PORSCHE

968

Repair Manual

Supplements

Supplement Contents

For Volume 1

For Volume 3

For Volume 4

Important Note

* = Replacement sheets

Please file the supplement in the usual manner in the appropriate group of the Repair Manual and exchange existing sheets for replacement sheets.

page

General

Maintenance, Self-diagnosis general

Engine, Crankcase, Engine Mounts

Engine, Cylinder Head, Valve Drive

Fuel System - Electronic Injection

Ignition system

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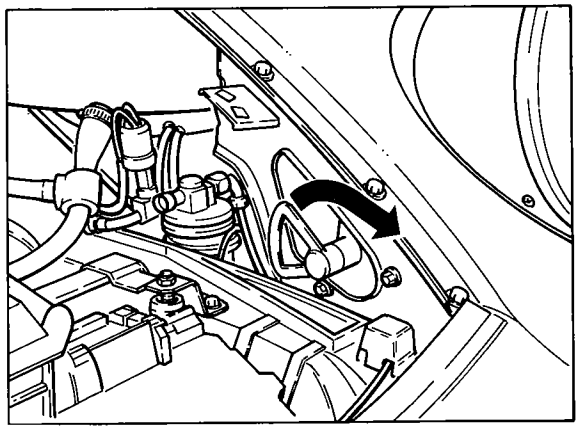
Checking operation of lighting system:

Adjusting the headlights

1. Raise pop-up headlights.

2. Release pop-up headlights and tilt forward.



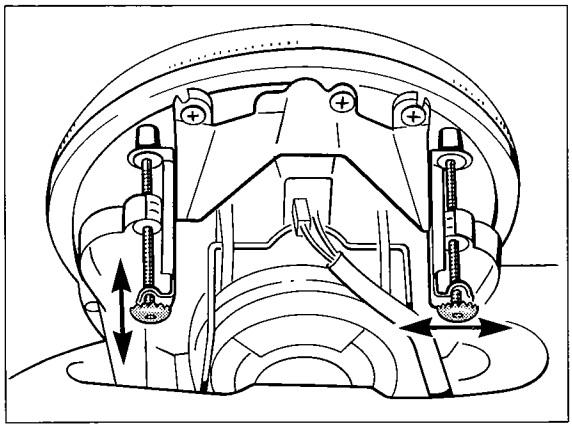
829 - 94 B

3. Remove cover shroud.

4. Tilt back pop-up headlights.

5. Clean light-diffusing lens and turn on low beam.

6. Adjust headlights with the car in roadworthy condition (fuel tank filled, driver's seat loaded with one person or 75 kg, tire pressure set to specified values), using a headlight aiming device.



842-03

Note

Adjustment is performed with the headlight beam adjuster switch set to position 0.

Adjusting auxiliary headlights and fog lights

Note

Auxiliary headlights and fog lights can only be adjusted together.

1. Remove turn signal lights.

2. Turn on high beam.

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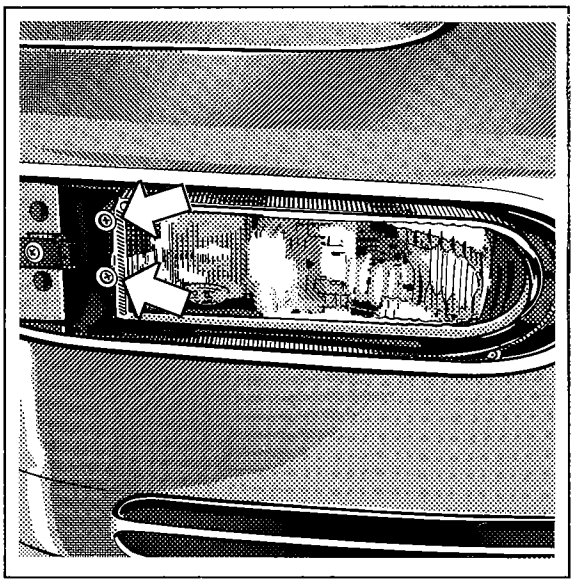
3. Adjust with the car in roadworthy condition (refer to headlight section), using a headlight aiming device.



843-03

Note

Adjustment is not performed horizontally and vertically via one adjusting screw each. Instead, horizontal and vertical adjustments are made simultaneously.
References:
Turning both screws in the same direction: Lateral adjustment.
Turning both screws in opposite directions: Height adjustment.

Adjust in such a manner that the center of the light beam is within the reference marks around the central mark on the screen of the headlight aiming device.

4. Check adjustment of fog lights.

Pop-up headlights:

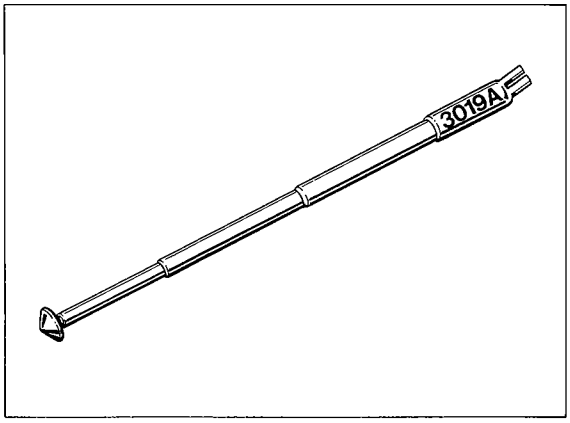
Greasing the linkage

Grease ball joints of link rod using commercial multi-purpose grease.

Headlight washer:

Adjusting the headlight washer jets

Special Adjusting Tool 3019 A



1. Insert Special Tool into sprayer jet.

2. Rotate jet insert using the tool until the telescopic extension points to the center of the light-diffusing lens.

3. Start washing operation and check operation of spray jet.

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Replacing the coolant and bleeding the cooling system

1. Drain cooling system (only with engine cooled off). Set heater lever to "hot", open drain plug at radiator and loosen coolant hose at auxiliary plastic flange of coolant pump.

2. Screw drain plug into radiator. Tightening torque: 5 Nm (4 ftlb). Fit coolant hose to flange

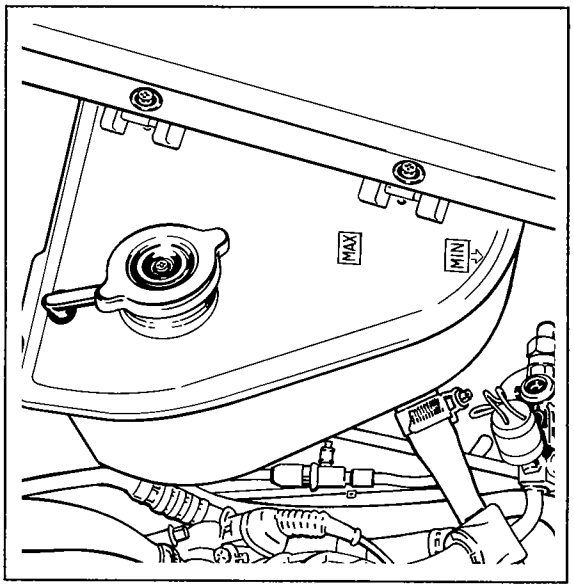
3. Leave heater lever in "hot" position or set to the hot position now and screw out bleeder screw. Fill up with coolant slowly until coolant overflows at the bleeder flange.

854-03

Drain some coolant until the coolant level has settled halfway down in the reservoir (this is required to keep the reservoir from overflowing when the engine warms up).

4. Turn bleeder screw a few turns in. Start engine and run at accelerated idle to warm it up to operating temperature (until radiator fan has switched on and off).

   As soon as no more air bubbles escape at the bleeder bore, tighten bleeder screw. Tightening torque 15 + 3 Nm (11 + 2 ftlb). Top up coolant level to "max:" mark on reservoir.



853-03

Check coolant level again after a test drive. If required, top up with coolant.

Replacing spark plugs

1. Pull off spark plug leads.

2. Remove spark plugs using a commercially avail. plug wrench (e.g. Hazet No. 767-1). A spark plug wrench is supplied with the tool kit.

3. Apply a light coat of **Molykote paste HTP White** to the plug threads.

Tightening torque: 25 to 30 Nm (18 to 22 ftlb)

Location	Thread	Tightening torque Nm (ftlb)
Cylinder head		
Cylinder head to crankcase upper section		
Engine type M 44.43/44	M 12	20 (15) 1st stage 60° torque angle 2nd stage 90° torque angle 3rd stage
Camshaft support to cylinder head	M 8	20 (15)
Camshaft adjuster - VarioCam to cylinder head	M 6	10 (7)
Socket head bolts for chain tensioner / oil pipe	M 6	10 (7)
Banjo bolt / oil pipe	M 8 x 1	10 (7)
Cylinder head cover	M 6	10 (7)
Intake pipe to cylinder head	M 8	20 (15)
Inlet flange for heater to cylinder head	M 8	20 (15)
Flange for coolant pipe	M 8	20 (15)
Toothed belt cover to cylinder head	M 6	10 (7)
Hall sender / mounting	M 6	10 (7)
Camshaft gearwheel to camshaft multi-tooth bolt	M 10	65 - 70 (48 - 52)
Distributor rotor to camshaft gearwheel	M 4	4 (3)
Transport bracket to cylinder head	M 6	10 (7)
Spark plugs	M 14 x 1.25	25 - 30 (18 - 22); grease thread lightly with Molykote paste HTP (white)

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Location	Thread	Tightening torque Nm (ftlb)
Fuel system		
Mounting of pressure regulator to fuel collection pipe	M 6 x 12	10
Cap nut to fuel collection pipe	M 12 x 1.5	12 (9)
Exhaust system		
Plug nut to catalytic converter	M 14 x 1.5	30 (22)
All other nuts and bolts:		
	M 6	8 + 2 (6 + 1)
	M 8	20 + 2 (15 + 1)
	M 10	40 + 5 (29 + 4)
Coat all nut and bolt unions with Optimoly HT		

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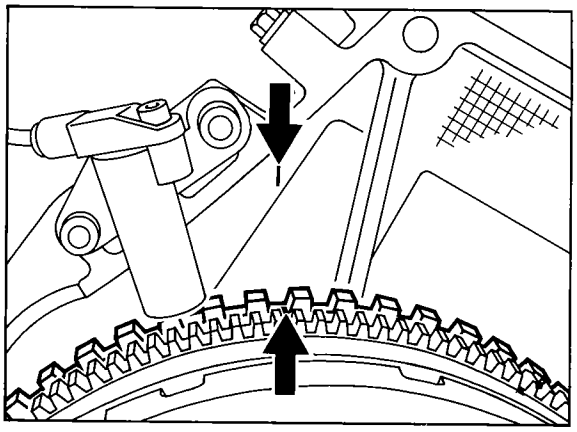
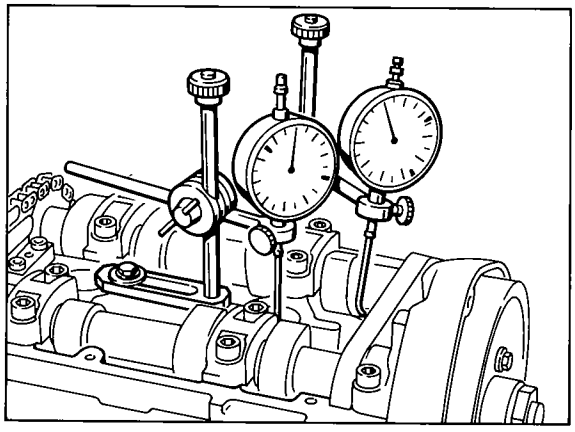
Set TDC flywheel mark opposite crankcase mark.

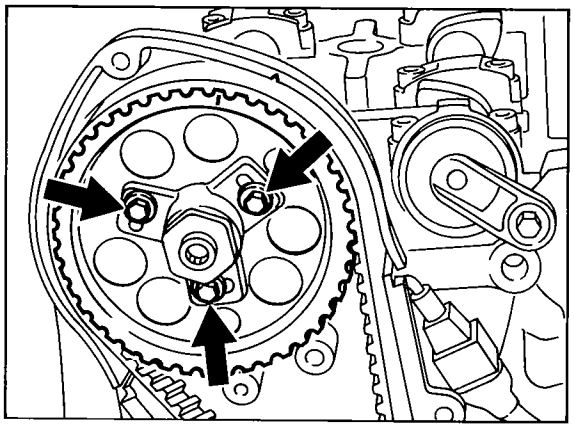


Adjusting with dial gauges

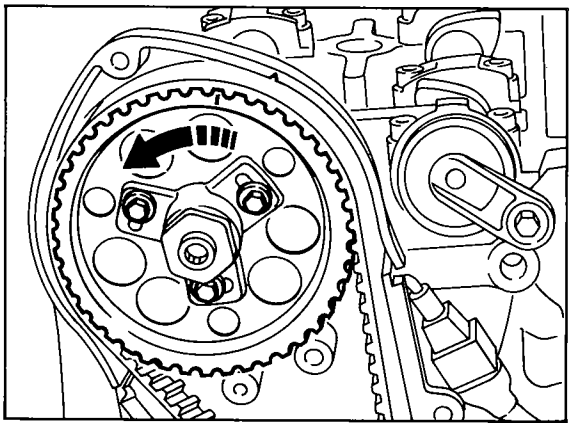
2. Align dial gauge with shop-made extension (length 205 mm) to piston pin (cyl. 1). Preload 3 mm.
   Align second dial gauge to hydraulic tappet of cyl. 1 inlet valve. The dial gauge must be set up perpendicular to the inlet valve. Preload: 3 mm.



3. Remove distributor rotor and fit camshaft gear with 3 auxiliary bolts (M 5 x 15) to prevent the camshaft gear and the camshaft, respectively, from turning when the central camshaft bolt is undone.

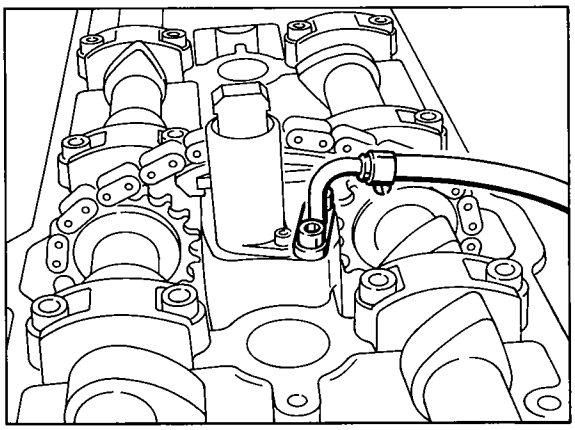


4. Undo central camshaft bolt, using a suitable retainer to keep the camshaft from turning. Rotate engine against the sense of rotation until the camshaft gear is against the stop within the woodruff key groove.



5. Tighten auxiliary bolts to 6 Nm (4 ftlb) and central bolt to approx. 40 Nm (29 ftlb).

6. Remove oil line from camshaft adjuster. Connect flange (Special Tool 9529) to camshaft adjuster and pressurize (pressure flow approx. 3.0 bar). A consistent supply of compressed air is required since air can escape across a vent hole.



799-15

7. Turn engine in sense of rotation until maximum piston stroke is reached.

8. Set dial gauge of hydraulic tappet of cyl. 1 inlet valve to zero.

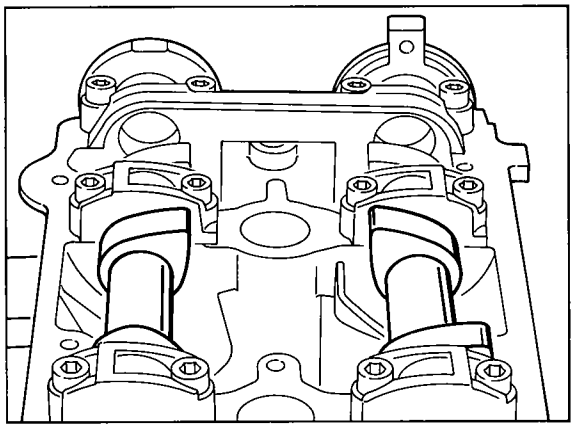
9. The crankshaft is now rotated from the firing TDC (cyl. 1). Observe dial gauge of cyl. 1 inlet valve at the same time.
Rotate until a stroke of **0.39 ± 0.03 mm** is reached.

Note

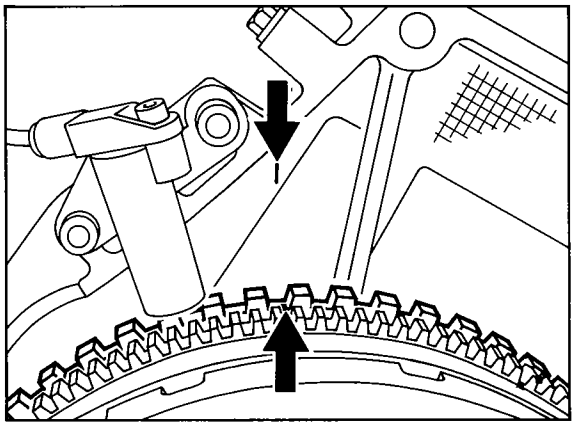
Do not rotate crankshaft against the sense of rotation.

10. Undo central bolt and auxiliary bolts, making sure the setting of **0.39 ± 0.03 mm** on the dial gauge does not change.

11. Continue to rotate the crankshaft slowly until maximum piston stroke on the dial gauge is reached. This crankshaft position corresponds to the cyl. 4 firing TDC setting of the camshafts.



800-15



796-15

12. Tighten auxiliary bolts and central bolt.
Tightening torque of central bolt:
65 (48) to 70 Nm (52 ftlb).

13. To verify the setting, rotate crankshaft by two more turns and check setting.

14. Remove Special Tool and auxiliary bolts and reinstall distributor rotor.

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Removing and installing DME injection system components

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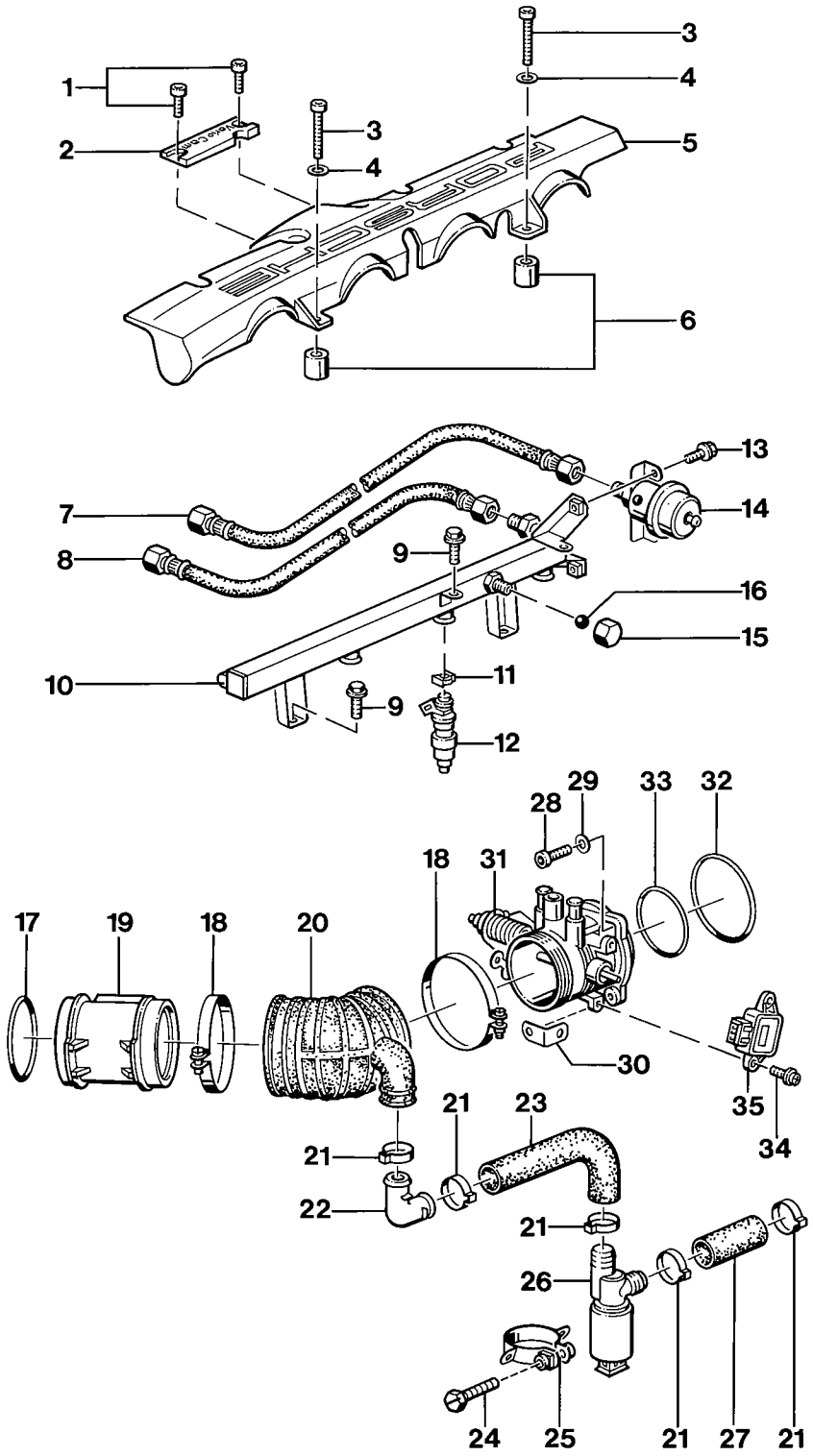
Removing and installing DME injection system components



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No.	Designation	Qty.	Note: Removal	Installation
1	Pan head screw M 5 x 10	2		
2	VarioCam script	1		
3	Pan head screw M 5 x 35	2		
4	Washer	2		
5	Cover	1		
6	Spacer bushing	2		
7	Fuel return line	1	use a second wrench to lock when removing	use a second wrench to lock when removing
8	Fuel supply line	1	use a second wrench to lock when installing	use a second wrench to lock when installing
9	Hexagon head bolt M 6 x 12	4		
10	Fuel distributor pipe	1		
11	Retaining clip	4		
12	Injection valve	4		Replace seals. Apply a light coat of oil to the seating bore
13	Hexagon head bolt M 6 x 12	2		
14	Pressure regulator	1		Replace seal. Apply a light coat of oil to the seating bore
15	Cap nut	1	use a second wrench to lock when removing	Tightening torque 12 Nm (9 ftlb). Use a second wrench to lock
16	Ball	1		
17	O-ring	1		
18	Hose clamp	2		
19	Air mass meter	1		
20	Shroud	1		
21	Hose clip	5		

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No.	Designation	Qty.	Note: Removal	Note: Installation
22	Union	1		
23	Hose	1		
24	Hexagon head bolt M 8 x 40	1		
25	Clamp	1		
26	Idle speed positioner	1		
27	Hose	1		
28	Pan head screw M 6 x 25	4		
29	Washer	3		
30	Retaining bracket	1		
31	Throttle body	1		
32	Round seal 82 x 2.5	1		always to be replaced
33	Round seal 65 x 3	1		always to be replaced
34	Philips screw M 4 x 10	2		
35	Throttle switch	1		

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Removing and installing injection valves

Removing

1. Detach and remove cover for injection valves and plug leads. Unclip plastic cover and leave suspended at plug leads.

2. Pull off vacuum hose at pressure regulator and electric connector at oil temperatur sensor (cylinder head).

3. Undo fuel distributor pipe at intake distributor and take out from above. Pull off electrical connector and retaining clamp at injection valve. Take out injection valve and catch overflowing fuel in a suitable container.

Installation

1. Replace injection valve seals. Oil seating bore of seals lightly.

2. Check visually for leaks.

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Replacing spark plugs

1. Pull off spark plug leads.

2. Remove spark plugs using a commercially avail. plug wrench (e.g. Hazet No. 767-1). A spark plug wrench is supplied with the tool kit.

3. Apply a light coat of **Molykote paste HTP White** to the plug threads.

Tightening torque: 25 to 30 Nm (18 to 22 ftlb)

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DME-Diagnosis / Troubleshooting

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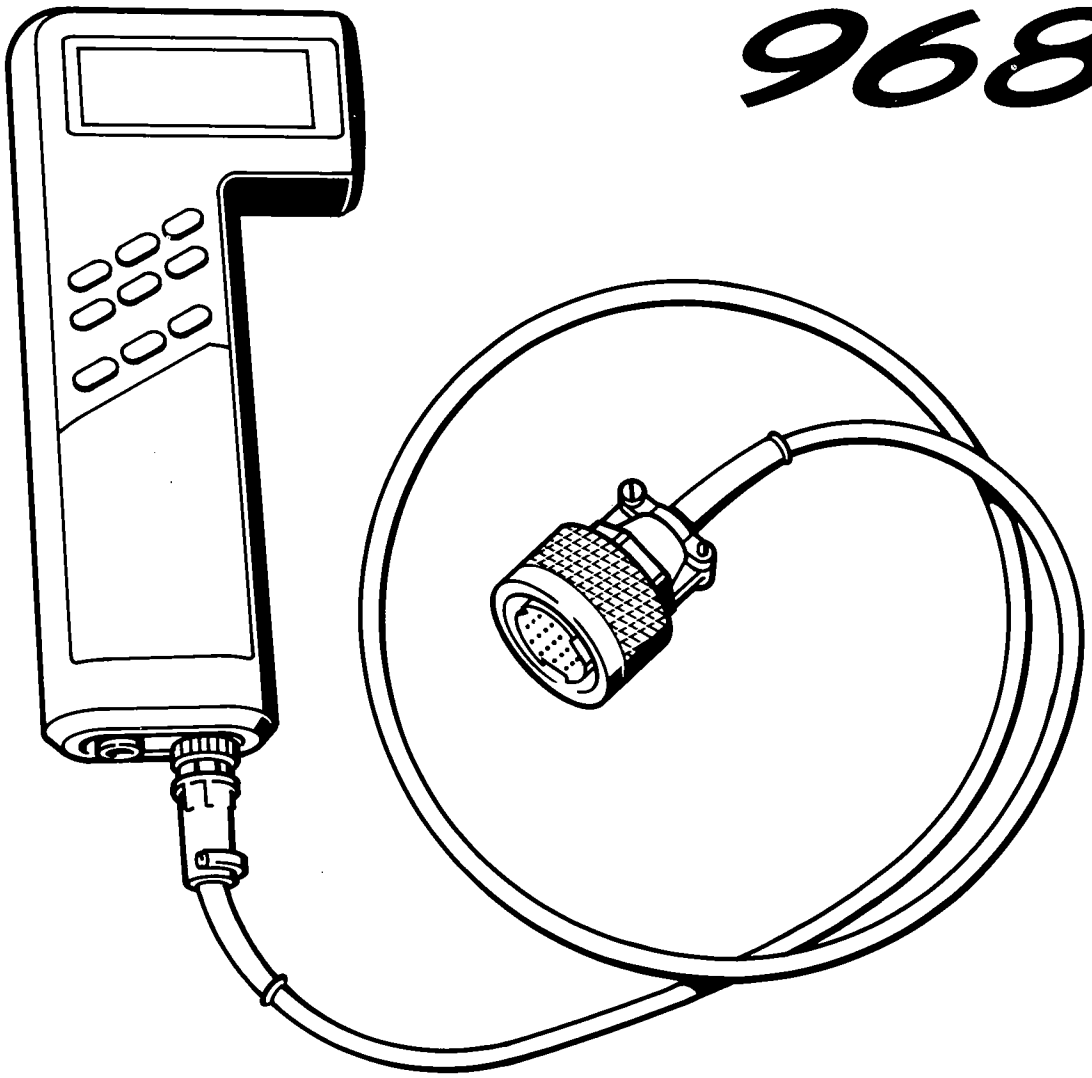

Dr. Ing. h.c. F. Porsche Aktiengesellschaft

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Precautions

Increased demands of modern engines on the ignition systems and a desire for freedom from maintenance have led to the introduction of electronic ignition systems in standard production some time ago. Normally the ignition power of electronic systems (of almost all makes) is greater than that of conventional systems and further power increases can be expected in the future. This places electronic ignition systems in a power range where touching live parts or terminals may be hazardous (this applies both to primary and to secondary circuits).

In this context, we must point out that all relevant national safety regulations and legislation must always be observed when working on or testing ignition systems. The ignition (i.e. ignition or power supply) must always be switched off when working on the ignition system.

Such work includes:

- Connecting engine testers, e.g.
  timing light, dwell angle/speed tester, oscilloscope etc.

- Replacing ignition system components, e.g.
  spark plugs, ignition coil, distributor, ignition leads etc.

The above hazardous voltage will be present in the entire system should it be necessary to switch on the ignition for ignition tests or engine adjustments.

Consequently, sources of hazardous voltages are not limited to the individual components of the ignition system (such as distributor, ignition coil, control unit, ignition tackle etc.) but are also present on wiring harnesses, plug connections and testers.

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Important Vehicle Information

- Always turn off the ignition or disconnect the battery for resistance tests. (If this is not done, the tester may be destroyed).
- Always disconnect the rpm sensor plug for compression tests. (If this is not done, hazardous high voltages and insulation damage to the ignition coil, high-voltage distributor and ignition leads may result).
- The specified ignition coil (refer to Order No.) must not be replaced by a different coil.
- Never connect a suppression capacitor to ignition coil teminals 1 and 15.
- Never connect ignition coil terminal 1 to ground for burglar alarm. (Ignition coil and control unit may be destroyed).
- Never connect the positive battery terminal or a test lamp to ignition coil terminal 1. (The control unit will be destroyed)
- Never disconnect the ignition lead from ignition coil terminal 4 to high-voltage distributor terminal 4 while the engine is running.
- Voltage flashover from ignition coil terminal 4 to coil terminals 1 and 15 must not occur. (Control unit may be destroyed).
- To avoid destruction of the control unit, the secondary circuit of the ignition system must be suppressed with at least 4 kΩ, the original distributor rotor with 1 kΩ suppression resistance having to be installed.
- Disconnect DME control unit only after turning off the ignition.
- Flashover or disruptive discharge in the area of the high-voltage distributor cap (poor insulation) may destroy the control unit.
- Never disconnect the battery when the engine is running.
- Battery polarity reversal could lead to destruction of the ignition coil and the DME control unit.
- External engine starting with more than 16 V or with a boost battery charger is not permitted.
- Always follow the accident prevention regulations when working on the fuel system.

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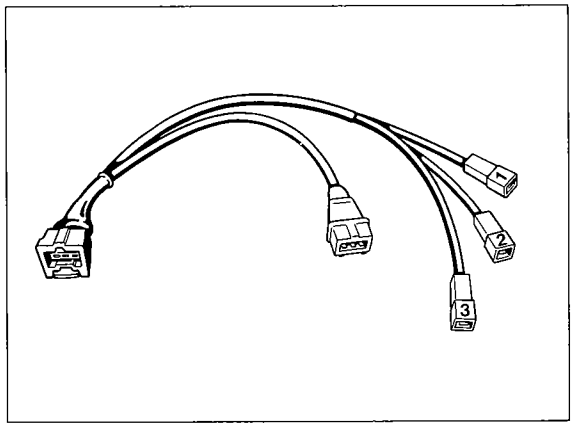
Equipment Required for DME Testing:

- Diagnostics tester 9288 with connecting leads
- 1 oscilloscope approved by Porsche
- 1 digital display multimeter with an internal resistance of at least 50 kΩ
- 1 Bosch L-Jetronic test lead, Bosch No. 1684 463 093 (check lead for correct polarity at plugs)
- 2 control unit plug test leads (shop-made) with 2 tab connectors no. 17.457.2 fitted to avoid damage to the plug terminals in the control unit plug during testing.
- 2 adapter test leads, consisting of: 4 plug connectors N 017.483.1 with 2 leads approx. 150 mm long, soledered.
- 1 three-pin test lead (e.g. VAG 1501).



958-24/28

- 2 control unit plug test leads (shop-made) with 4 tab connectors N 17.457.2.

The test leads must always be used for the tests!

All sender and ignition timing signals of Porsche vehicles can be checked with the engine testers recommended by Porsche. Since instructions for connection of testers on a car will differ depending on the equipment manufacturer, these instructions must always be followed to ensure correct tester connection.

The following signals can be checked with the oscilloscope:

- Engine speed
- Vehicle speed
- t_i (injection time)
- Idle stabilizer
- Hall signal
- Tank venting signal
- VarioCam

Note for USA:

If a fault that affects exhaust gas composition is detected by the Check Engine lamp and is read out, repair is possible with standard workshop tools.

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Diagnosable DME Control Unit

A self-diagnosis feature with fault memory is incorporated into the DME control unit to permit certain faults to be detected and stored.

The DME control unit has a permanent positive connection to prevent deletion of detected and stored faults when the iginition is switched off. Detected faults remain stored in the fault memory for at least 50 engine starts.

Caution:
If the DME control unit plug or the battery is disconnected, the fault memory will be cleared.

Tester Connections:
The diagnostics socket is located on the right-hand side of the passenger footwell.

Note:
The fault path and fault code displayed on the System Tester 9288 will be complemented by the relevant test point in the troubleshooting plan.

The Eprom module Version 4.0 may be used to select the following menus that may in turn be used to select additional submenus. These are displayed by the System Tester in text form.

Selectable menus:

- Fault memory
- Drive links
- Input signals
- Knock registration
- Actual values
- Drive link active

This DME diagnosis/troubleshooting plan is based on the contents of the fault memory.
Paths not covered by self-diagnosis are diagnosed by conventional means (test points 28 - 33, refer to fault list opposite).

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Troubleshooting requires that the person performing the tests

- is familiar with the location of components, function and technical relationships of the systems being tested
- is able to read and evaluate Porsche wiring diagrams
- knows the functions of circuits and relays
- is capable of using testers such as oscilloscope, voltmeter, ohmmeter and ammeter, as well as of evaluating the test results.

The fault text displayed indicates the fault path, i.e. the fault may be present anywhere, from the control unit, across all connectors up to the component itself.
Before reading the fault memory, do not try to locate faults by disconnecting plugs etc., since this may be detected and stored as a fault in the fault memory.

Note for System Tester 9288

If the tester display shows ... **not present**, this could mean

- Fault did not exist at time of testing
- In case of a loose contact, an additional + symbol is displayed.
  Example: **... not present +**
  Remedy: Visual inspection of path
- Conditions under which the fault is tested do not correspond to the conditions under which the fault occurred.
  Remedy: Conform with conditions displayed on the tester.

If the **Signal unplausible** message is displayed on the tester, this could mean

- The signal of the monitored component is not within the tolerance range.

Explanations for the counter shown on the tester display
When the fault is detected for the first time, the counter is always set to 50.
If a lower number is displayed, determine the difference between 50 and the value shown. This value represents the number determined from the combination of starting process, meeting the test conditions and non-presence of the fault. When the number 0 is reached, the fault path is deleted in the control unit.
Should the fault status change from not present to present at a number below 50, the counter is reset to 50. If a number above 50 is displayed, the difference indicates the number of loose contacts that have occurred. Even at a value above 50, the counter counts down to zero when the above combination of conditions is met.

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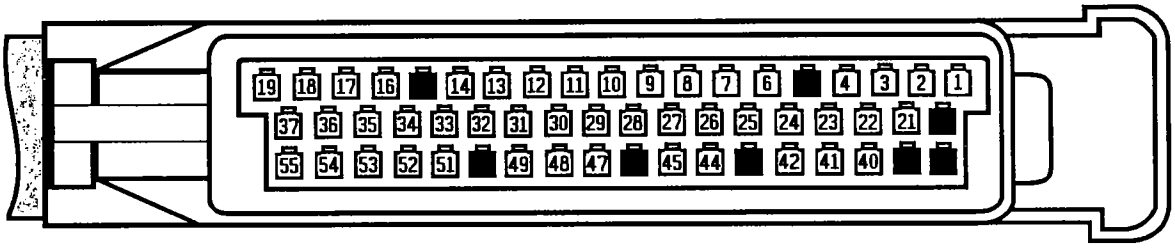
Pin assignment of DME control unit plug



Note

Slots marked black are not used.

1 Ignition coil

2 Ground, ignition output stage (MP IX)

3 Ground (Fuel pump relay)

4 Idle speed positioner, opening winding

5 not used

6 Speed signal at rev counter

7 Air mass sensor signal

8 Hall sender signal

9 Speed signal from speedometer

10 Ground, electronics (MP VIII)

11 Knock sensor 1

12 Positive terminal, Hall sender / throttle

13 Diagnostics L-wire

14 Ground, injection valves (MP IX)

15 not used

16 Injection valve cylinder 3

17 Injection valve cylinder 1

18 Terminal 30

19 Ground, electronics

20 not used

21 Check Engine warning lamp

22 Idle speed positioner, closing winding

23 VarioCam

24 Ground of remaining output stages (MP IX)

25 Hot-wire burnoff

26 Ground, air mass sensor

27 Terminal 15

28 Oxygen sensor/idle CO potentiometer

29 Knock sensor 2

30 Ground NTC/shield knock sensor

31 Knock yes/no

32 Control of AC relay

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33 Tank venting valve

34 Injection valve cylinder 2

35 Injection valve cylinder 4

36 DME relay 85

37 DME relay 87

38 not used

39 not used

40 AC switch input

41 Coolant temperature switch (115°C)

42 Position switch (selector lever)

43 not used

44 Ground, version coding

45 Engine temperature sensor 2

46 not used

47 Oil temperature sensor

48 Speed signal / reference mark

49 Speed signal / reference mark

50 not used

51 Ignition angle cut-in (Tiptronic)

52 Throttle position to transmission control unit

53 Signal from throttle potentiometer

54 Version coding

55 Diagnosis for lead K

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Fault, Fault Code	Possible Causes, Elimination, Remarks

Test Point 1a

Power supply for
DME control unit (V)

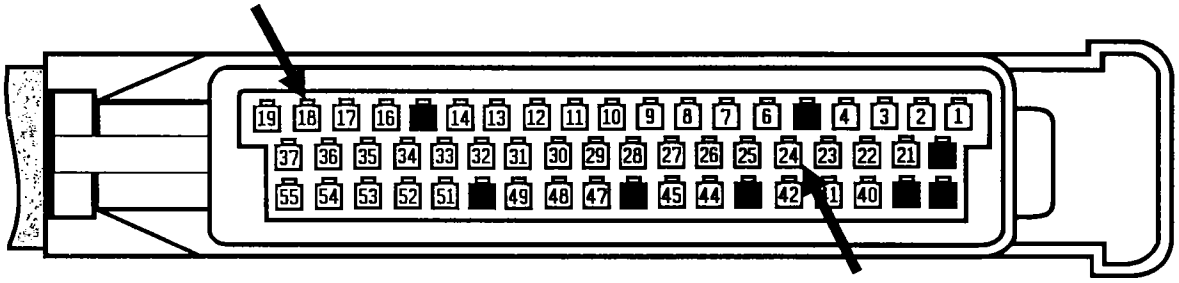
a) Permanent positive (B+) **If there is no B+ the fault memory is cleared**

Test procedure:

Connect a voltmeter to terminal 24 (–) and terminal 18 (+) of the control unit plug with the help of test leads.

Display: Battery voltage

No display: Check current flow and ground paths in accordance with wiring diagram.



Test point 1b

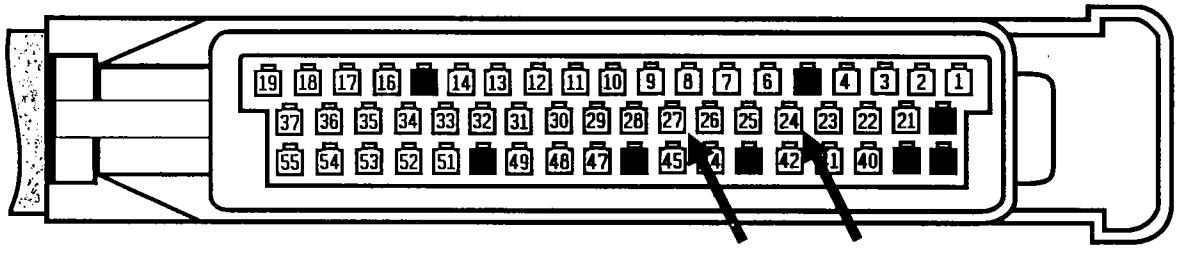
Power supply of
DME control unit (V)
too high/too low
Fault code 1_11

b) Power supply via terminal 15

Check regulator voltage with the engine running. Specified value approx. 13.8 V
Connect a voltmeter to terminal 24 (–) and terminal 27 (+) of the control unit plug with the help of test leads. Turn on ignition.

Display: Battery voltage

No display: Check current flow according to wiring diagram



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Fault, Fault Code	Possible Causes, Elimination, Remarks

Test point 2

Engine temp. sensor
(NTC II/Ω)
Fault code 1_14

Using System Tester 9288, the engine temperature can be read off directly in menu item „Actual values".

no is not plausible display:

Connect ohmmeter to terminal 45 and terminal 30 of the disconnected DME control unit plug with the help of test leads.

Display at:	0°C	=	4.4 - 6.8 kΩ
	15 - 30°C	=	1.4 - 3.6 kΩ
	40°C	=	1 - 1.3 kΩ
	80°C	=	250 - 390 Ω
	100°C	=	160 - 210 Ω

If the above values are not obtained, check directly at engine temperature sensor.

Note: Temperature sensor 2 informs the control unit of the engine temperature. It provides additional fuel in the cold starting and warm-up stages of engine operation.

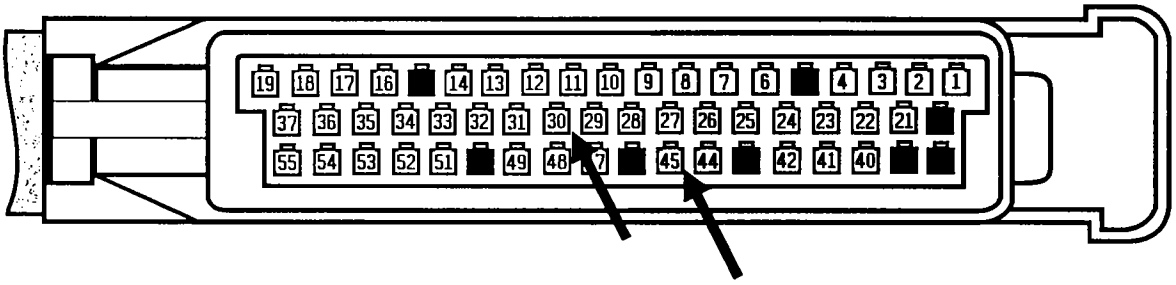
Open circuit (∞ Ω):

The DME control unit of the 968 adjusts to a value pre-set in the control unit that approximately corresponds to that of the engine at operating temperature. Enrichment by the faulty temperature sensor 2 when the engine is warm does not occur (emergency running program). This results in starting problems when the engine is cold (no cold start enrichment).

Short circuit to ground:

When engine is cold: No engine pickup, too lean, engine stops.
No effect if engine is at operating temperature.

Replacement value is applicable to both types of fault!



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Fault, Fault Code	Possible Causes, Elimination, Remarks

Test point 3

Throttle potentiometer
Fault code 1_16

Using System Tester 9288, the throttle angle may be read directly in the **Actual values** menu item.
If no plausible display is obtained, check power supply
Connect test lead VW 1501 between throttle potentiometer and disconnected plug. Connect voltmeter between lead No. 1 and No. 2.
Ignition on = display: approx. 5 V (Power supply of throttle potentiometer)
No display: Check according to wiring diagram
Connect voltmeter to lead No. 1 and No. 3.
Display approx. 0.5 Volt.
Operate throttle. Voltage should now increase to approx. 4.7 Volt.

Test point 4

Oil temperature sensor
(in cylinder head)
Fault code 1_17

Using System Tester 9288, the oil temperature may be read directly in the **Actual values** menu item. As an alternative, connect an ohmmeter between terminal 47 and terminal 30 of the disconnected DME control unit plug.

Display at: 60°C = 3.8 kΩ
85°C = 1.5 kΩ
100°C = 930 Ω

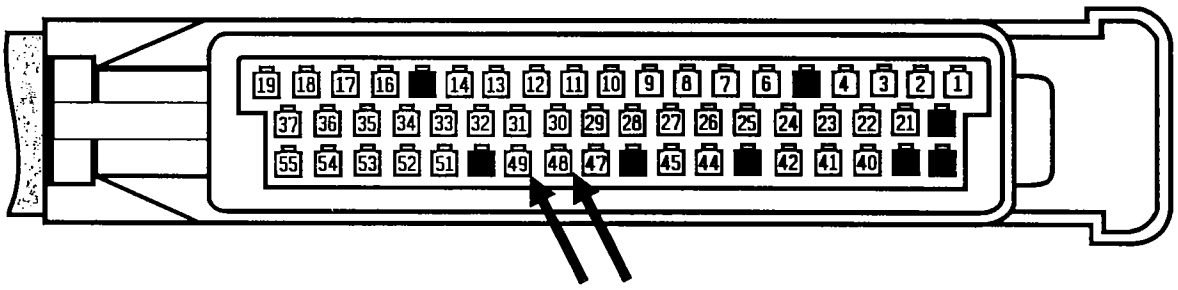
If the above values are not reached, check directly at oil temperature sensor.
Note: The engine temperature sensor informs the control unit of the actual oil temperature. Changes of the oil temperature cause the VarioCam shift points to be relocated.

Test point 5

Rpm signal
Fault code 1_18

Run test using an oscilloscope. Connect and adjust shop oscilloscope according to manufacturer's instructions.

Connect oscilloscope test lead with terminal 49 and terminal 48 of the disconnected DME control unit plug.



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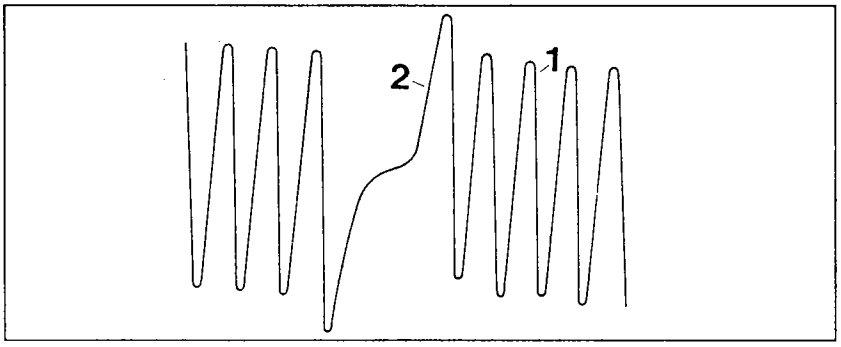
Fault, Fault Code	Possible Causes, Elimination, Remarks

Start engine. Sinewave fluctuations of 3 V min. must now be displayed. An intermittently higher amplitude indicates the reference mark signal.



1 – Rpm signal
2 – Reference mark signal

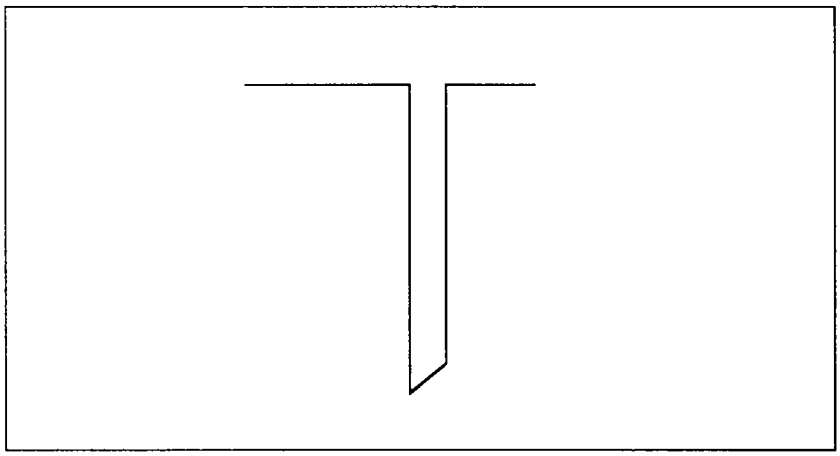
If the voltage signal is too low (< 3V), the gap between sensor and ring gear may be adjusted incorrectly.

Sensor gap: between ring gear and sensor: 0.8 ±0.2 mm.
Using System Tester 9288, the reference mark signal may be read directly in the **Input signals** menu item.

Test point 6

Speed signal/ Speedometer
Fault code 1_19

Using System Tester 9288, the speed signal may be read directly in the Actual values menu item. As an alternative, check with an oscilloscope.
To do so, connect oscilloscope to terminal 9 and terminal 24 of the control unit plug. Turn left front wheel manually.
The following signal must now be displayed:



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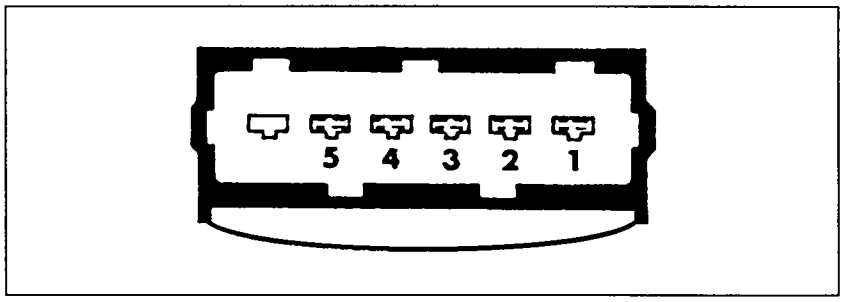
Fault, Fault Code	Possible Causes, Elimination, Remarks

Test point 7

Air flow sensor (V/Ω)
Fault code 1_21

Voltage supply (V)

Disconnect plug at air flow sensor, connect voltmeter to plug terminals 2 and 5 using test leads.



Ignition on:
Display: Voltage approx. 10 Volt up to 13.8 Volt

No display: check in accordance with wiring diagram
Reconnect plug.

Checking the hot-wire signal with System Tester 9288

The air flow sensor signal may be tested directly in the **Actual values** menu item using System Tester 9288.
To check the signal, remove upper air cleaner section and start engine.
Display: approx. 2.5 ±0.5 Volt
Blow against hot wire. This must cause the System Tester display to change.

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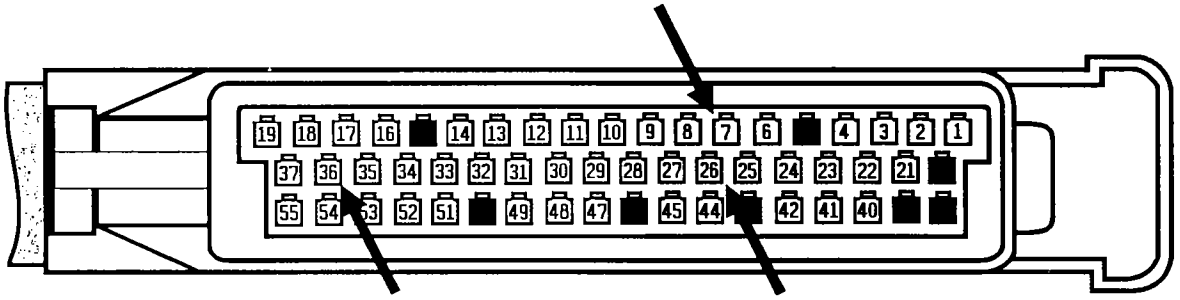
Fault, Fault Code	Possible Causes, Elimination, Remarks

Checking the hot wire signal (V)

Connect plug to air flow sensor.
Pull off DME plug.
Connect DME plug terminal 36 to ground (e.g. door stop).
Connect Voltmeter to DME plug terminal 7 and 26.

Display: ≈ 1.4 V

Blow against air flow sensor and observe voltmeter. A **voltage change** must occur **(~ 1.6 - 5 V)**.



Checking the hot-wire burn-off circuit (visual check)

Operate engine with air flow sensor installed and connected. When an engine temperature > 60° C is reached, increase engine speed to above 2,000 rpm and stop engine (ignition off).
After a waiting time of approx. 4 seconds, the hot wire must glow for approx. 1 second (burn-off).

Test point 8

Oxygen regulation stop
Fault code 1_23

The oxygen regulator cannot operate within its control range if extreme problems of mixture preparation occur, e.g. due to an excessively lean setting because of unmetered air, or due to an excessively rich setting because of a faulty injector valve. The oxygen regulator then moves up to the stop position.

Oxygen regulation stop **too rich:**	Check intake system for leaks (Test point 29)
Oxygen regulation stop **too lean:**	Check fuel pressure (Test point 28) Check injector valves for leaks

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Fault, Fault Code	Possible Causes, Elimination, Remarks

Test point 9

Oxygen sensor (V)
(Sensor signal)
Fault code 1_24

Checking the sensor signal

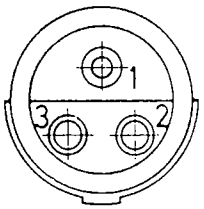
Using the System Tester 9288, the oxygen sensor signal may be read directly under the **Actual values** menu item.
Diagnosis can only be carried out if an engine temperature of 70 deg. C has been reached for more than 1 minute.

If not:

Disconnect oxygen sensor plug. Connect digital voltmeter with test connector (sensor voltage signal) and ground at the sensor end.

Start engine and allow to warm up so that the oxygen sensor reaches its operating temperature. When the mixture is enriched, e.g. acceleration, a change in the voltage signal must be displayed.

Voltmeter display:
approx. 150 mV - 900 mV (acc. to mixture composition)
If the regulator sets in with a certain delay, the oxygen sensor heater must be checked. To do so, connect voltmeter at control unit end with sensor plug disconnected and engine running. System voltage must be present.



Test connection:

1 = Sensor voltage

2 = Sensor heating

3 = Sensor heating

Note:

If the control unit detects an oxygen sensor voltage signal of more than 1.4 V or less than 0.1 V, the control unit switches to operation without oxygen sensor. (Short to ground or open circuit)

If regulation does not work and the sensor voltage is O.K., check the coding of the control unit before replacing it.

Test point 10

Ignition timing change
Fault code 1_26

Using the System Tester 9288, the ignition timing change signal may be modified directly in the Input signals menu item.
On Tiptronic vehicles, ignition is retarded when a gear change is made. When the Ignition timing change fault message occurs, check wiring continuity between DME plug and Tiptronic connector.
DME control unit plug: Pin 51, Tiptronic control unit plug: Pin 32
Caution, observe connection between plugs.
This fault causes the Tiptronic to operate in emergency mode. For the test to be valid, a test drive is required since the signal is only displayed for a very short time.

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Fault, Fault Code	Possible Causes, Elimination, Remarks

Test points 11 and 12

Idle stabilizer (V)
Fault code 1_27
1_28

The idle stabilizer is designed as a twin-winding actuator with one opening winding and one closing winding.

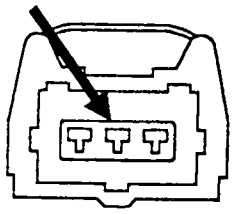
Using the System Tester 9288, actuation of the idle stabilizer may be read directly in the Drive links menu item.

If no higher pulse is present, check the following:

Voltage supply

Connect voltmeter with disconnected plug of idle stabilizer terminal 2 and engine ground. Ignition on.

Display: Battery voltage



No display:
Check power supply in accordance with wiring diagram.

Checking the control signal

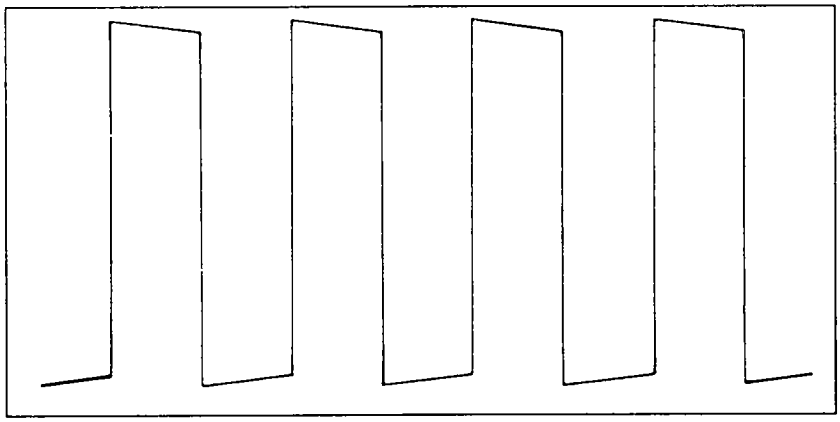
Using the System Tester 9288, the idle stabilizer signal may be read directly in the **Actual values** menu item.
Operational check: Switch on loads in idle mode. % display must change, idle speed remains constant. If not:

Connect 3-pin adapter lead VW 1501 between idle stabilizer and plug port.

Connect oscilloscope to the adapter lead terminal 2 and terminal 1 as well as terminal 2 and terminal 3, respectively.

Make sure the wiring connectors are not shorted to vehicle ground (to avoid short circuits).

With the engine running, the following display must appear:



If no audible pulse is detected even though voltage is present and a signal is applied, replace the idle stabilizer.

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Fault, Fault Code	Possible Causes, Elimination, Remarks

Test point 13

Activation of AC relay

Fault code 1_29

Using the System Tester 9288, activation of the AC relay may be checked directly in the **Drive links** menu item.
If no sound is audible, check the following:
1) AC switch signal:

DME plug disconnected, ignition on, connect voltmeter between terminal 40 and terminal 24.
AC switch on: Display approx. 12 Volt
If not: Check in accordance with wiring diagram
If the air conditioning system is inoperative, the fault may be due to the 115° C coolant temperature switch. To check the switch, connect ohmmeter with terminal 41 of the disconnected control unit plug and ground. Ignition on.
Display: $\infty\Omega$
If not, check in accordance with wiring diagram

2) Voltage at A/C relay:

Connect DME plug. Remove A/C relay (G19) from Central Electrical System. Connect voltmeter with relay base terminal 2 and terminal 7.
Operate A/C switch with engine running.
Display: Battery voltage after approx. 5 seconds
No display: Check wiring between A/C relay and DME control unit.

Test point 14

Knock sensor 1

Fault code 1_31

- Mounting of knock sensor (observe torque and type of screw)
- Check wiring harness and plug connection in accordance with wiring diagram
- Reconnecting the plugs helps to eliminate contact resistances
- Check if coolant or other fluids have ingressed in the knock sensor area
- Replace knock sensor

If the knock sensor is faulty, ignition timing is retarded by 6° on the crankshaft at a certain engine load.

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Fault, Fault Code	Possible Causes, Elimination, Remarks

Test point 15

Knock sensor II

Fault code 1_32

- Mounting of knock sensor (observe torque and type of screw)
- Check wiring harness and plug connections in accordance with wiring diagrams
- Reconnecting the sensors helps to eliminate contact resistances
- Check if coolant or other fluids have ingressed in the knock sensor area
- Replace knock sensor

If the knock sensor is faulty, ignition timing is retarded by 6° on the crankshaft

Test point 16

Control unit faulty

(Knock computer)

Fault code 1_33

Ignition timing is retarded by 6° on the crankshaft for all cylinders from a certain engine load if this fault occurs.

Replace control unit.

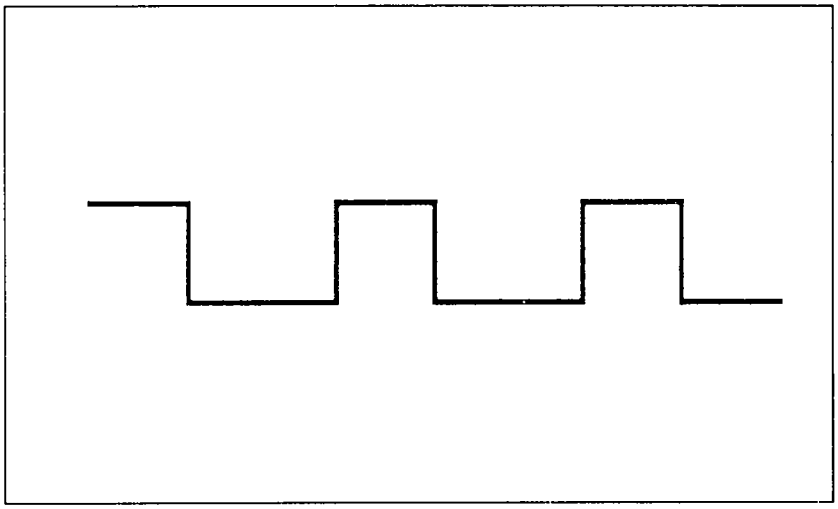
Test point 17

Hall signal

Fault code 1_34

To check the Hall signal, disconnect plug at the cylinder head behind the camshaft sprocket and insert 3-pin adapter lead (VW 1501). Connect oscilloscope to terminals 1 and 2 of the adapter lead, start engine.

If the Hall system is O.K., the following signal must be displayed:



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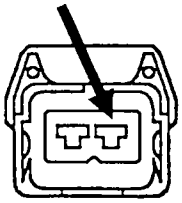
Fault, Fault Code	Possible Causes, Elimination, Remarks
	If the DME control unit detects a missing Hall signal, ignition timing is retarded by approx. 6° in all rpm ranges.
Test point 18	
VarioCam Fault code 1_35	Using the System Tester 9288, VarioCam may be checked directly in the **Drive links** menu item or the **Drive link active** test point. A switching noise must be audible in case of the Drive links test point. For the Drive link active menu item, the entire system is checked with the engine running. With this test, there is a risk of the engine stalling due to valve overlap. This causes communication to the System Tester 9288 to be interrupted. To be able to continue the diagnosis, switch the ignition off and back on again. Then press the ">"key on the System Tester. If VarioCam is not triggered, disconnect plug at the solenoid. Switch ignition on. Connect voltmeter to plug (refer to drawing) and ground (engine).  Display: Battery voltage No display: Check wiring according to wiring diagram
Test point 19	
Idle CO potentiometer Fault code 1_36	On vehicles without catalytic converter that show fault code 36, start by testing the control unit coding (Actual values menu item with System Tester 9288). If the coding is O.K., check power supply for CO potentiometer and potentiometer signal in accordance with the wiring diagram.
Test point 20	
Control unit faulty Fault code 1_41	Using the System Tester 9288, the version coding may be read directly in the **Actual values** menu item. If this fault is detected by the control unit, maximum engine speed is limited to 6,000 rpm 6 minutes after starting the engine. This is done to protect the engine.

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Fault, Fault Code	Possible Causes, Elimination, Remarks

Test point 21

Fuel pump relay
(DME relay) (V)
Fault code 1_42

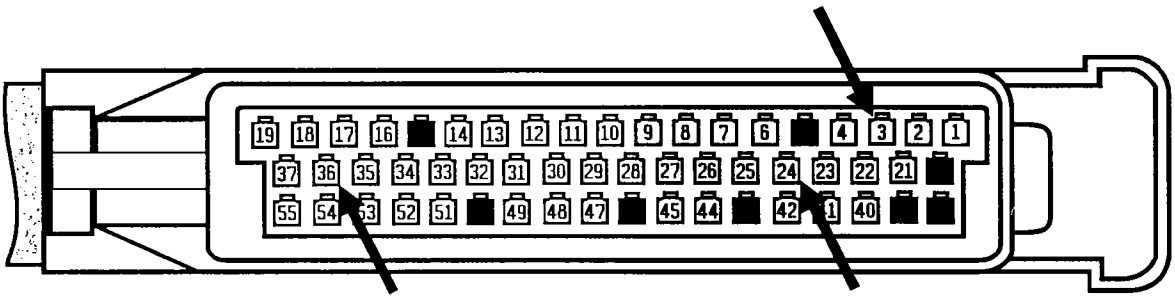
Start engine - the fuel pump must operate during engine starting.

If not:

Switch off ignition. Disconnect control unit plug. Use a test lead to connect terminal 36 and terminal 24 of the control unit plug. Using an additional test lead, connect terminal 3 of DME plug to ground (e.g. door stop). The pump must run.

If not:

Check in accordance with wiring diagram



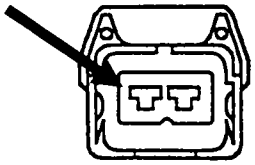
Test point 22

Tank ventilation valve (V)
Fault code 1_43

When the engine operates at operating temperature, the tank ventilation valve (at the brake booster) is opened for a longer or shorter period as a function of the load. The opening period is determined by a ground pulse from the control unit.

a) Activation test

To activate the tank ventilation valve directly, System 9288 may be used, selecting the Drive links menu item. If there is no audible pulse from the tank venting valve, check voltage supply at the terminal — refer to drawing — of the tank ventilation valve plug and body ground according to the wiring diagram.
Ignition on. Display: Battery voltage



b) Control signal test

Connect DME test lead (Bosch No. 1 684 463 093) between tank ventilation valve and plug connection. Connect and adjust engine tester according to manufacturer's instructions.

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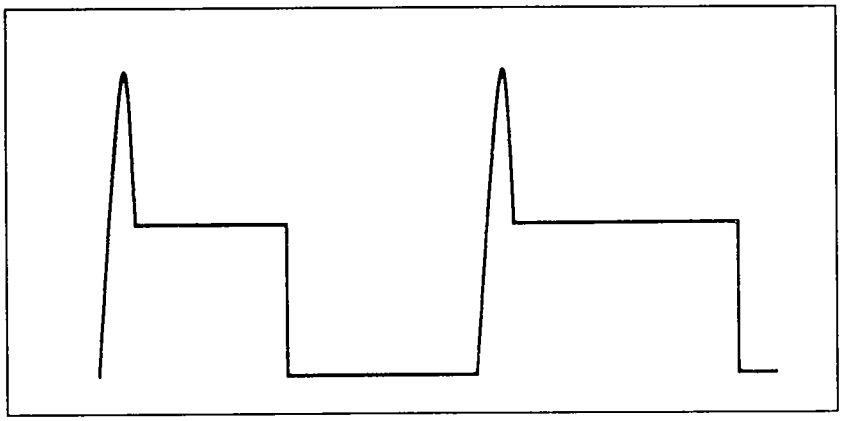
Fault, Fault Code	Possible Causes, Elimination, Remarks

The tank ventilation valve is not activated permanently.

Testing must be performed within 7 minutes after starting the engine at operating temperature. Then interrupt activation of ventilation valve for approx. 75 seconds, continue afterwards.

Start engine and accelerate. With the engine at operating temperature, the following display must be visible on the tester:



The signal becomes wider as the air throughput increases.

If there is no signal, check path in accordance with wiring diagram

Test point 23

Check Engine warning lamp

Fault code 1_45

A ground signal is fed from the control unit – terminal 21 – to the „Check Engine lamp", causing this lamp to come on when an emission control component fails.

If the „Check Engine" warning lamp fails, this fault is stored in the fault memory.

Check by supplying ground to disconnected DME control unit plug terminal 21 and switching on ignition. The Check Engine lamp must now come on.

To replace a faulty display lamp, always use the specified lamp.

Reading errors using the Check Engine warning lamp is covered on page D24/28 - 31.

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Fault, Fault Code	Possible Causes, Elimination, Remarks

Test point 24 - 27

Injector valves (V/Ω)
Fault code 1_51
1_54

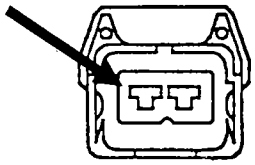
Using the System Tester 9288, the injector valves may be checked directly in the **Drive links** menu item or the **Drive link active** menu item.

Selective injection allows each injector valve to be actuated individually. In case of the Drive links test point, a rather weak switching noise of the injector valves is audible.
In case of the Drive link active menu item, each individual injector valve may be isolated with the engine running.

Power supply

Disconnect valve plug, connect voltmeter to the injector valve plug terminal – refer to drawing – and ground (engine).
Ignition on.

Display: Battery voltage



If no battery voltage is displayed, check according to wiring diagram.

Checking coil resistance of injector valves

Disconnect valve plug. Check coil resistance at injector valve terminal contacts with an ohmmeter.

Test value: approx. 16 Ω

Injection output stage

Adjust oscilloscope according to manufacturer's instructions. Connect a Bosch test lead (1 684 463 093) between injector valve and plug. Connect oscilloscope according to manufacturer's instructions with the test lead.

Caution:

Make sure the tester leads are not grounded in any way.

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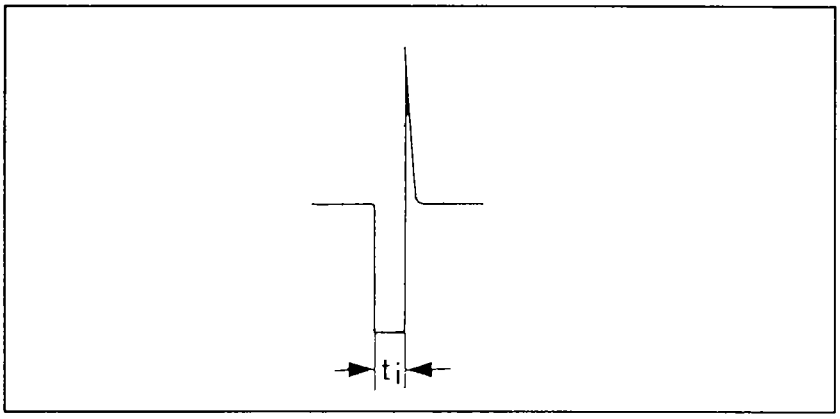
Fault, Fault Code	Possible Causes, Elimination, Remarks

Start engine. If the injection output stage operates correctly or if the tester connections are correct, respectively, the following signal must be displayed:

ti signal



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Fault, Fault Code	Possible Causes, Elimination, Remarks

Test point 28

Fuel pressure

The left-hand fuel collection pipe has a test connection at cyl. no. 3. Unscrew the cap nut of the test connection.

Caution: The inserted ball seat could fall out!

Connect pressure gauge P 378 or VW 1318 to the test connection. Start engine.

Test pressure 3.3 ±0.2 bar (Idle speed)

In case of hot starting problems:

Check with engine stopped and fuel pump running. For the test, remove fuel pump relay and jumper terminal 87b and terminal 30.

Test pressure 3.8 ±0.2 bar

- Switch off fuel pump. Read off pressure on pressure gauge (nominal 3.8 ±0.2 bar).
- Max. permissible pressure drop with warm engine: **0.5 bar in 30 minutes.**
- If the pressure drops below the specified value, proceed as described below:

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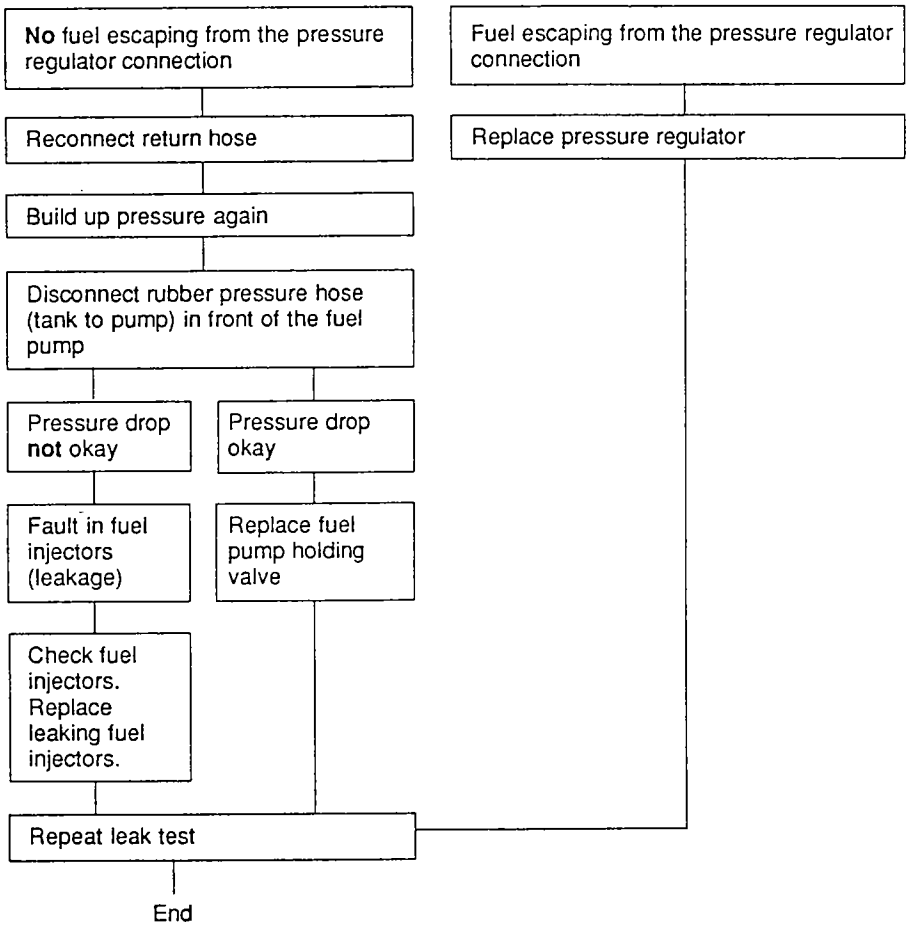
Fault, Fault Code **Possible Causes, Elimination, Remarks**

Build up pressure again by switching on the fuel pump briefly. Remove return pipe from pressure regulator (fuel pump must not be switched on).



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Test point 29

Intake System Leaks

Check all connections downstream of the air flow sensor for leaks. Remove upper air cleaner section. Attach Special Tool 9264/4 to the air mass sensor and build up a positive pressure of approx. 0.5 bar in the intake system. Leaks will cause the pressure in the intake system to drop quickly.

Note:

Fault flashing code 1_23 (oxygen regulator at stop) appears in cars with oxygen regulation and very large leaks in the intake system (e.g. intake pipe gasket).

Test point 30

Ground connection/plug connections (V)

- Ground lead (2x) from wiring harness to engine block.
- Battery ground lead at clutch bell housing (engine ground) and body (body ground, next to battery).
- Fuel pump ground between rear lock crosswall and spare wheel well.
- Are ground connections tight and free from corrosion?
  If not, undo, clean and retighten ground connections as specified.

Note:

Never start the engine as long as the ground lead between body and engine is disconnected!
This will destroy the control unit immediately!

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Plug connections

Are all plugs connected correctly, not loose and not corroded? The pins and sleeves of the plugs must not be bent!

- The 55-pin plug on the DME control unit (behind the floor plate in the passenger footwell)
- A 14-pin plug in the engine compartment next to the brake booster
- A 3-pin plug for reference mark/engine speed sensor and a 3-pin plug for the oxygen sensor behind intake pipe for cylinder no. 4 (remove cover at fuel ring pipe first)
- A 3-pin plug at throttle potentiometer
- A 2-pin plug at tank ventilation solenoid valve (at the brake booster)
- A 6-pin plug at the air mass sensor
- A 2-pin plug at NTC II (The temperature sensor is screwed into the engine block above the left-hand balance shaft near cylinder no. 1)
- A 3-pin Hall sender plug (behind the camshaft drive gear)
- A 2-pin plug for knock sensor I (between intake pipe for cylinder no. 1 and 2)
- A 2-pin plug for knock sensor II (between intake pipe for cylinder 3 and 4)
- A 3-pin plug for the idle stabilizer
- One 2-pin plug for each of the 4 injection valves

The 968 is fitted with a standard control unit. The control unit is coded accordingly depending on the vehicle model.

The type of coding may be retrieved under the Version coding heading in the Actual values menu.

Power to the DME control unit is supplied across ignition lock terminal 15 and terminal 30.

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Test point 31

Ignition system

a) Secondary ignition display

Adjust secondary ignition display at oscilloscope. Connect test leads according to manufacturer's instructions.

Note:

If a fault is displayed for all cylinders, the fault is located in the primary or secondary circuit from the ignition coil to the distributor rotor. If a fault is displayed for one cylinder only, the fault is located after the distributor rotor.

Primary resistor:
Terminal 1+15 = 0.4 - 0.6 Ω

Secondary resistor:
Terminal 1+4 = 5 - 7.2 kΩ

b) Spark plug connector (Ω)

Suppression resistor: 3 kΩ
Visual inspection for damage, traces of burning etc.

c) Distributor

Distributor rotor, distributor cap:
Suppression resistor: 1 kΩ each

Visual inspection for damage, dirt, faulty mounting position.

d) Ignition timing test

Ignition timing is tested with the engine at operating temperature:

Using System Tester 9288, ignition timing and engine speed can be read directly in the „Actual values" menu item.

Test values: 968 (with manual transmission)

At 840 ± 40 rpm ...10° ± 3°

968 (with Tiptronic)

At 880 ± 40 rpm ... 10° ± 3°

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Test point 32

Alternator, regulator

Engine misfire may be caused by voltage peaks of the alternator.

Take drive belt off the alternator, start engine.

Check alternator and regulator after having remedied the faults.

Test point 33

Leads K and L

The diagnosis connection between the DME control unit and testers is established by means of the two leads K and L. If no diagnosis is possible, the following points must be checked:

1. Continuity test (refer to wiring diagram)

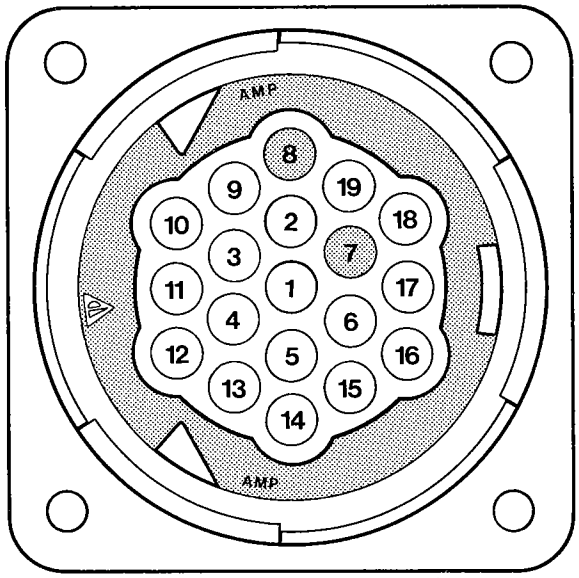
Leads L: Pin 7 (19-pin diagnostic socket) – Pin 13 (DME plug)

Leads K: Pin 8 (19-pin diagnostic socket) – Pin 55 (DME plug)

2. Ground short test (refer to wiring diagram)

Leads L: The voltage at pin 7 (19-pin diagnostic socket) must be > 8 V when the ignition is on.

Lead K: The voltage at pin 8 (19-pin diagnostic socket) must be > 8 V when the ignition is on



951 - 24/28

Assignments:

7 - Lead L
8 - Lead K
10 - Ground
13 - Terminal 15

Possible fault cause at < 8 Volt:

- Short to ground or open circuit in wiring or connectors
- A defective control unit connected to the above leads. (May be any diagnosable control unit, need not necessarily be the DME control unit).

Checking: Disconnect plugs at diagnosable control units one after the other until the voltage is > 8 V. Replace responsible control unit.

- Tester faulty.
- No power supply at the diagnostic plug.
- No ground supply at diagnostic plug.

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Notes on idling speed and idling CO testing:

a) Idling speed

Idle speed check value for engines at operating temperature:
840 ± 40 rpm with manual transmission
880 ± 40 rpm with Tiptronic

b) Idle speed CO of cars without catalytic converter

The CO level is adjusted at the idle potentiometer in the engine compartment. The following requirements must be observed:

- Engine at operating temperature
- Engine in good mechanical condition, ignition o.k.
- All loads switched off
- CO tester at operating temperature, calibrated and adjusted correctly

Adjusting value: 0.5 - 1.5 % CO

c) Idle speed CO of cars with catalytic converter

On these vehicles, adaptation of idle speed CO level takes place along with adaptation of the idle speed. As a result, only the actual condition can be checked on those vehicles. The following requirements must be observed when performing the checks:

- Engine at operating temperature
- Engine in good mechanical condition, ignition o.k.
- All loads disconnected
- Exhaust tester at operating temperature, calibrated and adjusted correctly
- **Oxygen sensor plug connected**

Test value: 0.4 - 1.2 % CO

After disconnecting the control unit plug or the battery, the engine must run at idle for at least 10 minutes before these values can be rechecked.

Coding the control unit

The DME control unit is coded using a jumper connection deviating from the control unit wiring loom. If the jumper connection is free, the control unit operates in controlled mode, i.e. with oxygen sensor regulation. If a 1 kΩ resistor is attached to the jumper, the control unit operates in uncontrolled mode, i.e. without oxygen sensor regulation.

The coding may also be read directly in the "Actual values" menu item using System Tester 9288.

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Check-Engine Lamp

(Malfunction Indicator Light M.I.L.)

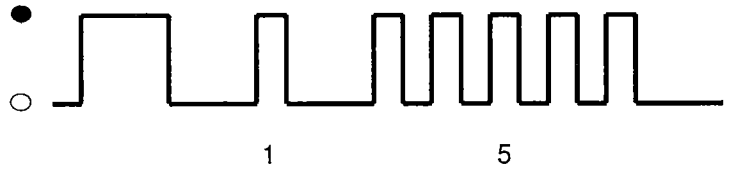
USA vehicles are fitted with with a warning lamp that lights up if a component relevant to exhaust gas composition fails.

As a function check of the warning lamp, the lamp lights up when the ignition is switched on and goes out when the engine is running after it has been started without depressing the accelerator.

A flashing code of the warning lamp indicates the defective fault path.

To trigger the flashing code, fully depress the accelerator pedal for 3 seconds with the engine off and the ignition on until the Check-Engine lamp flashes. Then ease off the throttle.

If no fault is stored, i.e. no warning came from the warning lamp, a flashing code appears

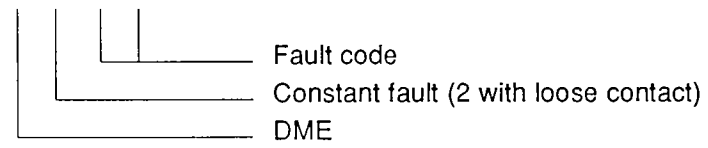


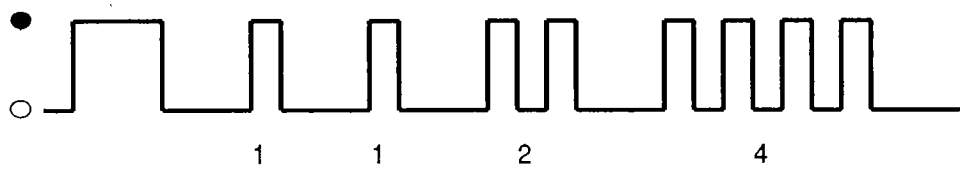
15
no fault.

• = Lamp on O = Lamp off

If the warning lamp did indicate a warning, i.e. there is a fault, a flashing code appears, e.g.

1 1 2 4





1124
Oxygensensor

The flashing code is listed in the Diagnosing/Troubleshooting plan on page D 24/28-8.
The fault can also be read directly using System Tester 9288. After the repair the fault memory must be erased using the **System Tester**.

If the fault memory is read via the Check-Engine lamp, repairs may be performed using conventional shop equipment.

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page

Front wheel suspension

Rear wheel suspension, drive shaft

Wheels, tires, alignment

Brakes, mechanical

Brake, hydraulics, regulator, booster

Steering

Body, general

Doors

Convertible top

Bumpers

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page

Glasses, window control

Exterior equipment

Interior equipment / Airbag

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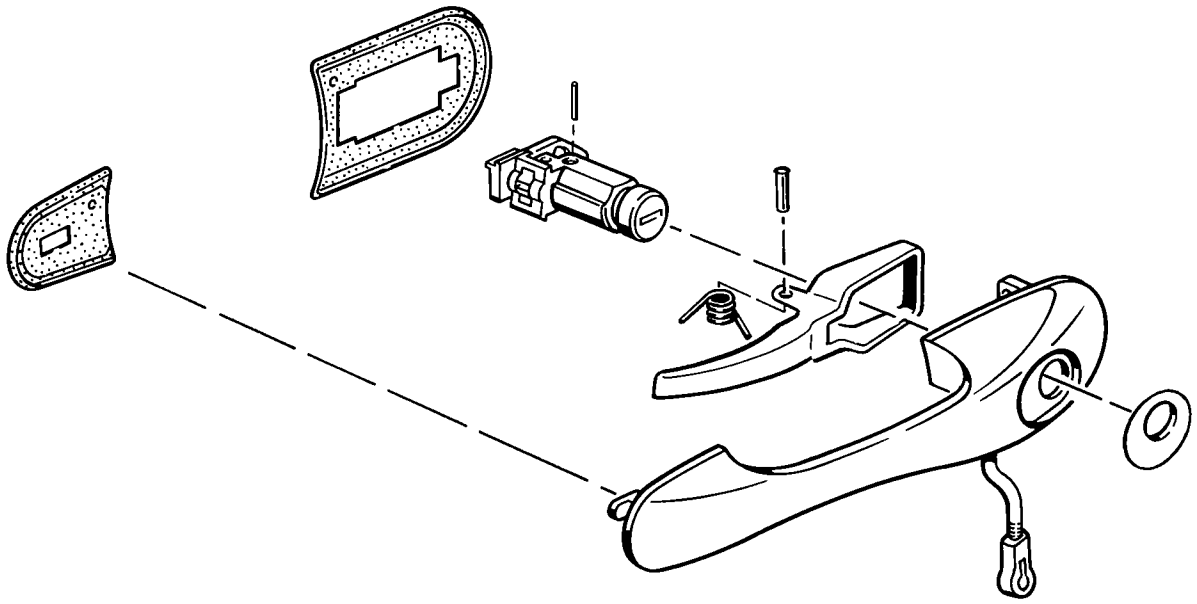
Dismantling and assembling door outer handle



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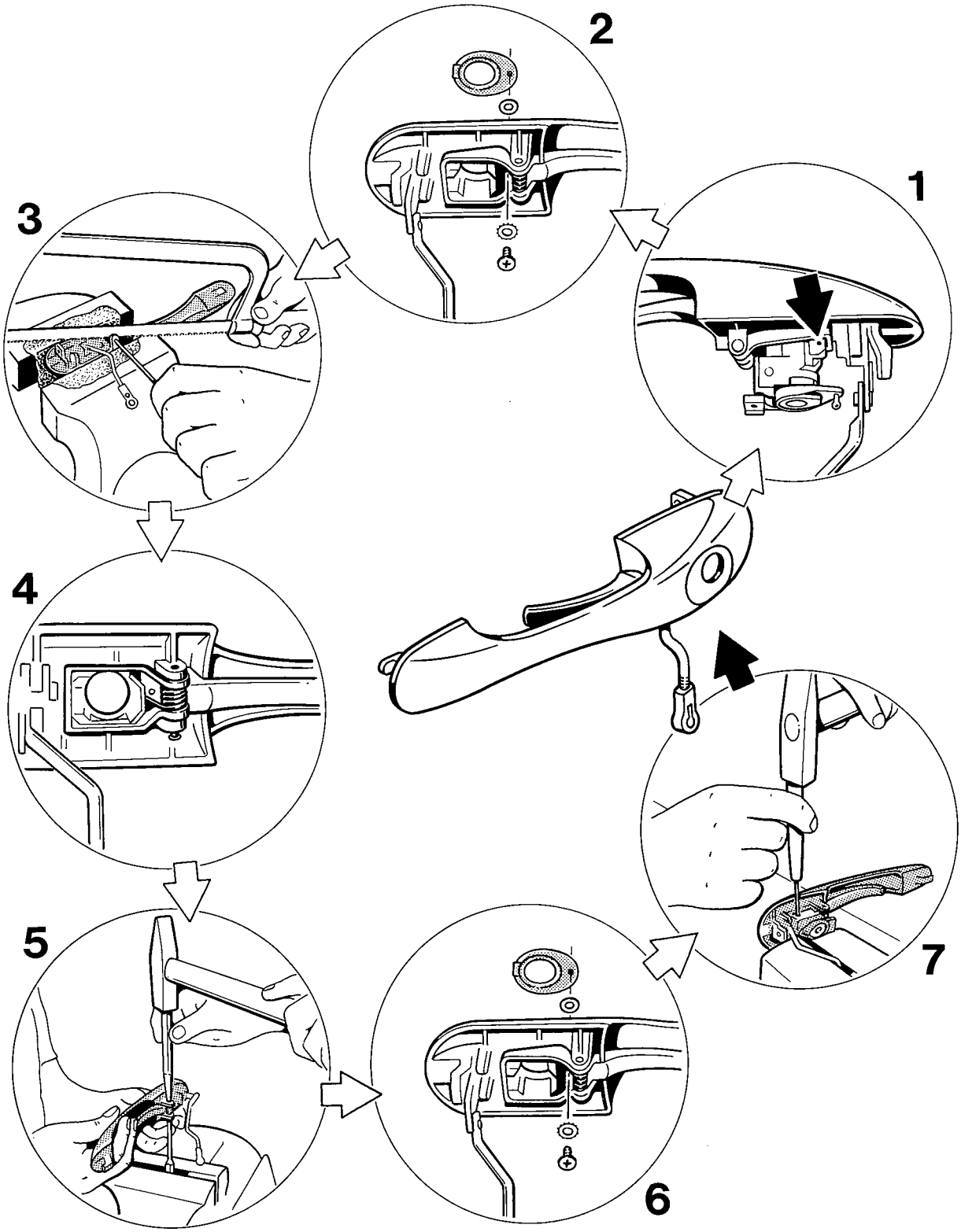
Dismantling and assembling door outer handle



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Dismantling and assembling door outer handle

Dismantling door outer handle:

No.	Operation	Instructions
1	Remove lock barrel	To separate the lock barrel from the door outer handle, drive out the lock pin using a drift.
2	Remove escutcheon	Undo bolts and lift off escutcheon.
3	Remove operating lever	Cut rivet connecting door outer handle and operating lever using a hacksaw. Pull out both rivet sections, pull operating lever and tensioning spring out of the door outer handle. *Note:* *When sawing off the rivet, lock the rivet stud to keep it from turning.*

Assembling the door outer handle:

No.	Operation	Instructions
4	Fit operating lever	Insert operating lever, tensioning spring and rivet stud into the door outer handle. *Note:* *Grease the operating lever (in the pivot area) and the rivet stud before inserting them into the door outer handle.*
5	Reestablish rivet connection	Position drift in a vise. Place preassembled door outer handle with rivet stud area (flat side of rivet stud) onto the drift. To rivet door outer handle to the operating lever, enlarge rivet stud using a center punch. *Note:* *Enlarge rivet stud head only enough to prevent the rivet stud from being pressed out of its assembled position.*
6	Fit escutcheon	Place escutcheon into door outer handle and screw in place.
7	Fit lock barrel	Place lock barrel into door outer handle and lock using the roll pin.

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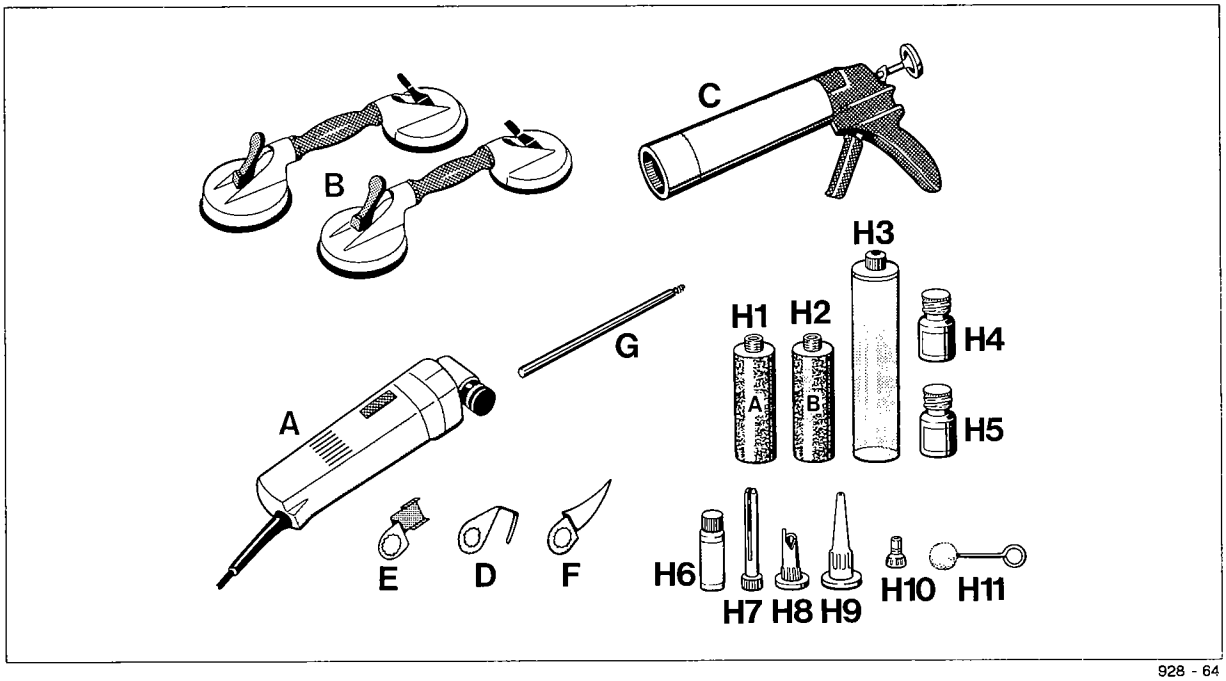
Removing and installing windshield – 2-pack adhesive

The following tools and materials are required for removal and installation of the windshield using 2-pack adhesive:



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A	Cutter	VAG 1561	e.g. VW Werk AG
B	Twin-cup suction puller	VAG 1344	Service equipment supply
C	Bonding gun	VAG 1628	
D	Cutting knife, U-shape	639.031.140.14	e.g. C & E FEIN GmbH & Co.
E	Flashing knife	639.031.130.22	P.O. Box 172
F	Cutting knife, cranked	639.030.720.17	7000 Stuttgart 1
G	Mixing rod 9528	000.721.952.80	Porsche Parts Department
H	Adhesive set	000.043.038.01	

Contents of adhesive set:

H 1 = Cartridge component A
H 2 = Cartridge component B
H 3 = Mixing cartridge
H 4 = Primer
H 5 = Activator
H 6 = Cleaning solution
H 7 = Injector nozzle
H 8 = Application nozzle
H 9 = Application nozzle
H 10 = Filling nozzle
H 11 = Touch-in tool

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Removing and installing windshield — 2-pack adhesive

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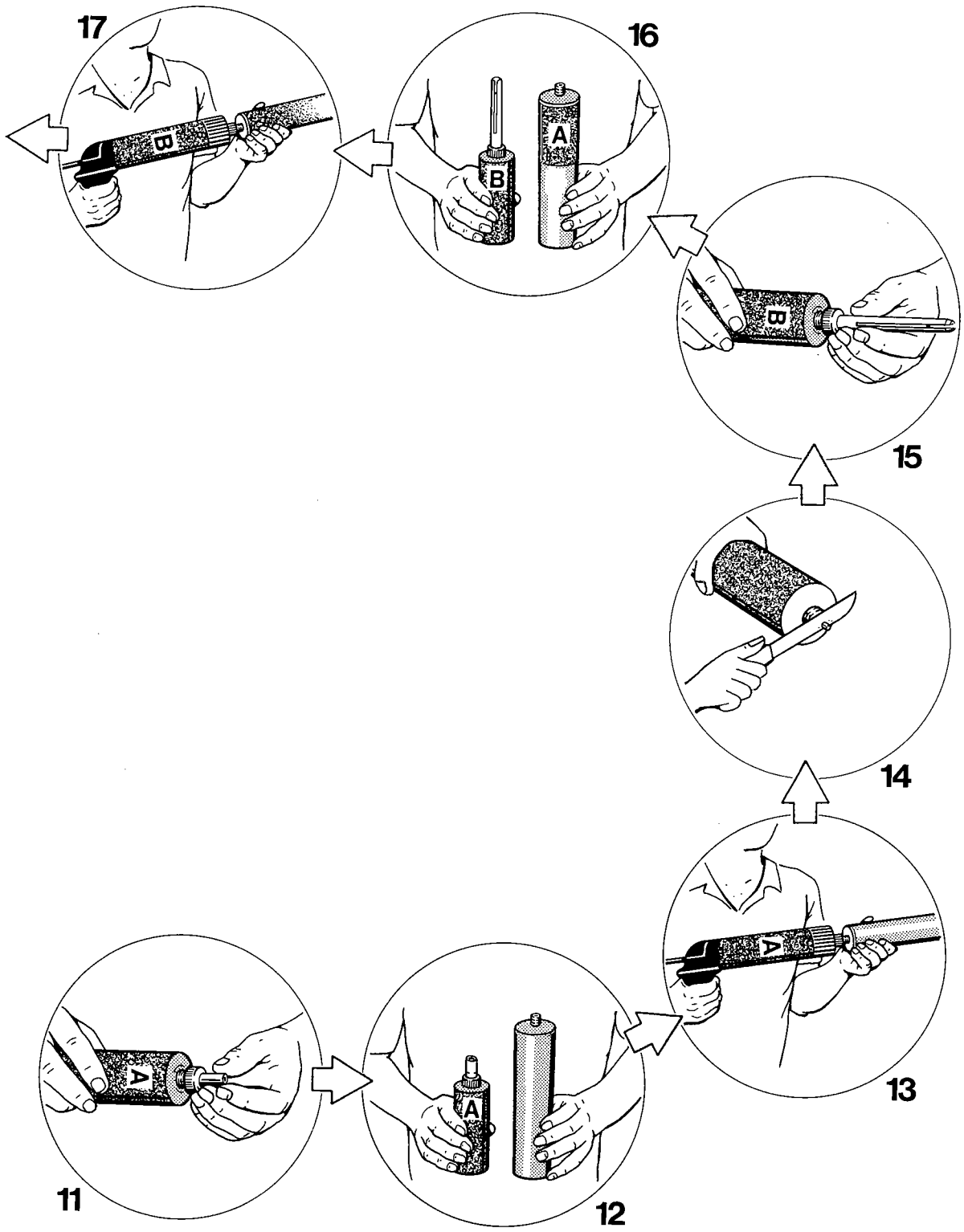
Removing and installing windshield, – 2-pack adhesive



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Removing and installing windshield, – 2-pack adhesive

Removing the windshield

No.	Operation	Instructions
	Remove interior in the windshield area	Remove sun visors, interior rearview mirror, front roof rail lining and A-pillar lining.
	Remove exterior parts in the windshield area	Remove front cover and windshield wipers. **Convertible only:** Remove cover molding for antenna cable and disconnect windshield antenna connector.
1	Pull off cover molding	Detach and pull off windshield cover molding.
2	Remove spacer blocks	**Vehicles with spacer blocks equipment only:** Undo eccentrics and lift off, making sure the notch in the eccentric points towards the mark on the spacer block. Push out spacer blocks in forward direction.
(2)	**Note:**	The spacer blocks are no longer required for fitting of the windshield, i.e. fitting the spacer blocks **may** be omitted when installing the windshield. For this purpose, undo the fittings, remove the spacer block supports and plug the bores in the cowl panel.
	Lay protective cover over instrument panel	Cover instrument panel to avoid staining or damaging the panel.
	Open door windows	**Caution: The door windows must not be closed until the adhesive has cured completely.**

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No.	Operation	Instructions
3	Cut out windshield in roof rail and A-pillar area	Insert cranked knife (F) into cutter (A). Set vibration regulator to stage 3. Cut bonding between windshield and body from inside (passenger compartment) along A-pillars and roof rail.
4	Cut off protruding adhesive	Cut off protruding adhesive from outside directly along edge of windshield.
5	Cut out windshield in instrument panel area	Insert U-shaped cutting knife (D) into cutter (A). Insert cutting knife in such a manner that the cutting edge is parallel to the cutter. Set vibration regulator to stage 6. Cut through remaining bonding of the windshield from outside along the instrument panel.
	Take out windshield	
6	Remove adhesive from body	Insert flashing knife (E) into cutter (A) and remove adhesive only to the extent that the remaining adhesive covers the whole area in a uniform manner.
	Clean windshield aperture of body	Clean windshield aperture of body thoroughly using cleaning solution (H6). **Caution: Make sure no cleaning solution residue remains on the body.**
	Apply primer to damaged areas of body	Use primer (H4) to coat damaged paintwork areas in non-visible section of windshield aperture.
7	Activate bonding section of windshield	Apply activator (H5) to bonding section of pre-coated windshield. **Caution: Allow a flash-off time of at least 10 minutes!**

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Preparing the adhesive cartridge for application of adhesive

No.	Operation	Instructions
8	Prepare application nozzle	Prepare application nozzle (H9) for application of adhesive to the windshield by cutting according to drawing.
9	Open nozzle fitting of cartridge containing component A	Use a screwdriver to pierce the diaphragm in the nozzle fitting of the cartridge containing component A (H1).
10	Open flanged cover of cartridge containingcomponent A	Use the screwdriver handle to pierce the flanged cover at the end of the cartridge containing component A (H1).
11	Screw filling nozzle onto cartridge containing component A	Screw filling nozzle (H9) onto cartridge containing component A (H1).
12	Place cartridge containing component A into bonding gun	Place cartridge containing component A (H1) into bonding gun (C). Remove screw-on cap from mixing cartridge (H3).
13	Press component A into mixing cartridge	Insert filling nozzle (H9) of cartridge containing component A (H1) into mixing cartridge. Press component A into mixing cartridge (H3) using the bonding gun.
14	Open screw-on fitting of cartridge containing component B	Use a knife to cut off the tip of the nozzle fitting of the cartridge containing component B (H2).
15	Screw injector nozzle onto cartridge cont. component B	Screw injector nozzle (H7) onto cartridge containing component B (H2).
16	Place cartridge containing component B into bonding gun	Place cartridge containing component B (H2) into bonding gun (C).

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No.	Operation	Instructions
17	Press component B into mixing cartridge containing component A	Introduce injector nozzle (H7) of cartridge containing component B (H2) into mixing cartridge (H3). Use the bonding gun (C) to press component B (H2) into mixing cartridge (H3) containing component A.
18	Close mixing cartridge	Pull injector nozzle (H7) out of mixing cartridge (H3) and close mixing cartridge with screw-on cap.
19	Screw mixing rod into mixing cartridge	Screw mixing rod (G) manually into internal thread of mixing disc in the mixing cartridge (H3). Clamp other end of mixing rod into a drill chuck. Fit the drill into a suitable clamping device.
20	Mix component A and component B	Switch on drill (900 to 1200 rpm) and rotate mixing cartridge 25 times from stop to stop. Perform all 25 double strokes fairly rapidly.
21	Engage mixing disc into piston	Pull back mixing cartridge until a rattling sensation is felt. Switch off drill and screw mixing rod out of mixing cartridge. The mixing disc will then engage into the piston of the mixing cartridge.
22	Place mixing cartridge into bonding gun	Insert mixing cartridge with mixed 2-pack windshield adhesive into bonding gun. Screw application nozzle (H8) onto mixing cartridge.

Caution: Open time is 15 minutes!

Open time is the time available for application of the adhesive and for installing the windshield into the aperture in the body.

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Installing the windshield

No.	Operation	Instructions
23	Apply adhesive to the bodywork	Apply a trapezoidal continuous bead of 2-pack adhesive to the body flange using the bonding gun. **Note: Do not apply adhesive to the cowl panel area (only across the width of the front cover) of the body flange.**
	Change application nozzle	Screw application nozzle H8 off the mixing cartridge and screw **application nozzle H9** onto the mixing cartridge.
24	Apply adhesive to the windshield	Using the bonding gun, apply 2-pack adhesive to the bonding section of the windshield in the cowl panel area (including both lower windshield radii).
	Note:	**When applying the adhesive, make sure the adhesive overlaps in the area of the lower windshield radii.**
	Insert windshield into body aperture	Insert windshield into windshield aperture and press in place. Move windshield until the gaps between the A-pillars and the windshield are parallel. In the roof area, the gap between windshield and body is 2 mm.
25	Locate windshield	Attach two strips of adhesive tape to locate the windshield and to keep it from sagging. Note: The locating strips may be removed after 1.5 to 2 hours.

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No.	Operation	Instructions
	Clean visible areas	Remove adhesive that has squeezed out immediately and clean the visible areas affected using cleaning solution (H5).
	Refit exterior parts	Press windshield cover molding into retainer. Install windshield wipers and front cover. **Convertible only:** Insert windshield antenna and fit cover molding for antenna cable.
	Refit interior	Refit A-pillar linings, roof rail linings, sun visors and interior rearview mirror.

Caution

The bonding does not immediately reach its full strength. In order to ensure sufficient bonding strength, the following boundary conditions must be met:

Curing time	3 hours
Temperature	min. 5 deg. C
Fixing time	1.5 – 2 hours

Do not operate the vehicle before the curing time has elapsed!

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Body Paint Colors Beginning With 1992 Models

Standard Colors:	
Grand Prix white	908
Black	700
Maritime blue	38B
Indian red	80K
Signal green	22S
Mint green	22R
Rubystone red	82N

Special Colors:	
Slate gray metallic	22 D
Slate grey metallic	23 F*
Oakgreen metallic	22 L
Horizon blue metallic	37 X
Cobalt blue metallic	37 U
Coral red metallic	82 H
Polar silver metallic	92 E
Polar silver metallic	92 M*
Black pearl effect	738
Midnight blue metallic	37 W
Midnight blue pearl effect	39 C*
Amethyst pearl effect	38 A
Amethyst pearl effect	83 K*
Amazon green pearl effect	39 A

* = Water-base paints

Water-base paints are applied exclusively by the manufacturer during production spraying. For repair of water-base paints, conventional refinishing paints matching the color of the original paint are used. I.e. the only prerequisite for resprays is that the correct refinishing paint is used (refer to Paint Manual, page L3-25 and L3-26). Color differences due to paint application do not occur.

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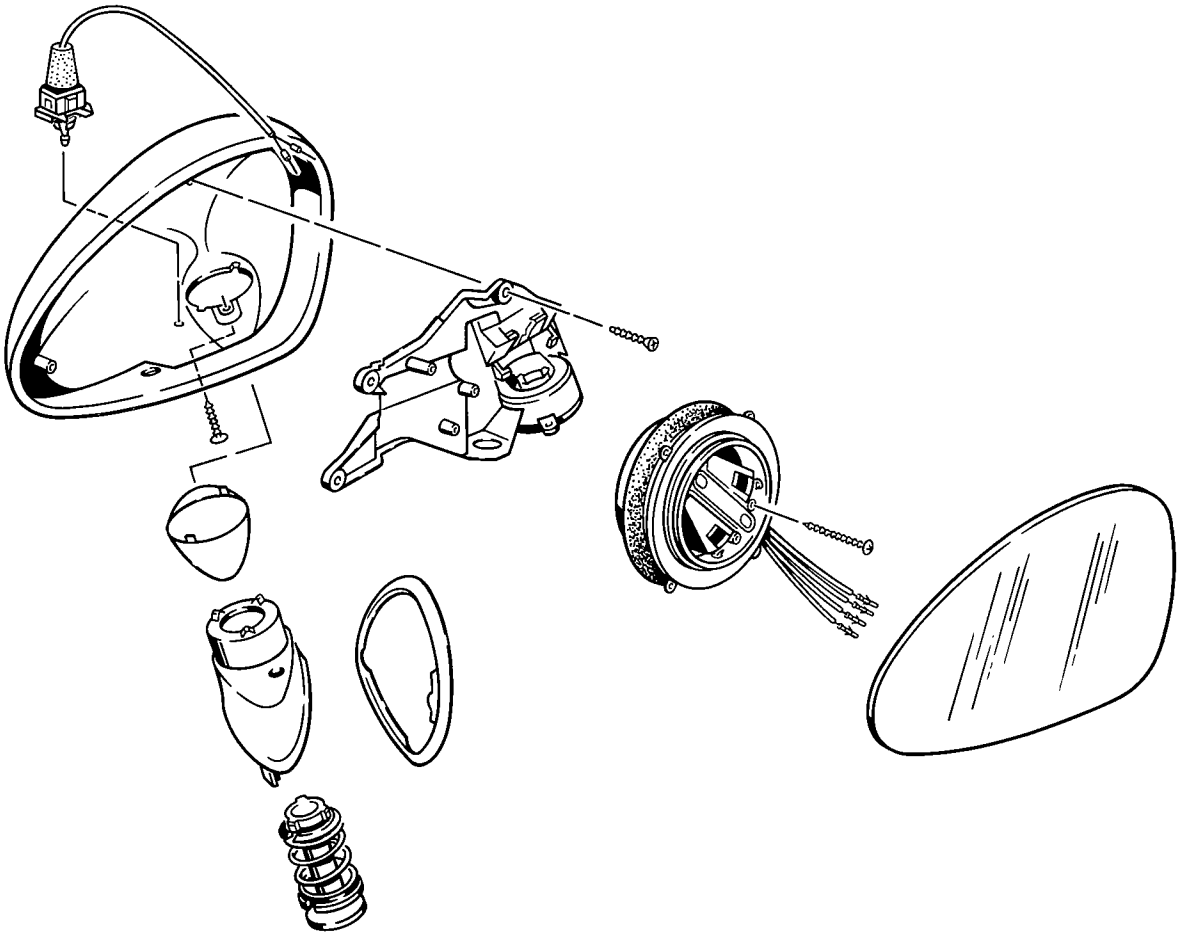
Dismantling and assembling door rearview mirror



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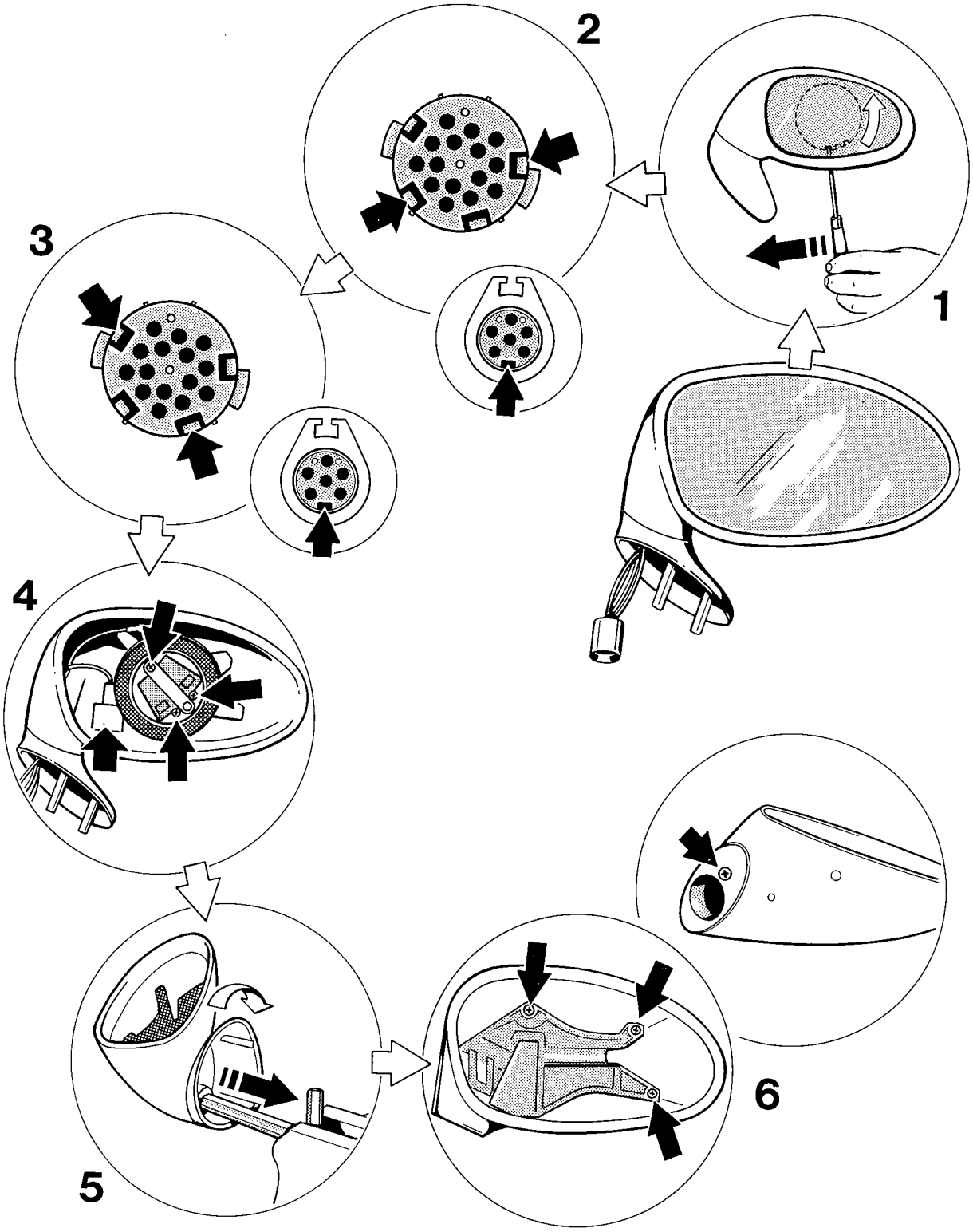
Dismantling and assembling door rearview mirror

Dismantling door rearview mirror



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Dismantling and assembling door rearview mirror

Dismantling door rearview mirror

No.	Operation	Instructions
1	Separate mirror glass from adjusting motor	Press mirror glass down into mirror housing. Insert a screwdriver across the bottom aperture into the mirror housing and loosen mirror glass retainer by turning the retaining ring.
	Disconnect plug	Disconnect plug for mirror glass heater.
2	Dismantle connector	Push back sealing cushion on wiring harness. Insert a small screwdriver from the wiring harness side to disengage the insert, pressing at the cables at the same time. Note: The insert is now in the preengagement position.
3	Dismantle connector	To remove the insert completely, disengage both remaining lugs in the same way.
	Disengage contact pins	Disengage contact pins by pulling lightly at the wires and turning the contact pins to and fro at the same time.
4	Loosen adjusting motor	Undo fastening screws of adjusting motor. Remove outside sensor from mirror housing and lift it out complete with its wiring harness.
5	Separate mirror base from mirror housing	Clamp 14 mm socket hex head wrench in a vise. Place stud for mirror base / mirror housing union onto the socket hex head wrench. Loosen union by applying force in axial direction and rotating the door mirror by 90 deg. Remove stud complete with centering washers and tensioning spring.
6	Remove reinforcing plate	Undo fastening screws and take reinforcing plate out of mirror housing. Remove mirror housing seal.

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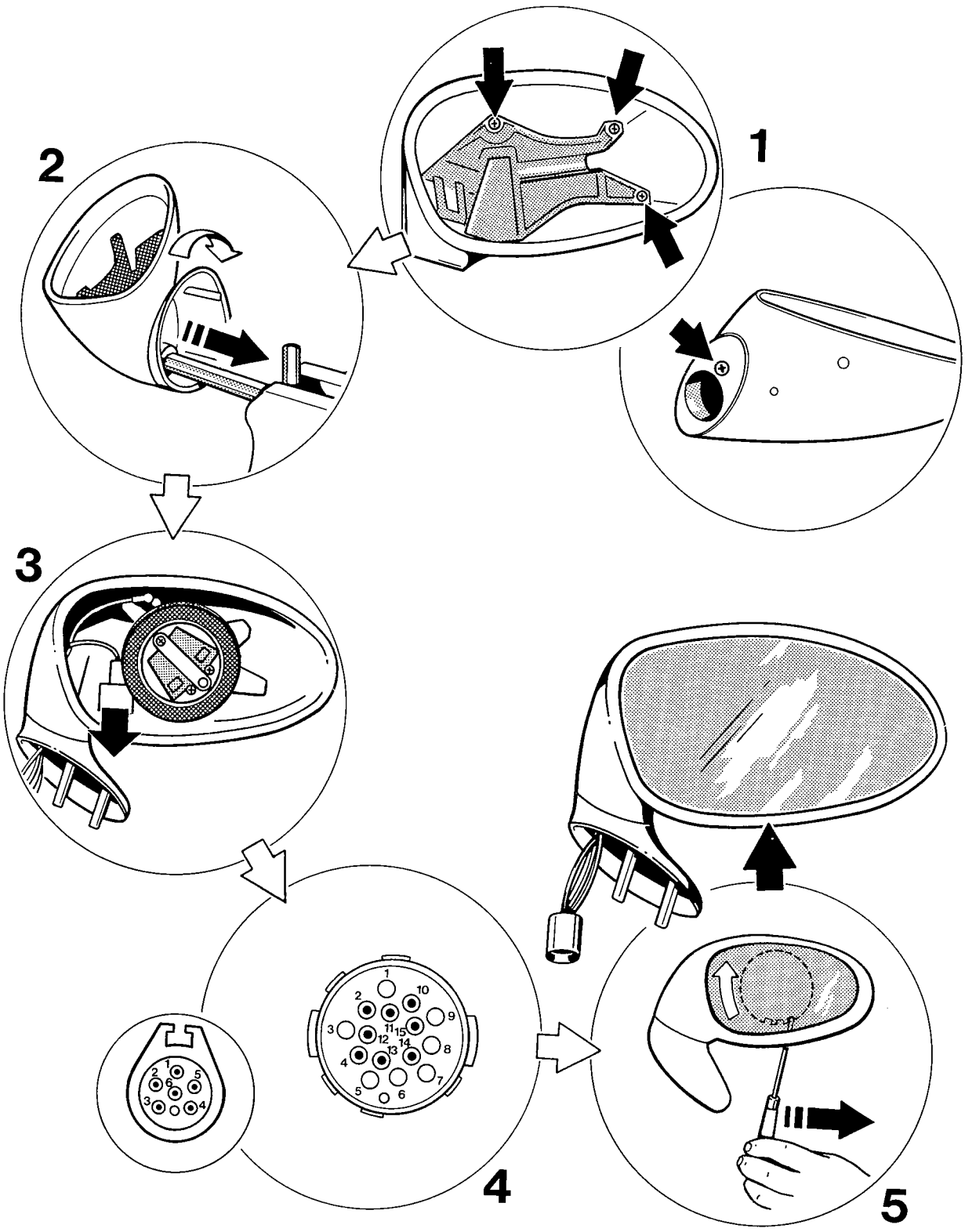
Dismantling and assembling door rearview mirror

Assembling door rearview mirror



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Dismantling and assembling door rearview mirror

Assembling door rearview mirror

No.	Operation	Instructions
	Position mirror housing seal	
1	Install reinforcing plate	Tighten fastening screws of reinforcing plate and mirror housing seal.
2	Fit mirror housing complete with mirror base	Clamp 14 mm socket hex head wrench in a vise. Grease centering washers of stud for mirror base / mirror housing union. Assemble mirror housing, mirror und base and stud. Place stud onto socket hex head wrench. Tighten by applying axial force and rotating the door mirror by 90°.
3	Install adjusting motor	Tighten fastening screws to fit adjusting motor to the reinforcing plate.
4	Assemble connector	Introduce wiring loom into door rearview mirror. Position insert in connector housing and push into preengagement position. Put sealing cushion in place. Insert contact pins according to pin allocation plan or wiring diagram. Note: When assembling the connector sections (with corresponding section on door), the insert is pushed into the final position. If a non-allocated terminal is pierced at the sealing cushion, use a sealing plug (available as spare part) to close it.
	Engage outside sensor into mirror housing	
	Reconnect cables	Reconnect electrical cables for mirror glass heating.
5	Fit mirror glass complete with adjusting motor	Place mirror glass into mirror housing. Insert a screwdriver through the bottom aperture and tighten mirror glass mounting by rotating the retaining ring.

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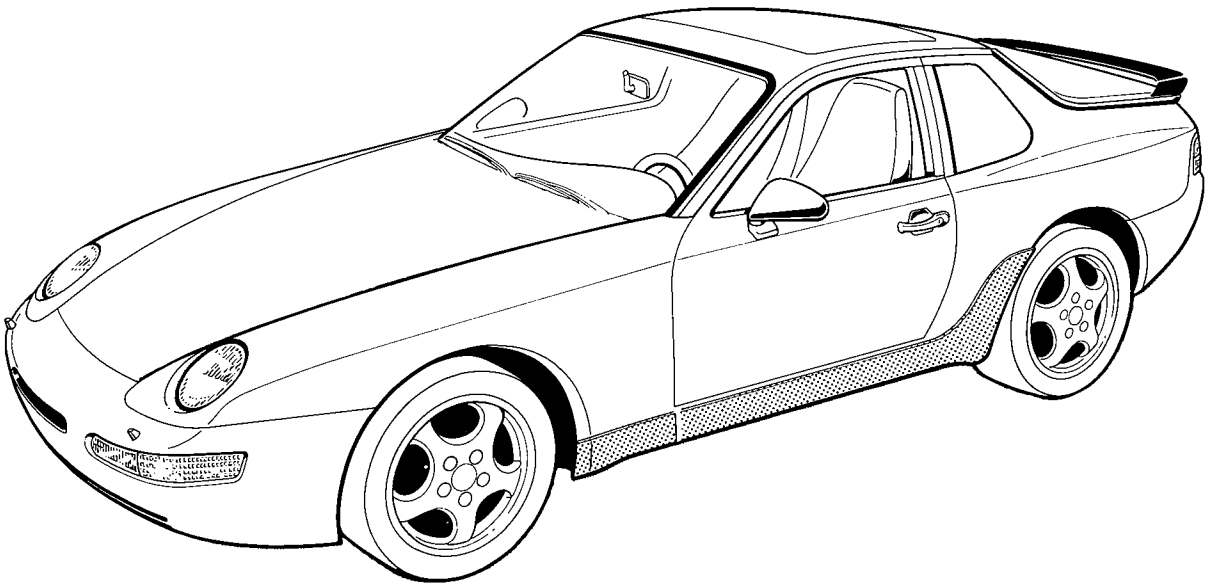
Removing and fitting side member panel



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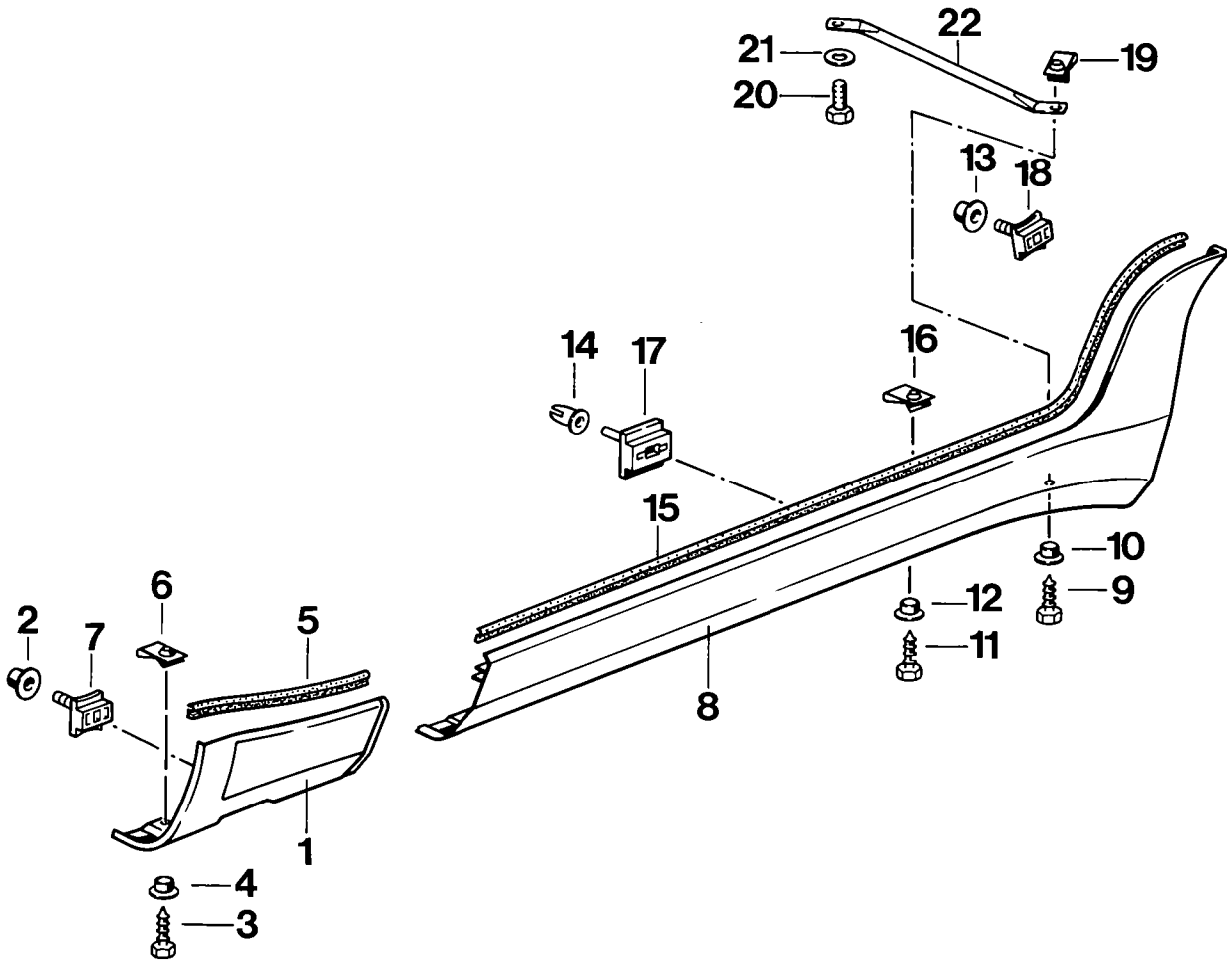
Removing and fitting side member panel



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Removing and fitting side member panel

No.	Designation	Qty.	Note: Removal	Installation
1	Side sill	1		
2	Pushbutton	1		
3	Hexagon head sheetmetal screw B 6.3 x 16	1		
4	Spacer sleeve	1		
5	Cover molding	1		Check, replace if required
6	Sheetmetal nut B 6.3	1		Adjust to center of hole
7	Bracket T 5	1		
8	Side sill	1		
9	Hexagon head sheetmetal screw B 6.3 x 16	1		
10	Spacer sleeve	1		
11	Hexagon head sheetmetal screw B 6.3 x 16	5		
12	Spacer sleeve	5		
13	Pushbutton	5		
14	Grommet	8		
15	Cover molding	1		Check, replace if required
16	Sheetmetal nut B 6.3	5		Adjust to center of hole
17	Clip	8	Preload clips by inserting a screwdriver and unclip them using a second screwdriver	Check, replace if required

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No.	Designation	Qty.	Note: Removal	Note: Installation
18	Bracket T 5	1		
19	Sheetmetal nut B 6.3	1		Adjust to center of hole
20	Hexagon head bolt M 6 x 16	1		
21	Washer B 6,4	1		
22	Stay	1		

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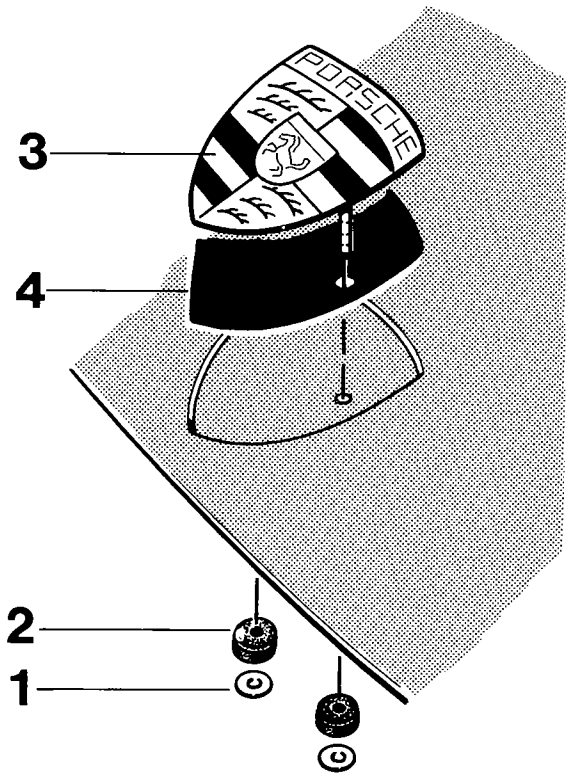
Removing and installing badge on cover



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No.	Designation	Qty.	Note: Removal	Installation
1	Tapping nut	2	Turn counterclockwise to remove	Replace, turn clockwise to fit
2	Grommet	2		Check, replace if required
3	Badge	1		
4	Backing	1		Insert into embossed recess in cover

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Replacing cover for passenger airbag

When the airbag was triggered while no passenger was in the car, damage to the instrument panel is minimal. In this case, if may be sufficient, following detailed inspection of the instrument panel, to replace only the cover. Check the instrument panel on the passenger side for cracks and other accident-related damage. **The instrument panel must be free from bending traces and cracks.** Minor deformations of the instrument panel can be straightened.

1. Disconnect battery negative terminal and cover terminal.

2. Remove steering wheel.

3. Remove instrument fascia.

4. Remove operating switch for heater/air conditioning.

5. Remove right-hand cover molding from instrument panel.

6. Remove right-hand switch cover.

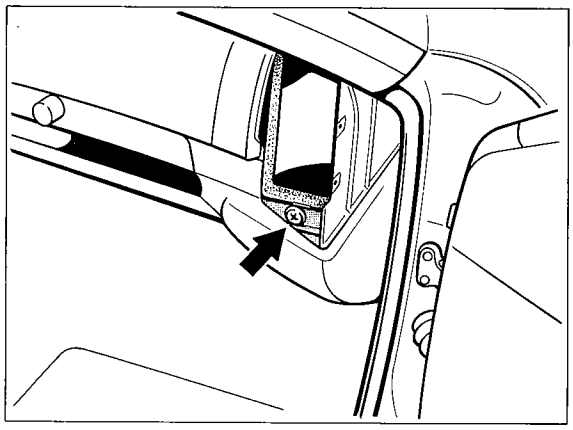
7. Remove right-hand lateral jet.

8. Remove glove compartment.

9. Undo airflow duct fastening screw.

Note

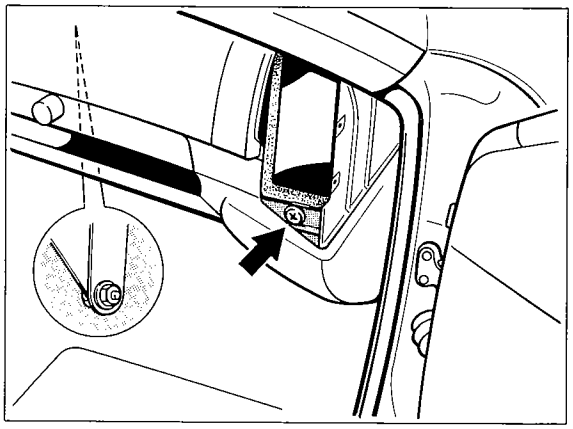
To facilitate assembly, the fastening screw of the airflow duct may be reversed for installation, i.e. remove the sheetmetal nut from the instrument panel and place it on the airflow duct.



947-68A

10. Disconnect plugs from airbag unit.

11. Undo fastening screw.



947-68B

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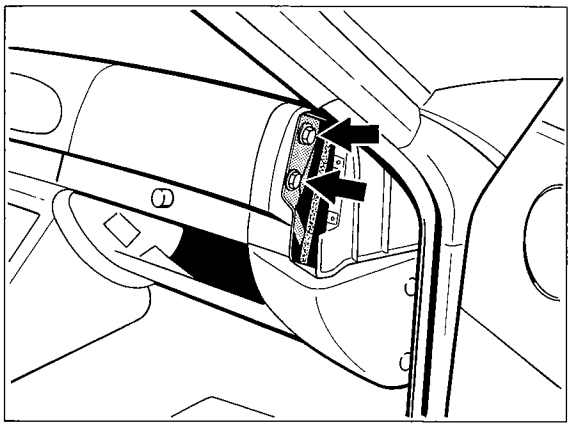
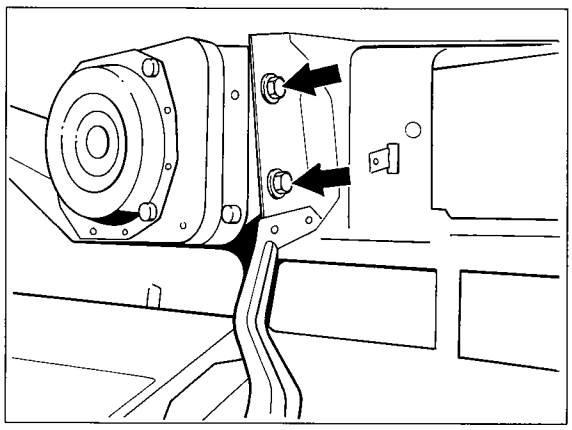
Note

The screw is of the micro-seal type. Use a new screw for assembly.

12. Undo fastening screws of cover (4 pc.).



949-68



Instrument panel removed 950-68

Note

The screws are of the micro-seal type. Use new screws for assembly.

13. Lift out cover complete with airbag unit.

Note

When fitting the unit, the cover may bind on the right-hand side. To prevent this, start inserting the cover on the right-hand side.

14. Undo fastening screws of airbag unit (socket hex head, 4 pc.).

Note

The screws are of the micro-seal type. Use new screws for assembly.

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Wiring Diagram Type 968
Model 92

	Coordinates	
Sheet 1	1 - 10	Lights
Sheet 2	11 - 20	Instrument Cluster and Sender
Sheet 3	21 - 30	Heating, Airconditioning, Ventilating, Power Seats, Wipe- and Wash Cleaners
Sheet 4	31 - 40	Two-Tone Horns, Mirrors, Lifting Roof, Power Window Regulator, Tailgate Unlocking
Sheet 4a	31 - 40	For vehicles as of VIN 96 NS 80 0102 RoW 96 NS 82 0067 USA
Sheet 5	41 - 50	Engine Compartment, Cruise Control
Sheet 6	51 - 60	Central Electric
Sheet 7	61 - 70	Central Locks, Alarm System
Sheet 8	71 - 80	Fog Light, Rear Fog Light
Sheet 9	81 - 90	Radio
Sheet 10	91 - 100	ABS, Airbag
Sheet 11	101 - 110	Wiring 968 Cabriolet
Sheet 12	111 - 120	Tiptronic
Sheet 13		Construction Components
Sheet 14		Plug Connections, Ground Points, M-Numbers

Wiring Diagram Type 968
Model 92

The wiring diagram consists of 12 individual wiring diagrams, 1 sheet construction components and 1 sheet plug connections and ground points. These are divided into coordinate fields.

Each individual wiring diagram contains a part of the central-electrics box in a dashdotted frame.

This part of the central-electrics box shows all the lines and relays necessary for the individual wiring diagram.

The earth/ground points are identified by "MP" and their location is shown in a vehicle diagram.

The 20-pin connectors on the central-electrics box are clipped together out of 5 parts.

Part 1, with the moduled-on fastening lug, is the "starting element".

Parts 2, 3 and 4 are "module elements".

Parts 1 to 4 are identified by the numbers 1.....5.

Part 5 is a "coding element".

The designations of the plug connections in the wiring diagram of the central-electrics box refer to the "starting element" from, for example, B 11.....15, and to the first module element from B 21.....25.

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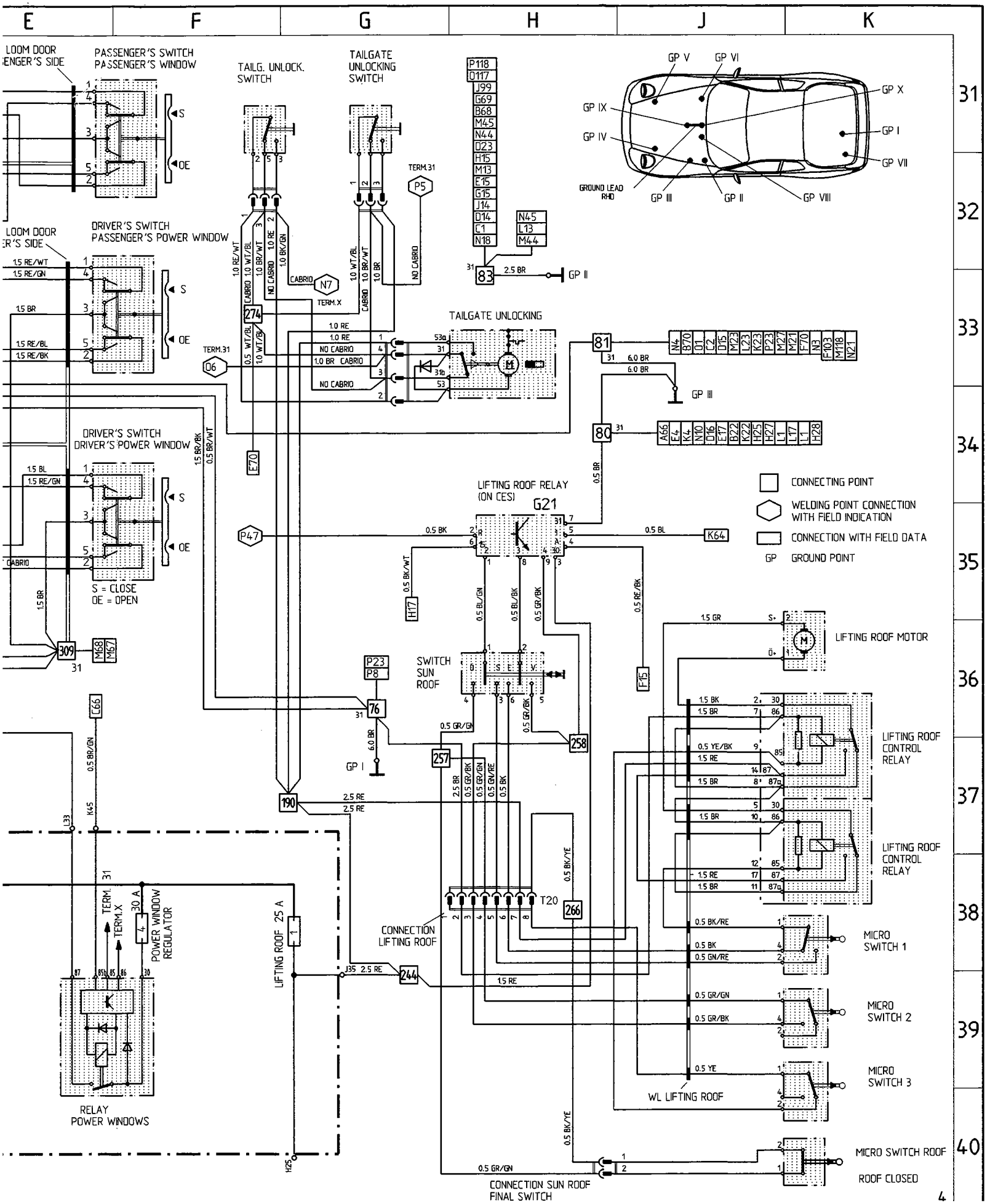
E UNLOCKING as of VIN 96 NS 80 0102 RoW and 96 NS 82 0067 USA



968 MODEL 92 SHEET 4a

TWO-TONE HORNS, MIRRORS, LIFTING ROOF, POWER WINDOW REGULATOR, TAILGATE UNLOCKIN