PORSCHE

968

Repair Manual

Supplement 4

Printed in Germany - March 1992

WKD 482 820 04

Supplement - Contents

Important Note

For Volume 1

For Volume 2

*** = Replacement sheets**

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

Supplement - Contents

For Volume 3

Important Note

Ride height and spring brace settings

For wheels with asymmetric hump

** = Replacement sheets

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

page

General

Maintenance, Self-diagnosis general

Engine, Crankcase, Engine Mounts

Engine, Crankshaft, Pistons

Engine, Cylinder Head, Valve Drive

Engine, Lubrication

Engine, Cooling

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Fuel Supply

Fuel System - Electronic Injection

Ignition system

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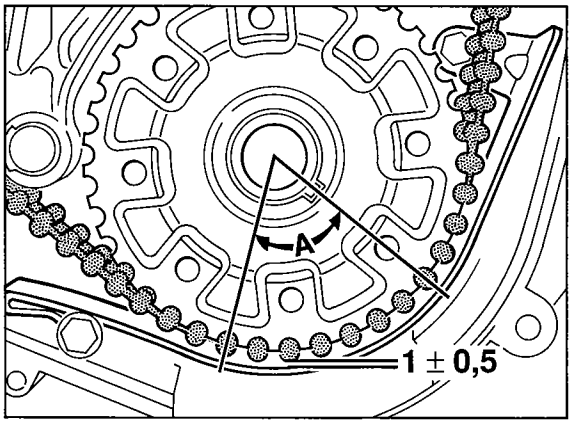
Adjusting guide rail for balance shaft toothed belt

Engine Type M 44.43/44

1. Tighten mounting bolts of guide rail lightly. Fit sprocket for balance shaft drive and toothed belt.
   Put balance shaft toothed belt under preload.

2. Using a feeler gauge, measure and adjust clearance between toothed belt and guide rail.
   Adjusting dimension: 1 ±0.5 mm



1041-13

3. Check clearance of guide rail over a length of 7 teeth (dimension A).
   The adjusting dimension must be 1 ±0.5 mm.

4. To achieve the correct adjustment, slide the guide rail in the bolt holes.

5. Tighten both hexagon head bolts of the guide rail and check setting dimension again. Take off toothed belt and sprocket and tighten both pan head screws.

6. Fit sprocket and balance shaft toothed belt and adjust according to specification.
   Refer to pages 13 - 7 to 13 - 10.

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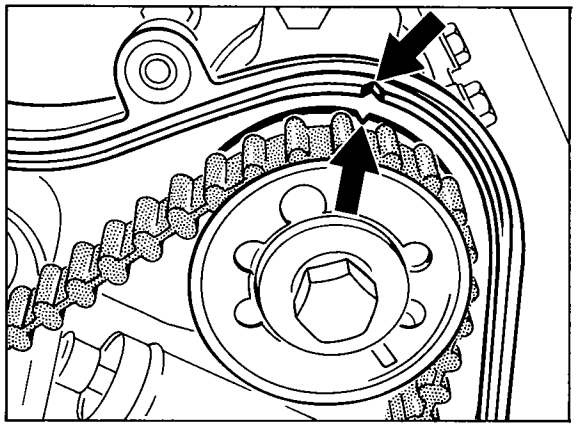
Checking adjustment of balance shafts

1. Undo and remove engine underside protection and upper toothed belt cover.

2. Rotate crankshaft clockwise until TDC mark on camshaft drive sprocket is lined up with the mark on the toothed belt cover.
   The TDC mark on the flywheel (center notch on double-mass flywheel) must also line up.

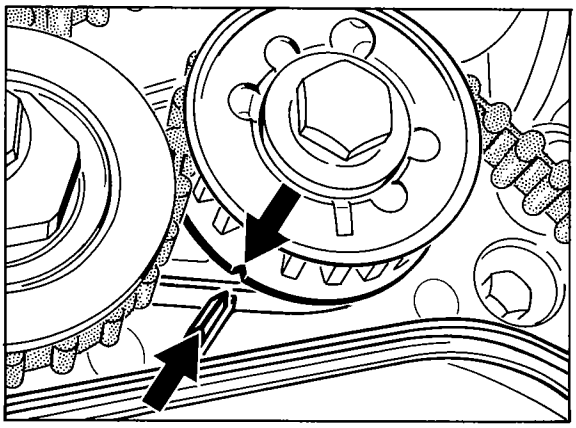
3. The mark on the upper balance shaft drive sprocket must line up with the mark on the rear toothed belt cover.



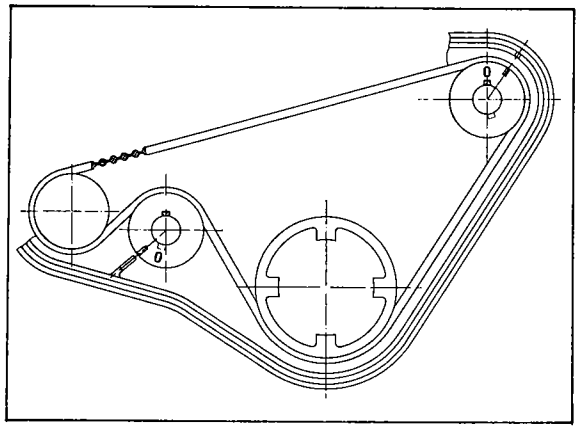
1042-13

4. Remove plug cap from lower toothed belt cover.
   Check position of marks of lower balance shaft drive sprocket across inspection hole. Mark on sprocket must line with mark on rear toothed belt cover.

The Fig. shows the sprocket position with the toothed belt cover removed.



1043-13



1044-13

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Fitting toothed belt for balance shaft

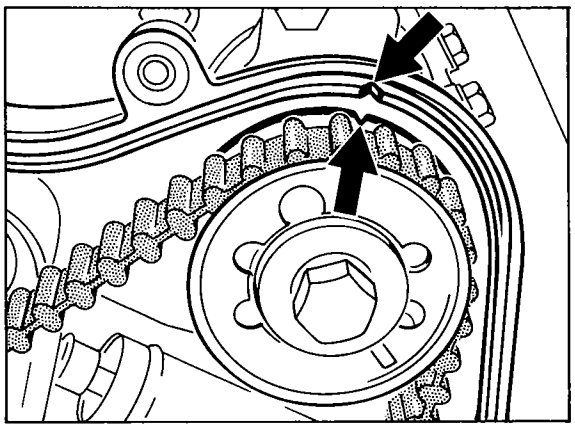
Note

Handle balance shaft toothed belt with care, avoid twisting or turning as this may cause excessive running noise. Store separately.

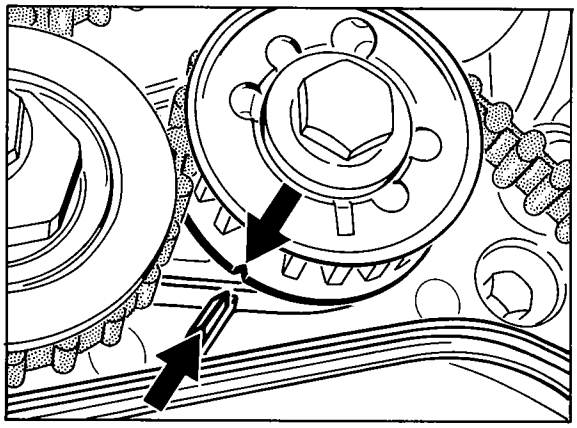
When replacing the toothed belt, do not undo the mounting bolts of the balance shaft drive sprockets.

1. Rotate crankshaft clockwise until the TDC mark on the camshaft drive sprocket lines up with the mark on the toothed belt cover. The TDC mark on the flywheel (center notch of double-mass flywheel) must also line up.

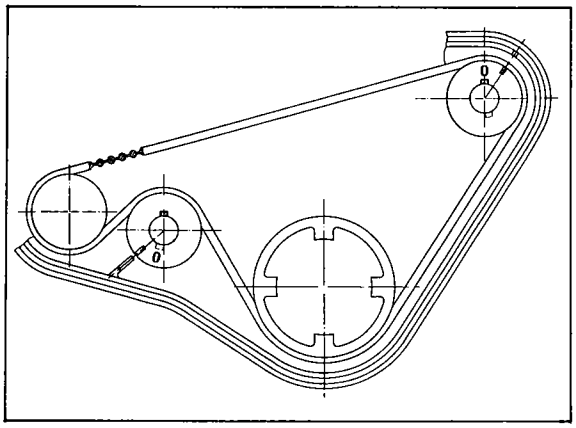
2. Rotate both balance shafts (without toothed belts) until the marks on the balance shaft drive sprockets are lined up with the marks on the rear toothed belt cover.



1042-13



1043-13



1044-13

3. Fit the toothed belt:

   When fitting the toothed belt, make sure the belt side with the color-coded tooth faces towards the outside.

4. Adjust toothed belt tension according to specification.
   Refer to page 13 - 7 to 13 - 10.

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Adjusting Special Tool 9201

The measuring gauge has been preset to a display of 4.0 dial values and allows the Special Tool 9201 to be checked and to be set to 4.0 dial values, respectively.

Adjustment of the device is required after:

- approx. 100 measurements
- hard shocks
- minor damage

If major damage is present or if the display deviates by more than approx. 2.0 dial values, the devices cannot be adjusted any more. Return the device to the manufacturer for repair.

Address:

Fritz Staeger
Jahnstrasse 68 - 72

D-1000 Berlin 47

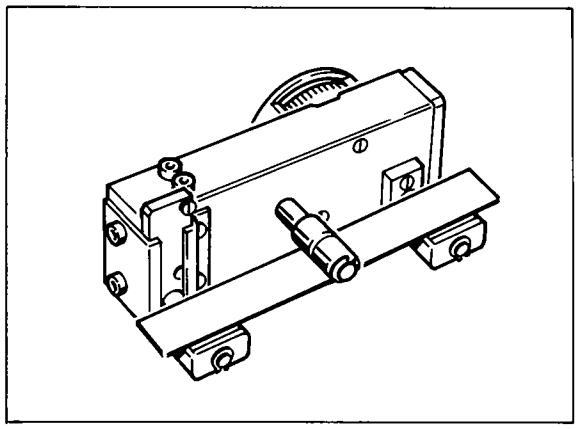
Phone: 030/6291-266
Fax: 030/6291277

Adjustment

Tools required:

- Hex socket head screwdriver 1.5 A/F (for new tools)
- or screwdriver 1.6 x 40 x 0.4 (for older tools)
- Measuring gauge 9201/2

1. Adjust to zero, rotating dial ring of dial gauge until pointer and zero line up.
2. Place measuring gauge 9201/2 into position, making sure both measuring mating faces on the sliding blocks are centered. (Measuring gauges of the new type are made of one piece, allowing them to be placed into position easier).



1045-13

3. Measure as when using the tool on the toothed belt, i.e. press in measuring button until engagement of the lock pin is felt, and read off displayed value on the dial gauge.

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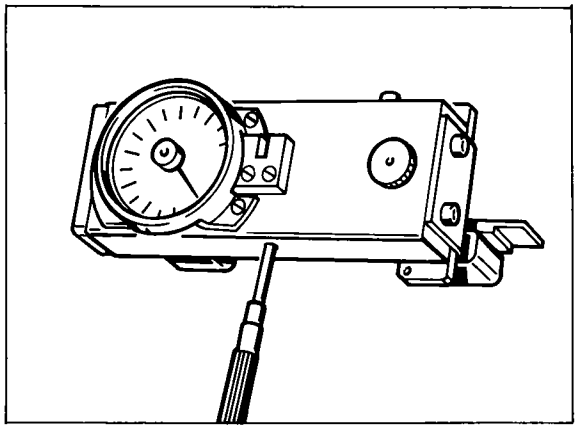
4. If the display is beyond the measuring range of 4.0 ± 0.3 dial values, readjust dial gauge. To do so, use hex socket head screwdriver or standard screwdriver, respectively, to turn the adjusting screw until the specified value of 4.0 dial values is obtained. The measuring gauge 9201/2 rests between the measuring pointer of the tester.



1046-13

5. Follow adjustment with another test.

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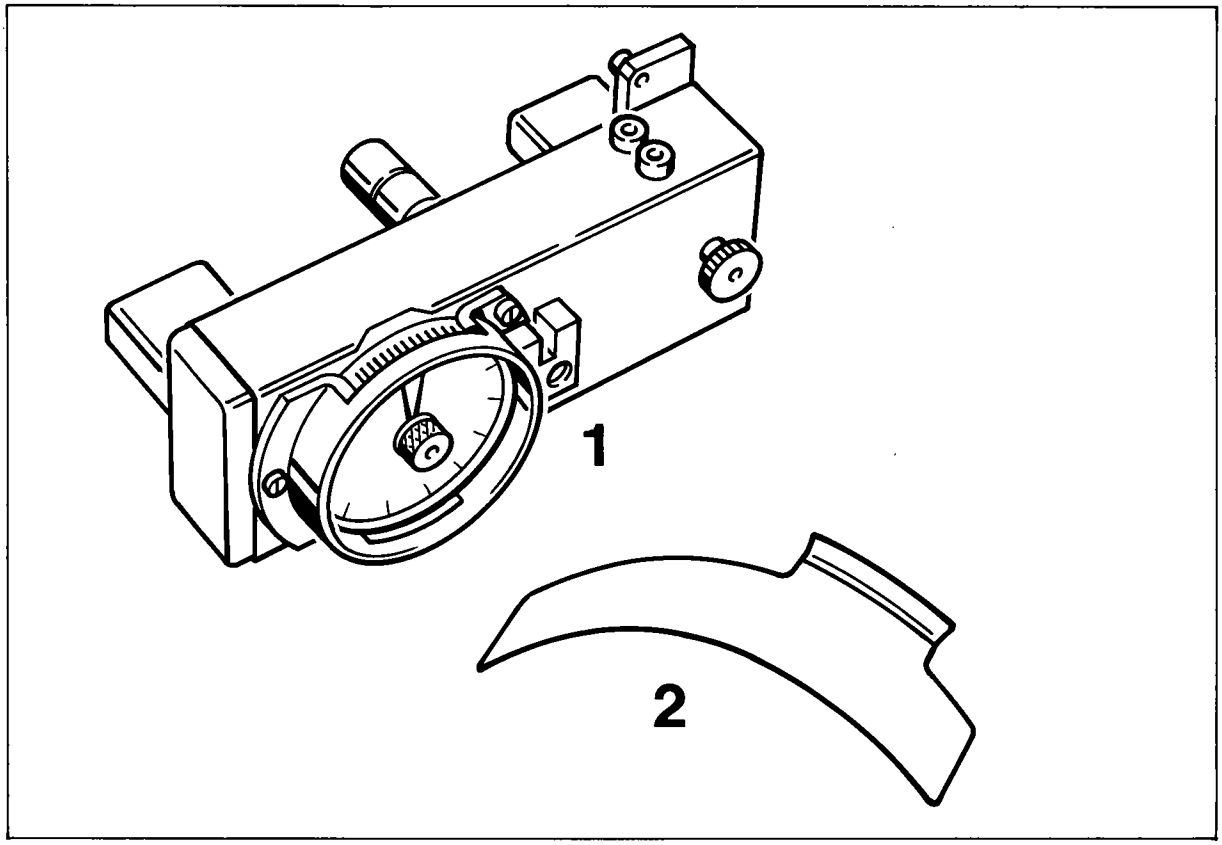
Checking and adjusting balance shaft toothed belt tension

Tools



No.	Designation	Special tool	Order number	Explanation
1	Tester for belt tension	9201	000.721.920.10	
2	Adjusting gauge	9207	000.721.920.70	

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Checking and adjusting balance shaft toothed belt tension

Note

The toothed belt tension must be checked and adjusted only when the engine is cold (room temperature).

1. Undo and remove air cleaner assembly and engine underside protection.

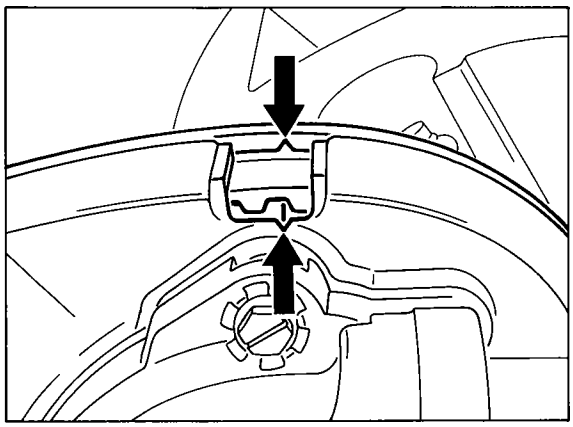
2. Remove Poly-Rib belt or power pump belt, respectively.

Note

Before undoing the lock nuts, always start by slightly loosening the hexagon head bolts of the link rod.

3. Remove toothed belt cover. Undo idler until the idler no longer places a preload on the toothed belt.

4. Rotate crankshaft clockwise until TDC mark on camshaft drive sprocket lines up with mark on toothed belt cover.



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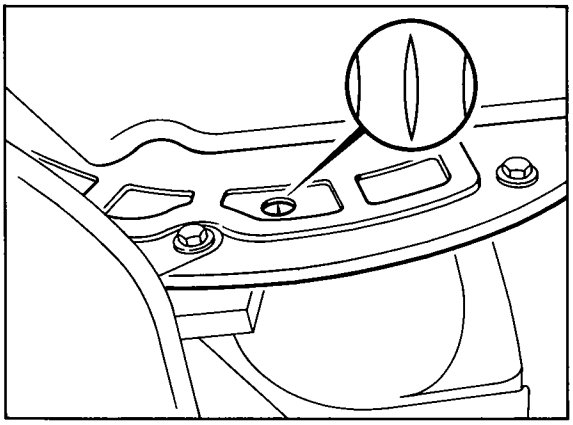
5. The TDC mark on the flywheel (double-mass flywheel) must also line up.



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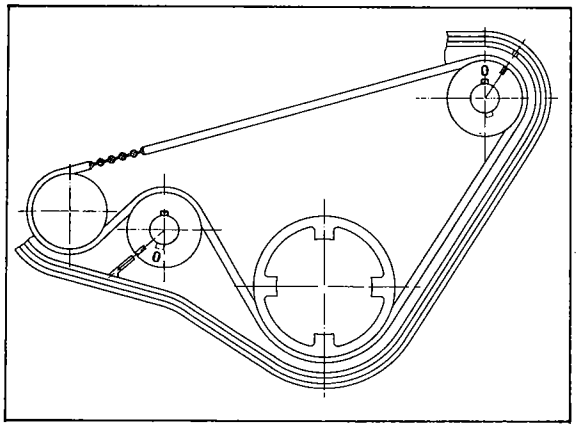
6. Check basic position of balance shaft drive sprockets. The marks on the sprockets must line up with the marks on the rear toothed belt cover.



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7. Prepare Special Tool 9201 for check. Pull out lock pin of Special Tool and push measuring pin opposite the lock pin all the way out. Align non-return pointer to measuring pointer.

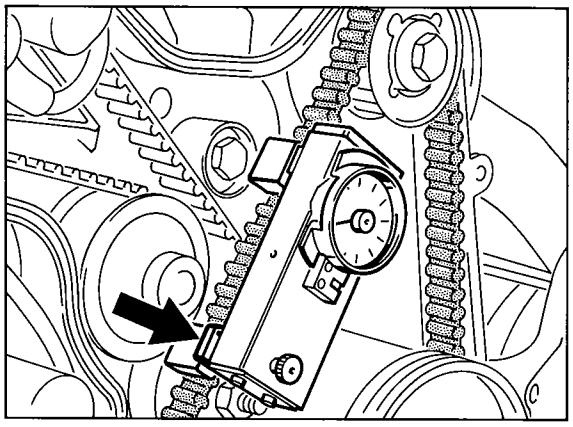
8. Push Special Tool onto toothed belt. Push measuring button (arrows) slowly in until engagement of the lock pin is felt and read off displayed value on dial gauge.

Note

To avoid reading errors, the non-return pointer must always be aligned to the measuring pointer after the lock pin has engaged (turn counterclockwise).

Adjusting value:

(new and used belts)
2.7 ± 0.3 dial values
If required, correct toothed belt tension.



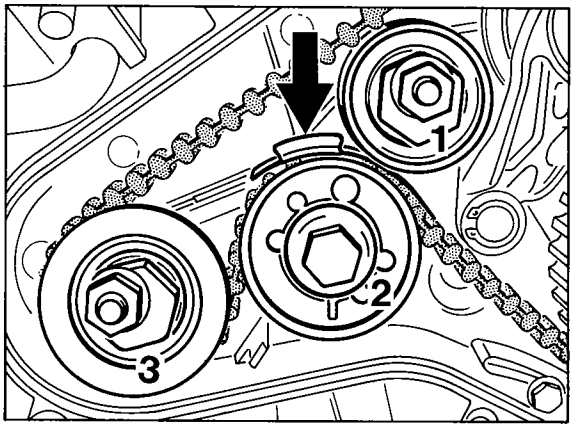
1049-13

Adjusting

9. The sliding blocks must rest on the belt along their entire surface. During the measuring process, the Special Tool must neither be twisted nor moved on the belt.

10. When tensioning, rotate tensioning pulley clockwise. When slackening, rotate tensioning pulley counterclockwise.
Tighten hexagon nut to 45 Nm (33 ftlb), using a second wrench to lock.

11. After the toothed belt has been adjusted, follow by adjusting the idler. Using Special Tool 9207 or a feeler gauge (0.5 mm), set idler pulley to a clearance of 0.5 mm to the toothed belt in bottom balance shaft area and preload upper toothed belt train by 0 to 1 mm at same time. Tighten idler pulley in this position. If the adjustment travel is not sufficient, turn idler pulley by 180° and repeat adjustment. Tighten hexagon head nut to 45 Nm (33 ftlb), using a second wrench to lock.



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1 - Idler pulley
2 - Balance shaft
3 - Tensioning pulley

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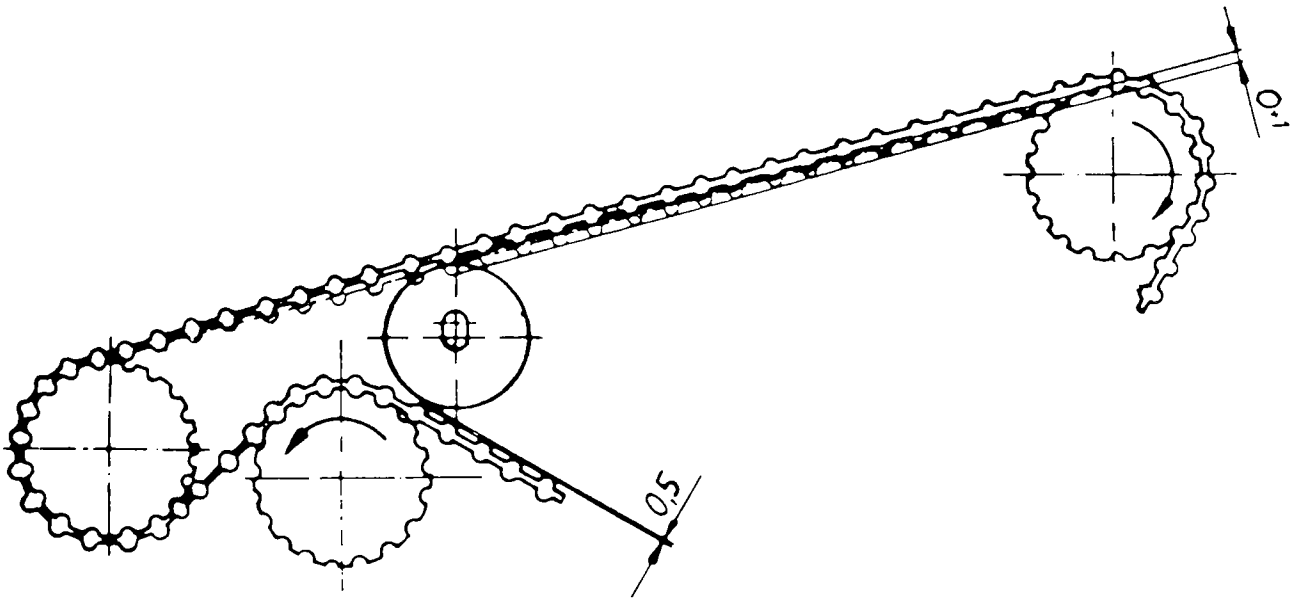
12. Fit toothed belt cover. Install Poly-Rib belt or power pump belt, respectively, and adjust according to specification. Fit belt or power pump belt, respectively, and adjust according to specification. Fit engine undertray and air assembly.



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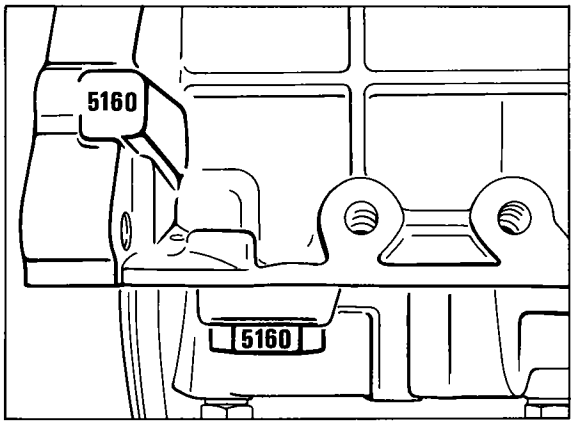
Crankcase markings

Upper and lower crankcase section and balance shaft cover

1. The upper and lower crankcase sections as well as the balance shaft cover are machined as a unit and must always be fitted as a unit. Observe correct identification marking.

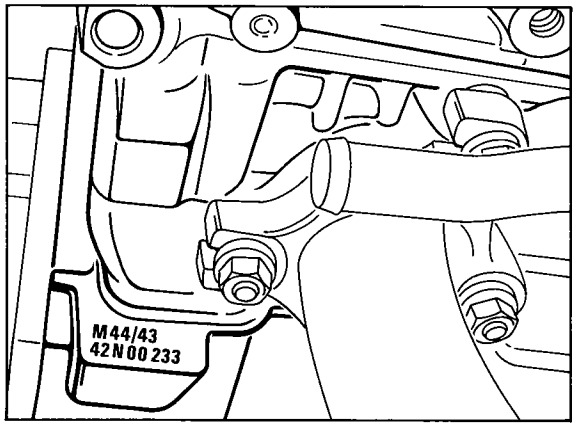


1052-13

2. When the components have been fitted, it must be possible to read off the markings of both balance shaft covers from above.

Engine number

The engine number is engraved on the right-hand rear end of the engine when seen in the direction of travel.



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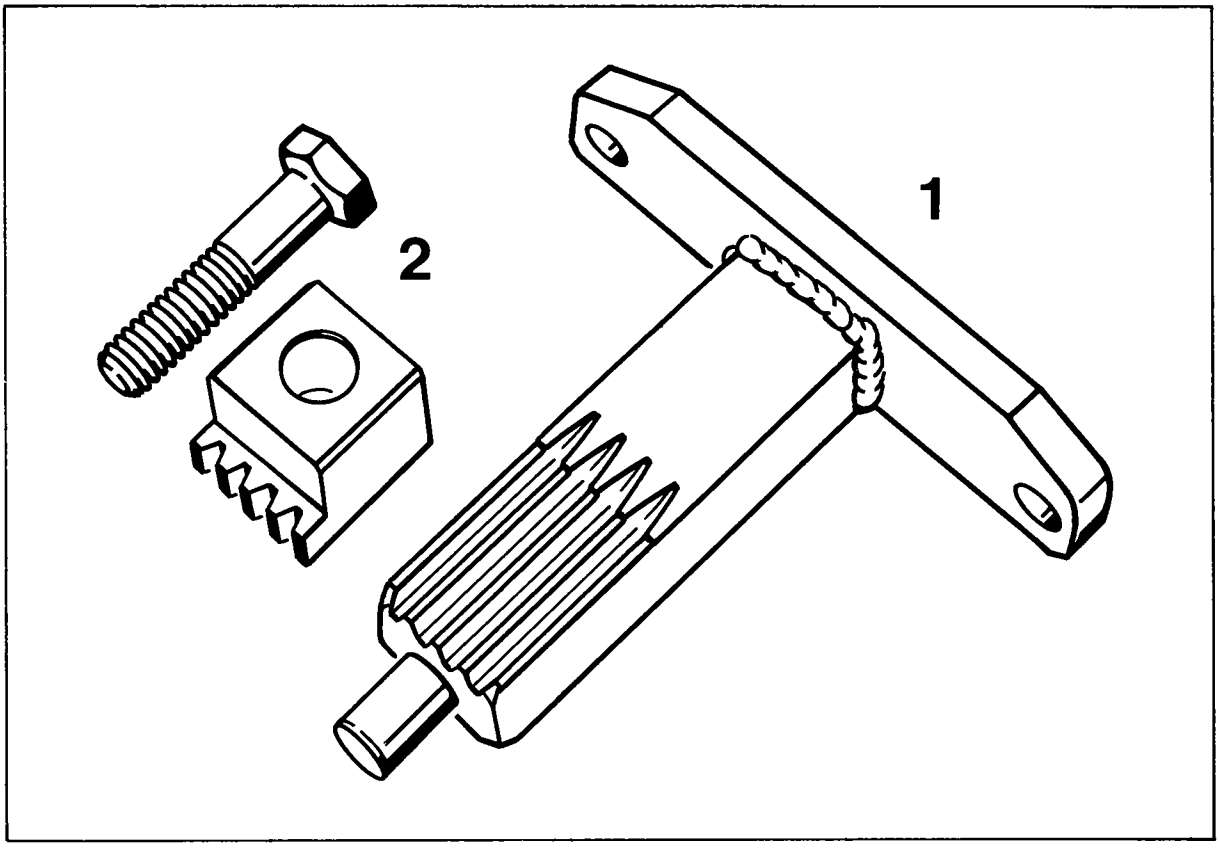
Locking the flywheel for assembly work

Tools



No.	Designation	Special tool	Order number	Explanation
1	Toothed segment	9206/1	000.721.920.61	Engine installed
2	Toothed segment with hex. head bolt M 12 x 1.5 x 60	9538/1	000.721.953.81	Engine removed

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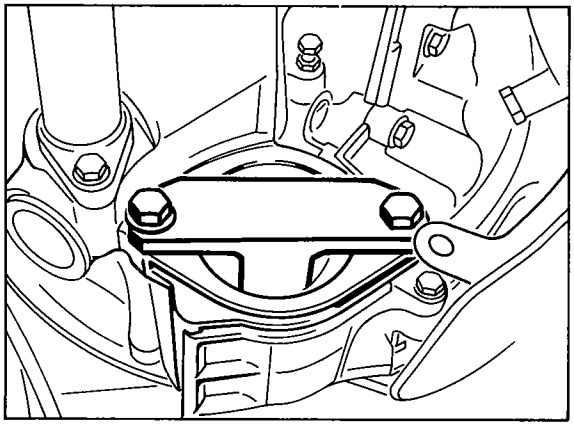
Locking the flywheel for assembly work

(Engine with double-mass flywheel is installed)

1. Disconnect ground cable from battery. Remove starter.

2. Place Special Tool 9206/1 into position and lock.

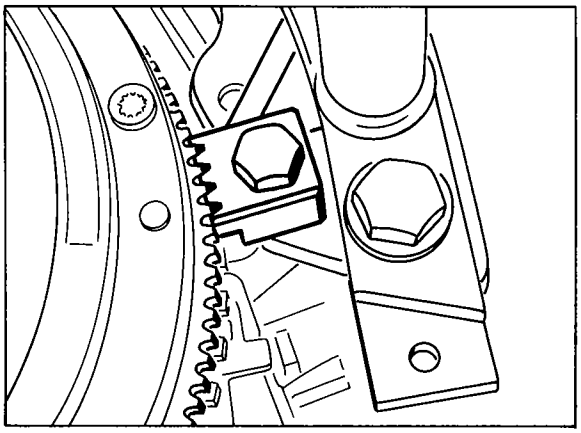


810-13

3. In case of Tiptronic transmissions, use old Special Tool 9206.

Engine removed

4. Fit hexagon head bolt with Special Tool 9538/1 to engine support adapter and lower engine mount.



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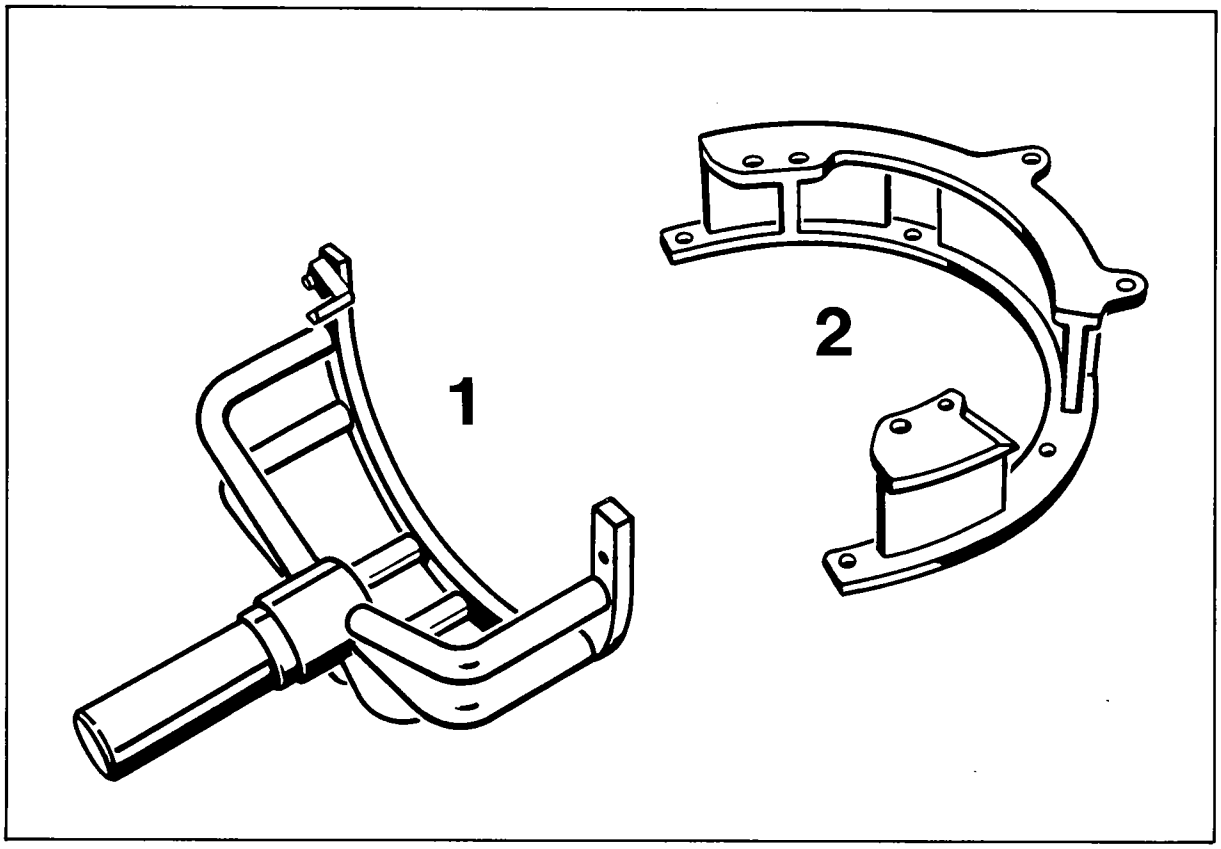
Engine support

Tools



No.	Designation	Special tool	Order number	Explanation
1	Engine support	9127	000.721.912.70	
2	Engine support adapter	9197	000.721.919.70	

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Applying TDC mark to camshaft sprocket

Engine Type M 44.43/44

Note

Camshaft sprockets supplied by the spares department do not have the TDC marks. The TDC mark is applied after the camshaft has been adjusted on the new engine.

1. Place new camshaft sprocket exactly over old camshaft sprocket and transfer TDC mark to new sprocket using a color pen.

2. Fit new camshaft sprocket and adjust camshaft according to instructions on page 15 - 4 to 15 - 6 in Repair Manual.

3. Following item 13, page 15 - 6, apply the final TDC mark to the new camshaft sprocket, using a three-square file and referring to page 15 - 4, Fig. 1.

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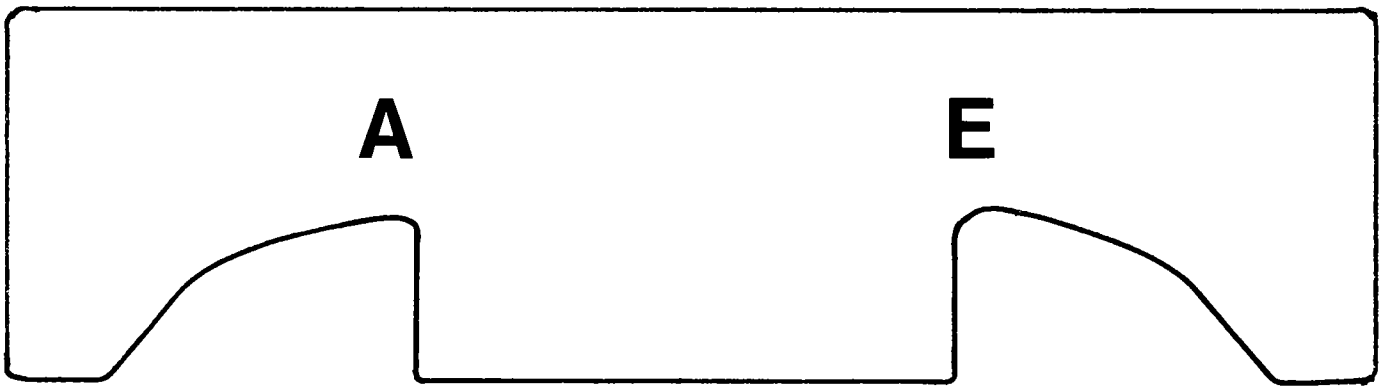
Camshaft adjustment gauge (shop-made)

Engine Type M 44.43/44

Tools



A - Exhaust
E - Inlet

Scale 1 : 1

Note

1. If color marks or casting lugs are missing on the camshafts, use the camshaft adjusting gauge (shop-made) for referencing the camshafts.

2. After having placed the camshafts into the timing chain, the attribution of the cams of **cylinder 1** may be checked with the gauge. Rotate both camshafts against each other so that the lower chain section is tensioned.

Check again after the bearing saddles have been tightened.

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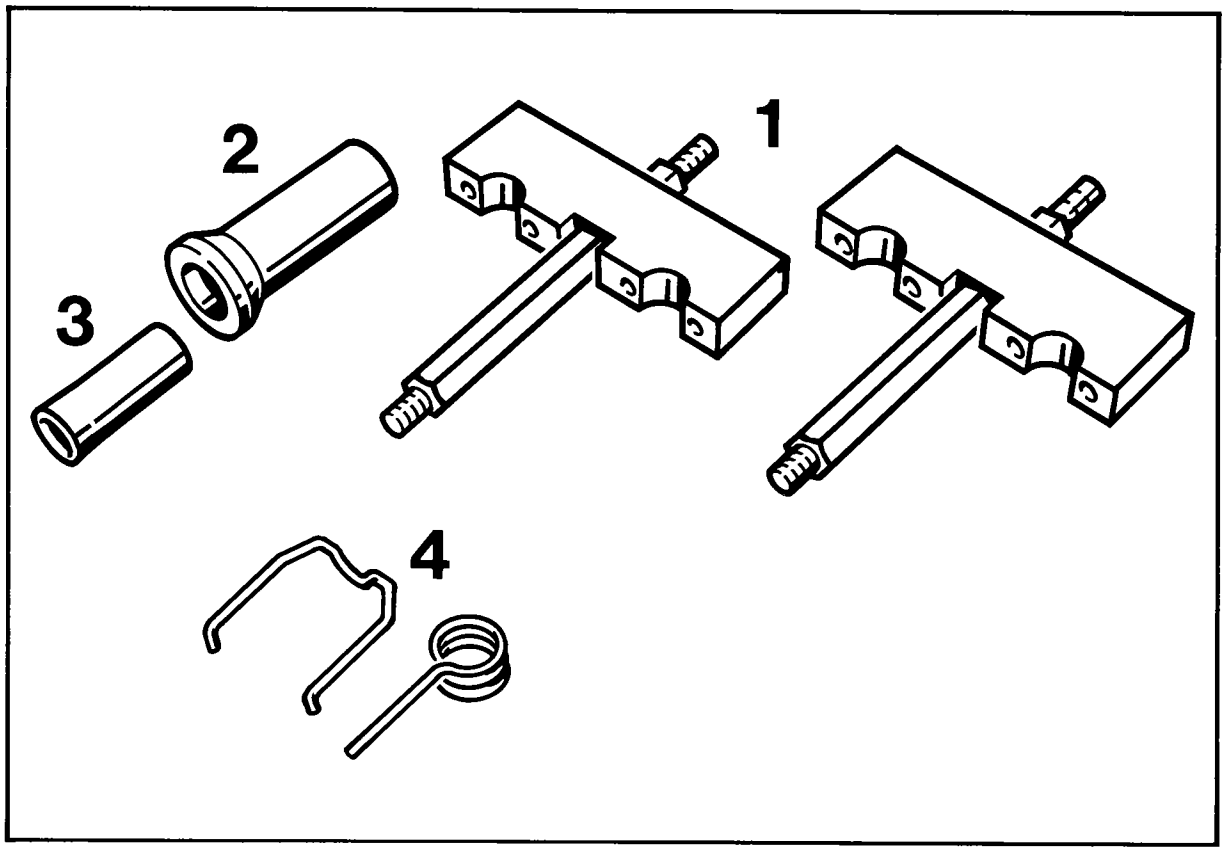
Fitting the camshafts

Tools



No.	Designation	Special tool	Order number	Explanation
1	Mounting saddles for removal and installation of camshafts	9248	000.721.924.80	Used in conjunction with tensioning pins of Special Tool 9226
2	Thrust piece for seal	9234	000.721.923.40	
3	Assembly sleeve for seal	9233	000.721.923.30	
4	Assembly tools	9530	000.721.953.00	For fitting of "VarioCam" camshaft adjuster and hydraulic toothed belt tensioner

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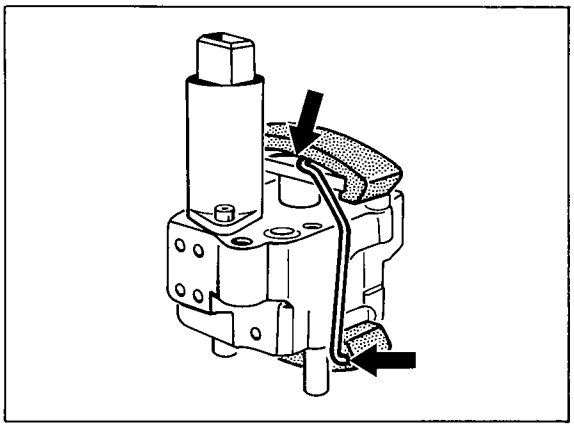
Fitting the camshafts

1. Rotate engine in direction of rotation to approx. 45° before firing TDC (cylinder 1).

2. Compress "VarioCam" camshaft adjuster and lock with Special Tool 9530.

Note

The oil check valve in the camshaft adjuster may drop out when the adjuster is compressed. Retain oil check valve and take it out if required.



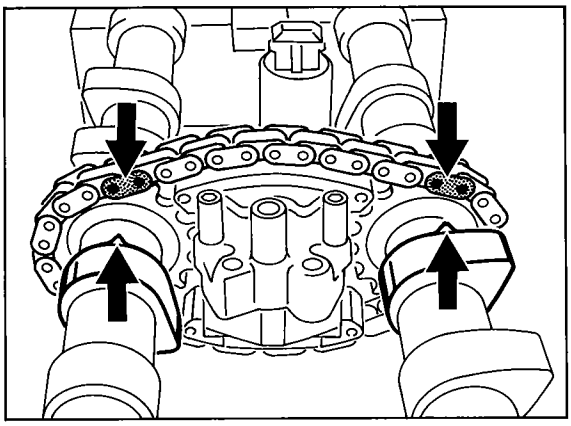
1057-15

3. Place inlet camshaft and exhaust camshaft into timing chain.
   Place both camshafts into timing chain in such a manner that the color marks or casting lugs line up with the chain links marked.

Note

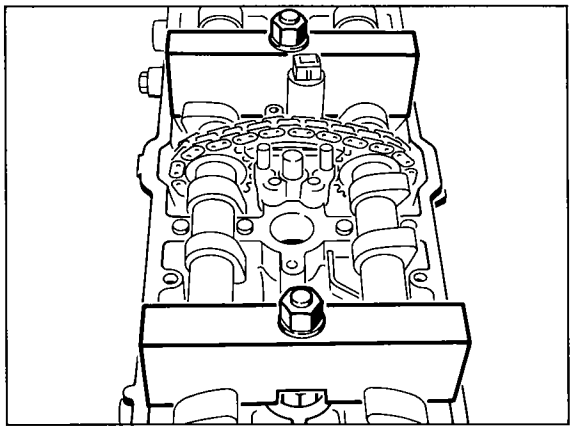
The distance between the inlet camshaft mark and the exhaust camshaft mark is 7 chain outer links.

4. Place "VarioCam" camshaft adjuster between the camshafts into the chain.



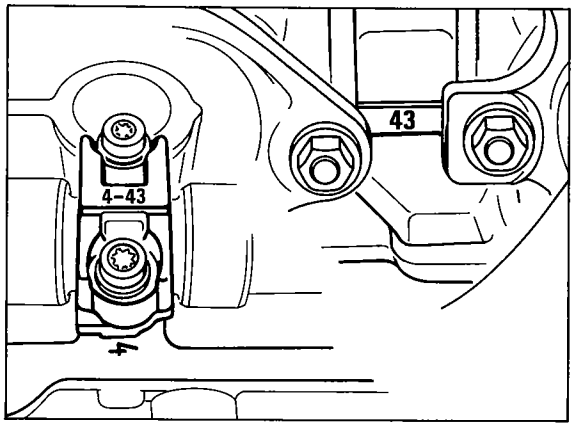
1058-15

5. Oil bearing surfaces of camshaft, cylinder head and cams. Fit camshafts with assembly saddles, Special Tool 9248, used in conjunction with tensioning pins of Special Tool 9226, to cylinder head.



1059-15

6. Fit camshaft bearing saddles and bearing covers. The bearing saddles or covers are machined as a unit with the cylinder head and must always be fitted as a unit. Observe correct identification character and matching number. Tighten bearing saddles or covers to 20 Nm (15 ftlb).

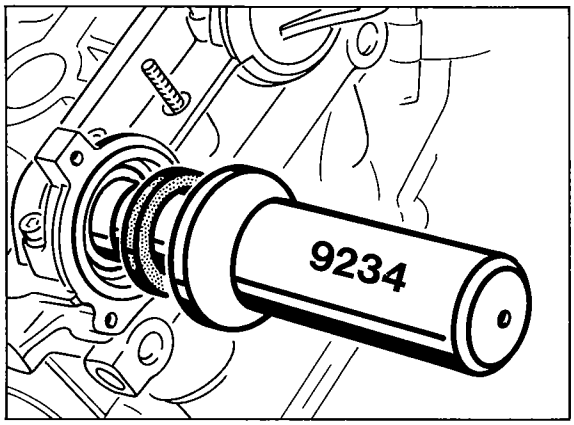


1060-15

7. When fitting, apply Loctite 574 to the sealing surfaces of the front and rear double bearing saddles.

8. Fit "VarioCam" camshaft adjuster to cylinder head. **Take out Special Tool 9530**. Fit oil pipe. Tightening torque of banjo bolt: 10 Nm (7 ftlb).

9. Use Special Tool 9233 (assembly sleeve) and thrust piece 9234 to press the seal into the drive side of the camshaft. Oil sealing lip before fitting the seal.



1061-15

Note

If a damaged toothed belt has caused the valves to be damaged by the pistons, it is mandatory to replace the timing chain. Visually check chain sprockets and chain tensioner thoroughly.

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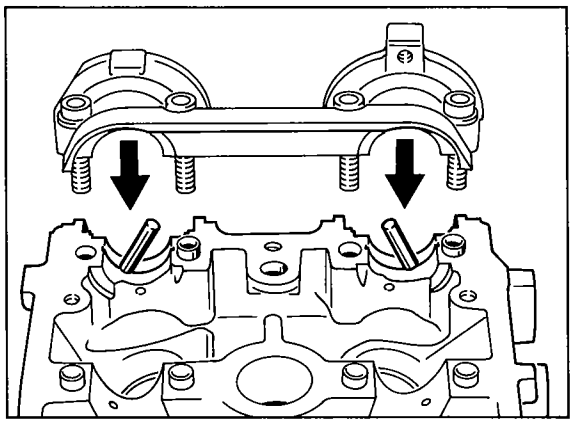
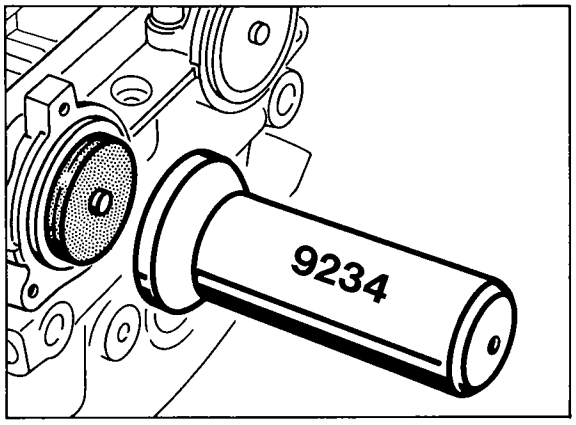
Fitting the camshaft seal

1. Place sealing washers or lock pins, respectively, into bearing surfaces and fit bearing saddle, applying some Loctite 574.
   Tightening torque: 20 Nm (15 ftlb).



1062-15

2. The seal cover may only be used with Special Tool 9234 after the bearing saddle has been tightened.



1063-15

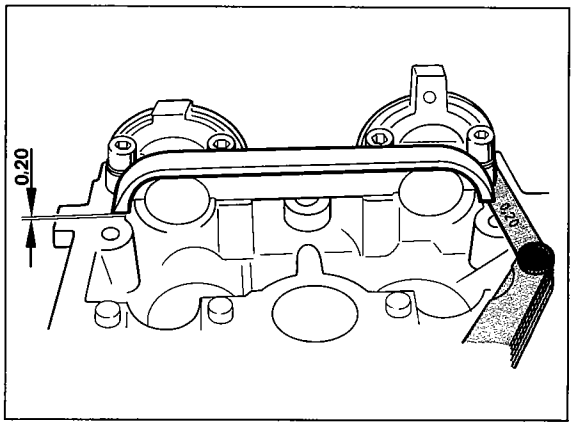
Engine fitted

Note

If the sealing cover leaks with the engine fitted to the vehicle, fit the sealing cover as follows:

1. Place sealing washers or lock pins, respectively, into bearing surfaces.

2. Coat bearing saddle with Loctite 574 and fit saddle. Place a 0.02 mm feeler gauge between bearing saddle and cylinder head and manually tighten bolts lightly.



1064-15

3. Oil sealing cover lightly and press in manually. Tighten bearing saddle to specified torque.
   Tightening torque: 20 Nm (15 ftlb)

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Camshaft references

Camshaft references	Worldwide as of MY '92
	Engine Type 968 M 44.43/44
Camshafts	
Inlet camshaft	944.105.277.09
Exhaust camshaft	944.105.275.10
Marking between thrust bearing and cam of cylinder 1 or on rear face	277.09 275.10
Camshaft timing 1 mm stroke, zero clearance	
Basic timing	
Inlet opens	7.5° CR after TDC
Inlet closes	52 ° CR after BDC
Exhaust opens	31 ° CR bef. BDC
Exhaust closes	1 ° CR after TDC
Torque timing	
Inlet opens	7.5° CR bef. TDC
Inlet closes	37 ° CR after BDC
Exhaust opens	31 ° CR bef. BDC
Exhaust closes	1 ° CR after TDC

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Machining the cylinder head mating face

Checking cylinder head for distortion

Using a feeler gauge and ruler or straight edge, check the cylinder head mating face for distortion.

Admissible distortion of the mating face: 0.05 mm

Distorted cylinder heads may be repaired by machining the mating face. Admissible distortion after machining: 0.03 mm.

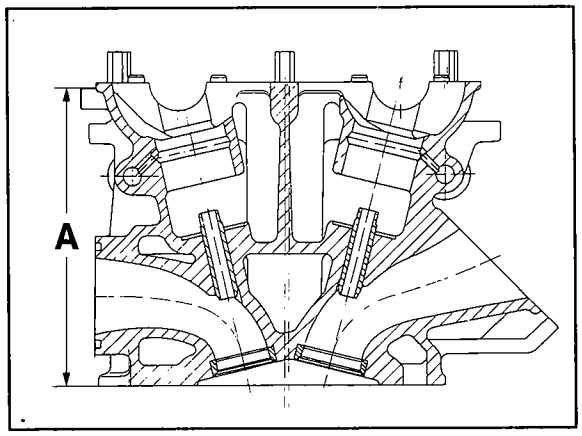
Machining the cylinder head

Reface cylinder head mating face only until the surface is level. Max. wear limit: 146,6 mm

Note for refacing the mating face:
Max. roughness = 0,015 mm

If the new-dimension tolerance is exceeded during machining, a cylinder head gasket with a thickness of 1.4 mm must be fitted.

New dimension A = 147 ±0.1 mm
Wear limit A =146.6 mm



1126-15

Machining dimension and identification of the cylinder head

New dimension : 147 ±0.1 mm
Gasket : 1.1 mm
Identification : none

Refacing dimension : 146.8...146.6 mm
Gasket : 1.4 mm
Identification : N

Identification „N"

To be applied on the exhaust side between cylinder nos. 2 and 3, on the boss below the mating surface of the cylinder head cover.

Height of stamped character „N" 6 mm

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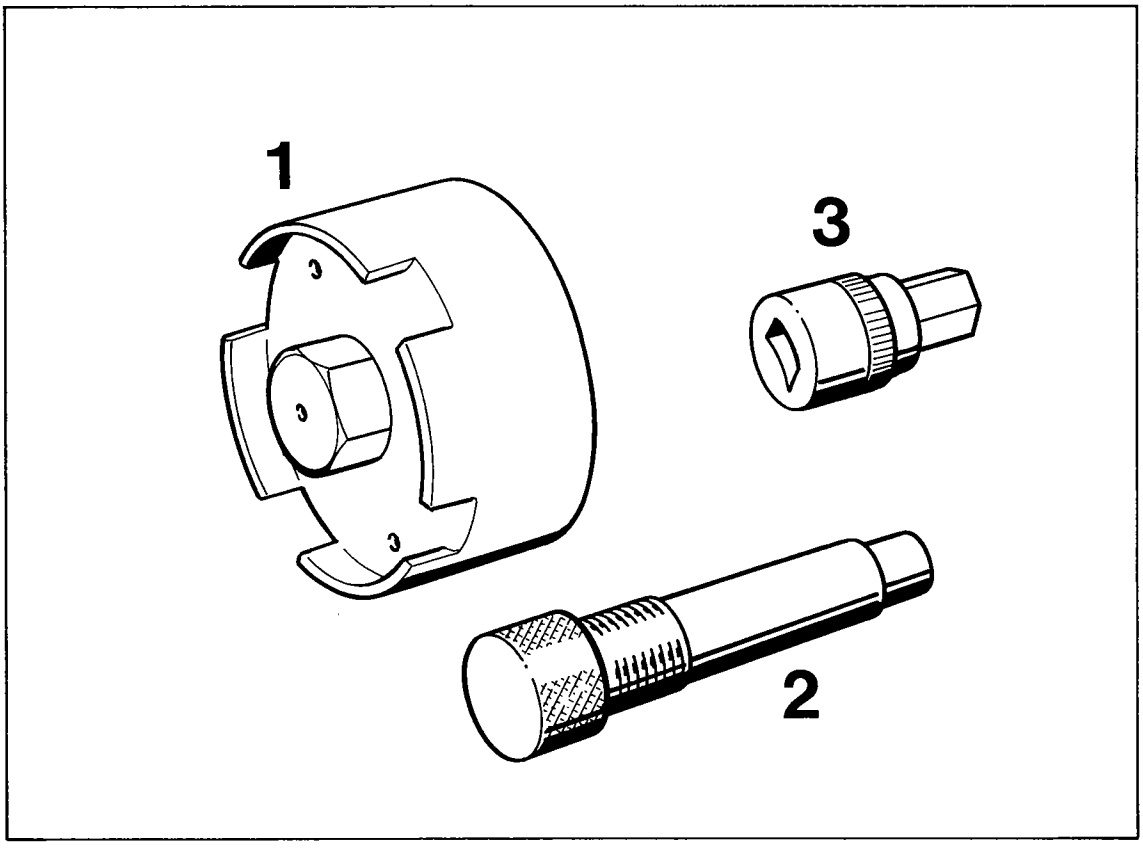
Removing and installing lubrication system components

Tools



1118-17

No.	Designation	Special tool	Order number	Explanation
1	Oil filter wrench	9204	000.721.920.40	
2	Assembly pin	9262/1	000.721.926.21	
3	Screwdriver insert for plug / thermostat		985-17	e.g. Hazet, available from tool shops

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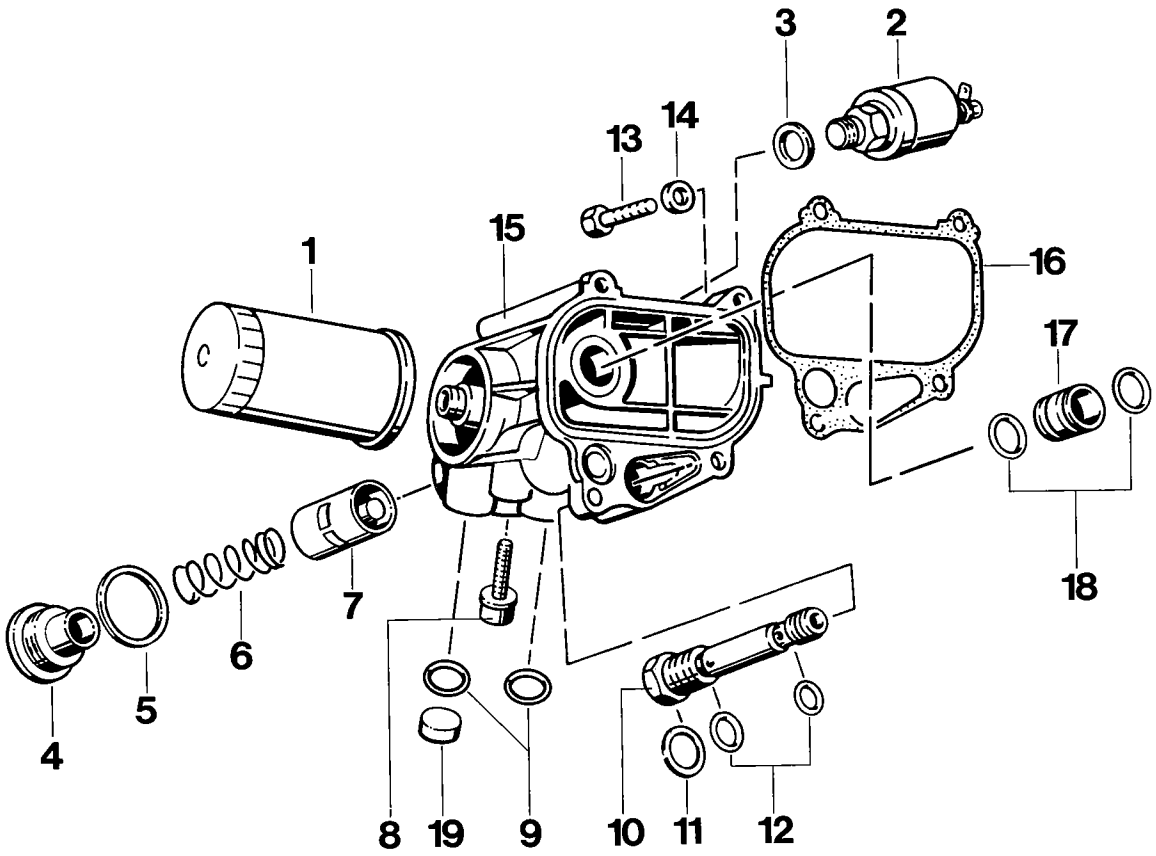
Removing and installing lubrication system components



1100-17

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No.	Designation	Qty.	Note: Removal	Note: Installation
1	Oil filter	1	Use Special Tool 9204	Oil gasket lightly, tightening torque 20 Nm (15 ftlb)
2	Oil pressure sender unit	1		Tightening torque 35 Nm (26 ftlb)
3	Seal	1		Replace
4	Plug M 42 x 1.5	1		Tightening torque 50 (37 ftlb) + 10 Nm (7 ftlb), use screwdriver insert (17 mm dia.) (e.g. Hazet 985-17)
5	Seal A 42 x 49	1		Replace
6	Spring	1		Check for correct seating
7	Thermostat	1		
8	Pan head screw with captive washer M 8 x 25	1		Tightening torque 28 Nm (21 ftlb)
9	O-ring	2		Replace
10	Oil pressure release valve	1		Tightening torque 45 Nm (33 ftlb)
11	Seal A 20 x 24	1		Replace
12	O-ring	2		Replace
13	Hexagon head bolt M 8 x 25	4		Tightening torque 28 Nm (21 ftlb)
14	Washer	4		
15	Thermostat housing	1		Align with assembly pin 9262/1
16	Profiled gasket	1		Replace
17	Flange	1		Preassemble in thermostat housing, press in to stop
18	O-ring	2		Replace, oil lightly
19	Cover	3		Bonded in place with Loctite 649

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Assembly note

Aligning the thermostat housing

1. Fit preassembled housing to crankcase and tighten hexagon head bolts lightly. Screw in oiled assembly pin 9262/1 manually, center and tighten hexagon head bolts crosswise. If a resistance is felt when the assembly pin is withdrawn, the fitting operation must be repeated.

2. Fit oil pressure release valve with new seal and oiled seals.
   Tightening torque 45 Nm (33 ftlb).

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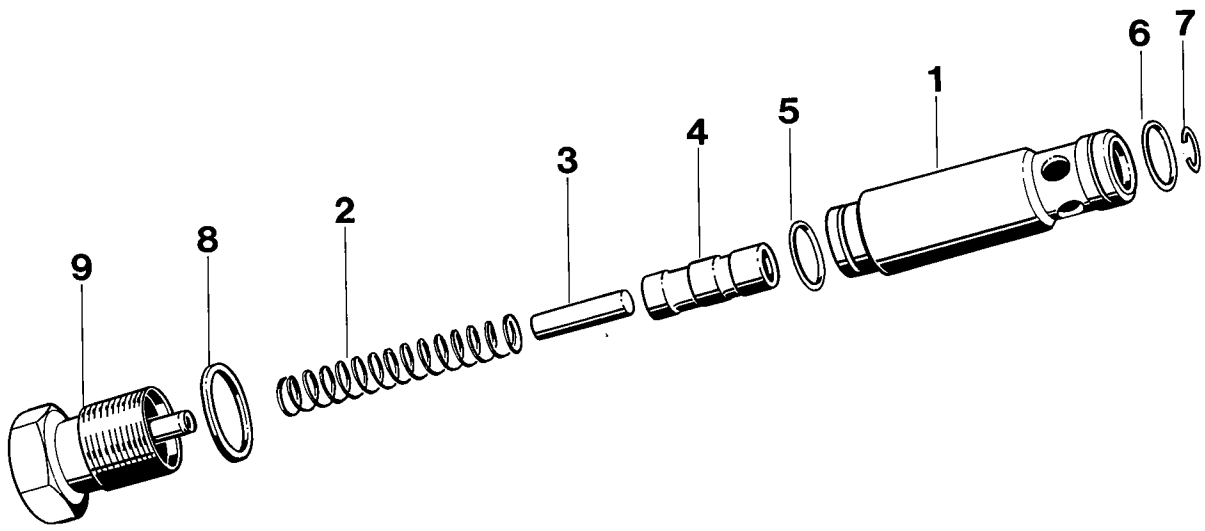
Dismantling and assembling oil pressure release valve



No.	Designation	Qty.	Note: Removal	Note: Installation
1	Slide valve housing	1		
2	Thrust spring	1		
3	Damping plunger	1		
4	Slide plunger	1		
5	O-ring	1		Replace, oil lightly
6	O-ring	1		Replace, oil lightly
7	Snap ring	1	May remain in slide valve housing	Check for correct seating
8	Seal A 20 x 24	1		Always to be replaced
9	Plug with grooved pin	1		Tightening torque 45 Nm (33 ftlb)

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Assembly notes

Note

Before dismantling the oil pressure release valve, use a suitable tool, e.g. a round wooden or plastic rod, to check if the slide plunger (4) slides smoothly in the slide valve housing (1). If it sticks or binds, the oil pressure release valve must not be fitted anymore.

Dismantling

1. Tighten oil pressure release valve at hexagon in a vise.

2. Put on protective gloves and pull slide housing out of plug.

Note

The slide valve housing (1) can only be pulled off with difficulty since the O-ring (5) must be destroyed in the process. In addition, the valve is spring-loaded.

Assembly

1. Oil O-ring (5) lightly and fit to slide housing.

2. Coat damping plunger (3) and slide plunger (4) with oil and preassemble them in the slide valve housing.

3. Grease slide valve housing (1) well in O-ring area, e.g. using Optimol Olit 2 EP or TL-VW 735.

4. Fit thrust spring (2), press slide valve housing into plug, using a vise and protecting the housing in a suitable manner (e.g. with a wooden or plastic block etc.).

5. Apply a thin oil coat to O-ring (6) and fit to slide valve housing.

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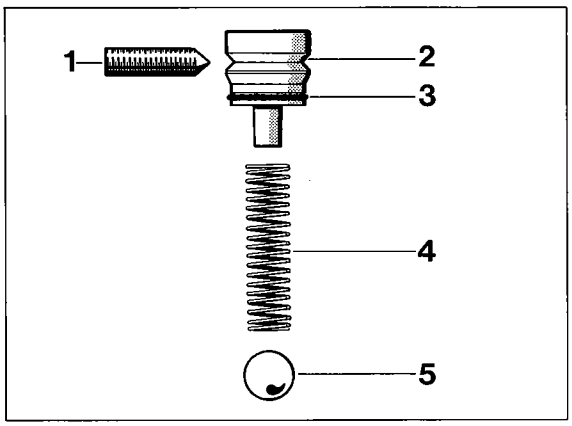
Removing and installing oil restraining valve



31-17

1 – Threaded pin

2 – Spring guide

3 – O-ring

4 – Thrust spring

5 – Ball

1. Remove cylinder head cover. Screw one hexagon head bolt, e.g. M 6 x 40, into spring guide from above. Undo threaded pin by two turns and pull out spring guide in upward direction.

2. Take out thrust spring and ball using a magnet. Clean ball seat, ball, thrust spring and oil duct thoroughly. The ball seat remains in cylinder head and must not be damaged.

3. Replace O-ring before fitting and oil lightly. Tightening torque for threaded pin: 3.5 Nm (3 ftlb).

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Mixing table

(Average values)

Antifreeze-Cooling water

Antifreeze protection to	Antifreeze	Water	Antifreeze	Water
– 30° C	45 %	55 %	3.5 liters	4.3 liters
– 35° C	50 %	50 %	3.9 liters	3.9 liters
– 40° C	55 %	45 %	4.3 liters	3.5 liters

Checking cooling and heating system for tightness

1. Check visually for leaks.

2. Check coolant and heater hoses for proper routing, porosity, cracks and chafing. Replace all damaged hoses.

3. Retighten hose clamps.

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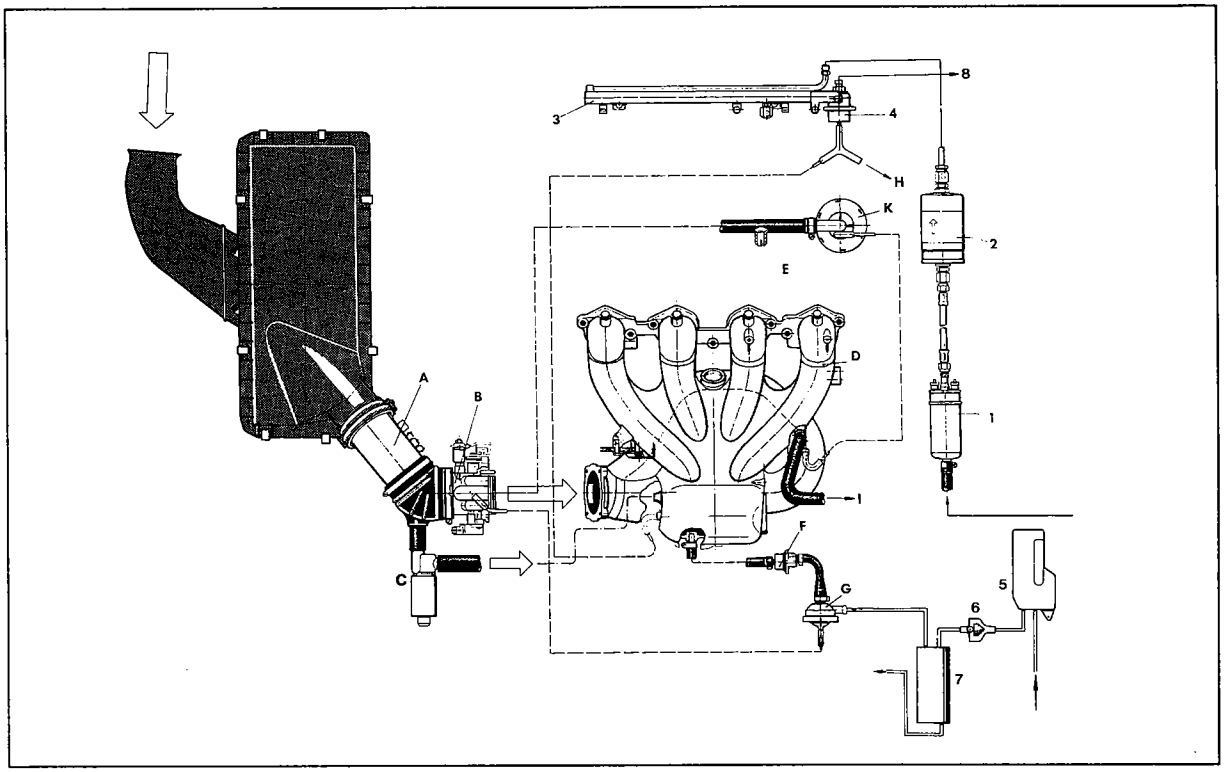
Fuel vacuum line routing

Engine Type M 44.43/44



1088-20

A - Air flow meter

B - Throttle body

C - Idle speed positioner

D - Inlet manifold

E - Overflow valve

F - Tank venting valve

G - Vacuum valve

H - Heating

I - Brake booster

K - Oil separator

1 - Fuel pump

2 - Fuel filter

3 - Injection line

4 - Pressure regulator

5 - Expansion tank

6 - Roll-over valve

7 - Carbon canister

8 - Return to tank

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DME control units as of Model Year '92

Engine Type M 44.43/44

Model	Production control unit	Introduction date	Remarks
92	944.618.123.00	Start of production July, '91	
	944.618.123.01	approx. September, '91	
	944.618.123.02	December, '91	

Spare control unit

944.618.123.02

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page

Clutch, operation

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Adjusting the clutch pedal

Note

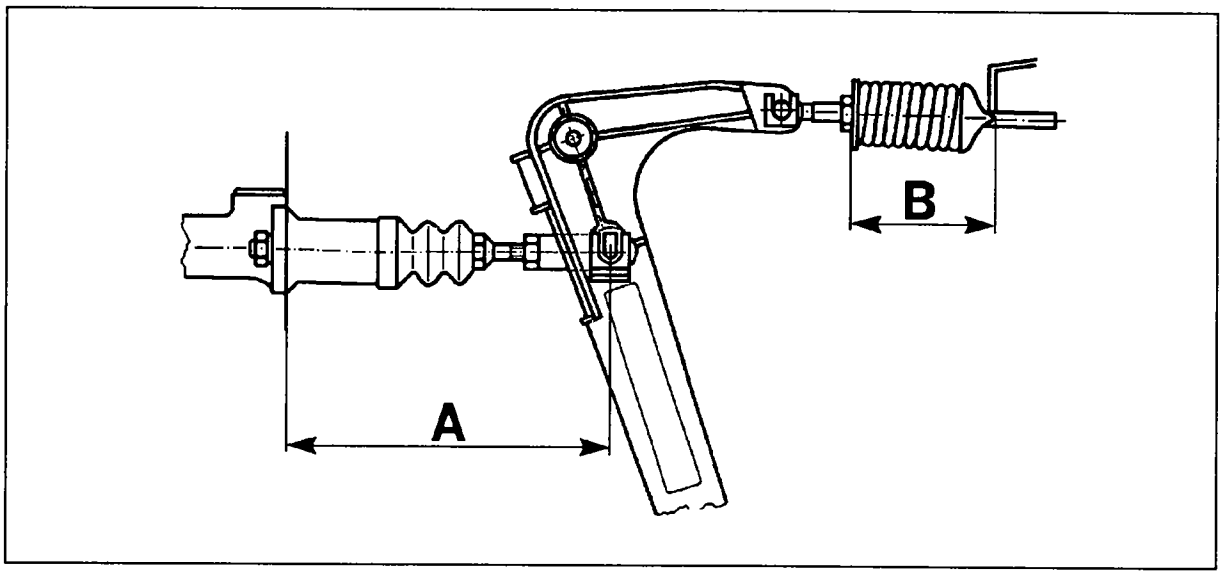
The following items are essential requirements for smooth clutch operation and must therefore be observed whenever the pedal is adjusted:

- Correct bleeding of clutch hydraulics.
- Tightness of hydraulic system.
- Correct setting of pushrod and boost spring.
- Pedal position according to standard setting.

Checking and adjustment procedures

1. **Adjusting pedal position/pushrod (dimension A = 147 mm).**
   If repairs on the master cylinder have been carried out, the pushrod must be readjusted. Move the sound insulation in this area out of the way. The correct pedal pos. is obtained automatically after the pushrod has been set to dimension A = **147 mm ±0.5** (measured between body and rod center). This dimension is set by turning the hexagon head pushrod and by locking with the hex nut.
   If required, correct the cruise control switch position on vehicles equipped with cruise control.

2. **Adjusting the boost spring (dimension B = 65 mm).**
   The boost spring can be set to dimension B = **65 mm ±1** only after the pedal position has been checked and adjusted. Measure the dimension between the outer edge of the washer and the cutter support (refer to diagram).
   If the parts have been **dismantled** or when ordering spare parts, dimension B is **76 mm ±1.**
   In this case, the boost spring is secured with a cotter pin (2 mm dia.).



1112-30

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3. Clutch free play.

The free play cannot be adjusted.

The clutch master cylinder is provided with an internal stop. If the boost spring and the pushrod are adjusted correctly, the clutch pedal is always forced against this stop. Pull the pedal back to check if this stop (= end position) is reached.

Due to the fact that any free play is automatically taken up hydraulically, the free play of the clutch **cannot** be checked at the clutch pedal.

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page

Front wheel suspension

Rear wheel suspension, drive shaft

Wheels, tires, alignment

Brakes, mechanical

Brake, hydraulics, regulator, booster

Steering

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page

Body, general

Doors

Convertible top

Bumpers

Glasses, window control

Exterior equipment

Interior equipment / Airbag

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Adjusting the front wheel bearings

Wheel bearing clearance is adjusted correctly when the thrust washer may be moved by applying finger pressure using a screwdriver (but not by rotational or levering action).

1. Take off wheel. Lever off hub cap with two tire irons or Special Tool VW 637/2 (lever).

2. Remove pan head screw of clamping nut. Tighten clamping nut somewhat, rotating the hub at the same time.

3. Loosen clamping nut far enough to allow the thrust washer to be shifted barely with a screwdriver.
   When shifting the washer, do not use the hub as a support for the screwdriver.

4. Tighten pan head screw of clamping nut to 13 + 3 Nm (10 + 2 ftlb) without rotating the clamping nut.

5. Recheck adjustment by shifting the thrust washer, correct if required.

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Ride height and spring brace settings

Front axle

	Height setting * Bottom bolt edge of rear trailing arm mount **below** wheel center (p. 44-7)
Sport-type running gear M 030 (height-adjustable spring struts)	
RoW	147 ± 10 mm
USA	127 ± 10 mm

Rear axle

		Spring brace setting (Spring brace inclination)**	Height setting * Center of brace mount (torsion bar center) **below** wheel center
RoW Coupé	Manual transmission	18°	–17 ± 10 mm
	Tiptronic	18.5°	–17 ± 10 mm
RoW Cabriolet	Manual transmission	18.5°	–17 ± 10 mm
	Tiptronic	20.5°	–17 ± 10 mm
USA Coupé	Manual transmission	18.5°	–17 ± 10 mm
	Tiptronic	18.5°	–17 ± 10 mm
USA Cabriolet	Manual transmission	19.5°	–17 ± 10 mm
	Tiptronic	20.5°	–17 ± 10 mm
RoW M 030	Manual transmission	10°	–37 ± 10 mm
M 030	Tiptronic	11°	–37 ± 10 mm
USA M 030	Manual transmission	14°	–17 ± 10 mm
M 030	Tiptronic	15°	–17 ± 10 mm

* max. ride height difference left to right: 10 mm.
On U.S. vehicles, the bumper height is used as a reference (refer to page 44-4). The distance from the measuring surface (road surface or any level surface) to the measuring point must be 543 ± 20 mm at the **rear axle. At the front axle,** the distance must be 611 ± 20 mm.
For measuring points, refer to page 44-4.

** **max. difference right to left: 0.5°.**

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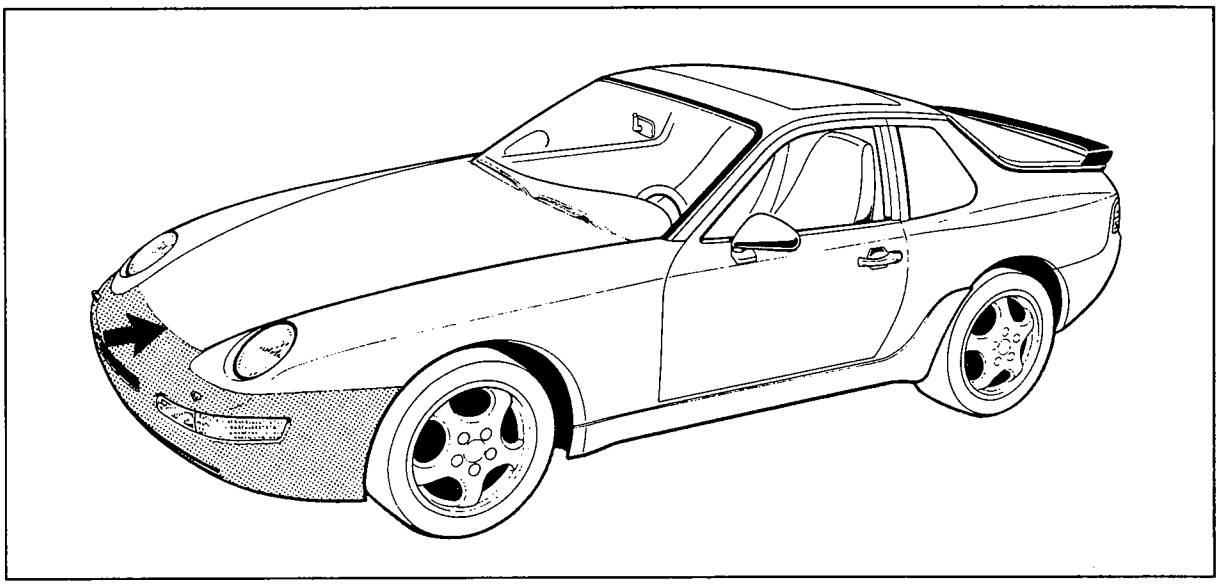
Body – Measuring points for U.S. vehicles

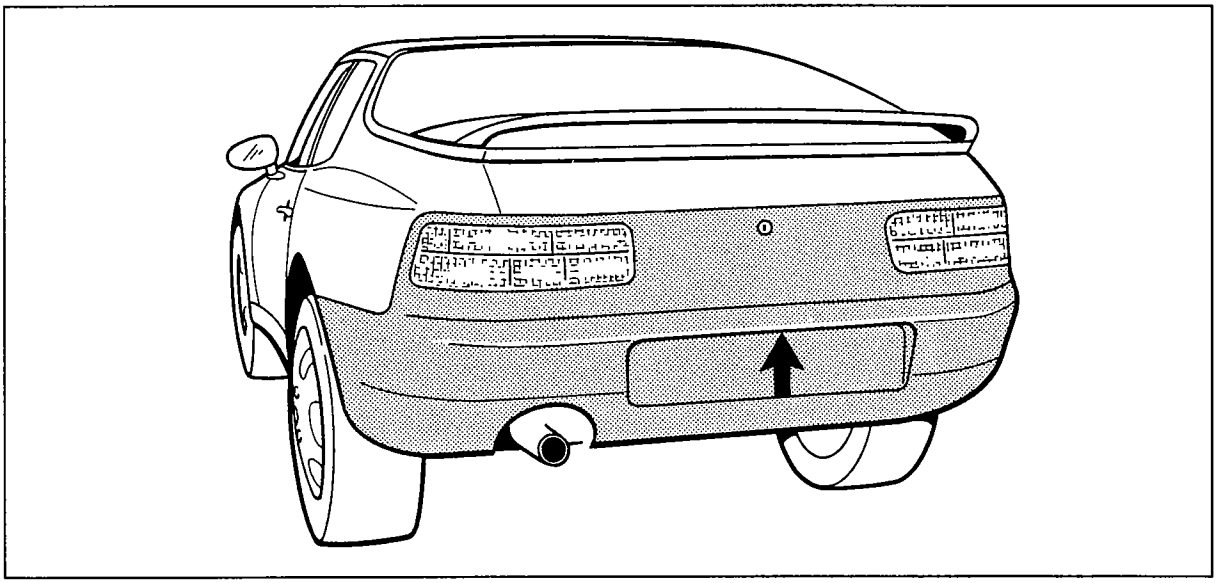
For settings, refer to page 44-3

Front measuring point:



821/1-63

Rear measuring point:



822/1-63

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Suspension alignment

General

Use optical or electronic wheel alignment equipment to check the suspension alignment. For measuring operations, refer to the operating instructions of the equipment manufacturer. The following requirements must be met prior to the wheel alignment procedure:

- Vehicle curb weight acc. to DIN 70020, i.e. vehicle in roadworthy condition with full fuel tank and spare wheel
- Axle joints and wheel bearing play o.k.
- Tire pressure to specification, virtually uniform tread depth on all tires

If the front and rear of the car are measured, **start by checking and adjusting (if required) the wheel settings of the rear axle.** Set steering wheel and steering gear to center position when adjusting toe-in.

Before adjusting the wheel settings of the front and rear axles, it is *recommended* (or required *) to check the height settings of the rear axle as well as, in the case of vehicles with height adjustable front struts, of the front axle at DIN curb weight.

If wheel load scales are available, the height adjustment feature may be used to reduce the wheel load difference between the left-hand and right-hand sides to the minimum possible. The wheel load difference is adjusted by modifying the vehicle ride height within the height tolerance. Try to achieve a left-to-right wheel load difference that is as small as possible.

* if operations affecting the ride height have been carried out or if it is evident that the ride height is incorrect

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Important information for suspension alignment

Observe the following when carrying out suspension alignment

Ride height adjustment/wheel load change

Changing the height on one side causes the wheel load to be changed at the same time. *If the wheel load is changed on one wheel, the wheel loads are also changed on the other wheels.*

Increasing the built-in spring preload on one side (raising the vehicle) causes the wheel load to be increased.

Reducing the built-in spring preload on one side (lowering the vehicle) causes the wheel load to be reduced.

A change of the wheel load affects the diagonally opposite side of the other axle side. I.e. if the wheel load is reduced or increased on one side, the diagonally opposite wheel is affected in the same way.

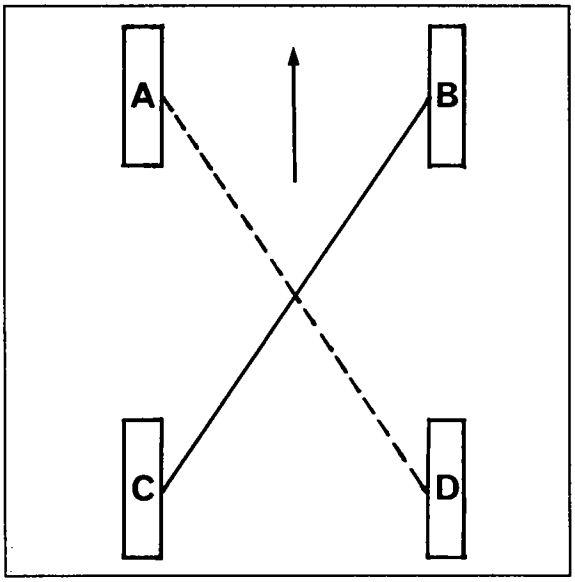
Example

Rear left spring preload C is increased.

This causes the wheel load :

– to be increased at LH rear C and RH front B

– to be reduced at RH rear D and LH front A



The left-to-right wheel load difference at the front and rear axles should be as small as possible (below 20 kgs, if possible).

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Ride height check / ride height adjustment

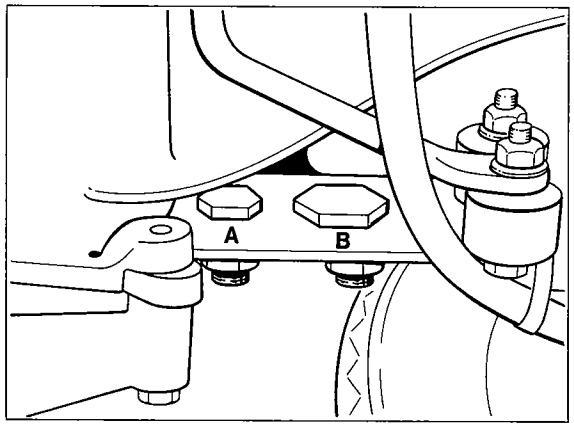
Drive vehicle onto measuring stand and check height adjustment at rear axle or at front and rear axle (if vehicle is equipped with height-adjustable front axle) and correct if required.

Rear axle

Both the torsion bar center and wheel center measuring points are measured taking the tire contact area as a reference.

Setting: P. 44 - 3

If required, correct rear vehicle ride height at two-part spring brace with eccentric screw B after having undone mounting screw A.



1110-44

Front axle

Non-adjustable spring struts

The front-axle ride height is determined by the coil springs and cannot be adjusted.

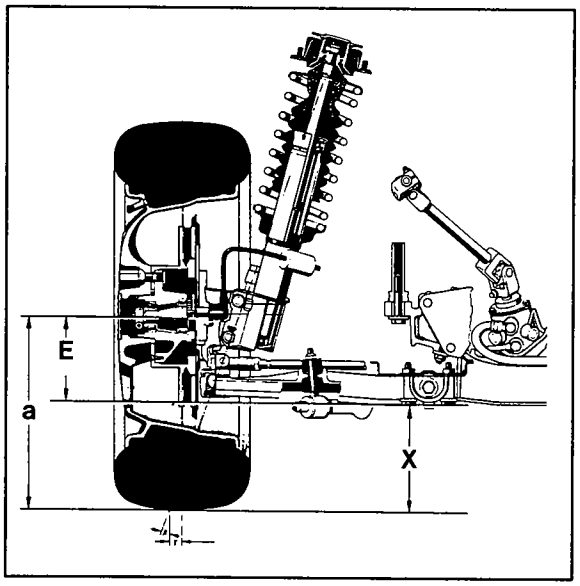
Adjustable spring struts

Both the wheel center and bolt bottom edge measuring points are measured taking the tire contact area as a reference.
Setting: P. 44-3.

Example *

(Ride height adjustment on one wheel)

measure to wheel center	a = 300 mm
specified height	E = 147 ± 10 mm
Value (from tire contact area to measuring point)	= 153 ± 10 mm



69/44

If required, correct height (p.44-8).

* In case of U.S. vehicles, the bumper height is used to determine the ride height. For settings, refer to p. 44-3.

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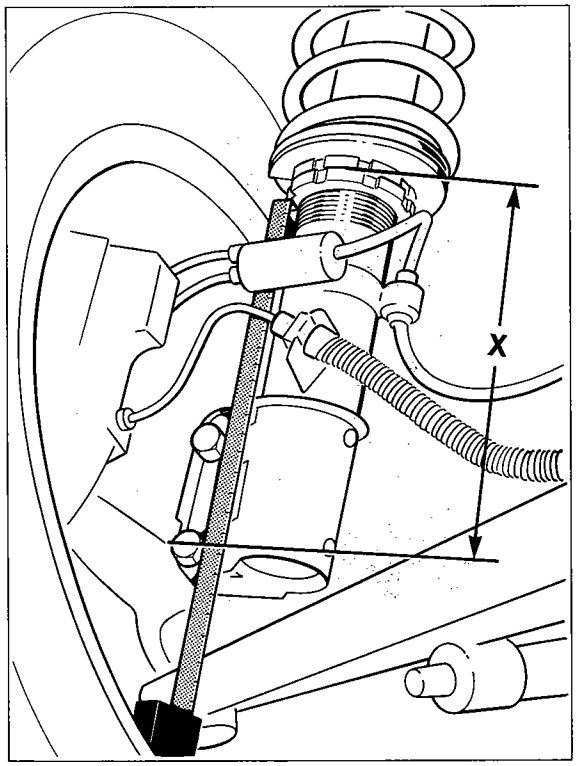
For height adjustment, undo lock nut and turn spring cup accordingly.
Use suitable hook wrench or Special Tool VW 637/2 (lever).

Turning the adjusting nut
– to the right - vehicle height is increased
– to the left - vehicle height is reduced

Note

If no wheel load balances are used to adjust the ride height, make sure the RH and LH coil springs have the same installation length (preload/dimension X).
Tolerance ± 1 mm. The wheel load difference will then be within an admissible range.



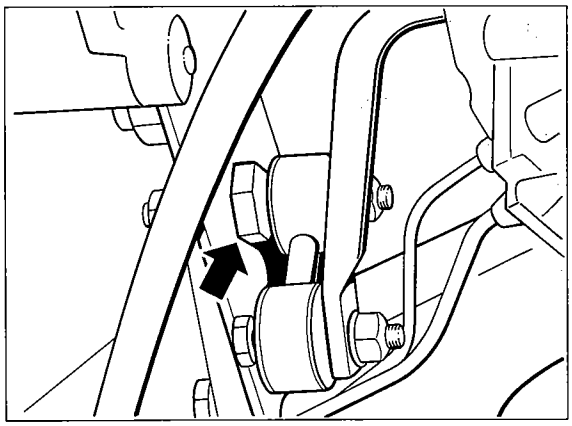
1109-44

Wheel alignment

Rear axle

Adjusting camber

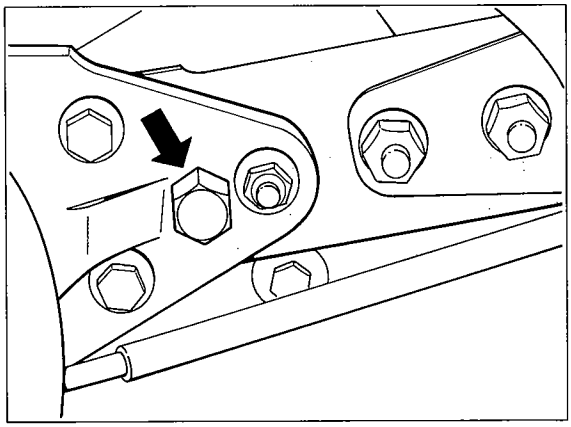
Undo stabilizer mounts and nut and bolt unions between spring brace and trailing arm and adjust to specified setting by turning the camber eccentric.



1105-44

Adjusting toe-in

To adjust toe-in, move trailing arm in the slots of the spring brace, using Special Tool 9171.



1104-44

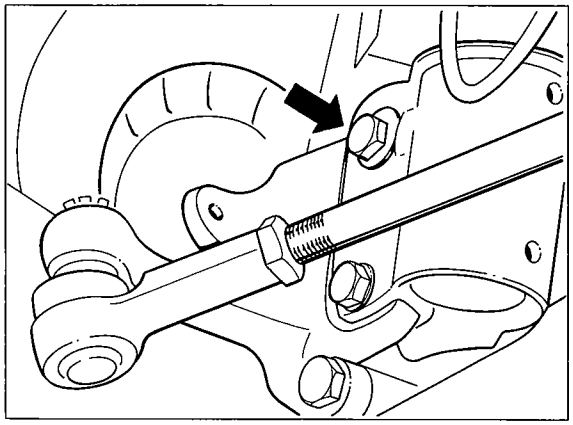
Front axle

Adjusting camber

To adjust the camber, turn the eccentric screw (arrow).
To do so, unscrew the air duct for brake cooling so that the eccentric screw and the clamping screw become accessible.

Note

When adjusting the camber on the M 030 sport-type running gear, make sure the brake pipe is not damaged (bent).



1108-44

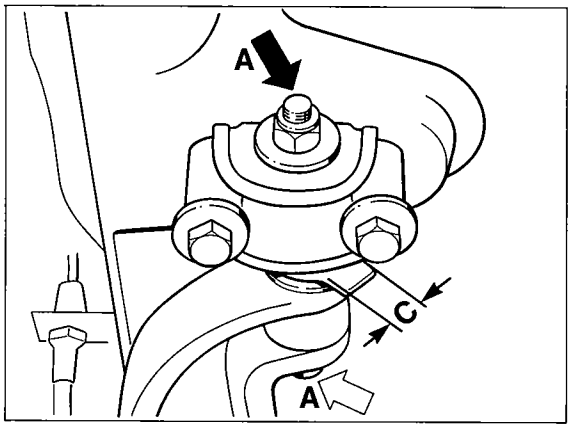
Adjusting caster

Remove undertray paneling.

Undo self-locking nuts A at caster eccentric.

Adjust to specified value by turning the caster eccentric.
Depending on the position of the eccentric, use a 19 or 32 mm (area C) open-ended wrench.

Observe tightening torque of hexagon head nuts A.

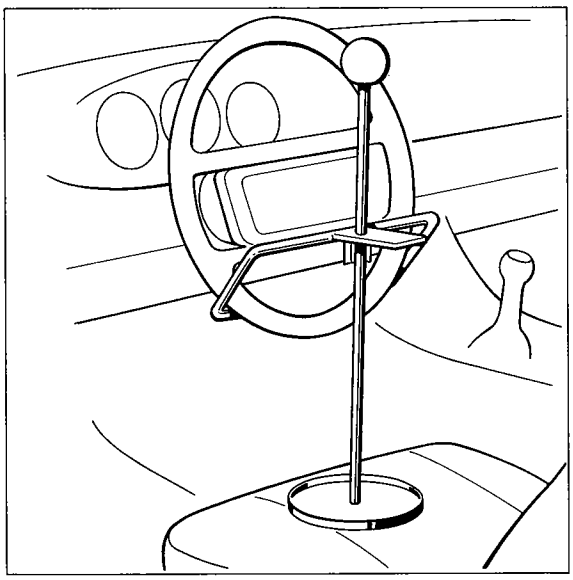


1107-44

Adjusting toe-in

Preliminary operations: Center out steering gear using Special Tool 9116. If the steering wheel is offset, try to achieve an optimum position when relocating the steering wheel. Then remove Special Tool 9116.

Clamp steering wheel in center position and adjust toe-in at tie rods.



1106-44

Toe difference angle

The toe difference angle cannot be adjusted (it can only be acted upon by replacing the steering arms).

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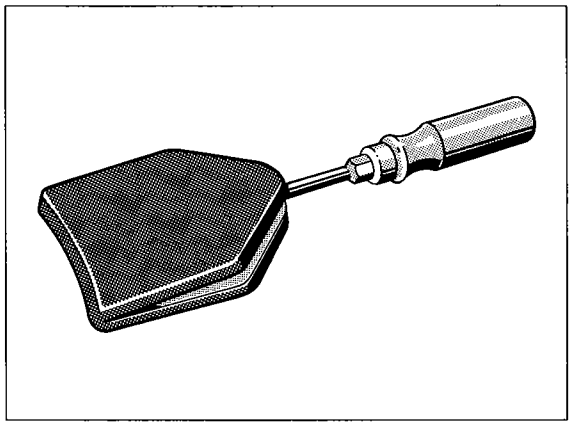
Tire fitting

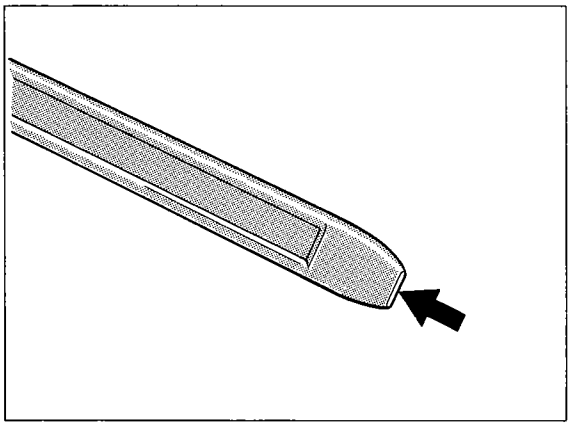
The following assembly and dismantling procedures refer to the 17-inch Cup Design wheels with asymmetric hump.

Notes / tools

- Avoid damaging the wheel paintwork.
- To remove / fit a tire, a tie-down tool – Special Tool 9539 – is required. In addition, the tire lever should be flattened along its front face and should then be rounded (arrow).



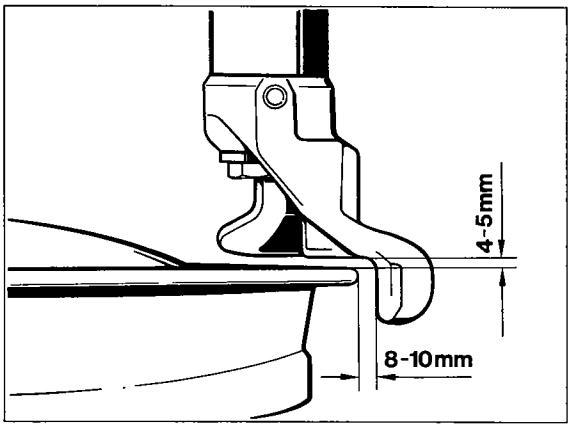
1012 - 44



1013 - 44

Tire assembly

- Fit wheel to assembly stand and coat inside of wheel and both tire beads with tire assembly compound.
  Replace the valve whenever a tire is fitted or refitted.
- Set assembly tool to correct clearance.



1014 - 44

- Fit first tire bead in the usual manner.

Note

The asymmetric hump changes its cross-section across the circumference.
The following points must therefore be observed when fitting or removing a tire.

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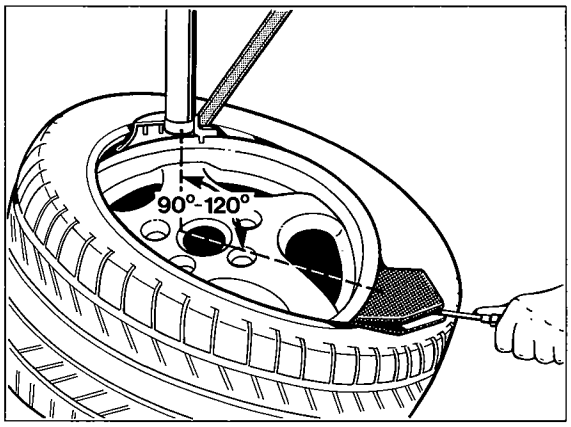
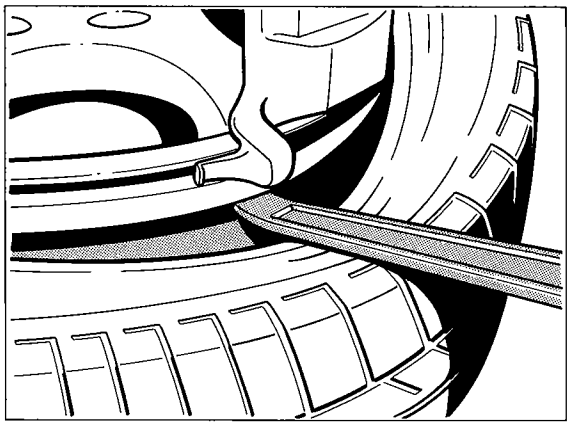
- When starting to fit the **second bead,** the assembly arm should be located **opposite the valve.** Then place the second bead as flat as possible onto the wheel, guide it across the assembly head and tie it down with Special Tool 9539, keeping it offset by approx. 90 to 120 deg.

  While performing the turning motion and fitting the **second bead,** use a second tire lever and Special Tool 9539 to locate the tire bead in the drop center.



1015 - 44

- To facilitate assembly, position the additional tire lever below the hump.



1016 - 44

- **When inflating the tire, the beads must jump over the hump at a positive pressure of 4.5 bar at the latest.**
  The bead still located in the drop center must therefore be positioned **opposite the valve (flatter hump section)** when the tire is pumped up. If required, rotate the tire accordingly and coat with assembly compound again.

Removing the tire

- Adjust assembly head as for tire fitting (Fig. 1014 - 44).

- **When pressing off the tire, start at the valve since the levering force required in this area is somewhat lower.**
  Then press off the tire on both sides, coating the rim flange with assembly compound.

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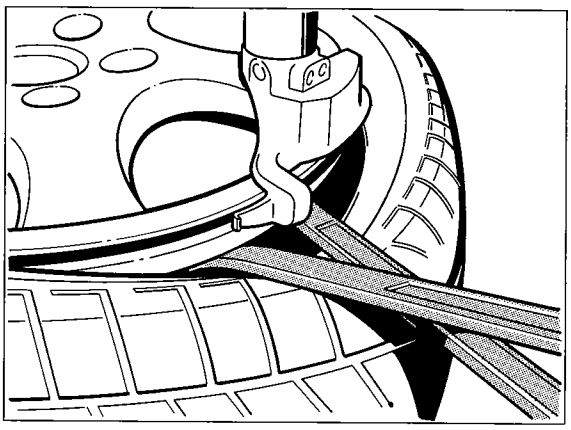
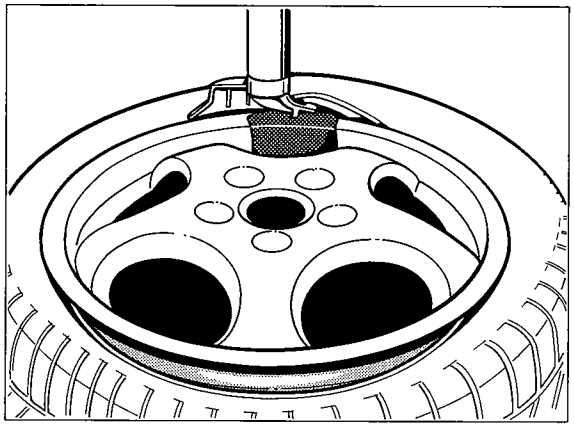
– **Lift the first side of the tire** over the assembly head (Fig. 1017 - 44). Place a rag or a leather cloth between the wheel and the tire lever.
In addition, make sure the tire remains in the drop center opposite the disassembly head (Fig. 1018 - 44). Use Special Tool 9539 to facilitate this.



1017-44



1018-44

– **Remove the second side of the tire** in the usual manner.

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Removing and installing brake pads

Note

The brake pads are changed in the usual manner known from other Porsche models fitted with four-piston fixed calipers. This is why only a short description of the operations is given. Please make sure the following is observed at all times:

- **use correct brake pad quality (refer to spare parts catalog).**

- **Replace damping plates or vibration dampers with new parts whenever the brake pads are changed.**

- The damping plates and vibration dampers are protected by an adhesive sheet. **Pull off this protective sheet before fitting the pads.**

- **Do not grease the pad backing plates (rear of brake pads).**

Removal

- Compress spreader spring in the middle and disengage from its mounting. **At the same time, i.e. before starting to compress it, press spreader spring towards brake disc in the retainer plate area (to take the load off the spring).** This prevents damage to the retainer plate.

- Extend warning contact lead at brake caliper and pull warning contact out of the brake pad plate.

Note

Replace warning contacts if the lead has been ground through to the bare wire. If grinding marks are limited to the plastic section of the warning contact, the warning contact may continue to be used.

- Pull out brake pads using a brake pad slide hammer puller, **absolutely** observing the following points:

  Expand brake pads complete with damping plates or vibration dampers, respectively. If this is not possible (depending on the degree of wear of the brake pads), use a spatula to separate the damping plates / vibration dampers from the brake backing plate prior to removal of the pads. Push back brake pads as far as possible in both cases, using the piston retracting tool. If required, start by drawing off some brake fluid from the reservoir.

Installation

- If required, use piston retracting tool to push piston back into home position.

- Clean seating and guiding surface of the brake pads inside the caliper with some white spirits and a cylinder brush or special brush. **Make sure the dust seals of the brake pistons are not damaged.**

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- Insert **new damping plates or vibration dampers, respectively,** into the pistons. Since the damping plates and vibration dampers are protected by an adhesive sheet, this **protective sheet** must be pulled off before the pads are fitted.

- Fit brake pads. **Be sure to use the correct pad quality.**

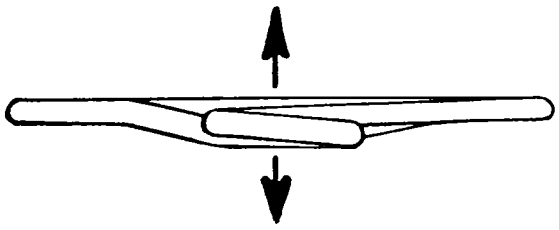
Note

The brake backing plates (back of brake pads) must not be greased. To prevent the brake pads from corroding in the brake caliper, apply a thin grease coat to the seating and guide surfaces.
Use Optimoly HT (Cu paste) or Plastilube (supplied by Messrs. Schillings, P.O. Box 1703, D-7080 Aalen) for this purpose.

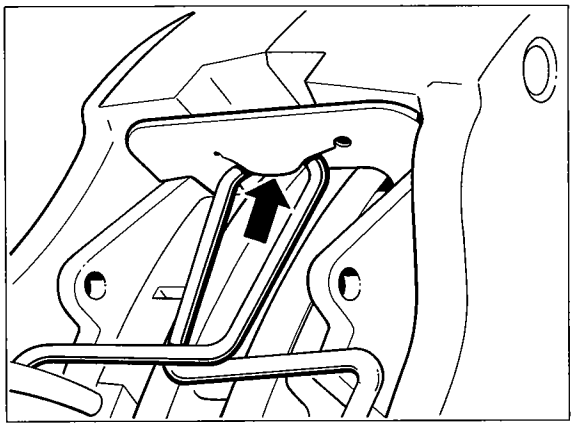
- Grease mounting eyelets of the spreader spring with Optimoly **TA** or Plastilube.

If required, fit a new spreader spring, making sure the flat side points towards the brake disc.
Make sure the spreader spring engages correctly (arrow). Do not force the spring into position as this may cause the retainer plate to be damaged.

Brake disc



Outside



1102-46

- Fit warning contact lead and warning contact. The spreader spring may have to be disengaged once again to allow the warning contact lead to be fitted.

- Actuate the brake pedal several times forcefully with the vehicle stationary to allow the brake pads to move to their normal operating position.
Then check brake fluid level and top up if required.

Running in the brake pads

New brake pads require a running-in period of approx. 200 kms (120 miles). It is only after this mileage that they reach optimum friction and deceleration values. Except for emergency situations, avoid hard braking from high speeds during this time.

Adjusting the brake pushrod

Note

Adjustment of the brake pushrod is only required in the following cases:

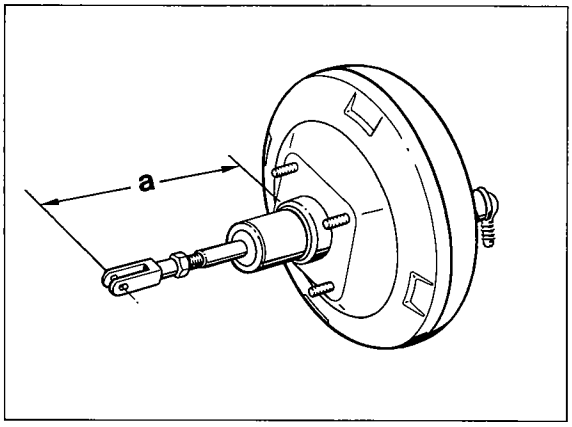
- when the brake booster is replaced
- if the clevis of the brake pushrod has been removed
- if the pushrod or the clevis has been rotated.

The brake pedal does not have a stop. As there is no resting position for the brake pedal if the brake pushrod is adjusted correctly, the correct built-in free play in the brake booster is provided for. If the brake pedal is actuated manually a pushrod play of **approx. 10 mm may be felt** at the pedal plate of the brake pedal.

Readjusting the pushrod at the joint clevis causes the position of the brake pedal to be changed. The adjustment of the stop light switch must then be checked as well.

Adjusting

1. Adjust length of brake pushrod by turning the clevis. The length (dimension a) must be 207 + 1 mm when measured from the contact surface of the booster on the spacer (mounting flange) to the center of the clevis pin.



1103-46

2. Tighten lock nut.

3. Check adjustment of stop light switch again (refer to page 46-6).

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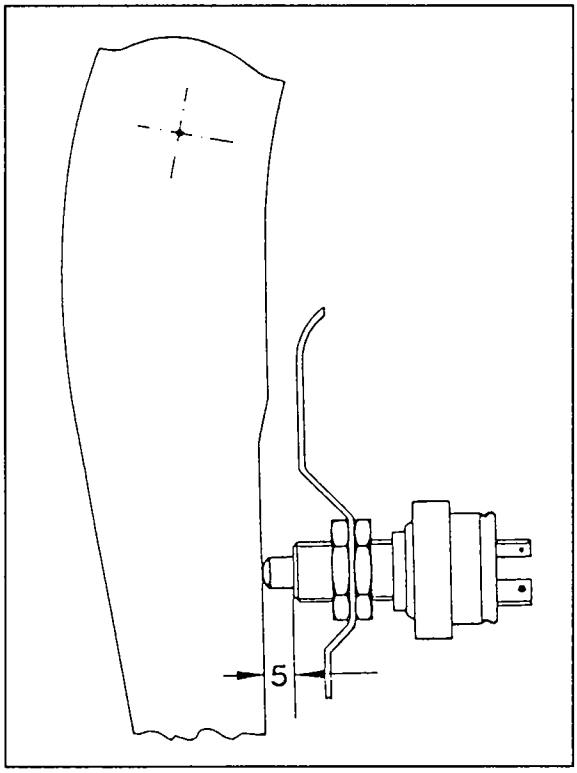
Checking stop light switch adjustment

A mechanically operated stop light switch fitted to a bracket above the brake pedal plate is used.

With the brake pedal in home position (pedal not depressed), the distance from the stop light switch to the brake pedal must be **5 mm**. If required, change position of the stop light switch by turning the mounting nuts until the specified **5 mm** are reached. Lock mounting nuts against each other.



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Checking and adjusting the parking brake

Checking the free travel of the parking brake lever

The parking brake is fitted with asbestos-free brake pads. As a rule, a parking brake fitted with asbestos-free pads must never be adjusted in such a manner that the pads must "grind themselves free" during operation.

If the parking brake lever can be pulled up more than 4 notches at average operating force without braking action being noticeable the parking brake must be readjusted.

Adjusting the parking brake

1. Remove rear wheels.

2. Release parking brake and push back rear disc brake pads until the brake disc can rotate freely.

3. If required, undo adjusting nut at the tension jack of the parking brake lever until the tension is released from the cable.

4. Engage a screwdriver across the bore in the brake disc to reset the adjuster until the wheel cannot be rotated anymore. Then turn back the adjuster until the wheel turns freely again, and follow this by turning back (loosening) the adjuster by 2 more notches. Repeat adjustment process on the other wheel.

5. Tighten parking brake lever by 2 notches and turn adjusting nut on the tension jack until both wheels can hardly be rotated manually anymore.

6. Release parking brake lever and check if both wheels now rotate freely.

7. Lock adjusting nut at tension jack.

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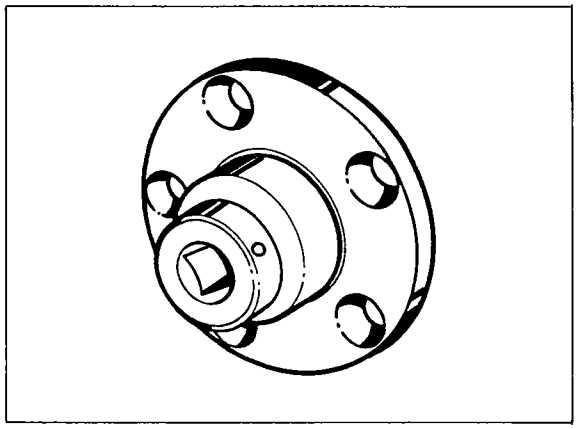
Checking brake disc lateral runout

1. Measuring requirements: No tilt play present at wheel. If required, adjust wheel bearing clearance of front wheels.

2. Fit adapter plate (Special Tool 9510/1) **to wheel hub**. Tightening torque of wheel nuts (mounting nuts): 130 Nm (96 ftlb).



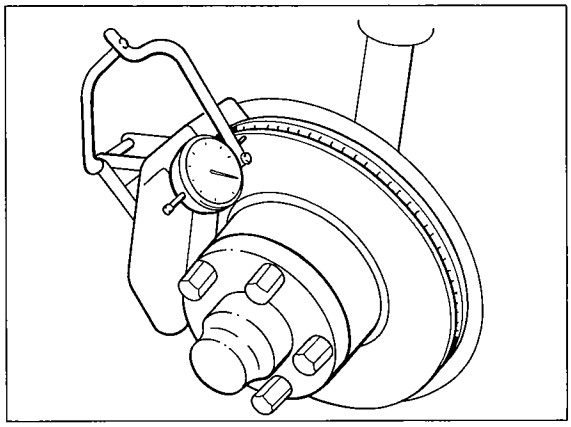
1035 - 46

3. Engage dial gauge holder, e.g. Ate Part No. 03.9314-5500.3/01, into brake caliper, determine center position and fit by turning the wing screw.
   If the brake disc cannot rotate freely, bush back brake pads slightly.
   Take care not to damage the tab for the spreader spring on the retainer plate of the four-piston fixed calipers when fitting the dial gauge holder.

Note

If required, fit dial gauge holder with Ate conversion kit, Part No. 03.9314-5510.3/01 (longer wing screw and bracket for dial gauge if required).

4. Fit dial gauge with a slight preload. Place measuring pointer on maximum diameter of braking surface.



1036 - 46

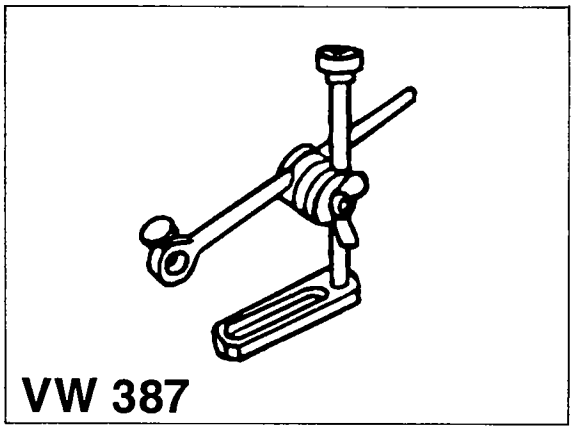
5. Rotate brake disc and read off runout on dial gauge.
   Max. permissible lateral runout of fitted brake disc **max. 0.1 mm.**

Note

Lateral runout of removed brake disc : max. 0.05 mm.
Lateral runout of wheel hub : max. 0.05 mm.

6. If the brake disc runout exceeds 0,1 mm, remove the brake disc and check lateral runout of the wheel hub. Mark position of disc with regard to wheel hub.

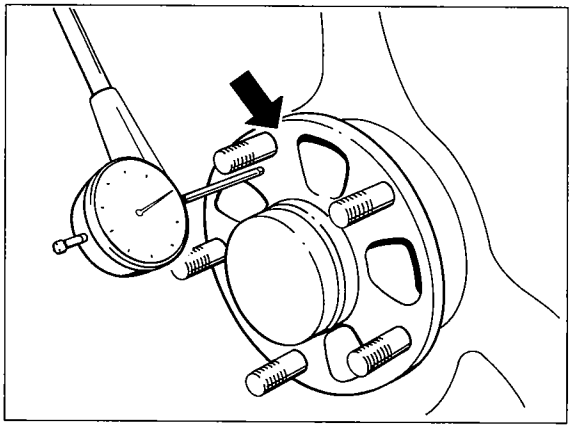
7. Check wheel hub runout as follows:
   Measure once outside (arrow) and once within wheel stud area of hub face. Lift off dial gauge carefully in cutout area of hub. To fit the dial gauge, use either a magnetic universal dial gauge holder or the dial gauge holder VW 387.



1039 - 46

Note

Make sure the brake hoses and brake pipes are not damaged when the brake caliper is removed and installed.



1038 - 46

8. **Excessive lateral runout of wheel hub:**
   Replace wheel hub.
   Lateral runout of wheel hub o.k.:
   Clean leveling and centering surfaces of brake disc and wheel hub. Then coat centering surfaces of wheel hub with a thin coat of Optimoly TA.
   Fit brake disc to wheel hub in another position, offset radially with regard to wheel hub. Repeat measurements with fitted adapter plate - Special Tool 9510/1.
   If the lateral runout is still in excess of 0.1 mm, the brake pad must be replaced.

Note

If the brake disc runout has been reduced by offsetting the brake disc radially with regard to the wheel hub, one 6 mm screw may be omitted if two 6 mm countersunk screws had been fitted.

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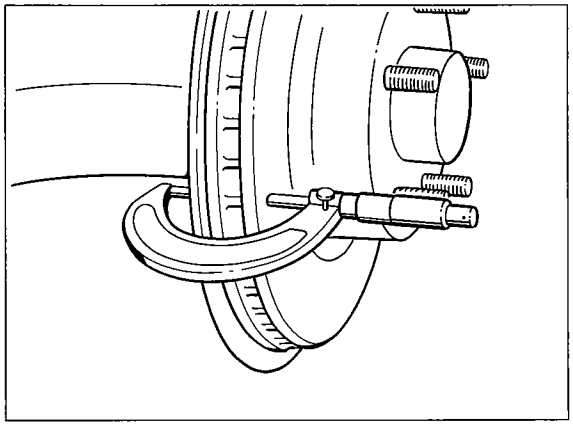
Checking brake disc thickness

Measure brake disc thickness in approx. 8 places within the braking surface using a micrometer.



1040 - 46

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Checking dimensions for body repairs

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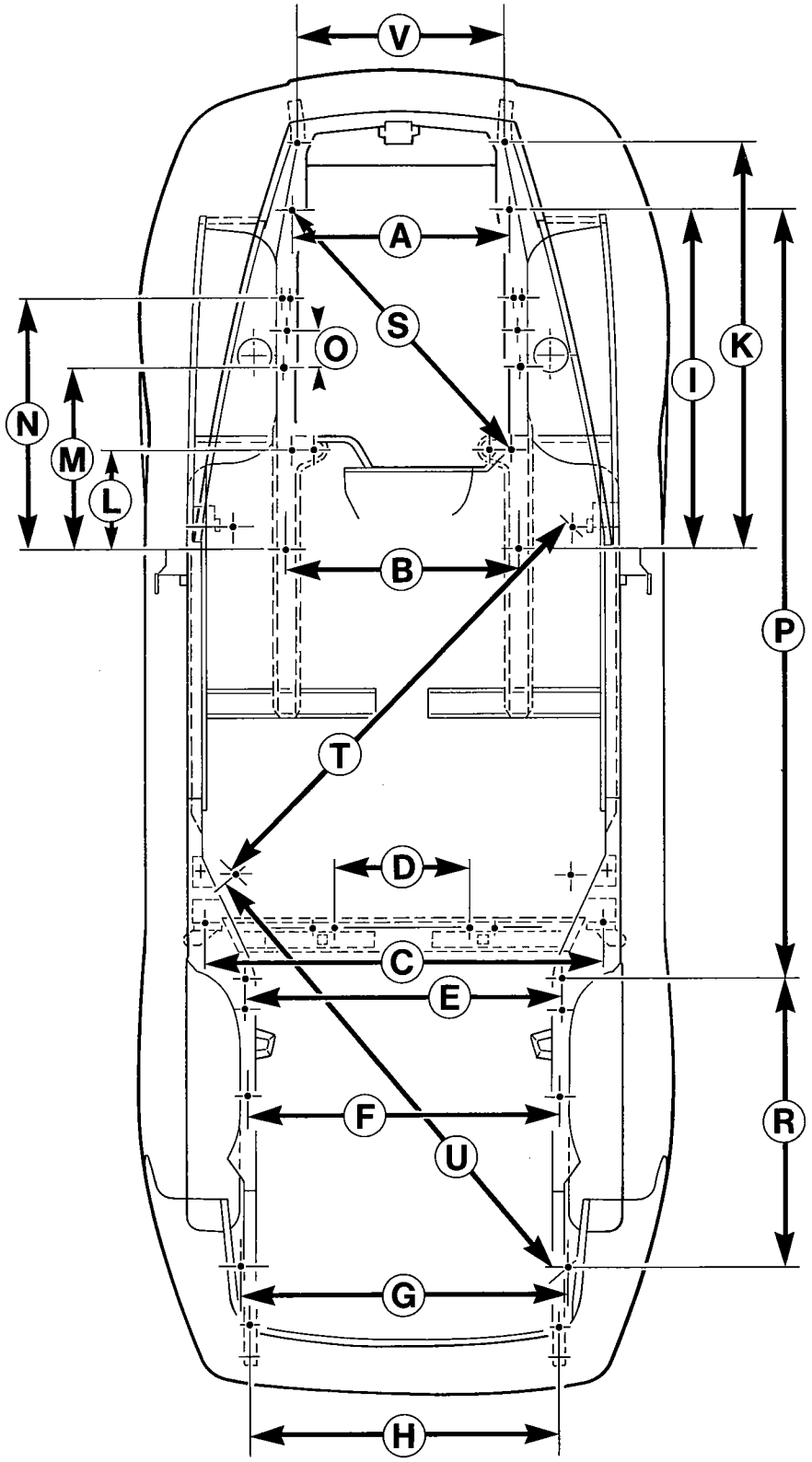
Floor assembly dimensions



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Floor assembly dimensions

Distance	Description	mm
A	Front side member take-up hole	710 ±1
B	Center side member take-up hole	758 ±1
C	Rear axle take-ups	1300 ±2
D	Strengthening member take-ups	380 ±2
E	Rear axle take-ups	1032 ±2
F	Transmission support take-ups	1014 ±2
G	Rear side member take-up hole	1060 ±2
H	Rear impact pipe/impact absorber take-up	1003 ±2
I	Side member take-up hole - front side member take-up hole	(1117 ± 5) 1137 ± 5
K	Side member take-up hole - front edge of side member	(1340 ± 5) 1370 ± 5
L	Side member take-up hole - control arm take-up	330 ±3
M	Side member take-up hole - rear cross member bolt	599 ±3
N	Side member take-up hole - stabilizer bar bolts	831 ±3
O	Rear cross member bolt - front cross member bolt	120 ±3
P	Front side member take-up hole - rear axle take-up	2515 ±3
R	Rear axle take-up - side member take-up hole	886 ±3
S	Side member take-up hole - outer side member take-up	1076 ±5
T	Front floor panel take-up hole - rear floor panel take-up hole	1581 ±5
U	Rear floor panel take-up hole - rear side member take-up hole	1636 ±3
V	Front impact pipe/impact absorber take-up	686 ±3

All distances are measured to the center of the respective holes

Note

The distances are measured directly, hence they give oblique dimensions. The distances in brackets are measured in a horizontal plane.

Caution!

For length measurements, the left-to-right deviation must not exceed the tolerance specified.

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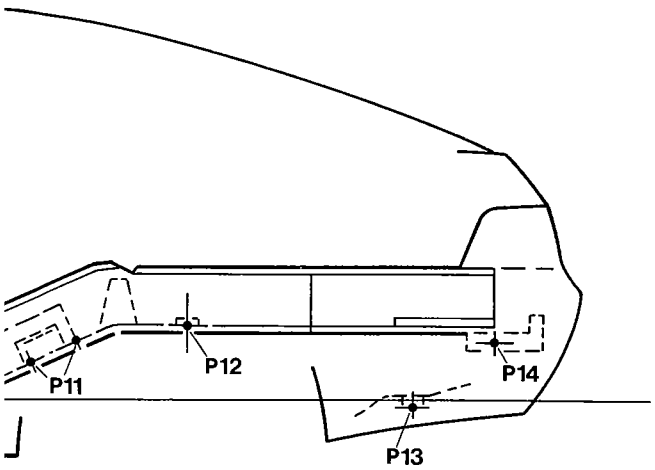
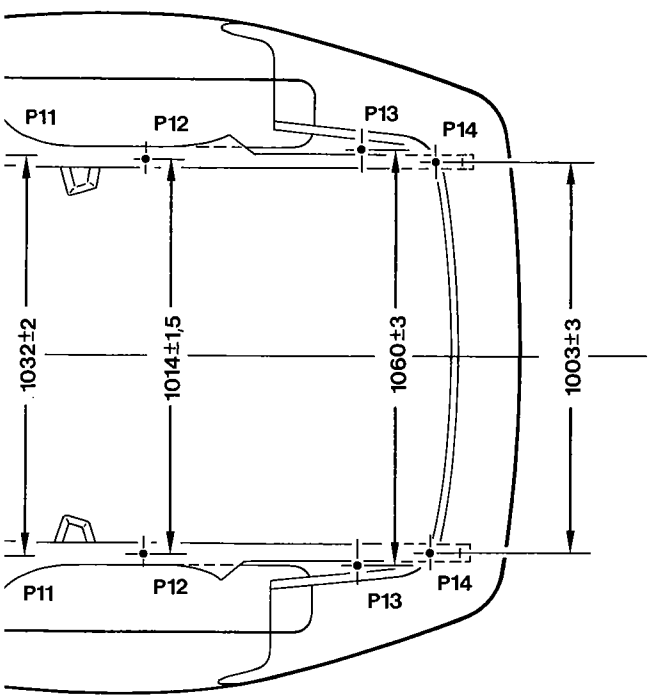


50 - 1034

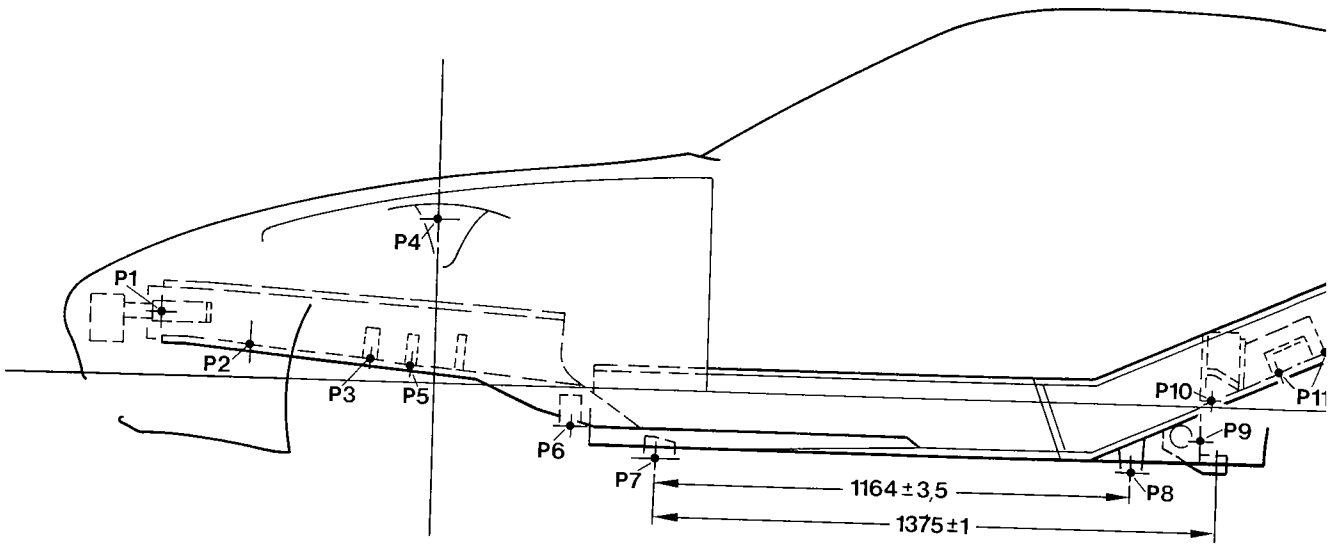


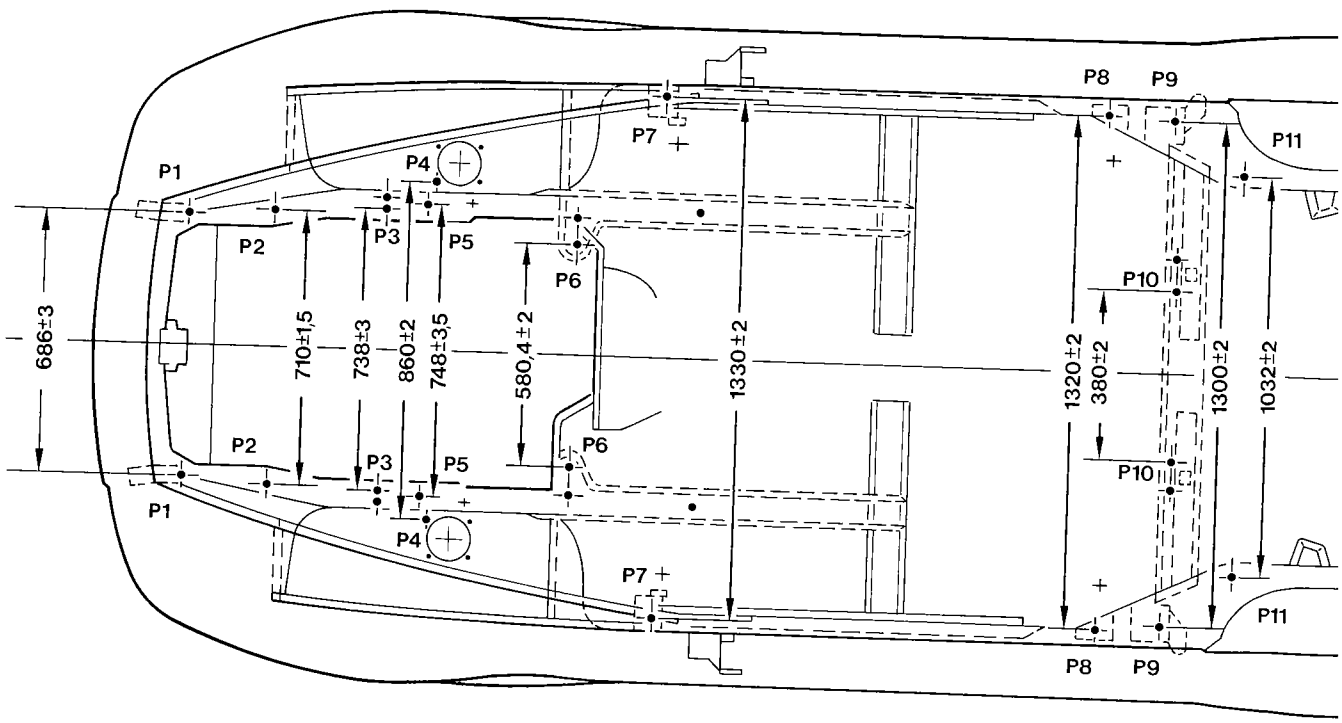
50 - 1033

Pt.LH/RH	Designation
1	Center impact pipe/absorber front
2	Front side member take-up hole
3	Stabilizer bar take-up, FA
4	Spring strut take-up, FA
5	Cross member take-up, FA
6	Control arm take-up, FA
7	Platform lift take-up, Car jack, front
8	Platform lift take-up, Car jack, rear
9	Bearing flange take-up, RA
10	Strengthening member take-up
11	Bearing flange take-up, RA
12	Transmission support take-up
13	Rear side member take-up hole
14	Center impact pipe/absorber rear

FA = Front axle
RA = Rear axle

Body dimensions





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Checking dimensions for body repairs – Cabriolet

Additions and deviations from the body dimensions valid for the Coupe body

Note

All distances have been measured directly (oblique dimensions).

All dimensions are measured to the center of the respective holes!

Caution!

For length measurements, the left-to-right deviation must not exceed the tolerance specified!

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Checking dimensions for body repairs – Cabriolet

Distance	Description	mm
A	Windshield frame left corner to right corner	1245 ± 3
B	Front screw locations of convertible supports	1442 ± 3
C	Rear screw locations of side panels	1328 ± 3
D	Windscreen wiper fitting hole – Windshield corner	985 ± 2
E	Windshield frame corner diagonally to front screw location of convertible support	1502 ± 3
F	Front screw location of convertible support diagonally to rear screw location of side panel	1763 ± 3
G	Front screw location of convertible support to take-up hole of rear center of lock cylinder	1555 ± 3
H	Front screw location of convertible support to rear screw location of side panel	1094 ± 3
I	Corner of windshield frame vertically to spotweld flange of sill (measured without cover molding)	790 ± 2
K	Corner of windshield frame to front screw location of convertible top support	685 ± 2
L	B-pillar top to convertible support	26 ± 1
M	B-pillar top parallel to spotweld flange of sill	470 ± 2
N	From level 0 to tunnel bracket mounting point	790 ± 2
O	Inner mounting points of tunnel bracket	418 ± 2
P	Outer mounting points of tunnel bracket	638 ± 2
Q	From level 0 to center of spring strut tower	27 ± 1

All dimensions are measured to the center of the respective holes!

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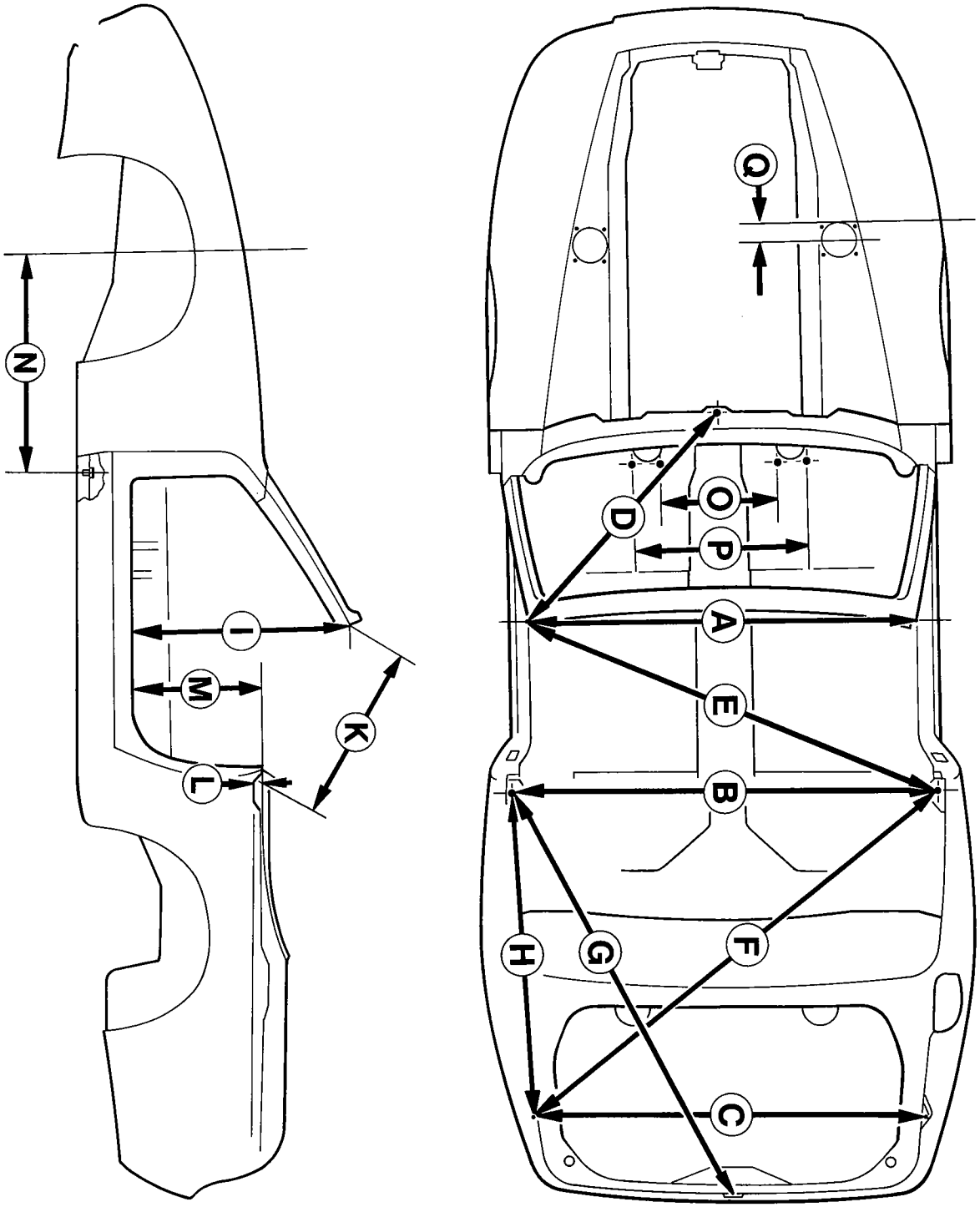
Checking dimensions for body repairs – Cabriolet



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Safety Precautions for Working on Cars with Airbag

Airbag units are pyrotechnical items of Danger Class T 1. Handling, transportation and stor-age are subjected to the legislation for explo-sives.

The mentioned legislative measures refer to the Federal Republic of Germany. Always conform with the pertinent legislation in other countries.

The beginning of work on pyrotechnical items must be reported to the Trade Supervisory Office (official authorities) 14 days in advance.

Shipping

The shipment of airbag units may only take place in the officially approved packaging for transportation. Airbag units may not be transported together with other dangerous items.

Within a company transportation is only permitted in the trunk or cargo room of a vehicle with use of the above mentioned packaging for transportation. Transportation in the passenger compartment is forbidden.

Storage

Storage of airbag units must be in conformance with the second ordinance of the legisation for explosives. According to this ordinance small amounts of substances and items may be stored at certain locations without a special storage permit. For pyrotechnical items of Danger Class T 1 this would be max. 20 kg (gross) in a workroom or max. 200 kg (gross) in a storeroom. Airbag units must be stored locked.

When storing airbag units it is very important to make sure that the padded sides face up (danger of injury from an ejected airbag unit in case of accidental ignition).

Airbag units may not be stored together with other products in danger classification (paint, etc.).

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Installation and Repairs

Testing and installing may only be carried out by qualified personnel.

The following precautionary measures are always mandatory prior to working on the airbag system as well as work on neighboring parts, where there is danger that power supplying parts could get too close to the airbag system.
1. Turn off ignition
2. Disconnect and cover battery ground pole.

After disconnecting the battery installation or repairs on the vehicle with use of a hammer or similar tools may first be begun after **waiting 20 minutes**. This is necessary to interrupt power supply of the airbag system and to guarantee that accidental ignition is not possible.

Installation of airbag units must commence immediately after removal from the location of storage. Under no circumstances may they be left unattended. Airbag units must be placed under lock immediately when installing procedures are interrupted.

Airbag units must never have contact with grease, oil, cleaning solutions or similar products.

Airbag units must never be subjected to temperatures above 90° C (195° F), not even briefly.

Airbag units, crash sensors and control units, which have fallen from a height of more than 0.5 meter (1.5 feet), may no longer be installed.

Additional trim, labels or anything similar may not be installed on the steering wheel or in the area of the front passenger's airbag.

No modifications or changes may be made on the wiring and components of the airbag system.

The battery must always be disconnected before beginning with straightening and welding work with use of an electric welder.

If welding is required in the immediate vicinity of crash sensors and control, these parts must be removed first.

Electric leads of other electrical equipment items may not be routed in the vicinity of the airbag wire harness.

Airbag components may never be repaired; they must always be replaced.

Note

Hands must always be washed thoroughly after touching triggered airbag units.

Scrapping Airbag Units

Non-ignited airbag units are a source of danger, even for the environment. Non-ignited airbag units may not be scrapped. They must be sent to Porsche or a responsible importer (see page 68 - 61).

Shipment of airbag units is permitted only in the officially approved packaging for transportation.

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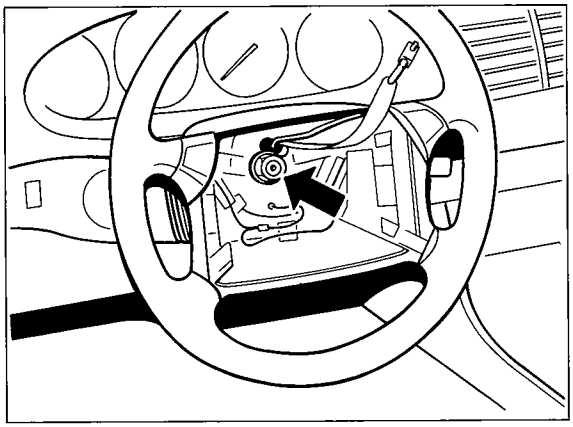
Removing and Installing Airbag Steering Wheel

Removing

1. Disconnect battery and cover pole or battery.

2. Remove driver's airbag unit (see page 68 - 54).

3. Unscrew and remove hexagon nut with the spring washer.



1019A-68

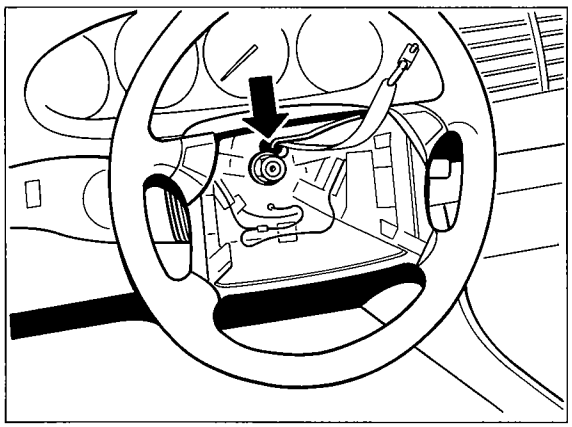
4. Mark position of steering wheel to steering shaft for reinstallation.

Installing

1. Mount steering wheel in straight ahead position of the road wheels or according to the removal marks in such a manner, that the upper steering wheel spokes are horizontal.

Note

Steering wheel must be mounted in such a manner that electric leads of the contact unit are not pinched.



1019B-68

2. Install hexagon nut with spring washer and tighten with **45 Nm** (32.5 ft. lbs.).

3. Install driver's airbag unit.

4. Check function of horn.

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Removing and Installing Airbag Components

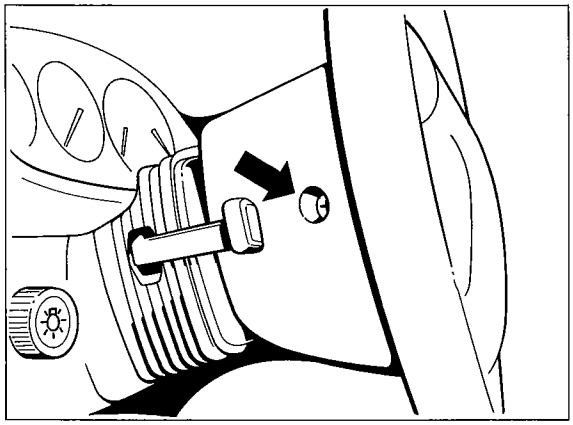
Removing and Installing Driver's Airbag Unit

1. Disconnect battery and cover pole or battery.

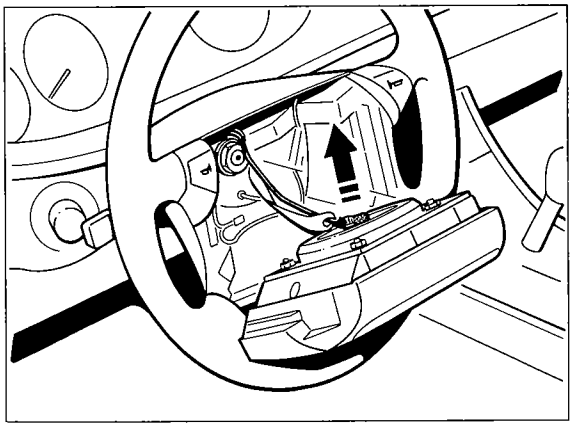
2. Unscrew two mounting screws with a Torx T 30 screwdriver socket.

Note

Screws must be replaced each time they are loosened.

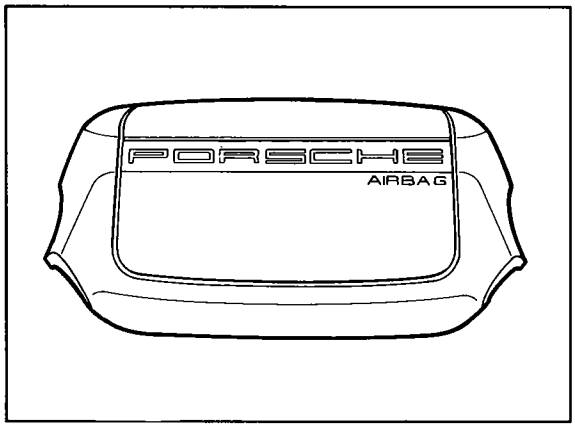


3. Disconnect plug.



Note

The airbag unit must always be laid aside in such a manner that the padded side faces up.



275-68

Airbag units must be placed under lock when removed for a long time. Confrom with the safety precautions.

Tightening torque for mounting screws: 10 Nm (7 ft. lbs.).

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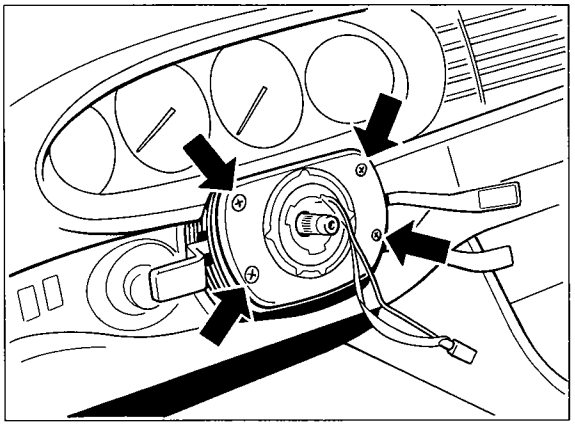
Removing and installing contact unit

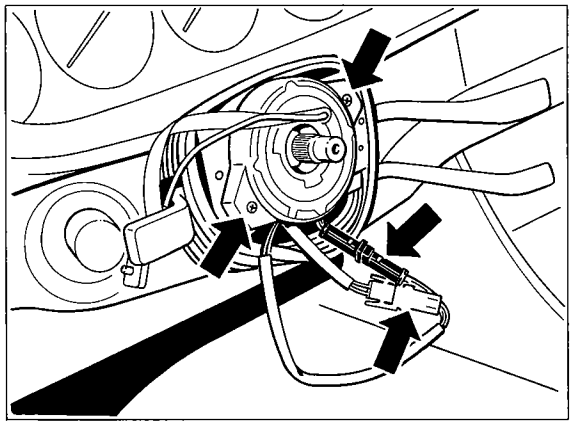
1. Remove airbag steering wheel (refer to page 68 - 53).

2. Undo and lift out cover.



277-68

3. Disconnect plug connectors.

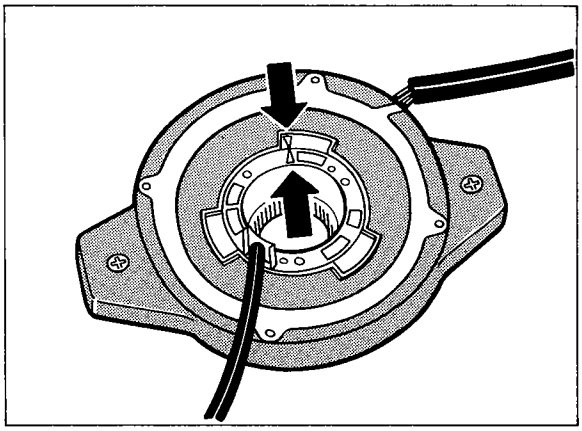


1023-68

4. Undo mounting screws

Note

Before fitting the contact unit, align front wheels to straight-ahead position and place contact unit in center position (approx. 4 1/2 turns from left-hand or right-hand end stop). The precise center position is indicated by two arrows.



280-68

New contact units are locked in the center position. The lock is not removed until the contact unit has been fitted.

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Removing and installing front impact sensors

Note

The front impact sensors are placed high up on the left and right wheel house walls in the driver and passenger footwells.

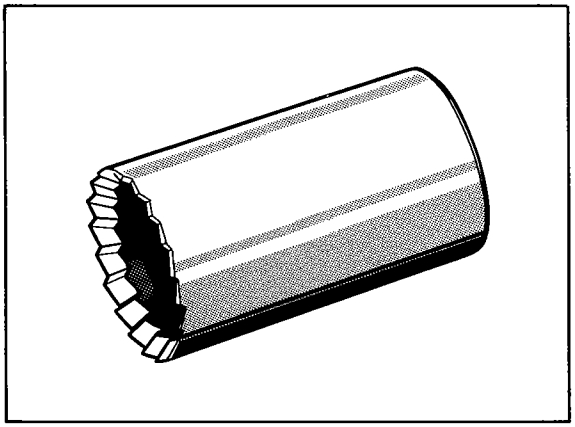
The installation position is determined by the mounting.

1. Disconnect battery and cover terminal or battery, respectively.

2. Remove control unit for cruise control and disconnect connectors T 19 and T 28 (for left-hand front sensor only).

3. Disconnect connector for front impact sensor.

4. Undo shear-off nuts using Special Tool 9259.



281-68

Special Tool 9259

Note

To tighten the shear-off nuts, use 1/4 inch Allen key.

The mounting locations at the body must be cleaned down to the bare metal.

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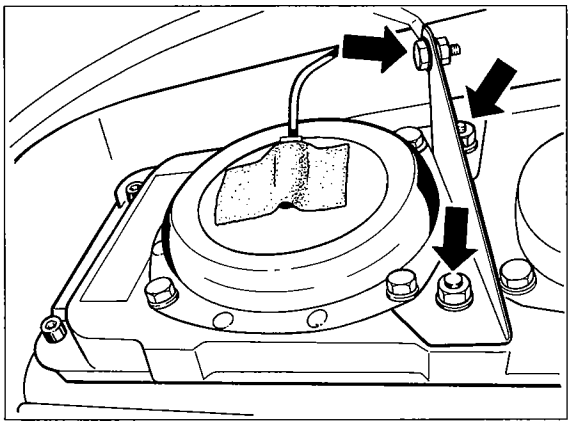
Removing and installing airbag unit on passenger side

1. Disconnect battery and cover terminal or battery, respectively.
2. Remove glove box.
3. Remove air duct hose.
4. Pull off insulating strips from connectors.
5. Disconnect the plug connectors from the unit.
6. Undo mounting screw and nuts of holder.
   Tightening torque: 13 Nm (10 ftlb)

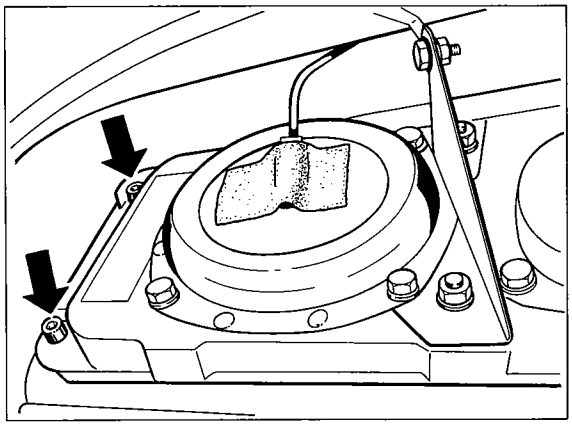


1026A-68

Note

The screw has a microencapsulated coating.
Use new screw for fitting.

7. Undo hexagon socket head screws (4 pc.).



1026B-68

Tightening torque: 6 Nm (5 ftlb)

Note

The screws have a microencapsulated coating. Use new screws for fitting.

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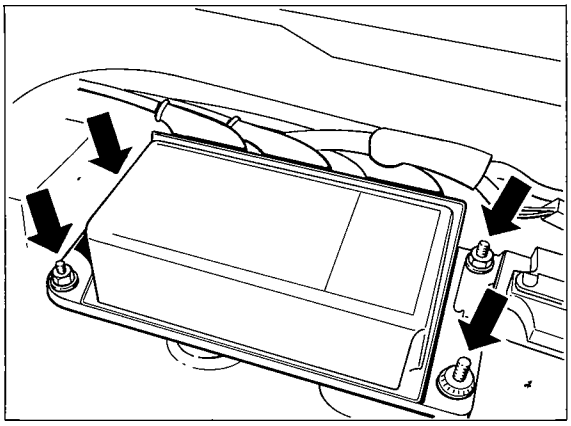
Removing and installing control unit

Note

The control unit is fitted on the passenger side ahead of the glove box.

1. Disconnect battery and cover terminal or battery, respectively.

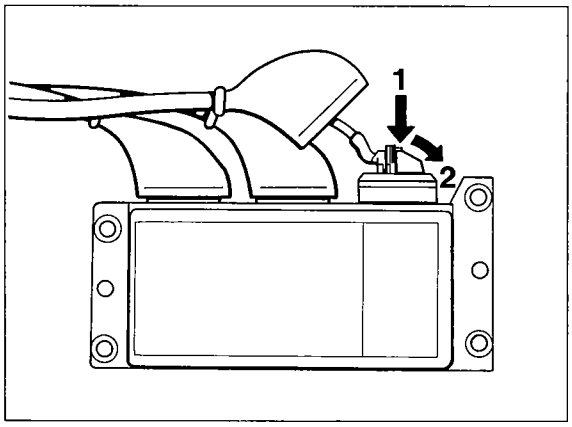
2. Undo shear-off nuts (2 pc.) with Special Tool 9259.



1024-68

3. Undo hexagon head nuts (2 pc.) with socket wrench.

4. Push back rubber grommets and release connector latch.



1025-68

5. Disengage connector.

Note

The mounting locations at the body must be cleaned down to the bare metal. To tighten the shear-off nuts, use a 1/4 inch Allen key.

Fit shear-off nuts diagonally.
The shear-off nuts are fitted without washers.
The M 6 hexagon head nuts are used with A 6.4 DIN 125 washers.

Tightening torque of M 6 nuts: 10 Nm (7 ftlb)

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Removing and installing wiring harness.

1. Disconnect battery and cover terminal or battery, respectively.

2. Remove fresh-air fan (for access to wiring harness).

3. Remove control unit and disconnect connectors for control unit
(refer to page 68 - 58).

4. Disconnect connectors:

– LH front sensor (next to Centr. Electr. Syst.)

– Contact unit (below dashboard)

– RH front sensor (next to control unit)

– 2-pin and 6-pin connector
(in front of control unit)

Note

The safety bracket (orange) of the 6-pin connector is destroyed during dismantling. When fitting the assembly, lock the connector with a new safety bracket (blue).

5. Disconnect wiring connection along wiring harness.

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Checking Airbag System Operation

1. **Functional check of airbag warning lamp.**
   Turn on ignition. The airbag warning lamp must light up for approx. 5 seconds. If the warning lamp remains dim, check bulb and/or supply voltage.

2. **Functional check of error memory.**
   Turn on ignition and pull off fuse for instrument voltage supply for approx. 30 seconds. The airbag warning lamp must indicate an error.
   Read off error and check if error code 30 (airbag warning lamp: signal implausible error not present) is displayed.

Note

The central warning lamp must light along with the airbag warning lamp if an error is stored in the error memory.

3. Erase error memory.

4. Make sure that no covers, decals or similar items are fitted at the steering wheel and in the passenger airbag area.

5. Check components visually for damage and modifications.

6. After checking the system, confirm the check in the appropriate fields of the warranty and service booklet.

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Correct disposal of airbag units

Airbag units are pyrotechnic objects and can represent an environmental hazard on account of their character as explosion-risk bodies and because of the materials they contain. For this reason, airbag units which have not yet been ignited, or complete vehicles containing such units must not be treated as "normal" waste or disposed of on any other final refuse dumps.
To avoid possible misues, the airbag units must first be rendered harmless by electrical ignition, making sure that all the relevant precautions are complied with
In the case of airbag units incapable of igniting or if ignition cannot be carried out in safety, the airbag units must in all cases be returned to Porsche or to the relevant importer in their original spare part packs and by the usual transport channels.

Note

Any specific local or national regulations or legal verdicts which go beyond these instructions must be complied and given preference over these instructions.

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Safety measures

- Ignition and preparation should only be carried out by properky qualified personnel under the supervision of a second, responsible person.
- All other generally applicable accident prevention regulations must be complied with.
- Only ignite airbag units which are in original condition and properly installed.
- Ignite airbag units only in suitable open spaces.
- Use only the ignition equipment specifically intended for the purpose.
- First remove all loose objects from the airbag expansion area.
- Anyone likely to be affected should be warned about the noise in advance.
- Use the whole length of the ignition device's cable in order to maintain a safe distance from the airbag unit which is to be ignited.
- Do not connect the ignition device to the power source until everything else is ready.
- Position yourself and anyone else involved in front of the vehicle.
- Ignite the airbag unir with the vehicle's doors closed but the tailgate/trunk lid or side windows open.
- If ignition fails to occur, do not approach the vehicle until approx. 3 minutes have elapsed.
- Allow airbag units to cool down after ignition and observe them carefully.
- Avoid skin contact with airbag units which have been ignited.

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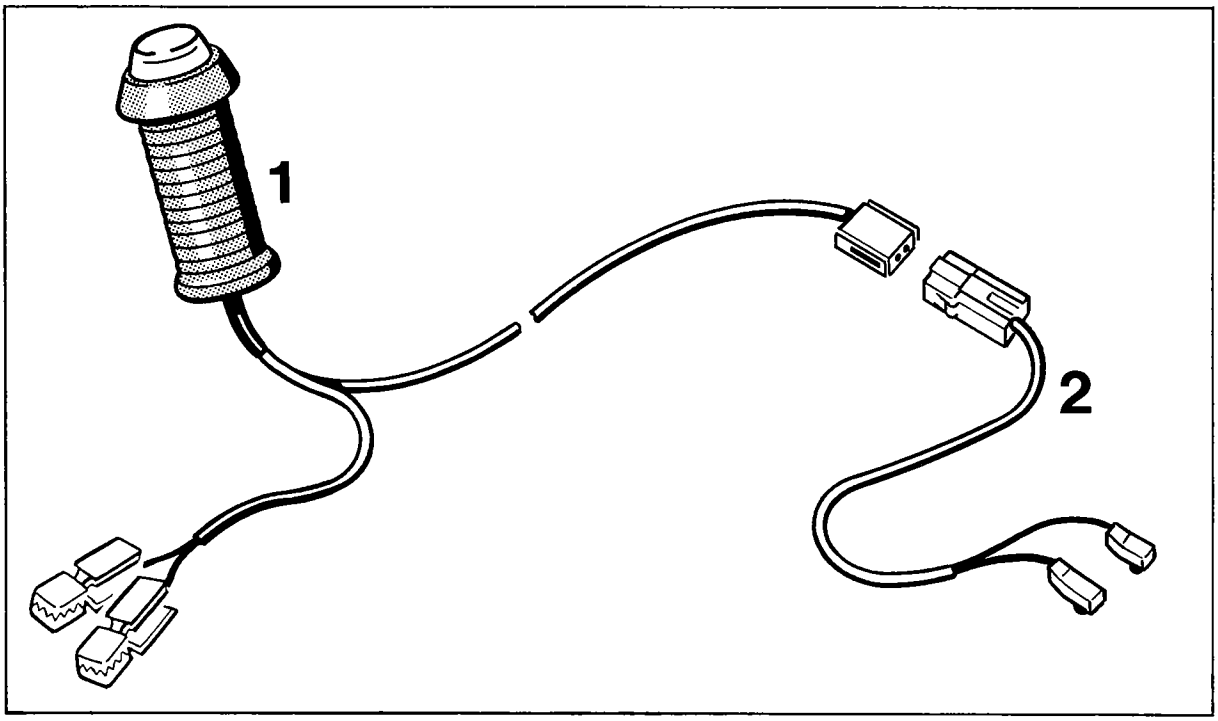
Tools



579-68

No.	Designation	Special tool	Order number	Explanation
1	Ignition device	9257*	000.721.925.70	
2	Ignition cable	9257/1*	000.721.925.71	Non-reusable part

* Order as required

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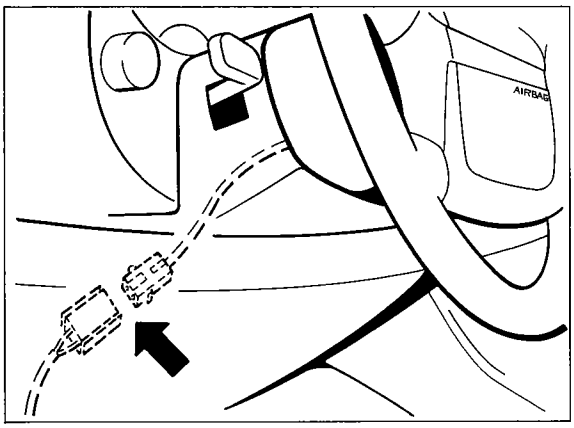
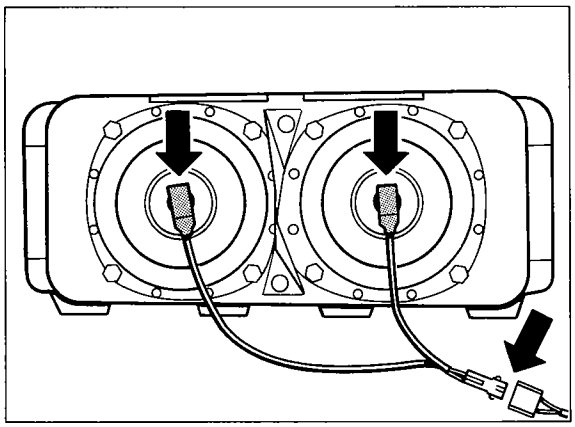
Connecting the ignition device

Driver's side



Direct to 2-pin plug of contact unit (below steering column).

Passenger's side



With ignition cable to both gas generators.

Run the ignition device out through the door gap to a point in front of the vehicle.

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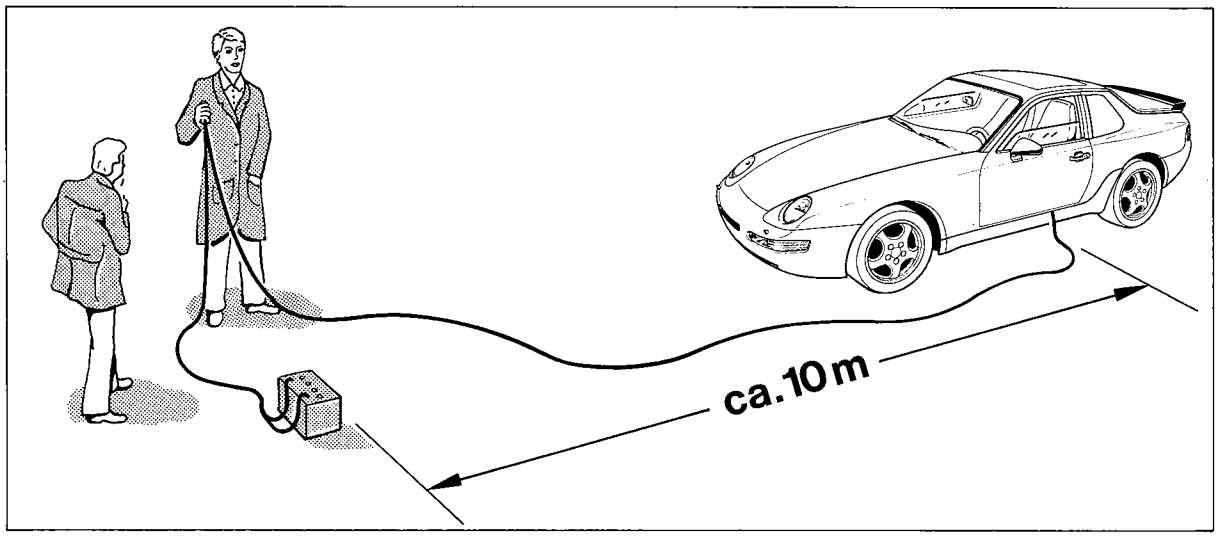
Ignition



582d-68

Connect the ignition device to a car battery and operate the switch.

Note

The driver's side and passenger's side airbag units must be ignited separately.

After igniting the passenger's side airbag unit, check that both gas generators have ignited (can be identified by both ignition cable plugs having melted).

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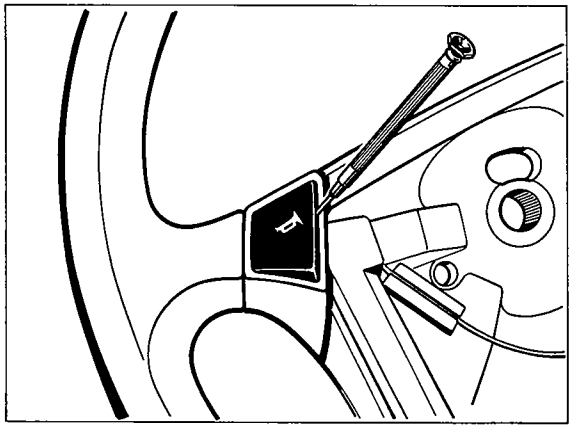
Repairing horn buttons on airbag steering wheel

Removal

1. Remove airbag steering wheel (refer to page 68-53).

2. Lever out horn button with a small screwdriver.



718-68

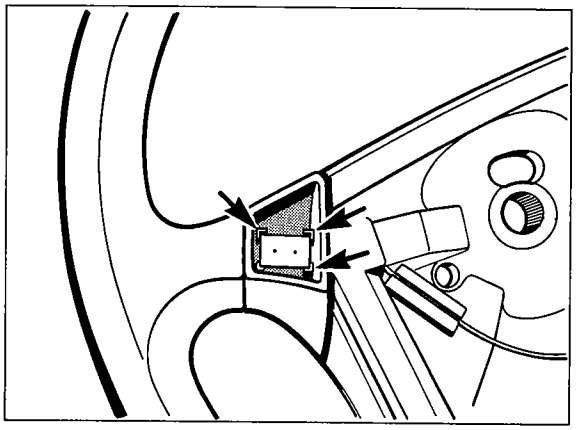
3. Take out contact spring.

Installation

Note

The silver contact in the middle of the contact spring must point downwards.

4. Insert contact spring into the guides.



719-68

5. Engage horn button starting with the upper retaining lug, then press all the way in.

Note

Make sure all retaining lugs engage properly. When actuated, the horn button must spring back into its initial position lightly.

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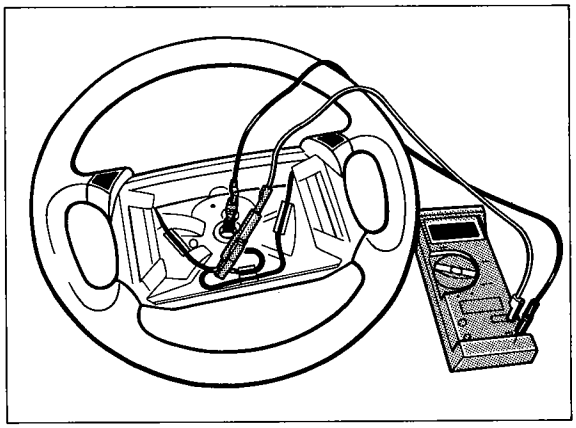
Checking operation of the horn buttons.

6. Connect ohmmeter to the connector and to the steering wheel housing.



720-68

Display: ∞ Ω

Press horn buttons one after another.

Display: 0 - 5 Ω

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Diagnosis / Troubleshooting Airbag

The airbag system is continuously monitored by a diagnosis unit in the control unit. If a fault occurs, it is indicated by a script in the instrument cluster.

In the event of a fault, the cental warning light and this script come on.

The airbag script comes on for approx. 5 seconds when the ignition is switched on, and then goes out.

Should the warning lamp come on again later, this indicates a fault in the airbag system. The fault can be read out with System Tester 9288.

Note

The control unit needs approx. 70 seconds to identify all faults in the system, and the ignition must therefore be switched on for at least this time to ensure that all poosible sources of defects can be checked.

After a fault in the airbag system has been identified and rectified, **the fault memory must be erased.**

If any components are exchanged, this must be noted in the warranty and maintenance booklet. The document number should be attached in the free space provided. The document number is shown on an adhesive label which can be torn off the spare part.

Following an accident in which the airbag system was activated, the following components must be removed and replaced:

- control unit
- both front impact sensors
- contact unit
- both airbag units

If non-activated airbag units have to be removed, they must be ignited electrically before being disposed of (see page 68 - 61).

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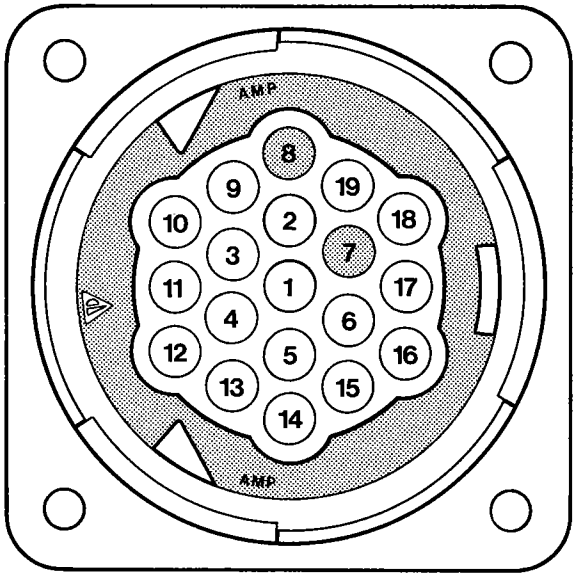
Accessing the menu items

Refer to Repair Group 03

If the airbag control unit is not displayed by the tester, check the following items:

- 2-pin connector T 42 (in airbag control unit area)
- K and L wires from control unit to diagnosis socket (continuity check)
- If no diagnosis is possible, the following items must be checked:
- **L wire**: The voltage at pin 7 of the diagnosis socket must be > 8 V when the ignition is switched on.
- **K wire**: The voltage at pin 8 of the diagnosis socket must be > 8 V when the ignition is switched on.



Assignment:

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

Possible fault causes if voltage is < 8 volts

- Short to ground or open circuit of wiring
- A defective, diagnosable control unit connected to the above wires
- Tester defective
- Voltage supply at diagnosis connector is missing

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Before troubleshooting can be carried out correctly, the person concerned must be

- familiar with the component locations and the function and technical relationship of the systems to be checked (Model Information)
- be able to read and evaluate Porsche circuit diagrams
- understand the function of the electrical circuits and relays
- be capable of operating and assessing the information supplied by the test gear.

Important:

If the tester display indicates that a component is defective, the fault may not necessarily be found in the component indicated but may be in the associated control unit or the connecting circuits (electrical paths) between the component and the control unit. Before the fault memory has been read out, no troubleshooting involving the pulling off of plugs or similar is to be carried out, as this could also be stored as a fault in the memory.

Note

The fault code shows two types of fault:

– Fault still present

– Fault currently not present

Faults are stored as currently not present if they occur briefly while the ignition is switched on, but are no longer present when the ignition is switched off.

Faults still present are those which are permanent or remain present when the ignition is switched off.

Do not assume that the fault in the readout is actually present or clearly identifiable during the check.

A fault being memorized may for example be due to tampering with the airbag system wiring while the ignition was switched on.

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In the case of faults currently not present, it is also important to determine the cause of the fault in order to prevent it from recurring and to avoid replacing parts unnecessarily. Check the entire length of the airbag system wiring for damage (wires damaged or trapped).

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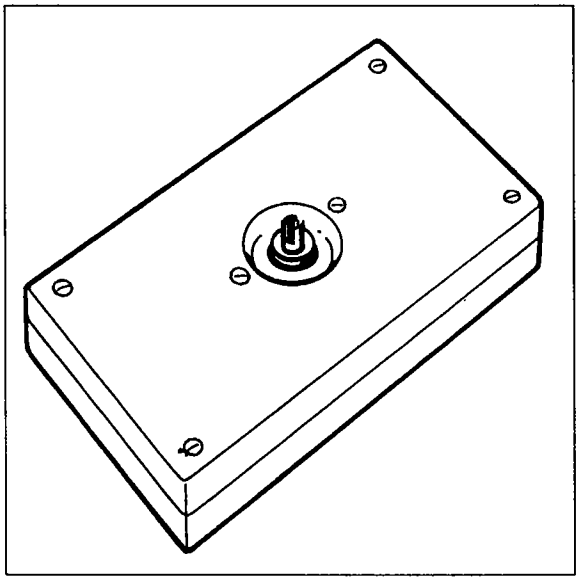
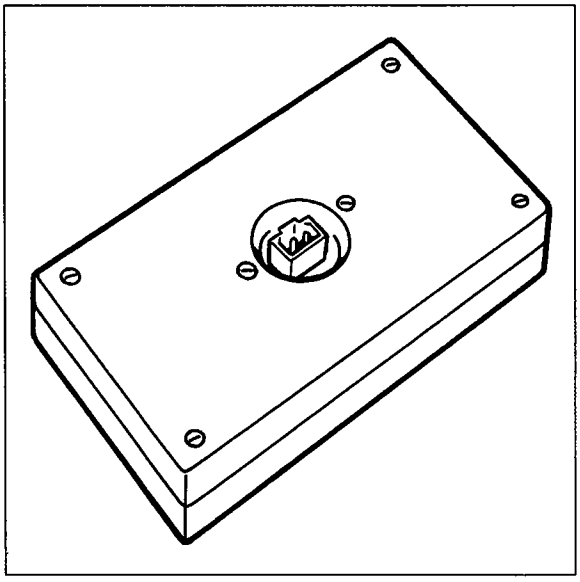
Tools



580-68

Special Tool 9516



561-68

Special Tool 9516/1

Special Tools 9516 and 9516/1 are used to check the ignition pill circuits.

If there is a fault in the ignition pill circuits, attach Special Tool 9516 in place of the airbag units, then erase the fault memory. Switch the ignition off and on again.

The fault can then be identified by means of the diagnosis unit in the airbag control unit.

If the warning light no longer indicates a fault, the airbag unit is defective and must be replaced.

If the warning light again indicates a fault, the control unit or the wiring are at fault.

A fault in ignition pill circuit 1 may also be caused by the contact unit. Disconnect the wiring harness from the contact unit and attach Special Tool 9516/1 in place of the contact unit. Erase the fault memory. Switch the ignition off and then on again. If the warning light no longer indicates a fault, the contact unit is defective; if the warning light again indicates a fault, the control unit or the wiring are at fault.

Note

For safety reasons, never drive the vehicle with the special tools installed in place of the airbag units.

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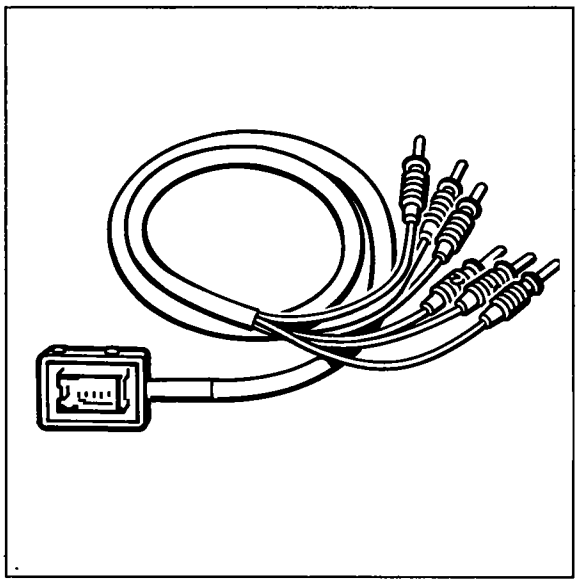

Special Tool 9541 1074-68

Special Tool 9541 is used to check the wiring of the airbag system. It is attached in place of the control unit. For safety reasons, the wiring to the ignition pills cannot be checked with this tool.

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1. Fault memory

Fault code table

Fault code	Designation of fault	
10	Ignition circuits	– closed once
		– closed several times
		– permanently closed
		– contact resistance to U_B
		– contact resistance to ground
		– coupled 1/3 or 2/3
11	Left front sensor	– resistance too high
12	Right front sensor	– resistance too high
21	Ignition pill circuit 1	– resistance too high / too low
22	Ignition pill circuit 2	– resistance too high / too low
23	Ignition pill circuit 3	– resistance too high / too low
30	Warning light airbag	– Signal implausible
31		– Control unit defective
40 to 47		– Control unit defective
50 to 54		– Control unit defective
60 to 62		– Control unit defective

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Fault, Fault Code	Possible Causes, Elimination, Remarks

Note

After an airbag system fault has been detected and rectified, the fault memory **must** be erased.

Test point 1

Ignition circuits
closed once
Fault code 10

- Replace both front impact sensors.
- Check wiring harness for squeezed sections or chafing and replace if required.

Test point 2

Ignition circuits
closed several times
Fault code 10

- Refer to test point 1.

Test point 3

Ignition circuits
closed permanently
Fault code 10

- Refer to test point 1.

Test point 4

Ignition circuits
Contact resistance
to U_B
Fault code 10

- Check wiring harness to front impact sensors and ignition pills for squeezed sections and chafing. Replace if required.
- Using Special Tool 9541, check wiring to front impact sensors for short to positive terminal, replace if required.
- Check front impact sensors for short to positive terminal.
- If no fault can be detected at the front impact sensors and at the wiring, the control unit must be replaced.

Test point 5

Ignition circuits
Contact resistance
to ground
Fault code 10

- Check wiring harness to front impact sensors and ignition pills for squeezed sections and chafing. Replace if required.
- Using Special Tool 9541, check wiring harness to front impact sensors for short to ground.
- Check front impact sensors for short to ground.
- If no fault can be detected at the front impact sensors and at the wiring harness, replace the control unit.

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Fault, Fault Code	Possible Causes, Elimination, Remarks
Test point 6 **Ignition circuits** Coupled 1/3 or 2/3 Fault code 10	– Check wiring harness and ignition pills for squeezed sections and chafing. Replace if required. – If no fault can be detected, replace control unit.
Test point 7 **Left front sensor** Resistance too high Fault code 11	– Using an ohmmeter, check front impact sensor at connector. 1. Ohmmeter to terminals 1 and 2 Display: 10 kΩ 2. Ohmmeter to terminals 2 and 3 Display: 0...0.5 Ω – Check control unit wiring to front impact sensor connector with Special Tool 9541 and ohmmeter Display: 0...0.5 Ω – If no fault is detected at the front impact sensor and at the wiring, replace control unit.
Test point 8 **Right front sensor** Resistance too high Fault code 12	– refer to test point 7.

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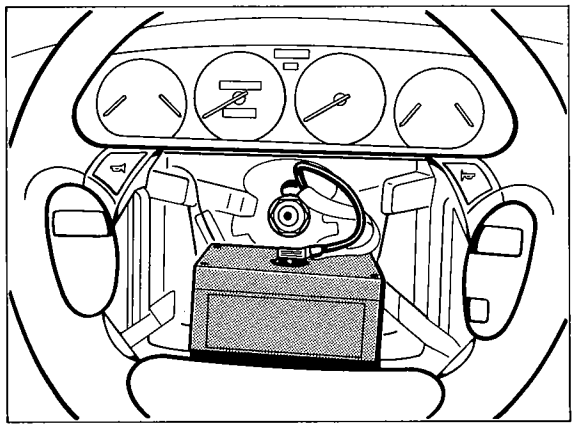
Fault, Fault Code	Possible Causes, Elimination, Remarks

Test point 9

Ignition pill circuit 1
Resistance too high / too low
Fault code 21

1. Remove driver airbag – unit.

2. Attach Special Tool 9516 in place of airbag unit.



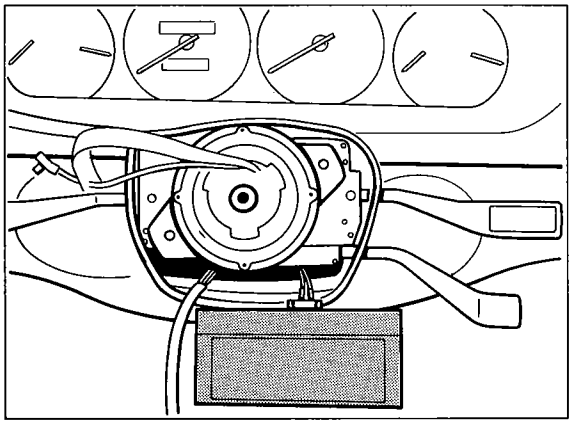
716-68

3. Erase fault memory.

4. Check if fault is still present.

   a) Replace airbag unit if the fault is no longer present.

   b) If the fault is still present, disconnect the contact unit wiring and attach Special Tool 9516/1.



717-68

5. Erase fault memory.

6. Check if fault is still present.

   a) Replace contact unit if the fault is no longer displayed.

   b) If the fault is still present, check wiring harness for squeezed sections and chafing. Replace if required.

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Fault, Fault Code	Possible Causes, Elimination, Remarks
	c) If no fault is detected in the wiring harness, replace the control unit.
Test point 10 **Ignition pill circuit 2** Resistance too high/too low Fault code 22	Note Ignition pill circuit 2 at the passenger side airbag is the leftmost of the two circuits. 1. Disconnect plug at passenger side airbag unit. 2. Attach Special Tool 9516. 3. Erase the fault memory. 4. Check if fault is still present. a) If the faut is no longer present, replace passenger side airbag unit. b) If the fault is still present, check wiring harness for squeezed sections and chafing. Replace if required. c) If no fault is detected in the wiring harness, replace the control unit.
Test point 11 Ignition pill circuit 3 Resistance too high/too low Fault code 23	Ignition pill circuit 3 at the passenger-side airbag is the rightmost of the two circuits. – refer to test point 10.
Test point 12 Airbag warning light Signal implausible Fault code 30	– Check warning lamp, replace if required. – Check wire from control unit to instrument cluster or to diagnosis socket, respectively, for short to positive terminal. – Check instrument cluster.
Test point 13 **Control unit defective** Fault code ...	– Replace control unit. Note This fault message may display several fault codes: 31, 40 to 47, 50 to 54 and 60 to 62.

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Fault, Fault Code	Possible Causes, Elimination, Remarks
Test point 14:	
Unknown fault code fault code xxx	– Check secondary ignition circuit. – Erase fault memory.

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Fault, Fault Code	Possible Causes, Elimination, Remarks

2. Failure time

The Failure Time menu item displays the time elapsed since the first fault was stored in the fault memory.

The maximum time that can be displayed is 99 hours and 59 minutes. If this time is exceeded, the " > " sign is displayed ahead of the hours.

3. Results

The Results menu item displays the crash data.

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