

## Workshop Manual Audi A8 2003 >

### Brake system

Edition 03.2013



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## List of Workshop Manual Repair Groups



### Repair Group

00 - Technical data

45 - Anti-lock brake system

46 - Brakes - mechanism

47 - Brakes - hydraulics

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Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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## 00 – Technical data

### 1 Brakes, wear limits

(ARL003290; Edition 03.2013)

Brake system
Diagonally split dual-circuit braking system with ABS, EBP, EDL, ASR, ESP, ECD and EPB

Front brakes						
Brake caliper		FNR G60 (16")	FNR G60 (16")	FNR 42 AL (17")	FNR 42 AL (18")	FNR 42 AL (18")
Factory code (PR No.)		1LG	1LG	1LL, 1LM	1LJ, 1LK	1LJ, <sup>1)</sup>
Ventilated brake disc	∅ mm	321	323	360	385	385
Brake disc, thickness	mm	30	30	34	36	36
Brake disc, wear limit	mm	28	28	32	34	34
Brake caliper, piston	∅ mm	60	60	2 x 42	2 x 42	2 x 42
Brake pad thickness	mm	20.3	20.3	20.43	20.43	20.43
Brake pad wear limit (including backplate and damper plate)	mm	9	9	9	9	9

1) Special security vehicle

⇒ ["1 Front brakes \(PR 1LG\)", page 38](#)

⇒ ["2 Front brakes \(PR 1LJ, 1LL, 1LM, 1LK\)", page 46](#)



#### Note

- ◆ When performing repair work on brakes, hairline cracks are often found on the friction surface of the brake discs. Hairline cracks up to a length of 10 mm do not present a technical problem and do not justify a renewal of brake discs.
- ◆ Brake discs with cracks going all the way across the friction surface must be renewed.

Ceramic front brakes		
Brake caliper		Brembo M6 Al
Factory code (PR No.)		1LW
Ventilated brake disc	∅ mm	380
Brake disc, thickness	mm	38
Brake disc, wear limit		The minimum thickness of the brake disc is stamped onto the brake disc hub as a wear limit specification.
Brake caliper, 6 piston monoblock	∅ mm	2 x 32/ 36/ 38

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Ceramic front brakes		
Minimum pad thickness (including backplate and damper plate)	mm	9.5

⇒ **"3 Ceramic front brakes (PR 1LW)", page 54**

 **Note**

*Depending on the version, the minimum weight of the brake disc is stamped on the disc. The brake disc must then be additionally weighed in order to assess the amount of wear. The disc must be renewed when the minimum weight is reached. Brake discs should always be renewed on both sides of the axle.*

 **Note**

*Hairline cracks on the friction surfaces of ceramic brakes can be caused during manufacturing and therefore already appear to varying degrees when the brakes are new. Hairline cracks on the friction surfaces do not justify a renewal of the ceramic brake discs.*

Rear brakes						
Factory code (PR No.)		1KE (16")	1KW (17")	1KY (18")	1KY <sup>2)</sup>	1KZ (18")
Ventilated brake disc	∅ mm	280	310	335	356	335
Brake disc, thickness	mm	22	22	22	28	22
Brake disc, wear limit	mm	20	20	20	26	20
Brake caliper, piston	∅ mm	43	43	43	43	43
Brake pad thickness	mm	17.45	17.45	17.45	17.45	17.45
Brake pad wear limit (including backplate)	mm	8	8	8	8	8

2) Special security vehicle

⇒ **"4 Rear brakes, electronic parking brake and handbrake (EPB)", page 65**

 **Note**

- ◆ *When performing repair work on brakes, hairline cracks are often found on the friction surface of the brake discs. Hairline cracks up to a length of 10 mm do not present a technical problem and do not justify a renewal of brake discs.*
- ◆ *Brake discs with cracks going all the way across the friction surface must be renewed. ⇒ [page 54](#)*

Ceramic rear brakes		
Brake caliper		TRW CII45 HE - DK
Factory code (PR No.)		1KU




Ceramic rear brakes		
Ventilated brake disc	∅ mm	356
Brake disc, thickness	mm	28
Brake disc, wear limit		The minimum thickness of the brake disc is stamped onto the brake disc hub as a wear limit specification.
Brake caliper, 1 piston	∅ mm	45
Minimum pad thickness (including backplate and damper plate)	mm	9.0

⇒ ["4 Rear brakes, electronic parking brake and handbrake \(EPB\)", page 65](#)

 **Note**

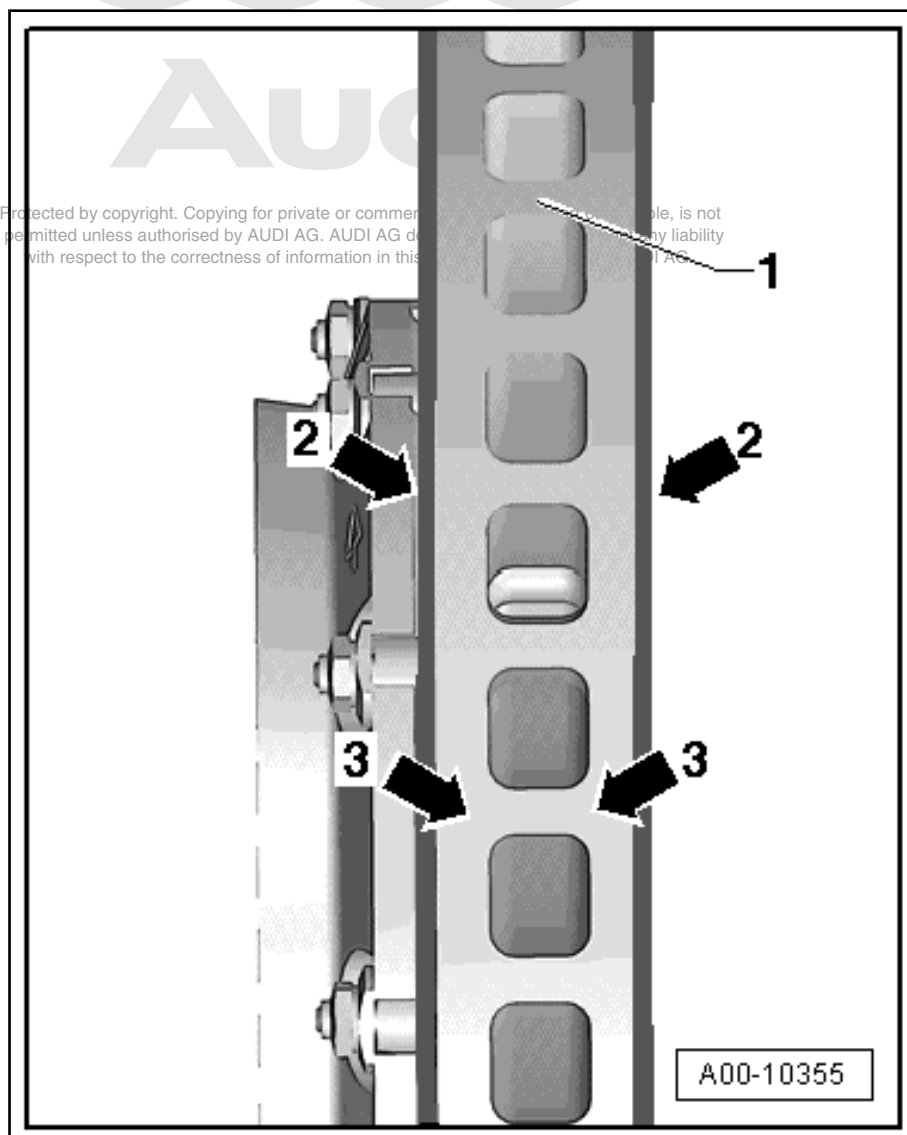
*Depending on the version, the minimum weight of the brake disc is stamped on the disc. The brake disc must then be additionally weighed in order to assess the amount of wear. The disc must be renewed when the minimum weight is reached. Brake discs should always be renewed on both sides of the axle.*

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*Hairline cracks on the friction surfaces of ceramic brakes can be caused during manufacturing and therefore already appear to varying degrees when the brakes are new. Hairline cracks on the friction surfaces do not justify a renewal of the ceramic brake discs.*

## 2 Assessment of ceramic brake discs

- 1 - Cooling channel lands
- 2 - Friction layer
- 3 - Carrier material



### 2.1 Visible features of ceramic brake discs

Checking area of bolted connection on friction ring and brake disc hub:



#### WARNING

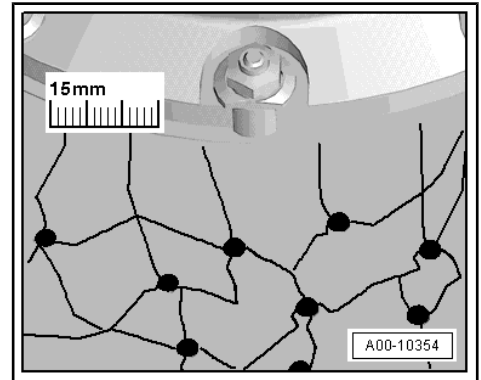
*The brake disc ring and the brake disc hub are bolted together and must NOT be separated. Do NOT slacken the bolted connection on the brake disc hub.*

Due to the production process there already are relaxation cracks (varying degrees) on the friction surface of the brake disc when it is new.

**i** Note

*Relaxation cracks on a ceramic brake disc do not constitute a technical problem.*

The relaxation cracks may be clearly visible and vary in size.

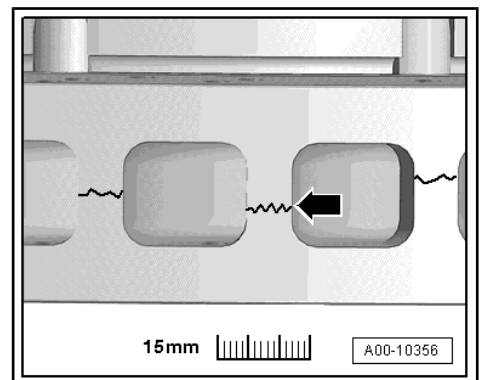


## 2.2 Superficial cracks in cooling channel lands

Superficial cracks in the cooling channel lands -arrow- are caused during manufacturing.

**i** Note

*Superficial cracks in the cooling channel lands do not constitute a technical problem on the ceramic brake discs.*

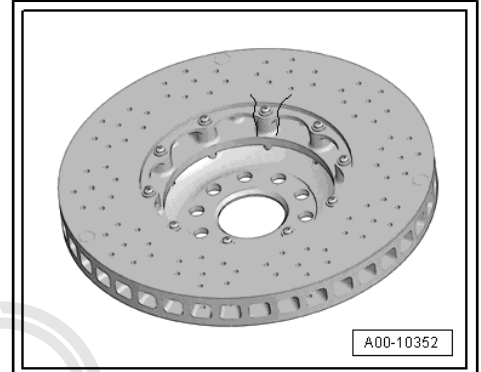


## 2.3 Cracks in area of bolted connection on ceramic brake discs

Checking area of bolted connection on friction ring and brake disc hub:

**! WARNING**

*The brake disc ring and the brake disc hub are bolted together and must NOT be separated. Do NOT slacken the bolted connection on the brake disc hub.*



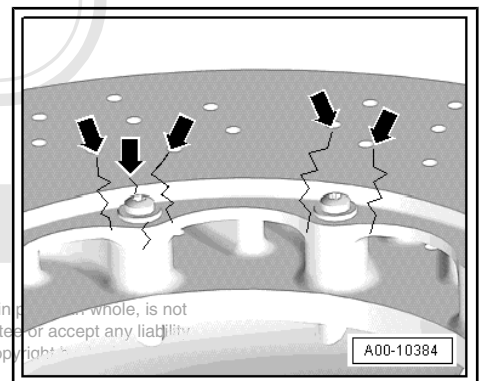
Ceramic brake discs must be renewed if there are cracks in the area of the bolted connection of the brake disc hub extending into the friction surface of the brake disc -arrows-. => [page 54](#)

The brake discs must be renewed on both sides of the axle if:

- ◆ renewal is necessary because of brake disc wear
- ◆ there has been a technical modification to the replacement brake disc (indicated by changed part number).

Always renew brake discs on both sides of axle. => [page 63](#)

When doing so, always renew the brake pads on both sides of the axle. => [page 57](#)



## 2.4 Edge fractures

Edge fractures -arrow- are caused by mechanical damage to the edges.

Permissible:

- ◆ max. width / depth = 2 mm
- ◆ max. length = 10 mm
- ◆ max. 3 edge fractures per brake disc

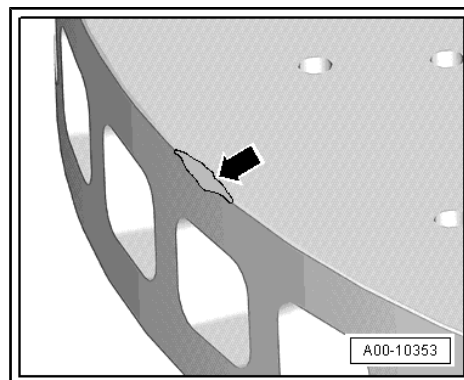
If any of the criteria listed above are exceeded, the brake disc must be renewed. ⇒ [page 54](#)

**Always renew brake discs on both sides of axle if:**

- ◆ renewal is necessary because of brake disc wear
- ◆ there has been a technical modification to the replacement brake disc (indicated by changed part number).

**Always renew brake discs on both sides of axle. ⇒ [page 63](#)**

**When doing so, always renew the brake pads on both sides of the axle. ⇒ [page 57](#)**



## 2.5 Chipping on ceramic brake discs

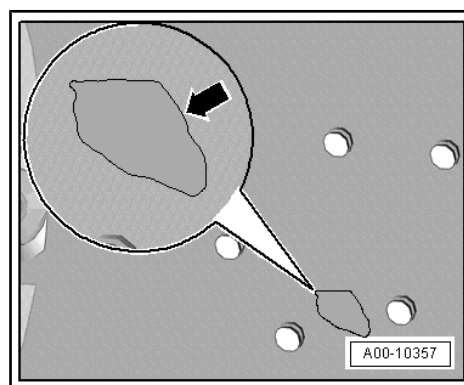
Always renew ceramic brake discs if there is chipping (larger than 1 cm<sup>2</sup> -arrow-) on the friction surface.

**Always renew brake discs on both sides of axle ⇒ [page 54](#) if:**

- ◆ renewal is necessary because of brake disc wear
- ◆ there has been a technical modification to the replacement brake disc (indicated by changed part number).

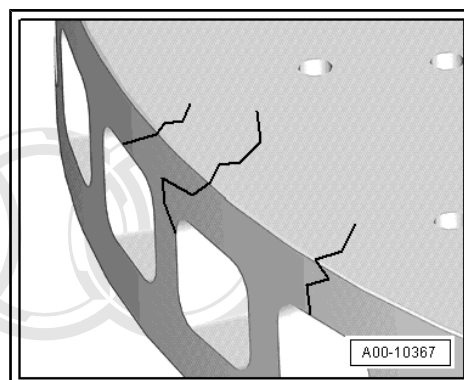
**Always renew brake discs on both sides of axle ⇒ [page 63](#) .**

**When doing so, always renew the brake pads on both sides of the vehicle ⇒ [page 57](#) .**



## 2.6 Cracks extending into cooling channels

Always renew ceramic brake discs if there is a crack extending from the friction surface of the brake disc to the cooling channel or through the cooling channel -arrow-. ⇒ [page 54](#)



### 3 Assessing degree of wear on ceramic brake discs

⇒ [“3.1 Wear assessment by checking thickness of brake disc”, page 11](#)

⇒ [“3.2 Wear assessment according to wear indicators”, page 11](#)

⇒ [“3.3 Wear assessment by weighing brake disc”, page 12](#)

When minimum weight is stamped on hub of brake disc:

⇒ [“3.4 Wear assessment by weighing brake disc”, page 13](#)



#### WARNING

*The brake disc ring and the brake disc hub are bolted together and must NOT be separated. Do NOT slacken the bolted connection on the brake disc hub.*

Checking area of bolted connection on friction ring and brake disc hub:

Designation of ceramic brake disc on brake disc hub



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1 - Direction of rotation

2 - Supplier

3 - Serial production number of brake disc

4 - Audi part number



Note

*The Audi part number of the brake disc is an example and can vary depending on the vehicle type and model*

5 - Production date of brake disc

6 - Permissible minimum thickness of brake disc



Note

*The minimum permissible thickness of the brake disc differs depending on the type of vehicle.*

7 - Weight of new brake disc with brake disc hub

Checking area of bolted connection on friction ring and brake disc hub:



**WARNING**

*The brake disc ring and the brake disc hub are bolted together and must NOT be separated. Do NOT slacken the bolted connection on the brake disc hub.*



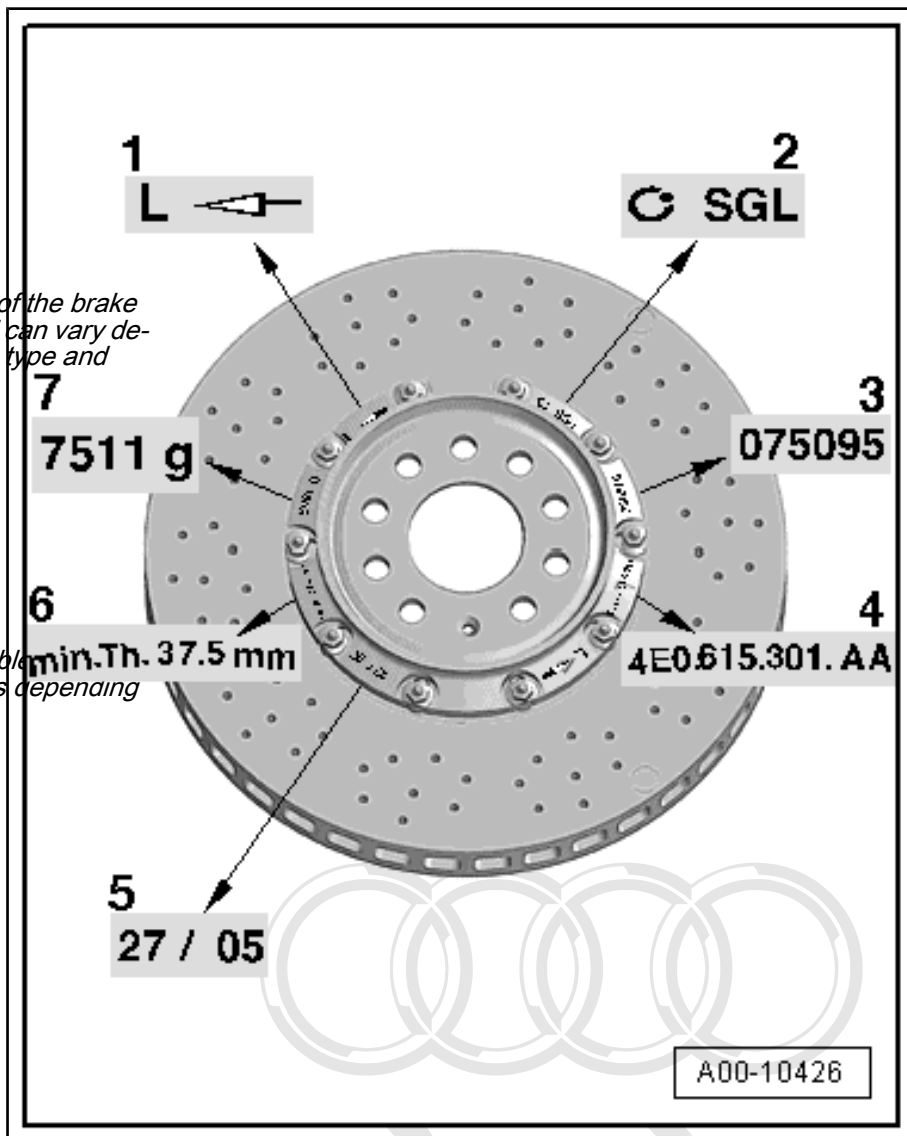
Note

*Depending on the version, the minimum permissible weight for a used brake disc is stamped on the brake disc hub. The disc must be renewed when the weight of the disc is less than or equal to the indicated minimum weight. Always renew brake discs on both sides of the axle.*




**Caution**


*If the minimum permissible weight of the disc is indicated on the hub of the disc ("min. weight"), the disc must be additionally weighed to assess the amount of wear.*



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 **Caution**  
*Always install brake discs of the same type on both sides of one axle.*

The brake disc must first be cleaned before assessing the degree of wear as described below.

 **WARNING**  
*Do NOT clean the brake disc with water or other fluids as this will falsify the results.*

 **Note**

- ◆ *The brake disc ventilation drillings must be completely free of brake dust and dirt. Clear out carefully with a suitable tool if necessary. Do not use force.*
- ◆ *Thoroughly blow out the brake discs with compressed air (including the area between the cooling channels and ventilation drillings).*

 **Caution**  
*Always observe respiratory protection requirements when cleaning brake discs or other parts of the brake system using compressed air.*

To assess the brake disc wear, proceed as follows:

- ◆ 1. Wear assessment by checking thickness of brake disc
- ◆ 2. Wear assessment according to wear indicators

1. Wear assessment by checking thickness of brake disc ⇒ <a href="#">page 11</a>	
Thickness of brake discs in permissible range → brake disc OK	
Brake disc thickness in critical range min. Th + 0.2 mm	Value at or below limit
↓↓	↓↓
Further wear assessment according to wear indicators	Renew brake disc
↓↓	-----
2. Wear assessment according to wear indicators ⇒ <a href="#">page 11</a>	
None of the six wear indicators fully worn out → brake disc OK	
-----	One of the six wear indicators fully worn out
-----	↓↓
-----	Renew brake disc



**Note**

Depending on the version, the minimum permissible weight for a used brake disc is stamped on the brake disc hub. The disc must be renewed when the weight of the disc is less than or equal to the indicated minimum weight. Always renew brake discs on both sides of the axle.



**Caution**

If the minimum permissible weight of the disc is indicated on the hub of the disc ("min. weight"), the disc must be additionally weighed to assess the amount of wear. The disc must be renewed when the weight of the disc is less than or equal to the indicated minimum weight.

**Brake disc with minimum weight stamped on hub:**

1. Wear assessment by checking thickness of brake disc (if minimum weight is stamped on hub) ⇒ <a href="#">page 11</a>	
Thickness of brake discs in permissible range → brake disc OK	
Brake disc thickness in critical range min. Th + 0.05 mm	Value at or below limit
↓↓	↓↓
Further wear assessment according to wear indicators	Renew brake disc
↓↓	-----
2. Wear assessment according to wear indicators ⇒ <a href="#">page 11</a>	
None of the six wear indicators fully worn out → brake disc OK	
-----	One of the six wear indicators fully worn out
-----	↓↓
-----	Weigh brake disc ⇒ <a href="#">page 13</a>
-----	Minimum weight not reached
-----	↓↓
-----	Brake disc OK
-----	Minimum weight reached
-----	↓↓
-----	Renew brake disc

**Always renew brake discs on both sides of axle if:**

- ◆ the brake discs have to be renewed because of wear.
- ◆ there has been a technical modification to the replacement brake disc (indicated by changed part number).

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If one of the three wear limits defined below has been reached, do NOT continue using the brake disc. The brake disc must be renewed.

In this case, always renew the brake discs on both sides of the axle.

When doing so, always renew the brake pads on both sides of the axle.

### 3.1 Wear assessment by checking thickness of brake disc

#### Special tools and workshop equipment required

- ◆ Use a commercially available caliper gauge or micrometer gauge.

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The minimum permissible thickness of the brake disc is engraved as "min.Th." on the brake disc hub.

- Measure the brake disc thickness at three points round the outside of the disc next to the individual wear indicators -x-.



#### Note

If the thickness is  $x = \text{min. Th.} + 0.2 \text{ mm}$ , additionally check the wear of the brake disc by inspecting the wear indicators [⇒ page 11](#).

When minimum weight is stamped on hub of brake disc:



#### Note

- ◆ When minimum weight is stamped on hub of brake disc:
- ◆ If the thickness is  $x = \text{min. Th.} + 0.05 \text{ mm}$ , additionally check the wear of the brake disc by inspecting the wear indicators [⇒ page 11](#).

#### All types of ceramic brake discs (continued):

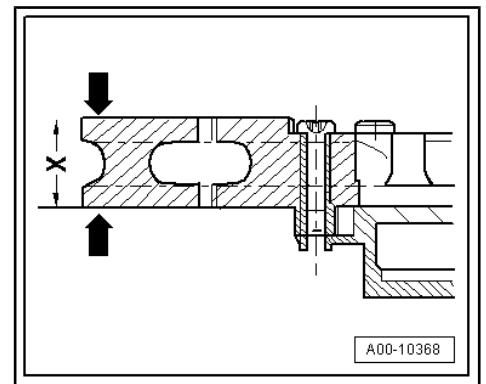
If the thickness of the brake disc is less than or equal to the minimum permissible thickness "min.Th.", do NOT continue using the brake disc. The brake disc must be renewed.

In this case, always renew the brake discs on both sides of the axle.

When doing so, always renew the brake pads on both sides of the axle.

### 3.2 Wear assessment according to wear indicators

Wear indicators are positioned at intervals of 120 degrees on the friction surface of the brake disc.



The wear indicators -arrow- appear in a different colour.

There are three indicators on each side of the brake disc (front and reverse side).

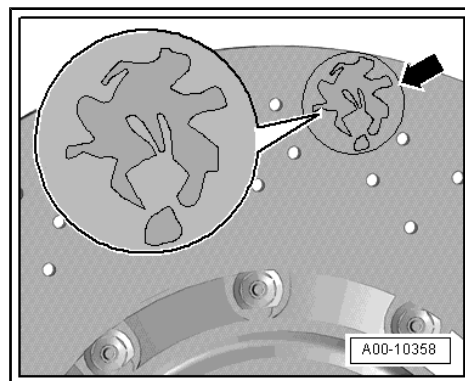
The wear of the indicators is visible as a dark, burnt out recess.

Do NOT continue using the brake disc if one of the six indicators is completely burnt out. The brake disc must be renewed.

In this case, always renew the brake discs on both sides of the axle.

When doing so, always renew the brake pads on both sides of the axle.

Checking area of bolted connection on friction ring and brake disc hub:



#### WARNING

*The brake disc ring and the brake disc hub are bolted together and must NOT be separated. Do NOT slacken the bolted connection on the brake disc hub.*

### 3.3 Wear assessment by weighing brake disc

#### Special tools and workshop equipment required

- ◆ Commercially available scales with a tolerance of  $\pm 1$  g

#### Procedure

- Remove front brake disc for weighing.
- Remove rear brake disc for weighing.
- The brake disc must be cleaned and dry before it is weighed.

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#### Caution

*Do NOT clean the brake disc with water or other fluids as this will falsify the results.*



#### Note

- ◆ *The brake disc ventilation drillings must be completely free of dirt. Clear out carefully with a suitable tool if necessary.*
- ◆ *Thoroughly blow out the brake discs with compressed air (including the area between the cooling channels and ventilation drillings).*
- Carefully place the clean brake disc on the scales.

The initial weight of the brake disc with disc brake hub is engraved on the disc brake hub.

For this model, the following maximum values are specified for brake disc weight loss:

- ◆ Front brake disc: Up to 120 g weight loss from initial weight of new brake disc.

- ◆ Rear brake disc: Up to 120 g weight loss from initial weight of new brake disc.

 **Note**

*If the weight loss is only 20 g within these limits, additionally check the wear of the brake disc according to the wear indicators.*

If the weight loss has reached or exceeded these limits, the brake discs must be renewed. It is no longer permissible to use these brake discs. The brake disc must be renewed.

Always renew brake discs on both sides of axle if:

- ◆ the brake discs have to be renewed because of wear.
- ◆ there has been a technical modification to the replacement brake disc (indicated by changed part number).

**In this case, always renew the brake discs on both sides of the axle.**

When doing so, always renew the brake pads on both sides of the axle.

### 3.4 Wear assessment by weighing brake disc

Brake disc with minimum weight stamped on hub:

**Special tools and workshop equipment required**

- ◆ Commercially available scales with a tolerance of  $\pm 1$  g


**Procedure**

- Remove front brake disc for weighing.
- Remove rear brake disc for weighing.

 **Note**

*Depending on the version, the **minimum permissible weight for a used brake disc is stamped on the brake disc hub**. The disc must be renewed when the weight of the disc is less than or equal to the indicated minimum weight. Always renew brake discs on both sides of the axle.*

- The brake disc must be cleaned and dry before it is weighed.

 **Caution**

**Do NOT clean the brake disc with water or other fluids as this will falsify the results.**

 **Note**

- ◆ *The brake disc ventilation drillings must be completely free of dirt. Clear out carefully with a suitable tool if necessary.*
- ◆ *Thoroughly blow out the brake discs with compressed air (including the area between the cooling channels and ventilation drillings).*



- Carefully place the clean brake disc on the scales.

**The disc must be renewed when the weight of the disc is less than or equal to the indicated minimum weight. Always renew brake discs on both sides of the axle.**

Always renew brake discs on both sides of axle if:

- ◆ the brake discs have to be renewed because of wear.
- ◆ there has been a technical modification to the replacement brake disc (indicated by changed part number).

**In this case, always renew the brake discs on both sides of the axle.**

**When doing so, always renew the brake pads on both sides of the axle.**



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## 4 Brake test

### 4.1 General notes

The wheels are driven by the brake test rollers.

During the test the gearbox must be in neutral on manual gearboxes or in position N on automatic gearboxes.

Follow the instructions provided by the manufacturer of the brake test equipment when performing the test.



#### Note

*Electronic brake control systems are inoperative when the ignition is switched off.*

### 4.2 Vehicles with front-wheel drive

Perform brake test on a single-axle brake dynamometer.

Test speed must not exceed 5 km/h. Otherwise the EDL control can activate the brakes if the rollers start at different points in time.

All brake test equipment approved by Audi meets these requirements.

### 4.3 Vehicles with four-wheel drive

**Testing on a single-axle brake dynamometer for four-wheel drive vehicles:**

The rollers drive the wheels of one axle in opposite directions to avoid transmitting torque to the other axle.

Test speed must not exceed 6 km/h. Otherwise the EDL control can activate the brakes if the rollers start at different points in time.



#### WARNING

*The Torsen differential will be seriously damaged if test speed exceeds 6 km/h.*

All brake test equipment approved by Audi meets these requirements.

**Testing on a single-axle brake dynamometer:**

Test speed must not exceed 6 km/h. Otherwise the EDL control can activate the brakes if the rollers start at different points in time.

All brake test equipment approved by Audi meets these requirements.

### 4.4 EPB (Electronic Parking Brake) on brake dynamometer

**Test sequence:**

- Drive rear wheels of vehicle onto test rollers; do not switch off ignition.
- As soon as the rollers reach a speed in excess of 3 km/h the “TÜV mode” (TÜV = German technical inspection agency) is activated.



- The instrument cluster will then display a crossed-out, yellow symbol of the electronic parking brake => Owner's Manual; Instruments and warning/indicator lamps

**The EPB will now function as follows:**

The full brake force is not applied at once, but step by step each time the parking brake switch is operated. The brake will be fully applied after operating the button 3 times.

The brake is released by pressing the switch once.

**Requirements for "TÜV mode":**

- Ignition on
- Front wheels, speed = 0 km/h
- Rear wheels, min. speed = 3 km/h, max. speed = 9 km/h.

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**WARNING**

***When testing models with four-wheel drive you must use brake test rollers with synchronised wheel speeds.***


## 5 Brake fluid

### 5.1 General notes

**Brake fluid is hygroscopic, i.e. it has the tendency to absorb water and moisture from the atmosphere**

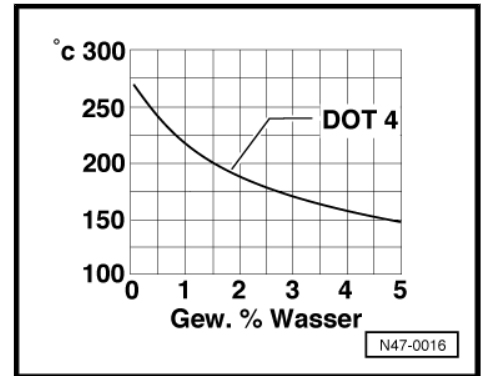
The boiling point decreases as the water content increases, which means a considerable rise in brake fluid temperature can lead to formation of vapour bubbles and brake failure.

The colour of the brake fluid becomes darker over the course of time. A dark brake fluid colour is not an indication of its condition. The change in colour is caused by chemical reactions and may occur within a short period (several weeks), particularly in vehicles equipped with ABS.



**WARNING**

*Rubber parts of brake system (sleeves, seals) are not compatible with mineral oil, fuel and cleaning agents.*



Even minute quantities coming into contact with a seal or sleeve will affect the component and could impair brake operation. The consequences of a contaminated brake system only become apparent months later, and then give rise to greater expenses, particularly in vehicles equipped with ABS.

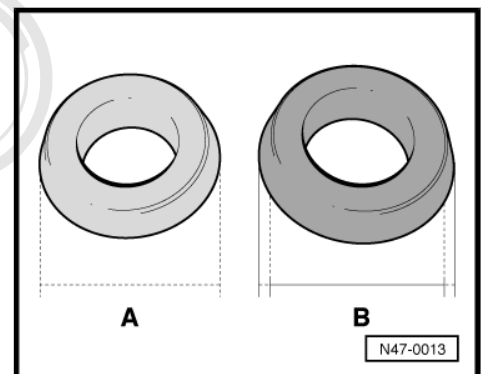
A = Sleeve (original size)

B = Sleeve (swollen due to contact with mineral oil)

#### Summary of the above mentioned points:

Always keep brake fluid containers properly sealed. This is the only way of preventing contamination by oil, dirt, cleaning agents or moisture.

Brake fluid containers should be kept completely separate from oils (including hydraulic fluid) and cleaning agents to prevent any mixture of fluids or even filling of the brake system with an incorrect fluid.



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## 45 – Anti-lock brake system

### 1 General information on the anti-lock brake system

#### 1.1 Notes for repair work on the ABS



#### WARNING

*The anti-lock brake system is basically maintenance-free.*

*Testing, removing, installing and repair work may only be performed by qualified personnel.*

*Failure to observe the information described in this Workshop Manual may result in damage to the system and could make the vehicle unsafe.*

- ◆ Before carrying out repair work on the anti-lock brake system, determine the cause of the problem using self-diagnosis.
- ◆ When installing a new hydraulic control unit, always check the coding ⇒ VAS 505x vehicle diagnostic, testing and information system .  
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- ◆ Always switch off the ignition before carrying out installation or repair work. On vehicles with a coded radio, find out the anti-theft code and disconnect the battery earth strap.
- ◆ When working with brake fluid, observe the relevant safety precautions and notes ⇒ [page 17](#) .
- ◆ Always bleed the brake system (using brake filling and bleeding equipment - V.A.G 1869/- or VAS 5234 or similar) after all work which involves opening the hydraulic system ⇒ Repair group 47. Additionally perform high-pressure and low-pressure tests ⇒ [page 83](#) .
- ◆ During the final road test, ensure that at least one ABS-controlled braking operation is performed (pulsations must be felt at the brake pedal) ⇒ Vehicle diagnostic, testing and information system - VAS 505x- .
- ◆ Absolute cleanliness is required when working on the anti-lock brake system; avoid any products that contain mineral oil, such as oil, grease, etc.
- ◆ Thoroughly clean all connections and the adjacent areas before loosening, but do not use aggressive cleaning agents such as brake cleaner, petrol, thinners or similar.
- ◆ Place removed parts on a clean surface and cover them up.
- ◆ Carefully cover or seal open components if repairs are not to be carried out immediately. (Use sealing plugs from repair kit 1 H0 698 311 A).
- ◆ Do not use fluffy cloths.
- ◆ Only remove replacement parts from packaging immediately prior to installation.
- ◆ Only use genuine spare parts from original packaging.
- ◆ When the system is open do not work with compressed air and do not move the vehicle.



- ◆ Ensure that no brake fluid enters electrical connectors.

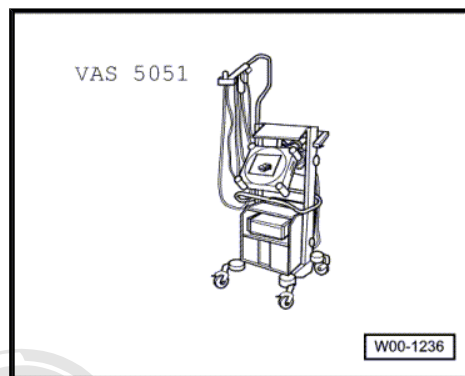


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## 2 Connecting -VAS 505x- and selecting functions

### Special tools and workshop equipment required

- ◆ Vehicle diagnostic, testing and information system - VAS 505x-
- ◆ Diagnosis lead (3m with power supply) - VAS 5051/1-

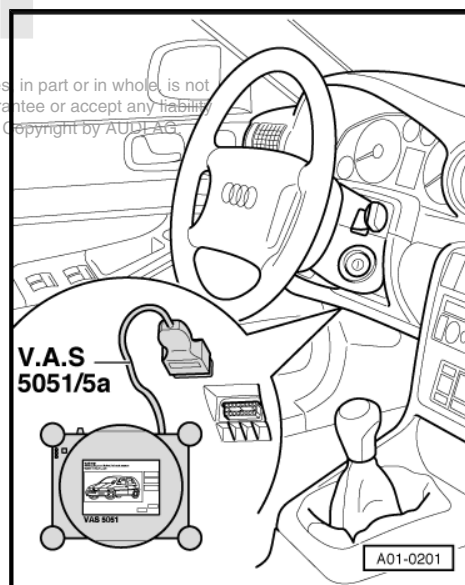


### WARNING

- ◆ *Test equipment must always be secured to the rear seat when road-testing the vehicle.*
- ◆ *While the vehicle is moving this equipment must be operated by a second person; NOT by the driver.*

- Attach the diagnosis cable connector VAS 5051/5a to the diagnosis connection.

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- Switch on the tester -arrow-.

The tester is ready as soon as a picture of a car appears in the display.

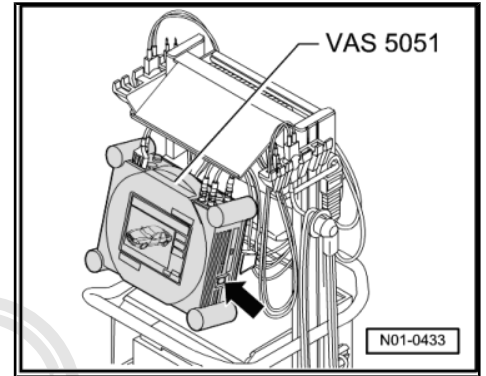
- Switch on ignition.
- Press the Guided Fault Finding button on the display screen.
- Select the following:
  - ◆ Make
  - ◆ Model
  - ◆ Model year
  - ◆ Version
  - ◆ Engine code letters
- Confirm the entered information.

Wait until the tester has interrogated all the control units in the vehicle.

- Press the **Go to** button and select the option "Function/component selection".
- Select "Running gear" on the display.
- Select "Brake system" on the display.
- Select "01 - Self-diagnosis compatible systems ..." on the display.
- Select "Anti-lock brake system ..." on the display.
- Select "Function" on the display.

You will now see displayed all possible functions for the anti-lock brake system installed in the vehicle.

- Select the function you require on the display.



### 3 Electronic stabilisation program Bosch 5.7

#### 3.1 Overview of components - ESP Bosch 5.7

##### 1 - ABS hydraulic unit - N55- with ABS control unit with EDL - J104-

- The hydraulic unit and the control unit together form the hydraulic control unit
- Do not disconnect connector (42 pin) before successfully completing self-diagnosis. Switch off ignition before detaching connector.
- Located on the hydraulic unit on left of engine compartment.
- Removing and installing ⇒ [page 24](#)

##### 2 - Brake pressure sender (01435) -1- - G201-

- Screws onto hydraulic unit
- Removing and installing ⇒ [page 36](#)

##### 3 - TCS (ASR)/ESP button - E256-

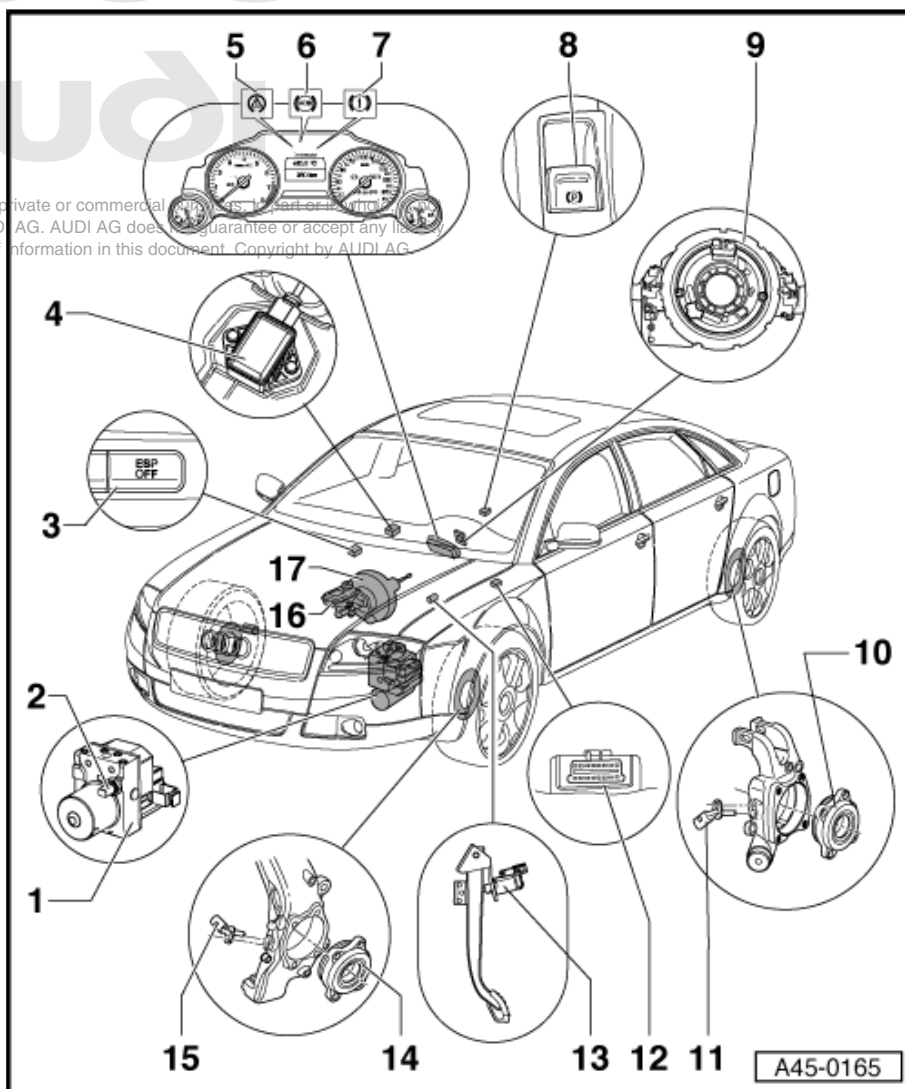
- Fitting location: in centre console

##### 4 - Lateral acceleration sender (01423) - G200- and yaw rate sender (01542) - G202-

- Combined in one housing
- Fitting location: under extension of centre console

- Can be checked in "Guided Fault Finding" with vehicle diagnostic, testing and information system - VAS 505x-
- Observe installation instructions

⇒ [page 35](#)



**5 - Traction control system warning lamp (00824-3424) - K86-**

- Location: In the dash panel insert
- See Owner's Manual for further information

**6 - ABS warning lamp - K47-**

- Location: In the dash panel insert
- See Owner's Manual for further information

**7 - Brake system warning lamp - K118-**

- Fitting location: in driver information system/ dash panel insert
- See Owner's Manual for further information

**8 - Parking brake switch - F234-**

- Fitting location: in centre console
- Removing and installing ⇒ [page 36](#)

**9 - Steering angle sender (00778-3132) - G85- (vehicles with ESP)**

- Fitting location: incorporated in return ring with slip ring on steering column ⇒ Body Repairs; Rep. gr. 69
- Performing zero compensation

Vehicle diagnostic, testing and information system - VAS 505x-

**10 - Wheel bearing/hub unit**

- The ABS sensor ring is installed in the wheel bearing

**11 - Rear right/left speed sensor (G44/G46)**

- Can be checked in "Guided Fault Finding" with vehicle diagnostic, testing and information system - VAS 505x-

- Renewing ⇒ [page 32](#)

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**12 - Diagnostic socket**

- Fitting location: cover in driver's footwell

**13 - Brake light switch -F- and cruise control system brake pedal switch (diesel direct injection system) (00629) - F47-**

- Removing and installing ⇒ [page 34](#)
- Can be checked in "Guided Fault Finding" with vehicle diagnostic, testing and information system - VAS 505x-

**14 - Wheel bearing/hub unit**

- The ABS sensor ring is installed in the wheel bearing

**15 - Front right/left speed sensor (G45/G47)**

- Can be checked in "Guided Fault Finding" with vehicle diagnostic, testing and information system - VAS 505x-

- Renewing ⇒ [page 31](#)

**16 - Brake fluid level warning contact - F34-**

**17 - Tandem brake servo**

### 3.2 Hydraulic unit and brake lines

1 - Brake master cylinder and brake servo

2 - Brake line

- Brake master cylinder/primary piston circuit to hydraulic unit

3 - Brake line

- Brake master cylinder/secondary piston circuit to hydraulic unit

4 - Brake line

- Hydraulic unit to front right brake caliper

5 - Brake line

- Hydraulic unit to front left brake caliper

6 - Brake line

- Hydraulic unit to rear left brake caliper

7 - Brake line

- Hydraulic unit to rear right brake caliper

8 - Brake pressure sender (01435) -1- - G201-

- Screws onto hydraulic unit
- Tightening torque: 20 Nm
- Removing and installing ⇒ [page 36](#)

9 - ABS hydraulic unit - N55- with ABS control unit with EDL - J104-

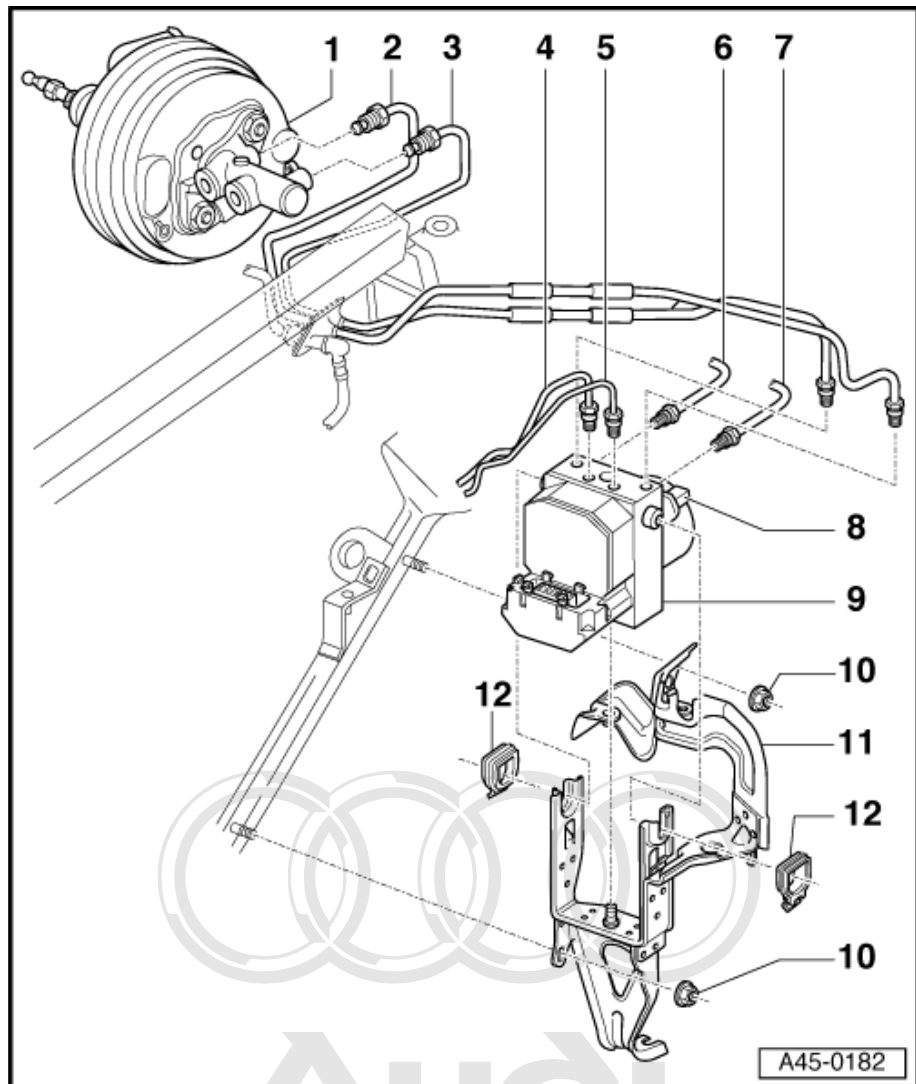
- Removing and installing ⇒ [page 24](#)

10 - Nut with washer

- Tightening torque 9 Nm

11 - Bracket for ESP

12 - Retaining clip



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### 3.3 Removing and installing hydraulic control unit

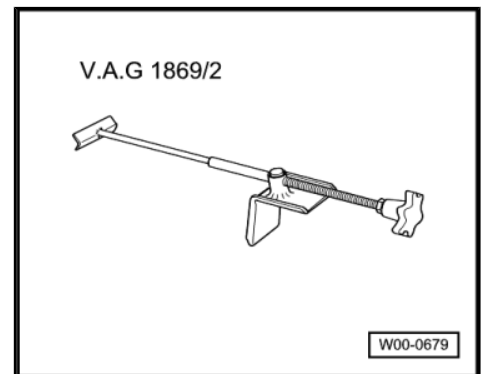
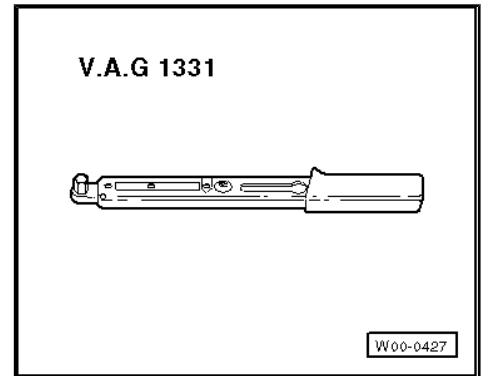
Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1331/-



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- ◆ Brake pedal actuator - V.A.G 1869/2
- ◆ Sealing plugs repair kit, part No. 1H0 698 311A



Fitting location:

The hydraulic control unit is fitted on the left-hand side of the engine compartment.

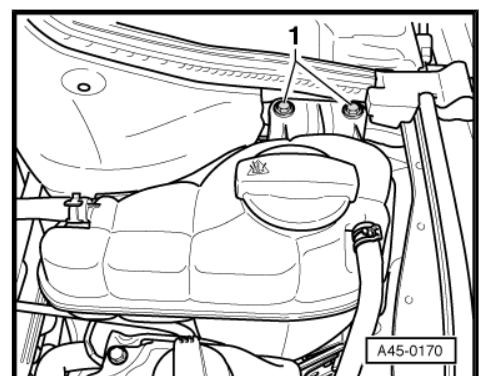
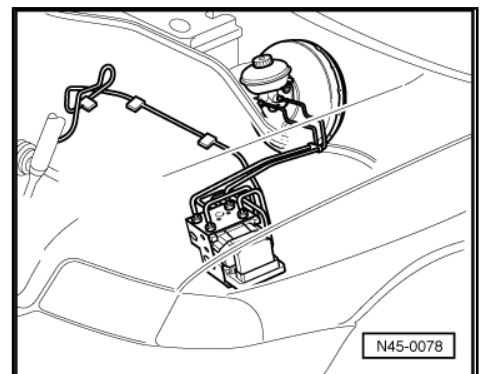
Removing



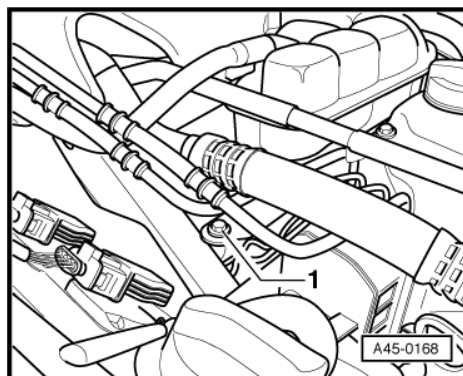
**WARNING**

*Do not bend the brake lines.*

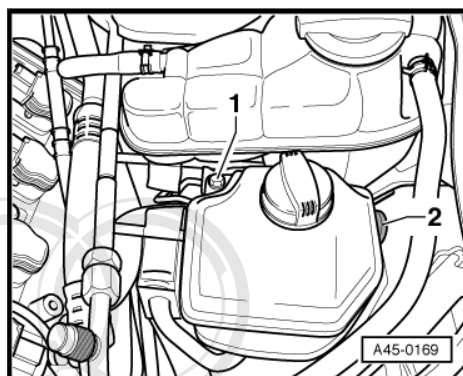
- Switch off ignition.
- Remove hexagon bolts - 1 - securing coolant expansion tank.



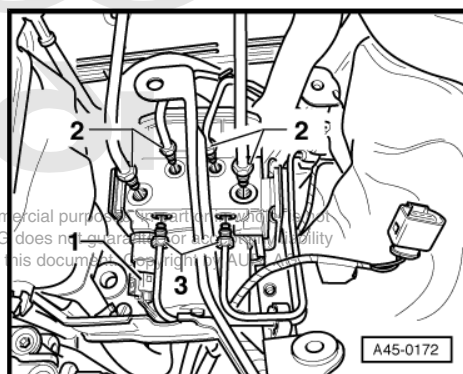
- Remove hexagon bolts -1-.
- Unplug connector from coolant expansion tank.
- Move coolant expansion tank clear to one side.



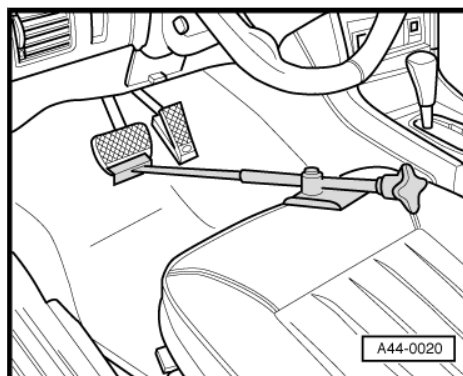
- Remove hexagon bolt - 1 - securing fluid reservoir and pull fluid reservoir to the side and out of buffer.



- Unplug connector - 1 - from brake pressure sender -G 201.



- Insert brake pedal actuator -V.A.G 1869/2- between brake pedal and driver's seat. Depress the brake pedal at least 60 mm.
- Connect hose of bleeder bottle to bleeder screws of front left and rear left brake calipers and open bleeder screws.




 **Note**

*This will release the pressure in the hydraulic unit.*

- Close front left and rear left bleeder screws.
- Do not remove brake pedal actuator -V.A.G 1869/2- .
- As protection against escaping brake fluid, place a sufficient number of lint-free cloths in area beneath control unit and hydraulic unit.
- Mark brake lines.



- Disconnect brake lines from hydraulic unit to brake master cylinder -3- and tie up.
- Disconnect remaining brake lines -2- on hydraulic unit.



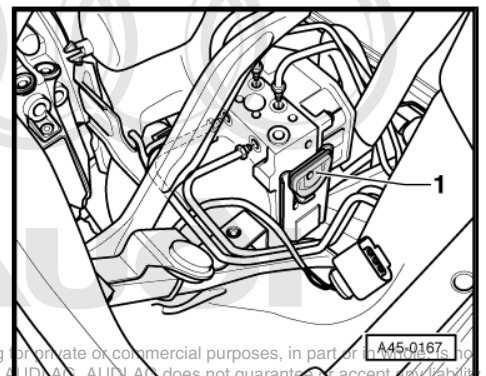
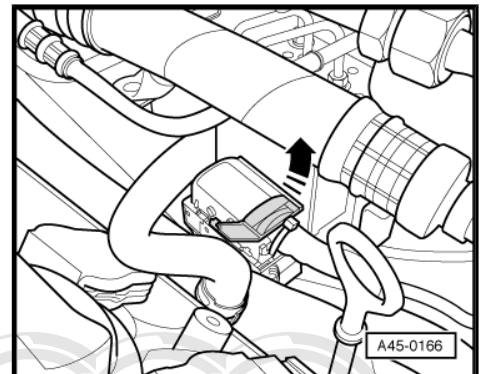
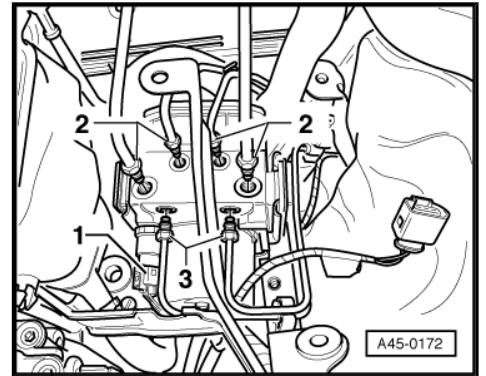
**WARNING**  
***Do not bend the brake lines in the vicinity of the hydraulic unit.***

- Seal brake lines and tapped holes with sealing plugs from repair kit.
- Release control unit connector -arrow- and unplug.

 **Note**

- ◆ *Make sure brake fluid does not get into connector housing of control unit. This can result in corrosion of the contacts and failure of the system.*
- ◆ *Use compressed air to carefully clean connector housing if necessary.*

- Release retaining clip on both sides from below -1-.



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- Remove retaining clips in direction indicated (arrow).
- Remove hydraulic control unit.

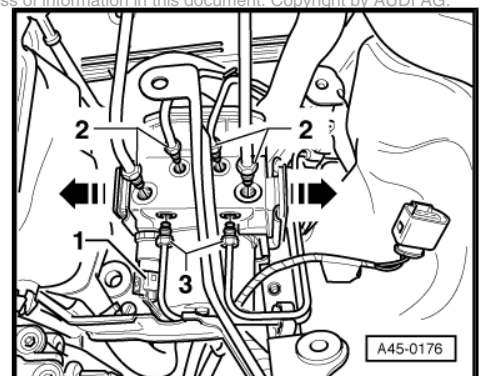
**Installing**

Installation is performed in reverse sequence; note the following:

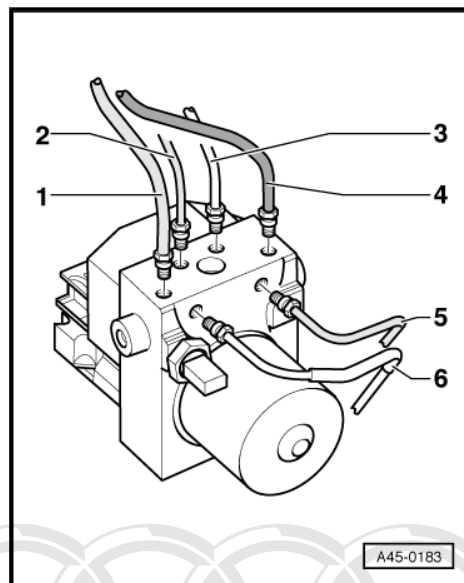
 **Note**

- ◆ *Do not remove sealing plugs from new hydraulic unit until corresponding brake line is ready to be fitted.*
- ◆ *If sealing plugs are removed from hydraulic unit sooner, brake fluid may escape and it may no longer be possible to fill and bleed the unit properly.*

- When assembling control unit and hydraulic unit, make sure contact pins of hydraulic unit do not catch on control unit solenoids.



- Connect pipes as previously marked:
- 1 - Primary piston circuit
- 2 - To front left brake caliper
- 3 - To front right brake caliper
- 4 - Secondary piston circuit
- 5 - To rear left brake caliper
- 6 - To rear right brake caliper
- Fit connector on hydraulic pump.
- Clip ABS unit onto bracket.



**i** Note

*Do not tighten bolts completely. This will make it easier to attach the individual brake lines to the hydraulic unit.*

- After tightening brake lines, tighten hydraulic unit.
- Remove brake pedal actuator - V.A.G 1869/2- .
- Bleed brake system ⇒ [page 110](#) .
- Code ABS control unit - J104- (with EDL) ⇒ Coding control unit with VAS 505x via "Guided Fault Finding" function .
- When renewing the control unit, select the function "Replace" for the relevant control unit in the "Guided Fault Finding".

**To do so, use the vehicle diagnostic, testing and information system - VAS 505x- .**

- Perform final control diagnosis after attaching brake lines to hydraulic unit ⇒ "Guided Fault Finding" function of vehicle diagnostic, testing and information system VAS 505x .

**i** Note

*Final control diagnosis can be used to establish whether line connections have been interchanged.*

**Tightening torques**

Component	Nm
Brake lines to hydraulic unit M10 (brake line diameter 5 mm)	12
Brake lines to hydraulic unit M12 (brake line diameter 5 mm)	12
Brake lines to hydraulic unit M12 (brake line diameter 8 mm)	20

### 3.4 Renewing ABS control unit J104

**Removing**

**⚠ Caution**

*The two components must be removed from the vehicle before separating the control unit from the hydraulic unit.*

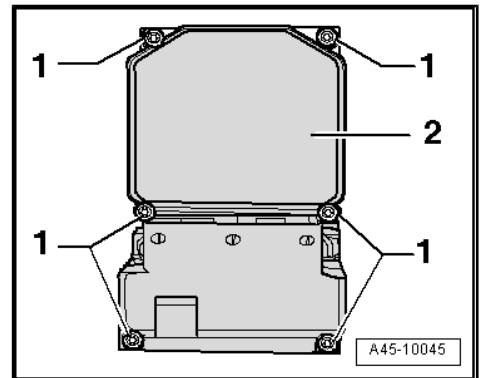
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 **Note**


- ◆ *Clean the hydraulic unit carefully before removal.*
- ◆ *Before removing the control unit, interrogate the fault memory and print out any fault codes that are displayed.*
- ◆ *Place the hydraulic unit together with the control unit on a clean flat surface.*
- ◆ *Renewal may only be performed by qualified personnel with adequate technical expertise.*

Removing and installing hydraulic unit ⇒ [page 24](#)

- Slacken bolts -1- and pull control unit -2- off hydraulic unit, taking care to keep it straight.



- Clean sealing surface -2- using a plastic scraper -1-. Check valves -3- for damage.

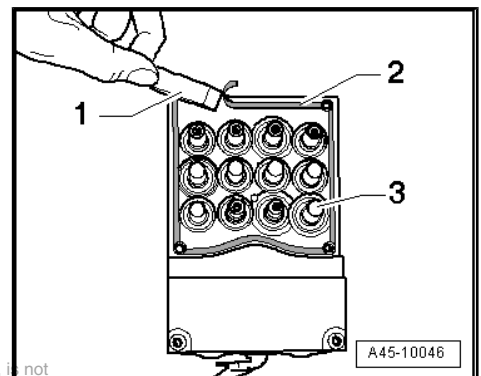
 **WARNING**

*Sealing surface of hydraulic unit must be clean and flat.*

*The hydraulic unit must be renewed if the sealing surface or the contact pins are damaged.*

*The seal on the control unit cannot be replaced.*


*The seal on the control unit must not be lifted or pulled out.*



 **Note**

- ◆ *Use the cleaning agent provided (do not use any aggressive cleaning products).*
- ◆ *Check sealing surface for damage (visual inspection).*

**Assembling**

 **Caution**

*Make sure that no moisture or dirt gets inside the control unit.*

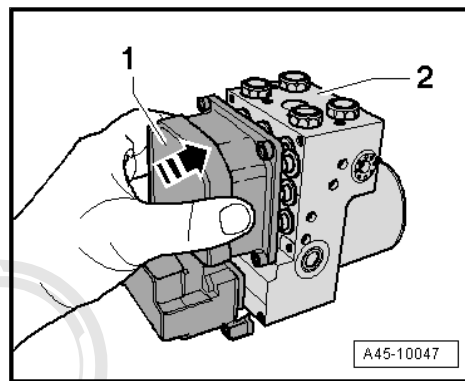
*Do not blow out control unit or hydraulic unit with compressed air.*

*Severe shocks or jolts can damage the control unit. The control unit must not be re-installed if it has been damaged in any way.*

- With solenoids pointing downwards, carefully press on control unit -1-, guiding it over valves on hydraulic unit -2-. Make sure that valves remain straight.
- The edge of the control unit housing must slide over the shoulder on the hydraulic unit.

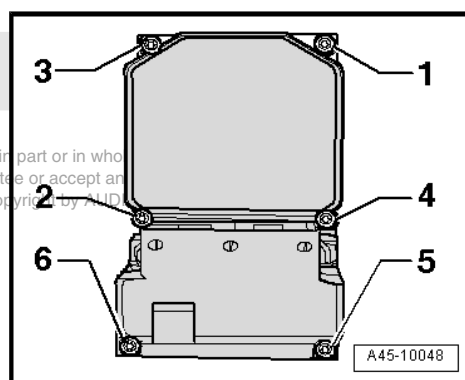
**Note**

- ◆ Use new bolts.
- ◆ To avoid any risk of leakage at the flexible seals, a new control unit must not be fitted more than twice onto an "old" hydraulic unit that is being re-installed.
- ◆ A control unit which has been in operation while the vehicle is being driven must not be fitted a second time.



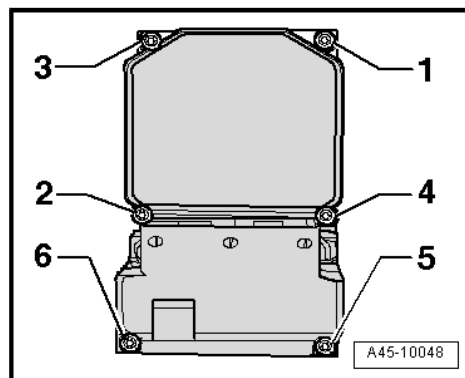
- Push control unit onto ABS hydraulic unit (N55) and screw in new bolts -1- and -2- evenly (without tightening) until control unit makes even contact with hydraulic unit.
- Screw in bolts -1- to -6- all the way, but do not tighten.
- Tighten bolts -1- to -6- in the sequence shown.

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Tightening torque 2.9 Nm

- After tightening, check that all bolt heads are seated flush.
- Install assembled unit ⇒ [page 27](#) .



## 4 Removing and installing parts of ABS system on front and rear axles

### 4.1 Removing and installing parts of ABS system on front axle

#### 1 - ABS speed sensor

- Before inserting sensor, clean inner surface of fitting hole and coat with grease G 000 650
- Renewing ⇒ [page 31](#)

#### 2 - Hexagon socket head bolt

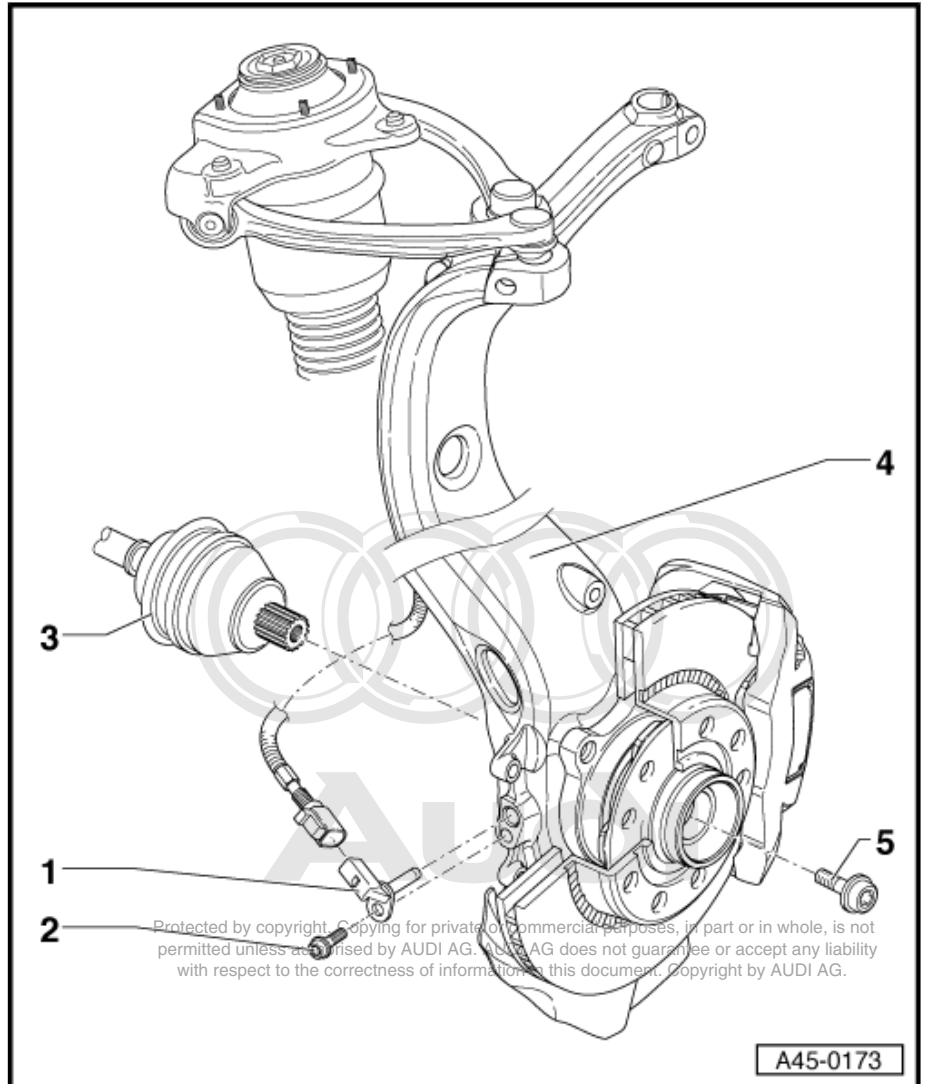
- Tightening torque: 18 Nm

#### 3 - Drive shaft

#### 4 - Wheel hub with wheel bearing

#### 5 - Hexagon socket head bolt

- Always renew if removed ⇒ Rep. gr. 40 ; Servicing drive shaft.



#### 4.1.1 Removing and installing front wheel speed sensor

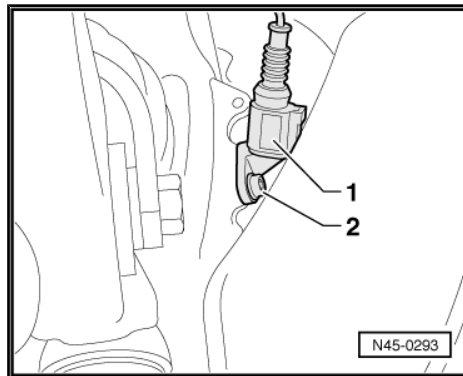
##### Removing

- Raise the vehicle.

- Unplug connector -1-.
- Remove bolt -2- from wheel bearing housing.
- Pull ABS speed sensor out of wheel bearing housing.

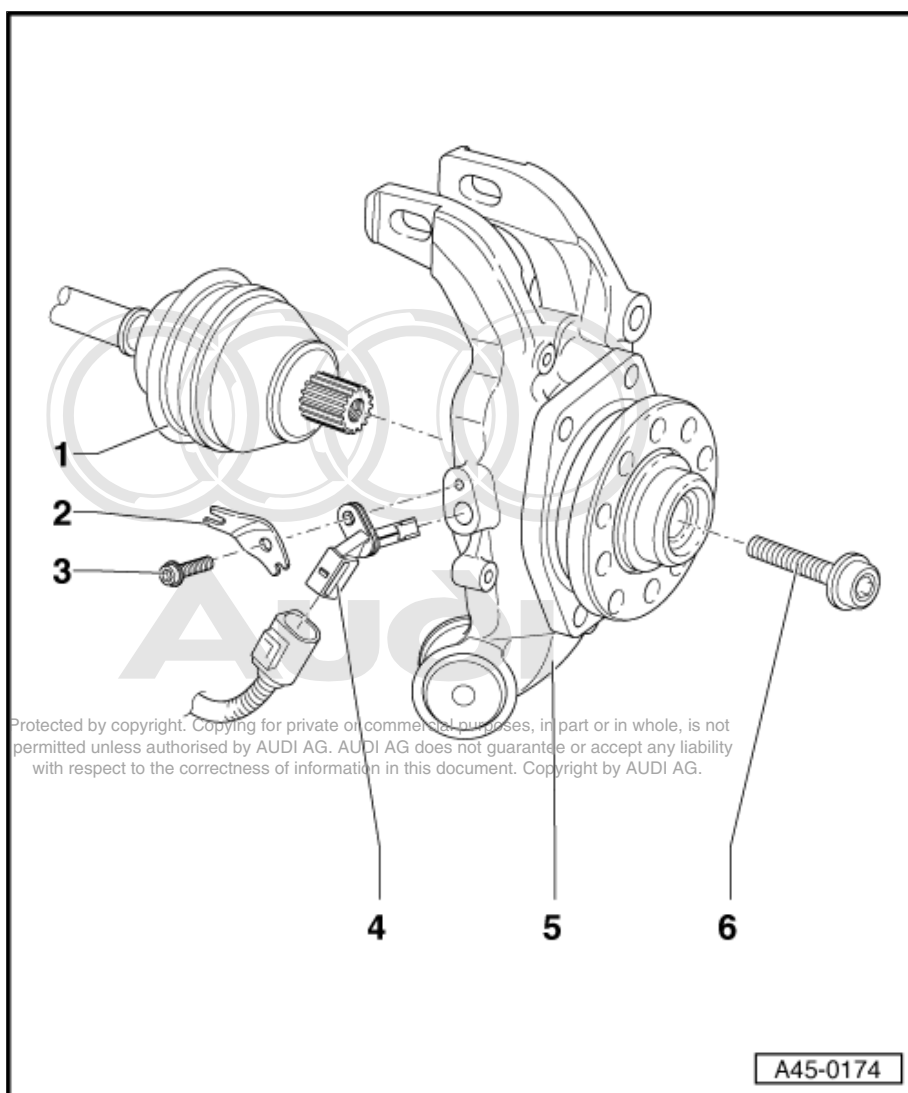
**Installing**

- Before inserting speed sensor, clean inner surface of hole and coat speed sensor thoroughly with lubricating paste G 000 650.
- Insert speed sensor into drilling in wheel bearing housing and tighten bolt.
- Connect speed sensor to speed sensor wiring.



**4.2 Removing and installing parts of ABS system on rear axle**

- 1 - Drive shaft**
- 2 - Bracket**
  - For speed sensor wire
- 3 - Hexagon socket head bolt, 18 Nm**
  - Tightening torque: 18 Nm
- 4 - ABS speed sensor**
  - Before inserting sensor, clean inner surface of fitting hole and coat with grease G 000 650
  - Renewing => [page 32](#)
- 5 - Wheel bearing/hub unit**
  - The ABS sensor ring is installed in the wheel bearing
- 6 - Hexagon socket head bolt**
  - Always renew if removed => Rep. gr. 42 ; Servicing rear drive shaft.



**4.2.1 Removing and installing rear wheel speed sensor**

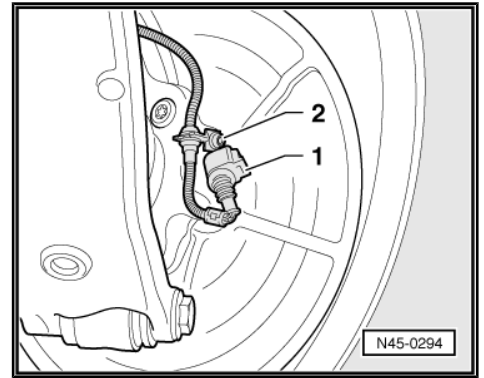
**Removing**

- Raise the vehicle.

- Detach speed sensor wiring connector -1- from speed sensor.
- Remove bolt -2- from wheel bearing housing.
- Pull ABS speed sensor out of wheel bearing housing.

#### Installing

- Before inserting speed sensor, clean inner surface of fitting hole and coat speed sensor thoroughly with grease - G 000 650- .
- Insert speed sensor into hole in wheel bearing housing and tighten bolt together with bracket for speed sensor wire to 10 Nm.
- Connect speed sensor to speed sensor wiring.



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## 5 Removing and installing parts of ESP system

### 5.1 Removing and installing brake light switch

#### Note

- ◆ *The brake light switch must be removed in order to adjust it.*
- ◆ *To ensure a secure fit, the switch may only be fitted once.*

#### Removing

- Unplug electrical connector.
- Turn brake light switch anti-clockwise 45° to remove.

#### Installing

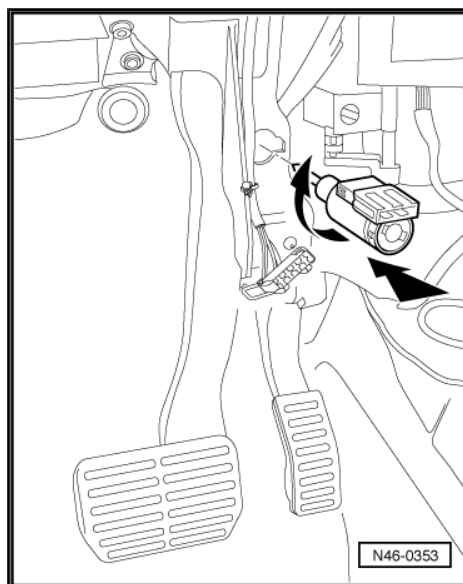
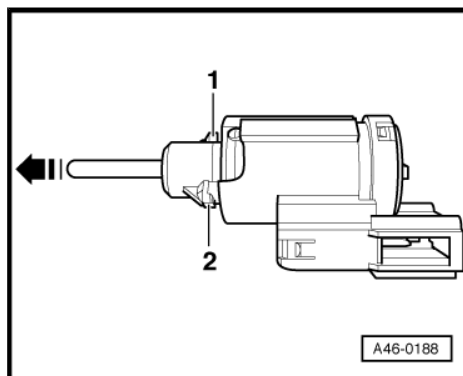
Installation is performed in reverse sequence; note the following:

- Pull out plunger of brake light switch as far as it will go -arrow-.
- Fit retainer tabs -1- and -2- on switch into recesses in mounting hole.

#### Note

- ◆ *When installing, brake pedal must not be pressed.*
  - ◆ *The plunger adjusts itself automatically when the brake light switch is inserted.*
- Guide switch through mounting hole, press against pedal and secure by turning 45° clockwise.
  - Install driver's storage compartment ⇒ Body Repairs; Rep. gr. 68 ; Storage compartments/trim panels and covers; Removing and installing driver's storage compartment .

**After adjusting the brake light switch check whether the brake pedal is on the end stop (rest position).**






## 5.2 Removing and installing lateral acceleration sender -G200- and yaw rate sender -G202-

The lateral acceleration sender -G200- and the yaw rate sender -G202- are integrated in one housing. The housing is located on the front tunnel below the air conditioner.

### Removing

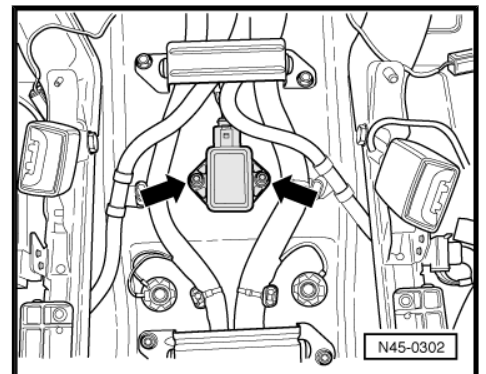
- Remove extension of centre console ⇒ Rep. gr. 68 ; General body repairs, interior .
- Pull connector off lateral acceleration/yaw rate sender.
- Remove the two securing bolts -arrows-.
- Take out lateral acceleration/yaw rate sender.

### Installing



**WARNING**

*Severe shocks or jolts can damage the lateral acceleration/yaw rate sender.*



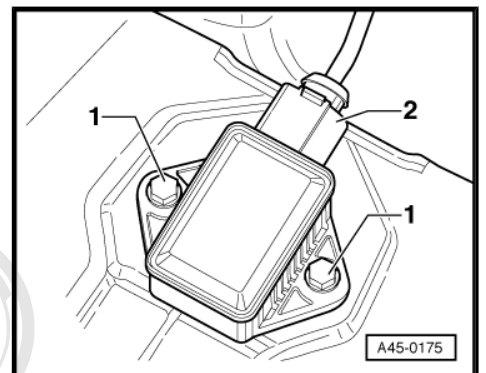
- Installation is carried out in the reverse sequence.

When installing, ensure lateral acceleration/ yaw rate sender is correctly seated in its bracket and is free of stress.

**Do not use the securing bolts to forcibly position the lateral acceleration/yaw rate sender.**

- Tighten securing bolts to 10 Nm.
- When renewing the control unit, select the function "Replace" for the relevant control unit in the "Guided Fault Finding".

**To do so, use the testing and information system.**



## 5.3 Removing and installing steering angle sender -G85-

The steering angle sender is located between the steering wheel and steering column switch.

### 5.3.1 Removing and installing

⇒ Rep. gr. 48 ⇒ Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the permission of Audi AG. Audi AG does not guarantee or accept any liability for the use of the information in this document. Copyright by AUDI AG. Vehicle diagnostic, testing and information system VAS 505x; "Guided Fault Finding" function

- Zero position compensation of steering angle sender must then be performed.
- Connect vehicle diagnostic, testing and information system - VAS 505x- and select "Function/component selection" with the "Go to" key.
- Then, under "Function" select Replace steering angle sender (00778-3132) - G85- ⇒ [page 20](#) .

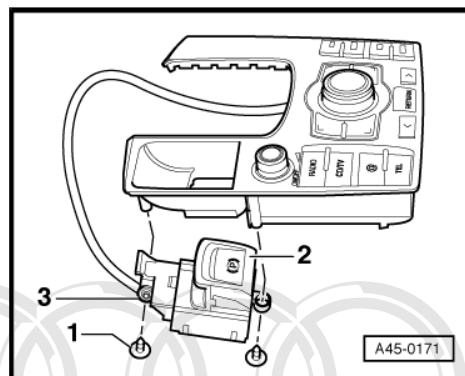
## 5.4 Removing and installing parking brake switch

### Removing

- Remove extension of centre console ⇒ Rep. gr. 68 ; General body repairs, interior .
- Remove switch -item 2- from navigation unit.
- -Item 1- bolt (2x), tightening torque 8 Nm.
- Unplug connector -item 3-.

### Installing

- Installation is carried out in the reverse sequence.



## 5.5 Removing and installing brake pressure sender -G201-

### Removing

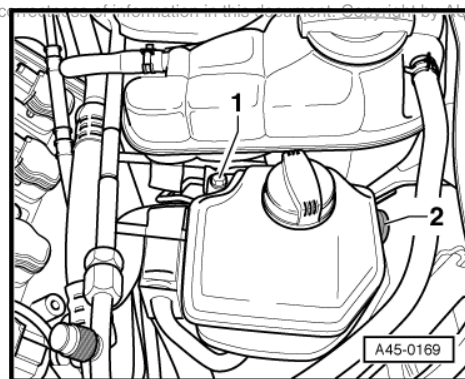


#### Note

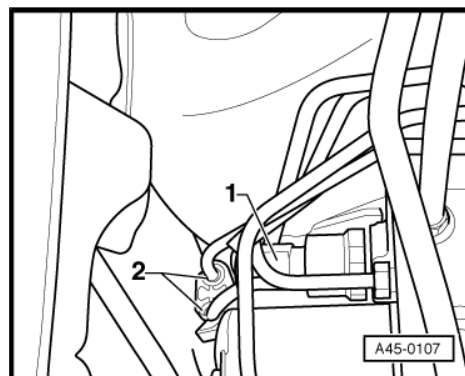
*Cover the engine compartment to ensure that no brake fluid flows into it.*

- Remove hexagon bolt - 1 - securing fluid reservoir and pull fluid reservoir to the side and out of buffer.
- Tightening torque: 6 Nm

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- Unplug connector -1-.

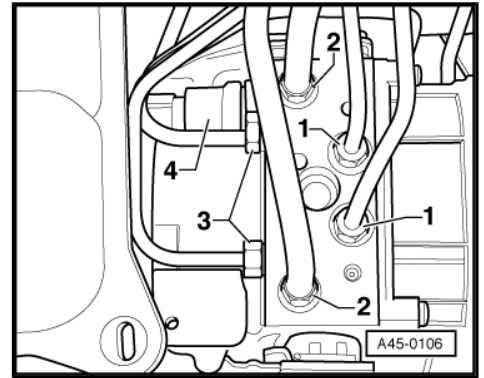


- Unscrew brake pressure sender -4-.

### Installing

Remaining installation steps are carried out in reverse sequence.

- Bleed brake system ⇒ [page 110](#) .
- Perform ESP road test ⇒ vehicle diagnostic, testing and information system VAS 505x in the function "Guided Fault Finding" .



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## 46 – Brakes - mechanism

### 1 Front brakes (PR 1LG)

⇒ [“1.1 Servicing front brakes”, page 38](#)

#### 1.1 Servicing front brakes

⇒ [“1.2 Removing and installing brake pads”, page 41](#)

⇒ [“1.3 Renewing brake caliper”, page 45](#)



#### Note

- ◆ *Always install all parts supplied in repair kit.*
- ◆ *After renewing brake pads, depress brake pedal firmly several times with vehicle stationary so that the pads are properly seated in their normal operating position.*
- ◆ *To draw off brake fluid from brake fluid reservoir use a bleeder bottle which is used only for brake fluid. Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.*
- ◆ *Check that the brake caliper moves freely by moving it from side to side.*



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## 1 - Brake pads



### Note

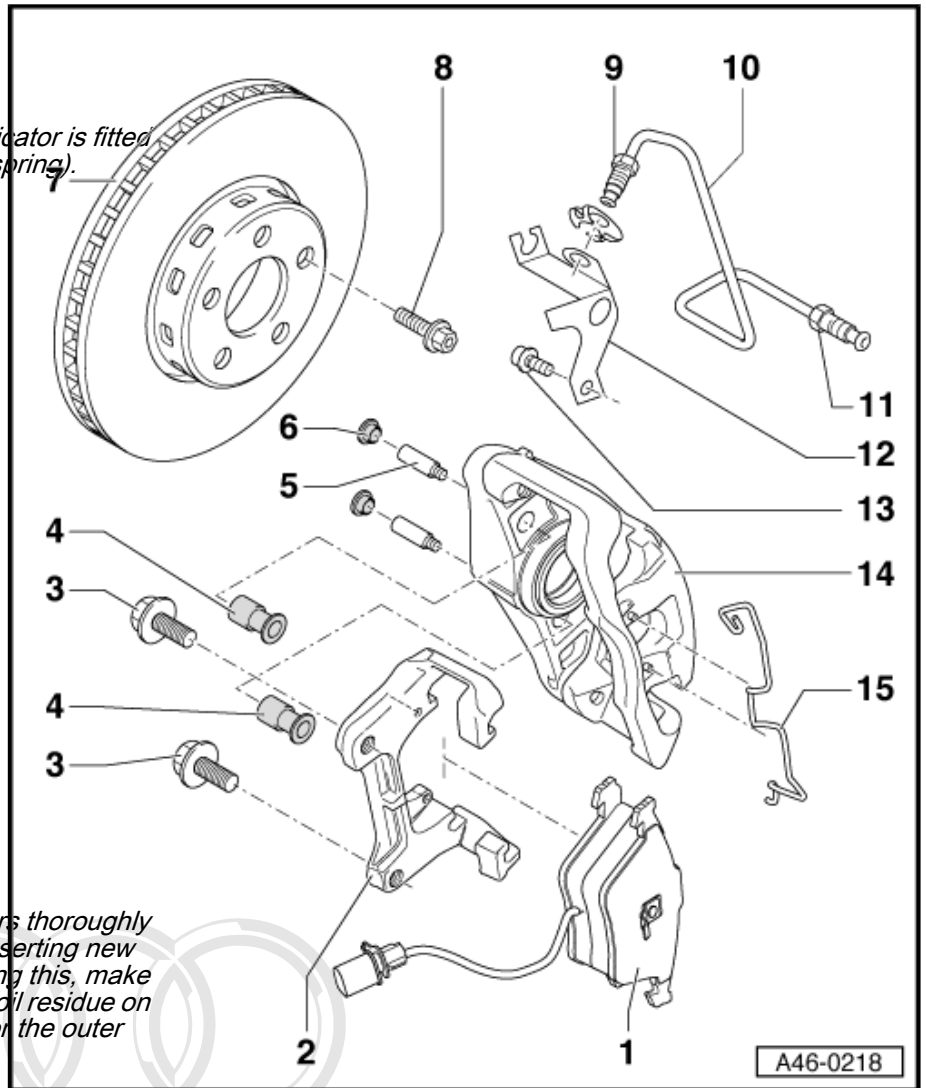
*A wire for the wear indicator is fitted to the inner pad (with spring).*

- ❑ There is an adhesive foil on the backplates of the outer brake pads. Remove the protective foil before fitting pads.
- ❑ Before fitting pads, clean guide surfaces and apply a thin coating of polycarbamide grease ⇒ Parts catalogue
- ❑ Different versions available ⇒ Parts catalogue
- ❑ Always renew on both sides of axle
- ❑ ⇒ ["1.2 Removing and installing brake pads", page 41](#)
- ❑ Checking pad thickness ⇒ Maintenance ; Booklet 4E



### Note

*Clean the brake calipers thoroughly (grease-free) before inserting new brake pads. When doing this, make sure that all adhesive foil residue on the contact surfaces for the outer brake pad is removed.*



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**2 - Brake carrier**

- Bolt to wheel bearing housing

**3 - Ribbed bolt**

- Tightening torque: 190 Nm
- Clean ribs if using again
- M14 × 1.5 × 38

**4 - Bearing bush**

- Insert into brake caliper housing

**5 - Guide pin**

- Tightening torque: 30 Nm

**6 - Protective cap**

- Take off
- Insert wear indicator wire in protective cap

**7 - Brake disc**

- Wear limit ⇒ [page 1](#)
- Always renew on both sides of axle
- Detach brake caliper prior to removing
- Lightly lubricate contact surfaces between brake disc and wheel hub with polycarbamide grease ⇒ Parts catalogue
- Allocation of brake discs ⇒ [page 1](#)

**8 - Wheel bolts**

- Fitting wheels ⇒ ELSA/ Wheel/Tyre Guide

**9 - Brake line connection at brake pipe**

- Tightening torque: 12 Nm

**Note**

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- ◆ *Brake line at brake pipe: 12 Nm*
- ◆ *Brake pipe in brake caliper: 19 Nm*

**10 - Brake line**

- Screw into brake caliper housing
- Screw into brake hose, counter hold on brake hose hexagon.
- Do not twist hose when fitting
- Ensure that lugs are properly seated in grooves in bracket.

**11 - Brake pipe in brake caliper**

- Tightening torque: 19 Nm

**Note**

- ◆ *Brake line at brake hose: 12 Nm*
- ◆ *Brake pipe in brake caliper: 19 Nm*

## 12 - Bracket

- Bolt to brake caliper housing
- Attach brake line

## 13 - Bolt for bracket

- 25 Nm

## 14 - Brake caliper

- If assembly work is required, do not leave caliper hanging from brake hose but secure it to body with wire
- With the exception of "Removing and installing brake pads" ⇒ [page 41](#) and "Servicing front brake caliper" ⇒ [page 84](#), no repairs may be performed on the brake caliper
- Do not twist hose when fitting
- Allocation ⇒ [page 1](#), Brakes
- ⇒ ["1.3 Renewing brake caliper", page 45](#)

## 15 - Retaining spring

- Note correct installation position.
- Engage onto both brake caliper housing studs and onto outer pad retaining spring.



### Note

*The retaining spring must be pushed under the brake carrier after engaging onto both studs. If incorrectly installed, the wear of the outer pad cannot be adjusted, and the pedal travel will be increased as a result.*

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## 1.2 Removing and installing brake pads

Check the thickness of the brake disc when renewing the brake pads. Refer to wear limit for brake disc. Wear limit ⇒ ["1 Brakes, wear limits", page 1](#)

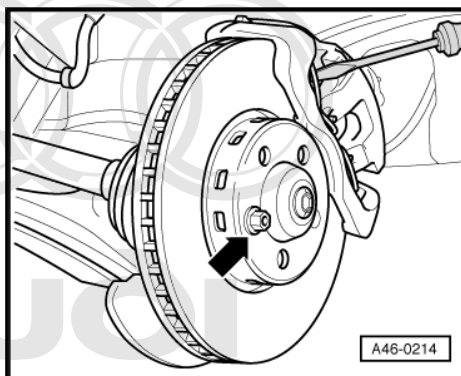
### Removing



### Note

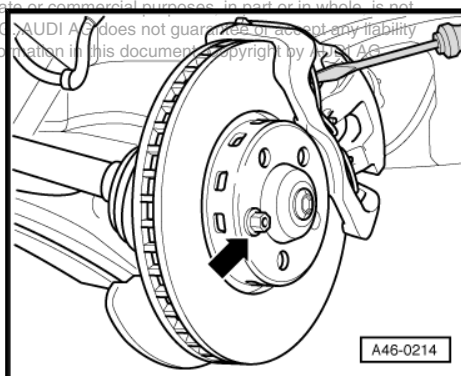
- ◆ *Mark brake pads when removing them if they are to be reinstalled. Reinstall in their original position to prevent uneven braking.*
- ◆ *When installing brake discs, note direction of travel -indicated by arrow on brake disc- and fitting location -left or right-.*
- Raise the vehicle.
- Remove wheels.

- Secure brake disc with one wheel bolt see -arrow-

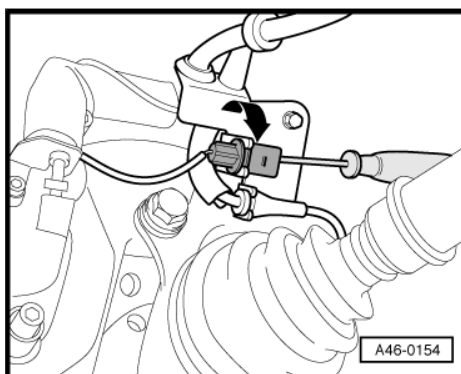


- Lever brake pad retaining spring out of brake caliper housing with a screwdriver and remove.

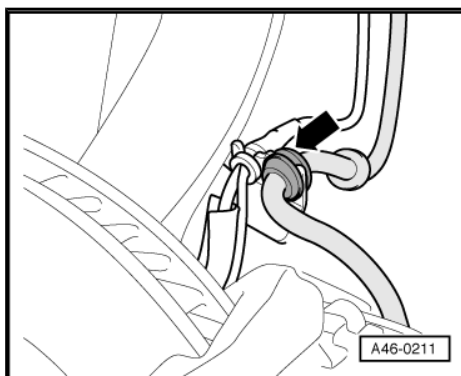
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- Unplug connector for brake pad wear indicator.
- Turn connector 90° while using a screwdriver to release connector from bracket.
- Pull connector upwards out of bracket and detach wire.

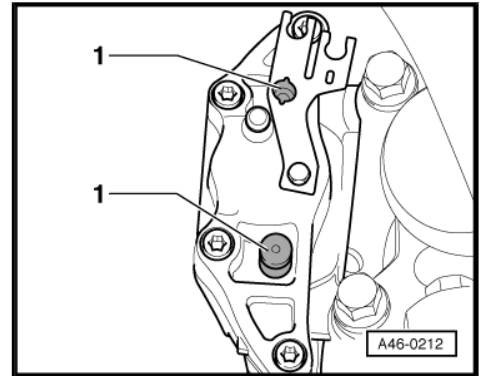


- Detach brake line from bracket.





- Remove caps -1-.



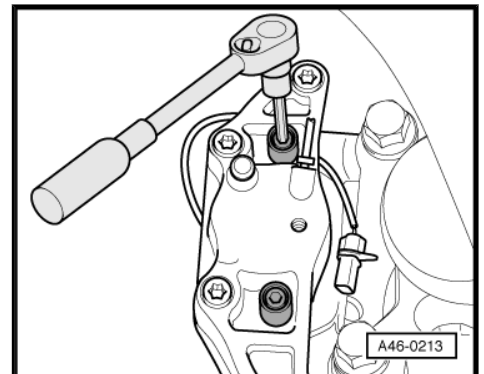
- Unscrew and remove both guide pins from brake caliper.
- Take off brake caliper housing and lay to one side so that the weight of the brake caliper does not stress or damage the brake hose.
- Take brake pads out of brake caliper housing or from brake carrier.

Use only methylated spirits to clean the brake caliper housing.

#### Installing

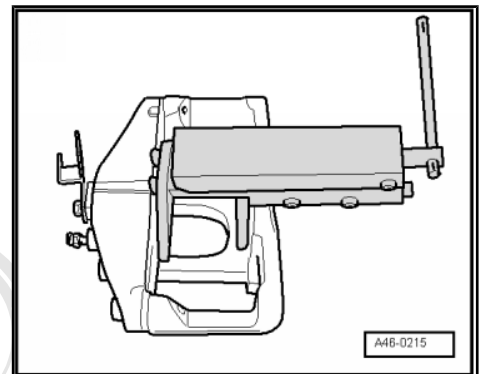
Check the thickness of the brake disc when renewing the brake pads. Refer to wear limit for brake disc.

- Check brake disc for wear ⇒ ["1 Brakes, wear limits", page 1](#).
- Press piston back.



#### Note

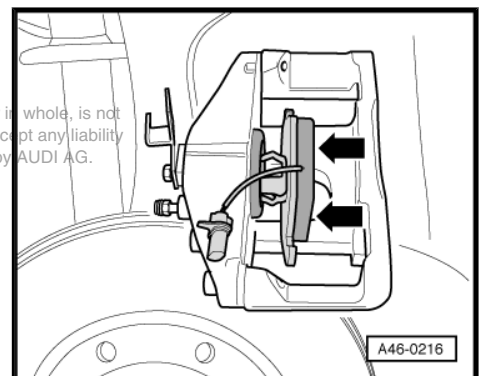
*Before inserting new brake pads, press piston back into cylinder with resetting appliance. Before pressing the piston back, draw off brake fluid from the reservoir with a bleeder bottle. Otherwise, fluid can overflow and cause damage, particularly if the reservoir has been subsequently topped up.*



 **WARNING**  
**Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.**

- Insert brake pad with retaining spring and wear indicator into brake caliper housing (piston).

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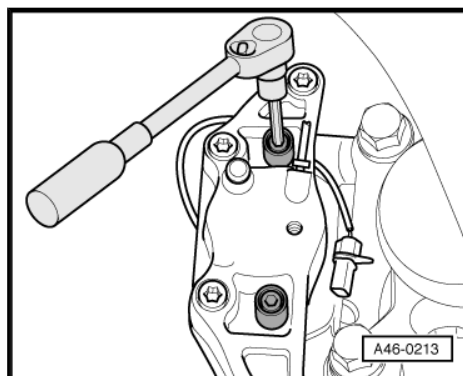
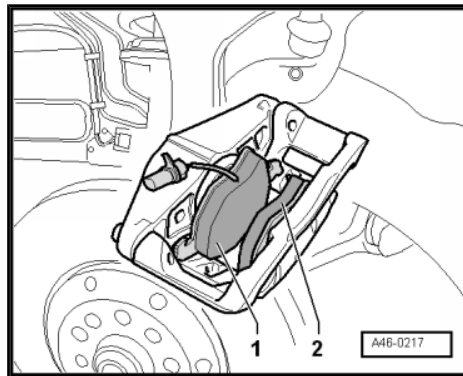
- Fit outer brake pad -2- in brake caliper.

**Note**

- ◆ *Fit brake pads into brake caliper and install assembly on brake carrier / brake disc.*



- Secure brake caliper housing to brake carrier with both guide pins (tighten to 30 Nm).
- Make sure not to twist the brake hose when installing.
- Fit both caps.
- Insert retaining spring into brake caliper housing.
- Attach brake line
- Connect wear indicator connector and insert wire in dust cap and protective cap.
- Fit wheels ⇒ ELSA/ Wheel/Tyre Guide ⇒ Rep. gr. 44 .

**Note**

*The retaining spring must be pushed under the brake carrier after engaging onto both studs. If incorrectly installed, the wear of the outer pad cannot be adjusted, and the pedal travel will be increased as a result.*

**Caution**

*After installing the brake pads and before driving the vehicle, depress brake pedal firmly several times with the vehicle stationary, so that the brake pads are properly seated in their normal operating position.*

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- Check brake fluid level and top up if necessary.

**Caution**

*Before driving vehicle for the first time, make sure function of brakes is OK.*

## 1.3 Renewing brake caliper

### Removing

#### Note

- ◆ *Mark brake pads when removing them if they are to be reinstalled. Reinstall in their original position to prevent uneven braking.*
- ◆ *When installing brake discs, note direction of travel -indicated by arrow on brake disc- and fitting location -left or right-.*

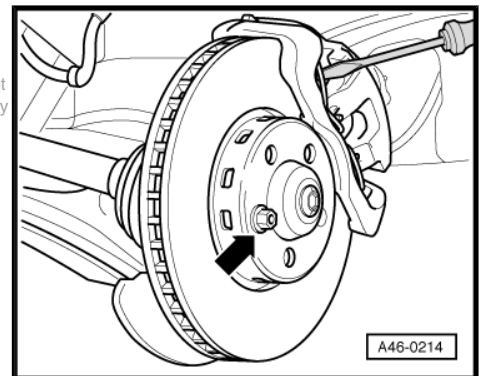
- Raise the vehicle.
- Remove wheels.
- Secure brake disc with one wheel bolt see -arrow-.
- Remove brake pads ⇒ [page 41](#) .

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#### Installing

Installation is carried out in reverse sequence.

- Install brake pads ⇒ [page 41](#) .
- Bleed brake system ⇒ [page 110](#) .
- Fit wheels ⇒ ELSA/ Wheel/Tyre Guide ⇒ Rep. gr. 44 .



#### Caution

*After installing the brake pads and before driving the vehicle, depress brake pedal firmly several times with the vehicle stationary, so that the brake pads are properly seated in their normal operating position.*

- Check brake fluid level and top up if necessary.



#### Caution

*Before driving vehicle for the first time, make sure function of brakes is OK.*

## 2 Front brakes (PR 1LJ, 1LL, 1LM, 1LK)

⇒ [“2.1 Servicing front brakes”, page 46](#)

### 2.1 Servicing front brakes

⇒ [“2.2 Removing and installing brake pads”, page 48](#)

⇒ [“2.3 Renewing brake caliper”, page 52](#)



#### Note

- ◆ Always install all parts supplied in repair kit.
- ◆ After renewing brake pads, depress brake pedal firmly several times with vehicle stationary so that the pads are properly seated in their normal operating position.
- ◆ To draw off brake fluid from brake fluid reservoir use a bleeder bottle which is used only for brake fluid. Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.
- ◆ Check that the brake caliper moves freely by moving it from side to side.

#### 1 - Brake pads



#### Note

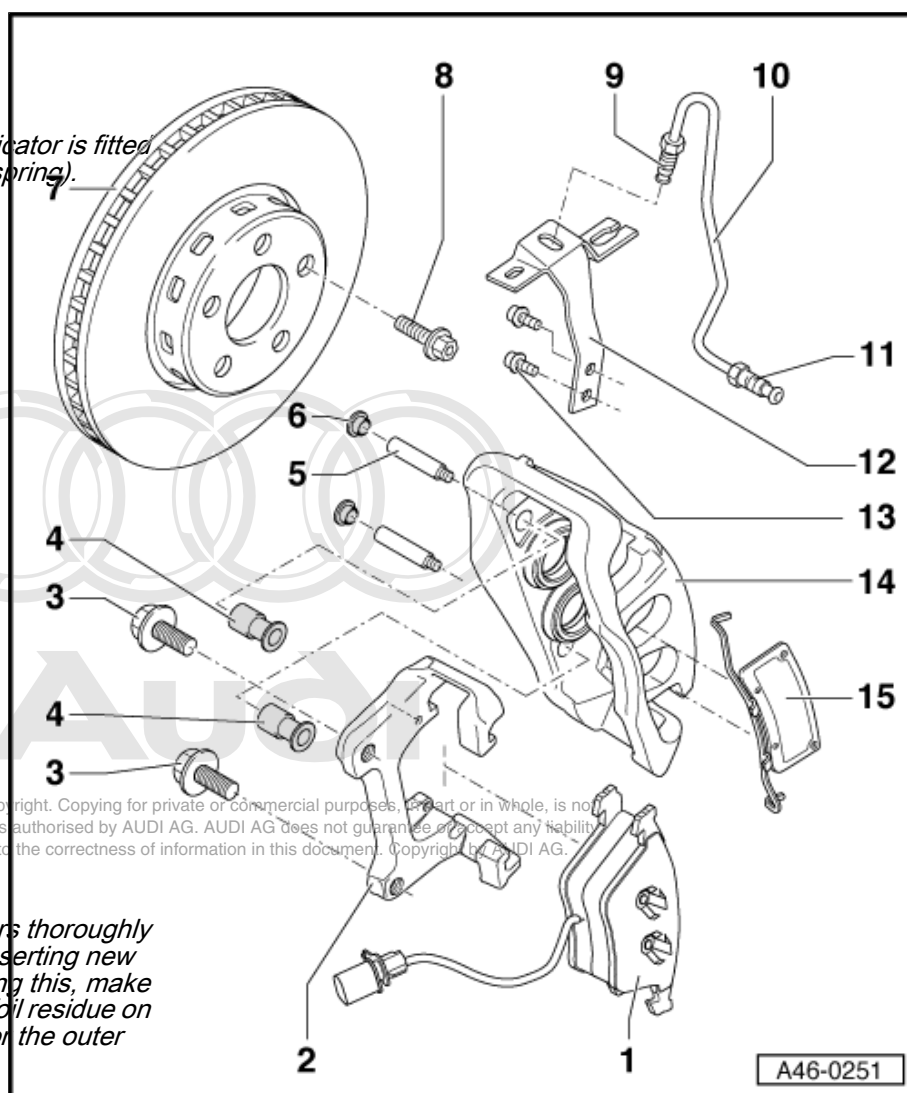
A wire for the wear indicator is fitted to the inner pad (with spring).

- ❑ There is an adhesive foil on the backplates of the outer brake pads. Remove the protective foil before fitting pads.
- ❑ Before fitting pads, clean guide surfaces and apply a thin coating of polycarbamide grease ⇒ Parts catalogue
- ❑ Different versions available ⇒ Parts catalogue
- ❑ Always renew on both sides of axle
- ❑ ⇒ [“2.2 Removing and installing brake pads”, page 48](#)
- ❑ Checking pad thickness ⇒ Maintenance ; Booklet 4E



#### Note

Clean the brake calipers thoroughly (grease-free) before inserting new brake pads. When doing this, make sure that all adhesive foil residue on the contact surfaces for the outer brake pad is removed.



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A46-0251

## 2 - Brake carrier

- Bolt to wheel bearing housing

## 3 - Ribbed bolt

- 190 Nm
- Clean ribs if using again
- M14 × 1.5 x 38

## 4 - Bearing bush

- Insert into brake caliper housing

## 5 - Guide pin

- 

Tightening torque: 30 Nm

## 6 - Protective cap

- Take off
- Insert wear indicator wire in protective cap

## 7 - Brake disc

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- Wear limit** → [page 1](#)
- Always renew on both sides of axle
- Detach brake caliper prior to removing
- Lightly grease contact surfaces between brake disc and wheel hub with polycarbamide grease G 052 142 A2.

## 8 - Wheel bolts

- Fitting wheels ⇒ Wheel/Tyre Guide

## 9 - Brake line connection at brake pipe

- Tightening torque: 12 Nm



### Note

- ◆ *Brake line connection at brake pipe: 12 Nm*
- ◆ *Brake pipe in brake caliper: 19 Nm*

## 10 - Brake line

- Screw into brake caliper housing
- Screw into brake hose, counter hold on brake hose hexagon.
- Do not twist hose when fitting
- Ensure that lugs are properly seated in grooves in bracket.

## 11 - Brake pipe in brake caliper

- Tightening torque: 19 Nm



### Note

- ◆ *Brake pipe in brake caliper: 19 Nm*
- ◆ *Brake line connection at brake pipe: 12 Nm*

## 12 - Bracket

- Bolt to brake caliper housing
- Attach brake line

## 13 - Bolt for bracket

- Tightening torque: 25 Nm

## 14 - Brake caliper

- If assembly work is required, do not leave caliper hanging from brake hose but secure it to body with wire
- With the exception of "Renewing brake pads" ⇒ [page 48](#) and "Servicing front brake caliper" ⇒ [page 88](#), no repairs may be performed on the brake caliper.
- Do not twist hose when installing
- Allocation ⇒ [page 1](#), Brakes
- ⇒ ["2.3 Renewing brake caliper", page 52](#)

## 15 - Retaining spring

- Note correct installation position.



### Note

*The retaining spring must be pushed under the brake carrier after engaging onto both studs. If incorrectly installed, the wear of the outer pad cannot be adjusted, and the pedal travel will be increased as a result.*

## 2.2 Removing and installing brake pads

**Check the thickness of the brake disc when renewing the brake pads. Refer to wear limit for brake disc. Wear limit ⇒ ["1 Brakes, wear limits", page 1](#)**

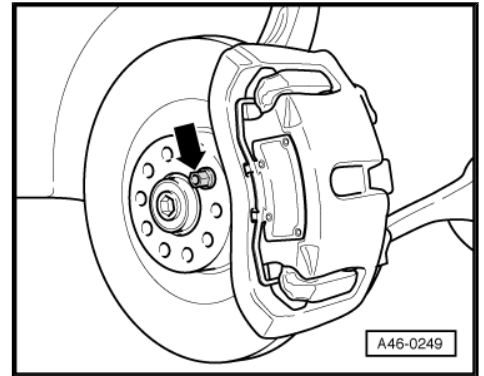
### Removing



### Note

- ◆
  - ◆ *Mark brake pads when removing them if they are to be reinstalled. Reinstall in their original position to prevent uneven braking.*
  - ◆ *When installing brake discs, note direction of travel -indicated by arrow on brake disc- and fitting location -left or right-.*
- Raise the vehicle.
  - Remove wheels.

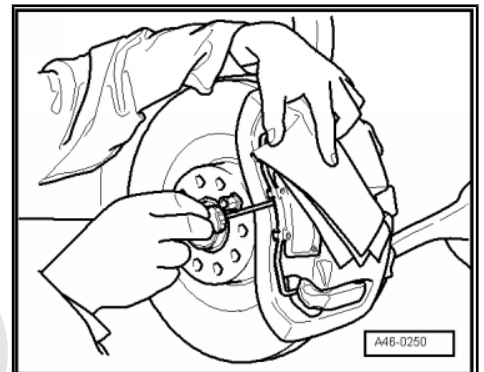
- Secure brake disc with one wheel bolt see -arrow-.



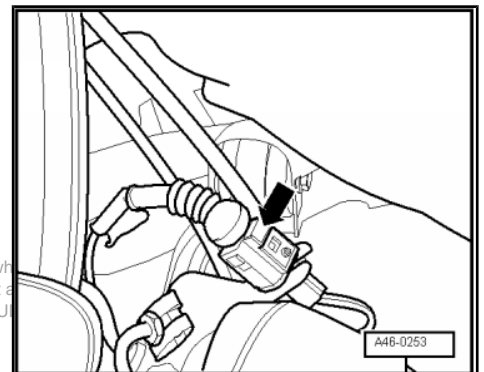
- Lever brake pad retaining spring out of brake caliper housing with a screwdriver and remove.

 **Note**

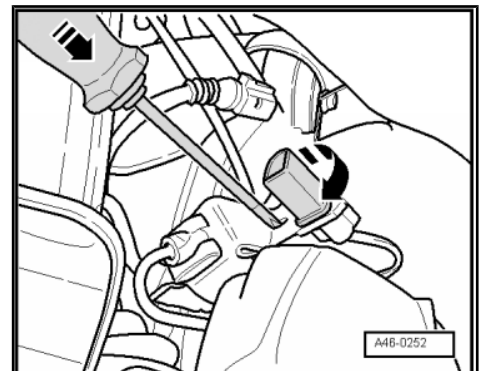
*Spring is under tension, so protect yourself by holding a glove or cloth in front of spring.*



- Unplug connector for brake pad wear indicator as shown in illustration.

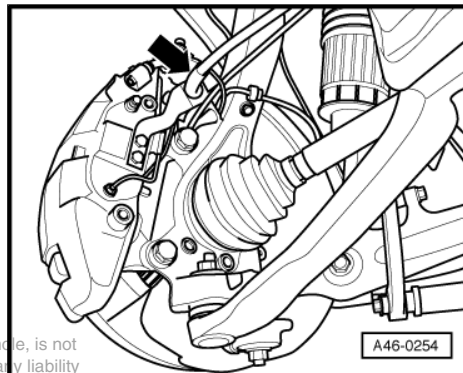


- Turn connector 90° while using a screwdriver to release connector from bracket.
- Pull connector upwards out of bracket and detach wire.



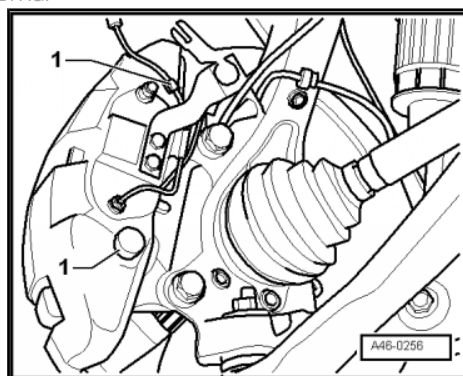
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- Detach brake line from bracket.



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- Remove caps -1-.



- Unscrew and remove both guide pins from brake caliper.
- Take off brake caliper housing and lay to one side so that the weight of the brake caliper does not stress or damage the brake hose.
- Take brake pads out of brake caliper housing or from brake carrier.



**Note**

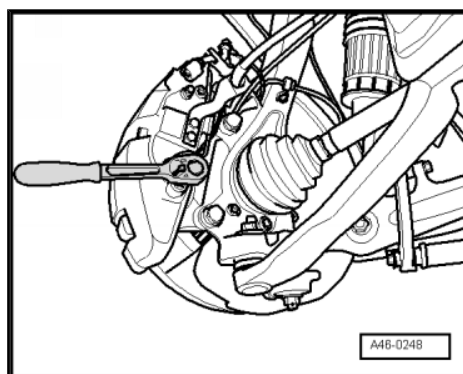
- ◆ *The brake pad with wear indicator is located on the inside.*
- ◆ *Remove brake carrier when renewing brake discs.*

**Use only methylated spirits to clean the brake caliper housing.**

**Installing**

**Check the thickness of the brake disc when renewing the brake pads. Refer to wear limit for brake disc.**

- Check brake disc for wear ⇒ ["1 Brakes, wear limits", page 1](#) .






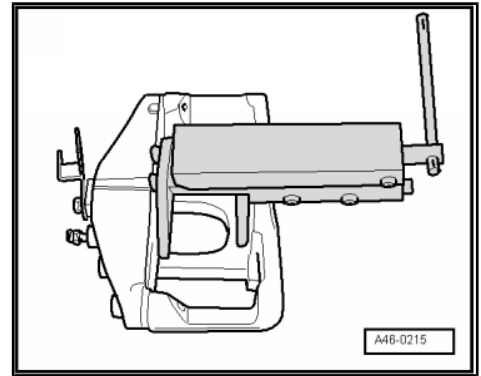
- Press back both pistons.

 **Note**

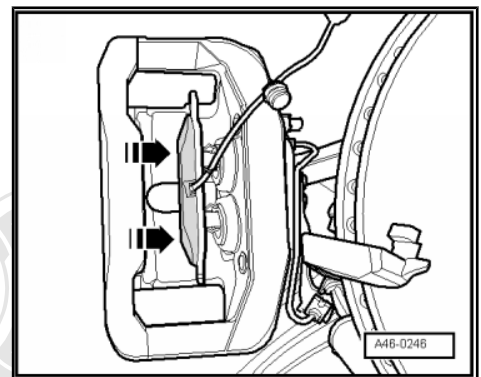
*Before inserting new brake pads, press pistons back into cylinders with resetting appliance. Before pressing the pistons back, draw off brake fluid from the reservoir with a bleeder bottle. Otherwise, fluid can overflow and cause damage, particularly if the reservoir has been topped up.*

 **WARNING**

*Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.*



- Insert brake pad with retaining spring and wear indicator into brake caliper housing (piston).

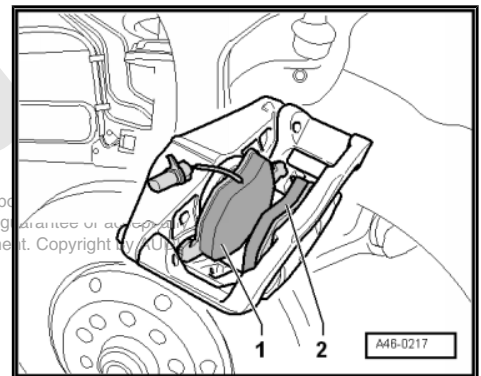


- Fit outer brake pad -2- in brake caliper.

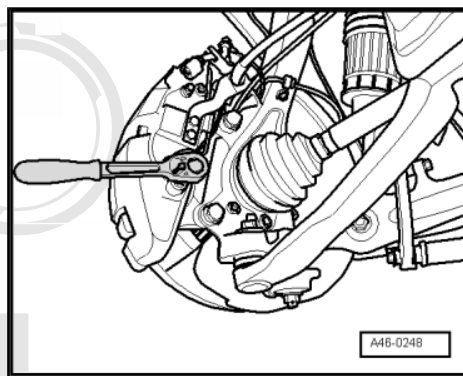
 **Note**

*Fit brake pads into brake caliper and install assembly on brake carrier / brake disc.*

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- Secure brake caliper housing to brake carrier with both guide pins (tighten to 30 Nm).
- Fit both caps.
- Make sure not to twist the brake hose when installing.
- Insert retaining spring into brake caliper housing.
- Attach brake line.
- Connect wear indicator connector and insert wire in dust cap and protective cap.
- Fit wheels ⇒ ELSA/ Wheel/Tyre Guide ⇒ Rep. gr. 44 .

**Note**

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*The retaining spring must be pushed under the brake carrier after engaging onto both studs. If incorrectly installed, the wear of the outer pad cannot be adjusted, and the pedal travel will be increased as a result.*

**Caution**

*After installing the brake pads and before driving the vehicle, depress brake pedal firmly several times with the vehicle stationary, so that the brake pads are properly seated in their normal operating position.*

- Check brake fluid level and top up if necessary.

**Caution**

*Before driving vehicle for the first time, make sure function of brakes is OK.*

## 2.3 Renewing brake caliper

### Removing

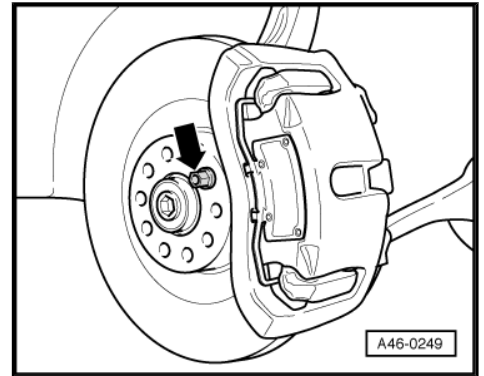
**Note**

- ◆ *Mark brake pads when removing them if they are to be reinstalled. Reinstall in their original position to prevent uneven braking.*
- ◆
- Raise the vehicle.
- Remove wheels.

- Secure brake disc with one wheel bolt see -arrow-.
- Remove brake pads ⇒ [page 48](#) .

#### Installing

- Install brake pads ⇒ [page 48](#) .
- Bleed brake system ⇒ [page 110](#) .
- Fit wheels ⇒ ELSA/ Wheel/Tyre Guide ⇒ Rep. gr. 44 .



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***After installing the brake pads and before driving the vehicle, depress brake pedal firmly several times with the vehicle stationary, so that the brake pads are properly seated in their normal operating position.***

- Check brake fluid level and top up if necessary.



#### Caution

***Before driving vehicle for the first time, make sure function of brakes is OK.***

### 3 Ceramic front brakes (PR 1LW)

⇒ **“3.1 Servicing ceramic brakes”, page 54**

#### 3.1 Servicing ceramic brakes

The ceramic brake discs must always be checked for damage and wear when renewing the brake pads.

- ◆ ⇒ **“2 Assessment of ceramic brake discs”, page 4**
- ◆ ⇒ **“3 Assessing degree of wear on ceramic brake discs”, page 7**

**i** Note

- ◆ Always install all parts supplied in repair kit.
- ◆ After renewing brake pads, depress brake pedal firmly several times with vehicle stationary so that the pads are properly seated in their normal operating position.
- ◆ To draw off brake fluid from brake fluid reservoir use a bleeder bottle which is used only for brake fluid. Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.

1 - Bolts

**Caution**  
Do NOT loosen these bolts.

**i** Note

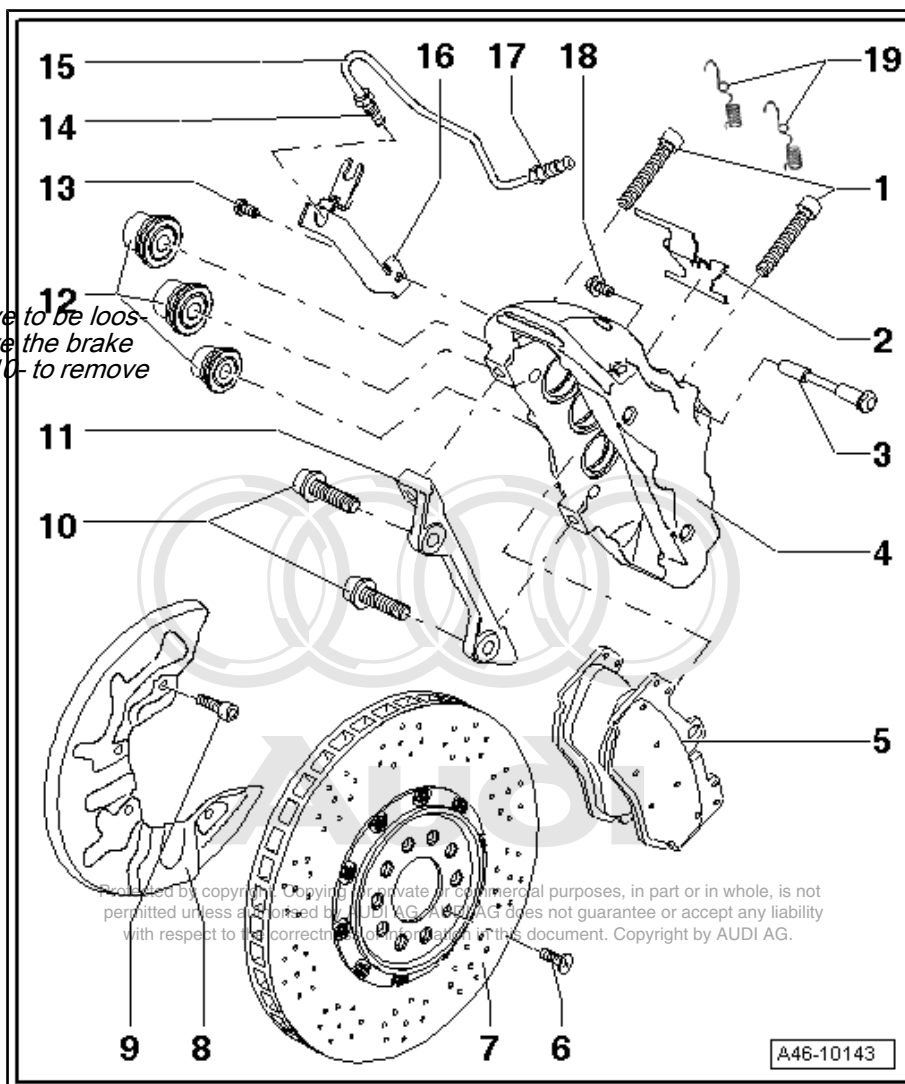
These bolts do not have to be loosened in order to remove the brake caliper. Loosen bolts -10- to remove the brake caliper.

2 - Retaining spring for brake pads

3 - Guide pin

4 - Brake caliper

- If assembly work is required, do not leave caliper hanging from brake hose but secure it to body with wire
- With the exception of **“Renewing brake pads”** ⇒ [page 48](#) and **“Servicing front brake caliper”** ⇒ [page 88](#), no repairs may be performed on the brake caliper.
- Always renew on both sides of axle
- Allocation ⇒ [page 1](#), Brakes
- Removing and installing



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[⇒ page 57](#)

## 5 - Brake pads



### Note

*A wire for the wear indicator is fitted to the inner pad.*

- There is an adhesive foil on the backplates of the outer brake pads. Remove the protective foil before fitting pads.
- Before fitting pads, clean guide surfaces and apply a thin coating of polycarbamide grease ⇒ Parts catalogue
- Different versions available ⇒ Parts catalogue
- Always renew on both sides of axle
- Removing and installing [⇒ page 57](#)
- Checking pad thickness ⇒ Maintenance ; Booklet 4E

## 6 - Locating bolt

- Tightening torque 5 Nm

## 7 - Brake disc

- Wear limit [⇒ page 1](#)
- Always renew on both sides of axle
- Detach brake caliper prior to removing
- Lightly grease contact surfaces between brake disc and wheel hub with polycarbamide grease G 052 142 A2.
- Allocation of brake discs [⇒ page 1](#)
- Removing and installing [⇒ page 62](#)
- Renewing [⇒ page 63](#)

## 8 - Splash plate

## 9 - Bolts for splash plate

- Tightening torque 9 Nm

## 10 - Bolts



### Note

*Loosen these bolts to remove brake caliper.*



### Note

*Always renew if removed*


- 190 Nm

## 11 - Brake carrier

- Bolt to wheel bearing housing
- Bolted onto brake caliper
- 190 Nm

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## 12 - Brake pistons

 **WARNING**

*The brake pistons have different diameters. When re-installing, please make sure that each of the brake pistons is inserted in the correct aperture in the brake caliper. The ceramic inserts on the brake piston act as heat insulators and must not be separated from the brake piston. If the ceramic insert is damaged, the brake pistons must be renewed for safety reasons.*

## 13 - Bolt for bracket

- Tightening torque: 25 Nm

## 14 - Brake line connection at brake pipe

- Tightening torque: 12 Nm
- Brake hose must not be twisted.



### Note

- ◆ *Brake line connection at brake pipe: 12 Nm*
- ◆ *Brake pipe in brake caliper: 19 Nm*

## 15 - Brake line

- Screw into brake caliper housing
- Screw into brake hose, counter hold on brake hose hexagon.
- Do not twist hose when fitting
- Ensure that lugs are properly seated in grooves in bracket.

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## 16 - Bracket for brake line

- Bolt to brake caliper housing
- Attach brake line

## 17 - Brake pipe in brake caliper

- Tightening torque: 19 Nm



### Note

- ◆ *Brake pipe in brake caliper: 19 Nm*
- ◆ *Brake line connection at brake pipe: 12 Nm*

## 18 - Bolt for guide pin

- 30 Nm

## 19 - Damper spring

- 2 fitted on each brake caliper
- Detaching and attaching ⇒ [page 57](#)




### 3.2 Detaching and attaching damper spring

#### Detaching

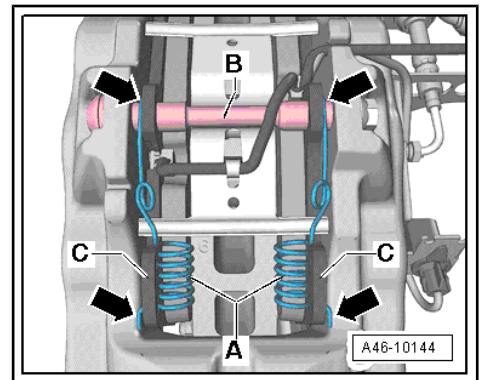
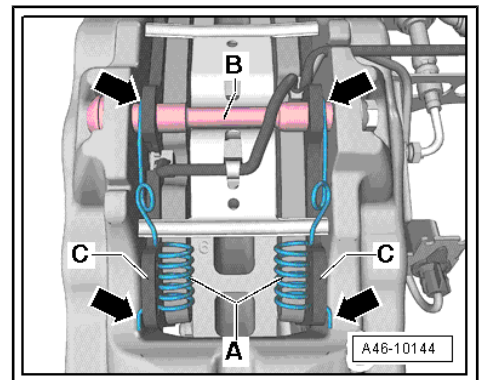
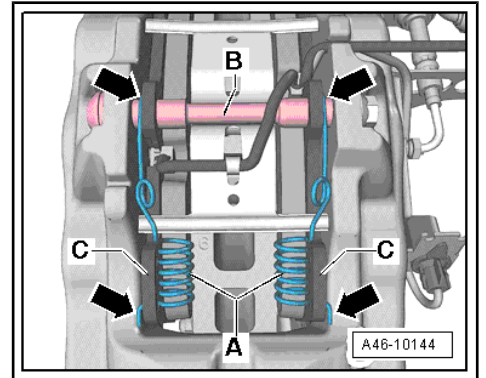
- First disengage damper springs -A- (left and right) from guide pin -B- using commercially available pliers.
- Then pull damper springs -A- out of brake pads -C-.

#### Attaching

- First engage damper springs -A- (left and right) in bottom hole in corresponding brake pads -C-.
- Then engage damper springs -A- (left and right) in guide pin -B- using commercially available pliers.

 **Caution**  
***Make sure that the damper springs are fitted correctly at the guide pin and brake pads.***

Installation position of damper springs at guide pin and brake pads -arrows-



### 3.3 Removing and installing brake pads (ceramic brakes)

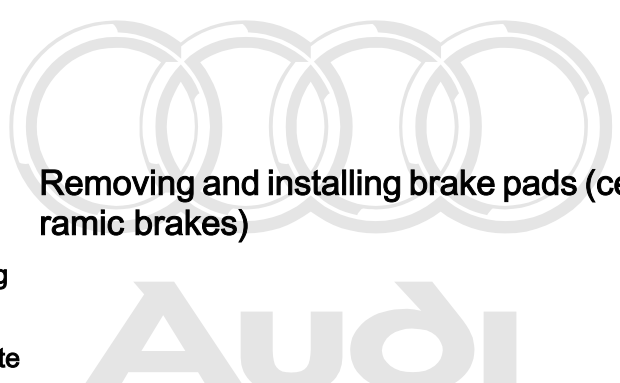
#### Removing

 **Note**

- ◆ ***The brake caliper does not have to be detached in order to remove the brake pads.***
- ◆ ***Mark brake pads when removing them if they are to be reinstalled. Reinstall in their original position to prevent uneven braking.***

The ceramic brake discs must always be checked for damage and wear when renewing the brake pads.

- ◆ => ["2 Assessment of ceramic brake discs", page 4](#)



◆ ⇒ ["3 Assessing degree of wear on ceramic brake discs", page 7](#)

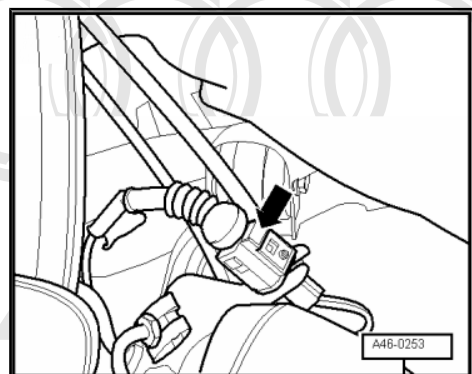
- Raise the vehicle.
- Remove wheels.



**Caution**

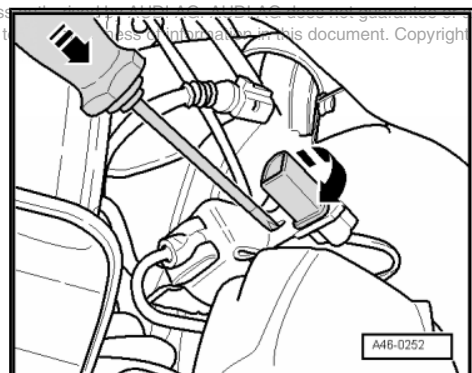
*On vehicles with ceramic brakes the wheel must not be allowed to drop onto the brake disc. This would cause irreparable damage to the disc. Screw two assembly pins (from vehicle tool kit) into the wheel bolt holes when removing and fitting a wheel. Insert the long assembly pin into the top hole.*

- Secure brake disc with one wheel bolt.
- Unplug connector for brake pad wear indicator as shown in illustration.



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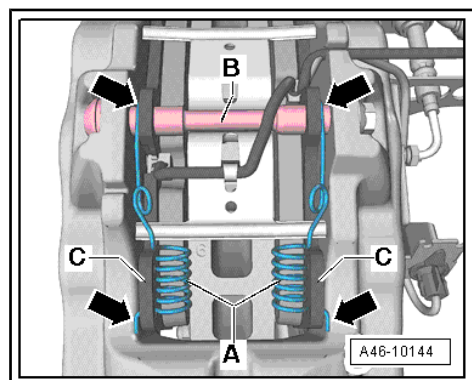
- Turn connector 90° while using a screwdriver to release connector from bracket.
- Pull connector upwards out of bracket and detach wire.



 **Note**

*The brake caliper does not have to be detached in order to remove the brake pads.*

- First disengage damper springs -A- (left and right) from guide pin -B- using commercially available pliers.
- Then pull damper springs -A- out of brake pads -C-.
- Remove bolt for guide pin -B-.
- Pull guide pin out of brake pads and brake caliper.



**WARNING**


*Retaining spring is under tension and could cause injury when pulling out the guide pin if suitable precautions are not taken.*



- Disengage pad wear indicator wire from retaining spring -2-.

 **Note**

*Before removing old brake pads, press pistons back into cylinders with resetting appliance. Before pressing the pistons back, draw off brake fluid from the reservoir with a bleeder bottle. Otherwise, fluid can overflow and cause damage, particularly if the reservoir has been topped up.*

 **WARNING**  
*Brake fluid is poisonous and must NOT be drawn off by sucking through a hose.*

- Remove retaining spring -2-.
- Remove brake pads from brake caliper housing.

Use only methylated spirits to clean the brake caliper housing.

**Installing**

The ceramic brake discs must always be checked for damage and wear when renewing the brake pads.


- ◆ ⇒ [“2 Assessment of ceramic brake discs”, page 4](#)
- ◆ ⇒ [“3 Assessing degree of wear on ceramic brake discs”, page 7](#)

- Insert brake pads into brake caliper.

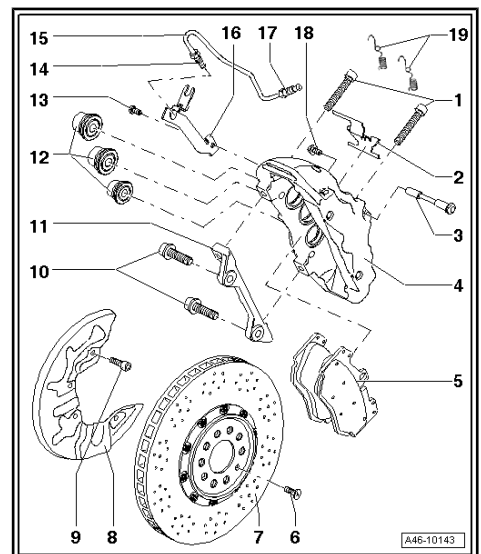
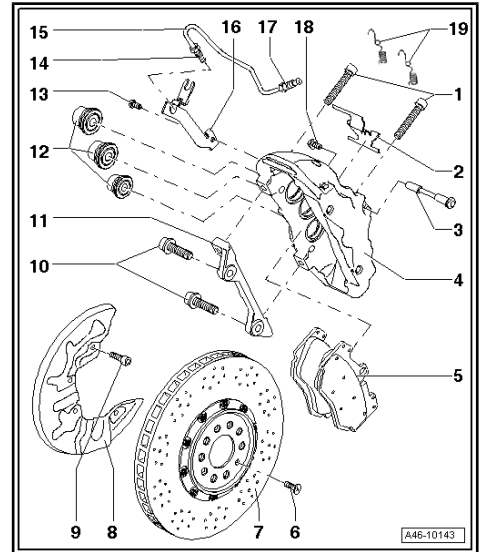
 **Note**

*The brake pad with the wear indicator wire is located on the inside.*

- Insert retaining spring in brake caliper housing -2-.
- Press guide pin -3- through brake caliper and brake pads.

 **WARNING**  
*After introducing the guide pin, the retaining spring must be pressed underneath the guide pin so that it is under tension. If the retaining spring is fitted incorrectly, the brake pads will be out of position and the function of the brakes will be impaired.*

- Tighten bolt of guide pin -18- to specified torque  
 ⇒ [Item 18 \(page 56\)](#) .

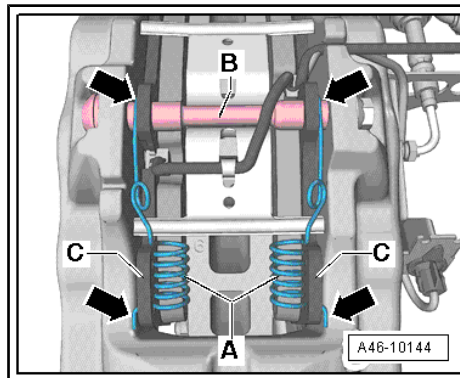


- First engage damper springs -A- (left and right) in bottom hole in corresponding brake pads -C-.
- Then engage damper springs -A- (left and right) in guide pin -B- using commercially available pliers.



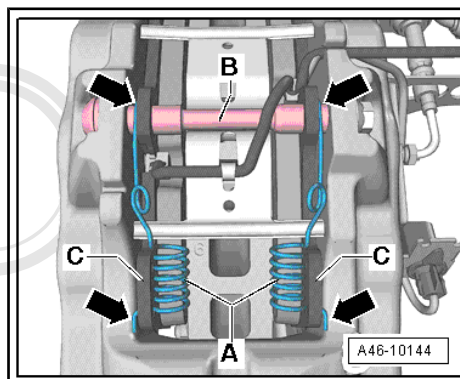
**Caution**

*Make sure that the damper springs are fitted correctly at the guide pin and brake pads.*



**Installation position of damper springs at guide pin and brake pads -arrows-**

- Connect wear indicator connector and insert wire in dust cap and protective cap.

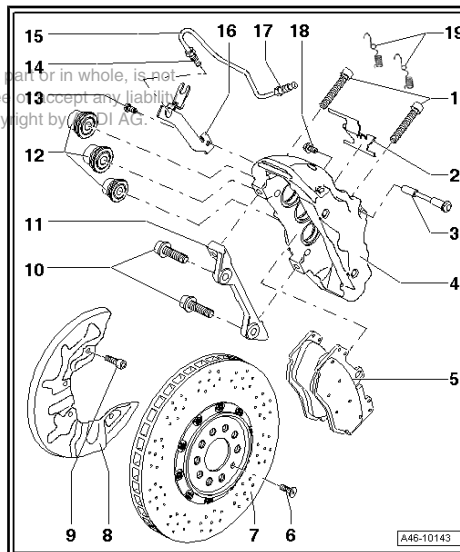


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*It is important to ensure that the pad wear indicator wire is inserted in the retaining spring -2-.*

- Insert pad wear indicator wire in retaining spring -2-.
- Fit wheels => ELSA/ Wheel/Tyre Guide => Rep. gr. 44 .
- Check brake fluid level and top up if necessary.



**Caution**

*After installing the brake pads and before driving the vehicle, depress brake pedal firmly several times with the vehicle stationary, so that the brake pads are properly seated in their normal operating position.*



**Caution**

*Before driving vehicle for the first time, make sure function of brakes is OK.*

### 3.4 Removing and installing brake caliper (ceramic brakes)



**Caution**

*Do NOT loosen bolts -1-.*

**4 - Brake caliper**

- If assembly work is required, do not suspend caliper from brake hose but tie it to body with a piece of wire.

**10 - Bolts**



**Note**

*Always renew if removed*

- 190 Nm

**11 - Brake carrier**

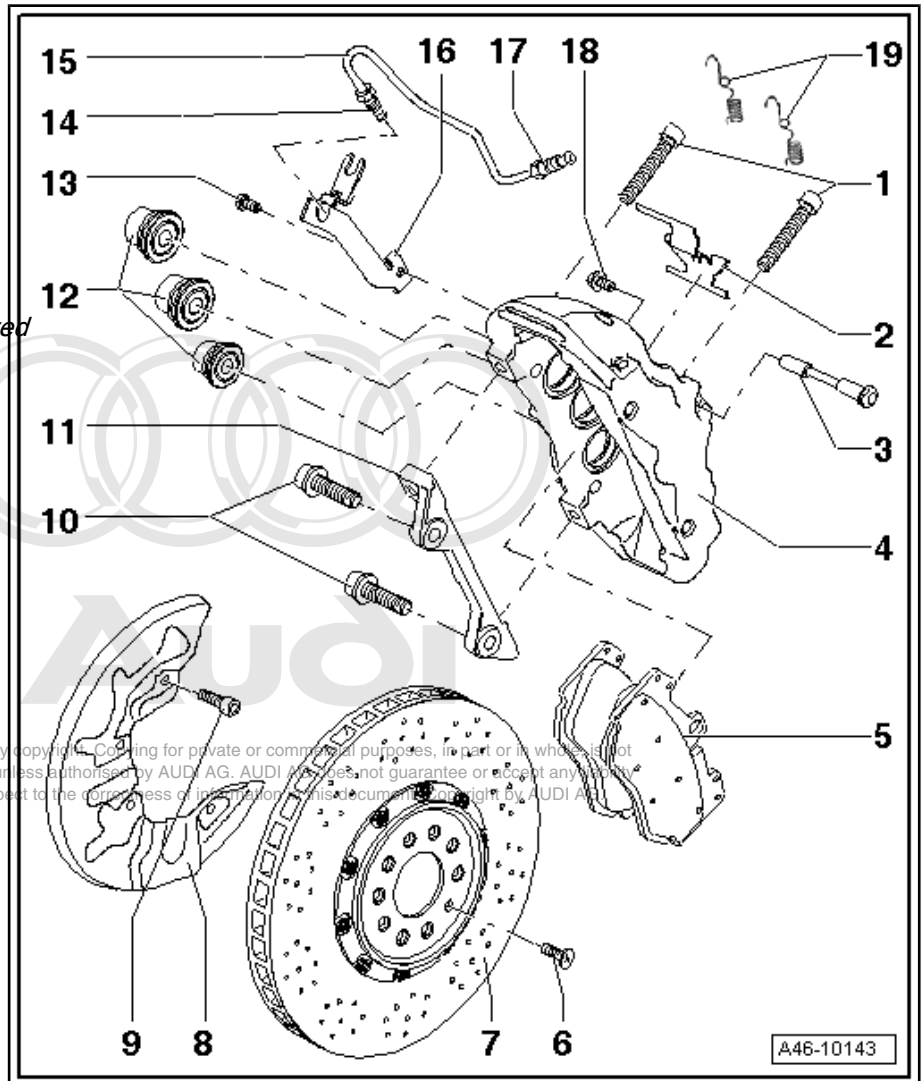
- Bolt to wheel bearing housing
- Bolted onto brake caliper
- 190 Nm

**13 - Bolt for bracket**

- 25 Nm

**16 - Bracket for brake line**

- Attach brake line



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 **Note**

Do NOT loosen bolts -1-.

**Removing**

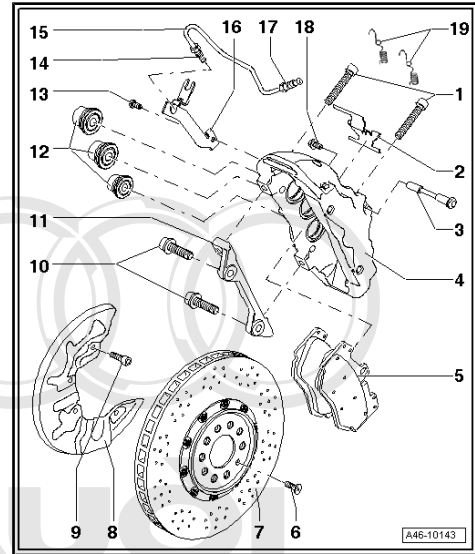
- Remove bracket for brake line.
- Loosen and remove the two bolts -10- on the brake carrier.
- Remove brake caliper. Leave brake carrier -11- in position on brake caliper.

**Installing**

- Installation is carried out in reverse sequence.

 **Note**

Take care not to twist brake hose.



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**Caution**

*Before driving vehicle for the first time, make sure function of brakes is OK.*

### 3.5 Detaching and attaching front brake disc (ceramic brakes)



**WARNING**

*The brake disc ring and the brake disc hub are bolted together and must NOT be separated. Do NOT slacken the bolted connection on the brake disc hub.*

- Raise vehicle.
- Remove wheels.



**Caution**

*On vehicles with ceramic brakes the wheel must not be allowed to drop onto the brake disc. This would cause irreparable damage to the disc. Screw two assembly pins (from vehicle tool kit) into the wheel bolt holes when removing and fitting a wheel. Insert the long assembly pin into the top hole.*

- Detach brake caliper via bolt -10- → [page 60](#) .

Do not leave brake caliper and brake carrier hanging from brake hose but secure them to bodywork using a suitable cable tie or wire. Take care that brake hose is not damaged by weight of brake components.

 **Note**

Do NOT loosen bolts -1-.

- Remove locating bolt -6- from brake disc, holding brake disc in position.
- Take brake disc off wheel hub.

 **Note**

*Take care to keep the brake disc straight when taking it off the wheel hub.*

**Installing**

- Clean contact surfaces of wheel hub and brake disc and remove corrosion.
- Fit brake disc onto wheel hub.

 **Note**

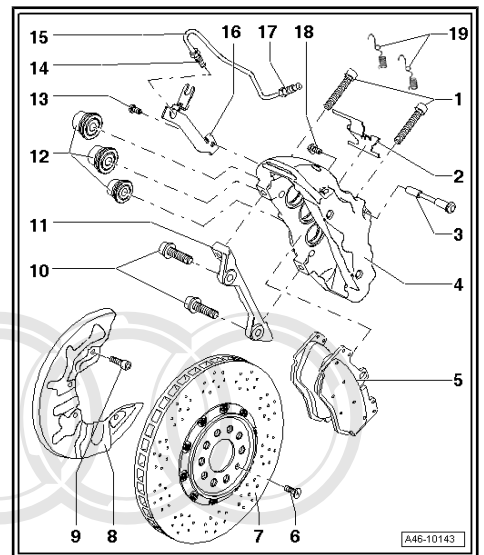
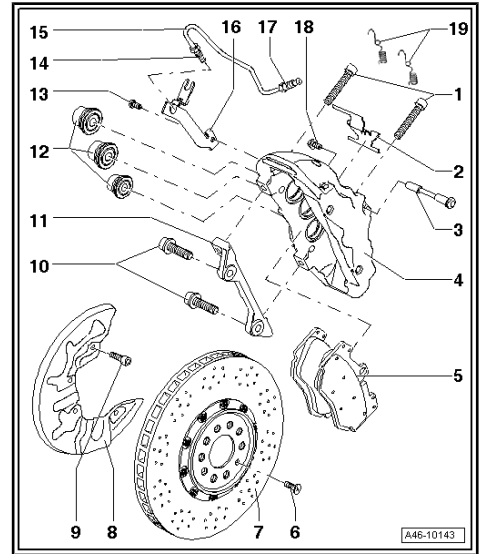
*Take care to keep the brake disc straight when fitting it onto the wheel hub.*

- Screw in locating bolt -6- and tighten to 5 Nm.
- Attach brake caliper ⇒ [page 60](#) .
- Fit wheels.

Tightening torque for wheel bolts ⇒ Rep. gr. 44

 **Caution**

*Before driving vehicle for the first time, make sure function of brakes is OK.*



### 3.6 Renewing front brake disc (ceramic brakes)

 **WARNING**

*The brake disc ring and the brake disc hub are bolted together and must NOT be separated. Do NOT slacken the bolted connection on the brake disc hub.*

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 **Note**

*Always renew on both sides of axle.*

**Removing**

- Raise vehicle.
- Remove wheels.



**Caution**

*On vehicles with ceramic brakes the wheel must not be allowed to drop onto the brake disc. This would cause irreparable damage to the disc. Screw two assembly pins (from vehicle tool kit) into the wheel bolt holes when removing and fitting a wheel. Insert the long assembly pin into the top hole.*

- Remove brake pads ⇒ [page 57](#) .
- Detach brake caliper ⇒ [page 60](#) .

**Do not leave brake caliper hanging from brake hose but secure it to bodywork using a suitable cable tie or wire. Take care that brake hose is not damaged by weight of brake components.**

- Remove locating bolt -6- from brake disc, holding brake disc in position.
- Take brake disc off wheel hub.



**Note**

*Take care to keep the brake disc straight when taking it off the wheel hub.*

**Installing**

- Clean contact surfaces of wheel hub and remove corrosion.
- Fit brake disc onto wheel hub.



**Note**

*Take care to keep the brake disc straight when fitting it onto the wheel hub.*

- Screw in locating bolt -6- and tighten to 5 Nm.
- Attach brake caliper ⇒ [page 60](#) .
- Install brake pads ⇒ [page 57](#) .
- Fit wheels.



**Caution**

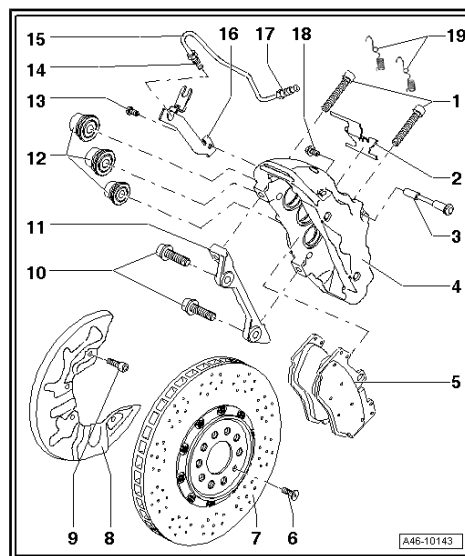
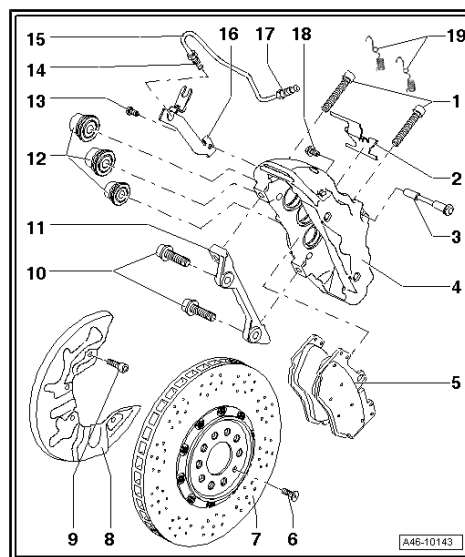
*On vehicles with ceramic brakes the wheel must not be allowed to drop onto the brake disc. This would cause irreparable damage to the disc. Screw two assembly pins (from vehicle tool kit) into the wheel bolt holes when removing and fitting a wheel. Insert the long assembly pin into the top hole.*

Tightening torque for wheel bolts ⇒ Rep. gr. 44



**Caution**

*Before driving vehicle for the first time, make sure function of brakes is OK.*



## 4 Rear brakes, electronic parking brake and handbrake (EPB)

⇒ [“4.1 Servicing rear brakes - all models including ceramic brakes”](#), page 65

### 4.1 Servicing rear brakes - all models including ceramic brakes

Steel version brakes:

Check the thickness of the brake disc when renewing the brake pads. Refer to wear limit for brake disc

⇒ [“1 Brakes, wear limits”](#), page 1 .

Ceramic brakes:

The ceramic brake discs must always be checked for damage and wear when renewing the brake pads.

◆ ⇒ [“2 Assessment of ceramic brake discs”](#), page 4

◆ ⇒ [“3 Assessing degree of wear on ceramic brake discs”](#), page 7



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*Install all parts supplied in repair kit.*



**1 - Self-locking bolt**

- ❑ Tightening torque: 12 Nm

**2 - Actuator motor for electronic parking brake and hand-brake**

- ❑ Removing and installing control unit for electro-mechanical parking brake ⇒ [page 79](#)
- ❑ Removing and installing actuator motor ⇒ [page 79](#)

**3 - Self-locking bolt**

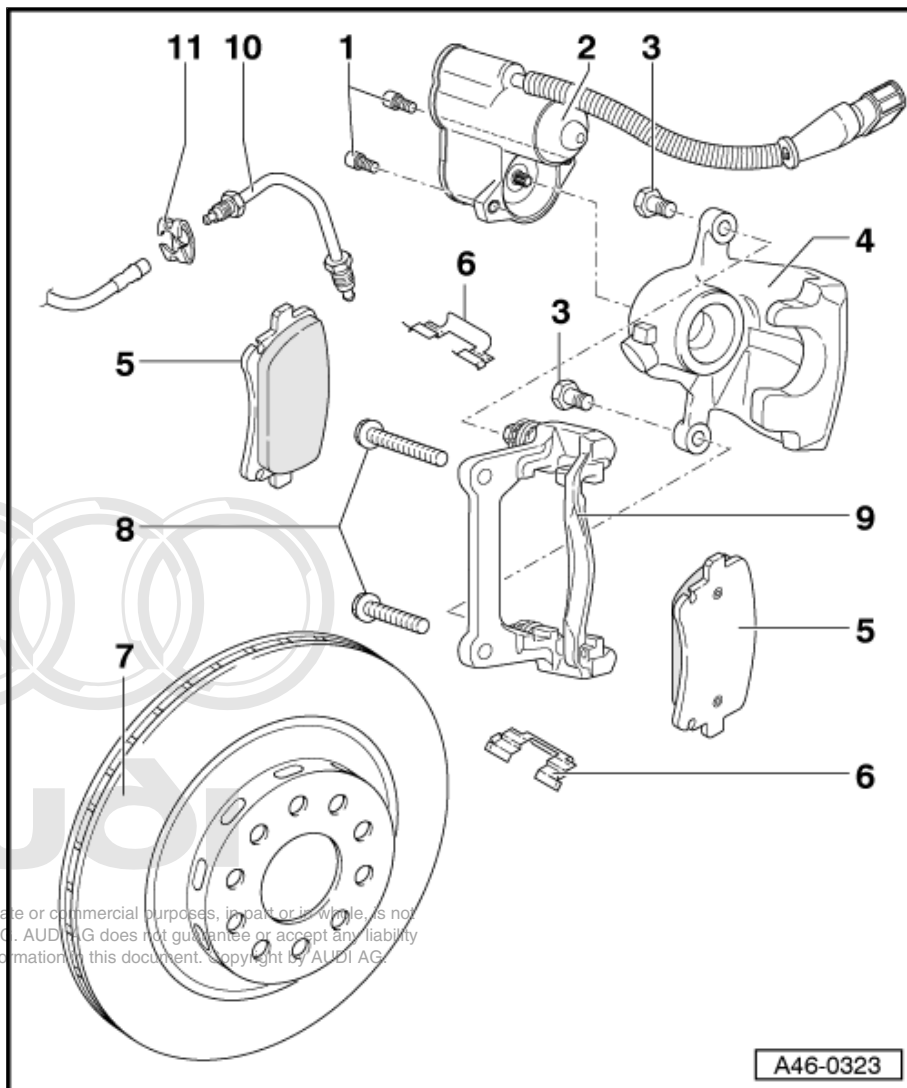
- ❑ Tightening torque: 35 Nm
- ❑ Always renew
- ❑ Counter-hold guide pin when loosening and tightening

**4 - Brake caliper**

- ❑ Do not disconnect brake hose when changing brake pads
- ❑ Servicing brake caliper ⇒ [page 101](#)

**5 - Brake pads**

- ❑ **Always renew on both sides of axle**
- ❑ Removing and installing ⇒ [page 67](#)
- ❑ Checking pad thickness ⇒ Maintenance ; Book-





let 8E

#### 6 - Pad retainer

- Always renew when changing pads

#### 7 - Brake disc

- Always renew on both sides of axle
- Detach brake caliper prior to removing
- Only dress evenly, on both sides, starting from thickness when new ⇒ [page 1](#)
- Allocation of brake discs ⇒ [page 1](#)

#### 8 - Ribbed bolt

- Tightening torque: 140 Nm
- M12×1.5 x 75
- Always renew
- Set torque wrench -V.A.G 1332- to 125 Nm to tighten the bottom bolt. This tightening torque only applies when using insert tool -T40036- .

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#### 9 - Brake carrier with guide pins and protective caps

- Replacement carriers are supplied assembled and with sufficient grease on guide pins
- If protective caps or guide pins are damaged, renew using repair kit. Use grease sachet supplied to lubricate guide pins.

#### 10 - Brake line

- Tightening torque: 14 Nm
- Do not disconnect brake line when changing brake pads

#### 11 - Retaining spring

- Make sure that the locking lug is fitted properly in the bracket.

## 4.2 Removing and installing brake pads (rear brakes)

Steel version brakes:

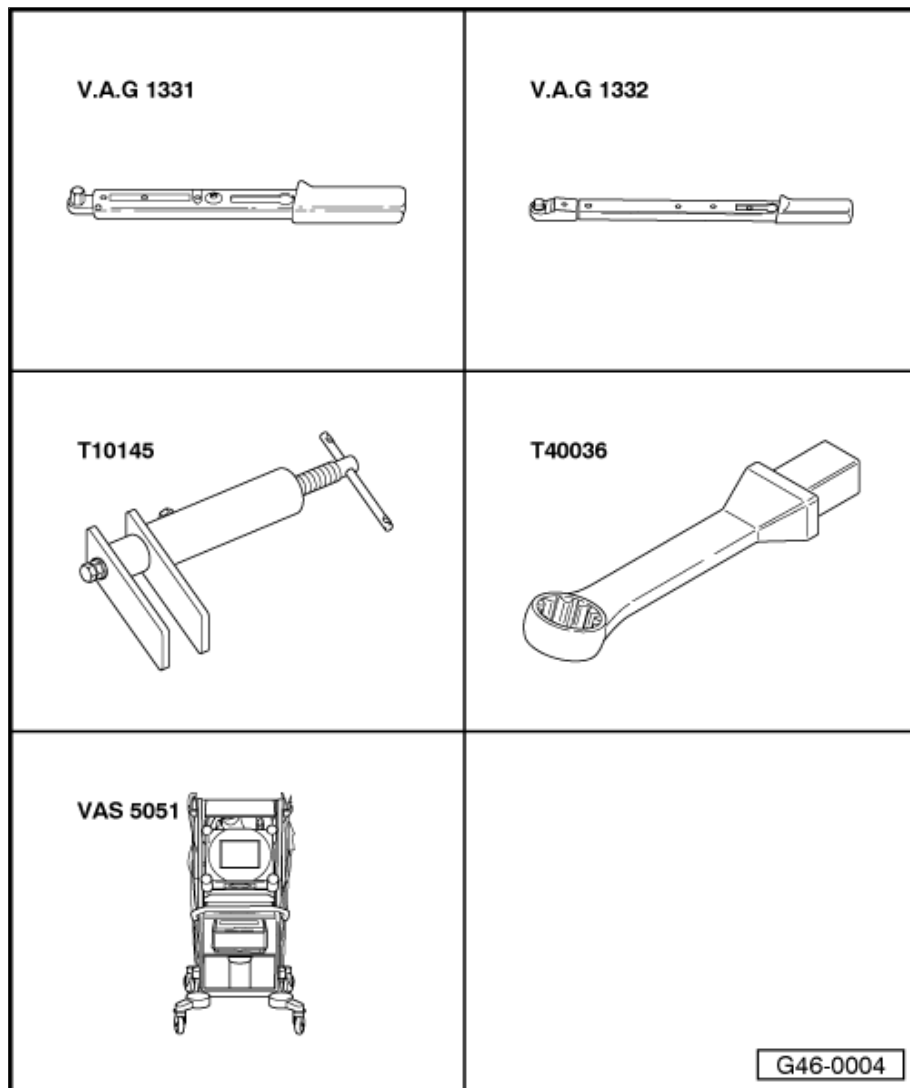
Check the thickness of the brake disc when renewing the brake pads. Refer to wear limit for brake disc  
⇒ ["1 Brakes, wear limits", page 1](#) .

Ceramic brakes:

The ceramic brake discs must always be checked for damage and wear when renewing the brake pads.

- ◆ ⇒ ["2 Assessment of ceramic brake discs", page 4](#)
- ◆ ⇒ ["3 Assessing degree of wear on ceramic brake discs", page 7](#)





### Special tools and workshop equipment required

- ◆
- ◆ Torque wrench - V.A.G 1331/-
- ◆ Torque wrench - V.A.G 1332/-
- ◆ Piston resetting appliance - T10145-
- ◆ Vehicle diagnostic, testing and information system - VAS 505x-
- ◆ Insert tool - T40036-

### Removing




#### Note

- ◆ *Mark brake pads when removing them if they are to be reinstalled. Fit in same position when installing otherwise uneven braking will be caused.*
- ◆ *It is recommended to apply the electronic parking brake after driving long distances.*
- ◆ *Pad wear is automatically adjusted approx. every 1,000 km.*

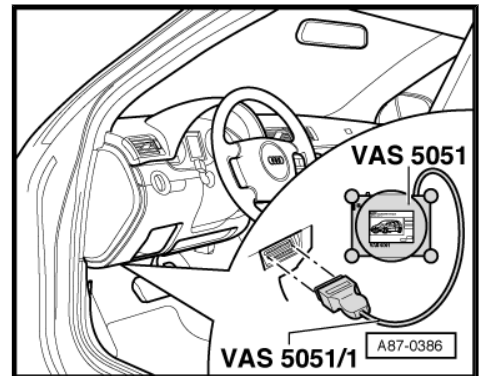
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- Select jacking mode. => Rep. gr. 43 Operation of air suspension
- Raise the vehicle.
- Remove wheels.

 **Caution**  

*On vehicles with ceramic brakes the wheel must not be allowed to drop onto the brake disc. This would cause irreparable damage to the disc. Screw two assembly pins into the wheel bolt holes when removing and fitting a wheel. Insert the long assembly pin into the top hole.*

- Connect vehicle diagnostic, testing and information system - VAS 505x- and diagnosis lead, 3m with voltage supply - VAS 5051/1- to 16-pin diagnostic connector of vehicle and select parking brake with "address word" 53. When doing this, the ignition must be off.

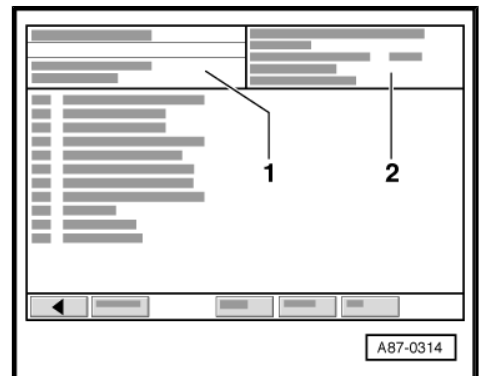


 **Note**

- ◆ Ignition on
- ◆ Release parking brake.
- ◆ Coding checked and rectified if necessary
- ◆ Event memory interrogated, indicated faults eliminated and memory erased.

Display on VAS 505x:

- Select function "53 - Parking brake".
- Select function "04 - Basic setting".



Display on VAS 505x:

- ◆ The prompt to enter a display group appears in display zone -1-.
- ◆ Display zone -2- shows a keypad.

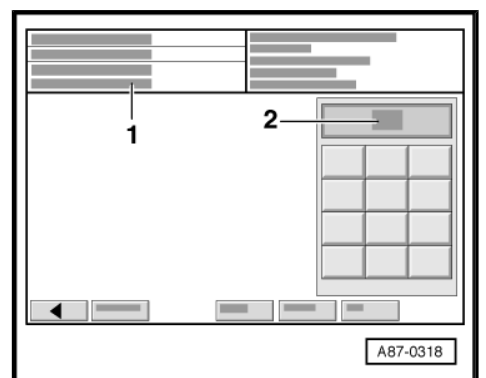
When installing new brake pads:

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Enter "05" or "005" as "Display group number" in display zone -2- via the keypad and confirm entry with "Q key" (resetting piston).

When re-installing old brake pads:

- Enter "07" or "007" as "Display group number" via the key pad -2- and confirm entry with the "Q key". (Brake opens all the way, the pad thickness does not have to be entered later on.)

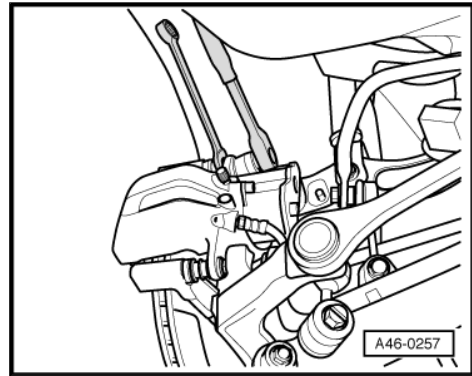


All vehicles

- Remove securing bolts from brake caliper housing, when doing this counter-hold on guide pins.

 **Note**

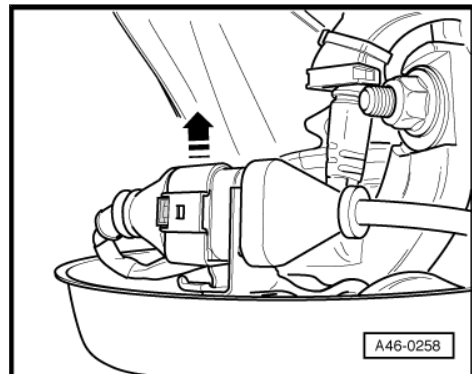
*Do not unplug connection of actuator motor and/or brake system.*



- Push connector out of retainer.
- Move brake caliper clear to one side.
- Remove brake pads.
- Remove guide clips.

 **Note**

*It is possible to change the brake disc without removing the brake carrier.*



- Push back piston with piston resetting appliance -T10145- .

**Installing**

**Steel version brakes:**

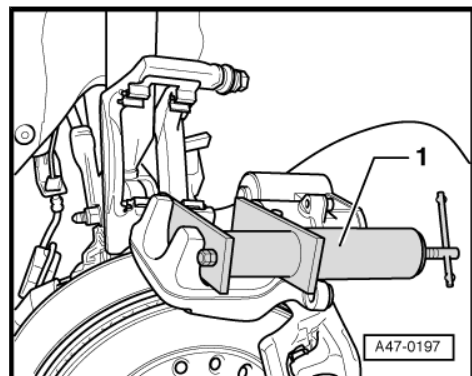
**Check the thickness of the brake disc when renewing the brake pads. Refer to wear limit for brake disc.**

- Check brake disc for wear ⇒ [“1 Brakes, wear limits”, page 1](#) .

**Ceramic brakes:**

**The ceramic brake discs must always be checked for damage and wear when renewing the brake pads.**

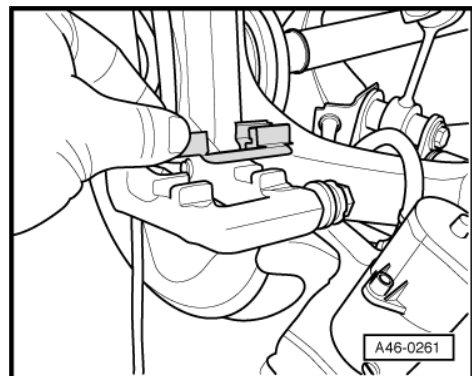
- ◆ ⇒ [“2 Assessment of ceramic brake discs”, page 4](#)
- ◆ ⇒ [“3 Assessing degree of wear on ceramic brake discs”, page 7](#)



**All types of brakes (continued):**

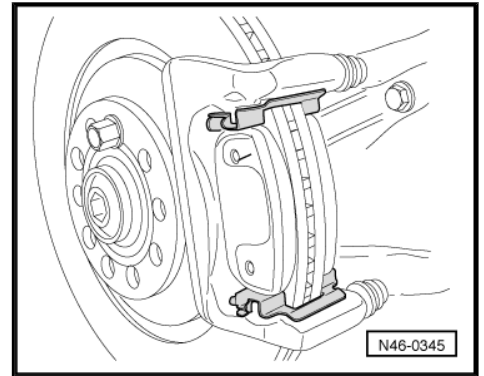
**Use only methylated spirits to clean the brake caliper housing.**

- Insert pad retaining springs.

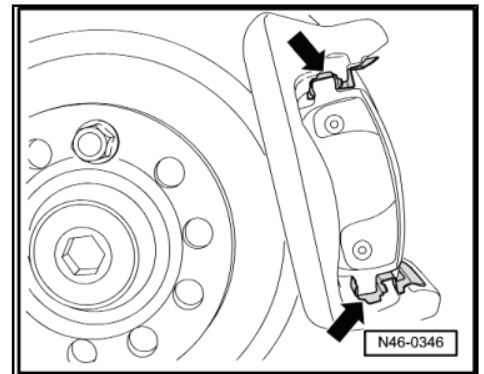


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- Fit brake pads.



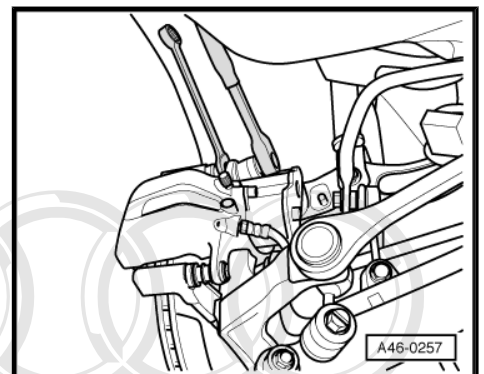
- Ensure that the brake pads are located correctly in the pad retainers -arrows-.



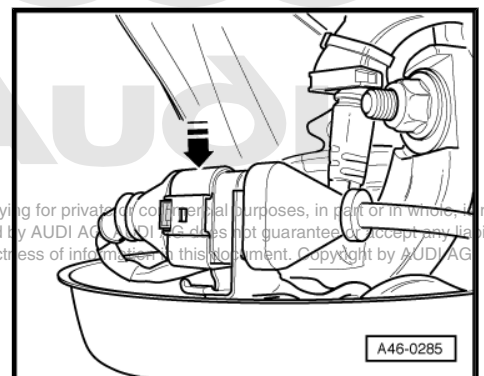
- Secure brake caliper housing with new self-locking bolts.

 **Note**

*The repair kit includes four self-locking hexagon bolts which must always be installed.*




- Fit connector for electronic parking brake in retainer.

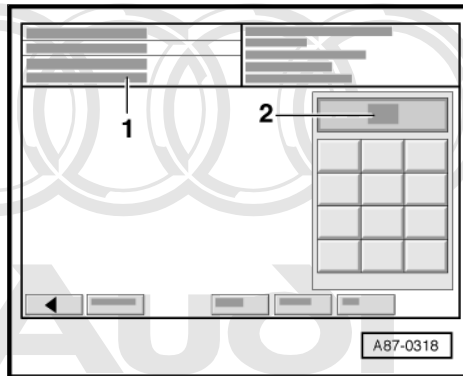


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Display on VAS 505x:

- ◆ Request to enter a display group in display zone -1-.
- ◆ Display zone -2- shows a keypad.
- Enter "06" or "006" as display group number via the keypad -2- and confirm entry with "Q key" (moves piston to original position).
- Press left  button to exit from basic setting mode.

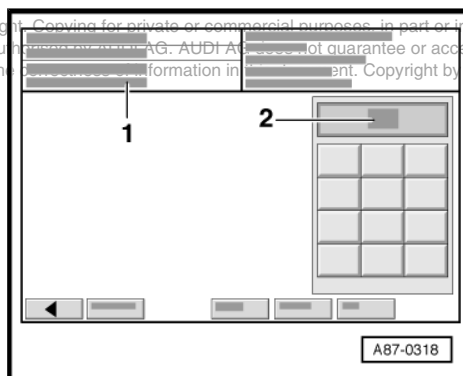
When installing new brake pads:




Display on VAS 505x:

- ◆ The prompt to enter a display group appears in display zone -1-.
- ◆ Display zone -2- shows a keypad.
- Press left arrow button twice.

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Display on VAS 505x:

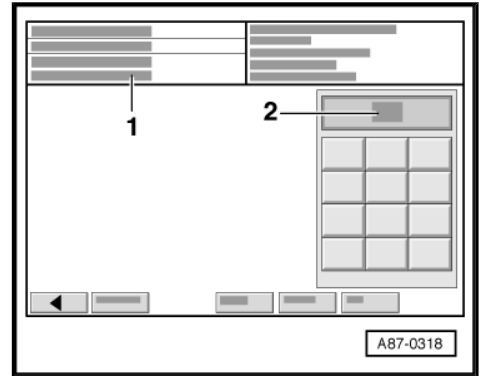
- Select function "10 - Adaption".
- Measure the thickness of the thinner of the two brake pads (without backplate) and enter the value via the keypad or scroll bar.
- Select keypad or enter via scroll bar.
- Enter value between 10 - 23 mm via keypad -2-.
- Confirm by pressing  key (moves piston to original position).
- Select Save and then Accept.



When re-installing old brake pads (different procedure):

Display on VAS 505x:

- ◆ The prompt to enter a display group appears in display zone -1-.
- ◆ Display zone -2- shows a keypad.
- Enter “06” or “006” as display group number via the keypad -2- and confirm entry with “Q key”.
- Fit wheels ⇒ Wheels and tyres; Repair group 44 .



**Caution**

***On vehicles with ceramic brakes the wheel must not be allowed to drop onto the brake disc. This would cause irreparable damage to the disc. Screw two assembly pins into the wheel bolt holes when removing and fitting a wheel. Insert the long assembly pin into the top hole.***

- Check brake fluid level and top up if necessary.



**Note**

*The electronic parking brake must now be recalibrated.*

**Requirements**

- ◆ Electronic parking brake must be released.
- ◆ Selector lever must be in position “P”.
- Switch off ignition, take out ignition key and lock steering.

Recalibration will now be performed.

- ◆ The electronic parking brake retracts and closes again audibly.
- ◆ It then sets the required clearance automatically.
- Wait for this process to be completed.

Recalibration is now completed.

Then erase fault memory.



**Caution**

***After installing the brake pads and before driving the vehicle, depress brake pedal firmly several times with the vehicle stationary, so that the brake pads are properly seated in their normal operating position.***



**Caution**

***Before driving vehicle for the first time, make sure function of brakes is OK.***

## 5 Brake pedal (LHD) - exploded view



### WARNING

*The brake pedal travel must not be restricted by additional floor coverings.*

- ◆ Lubricate all bearings and contact surfaces with grease, Part No. G 000 450 02.

1 - Hexagon bolt

2 - Brake pedal mounting bracket

3 - Hexagon nut

- Tightening torque: 25 Nm

4 - Torx socket head bolt -T45-

- Tightening torque: 25 Nm

5 - Tube

6 - Brake pedal

- Insert tube  
⇒ [Item 5 \(page 74\)](#)
- Removing and installing  
⇒ [page 76](#)

7 - Hexagon socket head bolt

- Tightening torque: 9 Nm
- The 3 hexagon head bolts locate the accelerator pedal module from the other side.

8 - Accelerator pedal

9 - Torx socket head bolt -T45-

- Tightening torque: 40 Nm

10 - Spacer sleeve

- With bonded gasket

11 - Mounting bracket for pedal cluster

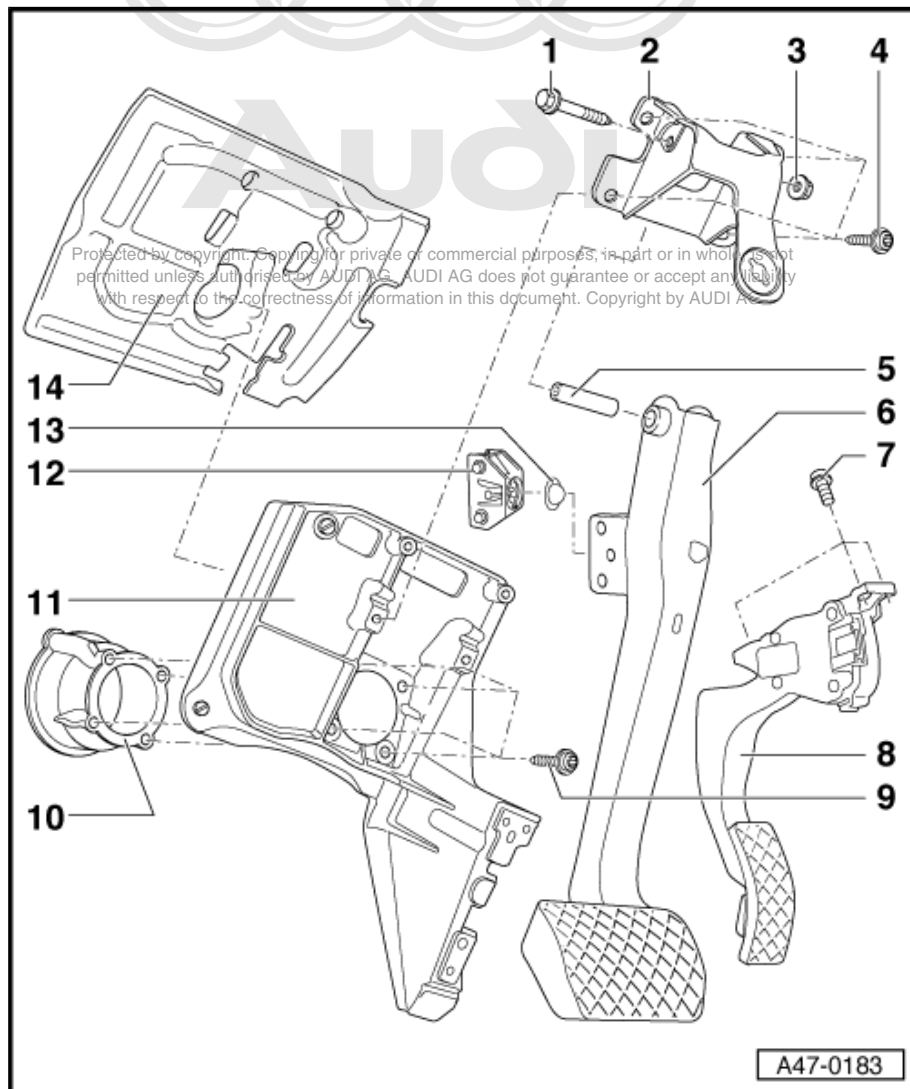
- Illustration for automatic gearbox

12 - Mounting

- For ball head of brake servo push rod

13 - Bearing shell

14 - Insulation cover

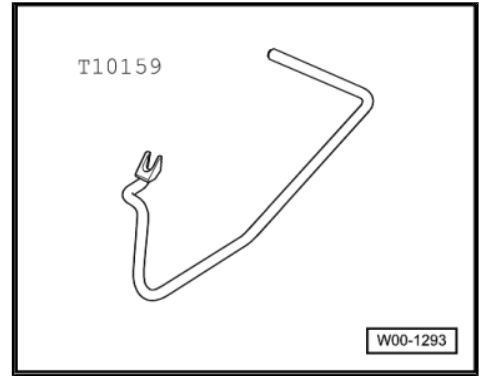


### 5.1 Separating brake pedal from brake servo

Special tools and workshop equipment required



◆ -T10159- Release tool

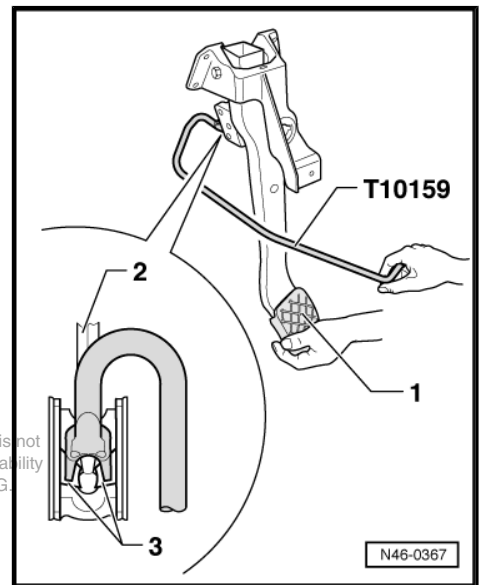


- Remove driver's footwell cover ⇒ Rep. gr. 68 ; General body repairs, interior .
- Remove brake light switch ⇒ [page 34](#) .
- First press brake pedal in direction of brake servo and hold.
  - 1 - Brake pedal
  - 2 - Push rod
  - 3 - Retaining lugs
- Insert special tool -T10159- and pull in direction of driver seat. When doing this, counter-hold on brake pedal. (At this moment the pedal must not be allowed to move backwards). This will press the retaining lugs -3- of the mounting off the ball head of the push rod -2-.

For illustration purposes, the method of separating the brake pedal from the brake servo is shown with the pedal cluster removed.

**Attaching brake pedal to brake servo**


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- Hold ball head of push rod in front of mounting and push brake pedal in direction of brake servo, so that the ball head audibly locks into place.

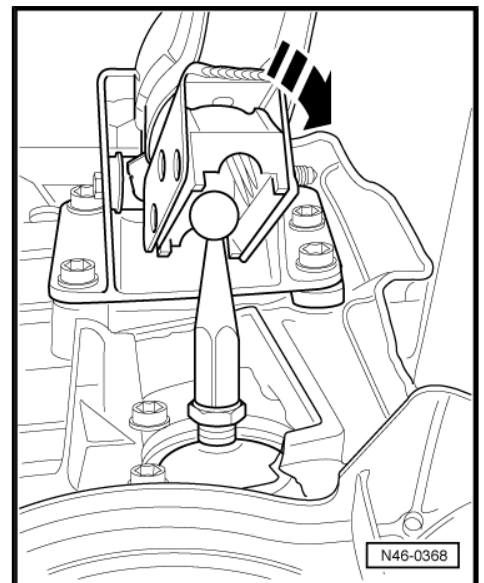
Remaining installation steps are carried out in reverse sequence.

- Adjust brake light switch ⇒ [page 34](#) .



**Caution**

*Before driving vehicle for the first time, make sure function of brakes is OK.*



## 5.2 Removing and installing brake pedal (LHD vehicles)

### Removing

- Remove driver's footwell cover ⇒ Rep. gr. 68 ; General body repairs, interior .
- Remove brake light switch ⇒ [page 34](#) .
- Separate brake pedal from brake servo ⇒ [page 74](#) .
- Unscrew hexagon bolt.
- Remove brake pedal.

### Installing

Installation is carried out in the reverse sequence, when doing this note the following:

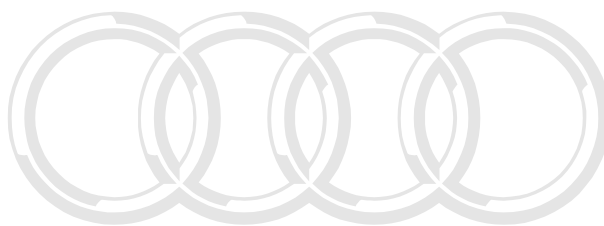
#### Attaching brake pedal to brake servo

- Hold ball head of push rod in front of mounting and push brake pedal towards brake servo so that ball head audibly locks into place.
- Adjust brake light switch/brake pedal switch ⇒ [page 34](#) .



#### Caution

*Before driving vehicle for the first time, make sure function of brakes is OK.*



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## 6 Removing and installing mounting bracket

### 6.1 Removing and installing mounting bracket

#### Removing

⇒ Rep. gr. 92 ; Servicing windscreen wiper system; Removing and installing wiper system

- Remove driver's storage compartment ⇒ [Body Repairs; Rep. gr. 68](#)
- Removing and installing brake servo ⇒ [page 117](#) .
- Remove brake light switch ⇒ [page 34](#) .
- Separate brake pedal from brake servo ⇒ [page 74](#) .
- Remove bolt connections -1-.
- Item -2- Mounting bracket
- Item -3- Bulkhead

Remove accelerator pedal

- Unscrew hexagon socket head bolts ⇒ [Item 7 \(page 74\)](#) .

Removing brake pedal mounting bracket

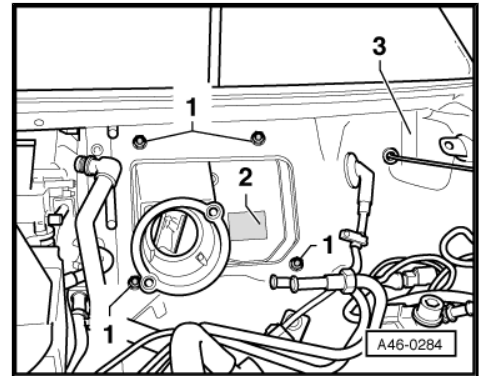
- Remove Torx socket head bolt -T45- ⇒ [Item 5 \(page 74\)](#) - item 4.

#### Installing

Installation is carried out in the reverse sequence, when doing this note the following:

#### Attaching brake pedal to brake servo

- Hold ball head of push rod in front of mounting and push brake pedal in direction of brake servo so that the ball head audibly locks into place ⇒ [page 75](#) .
- Adjust brake light switch/brake pedal switch ⇒ [page 34](#) .
- Bleed brake system ⇒ [page 110](#) .



#### Caution

*Before driving vehicle for the first time, make sure function of brakes is OK.*

## 7 Overview of components: electronic parking brake and handbrake (EPB)

### 1 - Parking brake switch

- Pull switch to apply brake
- Push switch => to release brake
- Fitting location: in centre console
- Removing and installing => [page 36](#)

### 2 - LED indicator for applied parking brake (light-emitting diode)

### 3 - EPB system fault warning lamp (yellow)

### 4 - Indication of achieved clamping force and dynamic deceleration

### 5 - Electronic parking brake with rear left actuator motor

- Removing and installing => [page 100](#)
- Removing and installing control unit for electronic parking brake and handbrake => [page 79](#)
- Removing and installing actuator motor for electronic parking brake and handbrake => [page 79](#)

### 6 - EPB control unit

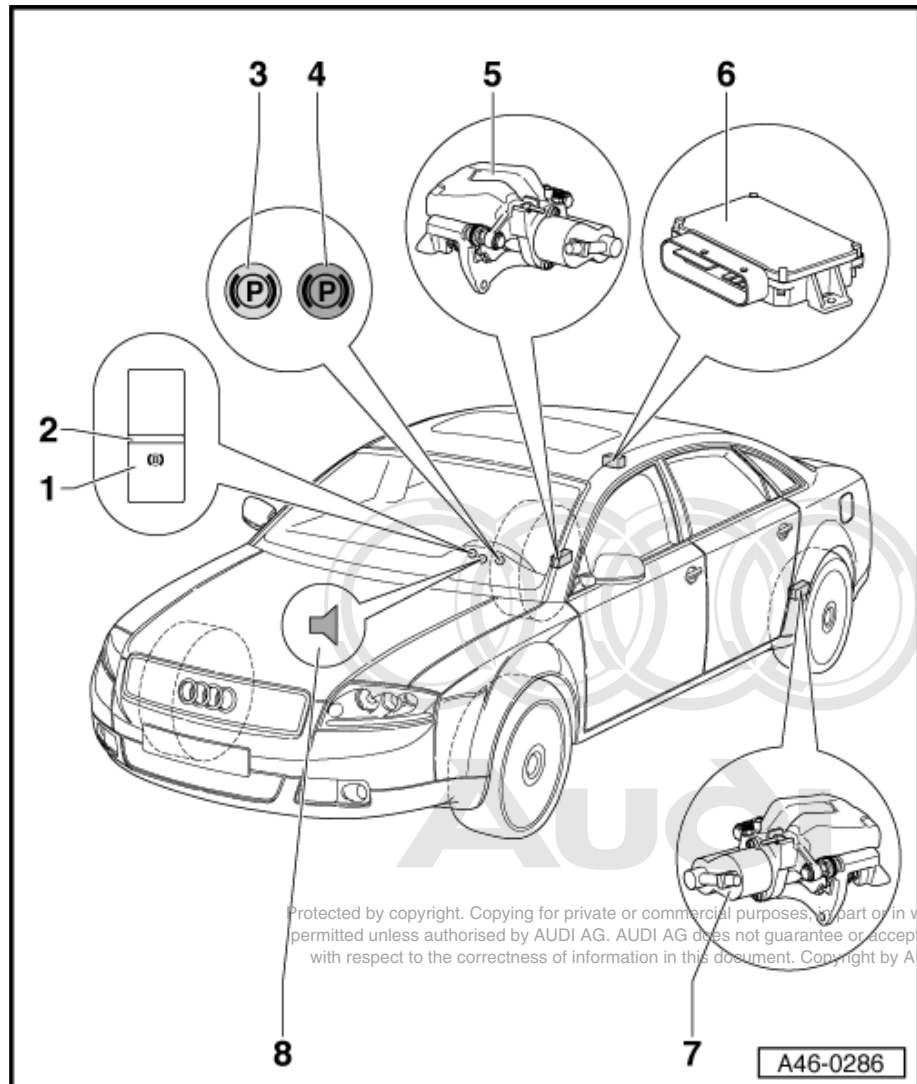
- Control unit for electro-mechanical parking brake (EPB) J540
- Fitting location: below battery in rear right side panel
- Removing and installing => [page 79](#)

### 7 - Electronic parking brake with rear left actuator motor

- Removing and installing => [page 101](#)

### 8 - Acoustic signal

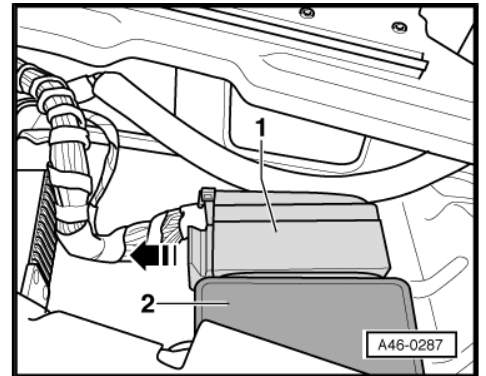
- Warning signal if parking brake is operated while vehicle is in motion
- Warning signal if a fault is detected in the system



## 7.1 Removing and installing control unit for electronic parking brake and handbrake

### Removing

- Remove battery.
- Pull locking slide in direction of arrow and unplug connector -1-.
- Item -2- EPB control unit

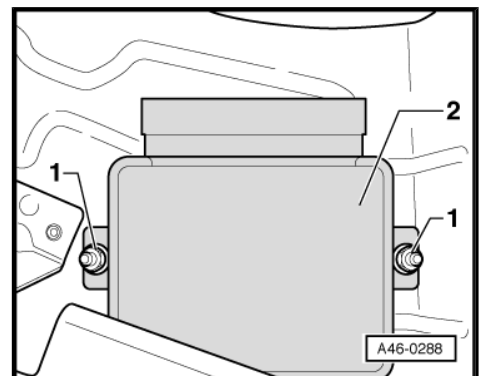


- Remove nuts -1-.
- Remove item -2- EPB control unit

### Installing

Installation is carried out in the reverse sequence, when doing this note the following:

- Screw on nuts -1-, tightening torque 10 Nm.
- When renewing the control unit, select the function "Replace" for the relevant control unit in the "Guided Fault Finding".



Vehicle diagnostic, testing and information system - VAS 505x-



#### Caution

*Before driving vehicle for the first time, make sure function of brakes is OK.*

## 7.2 Removing and installing actuator motor for electronic parking brake and handbrake

### Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1331/-

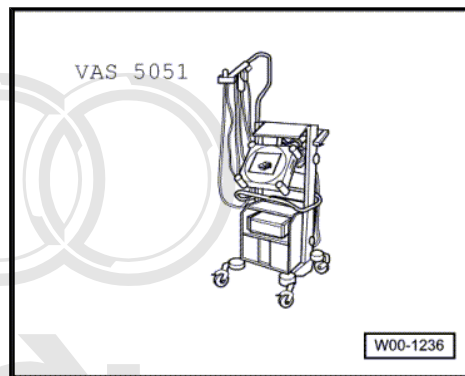
V.A.G 1331



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W00-0427

- ◆ Vehicle diagnostic, testing and information system - VAS 505x-



## Removing



### Note

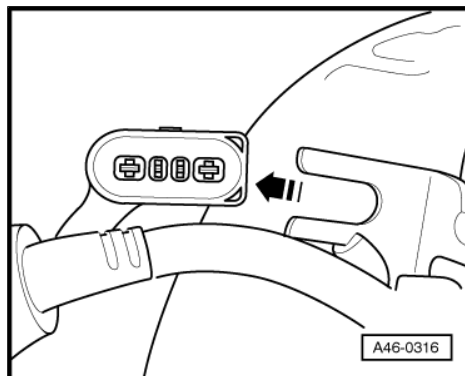
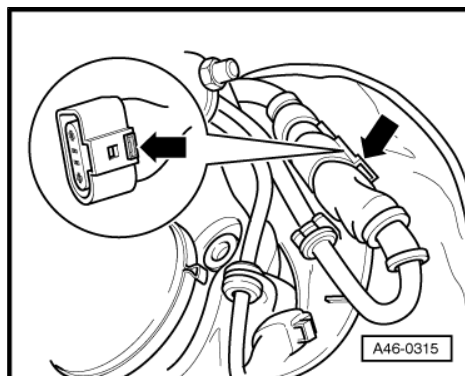
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- ◆ Ignition on
  - ◆ Release parking brake.
  - ◆ Coding checked and rectified if necessary
  - ◆ Event memory interrogated, indicated faults eliminated and memory erased.
  - ◆ Ignition off.
- Select jacking mode. ⇒ Rep. gr. 43
  - Raise the vehicle.
  - Remove wheels.

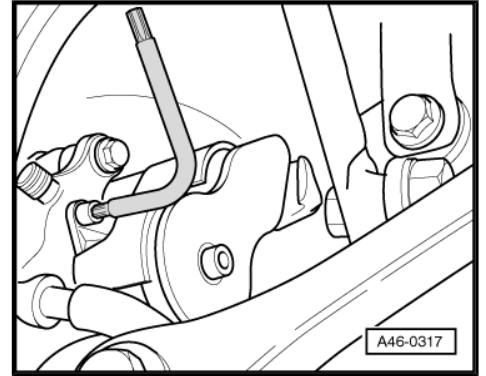


### Note

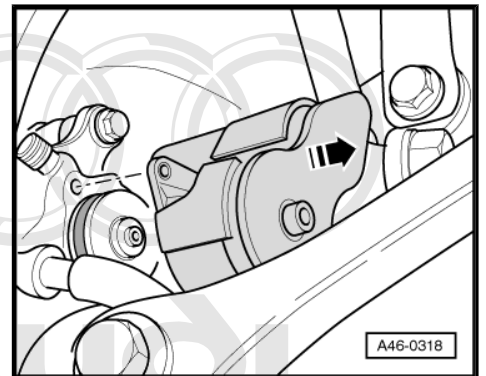
- ◆ Ignition must be switched off at least 30 sec. before unplugging connector.
  - ◆ Clean whole area around connector and actuator motor/ brake caliper.
- Press down securing lug on upper part of connector (vehicle side of connection) as shown in illustration detail and unplug actuator motor connection.
  - Pull connector (on actuator side of connection) out of the bracket.



- Remove both securing bolts (Torx TX25) from actuator motor.



- Remove actuator motor.



- Remove seal with suitable tool.

**Make sure you do not damage annular groove for seal and contact surface on actuator motor.**

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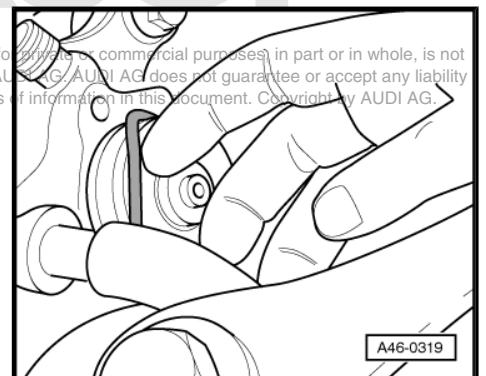
 **Note**

*Do not use tools with sharp edges.*

- If necessary clean annular groove and contact surfaces. Only use brake cleaner.

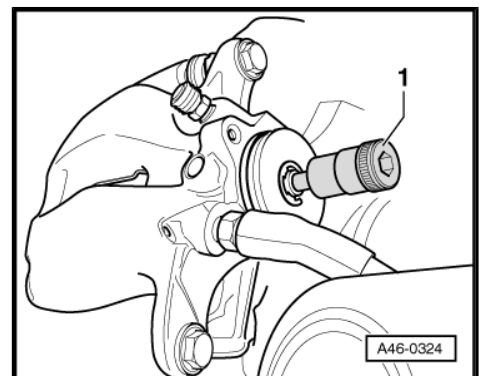
**Installing**

- Fit new seal.
- Back off adjuster screw on caliper slightly to facilitate installation of actuator motor.



 **Note**

*This makes it easier to install the actuator motor.*

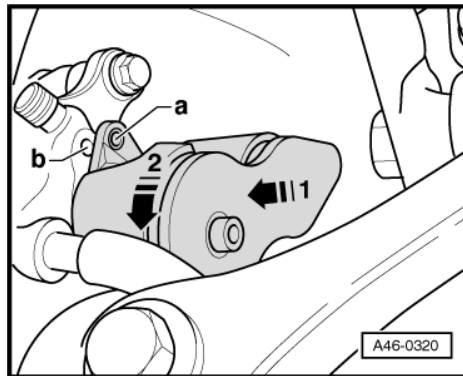


- Fit actuator motor as shown in illustration (item -1-).

 **Note**

*Ensure that seal is fitted correctly.*

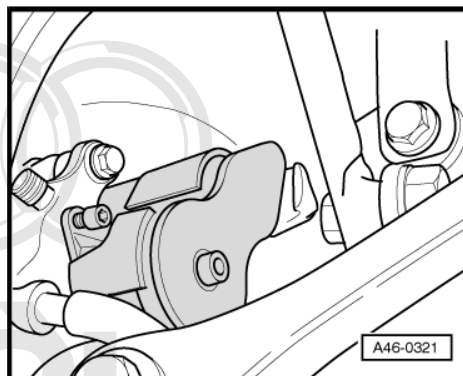
- Then turn actuator motor in such a way (item -2-) that bolt hole -a- and thread in brake caliper housing -b- are aligned.



**Make sure that actuator motor is flush with brake housing.**

- Fit both securing bolts on actuator motor. Tightening torque 12 Nm

**Important: Bolts must be fitted and screwed in several turns by hand. If the thread is damaged the complete brake caliper has to be renewed.**



- Push actuator motor connector into bracket.

 **Note**

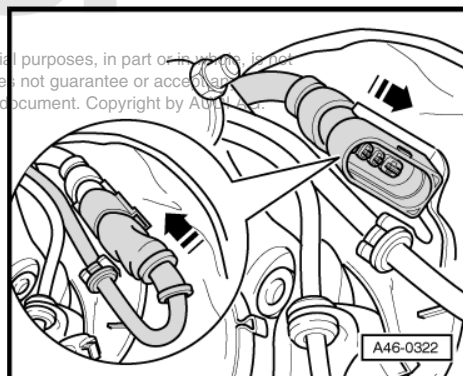
*To avoid any damage to connector only fit it by hand.*

- Insert connector (on vehicle side of connection).
- Fit wheels => ELSA/ Wheel/Tyre Guide .

**After renewing actuator motor you must use vehicle diagnostic tester to perform basic setting 10 in EPB function.**

**To do so, use the vehicle diagnostic, testing and information system -VAS 505x- .**

- Either select basic setting 10 => [page 20](#) under "Function" or
- under Running gear (repair group 01: 34-65)
- Brake system (repair group 01: 45-46)
- 01 - Self-diagnosis compatible systems
- 53- Parking brake
- J540- Control unit for electromechanical parking brake
- J540- Basic setting (3 Function test: electronic parking brake and handbrake)



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 **Caution**

***Before driving vehicle for the first time, make sure function of brakes is OK.***



## 47 – Brakes - hydraulics

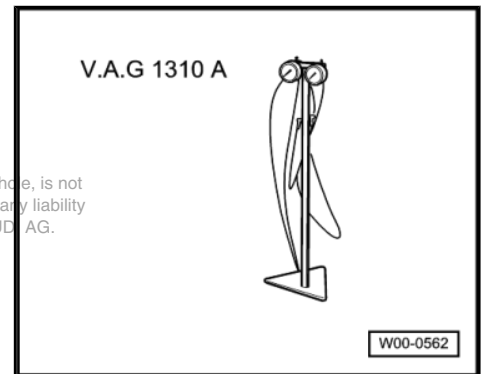
### 1 Pressurised leak test

#### 1.1 Pressurised leak test

##### Special tools and workshop equipment required

- ◆ Tester for brake pressure regulator - V.A.G 1310/A-

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- ◆ -V.A.G 1310—

#### 1.2 High-pressure and low-pressure tests

##### Before starting:

Make sure that the brake system (master cylinder, brake hoses, brake lines and brake calipers) works properly and is free of leaks.

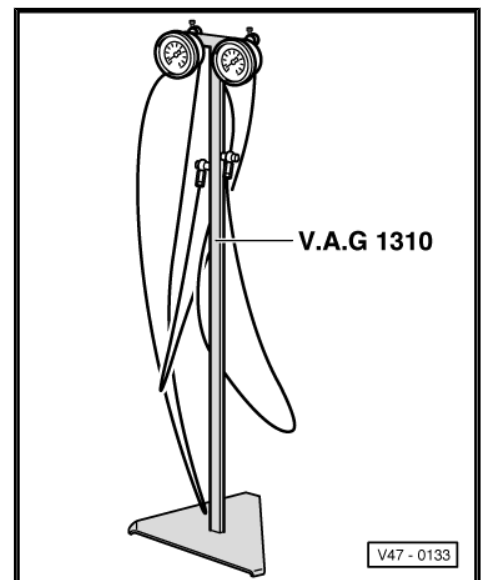
##### High-pressure test:

- Remove bleeder screw at one of the front brake calipers. Connect pressure gauge -V.A.G 1310-- or tester for brake pressure regulator - V.A.G 1310/A- and bleed.
- Insert brake pedal depressor between brake pedal and driver's seat. Apply pressure to brake pedal until the gauge indicates a pressure of 50 bar. The pressure must not drop by more than 4 bar during the test period of 45 seconds. Renew hydraulic unit if drop in pressure exceeds the above figure.

##### Low-pressure test:

- Move the brake pedal depressor back until the pressure gauge indicates a pressure of 6 bar.
- The pressure should not drop by more than 1 bar within the test period of 3 minutes.

Renew hydraulic unit if drop in pressure exceeds the above figure.



## 2 Brake calipers FNR -G60-

### 2.1 Servicing brake calipers



#### Note

- ◆ Install complete repair kit when servicing.
- ◆ Apply a thin coat of assembly paste **G 052 150 A2** to brake cylinder, piston and seal.

#### 1 - Brake carrier

- Bolt to brake caliper housing

#### 2 - Guide pin

- Tightening torque: 30 Nm

#### 3 - Caps

- Insert into bearing bush

#### 4 - Protective cap

- Push onto bleeder valve

#### 5 - Bleeder valve

- Tightening torque: 15 Nm
- Before screwing in, grease thread lightly with lithium grease ⇒ Parts catalogue .

#### 6 - Bearing bush

- Insert into brake caliper housing

#### 7 - Brake caliper

#### 8 - Retaining spring

- Note correct installation position.
- Engage onto both brake caliper housing studs and onto outer pad retaining spring.

#### 9 - Protective cap

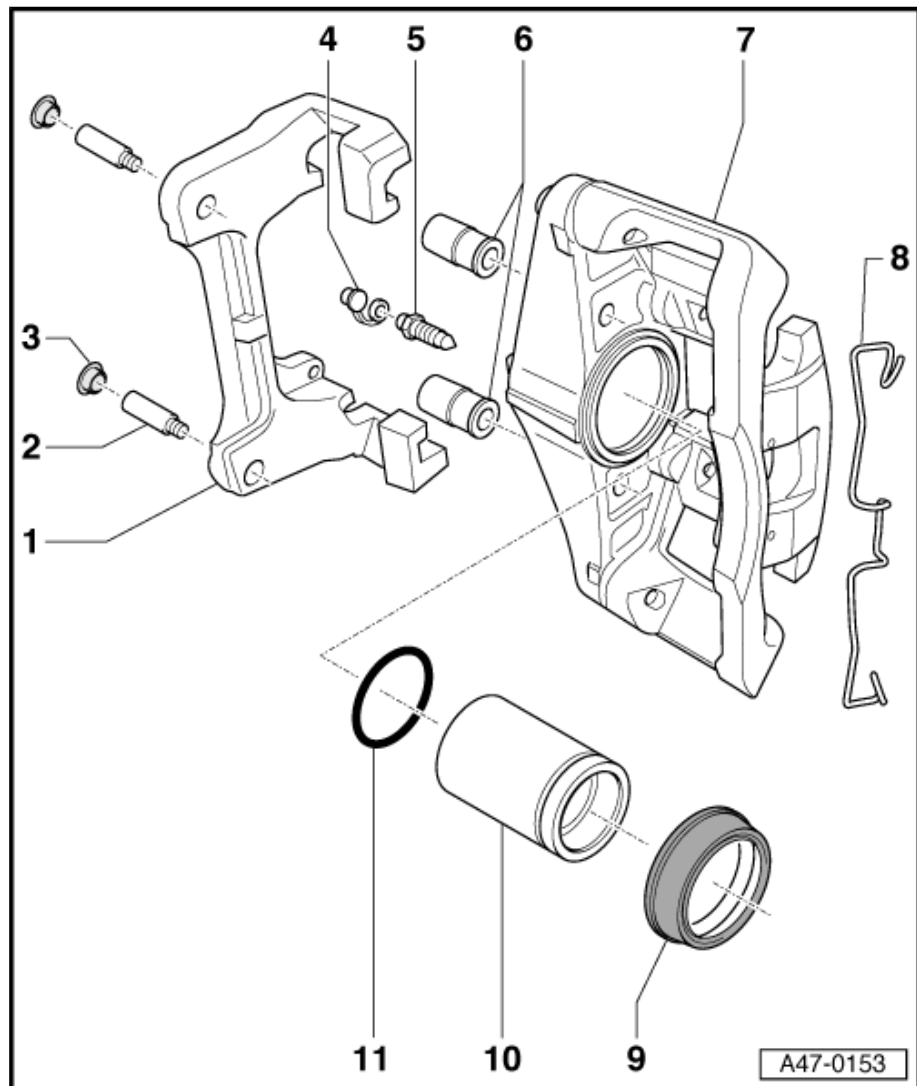
- Do not damage when inserting piston
- Grease with assembly paste ⇒ Parts catalogue

#### 10 - Piston

- Apply a thin coat of assembly paste to piston before inserting
- Allocation ⇒ [page 1](#)

#### 11 - Seal

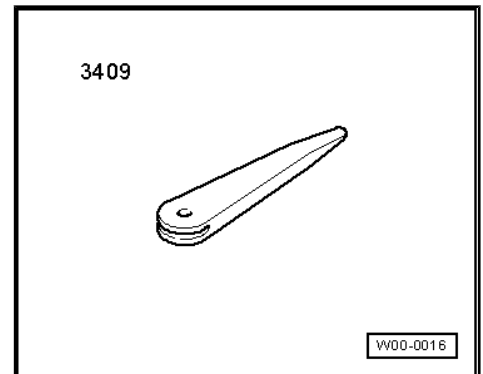
- Grease with assembly paste



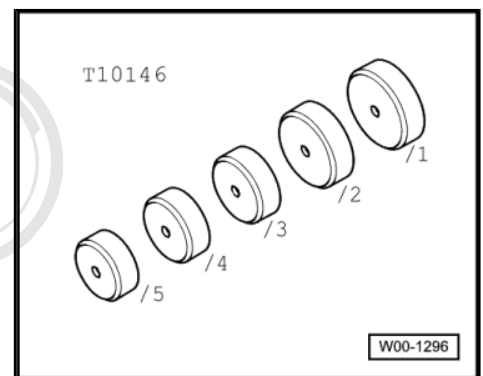
## 2.2 Removing and installing piston for front brake caliper

### Special tools and workshop equipment required

- ◆ Removal wedge - VAS 3409-



- ◆ Assembly paste ⇒ Parts catalogue
- ◆ Assembly tool for protective caps -T10146/-



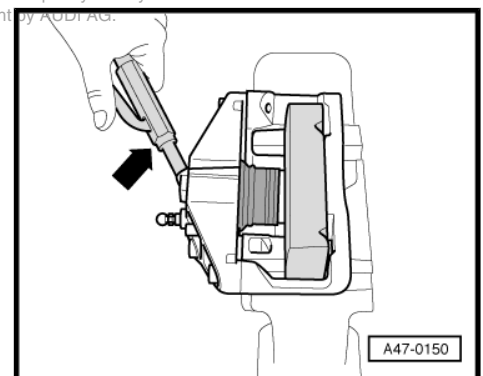
- ◆ Piston resetting appliance -T10145-

### Removing

- Force piston out of brake caliper housing using compressed air.



*Place a piece of wood in the recess to prevent damaging the piston.*



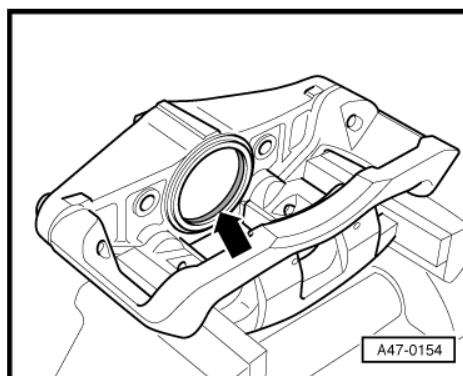
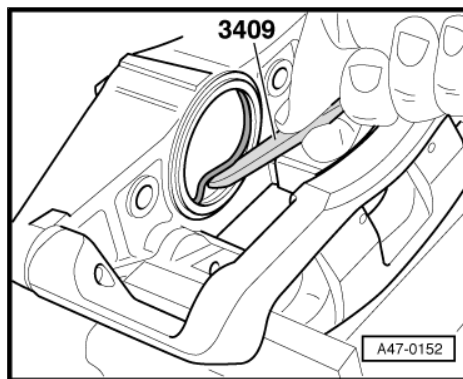
- Take out seal.
- To do this use removal wedge 3409.

 **Note**

*When removing ensure that the bore of the cylinder is not damaged.*

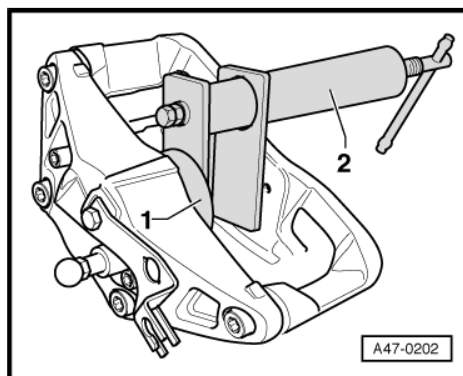
**Installing**

- The surface of the piston and seal should be cleaned using only methylated spirits and then dried.
- Apply a small amount of assembly paste to piston and seal before inserting.
- Insert inner seal in groove in brake caliper housing with removal wedge 3409.

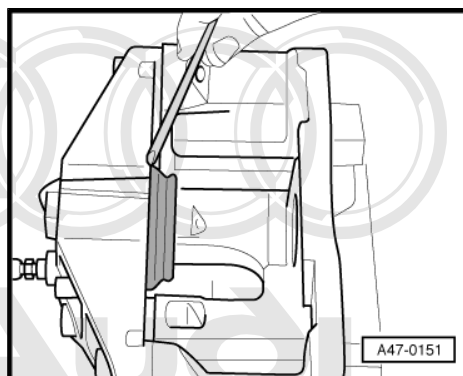


- Press in protective cap with special tool -1- and -2-.
- Item -1-: Assembly tool for protective caps -T10146/1-
- Item -2-: Piston resetting appliance -T10145-

Use jaw protectors



- Push protective cap onto brake caliper housing and press it in so that it is seated flush -arrow-.
- At this stage it should not be possible to remove the protective cap from the brake caliper housing by hand.
- Apply a small amount of assembly paste to piston and seal before inserting.



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- Lift up piston with standard extension and ratchet attachment as shown in illustration and press lightly onto protective cap.

Keep the piston straight to avoid damaging the protective cap.

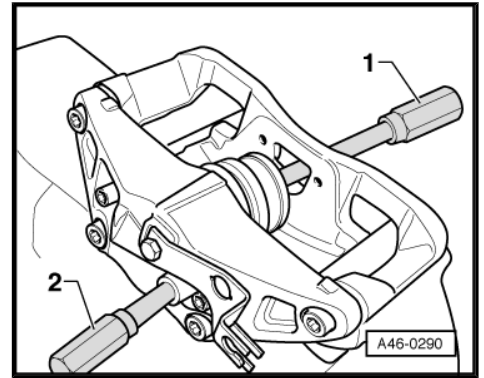
- Inflate protective cap with compressed air (maximum 3 bar).  
The protective cap will then locate around the brake piston.

Use jaw protectors

- Press piston into brake caliper housing by hand.

 **Note**

*The inner sealing lip on the protective cap will then locate in the piston groove.*



 **Caution**

***Before driving vehicle for the first time, make sure function of brakes is OK.***



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### 3 Brake calipers 2FNR 42 AL

#### 3.1 Servicing brake calipers



#### Note

- ◆ Install complete repair kit when servicing.
- ◆ Apply a thin coat of assembly paste to brake cylinders, pistons and seals => Parts catalogue .

#### 1 - Brake carrier

- ❑ Bolt to brake caliper housing

#### 2 - Guide pin

- ❑ Tightening torque: 30 Nm

#### 3 - Caps

- ❑ Insert into bearing bush

#### 4 - Protective cap

- ❑ Push onto bleeder valve

#### 5 - Bleeder valve

- ❑ Tightening torque: 10 Nm
- ❑ Before screwing in, grease thread lightly with lithium grease => Parts catalogue .

#### 6 - Bearing bush

- ❑ Insert into brake caliper housing

#### 7 - Brake caliper

#### 8 - Retaining spring

- ❑ Note correct installation position.
- ❑ Engage onto both brake caliper housing studs and onto outer pad retaining spring

#### 9 - Protective cap

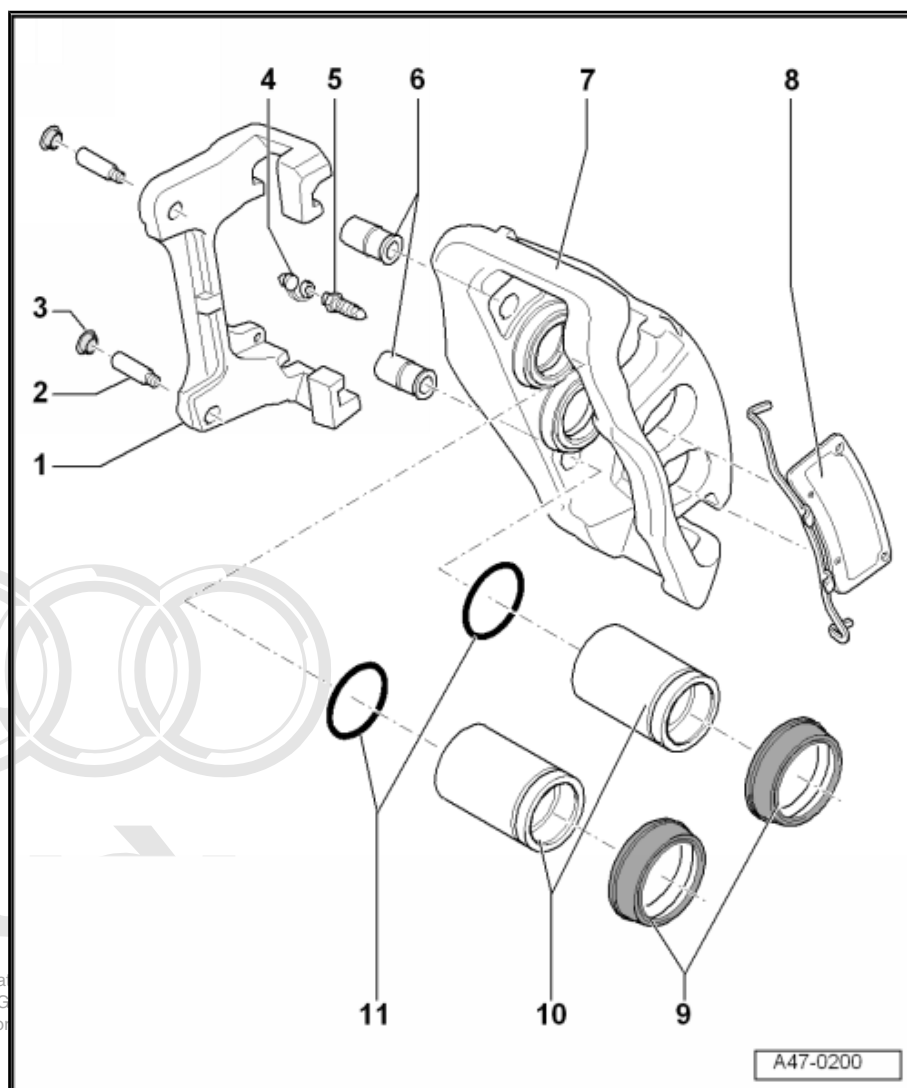
- ❑ Do not damage when inserting piston
- ❑ Apply a thin coat of lithium grease

#### 10 - Piston

- ❑ Apply a thin coat of lithium grease to piston
- ❑ Allocation => [page 1](#)

#### 11 - Seal

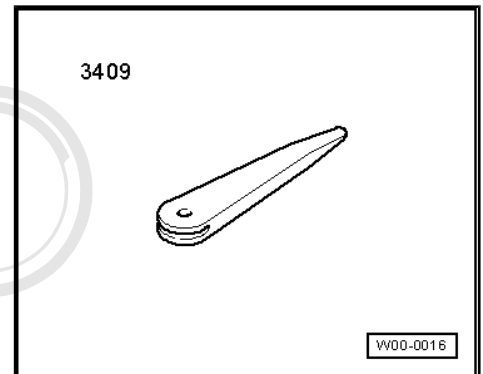
- ❑ Grease with assembly paste



## 3.2 Removing and installing pistons for front brake caliper

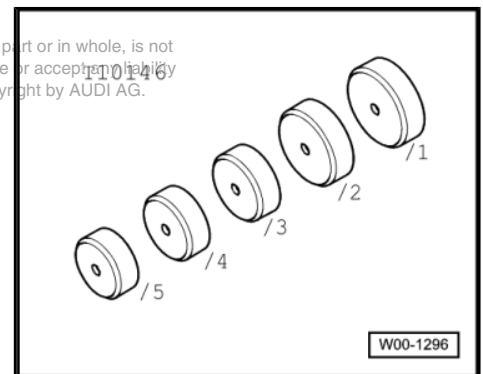
### Special tools and workshop equipment required

- ◆ Removal wedge - VAS 3409-



- ◆ Assembly paste ⇒ Parts catalogue
- ◆ Assembly tool for protective caps -T10146/-

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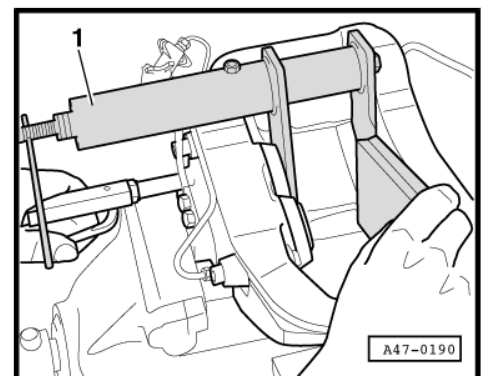
- ◆ Piston resetting appliance -T10145-

### Removing

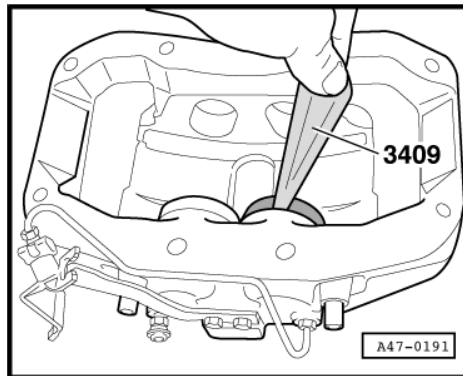
- Force piston out of brake caliper housing using compressed air.
- Item -1-: Piston resetting appliance -T10145-



*Place a piece of wood in the recess to prevent damaging the piston.*



- Lever off protective cap from brake caliper (e.g. with removal wedge 3409)



- Take out seal.
- To do this use wedge 3409 -2-.
- Item -1-: Piston resetting appliance -T10145-



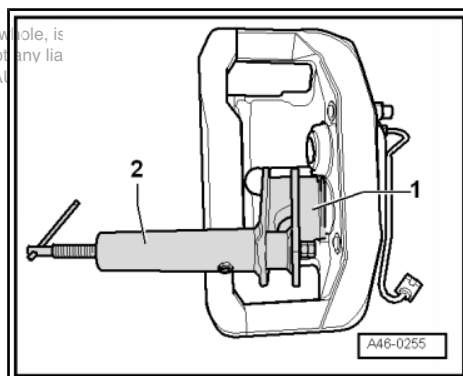
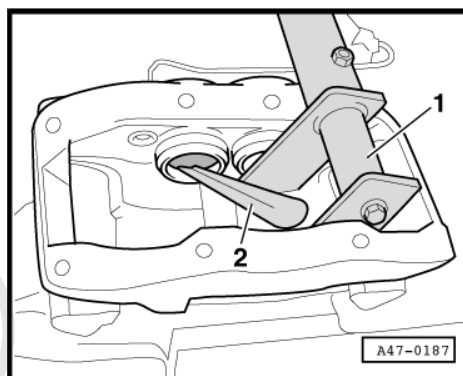
**Note**

*When removing ensure that the surface of the cylinder is not damaged.*

**Installing**

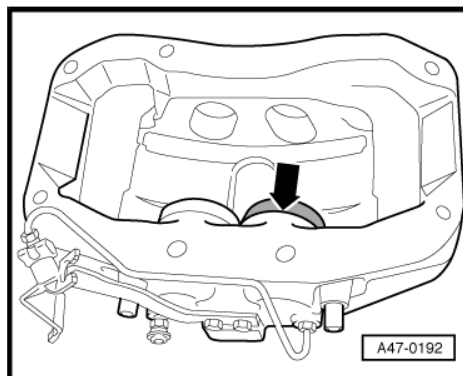
- The surface of the piston and seal should be cleaned using only methylated spirits and then dried.
- Apply a small amount of assembly paste to piston and seal before inserting.
- Insert inner seal in groove in brake caliper housing with removal wedge 3409.
- Press in protective cap with special tool -1- and -2-.
- Item -1-: Assembly tool for protective caps -T10146/5-
- Item -2-: Piston resetting appliance -T10145-

Use jaw protectors



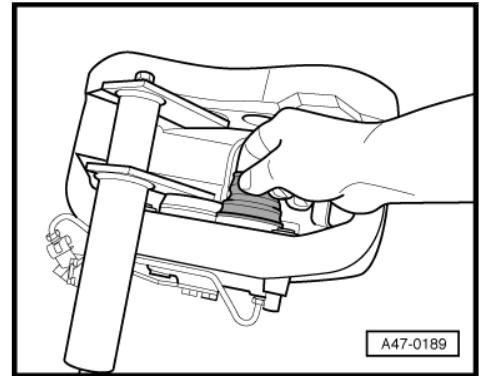
- Push protective cap onto brake caliper housing and press it in so that it is seated flush -arrow-.

Use jaw protectors





- At this stage it should not be possible to remove the protective cap from the brake caliper housing by hand.
- Apply a small amount of assembly paste to piston and seal before inserting.

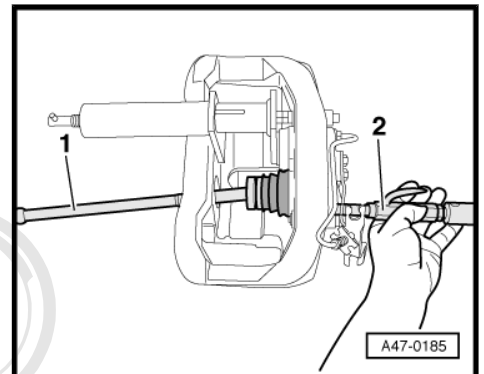


- Lift up piston with standard extension and ratchet attachment as shown in illustration and press lightly onto protective cap.

Keep the piston straight to avoid damaging the seal.

- Inflate protective cap with compressed air (maximum 3 bar). The protective cap will then locate around the brake piston.

Use jaw protectors



- Press piston into brake caliper housing by hand.

 **Note**

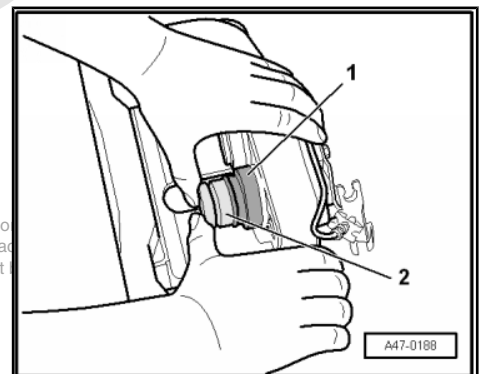
*The inner sealing lip on the protective cap will then locate in the piston groove.*

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**Caution**

***Before driving vehicle for the first time, make sure function of brakes is OK.***



## 4 Brembo brake calipers (18")

### 4.1 Servicing brake calipers



**Note**

- ◆ Brake line connection at brake pipe: 12 Nm
- ◆ Brake pipe in brake caliper: 19 Nm



**Note**

- ◆ Use only methylated spirits to clean the brake caliper
- ◆ Install complete repair kit when servicing.
- ◆ New brake calipers are filled with brake fluid and are pre-bled.
- ◆ Apply a thin coat of lithium grease - G 052 150 A2- to brake cylinder, piston and seal.

**1 - Dust cap**

- Fit onto bleeder valve

**2 - Bleeder valve, 12 Nm**

- Before screwing in, grease thread with thin coat of lithium grease - G 052 150 A2-

**3 - Brake caliper**

**4 - Seal for 32 mm piston**

- Removing and installing  
⇒ [page 93](#)

**5 - Seal for 28 mm piston**

- Removing and installing  
⇒ [page 93](#)

**6 - Piston, 32 mm**

- Removing and installing  
⇒ [page 93](#)
- Apply a thin coat of lithium grease - G 052 150 A2- to piston

**7 - Piston, 28 mm**

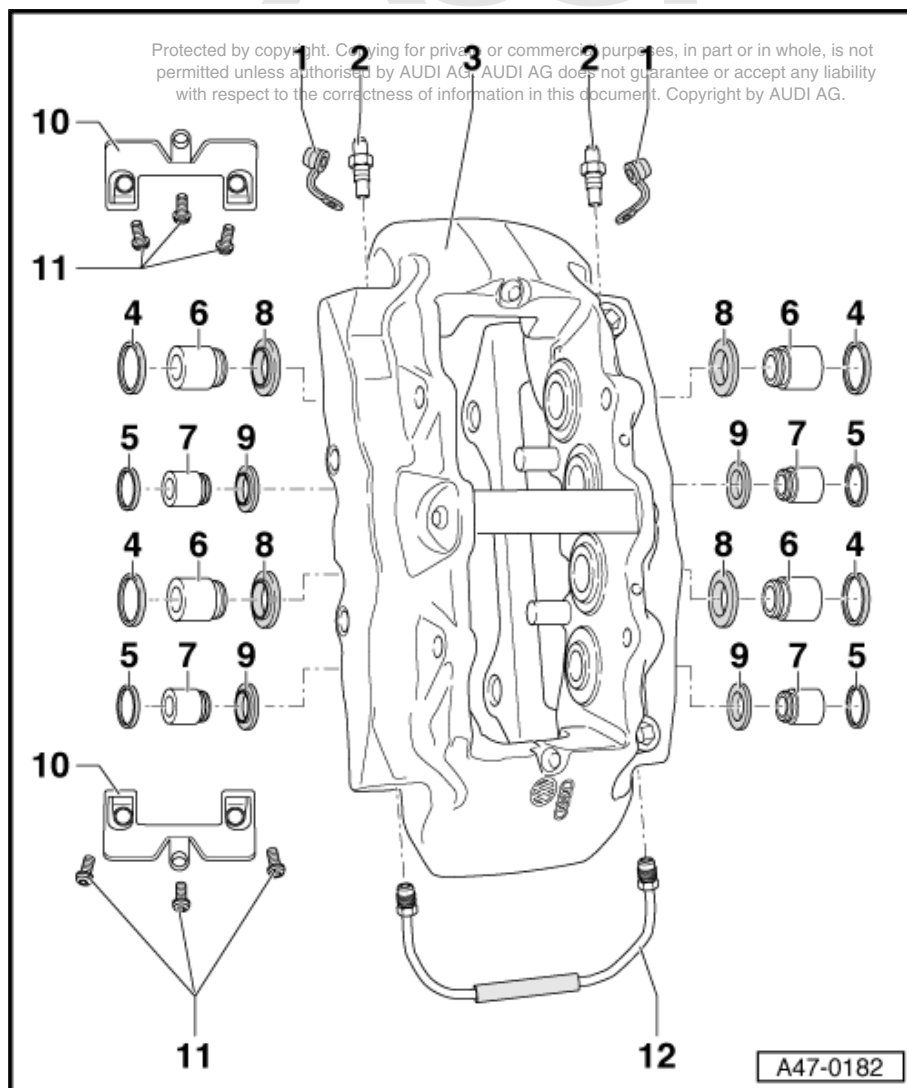
- Removing and installing  
⇒ [page 93](#)
- Apply a thin coat of lithium grease - G 052 150 A2- to piston

**8 - Protective cap for 32 mm piston**

- Do not damage when inserting piston

**9 - Protective cap for 28 mm piston**

- Do not damage when inserting piston



10 - Support plate

11 - Hexagon socket head bolt, 6 Nm

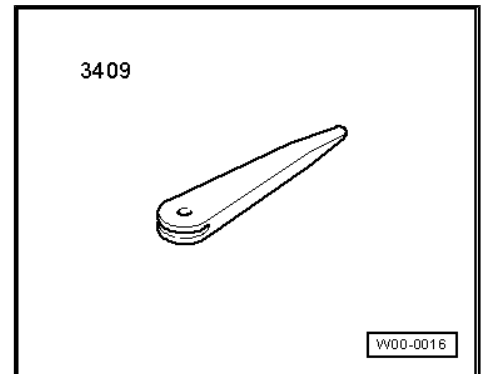
12 - Connecting pipe, 17 Nm

## 4.2 Removing and installing pistons for front brake caliper

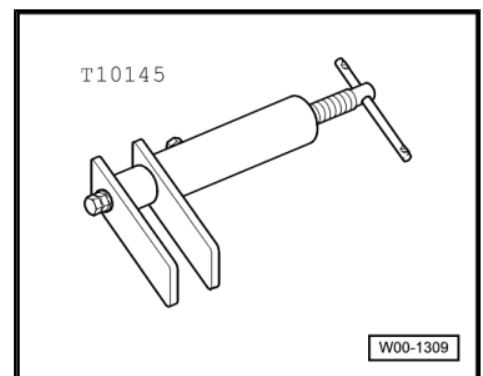
### Special tools and workshop equipment required

#### ◆ Removal wedge - 3409

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#### ◆ Piston resetting appliance - T10145-

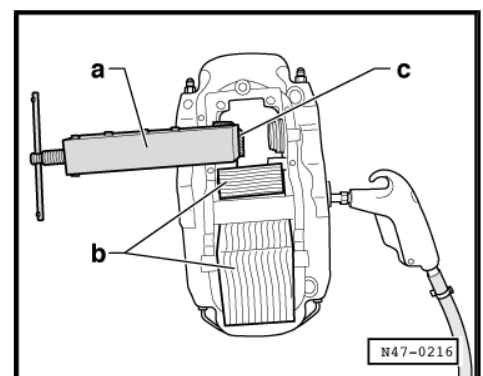


#### ◆ Lithium grease - G 052 150 A2-

### Removing

- Force pistons out of brake caliper housing one at a time using compressed air.

The pistons can only be removed one at a time. Hold the opposite piston in the caliper housing with piston resetting appliance -a-. Use blocks of wood or similar -b- to keep the other pistons in place. Also place a piece of wood -c- against the resetting tool to prevent the piston from being damaged when it is forced out.

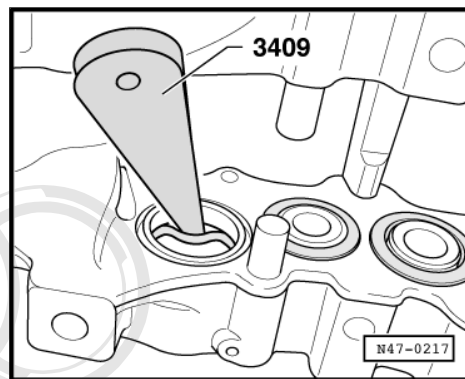


- Remove seal using removal wedge - 3409- .

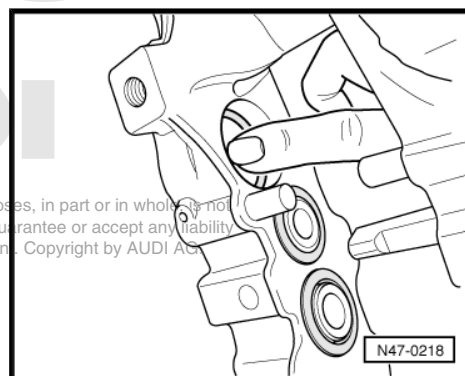
When removing ensure that the bore of the cylinder is not damaged.

### Installing

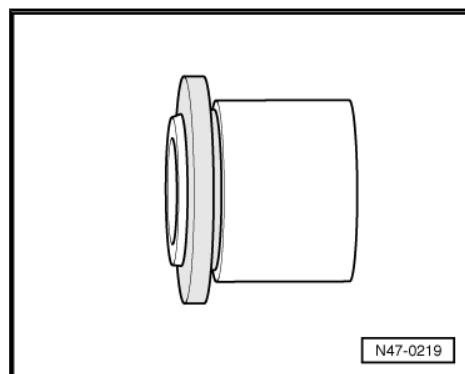
- The surface of the piston and seal should be cleaned using only methylated spirits and then dried.
- Apply a thin coat of lithium grease - G 052 150 A2- to piston and seal before inserting.



- Insert the seal into the brake caliper housing.



- Fit protective cap onto piston.

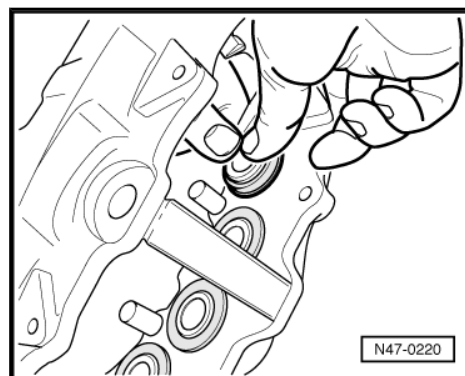


- Push piston into caliper housing, exerting even pressure.

The protective cap must fit securely in the groove; if necessary, apply additional pressure with piston resetting appliance.

### Note

- ◆ Brake line connection at brake pipe: 12 Nm
- ◆ Brake pipe in brake caliper: 19 Nm



### Caution

**Before driving vehicle for the first time, make sure function of brakes is OK.**

## 5 Brake caliper (ceramic brakes)

### Note

- ◆ Brake line connection at brake pipe: 12 Nm
- ◆ Brake pipe in brake caliper: 19 Nm

### 5.1 Servicing brake caliper (ceramic brakes)

#### 1 - Bolts for brake caliper

##### Note

*These bolts do not have to be slackened in order to remove the brake caliper or change the brake pads.*

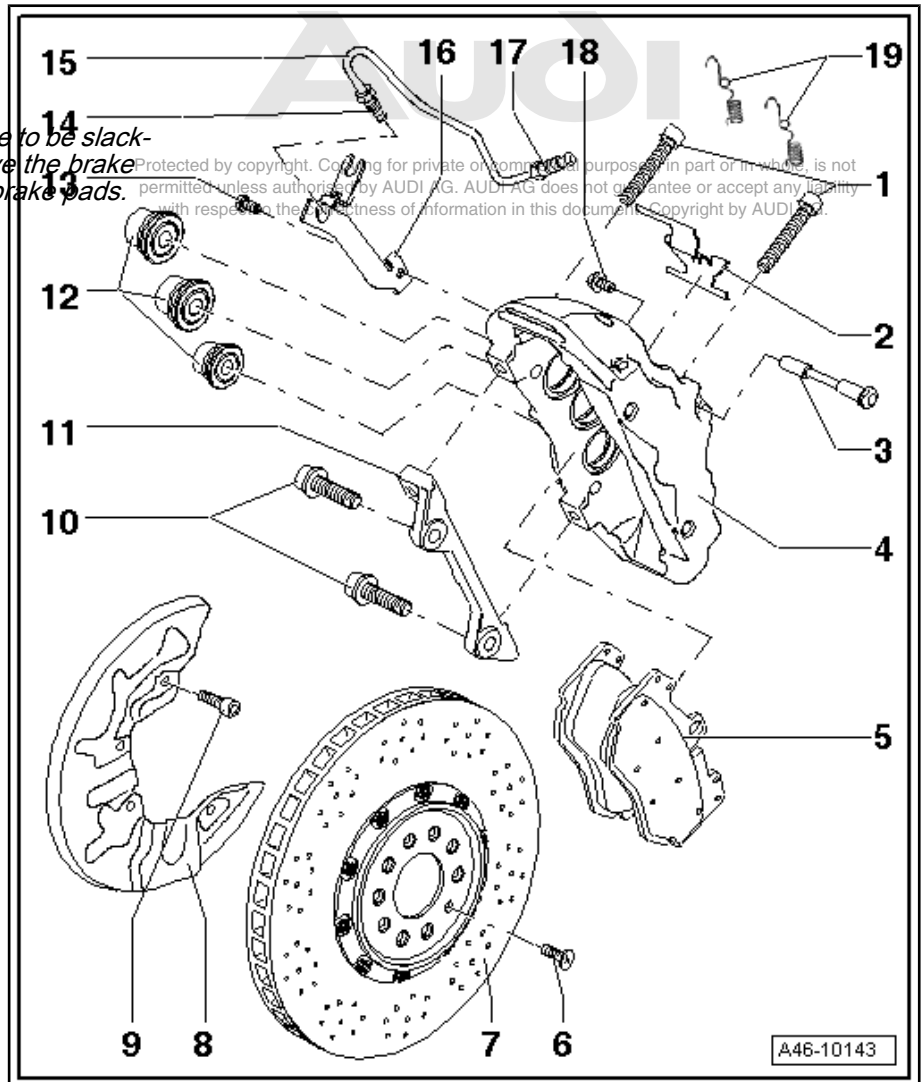
- Tightening torque 190 Nm

#### 2 - Retaining spring for brake pads

#### 3 - Guide pin

#### 4 - Brake caliper

- If assembly work is required, do not leave caliper hanging from brake hose but secure it to body with wire
- With the exception of "Removing and installing brake pads", "Removing and installing brake caliper" and "Removing and installing brake pistons", no repairs may be performed on the brake caliper
- Do not twist hose when installing
- Allocation ⇒ [page 1](#) ,



## Brakes

## 5 - Brake pads

- Wear limit ⇒ [page 1](#)



## Note

*A wire for the wear indicator is fitted to the inner pad.*

- There is an adhesive foil on the backplates of the outer brake pads. Remove the protective foil before fitting pads.
- Before fitting pads, clean guide surfaces and apply a thin coating of polycarbamide grease ⇒ Parts catalogue
- Different versions available ⇒ Parts catalogue
- Always renew on both sides of axle
- Removing and installing
- Checking pad thickness ⇒ Maintenance ; Booklet 4E


## 10 - Ribbed bolt

- Tightening torque: 190 Nm
- Clean ribs if using again

## 11 - Brake carrier

- Bolt to wheel bearing housing

## 12 - Brake pistons

**WARNING**

*The brake pistons have different diameters. When re-installing, please make sure that each of the brake pistons is inserted in the correct aperture in the brake caliper. The ceramic inserts on the brake piston act as heat insulators and must not be separated from the brake piston. If the ceramic insert is damaged, the brake pistons must be renewed for safety reasons.*

## 13 - Bolt for bracket

- Tightening torque: 25 Nm
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## 14 - Brake line connection at brake pipe

- Tightening torque: 12 Nm
- Brake hose must not be twisted.



## Note

- ◆ *Brake line connection at brake pipe: 12 Nm*
- ◆ *Brake pipe in brake caliper: 19 Nm*

### 15 - Brake line

- Screw into brake caliper housing
- Screw into brake hose, counter hold on brake hose hexagon.
- Do not twist hose when fitting
- Ensure that lugs are properly seated in grooves in bracket.

### 16 - Bracket for brake line

- Bolt to brake caliper housing
- Attach brake line

### 17 - Brake pipe in brake caliper

- Tightening torque: 19 Nm



#### Note

- ◆ *Brake pipe in brake caliper:*  
19 Nm
  - ◆ *Brake line connection at brake pipe:* 12 Nm
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### 18 - Bolt for guide pin

- Tightening torque: 30 Nm

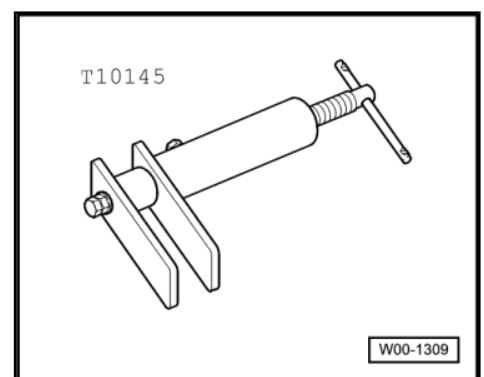
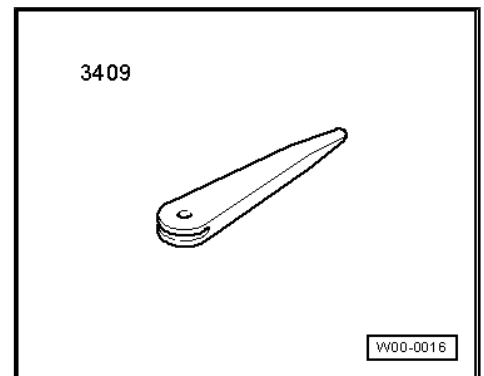
### 19 - Damper spring

- 2 fitted on each brake caliper
- Detaching and attaching => [page 57](#)

## 5.2 Removing and installing pistons for front brake caliper

### Special tools and workshop equipment required

- ◆ Removal wedge - 3409-
- ◆ Piston resetting appliance - T10145-

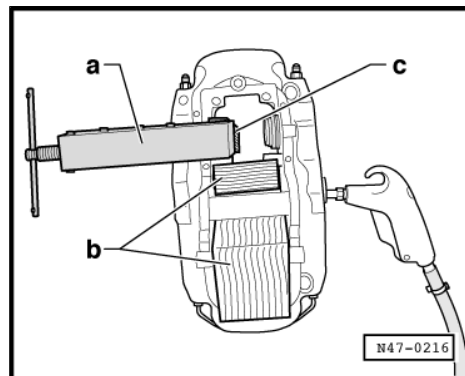


- ◆ Lithium grease - G 052 150 A2-

### Removing

- Force pistons out of brake caliper housing one at a time using compressed air.

The pistons can only be removed one at a time. Hold the opposite piston in the caliper housing with piston resetting appliance -a-. Use blocks of wood or similar -b- to keep the other pistons in place. Also place a piece of wood -c- against the resetting tool to prevent the piston from being damaged when it is forced out.



- Remove seal using removal wedge - 3409- .

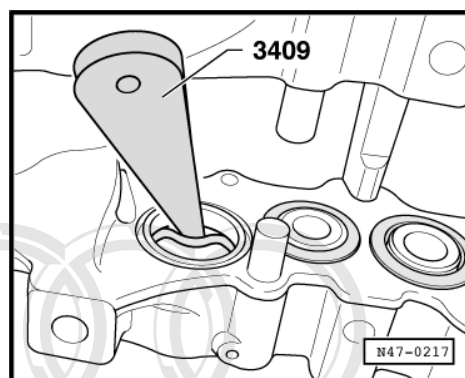
When removing ensure that the bore of the cylinder is not damaged.

### Installing



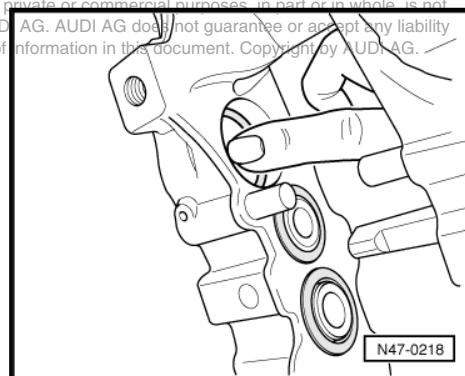
#### WARNING

*The brake pistons have different diameters. When re-installing, please make sure that each of the brake pistons is inserted in the correct aperture in the brake caliper. The ceramic inserts on the brake piston act as heat insulators and must not be separated from the brake piston. If the ceramic insert is damaged, the brake pistons must be renewed for safety reasons.*



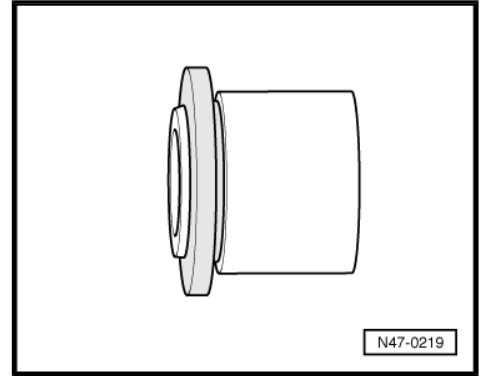
- The surface of the piston and seal should be cleaned using only methylated spirits and then dried.
- Apply a thin coat of lithium grease - G 052 150 A2- to piston and seal before inserting.
- Insert the seal into the brake caliper housing

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- Fit protective cap onto piston.

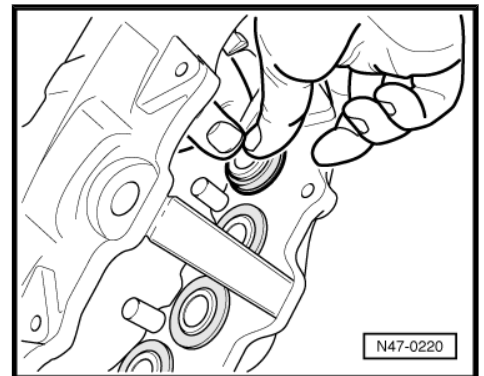


- Push piston into caliper housing, exerting even pressure.

The protective cap must fit securely in the groove; if necessary, apply additional pressure with piston resetting appliance.

 **Note**

- ◆ *Brake pipe in brake caliper: 19 Nm*
- ◆ *Brake line connection at brake pipe: 12 Nm*



**Caution**

***Before driving vehicle for the first time, make sure function of brakes is OK.***

**Audi**

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## 6 Rear brake calipers for electronic parking brake and handbrake (EPB)

### 6.1 Servicing brake calipers

Applies to steel and ceramic brakes.



#### Note

- ◆ When carrying out repairs install all parts supplied in repair kit.
- ◆ Apply a thin coat of assembly paste to brake cylinder, piston and seal.

#### 1 - Self-locking bolt

- ❑ Tightening torque: 35 Nm
- ❑ Always renew
- ❑ Counter-hold guide pin when loosening and tightening

#### 2 - Brake caliper with actuator

- ❑ The brake caliper should not be separated from the actuator
- ❑ After repairing, pre-bleed brake caliper housing ⇒ [page 110](#)

#### 3 - Bleeder valve

#### 4 - Dust cap

- ❑ Fit onto bleeder valve

#### 5 - Seal

- ❑ Removing and installing ⇒ [page 101](#)

#### 6 - Compressor nut

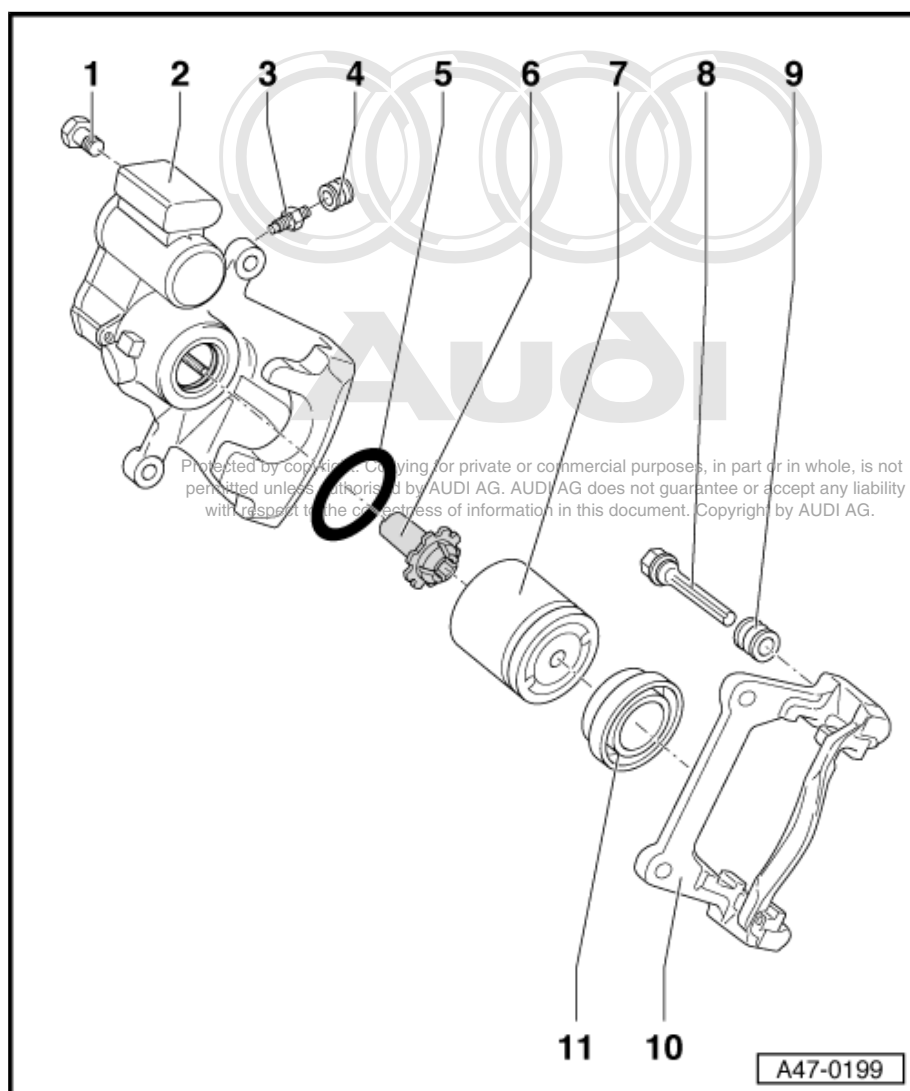
- ❑ To operate the parking brake

#### 7 - Piston

- ❑ Removing and installing ⇒ [page 101](#)

#### 8 - Guide pin

- ❑ Lubricate before instal-



ling protective cap

**9 - Protective cap**

- Insert onto brake carrier and guide pin

**10 - Brake carrier with guide pins and protective caps**

- Replacement carriers are supplied assembled and with sufficient grease on guide pins
- If protective caps or guide pins are damaged, renew using repair kit. Use grease sachet supplied to lubricate the guide pins.






**11 - Protective cap**

- Removing and installing ⇒ [page 101](#)
- Push outer sealing lip onto piston

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**6.2 Removing and installing piston for rear brake caliper**

Applies to steel and ceramic brakes.

<p><b>V.A.G 1331</b></p> 	<p><b>V.A.G 1332</b></p> 
	<p><b>3409</b></p> 
<p><b>V.A.G 1551</b></p> 	<p><b>VAS 5051</b></p> 
	<p>G47-0003</p>

Special tools and workshop equipment required

- ◆ -V.A.G 1331- Torque wrench
- ◆ -V.A.G 1332- Torque wrench
- ◆ -T10145- Piston resetting appliance
- ◆ -VAS 505x- Vehicle diagnosis, testing and information system
- ◆ 3409 Removal wedge

### Removing

- Raise the vehicle.
- Remove wheels.
- Connect vehicle diagnostic, testing and information system - VAS 505x- with diagnosis lead -VAS 5051/1- to the 16-pin diagnosis connector of the vehicle and select the parking brake via self-diagnosis with "Address word" 53. When doing this the ignition must be off.


### Note

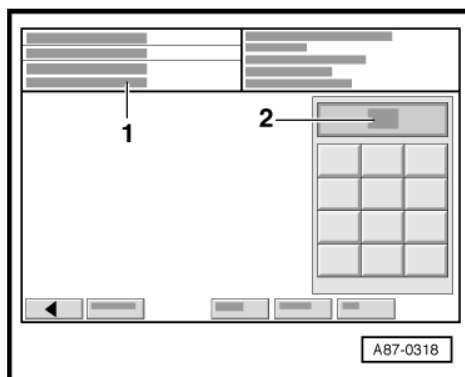
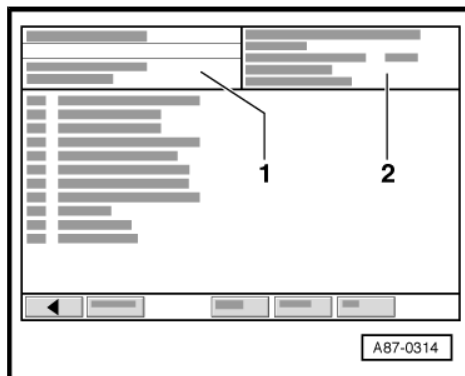
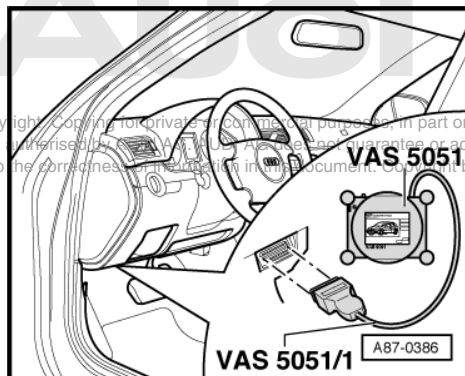
- ◆ *Ignition on*
- ◆ *Release parking brake.*
- ◆ *Coding checked and rectified if necessary*
- ◆ *Event memory interrogated, indicated faults eliminated and memory erased.*

Display on VAS 505x:

- Select function "04 - Basic setting".

Display on VAS 505x:

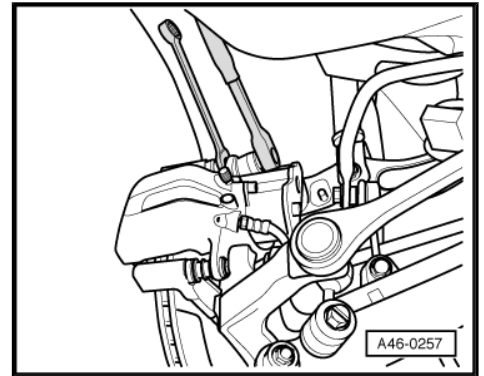
- ◆ The prompt to enter a display group appears in display zone -1-.
- ◆ Display zone -2- shows a keypad.
- Enter "7" to select "Display group 007" via the keypad in display zone -2- and confirm entry with  key (brake opens all the way).



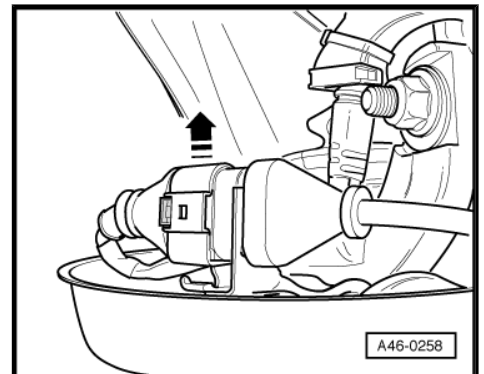
- Remove securing bolts from brake caliper housing, when doing this counter-hold on guide pins.

 **Note**

*Do not unplug connection of actuator motor or brake system.*

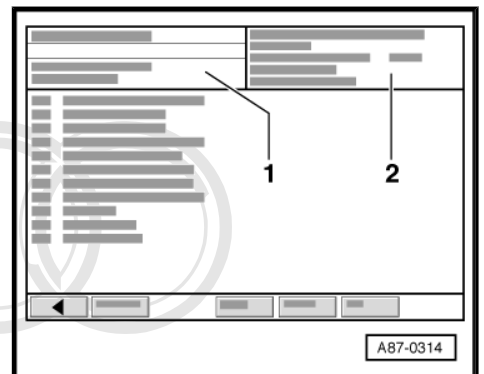


- Push connector out of retainer.
- Move brake caliper clear to one side.
- Remove brake pads.
- Remove guide clips => Self-diagnosis; Address word 53, Parking brake .




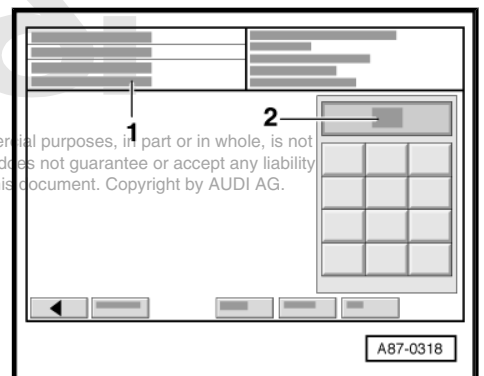
Display on VAS 505x:

- Select function "04 - Basic setting".



Display on VAS 505x:

- ◆ The prompt to enter a display group appears in display zone -1-.
- ◆ Display zone -2- shows a keypad.
- Enter "6" to select "Display group 006" via the keypad in display zone -2- and confirm entry with  key (extending piston). The piston extends for 20 seconds and drops out of the brake caliper.



 **Note**

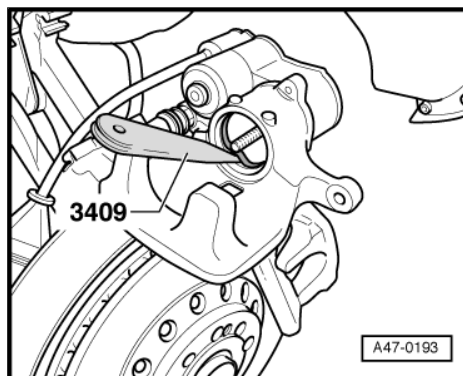
*If the brake piston has not dropped out after 20 seconds, switch ignition off and on again after 10 seconds. Then operate the switch for the electronic parking brake. The brake piston will extend for another 20 seconds.*

- Switch off ignition.
- Take brake piston and compressor nut out of brake caliper.
- Detach the old protective cap from the brake piston.

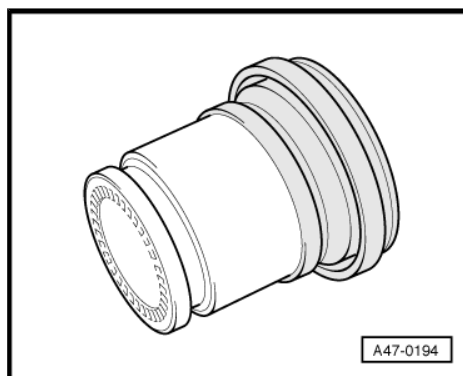
- Remove the old seal from the brake caliper using removal wedge 3409.

### Installing

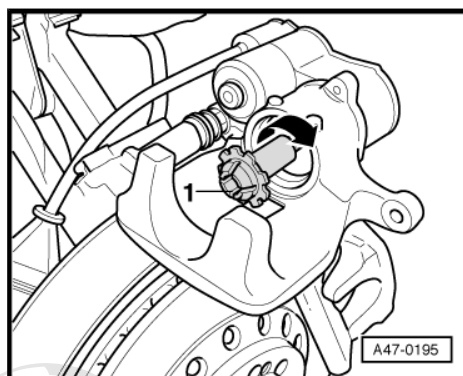
- Fit the new seal in the brake caliper.



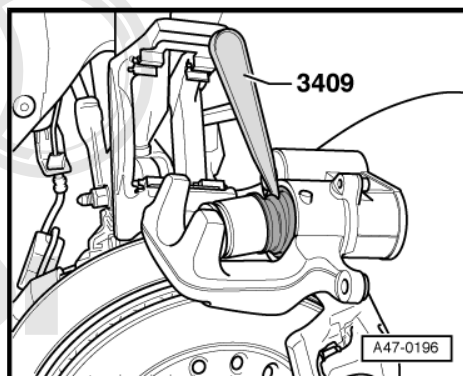
- Fit the new protective cap onto the brake piston as shown in the illustration.



- Screw compressor nut -1- into brake caliper onto stop, then turn nut a quarter turn in the opposite direction.



- Insert protective cap into groove in brake caliper. To do this use removal wedge 3409.
- Carefully slide brake piston into brake caliper. Turn brake piston as required. The brake piston must be guided over the compressor nut, which is only possible in four positions.

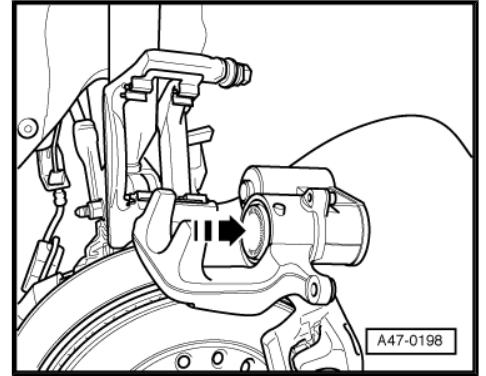


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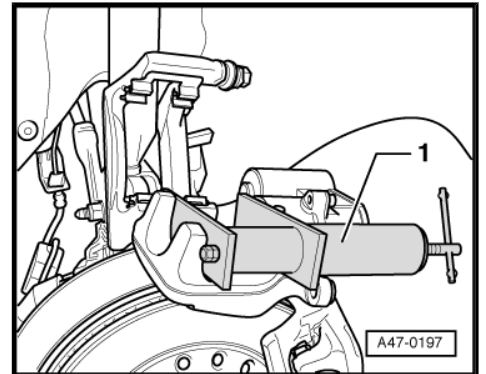
- Press brake piston onto stop in brake caliper after passing the compressor nut.

 **Note**

*Make sure not to damage the compressor nut.*



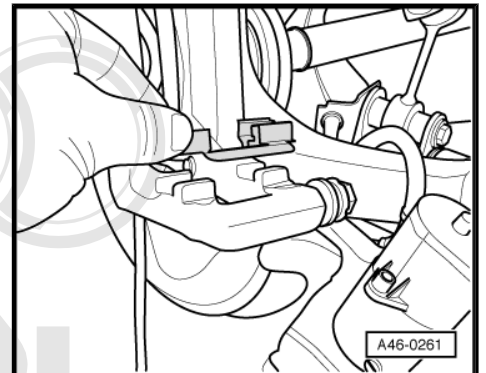
- Piston resetting appliance -T10145- can also be used to press in the brake piston.
- Make sure that the protective cap is located in the groove of the brake piston when the piston is pressed in all the way.



- Insert pad retaining springs.
- Measure the pad thicknesses of both brake pads without back-plates and make a note of the lower value.

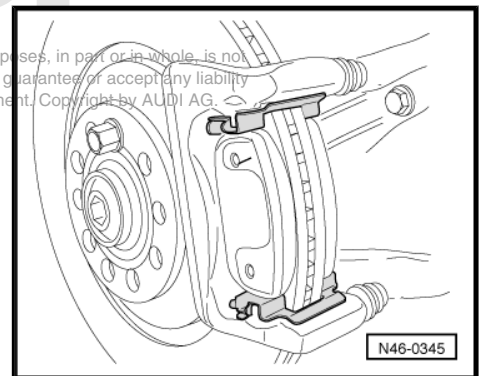
 **Note**

*Round off the measured value to a whole number. The value should be between 3 and 14. Use new brake pads if the measured value is less than 3.*

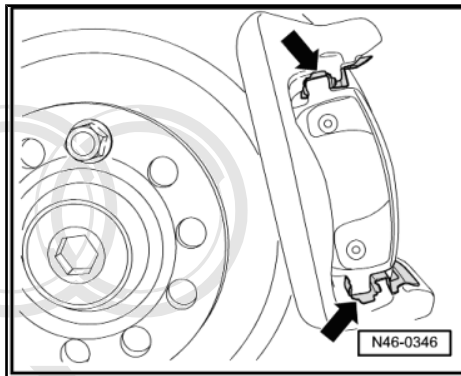


- Fit brake pads.

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- Ensure that the brake pads are located correctly in the pad retainers -arrows-.



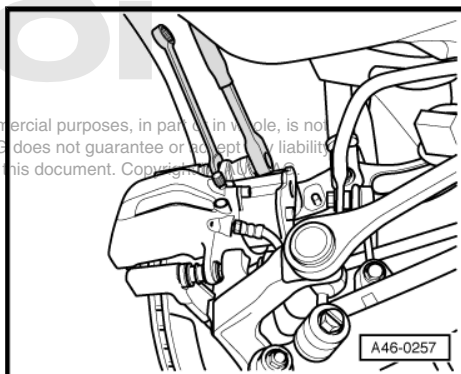
- Secure brake caliper housing with new self-locking bolts.



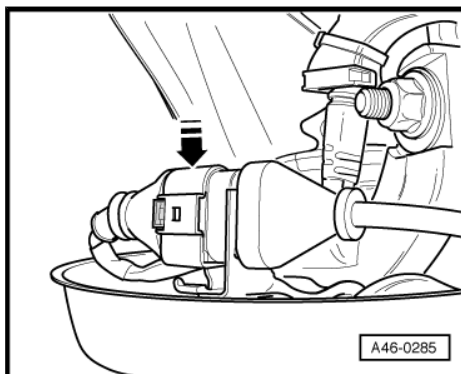
**Note**

*The repair kit includes four self-locking hexagon bolts which must always be installed.*

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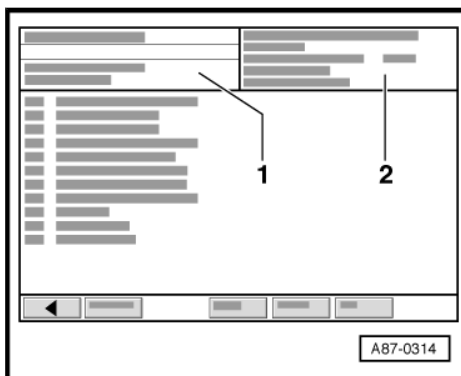


- Fit electronic parking brake connector into bracket.
- Switch on ignition.
- Apply and release electronic parking brake three times. Wait in each case until the actuator motors of the electronic parking brake have reached their end position.
- Switch ignition off and on again after 10 seconds. ⇒ Self-diagnosis; Address word 53, Parking brake




Display on VAS 505x:

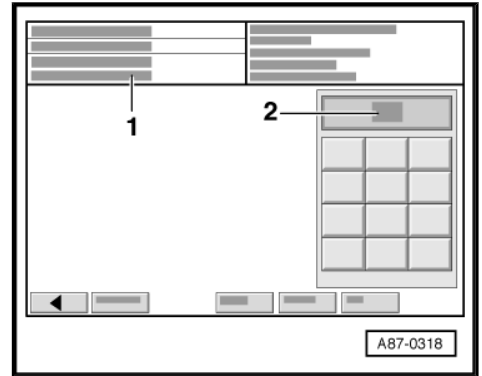
- Select function "04 - Basic setting".





Display on VAS 505x:

- ◆ The prompt to enter a display group appears in display zone -1-.
- ◆ Display zone -2- shows a keypad.
- Enter "10" to select "Display group 10" via the keypad in display zone -2- and confirm entry with  key (system test). The operation of the brake is tested. The electronic parking brake opens all the way and closes three times. → Self-diagnosis; Address word 53, Parking brake




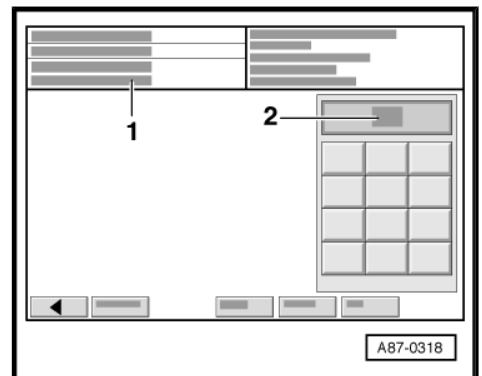
Display on VAS 505x:

- Select function "10 - Adaption".



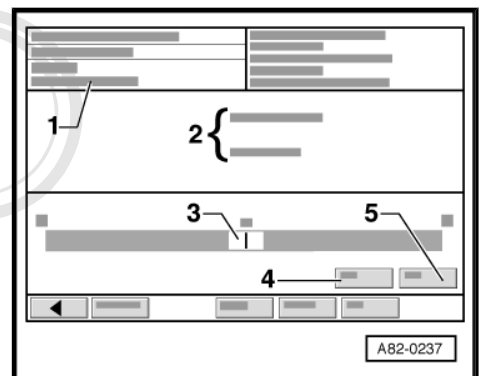
Display on VAS 505x:

- ◆ Prompt for entering channel number appears in display zone -1-.
- ◆ Display zone -2- shows a keypad.
- Enter "6" to select "Channel number 06" via the keypad in display zone -2- and confirm entry with  key (entering brake pad thickness).



Display on VAS 505x:

- ◆ "Read and test channel 6" appears in display zone -1-.
- ◆ Zone -2- displays the specified limits for brake pad thickness.
- ◆ Zone -3- displays a sliding bar diagram with a number representing the currently stored pad thickness.
- The pad thickness can be changed within the specified limits (3...14) via the sliding bar.

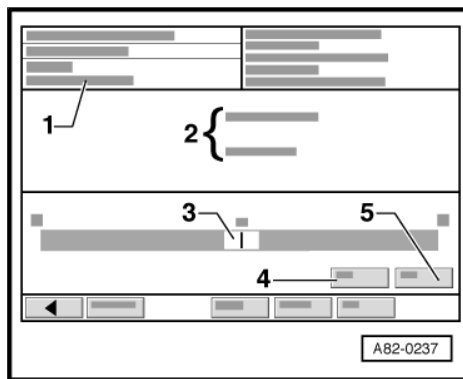


 Note


- ◆ If you enter a pad thickness that is outside the specified limits via the sliding bar, the value will be indicated but not accepted.
- ◆ The display resets automatically if the pad thickness entered via the sliding bar is too large or too small.

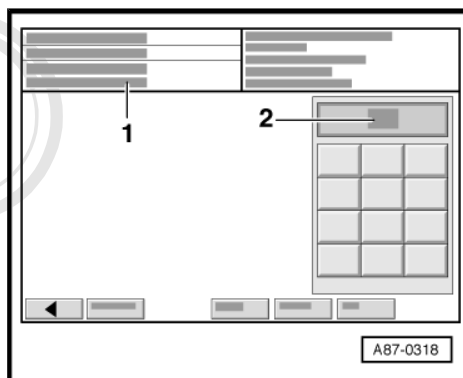
The values can be entered via the keypad as well.

- Press key -4- (to enter values via keypad).



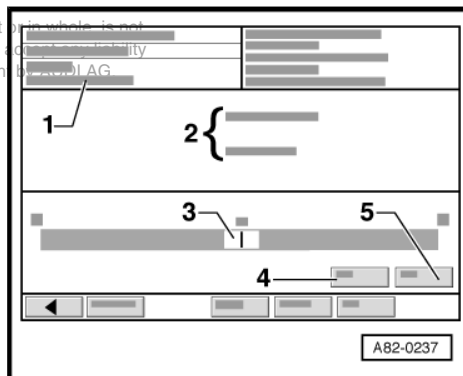
Display on VAS 505x:

- ◆ Request in display zone -1- “Enter adaption value: 0...65535”.
- ◆ Display zone -2- shows a keypad.
- Enter the measured pad thickness in display zone -2- via the keypad and confirm entry with  key.



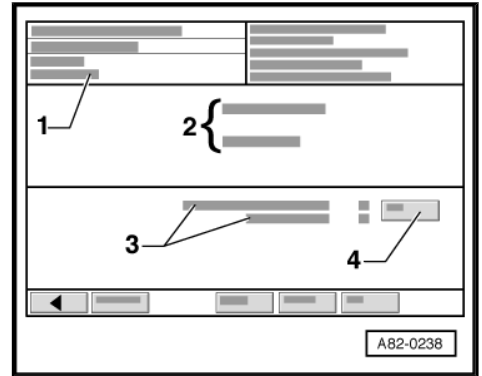
Display on VAS 505x:

- ◆ Zone -3- displays the newly entered pad thickness value indicated by the sliding bar.
- Store the new pad thickness by pressing key -5-.



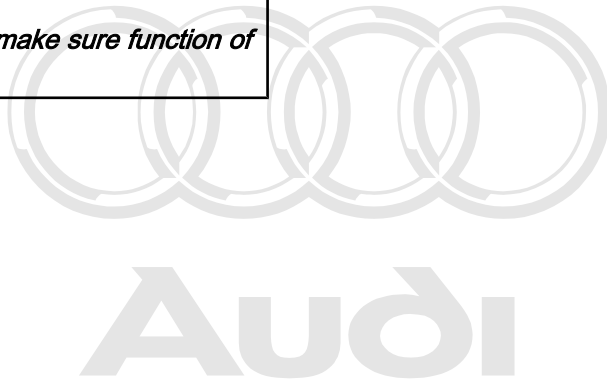
Display on VAS 505x:

- ◆ “Store channel 6” appears in display zone -1-.
- ◆ Zone -2- displays the specified limits for brake pad thickness.
- ◆ Zone -3- displays the original and the newly entered pad thickness value.
- Confirm and store the new pad thickness by pressing key -4-.
- ◆ Display zone -1- indicates “Store channel 6 Value 0...23 stored”.
- End self-diagnosis and switch ignition off.
- Fit wheels ⇒ ELSA/ Wheel/Tyre Guide ⇒ Rep. gr. 44 .
- Check brake fluid level and top up if necessary.



**Caution**

*Before driving vehicle for the first time, make sure function of brakes is OK.*



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## 7 Bleeding brake system



### WARNING

- ◆ *Do not under any circumstances allow brake fluid to come into contact with fluids that contain mineral oils (e.g. oil, petrol, cleaning agents). Mineral oils damage the plugs and seals in the brake system.*
- ◆ *Brake fluid is poisonous and must NOT be drawn off by sucking through a hose. Because of its caustic properties it must also not come into contact with paintwork.*
- ◆ *Brake fluid is hygroscopic, i.e. it absorbs moisture from the surrounding air, and should therefore always be stored in airtight containers.*
- ◆ *Brake fluid flushed out during the bleeding process must not be re-used and must be disposed of in the proper manner.*
- ◆ *Always observe the relevant environmental regulations for disposal → [page 17](#).*



### Note

- ◆ *Only use new brake fluid conforming to US standard FMVSS 116 DOT 4.*
- ◆ *Genuine VW/Audi brake fluid conforms to this specification.*
- ◆ *Do not use liquids containing silicone.*
- ◆ *Avoid contamination of brake fluid with any dirt particles or bits of fluff (e.g. from cleaning cloths etc.).*
- ◆ *Rinse off spillages using plenty of water.*
- ◆ *When the system is open do not work with compressed air and do not move the vehicle.*
- ◆ *During the final road test, ensure that at least one ABS-controlled braking operation is performed (pulsations must be felt at the brake pedal).*

### 7.1 Bleeding sequence for vehicles with Electronic Stabilisation Program (ESP)

Applies to steel and ceramic brakes.

Unlike ESP 5.3, ESP 5.7 does not incorporate hydraulic pump - V156-. It is therefore not necessary to bleed the pre-charging pump with the diagnostic tester.

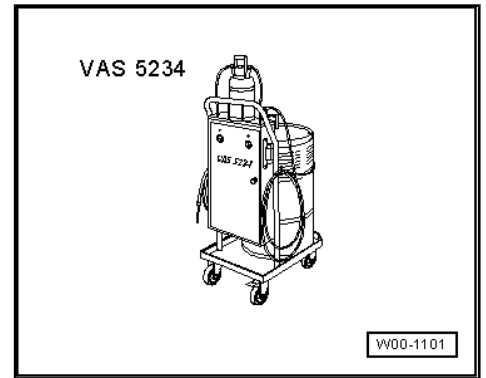


### Note

- ◆ *A pressure of at least 2 bar is required for bleeding the hydraulic unit. For this reason it is important to always check the pressure setting on the bleeder unit.*
- ◆ *Only use the brake pedal actuator when installing brake system components, and bleed the system afterwards.*

Special tools and workshop equipment required

- ◆ -VAS 5234- Brake filling and bleeding equipment



or

- ◆ Brake filling and bleeding equipment - V.A.G 1869/- with up-grade kit and extraction unit -V.A.G 1869/4-

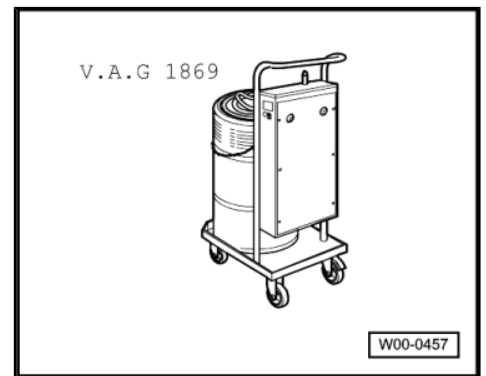
or

- ◆ -V.A.G 1869- Brake filling and bleeding equipment without up-grade kit and extraction unit -V.A.G 1869/4-

#### Bleeding brake system using brake filling and bleeding equipment -V.A.G 1869- or VAS 5234

Observe instruction manual for -VAS 5234- or for -V.A.G 1869- !

- Connect -V.A.G 1869- or VAS 5234.
- Open bleeder screws in the specified order and bleed brake calipers (assist as required with pedal pressure).



#### Bleed sequence for LHD and RHD vehicles

- 1 - Front left-side brake caliper
  - 2 - Front right-side brake caliper
  - 3 - Rear left-side brake caliper
  - 4 - Rear right-side brake caliper
- Keep bleeding the calipers until clear, foam-free brake fluid emerges.
  - Close bleeder screw.



#### Caution

*Before driving vehicle for the first time, make sure function of brakes is OK.*

## 7.2 Changing brake fluid

### Changing brake fluid

⇒ Maintenance ; Booklet 4E ; Work descriptions; Changing brake fluid (every 2 years)

## 8 Brake servo/ brake master cylinder - exploded view



*Use only new brake fluid. Observe information on brake fluid reservoir!*

### 1 - Torx bolt -T45-

- Tightening torque: 23 Nm

### 2 - Self-locking hexagon nut

- Tightening torque: 49 Nm

### 3 - Tandem brake master cylinder

- Cannot be repaired. If faulty, renew complete.
- Removing and installing  
 ⇒ [page 114](#)

### 4 - Sealing plug

- Moisten with brake fluid and press into brake fluid reservoir

### 5 - Filler cap

### 6 - Brake fluid reservoir

### 7 - Vacuum hose

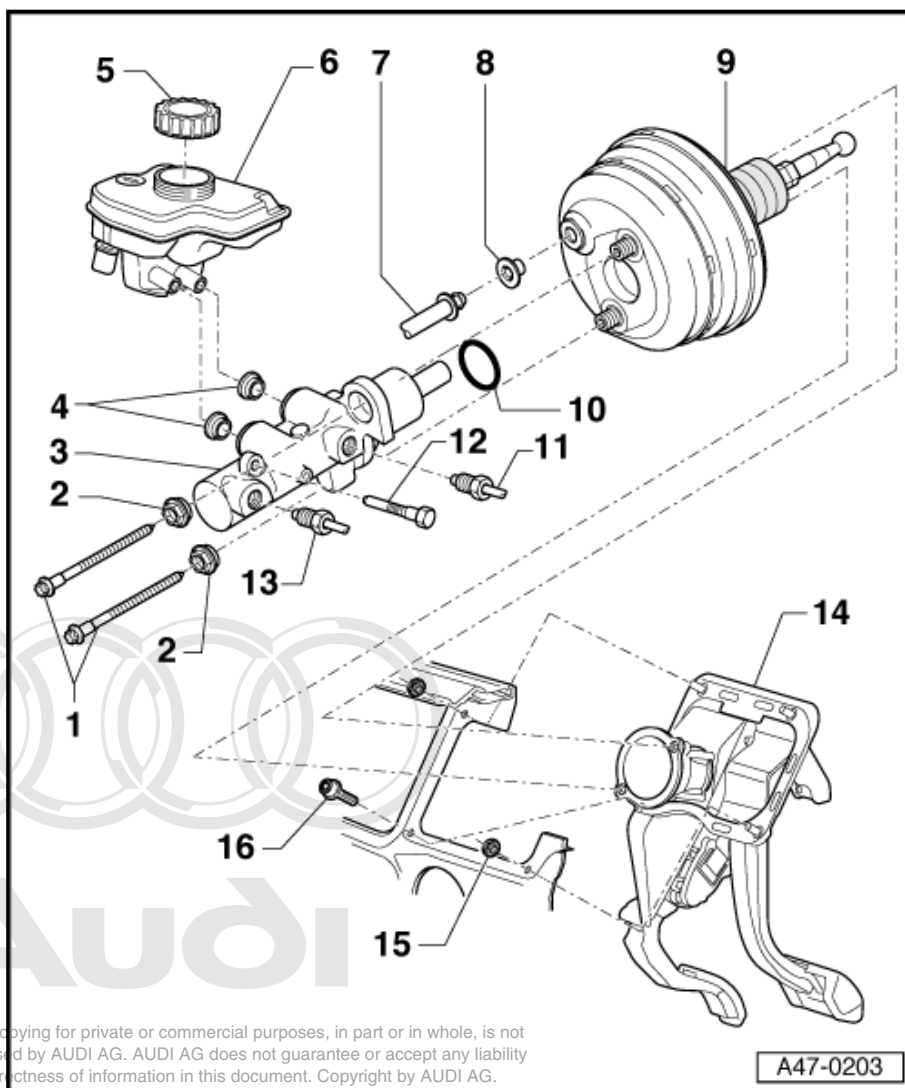
- Insert into brake servo unit

### 8 - Sealing plug

- Connection for vacuum hose

### 9 - Tandem brake servo

- Adjusting ball head  
 ⇒ [page 113](#)
- On petrol engines the vacuum required is taken from the intake manifold



A47-0203

fold.

- Vehicles with a V6 petrol engine and automatic gearbox are equipped with a brake vacuum pump.
- Checking function
- With the engine switched off, firmly depress the brake pedal several times (this reduces the vacuum present in the servo unit).
- Then hold brake pedal in applied position employing moderate force and start engine. If the servo unit is working properly, the pedal will give slightly under foot (servo assistance becomes activated).
- Renew complete unit if defective
- With bonded gasket
- Removing and installing ⇒ [page 117](#)

#### 10 - Seal

- Renew

#### 11 - Brake line

- Tightening torque: 24 Nm
- Brake master cylinder/primary piston circuit to hydraulic unit

#### 12 - Trunion bolt

- Tightening torque: 10 Nm

#### 13 - Brake line

- Tightening torque: 24 Nm
- Brake master cylinder/secondary piston circuit to hydraulic unit

#### 14 - Mounting bracket for pedal cluster

- Removing and installing ⇒ [page 77](#)

#### 15 - Hexagon nut

- Tightening torque: 25 Nm

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#### 16 - Torx socket head bolt -T45-

- Tightening torque: 25 Nm

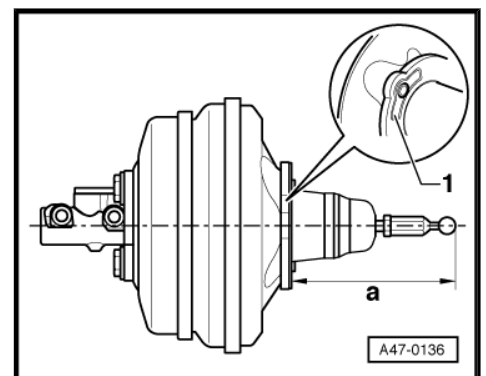
### Adjusting ball head

LHD vehicles:

$a = 184.4 \text{ mm} \pm 0.5 \text{ mm}$


#### Note

- ◆ *Surface -1- for measuring*
- ◆ *When measuring the ball head, it must be set at right angles to the surface of the brake servo.*
- ◆ *Measure to end of ball head without gasket fitted.*



#### Tightening torque:

Ball head to brake servo	30 Nm
--------------------------	-------

 **Caution**

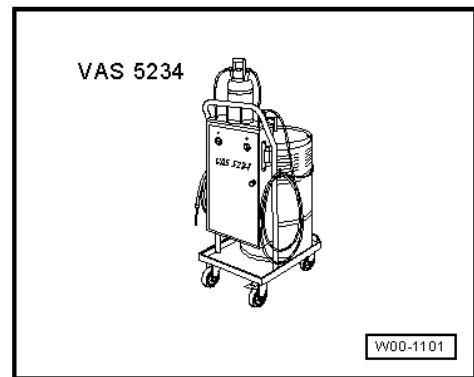
*Before driving vehicle for the first time, make sure function of brakes is OK.*

## 9 Removing and installing brake master cylinder

### 9.1 Removing and installing brake master cylinder

#### Special tools and workshop equipment required

- ◆ Brake filling and bleeding equipment -VAS 5234-



or

- ◆ Brake filling and bleeding equipment -V.A.G 1869 A-
- ◆ Sealing plugs repair kit, part No. 1H0 698 311A

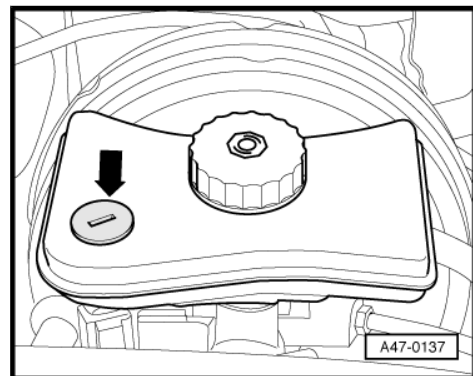
#### Removing

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- Detach plenum chamber cover.

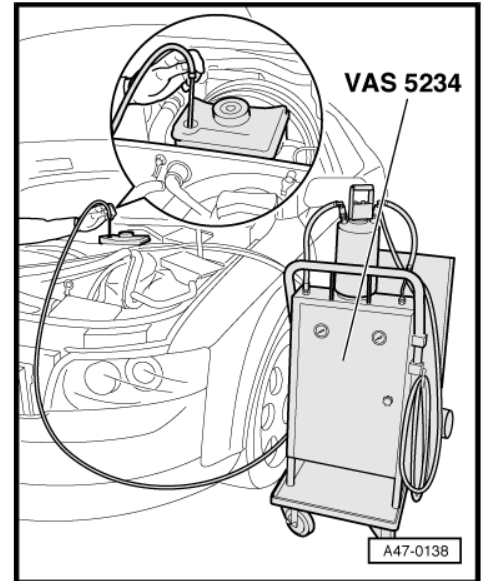
#### Drawing off brake fluid with brake filling and bleeding equipment -V.A.G 1869- or VAS 5234.

- Open brake fluid reservoir.
- As protection against escaping brake fluid, place a sufficient number of lint-free cloths in area beneath brake master cylinder.

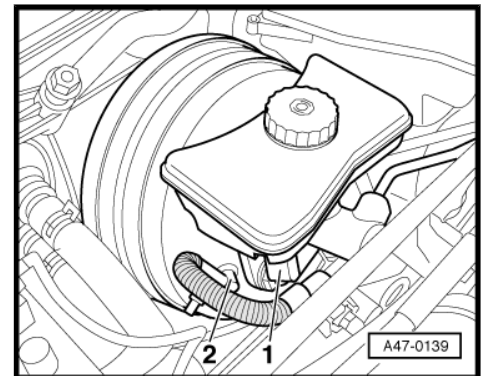




- Draw off as much brake fluid as possible from brake fluid reservoir using brake filling and bleeding equipment -VAS 5234- or extraction unit -V.A.G 1869/4- .

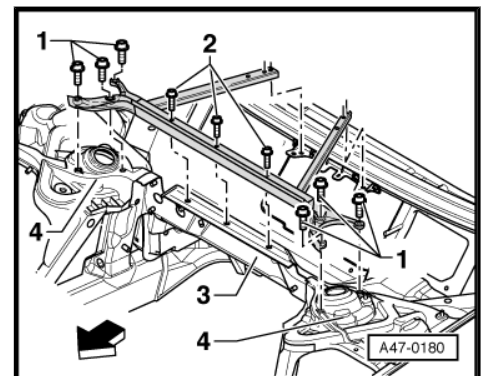


- Unplug connector from sender for float warning indicator -1-.
- Removing body brace

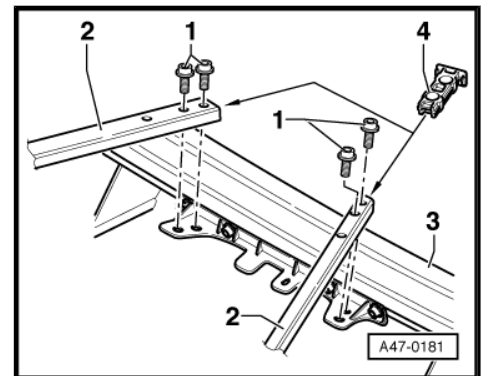


- Remove bolts with washers -1- (tightening torque 45 Nm).
- Remove bolts with washers -2- (tightening torque 3 Nm).
- Item 3- Front section of plenum chamber
- Item 4- Suspension turret

Arrow in illustration points in direction of travel.



- Remove bolts with washers -1- (tightening torque 9 Nm).
- Item 2- Cross piece for suspension turret
- Item 3- Windscreen cross member
- Item 4- Support/ connection piece at windscreen cross member

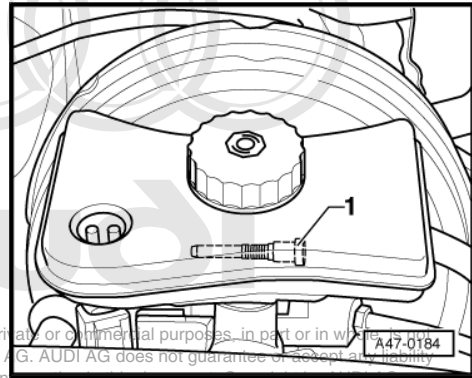


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- Unscrew securing bolt -1- for brake fluid reservoir.
- Pull off brake fluid reservoir and lay it to one side.

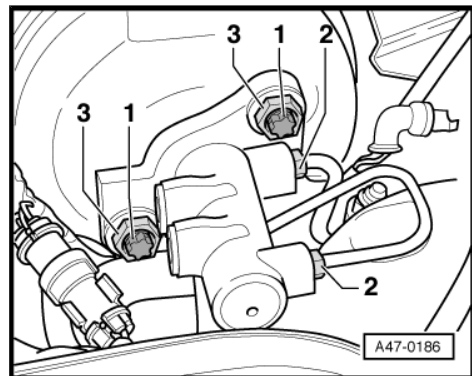
 **Note**

- ◆ *Protect the plenum chamber against any brake fluid which escapes.*
- ◆ *The underside of the brake fluid reservoir clips into the brake master cylinder.*



- To remove reservoir, press down locking lug and at the same time pull brake fluid reservoir out of sealing plugs.

- Disconnect brake lines -2- and seal with sealing plugs from repair kit, Part No. 1H0 698 311 A.

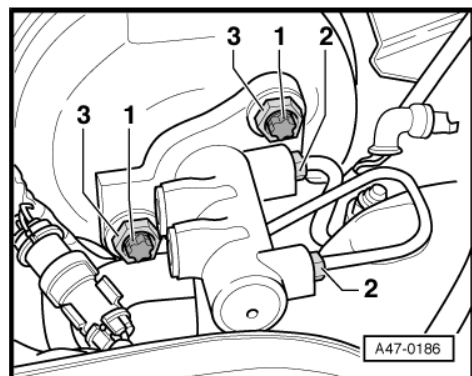


- Unscrew securing bolts for brake master cylinder -3-.
- Carefully remove brake master cylinder from brake servo.

**Installing**

When installing, note the following points in particular:

- ◆ Before installing brake master cylinder, clean any residual brake fluid off plenum chamber.
- ◆ When assembling brake master cylinder with brake servo unit, make sure push rod is properly positioned in brake master cylinder.
- Adjust brake light switch ⇒ [page 34](#) .
- Bleed brake system ⇒ [page 110](#) .



**Caution**

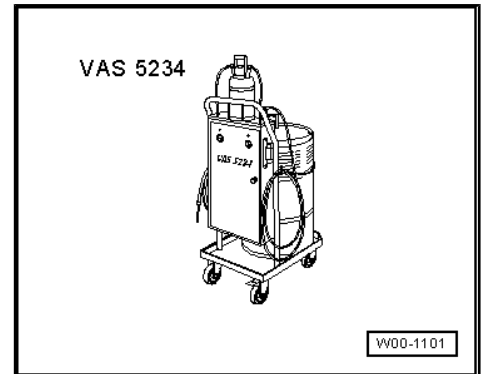
*Before driving vehicle for the first time, make sure function of brakes is OK.*

## 10 Removing and installing brake servo

### 10.1 Removing and installing brake servo

#### Special tools and workshop equipment required

- ◆ Brake filling and bleeding equipment -VAS 5234-



or

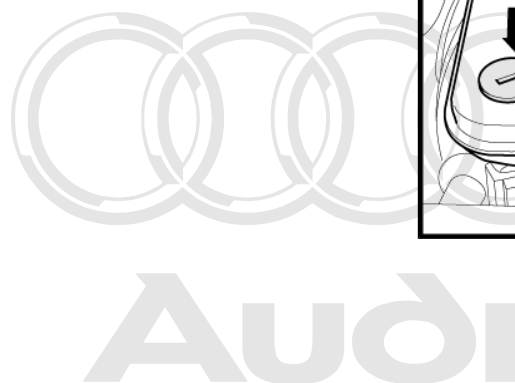
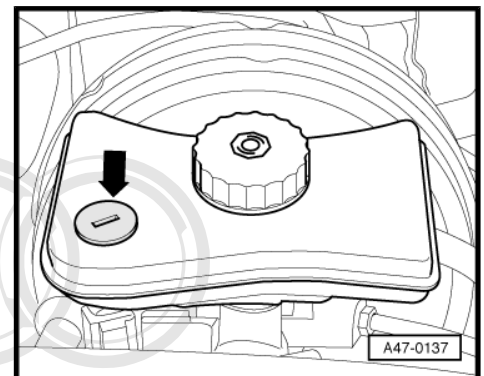
- ◆ Brake filling and bleeding equipment -V.A.G 1869 A-
- ◆ Sealing plugs repair kit, part No. 1H0 698 311A

#### Removing

- Remove storage compartment on driver's side ⇒ Body Repairs; Rep. gr. 68
- Detach plenum chamber cover.

#### Drawing off brake fluid with brake filling and bleeding equipment -V.A.G 1869- or VAS 5234.

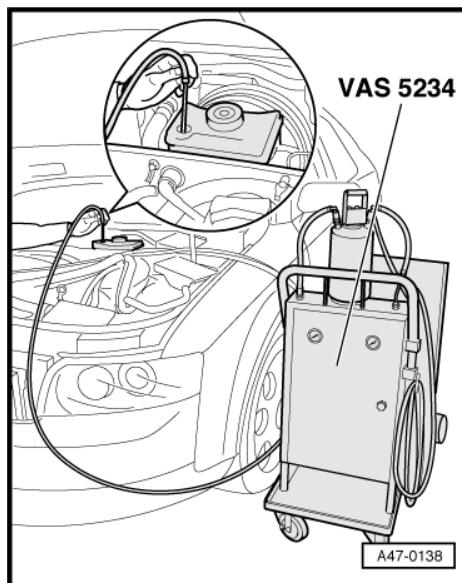
- Open brake fluid reservoir.
- As protection against escaping brake fluid, place a sufficient number of lint-free cloths in area beneath brake master cylinder.



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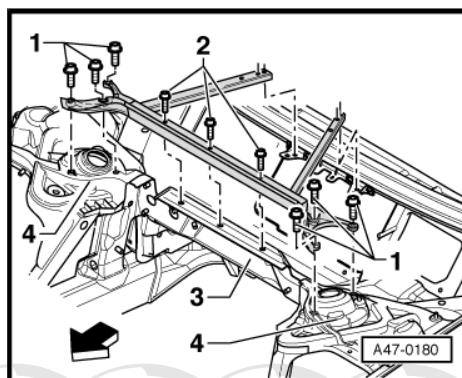
- Draw off as much brake fluid as possible from brake fluid reservoir using brake filling and bleeding equipment -VAS 5234- or extraction unit -V.A.G 1869/4- .

Removing body brace

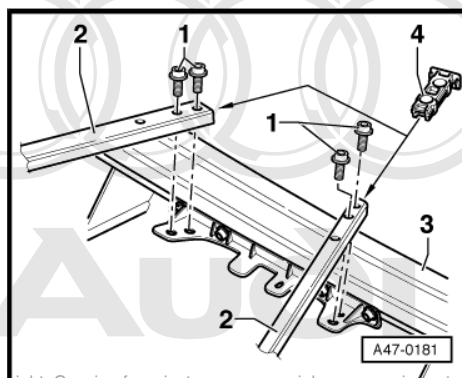


- Remove bolts with washers -1- (tightening torque 45 Nm).
- Remove bolts with washers -2- (tightening torque 3 Nm).
- -Item 3- Front section of plenum chamber
- -Item 4- Suspension turret

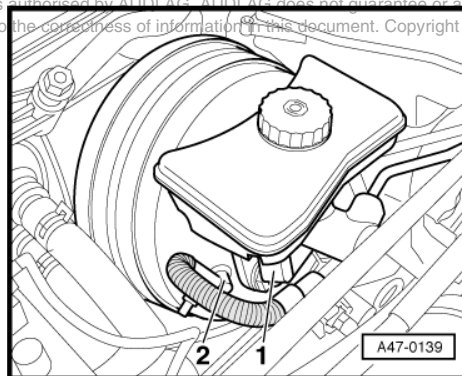
Arrow in illustration points in direction of travel.



- Remove bolts with washers -1- (tightening torque 9 Nm).
- -Item 2- Cross piece for suspension turret
- -Item 3- Windscreen cross member
- -Item 4- Support/ connection piece at windscreen cross member



- Unplug connector from sender for float warning indicator -1-
- Pull off vacuum hose -2-.



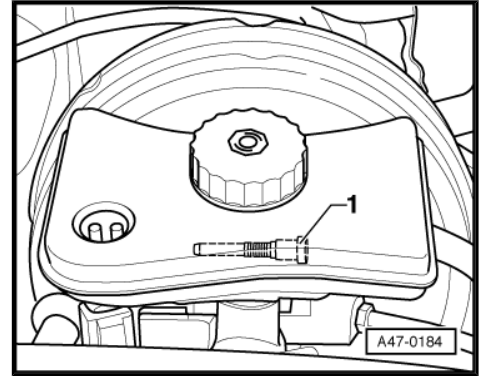
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- Unscrew securing bolt -1- for brake fluid reservoir.

 **Note**

- ◆ *Protect the plenum chamber against any brake fluid which escapes.*
- ◆ *The underside of the brake fluid reservoir clips into the brake master cylinder.*

- To remove reservoir, press down locking lug and at the same time pull brake fluid reservoir out of sealing plugs.

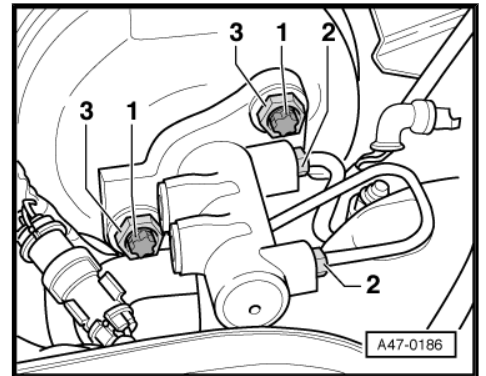


- Pull off brake fluid reservoir and lay it to one side.

- Disconnect brake lines -2- and seal with sealing plugs from repair kit, Part No. 1H0 698 311 A.

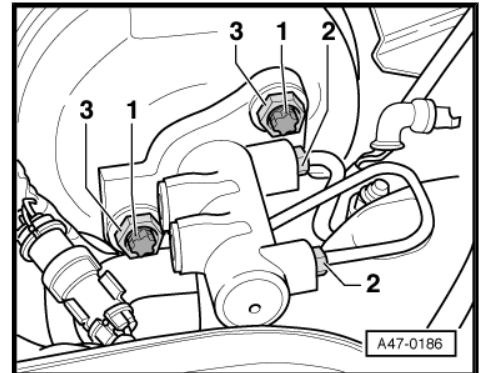
- Removing and installing brake light switch ⇒ [page 34](#) .

- Separate brake pedal from brake servo ⇒ [page 74](#) .



- Unscrew securing bolts for brake servo -1-.

- Remove brake servo with brake master cylinder.

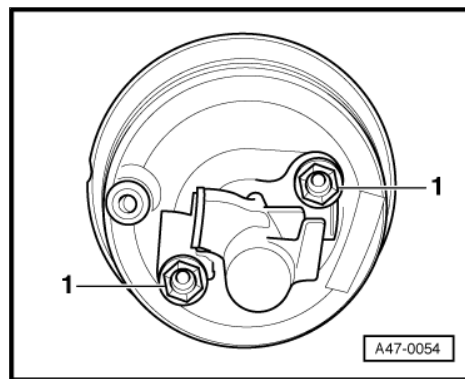


- Unscrew securing nuts for brake master cylinder -1-.
- Carefully remove brake master cylinder from brake servo.

### Installing

When installing, note the following points in particular:

- ◆ Before installing brake master cylinder, clean any residual brake fluid off plenum chamber.
- ◆ When assembling brake master cylinder with brake servo unit, make sure push rod is properly positioned in brake master cylinder.
- Adjust brake light switch ⇒ [page 34](#) .
- Bleed brake system ⇒ [page 110](#) .



### Caution

*Before driving vehicle for the first time, make sure function of brakes is OK.*



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## 11 Vacuum pumps for brake servo

Removing and installing vacuum pump (3.0 ltr. diesel engine)  
 ⇒ [page 122](#)

Removing and installing vacuum pump (4.0 ltr. diesel engine)  
 ⇒ [page 124](#)

Removing and installing vacuum pump (4.2 ltr. diesel engine)  
 ⇒ [page 127](#)

Removing and installing vacuum pump (2.8 ltr. and 3.2 ltr. petrol engine) ⇒ [page 131](#)

Electric vacuum pump for brake servo -V192- (petrol engines)  
 ⇒ [page 133](#)

### 11.1 Vacuum pump - exploded view (3.0 ltr TDI)

1 -

9 Nm

#### 2 - Vacuum pump

- Removing and installing ⇒ [page 122](#)

#### 3 - Vacuum hose

- Secure with hose clips (same as original equipment) ⇒ Electronic parts catalogue

4 -

5 Nm

#### 5 - O-ring

- Renew

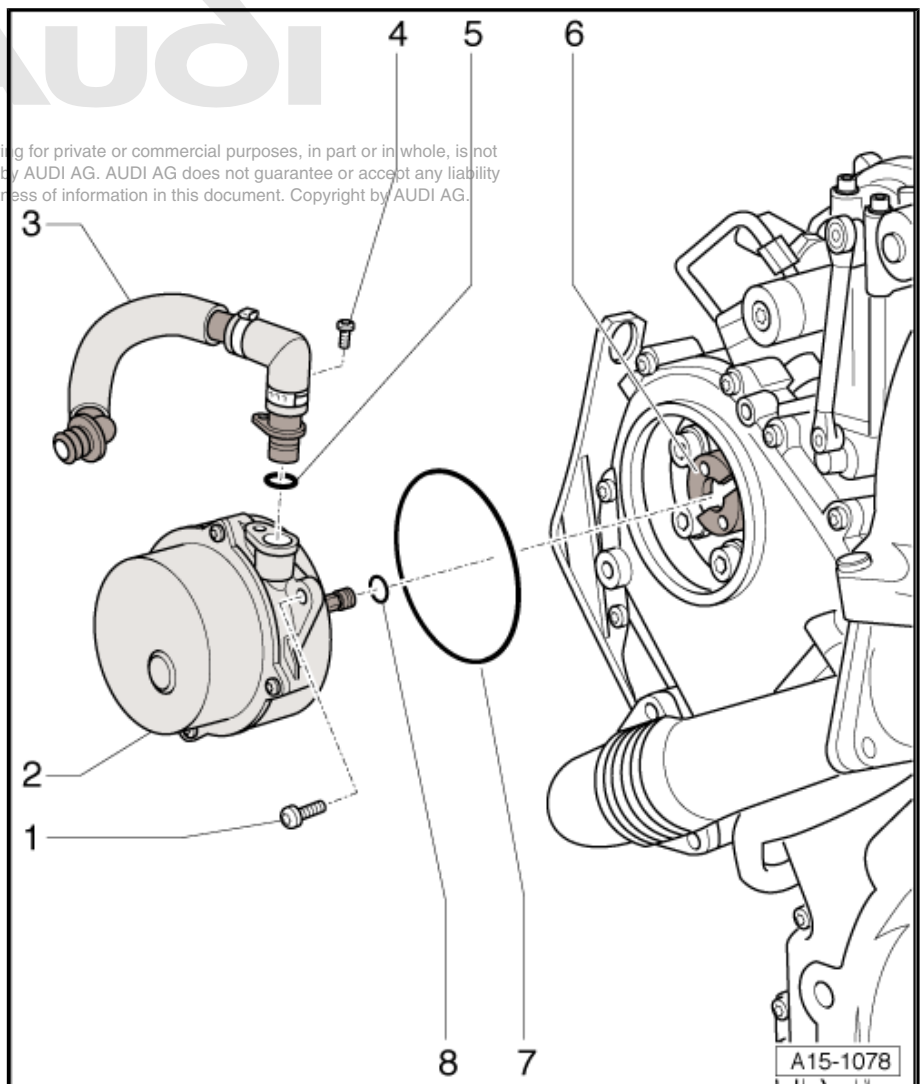
#### 6 - Inlet camshaft

#### 7 - O-ring

- Renew

#### 8 - O-ring

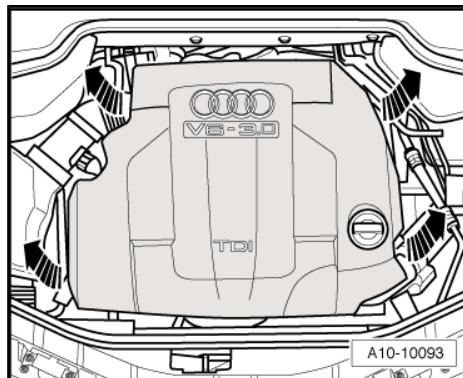
- Renew



## 11.2 Removing and installing vacuum pump (3.0 ltr. TDI)

### Removing

- Carefully pull engine cover panel off 4 mounting studs (one at a time) -arrows-.



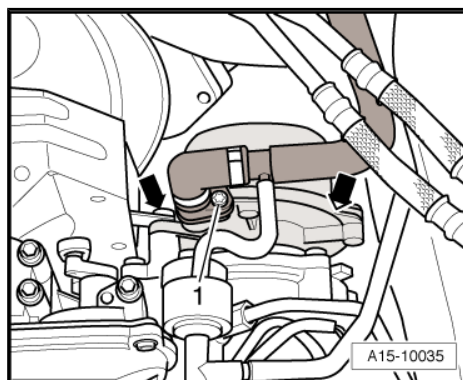
- Remove bolt -1- and detach vacuum hose with hose connection from vacuum pump.



### Caution

*Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.*

- Remove bolts -arrows- and take off vacuum pump.



### Installing

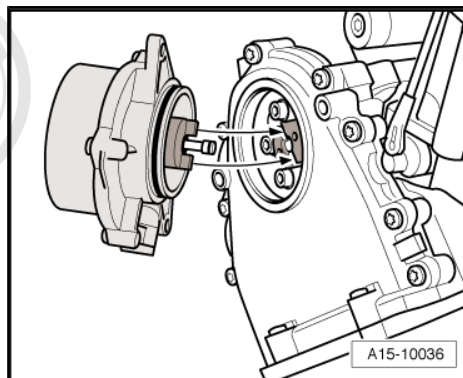
Installation is performed in reverse sequence; note the following:



### Note

*Renew O-rings*


- Set drive lugs of vacuum pump so they engage in slots in camshaft when vacuum pump is installed -arrows-.
- Attach vacuum pump to flange -arrows- and tighten bolts to 9 Nm.

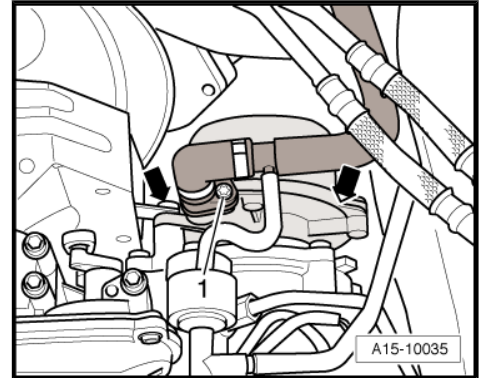


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- Secure vacuum hose to vacuum pump with bolt -1- (5 Nm).

 **Caution**  
*Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.*



**Tightening torques**

Component	Nm
Vacuum pump to timing chain cover	9
Hose connection for vacuum hose to vacuum pump	5

**11.3 Vacuum pump - exploded view (4.0 ltr TDI)**

1 - 10 Nm

2 - Vacuum pump

- Removing and installing  
 => [page 124](#)

3 - Vacuum hose

- Secure with hose clips (same as original equipment) => Electronic parts catalogue

4 - Hose clip

 **Note**

*On some models the vacuum hose has to be secured at the vacuum pump with a bolt.*

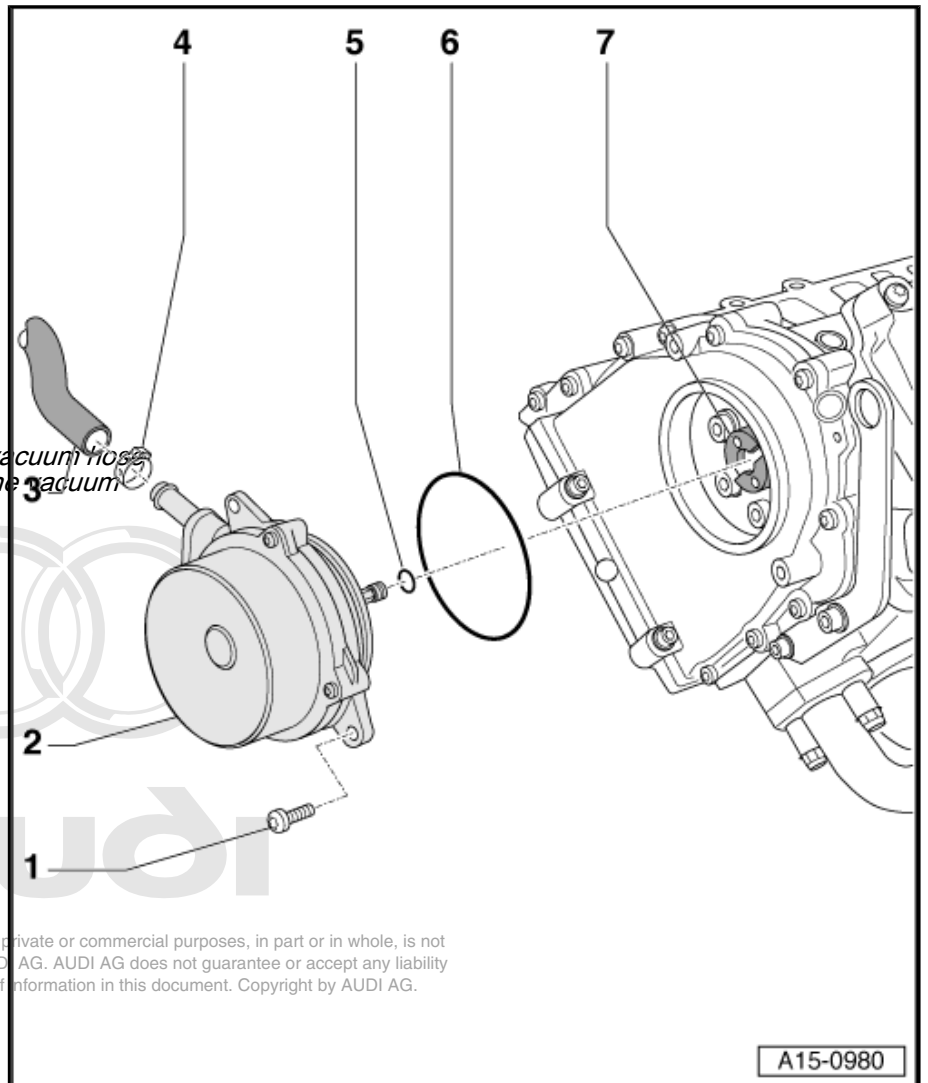
5 - O-ring

- Renew

6 - O-ring

- Renew

7 - Inlet camshaft

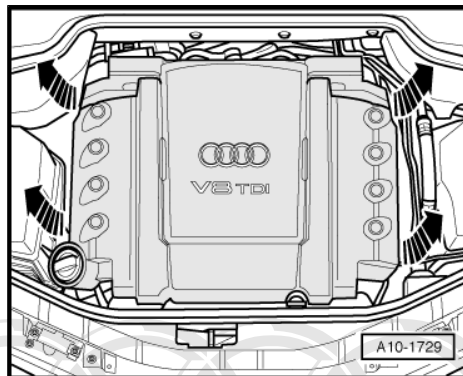


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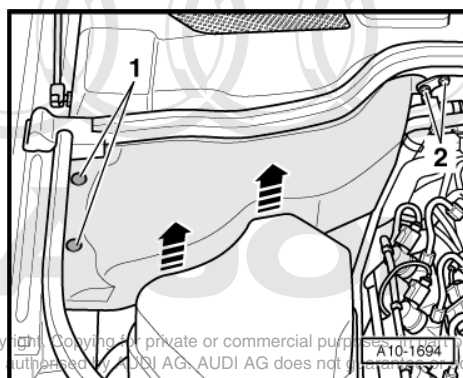
## 11.4 Removing and installing vacuum pump (4.0 ltr. TDI)

### Removing

- Carefully pull engine cover panel off four mounting studs (one at a time) -arrows-.



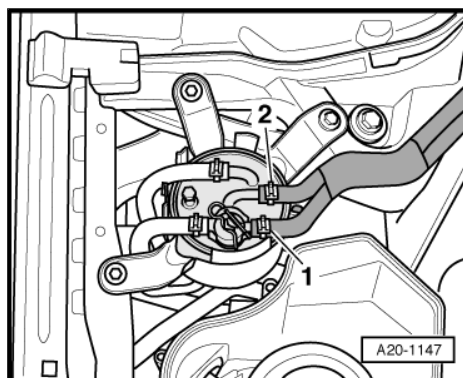
- Remove cover for suspension turret (right-side); to do so, detach fasteners-1- and unscrew retainer -2-.
- Pull cover out of retainer clamps -arrows-.



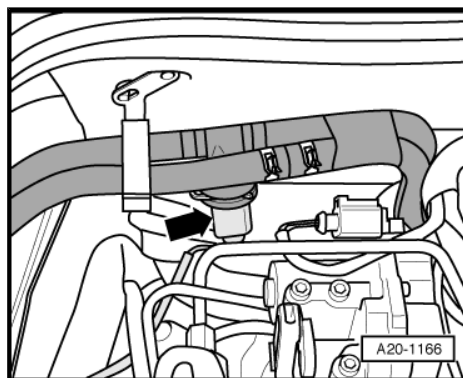
### Caution

*Observe rules for cleanliness when working on the injection system.*

- Disconnect fuel return line -1- and fuel supply line -2- at fuel filter.




- Unplug electrical connector -arrow- at fuel temperature sender - G81- and move fuel lines to one side.



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- Disconnect vacuum hose -1- from vacuum pump.



**Caution**  
*Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.*

- Remove bolts -2- and -3-.
- Take off vacuum pump.

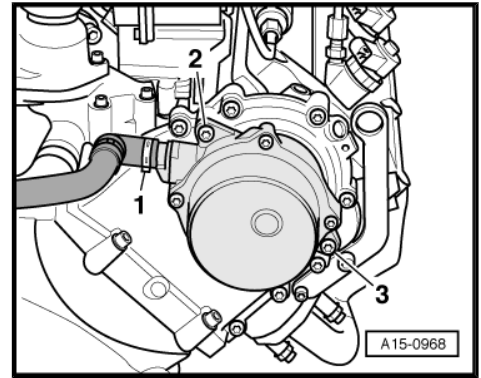
**Installing**

Installation is performed in reverse sequence; note the following:

 **Note**

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- ◆ **Renew O-rings**
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Set drive lugs of vacuum pump so they engage in slots in camshaft when vacuum pump is installed.
- Attach vacuum pump to flange and tighten bolts to 9 Nm.



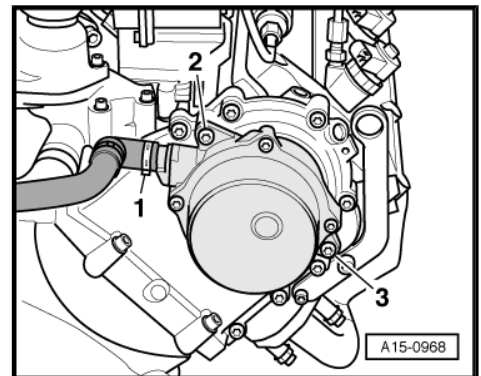
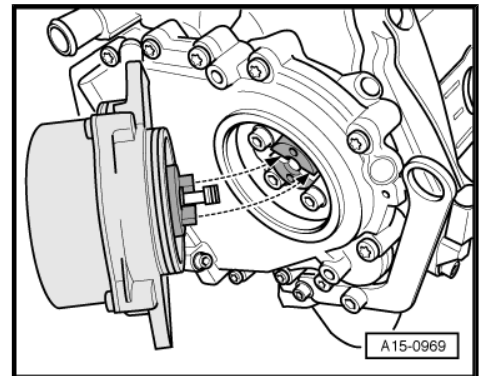
- Fit new hose clip onto vacuum hose.
- Push vacuum hose -1- onto connection on vacuum pump.
- Fasten hose clip using suitable pliers.

 **Note**

*On some models the vacuum hose has to be secured at the vacuum pump with a bolt.*



**Caution**  
*Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.*



**Tightening torque**

Component	Nm
Vacuum pump to timing chain cover	10

## 11.5 Vacuum pump - exploded view (4.2 ltr TDI)

1 - 10 Nm

2 - Vacuum pump

- ❑ Removing and installing  
⇒ [page 127](#)

3 - Vacuum hose

- ❑ Secure with hose clips  
(same as original equipment) ⇒ Electronic  
parts catalogue

4 - Hose clip



Note

*On some models the vacuum hose  
has to be secured at the vacuum  
pump with a bolt.*

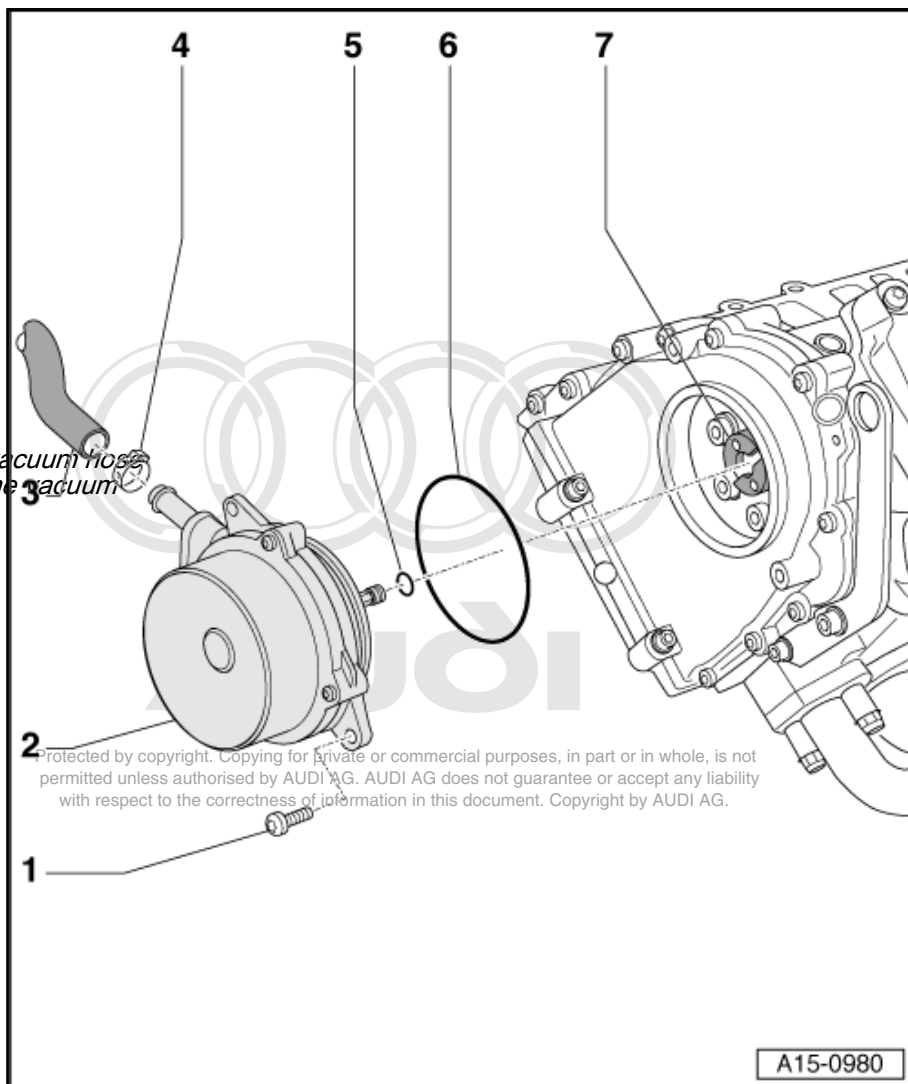
5 - O-ring

- ❑ Renew

6 - O-ring

- ❑ Renew

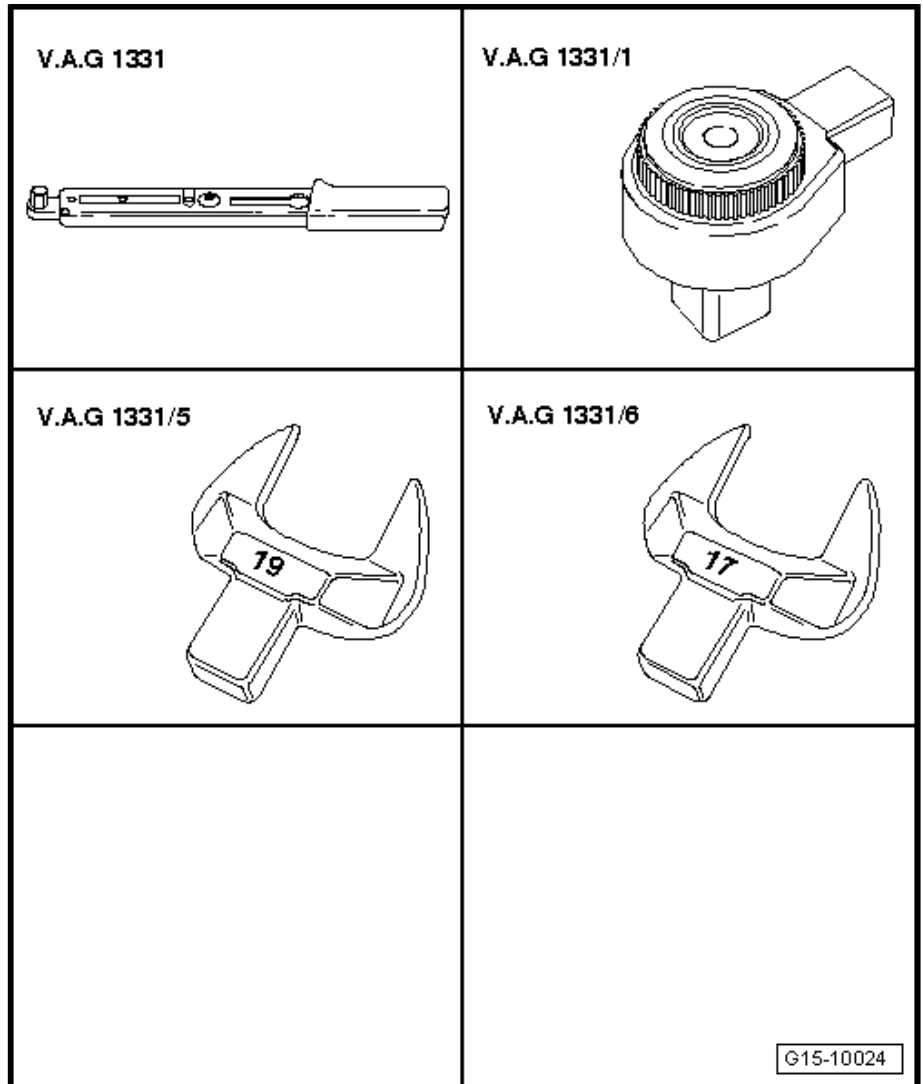
7 - Inlet camshaft



## 11.6 Removing and installing vacuum pump (4.2 ltr. TDI)

### Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1331-
- ◆ Ratchet - V.A.G 1331/1-
- ◆ Tool insert (19 mm) - V.A.G 1331/5-
- ◆ Tool insert (17 mm) - V.A.G 1331/6-



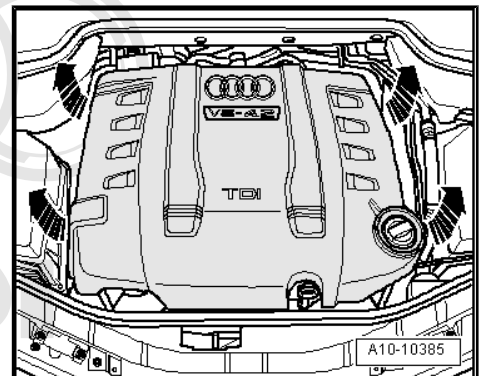
### Removing

- Drain off coolant.
- Carefully pull engine cover panel off four mounting studs (one at a time) -arrows-.



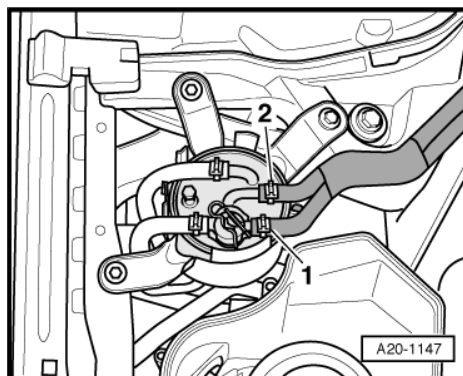
#### Caution

*Observe rules for cleanliness when working on the injection system.*

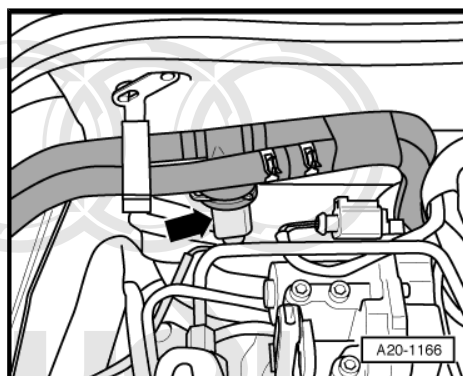


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- Disconnect fuel return line -1- and fuel supply line -2- at fuel filter.

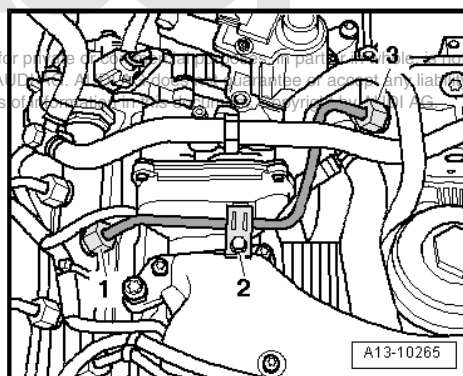


- Unplug electrical connector -arrow- at fuel temperature sender - G81- and move fuel lines to one side.

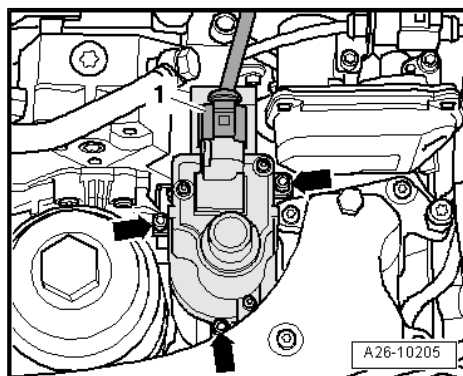


- Slacken off union nuts -1- and -3-.
- Remove bolt -2- and take off high-pressure pipe.

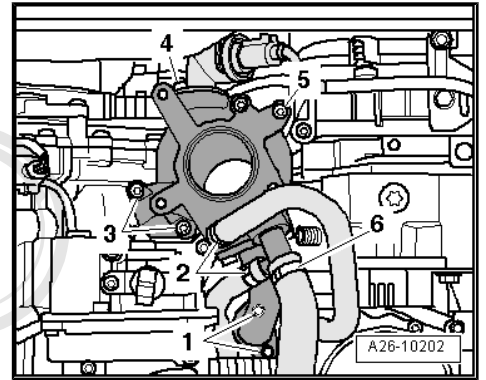
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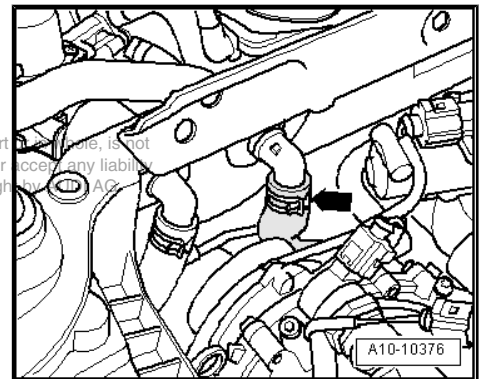
- Detach electrical connector -1-.
- Remove bolts -arrows- and detach exhaust gas recirculation control motor - V339- (left-side).




- Remove bolt -4- and detach coolant connection.
- Detach hoses -2- and -6-.
- Remove bolts -1-, -3- and -5- and detach connection for exhaust gas recirculation.



- Detach coolant hose -arrow- in front of bulkhead.

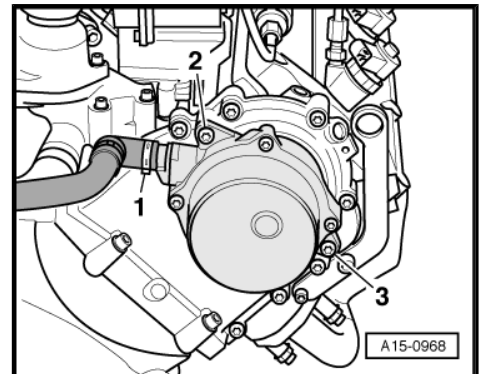


- Disconnect vacuum hose -1- from vacuum pump.



**Caution**

*Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.*



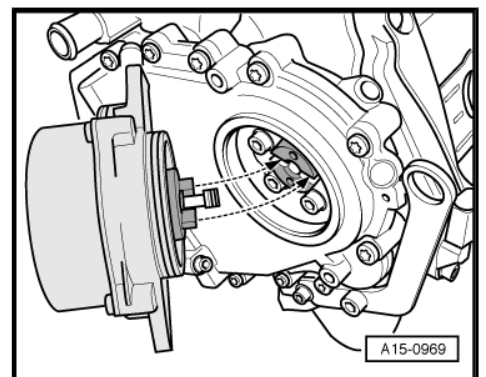
- Remove bolts -2- and -3- and take off vacuum pump.

### Installing

Installation is performed in reverse sequence; note the following:

### Note

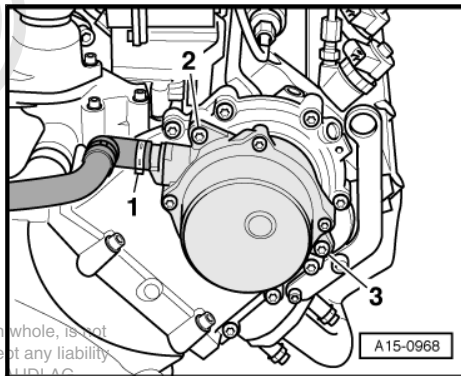
- ◆ *Renew seals and O-rings.*
  - ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Set drive lugs of vacuum pump so they engage in slots in camshaft when vacuum pump is installed -arrows-.



- Attach vacuum pump to flange and tighten bolts to 9 Nm.
- Fit new hose clip onto vacuum hose.
- Push vacuum hose -1- onto connection on vacuum pump.
- Close hose clip using suitable pliers.

 **Note**

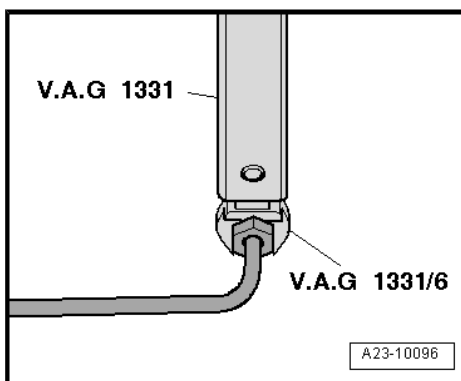
*On some models the vacuum hose has to be secured at the vacuum pump with a bolt.*



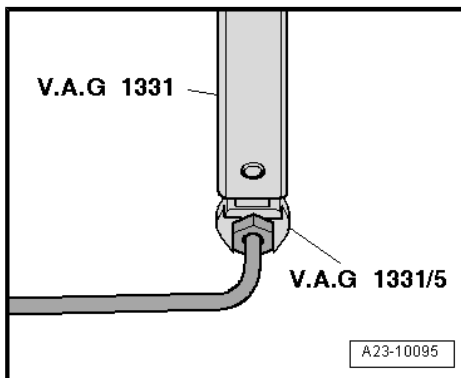
**Caution**

**Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.**

- Tighten union nuts on high-pressure pipes hand-tight initially.
- Make sure high-pressure pipes are seated without strain.
- Use torque wrench - V.A.G 1331- with ratchet - V.A.G 1331/1- and tool insert (17 mm) - V.A.G 1331/6- to tighten high-pressure pipe connection at high-pressure pump.



- Use torque wrench - V.A.G 1331- with ratchet - V.A.G 1331/1- and tool insert (19 mm) - V.A.G 1331/5- to tighten high-pressure pipe connections at rail elements.
- Install exhaust gas recirculation control motor - V339- (left-side).
- Fill cooling system.



**Tightening torque**

Component	Nm
Vacuum pump to timing chain cover	9
EGR connection to:	
Cylinder head	9
Connecting pipe	9
Coolant connection to EGR connection	9
High-pressure pipe to:	
High-pressure pump	25
Rail element	25



## 11.7 Removing and installing vacuum pump (2.8 ltr. and 3.2 ltr. petrol engine)

### Removing

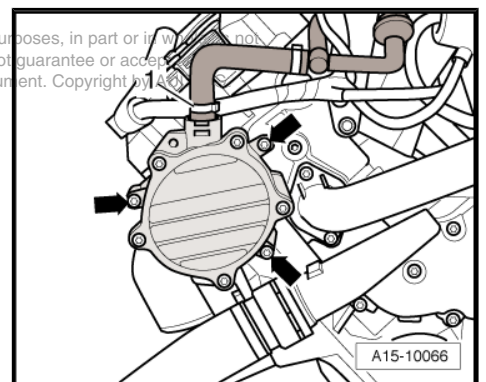
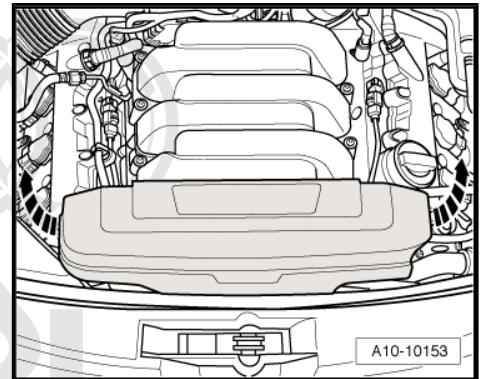
- Pull off front engine cover panel -arrows-.



#### Caution

*Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.*

- Unclip vacuum line leading to air cleaner at vacuum pump housing.
- Disconnect vacuum hose -1- from vacuum pump.
- Remove bolts -arrows- and take off vacuum pump.



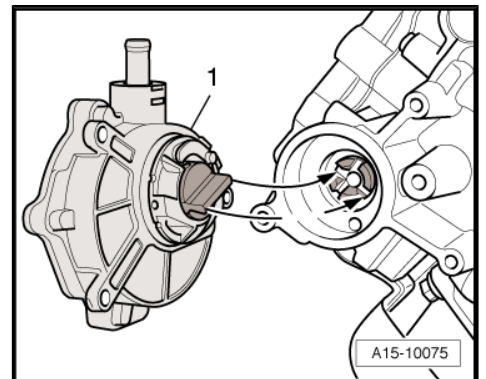
### Installing

Installation is performed in reverse sequence; note the following:



#### Note

- ◆ Renew O-rings
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) → *Electronic parts catalogue*.
- Set drive lug of vacuum pump -1- so it engages in symmetrical slot in camshaft when vacuum pump is installed -arrows-.





- Attach vacuum pump to flange -arrows- and tighten bolts to 9 Nm.
- Slide new hose clip onto vacuum hose.
- Push vacuum hose -1- onto connection on vacuum pump.



**Caution**

*Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.*

- Use suitable pliers to fasten clip on vacuum hose.

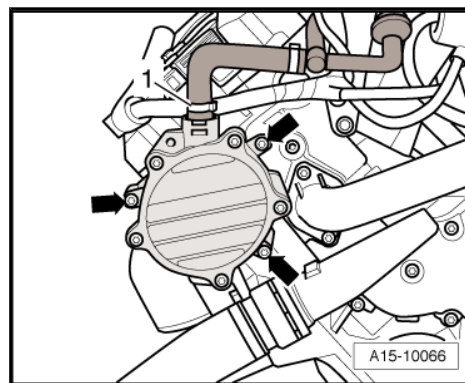


**Note**

*On some models the vacuum hose has to be secured at the vacuum pump with a bolt.*

**Tightening torque**

Component	Nm
Vacuum pump to cylinder head	9



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## 12 Electric vacuum pump for brakes - V192-

### 12.1 Vacuum pump for brakes - V192- - exploded view

#### 1 - Brake servo pressure sensor - G294-

- Removing and installing  
 ⇒ [page 136](#)

#### 2 - Vacuum hose

- To brake servo

#### 3 - Brake servo relay - J569-

- Removing and installing  
 ⇒ Current flow diagrams

#### 4 - Non-return valve

- Checking function  
 ⇒ [page 136](#)

#### 5 - Hose clip

- Renew

#### 6 - Clip

#### 7 - Stop buffer

#### 8 - Vacuum pump for brakes - V192-

- Removing and installing  
 ⇒ [page 133](#)
- Checking ⇒ [page 134](#)

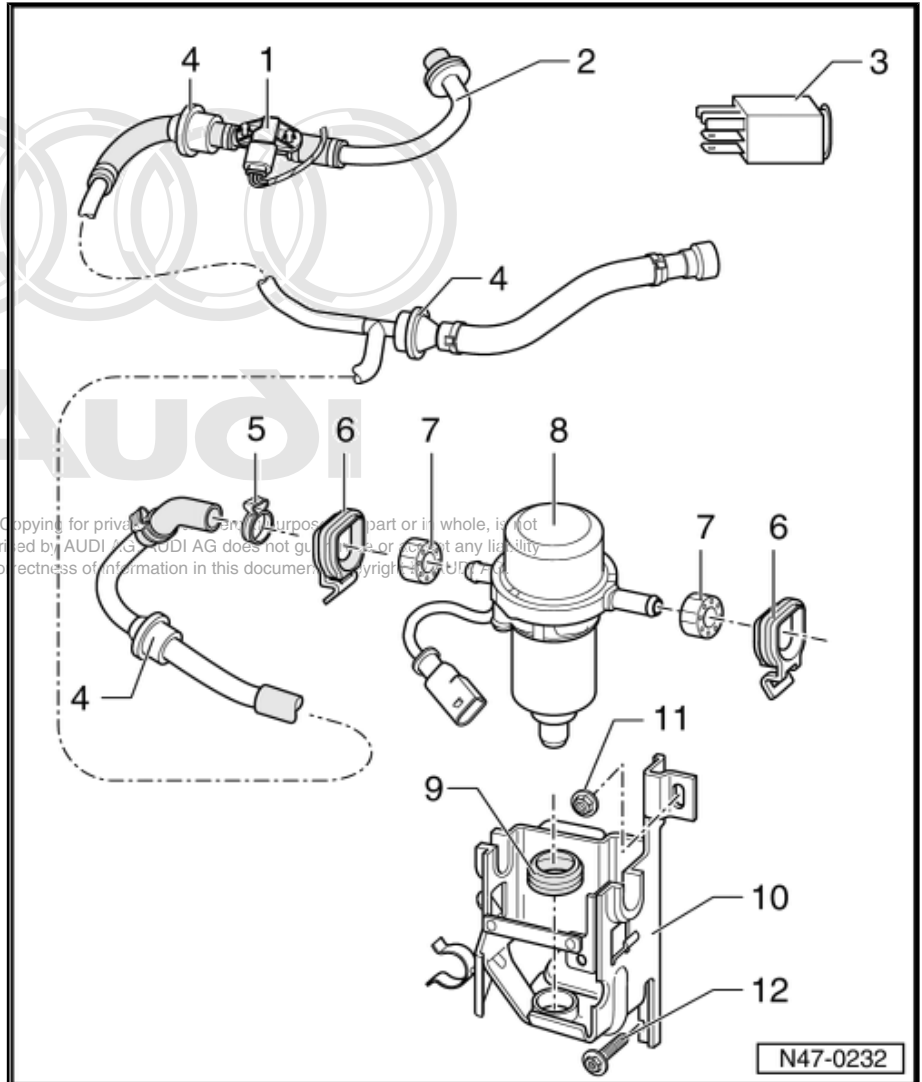
#### 9 - Stop buffer

#### 10 - Bracket

- For correct version refer to ⇒ Electronic parts catalogue (ETKA)

#### 11 - Nut

#### 12 - Hexagon bolt



### 12.2 Removing and installing vacuum pump for brakes - V192-

No provision is made for repairs to vacuum pump for brakes - V192- . If a fault occurs, the vacuum pump for brakes - V192- must be renewed.

## Removing

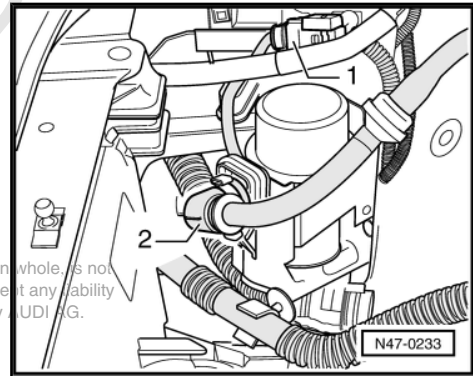
- Unplug connector -1-.
- Disconnect vacuum hose -2- from vacuum pump for brakes - V192- .



### Caution

**Take care not to damage the vacuum hose. The vacuum hose must be renewed if it is damaged.**

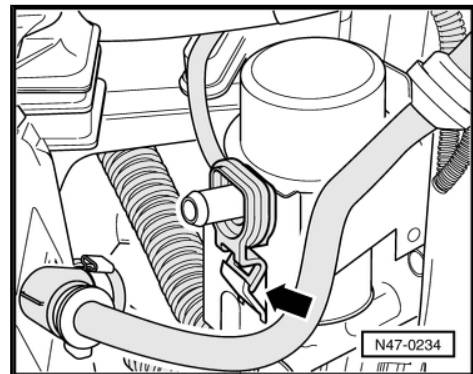
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- Release clip in direction of arrow and remove.
- Pull vacuum pump for brakes - V192- upwards out of bracket.

## Installing

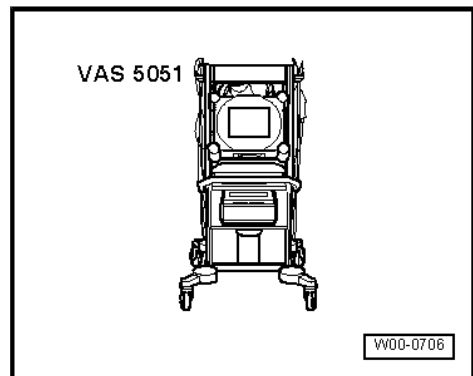
Installation is carried out in the reverse sequence.



## 12.3 Checking vacuum pump for brakes - V192-

### Special tools and workshop equipment required

- ◆ Vehicle diagnosis and service information system - VAS 505x-



## Procedure

- With ignition switched off, connect vehicle diagnosis, service and information system - VAS 505x- to diagnostic connection.

- Switch on tester -arrow-.

The tester may need up to 3 minutes before it is ready for operation.

- Switch on ignition.
- Select mode: Press the button on the display for "Vehicle self-diagnosis".
- Select vehicle system: Press the button for "Engine electronics".

The control unit identification and coding will appear at the top right of the display.

- Select diagnosis function (all diagnosis functions are available at this stage).
- Select "006 - Basic setting" on the display.
- Press buttons **0**, **1** and **1** for Measured value block.
- Confirm entry with **Q** key.

The following information will appear at the bottom of the display:

Basic setting	
	Not operated
	Pump off
	xxx mbar
	Test off

- Firmly depress the brake pedal several times in succession until the test is activated.

The following information will appear at the bottom of the display:

Basic setting	
	Not operated
	Pump on
	xxx mbar
	Test on

Do not press the brake pedal again once the test has been activated.

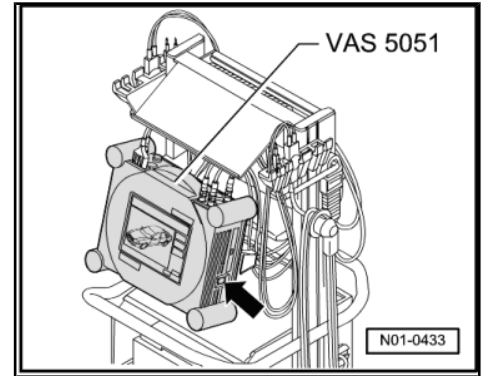
The vacuum pump for brakes - V192- supplies vacuum to the brake servo. The diagnosis of the brake servo system runs in the control unit at the same time.

The system passes the test if the pressure in the brake servo reaches the shut-off threshold within the time limit set by the diagnostic function.

The following information will appear at the bottom of the display:

Basic setting	
	Not operated
	Pump off
	xxx mbar
	Syst. OK

- You can cancel or exit from this mode by pressing the **Go** button.



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The system fails the test if the pressure in the brake servo does not reach the shut-off threshold within the time limit set by the diagnostic function.

The following information will appear at the bottom of the display:

Basic setting	
	Not operated
	Pump off
	xxx mbar
	Syst.n.OK

- Perform "Guided Fault Finding" using vehicle diagnosis, and service information system - VAS 505x- .

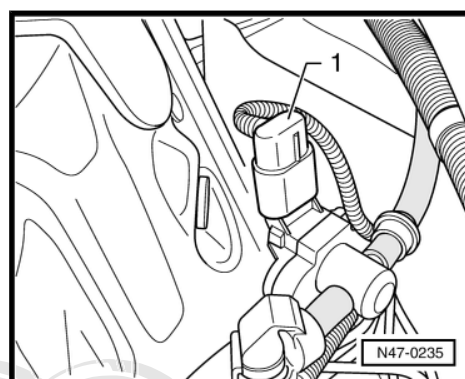
## 12.4 Removing and installing brake servo pressure sensor - G294-

### Removing

- Unplug connector -1-.
- Carefully pry out and remove brake servo pressure sensor - G294- .

### Installing

Installation is carried out in the reverse sequence.



## 12.5 Checking non-return valve

The valve should allow air to pass in the direction indicated by the arrow.

Valve must remain closed in opposite direction.

Observe correct installation position.

Arrow must point towards vacuum pump.

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## 13 Brake hoses and brake lines

### 13.1 Routing of brake hoses/lines

Replacement brake hoses and brake lines are supplied as spare parts ready to be installed.

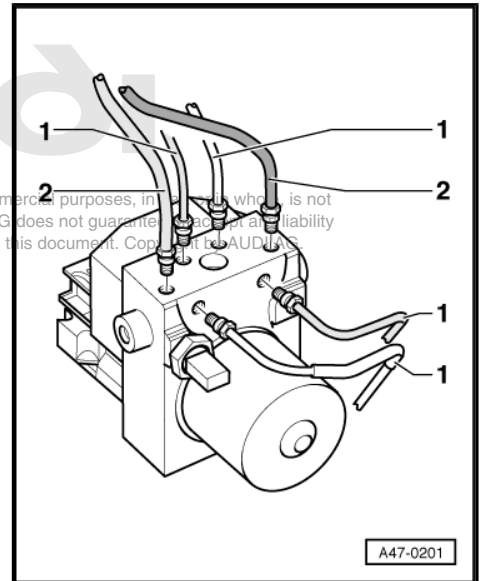
Secure brake hoses and brake pipes to the original mounting points when installing.

#### Brake lines to hydraulic unit

- Item -1- Hexagon bolt ( -M10- and M12 Ø 5 mm brake lines), 12 Nm tightening torque
- Item -2- Hexagon bolt ( -M14- Ø 8 mm brake lines), 12 Nm tightening torque

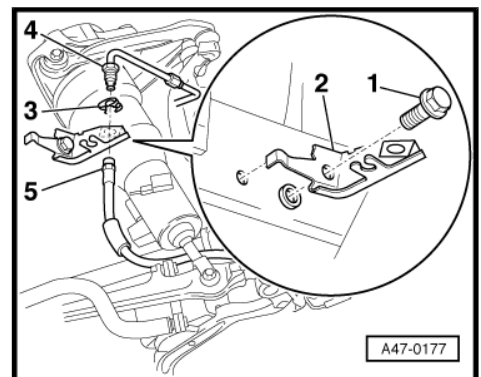
#### Brake line routing at front wheels

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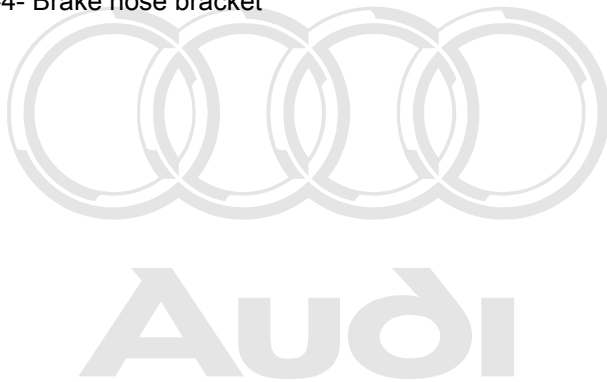


- Item -1-: Hexagon bolt, tightening torque 25 Nm
- Item -2- Brake hose bracket
- Item -3- Retaining spring
- Item -4- Brake line, 14 Nm tightening torque
- Item -5- Brake hose; make sure that locating lugs engage properly in bracket.

#### Routing of brake lines at rear wheels

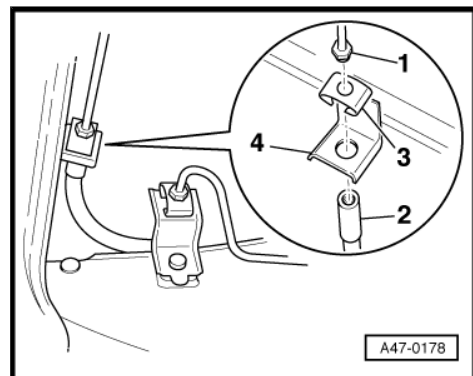
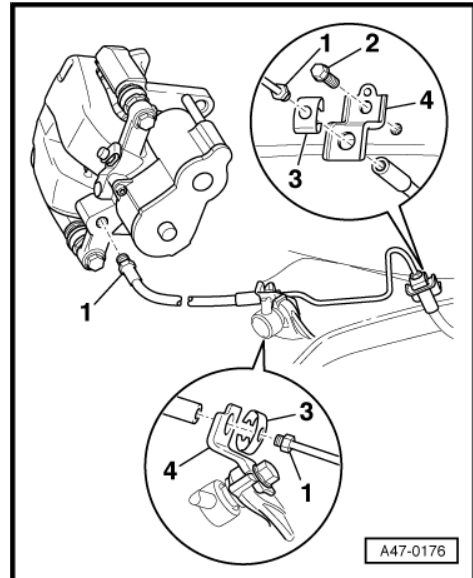


- Item -1- Brake line, 14 Nm tightening torque
- Item -2-: Hexagon bolt, tightening torque 10 Nm
- Item -3- Retaining spring
- Item -4- Brake hose bracket



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- Item -1- Brake line, 14 Nm tightening torque
- Item -2- Brake hose
- Item -3- Retaining spring
- Item -4- Brake hose bracket



## 13.2 Tightening torques

Splash plates to wheel bearing housing	10 Nm
Hydraulic unit with bracket to longitudinal member (Bosch 5.7)	10 Nm
Bleed valve to brake caliper	10 Nm
Brake pipe to brake hoses	15 Nm
Rear brake caliper (EPB); brake hose to brake caliper (banjo union with banjo bolt)	38 Nm
Brake caliper to brake carrier	35 Nm
Brake carrier to wheel bearing housing (always renew bolts). See note	140 Nm

⇒ [Item 8 \(page 67\)](#)



## 14 Repairing brake lines

With the aid of the flanging tool for brake lines - VAS 6056- it is possible to make connections on the ends of the brake lines without damaging the coating. In certain cases this makes it possible to replace sections of brake lines and thus save repair costs.

The flanging tool set V.A.G 1356 must not be used for the black brake lines because of the coating and the diameter of these brake lines.

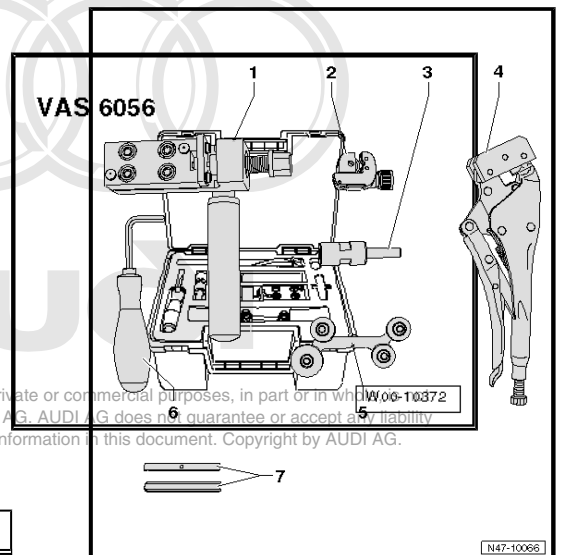


### Note

- ◆ Do not bend brake lines more than 90°; this would cause kinks or other deformations which would excessively restrict the brake lines.
- ◆ Brake lines should preferably be cut at some point on the underside of the vehicle.
- ◆ Select the position of the connecting pieces so that they cannot chafe against any moving parts.
- ◆ Do not grease the spindle; clean with methylated spirits only.

### Special tools and workshop equipment required

- ◆ Flanging tool for brake lines - VAS 6056-



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### List of tools in set

Item	Tool	Tool number
1	Flanging tool (including jaws VAS 6056/6)	VAS 6056/1
2	Pipe cutter	VAS 6056/2
3	Brake line scraper tool <sup>3)</sup>	VAS 6056/3
4	Mole grips with plastic jaws	VAS 6056/4
5	Pipe bending tool	VAS 6056/5
6	Allen key (6 mm)	-
7	Jaws for flanging tool	VAS 6056/7

3) The grub screws (in the stem and on the sides of the tool) are pre-set and must not be turned.

## 14.1 Flanging tool - exploded view

### 1 - Top section of flanging tool

- Unscrew this part to change jaws of flanging tool

### 2 - Mounting for handle

- Must be removed for access to retaining screw for top section of tool

### 3 - Retaining screw

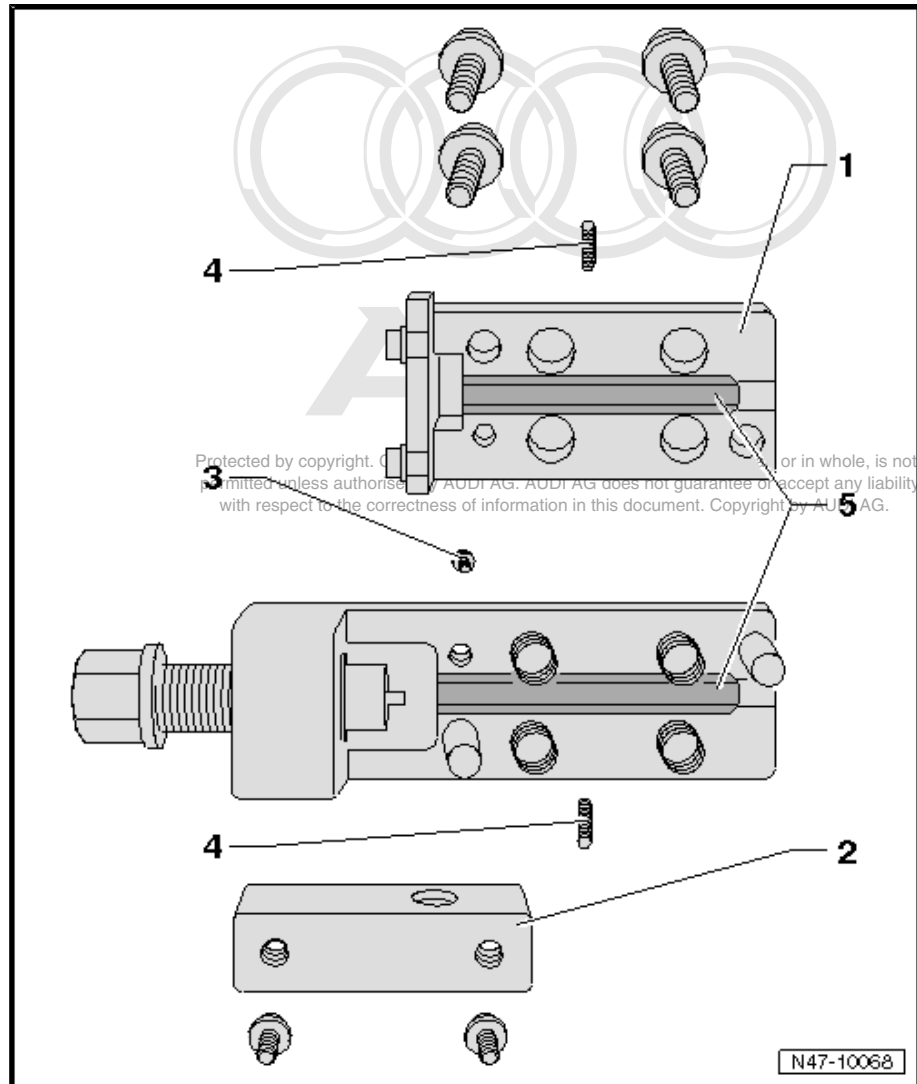
- For top section of flanging tool

### 4 - Grub screws for jaws

- These screws centralise and secure jaws of flanging tool
- 2 mm socket head

### 5 - Jaws for flanging tool

- Different versions available
- Assembly instructions ⇒ [page 140](#)



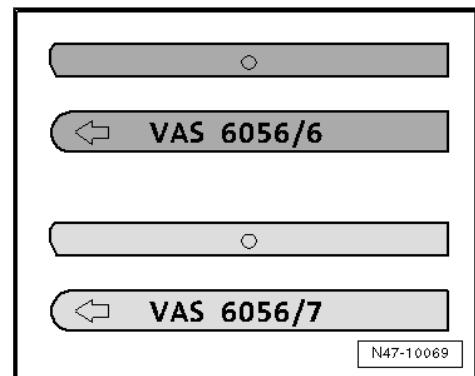
### Assembly instructions for jaws of flanging tool:

- ◆ VAS 6056/6 (dark) for black brake lines
- ◆ VAS 6056/7 (light) for green brake lines



#### Note

*The arrow on the rounded end of the jaws must face the end of the housing and the straight end of the jaws must face the spindle, otherwise the flanged connection on the brake line will not be formed correctly.*

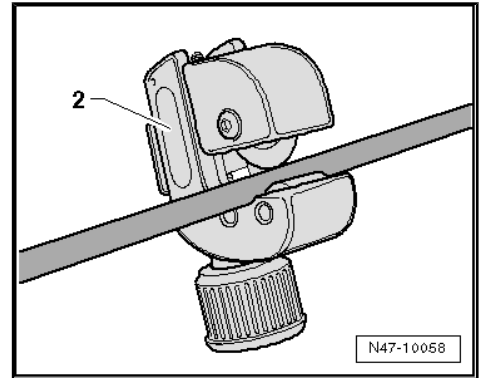


## 14.2 Instructions for use

Applies to steel and ceramic brakes.

- Unscrew defective brake line at brake caliper or wheel brake cylinder. Catch escaping brake fluid and dispose of fluid in the correct manner.

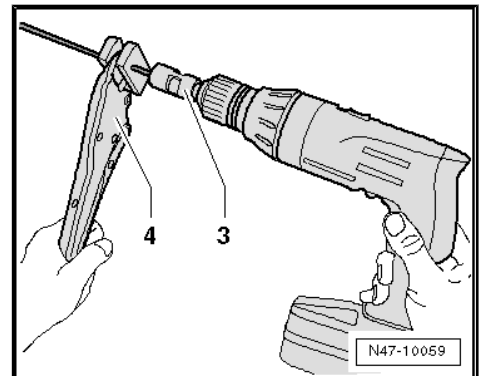
- Cut through brake line at a suitable point (straight, easily accessible section of pipe) using pipe cutter -2-.
- Remove section of pipe to be replaced.
- De-grease outside surface of brake lines.



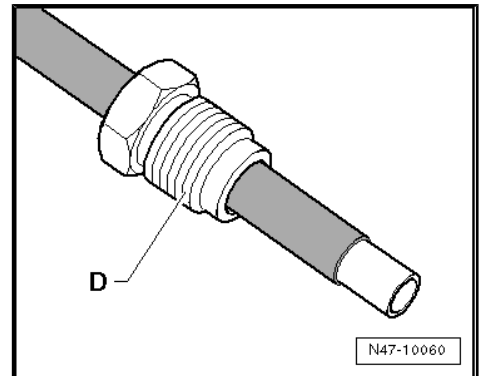
- Clamp brake line in mole grips -4- so that approx. 50 mm of pipe protrudes from plastic jaws.
- Clamp brake line scraper tool -3- in electric drill and apply tool to brake line.
- With electric drill running at slow speed, exert light pressure and strip off coating from brake line.

The length of the coating that is stripped off is determined by the limit stop incorporated in the brake line scraper tool.

- Pull scraper tool off brake line and clean off residue of coating.



- Remove mole grips and slide union screw -D- onto brake line.

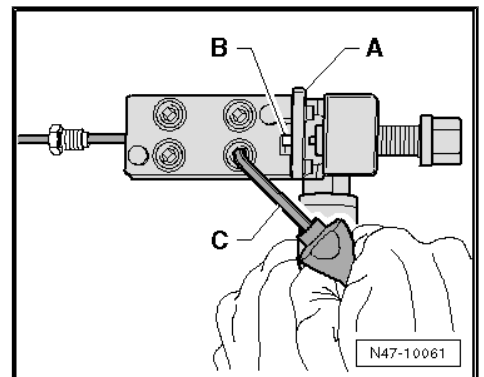


- Push brake line -B- against limit stop -A- in flanging tool.

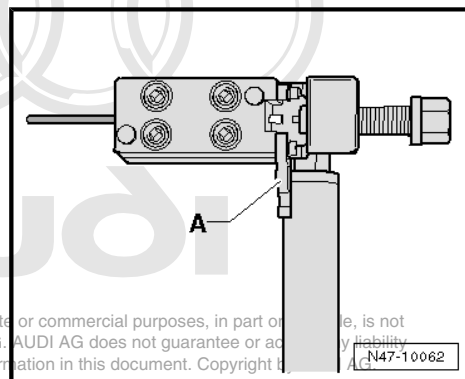
 **Note**

*The brake line must be in contact with the limit stop when the socket head bolts are tightened, otherwise the flanged connection on the brake line will not be formed correctly.*

- Clamp brake line in flanging tool tightly enough to prevent it from moving. Then fold up limit stop -A- and fully tighten socket head bolts in diagonal sequence using Allen key -C-.



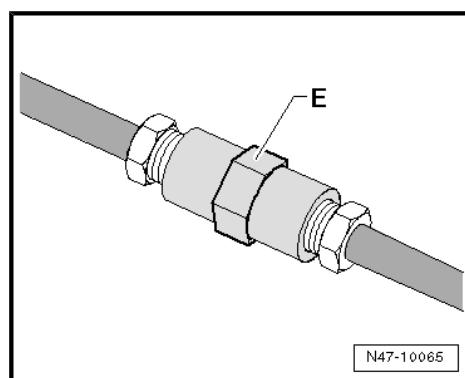
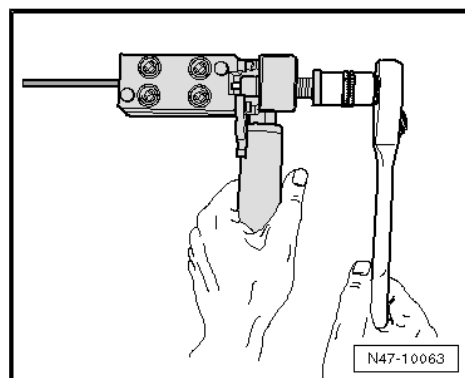
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- Screw spindle into flanging tool onto limit stop.
- Unscrew spindle.
- Slacken off socket head bolts in diagonal sequence.
- Take brake line out of flanging tool. Clean and inspect brake line with flanged connection.

Briefly flush out section of pipe remaining in vehicle:

- Connect brake filling and bleeding equipment - VAS 5234- , fit hose of bleeder bottle onto flared connection on brake line and operate brake filling and bleeding equipment - VAS 5234- briefly until a small quantity of brake fluid has run through.
- Blow out new section of brake line with compressed air before installing.
- Join together sections of brake line with connecting piece -E-.
- Install brake line.
- Then bleed brake system ⇒ [page 110](#) .



**Caution**

***Before driving vehicle for the first time, make sure function of brakes is OK.***