

## 44 - WHEELS, TIRES, WHEEL ALIGNMENT

### WHEELS AND TIRES

This information can be found in --> **44 - Wheels, Tires, Wheel alignment.**

### TIRE PRESSURE MONITORING SYSTEM

#### General Information

Observe operating information in operating instructions.

While driving, tire pressure monitoring system monitors air pressure as well as tire temperature of the four wheels.

For security reasons, damaged wheel electronics or valves must be replaced.

Do not clean wheel electronics using pressure washers or strong pressurized air stream.

For safety reasons, wheel electronics must be replaced and wheel rims cleaned after applying tire sealant compound.

There is a Basic version (Low) or Comfort version (High).

Low Version consists of a control module, a central antenna and wheel electronics in each wheel.

High Version also has a trigger in each wheel housing and also serves to identify the position of installed sensors.

Version installed is indicated by corresponding PR number on vehicle data plate --> **Explanatory notes for Production Relevant numbers (PR No.):**

If wheel positions on vehicle are changed, wheels are replaced or wheel electronics are replaced or pressures have changed, it must be confirmed via MMI.

If conventional wheels (e.g. winter tires without run-flat capability) are installed in place of the Pax system, the system must be re-coded via Guided Fault Finding using function "Code control module".

#### NOTE:

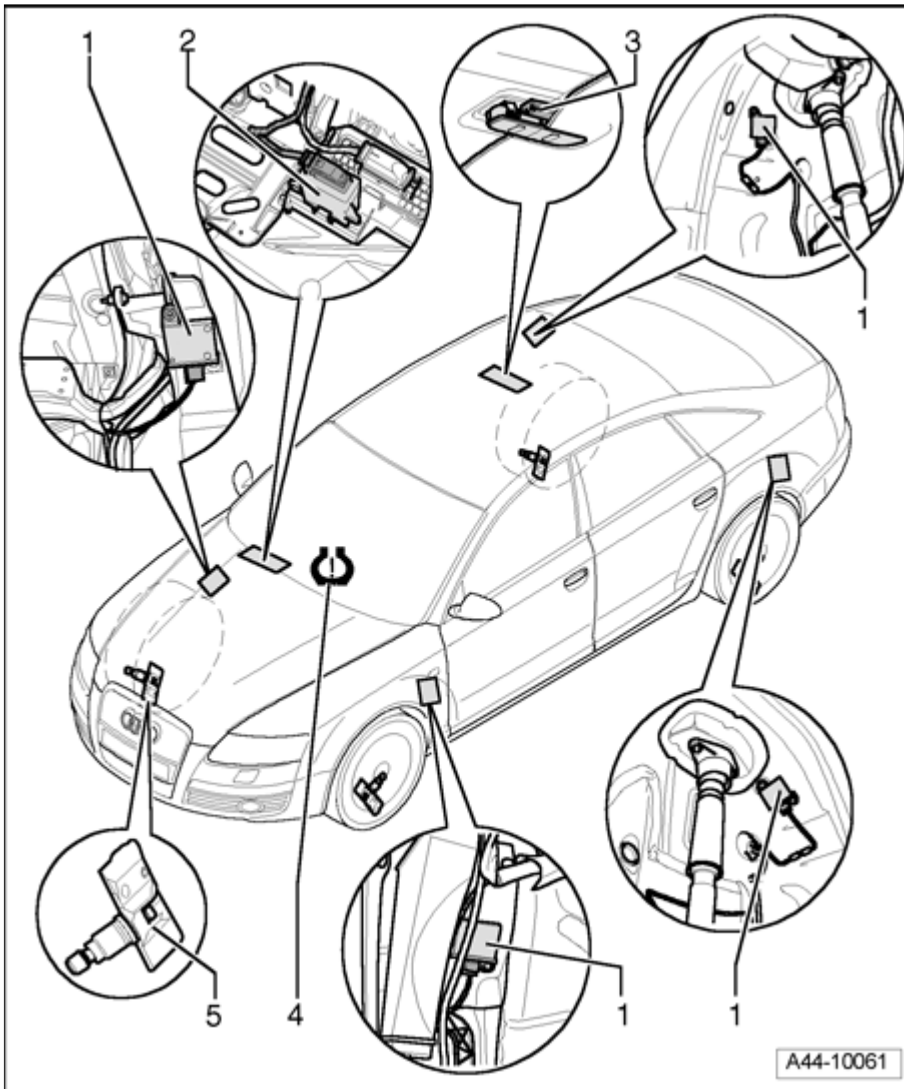
- **If wheels with wheel electronics are replaced (summer/winter tires), tire pressure must be checked and wheel electronics must be adapted again to control module via MMI.**

A DTC may be entered in DTC memory if:

Less than four wheels with wheel electronics are installed.

Winter tires without or incorrect wheel electronics are installed. (If this is the case, yellow indicator lamp "system malfunction pictogram" is set in instrument cluster and cannot be deactivated via the system.)

### Tire pressure monitoring system, component overview



**Fig. 521: Tire Pressure Monitoring System, Component Overview**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Left Front Tire Pressure Monitoring Transmitter (in wheel housing) G431 , Right Front Tire Pressure Monitoring Transmitter (in wheel housing) G432 , Left Rear Tire Pressure Monitoring Transmitter (in wheel housing) G433 and Right Rear Tire Pressure Monitoring Transmitter (in wheel housing) G434

- Transmitters for tire pressure monitoring system are installed only in vehicles with High Version.

2 - Tire Pressure Monitoring Control Module J502

- If Tire Pressure Monitoring Control Module J502 is replaced, system must be coded again --> **Tire**

**pressure monitoring system, system operation.**

## 3 - Rear Tire Pressure Monitoring Antenna R96

- Removing and installing --> **Rear Tire Pressure Monitoring Antenna R96 , removing and installing**

## 4 - Display in instrument cluster

- See Vehicle Diagnosis, Testing and Information System VAS 5051 A

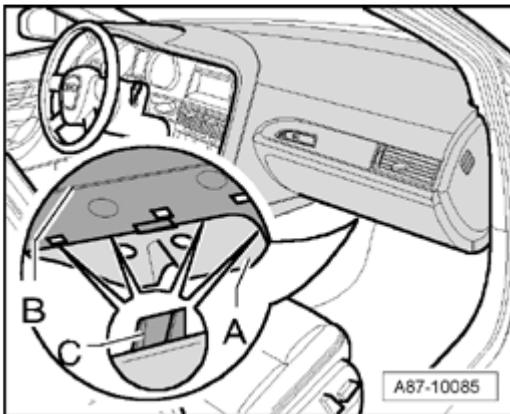
## 5 - Left Front Tire Pressure Monitoring Sensor G222 , Right Front Tire Pressure Monitoring Sensor G223 , Left Rear Tire Pressure Monitoring Sensor G224 I and Right Rear Tire Pressure Monitoring Sensor G225

- Removing and installing --> **Metal valve body, removing and installing**
- If wheel positions on vehicle are changed, wheels are replaced or wheel electronics are replaced or pressures have changed, it must be confirmed via MMI.

**Tire Pressure Monitoring Control Module J502 , removing and installing****Removing**

Tire Pressure Monitoring Control Module J502 is located behind glove compartment.

Before removing control module, read out coding via Guided Fault Finding in "Replace control module" function.



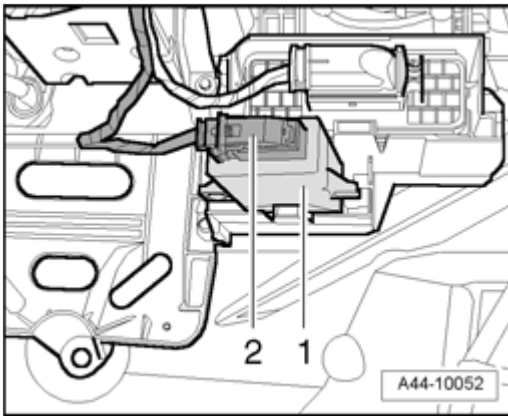
**Fig. 522: Identifying Lid For Lower Glove Compartment Cover**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove lid - A - from lower cover of glove compartment - B -.

**NOTE:**

- The lid - A - is secured in lower cover of glove compartment - B - via 4 locking mechanisms. It is possible these locking mechanisms may be disengaged only with difficulty, therefore make sure that the lower cover

of the glove compartment - B - is not damaged when removing.



**Fig. 523: Identifying Control Module And Harness Connector**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unclip control module - 1 -.
- Disconnect harness connector - 2 - and remove control module.

### Installing

Installation is in reverse order of removal.

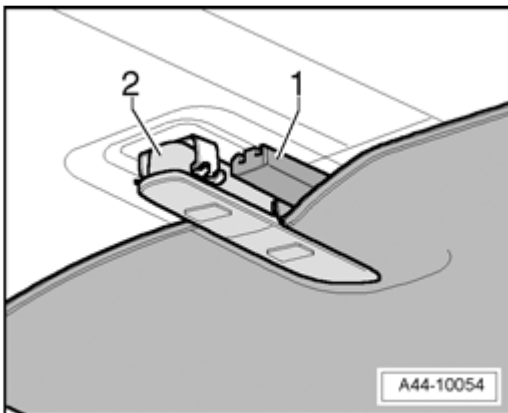
- If Tire Pressure Monitoring Control Module J502 is replaced, system must be coded again --> **Tire pressure monitoring system, system operation.**

### Rear Tire Pressure Monitoring Antenna R96 , removing and installing

#### Removing

Reception antenna is located behind rear interior reading light.

- Remove rear interior/reading light --> **96 - LIGHTS, SWITCHES - INTERIOR, ANTI-THEFT .**



**Fig. 524: Identifying Rear Tire Pressure Monitoring Antenna**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unclip Rear Tire Pressure Monitoring Antenna R96 - 1 -.
- Disconnect connector from antenna.
- Remove antenna - 1 -.

**Installing**

Installation is in reverse order of removal.

Lettering on antenna must point in direction of vehicle interior.

**Tire pressure monitoring system, system operation**

Function:

Tire pressure monitoring system is operated in MMI.

The system monitors air pressures set by the user in tires and utilized for monitoring.

- First, tire pressures must be checked, corrected and stored via MMI.
- Next, check and correct tire pressures of vehicles wheels (including spare wheel) according to specifications listed on sticker located in fuel filler flap.

Code Tire Pressure Monitoring Control Module J502 again.

If Tire Pressure Monitoring Control Module J502 was replaced, new control module must be coded. To do so, proceed as follows.

- Connect VAS 5051 A , perform vehicle-specific entries in Guided Fault Finding and select "Function/component selection" via Goto button --> **VAS 5051 , connecting and selecting functions.**

Then

- "Suspension"
- "Tire pressure monitoring system"
- "On Board Diagnostic (OBD) capable systems"
- "Control module for tire pressure monitoring system Basic Low" or "Control module for tire pressure monitoring system High Sender"
- "Tire Pressure Monitoring Control Module -J502-, functions"
- "Tire Pressure Monitoring Control Module -J502-, code control module"

Storing of tire pressures must be started after every intentional modification of specified pressures.

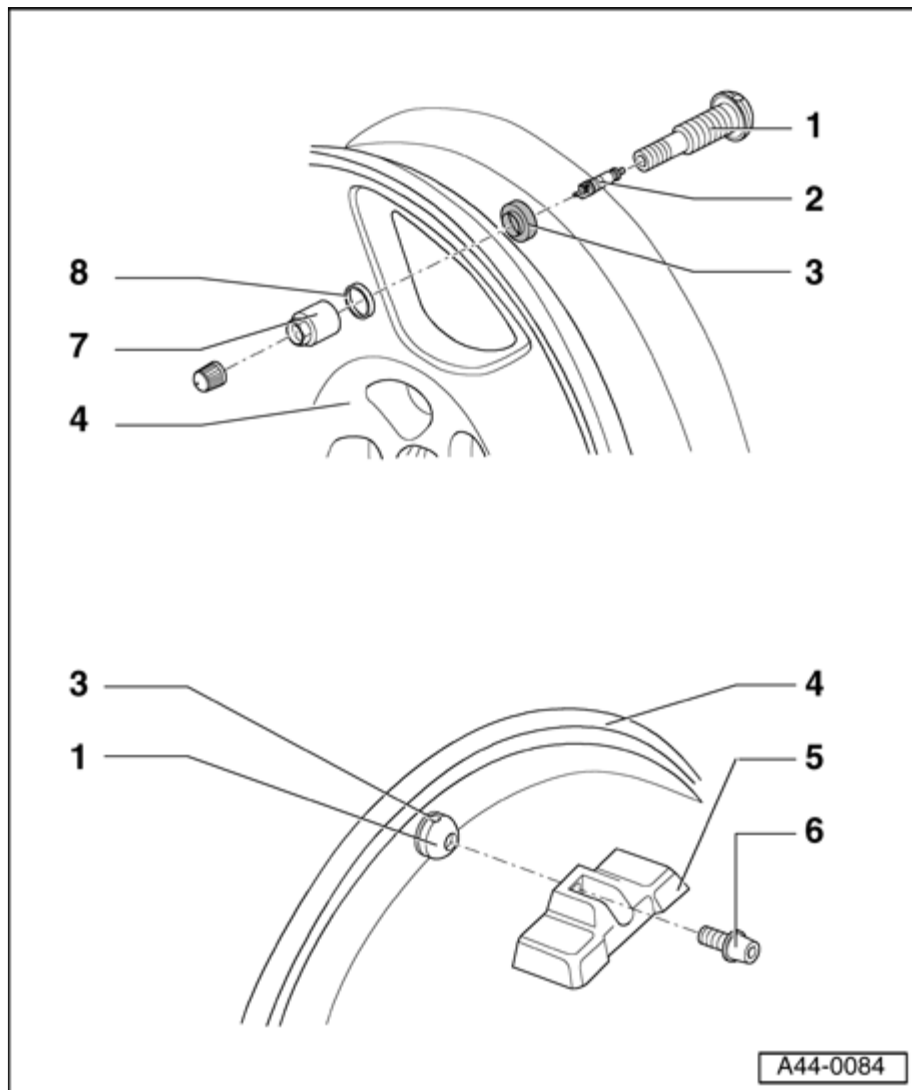
Storing wheel replacement or tire pressures.

The basic requirement for reliable tire pressure monitoring is correctly storing specified pressures.

- Switch ignition on.
- Press the "CAR" function button.
- Select "Systems" in CAR menu via rotary switch and confirm input by pressing rotary switch.
- Select "Tire pressure monitoring system" in CAR menu via rotary switch and confirm input by pressing rotary switch.
  
- Select "Display tire pressures" in CAR menu via rotary switch and confirm input by pressing rotary switch.
- Select "Store tire pressures" or "Initialize wheels" in CAR menu via rotary switch and confirm input by pressing rotary switch.

Storing of tire pressures must be started after every intentional modification of specified pressures.

**Wheel electronics, assembly overview**



**Fig. 525: Wheel Electronics, Assembly Overview**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Metal valve body

- Only use valve according to Electronic Parts Catalog "ETKA"
- Is supplied complete
- Replace valve insert at every tire change
- Removing and installing --> **Metal valve body, removing and installing**

2 - Valve insert

3 - Seal

- Removing and installing --> **Metal valve body, removing and installing**

## 4 - Rim

- Removing and installing tires **Removing tire** and **Installing tire**

## 5 - Left Front Tire Pressure Monitoring Sensor G222 , Right Front Tire Pressure Monitoring Sensor G223 , Left Rear Tire Pressure Monitoring Sensor G224 I and Right Rear Tire Pressure Monitoring Sensor G225

- Sensor must be replaced completely.
- Remaining service life, temperature, air pressure can be read out via diagnostic using diagnostic operation system VAS 5051 B

## 6 - Microencapsulated bolt Torx T20

- Tightening torque 4 Nm
- Always replace bolt
- Available as a replacement part only together with metal valve

## 7 - Union nut

- Tightening torque 4 Nm
- Removing and installing --> **Metal valve body, removing and installing**

## 8 - Chamfered washer

**Tire change**

The nickel-coated valve insert must be replaced during every tire change.

Metal valve and wheel electronics can be reused.

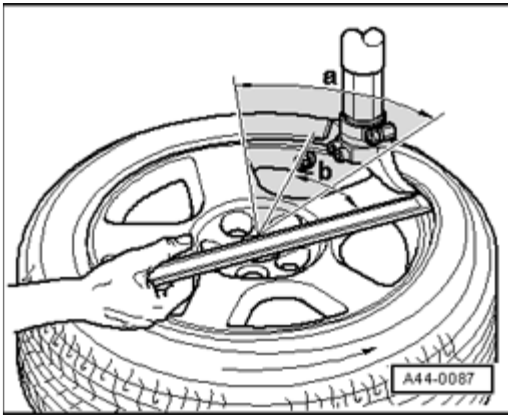
- Releasing air in tire by removing nickel-coated valve insert.
- Remove tires **Removing tire**
- Perform a visual inspection for loosened or damaged components. Replace complete valve complex when threaded connections are loose.

Always replace damaged wheel electronics.

- Install tires **Installing tire**.
- Thread in new nickel-coated valve insert.
- Inflate tire, thread on plastic cap again.
- Balance tires.

**Removing tire**



**Fig. 526: Dismounting Tire**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

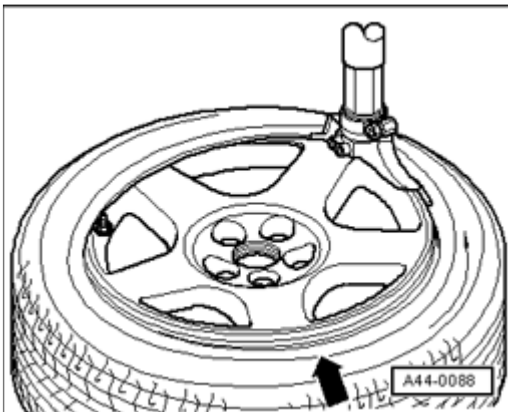
Rolling off or pressing off tires.

When using press-off shoes, first press tire off on opposite side of valve.

Do not use press-off shoes in hatched area - **a** -.

- Position mounting shoes in area of valve so that tire iron can be placed at approx. 30 ° - **b** - beside valve.
- Then remove tire in area of valve first.

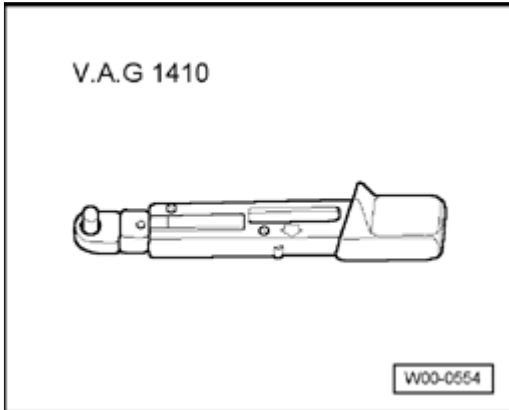
#### Installing tire

**Fig. 527: Mounting Tire**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

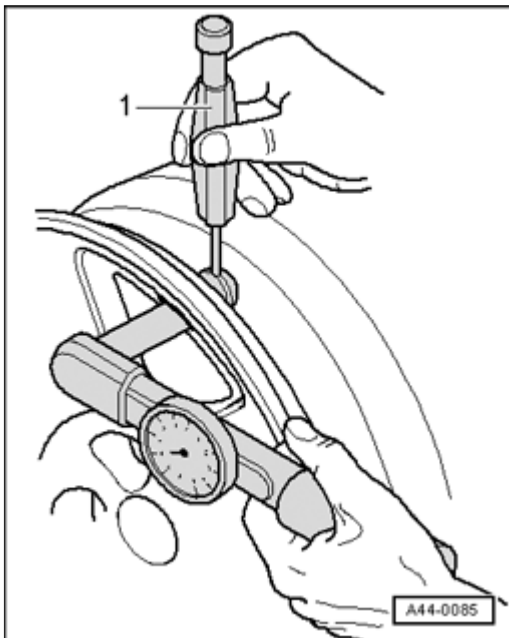
Do not use press-off shoes in area of valve.

- Position wheel electronics approx. 180 ° opposite mounting shoe.
- Press tires approx. 90 ° in front of mounting shoe - **arrow** - into well-drop.
- Install tires.

**Metal valve body, removing and installing****Special tools, testers and auxiliary items required**

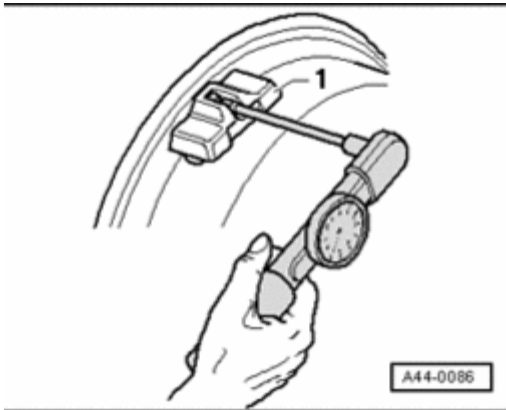
**Fig. 528: Torque Wrench V.A.G 1410**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1410
- Install metal valve with rubber seal through rim from inside.
- Set chamfered washer and union nut on outside and tighten.



**Fig. 529: Securing Against Turning With Counter Hold**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure against turning, using retainer - **1** - (e.g. 2 mm diameter drill bit).



**Fig. 530: Pressing Wheel Electronics Into Bed And Fasten At Rear Of Valve With Microencapsulated Bolt**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press wheel electronics - 1 - into well-drop center and tighten with microencapsulated bolt at rear of valve.

**WHEEL ALIGNMENT**

**General Information**

Always measure wheel alignment using VW/Audi approved wheel alignment equipment.

Wheel alignment checks must always include both front and rear axles.

Otherwise, proper vehicle driveability cannot be ensured.

**NOTE:**

- **Wheels should not be aligned until the vehicle has been driven 1,000-2,000 km, since it takes this long for the suspension to settle.**
- **When making adjustments the relevant specifications must be adhered to as closely as possible.**

Wheel alignment must be checked if:

- The vehicle shows handling problems.
- There is accident damage.
- Axle components have been removed.
- Tires are worn on one side.

Front Axle Component	Wheel alignment check required		Setting toe constant "" required		Rear axle component	Wheel alignment check required	
	Yes	No	Yes	No		Yes	No
Upper rear control		X		X	Shock absorbers		X

## 2008 Audi A6 Quattro

### SUSPENSION Suspension, Wheels, Steering

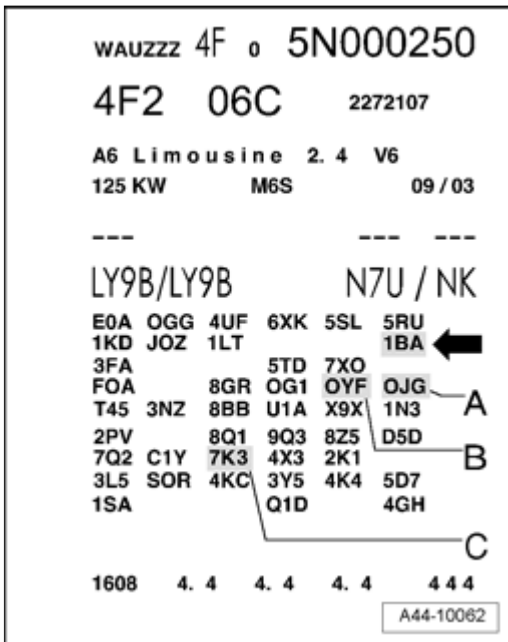
arm							
Upper front control arm		X		X			
Lower guide control arm		X		X	Coil spring		X
Suspension strut		X		X			
Lower control arm		X		X	Upper control arm	X	
Mounting bracket		X		X			
Wheel bearing housing	X		X		Wheel bearing housing	X	
Tie rod	X		X		Tie rod	X	
Steering gear	X		X		Trapezoidal control arm	X	
Subframe	X		X		Subframe	X	
Stabilizer bar		X		X	Stabilizer bar		X

#### Explanatory notes for Production Relevant numbers (PR No.):

Suspension version, front/rear axles or tire pressure monitoring system installed in vehicle are indicated by corresponding PR. No. on vehicle data plate.

Vehicle data plate is located in spare tire well and in service book.

Front axle/rear axle



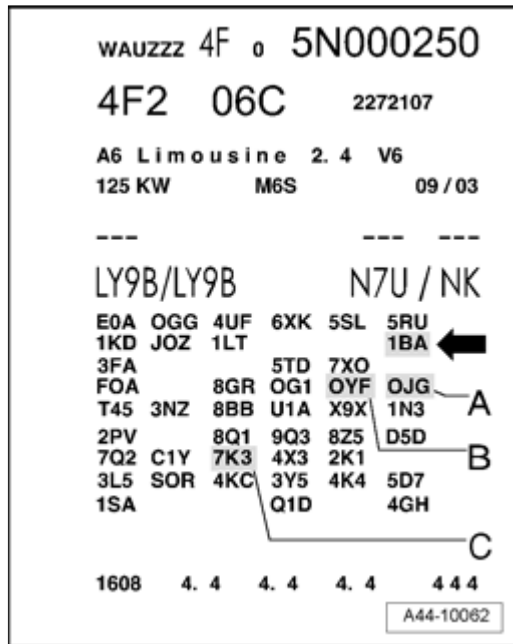
**Fig. 531: Identifying PR Numbers For Front Axle/Rear Axle**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

PR numbers for front axle/rear axle can be found in illustrations - **A** - and - **B** -.

- Item - **A** - shows PR no. for front axle
- Item - **B** - shows PR no. for rear axle

Use PR no. to locate appropriate shock absorber combination in replacement parts catalog.

Suspension versions



**Fig. 532: Identifying PR Numbers For Front Axle/Rear Axle**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

PR no. for suspension versions is shown in figure - **arrow** -

In this example the vehicle has standard suspension 1BA installed.

1BA = Standard suspension

1BE = Sport suspension

1BR = Rough terrain suspension

1BV = Sport suspension quattro GmbH

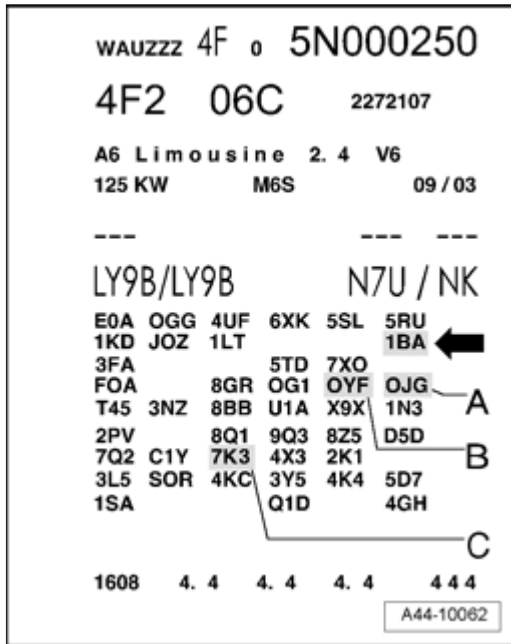
1BK = Air spring suspension

1BB = Urban suspension

1BY = Air spring suspension allroad

1BD = Sport suspension S6

Tire pressure monitoring system



**Fig. 533: Identifying PR Numbers For Front Axle/Rear Axle**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

PR no. for tire pressure monitoring system is shown in figure - C -

In this example, High Version 7K3 is installed in vehicle.

7K3 = High Version

7K4 = High Version

7K7 = Low Version

7K8 = Low Version

**Specifications for wheel alignment**

Front and All Wheel Drive

Specified values valid for all engine versions

	Standard		Rough	Sport		Air spring
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## 2008 Audi A6 Quattro

### SUSPENSION Suspension, Wheels, Steering

Front axle	suspension (1BA) Urban suspension (1BB)	Sport suspension (1BE)	terrain suspension (1BR )	suspension quattro GmbH (1BV)	Sport suspension S6 (1BD)	suspension (1BK), air spring suspension allroad (1BY)
Camber	- 52' ± 25'	- 67' ± 25'	- 44' ± 25'	- 74' ± 25'	- 67' ± 25'	- 62' ± 25'
Maximum permissible difference between sides	30'	30'	30'	30'	30'	30'
Toe per wheel (setting value in initial position)	+ 9' ± 4'	+ 9' ± 4'	+ 9' ± 4'	+ 9' ± 4'	+ 9' ± 4'	+ 9' ± 4'
Toe per wheel (control value in initial position)	+ 9' ± 6'	+ 9' ± 6'	+ 9' ± 6'	+ 9' ± 6'	+ 9' ± 6'	+ 9' ± 6'
Toe constant per wheel (setting value)	+ 25' ± 4'	+ 25' ± 4'	+ 25' ± 4'	+ 25' ± 4'	+ 13' ± 4'	+ 25' ± 4'
Toe constant per wheel (control value)	+ 25' ± 7'	+ 25' ± 7'	+ 25' ± 7'	+ 25' ± 7'	+ 13' ± 7'	+ 25' ± 7'
Difference of toe constants between both sides	max. 8 '	max. 8 '	max. 8 '	max. 8 '	max. 8 '	max. 8 '
Toe-out angle at 20 degrees * See note	1 ° 12' ± 30'	1 ° 20' ± 30'	1 ° 6' ± 30'	1 ° 33' ± 30'	1 ° 33' ± 30'	1 ° ± 30'

\* The angle of the outside wheel is less by this amount. Depending on manufacturer, it may be indicated as negative on the alignment computer.

Rear axle	Standard suspension (1BA) Urban suspension (1BB)	Sport suspension (1BE)	Rough terrain suspension (1BR )	Sport suspension quattro GmbH (1BV)	Sport suspension S6 (1BD)	Air spring suspension, air spring suspension allroad (1BY)
Camber	- 50' ± 20'	- 50' ± 20'	- 50' ± 20'	- 50' ± 20'	- 50' ± 20'	- 75' ± 20'
Maximum permissible difference between sides	25'	25'	25'	25'	25'	25'
Toe per wheel	+ 9' ± 5'	+ 9' ± 5'	+ 9' ± 5'	+ 9' ± 5'	+ 9' ± 5'	+ 9' ± 5'

## 2008 Audi A6 Quattro

### SUSPENSION Suspension, Wheels, Steering

Maximum permissible deviation from longitudinal axis of vehicle	10'	10'	10'	10'	10'	10'
-----------------------------------------------------------------	-----	-----	-----	-----	-----	-----

Additional vehicle data for vehicles with Front- and All Wheel Drive:

This additional data is only for more rapid diagnosis in accidents.

Table --> **Technical data**.

These specified values apply to all engine versions.

#### Test requirements:

- Tread depth difference of no more than 2 mm on an axle
- Tires inflated to prescribed pressure
- Be sure that the sliding plates and turn tables are not touching the end stop when checking wheel alignment
- Curb weight position of vehicle "Curb weight is defined as follows: Weight of vehicle ready for road operation (gas tank and washer fluid tank for windshield and headlamp washing system filled completely, spare wheel, vehicle tool kit, vehicle jack) and no persons in vehicle."

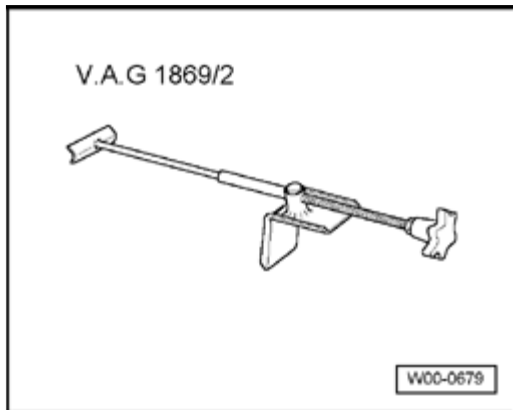
Spare wheel, vehicle tool kit and vehicle jack must be located in the locations designated by the vehicle manufacturer.

- Vehicle accurately aligned, suspension bounced and rocked several times
- Check wheel suspensions, steering and steering linkage for excessive play and damage, service if necessary.
- Performing wheel run-out compensation: Permissible axial runout of the wheel rims can exceed the specified toe setting tolerance. If compensation for wheel run-out is not performed, it will not be possible to obtain a correct toe-in adjustment.

#### Preparations for measurement

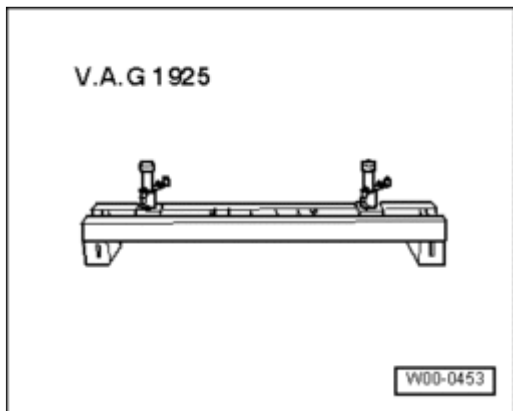
#### Special tools, testers and auxiliary items required





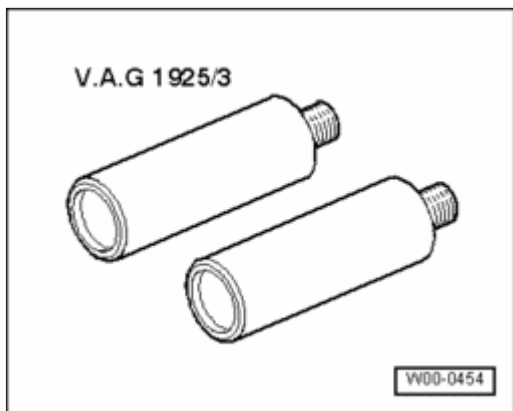
**Fig. 534: Brake Pedal Actuator V.A.G 1869/2**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Brake pedal actuator V.A.G 1869/2



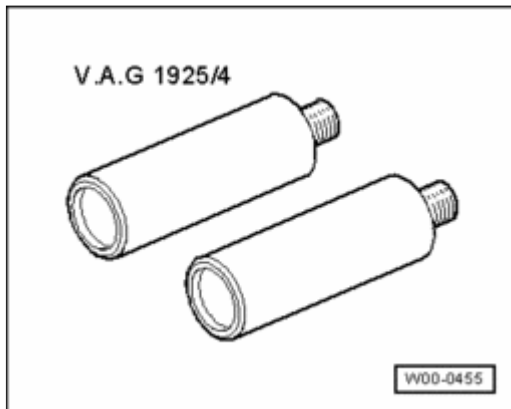
**Fig. 535: Spacer V.A.G 1925**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Spacer V.A.G 1925



**Fig. 536: Adapter V.A.G 1925/3**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

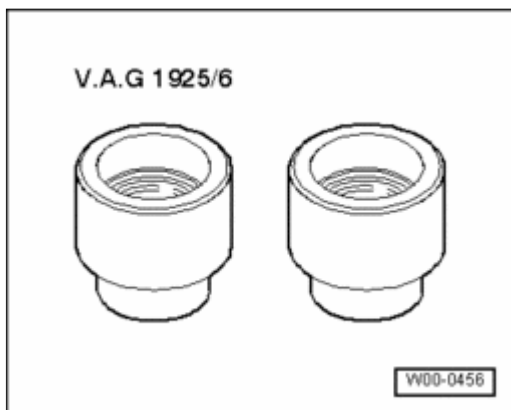
- Adapter V.A.G 1925/3



**Fig. 537: Adapter V.A.G 1925/4**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

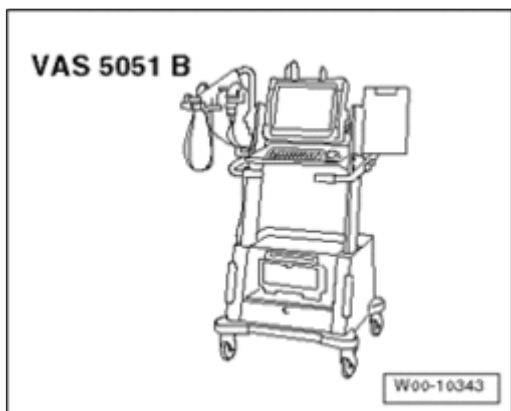
- Adapter V.A.G 1925/4



**Fig. 538: Adapter V.A.G 1925/6**

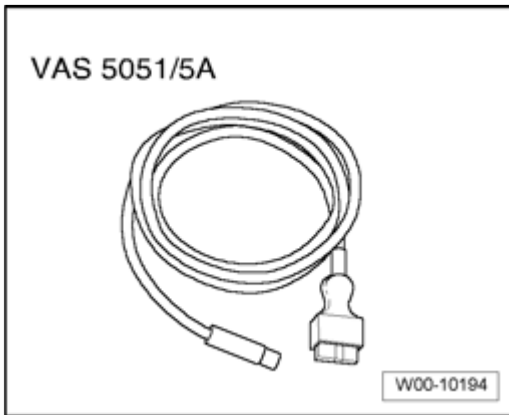
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Adapter V.A.G 1925/6



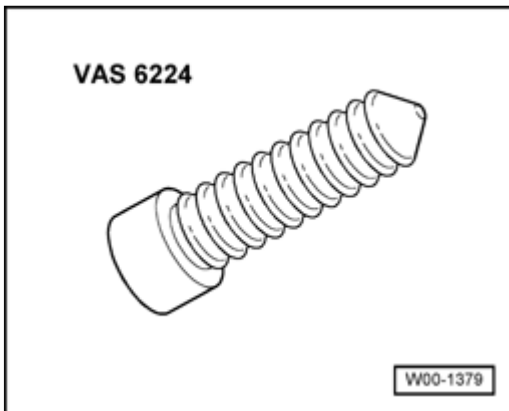
**Fig. 539: Identifying Vehicle Diagnosis, Testing And Information System VAS 5051B**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Vehicle Diagnosis, Testing and Information System VAS 5051 B



**Fig. 540: Diagnostic Cable VAS 5051/5A**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Diagnostic cable VAS 5051/5A



**Fig. 541: Steering Centering Bolt VAS 6224**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Steering centering bolt VAS 6224
- Alignment computer

Pickup must be properly adjusted and attached to the vehicle; see equipment manufacturers instructions!

Be sure that the sliding plates and turn tables are not touching the end stop when checking wheel alignment

**Mechanical center position of rack, checking**

The mechanical center position (centering steering) of the rack can be checked using steering centering bolt

VAS 6224 --> **Centering steering.**

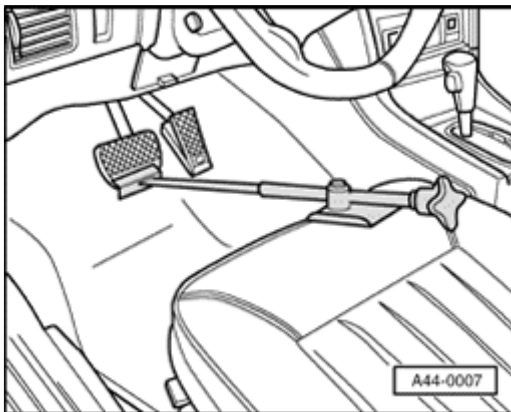
**Runout compensation**

The present lateral run-out of the rims must be balanced (compensated). Otherwise, measurement will result in false readings.

Permissible axial runout of the wheel rims can exceed specified toe setting tolerance. If compensation for wheel run-out is not performed, it will not be possible to obtain a correct toe-in adjustment.

If compensation for wheel run-out is not performed, it will not be possible to obtain a correct toe-in adjustment!

- o For this purpose, observe notes of alignment equipment manufacturer.



**Fig. 542: Inserting Brake Pedal Depressor V.A.G 1869/2**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- o Insert brake pedal actuator V.A.G 1869/2.

**Allocation of adapter to suspension for alignment**

Adapter	Standard suspension (1BA) Urban suspension (1BB)	Sport suspension (1BE) Air spring suspension (1BK) Air spring suspension allroad (1BY) Sport suspension S6 (1BD)	Rough terrain suspension (1BR )	Sport suspension quattro GmbH (1BV)
V.A.G 1925	X	X	X	X
V.A.G 1925/4	X	X	X	X
V.A.G 1925/6	X	X	X	
V.A.G 1925/3 * See note	X	X	X	X

\* Only necessary for certain lifts. V.A.G 1925/3 replaces V.A.G 1925/4

#### Work procedure for vehicle alignment, overview

#### NOTE:

- **Vehicle must be at correct curb weight when measuring wheel alignment --> Test requirements:**
- **Ascertain which suspension is installed in the vehicle. This information can be found on the vehicle data plate --> Explanatory notes for Production Relevant numbers (PR No.):**
- **Exception: Alignment of the toe-in curve according to instructions of the alignment program.**

The following work sequence must be followed!

1 - In vehicles with air spring suspension, check control position for axle alignment --> **In vehicles with air spring suspension, check control position for axle alignment**

2 - If necessary, check center position of steering rack --> **Mechanical center position of rack, checking**

3 - Perform wheel run-out compensation --> **Runout compensation.**

4 - Check front axle camber and even out if necessary --> **Front axle camber, checking and evening out if necessary.**

5 - Check rear axle camber and adjust if necessary --> **Rear Axle Camber, adjusting.**

6 - Check rear axle toe and adjust if necessary --> **Rear axle toe, adjusting.**

7 - If necessary, check behavior of toe-in curve on front axle. Whether and when toe-in curve/toe constant "S" must be adjusted is described in table --> **Wheel alignment must be checked if:** and --> **Adjusting Toe-In Curve on Front Axle.**

8 - Check front axle toe with vehicle in initial position and adjust if necessary --> **Front Axle Toe, adjusting.**

9 - If adjustments have been made on front axle, perform a zero adjustment on Steering Angle Sensor G85 Vehicle Diagnostic, Testing and Information System VAS 5051 tester.

10 - If adjustments have been made on rear axle, ACC adjustment is required --> **Adaptive Cruise Control (ACC).**

#### In vehicles with air spring suspension, check control position for axle alignment

#### Checking control position for axle alignment

- Connect VAS 5051 A , perform vehicle-specific entries in Guided Fault Finding and select "Function/component selection" via Goto button --> **VAS 5051 , connecting and selecting functions.**

Then

- "Suspension"
- "Level control system".
- "Wheels, tires, vehicle alignment".
- "KD44 85 - Axle alignment".

**NOTE:**

- **Activate vehicle jack mode only after testing or re-adapting height dimensions.**
- **Activate vehicle jack mode --> Vehicle jack mode.**

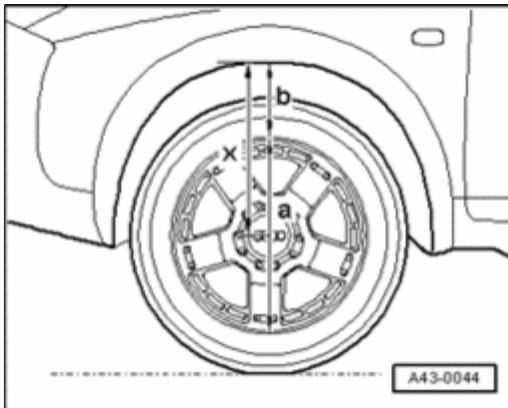
Suspension 1BK

- Front height dimension: 386 mm
- Rear height dimension: 384 mm

Suspension 1BY

- Front height dimension: 388 mm
- Rear height dimension: 380 mm

Determining height dimension - **x** -



**Fig. 543: Identifying Height Dimension**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

The height dimension - **x** - is the value in mm between wheel center and lower edge of fender.

- Measure rim diameter.

Measure value determines dimension: - **a** -.

- Measure vertically from upper edge of rim to lower edge of fender.

Measure value determines dimension: - **b** -.

Height dimension  $x$  results from:

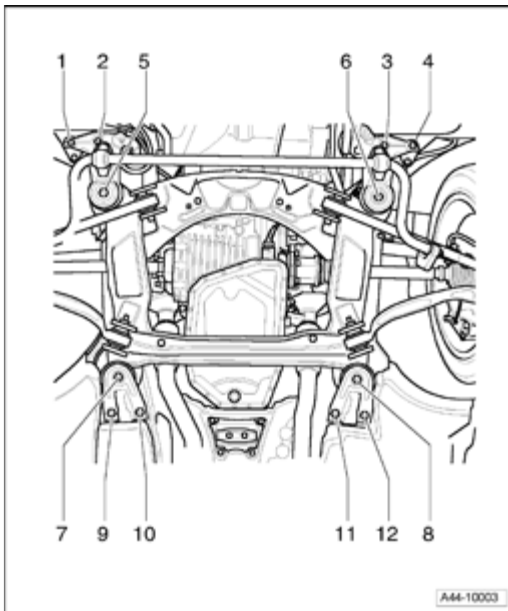
$$x = a : 2 + b.$$

**Front axle camber, checking and evening out if necessary**

Camber cannot be adjusted.

It is possible to even out camber uniformly within expected tolerance range by shifting carrier.

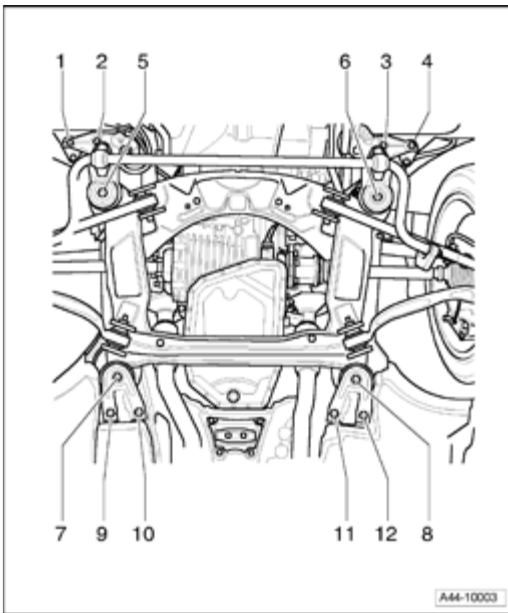
- Remove noise insulation --> **50 - BODY - FRONT** .



**Fig. 544: Identifying Hex Bolts**

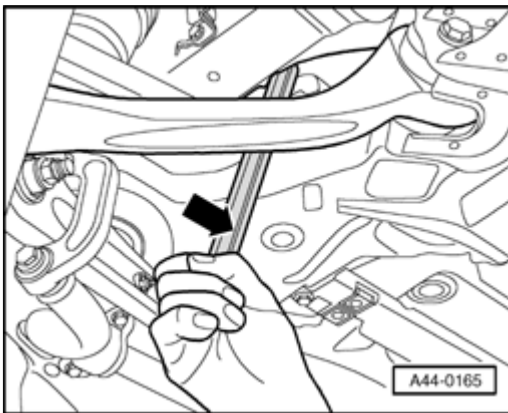
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen hex bolts - **1** - to - **12** -.



**Fig. 545: Identifying Hex Bolts**

Courtesy of VOLKSWAGEN UNITED STATES, INC.



**Fig. 546: Sliding Subframe With Engine Mount And Stabilizer Bar Into Respective Position Using A Plastic Coated Tire Iron**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Slide subframe with engine mount and stabilizer bar into respective position using a plastic coated tire iron.

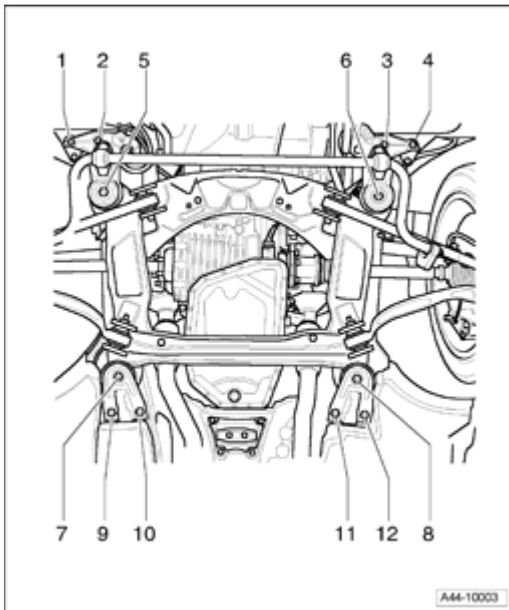
Press at center of subframe between subframe and body long member.

If no plastic coated tire iron is available, a standard tire iron must be wrapped with masking tape.

**CAUTION: Do not damage any parts!**



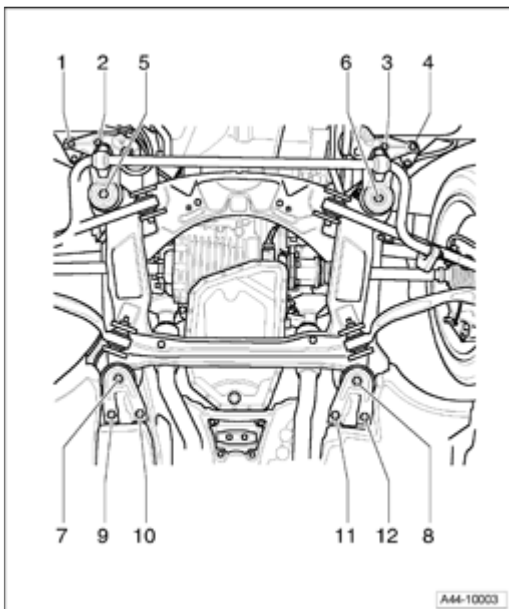
Specified values for wheel alignment --> [Specifications for wheel alignment.](#)



**Fig. 547: Identifying Hex Bolts**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install new hex bolts - **6** - and - **7** - in succession and tighten.



**Fig. 548: Identifying Hex Bolts**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

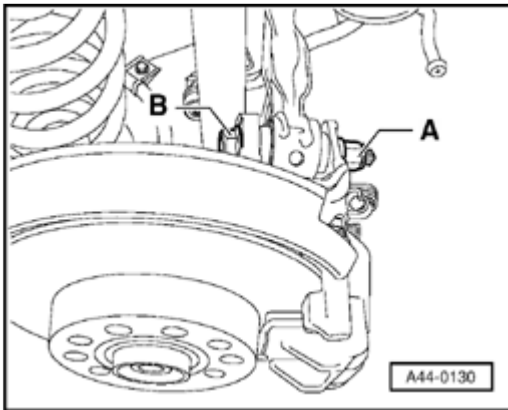
- Install new hex bolts - **5** - and - **8** - in succession and tighten.
- Install new hex bolts - **1** - , - **2** - , - **3** - and - **4** - in succession and tighten.

- Tighten hex bolts - 9 - , - 10 - , - 11 - and - 12 - .
- Check camber value once more --> **Specifications for wheel alignment.**
- Install noise insulation --> **50 - BODY - FRONT .**

Note the following!

Every time camber is corrected, all axle alignment values should be checked.

#### Rear Axle Camber, adjusting



**Fig. 549: Identifying Nut And Eccentric Bolt**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove nut - A - of threaded connection of wheel bearing housing/control arm, and install new nut until stop.
- Adjust camber by turning = eccentric bolt - B - .

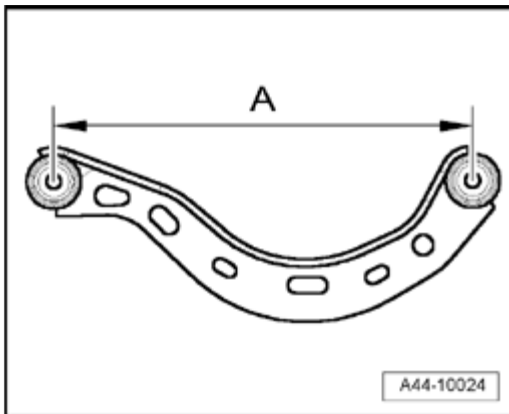
Specified values for wheel alignment --> **Specifications for wheel alignment.**

#### NOTE:

- The maximum adjustment range is 90 ° to the left or right of center position.
- If it is not possible to set the specified camber value by turning the eccentric bolt, there may be a deformation of the upper control arm. **Aligning upper control arm Aligning upper control arm.**
- For reasons of clarity, camber setting is depicted with the wheel removed.
- Tighten nut - A - .
- After tightening nut - A - , check camber value once more --> **Specifications for wheel alignment.**

#### Aligning upper control arm

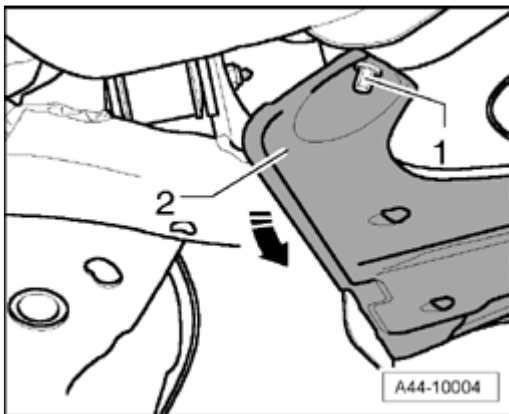
- Removing upper control arm --> **Upper control arm, removing and installing.**



**Fig. 550: Identifying Upper Control Arm Dimension**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

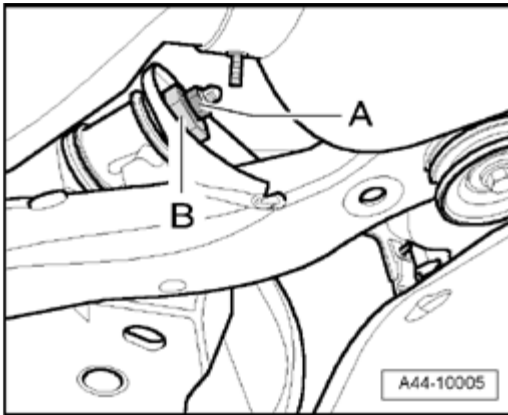
- Check dimension - **A** -.
- Replace upper control arm if measured dimension - **A** - is less than 337 mm.

#### Rear axle toe, adjusting



**Fig. 551: Identifying Cover And Brake Caliper**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove plastic nut - **1** - and press plastic cover - **2** - lightly downward - **arrow** -.



**Fig. 552: Identifying Nut And Adjustment Screw**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove nut - **A** - of threaded connection of trapezoidal control arm/subframe, and install new nut until stop.
- Set toe accordingly by turning adjustment screw - **B** - 36 AF.

Specified values for wheel alignment --> **Specifications for wheel alignment.**

- Tighten nut - **A** -.
- After tightening nut - **A** - , check toe value once more --> **Specifications for wheel alignment.**

**NOTE:**

- **The maximum adjustment range is 90 ° to the left or right of center position.**
- **Adjusting the individual toe settings automatically alters the geometric running direction of the axle.**

**Adjusting Toe-In Curve on Front Axle**

Explanation:

When the wheel compresses or rebounds, the wheels toe changes as a function of compression and rebound travel. The resulting toe values are called toe-in curve.

The change in toe constants "S" is adjusted when the vehicle is raised by vertically shifting the toe head --> **Setting toe constant "S".**

The wheel alignment computer determines toe constant "S" from a value measured in initial position and a value measured in raised position. In the process it compares actual values with specified values and displays them on the screen.

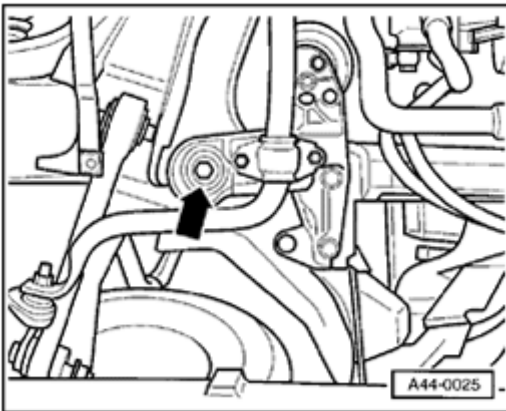
Different adapters are needed for lifting, depending on the suspension --> **Allocation of adapter to suspension for alignment.**

- NOTE:**
- An incorrectly adjusted toe constant causes the vehicle to pull to one side when braking or accelerating or when driving over bumps.

Bringing vehicle into initial position for alignment

Suspension 1BA, 1BE, 1BR, 1BV, 1BK, 1BB

- NOTE:**
- Due to the different alignment platforms, it may be necessary to raise the vehicle at the front axle so that it is possible to insert the spacer V.A.G 1925. After the vehicle is lowered, it should be bottomed out.



**Fig. 553: Inserting Spacer V.A.G 1925 With Adapters V.A.G 1925/3 Or V.A.G 1925/4**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert spacer V.A.G 1925 with appropriate adapter --> **Allocation of adapter to suspension for alignment** and remove both threaded spindles far enough that they just make contact on front bolts - **arrow** - of subframe.

The vehicle may not be raised as a result of this!

The vehicle is now in initial position.

For all vehicle variants

The check of whether the present toe-in value of each wheel matches specification is performed in this position by the alignment program on the alignment computer. If necessary, the toe-in should be corrected by adjusting the length of the tie rod.

Adjusting Front Axle Toe in initial position --> **Front Axle Toe, adjusting.**

Specified values for wheel alignment --> **Specifications for wheel alignment.**

The alignment program only shows correction if it is necessary to make one.

**Lifting vehicle with suspension 1BA, 1BE, 1BR, 1BV, 1BK, 1BB**

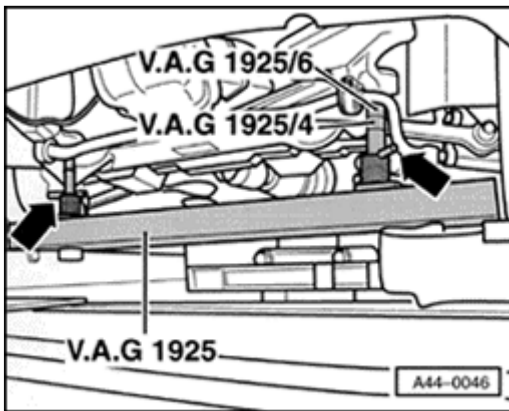
During the next step make sure that the wheels do not lose contact with the turntables when the vehicle is raised!

If this should happen anyway, the turntables may not be moved. Otherwise measurement result will be falsified!

- Apply axle lift to the front jacking points and raise vehicle.

**NOTE:**

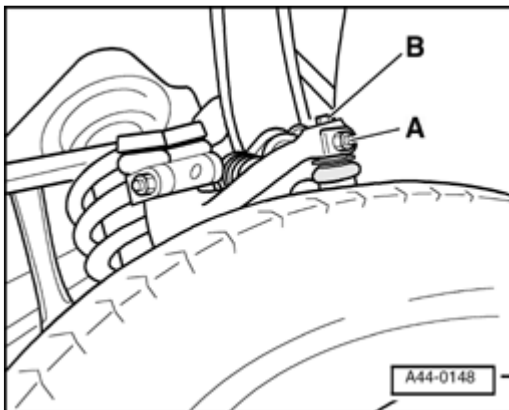
- Raise vehicle by 60 mm.
- Push cylinder out of threaded spindles and fix with locking pins.



**Fig. 554: Ensuring Securing Pins Are Correctly Positioned**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

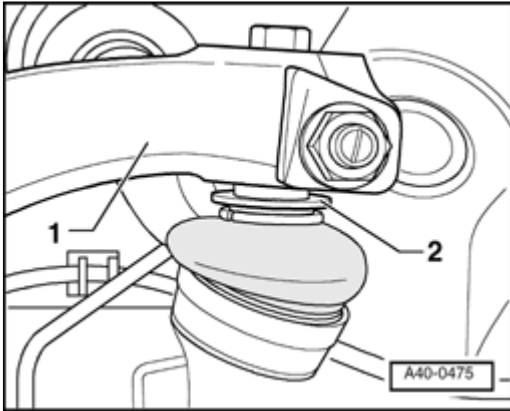
Make sure that the safety bolts - **arrows** - are correctly positioned!

- Lower vehicle on spacer V.A.G 1925.

**Setting toe constant "S"**

**Fig. 555: Loosening Hex Head Nut & Unscrewing Bolt**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

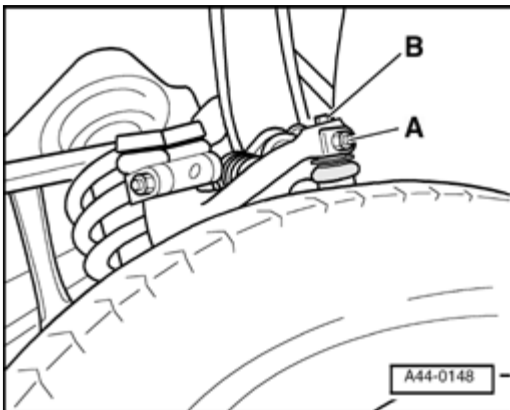
- Loosen hex nut - **A** - .
- Remove bolt - **B** - about 4 mm.
- Press down tie rod joint until it stops.



**Fig. 556: Identifying Steering Arm & Tie Rod Ball Joint Sealing Washer**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

**NOTE:**

- Do not use a chisel or similar tool to press out tie rod between steering arm - 1 - and seal - 2 - , otherwise seal will be damaged.
- Tie rod must only be pressed over joint end of tie rod ball joint out of steering arm or knocked using a wooden or rubber mallet.



**Fig. 557: Loosening Hex Head Nut & Unscrewing Bolt**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install bolt - **B** - far enough until specified value is obtained exactly.
- Tighten hex nut - **A** - , and check value.
- Tighten bolt - **B** - .
- Lower vehicle back into initial position.
- Turn down threaded spindle.

- Bounce vehicles several times.

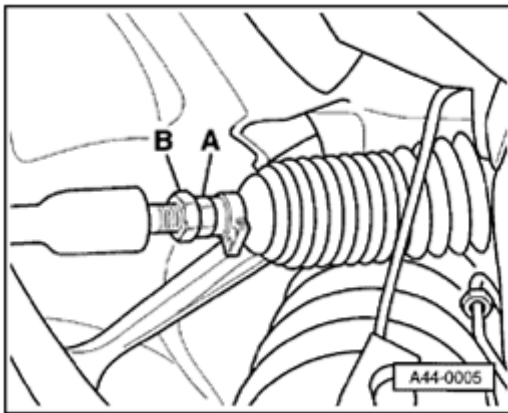
Check toe constant after it is adjusted

Now wheel alignment equipment will check toe constant once more.

If measured values are within the tolerance of control value the second time they are checked, adjustment is O.K.

If measured values are not within control values, they must be set again in raised position.

### Front Axle Toe, adjusting



**Fig. 558: Identifying Lock Nut & Hex Nut**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen lock nut - **B** -.
- Adjust toe on left and right wheels with hex - **A** -.

Be sure that boots are not twisted after turning tie rods.

Twisted boots wear out quickly.

- Tighten lock nut - **B** -, and check toe-in value again.

Setting may change slightly after lock nut - **B** - is tightened.

If measured toe is still within specified range, adjustment is correct.

### ADAPTIVE CRUISE CONTROL (ACC)

#### Adaptive Cruise Control (ACC)

Assembly overview, ACC sensor --> [ACC sensor, assembly overview](#).

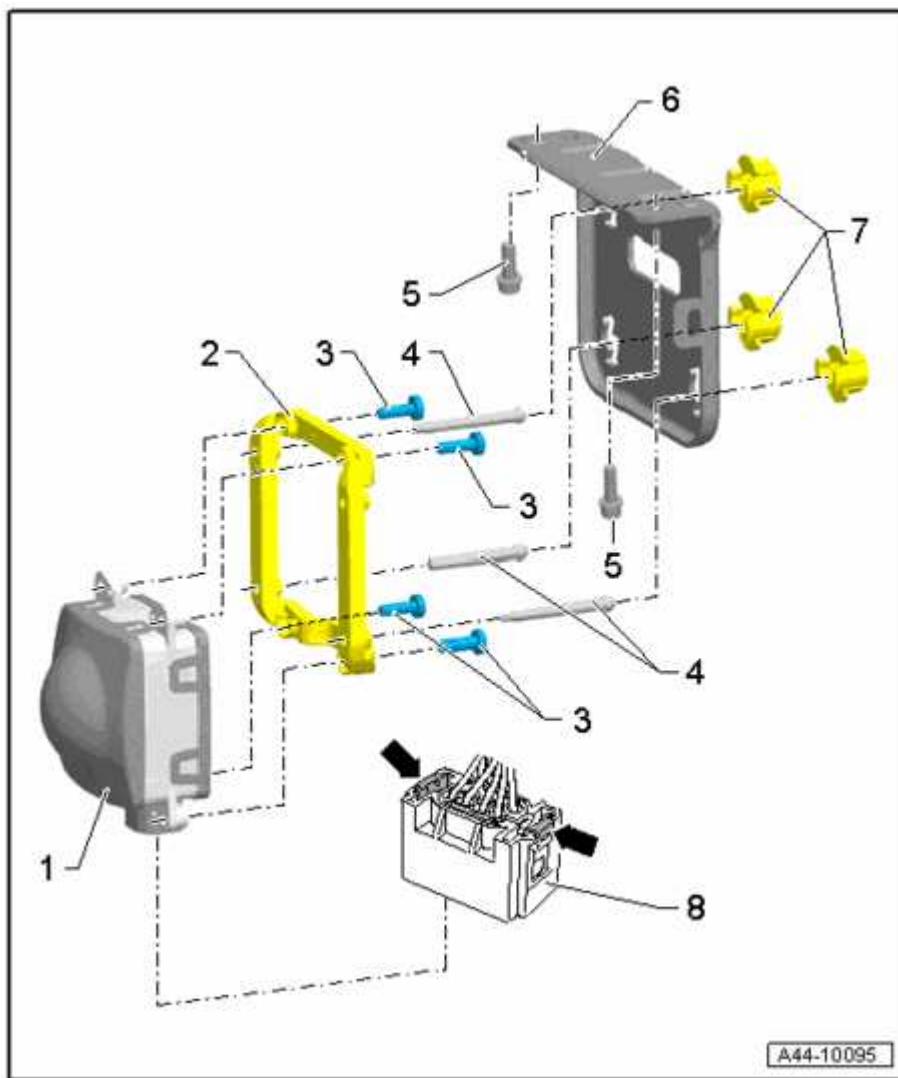


General notes for ACC --> [General notes for ACC.](#)

Adjustment procedure --> [Adjustment procedure.](#)

ACC sensor, removing and installing --> [ACC sensor, removing and installing.](#)

ACC sensor, assembly overview



**Fig. 559: ACC Sensor, Assembly Overview**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Sensor

- Removing and installing --> [ACC sensor, removing and installing](#)

2 - Frame

3 - Bolt, 4.5 Nm

4 - Stud

- Observe adjustment dimension when installing --> **ACC sensor, disassembling and assembling**

5 - Bolt, 8 Nm

6 - Bracket

7 - Nut

8 - Connector

- To disengage, compress both clamps - **arrows** -.

#### **General notes for ACC**

Distance regulation sensor and Distance Regulation Control Module J428 are installed in one housing. If there is a malfunction at sensor/control module, the complete unit must be replaced.

In the continuing description, the sensor/control module unit is called "sensor".

Radar cover of sensor is located behind front bumper cover and is made of radar permeable material. All modifications such as subsequent paint work, applied stickers, etc. may cause malfunctions.

Malfunctions may also occur if sensor is soiled. For this, remove decorative grille or radiator grille in front of sensor according to Repair Information and clean interior of decorative grille or radiator grille and sensor.

Before adjusting the ACC system, check DTC memory and perform corrective actions if necessary.

It can be determined whether sensor is out of adjustment in "measuring value block 2" of ACC control module.

If sensor is out of adjustment by  $-0.8^\circ$  to  $+0.8^\circ$ , it does not need to be re-adjusted.

The ACC adjustment must only be performed using axle alignment equipment and adjusting device approved by VW/Audi!

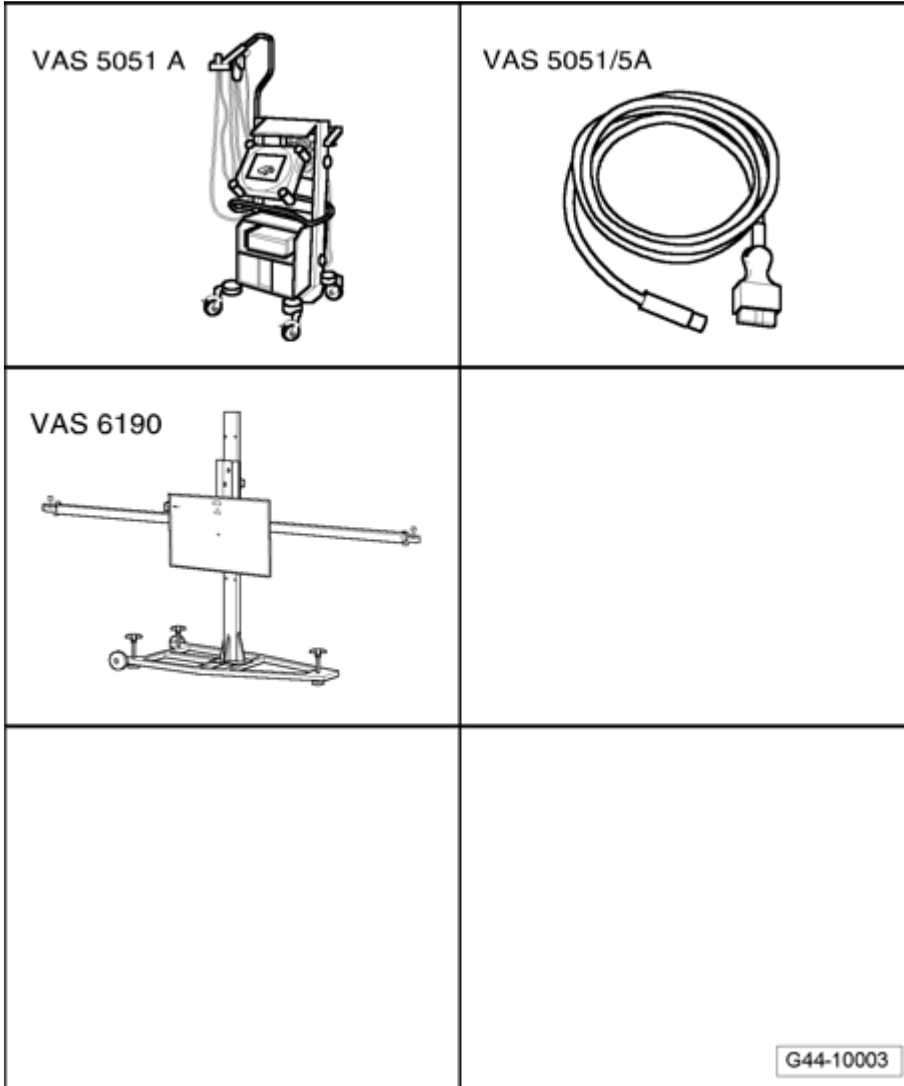
Correct adjustment is a requirement for perfect ACC function.

#### **NOTE:**

- **A zero adjustment is necessary if:**
- **Rear axle toe is adjusted.**
- **Complete radar sensor is replaced.**
- **Bumper cross member is loosened or out of adjustment.**
- **There is damage on the front end.**

- Sensor is out of adjustment in angles greater than  $-0.8^{\circ}$  to  $+0.8^{\circ}$

**Adjustment procedure**



**Fig. 560: Identifying Special Tools**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

**Special tools, testers and auxiliary items required**

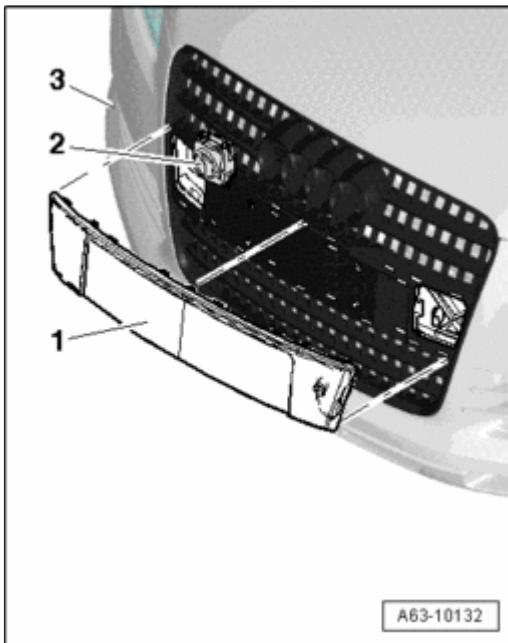
- Vehicle Diagnosis, Testing and Information System VAS 5051 A
- Diagnostic cable VAS 5051/5A
- ACC setting device VAS 6190
- Alignment computer

**NOTE:**

- Before driving vehicle onto axle alignment platform, check whether there is a sufficiently large space between vehicle and ACC setting device VAS 6190. Distance between ACC setting device VAS 6190 and vehicle must be  $120 \text{ cm} \pm 5 \text{ cm}$ .
- If the space is insufficient, drive vehicle backwards onto axle alignment platform in order to utilize a suitable space.
- Requirement of ACC adjustment is vehicle alignment is checked and adjustments made if necessary according to alignment computer --> Wheel Alignment.
- Before beginning adjustment, DTC memory must be checked and any DTCs present must be repaired.

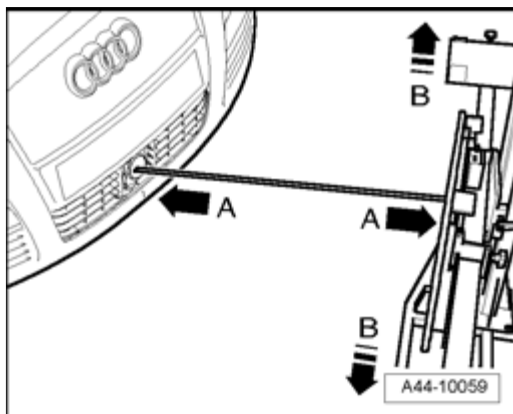
The adjustment procedure is described here using ACC setting device VAS 6190. However ADC test fixture VAS 6041 and ADC reflector mirror VAS 6041/1 can also be used.

- Connect battery charger --> 27 - STARTER, GENERATOR, CRUISE CONTROL .



**Fig. 561: Identifying Radar Cover, Bumper, And Sensor Lens**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

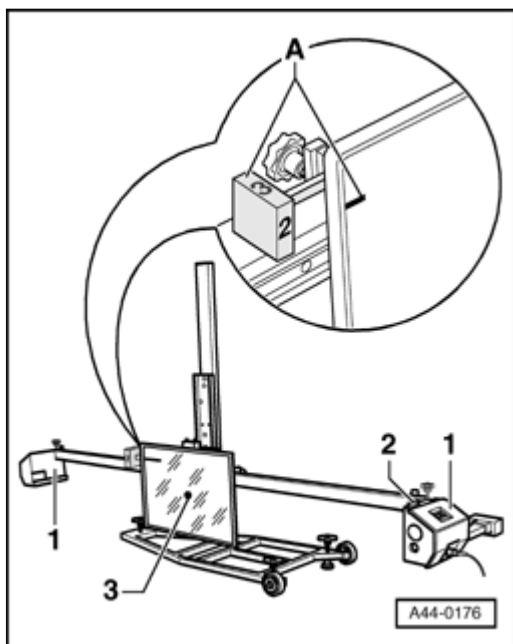
- Remove radar cover - **1** - at bumper - **3** - --> 63 - BUMPERS .
- Remove any dirt from sensor lens - **2** - and inside of radar cover - **1** - .



**Fig. 562: Positioning ACC Setting Device VAS 6190 At Distance Of 120 Cm  $\pm$  5 Cm From Sensor Lens To Mirror Surface**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

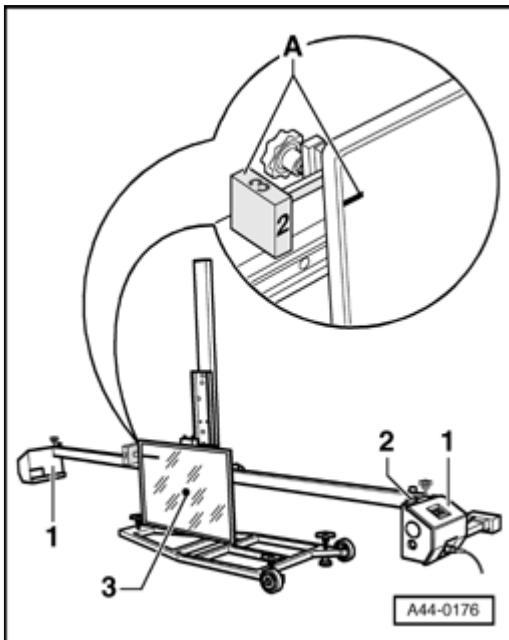
- Position ACC setting device VAS 6190 at distance - A - of 120 cm  $\pm$  5 cm from sensor lens to mirror surface.



**Fig. 563: Attaching Measurement Pick-Ups For Front Wheels On VAS 6190**

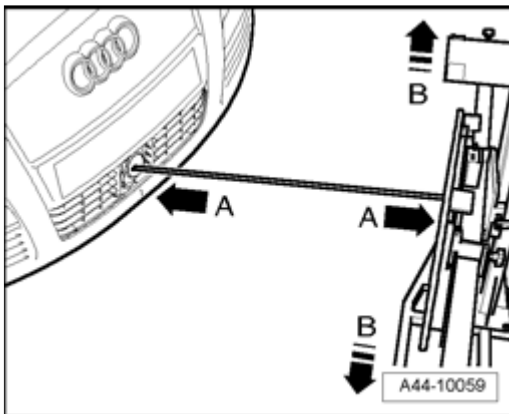
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Attach measurement pick-ups - 1 - for front wheels on VAS 6190.



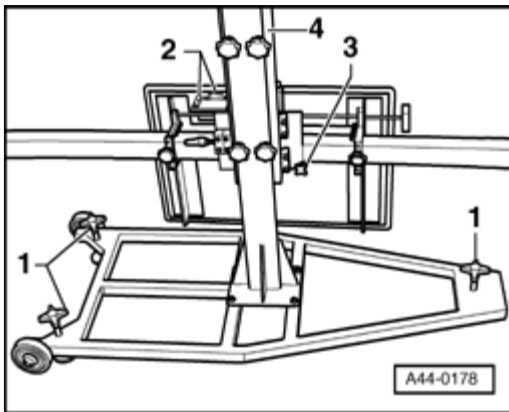
**Fig. 564: Attaching Measurement Pick-Ups For Front Wheels On VAS 6190**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- In area - A - of item - 2 - , turn rotary knob so it aligns with marking on mirror (the number 2 on rotary knob must point toward vehicle).



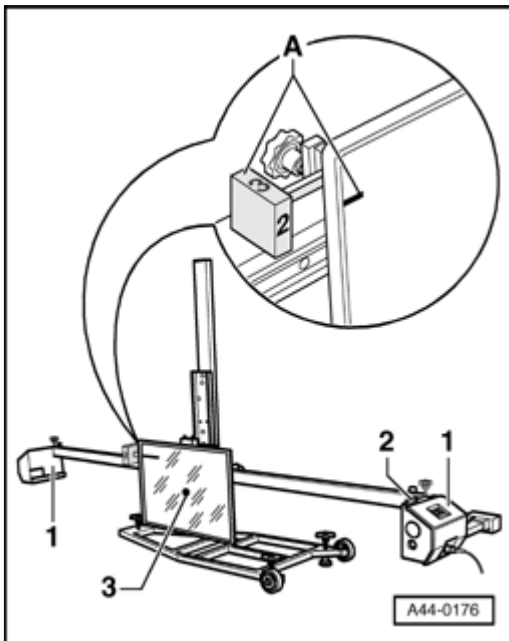
**Fig. 565: Positioning ACC Setting Device VAS 6190 At Distance Of 120 Cm  $\pm$  5 Cm From Sensor Lens To Mirror Surface**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Now align VAS 6190 by sliding sideways - **arrows B** - so that laser beam strikes the center of the sensor lens on the horizontal.



**Fig. 566: Identifying Adjusting Screws, Spirit Levels, And Vertical Slits**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Use adjusting screws - 1 - to bring spirit levels - 2 - on VAS 6190 into horizontal position.
- Adjust vertical slits - 4 - on VAS 6190 so that laser beam strikes center of sensor lens in the vertical.
- Set same individual toe values of front axle using fine-adjustment screw - 3 -.
- The difference of both individual toe values must be less than 6' or equal.



**Fig. 567: Attaching Measurement Pick-Ups For Front Wheels On VAS 6190**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

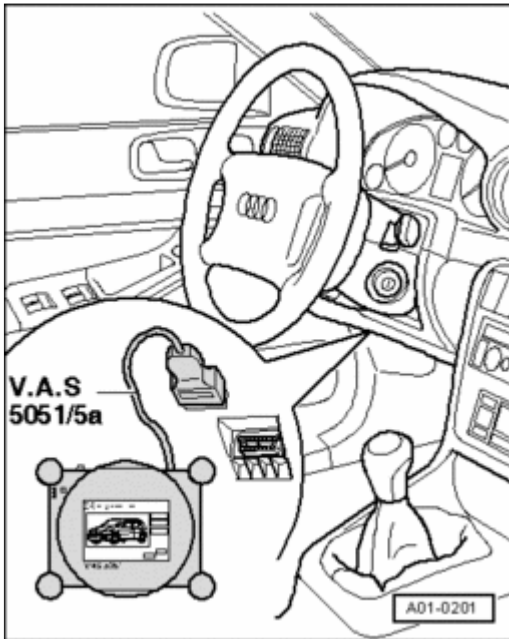
- Bring spirit levels - 2 - of measurement pick-ups - 1 - into horizontal position.
- Now check once again whether laser beam - 3 - on VAS 6190 strikes sensor lens.

**NOTE:**

- **VAS 6190 is correctly aligned if the laser beam still coincides with the sensor lens at this stage, after the identical toe values have been set.**

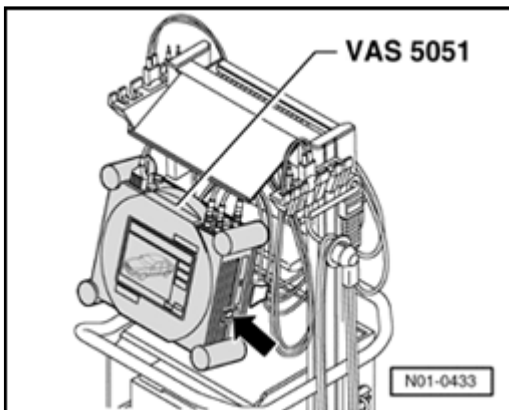
- If the laser beam does not strike the sensor lens, the alignment of the VAS 6190 must be repeated once more.

- Connect diagnostic operation system VAS 5051 A.



**Fig. 568: Connecting Diagnostic Cable VAS 5051/5A Connector To Data Link Connector (DLC)**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect diagnostic cable VAS 5051/5A connector to Data Link Connector (DLC).



**Fig. 569: Identifying Volkswagen Tester VAS 5051, On Switch**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Switch on Vehicle Diagnosis, Testing and Information System - **arrow** -.

Diagnostic operation system is ready for operation when the button fields of the operating modes are displayed.



- Switch on ignition.
- Touch Guided Fault Finding on screen.
- Select one after another:
  - Brand
  - Model
  - Model year
  - Version
- Engine identification
- Confirm entered data.

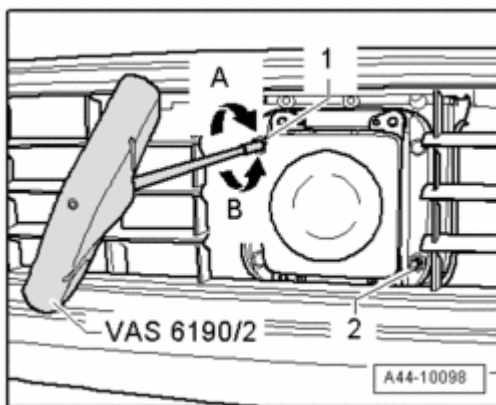
Wait until diagnostic operation system has checked all control modules in the vehicle.

- Press Goto button and select "Function/component selection" function.

Then

- "Body"
- "Electrical Equipment".
- "On Board Diagnostic (OBD) capable systems".
- "Distance regulation".
  - "Distance Regulation Control Module -J428-, functions".
  - "Distance Regulation Control Module -J428-, distance regulation adjustment".

Now follow instructions on screen to perform adjustment.

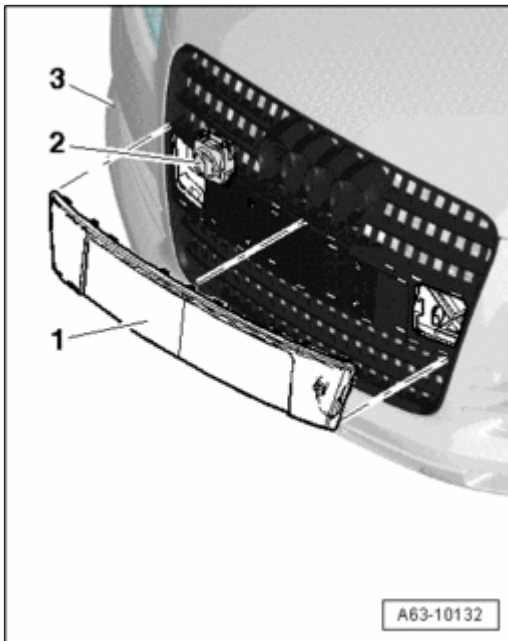


**Fig. 570: Identifying Upper Bolts And Lower Bolts**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Use upper bolts - **1** - and lower bolt - **2** - for fine-adjustment in "Guided Fault Finding".

**CAUTION: ACC adjustment has not been completed until VAS 5051 A displays "Actuator test ended".**

- Switch off ignition.
- Disconnect connector for diagnostic cable VAS 5051/5A from Data Link Connector (DLC).
- Disconnect battery charger --> **27 - STARTER, GENERATOR, CRUISE CONTROL** .



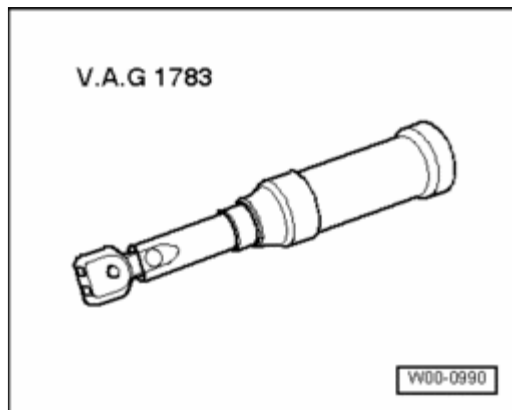
**Fig. 571: Identifying Radar Cover, Bumper, And Sensor Lens**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install radar cover - **1** - at bumper - **3** - --> **63 - BUMPERS** .
- When installing radar cover - **1** - , make sure electrical wire does not slide over sensor lens - **2** - .

#### ACC sensor, removing and installing

Sensor is located behind radar cover in front bumper.

#### Special tools, testers and auxiliary items required



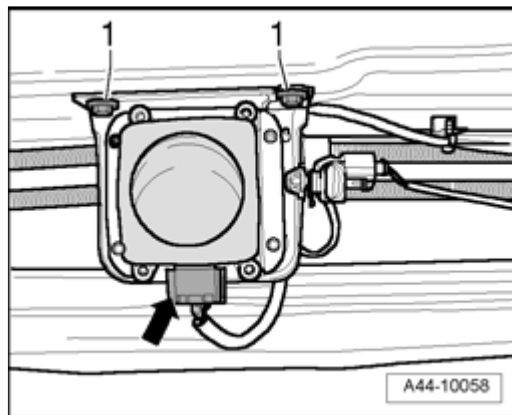
**Fig. 572: Torque Wrench V.A.G 1783**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1783

### Removing

- Remove front bumper cover --> **63 - BUMPERS** .



**Fig. 573: Identifying Harness Connector And Hex Bolts**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect harness connector - **arrow** - .
- Remove hex bolts - **1** - .
- Remove ACC sensor.

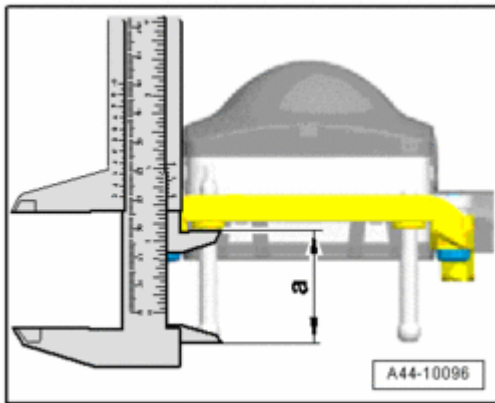
### Installing

Installation is in reverse order of removal. Note the following:

#### NOTE:

- Studs in bracket are preset. If necessary, correct adjustment.

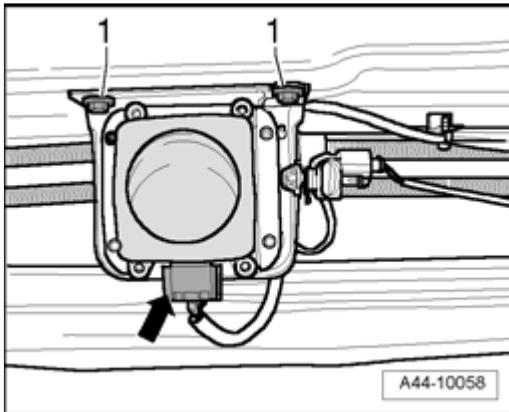
- Place sensor on a soft and clean surface.



**Fig. 574: Identifying Dimension Of Studs**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Measure dimension - **a** - of all studs.

Dimension - **a** - must be 34 mm.



**Fig. 575: Identifying Harness Connector And Hex Bolts**  
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install hex bolts - **1** - and tighten.
- Reconnect electrical harness connector - **arrow** -.

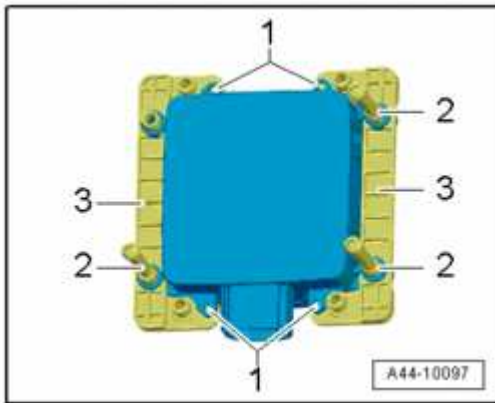
Tightening torques: --> [ACC sensor, assembly overview](#)

- Install front bumper cover --> [63 - BUMPERS](#) .
- Perform ACC adjustment --> [Adjustment procedure](#).

**ACC sensor, disassembling and assembling**

Disassembling

- Remove ACC sensor --> **ACC sensor, removing and installing.**

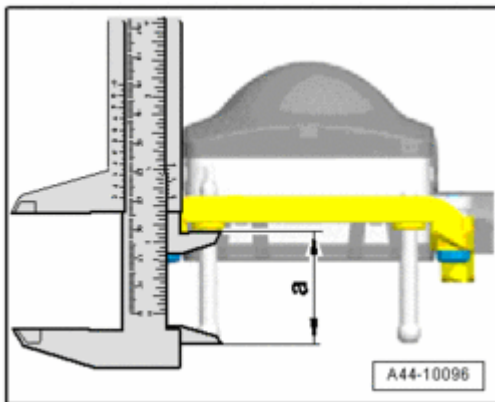


**Fig. 576: Identifying Studs, Frames, And Bolts**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove studs - **2** - from frames - **3** -.
- Remove bolts - **1** - and remove frame from sensor.

#### Assembling

Assembly is in reverse order of removal. Note the following:



**Fig. 577: Identifying Dimension Of Studs**  
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Adjust dimension - **a** - on all studs.

Dimension - **a** - must be 34 mm.

Tightening torques: --> **ACC sensor, assembly overview**