

Volvo TP 30838

VOLVO

Service Manual

Fault tracing

Design

Repair

Function

Maintenance

Section
5(50, 51, 52, 55, 59)

Brakes (incl. ABS)

700/900
1982-19..

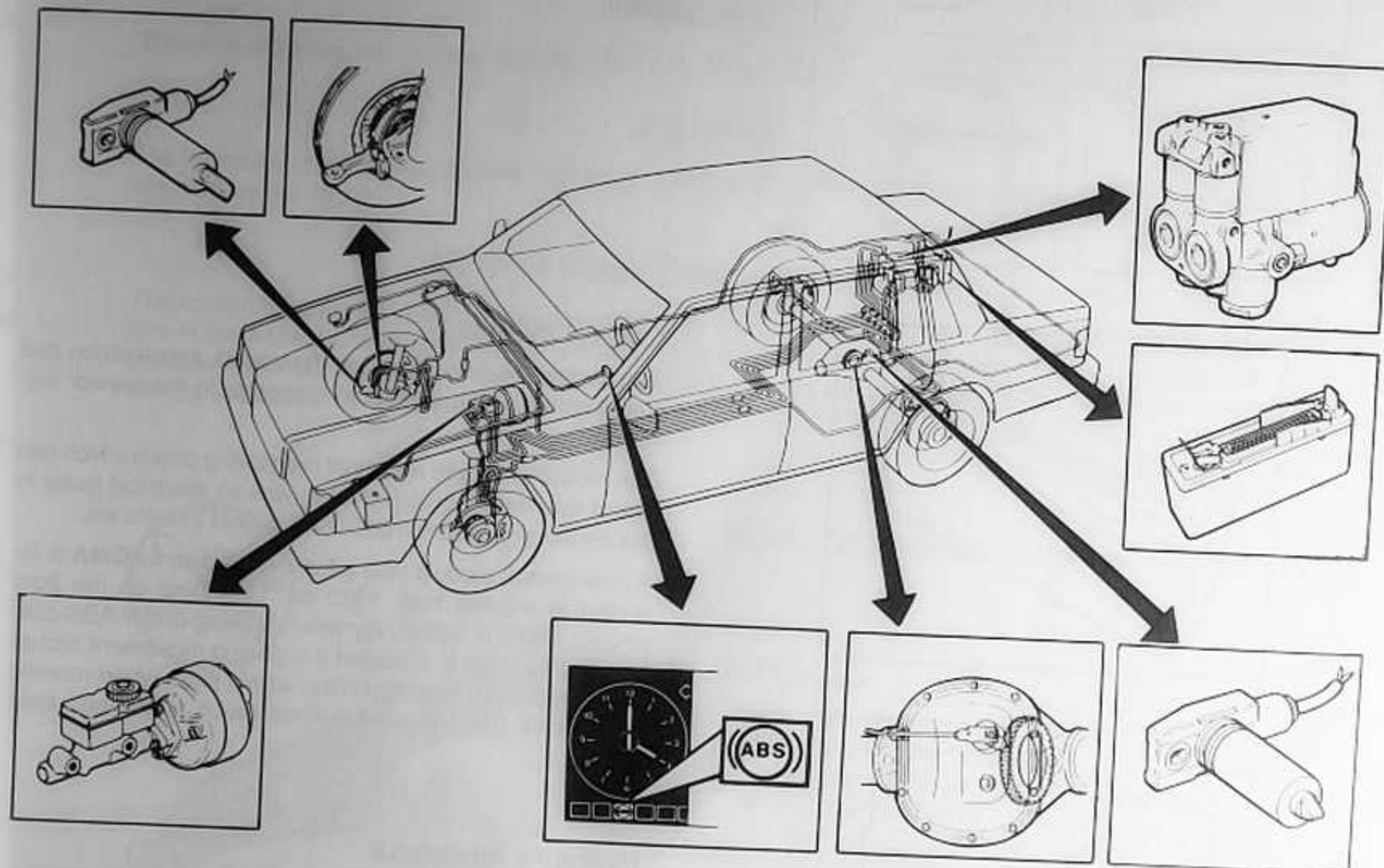
TP 30838/2



Volvo Car Corporation

Group 59 Anti-lock brakes (ABS) Design and function

General



Location of main components in car

The illustration shows an earlier configuration with the hydraulic modulator and control module mounted at the rear. The hydraulic modulator is installed in the engine compartment and the control module in the passenger compartment on models from 1988 on.

The ABS system consists of the following main components: hydraulic modulator, sensors, control module, wiring and a warning lamp on the combined instrument which lights if the system becomes inoperative.

Vehicles equipped with ABS have an axle-split braking system. The rear piston in the master cylinder serves the front axle and the front cylinder the rear axle.

ABS ensures that directional stability and steering control are maintained, and the braking distance minimised, when the brakes are applied. This is achieved by a combination of precision hydraulics and digital technology.

The system is designed to sense the degree of friction between the road surface and each of the tyres, and the control module automatically operates the hydraulic system so as to maintain the correct pressure in the braking circuits at all times. If a wheel is about to lock, the supply pressure to that caliper is reduced temporarily.

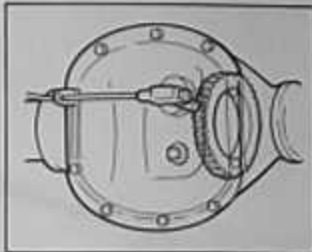
A warning lamp on the combined instrument lights if the ABS system is inoperative. **Note:** The normal braking function is available at all times.

Description of components and function

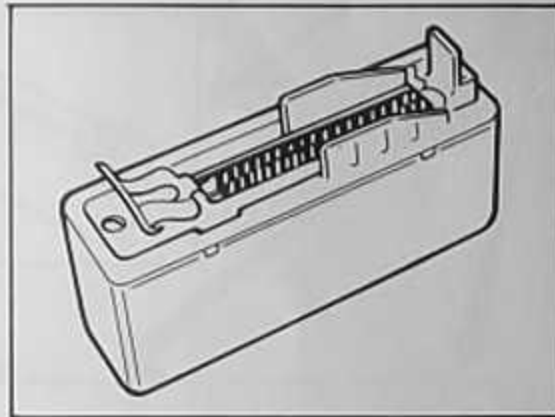
Sensor



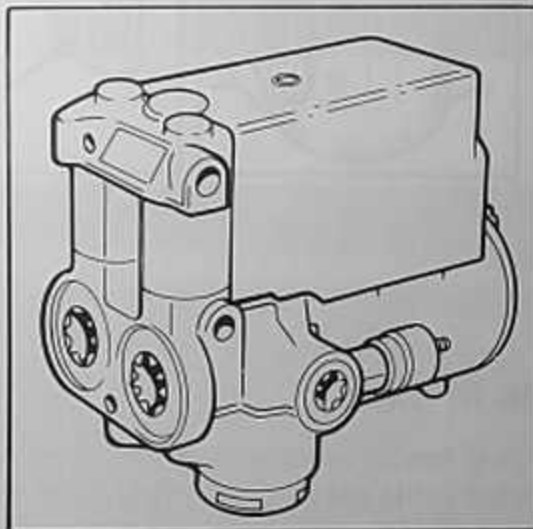
Sensor wheel



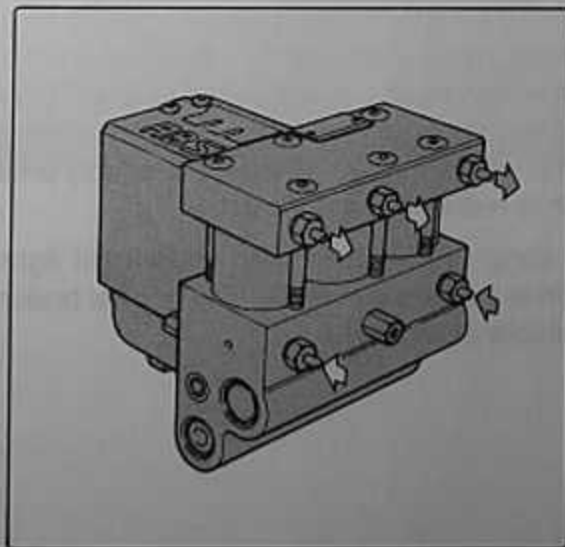
150 079



150 071



150 072



152 886

Sensors/sensor wheels

Each ABS sensor measures the speed of the road wheel by detecting the rate of passage of the teeth on the sensor wheel.

In the case of the rear wheels, the value recorded is an average since only one sensor and sensor wheel is installed.

Control module

The control module computes the speed, acceleration and deceleration of the wheels in response to the sensor signals.

The module features an inbuilt monitoring circuit which can detect internal module faults, as well as electrical faults in the sensors, hydraulic modulator, signal circuits etc.

A new control module with a function known as **GMA** is installed in models from 1990 on. Operating on the front wheels, GMA is active only when braking under ABS control. The function is engaged if a yawing movement occurs between the left and right-hand wheel pairs when running on different types of road surface (such as ice and bare earth).

Hydraulic modulator

The hydraulic modulator receives and processes the control module signals so as to maintain the correct pressure in the wheel cylinders. In the event of wheel lock, the pressure in the brake cylinder of the locked wheel is reduced and the integral electrical control pump returns brake fluid from the wheel cylinder to the master cylinder.

A later version of the hydraulic modulator is provided with new pipe connections at two points. The outlets in question are marked 'h' (rear circuit outlet) and 'i' (left front outlet). Since the size of the new outlets is M12 compared with M10 previously, the brake pipes must also be replaced when replacing an earlier modulator with the new type.

A completely new type of modulator was introduced on models from 1992 on (see illustration).

The piping and connector arrangement is completely different on the new version which, as a result, cannot be installed in earlier models.

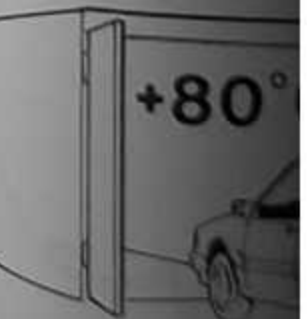
The following procedure should be followed while driving.

Note: First see the Special tools: Multitool 999 9724-9.

These fault-tracing instructions should be followed.

The instructions on the side of the module may be damaged.

The control module is located in the sensor circuit and in the sensor circuit engages the ABS system. Checks should be carried out.



Fault tracing of ABS system

The following procedure applies to cars to 1987 inclusive and should be carried out if the ABS lamp lights while driving.

Note: First see the ABS fault-tracing charts on pages 118–120.

Special tools: Multimeter, P/N 999 6525–3, or voltmeter, P/N 999 6450–4, and ohmmeter, P/N 999 9724–9.

General

These fault-tracing instructions assume that the braking system as a whole is operational.

Important

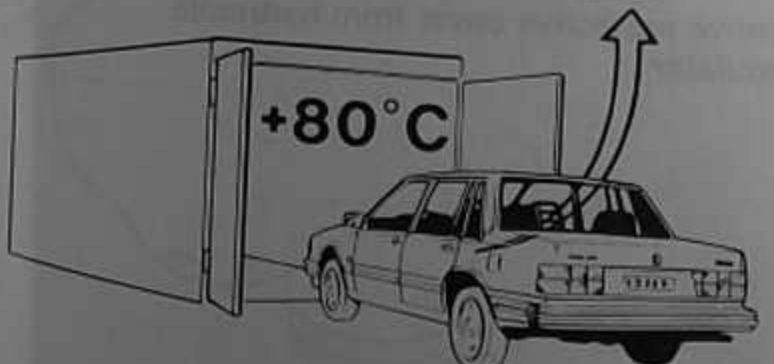
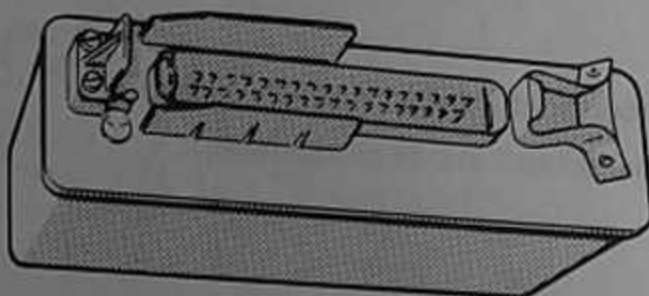
The instructions on this and the following pages must be observed at all times, otherwise the control module may be damaged.

Control module monitoring circuit

The control module incorporates a fault-monitoring circuit designed to detect faults in the module itself, and in the sensor circuitry, hydraulic modulator, signal circuits etc. On detecting a fault, the circuit disengages the ABS system and operates the warning lamp on the combined instrument. The following checks should be carried out if the lamp lights:



138 584



138 583

Note: All checks must be carried out.

AH1

Battery:

- do not disconnect battery while engine is running
- disconnect battery leads when booster charging
- do not use booster charger or voltage source higher than 16 V for jump starting

AH2

Ignition

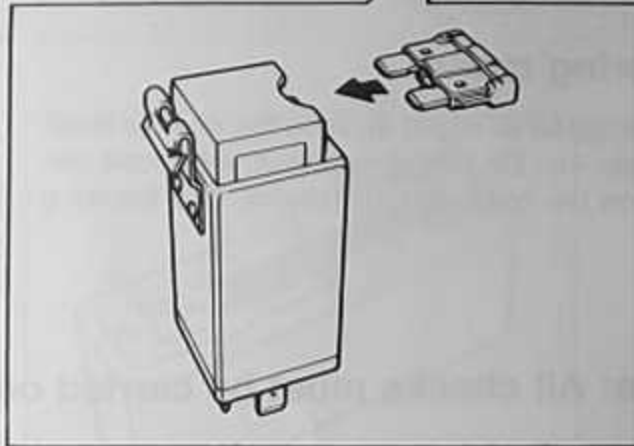
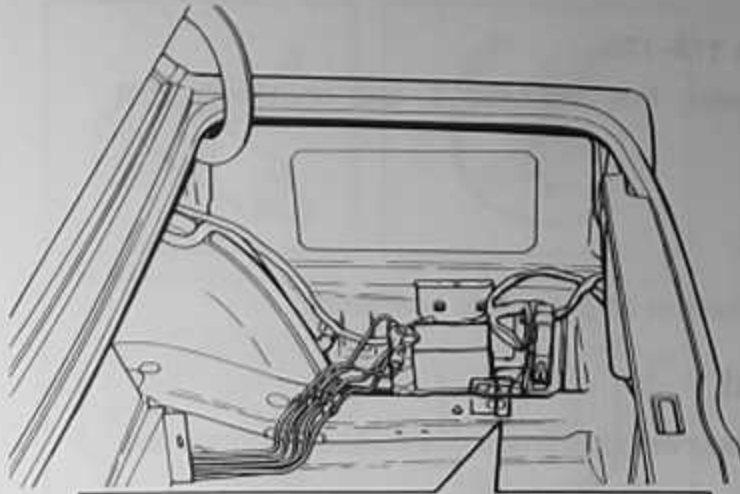
Switch off ignition when disconnecting or connecting control module connector.

AH3

Control module

- Remove control module, for example when stoving paintwork. The module must not be exposed to temperatures above +80°C (176°F).
- Disconnect control module connector when carrying out arc welding on the car.
- Do not replace the module without checking the associated wiring and components, otherwise the new module may be damaged in the same manner as the original.

Checking fuses, connectors and ground terminals



138 539

Models to 1984 inclusive:

Check fuses 2 and 10 in electrical distribution unit.
Check fuse at right-hand wheel housing (80 A).

AH4

AH5

Models from 1985 to 1987 inclusive:

Check fuses 2 and 12 in electrical distribution unit.

AH6

Check transient surge protector fuse (10 A)

Remove cover over right-hand well in luggage compartment. Fold back carpet.

AH7

Check all ABS system connectors, wiring and ground terminals

Ensure that components are correctly and securely connected.

Poor contacts can cause fault symptoms.

Checking components and wiring

See appropriate wiring diagram at rear of manual.

AH8

Switch off ignition

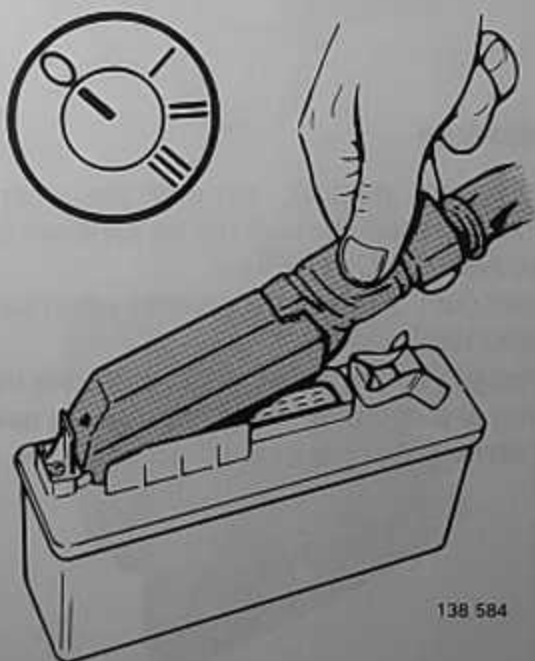
AH9

Disconnect control module connector

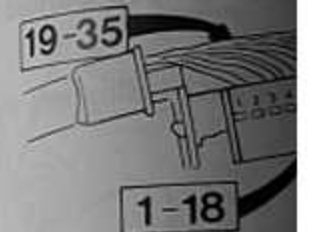
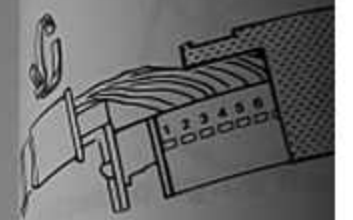
Depress catch and lift off connector.

AH10

Remove protective cover from hydraulic modulator



138 584



34
32
20
10

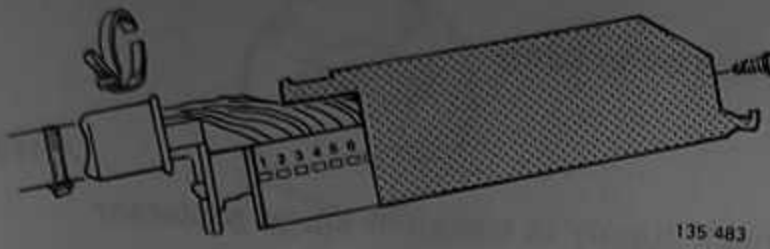


Group 59 Anti-lock brakes (ABS) Fault tracing

AH11

Remove protective cover from connector

Important!
Never insert test instrument probes into terminal sockets.
Experience has shown that this may damage terminals and further aggravate fault(s).
Check terminals through holes in connector sides. Do not exert greater force than necessary to make contact.
Terminal numbers are punched in connector sides.



135 483

AH12

Check ground terminals in connector

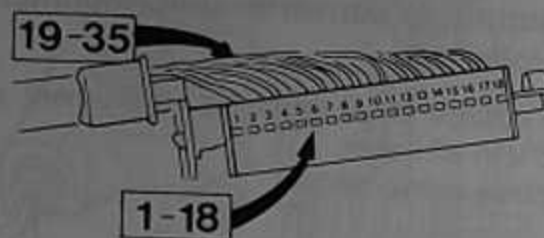
AH13

Connect ohmmeter between ground and

- terminal 10
- terminal 20
- terminal 32
- terminal 34

Resistance should be 0 ohm in all cases.
If reading is incorrect: Check integrity and connection of leads.

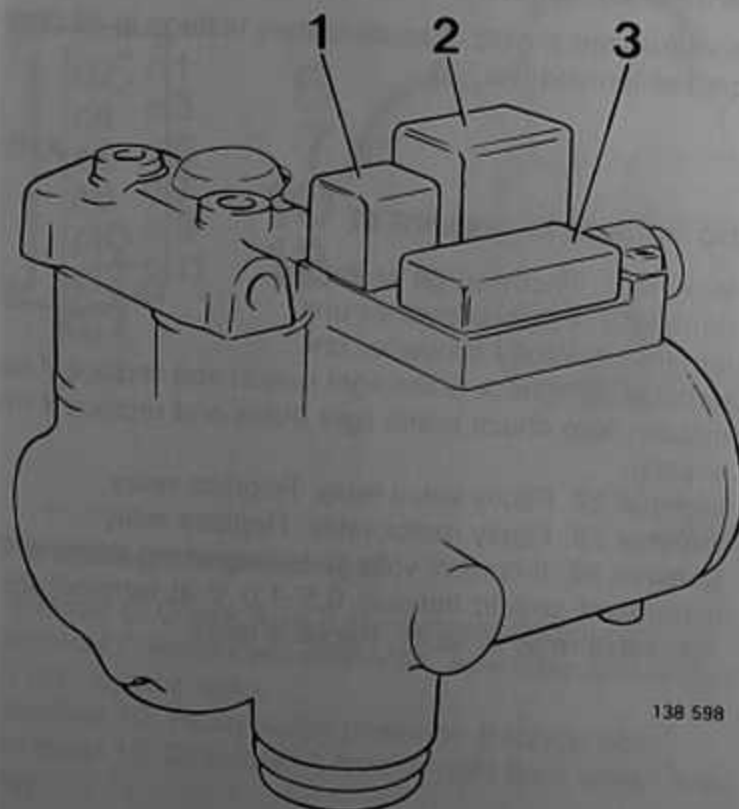
Leads are grounded at right-hand rear light.



34
32
20
10



141 123



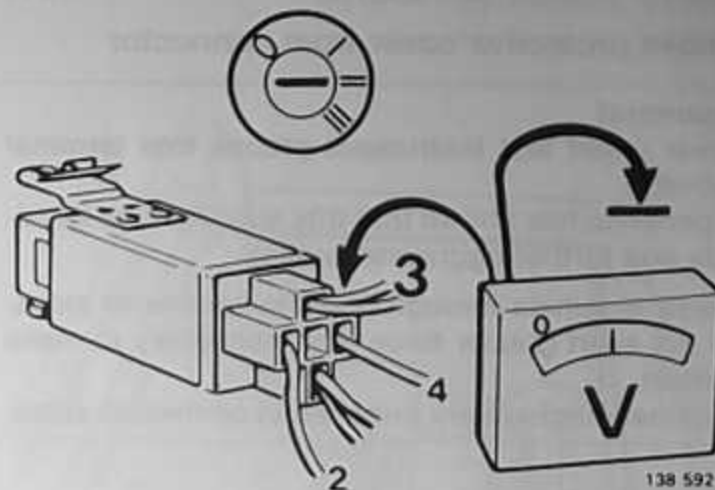
138 598

If test of terminal 32 indicates fault, repeat test with new valve relay. Relay is mounted on hydraulic modulator.

1. Valve relay
2. Motor relay
3. Connector

Group 59 Anti-lock brakes (ABS)

Fault tracing



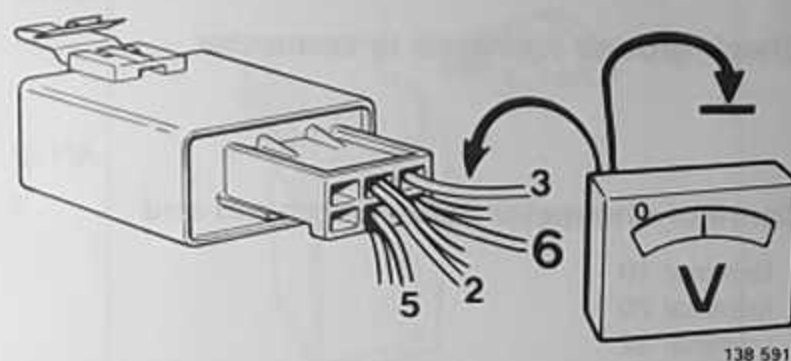
Switch on ignition

AH14

AH15

Check supply to transient surge protector

Protector is mounted on bracket beside control module. Measure voltage at connector terminals 2, 4 and 3. Instrument should indicate 12 V in all cases. If no supply is present at terminal 3, check that leads are intact. If so, replace surge protector.



Check supply to converter unit (mounted beside surge protector)

Measure voltage at all terminals. Instrument should indicate 12 V in all cases. If not, replace converter unit.

AH16

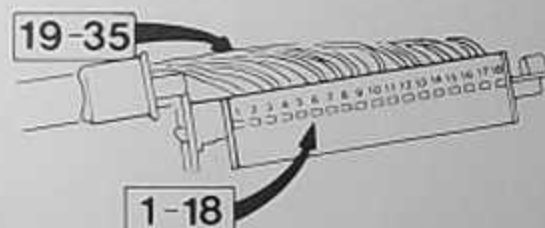
AH17

Check that wiring is intact

AH18

Check supply to control module connector

AH19



Connect voltmeter between ground and

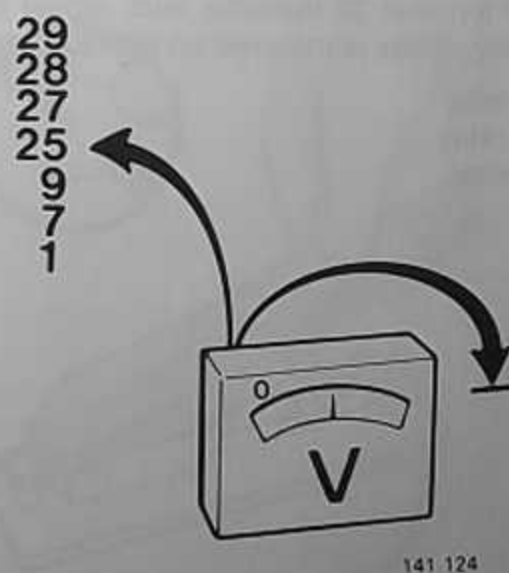
- terminal 1
- terminal 7
- terminal 9
- terminal 25, while operating brake pedal
- terminal 27
- terminal 28
- terminal 29. **Note:** Instrument should indicate 0.5–1.0 V.

The instrument should indicate battery voltage in all cases except at terminal No. 29.

AH20

If no voltage is present at

- terminal 1: Faulty surge protector
- terminal 7: Faulty converter unit
- terminal 9: Faulty converter unit
- terminal 25: Check brake light switch and replace if necessary. Also check brake light bulbs and replace if necessary.
- terminal 27: Faulty valve relay. Replace relay.
- terminal 28: Faulty motor relay. Replace relay.
- terminal 29: If correct voltage is present at terminal 27, instrument should indicate 0.5–1.0 V at terminal 29. If not, valve relay is faulty. Replace relay.



6 7 10 12

terminal 6: Check fuse 2 in
terminal 7: Reconnect conn
replace lamp.
terminal 10: Faulty surge pr
terminal 12: Check 80 A fus

Group 59 Anti-lock brakes (ABS)

Fault tracing



139 877

Check that wiring is intact

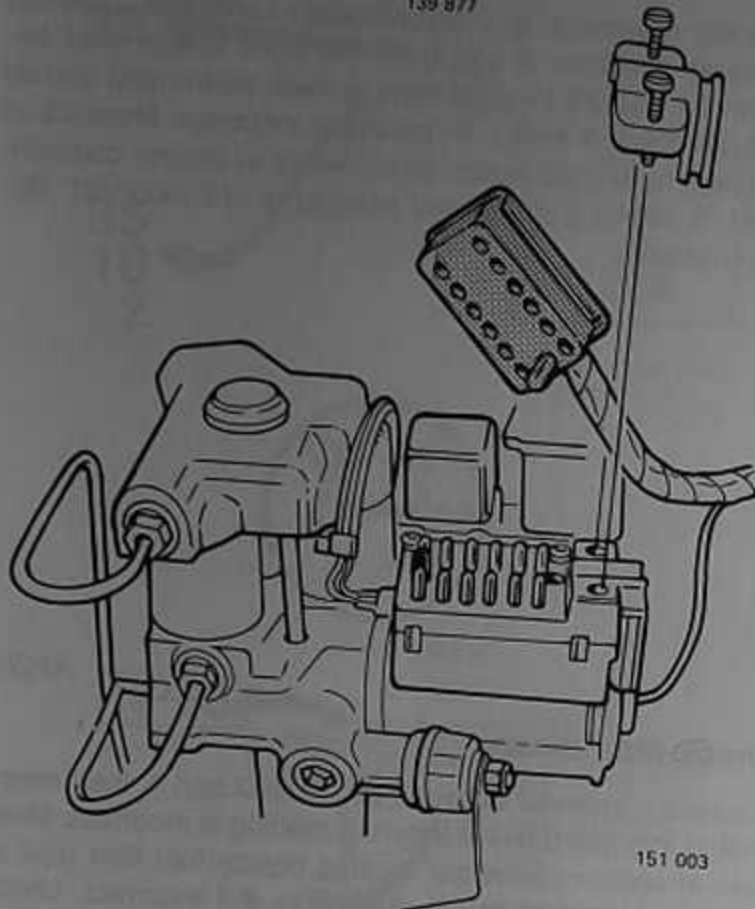
AH21

Switch off ignition

AH22

Check voltage at hydraulic modulator connector.
Disconnect connector from unit

AH23



151 003



152 889

Switch on ignition

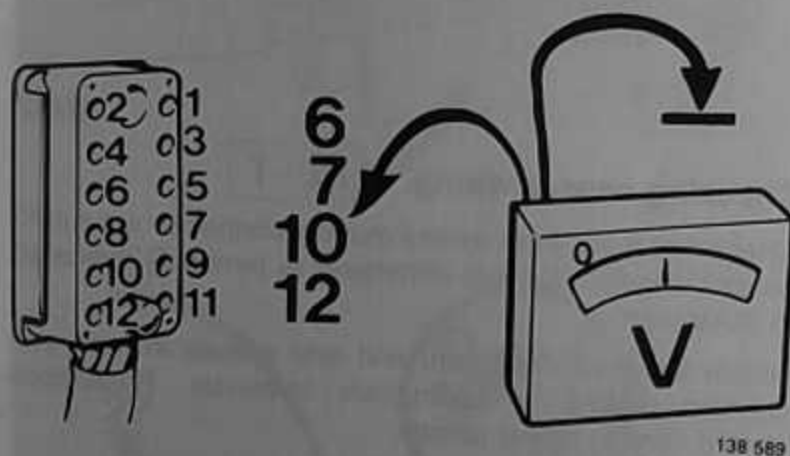
AH24

Connect voltmeter between ground and

- terminal 6
- terminal 7
- terminal 10
- terminal 12

AH25

Instrument should indicate battery voltage in all cases.



138 589

AH26

If no voltage is present at

- terminal 6: Check fuse 2 in electrical distribution unit.
- terminal 7: Reconnect connector. ABS lamp should light. If not, replace lamp.
- terminal 10: Faulty surge protector. Replace unit.
- terminal 12: Check 80 A fuse at right front wheel housing.

Check that wiring is intact

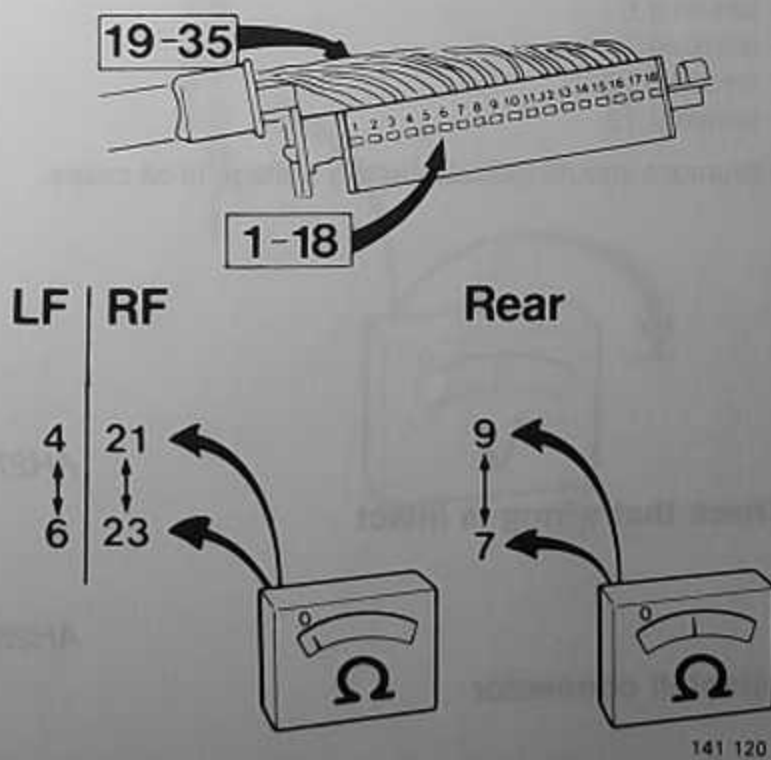
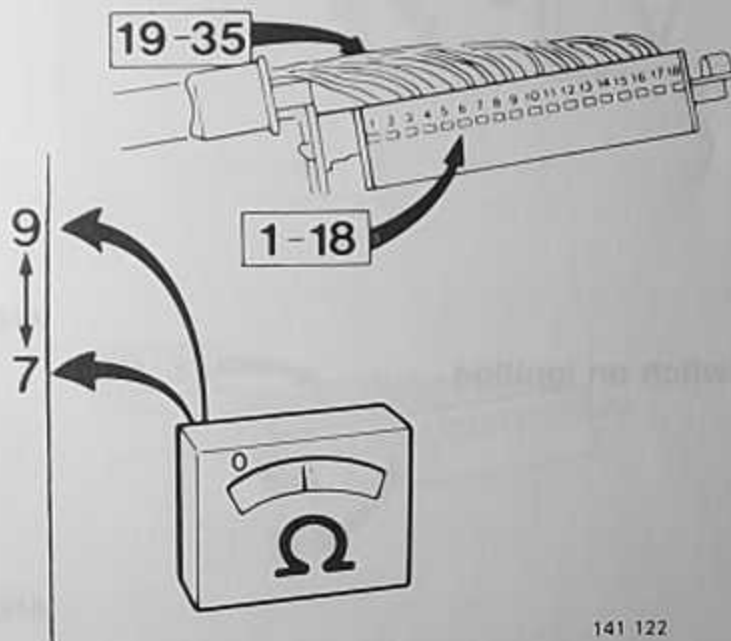
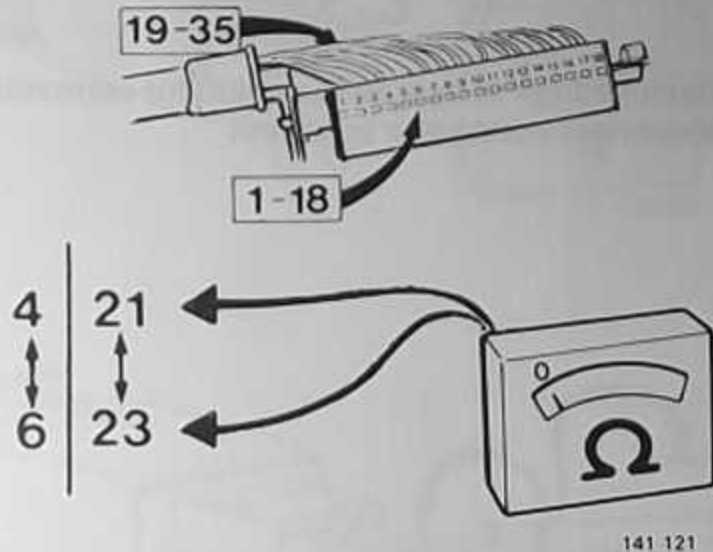
AH27

Reinstall connector

AH28

Group 59 Anti-lock brakes (ABS)

Fault tracing



Switch off ignition

AH29

Check front wheel sensors

AH30

Connect ohmmeter to control module connector. Connect between terminals 4 and 6 for left front sensor, and between 21 and 23 for right front sensor. Instrument should indicate 0.9–2.2 kohm. If reading is incorrect: Measure at connectors at suspension strut towers in engine compartment. If wiring is intact and reading is still incorrect: Replace sensor.

Check rear sensor

AH31

Connect ohmmeter between terminals 7 and 9. Instrument should indicate 0.6–1.6 kohm. If reading is incorrect: Measure at sensor connector located beside fuel filler pipe in luggage compartment. If reading is still incorrect, check first that wiring is intact.

If wiring is intact and reading is still incorrect: Replace sensor.

Note: If clearance between sensor and sensor wheel is incorrect, system will become inoperative and ABS lamp will light. Clearance may be adjusted as described in operations AN5–AN9 on page 130.

See pages 130–131 regarding replacement of sensor.

Checking sensor wiring

AH32

Check that leads from control module connector are run to correct wheels. Connect ohmmeter to terminals indicated in illustration.

Rotate left front, right front and rear wheels in turn, and connect probes to appropriate terminals. Resistance should vary as wheel rotates.



Group 59 Anti-lock brakes (ABS)

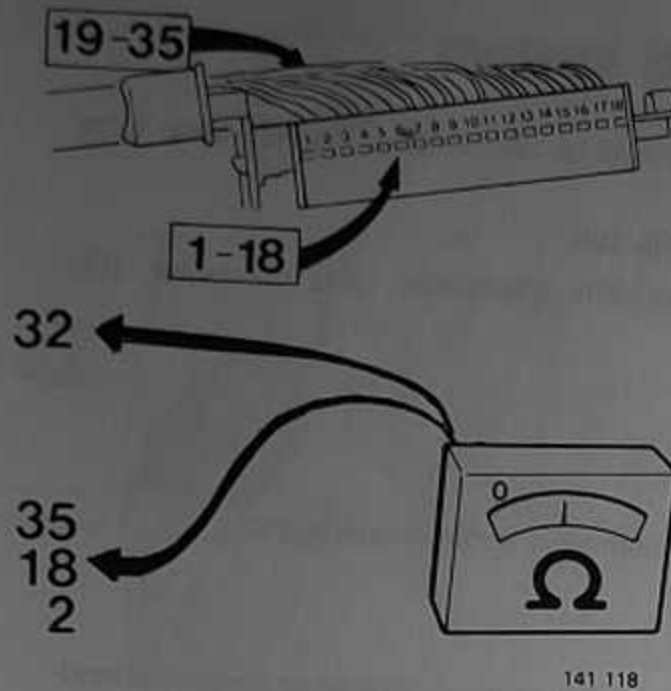
Fault tracing

AH33

Check hydraulic modulator solenoid valves

Connect one ohmmeter probe to terminal 32 on control module connector. Use other probe to measure at terminals 2 (left front), 35 (right front) and 18 (rear).

Instrument should indicate 0.7–1.7 ohm in all cases. If reading is incorrect: Measure directly at hydraulic modulator (see wiring diagram). If reading is still incorrect: Replace modulator.



141 118

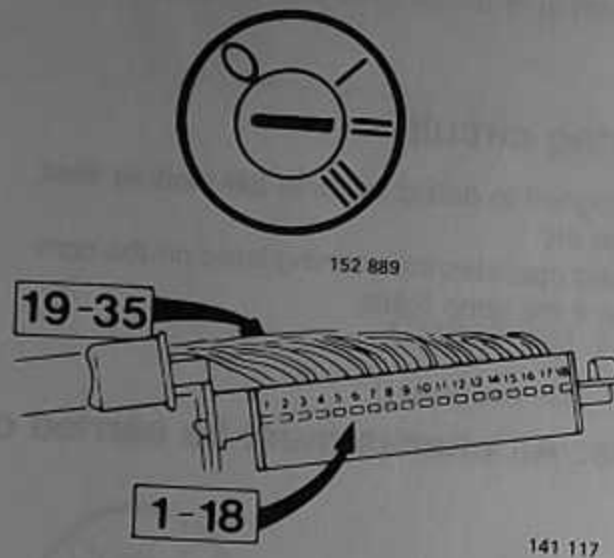
Switch on ignition

AH34

Check motor relay in hydraulic modulator

Connect lead between ground and terminal 28. Hydraulic modulator should start.

Note: Do not connect lead for more than 2 seconds. If modulator does not start, repeat test with new motor relay.



141 117

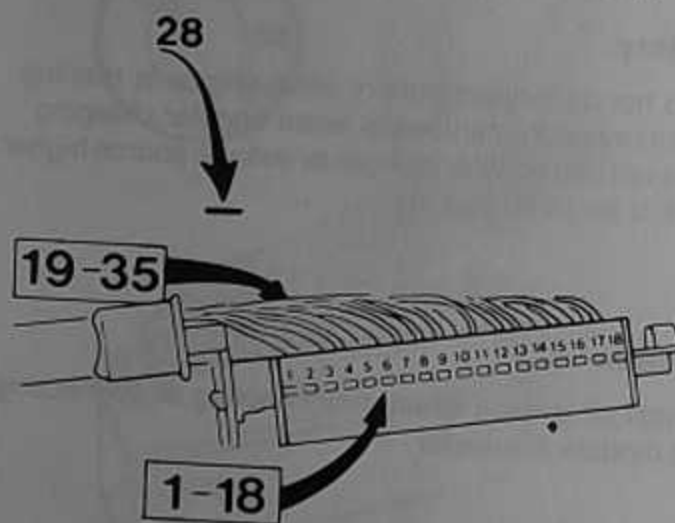
Check that wiring is intact

AH36

Check valve relay in hydraulic modulator

Connect voltmeter between terminal 32 and ground. Connect lead between ground and terminal 27. Valve relay should operate and instrument should indicate battery voltage.

If fault persists, repeat test with new relay.



141 119

Check that wiring is intact

AH38

Switch off ignition and disconnect test equipment

If no fault has been detected, repeat procedure with new control module.

Reinstall panels, carpets, hydraulic modulator cover etc.

AH40

Fault tracing of ABS system

The following procedure applies to cars from 1988 on and should be carried out if the ABS lamp lights while driving.

Note: First see the ABS fault-tracing charts on pages 118–120.

Special tools: Multimeter, P/N 999 6525-3, or voltmeter, P/N 999 6450-4, and ohmmeter, P/N 999 9724-9.

Note: Cars from 1993 on: See TP 5901201.

General

These fault-tracing instructions assume that the braking system as a whole is operational.

Important

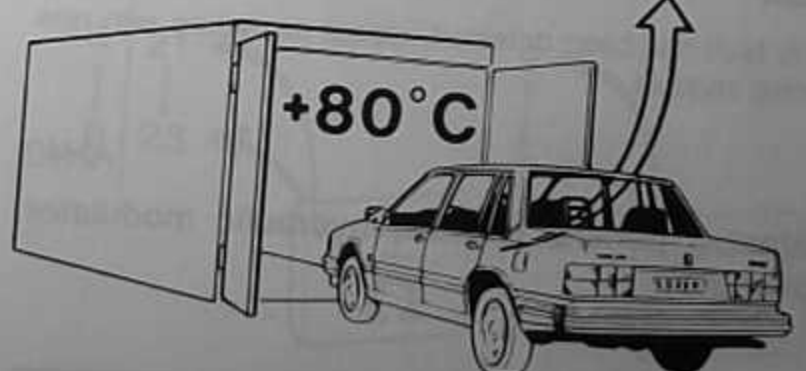
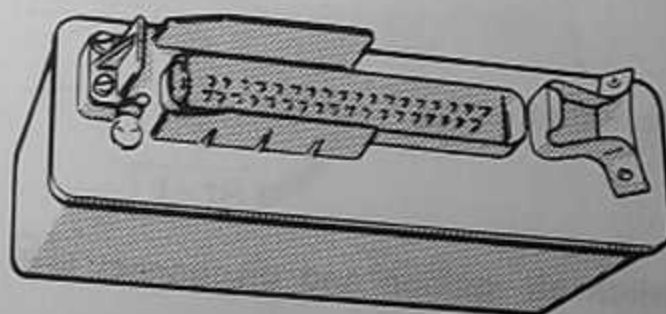
The instructions on this and the following pages must be observed at all times, otherwise the control module may be damaged.

Control module monitoring circuit

The control module incorporates a fault-monitoring circuit designed to detect faults in the module itself, and in the sensor circuitry, hydraulic modulator, signal circuits etc. On detecting a fault, the circuit disengages the ABS system and operates the warning lamp on the combined instrument. The following checks should be carried out if the lamp lights:



138 584



138 583

Note: All checks must be carried out

AJ1

Battery:

- do not disconnect battery while engine is running
- disconnect battery leads when booster charging
- do not use booster charger or voltage source higher than 16 V for jump starting

AJ2

Ignition

Switch off ignition when disconnecting or connecting control module connector.

AJ3

Control module

- Remove control module, for example when stoving paintwork. The module must **not** be exposed to temperatures above +80°C (176°F).
- Disconnect control module connector when carrying out arc welding on the car.
- Do not replace module without checking associated wiring and components, otherwise new module may be damaged in same manner as original.

Group 59 Anti-lock brakes (ABS) Fault tracing

AJ4

Check transient surge protector fuse (10 A)

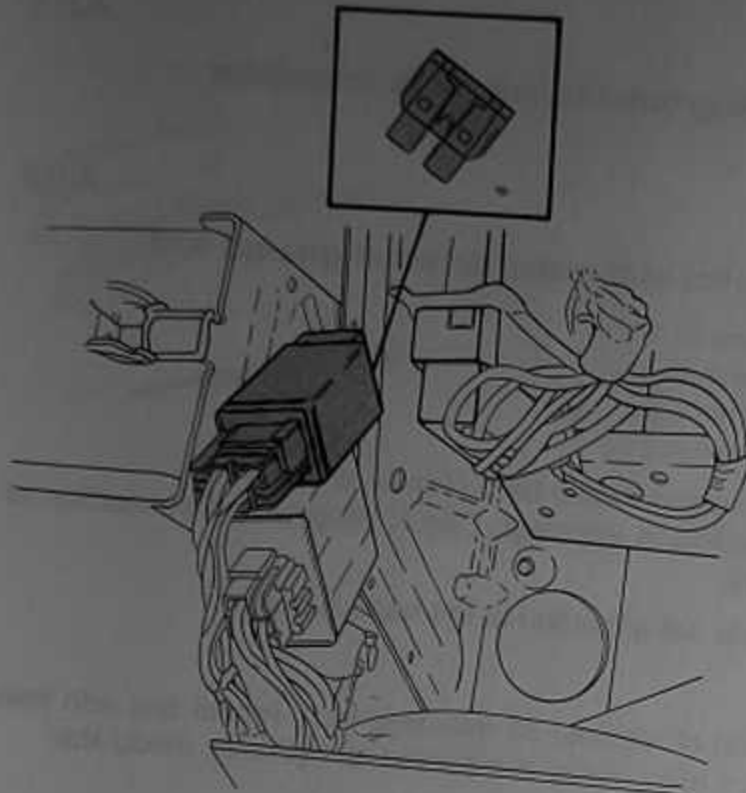
Remove soundproofing panel under dashboard on driver's side.

AJ5

Check all ABS system connectors, wiring and ground terminals

Ensure that components are correctly and securely connected.

Poor contacts can cause fault symptoms.



146 156

Checking components and wiring

See appropriate wiring diagram at rear of manual.



138 584

Switch off ignition

AJ6

Disconnect control module connector

Depress catch and lift off connector.

AJ7

Remove protective cover from hydraulic modulator

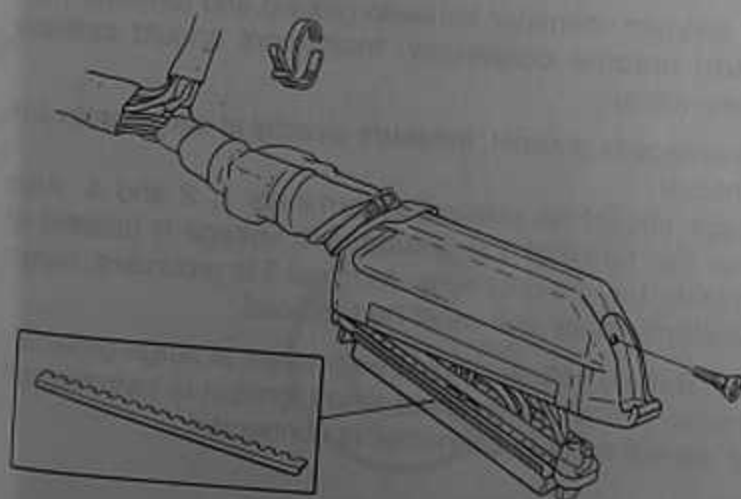
AJ8

Remove protective cover from connector

AJ9

Important!

Never insert test instrument probes into terminal sockets.
Experience has shown that this may damage terminals and further aggravate fault(s).
Check terminals through holes in connector sides.
Do not exert greater force than necessary to make contact.

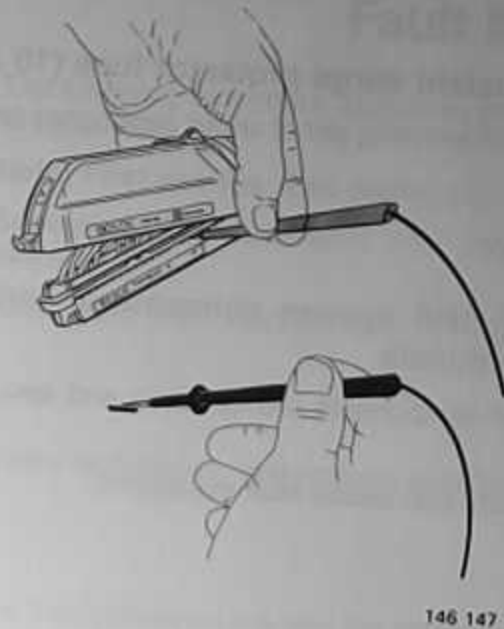


146 136

Remove white cover strips on connector sides

AJ10

Group 59 Anti-lock brakes (ABS) Fault tracing



146 147

Check ground terminals in connector

AJ11

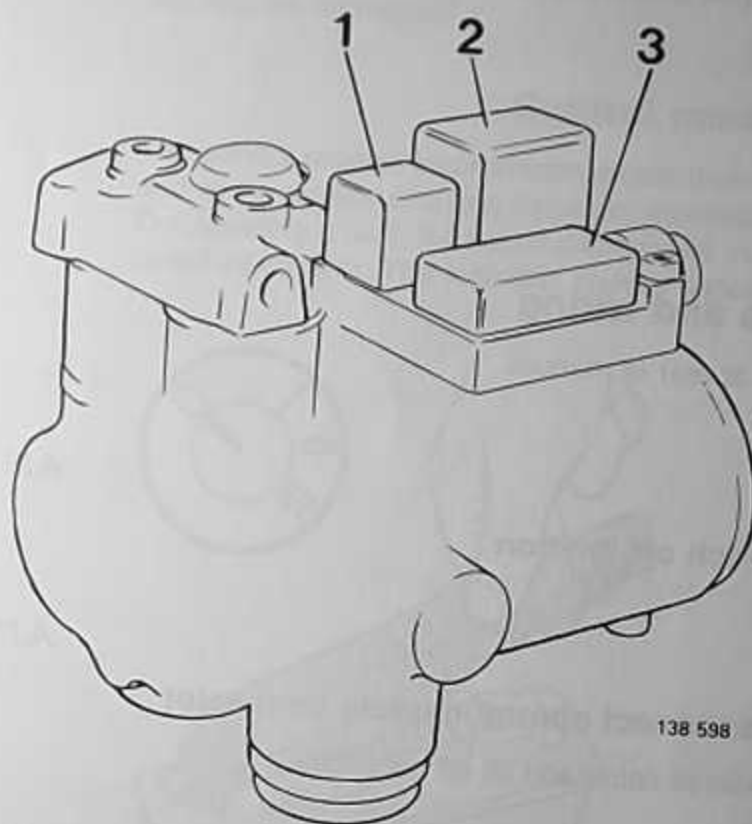
Connect ohmmeter between ground and

AJ12

- terminal 10
- terminal 20
- terminal 32
- terminal 34

Resistance should be 0 ohm in all cases.
If reading is incorrect: Check integrity and connection of leads.

Leads are grounded at left-hand A-post.



138 598

If test of terminal 32 indicates fault, repeat test with new valve relay. Relay is mounted on hydraulic modulator.

1. Valve relay
2. Motor relay
3. Connector



152 889

Switch on ignition

AJ13

Check supply to transient surge protector

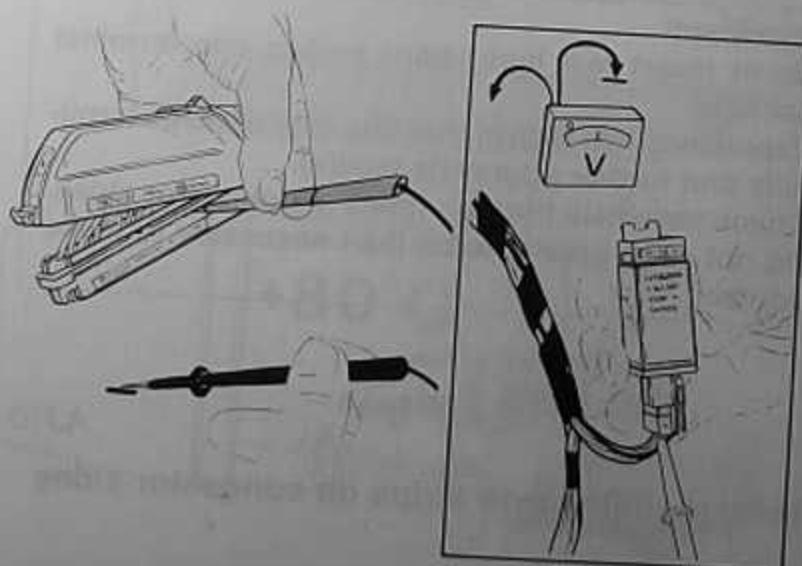
AJ14

Protector is mounted on bracket beside control module.
First connect voltmeter between ground and terminal 1 on **control module connector**. Instrument should indicate battery voltage.

If no voltage is present, measure directly at surge protector connector.

Voltage should be present at terminals 1, 2 and 4. Also check that terminal 3 is grounded. If voltage is present at terminals 1 and 4 only when terminal 3 is grounded, surge protector is faulty and must be replaced.

Note: Battery voltage should be present at surge protector terminal 1 at all times, even when ignition is switched off and control module connector is connected.



152 890

Group 59 Anti-lock brakes (ABS)

Fault tracing

AJ15

Check converter unit

(Installed only on cars up to 1988.)

Unit is mounted on control module bracket.

Connect voltmeter between ground and terminals 7 and 9 on **control module connector**.

Instrument should indicate battery voltage.

If no voltage is present, measure directly at converter unit terminals 1, 2 and 4.

If no voltage is present at any of above terminals, replace converter unit.

Note: Battery voltage should be present only at converter unit terminal 3 when control module connector is connected and ignition is on.

AJ16

Check supply to control module connector

AJ17

Connect voltmeter between ground and

- terminal 25, while operating brake pedal
 - terminal 27
 - terminal 28
 - terminal 29. **Note:** Instrument should indicate 0.5–1.0 V.
- Instrument should indicate battery voltage in all cases except at terminal No. 29.

Start engine. Instrument should indicate battery voltage at terminal 15.

AJ18

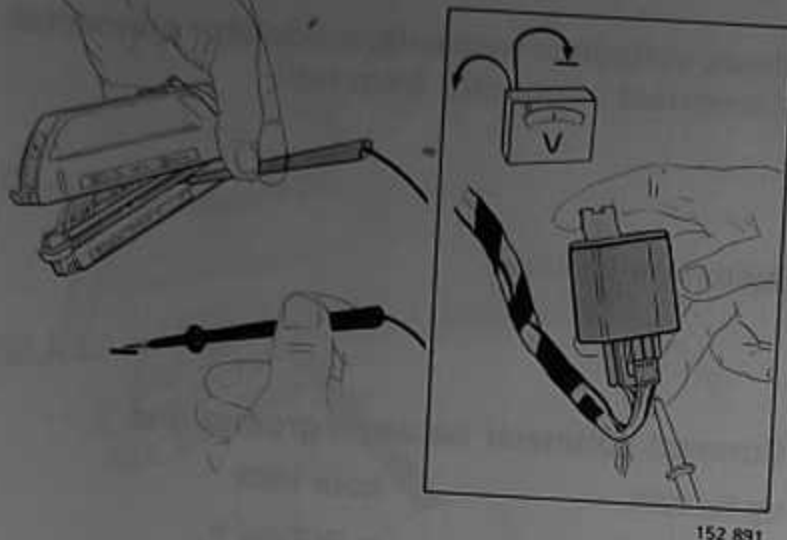
First check that wiring is intact. If voltage is not present at

- terminal 25: Check brake light switch and replace if necessary. Also check brake light bulbs and replace if necessary.
- terminal 27: Faulty valve relay. Replace relay.
- terminal 28: Faulty motor relay. Replace relay.

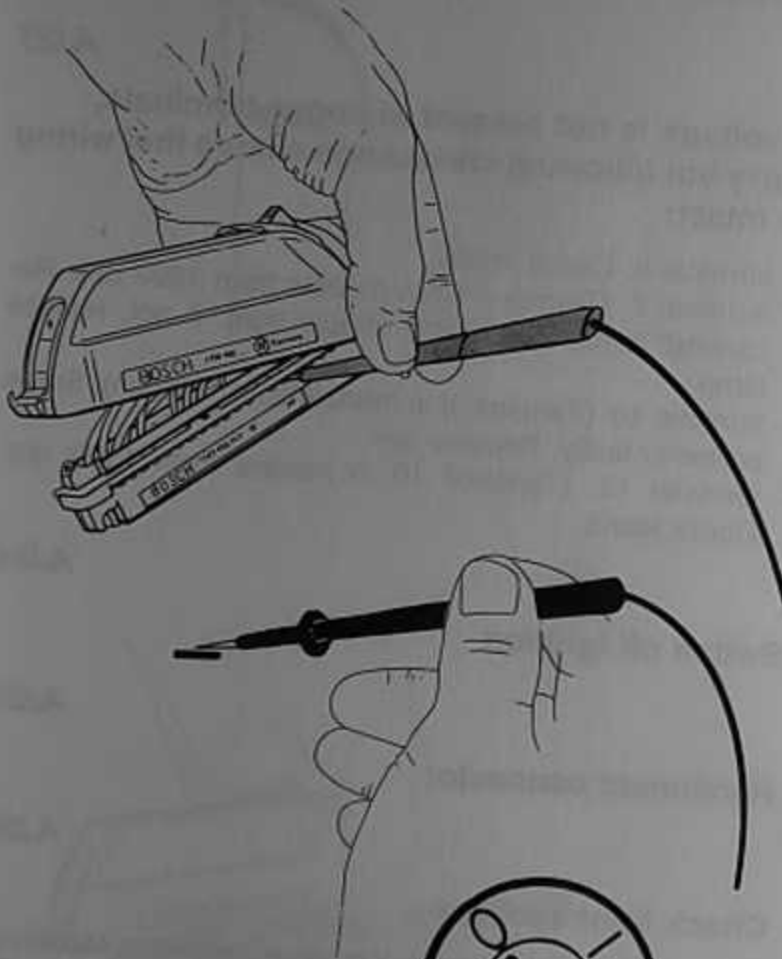
Also measure at terminal 29. If voltage is present at terminal 27 when checked, instrument should indicate 0.5–1.0 V at terminal 29. If not, valve relay is faulty. Replace relay.

AJ19

Switch off ignition



152 891



146 148



139 877

Group 59 Anti-lock brakes (ABS) Fault tracing



152 889

Check voltage at hydraulic modulator connector.
Disconnect connector from unit

AJ20

Switch on ignition

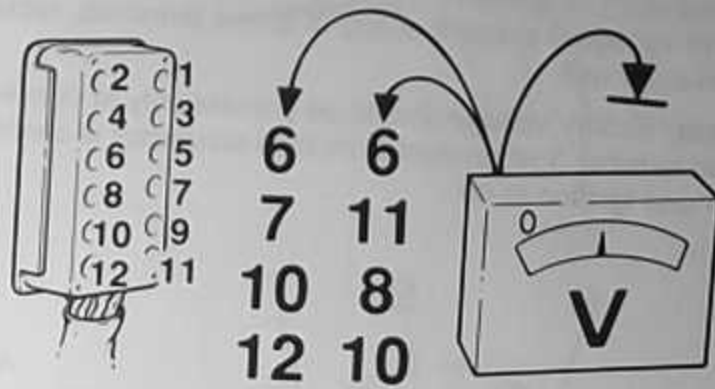
AJ21

Connect voltmeter between ground and
up to 1991

- | | |
|---------------|---------------|
| – terminal 6 | from 1992 |
| – terminal 7 | – terminal 6 |
| – terminal 10 | – terminal 11 |
| – terminal 12 | – terminal 8 |
| | – terminal 10 |

Instrument should indicate battery voltage in all cases.

AJ22



S5900171

If voltage is not present at above terminals,
carry out following checks and ensure that wiring
is intact:

AJ23

- terminal 6: Check leads
- terminal 7: (Terminal 11 in models from 1992 on): Re-connect leads. ABS lamp should light. If not, replace lamp.
- terminal 10: (Terminal 8 in models from 1992 on): Surge protector faulty. Replace unit.
- terminal 12: (Terminal 10 in models from 1992 on): Check leads.

Switch off ignition

AJ24

Reconnect connector

AJ25

Check front sensors

AJ26

Connect ohmmeter to control module connector. Models to 1988 inclusive: Connect between terminals 4 and 6 for left front sensor, and between terminals 21 and 23 for right front sensor.

Models from 1989 on: Connect between terminals 4 and 6 for left front sensor, and between 11 and 21 for right front sensor.

Instrument should indicate between 0.9 and 2.2 kohm. If reading is incorrect: Measure at connectors at suspension strut towers in engine compartment. If reading is still incorrect: Check first that wiring is intact. If wiring is intact and reading is still incorrect: Replace sensor.

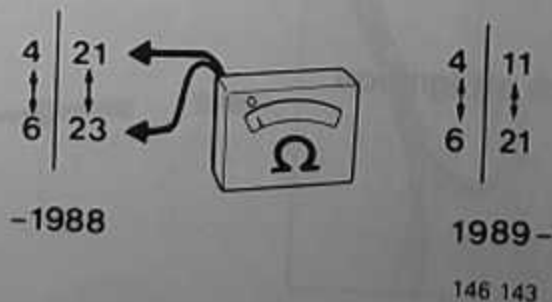
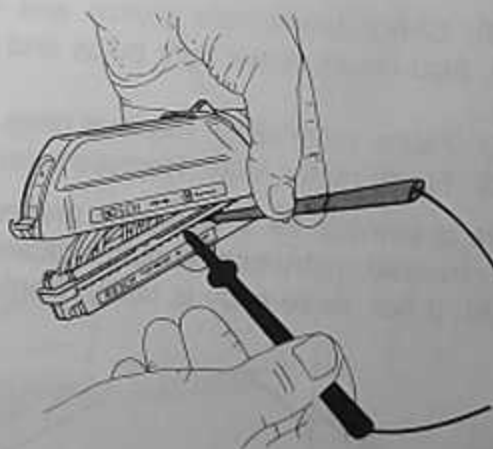
Also inspect front sensor wheels for damage. Max. permissible radial run-out = 0.15 mm (0.006 in).

Note: If replacing sensor wheel, ensure that correct type is installed.

Models to 1988 inclusive: 96 teeth
Models from 1989 on: 48 teeth.



139 877



-1988

1989-

146 143

Group 59 Anti-lock brakes (ABS) Fault tracing

AJ27

Check rear sensor

Connect ohmmeter between terminals 7 and 9. Instrument should indicate 0.6–1.6 kohm. If reading is incorrect: Measure at sensor connector located beside fuel filler pipe in luggage compartment.

Note: Connector seal must be replaced. If reading is still incorrect: Check first that wiring is intact.

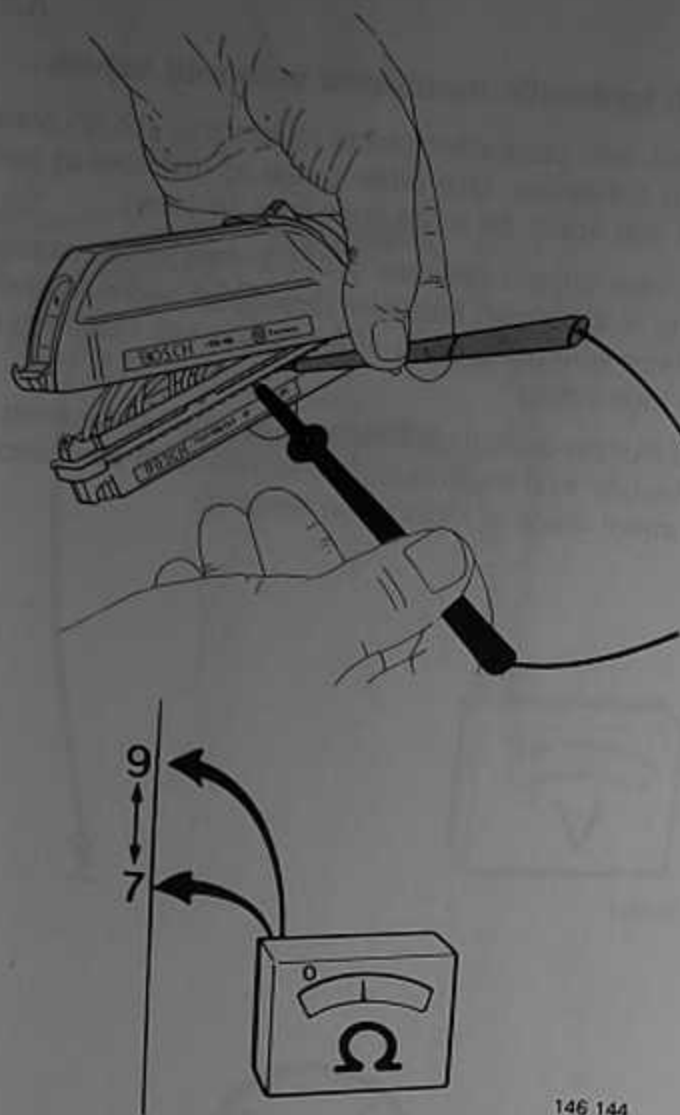
If wiring is intact and reading is still incorrect: Replace sensor.

Note: See pages 130–131 regarding replacement of sensor on cars with **live rear axle**.

See pages 132–134 regarding replacement of sensor on cars with **multilink rear axle**.

Sensor signals will be incorrect if sensor wheel is more than 0.2 mm out of round or if any teeth are damaged. If so, replace sensor wheel as described in Service Manual, Section 4(46) Rear axle.

When replacing sensor wheel, remember that two different types (with 48 and 96 teeth) are available.



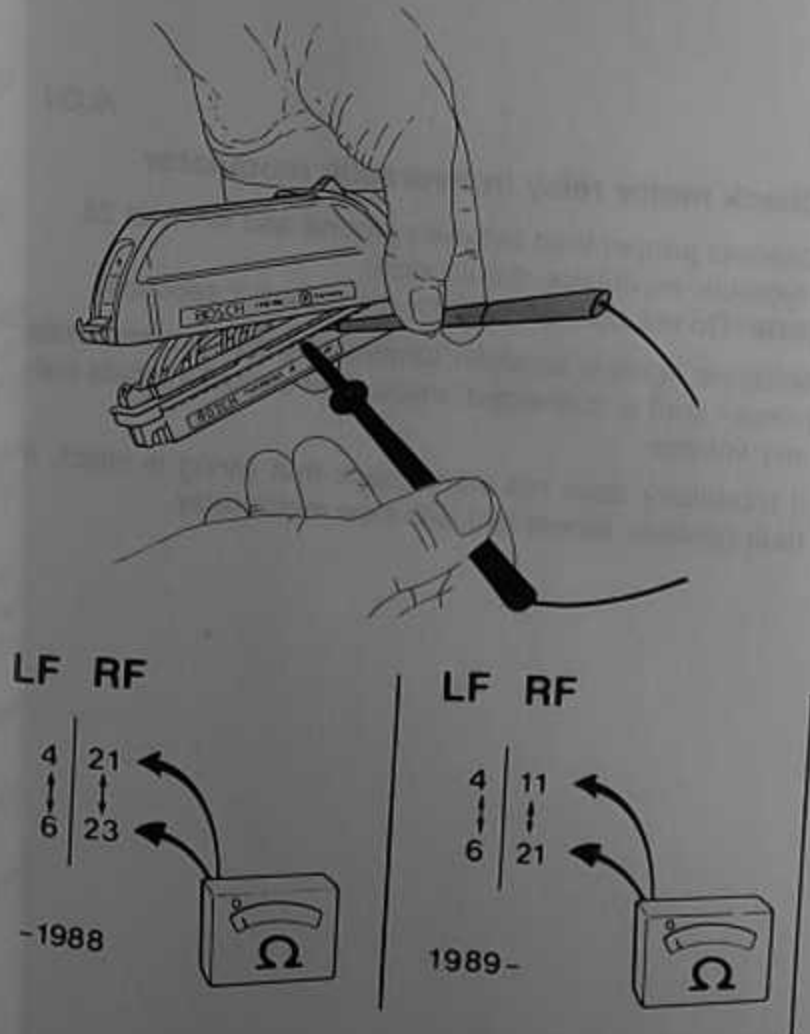
146 144

AJ28

Checking sensor wiring

Check that leads from control module connector are run to correct wheels. Connect ohmmeter as described in AJ26 and AJ27 'Check front/rear sensors'.

Rotate left front, right front and rear wheels in turn, and connect probes to appropriate terminals. Resistance should vary as wheel rotates.



LF RF

4 21
6 23

-1988

LF RF

4 11
6 21

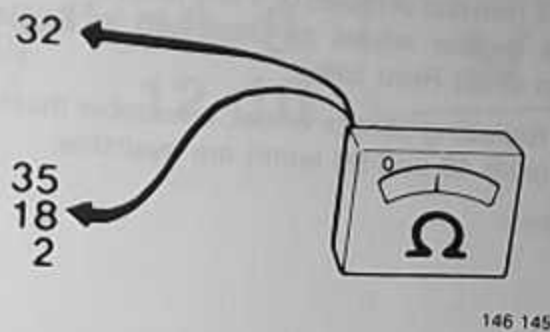
1989-

Rear

9 7

146 150

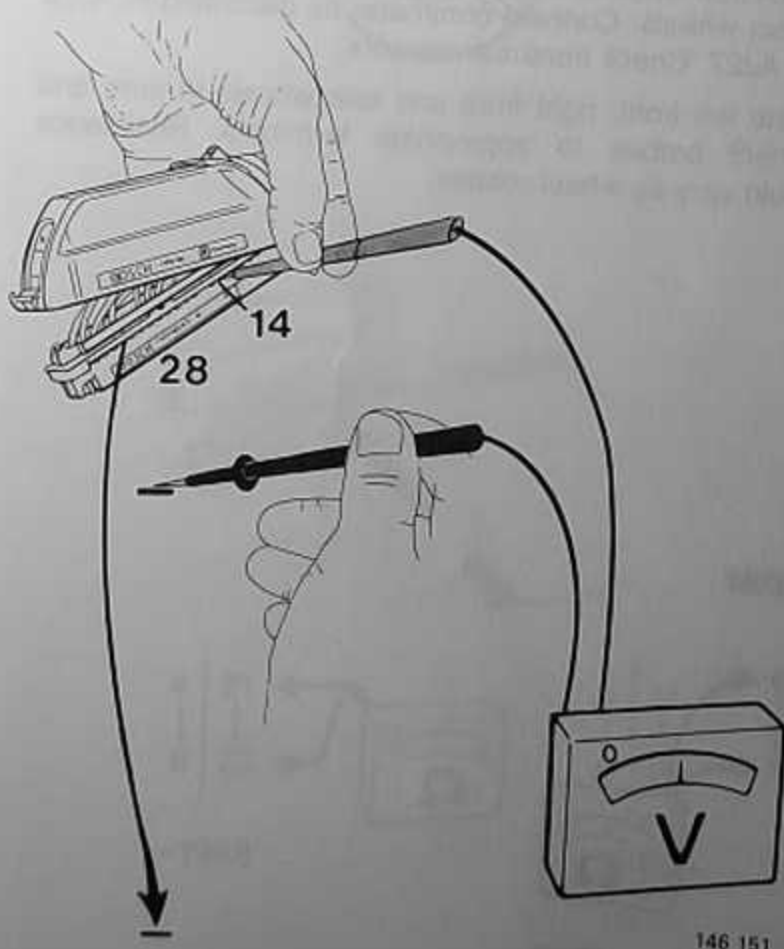
Group 59 Anti-lock brakes (ABS) Fault tracing



146 145



152 889



146 151

116

AJ29

Check hydraulic modulator solenoid valves

Connect one ohmmeter probe to terminal 32 on control module connector. Use other probe to measure at terminals 2 (left front), 35 (right front) and 18 (rear).

Instrument should indicate 0.7–1.7 ohm in all cases. If reading is incorrect: Measure directly at hydraulic modulator (see wiring diagram). If reading is still incorrect: Replace modulator.

Note: Buzzer setting should be used when measuring low resistances with multimeter. Remember that resistance of instrument leads is included in reading.



Switch on ignition

AJ30

AJ31

Check motor relay in hydraulic modulator

Connect jumper lead between ground and terminal 28. Hydraulic modulator should start.

Note: Do not connect lead for more than 2 seconds.

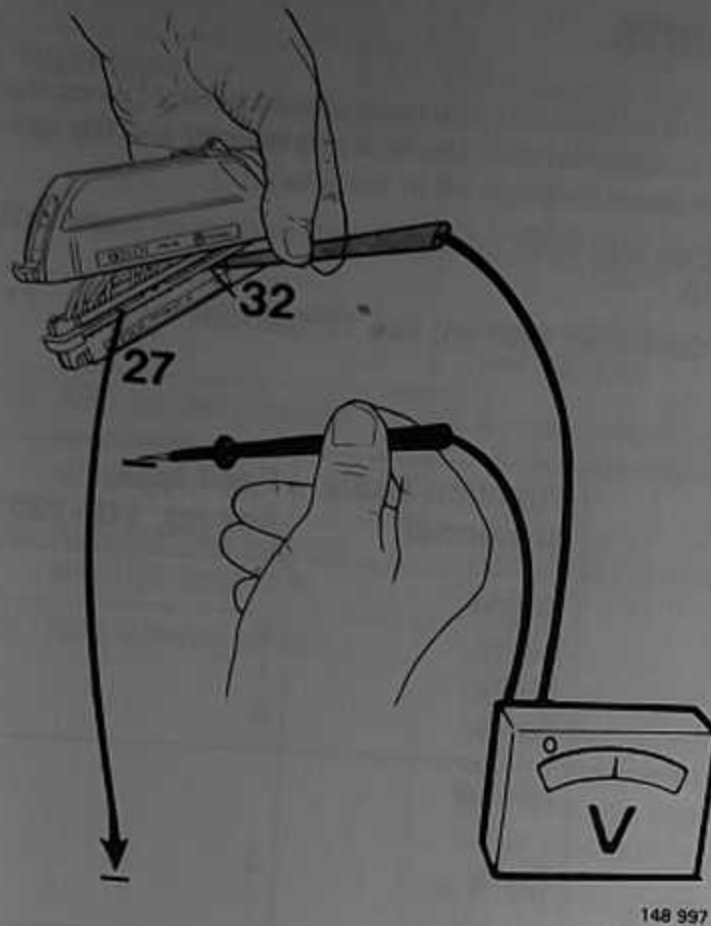
Measure voltage between terminal 14 and ground while jumper lead is connected. Instrument should indicate battery voltage.

If modulator does not start, check that wiring is intact. If fault persists, repeat test with new motor relay.

Check valve relay in hydraulic modulator

Connect voltmeter between terminal 32 and ground. Connect jumper lead between ground and terminal 27. Valve relay should operate and instrument should indicate battery voltage.

If relay does not operate, check that wiring is intact. If fault persists, repeat test with new relay.



Switch off ignition

AJ33

Disconnect test equipment

AJ34

If no fault has been detected, repeat procedure with new control module.

Reinstall panels, carpets, hydraulic modulator cover etc

AJ35

Group 59 Anti-lock brakes (ABS)

Fault tracing

Fault tracing charts

The following charts have been prepared to facilitate fault tracing if the ABS warning lamp lights. The ABS function ceases to operate when the control unit detects a fault; however, the ordinary braking system continues to operate as normal.

When the ABS function ceases to operate, the warning lamp will continue to light until the ignition is switched off,

even if the fault clears. The lamp should not light when the engine is restarted after the fault has cleared and the ignition has been switched off in the interim.

Note: See also Fault tracing of ABS system on pages 103 and 110.

Note: Cars from 1993 on: See TP 5901201.

Fault indication occurs	Warning lamp status	Function faulty or normal	Fault type, see pp. 119–120
When ignition is switched on	– Lamp lights – Lamp goes out after 2 s – Lamp does not light – Lamp lights/goes out alternately	Normal Faulty Faulty Faulty	8 1 3
When engine starts Speed = 0 km/h	– Lamp goes out after engine starts – Lamp does not go out after engine starts	Normal Faulty	2
When speed reaches 6 km/h (4 mph) for first time after ignition has been switched on (i.e. when car begins to roll)	– Lamp lights at 6 km/h (4 mph) and remains lit until ignition is switched off	Faulty	4
Sporadically while driving	– Lamp lights while driving and remains lit until ignition is switched off	Faulty	5
When braking while ABS system is controlling	– Lamp lights when system is controlling and remains lit until ignition is switched off	Faulty	6
	– Lamp goes out before ignition is switched off (also applies while driving)	Faulty	7

Fault type	Probable cause(s)
1a. ABS function present	- Lamp faulty - Fault in supply to lamp in combined instrument - Open-circuit in wiring between lamp in combined instrument, control module and hydraulic modulator
1b. ABS function absent	- 6-pin connector between instrument panel wiring and ABS wiring at pedal mounting not installed
1c. ABS function present even when ignition is switched off	- Surge protector relay activated continuously, even when ignition is switched off (applies therefore to complete ABS system)
2a. ABS function present although lamp is lit	- Lead to lamp in combined instrument short-circuited to ground - Low generator charge, D+ signal absent or grounded
2b. ABS function absent	- Control module, surge protector, hydraulic modulator connectors not installed - SUPPLY-RELATED FAULT involving: - poor battery condition, deficient voltage in busbar 30 and/or 15 supply - wiring; busbar 30/15 supply controller, busbar 31 ground, ground connection - fuse in surge protector relay, fusebox or electrical distribution unit - surge protector relay - Fault detected during INITIAL TEST: - VALVE-RELATED FAULT involving: - valve relay - wiring, connectors between control module, valves and valve relay - valve coils - internal control unit fault
3. Oscillatory (continuous) on/off operation of warning lamp	- Special case: Open-circuit/poor contact in lead between control module and surge protector relay - Poor battery condition and/or alternator function
4. ABS function absent	- Fault detected during special FUNCTION TEST: - PUMP-RELATED FAULT involving: - pump motor relay - wiring and connector between control module, pump and pump relay - SENSOR-RELATED FAULT: open-circuit, short-circuit, (low signal strength) involving: - sensor - wiring and connector between sensor and control module - internal control module fault

Group 59 Anti-lock brakes (ABS)

Fault tracing

Fault type	Probable cause(s)
5. ABS function absent	Sporadic fault which occurs when speed exceeds 6 km/h (4 mph) and is not, therefore, detected by function test as per item 4: - intermittent SENSOR-RELATED FAULT (see item 4 for details)
6. ABS function absent	Sporadic fault which occurs when speed exceeds 6 km/h (4 mph) and is not, therefore, detected by either initial test or function test as per item 2b or 4: - intermittent SENSOR-RELATED FAULT (see item 4 for details) - intermittent PUMP-RELATED FAULT (see item 4 for details) - intermittent VALVE-RELATED FAULT (see item 2b for details)
7a. Lamp lights and ABS function is present. Lamp goes out before ignition is switched off.	- Poor alternator charge, D+ signal grounded while lamp is lit
7b. ABS function absent while lamp is lit. Lamp goes out before ignition is switched off	- Intermittent SUPPLY-RELATED FAULT (see item 2b for details)
8. Lamp lights for approx. 2 s and then goes out	- Open-circuit in D+ signal - Fault in wiring and connector between alternator and control module