SAAB

9000

SERVICE MANUAL

0 News M 1988

SAAB 9000

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0 News
1988 models

Preface

This manual contains brief descriptions of the most important modifications which will be made to the 1988 Saab 9000 series.

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

Saab-Scania AB
Saab Car Division

Units

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

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

The following symbols and abbreviations are used:

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

Conversion factors

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

Market codes

The codes refer to market specifications

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

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

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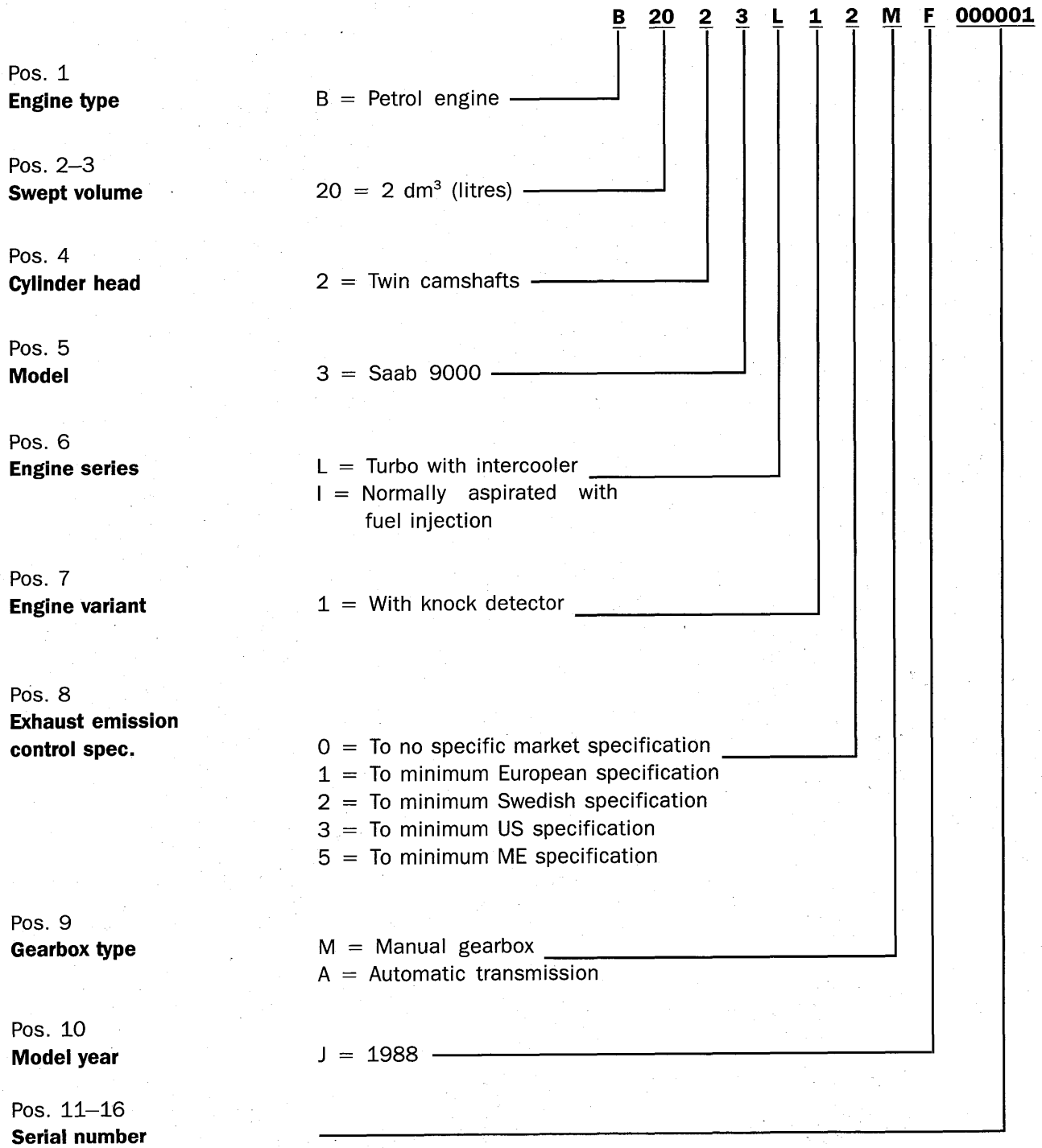
Technical Data

Engine No.



Seven-cylinder AC compressor

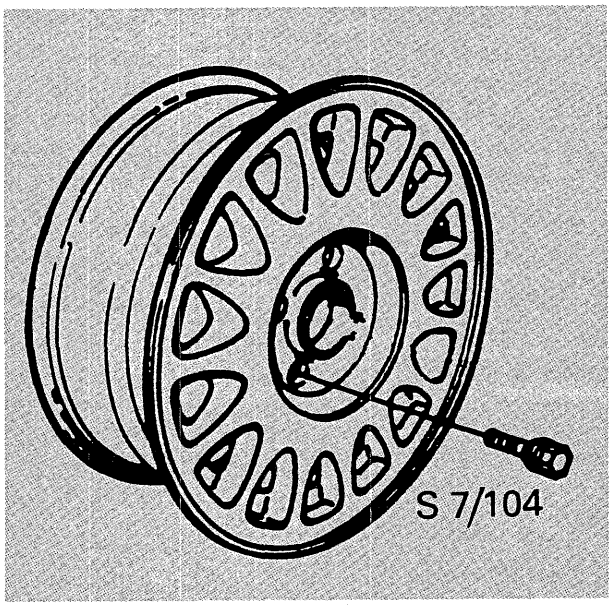
Type		Sanden SD 709
No. of cylinders		7
Swept volume	cm^3	154.9
Refrigerant		R12
Oil capacity (new compressor)	dl	1.35
Clutch		Electromagnetic
Speed range	r/min	500 – 6000
Weight including clutch	kg	6.95

Pre-delivery and break-in service

Pre-delivery service

Tightening of wheel bolts

Tighten the bolts to 105 – 125 Nm (77 – 92 lbf ft).
Note: Do not tighten them too hard. Use a torque wrench, not a nut runner.



Break-in service

Cylinder head bolts

Note:
The retightening of the cylinder head bolts has been eliminated.

Throttle cable – check on cars with automatic transmission

For description, see Group 4:2 in the Service Manual.

AIC system – to check and adjust

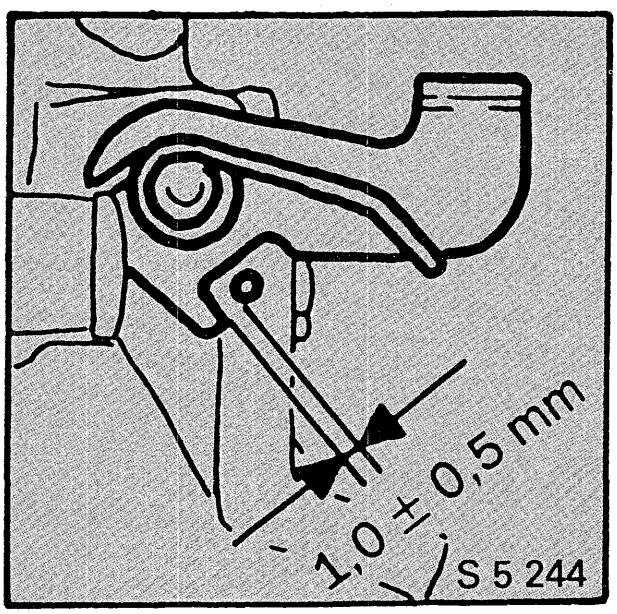
Due to the change in routines for the adjustment of the AIC system in production, checking and adjustment of the AIC system shall be carried out in conjunction with the 1000 miles service.

Service

Brake lever – to check the play

To be carried out every 15 000 miles.

Check that there is some play between the lever and the stop.



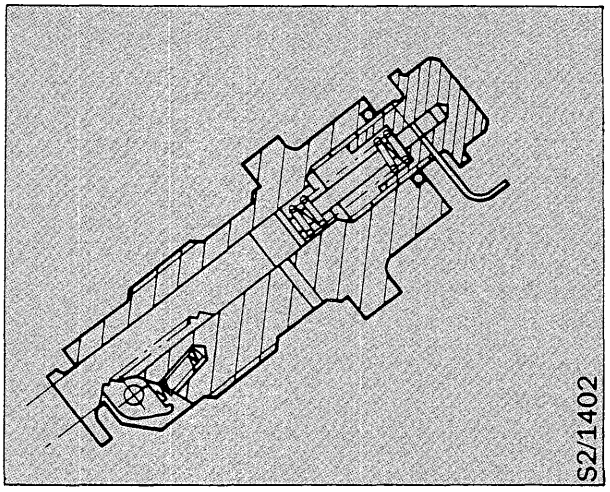
Engine

Chain tensioner, M88 onwards (US only)

The latest chain tensioner has a tighter adjustment range than earlier versions, thus providing more-precise compensation for chain wear and quieter operation.

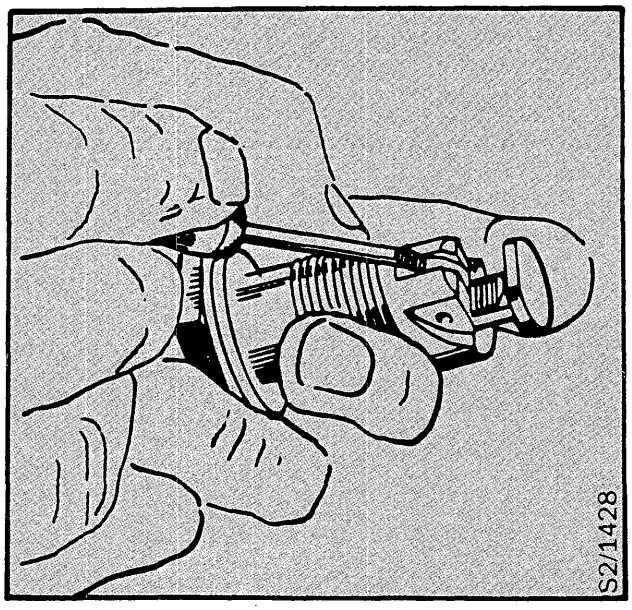
The function is both mechanical and hydraulic, the tensioning force being provided by a spring acting on the tensioning arm. A ratchet prevents return of the tensioning arm inside the tensioner unit.

Only the latest chain tensioner will be available as a spare part, as a result of which the earlier version has been discontinued.

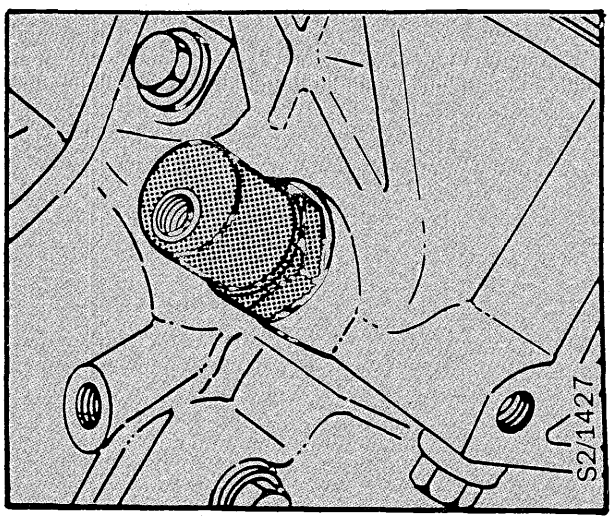


To fit

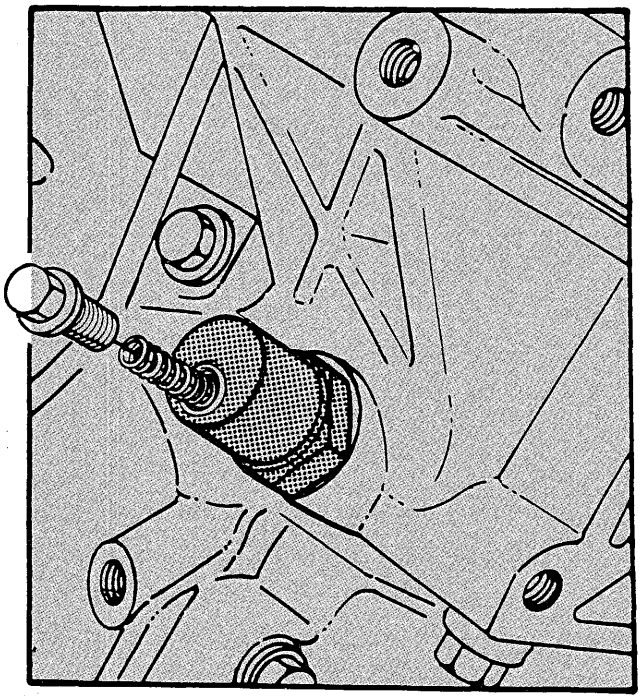
1. Preset the chain tensioner for fitting by pressing down on the ratchet and pushing in the tensioner.



2. Fit the chain tensioner complete with gasket and tighten to a torque of 65 Nm (52 lbf ft).



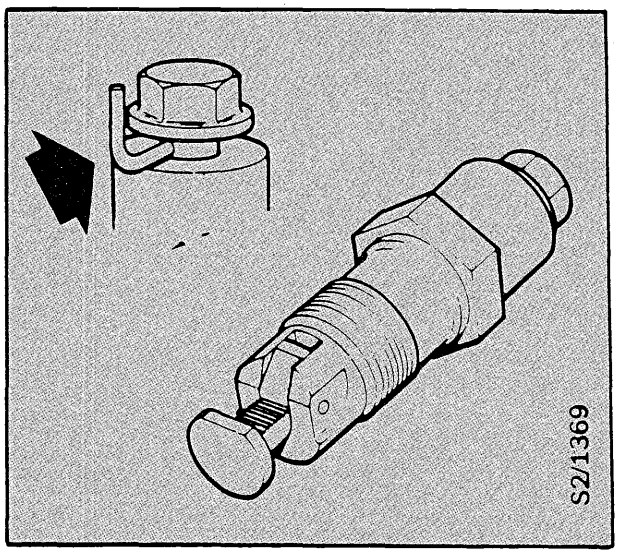
3. Insert the spring and plastic guide pin inside the tensioner body.
4. Fit the plug, checking that the "O" ring is properly seated.
   Tighten the plug to 22 Nm (16 lbf ft).



As the plug is screwed in, the spring will push the tensioning arm out, thereby tensioning the chain.

Warning

New chain tensioners come with the spring under tension. Never remove the safety pin (step 4) before the tensioner has been fitted to the engine.



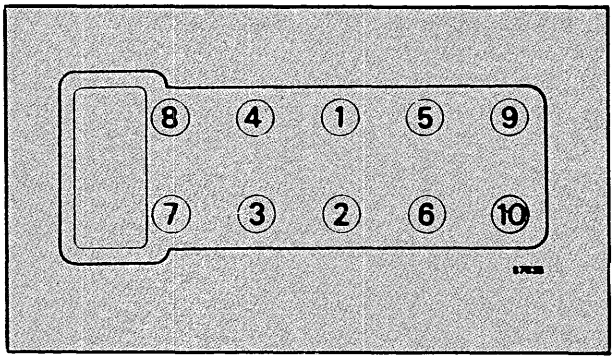
Withdraw the safety pin, whereupon the spring will push the tensioner arm out, thereby tensioning the chain.

New cylinder head gasket – no retorquing

As from 1988 models, a new cylinder head gasket that does not require retorquing of the head is fitted to all engines. Accordingly, tightening down of the head in conjunction with the Warranty service at 600 miles (1000 km) is no longer necessary either.

After fitting a new head gasket, tighten the head as follows:

1. Tighten bolts in sequence shown to 60 Nm (44 lbf ft).
2. Tighten bolts in sequence shown to 80 Nm (59 lbf ft).
3. Tighten a further quarter-turn (90°).

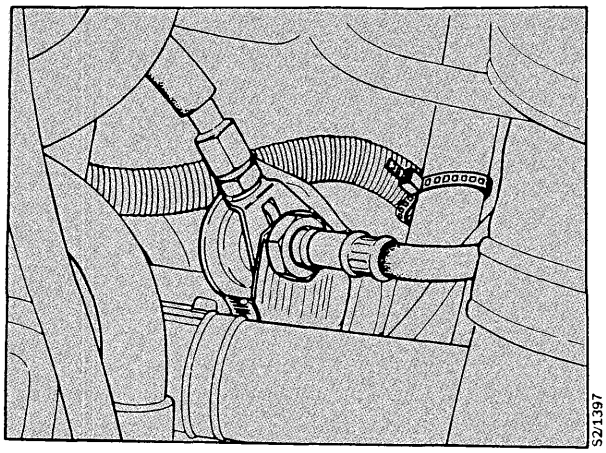


Tightening sequence for head bolts

Fuel pressure regulator M88 onwards (Cars with catalytic converter only)

As from 1988 models, the fuel pressure regulator is located at the left end of the fuel injection manifold.

It is fitted to a bracket on the thermostat housing and connected to the fuel injection manifold via a short length of fuel hose.

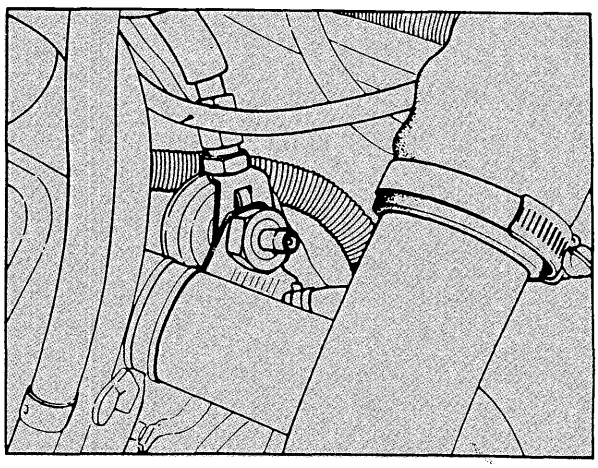


To replace

Warning

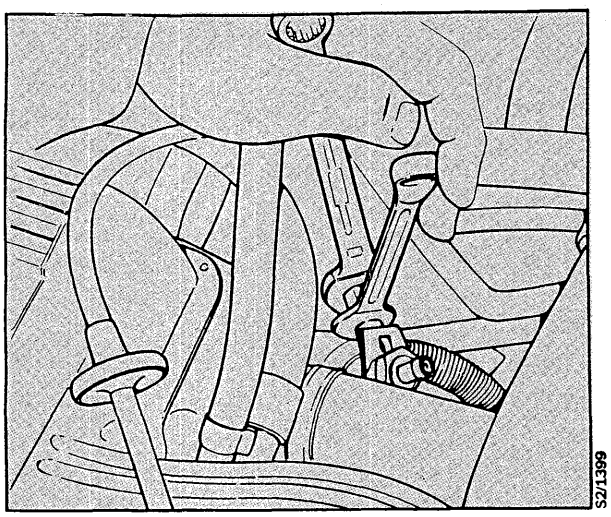
When working on the fuel system, always make sure there is ample ventilation.
If approved extraction equipment for fuel vapour is available, use it.
Wear suitable gloves, as prolonged contact with fuel can cause dermatitis.

1. Disconnect the negative (–) battery lead and cover the terminal pole on the battery.
2. Release the pressure in the fuel system by undoing the nipple on the fuel filter. Retighten the nipple as soon as the pressure has been released.
3. Disconnect the return hose from the fuel pressure regulator and move it to one side.

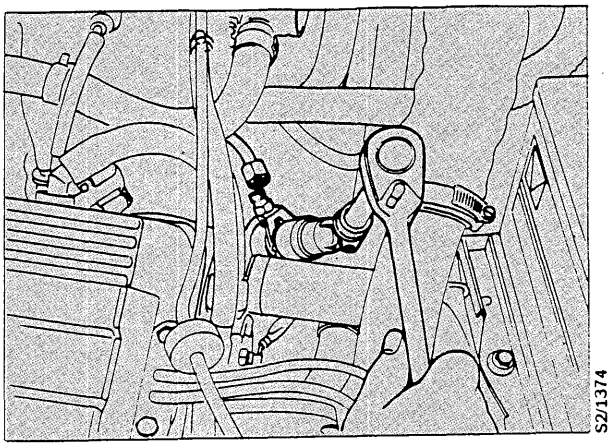


4. Using two open-ended spanners (17 mm & 14 mm), disconnect the supply hose from the pressure regulator.

   Plug the end of the hose to prevent fuel from leaking out.



5. Undo the nuts securing the regulator to the bracket, remove the regulator and disconnect the signal hose.



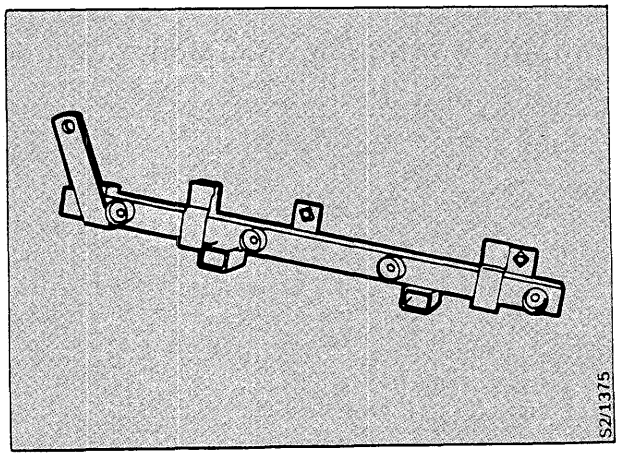
   Refit in the reverse order.

Fuel injection manifold, M88 onwards

As from 1988 models, a modified fuel injection manifold has been fitted to accommodate the new position of the fuel pressure regulator.

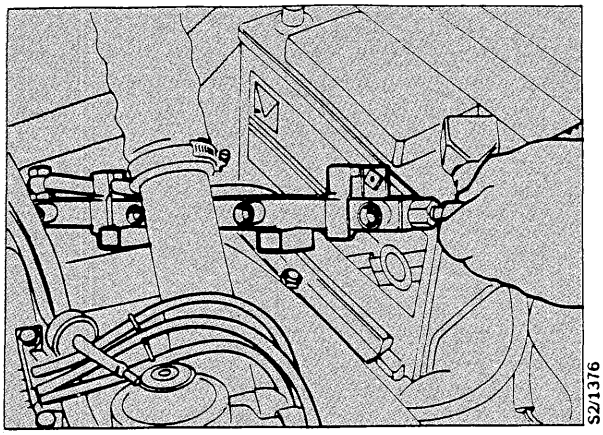
To remove

1. Disconnect the negative (-) battery lead and cover the terminal pole on the battery.
2. Undo the three securing bolts.



N.B.
Take care not to lose the securing clips for the injection valves.

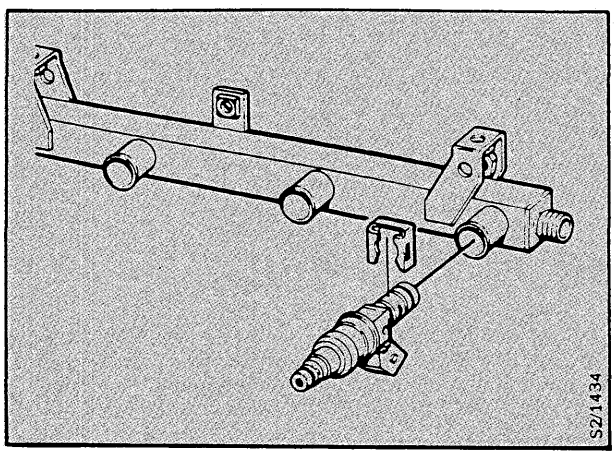
3. Remove the clips from the injection valve connections.
4. Undo the banjo fitting and disconnect the fuel hose from the fuel injection manifold by carefully prising open the clips.
5. Remove the valves from the injection manifold and remove the manifold by withdrawing it from the left, taking care not to damage any electrical leads or signal hoses.



To fit

Refit in the reverse order

N.B.
Make sure the clips on the injection valves are fitted with the flange towards the fuel injection manifold.



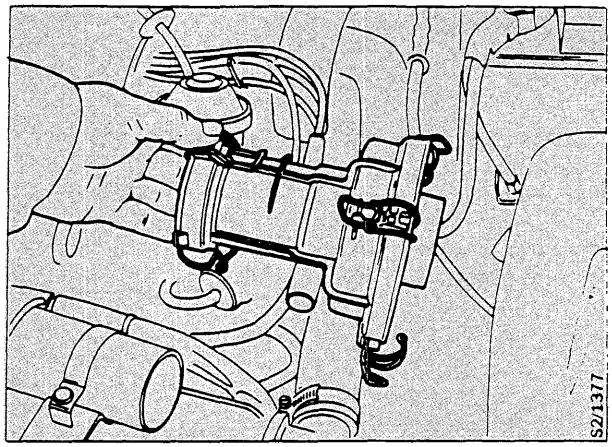
New mounting of air cleaner, M88 onwards (Turbo)

As from 1988 models, the air cleaner in all 9000 Turbo and 9000i automatics is mounted on the inside of the LH wing.

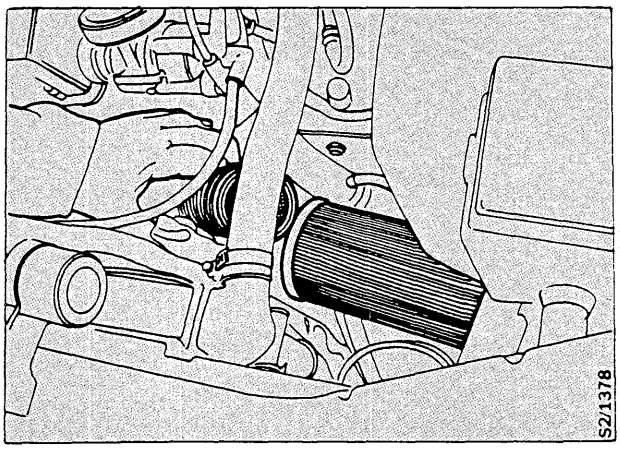
Filter element replacement intervals:
30. 000 miles (40.000 km)

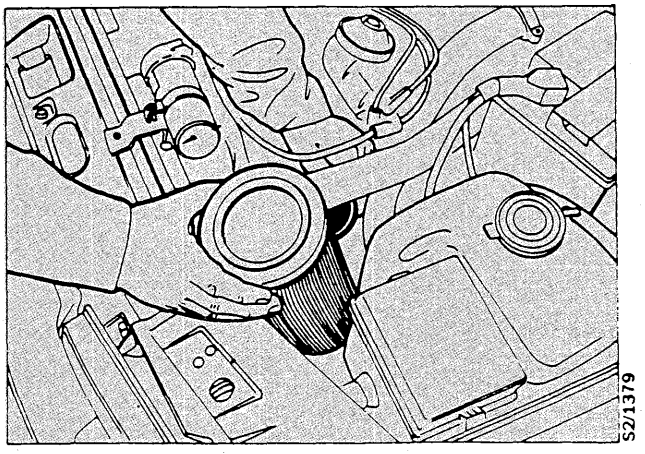
To change the filter element

1. Remove the intermediate section of the air cleaner (three toggle fasteners at air cleaner casing and two at air mass meter).



2. Pull up the air mass meter and the hose connecting it to the turbo unit and lift the filter element straight up and out.





3. Wipe out the inside of the air cleaner using a clean, dry rag.

4. Insert a new filter element into the air cleaner. Note that the opening for the air intake must be towards the intermediate section.
5. Refit the intermediate section complete with "O" ring (to seal joint with air mass meter).

To change the air cleaner housing

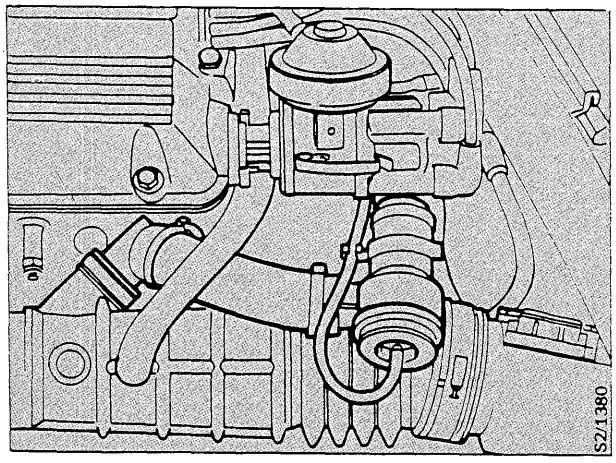
1. Remove the filter element.
2. Remove the front section of the wing liner.
3. Release the toggle fasteners and remove the housing.

Refit in the reverse order.

Relief valve, M88 onwards (Turbo only)

As from 1988 models, the relief valve is located closer to the turbo pressure (delivery) pipe, necessitating a new 45-degree connector for the bypass line.

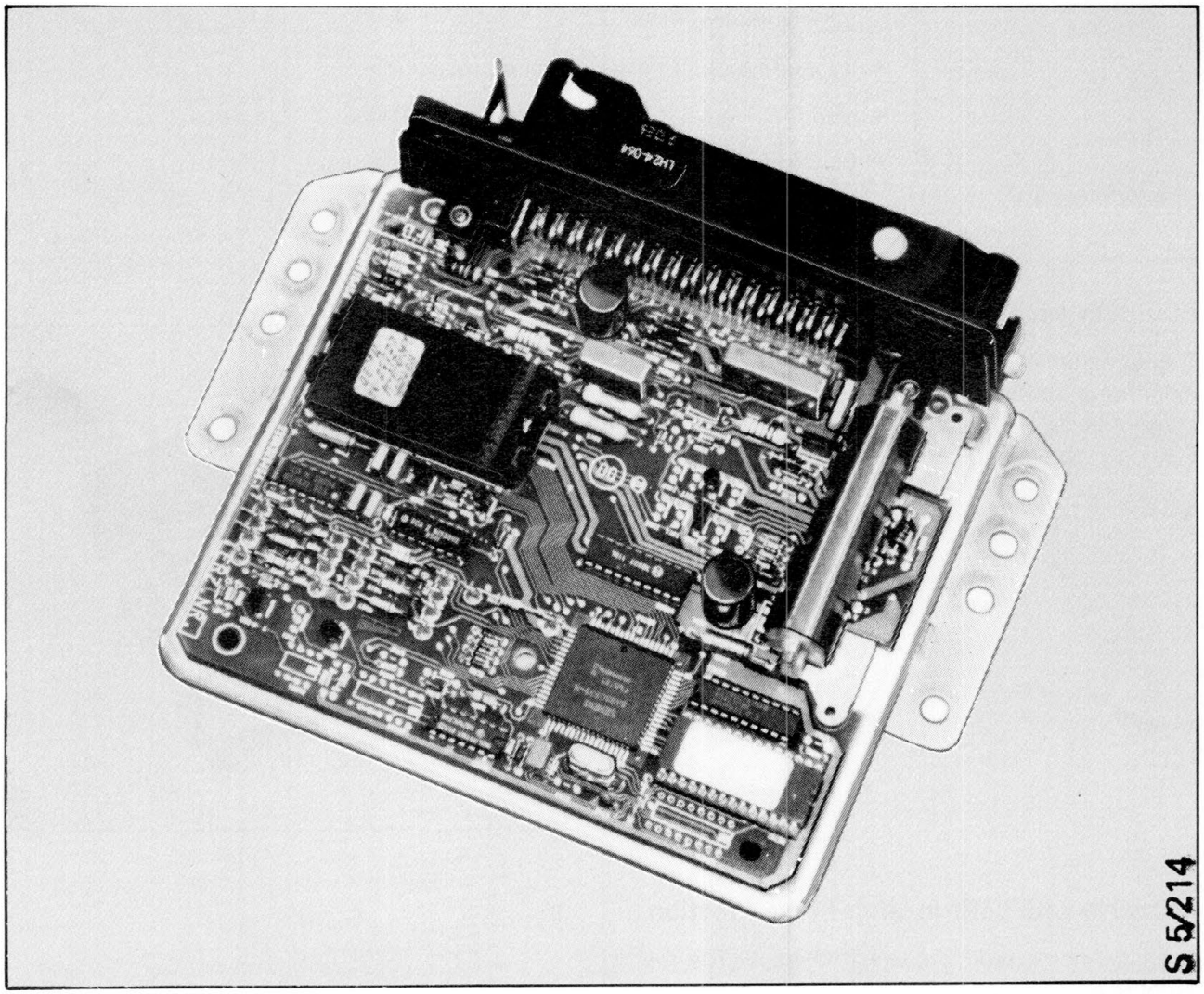
As a result, the turbo delivery pipe and the rubber socket connector between the air mass meter and turbo unit have also been modified.



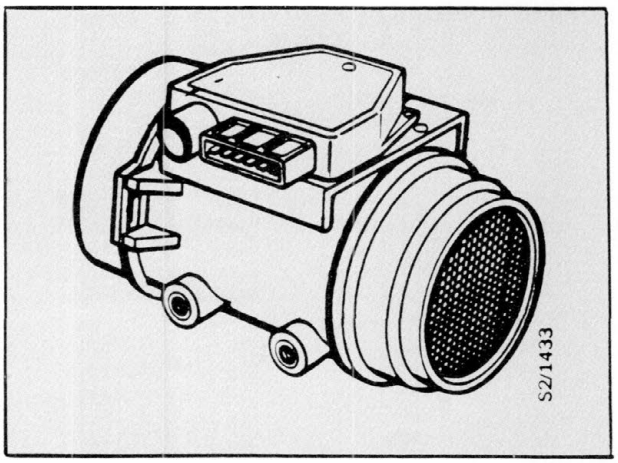
LH 2.4 system, 9000S (US)

The LH 2.4 system is a new, improved version of the LH 2.2 fuel injection system.

The main improvements are associated with the expanded memory, which has allowed a host of new functions to be added to the system. To cope with these, the ECU now has a 35-pin connector.



The air mass meter casing has been modified and is made of plastic as from 1988 models. The CO adjusting screw has been discontinued on the LH 2.4 system.



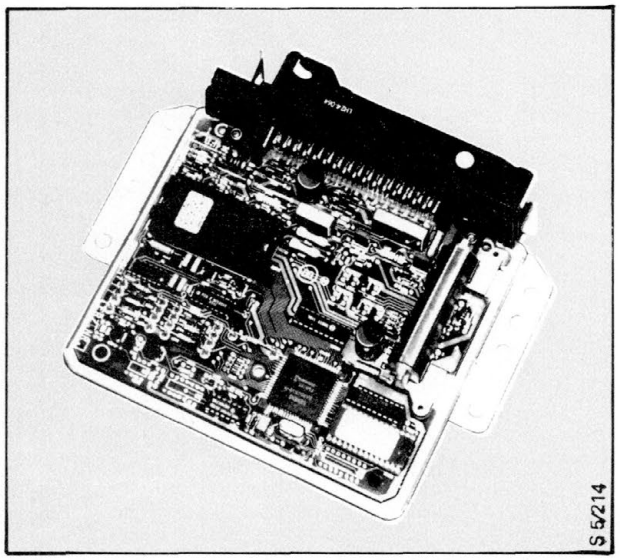
The remaining components in the system remain largely unchanged.

New functions in the LH 2.4

- ECU with expanded memory
- AIC valve with built-in Limp-home function
- Adaptive ("intelligent" or self- teaching) idling control system
- Adaptive Lambda system
- Built-in deceleration function (fuel shut-off during engine overrun)
- Refined function for gear-change indication
- New ELCD valve
- Built-in fault-diagnosis system

ECU with expanded memory

The expanded memory of the ECU has enabled new monitoring and control functions to be added. In consequence of this, a 35-pin connector for the ECU now replaces the earlier 25-pin one.



AIC valve with built-in Limp-home function

The Limp-home function, which takes over in the event of a fault in the AIC system (e.g. a loose connection), results in the system reverting to a high fixed idling speed of 1200 rpm.

Adaptive idling control system

The idling control system is of the adaptive type, which means that the idling speed and AIC setting are varied automatically and continuously to compensate for all normal variations. This is achieved by the microprocessor remembering how far the AIC valve was open the last time the engine was at idling speed.

The benefits of this system include a reduced service requirement and an idling setting that is constantly maintained at a high level.

Adaptive Lambda system

The adaptive Lambda system compensates automatically for variations in the air-fuel mixture, by raising or lowering the basic setting. Variations in the mixture can be occasioned by air leaks, fluctuations in the quality of the fuel or normal wear and tear.

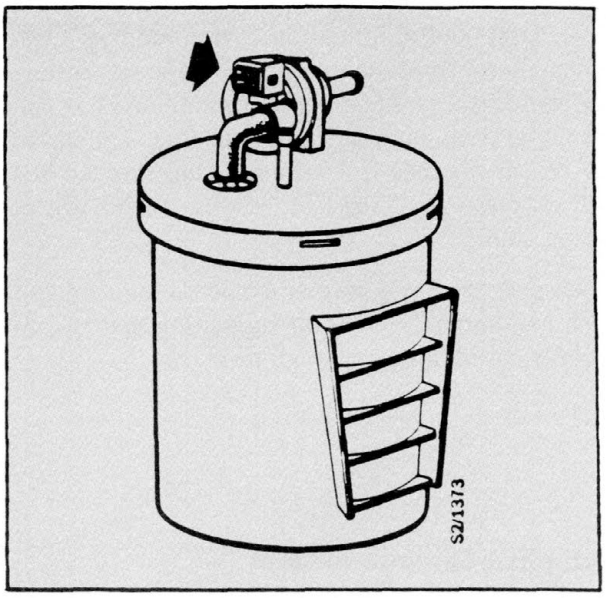
The system eliminates the need to adjust the basic setting or make any other adjustment to the Lambda system.

Built-in deceleration function

The deceleration function shuts off the supply of fuel during engine overrun. The system supersedes the dashpot function and both reduces fuel consumption and contributes to cleaner exhaust emissions.

New ELCD valve

The purging valve on the activated-charcoal filter is of a new design and controlled by signals from the ECU. Operation of the valve is now governed by the load on the engine and the engine speed.



Built-in fault-diagnosis system

The integrated fault-diagnosis system makes for easier and improved fault diagnosis. The system displays an error code, by the CHECK ENGINE warning flashing a varying number of times and with varying duration. Reference to the error-code table then enables the location of the fault to be pinpointed or narrowed down.

Further details are given under "Built-in fault-diagnosis system for the LH 2.4".

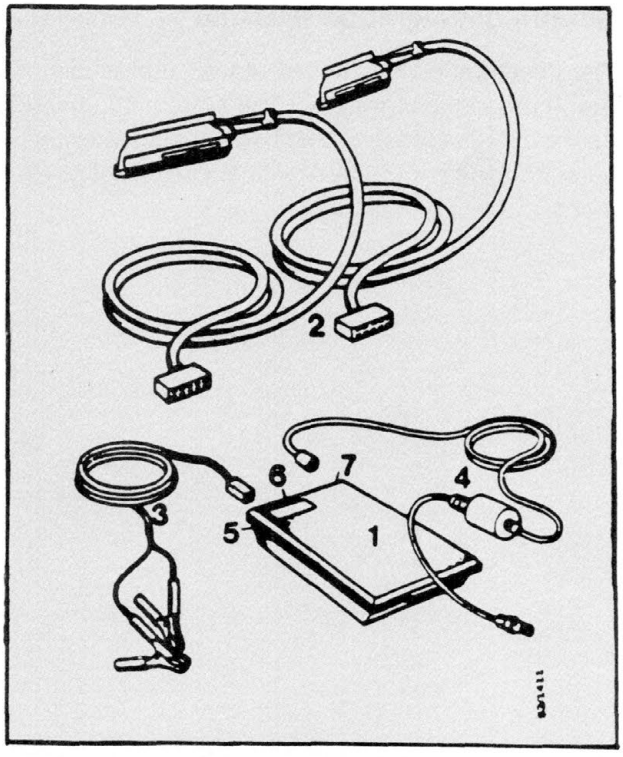
LH-system tester

A new upgraded microprocessor-based tester is available for the LH 2.4 system, part no. 83 94 223.

The tester comes with a comprehensive manual, which describes the test procedures and provides full details of the steps to be taken for each error code.

The manual is available in the following languages:

Edition	Part no.
Swedish	40 17 03
English (GB)	40 17 11
English (US)	40 17 78
German	40 17 29
French	40 17 37
Spanish	40 17 45
Italian	40 17 52
Dutch	40 17 60



Built-in fault-diagnosis system for the LH 2.4, 9000S (US)

The fault-diagnosis system has two principal applications:

- Memory facility for faults detected
- Component and signal testing

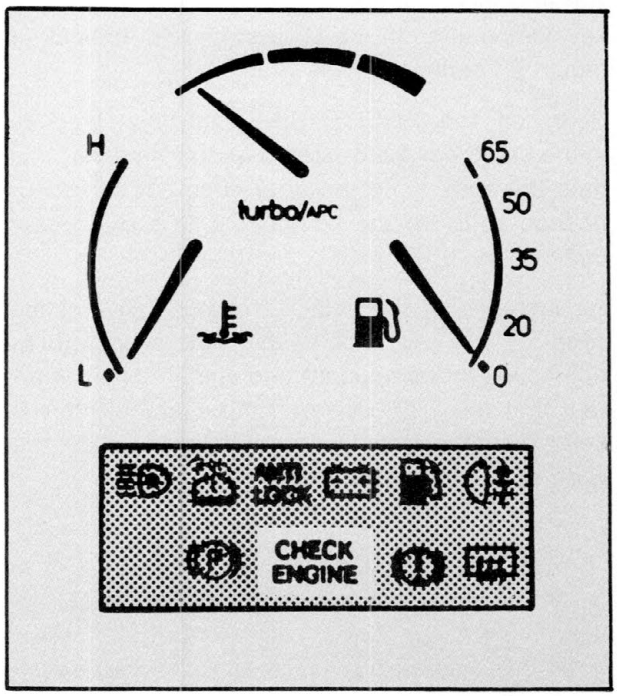
N.B.
Any flashing of the CHECK ENGINE warning on the **EDU 2 display** is totally unrelated to the built-in fault-diagnosis system and should be ignored.
All readings for the fualt-diagnosis system are made by observing the CHECK ENGINE light on the main instrument display panel.

Memory facility for faults detected

Faults which only occur intermittently are often difficult to find; the built-in memory in the LH 2.4 stores information on such faults so that they can be identified and rectified by the technician.

When the memory facility has been initiated ("Fault diagnosis – stored faults" refers), the CHECK ENGINE light on the car's instrument panel will flash, providing information on any faults detected.

Each fault has a special code consisting of a combination of short flashes, e.g. 1 + 2 + 3 + 2 + 2. By looking for 12322 in the list of error codes, you can then identify the fault and rectify it. The procedure can then be repeated for the next fault, whereupon the CHECK ENGINE light will flash a new code, enabling you to identify the fault from the table of error codes.



The memory facility can store up to three faults at a time, which can be accessed as described above. Serious malfunctions are always given priority, which means that these must be rectified before the memory can store information on minor faults.

N.B.
If a serious malfunction occurs repeatedly, each occurrence will be recorded in the memory and the CHECK ENGINE light will come on. Once the fault has been rectified, it may be necessary to erase the contents of the memory to delete any additional codes for the same fault. If you are in any doubt about whether the fault has been rectified, test drive the car.

Component and signal testing

These tests are best done in conjunction with the diagnosis of stored faults.

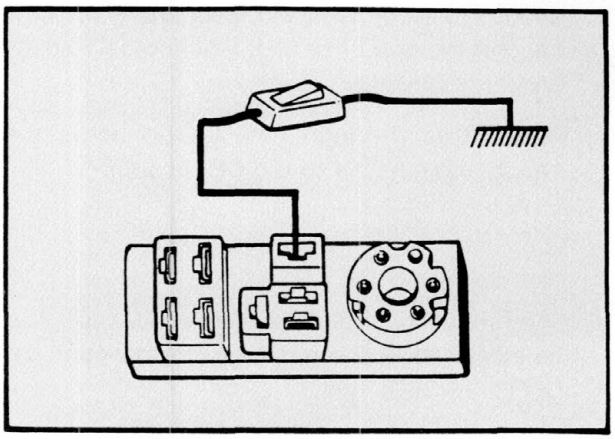
The test incorporates a function check of certain key components in the LH system and a check of important control signals.

Here, too, the CHECK ENGINE light flashes codes in the same way as for stored faults. However, this time the code is not an error code but an identification code for the component or signal being tested.

For instance, if the CHECK ENGINE light flashes code 12413, reference to the table of identification codes for component and signal tests will reveal that the ELCD valve on the charcoal filter is being tested, and that you should listen to hear the valve opening and closing.

Fault diagnosis – stored faults

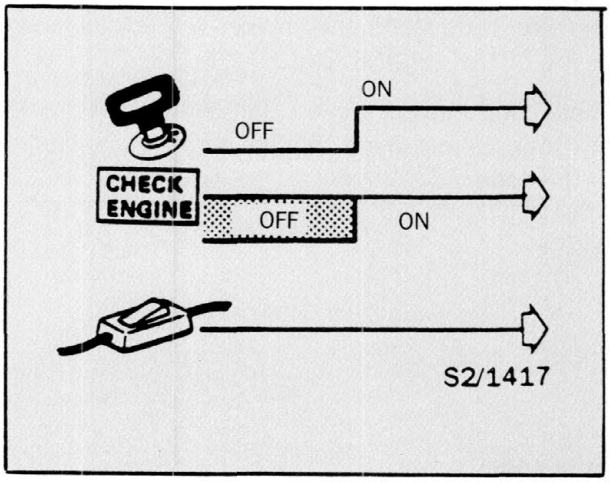
1. Using switched jumper lead, part no. 83 93 886, connect the single-pin socket on the test box on the left-hand side in the engine compartment to the battery earth (negative terminal pole).
2. Read off the error codes from the CHECK ENGINE light as detailed below.



N.B.
Read the following instructions carefully before switching on the ignition.

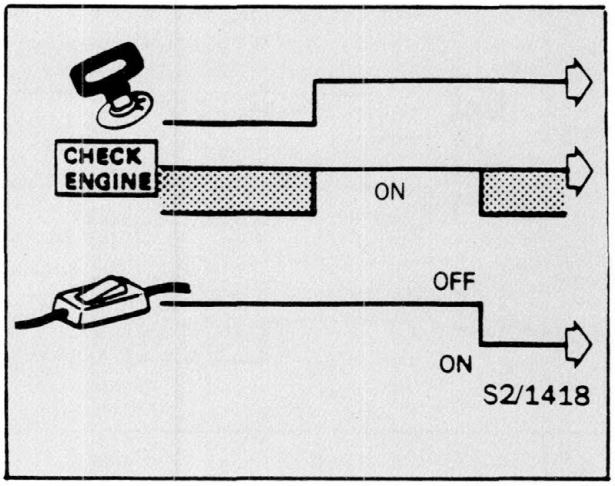
3. Switch on the ignition.

   The CHECK ENGINE light will now come on.



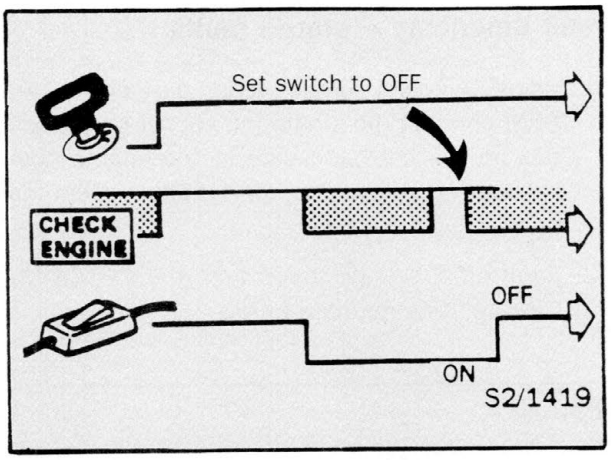
4. Set the switch to ON (earthing ECU pin 16).

   The CHECK ENGINE light will now be extinguished.



5. Watch the CHECK ENGINE light carefully. After about 2.5 seconds, it will **flash briefly,** signifying that the first error code will now be displayed.

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



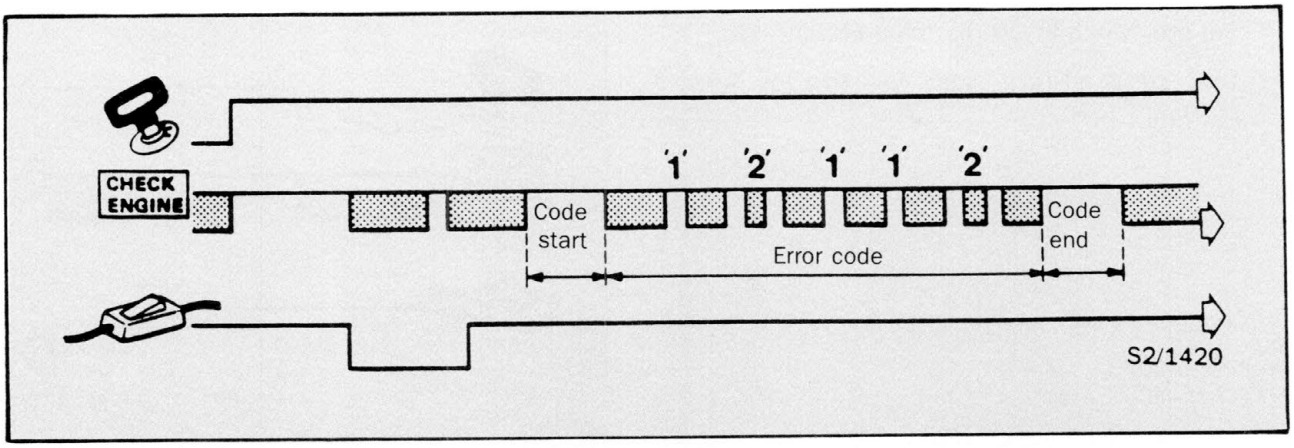
6. The first of three possible error codes will now be displayed by a series of short flashes of the CHECK ENGINE light.

N.B.
The error code starts and finishes with a long flash of the CHECK ENGINE light.

These long flashes are not part of the code itself but serve merely to indicate the beginning and end of the code.

Error code

The entire procedure will therefore be as shown in the figure.



In the figure, the error code is 12112. Reference to the table shows that the mixture on idling is incorrect.

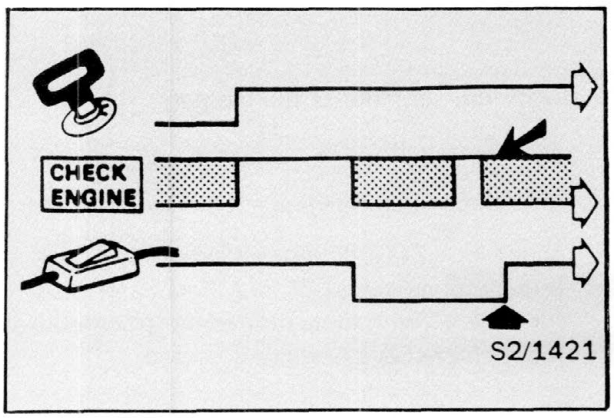
When the switch is set to OFF, error code 12112 will be flashed repeatedly – the next error code cannot be displayed until the switch has been operated as detailed in step 7 and 8.

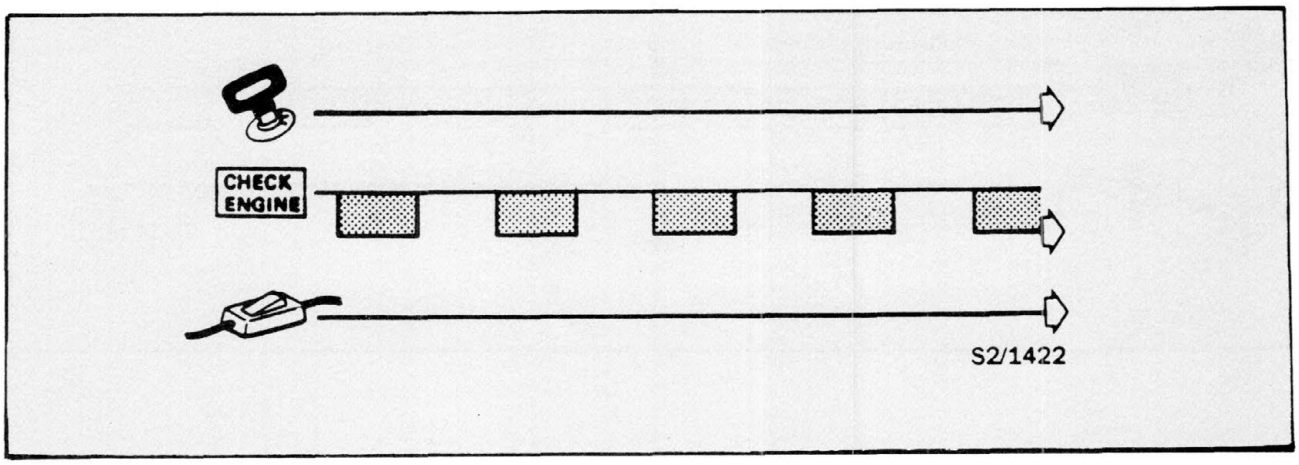
N.B.
If the test is run with the engine switched off, 12231 (no rpm signal) will be the first code displayed. The moment this code is displayed, turn the ignition key to the start position and hold it there, until the ECU acknowledges, by flashing the CHECK ENGINE light, that the signal is being generated. As soon as this acknowledgement is received, let the ignition key spring back to the drive position so that the next error code can be displayed.

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

7. Set the switch to ON.
8. After a **short flash of the light,** set the switch to OFF.

   The next error code (if any) will now be displayed in the same way as the first one.
9. Follow the same procedure to display the error code for a third stored fault, if any. If no third fault has been detected, or all the faults have been rectified, the system will indicate this by a continuous series of long flashes or by displaying code 1–2–4–4–4.

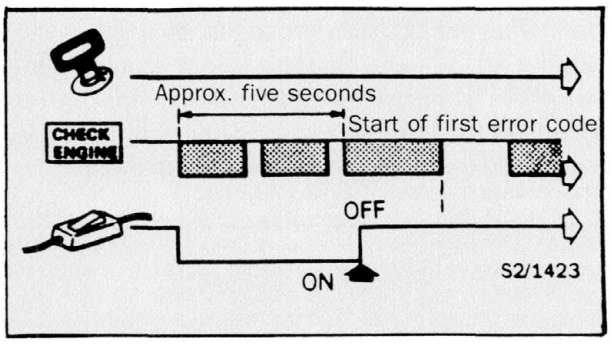




To restart the test procedure

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

1. Set the switch to ON.
2. After **two short flashes,** set the switch to OFF, whereupon the error code for number 1 fault will be displayed.



The switch must be set to OFF immediately after the second flash.

To delete the contents of the memory

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

   The CHECK ENGINE light will now either flash in a continuous series of long flashes or display the code 12444, indicating that the contents of the memory have now been erased.

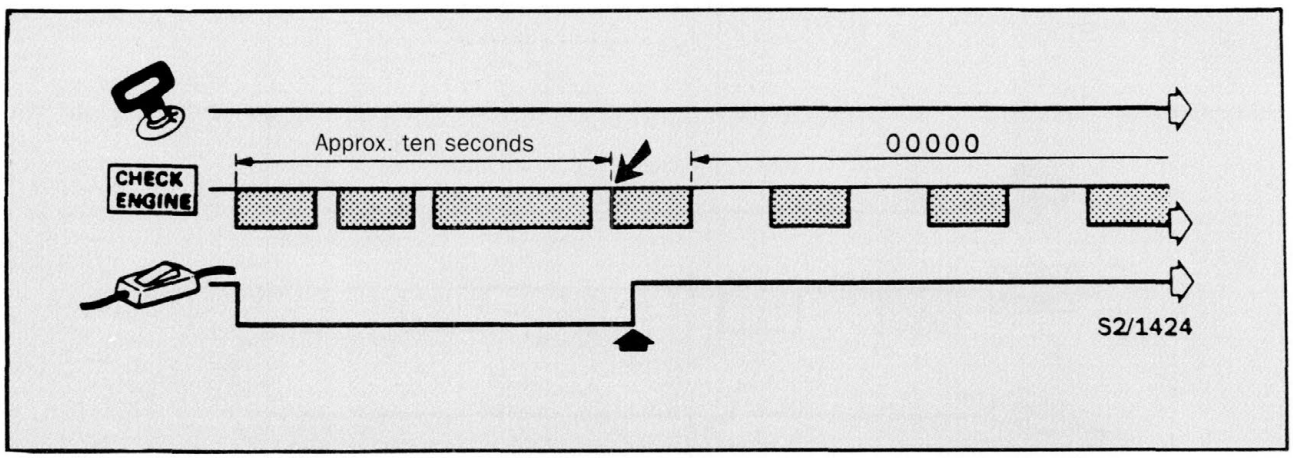


Table of error codes for stored faults

Fault	CHECK ENGINE	Error Code
Break in rpm signal	OFF	12231[1]
Air mass meter signal faulty	ON	12221[2]
Oxygen sensor signal faulty	ON	12225[3]
Air leakage, mixture lean		12223
mixture rich		12224
Temperature sensor faulty (Temperature below 90°C or above 160°C)	ON	12214
Incorrect battery voltage when engine running (Below 10 V or over 16 V)	OFF	12211
Break in circuit to ECU pin 4	OFF	12232
Throttle-position sensor faulty	OFF	
Idling contacts		12212
Full-throttle contacts		12213
Idling control (AIC) No pulse switching 0 – 12 V (ECU defective)	OFF	12222
Adaptation fault, Lambda	OFF	
Air-fuel mixture, car running (multiplicative fault)		12111
Air-fuel mixture, engine idling (additive)		12112
Adaptation fault, idling control (AIC)		
Air-fuel mixture, pulse ratio low	OFF	12113
Air-fuel mixture, regulation faulty		12114
Program error, automatic diagnosis (ROM check)	OFF	12233
No more faults		00000
Memory content erased/no faults		12444

1) Occurs only with engine switched off
2) Engine in Limp-home mode
3) Occurs only at engine temperatures above 80°C (176°F)

Component and signal testing

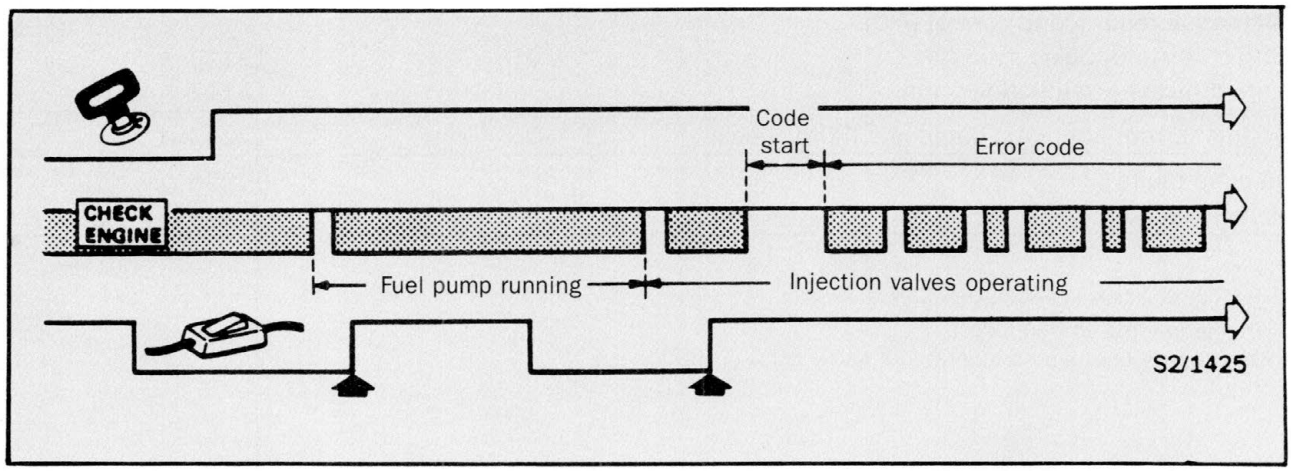
The testing starts at item 1 (Table of identification codes) and runs through all eight items. The jumper lead should be connected in the same way as for diagnosis of stored faults.

N.B.

In this test cycle, the switch must be set to ON **before** the ignition is switched on.

1. Set the switch to ON.
2. Switch on the ignition and wait for **a short flash** of the CHECK ENGINE light, then immediately set the switch to OFF.

The moment the light starts flashing, the fuel pump should start running (provided it is not defective). Check by listening for the pump or, if necessary, by checking the fuel pressure.



3. To move on to no. 2 test, i.e. of injection valves, set the switch to ON.
4. After **a short flash,** move the switch to OFF. A code will now be displayed in the same way as for the stored faults, i.e. first a long flash, then a series of short flashes for the error code itself and, finally, a long flash, signifying the end of the code.

   Check by listening to hear whether the valves are operating.
5. Run through the remaining items in the table in the same way. Set the switch to ON, wait for a short flash and then set the switch to OFF.

Table of identification codes for component and signal testing

The procedure starts at item 1 and continues through to item 8.

Component/signal		Identification code	Remarks
1.	Fuel pump	–	Listen
2.	Injection valves (1.5 ms – 10 Hz)	12411	Listen
3.	AIC valve (valve switches between closed and open positions once a second	12412	Listen
4.	ELCD valve (valve switches between closed and open positions once a second)	12413	Listen
5.	"Drive" signal (signal changes when shifting from D to N)	12421	Flashing stops
6.	AC signal (cannot be tested)	12423	
7.	Idling signal (signal changes as accelerator depressed)	12424	Flashing stops
8.	Full-throttle signal (signal changes as accelerator pressed down to floor)	12431	Flashing stops

Setting the idling speed on cars with AIC

900 Turbo

The following is a new method for adjusting the AIC system. It is more accurate, making for more reliable operation, and involves the use of a dwell angle tester and tachometer, or the LH system tester.

Before starting work on the AIC system, check the ignition timing and CO setting.

Tools: Dwell angle tester and Tachometer
or
Digital inductive dwell meter and Tachometer
or
LH-system tester
Throttle stop locknut T-wrench 8394322

The accuracy of the dwell angle tester and the digital inductive dwell meter should be $\geqslant \pm 0.5\%$.

1. Start the engine and run it up to normal temperature. (It is vital that the transmission oil be hot.)
2. Undo the locknut on the throttle damper (dashpot) and lower the dashpot clear of the throttle lever.

When using a dwell angle tester:

3 a Pull back the rubber boot on the AIC valve connector and connect the dwell angle tester probes to pins 2 and 3 (valve terminals 4 and 5).

Connect the tachometer.

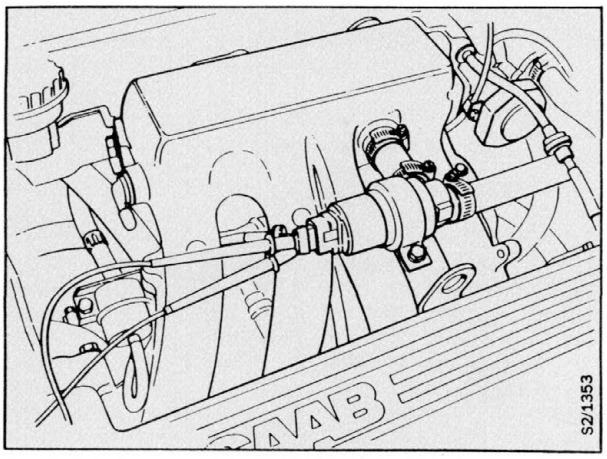
When using digital inductive dwell meter:

3 b Pull back the rubber boot on the AIC valve connector. Insert probe into pin 3 (valve terminal 5) and connect lead of dwell meter.

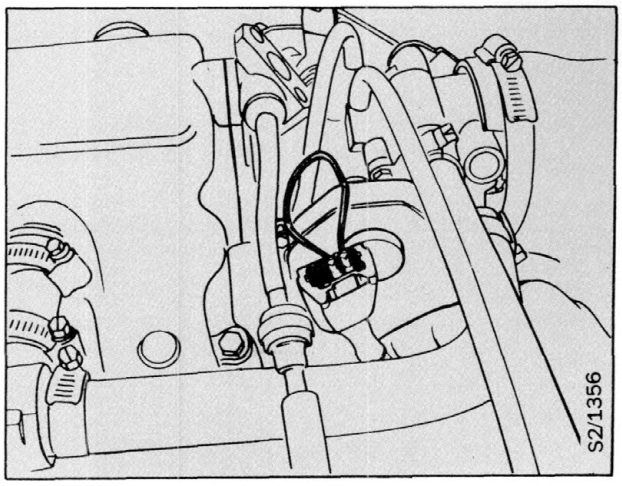
Connect the tachometer.

When using the LH system tester:

3 c Undo the ECU securing screws and connect the LH system tester between the ECU and the ECU wiring-loom connector.

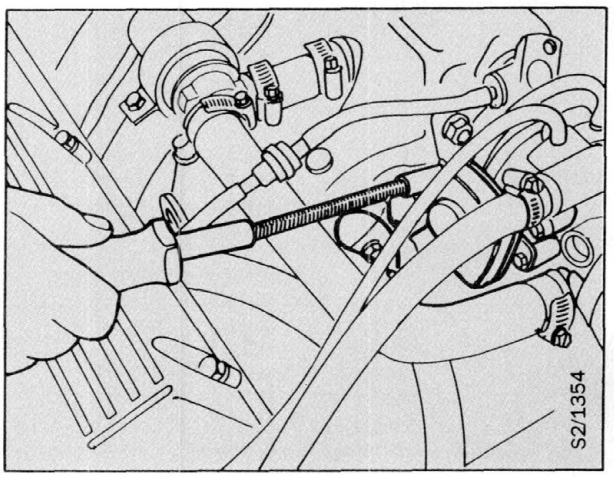


4 Unplug the connector for the throttle-position sensor and connect a jumper lead between pins 1 and 2 on the back of connector (terminals 2 and 18 on the throttle-position sensor). This simulates closed contacts for the idling position.



5 Undo the two retaining screws for the throttle-position sensor and rotate the sensor clear of the throttle butterfly. Make sure that the throttle cable is slack so that is cannot interfere with movement of the butterfly.

6 Start the engine and isolate all possible loads, such as the AC system, headlights, seat heaters, etc.



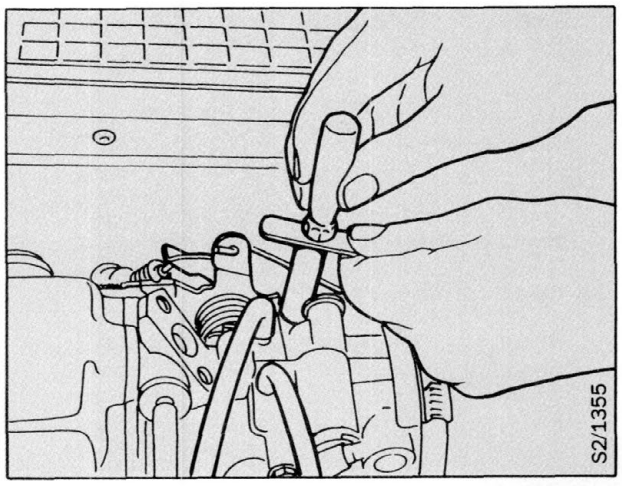
N.B.
Setting must not be carried out when the radiator fan is running.

Cars not fitted with air bleed screw:

7 a Loosen throttle stop screw locknut and turn adjusting screw counterclockwise until it no longer touches the throttle linkage.

Cars fitted with screw:

7 b Loosen throttle stop screw locknut and turn adjusting screw counterclockwise until it no longer touches the throttle linkage. Slowly turn screw clockwise until it just contacts the linkage then turn screw and additional 1/2–3/4 turn clockwise and tighten and turn air bleed screw in (clockwise) until fully seated.

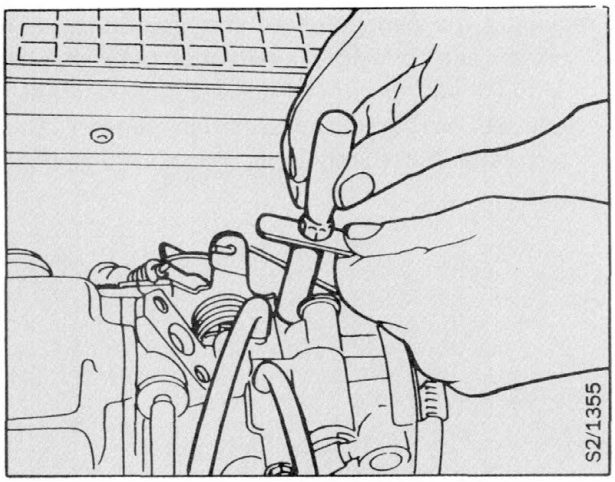


N.B.
The meter reading should increase to a minimum of 34° or 38%.

If difficulty is encountered in obtaining this value, check for air leaks in the inlet manifold downstream of throttle housing or improperly centered throttle plate.

8 Turn the adjusting screw clockwise so the AIC valve setting slowly decreases.

When the reading shows the correct setting value, the idling speed should be 850 r/min.



N.B.
When using LH-system tester, the adjustment must be done **slowly** due to delay time for calculation.

AIC-valve setting values

Using dwell angle tester (degrees)	Using LH system tester (%)	
32	35	New car < 1000 miles
30	33	Run in car > 1000 miles

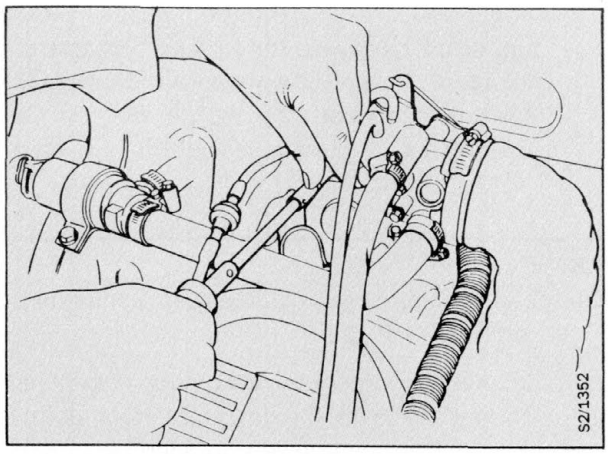
Value tolerance: ± 1 degree/± 1%

9 Tighten the locknut on the adjusting screw **taking care not to alter the setting.**

10 Switch off the engine.

11 Reset the throttle-position sensor (closed in idling position).

Check the setting: move the throttle lever and if the setting is correct a light metallic click should be heard as the sensor switches from the idling position. Do not confuse this with click from upshift switch.



12 Set the throttle dashpot to close within a period of 4 ± 1 seconds and then tighten the locknut.

13 Remove the jumper lead from the throttle-position sensor connector and plug the connector onto the sensor.

14 Remove the probes from the AIC valve connector and push back the rubber boot.

If the LH system tester has been used, unplug the connector and refit the LH control unit.

15 Turn AC on and ensure that the idling speed increases slightly.

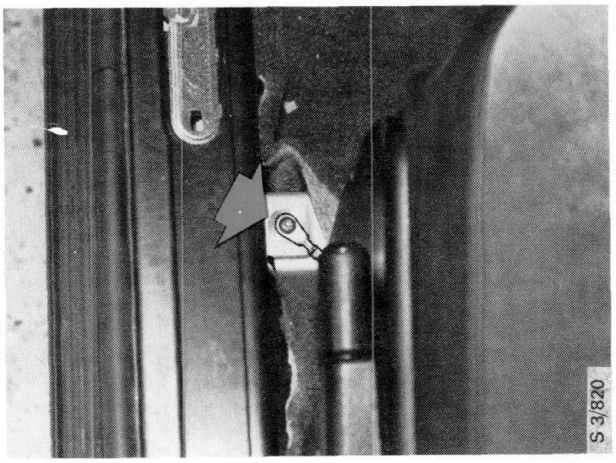
900S

The idling speed is preset at the factory and should not be adjusted.

Electrical system

Ground point (341)

The ground point (341) is located on the left-hand front seat member to the left under the carpet.
See the system diagram on page 46.

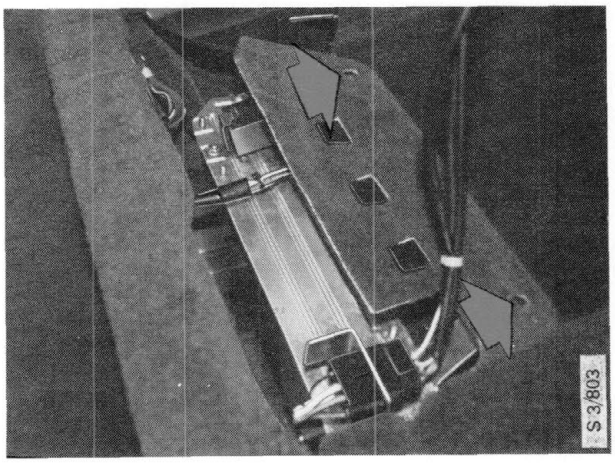


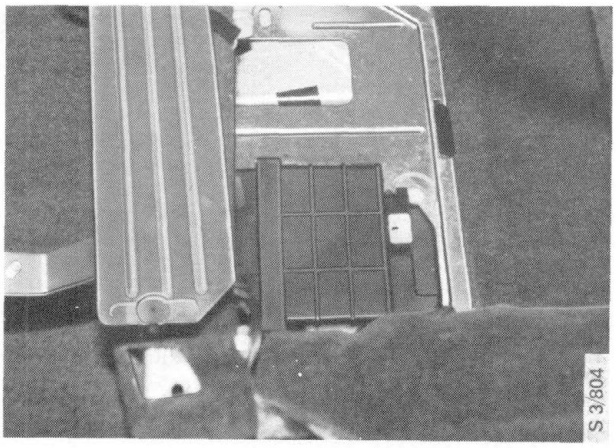
APC/EZK control unit

The APC/EZK control unit is located under a cover under the left-hand seat.
See the system diagram on page 51 (APC) and page 52 (EZK).

To remove

Release and move away the seat. Release the screws and open the cover. The control unit can then be replaced.





Ignition amplifier

The ignition amplifier has been withdrawn from all models. The ignition pulses will instead be supplied from ignition module 146, pin 7.

Switch for rear door demister fans

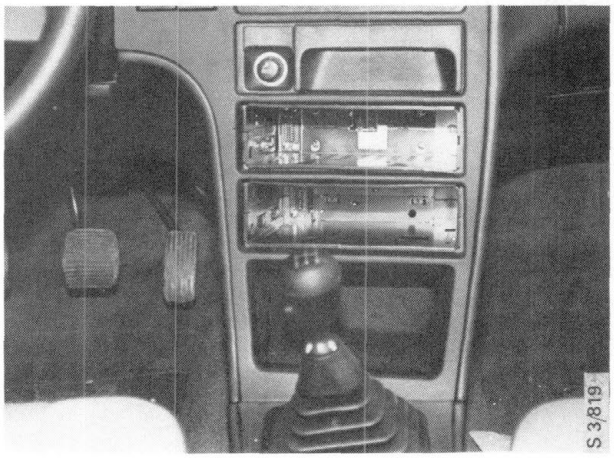
The switch is located on the centre console. See the system diagram on page 78.

Pre-wired radio installation (US)

On the Saab 9000S, a radio mounting box with built-in amplifier is mounted in the centre console.

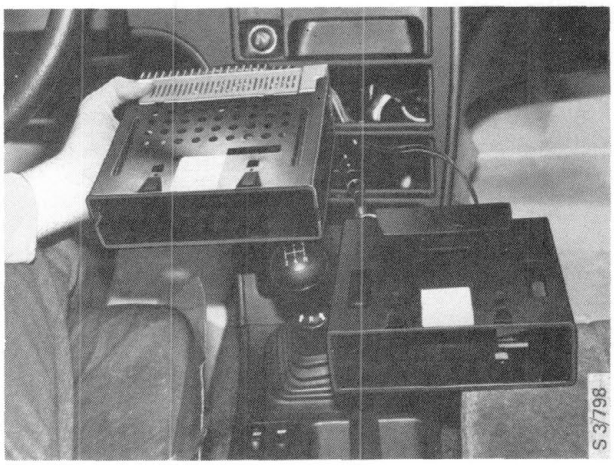
In addition to the mounting box with built-in amplifier, the Saab 9000 Turbo has an extra mounting box for an equaliser or a CD player, also located in the centre console.
Fuses for the amplifier are located at the back of the box and are easily accessible once the radio is removed.

See the system diagram on page 85.



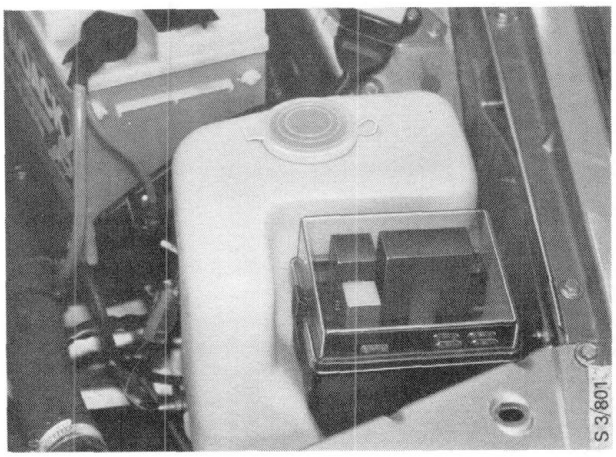
To remove

Pull the mounting boxes forward and disconnect the antenna and electrical connections.



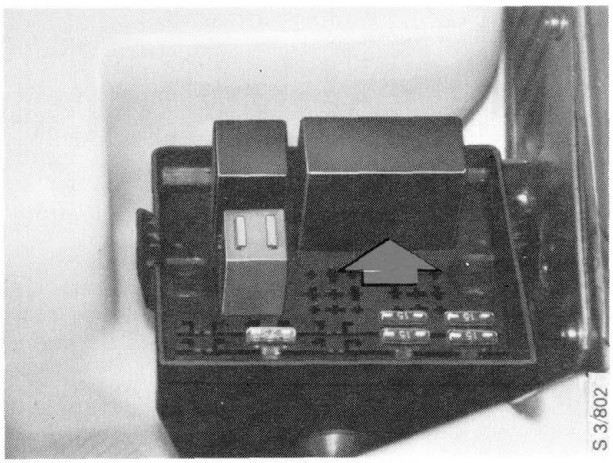
Front fuse box

The additional front fuse box contains the relays for the radiator fan, full/dipped beam, extra fog lamps (US), horn and filament monitor for the front lamps, together with certain fuses.



Electronic headlight relay

An electronic headlight relay, located in the front fuse box, has been added.

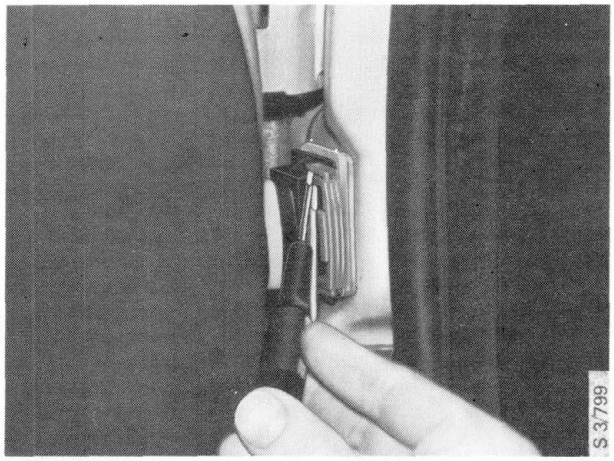


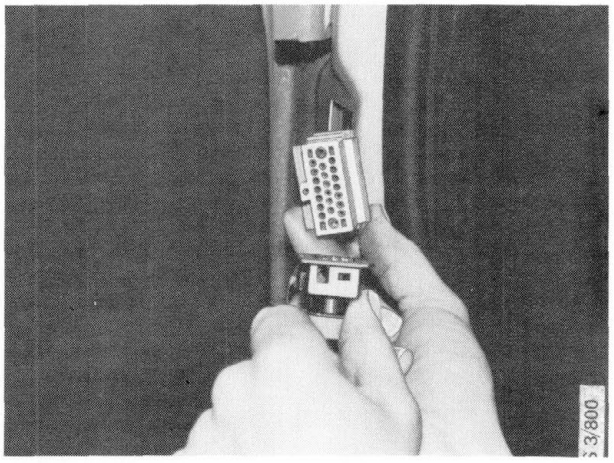
22-pole connector

A 22-pole connector is fitted to each A pillar.

To remove

Use a pair of screwdrivers to remove the red plastic clip. Separate the two halves of the connector.





To fit

Connect the two halves of the connector. Push the connector in, at the same time pulling it towards the rear, until it locks in position. Fit the red plastic clip.

Fuse boxes

Fuse box in the glove compartment

Fuses

Fuse	Function	Rating (A)
1	Automatic Climate Control (ACC)	10
2	Cruise Control system Electrically operated and heated rear-view mirrors	10
3	Seat-belt warning lamp Seat belt and ignition key warning Instrument lighting Door demister fans Storage compartment, centre console Reading lamps	10
4	Air conditioner (AC)	30
5	APC system	10
6	Ventilation fan (ACC)	30
7	Headlamp wipers Horn contacts Shift-up indicator	10
8	Windscreen wipers Headlamp wipers	15
9	Cigarette lighter Reversing lights Side reversing lights Rear window regulators Electrically operated sunroof Heater element for the rear window	25
10	Electric heating pads for the front seats	15
11	Front window regulators	30
12	Direction indicators Beam length control	15
13	Combined instrument Fuel injection system EDU Seat belt warning Interior lighting	10
14	Fuel pump	20
15	–	
16	Central locking system Interior lights Courtesy lights Luggage compartment illumination	15
17	ACC, EDU I, EDU II, DCC, clock	10
18	Heater element for the rear window	30
19	Radio, electric aerial	15
20	AC radiator fan, compressor	30
–		
22	Hazard warning lights Burglar alarm	15
23	Radiator fan	25
24	Brake lights APC system	15
25	–	
26	–	
27	–	
28	–	
29	Parking lights, right-hand Engine compartment illumination Extra fog lamps Tow hitch installation (rear lights, number plate illumination)	10
30	Parking lights, left-hand Glove compartment illumination	10
31	Corner lights Dim dipped beams	15
32	Rear fog lights	15

Relays

Location	Component No.	Function
A	82	Seat belt warning (US)
B	228A	Filament monitor
C	26	Timedelayrelay, radiator fan
D	113	Electric heater element for the rear window
E	156	AC compressor (time)
F	155	AC radiator fan
G	21	Ignition switch relay
H	229	Fuel injection system
I	102	Fuel pump
J	78	Dim dipped beam (GB)
K	259	Dim dipped beam (GB)
L	83	Intermittent operation of the windscreen wipers
M	151	Time delay for the interior lighting
N	23	Flasher relay
O	270	Shift-up indication (US)

Fuse box in the engine compartment

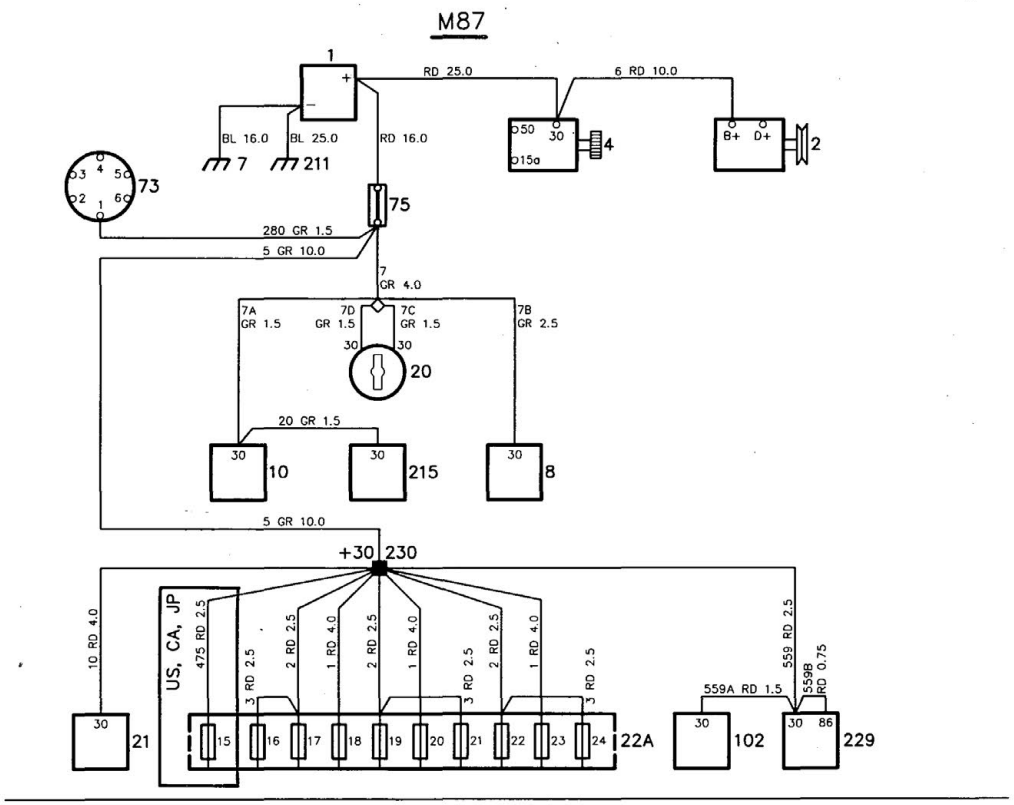
Fuses

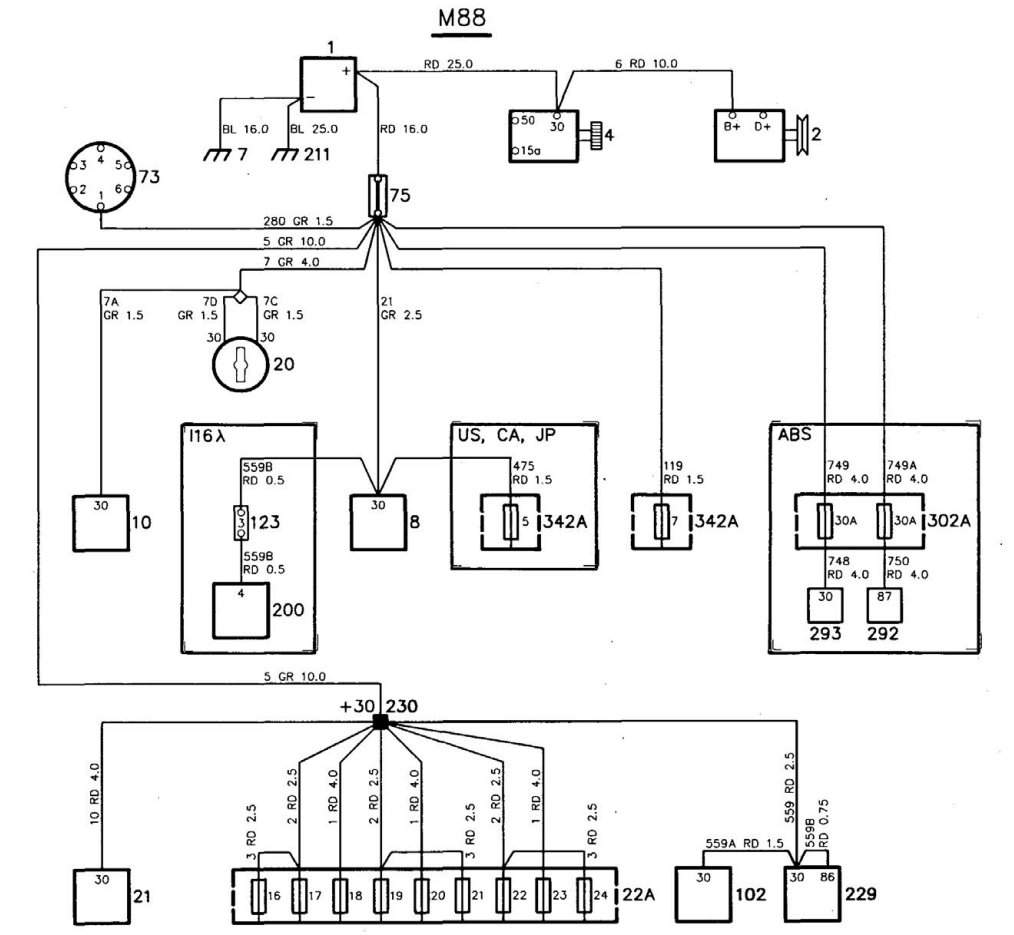
Fuse	Function	Rating (A)
1	Headlamp dipped beam, left-hand	15
2	Headlamp dipped beam, right-hand	15
3	Headlamp full beam, left-hand	15
4	Headlamp full beam, right-hand	15
5	Extra fog lamps	10
6	–	
7	Horn	10
8	–	
9	Ignition coil, amplifier	15
10	–	

Relays

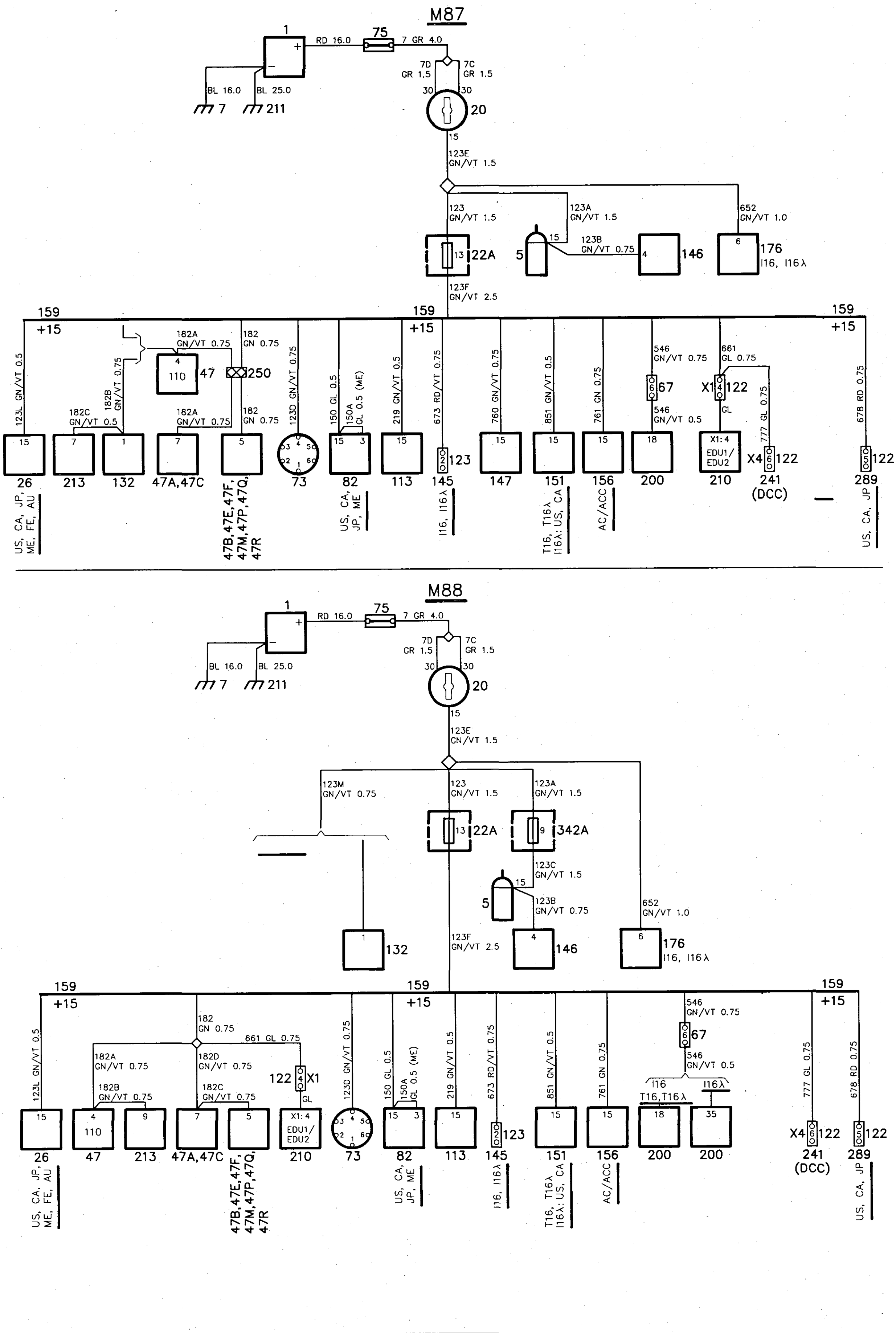
Location	Component No.	Function
A+B	8	Lighting relay
C	228B	Filament monitor
D	107	Extra fog lamps
E	–	–
F	68	Horn

Supply +30

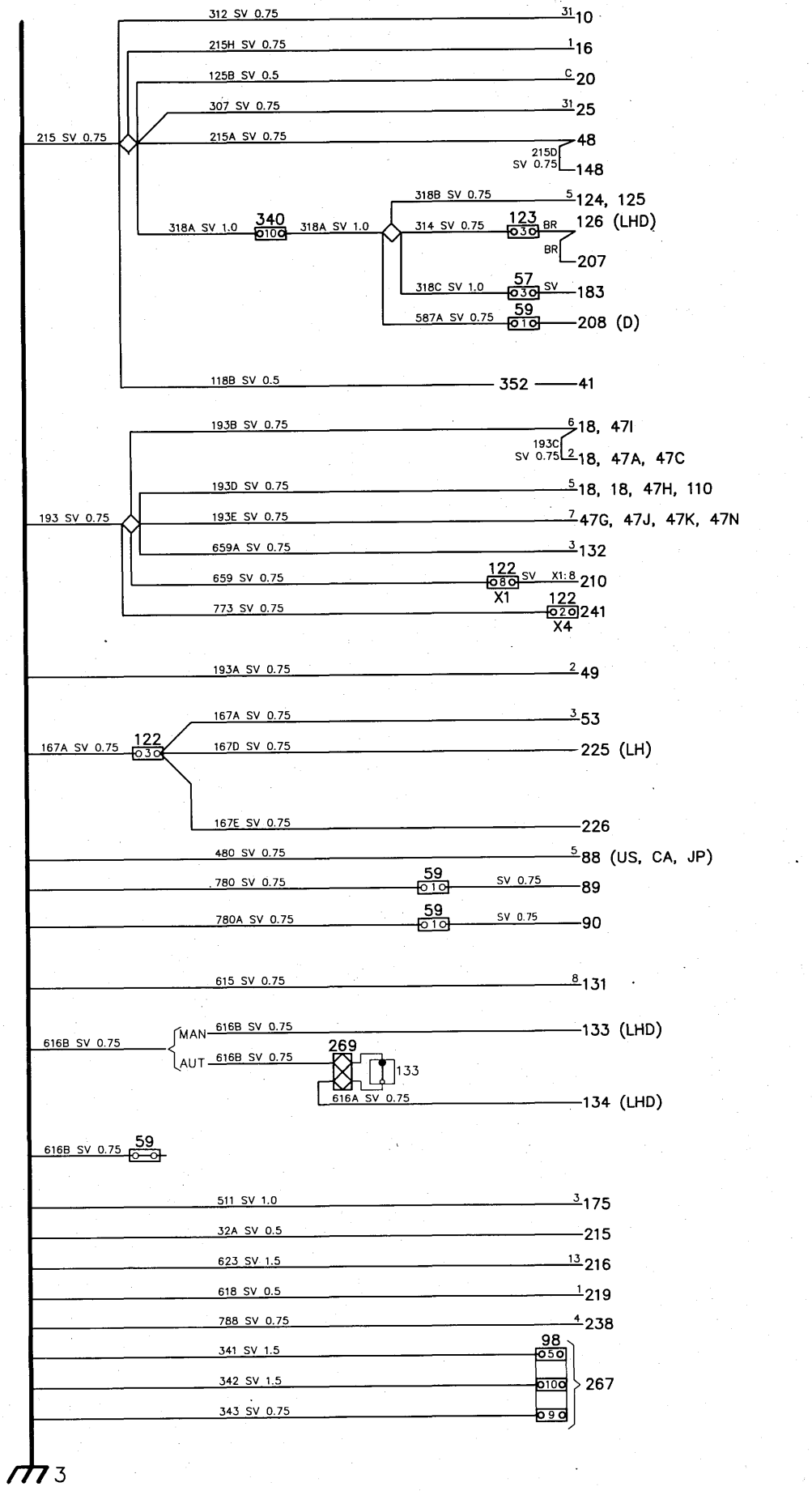

M87
1
RD 25.0
6 RD 10.0
BL 16.0
BL 25.0
RD 16.0
7
211
50
30
15a
4
B+
D+
2
73
75
280 GR 1.5
5 GR 10.0
7
GR 4.0
7A
GR 1.5
7D
GR 1.5
7C
GR 1.5
7B
GR 2.5
30
30
20
20 GR 1.5
30
10
30
215
30
8
5 GR 10.0
+30
230
10 RD 4.0
US, CA, JP
475 RD 2.5
3 RD 2.5
2 RD 2.5
1 RD 4.0
2 RD 2.5
1 RD 4.0
3 RD 2.5
2 RD 2.5
1 RD 4.0
3 RD 2.5
559 RD 2.5
559B
RD 0.75
559A RD 1.5
30
21
15
16
17
18
19
20
21
22
23
24
22A
30
102
30
86
229


M88
1
RD 25.0
6 RD 10.0
BL 16.0
BL 25.0
RD 16.0
7
211
50
30
15a
4
B+
D+
2
73
75
280 GR 1.5
5 GR 10.0
7 GR 4.0
7A
GR 1.5
7D
GR 1.5
7C
GR 1.5
21
GR 2.5
30
30
20
I16λ
559B
RD 0.5
123
559B
RD 0.5
4
200
US, CA, JP
475
RD 1.5
5
342A
119
RD 1.5
7
342A
ABS
749
RD 4.0
749A
RD 4.0
30A
30A
302A
748
RD 4.0
750
RD 4.0
30
293
87
292
30
10
30
8
5 GR 10.0
+30
230
10 RD 4.0
3 RD 2.5
2 RD 2.5
1 RD 4.0
2 RD 2.5
1 RD 4.0
3 RD 2.5
2 RD 2.5
1 RD 4.0
3 RD 2.5
559 RD 2.5
559B
RD 0.75
559A RD 1.5
30
21
16
17
18
19
20
21
22
23
24
22A
30
102
30
86
229

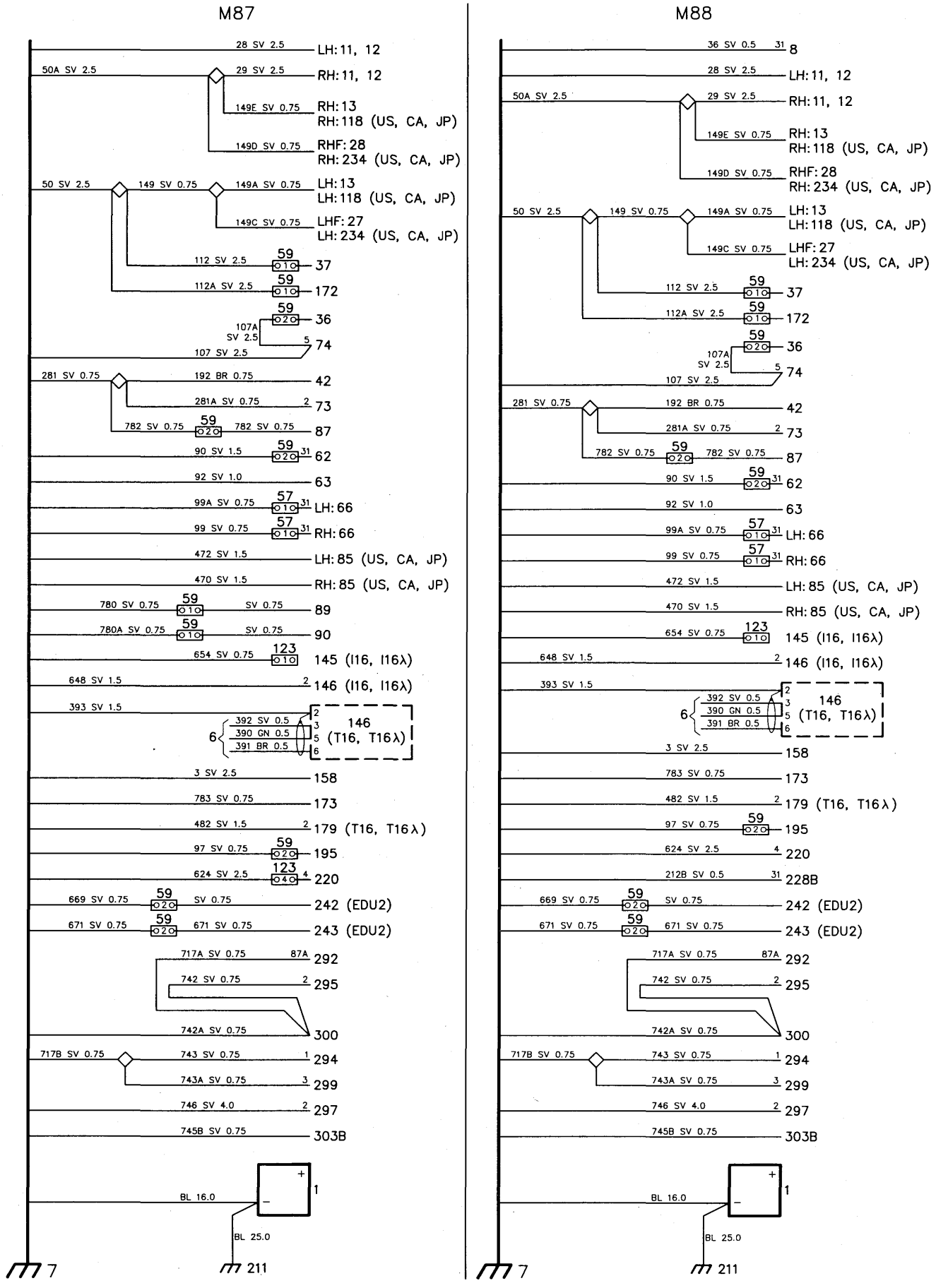
Supply +15


M87
1
RD 16.0
75
7 GR 4.0
7D GR 1.5
7C GR 1.5
BL 16.0
BL 25.0
7
211
30
30
20
15
123E GN/VT 1.5
123 GN/VT 1.5
123A GN/VT 1.5
652 GN/VT 1.0
123B GN/VT 0.75
22A
5
146
176
I16, I16λ
123F GN/VT 2.5
159
+15
182A GN/VT 0.75
182 GN 0.75
110
47
250
123L GN/VT 0.5
182C GN/VT 0.5
182B GN/VT 0.75
182 GN 0.75
123D GN/VT 0.75
150 GL 0.5
150A GL 0.5 (ME)
219 GN/VT 0.5
673 RD/VT 0.75
760 GN/VT 0.75
851 GN/VT 0.5
761 GN 0.75
546 GN/VT 0.75
661 GL 0.75
67
X1
122
546 GN/VT 0.5
GL
777 GL 0.75
678 RD 0.75
X1:4 EDU1/ EDU2
X4
123
26
213
132
47A,47C
73
82
113
145
147
151
156
200
210
241 (DCC)
289
US, CA, JP, ME, FE, AU
47B,47E,47F, 47M,47P,47Q, 47R
US, CA, JP, ME
I16, I16λ
T16, T16λ I16λ: US, CA
AC/ACC
US, CA, JP
M88
1
RD 16.0
75
7 GR 4.0
7D GR 1.5
7C GR 1.5
BL 16.0
BL 25.0
7
211
20
123E GN/VT 1.5
123M GN/VT 0.75
123 GN/VT 1.5
123A GN/VT 1.5
22A
342A
123C GN/VT 1.5
5
123B GN/VT 0.75
652 GN/VT 1.0
132
123F GN/VT 2.5
146
176
I16, I16λ
159
+15
182 GN 0.75
661 GL 0.75
182A GN/VT 0.75
182D GN/VT 0.75
122
X1
182B GN/VT 0.75
182C GN/VT 0.75
GL
123L GN/VT 0.5
123D GN/VT 0.75
150 GL 0.5
150A GL 0.5 (ME)
219 GN/VT 0.5
673 RD/VT 0.75
851 GN/VT 0.5
761 GN 0.75
546 GN/VT 0.75
67
546 GN/VT 0.5
I16
I16λ
T16,T16λ
777 GL 0.75
678 RD 0.75
110
X1:4 EDU1/ EDU2
123
X4
122
26
47
213
47A,47C
210
73
82
113
145
151
156
200
200
241 (DCC)
289
US, CA, JP, ME, FE, AU
47B,47E,47F, 47M,47P,47Q, 47R
US, CA, JP, ME
I16, I16λ
T16, T16λ I16λ: US, CA
AC/ACC
US, CA, JP

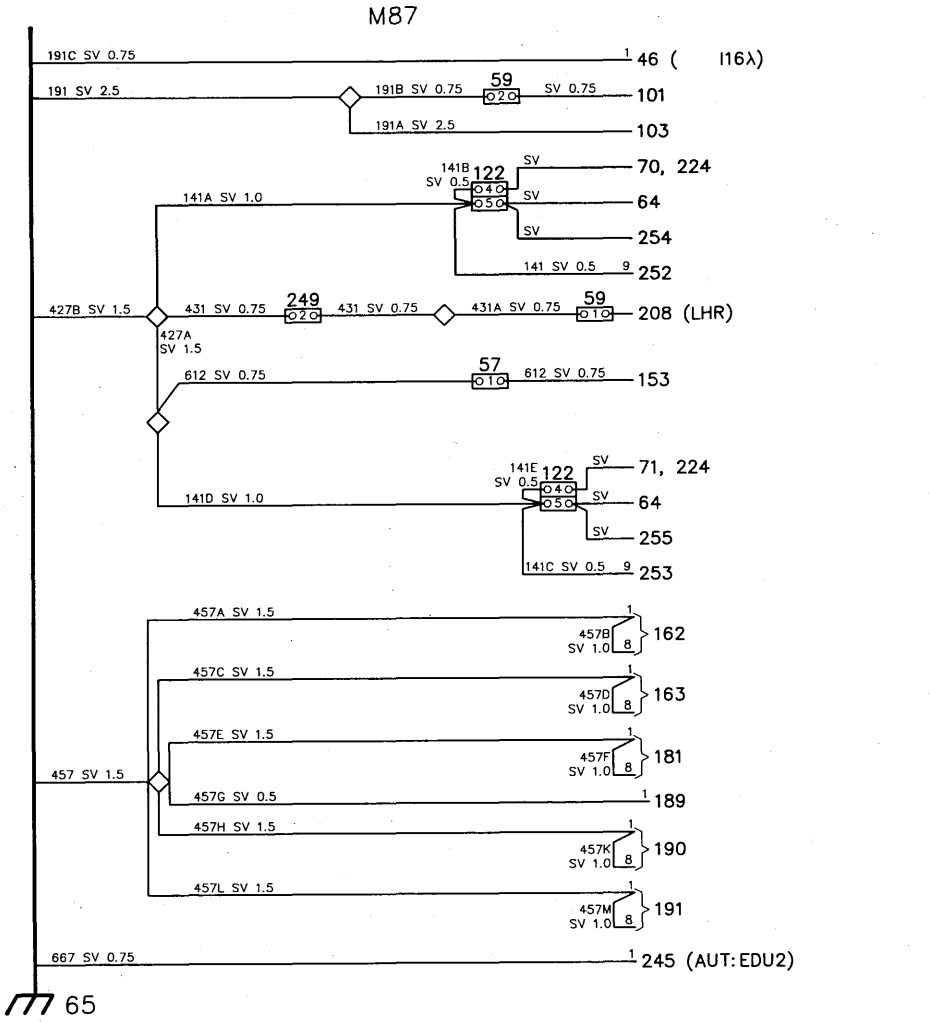
Ground point 3

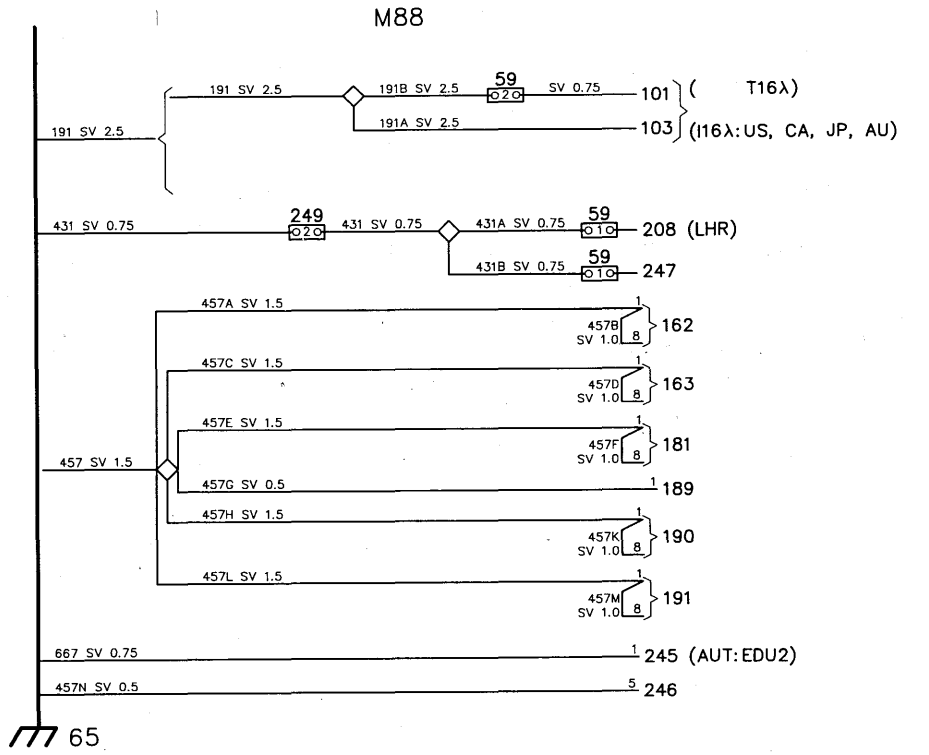


Ground point 7 on the wheel housing

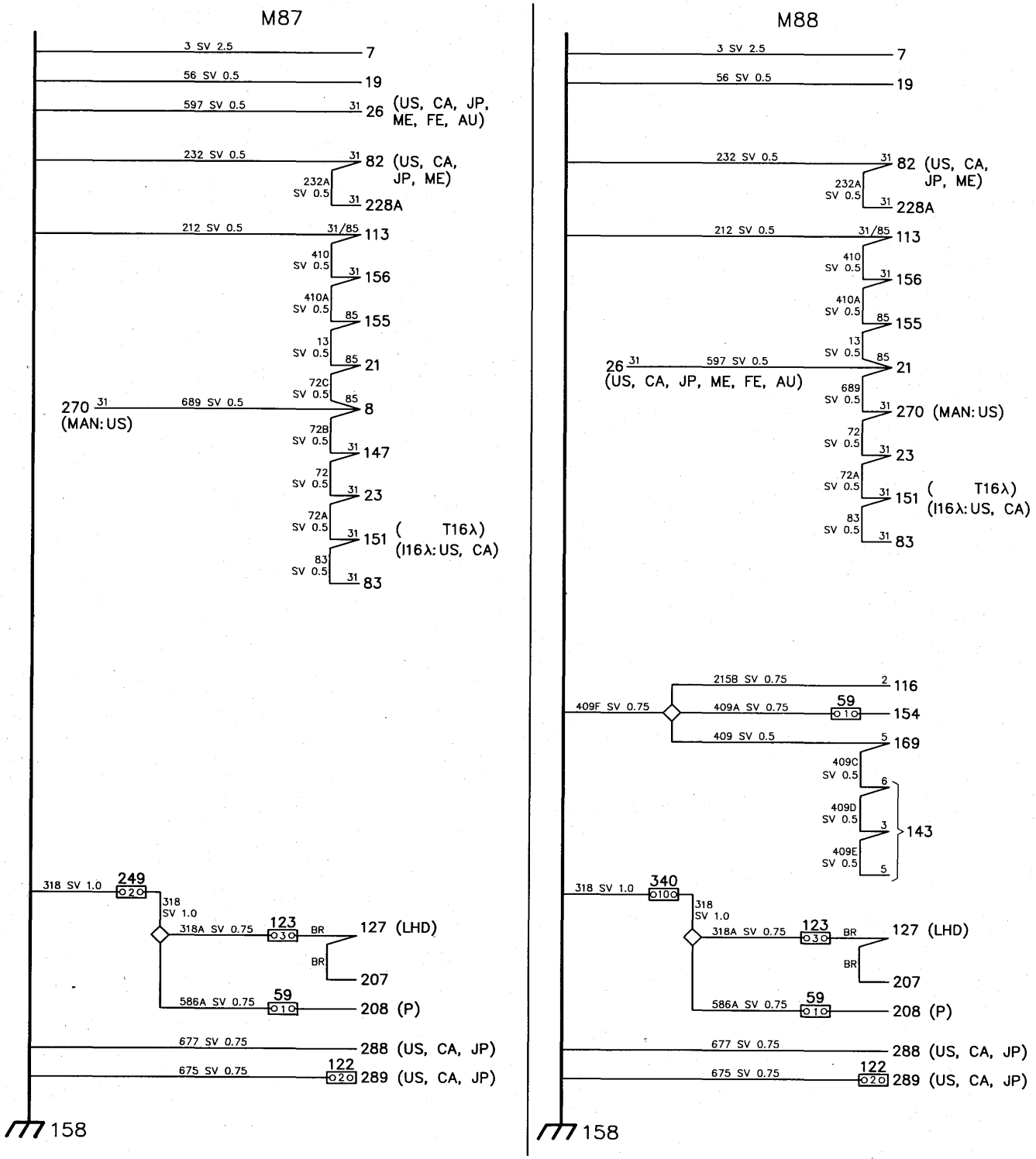


Ground point 65 under the back seat





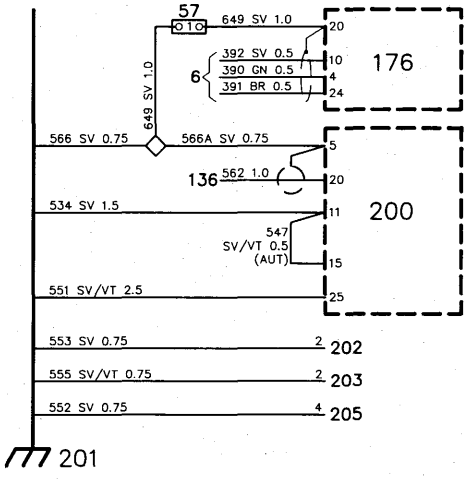
Negative distribution terminal (158)



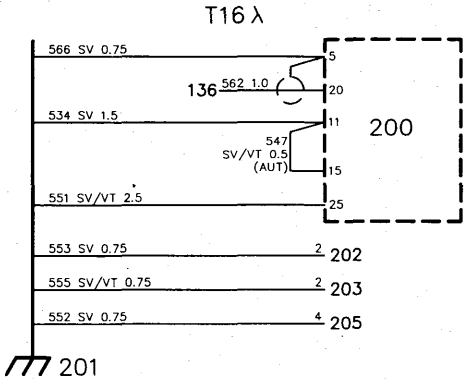
Ground point 201

M87

I16λ

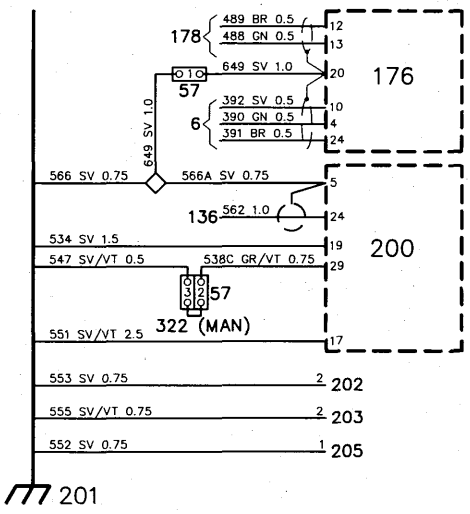


T16λ

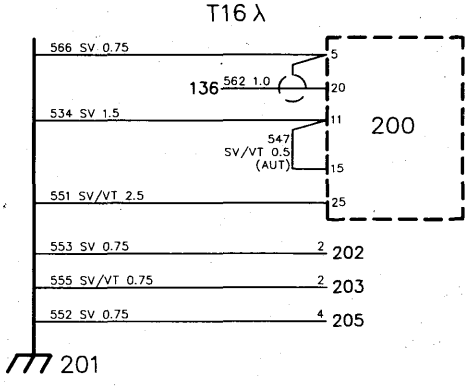


M88

I16λ

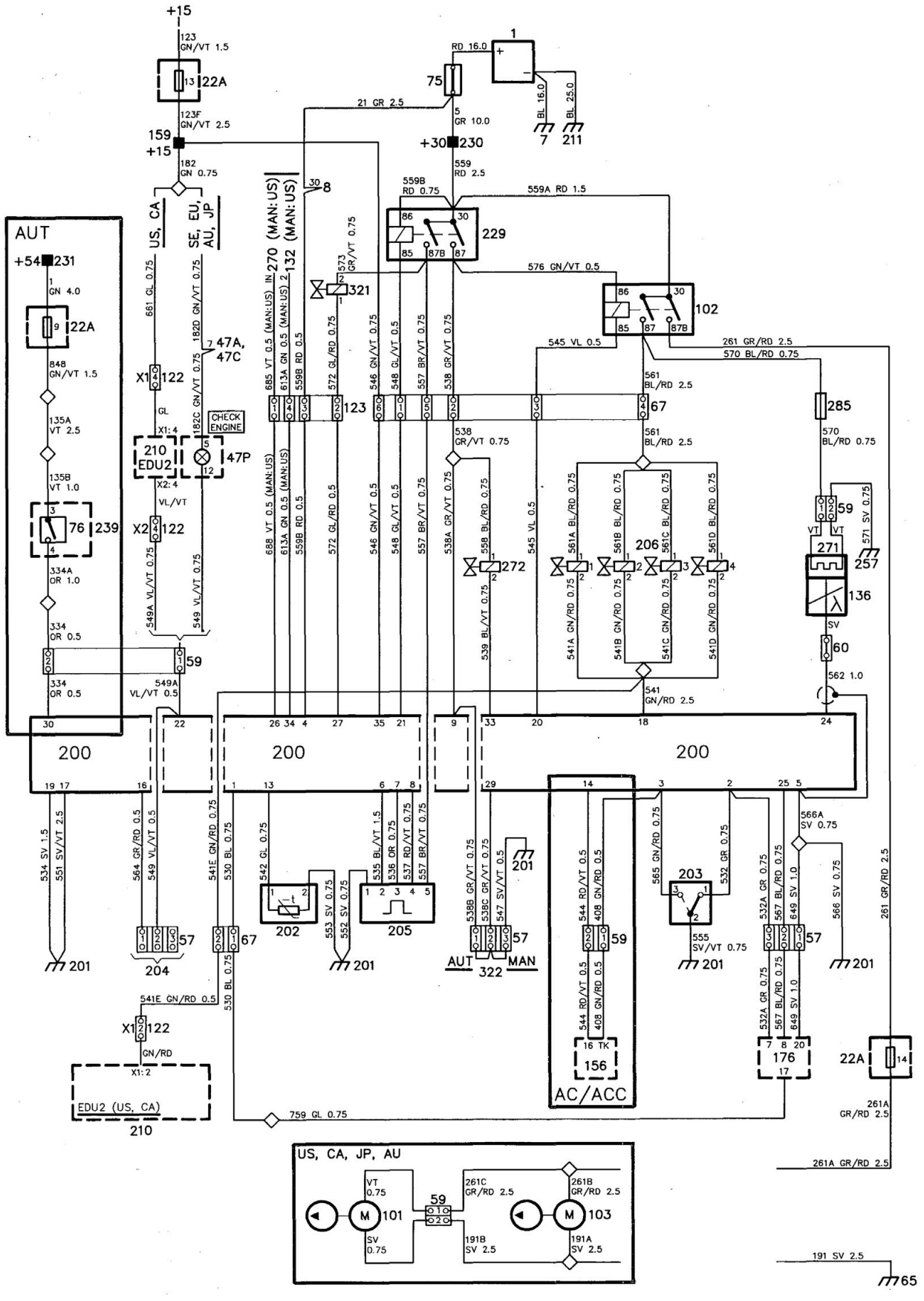


T16λ



Gound point 341

LH fuel injection system: 9000S



Operation

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

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

- Shift-up indication
- Adaptive Lambda control system
- AIC (Automatic Idle Control) valve with built-in "limp home" function. When necessary, the valve provides a fixed idling speed of 1200 r/min.
- Adaptive idle control system. Normal changes are compensated for automatically. The idling speed is controlled by means of valve 272.
- Built-in deceleration function. During overrun braking, it shuts off the fuel supply within a certain engine speed range.
- An 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 that gives fault codes via the CHECK ENGINE lamp.

The system receives a positive supply from fuse 13 when the ignition switch is in the start or drive position, and a constant +30 supply to relays 229 and 102.

The system calculates and controls the opening times of electrically controlled fuel injection valves 206, on the basis of the information received from various transmitters.

Pulses from the ignition system provide control unit 200 with information on the engine speed.

Throttle angle transmitter 203 provides the control unit with information on the throttle angle. The transmitter has two contact positions - at throttle angles of 0° (idling speed) and 72° (full load).

Temperature transmitter 202 is of Negative Temperature Coefficient (NTC) type and continuously supplies the control unit with information on the engine temperature. If the signal is interrupted, the control unit will simulate an engine temperature of +45°C (+113°F).

Air mass meter 205 is built into a plastic housing and has no CO/Lambda screw. If the signal from the air mass meter should cease, e.g. due to failure of the filament, an emergency system incorporated into the control unit, known as the "Limp-home system", will come into operation. This enables the car to be driven, although at impaired performance. CHECK ENGINE warning lamp 47P will light up when the Limp-home system is in operation. The lamp is located in the combined instrument, and is supplied from fuse 13. (The lamp can also be activated from the EZK ignition system.)

Fuel is supplied to the engine by electrically driven fuel pump with integral feed pump (323), which draws fuel from the fuel tank and pressurises the fuel in the system.

The control unit is connected to the air conditioning system via pin 14 of AC 156. When the AC compressor is operating and the engine is idling, the control unit compensates for the increase in load caused by the compressor. The signal (earth) is supplied from pin 3 when the accelerator pedal is fully depressed, which disconnects the AC compressor.

Test tapping 204 should be used for fault tracing. When pin 1 in the socket 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 ratio caused by changes in the fuel system.

Lambda sensor 136 is used to measure continuously the oxygen content of the exhaust gases, and the control unit can then adjust the fuel/air ratio to as close to 2 $\lambda = 1$ as possible. The sensor is heated by preheater 271, supplied across in-cable fuse 285.

Automatic transmission

Cars with automatic transmission are equipped with switch 76, which closes when the selector lever is in the drive position, thus allowing the control unit to compensate for the increased engine load at idling speed caused by the automatic transmission. Connector (codifier) 322 has different plugs for the manual gearbox and the automatic transmission.

Fault-tracing hints

Bear in mind the following when carrying out fault tracing in the wiring:

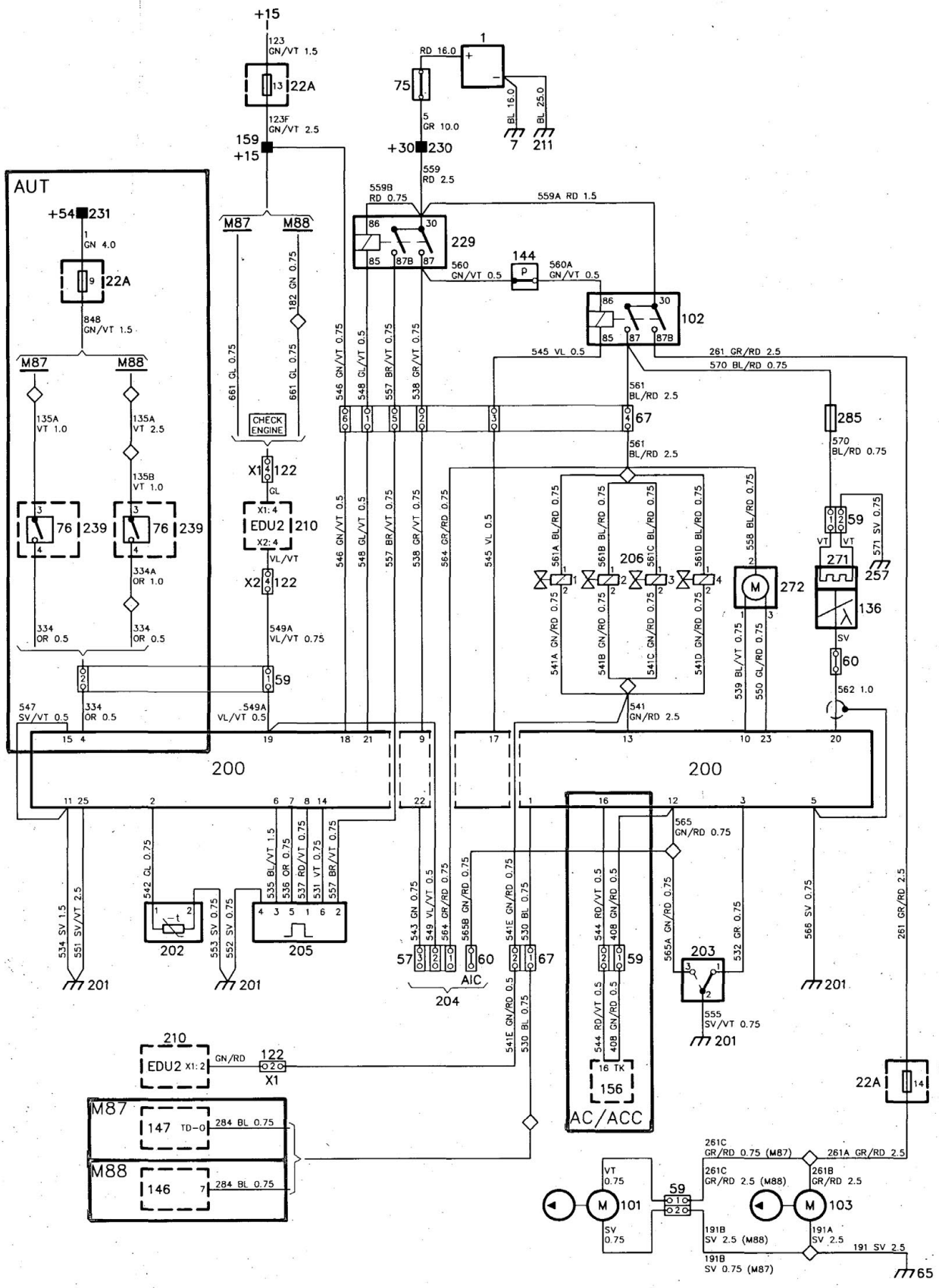
1. **Always disconnect the 35-pole connector from the control unit and the connector on the air mass meter. NOTE. These two components can easily be ruined if measurements are carried out at their terminal pins.**
2. Always disconnect the electrical connection from the component which is suspected of being faulty.
3. Use an digital ohmmeter (not a buzzer) to check the wiring.

Before checking the wiring, check fuse 13 and check that the supply to it is live. Also check incable fuse 285 for the Lambda sensor preheater.

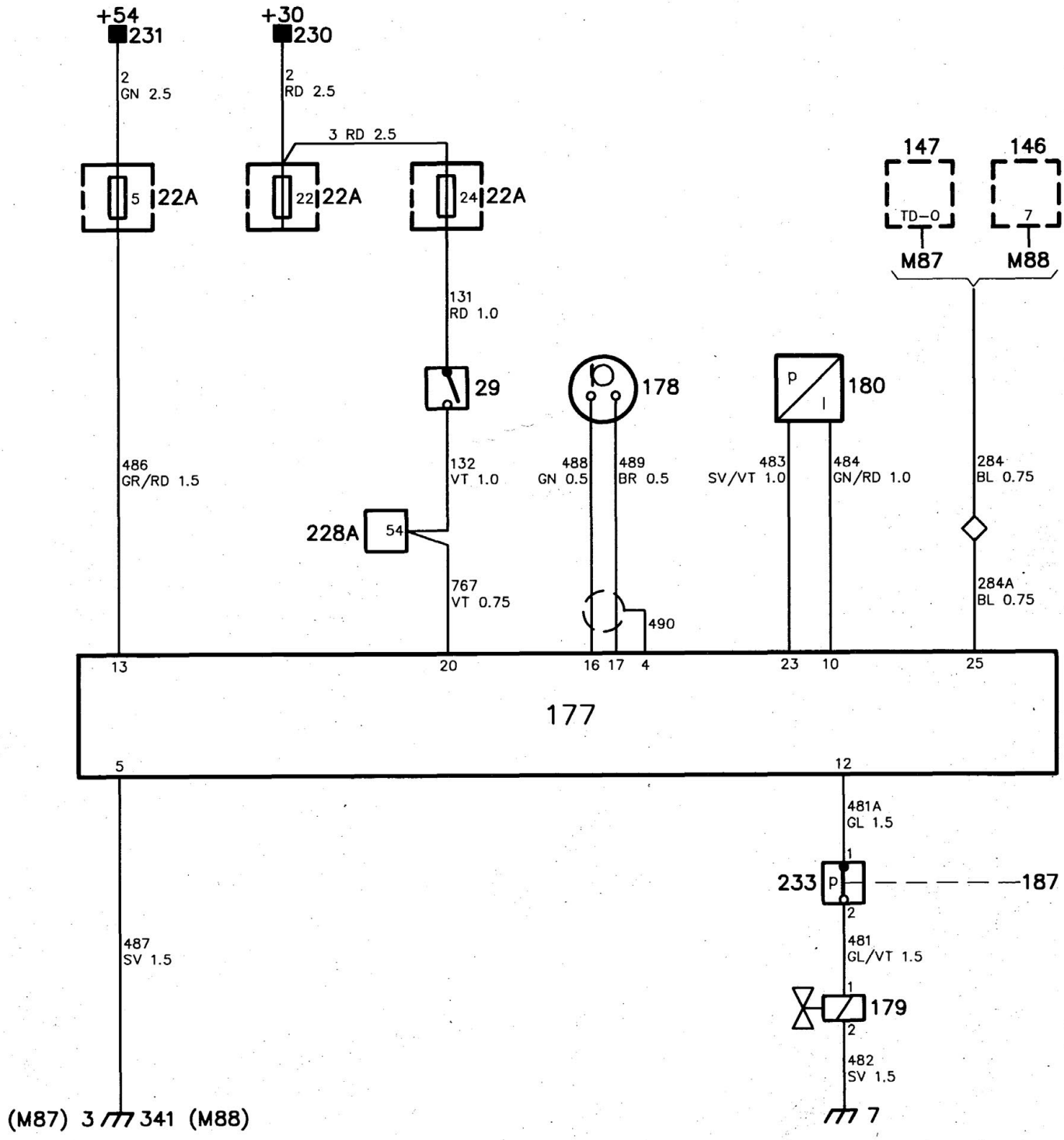
For complete fault-tracing instructions for the system, see the Service Manual, Group 2:3, Engine.

Ground point 201, located on the engine intake manifold, is important for correct performance of the fuel system. Do not change its location when doing other work on the engine, etc.

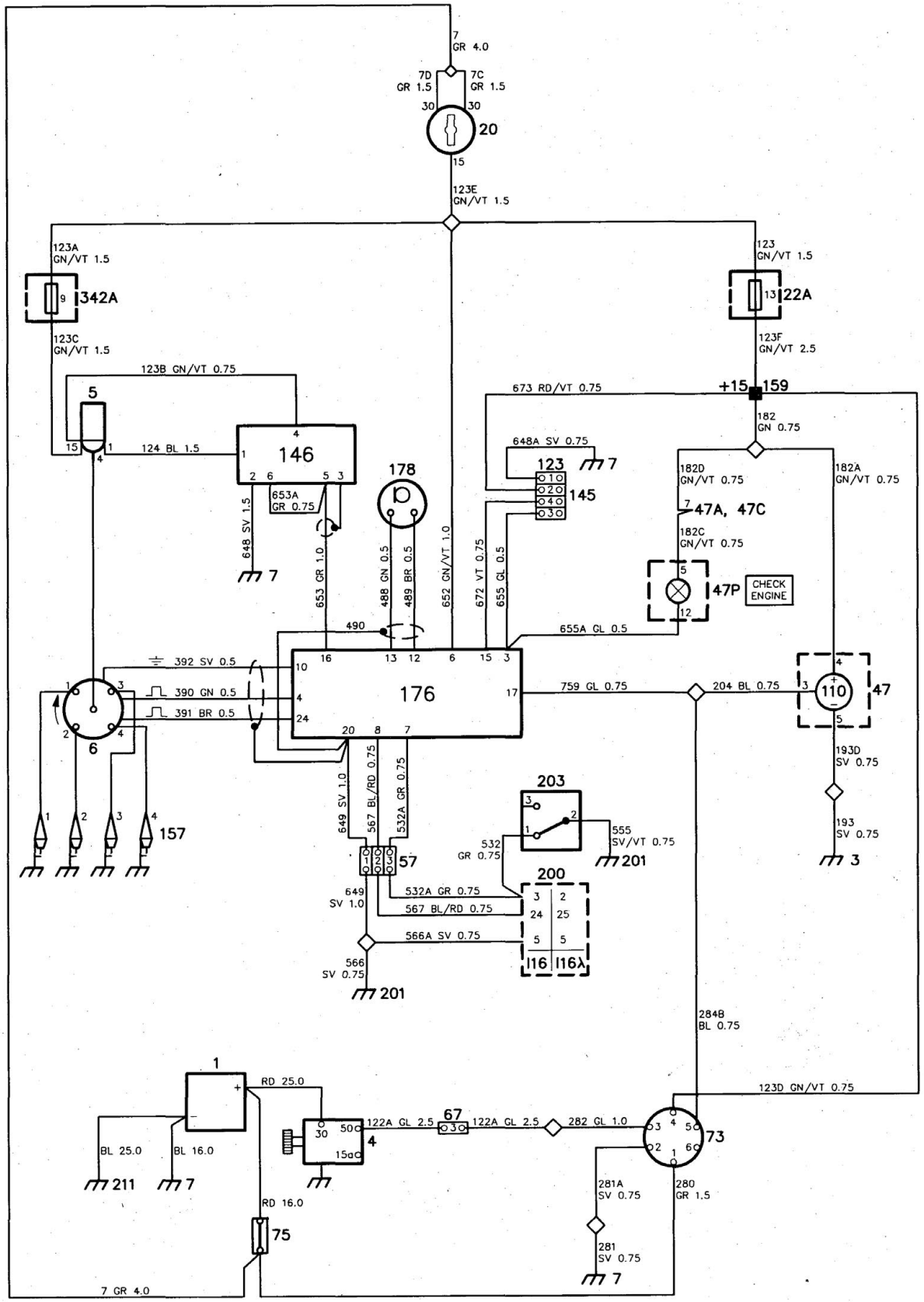
LH fuel system: 9000 Turbo



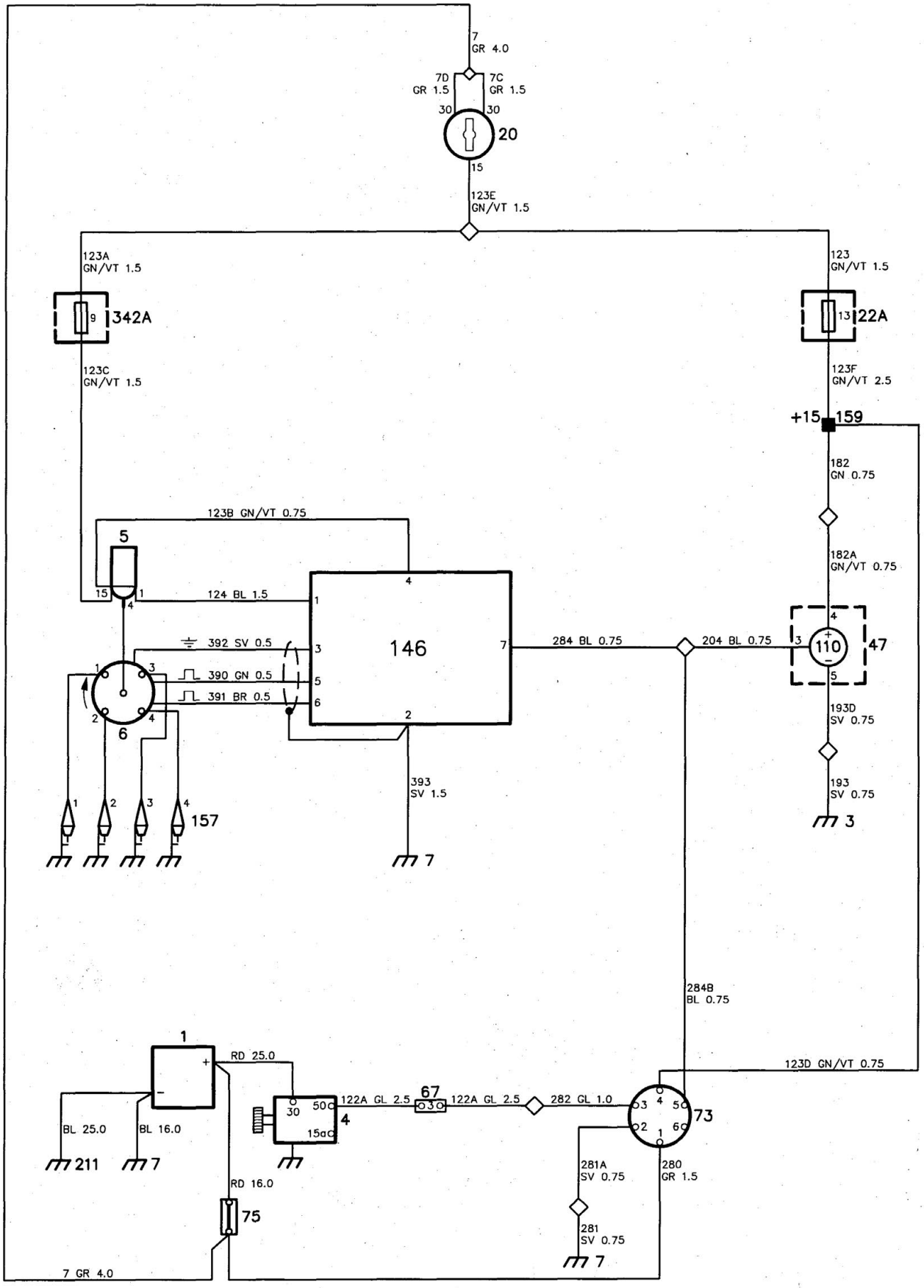
APC system


+54
231
+30
230
2
GN 2.5
2
RD 2.5
3 RD 2.5
5
22A
22
22A
24
22A
147
146
TD-O
7
M87
M88
131
RD 1.0
29
178
180
p
l
486
GR/RD 1.5
132
VT 1.0
488
GN 0.5
489
BR 0.5
483
SV/VT 1.0
484
GN/RD 1.0
284
BL 0.75
228A
54
767
VT 0.75
284A
BL 0.75
490
13
20
16 17 4
23 10
25
177
5
12
481A
GL 1.5
1
233
p
187
2
487
SV 1.5
481
GL/VT 1.5
1
179
2
482
SV 1.5
(M87) 3
341 (M88)
7

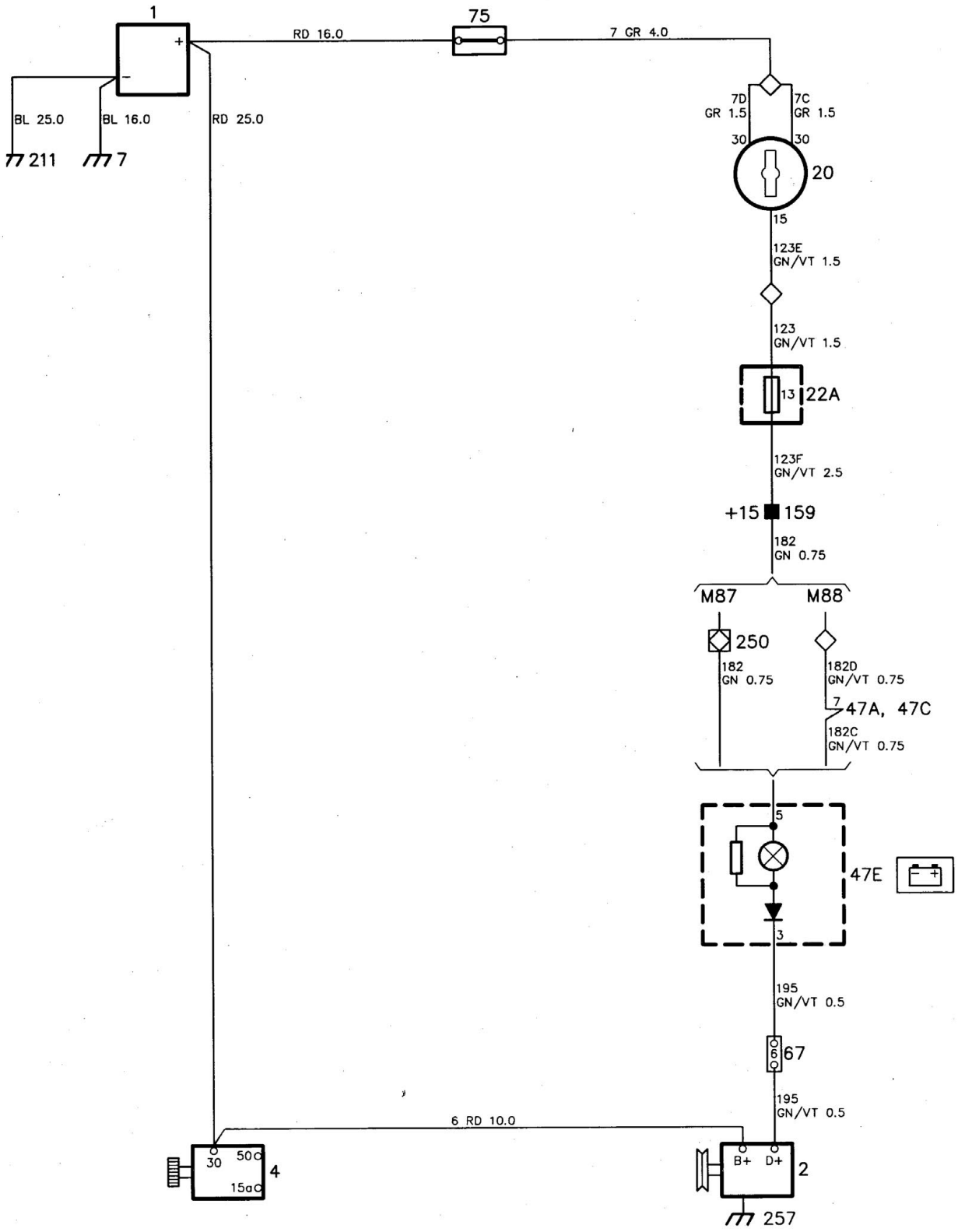
Ignition system with tachometer and T.S.I. socket for 9000S



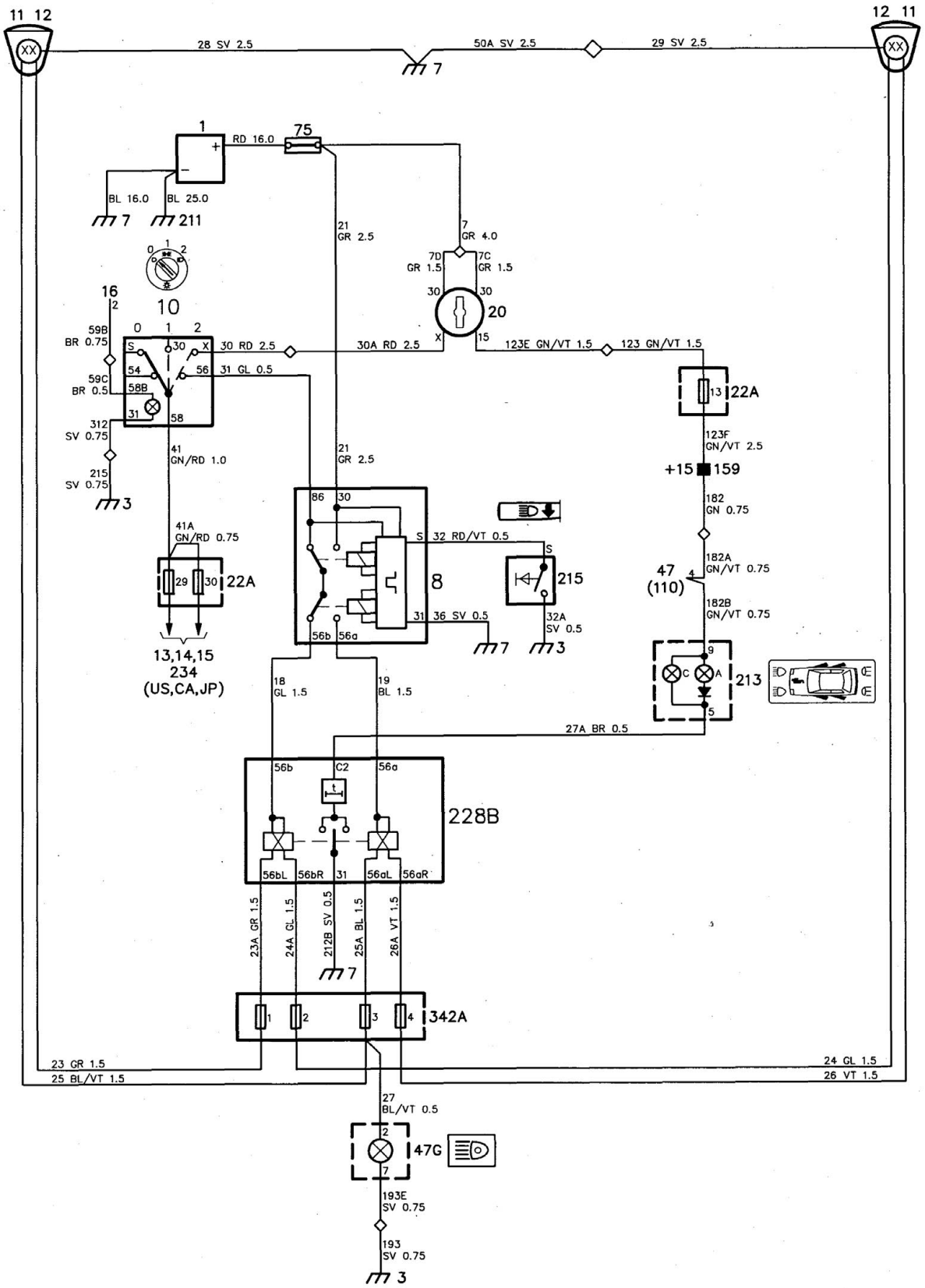
Ignition system with tachometer and T.S.I. socket for 9000 Turbo



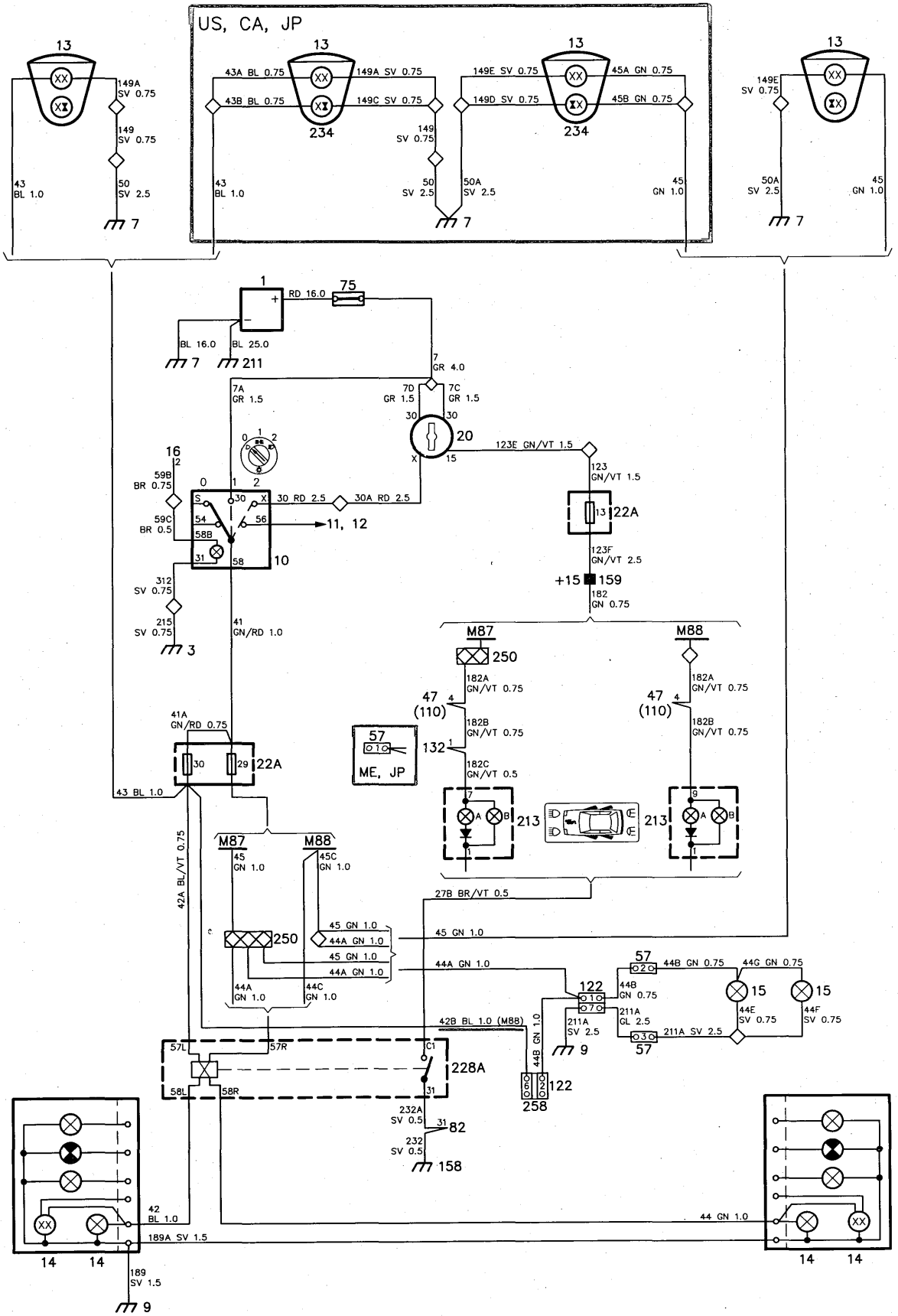
Battery charging system



Headlights

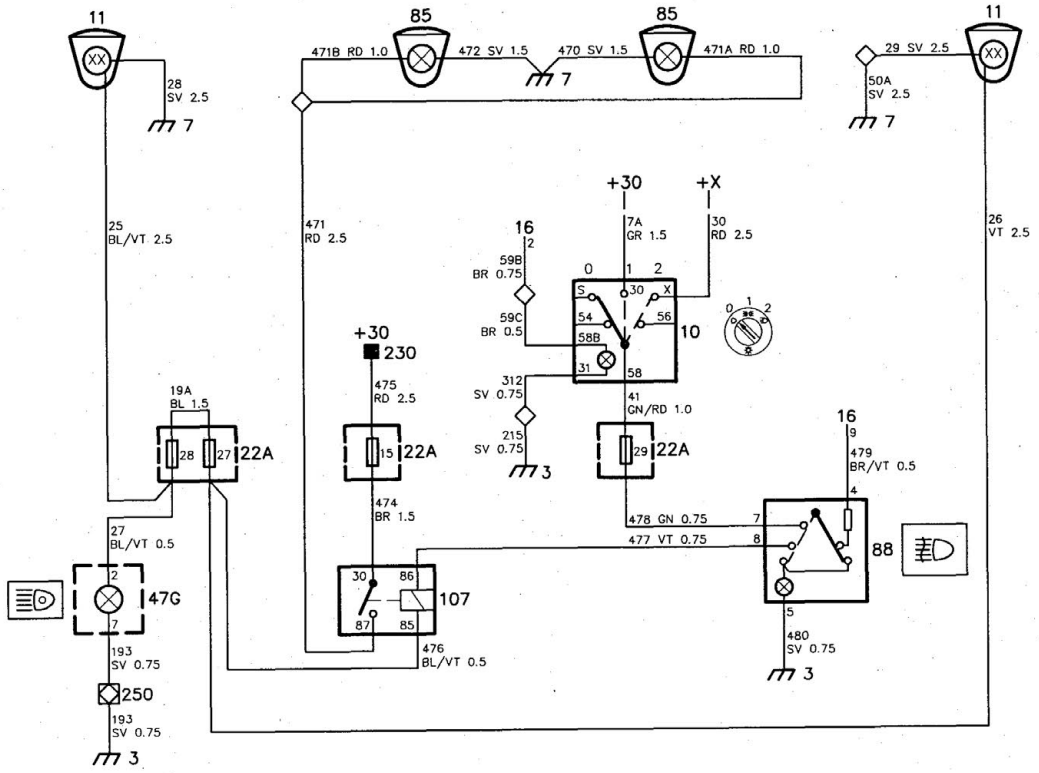

11 12
12 11
28 SV 2.5
50A SV 2.5
29 SV 2.5
7
1
RD 16.0
75
BL 16.0
BL 25.0
7
211
21
GR 2.5
7
GR 4.0
7D
GR 1.5
7C
GR 1.5
30
30
20
16
2
10
59B
BR 0.75
59C
BR 0.5
54
58B
31
58
56
30 RD 2.5
30A RD 2.5
31 GL 0.5
123E GN/VT 1.5
123 GN/VT 1.5
13
22A
123F
GN/VT 2.5
+15
159
182
GN 0.75
182A
GN/VT 0.75
182B
GN/VT 0.75
47
(110)
312
SV 0.75
215
SV 0.75
3
41
GN/RD 1.0
41A
GN/RD 0.75
29
30
22A
13,14,15
234
(US,CA,JP)
86
30
S
32 RD/VT 0.5
8
31
36 SV 0.5
56b
56a
215
32A
SV 0.5
3
18
GL 1.5
19
BL 1.5
213
27A BR 0.5
56b
C2
56a
228B
56bL
56bR
31
56aL
56aR
23A GR 1.5
24A GL 1.5
212B SV 0.5
25A BL 1.5
26A VT 1.5
342A
23 GR 1.5
25 BL/VT 1.5
24 GL 1.5
26 VT 1.5
27
BL/VT 0.5
47G
193E
SV 0.75
193
SV 0.75
3

Parking lights

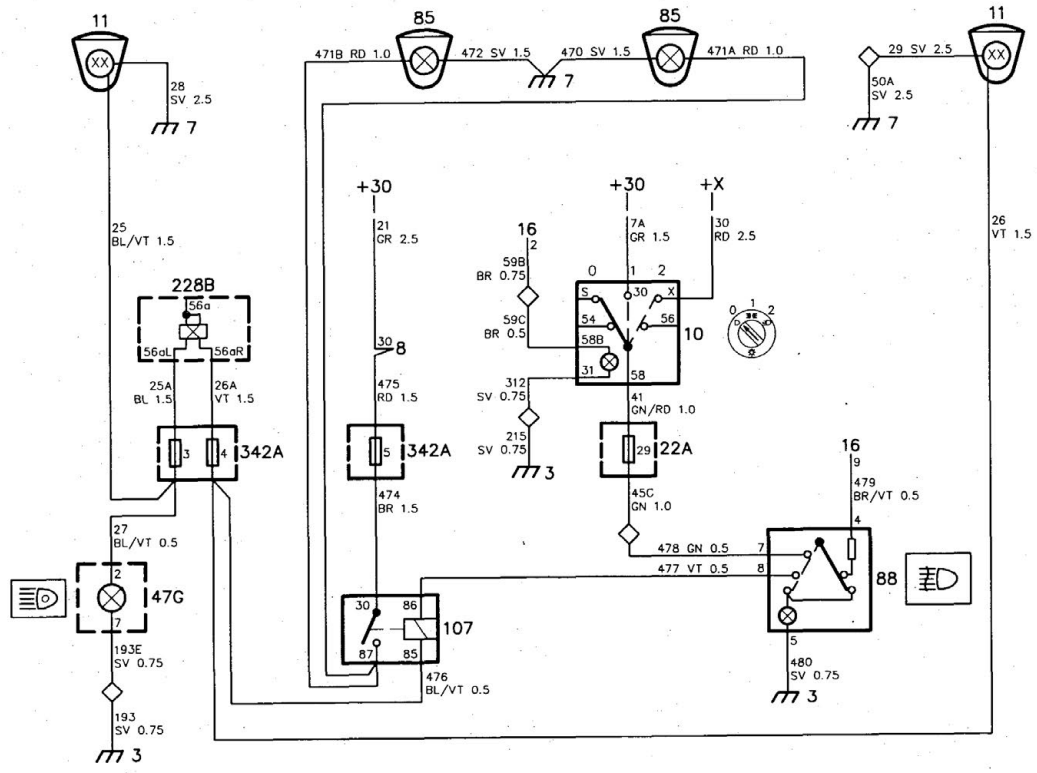


Extra fog lamps

M87

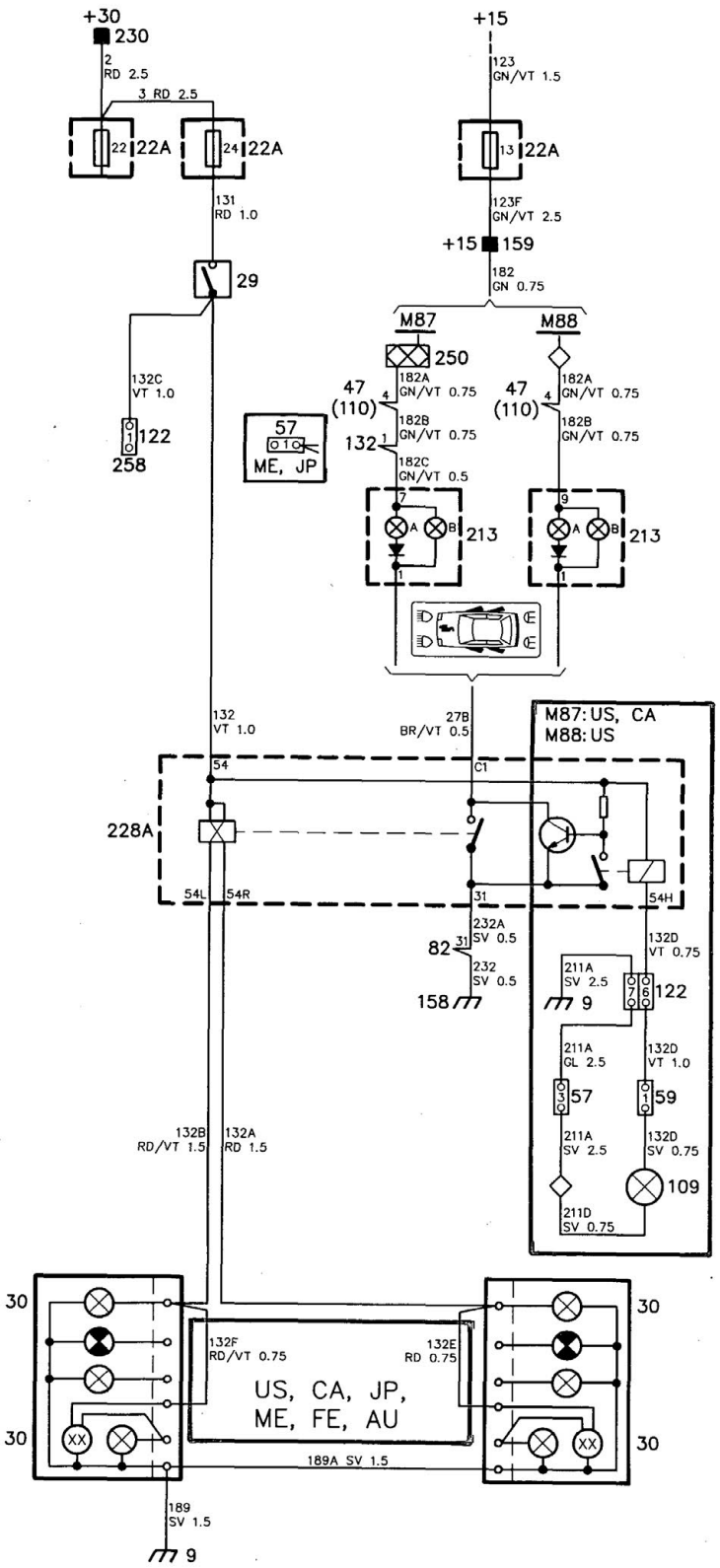


M88

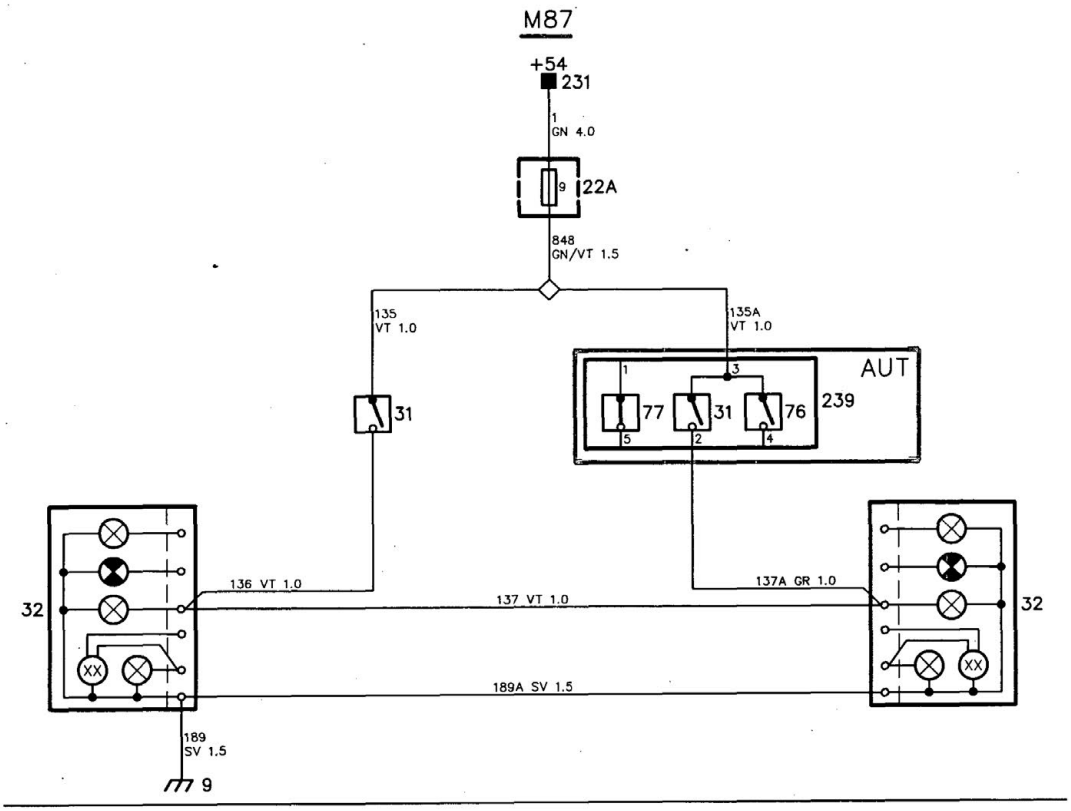


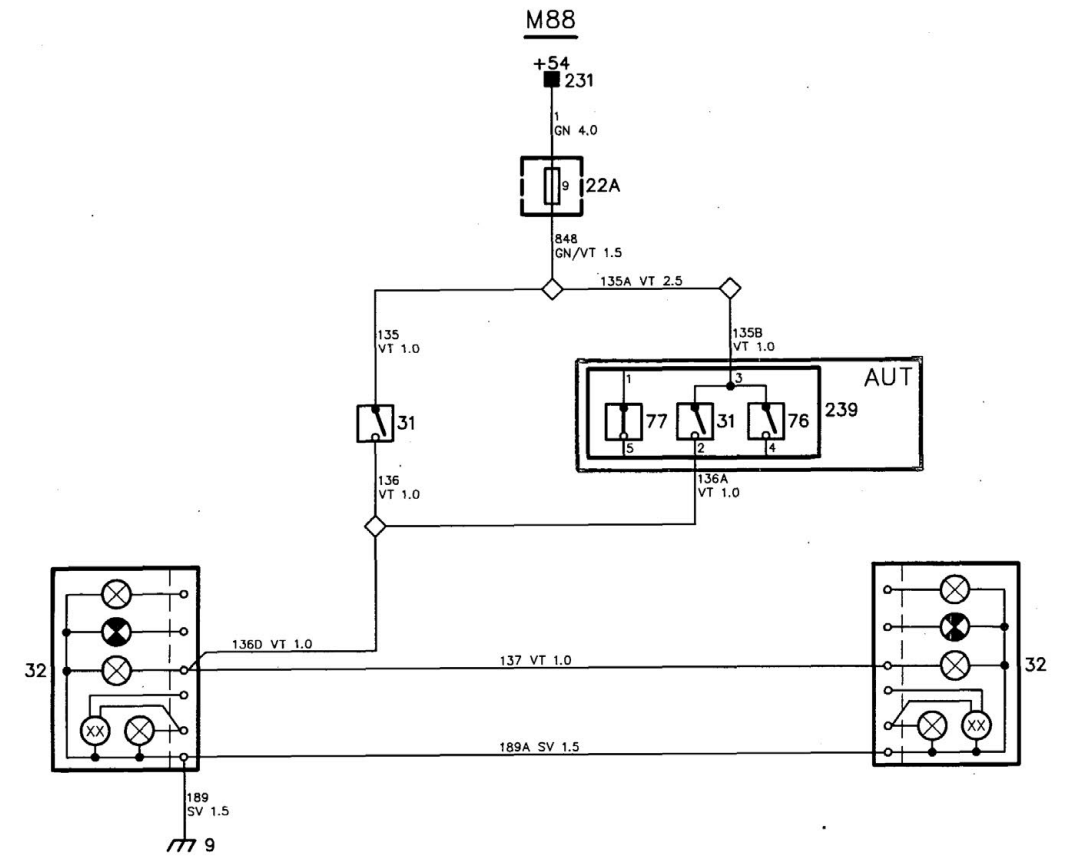
Brake lights

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

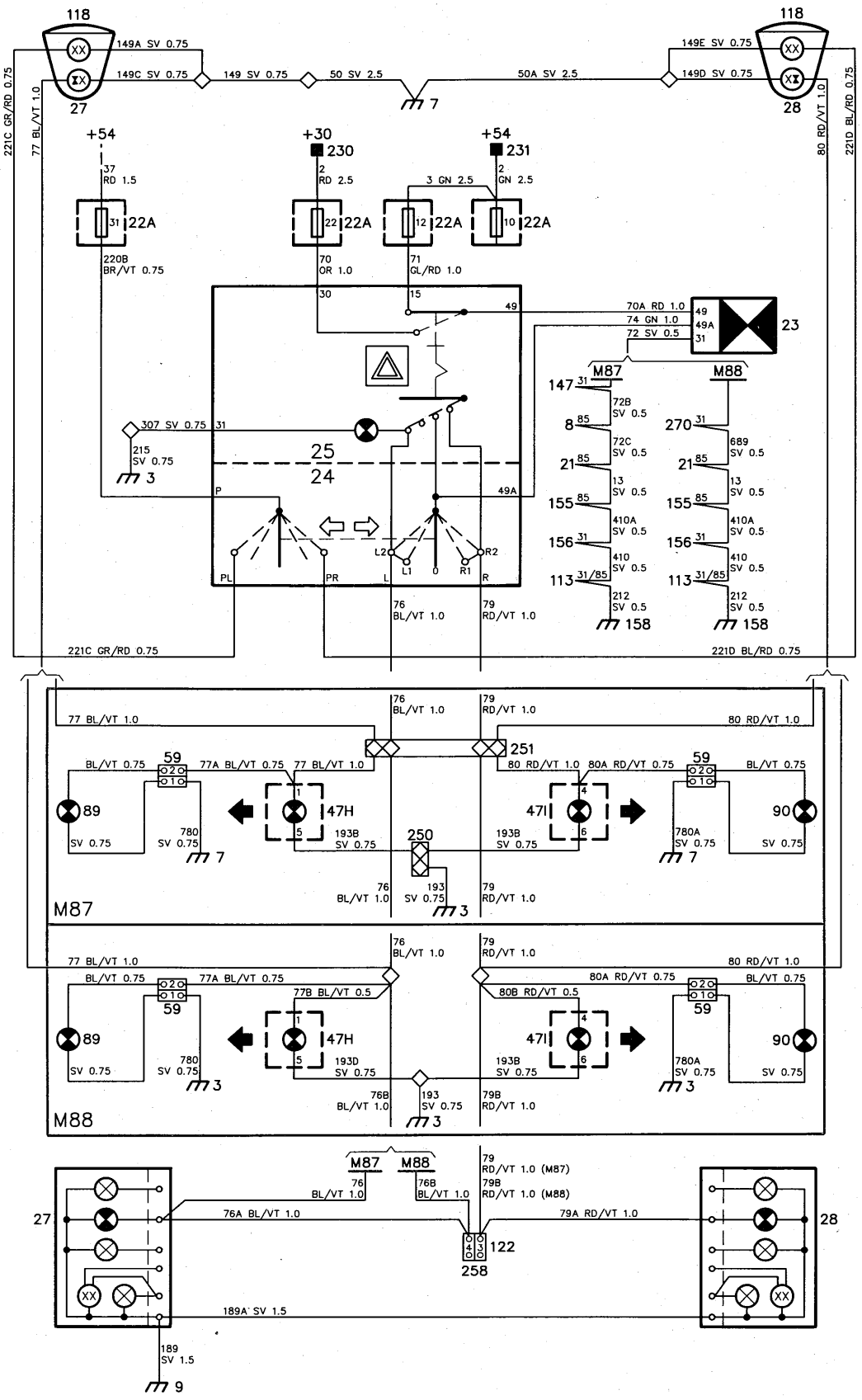


Reversing lights

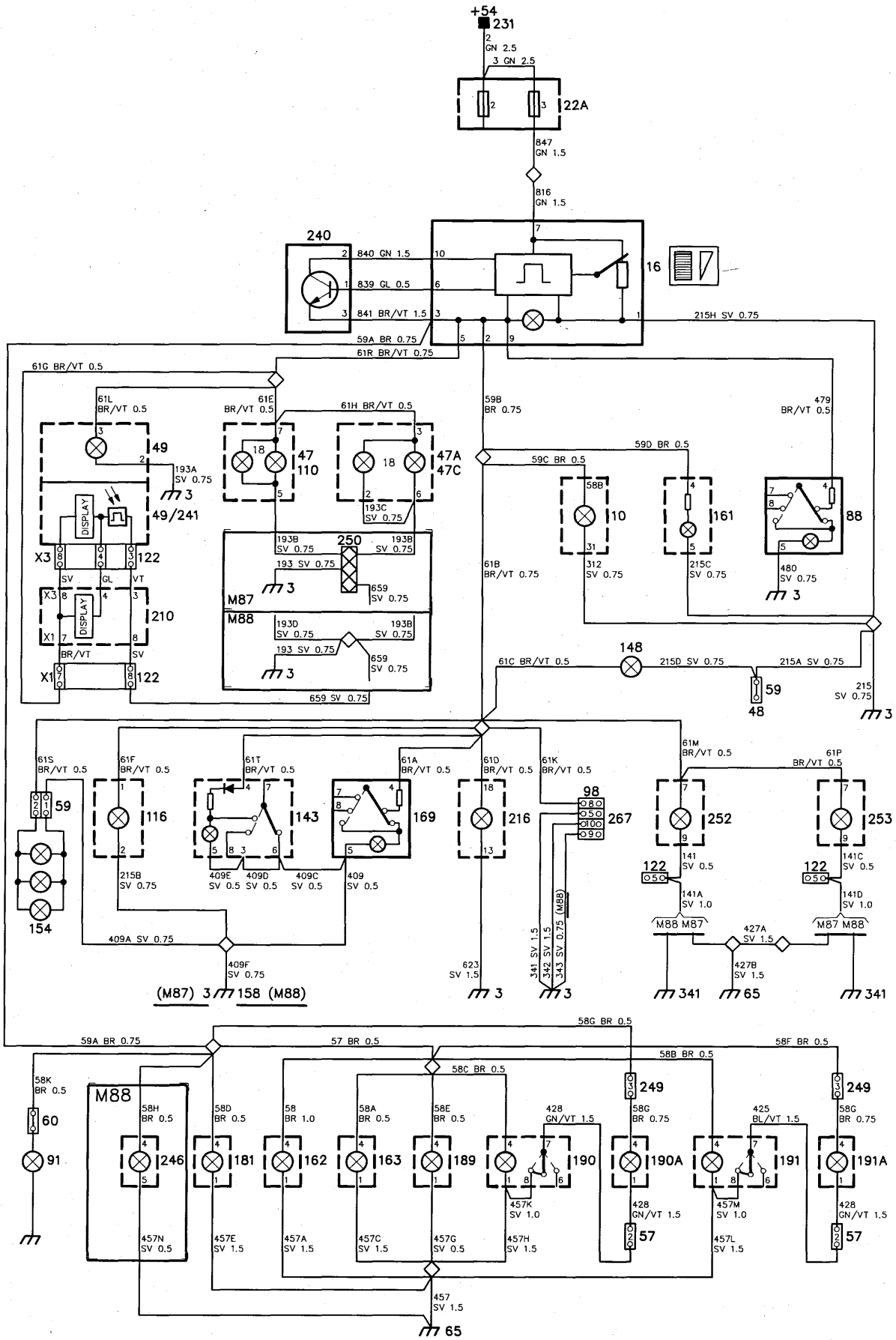




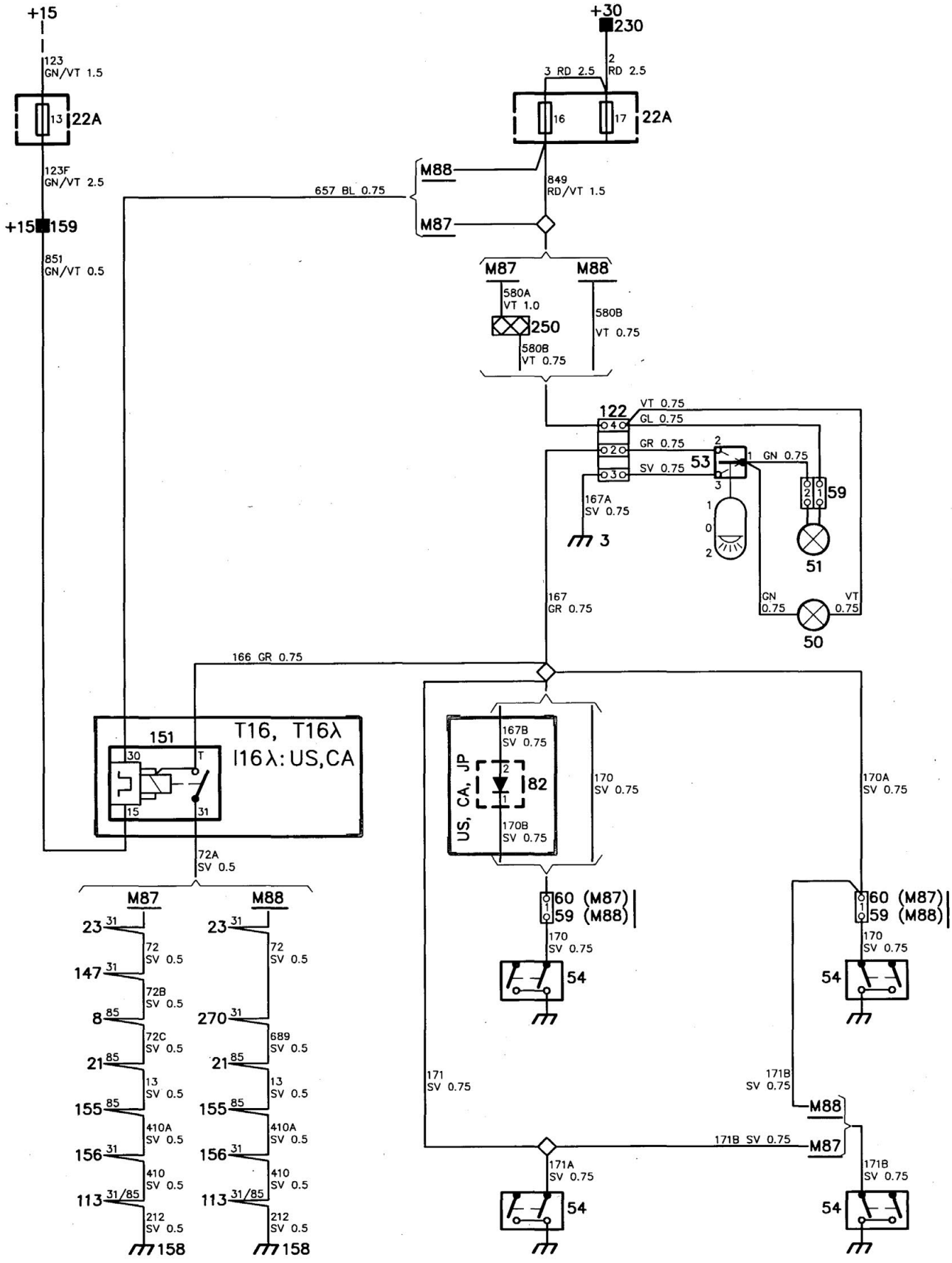
Direction indicators and hazard warning lights (USA)



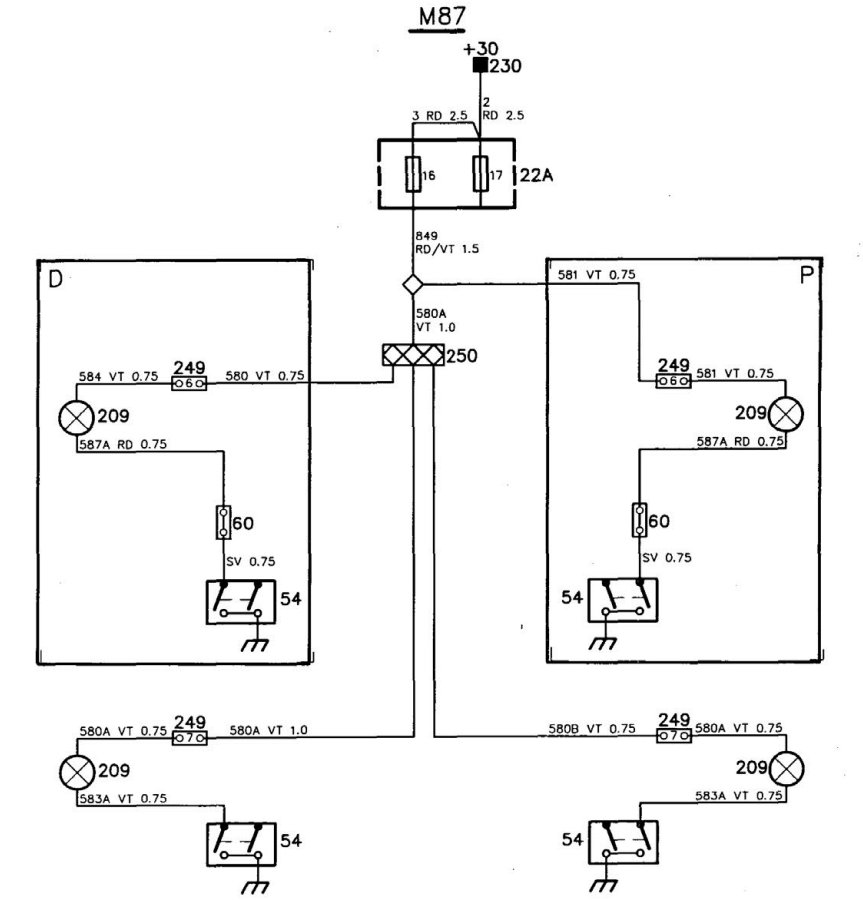
Lighting for instruments and controls

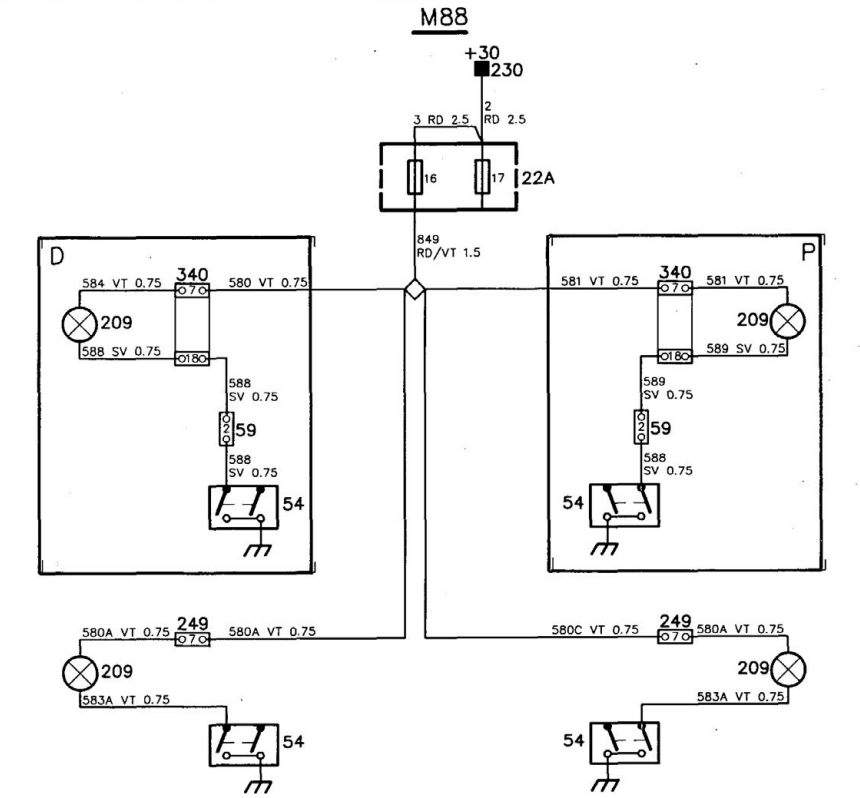


Interior lighting

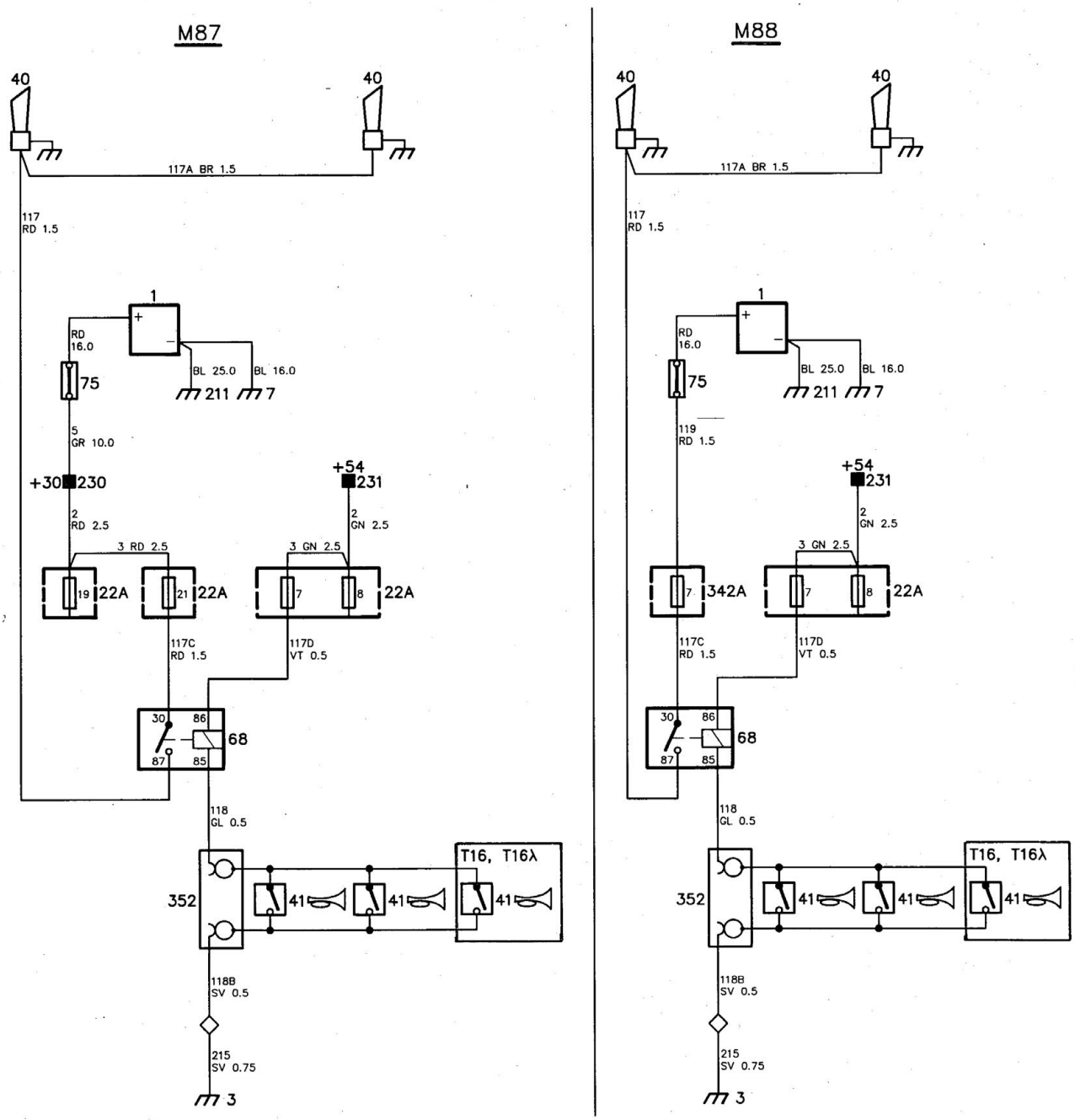


Courtesy lights

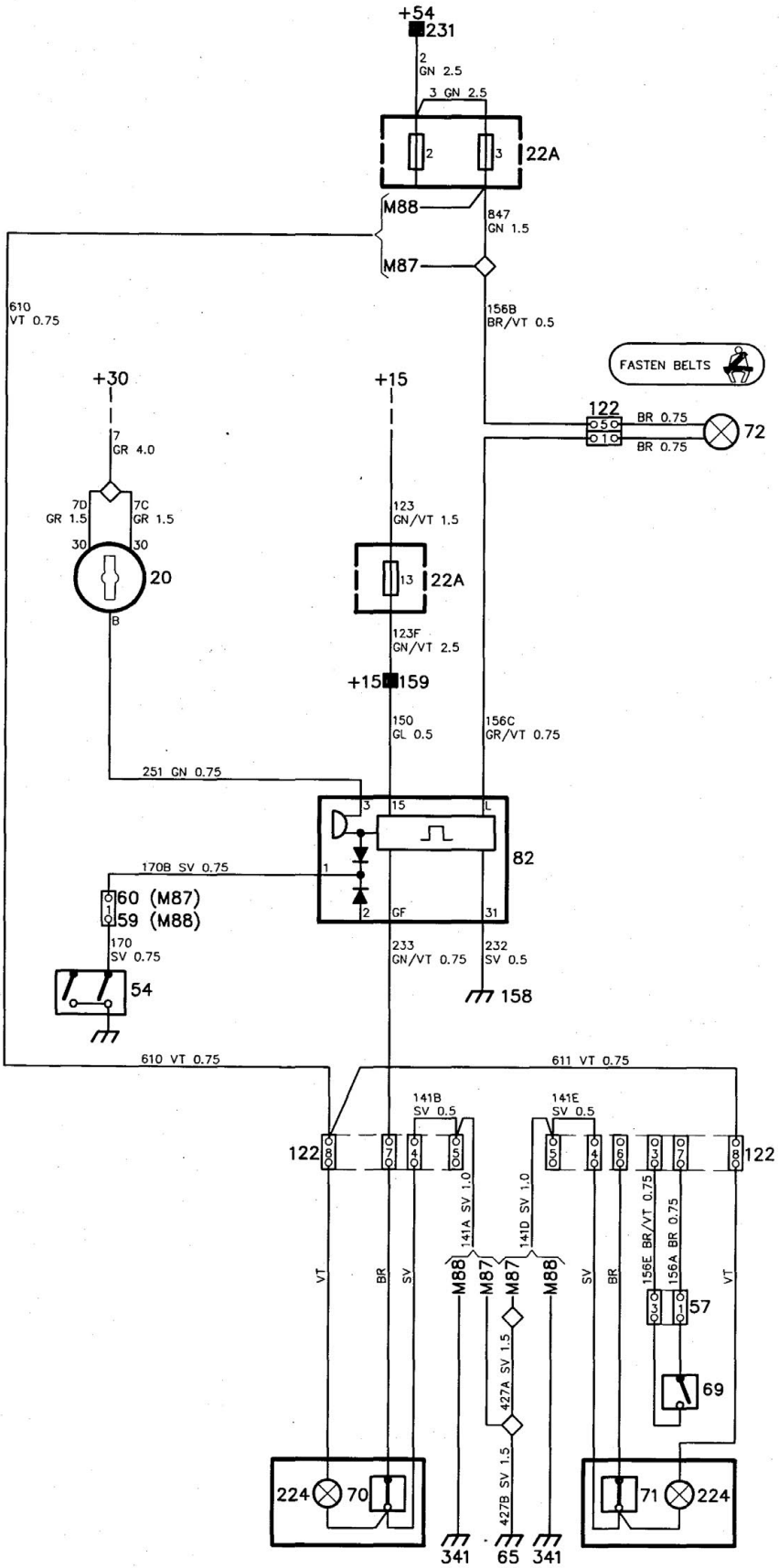




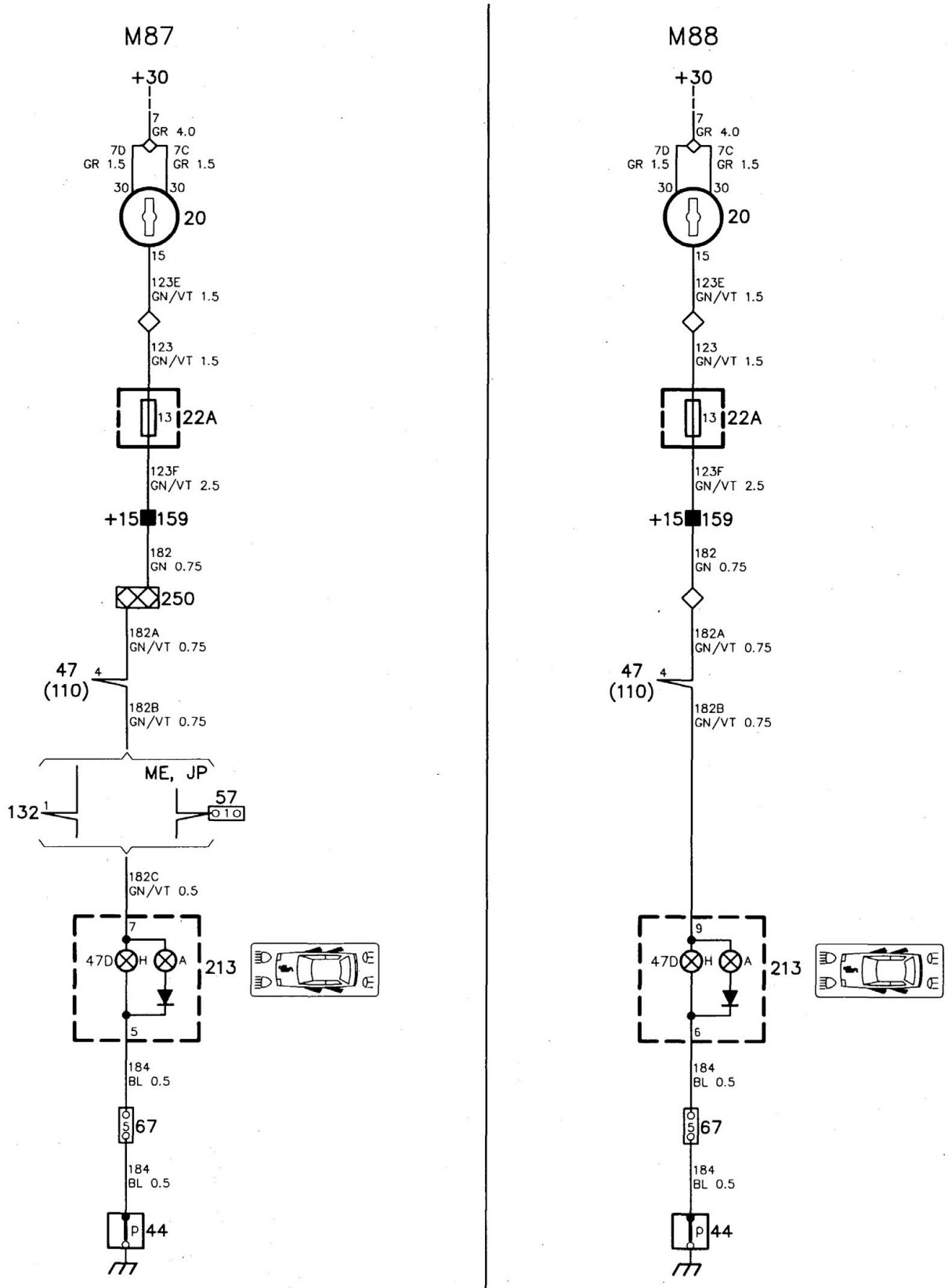
Horn


M87
40
40
117A BR 1.5
117
RD 1.5
1
RD
16.0
75
BL 25.0
BL 16.0
211
7
5
GR 10.0
+30
230
+54
231
2
RD 2.5
3 RD 2.5
3 GN 2.5
2
GN 2.5
19
22A
21
22A
7
8
22A
117C
RD 1.5
117D
VT 0.5
30
86
87
85
68
118
GL 0.5
352
41
41
41
T16, T16λ
118B
SV 0.5
215
SV 0.75
3
M88
40
40
117A BR 1.5
117
RD 1.5
1
RD
16.0
75
BL 25.0
BL 16.0
211
7
119
RD 1.5
+54
231
2
GN 2.5
3 GN 2.5
7
342A
7
8
22A
117C
RD 1.5
117D
VT 0.5
30
86
87
85
68
118
GL 0.5
352
41
41
41
T16, T16λ
118B
SV 0.5
215
SV 0.75
3

Seat belt and ignition switch warning

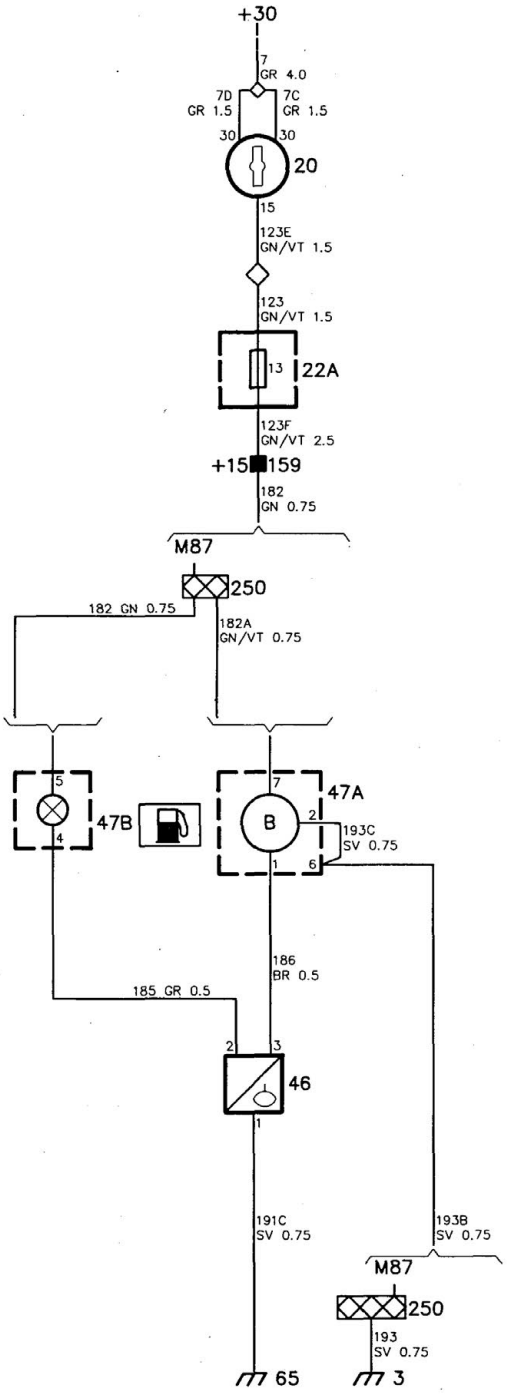


Oil pressure warning lamp

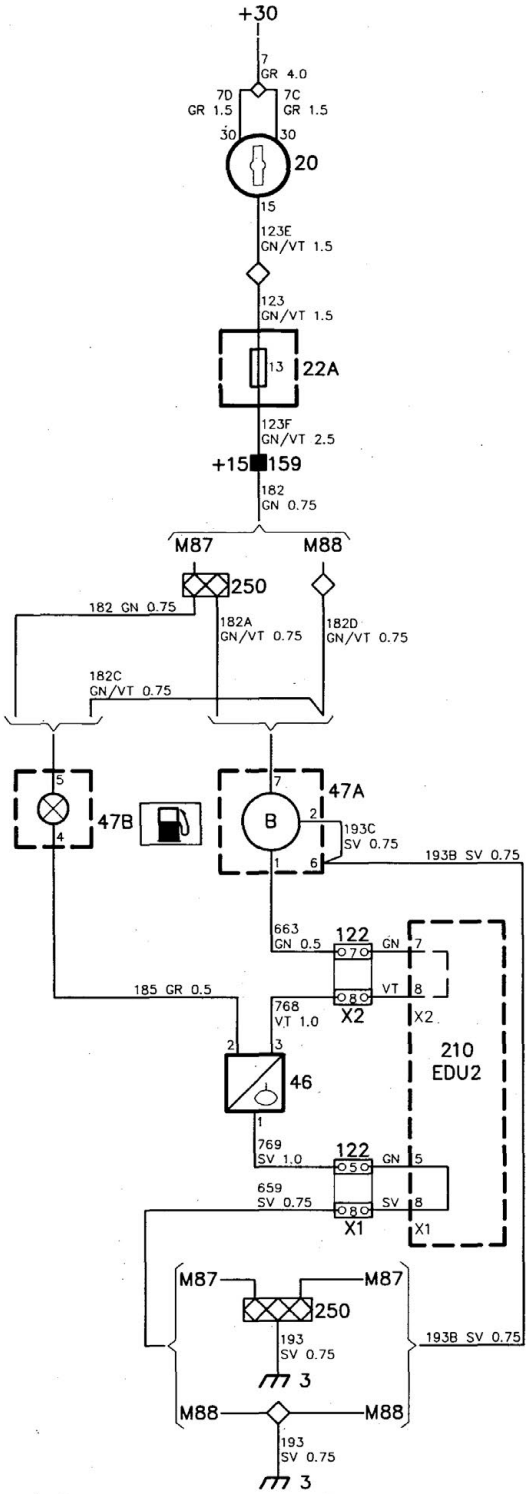


Fuel gauge and fuel reserve warning lamp

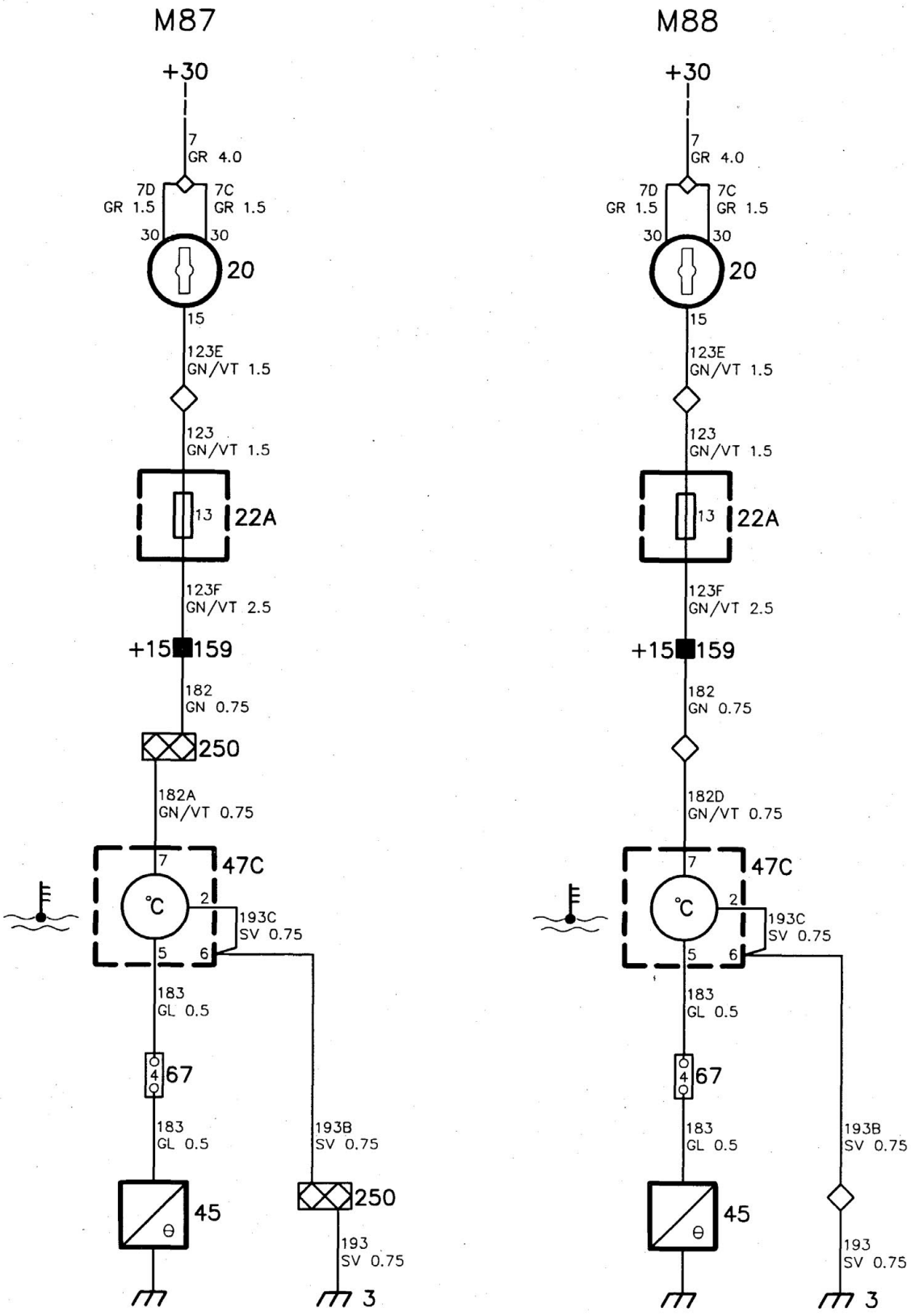
M87: I16λ



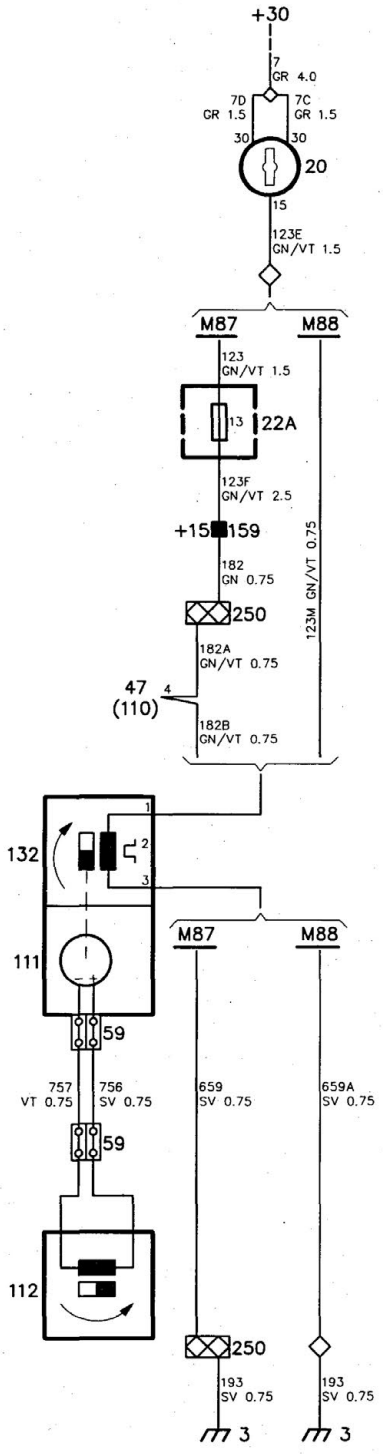
M87–M88: T16λ
M88: I16λ (US, CA)



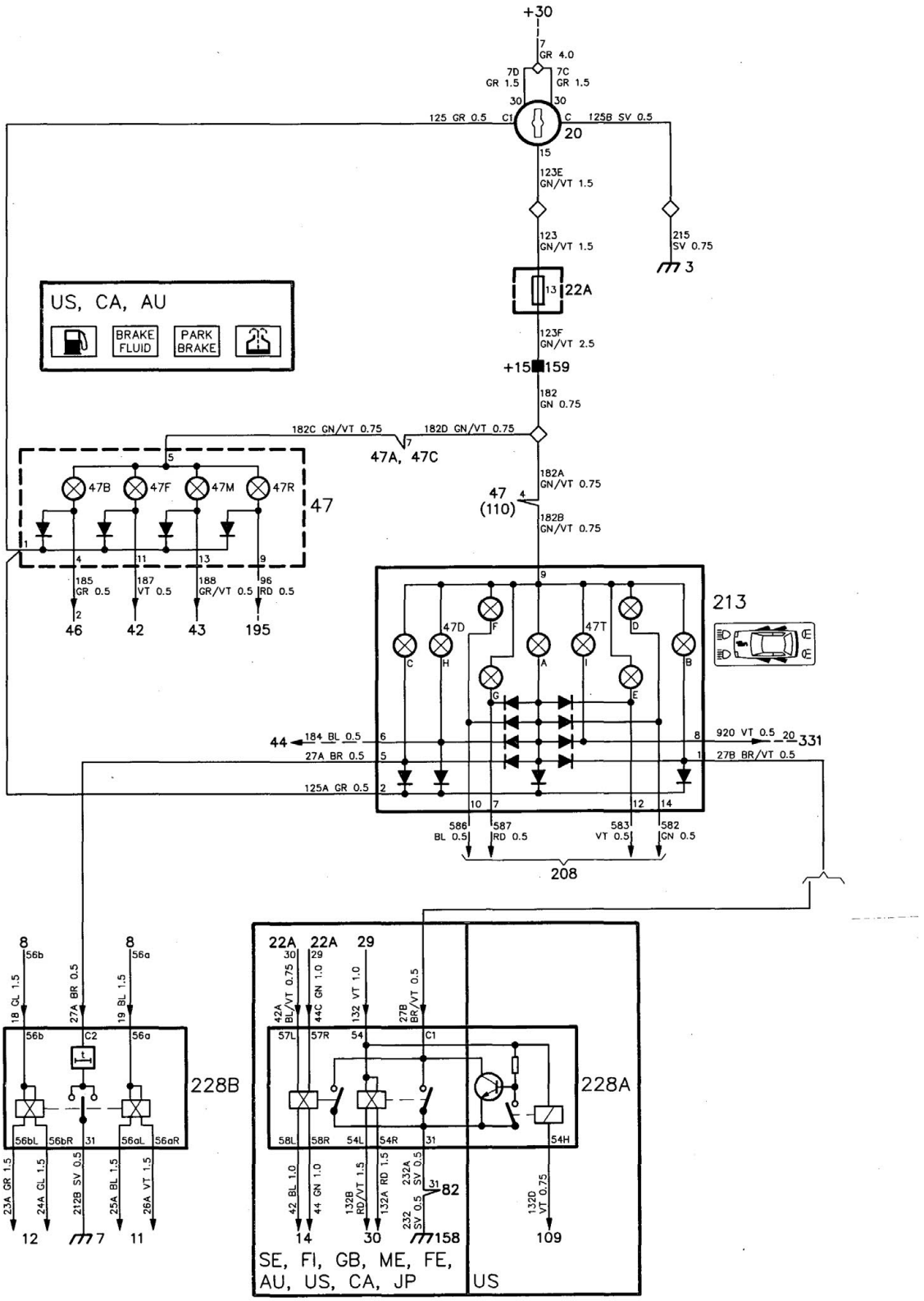
Coolant temperature gauge



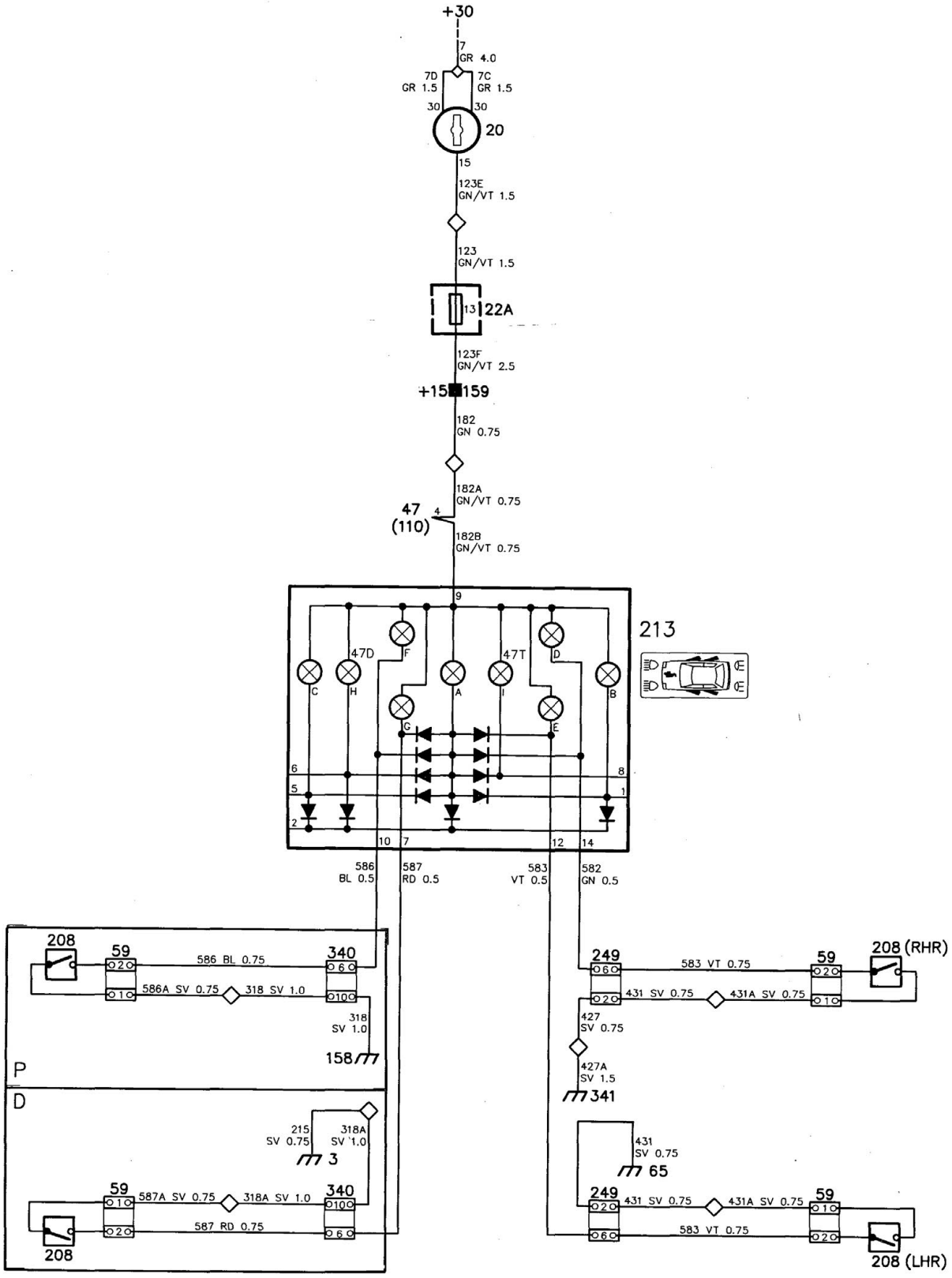
Electronic speedometer



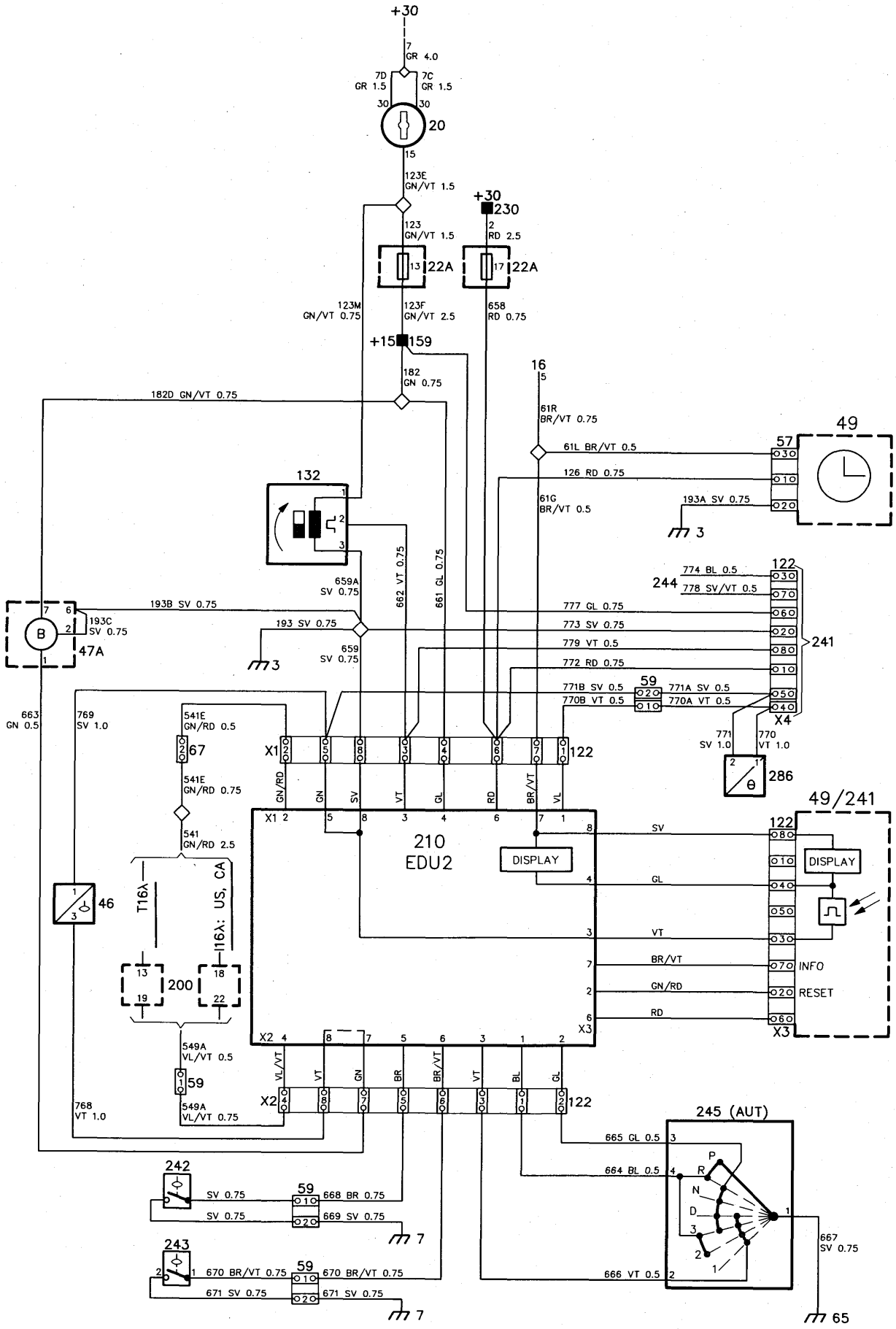
Pictogram – filament monitor



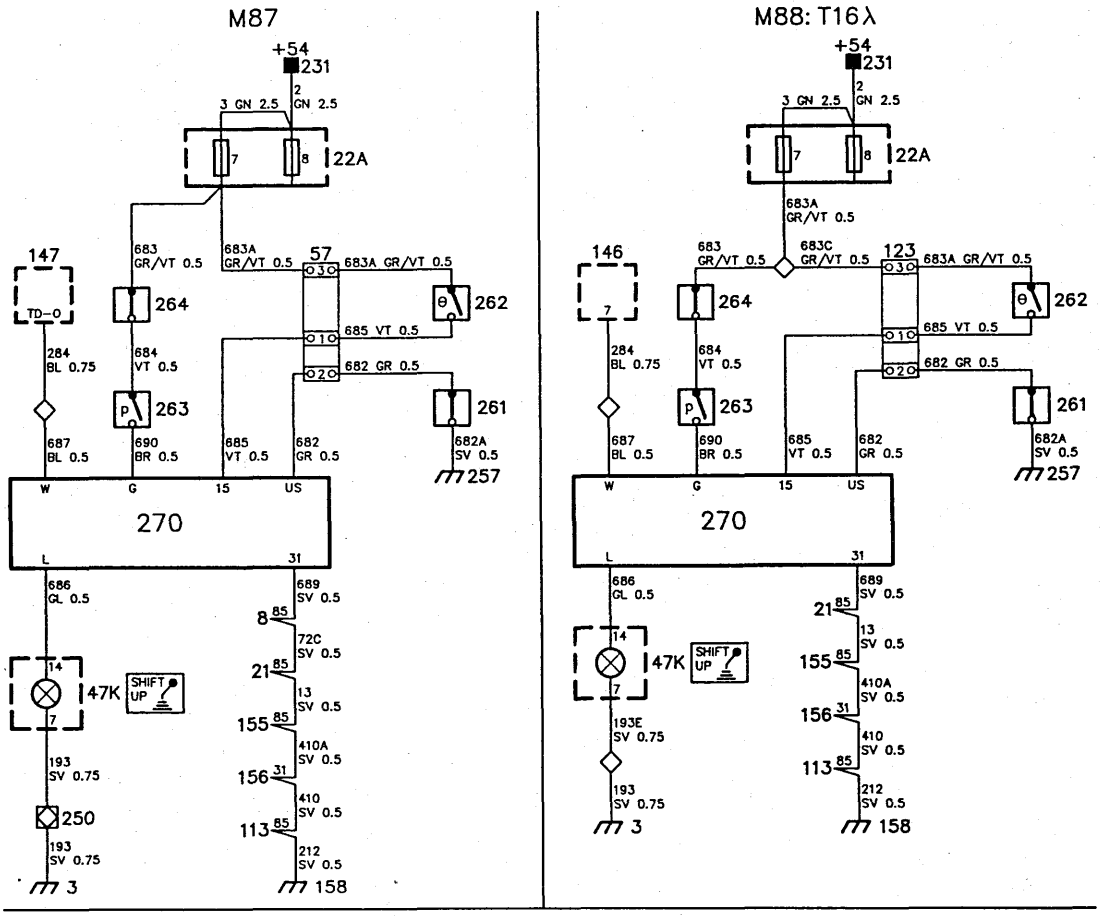
Pictogram – door indication



EDU II trip computer and clock



LH shift-up indication, Lambda



Operation

Cars with manual transmission delivered to the USA market are equipped with shift-up indication.

The shift-up indication system enables the driver to use the engine characteristics in the best possible manner, thus minimising the fuel consumption. Indication is provided by a lamp which lights up when the driver should shift up, i.e. at certain values of engine speed and throttle setting.

1987 model

The shift-up indication system receives its power from fuse 7 when the ignition switch is in the drive position.

Shift-up indication relay 270 receives ignition pulses from ignition pulse amplifier 147, which provides information on the engine speed. Vacuum switch 263 provides information on the vacuum in the intake manifold. When the engine speed has exceeded 1800±100 r/min and the vacuum is about 0.3 bar, lamp 47K will light up.

To avoid incorrect indication, the system is equipped with the following switches:

- Switch 264 which switches out the system when 5th gear is engaged.
- Temperature switch 262 which switches out the system when the engine temperature is below about +35°C (+95°F).
- Throttle contacts 261 which switches out the system when the throttle is in the rest position.

To avoid flashing of the lamp caused by sudden changes in the engine load, the relay includes a time delay function which delays lighting-up of the lamp by 0.7 s and switching-off by 1.5 s.

1988 model 9000 Turbo

Operation is the same as on the 1987 model, except that the ignition pulses to relay 270 are supplied by ignition system amplifier 146.

1988 model 9000S

The shift-up indication system is of an entirely new type on cars with fuel injection engines but without turbocharger. Relay 270 is therefore not interchargeable between cars with and without turbocharger.

The logic function for lighting-up lamp 47K is included in the injection system control unit 200 (which is variant 2.4 of the system). Relay 270 serves only as signal converter, since the lamp cannot be connected directly to the control unit.

Relay 270 receives its power from fuse 7, and speed transmitter sensor 132 from fuse 13. For particulars of the power supply to the control unit, see the section entitled LH fuel system for 9000S.

To determine when the lamp should light up, control unit 200 requires information on the engine speed, load and on the gear which is engaged on every occasion, i.e.

- ignition pulses from control unit 176 for the EZK ignition system
- control signals for the injection valves (opening times)
- the gear engaged, which the control unit calculates from the information from sensor 132 and the engine speed

When the engine load is below a certain value (basic injection time) and the engine speed has attained a certain value, the control unit will close the circuit to earth via pin 26 to relay 270, which then lights up lamp 47K. The engine speed at which the lamp lights up is dependent on which gear is engaged:

1st at 2000 r/min
2nd at 1900 r/min
3rd at 1800 r/min
4th at 1775 r/min

Regardless of the load, the lamp will also light up when the engine speed is above 5000 r/min in 1st, 2nd, 3rd and 4th gears.

To avoid incorrect indications, the system is inoperative under the following conditions:

- coolant temperature below +47.6°C (+117,7°F), from engine temperature transmitter 202
- at idling speed, pin 1 is earthed on throttle angle transmitter 203
- when 5th gear is engaged.

In addition, all input signals must have been recorded for at least 0.75 s.

Fault-tracing hints

1987 models

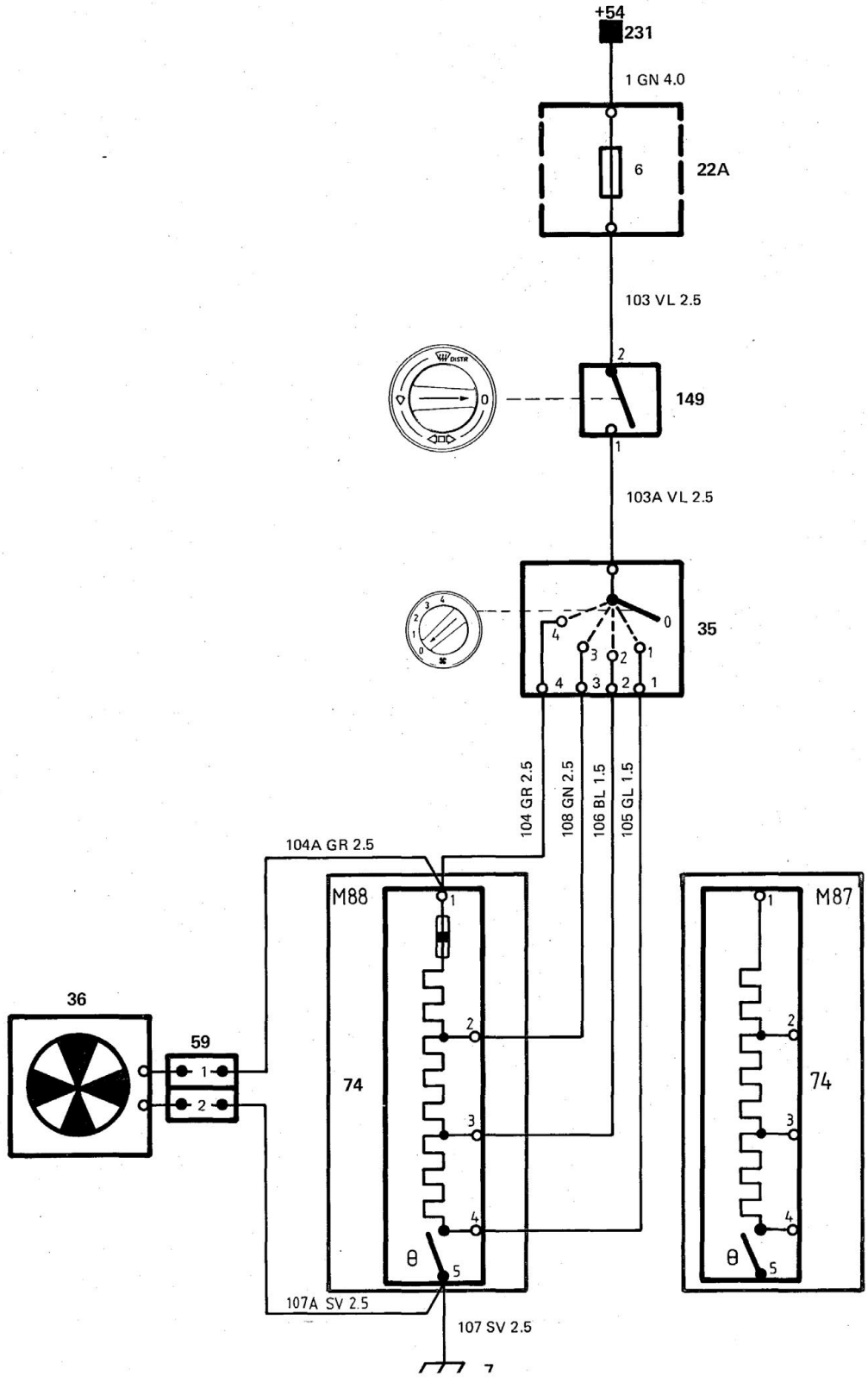
1. Set the ignition switch to the drive position and check fuse 7. Also check that the supply to the fuse is live.
2. Check that lamp 47K is in good condition.
3. Check that the switches in the system close and open the circuit under the specified conditions.
4. Check that relay 270 is receiving ignition pulses.
5. Check the connectors and the ground connections.

1988 models

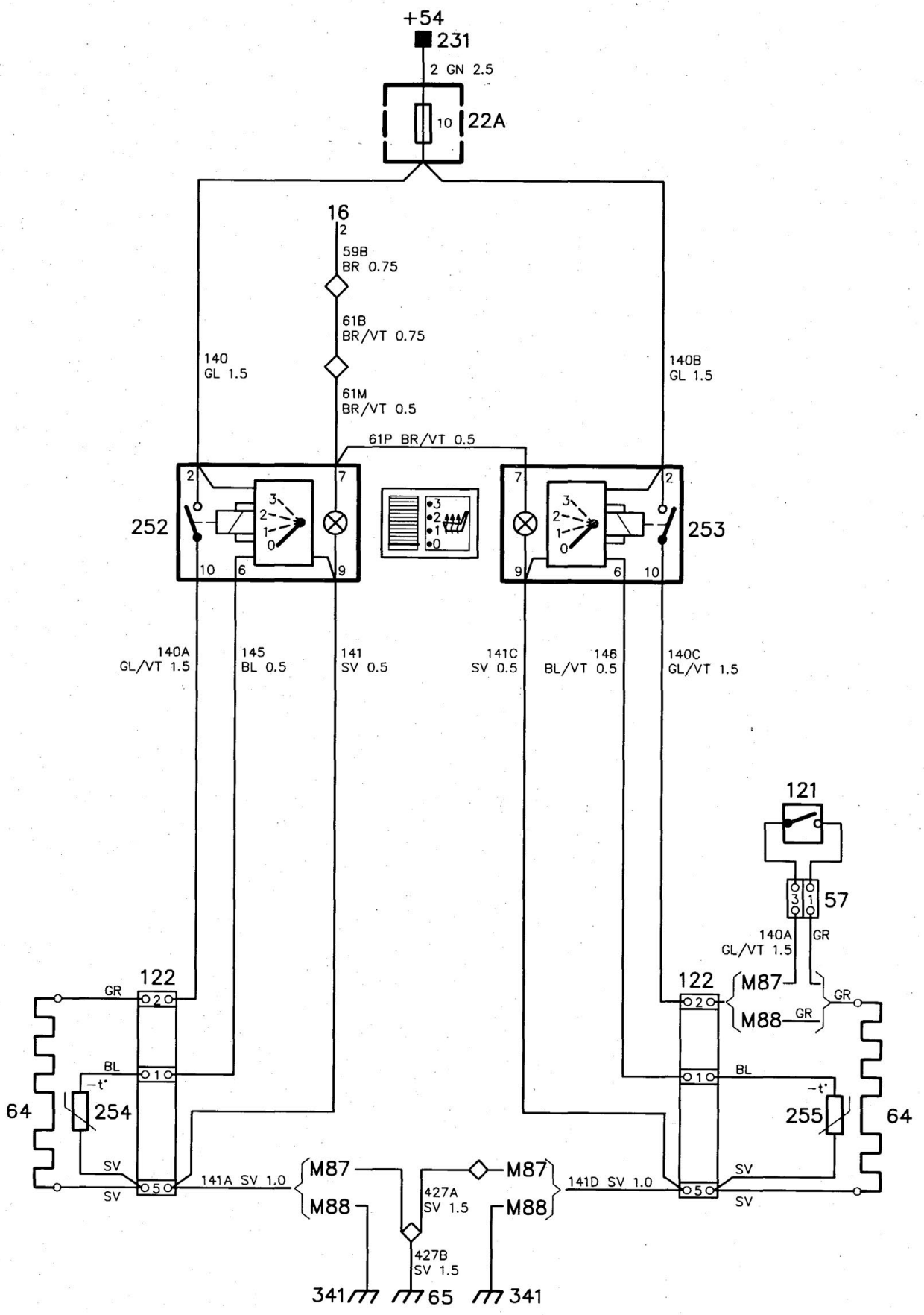
The instructions for the 1987 models may be used for fault-tracing on Turbo cars.

When carrying out fault-tracing on cars without turbocharger, check that the supply to relay 270 is live and that the connectors and ground connections are in good condition. In addition, check the control unit and the relevant transmitters. The performance of the shift-up indication system is dependent on the LH system performing satisfactorily.

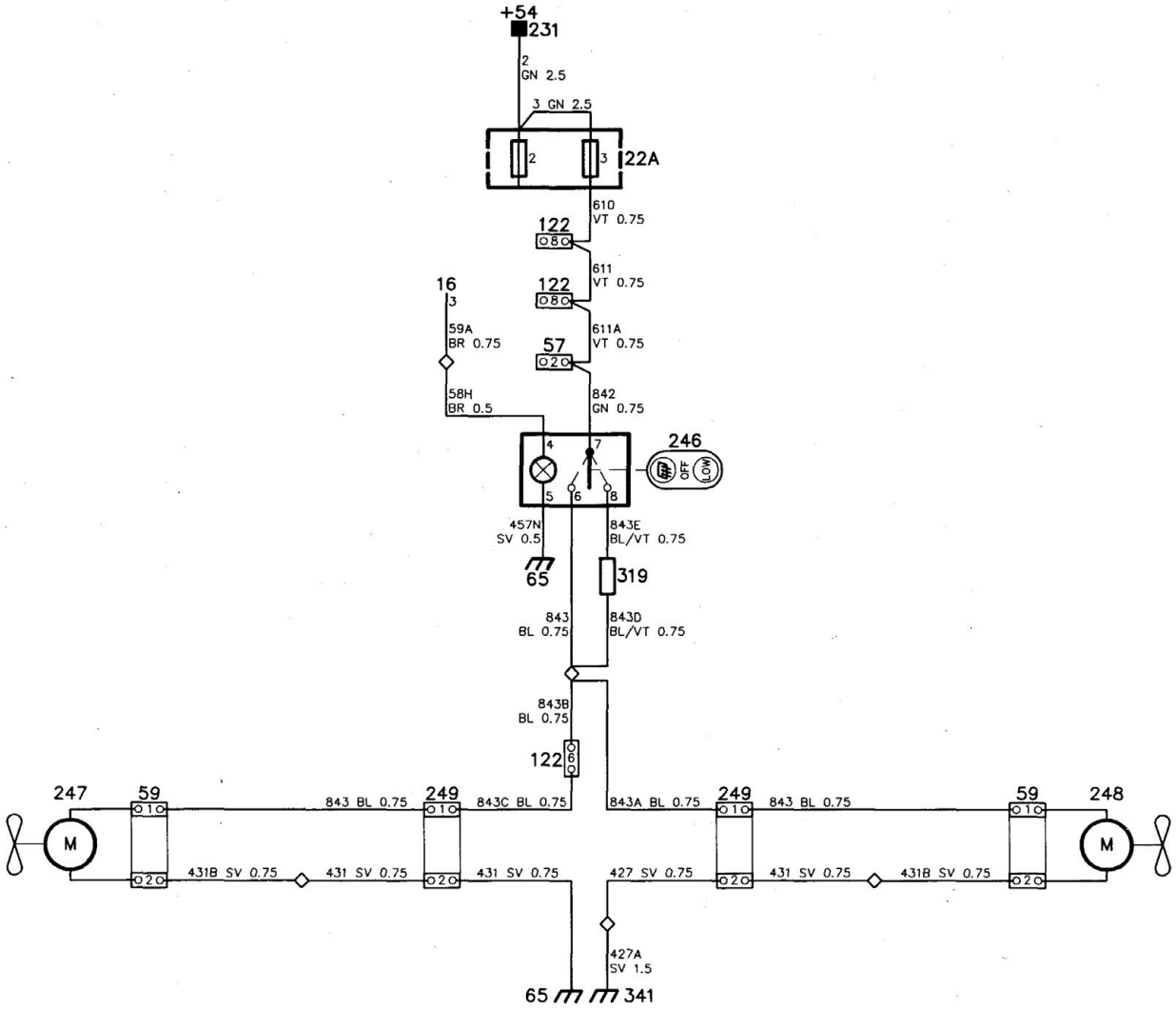
Ventilation fan



Electrically heated front seats



Door demister fans



Operation

Door demister fans are fitted in the rear doors of Turbo cars with automatic climate control (ACC). These fans can be used for increasing the air flow rate in the rear of the interior.

The fans are supplied from fuse 3 when the ignition switch is in the drive position.

The fans can be switched on and off by means of switch 246 mounted in the centre console. The switch has three positions. In the centre position, the fans are switched off, whereas in the outer positions, the fans run at different speeds. When the switch is set to LOW, the fans are supplied across resistor 319, and the fans run at low speed. Fan 247 is mounted in the left-hand rear door and fan 248 in the right-hand rear door.

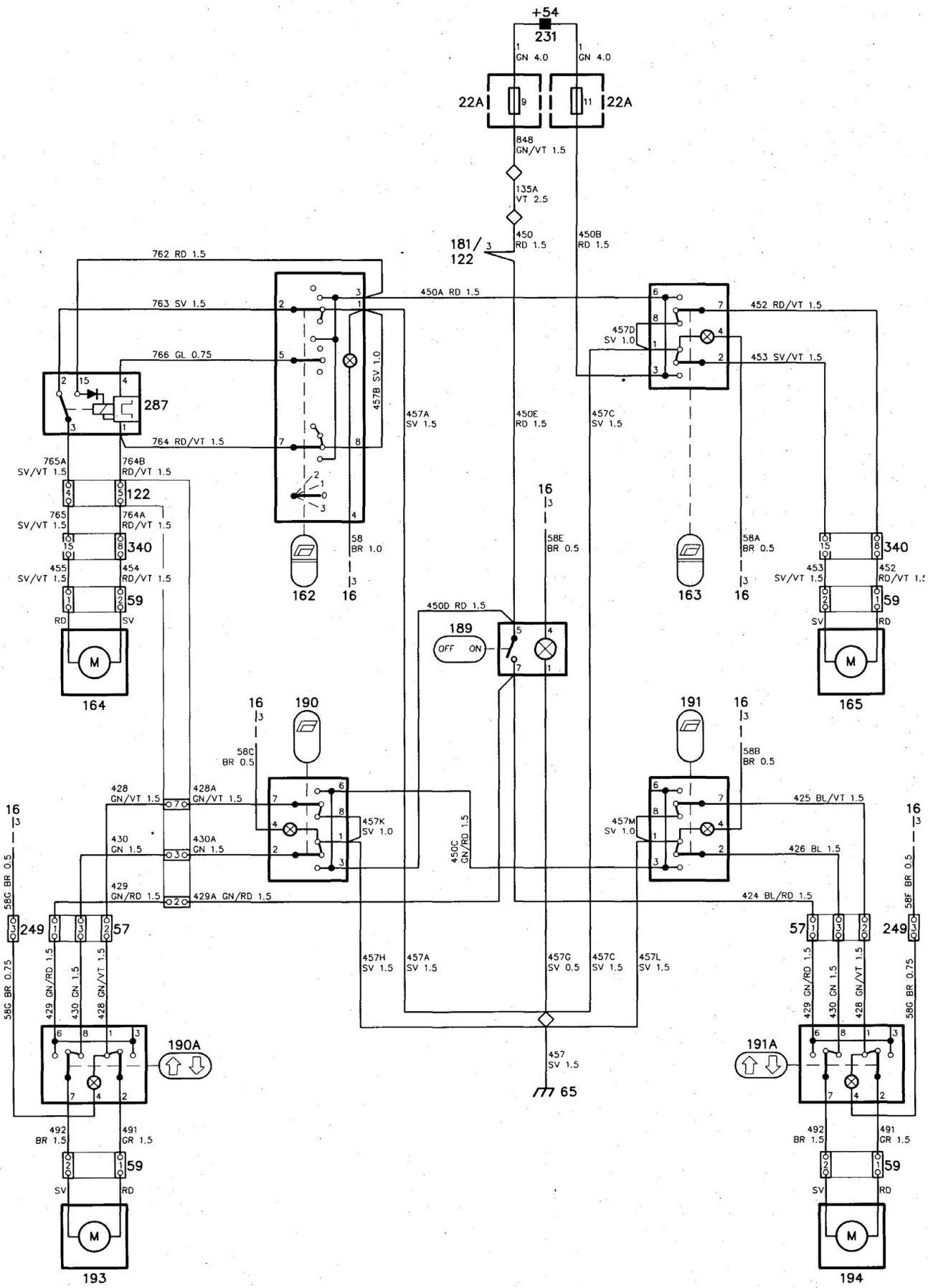
The lamp in the switch is connected across instrument lighting rheostat 16.

Fault-tracing hints

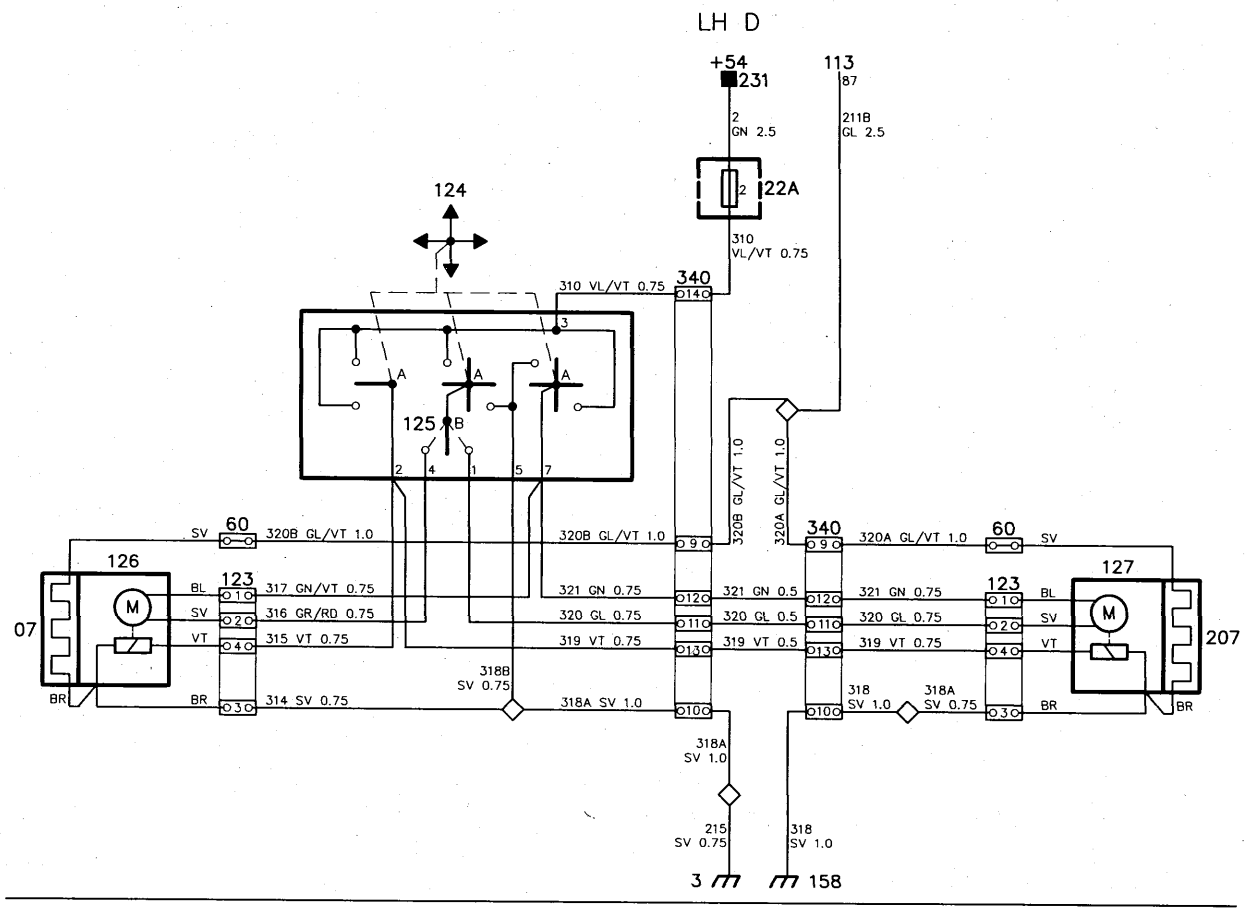
The fans are operative when the ignition switch is in the drive position.

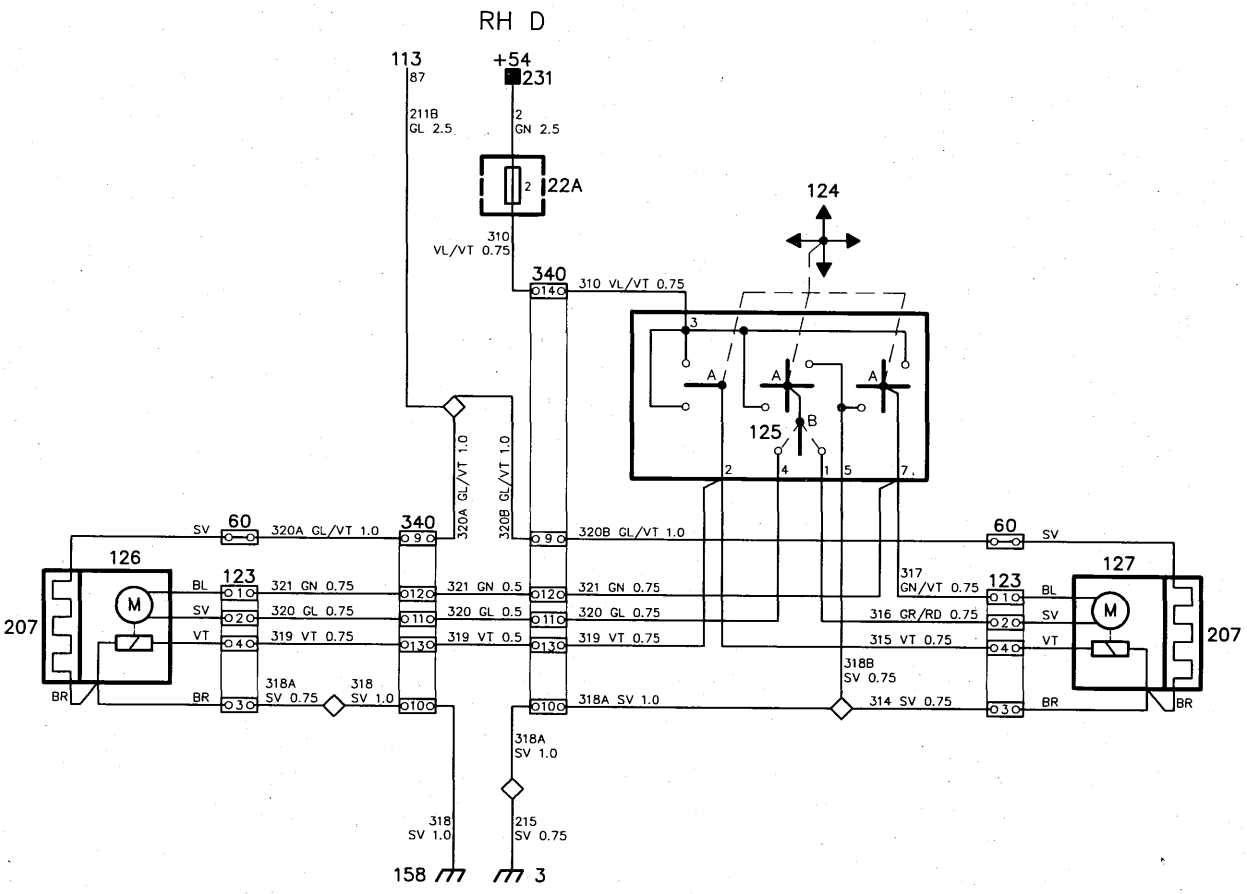
1. Check fuse 3 and check that the supply to it is live.
2. Check that the supply to terminal 6 of switch 246 is live.
3. Check the performance of the switch.
4. Check the connectors, wiring and earth connections.

Electric window regulators, LHD

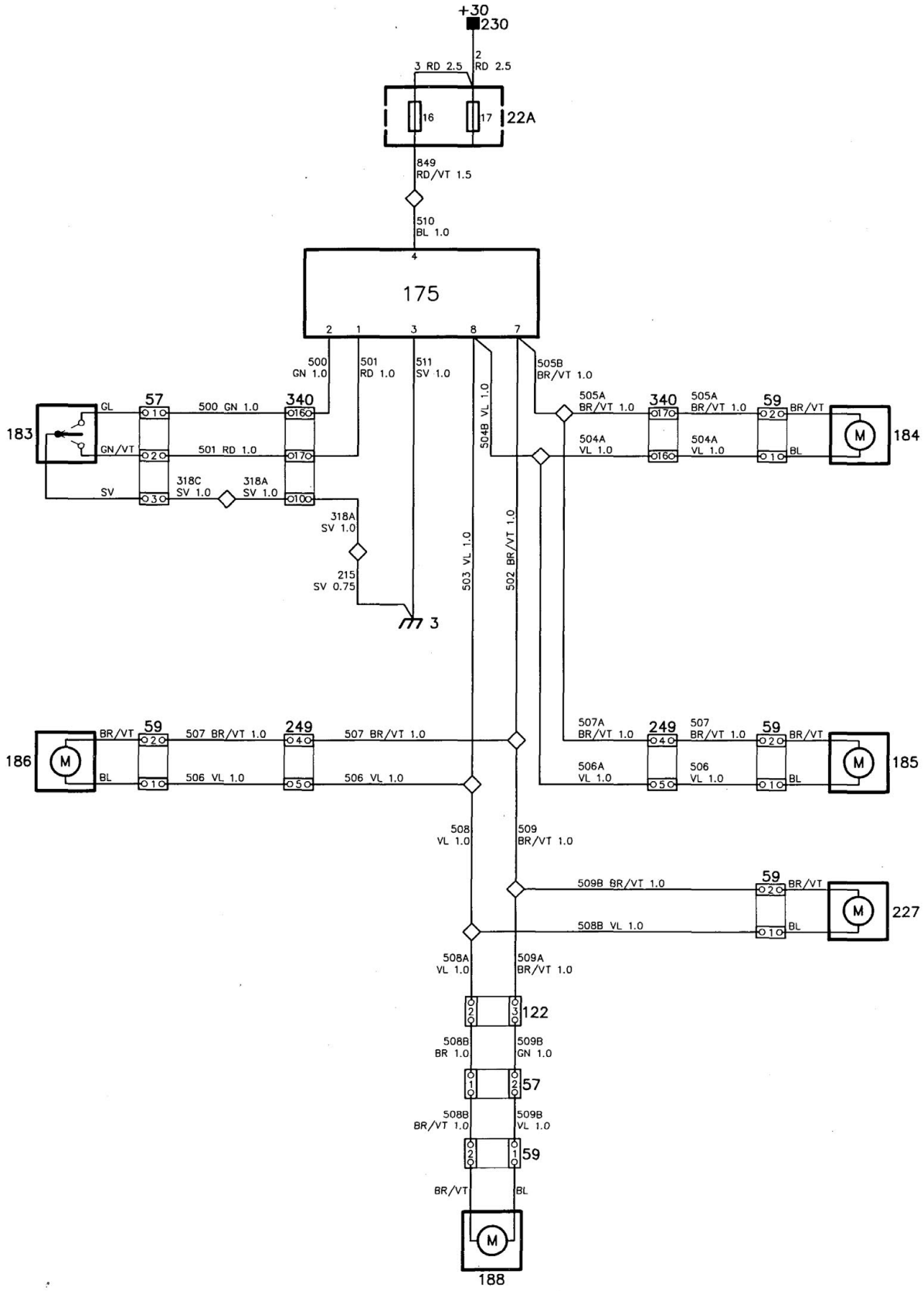


Electrically operated and heated rear-view mirrors

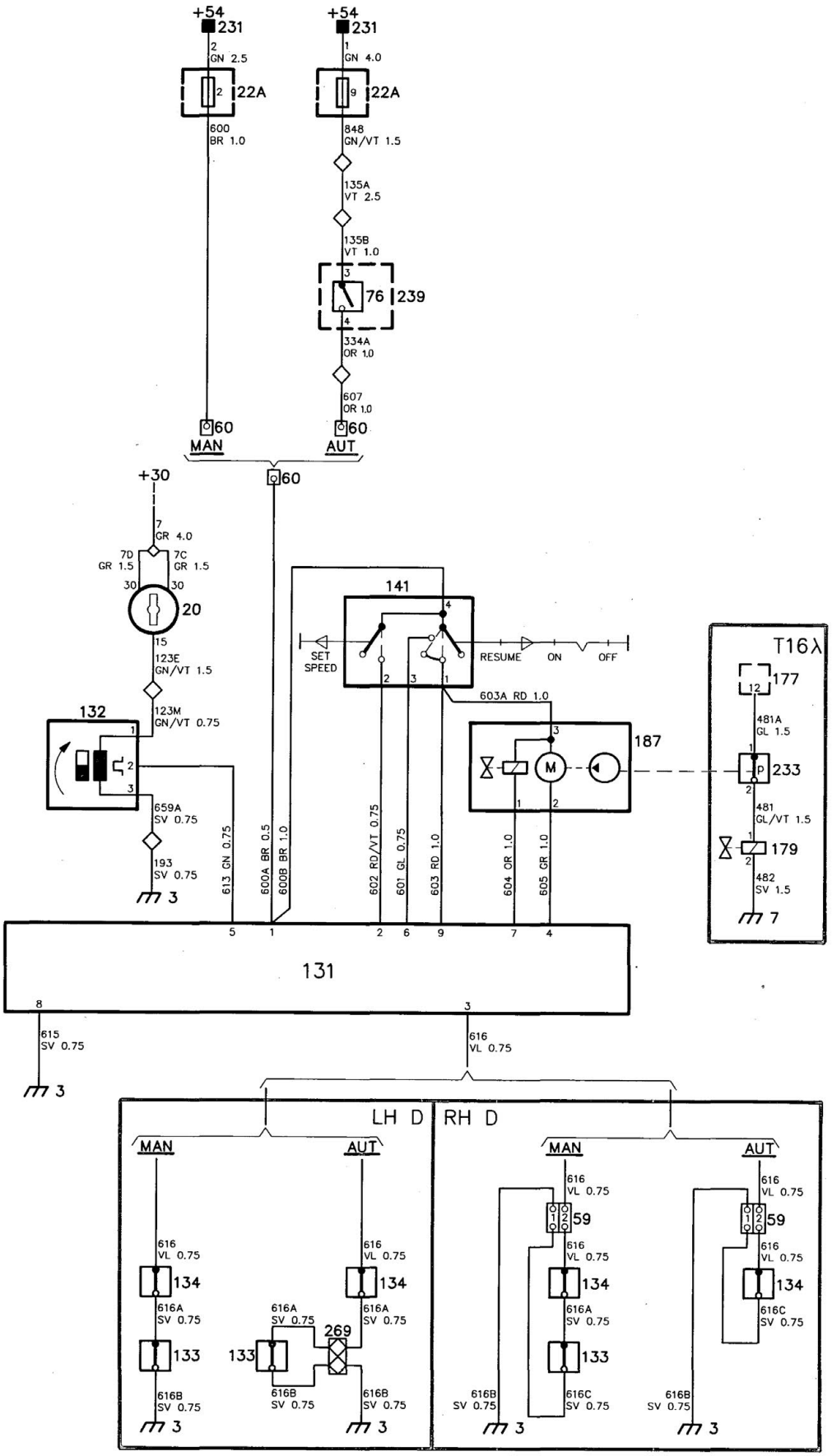




Central locking system

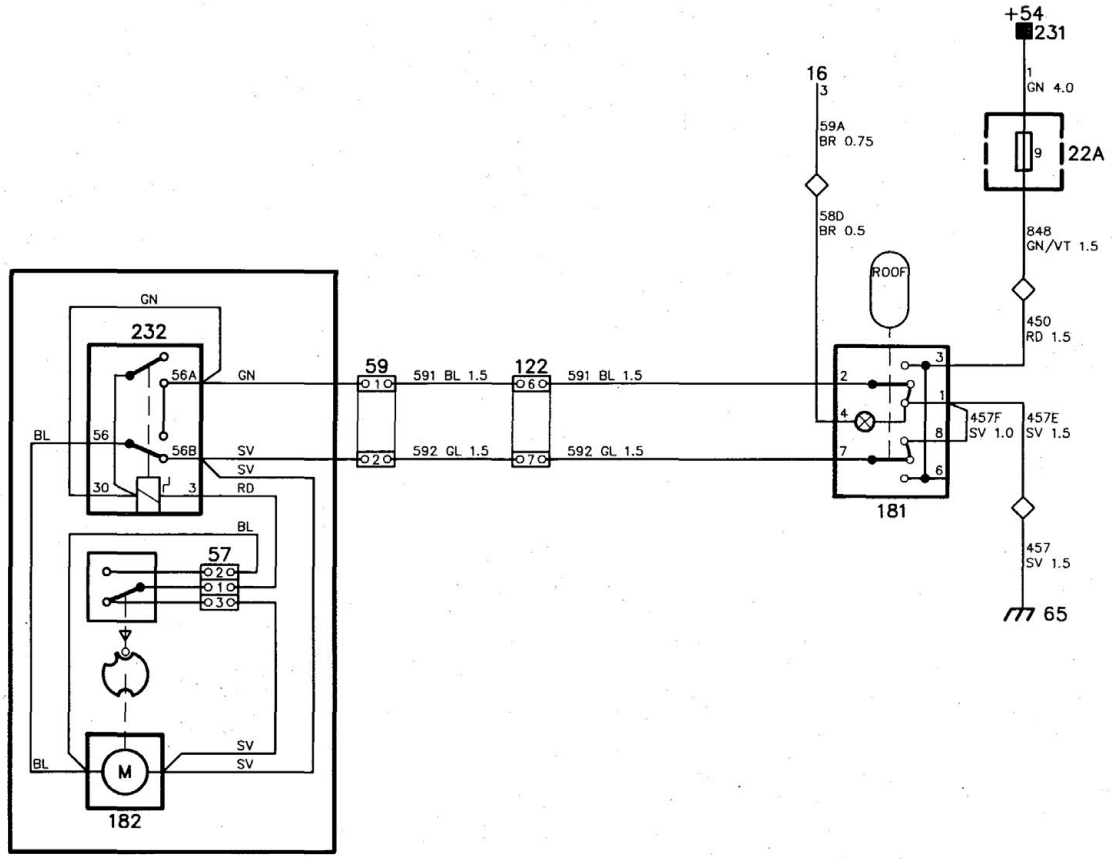


Cruise Control system



Electrically operated sunroof

M87



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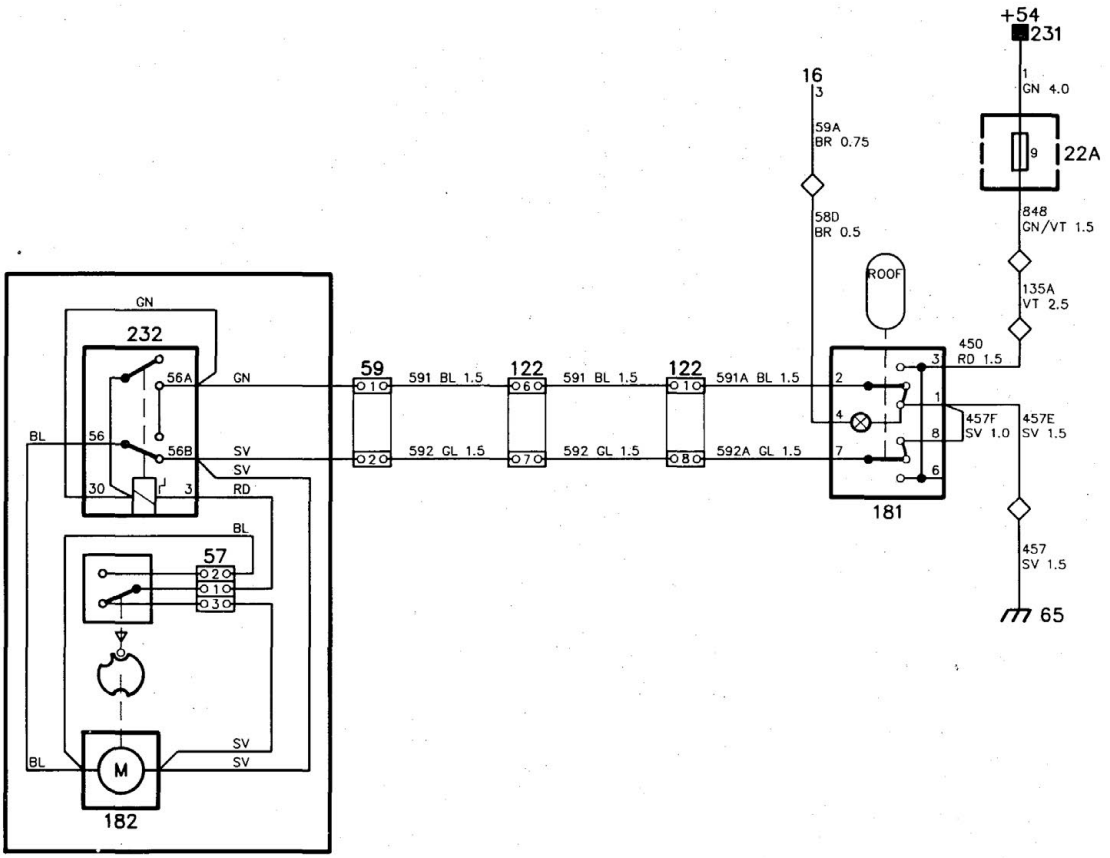
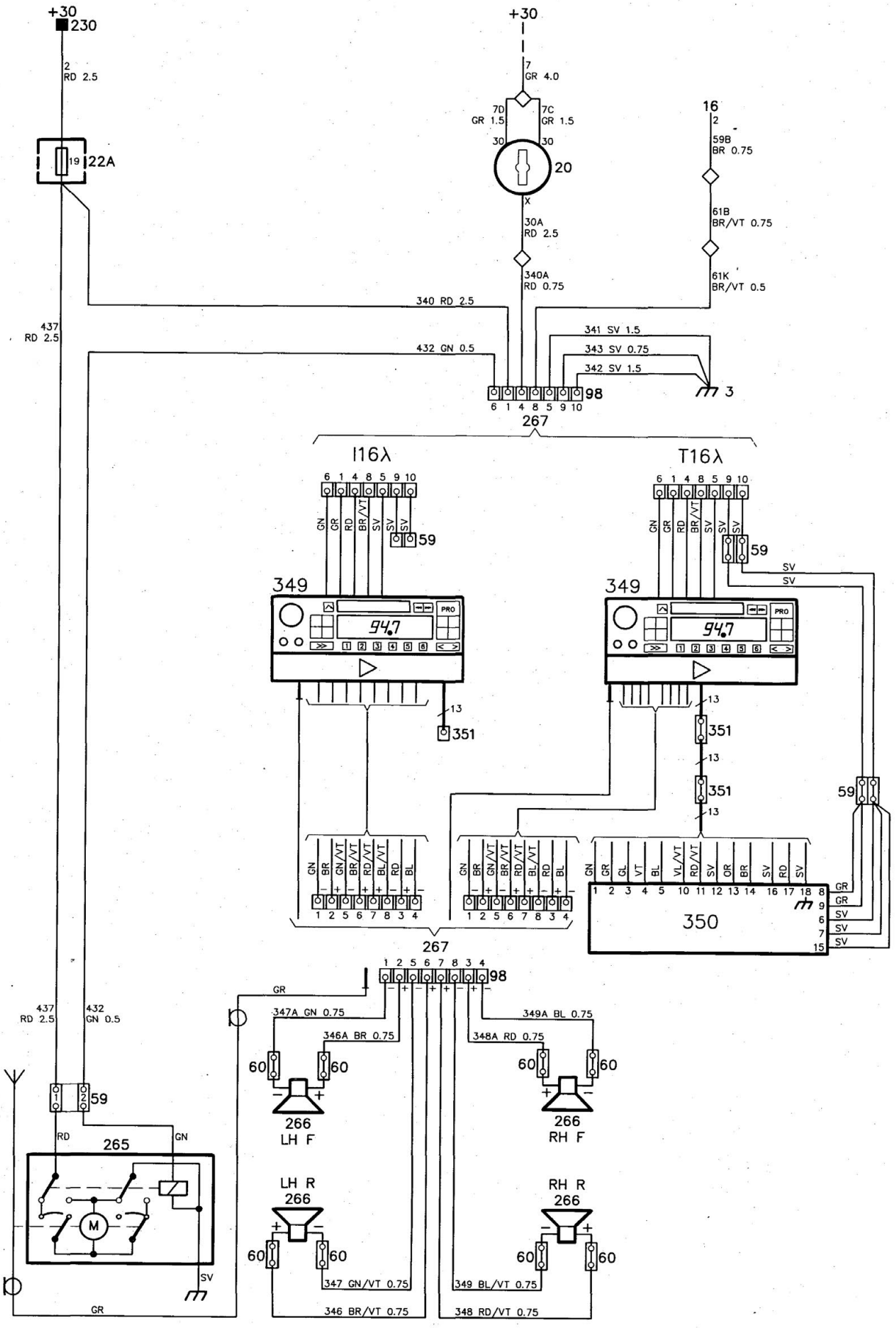


Radio installation (US)



List of components

Numerical index

1 Battery
2 Alternator
3 Ground point, facia
4 Starter motor
5 Ignition coil
6 Ignition distributor
7 Ground point, wheel housing
8 Lighting relay
9 Ground point, luggage compartment
10 Light switch
11 Full beam filament
12 Dipped beam filament
13 Parking lights
14 Rear lights
15 Number plate illumination
16 Instrument lighting rheostat
17 –
18 Instrument lighting
19 Glove compartment lamp
20 Ignition switch
21 Ignition switch relay
22 Fuse box in the glove compartment
22A Fuse board in the glove compartment
22B Relay board in the glove compartment
23 Flasher relay
24 Direction indicator stalk switch
25 Switch for hazard warning lights
26 Time delay relay for the radiator fan
27 Direction indicator lamps, left-hand side
28 Direction indicator lamps, right-hand side
29 Brake light switch
30 Brake lamps
31 Reversing light switch
32 Reversing lights
33 Rear fog lights
34 –
35 Selector switch for the ventilation fan
36 Motor for the ventilation fan, AC
37 Radiator fan motor
38 Recirculation damper motor
39 Temperature switch for the radiator fan
40 Horns
41 Horn switch
42 Brake fluid level warning switch
43 Handbrake switch
44 Oil pressure transmitter
45 Coolant temperature transmitter
46 Fuel level transmitter
47 Combined instrument
47A Fuel gauge
47B Fuel reserve warning lamp
47C Coolant temperature gauge
47D Oil pressure warning lamp
47E Charging warning lamp
47F Brake fluid level warning lamp
47G Full-beam warning lamp
47H Direction indicator warning lamp, left-hand
47I Direction indicator warning lamp, right-hand
47J Indicating lamp for the rear-window electric heater
47K Lamp for shift-up indication
47L –
47M Handbrake warning lamp
47N Warning lamp for the rear fog lights
47O –
47P CHECK ENGINE warning lamp
47Q Warning lamp, ABS
47R Washer fluid level warning lamp
48 Cigarette lighter
49 Clock
50 Roof lamp, centre
51 Interior lighting lamp, front
52 –
53 Switch, interior lighting
54 Door switch for the interior lighting
55 Luggage compartment light fitting
56 Luggage compartment light switch
57 Three-pole connector
58 Twelve-pole connector
59 Two-pole connector
60 Single-pole connector
61 Windscreen wiper stalk switch
62 Windscreen wiper motor
63 Washer motor
64 Heating pad
65 Ground point, back seat
66 Headlamp wiper motor
67 Six-pole connector
68 Horn relay
69 Seat switch for the co-driver's seat-belt warning lamp
70 Seat-belt switch for the driver
71 Seat-belt switch for the co-driver
72 Seat-belt warning lamp
73 Timing service instrument (TSI) socket
74 Resistor for radiator fan
75 Distribution block, positive supplies from battery
76 Switch for raising the engine idling speed, automatic transmission
77 Starting interlock contacts, automatic transmission
78 Relay, dim dipped beams
79 –
80 Resistor, dim dipped beams
81 –
82 Seat belt/ignition switch warning relay
83 Relay for intermittent operation of the wipers
84 –
85 Extra fog lights
86 –
87 Engine compartment light fitting and switch
88 Switch for extra fog lights
89 Side direction indicator lamp, left-hand side
90 Side direction indicator lamp, right-hand side
91 Selector lever lamp
92 –
93 –

94 –
95 –
96 –
97 –
98 Ten-pole connector
99 –
100 –
101 Fuel feed pump
102 Fuel pump relay
103 Fuel pump
104 –
105 –
106 –
107 Relay for the extra fog lights
108 –
109 High-level brake light
110 Tachometer
111 Electronic speedometer
112 Transmitter for electronic speedometer
113 Relay for the electric heater for the rear window
114 (Spare)
115 Electric heater for the rear window
116 Switch for the rear window heating
117 (Spare)
118 Corner lights
119 –
120 –
121 –
122 Eight-pole connector
123 Four-pole connector
124 Switch for the rear-view mirrors
125 Selector switch for the rear-view mirrors
126 Motor for the left-hand rear-view mirror
127 Motor for the right-hand rear-view mirror
128 –
129 –
130 –
131 Electronic unit for Cruise Control
132 Sensor for the speed transmitter
133 Clutch switch for Cruise Control
134 Brake switch for Cruise Control
135 –
136 Lambda sensor
137 (Spare)
138 –
139 –
140 –
141 Selector for Cruise Control
142 –
143 Recirculation switch for the AC
144 Pressure switch, Turbo
145 Test tapping, EZK
146 Amplifier of the electronic ignition system
147 Ignition pulse amplifier
148 Front ashtray illumination, cigarett lighter
149 Main switch for the ventilation fan
150 –
151 Time-delay relay for the interior lighting
152 –
153 Lamp for centre console and rear ashtray
154 Lighting for the heater controls
155 Relay for the AC radiator fan
156 Relay for the AC and ACC radiator fan
157 Spark plug
158 Negative distribution terminal
159 Distribution terminal +15
160 Switch for glove compartment illumination
161 Switch for the rear fog lights
162 Switch for the electric window regulator, driver's door
163 Switch for the electric window regulator, co-driver's door
164 Motor for the electric window regulator, left-hand front door
165 Motor for the electric window regulator, right-hand front door
166 Pressure switch for the AC and ACC radiator fan
167 (Spare)
168 –
169 Switch for the AC
170 Compressor for the AC and ACC
171 Anti-freeze thermostat (cycling clutch switch), AC and ACC
172 Radiator fan for the AC and ACC
173 Diode for the AC compressor
174 (Spare)
175 Electronic unit for the central locking system
176 Control unit for the EZK ignition system
177 Control unit for the APC system
178 Knock sensor for the APC/EZK system
179 Solenoid valve, APC
180 Pressure transmitter, APC
181 Switch for the electrically operated sunroof
182 Motor for the electrically operated sunroof
183 Control unit for central locking system, driver's door
184 Motor for central locking system, co-driver's door
185 Motor for the central locking system, right-hand rear door
186 Motor for the central locking system, left-hand rear door
187 Vacuum pump for Cruise Control
188 Motor for the central locking system, luggage compartment lid
189 Interlock switch for the rear-door electric window regulators
190 Switch for the left-hand rear electric window regulator
190A Switch for the left-hand rear electric window regulator
191 Switch for the right-hand rear electric window regulator
191A Switch for the right-hand rear electric window regulator
192 Distribution block
193 Motor for the electric window regulator, left-hand rear door
194 Motor for the electric window regulator, right-hand rear door
195 Level switch, washer fluid
196 –
197 Outside temperature transmitter, ACC
198 Recirculation damper motor, ACC
199 Motor for the ventilation fan, ACC
200 Control unit for the LH fuel injection system
201 Engine ground point
202 Engine temperature transmitter, LH fuel injection system

203 Throttle angle transmitter, LH fuel injection system
204 Test connector, LH fuel injection system
205 Air mass meter, LH fuel injection system
206 Fuel injection valves, LH fuel injection system
207 Heating element for the rear-view mirror
208 Door lock indication
209 Courtesy light
210 EDU trip computer (voltmeter, fuel consumption instrument)
211 Ground point, gearbox
212 –
213 Pictogram (part of combined instrument)
214 –
215 Dip switch
216 Automatic climate control unit (ACC)
217 Air mixture transmitter, ACC
218 Interior temperature transmitter, ACC
219 Suction fan for the interior temperature transmitter, ACC
220 Speed control for the ventilation fan, ACC
221 Air distribution damper motor, ACC
222 Temperature control damper motor, ACC
223 Sun transmitter, ACC
224 Seat-belt lock illumination
225 Reading lamp
226 Co-driver's lamp
227 Motor for the central locking system, fuel tank lid
228A Filament monitor in the glove compartment
228B Filament monitor in the engine compartment
229 Main relay, LH fuel injection system
230 Distribution terminal +30
231 Distribution terminal +54
232 Stepping relay for the electrically operated sunroof
233 Vacuum switch, Cruise Control/APC
234 Side marker lights
235 Seat-belt tensioner, left-hand
236 Seat-belt tensioner, right-hand
237 Test tapping for seat-belt tensioner
238 Electronic control unit for the seat-belt tensioners
239 Selector lever switch (automatic transmission)
240 Electronic unit for instrument lighting rheostat
241 DCC trip computer
242 Coolant level switch
243 Engine oil level switch
244 Heater socket
245 Selector lever switch, EDU II (automatic transmission)
246 Connector for switch, rear side window demister fans
247 Connector, rear side window demister fan, left-hand door
248 Connector, rear side window demister fan, right-hand door
249 Seven-pole connector
250 Multi-lead connector, 6 circuits
251 Multi-lead connector, 3+3 circuits
252 Rheostat for the heating pad, driver's seat
253 Rheostat for the heating pad, co-driver's seat
254 Thermostat for the heating pad, driver's seat
255 Thermostat for the heating pad, co-driver's seat
256 Speed warning buzzer
257 Ground point, alternator bracket
258 Connector for trailer
259 Relay, reverse current protection, dim dipped beams
260 –
261 Throttle contacts, zero position, shift-up indication
262 Temperature switch, shift-up indication
263 Vacuum switch, shift-up indication
264 Switch, fifth gear, shift-up indication
265 Electric antenna
266 Speakers
267 Connectors for radio
268 –
269 Multi-lead connector, two-pole
270 Shift-up indication relay
271 Lambda sensor preheater
272 Engine idling speed adjustment, LH fuel injection system
273 –
274 –
275 Connector for horn, burglar alarm
276 Connector for main switch, burglar alarm
277 –
278 –
279 –
280 Connector for motor, headlamp levelling, left-hand side
281 Connector for motor, headlamp levelling, right-hand side
282 Connector for switch, headlamp levelling
283 –
284 –
285 Lambda sensor fuse
286 Outside temperature sensor
287 Relay, automatic window regulator controls
288 Connector for burglar alarm switch
289 Connector for burglar alarm control unit
290 –
291 Control unit, ABS
292 Main relay, ABS
293 Pump relay, ABS
294 Pressure switch, ABS
295 Main valve, ABS
296 Valve block, ABS
297 Hydraulic pump motor, ABS
298A Left-hand front wheel sensor, ABS
298B Right-hand front wheel sensor, ABS
298C Left-hand rear wheel sensor, ABS
298D Right-hand rear wheel sensor, ABS
299 Brake fluid level sensor, ABS
300 Ground point for the brake unit, ABS
301 Ground point for the control unit, ABS
302 Relay and fuse board, ABS
302B Fuses, ABS
303A Diode, ABS
303B Diode, ABS
304 (Spare)
305 (Spare)
306 (Spare)
307 (Spare)
308 –
309 –
310 –

311 –
312 –
313 –
314 –
315 –
316 –
317 –
318 Speaker box
319 Resistor for door demister fans
320 –
321 Valve for charcoal canister
322 Connector, Auto/Man, LH 2.4
323 Fuel pump with integrated feed pump
324 –
325 –
326 –
327 –
328 –
329 –
337 (Spare)
338 (Spare)
339 –
340 22-pole connector, A pillars
341 Ground point, left-hand front seat member
342 Fuse box in the engine compartment
342A Fuse board in the engine compartment
342B Relay board in the engine compartment
348 –
349 Mounting box with amplifier, for radio
350 Mounting box for CD player/equalizer
351 13-pole connector
352 Brushes for horn
353 Radio – cassette tape player
354 Amplifier

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List of systems, comprehensive wiring diagram (small, blue numbers)

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9 Cruise Control system
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12 Electrically operated and heated rear-view mirrors
13 Horn
14 Headlamp full beam
15 Headlamp dipped beam
16 Extra fog lamps
17 Rear lights
18 ~~Dim-dipped beam~~
19 Engine compartment illumination
20 Glove compartment illumination
21 Parking lights
22 Number plate illumination
23 Brake lights
24 ~~Rear fog lights~~
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27 Side marker lights
28 Corner lights
29 Reading lamps
30 Seat belt (ignition switch) warning
31 Central locking system
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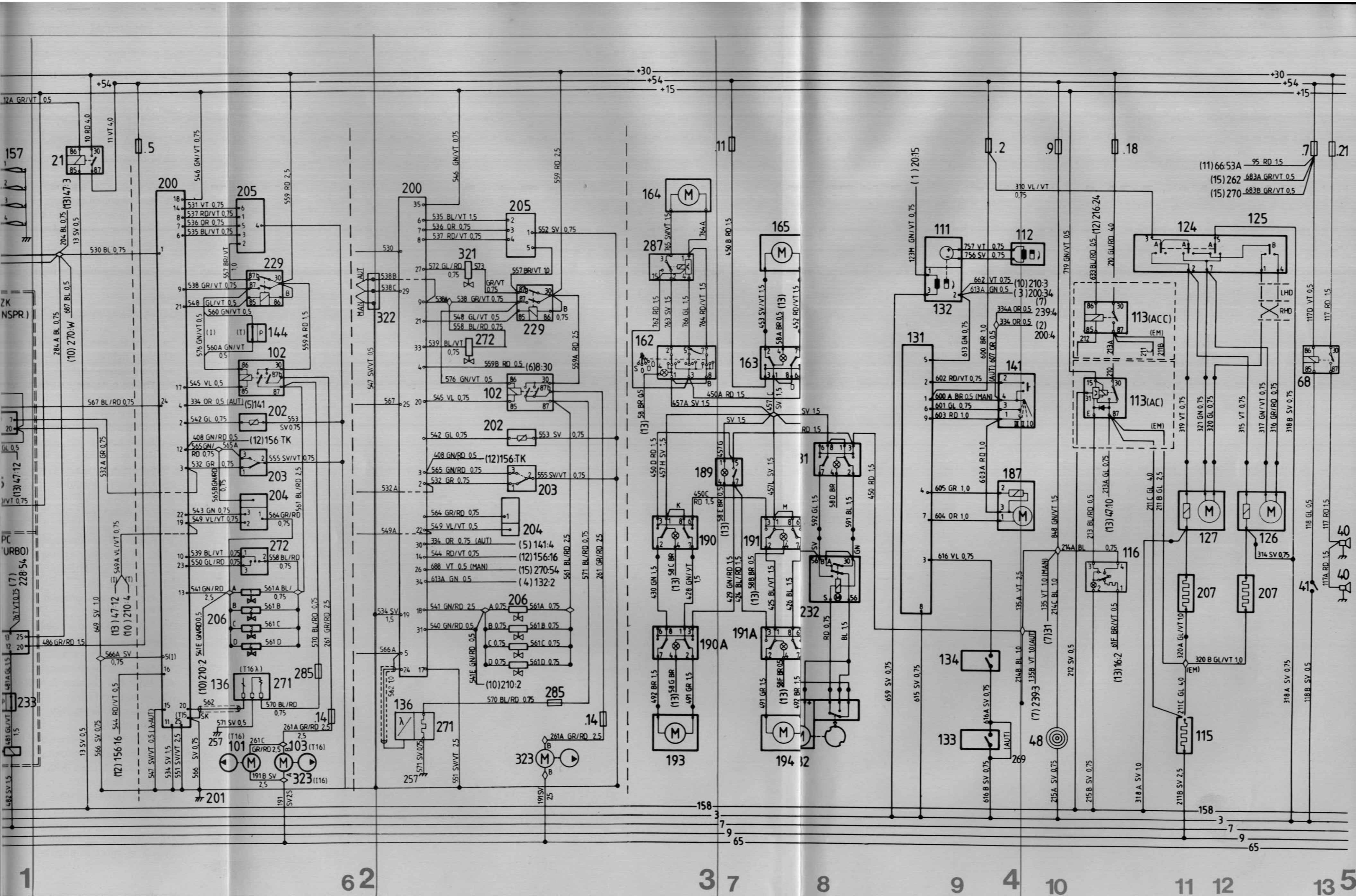
33 Courtesy lights
34 Luggage compartment illumination
35 Burglar alarm
36 EDU and DCC trip computers and clock
37 ~~Headlamp wipers~~
38 Windscreen wipers
39 Seat-belt tensioners
40 Automatic Climate Control (ACC)
41 Ventilation fan
42 ~~Air Conditioning (AC)~~
43 Radiator fan
44 Lighting for switches and controls
45 Warning and indicating lamp in the combined instrument
46 Anti-lock brakes (ABS)
47 Radio installation
48 Door demister fans
49 Shift-up indication

(T) = Turbocharged engine
(I) = Fuel injection engine

1988 Saab 9000 USA, sheet 1 (of 3)



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113(AC)
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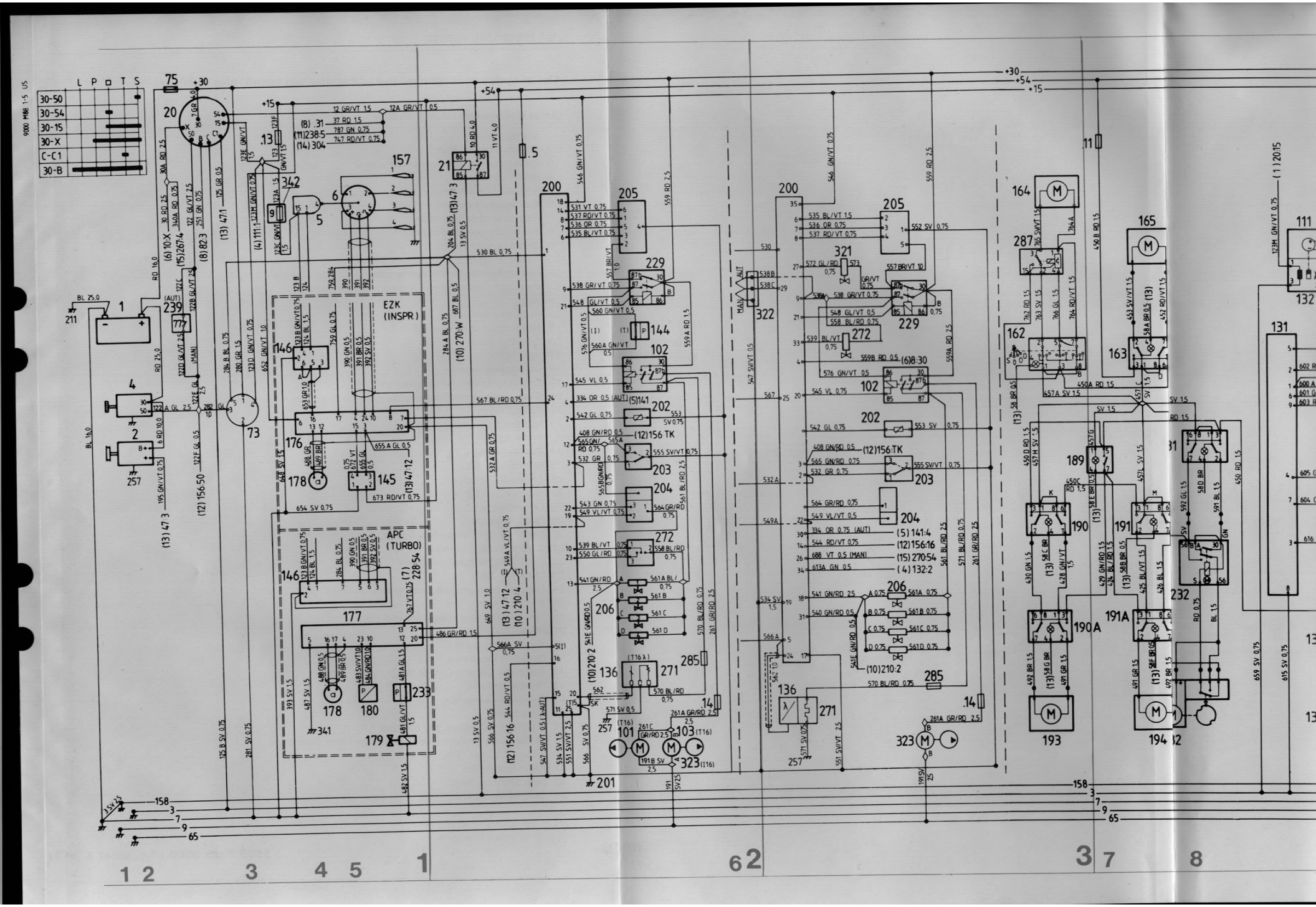
9000 M88 1·5 US
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30-X
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APC (TURBO)
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17 Rear lights
18 ~~Dim-dipped beam~~
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20 Glove compartment illumination
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22 Number plate illumination
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32 Electrically heated front seats
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34 Luggage compartment illumination
35 Burglar alarm
36 EDU and DCC trip computers and clock
37 ~~Headlamp wipers~~
38 Windscreen wipers
39 Seat-belt tensioners
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41 Ventilation fan
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43 Radiator fan
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46 Anti-lock brakes (ABS)
47 Radio installation
48 Door demister fans
49 Shift-up indication

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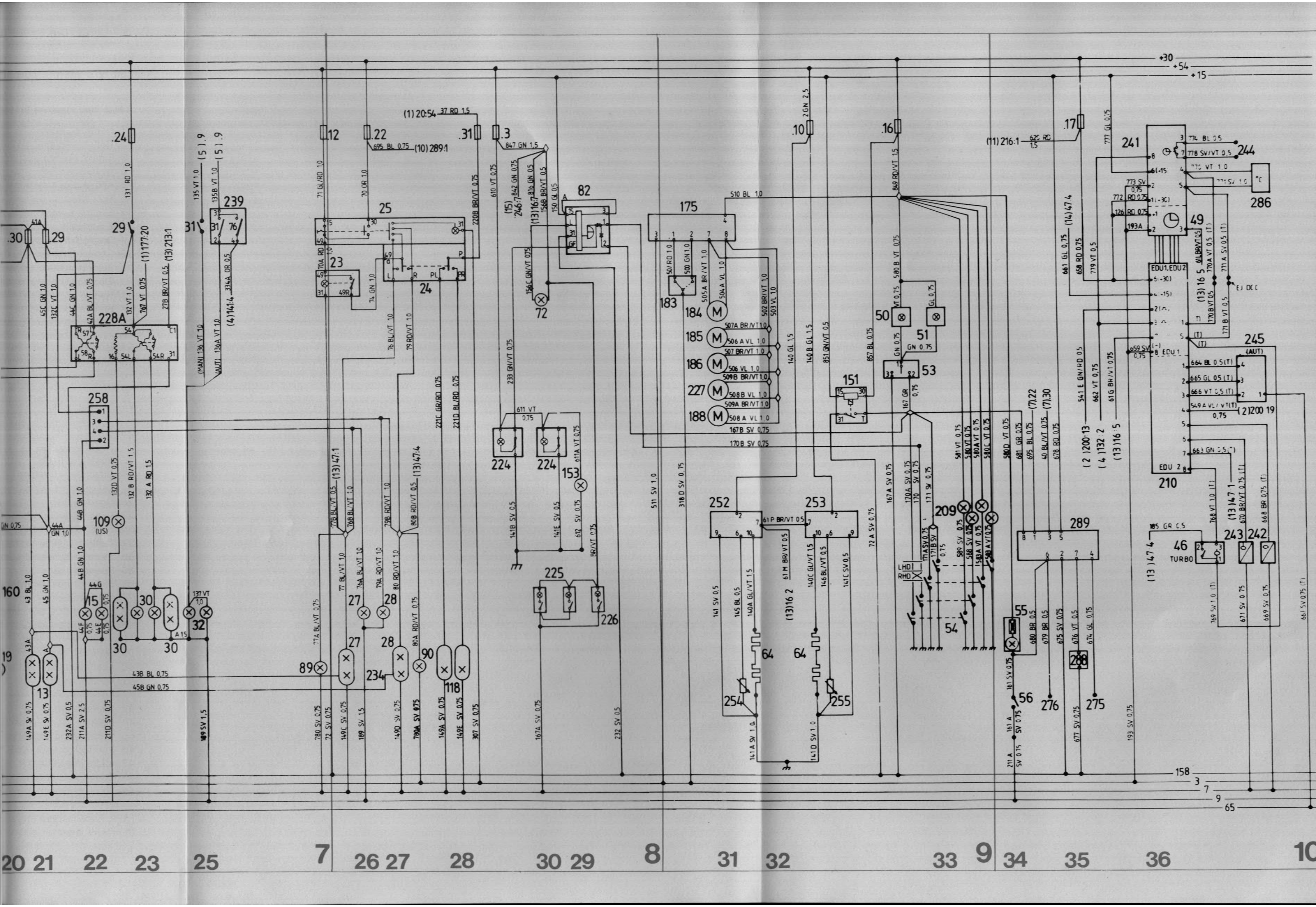
1988 Saab 9000 USA, sheet 2 (of 3)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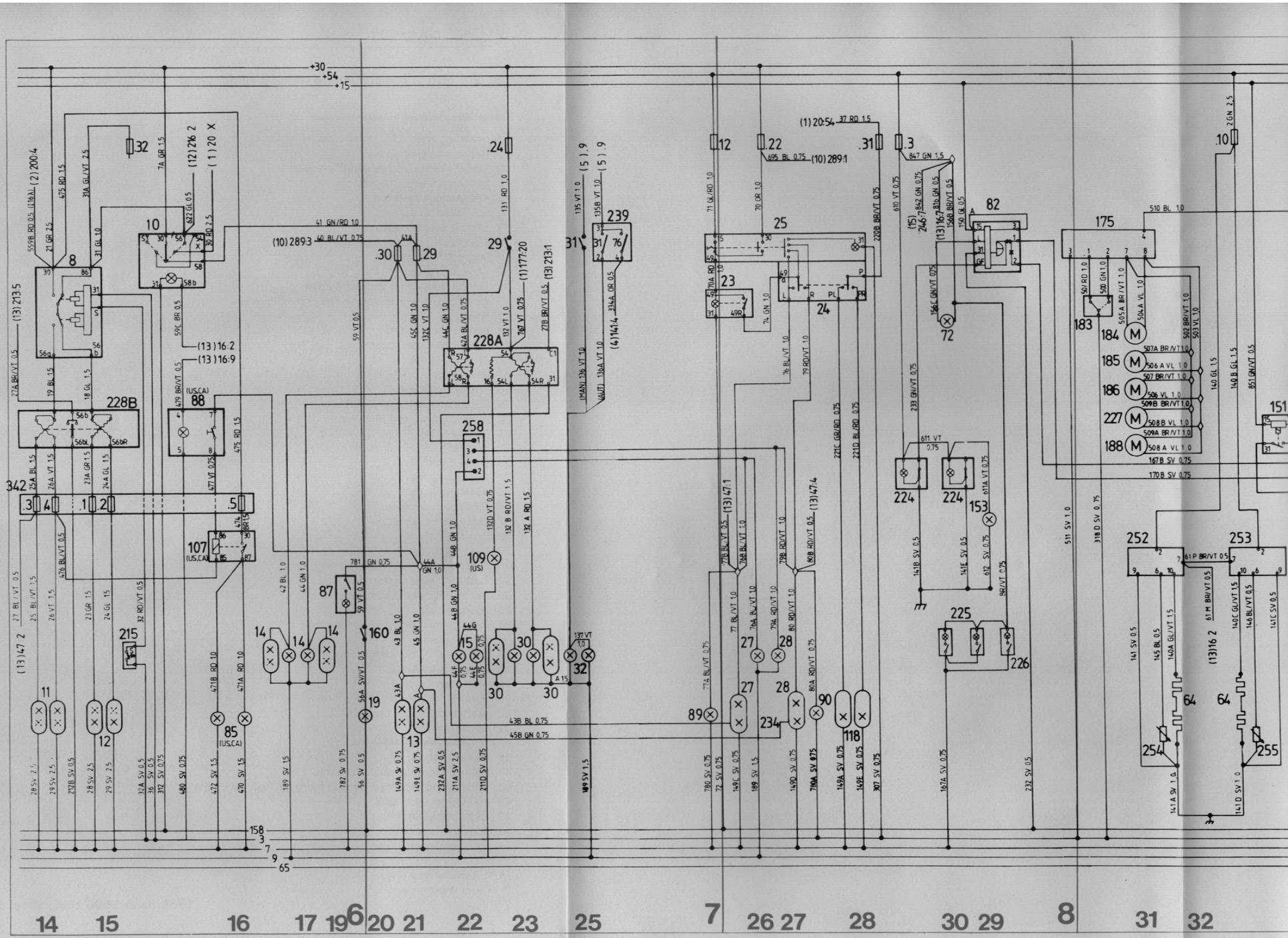
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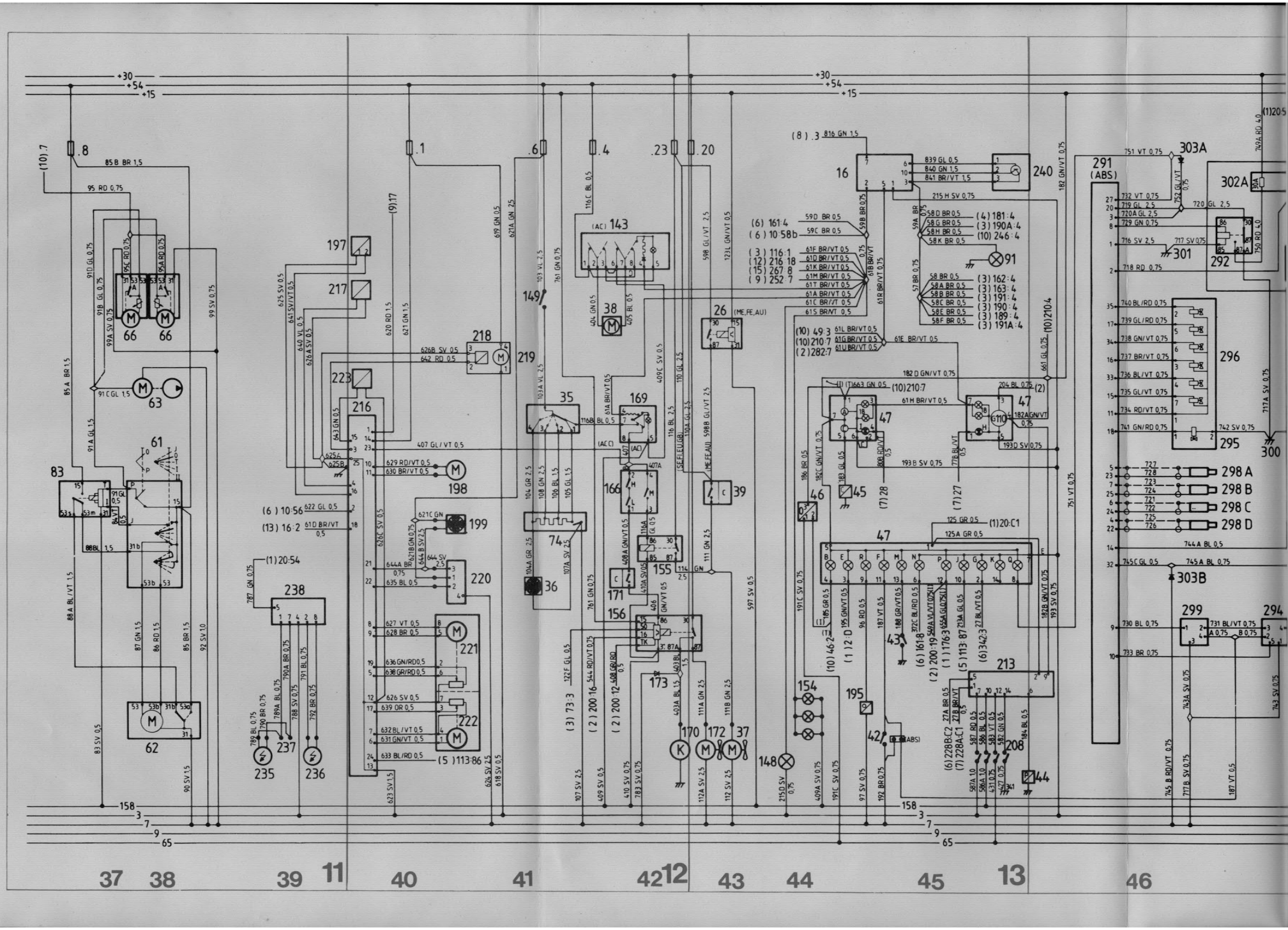
1988 Saab 9000 USA, sheet 3 (of 3)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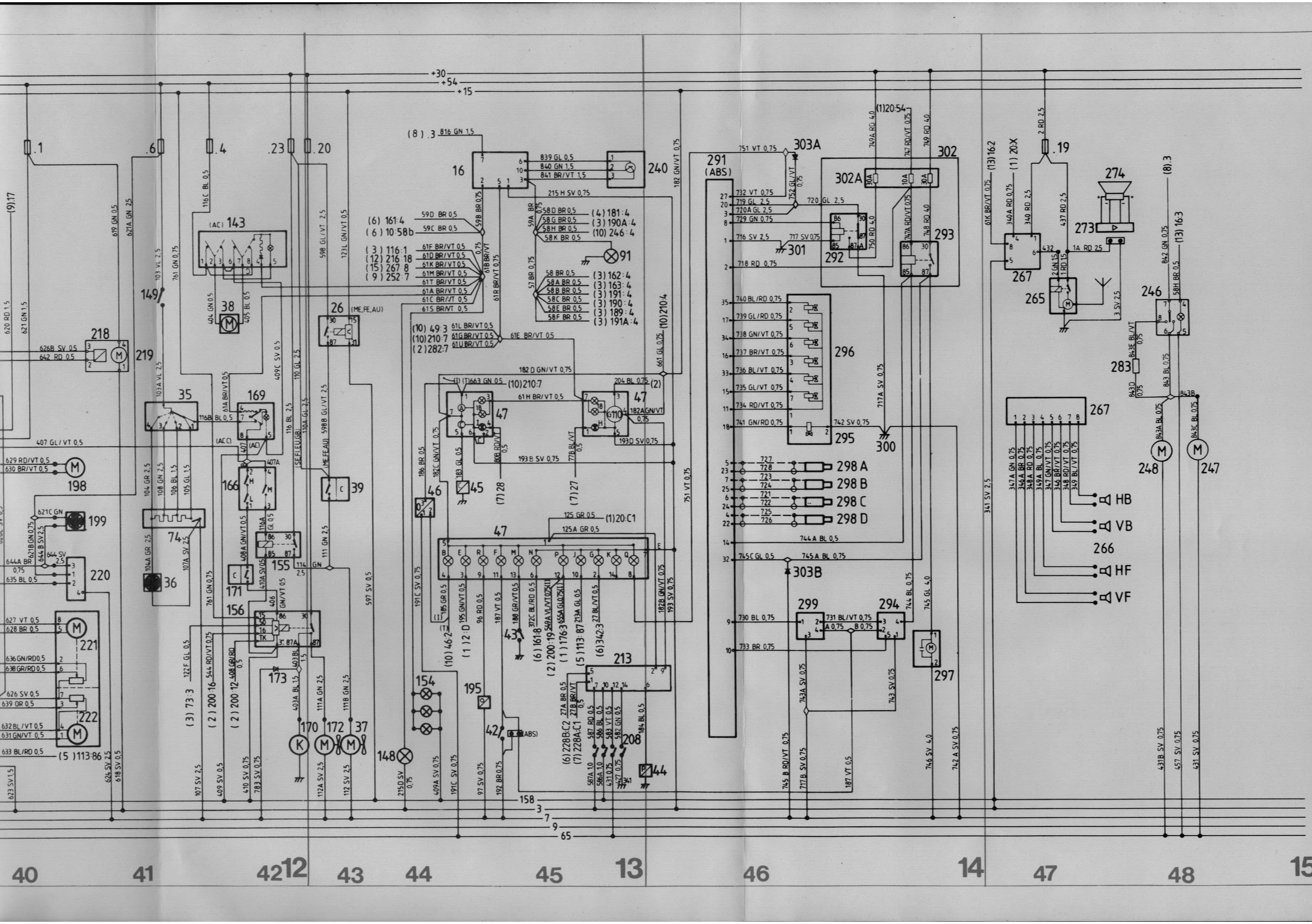

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291 (ABS)
303A
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302A
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298 A
298 B
298 C
298 D
303B
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HB
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HF
VF
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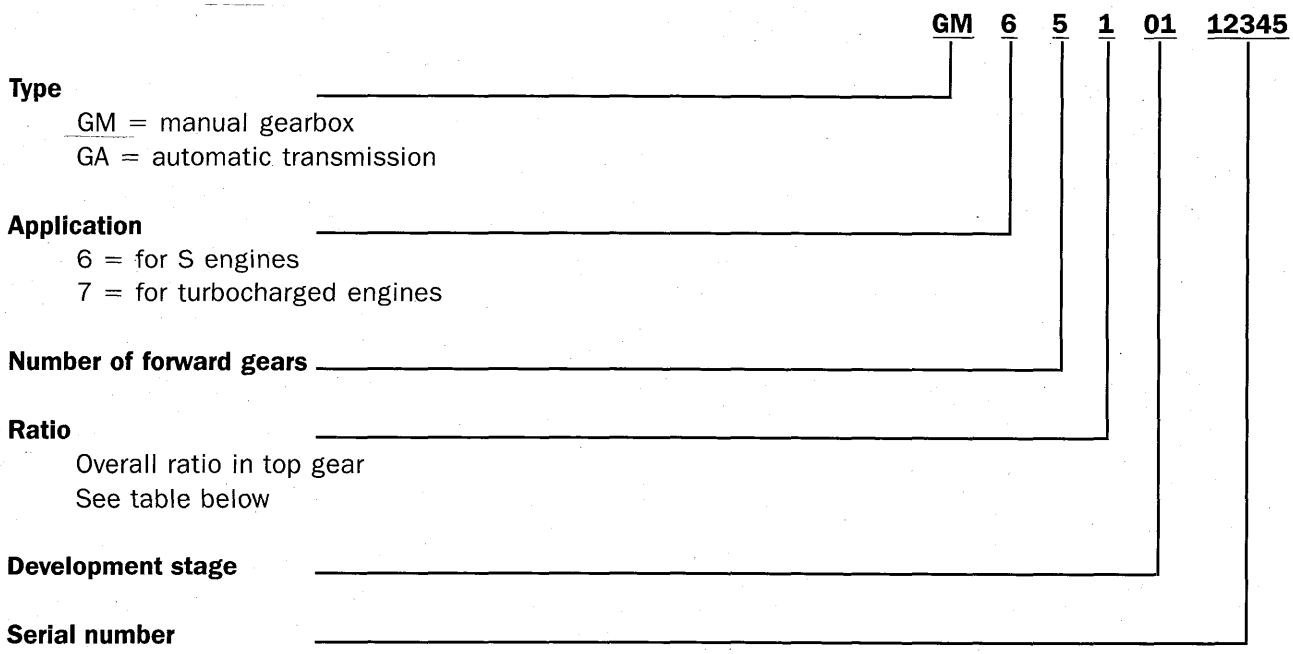
Transmission

Modified type designation

The type designations of all gearboxes have been modified and are now made up as follows:



Overall ratios in top gear

Code	0	1	2	3	4	5	6	7	8	9
Ratio	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3

Manual gearbox

Gearbox

The GM65101 supersedes the GMT5202 and GMT 5203. The overall ratios of the new gearbox in 4th and 5th gear are different from the previous gearbox (see table below).

Year	Model	Type designation	Final drive	Overall ratios 1	2	3	4	5
1988	9000S	GM 65101	89:20 4.45	14.72	7.84	5.25	3.98	3.13

Year	Model	Type designation	Tyre size	Speed km/h per 1000 engine r/min 1	2	3	4	5	Reverse
1988	9000S	GM 65101	1) 2)	7.7 7.7	14.5 14.4	21.6 21.5	28.5 28.3	36.2 35.9	7.9 7.9

1) 185/65 R15 H Michelin MXV/Pirelli P6/Goodyear Eagle NCT 65
   Dynamic rolling radius: 301 mm
2) 195/60 R15 H Michelin MXV/Pirelli P6/Goodyear Eagle NTC 65
   Dynamic rolling radius: 299 mm

Asbestos-free clutch discs

Asbestos-free plates have been introduced on all models.

Automatic transmission

New 3-stage governor

A new 3-stage governor with filter has been introduced. As a result, the shifting points are more uniformly distributed. Shifting from first to second now takes place earlier than in the past.

New throttle cable

A new, stiffer throttle cable (KD cable) has been introduced to improve the shifting quality.

New oil pump

A new oil pump with better high-temperature characteristics has been introduced.

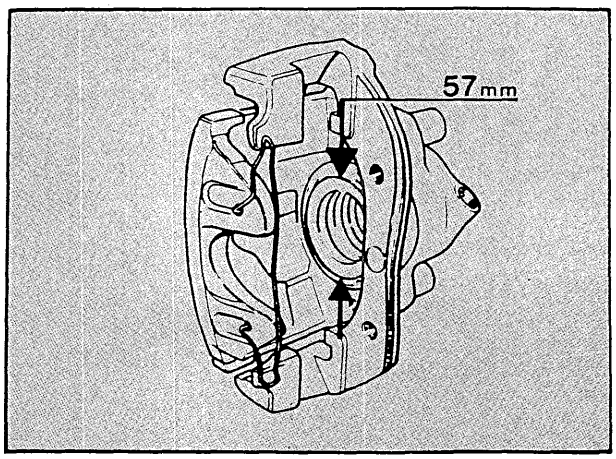
Brakes

Front brakes, M88 onwards (Turbo)

Brake calipers

The ATE brake calipers at the front are of the same basic design as the rear calipers. The brake pistons are now 57 mm (2.24 in) in diameter as against 54 mm (2.13 in) before.

The new front brakes have improved performance, a longer service life and are better balanced for high- speed motoring.



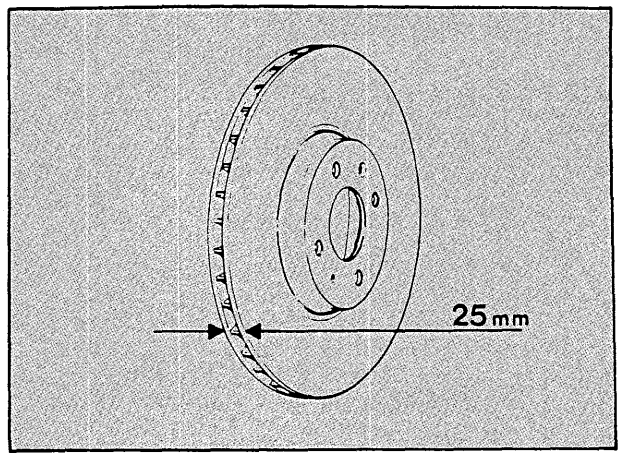
Brake piston with increased diameter

Brake discs

The thickness of the brake discs has been increased from 23.5 mm (0.93 in) to 25 mm (0.98 in).

The minimum permissible thickness after wear is now 23 mm (0.91 in) as against 21 mm (0.83 in) before.

The diameter remains unchanged at 278 mm (10.95 in).



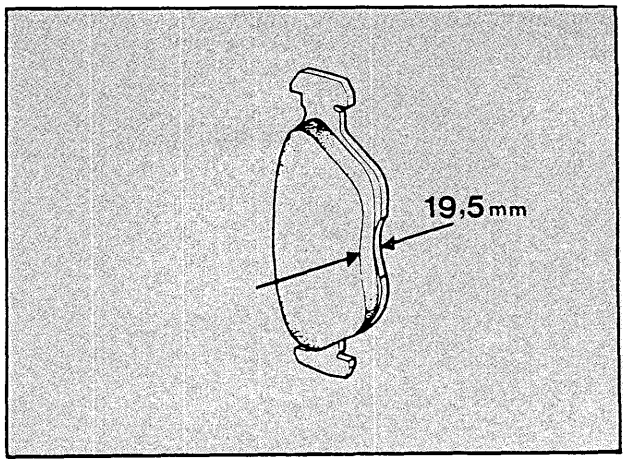
Thicker disc

Brake pads

The linings have been increased in size from 35 mm^2 to 48 mm^2 and the thickness of the pads has been increased from 16.7 mm (0.66 in) to 19.5 mm (0.77 in).

The friction material used is of the same grade as before, i.e. Textar 474.

The new pads provide increased performance for high-speed motoring and have an extended life.



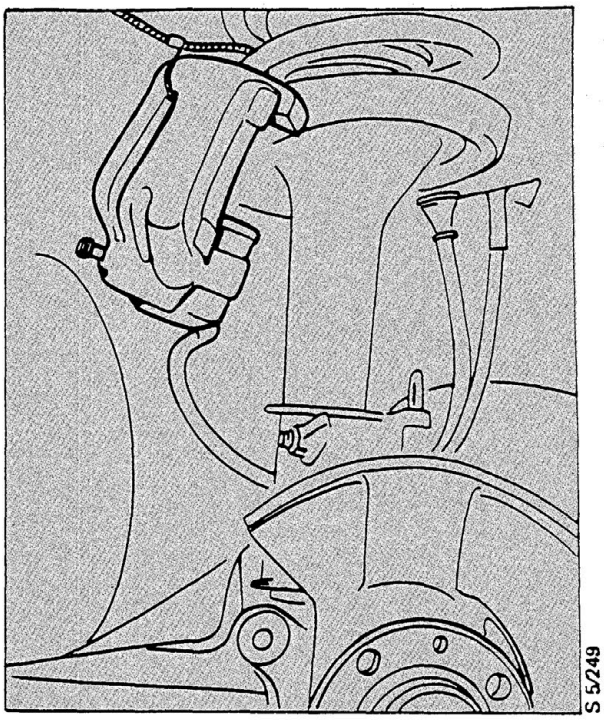
Thicker pads with greater friction area

Front brake discs

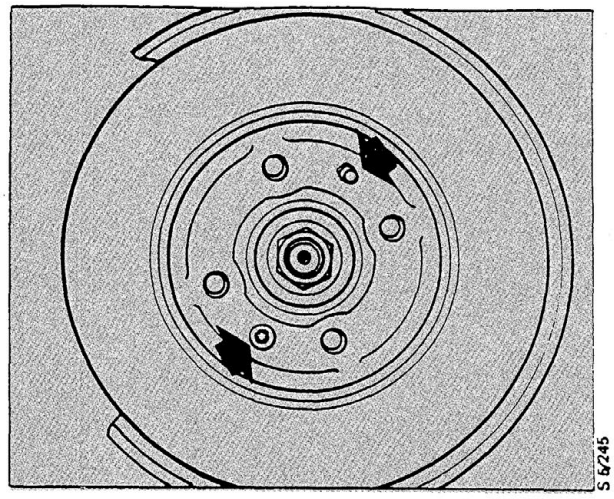
To remove

1. Raise the car and remove the wheel.
2. Remove the caliper securing bolts.

   Lift off the caliper and tie it to the MacPherson strut using a piece of wire.



3. Undo the locating stud and Torx screw and remove the disc.



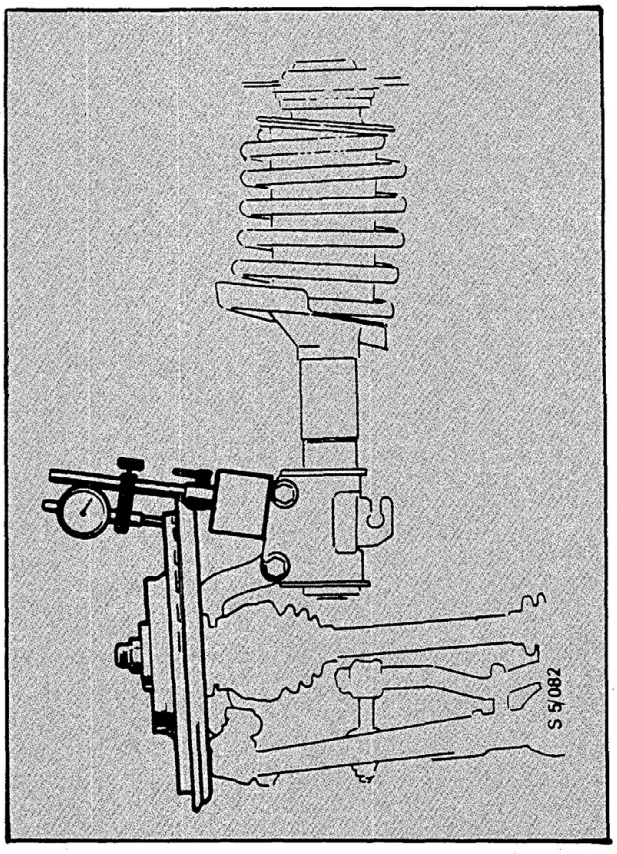
To refit

Before refitting the disc, check that the contact surface between the disc and the hub is free from corrosion, burrs, etc.

Refit in the reverse order.

Tightening torque for caliper securing bolts: 70–110 Nm (52–81 lbf ft)

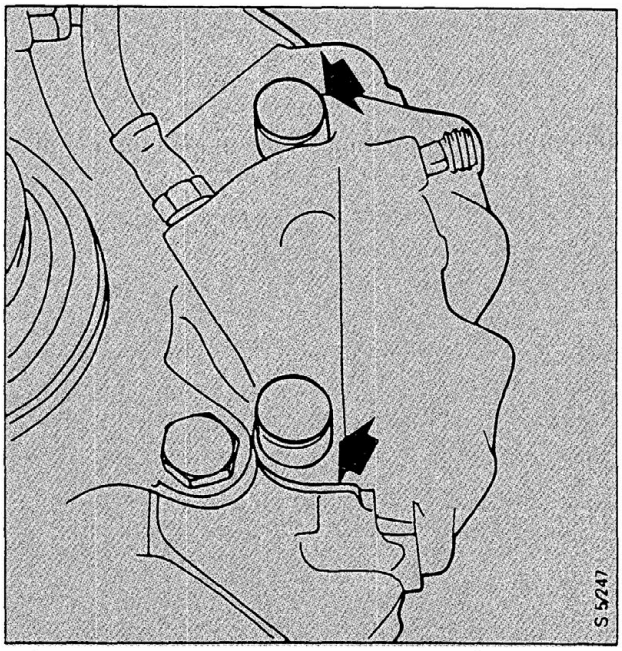
Check that the runout of the disc after fitting does not exceed 0.08 mm (0.003 in).



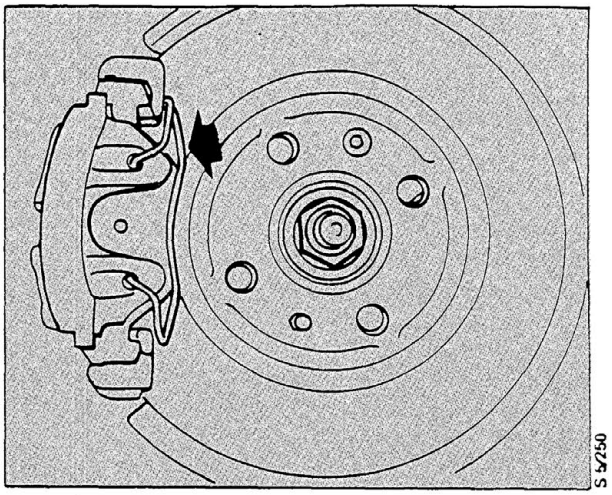
Front brake pads

To remove

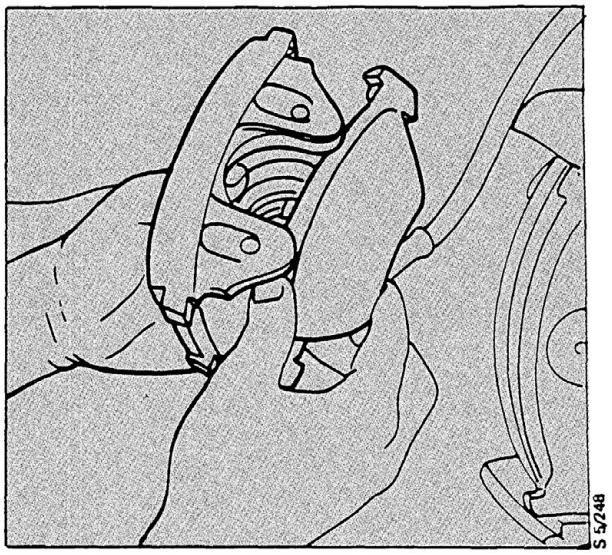
1. Raise the car and remove the wheel.
2. Remove the dust caps and unscrew the guide pins using a 7-mm Allen key or hex bit adaptor.



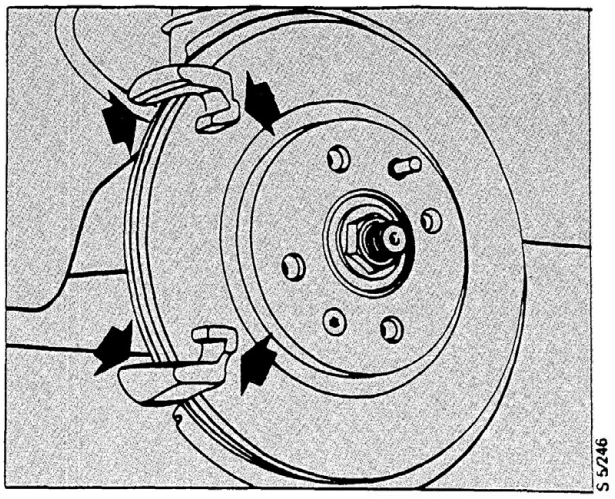
3. Remove the pad retainer.



4. Remove the caliper and then the pads.

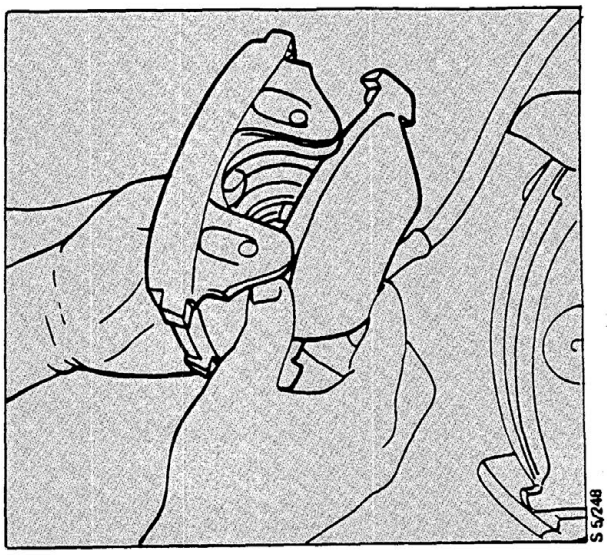


5. Lubricate the guide pins and check that the dust seals on the pins and piston are in good condition.
6. Clean the surface of the carrier in contact with the pads. If necessary, lubricate with Gleitmo 540 or the equivalent.

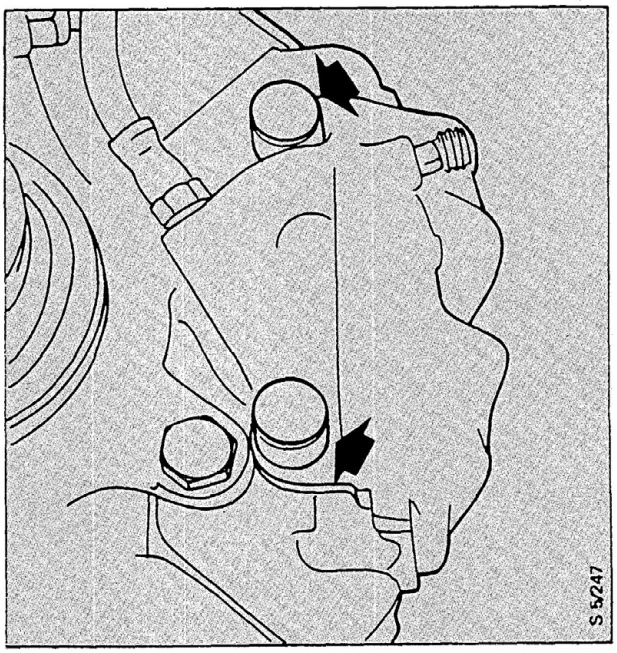


To refit

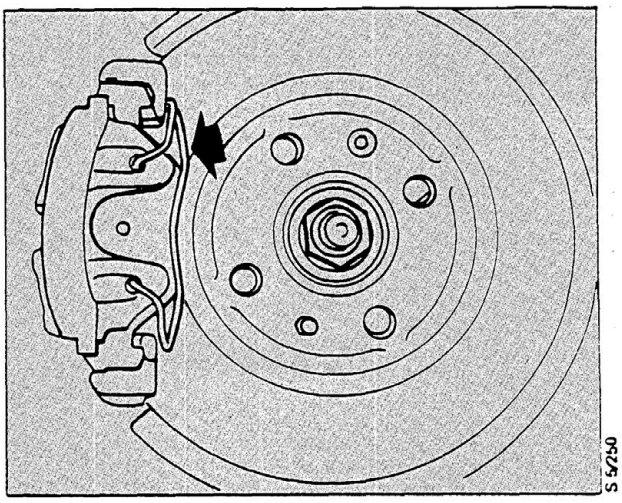
1. Fit the new brake pads and refit the caliper.



2. Tighten the guide pins and refit the dust caps.



3. Refit the pad retainer.



4. Refit the wheel.

   Repeat the procedure on the other wheel and lower the car.

   Pump the brake pedal to bring the pads into contact with the discs.

ABS brakes (US)

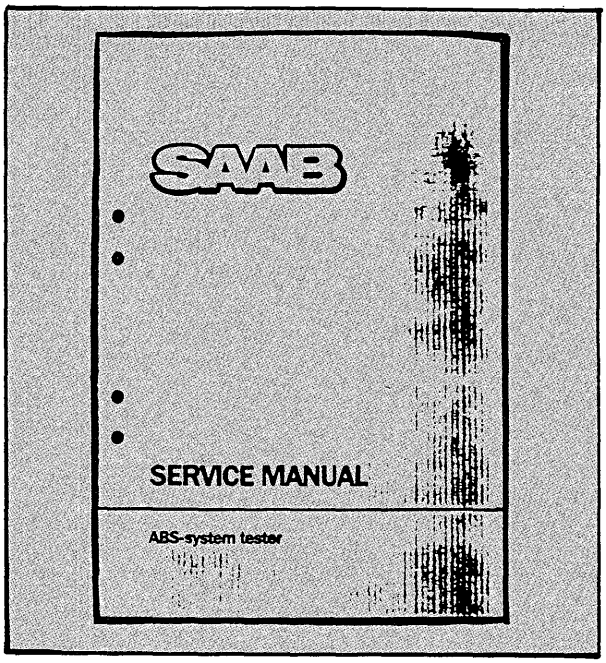
All Saab 9000 cars are equipped with anti-lock brakes as standard.

For a technical description of the ABS system, together with servicing procedures and fault diagnosis, refer to Section 5:2 of the Service Manual and to the manual for the ABS-system tester.

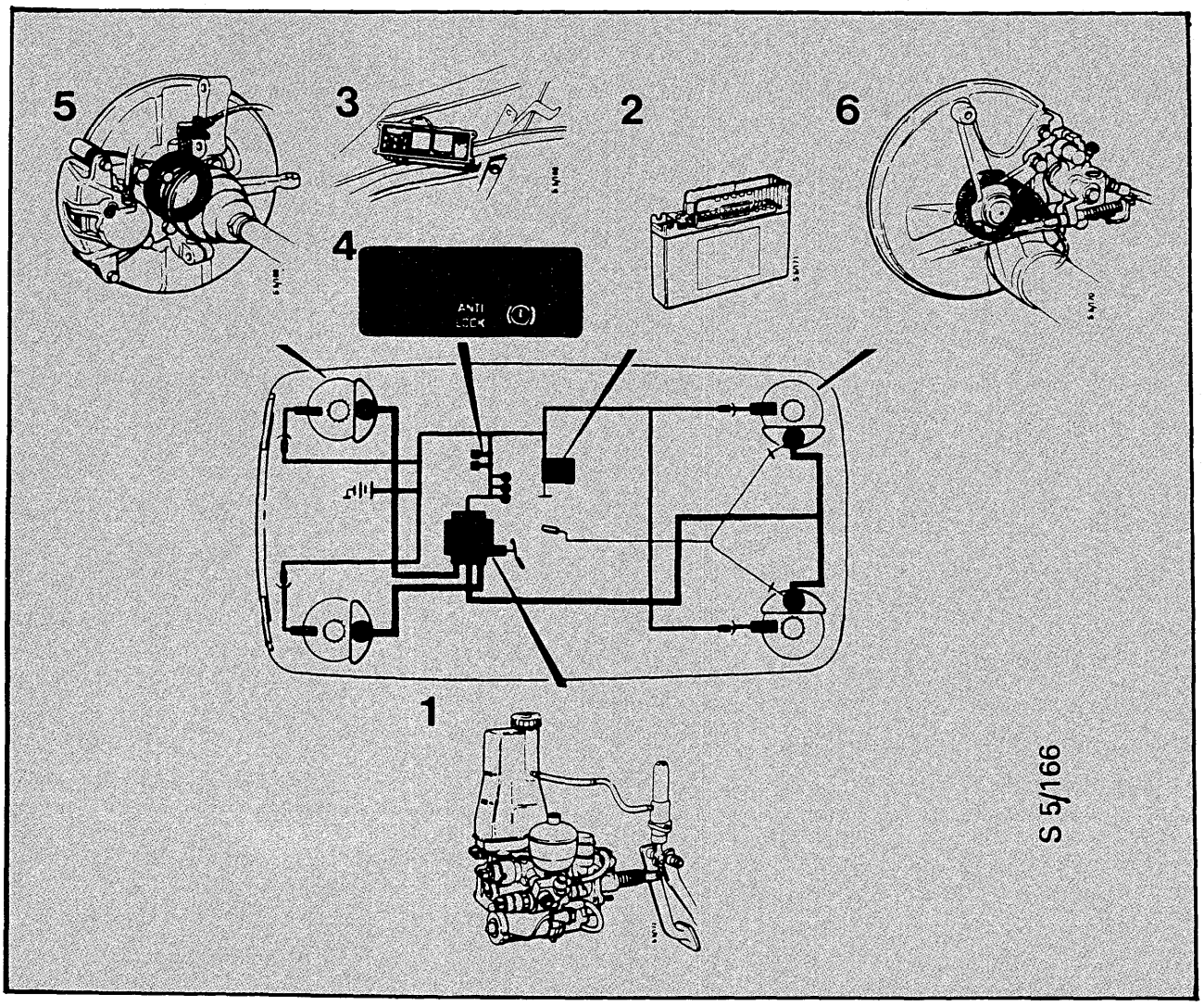
ABS brakes (CA)

All Saab 9000 Turbo cars are equipped with anti-lock brakes as standard; ABS brakes are available as an option on the Saab 9000S.

For a technical description of the ABS system, together with servicing procedures and fault diagnosis, refer to Section 5:2 of the Service Manual and to the manual for the ABS-system tester.



Manual on use of the ABS-system tester



Main components of the ABS system

1. Hydraulic unit
2. Electronic control unit (ECU)
3. Relay and fuse holder
4. Brake-warning and ABS-warning lights
5. Front wheel sensor and sensor wheel
6. Rear wheel sensor and sensor wheel.

Suspension and wheels

Tires, M 88

9000S (US & CA)

Tires of size 185/65T supersede the earlier 195/60H tires.

As from 1988 models, all Saab 9000 cars have a new spare wheel, consisting of a 16-inch steel wheel with a 105/80R tire.

Table of wheels and tires

How to use the tables:

Use the first table to find the number-letter code for the car variant and market specification concerned. Look up the digit part of the code in the table of tires and the letter part of the code in the table of wheels.

Tire-wheel code

Car model

Market specification	US	CA
9000Turbo	4C	4C
9000S	1C	1C
Spare wheel	5E	5E

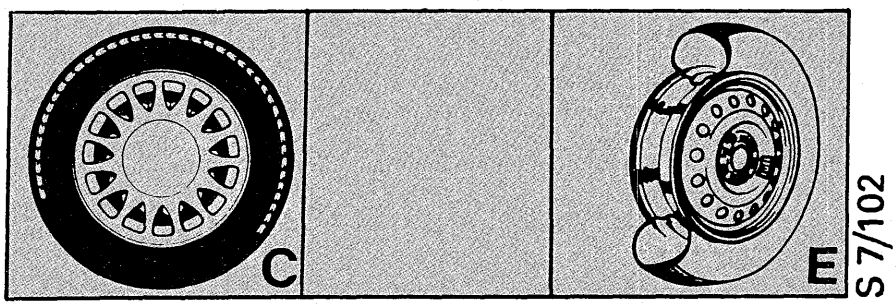


Table of tires

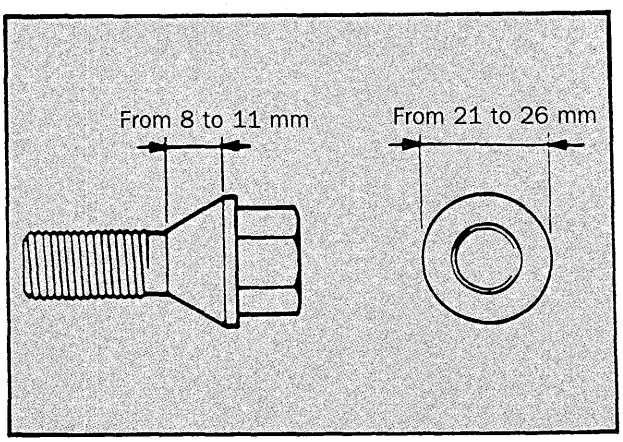
Code digit	Tire designation
1	185/65 R15 87T
4	205/55 VR15
5	T105/80 R16/D16 or T115/70 R16/D16

Table of wheels

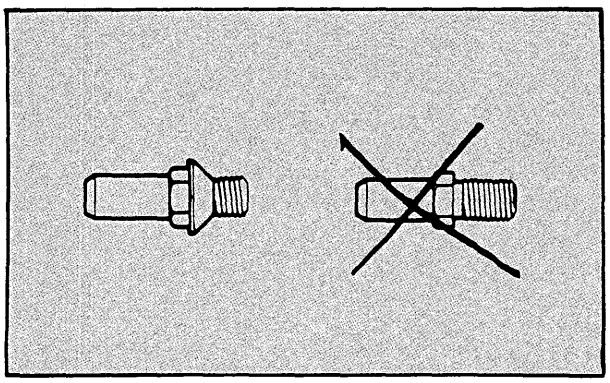
Code letter	Wheel designation	Type	Remarks
C	6J x 15 H2 ET33	Light-alloy	Spoked
E	4J x 15 H1	Steel	Red

Wheel fixings, M88 onwards

Wheel fixings have been improved by increasing the length of taper and the finish on the wheel bolts.
The conical section in the wheel holes has also been increased (alloy wheels only).

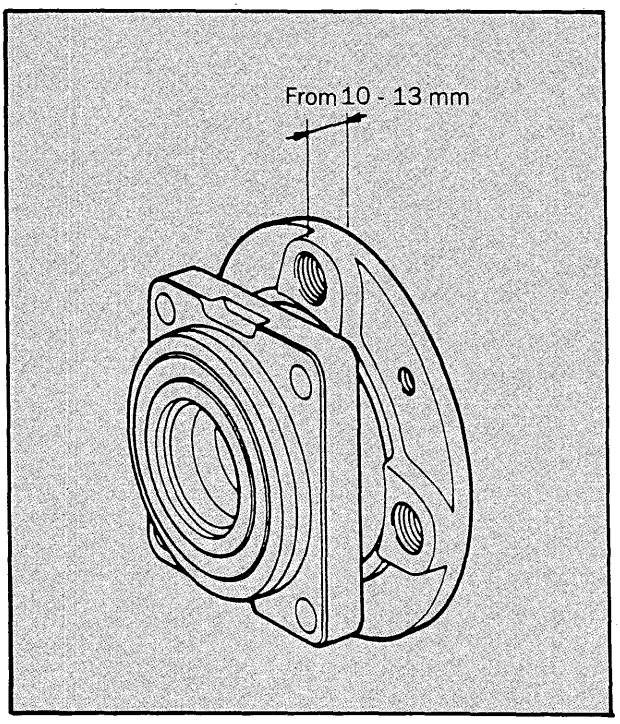


The locating stud on each wheel is now tapered against the brake disc, with a corresponding conical section in the hole in the disc.



Front-wheel hubs, M88 onwards

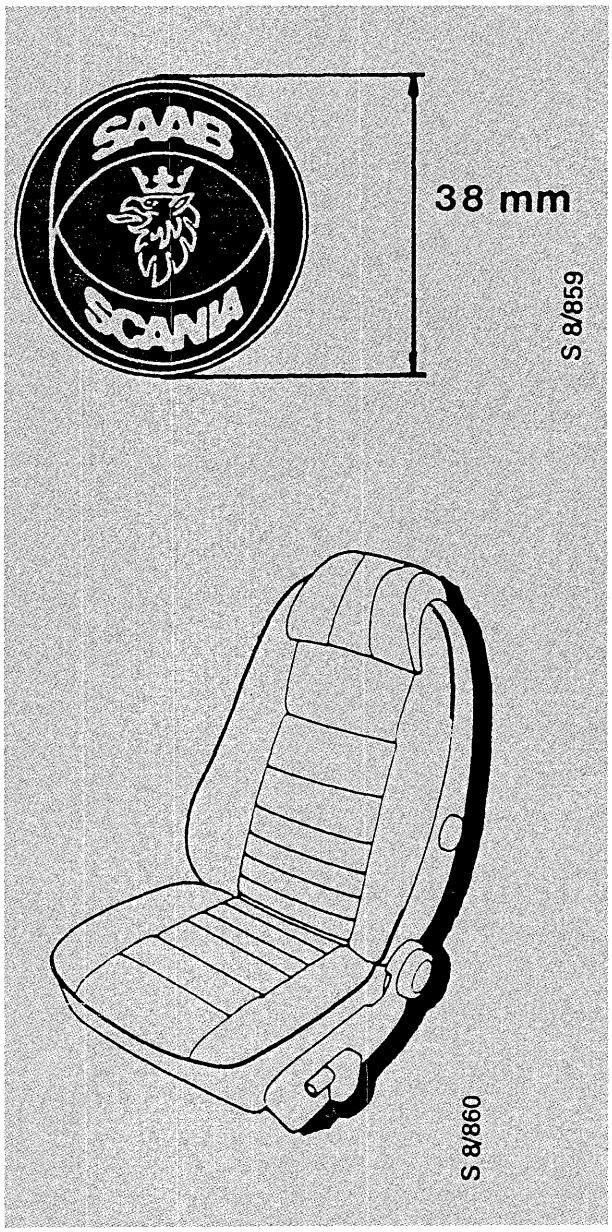
The thickness of the wheel hub has been increased from 10 to 13 mm to increase the length of thread for the wheel bolts.



Body

Emblem

A new, larger emblem, fitted in the same place as before, has been introduced for the tailgate.



Upholstery

Horizon, a new style of upholstery, supersedes the earlier Block and Contour styles.

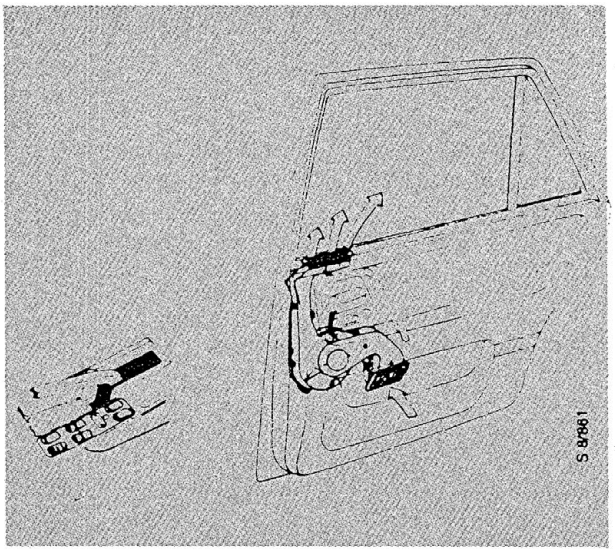
Matching heating pads have also been introduced.

Adjustable thigh support for passenger seat

All Turbo 16 cars, as well as 9000S cars to US specification, have front passenger seats with adjustable thigh support.

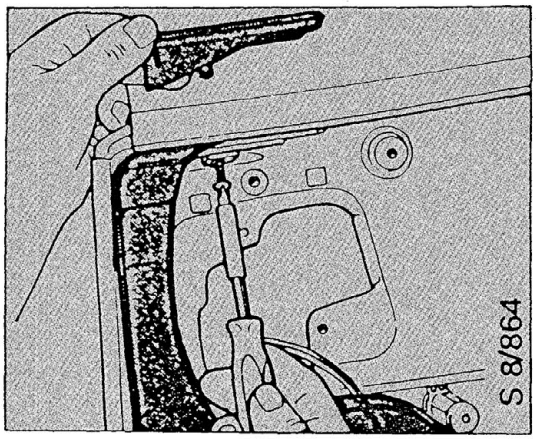
Demister fans for rear-door windows (Cars with ACC only)

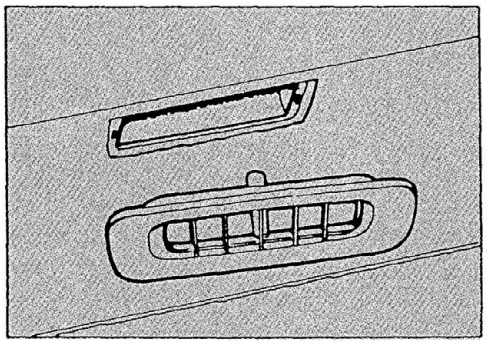
Turbo models equipped with ACC now have demister fans for the rear-door windows. The fans, which have two speeds, are operated by means of a switch on the centre console.

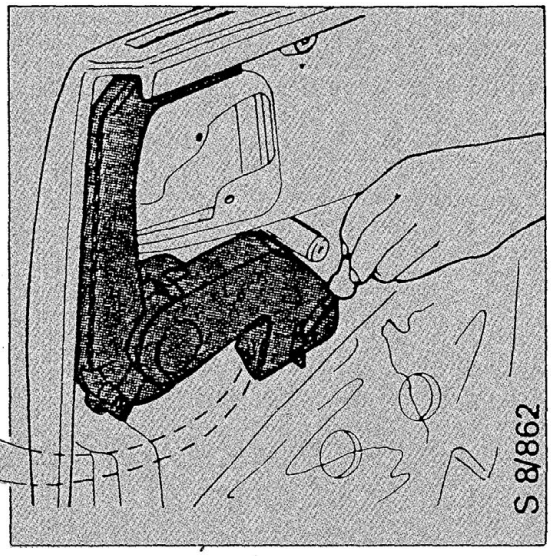


Removal and refitting

1. Disconnect the negative (-) battery lead and cover the terminal pole on the battery.
2. Remove the door trim.
3. Fold back the acoustic felt.
4. Remove the screws securing the air inlet and outlet grilles. Unplug the connector.





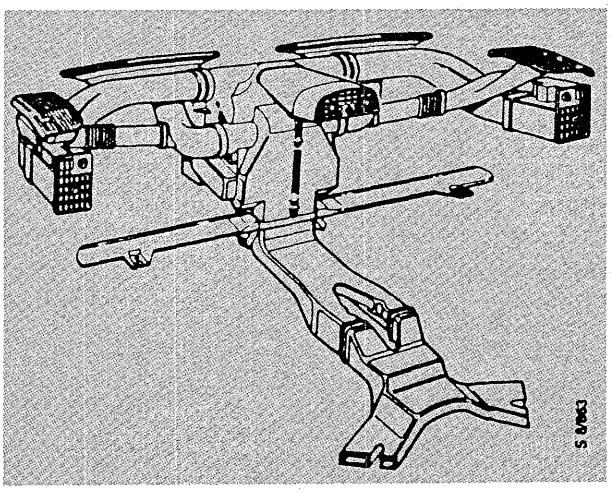


5. Lift out the fan.

Refit in the reverse order.

Front floor ducts – new vents

Front floor ducts with four separate outlets have been introduced. The earlier floor vent has been retained, although the supply of air from it has been reduced.



Removal and refitting

1. Fold back the carpeting under the dashboard.
2. Unscrew the floor duct.
3. Lift out the duct.

Refit in the reverse order.

Seven-cylinder AC compressor

The earlier five-cylinder AC compressor has been superseded by a new, quieter seven-cylinder compressor. The two versions are fully interchangeable.

Seven-cylinder AC compressor

Type		Sanden SD 709
No. of cylinders		7
Swept volume	cm^3	154.9
Refrigerant		R12
Oil capacity (new compressor)	dl	1.35
Clutch		Electromagnetic
Speed range	r/min	500 – 6000
Weight including clutch	kg	6.95

New body colors, M88

The following colors have been added to the body-color range:

Color code	Color	Type
212	Sandstone	Base color
213	Rhodonite	Solid
214	Cherry Red 2	Solid

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