a load is applied to the seat, the seat switch will close and the heating pad can be switched on and off by thermostat 64. This heating pad will thus be operative only when a person is seated in the co-driver's seat.

Fault-tracing hints

The heating pads will be operative when the ignition switch is in the drive position.

1. Check fuse 12 and check that the supply to it is live.
2. Check thermostats 64 and check that the supply to them is live.
3. Check seat switch 121 under the co-driver's seat.
4. Check that there is no open circuit in the heating pad wiring.
5. Check the connectors, cable harnesses and earth connections.

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Locations of components

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

59 2-pole connector
one under each front seat

60 Single-pole connector
under the centre console, near the ignition switch

64 Heating pad with thermostat
in the seat cushion and backrest of the driver's and co-driver's seats

98 10-pole connector
to the left of the steering column, behind the knee shield below the fascia

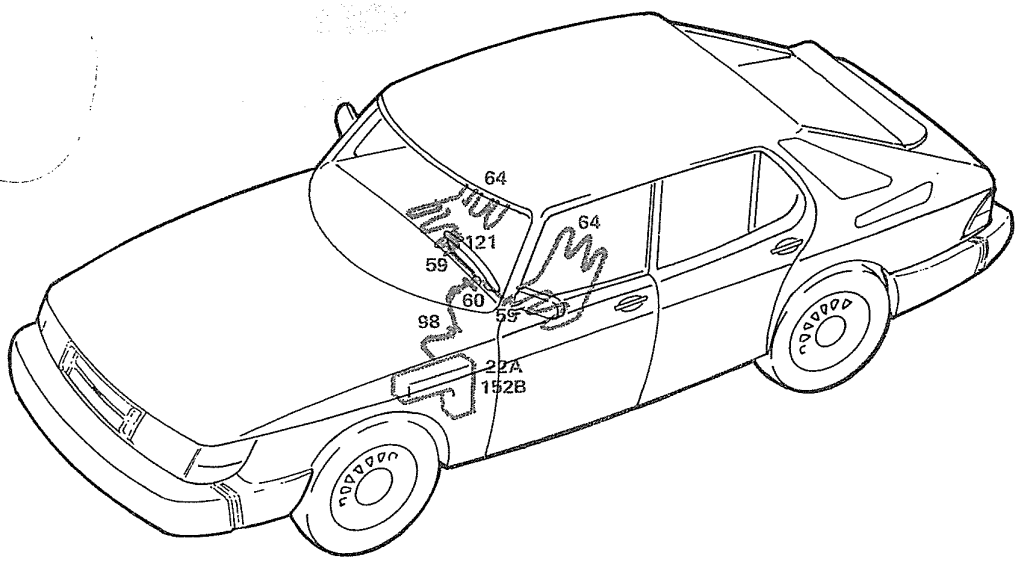
117 Earthing point
between the ignition switch and the handbrake lever

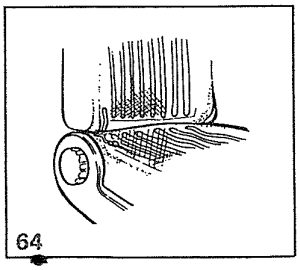
121 Seat switch for the heating pad
under the co-driver's seat, on the left-hand side

152B 29-pole red connector
in the engine compartment, in the electrical distribution box, on the left-hand wheel housing. The connector is accessible from the interior of the car.

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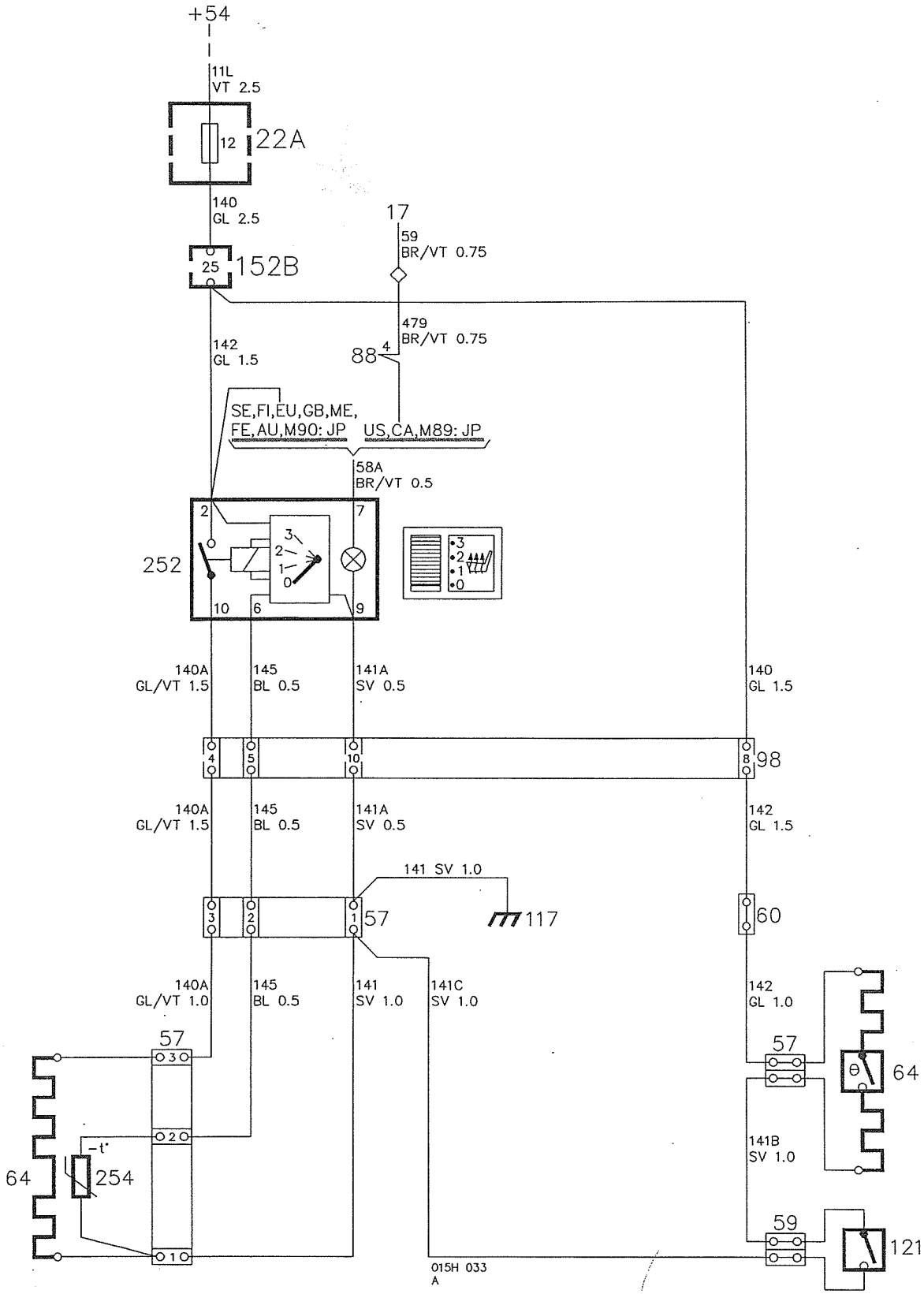
Components





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Electrically heated front seats with rheostat control for the driver's seat



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Operation

Both front seats of the car are electrically heated. On certain models, heating of the driver's seat can be controlled by means of a rheostat.

For a complete description of the wiring for the lighting of switch 252 on cars for the US, CA and JP markets, see also the section entitled "Lighting systems, Lighting for controls – US, CA and 1989 for JP".

Driver's seat

Heating pad 64 is supplied from fuse 12 via the red 29-pole connector 152B, and is switched on and off by temperature transmitter 254.

The temperature transmitter is a Negative Temperature Coefficient (NTC) resistor, whose resistance varies with the heating pad temperature.

The temperature of the driver's seat heating pad can be set by means of rheostat 252 which has four positions, marked 0, 1, 2 and 3. In position 0, the heating is switched off, whereas in position 3, the heating is a maximum. When the heating pad temperature has reached the preset value for a given rheostat setting, the heating pad will be switched off, but will be switched on again when the temperature has dropped to the lower limit for that particular rheostat setting.

Co-driver's seat

The heating pad of the co-driver's seat is supplied from fuse 12 via the same 29-pole connector as the driver's seat. The heating pad is switched on and off by thermostat 64 and is earthed via seat switch 121.

When a load is applied to the seat, the seat switch will close and the heating pad can be switched on and off by thermostat 64. This heating pad will thus be operative only when a person is seated in the co-driver's seat.

Fault-tracing hints

1. Set the ignition switch to the drive position.
2. Check fuse 12 and check that the supply to rheostat 252 is live.
3. Check that there is no open circuit in temperature transmitter 254. (Measure between pins 6 and 9 of the rheostat.)
4. Check seat switch 121 under the co-driver's seat.
5. Check that there is no open circuit in the heating pad wiring.
6. Check the connectors, cable harnesses and earth connections. 224

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Locations of components

17 Extra rheostat for the lighting of switches and controls
on the left-hand side of the fascia

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

57 3-pole connector
two under the driver's seat
one under the co-driver's seat

59 2-pole connector
one under the co-driver's seat

60 Single-pole connector
under the centre console, near the ignition switch

64 Heating pad with thermostat
in the seat cushion and backrest of the driver's and co-driver's seats

88 Switch for extra fog lamps
on the fascia

98 10-pole connector
to the left of the steering column, behind the knee shield below the fascia

117 Earthing point
between the ignition switch and the handbrake lever

121 Seat switch for the heating pad
under the co-driver's seat, on the left-hand side

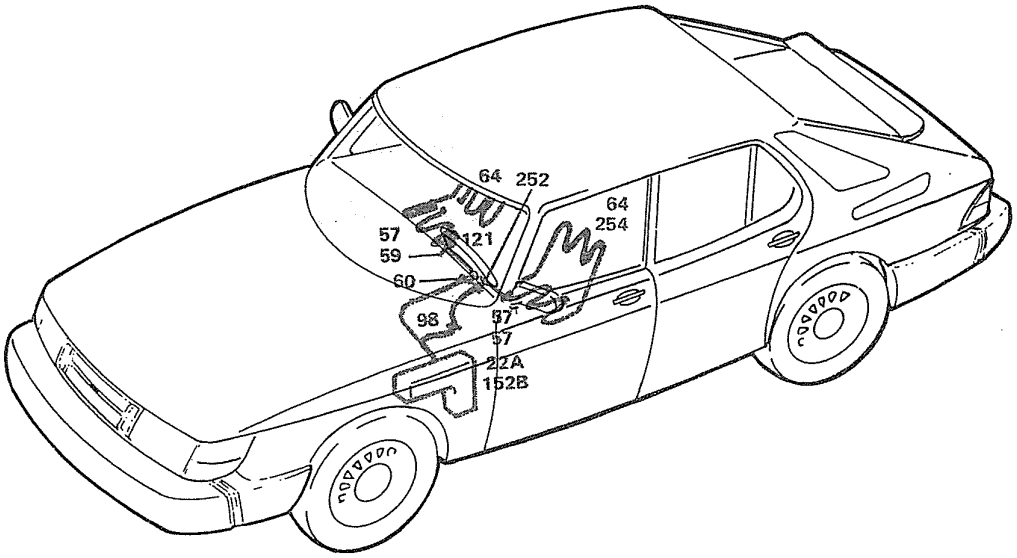
152B 29-pole red connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connector is accessible from the interior of the car.

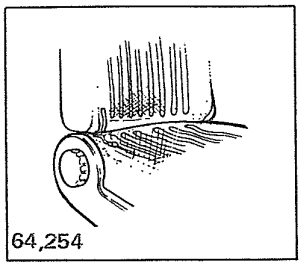
252 Driver's seat heating rheostat
on the fascia

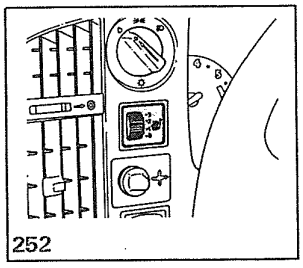
254 Temperature transmitter for the driver's seat heating pad
in the driver's seat

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Components

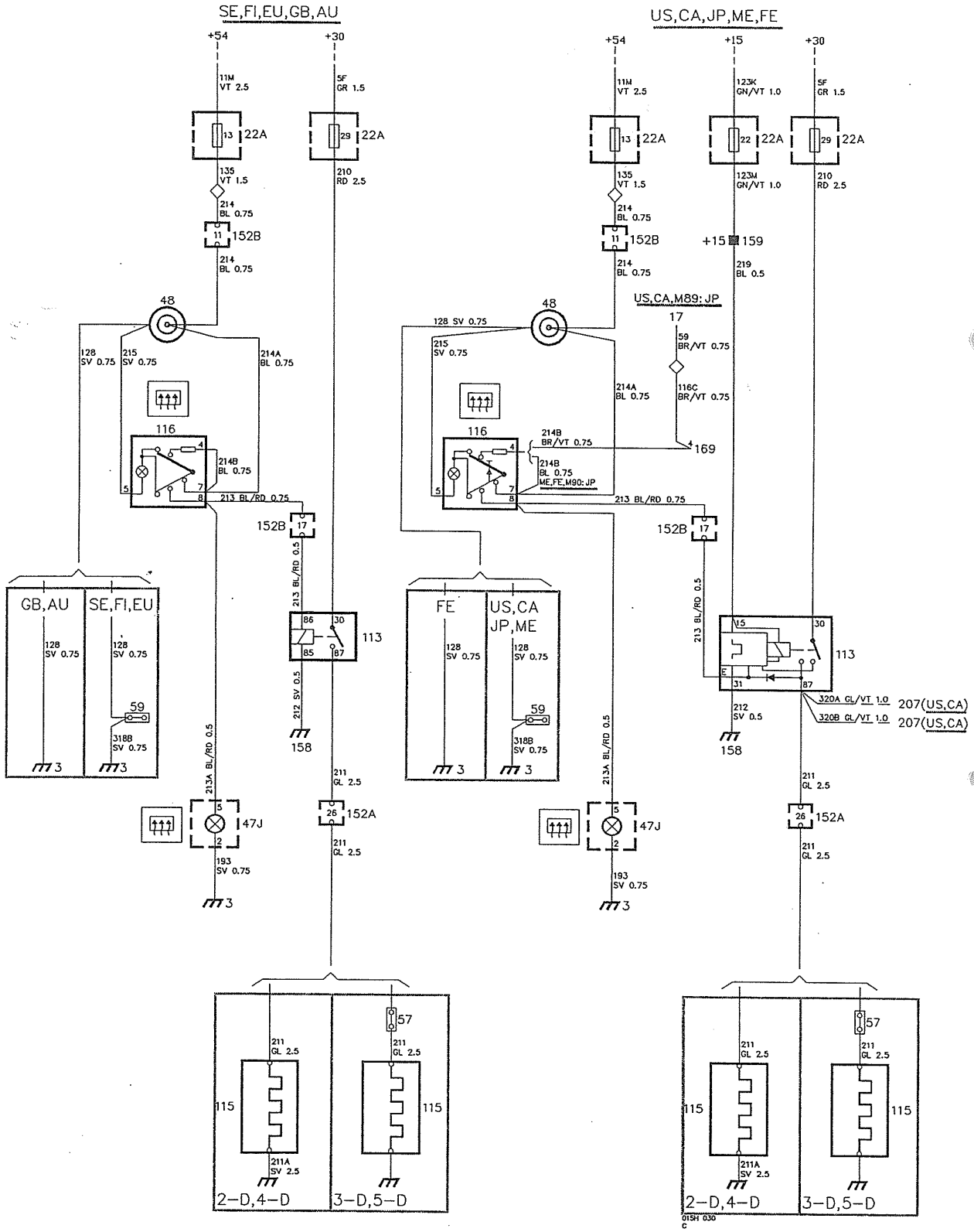






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Electric heating for the rear window



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Operation

The electric heating of the rear window can be switched on and off by means of switch 116. (The switch is spring-loaded and is combined with a time-delay relay.) For a complete description of the wiring for the lighting of the switch on cars for the US and CA markets and 1989 model for JP, see also the section entitled "Lighting systems, Lighting for controls – US, CA and 1989 for JP".

The switch is supplied from fuse 13, via the 29-pole red connector 152B (when the ignition switch is in the drive position).

When the switch is depressed, relay 113 will be energised. Warning lamp 47J in the combined instrument will light up.

Electric heater 115 for the rear window is supplied from fuse 29, via the relay contacts.

On the 3-D and 5-D models, the electric heating of the rear window is earthed to the tailgate which, in turn, is earthed to earthing point 9 (cable 211A black).

Time-delay relay

On certain markets, relay 113 is replaced by a time-delay relay and spring-loaded switch 116.

After the switch has been depressed and the relay has been energised, the time circuit in the relay will be supplied (terminal 15) from fuse 22. After around 10 minutes, the relay will switch off the supply to the electric heating for the rear window. If the switch is depressed when the heating is on, the relay will trip.

When the electric heating for the rear window is switched on, warning lamp 47J will be supplied from terminal E of the relay.

If the ignition is switched off while the electric heating for the rear window is switched on, the supply to terminal 15 will be opened, and the relay will immediately switch off the supply to the heating element for the rear window.

US and CA markets

The time-delay relay also controls the heating of the rear-view mirrors.

Fault-tracing hints

The electric heating for the rear window will be operative when the ignition switch is in the drive position.

1. Check fuses 13 and 29 and check that the supply to them is live. (On certain markets, also fuse 22.)
2. Check that the supply to the switch and terminal 30 of the relay is live.
3. Check the relay: Press the switch and check that the supply to the electric heating for the rear window is live.
4. Check the connectors, cable harnesses and earth connections.

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Locations of components

3 Earthing point in the fascia

17 Extra rheostat for the lighting of switches and controls
on the left-hand side of the fascia

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

47J Rear window heater warning lamp
in the combined instrument on the instrument panel

48 Cigarette lighter
on the fascia

57 3-pole connector
in the luggage compartment, at the left-hand air outlet

59 2-pole connector
in the luggage compartment, at the left-hand air outlet

113 Relay/time delay relay for the electrically heated rear window
in the electrical distribution box in the engine compartment, relay position C

115 Electric heater for the rear window

116 Switch for the electrically heated rear window
in the centre of the fascia

152A 29-pole white connector
152B 29-pole red connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing.
The connectors are accessible from the interior of the car

158 Negative distribution terminal

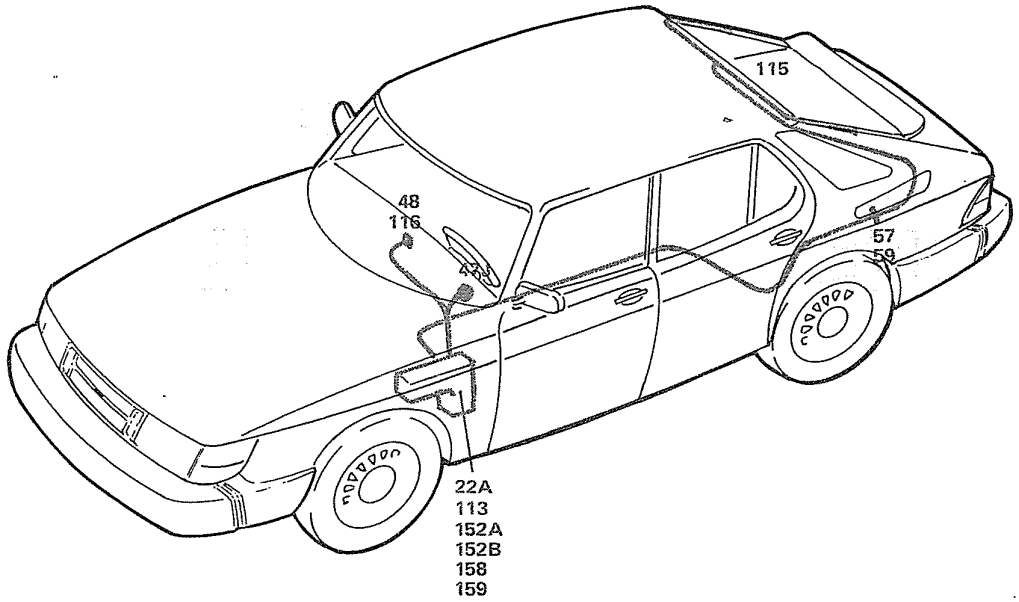
159 Distribution terminal +15
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

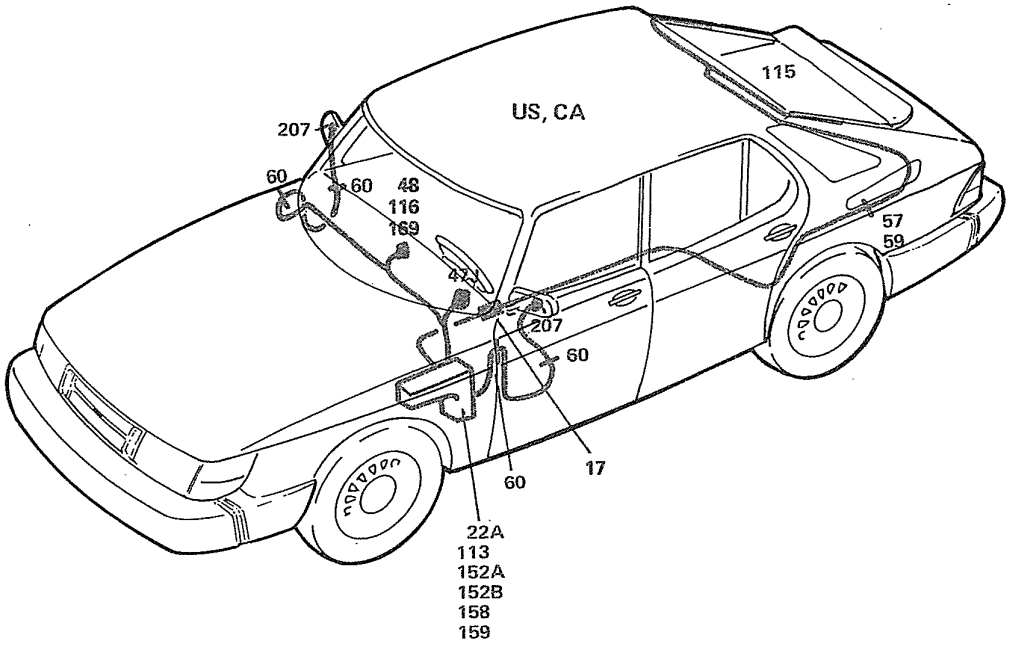
169 Switch, AC
on the fascia

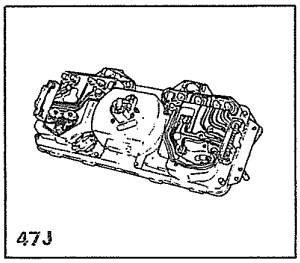
207 Electrically-heated rear-view mirrors
one on each front door

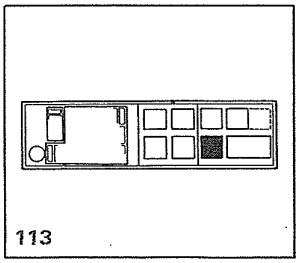
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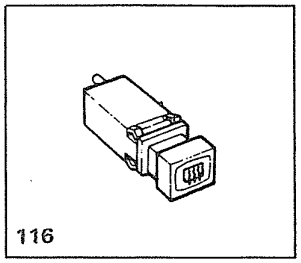
Components

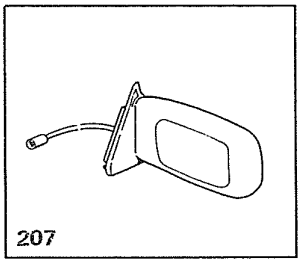





47J

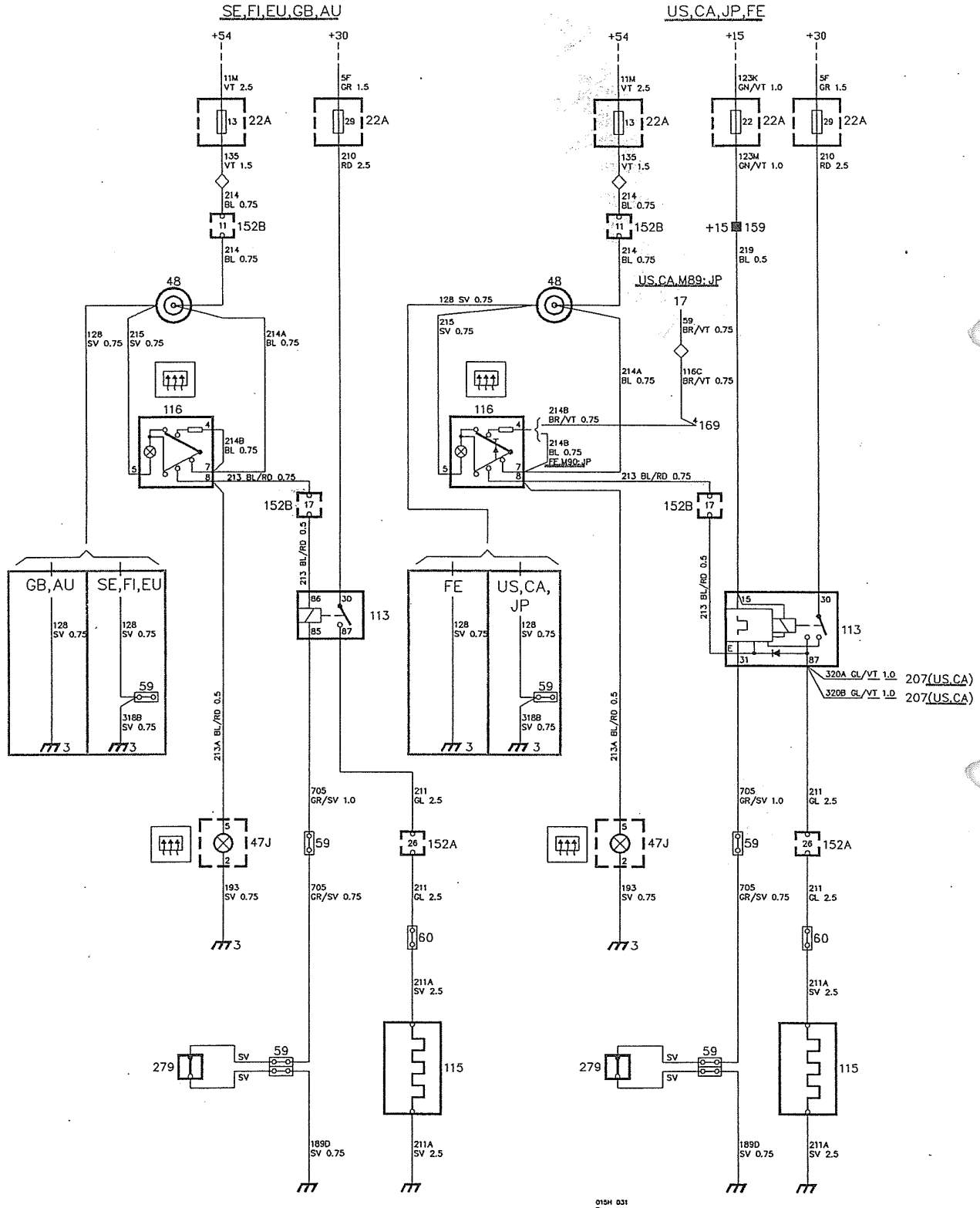

113


116


207

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Electric heating for the rear window, Convertible



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Operation

The electric heating of the rear window can be switched on and off by means of switch 116. (The switch is spring-loaded and is combined with a time-delay relay.) For a complete description of the wiring for the lighting of the switch on cars for the US and CA markets and 1989 model for JP, see also the section entitled "Lighting systems, Lighting for controls – US, CA and 1989 for JP".

The switch is supplied from fuse 13, via 29-pole red connector 152B (when the ignition switch is in the drive position).

When the switch is depressed, relay 113 will be energised. Warning lamp 47J in the combined instrument will be alight. Electric heater 115 for the rear window will then be supplied from fuse 29, via the relay contacts.

The relay coil is earthed (terminal 85 or 31 of time-delay relay) via mercury switch 279 which is open when the top is down and is closed when the top is up. The relay is thus always de-energised when the top is down.

Time-delay relay

On certain markets, relay 113 has been replaced by a time-delay relay and spring-loaded switch 116.

After the switch has been depressed and the relay has been energised, the time circuit in the relay will be supplied (terminal 15) from fuse 22. After around 10 minutes, the relay will switch off the supply to the electric heating for the rear window. If the switch is depressed when the heating is on, the relay will trip.

When the electric heating for the rear window is switched on, warning lamp 47J will be supplied from terminal E of the relay.

If the ignition is switched off while the electric heating for the rear window is switched on, the supply to terminal 15 will be opened, and the relay will immediately trip the supply to the heating element for the rear window.

US and CA markets

The time-delay relay also controls the heating of the rear-view mirrors.

Fault-tracing hints

The electric heating for the rear window will be operative when the ignition switch is in the drive position.

1. Check fuses 13 and 29 and check that the supply to them is live. (On cars for some markets, also check fuse 22.)
2. Check that the supply to the switch and terminal 30 of the relay is live.
3. Check the relay: Press the switch and check that the supply to the electric heating for the rear window is live.
4. Check that the mercury switch closes the circuit when the top is raised.
5. Check the connectors, cable harnesses and earth connections.

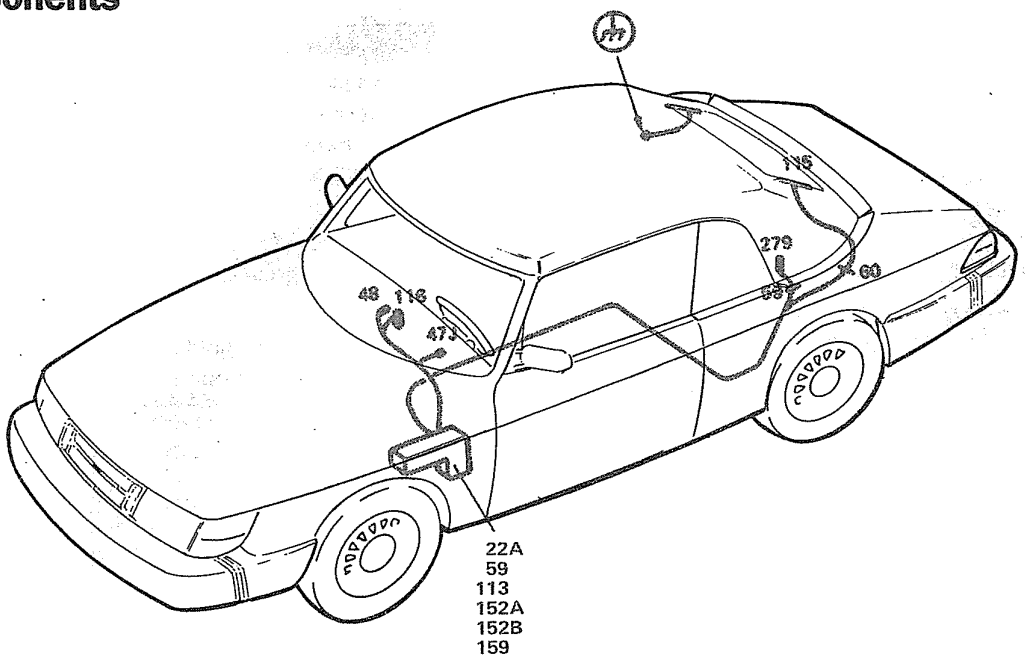
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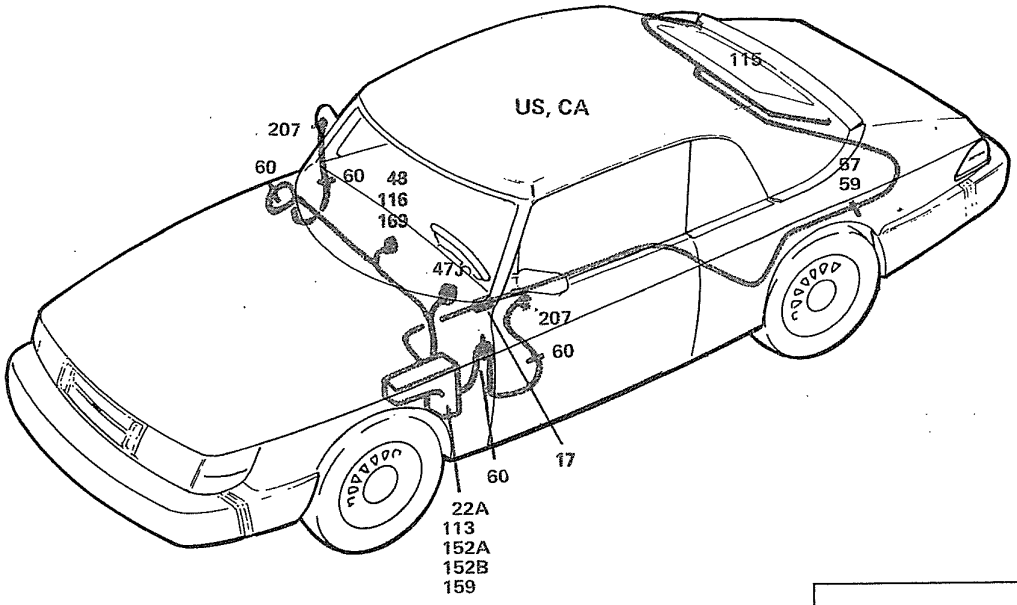
Locations of components

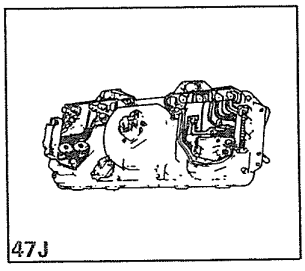
3	Earthing point in the fascia
17	Extra rheostat for the lighting of switches and controls on the left-hand side of the fascia
22A	Fuse holder in the electrical distribution box, in the engine compartment, on the left-hand wheel housing
47J	Rear window heater warning lamp in the combined instrument on the instrument panel
48	Cigarette lighter on the fascia
59	2-pole connector one in the electrical distribution box in the engine compartment, on the left-hand wheel housing one on the inside of the top, on the left-hand side (Convertible)
60	Single-pole connector in the luggage compartment, at the left-hand lid hinge, behind the trim
113	Relay/time delay relay for the electrically heated rear window in the electrical distribution box in the engine compartment, relay position C
115	Electric heater for the rear window
116	Switch for the electrically heated rear window in the centre of the fascia
152A 152B	29-pole white connector 29-pole red connector in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car.
159	Distribution terminal +15 in the electrical distribution box, in the engine compartment, on the left-hand wheel housing
169	Switch, AC on the fascia
207	Electrically-heated rear-view mirrors one on each front door
279	Mercury switch for the electrically heated rear window (Convertible) on the top mounting on the left-hand side, inside the top

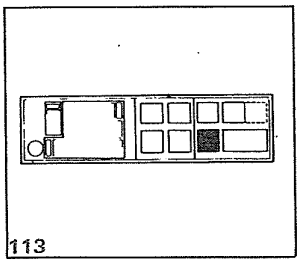
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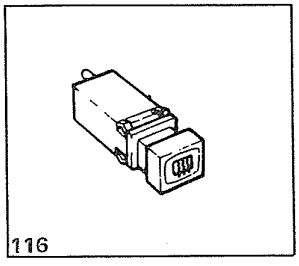
Components

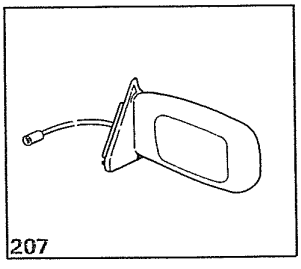


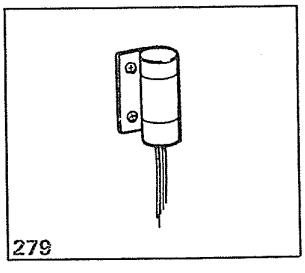






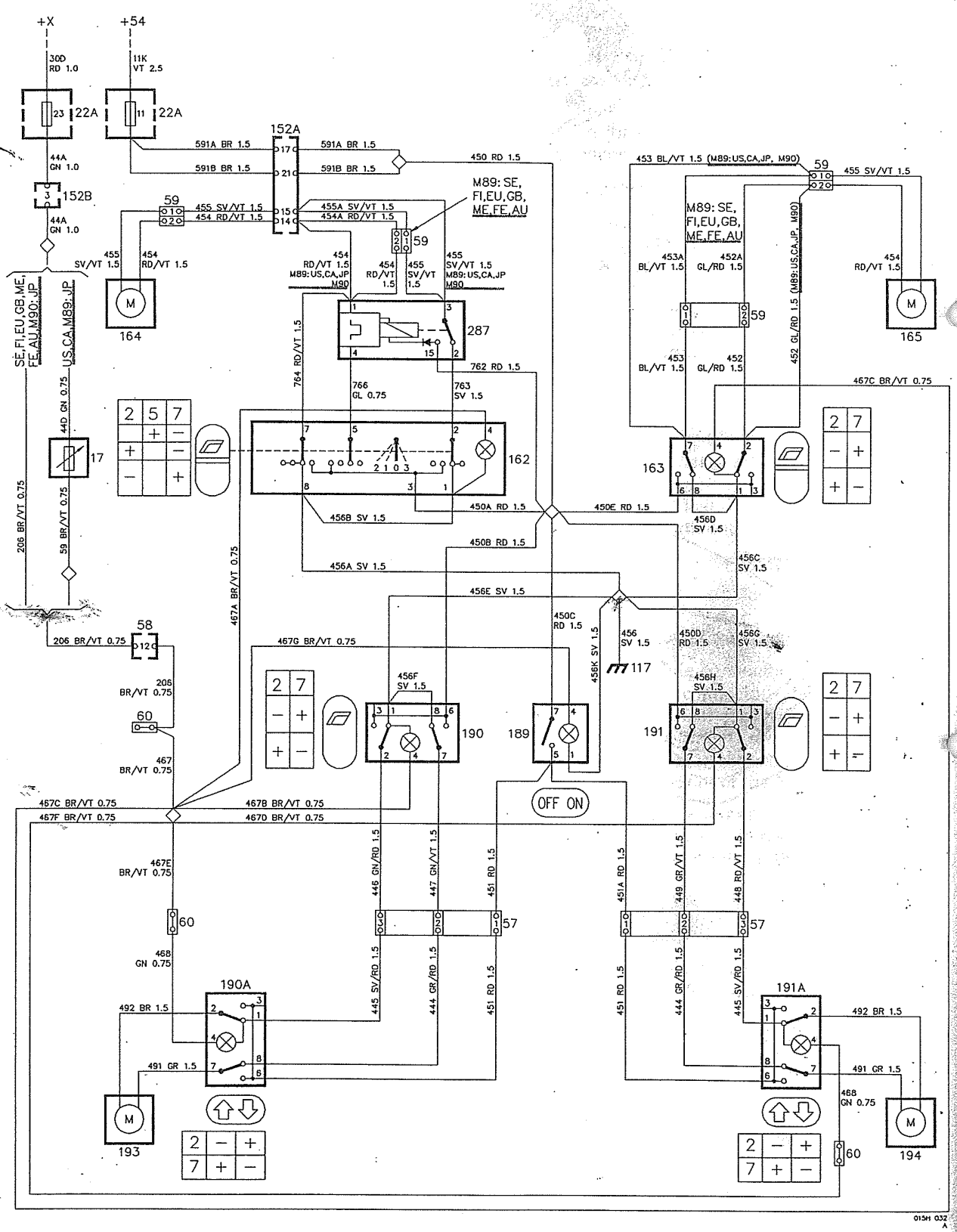






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Electric window regulators



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Operation

All window regulators in the car can be operated by means of switches in the centre console between the front seats. Under certain circumstances, the window regulator in each of the rear doors can also be operated by means of a switch in the corresponding door.

The supply is taken from fuse 11, via 29-pole white connector 152A, to the following switches on the *centre console*:

- Switch 189, for switching in and out the window regulators in the rear doors
- To switches 162 (driver's door), 163 (co-driver's door), 190 (left-hand rear door) and 191 (right-hand rear door).

If switch 189 is closed, the rear window regulators can also be operated from switches 190A in the left-hand rear door and 191A in the right-hand rear door.

If switch 189 is open, the switches in the rear doors will be inoperative. The window regulators in the rear doors can then only be operated by means of the switches on the centre console. To open the window, press the window symbol on the button.

As an example, if switch 190 (for the left-hand rear door) on the centre console is depressed, one of the two pairs of contacts (depending on whether the window is to be raised or lowered) will close. Current will then flow to switch 190A in the left-hand rear door, through the switch and to regulator motor 193. It then flows through the second pair of contacts of the switch, back to the switch on the centre console and to earth (117).

For a complete description of the wiring for the lighting of the switches on cars for the US, CA and JP markets, see also the section entitled "Lighting systems, Lighting for controls – US, CA, JP".

The connectors (59) marked SE, FI, EU, GB, ME, FE and AU in the diagram are used for adjusting the operation of the system to suit RHD or LHD cars. This also applies to cars for Japan.

Automatic window regulator controls

Unlike the other switches, driver's door switch 162 has two positions for lowering the window. This switch is also connected to time-delay relay 287.

Position 1: The window travels downwards as long as the switch is kept depressed in this position.
A positive voltage is supplied to motor 164 across pin 2 on the switch and across the relay contacts. The motor will stop when the switch is released.

Position 2: The window opens fully even if the switch is released after a brief instant.
The coil of relay 287 is now supplied with a positive voltage across pin 5 of the switch, and the relay is energised. The motor is supplied across the closed relay contacts (pin 15). The supply is maintained (for approx. 6 seconds) by the time-delay function of the relay until the window has been lowered fully, even if the switch is released immediately. (The downward travel of the window may be interrupted by setting the switch to position 3, "Raise".)

Position 3: The window will travel upwards as long as the switch is held depressed in this position. The motor is supplied across pin 7 on the switch and the direction of rotation is reversed, causing the window to be raised.

Fault-tracing hints

The electric window regulators will be operative when the ignition switch is in the drive position.

1. Check fuse 11 and check that the supply to it is live.
2. Check that terminal 7 of switch 189 and terminals 3 and 6 of the other switches in the centre console are live. (On 162, terminal 3 only.)

   If the window regulators in the rear doors cannot be operated from the corresponding switches in the rear doors, check that current flows from switch 189 to terminals 3 and 6 of these switches as well.
3. Check the switches by measuring at their terminals.
4. Check the connectors, cable harnesses and earth connections.

Automatic window regulator controls

Check the automatic window regulator controls as follows: Set switch 162 to position 2 and check that the supply to pin 4 on the relay is live. Pin 1 should be earthed. Check that pin 3 and pin 15 of the relay are live.

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Locations of components

17 Extra rheostat for the lighting of switches and controls
on the left-hand side of the fascia

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

57 3-pole connector
one behind the trim, at the corresponding B pillar

58 12-pole connector
on the angle bracket, under the fascia to the left of the steering column

59 2-pole connector
one in the engine compartment, at the upper hinge of the left-hand front door, behind the electrical distribution box
one in the engine compartment, at the upper hinge of the right-hand front door
two under the centre console, between the front seats (1989 model)

60 Single-pole connector
one under the centre console, between the front seats
one behind the trim, at the corresponding B pillar

117 Earthing point
between the ignition switch and the handbrake lever

152A 29-pole white connector
152B 29-pole red connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car.

162 Switch for driver's door electric window regulator
between the front seats, on the centre console

163 Switch for co-driver's door electric window regulator
between the front seats, on the centre console

164 Motor for left-hand front electric window regulator
in the left-hand front door

165 Motor for right-hand front electric window regulator
in the right-hand front door

189 Switch for the rear-door electric window regulators
between the front seats, on the centre console

190 Switch for left-hand rear electric window regulator
between the front seats, on the centre console

190A Switch for left-hand rear electric window regulator
in the left-hand rear door

191 Switch for right-hand rear electric window regulator
between the front seats, on the centre console

191A Switch for right-hand rear electric window regulator
in the right-hand rear door

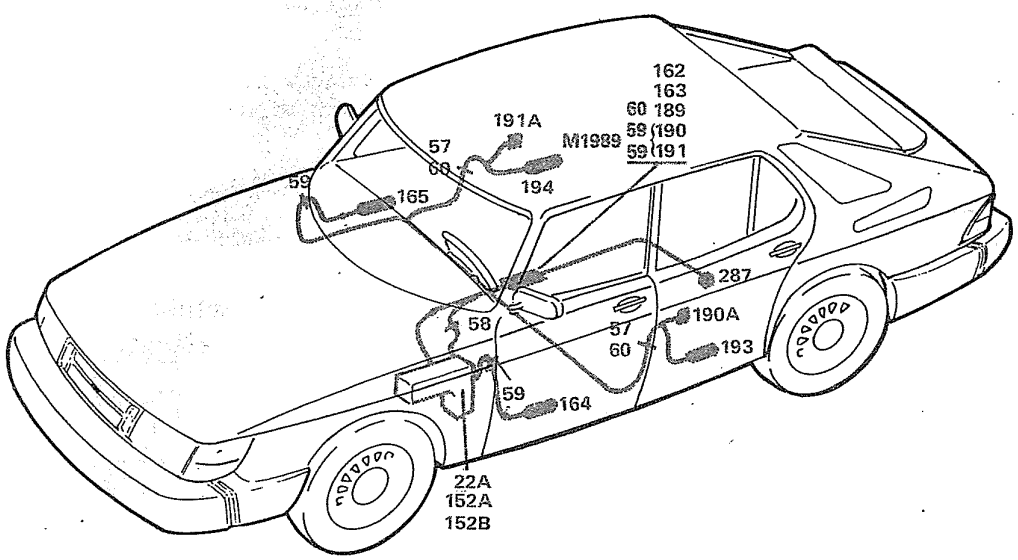
193 Motor for left-hand rear electric window regulator
in the left-hand rear door

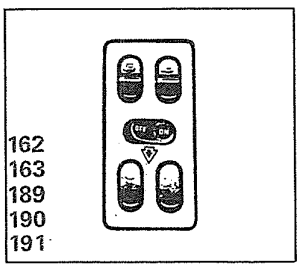
194 Motor for right-hand rear electric window regulator
in the right-hand rear door

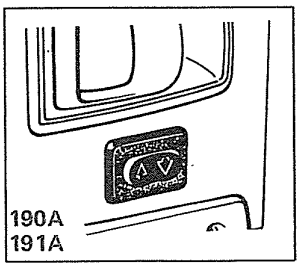
287 Relay for automatic control of window regulators
under the back seat, on the left-hand side

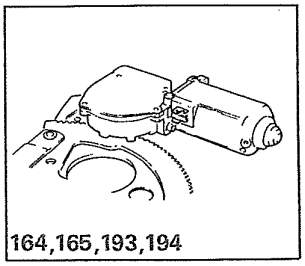
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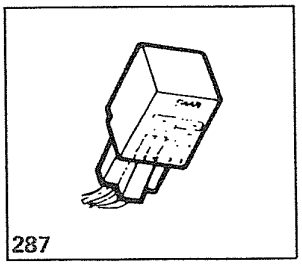
Components





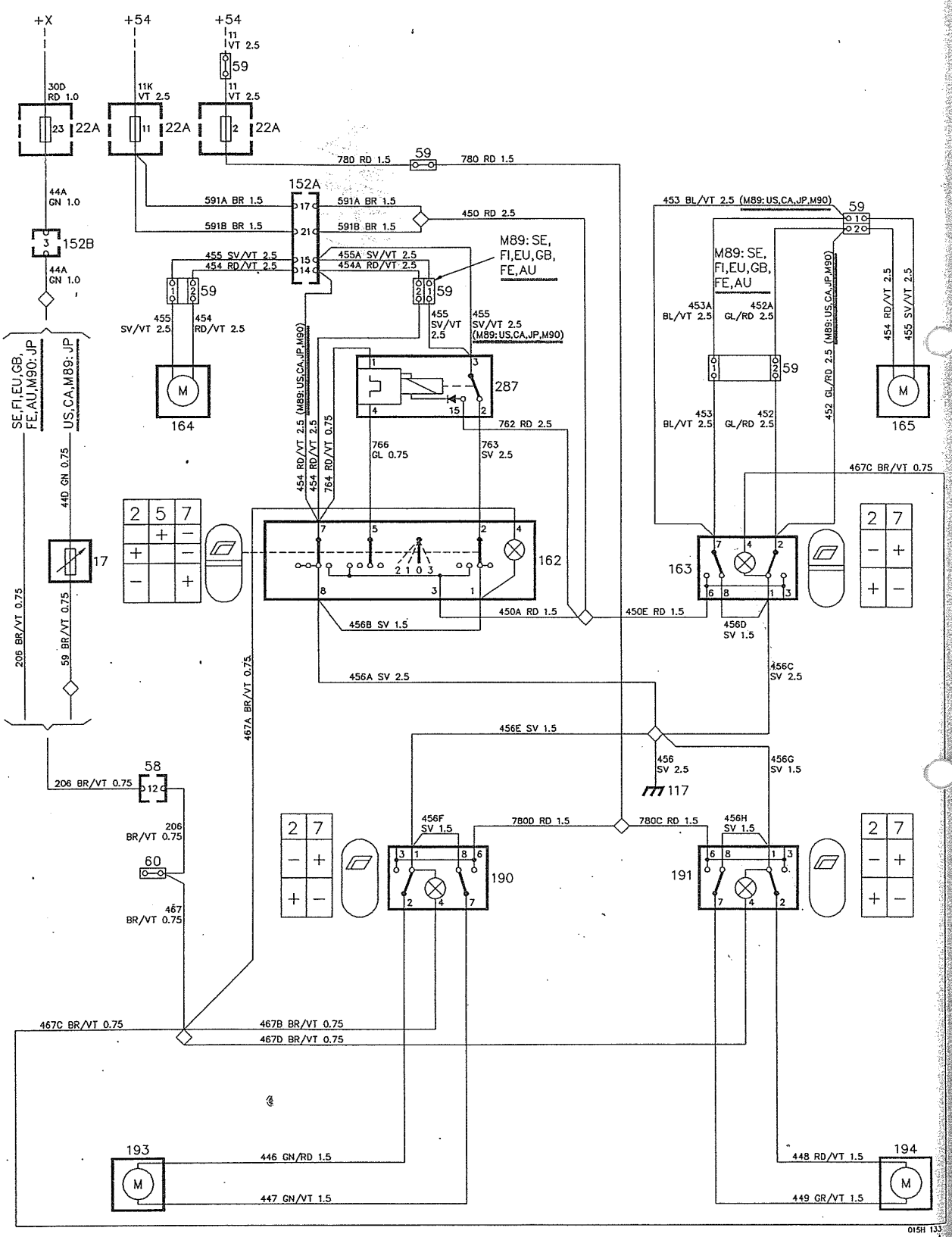






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Electric window regulators, Convertible



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Operation

The window regulators in the car can be operated by means of switches in the centre console between the front seats.

The supply is taken from fuse 11, via white 29-pole connector 152A, to the following switches:

- 162 in the driver's door
- 163 in the co-driver's door

The following switches are supplied from fuse 2 via 2-pole connector 59:

- 190 (left-hand side window)
- 191 (right-hand side window)

To open the window, press the window symbol on the button.

As an example, if switch 190 (for the left-hand rear door) is depressed, one of the two pairs of contacts (depending on whether the window is to be raised or lowered) will close. Current will then flow to regulator motor 193. It then flows through the second pair of contacts of the switch, and to earth (117).

For a complete description of the wiring for the lighting of the switch on cars for the US and CA markets and 1989 model for JP, see also the section entitled "Lighting systems, Lighting for controls – US, CA and 1989 for JP".

Right-hand drive cars

1989 models

The connectors (59) marked SE, FI, EU, GB, FE, AU in the diagram are used for adjusting the operation of the system to suit RHD or LHD cars. This also applies to cars for Japan.

1990 models

On right-hand drive cars, items 454 and 455 on relay 287 change places with items 453 and 452 on switch 163.

Automatic window regulator controls

Unlike the other switches, driver's door switch 162 has two positions for lowering the window. This switch is also connected to time-delay relay 287.

Position 1: The window travels downwards as long as the switch is kept depressed in this position.
A positive voltage is supplied to motor 164 across pin 2 on the switch and across the relay contacts. The motor will stop when the switch is released.

Position 2: The window opens fully even if the switch is released after a brief instant.
The coil of relay 287 is now supplied with a positive voltage across pin 5 of the switch, and the relay is energised. The motor is supplied across the closed relay contacts (pin 15). The supply is maintained (for approx. 6 seconds) by the time-delay function of the relay until the window has been lowered fully, even if the switch is released immediately. (The downward travel of the window may be interrupted by setting the switch to position 3, "Raise".)

Position 3: The window will travel upwards as long as the switch is held depressed in this position.
The motor is supplied across pin 7 on the switch and the direction of rotation is reversed, causing the window to be raised.

Fault-tracing hints

The electric window regulators will be operative when the ignition switch is in the drive position.

1. Check fuses 11 and 2 and check that the supply to them is live.
2. Check that terminals 3 and 6 of the switches in the centre console are live. (On 162, terminal 3 only.)
3. Check the switches by measuring at their terminals.
4. Check the connectors, cable harnesses and earth connections.

Automatic window regulator controls

Check the automatic window regulator controls as follows: Set switch 162 to position 2 and check that the supply to pin 4 on the relay is live. Pin 1 should be earthed. Check that pin 3 and pin 15 on the relay are live.

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Locations of components

17 Extra rheostat for the lighting of switches and controls
on the left-hand side of the fascia

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

58 12-pole connector
on the angle bracket, under the fascia to the left of the steering column

59 2-pole connector
one in the engine compartment, at the upper hinge of the left-hand front door, behind the electrical distribution box
one in the engine compartment, at the upper hinge of the right-hand front door
two in the electrical distribution box, in the engine compartment, on the left-hand wheel housing
two under the centre console between the front seats (1989 model)

60 Single-pole connector
under the centre console, between the front seats

117 Earthing point
between the ignition switch and the handbrake lever

152A 29-pole white connector
152B 29-pole red connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connectors are accessible from the interior of the car.

162 Switch for driver's door electric window regulator
between the front seats, on the centre console

163 Switch for co-driver's door electric window regulator
between the front seats, on the centre console

164 Motor for left-hand electric window regulator
in the left-hand door

165 Motor for right-hand electric window regulator
in the right-hand door

190 Switch for left-hand side-window electric regulator
between the front seats, on the centre console

191 Switch for right-hand side-window electric regulator
between the front seats, on the centre console

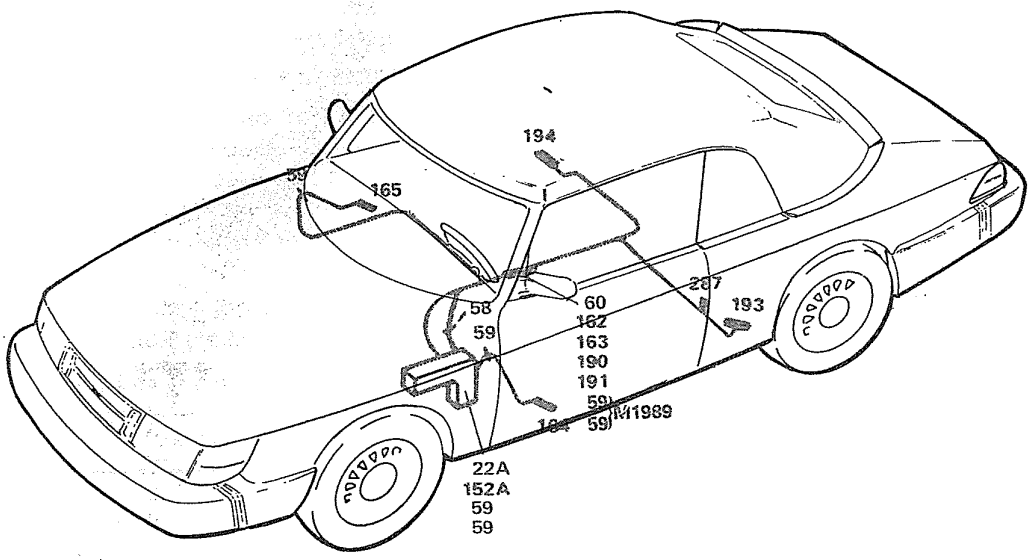
193 Motor for left-hand side-window electric regulator
on the left-hand side, at the rear

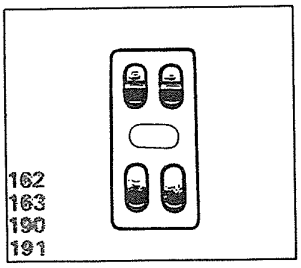
194 Motor for right-hand side-window electric regulator
on the right-hand side, at the rear

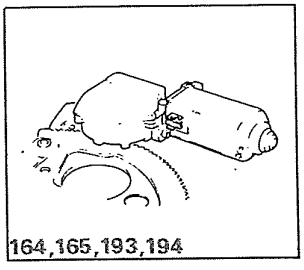
287 Relay for automatic control of window regulators
in the electrical distribution box under the back seat, relay position A

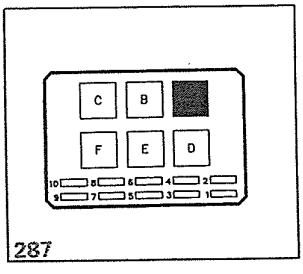
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Components



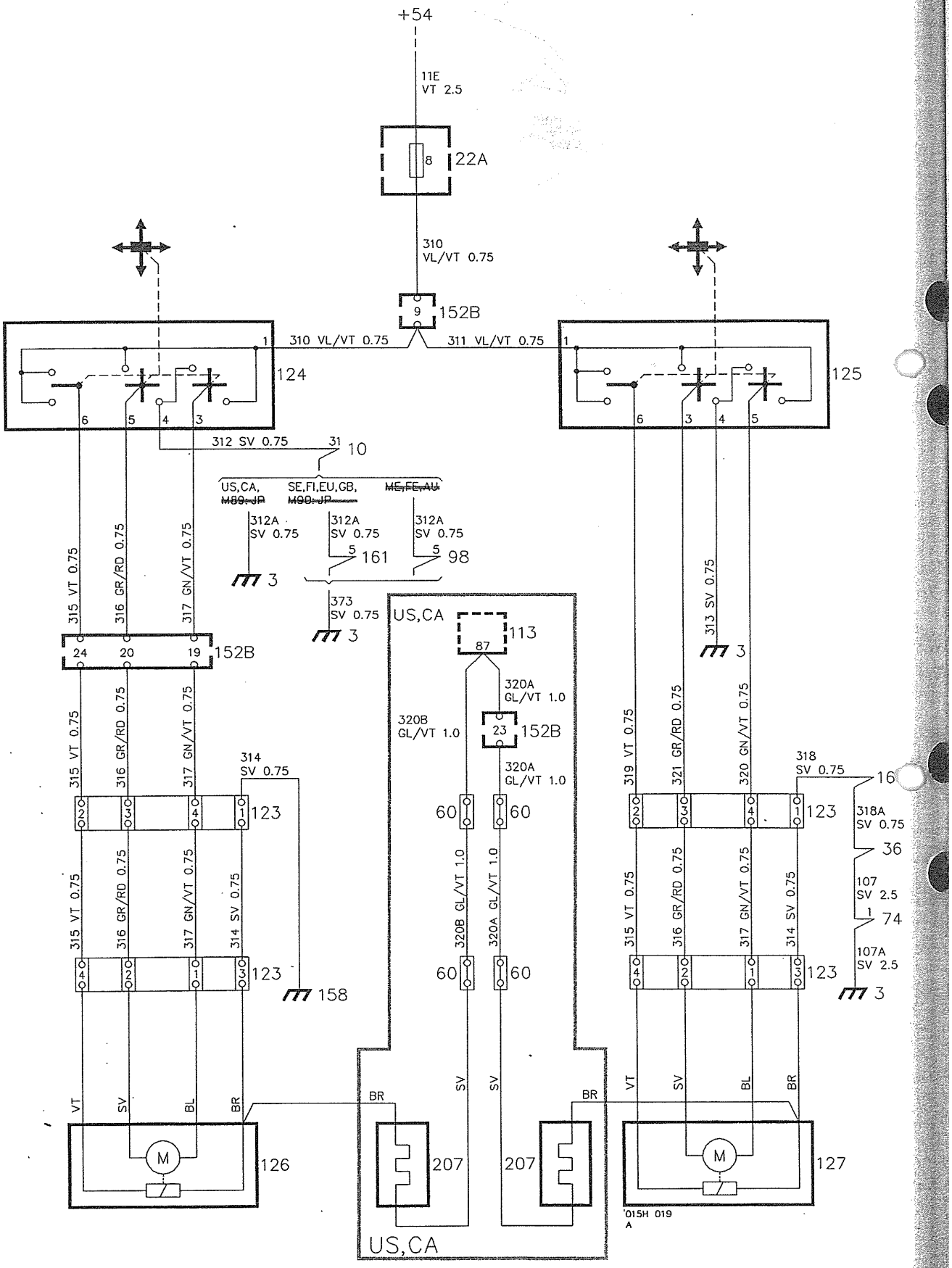






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Electrically operated rear-view mirrors



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Operation

Each of the outer rear-view mirrors is operated by means of a four-position switch.

The two switches 124 (left) and 125 (right) are supplied from fuse 8, via red 29-pole connector 152B.

Each rear-view mirror will turn in the direction in which the switch lever is moved. For horizontal setting, only the mirror motors are used. For vertical setting, a solenoid is also energised, which causes the motors to move the mirrors vertically instead of horizontally.

The following table lists the cables that are live/earthed in each switch position:

Left-hand switch 124 and motor 126

Pos.	+ to motor	Motor to earth	+ to solenoid
←	316 grey-red	317 green-white	–
→	317 green-white	316 grey-red	–
↑	316 grey-red	317 green-white	315 white
↓	317 green-white	316 grey-red	315 white

Right-hand switch 125 and motor 127

Pos.	+ to motor	Motor to earth	+ to solenoid
←	321 grey-red	320 green-white	–
→	320 green-white	321 grey-red	–
↑	321 grey-red	320 green-white	319 white
↓	320 green-white	321 grey-red	319 white

US and CA markets

Cars for these markets are equipped with electrically heated rear-view mirrors 207, which are supplied via the switch for the heating of the rear window.

Fault-tracing hints

The rear-view mirrors will be operative when the ignition switch is in the drive position.

1. Check fuse 8 and check that the supply to it is live.
2. Check that the supply to the corresponding switch is live.
3. By operating the switch, check that the supply to the corresponding motor and to the solenoid is live. The table shown in the "Operation" section lists the cables that are live in each switch position.
4. Check the connectors, cable harnesses and earth connections.

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Locations of components

3 Earthing point in the fascia

10 Light switch
on the left-hand side of the fascia

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

60 Single-pole connector
one in the engine compartment, at the upper hinge of the left-hand front door, behind the electrical distribution box
one in the left-hand front door
one in the engine compartment, at the upper hinge of the right-hand front door
one in the right-hand front door

98 10-pole connector
to the left of the steering column, under the fascia (behind the knee shield)

113 Relay/time-delay relay for the electrically heated rear window
in the electrical distribution box in the engine compartment, relay position C

123 4-pole connector
one in the engine compartment, at the upper hinge of the left-hand front door, behind the electrical distribution box
one in the left-hand front door
one in the engine compartment, at the upper hinge of the right-hand front door
one in the right-hand front door

124 Switch for the left-hand electrically operated rear-view mirror
on the fascia, to the left of the steering column

125 Switch for the right-hand electrically operated rear-view mirror
on the fascia, to the right of the steering column

126 Motor for the left-hand electrically operated rear-view mirror
in the left-hand rear-view mirror

127 Motor for the right-hand electrically operated rear-view mirror
in the right-hand rear-view mirror

152B 29-pole red connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connector is accessible from the interior of the car.

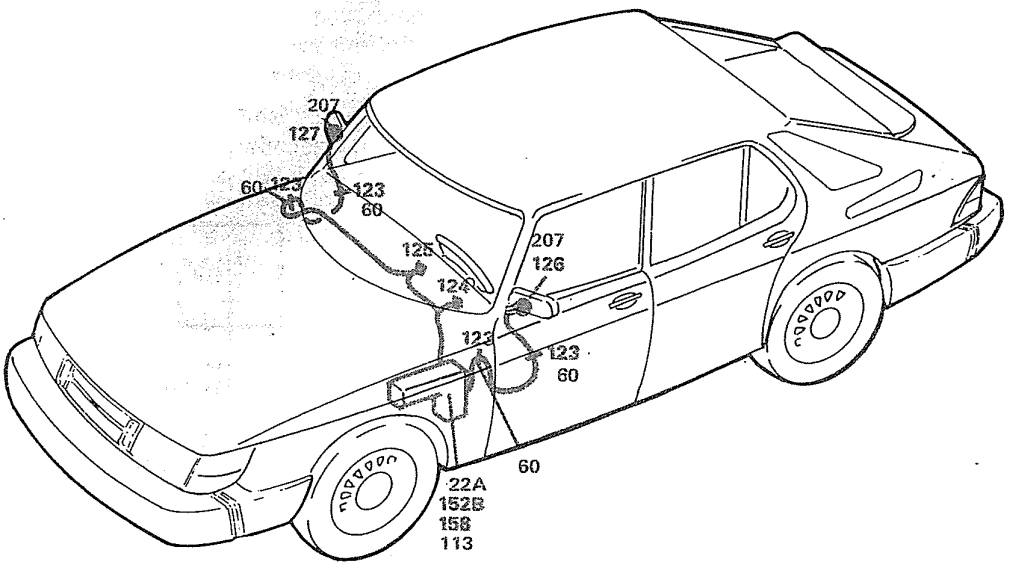
158 Negative distribution terminal
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

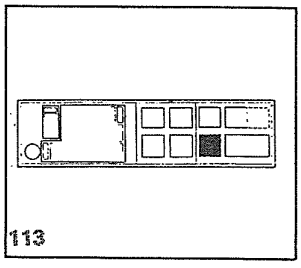
161 Switch for the rear fog lights
on the left-hand side of the fascia

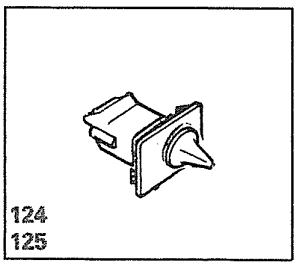
207 Electrically-heated rear-view mirrors
one on each front door

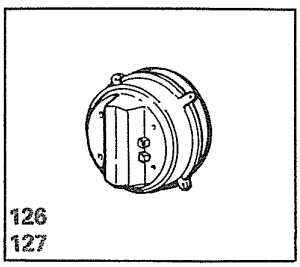
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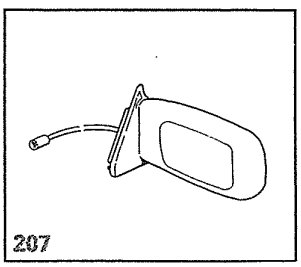
Components





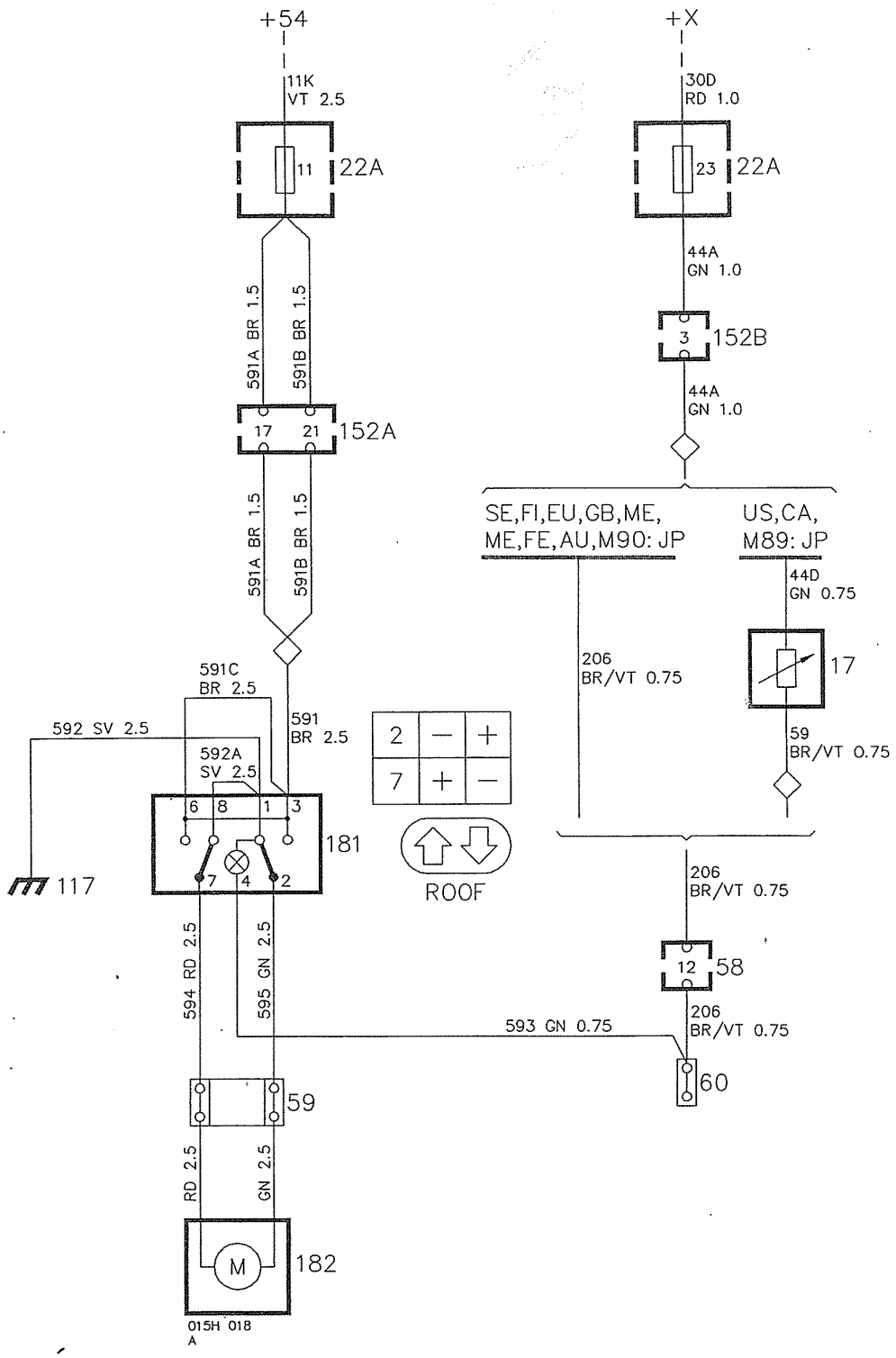






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Electrically operated sunroof



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Operation

Switch 181 for the electrically operated sunroof is supplied from fuse 11, via white 29-pole connector 152A. To open the sunroof, depress the left-hand downward arrow symbol on the switch.

Motor 182 is earthed via terminals 1 and 8 on the rocker-type switch. For a complete description of the wiring for the lighting of switch 181 on cars for the US and CA markets and 1989 model for JP, see also the section entitled "Lighting systems, Lighting for controls – US, CA and 1989 for JP".

Fault-tracing hints

The sunroof will be operative when the ignition switch is in the drive position.

1. Check fuse 11 and check that the supply to it is live.
2. Check that the supply to terminals 3 and 6 is live.
3. Close the switch and check that the supply to the motor is live.
4. Check the connectors, cable harnesses and earth connections.

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Locations of components

17 Extra rheostat for the lighting of switches and controls
on the left-hand side of the fascia

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

58 12-pole connector
on the angle bracket, under the fascia, to the left of the steering column

59 2-pole connector
at the motor for the electrically operated sunroof

60 Single-pole connector
one under the centre console, between the front seats

117 Earthing point
between the ignition switch and the handbrake lever

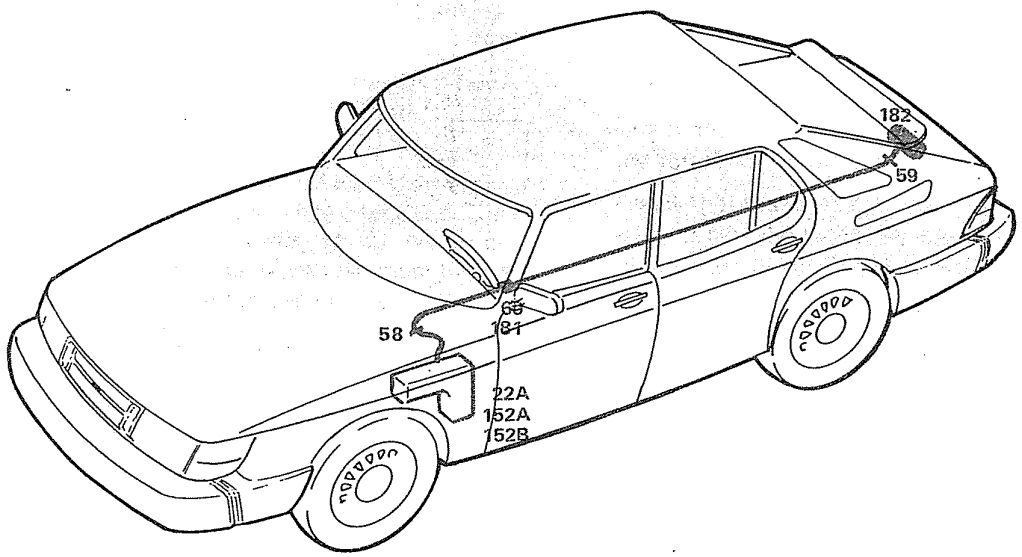
152A 29-pole white connector
152B 29-pole red connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connectors are accessible from the interior of the car.

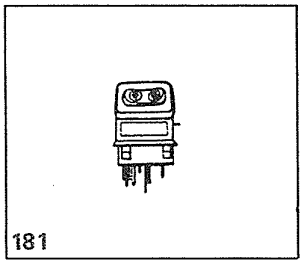
181 Switch for the electrically operated sunroof
between the front seats, on the centre console

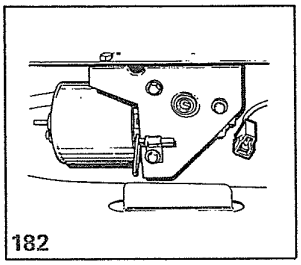
182 Motor for the electrically operated sunroof
at the extreme rear of the luggage compartment, under the spare wheel hatch

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Components

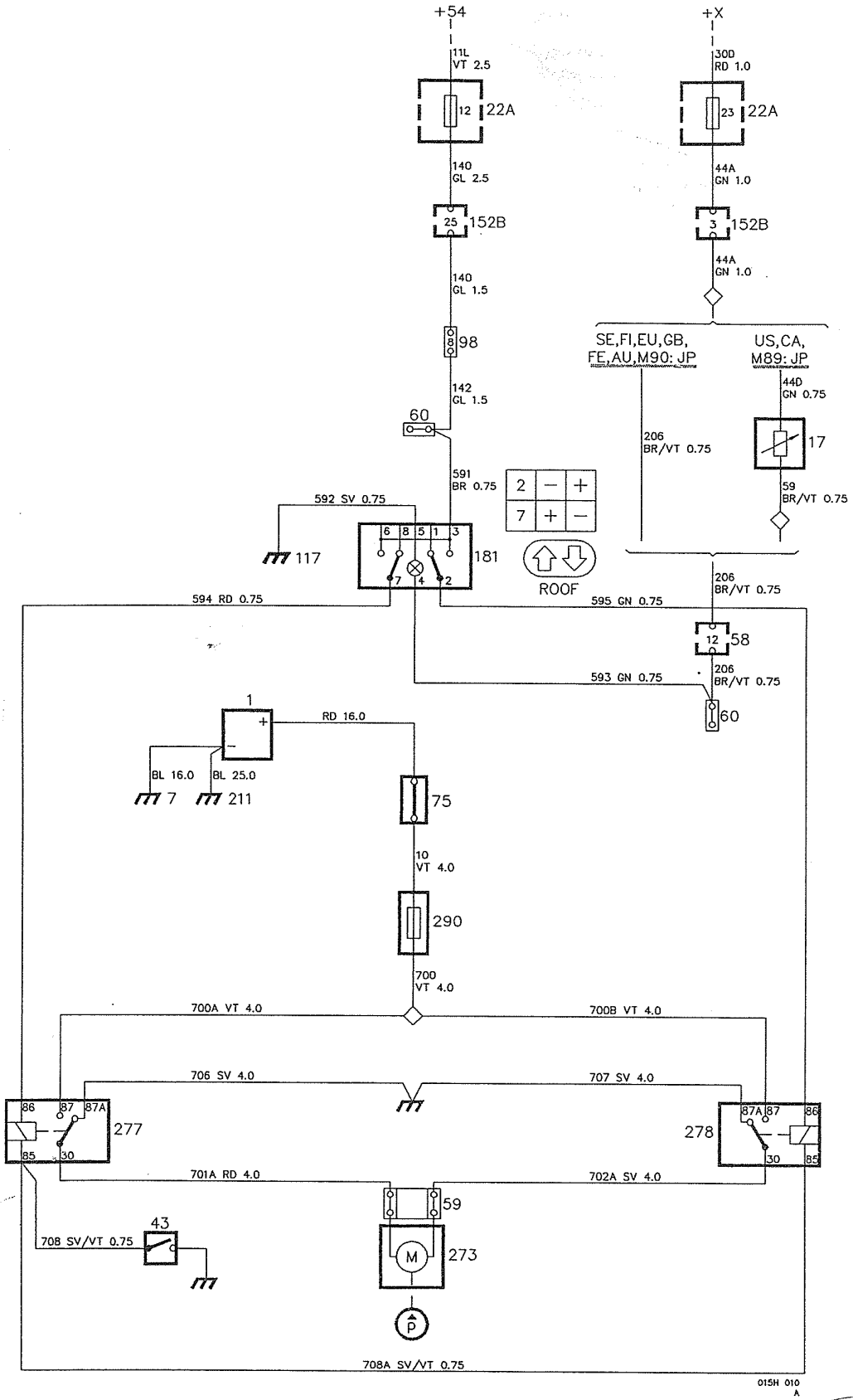






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Electrically operated Convertible top



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Operation

Two hydraulic cylinders actuated by oil from an electric-motor driven hydraulic pump are used for raising and lowering the top.

Switch 181 for operating the top is supplied from fuse 12 via red 29-pole connector 152B and 10-pole connector 98.

When the top is being lowered, current flows from pin 2 on the switch to relay 278, which is energised. The relay coil is earthed across switch 43 for the handbrake warning lamp, and the handbrake must therefore be applied before the top can be operated.

Motor 273 of the hydraulic pump (P) is now supplied across the relay contacts from battery 1 and fuse 290 (25 A). The motor is earthed through the second relay (277) which is de-energised.

To raise the top, the direction of rotation of the motor is reversed, since relay 277 is energised instead, and relay 278 is de-energised.

For a complete description of the wiring for the lighting of switch 181 on cars for the US and CA markets and 1989 model for JP, see also the section entitled "Lighting systems, Lighting for controls – US, CA and 1989 for JP".

Fault-tracing hints

The top can be operated when the ignition switch is in the drive position and the handbrake is applied.

1. Check fuse 12 and check that the supply to it is live.
2. Check that the relays for raising and lowering the top perform correctly.
3. Check that the relays are energised at terminal 87 and that the hydraulic pump motor is energised when the switch is actuated.
4. Check the connectors, cable harnesses and earth connections.

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Locations of components

1 Battery
on the right-hand side of the engine compartment

7 Earthing point on the radiator cross-member

17 Extra rheostat for the lighting of switches and controls
on the left-hand side of the fascia

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

43 Handbrake switch
under the plastic cover at the handbrake lever

58 12-pole connector
on the angle bracket, under the fascia, to the left of the steering column

59 2-pole connector
at the motor for the top

60 Single-pole connector
two under the centre console, between the front seats

75 Distribution block
in the engine compartment, on the side of the right-hand wheel housing

98 10-pole connector
under the fascia, to the left of the steering column

117 Earthing point
between the ignition switch and the handbrake lever

152B 29-pole red connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connector is accessible from the interior of the car.

181 Switch for the electrically operated top
between the seats, on the the centre console

211 Earthing point on the gearbox

273 Motor for the hydraulic pump
under the back seat, on the right-hand side

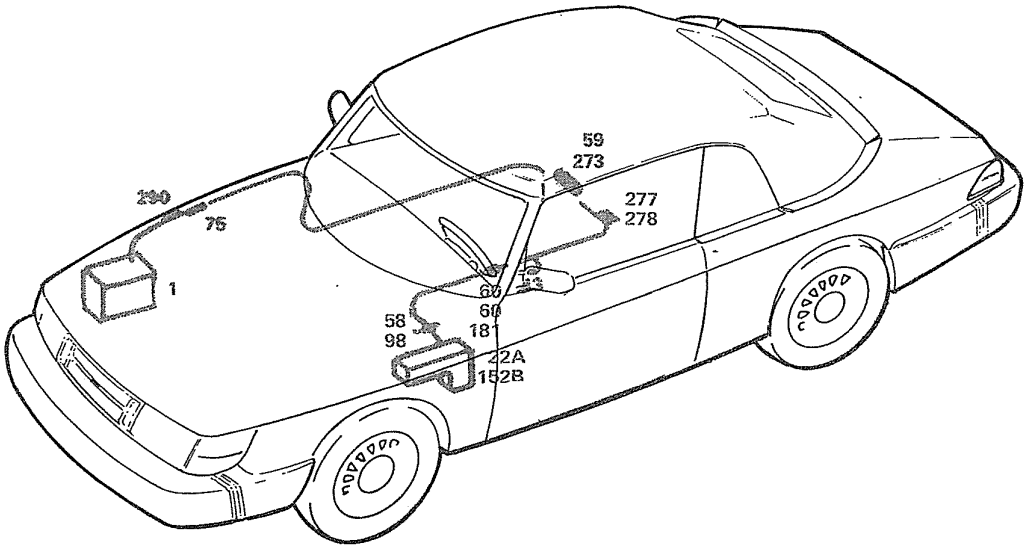
277 Relay for raising the top
in the electrical distribution box under the back seat, relay position C

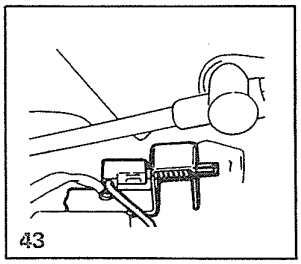
278 Relay for lowering the top
in the elactrical distribution box under the back seat, relay position D

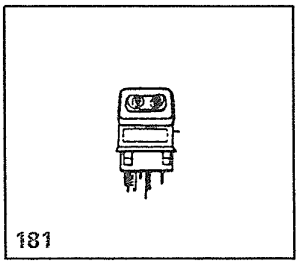
290 Fuse for the top
in the engine compartment, on the right-hand side (at distribution block 75)

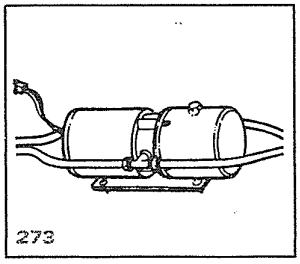
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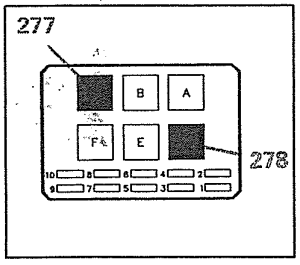
Components

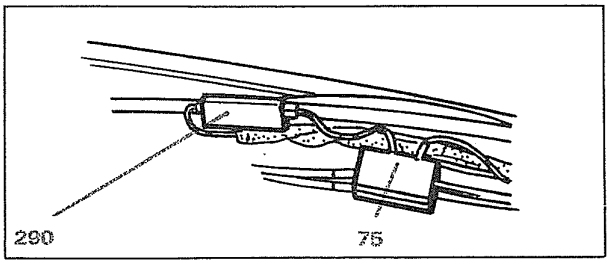






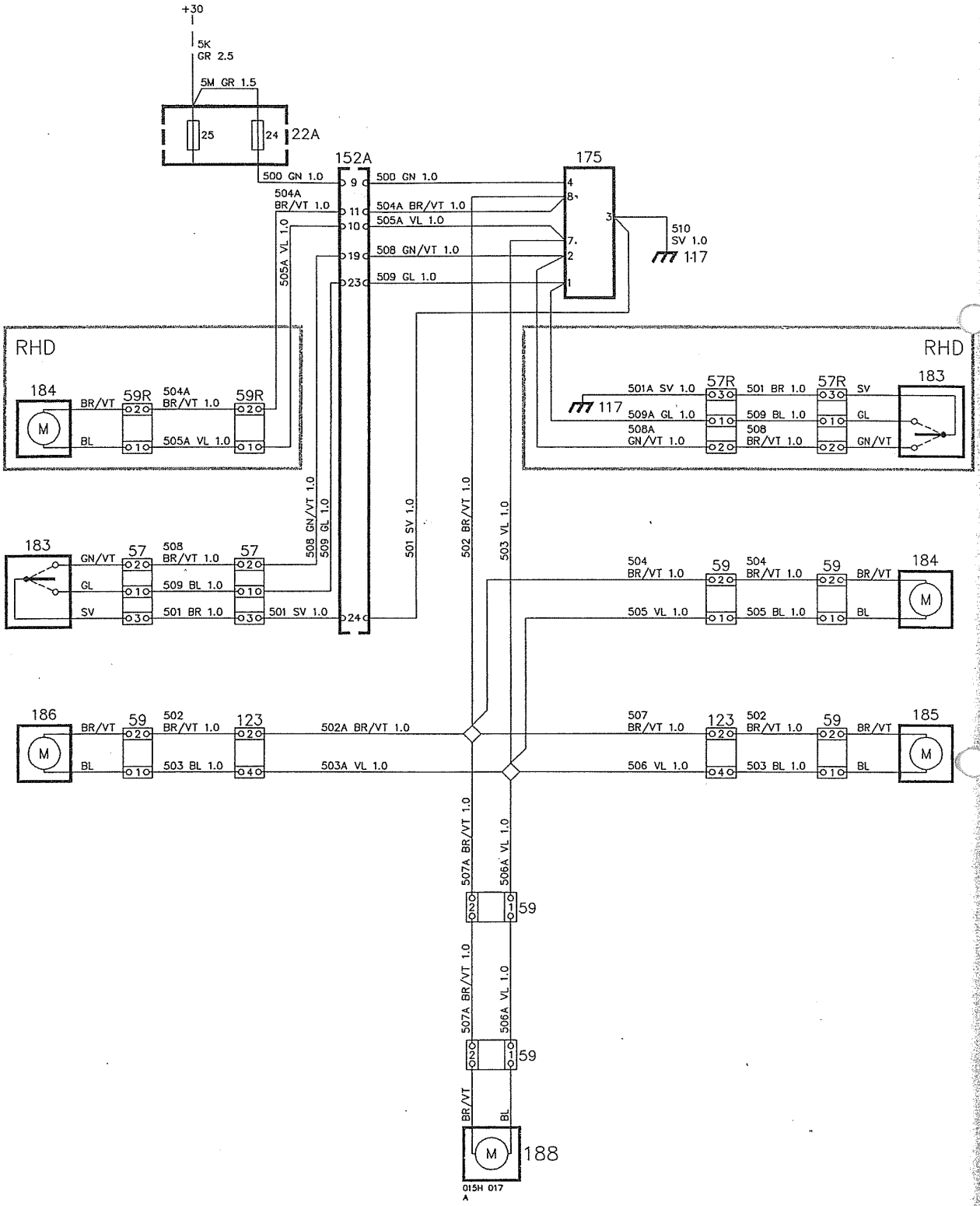






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Central locking



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Operation

The central locking system of the car locks or unlocks all doors and the luggage compartment lid when the key is turned in the lock of the driver's door.

Terminal 4 of control unit 175 for the central locking system is continuously supplied from fuse 24, via white 29-pole connector 152A. The control unit is controlled by key switch 183 in the driver's door.

When the driver's door is locked, terminal 1 of the control unit will be earthed via earthing point 117.

Current will then flow from output 8. All central locking motors (which are connected in parallel) will now be energised for approx. 1 second and the doors will be locked. The motors are earthed through pin 7 of the control unit, and on from terminal 3 to earthing point 117.

When the driver's door is unlocked, terminal 2 of the control unit will instead be earthed across the key switch. The motors will now be energised from pin 7 instead, and will be earthed across pin 8 of the control unit (for approx. 1 second), causing the locks to open.

On right-hand drive cars, the key switch is connected to connector 57R, and motor 184 for the co-driver's door lock is connected to connector 59R.

Fault-tracing hints

1. Check fuse 24 and check that the supply to it is live.
2. Check that the supply to terminal 4 of control unit 175 is live.
3. Check that pin 7 of the control unit is live when the doors are being unlocked and that pin 8 is live when the doors are being locked.

   Note that terminals 7 and 8 are only energised for around one second in conjunction with locking and unlocking. Measurement at these terminals must therefore be carried out when key switch 183 is switching over.
4. Check the connectors, cable harnesses and earth connections.

Note
On testing, the actuating motors may be connected to terminals 7 and 8 of the control unit only. Do not connect them to any other power supply sources. Doing so may overload the motors and damage them.

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Locations of components

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

57 3-pole connector
one in the left-hand front door
one in the engine compartment, at the upper hinge of the left-hand front door, behind the electrical distribution box

57R 3-pole connector
one in the right-hand front door
one in the engine compartment, at the upper hinge of the right-hand front door

59 2-pole connector
one in the right-hand front door
one in the engine compartment, at the upper hinge of the right-hand front door
one in the left-hand rear door
one in the right-hand rear door
one in the luggage compartment lid, near the motor for the luggage compartment lock
one in the luggage compartment, above the left-hand wheel housing

59R 2-pole connector
one in the left-hand front door
one in the engine compartment, at the upper hinge of the left-hand front door, behind the electrical distribution box

117 Earthing point
between the ignition switch and the handbrake lever

123 4-pole connector
one in the left-hand B pillar
one in the right-hand B pillar

152A 29-pole white connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connector is accessible from the interior of the car.

175 Control unit for the central locking system
under the fascia on the right-hand side, behind the knee shield

183 Key switch for the driver's central door lock
in the driver's door

184 Motor for the co-driver's door lock
in the co-driver's door, at the rear, under the lock

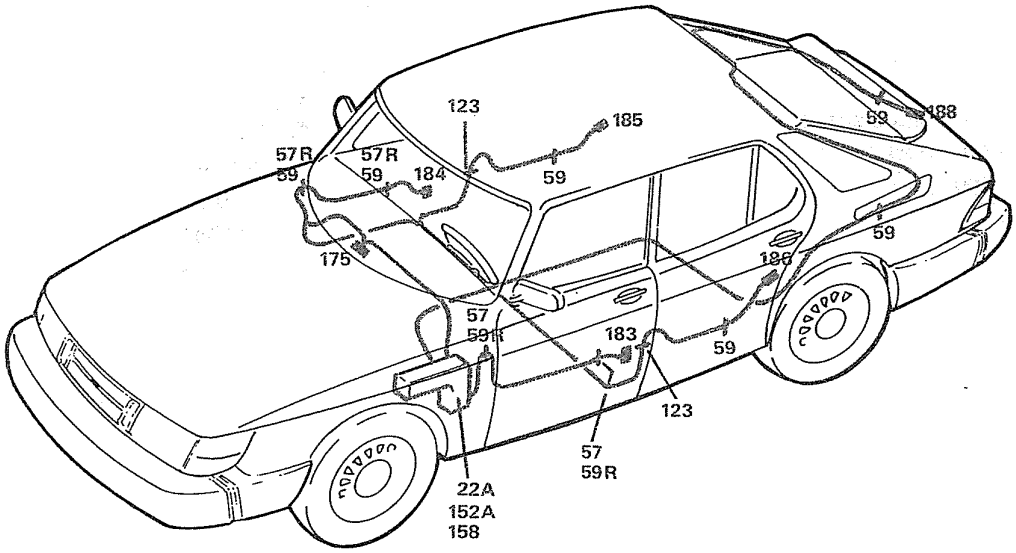
185 Motor for the right-hand rear door lock
under the lock in the right-hand rear door

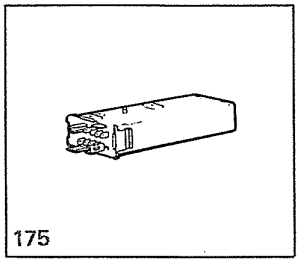
186 Motor for the left-hand rear door lock
under the lock in the left-hand rear door

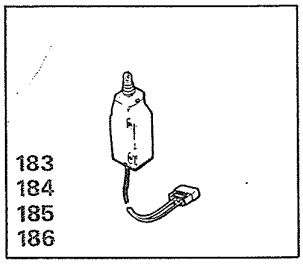
188 Motor for the tailgate lock
in the tailgate

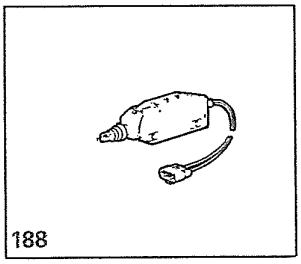
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Components



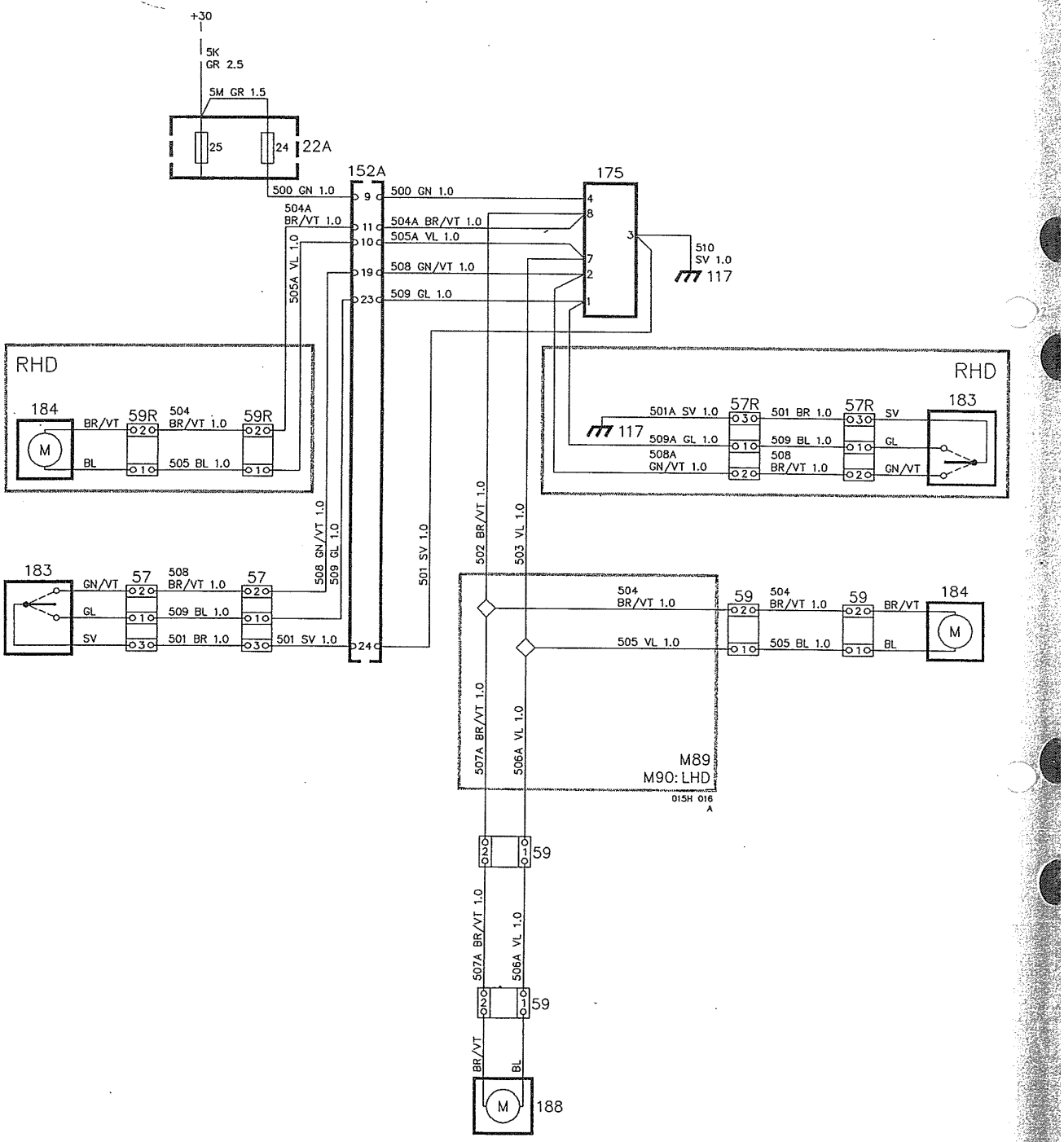






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Central locking – Convertible



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Operation

The central locking system of the car locks or unlocks the doors and the luggage compartment lid when the key is turned in the lock of the driver's door.

Terminal 4 of control unit 175 for the central locking system is continuously supplied from fuse 24, via 29-pole white connector 152A. The control unit is controlled by key switch 183 in the driver's door.

When the driver's door is locked, terminal 1 of the control unit will be earthed via earthing point 117.

Current will then flow from output 8. Both central locking motors will now be energised for approx. 1 second and the doors will be locked. The motors are earthed through pin 7 of the control unit, and on from terminal 3 to earthing point 117.

When the driver's door is unlocked, terminal 2 of the control unit will instead be earthed across the key switch. The motors will now be energised from pin 7 instead, and will be earthed across pin 8 of the control unit (for approx. 1 second), causing the locks to open.

Fault-tracing hints

1. Check fuse 24 and check that the supply to it is live.
2. Check that the supply to terminal 4 of control unit 175 is live.
3. Check that pin 7 of the control unit is live when the doors are being unlocked and that pin 8 is live when the doors are being locked.

   Note that terminals 7 and 8 are only energised for around one second in conjunction with locking and unlocking. Measurement at these terminals must therefore be carried out when key switch 183 is switching over.
4. Check the connectors, cable harnesses and earth connections.

Note
On testing, the actuating motors may be connected to terminals 7 and 8 of the control unit only. Do not connect them to any other power supply sources. Doing so may overload the motors and damage them.

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Locations of components

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

57 3-pole connector
one in the left-hand front door
one in the engine compartment, at the upper hinge of the left-hand front door, behind the electrical distribution box

57R 3-pole connector
one in the right-hand front door
one in the engine compartment, at the upper hinge of the right-hand front door

59 2-pole connector
one in the right-hand door
one in the engine compartment, at the upper hinge of the right-hand front door
one in the luggage compartment lid, near the motor for the luggage compartment lock
one in the luggage compartment, at the left-hand lid hinge, behind the trim

59R 2-pole connector
one in the left-hand front door
one in the engine compartment, at the upper hinge of the left-hand front door, behind the electrical distribution box

117 Earthing point
between the ignition switch and the handbrake lever

152A 29-pole white connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connector is accessible from the interior of the car.

175 Control unit for the central locking system
under the fascia on the right-hand side, behind the knee shield

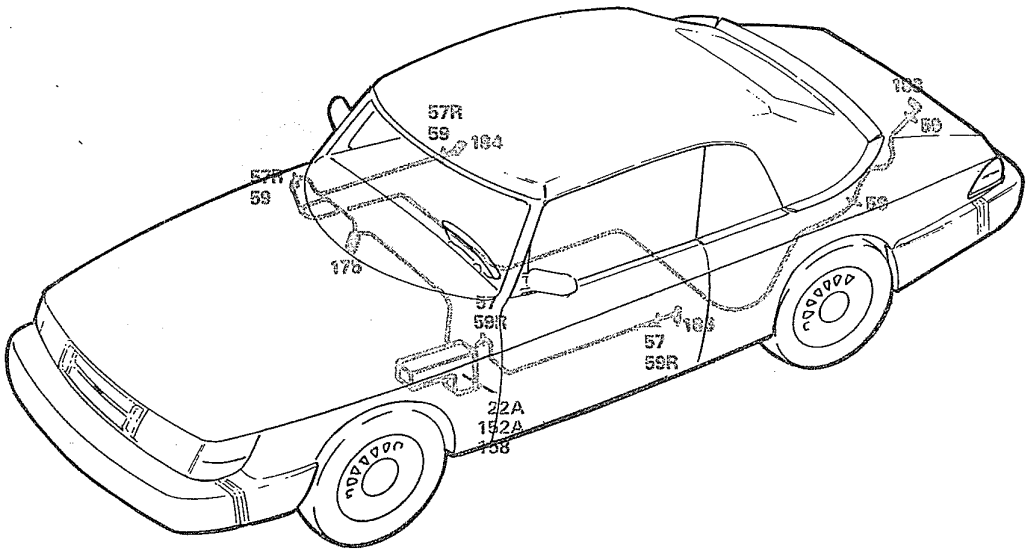
183 Key switch for the driver's central door lock
at the rear of the driver's door

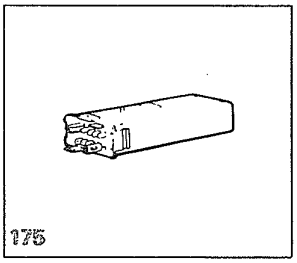
184 Motor for the co-driver's door lock
at the rear of the co-driver's door, under the lock

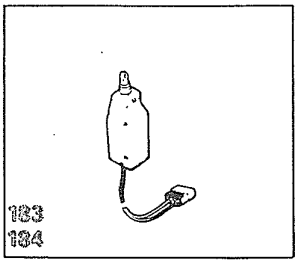
188 Motor for the tailgate lock
in the tailgate

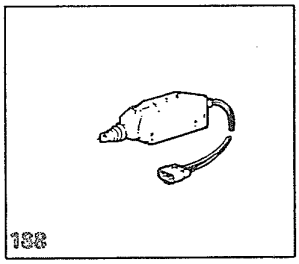
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Components



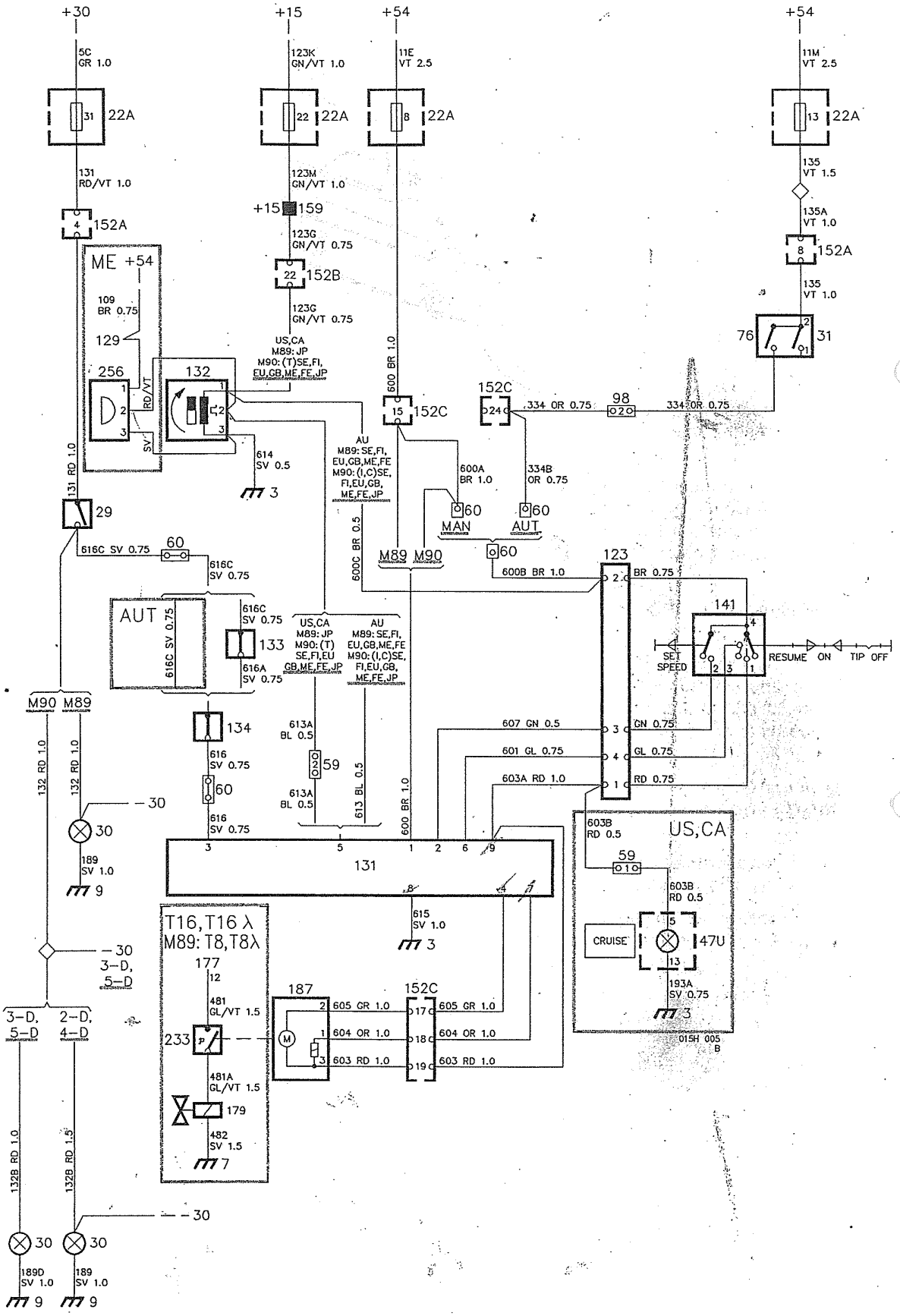






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Cruise Control system



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Operation

The Cruise Control system consists of the following components:

- Speed transmitter 132
- Selector 141 for Cruise Control
- Control unit 131 for Cruise Control
- Vacuum pump 187 for Cruise Control (with vacuum valve)
- Vacuum controller
- Pedal switches 133 and 134

The system is switched in by means of selector 141. When the latter is set to the ON position, the supply will be taken to vacuum pump and vacuum valve 187. The pump is earthed across terminal 4 and valve across terminal 7. In addition, a supply is taken from the selector to terminal 9 of the control unit.

When the SET button is depressed, the supply circuit will be closed to terminal 2 of the control unit and the road speed of the car will be read by speed transmitter 132. The value will be fed into the memory of the control unit and stored there.

Vacuum pump 187 generates a vacuum in the vacuum controller. This vacuum corresponds to the selected speed. The vacuum controller is connected by chain to the accelerator linkage.

The speed of the car is sensed continuously and is compared with the value stored in the memory. In the event of a deviation, the vacuum pump/vacuum valve will increase or decrease the vacuum in the controller, thus resetting the accelerator linkage.

When terminal 4 is earthed, the vacuum pump will run and the vacuum in the controller will increase, thereby increasing the accelerator setting.

When terminal 7 is earthed, the vacuum valve will be closed and the vacuum in the system will be constant.

When terminals 4 and 7 are both open (not earthed), the vacuum pump will be stationary and the valve will be open. The vacuum in the controller will decrease, thereby reducing the accelerator setting.

If the clutch or brake pedal is depressed, the circuit to earth will be opened by the corresponding pedal switch (133 or 134). At the same time, a valve in the pedal switches will open, so that the vacuum will be lost. The pedal switches thus take both the electrical system and the vacuum system out of operation.

The pedal switches are normally earthed across the brake light bulbs. If a fault should occur on one of the switches 133 or 134, the Cruise Control system will be switched out by brake light switch 29, since a positive voltage will be applied to terminal 3 of control unit 131.

The memory of the control unit is not erased, so the selected speed can be resumed after the pedal has been released. This is done by pressing the selector to the RESUME position, thereby applying a supply voltage to terminal 6 of the control unit.

A TIP position is provided between the ON and OFF positions of selector 141. When the selector is pressed to this position, the supply to terminal 9 of the control unit will be interrupted and the Cruise Control system will be switched out (the vacuum pump will stop and the vacuum valve will open).

When the selector is released, its return spring will return it to the ON position, and the supply to terminal 9 of the control unit will be re-established.

To revert to the selected speed, the selector must be pressed to the RESUME position, thereby applying a supply voltage to terminal 6 of the control unit.

The information in the memory of the control unit is erased when the ignition is switched off.

Cars with the Turbo engine and Cruise Control are also equipped with vacuum switch 233 controlled from the vacuum pump through a hose. When the switch is closed, the control unit will reduce the boost pressure to the basic value, thus providing smoother control of the speed of the car.

Manual gearbox

The Cruise Control system is supplied from fuse 8.

Automatic transmission

The Cruise Control system is supplied from fuse 13 via the white 29-pole connector 152A. The system will thus be inoperative until the selector lever is in one of the drive positions.

US and CA markets

Cars for these markets are equipped with a CRUISE warning lamp (47U) which will light up when selector 141 is set to ON.

+ = 2
ON = 1 + 4 = 9 - Brown
SET = 1 + 2
RES = 1 + 3

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Fault-tracing hints

The Cruise Control system will be operative when the ignition switch is in the drive position.

OFF position

Note.
Fault tracing can be carried out without the ignition being set to drive.

1. Check fuse 8 and check that the supply to it is live (MAN).
2. Check fuse 13 and check that the supply to it is live. Also check switch 76 (AUT).
3. Check that the supply to terminal 4 of selector 141 and to terminal 1 of control unit 131 is live.
4. Check the voltage at terminal 1 of speed transmitter 132.

ON position

1. Check the voltage at terminal 1 of the selector and at terminal 9 of the control unit.
2. Check that the supply to vacuum pump 187 is live.

SET position (spring-loaded)

1. Check the voltage at terminal 2 of the selector and terminal 2 of the control unit.

RESUME position (spring-loaded)

1. Check the voltage at terminals 1 and 3 of the selector and at terminals 6 and 9 of the control unit.
2. Check that the supply to the vacuum pump is live (cable 603 RD).
3. Check the connectors, cable harnesses and earth connections.

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Locations of components

3 Earthing point in the fascia

7 Earthing point on the radiator cross-member

9 Earthing point in the luggage compartment

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

29 Brake light switch
at the brake pedal

30 Brake lamps
in the rear light clusters

31 Reversing light switch
under the centre console, at the selector lever

47U Cruise Control warning lamp
in the combined instrument

59 2-pole connector
under the fascia, on the left-hand side (behind the knee shield)

60 Single-pole connector
two on the left-hand side under the fascia, at the 29-pole connector
two under the fascia, to the left of the steering column, behind the knee shield

76 Switch for raising the idling speed, auto. transm.
under the centre console, at the selector lever

98 10-pole connector
to the left of the steering column, under the fascia

123 4-pole connector
on the left-hand side, under the fascia (behind the knee shield)

129 Buzzer for coolant temperature
under the fascia, to the left of the steering column, behind the knee shield

131 Control unit for Cruise Control
on the left-hand side under the fascia (behind the knee shield)

132 Speed transmitter
in the combined instrument

133 Clutch switch for Cruise Control
at the clutch pedal

134 Brake switch for Cruise Control
at the brake pedal

141 Selector for Cruise Control
in the direction indicator stalk switch, on the left-hand side of the steering column

152A 29-pole white connector
152B 29-pole red connector
152C 29-pole black connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car.

159 Distribution terminal +15
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

177 Control unit for the APC system
in the engine compartment, forward of the left-hand wheel housing

179 Solenoid valve
at the extreme front of the engine compartment, above the radiator fan

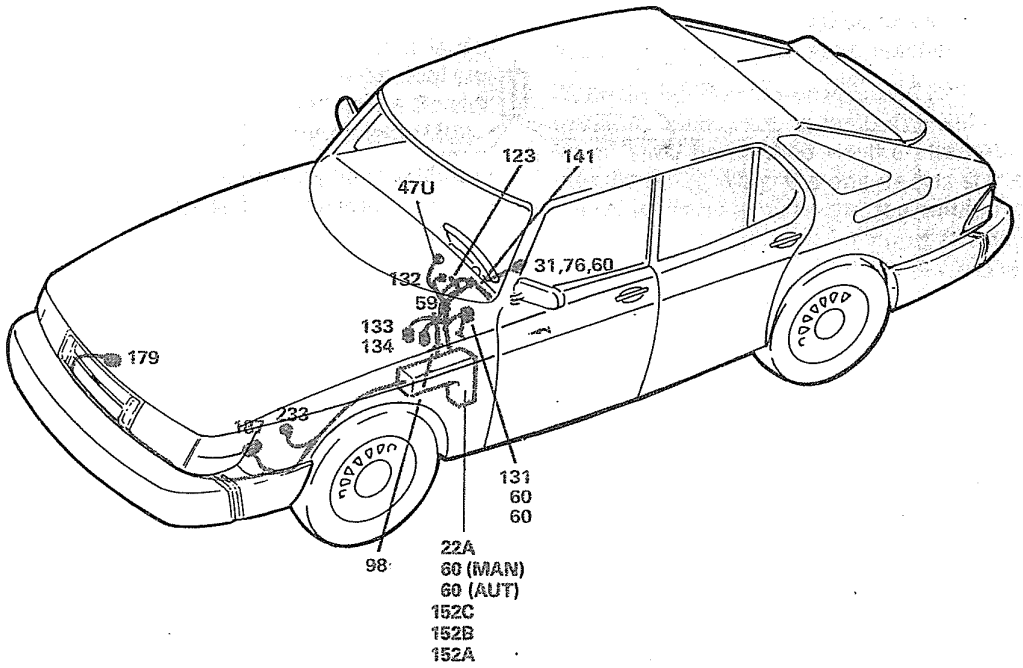
187 Vacuum pump for Cruise Control
in the engine compartment, forward of the left-hand wheel housing

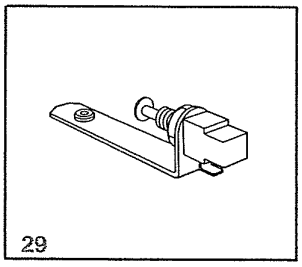
233 Vacuum switch for Cruise Control
in the engine compartment, on the left-hand wheel housing

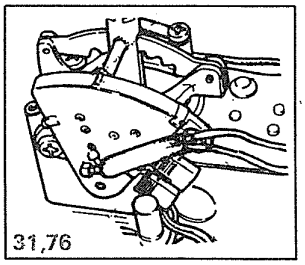
256 Speed warning buzzer
behind the combined instrument

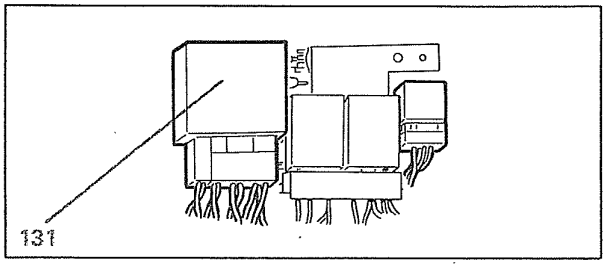
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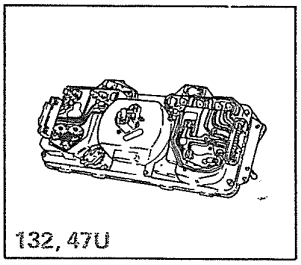
Components

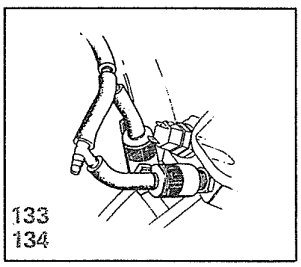


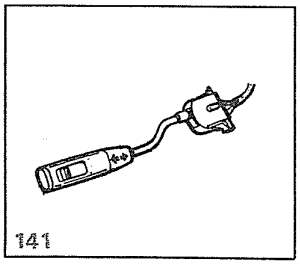


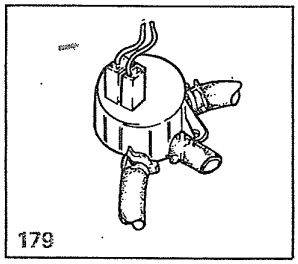


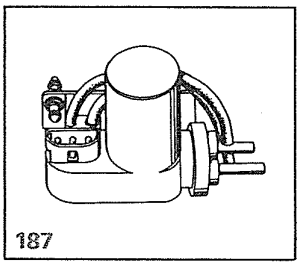


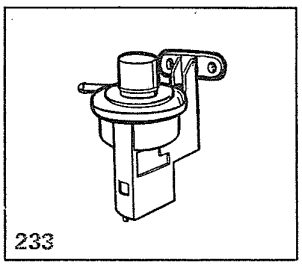






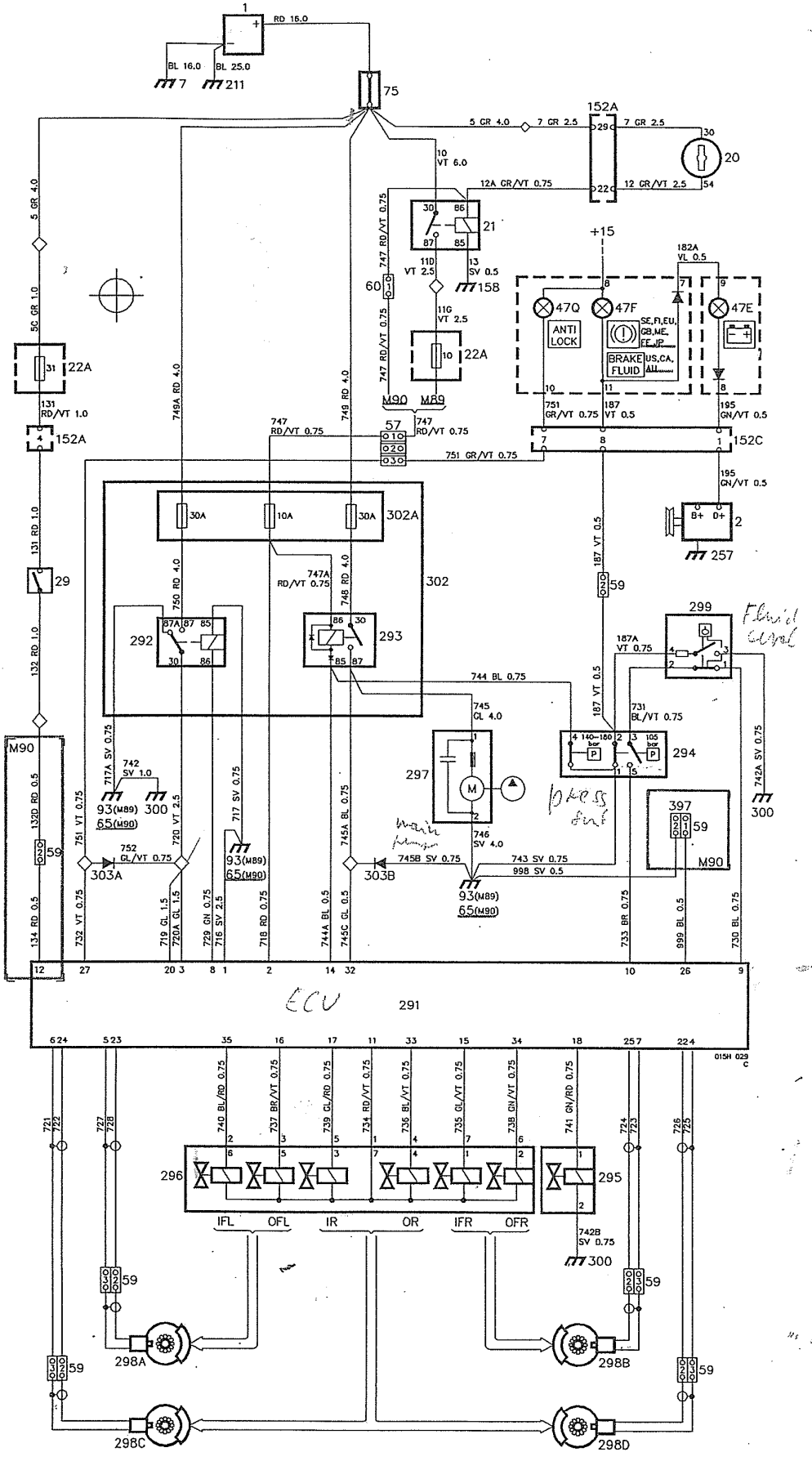






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Anti-lock brake system (ABS)



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Operation

The Anti-lock Brake System (ABS) is controlled and monitored electrically.

Only the electrical operation of the system is described in this manual, whereas the mechanical and hydraulic components are discussed in the Service Manual, Group 5:2 Anti-lock braking system (ABS).

A sensor at each wheel of the car supplies the control unit with information on the speed of rotation of the corresponding wheel. If any of the wheels should tend to lock, the control unit will adjust the braking effort, i.e. the hydraulic fluid pressure in the brake lines, by means of electric control valves. The braking effort on the front wheels can be controlled individually, whereas that on the rear wheels is controlled jointly.

The brake unit, which is connected to the brake pedal, does not employ the vacuum in the engine intake manifold for the servo action. The car is equipped instead with an electrically driven hydraulic pump which provides the servo action. The hydraulic fluid pressure is maintained at the required value by means of a pressure switch which controls the hydraulic pump motor.

Two warning lamps on the fascia are connected to the brake system: the ABS warning lamp (ANTI LOCK) and the usual brake warning lamp which is also incorporated into brake systems without ABS. On cars for the US, CA and UA market, the lamp is marked with the text BRAKE FLUID instead of the symbol.

The components of the ABS system are supplied across the fuses on relay and fuse board 302.

Control unit 291 is protected by the 10A fuse, and main relay 292 and pump relay 293 are protected by the two 30A fuses.

In addition, warning lamps 47Q and 47F are supplied (+15) when the ignition switch is in the drive or start position.

Power supply

When the ignition switch is turned to the drive position, pin 2 of the control unit will be energised (+54). The supply from pin 8 of the control unit then energises main relay 292. The unit is thus supplied (+30) so that it can operate the control valves of the hydraulic unit.

Operation of warning lamps when the car is started

The warning lamps for the brake system light up every time the engine is started. This allows the driver to check that the bulb filaments are intact. (How the warning lamps light up to indicate defects is covered in the section entitled "Monitoring functions".)

When the ignition switch is turned to the start position, the +54 supply to main relay 292 will be interrupted, the relay will be de-energised, and ABS warning lamp 47Q will therefore be earthed at earthing point 63/93 via diode 303A and the relay contacts. Since the relay is always de-energised for at least 2 seconds when the engine is started, the lamp will light up during this time. (However, the lamp may remain alight for up to 60 seconds, until the correct hydraulic pressure has been reached.)

When the ignition switch is turned to the drive or start position, brake warning lamp 47F will also light up, since it will be earthed via the alternator charging warning lamp. When the engine has started and the alternator begins to charge, the voltage at terminal D+ of the alternator will increase, the diodes in the earth circuit will cut off, and the warning lamp will be extinguished.

Hydraulic pressure

The pressure in the hydraulic unit accumulator is maintained at the correct value by a hydraulic pump, which is driven by motor 297 and is controlled by pressure switch 294.

If the pressure is less than 140 bar when the engine is started, contacts 4-1 will be closed. The coil of pump relay 293 is then earthed and motor 297 is supplied across the relay contacts.

When the hydraulic pump has raised the pressure in the accumulator to 180 bar, the contacts will open and the motor will stop. If the pressure should drop to 140 bar while the car is travelling, the contacts will again close and the pump will start. The pump requires 10 – 15 seconds to raise the pressure from 140 bar to 180 bar.

Fault tracing

The ABS system tester should be used for fault tracing in the ABS system. This tester carries out measurements on the entire ABS system automatically, in accordance with a program stored in the tester. Most of the measurements are taken while the car is travelling. Detailed fault-tracing instructions are included in the manual supplied with the tester.

In exceptional cases, conventional measuring instruments may be used for fault tracing, and the table below includes resistance values for valve coils, etc. and values for the output voltage from the wheel sensors.

Component	Value	Remarks
298 Wheel sensors	800 – 1400 ohm	
	at least 0.1 V AC	value when the wheel is rotating at 1 rev/s
295 Master valve	2 – 5 ohm	
296 Inlet valves	5 – 7 ohm	IFL, IFR, IR
296 Outlet valves	3 – 5 ohm	OFL, OFR, OR
299 Brake fluid level sensor		
Contacts 1 – 2	10 ohm	contacts closed, float in bottom position
Contacts 3 – 4	1 ohm	contacts closed, float in the top position

Test equipment

ABS system tester, part No. 89 96 514.

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Control unit 291

Control unit 291 continually receives information on the speed of rotation of the wheels from the following four wheel sensors:

298A left-hand front
298B right-hand front
298C left-hand rear
298D right-hand rear

On the basis of the speed values obtained from the sensors, the control unit then controls the braking effort on the wheels via the six hydraulic valves 296 in the hydraulic unit. The front-wheel brakes are controlled individually, whereas the brakes of the rear wheels are controlled jointly. One inlet valve and one outlet valve is provided for each function.

Left-hand front wheel
IFL inlet valve
OFL outlet valve

Right-hand front wheel
IFR inlet valve
OFR outlet valve

Rear wheels (common circuit)
IR inlet valve
OR outlet valve

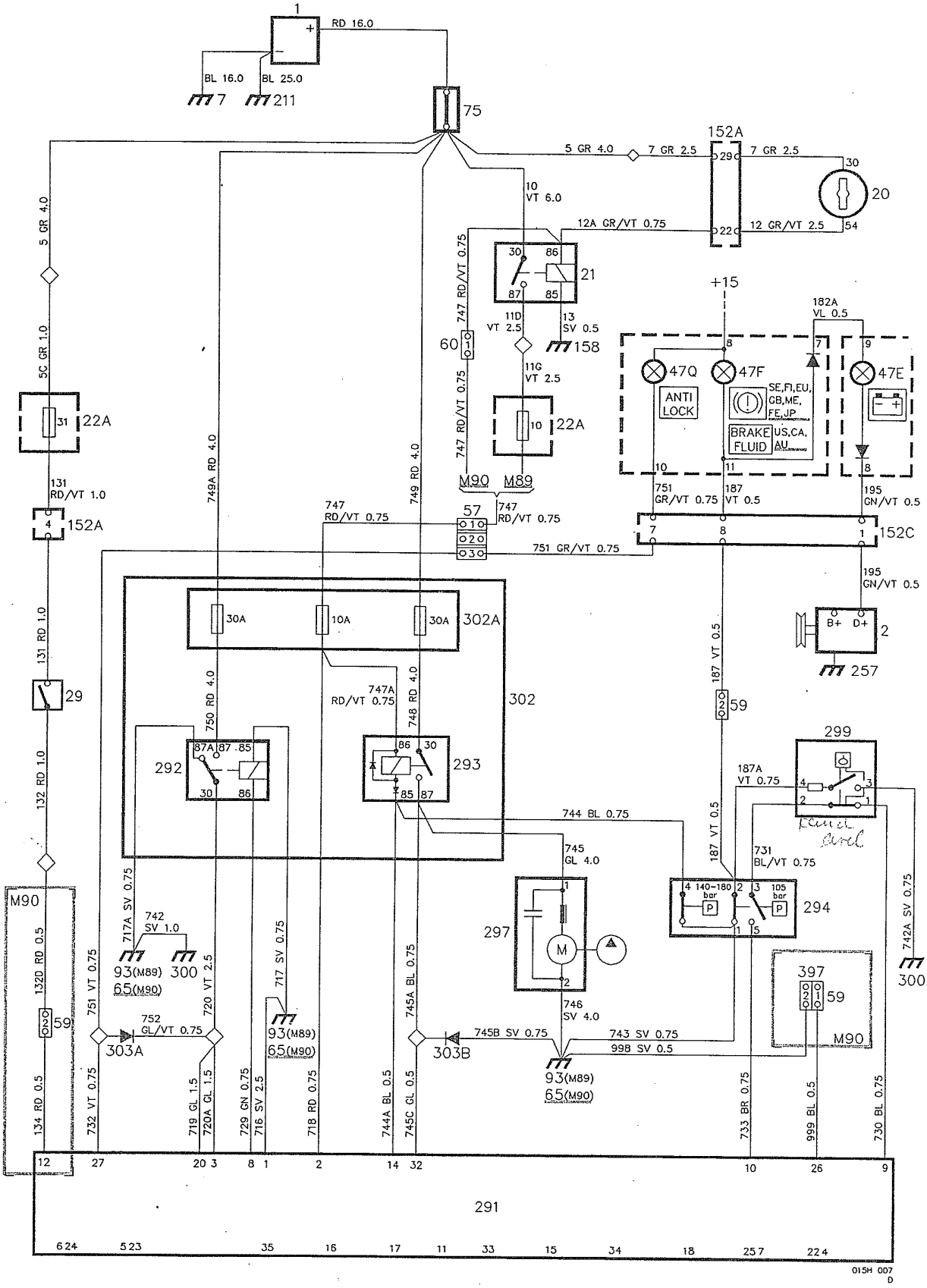
In the de-energised condition, the inlet valves are open and the outlet valves are closed.

When the ABS system is in operation, master valve 295 will be energised and is open.

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Power supply, hydraulic pressure and monitoring functions



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Operation

For particulars of the operation of the lamps during starting, see page 269.

Brake warning lamp

Brake warning lamp 47F will light up under the following circumstances:

- if the level in the fluid reservoir reaches the MIN mark on the reservoir. The lamp will then be earthed at earthing point 300 across contacts 4 – 3 of level sensor 299.
- if the pressure in the accumulator of the hydraulic unit should drop below 105 bar. The lamp will then be earthed at earthing point 7 across contacts 2 – 1 of pressure switch 294. The contacts close at 105 bar and open at 134 bar. (In this case, the ABS warning lamp will also light up.)

Both pairs of contacts are open under normal operating conditions.

Cars without ABS are also equipped with the brake warning lamp, although it is then used only for warning the driver that the level in the brake fluid reservoir is too low.

ABS warning lamp

The control unit monitors the performance of the ABS system and, if a fault should occur, will light up ANTI LOCK warning lamp 47Q. When the lamp is alight, the ABS function is inoperative, and the brake system will perform as a conventional brake system.

The following faults will cause pin 27 of control unit 291 to earth the lamp, thus lighting it up:

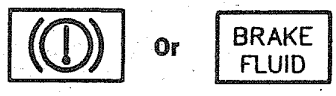
- if the level in the brake fluid reservoir should drop below the MIN marking on the reservoir. Contacts 1 – 2 of level sensor 299 will then open, thus opening the circuit between pins 9 and 10 of the control unit. Under normal operating conditions, contacts 3 – 5 of pressure switch 294 are closed. (In this case, the brake warning lamp will also light up.)
- if the pressure in the accumulator of the hydraulic unit should drop below 105 bar. Contacts 3 – 5 of pressure switch 294 will then open. Contacts 1 – 2 of level sensor 299 are closed if the level in the brake fluid reservoir is correct. (The brake warning lamp will also light up.)
- if the signal level from one of the wheel sensors 298 is too low.

The following faults will cause pin 8 of the control unit to be de-energised. ABS system relay 292 will then trip and the lamp will be earthed at earthing point 300 across the relay contacts and diode 303A.

- open-circuit in the wiring (or in the connector) to valve block 296, wheel sensors 298 or master valve 295.
- fault in the control unit.

Summary of indications provided by the warning lamps:

Brake fluid warning lamp lights up



Only the brake fluid level warning lamp will light up if the brake fluid level has dropped slightly.

Normal braking and ABS control remain unaffected.

ABS warning lamp lights up



Only the ABS warning lamp will light up if the electronic control unit should detect a fault in the ABS system.

The ordinary brakes operate normally but the ABS system is disconnected.

Brake fluid level warning and ABS warning lamps light up simultaneously



If both lamps are alight, this indicates either that the brake fluid in the reservoir has dropped further or that the hydraulic pressure has dropped to below 105 bar (1523 psi). This means that ABS control is inoperative and only reduced braking effort is available.

Joint activation due to low brake fluid level indicates that brake fluid is leaking out of the brake system. **Stop immediately and don't drive the car** until repairs have been carried out.

Joint activation due to low hydraulic pressure indicates that the servo action and the brake pressure at the rear wheels are not proportional to the pedal pressure. Finally, when the hydraulic pressure is 0 bar, there will be no servo action and no brake pressure to the rear wheels. The front-wheel brakes will operate normally, although without power assistance.

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Locations of components

1 Battery
on the right-hand side of the engine compartment

2 Alternator
on the left-hand side of the engine

7 Earthing point on the radiator cross-member

20 Ignition switch
on the centre console between the front seats

21 Ignition switch relay
in the electrical distribution box, in the engine compartment, relay position E

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

47E Charging warning lamp

47F Brake warning lamp

47K SHIFT UP warning lamp
in the combined instrument in the instrument panel

47Q ABS warning lamp
in the combined instrument on the fascia

47T SRS Airbag warning lamp
in the combined instrument on the fascia

57 3-pole connector
one at the right-hand front wheel sensor
one at the left-hand front wheel sensor

58 12-pole connector
on the inside of the knee shield, to the left of the steering column

59 2-pole connector
at the electrical distribution box at the left-hand wheel housing
on the left-hand side, under the back seat (1990 model)
in the electrical distribution box in the engine compartment (CAB)
one in the engine compartment, at the hydraulic unit
one in the engine compartment, on the right-hand side of the bulkhead partition
one under the back seat, on the left-hand side
one under the back seat, on the right-hand side

60 Single-pole connector
in the electrical distribution box, on the left-hand wheel housing (1990 model)

65 Earthing point at the back seat (1990 model)

75 Distribution block
in the engine compartment, on the right-hand side

93 Earthing point on the left-hand wheel housing member

98 10-pole connector
one (black) on the inside of the knee shield, to the left of the steering column
one at the electronic unit

123 4-pole connector
two at the electronic unit. One black (left-hand front sensor) and one grey (right-hand front sensor)

152A 29-pole white connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connector is accessible from the interior of the car.

152B 29-pole red connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connector is accessible from the interior of the car.

152C 29-pole black connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connector is accessible from the interior of the car.

158 Negative distribution terminal
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

211 Earthing point on the gearbox

257 Earthing point on the alternator bracket

291 ABS control unit
on the left-hand side of the engine compartment, forward of the wheel housing (1989 model)
under the back seat, on the right-hand side (1990 model)

292 ABS system relay
in the engine compartment, forward of the left-hand wheel housing, in the ABS electrical distribution box (1989 model)
in the engine compartment, behind the right-hand wheel housing, in the ABS electrical distribution box (1990 model)

293 ABS pump relay
in the engine compartment, forward of the left-hand wheel housing, in the ABS electrical distribution box (1989 model)
in the engine compartment, behind the right-hand wheel housing, in the ABS electrical distribution box (1990 model)

294 ABS pressure switch
in the engine compartment, on the hydraulic unit

295 ABS master valve
in the engine compartment, on the hydraulic unit

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296 ABS valve block
in the engine compartment, forward of the left-hand wheel housing

297 ABS hydraulic pump motor
in the engine compartment, on the hydraulic unit

298A Wheel sensor, left-hand front
on the left-hand steering swivel member

298B Wheel sensor, right-hand front
on the right-hand steering swivel member

298C Wheel sensor, left-hand rear
on the left-hand rear wheel hub

298D Wheel sensor, right-hand rear
on the right-hand rear wheel hub

299 ABS brake fluid level sensor
in the engine compartment, on the brake fluid reservoir of the hydraulic unit

300 Earthing point on the hydraulic unit
in the engine compartment, on the front of the hydraulic unit

302 ABS electrical distribution box
in the engine compartment, forward of the left-hand wheel housing (1989 model)
in the engine compartment, behind the right-hand wheel housing (1990 model)

302A ABS fuse holder
in the engine compartment, forward of the left-hand wheel housing, in the ABS electrical distribution box (1989 model)
in the engine compartment, behind the right-hand wheel housing, in the ABS electrical distribution box (1990 model)

303A ABS diode
303B ABS diode
in the engine compartment, forward of the left-hand wheel housing, in the ABS electrical distribution box (1989 model)
in the engine compartment, behind the right-hand wheel housing, in the ABS electrical distribution box (1990 model)

330 10-pole airbag test connector
in the centre console, under the rubber bellows, forward of the gear lever

331 Electronic unit for the airbag
in the fascia, under the left-hand speaker grille

332A Sensor, left-hand
in the engine compartment, forward of the left-hand wheel housing

332B Sensor, right-hand
in the engine compartment, forward of the right-hand wheel housing

333 Airbag
in the steering wheel

334 Earthing point for the electronic unit and test connector
adjacent to the electronic unit

335 2-pole orange connector
the pins are short-circuited when the connector is separated

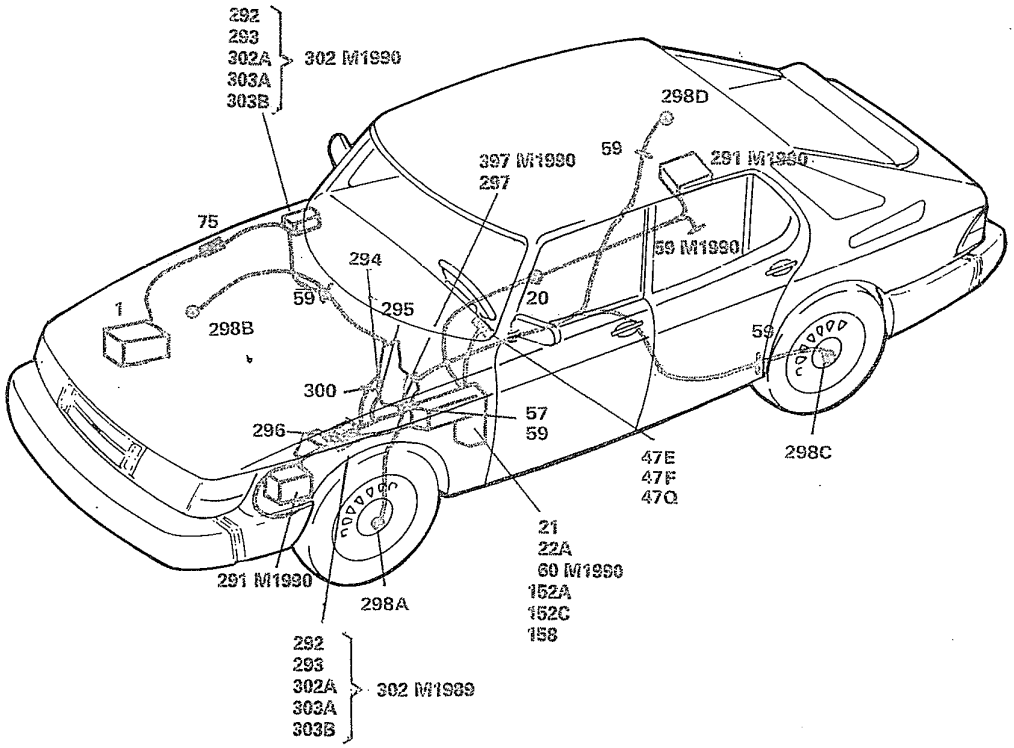
336 Slip-ring contact
in the steering wheel

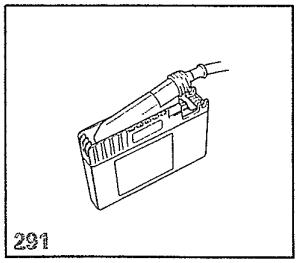
397 Diagnostic test socket, ABS
in the engine compartment, in the cable harness at the hydraulic unit (1990 model)

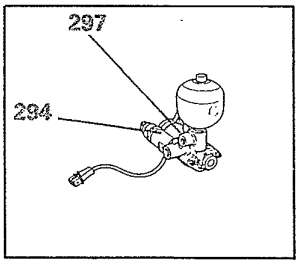
400 Redundant earth for the airbag
on the left-hand wheel housing, accessible from the interior

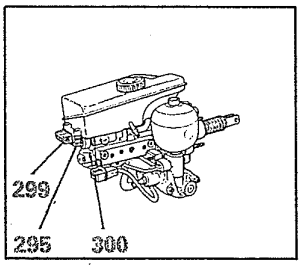
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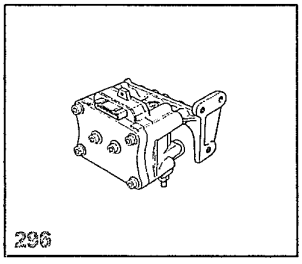
Components

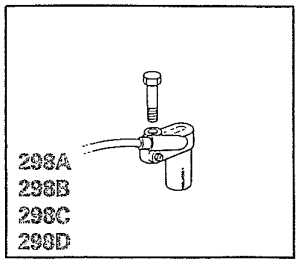


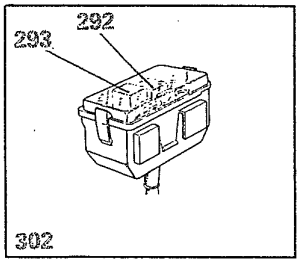


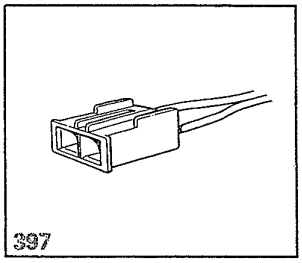






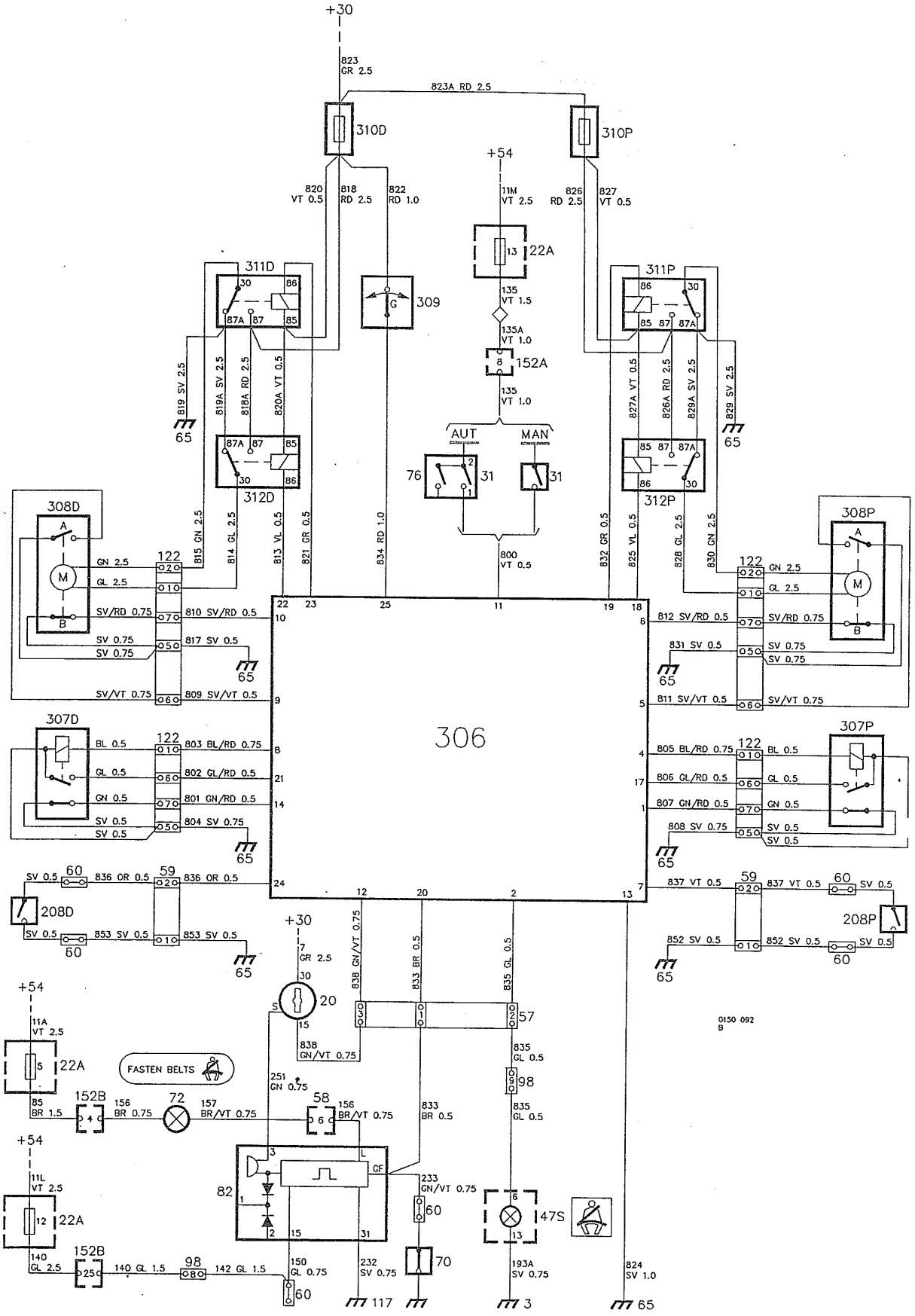






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Passive seat belts, 1989 model



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Operation

In certain cars, passive seat belts are provided for the front-seat occupants. The seat belt consists of a motor-driven, two-point diagonal strap and a manually fastened lap strap. The diagonal strap is controlled and monitored by logic box 306.

Regardless of the position of the ignition switch, the seat-belt system is always supplied (+30) across fuses 310 (D = driver's side and P = passenger's side). The g sensor 309 is designed to isolate the supply to the logic box in the event of a collision (retardation of more than 0.7 g).

Driver's side

The upper anchor point of the diagonal strap (the carriage on the guide rail) is moved between the A and B pillars by motor 308D, which is controlled by the logic box via relays 311D and 312D. The travel of the carriage is monitored by the two limit switches 308D:A and B. Limit switch A opens a circuit and thus provides information to the logic box that the carriage has reached the A pillar, and limit switch B opens the circuit when the carriage is locked at the B pillar.

When the door is opened from the outside, the carriage is in the forward position at the A pillar. After the door has been closed, i.e. door switch 208D is open and ignition switch 20 is in the drive or start position, the coil of relay 311D will be earthed via pin 23 in logic box 306. The relay is energised and one pole of the motor is supplied via the relay contacts, while the other pole is earthed via relay 312D. When the carriage has reached the rear limit of its travel at the B pillar, limit switch B will open. The logic box will then open the earth circuit to the coil of relay 311D and the motor will stop.

When the ignition is switched off or the door is opened, the logic box will energise (via pin 22) relay 312D. The direction of rotation of the motor will then be reversed and the carriage will move towards the A pillar. When the carriage has reached the A pillar, limit switch A will open and the motor will stop.

When reverse gear is engaged, reversing light switch 31 will close and a signal will be applied to the logic box. The driver can then open the door while the ignition is switched on, without the seat-belt carriage moving to the forward position.

The sensor-override solenoid 307D in the belt reel overrides the acceleration and tipping sensors for the diagonal strap. The solenoid is energised while the carriage is travelling between the two limits of its travel, to enable the belt to be withdrawn freely. In addition, the solenoid is energised for 30 seconds after the door has been opened or closed, to enable the seat to be adjusted.

When the solenoid is energised, the circuit will be closed at the upper contacts in the diagram (earth at pin 21) to provide the logic box with information that the solenoid has actually been energised. The lower contacts sense whether or not the strap has been wound up fully on the reel. The contacts are open when the strap is on the reel (not connected to the carriage).

Co-driver's side

The diagonal strap on the co-driver's side is driven in the same way as that on the driver's side. (When relay 311P is energised, motor 308P moves the strap from A pillar to B pillar, and moves it in the opposite direction when 312P is energised.) Reel 307P and door switch 208P have the same function as the corresponding components on the driver's side.

When the co-driver's door is opened from the outside, the seat belt may be at either the A pillar or the B pillar. If the belt is at the B pillar, it will move to the A pillar when the door is opened.

When the door is closed and the ignition is switched on or if it is already switched on, the belt will move to the B pillar, regardless of whether or not the seat is occupied.

When the co-driver's door is opened, the carriage will move to the A pillar, and will remain there when the door is closed, unless the ignition is switched on.

Warning system

Warning lamp 47S for the passive seat belts is controlled by the logic box. The lamp will flash:

- when the carriage on the driver's side is moving from A pillar to B pillar
- when the carriage on the co-driver's side moves from the A pillar to the B pillar and if it takes more than 8 seconds to reach the B pillar
- if the carriage is locked at the B pillar and a fault has occurred on the sensor-override function
- if the carriage is not securely locked at the B pillar

Lamp 47S will light up with a steady light:

- if the diagonal strap has worked loose from the carriage.

A flashing light has priority over a steady light.

The buzzer in relay 82 is actuated by the logic box (earth at pin 20) and by the driver's side lap strap.

The buzzer will sound:

- while the carriage for the diagonal strap is moving from the A pillar or B pillar when the ignition is switched on
- for up to 8 seconds if the lap strap has not been fastened, i.e. if seat-belt switch 70 is still closed.

Seat-belt warning lamp 72 is not affected by the passive seat-belt system. Lamp 72 will light up for 4 – 8 s after the ignition has been switched on.

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Fault-tracing hints

Check that the supply to the seat-belt system is live. Fuse 310D protects the logic box and the seat belt on the driver's side, whereas fuse 310P protects the seat belt on the co-driver's side. (The seat belt on the driver's side will still operate, even if fuse 310P has blown.) Also check fuses 5, 12 and 13.

As a general rule, always disconnect the connector from the logic box before carrying out fault-tracing on the system. Never take any measurements with the logic box connected or on the pins of the logic box.

The logic box is regarded as an exchange unit, and fault-tracing should start by determining whether the fault is in the logic box or in other components, connectors, etc. Most of the signals to and from the logic box can be checked using the system diagram and the table below. The diagram shows the belt system with the carriages at the A pillars, the car doors open and the lap straps not fastened.

1. Ensure that the ignition is switched off and disconnect the connector from the logic box. Carry out all measurements from the rear of the connector.
2. Turn the ignition key to the drive position and use a voltmeter to check that the following pins in the connector are at battery voltage.

Pin	Remarks
11	reverse gear engaged
12	ignition switch in the drive position
18	via the relay coil in 312P
19	via the relay coil in 311P
22	via the relay coil in 312D
23	via the relay coil in 311D
25	via g sensor 309

3. Use an ohmmeter to measure between the following pins and earth.

Pin	Resistance, ohm	Remarks
1	0	belt in the carriage
2	approx. 13	bulb resistance
4	approx. 22	coil resistance
5	open circuit	carriage at A pillar
6	0	
7	0	co-driver's door open
8	approx. 22	coil resistance
9	open circuit	carriage at A pillar
10	0	
13	0	
14	0	belt in the carriage
17	open circuit	
20	0	lap strap not fastened
21	open circuit	
24	0	driver's door open

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Locations of components

3 Earthing point in the fascia

20 Ignition switch
on the centre console between the front seats

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

31 Reversing light switch
under the centre console, to the left of the selector lever

47S Passive seat-belt warning lamp
in the combined instrument on the fascia

57 3-pole connector
under the back seat, on the left-hand side

58 12-pole connector
to the left of the steering column, under the fascia, behind the knee shield

59 2-pole connector
one in the engine compartment, at the top hinge of the left-hand door
one in the engine compartment, at the top hinge of the right-hand door

60 Single-pole connector
two in each door, at the door switch for the passive seat-belt system, behind the trim
two under the centre console, between the front seats

65 Earthing point at the back seat

70 Seat-belt switch – driver's side
between the driver's seat and the co-driver's seat

72 Seat-belt warning lamp
in the centre of the fascia

76 Switch for raising the idling speed (auto.)
under the centre console, at the selector lever

82 Seat belt/ignition switch warning relay
under the back seat, on the left-hand side

98 10-pole connector
to the left of the steering column, below the fascia, behind the knee shield

117 Earthing point
between the ignition switch and the handbrake lever

122 8-pole connector
one under the driver's seat, on the left-hand side, under the carpet
one under the co-driver's seat, on the right-hand side, under the carpet
one under the back seat, on the left-hand side
one under the back seat, on the right-hand side

152A 29-pole white connector
152B 29-pole red connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connectors are accessible from the interior of the car.

208D Driver's door switch, passive seat-belt system
at the driver's door lock, behind the trim.

208P Co-driver's door switch, passive seat-belt system
at the co-driver's door lock, behind the trim.

306 Logic box for passive seat belts
under the back seat, on the left-hand side

307D Belt reel for passive seat belts, driver's side
on the inboard side of the driver's seat.

307P Belt reel for passive seat belts, co-driver's side
on the inboard side of the co-driver's seat

308D Motor with limit switches for passive seat belts, driver's side
behind the driver's side B pillar, behind the side trim.

308P Motor with limit switches for passive seat belts, co-driver's side
behind the co-driver's side B pillar, behind the side trim.

309 g sensor for passive seat belts
under the back seat, on the left-hand side.

310D Fuse (25 A) for passive seat belts, driver's side

310P Fuse (25 A) for passive seat belts, co-driver's side
under the back seat, on the left-hand side.

311D Motor relay for passive seat belts, driver's side

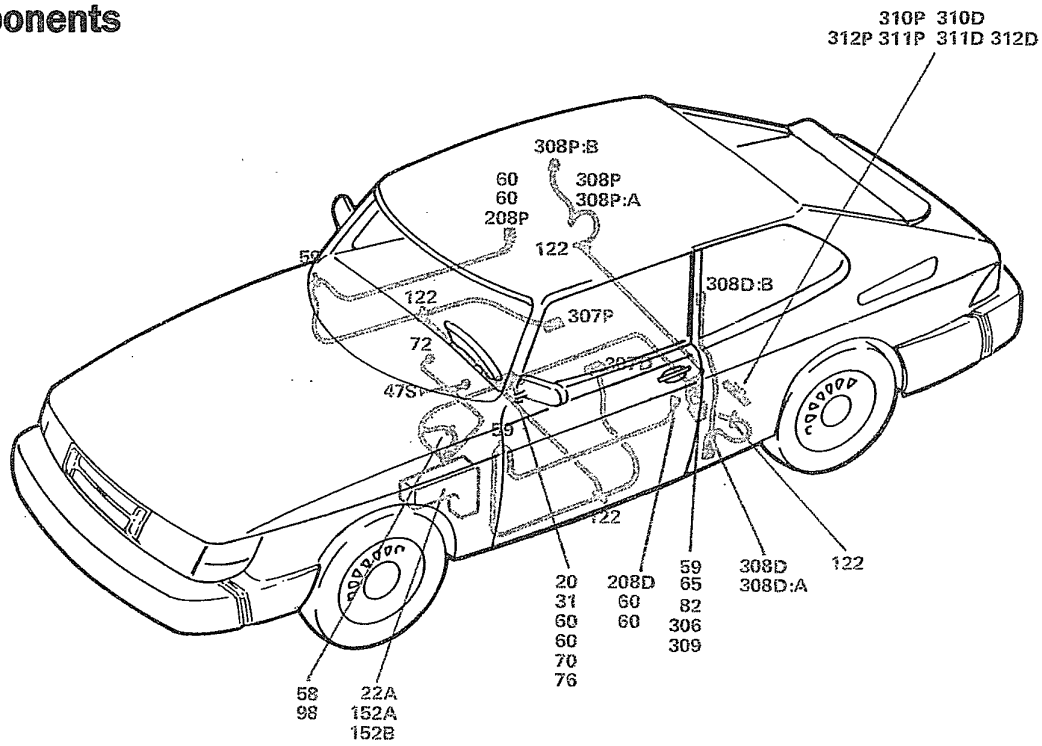
311P Motor relay for passive seat belts, co-driver's side
under the back seat, on the left-hand side.

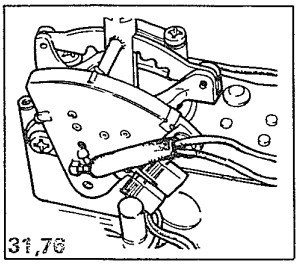
312D Motor relay for passive seat belts, driver's side

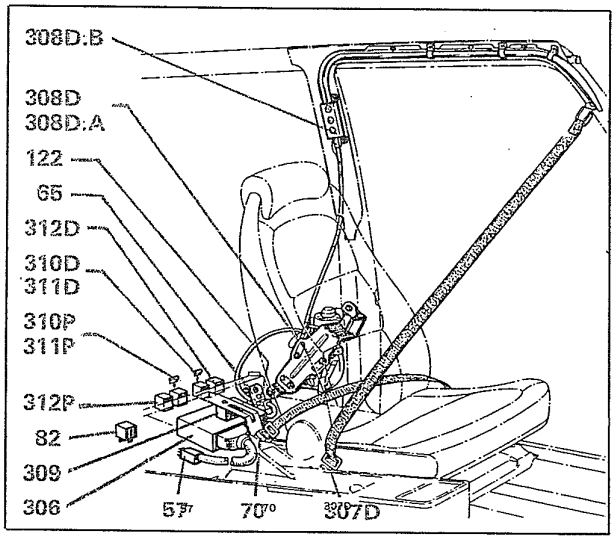
312P Motor relay for passive seat belts, co-driver's side
under the back seat, on the left-hand side

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Components

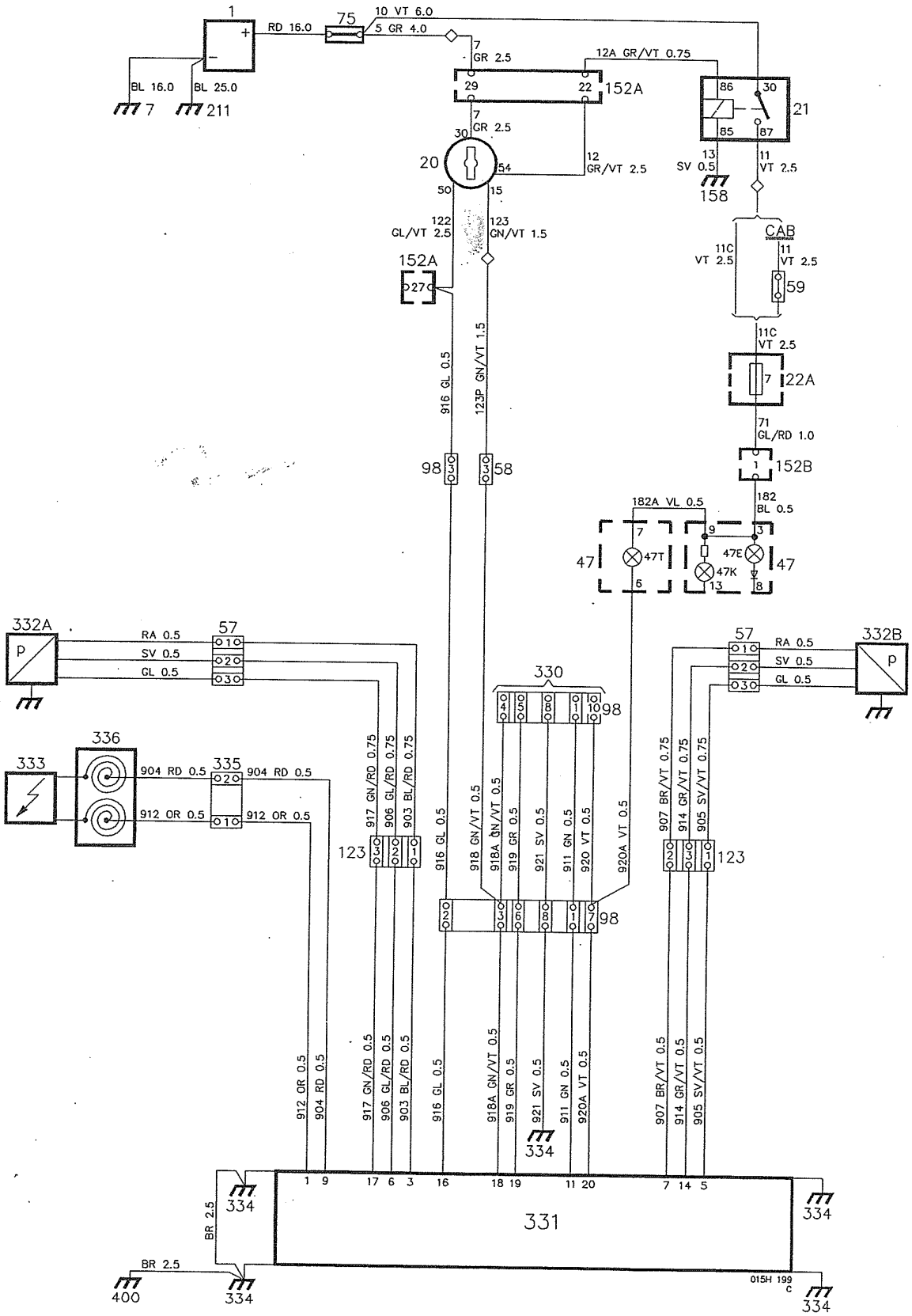






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Airbag



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Operation

The steering wheel pads of cars equipped with the Airbag system are marked "SRS" (Supplemental Restraint System).

The system consists of two front sensors, an electronic unit, a safety sensor and a steering wheel pad containing a gas generator and an airbag.

The system will be activated when at least one of the two front sensors and the safety sensor are subjected to a retardation force equivalent to a frontal collision at around 20 km/h (12 mph).

The supply to the system is taken from distribution terminal +15 when the ignition switch is in the start or drive position, and from the +50 supply when the ignition switch is in the start position.

Front sensor

The front sensor consists of a contact roller which is held in the rest position by a spring. When the roller is subjected to a force of at least 16 g, it will roll forward and close the circuit. The front sensor must therefore be mounted facing the right way.

Electronic unit

The electronic unit contains the safety sensor, a capacitor pack, and the firing and monitoring circuits. The electronic unit must also be mounted facing the right way.

Steering wheel pad (Airbag module)

The gas generator and the airbag are located in the steering wheel pad.

Gas generator

The gas generator consists of an aluminium case with a centre compartment and two annular compartments.

The centre compartment includes an electric detonator and an explosive charge, and is in communication with the inner annular compartment.

SRS warning lamp

The SRS warning lamp is located in the combined instrument.

The SRS lamp will light up for around 6 seconds when the ignition key is turned to the start or drive position, and will then go out if there are no faults in the system.

Supply

When the ignition switch is turned to the start or drive position, the supply (+15) is taken across pin 3 in connector 98 to pin 18 in electronic unit 331, thus charging the capacitor pack. The capacitor pack serves as a power supply reserve in the event of loss of supply at the instant of collision. At the same time, SRS lamp 47T in the combined instrument will be energised from the +54 supply, across fuse 7.

SRS lamp 47T will be earthed across pin 7 in connector 98, and pin 20 in electronic unit 331, and will light up.

When the ignition switch is turned to the start position, pin 16 in electronic unit 331 will be energised (+50), which will start the measurement cycle, etc. in the diagnostic unit.

Activation of the airbag

In a collision, the airbag and the seat-belt tensioners will be activated if the front sensors and the safety sensor in the electronic unit sense a retardation of at least 16 g at the front sensor and at least 2 g at the safety sensor.

The contacts in each sensor will then close and the capacitor pack in the electronic unit will discharge, applying a current pulse to the electric detonators in the airbag.

Earthing

Do not connect earth cables of other systems to the mounting screws of the front sensors and the electronic unit, since this may cause disturbances in the system and fault indications from the electronic unit.

Fault codes

If a fault should occur in the system, the SRS lamp will flash when the ignition switch is in the drive position. The fault codes stored in the memory of the system can be read by connecting the SRS tester to test connector 330.

For a more detailed description of tests, fault codes and fault tracing, see Group 8:6 of the Service Manual.

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Locations of components

1 Battery
on the left-hand side of the engine compartment

7 Earthing point on the radiator cross-member

20 Ignition switch
on the centre console between the front seats

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

47E Charging warning lamp
47K SHIFT UP warning lamp
47T SRS Airbag warning lamp
in the combined instrument

57 3-pole connector
one at the right-hand front sensor
one at the left-hand front sensor

58 12-pole connector
on the inside of the knee shield, to the left of the steering column

59 2-pole connector (Convertible)
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

75 Distribution block
in the engine compartment, forward of the battery

98 10-pole connector
one (black) on the inside of the knee shield, to the left of the steering column
one at the electronic unit

123 4-pole connector
one at the electronic unit
one black (left-hand front sensor)
one grey (right-hand front sensor)

152A 29-pole white connector
152B 29-pole red connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connectors are accessible from the interior of the car.

158 Negative distribution terminal
in the electrical distribution box in the engine compartment, on the left-hand wheel housing

211 Earthing point on the gearbox

330 10-pole airbag test connector
in the centre console, under the rubber bellows, forward of the gear lever

331 Electronic unit for the airbag
to the left, under the fascia

332A Sensor, left-hand
in the engine compartment, forward of the left-hand wheel housing

332B Sensor, right-hand
in the engine compartment, forward of the right-hand wheel housing

333 Airbag
in the steering wheel

334 Earthing point for the electronic unit and test connector
adjacent to the electronic unit

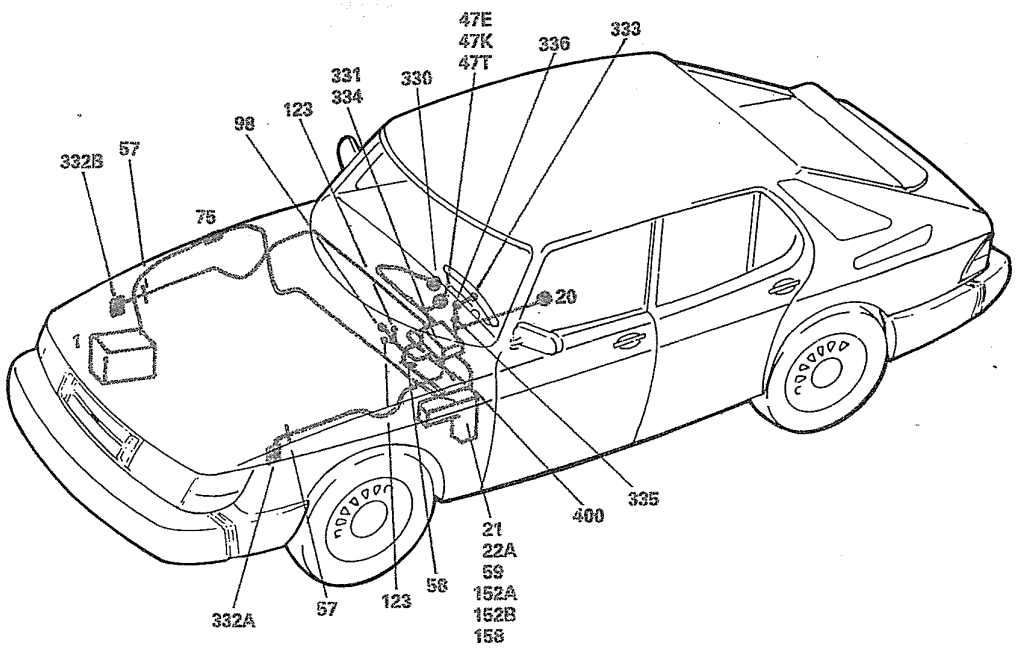
335 2-pole orange connector
the pins are short-circuited when the connector is separated

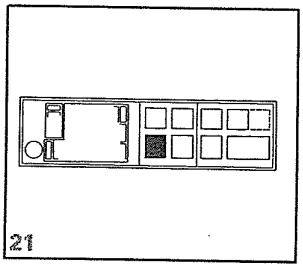
336 Slip-ring contact
in the steering wheel

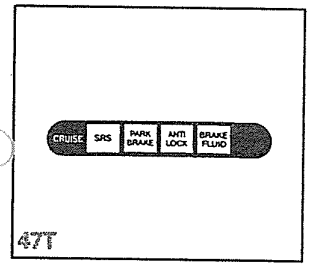
400 Redundant earth for the airbag
on the left-hand wheel housing, accessib
from the interior

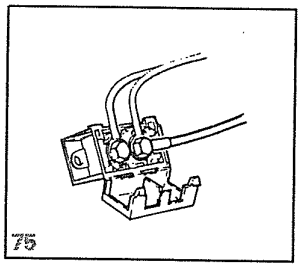
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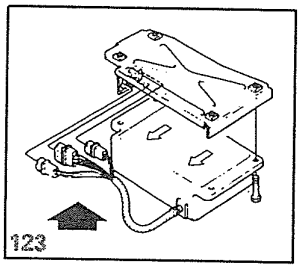
Components

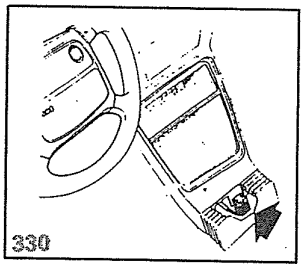


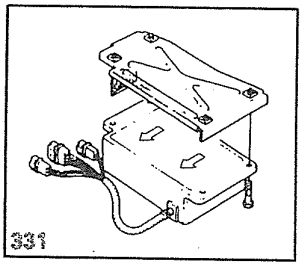


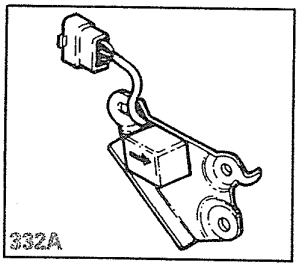


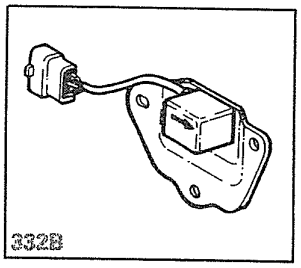


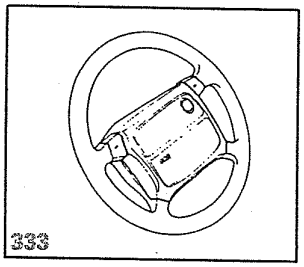


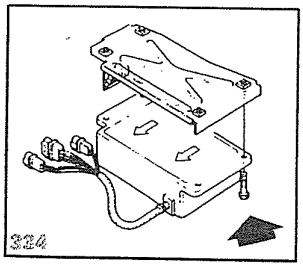


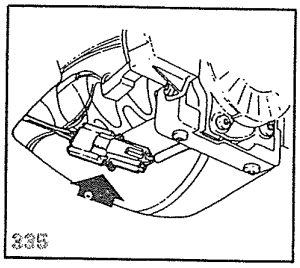


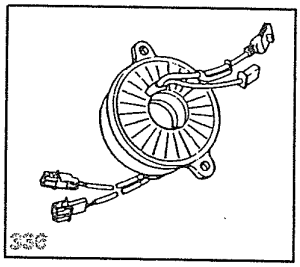


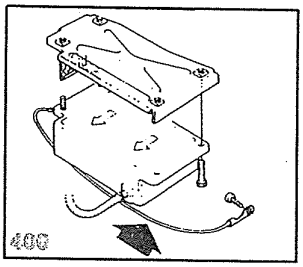






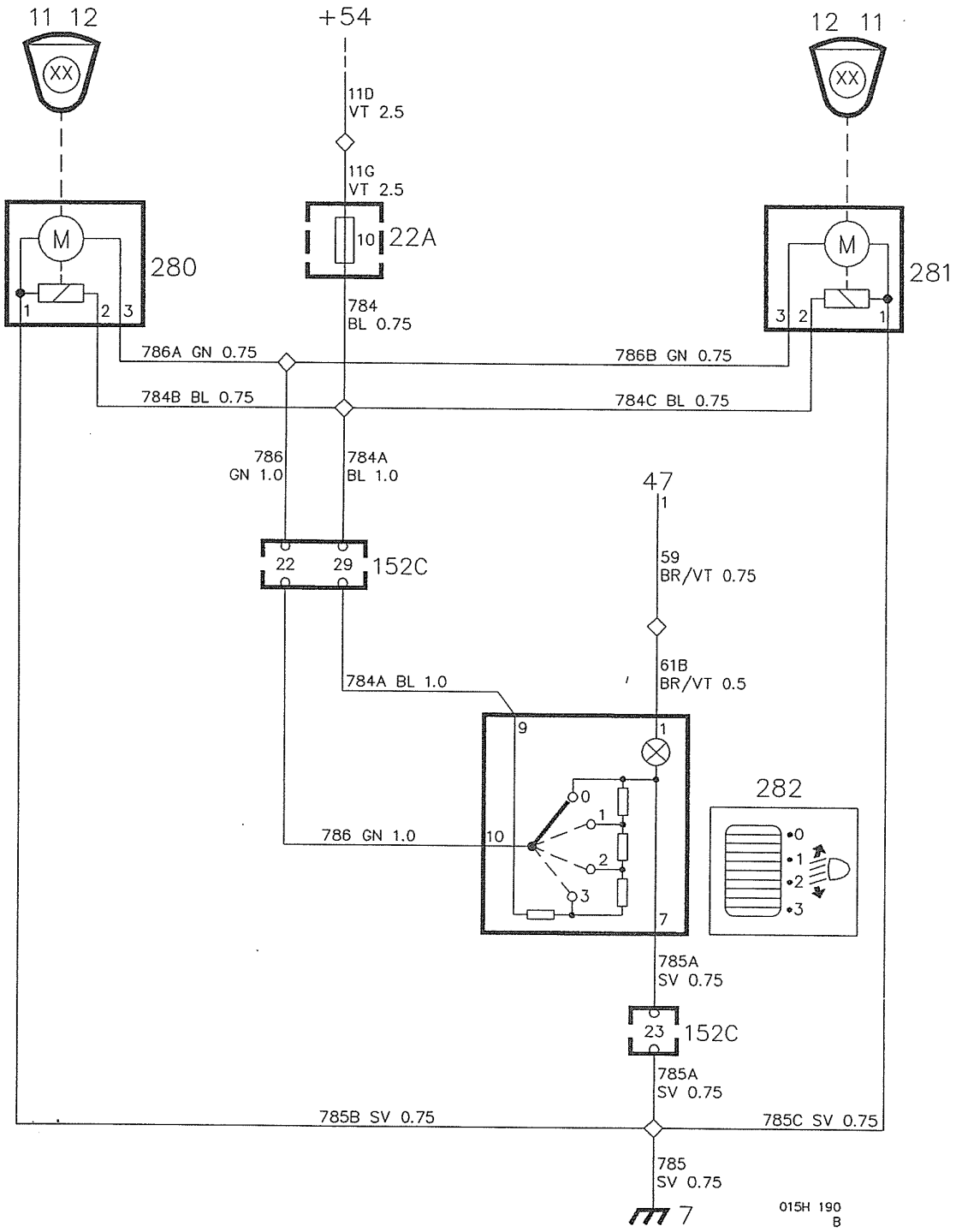






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Headlamp beam adjustment



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Operation

Some models for certain markets are equipped with a headlamp beam adjustment system. A switch on the fascia enables the driver to change the vertical alignment of the headlamps, so that they will not dazzle oncoming drivers in situations such as when the car is heavily loaded.

When the ignition switch is in the drive position, terminal 9 of switch 282 is supplied across fuse 10 and the black 29-pole connector 152C. When the switch is in position 0, the headlamps will be in their normal setting. When the switch is moved to position 1, electric motors (stepping motors) 280 and 281 will be energised and will rotate a number of revolutions, turning the adjusting screws to lower the headlamp setting. When the switch is moved to positions 2 and 3, the setting will be lowered further, in two steps.

Similarly, the setting can be raised in steps, from 3 to 2, 1 and 0.

Fault-tracing hints

The headlamp beam adjustment system will be operative when the ignition switch is in the drive position.

1 Check fuse 10 and check that the supply to it is live.

2 Check that the supply to switch 282 is live.

3 By operating the switch, check that the supply to motors 280 and 281 is live.

4 Check the connectors, wiring and earth connections.

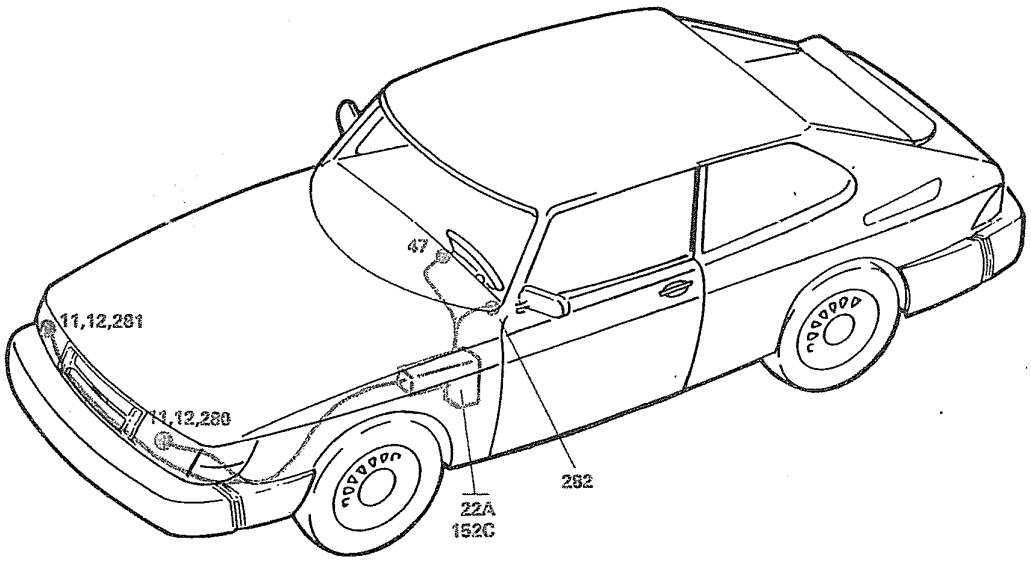
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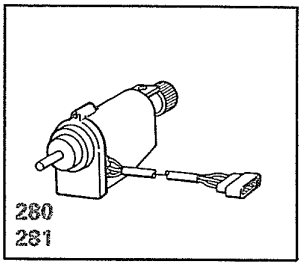
Locations of components

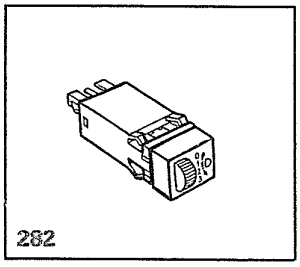
7	Earthing point on the radiator cross-member
11	Full beam filament in the left-hand and right-hand headlamps
12	Dipped beam filament in the left-hand and right-hand headlamps
22A	Fuse holder in the electrical distribution box, in the engine compartment
47	Combined instrument on the fascia
152C	29-pole black connector in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connector is accessible from the interior of the car.
280	Headlamp beam adjustment motor at the left-hand headlamp
281	Headlamp beam adjustment motor at the right-hand headlamp
282	Switch for headlamp beam control on the fascia, to the left of the steering column

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Components

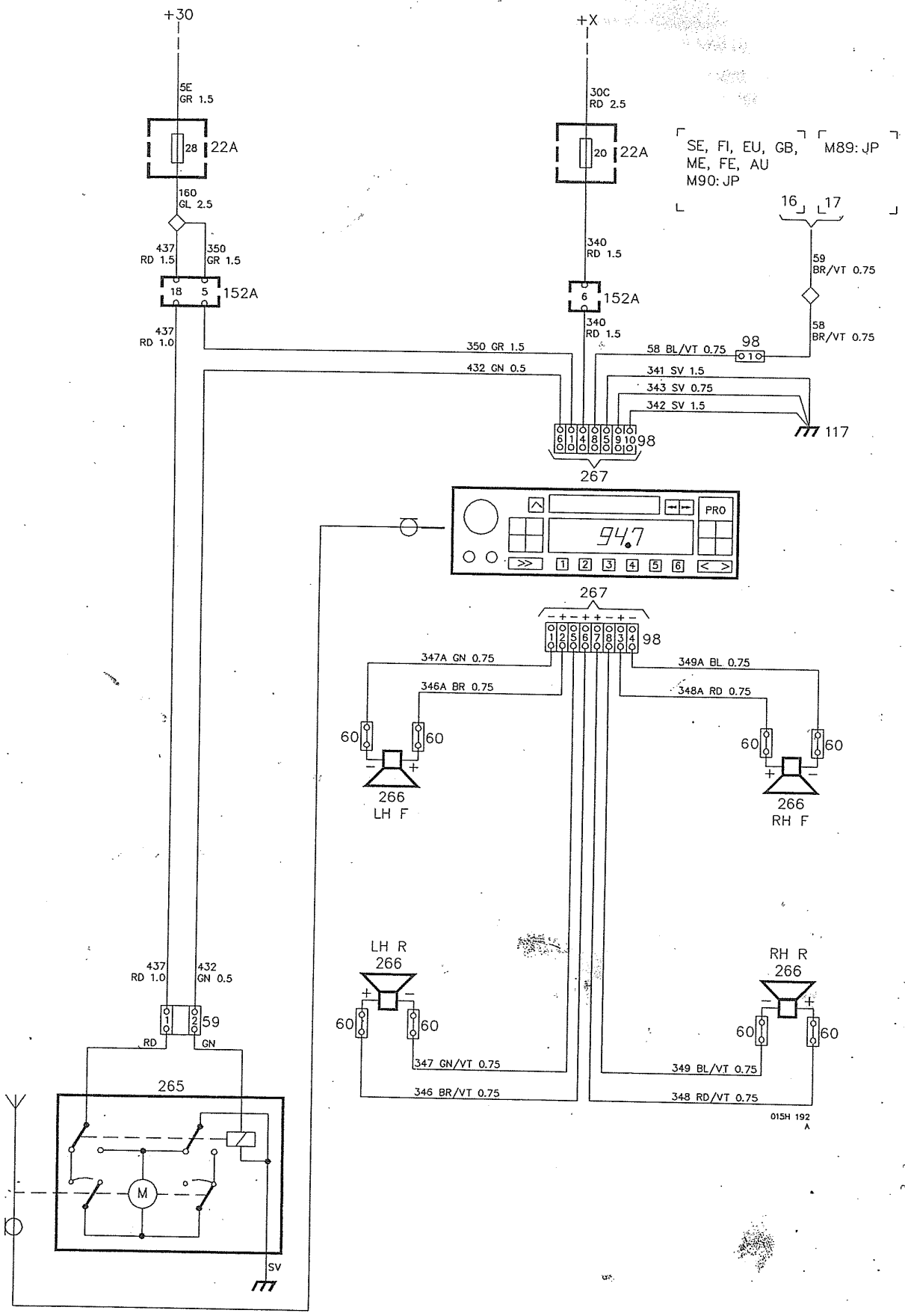






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Radio installation



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Operation

Space has been reserved in the fascia for a radio (267). Cars for certain markets and certain models are factrory-wired for the installation of a radio, and are factory-fitted with speakers and an electrically operated aerial.

Two 10-pole connectors 98, i.e. one for the power supply and one for the speakers, are fitted in the radio compartment in the fascia. A coaxial cable is also run to the mounting point for the aerial, on the left-hand rear wing.

Power supply

The following cables are connected to the upper 10-pole connector 98 shown on the wiring diagram:

Grey (pin 1) – Positive supply via fuse 28, which is supplied directly from the battery (regardless of the position of the ignition switch).

Red (pin 4) – Positive supply via the ignition switch and fuse 20. The radio is supplied when the ignition switch is in the parked or drive positions.

Black (pin 5) – Earth.

Green (pin 6) – For control of the electrically operated aerial (265). The motor of the electrically operated aerial is supplied via fuse 28.

Brown/white (pin 8) – Dial lighting. The supply is taken from the instrument lighting rheostat 16/17.

Speakers

The speaker connections are made via the lower 10-pole connector shown in the diagram.

Left-hand front:
Green (pin 1) –
Brown (pin 2) +

Right-hand front:
Red (pin 3) +
Blue (pin 4) –

Left-hand rear:
Green/white (pin 5) –
Brown/white (pin 6) +

Right-hand rear:
Red/white (pin 7) +
Blue/white (pin 8) –

Each speaker is connected via single-pole connector 60.

Fault-tracing hints

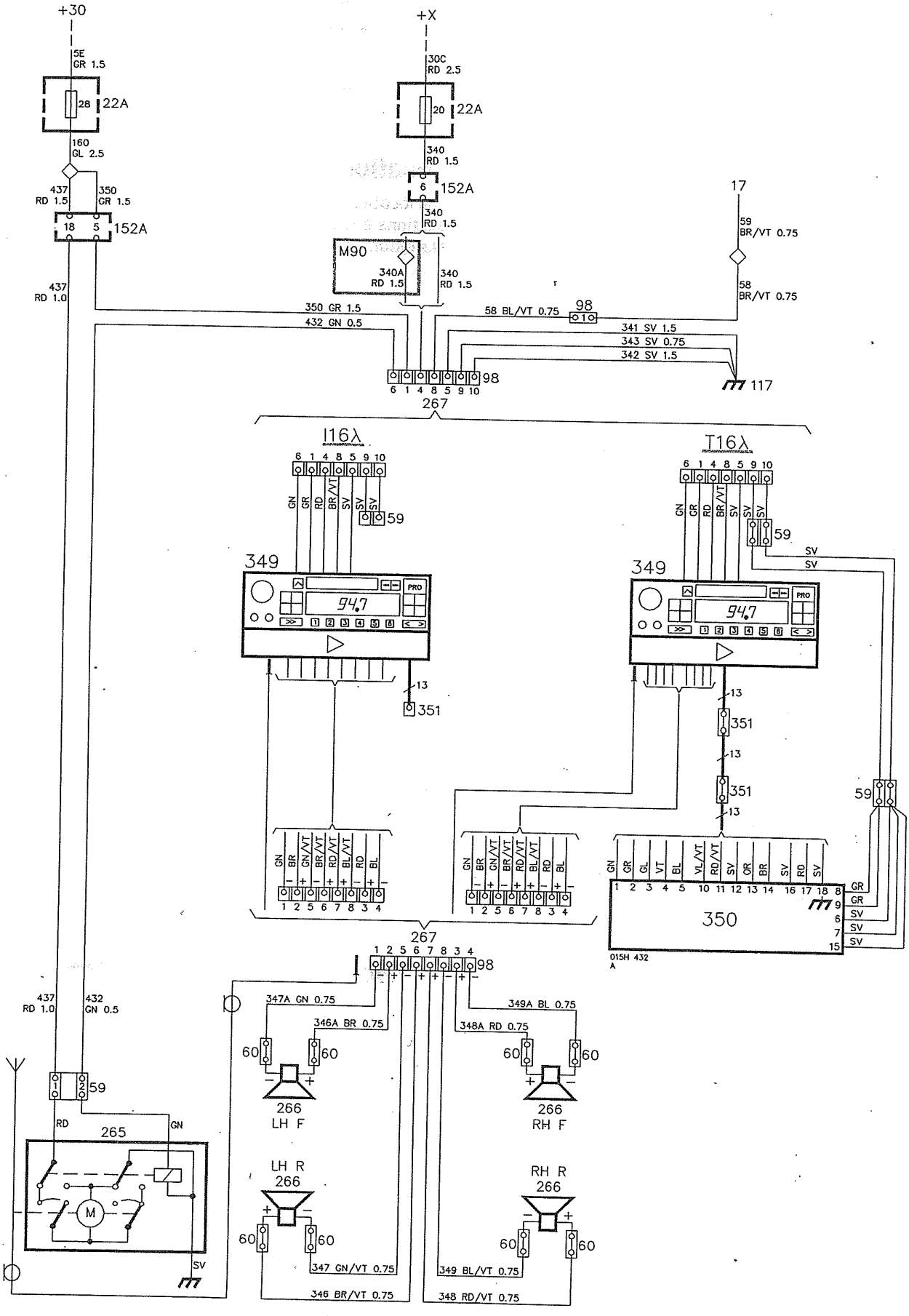
1. Check the supply to the radio and the earth connection.
2. Check the connectors.
3. Check the existing cable harness for open circuits and short circuits to earth.

Locations of components

The locations of the components are the same for the sections entitled "Radio installation" and "Radio installation (US, CA)" as listed on pages 296 – 297.

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Radio installation – US, CA



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Operation

The fascia is fitted with a radio contact box.

The following variants exist:

900 I16: A radio contact box with amplifier (349)

900 T16: A radio contact box with amplifier (349). This contact box is equipped with a shielded cable with an 18-pole connector, for the connection of a CD player or equalizer. The shielded cable is fitted with two 13-pole connectors 351 (DIN connectors). The CD player or equalizer can be connected by inserting it into a contact box located in the top compartment of the centre console.

In addition, the car is factory-wired, and speakers and an electrically operated aerial are fitted, to facilitate the installation of a radio.

The radio contact box must be connected to the aerial cable and to two 10-pole connectors 98 (267), one for the power supply and the other for the speakers.

The contact box with amplifier (349) is fitted with a 3A blade fuse to the right (for the electric aerial) and a 15A blade fuse to the left (for the amplifier, equalizer and radio).

Power supply

The following cables are connected to the upper 10-pole connector 98 shown on the wiring diagram:

Grey (pin 1) – Positive supply via fuse 28, which is supplied directly from the battery (regardless of the position of the ignition switch).

Red (pin 4) – Positive supply via the ignition switch and fuse 20. The radio is supplied when the ignition switch is in the parked or drive position.

Black (pins 5, 9 and 10) – Earth.

Green (pin 6) – For control of the electrically operated aerial (265). The motor of the electrically operated aerial is supplied via fuse 28.

Brown/white (pin 8) – Dial lighting. The supply is taken from the instrument lighting rheostat 17.

Speakers

The speaker connections are made via the lower 10-pole connector 98 shown in the diagram.

Left-hand front:
Green (pin 1) –
Brown (pin 2) +

Right-hand front:
Red (pin 3) +
Blue (pin 4) –

Left-hand rear:
Green/white (pin 5) –
Brown/white (pin 6) +

Right-hand rear:
Red/white (pin 7) +
Blue/white (pin 8) –

Each speaker is connected via single-pole connector 60.

Fault-tracing hints

1. Check the supply to the radio and the earth connection.
2. Check the connectors.
3. Check the existing cable harness for open circuits and short circuits to earth.

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Locations of components

16 Instrument lighting rheostat
in the combined instrument

17 Extra rheostat for the lighting of switches and controls
on the left-hand side of the fascia

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

59 2-pole connector for electrically-operated aerial 265
on the left-hand rear wing (in the luggage compartment)

60 Single-pole connector for speakers 266:
two under the speaker grille, on the left-hand side of the fascia
two under the speaker grille, on the right-hand side of the fascia
two on the left-hand side of the luggage compartment, behind the trim, at the parcel shelf
two on the left-hand side, at the back seat, behind the trim (Convertible)
two on the right-hand side of the luggage compartment, behind the trim, at the parcel shelf
two on the right-hand side, at the back seat, behind the trim (Convertible)

98 10-pole connector for the radio
two in the radio compartment on the fascia (267) for connecting the radio
one to the left of the steering column, under the knee shield

117 Earthing point
between the ignition switch and the handbrake lever

152A 29-pole white connector
in the electrical distribution box in the engine compartment, on the left-hand wheel housing. The connector is accessible from the interior of the car.

265 Electrically operated aerial
in the luggage compartment, on the left-hand side, behind the trim

266 Speaker
on the left-hand and right-hand sides of the fascia
on the left-hand and right-hand sides of the back seat

267 Radio connector
one in the fascia, behind the radio panel

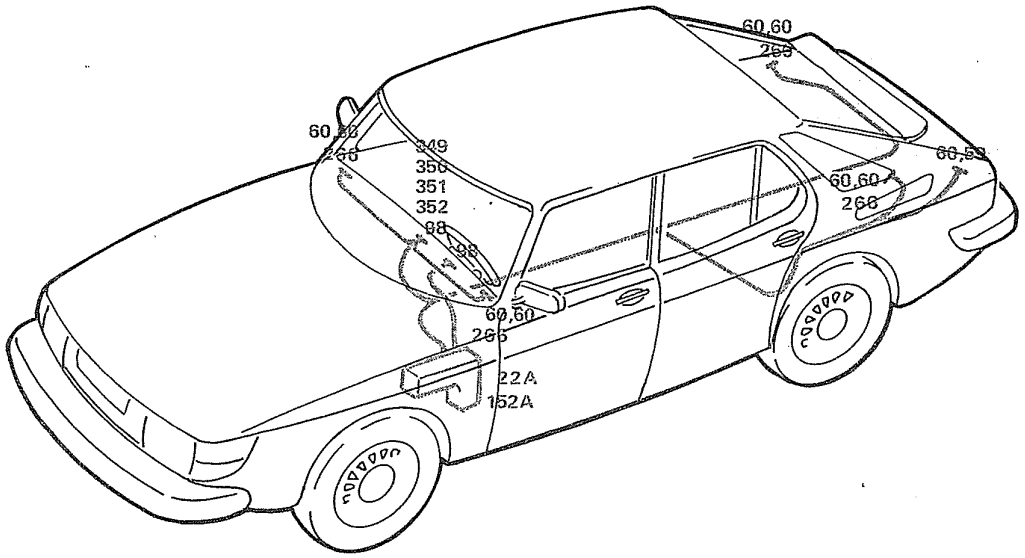
349 Radio contact box with amplifier
in the radio compartment on the fascia

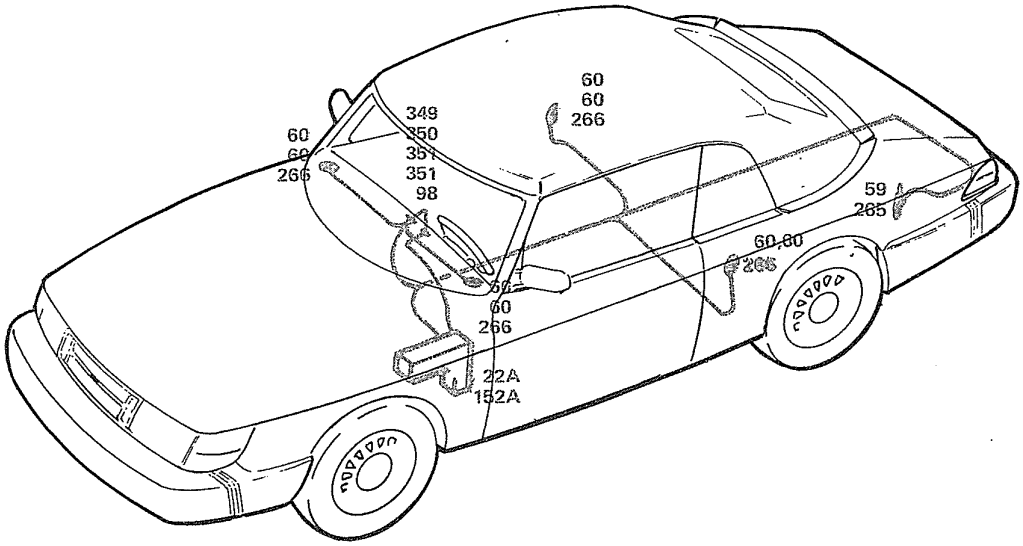
350 Contact box for CD player or equalizer
in the top compartment of the centre console

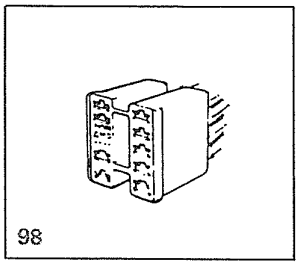
351 13-pole connector (DIN connector)
two in the fascia

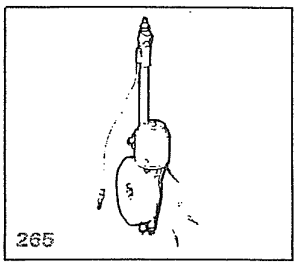
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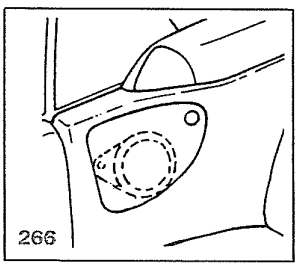
Components

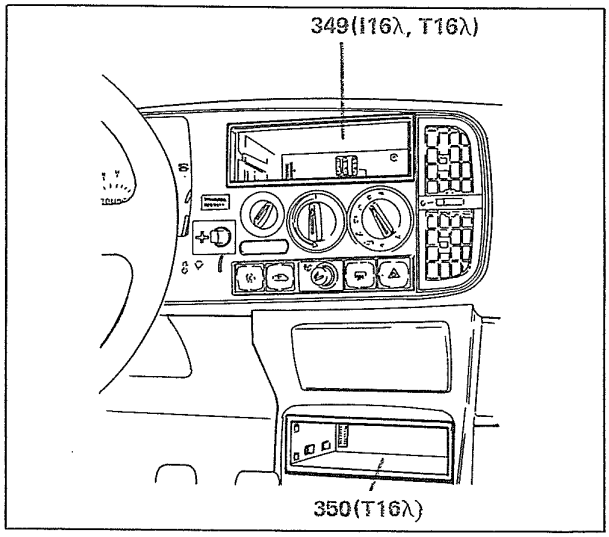






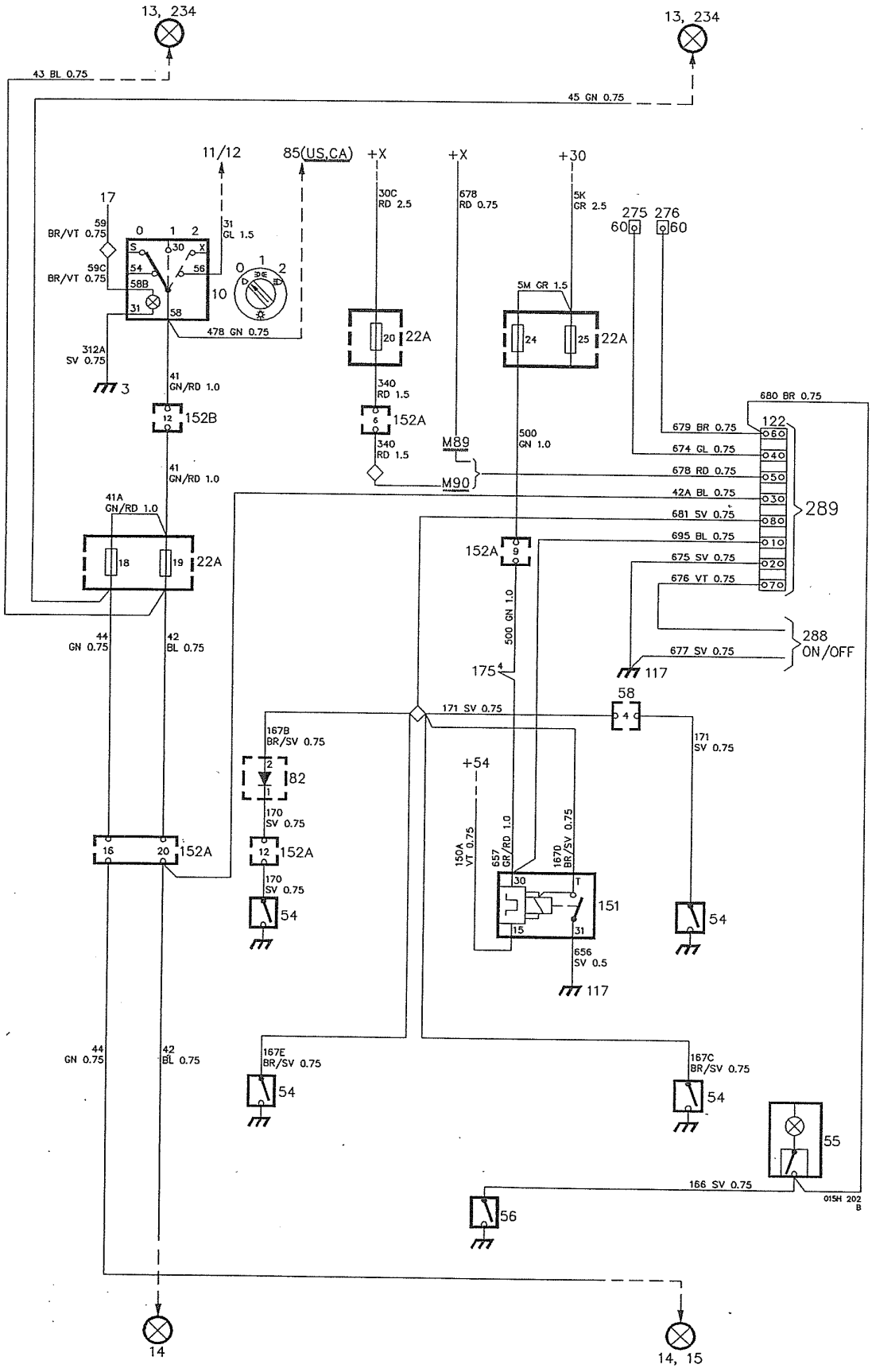






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Burglar alarm – US, CA and 1989 for JP



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Operation

Cars delivered to certain markets, including the USA market, have provision for the installation of a burglar alarm. A special cable harness and an 8-pole connector (289) for connecting the burglar alarm control unit are included.

The control unit is supplied (+30) from fuse 24 across the white 29-pole connector 152A, pin 30 of relay 151 and pin 1 of control unit 289, regardless of the position of the ignition switch, and from pin 5 (+X) when the ignition switch is in the parked, drive or start position. On the 1990 model, +X is protected by fuse 20.

To prevent the burglar alarm from being set off, the ignition key must be turned within a certain time after a car door has been opened.

The movement detector can be switched on and off by means of ON/OFF switch 288 connected to pin 7 of the control unit (earth/no earth).

If the burglar alarm is activated, the alarm will be set off if one of the following contacts should close:

- Door switches 54 connected to pin 8.
- Luggage compartment light switch 56, luggage compartment lighting 55 or the HOOD switch, which are connected to pin 6.

When the alarm is set off, the siren will be supplied via pin 4, and the parking lights via pin 3.

The parking lights are supplied via pin 20 of white 29-pole connector 152A, and include:

13	Parking lights (front)
14	Rear lights
15	Number plate illumination
234	Side marker lights (certain markets)

Note: The wiring varies from one market to the next, and between the 3-D/5-D and 2-D/4-D models (see the section entitled "Parking lights").

Fault-tracing hints

1. Check that the supply to connector 289 (terminals 1 and 5) is live.
2. Check ON/OFF switch 288 for the movement detector.
3. Check the door switches, luggage compartment light switch and bonnet switch, and the corresponding connections to connector 289.
4. Check the connectors, cable harnesses and earth connections.

For fault-tracing hints on the parking lights, see the section entitled "Parking lights".

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Locations of components

For the locations of parking light components, see the section entitled "Parking lights".

3 Earthing point in the fascia

10 Light switch
on the left-hand side of the fascia

11 Full beam filament
in the left-hand and right-hand headlamps

12 Dipped beam filament
in the left-hand and right-hand headlamps

13 Parking lights
in the front light clusters

14 Rear lights, 3-D and 5-D
in the rear light clusters and on the tailgate
Rear lights, 2-D and 4-D
in the rear light clusters

15 Number plate illumination
on the tailgate (3-D and 5-D)
on the rear sill (2-D and 4-D)

17 Extra rheostat for the lighting of switches and controls
on the left-hand side of the fascia

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

54 Door switches, interior lighting
at the front of each door frame

55 Luggage compartment lamp
in the luggage compartment, on the left-hand side

56 Luggage compartment light switch
3-D and 5-D: at the luggage compartment lock
2-D and 4-D: in the luggage compartment, at the left hinge of the luggage compartment lid.

58 12-pole connector
on the angle bracket, under the fascia, to the left of the steering column (behind the knee shield)

60 Single-pole connector
one for the siren, in the engine compartment, behind the right-hand wheel housing
one for the bonnet switch, in the engine compartment, behind the right-hand headlamp

82 Seat belt/ignition switch warning relay
under the back seat, on the left-hand side

85 Extra fog lamps
under the front bumper

117 Earthing point
between the ignition switch and the handbrake lever

122 8-pole connector
under the back seat

151 Time-delay relay for the interior lighting
under the back seat, on the left-hand side

152A 29-pole white connector
152B 29-pole red connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connectors are accessible from the interior of the car.

175 Control unit for the central locking system
under the fascia on the right-hand side, behind the knee shield

234 Side marker lights
in the front light clusters

275 Connector for the burglar alarm siren
in the luggage compartment, behind the right-hand wheel housing

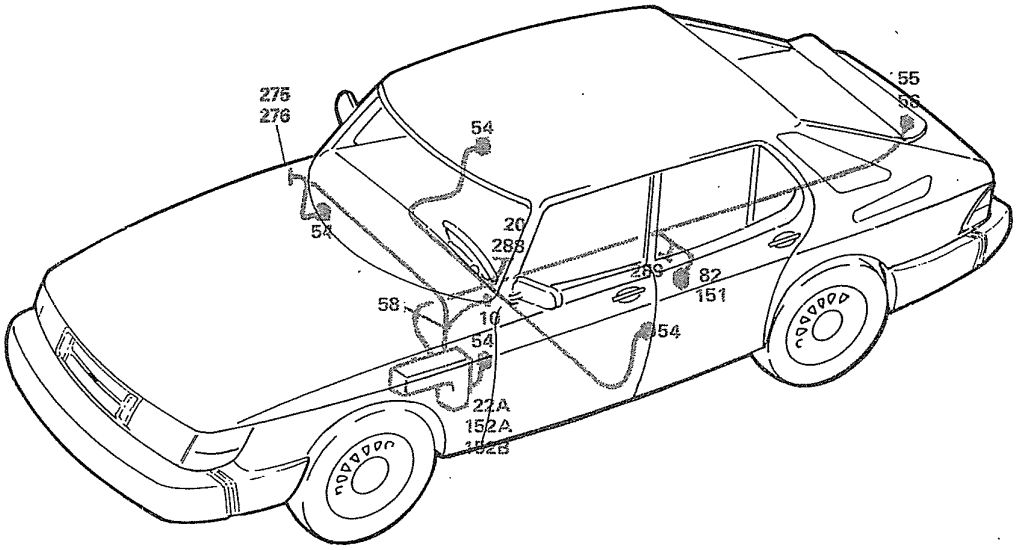
276 Connector for the burglar alarm bonnet switch
in the luggage compartment, behind the right-hand wheel housing

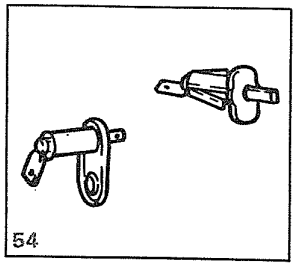
288 Selector for the movement detector
on the centre console between the front seats

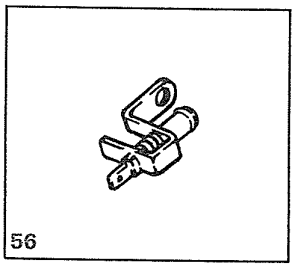
289 Connector for the burglar alarm control unit
under the back seat

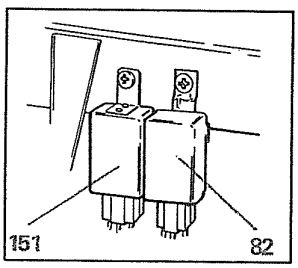
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Components



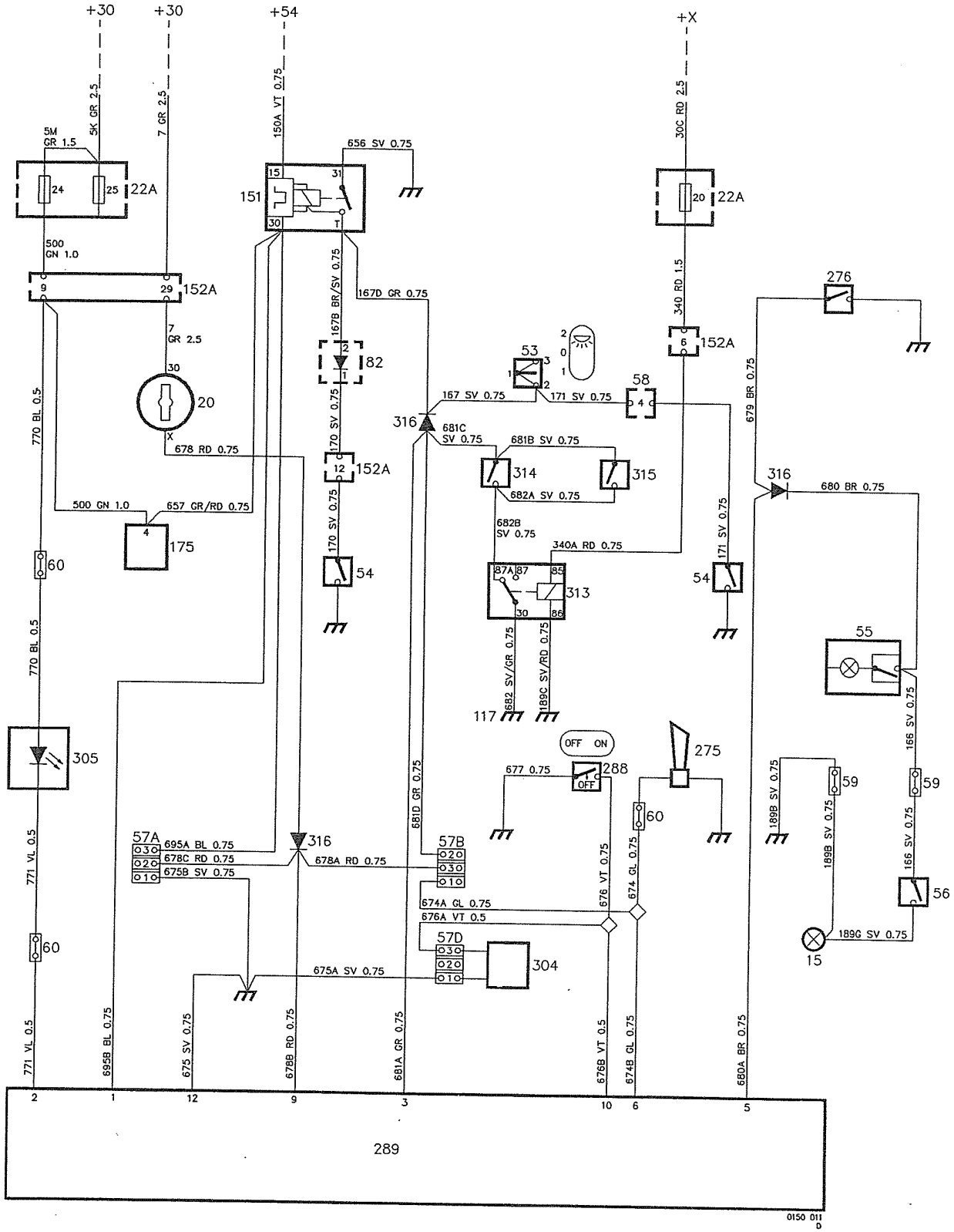






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Burglar alarm, 1989 model Convertible



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Operation

The car is equipped with a burglar alarm comprising a control unit, movement detector, siren and transmitters (switches) in the hood (bonnet), doors and luggage compartment lid. For particulars of the operation of the control unit, i.e. the activation times for the alarm, the time during which the siren will sound when the alarm is set off, etc. see the separate instruction manual for the burglar alarm.

The control unit is supplied (+30) from fuse 24 across the white 29-pole connector 152A, pin 4 of the central locking control unit 175, pin 30 of relay 151 and pin 1 of control unit 289, regardless of the position of the ignition switch, and from pin 9 (+X) when the ignition switch is in the parked, drive or start position.

If the burglar alarm is activated (LED 305 flashes), the alarm will be set off if movement detector 304 is activated or if one of the following contacts should close:

- Door switches 54 connected to pin 3. (Time-delay relay 151 for the interior lighting only affects the activation time of about 15 s for the alarm.)
- Luggage compartment light switch 56 or the bonnet switch, which are connected to pin 5.

When the alarm is set off, the siren will be supplied via pin 6 and will sound.

The movement detector can be switched off by means of ON/OFF switch 288 connected to pin 10 (contacts will close).

If one of the seat switches 314 or 315 is closed at the same time as the ignition switch is in the parked, drive or start position, LED 305 will be switched off.

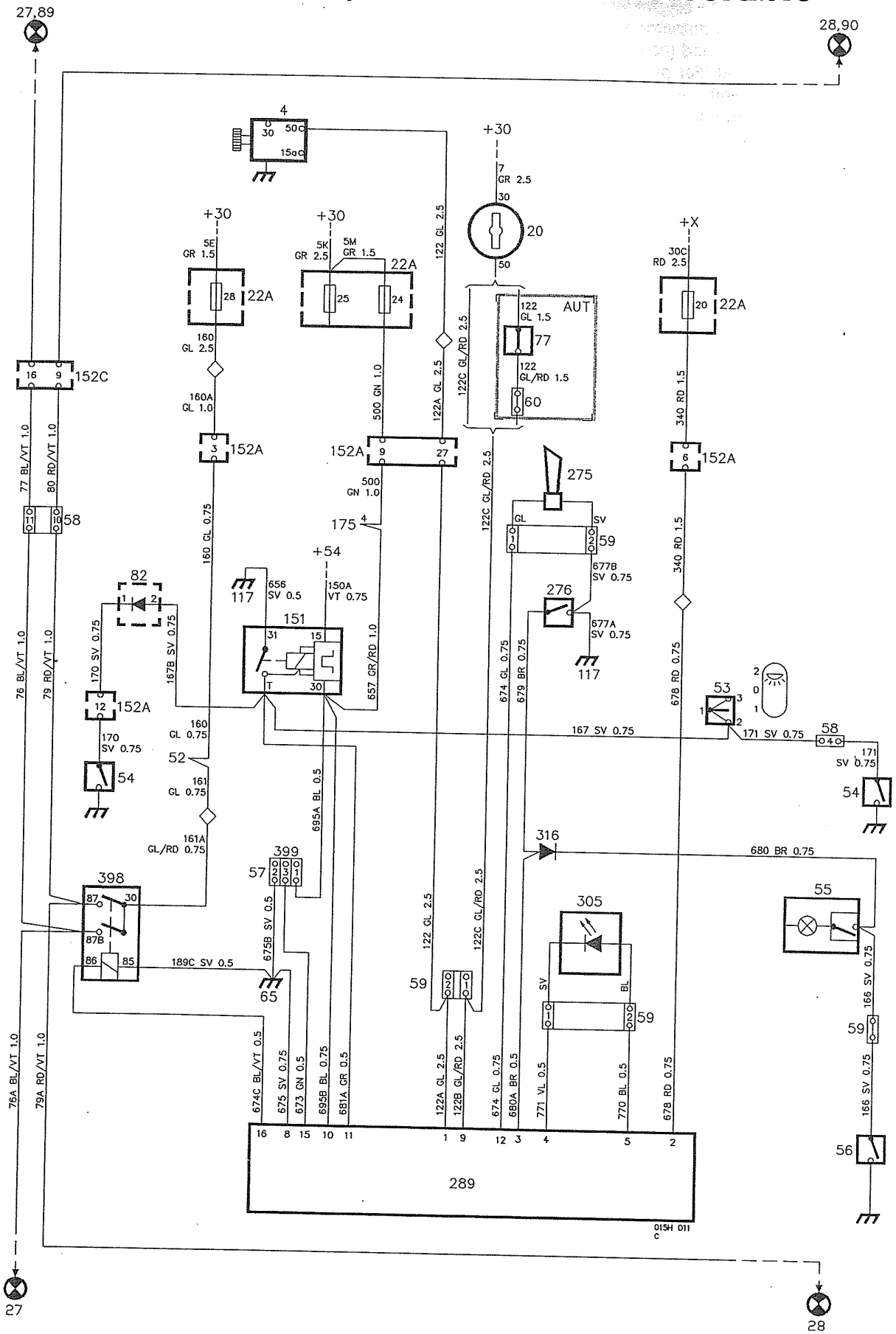
A receiver for remotely controlled de-activation can be connected to white connector 57A. A transmitter designed to intiate an alarm in a portable receiver can be connected to red connector 57B.

Fault-tracing hints

Start by checking that the supply to the connector (pins 1 and 9) at control unit 289. Then follow the fault-tracing instructions in the accompanying installation instructions.

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Burglar alarm, 1990 model Convertible



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Operation

The car is equipped with a burglar alarm comprising a control unit, movement detector, siren and transmitters (switches) in the hood (bonnet), doors and luggage compartment lid. For particulars of the operation of the control unit, i.e. the activation times for the alarm, the time during which the siren will sound when the alarm is set off, etc. see the separate instruction manual for the burglar alarm.

The burglar alarm is supplied (+30) from fuse 24 across the white 29-pole connector 152A, pin 4 of the central locking control unit 175, pin 30 of relay 151 and pin 10 of control unit 289, and (+X) from fuse 20 across the white connector 152A to pin 2 of control unit 289.

If the burglar alarm is activated (LED 305 flashes), the alarm will be set off if one of the following contacts should close:

- Door switches 54 connected to pin 11. (Time-delay relay 151 for the interior lighting only affects the activation time of about 15 s for the alarm.)
- Luggage compartment light switch 56 or bonnet switch 276, which are connected to pin 3.

When the alarm is set off, the siren 275 will be supplied via pin 12 and will sound.

A receiver for remotely controlled de-activation can be connected to connector 399.

Fault-tracing hints

Start by checking fuses 24 and 20 and that the supply to the connector (pins 10 and 2) at control unit 289 is live. Then follow the fault-tracing instructions in the accompanying installation instructions.

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Locations of components

For the locations of parking light components, see the section entitled "Parking lights".

15 Number plate illumination
on the tailgate (3-D and 5-D)
on the rear sill (2-D and 4-D)

20 Ignition switch (1989 model)
on the centre console between the front seats

22A Fuse holder
in the electrical distribution box, in the engine compartment, on the left-hand wheel housing

53 Interior lighting switch
on the centre console, between the front seats

54 Door switches, interior lighting
at the front of each door pillar

55 Luggage compartment lamp
in the luggage compartment, on the left-hand side

56 Luggage compartment light switch
at the luggage compartment lock

57A 3-pole white connector
57B 3-pole red connector
57D 3-pole green connector
under the back seat

58 12-pole connector
on the angle bracket, under the fascia to the left of the steering column (behind the knee shield)

59 2-pole connector
one in the luggage compartment at the left-hand lid hinge, behind the trim
one for the siren, in the engine compartment, behind the right-hand headlamp (1990 model)

60 Single-pole connector
one for the siren in the engine compartment, behind the right-hand headlamp (1989 model)
two for the LEDs on the fascia, at the left-hand speaker grille

82 Seat belt/ignition switch warning relay
in the electrical distribution bux under the back seat, relay position E

117 Earthing point
between the ignition switch and the handbrake lever

151 Time-delay relay for the interior lighting
in the electrical distribution bux under the back seat, relay position B

152A 29-pole white connector
in the engine compartment, in the electrical distribution box on the left-hand wheel housing. The connector is accessible from the interior of the car.

175 Control unit for the central locking system
under the fascia on the right-hand side, behind the knee shield

275 Burglar alarm siren
in the engine compartment, behind the right-hand headlamp

276 Burglar alarm bonnet switch
under the bonnet, at the extreme front of the wheel housing

288 Burglar alarm switch
on the centre console between the front seats

289 Burglar alarm control unit
under the back seat

304 Movement detector
under the back seat, at the control unit

305 LED for burglar alarm
on the fascia, in the left-hand speaker grille

313 Burglar alarm relay
in the electrical distribution box under the back seat, relay position F

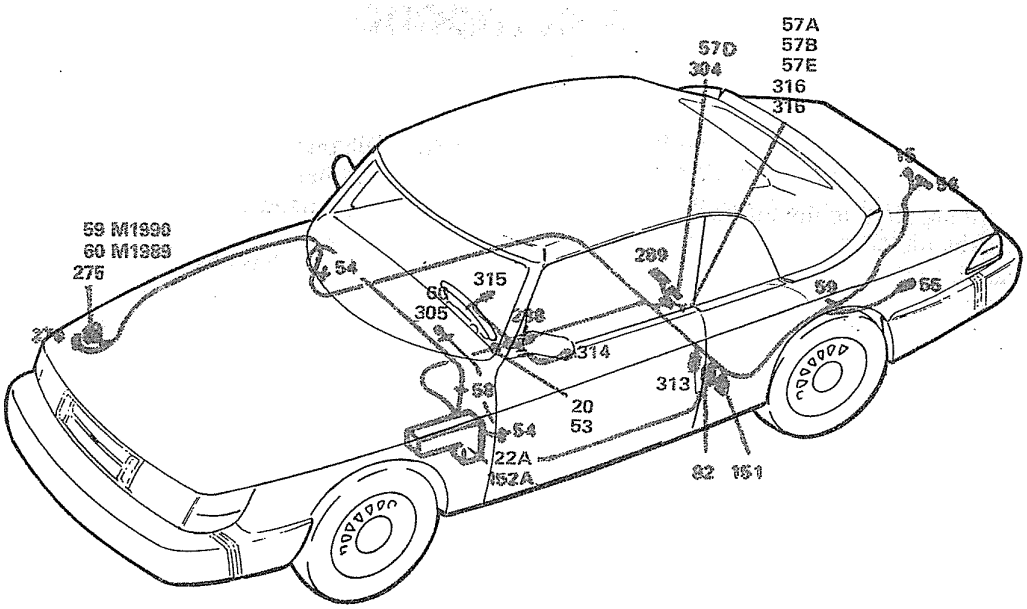
314 Driver's seat switch for the burglar alarm
under the driver's seat

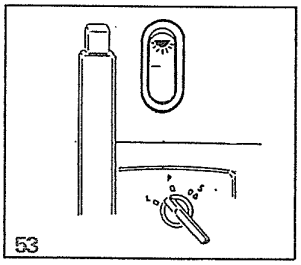
315 Co-driver's seat switch for the burglar alarm
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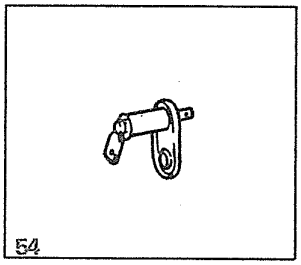
316 Diode for the burglar alarm

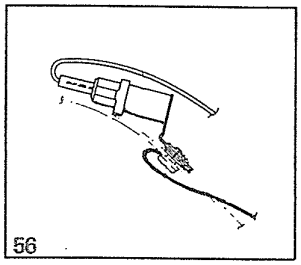
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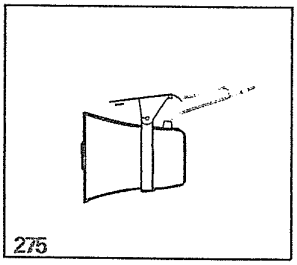
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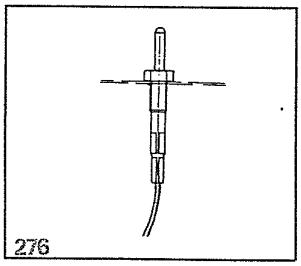


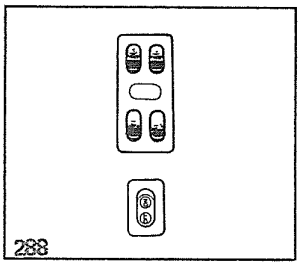


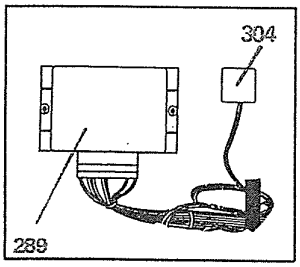


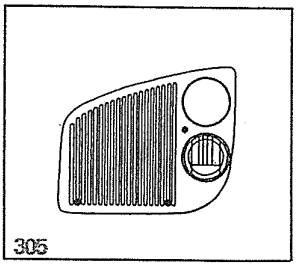


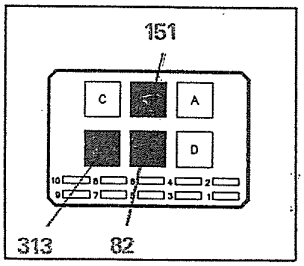


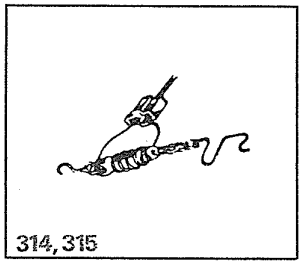












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