Workshop Manual

Audi A6 2005 ➢

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Running gear, front-wheel drive and four-wheel drive

Edition 09.2013

List of Workshop Manual Repair Groups

Repair Group

00 - Technical data

40 - Front suspension

42 - Rear suspension

43 - Self-levelling suspension

44 - Wheels, tyres, vehicle geometry

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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 Technical data

(ARL003399; Edition 09.2013)

⇒ “1.1 Running gear”, page 1

⇒ “1.2 Steering”, page 2

1.1 Running gear

Front axle	Four-link front suspension with top and bottom transverse links, anti-roll bar and twin-tube, gas-filled shock absorbers, or suspension struts (air suspension) with variable height settings and damper characteristics
Rear axle	Independent suspension with self-tracking trapezium links, anti-roll bar, twin-tube, gas-filled shock absorbers with coil springs, or air springs with variable height settings and damping characteristics

		Front-wheel drive / four-wheel drive				
		Standard running gear 1BA	Sports running gear 1BE	Heavy-duty running gear 1BR	Urban running gear 1BB	Sports running gear (quattro GmbH) 1BV
Wheelbase	mm	approx. 2845 [1]	approx. 2850 [1]	approx. 2841 [1] approx. 2945 [2]	approx. 2845 [1] approx. 2950 [2]	approx. 2853 [1]
Track width (front)	mm	approx. 1613 [3]	approx. 1616 [3]	approx. 1610 [3]	approx. 1613 [3]	approx. 1616 [3]
Track width (rear)	mm	approx. 1621 [3]	approx. 1625 [3]	approx. 1617 [3]	approx. 1621 [3]	approx. 1627 [3]
Maximum steering angle at inside wheel	Degrees	38° 12′	38° 18′	38° 30′	38° 12′	38° 18′

		Front-wheel drive / four-wheel drive			
		Sports running gear, S6 1BD	Air suspension 1BK	Air suspension, allroad 1BY	Sports running gear 2MC / 2MS (quattro GmbH)
Wheelbase	mm	approx. 2848 [1]	approx. 2846 [1] approx. 2950 [2]	approx. 2846 [1]	approx. 2847 [3]
Track width (front)	mm	approx. 1630 [3]	approx. 1614 [3,4]	approx. 1608 [4.5]	approx. 1603 [3]
Track width (rear)	mm	approx. 1612 [3]	approx. 1622 [3,4]	approx. 1605 [4.5]	approx. 1626 [3]
Maximum steering angle at inside wheel	Degrees	38° 18′	38° 18′	38° 18′	38° 12′

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1 - Vehicles with “short” wheelbase.

2 - Vehicles with “long” wheelbase.

3 - These specifications correspond to a rim offset (ET) of 35 mm

4 - These specifications apply to air suspension at normal height level

5 - These specifications correspond to a rim offset (ET) of 38 mm

Note

- *These specifications are applicable for all engines.*
- *Different track width figures will apply if wheels with different rim offset are installed.*

1.2 Steering

Steering rack	Maintenance-free rack-and-pinion steering with speed-dependent power assistance
Turning circle diameter	approx. 11.90 m 1) approx. 12.30 m 2) approx. 12.21 m 3)

1) Vehicles with “short” wheelbase.

2) Vehicles with “short” wheelbase.

3) RS 6 vehicles.

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2 Proper disposal procedures for oil-filled and gas-filled components

⇒ “2.1 Releasing gas and draining gas-filled shock absorbers (front)”, page 3

⇒ “2.2 Releasing gas in gas-filled shock absorbers (rear)”, page 4

⇒ “2.3 Discharging front suspension strut (air suspension)”, page 5

⇒ “2.4 Discharging accumulator”, page 5

⇒ “2.5 Draining power steering rack”, page 6

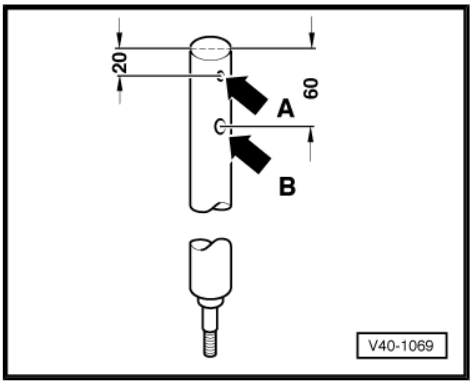
2.1 Releasing gas and draining gas-filled shock absorbers (front)

A - Releasing gas by drilling

– Clamp gas-filled shock absorber vertically in vice, with piston rod pointing downwards.

WARNING

Safety goggles must be worn when drilling.



– Drill a 3 mm ∅ hole -arrow A- through outer tube of shock absorber.

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Note

Gas will escape during drilling.

– Continue drilling until inner tube is fully penetrated (approx. 25 mm deep).

– Drill a second 6 mm ∅ hole -arrow B- through outer and inner tubes of shock absorber.

– Hold shock absorber over a drip tray and move piston rod up and down several times through entire stroke until no more fluid comes out.

B - Opening with pipe cutter

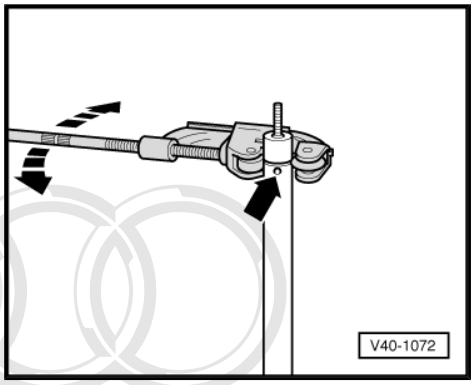
Special tools and workshop equipment required

♦ Pipe cutter (commercially available type)

WARNING

Safety goggles must be worn while drilling and cutting.

– Drill a 3 mm ∅ hole -arrow- through outer tube of shock absorber, or saw through side of tube.



Note

Gas will escape when drilling or sawing.

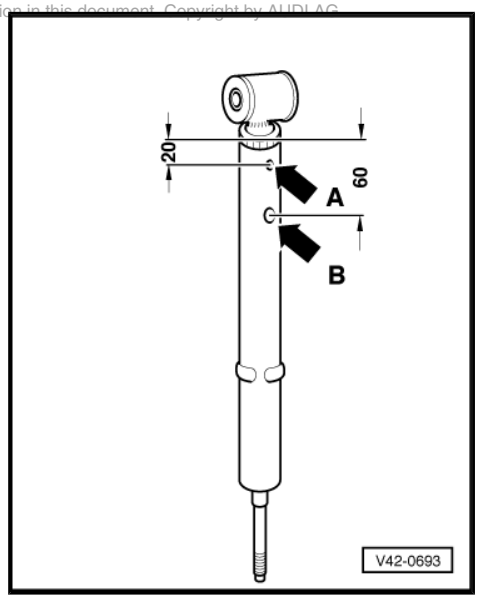
– Apply pipe cutter (commercially available type) as shown in illustration and cut through outer tube of shock absorber.
– Pull the piston rod upwards, at the same time holding the inner tube securely with pliers and pressing it downwards, so that it remains in the outer tube when the piston rod is slowly pulled upwards.
– Pull piston rod off inner tube of shock absorber.
– Drain shock absorber tube.

2.2 Releasing gas in gas-filled shock absorbers (rear)

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A - Releasing gas by drilling

– Clamp gas-filled shock absorber vertically in vice, with piston rod pointing downwards.



WARNING

Safety goggles must be worn when drilling.

– Drill a 3 mm ∅ hole -arrow A- through outer tube of shock absorber.

Note

Gas will escape during drilling.

– Continue drilling until inner tube is fully penetrated (approx. 25 mm deep).
– Drill a second 6 mm ∅ hole -arrow B- through outer and inner tubes of shock absorber.
– Hold shock absorber over a drip tray and move piston rod up and down several times through entire stroke until no more fluid comes out.

B - Opening with pipe cutter

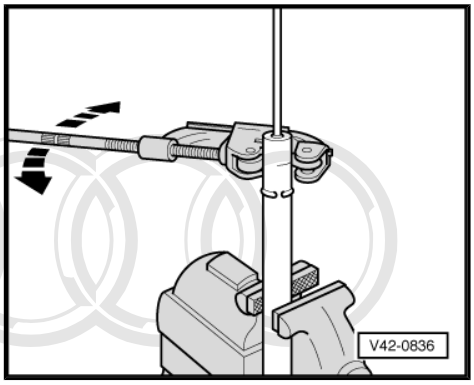
Special tools and workshop equipment required

♦ Pipe cutter (commercially available type)

WARNING

Safety goggles must be worn while drilling and cutting.

– Drill a 3 mm ∅ hole -arrow- through outer tube of shock absorber, or saw through side of tube.



Note

Gas will escape when drilling or sawing.

– Apply pipe cutter (commercially available type) as shown in illustration and cut through outer tube of shock absorber.
– Pull the piston rod upwards, at the same time holding the inner tube securely with pliers and pressing it downwards, so that it remains in the outer tube when the piston rod is slowly pulled upwards.
– Pull piston rod off inner tube of shock absorber.
– Drain shock absorber tube.

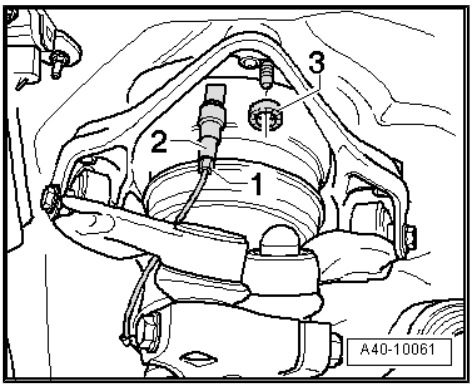
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2.3 Discharging front suspension strut (air suspension)

Remove front suspension strut (air suspension) ⇒ page 54 .

– Slowly loosen residual pressure valve -2- on front suspension strut (air suspension) to dissipate air pressure.

A - Drilling open

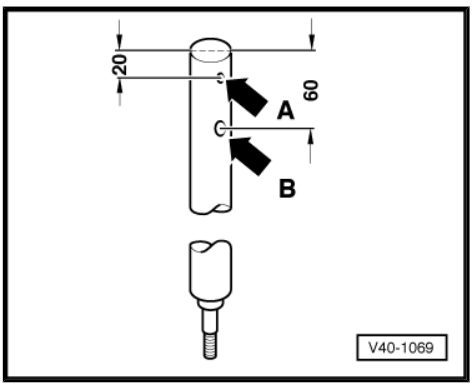


The illustration shows a conventional shock absorber. The procedure for the suspension struts (air suspension) is identical.

– Clamp suspension strut (air suspension) vertically in vice with piston rod facing downwards.

WARNING

Safety goggles must be worn when drilling.

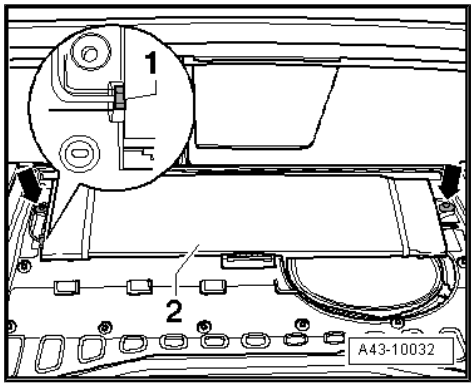


– Drill a 3 mm ∅ hole -arrow A- through outer tube of shock absorber.
– Continue drilling until inner tube is fully penetrated (approx. 25 mm deep).
– Drill a second 6 mm ∅ hole -arrow B- through outer and inner tubes of shock absorber.
– Hold shock absorber over a drip tray and move piston rod up and down several times through entire stroke until no more fluid comes out.

2.4 Discharging accumulator

– Bleed system using -VAS 5051 A- ⇒ page 229 .

– Slowly loosen air pipe -1- at accumulator -2- to dissipate air pressure. Unscrew air pipe -1- when air pressure has been dissipated.



2.5 Draining power steering rack

Note

Room temperature should be at least 20°C when draining the steering rack.

– Hold power steering rack over drip tray and allow hydraulic fluid to drain off.
– Clamp power steering rack horizontally into vice with connections facing downwards.
– Place drip tray underneath power steering rack.
– By pushing and pulling track rod, move rack approx. 6 times backwards and forwards between its end positions.
– Dispose of power steering rack.

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3 Checking shock absorbers

⇒ “3.1 Leaks at shock absorbers”, page 7

⇒ “3.2 Noises from shock absorbers”, page 7

⇒ “3.3 Checking shock absorbers when removed”, page 7

⇒ “3.4 Checking shock absorbers on shock tester”, page 8

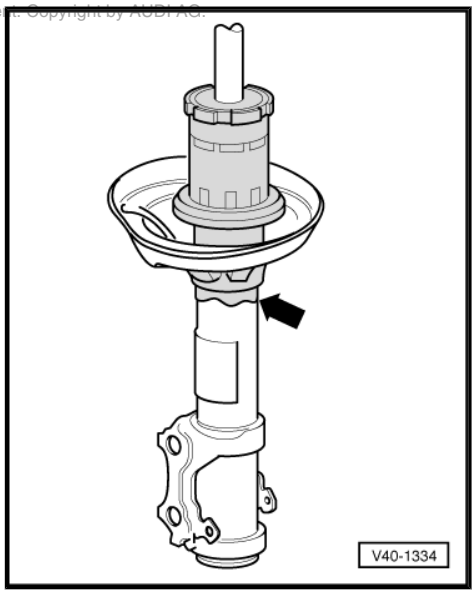
3.1 Leaks at shock absorbers

Shock absorbers are often replaced because of externally visible leakage. Inspections on the test rig and in the vehicle have shown that in the majority of cases this replacement is not justified.

Slight loss of fluid (“sweating”) at the piston rod seal is not a reason for replacing a shock absorber. A shock absorber with slight fluid leakage can be accepted as "OK" under the following conditions:

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- Fluid seepage (as shown in the shaded part of the illustration) is visible, but the fluid is dull and possibly dried by dust.
- The fluid seepage extends only from the top shock absorber seal (piston rod oil seal) down to the bottom spring plate -arrow-.



Note

Slight fluid leakage is actually beneficial, as it lubricates the piston rod oil seal and thus extends the life of the shock absorber. This applies to shock absorbers on both the front and rear axles.

3.2 Noises from shock absorbers

Shock absorbers are often replaced because of noises (rumbling, etc.) experienced by the customer. Inspections on the test rig and in the vehicle have shown that in approx. 70 % of these cases the complaints and subsequent replacement are not justified.

In the case of complaints regarding rumbling or knocking noises please proceed as follows:

– Carry out a road test with the customer - if possible on a dry, uneven road - to establish when, where and how the noises occur.

Note

These noises are only very rarely caused by the shock absorbers.

3.3 Checking shock absorbers when removed

Defective shock absorbers can be identified by loud rumbling noises when driving, caused by wheel hopping, especially on bad roads. Heavy fluid leakage is an additional visual indication.

Note

Shock absorbers are maintenance-free; shock absorber fluid cannot be topped up.

After removal, a shock absorber can be checked by hand as follows:

– Compress shock absorber by hand.

♦ The piston rod should move smoothly over the entire stroke with uniform resistance and without jolts.

– Release piston rod.

♦ If the shock absorber has sufficient gas pressure the piston rod will return by itself to its original position.

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Note

♦ *If this is not the case, the shock absorber does not necessarily need to be renewed. Provided there has been no major loss of fluid, it will still be as effective as a conventional shock absorber.*

♦ *Even without gas pressure, the shock absorber will provide full damping effect as long as there has been no major loss of fluid. However, it may produce more noise.*

3.4 Checking shock absorbers on shock tester

The shock tester allows shock absorbers to be tested without removing them from the vehicle. The damping effect can be assessed on the basis of the pointer deflection or the print-out.

Special tools and workshop equipment required

♦ Boge shock tester or

♦ Sachs shock tester - V.A.G 1975- or

♦ Maha shock absorber tester - VAS 1990-

Note

♦ *Temperature +10 ... +40 °C.*

♦ *Driver in vehicle.*

♦ *Tyre pressure OK*

♦ *Wheels of vehicle in a central and straight position on the tyre contact plates.*

♦ *Front wheels in straight-ahead position.*

♦ *Handbrake not applied, brake pedal not depressed.*

Test results

The condition of the shock absorbers can only be evaluated as follows:

♦ Satisfactory damping effect

or

- Unsatisfactory damping effect

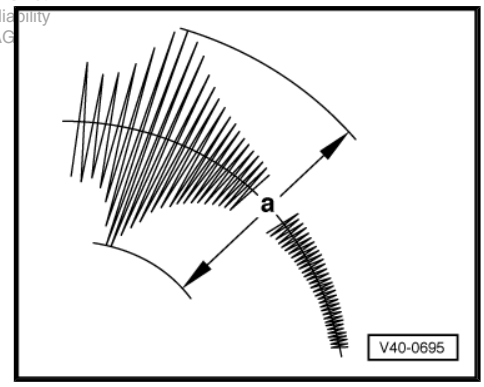
Note

- *It is not possible to obtain more detailed readings specifying the exact degree of impairment of damping effect.*
- *A forecast of the remaining service life is not permissible.*
- *Test results will be falsified if the suspension contacts the bump stops when the readings are taken.*

The following values apply only to tests conducted on the test equipment listed above. If the maximum values listed below are exceeded, the effectiveness of the shock absorber has deteriorated significantly and replacement is recommended.

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Example:



Maximum value = 70

- a = higher than 70: unsatisfactory damping effect
- a = lower than 70: satisfactory damping effect

The shock absorber combination installed in the vehicle is indicated by the corresponding PR number on the vehicle data sticker.

Explanatory notes on weight codes (PR Nos.) ⇒ page 282

Maximum values “a” in mm

Note

- *If the reading is higher than the maximum value “a” listed in the table, the damping effect is unsatisfactory ⇒ renew the shock absorber.*
- *If the reading is lower than the maximum value “a” listed in the table, the damping effect is satisfactory ⇒ the shock absorber does not have to be renewed.*

Model/version	Front axle	Rear axle	Remarks
A6 standard running gear, front axle (saloon/Avant); A6 urban running gear, front axle (saloon/Avant)	38	/	Applies to front-wheel drive and four-wheel drive
A6 standard running gear, rear axle (saloon/Avant); A6 urban running gear, rear axle (saloon/Avant)	/	38	Applies to front-wheel drive and four-wheel drive
A6 heavy-duty running gear, front axle (saloon/Avant)	30	/	Applies to front-wheel drive and four-wheel drive
A6 heavy-duty running gear, rear axle (saloon/Avant)	/	45	Applies to front-wheel drive and four-wheel drive
A6 air suspension, front axle (saloon/Avant)	42	/	Applies to front-wheel drive and four-wheel drive
A6 air suspension, rear axle (saloon/Avant)	/	42	Applies to front-wheel drive and four-wheel drive

Model/version	Front axle	Rear axle	Remarks
A6 sports running gear, front axle (saloon/Avant)	35	/	Applies to front-wheel drive and four-wheel drive
A6 sports running gear, rear axle (saloon/Avant)	/	35	Applies to front-wheel drive and four-wheel drive

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4 Positioning vehicle on lifting platform and setting down on wheels

⇒ “4.1 Raising and lowering vehicle when air spring system has been opened; raising and lowering vehicle when air spring system has not been opened”, page 11

4.1 Raising and lowering vehicle when air spring system has been opened; raising and lowering vehicle when air spring system has not been opened

Raising vehicle when air spring system has not been opened

– Before raising vehicle with lifting platform, set vehicle to “Lift” (high level) and activate “Jacking mode” ⇒ page 215 .

This ensures that the support arms of the lifting platform can be swivelled under the vehicle and that no unregulated air spring system control action is activated.

– Position support arms of lifting platform beneath jacking points provided at longitudinal members and raise vehicle.

Lowering vehicle when air spring system has not been opened

– Lower lifting platform and set down vehicle on its wheels.

– Swivel back support arms of lifting platform.

– Deactivate “Jacking mode” and set desired drive mode ⇒ page 215 .

Note

“Jacking mode” is also deactivated automatically at road speeds in excess of 10 km/h.

Lowering vehicle when air spring system has been opened

Caution

The vehicle must not be set down on its wheels before the air spring system has been charged.

– Charge system using -VAS 5051 A- ⇒ page 229 .

– Lower lifting platform and set down vehicle on its wheels.

If suspension is not high enough to swivel back support arms of lifting platform (not enough pressure in accumulator), start engine and allow it to idle. This switches on compressor of air supply unit.

– Deactivate “Jacking mode” and set desired drive mode ⇒ page 215 .

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40 – Front suspension

1 General notes

⇒ “1.1 General notes”, page 12

⇒ “1.2 Contact corrosion”, page 13

⇒ “1.3 Repairing damaged threads in longitudinal member (sub-frame to body)”, page 13

⇒ “1.4 Lifting suspension to unladen position (vehicles with coil springs)”, page 13

⇒ “1.5 Lifting suspension to reference position (vehicles with air suspension)”, page 15

⇒ “1.6 Exploded views of front axle”, page 18

1.1 General notes

All contact surfaces must be cleaned when installing wax-coated components. The contact surfaces must be free of wax and grease.

Tightening torques refer to unoiled bolts and nuts.

Load-bearing components and other suspension parts must not be welded or straightened.

Do not subject coil springs to hammer blows or weld splashes and do not make any new paint markings.

Do not perform welding or cutting operations (using power grinders) near the coil springs or suspension struts. Cover up coil springs or suspension struts if necessary.

Do not attempt to move the vehicle without the drive shafts fitted; this would result in wheel bearing damage. If the vehicle does have to be moved, always note the following points:

– Fit an outer joint in place of the drive shaft.

– Tighten the outer joint to 200 Nm.

Bonded rubber bushes can only be turned to a limited extent. The suspension must therefore always be in the unladen position or the reference position when the suspension link attachments are tightened.

- Lifting suspension to unladen position (vehicles with coil springs) ⇒ page 13
- Lifting suspension to reference position (vehicles with air suspension) ⇒ page 15

If the wheel alignment has to be checked and adjusted at a later stage, all bolts and nuts which need to be slackened to make adjustments should initially only be tightened to the specified torque figure. After wheel alignment has been checked and adjusted, bolts and nuts must then be fully tightened by turning them through the specified angle.

WARNING

All bolts and nuts must be fully tightened according to specifications before the vehicle is driven on public roads.

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1.2 Contact corrosion

Contact corrosion can occur if unsuitable fasteners (bolts, nuts, washers ...) are used.

For this reason, all the fastening components have received a special surface treatment (Dacromet). These components can be recognised by their greenish colour.

In addition, rubber parts, plastic parts and adhesives are made of non-conductive material.

Always install new parts if you are not sure whether used parts can be refitted.

Note:

Always use genuine parts. These have been tested and are compatible with aluminium.

Accessories must be approved by AUDI AG.

Damage resulting from contact corrosion is not covered under the warranty.

1.3 Repairing damaged threads in longitudinal member (subframe to body)

Damaged threads can be repaired with wire inserts (Helicoil).

The exploded views indicate which threads can be repaired.

Metal particles remaining in the vehicle body must be embedded in wax.

Under certain circumstances it is possible to repair the threads in the captive nuts in the longitudinal member.

- Each thread can only be repaired once.
- If a second repair is needed, the captive nut must be renewed.

> **WARNING**
>
> *Always wear safety goggles when drilling.*

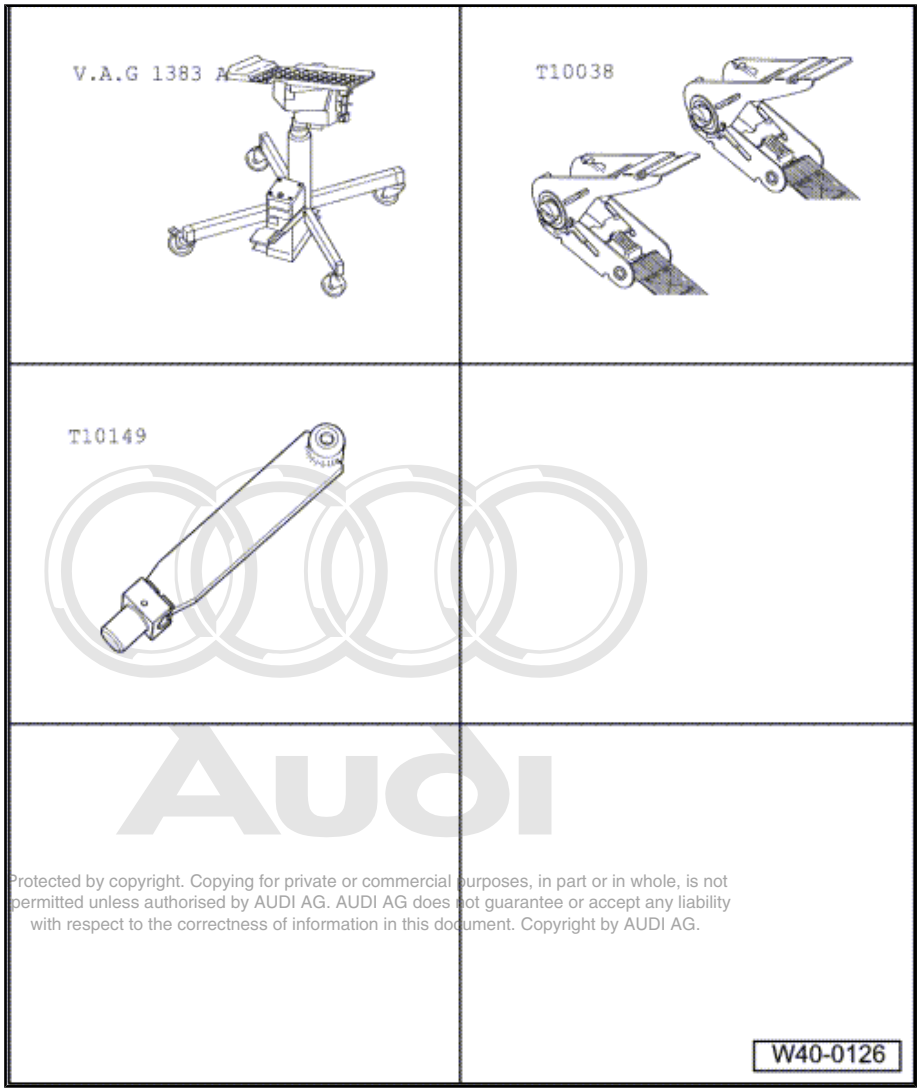
- Have all thread repairs checked by foreman or supervisor.
- The thread insert must be of the same length as the thread in the body.
- Make good any damage to underseal ⇒ General Information; Body Repairs, General Body Repairs .

1.4 Lifting suspension to unladen position (vehicles with coil springs)

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Special tools and workshop equipment required

- Engine and gearbox jack - V.A.G 1383 A-
- Tensioning strap - T10038-
- Support - T10149-



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Note

All bolts on running gear components with bonded rubber bushes must always be tightened with the suspension in the unladen position (vehicle unladen).

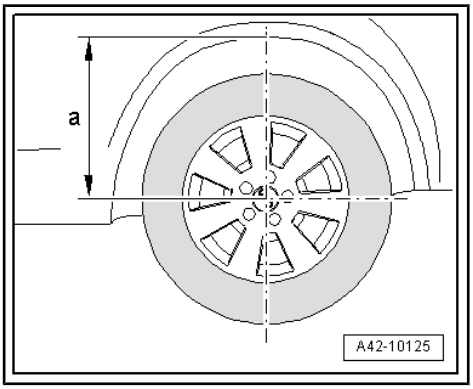
Bonded rubber bushes can only be turned to a limited extent.

Therefore, before tightening the bolts, suspension components with bonded rubber bushes must be brought into a position corresponding to the normal position of the unladen vehicle while driving (unladen position).

Otherwise, the bush would be subject to torsion loading and its service life would be shortened.

This position can be simulated on the lifting platform by raising the appropriate part of the suspension with the engine and gearbox jack - V.A.G 1383 A- and support - T10149- .

– Before commencing work, use measuring tape or similar to measure dimension -a- from wheel centre to lower edge of wheel housing.



This measurement must be taken with the suspension in the unladen position (vehicle unladen).

– Make a note of the measured value. This will be needed when tightening the bolts and/or nuts on the suspension.

Before raising wheel unit, secure vehicle to arms of lifting platform using tensioning straps - T10038- .

If vehicle is not secured, there is a risk of it slipping off the lifting platform.

– Remove wheel.

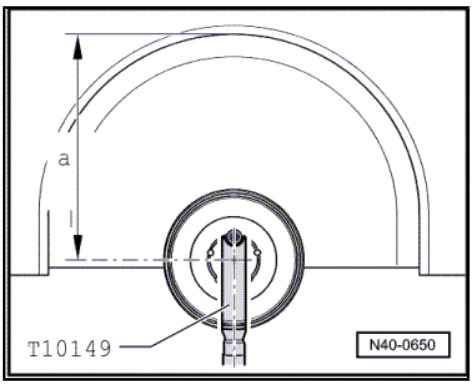
– Turn wheel hub until one of the wheel bolt holes is at the top.

– Attach support - T10149- to wheel hub using wheel bolt.

The bolts/nuts on the relevant suspension mountings must not be tightened until the distance -a- between the wheel centre and the lower edge of the wheel arch is the same as the distance measured before commencing work.

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– Raise wheel bearing housing with engine and gearbox jack - V.A.G 1383 A- until distance -a- is obtained.



> **WARNING**
>
> - *Do not raise or lower vehicle when engine and gearbox jack is under vehicle.*
> - *Do not leave engine and gearbox jack - V.A.G 1383 A- under vehicle for longer than necessary.*

– Tighten relevant bolts/nuts.

– Lower wheel bearing housing.

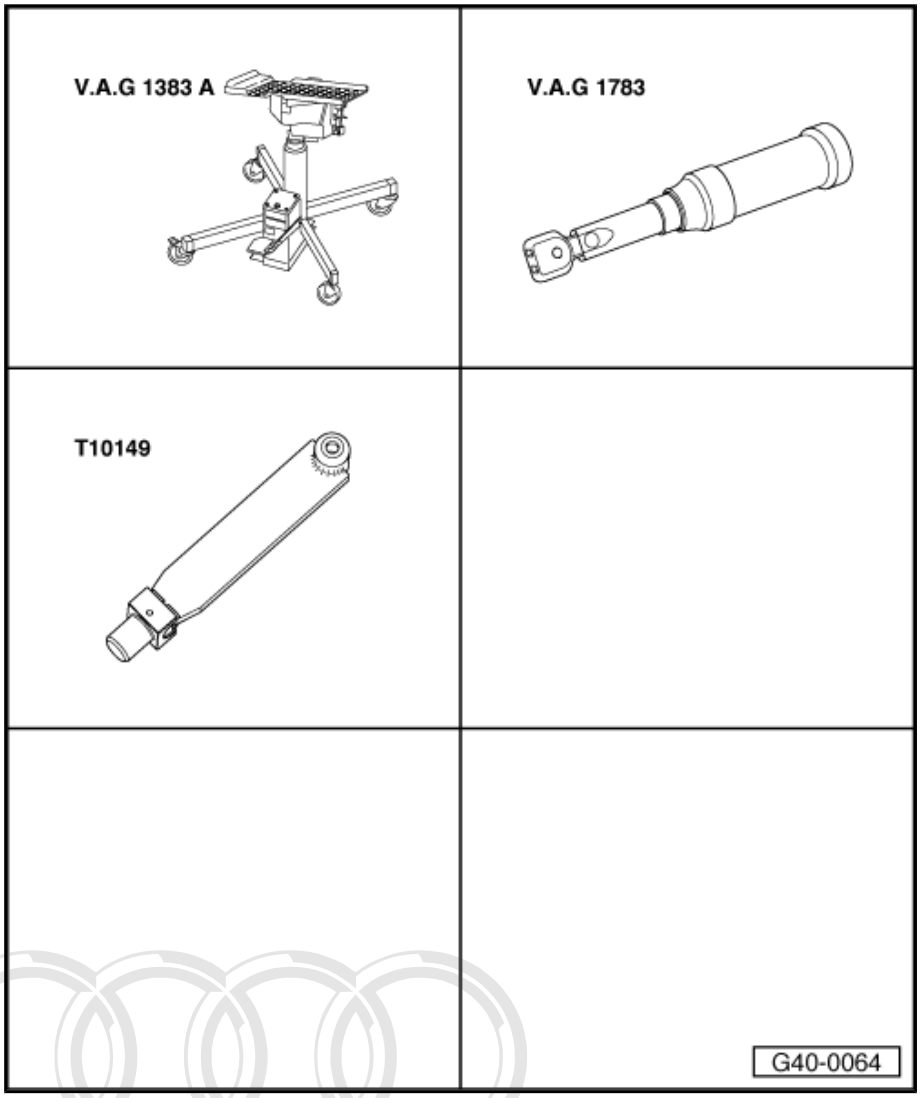
– Pull out engine and gearbox jack from underneath vehicle.

– Remove support - T10149- .

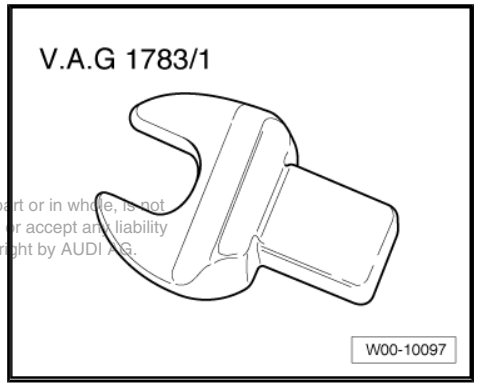
1.5 Lifting suspension to reference position (vehicles with air suspension)

Special tools and workshop equipment required

- Engine and gearbox jack - V.A.G 1383 A-
- Torque wrench - V.A.G 1783-
- Support - T10149-



- Open end spanner insert, 10 mm - V.A.G 1783/1-



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Bonded rubber bushes can only be turned to a limited extent.

Therefore, before tightening the bolts, suspension components with bonded rubber bushes must be brought into a position corresponding to the normal position of the vehicle while driving (reference position).

Otherwise, the bush would be subject to torsion loading and its service life shortened.

This position can be simulated on the lifting platform by raising the wheel bearing housing with engine and gearbox jack - V.A.G 1383 A- and support - T10149- .

Requirement:

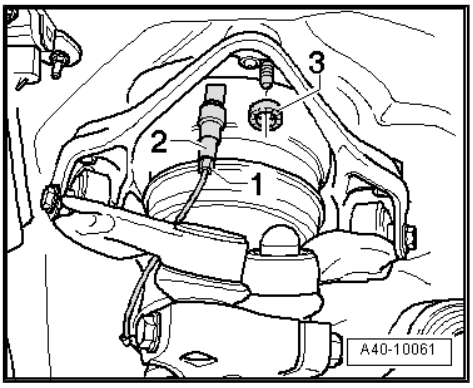
- Engine must be installed

– Position vehicle on lifting platform ⇒ page 11 .

– Bleed system using -VAS 5051 A- ⇒ page 229 .

– Clean area around air connection.

– Unscrew connection piece -1- on residual pressure valve -2-. This will allow air to escape.



Note

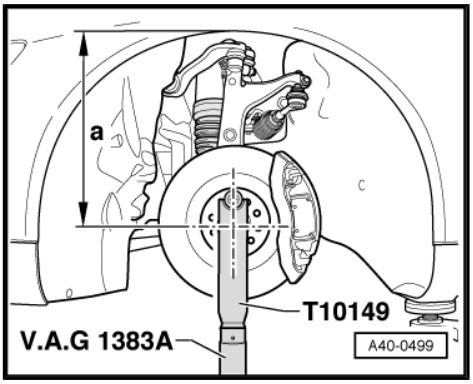
The residual pressure valve -2- MUST NOT be loosened or removed.

– Seal both connections. Take care to prevent dirt entering the connections.

– Turn wheel hub until one of the wheel bolt holes is at the top.

– Use wheel bolt to attach support - T10149- .

– Insert support - T10149- in engine/gearbox jack - V.A.G 1383 A- and press wheel bearing housing upwards until reference position, dimension -a-, is attained.



Reference position

- Dimension -a- for vehicles with air suspension: 386 mm
- Dimension -a- for allroad vehicles with air suspension: 388 mm

WARNING

- *Do not raise or lower vehicle when engine and gearbox jack is under vehicle.*
- *Do not leave engine and gearbox jack under vehicle for longer than necessary.*

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Operations following setting of reference position

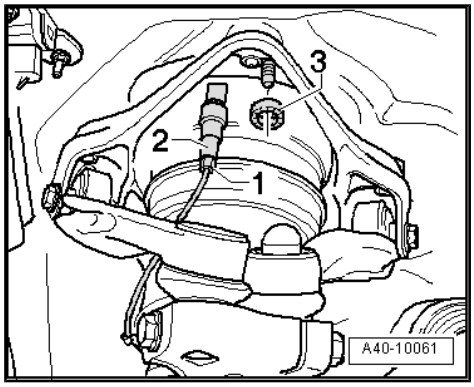
– Tighten relevant bolts/nuts.

– Lower wheel bearing housing.

– Pull out engine and gearbox jack from underneath vehicle.

– Detach support - T10149- .

– Screw on connection piece -1- at residual pressure valve -2- ⇒ Item 8 (page 52) .
– Fit and secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .
– Charge air spring system ⇒ page 229 .



1.6 Exploded views of front axle

I - Subframe, console for engine mounting, anti-roll bar, cross member, coupling rod ⇒ page 20

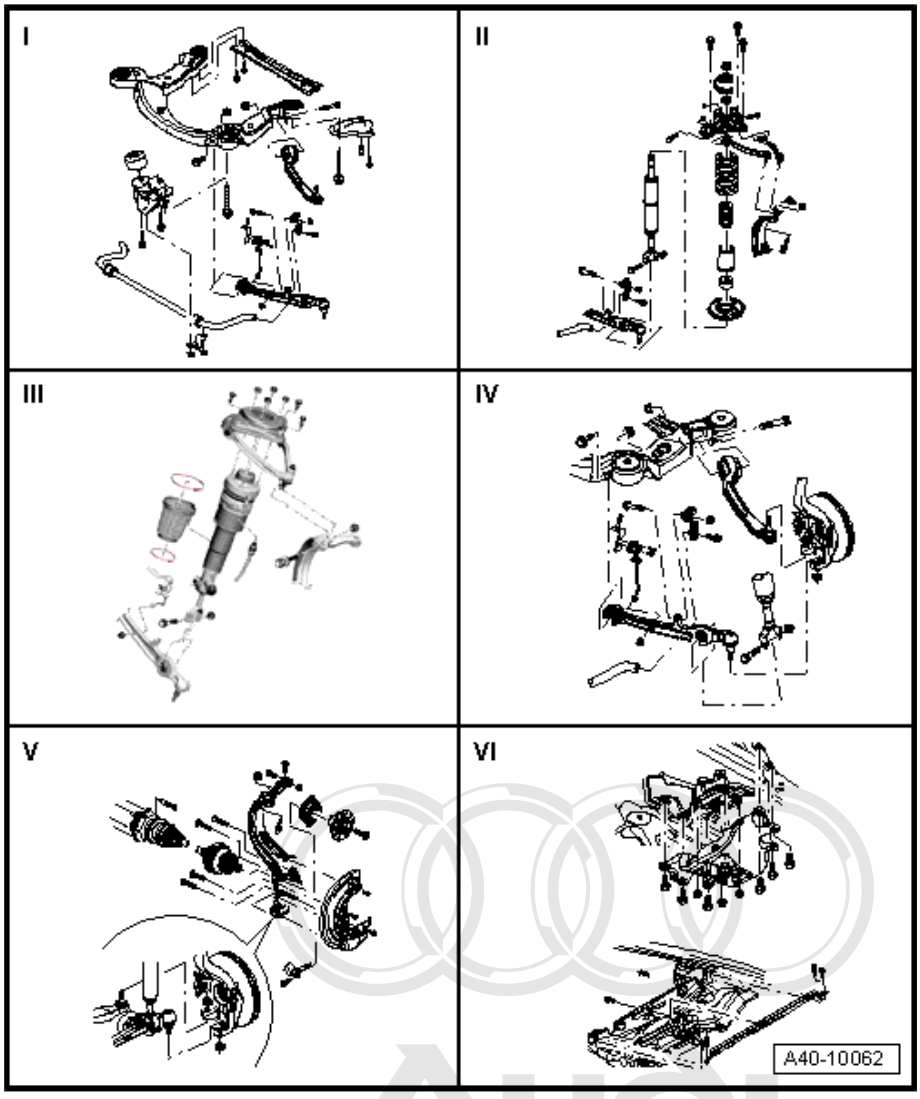
II - Suspension strut (coil springs), mounting bracket, upper links ⇒ page 37

III - Suspension strut (air suspension), mounting bracket, upper links ⇒ page 52

IV - Track control link, guide link, vehicle level sender ⇒ page 66

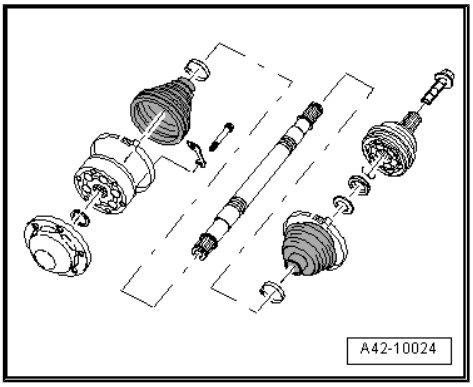
V - Wheel bearing housing, wheel bearing unit ⇒ page 80

VI - Tunnel cross member, body brace ⇒ page 95



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VII: “Drive shafts” are described on ⇒ page 98



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2 Subframe, console for engine mounting, anti-roll bar, cross member, coupling rod

⇒ “2.1 Subframe, console for engine mounting, anti-roll bar, cross member, coupling rod - exploded view”, page 20

⇒ “2.2 Removing and installing subframe”, page 22

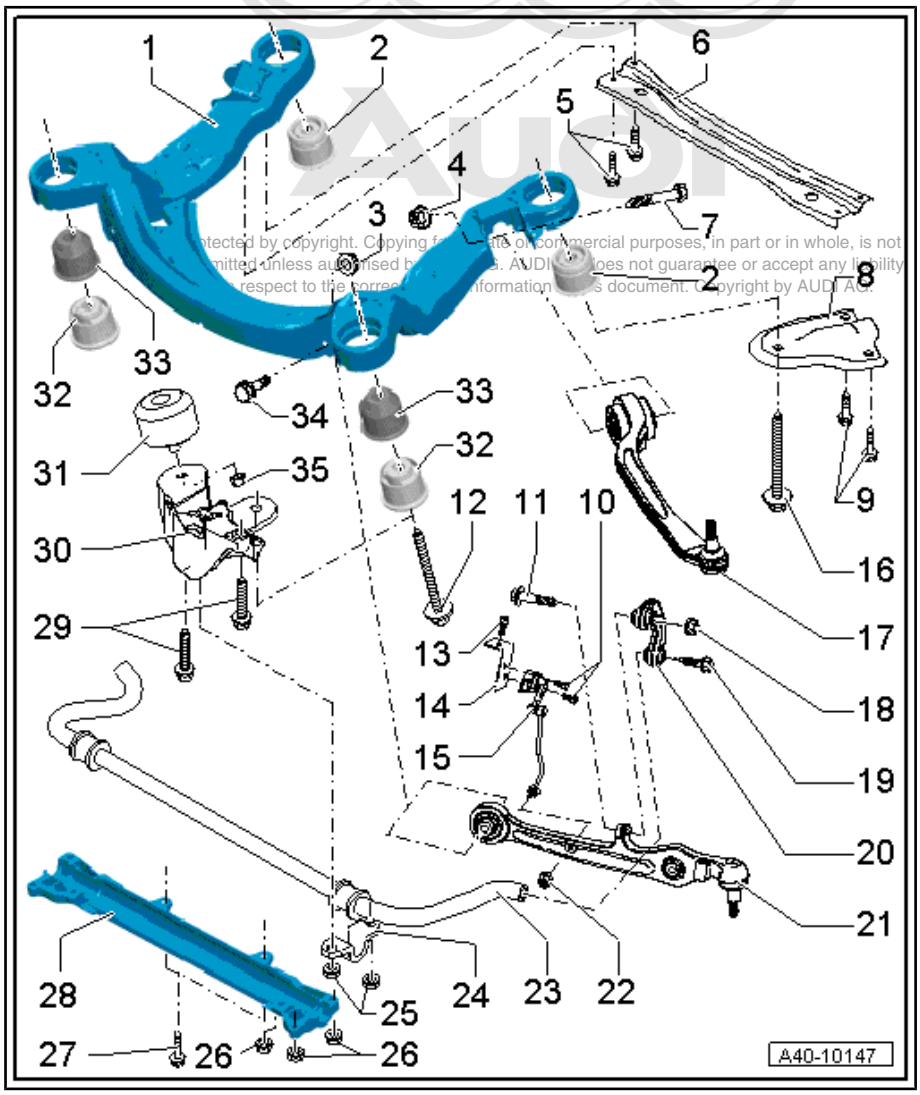
⇒ “2.3 Renewing bonded rubber bushes in subframe”, page 28

⇒ “2.4 Removing and installing anti-roll bar”, page 33

⇒ “2.5 Removing and installing cross member”, page 34

⇒ “2.6 Removing and installing coupling rod”, page 35

2.1 Subframe, console for engine mounting, anti-roll bar, cross member, coupling rod - exploded view



1 - Subframe

- ❑ Removing and installing ⇒ page 22

2 - Bonded rubber bush

- ❑ Removing and installing ⇒ page 28

3 - Nut

- ❑ Always renew if removed

4 - Nut

- ❑ Always renew if removed

5 - Bolt

- ❑ 60 Nm +90°
- ❑ Always renew if removed

6 - Cross piece for subframe

7 - Bolt

- ❑ 70 Nm +180°
- ❑ Always renew if removed

8 - Subframe support

9 - Bolt

- ❑ 55 Nm

10 - Bolt

- ❑ 5 Nm

11 - Bolt

- ❑ 40 Nm +90°
- ❑ Always renew if removed

12 - Bolt

- ❑ 115 Nm +90°
- ❑ Always renew if removed

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- ❑ Tighten together with bolt ⇒ Item 16 (page 21) in diagonal sequence
- ❑ Thread in body can be repaired with Helicoil threaded wire insert (DIN 8140). The thread insert must be of the same length as the thread in the body.

13 - Bolt

- ❑ 10 Nm

14 - Retaining bracket

15 - Front left vehicle level sender -G78-; front right vehicle level sender -G289-

- ❑ Remove/install and renew only as a complete assembly ⇒ page 222
- ❑ Lever of sender must face forwards.
- ❑ Check basic adjustment of headlights if sender mountings are loosened ⇒ Rep. gr. 94
- ❑ Vehicles with air suspension: re-adapt reference position if sender mountings are loosened ⇒ page 229
- ❑ Perform calibration of lane departure warning system if sender mountings are loosened ⇒ page 312 .

16 - Bolt

- ❑ 115 Nm +90°
- ❑ Always renew if removed
- ❑ Tighten together with bolt ⇒ Item 12 (page 20) in diagonal sequence
- ❑ Thread in body can be repaired with Helicoil threaded wire insert (DIN 8140). The thread insert must be of the same length as the thread in the body.

17 - Guide link

18 - Nut

19 - Bolt

- ❑ 40 Nm +90°
- ❑ Always renew if removed

20 - Coupling rod

- ❑ Removing and installing ⇒ page 35
- ❑ Installation position: arrow on coupling rod points towards outside of vehicle and in direction of travel

21 - Track control link

22 - Nut

- ❑ 8 Nm

23 - Anti-roll bar

- ❑ Removing and installing ⇒ page 33

24 - Clamp

- ❑ Only on vehicles with no cross member ⇒ Item 28 (page 21)

25 - Nut

- ❑ 25 Nm
- ❑ 2x
- ❑ Only on vehicles with no cross member ⇒ Item 28 (page 21)

26 - Nut

- ❑ Only on vehicles with 10-cylinder petrol engine
- ❑ 40 Nm, vehicles with 10-cylinder FSI engine
- ❑ 55 Nm, vehicles with 10-cylinder TFSI engine

27 - Bolt

- ❑ 40 Nm
- ❑ Only on vehicles with cross member ⇒ Item 28 (page 21)

28 - Cross member

- ❑ Only on vehicles with 10-cylinder petrol engine

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- ❑ Removing and installing ⇒ page 34

29 - Bolt

- ❑ 75 Nm

30 - Console for engine mounting

- ❑ Check that parts fit together positively when assembling subframe and console for engine mounting

31 - Engine mounting

- ❑ Removing and installing ⇒ Rep. gr. 10

32 - Bonded rubber bush

- ❑ Hydro-bush
- ❑ All engine versions except 10-cylinder petrol engine
- ❑ Removing and installing ⇒ page 28

33 - Aluminium bush

- ❑ Only on vehicles with 10-cylinder petrol engine
- ❑ Removing and installing ⇒ page 28

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34 - Bolt

- ❑ 70 Nm +180°
- ❑ Always renew if removed

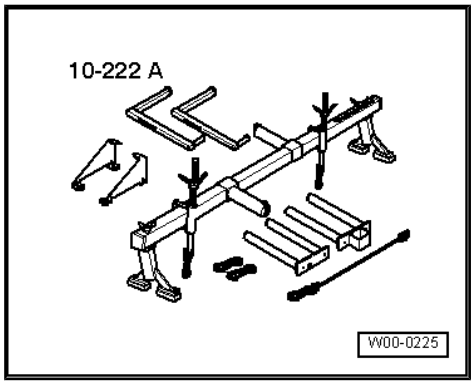
35 - Nut

- ❑ Tightening torque ⇒ Rep. gr. 10

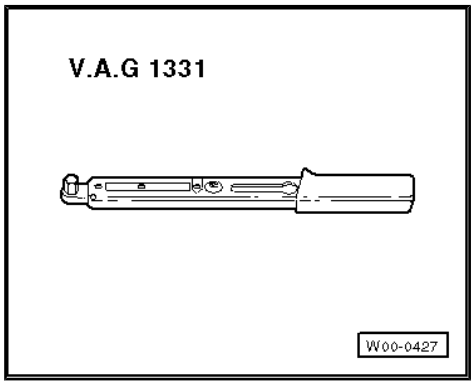
2.2 Removing and installing subframe

Special tools and workshop equipment required

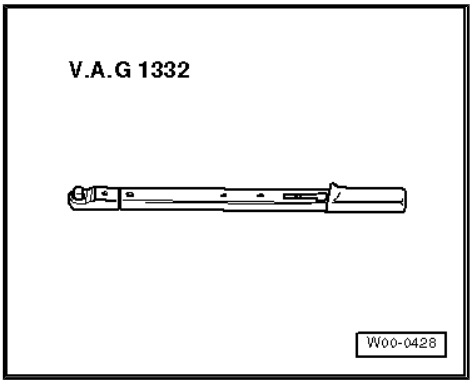
- ♦ Support bracket - 10-222 A-



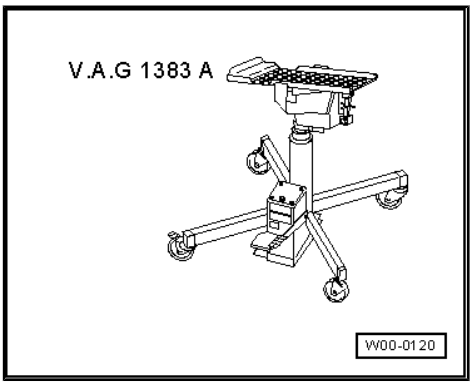
- ♦ Torque wrench - V.A.G 1331-



- Torque wrench - V.A.G 1332-

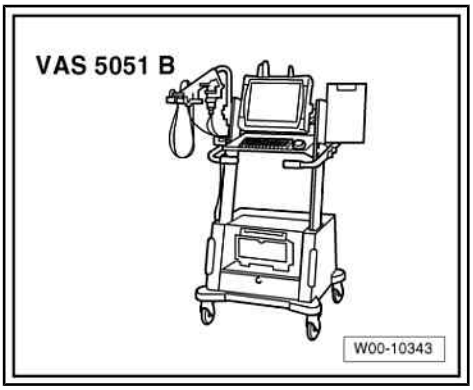


- Engine and gearbox jack - V.A.G 1383 A-

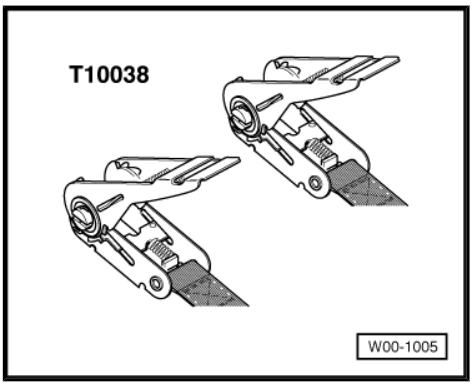


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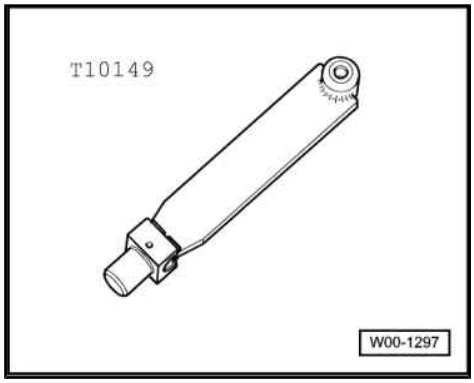
- Vehicle diagnostic, testing and information system - VAS 5051 B- with appropriate diagnosis cable



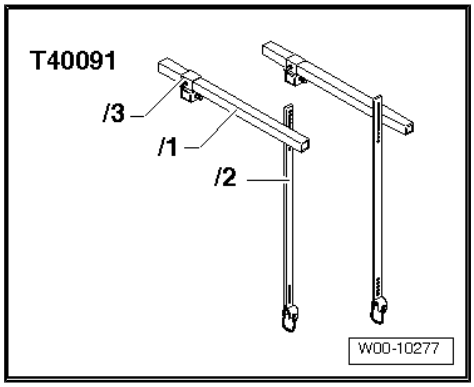
- Tensioning strap - T10038-



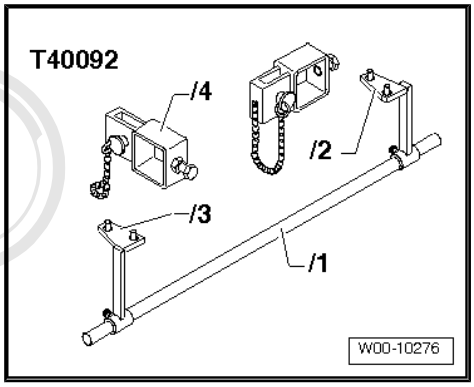
- Support - T10149-



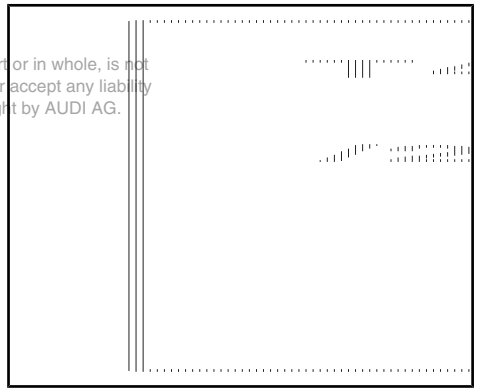
- Engine support bracket, basic set - T40091-



- Engine support bracket, supplementary set - T40092-



- Engine support bracket, supplementary set - T40093-



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Removing

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

– Bleed system using -VAS 5051 A- ⇒ page 229 .

All vehicles

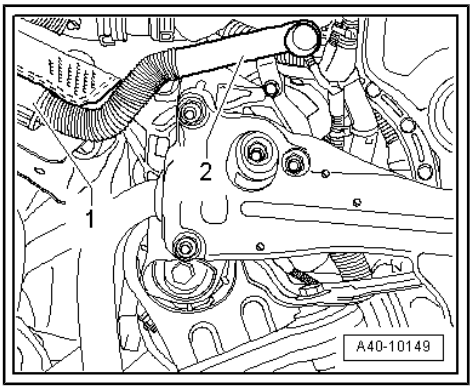
– Remove noise insulation ⇒ Rep. gr. 50 .

– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).

– Remove wheels.

Vehicles with auxiliary heater

– Remove exhaust silencer -1- for auxiliary heater with exhaust pipe -2-.



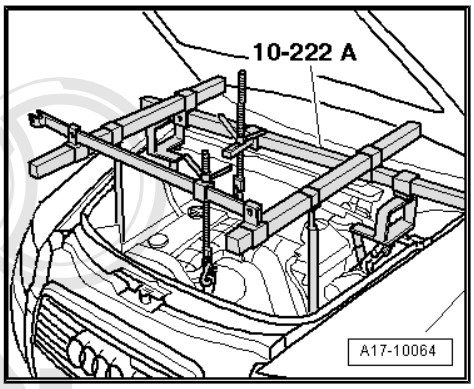
All vehicles

– Remove coupling rods on right and left sides ⇒ page 35 .

– Remove anti-roll bar ⇒ page 33 .

– Take up weight of engine assembly with support bracket .

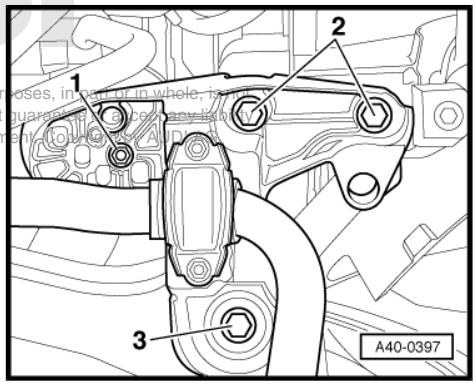
– Set up support bracket - 10-222 A- with engine support basic set - T40091- , engine support supplement set - T40092- and engine support supplement set - T40093- on suspension turrets and longitudinal members as illustrated.



Note

A detailed description of the steps required to support the engine is given in ⇒ Rep. gr. 10 for the relevant engine version.

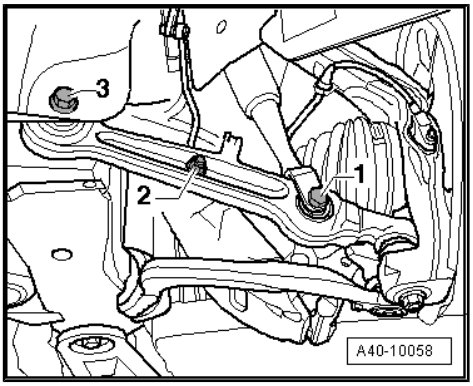
– Remove nut -1- on both sides.



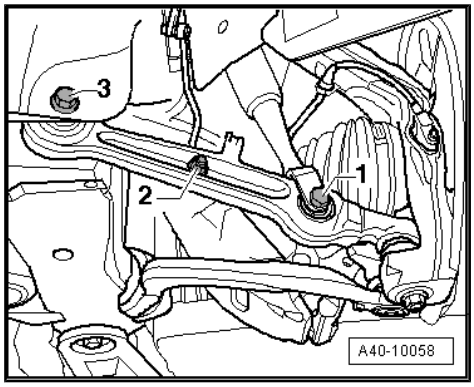
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– On vehicles with vehicle level sender, unscrew nut -2- on both sides.

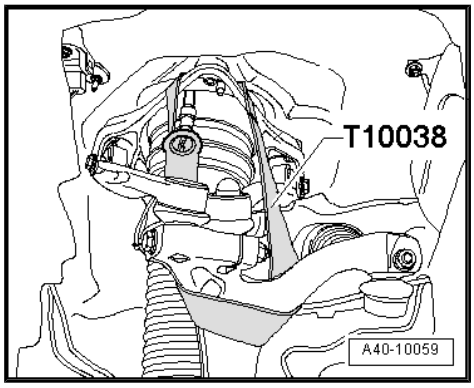
– Unplug connector from vehicle level sender on both sides.



– Remove hexagon bolt -1- on both sides.



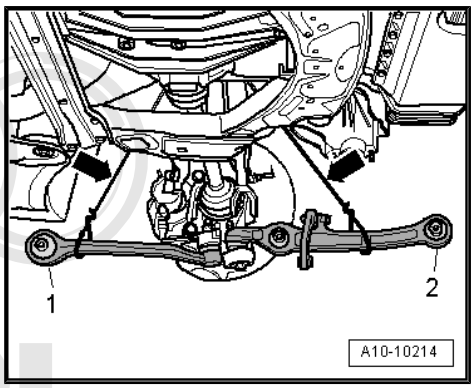
– Tie up wheel bearing housing on both sides with tensioning strap - T10038- as shown in illustration.



Note

Wheel bearing housing must be supported to avoid damaging joints of upper links.

– Detach bolt connections of both guide links -1- and both track control links -2- at subframe. Tie up guide links and track control links with wire -arrows-.



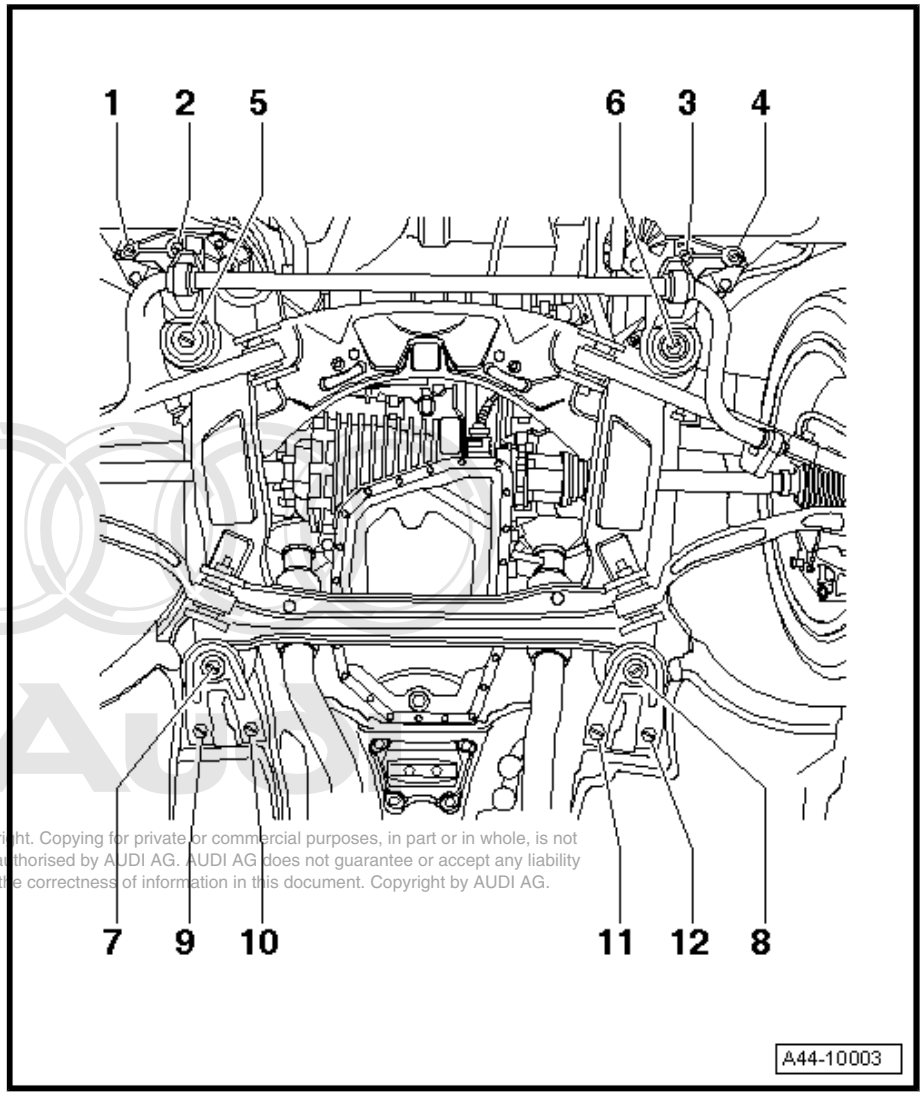
Note

To prevent the outboard joints on the track control links and guide links from being bent too far, secure the links to the car body with a piece of wire or similar.

– Position engine and gearbox jack - V.A.G 1383 A- with suitable wooden block under subframe and press subframe upwards lightly.

– Remove hexagon bolts -5- and -6-.

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– Remove hexagon bolts -7- to -12- and lower subframe at the rear.
– Slacken off hexagon bolts -1- to -4- until subframe can be taken out.

Installing

Installation is carried out in the reverse sequence. Note the following points:

Check that parts fit together positively when assembling subframe and console for engine mounting

– Bores in subframe mountings must be aligned centrally with mounting points on body.

Note

- *Bonded rubber bushes can only be turned to a limited extent. The suspension mountings must therefore only be tightened when the suspension is in the unladen position or reference position.*
- *Lifting suspension to unladen position (vehicles with coil springs)* *⇒ page 13*
- *Lifting suspension to reference position (vehicles with air suspension)* *⇒ page 15*

Tightening torques ⇒ page 20

– Fit wheels.

– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .

– Secure wheels ⇒ Wheels and tyres; Rep. gr. 44 .

– Vehicles with air suspension: re-adapt reference position ⇒ page 229 .

– On vehicles with automatic headlight range control, carry out basic adjustment of headlights ⇒ Rep. gr. 94 .

– Check and adjust wheel alignment ⇒ page 281 .

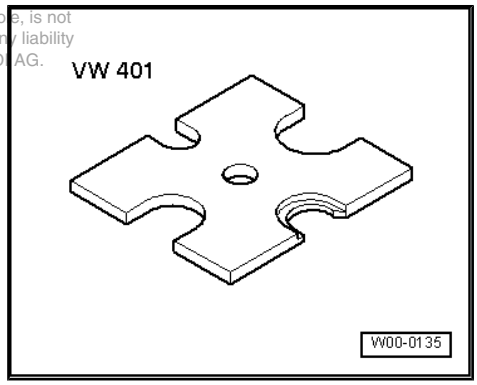
Front and rear wheel alignment must always be checked and adjusted if necessary using VW/Audi approved equipment.

2.3 Renewing bonded rubber bushes in subframe

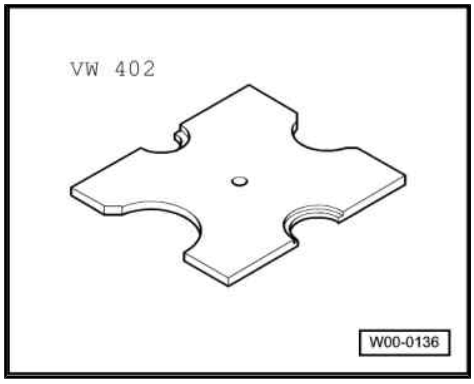
Special tools and workshop equipment required

- Thrust plate - VW 401-

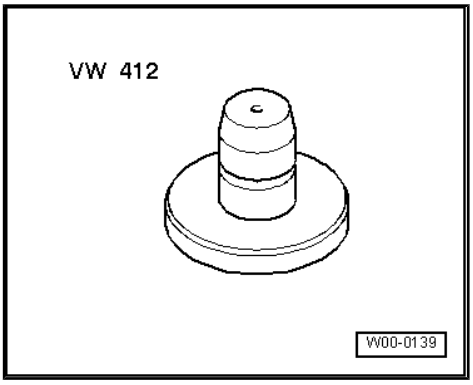
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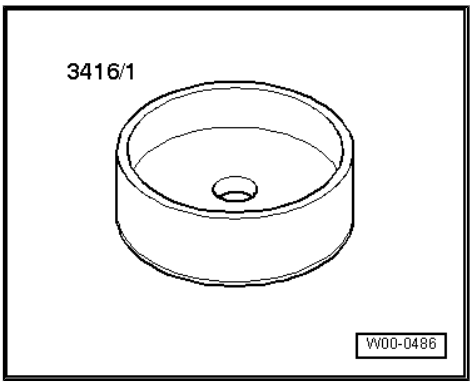
- Thrust plate - VW 402-



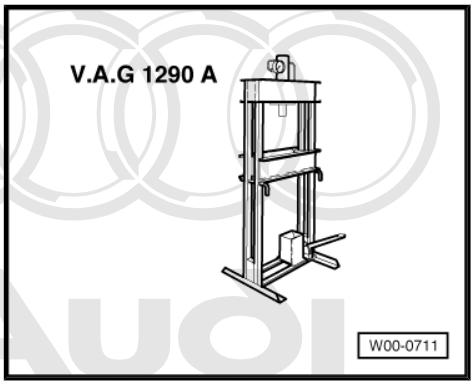
- Press tool - VW 412-



- Thrust piece - 3416/1-

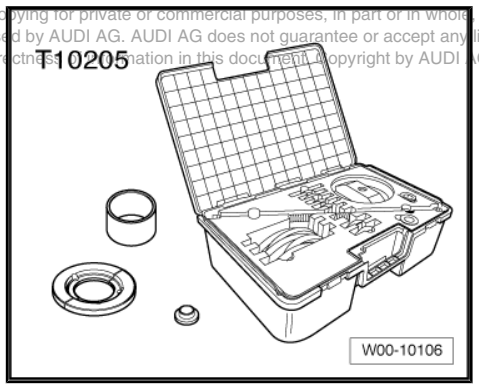


- Workshop press - V.A.G 1290 A-

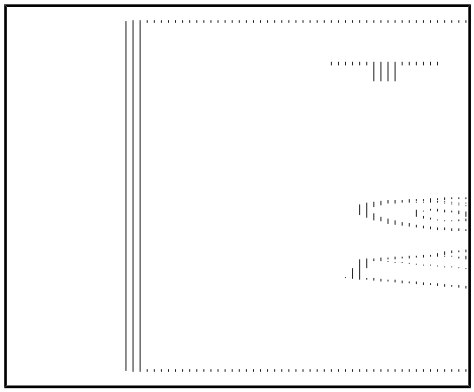


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- Assembly tool - T10205-



♦ Assembly tool - T10301-



– Remove subframe ⇒ page 22 .

Note

♦ *The bushes are removed and installed using workshop press - V.A.G 1290 A- .*

♦ *A second mechanic is required to hold the subframe when removing and installing the bushes.*

Pressing out front bush (aluminium)

– Apply special tools to front bush (aluminium) as shown in illustration.

1 - Press tool - VW 412-

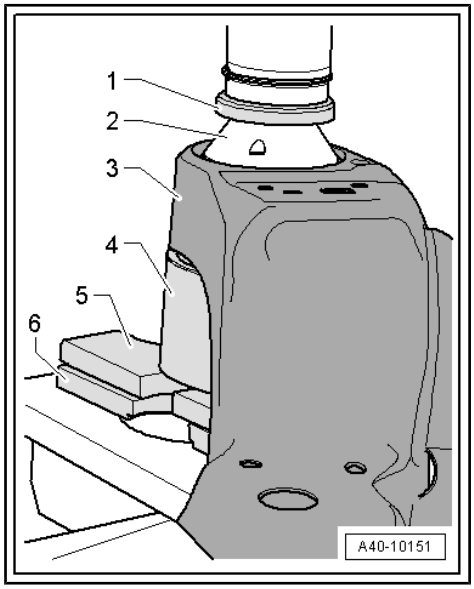
2 - Front bush (aluminium)

3 - Subframe

4 - Sleeve - T10205/5-

5 - Thrust plate - VW 402-

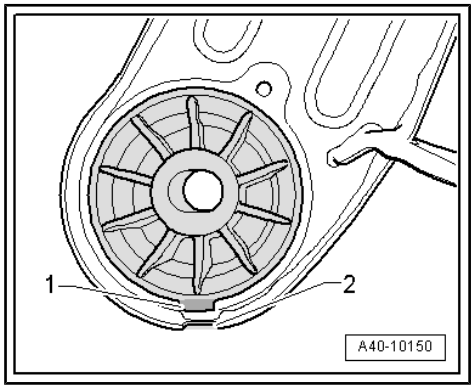
6 - Thrust plate - VW 401-



Pressing in front bush (aluminium)

– Note correct position of front bush when installing.

• The »projection« -1- on the front bush must be aligned with recess -2-.



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– Apply special tools to front bush (aluminium) as shown in illustration.

1 - Press tool - VW 412-

2 - Front bush (aluminium)

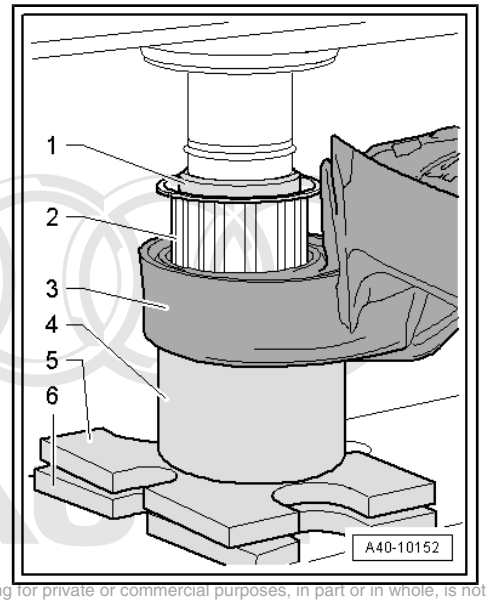
3 - Subframe

4 - Sleeve - T10205/5-

5 - Thrust plate - VW 402-

6 - Thrust plate - VW 401-

– Press front bush (aluminium) into subframe as far as stop.



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Pressing out front bush (bonded rubber bush)

– Apply special tools to front bush (bonded rubber bush) as shown in illustration.

1 - Press tool - VW 412-

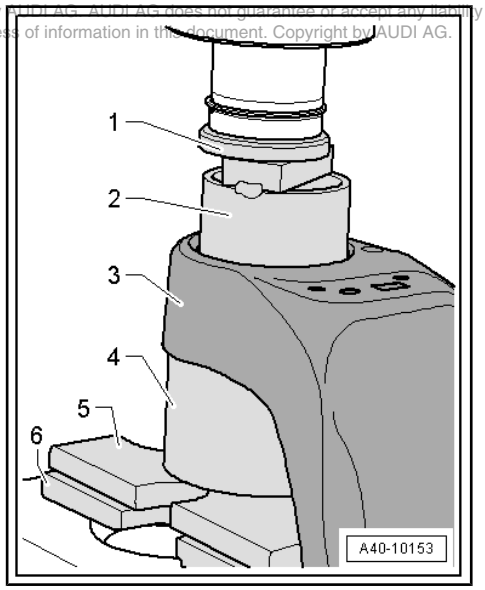
2 - Thrust piece - 3416/1-

3 - Subframe

4 - Sleeve - T10205/5-

5 - Thrust plate - VW 402-

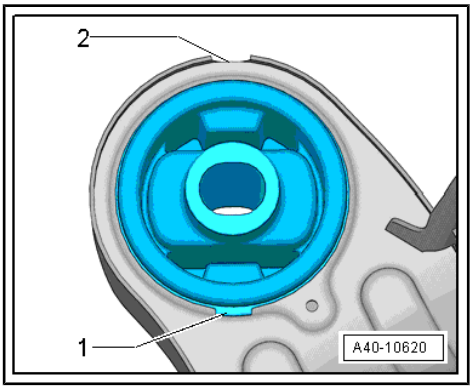
6 - Thrust plate - VW 401-



Pressing in front bush (bonded rubber bush)

– Note correct position of bush when installing.

• The »projection« -1- on the front bush must be aligned directly opposite recess -2- on subframe.



– Apply special tools to front bush (bonded rubber bush) as shown in illustration.

1 - Press tool - VW 412-

2 - Washer - T10205/15-

3 - Front bush (bonded rubber bush)

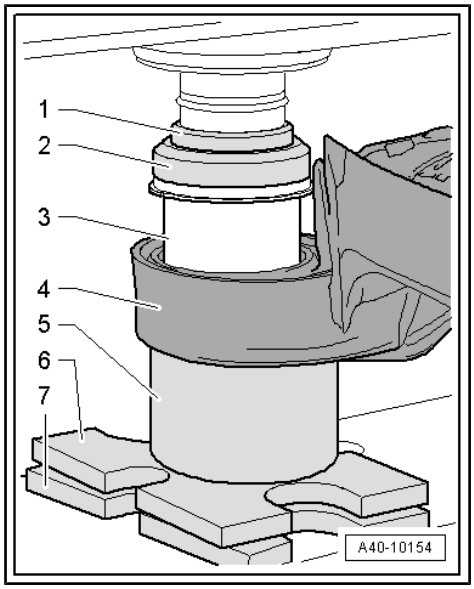
4 - Subframe

5 - Sleeve - T10205/5-

6 - Thrust plate - VW 402-

7 - Thrust plate - VW 401-

– Press front bush (bonded rubber bush) into subframe as far as stop.



Pressing out rear bush

– Apply special tools to rear bush as shown in illustration.

1 - Press tool - VW 412-

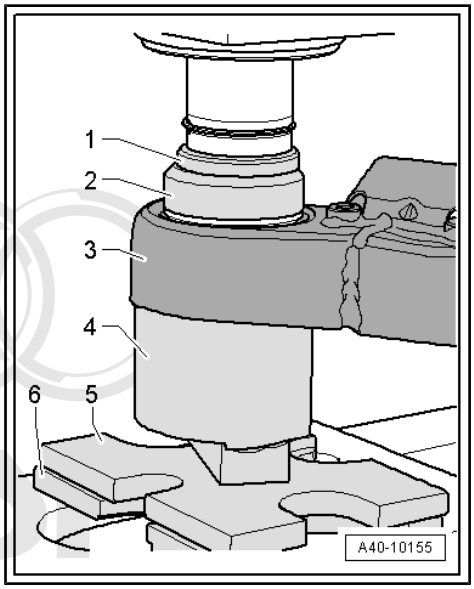
2 - Thrust piece - 3416/1-

3 - Subframe

4 - Sleeve - T10301/3-

5 - Thrust plate - VW 402-

6 - Thrust plate - VW 401-

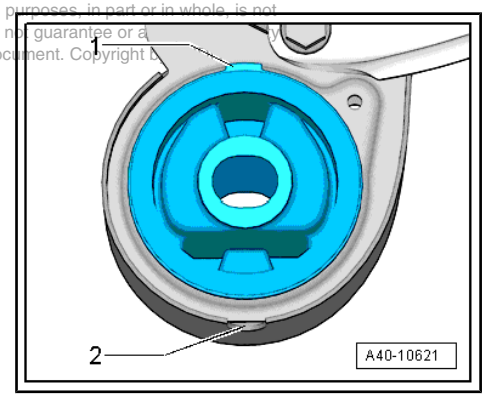


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Pressing in rear bush

– Note correct position of bush when installing.

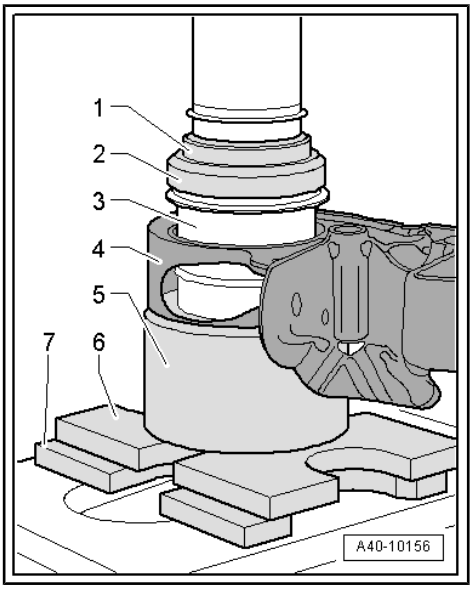
• The »projection« -1- on the rear bush must be aligned directly opposite recess -2- on subframe.



– Apply special tools to rear bush as shown in illustration.

1 - Press tool - VW 412-
2 - Washer - T10205/15-
3 - Rear bush
4 - Subframe
5 - Sleeve - T10205/5-
6 - Thrust plate - VW 402-
7 - Thrust plate - VW 401-

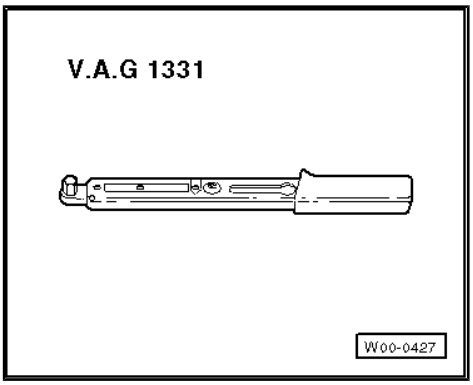
– Press rear bush into subframe as far as stop.



2.4 Removing and installing anti-roll bar

Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1331-



Removing

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

All vehicles

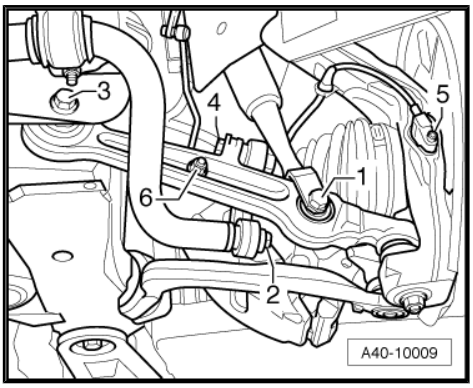
– Remove noise insulation ⇒ Rep. gr. 50 .

Vehicles with cross member

– Remove cross member ⇒ page 34 .

All vehicles

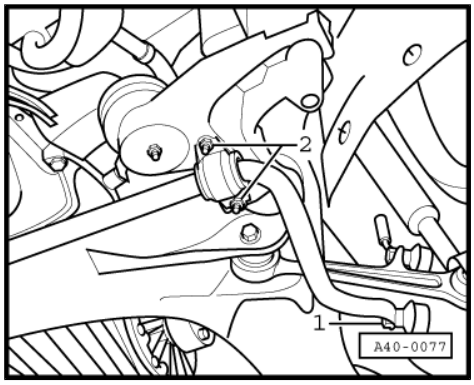
– Remove bolt -2-.



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– Unscrew hexagon nuts -2-.

– Take out anti-roll bar.

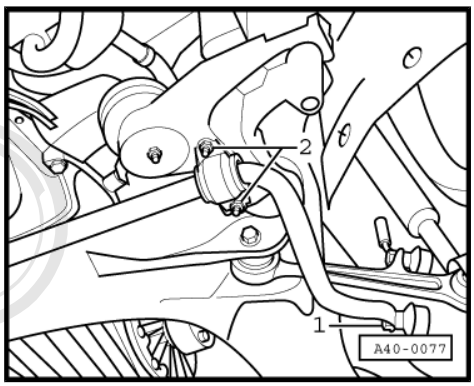


Installing

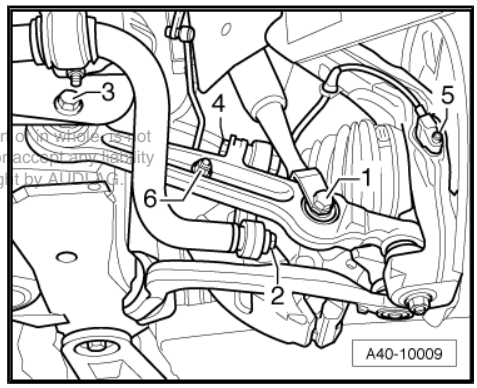
Note

- *If renewing the anti-roll bar, check the suspension version fitted on the vehicle.*
- *Anti-roll bar and bushes must be free of grease.*

– Fit new nuts -2-, but do not tighten yet.



– Tighten new bolt -2-.



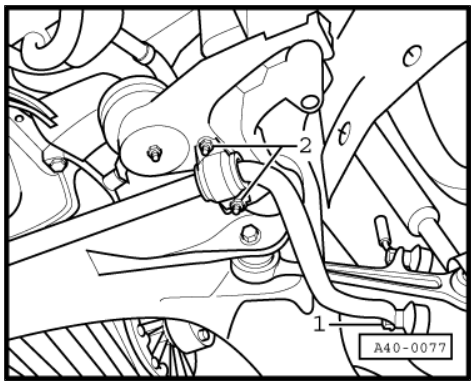
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– Tighten nuts -2-.

Tightening torques ⇒ page 20

– Fit noise insulation ⇒ Rep. gr. 50 .

– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .

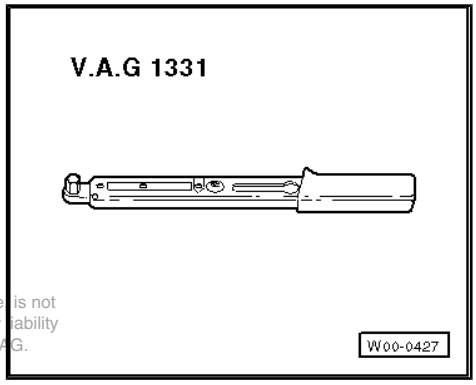


2.5 Removing and installing cross member

Special tools and workshop equipment required

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♦ Torque wrench - V.A.G 1331-



Removing

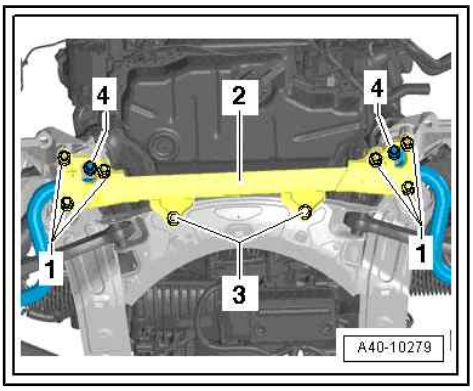
Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

All vehicles

– Remove noise insulation ⇒ Rep. gr. 50 .

– If fitted, unscrew nuts -1- and bolts -3- for cross member -2- and detach cross member -2-.



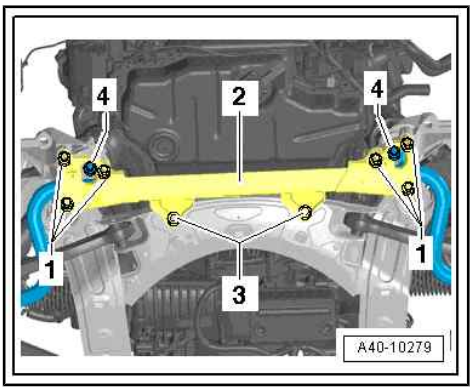
Installing

Installation is carried out in the reverse sequence. Note the following points:

– Fit new nuts -1-, but do not tighten yet.

– If fitted, tighten bolts -3-.

– Tighten nuts -1-.



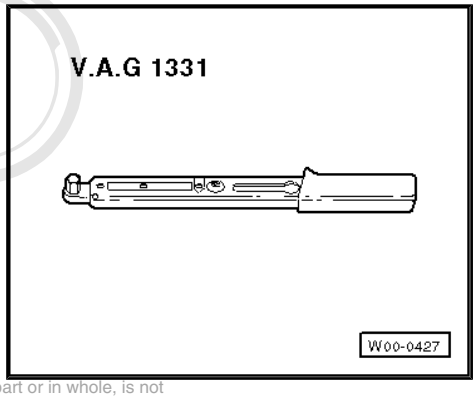
Tightening torques ⇒ page 20

– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .

2.6 Removing and installing coupling rod

Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1331-



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Removing

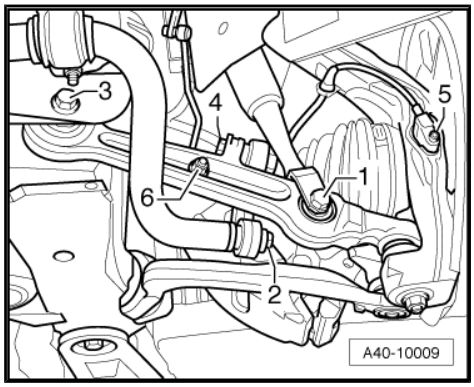
Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

All vehicles

– Remove bolts -2- and -4-.

– Take off coupling rod.



Installing

Installation is carried out in the reverse sequence. Note the following points:

– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .

Tightening torques ⇒ page 20

3 Suspension strut (coil springs), mounting bracket, upper links

⇒ “3.1 Suspension strut (coil springs), mounting bracket, upper links - exploded view”, page 37

⇒ “3.2 Removing and installing suspension strut (coil springs) with mounting bracket”, page 38

⇒ “3.3 Servicing suspension strut (coil springs) and mounting bracket”, page 43

⇒ “3.4 Removing and installing upper links (coil springs)”, page 48

⇒ “3.5 Renewing bushes for front and rear upper links”, page 49

3.1 Suspension strut (coil springs), mounting bracket, upper links - exploded view

1 - Nut
- ❑ 50 Nm
- ❑ Always renew if removed

2 - Shock absorber mounting

3 - Washer

4 - Mounting bracket
- ❑ Removing and installing suspension strut and mounting bracket ⇒ page 38
- ❑ Servicing suspension strut and mounting bracket ⇒ page 43

5 - Bolt
- ❑ 50 Nm +90°
- ❑ Always renew if removed

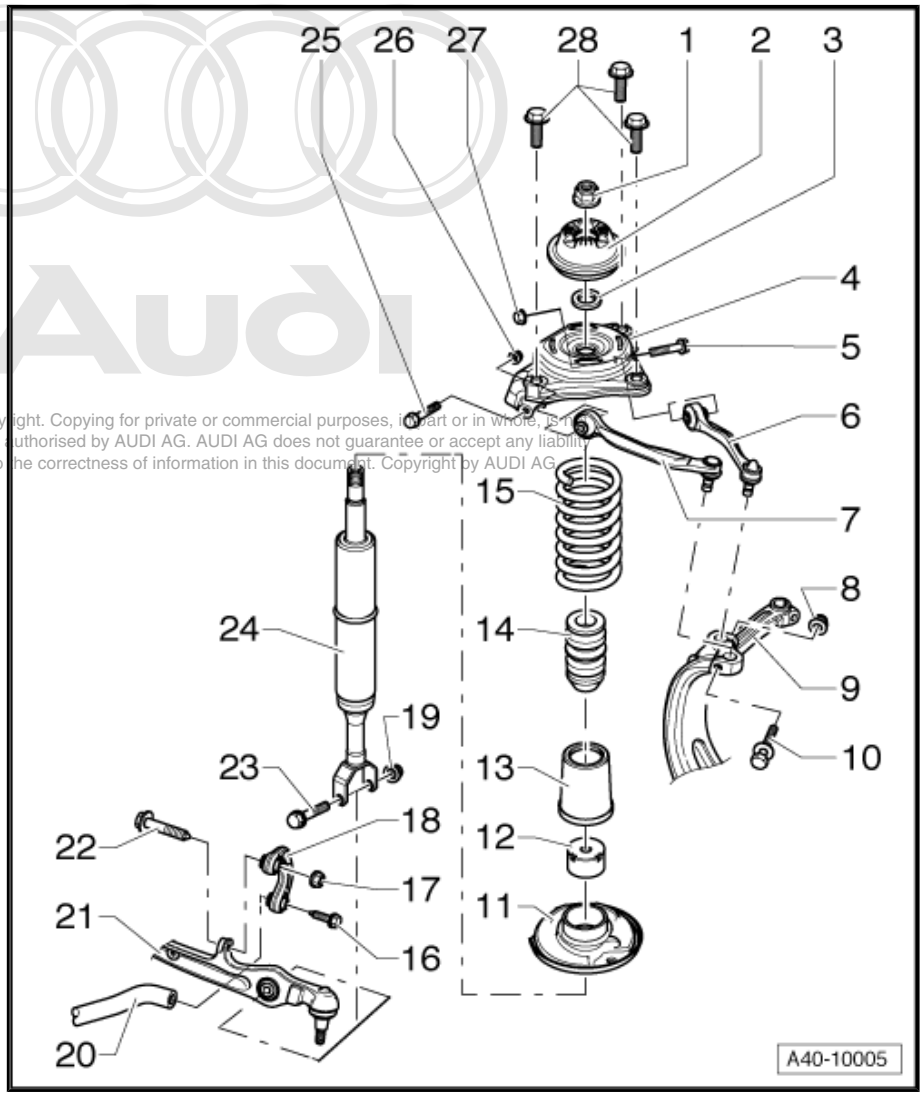
6 - Upper link (rear)
- ❑ Removing and installing ⇒ page 48
- ❑ Removing and installing bush ⇒ page 49

7 - Upper link (front)
- ❑ Removing and installing ⇒ page 48
- ❑ Removing and installing bush ⇒ page 49

8 - Nut
- ❑ Always renew if removed

9 - Wheel bearing housing

10 - Bolt
- ❑ 45 Nm
- ❑ 50 Nm for RS 6 vehicles



Audi
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11 - Spring plate

12 - Protective cap

13 - Protective sleeve

- ❑ Secured to protective cap and auxiliary spring on RS 6 vehicles

14 - Auxiliary spring

15 - Spring

16 - Bolt

- ❑ 40 Nm +90°
- ❑ Always renew if removed

17 - Nut

- ❑ Always renew if removed

18 - Coupling rod

19 - Nut

- ❑ Always renew if removed

20 - Anti-roll bar

21 - Track control link

22 - Bolt

- ❑ 40 Nm +90°
- ❑ Always renew if removed

23 - Bolt

- ❑ 90 Nm +90°
- ❑ Always renew if removed

24 - Shock absorber

- ❑ Removing and installing suspension strut and mounting bracket ⇒ page 38
- ❑ Servicing suspension strut and mounting bracket ⇒ page 43
- ❑ Note different running gear versions; see vehicle data sticker ⇒ page 282
- ❑ Defective shock absorbers must always be degassed and drained before disposal ⇒ page 7
- ❑ Checking shock absorber following removal ⇒ page 7

25 - Bolt

- ❑ 50 Nm +90°
- ❑ Always renew if removed

26 - Nut

- ❑ Always renew if removed

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27 - Nut

- ❑ Always renew if removed

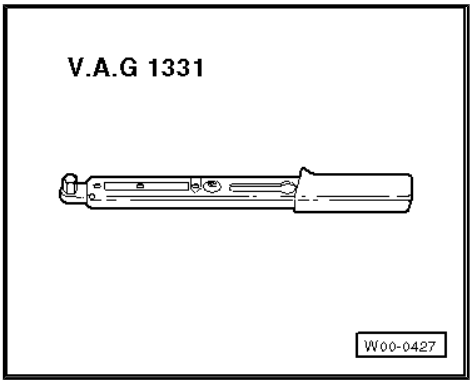
28 - Bolt

- ❑ 50 Nm +90°
- ❑ Always renew if removed
- ❑ Observe correct tightening sequence ⇒ page 42

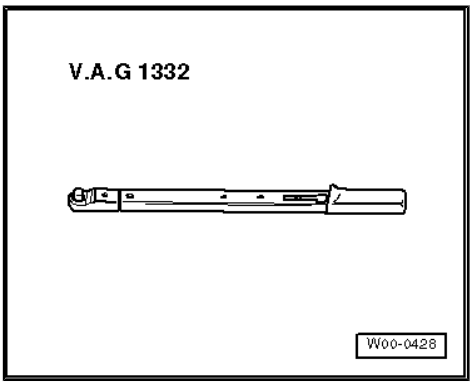
3.2 Removing and installing suspension strut (coil springs) with mounting bracket

Special tools and workshop equipment required

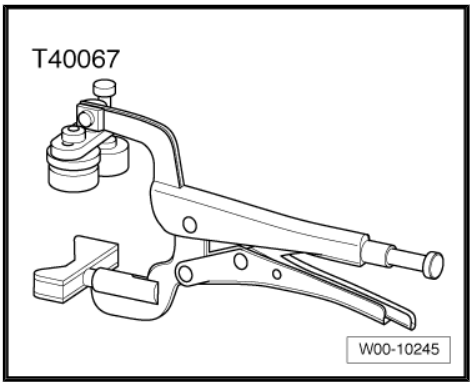
- Torque wrench - V.A.G 1331-



- Torque wrench - V.A.G 1332-



- Pliers - T40067-



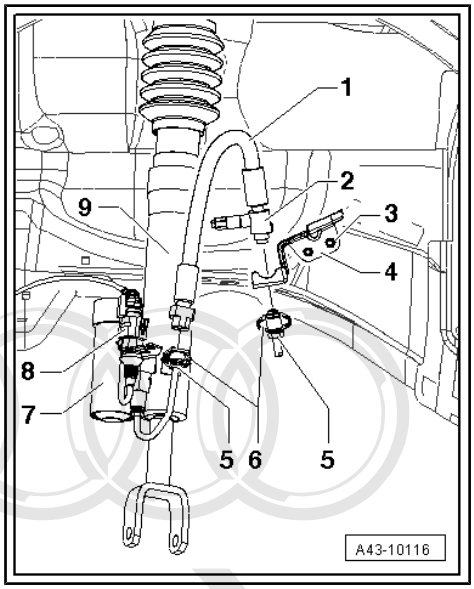
Removing

– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).

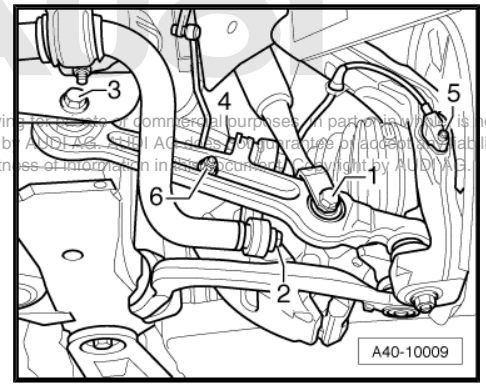
– Remove wheel.

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– On vehicles with Dynamic Ride Control (DRC), if fitted, unplug electrical connector -8- at shock absorber, pull out of bracket and discharge system ⇒ page 259 . Unscrew union nut -5- and move hose -1- clear.



– On vehicles with vehicle level sender, unscrew nut -6-.



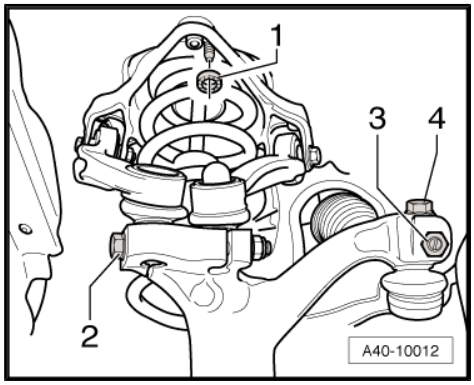
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– Remove clip -1- with a pair of pliers.

This clip does not have to be re-installed.

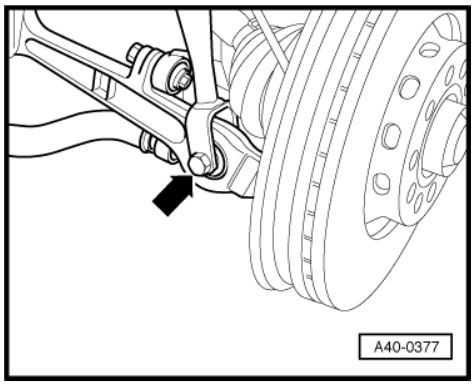
– Slacken bolt connection -2-, take out hexagon bolt and pull both links out upwards.

Do not attempt to enlarge slots in wheel bearing housing using a chisel or similar.

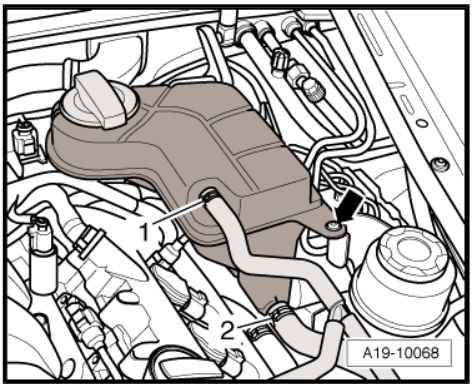


– Unscrew hexagon bolt -arrow- securing suspension strut to track control link.

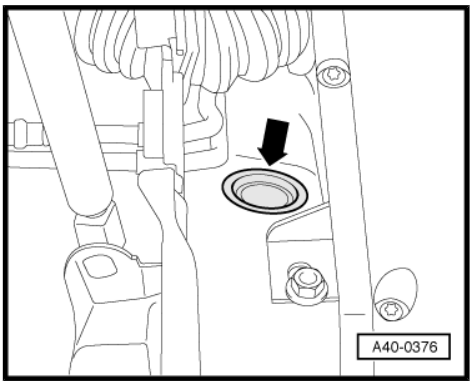
– Pivot wheel bearing housing away to the side and disengage fork joint from track control link.



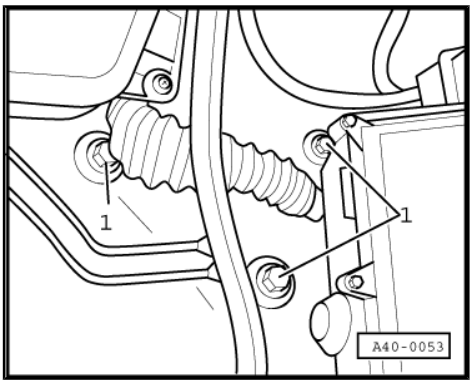
– If fitted, unfasten mounting of coolant expansion tank -arrow-, unclip tank and lay aside.
– Remove plenum chamber cover.



– Remove cover -arrow- for bolt.



– Unscrew hexagon bolts -1- in plenum chamber.
– Take out suspension strut with mounting bracket.



Note

Take care not to damage drive shaft boot.

Installing

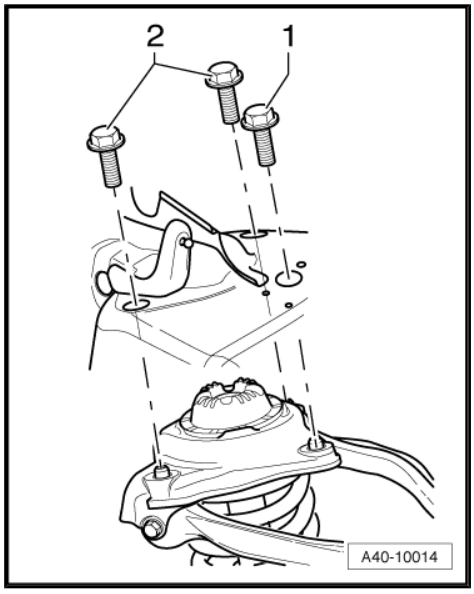
– Insert suspension strut with mounting bracket into suspension turret.

Note

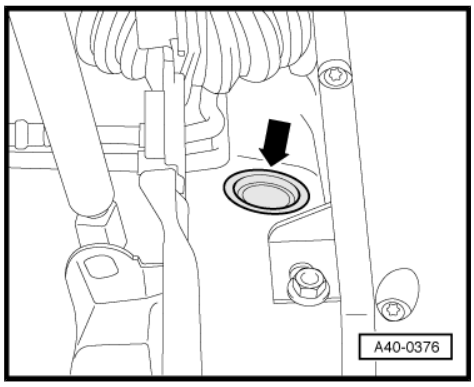
Observe correct sequence for tightening bolts securing mounting bracket and suspension strut to suspension turret.

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– The bolts must be tightened in the sequence shown by the numbers in the illustration ⇒ page 37
.



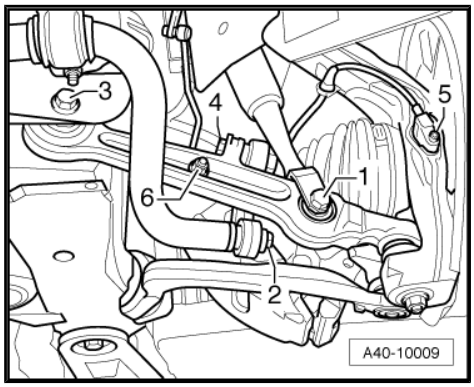
– Install cover -arrow- for bolt.
– Install plenum chamber cover.



Note

The bolt connection must only be tightened when the suspension is in the unladen position.

– Fit fork joint of suspension strut onto track control link and tighten bolt connection -1- ⇒ page 37 .

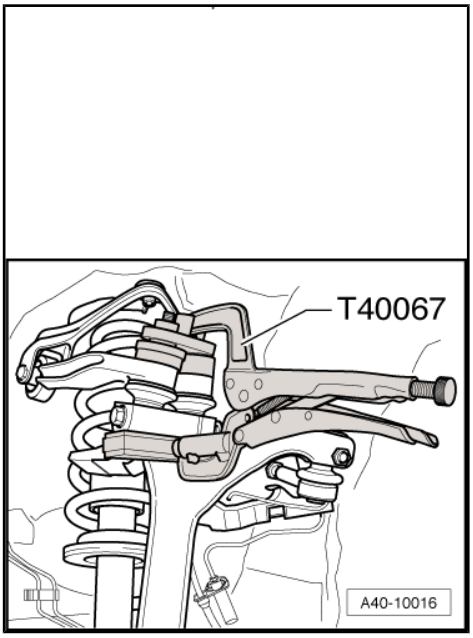


Note

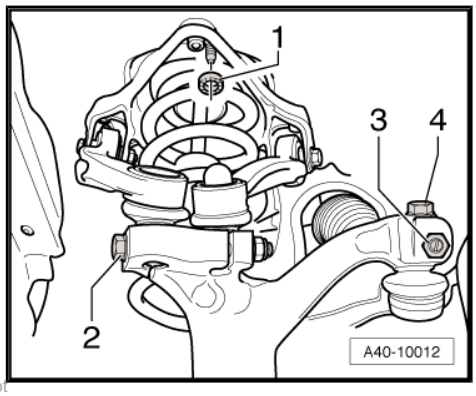
The bolt must be inserted from front to rear.

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– Fit joint pins of both upper links in wheel bearing housing and press down as far as possible by clamping with pliers - T40067- .

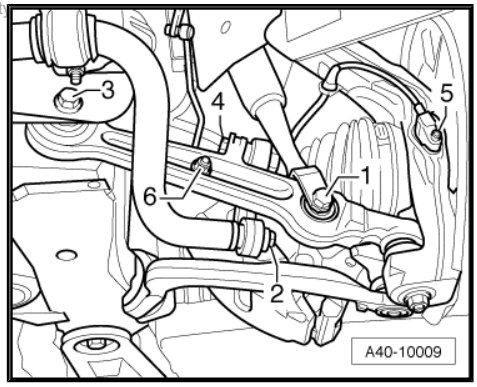


– Install and tighten new bolt -2- and self-locking nut ⇒ page 37 .



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– On vehicles with vehicle level sender, screw on nut -6- ⇒ Item 11 (page 67) .



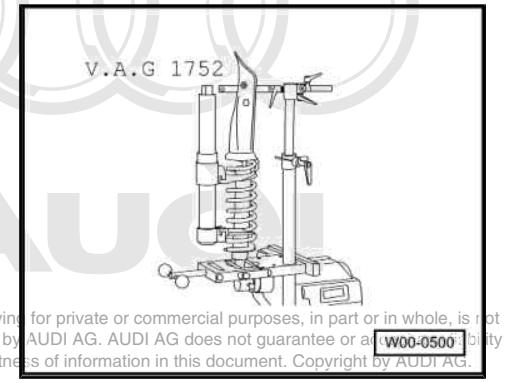
– On vehicles with Dynamic Ride Control (DRC), if fitted, plug electrical connector back in at shock absorber, engage in bracket and charge system ⇒ page 259 .
– Fit and secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .
– On vehicles with automatic headlight range control, carry out basic adjustment of headlights ⇒ Rep. gr. 94 .
– On vehicles with air springs, re-adapt reference position ⇒ page 229 .

3.3 Servicing suspension strut (coil springs) and mounting bracket

Special tools and workshop equipment required

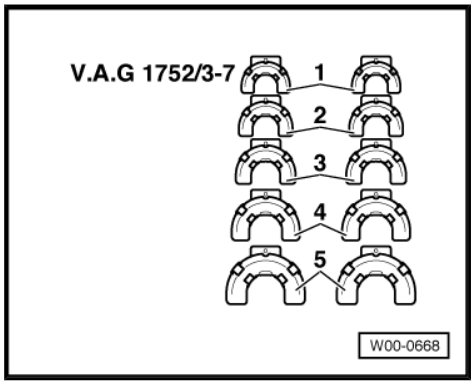
♦ Spring compressor - V.A.G 1752/1-

- Strut holder - V.A.G 1752/2-

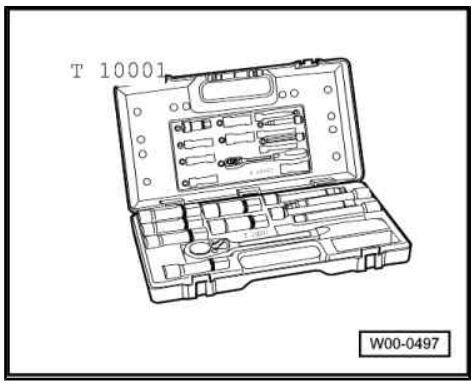


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- Spring retainer - V.A.G 1752/6-



- Shock absorber set - T10001/3-



- Shock absorber set - T10001/4-
- Shock absorber set - T10001/7-
- Shock absorber set - T10001/11-

Exploded view

1 - Nut

- ❑ 50 Nm
- ❑ Always renew if removed

2 - Shock absorber mounting

3 - Washer

4 - Mounting bracket

- ❑ Installation position ⇒ page 47

5 - Coil spring

- ❑ Removing ⇒ page 46
- ❑ Installing ⇒ page 47
- ❑ Note different running gear versions; see vehicle data sticker ⇒ page 282
- ❑ For correct version refer to ⇒ Electronic parts catalogue

6 - Auxiliary spring

7 - Protective sleeve

- ❑ Secured to protective cap and auxiliary spring on RS 6 vehicles

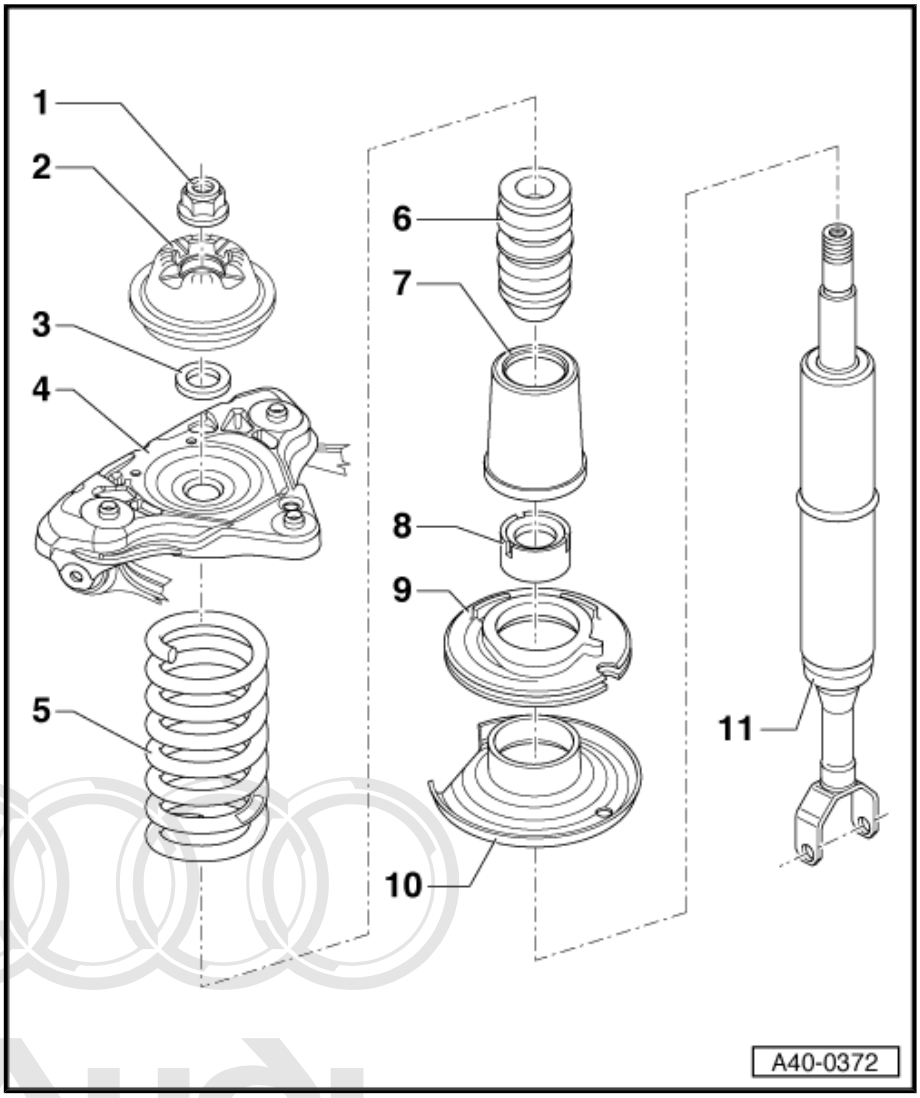
8 - Protective cap

9 - Bottom spring seat

10 - Bottom spring plate

11 - Shock absorber

- ❑ Renewing ⇒ page 47
- ❑ Note different running gear versions; see vehicle data sticker ⇒ page 282
- ❑ Defective shock absorbers must always be degassed and drained before disposal
- ❑ For correct version refer to ⇒ Electronic parts catalogue



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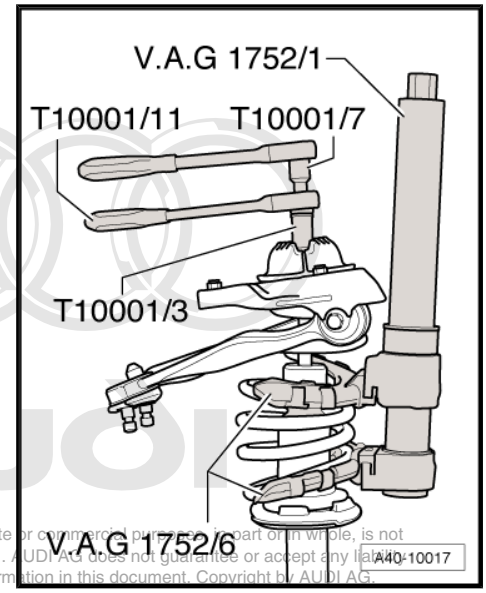
Explanatory notes on production control numbers (PR Nos.)
⇒ page 282

The shock absorber combination installed in the vehicle is indicated by the corresponding PR number on the vehicle data sticker.

Removing coil spring

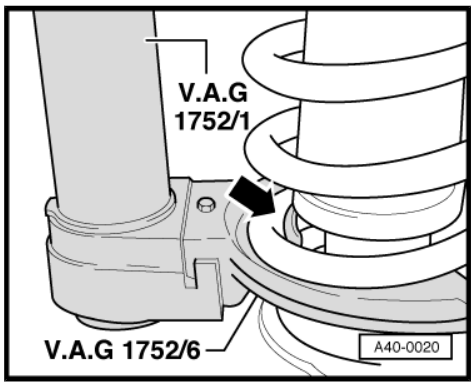
– Clamp suspension strut in a vice.

– Compress coil spring using spring compressor - V.A.G 1752/1- and spring retainers - V.A.G 1752/6- until top spring plate is free.



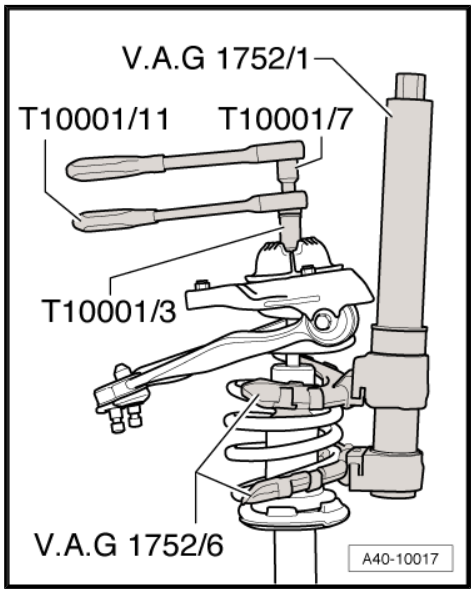
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– Ensure that coil spring is correctly seated in spring retainer - V.A.G 1752/6- -arrow-.



– Remove flange nut from piston rod using tools -T10001/3- , -T10001/11- and -T10001/7- .

– Take off suspension strut components and compressed coil spring together with spring compressor - V.A.G 1752/1- .

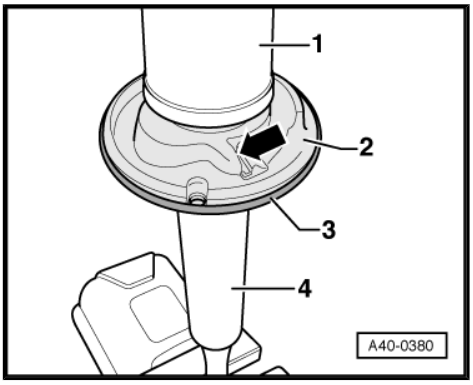


Renewing shock absorber

– Take off protective cap -1- and bottom spring seat -2-.

– Knock spring plate -3- loose using plastic-headed hammer and lift off.

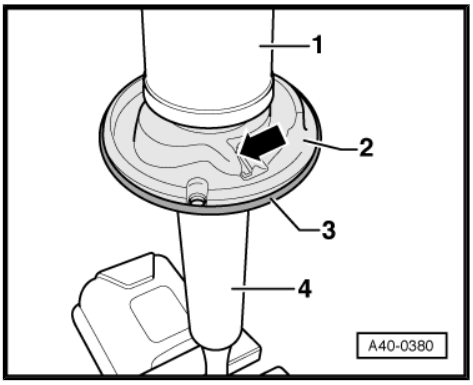
– Using plastic-headed hammer, knock spring plate onto new shock absorber.



Installing coil spring

– Install bottom spring seat and protective cap.

– Position compressed coil spring on bottom spring seat. End of spring coil must make contact with stop -arrow- (maximum permissible clearance 2 mm).

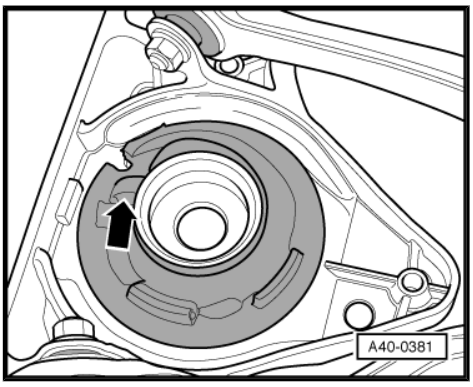


Install mounting bracket with spring seat on compressed coil spring so that spring seat makes contact with end of spring coil -arrow- (maximum permissible clearance 2 mm).

– Fit component parts of suspension strut.

– Tighten flange nut with special tools ⇒ Item 1 (page 45) .

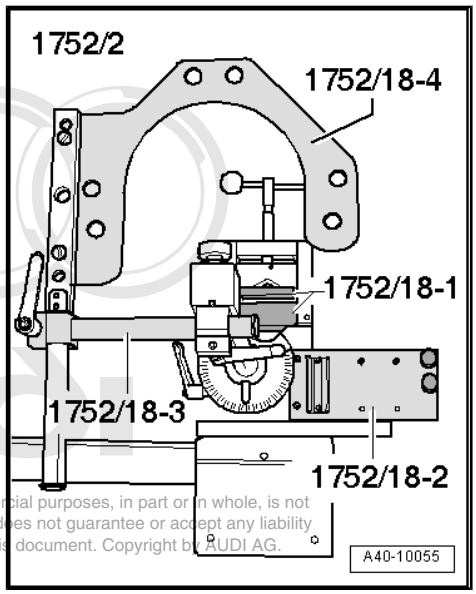
– Do not slacken spring yet.



Installation position of mounting bracket

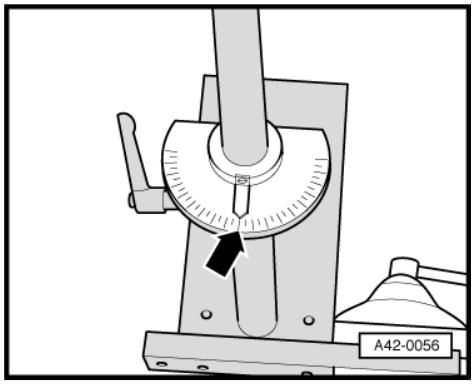
– Attach strut holder - V.A.G 1752/2- as shown in illustration.

– Clamp suspension strut with spring compressor vertically in strut holder - V.A.G 1752/2- .



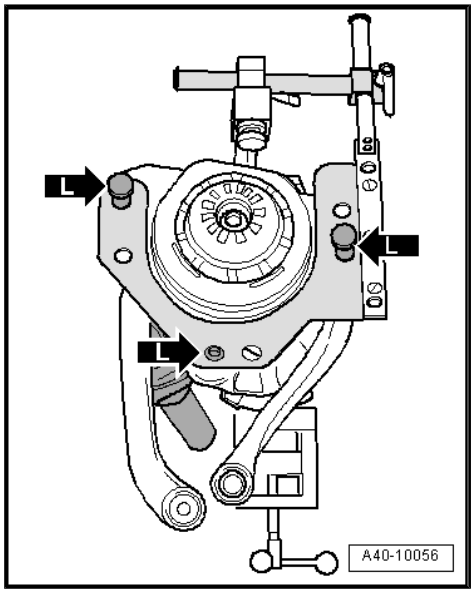
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– Release clamping lever and set pointer to 0° -arrow-. Then tighten clamping lever again.
– Adjust mounting bracket so that suspension strut adjuster gauge - V.A.G 1752/18-4- (for relevant side) can be bolted onto mounting bracket.



Left side of vehicle:

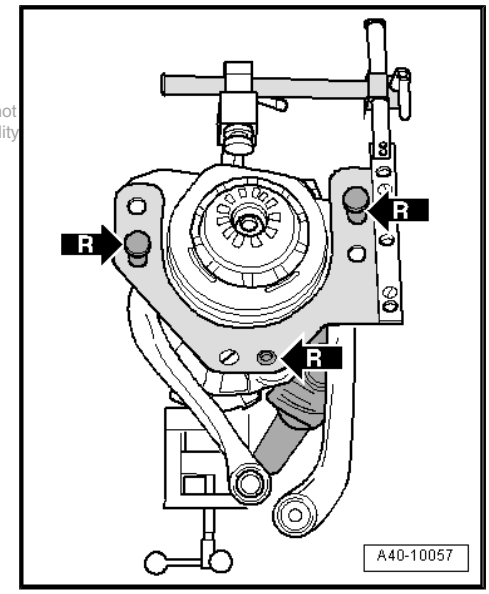
– Bolt suspension strut adjuster gauge - V.A.G 1752/18-4- to mounting bracket -arrows L-



Right side of vehicle:

– Bolt suspension strut adjuster gauge - V.A.G 1752/18-4- to mounting bracket -arrows R-
– Now slacken off and remove spring compressor - V.A.G 1752/1- .

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Note

When slackening spring compressor, make sure that ends of spring are in contact with stops on bottom spring seat and spring seat on mounting bracket.

– Check adjustment and repeat procedure if necessary.

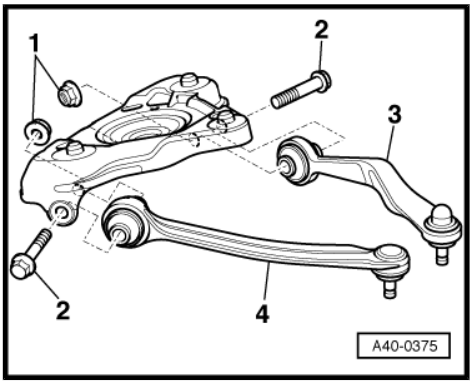
Maximum permissible misalignment: ± 2°

3.4 Removing and installing upper links (coil springs)

Removing

– Remove suspension strut with mounting bracket ⇒ page 38 .

– Loosen nuts -1- and take out bolts -2-.
– Take out links -3- and -4-.



Installing

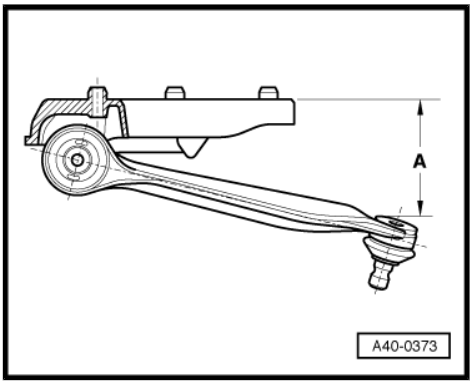
Installation is carried out in the reverse sequence. Note the following points:

– Secure upper links -3- and -4- with bolts -2- and nuts -1-, but only tighten lightly, so that position of links can still be changed.

Upper link (front)

– Adjust height -A-.

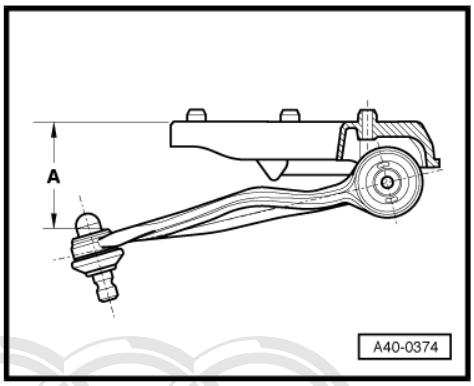
A = 94 mm ±2 mm



Upper link (rear)

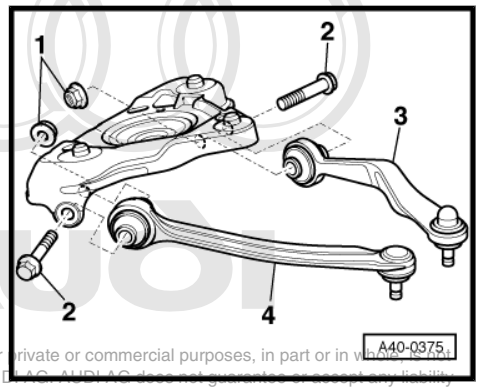
– Adjust height -A-.

A = 85 mm ±2 mm



Continued for upper links (front and rear)

– Tighten new nuts -1- ⇒ page 37 .
– Check positions of upper links.
– Repeat adjustment if necessary.
– Re-install suspension strut ⇒ page 38 .

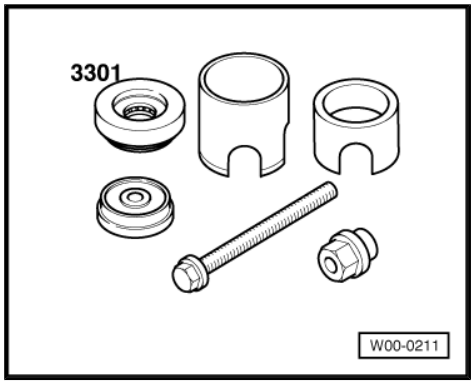


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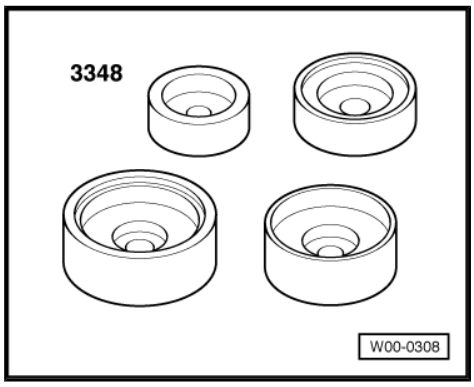
3.5 Renewing bushes for front and rear upper links

Special tools and workshop equipment required

♦ Assembly tool - 3301-



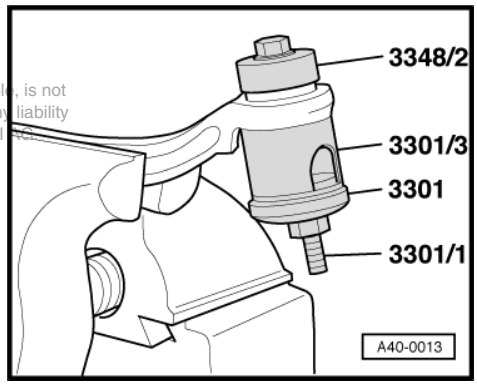
♦ Assembly tool - 3348-



Always use soft jaws when clamping suspension links in a vice.

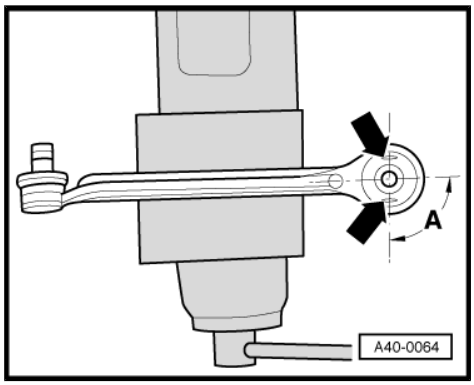
Pulling out bush

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Installation position of bush

A = ~ 90° ± 5°

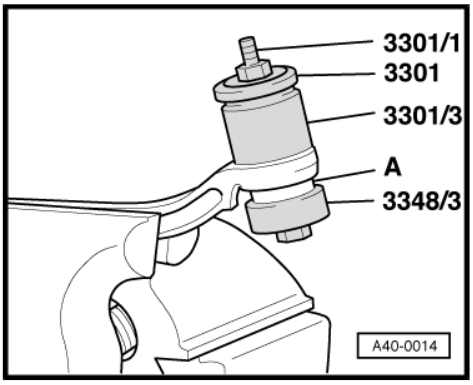


Installing bush

A = Bush

Note

Do not use lubricant.



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4 Suspension strut (air suspension), mounting bracket, upper links

⇒ “4.1 Suspension strut (air suspension), mounting bracket, upper links - exploded view”, page 52

⇒ “4.2 Removing and installing suspension strut (air suspension) with mounting bracket”, page 54

⇒ “4.3 Renewing shock absorber damper adjustment valve ”, page 58

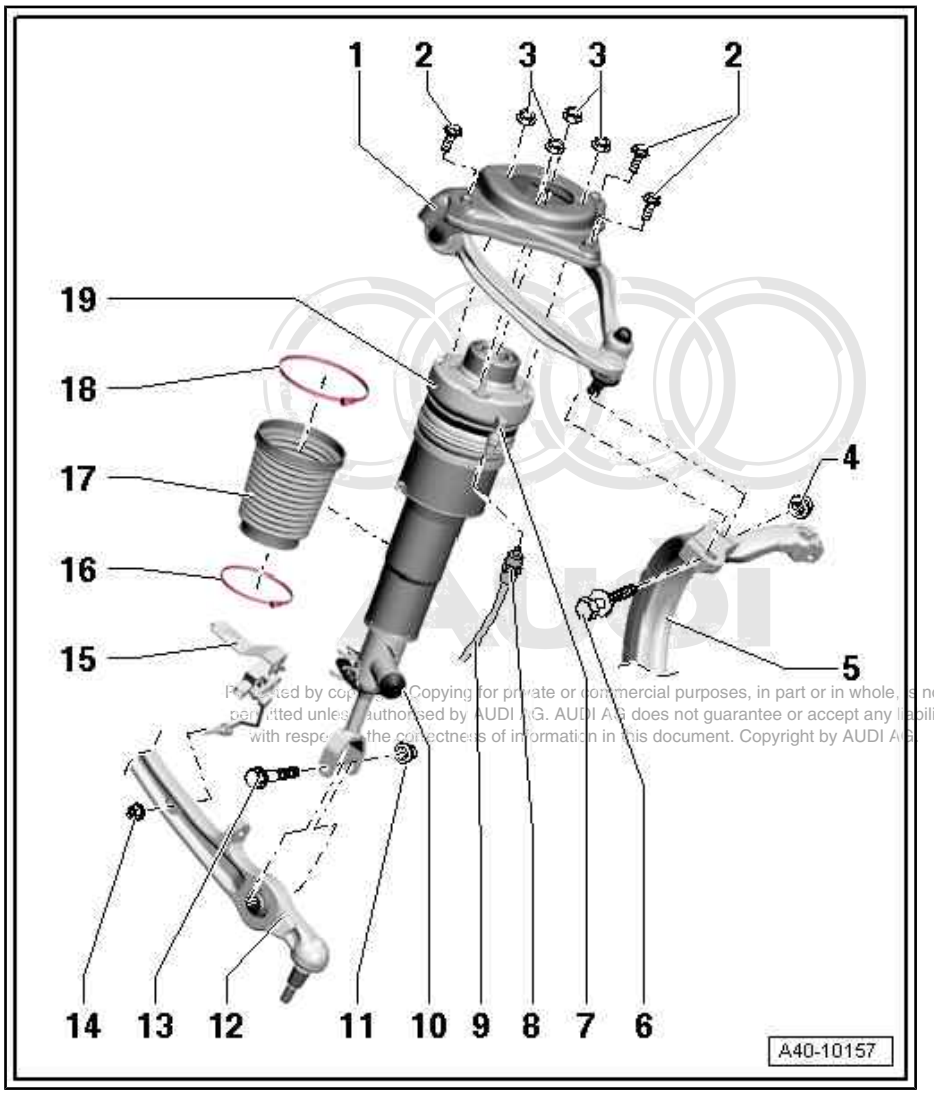
⇒ “4.4 Renewing boot”, page 60

⇒ “4.5 Charging suspension strut (air suspension)”, page 62

⇒ “4.6 Removing and installing upper links (air suspension)”, page 64

⇒ “4.7 Renewing bushes for front and rear upper links”, page 65

4.1 Suspension strut (air suspension), mounting bracket, upper links - exploded view



1 - Mounting bracket

- ❑ Removing and installing suspension strut and mounting bracket ⇒ page 54
- ❑ Tightening torque of bolted connection securing upper link to mounting bracket ⇒ Item 5 (page 37) or ⇒ Item 25 (page 38)

2 - Bolt

- ❑ 50 Nm +90°
- ❑ Always renew if removed
- ❑ Observe correct tightening sequence ⇒ page 57

3 - Nut

- ❑ 23 Nm

4 - Nut

5 - Wheel bearing housing

6 - Bolt

- ❑ 45 Nm

7 - Residual pressure valve

- ❑ MUST NOT be loosened

8 - Connection piece

- ❑ 3 Nm
- ❑ Important: Always keep to specified tightening torque.
- ❑ Only to be unscrewed with vehicle raised and no load on air spring strut (otherwise danger of injury due to vehicle dropping)

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- ❑ In the event of leaks: service air pipe ⇒ page 233 or renew connection piece ⇒ page 234
- ❑ Clean pipe connection before loosening
- ❑ Air will escape when this component is unscrewed

9 - Air pipe

- ❑ Colours: Front left - red; front right - green
- ❑ Servicing air pipe ⇒ page 233
- ❑ Renewing connection piece if leakage occurs ⇒ page 234

10 - Front left shock absorber damper adjustment valve - N336- or front right shock absorber damper adjustment valve - N337-

- ❑ Removing and installing ⇒ page 58

11 - Hexagon nut

- ❑ Always renew if removed

12 - Track control link

13 - Bolt

- ❑ 90 Nm +90°
- ❑ Always renew if removed

14 - Nut

- ❑ 8 Nm

15 - Front left vehicle level sender - G78- or front right vehicle level sender - G289-

- ❑ Remove/install and renew only as a complete assembly ⇒ page 222
- ❑ Lever of sender must face forwards.
- ❑ Check basic adjustment of headlights if sender mountings are loosened ⇒ Rep. gr. 94
- ❑ Vehicles with air suspension: re-adapt reference position if sender mountings are loosened ⇒ page 229

Perform calibration of lane departure warning system if sender mountings are loosened ⇒ page 312

16 - Clip

- ❑ Only fitted when performing repairs

17 - Boot

- ❑ Renewing ⇒ page 60

18 - Clip

19 - Air spring strut

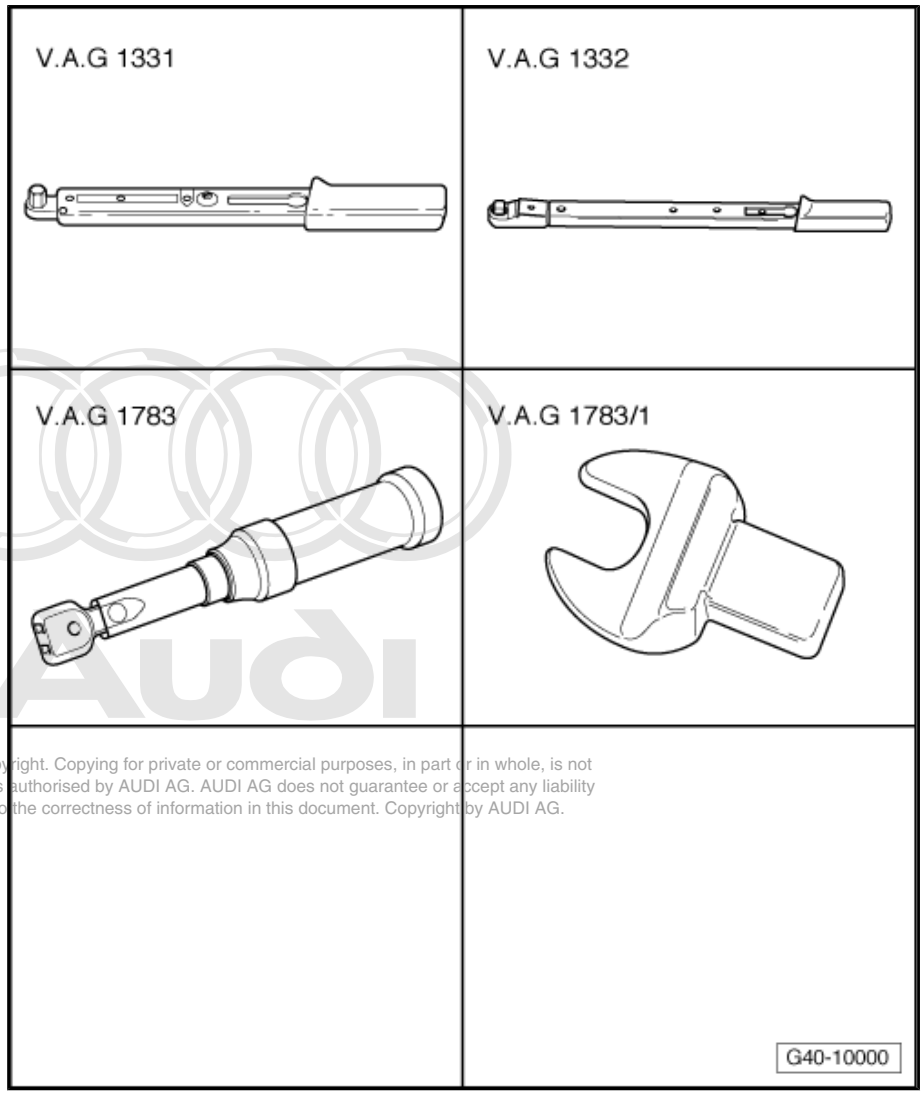
- ❑ Removing and installing ⇒ page 54
- ❑ Renewing shock absorber damper adjustment valve ⇒ page 58

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4.2 Removing and installing suspension strut (air suspension) with mounting bracket

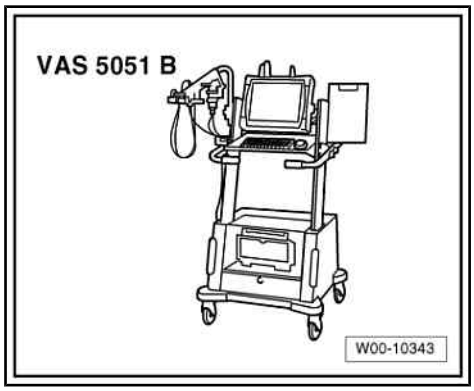
Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-
- Torque wrench - V.A.G 1332-
- Torque wrench - V.A.G 1783-
- Open end spanner insert (10 mm) - V.A.G 1783/1-

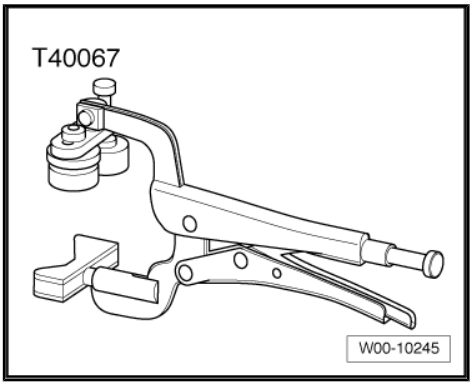


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- Vehicle diagnostic, testing and information system - VAS 5051 B- with appropriate diagnosis cable



♦ Pliers - T40067-



Removing

The suspension strut (air suspension) is removed together with the mounting bracket and upper links.

Take care to prevent indentations forming in boot on suspension strut (air suspension) during assembly work.

– Position vehicle on lifting platform ⇒ page 11 .

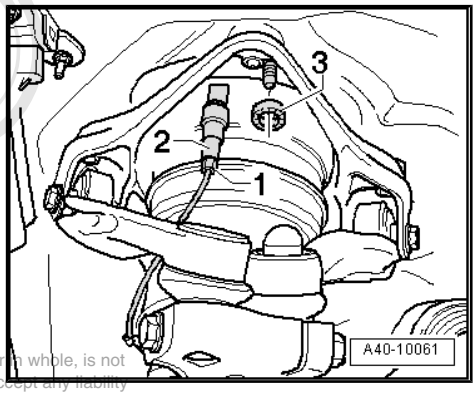
– Bleed system using -VAS 5051 A- ⇒ page 229 .

– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).

– Remove wheel.

– Clean area around air connection.

– Unscrew connection piece -1- at residual pressure valve -2- and unclip air pipe from suspension strut.



Note

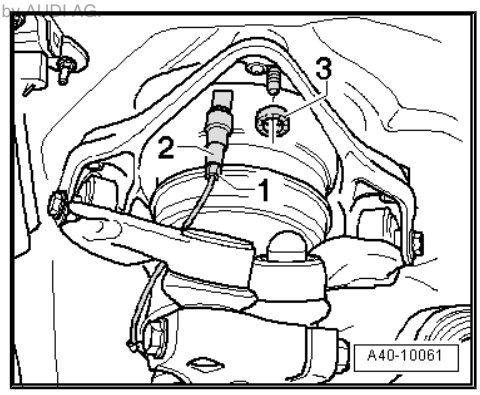
The residual pressure valve -2- MUST NOT be loosened or removed.

– Seal both connections. Take care to prevent dirt entering the connections.

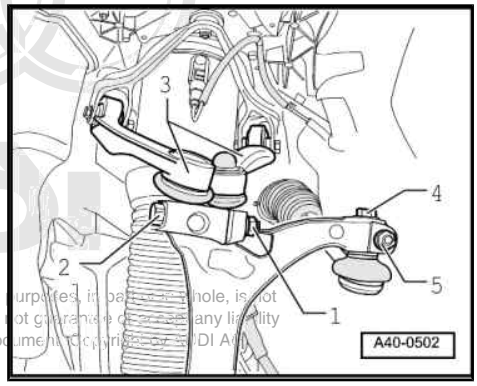
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– Remove clip -3- with a pair of pliers.

This clip does not have to be re-installed.

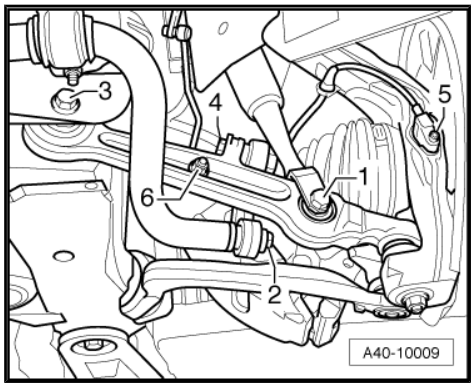


– Unscrew nut -1-, take out bolt -2- and lift out both links -3-.
– Do not attempt to enlarge slots in wheel bearing housing using a chisel or similar.

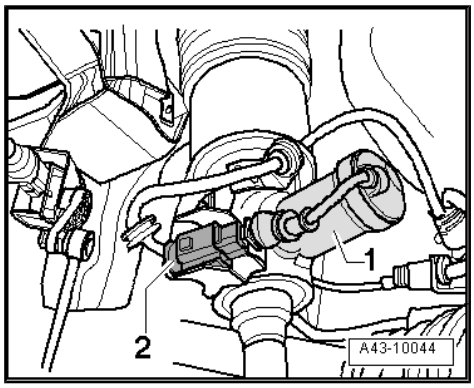


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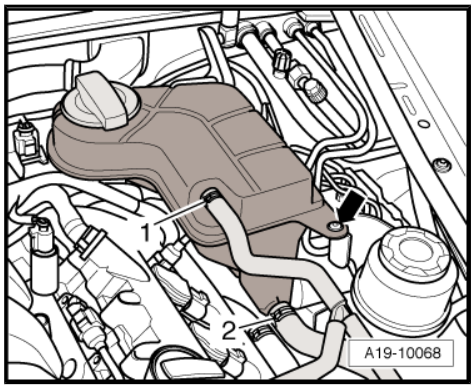
– Unscrew coupling rod of vehicle level sender -6- from track control link.
– Remove hexagon bolt -1- and guide fork joint of suspension strut off track control link.



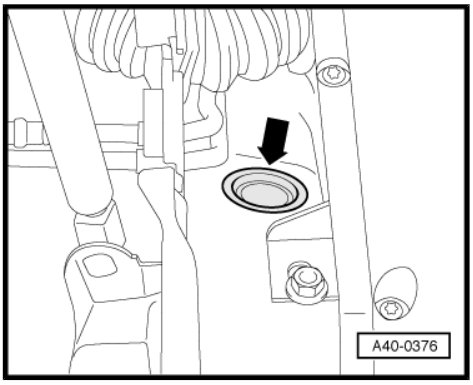
– Carefully unclip and unplug connector -2-.



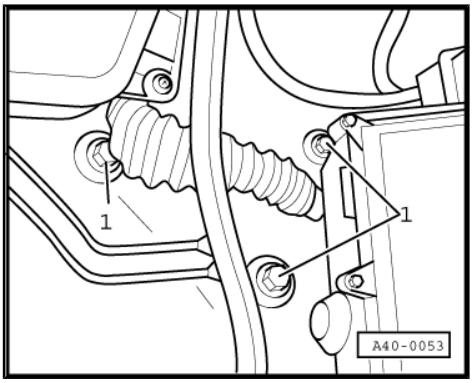
– If fitted, unfasten mounting of coolant expansion tank -arrow-, unclip tank and lay aside.
– Remove plenum chamber cover.



– Remove cover -arrow- for bolt.



– Unscrew hexagon bolts -1- in plenum chamber.
– Take out suspension strut with mounting bracket.



Note

When removing suspension strut (air suspension), take care not to damage protective boots on steering, drive shaft and air spring strut.

Refer to ⇒ page 62 if suspension strut (air suspension) is to be renewed.

Installing

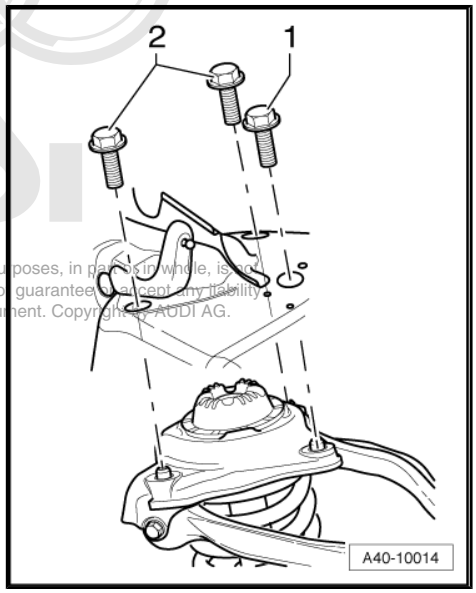
Installation is carried out in the reverse sequence. Note the following points:

Take care to prevent indentations forming in boot on suspension strut (air suspension) during assembly work.

– Start by attaching suspension strut (air suspension) to body.

Guides of mounting bracket must be positioned in bushes on body.

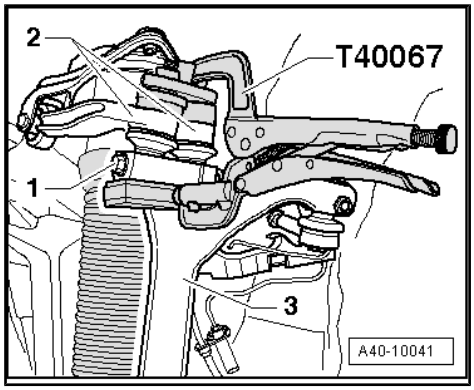
– The bolts must be tightened in the sequence shown by the numbers in the illustration
.



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– Fit joint pins of both upper links -2- in wheel bearing housing -3- and press down as far as possible by clamping with pliers - T40067- .

– Tighten bolt -1-.



Note

- *Bonded rubber bushes can only be turned to a limited extent. The suspension mountings must therefore only be tightened when the suspension is in the reference position.*
- *Raising suspension to reference position (vehicles with air suspension)* ⇒ *page 15*

– Fit wheel.

– Stand vehicle on its wheels ⇒ page 11 .

– Secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .

– Re-adapt reference position ⇒ page 229 .

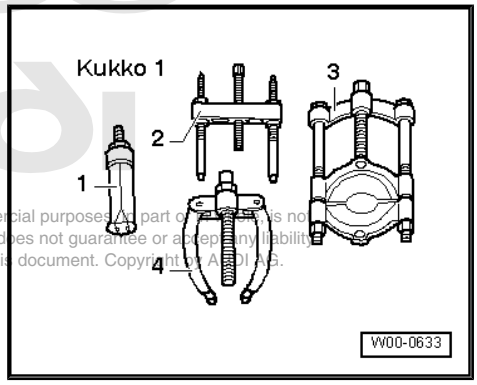
– Fit plenum chamber cover ⇒ Rep. gr. 92 .

Tightening torques ⇒ page 52

4.3 Renewing shock absorber damper adjustment valve

Special tools and workshop equipment required

- Puller - Kukko 17/0- - 3



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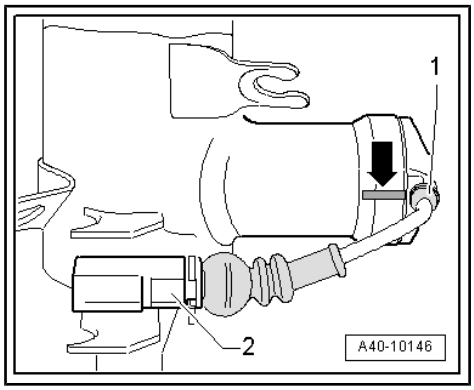
Removing

– Position vehicle on lifting platform ⇒ page 11 .

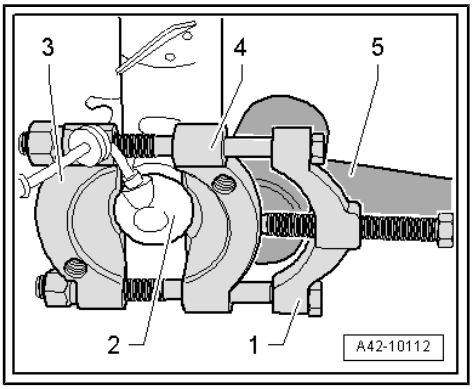
– Remove wheel.

– Mark position of cable connection -1- of shock absorber damper adjustment valve on shock absorber -arrow-.

– Carefully unplug connector and pull connector -2- out of retainer by hand.



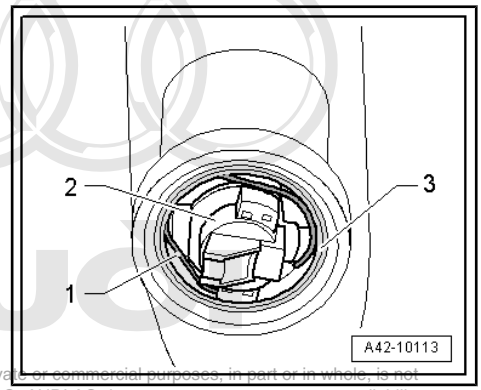
– Apply puller - Kukko 17/0- -1- with flat surface towards shock absorber and compress by hand. Jaws -3- and -4- are applied between shock absorber damper adjustment valve -2- and shock absorber tube.
– Using a plastic hammer -5-, knock off shock absorber damper adjustment valve -2- at right angles. Apply hammer blows to jaw section -4- as close as possible to valve housing. At the same time, pull jaw section -3- at right angles by hand.



Note

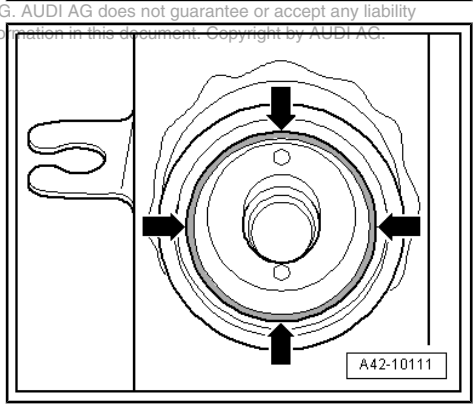
The shock absorber damper adjustment valve will be destroyed during removal.

– Remove circlip -1-.
– Remove coil -2- and seal -3-.



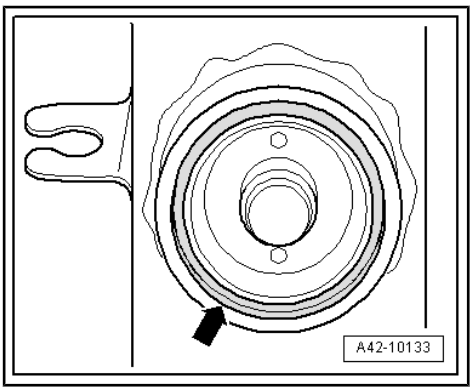
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– Check housing of shock absorber damper adjustment valve all round for distortion -arrows-. If necessary, press any distorted sections back into shape using a small screwdriver.



Installing

– Clean housing for shock absorber damper adjustment valve .
– Always renew seal -arrow-.

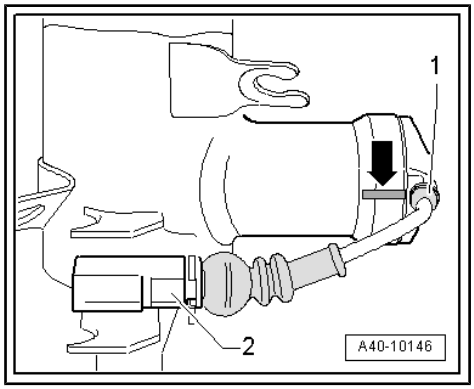


Note

- *The new circlip -1- is already fitted on the shock absorber damper adjustment valve .*
- *The circlip and valve must be installed together - do not separate them.*

– Fit new shock absorber damper adjustment valve and align cable connection -1- with marking made previously -arrow-.
– Press on shock absorber damper adjustment valve firmly by hand until circlip engages audibly.

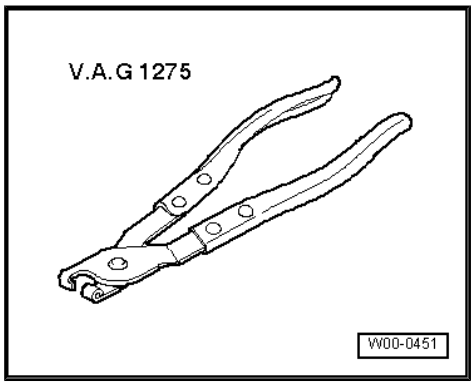
Remaining installation steps are carried out in reverse sequence.



4.4 Renewing boot

Special tools and workshop equipment required

♦ Hose clip pliers - V.A.G 1275-

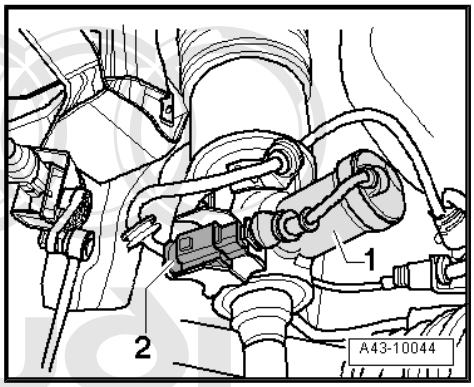


Removing

Note

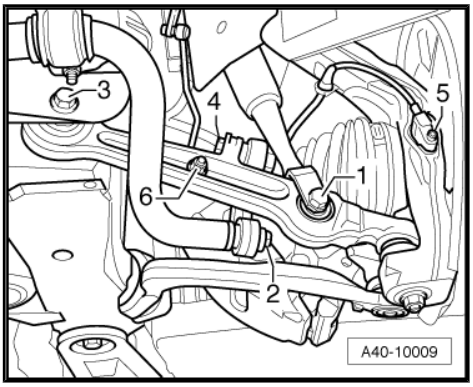
The boot can be renewed without removing the suspension strut.

– Position vehicle on lifting platform ⇒ page 11 .
– Remove wheel.
– Carefully unclip and unplug connector -2-. Disengage wiring harness for connector -2- from suspension strut.



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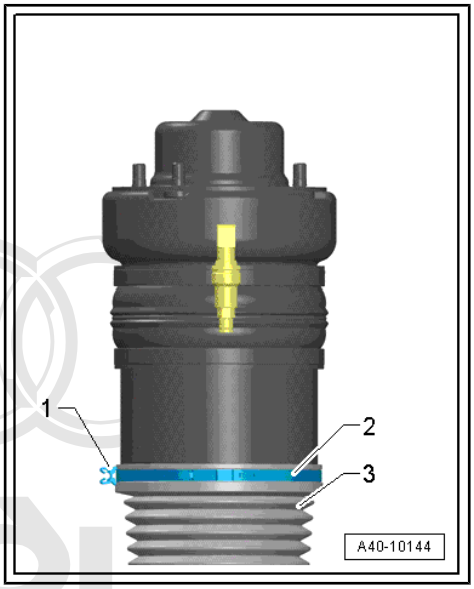
– Unscrew coupling rod of vehicle level sender -6- from track control link.
– Remove hexagon bolt -1- and guide fork joint of suspension strut off track control link.



– Mark position of wiring retainer -1- on suspension strut.

Note

- *One wiring retainer -1- is installed on the left-side suspension strut.*
- *Two wiring retainers -1- are installed on the right-side suspension strut.*



– Detach hose clip -2-.

If the boot -3- has already been renewed at least once, the hose clip at the bottom of the boot must also be detached.

– Carefully cut open boot -3-, working downwards from the top and taking care not to damage suspension strut. Then detach boot.

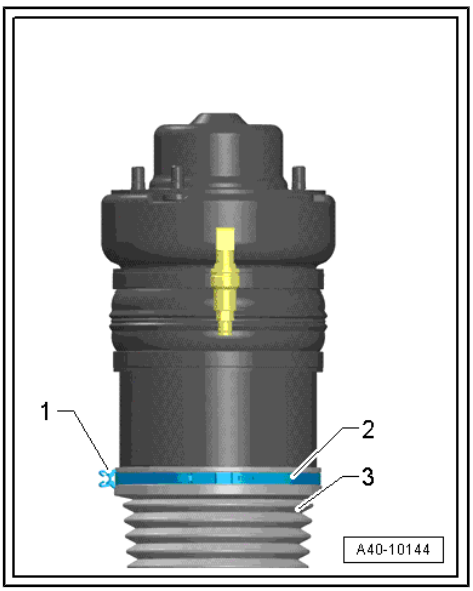
Installing

Installation is carried out in the reverse sequence. Note the following points:

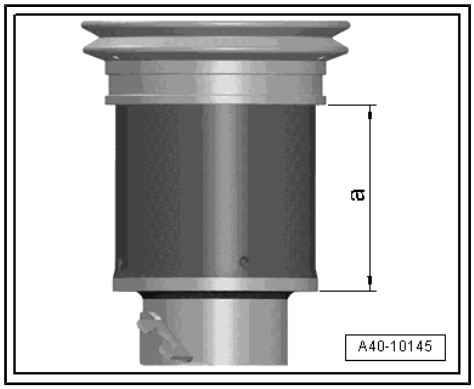
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– Carefully pull on new boot.
– Bolt suspension strut to track control link.
– Bring steering wheel to centre position.
– Raise suspension to reference position ⇒ page 15 .

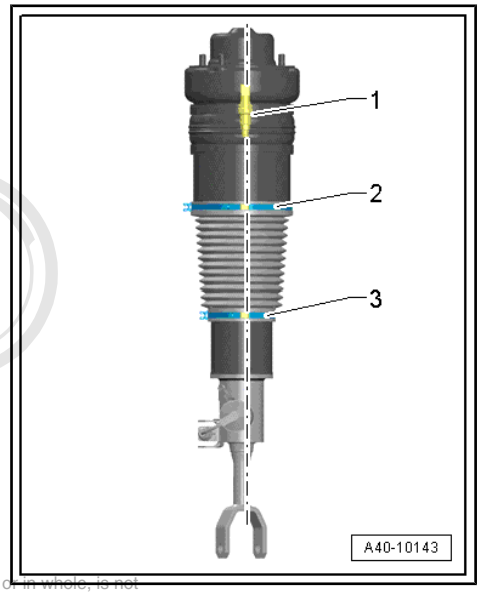
– Slide boot -3- onto suspension strut housing.
– Fit wiring retainer -1- onto hose clip -2-.
– Install hose clip -2-, but do not tighten.
– Align wiring retainer -1- with marking made previously on suspension strut.
– Fit hose clip from repair kit loosely at bottom of boot.



– Measure distance -a- between boot and bottom edge of suspension strut housing. Distance -a- must be 70 mm.



– Align hose clips -2- and -3- so they are in line with residual pressure valve -1-.
– Before tightening hose clips ensure that boot is not twisted; straighten boot if necessary.
– Tighten hose clips with hose clip pliers - V.A.G 1275- .

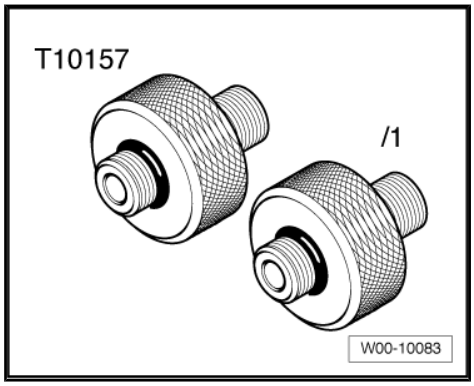


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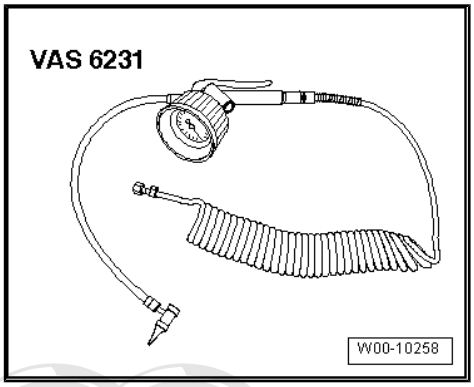
4.5 Charging suspension strut (air suspension)

Special tools and workshop equipment required

♦ Adapter - T10157- , M8x1 thread



♦ Air suspension strut charger unit - VAS 6231-



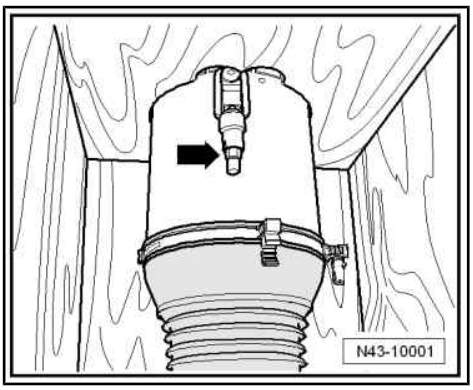
♦ Gas cylinder: Argon or Corgon

Note

Replacement suspension struts (air suspension) are supplied with a minimum gas filling. After a period of storage, the struts can lose some of this initial pressure (in the same way as a tyre). The minimum pressure must therefore be checked, and if necessary »recharged« to the required level before the struts are taken out of their packaging. If the strut is taken out of its packaging without checking and recharging the pressure, this can cause indentations or kinks to form in the U-bellows before it reaches its normal shape. This will damage the bellows and can cause premature failure.

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– Remove cover from packaging.
– Remove union screw -arrow- from residual pressure valve.
– Close valve on gas cylinder.
– Make sure that you are familiar with the relevant safety instructions for the use of pressurised containers and industrial gases.



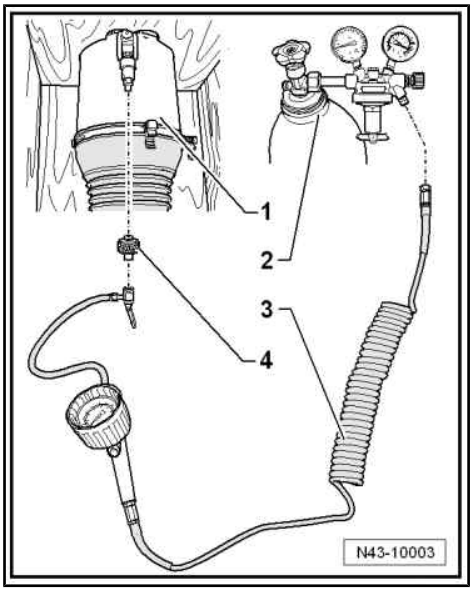
– Connect air suspension strut charger unit - VAS 6231- and adapter - T10157/1- as illustrated.

1 - Suspension strut (air suspension) in its packaging

2 - Gas cylinder for argon or Corgon with fittings

3 - Air suspension strut charger unit - VAS 6231-

4 - Adapter - T10157/1-

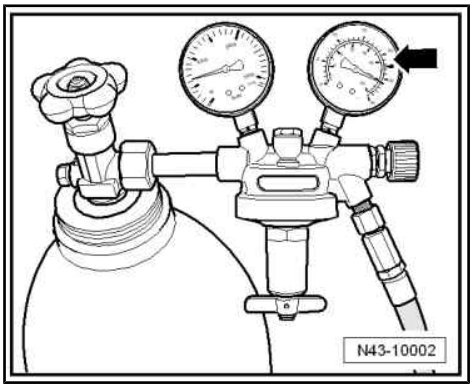


Note

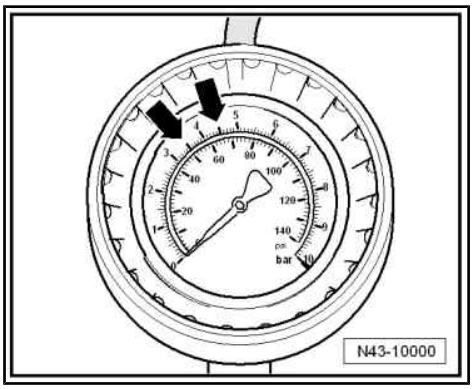
To stop “unfiltered” air entering the air spring system, the suspension strut (air suspension) may only be »recharged« with the gases listed above.

– Set restrictor valve to 2.0 ltr./min -arrow-.

– Now charge the suspension strut (air suspension) with gas, using several separate bursts of pressure.



The display will only show the correct pressure when the »back pressure« in the residual pressure valve has been overcome. The »back pressure« is approx. 3.5 bar. The suspension strut (air suspension) is adequately filled when the indicated pressure reaches 3.5 … 4.5 bar.



– Make sure pressure does not exceed 4.5 bar while charging.

– Disconnect air suspension strut charger unit - VAS 6231- from adapter - T10157/1- ; gas pressure in excess of 3.5 bar will then be released.

The minimum pressure has now been restored. You can take the suspension strut (air suspension) out of the packaging.

– After installation, set the suspension to the raised level setting and then back to the normal level. Repeat this procedure once more.

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Most of the gas will be replaced with the filtered air from the air supply unit once the suspension has twice moved up and down to these settings.

– Install suspension strut (air suspension) ⇒ page 54 .

4.6 Removing and installing upper links (air suspension)

– Removing and installing suspension strut (air suspension) with mounting bracket ⇒ page 54 .

Further procedure is the same as for removing and installing upper links (coil springs) ⇒ page 48 .

4.7 Renewing bushes for front and rear upper links

– Removing and installing suspension strut (air suspension) with mounting bracket ⇒ page 54 .

Further procedure is the same as for renewing bushes for front and rear upper links (coil springs) ⇒ page 49 .

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5 Track control link, guide link, vehicle level sender

⇒ “5.1 Exploded view of track control link, guide link, vehicle level sender”, page 66

⇒ “5.2 Removing and installing track control link”, page 67

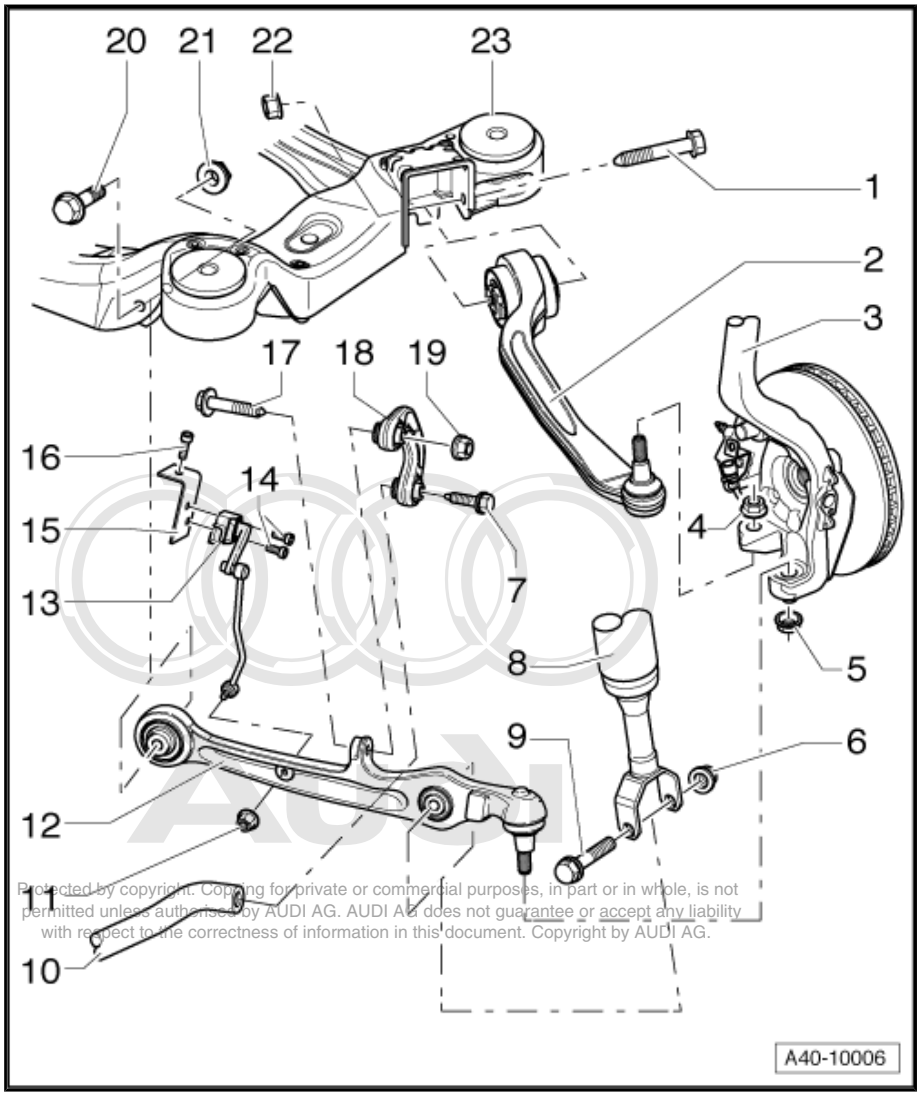
⇒ “5.3 Renewing bush for track control link”, page 70

⇒ “5.4 Removing and installing guide link”, page 74

⇒ “5.5 Renewing guide link bush”, page 76

⇒ “5.6 Removing and installing vehicle level sender”, page 79

5.1 Exploded view of track control link, guide link, vehicle level sender



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1 - Bolt

- ❑ 70 Nm +180°
- ❑ Always renew if removed

2 - Guide link

- ❑ Removing and installing ⇒ page 74
- ❑ Renewing guide link bush ⇒ page 76

3 - Wheel bearing housing

4 - Self-locking nut

- ❑ 110 Nm
- ❑ Always renew if removed
- ❑ After detaching guide link from wheel bearing housing, remove residual adhesive from thread of joint pin.

5 - Self-locking nut

- ❑ 110 Nm
- ❑ Always renew if removed
- ❑ After detaching track control link from wheel bearing housing, remove residual adhesive from thread of joint pin.

6 - Nut

- ❑ Always renew if removed

7 - Bolt

- ❑ 40 Nm +90°
- ❑ Always renew if removed

8 - Shock absorber

9 - Bolt

- ❑ 90 Nm +90°
- ❑ Always renew if removed

10 - Anti-roll bar

11 - Self-locking nut

- ❑ 8 Nm
- ❑ Always renew if removed

12 - Track control link

- ❑ Removing and installing ⇒ page 67
- ❑ Renewing bush for track control link ⇒ page 70

13 - Front left vehicle level sender -G78-; front right vehicle level sender -G289-

- ❑ Remove/install and renew only as a complete assembly ⇒ page 222
- ❑ Lever of sender must face forwards.
- ❑ Check basic adjustment of headlights if sender mountings are loosened ⇒ Rep. gr. 94
- ❑ Vehicles with air suspension: re-adapt reference position if sender mountings are loosened ⇒ page 229
- ❑ Perform calibration of lane departure warning system if sender mountings are loosened ⇒ page 312 .

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14 - Bolt

- ❑ 5 Nm

15 - Retaining bracket

16 - Bolt

- ❑ 10 Nm

17 - Bolt

- ❑ 40 Nm +90°
- ❑ Always renew if removed

18 - Coupling rod

19 - Nut

- ❑ Always renew if removed

20 - Bolt

- ❑ 70 Nm +180°
- ❑ Always renew if removed

21 - Nut

- ❑ Always renew if removed

22 - Nut

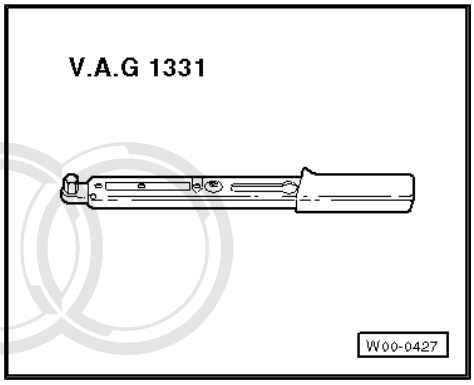
- ❑ Always renew if removed

23 - Subframe

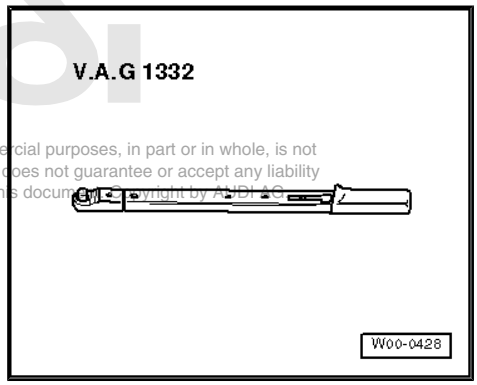
5.2 Removing and installing track control link

Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-

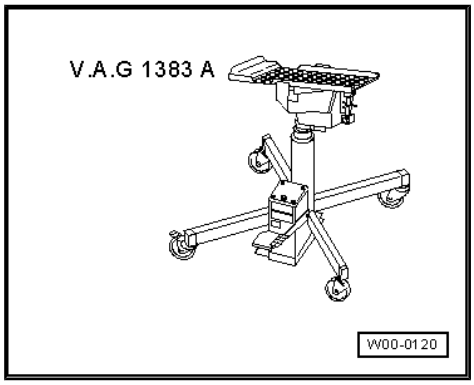


- Torque wrench - V.A.G 1332-

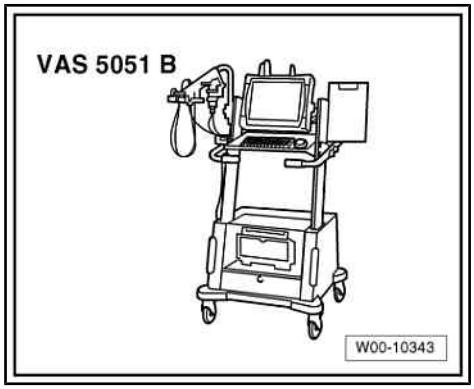


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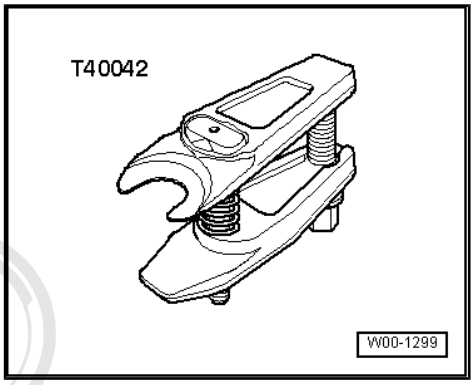
- Engine and gearbox jack - V.A.G 1383 A-



- Vehicle diagnostic, testing and information system - VAS 5051 B- with appropriate diagnosis cable



♦ Ball joint puller - T40042-



Removing

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

– Bleed system using -VAS 5051 A- ⇒ page 229 .

All vehicles

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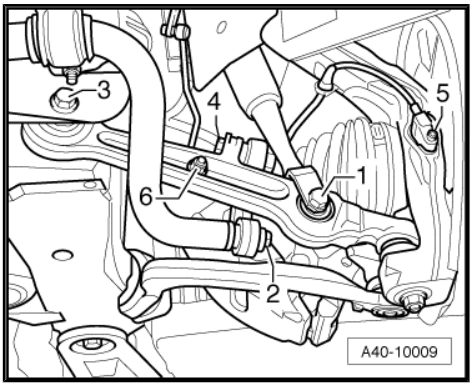
– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).

– Remove wheel.

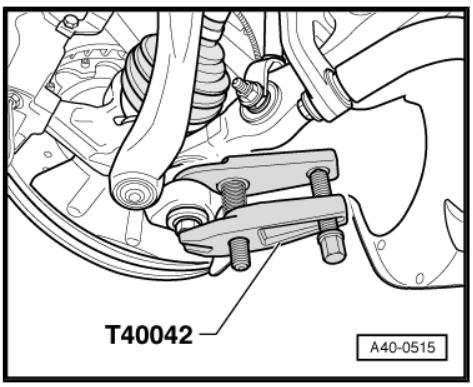
– Remove noise insulation ⇒ Rep. gr. 50 .

– On vehicles with vehicle level sender, unscrew nut -6-.

– Unscrew nut on joint pin of track control link until it is flush with end of thread. Counterhold joint pin with 6 mm Allen key if necessary.



– Press joint pin of track control link out of tapered seat using ball joint puller - T40042- .

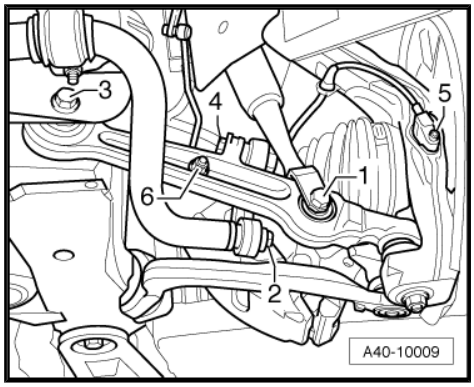


Note

♦ *Make sure the two lever arms of the puller are parallel when maximum force is exerted; adjust as necessary.*

♦ *To avoid damage to joints of upper links, support wheel bearing housing (e.g. using engine and gearbox jack - V.A.G 1383 A-) to prevent the suspension from extending too far.*

– Remove hexagon bolt -1-.
– Remove bolts -2- and -4-, take out coupling rod.
– Remove hexagon bolt -3-.
– Take out track control link.



Installing

Installation is carried out in the reverse sequence. Note the following points:

Note

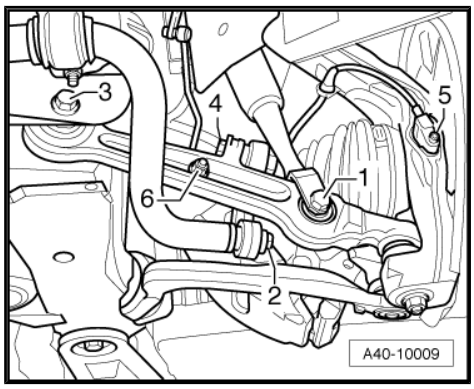
- *Bonded rubber bushes can only be turned to a limited extent. The suspension mountings must therefore only be tightened when the suspension is in the unladen position or reference position.*
- *Lifting suspension to unladen position (vehicles with coil springs) ⇒ page 13*
- *Lifting suspension to reference position (vehicles with air suspension) ⇒ page 15*

– Remove remaining adhesive from thread of joint pin on track control link.

– On vehicles with vehicle level sender, screw on nut -6- ⇒ Item 11 (page 67) .
– Fit and secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .

Tightening torques ⇒ page 66

– Fit wheel.
– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .
– Secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .
– On vehicles with automatic headlight range control, carry out basic adjustment of headlights ⇒ Rep. gr. 94 .
– Vehicles with air suspension: re-adapt reference position ⇒ page 229 .



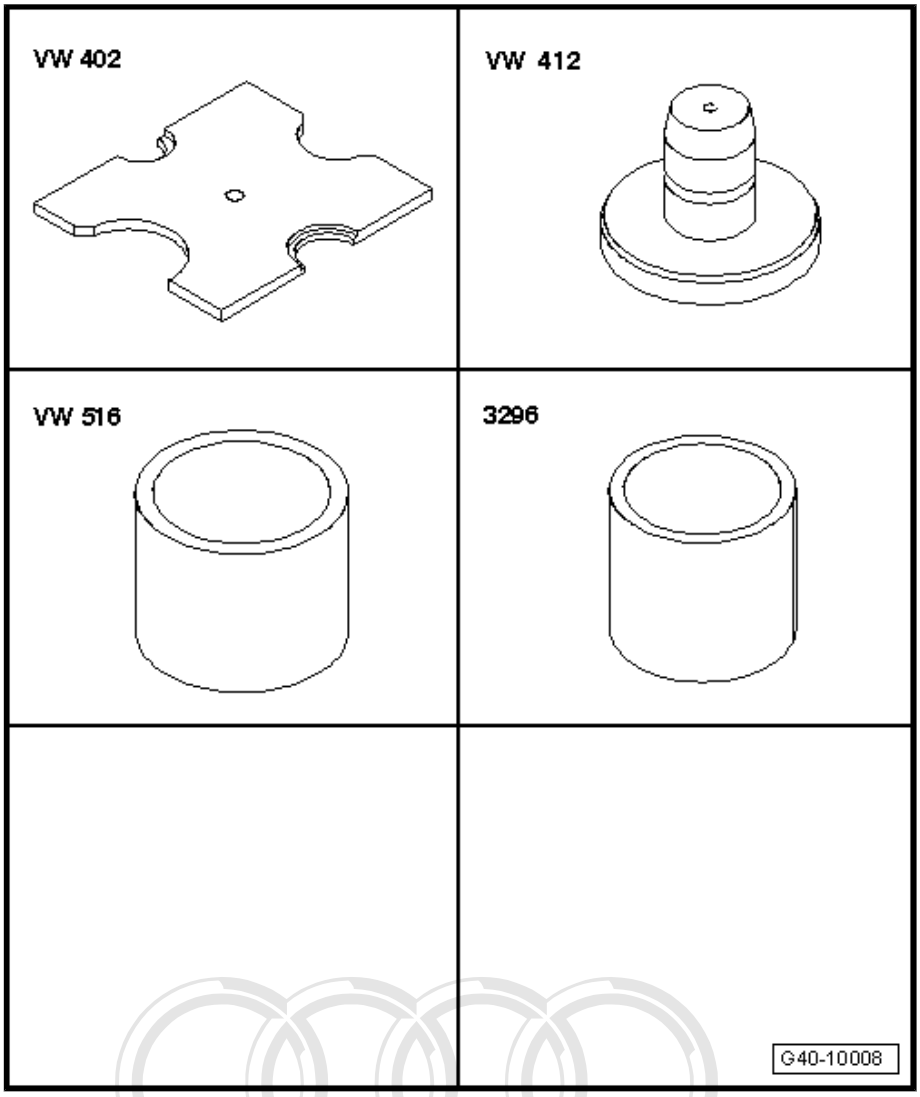
5.3 Renewing bush for track control link

Pressing out / pressing in bush for track control link (wheel bearing housing end)

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Special tools and workshop equipment required

- Thrust plate - VW 402-
- Press tool - VW 412-
- Tube - VW 516-
- Tube - 3296-
- Assembly paste - G 052 109 A2-



Note

Track control link must be held in position while bush is being removed or installed.

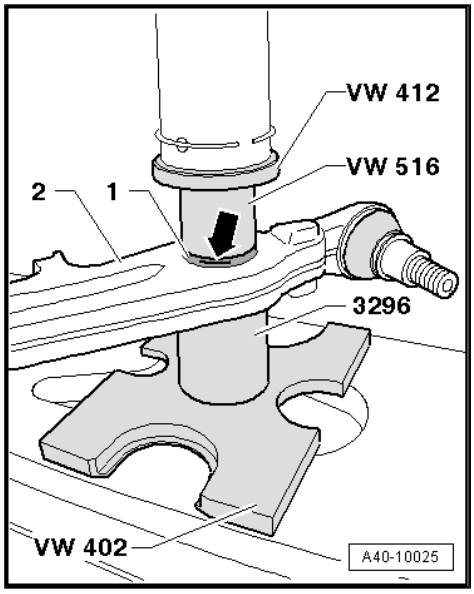
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Pressing out bush

– Remove track control link ⇒ page 67 .
– Mark position (installation depth) of bush -1- on bush -arrow-.

Use a waterproof felt-tip pen or similar for marking.

– Apply special tools as shown in illustration.
– Press bush -1- out of track control link -2-.



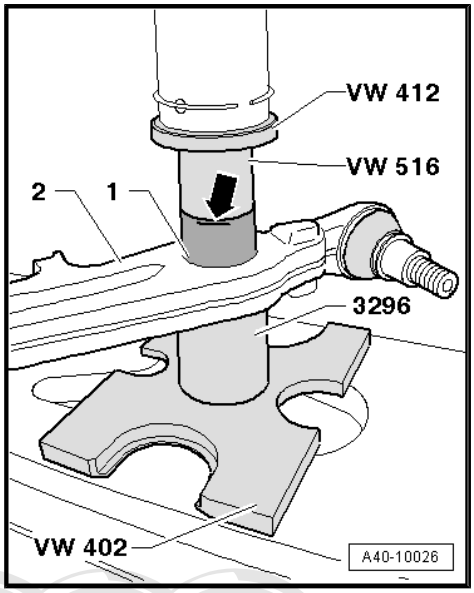
Pressing in bush

– Transfer marking for installation position from old bush to new bush.
– Apply a thin coat of assembly paste to bush.
– Locate bush -1- in track control link -2-.
– Apply special tools as shown in illustration.

Note

Make sure bush remains straight while pressing in.

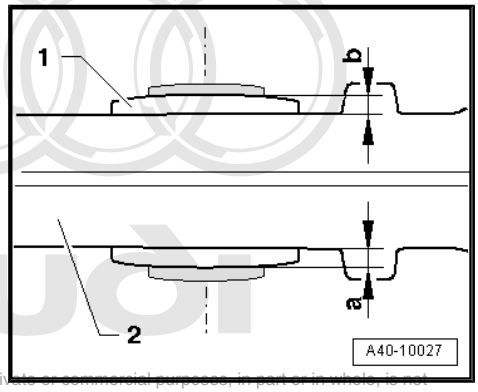
– Press bush -1- into track control link -2-.
– Refit to marking made before removal -arrow-.



– Check installation depth of bush -1- in track control link -2-.

Dimensions -a- and -b- must be equal.

– Press bush -1- in further if dimensions -a- and -b- are not equal.
– Install track control link ⇒ page 67 .

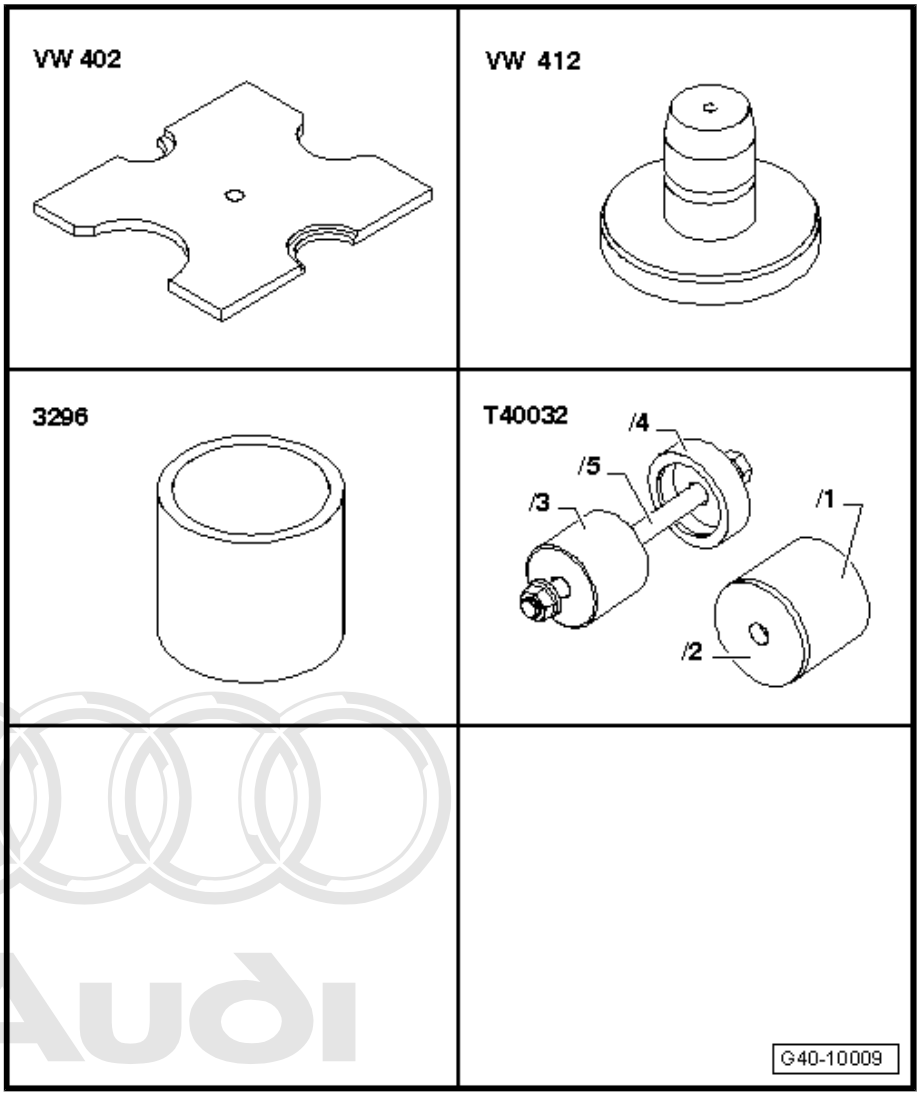


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Pressing out / pressing in bush for track control link (subframe end)

Special tools and workshop equipment required

- Thrust plate - VW 402-
- Press tool - VW 412-
- Tube - 3296-
- Assembly tool - T40032-
- Assembly paste - G 052 109 A2-



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Note

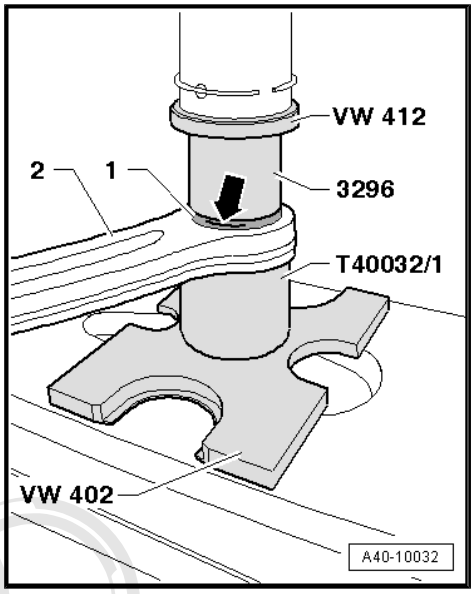
Track control link must be held in position while bush is being removed or installed.

Pressing out bush

– Remove track control link ⇒ page 67 .
– Mark position (installation depth) of bush -1- on bush -arrow-.

Use a waterproof felt-tip pen or similar for marking.

– Apply special tools as shown in illustration.
– Press bush -1- out of track control link -2-.



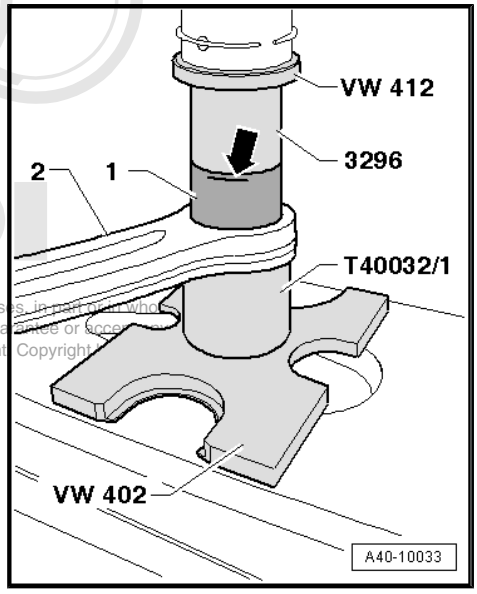
Pressing in bush

– Transfer marking for installation position from old bush to new bush.
– Lightly lubricate bush with assembly paste - G 052 109 A2- .
– Locate bush -1- in track control link -2-.
– Apply special tools as shown in illustration.

Note

Make sure bush remains straight while pressing in.

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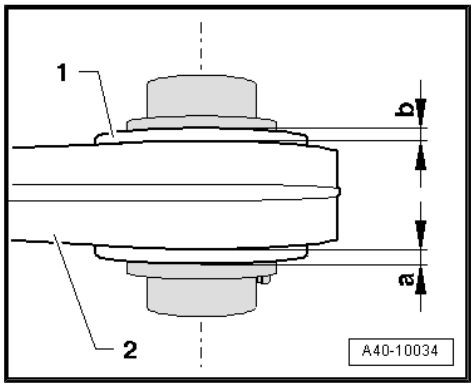


– Press bush -1- into track control link -2-.
– Refit to marking made before removal -arrow-.

– Check installation depth of bush -1- in track control link -2-.

Dimensions -a- and -b- must be equal.

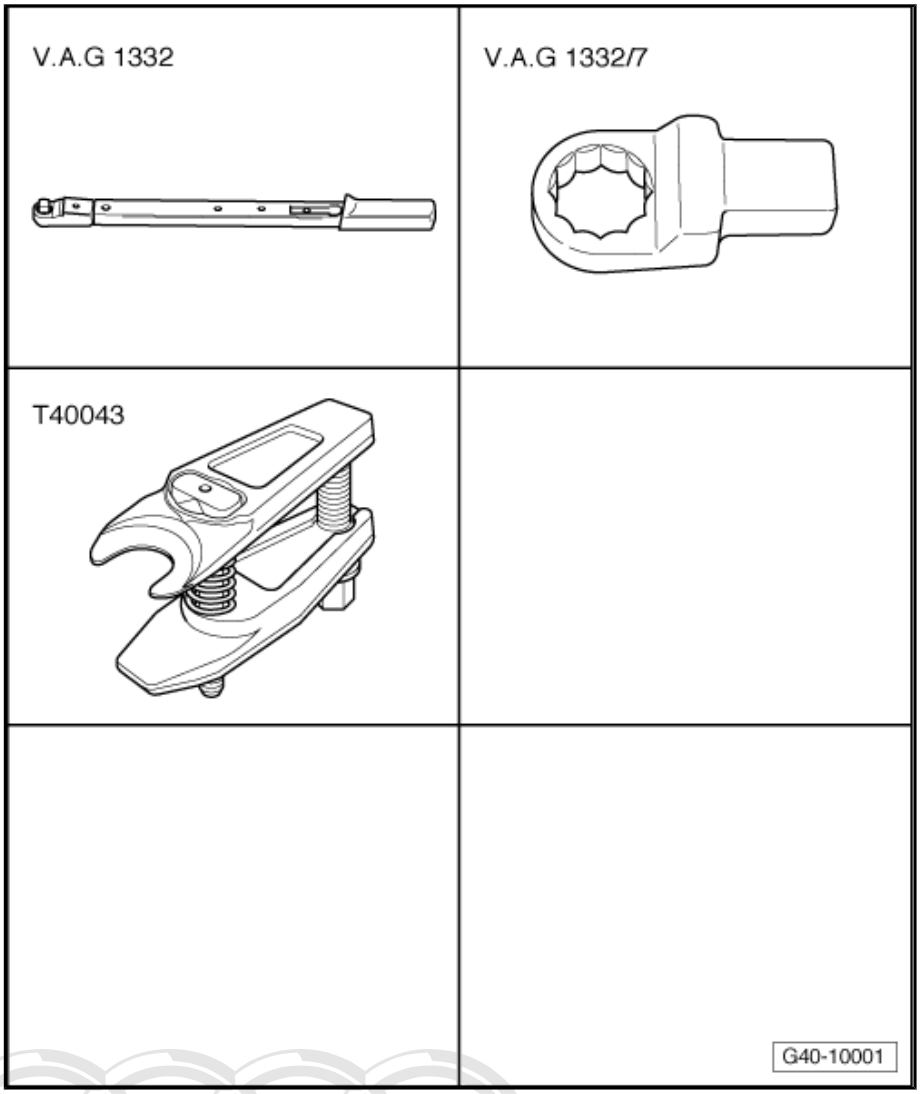
– Press bush -1- in further if dimensions -a- and -b- are not equal.
– Install track control link ⇒ page 67 .



5.4 Removing and installing guide link

Special tools and workshop equipment required

- Torque wrench - V.A.G 1332-
- Ring spanner insert - V.A.G 1332/7-
- Ball joint puller - T40043-



Removing

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

All vehicles

– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).

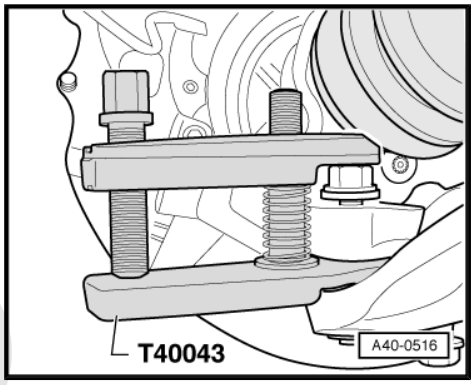
– Remove wheel.

– Remove noise insulation ⇒ Rep. gr. 50 .

– Unscrew nut on joint pin of guide link until it is flush with end of thread. Counterhold joint pin with 6 mm Allen key if necessary.

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– Press joint pin of guide link out of tapered seat using ball joint puller - T40043- .

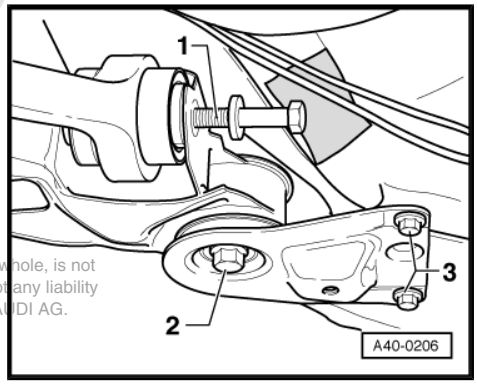


Note

- *Take care not to damage drive shaft boot.*
- *Make sure the two lever arms of the puller are parallel when maximum force is exerted.*

– Remove hexagon bolt -1-.

– Take out guide link.



Installing

Installation is carried out in the reverse sequence. Note the following points:

– Remove remaining adhesive from thread of joint pin on guide link.

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Note

- *Bonded rubber bushes can only be turned to a limited extent. The suspension mountings must therefore only be tightened when the suspension is in the unladen position or reference position.*
- *Lifting suspension to unladen position (vehicles with coil springs)* *⇒ page 13*
- *Lifting suspension to reference position (vehicles with air suspension)* *⇒ page 15*

Tightening torques ⇒ page 66

– Fit wheel.

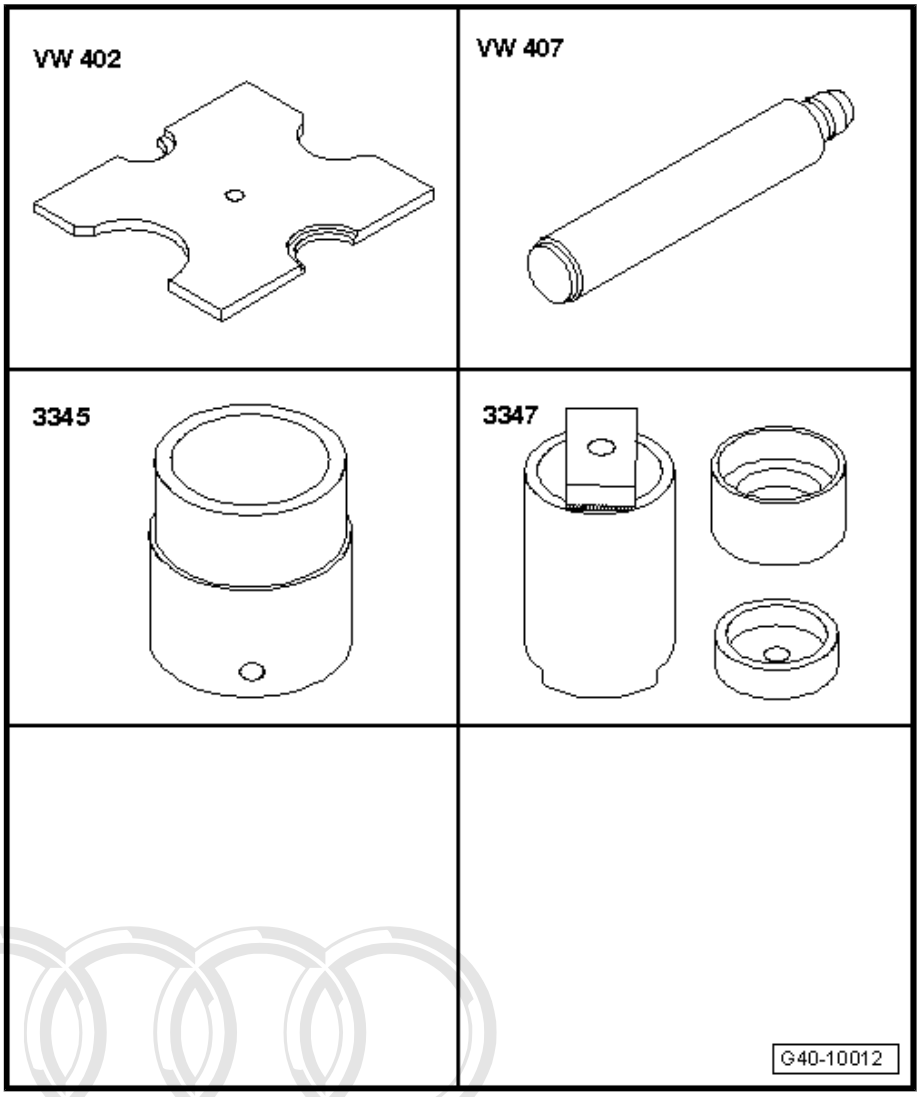
– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .

– Secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .

5.5 Renewing guide link bush

Special tools and workshop equipment required

- Thrust plate - VW 402-
- Press tool - VW 407-
- Wheel bearing tube - 3345-
- Assembly tool - 3347/1-



Note

Guide link must be held in position while bush is being removed or installed.

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Pressing out bush

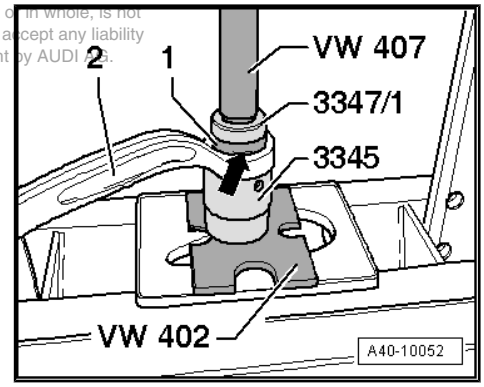
– Remove guide link ⇒ page 74 .

– Mark position (installation depth) of bush -1- on bush -arrow-.

Use a waterproof felt-tip pen or similar for marking.

– Apply special tools as shown in illustration.

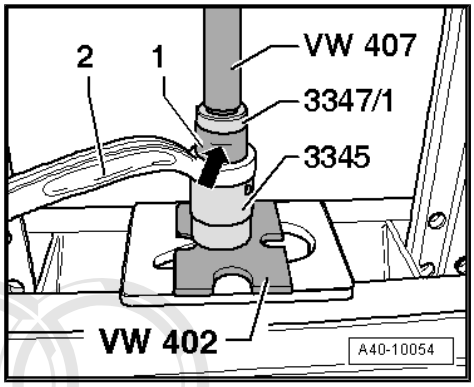
– Press bush -1- out of track control link -2-.



Pressing in bush

– Transfer marking for installation position from old bush to new bush -arrow-.

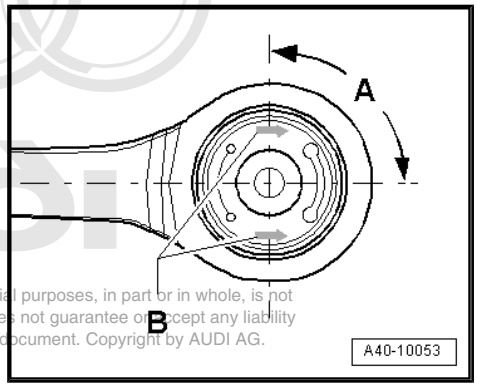
– Lightly lubricate bush with assembly paste - G 052 109 A2- .



Installation position of bush

A = ~ 90° ± 5°

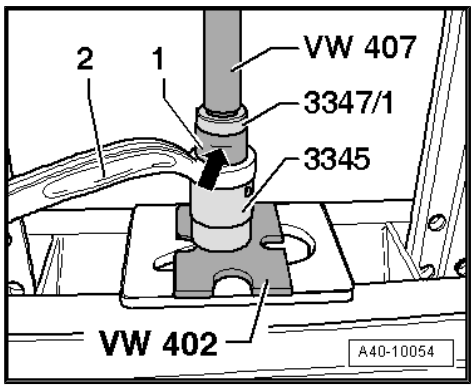
Arrows on bush -B- point away from ball joint.



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– Locate bush -1- in guide link -2-, making sure bush is positioned correctly.

– Apply special tools as shown in illustration.



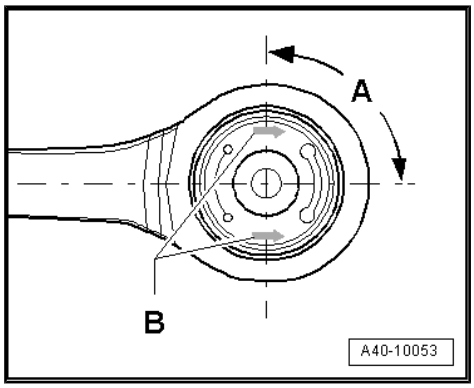
Note

Make sure bush remains straight while pressing in.

– Press bush -1- into guide link -2-.

– Refit to marking made before removal -arrow-.

– Check that bush -1- is positioned correctly in guide link -2-.

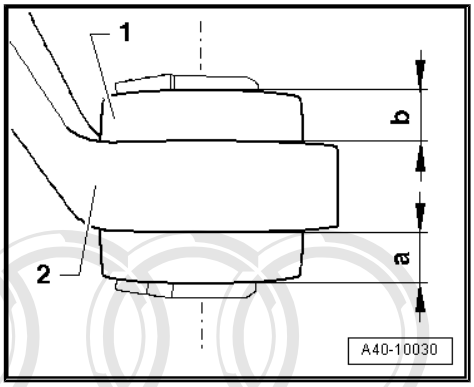


– Check installation depth of bush -1- in guide link -2-.

Dimensions -a- and -b- must be equal.

– Press bush -1- in further if dimensions -a- and -b- are not equal.

– Install guide link ⇒ page 74 .



5.6 Removing and installing vehicle level sender

– Removing and installing vehicle level sender ⇒ page 222

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6 Wheel bearing housing, wheel bearing unit

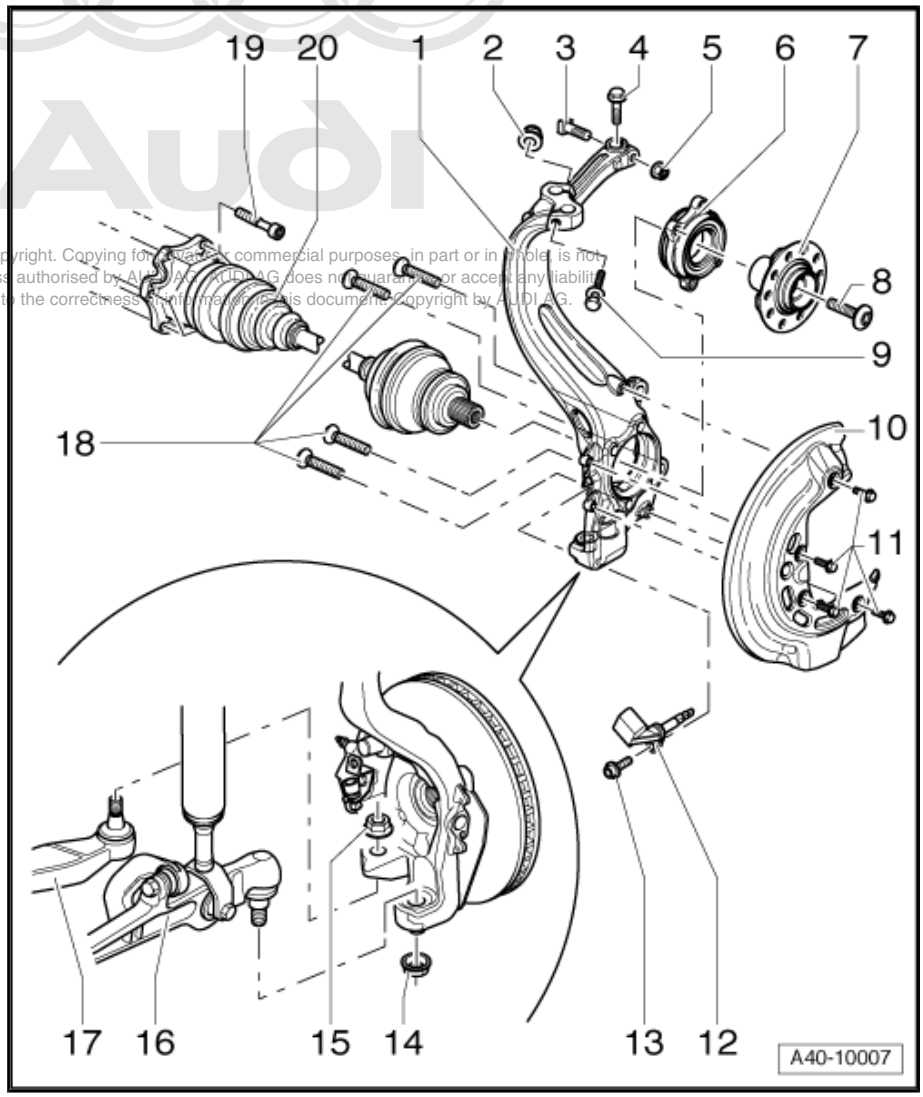
⇒ “6.1 Exploded view of wheel bearing housing, wheel bearing unit”, page 80

⇒ “6.2 Removing and installing wheel bearing housing”, page 81

⇒ “6.3 Removing and installing wheel bearing unit”, page 87

⇒ “6.4 Servicing wheel bearing unit”, page 91

6.1 Exploded view of wheel bearing housing, wheel bearing unit



1 - Wheel bearing housing

- ❑ Removing and installing ⇒ page 81

2 - Nut

- ❑ Always renew if removed

3 - Bolt

4 - Bolt

- ❑ 5 Nm
- ❑ For adjusting toe constant “S”
- ❑ Always renew if removed

5 - Self-locking nut

- ❑ Always renew if removed
- ❑ 50 Nm

6 - Ball bearing

- ❑ Removing and installing ⇒ page 87

7 - Wheel hub

- ❑ Removing and installing ⇒ page 91

8 - Bolt

- ❑ 200 Nm +180°
- ❑ Always renew if removed
- ❑ Keep to specified sequence when loosening and tightening flange bolt ⇒ page 100

9 - Bolt

- ❑ 45 Nm
- ❑ 50 Nm for RS 6 vehicles

10 - Splash plate for brakes

11 - Hexagon socket head bolt

- ❑ 10 Nm

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12 - Speed sensor

13 - Hexagon socket head bolt

- ❑ 8 Nm

14 - Self-locking nut

- ❑ 110 Nm
- ❑ Always renew if removed
- ❑ After detaching track control link from wheel bearing housing, remove residual adhesive from thread of joint pin.

15 - Self-locking nut

- ❑ 110 Nm
- ❑ Always renew if removed
- ❑ After detaching guide link from wheel bearing housing, remove residual adhesive from thread of joint pin.

16 - Track control link

17 - Guide link

18 - Countersunk bolt

- ❑ 80 Nm +90°
- ❑ Always renew if removed

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19 - 12-point socket head bolt

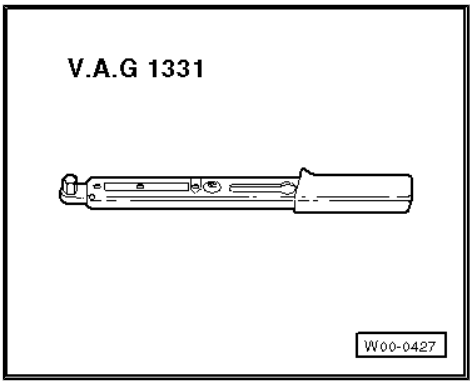
- ❑ 70 Nm
- ❑ Always renew if removed

20 - Drive shaft

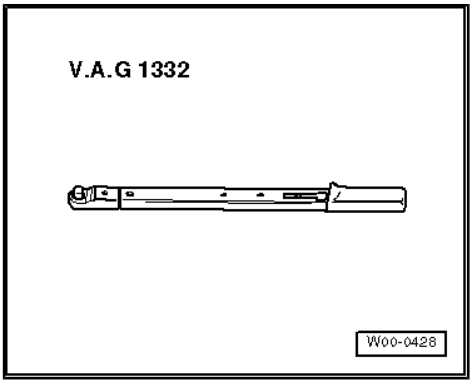
6.2 Removing and installing wheel bearing housing

Special tools and workshop equipment required

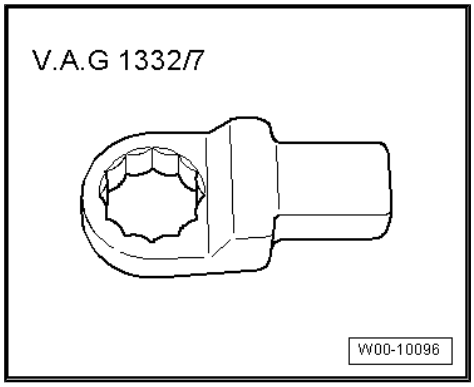
- ♦ Torque wrench - V.A.G 1331-



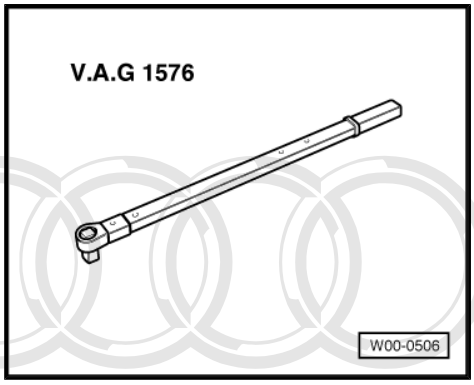
- ♦ Torque wrench - V.A.G 1332-



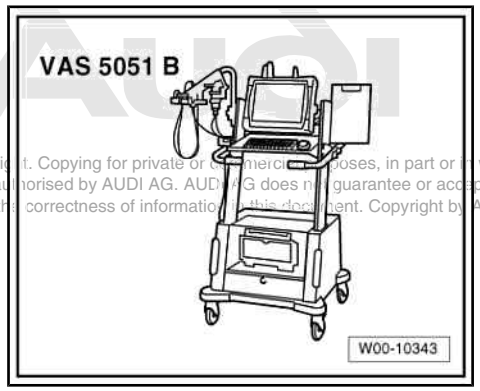
- Ring spanner insert - V.A.G 1332/7-



- Torque wrench - V.A.G 1576-

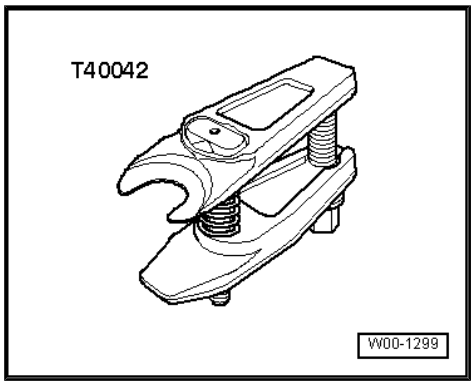


- Vehicle diagnostic, testing and information system - VAS 5051 B- with appropriate diagnosis cable

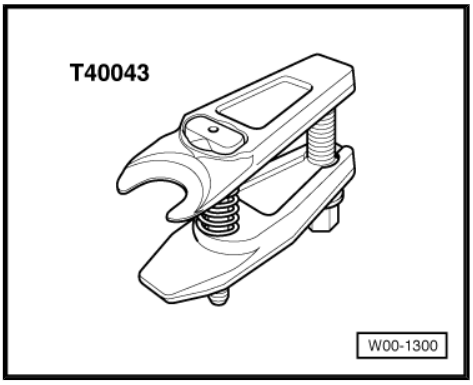


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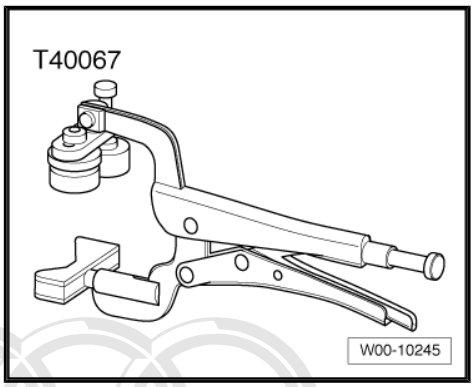
- Ball joint puller - T40042-



♦ Ball joint puller - T40043-



♦ Pliers - T40067-



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Removing

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

– Bleed system using -VAS 5051 B- ⇒ page 229 .

All vehicles

– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).

– Loosen flange bolt securing outer joint of drive shaft (loosen only when vehicle is standing on its wheels -accident risk-) ⇒ page 100 .

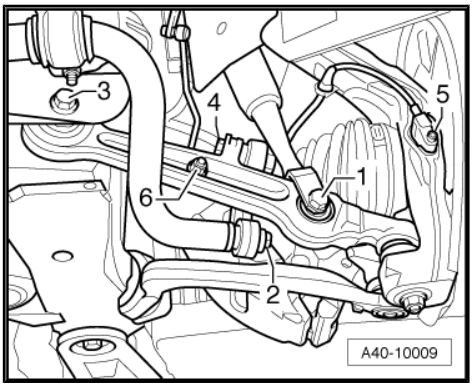
– Detach ABS speed sensor wiring from bracket on wheel bearing housing.

– Detach brake caliper and secure to body so that weight of brake caliper does not stretch or damage brake hose or brake pipe.

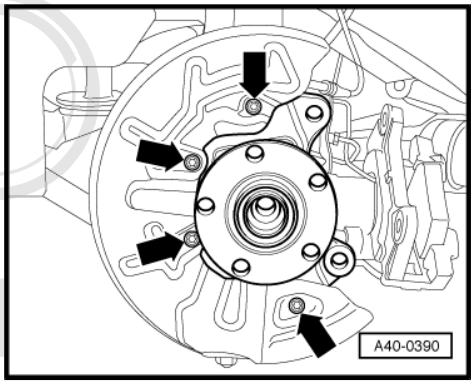
– Unscrew bolt -5- for ABS speed sensor.

– Unclip ABS wire from wheel bearing housing.

– Remove brake disc.

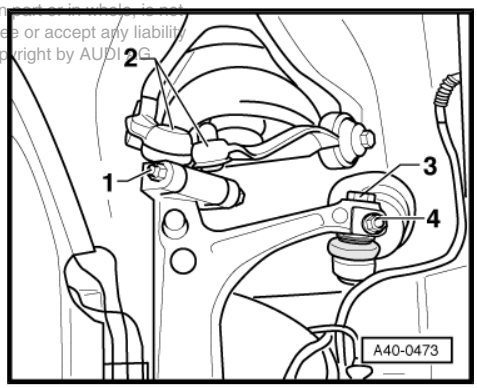


– Remove bolts -arrows- and take off heat shield.



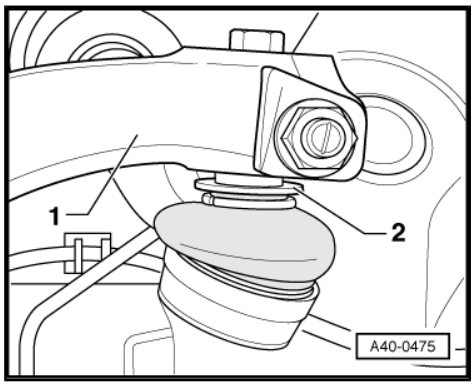
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– Unscrew bolt -3- and bolt -4-.



Note

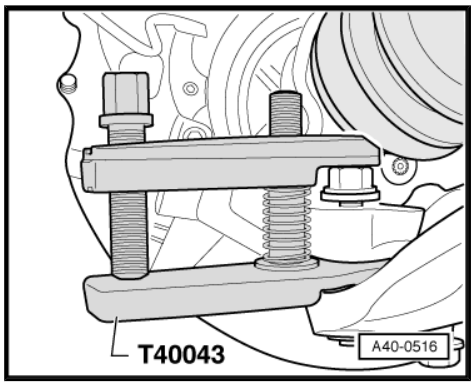
- *Do not apply a chisel or similar tool between steering arm -1- and seal -2- on track rod ball joint when pressing out track rod, otherwise the seal can be damaged.*
- *Do not attempt to enlarge slots in wheel bearing housing using a chisel or similar.*
- *When pressing track rod out of steering arm, apply pressure only to end of track rod ball joint, or knock out end of joint using a wooden or rubber mallet.*
- *Perform wheel alignment check after completing repair* *⇒ page 281* .



– Pull out or press out track rod downwards.

– Unscrew nut on joint pin of guide link until it is flush with end of thread. Counterhold joint pin with 6 mm Allen key if necessary.

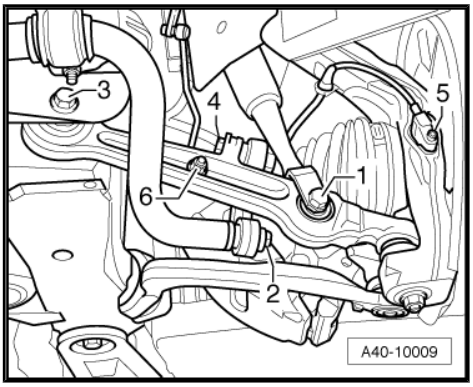
– Press joint pin of guide link out of tapered seat using ball joint puller - T40043- .



Note

- *Take care not to damage drive shaft boot.*
- *Make sure the two lever arms of the puller are parallel when maximum force is exerted.*

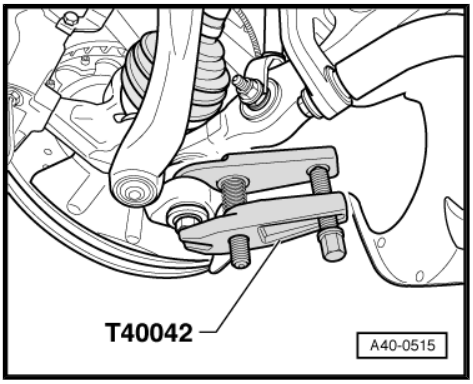
– On vehicles with vehicle level sender, unscrew nut -6-.
– Unscrew nut on joint pin of track control link until it is flush with end of thread. Counterhold joint pin with 6 mm Allen key if necessary.



– Press joint pin of track control link out of tapered seat using ball joint puller - T40042- .

Note

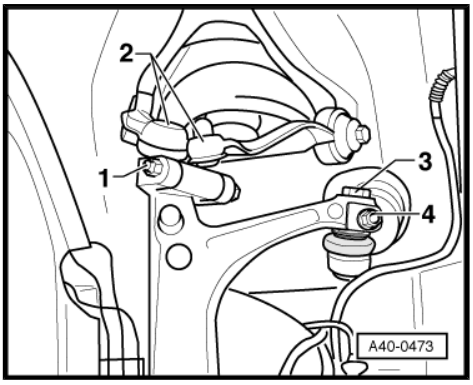
Make sure the two lever arms of the puller are parallel when maximum force is exerted.



– Separate bolt connection -1- and pull out both upper links -2- upwards.

Do not attempt to enlarge slots in wheel bearing housing using a chisel or similar.

– Swing wheel bearing housing away to the side, and at the same time pull end of drive shaft out of wheel hub.
– Tie up drive shaft to body with wire or similar.
– Remove nut from joint pin of track control link.
– Take off wheel bearing housing.



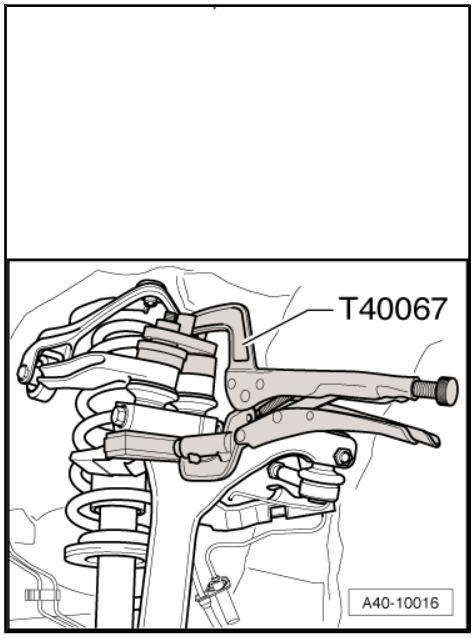
Installing

Installation is carried out in the reverse sequence. Note the following points:

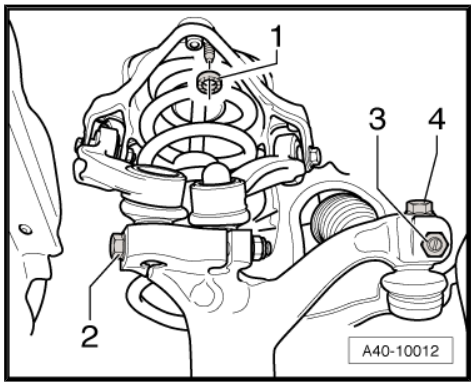
– Fit wheel bearing housing.
– Push outer joint of drive shaft into wheel hub and tighten new flange bolt hand-tight.
– Insert joint pins of track control link and guide link into wheel bearing housing.
– Remove remaining adhesive from thread of joint pin on track control link and guide link.
– Fit and tighten new self-locking nuts on track control link and guide link ⇒ page 80 ; counterhold end of joint if necessary with 6 mm Allen key.

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– Fit joint pins of both upper links in wheel bearing housing and press down as far as possible by clamping with pliers - T40067- .



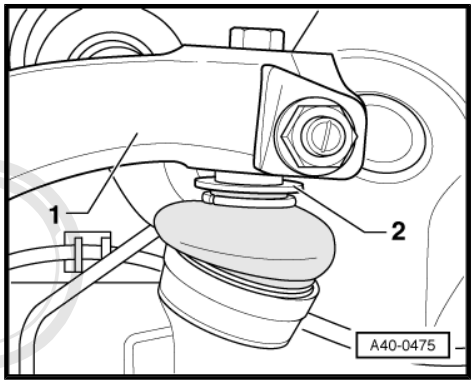
– Install and tighten new bolt -2- and self-locking nut ⇒ page 80 .



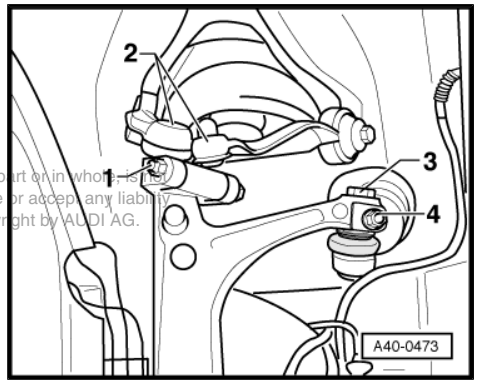
Note

The track rod/ball joint must be inserted into the steering arm -1- by hand. Make sure that no force is applied to seal -2-.

– Insert track rod.

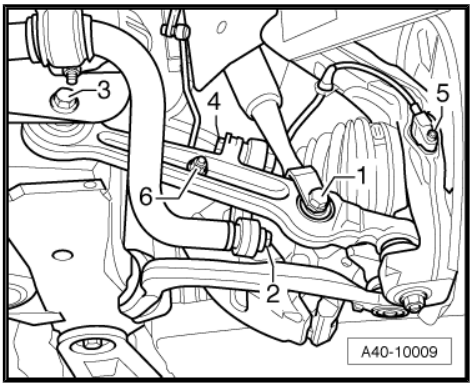


– Fit and tighten new self-locking nut -4- ⇒ page 80 .
– Tighten hexagon bolt -3- ⇒ page 80 .
– Install ABS speed sensor ⇒ Brake system; Rep. Gr. 45 .

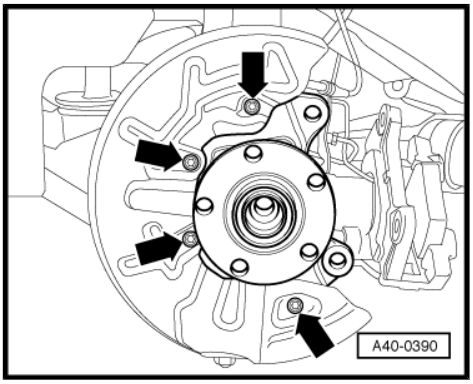


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– On vehicles with vehicle level sender, screw on nut -6- ⇒ Item 11 (page 67) .



– Fit splash plate and tighten bolts ⇒ page 80 .
– Install brake disc and brake caliper ⇒ Rep. gr. 46 .
– Fit wheel.
– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .
– Secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .
– Tighten flange bolt securing outer joint of drive shaft (tighten only when vehicle is standing on its wheels -accident risk-) ⇒ page 100 .
– On vehicles with automatic headlight range control, carry out basic adjustment of headlights ⇒ Rep. gr. 94 .
– Vehicles with air suspension: re-adapt reference position ⇒ page 229 .
– Check and adjust wheel alignment ⇒ page 281 .

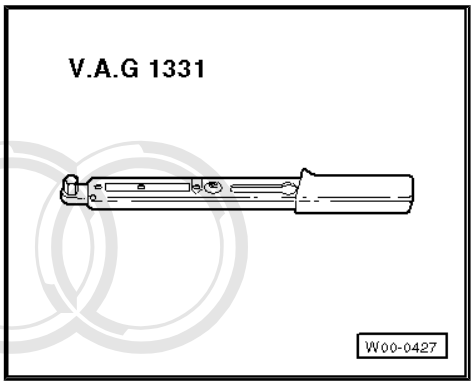


Wheel alignment must always be checked and adjusted if necessary using VW/Audi-approved equipment.

6.3 Removing and installing wheel bearing unit

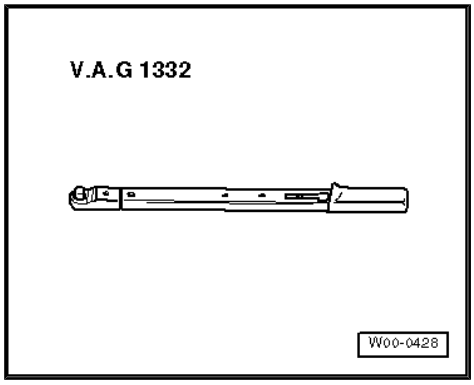
Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1331-

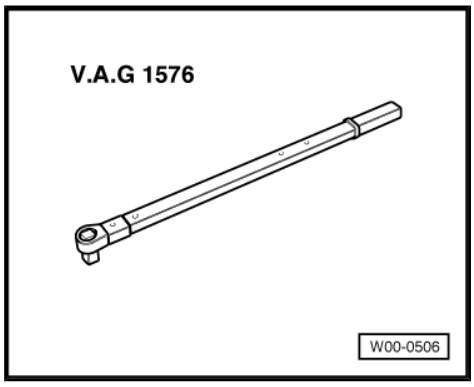


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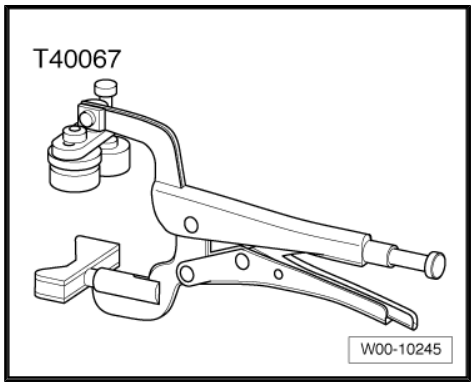
♦ Torque wrench - V.A.G 1332-



♦ Torque wrench - V.A.G 1576-



♦ Pliers - T40067-



Removing

Vehicles with air suspension

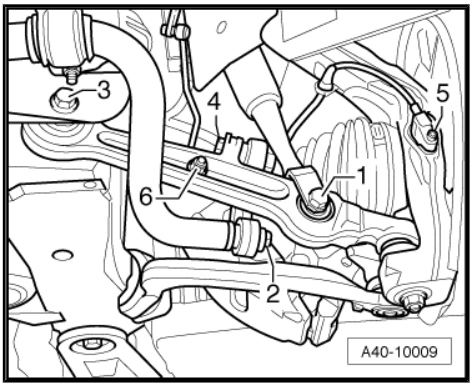
– Position vehicle on lifting platform ⇒ page 11 .

All vehicles

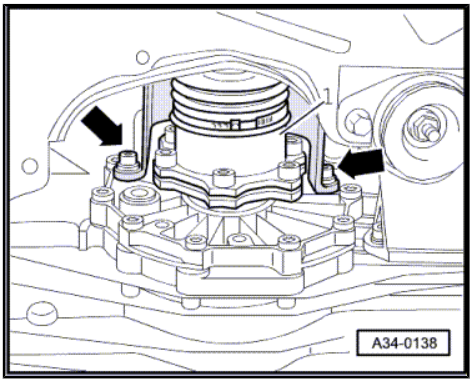
– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).
– Loosen flange bolt securing outer joint of drive shaft (loosen only when vehicle is standing on its wheels -accident risk-) ⇒ page 100 .
– Remove noise insulation ⇒ Rep. gr. 50 .
– Detach brake caliper and secure to body so that weight of caliper does not stretch or damage brake hose or brake pipe ⇒ Rep. gr. 46 .

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– Unscrew bolt -5- for ABS speed sensor.
– Unclip ABS wire from wheel bearing housing.
– Remove brake disc.



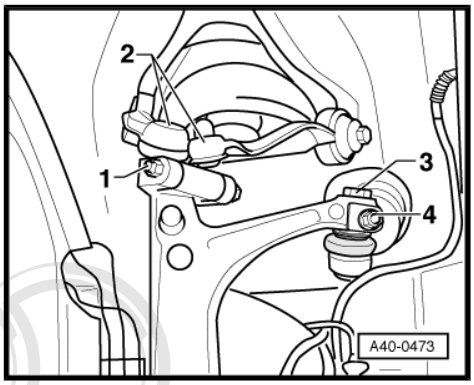
– Unbolt drive shaft -1- from flange shaft on gearbox.



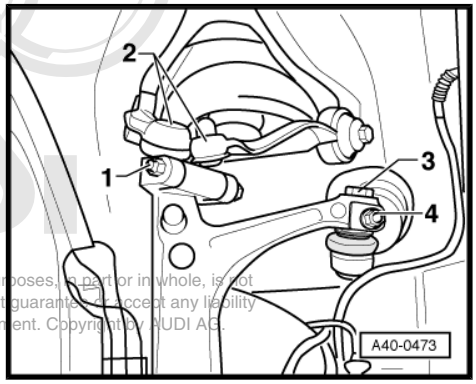
– Separate bolt connection -1- and pull out both upper links -2- upwards.

Do not attempt to enlarge slots in wheel bearing housing using a chisel or similar.

– Swing wheel bearing housing away to the side, and at the same time pull end of drive shaft out of wheel hub.
– Take out drive shaft.



– Fit joint pins of both upper links -2- into wheel bearing housing and insert bolt -1- without fitting nut.

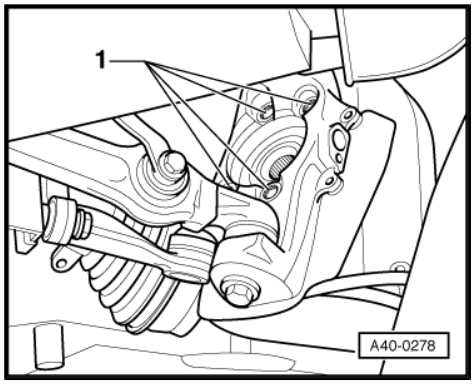


Note

This step prevents damage to suspension parts when loosening and tightening the countersunk bolts.

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– Unscrew countersunk bolts -1-.
– Take out wheel bearing unit.

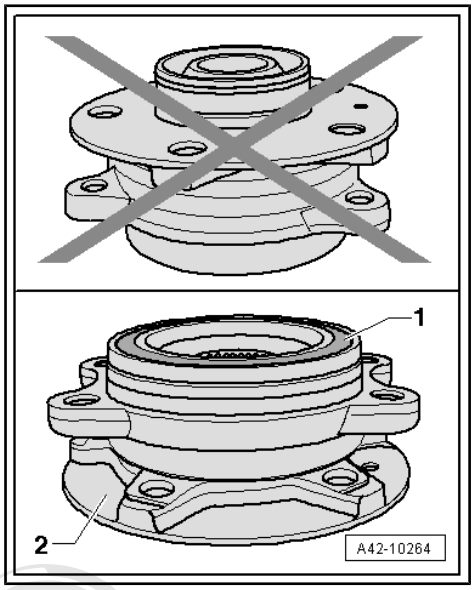


Caution

- *Avoid dirtying or damaging the seal when laying down or storing the wheel bearing.*

The wheel bearing -1- must always be pointing upwards.

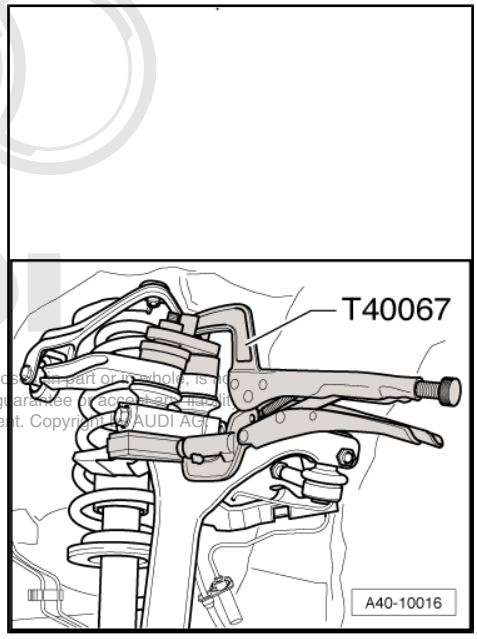
– Always put down the wheel bearing unit with the wheel hub -2- facing downwards.
– Servicing wheel bearing unit ⇒ page 91 .



Installing

Installation is carried out in the reverse sequence. Note the following points:

– Fit joint pins of both upper links in wheel bearing housing and press down as far as possible by clamping with pliers - T40067- .



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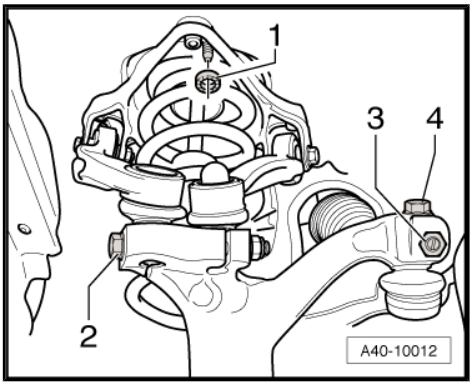
– Install and tighten new bolt -2- and self-locking nut ⇒ page 80 .

Tightening torques ⇒ page 80

– Fit wheel.

– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .

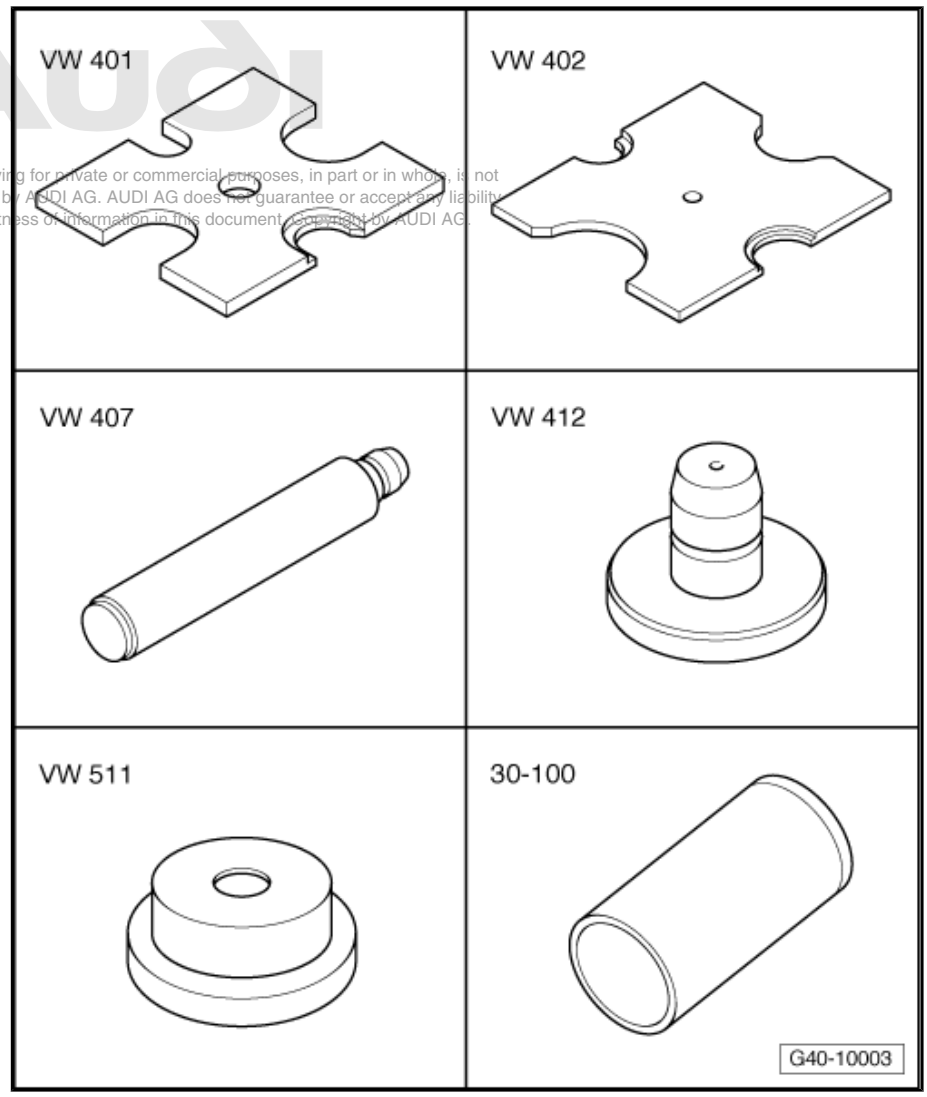
– Secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .



6.4 Servicing wheel bearing unit

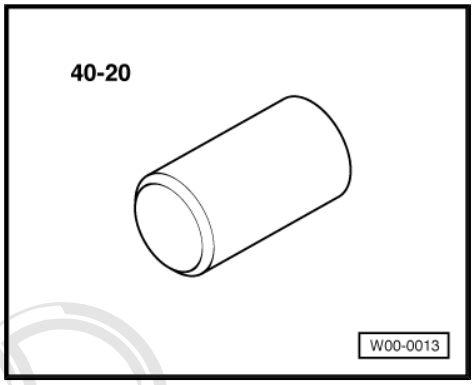
Special tools and workshop equipment required

- Thrust plate - VW 401-
- Thrust plate - VW 402-
- Press tool - VW 407-
- Press tool - VW 412-
- Thrust pad - VW 511-
- Drift sleeve - 30 - 100-

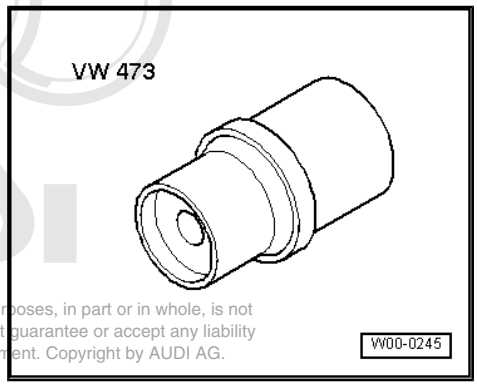


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- Drift sleeve - 40-20-

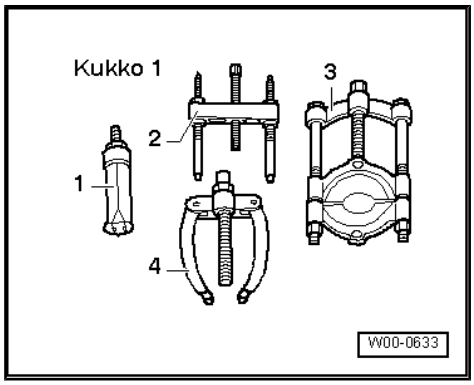


- Press tool - VW 473-

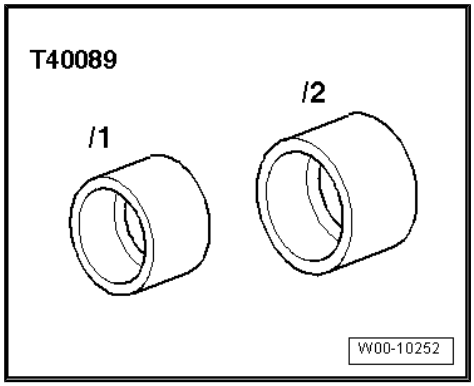


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- Splitter 3 - Kukko 17/2-

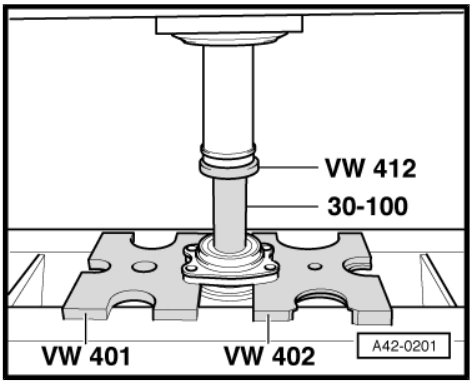


- Assembly tool - T40089/1- for 85 mm ∅ wheel bearings or assembly tool - T40089/2- for 92 mm ∅ wheel bearings

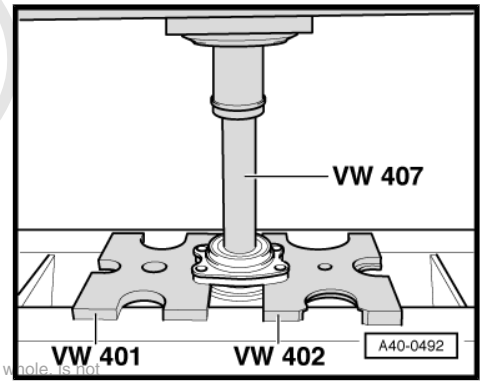


- Wheel bearing unit removed ⇒ page 87

Pressing wheel hub out of 85 mm ∅ wheel bearing



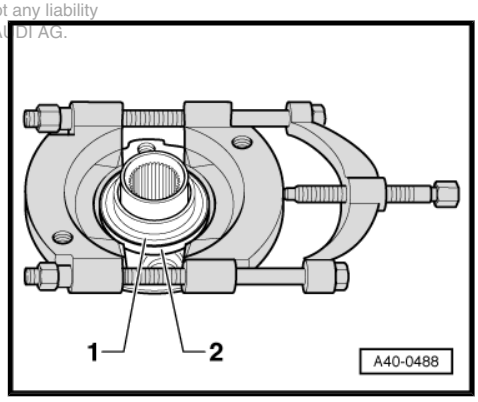
Pressing wheel hub out of 92 mm ∅ wheel bearing



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Pressing inner bearing race off wheel hub (85 mm ∅ or 92 mm ∅)

– Apply splitter between inner bearing race -1- and deflector ring -2-, and tighten spindle.

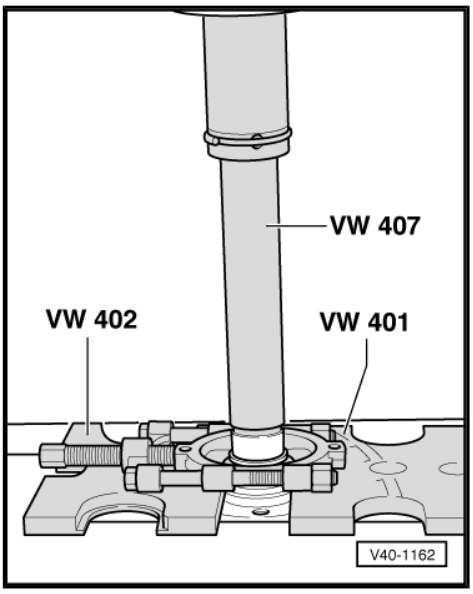


Note

Use commercially available splitter, e.g. Kukko 17/2.

The deflector ring becomes deformed in this process and must then be renewed.

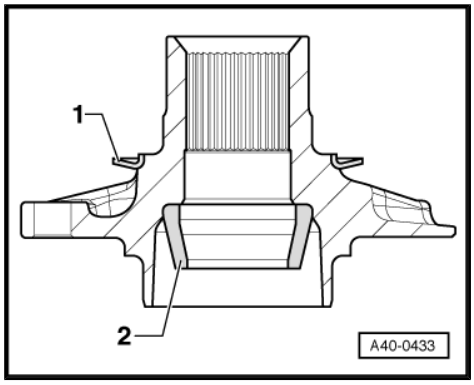
– Press inner bearing race (85 mm ∅ or 92 mm ∅ wheel bearing) off wheel hub.



Renewing deflector ring (85 mm ∅ or 92 mm ∅ wheel bearing)

– Carefully prise off old deflector ring -1- using a screwdriver.

– Fit new deflector ring on wheel hub.



– Apply special tools as shown in illustration.

1 - Press tool - VW 473-

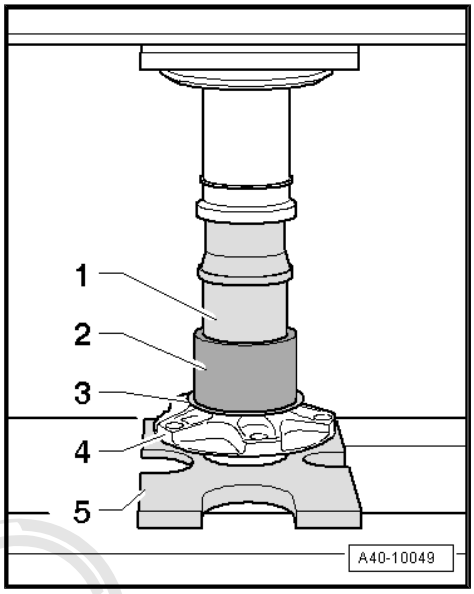
2 - Assembly tool - T40089/1- for 85 mm ∅ wheel bearings or assembly tool - T40089/2- for 92 mm ∅ wheel bearings

3 - Deflector ring

4 - Wheel hub

5 - Thrust plate - VW 401-

– Press on deflector ring as far as radius on wheel hub using assembly tool - T40089/1- or -T40089/2- as illustrated.



Note

The deflector ring must be pressed on until it is seated against the radius on the wheel hub.

Pressing wheel hub into wheel bearing

– Apply the special tools as shown.

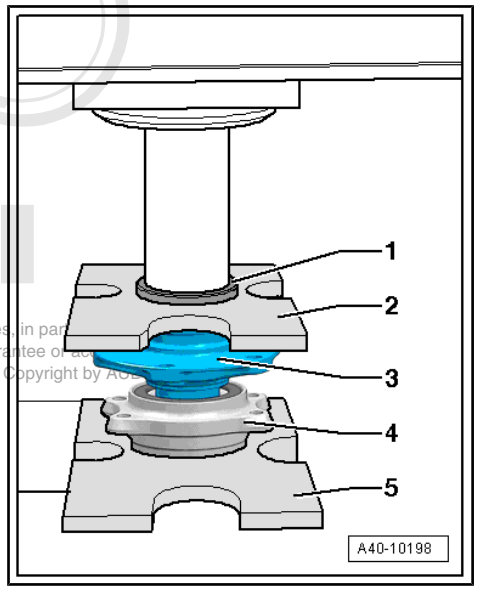
1 - Press tool - VW 412-

2 - Thrust plate - VW 402-

3 - Wheel hub

4 - Ball bearing

5 - Thrust plate - VW 401-



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Note

The machined surface of the wheel bearing outer race faces downwards.

Caution

Make sure no dirt gets between thrust plate - VW 401- -5- and ball bearing -4- when pressing in the hub or when the parts are placed on a workbench, etc.

– Press wheel hub into wheel bearing.

– Install wheel bearing unit ⇒ page 87 .

7 Tunnel cross member, body brace

⇒ “7.1 Tunnel cross member, body brace - exploded view”, page 95

⇒ “7.2 Removing and installing tunnel cross member”, page 95

⇒ “7.3 Removing and installing body brace”, page 97

7.1 Tunnel cross member, body brace - exploded view

1 - Tunnel cross member
- ❑ Removing and installing ⇒ page 95

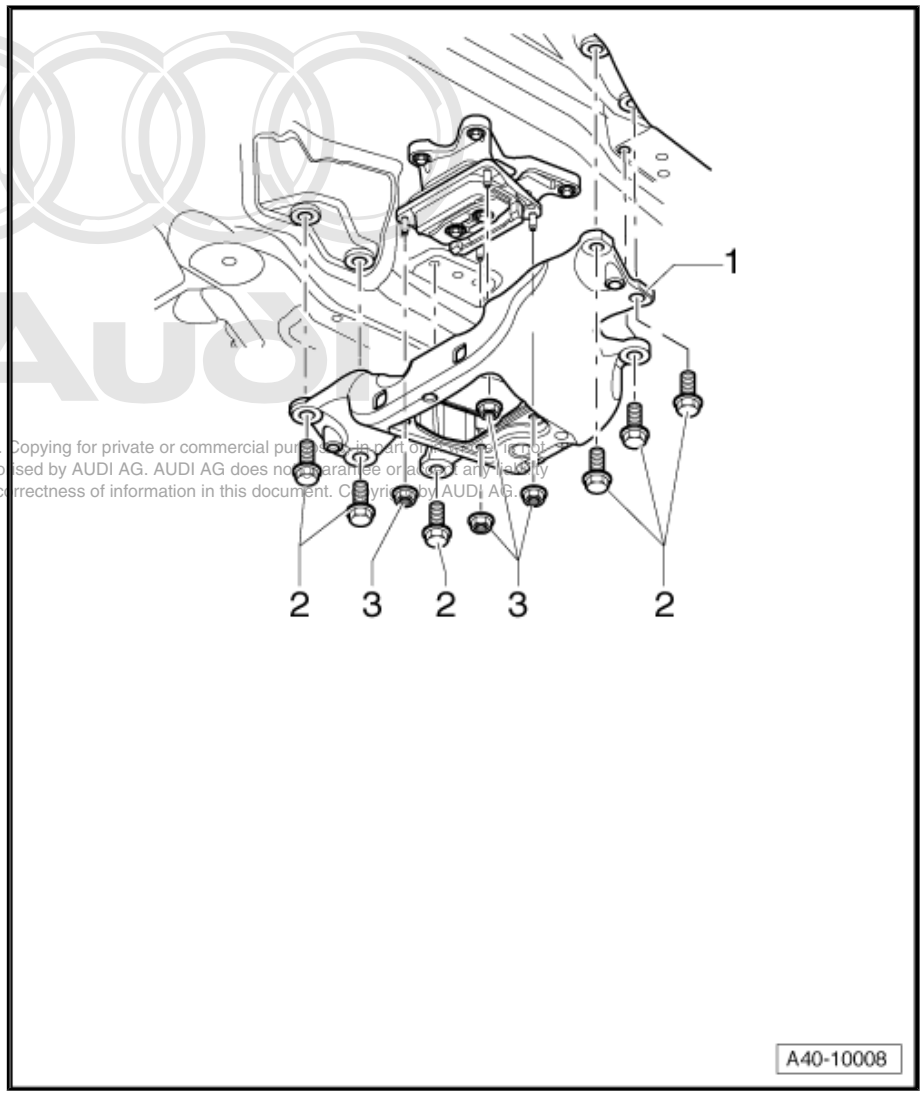
2 - Bolt
- ❑ 50 Nm

3 - Nut
- ❑ 23 Nm

4 - Multi-point socket head bolt
- ❑ 25 Nm

5 - Body brace
- ❑ Removing and installing ⇒ page 97

6 - Multi-point socket head bolt
- ❑ 25 Nm

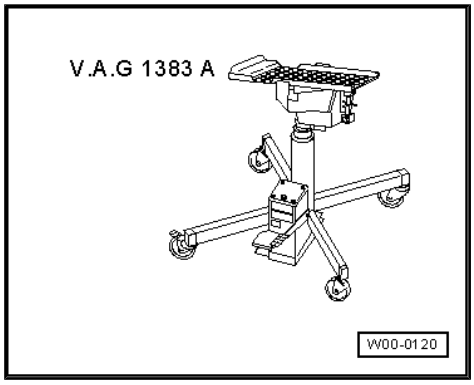


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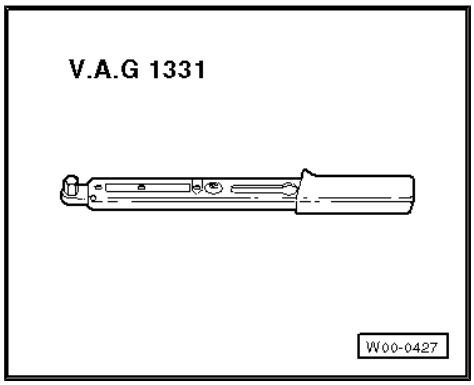
7.2 Removing and installing tunnel cross member

Special tools and workshop equipment required

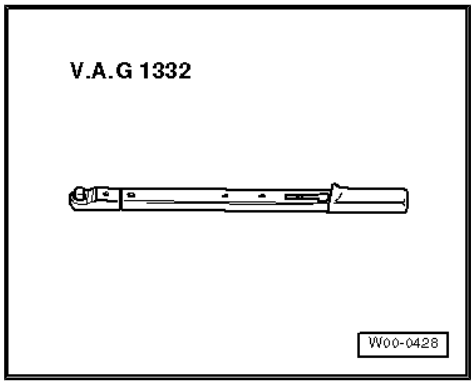
♦ Engine and gearbox jack - V.A.G 1383 A-



♦ Torque wrench - V.A.G 1331-



♦ Torque wrench - V.A.G 1332-



Removing

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

All vehicles

On vehicles with dual exhaust system, remove noise insulation and exhaust pipe (left or right side).

– Remove noise insulation ⇒ Rep. gr. 50 .

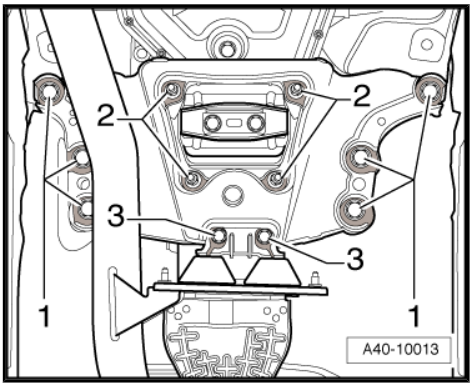
– Remove exhaust system ⇒ Rep. gr. 26 .

– Take up weight of gearbox with engine and gearbox jack - V.A.G 1383 A- , using a suitable block of wood.

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– Remove bolts -1- and -3- and nuts -2-.

– Take out tunnel cross member.



Installing

Installation is carried out in the reverse sequence. Note the following points:

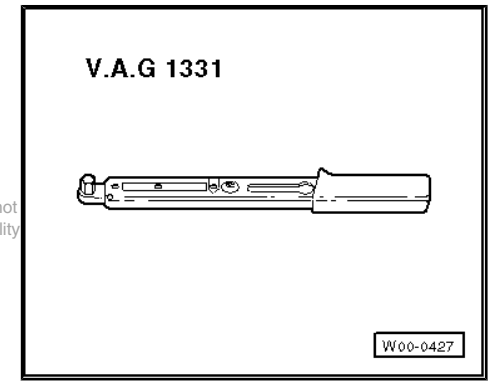
Tightening torques ⇒ page 95

– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .

7.3 Removing and installing body brace

Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1331-

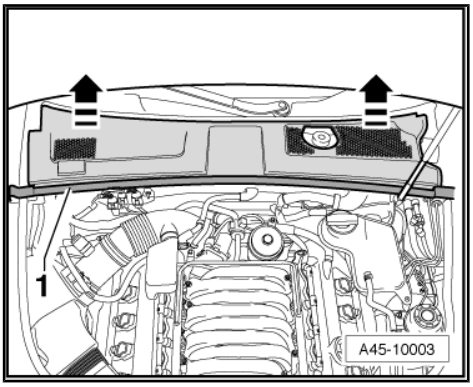


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Removing

– Pull rubber seal -1- off plenum chamber cover.

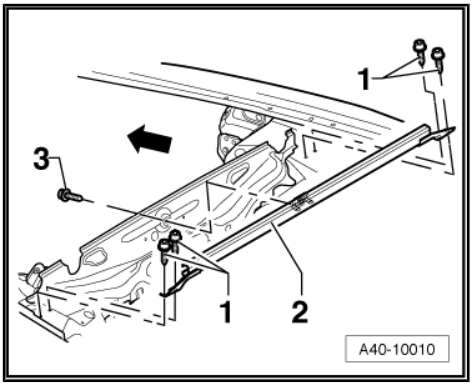
– Detach plenum chamber cover -see arrows- towards the front.



– Remove multi-point socket head bolts -1- and -3-.

Refer to ⇒ Electronics parts catalogue for allocation of multi-point socket head bolts

– Lift body brace -2- out of plenum chamber.



Installing

Installation is carried out in the reverse sequence. Note the following points:

Tightening torques ⇒ page 95

8 Drive shaft

⇒ “8.1 Removing and installing drive shaft”, page 98

⇒ “8.2 Loosening and tightening flange bolt for outer joint on drive shaft”, page 100

⇒ “8.3 Exploded view of drive shaft with peened triple roller joint AAR 3300 i and outer constant velocity joint (100 mm dia.)”, page 101

⇒ “8.4 Dismantling and assembling peened triple roller joint AAR 3300 i”, page 104

⇒ “8.5 Servicing outer constant velocity joint (100 mm diameter)”, page 110

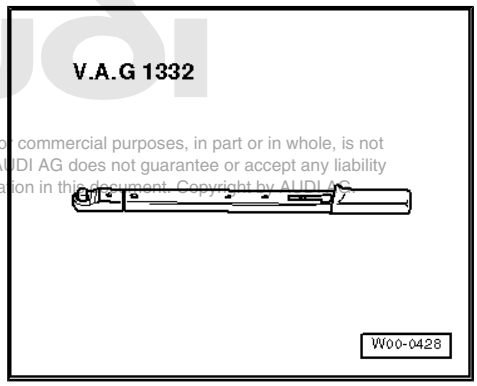
⇒ “8.6 Checking outer constant velocity joint”, page 111

⇒ “8.7 Tightening large and small clips on triple roller joint and outer joint”, page 112

8.1 Removing and installing drive shaft

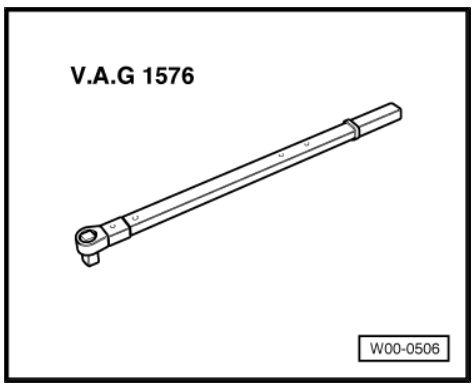
Special tools and workshop equipment required

- Torque wrench - V.A.G 1332-

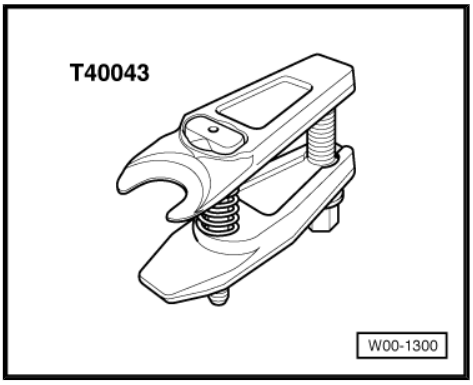


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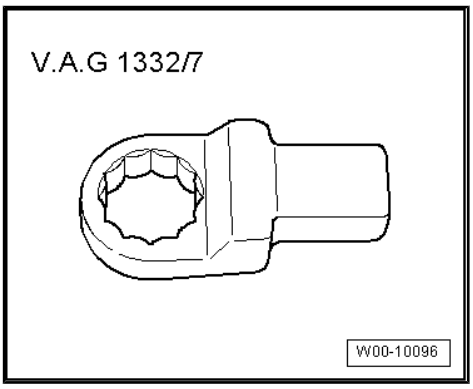
- Torque wrench - V.A.G 1576-



♦ Ball joint puller - T40043-



♦ Ring spanner insert - V.A.G 1332/7-



Removing

Vehicles with air suspension

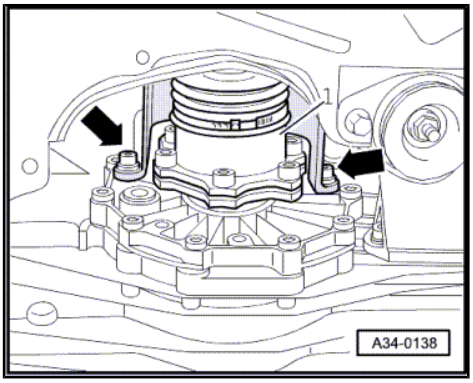
– Position vehicle on lifting platform ⇒ page 11 .

All vehicles

– Loosen flange bolt for outer joint on drive shaft ⇒ page 100 .
– Remove wheel.
– Remove noise insulation ⇒ Rep. gr. 50 .
– Unbolt drive shaft -1- from flange shaft on gearbox.
– Take out drive shaft.

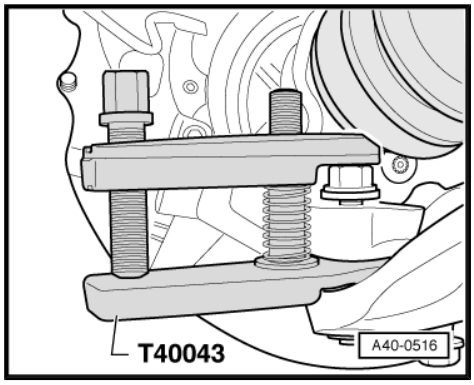
Perform the following step if there is not enough clearance to take out the drive shaft.

– Unscrew nut on joint pin of guide link until it is flush with end of thread. Counterhold joint pin with 6 mm Allen key if necessary.



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– Press joint pin of guide link out of tapered seat using ball joint puller - T40043- .



Note

- *Take care not to damage drive shaft boot.*
- *Make sure the two lever arms of the puller are parallel when maximum force is exerted.*

– Unscrew nut and take joint pin of guide link out of wheel bearing housing.

– Together with a second mechanic, swivel aside wheel bearing housing and at the same time pull drive shaft pin out of wheel hub.

– Take out drive shaft.

Installing

Installation is carried out in the reverse sequence. Note the following points:

– Remove remaining adhesive from thread of joint pin on guide link.

Tightening torques ⇒ page 66

– Tightening torque for securing drive shaft to flange shaft on gearbox ⇒ Item 19 (page 81) .

– Fit wheel.

– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .

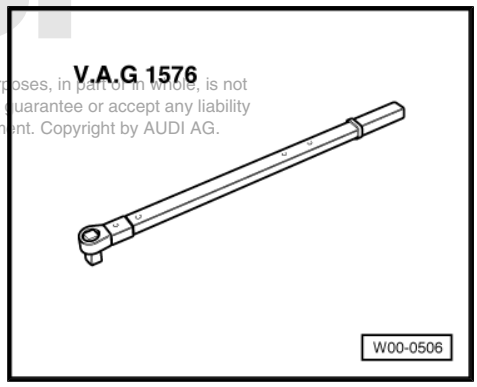
– Secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .

– Tighten flange bolt for outer joint on drive shaft ⇒ page 100 .

8.2 Loosening and tightening flange bolt for outer joint on drive shaft

Special tools and workshop equipment required

- Torque wrench - V.A.G 1576-



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Loosening flange bolt for outer joint on drive shaft

– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).

WARNING

The vehicle must be standing on its wheels when loosening and tightening the flange bolt.

-Accident risk-

– Slacken off flange bolt for outer joint of drive shaft by no more than 90° (vehicle must be standing on its wheels to avoid any accident risk).
– Lift vehicle and remove wheel.
– Screw in and hand-tighten all 5 wheel bolts again.

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A second mechanic is required for the next operation.

– 1st mechanic gets into vehicle and presses brake pedal.
– 2nd mechanic unscrews flange bolt for drive shaft.

The wheel bearings must not be subjected to load after the flange bolt has been slackened or removed.

If the wheel bearings are subjected to the full weight of the vehicle they will be overloaded, resulting in reduced service life.

If a vehicle has to be moved after removing the drive shaft, first install an outer joint in place of the drive shaft and tighten to 200 Nm. Otherwise the wheel bearing will be damaged.

Tightening flange bolt for outer joint on drive shaft

– Renew flange bolt.

A second mechanic is required when tightening flange bolt for drive shaft.

– 1st mechanic gets into vehicle and presses brake pedal.
– 2nd mechanic pre-tightens flange bolt for drive shaft ONLY to specified torque (without turning further) ⇒ page 80 .
– Fit wheel and lower vehicle onto its wheels.

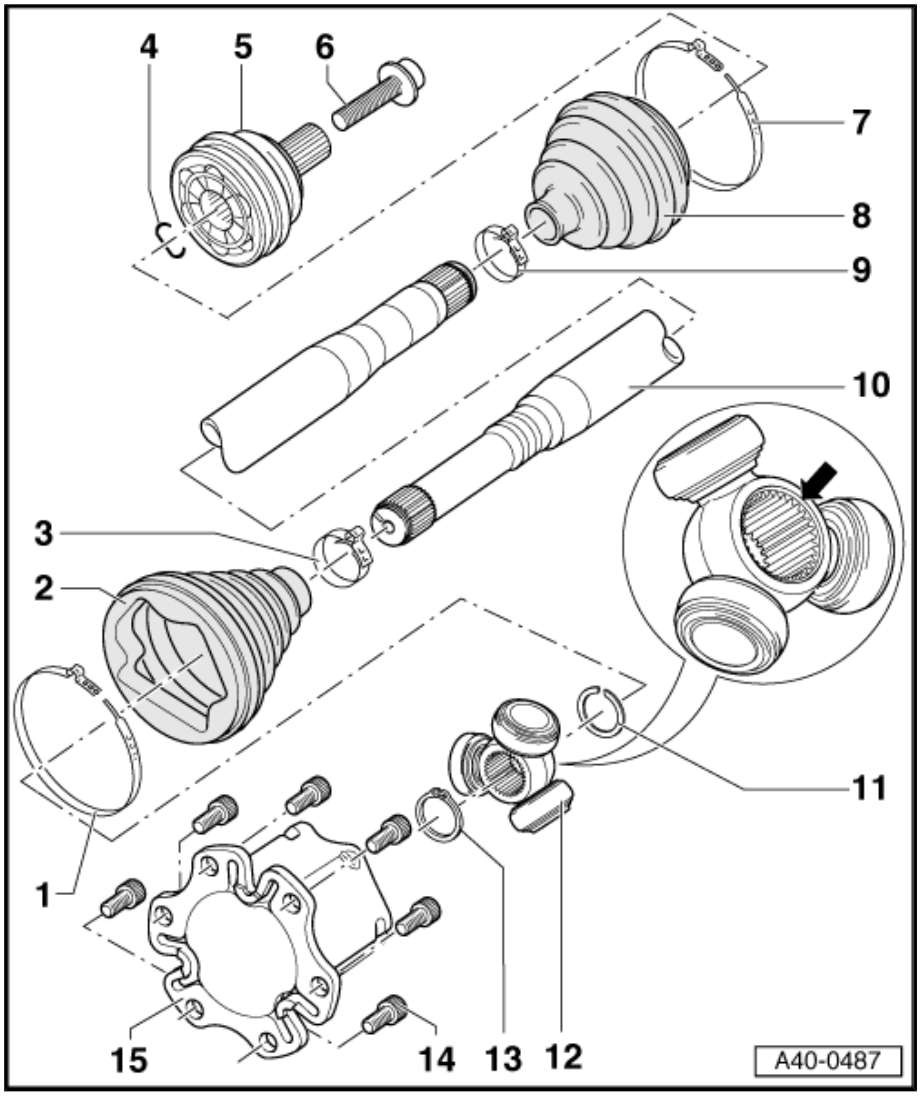
WARNING

The vehicle must be standing on its wheels when loosening and tightening the flange bolt.

-Accident risk-

– Tighten flange bolt to final setting by turning through specified angle (vehicle must be standing on its wheels to avoid any accident risk) ⇒ page 80 .

8.3 Exploded view of drive shaft with peened triple roller joint AAR 3300 i and outer constant velocity joint (100 mm dia.)



1 - Hose clip

- ❑ Always renew
- ❑ Tightening ⇒ page 112

2 - Boot for triple roller joint

- ❑ Boot must rest in groove and on contour of joint body.
- ❑ Briefly lift boot to equalise pressure before tightening hose clip

3 - Hose clip

- ❑ Always renew
- ❑ Tightening ⇒ page 112

4 - Circlip

- ❑ Always renew
- ❑ Fit into annular groove on shaft before installing (no longer visible once joint is installed)
- ❑ Before fitting constant velocity joint, align circlip centrally with opening facing upwards.

5 - Outer constant velocity joint

- ❑ Renew only as complete unit
- ❑ Removing ⇒ page 110
- ❑ Checking ⇒ page 111
- ❑ Installing ⇒ page 110
- ❑ Greasing ⇒ page 103
- ❑ Grease splines on drive shaft lightly with grease used in joint when fitting joint onto drive shaft

6 - Flange bolt

- ❑ Always renew if removed
- ❑ Keep to specified sequence when loosening and tightening flange bolt ⇒ page 100
- ❑ Tightening torque ⇒ Item 8 (page 80)

7 - Hose clip

- ❑ Always renew
- ❑ Tightening ⇒ page 112

8 - Boot for outer constant velocity joint

- ❑ Check for splits and chafing
- ❑ Briefly lift boot to equalise pressure before tightening hose clip

9 - Hose clip

- ❑ Always renew
- ❑ Tightening ⇒ page 112

10 - Drive shaft

11 - Circlip

- ❑ For correct version refer to ⇒ Parts catalogue

12 - Triple roller spider

Chamfer -arrow- faces towards drive shaft splines

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- ❑ Grease splines on drive shaft lightly with grease used in joint when fitting triple roller spider onto drive shaft

13 - Circlip

- ❑ Renew
- ❑ Insert in groove on shaft

14 - Bolt

- ❑ For correct version refer to ⇒ Electronic parts catalogue
- ❑ Tightening torque ⇒ Item 19 (page 81)

15 - Joint body

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Grease quantity and type

Regrease joint when renewing boot.

For required grease filling of joints, refer to ⇒ Electronic parts catalogue .

Note

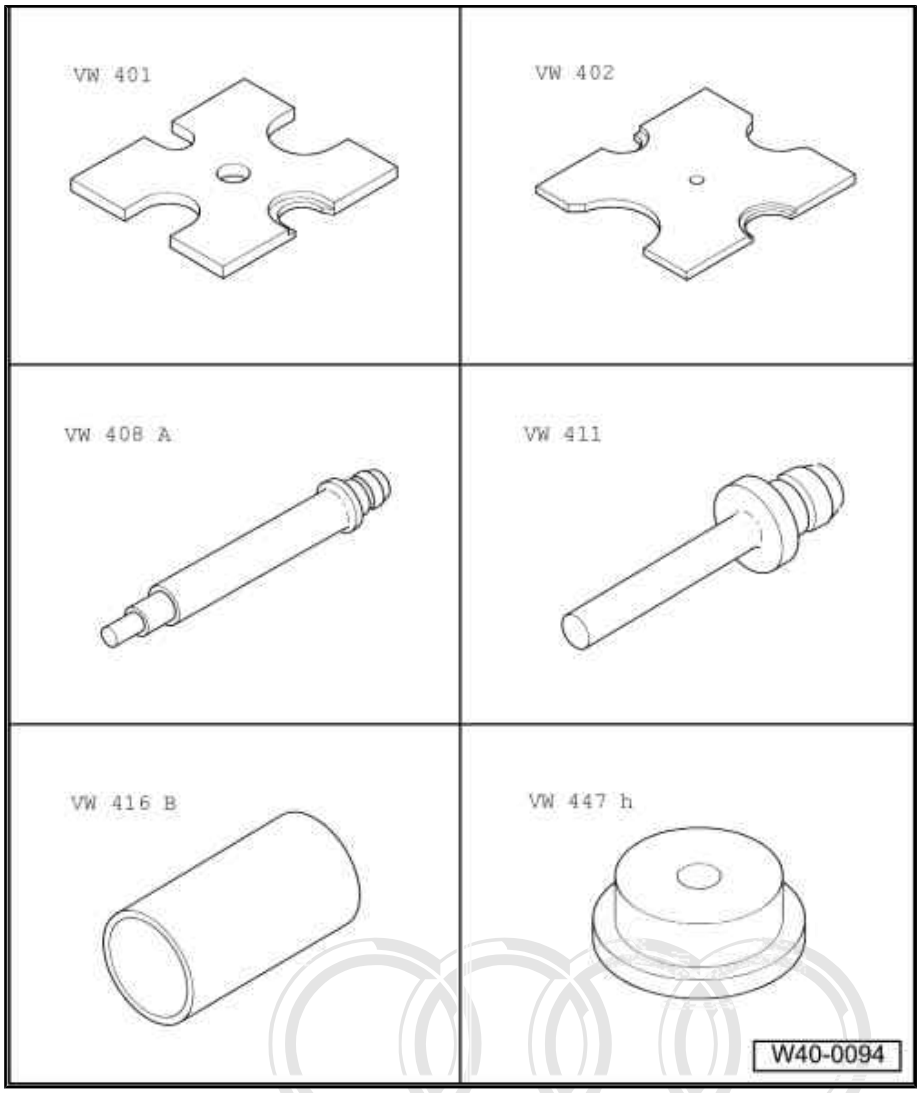
Note that different types of grease are required for outer and inner joints.

	Grease	of which in:	
Outer joint	**Total quantity**	**Joint**	**Boot**
∅ mm	[g]	[g]	[g]
100	120	70	50
Inner joint			
	130	70	60

8.4 Dismantling and assembling peened triple roller joint AAR 3300 i

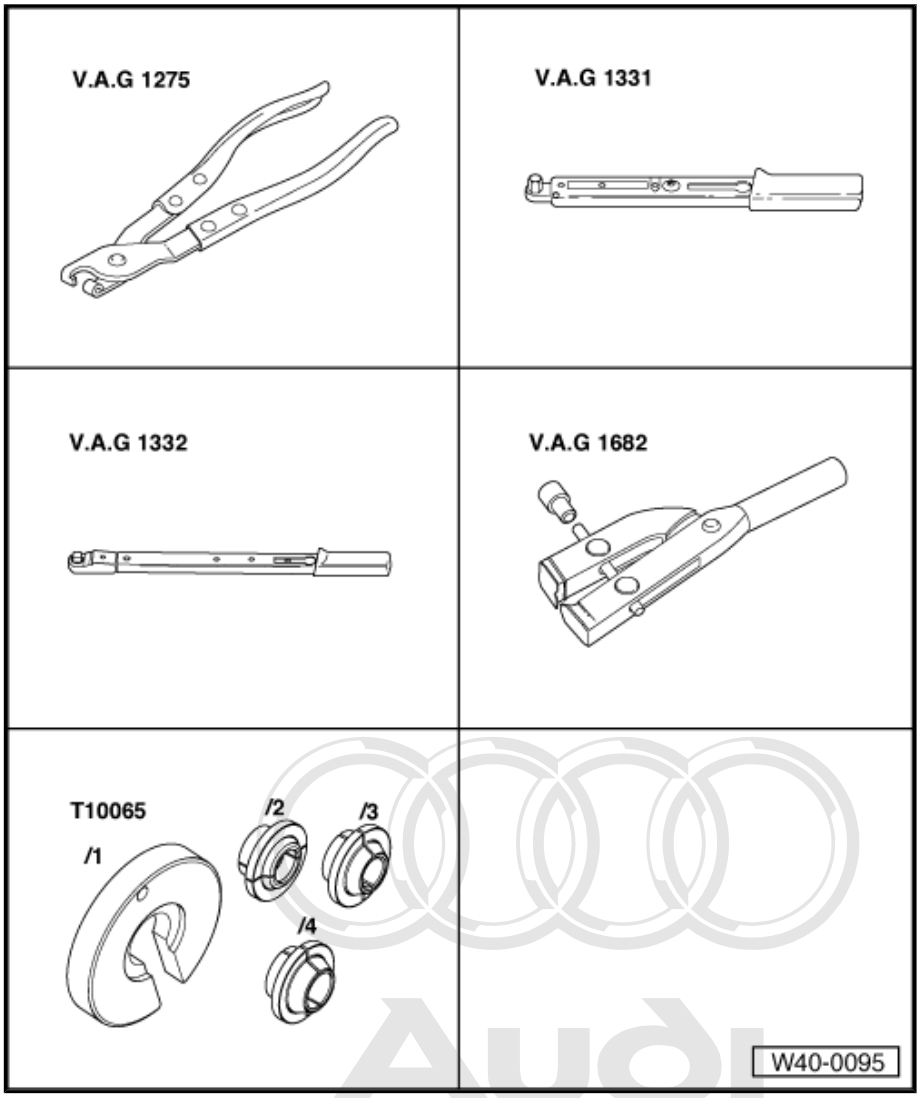
Special tools and workshop equipment required

- Thrust plate - VW 401-
- Thrust plate - VW 402-
- Press tool - VW 408 A-
- Press tool - VW 411-
- Tube - VW 416 B-
- Thrust plate - VW 447 H-



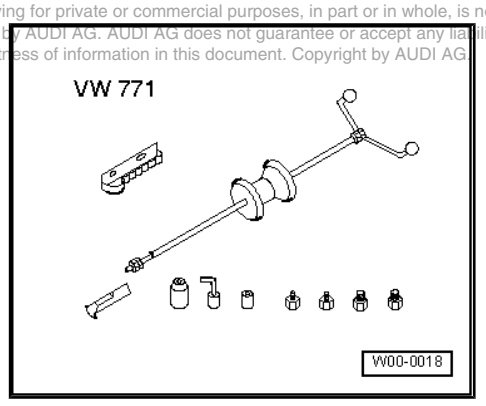
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- Hose clip pliers - V.A.G 1275-
- Torque wrench - V.A.G 1331-
- Torque wrench - V.A.G 1332-
- Clamp tensioner - V.A.G 1682-
- Assembly tool - T10065-

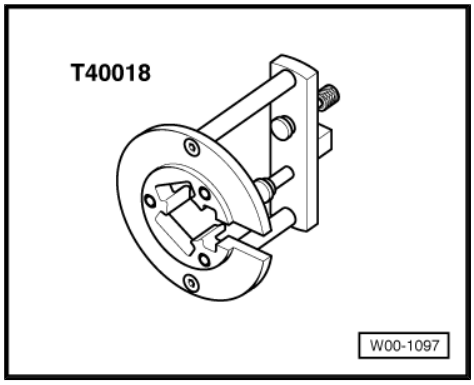


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- Multi-purpose tool - VW 771-



♦ Assembly tool - T40018-



♦ Brass/copper drift

Dismantling peened triple roller joint AAR 3300 i

– Clamp drive shaft horizontally in vice.

Note

♦ *Use jaw protectors for vice.*

♦ *Take care not to damage drive shaft.*

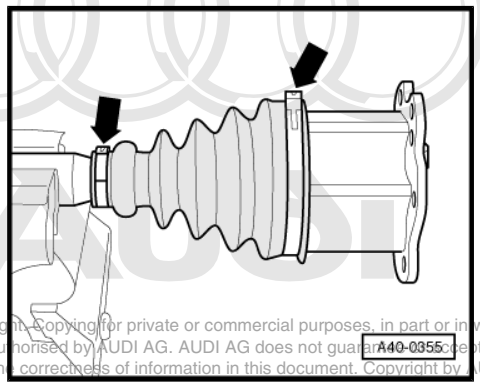
– Mark position of joint body relative to drive shaft.

The joint may be noisy if these parts are not marked and reinstalled in their original positions.

Use a waterproof felt-tip pen for marking.

– Open hose clips -arrows-.

– Push back boot.

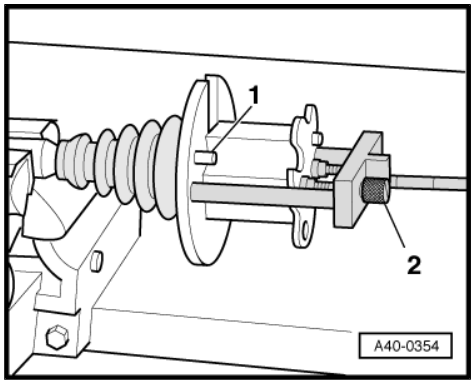


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– Apply removal and assembly tool - T40018- behind joint body.

Locating pin -1- must lie against outside of joint body.

– Bring assembly tool - T40018- into contact with joint body by turning knurled screws -2-.



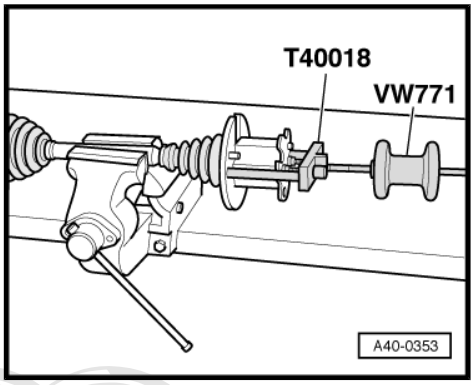
Note

♦ *Joint body must be fixed in assembly tool - T40018- without play.*

♦ *Tighten screws -2- only hand-tight.*

– Screw multi-purpose tool - VW 771- into removal and assembly tool - T40018- .
– Remove joint body by knocking horizontally.

Leave joint body clamped in assembly tool - T40018- .



– Mark installation position of components -1- and -2- as shown.

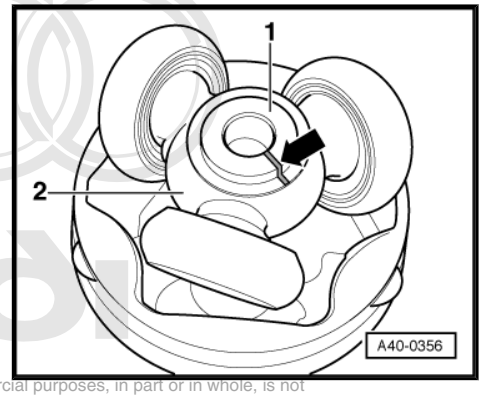
The joint may be noisy if these parts are not marked and reinstalled in their original positions.

Use a waterproof felt-tip pen for marking.

1 - Drive shaft

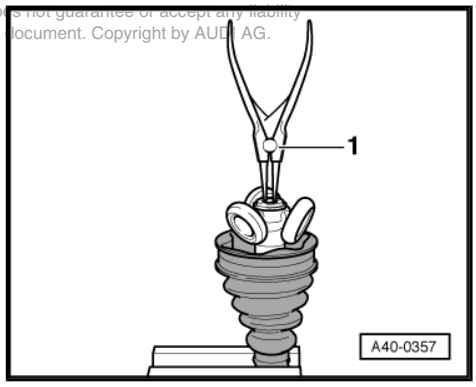
2 - Triple roller spider

– Remove grease with a lint-free cloth.



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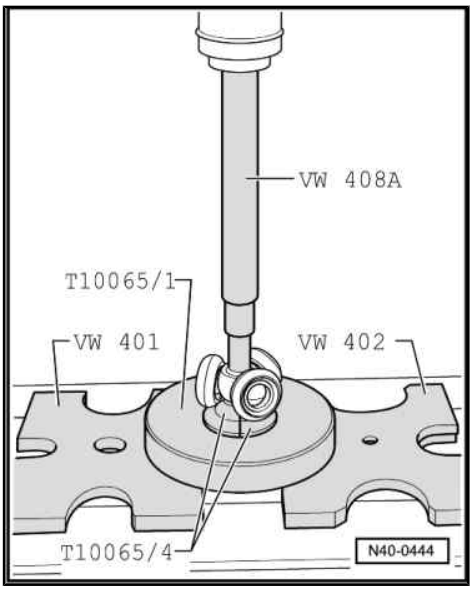
– Remove circlip (use commercial-type pliers -1-).



– Press triple roller spider off drive shaft.

Assembly tool - T10065/4- must not make contact with joint rollers.

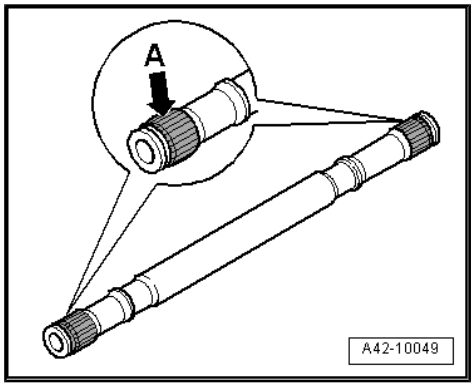
– Pull off boot.
– Remove grease from shaft splines.
– Check rollers and roller races for wear.
– Clean drive shaft and housing.



Assembling triple roller joint AAR 3300 i

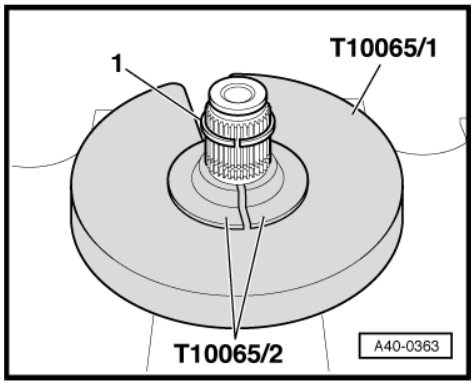
– Grease splines -A- on drive shaft lightly with grease used in joint before fitting triple roller spider onto drive shaft.

– Push new joint boot onto drive shaft.



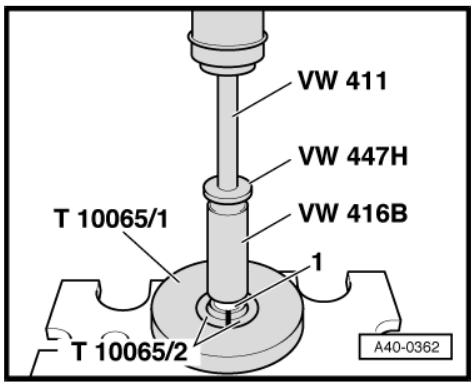
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– Press on circlip -1- as far as centre of splines.



– Use the special tools shown in the illustration.

Instead of -T10065/2- for drive shaft with tapered end, use -T10065/3- for drive shaft with cylindrical (straight) end ⇒ page 109 .



Pressing triple roller spider onto drive shaft

This description only applies to drive shafts with tapered end -arrow-.

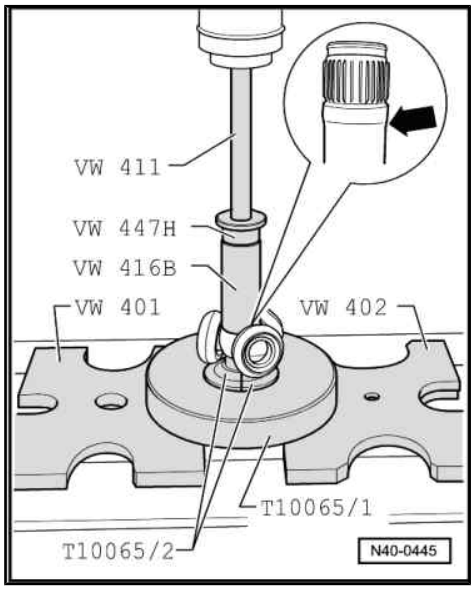
Chamfer on spider faces towards drive shaft and is used as an assembly aid.

– Use the special tools shown in the illustration.

Special tool -T10065/2- must not rest on rollers.

– Fit triple roller spider onto shaft according to markings and drive home onto stop.

– Circlip must engage audibly. Triple roller spider must lie directly against circlip (zero gap).



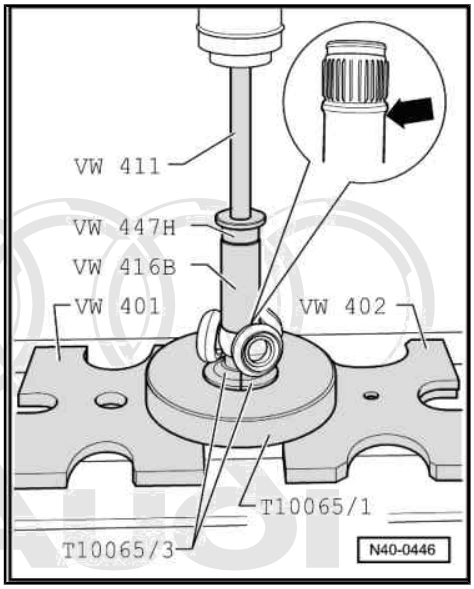
This description only applies to drive shafts with cylindrical (straight) end -arrow-.

Chamfer on spider faces towards drive shaft and is used as an assembly aid.

– Use the special tools shown in the illustration.

Special tool -T10065/3- must not rest on rollers.

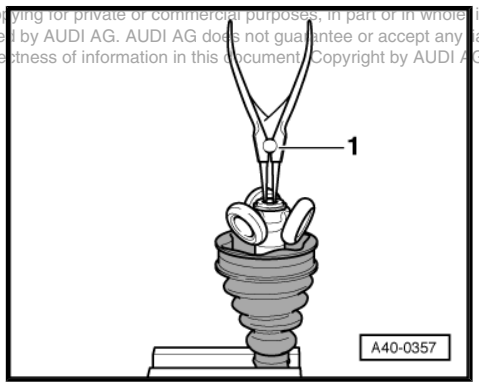
– Fit triple roller spider onto shaft according to markings and drive home onto stop.
– Circlip must engage audibly. Triple roller spider must lie directly against circlip (zero gap).



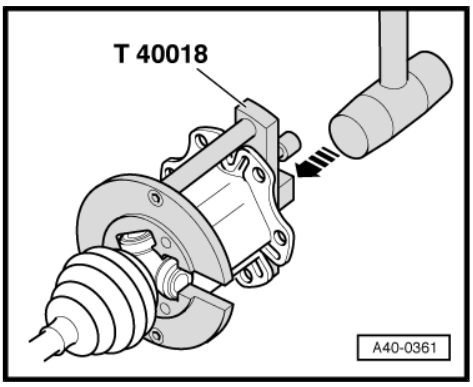
– Install circlip (use commercial-type pliers -1-).
– Press 70 g of high-temperature grease from repair kit into triple roller joint.
– Lightly grease the rollers.

Make sure rollers are aligned straight.

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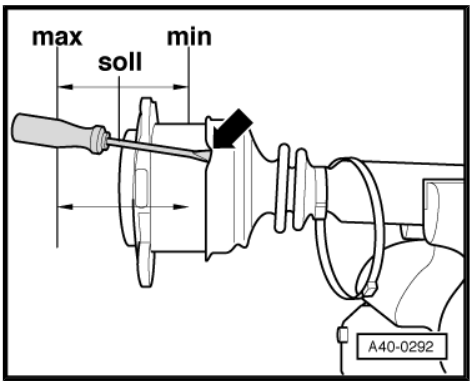
– Use plastic-headed hammer to drive joint body over triple roller spider.
– Pack remaining quantity of grease into boot.
– Make sure boot is properly seated on joint body.
– Boot must engage in groove and make contact with contour of joint body.



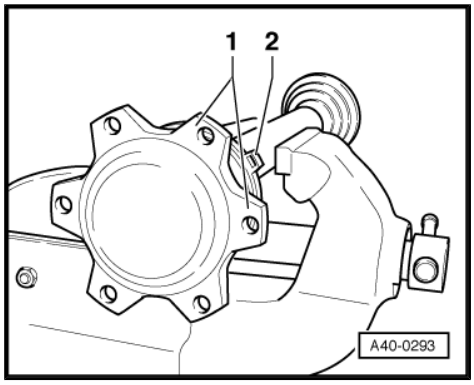
– Position joint body in central position. Refer to “min - max” position.

Note

When setting joint body to centre position, use screwdriver or similar to vent boot -arrow-.



– Install hose clip.



Note

To facilitate fitting of multi-point socket head bolts when installing drive shaft, fastener lug -2- on hose clip must be positioned between mounting flanges -1- on joint body.

– Tighten hose clips on triple roller joint ⇒ page 112 .

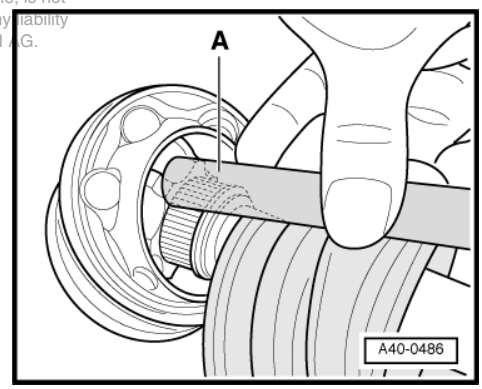
8.5 Servicing outer constant velocity joint (100 mm diameter)

Removing outer constant velocity joint

– Clamp drive shaft in vice using protective jaw covers.

– Unfasten both clips and detach boot from outer joint.

– Use hammer to tap copper or brass drift -A- against inner race of constant velocity joint.



– Detach joint and boot.

Installing outer constant velocity joint

– Push boot with small hose clip onto drive shaft.

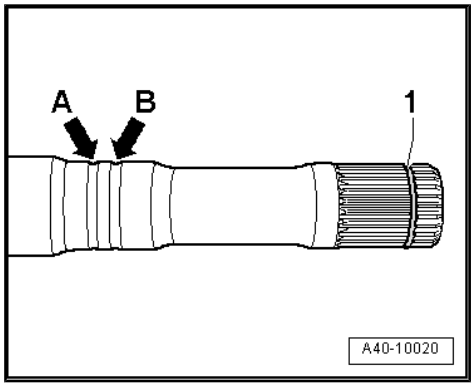
Boot and drive shaft must be free from grease.

– Always renew circlip -1-.

– Position boot in outer groove -arrow B-.

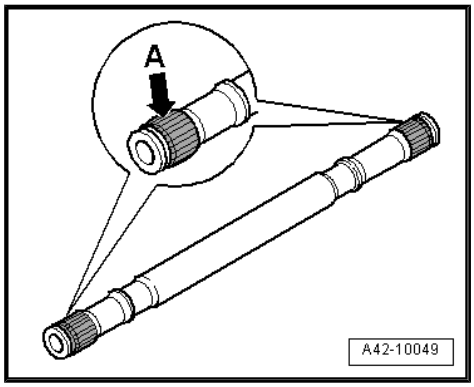
The inner groove -arrow A- must remain visible (“identification groove” for correct boot assembly).

– Refer to table ⇒ page 103 and pack indicated quantity of grease inside joint body.



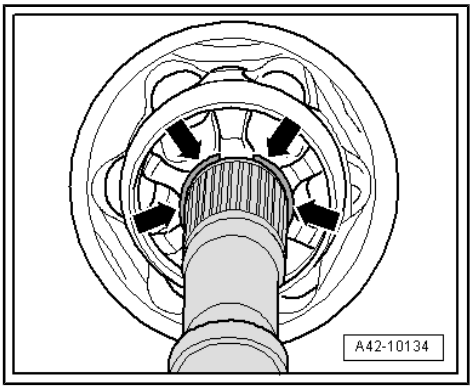
– Grease splines -A- on drive shaft lightly with grease used in joint before fitting joint body onto drive shaft.

– Fit circlip in groove on shaft.

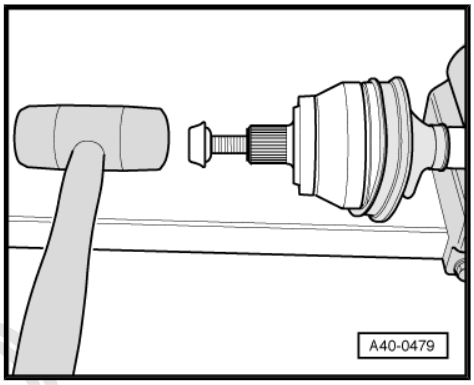


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– Slide on constant velocity joint as far as circlip.
– Align circlip so that opening faces upwards -arrows-.



– Screw old drive shaft bolt into joint body as shown.
– Use plastic hammer to drive joint onto drive shaft until circlip engages.
– Refer to table ⇒ page 103 and pack indicated quantity of grease into boot side of joint body.
– Push boot onto joint body.
– Make sure boot is properly positioned on joint body.
– Boot must rest in groove and on contour of joint body.
– Tighten hose clips on outer joint ⇒ page 112 .



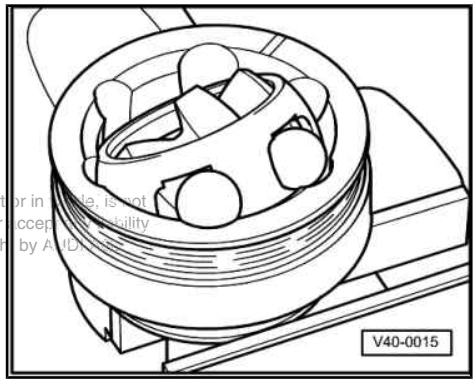
8.6 Checking outer constant velocity joint

The joint should be dismantled to renew dirty grease or for checking the balls and ball races for wear and damage.

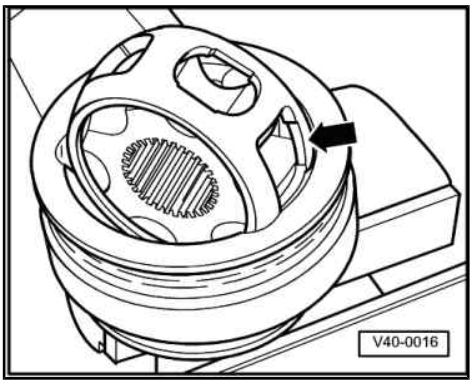
Dismantling

– Before dismantling, mark position of ball hub in relation to ball cage and joint body with an electric scriber or oil stone.
– Swivel ball hub and ball cage.
– Take out balls one after the other.

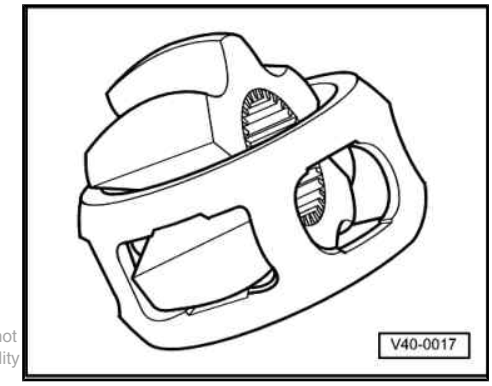
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– Turn the cage until the two rectangular openings -arrow- are level with the joint body.
– Lift out cage together with hub.



– Swivel segment of hub with short lobe into square cage opening.
– Pivot hub out of cage.



Checking

The 6 balls in each joint belong to one tolerance group. Check stub axle, hub, cage and balls for pitting and signs of seizure. Excessive backlash in the joint will cause knocking or jolts under load change; in such cases the joint must be renewed. Polished areas and visible tracks in the ball races do not justify renewal of the joint.

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Assembling

– Fit cage with hub into joint body.

Note

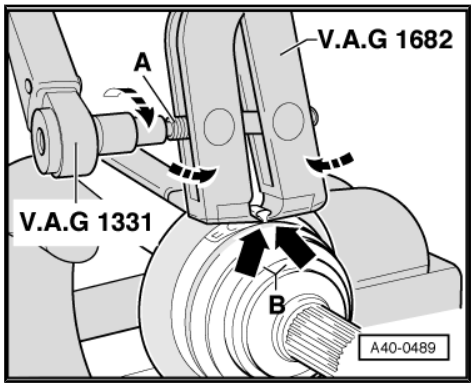
Make sure cage is inserted in correct position (i.e. sides facing in same direction as original position).

– Press in balls one after the other from opposite sides, taking care to re-establish original position of hub relative to cage and joint body.
– Pack required amount of grease into joint body ⇒ page 103 .

8.7 Tightening large and small clips on triple roller joint and outer joint

Galvanised hose clips for boots made of rubber material are tightened using hose clip pliers - V.A.G 1275- .

The following instructions apply only to stainless steel hose clips and boots of plastic material.



– Apply clamp tensioner - V.A.G 1682- as shown. Ensure jaws of clamp tensioner make contact with both sides of lug -arrows B- on hose clip.
– Tighten hose clip by turning spindle with torque wrench (take care to keep tool straight).

- Tightening torque: 20 Nm
- Use torque wrench with 5…50 Nm adjustment range (e.g. - V.A.G 1331-).
- Make sure thread of spindle on tool -A- turns freely. Lubricate with MoS_2 grease if necessary.
- If the thread is stiff (e.g. due to dirt), the required clamping force will not be attained at the hose clip when the specified tightening torque is applied.

42 – Rear suspension

1 General notes

⇒ “1.1 General notes”, page 113

⇒ “1.2 Contact corrosion”, page 114

⇒ “1.3 Repairing damaged threads in longitudinal member (sub-frame to body)”, page 114

⇒ “1.4 Lifting suspension to unladen position (vehicles with coil springs)”, page 114

⇒ “1.5 Lifting suspension to reference position (vehicles with air suspension)”, page 116

⇒ “1.6 Rear axle - overview”, page 120

1.1 General notes

All contact surfaces must be cleaned when installing wax-coated components. The contact surfaces must be free of wax and grease.

Tightening torques refer to unoiled bolts and nuts.

Load-bearing components and other suspension parts must not be welded or straightened.

Do not subject coil springs to hammer blows or weld splashes and do not make any new paint markings.

Do not perform welding or cutting operations (using power grinders) near the coil springs or suspension struts. Cover up coil springs or suspension struts if necessary.

Do not attempt to move the vehicle without the drive shafts fitted; this would result in wheel bearing damage. If the vehicle does have to be moved, always note the following points:

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– Fit an outer joint in place of the drive shaft.

– Tighten the outer joint to 200 Nm.

Bonded rubber bushes can only be turned to a limited extent. The suspension must therefore always be in the unladen position or the reference position when the suspension link attachments are tightened.

- Lifting suspension to unladen position (vehicles with coil springs) ⇒ page 114
- Lifting suspension to reference position (vehicles with air suspension) ⇒ page 116

If the wheel alignment has to be checked and adjusted at a later stage, all bolts and nuts which need to be slackened to make adjustments should initially only be tightened to the specified torque figure. After wheel alignment has been checked and adjusted, bolts and nuts must then be fully tightened by turning them through the specified angle.

WARNING

All bolts and nuts must be fully tightened according to specifications before the vehicle is driven on public roads.

1.2 Contact corrosion

Contact corrosion can occur if unsuitable fasteners (bolts, nuts, washers ...) are used.

For this reason, all the fastening components have received a special surface treatment (Dacromet). These components can be recognised by their greenish colour.

In addition, rubber parts, plastic parts and adhesives are made of non-conductive material.

Always install new parts if you are not sure whether used parts can be refitted.

Note:

Always use genuine parts. These have been tested and are compatible with aluminium.

Accessories must be approved by AUDI AG.

Damage resulting from contact corrosion is not covered under the warranty.

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1.3 Repairing damaged threads in longitudinal member (subframe to body)

Damaged threads can be repaired with wire inserts (Helicoil).

The exploded views indicate which threads can be repaired.

Metal particles remaining in the vehicle body must be embedded in wax.

Under certain circumstances it is possible to repair the threads in the captive nuts in the longitudinal member.

- Each thread can only be repaired once.
- If a second repair is needed, the captive nut must be renewed.

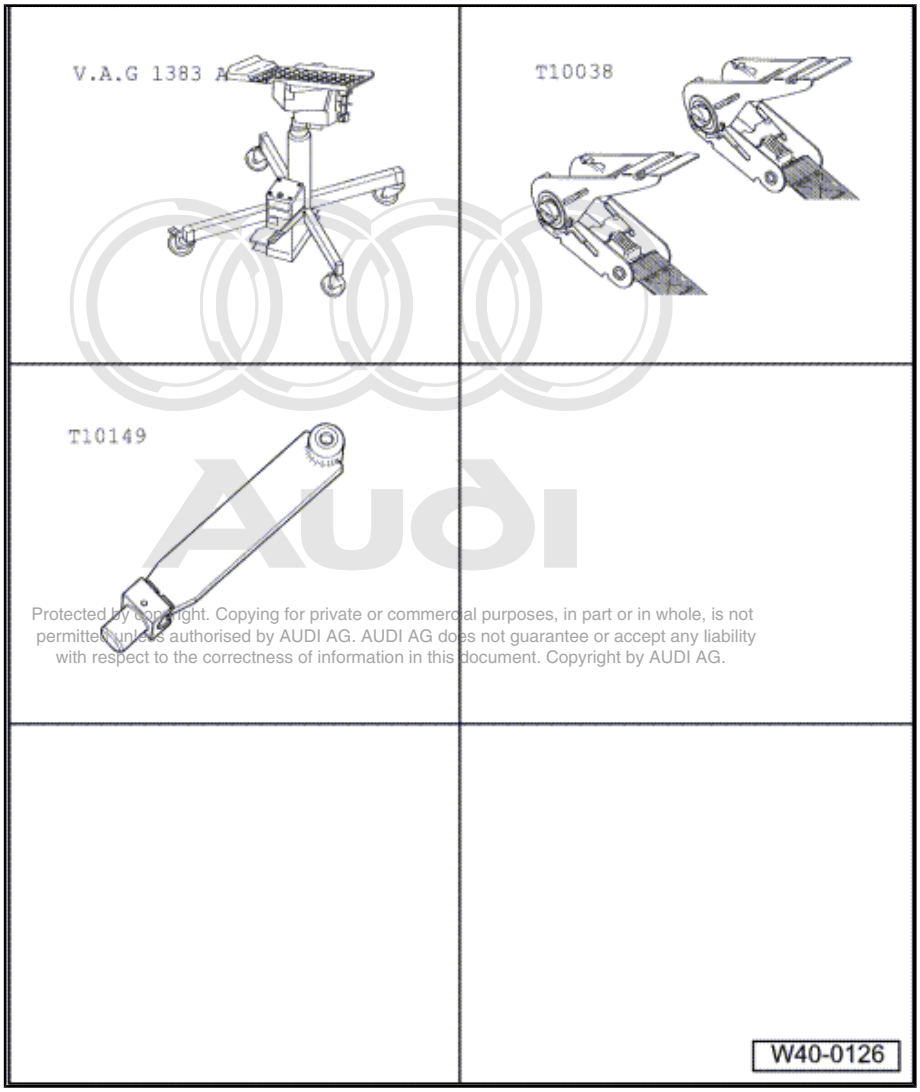
> **WARNING**
>
> *Always wear safety goggles when drilling.*

- Have all thread repairs checked by foreman or supervisor.
- The thread insert must be of the same length as the thread in the body.
- Make good any damage to underseal ⇒ General Information; Body Repairs, General Body Repairs .

1.4 Lifting suspension to unladen position (vehicles with coil springs)

Special tools and workshop equipment required

- Engine and gearbox jack - V.A.G 1383 A-
- Tensioning strap - T10038-
- Support - T10149-



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Note

All bolts on running gear components with bonded rubber bushes must always be tightened with the suspension in the unladen position (vehicle unladen).

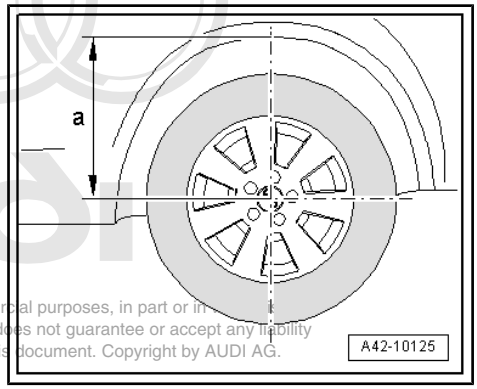
Bonded rubber bushes can only be turned to a limited extent.

Therefore, before tightening the bolts, suspension components with bonded rubber bushes must be brought into a position corresponding to the normal position of the unladen vehicle while driving (unladen position).

Otherwise, the bush would be subject to torsion loading and its service life would be shortened.

This position can be simulated on the lifting platform by raising the appropriate part of the suspension with the engine and gearbox jack - V.A.G 1383 A- and support - T10149- .

– Before commencing work, use measuring tape or similar to measure dimension -a- from wheel centre to lower edge of wheel housing.



This measurement must be taken with the suspension in the unladen position (vehicle unladen).

– Make a note of the measured value. This will be needed when tightening the bolts and/or nuts on the suspension.

Before raising wheel unit, secure vehicle to arms of lifting platform using tensioning straps - T10038- .

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If vehicle is not secured, there is a risk of it slipping off the lifting platform.

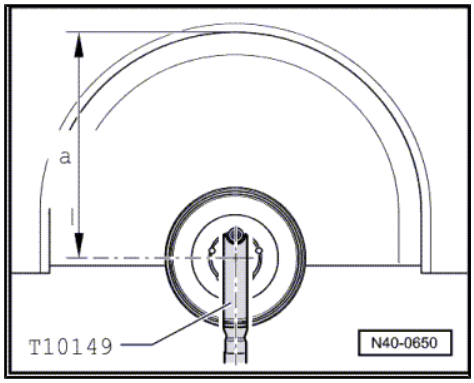
– Remove wheel.

– Turn wheel hub until one of the wheel bolt holes is at the top.

– Attach support - T10149- to wheel hub using wheel bolt.

The bolts/nuts on the relevant suspension mountings must not be tightened until the distance -a- between the wheel centre and the lower edge of the wheel arch is the same as the distance measured before commencing work.

– Raise wheel bearing housing with engine and gearbox jack - V.A.G 1383 A- until distance -a- is obtained.



WARNING

- *Do not raise or lower vehicle when engine and gearbox jack - V.A.G 1383 A- is under vehicle.*
- *Do not leave engine and gearbox jack - V.A.G 1383 A- under vehicle for longer than necessary.*

– Tighten relevant bolts/nuts.

– Lower wheel bearing housing.

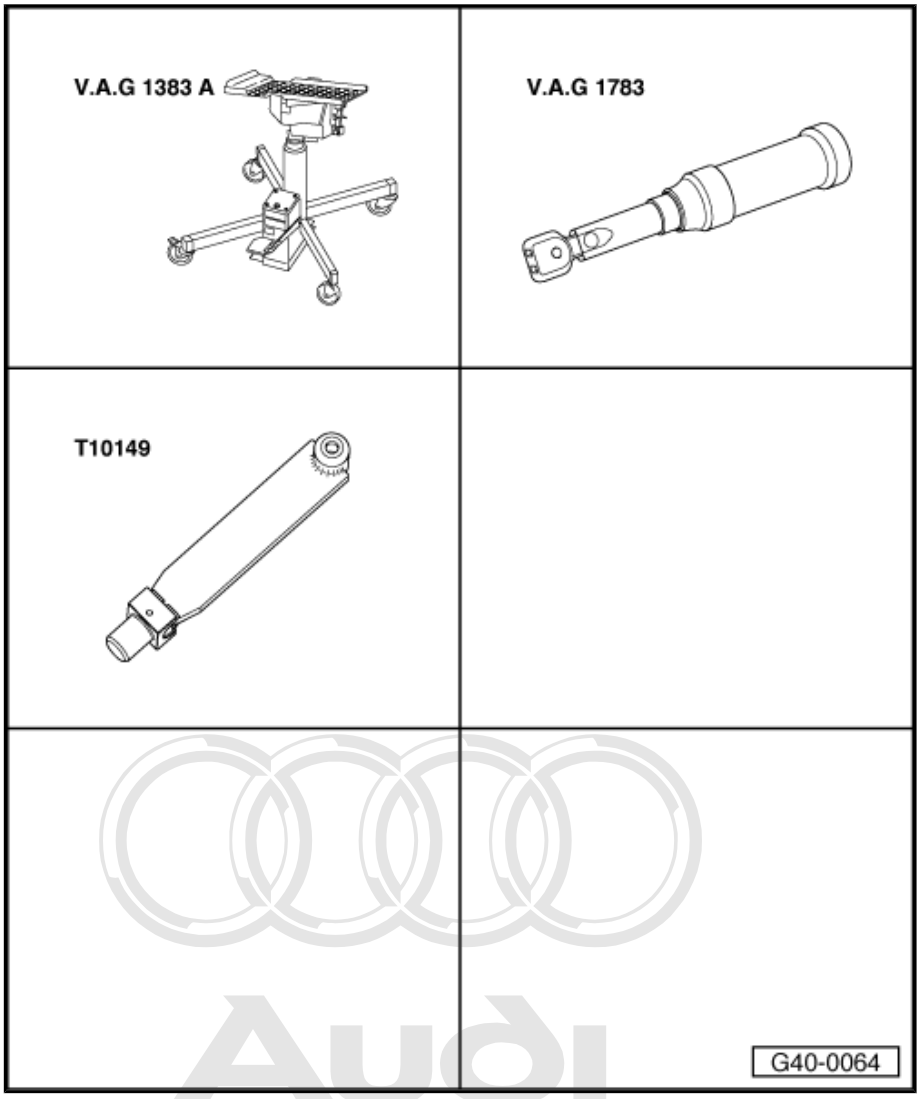
– Pull out engine and gearbox jack - V.A.G 1383 A- from underneath vehicle.

– Remove support - T10149- .

1.5 Lifting suspension to reference position (vehicles with air suspension)

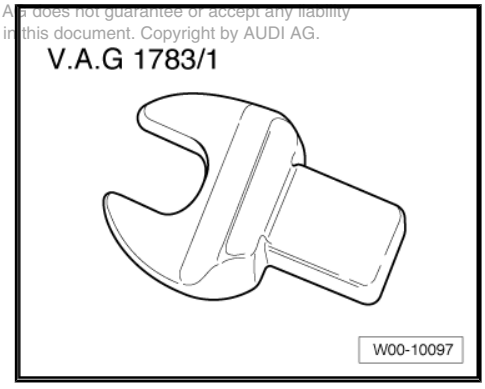
Special tools and workshop equipment required

- Engine and gearbox jack - V.A.G 1383 A-
- Torque wrench - V.A.G 1783-
- Support - T10149-



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- Open end spanner insert, 10 mm - V.A.G 1783/1-



Bonded rubber bushes can only be turned to a limited extent.

Therefore, before tightening the bolts, suspension components with bonded rubber bushes must be brought into a position corresponding to the normal position of the vehicle while driving (reference position).

Otherwise, the bush would be subject to torsion loading and its service life shortened.

This position can be simulated on the lifting platform by raising the wheel bearing housing with engine and gearbox jack - V.A.G 1383 A- and support - T10149- .

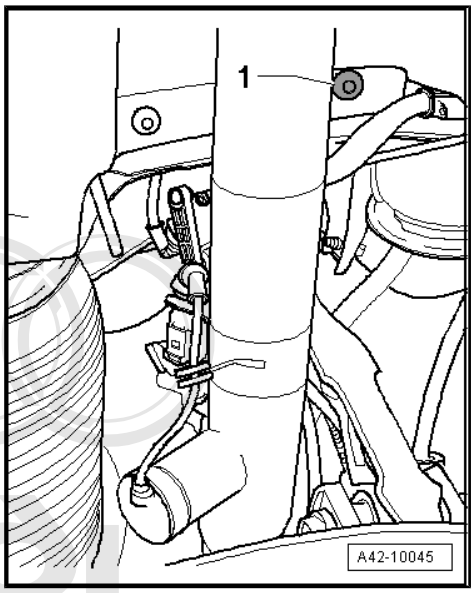
Requirement:

- Engine must be installed

– Position vehicle on lifting platform ⇒ page 11 .

– Bleed system using -VAS 5051 A- ⇒ page 229 .

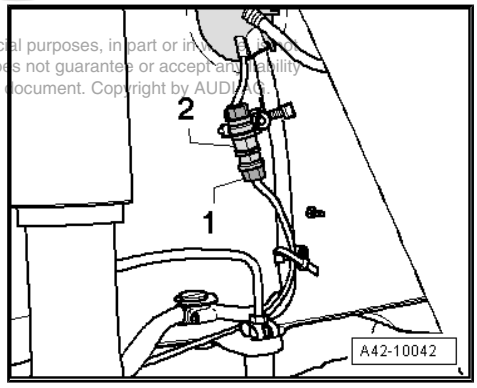
– Remove bolt -1- and move wheel housing liner to the side.



– Slowly loosen air pipe -1- at connection -2- to dissipate air pressure. Unscrew air pipe when air pressure has been dissipated.

– Seal both connections. Take care to prevent dirt entering the connections.

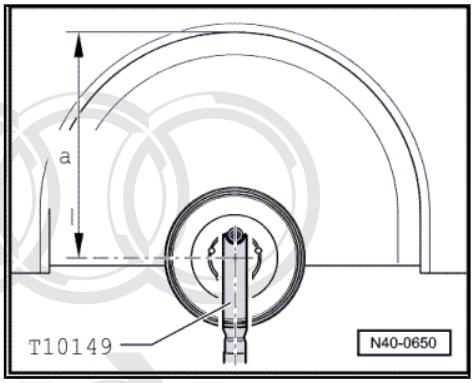
– Turn wheel hub until one of the wheel bolt holes is at the top.



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– Use wheel bolt to attach support - T10149- .

– Insert support - T10149- in engine/gearbox jack - V.A.G 1383 A- and press wheel bearing housing upwards until reference position, dimension -a-, is attained.



Reference position

- Dimension -a- for vehicles with air suspension: 384 mm
- Dimension -a- for allroad vehicles with air suspension: 380 mm

WARNING

- *Do not raise or lower vehicle when engine and gearbox jack is under vehicle.*
- *Do not leave engine and gearbox jack under vehicle for longer than necessary.*

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Operations following setting of reference position

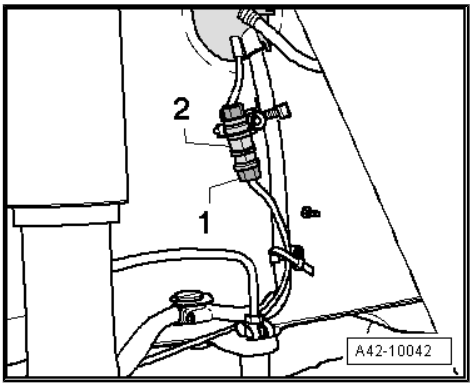
– Tighten relevant bolts/nuts.

– Lower wheel bearing housing.

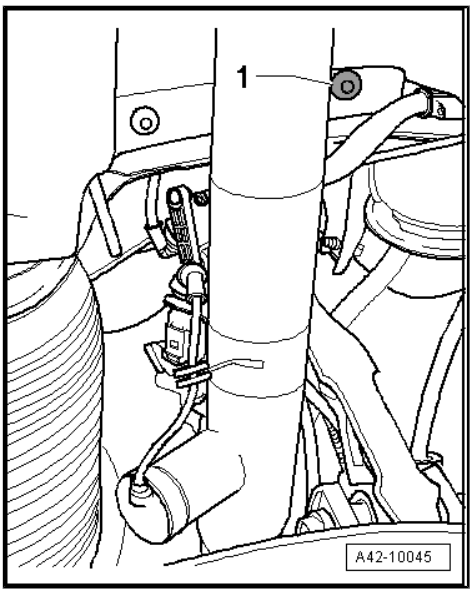
– Pull out engine and gearbox jack from underneath vehicle.

– Detach support - T10149- .

– Connect air pipe -1- at connection -2-.

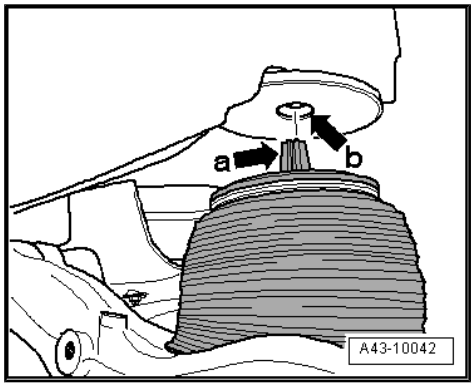


– Screw in bolt -1-



Charging rear air springs

> **Caution**
>
> *When charging suspension, make sure centralising pin -arrow a- locates in hole in longitudinal member -arrow b-.*



- Charge system using -VAS 5051 A- ⇒ page 229 .
- Fit wheel.
- Stand vehicle on its wheels ⇒ page 11 .
- Secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .

1.6 Rear axle - overview

I - Subframe (front-wheel drive), anti-roll bar, coupling rod ⇒ page 121

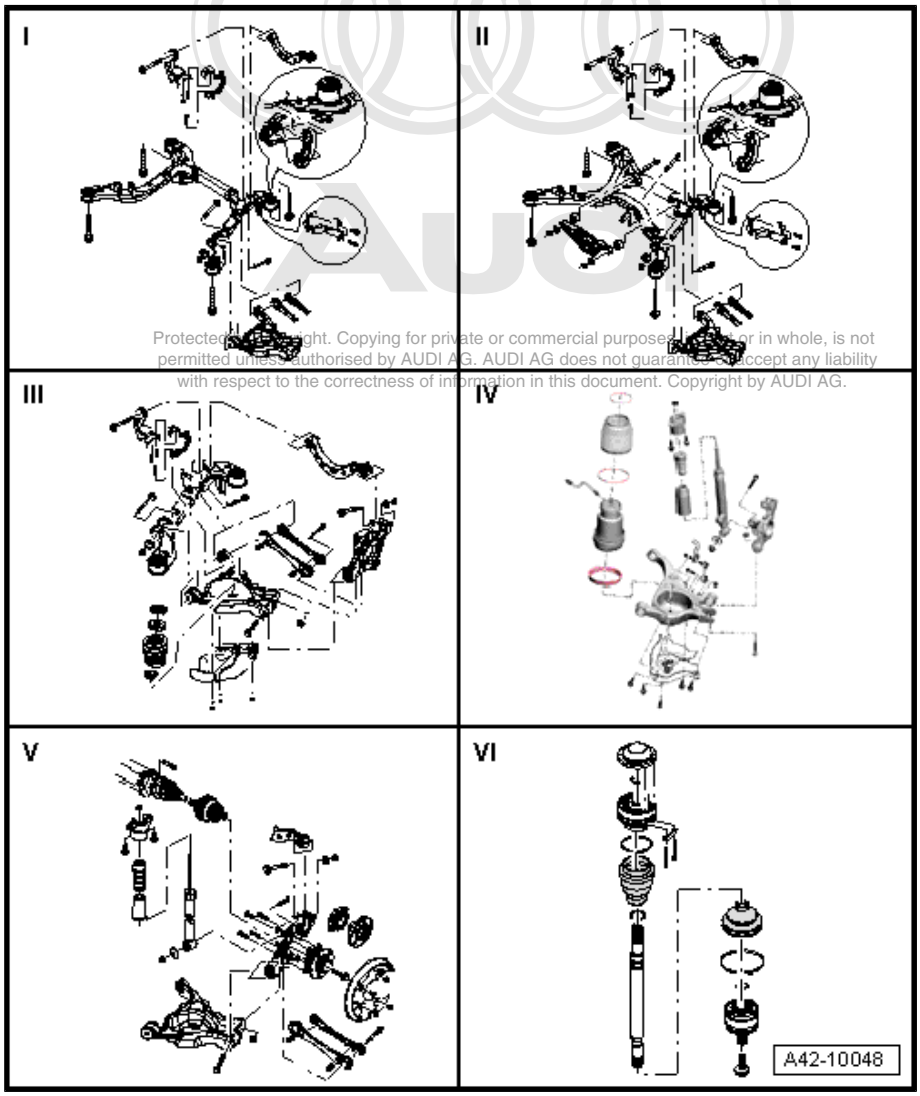
II - Subframe (four-wheel drive), anti-roll bar, coupling rod ⇒ page 137

III - Trapezium link, upper transverse link, track rod, coil spring, vehicle level sender ⇒ page 155

IV - Air spring, shock absorber for air suspension ⇒ page 174

V - Wheel bearing housing , wheel bearing unit, shock absorber ⇒ page 187

VI - Drive shaft ⇒ page 202



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2 Subframe (front-wheel drive), anti-roll bar, coupling rod

⇒ “2.1 Subframe (front-wheel drive), anti-roll bar, coupling rod - exploded view”, page 121

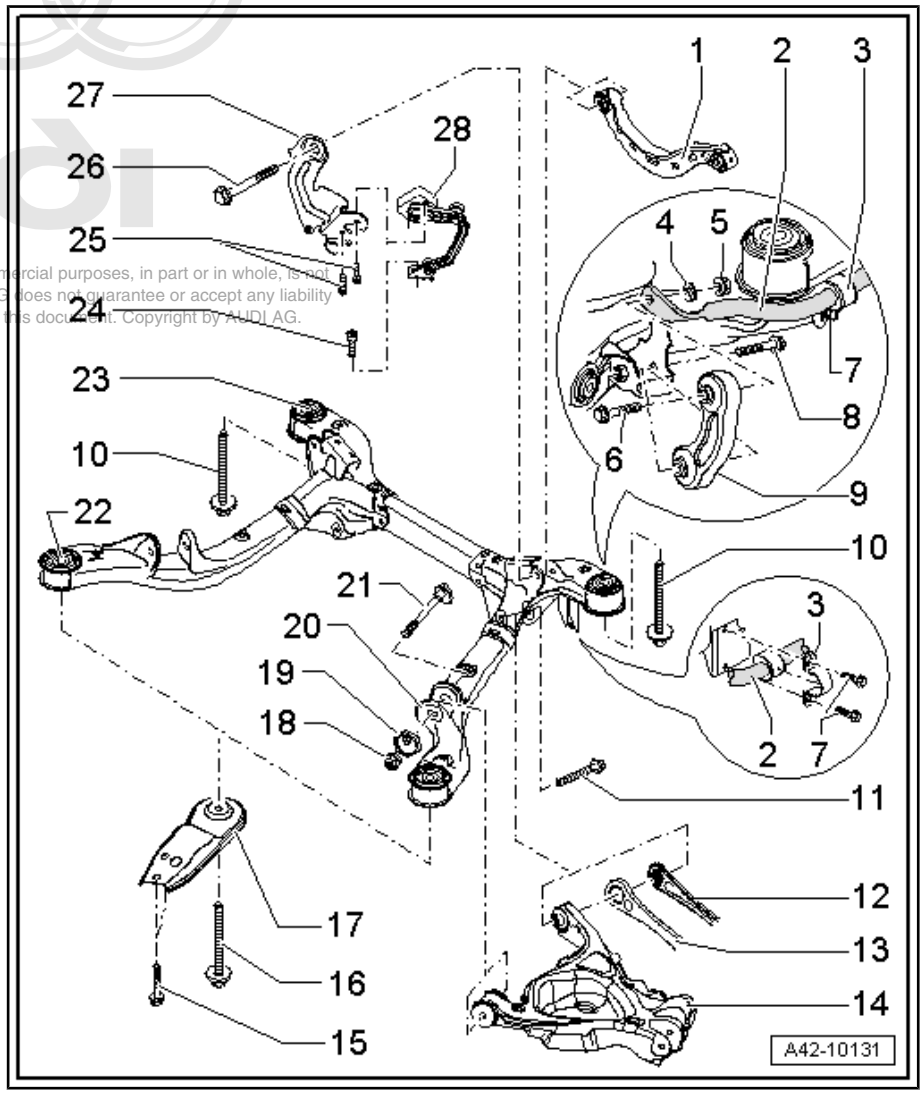
⇒ “2.2 Removing and installing subframe with attachments”, page 123

⇒ “2.3 Renewing bonded rubber bushes in subframe”, page 125

⇒ “2.4 Removing and installing coupling rod and anti-roll bar”, page 133

⇒ “2.5 Renewing anti-roll bar bushes”, page 135

2.1 Subframe (front-wheel drive), anti-roll bar, coupling rod - exploded view



1 - Upper transverse link

2 - Anti-roll bar

- ❑ Anti-roll bar is removed together with coupling rod
- ❑ Removing and installing ⇒ page 133

Renewing anti-roll bar bushes ⇒ page 135

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3 - Clamp

4 - Washer

5 - Nut

- ❑ 65 Nm

6 - Bolt

7 - Bolt

- ❑ 25 Nm

8 - Bolt

- ❑ 65 Nm

9 - Coupling rod

- ❑ Coupling rod is removed together with anti-roll bar
- ❑ Removing and installing ⇒ page 133

10 - Bolt

- ❑ 115 Nm +90°
- ❑ Always renew if removed
- ❑ Hexagon bolts must not be slackened while springs are still installed
- ❑ Tighten together with bolt ⇒ Item 16 (page 122) in diagonal sequence
- ❑ Thread in body can be repaired with Helicoil threaded wire insert (DIN 8140). The thread insert must be of the same length as the thread in the body.

11 - Bolt

- ❑ 85 Nm +90°

- ❑ Always renew if removed

12 - Track rod

13 - Stone deflector

14 - Trapezium link

15 - Bolt

- ❑ 55 Nm

16 - Bolt

- ❑ 115 Nm +90°
- ❑ Always renew if removed
- ❑ Hexagon bolts must not be slackened while springs are still installed
- ❑ Tighten together with bolt ⇒ Item 10 (page 121) in diagonal sequence
- ❑ Thread in body can be repaired with Helicoil threaded wire insert (DIN 8140). The thread insert must be of the same length as the thread in the body.

17 - Support

18 - Nut

- ❑ 95 Nm
- ❑ Always renew if removed

19 - Shim

20 - Subframe

- ❑ Removing and installing ⇒ page 123

21 - Eccentric bolt

22 - Bonded rubber bush (front)

- ❑ Hydro-bush
- ❑ Renewing ⇒ page 141
- ❑ Note correct installation position ⇒ page 141

23 - Bonded rubber bush (rear)

- ❑ Hydro-bush
- ❑ Renewing ⇒ page 141
- ❑ Note correct installation position ⇒ page 141

24 - Bolt

- ❑ 10 Nm

25 - Bolt

- ❑ 5 Nm

26 - Bolt

- ❑ 85 Nm +90°
- ❑ Always renew if removed

27 - Retaining bracket

28 - Rear left vehicle level sender -G76-

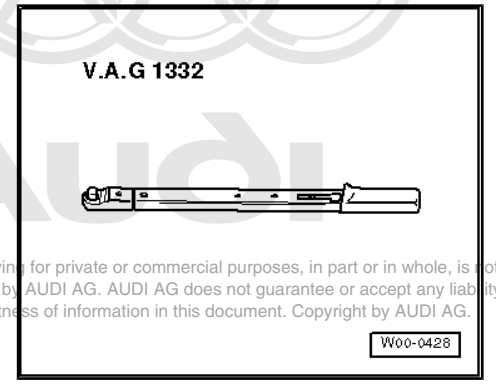
- ❑ Complete with mounting parts
- ❑ Lever of sender must face outwards.
- ❑ Renewing in vehicle ⇒ page 223
- ❑ Check basic adjustment of headlights if sender mountings are loosened ⇒ Rep. gr. 94
- ❑ Vehicles with air suspension: re-adapt reference position if sender mountings are loosened ⇒ page 229

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2.2 Removing and installing subframe with attachments

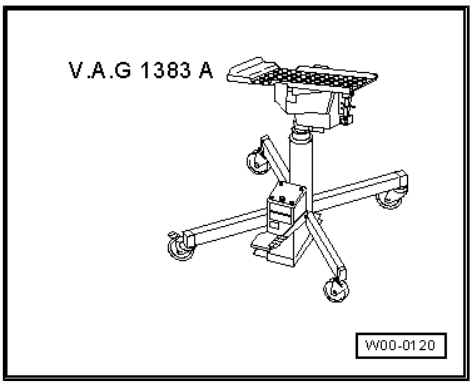
Special tools and workshop equipment required

- Torque wrench - V.A.G 1332-



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- Engine and gearbox jack - V.A.G 1383 A- with universal gearbox support - V.A.G 1359/2-



Removing subframe with attachments

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

– Bleed air springs of rear axle ⇒ page 183 .

Vehicles with coil springs

– Remove coil springs ⇒ page 163 .

All vehicles

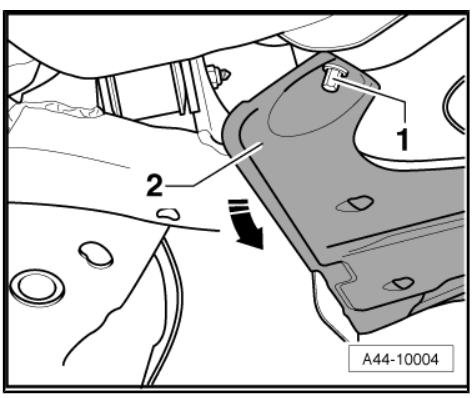
– Remove rear silencer(s) ⇒ Rep. gr. 26 .

– Disconnect electrical wiring for electromechanical parking brake and ABS speed sensors. On vehicles with automatic headlight range control or air spring struts, unplug connectors and detach from upper link.

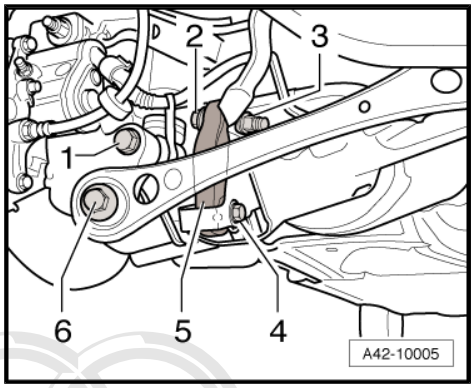
– Remove cover -2- ⇒ Rep. gr. 66 .

– Remove brake caliper ⇒ Rep. gr. 46 .

– Secure brake caliper to body so that weight of caliper does not stretch or damage brake hose or brake pipe.



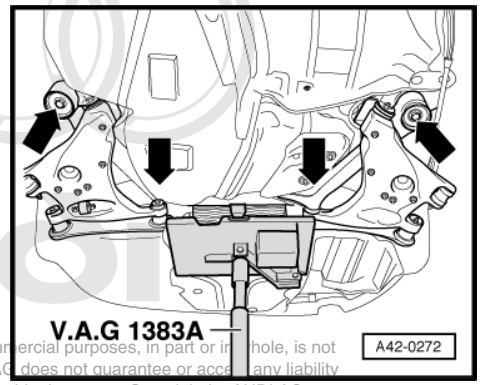
– Unscrew bolt/nut -1- and detach shock absorber.



WARNING

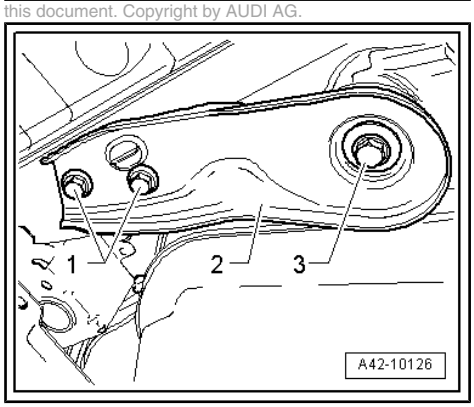
BEFORE slackening subframe bolts, secure vehicle against tipping over (e.g. by placing a weight of approx. 50 kg in the luggage compartment).

– Apply engine and gearbox jack - V.A.G 1383 A- with universal gearbox support - V.A.G 1359/2- and a suitable wooden block to subframe.
– Wind strap around subframe.
– Remove rear hexagon bolts securing subframe -arrows-.



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– Remove bolts -1- and -3-.
– Take off reinforcement -2-.
– Carefully lower subframe with attachments.



Note

When lowering components, make sure there is enough clearance for shock absorbers and electrical wiring.

Installing subframe with attachments

Installation is carried out in the reverse sequence. Note the following points:

Tightening torques ⇒ page 121

– Bores in subframe mountings must be aligned centrally with mounting points on body.

Note

Do not install the coil springs/air springs until the subframe mountings have been tightened to the specified torque.

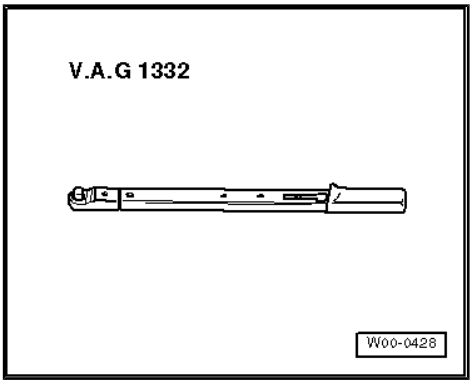
– On vehicles with air suspension, install air spring ⇒ page 175 .
– Check and adjust wheel alignment ⇒ page 281 .

Front and rear wheel alignment must always be checked and adjusted if necessary using VW/Audi approved equipment.

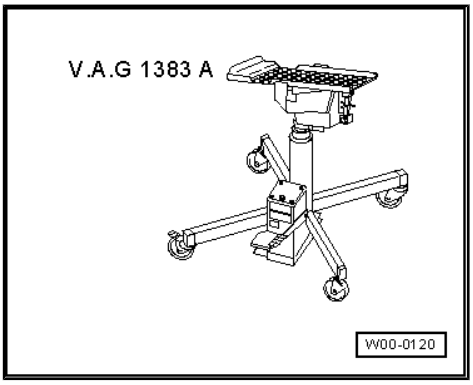
2.3 Renewing bonded rubber bushes in subframe

Special tools and workshop equipment required

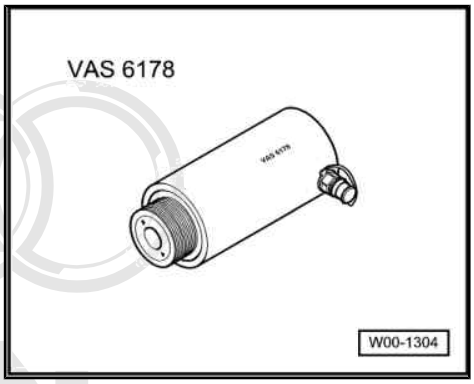
- Torque wrench - V.A.G 1332-



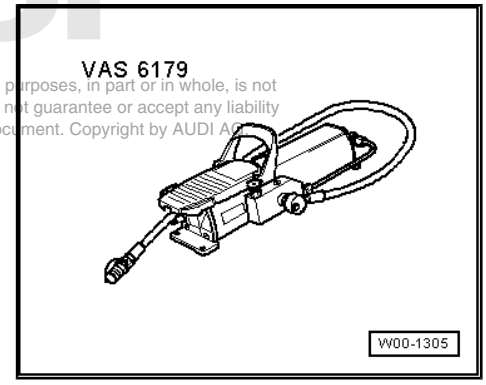
- Engine and gearbox jack - V.A.G 1383 A- with universal gearbox support - V.A.G 1359/2-



- Hydraulic press - VAS 6178-

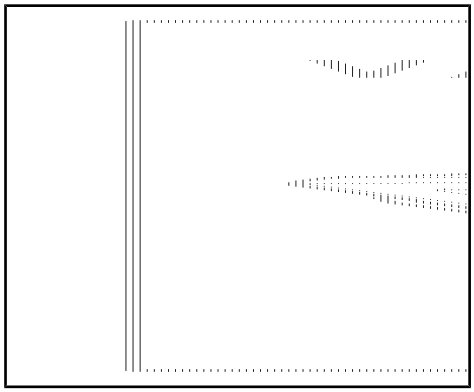


- Foot pump - VAS 6179-

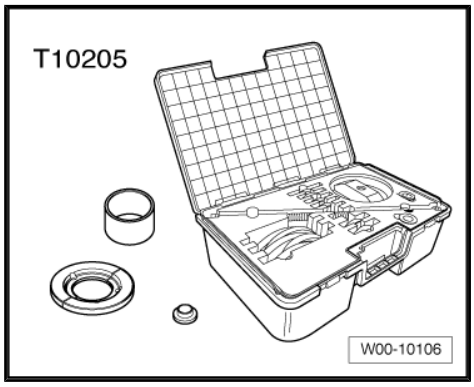


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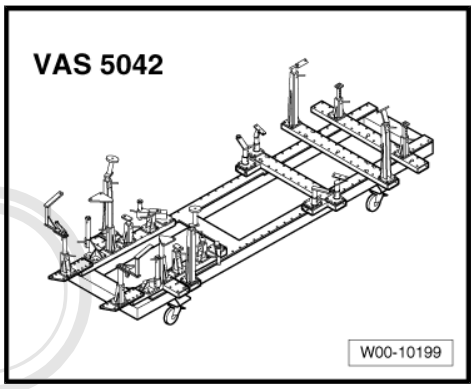
- Drip tray for workshop hoist - VAS 6208-



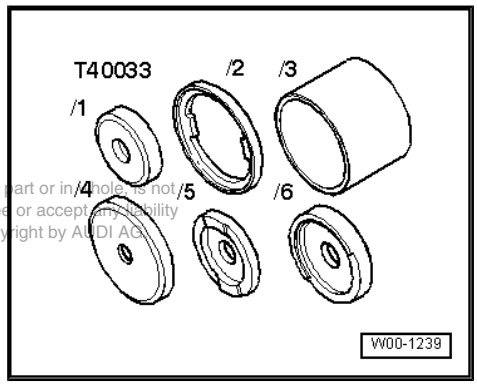
- Assembly tool - T10205-



- Assembly tool - T10263-



- Assembly tool - T40033-



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- Thrust piece - T40141-

Note

- *Also check the other bushes before renewing a defective bush.*
- *If cracks, oil leakage or other damage is visible these bushes must also be renewed.*

Pressing out bonded rubber bushes (front)

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

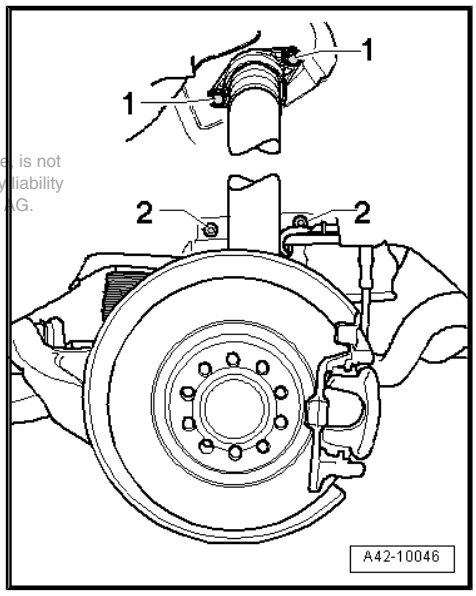
All vehicles

– Remove wheels.

– Remove wheel housing liner on left and right sides ⇒ Rep. gr. 66 .

– Remove hexagon bolts -1- from shock absorber (left and right).

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– Remove cover -2- ⇒ Rep. gr. 66 .

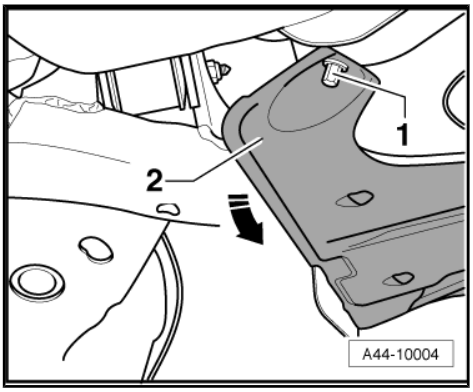
– Remove rear section of exhaust system ⇒ Rep. gr. 26 .

Vehicles with air suspension

– Remove air springs ⇒ page 175 .

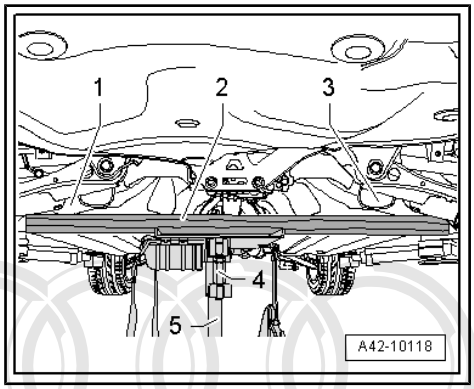
Vehicles with coil springs

– Remove coil springs ⇒ page 163 .

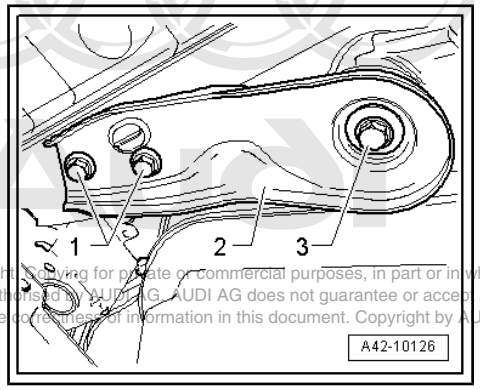


All vehicles

– Apply engine and gearbox jack - V.A.G 1383 A- with universal gearbox support - V.A.G 1359/2- and a suitable wooden block -2- to subframe and support front part of subframe.

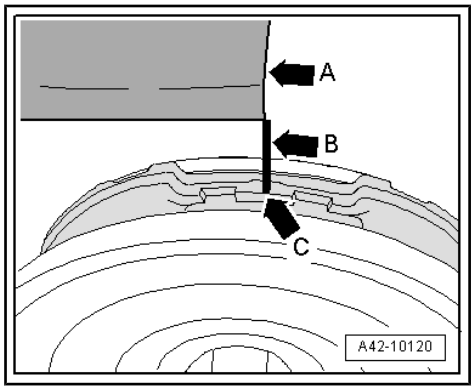


– Remove bolts -1- and -3-.
– Take off reinforcement -2-.
– Lower subframe only as far as necessary.



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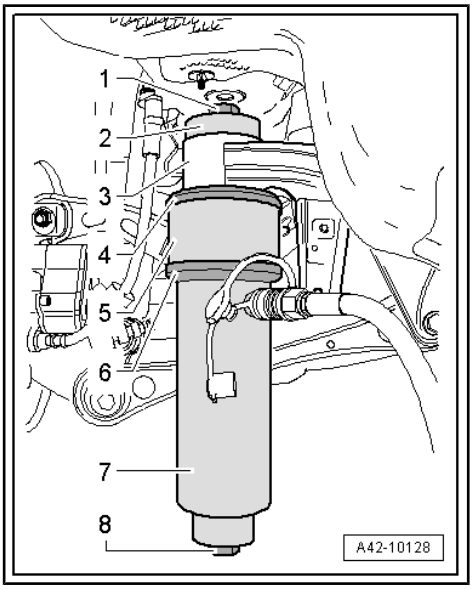
– Mark position of bushes relative to subframe -arrow A-.
– Make a marking -arrow B- from rib -arrow C- on bush to mounting on subframe -arrow A-.



Note

The marking -arrow B- is required when installing the new bush.

– Apply special tools to subframe as shown in illustration.



1 - Spindle - T10263/4- with nut - T10263/5-
2 - Plate - T40033/1- Conical side faces body.
3 - Subframe
4 - Plate - T40033/2- Conical side faces body.
5 - Sleeve - T40033/3-
6 - Washer - T10205/4-
7 - Hydraulic press - VAS 6178-
8 - Spindle - T10263/4- with nut - T10263/5-

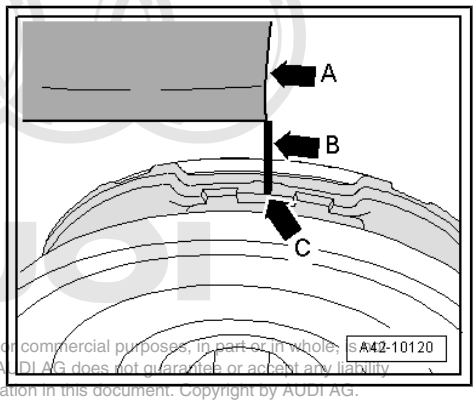
WARNING

- *Hold hydraulic press - VAS 6178- securely during pressing operation.*
- *The bonded rubber bush will come loose suddenly. Injuries can be caused if the tools and the bonded rubber bush are allowed to drop.*

– Place drip tray for workshop hoist - VAS 6208- under vehicle.
– Press out bonded rubber bush and catch escaping oil.

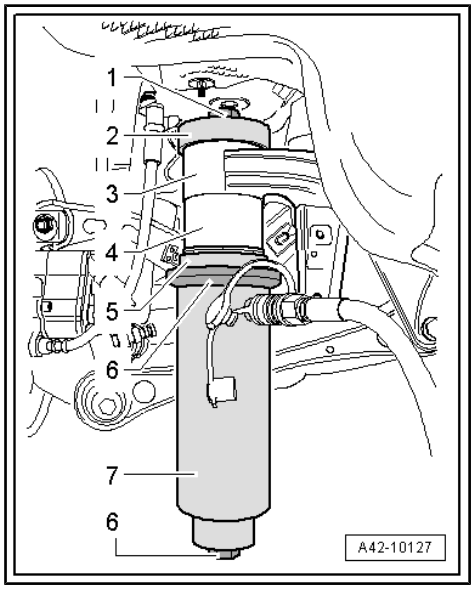
Pressing in bonded rubber bush

– Note correct installation position of bonded rubber bush.
– Observe marking made previously: -arrow B- on subframe -arrow A-.
– Marking -arrow B- and rib -arrow C- on bush must be in line with mounting on subframe -arrow A-.



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– Apply special tools to subframe as shown in illustration.



1 - Spindle - T10263/4- with nut - T10263/5-

2 - Thrust piece - T40141- Conical side faces body.

3 - Subframe

4 - Bonded rubber bush

5 - Washer - T10205/15-

6 - Washer - T10205/4-

7 - Hydraulic press - VAS 6178-

8 - Spindle - T10263/4- with nut - T10263/5-

– Press front bush into subframe as far as stop.

Remaining installation steps are carried out in reverse sequence. Note the following points:

Note

Do not install the coil springs/air springs until the subframe mountings have been tightened to the specified torque.

– Installing coil springs ⇒ page 163 ; installing air springs ⇒ page 175 .

Tightening torques ⇒ page 137

– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .

– Secure wheels ⇒ Wheels and tyres; Rep. gr. 44 .

Pressing out bonded rubber bushes (rear)

Vehicles with air suspension

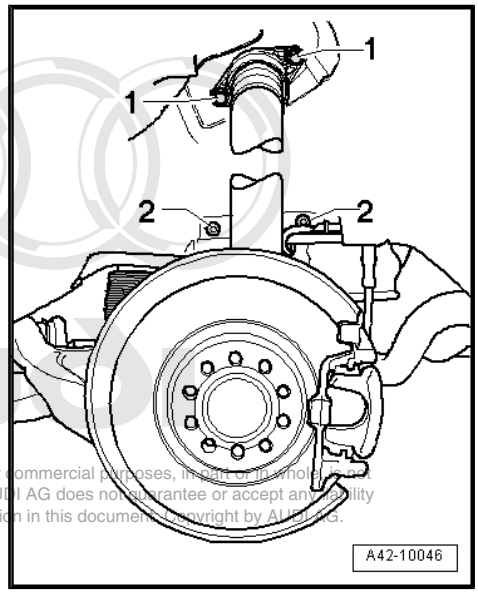
– Position vehicle on lifting platform ⇒ page 11 .

All vehicles

– Remove wheels.

– Remove wheel housing liner on left and right sides ⇒ Rep. gr. 66 .

– Remove hexagon bolts -1- from shock absorber (left and right).



– Remove rear section of exhaust system ⇒ Rep. gr. 26 .

Vehicles with air suspension

– Remove air springs ⇒ page 175 .

Vehicles with coil springs

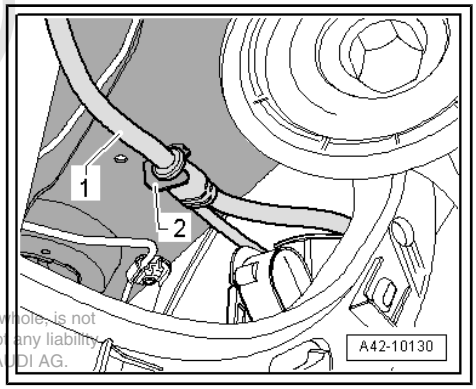
– Remove coil springs ⇒ page 163 .

All vehicles

– Remove anti-roll bar ⇒ page 152 .

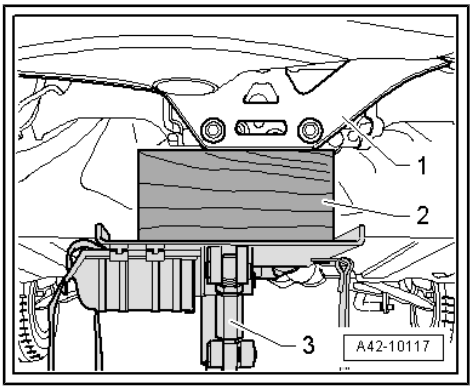
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– Disengage electrical wiring harness -1- (left and right) from retainers -2- on body.



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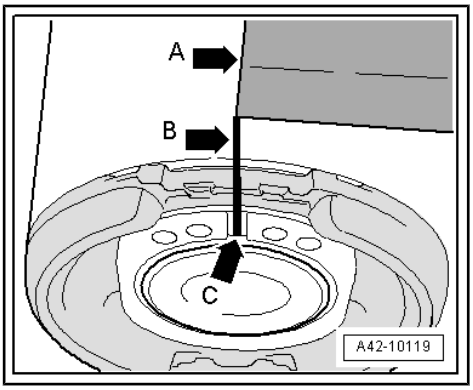
– Apply engine and gearbox jack - V.A.G 1383 A- with universal gearbox support - V.A.G 1359/2- and a suitable wooden block -2- to final drive and support rear part of final drive.
– Remove only rear subframe bolts.
– Lower subframe only as far as necessary.



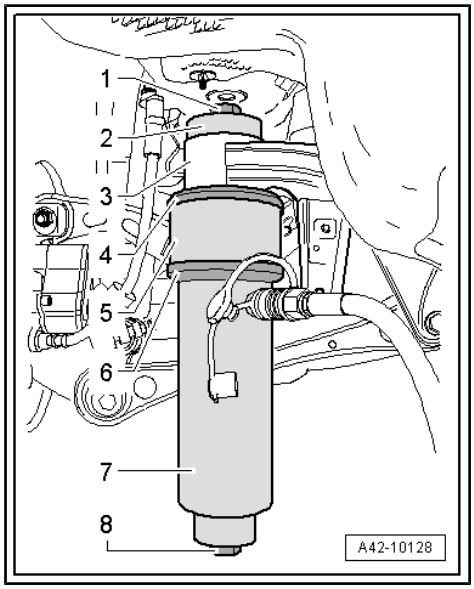
– Mark position of bushes relative to subframe -arrow A-.
– Make a marking -arrow B- from slot -arrow C- in bush to mounting on subframe -arrow A-.

Note

The marking -arrow B- is required when installing the new bush.



– Apply special tools to subframe as shown in illustration.



1 - Spindle - T10263/4- with nut - T10263/5-
2 - Plate - T40033/1- Conical side faces body.
3 - Subframe
4 - Plate - T40033/2- Conical side faces body.
5 - Sleeve - T40033/3-
6 - Washer - T10205/4-
7 - Hydraulic press - VAS 6178-
8 - Spindle - T10263/4- with nut - T10263/5-

WARNING

- *Hold hydraulic press - VAS 6178- securely during pressing operation.*
- *The bonded rubber bush will come loose suddenly. Injuries can be caused if the tools and the bonded rubber bush are allowed to drop.*

– Place drip tray for workshop hoist - VAS 6208- under vehicle.
– Press out bonded rubber bush and catch escaping oil.

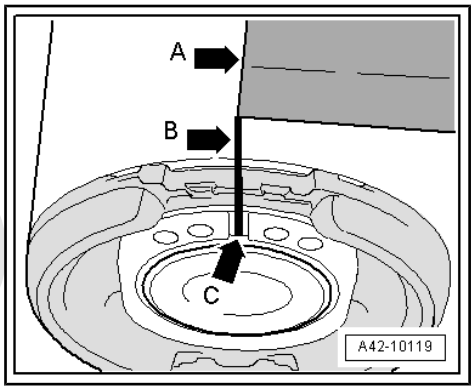
Pressing in bonded rubber bush

Note

Bushes with identical Part Nos. must be fitted on both sides.

– Note correct installation position of bonded rubber bush

– Observe marking made previously: -arrow B- on subframe -arrow A-.
– Marking -arrow B- and rib -arrow C- on bush must be in line with mounting on subframe -arrow A-.



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– Apply special tools to subframe as shown in illustration.

1 - Spindle - T10263/4- with nut - T10263/5-

2 - Thrust piece - T40141- Conical side faces body.

3 - Subframe

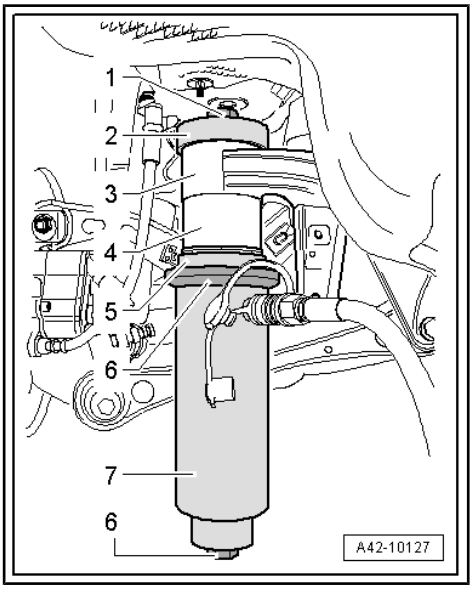
4 - Bonded rubber bush

5 - Washer - T10205/15-

6 - Washer - T10205/4-

7 - Hydraulic press - VAS 6178-

8 - Spindle - T10263/4- with nut - T10263/5-



– Press front bush into subframe as far as stop.

Remaining installation steps are carried out in reverse sequence. Note the following points:

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Note

Do not install the coil springs/air springs until the subframe mountings have been tightened to the specified torque.

– Installing coil springs ⇒ page 163 ; installing air springs ⇒ page 175 .

Tightening torques ⇒ page 137

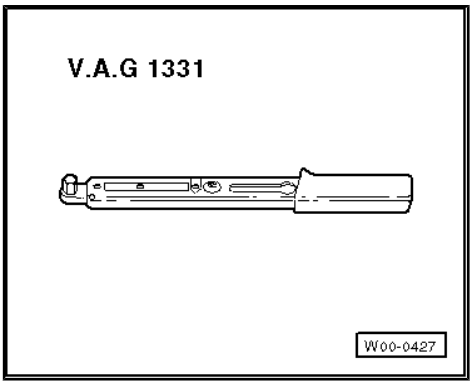
– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .

– Secure wheels ⇒ Wheels and tyres; Rep. gr. 44 .

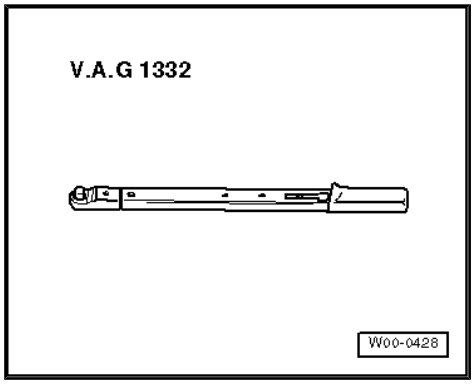
2.4 Removing and installing coupling rod and anti-roll bar

Special tools and workshop equipment required

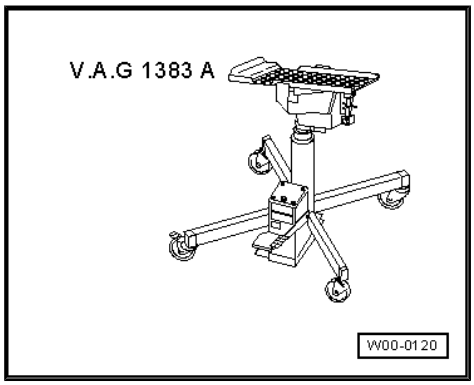
♦ Torque wrench - V.A.G 1331-



- Torque wrench - V.A.G 1332-



- Engine and gearbox jack - V.A.G 1383 A- with universal gearbox support - V.A.G 1359/2-



Removing

Vehicles with coil springs

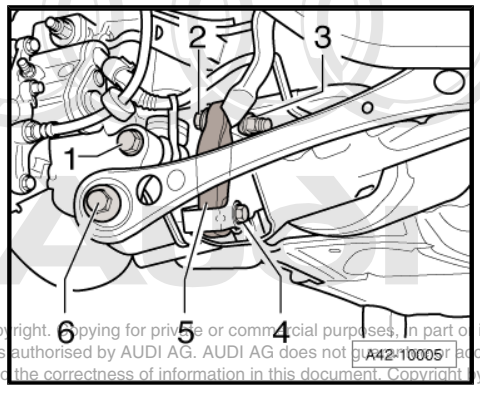
– Remove coil springs ⇒ page 163 .

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .
– Bleed air springs of rear axle ⇒ page 183 .

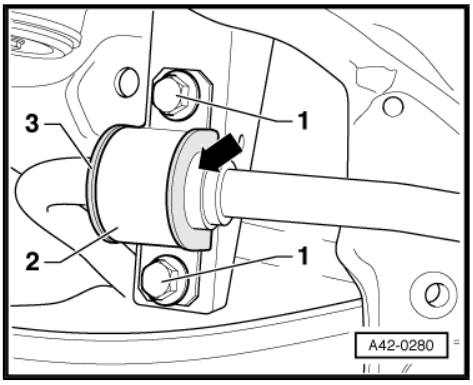
All vehicles

– Remove hexagon nut -3-.
– Remove hexagon bolt -4-.



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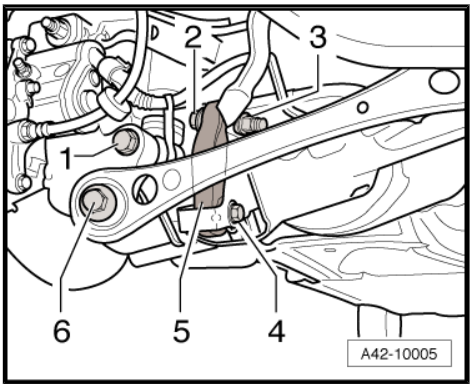
– Remove hexagon bolts -1-.



– Pull anti-roll bar towards the rear until hexagon bolt -2- can be taken out.
– Take out coupling rod -5-.
– Remove anti-roll bar.

Perform the following step if there is not enough clearance to take out the anti-roll bar.

– Support exhaust system by applying engine and gearbox jack - V.A.G 1383 A- with a suitable wooden block to both rear silencers.



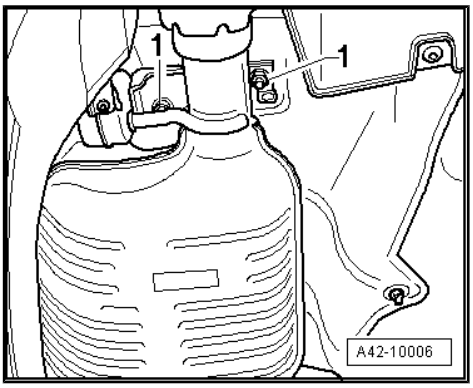
– Unscrew hexagon nuts -1- and lower exhaust system.
– Remove anti-roll bar.

Installing

Installation is carried out in the reverse sequence. Note the following points:

Tightening torques ⇒ page 121

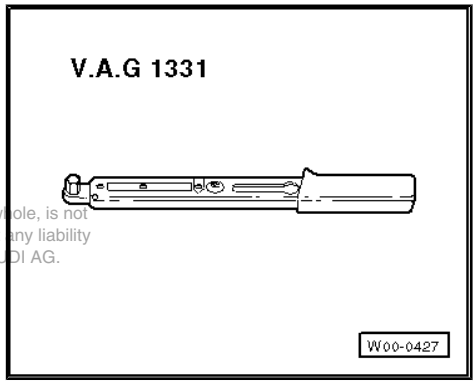
– On vehicles with air suspension, charge air springs of rear axle ⇒ page 183 .
– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .



2.5 Renewing anti-roll bar bushes

Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1331-

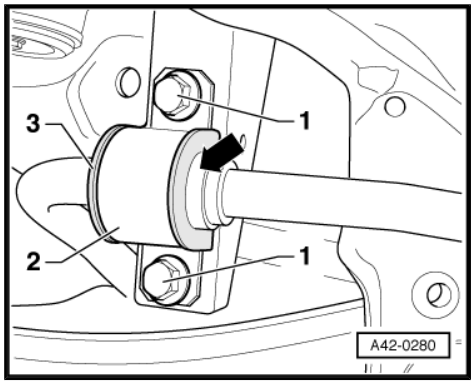


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Removing

– Remove bolts -1-.

– Take off clamp -2- and rubber bush -3-.



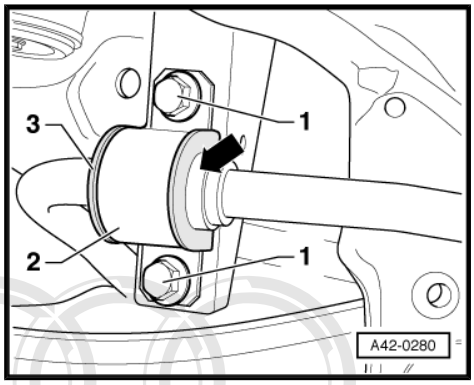
Installing

– Rubber bush must make contact with collar -arrow- on anti-roll bar.

– Initially tighten bolts -1- hand-tight only.

– Lower vehicle onto its wheels and bounce suspension several times.

– Tighten bolts -1- ⇒ Item 7 (page 121) .



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3 Subframe (four-wheel drive), anti-roll bar, coupling rod

⇒ “3.1 Subframe (four-wheel drive), anti-roll bar, coupling rod - exploded view”, page 137

⇒ “3.2 Removing and installing subframe with attachments”, page 139

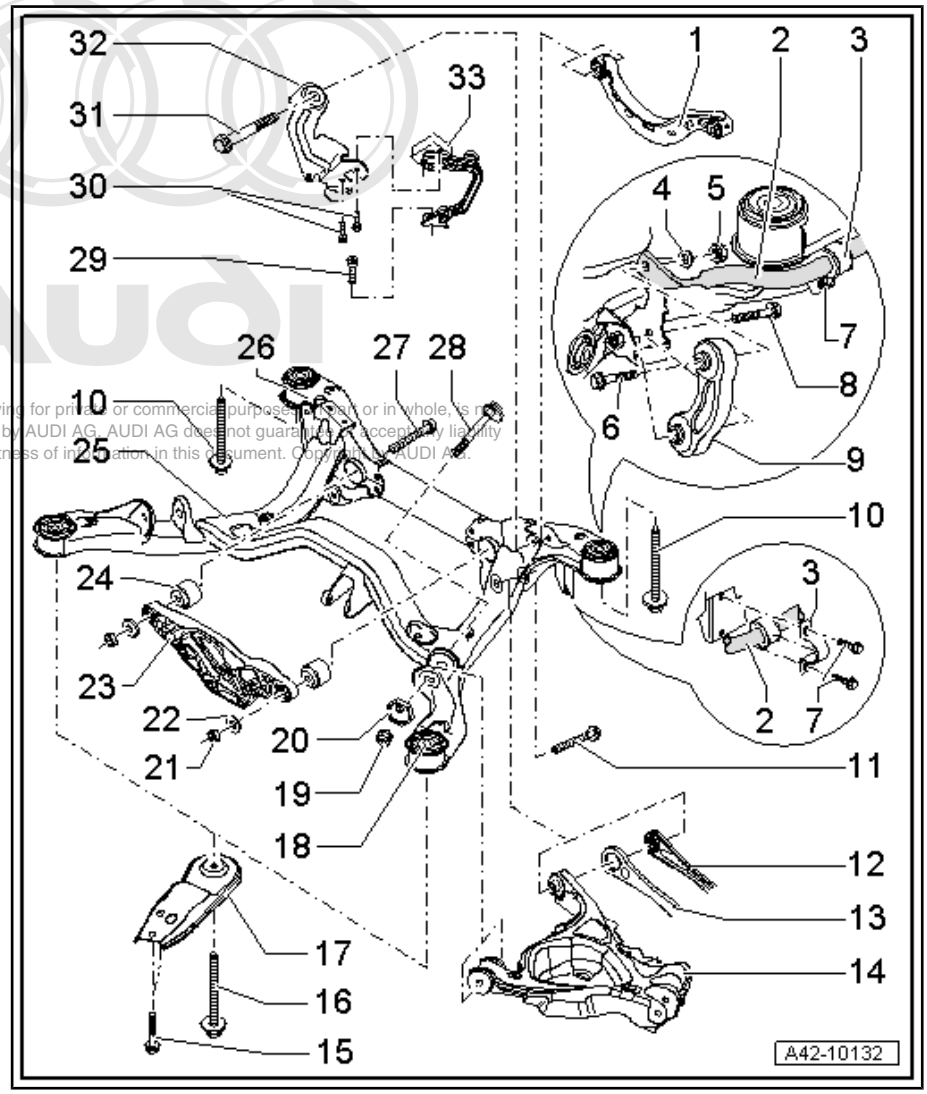
⇒ “3.3 Renewing bonded rubber bushes in subframe”, page 141

⇒ “3.4 Renewing bonded rubber bushes for differential cross member”, page 149

⇒ “3.5 Removing and installing coupling rod and anti-roll bar”, page 152

⇒ “3.6 Renewing anti-roll bar bushes”, page 154

3.1 Subframe (four-wheel drive), anti-roll bar, coupling rod - exploded view



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1 - Upper transverse link

2 - Anti-roll bar

- ❑ Anti-roll bar is removed together with coupling rod
- ❑ Removing and installing ⇒ page 152
- ❑ Renewing anti-roll bar bushes ⇒ page 154

3 - Clamp

4 - Washer

5 - Nut

- ❑ 65 Nm

6 - Bolt

7 - Bolt

- ❑ 25 Nm

8 - Bolt

- ❑ 65 Nm

9 - Coupling rod

- ❑ Coupling rod is removed together with anti-roll bar
- ❑ Removing and installing ⇒ page 152

10 - Bolt

- ❑ 115 Nm +90°
- ❑ Always renew if removed
- ❑ Hexagon bolts must not be slackened while springs are still installed
- ❑ Tighten together with bolt ⇒ Item 16 (page 138) in diagonal sequence
- ❑ Thread in body can be repaired with Helicoil threaded wire insert (DIN 8140). The thread insert must be of the same length as the thread in the body.

11 - Bolt

- ❑ 85 Nm +90°
- ❑ Always renew if removed

12 - Track rod

13 - Stone deflector

14 - Trapezium link

15 - Bolt

- ❑ 55 Nm

16 - Bolt

- ❑ 115 Nm +90°
- ❑ Always renew if removed
- ❑ Hexagon bolts must not be slackened while springs are still installed
- ❑ Tighten together with bolt ⇒ Item 10 (page 137) in diagonal sequence
- ❑ Thread in body can be repaired with Helicoil threaded wire insert (DIN 8140). The thread insert must be of the same length as the thread in the body.

17 - Support

18 - Bonded rubber bush (front)

- ❑ Hydro-bush
- ❑ Renewing ⇒ page 141
- ❑ Note correct installation position ⇒ page 141

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19 - Nut

- ❑ 95 Nm
- ❑ Always renew if removed

20 - Shim

21 - Nut

22 - Washer

23 - Cross member for differential

24 - Bonded rubber bush

- ❑ For cross member for differential
- ❑ Note installation position: bonded rubber bush on right side of vehicle is marked with a yellow dot
- ❑ Renewing ⇒ page 149

25 - Subframe

- ❑ Removing and installing subframe with attachments ⇒ page 139

26 - Bonded rubber bush (rear)

- ❑ Hydro-bush
- ❑ Renewing ⇒ page 141
- ❑ Note correct installation position ⇒ page 141

27 - Bolt

- ❑ 55 Nm

28 - Eccentric bolt

29 - Bolt

- ❑ 10 Nm

30 - Bolt

- ❑ 5 Nm

31 - Bolt

- ❑ 85 Nm +90°

❑ Always renew if removed

32 - Retaining bracket

33 - Rear left vehicle level sender -G76-

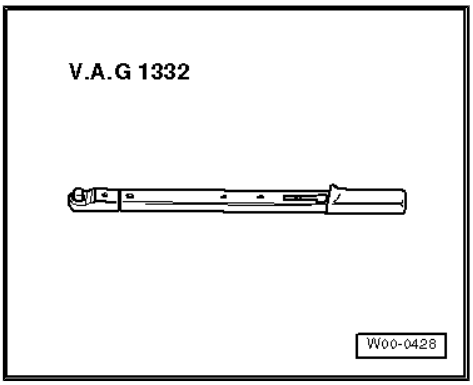
❑ Complete with mounting parts
❑ Lever of sender must face outwards.
❑ Renewing in vehicle ⇒ page 223
❑ Check basic adjustment of headlights if sender mountings are loosened ⇒ Rep. gr. 94
❑ Vehicles with air suspension: re-adapt reference position if sender mountings are loosened ⇒ page 229

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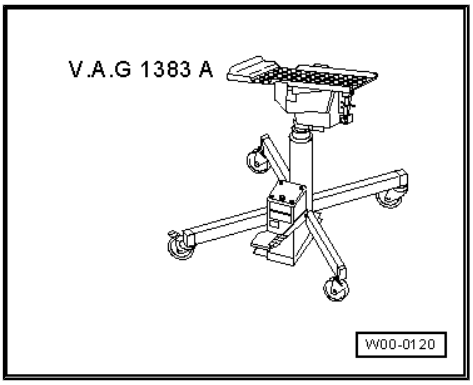
3.2 Removing and installing subframe with attachments

Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1332-



♦ Engine and gearbox jack - V.A.G 1383 A- with universal gearbox support - V.A.G 1359/2-



Removing subframe with attachments

Note

If the flange bolt securing the drive shaft has to be loosened for later operations, remember that this must be done with the vehicle standing on its wheels. Loosening flange bolt for drive shaft ⇒ page 203 .

Vehicles with coil springs

– Remove coil springs ⇒ page 163 .

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .
– Bleed air springs of rear axle ⇒ page 183 .

All vehicles

– Remove rear silencer(s) ⇒ Rep. gr. 26 .

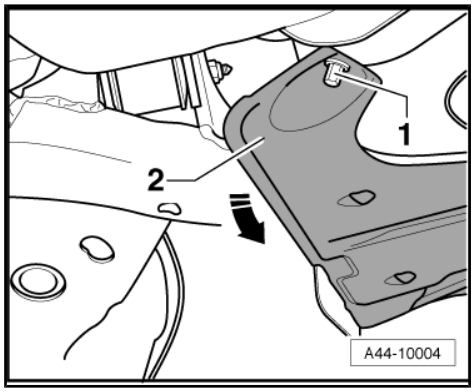
– Disconnect electrical wiring for electromechanical parking brake and ABS speed sensors. On vehicles with automatic headlight range control or air spring struts, unplug connectors and detach from upper link.

– Remove cover -2- ⇒ Rep. gr. 66 .

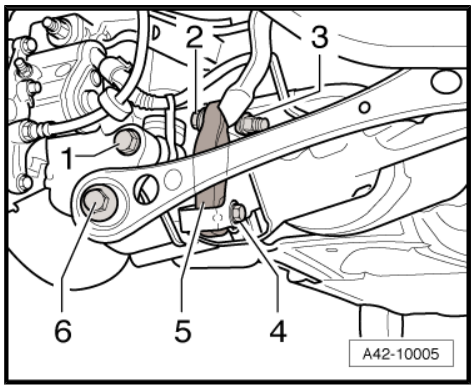
– Disconnect propshaft from rear final drive ⇒ Rep. gr. 39 .

– Remove brake caliper ⇒ Rep. gr. 46 .

– Secure brake caliper to body so that weight of caliper does not stretch or damage brake hose or brake pipe.



– Unscrew bolt/nut -1- and detach shock absorber.

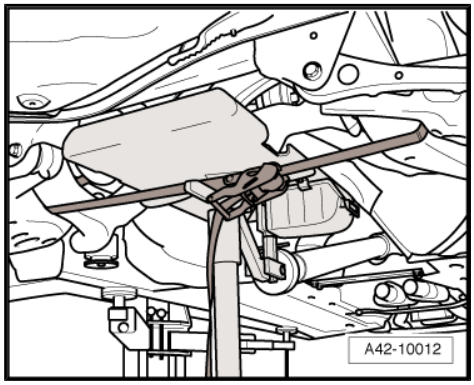


– Position engine and gearbox jack - V.A.G 1383 A- with universal gearbox support - V.A.G 1359/2- beneath subframe and secure with strap.

WARNING

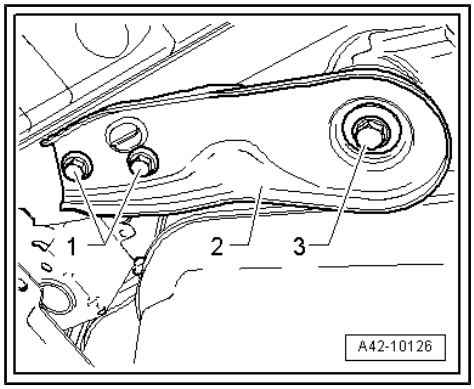
BEFORE slackening subframe bolts, secure vehicle against tipping over (e.g. by placing a weight of approx. 50 kg in the luggage compartment).

Audi
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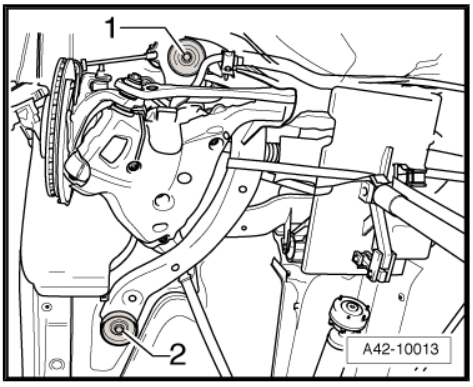


– Remove bolts -1- and -3-.

– Take off reinforcement -2-.



– Remove hexagon bolts -1-.



Note

For clarity, illustration only shows left side of vehicle.

– Carefully lower subframe with attachments.

Note

When lowering components, make sure there is enough clearance for shock absorbers and electrical wiring.

Installing subframe with attachments

Installation is carried out in the reverse sequence. Note the following points:

Tightening torques ⇒ page 137

– Bores in subframe mountings must be aligned centrally with mounting points on body.

Note

Do not install the coil springs/air springs until the subframe mountings have been tightened to the specified torque.

– On vehicles with air suspension, install air springs ⇒ page 175 .

– Check and adjust wheel alignment ⇒ page 281 .

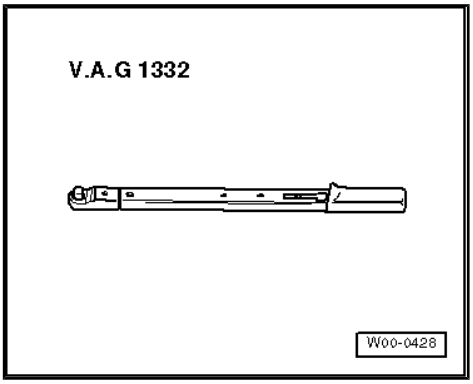
Front and rear wheel alignment must always be checked and adjusted if necessary using VW/Audi approved equipment.

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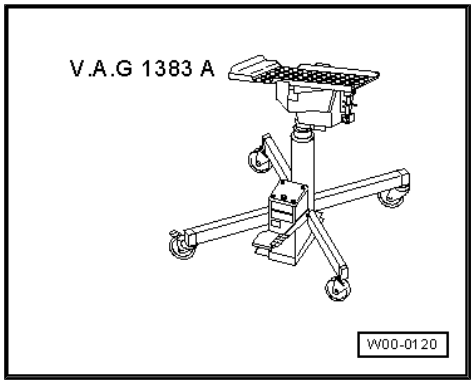
3.3 Renewing bonded rubber bushes in subframe

Special tools and workshop equipment required

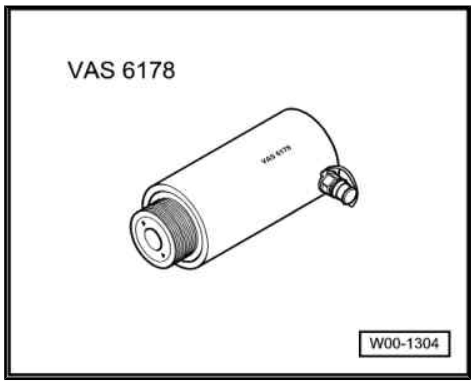
♦ Torque wrench - V.A.G 1332-



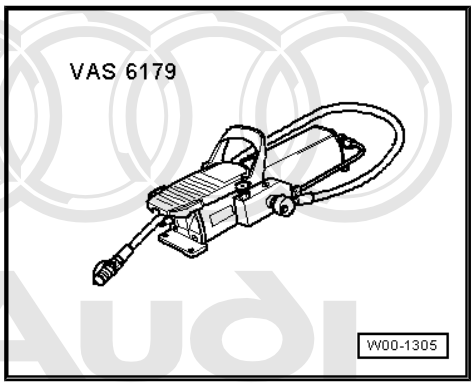
- Engine and gearbox jack - V.A.G 1383 A- with universal gearbox support - V.A.G 1359/2-



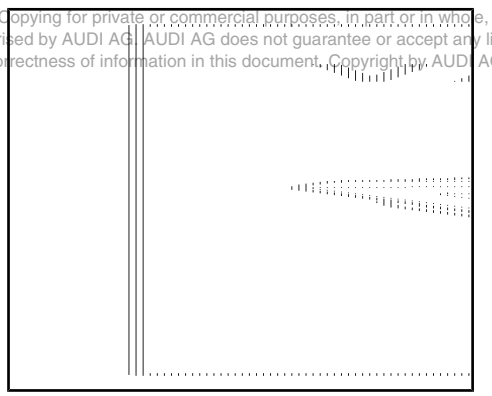
- Hydraulic press - VAS 6178-



- Foot pump - VAS 6179-

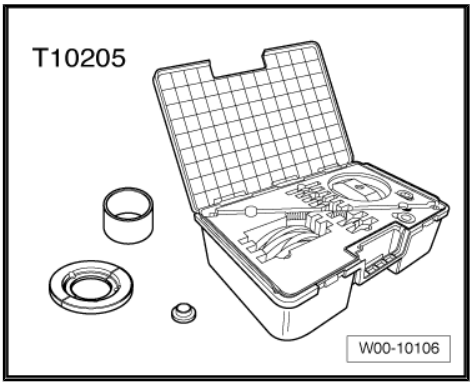


- Drip tray for workshop hoist - VAS 6208-

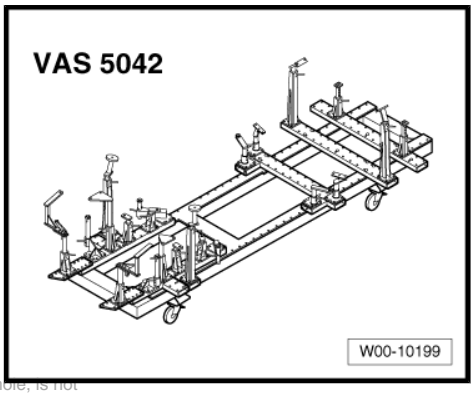


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- Assembly tool - T10205-

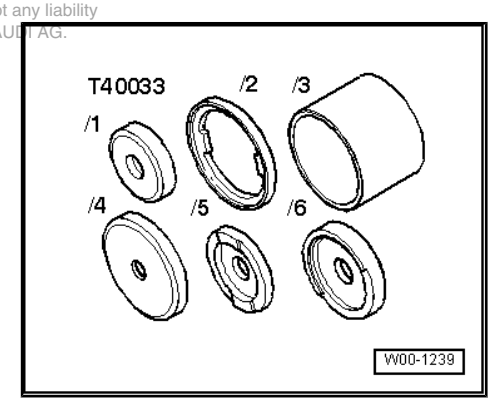


- Assembly tool - T10263-



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- Assembly tool - T40033-



- Thrust piece - T40141-

Note

- *Also check the other bushes before renewing a defective bush.*
- *If cracks, oil leakage or other damage is visible these bushes must also be renewed.*

Pressing out bonded rubber bushes (front)

Vehicles with air suspension

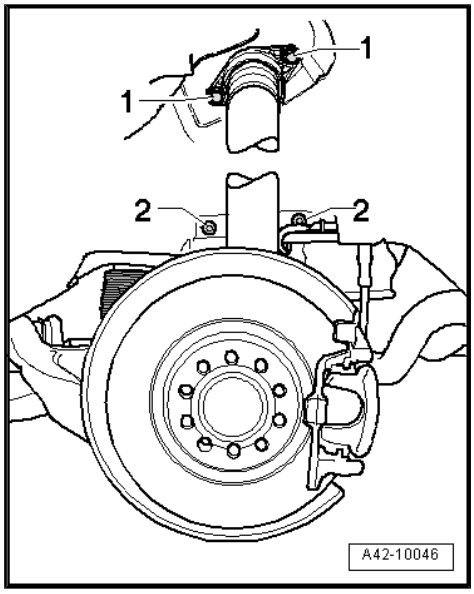
– Position vehicle on lifting platform ⇒ page 11 .

All vehicles

– Remove wheels.

– Remove wheel housing liner on left and right sides ⇒ Rep. gr. 66 .

– Remove hexagon bolts -1- from shock absorber (left and right).



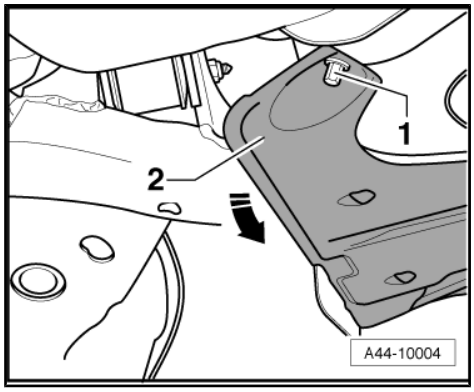
– Remove cover -2- ⇒ Rep. gr. 66 .
– Remove rear section of exhaust system ⇒ Rep. gr. 26 .

Vehicles with air suspension

– Remove air springs ⇒ page 175 .

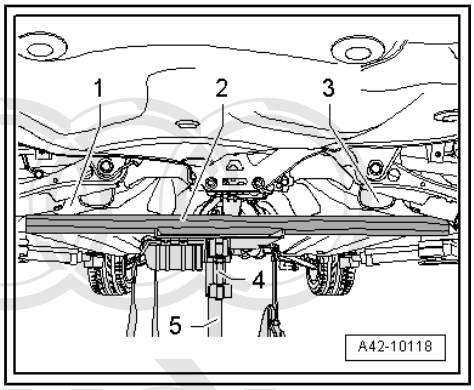
Vehicles with coil springs

– Remove coil springs ⇒ page 163 .

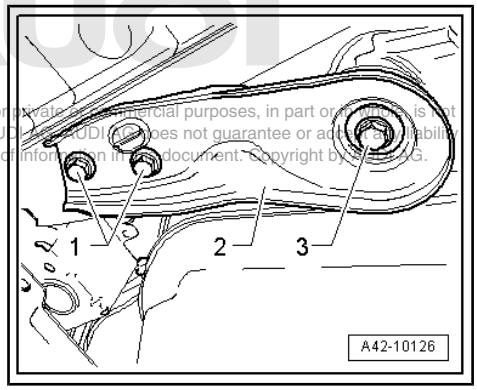


All vehicles

– Apply engine and gearbox jack - V.A.G 1383 A- with universal gearbox support - V.A.G 1359/2- and a suitable wooden block -2- to subframe and support front part of subframe.

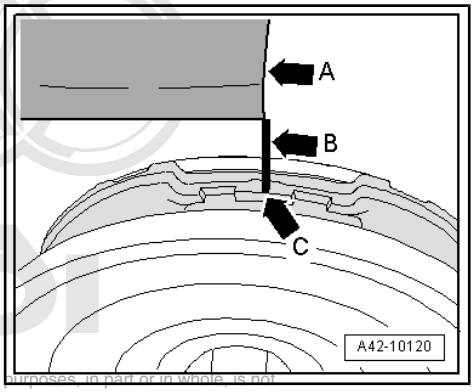


– Remove bolts -1- and -3-.
– Take off reinforcement -2-.
– Lower subframe only as far as necessary.



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– Mark position of bushes relative to subframe -arrow A-.
– Make a marking -arrow B- from rib -arrow C- on bush to mounting on subframe -arrow A-.

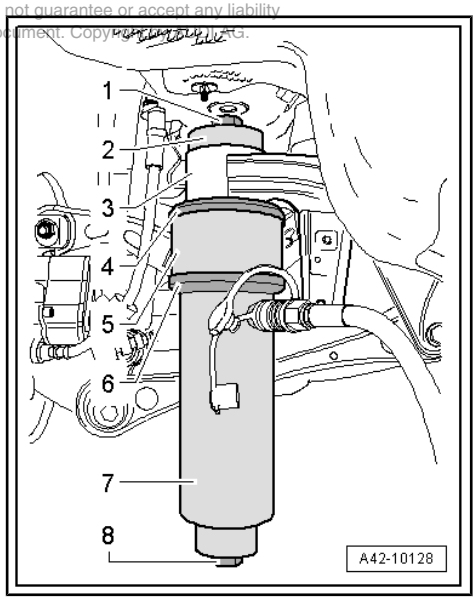


Note

The marking -arrow B- is required when installing the new bush.

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– Apply special tools to subframe as shown in illustration.



1 - Spindle - T10263/4- with nut - T10263/5-
2 - Plate - T40033/1- Conical side faces body.
3 - Subframe
4 - Plate - T40033/2- Conical side faces body.
5 - Sleeve - T40033/3-
6 - Washer - T10205/4-
7 - Hydraulic press - VAS 6178-
8 - Spindle - T10263/4- with nut - T10263/5-

WARNING

- ***Hold hydraulic press - VAS 6178- securely during pressing operation.***
- ***The bonded rubber bush will come loose suddenly. Injuries can be caused if the tools and the bonded rubber bush are allowed to drop.***

– Place drip tray for workshop hoist - VAS 6208- under vehicle.
– Press out bonded rubber bush and catch escaping oil.

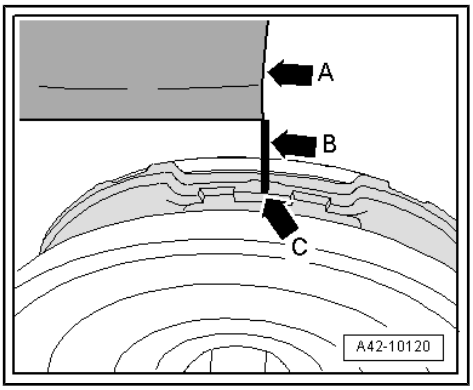
Pressing in bonded rubber bush

Note

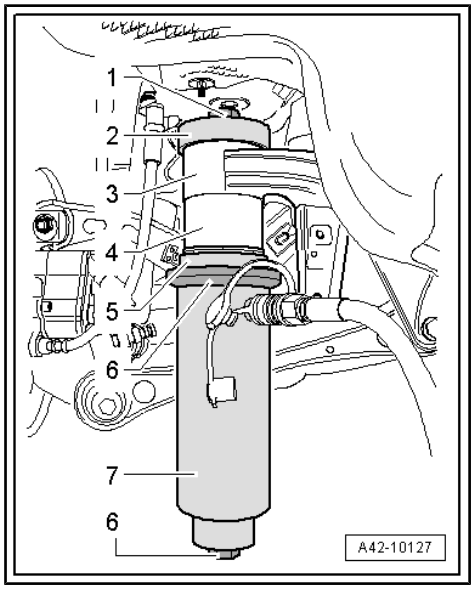
Bushes with identical Part Nos. must be fitted on both sides.

– Note correct installation position of bonded rubber bush.

– Observe marking made previously: -arrow B- on subframe -arrow A-.
– Marking -arrow B- and rib -arrow C- on bush must be in line with mounting on subframe -arrow A-.



– Apply special tools to subframe as shown in illustration.



1 - Spindle - T10263/4- with nut - T10263/5-

2 - Thrust piece - T40141- Conical side faces body.

3 - Subframe

4 - Bonded rubber bush

5 - Washer - T10205/15-

6 - Washer - T10205/4-

7 - Hydraulic press - VAS 6178-

8 - Spindle - T10263/4- with nut - T10263/5-

– Press front bush into subframe as far as stop.

Remaining installation steps are carried out in reverse sequence. Note the following points:

Note

Do not install the coil springs/air springs until the subframe mountings have been tightened to the specified torque.

– Installing coil springs ⇒ page 163 ; installing air springs ⇒ page 175 .

Tightening torques ⇒ page 137

– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .

– Secure wheels ⇒ Wheels and tyres; Rep. gr. 44 .

Pressing out bonded rubber bushes (rear)

Vehicles with air suspension

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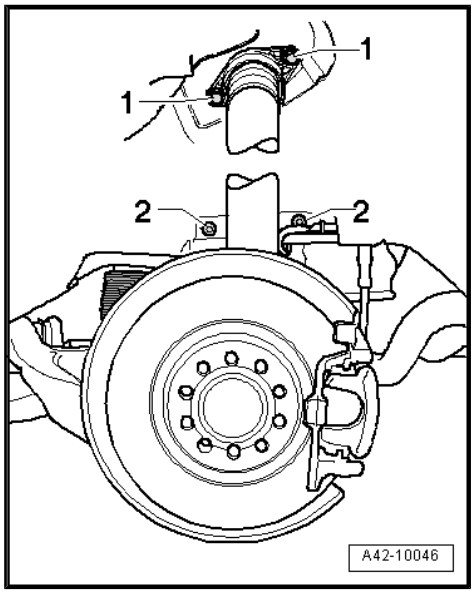
– Position vehicle on lifting platform ⇒ page 11 .

All vehicles

– Remove wheels.

– Remove wheel housing liner on left and right sides ⇒ Rep. gr. 66 .

– Remove hexagon bolts -1- from shock absorber (left and right).



– Remove rear section of exhaust system ⇒ Rep. gr. 26 .

Vehicles with air suspension

– Remove air springs ⇒ page 175 .

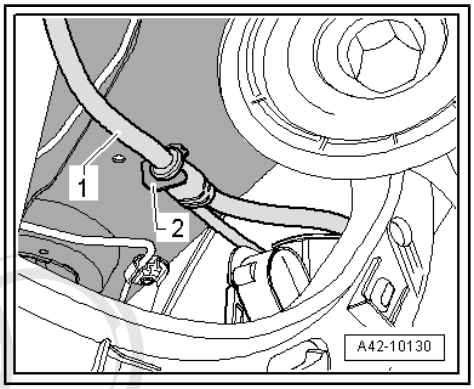
Vehicles with coil springs

– Remove coil springs ⇒ page 163 .

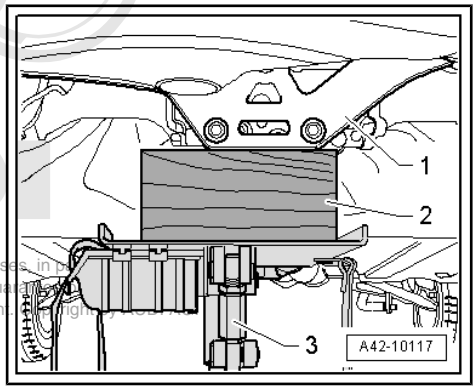
All vehicles

– Remove anti-roll bar ⇒ page 152 .

– Disengage electrical wiring harness -1- (left and right) from retainers -2- on body.

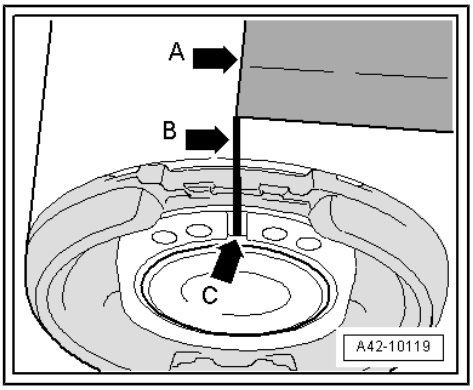


– Apply engine and gearbox jack - V.A.G 1383 A- with universal gearbox support - V.A.G 1359/2- and a suitable wooden block -2- to final drive and support rear part of final drive.
– Remove only rear subframe bolts.
– Lower subframe only as far as necessary.



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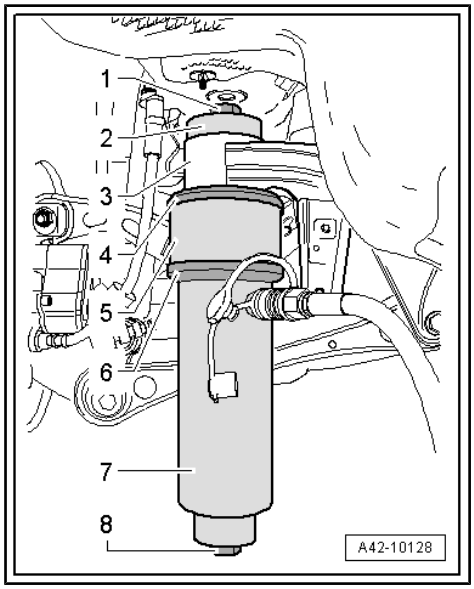
– Mark position of bushes relative to subframe -arrow A-.
– Make a marking -arrow B- from slot -arrow C- in bush to mounting on subframe -arrow A-.



Note

The marking -arrow B- is required when installing the new bush.

– Apply special tools to subframe as shown in illustration.



1 - Spindle - T10263/4- with nut - T10263/5-
2 - Plate - T40033/1- Conical side faces body.
3 - Subframe
4 - Plate - T40033/2- Conical side faces body.
5 - Sleeve - T40033/3-
6 - Washer - T10205/4-
7 - Hydraulic press - VAS 6178-
8 - Spindle - T10263/4- with nut - T10263/5-

WARNING

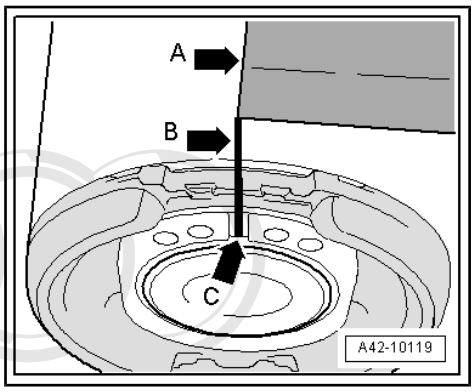
- *Hold hydraulic press - VAS 6178- securely during pressing operation.*
- *The bonded rubber bush will come loose suddenly. Injuries can be caused if the tools and the bonded rubber bush are allowed to drop.*

– Place drip tray for workshop hoist - VAS 6208- under vehicle.
– Press out bonded rubber bush and catch escaping oil.

Pressing in bonded rubber bush

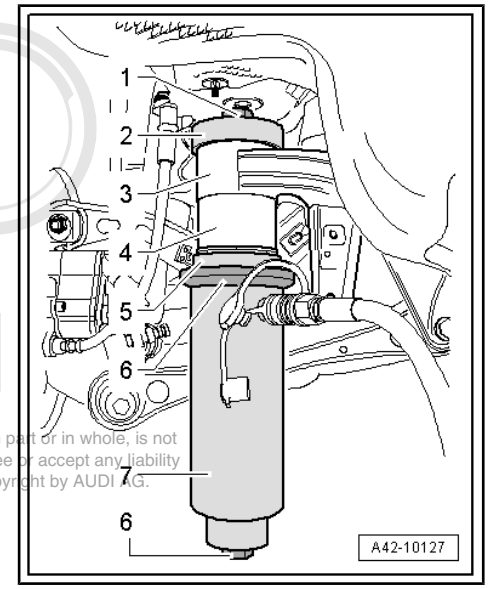
– Note correct installation position of bonded rubber bush

– Observe marking made previously: -arrow B- on subframe -arrow A-.
– Marking -arrow B- and rib -arrow C- on bush must be in line with mounting on subframe -arrow A-.



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– Apply special tools to subframe as shown in illustration.



1 - Spindle - T10263/4- with nut - T10263/5-

2 - Thrust piece - T40141- Conical side faces body.

3 - Subframe

4 - Bonded rubber bush

5 - Washer - T10205/15-

6 - Washer - T10205/4-

7 - Hydraulic press - VAS 6178-

8 - Spindle - T10263/4- with nut - T10263/5-

– Press front bush into subframe as far as stop.

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Remaining installation steps are carried out in reverse sequence.
Note the following points:

Note

Do not install the coil springs/air springs until the subframe mountings have been tightened to the specified torque.

– Installing coil springs ⇒ page 163 ; installing air springs ⇒ page 175 .

Tightening torques ⇒ page 137

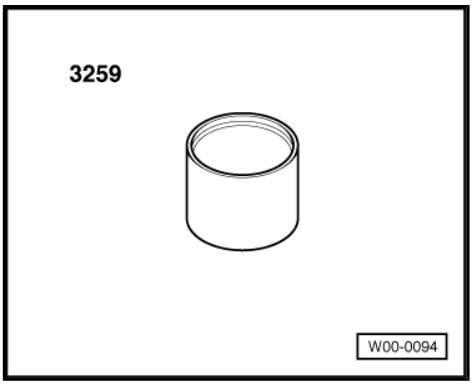
– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .

– Secure wheels ⇒ Wheels and tyres; Rep. gr. 44 .

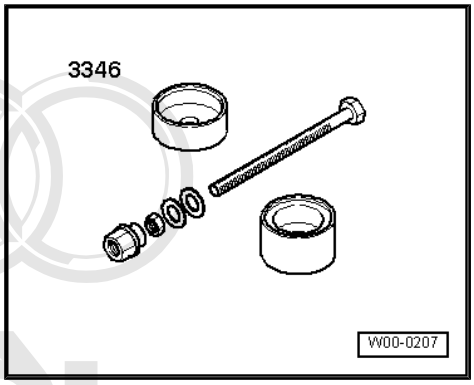
3.4 Renewing bonded rubber bushes for differential cross member

Special tools and workshop equipment required

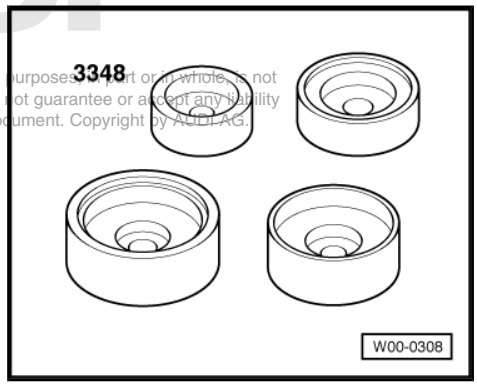
♦ Tube - 3259-



♦ Assembly tool - 3346-

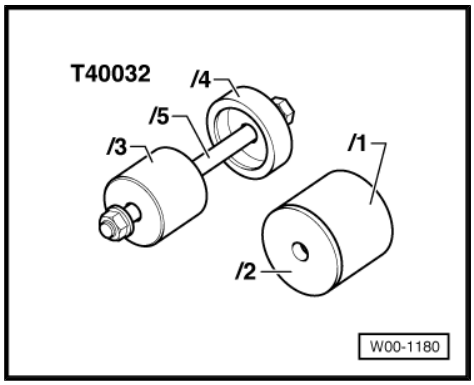


♦ Assembly tool - 3348-



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♦ Assembly tool - T40032-

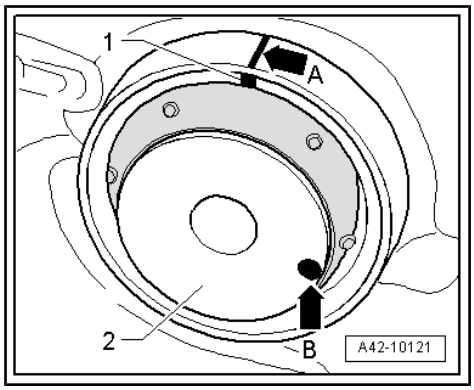


♦ Thrust piece - T40144-

Removing

– Removing and installing subframe with attachments ⇒ page 139 .

– Make a marking -arrow A- on subframe above slot -1- in bush -2-.



– Apply special tools to subframe as shown in illustration.

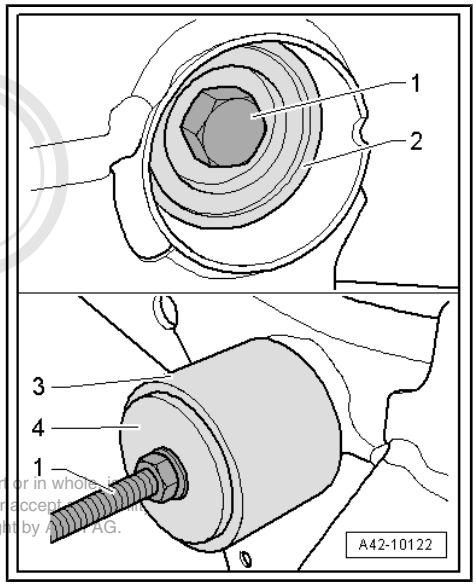
1 - Spindle - 3346/2-

2 - Thrust piece - 3348/2- Insert in subframe with flat side towards bush.

3 - Tube - 3259-

4 - Washer - T40032/2-

– Pull bush out of subframe.

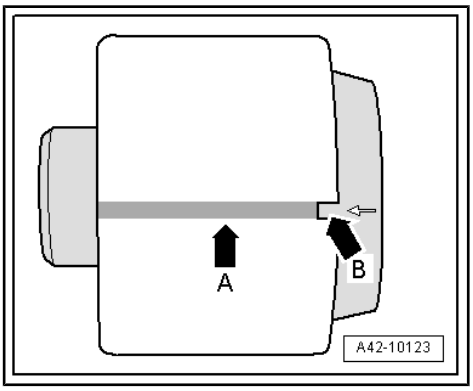


Installing

Installation is carried out in the reverse sequence. Note the following points:

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– Make a continuous marking -arrow B- in line with slot -arrow A-.



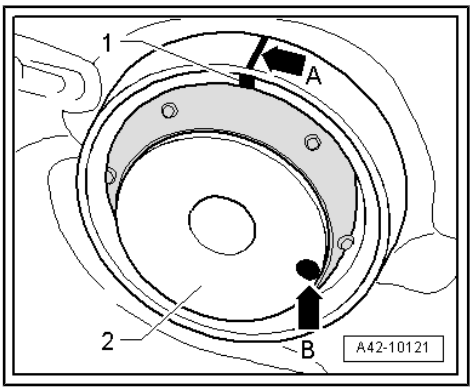
Note

- *This marking is required for aligning the bush with the subframe.*
- *The slot is concealed by the tools when the bush is being installed.*

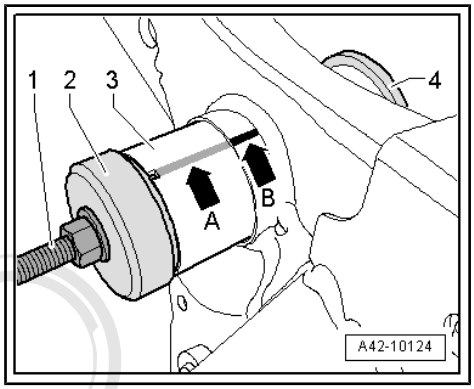
– Note that the bushes are different.

The bush -2- with yellow dot -arrow B- must be installed on the right side of the vehicle.

– Fit bush -2- so that slot -1- is in line with previously made marking -arrow A-.



– Apply special tools and bush to subframe as shown in illustration. Marking -arrow A- on bush must be in line with marking -arrow B- on subframe.



1 - Spindle - 3346/2-

2 - Thrust piece - T40144-

3 - Bush

4 - Washer - T40032/2-

– Pull bush into subframe as far as stop.

Note

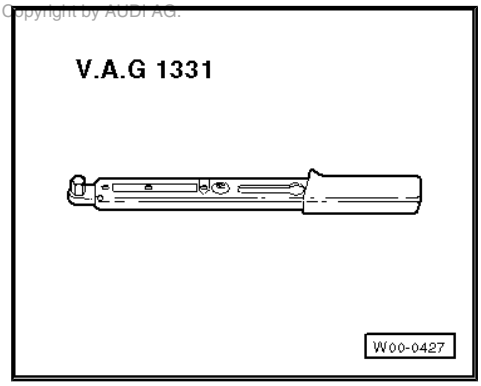
If the paint on the subframe has been damaged when renewing the bushes, make good the damage with anti-corrosion coating, primer and black topcoat.

3.5 Removing and installing coupling rod and anti-roll bar

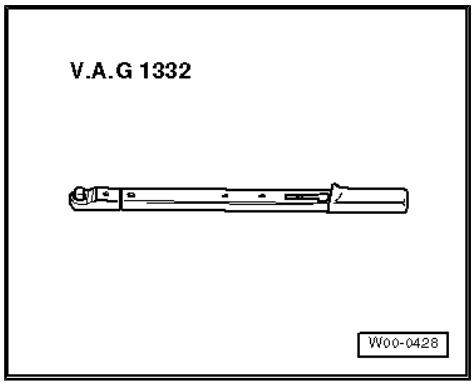
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Special tools and workshop equipment required

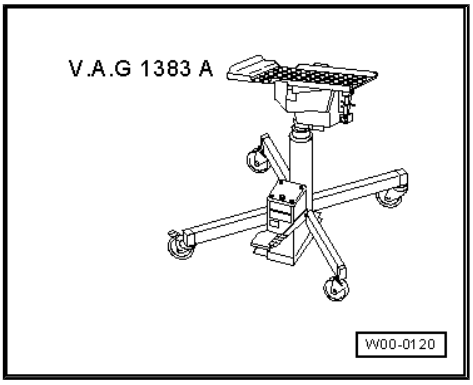
- Torque wrench - V.A.G 1331-



- Torque wrench - V.A.G 1332-



♦ Engine and gearbox jack - V.A.G 1383 A- with universal gearbox support - V.A.G 1359/2-



Removing

Vehicles with coil springs

– Remove coil springs ⇒ page 163 .

Vehicles with air suspension

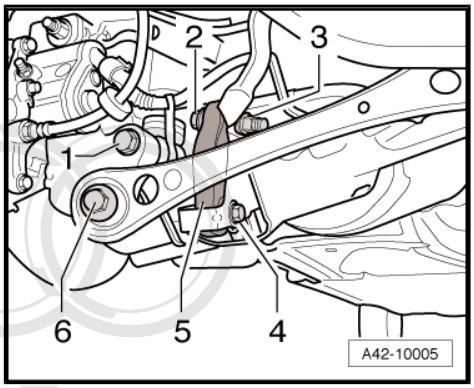
– Position vehicle on lifting platform ⇒ page 11 .

– Bleed air springs of rear axle ⇒ page 183 .

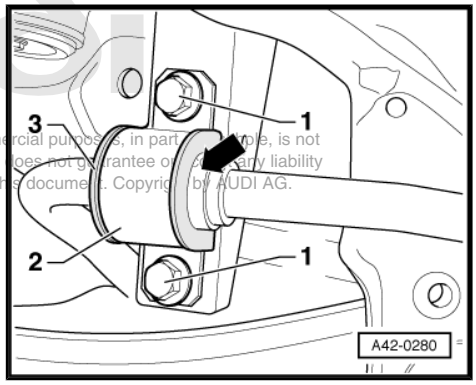
All vehicles

– Remove hexagon nut -3-.

– Remove hexagon bolt -4-.



– Remove hexagon bolts -1-.



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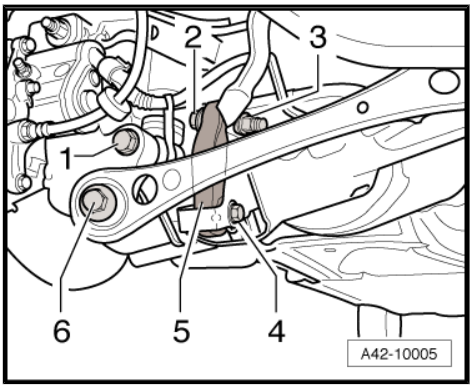
– Pull anti-roll bar towards the rear until hexagon bolt -2- can be taken out.

– Take out coupling rod -5-.

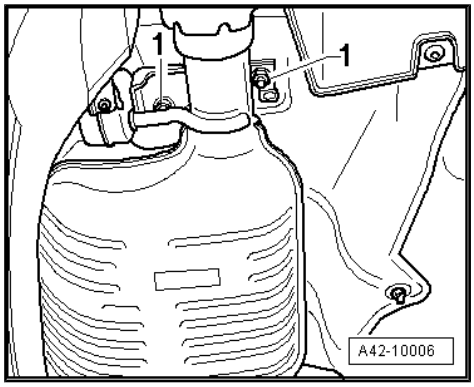
– Remove anti-roll bar.

Perform the following step if there is not enough clearance to take out the anti-roll bar.

– Support exhaust system by applying engine and gearbox jack - V.A.G 1383 A- with a suitable wooden block to both rear silencers.



– Unscrew hexagon nuts -1- and lower exhaust system.
– Remove anti-roll bar.



Installing

Installation is carried out in the reverse sequence. Note the following points:

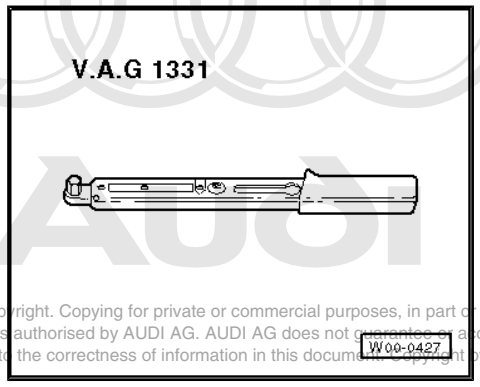
Tightening torques ⇒ page 137

– On vehicles with air suspension, charge air springs of rear axle ⇒ page 183 .
– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .

3.6 Renewing anti-roll bar bushes

Special tools and workshop equipment required

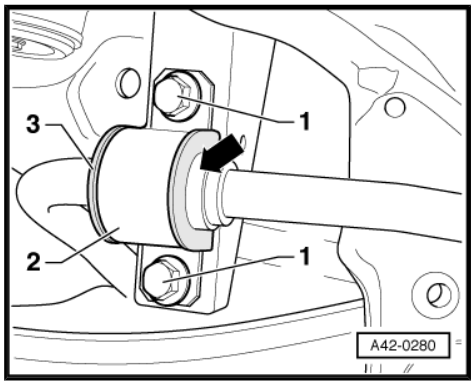
♦ Torque wrench - V.A.G 1331-



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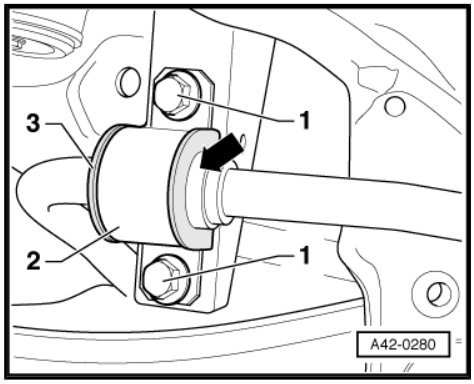
Removing

– Remove bolts -1-.
– Take off clamp -2- and rubber bush -3-.



Installing

– Rubber bush must make contact with collar -arrow- on anti-roll bar.
– Initially tighten bolts -1- hand-tight only.
– Lower vehicle onto its wheels and bounce suspension several times.
– Tighten bolts -1- ⇒ Item 7 (page 137) .



4 Trapezium link, upper transverse link, track rod, coil spring, vehicle level sender

⇒ “4.1 Trapezium link, upper transverse link, track rod, coil spring, vehicle level sender - exploded view”, page 155

⇒ “4.2 Removing and installing trapezium link”, page 156

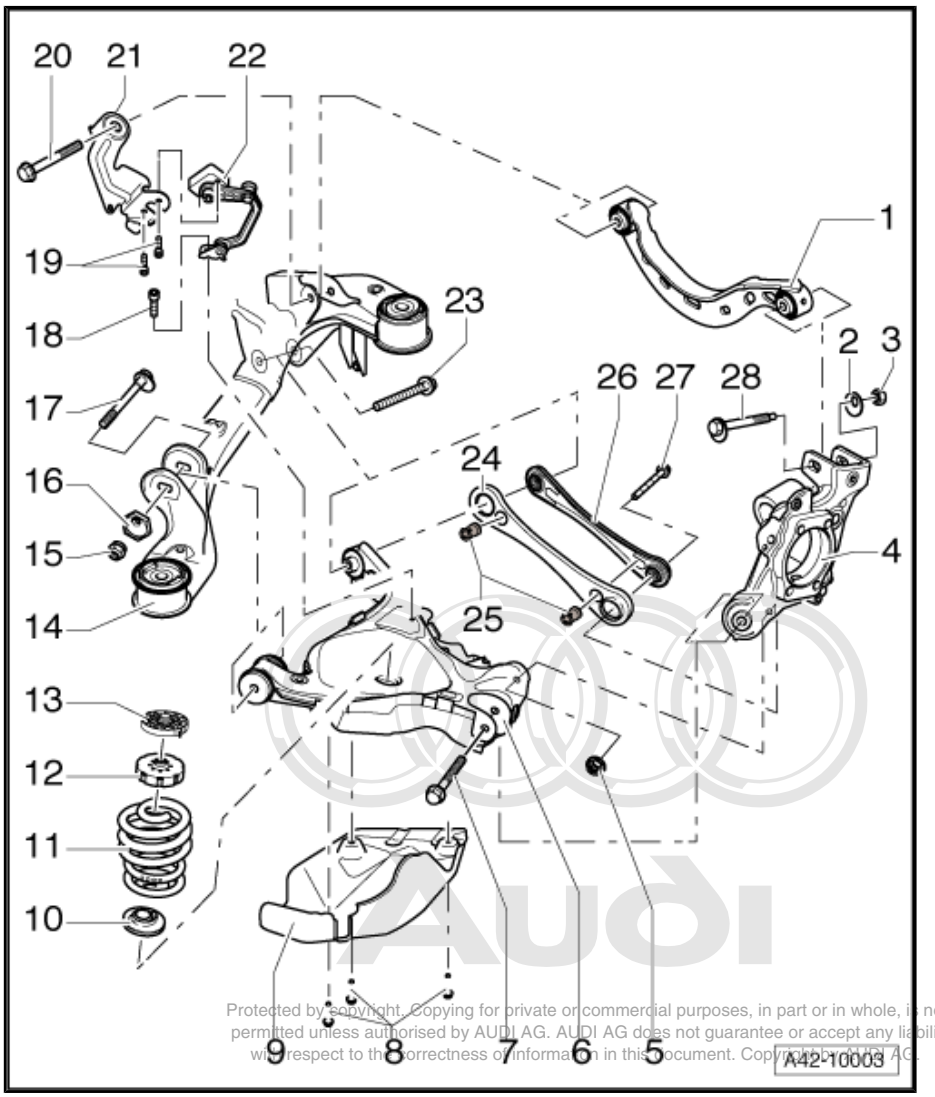
⇒ “4.3 Removing and installing upper transverse link”, page 159

⇒ “4.4 Removing and installing track rod”, page 161

⇒ “4.5 Removing and installing coil spring”, page 163

⇒ “4.6 Removing and installing vehicle level sender”, page 173

4.1 Trapezium link, upper transverse link, track rod, coil spring, vehicle level sender - exploded view



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1 - Upper transverse link

- ❑ Removing and installing ⇒ page 159

2 - Eccentric washer

3 - Nut

- ❑ 95 Nm
- ❑ Always renew if removed

4 - Wheel bearing housing

5 - Nut

6 - Trapezium link

- ❑ Removing and installing ⇒ page 156

7 - Bolt

- ❑ 85 Nm +90°
- ❑ Always renew if removed

8 - Bolt

- ❑ 25 Nm

9 - Stone deflector for trapezium link

10 - Bottom spring seat

11 - Coil spring

- ❑ Note different running gear versions; see vehicle data sticker ⇒ page 282
- ❑ Removing and installing ⇒ page 163

12 - Top spring seat

13 - Spacer for top spring seat

- ❑ Only fitted on heavy-duty running gear version

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14 - Subframe

15 - Nut

- ❑ 95 Nm
- ❑ Always renew if removed

16 - Shim

17 - Eccentric bolt

18 - Bolt

- ❑ 10 Nm

19 - Bolt

- ❑ 5 Nm

20 - Bolt

- ❑ 85 Nm +90°
- ❑ Always renew if removed

21 - Retaining bracket

22 - Rear left vehicle level sender -G76-

- ❑ Complete with mounting parts
- ❑ Lever of sender must face outwards.
- ❑ Renewing in vehicle ⇒ page 223
- ❑ Check basic adjustment of headlights if sender mountings are loosened ⇒ Rep. gr. 94
- ❑ Vehicles with air suspension: re-adapt reference position if sender mountings are loosened ⇒ page 229

23 - Bolt

- ❑ 85 Nm +90°
- ❑ Always renew if removed

24 - Stone deflector

- ❑ Only fitted on heavy-duty running gear version

25 - Retaining clip

26 - Track rod

- ❑ Removing and installing ⇒ page 161

27 - Bolt

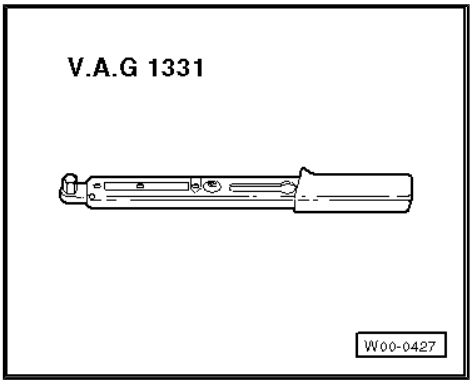
- ❑ 85 Nm +90°
- ❑ Always renew if removed

28 - Eccentric bolt

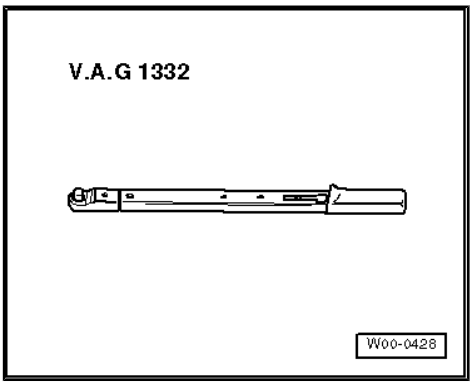
4.2 Removing and installing trapezium link

Special tools and workshop equipment required

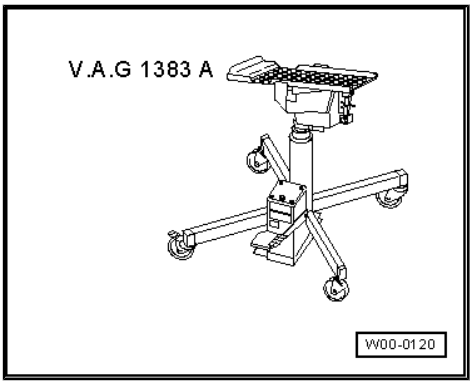
♦ Torque wrench - V.A.G 1331-



♦ Torque wrench - V.A.G 1332-



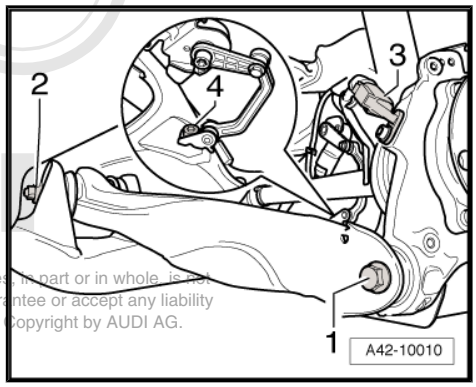
♦ Engine and gearbox jack - V.A.G 1383 A- with universal gearbox support - V.A.G 1359/2-



Removing

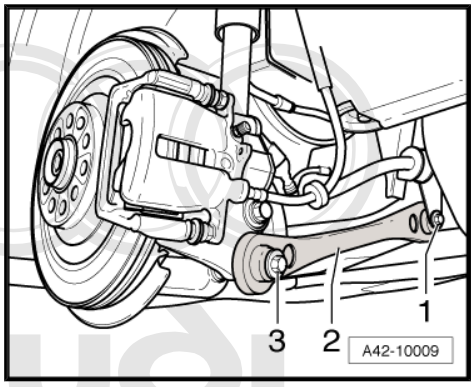
Removing coil spring or air spring

– Remove coil spring ⇒ page 163 .
– Remove air spring ⇒ page 175 .
– On vehicles with vehicle level sender, unscrew bolt -4-.
– Detach brake caliper with brake carrier and brake disc ⇒ Rep. gr. 46 .
– Secure brake caliper to body so that weight of caliper does not stretch or damage brake hose or brake pipe.



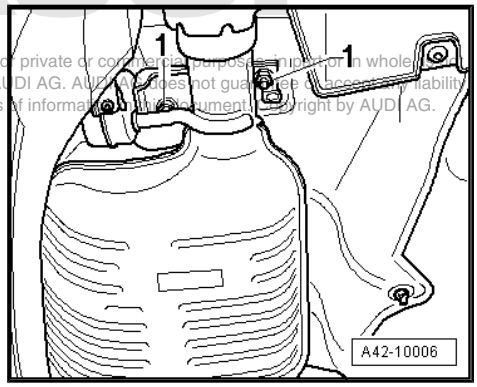
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– Remove hexagon bolt -3-.
– Support exhaust system by applying engine and gearbox jack - V.A.G 1383 A- with a suitable wooden block to both rear silencers.

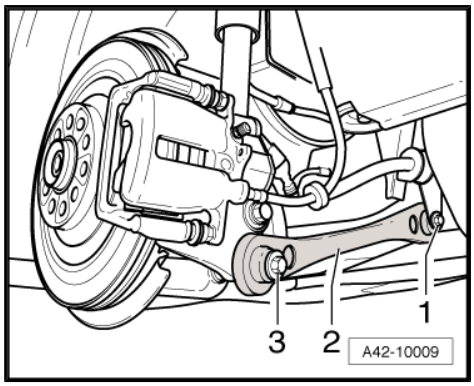


– Unscrew hexagon nuts -1- and lower exhaust system.

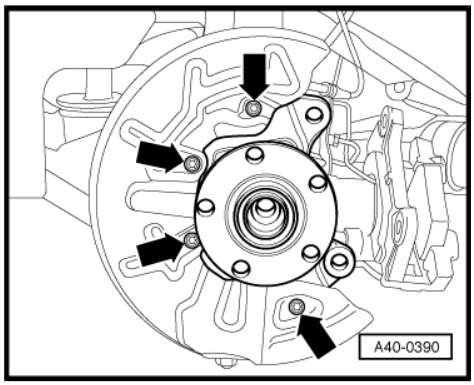
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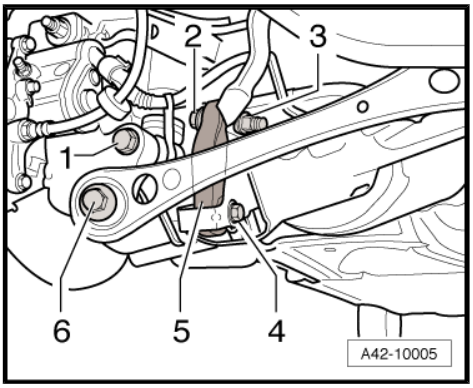
– Remove hexagon bolt -1-.
– Take out track rod -2-.



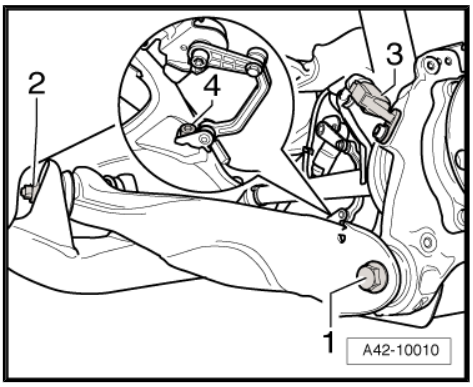
– Remove bolts -arrows- and take out splash plate.



– Remove hexagon bolt -4-.



– Remove hexagon bolt -1-.
– Detach bolt connection -2-.
– Take out trapezium link.



Installing

Installation is carried out in the reverse sequence. Note the following points:

Note

- *Bonded rubber bushes can only be turned to a limited extent. The suspension mountings must therefore only be tightened when the suspension is in the unladen position or reference position.*
- *Lifting suspension to unladen position (vehicles with coil springs) ⇒ page 114*
- *Lifting suspension to reference position (vehicles with air suspension) ⇒ page 116*

Tightening torques ⇒ page 155

– On vehicles with automatic headlight range control, carry out basic adjustment of headlights ⇒ Rep. gr. 94 .
– Install coil spring ⇒ page 163 .
– On vehicles with air suspension, install air spring ⇒ page 175 .
– Vehicles with air suspension: re-adapt reference position ⇒ page 229 .
– Check and adjust wheel alignment ⇒ page 281 .

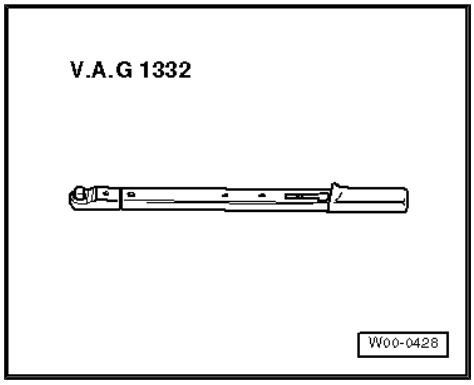
Front and rear wheel alignment must always be checked and adjusted if necessary using VW/Audi approved equipment.

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4.3 Removing and installing upper transverse link

Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1332-



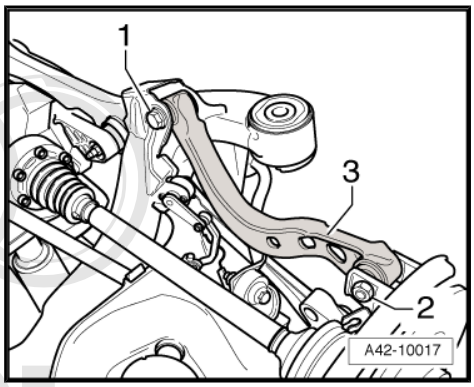
Note

As inner bolt -1- is inaccessible, upper transverse link can only be removed after taking out subframe.

Removing

– Remove subframe (vehicles with front-wheel drive ⇒ page 123).

– Remove subframe (vehicles with four-wheel drive ⇒ page 139).

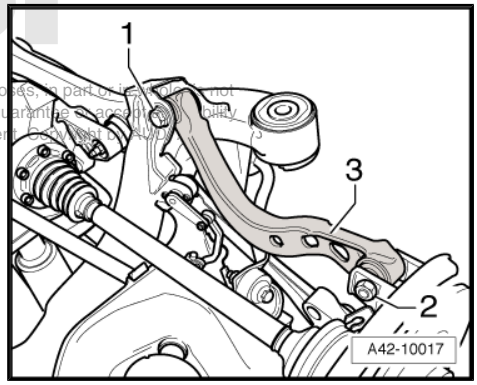


– Using a felt-tip pen or similar, mark position of eccentric washer -2- on wheel bearing housing.

– Unscrew bolt connections -1- and -2-.

– Take out upper transverse link.

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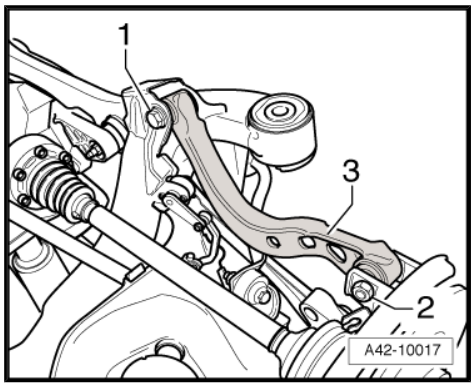
Installing

Note

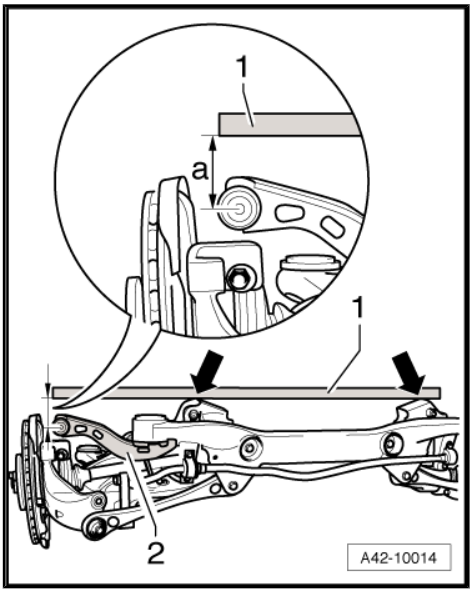
Renew bolts and self-locking nuts.

Installation position of transverse link on subframe

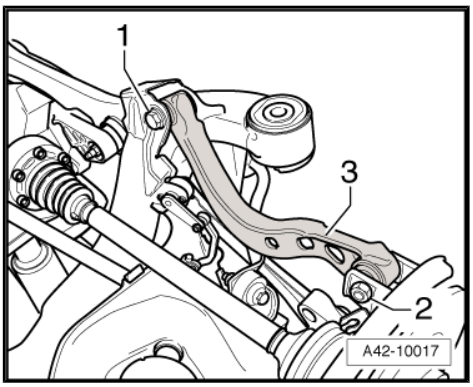
– Bolt transverse link -3- loosely to subframe at mounting -1-.



– Lay straightedge or straight bar -1- flat on subframe -arrows-.
– Position transverse link so that dimension a = 64 ± 1 mm is obtained.



– Secure transverse link to subframe in this position at mounting -1-.
– Attach wheel bearing housing to transverse link and tighten new nut to 20 Nm. Note position of eccentric washer -2-.
– Install subframe (vehicles with front-wheel drive ⇒ page 123).
– Install subframe (vehicles with four-wheel drive ⇒ page 139).



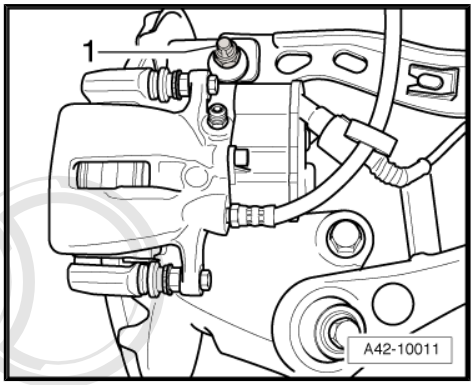
– Loosen bolt connection -1-.

Vehicles with coil springs

– Lift suspension to unladen position ⇒ page 114 and tighten bolt connection -1-.

Vehicles with air suspension

– Lift suspension to reference position ⇒ page 116 and tighten bolt connection -1-.



All vehicles

Tightening torques ⇒ page 155

– Check and adjust wheel alignment ⇒ page 281 .

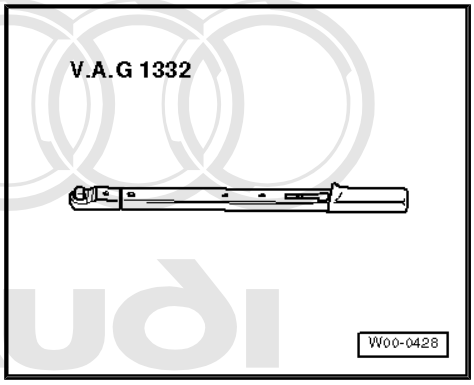
Wheel alignment must always be checked and adjusted if necessary using VW/Audi-approved equipment.

4.4 Removing and installing track rod

Special tools and workshop equipment required

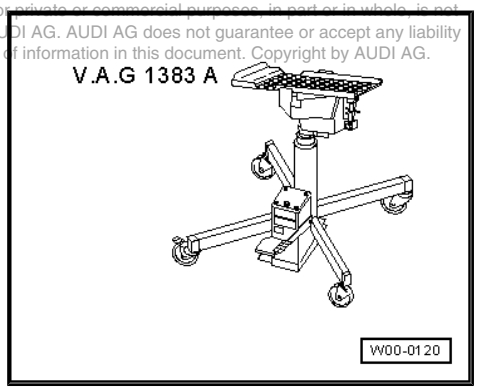
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- Torque wrench - V.A.G 1332-



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- Engine and gearbox jack - V.A.G 1383 A- with universal gearbox support - V.A.G 1359/2-



Removing

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

– Bleed air springs of rear axle ⇒ page 183 .

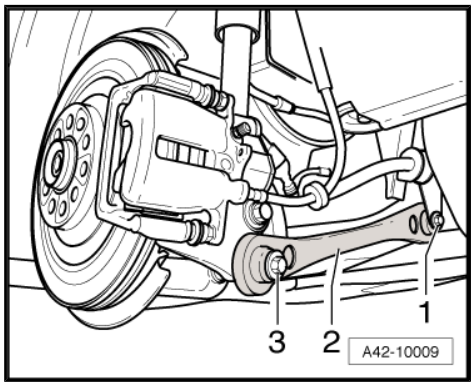
Vehicles with coil springs

– Remove coil spring ⇒ page 163 .

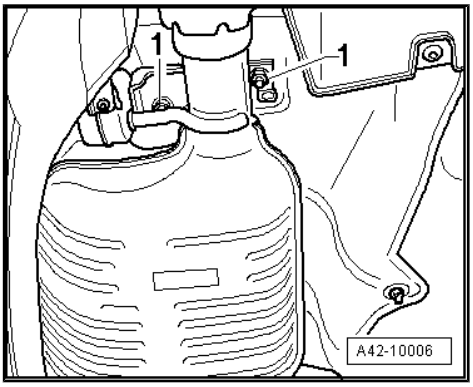
All vehicles

– Remove hexagon bolt -3-.

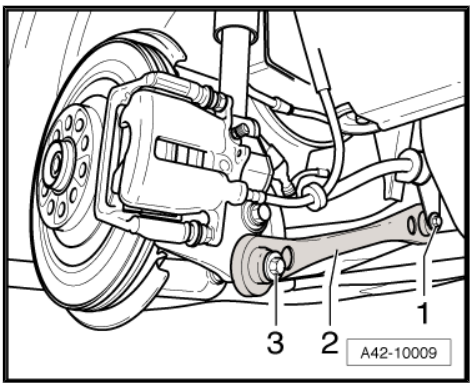
– Support exhaust system by applying engine and gearbox jack - V.A.G 1383 A- with a suitable wooden block to both rear silencers.



– Unscrew hexagon nuts -1- and lower exhaust system.



– Remove hexagon bolt -1-.
– Take out track rod -2-.



Installing

Installation is carried out in the reverse sequence. Note the following points:

Note

- *Bonded rubber bushes can only be turned to a limited extent. The suspension mountings must therefore only be tightened when the suspension is in the unladen position or reference position.*
- *Lifting suspension to unladen position (vehicles with coil springs)* ⇒ page 114
- *Lifting suspension to reference position (vehicles with air suspension)* ⇒ page 116

Tightening torques ⇒ page 155

– Install coil spring ⇒ page 163 .
– On vehicles with air suspension, charge air springs of rear axle ⇒ page 183 .
– Fit wheel.
– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .
– Secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .
– Check and adjust wheel alignment ⇒ page 281 .

Wheel alignment must always be checked and adjusted if necessary using VW/Audi-approved equipment.

4.5 Removing and installing coil spring

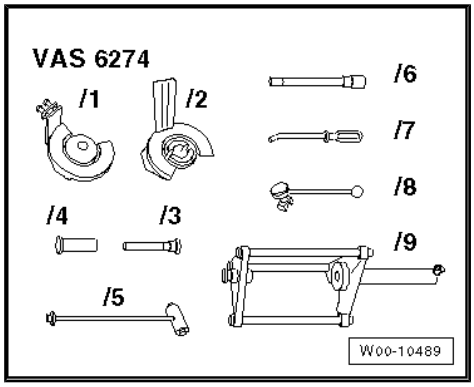
Note

The video supplied with the spring compressing system - VAS 6274- can be used as an aid when removing and installing the coil springs.

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Special tools and workshop equipment required

♦ Spring compressing system - VAS 6274-



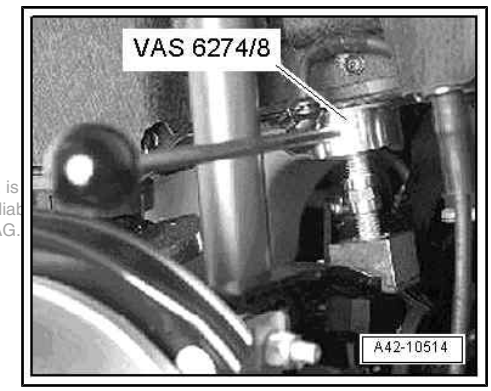
Removing

– Remove rear wheel ⇒ Wheels and tyres; Rep. gr. 44 .

Caution

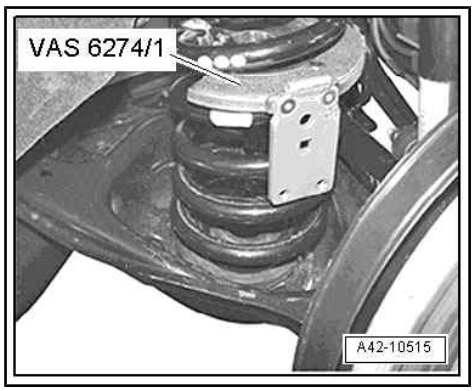
To avoid damaging the brake line, the flat section of the thrust piece on the spreader device (top) must face towards the front of the vehicle.

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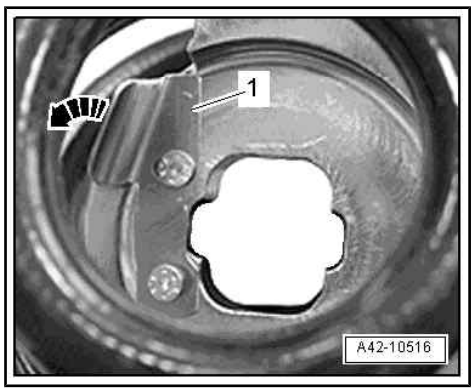


– Insert spreader device - VAS 6274/8- between body and upper transverse link, as shown in illustration, and apply light pressure.

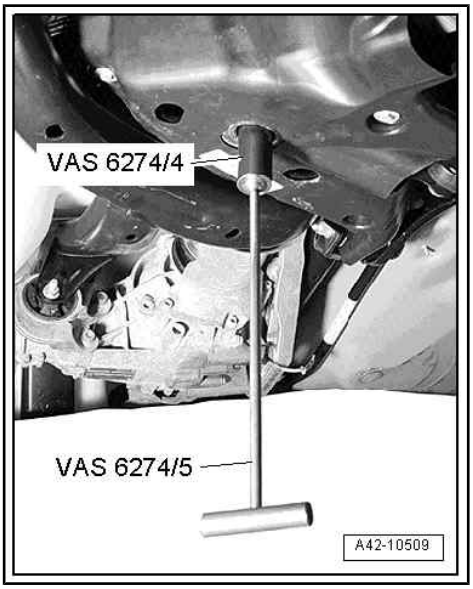
– Insert thrust plate with locking mechanism - VAS 6274/1- between 2nd and 3rd coils of spring from outside, as shown in illustration.



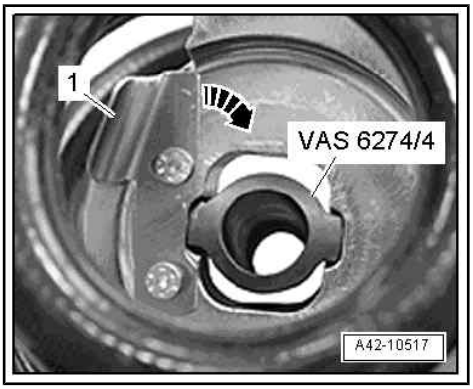
– Turn locking lever -1- of thrust plate with locking mechanism - VAS 6274/1- in direction of -arrow-.



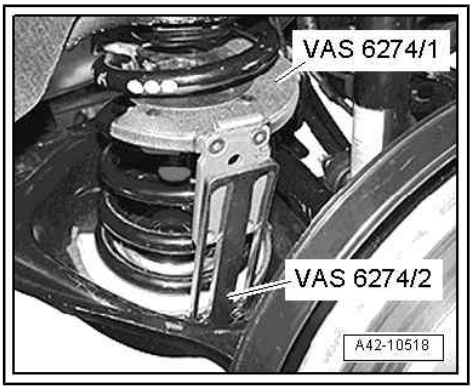
– Insert plunger - VAS 6274/4- with T-bar - VAS 6274/5- through hole in trapezium link and into thrust plate with locking mechanism - VAS 6274/1- .



– Secure plunger -VAS 6274/4- by turning locking lever -1- in direction of -arrow-.
– Unscrew and remove T-bar - VAS 6274/5- .



– Rotate thrust plate with locking mechanism - VAS 6274/1- upwards until it is still just free inside spring.
– Insert thrust plate with swivel mounting - VAS 6274/2- into spring as shown in illustration, and rotate downwards until it is still just free inside spring.



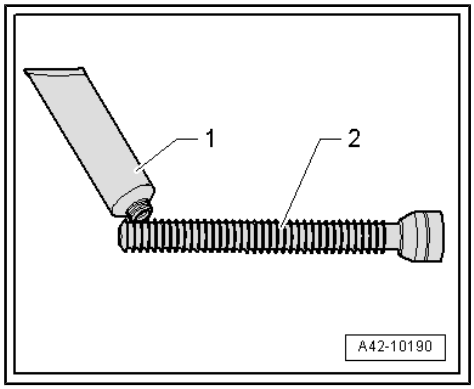
Note

If it is not possible to rotate the thrust plate downwards in the spring, unbolt the locating bracket, rotate the thrust plate into the required position and then reattach the locating bracket.

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Caution

- *Before removing and installing any of the springs, always lubricate the front of the spindle lightly with the grease supplied.*
- *Lubricate the spindle only with the grease supplied. If other greases are used the spindle will be damaged.*



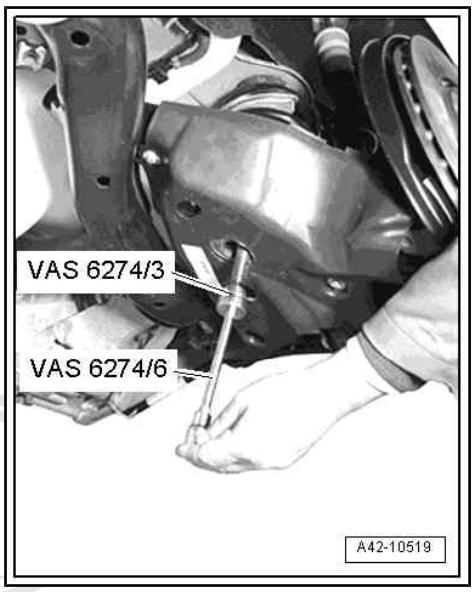
– Lubricate the front of the spindle - VAS 6274/3- lightly with the grease supplied.

1 - Lubricating grease from spring compressing system - VAS 6274-

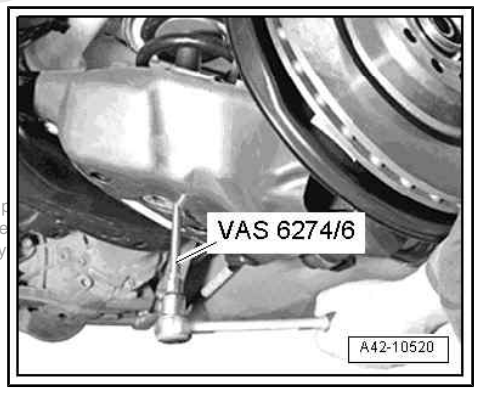
2 - Spindle - VAS 6274/3-

– Insert socket - VAS 6274/6- in spindle - VAS 6274/3- and screw upwards through hole in trapezium link.

- The spindle should screw easily into the thread of the plunger. Do not use force.
- The collar of the spindle must be seated correctly in the axial bearing of the thrust plate with swivel mounting - VAS 6274/2- .



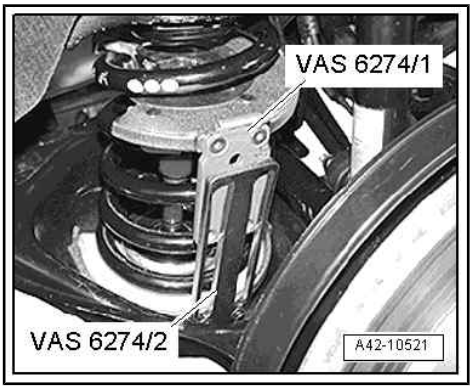
– Hand-tighten spindle - VAS 6274/3- using socket - VAS 6274/6- .



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Note

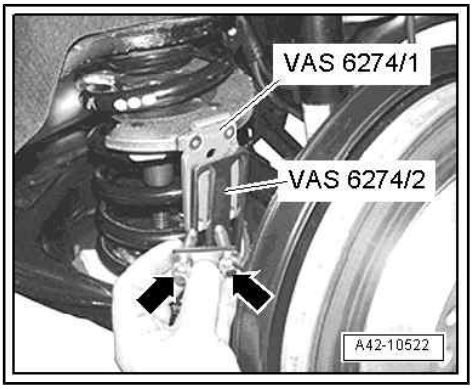
- *In order to be able to compress the different types of spring as far as possible, the two thrust plates should be positioned so there are $4^1/_4$ to $4^3/_4$ spring coils between them.*
- *If necessary, move round the upper locating bracket 180° and rotate -VAS 6274/1- 180° further (from $4^1/_4$ to $4^3/_4$ spring coils).*



• The locating bracket should be facing slightly forwards in the vicinity of the brake splash plate, as shown in the illustration.

– Align thrust plate with locking mechanism - VAS 6274/1- and thrust plate with swivel mounting - VAS 6274/2- with each other so that the two locating brackets can be bolted together.

– Screw in flange bolts -arrows- hand-tight.

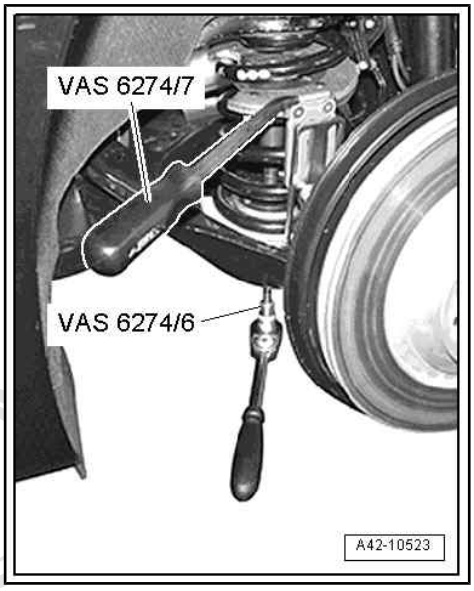


WARNING

The coil spring must be compressed or released only when the two locating brackets are joined together by the flange bolts -arrows-.

– Now compress coil spring by turning socket -VAS 6274/6- while holding spring compressor with counterhold tool - VAS 6274/7- .

• Stop compressing the spring when the plunger - VAS 6274/4- makes contact with the bearing of the thrust plate with swivel mounting - VAS 6274/2- , or the flange bolts of the locating brackets reach the end stop.



Caution

- ***When compressing the spring, make sure the flange bolts do not make contact with the stop on the thrust plate.***
- ***The locating bracket of the thrust plate must not make contact with the stop on the thrust plate.***

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– Carefully take out compressed coil spring.

WARNING

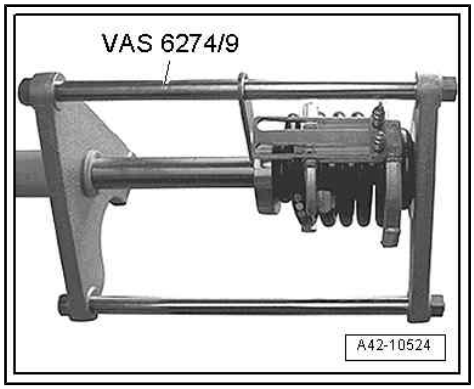
- *The coil spring may only be compressed or released when it is in the vehicle or in the hydraulic tensioning device - VAS 6274/9- .*
- *The coil spring must on no account be released by turning the spindle - VAS 6274/3- because the spindle is too short. In the compressed condition the spring is under very high pressure.*



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– Insert compressed coil spring in correct position in hydraulic tensioning device - VAS 6274/9- and compress spring slightly further by operating hydraulic pump.

• The free end of the spring coil must lie against the stop of the take-up plate.

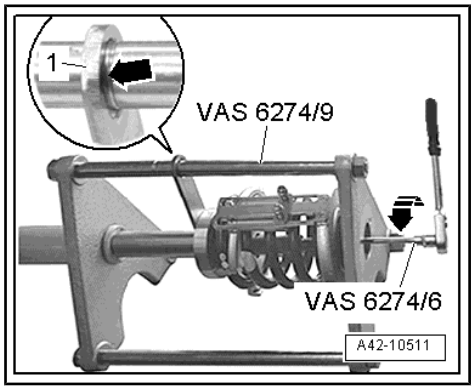


– Unscrew spindle - VAS 6274/3- from plunger - VAS 6274/4- using socket - VAS 6274/6- and remove from spring.

WARNING

Risk of accident! The coil spring is now only held by the hydraulic tensioning device - VAS 6274/9- .

– Slacken tensioning device via foot pump - VAS 6179- until guide -1- is level with marking -arrow-.

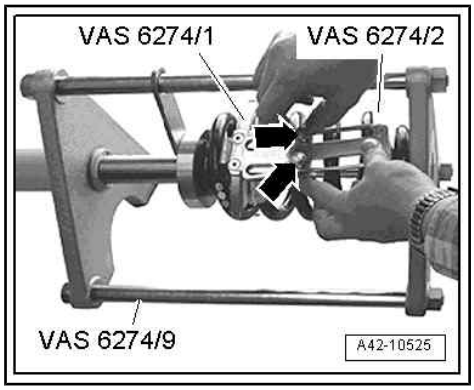


– Remove both flange bolts -arrows-.

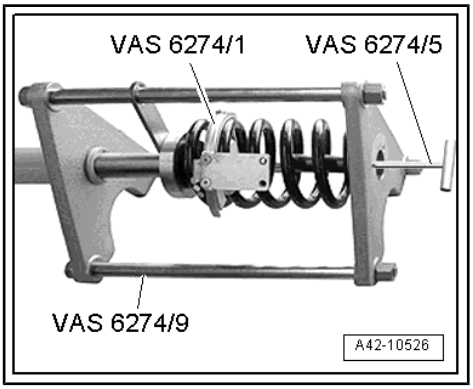
WARNING

The flange bolts must not be unscrewed until the spring has been completely slackened.

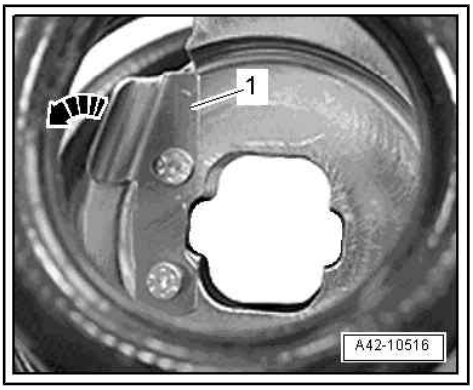
– Remove thrust plate with swivel mounting - VAS 6274/2- from coil spring.



– Screw T-bar - VAS 6274/5- into plunger - VAS 6274/4- .

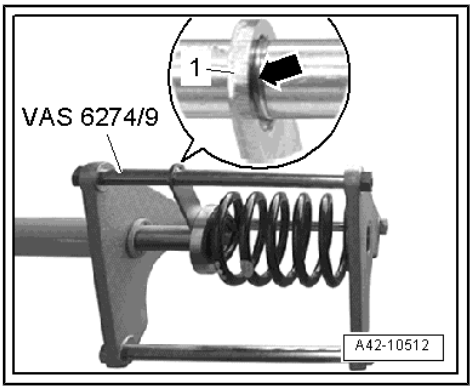


– Turn locking lever -1- of thrust plate with locking mechanism - VAS 6274/1- in direction of -arrow-.
– Take plunger - VAS 6274/4- out of locking mechanism.
– Remove thrust plate with locking mechanism - VAS 6274/1- from coil spring.
– Release spring compressor via foot pump and take coil spring out of hydraulic tensioning device -VAS 6274/9- .

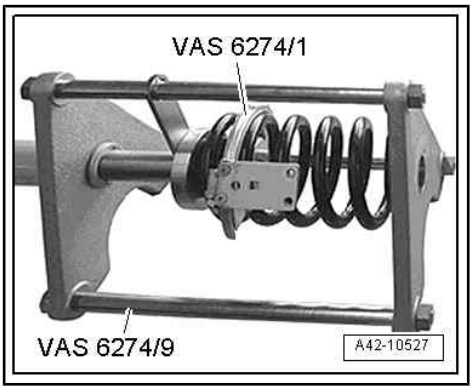


Installing

– Insert coil spring in correct position in hydraulic tensioning device - VAS 6274/9- and compress spring slightly on push rod by operating hydraulic pump.
• Guide -1- must be level with marking -arrow-.

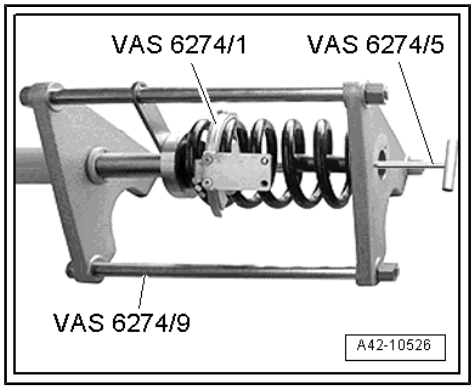


– Insert thrust plate with locking mechanism - VAS 6274/1- into coil spring.

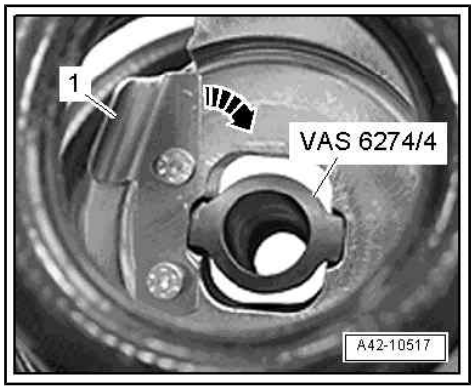


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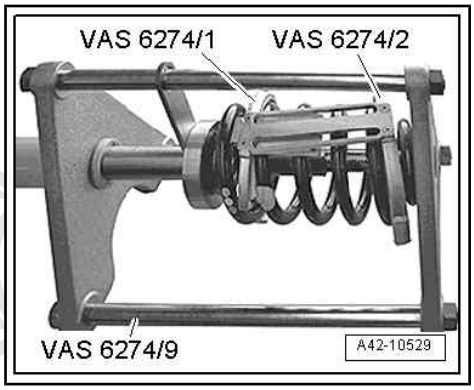
– Insert plunger - VAS 6274/4- with T-bar - VAS 6274/5- into thrust plate with locking mechanism - VAS 6274/1- .



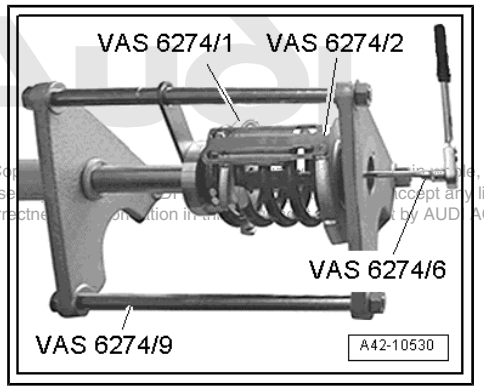
– Secure plunger - VAS 6274/4- with locking lever -1- -arrow-.
– Unscrew and remove T-bar - VAS 6274/5- .



– Insert thrust plate with swivel mounting - VAS 6274/2- into coil spring as shown in illustration.



– Fit spindle - VAS 6274/3- onto socket - VAS 6274/6- and screw spindle into thread of plunger -VAS 6274/4- .
– Without using force, rotate thrust plate with locking mechanism - VAS 6274/1- and thrust plate with swivel mounting - VAS 6274/2- to a position where they can compress the spring to the maximum extent.



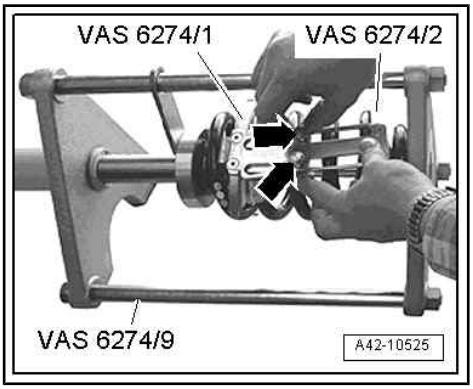
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Note

- *In order to be able to compress the different types of spring as far as possible, the two thrust plates should be positioned so there are $4^1/_4$ to $4^3/_4$ spring coils between them.*
- *If necessary, move round the upper locating bracket 180° and rotate -VAS 6274/1- 180° further (from $4^1/_4$ to $4^3/_4$ spring coils).*

– Take out socket.

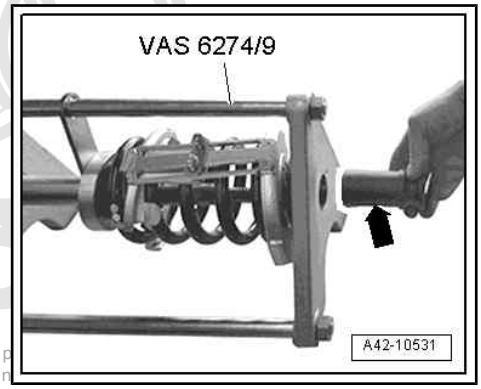
– Align thrust plate with locking mechanism - VAS 6274/1- and thrust plate with swivel mounting - VAS 6274/2- with each other so that the two locating brackets can be bolted together.
– Screw in flange bolts -arrows- hand-tight.
• The locating bracket should be close to the push rod at the top, as shown in the illustration.



WARNING

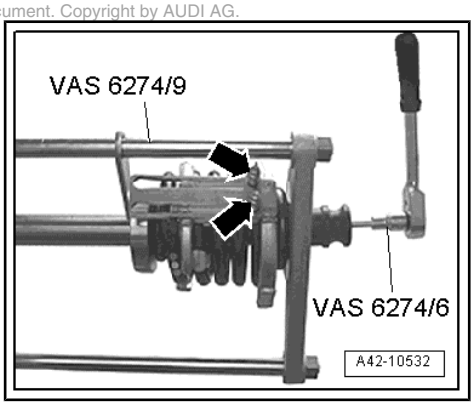
The coil spring must be compressed or released only when the two locating brackets are joined together by the flange bolts -arrows-.

– Insert guide bush -arrow- for centring spindle - VAS 6274/3- in hydraulic tensioning device - VAS 6274/9- .
• The collar of the spindle should be located in the guide bush after the spring has been compressed.



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– Slowly compress coil spring by operating hydraulic pump and at the same time take up travel on spindle - VAS 6274/3- by turning spindle with socket - VAS 6274/6- .
• Stop compressing the spring when the plunger - VAS 6274/4- makes contact with the bearing of the thrust plate with swivel mounting - VAS 6274/2- , or the flange bolts -arrows- of the locating brackets reach the end stop.



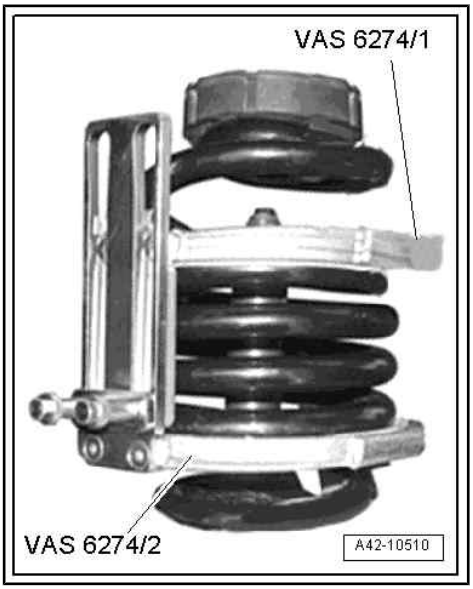
– Slowly open valve on hydraulic pump and take compressed coil spring out of hydraulic tensioning device -VAS 6274/9- .
– Locate compressed coil spring in correct position in vehicle.

Note

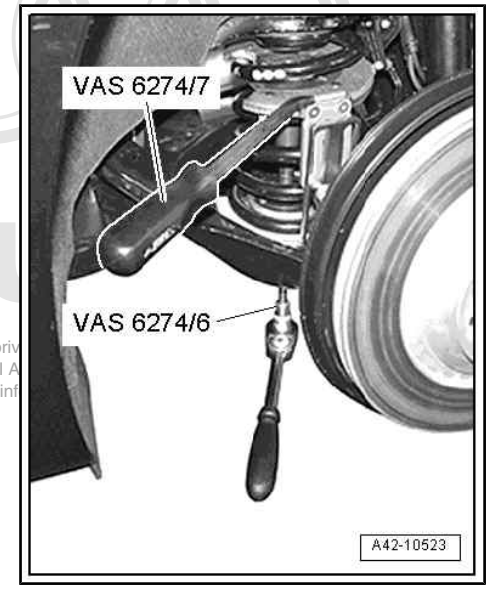
Make sure that the spring seats (top and bottom) are positioned correctly.

WARNING

Risk of accident! Do not use compressed-air impact wrenches to compress or release the coil spring.

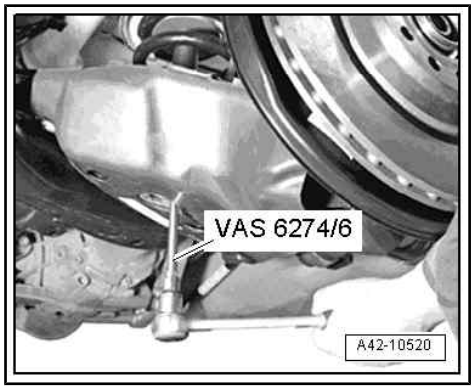


– Now release coil spring by turning socket -VAS 6274/6- while holding spring compressor with counterhold tool - VAS 6274/7- .



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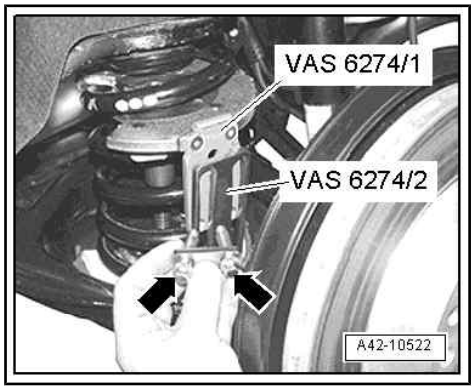
– Unscrew spindle - VAS 6274/3- from plunger - VAS 6274/4- using socket - VAS 6274/6- and remove.



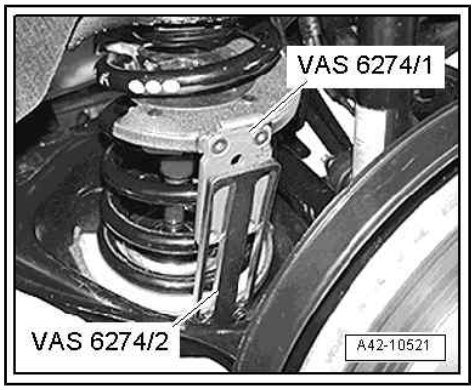
Note

The spindle is easier to remove if the opening on thrust plate with locking mechanism - VAS 6274/1- is facing outwards.

– Remove flange bolts -arrows- from locating brackets.



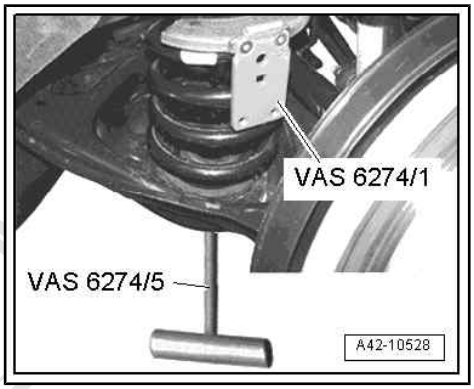
– Rotate thrust plate with swivel mounting - VAS 6274/2- upwards slightly and remove from coil spring.



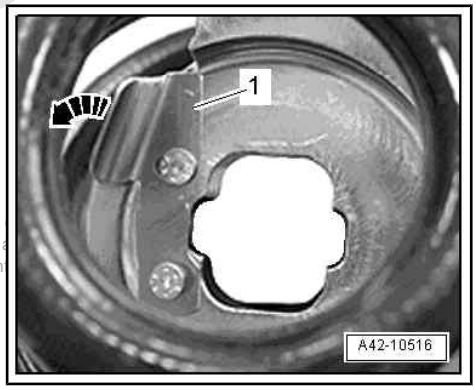
Note

If it is not possible to remove the thrust plate from the spring, unbolt the locating bracket, take the thrust plate out of the spring and then reattach the locating bracket.

– Rotate thrust plate with locking mechanism - VAS 6274/1- downwards slightly.
– Screw T-bar - VAS 6274/5- into plunger - VAS 6274/4- .

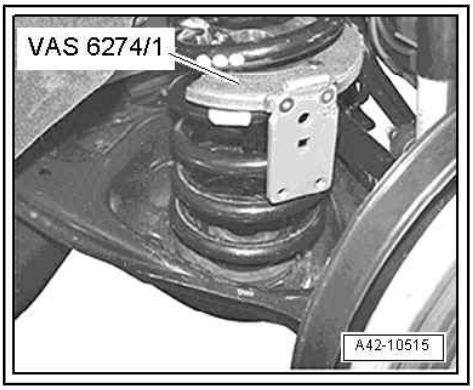


– Turn locking lever -1- of thrust plate with locking mechanism - VAS 6274/1- in direction of -arrow-.
– Take plunger - VAS 6274/4- out of locking mechanism and remove through hole in bottom link.

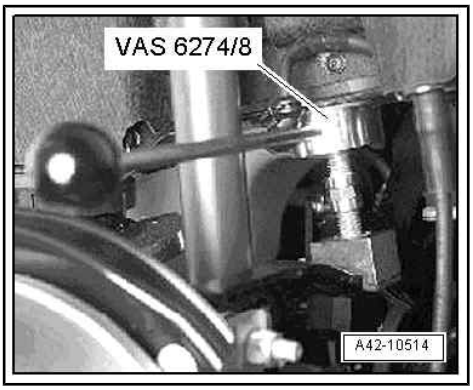


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– Remove thrust plate with locking mechanism - VAS 6274/1- from coil spring.



– Slacken and remove spreader device - VAS 6274/8- .



4.6 Removing and installing vehicle level sender

– Removing and installing vehicle level sender ⇒ page 223

5 Air spring, shock absorber for air suspension

⇒ “5.1 Air spring, shock absorber for air suspension - exploded view”, page 174

⇒ “5.2 Removing and installing air spring”, page 175

⇒ “5.3 Removing and installing boot”, page 178

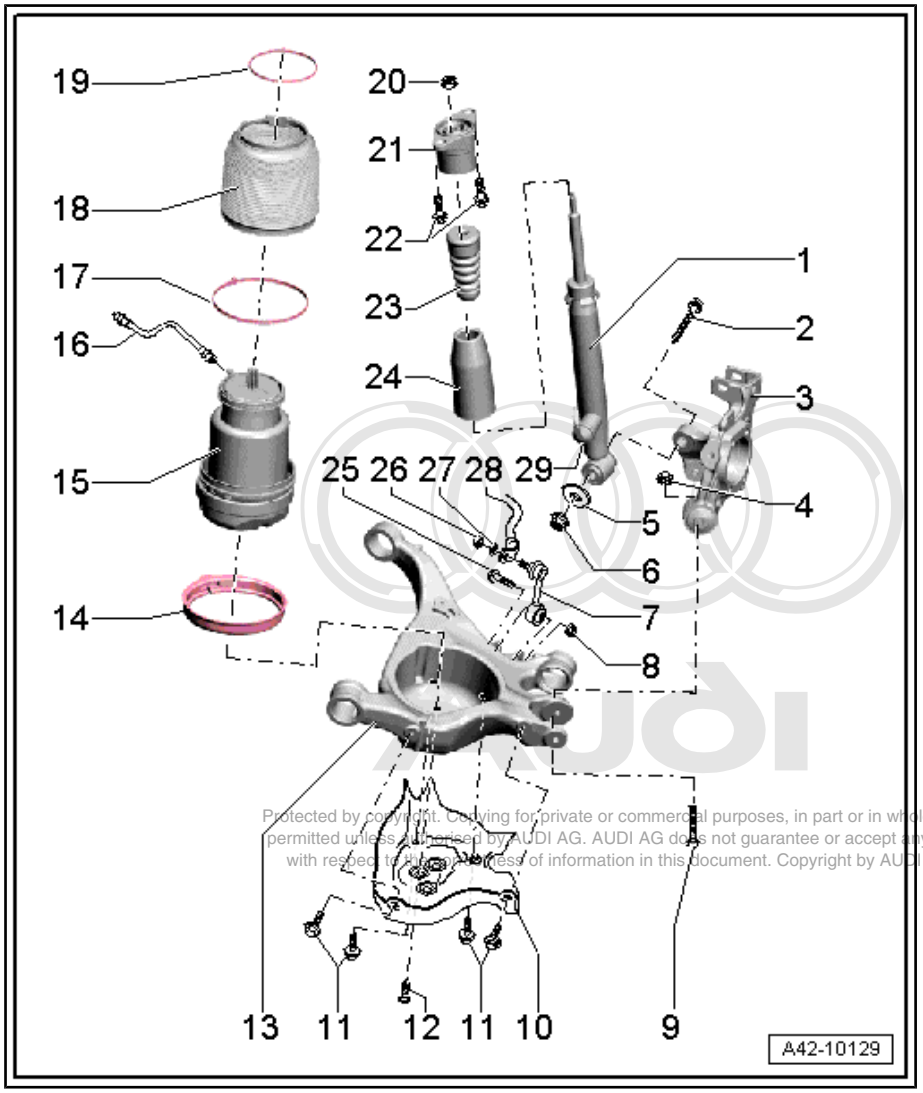
⇒ “5.4 Removing and installing shock absorber for air suspension”, page 179

⇒ “5.5 Renewing shock absorber damper adjustment valve ”, page 181

⇒ “5.6 Servicing shock absorber for air suspension”, page 183

⇒ “5.7 Bleeding/charging air springs of rear axle”, page 183

5.1 Air spring, shock absorber for air suspension - exploded view



1 - Shock absorber for air suspension

- ❑ Removing and installing ⇒ page 179

2 - Bolt

- ❑ 150 Nm +90°
- ❑ Always renew if removed

3 - Wheel bearing housing

4 - Nut

5 - Washer

6 - Nut

7 - Coupling rod

8 - Nut

9 - Bolt

- ❑ 85 Nm +90°
- ❑ Always renew if removed

10 - Stone deflector

- ❑ Only fitted on heavy-duty running gear version

11 - Bolt

- ❑ 25 Nm

12 - Multi-point socket head bolt

- ❑ 20 Nm

13 - Trapezium link

14 - Rubber seal

15 - Air spring

- ❑ Removing and installing ⇒ page 175

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16 - Air pipe

17 - Clip

18 - Boot

- ❑ Removing and installing ⇒ page 178

19 - Clip

20 - Nut

- ❑ 25 Nm

21 - Shock absorber mounting

22 - Bolt

- ❑ 35 Nm

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23 - Bump stop

24 - Protective sleeve

25 - Bolt

- ❑ 70 Nm

26 - Nut

- ❑ 70 Nm

27 - Washer

28 - Anti-roll bar

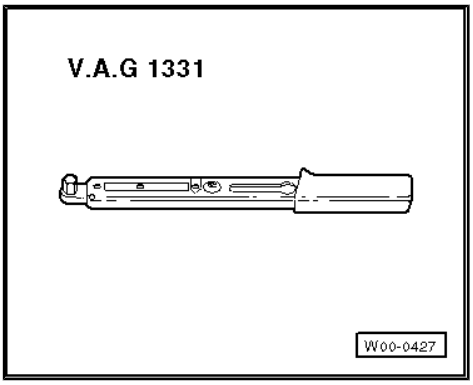
29 - Rear left shock absorber damper adjustment valve - N338- or rear right shock absorber damping adjustment valve - N339-

- ❑ Removing and installing ⇒ page 181

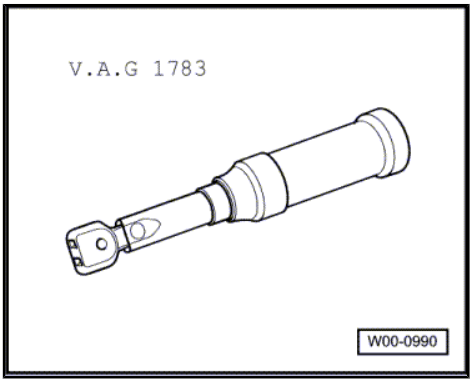
5.2 Removing and installing air spring

Special tools and workshop equipment required

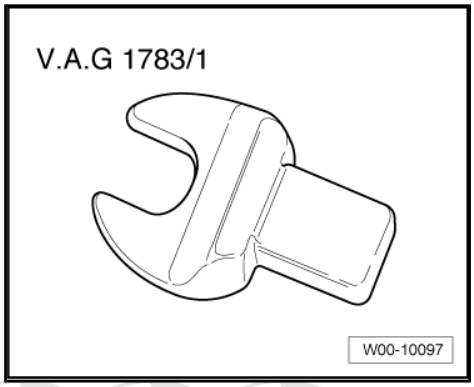
- ♦ Torque wrench - V.A.G 1331-



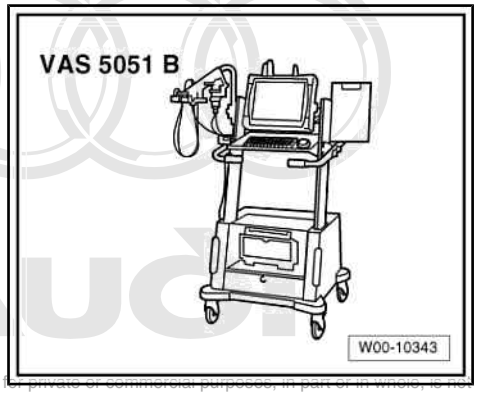
- ♦ Torque wrench - V.A.G 1783-



- Open end spanner insert (10 mm) - V.A.G 1783/1-



- Vehicle diagnostic, testing and information system - VAS 5051 B- with appropriate diagnosis cable



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- Spreader device - VAS 6274/8- from spring compressing system - VAS 6274-

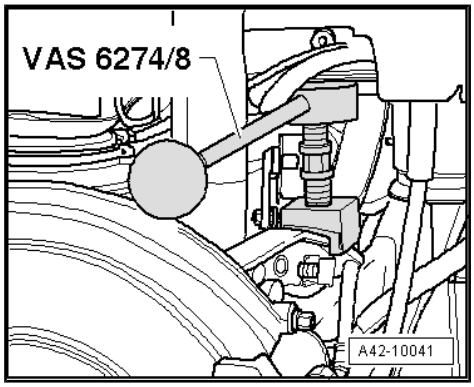
Removing

– Position vehicle on lifting platform ⇒ page 11 .

– Bleed system using -VAS 5051 A- ⇒ page 229 .

– Remove wheel.

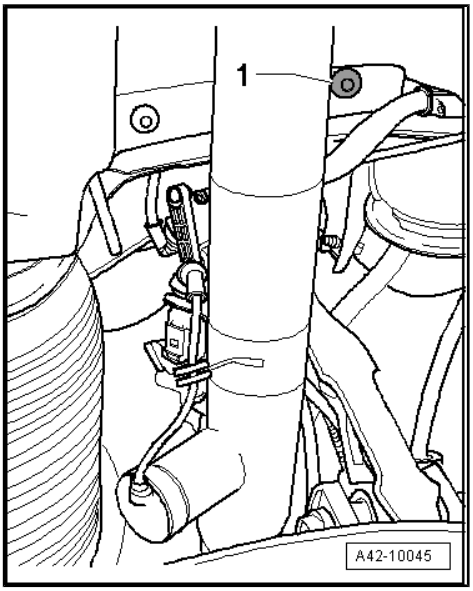
– Insert spreader device -VAS 6274/8- in correct position between body frame and upper transverse link, and apply light pressure.



Note

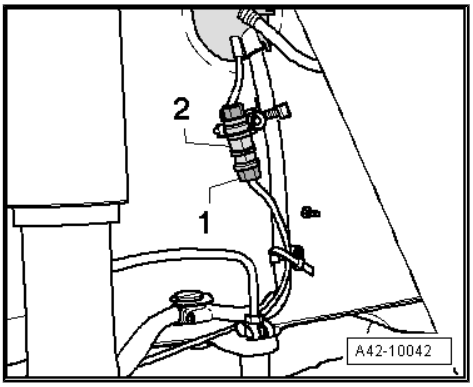
The flat side of the top thrust piece must always face towards the front of the vehicle. The brake pipe can be damaged if the tool is not positioned correctly.

– Slacken bolt -1- and move wheel housing liner to the side.



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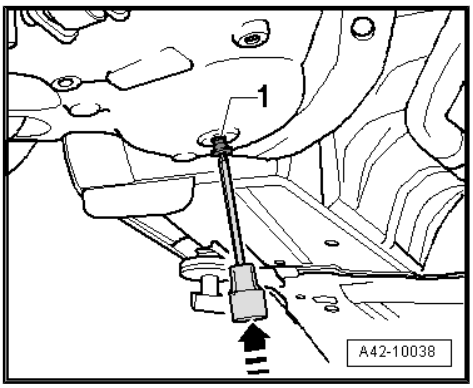
– Slowly loosen air pipe -1- at connection -2- to dissipate air pressure. Unscrew air pipe when air pressure has been dissipated.
– Unclip air pipe -1- and cut open cable tie.
– Compress air spring by hand.



– Slacken bolt -1- approx. 5 - 6 turns.
– Using socket attachment, press air spring out of trapezium link in direction of -arrow-.

Caution

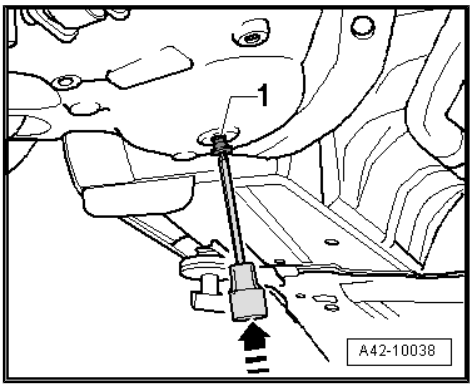
The air spring may only be detached from the trapezium link by pushing it with the socket attachment. DO NOT apply any blows to the socket attachment.



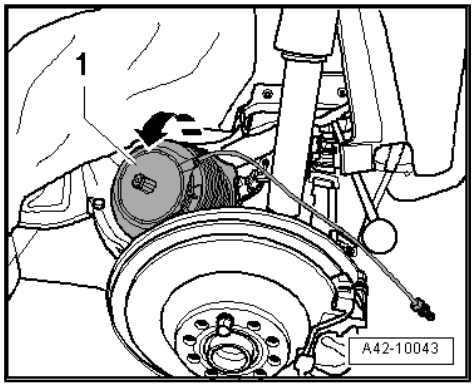
– Remove bolt -1- completely.

Note

The air spring can be compressed for removal or installation.



– Lift air spring -1- out of trapezium link, pivot outwards in direction of -arrow- and remove.
– Transfer air pipe.

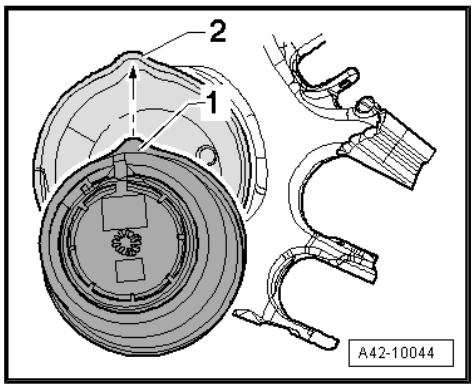


Installing

Installation is carried out in the reverse sequence. Note the following points:

Tightening torques ⇒ page 174

– Clean inside of trapezium link at points where air spring makes contact.
– Projection -1- on air spring must be located in recess -2- in trapezium link.

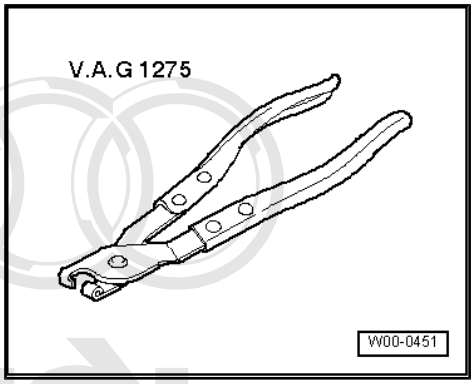


– Charge system using -VAS 5051 A- ⇒ page 229 .
– Take out spreader device -VAS 6274/8- .
– Fit wheel.
– Stand vehicle on its wheels ⇒ page 11 .
– Secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .

5.3 Removing and installing boot

Special tools and workshop equipment required

♦ Hose clip pliers - V.A.G 1275-

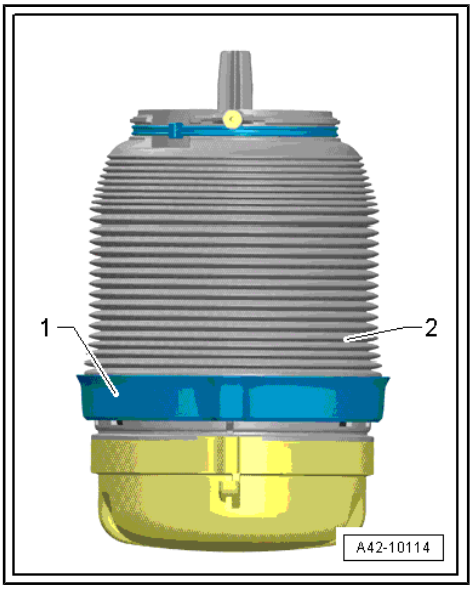


Removing

– Remove air spring ⇒ page 175 .

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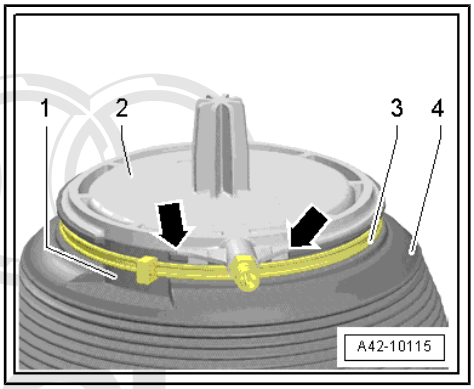
– Remove ring -1- from boot -2-.
– Detach hose clips (top and bottom) from boot -2-.
– Carefully pull off boot.



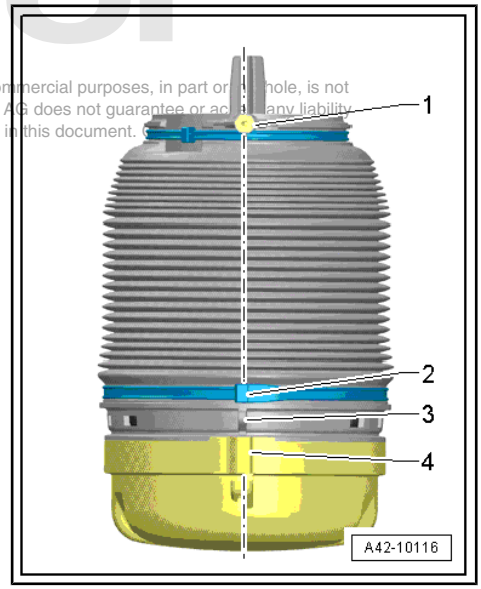
Installing

Installation is carried out in the reverse sequence. Note the following points:

– Carefully pull on rubber boot and align.
– Position rubber boot -4- on piston -2- so that cut-out -arrows- is adjacent to air pipe connection.
– Fit hose clip -3- with »lug« located centrally in recess -1- and tighten with hose clip pliers - V.A.G 1275- .



– Fit hose clip -2-.
– Align hose clip -2- so that »lug« on hose clip is in line with air pipe connection -1- and ribs -3- and -4-.
– Tighten hose clip -2- with hose clip pliers - V.A.G 1275- .

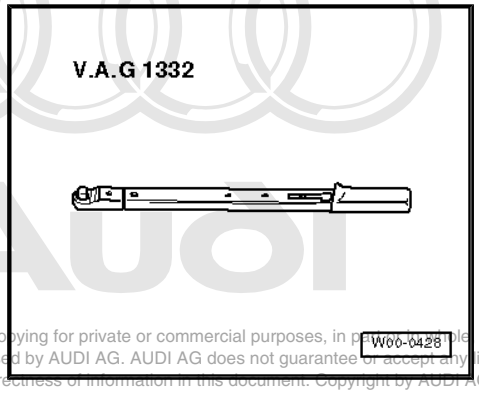


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5.4 Removing and installing shock absorber for air suspension

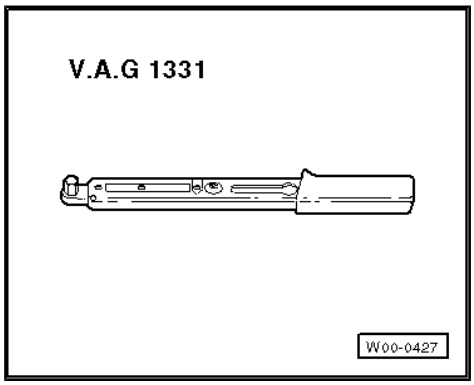
Special tools and workshop equipment required

- Torque wrench - V.A.G 1332-



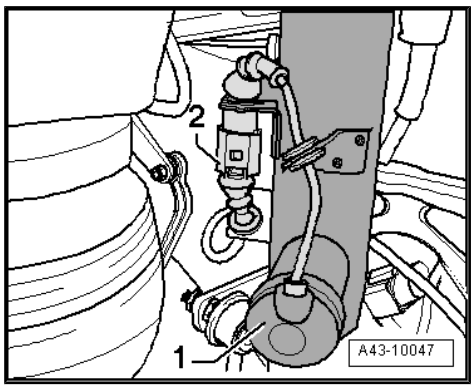
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- Torque wrench - V.A.G 1331-

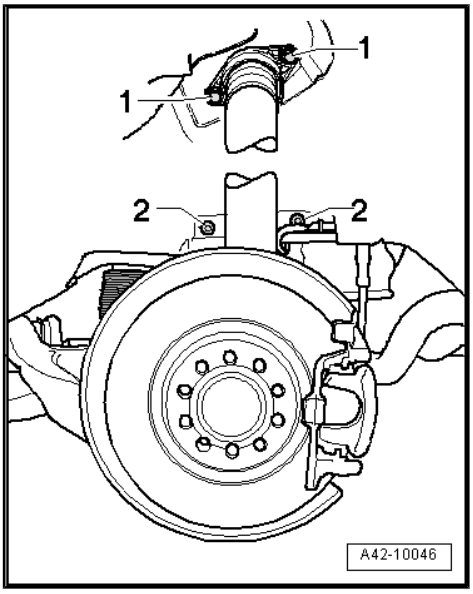


Removing

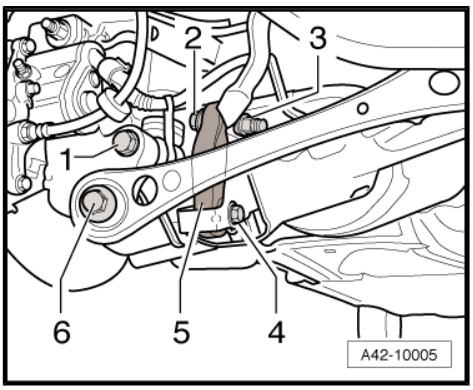
– Position vehicle on lifting platform ⇒ page 11 .
– Remove wheel.
– Bleed air springs of rear axle ⇒ page 183 .
– Unplug connector -2- and unclip electrical wiring.



– Unscrew fasteners -2- and pull wheel housing liner to one side.
– Remove hexagon bolts -1-.



– Detach bolt connection -1-.
– Take out shock absorber.



Installing

Installation is carried out in the reverse sequence. Note the following points:

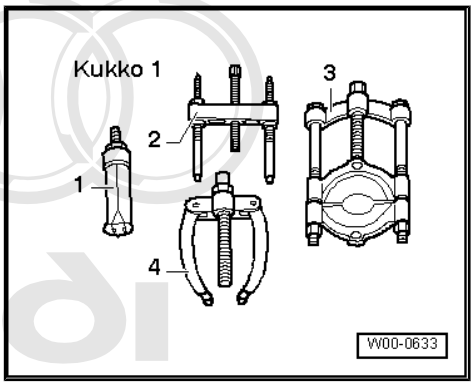
Tightening torques ⇒ page 174

– Charge system using -VAS 5051 A- ⇒ page 229 .
– Fit wheel.
– Stand vehicle on its wheels ⇒ page 11 .
– Secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .

5.5 Renewing shock absorber damper adjustment valve

Special tools and workshop equipment required

♦ Puller - Kukko 17/0- - 3

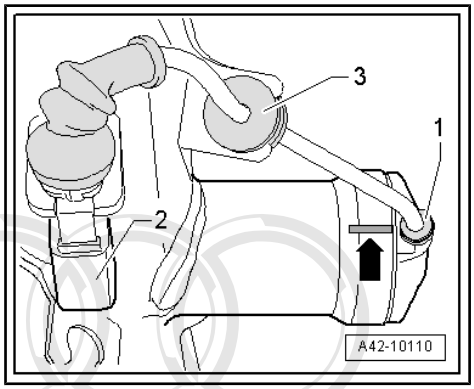


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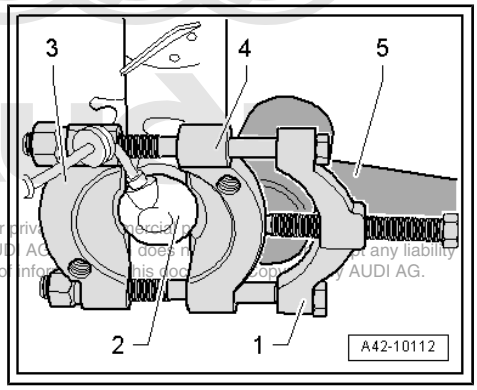
Removing

– Remove wheel.

– Mark position of cable connection -1- of shock absorber damper adjustment valve on shock absorber -arrow-.
– Carefully unplug connector -2- by hand and unclip electrical wire -3-.



– Apply puller - Kukko 17/0- -1- with flat surface towards shock absorber and compress by hand. Jaws -3- and -4- are applied between shock absorber damper adjustment valve -2- and shock absorber tube.
– Using a plastic hammer, knock off shock absorber damper adjustment valve at right angles. Apply hammer blows to jaw section -4- as close as possible to valve housing. At the same time, pull jaw section -3- at right angles by hand.

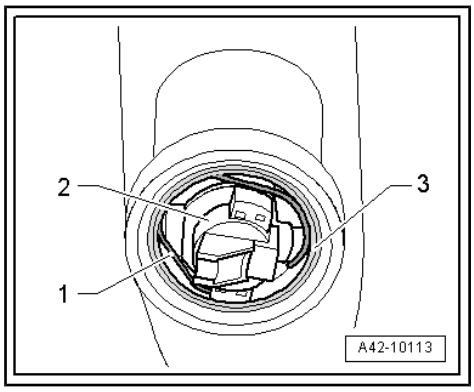


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Note

The shock absorber damper adjustment valve will be destroyed during removal.

– Remove circlip -1-.
– Remove coil -2- and seal -3-.

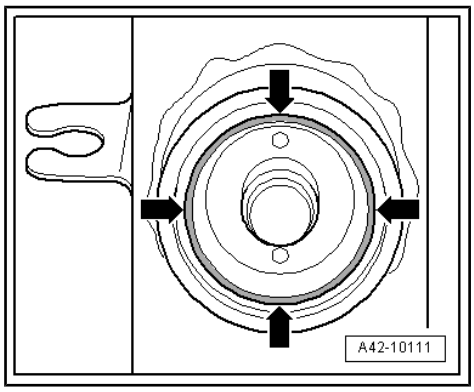


– Check housing of shock absorber damper adjustment valve all round for distortion -arrows-. If necessary, press any distorted sections back into shape using a small screwdriver.

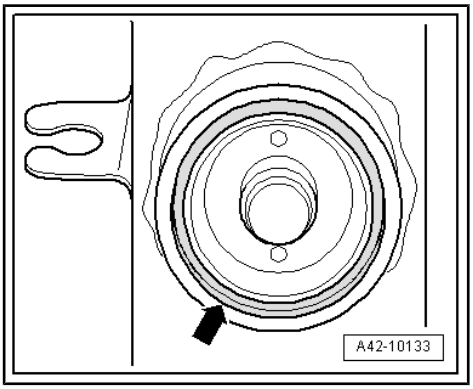
Installing

Installation is carried out in the reverse sequence. Note the following points:

– Clean housing for shock absorber damper adjustment valve .



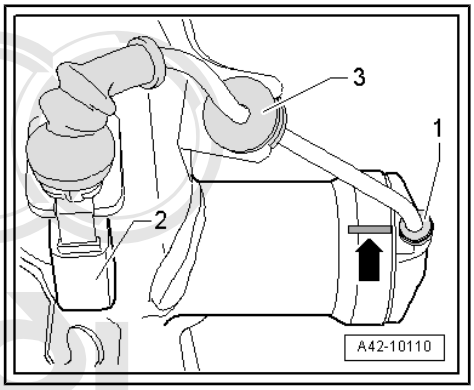
– Always renew seal -arrow-.



Note

- *The new circlip -1- is already fitted on the shock absorber damper adjustment valve .*
- *The circlip and valve must be installed together - do not separate them.*

– Fit new shock absorber damper adjustment valve and align cable connection -1- with marking made previously -arrow-.
– Press on shock absorber damper adjustment valve firmly by hand until circlip engages audibly.
– Plug in connector -2- and clip on electrical wiring -3-.



5.6 Servicing shock absorber for air suspension

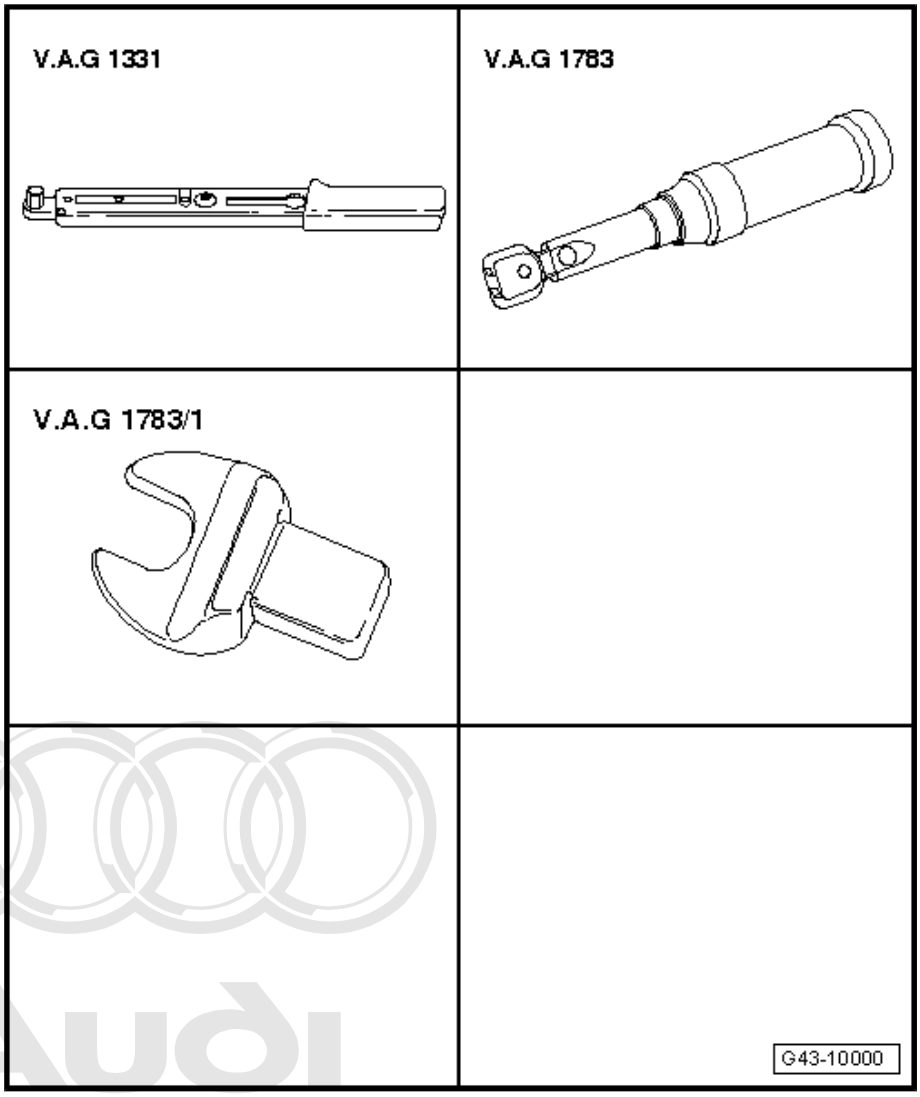
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Procedure is the same as for shock absorbers with coil springs
⇒ page 197 .

5.7 Bleeding/charging air springs of rear axle

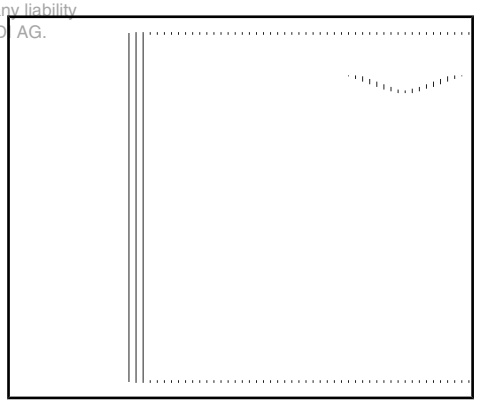
Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-
- Torque wrench - V.A.G 1783-
- Open end spanner insert (10 mm) - V.A.G 1783/1-

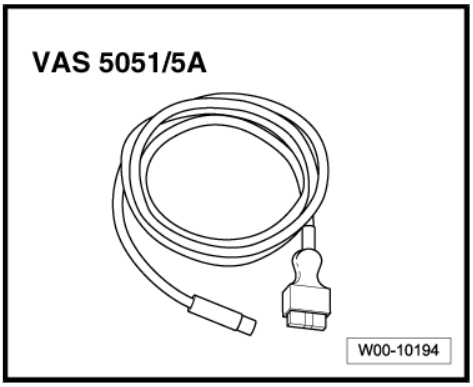


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- Vehicle diagnostic, testing and information system - VAS 5051 A-

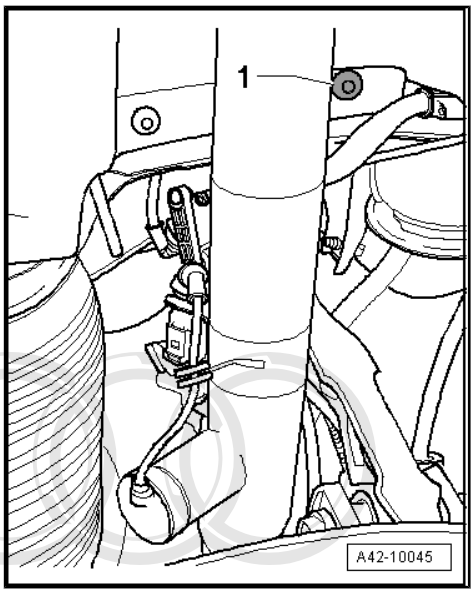


♦ Diagnosis cable - VAS 5051/5A-

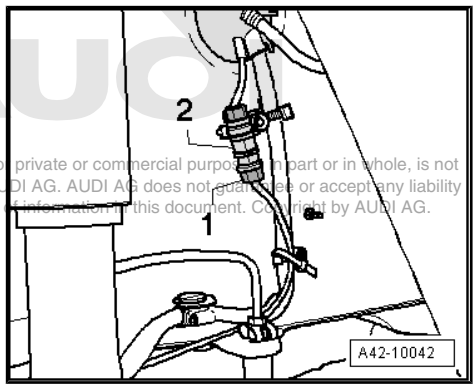


Bleeding air spring for repair work

– Position vehicle on lifting platform ⇒ page 11 .
– Bleed system using -VAS 5051 A- ⇒ page 229 .
– Remove wheel.
– Slacken bolt -1- and move wheel housing liner to the side.



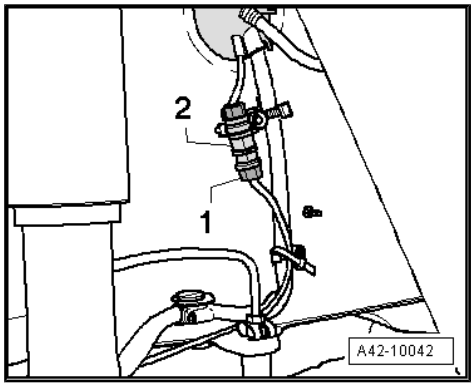
– Slowly loosen air pipe -1- at connection -2- to dissipate air pressure. Unscrew air pipe when air pressure has been dissipated.



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Charging air spring after repair work

– Connect air pipe -1- at connection -2-.
– Charge system using -VAS 5051 A- ⇒ page 229 .



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6 Wheel bearing housing, wheel bearing unit, shock absorber for coil springs

⇒ “6.1 Wheel bearing housing, wheel bearing unit, shock absorber for coil springs - exploded view”, page 187

⇒ “6.2 Removing and installing wheel bearing housing”, page 189

⇒ “6.3 Removing and installing wheel bearing unit”, page 191

⇒ “6.4 Servicing wheel bearing unit (only possible on four-wheel drive vehicles)”, page 193

⇒ “6.5 Removing and installing shock absorber for coil springs”, page 197

⇒ “6.6 Servicing shock absorber for coil springs”, page 199

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6.1 Wheel bearing housing, wheel bearing unit, shock absorber for coil springs - exploded view

1 - Eccentric washer

2 - Nut

- ❑ 95 Nm

3 - Wheel bearing housing

- ❑ Removing and installing ⇒ page 189

4 - Ball bearing

- ❑ Items 4 and 5 are only installed in vehicles with four-wheel drive
- ❑ Servicing wheel bearing unit ⇒ page 193

5 - Wheel hub

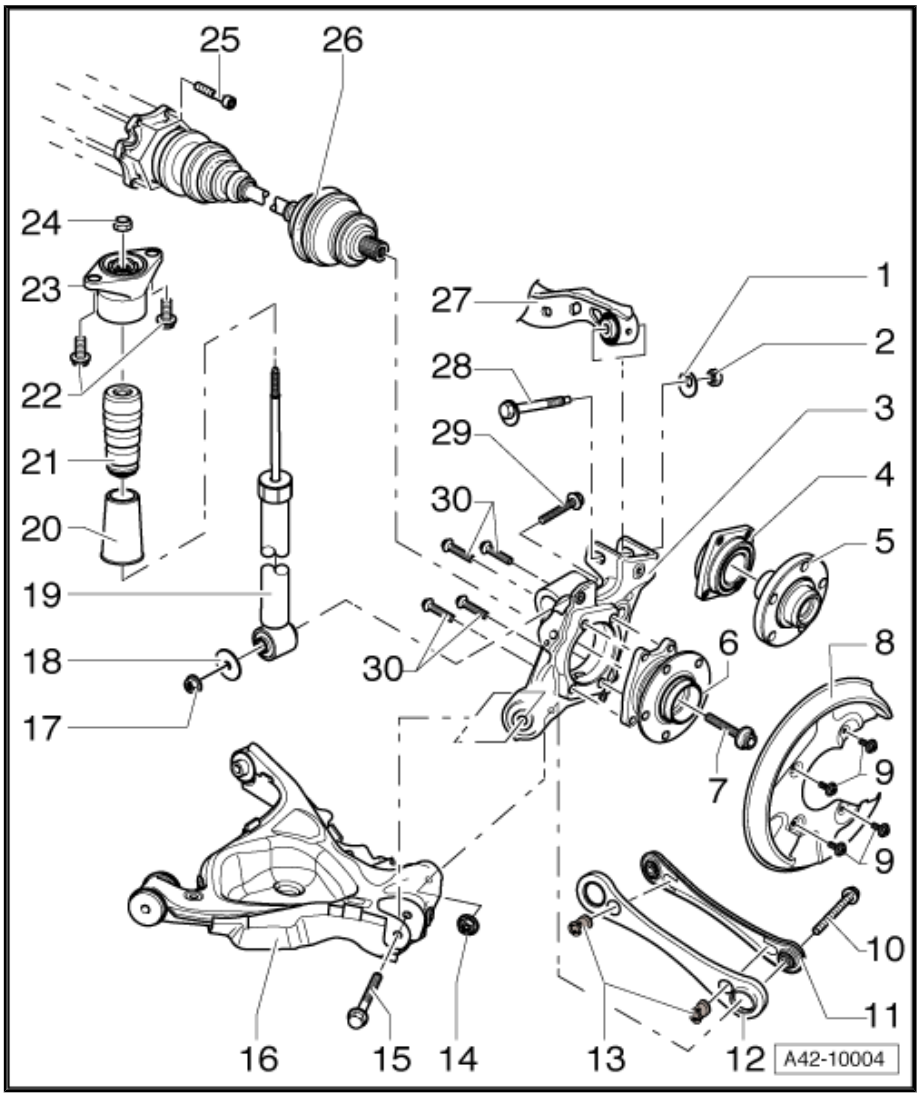
- ❑ Items 5 and 4 are only installed in vehicles with four-wheel drive
- ❑ Servicing wheel bearing unit ⇒ page 193

6 - Wheel bearing unit

- ❑ Removing and installing ⇒ page 191
- ❑ Complete wheel bearing unit is only installed on vehicles with front-wheel drive
- ❑ Wheel bearing unit cannot be repaired

7 - Bolt

- ❑ 200 Nm +180°
- ❑ Always renew if removed



8 - Splash plate for brake disc

9 - Hexagon bolt

10 - Bolt

- ❑ 85 Nm +90°
- ❑ Always renew if removed

11 - Track rod

12 - Stone deflector

- ❑ Only fitted on heavy-duty running gear version

13 - Retaining clip

14 - Nut

15 - Bolt

- ❑ 85 Nm +90°
- ❑ Always renew if removed

16 - Trapezium link with stone deflector

17 - Nut

18 - Washer

19 - Shock absorber

- ❑ Removing and installing ⇒ page 197

20 - Protective sleeve

- ❑ On RS 6 vehicles: secured to bump stop and retaining ring
- ❑ On RS 6 vehicles: note position ⇒ page 189

21 - Bump stop

22 - Bolt

- ❑ 35 Nm

23 - Shock absorber mounting

24 - Nut

- ❑ 25 Nm

25 - 12-point socket head bolt

- ❑ Always renew if removed
- ❑ 70 Nm

26 - Drive shaft

27 - Upper transverse link

28 - Eccentric bolt

29 - Bolt

- ❑ 150 Nm +90°
- ❑ Always renew if removed

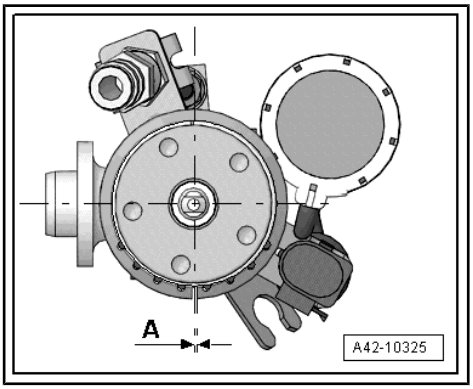
30 - Countersunk bolt

- ❑ 80 Nm +90°
- ❑ Always renew if removed

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Correct position of protective sleeve on RS 6 vehicles

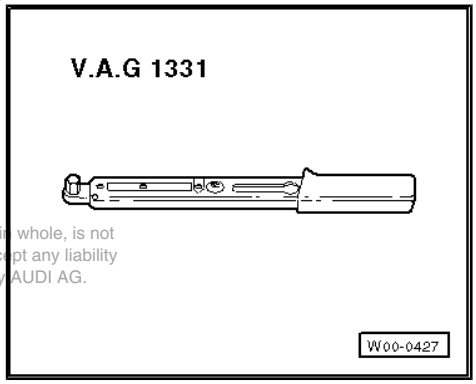
-A- 0° ± 2° position of slot in retaining ring on protective sleeve



6.2 Removing and installing wheel bearing housing

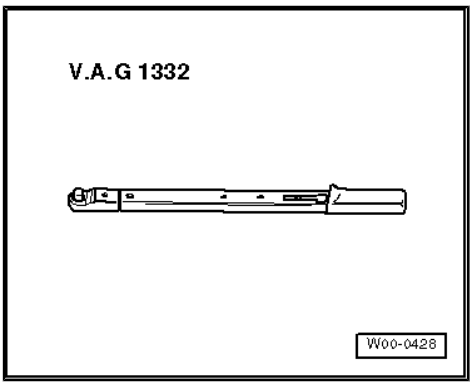
Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-



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- Torque wrench - V.A.G 1332-



Removing

Vehicles with coil springs

Front-wheel drive

– Remove coil spring ⇒ page 163 .

Four-wheel drive

– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).

– Loosen flange bolt securing outer joint of drive shaft (loosen only when vehicle is standing on its wheels -accident risk-) ⇒ page 203 .

– Remove coil spring ⇒ page 163 .

Vehicles with air suspension

Front-wheel drive

– Position vehicle on lifting platform ⇒ page 11 .

– Bleed air springs of rear axle ⇒ page 183 .

Four-wheel drive

– Position vehicle on lifting platform ⇒ page 11 .

– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).

– Loosen flange bolt securing outer joint of drive shaft (loosen only when vehicle is standing on its wheels -accident risk-) ⇒ page 203 .

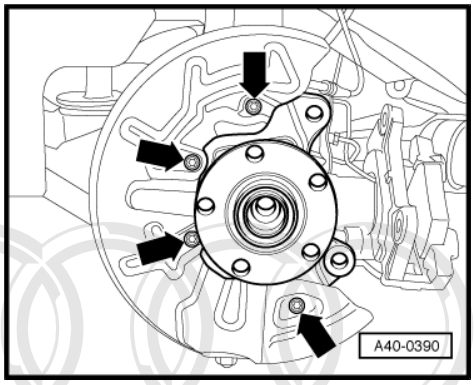
– Bleed air springs of rear axle ⇒ page 183 .

All vehicles

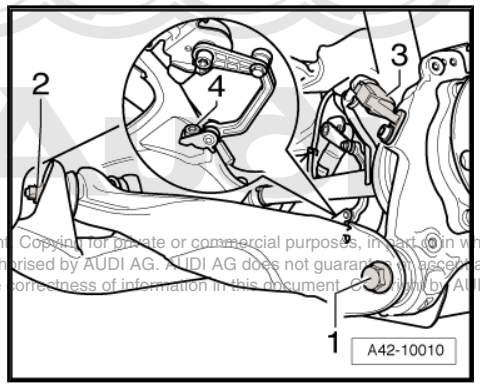
– Detach brake caliper and brake disc ⇒ Rep. gr. 46 .

– Secure brake caliper to body so that weight of caliper does not stretch or damage brake hose or brake pipe.

– Remove bolts -arrows- and take out splash plate.



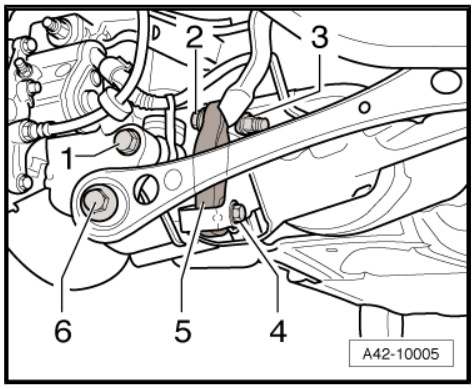
– Remove wheel speed sensor -3- ⇒ Rep. gr. 45 .



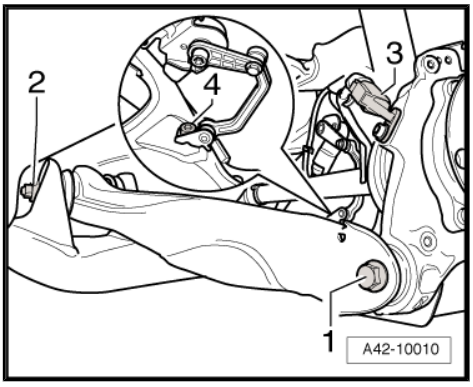
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– Remove hexagon bolt -6-.

– Detach bolt connection -1-.

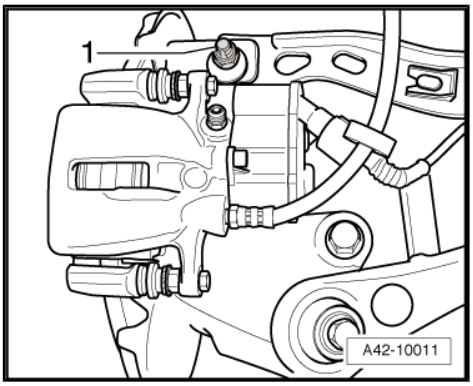


– Remove hexagon bolt -1-.



– Detach bolt connection -1-.

– Take out wheel bearing housing.



Installing

Installation is carried out in the reverse sequence. Note the following points:

Note

- *Bonded rubber bushes can only be turned to a limited extent. The suspension mountings must therefore only be tightened when the suspension is in the unladen position or reference position.*
- *Lifting suspension to unladen position (vehicles with coil springs) ⇒ page 114*
- *Lifting suspension to reference position (vehicles with air suspension) ⇒ page 116*

Tightening torques ⇒ page 187

– Install coil spring ⇒ page 163 .

– On vehicles with air suspension, charge air springs of rear axle ⇒ page 183 .

– Fit wheel.

– Vehicles with air suspension: set down vehicle on its wheels ⇒ page 11 .

– Secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .

– On vehicles with four-wheel drive: Tighten flange bolt securing outer joint of drive shaft (vehicle must be standing on its wheels - accident risk) ⇒ page 203 .

– Check and adjust wheel alignment ⇒ page 281 .

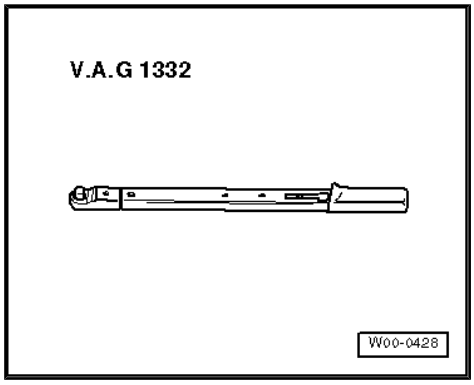
Front and rear wheel alignment must always be checked and adjusted if necessary using VW/Audi approved equipment.

6.3 Removing and installing wheel bearing unit

Special tools and workshop equipment required

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♦ Torque wrench - V.A.G 1332-



Removing

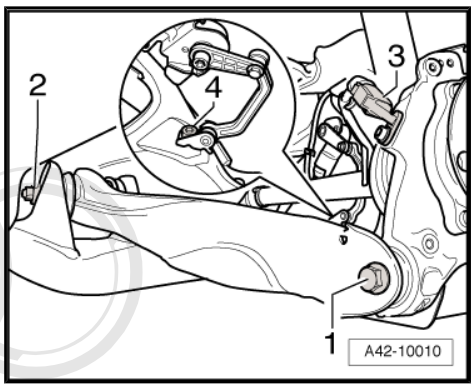
Vehicles with coil springs

Front-wheel drive

– Remove wheel.

Four-wheel drive

– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).
– Loosen flange bolt securing outer joint of drive shaft (loosen only when vehicle is standing on its wheels -accident risk-) ⇒ page 203 .
– Remove coil spring ⇒ page 163 .
– Remove wheel speed sensor -3- ⇒ Rep. gr. 45 .
– Remove drive shaft ⇒ page 202 .



Vehicles with air suspension

Front-wheel drive

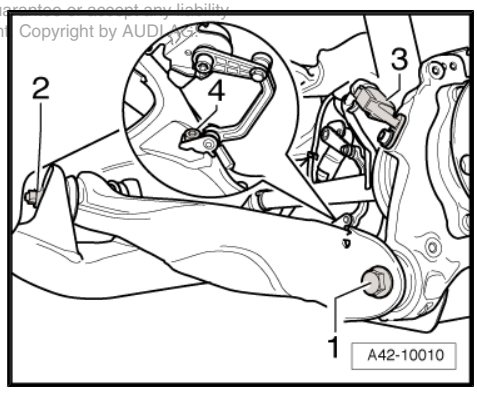
– Position vehicle on lifting platform ⇒ page 11 .
– Remove wheel.

Four-wheel drive

– Position vehicle on lifting platform ⇒ page 11 .
– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).
– Loosen flange bolt securing outer joint of drive shaft (loosen only when vehicle is standing on its wheels -accident risk-) ⇒ page 203 .
– Remove air spring ⇒ page 175 .

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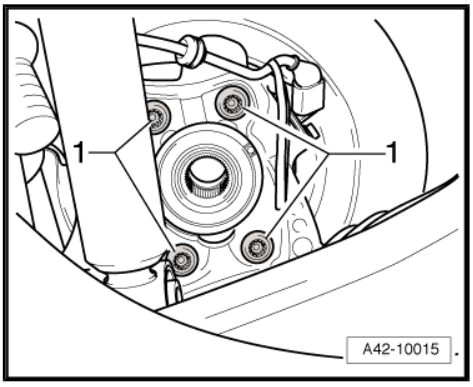
– Remove wheel speed sensor -3- ⇒ Rep. gr. 45 .
– Remove drive shaft ⇒ page 202 .



All vehicles

– Detach brake caliper and brake disc ⇒ Rep. gr. 46 .
– Secure brake caliper to body so that weight of caliper does not stretch or damage brake hose or brake pipe.

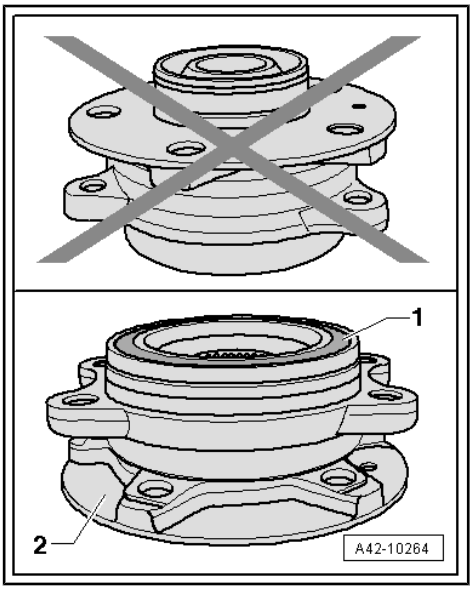
– Unscrew countersunk bolts -1-.
– Take out wheel bearing unit.



> **Caution**
>
> • *Avoid dirtying or damaging the seal when laying down or storing the wheel bearing.*

The wheel bearing -1- must always be pointing upwards.

– Always put down the wheel bearing unit with the wheel hub -2- facing downwards.



Installing

Installation is carried out in the reverse sequence. Note the following points:

Tightening torques ⇒ page 187

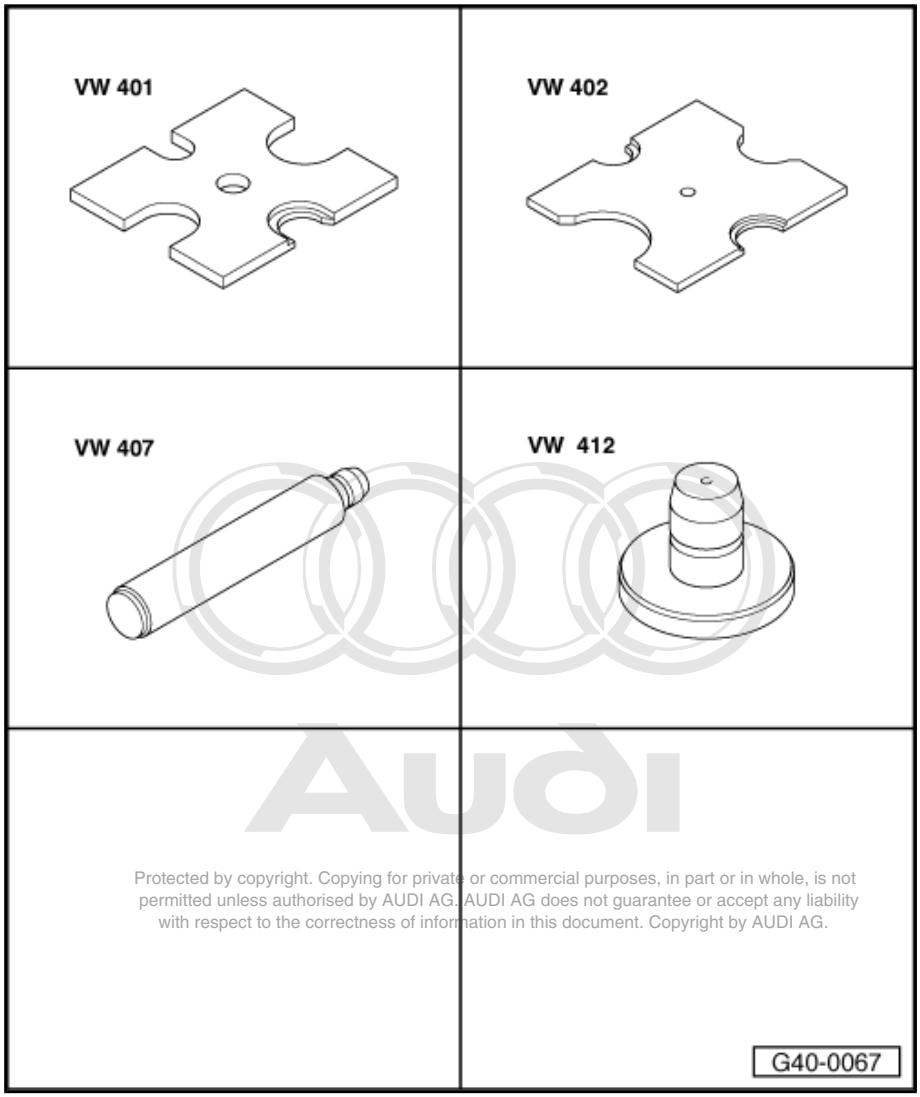
– Install drive shaft ⇒ page 202 .
– On vehicles with air suspension, install air spring ⇒ page 175 .
– On vehicles with four-wheel drive: Tighten flange bolt securing outer joint of drive shaft (vehicle must be standing on its wheels - accident risk) ⇒ page 203 .

6.4 Servicing wheel bearing unit (only possible on four-wheel drive vehicles)

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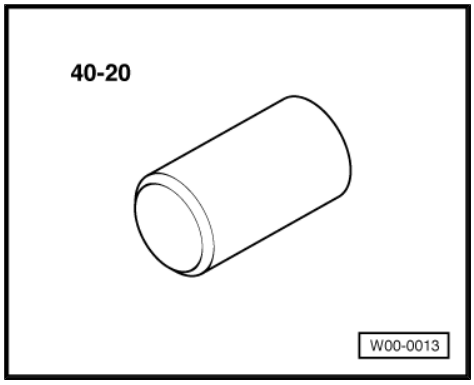
Special tools and workshop equipment required

- Thrust plate - VW 401-
- Thrust plate - VW 402-
- Press tool - VW 407-
- Press tool - VW 412-

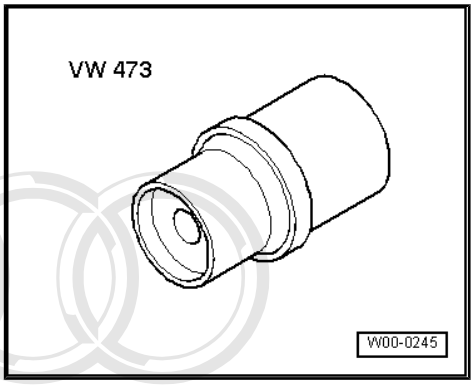


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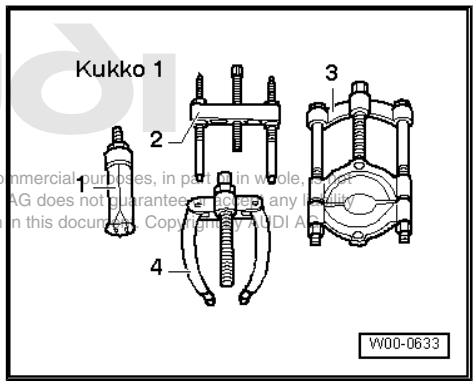
- Drift sleeve - 40-20-



♦ Press tool - VW 473-

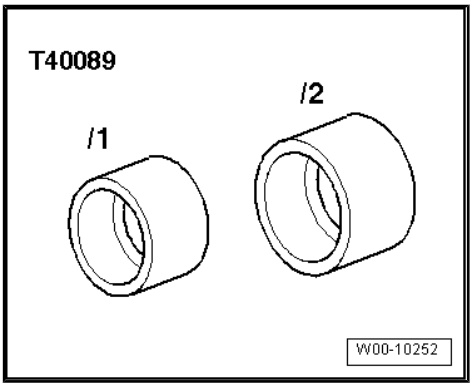


♦ Splitter 3 - Kukko 17/2-



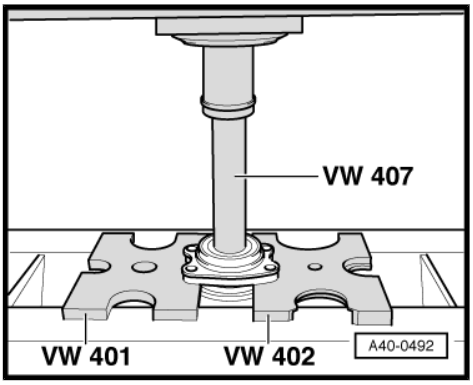
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♦ Assembly tool - T40089/2-



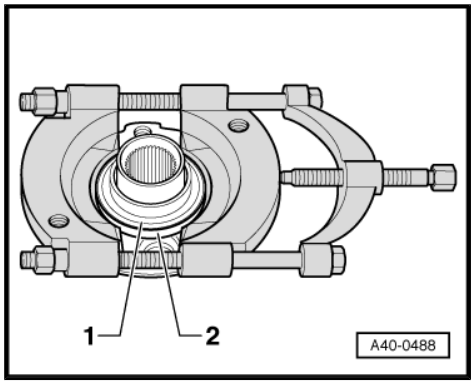
• Wheel bearing unit removed ⇒ page 191

Pressing wheel hub out of wheel bearing



Pressing inner bearing race off wheel hub

– Apply splitter between inner bearing race -1- and deflector ring -2-, and tighten spindle.

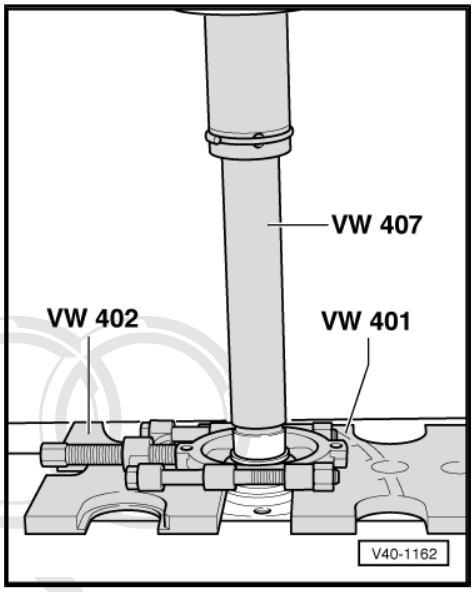


Note

Use commercially available splitter, e.g. Kukko 17/2.

The deflector ring becomes deformed in this process and must then be renewed.

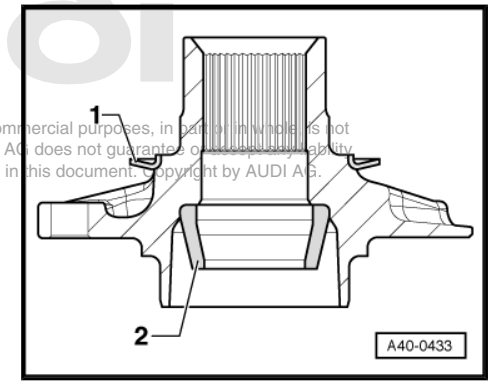
– Press inner wheel bearing race off wheel hub.



Renewing deflector ring for wheel bearing

– Carefully prise off old deflector ring -1- using a screwdriver.

– Fit new deflector ring on wheel hub.



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– Apply special tools as shown in illustration.

1 - Press tool - VW 473-

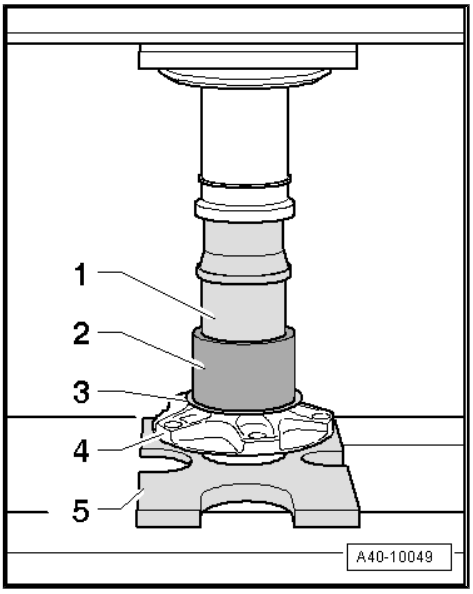
2 - Assembly tool - T40089/2-

3 - Deflector ring

4 - Wheel hub

5 - Thrust plate - VW 401-

– Press on deflector ring as far as radius on wheel hub using assembly tool - T40089/2- as illustrated.



Note

The deflector ring must be pressed on until it is seated against the radius on the wheel hub.

Pressing wheel hub into wheel bearing

– Apply the special tools as shown.

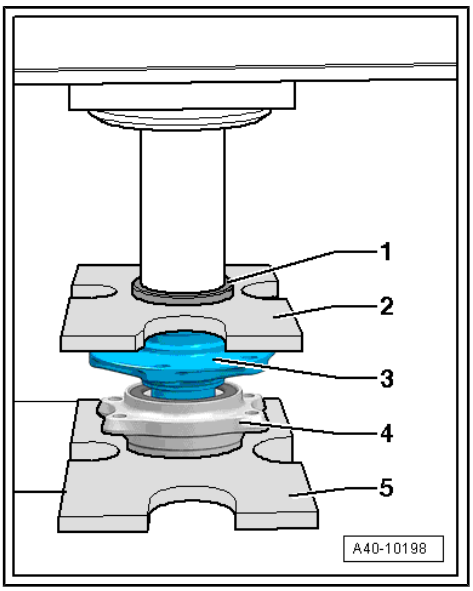
1 - Press tool - VW 412-

2 - Thrust plate - VW 402-

3 - Wheel hub

4 - Ball bearing

5 - Thrust plate - VW 401-



Note

The machined surface of the wheel bearing outer race faces downwards.

Caution

Make sure no dirt gets between thrust plate - VW 401- -5- and ball bearing -4- when pressing in the hub or when the parts are placed on a workbench, etc.

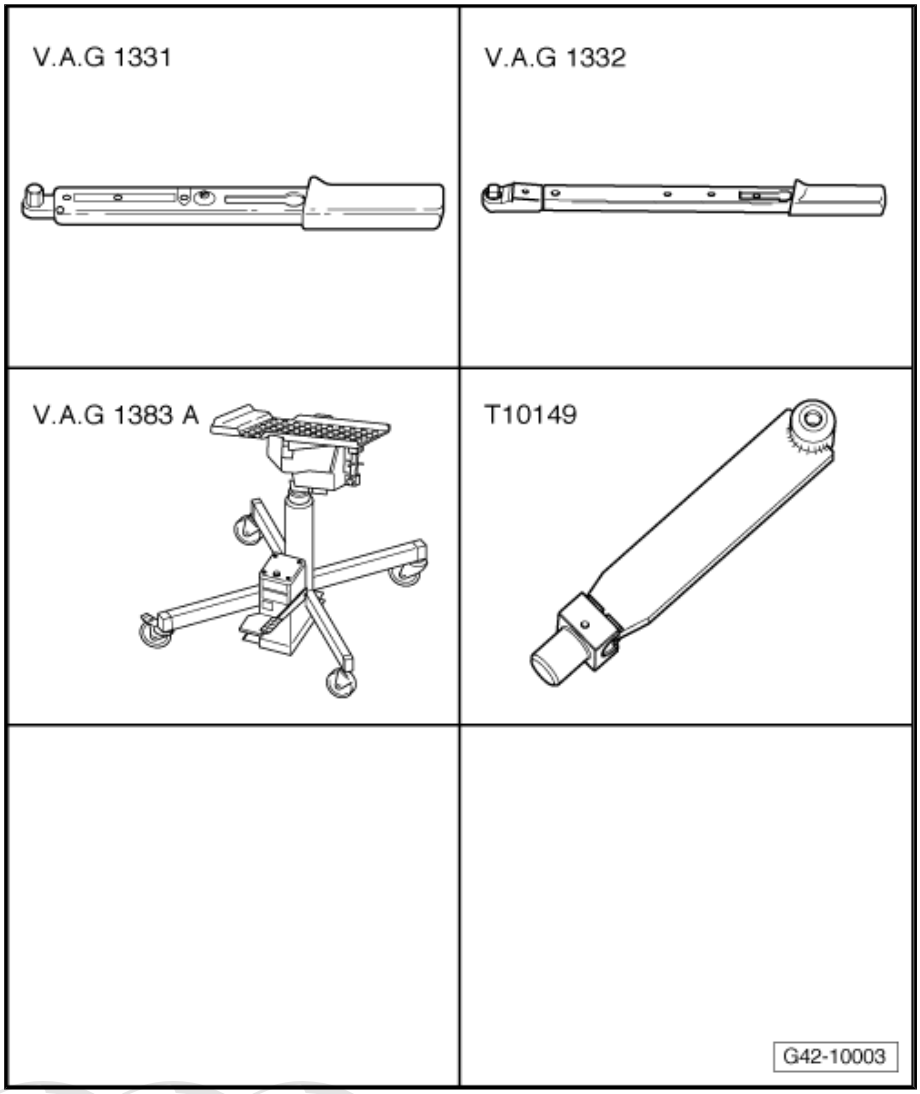
– Install wheel bearing unit ⇒ page 191 .

6.5 Removing and installing shock absorber for coil springs

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Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-
- Torque wrench - V.A.G 1332-
- Engine and gearbox jack - V.A.G 1383 A-
- Support - T10149-

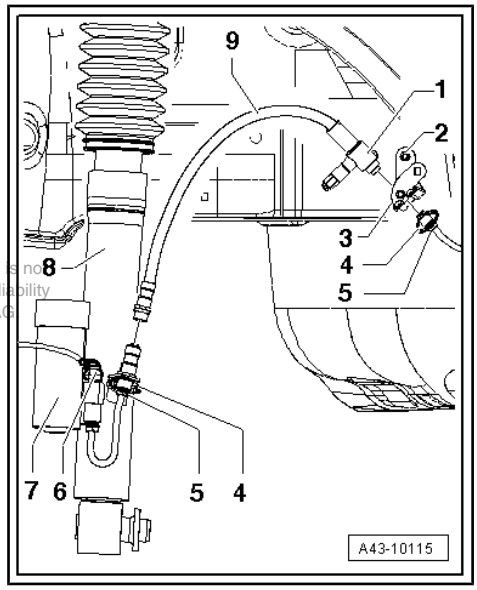


Removing

– Remove wheel.

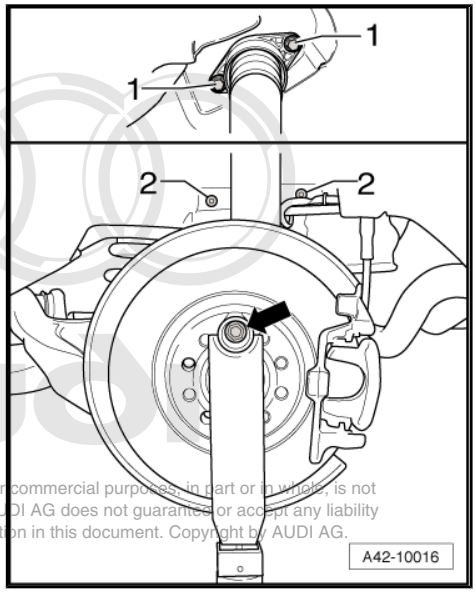
– On vehicles with Dynamic Ride Control (DRC), if fitted, unplug electrical connector -6- at shock absorber, pull out of bracket and discharge system ⇒ page 259 . Unscrew union nut -5- and move hose -9- clear.

– Turn the wheel hub until one of the bores for the wheel bolts is at the top.



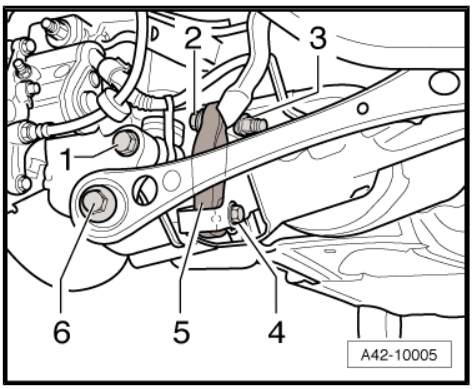
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– Attach support - T10149- using wheel bolt -arrow-.
– Fit support - T10149- in engine and gearbox jack - V.A.G 1383 A- and raise wheel bearing housing approx. 5 cm.



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– Detach bolt connection -1-.



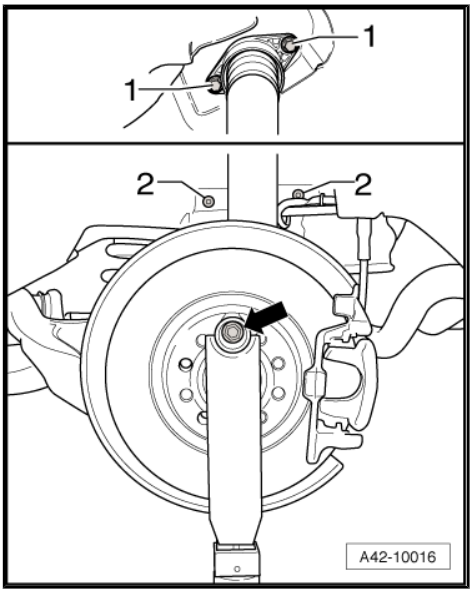
– Unscrew fasteners -2- and pull wheel housing liner to one side.
– Remove hexagon bolts -1-.
– Take out shock absorber.

Installing

Installation is carried out in the reverse sequence. Note the following points:

– On vehicles with Dynamic Ride Control (DRC), if fitted, plug electrical connector back in at shock absorber, engage in bracket and charge system ⇒ page 259 .

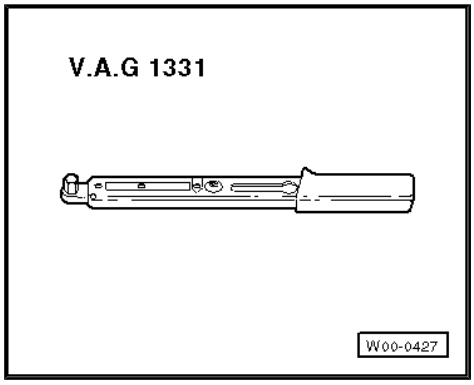
Tightening torques ⇒ page 187



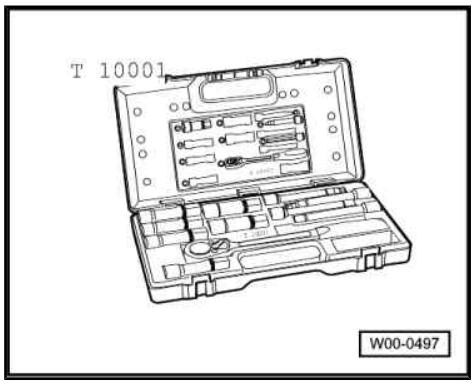
6.6 Servicing shock absorber for coil springs

Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-



- Shock absorber set - T10001-



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1 - Self-locking nut

- ❑ Tightening torque ⇒ Item 24 (page 188)
- ❑ Always renew
- ❑ Loosening and tightening ⇒ page 201

2 - Shock absorber mounting

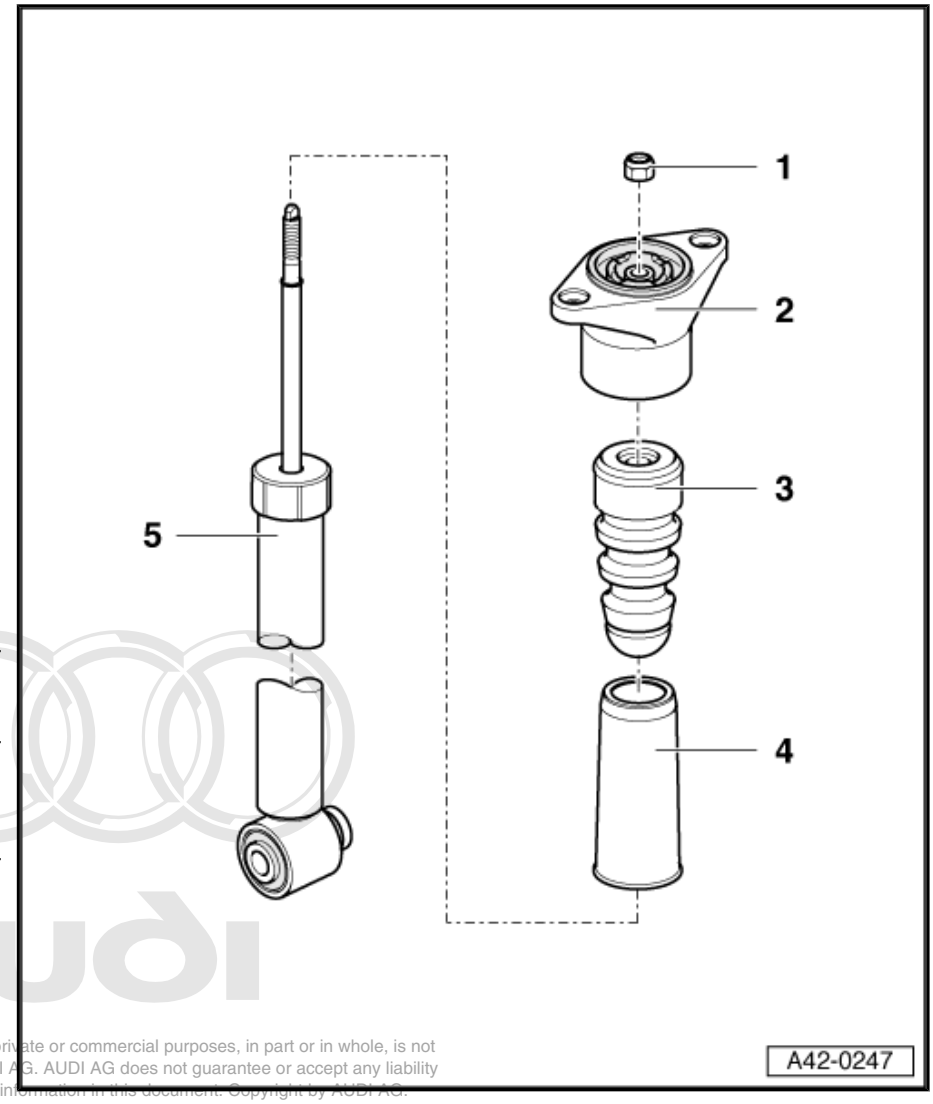
3 - Bump stop

4 - Protective sleeve

- ❑ On RS 6 vehicles: secured to bump stop and retaining ring
- ❑ On RS 6 vehicles: note position ⇒ page 189

5 - Shock absorber

- ❑ Removing and installing ⇒ page 197
- ❑ Note different running gear versions; see vehicle data sticker ⇒ page 282
- ❑ Defective shock absorbers must always be degassed and drained before disposal ⇒ page 7
- ❑ Checking shock absorber following removal ⇒ page 7



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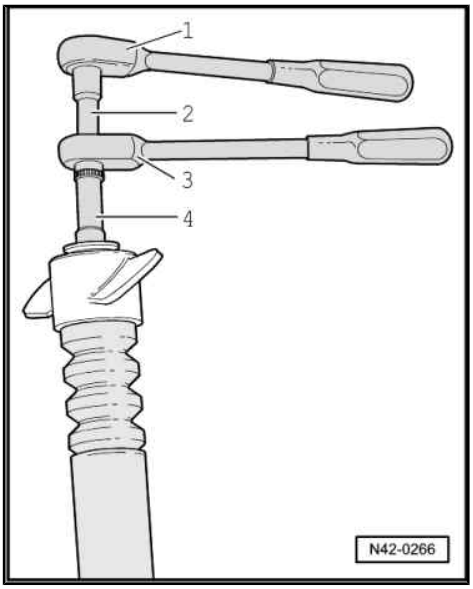
Loosening and tightening nut on shock absorber mounting

1 - Commercially available ratchet

2 - Insert tool -T10001/9-

3 - Ratchet -T10001/11-

4 - Insert tool -T10001/1-



7 Drive shaft

⇒ “7.1 Removing and installing drive shaft”, page 202

⇒ “7.2 Loosening and tightening flange bolt for outer joint on drive shaft”, page 203

⇒ “7.3 Drive shaft with 88 or 100 mm dia. outer CV joint and 108 mm dia. inner CV joint - exploded view”, page 204

⇒ “7.4 Servicing outer constant velocity joint (88 mm or 100 mm diameter)”, page 206

⇒ “7.5 Servicing inner constant velocity joint (108 mm diameter)”, page 208

⇒ “7.6 Checking outer constant velocity joint”, page 212

⇒ “7.7 Checking inner constant velocity joint”, page 213

7.1 Removing and installing drive shaft

Removing

Vehicles with coil springs

– Loosen flange bolt for outer joint on drive shaft ⇒ page 203 .

– Remove coil spring ⇒ page 163 .

– Remove wheel speed sensor -3- ⇒ Rep. gr. 45 .

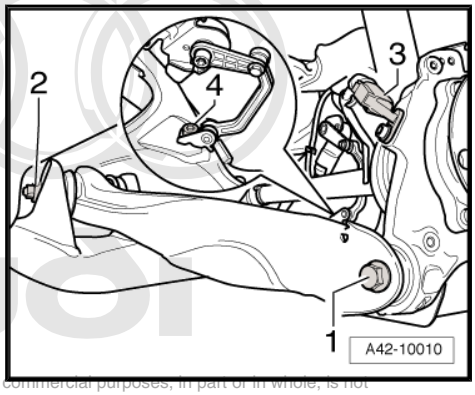
Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).

– Loosen flange bolt securing outer joint of drive shaft (loosen only when vehicle is standing on its wheels -accident risk-) ⇒ page 203 .

– Remove air spring ⇒ page 175 .



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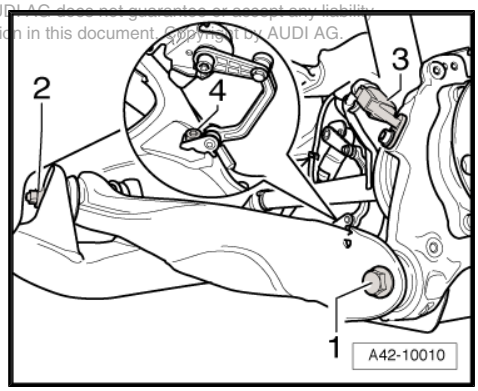
– Remove wheel speed sensor -3- ⇒ Rep. gr. 45 .

All vehicles

– Remove rear silencer(s) ⇒ Rep. gr. 26 .

– Remove rear final drive ⇒ Rep. gr. 39 .

– Take out drive shaft from the inside.



Installing

Installation is carried out in the reverse sequence. Note the following points:

Tightening torque for drive shaft ⇒ page 187

– Install rear final drive ⇒ Rep. gr. 39 .

– Install coil spring ⇒ page 163 .

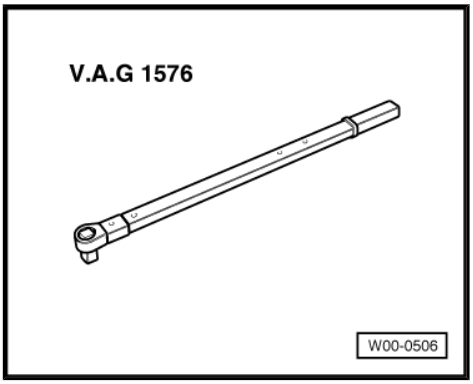
– Install air spring ⇒ page 175 .

– Tighten flange bolt securing outer joint of drive shaft (tighten only when vehicle is standing on its wheels -accident risk-) ⇒ page 203 .

7.2 Loosening and tightening flange bolt for outer joint on drive shaft

Special tools and workshop equipment required

- Torque wrench - V.A.G 1576-



Loosening flange bolt for outer joint on drive shaft

– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).

> **WARNING**
>
> *The vehicle must be standing on its wheels when loosening and tightening the flange bolt.*
>
> *-Accident risk-*

– Slacken off flange bolt for outer joint of drive shaft by no more than 90° (vehicle must be standing on its wheels to avoid any accident risk).

– Lift vehicle and remove wheel.

– Screw in and hand-tighten all 5 wheel bolts again.

A second mechanic is required for the next operation.

– 1st mechanic gets into vehicle and presses brake pedal.

– 2nd mechanic unscrews flange bolt for drive shaft.

The wheel bearings must not be subjected to load after the flange bolt has been slackened or removed.

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If the wheel bearings are subjected to the full weight of the vehicle they will be overloaded, resulting in reduced service life.

If a vehicle has to be moved after removing the drive shaft, first install an outer joint in place of the drive shaft and tighten to 200 Nm. Otherwise the wheel bearing will be damaged.

Tightening flange bolt for outer joint on drive shaft

– Renew flange bolt.

A second mechanic is required when tightening flange bolt for drive shaft.

– 1st mechanic gets into vehicle and presses brake pedal.

– 2nd mechanic pre-tightens flange bolt for drive shaft ONLY to specified torque (without turning further) ⇒ page 80 .

– Fit wheel and lower vehicle onto its wheels.

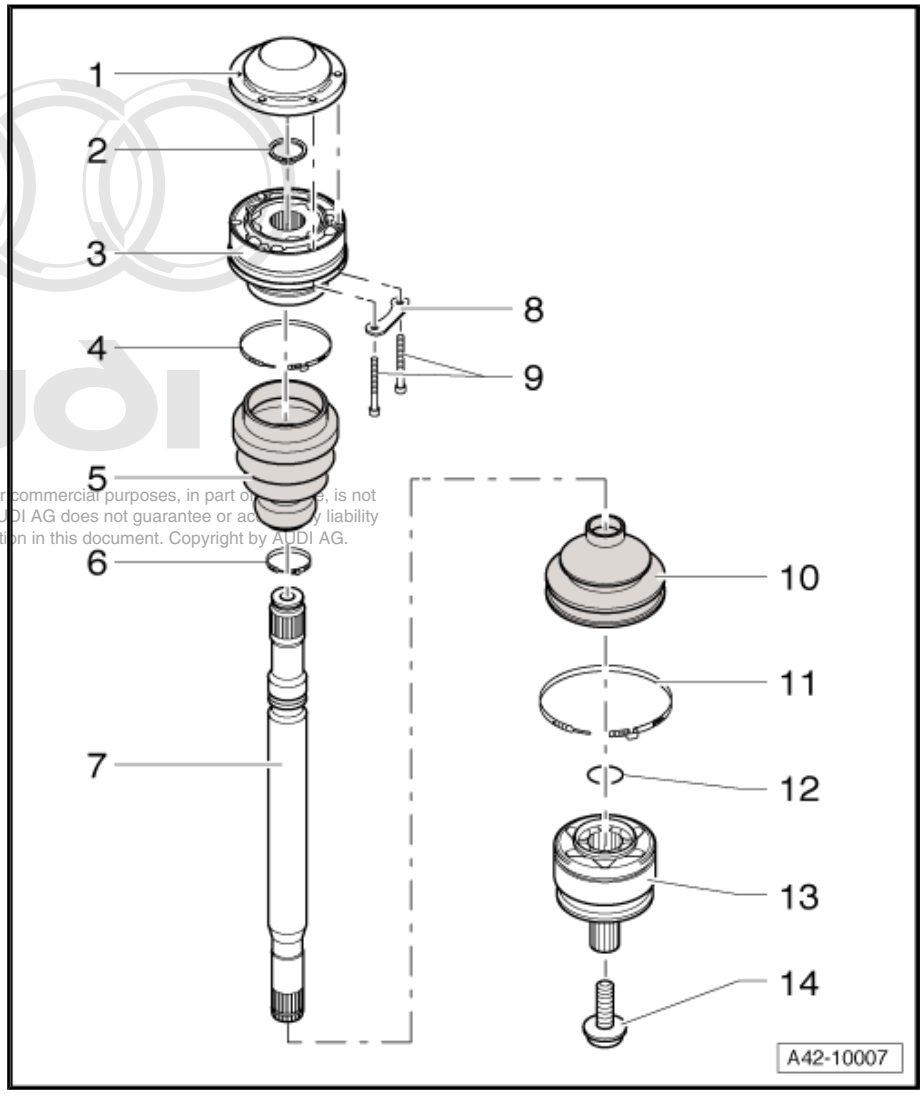
WARNING

The vehicle must be standing on its wheels when loosening and tightening the flange bolt.

-Accident risk-

– Tighten flange bolt to final setting by turning through specified angle (vehicle must be standing on its wheels to avoid any accident risk) ⇒ page 80 .

7.3 Drive shaft with 88 or 100 mm dia. outer CV joint and 108 mm dia. inner CV joint - exploded view



1 - Cover

- ❑ Always renew

2 - Circlip

- ❑ Use normal commercial circlip pliers when removing and installing
- ❑ Always renew

3 - Inner constant velocity joint

- ❑ Outside diameter: 108 mm
- ❑ Renew only as complete unit
- ❑ Checking ⇒ page 213
- ❑ Pressing off ⇒ page 209
- ❑ Pressing on ⇒ page 210
- ❑ Grease quantity and type ⇒ page 205
- ❑ Adhesive surfaces must be free of oil and grease
- ❑ Grease splines on drive shaft lightly with grease used in joint when fitting joint onto drive shaft

4 - Hose clip

- ❑ Always renew
- ❑ Tightening ⇒ page 211

5 - Boot for inner constant velocity joint

- ❑ Without vent hole
- ❑ Check inner constant velocity joint if boot is damaged ⇒ page 213
- ❑ Sealing surfaces between boot and drive shaft must be free from grease on assembly

6 - Hose clip

- ❑ Always renew
- ❑ Tightening ⇒ page 211

7 - Drive shaft

- ❑ Removing and installing ⇒ page 202

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8 - Lock plate

9 - Bolt

- ❑ Tightening torque ⇒ Item 25 (page 188)

10 - Boot for outer constant velocity joint

- ❑ Without vent hole
- ❑ Check for splits and chafing, renew if necessary
- ❑ Check outer constant velocity joint if boot is damaged ⇒ page 212
- ❑ Sealing surfaces between boot and joint must be free from grease on assembly

11 - Hose clip

- ❑ Always renew
- ❑ Tightening ⇒ page 207

12 - Circlip

- ❑ Always renew
- ❑ Fit into annular groove on shaft before installing (no longer visible once joint is installed)
- ❑ Before fitting constant velocity joint, align circlip centrally with opening facing upwards.

13 - Outer constant velocity joint

- ❑ Outside diameter: 88 mm or 100 mm
- ❑ Renew only as complete unit
- ❑ Checking ⇒ page 212
- ❑ Driving off ⇒ page 206
- ❑ Installing: drive onto shaft with plastic hammer until compressed circlip seats
- ❑ Circlip must fit in chamfer on joint when installing; guide with pliers if necessary
- ❑ Grease quantity and type ⇒ page 205
- ❑ Grease splines on drive shaft lightly with grease used in joint when fitting joint onto drive shaft

14 - Flange bolt

- ❑ Always renew
- ❑ Observe instructions for loosening and tightening ⇒ page 203
- ❑ Tightening torque ⇒ Item 7 (page 187)

Grease quantity and type

Regrease joint when renewing boot.

For required grease filling of joints, refer to ⇒ Electronic parts catalogue .

Note

Note that different types of grease are required for outer and inner joints.

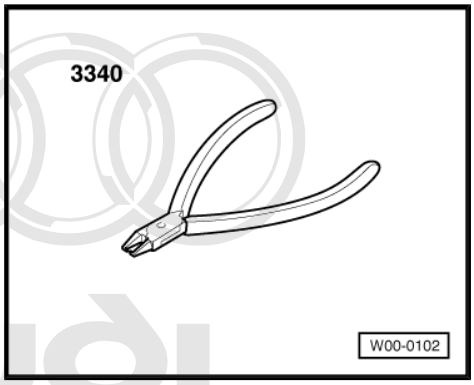
	Grease quantity	of which in:	
Outer joint	Total quantity	Joint	Boot
[mm]	[g]	[g]	[g]
88	90	40	50
100	120	70	50
Inner joint		Put in grease through ball bearing races	
108	120		

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7.4 Servicing outer constant velocity joint (88 mm or 100 mm diameter)

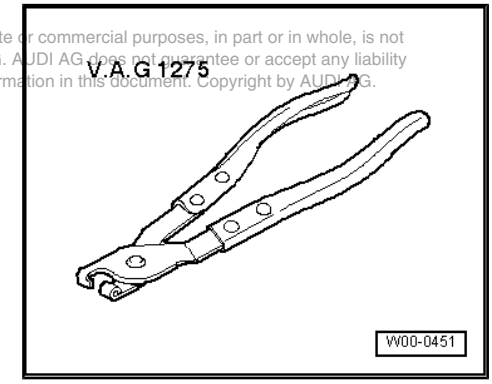
Special tools and workshop equipment required

- Pliers - 3340-



- Hose clip pliers - V.A.G 1275-

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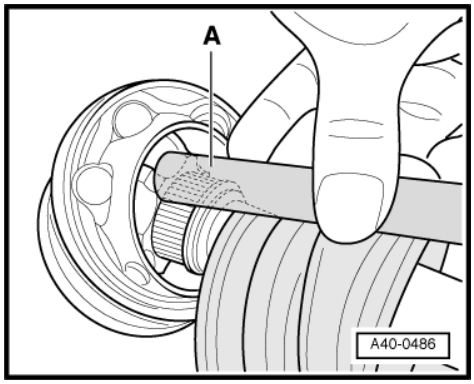


Removing outer constant velocity joint (88 mm or 100 mm dia.)

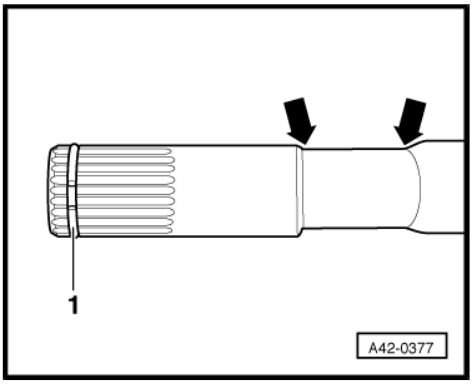
– Clamp drive shaft in vice using protective jaw covers.
– Open hose clip and detach boot from outer joint.
– Use hammer to tap copper or brass drift -A- against inner race of constant velocity joint.
– Detach joint and boot.

Installing outer constant velocity joint (88 mm or 100 mm dia.)

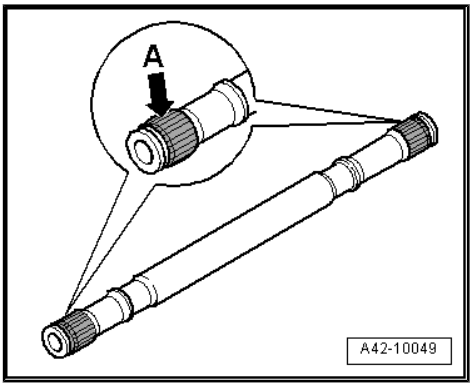
– Push joint boot onto drive shaft.



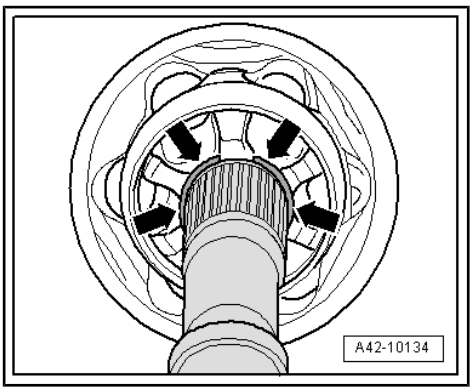
– Position boot between -arrows-.



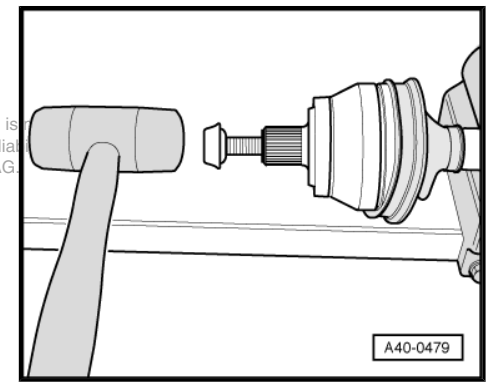
– Grease splines -A- on drive shaft lightly with grease used in joint before fitting joint body onto drive shaft.
– Fit circlip in groove on shaft.



– Slide on constant velocity joint as far as circlip.
– Align circlip so that opening faces upwards -arrows-.



– Screw old drive shaft bolt into joint body as shown.
– Use plastic hammer to drive joint onto drive shaft until circlip engages.
– Refer to table ⇒ page 205 and pack indicated quantity of grease inside joint body.
– Refer to table ⇒ page 205 and pack indicated quantity of grease into boot side of joint body.
– Install boot on outer joint.



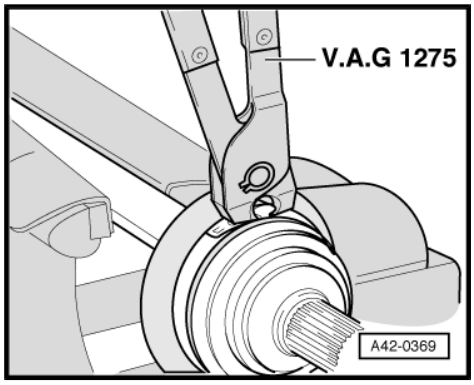
Fitting and tightening hose clip on outer joint

Tightening hose clip on outer joint (88 mm diameter)

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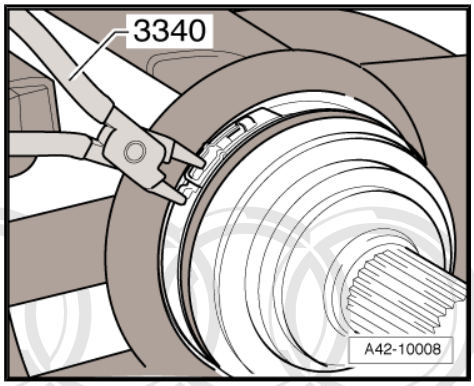
– Tighten hose clip with hose clip pliers - V.A.G 1275- .

Tightening hose clip on outer joint (100 mm diameter)



– Engage hose clip by hand at first lug.
– Use pliers - 3340- to fasten hose clip.

Pliers - 3340- must be applied to front of clip as shown.

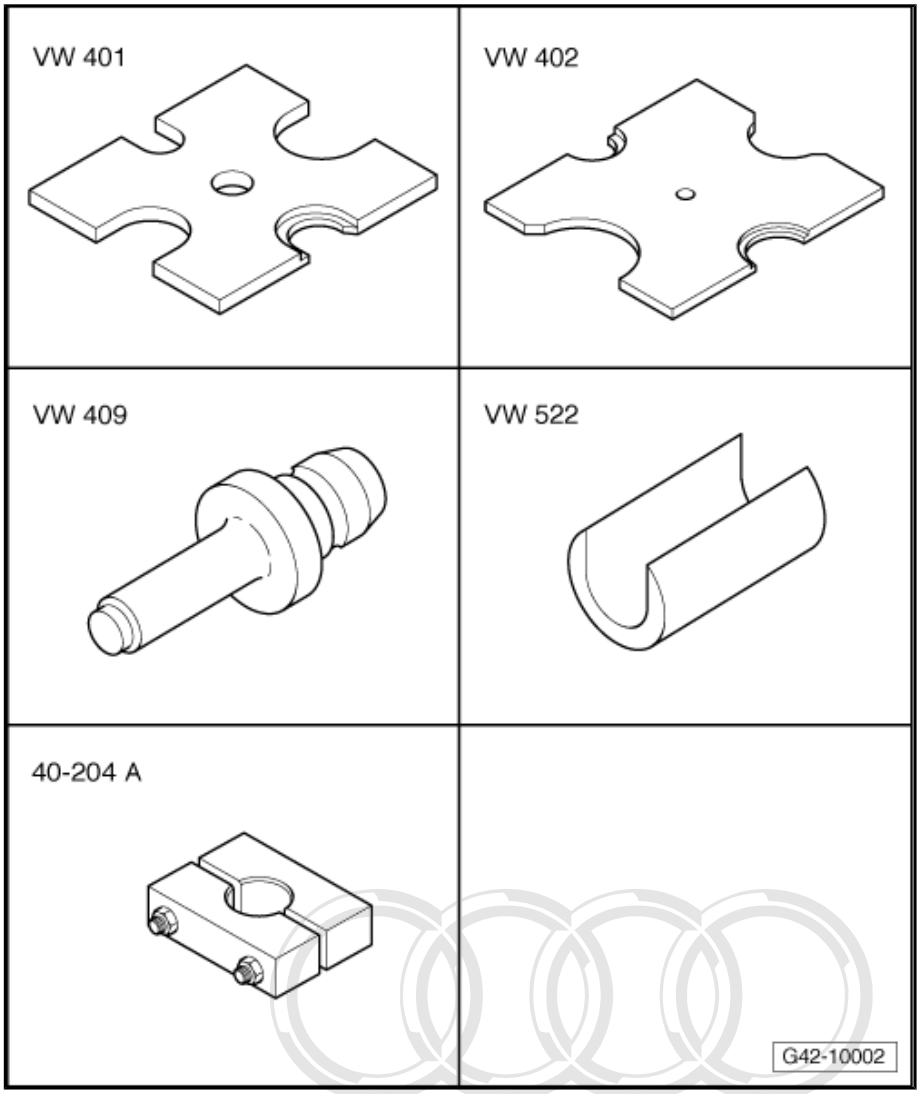


7.5 Servicing inner constant velocity joint (108 mm diameter)

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Special tools and workshop equipment required

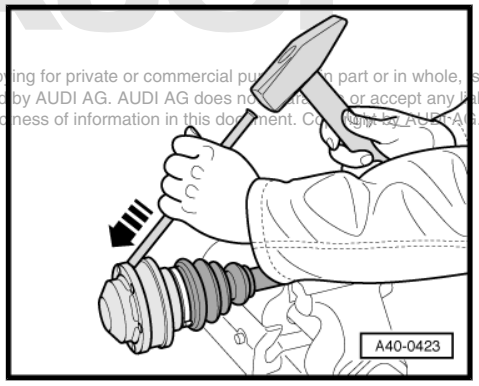
- Thrust plate - VW 401-
- Thrust plate - VW 402-
- Press tool - VW 409-
- Support sleeve - VW 522-
- Clamp - 40 - 204 A-



Detaching inner constant velocity joint (108 mm dia.)

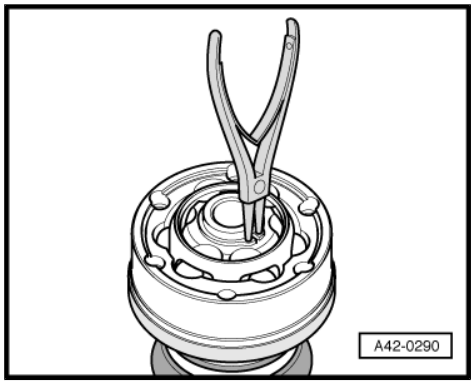
– Clamp drive shaft in vice using protective jaw covers.

– Drive off cover with a copper or brass drift.



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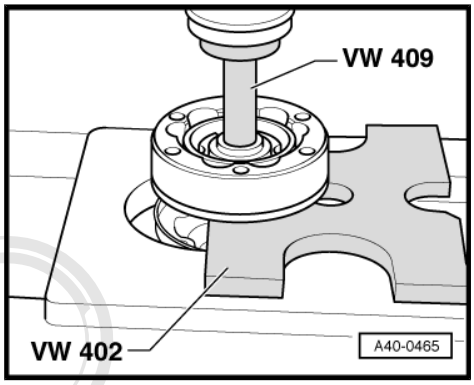
– Remove circlip.
– Unfasten both hose clips and detach boot from inner joint.



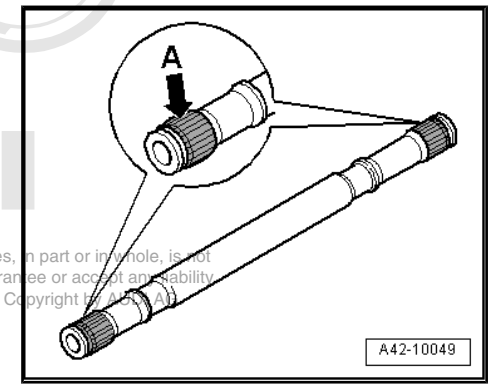
– Press inner constant velocity joint off drive shaft using special tools shown in illustration.
– Pull boot off drive shaft.

Installing inner constant velocity joint (108 mm dia.)

– Push boot with small hose clip onto drive shaft.



– Grease splines -A- on drive shaft lightly with grease used in joint before fitting joint or triple roller spider onto drive shaft.



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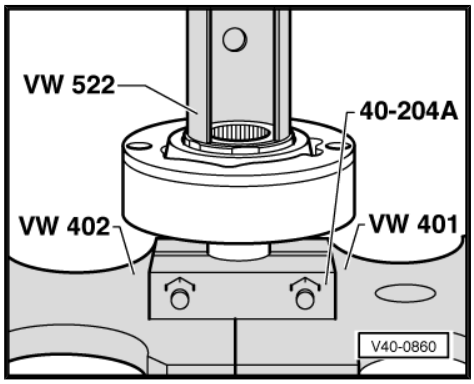
– Press on joint as far as stop.

Chamfer on internal diameter of ball hub (splines) must face contact collar of drive shaft.

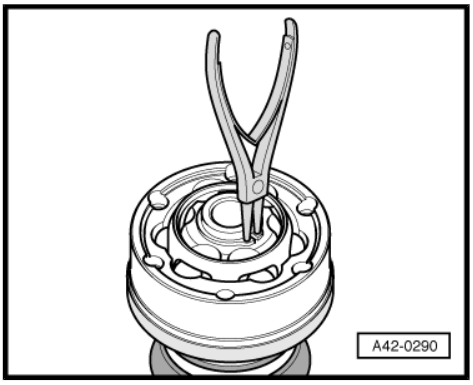
Use the special tools shown in the illustration.

Tensioner - 40-204 A- and clamping surface on drive shaft must be free of grease.

Always renew circlip.



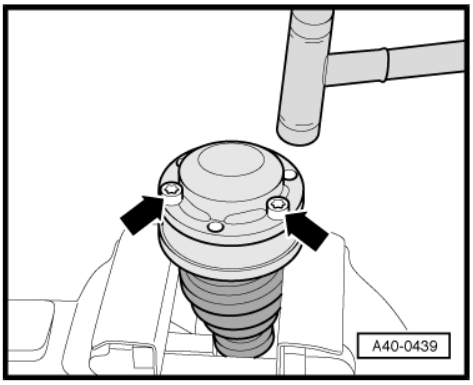
– Fit circlip.
– Check that circlip is properly seated.
– Before fitting boot, pack 60 g of drive shaft grease into joint body from boot side of joint.
– Fit boot on inner joint.
– Pack 60 g of drive shaft grease into joint through ball races.
– Degrease contact surface for cover.



– Using bolts -arrows-, align new cover in relation to bolt holes.

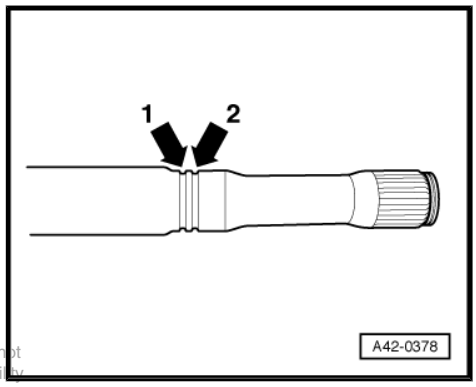
The alignment must be very accurate, because no further alignment is possible once the part has been hammered on.

– Drive on cover using a plastic hammer.
– Remove surplus sealant immediately as it is pressed out.



– Position boot in outer groove -arrow 2-.

The inner groove -arrow 1- must remain visible (“identification groove” for correct boot assembly).

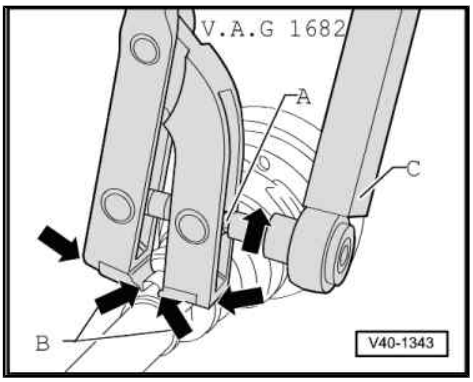


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Fitting and tightening hose clips on inner joint

– Apply clamp tensioner - V.A.G 1682- as shown. Ensure jaws of clamp tensioner make contact with both sides of lug -arrows B- on hose clip.
– Tighten clip by turning spindle with torque wrench -C- (take care to keep tool straight).

♦ Due to the hard material of the CV joint boot (as opposed to rubber), a stainless steel hose clip is required; this can only be tightened using clamp tensioner - V.A.G 1682- .
♦ Tightening torque: 20 Nm
♦ Use torque wrench with 5…50 Nm adjustment range (e.g. - V.A.G 1331-).
♦ Make sure thread of spindle on tool -A- turns freely. Lubricate with MoS_2 grease if necessary.
♦ If the thread is stiff (e.g. due to dirt), the required clamping force will not be attained at the hose clip when the specified tightening torque is applied.



7.6 Checking outer constant velocity joint

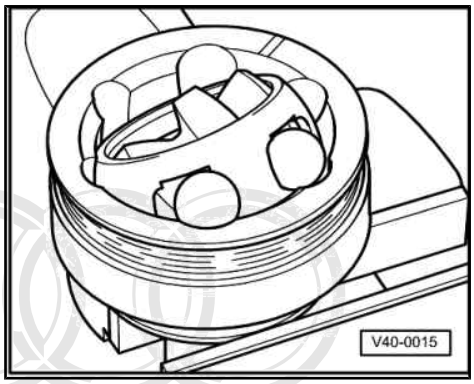
The joint should be dismantled to renew dirty grease or for checking the balls and ball races for wear and damage.

Dismantling

– Before dismantling, mark position of ball hub in relation to ball cage and joint body with an electric scriber or oil stone.

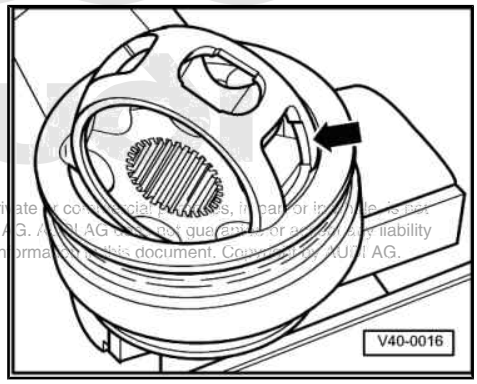
– Swivel ball hub and ball cage.

– Take out balls one after the other.



– Turn the cage until the two rectangular openings -arrow- are level with the joint body.

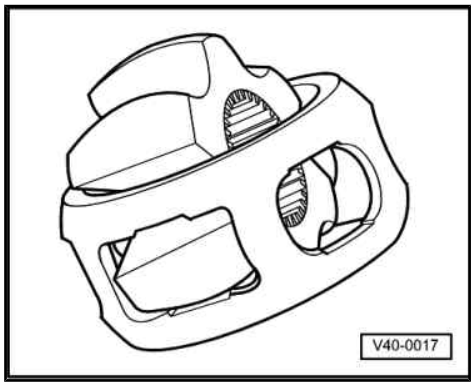
– Lift out cage together with hub.



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– Swivel segment of hub with short lobe into square cage opening.

– Pivot hub out of cage.



Checking

The 6 balls in each joint belong to one tolerance group. Check stub axle, hub, cage and balls for pitting and signs of seizure. Excessive backlash in the joint will cause knocking or jolts under load change; in such cases the joint must be renewed. Polished areas and visible tracks in the ball races do not justify renewal of the joint.

Assembling

– Fit cage with hub into joint body.

Note

Make sure cage is inserted in correct position (i.e. sides facing in same direction as original position).

– Press in balls one after the other from opposite sides, taking care to re-establish original position of hub relative to cage and joint body.

– Pack required amount of grease into joint body.

Refer to ⇒ page 205 for quantities and type of grease required for drive shaft with 88 mm or 100 mm dia. outer constant velocity joint.

7.7 Checking inner constant velocity joint

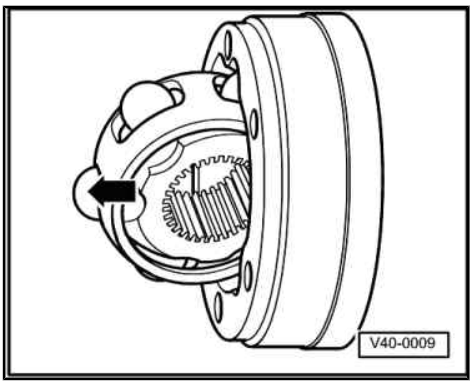
The joint should be dismantled to renew dirty grease or for checking the balls and ball races for wear and damage.

Dismantling

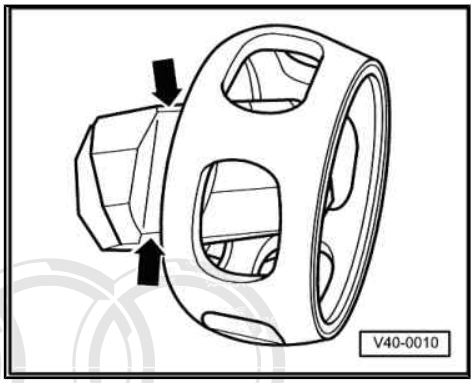
Note

Ball hub and joint body are paired and must be marked before dismantling. Ensure that the balls run in the same races after assembly.

– Swivel ball hub and ball cage.
– Press out joint body in direction of -arrow-.
– Push balls out of cage.



– Align ball hub with cage as shown -arrows- and pivot hub out of cage.
– Check joint, ball hub, ball cage and balls for pitting and signs of seizure.

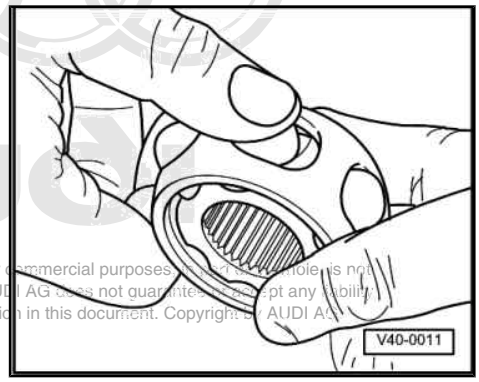


Note

Excessive backlash in the joint will cause knocking or jolts under load change. In such cases the joint must be renewed. Polished areas and visible tracks in the ball races are not a reason for renewing the joint.

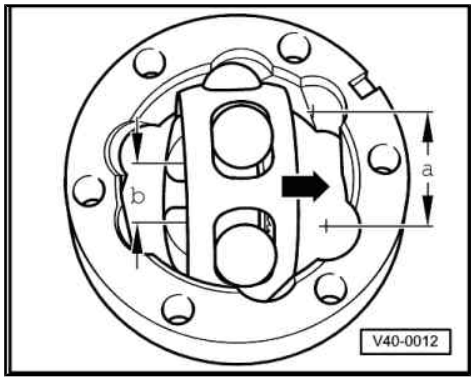
Assembling

– Insert hub into cage via the two chamfers. No specific installation position is required. Push balls into cage.
– Insert hub with cage and balls at a right angle to the joint body.

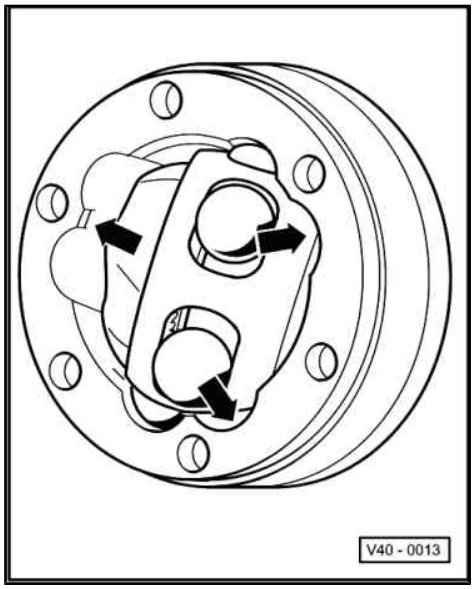


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- When inserting, ensure that the wide spacing -a- on the joint body is aligned with the narrow spacing -b- on the hub after swivelling in.
- Chamfer on internal diameter of ball hub (splines) must face drive shaft.



– Swivel the hub into the joint body; at the same time the hub must be swivelled out of the cage -arrows- far enough to allow the balls to fit into the ball races.



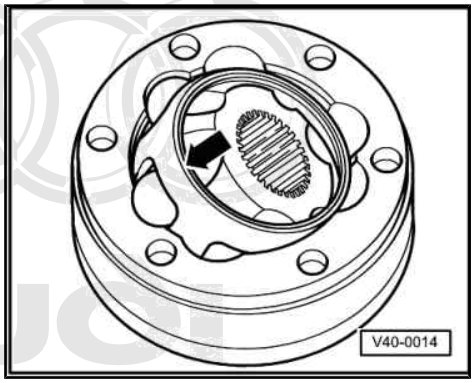
– Swivel in the hub with balls by applying firm pressure on the cage -arrow-.

Checking function of constant velocity joint

The constant velocity joint has been correctly assembled if the ball hub can be moved by hand backwards and forwards over its entire axial range of movement.

– Pack required amount of grease into joint body.

Refer to ⇒ page 205 for quantities and type of grease required for drive shaft with 108 mm dia. inner constant velocity joint.



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43 – Self-levelling suspension

1 Level settings of adaptive air suspension, connecting -VAS 5051- and selecting functions

⇒ “1.1 Possible level settings”, page 215 .

⇒ “1.2 Setting vehicle level”, page 215 .

⇒ “1.3 Jacking mode”, page 215 .

⇒ “1.4 Towing mode”, page 216 .

⇒ “1.5 Shipping mode”, page 216 .

⇒ “1.6 Connecting VAS 5051 and selecting functions”, page 217

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1.1 Possible level settings

Four different levels can be set by the driver:

- Automatic
- Dynamic
- Comfort
- Lift

Note

The automatic control processes are subject to speed and time factors. Thus for example, it is not possible to raise the suspension to the high (raised) level above certain speed thresholds.

For further details on level settings, refer to ⇒ Owner's Manual

1.2 Setting vehicle level

The vehicle level has to be set via the MMI system.

– Switch on ignition.

– Press function key “CAR”. Central menu “adaptive air suspension” appears.

– Use rotary pushbutton to select required level.

Note

Please note that some level settings are not available in certain driving situations.

Please refer to the ⇒ Owner's manual for further details on the operation of the various vehicle level settings.

1.3 Jacking mode

Before raising the vehicle with a jack or lifting platform, the jacking mode must be activated to prevent automatic air suspension control processes impeding the operation of the jack or lifting platform.

Note

The jacking mode is deactivated automatically at speeds above 10 km/h.

Activation

– Switch on ignition.
– Press function key “CAR”. Central menu “adaptive air suspension” appears.
– Press function key “SETUP”. Menu “adaptive air suspension” appears.
– Turn rotary pushbutton to required mode and select “ON”.
– Switch off ignition.

Deactivation

– Switch on ignition.
– Press function key “CAR”. Central menu “adaptive air suspension” appears.
– Press function key “SETUP”. Menu “adaptive air suspension” appears.
– Turn rotary pushbutton to “jacking mode” and select “OFF” to deactivate jacking mode.
– Switch off ignition.

1.4 Towing mode

When the towing mode is active, certain level settings cannot be fully utilised.

Activation

– Switch on ignition.
– Press function key “CAR”. Central menu “adaptive air suspension” appears.
– Press function key “SETUP”. Menu “adaptive air suspension” appears.
– Turn rotary pushbutton to required mode and select “ON”.
– Switch off ignition.

Deactivation

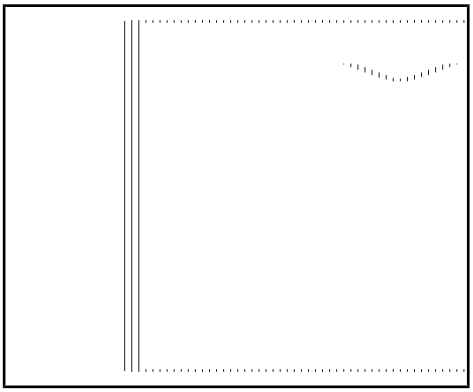
– Switch on ignition.
– Press function key “CAR”. Central menu “adaptive air suspension” appears.
– Press function key “SETUP”. Menu “adaptive air suspension” appears.
– Turn rotary pushbutton to “towing mode” and select “OFF” to deactivate towing mode.
– Switch off ignition.

1.5 Shipping mode

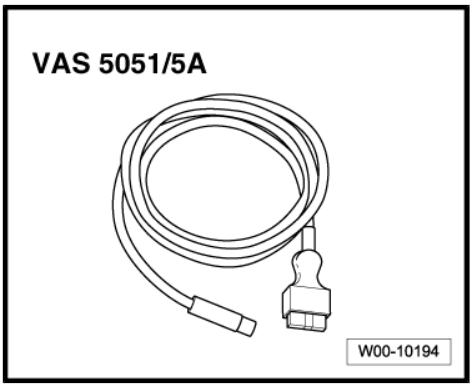
Special tools and workshop equipment required

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- Vehicle diagnostic, testing and information system - VAS 5051 A-



- Diagnosis cable - VAS 5051/5A-



The shipping mode can only be activated and deactivated using tester - VAS 5051- .

When the shipping mode is active, it is not possible to move to other levels using the MMI.

Activation and deactivation

– Connecting tester - VAS 5051- and selecting functions ⇒ page 217

Then

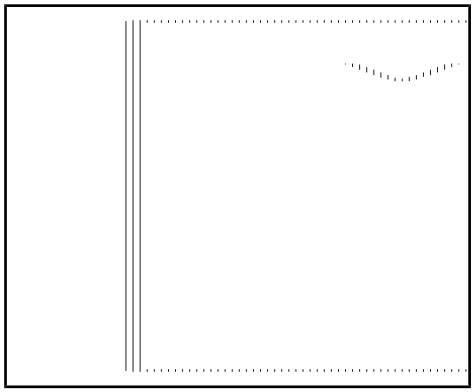
– “Running gear (Rep. Gr. 01; 40 - 49)”
– “34 - Adaptive suspension (Rep. Gr. 01; 43; 44)”
– “01 - Self-diagnosis compatible systems”
– “34 - Adaptive suspension control unit”
– “J197 - Activating/deactivating shipping mode” (loading mode).

1.6 Connecting -VAS 5051- and selecting functions

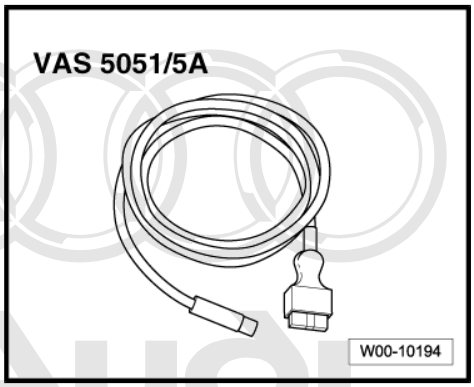
Special tools and workshop equipment required

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- Vehicle diagnostic, testing and information system - VAS 5051 A-



- Diagnosis cable - VAS 5051/5A-

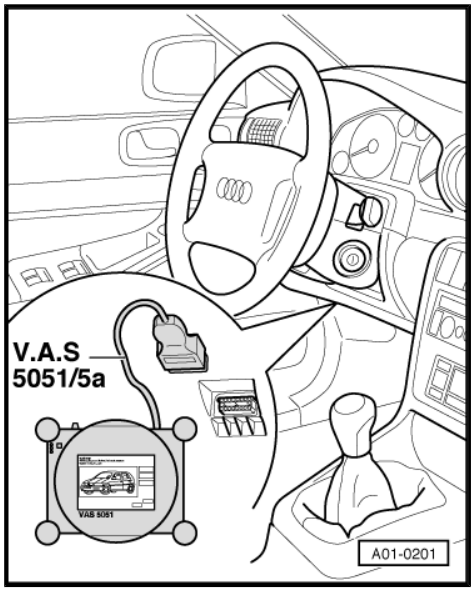


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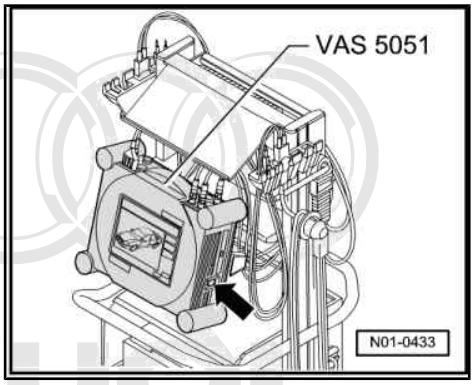
WARNING

- *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.*

– Plug in connector of diagnosis cable - VAS 5051/5A- at diagnostic connection.



– Switch on the tester -arrow-.



The tester is ready for operation when the selector “buttons” for the operating modes appear on the screen.

– Switch on ignition.

Note

When control units or other electrical/electronic components have been renewed, the relevant component(s) must normally be “adapted” via the Guided Fault Finding function.

– Touch the Guided Fault Finding button on the display screen.
– Select the following:

- Make
- Model
- Model year
- Version
- Engine code letters

– Confirm the entered information.

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Note

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”.

Then

– “Running gear (Rep. Gr. 01; 40 - 49)”
– “34 - Adaptive suspension (Rep. Gr. 01; 43; 44)”
– “01 - Self-diagnosis compatible systems”
– “34 - Adaptive suspension control unit”
– “J197 - Functions, adaptive suspension control unit”

or

– “Running gear (Rep. Gr. 01; 40 - 49)”
– “34 - Adaptive suspension (Rep. Gr. 01; 43; 44)”
– “01 - Self-diagnosis compatible systems”
– “34 - Adaptive suspension control unit”
– “Electrical components”

2 Servicing self-levelling suspension (adaptive suspension)

⇒ “2.1 Electrical/electronic components - overview and fitting locations”, page 220 .

⇒ “2.2 Removing and installing front vehicle level senders ”, page 222 .

⇒ “2.3 Removing and installing rear vehicle level senders ”, page 223 .

⇒ “2.4 Removing and installing front body acceleration senders G341 and G342 ”, page 225 .

⇒ “2.5 Removing and installing rear body acceleration sender G343 ”, page 226 .

⇒ “2.6 Removing and installing adaptive suspension control unit J197 ”, page 227 .

⇒ “2.7 Re-adapting adaptive suspension control unit”, page 228 .

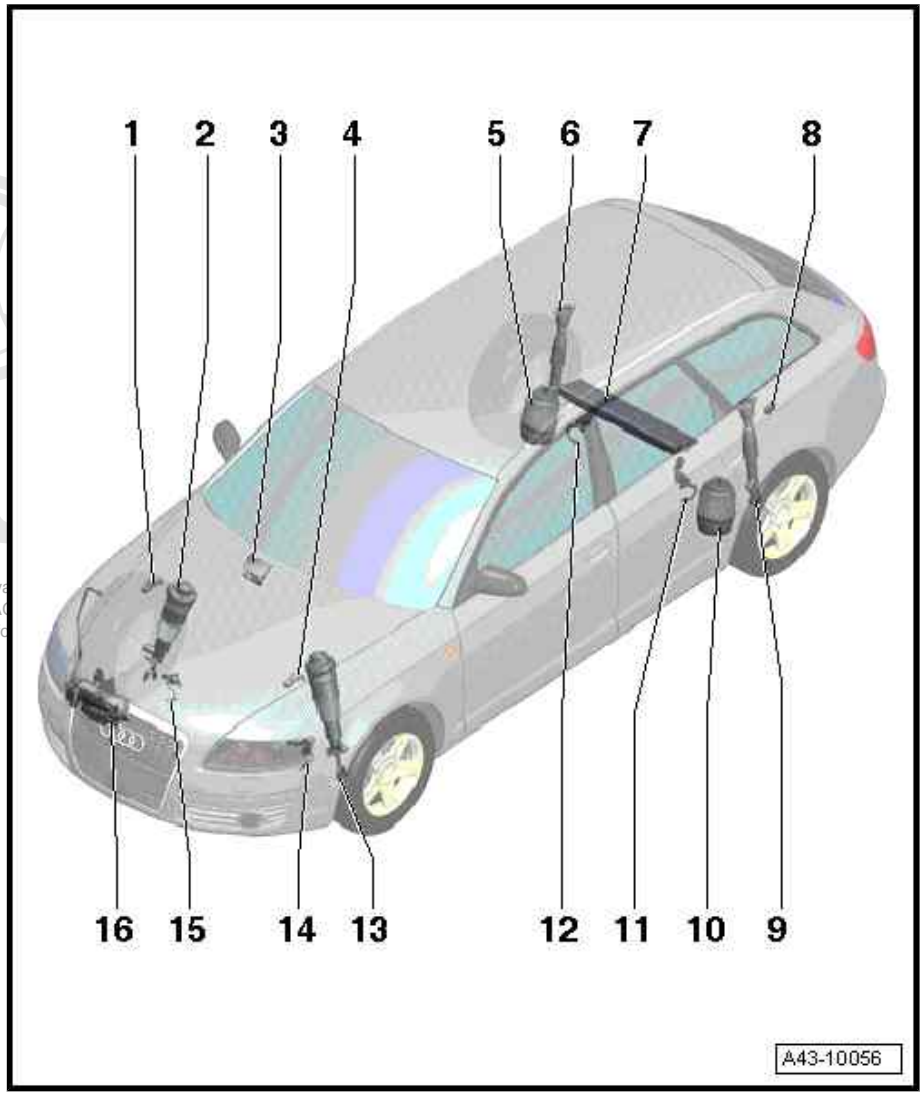
⇒ “2.8 Checking body acceleration signals from front/rear body acceleration senders”, page 229 .

⇒ “2.9 Bleeding or charging system”, page 229 .

⇒ “2.10 Re-adapting reference position (default position)”, page 229 .

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2.1 Electrical/electronic components - overview and fitting locations



1 - Front right body acceleration sender - G342-

- ❑ Removing and installing ⇒ page 225
- ❑ Can be checked via “Guided Fault Finding” with -VAS 5051 A-

2 - Suspension strut (air suspension), front right

- ❑ With front right shock absorber damping adjustment valve - N337-
- ❑ Removing and installing ⇒ page 54
- ❑ Charging ⇒ page 229

3 - Adaptive suspension control unit - J197-

- ❑ Removing and installing ⇒ page 227

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4 - Front left body acceleration sender - G341-

- ❑ Removing and installing ⇒ page 225
- ❑ Can be checked via “Guided Fault Finding” with -VAS 5051 A-

5 - Air spring (rear right)

- ❑ Removing and installing ⇒ page 175

6 - Shock absorber (rear right)

- ❑ With rear right shock absorber damping adjustment valve - N339-
- ❑ Removing and installing ⇒ page 179

7 - Accumulator

- ❑ Before removing accumulator, system must be bled using -VAS 5051 A- and “Guided Fault Finding” routine
- ❑ Removing and installing ⇒ page 247

8 - Rear body acceleration sender - G343-

- ❑ Removing and installing ⇒ page 226
- ❑ Can be checked via “Guided Fault Finding” with -VAS 5051 A-
- ❑ Rear body acceleration sender - G343- is installed behind left wheel housing trim near top shock absorber attachment point

9 - Shock absorber (rear left)

- ❑ With rear left shock absorber damping adjustment valve - N338-
- ❑ Removing and installing ⇒ page 175

10 - Air spring (rear left)

- ❑ Removing and installing ⇒ page 175

11 - Rear left vehicle level sender - G76-

- ❑ Removing and installing ⇒ page 223
- ❑ Re-adapting reference position (default position) following disconnection ⇒ page 229
- ❑ Can be checked via “Guided Fault Finding” with -VAS 5051 A-

- ❑ If the rear left vehicle level sender - G76- has been re-adapted on vehicles with lane departure warning function, the camera and the lane departure warning control unit - J759- must also be re-calibrated ⇒ page 312

12 - Rear right vehicle level sender - G77-

- ❑ Removing and installing ⇒ page 223
- ❑ Re-adapting reference position (default position) following disconnection ⇒ page 229
- ❑ Can be checked via “Guided Fault Finding” with -VAS 5051 A-
- ❑ If the rear right vehicle level sender - G77- has been re-adapted on vehicles with lane departure warning function, the camera and the lane departure warning control unit - J759- must also be re-calibrated ⇒ page 312

13 - Suspension strut (air suspension), front left

- ❑ With front left shock absorber damper adjustment valve - N336-
- ❑ Removing and installing ⇒ page 54

14 - Front left vehicle level sender - G78-

- ❑ Removing and installing ⇒ page 222
- ❑ Re-adapting reference position (default position) following disconnection ⇒ page 229
- ❑ Can be checked via “Guided Fault Finding” with -VAS 5051 A-
- ❑ If the front left vehicle level sender - G78- has been re-adapted on vehicles with lane departure warning function, the camera and the lane departure warning control unit - J759- must also be re-calibrated ⇒ page 312

15 - Front right vehicle level sender - G289-

- ❑ Removing and installing ⇒ page 222
- ❑ Re-adapting reference position (default position) following disconnection ⇒ page 229
- ❑ Can be checked via “Guided Fault Finding” with -VAS 5051 A-
- ❑ If the front right vehicle level sender - G289- has been re-adapted on vehicles with lane departure warning function, the camera and the lane departure warning control unit - J759- must also be re-calibrated ⇒ page 312

16 - Air supply unit with solenoid valve block

- ❑ Removing and installing air supply unit ⇒ page 238
- ❑ Removing and installing solenoid valve block ⇒ page 245
- ❑ If air supply unit is renewed, adaptive suspension compressor relay - J403- must also be renewed. Fitting location ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

2.2 Removing and installing front vehicle level senders

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General notes:

Vehicles with adaptive suspension and/or gas discharge lamps have automatic headlight range control fitted as standard equipment ⇒ Rep. gr. 94 .

The adaptive suspension and the automatic headlight range control functions require information on the compression and rebound travel at the front and rear suspension.

For this purpose, the position of the left/right track control link in relation to the body is transferred to the front left vehicle level sender - G78- and the front right vehicle level sender - G289- via a coupling rod. The senders then transmit electrical signals to the gas discharge light control unit (left/right) - J343/344- .

Servicing left/right gas discharge bulb control unit - J343/344- ⇒ Rep. gr. 94

On the rear axle these signals are supplied by the vehicle level sender (rear, left) - G76- and vehicle level sender (rear, right) - G77- to the gas discharge light control units (left/right) - J343/344- .

These signals are required for calculating the current attitude of the vehicle.

The automatic headlight range control reacts to changes in the suspension height (attitude of the vehicle).

The following situations may produce a change in the suspension height:

- Towing a trailer/caravan
- Different loads (vehicle unladen, partly laden or fully laden)

WARNING

Headlight adjustment, adaption of self-levelling suspension and calibration of lane departure warning system

The reference position must always be adapted, the headlight basic setting checked and the lane departure warning system calibrated if:

- Track control link has been removed and installed or renewed,
- Work has been performed on the vehicle level sender,
- Vehicle level sender has been renewed,
- Coupling rod for vehicle level sender has been detached from track control link.

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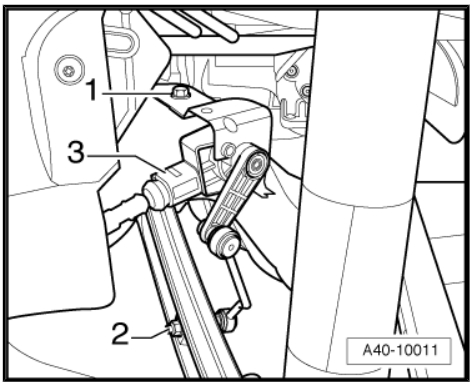
Re-adapting reference position ⇒ page 229

Basic setting of headlights ⇒ Rep. gr. 94

Calibration of lane departure warning system ⇒ page 312

Removing

– Unplug connector -3-.
– Remove hexagon nut -2-.
– Remove hexagon bolt -1-.
– Take out vehicle level sender.



Installing

Installation is carried out in the reverse sequence. Note the following points:

Locating hook on sender bracket must engage on subframe.

Lever of sender must face forwards.

Tightening torques ⇒ page 66

– Re-adapt reference position ⇒ page 229 .
– Perform basic setting of headlights ⇒ Rep. gr. 94 .
– Perform calibration of lane departure warning system ⇒ page 312 .

2.3 Removing and installing rear vehicle level senders

General notes:

Vehicles with adaptive suspension and/or gas discharge lamps have automatic headlight range control fitted as standard equipment ⇒ Rep. gr. 94 .

The adaptive suspension and the automatic headlight range control functions require information on the compression and rebound travel at the front and rear suspension.

For this purpose, the position of the left/right trapezium link in relation to the body is transferred to the rear left vehicle level sender - G76- and the rear right vehicle level sender - G77- via a coupling rod. The senders then transmit electrical signals to the gas discharge light control unit (left/right) - J343/344- .

Servicing left/right gas discharge bulb control unit - J343/344- ⇒ Rep. gr. 94

On the front axle these signals are sent by the front left vehicle level sender - G78- and front right vehicle level sender - G289- to the gas discharge light control units (left/right) - J343/344- .

These signals are required for calculating the current attitude of the vehicle.

The automatic headlight range control reacts to changes in the suspension height (attitude of the vehicle).

The following situations may produce a change in the suspension height:

- Towing a trailer/caravan
- Different loads (vehicle unladen, partly laden or fully laden)

WARNING

Headlight adjustment, adaption of self-levelling suspension and calibration of lane departure warning system

The reference position must always be adapted, the headlight basic setting checked and the lane departure warning system calibrated if:

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- the trapezium link has been removed and installed or renewed,
- Work has been performed on the vehicle level sender,
- Vehicle level sender has been renewed,
- Coupling rod for vehicle level sender has been detached from trapezium link.

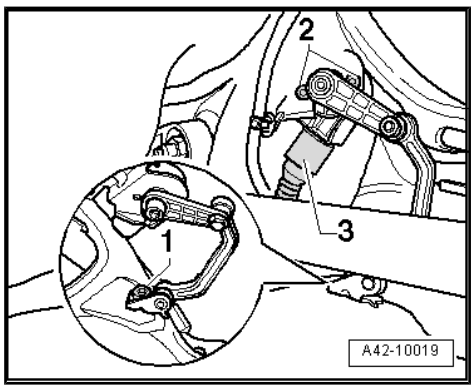
Re-adapting reference position ⇒ page 229

Basic setting of headlights ⇒ Rep. gr. 94

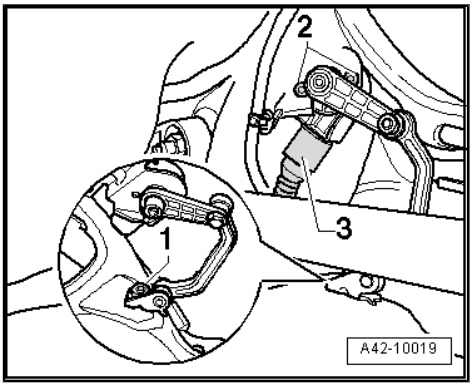
Calibration of lane departure warning system ⇒ page 312

Renewing vehicle level sender with subframe in vehicle

– Remove wheel.
– Unplug connector -3-.
– Remove bolt -1-.
– Unscrew bolts -2- with angled spanner. Take care not to bend upper retaining plate.
– Take out vehicle level sender.
– Prepare replacement part accordingly and install.



– Screw in bolts -2- with angled spanner. Take care not to bend upper retaining plate.



Note

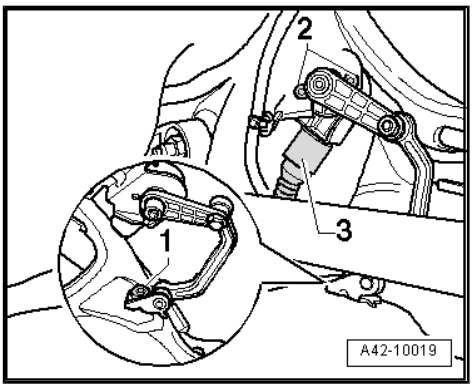
Hold vehicle level sender while tightening bolts -2-.

Lever of sender must face outwards.

– Screw in bolt -1-.
– Attach connector -3-.

Tightening torques ⇒ page 155

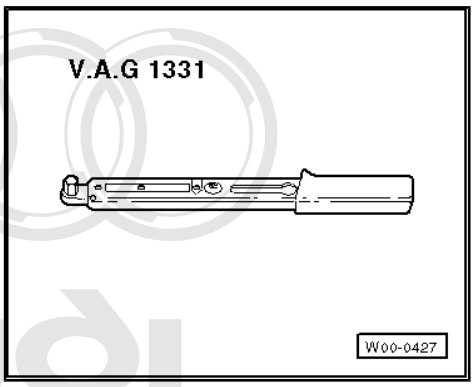
– Re-adapt reference position ⇒ page 229 .
– Perform basic setting of headlights ⇒ Rep. gr. 94 .
– Perform calibration of lane departure warning system ⇒ page 312 .



2.4 Removing and installing front body acceleration senders - G341- and -G342-

Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1331-



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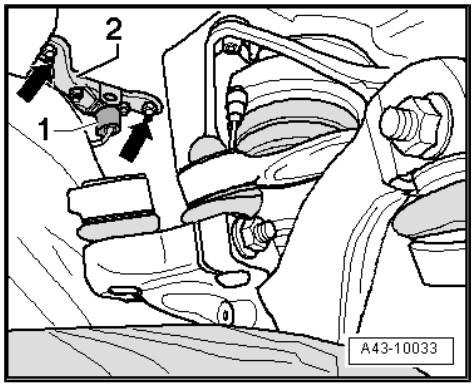
Removing

Note

The front body acceleration senders are located at the top of the left and right wheel housings.

– Remove wheel.

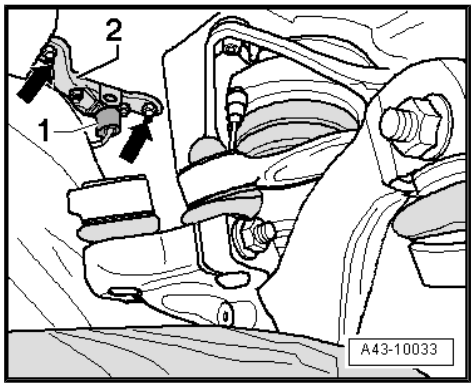
– Unplug connector -1-.
– Unscrew nuts -arrows- and take out body acceleration sender -2-.



Installing

Installation is carried out in the reverse sequence. Note the following points:

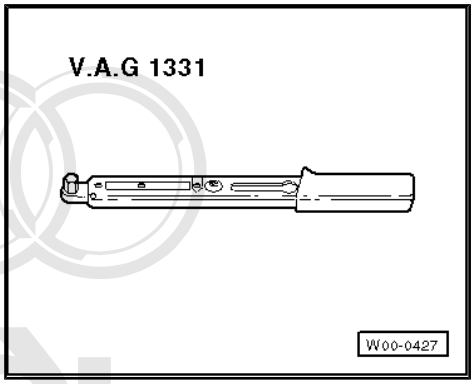
– Fit nuts -arrows- for body acceleration sender and tighten to 6 Nm.
– Attach connector -1-.
– Fit and secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .
– Set down vehicle on its wheels ⇒ page 11 .
– Check body acceleration signal ⇒ page 229 .



2.5 Removing and installing rear body acceleration sender - G343-

Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1331-



Removing

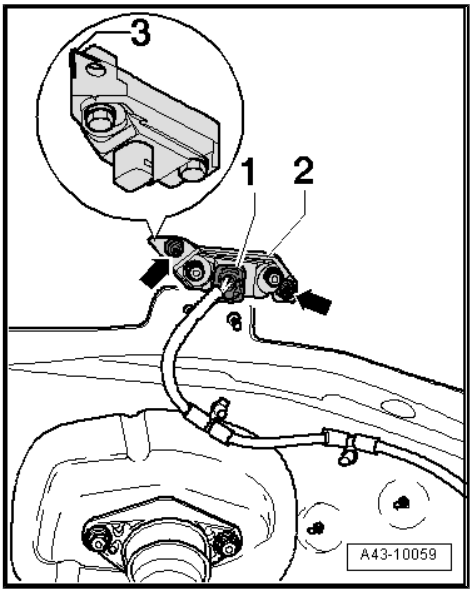
Note

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Rear body acceleration sender - G343- is installed behind left wheel housing trim near top shock absorber attachment point

– Position vehicle on lifting platform ⇒ page 11 .
– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).
– Remove wheel.
– Remove wheel housing liner (rear left) ⇒ Rep. gr. 66 .

– Unplug connector -1-.



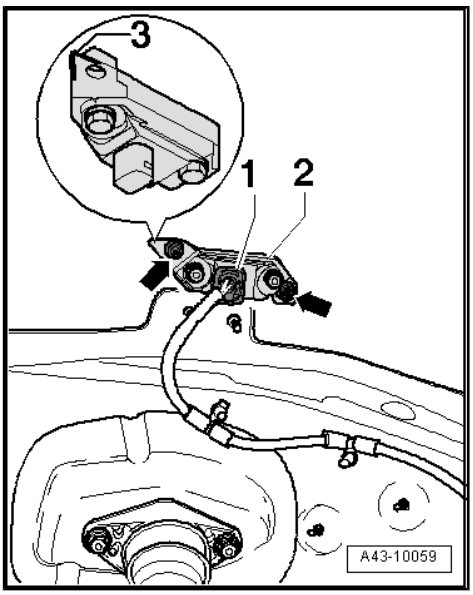
Note

Note correct installation position of rear body acceleration sender .

– Unscrew nuts -arrows- and take out rear body acceleration sender - G343- -2-.

Installing

Installation is carried out in the reverse sequence. Note the following points:



Note

The tip of the arrow -3- on the rear body acceleration sender must face in the direction of travel.

– Fit nuts -arrows- for body acceleration sender and tighten to 6 Nm.
– Attach connector -1-.
– Install wheel housing liner (rear left) ⇒ Rep. gr. 66 .
– Fit and secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .
– Set down vehicle on its wheels ⇒ page 11 .
– Check body acceleration signal ⇒ page 229 .

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2.6 Removing and installing adaptive suspension control unit - J197-

Removing

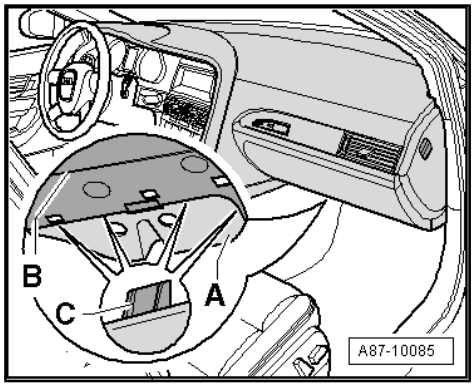
– When renewing control unit, select “Replace” function for relevant control unit in “Guided Fault Finding” routine.

Use vehicle diagnostic, testing and information system - VAS 5051 A- .

Note

Adaptive suspension control unit - J197- is installed on plenum chamber partition panel behind glove box.

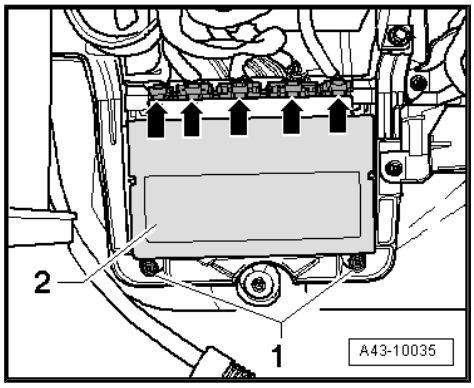
– Remove cover panel -A- from cover below glove box -B-.



Note

Cover panel -A- is held by 4 retainers in cover below glove box -B-. These may be difficult to release and care is therefore required to avoid damaging cover below glove box -B- during removal.

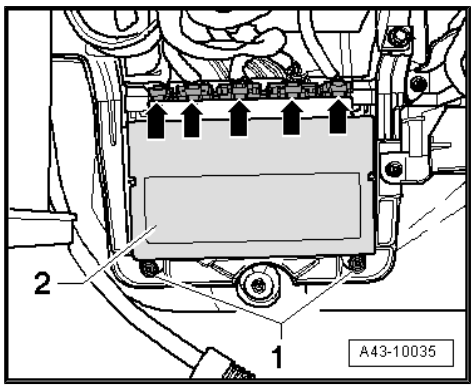
– Remove bolts -1-.
– Pull out control unit -2- downwards.
– Release and detach electrical connectors -arrows- on control unit.
– Take out control unit -2-.



Installing

Installation is carried out in the reverse sequence. Note the following points:

– Attach electrical connectors -arrows-.
– Fit bolts -1- and tighten to 2 Nm.
– Re-adapt adaptive suspension control unit -J197- ⇒ page 228 .



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2.7 Re-adapting adaptive suspension control unit

– Connect -VAS 5051 A- , start Guided Fault Finding sequence for the vehicle in question and use Go to button to select “Function /Component Selection” ⇒ page 217 .

Then

– “Running gear (Rep. Gr. 01; 40 - 49)”
– “34 - Adaptive suspension (Rep. Gr. 01; 43; 44)”
– “01 - Self-diagnosis compatible systems”
– “J197 - Functions, adaptive suspension control unit”
– “J197 - Replace control unit”

2.8 Checking body acceleration signals from front/rear body acceleration senders

– Connect -VAS 5051 A- , start Guided Fault Finding sequence for the vehicle in question and use Go to button to select “Function /Component Selection” ⇒ page 217 .

Then

– “Running gear (Rep. Gr. 01; 40 - 49)”
– “34 - Adaptive suspension (Rep. Gr. 01; 43; 44)”
– “01 - Self-diagnosis compatible systems”
– “J197 - Functions, adaptive suspension control unit”
– “G341 - Front left body acceleration sender”

or

– “G342 - Front right body acceleration sender”

or

– “G343 - Rear body acceleration sender”

2.9 Bleeding or charging system

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– Connect -VAS 5051 A- , start Guided Fault Finding sequence for the vehicle in question and use Go to button to select “Function /Component Selection” ⇒ page 217 .

Then

– “Running gear (Rep. Gr. 01; 40 - 49)”
– “34 - Adaptive suspension (Rep. Gr. 01; 43; 44)”
– “01 - Self-diagnosis compatible systems”
– “J197 - Functions, adaptive suspension control unit”
– “J197 - Bleeding or charging system”

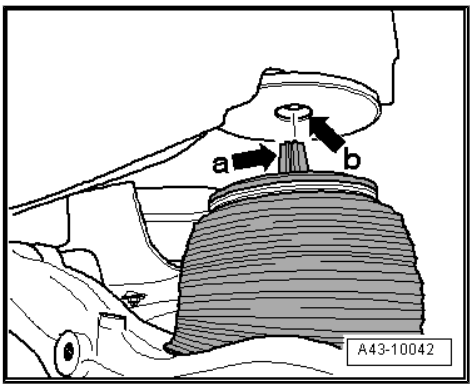
Note

Note the following points when charging the rear suspension.

Charging rear air springs

Caution

When charging suspension, make sure centralising pin -arrow a- locates in hole in longitudinal member -arrow b-.



2.10 Re-adapting reference position (default position)

– Connect -VAS 5051 A- , start Guided Fault Finding sequence for the vehicle in question and use Go to button to select “Function /Component Selection” ⇒ page 217 .

Then

– “Running gear (Rep. Gr. 01; 40 - 49)”

– “34 - Adaptive suspension (Rep. Gr. 01; 43; 44)”
– “01 - Self-diagnosis compatible systems”
– “J197 - Functions, adaptive suspension control unit”
– “J197 - Re-adapting reference position” (default position)

Note

On vehicles with lane departure warning function, the lane departure warning control unit - J759- with integral camera must be re-calibrated if the reference position has been re-adapted *⇒ page 312* .

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3 Self-levelling suspension (adaptive air suspension)

⇒ “3.1 Overview of air pipes”, page 231 .

⇒ “3.2 Servicing air pipe”, page 233 .

⇒ “3.3 Renewing connection piece”, page 234 .

⇒ “3.4 Air supply unit and solenoid valve block - exploded view”, page 236 .

⇒ “3.5 Removing and installing air supply unit”, page 238 .

⇒ “3.6 Removing and installing adaptive suspension drain valve N111 ”, page 240

⇒ “3.7 Removing and installing compressor temperature sender for adaptive suspension system G290 ”, page 243

⇒ “3.8 Removing and installing solenoid valve block”, page 245 .

⇒ “3.9 Removing and installing accumulator”, page 247 .

3.1 Overview of air pipes

1 - Air intake with filter

2 - Suspension strut (air suspension), front right

3 - Connectors for air pipes

- Fitting location: in interior of vehicle behind A-pillar trim on passenger's side ⇒ page 233

4 - Air pipe “blue”

- From solenoid valve block to air spring (rear right)
- Servicing air pipe ⇒ page 233
- Renewing connection piece ⇒ page 234

5 - Air spring (rear right)

6 - Connectors for air pipes

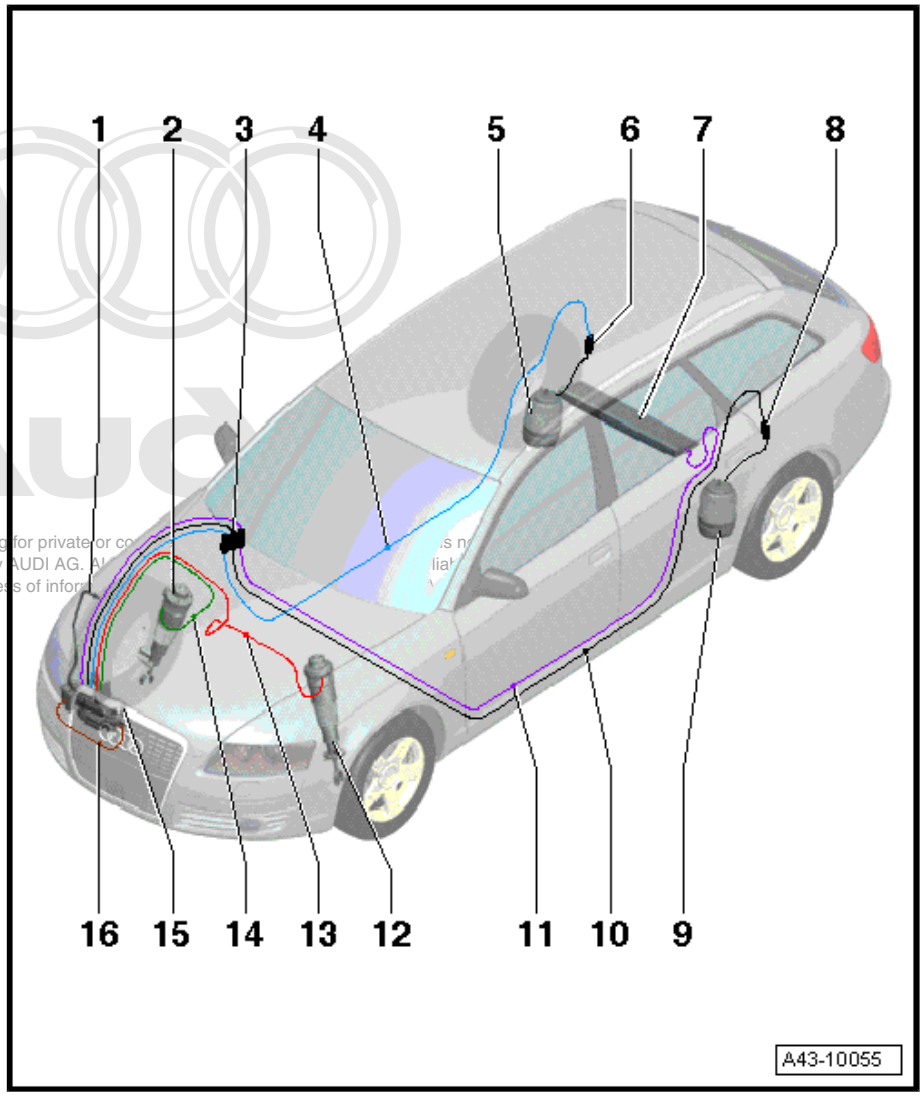
- Fitting location: behind wheel housing liner (rear right)

7 - Accumulator

- The accumulator is located in the luggage compartment below the anti-soiling tray under the floor mat

8 - Connectors for air pipes

- Fitting location: behind wheel housing liner (rear left)



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9 - Air spring (rear left)

10 - Air pipe “black”

- ❑ From solenoid valve block to air spring (rear left)
- ❑ Servicing air pipe ⇒ page 233
- ❑ Renewing connection piece ⇒ page 234

11 - Air pipe “purple”

- ❑ From solenoid valve block to accumulator
- ❑ Servicing air pipe ⇒ page 233
- ❑ Renewing connection piece ⇒ page 234

12 - Suspension strut (air suspension), front left

13 - Air pipe “red”

- ❑ From solenoid valve block to suspension strut (air suspension), front left
- ❑ Servicing air pipe ⇒ page 233
- ❑ Renewing connection piece ⇒ page 234
- ❑ Fitting location: the air pipe is routed parallel to the brake line in the engine compartment under the plenum chamber cover

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14 - Air pipe “green”

- ❑ From solenoid valve block to suspension strut (air suspension), front right
- ❑ Servicing air pipe ⇒ page 233
- ❑ Renewing connection piece ⇒ page 234

15 - Air supply unit with solenoid valve block

- ❑ Identification of pipes on solenoid valve block ⇒ page 232
- ❑ If air supply unit is renewed, adaptive suspension compressor relay - J403- must also be renewed. Fitting location ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

16 - Air pipe “brown”

- ❑ From air supply unit to solenoid valve block
- ❑ Servicing air pipe ⇒ page 233
- ❑ Renewing connection piece ⇒ page 234

Identification of pipes on solenoid valve block

The air pipes are colour-coded:

1 - Air pipe “brown”: from air supply unit

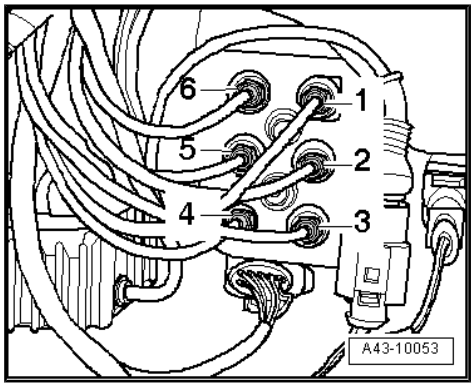
2 - Air pipe “red”: to suspension strut (air suspension), front left

3 - Air pipe “purple”: to accumulator

4 - Air pipe “blue”: to air spring strut (rear right)

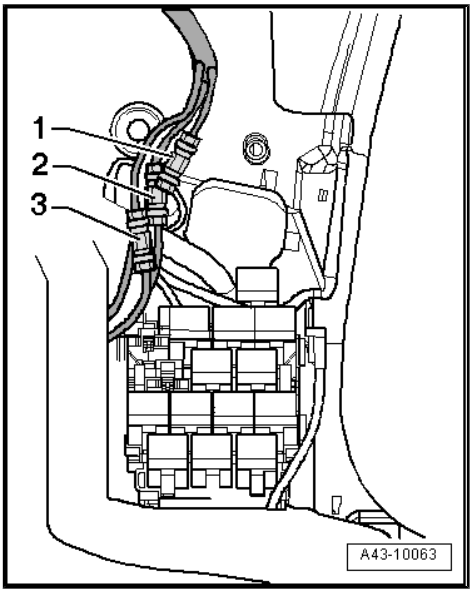
5 - Air pipe “black ”: to air spring strut (rear left)

6 - Air pipe “green”: to suspension strut (air suspension), front right



Fitting location of air pipe connectors

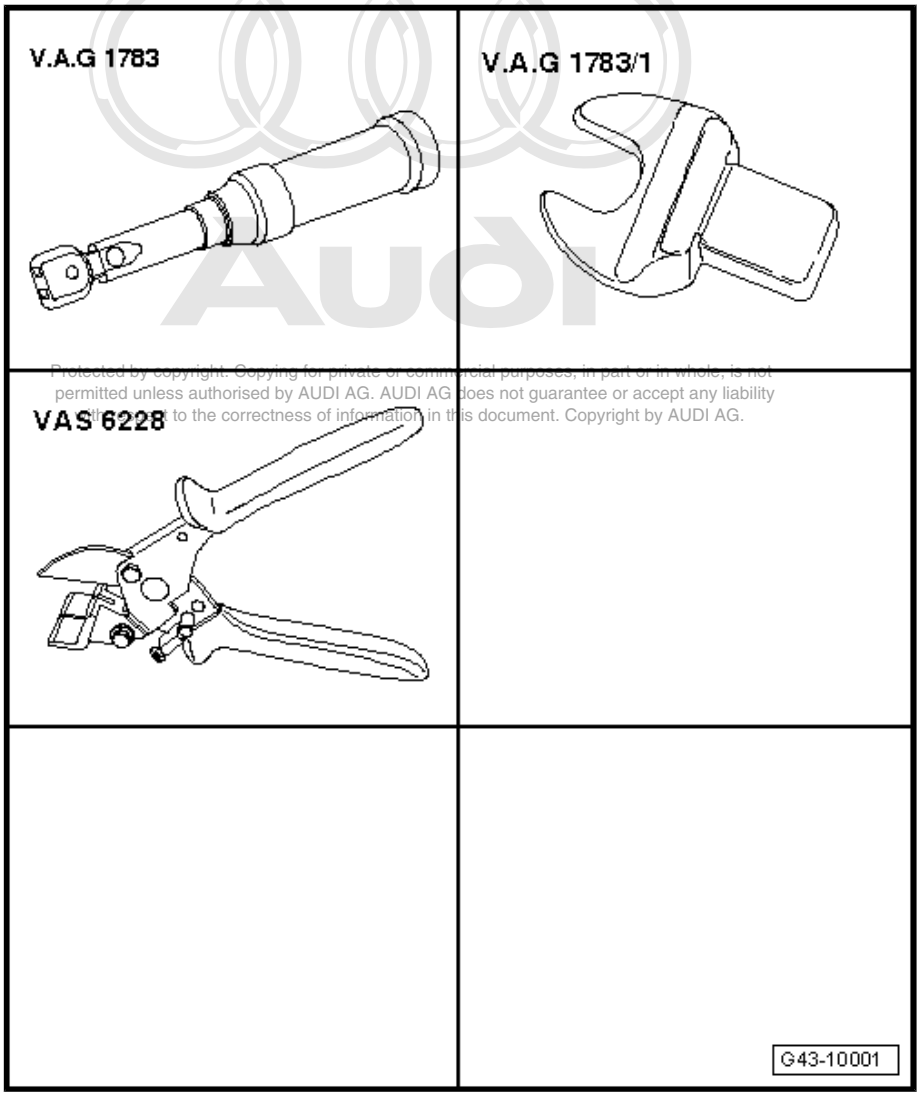
Connectors -1-, -2- and -3- for air pipes leading to rear suspension are located in interior of vehicle behind A-pillar trim on passenger's side.



3.2 Servicing air pipe

Special tools and workshop equipment required

- Torque wrench - V.A.G 1783-
- Open end spanner insert (10 mm) - V.A.G 1783/1-
- Cutting pliers - VAS 6228-



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If the air pipe is damaged, the damaged section can be renewed.

In the event of leakage at the connection, the air pipe can be shortened by 10 mm and a new connection piece fitted ⇒ page 234 .

Note

- *The air pipes between the air supply unit and the solenoid valve block and between the front right suspension strut (air suspension) and the solenoid valve block are replaced completely with a new pipe (same as original equipment).*
- *The air pipe between the solenoid valve block and the front left suspension strut (air suspension) can be replaced in the left and right wheel housings using parts from the repair kit.*
- *Damaged air pipes in the vehicle interior are replaced completely with new pipes (same as original equipment). Route new air pipe along existing pipe/electrical harness. Secure new air pipes at the positions marked. Renew cable ties where necessary.*
- *Clean the area around the cutting point before cutting the air pipe.*
- *Any dirt entering the connections can cause malfunctions or failure of the system.*

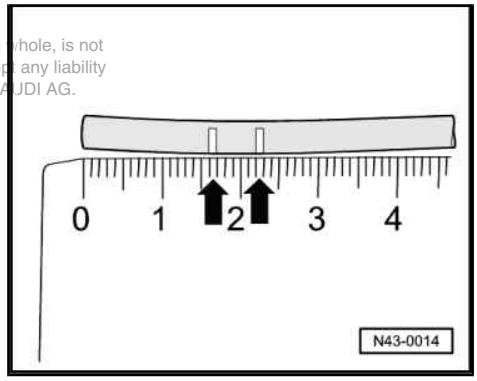
– Clean sections in vicinity of connection piece and relevant cutting location.

– Unscrew connection piece and remove air pipe.

– Then use waterproof pen to mark end of air pipe in vehicle and both ends of new air pipe.

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Use 17 mm/22 mm marks to check whether air pipe has been properly inserted in connection piece.



– Fit sponge rubber insulation to both pipes.

– Fit new pipe connector.

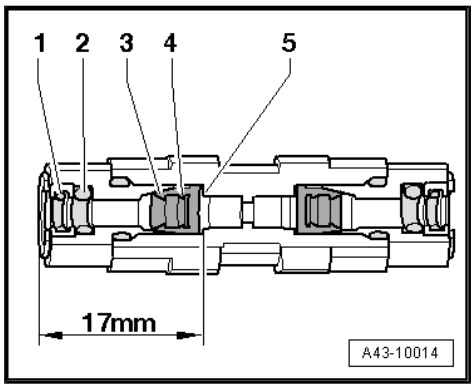
Note

The connection pieces in the pipe connector are already tightened to torque. The air pipes only need to be pushed in.

– Remove transport protection cap.

– Push old air pipe through seals -1- and -2-.

– Then push air pipe through sealing edges -3- and -4- of cutting ring in pipe connector as far as stop -5-, exerting more force as required.



– Fit sponge rubber insulation over connection pieces.

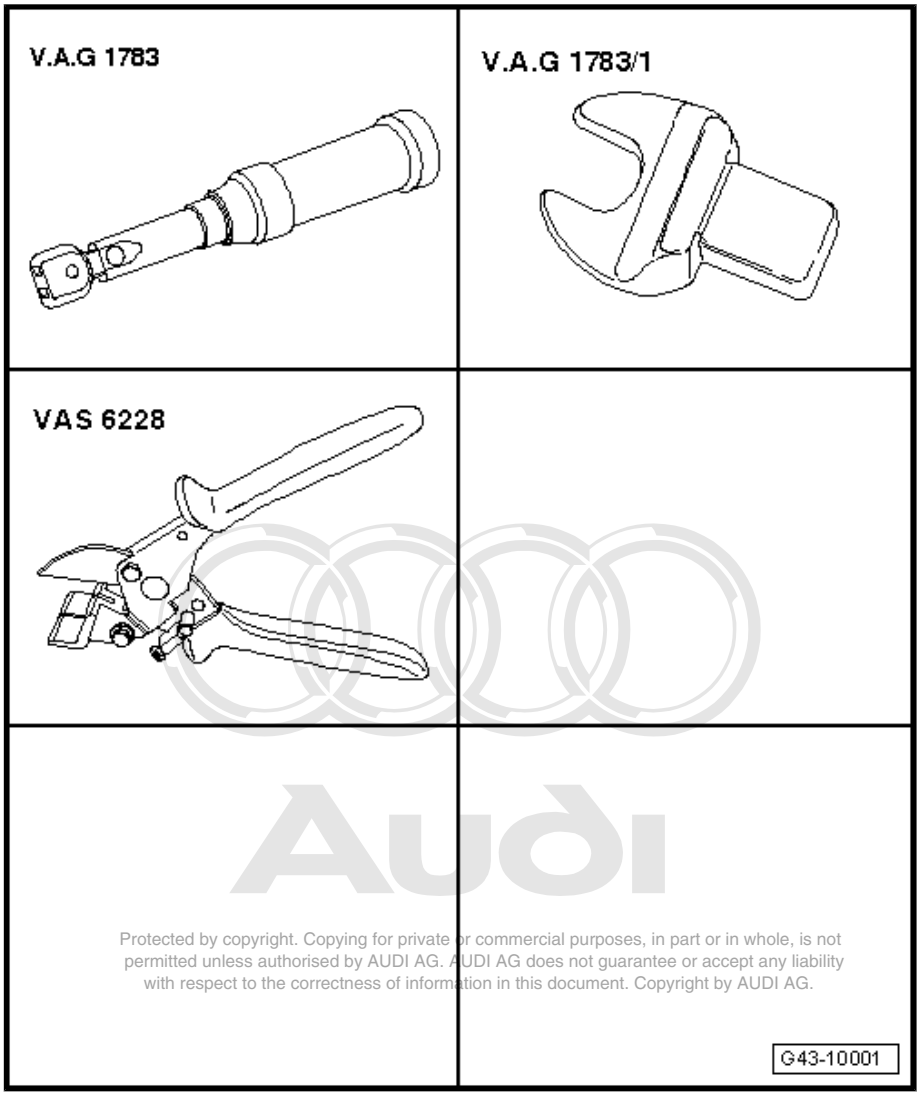
– Repeat this procedure with the new pipe.

– Renew connection piece ⇒ page 234 .

3.3 Renewing connection piece

Special tools and workshop equipment required

- Torque wrench - V.A.G 1783-
- Open end spanner insert (10 mm) - V.A.G 1783/1-
- Cutting pliers - VAS 6228-



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In the event of leakage at the connection, the air pipe can be shortened by 10 mm (if sufficient length is available) and a new connection piece fitted.

Note

- *Clean the area around the cutting point before cutting the air pipe.*
- *Any dirt entering the connections can cause malfunctions or failure of the system.*

– Clean area around connection piece.

– Unscrew connection piece and detach air pipe.

– Detach cutting ring from air pipe.

– Use cutting tool - VAS 6228- to cut through the air pipe at a right angle behind the impression made by the cutting ring.

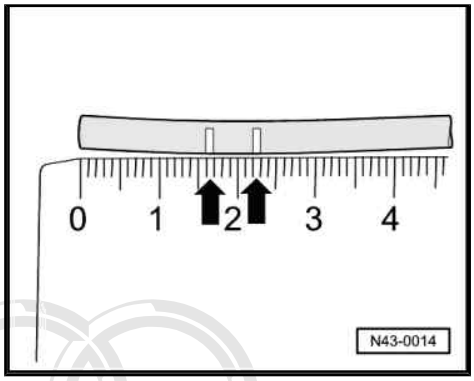
– Then use waterproof pen to mark end of air pipe in vehicle.

Use 17 mm/22 mm marks to check whether air pipe has been properly inserted in connection piece.

– Always renew connection piece.

Important: Always keep to specified tightening torque.

– Screw in and tighten new connection piece by hand ⇒ page 238 .



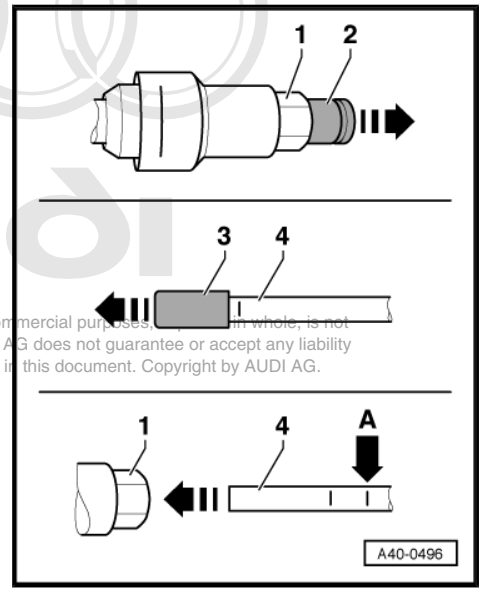
Only remove transport protection caps -2- and -3- immediately prior to attachment of air pipe -4-.

– Install and secure air pipe in vehicle with appropriate clips and/or grommets. Renew cable ties that have been cut open as required.

– Detach transportation caps -2- and -3-.

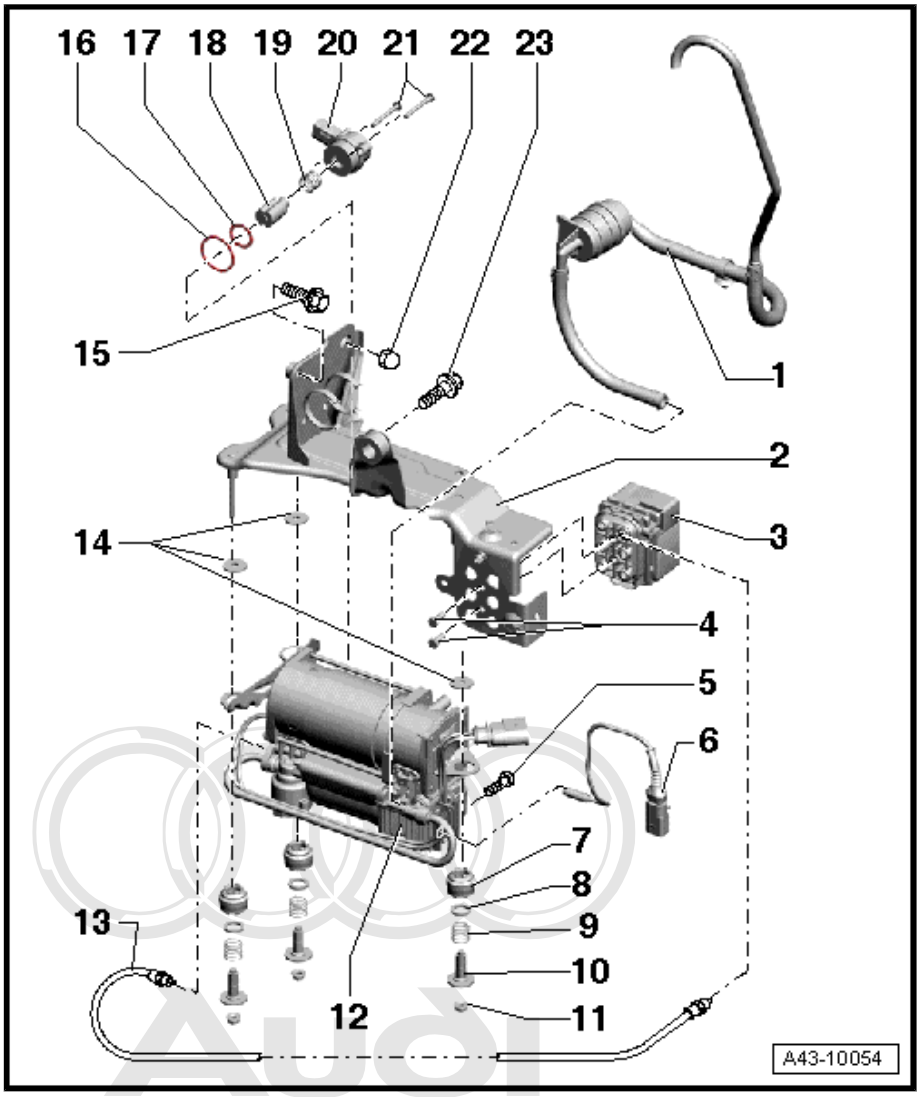
– Exerting moderate pressure, push air pipe -4- all the way into connection piece -1-.

Air pipes have been properly fitted if only one of the two marks is visible -arrow A-.



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3.4 Air supply unit and solenoid valve block - exploded view



1 - Air intake with filter

2 - Bracket for compressor unit and solenoid valve block

3 - Solenoid valve block

- ❑ Removing and installing ⇒ page 245

4 - Bolt

- ❑ 10 Nm

5 - Bolt

- ❑ 7 Nm

6 - Compressor temperature sender for adaptive suspension system

- ❑ Removing and installing ⇒ page 243

7 - Rubber bush

8 - Spring seat

9 - Spring

10 - Sleeve

11 - Self-locking nut

- ❑ 6 Nm
- ❑ Always renew if removed

12 - Air supply unit

- ❑ Removing and installing ⇒ page 238
- ❑ If air supply unit is renewed, adaptive suspension compressor relay - J403- must also be renewed. Fitting location ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

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13 - Air pipe

- ❑ Between solenoid valve block and air supply unit
- ❑ Renew air pipe in the event of leakage ⇒ page 233

14 - Washer

15 - Bolt

- ❑ 20 Nm

16 - O-ring

17 - O-ring

18 - Armature

- ❑ Note correct position when installing: chamfered end faces spring ⇒ page 242

19 - Spring

20 - Adaptive suspension drain valve

- ❑ Removing and installing ⇒ page 240

21 - Bolt

- ❑ 3 Nm

22 - Cap nut

- ❑ 20 Nm

23 - Bolt

- ❑ 20 Nm

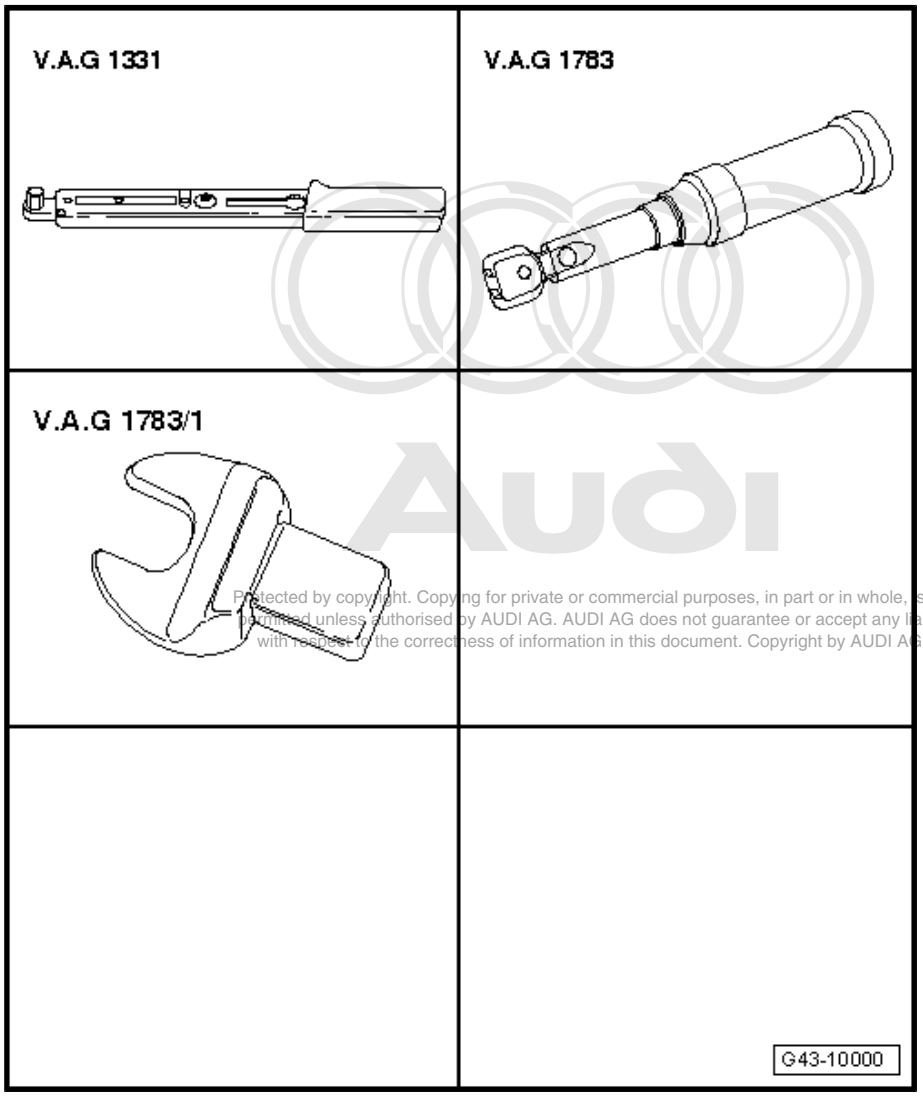
Tightening torques

Component	
Connection piece in solenoid valve block	2 Nm
Connection piece in air supply unit	2 Nm
Connection piece in rear air spring	2 Nm
Connection piece in residual pressure valve (front suspension struts for air suspension)	3 Nm
Connection piece in accumulator	5 Nm
Connection piece in plastic pipe connector	3 Nm
Connection piece in brass pipe connector	5 Nm

3.5 Removing and installing air supply unit

Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-
- Torque wrench - V.A.G 1783-
- Open end spanner insert (10 mm) - V.A.G 1783/1-



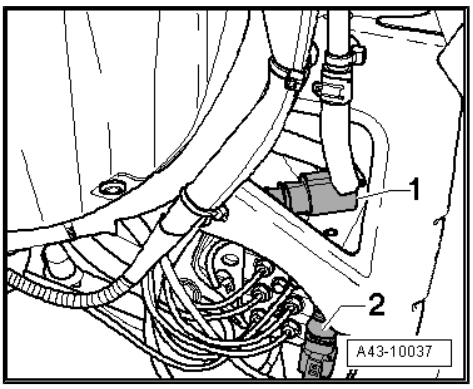
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Removing

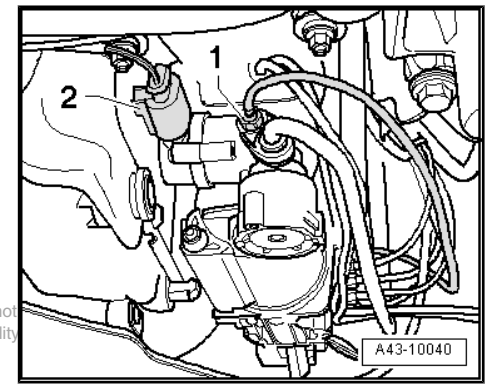
Note

The air supply unit is fitted behind the wheel housing liner (front right).

- Position vehicle on lifting platform ⇒ page 11 .
- Bleed system using -VAS 5051 A- ⇒ page 229 .
- Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).
- Remove wheel.
- Remove noise insulation ⇒ Rep. gr. 50 .
- Remove wheel housing liner (front right) ⇒ Rep. gr. 66 .
- Unclip and unplug connectors -1- and -2-.

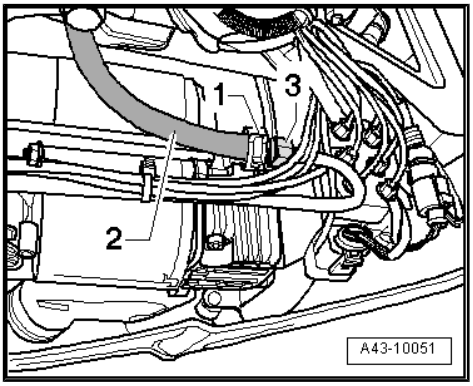


- Slowly loosen air pipe -1- at air supply unit and allow air pressure to dissipate. Unscrew air pipes when air pressure has been dissipated.
- Unplug connectors -2-.



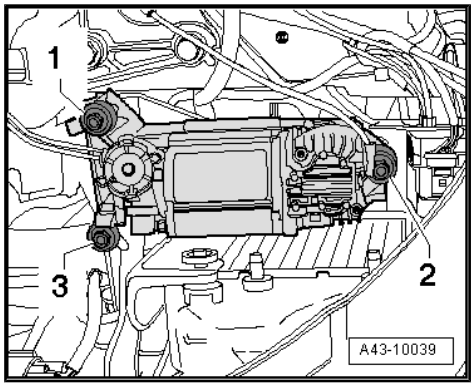
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- Unfasten clip -1- and detach intake hose -2- from connecting piece -3-.
- Release cable ties.



Removing air supply unit without bracket

– Unscrew nuts -1-, -2- and -3- and take out air supply unit.

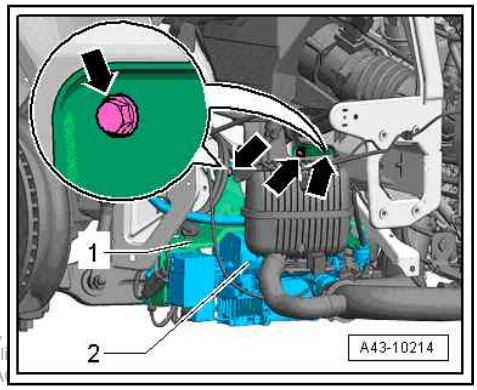


Note

Note correct locations when removing mounting sleeves.

Removing air supply unit with bracket

– Remove front bumper ⇒ Rep. gr. 63 .
– If fitted, remove charge air pipe ⇒ Rep. gr. 21 .
– Remove bolts -arrows- and detach bracket -1- with air supply unit and solenoid valve block -2- downwards.

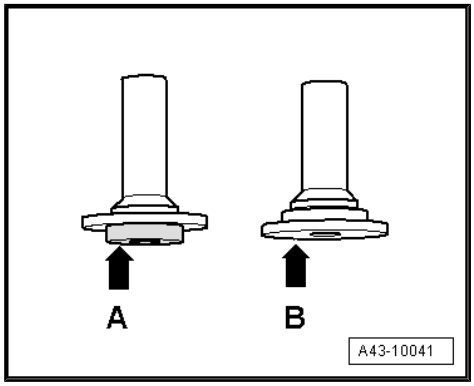


Installing

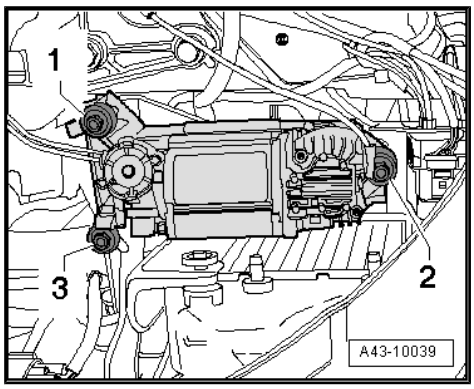
Installation is carried out in the reverse sequence. Note the following points:

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Identification of mounting sleeves



– Sleeve -B- without collar -arrow- is installed towards outside of vehicle -2-.



Tightening torques ⇒ page 236

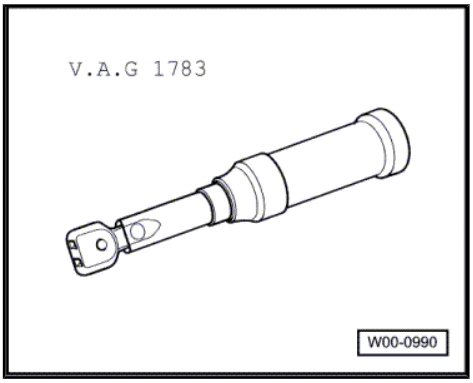
– Install wheel housing liner (front right) ⇒ Rep. gr. 66 .
– Install front noise insulation ⇒ Rep. gr. 50 .
– Fit wheel.
– Stand vehicle on its wheels ⇒ page 11 .
– Secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .

If air supply unit has been renewed, adaptive suspension compressor relay - J403- must also be renewed. Fitting location ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

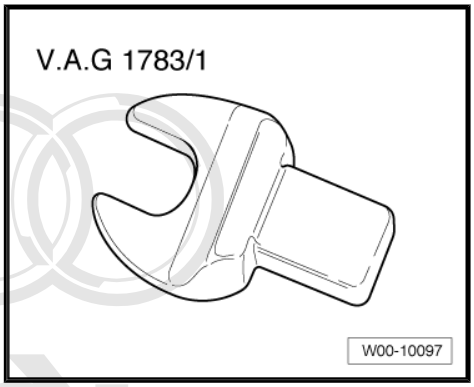
3.6 Removing and installing adaptive suspension drain valve - N111-

Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1783-



♦ Open end spanner insert (10 mm) - V.A.G 1783/1-



Removing

Note

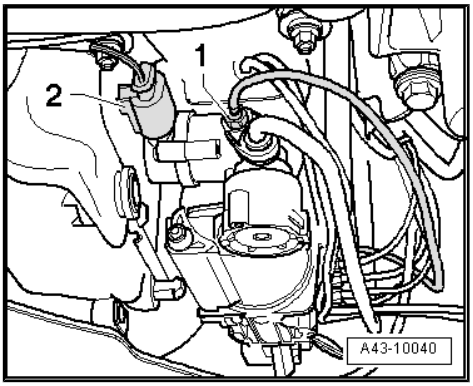
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The adaptive suspension drain valve - N111- is fitted on the air supply unit behind the wheel housing liner (front right).

– Position vehicle on lifting platform ⇒ page 11 .

– Remove noise insulation ⇒ Rep. gr. 50 .

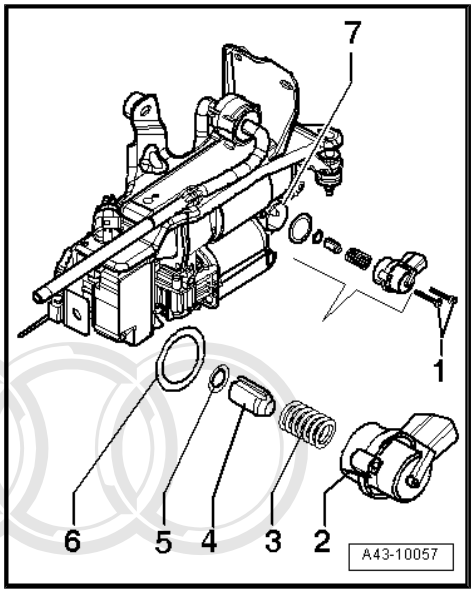
– Slowly loosen air pipe -1- at air supply unit and allow air pressure to dissipate. Unscrew air pipes when air pressure has been dissipated.



Note

Air supply unit is removed in illustration.

– Unplug connector at adaptive suspension drain valve and unscrew bolted joints -1-.



Note

Make sure armature -4- is installed in correct position.

– Take out adaptive suspension drain valve -2- together with spring -3- and armature-4-.
– Remove O-rings -5- and -6-.

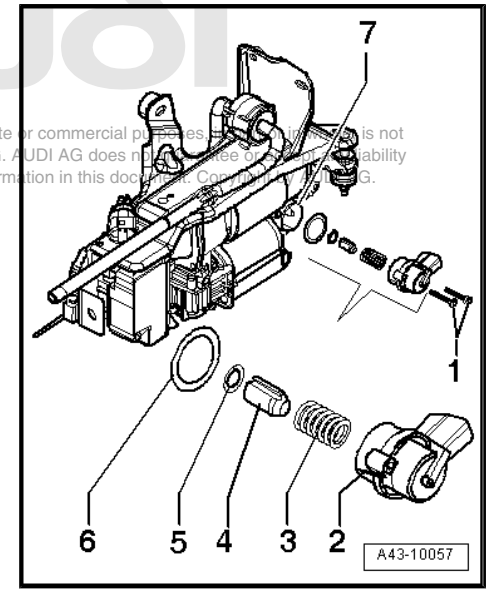
Note

The "old" O-ring -5- may have remained in the housing -7-.

Installing

Always renew O-rings.

– Lubricate O-rings -5- and -6- with grease provided.



Note

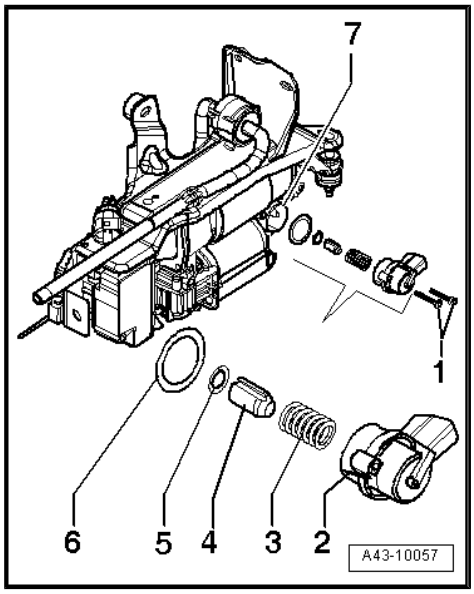
Make sure armature -4- is installed in correct position. Chamfered end faces spring

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– Fit spring -3- and armature -4- in adaptive suspension drain valve -2-.
– Slide adaptive suspension drain valve -2- together with spring and armature into housing -7-.

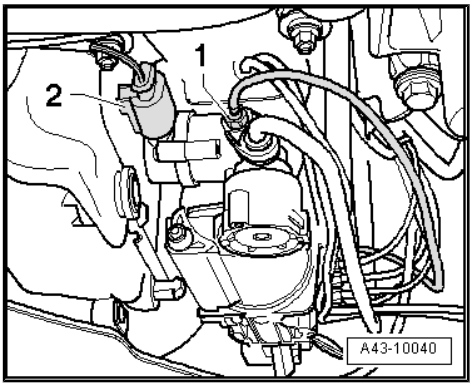
Note

Coil must be kept straight during assembly.



– Screw in and tighten bolts -1- ⇒ page 236 .
– Attach electrical connector to adaptive suspension drain valve -2-.

– Connect air pipe -1- at air supply unit.
– Fit noise insulation ⇒ Rep. gr. 50 .
– Stand vehicle on its wheels ⇒ page 11 .



3.7 Removing and installing compressor temperature sender for adaptive suspension system - G290-

Removing

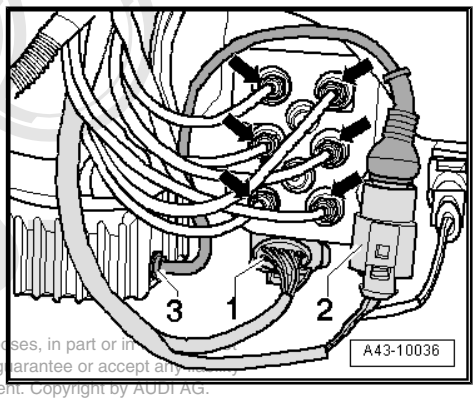
Note

The compressor temperature sender for adaptive suspension system - G290- is fitted on the air supply unit behind the wheel housing liner (front right).

– Position vehicle on lifting platform ⇒ page 11 .
– Remove noise insulation ⇒ Rep. gr. 50 .
– Remove wheel.
– Remove wheel housing liner (front right) ⇒ Rep. gr. 66 .
– Unclip and unplug connectors -2-.

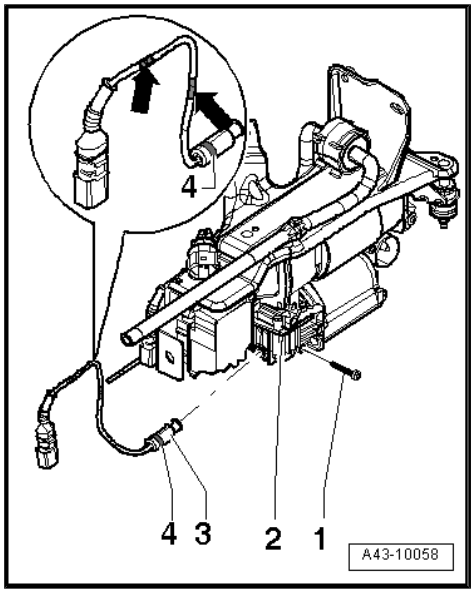
Note

Air supply unit is removed in illustration.



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– Remove bolt -1- and pull out compressor temperature sender for adaptive suspension system -3-.

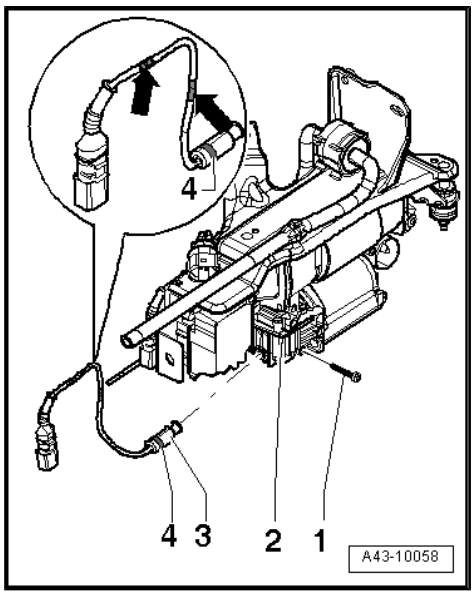


Installing

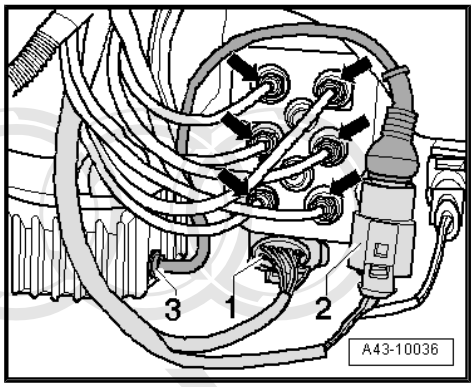
– Lubricate O-rings -4- with grease provided.

– Slide in compressor temperature sender for adaptive suspension system -3- as far as stop in housing -2-.

– Screw in and tighten bolt -1- to specified torque ⇒ page 236 .



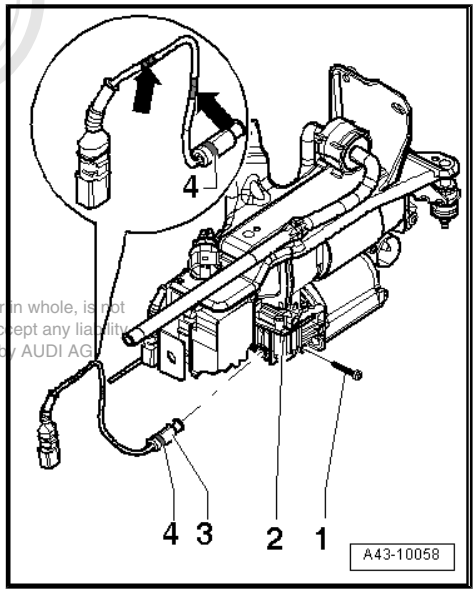
– Plug in connector -2- and clip on electrical wiring.



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Note

The electrical wiring should only be secured at the points marked -arrows-.



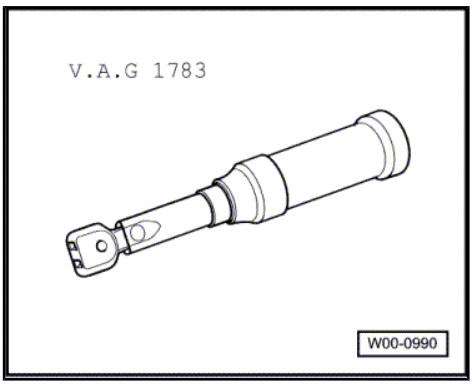
- Fit noise insulation ⇒ Rep. gr. 50 .
- Install wheel housing liner (front right) ⇒ Rep. gr. 66 .
- Fit wheel.
- Stand vehicle on its wheels ⇒ page 11 .
- Secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .

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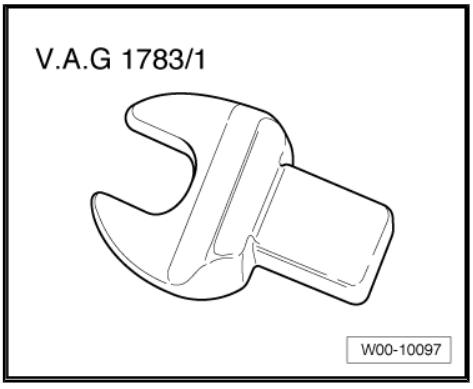
3.8 Removing and installing solenoid valve block

Special tools and workshop equipment required

- Torque wrench - V.A.G 1783-



- Open end spanner insert (10 mm) - V.A.G 1783/1-



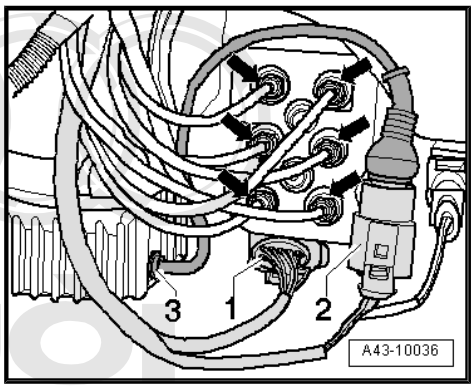
Removing

Note

The solenoid valve block is installed on the right side behind the front bumper.

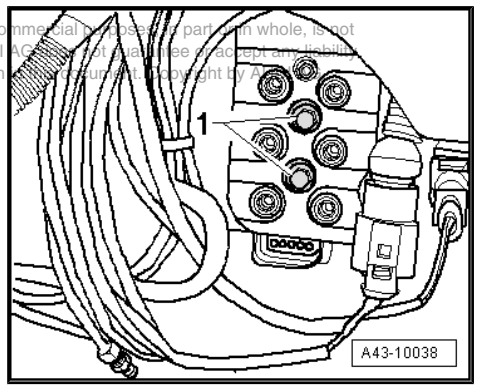
- Position vehicle on lifting platform ⇒ page 11 .

– Bleed system using -VAS 5051 A- ⇒ page 229 .
– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).
– Remove wheel.
– Remove noise insulation ⇒ Rep. gr. 50 .
– Remove wheel housing liner (front right) ⇒ Rep. gr. 66 .
– Unplug connector -1-.
– Slowly loosen air pipes -arrows- and allow air pressure to dissipate. Unscrew air pipes when air pressure has been dissipated.
– Protect air pipes from dirt.



– Unscrew bolts -1- and take out solenoid valve block.

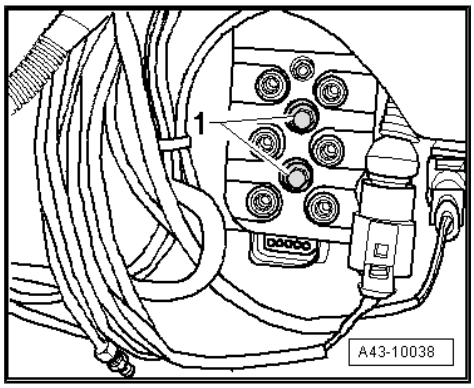
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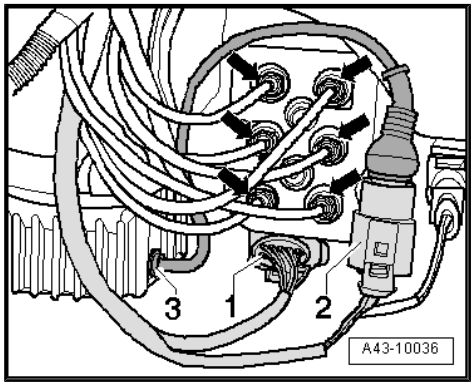
Installing

Installation is carried out in the reverse sequence. Note the following points:

– Fit solenoid valve block.
– Install and tighten bolts -1- ⇒ page 236 .
– Unscrew air pipe connections on new solenoid valve block.



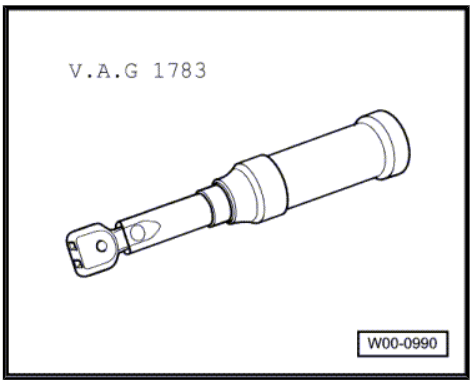
– Attach air pipes -arrows- to solenoid valve block and secure ⇒ page 238 .
– Attach connector -1-.
– Fit wheel housing liner ⇒ Rep. gr. 66 .
– Fit noise insulation ⇒ Rep. gr. 50 .
– Fit wheel.
– Stand vehicle on its wheels ⇒ page 11 .
– Secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .



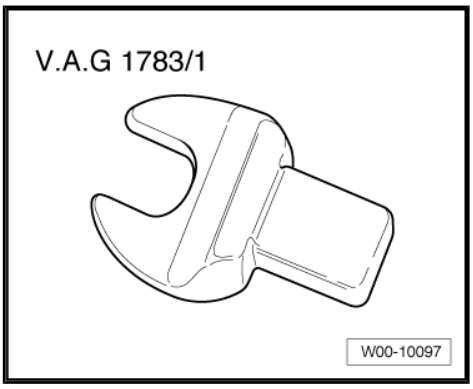
3.9 Removing and installing accumulator

Special tools and workshop equipment required

- Torque wrench - V.A.G 1783-



- Open end spanner insert (10 mm) - V.A.G 1783/1-

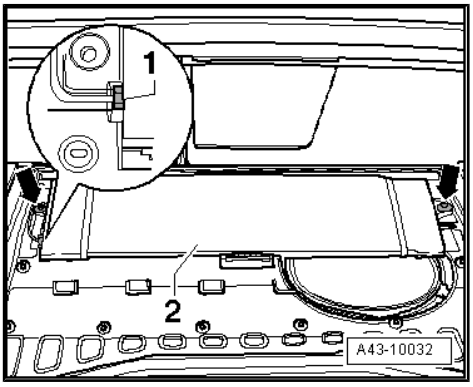


Removing

Note

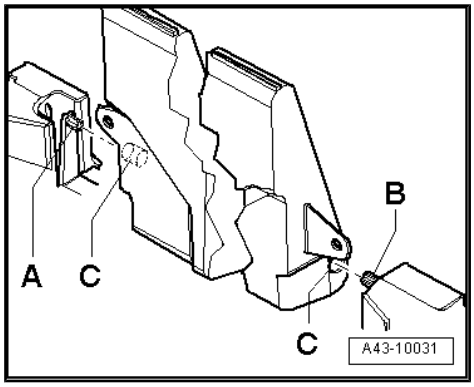
The accumulator is located in the luggage compartment below the anti-soiling tray under the floor mat

– Position vehicle on lifting platform ⇒ page 11 .
– Bleed system using -VAS 5051 A- ⇒ page 229 .
– Remove luggage compartment floor mat ⇒ Rep. gr. 70 .
– Removing and installing anti-soiling tray ⇒ Rep. gr. 70 .
– Slowly loosen air pipe -1- at accumulator -2- to dissipate air pressure. Unscrew air pipe -1- when air pressure has been dissipated.
– Remove bolts -arrows- and pivot accumulator -2- 90° upwards.



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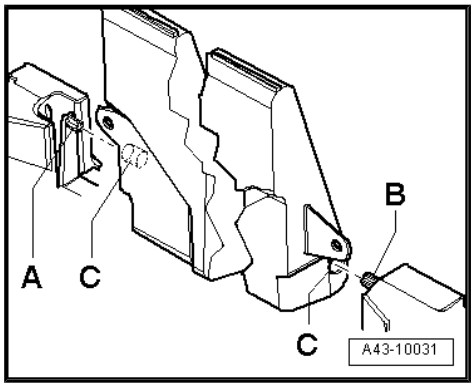
– First guide peg -A- and then peg -B- out of holes -C- and take out accumulator.



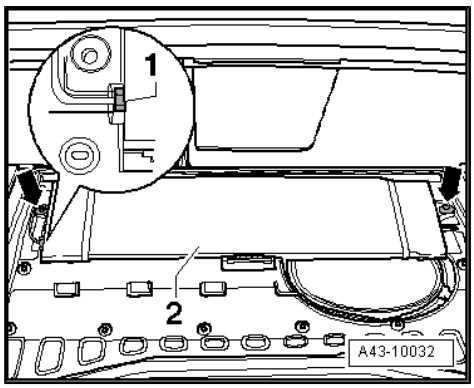
Installing

Installation is carried out in the reverse sequence. Note the following points:

– First fit peg -B- and then peg -A- into holes -C- and pivot accumulator 90° into loading compartment.



– Screw in bolts -arrows- and tighten to 4 Nm.
– Screw air pipe -1- onto accumulator -2- and tighten ⇒ page 238 .
– Stand vehicle on its wheels ⇒ page 11 .



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4 Dynamic Ride Control with variable damping (1 and 3-stage)

⇒ “4.1 General information on DRC”, page 249

⇒ “4.2 Fitting locations”, page 250

⇒ “4.3 Removing and installing electronically controlled damping control unit J250 ”, page 251

⇒ “4.4 Central valve and pipe connections for suspension struts”, page 252

⇒ “4.5 DRC fault-finding”, page 254

⇒ “4.6 DRC system pressure test”, page 255

⇒ “4.7 Discharging and charging Dynamic Ride Control (DRC)”, page 259

⇒ “4.8 Removing and installing central valve”, page 268

4.1 General information on DRC

The DRC wheel damping system counteracts the pitch and roll of the body about the longitudinal and transverse axes to permit optimum handling. Two different running gear versions are available for the Audi RS 6 - a purely hydraulic DRC with variable damping employing neither electronics nor sensors (identical to the RS 4) and a more advanced, driver-adjustable DRC with variable damping. The mode of operation and basic design of the two systems are identical.

In addition to the suppression of pitch and roll (comparable to the purely hydraulic DRC), the driver-adjustable DRC with variable damping offers the further option of setting different levels of damper stiffness by way of the MMI operating unit. To achieve this, each shock absorber is provided with an additional element with integrated DC motor. The DC motors are activated by the electronically controlled damping control unit - J250- .

Three different damper settings are available for selection by way of the MMI operating unit:

- “comfort”
- “dynamic”
- “sports”

Use only the approved type of fluid when charging and topping up the system. Please refer to ⇒ Electronic parts catalogue



Caution

The “comfort” damper setting must be activated when draining, evacuating and charging the DRC system on vehicles with 3-stage variable damping.

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Charging may only be performed at room temperature (approx. 20° Celsius).

Replacement shock absorbers and pipes are supplied empty.

Pipes/shock absorbers and central valves may only be discharged, evacuated and charged when they are connected and installed in the vehicle.

The vehicle must never be lowered onto its wheels when the DRC system is separated from the individual components (e.g. connection between pipe/shock absorbers/central valve).

When charging the DRC system, the gas accumulator leading to the pressure chambers at the piston in the central valve is automatically checked for leaks.

If the pressure of 22 bar could not be obtained, or if the pressure drops continuously when charging the DRC system, check all the separating couplings and connections for leaks and damage. If no irregularities are visible on the outside, the piston of the gas accumulator inside the central valve leading to the pressure chambers is leaking, so the central valve must be renewed.

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Discharging, evacuating or charging the DRC system can only be performed at the drain/charge valve (front) and at the drain/charge valve (rear) of the shock absorbers in the relevant section of the system. Note the following points:

> **WARNING**
>
> *Safety goggles must be worn for all operations.*

Discharge the relevant section of the system completely before removing or disconnecting any DRC components.

Shock absorbers may only be charged when they are installed in the vehicle.

The vehicle must never be lowered onto its wheels when the system is closed (and charged) and the central valves are closed off. This would invariably cause leakage and system failure.

Pipes must not be bent.

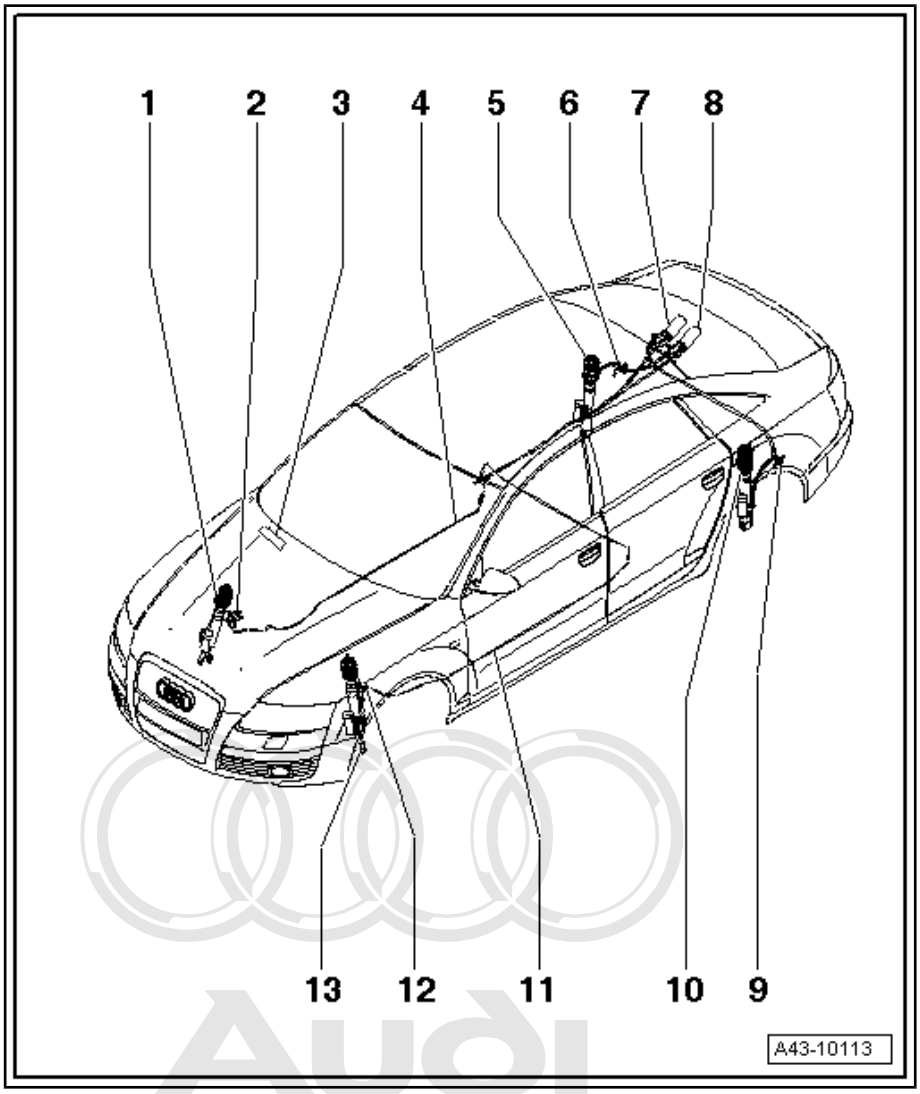
Before connecting and disconnecting the pressure tester for DRC system -V.A.S 6209/2- , the section of the system that is being tested must be shut off at the central valve so as to keep the amount of fluid leakage to a minimum and to prevent the pressurised central valve from becoming discharged.

The small quantity of fluid escaping from the connection when the pressure tester -V.A.S 6209/2- is connected and disconnected with the central valve shut off is not critical. Repeated measurements should be avoided because the system loses a small amount of fluid every time the pressure tester -V.A.S 6209/2- is connected. The pressure reading will be about 0.3 bar lower than the previous value when the tester is reconnected. Several repeated measurements will thus cause the pressure in the system to drop below the minimum limit, or can cause failure of the system.

4.2 Fitting locations

Dynamic Ride Control (DRC)

Illustration applies to Saloon and Avant.



1 - Suspension strut (front right) ⇒ page 254

2 - Drain/charge valve (front right)

3 - Electronically controlled damping control unit - J250-
- ❑ Removing and installing ⇒ page 251

4 - DRC pipe to suspension strut (front right)

5 - Shock absorber (rear right) ⇒ page 254

6 - Drain/charge valve (rear right)

7 - Central valve for front right and rear left
- ❑ Central valve is located on right side of vehicle (in direction of travel)
- ❑ Removing and installing ⇒ page 268

8 - Central valve for front left and rear right
- ❑ Central valve is located on left side of vehicle (in direction of travel)
- ❑ Removing and installing ⇒ page 268

9 - Drain/charge valve (rear left)

10 - Shock absorber (rear left) ⇒ page 254

11 - DRC pipe to suspension strut (front left)

12 - Drain/charge valve (front left)

13 - Suspension strut (front left) ⇒ page 254

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4.3 Removing and installing electronically controlled damping control unit - J250-

Removing

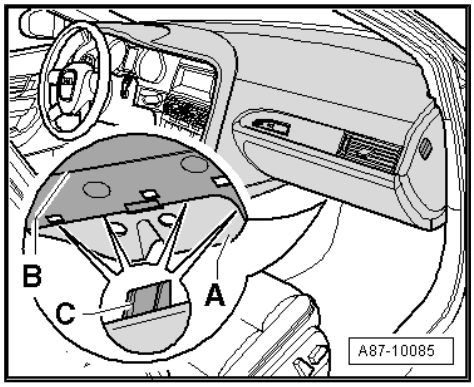
Replacement of the control unit does not require encoding and adaption. For this reason the “Replacement” function cannot be performed in the “Guided Fault Finding” routine by way of the vehicle diagnostic, testing and information system - VAS 5051 A- .

The new electronically controlled damping control unit - J250- can be started up directly.

Note

The electronically controlled damping control unit - J250- is installed behind the glove box at the plenum chamber partition panel.

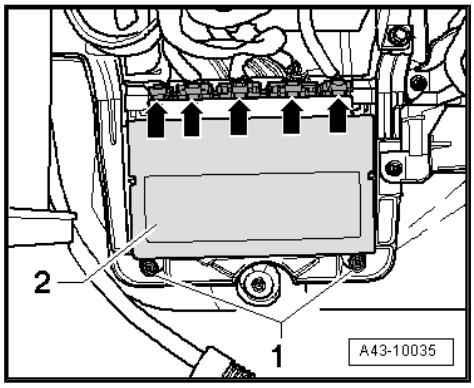
– Remove cover panel -A- from cover below glove box -B-.



Note

Cover panel -A- is held by 4 retainers in cover below glove box -B-. These may be difficult to release and care is therefore required to avoid damaging cover below glove box -B- during removal.

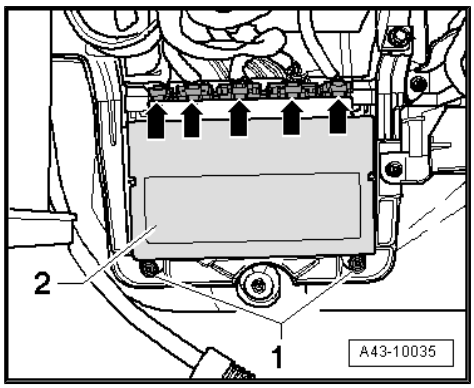
– Remove bolts -1-.
– Pull out control unit -2- downwards.
– Release and detach electrical connectors -arrows- on control unit.
– Take out control unit -2-.



Installing

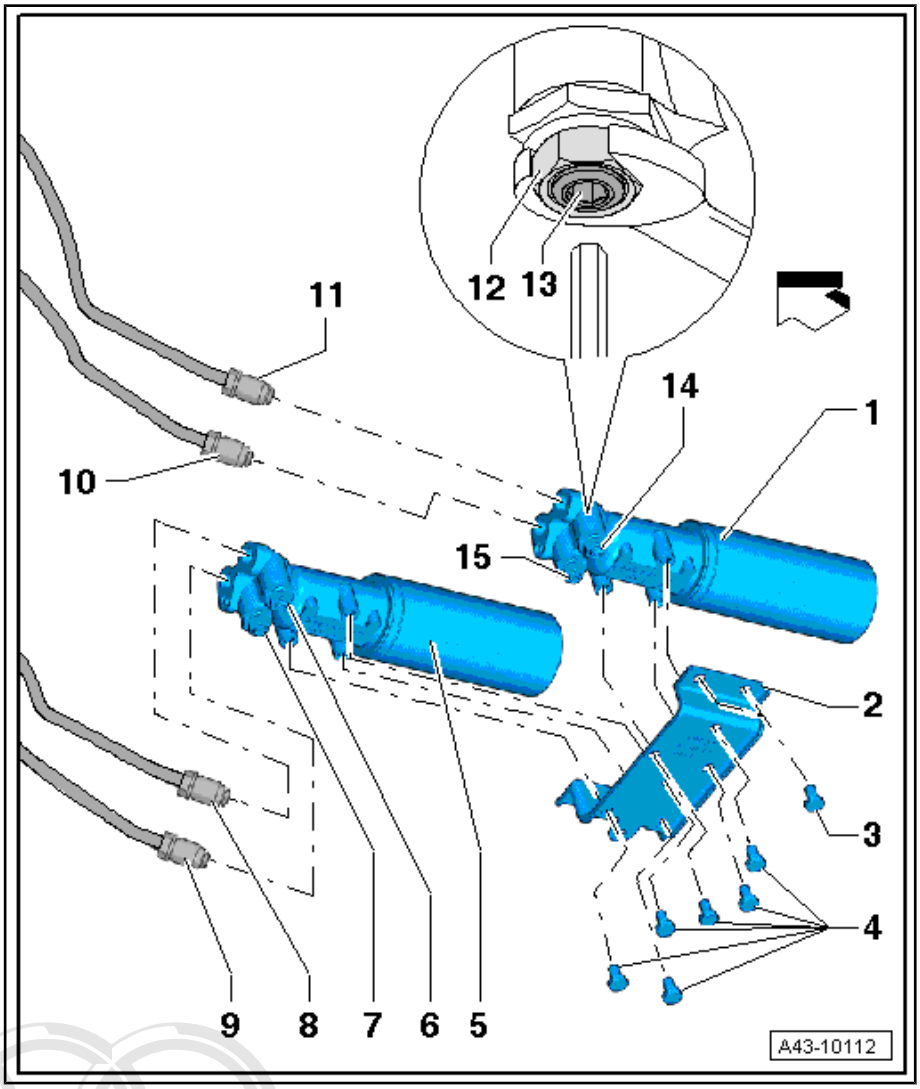
Installation is carried out in the reverse sequence. Note the following points:

– Attach electrical connectors -arrows-.
– Fit bolts -1- and tighten to 2 Nm.



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4.4 Central valve and pipe connections for suspension struts



1 - Central valve for front left and rear right

- ❑ Central valve is located on left side of vehicle (in direction of travel)
- ❑ Removing and installing ⇒ page 268

2 - Retainer

3 - Bolt

- ❑ 4x
- ❑ 20 Nm

4 - Bolt

- ❑ 6x
- ❑ 20 Nm

5 - Central valve for front right and rear left

- ❑ Central valve is located on right side of vehicle (in direction of travel)
- ❑ Removing and installing ⇒ page 268

6 - Shut-off valve for pipe connection (front right)

7 - Shut-off valve for pipe connection (rear left)

8 - DRC pipe to shock absorber (front right)

- ❑ 14 Nm
- ❑ White marking

9 - DRC pipe to shock absorber (rear left)

- ❑ 14 Nm

10 - DRC pipe to shock absorber (rear right)

- ❑ 14 Nm
- ❑ Blue marking

11 - DRC pipe to shock absorber (front left)

- ❑ 14 Nm
- ❑ Yellow marking

12 - Lock nut for shut-off valve

- ❑ 12 Nm

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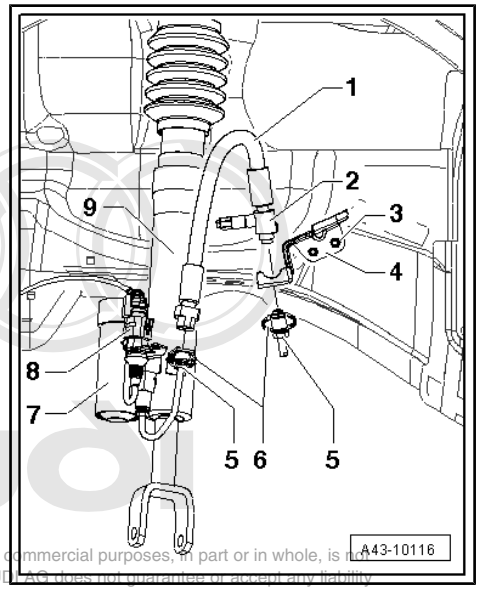
13 - Shut-off valve

- ❑ 5 Nm
- ❑ To shut off, turn clockwise as far as it will go
- ❑ To open, turn anti-clockwise as far as it will go

14 - Shut-off valve for pipe connection (front left)

15 - Shut-off valve for pipe connection (rear right)

Suspension strut (front)



-1- Hose, ensure strain-free installation

-2- Drain/charge valve

-3- Nut, 6 Nm

-4- Bracket

-5- Union nut, 14 Nm

-6- Clamp

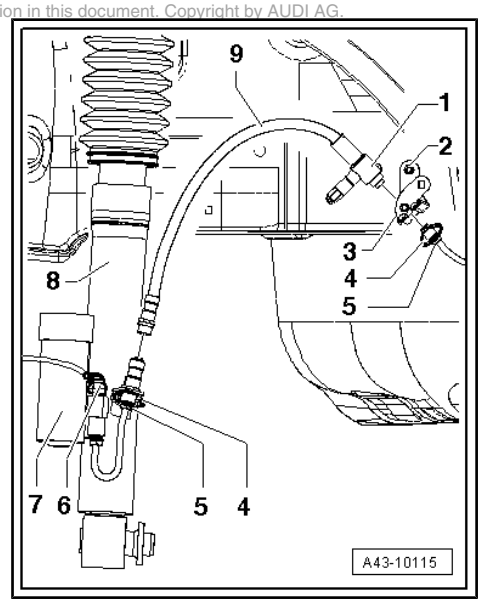
-7- Additional element with control motor, fitted on vehicles with variable damping (3-stage), in direction of travel

-8- Electrical connector, fitted on vehicles with variable damping (3-stage)

-9- DRC shock absorber

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Shock absorber (rear)



-1- Drain/charge valve

-2- Nut, 6 Nm

-3- Bracket

-4- Clamp

-5- Union nut, 14 Nm

-6- Electrical connector, fitted on vehicles with variable damping (3-stage)

-7- Additional element with control motor, fitted on vehicles with variable damping (3-stage), in direction of travel

-8- DRC shock absorber

-9- Hose, ensure strain-free installation

4.5 DRC fault-finding

Start				
Rattling noise coming from suspension or rear of vehicle when driving over rough surfaces				Excessive body roll when entering a bend
→	Visible fluid leakage?			←
	↓		↓	

♦ Check components ♦ Check unions at central valves, shock absorbers and pipe connections ♦ Renew leaking shock absorbers	← Yes		No →	Check all unions at central valves, shock absorbers and pipe connections
↓			↓	
↓			Problem eliminated?	
↓			↓	↓
↓			No ↓	Yes ↓
↓			Check system pressure in both sections of system. (Central valves must be closed when connecting and disconnecting pressure tester.)	↓
↓			↓	↓
↓		System pressure higher than 12.0 bar?		↓
↓		No ↓	Yes ↓	↓
Discharge, evacuate and charge entire DRC system using filling device for DRC system - VAS 6544- ; check for leakage ⇒ page 259 .			↓	↓
↓			↓	↓
↓				↓
↓				
End				

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4.6 DRC system pressure test

Special tools and workshop equipment required

- Pressure tester -V.A.S 6209/2-
- Hand vacuum pump - VAS 6213-

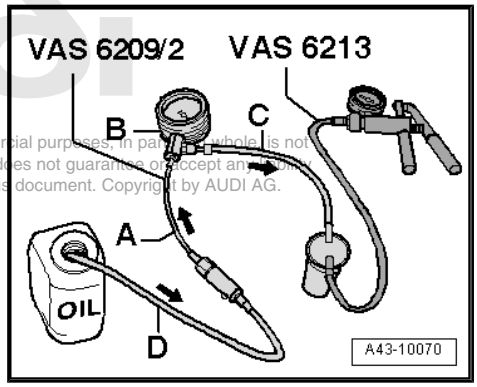
Bleeding pressure tester -V.A.S 6209/2-

Use only the approved type of fluid for this bleeding procedure.
Please refer to ⇒ Electronic parts catalogue

Note

- *The pressure tester -V.A.S 6209/2- must always be bled before it is used for the first time.*
- *Bleeding is not required if the pressure tester -V.A.S 6209/2- still indicates a residual pressure in excess of 0.5 bar (e.g. from a previous measurement).*

– Set up special tools as illustrated in order to bleed pressure gauge -B- and connecting line -A-.



Note

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The illustration shows the bleeding method involving drawing in hydraulic fluid with hand vacuum pump - VAS 6213- .

– Continue bleeding until no more air bubbles are visible in hose -C-.

– Disconnect hoses -C- and -D- and perform system pressure test.

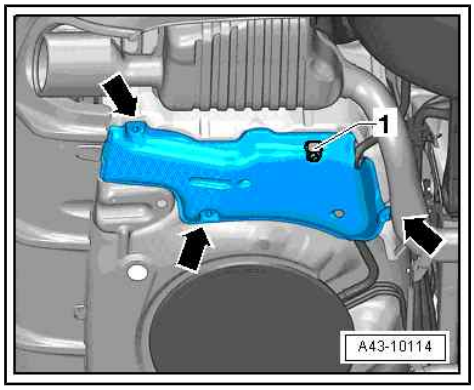
The system pressure test is carried out at the front shock absorber of the section of the system that is to be tested.

Note

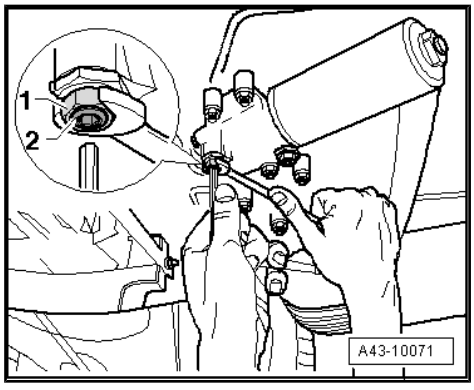
When connecting and disconnecting pressure tester -V.A.S 6209/2- , the section of the system that is under test must be closed off at the central valve in order to minimise the fluid loss and to avoid discharging the central valve that is under pressure.

– Remove wheel.

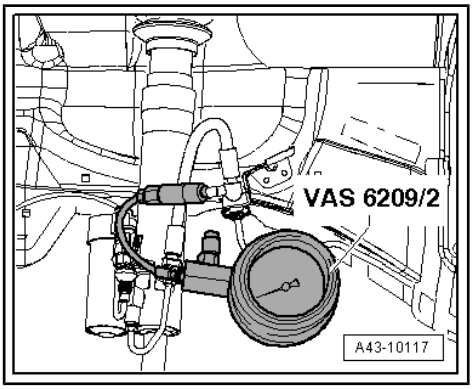
– Detach plastic cover by unscrewing nuts -arrows- and removing clip -1-.



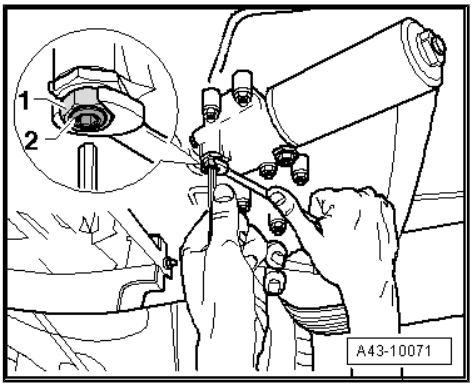
– Slacken lock nut -1- for the section of the system that is to be tested. Screw in cut-off screw -2- hand-tight as far as stop and tighten lock nut -1- again.



– Unscrew dust cap from drain/charge valve and connect pressure tester -V.A.S 6209/2- .



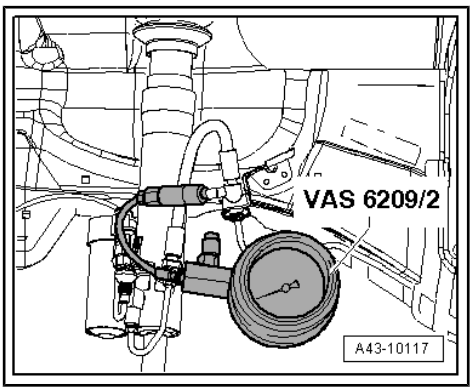
– Slacken lock nut -1- for the section of the system that is to be tested. Unscrew cut-off screw -2- as far as stop (hand-tight) and tighten lock nut -1- again.



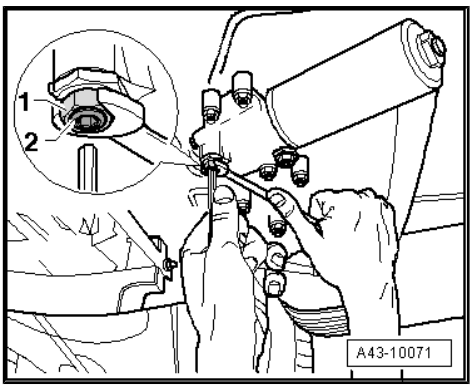
– Read off system pressure at pressure tester -V.A.S 6209/2- .

Note

The pressure at pressure tester -V.A.S 6209/2- only builds up gradually; the process takes approx. 2 minutes. Do not read off the system pressure until the gauge needle of -V.A.S 6209/2- has finally come to rest.

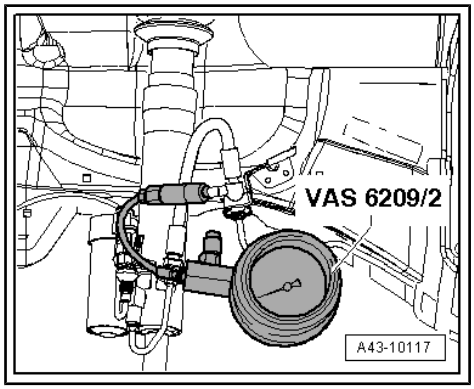


– Slacken lock nut -1- for the section of the system that is to be tested. Screw in cut-off screw -2- hand-tight as far as stop and tighten lock nut -1- again.

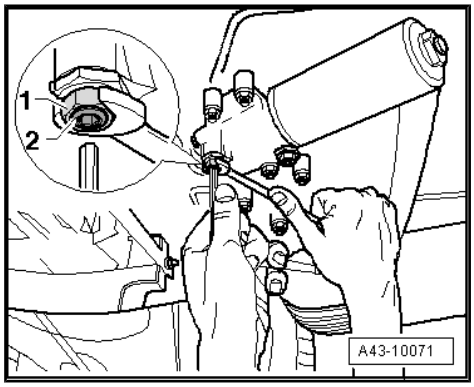


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– Disconnect pressure tester -V.A.S 6209/2- and screw on dust cap.



– Slacken lock nut -1- for the section of the system that is to be tested. Unscrew cut-off screw -2- as far as stop (hand-tight) and tighten lock nut -1- again.

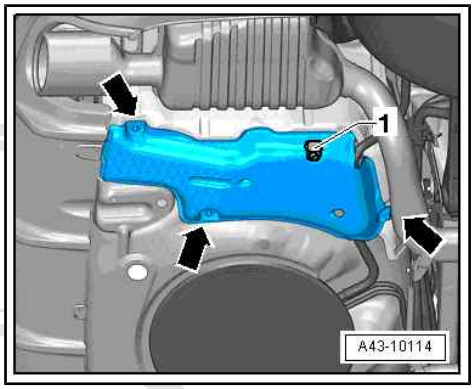


Note

When connecting and disconnecting pressure gauge -V.A.S 6209/2- , a small amount of fluid will always escape at the connection, but this is not critical. Repeated measurements should be avoided because the system loses a small amount of fluid every time the pressure tester -V.A.S 6209/2- is connected. The pressure reading will be about 0.3 bar lower than the previous value when the gauge is reconnected. Several repeated measurements will thus cause the pressure in the system to drop below the minimum limit, or can cause failure of the system.

– If the pressure is not OK, trace the cause of the fault and repair the system.

– Install plastic cover.



Tightening torques:

– Nuts -arrows- 2 Nm

DRC system pressure values

These pressure values are based on a reference temperature of 20 °C.

- 16 bar = Maximum pressure
- 15 bar – 16 bar = Central valve new or in as-new condition
- 12 bar – 15 bar = Normal working range; system OK
- < 12 bar = System leaking or not fully charged; air trapped in system; central valve depressurised/empty.

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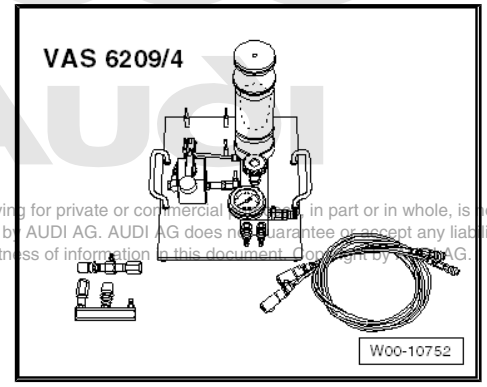
4.7 Discharging and charging Dynamic Ride Control (DRC)

Note

Discharging, evacuating and charging the entire section of the DRC system (pipes/shock absorbers and central valve) is performed using the filling device for DRC system - VAS 6544- . Depending on the equipment available in your workshop for the DRC system, it may be necessary to modify/convert the existing equipment with the appropriate supplementary, upgrade or retrofit kits to meet the standard of the filling device for DRC system - VAS 6544- . The following equipment is available:

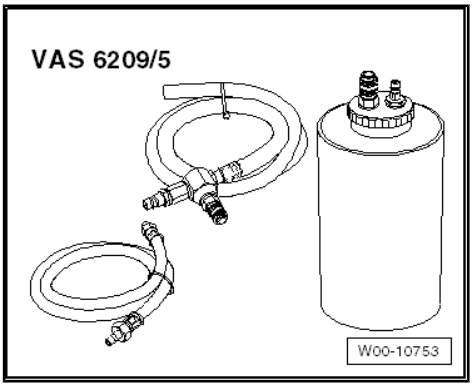
Special tools and workshop equipment required

- Upgrade kit, filling device DRC system - VAS 6209/4-



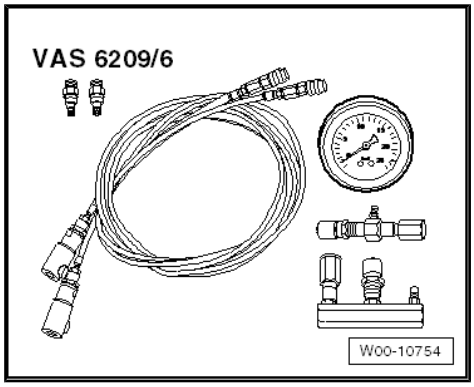
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- The upgrade kit, filling device DRC system - VAS 6209/4- is used as an upgrade kit for the charging device for Audi RS 6 DRC system - VAS 6209- already available in the workshop.
- Retrofit kit, filling device DRC system - VAS 6209/5-



- The retrofit kit, filling device DRC system - VAS 6209/5- is required by workshops equipped with the central valve filler, Audi RS 4/RS 6 - VAS 6209/3- wishing to upgrade this to the technical standard of the filling device for DRC system - VAS 6544- . The supplementary kit, filling device DRC system - VAS 6209/6- must also be obtained.

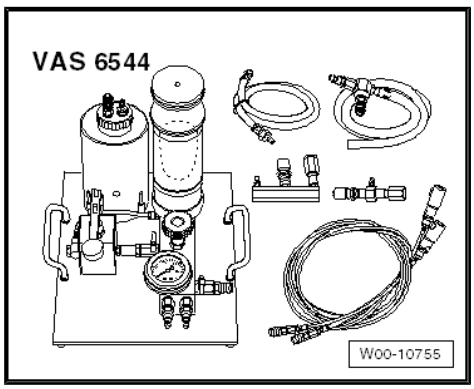
- Supplementary kit, filling device DRC system - VAS 6209/6-



- The supplementary kit, filling device DRC system - VAS 6209/6- is required to upgrade the existing central valve filler, Audi RS 4/RS 6 - VAS 6209/3- to the technical standard of the filling device for DRC system - VAS 6544- . As a basic requirement, the workshop must already be equipped with the charging device for Audi RS 6 DRC system - VAS 6209- . If the workshop is not equipped with the charging device for Audi RS 6 DRC system - VAS 6209- the retrofit kit, filling device DRC system - VAS 6209/5- must be obtained additionally.

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- Filling device for DRC system - VAS 6544-



Note

The equipment for the DRC system only needs to be modified once in your workshop. It is not necessary to convert the equipment back to its original condition. The further procedure for discharging and charging the entire DRC system is described for the filling device for DRC system - V.A.S 6544- .

Use only the approved type of fluid when charging and topping up the system. Please refer to ⇒ Electronic parts catalogue “ETKA” .

Replacement shock absorbers and pipes are supplied empty.

Charging may only be performed at room temperature (approx. 20° Celsius).

Pipes/shock absorbers and central valves may only be discharged, evacuated and charged when they are connected and installed in the vehicle.

Note

The shut-off valve for the pipe connection at the central valve must remain open when discharging, evacuating and charging the DRC system (pipes/shock absorbers and central valve).

Caution

The "comfort" damper setting must be activated when draining, evacuating and charging the DRC system on vehicles with 3-stage variable damping.

When charging the DRC system, the gas accumulator leading to the pressure chambers at the piston in the central valve is automatically checked for leaks.

WARNING

Safety goggles must be worn for all operations.

The valves on the workshop equipment are open when the cut-off lever is in line with the direction of flow.

Pipes must not be bent.

Workshop equipment required

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1 - Adapter for front shock absorber

- ❑ Does not apply to this model

2 - Adapter for rear shock absorber

- ❑ Does not apply to this model

3 - Charging lines with quick-release couplings

4 - Venturi nozzle with air outlet hose

- ❑ From charging device for Audi RS 6 DRC system - VAS 6209-

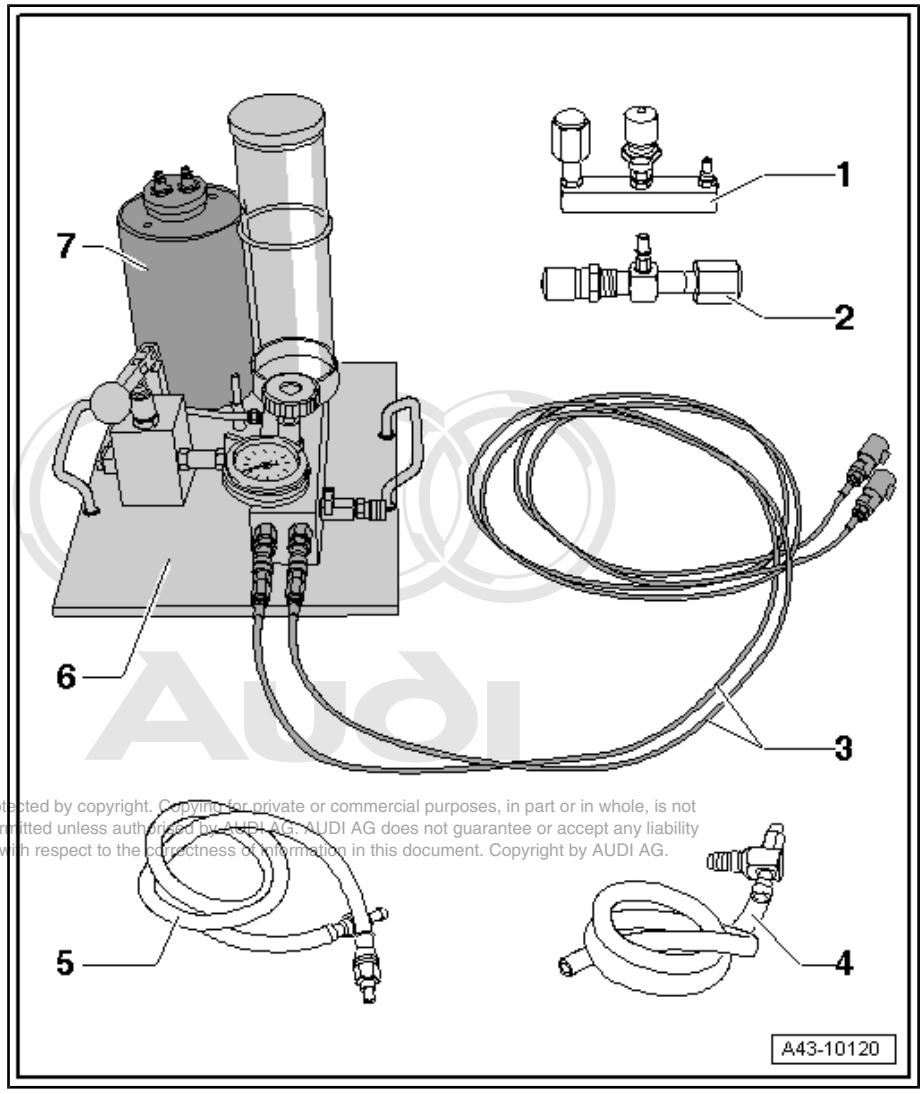
5 - Connecting hose

- ❑ From charging device for Audi RS 6 DRC system - VAS 6209-

6 - Filling device for DRC system - VAS 6544-

7 - Used fluid container

- ❑ Empty before starting work
- ❑ Identified by red dot



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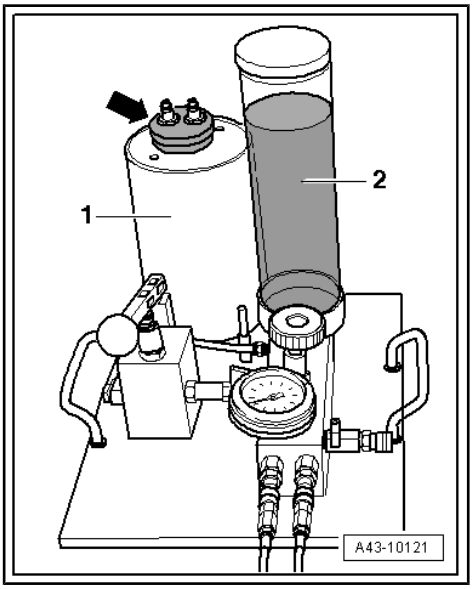
Note

- *Before starting to charge the DRC system, it is important to ensure that the fluid container of the filling device for DRC system - VAS 6544- and the connecting line between the pressure pump and the fluid container are filled with fluid.*
- *The used fluid container of the filling device for DRC system - VAS 6544- must be empty.*

Draining used fluid container

– Unscrew the cap -arrow- on the used fluid container -1- and dispose of the used fluid.

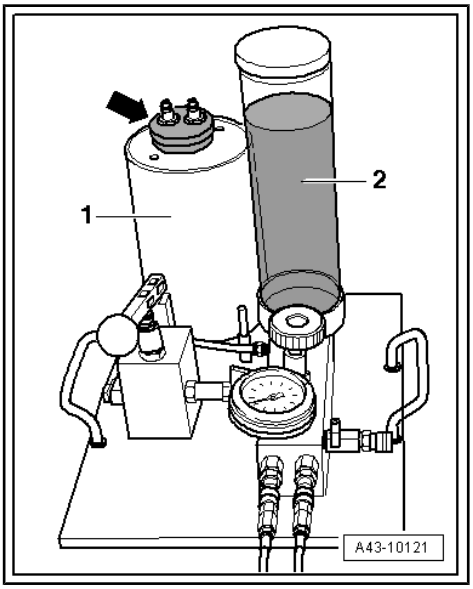
– Screw the cap -arrow- onto the used fluid container -1-.



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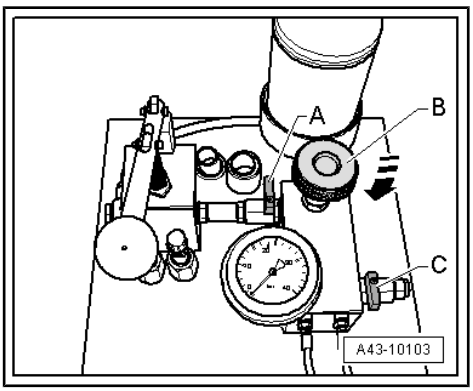
Filling and bleeding filling device for DRC system - VAS 6544-

– Fill up the fluid container -2- with fresh fluid as far as the mark and position the O-ring in line with the fluid level ⇒ Electronic parts catalogue .

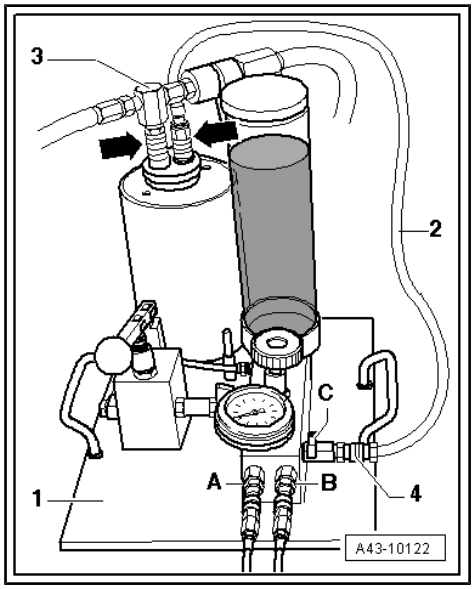


– Close shut-off valves -A- and -C- of filling device for DRC system - VAS 6544- .

– Close needle valve -B-.



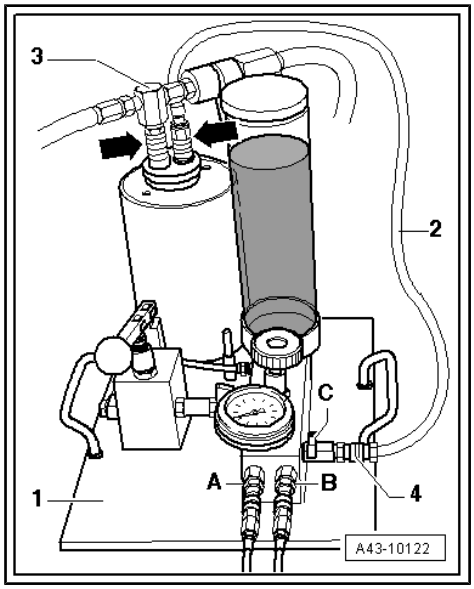
– Connect hose -2- to used fluid container -arrow- and quick-release coupling -4- of filling device for DRC system - VAS 6544- .



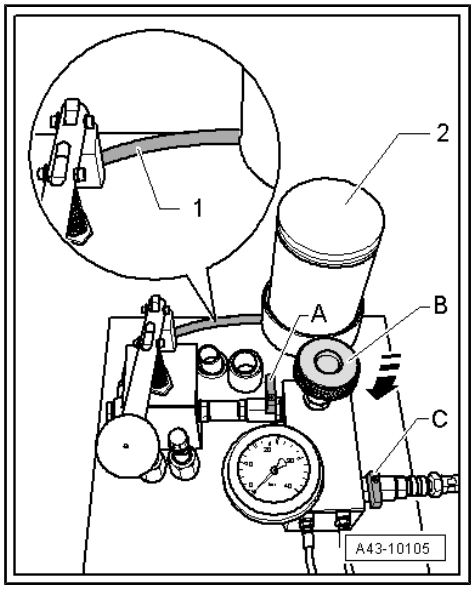
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– Connect venturi nozzle -3- with air outlet hose to used fluid container -arrow- as shown in illustration.

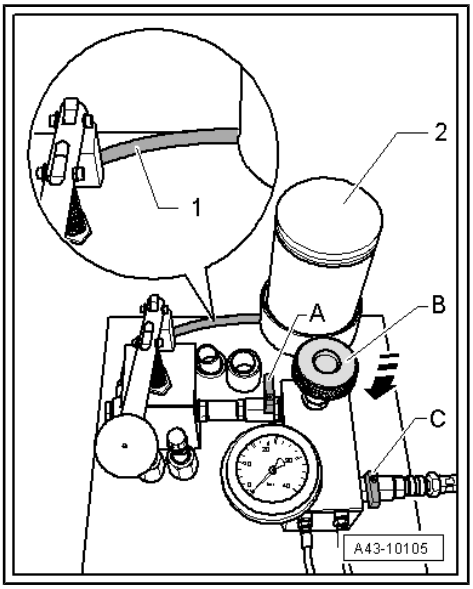
– Connect compressed air line to venturi nozzle -3-.



– Open shut-off valve -C-.



– Open shut-off valve -A- briefly (for about 1-2 seconds) until line -1- between fluid tank -2- and pressure pump is filled with bubble-free fluid.
– Close shut-off valve -C-. Disconnect compressed air line from venturi nozzle.



Discharging

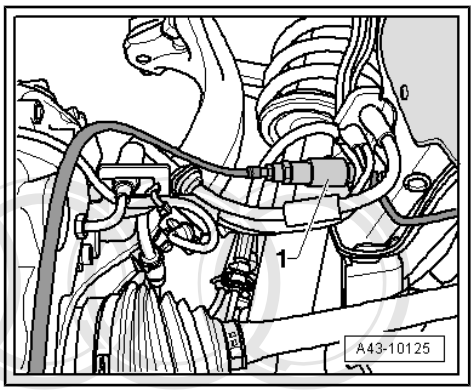
Caution

The "comfort" damper setting must be activated when draining, evacuating and charging the DRC system on vehicles with 3-stage variable damping.

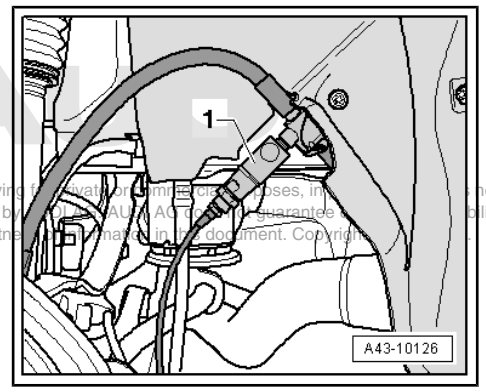
WARNING

Safety goggles must be worn for all operations.

– Turn the front wheel outwards on the side to be discharged.
– Unscrew dust cap from drain/charge valve (front).
– Connect charging line with quick-release coupling -1- of filling device for DRC system - VAS 6544- ⇒ Item 3 (page 262) to drain/charge valve (front) on the pipe connection to be discharged.
– Remove the rear wheel on the side of the pipe connection to be discharged.
– Move clear wheel housing liner at drain/charge valve (rear).
– Unscrew dust cap from drain/charge valve (rear).

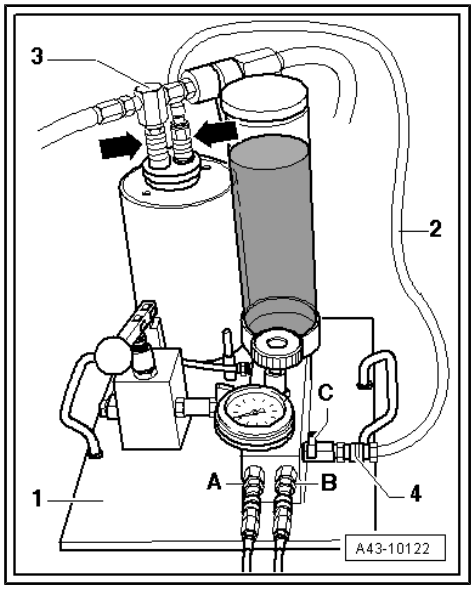


– Connect charging line with quick-release coupling -1- of filling device for DRC system - VAS 6544- ⇒ Item 3 (page 262) to drain/charge valve (rear) on the pipe connection to be discharged.



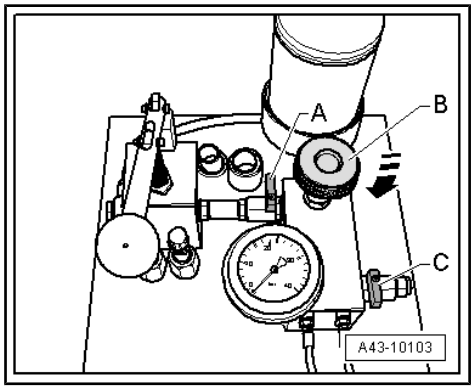
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– Connect charging lines ⇒ Item 3 (page 262) to connections -A- and -B- of the filling device for DRC system - VAS 6544- .

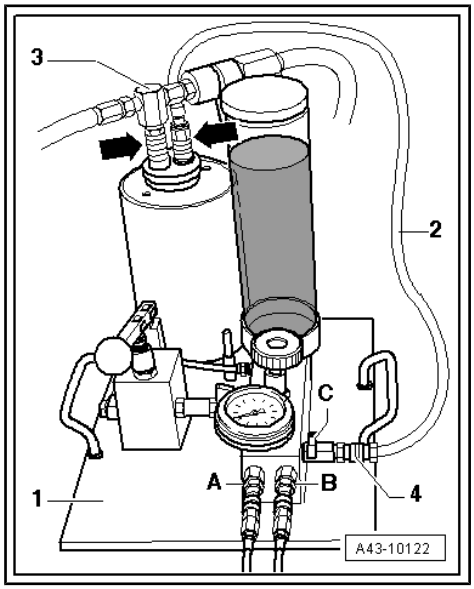


Shut-off valves -A- and -C- of filling device for DRC system - VAS 6544- closed.

Needle valve -B- closed.



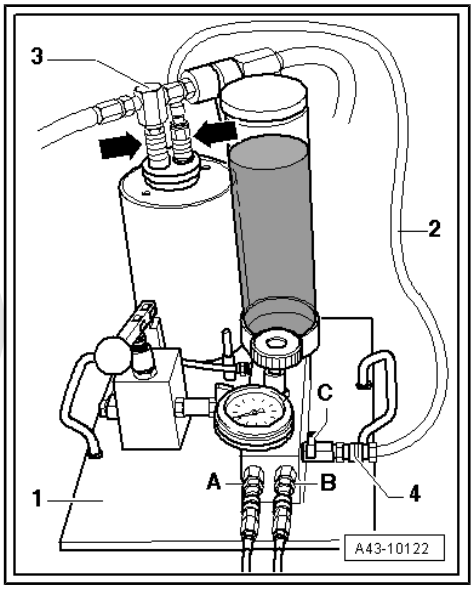
Hose -2- connected to used fluid container -arrow- and to filling device for DRC system - VAS 6544- -4-.



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Venturi nozzle -3- with air outlet hose connected to used fluid container -arrow- of filling device for DRC system - VAS 6544- .

Compressed air connected to venturi nozzle -3-.

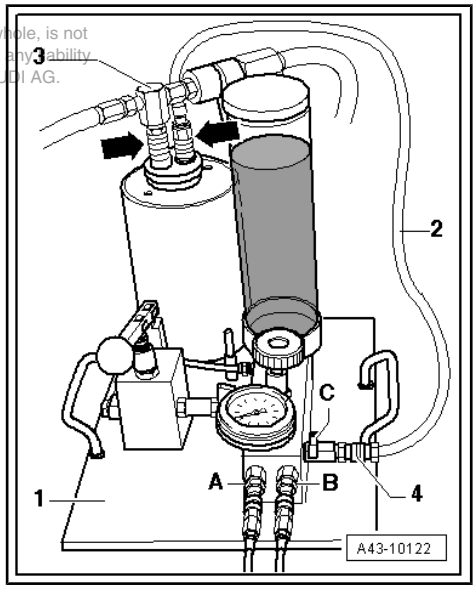


– Open valve -C- until fluid is discharged from DRC system down to the smallest possible remainder. (This is visible at return hose -2- going to used fluid container).

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– At a pressure gauge reading of approx. minus 0.9 bar, close valve -C- and disconnect compressed air line from venturi nozzle.

• Check for leakage.



Note

Vacuum must be maintained stable at minus 0.9 bar for at least 2 minutes.

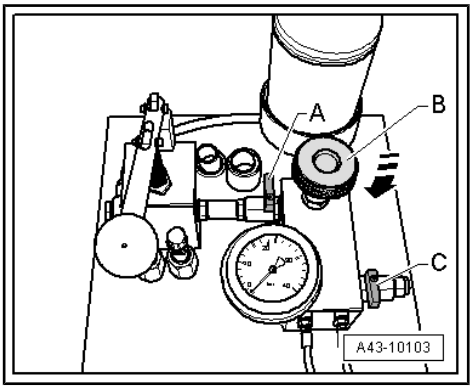
– Check fluid level in fluid container, fill up fluid container with fresh fluid as far as the mark (if necessary) and position O-ring in line with fluid level ⇒ Electronic parts catalogue .

Caution

The "comfort" damper setting must be activated when draining, evacuating and charging the DRC system on vehicles with 3-stage variable damping.

Charging

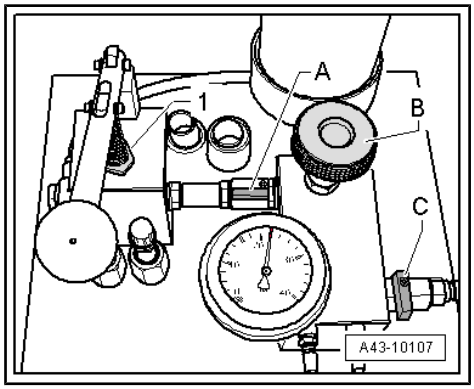
– Open needle valve -B- about two turns, allowing fluid to be drawn out of fluid container of filling device for DRC system - VAS 6544- and into evacuated DRC system.



The fluid will flow out of the fluid container and into the connected DRC system. This can be seen from the dropping fluid level in the fluid container. This process may take several minutes, depending on the quantity of fluid remaining after drainage. The rate at which the fluid level drops decreases as system charging progresses. When the fluid level stops dropping, the first step in the charging process is complete.

– Close needle valve -B-.

– Open valve -A- and charge DRC system to 22 bar by repeatedly pumping lever of hand-operated pump -1-.



Note

Make sure the fluid container of the filling device for DRC system - VAS 6544- does not run empty when charging. Top up the fluid container with fresh fluid if necessary.

- When a pressure of 22 bar has been reached, close valve -A- and stop pumping lever of hand-operated pump.

Note

If the pressure of 22 bar cannot be reached, or if the pressure drops continuously, check all the separating couplings and connections for leaks and damage. If no irregularities are visible on the outside, the piston of the gas accumulator inside the central valve leading to the pressure chambers is leaking, so the central valve must be renewed.

– Open needle valve -B- slightly and allow pressure to drop to 16 bar.

- When needle on pressure gauge reaches 16 bar mark, close valve -B-.

Charging of the DRC system is now completed.

– Disconnect charging line with quick-release coupling of filling device for DRC system - VAS 6544- ⇒ Item 3 (page 262) from drain/charge valves (front and rear).

– Fit rear wheel.

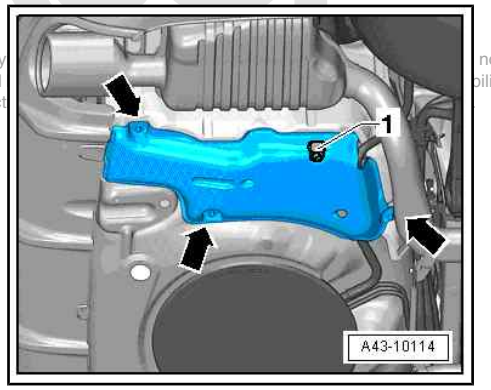
– Screw on dust cap for drain/charge valves (front and rear).

4.8 Removing and installing central valve

Removing

The central valves are fitted at the rear right of the vehicle, between the spare wheel well and rear silencer.

– Slacken off bolts -arrow-, remove spreader rivet -1- and detach plastic cover.



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WARNING

Safety goggles must be worn for all operations.

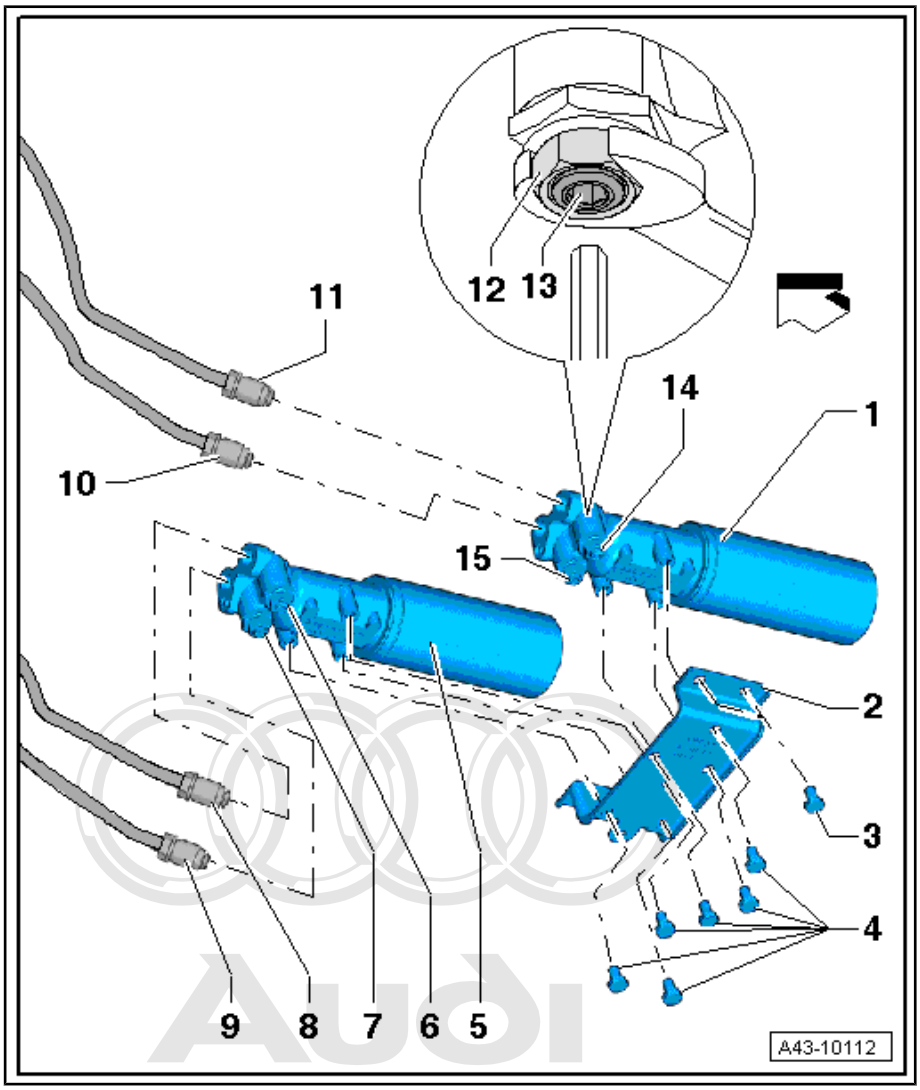
Note

Before disconnecting the DRC pipes from the central valve, the relevant section of the system must be discharged ⇒ page 259 .

Note

This step must be repeated for both sets of pipes connected to the relevant central valve.

– Unscrew union nuts -8- and -9- or -10- and -11- on relevant central valve.
– Unscrew bolts -4- and -3- and detach retainer -2- with central valve.



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Note

When detaching the central valve and the retainer -2-, make sure the central valve left in the vehicle is secured to stop it hanging down.

Installing

– Installation is carried out in the reverse sequence. Note the following points:

Tightening torques
⇒ “4.4 Central valve and pipe connections for suspension struts”, page 252

– Insert central valve with retainer.
– Screw in securing bolts.
– Connect DRC pipes to relevant central valve.

Note

- *The new central valve is charged and the shut-off valves are closed.*
- *Only if a new central valve is installed: Open shut-off valve ⇒ Item 6 (page 253) and ⇒ Item 7 (page 253) or ⇒ Item 14 (page 253) and ⇒ Item 15 (page 253) on new central valve and secure with appropriate lock nut.*

Charge DRC system
⇒ “4.7 Discharging and charging Dynamic Ride Control (DRC)”, page 259 .

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44 – Wheels, tyres, vehicle geometry

1 Wheels and tyres

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2 Tyre Pressure Loss Indicator (TPLI+)

⇒ “2.1 General notes”, page 272

⇒ “2.2 Removing and installing Tyre Pressure Monitoring System control unit 2 J793 ”, page 273

2.1 General notes

Please observe the instructions in the ⇒ Owner's Manual .

The Tyre Pressure Loss Indicator is a system designed to detect slow or gradual tyre pressure loss at one or more wheels. The TPLI+ uses information from the ABS sensors to compare the rolling circumference and the vibration characteristics of the individual wheels. Any changes on one or more wheels are indicated on the dash panel display. If only one tyre is affected, the tyre position is indicated.

The rolling circumference of the tyre may change under the following circumstances:

- If the tyre pressure is too low.
- If the tyre is damaged.
- If the wheels or the inflation pressures have been changed and the new tyre pressures not saved.
- If the vehicle is loaded unevenly.
- If the wheels of one axle are subjected to a greater load (e.g. when pulling a trailer or when driving uphill and downhill).
- When driving with the temporary spare wheel.
- If one wheel has been changed on each axle (this also includes changing round the wheels from front to rear or vice versa).

If the Tyre Pressure Loss Indicator lights up:

The Tyre Pressure Loss Indicator on the instrument cluster indicates if the tyre pressure is too low or if a system malfunction has occurred.

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System fault in Tyre Pressure Loss Indicator (TPLI+):

A system fault is stored in the fault memory of the Tyre Pressure Monitoring System control unit 2 - J793- and the yellow TPLI+ warning lamp in the instrument cluster flashes. The message “TPMS” is also displayed in the dash panel insert. If a system fault has been detected, connect -VAS 5051- and select “Guided Fault Finding” ⇒ Vehicle diagnostic tester.

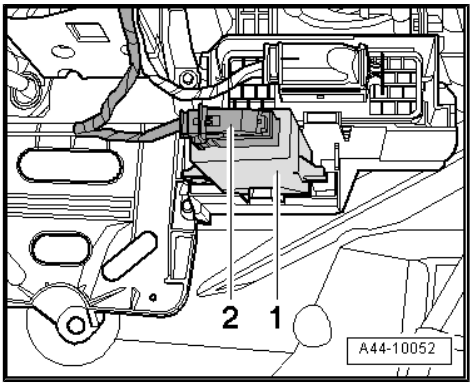
Performing calibration (re-adaption of tyre pressure):

The tyre pressures must be stored in the MMI following any changes to the inflation pressures or after changing a tyre on the vehicle.

– Switch on ignition, press “CAR” function selector button, turn rotary pushbutton on multimedia system operating unit - E380- to select tyre pressure monitoring and press rotary pushbutton to save tyre pressure.

2.2 Removing and installing Tyre Pressure Monitoring System control unit 2 - J793-

Removing



The Tyre Pressure Monitoring System control unit 2 - J793- is located behind the glove box.

Before removing the control unit, read out the coding via Guided Fault Finding using the function “Replace control unit”.

– Remove glove box ⇒ Rep. gr. 68 .
– Unclip control unit -1-.
– Unplug connector -2- and take out control unit.
– Detach Tyre Pressure Monitoring System control unit 2 - J793- -1- and unplug connector -2-.

Installing

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Installation is performed in reverse sequence; note the following:

– The system must be re-coded if the Tyre Pressure Monitoring System control unit 2 - J793- is renewed.
– Connect up -VAS 5051- and select the corresponding control unit in the “Guided Functions” ⇒ Vehicle diagnostic tester.

3 Tyre Pressure Monitoring System

⇒ “3.1 General notes”, page 274

⇒ “3.2 Overview of Tyre Pressure Monitoring System”, page 275

⇒ “3.3 Removing and installing Tyre Pressure Monitoring System control unit J502 ”, page 275

⇒ “3.4 Removing and installing Tyre Pressure Monitoring System aerial R96 ”, page 276

⇒ “3.5 Operation of Tyre Pressure Monitoring System”, page 276

⇒ “3.6 Exploded view of tyre pressure sensor”, page 277

⇒ “3.7 Changing a tyre”, page 278

⇒ “3.8 Removing and installing metal valve body”, page 279

3.1 General notes

Please observe the instructions in the ⇒ Owner's Manual .

The Tyre Pressure Monitoring System monitors the inflation pressure and temperature of the tyres on the four road wheels while the vehicle is moving.

For safety reasons, the tyre pressure sensors or valves must be renewed if they are defective.

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Do not use steam cleaners or a powerful jet of compressed air to clean the tyre pressure sensor.

For safety reasons, the tyre pressure sensor must be renewed and the wheel rim must be cleaned if tyre sealing compound has been used.

Two different versions are available: the base version (Low) or the enhanced convenience version (High).

The Low version consists of a control unit, a central aerial and a tyre pressure sensor in each wheel.

The High version additionally has one trigger in each wheel housing and the sensors fitted also feature position recognition.

The corresponding PR number on the vehicle data sticker indicates which version is installed in the vehicle ⇒ page 282 .

If the wheels are changed or rotated to a different position on the vehicle, if the tyre pressure sensors are renewed, or if the tyre pressures are altered, the new status must always be confirmed via the MMI.

If conventional wheels (e.g. winter tyres without run-flat capability) are fitted in place of the PAX system, the system must be re-coded via Guided Fault Finding using the function “Code control unit”.

Note

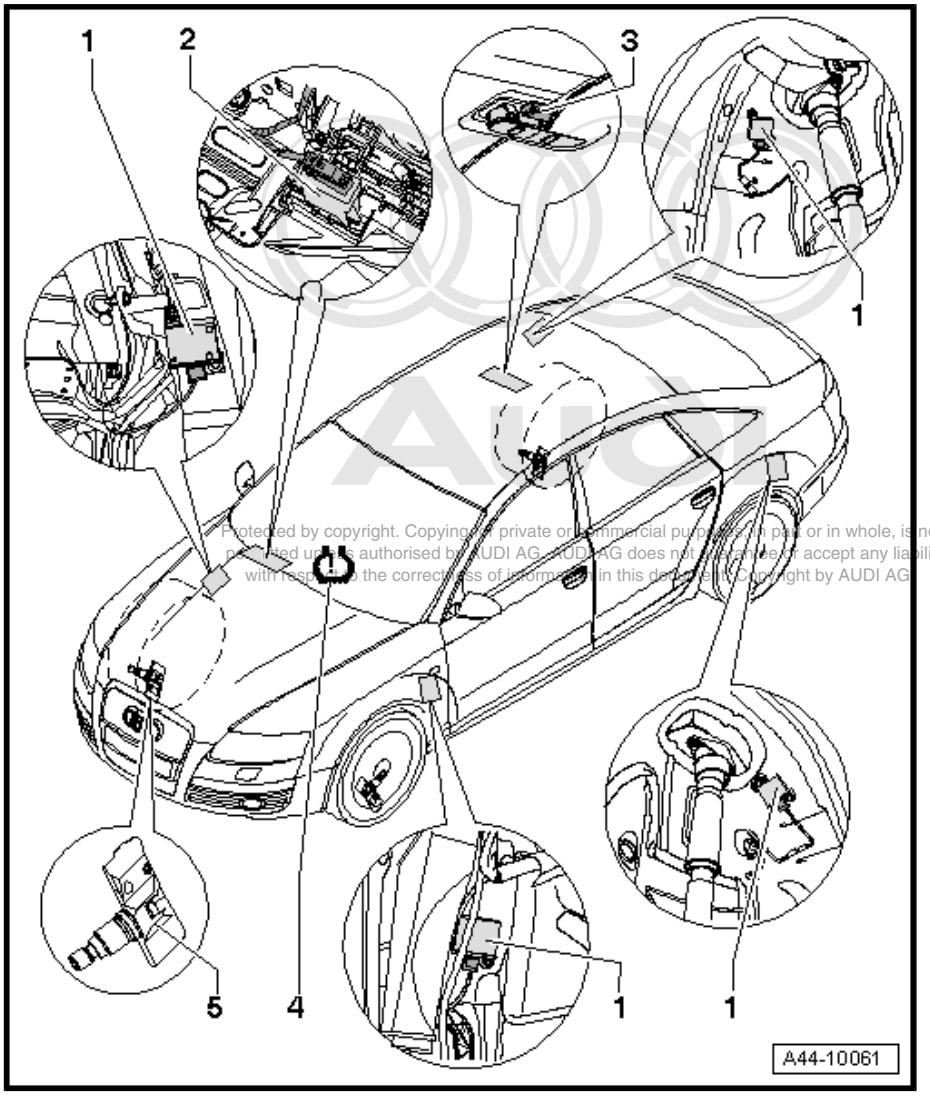
After changing the wheels (including the tyre pressure sensors), for instance from summer to winter tyres, the inflation pressures must be checked and the tyre pressure sensors re-adapted to the control unit via the MMI.

A fault may be detected and registered in the fault memory:

If fewer than four wheels are fitted with tyre pressure sensors.

If the wrong type of tyre pressure sensor is fitted on winter tyres, or if winter tyres without tyre pressure sensors are fitted. (In this case the yellow warning lamp with “system malfunction” pictogram will light up in the instrument cluster; this cannot be deactivated via the system.)

3.2 Overview of Tyre Pressure Monitoring System



1 - Sender unit for Tyre Pressure Monitoring System in front left wheel housing - G431- , front right -G432- , rear left -G433- and rear right - G434-

- The sender units for the Tyre Pressure Monitoring System are only fitted in vehicles equipped with the "High" version.

2 - Tyre Pressure Monitoring System control unit - J502-

- The system must be recoded if the Tyre Pressure Monitoring System control unit - J502- is renewed ⇒ page 276 .

3 - Tyre Pressure Monitoring System aerial - R96-

- Removing and installing ⇒ page 276

4 - Display in instrument cluster

- See vehicle diagnostic, testing and information system - VAS 5051 A-

5 - Tyre pressure sensor, front left - G222- , front right -G223- , rear left -G224- and rear right - G225-

- Removing and installing ⇒ page 279
- If the wheels are changed or rotated to a different position on the vehicle, if a tyre pressure sensor is renewed, or if the tyre pressures are altered, the new status must always be confirmed via the MMI.

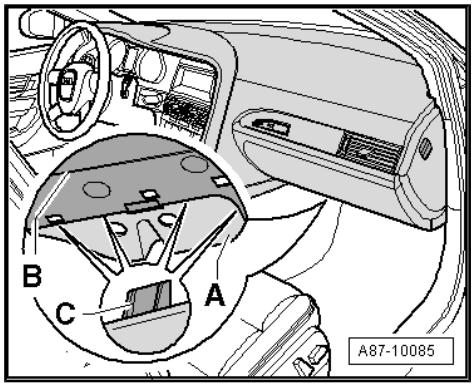
3.3 Removing and installing Tyre Pressure Monitoring System control unit - J502-

Removing

The Tyre Pressure Monitoring System control unit - J502- is located behind the glove box.

Before removing the control unit, read out the coding via Guided Fault Finding using the function “Replace control unit”.

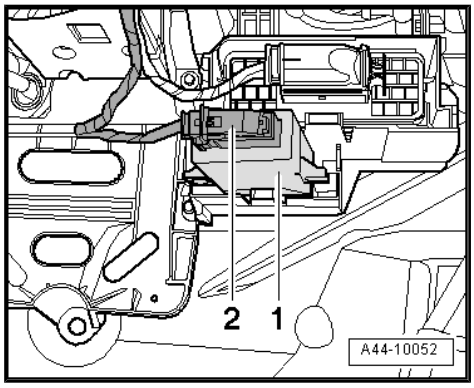
– Remove cover panel -A- from cover below glove box -B-.



Note

Cover panel -A- is held by 4 retainers in cover below glove box -B-. These may be difficult to release and care is therefore required to avoid damaging cover below glove box -B- during removal.

– Unclip control unit -1-.
– Unplug connector -2- and take out control unit.



Installing

Installation is carried out in the reverse sequence.

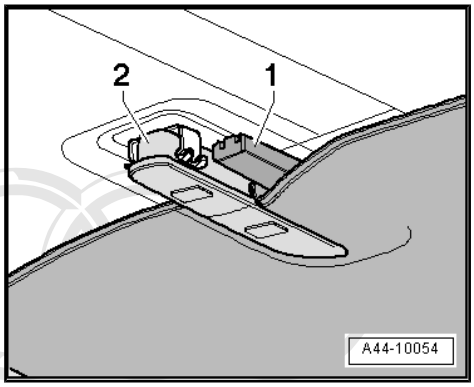
– The system must be re-coded if the Tyre Pressure Monitoring System control unit - J502- is renewed ⇒ page 276 .

3.4 Removing and installing Tyre Pressure Monitoring System aerial - R96-

Removing

The receiving aerial is located behind the rear interior light / reading light.

– Remove rear interior light / reading light ⇒ Rep. gr. 96 .
– Unclip Tyre Pressure Monitoring System aerial - R96- -1-.
– Unplug connector from aerial.
– Take out aerial -1-.



Installing

Installation is carried out in the reverse sequence.

The identification markings on the aerial must face towards the vehicle interior.

3.5 Operation of Tyre Pressure Monitoring System

Function:

The Tyre Pressure Monitoring System is operated via the MMI.

The system monitors the tyre inflation pressures that have been set by the operator and stored as reference values.

– The inflation pressures must first be checked and corrected before being stored via the MMI.

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– Start by checking and correcting the inflation pressure of the tyres on the vehicle (including spare wheel) according to the figures listed on the sticker on the fuel filler flap.

Re-coding Tyre Pressure Monitoring System control unit - J502-

If the Tyre Pressure Monitoring System control unit - J502- is renewed, the new control unit must be coded. Proceed as follows:

– Connect -VAS 5051 A- , start Guided Fault Finding sequence for the vehicle in question and use Go to button to select “Function /Component Selection” ⇒ page 217 .

Then

– “Running gear (Rep. Gr. 01; 40 - 49)”
– “Tyre Pressure Monitoring System (Rep. Gr. 01; 44)”
– “01 - Self-diagnosis compatible systems”
– “65 - Tyre Pressure Monitoring System control unit Basic Low” or “65 - Tyre Pressure Monitoring System control unit High Sender”
– “J502 - Tyre Pressure Monitoring System control unit, Functions”
– “J502 - Code control unit”

The new tyre pressures must be stored as reference values whenever the inflation pressures are changed intentionally.

Changing a wheel or storing tyre pressures

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To ensure reliable operation of the Tyre Pressure Monitoring System, it is important to store the reference pressures correctly.

– Switch on ignition.
– Press function key “CAR”.
– Using the rotary pushbutton, select “Systems” from the CAR menu and confirm by pressing the button.
– Using the rotary pushbutton, select “Tyre pressure monitoring” from the CAR menu and confirm by pressing the button.
– Using the rotary pushbutton, select “Display tyre pressures” from the CAR menu and confirm by pressing the button.
– Using the rotary pushbutton, select “Store tyre pressures” or “Initialize tyres” from the CAR menu and confirm by pressing the button.

The new tyre pressures must be stored as reference values whenever the inflation pressures are changed intentionally.

3.6 Exploded view of tyre pressure sensor

1 - Metal valve body

- ❑ Use only correct valves as specified in ⇒ Parts catalogue
- ❑ Supplied as complete unit
- ❑ Always renew valve core when changing tyre
- ❑ Removing and installing ⇒ page 279

2 - Valve core

3 - Seal

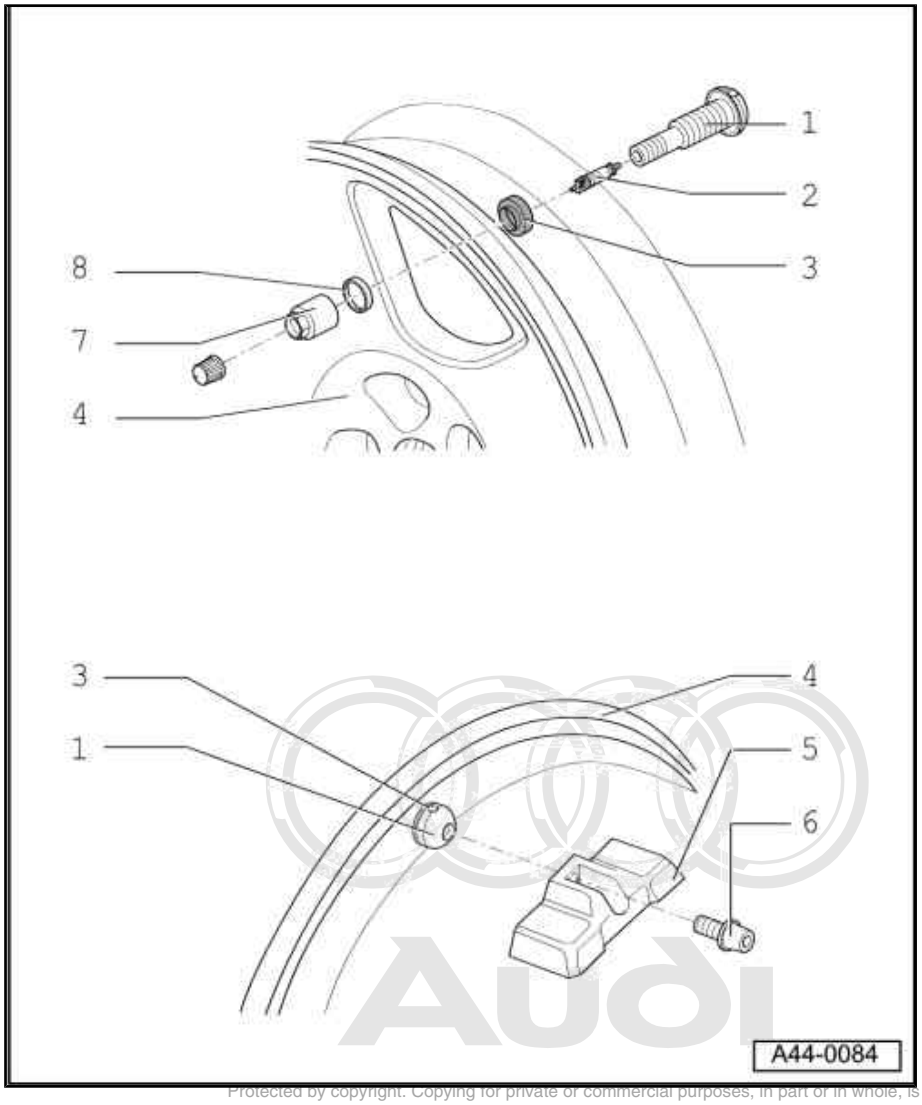
- ❑ Removing and installing ⇒ page 279

4 - Rim

- ❑ Removing and fitting tyre ⇒ page 279 and ⇒ page 279

5 - Tyre pressure sensor, front left - G222- , front right - G223- , rear left - G224- or rear right - G225-

- ❑ The sensor must be renewed as complete unit
- ❑ Remaining service life, temperature and inflation pressure can be read out via diagnosis function with vehicle diagnostic, testing and information system - VAS 5051 B-



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6 - Micro-encapsulated Torx - T20- bolt

- ❑ Tightening torque: 4 Nm
- ❑ Always renew bolt
- ❑ Replacement part only available together with metal valve

7 - Union nut

- ❑ Tightening torque: 4 Nm
- ❑ Removing and installing ⇒ page 279

8 - Chamfered washer

3.7 Changing a tyre

The nickel-plated valve core must always be renewed if a tyre is changed.

The metal valve and the tyre pressure sensor can be re-installed.

– Release air from tyre by unscrewing nickel-plated valve core.

– Remove tyre ⇒ page 279 .

– Perform visual inspection to check for loose or damaged components. Renew complete valve assembly if attachment points are loosened/detached.

Always renew damaged tyre pressure sensors.

– Fit tyre ⇒ page 279 .
– Screw in new nickel-plated valve core.
– Inflate tyre and screw plastic cap back on.
– Balance tyre.

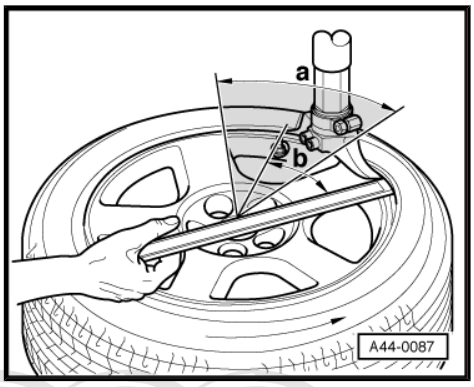
Removing tyre

Roll off or unseat tyre.

When using an unseating tool, first press off the tyre on the side opposite the valve.

Unseating tools must not be used in hatched area -a-.

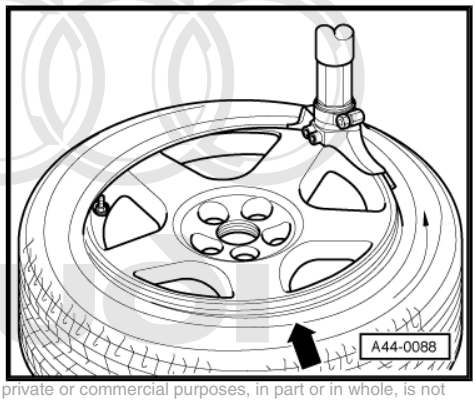
– Position head of installing tool close to valve so that tyre iron can be applied approx. 30° -b- away from valve.
– Then pull off the tyre in the valve area first.



Fitting tyre

Unseating tools must not be used in valve area.

– Position tyre pressure sensor approx. 180° opposite head of installing tool.
– Press tyre into well base approx. 90° in front of installing tool -arrow-.
– Fit tyre.

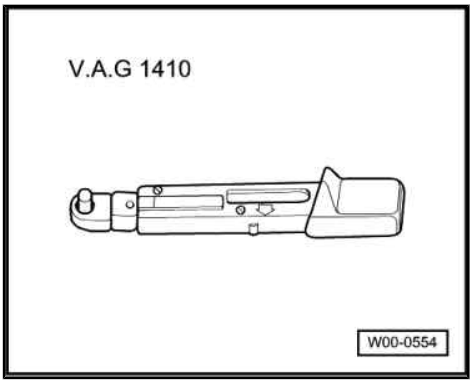


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3.8 Removing and installing metal valve body

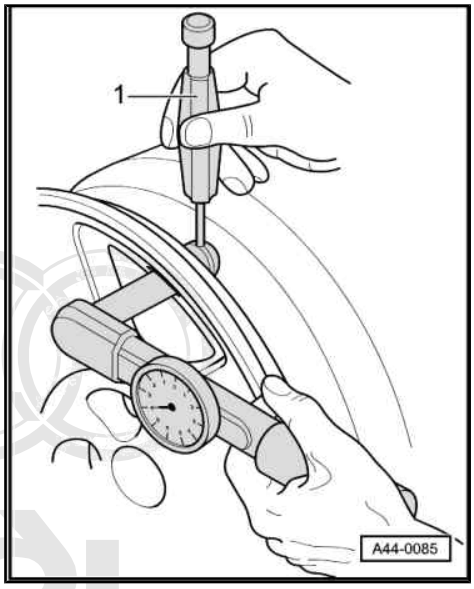
Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1410-

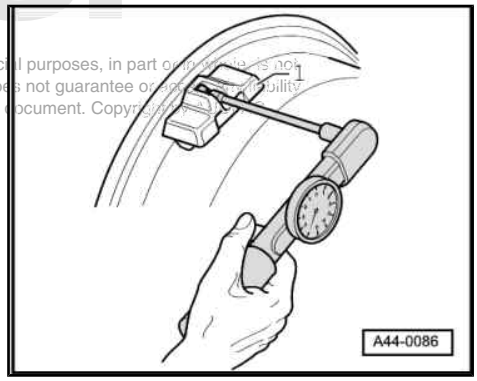


– Push metal valve with rubber seal through the rim from the inside.
– Fit chamfered washer and union nut from outside and tighten ⇒ Item 7 (page 278) .

– Use a suitable tool -1- (e.g. ∅ 2 mm drill bit) to prevent turning.



– Press tyre pressure sensor -1- into well base and screw to back of valve with micro-encapsulated bolt ⇒ Item 6 (page 278) .



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4 Wheel alignment

⇒ “4.1 General notes”, page 281

⇒ “4.2 Wheel alignment must be checked:”, page 281

⇒ “4.3 Explanatory notes on production control numbers (PR Nos.)”, page 282

⇒ “4.4 Wheel alignment specifications”, page 283

⇒ “4.5 Test requirements:”, page 285

⇒ “4.6 Preparations for measurement”, page 285

⇒ “4.7 Checking centre position of rack (mechanical method)”, page 287

⇒ “4.8 Wheel runout compensation”, page 287

⇒ “4.9 Assignment of adapters to running gear versions (for wheel alignment)”, page 288

⇒ “4.10 Sequence of operations for checking and adjusting wheel alignment”, page 288

⇒ “4.11 Checking reference position for wheel alignment (vehicles with air suspension)”, page 289

⇒ “4.12 Checking camber at front wheels and centralising if necessary”, page 290

⇒ “4.13 Adjusting camber at rear wheels”, page 292

⇒ “4.14 Adjusting toe setting at rear wheels”, page 293

⇒ “4.15 Adjusting toe-in curve at front wheels”, page 293

⇒ “4.16 Setting vehicle to initial position for wheel alignment”, page 294

⇒ “4.17 Raising vehicle with running gear 1BA, 1BE, 1BR, 1BV, 1BK, 1BB, 1BD, 1BY, 2MC, 2MS”, page 294

⇒ “4.18 Adjusting toe-constant S ”, page 295

⇒ “4.19 Adjusting toe setting at front wheels”, page 296

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4.1 General notes

Wheel alignment must always be performed using wheel alignment equipment approved by VW/Audi.

The alignment check must always include both the front and the rear axles.

This is important to achieve proper handling and road behaviour.

Note

- *To allow running gear to fully settle, wheel alignment should not be checked before the vehicle has completed 1000 to 2000 km.*
- *When making adjustments, try to obtain the specified settings as accurately as possible.*

4.2 Wheel alignment must be checked:

- In the event of handling problems
- Following accident damage

- If suspension components have been removed.
- If tyres are worn unevenly.

Front axle components	Wheel alignment check required		Adjustment of toe-constant “S” required		Rear axle components	Wheel alignment check required	
	Yes	No	Yes	No		Yes	No
Upper link (rear)		X		X	Shock absorber		X
Upper link (front)		X		X			
Guide link (bottom)		X		X	Coil spring		X
Suspension strut		X		X			
Track control link (bottom)		X		X	Upper transverse link	X	
Mounting bracket		X		X			
Wheel bearing housing	X		X		Wheel bearing housing	X	
Track rod	X		X		Track rod	X	
Steering rack	X		X		Trapezium link	X	
Subframe	X		X		Subframe	X	
Anti-roll bar		X		X	Anti-roll bar		X

4.3 Explanatory notes on production control numbers (PR Nos.)

The PR number on the vehicle data sticker indicates the type of running gear (for front axle and rear axle) and which version of the Tyre Pressure Monitoring System / Tyre Pressure Loss Indicator is fitted in the vehicle.

The vehicle data sticker can be found in the spare wheel well and in the Service Schedule.

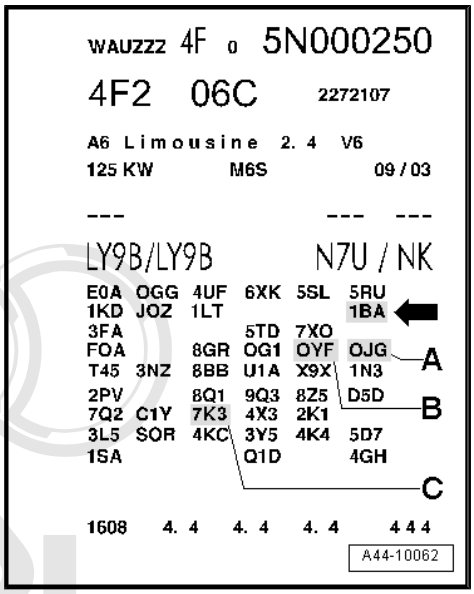
Front axle/rear axle

The PR Nos. for the front axle and rear axle are shown in the illustration: -A- and -B-.

– -A- indicates front axle PR No.

– -B- indicates rear axle PR No.

The PR numbers can be used to identify the correct shock absorber combination in the ⇒ Electronic parts catalogue .



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Running gear versions

The PR No. for the different running gear versions is indicated by the -arrow- in the illustration.

In this example the vehicle is fitted with standard running gear, version 1BA.

1BA = Standard running gear

1BE = Sports running gear

1BR = Heavy-duty running gear

1BV = Sports running gear (quattro GmbH)

1BK = Air suspension

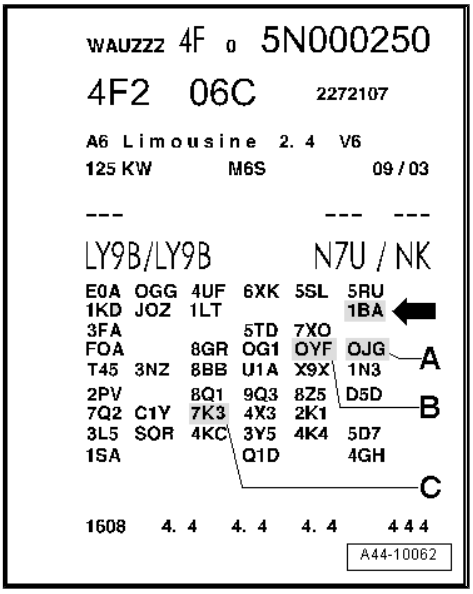
1BB = Urban running gear

1BY = Air suspension, allroad

1BD = Sports running gear, S6

2MS = DRC - Sports running gear with variable 1-stage damping (RS 6 quattro GmbH)

2MC = DRC - Sports running gear with variable 3-stage damping (RS 6 quattro GmbH)



Tyre Pressure Monitoring System

The PR No. for the Tyre Pressure Monitoring System is shown in the illustration: -C-.

In this example the vehicle is fitted with the High version 7K3.

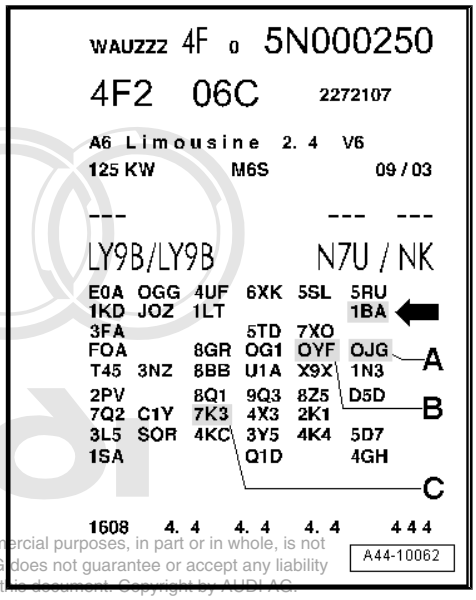
7K3 = High version

7K4 = High version

7K7 = Low version

7K8 = Low version

7K6 = Tyre Pressure Loss Indicator



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4.4 Wheel alignment specifications

Front-wheel drive and four-wheel drive

These specifications are applicable for all engines.

Front axle	Standard running gear (1BA) Urban running gear (1BB)	Sports running gear (1BE)	Heavy-duty running gear (1BR)	Sports running gear, quattro GmbH (1BV)	Sports running gear, S6 (1BD)	Air suspension (1BK); air suspension, allroad (1BY)	Sports running gear (2MC) / (2MS) RS 6 quattro GmbH
Camber	- 52′ ± 25′	- 67′ ± 25′	- 44′ ± 25′	- 74′ ± 25′	- 67′ ± 25′	- 62′ ± 25′	- 38' ± 25'
Maximum permissible difference between left and right	30′	30′	30′	30′	30′	30′	30'

Front axle	Standard running gear (1BA) Urban running gear (1BB)	Sports running gear (1BE)	Heavy-duty running gear (1BR)	Sports running gear, quattro GmbH (1BV)	Sports running gear, S6 (1BD)	Air suspension (1BK); air suspension, allroad (1BY)	Sports running gear (2MC) / (2MS) RS 6 quattro GmbH
Toe angle at each wheel (specification when making adjustment, suspension in initial position)	+ 9′ ± 4′	+ 10′ ± 4′	+ 9′ ± 4′	+ 10′ ± 4′	+ 10′ ± 4′	+ 11′ ± 4′	+ 10′ ± 4′
Toe angle at each wheel (specification when checking adjustment, suspension in initial position)	+ 9′ ± 6′	+ 10′ ± 6′	+ 9′ ± 6′	+ 10′ ± 6′	+ 10′ ± 6′	+ 11′ ± 6′	+ 10′ ± 6′
Toe-constant for each wheel (specification when making adjustment)	+ 25′ ± 4′	+ 25′ ± 4′	+ 25′ ± 4′	+ 25′ ± 4′	+ 13′ ± 4′	+ 13′ ± 4′	+ 20' ± 4′
Toe-constant for each wheel (specification when checking adjustment)	+ 25′ ± 7′	+ 25′ ± 7′	+ 25′ ± 7′	+ 25′ ± 7′	+ 13′ ± 7′	+ 13′ ± 7′	+ 20' ± 7′
Permissible difference between left and right toe-constant	max. 8′	max. 8′	max. 8′	max. 8′	max. 8′	max. 8′	max. 8′
Toe-out on turns at 20 degrees steering angle [4)]	1° 12′ ± 30′	1° 20′ ± 30′	1° 6′ ± 30′	1° 33′ ± 30′	1° 33′ ± 30′	1° ± 30′	1° 33′ ± 30′

4) The wheel on the outside of a curve is turned in less than the inside wheel. This value shows the difference in the steering angles. It can be displayed as a negative value on the wheel alignment computer, depending on the manufacturer.

Rear axle	Standard running gear (1BA) Urban running gear (1BB)	Sports running gear (1BE)	Heavy-duty running gear (1BR)	Sports running gear, quattro GmbH (1BV)	Sports running gear, S6 (1BD)	Air suspension (1BK) air suspension, allroad (1BY)	Sports running gear (2MC) / (2MS) RS 6 quattro GmbH
Camber	- 50′ ± 20′	- 50′ ± 20′	- 50′ ± 20′	- 50′ ± 20′	- 50′ ± 20′	- 75′ ± 20′	- 50′ ± 20′
Maximum permissible difference between left and right	25′	25′	25′	25′	25′	25′	25′
Toe setting for each wheel	+ 9′ ± 5′	+ 9′ ± 5′	+ 9′ ± 5′	+ 9′ ± 5′	+ 9′ ± 5′	+ 9′ ± 5′	+ 9′ ± 5′
Maximum permissible deviation in direction of travel relative to longitudinal axis of vehicle	10′	10′	10′	10′	10′	10′	10′

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Additional data for vehicles with front-wheel drive and four-wheel drive:

The additional data listed here are intended only to facilitate diagnosis after an accident.

Table ⇒ page 1

These specifications are applicable to all engines.

4.5 Test requirements:

- Tread depth difference of no more than 2 mm on one axle.
- Tyres inflated to correct pressures.
- Ensure that the sliding plates and turntables are not touching the end stop when checking the alignment.
- Vehicle in unladen condition. “Unladen” means: ready for the road (full tank, full windscreen washer/headlight washer fluid reservoir, spare wheel, vehicle tools and vehicle jack) but without driver.

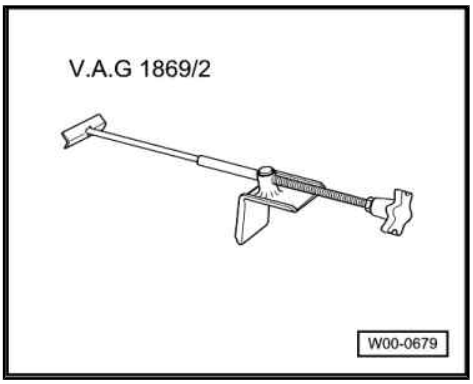
Spare wheel, vehicle tool kit and jack must be in their specified positions.

- Vehicle accurately aligned, suspension bounced and rocked several times
- Check suspension, steering and steering linkage for excessive play or damage and service if necessary.
- Perform compensation of wheel rim runout: A certain amount of axial runout at the wheel rims is permissible, but this may already exceed the specified toe-in tolerance. In such cases it is not possible to set the toe-in correctly without first compensating for the wheel runout.

4.6 Preparations for measurement

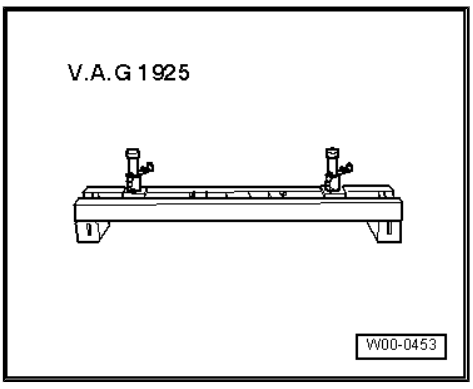
Special tools and workshop equipment required

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



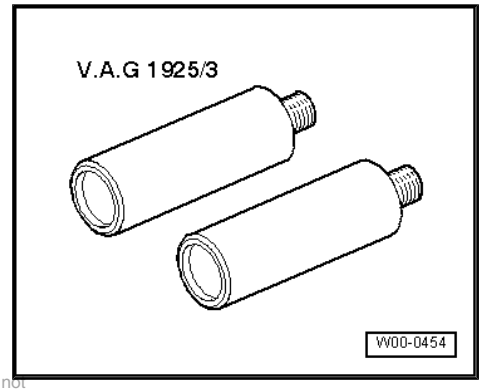
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♦ Gap setting gauge - V.A.G 1925-

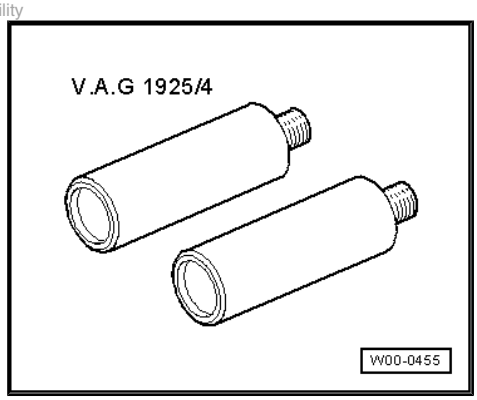


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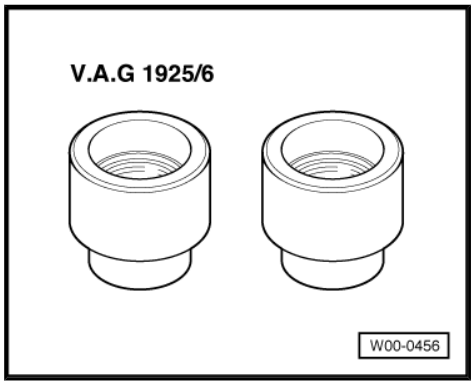
- Adapter - V.A.G 1925/3-



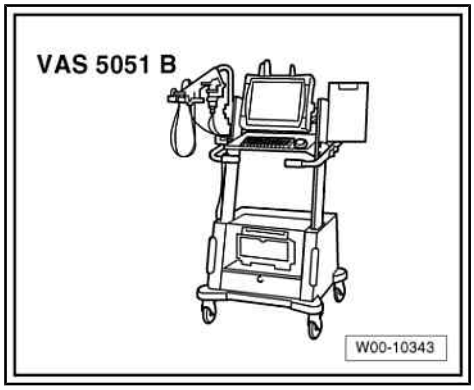
- Adapter - V.A.G 1925/4-



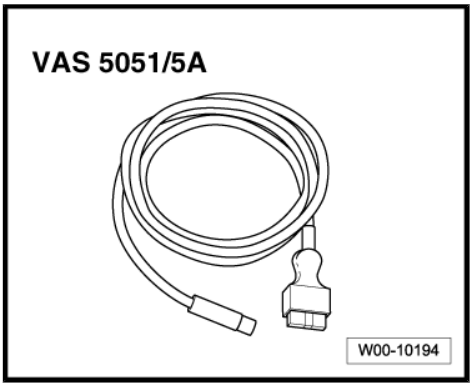
- Adapter - V.A.G 1925/6-



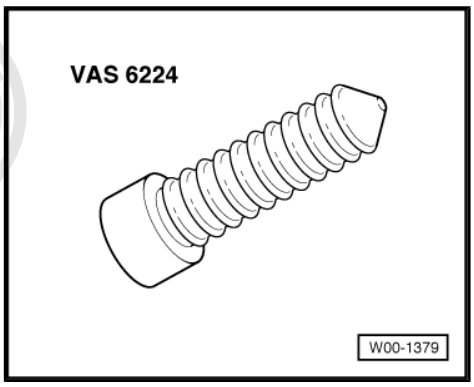
- Vehicle diagnostic, testing and information system - VAS 5051 B-



- Diagnosis cable - VAS 5051/5A-



- Steering centring bolt - VAS 6224-



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- Wheel alignment computer

Sensors must be properly attached and adjusted; refer to operating instructions of equipment manufacturer.

Ensure that the sliding plates and turntables are not touching the end stop when checking the alignment.

4.7 Checking centre position of rack (mechanical method)

The centre position of the rack can be checked with steering centring bolt - VAS 6224- (mechanical method) ⇒ page 333 **.**

4.8 Wheel runout compensation

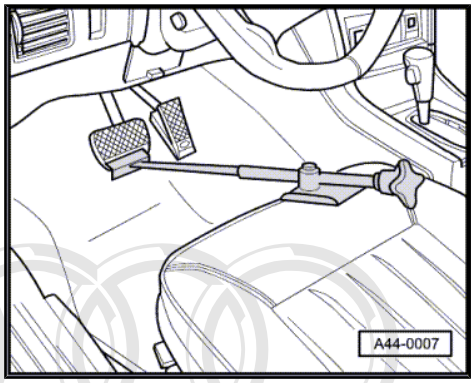
The existing lateral runout of the wheel rims must be compensated accordingly. Otherwise false results will be obtained.

A certain amount of axial runout at the wheel rims is permissible, but this may already exceed the specified toe-in tolerance. In such cases it is not possible to set the toe-in correctly without first compensating for the wheel runout.

The toe-in cannot be set correctly without performing wheel runout compensation.

– Please observe the operating instructions provided by the manufacturer of the wheel alignment unit.

– Set up brake pedal actuator - V.A.G 1869/2- .



4.9 Assignment of adapters to running gear versions (for wheel alignment)

Adapter	Standard running gear (1BA) Urban running gear (1BB)	Sports running gear (1BE); air suspension (1BK); air suspension, all-road (1BY); sports running gear, S6 (1BD)	Heavy-duty running gear (1BR)	Sports running gear quattro GmbH (1BV) Sports running gear quattro GmbH (2MC) / (2MS) RS 6
-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- 5)	X	X	X	X

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5) Only required on certain lifting platforms. -V.A.G 1925/3- replaces -V.A.G 1925/4-

4.10 Sequence of operations for checking and adjusting wheel alignment

Note

- *The vehicle must always be in unladen condition when measuring wheel alignment ⇒ page 285 .*
- *Check which running gear version is fitted in vehicle. This information is listed on the vehicle data sticker ⇒ page 282*
- *Exception: this does not apply when measuring toe-in curve as described in alignment program instructions.*

Always keep to the following sequence of operations.

1 - Vehicles with air suspension: check reference position for wheel alignment ⇒ page 289 .

2 - If necessary, check centre position of rack ⇒ page 287 .

3 - Carry out wheel rim runout compensation ⇒ page 287 .

4 - Check camber at front wheels and centralise if necessary ⇒ page 290 .

5 - Check camber at rear wheels and adjust if necessary ⇒ page 292 .

6 - Check toe setting at rear wheels and adjust if necessary ⇒ page 293 .

7 - Check toe-in curve at front wheels if necessary. The table on ⇒ page 281 and the description on ⇒ page 293 indicate whether or not the toe-in curve (toe constant “S”) requires adjustment.

8 - Check toe setting at front wheels with suspension in initial position and adjust if necessary ⇒ page 296 .

9 - If suspension geometry settings have been altered, zero position compensation must be performed for steering angle sender -G85- , see ⇒ vehicle diagnostic, testing and information system VAS 5051 .

10 - If settings have been altered at the rear wheels, perform ACC adjustment ⇒ page 297 .

11 - If settings have been altered at the rear wheels, perform calibration of lane departure warning function ⇒ page 312 .

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4.11 Checking reference position for wheel alignment (vehicles with air suspension)

Checking reference position for wheel alignment

– Connect -VAS 5051 A- , start Guided Fault Finding sequence for the vehicle in question and use Go to button to select “Function /Component Selection” ⇒ page 217 .

Then

– “Running gear (Rep. Gr. 01; 40 - 49)”
– “34 - Adaptive suspension (Rep. Gr. 01; 43; 44)”
– “44 - Wheels, tyres, vehicle geometry”
– “KD44 85 - Wheel alignment”

Note

Height dimensions must be checked and if necessary re-adapted before activating jacking mode.

– Activate jacking mode ⇒ page 215 .

Running gear 1BK

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

Running gear 1BY

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

Determining height dimension -x-

Height dimension -x- is the value in mm between the centre of the wheel and the bottom edge of the wing.

– Measure rim diameter.

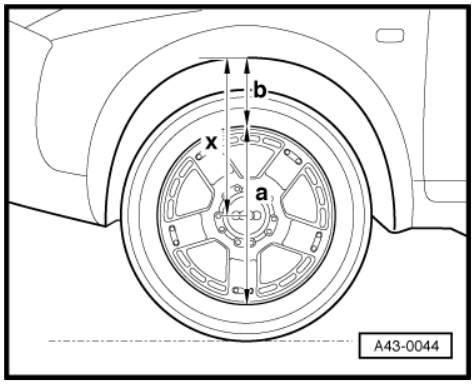
The measured value is dimension -a-.

– Measure vertical distance from top edge of rim to bottom edge of wing.

The measured value is dimension -b-.

The height dimension x is calculated as follows:

x = a : 2 + b



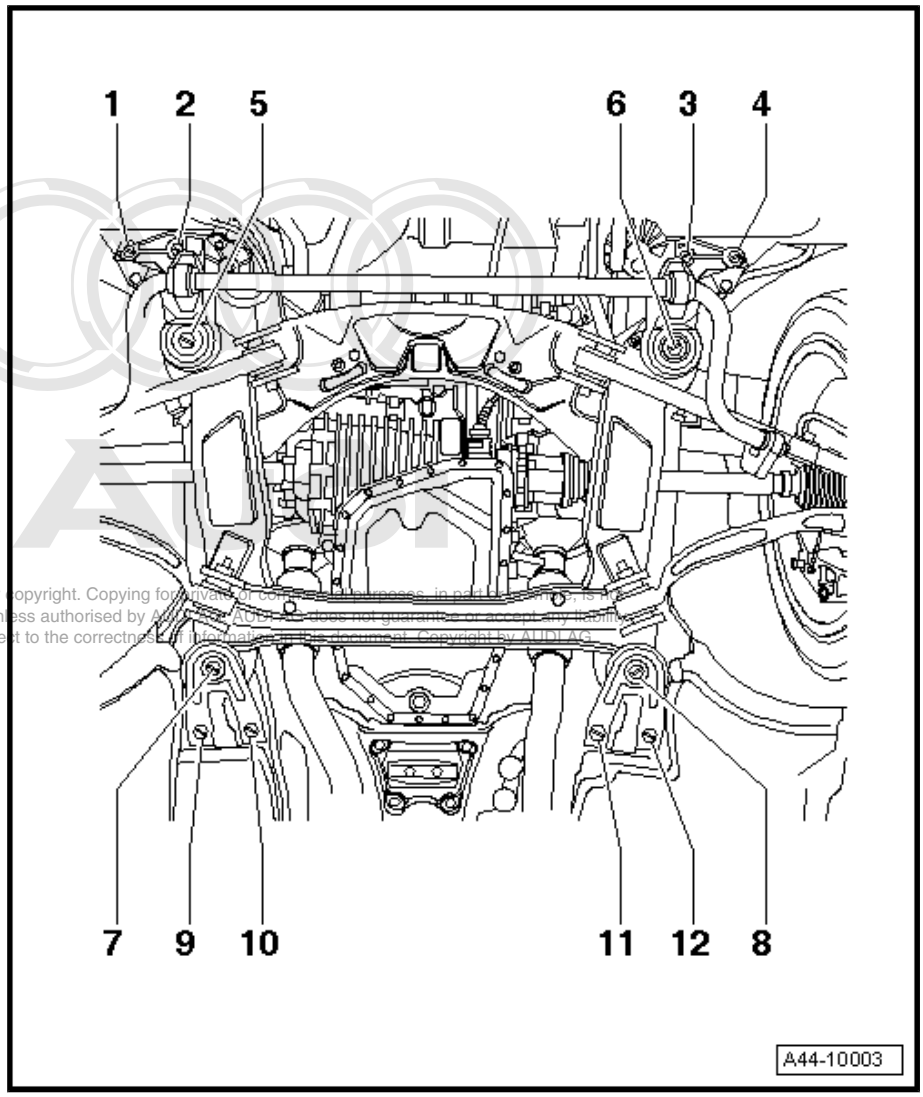
4.12 Checking camber at front wheels and centralising if necessary

The camber cannot be adjusted.

By moving the subframe, it is possible to centralise the camber setting symmetrically within the specified tolerance range.

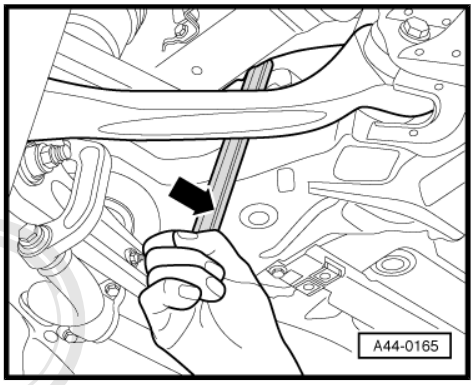
– Remove noise insulation ⇒ Rep. gr. 50 .

– Slacken off hexagon bolts -1- to -12-.



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– Use plastic-coated tyre iron to move subframe (with engine mountings and anti-roll bar) to required position.



Apply pressure in centre of subframe between subframe and longitudinal member of body.

If no plastic-coated tyre iron is available, wrap adhesive tape around a conventional tyre iron.

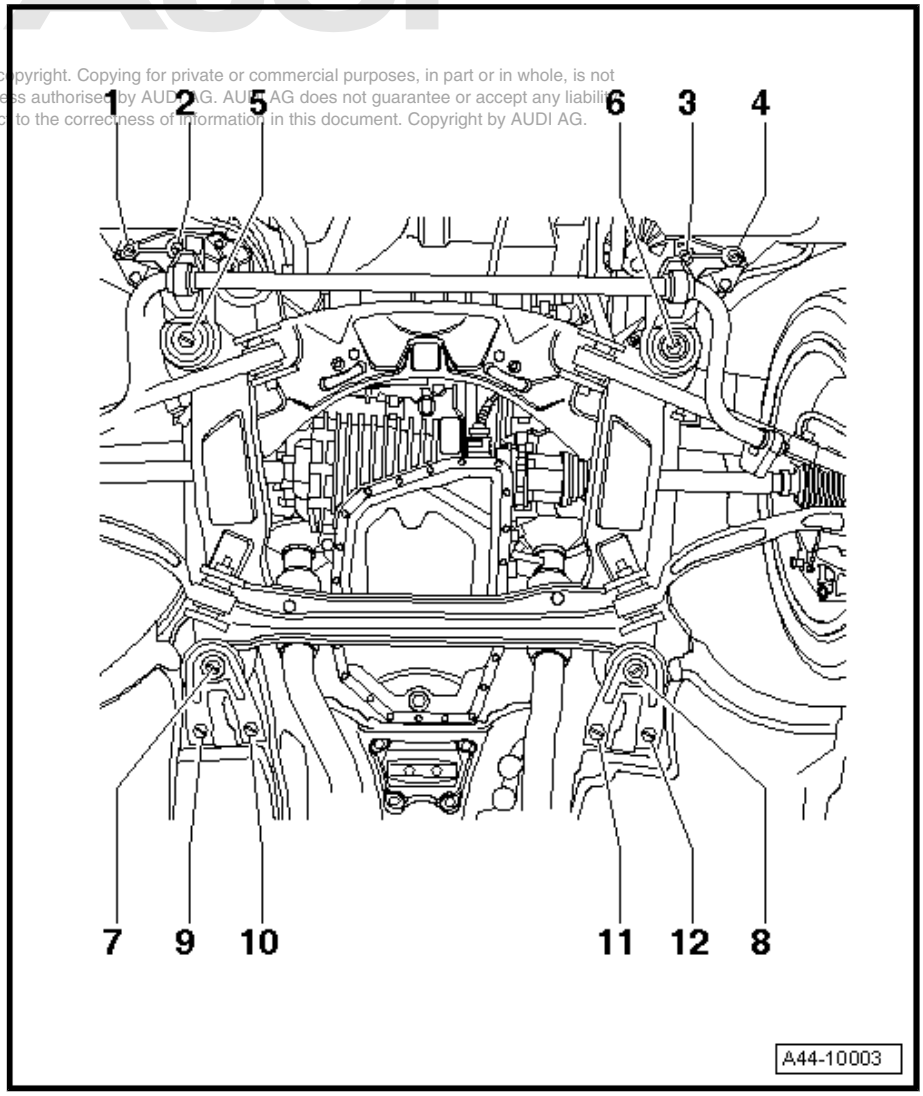
WARNING

Take care not to damage any components.

Wheel alignment specifications ⇒ page 283

– Screw in and tighten new hexagon bolts -6- and -7- in turn ⇒ Item 16 (page 21) .

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– Screw in and tighten new hexagon bolts -5- and -8- in turn ⇒ Item 12 (page 20) .

– Screw in and tighten new hexagon bolts -1-, -2-, -3- and -4- in turn ⇒ Item 29 (page 22) .

– Tighten hexagon bolts -9-, -10-, -11- and -12- ⇒ Item 9 (page 20) .
– Now check camber setting again ⇒ page 283 .
– Fit noise insulation ⇒ Rep. gr. 50 .

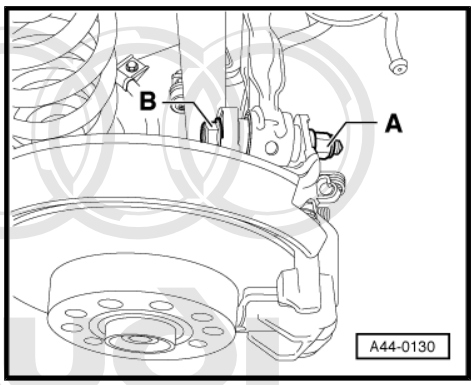
Please note:

All wheel alignment settings must be checked if camber setting has been altered.

4.13 Adjusting camber at rear wheels

– Unscrew nut -A- at wheel bearing housing/upper link, and screw on new nut as far as stop.
– Adjust camber by turning eccentric bolt -B-.

Wheel alignment specifications ⇒ page 283



Note

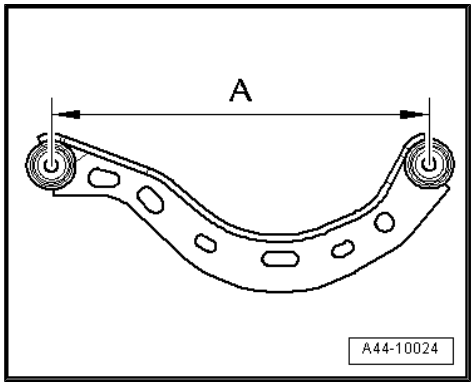
- *The maximum adjustment range is 90° to the left or right of the centre position.*
- *If it is not possible to obtain the specified camber setting by turning the eccentric bolt, the upper link may be deformed. Check dimensions of upper link ⇒ page 292 .*
- *For illustration purposes the camber adjustment is shown with the wheel removed.*

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– Tighten nut -A- ⇒ Item 3 (page 155) .
– Check camber value again after tightening nut -A- ⇒ page 283 .

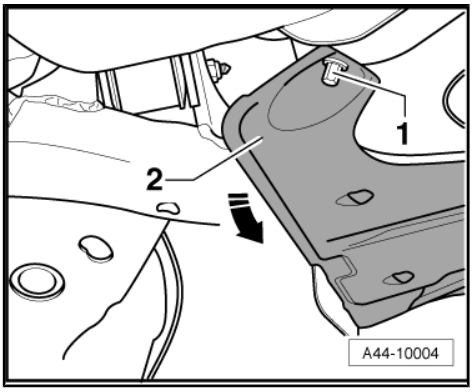
Checking dimensions of upper link

– Remove upper link ⇒ page 159 .
– Check dimension -A-.
– Renew upper link if dimension -A- is less than 337 mm.



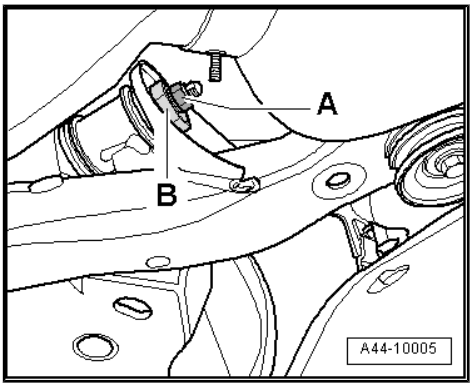
4.14 Adjusting toe setting at rear wheels

– Remove plastic nut -1- and press plastic cover -2- down slightly -arrow-.



– Unscrew nut -A- at trapezium arm/subframe, and screw on new nut as far as stop.

– Adjust toe setting as required by turning adjuster plate -B- (36 mm).



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Wheel alignment specifications ⇒ page 283

– Tighten nut -A- ⇒ Item 15 (page 156) .

– Check toe setting again after tightening nut -A- ⇒ page 283 .

Note

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

4.15 Adjusting toe-in curve at front wheels

Explanatory notes:

The compression and rebound movement of the front wheels alters the toe value as a function of the compression/rebound travel. The resulting toe values are referred to as the toe-in curve.

The change in the toe-constant “S” is adjusted by vertical adjustment of the track rod end with the vehicle lifted ⇒ page 295 .

The electronic wheel alignment equipment determines the toe-constant “S” by comparing one value measured with the suspension in the initial position and one value measured with the vehicle lifted. It compares the actual values with the specified values and displays them on the screen.

Different adapters are required for lifting the suspension, depending on the type of running gear ⇒ page 288 .

Note

An incorrectly set toe-constant causes steering deviation when braking/accelerating or when driving over uneven ground.

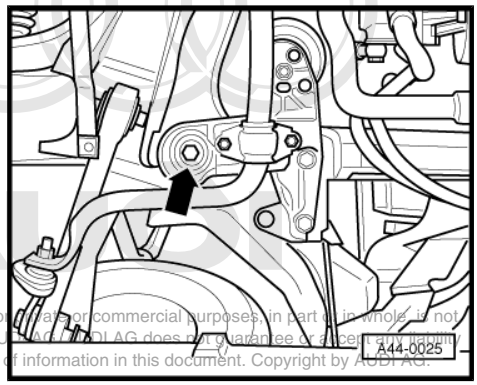
4.16 Setting vehicle to initial position for wheel alignment

Running gear 1BA, 1BE, 1BR, 1BV, 1BK, 1BB, 1BD, 1BY, 2MC, 2MS

Note

Depending on the type of wheel alignment equipment, it may be necessary to raise the front axle of the vehicle in order to insert spacer - V.A.G 1925- . Bounce suspension after lowering vehicle.

– Insert spacer - V.A.G 1925- with appropriate adapters ⇒ page 288 and screw out both spindles until they just make contact with front bolts -arrow- on subframe.



This must not cause the vehicle to be raised.

The suspension is now in the initial position.

All running gear versions

In this position, the wheel alignment program checks whether the current toe-in value for each wheel corresponds with the specification. If necessary, the toe-in must be corrected by adjusting the track rod length.

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Adjusting toe setting at front wheels with suspension in initial position ⇒ page 296 .

Wheel alignment specifications ⇒ page 283

The wheel alignment software will only show the relevant display if a correction is required.

4.17 Raising vehicle with running gear 1BA, 1BE, 1BR, 1BV, 1BK, 1BB, 1BD, 1BY, 2MC, 2MS

When performing the next step, ensure that the wheels do not lose contact with the turntables when the vehicle is lifted.

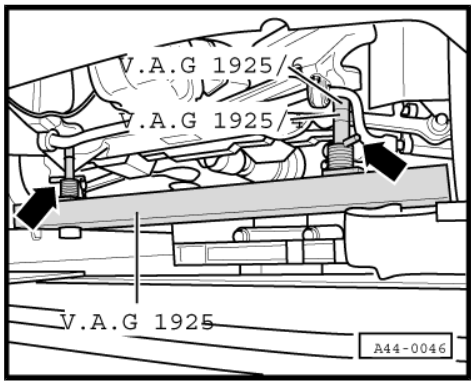
If this does happen, do not move the turntables as this would give false results.

– Position axle lift under front jacking points and raise vehicle.

Note

The vehicle must be lifted 60 mm.

– Push cylinders out of threaded spindles and secure in position with locking pins.



Ensure that locking pins -arrows- are correctly positioned.

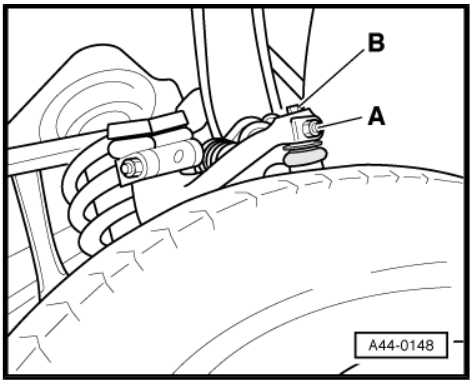
– Lower vehicle onto spacer - V.A.G 1925- .

4.18 Adjusting toe-constant “S”

– Slacken off hexagon nut -A-.

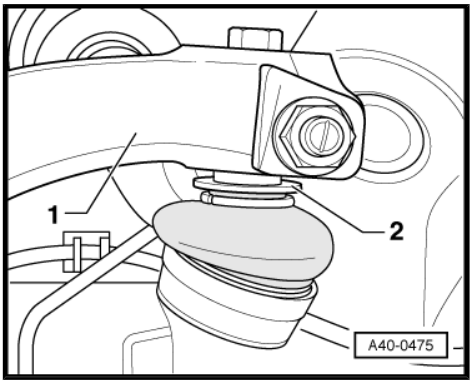
– Remove bolt -B-.

– Push track rod ball joint downwards onto stop.



Note

- *Do not apply a chisel or similar tool between steering arm -1- and seal -2- when pressing out track rod, otherwise the seal can be damaged.*
- *When pressing track rod out of steering arm, apply pressure only to end of track rod ball joint, or knock out end of joint using a wooden or rubber mallet.*



– Screw in new bolt -B- until exact specification is achieved.

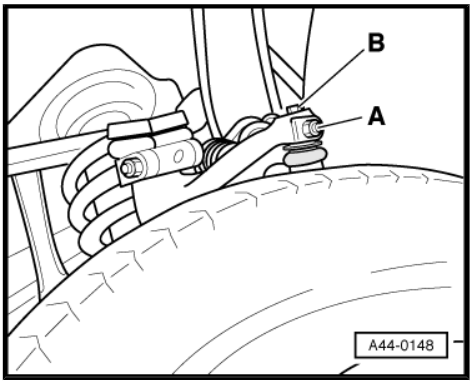
– Tighten hexagon nut -A- ⇒ Item 5 (page 80) and check value.

– Tighten bolt -B- ⇒ Item 4 (page 80) .

– Lower vehicle back into initial position.

– Screw down threaded spindle.

– Bounce suspension several times.



Checking toe-constant after adjusting

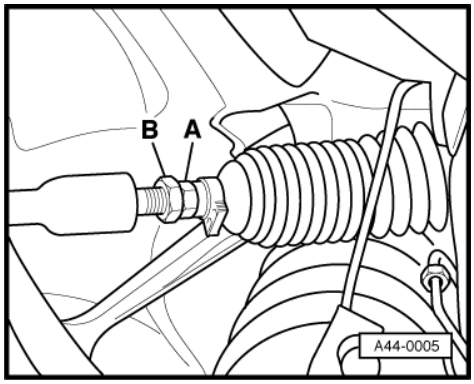
The wheel alignment equipment will then re-check the toe-constant.

If the second check shows that the values are within the tolerance (specification when checking adjustment), the setting is OK.

If the values are outside the tolerance (specification when checking adjustment), the setting must be adjusted again with the suspension in the raised position.

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4.19 Adjusting toe setting at front wheels



– Loosen lock nut -B-.
– Adjust toe setting at left and right wheels via hexagon flats -A-.

Make sure that rubber boots are not twisted after turning track rods.

Twisted rubber boots wear out quickly.

– Tighten lock nut -B- ⇒ Item 2 (page 346) and check toe-in value again.

The setting may change slightly after tightening lock nut -B-.

However, the adjustment is correct if the measured toe value is still inside the tolerance.

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5 Adaptive Cruise Control (ACC)

⇒ “5.1 Exploded view of sensor for adaptive cruise control G550 ”, page 297 .

⇒ “5.2 General information on ACC”, page 297 .

⇒ “5.3 Adjustment procedure using ACC setting device VAS 6190 ”, page 298 .

⇒ “5.4 Adjustment procedure using ACC setting device VAS 6430 ”, page 304 .

⇒ “5.5 Removing and installing sensor for adaptive cruise control G550 ”, page 309 .

⇒ “5.6 Dismantling and assembling sensor for adaptive cruise control G550 with frame”, page 310

5.1 Exploded view of sensor for adaptive cruise control - G550-

1 - Sensor for adaptive cruise control - G550-

- ❑ Removing and installing ⇒ page 309

2 - Frame

3 - Bolt

- ❑ 4.5 Nm

4 - Stud

- ❑ Note setting dimension when installing ⇒ page 310

5 - Bolt

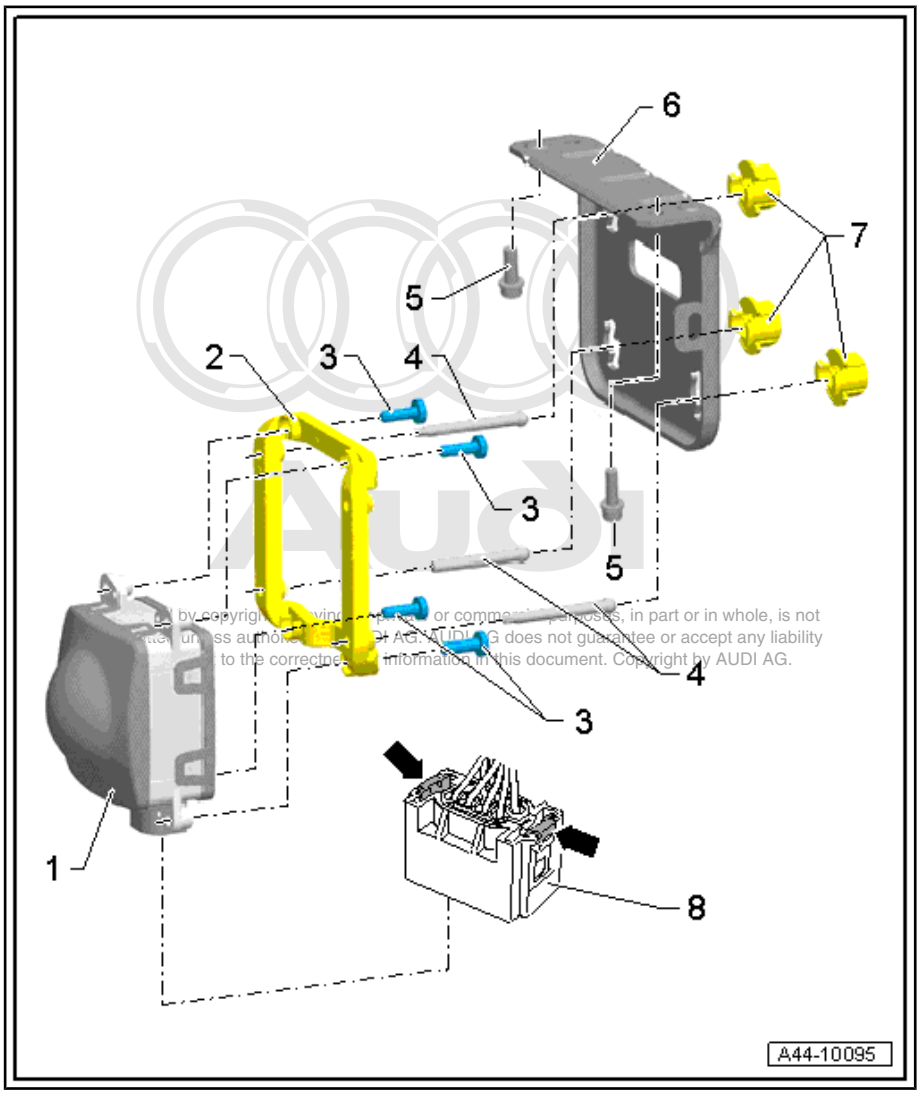
- ❑ 8 Nm

6 - Bracket

7 - Nut

8 - Connector

- ❑ Compress both catches -arrows- to release.



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5.2 General information on ACC

The adaptive cruise control sensor and adaptive cruise control unit - J428- are installed together in a single housing. The entire

unit has to be replaced if the sensor or the control unit are defective.

In the following description the combined sensor/control unit is referred to as the "sensor".

The radar cover of the sensor is located behind the front bumper cover and is made of radar-transparent material. Any modifications, such as subsequent paint application or the affixing of stickers, can lead to malfunctions.

Malfunctions can also occur if the sensor is dirty. In this case, remove the air intake grille or the radiator grille in front of the sensor as described in the Workshop Manual and clean the sensor and the inside of the grille.

Before performing ACC adjustment, read out fault memory and rectify faults as necessary.

"Measured value block 2" of the ACC control unit will indicate whether or not the sensor is out of adjustment.

The sensor does not have to be re-adjusted if it is only slightly out of adjustment (–0.8° to +0.8°).

Use only wheel alignment and adjustment equipment approved by VW/Audi for ACC adjustment.

Correct adjustment is essential for proper ACC operation.

Note

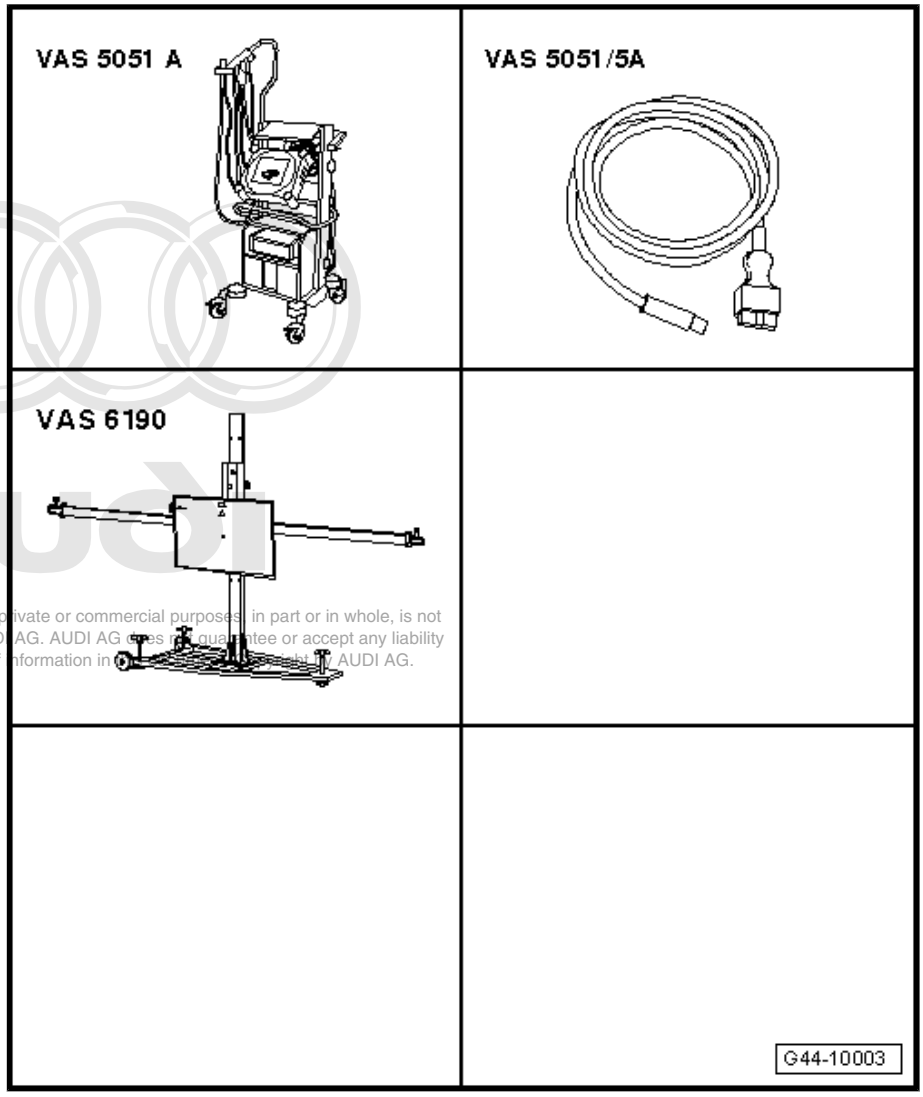
- *Re-adjustment is required:*
- *If the rear axle toe setting has been changed.*
- *If the complete sensor for adaptive cruise control - G550- has been renewed.*
- *If the bumper cross member has been unfastened or repositioned.*
- *If the front end has been unfastened or repositioned.*
- *If front end of vehicle is damaged.*
- *If sensor is more than –0.8° to +0.8° out of adjustment.*

5.3 Adjustment procedure using ACC setting device - VAS 6190-

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Special tools and workshop equipment required

- Vehicle diagnostic, testing and information system - VAS 5051/B-
- Diagnosis cable - VAS 5051/5A-
- ACC setting device - VAS 6190-
- Wheel alignment computer



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Note

- *Before driving the vehicle onto the alignment platform, make sure there is sufficient space between the vehicle and the ACC setting device - VAS 6190- . The distance between the ACC setting device - VAS 6190- and the vehicle must be 120 cm ± 5 cm.*
- *If the available space is not adequate, drive the vehicle backwards onto the alignment platform as required.*

- Before starting adjustment, read out fault memory and rectify any faults.

The adjustment procedure described here is based on ACC setting device - VAS 6190- . However, you can also use ADC adjustment device - VAS 6041- and ACC reflective mirror - VAS 6041/1- .

Note

The steps listed under “Adjustment procedure (when wheel alignment has not been previously checked)” are only required if no wheel alignment check has already been performed.

Adjustment procedure (when wheel alignment has not been previously checked)

– Connect battery charger ⇒ Rep. gr. 27 .

– Activate jacking mode ⇒ page 215 .

– Press button to select ACC adjustment procedure in wheel alignment computer.

– Attach quick-release clamps to rear wheels.

– Attach wheel alignment sensors to rear wheels.

– Carry out wheel rim runout compensation for rear wheels.

Note

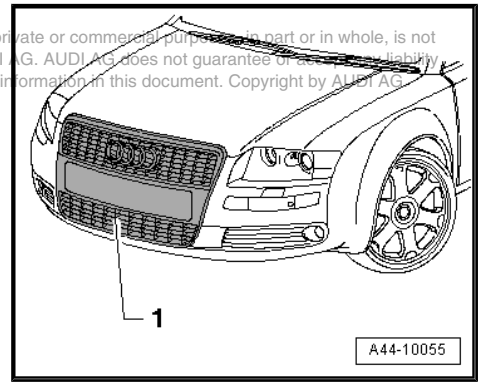
Do not take hold of the cross bar when moving the -VAS 6190- .

Adjustment procedure (irrespective of previous wheel alignment check)

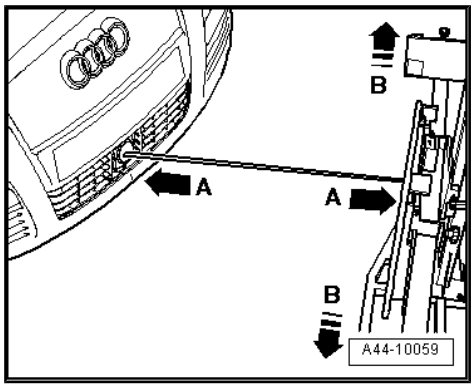
– Detach radar cover -1- from bumper ⇒ Rep. gr. 63 .

– Remove any dirt from sensor lens and inside of radar cover.

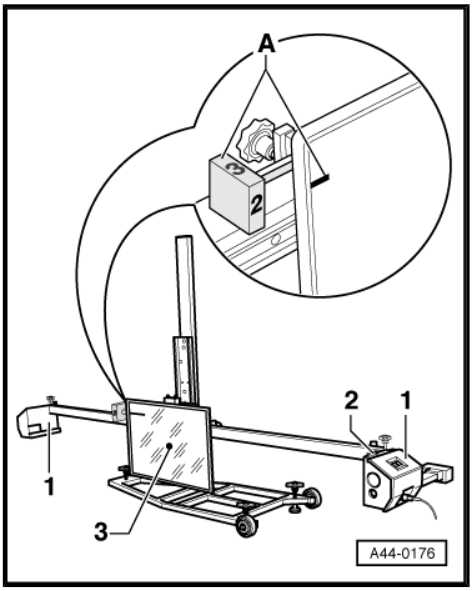
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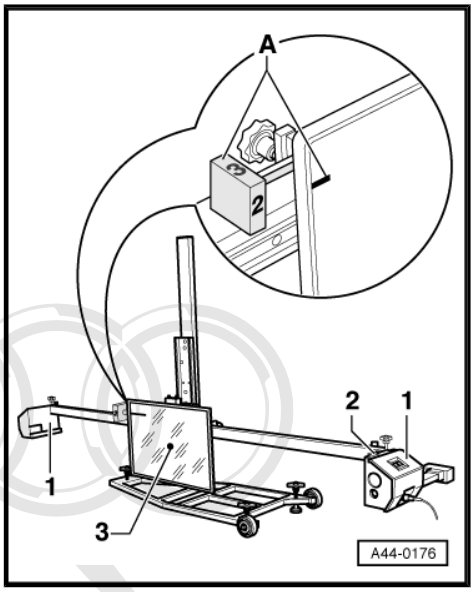
– Position ACC setting device - VAS 6190- so that distance -A- between sensor lens and surface of reflector is 120 cm ± 5 cm.



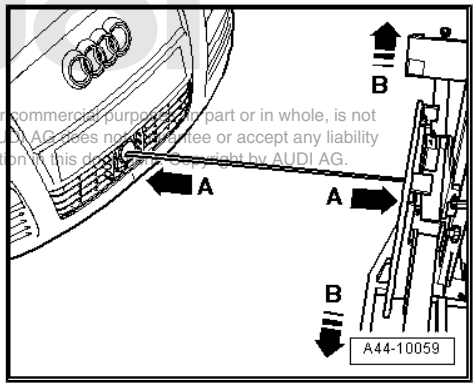
– Attach front wheel alignment sensors -1- to -VAS 6190- .



– In area -A-, align number -2- on rotary knob with mark on mirror (number 2 on rotary knob must face vehicle).

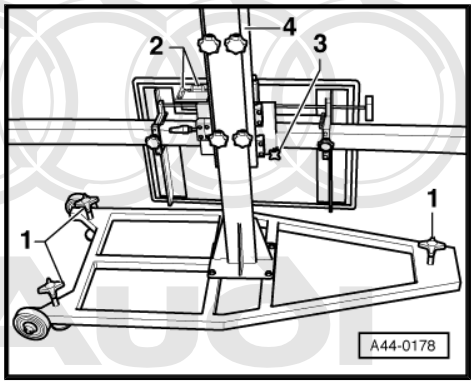


– By moving it sideways -arrows B-, set -VAS 6190- so that laser beam coincides with centre of sensor lens in the horizontal plane.



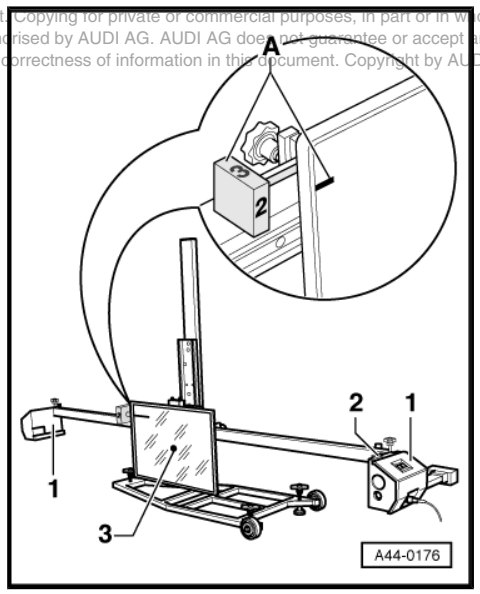
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– Use adjusting screws -1- to bring spirit levels -2- on -VAS 6190- into horizontal position.
– Set vertical slide -4- of -VAS 6190- so that laser beam coincides with centre of sensor lens in vertical plane.
– Set identical individual front axle toe values with fine adjustment screw -3-.
– Difference between individual toe values must be less than 6' or equal.



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– Balance out spirit levels -2- on wheel alignment sensors -1-.
– Then check again that laser beam -3- from -VAS 6190- coincides with 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.*
- *The alignment of -VAS 6190- must be repeated if the laser beam does not coincide with the sensor lens.*

– Connect vehicle diagnostic, testing and information system -VAS 5051/B- .

– Plug in connector of diagnosis cable - VAS 5051/5A- at diagnostic connection.

– Switch on vehicle diagnostic, testing and information system .

The vehicle diagnostic, testing and information system is ready for operation when the selector buttons for the operating modes appear on the screen.

– Switch on ignition.

– Touch 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 vehicle diagnostic, testing and information system has interrogated all the control units in the vehicle.

– Press the Go to button and select the option “Function/component selection”.

Then

– “Body (repair group 01; 27; 50 - 97)”

– “Electrical system (Rep. Gr. 01; 27; 50 - 97)”

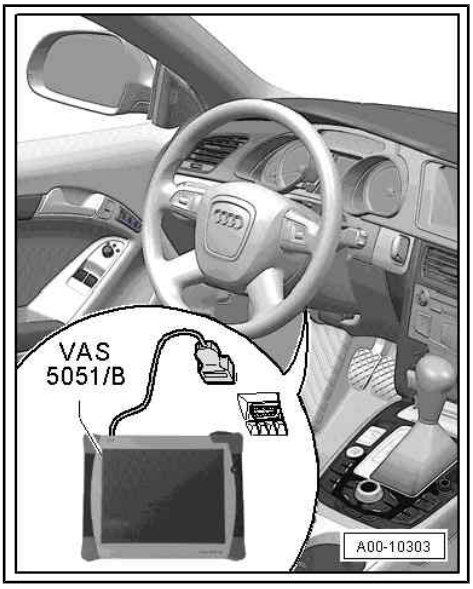
– “01 - Self-diagnosis compatible systems”

– “13 - Adaptive cruise control” (Distance regulation)

– “J428 - Adaptive cruise control unit, functions”

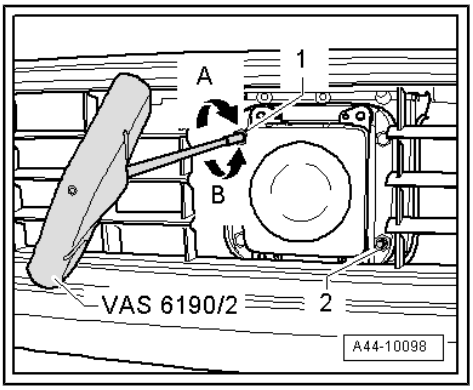
– “J428 - Adaptive cruise control adjustment”

Then follow adjustment instructions on screen.



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– For fine adjustment in the “Guided Fault Finding” routine, use screws -1- (top) and -2- (bottom).



WARNING

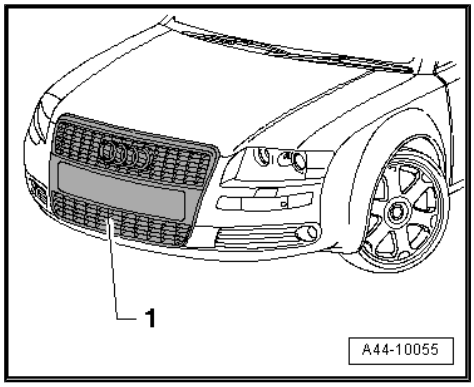
ACC adjustment is not completed until -VAS 5051/B- displays “Control element test ended”.

– Switch off ignition.

– Detach connector of diagnosis cable - VAS 5051/5A- at diagnostic connection.

– Disconnect battery charger ⇒ Rep. gr. 27 .

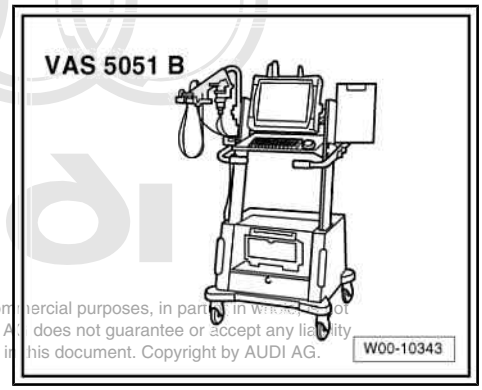
– Install radar cover -1- on bumper ⇒ Rep. gr. 63 .
– When sliding on radar cover -1-, make sure that electrical wiring is not pushed over sensor lens.



5.4 Adjustment procedure using ACC setting device - VAS 6430-

Special tools and workshop equipment required

♦ Vehicle diagnostic, testing and information system - VAS 5051 B- with appropriate diagnosis cable



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♦ Wheel alignment computer
♦ -VAS 6430-

Note

♦ *Before driving the vehicle onto the alignment platform, make sure there is sufficient space between the vehicle and the ACC setting device -VAS 6430- . The distance between the ACC setting device -VAS 6430- and the vehicle must be 120 cm ± 5 cm.*
♦ *If the available space is not adequate, drive the vehicle backwards onto the alignment platform as required.*

• Before starting adjustment, read out fault memory and rectify any faults.

The adjustment procedure described here is based on ACC setting device - VAS 6430- .

Note

The steps listed under “Adjustment procedure (when wheel alignment has not been previously checked)” are only required if no wheel alignment check has already been performed.

Adjustment procedure (when wheel alignment has not been previously checked)

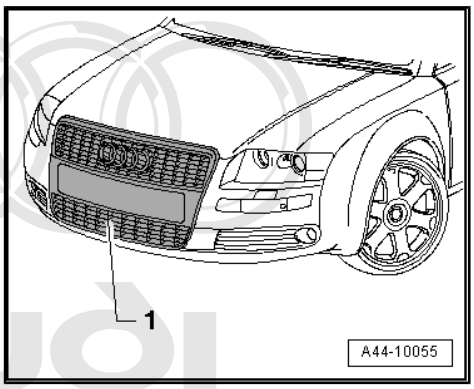
– Connect battery charger ⇒ Rep. gr. 27 .
– Activate jacking mode ⇒ page 215 .
– Press button to select ACC adjustment procedure in wheel alignment computer.
– Attach quick-release clamps to rear wheels.
– Attach wheel alignment sensors to rear wheels.
– Carry out wheel rim runout compensation for rear wheels.

Note

Do not take hold of the cross bar when moving the -VAS 6430- .

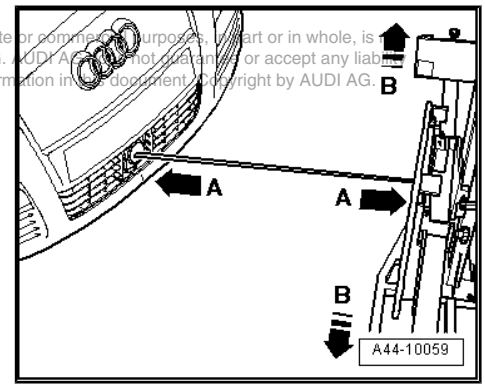
Adjustment procedure (irrespective of previous wheel alignment check)

– Detach radar cover -1- from bumper ⇒ Rep. gr. 63 .
– Remove any dirt from sensor lens and inside of radar cover.

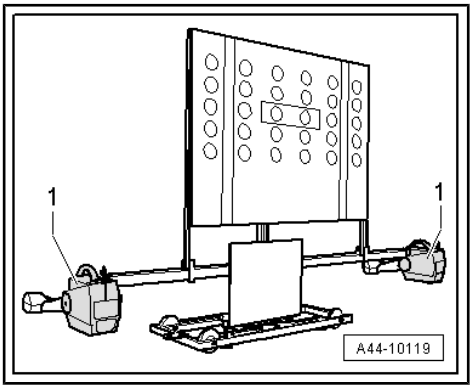


– Position ACC setting device - VAS 6430- so that distance -A- between sensor lens and surface of reflector is 120 cm ± 5 cm.

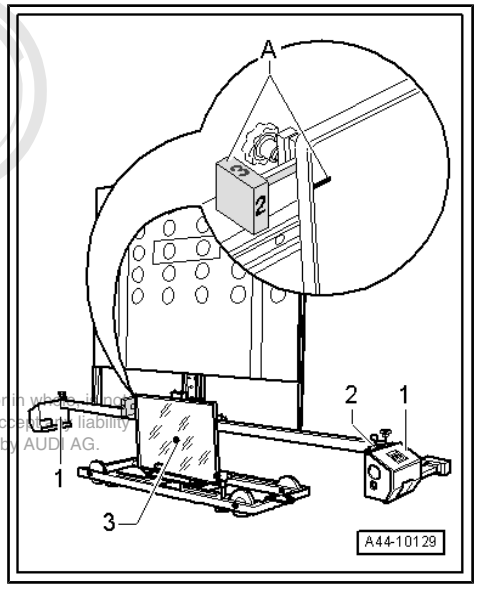
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– Attach front wheel alignment sensors -1- to -VAS 6430- .

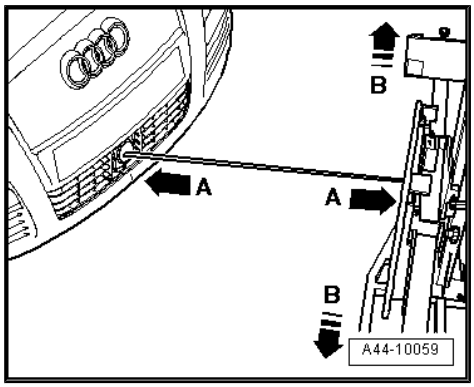


– In area -A-, align number -2- on rotary knob with mark on mirror (number 2 on rotary knob must face vehicle).

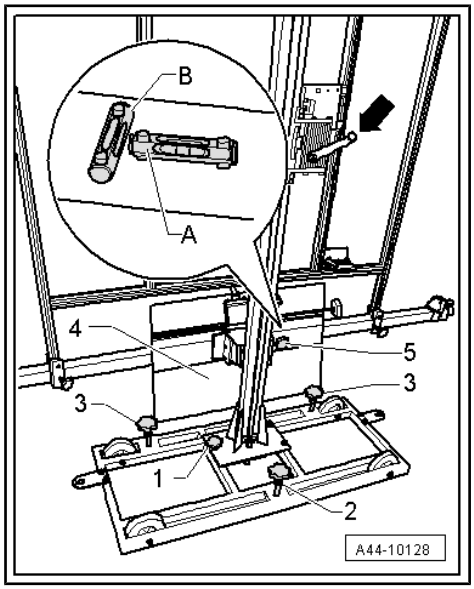


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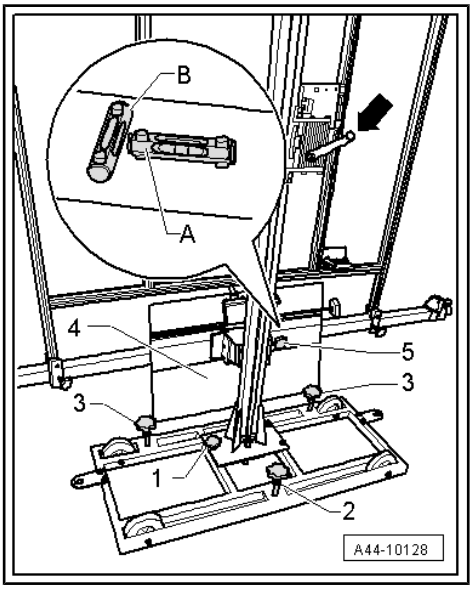
– By moving it sideways -arrows B-, set -VAS 6430- so that laser beam coincides with centre of sensor lens in the horizontal plane.



– Use adjusting screws -1-, -2- and -3- to bring spirit levels -A- and -B- on -VAS 6430- into horizontal position.

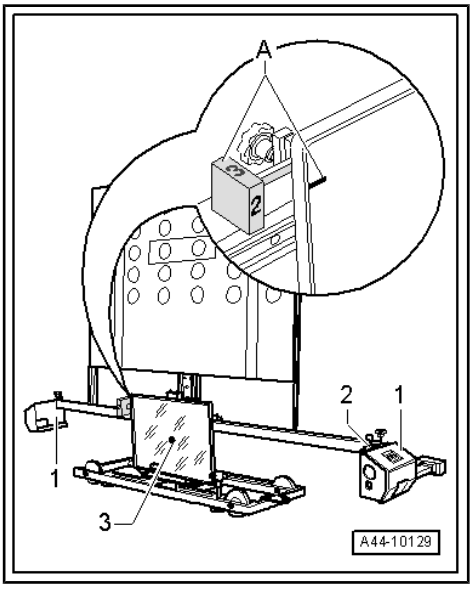


– Using crank handle -arrow- on -VAS 6430- , set mirror -4- so that laser beam coincides with centre of sensor lens in vertical plane.
– Set identical individual front axle toe values with fine adjustment screw -5-.
– Difference between individual toe values must be less than 6' or equal.



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– Balance out spirit levels -2- on wheel alignment sensors -1-.
– Then check again that laser beam -3- from -VAS 6430- coincides with sensor lens.



Note

- *-VAS 6430- is correctly aligned if the laser beam still coincides with the sensor lens at this stage, after the identical toe values have been set.*
- *The alignment of -VAS 6430- must be repeated if the laser beam does not coincide with the sensor lens.*

– Connect vehicle diagnostic, testing and information system -VAS 5051/B- .

– Plug in connector of diagnosis cable - VAS 5051/5A- at diagnostic connection.

– Switch on vehicle diagnostic, testing and information system .

The vehicle diagnostic, testing and information system is ready for operation when the selector buttons for the operating modes appear on the screen.

– Switch on ignition.

– Touch the Guided Fault Finding button on the display screen.

– Select the following:

♦ Make

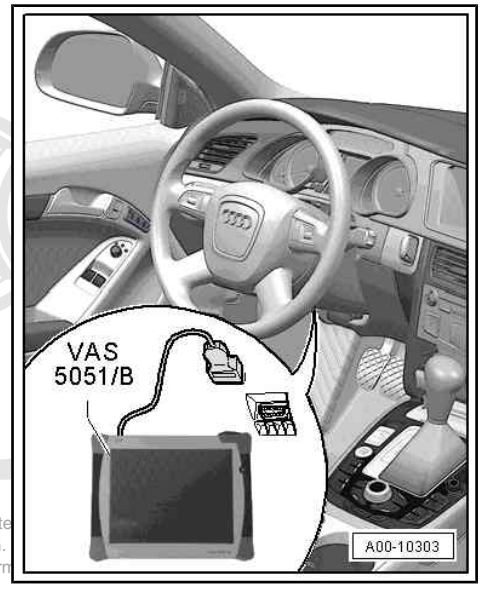
♦ Model

♦ Model year

♦ Version

♦ Engine code letters

– Confirm the entered information.



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Wait until the vehicle diagnostic, testing and information system has interrogated all the control units in the vehicle.

– Press the Go to button and select the option “Function/component selection”.

Then

– “Body (repair group 01; 27; 50 - 97)”

– “Electrical system (Rep. Gr. 01; 27; 50 - 97)”

– “01 - Self-diagnosis compatible systems”

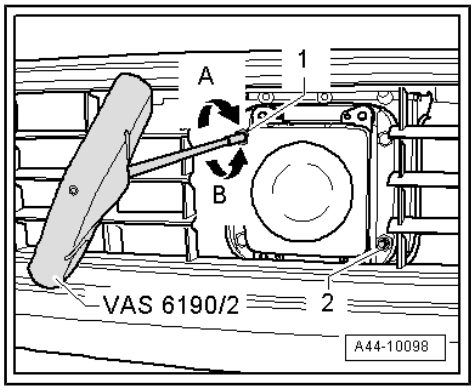
– “13 - Adaptive cruise control” (Distance regulation)

– “J428 - Adaptive cruise control unit, functions”

– “J428 - Adaptive cruise control adjustment”

Then follow adjustment instructions on screen.

– For fine adjustment in the “Guided Fault Finding” routine, use screws -1- (top) and -2- (bottom).



WARNING

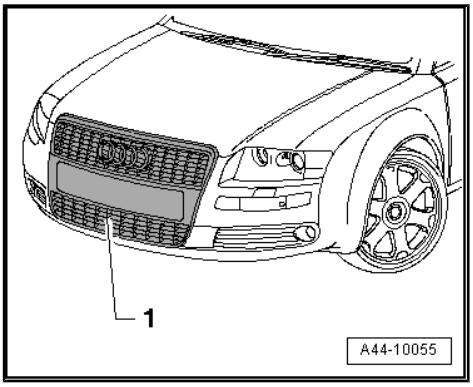
ACC adjustment is not completed until -VAS 5051/B- displays “Control element test ended”.

– Switch off ignition.

– Detach connector of diagnosis cable - VAS 5051/5A- at diagnostic connection.

– Disconnect battery charger ⇒ Rep. gr. 27 .

– Install radar cover -1- on bumper ⇒ Rep. gr. 63 .
– When sliding on radar cover -1-, make sure that electrical wiring is not pushed over sensor lens.

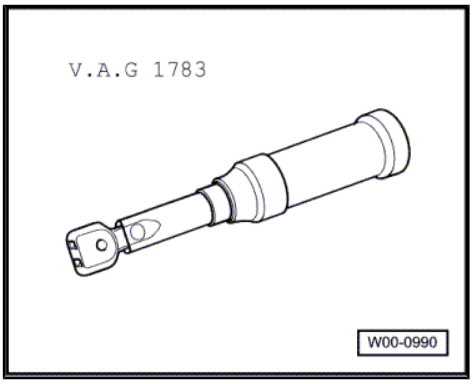


5.5 Removing and installing sensor for adaptive cruise control - G550-

The sensor for adaptive cruise control - G550- is located in the front bumper behind the radar cover.

Special tools and workshop equipment required

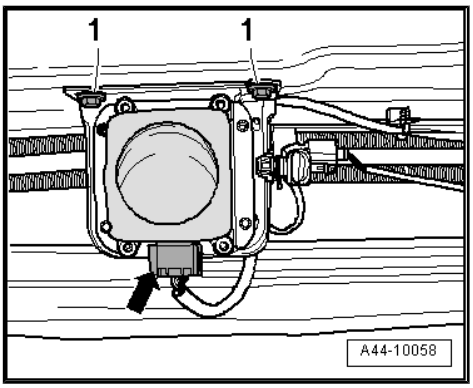
♦ Torque wrench - V.A.G 1783-



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Removing

– Detach front bumper cover ⇒ Rep. gr. 63 .
– Unplug connector -arrow-.
– Unscrew hexagon bolts -1-.
– Remove sensor for adaptive cruise control - G550- .



Installing

Installation is carried out in the reverse sequence. Note the following points:

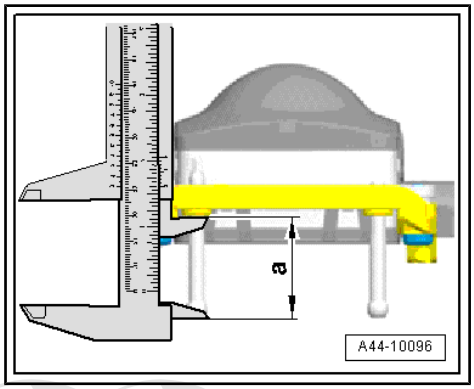
Note

The studs in the frame are pre-adjusted. This setting should be corrected if necessary.

– Place sensor for adaptive cruise control - G550- on a soft clean surface.

Measure distance -a- for all studs.

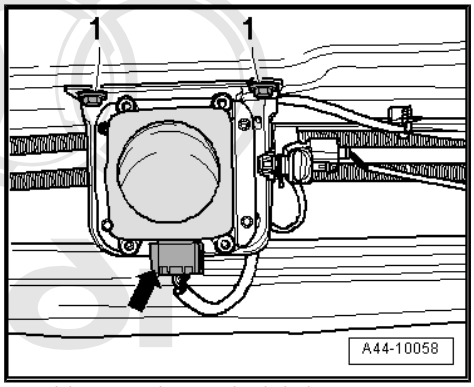
Dimension -a- should be 34 mm.



– Install hexagon bolts -1- and tighten.
– Plug in connector -arrow-.

Tightening torques ⇒ page 297

– Attach front bumper cover ⇒ Rep. gr. 63 .
– Perform adjustment of ACC ⇒ page 298 .

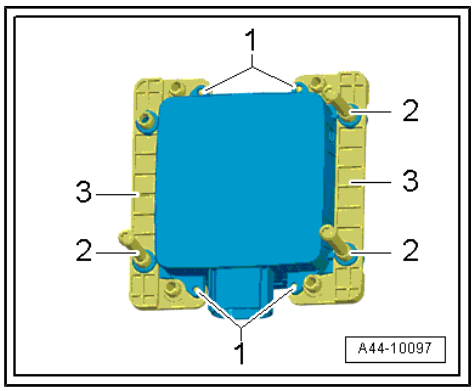


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5.6 Dismantling and assembling sensor for adaptive cruise control - G550- with frame

Dismantling

– Remove sensor for adaptive cruise control - G550- ⇒ page 309 .
– Unscrew studs -2- out of frame -3-.
– Remove bolts -1- and detach frame from sensor for adaptive cruise control - G550- .



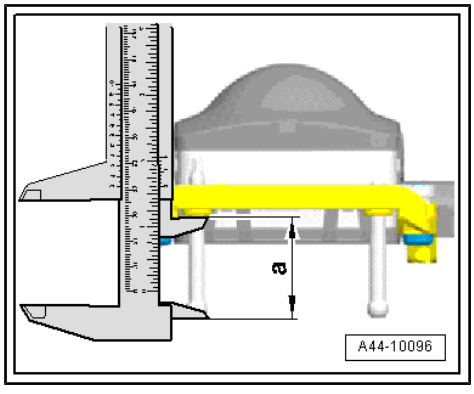
Assembling

Assemble in reverse sequence. Note the following points:

– Set all studs to dimension -a-.

Dimension -a- should be 34 mm.

Tightening torques ⇒ page 297



6 Lane departure warning (Audi lane assist)

⇒ “6.1 General notes on lane departure warning function”, page 311

⇒ “6.2 Calibration procedure”, page 312

⇒ “6.3 Removing and installing lane departure warning control unit J759 and backlight masking screen”, page 319

6.1 General notes on lane departure warning function

The lane departure warning function assists the driver in keeping the vehicle in its lane. If the vehicle approaches one of the detected lane markings while the system is active, the steering wheel vibrates to warn the driver that the vehicle might be about to cross one of the markings. If the driver operates the turn signal before crossing one of the lane markings (while the system is active), the system will detect that the lane change is intended and will not warn the driver.

The steering wheel is equipped with a vibration motor to generate the required warning vibration. The vibration motor is located under a layer of foam in the lower right spoke of the steering wheel. The vibration in the steering wheel is generated by an eccentric weight that is rotated by the motor. The motor cannot be renewed separately. The complete steering wheel must be renewed if the vibration motor is defective. ⇒ page 320 The duration of the steering wheel vibration is normally approx. one second, but varies according to the driver's reaction.

The camera and the lane departure warning control unit - J759- are installed together in a single housing. The entire unit has to be replaced if the camera or the control unit are defective.

The lane departure warning control unit - J759- is located at the top of the windscreen in the centre, level with the interior mirror. It is attached to a bracket which is bonded to the windscreen.

Anything that restricts the view of the camera, such as stone chips or stickers applied to the windscreen, can cause malfunctions of the system.

The lane departure warning button - E517- is integrated in the turn signal switch lever. The system can be switched on and off by pressing the button. The turn signal switch lever with lane departure warning button - E517- must be replaced as a complete unit if the button is defective ⇒ Rep. gr. 94 .

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Note

The message “Audi lane assist not available: currently no sensor vision” will appear in the display if the camera is not able to detect the lane markings for longer than a defined period. This can be caused by the following:

- Camera vision is obstructed by dirt or ice, etc. This should be rectified accordingly.
- Camera vision is obstructed by condensation. Wait for condensation to clear.
- Lane markings not visible for long periods due to road conditions (e.g. snow-covered surface).

If the condensation does not clear by itself, or if the inside of the windscreen is very dirty (in the camera's range of vision), the rel-

evant area must be cleaned by hand. To do this, remove the control unit and the backlight masking screen and clean the windscreen with cleaning fluid - D 009 401 04- . Removing control unit and backlight masking screen ⇒ page 319 **.**

The lane departure warning must be calibrated correctly to ensure proper function.

Re-calibration is required when:

- The fault “No or incorrect basic setting / adaption” is registered in the fault memory.
- The lane departure warning control unit - J759- is renewed.
- The windscreen is removed or renewed.
- The rear axle toe setting is changed.
- The running gear of the vehicle is modified in any way – e.g. conversion from standard running gear to sports running gear.
- The vehicle level senders are re-adapted on vehicles with electronic damping control or air suspension.

Note

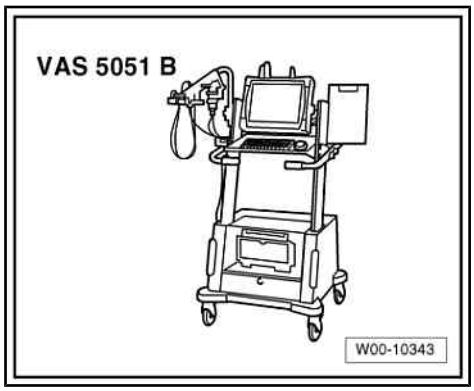
Before performing a calibration of the lane departure warning system, read out the fault memory and rectify any faults as necessary. The direction of travel of the vehicle must be determined in order to provide the reference position of the setting device - VAS 6430- when calibrating the lane departure warning system. Calibration of the lane departure warning system must always be performed using the wheel alignment equipment approved by VW/Audi. Always use the setting device -VAS 6430- for calibrating the lane departure warning system.

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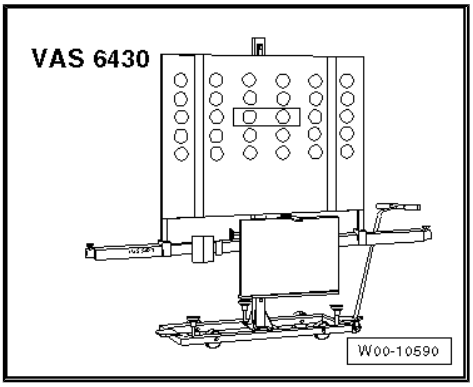
6.2 Calibration procedure

Special tools and workshop equipment required

- Vehicle diagnostic, testing and information system - VAS 5051 B- with appropriate diagnosis cable



- -VAS 6430-



Wheel alignment computer

Note

- *Check that the lane departure warning control unit - J759- is seated correctly in the bracket.*
- *Check that the camera vision is unobstructed (visual inspection).*
- *Before commencing calibration, interrogate fault memory and rectify any faults.*
- *Before driving the vehicle onto the alignment platform, make sure there is sufficient space between the hub centres of the front wheels and the setting device -VAS 6430- . The distance between -VAS 6430- and the hub centres of the front wheels must be 150 cm ± 2.5 cm.*
- *If the available space is not adequate, drive the vehicle backwards onto the alignment platform as required.*
- *Check the position of the calibration screen on the cross bar and align and lock the calibration screen centrally if necessary.*

– Observe test requirements for wheel alignment check ⇒ page 285 .
– Connect battery charger ⇒ Rep. gr. 27 .
– Connect diagnostic tester to vehicle. (Run diagnosis cable through open window.)

Note

During the calibration, make sure that all doors are closed on the vehicle and that the exterior lights are switched off.

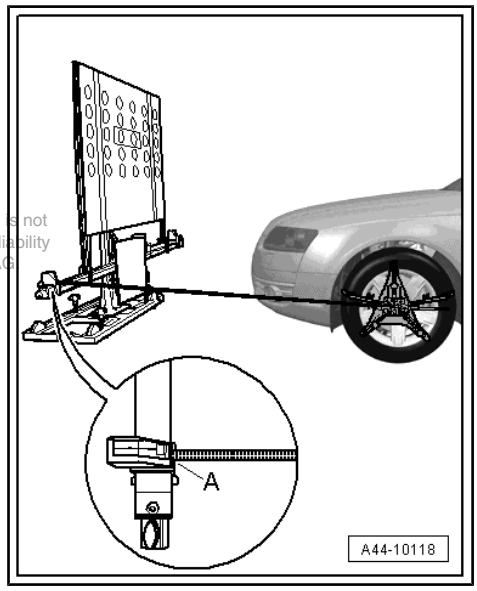
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– On vehicles with air suspension, activate jacking mode in comfort level setting ⇒ page 215 .
– Set front wheels to straight-ahead position.
– Select calibration procedure for lane departure warning system in wheel alignment computer.
– Attach quick-release clamps to all four wheels.
– Attach wheel alignment sensors to rear wheels.
– Carry out wheel rim runout compensation for rear wheels.

Note

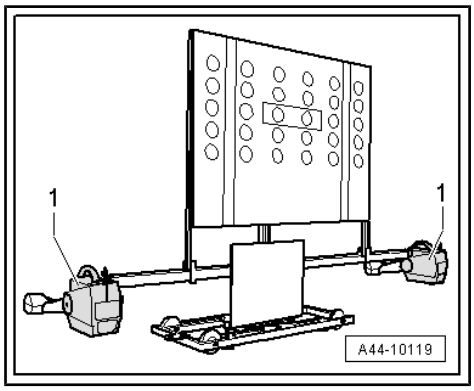
Do not take hold of the cross bar when moving the -VAS 6430- .

– Set up -VAS 6430- as shown in illustration so that distance -A- measured from hub centres of front wheels to cross bar of -VAS 6430- is 150 cm ± 2.5 cm.



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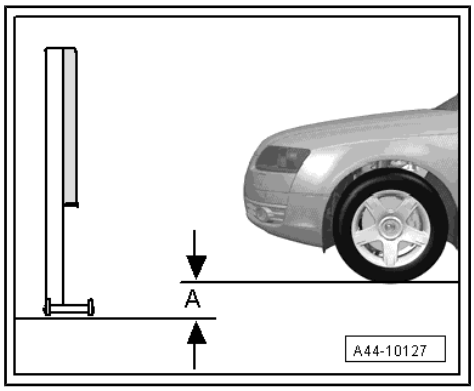
– Attach front wheel alignment sensors -1- to -VAS 6430- .



Note

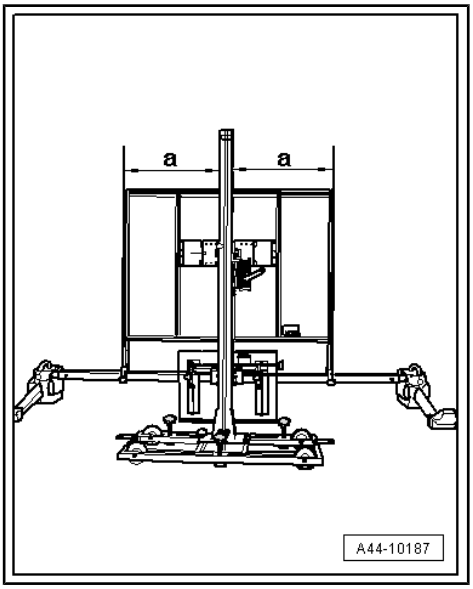
For the next step the wheel alignment platform must be set at the lowest available position.

– Determine height difference -A- between floor level where -VAS 6430- is set up and tyre contact surface as shown in illustration and enter this value in the wheel alignment computer.

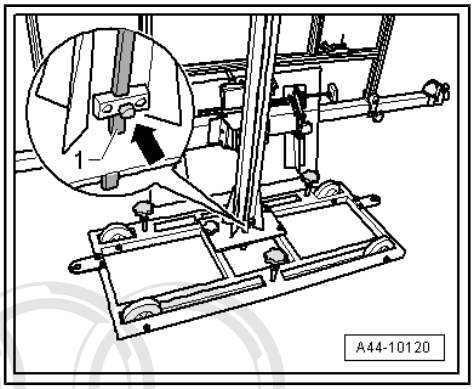


– Check the position of the calibration screen on the cross bar and align the calibration screen centrally if necessary.

a = a



– Loosen bolt -arrow- and set measuring bar -1- on floor.

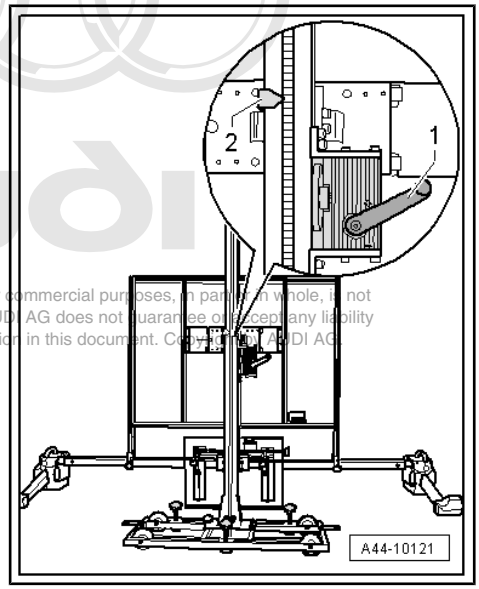


– Using crank -1-, adjust calibration screen to specified height -2- as indicated by wheel alignment computer.

When specified height -2- has been set, move measuring bar up slightly and tighten securing bolt.

Note

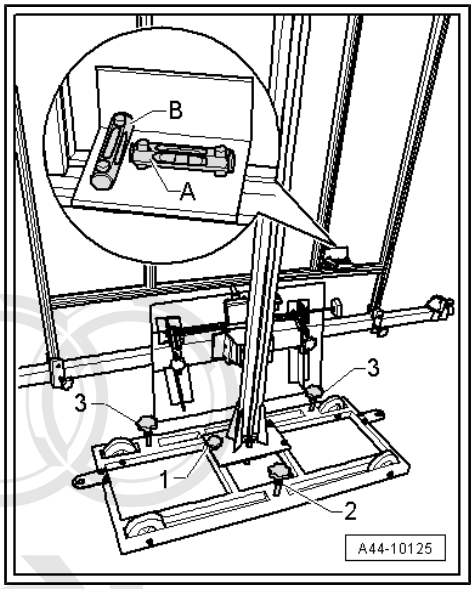
If the height of the calibration screen has to be corrected at a later stage of the procedure, the measuring bar must be set on the floor when making the adjustment.



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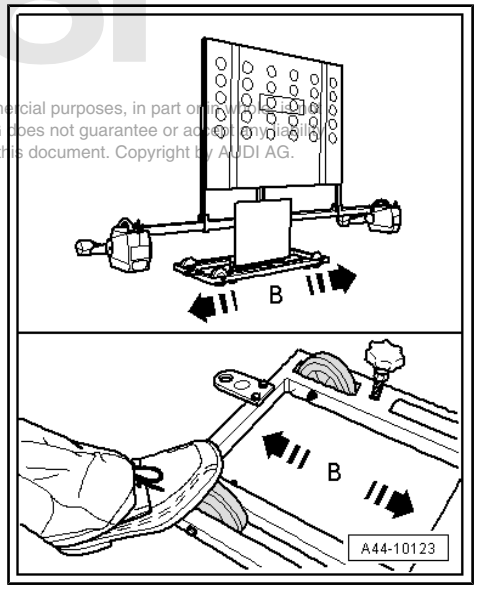
– Set spirit level -A- to horizontal position with adjuster screw -1-.

The spirit level -A- has to be adjusted at this point to compensate for any floor irregularities.

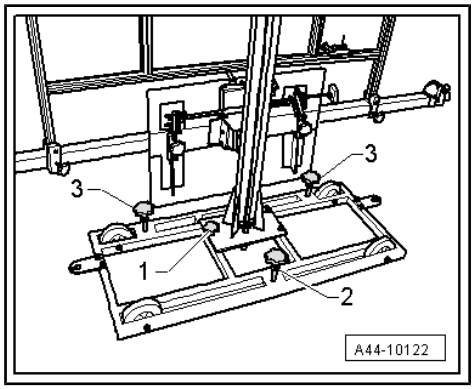


– Move -VAS 6430- sideways -arrow B- until display on wheel alignment computer is within tolerance.

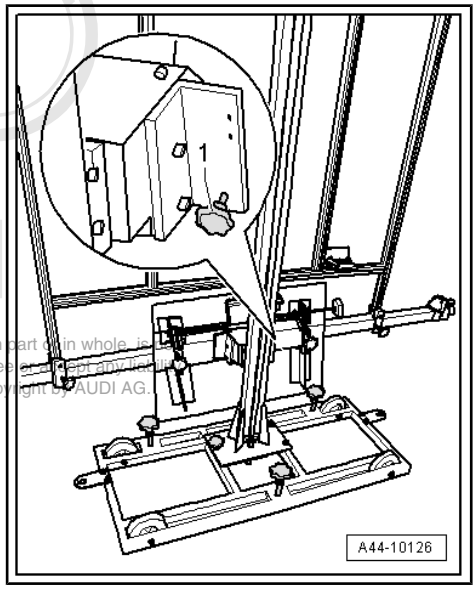
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– Lightly tighten bolts -2- and -3- to prevent -VAS 6430- from moving out of position.

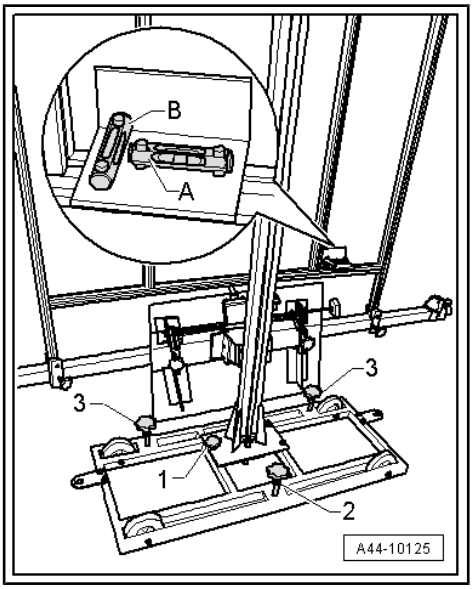


– Turn fine adjustment screw -1- until display on wheel alignment computer is within tolerance.

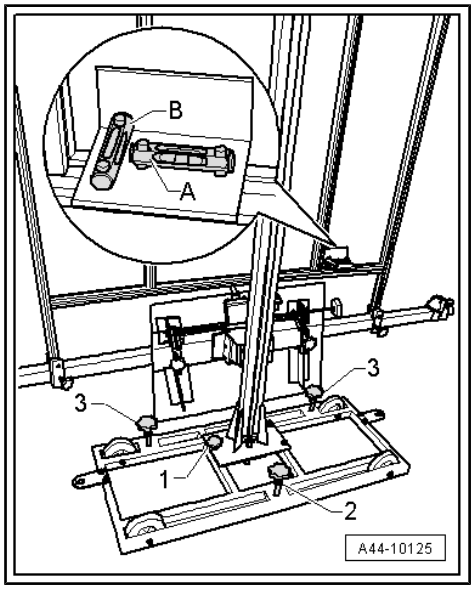


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– Set spirit level -A- to horizontal position with adjuster screw -1-.



– Set spirit level -B- to horizontal position with adjuster screw -2-.



The remaining steps are now performed via the diagnostic tester.

– Switch on ignition.

– Touch 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 vehicle diagnostic, testing and information system has interrogated all the control units in the vehicle.

– Press the Go to button and select the option “Function/component selection”.

Then

– “Body (repair group 01; 27; 50 - 97)”

– “Electrical system (Rep. Gr. 01; 27; 50 - 97)”

– “01 - Self-diagnosis compatible systems”

– “5C - Lane departure warning”

– “J759 - Lane departure warning control unit, functions”

– “J759 - Calibration”

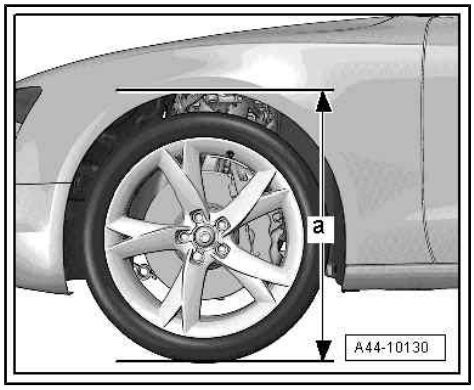
Then follow the instructions on the screen to perform the calibration.

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Note

The next step required in the Guided Fault Finding program is to measure the height of the body.

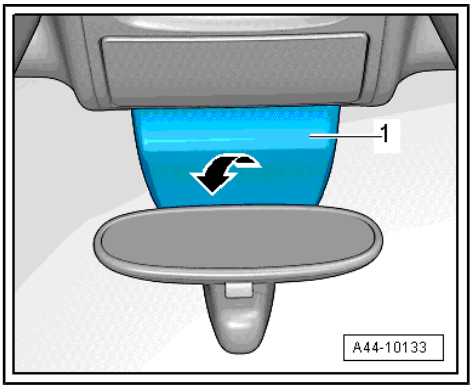
– Measure height of body -a- at all four wheels between tyre contact surface and bottom edge of wing panel at centre of wheel.



6.3 Removing and installing lane departure warning control unit - J759- and backlight masking screen

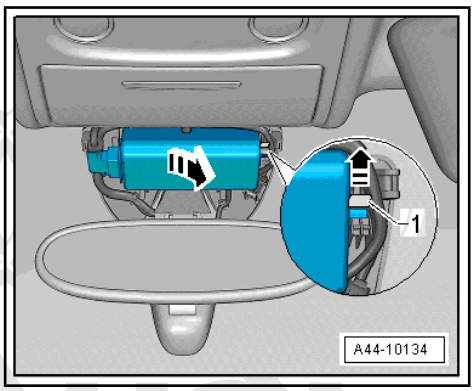
Removing

– Detach cover panel -1- from bracket by pulling down in direction indicated by arrow.

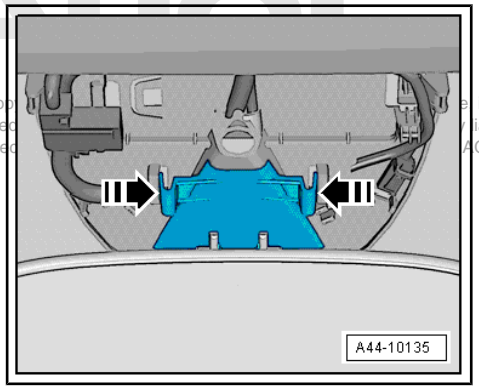


– Press retaining clip -1- forwards in direction of -arrow- and detach lane departure warning control unit - J759- from bracket by moving it downwards and to one side.

– Unplug electrical connector and take out lane departure warning control unit - J759- .



– Press clips -arrows-, pull backlight masking screen out of bracket and remove towards the rear.



Installing

Installation is carried out in the reverse sequence. Note the following points:

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Note

- *The camera's area of vision on the inside of the windscreen must not be obstructed by condensation or dirt. If necessary, clean this part of the glass by hand using cleaning fluid - D 009 401 04- .*
- *If the lane departure warning control unit - J759- is renewed, the camera and the lane departure warning control unit - J759- must be re-calibrated* ⇒ page 312 .

48 – Steering

1 Airbag steering wheel

⇒ “1.1 Exploded view of airbag steering wheel”, page 320 .

⇒ “1.2 Removing and installing airbag steering wheel”, page 320 .

1.1 Exploded view of airbag steering wheel

1 - Return ring with slip ring

2 - Steering wheel

- ❑ Removing and installing ⇒ page 320
- ❑ Different versions available
- ❑ For correct version refer to ⇒ Electronic parts catalogue

3 - Bolt

- ❑ 50 Nm
- ❑ Always renew
- ❑ Removing and installing ⇒ Rep. gr. 69

4 - Connector

- ❑ For return ring with slip ring
- ❑ Renewing ⇒ Rep. gr. 69

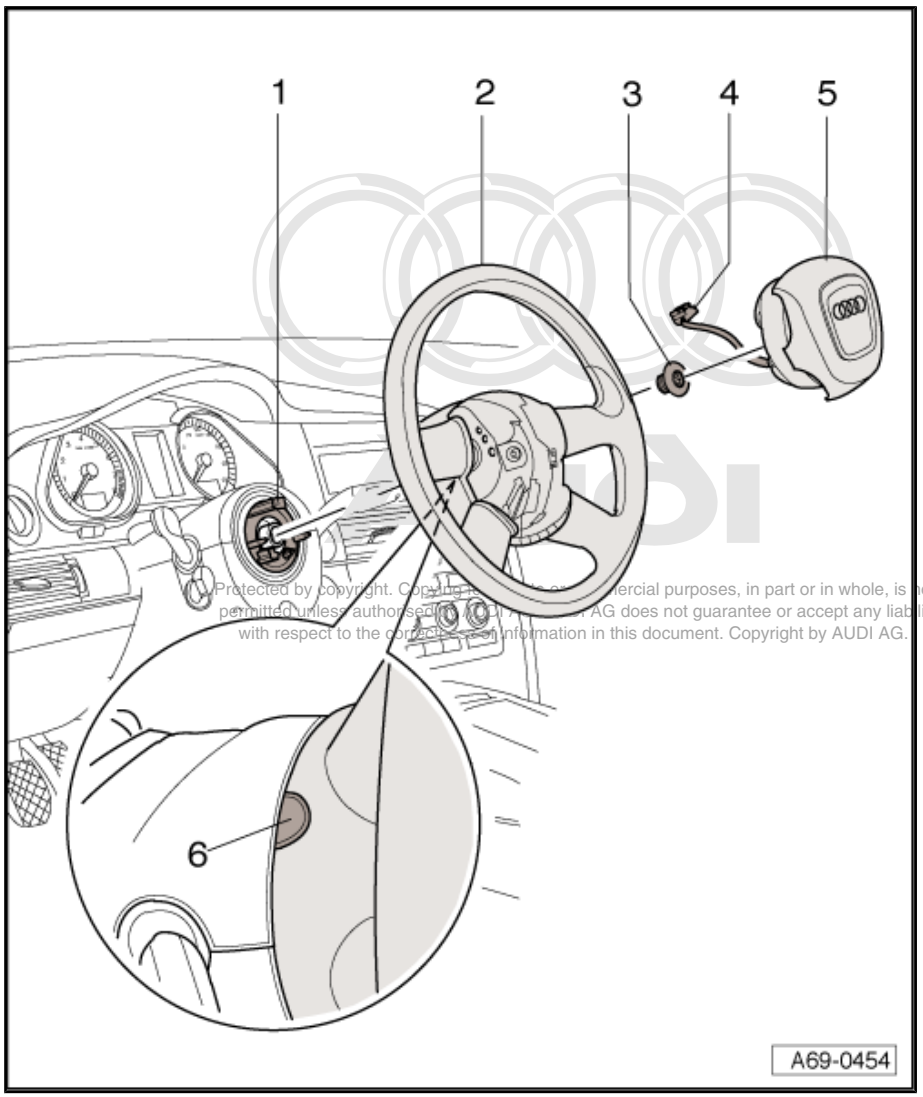
5 - Airbag unit

> **WARNING**
> *Observe safety precautions for working on airbags ⇒ Rep. gr. 69 .*

- ❑ Removing and installing ⇒ Rep. gr. 69

6 - Trim cap

- ❑ For airbag unit securing bolt



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1.2 Removing and installing airbag steering wheel

Removing

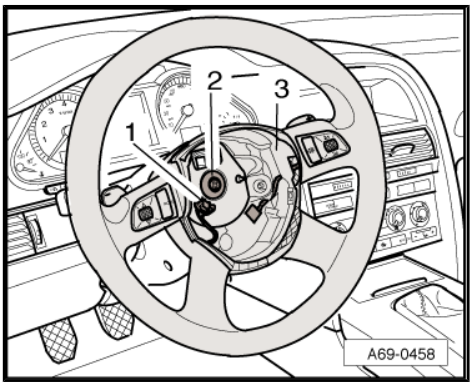
– Turn wheels to straight ahead position.

– Move steering wheel upwards and rearwards as far as possible, using the full range of the steering column adjuster.

– Remove airbag unit ⇒ General body repairs, interior; Rep. gr. 69 .

Note

The steering must be in the centre position (wheels straight-ahead) when the steering wheel is removed and installed.



– Remove bolt -2-.
– Mark relative position of steering wheel to steering column with a felt-tip pen.
– Pull steering wheel -3- off steering column.

Installing

Note the following points when installing:

Before fitting steering wheel, make sure wheels are in straight ahead position.

– If installing original steering wheel: Make sure marks on steering column and steering wheel coincide.
– If installing new steering wheel (no marks): Steering wheel must be mounted in centre position (spoke horizontal and wheels in straight-ahead position).
– Install steering wheel.
– Install airbag unit ⇒ Rep. gr. 69 .
– Test-drive vehicle.
– If steering wheel is not straight, remove it again and adjust it on steering column splines.
– Tighten new bolt for steering wheel ⇒ Rep. gr. 69 .

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2 Steering column

⇒ “2.1 Exploded view of steering column”, page 322 .

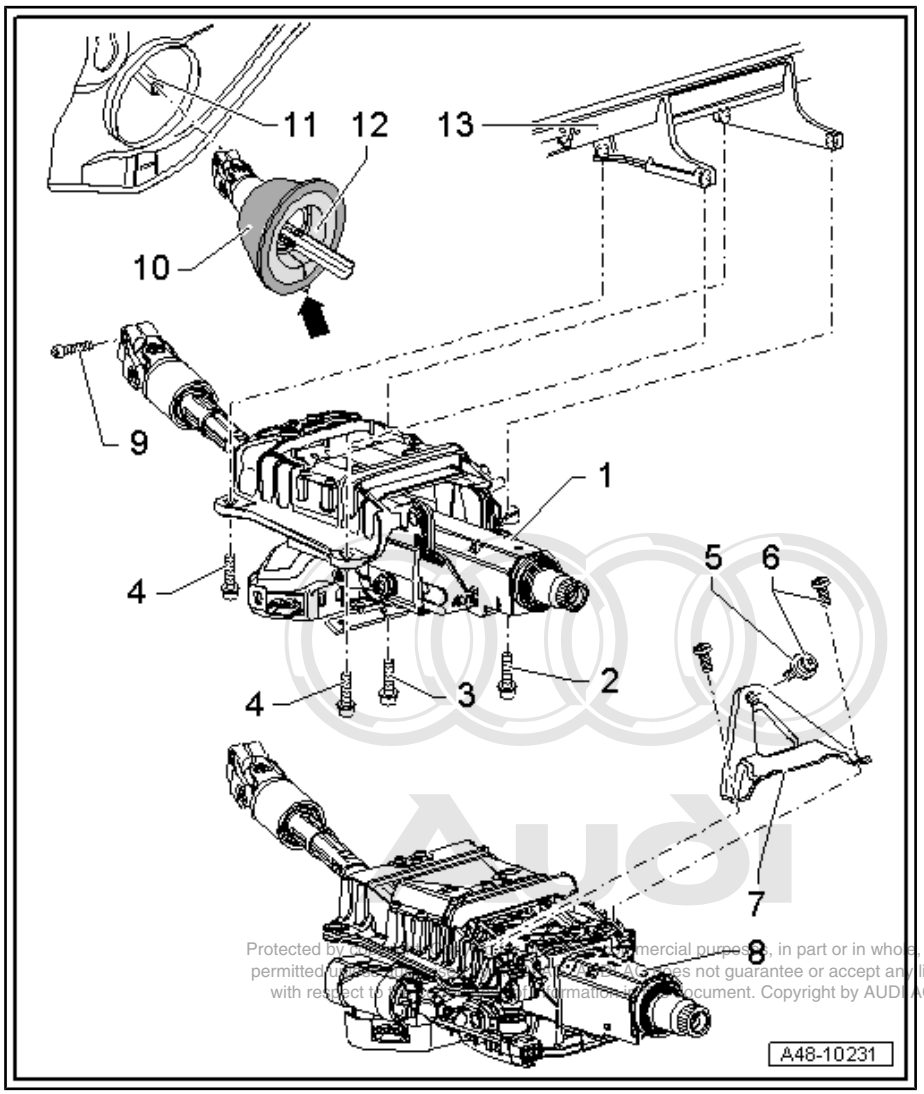
⇒ “2.3 Removing and installing steering column”, page 324 .

⇒ “2.4 Electrical adjustment of steering wheel position”, page 329 .

⇒ “2.5 Easy-entry facility for vehicles with seat memory”, page 330 .

2.1 Exploded view of steering column

The replacement steering column is only supplied as a complete unit. Repair is not possible.



1 - Steering column

- With mechanical height adjustment
- Can only be replaced as complete unit
- Removing and installing ⇒ page 324

2 - Bolt

- 22 Nm
- Note correct installation sequence ⇒ page 328

3 - Bolt

- 22 Nm
- Note correct installation sequence ⇒ page 328

4 - Bolt

- 22 Nm
- Note correct installation sequence ⇒ page 328

5 - Washer

- Only fitted on vehicles with electrically adjustable steering column

6 - Bolt

- 3.6 Nm
- Only fitted on vehicles with electrically adjustable steering column

7 - Reinforcement

- Only fitted on vehicles with electrically adjustable steering column

8 - Steering column

- With electrical height adjustment
- Can only be replaced as complete unit
- Removing and installing ⇒ page 324

9 - Bolt

- 30 Nm

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10 - Bulkhead seal

- ❑ Note correct installation position ⇒ page 323

11 - Steering pinion

12 - Seal

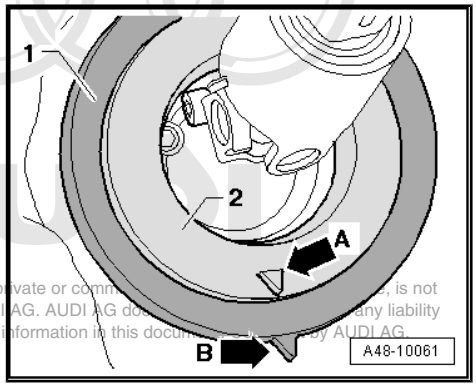
- ❑ Marking -arrow- must face downwards
- ❑ Note correct installation position ⇒ page 323

13 - Cross member for steering column

Installation position of seal and bulkhead seal

– Fit bulkhead seal -1- in plenum chamber partition panel so that marking -arrow B- faces vertically downwards.

– Fit seal -2- in bulkhead seal -1- so that marking -arrow A- faces vertically downwards.



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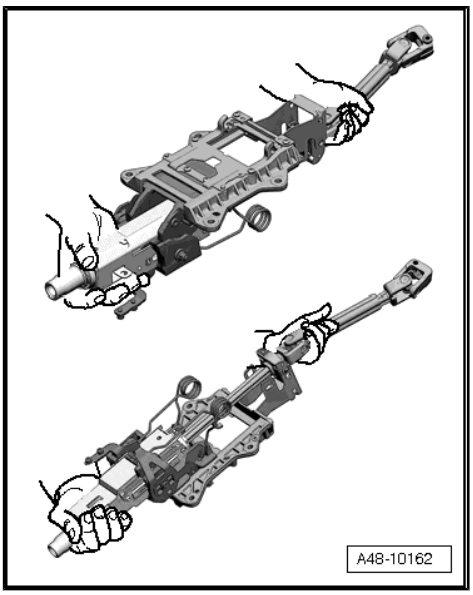
2.2 Handling and transporting steering column

WARNING

- *These instructions for handling the steering column MUST be observed at all times.*
- *Incorrect handling can damage the steering column and thus cause a safety risk.*

Correct handling and transportation of steering column

- Use both hands to carry the steering column.
- Take hold of the steering column at the top column tube and the upper universal joint.



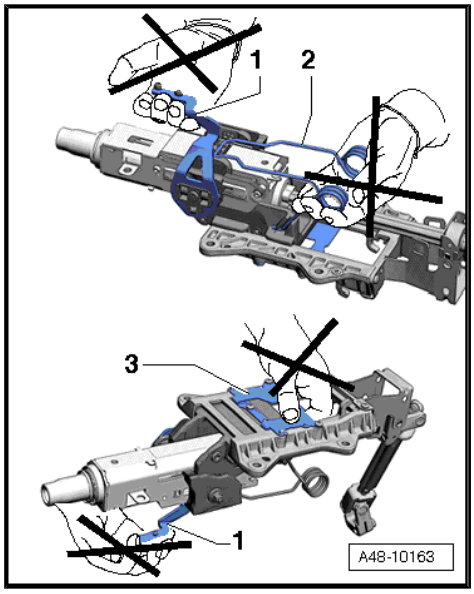
Incorrect handling of steering column

Carrying the steering column by the following parts will cause damage:

1 - Clamping lever

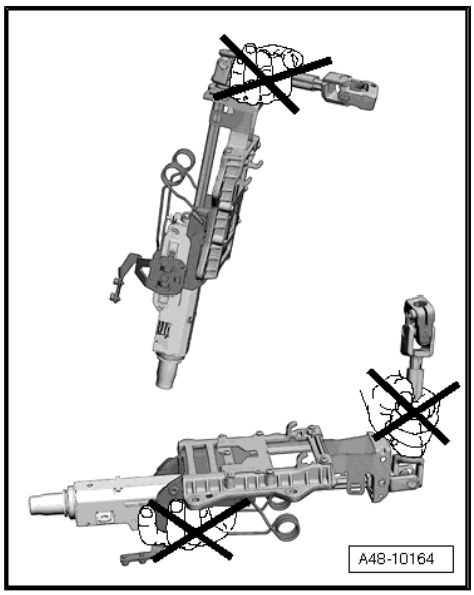
2 - Balance springs

3 - Deformation element



The bushes of the universal joint at the lower steering column bearing will be damaged by:

- Picking up and carrying the steering column by the jointed shaft with one hand.
- Bending the universal joints further than 90°.

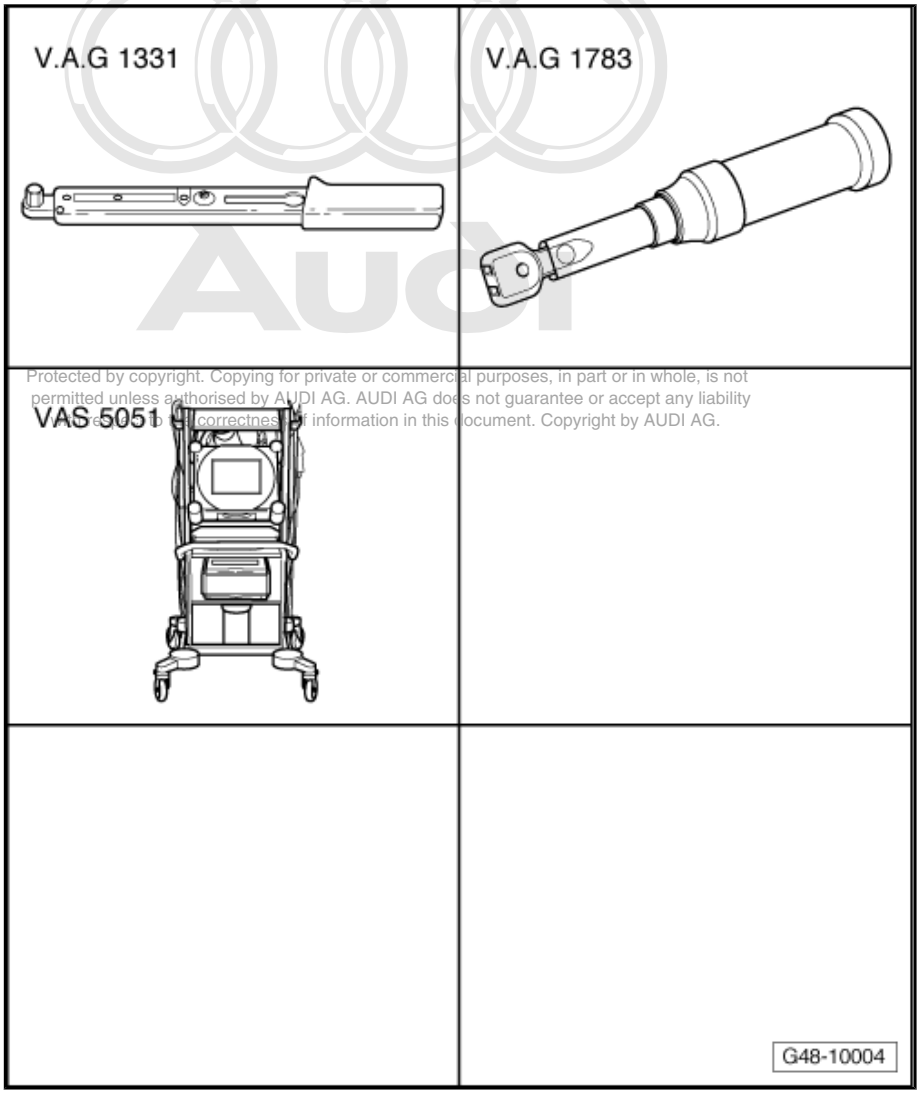


2.3 Removing and installing steering column

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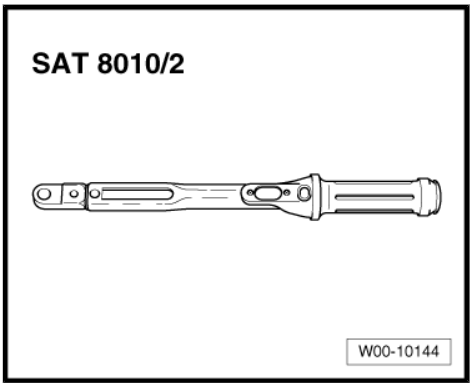
Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-
- Torque wrench - V.A.G 1783-
- Vehicle diagnostic, testing and information system - VAS 5051 B-
- Universal low-temperature grease - G 052 745 A3- or universal grease - G 052 735 A2-



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- Special screwdriver T8 - T40056 A-



Caution

- *The following steps are only required if the steering column is being renewed:*
- *First read out software version of onboard supply control unit - J519- with vehicle diagnostic, testing and information system - VAS 5051 B- .*
- *If a noise-optimised steering column is being installed, the onboard supply control unit - J519- must be renewed together with the steering column if the software version is <0190.*
- *Removing onboard supply control unit - J519- ⇒ Rep. gr. 97 .*

The replacement steering column is only supplied as a complete unit. Repair is not possible.

The steering lock housing can be transferred from the old unit.

Removing

WARNING

- *Wheels must be in straight-ahead position before removing steering wheel.*
- *Observe safety precautions for working on airbags ⇒ Rep. gr. 69 .*
- *Failure to comply with these precautions may lead to subsequent failure of the airbag system.*

– Remove driver's airbag unit ⇒ Rep. gr. 69 .

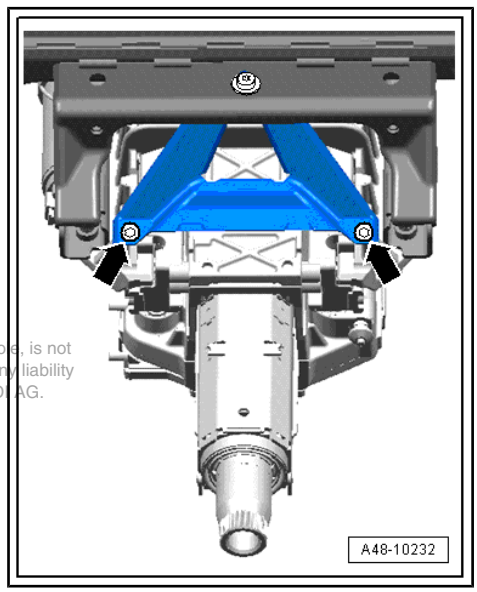
– Remove airbag steering wheel ⇒ page 320 .

– Remove steering column switch ⇒ Rep. gr. 94 .

Vehicles with electrically adjustable steering column

– Remove instrument cluster ⇒ Rep. gr. 90 .

– Remove bolts -arrows-.



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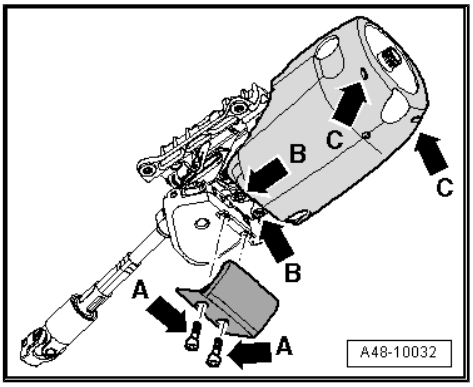
Vehicles with manually adjustable steering column

– Remove bolts -arrows A- and take off handle.

All vehicles

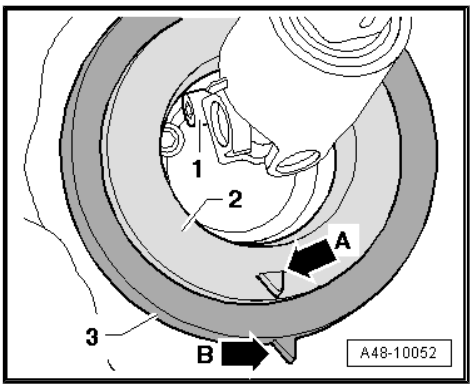
– Remove bolts -arrows B- and -arrows C- and take off steering column trim.

– Remove driver's storage compartment ⇒ Rep. gr. 68 .



– Pull seal -2- out of bulkhead seal and pull seal -2- off universal joint.

– Pull bulkhead seal -3- off steering rack and plenum chamber partition panel.



Note

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Always renew bulkhead seal -3- if damaged.

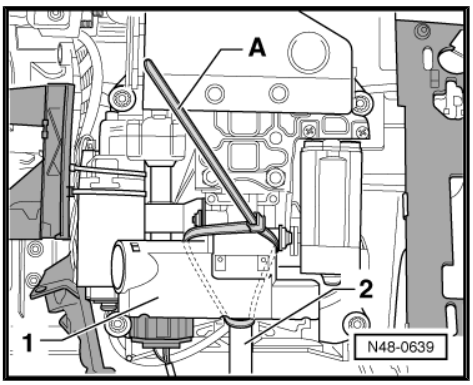
– Unscrew bolt -1- and pull universal joint off steering pinion on steering rack.

To prevent them being pulled apart, the upper and lower sections of the steering column must be held together when they are detached from steering rack.

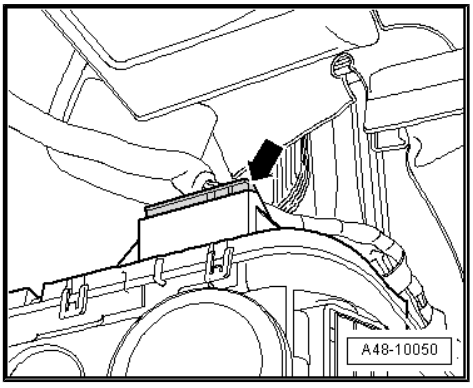
The splines will separate if the top and bottom sections of the steering column are pulled apart or telescoped together too far.

Rattling noise may develop while driving if the splines are no longer engaged in their original position.

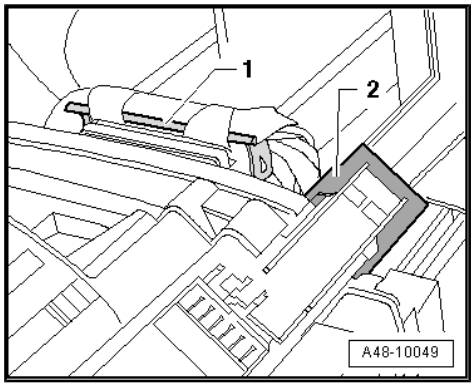
– Use cable tie -A- to secure universal joint -2- to steering column -1-.



– Unplug electrical connector on steering column (left-side) -arrow-.



– Unplug electrical connector on steering column (right-side) -2-.
– Release and detach wiring bracket -1-.

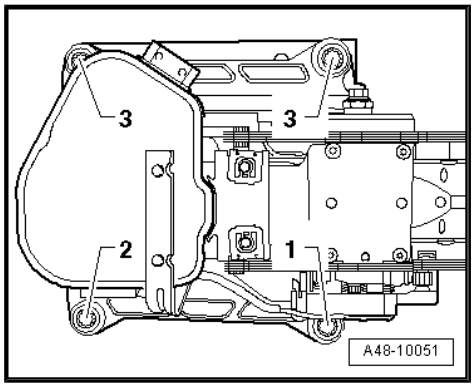


Vehicles with electrical height adjustment

– Unplug connectors (2x) for electrical height adjustment on steering column (left-side) and detach from steering column.

All vehicles (continued):

– Remove bolts -1-, -2- and -3- and take out steering column.



Installing

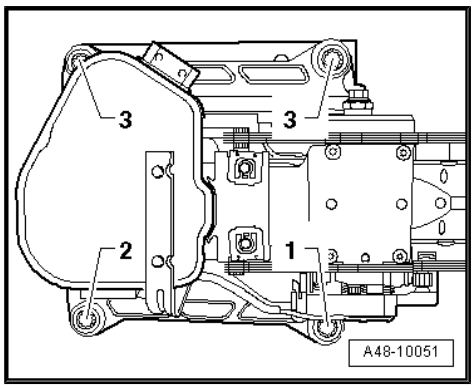
Installation is carried out in the reverse sequence. Note the following points:

New replacement steering columns are fitted with a transport lock.

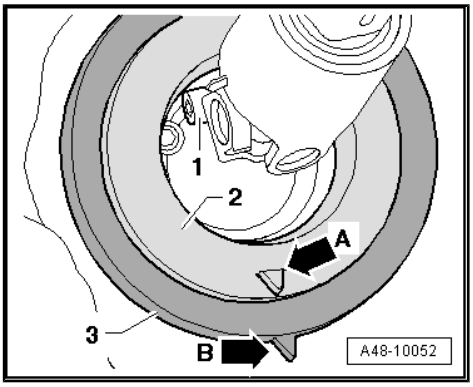
– Remove transport lock after installing steering column.
– Position steering column at cross member.

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Assembly sequence:



– Install bolt -1- and tighten only hand-tight.
– Install and tighten bolt -2- ⇒ Item 3 (page 322) .
– Install and tighten bolts -3- ⇒ Item 4 (page 322) .
– Tighten bolt -1- ⇒ Item 2 (page 322) .
– Grease contact surfaces of bulkhead seal with universal low-temperature grease - G 052 745 A3- .



– Fit bulkhead seal -3- and seal -2- loosely onto steering column.
– Turn steering wheel to centre position, then attach universal joint with bulkhead seal and seal -2- to steering pinion.
– Tighten bolt -1- for universal joint ⇒ Item 9 (page 322) .
– Fit bulkhead seal -3- onto steering rack and insert into plenum chamber partition panel.
– Fit seal -2- in bulkhead seal -3-.

Markings -arrow A- and -arrow B- must point vertically downwards.

– Remove cable tie.
– Install driver's storage compartment ⇒ Rep. gr. 68 .
– Install trim for steering column switch and switch itself ⇒ Rep. gr. 94 .
– Install airbag steering wheel ⇒ page 320 .
– Install handle for steering column adjustment and tighten bolts to 2.5 Nm.
– Install driver's airbag unit ⇒ Rep. gr. 69 .
– Electric steering column lock, steering angle sender - G85- and “basic setting” in onboard supply control unit - J519- must be (re-)adapted in next operation.
– Connect -VAS 5051- and select “function/component” for function test ⇒ vehicle diagnosis, testing and information system - VAS 5051 A- .

Then

– “Running gear (Rep. Gr. 01; 34 - 65)”
– “Steering (Repair group 48)”
– “Steering column assembly, functions”
– “Renewing steering column”.

2.4 Electrical adjustment of steering wheel position

Note

The height and axial position of the steering wheel can be adjusted electrically.

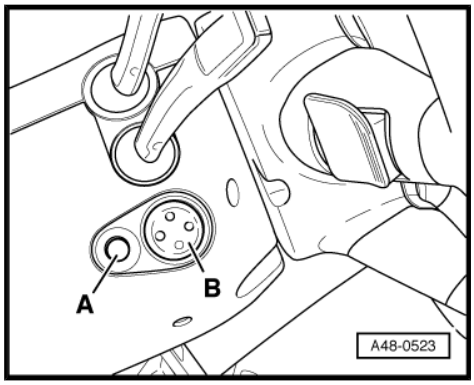
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Height adjustment

– Press switch -B- up or down. Height is adjusted as long as switch is pressed.

Axial adjustment

– Press switch -B- forwards or pull it towards you. The axial position is adjusted as long as the switch is operated.



Note

- *The steering column can also be electrically adjusted with the ignition switched off.*
- *On vehicles with seat memory, the corresponding steering column setting can be stored together with the seat position.*

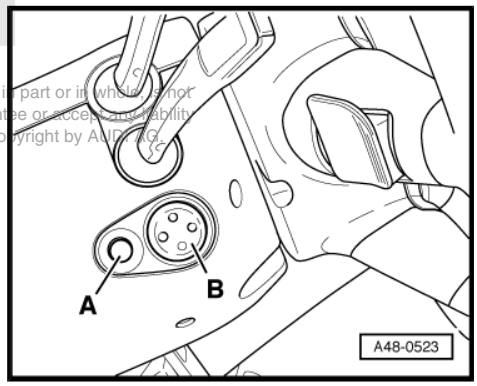
2.5 Easy-entry facility for vehicles with seat memory

Note

This function provides automatic steering column adjustment to facilitate getting into and out of the vehicle.

– Press button -A- to activate/deactivate easy-entry facility.

- With easy-entry facility activated (button -A- pressed), steering column moves into park position, i.e. upwards, when ignition is switched off.
- After driver gets into vehicle, steering column returns to stored position as soon as ignition is switched on.
- Stored steering wheel position can only be called up if driver's seat memory button is set to “ON” (pressed).
- With easy entry facility deactivated, steering column adopts stored position as soon as seat memory button is pressed.



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3 Power steering rack

⇒ “3.1 Exploded view of power steering rack”, page 331 .

⇒ “3.2 Centralising steering”, page 333 .

⇒ “3.3 Removing and installing power steering rack (LHD vehicles)”, page 335 .

⇒ “3.4 Servicing power steering rack”, page 344 .

⇒ “3.6 Adjusting power steering rack”, page 348 .

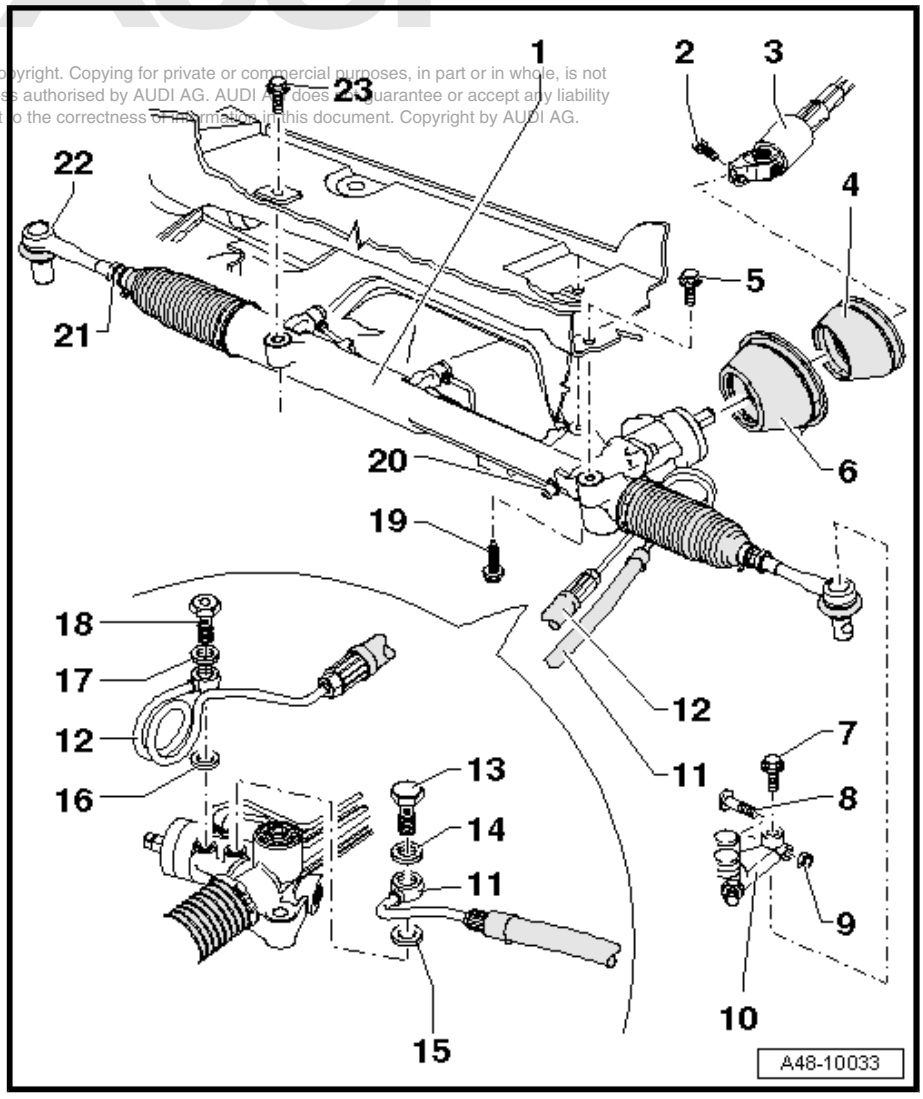
⇒ “3.7 Removing and installing track rod ball joint”, page 349 .

⇒ “3.8 Removing and installing track rods”, page 352 .

3.1 Exploded view of power steering rack

The power steering rack is removed and installed complete with track rods.

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1 - Power steering rack with track rods

- ❑ Removing and installing (LHD) ⇒ page 335
- ❑ Servicing ⇒ page 344
- ❑ Different versions available ⇒ Electronic parts catalogue

2 - Bolt

- ❑ 30 Nm

3 - Steering column

4 - Seal

- ❑ Note correct installation position ⇒ page 333

5 - Bolt

- ❑ 60 Nm +90°
- ❑ Always renew if removed
- ❑ Observe correct tightening sequence ⇒ page 342

6 - Bulkhead seal

- ❑ Check for splits and chafing
- ❑ Note correct installation position ⇒ page 333

7 - Bolt

- ❑ 5 Nm
- ❑ For adjusting toe constant “S”
- ❑ Always renew if removed

8 - Bolt

9 - Self-locking nut

- ❑ 50 Nm
- ❑ Always renew if removed

10 - Wheel bearing housing

11 - Return hose

- ❑ Note installation position on steering rack ⇒ page 333
- ❑ Different versions available ⇒ Electronic parts catalogue

12 - Pressure hose

- ❑ Note installation position on steering rack ⇒ page 333
- ❑ Different versions available ⇒ Electronic parts catalogue

13 - Banjo bolt

- ❑ 47 Nm
- ❑ Always renew if removed

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14 - Seal

- ❑ Always renew if removed

15 - Seal

- ❑ Always renew if removed

16 - Seal

- ❑ Always renew if removed

17 - Seal

- ❑ Always renew if removed

18 - Banjo bolt with non-return valve

- ❑ 35 Nm
- ❑ Always renew if removed

19 - Bolt

- ❑ 60 Nm +90°
- ❑ Always renew if removed
- ❑ Observe correct tightening sequence ⇒ page 342

20 - Socket head bolt

- ❑ 23 Nm
- ❑ Removing and installing screw plug ⇒ page 333

21 - Track rod

- ❑ Removing and installing ⇒ page 352

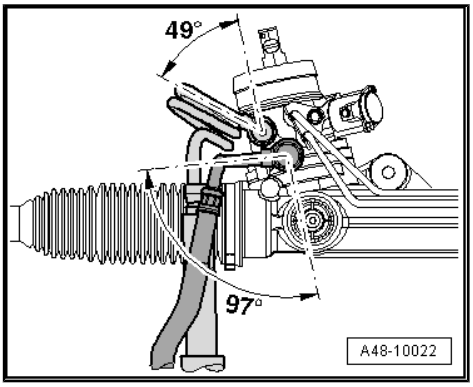
22 - Track rod ball joint

- ❑ Removing and installing ⇒ page 349

23 - Bolt

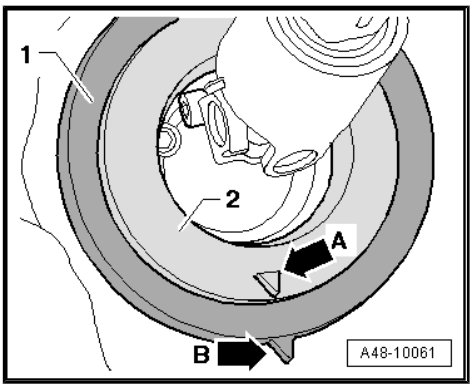
- ❑ 90 Nm +90°
- ❑ Always renew if removed
- ❑ Observe correct tightening sequence ⇒ page 342

Position of pipe connections on steering rack



Installation position of seal and bulkhead seal

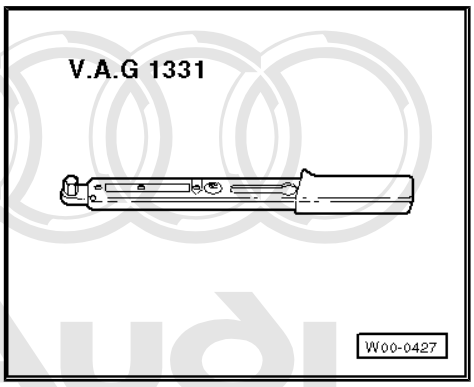
– Fit bulkhead seal -1- in plenum chamber partition panel so that marking -arrow B- faces vertically downwards.
– Fit seal -2- in bulkhead seal -1- so that marking -arrow A- faces vertically downwards.



3.2 Centralising steering

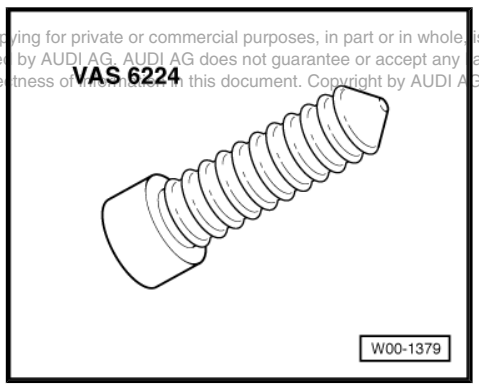
Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1331-



♦ Steering centring bolt - VAS 6224-

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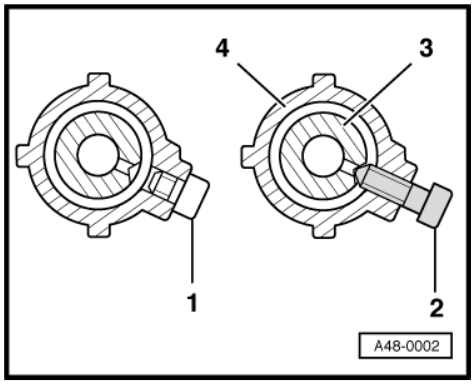
Steering rack (sectional drawing)

1 - Screw plug, 23 Nm

2 - Screw in steering centring bolt - VAS 6224- as far as possible by hand.

3 - Rack

4 - Steering rack housing



Vehicles with heat shield in front of screw plug

Vehicles with air suspension

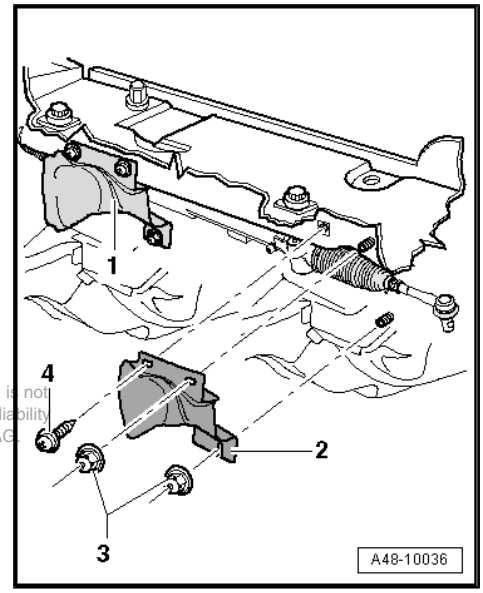
– Position vehicle on lifting platform ⇒ page 11 .

All vehicles

– Remove noise insulation ⇒ Rep. gr. 50 .

Note

- *Heat shield -2- is not fitted on all engine versions.*
- *Heat shield -1- does not have to be removed.*



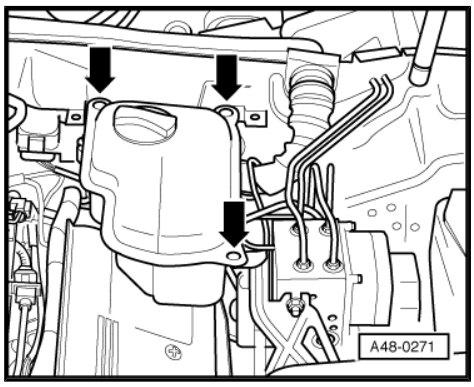
– Unscrew bottom nut -3- from heat shield -2- for steering rack (above catalytic converter on left side).

All vehicles (continued):

– Detach engine cover panel.

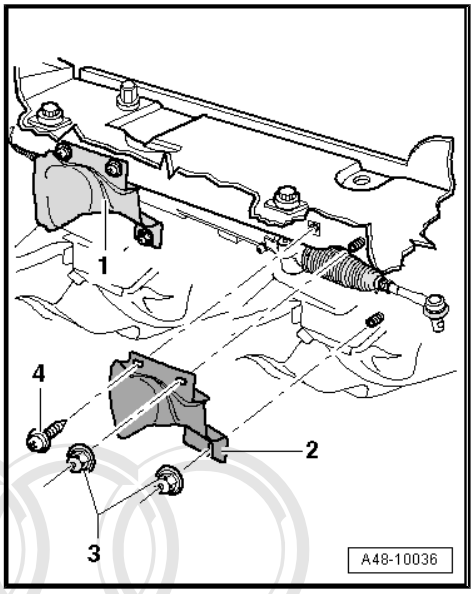
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– If fitted, detach coolant expansion tank -arrows- and lay it aside. Do not open cooling system.



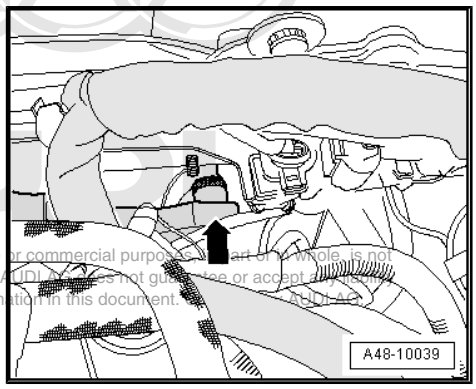
Vehicles with heat shield in front of screw plug

– Working from engine compartment, unscrew bolt -4- and upper nut -3- on heat shield -2- for steering rack.
– Guide heat shield -2- clear to one side over gearbox.



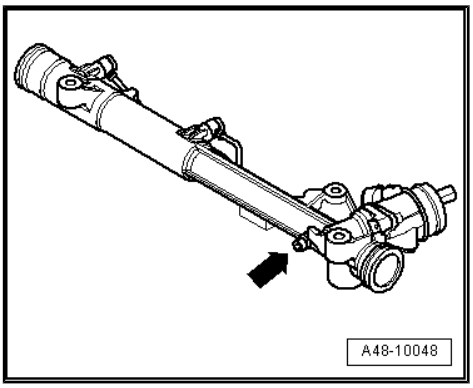
All vehicles (continued):

– Guide in tool -arrow- from above between engine and plenum chamber.

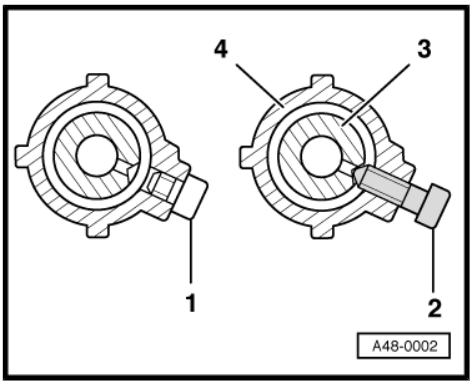


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– Remove screw plug -arrow- from steering rack.
– Move steering wheel slightly to left and right of centre position.



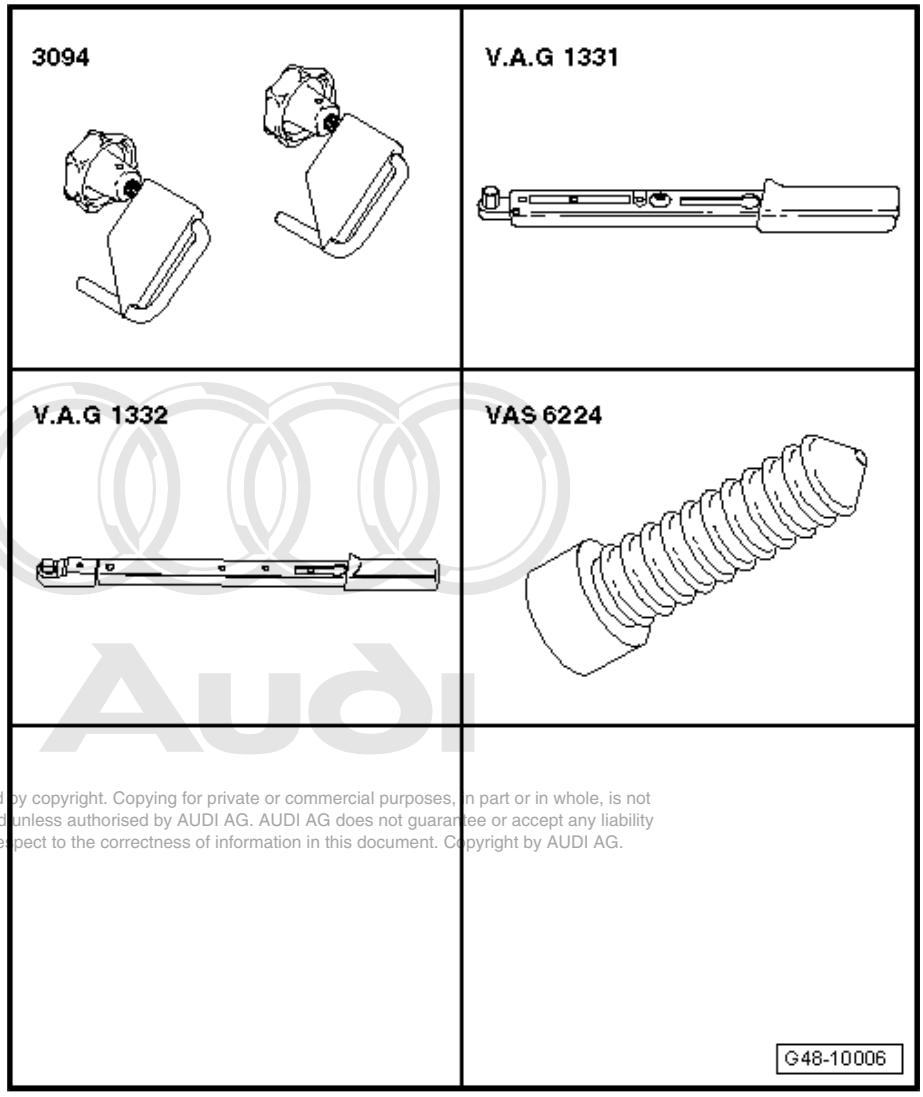
– Have second mechanic screw steering centring bolt - VAS 6224- -2- into steering rack unit -4- until it can be felt to engage in centring hole in rack -3-.



3.3 Removing and installing power steering rack (LHD vehicles)

Special tools and workshop equipment required

- Hose clamp - 3094-
- Torque wrench - V.A.G 1331-
- Torque wrench - V.A.G 1332-
- Steering centring bolt - VAS 6224-
- Universal low-temperature grease
- or
- Universal grease



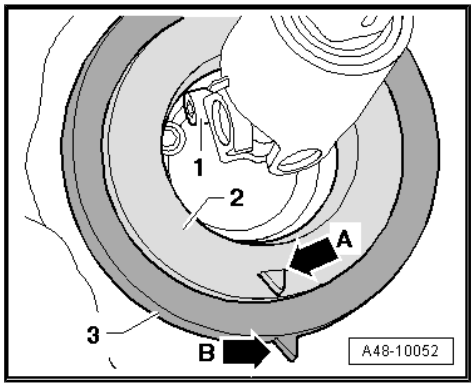
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Removing

– Remove driver's storage compartment ⇒ Rep. gr. 68 .

– Pull seal -2- out of bulkhead seal and pull seal -2- off universal joint.

– Pull bulkhead seal -3- off steering rack and plenum chamber partition panel.



Note

Always renew bulkhead seal -3- if damaged.

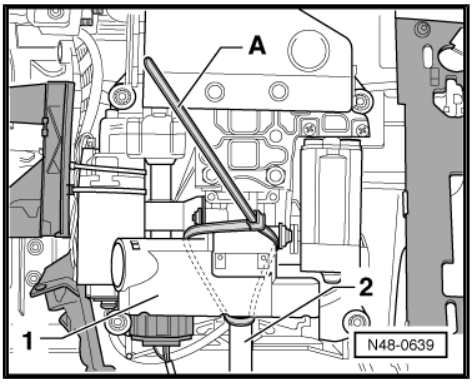
– Unscrew bolt -1- and pull universal joint off steering pinion on steering rack.

To prevent them being pulled apart, the upper and lower sections of the steering column must be held together when they are detached from steering rack.

The splines will separate if the top and bottom sections of the steering column are pulled apart or telescoped together too far.

Rattling noise may develop while driving if the splines are no longer engaged in their original position.

– Use cable tie -A- to secure universal joint -2- at steering column.



Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

All vehicles

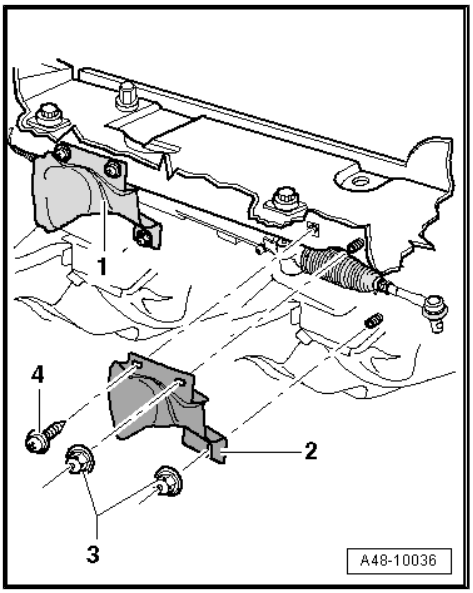
– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).

– Remove front wheels.

– Remove wheel housing liners (front left and front right) ⇒ Rep. gr. 66 .

– Remove noise insulation ⇒ Rep. gr. 50 .

– Heat shield -1- does not have to be removed.



Applies to S6 vehicles

– Remove engine ⇒ Rep. gr. 10 .

Applies to RS 6 vehicles

The heat shield -2- is provided with a hole for access from underneath to the bolted joint of the steering rack. The heat shield -2- therefore does not have to be removed.

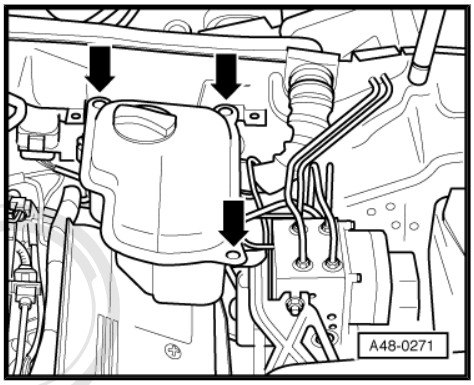
All vehicles

– Unscrew bottom nut -3- from heat shield -2- for steering rack (above catalytic converter on left side).

– Lower vehicle.

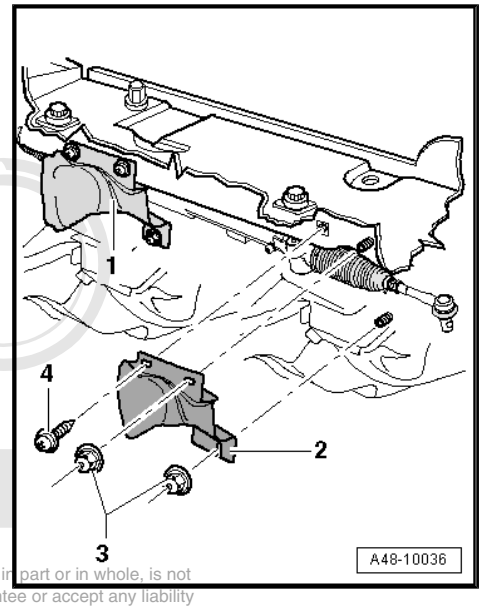
– Remove engine cover panel.

– Detach coolant expansion tank -arrows- and move it to one side. Do not open cooling system.



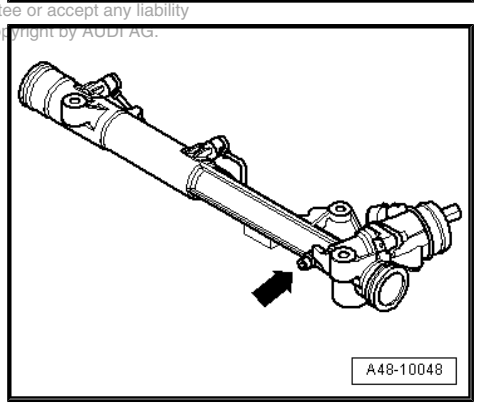
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– Working from engine compartment, unscrew bolt -4- and upper nut -3- on heat shield -2- for steering rack.
– Guide heat shield -2- clear to one side over gearbox.

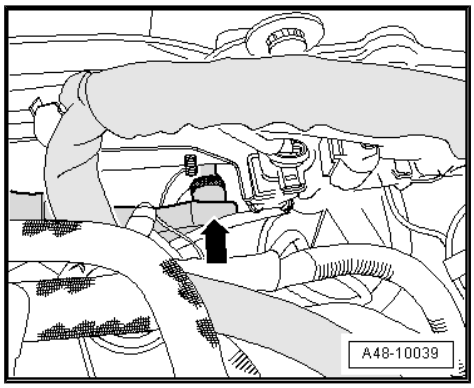


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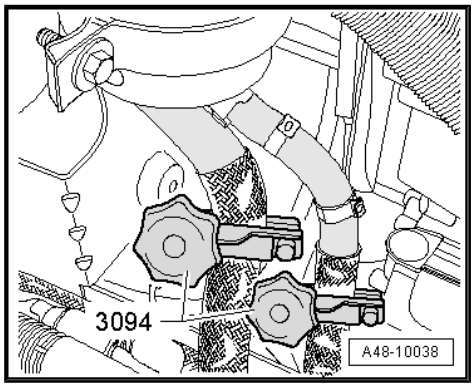
– Remove screw plug -arrow- from steering rack.



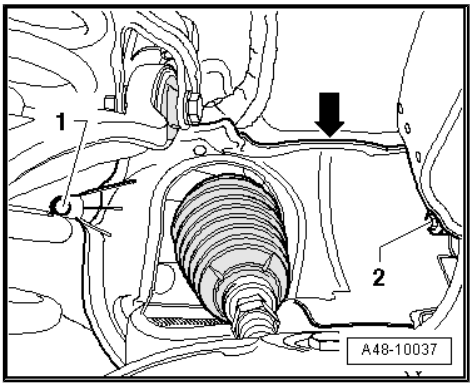
– To remove screw plug, guide in tool -arrow- from above between engine and plenum chamber.
– Centralise steering rack ⇒ page 333 .



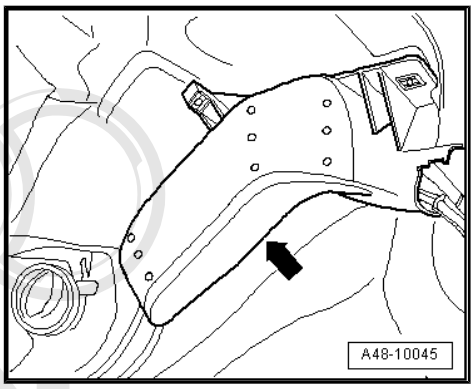
– Clamp off suction and return hoses using hose clamps -3094- .



– Remove spreader rivet -1- and nut -2-, and detach trim -arrow- in wheel housing (left and right).



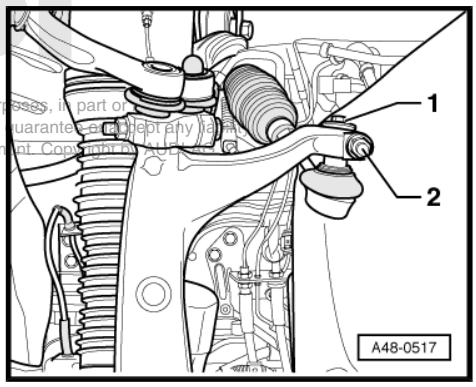
– Remove cable duct -arrow- in wheel housing (left-side).



– Unscrew bolts -1- and -2- and pull out track rod ball joint downwards.

– Pull or press track rod downwards out of steering arm.

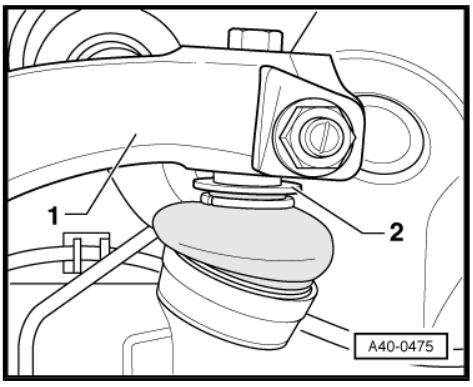
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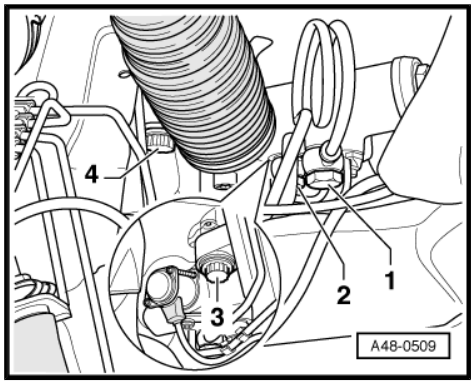
Note

- *Do not apply chisel or similar between steering arm -1- and seal -2- on track rod ball joint to press out track rod, as this would damage seal.*
- *When pressing track rod out of steering arm, apply pressure only to end of track rod ball joint, or knock out end of joint using a wooden or rubber mallet.*

– Place a cloth under the union to catch escaping hydraulic fluid.



– Unscrew banjo bolt -1- and tie up pressure hose to wheel bearing housing.
– Use offset ring spanner, e.g. Hazet 615, to remove banjo bolt -2-.
– Bolt -3- is located behind banjo bolts -1- and -2- and (depending on engine version) can be removed from steering rack from underneath.



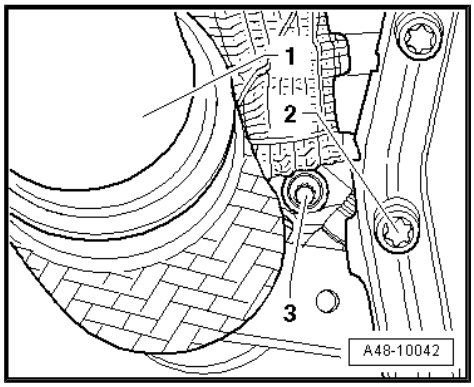
Note

For illustration purposes, bolt -3- is shown from inside.

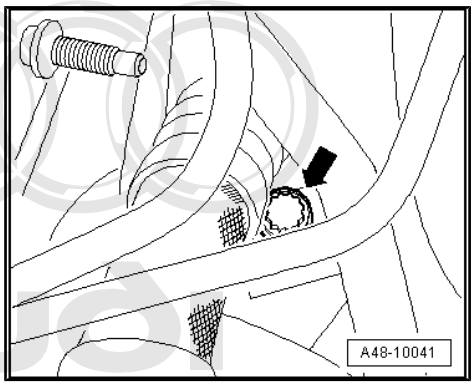
– Remove bolt -3- for steering rack.

1 - Catalytic converter (left-side)

2 - Gearbox



– Remove bolt -arrow- for steering rack in plenum chamber (left-side).

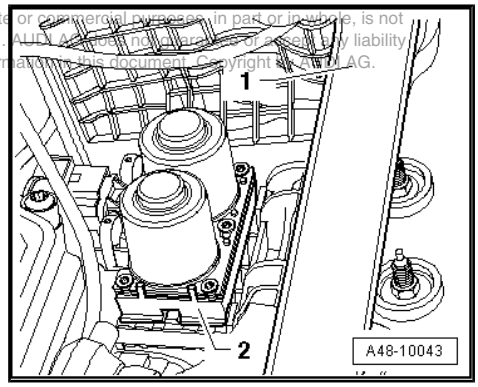


– Remove body brace -1-, if fitted ⇒ page 97.
– Remove bracket -2- with heater valves.

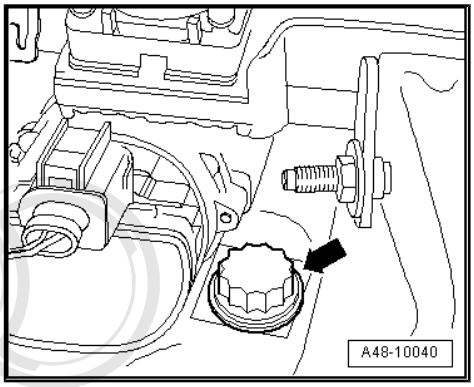
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WARNING

The valve unit is connected to the engine cooling system, and can have a temperature of up to 120°C.



– Remove bolt -arrow- for steering rack in plenum chamber (right-side).

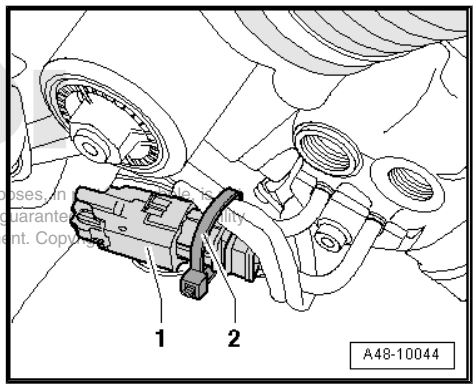


Two mechanics are required for the following operations.

– Guide steering rack slightly to the left.
– Guide steering rack past coolant hose (approximately in centre of engine compartment).
– Now guide steering rack as far as possible to the left until connector for servotronic is accessible.

Steering rack with separate connector

– Remove cable tie -2-.
– Unplug connector -1-.

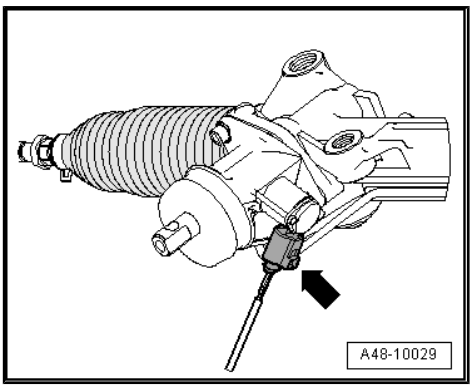


If a new steering rack is being installed, please note that all replacement units are supplied with an integral connector. The connector on the wiring harness must therefore be adapted to suit the steering rack.

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Steering rack with integral connector

– Unplug connector -arrow-.



All vehicles (continued):

– Guide steering rack to the left and remove.

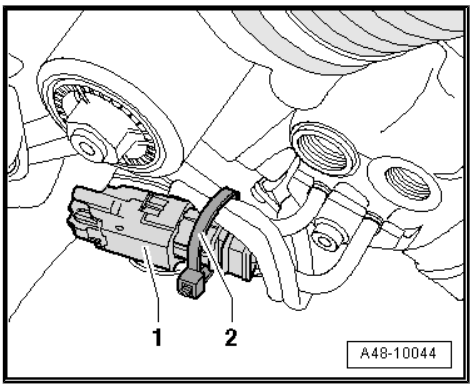
Installing

Installation is carried out in the reverse sequence. Note the following points:

– Guide in steering rack from the left side (2nd mechanic required) until electrical connector can be attached.

Steering rack with separate connector

– Plug in connector -1- and secure to steering rack with cable tie -2- as illustrated.



If a new steering rack is being installed, the connector on the wiring harness must be adapted to suit the steering rack.

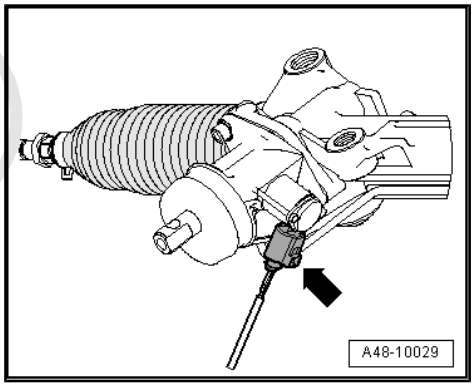
Steering rack with integral connector

– Plug in connector -arrow-.

All vehicles (continued):

– Guide steering rack to the right, past coolant hose which is approximately in centre of engine compartment (2nd mechanic required).

– Position steering rack on plenum chamber (2nd mechanic required).



Note

Make sure threads and contact surfaces of bolts are free from oil and grease.

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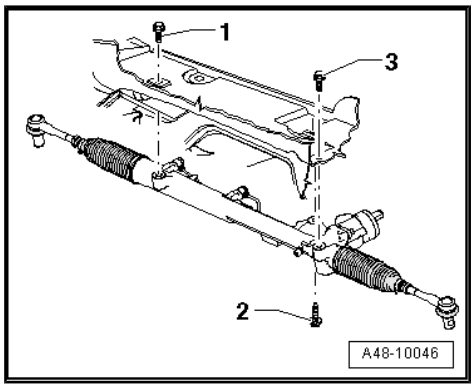
Tightening sequence:

– First tighten bolts -1- and -3- by hand (2nd mechanic required).

– Then screw in and tighten bolt -2- ⇒ Item 19 (page 332) .

– Then tighten bolt -1- ⇒ Item 23 (page 332) .

– Then tighten bolt -3- ⇒ Item 5 (page 331) .

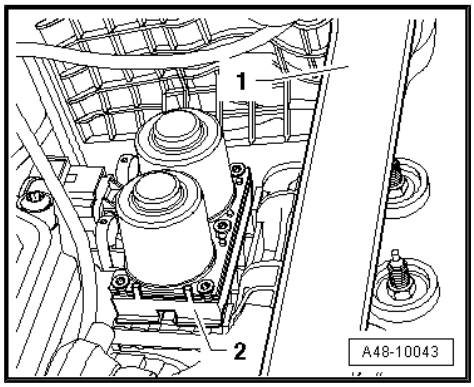


– Install bracket -2- with heater valves ⇒ Rep. gr. 80 .

– Install body brace -1-, if fitted ⇒ page 97 .

WARNING

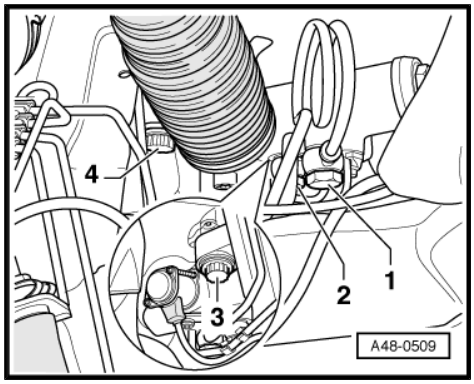
The valve unit is connected to the engine cooling system, and can have a temperature of up to 120°C.



– First tighten banjo bolt -2- using offset ring spanner, e.g. Hazet 615 ⇒ Item 13 (page 332) . Note correct installation position ⇒ page 333 .

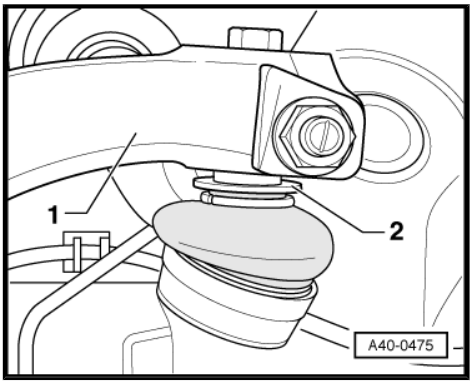
– Tighten banjo bolt -1- ⇒ Item 18 (page 332) . Note correct installation position ⇒ page 333 .

– Insert track rod ball joint into wheel bearing housing as far as the stop.

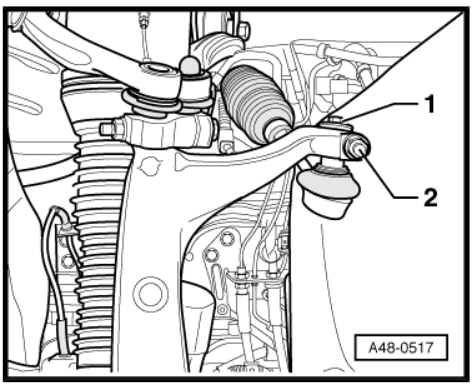


Note

Only fit track rod ball joint in wheel bearing housing -1- by hand. Take care not to apply any force to seal -2- on track rod ball joint when doing so.



– Attach bolt connection -2- and tighten nut ⇒ Item 9 (page 331) .
– Screw in and tighten bolt -1- ⇒ Item 7 (page 331) .



– Unscrew steering centring bolt - VAS 6224- -2- from steering rack.

Steering rack (sectional drawing)

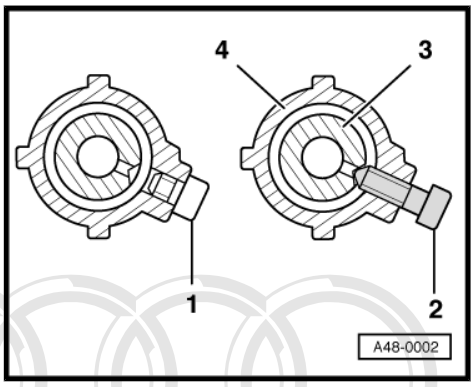
1 - Plug, 23 Nm

2 - Unscrew steering centring bolt - VAS 6224- .

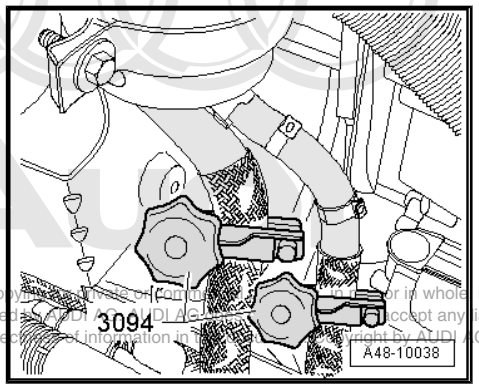
3 - Rack

4 - Steering rack housing

– Seal steering rack with screw plug -1-.



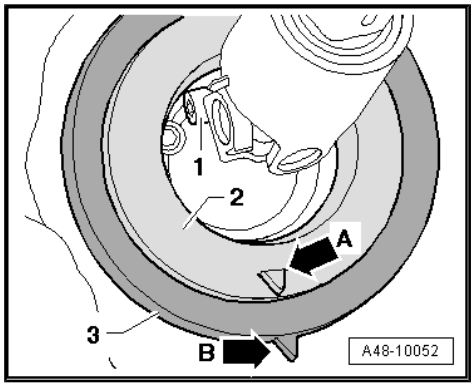
– Detach hose clamps - 3094- from suction and return hoses.
– Grease contact surfaces of bulkhead seal with universal low-temperature grease .



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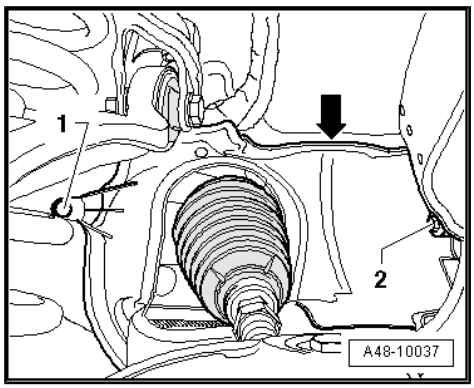
– Fit bulkhead seal -3- and seal -2- loosely onto steering column.
– Turn steering wheel to centre position, then attach universal joint with bulkhead seal and seal -2- to steering pinion.
– Tighten bolt -1- for universal joint ⇒ Item 9 (page 322) .
– Fit bulkhead seal -3- onto steering rack and insert into plenum chamber partition panel.
– Fit seal -2- in bulkhead seal -3-.

Markings -arrow A- and -arrow B- must point vertically downwards.

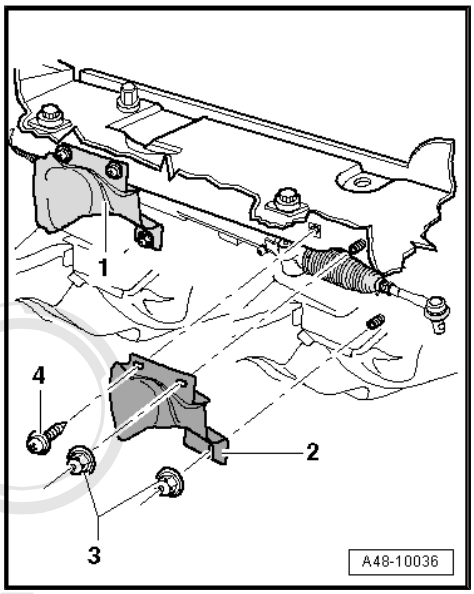


– Bleed steering system ⇒ page 358 .
– Check hydraulic fluid level ⇒ page 356 .
– Check steering system for leaks ⇒ page 359 .

– Install trim -arrow- in wheel housing (left and right), and secure with spreader rivet -1-.
– Tighten nut -2- to 2 Nm.
– Install cable duct in wheel housing.



– Fit heat shield -2- for steering rack.
– Tighten bolt -4- and nuts -3- on heat shield -2- for steering rack to 2 Nm.
– Fit engine cover panel and coolant expansion tank.
– Install noise insulation underneath engine.
– Install front wheel housing liners ⇒ Rep. gr. 66 .
– Fit and secure wheels ⇒ Wheels and tyres; Rep. gr. 44 .
– Stand vehicle on its wheels ⇒ page 11 .
– Install driver's storage compartment ⇒ Rep. gr. 68 .
– Bleed steering system ⇒ page 358 .
– Check hydraulic fluid level ⇒ page 356 .
– Check steering system for leaks ⇒ page 359 .
– Check and adjust wheel alignment ⇒ page 281 .

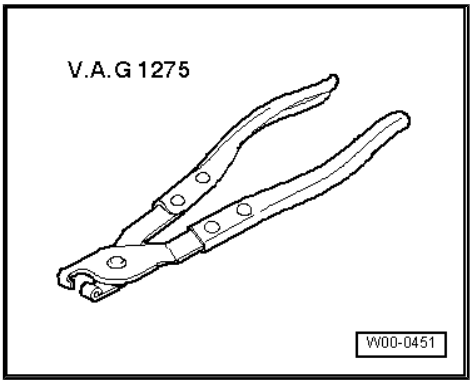


3.4 Servicing power steering rack

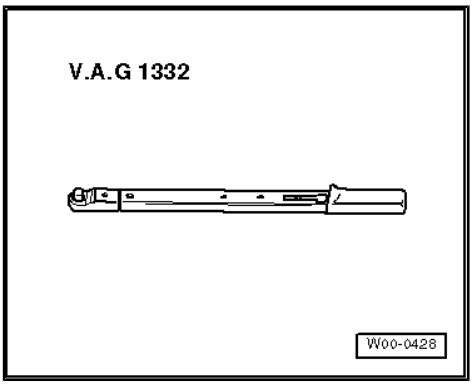
Special tools and workshop equipment required

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- Hose clip pliers - V.A.G 1275-



- Torque wrench - V.A.G 1332-

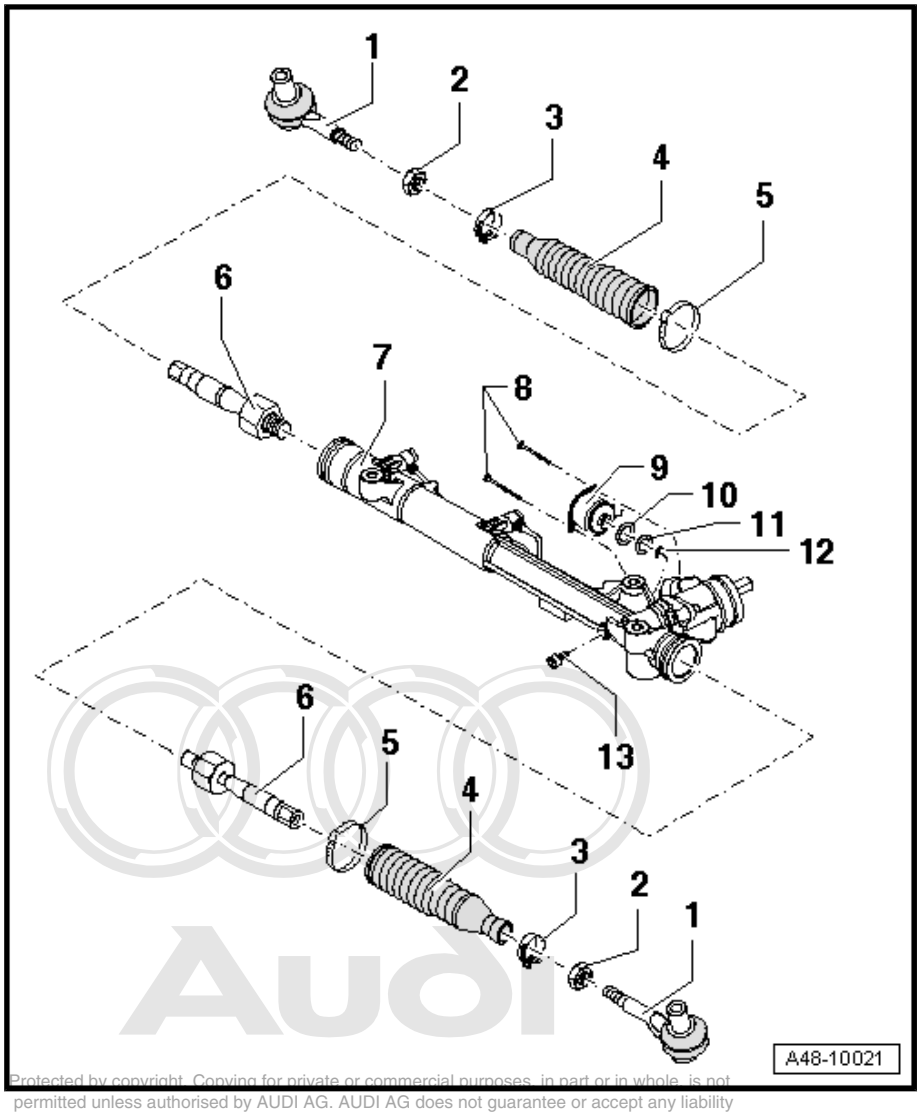


- Steering rack grease - AOF 063 000 04-

Note

- *Renew self-locking nuts and bolts.*
- *Welding and straightening work on steering components is not permitted.*
- *Use only steering rack grease for greasing rack.*

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1 - Track rod ball joint

- ❑ Removing and installing ⇒ page 349
- ❑ Check that grease caps are seated correctly and not damaged

2 - Lock nut

- ❑ 55 Nm

3 - Spring-type clip

- ❑ Always renew
- ❑ For correct version refer to ⇒ Electronic parts catalogue

4 - Boot

- ❑ Check for damage
- ❑ Must not be twisted after adjusting toe setting
- ❑ Can be renewed with steering rack installed
- ❑ Remove track rods to renew boot ⇒ page 352

5 - Hose clip

- ❑ Always renew
- ❑ Installing hose clip ⇒ page 354

6 - Track rod

- ❑ 100 Nm
- ❑ Removing and installing ⇒ page 352
- ❑ Grease joint with steering rack grease

7 - Power steering rack

- ❑ Grease rack with steering rack grease
- ❑ Different versions available ⇒ Electronic parts catalogue

8 - Hexagon socket head bolt

- ❑ 3 Nm

9 - Servotronic solenoid valve - N119-

- ❑ Removing and installing ⇒ page 347
- ❑ The following values can be displayed with -VAS 5051- :

♦ speed signal

♦ power supply from onboard power supply control unit 2 - J520-

♦ status of solenoid valve

♦ electrical current values for activation of solenoid valve

– Connect -VAS 5051- and select Fault finding (via “Function/component selection”) ⇒ Vehicle diagnostic tester.

– Then select “Body”

– “Electrical system”

– “01 - Self-diagnosis compatible systems”

– “J520 - Onboard supply control unit 2”
– “Electrical components”
– “N119 - Servotronic solenoid valve”

10 - Seal
❑ Always renew

11 - Seal
❑ Always renew

12 - Strainer
❑ Always renew

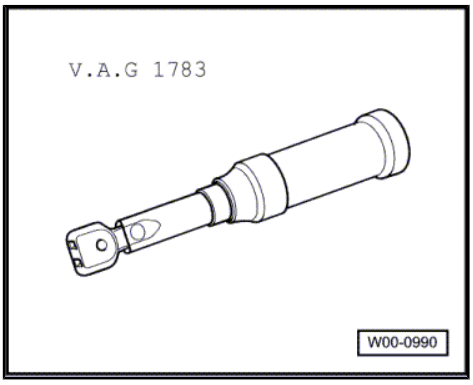
13 - Socket head bolt
❑ 23 Nm

3.5 Removing and installing servotronic solenoid valve - N119-

Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1332-

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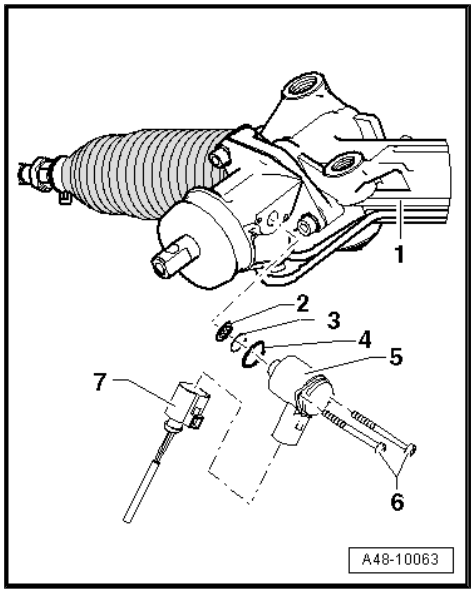
♦ Steering rack grease

Removing

Steering rack must be removed in order to renew this component.

– Remove steering rack ⇒ page 335 .

– Thoroughly clean steering rack -1- in vicinity of solenoid valve -5-.
– Make sure that no dirt enters steering rack.
– Unplug connector -7-.
– Remove bolts -6-.
– Pull solenoid valve -5- out of steering rack -1-.
– Take strainer -2- out of steering rack -1-; clean steering rack if necessary.



Installing

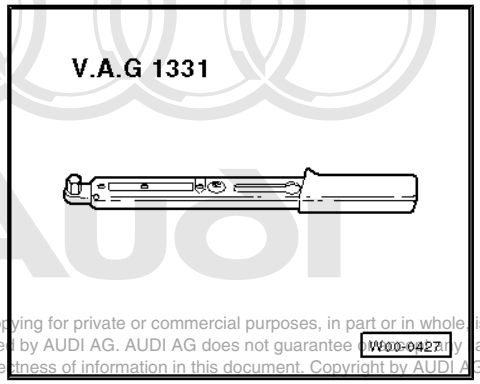
Installation is carried out in the reverse sequence. Note the following points:

– Install new strainer -2-.
– Apply a small quantity of steering rack grease to seals -3- and -4-.
– Insert solenoid valve -5- into steering rack -1- as far as stop. Take care to keep solenoid valve straight when installing.
– Tighten bolts -6- alternately in stages to 0.5 Nm, 1.5 Nm and final torque of 3 Nm.
– Install steering rack ⇒ page 335 .

3.6 Adjusting power steering rack

Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1331-



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Note

Two mechanics are required to perform adjustment. Perform adjustment with engine switched off.

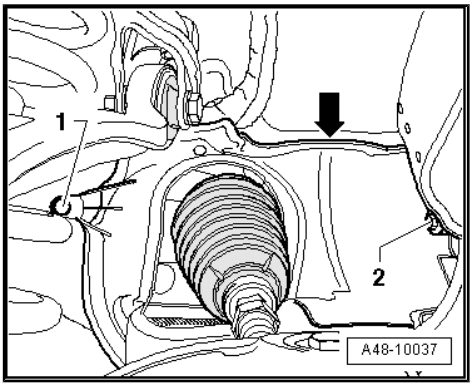
Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

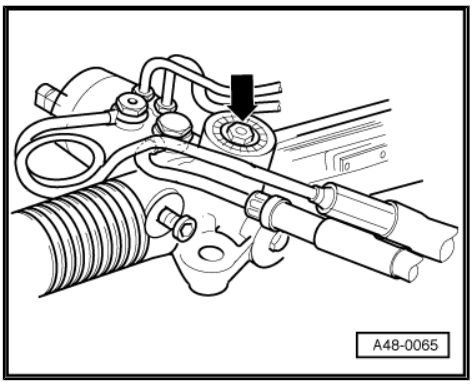
All vehicles

– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).
– Remove front left wheel.
– Remove wheel housing liner (front left) ⇒ Rep. gr. 66 .

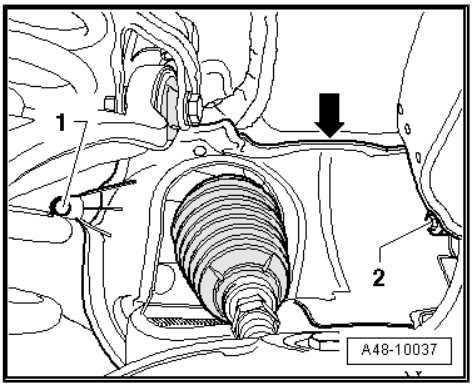
– Remove spreader rivet -1- and nut -2-, and detach trim -arrow-.
– Wheels in straight-ahead position.
– If there is excessive play in the steering, a knocking noise will be audible when the steering wheel is turned backwards and forwards (about 30° either side of centre position).



– In this case, have the second mechanic carefully screw in the adjusting screw -arrow- until the knocking noise can no longer be heard inside the vehicle.



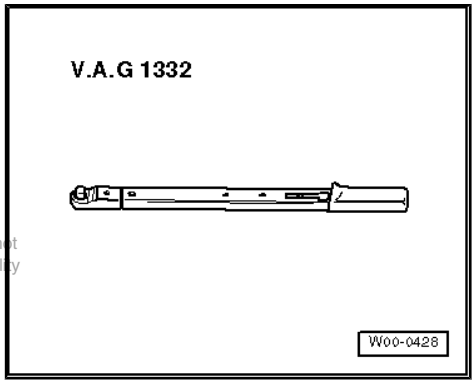
– Install trim -arrow- and secure with spreader rivet -1-.
– Tighten nut -2- to 2 Nm.
– Install front wheel housing liner ⇒ Rep. gr. 66 .
– Fit and secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .
– Stand vehicle on its wheels ⇒ page 11 .
– Road-test vehicle.
– Check that the steering centres smoothly by itself back to the straight-ahead position after a turn. Correct the adjustment if necessary.



3.7 Removing and installing track rod ball joint

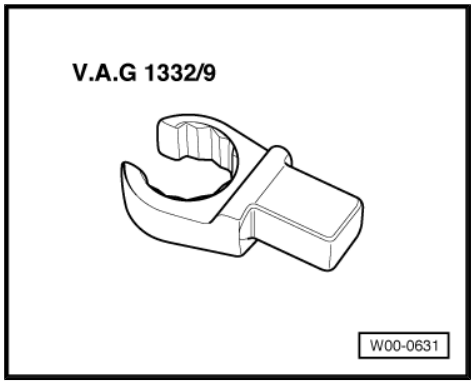
Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1332-



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♦ Open ring spanner insert - V.A.G 1332/9-



Removing

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

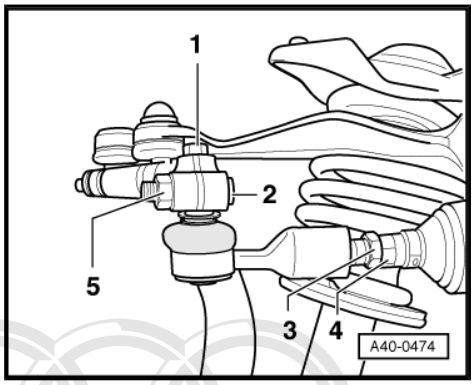
All vehicles

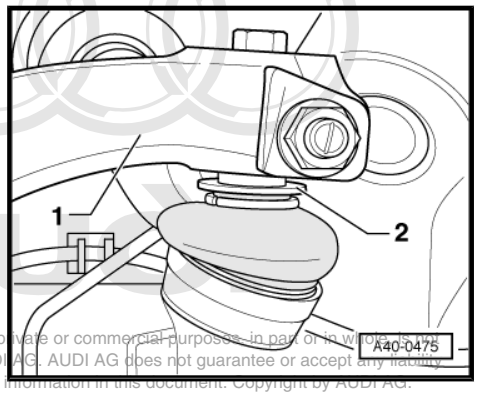
– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).

– Remove wheel.

– Remove bolt -1-.

– Unscrew hexagon nut -5- and take out bolt -2-.

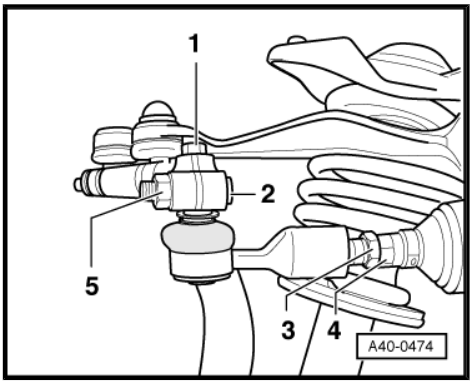




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Note

- *Do not attempt to enlarge slots in wheel bearing housing using a chisel or similar.*
- *Do not apply chisel or similar between steering arm -1- and seal -2- on track rod ball joint to press out track rod, as this would damage seal.*
- *When pressing track rod out of steering arm, apply pressure only to end of track rod ball joint, or knock out end of joint using a wooden or rubber mallet.*
- *Press out track rod downwards.*
- *Loosen hexagon nut -3- and unscrew track rod ball joint. Hexagon flats -4- serve to counterhold track rod.*
- *Remove all grease from track rod ball joint and clamping bore in wheel bearing housing.*



Installing

Installation is carried out in the reverse sequence. Note the following points:

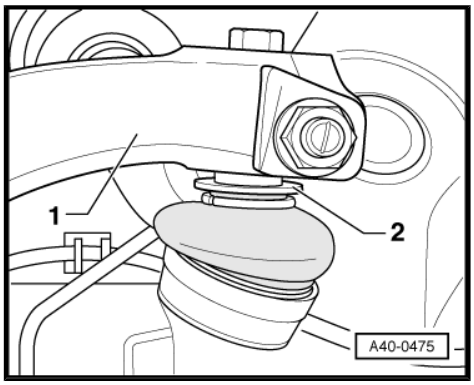
– Screw track rod ball joint onto stop on track rod.

– Align track rod so that pin of track rod ball joint is in installation position.

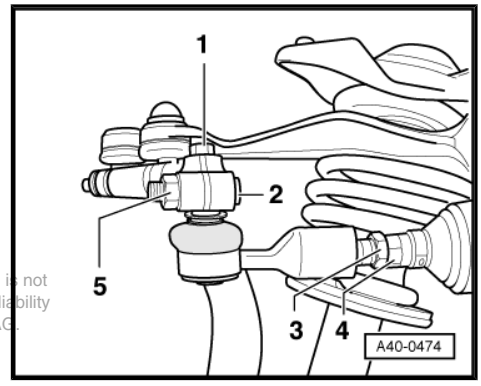
– Insert track rod ball joint into wheel bearing housing as far as the stop.

Note

Only fit track rod ball joint in wheel bearing housing -1- by hand. Take care not to apply any force to seal -2- on track rod ball joint when doing so.

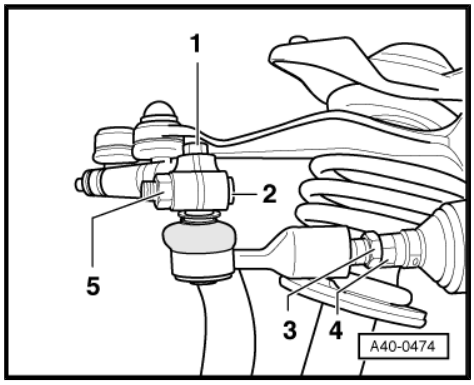


– Tighten lock nut -3- ⇒ Item 2 (page 346) using open ring spanner insert - V.A.G 1332/9- . Counterhold track rod at hexagon flats -4- when tightening nut.



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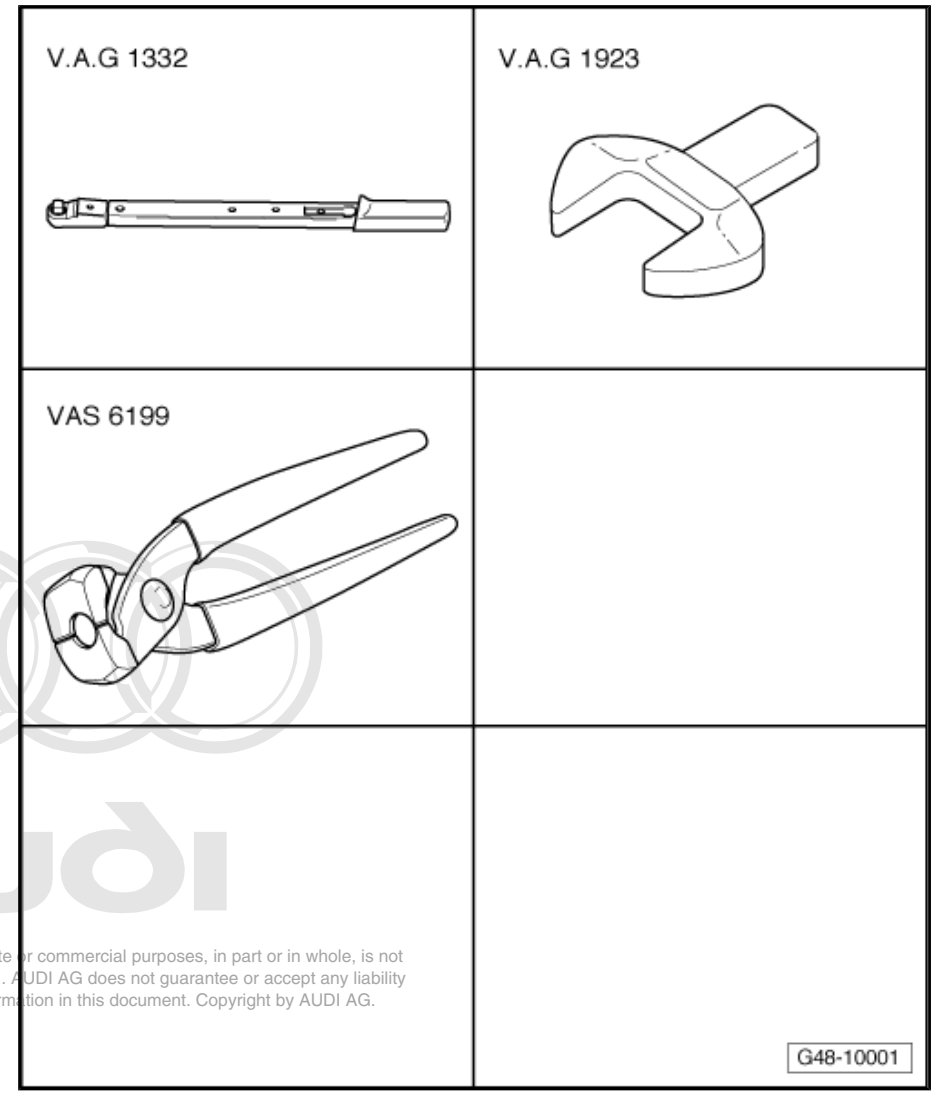
– Insert bolt -2- and tighten nut -5- ⇒ Item 9 (page 331) .
– Insert and tighten bolt -1- ⇒ Item 7 (page 331) .
– Fit and secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .
– Stand vehicle on its wheels ⇒ page 11 .
– Check and adjust wheel alignment ⇒ page 281 .



3.8 Removing and installing track rods

Special tools and workshop equipment required

- Torque wrench - V.A.G 1332-
- Open-end spanner attachment - V.A.G 1923-
- Locking pliers for steering rack - VAS 6199-



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Removing

Left and right track rods are identical. They can be removed and installed with the steering rack in the vehicle.

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

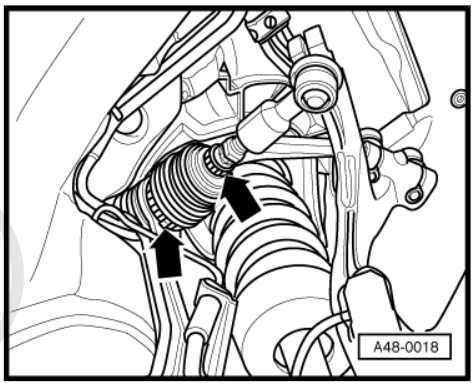
All vehicles

– Remove wheel trim; on light-alloy wheels, pull off trim cap (use puller in vehicle tool kit).

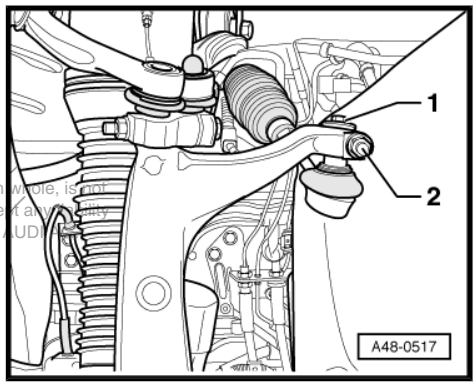
– Remove wheel.

– Remove engine cover panel ⇒ Rep. gr. 66 .

– Unfasten hose clip and spring-type hose clip at boot -arrows-.



– Unscrew bolts -1- and -2- and pull out track rod ball joint downwards.



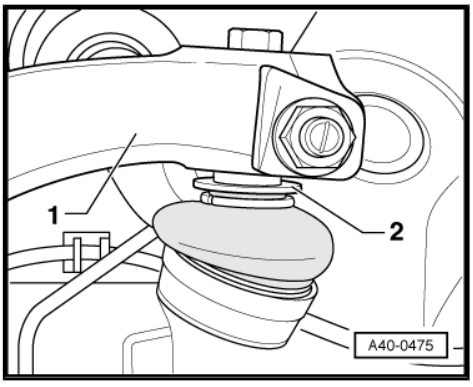
Note

Do not attempt to enlarge slots in wheel bearing housing using a chisel or similar.

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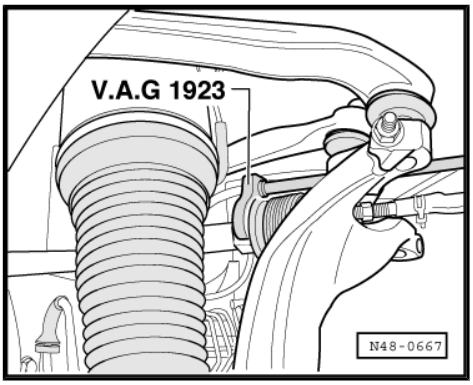
Note

- *Do not apply chisel or similar between steering arm -1- and seal -2- on track rod ball joint to press out track rod, as this would damage seal.*
- *When pressing track rod out of steering arm, apply pressure only to end of track rod ball joint, or knock out end of joint using a wooden or rubber mallet.*



– Pull rubber boot as far as possible outwards.

– Unscrew track rod using open-end spanner attachment - V.A.G 1923- .



Installing

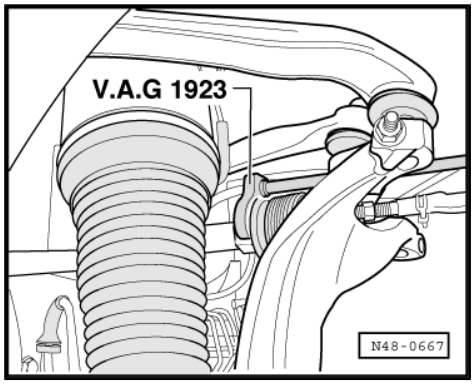
Installation is carried out in the reverse sequence. Note the following points:

– Use open-end spanner attachment - V.A.G 1923- to screw on track rod ⇒ Item 6 (page 346) .

– When fitting the boot, make sure that:

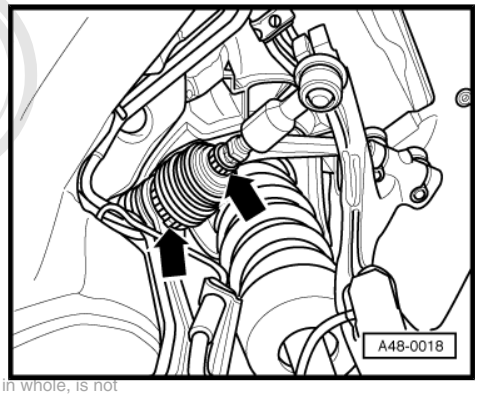
♦ the smaller diameter of the boot clips into the groove on the track rod

♦ Boot is not twisted



– Renew spring-type hose clip and hose clip -arrows-.

Installing O-type hose clip:



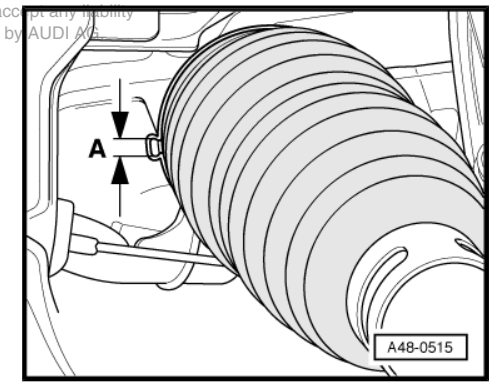
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Make sure that dimension -A- is not greater than 5.7 mm. Dimension -A- must never exceed 5.7 mm, as otherwise leakage can occur.

– Install new hose clip and tighten clip using locking pliers for steering rack - VAS 6199- .

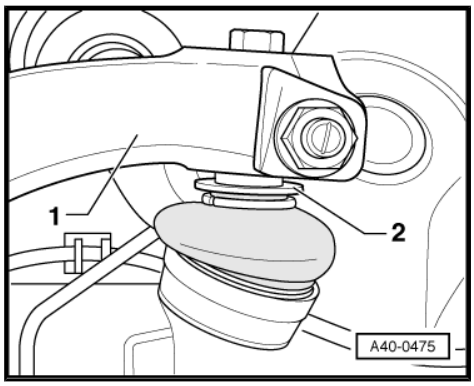
– Align track rod so that pin of track rod ball joint is in installation position.

– Insert track rod as far as it will go in steering arm.

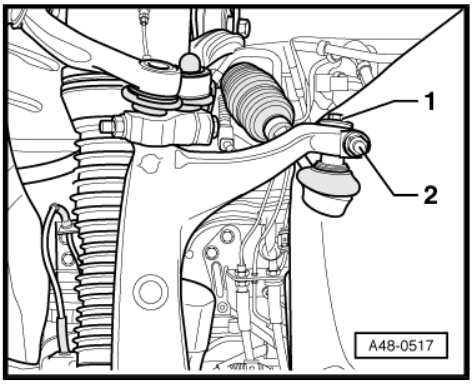


Note

Only fit track rod by hand in steering arm -1-. Take care not to apply any force to seal -2- on track rod ball joint when doing so.



– Attach bolt connection -2- and tighten nut ⇒ Item 9 (page 331) .
– Screw in and tighten bolt -1- ⇒ Item 7 (page 331) .
– Fit and secure wheel ⇒ Wheels and tyres; Rep. gr. 44 .
– Stand vehicle on its wheels ⇒ page 11 .
– Check and adjust wheel alignment ⇒ page 281 .



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4 Checking fluid level, bleeding steering system and checking for leaks

⇒ “4.1 Checking power steering fluid level (all engines except 10-cylinder TFSI)”, page 356 .

⇒ “4.2 Checking power steering fluid level (10-cylinder TFSI engine)”, page 357

⇒ “4.3 Bleeding steering system after repairs”, page 358 .

⇒ “4.4 Checking steering system for leaks”, page 359 .

4.1 Checking power steering fluid level (all engines except 10-cylinder TFSI)

– Do not start engine. Set front wheels to straight-ahead position.

When fluid is cold (approx. 20°C):

– Unscrew filler cap.

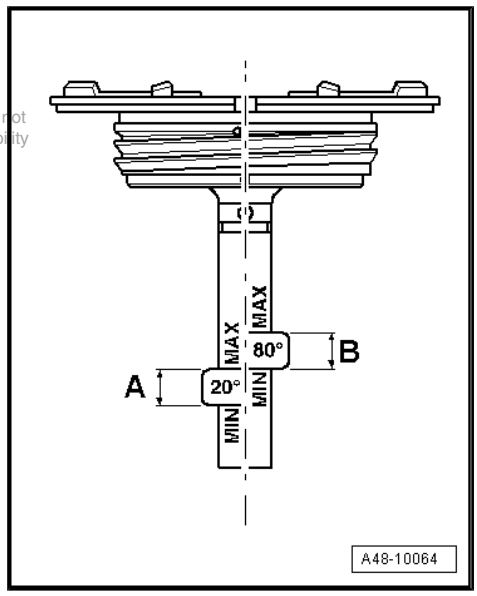
– Wipe dipstick with a clean cloth.

– Screw filler cap on hand tight and unscrew again.

Note

The cap must first be fully screwed on in order to obtain an accurate fluid level reading.

– Check fluid level: fluid level should be in area -A-.



When fluid is at operating temperature (approx. 80 °C):

– Unscrew filler cap.

– Wipe dipstick with a clean cloth.

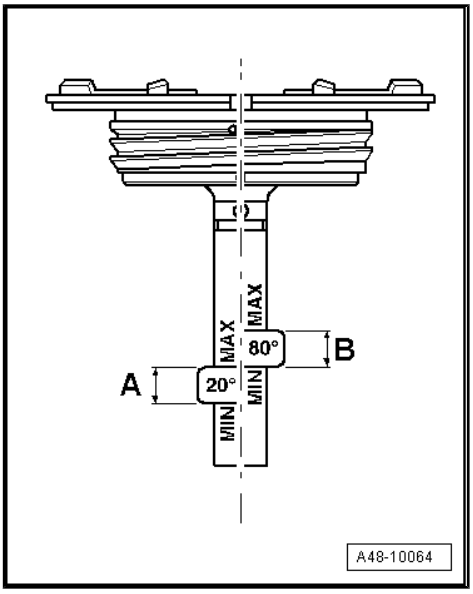
– Screw filler cap on hand tight and unscrew again.

Note

The cap must first be fully screwed on in order to obtain an accurate fluid level reading.

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– Check fluid level: fluid level should be in area -B-.



Note

- *Excess fluid must be drained off if the level is above the range specified above.*
- *If the fluid level is below the range specified, the hydraulic system must be checked for leaks. In this case it is not sufficient to merely top up the fluid.*
- *Do not re-use hydraulic fluid which has been drained off.*

4.2 Checking power steering fluid level (10-cylinder TFSI engine)

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The power steering fluid level must be checked immediately after shutting off the warm engine. The engine must have been running for at least 2 minutes beforehand.

– Switch off engine and move front wheels to straight-ahead position.

When fluid is warm (approx. 50°C and above):

– Unscrew filler cap.

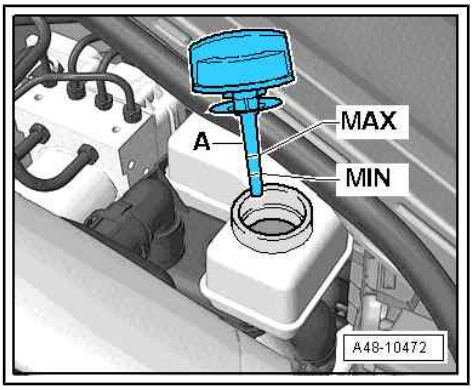
– Wipe dipstick with a clean cloth.

– Screw filler cap on hand tight and unscrew again.

Note

The cap must first be fully screwed on in order to obtain an accurate fluid level reading.

– Check fluid level: the fluid level must be at the “MAX” mark, or up to 5 mm above the “MAX” mark in area -A-.



Note

- *On 10-cylinder TFSI vehicles, the reservoir consists of 2 chambers separated by a strainer. To prevent incorrect filling, wait several minutes after filling or extraction for the level to even out in the 2 chambers.*
- *Excess fluid must be drained off if the level is above the range specified above.*
- *If the fluid level is below the range specified, the hydraulic system must be checked for leaks. In this case it is not sufficient to merely top up the fluid.*
- *Do not re-use hydraulic fluid which has been drained off.*

4.3 Bleeding steering system after repairs

Different bleeding procedures are required after repairs to the steering system, depending on which components have been removed or renewed.

Bleeding system after replacement of entire steering system or steering rack:

– Fill reservoir completely.

Applies to 10-cylinder TFSI vehicles

Note

On 10-cylinder TFSI vehicles, the reservoir consists of 2 chambers separated by a strainer. To prevent incorrect filling, wait several minutes after filling or extraction for the level to even out in the 2 chambers.

All vehicles

– Raise vehicle so that all wheels are free.
• Engine switched off.
– With engine switched off, turn steering wheel 10 times from lock to lock.
– Fill reservoir completely.
– Start engine and let it run briefly (2 seconds maximum).

Pump must not draw in air. Steering wheel must not be turned.

Wait approx. 30 seconds between engine starts.

– Check hydraulic fluid level and top up if necessary.
– Keep repeating this procedure until fluid level remains constant.
– With engine switched off, turn steering wheel 10 times from lock to lock.
– Check hydraulic fluid level and top up if necessary.
– Start engine.
– Turn steering wheel 10 times from lock to lock.
– Check hydraulic fluid level and top up if necessary.

Any air remaining in the steering system will dissipate when the vehicle has been driven 10…20 km.

Bleeding system after removing one or more steering system components with the exception of the steering rack (i.e. pump, hoses, etc.):

– Check hydraulic fluid level and top up if necessary ⇒ page 356 .

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Applies to 10-cylinder TFSI vehicles

Note

On 10-cylinder TFSI vehicles, the reservoir consists of 2 chambers separated by a strainer. To prevent incorrect filling of the reservoir, wait several minutes after filling or extraction for the level to even out in the 2 chambers.

All vehicles

– Start engine and let it run briefly (2 seconds maximum).

Pump must not draw in air; steering wheel must not be turned.

Wait approx. 30 seconds between engine starts.

– Check hydraulic fluid level and top up if necessary.

– Keep repeating this procedure until fluid level remains constant.

– Start engine and let it run for 2 - 3 minutes without turning steering wheel.

– Check hydraulic fluid level and top up if necessary.

Any air remaining in the steering system will dissipate when the vehicle has been driven 10…20 km.

4.4 Checking steering system for leaks

Note

The steering system must be checked for leaks after repair work and if the hydraulic fluid level in the reservoir is low.

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

All vehicles

– Remove noise insulation ⇒ Rep. gr. 50 .

– Start engine.

– Turn steering to full lock on both sides and hold briefly.

This builds up the maximum possible pressure.

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Note

To avoid damaging the pump, the steering wheel must not be held on full lock for more than 10 seconds during this test.

Check the following components for leaks with the steering in this position:

- Pinion seal on steering rack valve housing
- All pipe connections
- Steering rack seals

Rubber boots must be pushed back before checking components.

– Open hose clips (spring-type clip and clip with lug fastener) on rubber boot.

– Push back the boot.

The steering rack must be renewed if fluid is visible in the steering rack housing and/or in the rubber boots.

– Stand vehicle on its wheels ⇒ page 11 .

5 Power steering pump, hydraulic pipes and hoses, fluid reservoir (vehicles with 4-cylinder diesel engine)

⇒ “5.1 Exploded view (vehicles with 4-cylinder diesel engine)”, page 360 .

⇒ “5.2 Checking delivery pressure of power steering pump up to model year 2009 (vehicles with 4-cylinder diesel engine)”, page 363 .

⇒ “5.3 Checking delivery pressure of power steering pump from model year 2009 onwards (vehicles with 4-cylinder diesel engine)”, page 367

Exploded view of power steering pump (vehicles with 4-cylinder diesel engine) ⇒ page 372

Removing and installing power steering pump (vehicles with 4-cylinder diesel engine) ⇒ page 373

5.1 Exploded view (vehicles with 4-cylinder diesel engine)

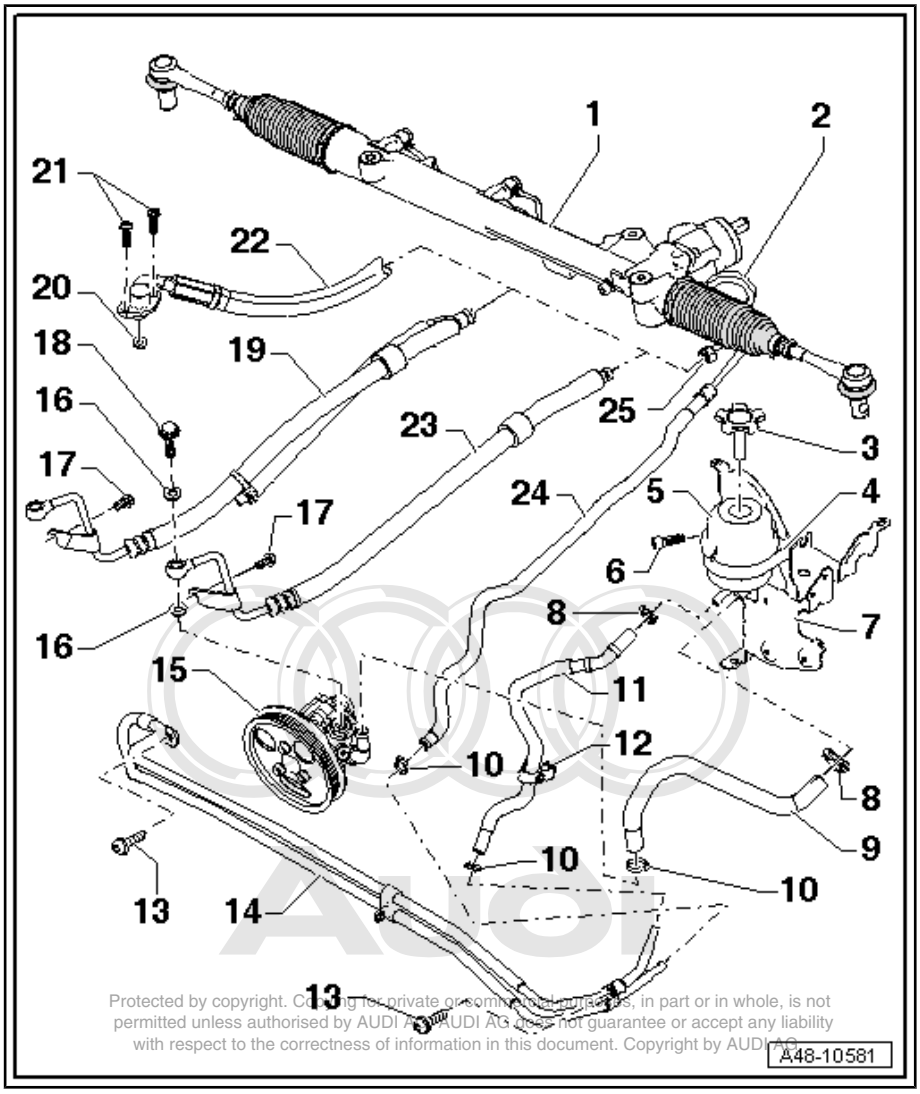
In model year 2009 a new-generation power steering pump was phased into production; refer to ⇒ Electronic parts catalogue .

There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

Note

- *Always check steering system for leaks if fluid level is low in reservoir.*
- *If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.*
- *The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and turned by hand. Otherwise, there is a possibility of pump damage or noise while driving.*

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1 - Power steering rack

- ❑ For correct version refer to ⇒ Electronic parts catalogue

2 - Pressure line

- ❑ Note correct position on steering rack ⇒ page 363

3 - Cap with dipstick

- ❑ Checking fluid level ⇒ page 356

4 - Securing strap

5 - Reservoir

- ❑ Note correct installation position ⇒ page 490

6 - Bolt

- ❑ 8 Nm

7 - Bracket

- ❑ For reservoir and ESP hydraulic unit

8 - Spring-type clip

- ❑ Use spring-type clip pliers - VAS 5024 A- when removing and installing

9 - Suction hose

- ❑ Note correct position on reservoir ⇒ page 490
- ❑ Note correct position on power steering pump ⇒ page 372

10 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

11 - Return hose

- ❑ Note correct position on reservoir ⇒ page 490
- ❑ Note attachment on longitudinal member ⇒ page 362

12 - Bracket

- ❑ Clipped onto longitudinal member

13 - Bolt

- ❑ 9 Nm

14 - Cooling pipe

- ❑ Secured to lock carrier together with pressure pipe ⇒ page 363

15 - Power steering pump

- ❑ Different versions; for correct version refer to ⇒ Electronic parts catalogue
- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure, power steering pump up to model year 2009 ⇒ page 363
- ❑ Checking delivery pressure, power steering pump from model year 2009 onwards ⇒ page 367
- ❑ Removing and installing ⇒ page 373

16 - Seal

- ❑ Always renew

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17 - Bolt

- ❑ 20 Nm

18 - Banjo bolt

- ❑ 50 Nm

19 - Pressure hose

- ❑ Connection to power steering pump with banjo bolt
- ❑ With additional vibration damper hose ⇒ Electronic parts catalogue
- ❑ Alternatively: pressure hose without vibration damper ⇒ Item 23 (page 362)
- ❑ Note correct position on power steering pump ⇒ page 372

20 - Seal

- ❑ Always renew

21 - Bolt

- ❑ 9 Nm

22 - Pressure hose

- ❑ Connection to power steering pump with clamping plate
- ❑ When connecting to power steering pump, fully insert clamping plate and tighten bolts

23 - Pressure hose

- ❑ Connection to power steering pump with banjo bolt
- ❑ Without additional vibration damper hose ⇒ Electronic parts catalogue
- ❑ Alternatively: pressure hose with vibration damper ⇒ Item 19 (page 362)
- ❑ Note correct position on power steering pump ⇒ page 372

24 - Return hose

- ❑ Note correct position on steering rack ⇒ page 401
- ❑ Note installation position on longitudinal member ⇒ page 363
- ❑ Note attachment on longitudinal member ⇒ page 362

25 - Union nut

- ❑ 40 Nm

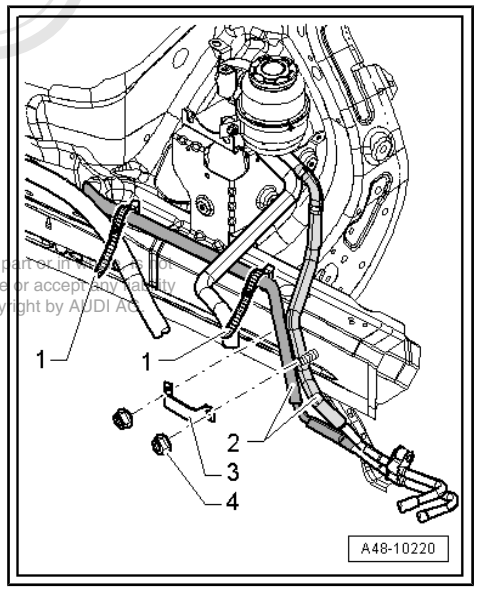
Attachment of return hoses on longitudinal member

– Insert return hoses between studs.

– Secure return hoses -2- on longitudinal member with bracket -3- and nuts -4-.

Tightening torque for nuts -4-: 2 Nm.

– Secure return hoses -2- on longitudinal member with cable tie -1-.

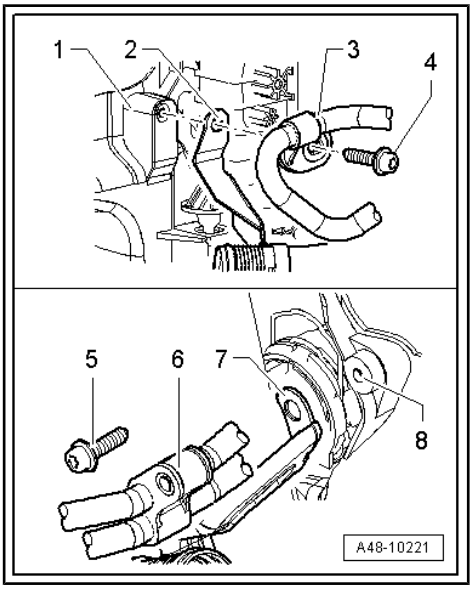


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Installing cooling pipe together with pressure pipe on lock carrier

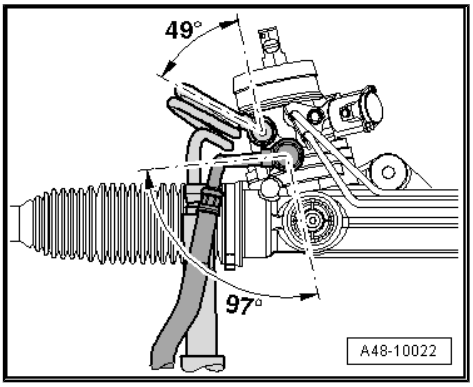
– Secure right lug -3- on cooling pipe and bracket -2- for pressure pipe to lock carrier -1- with bolt -4-.

– Secure left lug -6- on cooling pipe and bracket -7- for pressure pipe to lock carrier -8- with bolt -5-.



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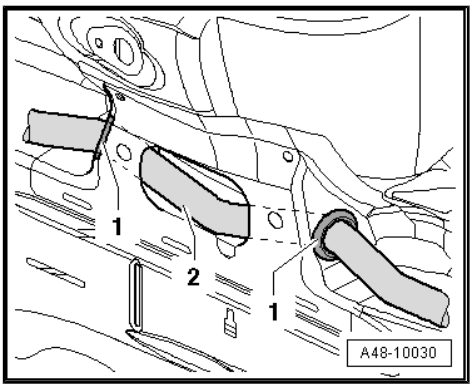
Position of pipe connections on steering rack



Installation position in longitudinal member

– Engage guide bushes -1- in longitudinal member.

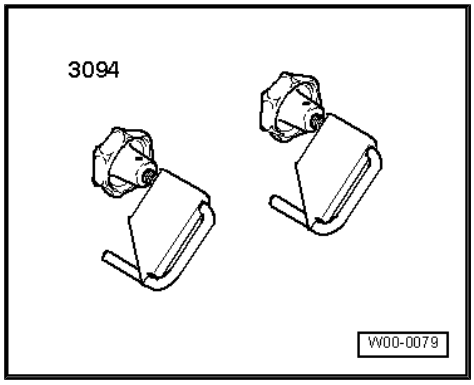
– Guide return hose -2- through support after installing bushes -1-.



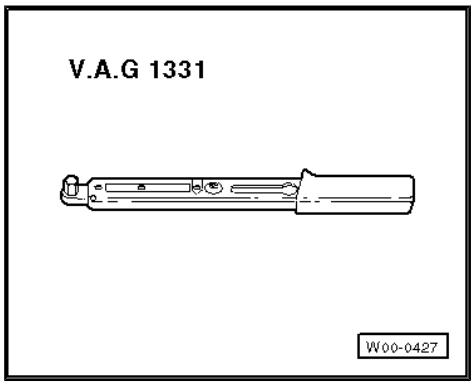
5.2 Checking delivery pressure of power steering pump up to model year 2009 (vehicles with 4-cylinder diesel engine)

Special tools and workshop equipment required

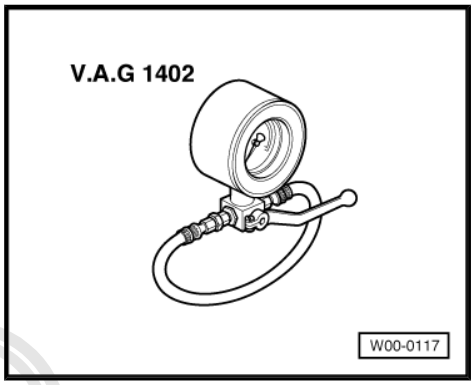
- Hose clamps - 3094-



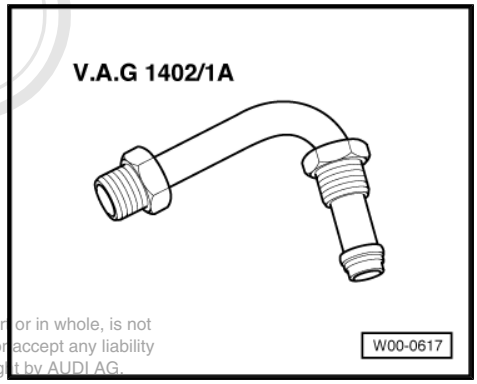
- Torque wrench - V.A.G 1331-



- Power steering tester - V.A.G 1402-

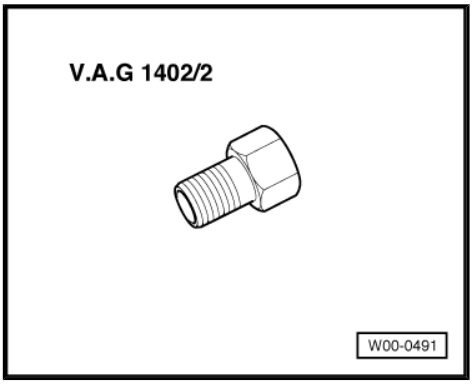


- Adapter - V.A.G 1402/1 A-

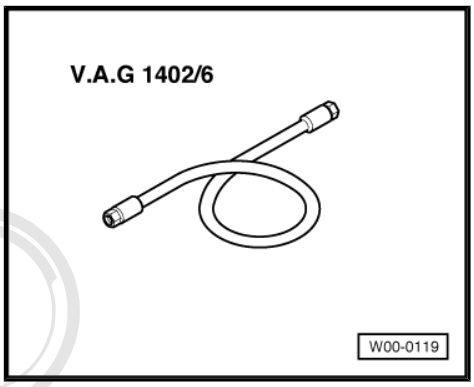


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♦ Adapter - V.A.G 1402/2-



♦ Adapter set - V.A.G 1402/6-

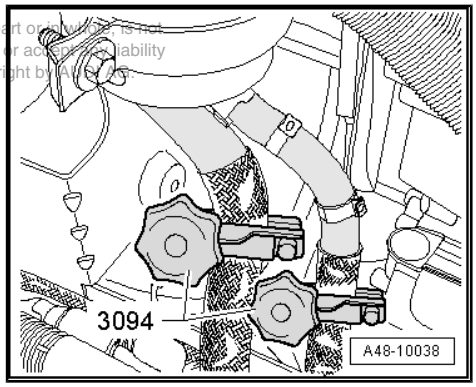


Test requirements:

- V-belt and V-belt tension OK.
- No leaks in system
- Hoses and pipes not kinked or constricted

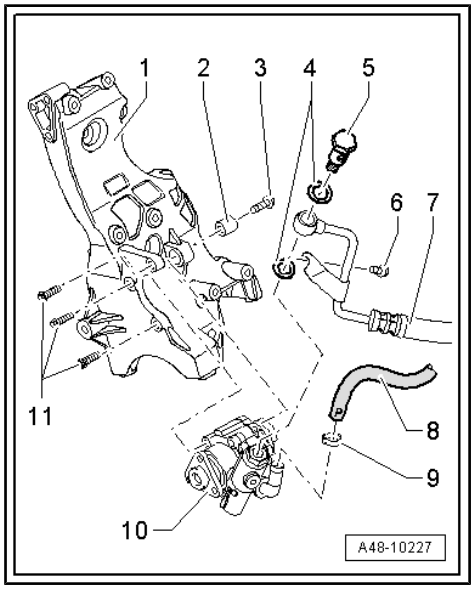
Checking

– Clamp off suction and return hoses using hose clamps - 3094- .



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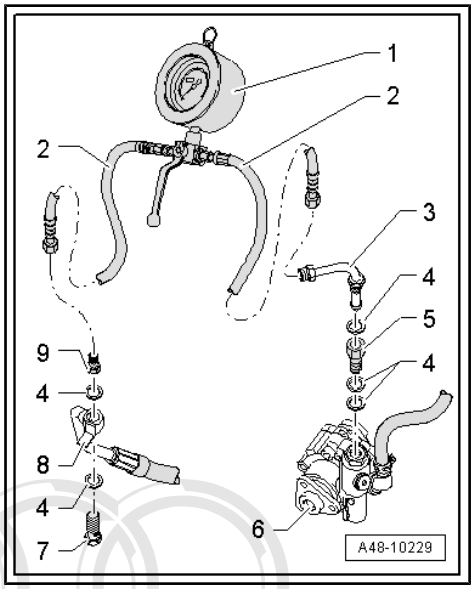
– Remove bolt -6- securing pressure line -7-.
– Remove banjo bolt -5- for pressure line -7- and detach seals -4-.



– Connect power steering tester - V.A.G 1402- as shown.

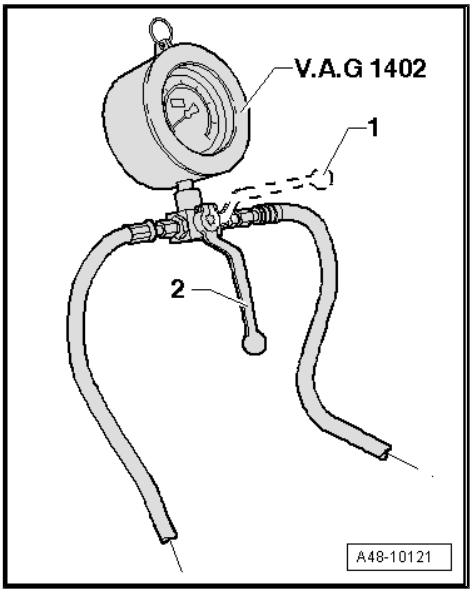
1 - Pressure gauge - V.A.G 1402-
2 - Hose from adapter set - V.A.G 1402/6-
3 - Adapter - V.A.G 1402/1 A-
4 - Seal
5 - Adapter - V.A.G 1402/2-
6 - Power steering pump
7 - Banjo bolt
8 - Pressure line
9 - Adapter from adapter set - V.A.G 1402/6-

– Remove hose clamps - 3094- .



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– Make sure lever on pressure gauge is at position -2-.
– Start engine but do not press accelerator.
– Turn steering wheel approx. 10 times from lock to lock.
– Switch off engine and top up hydraulic fluid in reservoir if necessary.

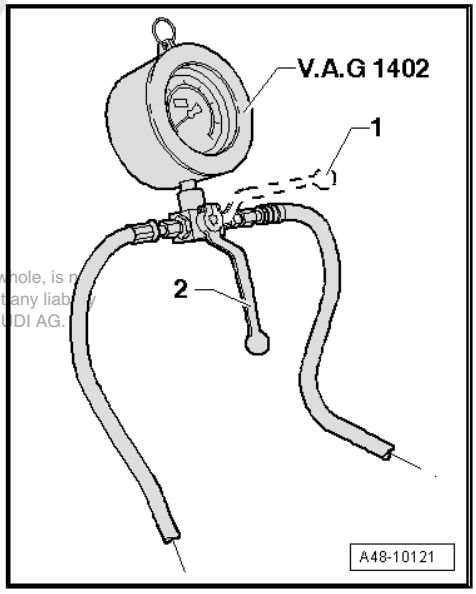


Note

- *To avoid damaging the power steering pump, please note the following points:*
- *Cut-off valve of pressure gauge must not remain closed for more than 10 seconds during this test.*
- *Start engine without pressing accelerator and leave it running at idling speed.*
- *Take pump pressure reading at idling speed immediately after starting engine (have second mechanic take reading).*
- *The pressure will drop during the test; the highest pressure reading is therefore the required test value.*

– Then check delivery pressure.

– Start engine, close cut-off valve (position -1-) with engine idling and read off pressure (lever must face away from pressure hose). Do not perform measurement for longer than 10 seconds.



Delivery pressure specifications:	
Pump	**Delivery pressure**
4F0 145 155 E	120…130 bar
4F0 145 155 P	110…120 bar

Audi
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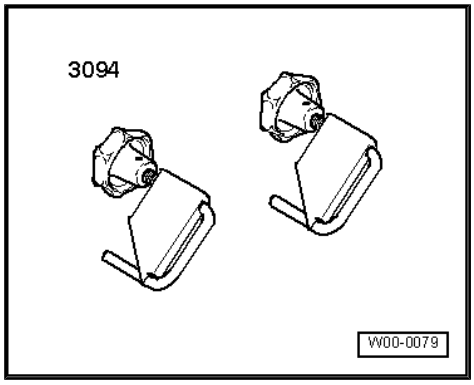
Renew power steering pump if specification is not attained ⇒ page 372 .

– Switch off engine.
– Remove power steering tester - V.A.G 1402- .
– Install banjo bolt ⇒ Item 1 (page 372) .
– Bleed steering system ⇒ page 358 .
– Check hydraulic fluid level ⇒ page 356 .
– Check steering system for leaks ⇒ page 359 .

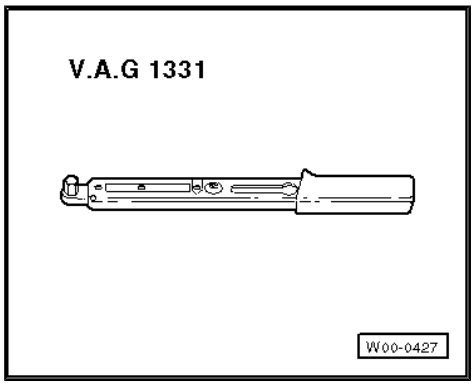
5.3 Checking delivery pressure of power steering pump from model year 2009 onwards (vehicles with 4-cylinder diesel engine)

Special tools and workshop equipment required

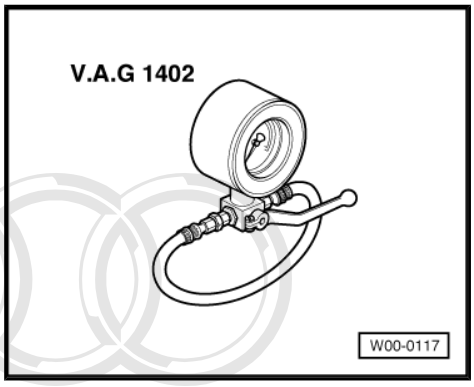
- Hose clamps - 3094-



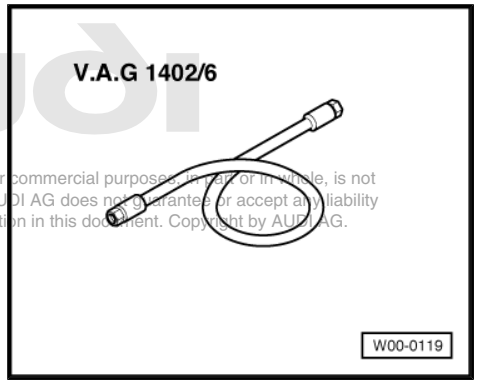
- Torque wrench - V.A.G 1331-



- Power steering tester - V.A.G 1402-

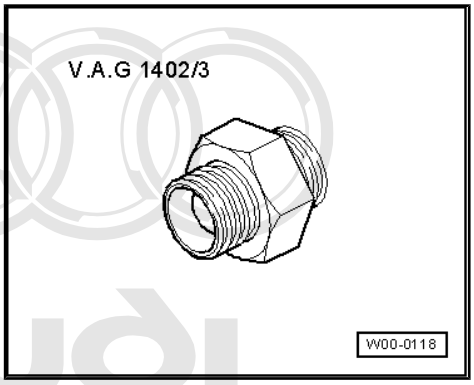


- Adapter set - V.A.G 1402/6-



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♦ Adapter - V.A.G 1402/3-



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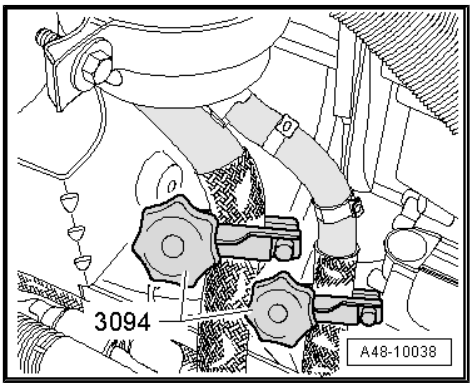
Test requirements:

- V-belt and V-belt tension OK.
- No leaks in system
- Hoses and pipes not kinked or constricted

Checking

– Clamp off suction and return hoses using hose clamps - 3094- .

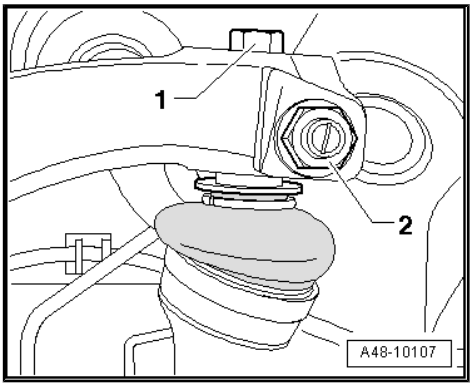
– Remove front left wheel.



– Unscrew bolt -1- and nut -2-.

– Pull or press track rod downwards out of steering arm.

Do not attempt to enlarge slots in wheel bearing housing using a chisel or similar.

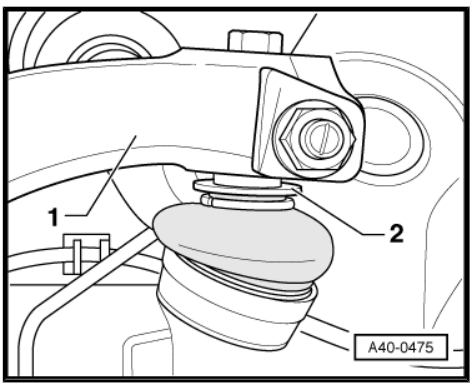


Note

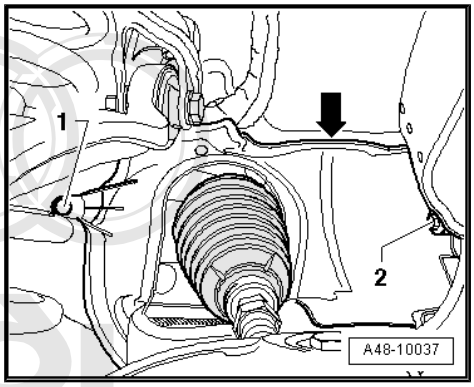
♦ *Do not apply chisel or similar between steering arm -1- and seal -2- on track rod ball joint to press out track rod, as this would damage seal.*

♦ *When pressing track rod out of steering arm, apply pressure only to end of track rod ball joint, or knock out end of joint using a wooden or rubber mallet.*

– Lift track rod clear and tie up.

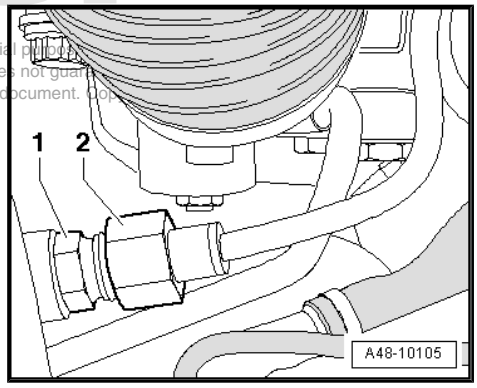


– Remove spreader rivet -1- and nut -2-, and detach trim -arrow- in wheel housing.
– Place a cloth underneath to catch hydraulic fluid.

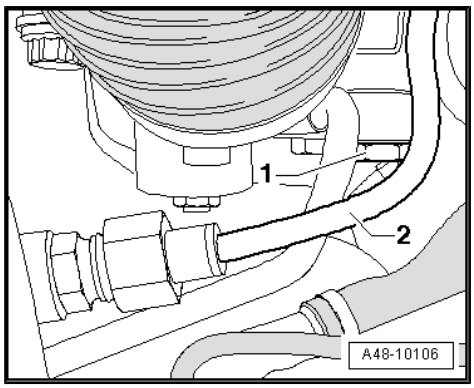


– Unscrew union nut -2- on pipe. Counterhold at hexagon flats -1- on expansion hose.

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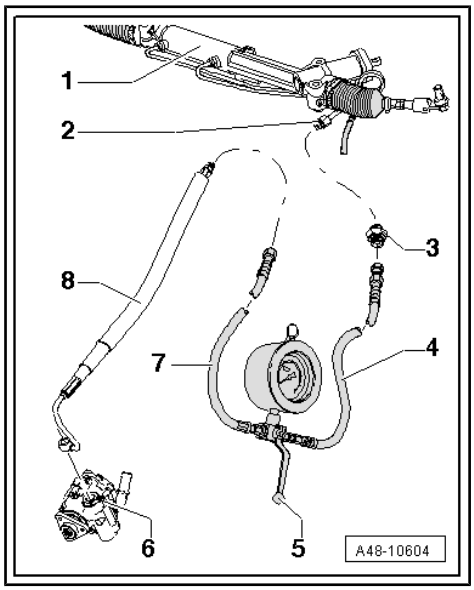


– Slacken banjo bolt -1- on steering rack, but do not remove.
– Turn pipe -2- outwards and tighten banjo bolt -1- again.

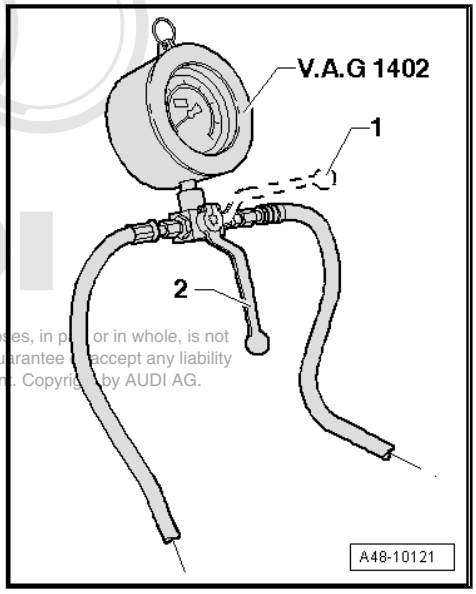


– Connect power steering tester - V.A.G 1402- as shown.

1 - Servotronic steering rack
2 - Union nut, 40 Nm
3 - Adapter - V.A.G 1402/3-
4 - Hose from adapter set - V.A.G 1402/6-
5 - Pressure gauge - V.A.G 1402-
6 - Power steering pump
7 - Hose from adapter set - V.A.G 1402/6-
8 - Expansion hose



– Make sure lever on pressure gauge is at position -2-.
– Start engine but do not press accelerator.
– Turn steering wheel approx. 10 times from lock to lock.
– Switch off engine and top up hydraulic fluid in reservoir if necessary.
– Then check delivery pressure.
– Start engine, close cut-off valve (position -1-) with engine idling and read off pressure.



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Note

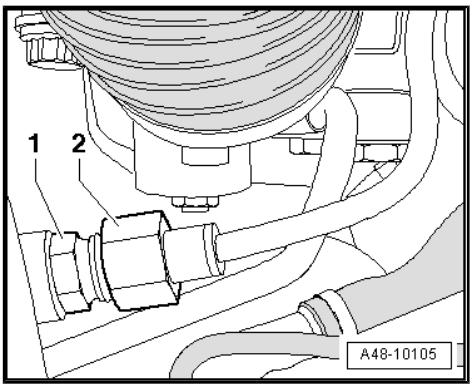
- *To avoid damaging the pump, please note the following points:*
- *Cut-off valve of pressure gauge must not remain closed for more than 10 seconds during this test.*
- *Start engine and let it idle without pressing accelerator.*
- *Read off pump pressure at idling speed immediately after starting engine (have second mechanic take reading if necessary).*
- *The pressure will drop during the test; the highest pressure reading is therefore the required test value.*

– Read off gauge pressure with engine running at idling speed (measurement must not take longer than 10 seconds).

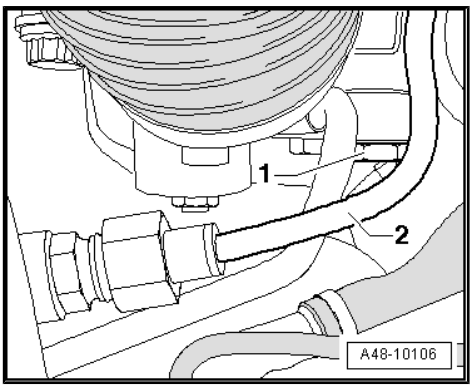
Delivery pressure specification: 125…130 bar

Renew power steering pump if specification is not attained ⇒ page 372 .

– Switch off engine.
– Remove power steering tester - V.A.G 1402- .
– Tighten union nut -2- on pipe ⇒ Item 25 (page 362) . Counterhold at hexagon flats -1- on expansion hose.



– Tighten banjo bolt -1- ⇒ Item 18 (page 332) . Note correct installation position ⇒ page 333 .
– Remove hose clamps - 3094- .
– Fit wheel.
– Bleed steering system ⇒ page 358 .
– Check hydraulic fluid level ⇒ page 356 .
– Check steering system for leaks ⇒ page 359 .



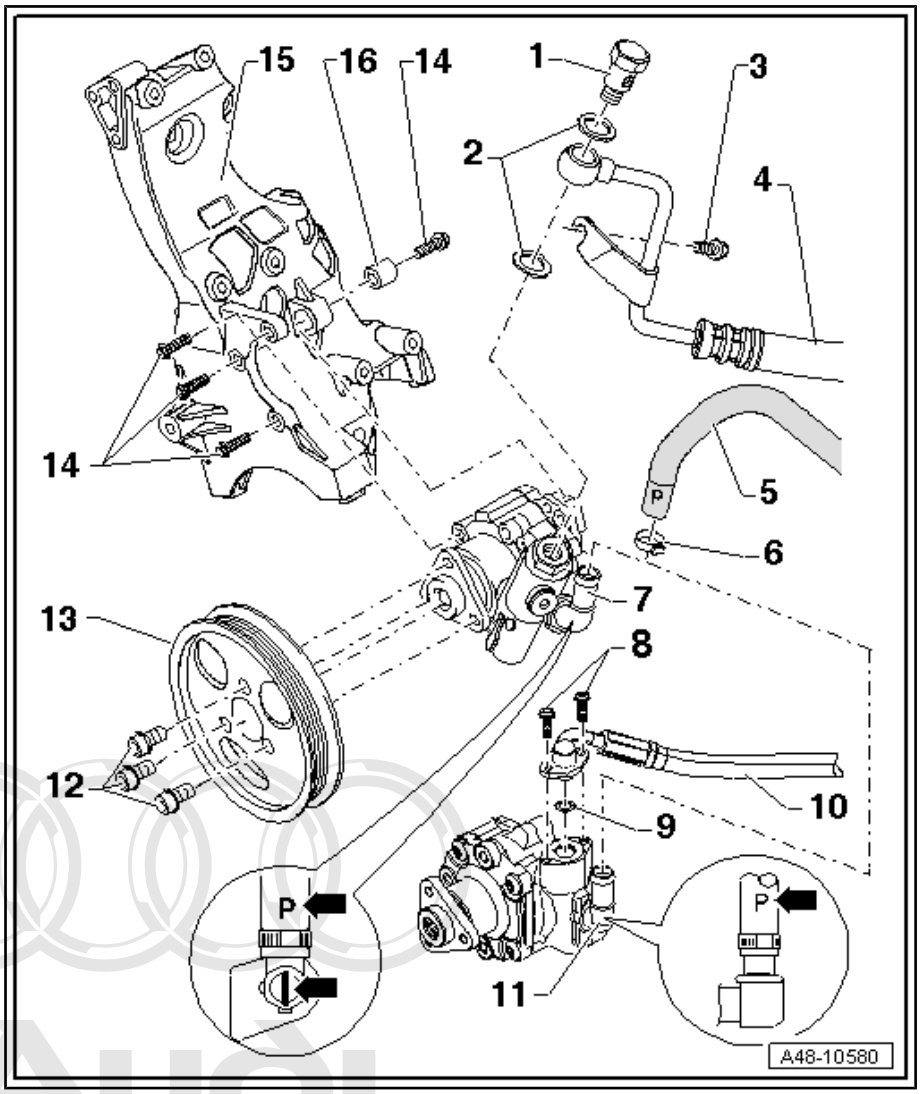
5.4 Removing and installing power steering pump (vehicles with 4-cylinder diesel engine)

Exploded view of power steering pump

In model year 2009 a new-generation power steering pump was phased into production; refer to ⇒ Electronic parts catalogue .

Note

- *Renew seals.*
- *Do not re-use hydraulic fluid which has been drained off.*
- *Use only hydraulic fluid .*



1 - Banjo bolt
- ❑ 50 Nm

2 - Seal
- ❑ Always renew

3 - Bolt
- ❑ 20 Nm

4 - Pressure hose
- ❑ Connection to power steering pump with banjo bolt
- ❑ Secured to rear side of power steering pump with bolt ⇒ Item 3 (page 372)

5 - Suction hose
- ❑ On the type of pump with banjo bolt at pressure hose connection, marking -P- on suction hose must be aligned with seam on pump
- ❑ On the type of pump with clamping plate at pressure hose connection, marking -P- on suction hose must face in direction of travel

6 - Hose clip
- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

7 - Power steering pump
- ❑ Different versions; for correct version refer to ⇒ Electronic parts catalogue
- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure, power steering pump up to model year 2009 ⇒ page 363
- ❑ Removing and installing ⇒ page 372

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8 - Bolt

- ❑ 9 Nm

9 - Seal

- ❑ Always renew

10 - Pressure hose

- ❑ Connection to power steering pump with clamping plate
- ❑ When connecting to power steering pump, fully insert clamping plate and tighten bolts

11 - Power steering pump

- ❑ Different versions; for correct version refer to ⇒ Electronic parts catalogue
- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure, power steering pump from model year 2009 onwards ⇒ page 367
- ❑ Removing and installing ⇒ page 372

12 - Bolt

- ❑ 23 Nm

13 - Belt pulley

14 - Bolt

- ❑ 20 Nm

15 - Bracket

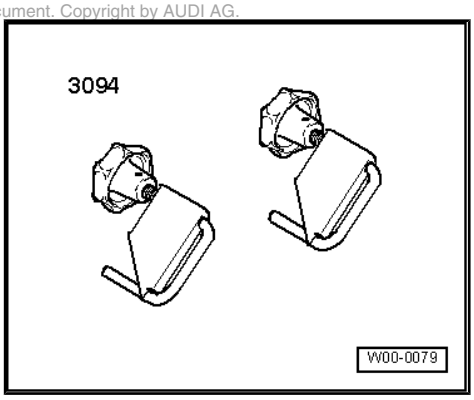
16 - Threaded bush

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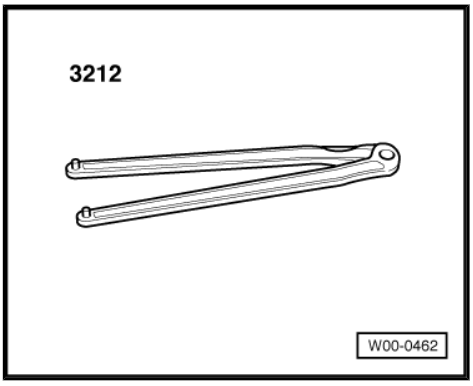
Removing

Special tools and workshop equipment required

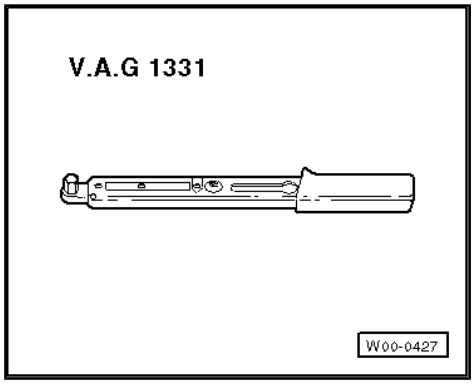
♦ Hose clamps up to 25 mm ∅ - 3094-



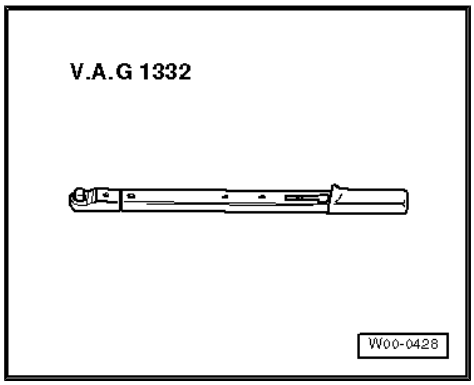
♦ Pin wrench - 3212-



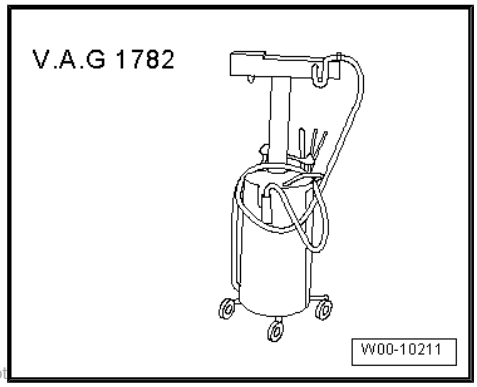
- Torque wrench - V.A.G 1331-



- Torque wrench - V.A.G 1332-

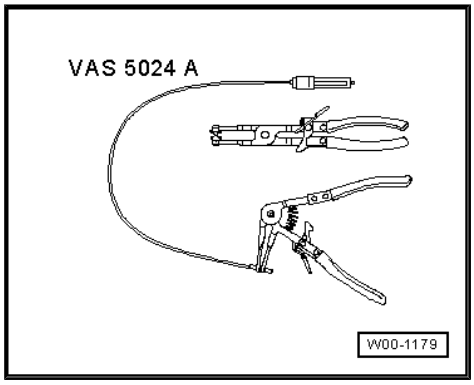


- Used oil collection and extraction unit - V.A.G 1782-

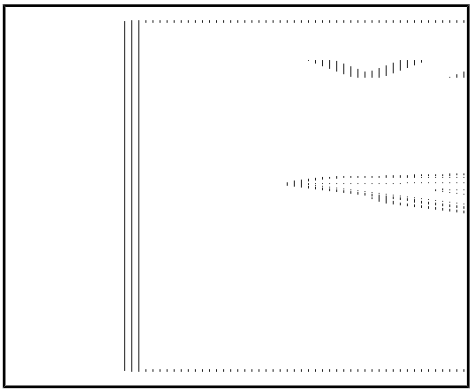


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- Spring-type clip pliers - VAS 5024 A-



♦ Drip tray for workshop hoist - VAS 6208-



General notes

In model year 2009 a new-generation power steering pump was phased into production; refer to ⇒ Electronic parts catalogue .

There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

♦ Always check steering system for leaks if fluid level is low in reservoir.

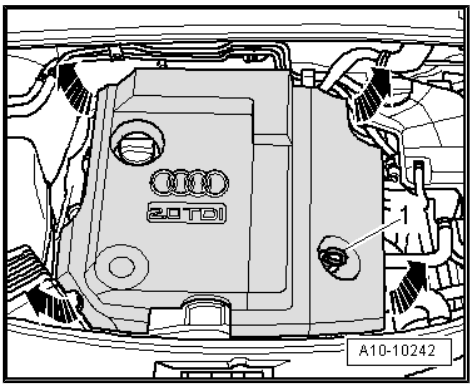
♦ If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.

♦ The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and turned by hand. Otherwise, there is a possibility of pump damage or noise while driving.

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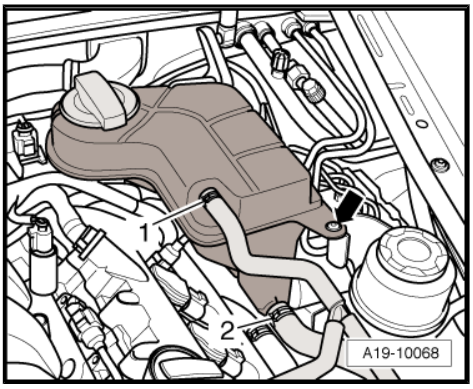
– Extract hydraulic fluid from reservoir with used oil collection and extraction unit - V.A.G 1782- .

– Pull off engine cover panel -arrows-.

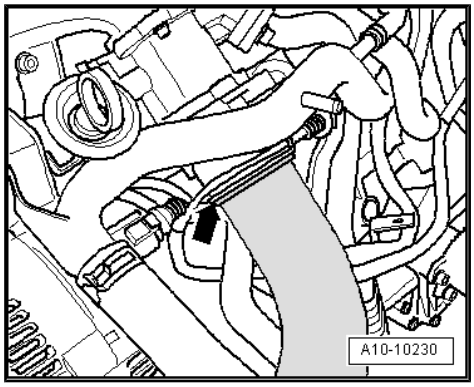


– Unbolt coolant expansion tank -arrow-.

– Unplug electrical connector for coolant shortage indicator sender - G32- on underside of coolant expansion tank and move expansion tank clear to the side with coolant hoses -1- and -2- connected.



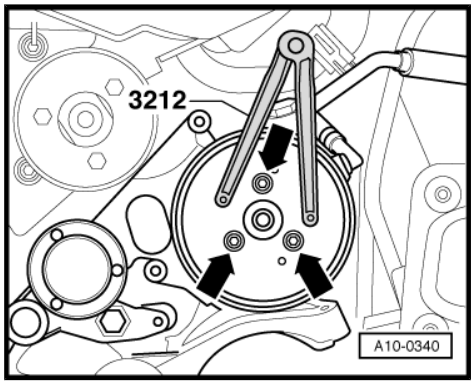
– Lift retaining clip -arrow- slightly and remove air intake hose leading to intake manifold flap motor - V157- .
– Remove noise insulation ⇒ Rep. gr. 50 .
– Remove poly V-belt ⇒ Rep. gr. 13 .



Note

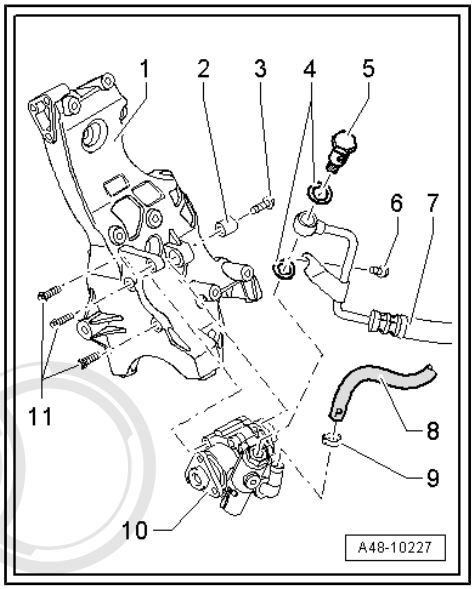
- *Note position of spacer sleeves for belt cover.*
- *Before removing poly V-belt, mark direction of rotation. A used belt can break if it runs in the opposite direction. Ensure that the belt is properly seated in the pulleys when installing.*

– Remove bolts -arrows-. Use pin wrench - 3212- to counterhold pulley.
– Take off power steering pump pulley.
– Place a drip tray underneath to catch hydraulic fluid.



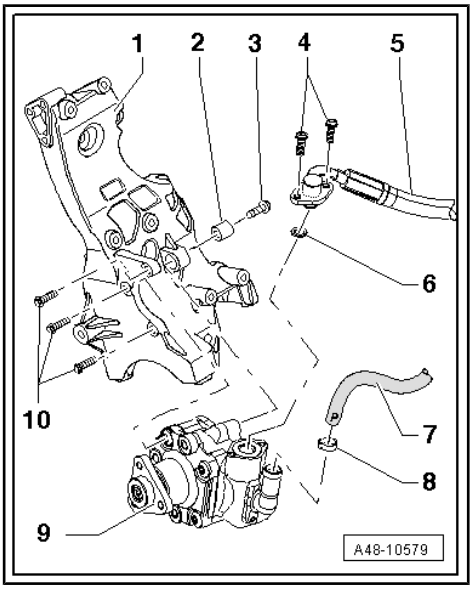
Applies to vehicles up to model year 2009

– Detach hose clip -9- from suction hose -8-. Disconnect suction hose and move hose to one side.
– Remove bolt -6- securing pressure line -7-.
– Remove banjo bolt -5- for pressure line -7- and detach seals -4-.
– Seal off connections with clean plugs.
– Remove bolts -3- and -11- and detach power steering pump -10- from bracket -1-.



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Applies to vehicles from model year 2009 onwards



– Detach hose clip -8- from suction hose -7-. Disconnect suction hose and move hose to one side.
– Remove bolts -4- securing pressure pipe -5-.
– Pull clamping plate with pressure pipe -5- out of power steering pump and move clear to the side.
– Seal off connections with clean plugs.
– Remove bolts -3- and -10- and detach power steering pump -9- from bracket -1-.

Installing

Installation is carried out in the reverse sequence. Note the following points:

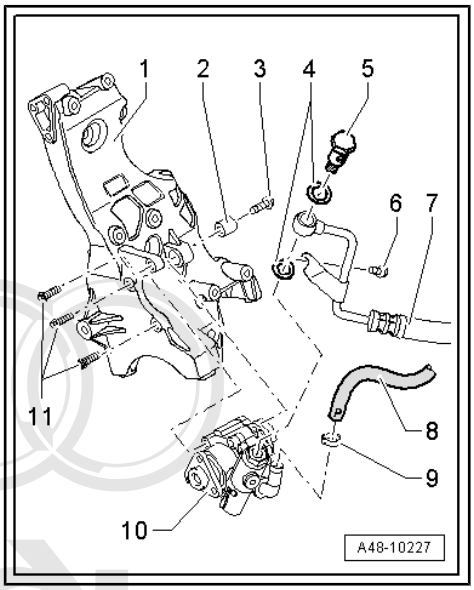
Tightening torques ⇒ page 372

Note

- *Renew gaskets and seals.*
- *Before fitting a new power steering pump, put in hydraulic fluid at the inlet and turn pump by hand until fluid flows out at the pressure outlet.*
- *Secure all hose connections with new hose clips ⇒ Electronic parts catalogue .*

– Turn hub by hand until fluid comes out at pump outlet.

Applies to vehicles up to model year 2009



– To make it easier to fit power steering pump -10-, knock back threaded bush -2- for bolt -3- in bracket -1- slightly.
– Fit power steering pump -10- in bracket -1-.
– Fit bolts -11- and -3- loosely to start with.
– First tighten bolts -11-. Then tighten bolt -3-.
– Connect pressure pipe -7- with banjo bolt -5- and new seals -4-.
– Install bolt -6- securing pressure pipe -7-.
– Connect suction hose -8- and secure with new hose clip -9-. Note correct installation position ⇒ page 490 .

Marking -P- on suction hose -8- must be aligned with seam on power steering pump.

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Applies to vehicles from model year 2009 onwards

– To make it easier to fit power steering pump -9-, knock back threaded bush -2- for bolt -3- in bracket -1- slightly.

– Fit power steering pump -9- in bracket -1-.

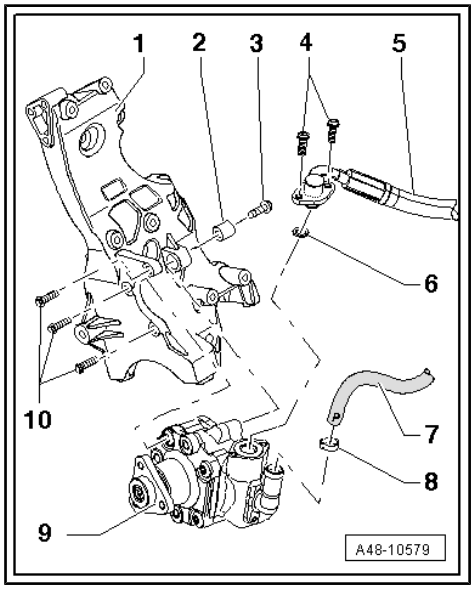
– Fit bolts -10- and -3- loosely to start with.

– First tighten bolts -10-. Then tighten bolt -3-.

– Insert clamping plate and pressure pipe -5- with new seal -6- fully into power steering pump and install bolts -4-.

– Connect suction hose -7- and secure with new hose clip -8-. Note correct installation position ⇒ page 490 .

Marking -P- on suction hose -7- must face in direction of travel.

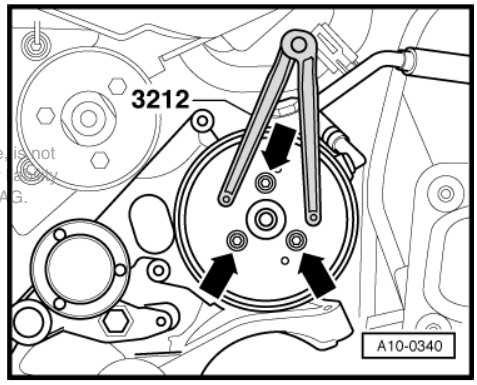


Applies to all vehicles:

– Clean off fluid in engine compartment where necessary.

– Tighten bolts -arrows- for belt pulley ⇒ Rep. gr. 13 .

Install poly V-belt for power steering pump ⇒ Rep. gr. 13 .



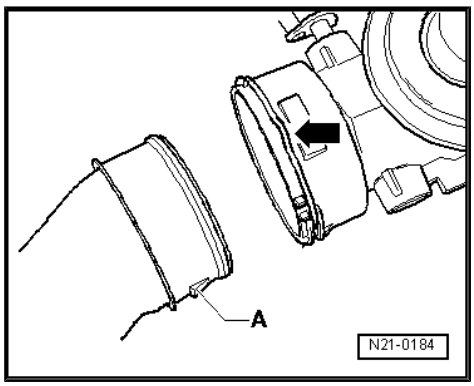
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– When installing air intake hoses with plug-in connectors, make sure that retaining clip -arrow- engages audibly on lug -A-.

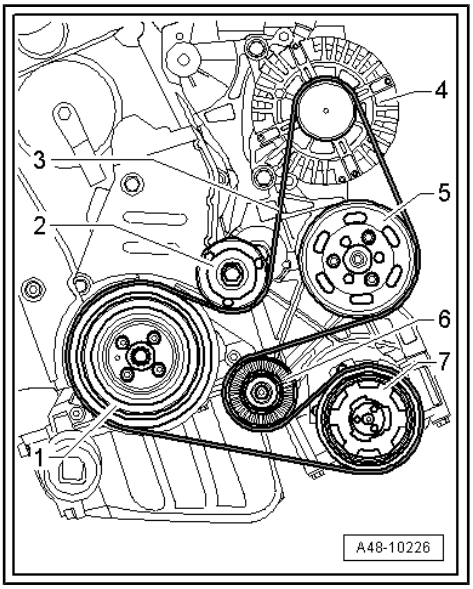
– Check hydraulic fluid level ⇒ page 356 .

– Bleed steering system ⇒ page 358 .

– Check steering system for leaks ⇒ page 359 .



– Install poly-V-belt and make sure that belt runs straight ⇒ Rep. gr. 13 .



Note

Ensure that the belt is properly seated in the pulleys when installing.

1 - Vibration damper
2 - Tensioner for poly V-belt
3 - Poly V-belt
4 - Alternator
5 - Power steering pump
6 - Idler roller
7 - Air conditioner compressor

– Fit noise insulation ⇒ Rep. gr. 50 .

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6 Power steering pump, hydraulic pipes and hoses, fluid reservoir (vehicles with 4-cylinder TFSI engine)

⇒ “6.1 Exploded view (vehicles with 4-cylinder TFSI engine)”, page 380 .

⇒ “6.2 Checking delivery pressure of power steering pump up to model year 2009 (vehicles with 4-cylinder TFSI engine)”, page 383 .

⇒ “6.3 Checking delivery pressure of power steering pump from model year 2009 onwards (vehicles with 4-cylinder TFSI engine)”, page 386

Exploded view of power steering pump (vehicles with 4-cylinder TFSI engine) ⇒ page 391

Removing and installing power steering pump (vehicles with 4-cylinder TFSI engine) ⇒ page 392

6.1 Exploded view (vehicles with 4-cylinder TFSI engine)

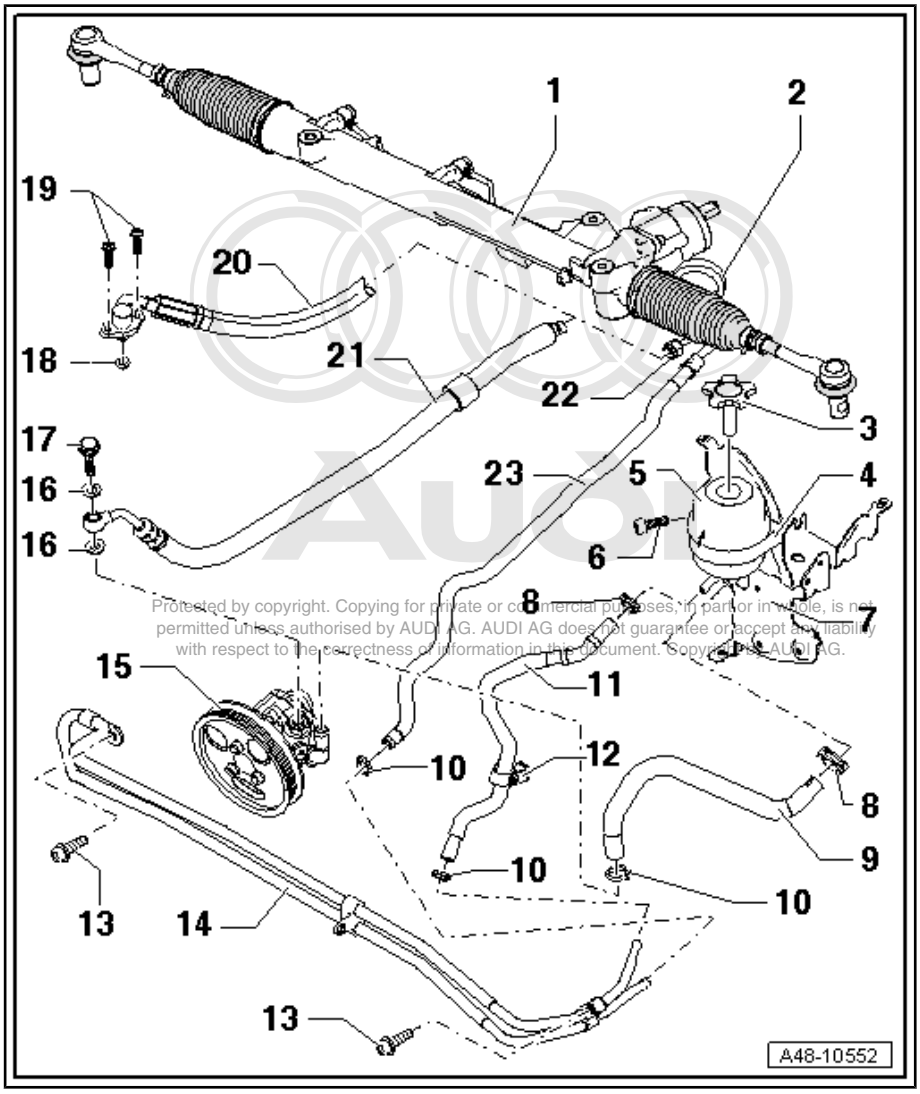
In model year 2009 a new-generation power steering pump was phased into production; refer to ⇒ Electronic parts catalogue .

There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

Note

- *Always check steering system for leaks if fluid level is low in reservoir.*
- *If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.*
- *The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and turned by hand. Otherwise, there is a possibility of pump damage or noise while driving.*

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1 - Power steering rack

- ❑ For correct version refer to ⇒ Electronic parts catalogue

2 - Pressure line

- ❑ Note correct position on steering rack ⇒ page 383

3 - Cap with dipstick

- ❑ Checking fluid level ⇒ page 356

4 - Securing strap

5 - Reservoir

- ❑ Note correct installation position ⇒ page 490

6 - Bolt

- ❑ 8 Nm

7 - Bracket

- ❑ For reservoir and ESP hydraulic unit

8 - Spring-type clip

- ❑ Use spring-type clip pliers - VAS 5024 A- when removing and installing

9 - Suction hose

- ❑ Note correct position on reservoir ⇒ page 490
- ❑ Note correct position on power steering pump ⇒ page 391

10 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

11 - Return hose

- ❑ Note correct position on reservoir ⇒ page 490
- ❑ Note attachment on longitudinal member ⇒ page 382

12 - Bracket

- ❑ Clipped onto longitudinal member

13 - Bolt

- ❑ 9 Nm

14 - Cooling pipe

- ❑ Secured to lock carrier together with pressure pipe ⇒ page 383

15 - Power steering pump

- ❑ Different versions; for correct version refer to ⇒ Electronic parts catalogue
- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure, power steering pump up to model year 2009 ⇒ page 383
- ❑ Checking delivery pressure, power steering pump from model year 2009 onwards ⇒ page 386
- ❑ Removing and installing ⇒ page 392

16 - Seal

- ❑ Always renew

17 - Banjo bolt

- ❑ 50 Nm

18 - Seal

- ❑ Always renew

19 - Bolt

- ❑ 9 Nm

20 - Pressure hose

- ❑ Connection to power steering pump with clamping plate
- ❑ When connecting to power steering pump, fully insert clamping plate and tighten bolts

21 - Pressure hose

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- ❑ Note correct position on power steering pump ⇒ page 391
- ❑ Connection to power steering pump with banjo bolt

22 - Union nut

- ❑ 40 Nm

23 - Return hose

- ❑ Note correct position on steering rack ⇒ page 401
- ❑ Note installation position on longitudinal member ⇒ page 383
- ❑ Note attachment on longitudinal member ⇒ page 382

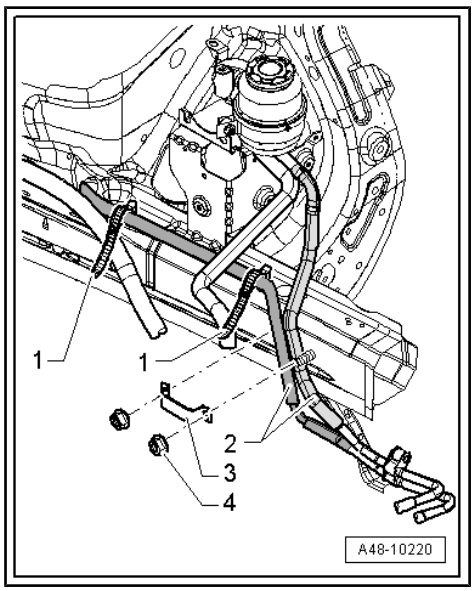
Attachment of return hoses on longitudinal member

– Insert return hoses between studs.

– Secure return hoses -2- on longitudinal member with bracket -3- and nuts -4-.

Tightening torque for nuts -2-: 2 Nm.

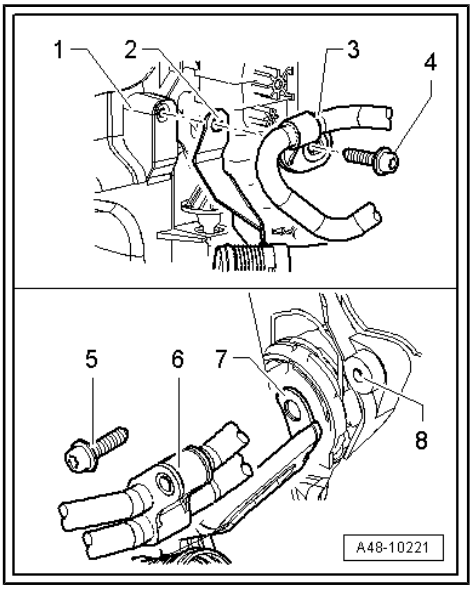
– Secure return hoses -2- on longitudinal member with cable tie -1-.



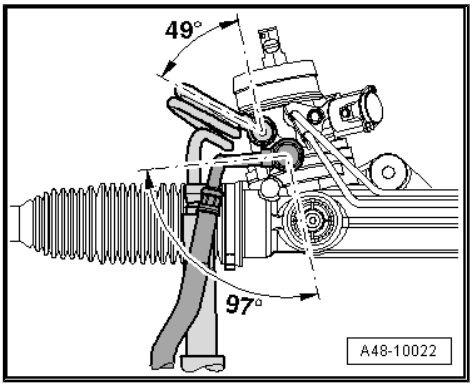
Installing cooling pipe together with pressure pipe on lock carrier

– Secure right lug -3- on cooling pipe and bracket -2- for pressure pipe to lock carrier -1- with bolt -4-.

– Secure left lug -6- on cooling pipe and bracket -7- for pressure pipe to lock carrier -8- with bolt -5-.



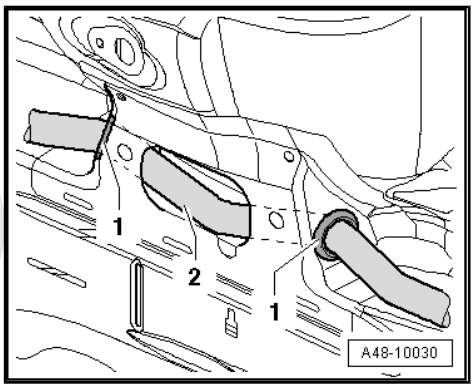
Position of pipe connections on steering rack



Installation position in longitudinal member

– Engage guide bushes -1- in longitudinal member.

– Guide return hose -2- through support after installing bushes -1-.



6.2 Checking delivery pressure of power steering pump up to model year 2009 (vehicles with 4-cylinder TFSI engine)

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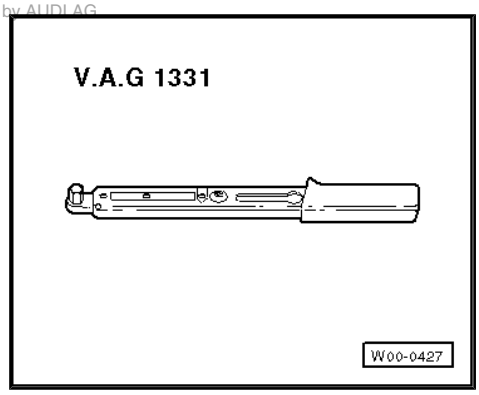
Special tools and workshop equipment required

- Hose clamps - 3094-
- Power steering tester - V.A.G 1402-
- Adapter - V.A.G 1402/2-
- Adapter - V.A.G 1402/3-
- Adapter set - V.A.G 1402/6-



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- Torque wrench - V.A.G 1331-

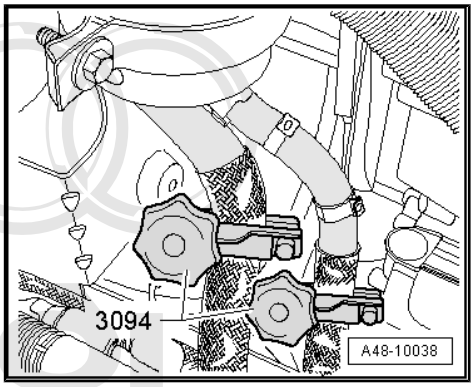


Test requirements:

- V-belt and V-belt tension OK.
- No leaks in system
- Hoses and pipes not kinked or constricted

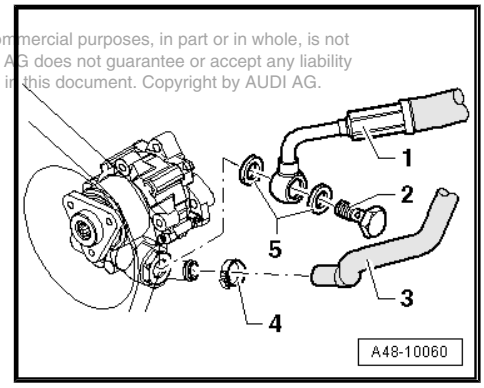
Checking

– Clamp off suction and return hoses using hose clamps - 3094- .



– Unscrew banjo bolt -2-. Disconnect pressure hose -1- and seals -5- from power steering pump.

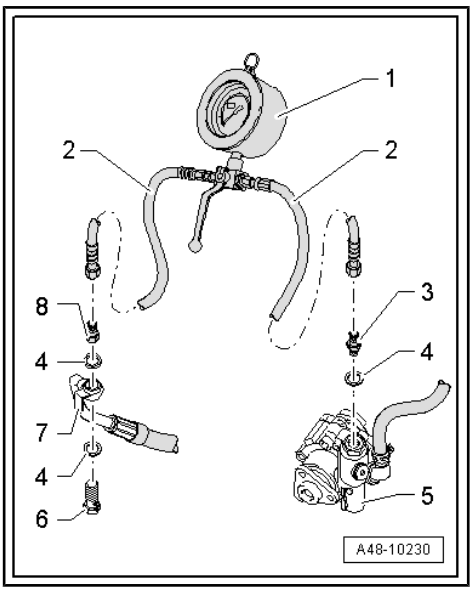
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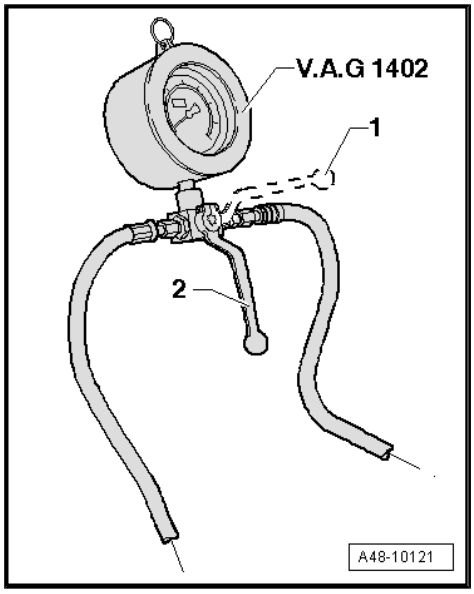
– Connect power steering tester - V.A.G 1402- as shown.

1 - Pressure gauge - V.A.G 1402-
2 - Hose from adapter set - V.A.G 1402/6-
3 - Adapter - V.A.G 1402/3-
4 - Seal
5 - Power steering pump
6 - Banjo bolt
7 - Pressure line
8 - Adapter - V.A.G 1402/2-

– Remove hose clamps - 3094- .



– Make sure lever on pressure gauge is at position -2-.
– Start engine but do not press accelerator.
– Turn steering wheel approx. 10 times from lock to lock.
– Switch off engine and top up hydraulic fluid in reservoir if necessary.

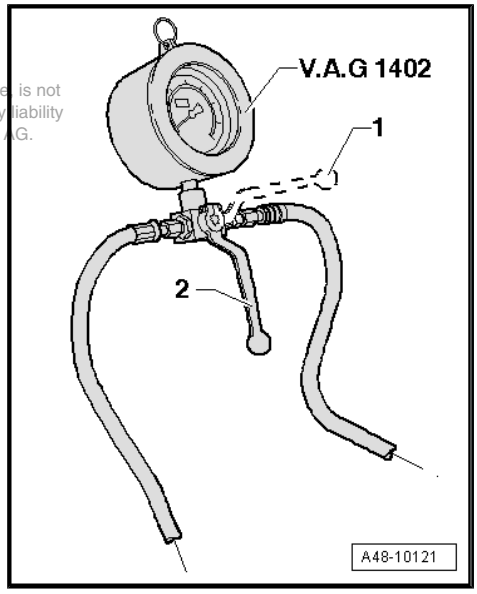


Note

- *To avoid damaging the power steering pump, please note the following points:*
- *Cut-off valve of pressure gauge must not remain closed for more than 10 seconds during this test.*
- *Start engine without pressing accelerator and leave it running at idling speed.*
- *Take pump pressure reading at idling speed immediately after starting engine (have second mechanic take reading).*
- *The pressure will drop during the test; the highest pressure reading is therefore the required test value.*

– Then check delivery pressure.

– Start engine, close cut-off valve (position -1-) with engine idling and read off pressure (lever must face away from pressure hose). Do not perform measurement for longer than 10 seconds.



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Delivery pressure specifications:	
Pump	**Delivery pressure**
4F0 145 155 E	120…130 bar
4F0 145 155 P	110…120 bar

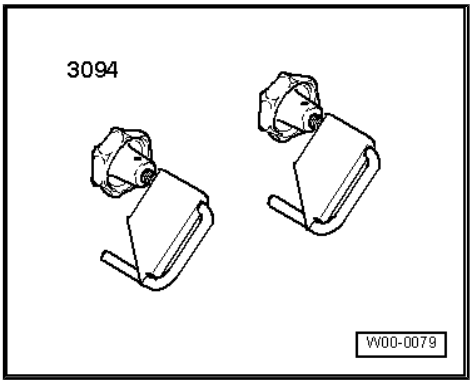
Renew power steering pump if specification is not attained ⇒ page 409 .

– Switch off engine.
– Remove power steering tester - V.A.G 1402- .
– Install banjo bolt ⇒ Item 7 (page 409) .
– Bleed steering system ⇒ page 358 .
– Check hydraulic fluid level ⇒ page 356 .
– Check steering system for leaks ⇒ page 359 .

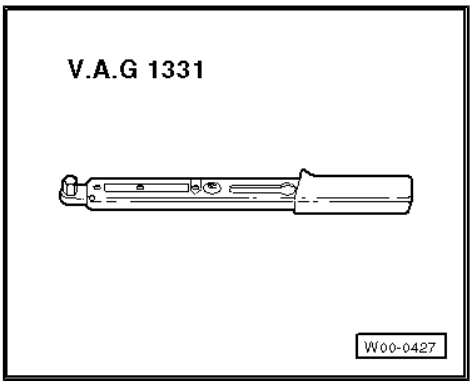
6.3 Checking delivery pressure of power steering pump from model year 2009 onwards (vehicles with 4-cylinder TFSI engine)

Special tools and workshop equipment required

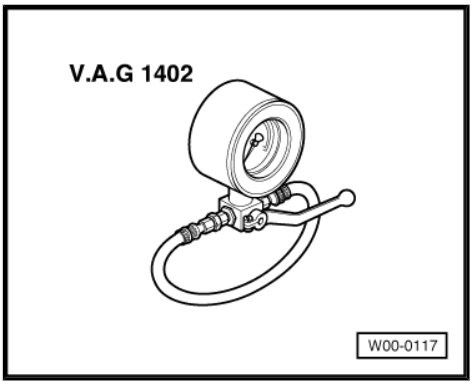
- Hose clamps - 3094-



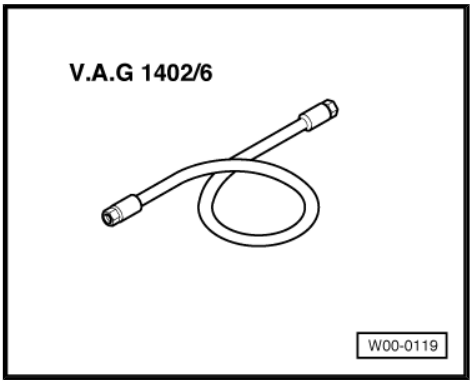
- Torque wrench - V.A.G 1331-



- Power steering tester - V.A.G 1402-

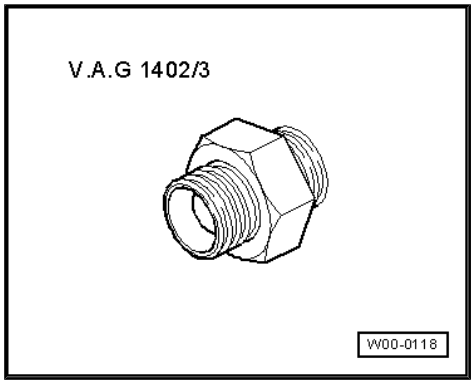


- Adapter set - V.A.G 1402/6-



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♦ Adapter - V.A.G 1402/3-



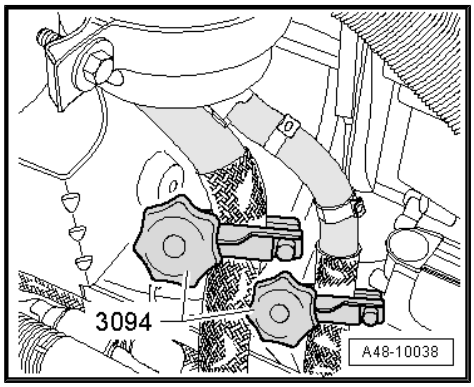
Test requirements:

- V-belt and V-belt tension OK.
- No leaks in system
- Hoses and pipes not kinked or constricted

Checking

– Clamp off suction and return hoses using hose clamps - 3094- .

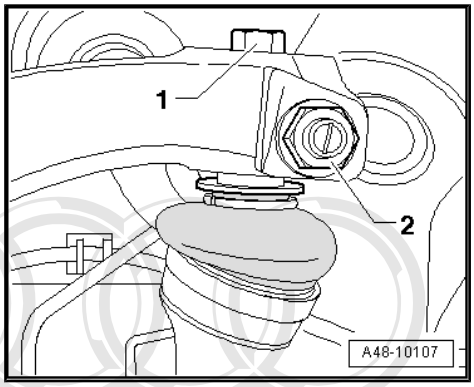
– Remove front left wheel.



– Unscrew bolt -1- and nut -2-.

– Pull or press track rod downwards out of steering arm.

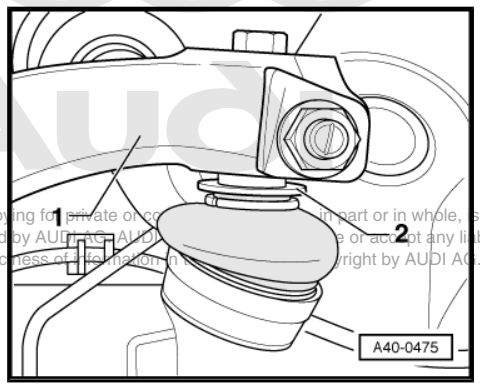
Do not attempt to enlarge slots in wheel bearing housing using a chisel or similar.



Note

♦ *Do not apply chisel or similar between steering arm -1- and seal -2- on track rod ball joint to press out track rod, as this would damage seal.*

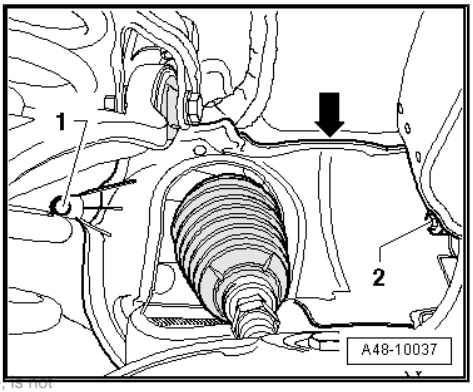
♦ *When pressing track rod out of steering arm, apply pressure only to end of track rod ball joint, or knock out end of joint using a wooden or rubber mallet.*



– Lift track rod clear and tie up.

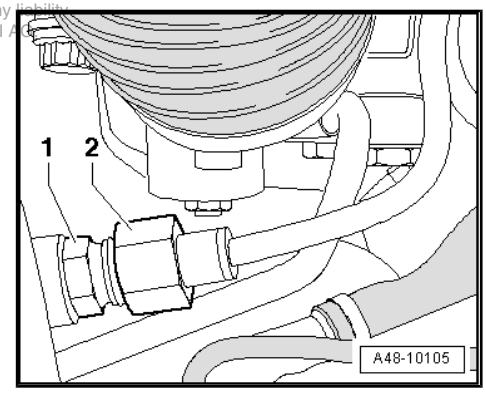
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– Remove spreader rivet -1- and nut -2-, and detach trim -arrow- in wheel housing.
– Place a cloth underneath to catch hydraulic fluid.

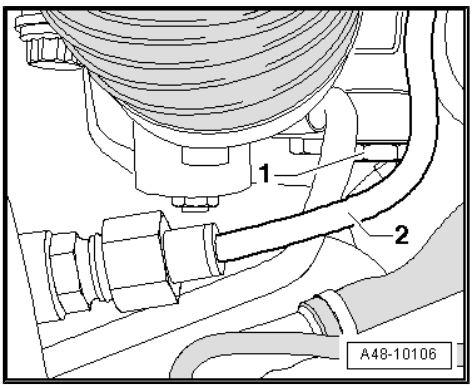


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– Unscrew union nut -2- on pipe. Counterhold at hexagon flats -1- on expansion hose.

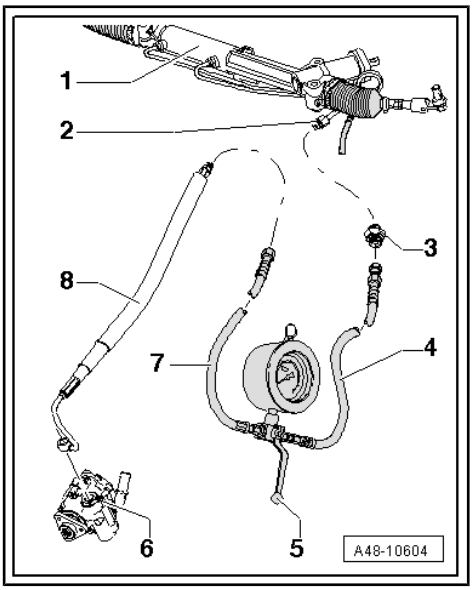


– Slacken banjo bolt -1- on steering rack, but do not remove.
– Turn pipe -2- outwards and tighten banjo bolt -1- again.

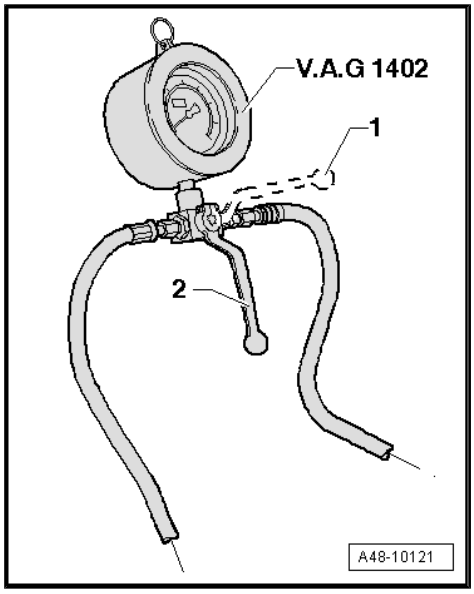


– Connect power steering tester - V.A.G 1402- as shown.

1 - Servotronic steering rack
2 - Union nut, 40 Nm
3 - Adapter - V.A.G 1402/3-
4 - Hose from adapter set - V.A.G 1402/6-
5 - Pressure gauge - V.A.G 1402-
6 - Power steering pump
7 - Hose from adapter set - V.A.G 1402/6-
8 - Expansion hose



– Make sure lever on pressure gauge is at position -2-.
– Start engine but do not press accelerator.
– Turn steering wheel approx. 10 times from lock to lock.
– Switch off engine and top up hydraulic fluid in reservoir if necessary.
– Then check delivery pressure.
– Start engine, close cut-off valve (position -1-) with engine idling and read off pressure.



Note

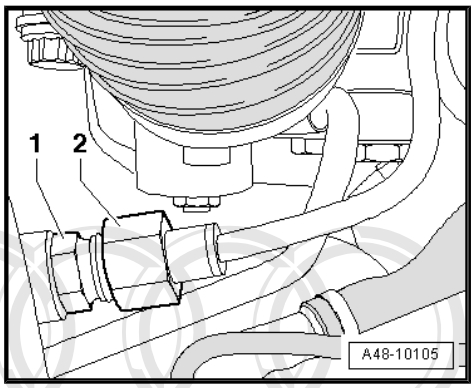
- *To avoid damaging the pump, please note the following points:*
- *Cut-off valve of pressure gauge must not remain closed for more than 10 seconds during this test.*
- *Start engine and let it idle without pressing accelerator.*
- *Read off pump pressure at idling speed immediately after starting engine (have second mechanic take reading if necessary).*
- *The pressure will drop during the test; the highest pressure reading is therefore the required test value.*

– Read off gauge pressure with engine running at idling speed (measurement must not take longer than 10 seconds).

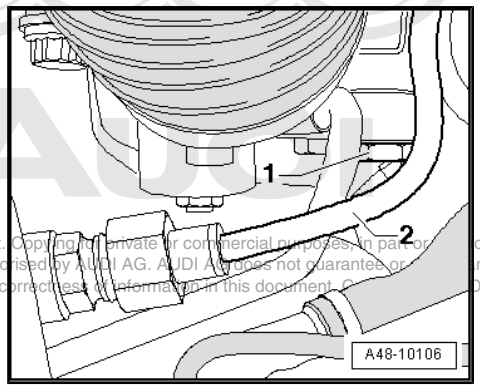
Delivery pressure specification: 120…130 bar

Renew power steering pump if specification is not attained ⇒ page 391 .

– Switch off engine.
– Remove power steering tester - V.A.G 1402- .
– Tighten union nut -2- on pipe ⇒ Item 22 (page 382) . Counterhold at hexagon flats -1- on expansion hose.



– Tighten banjo bolt -1- ⇒ Item 18 (page 332) . Note correct installation position ⇒ page 333 .
– Remove hose clamps - 3094- .
– Fit wheel.
– Bleed steering system ⇒ page 358 .
– Check hydraulic fluid level ⇒ page 356 .
– Check steering system for leaks ⇒ page 359 .



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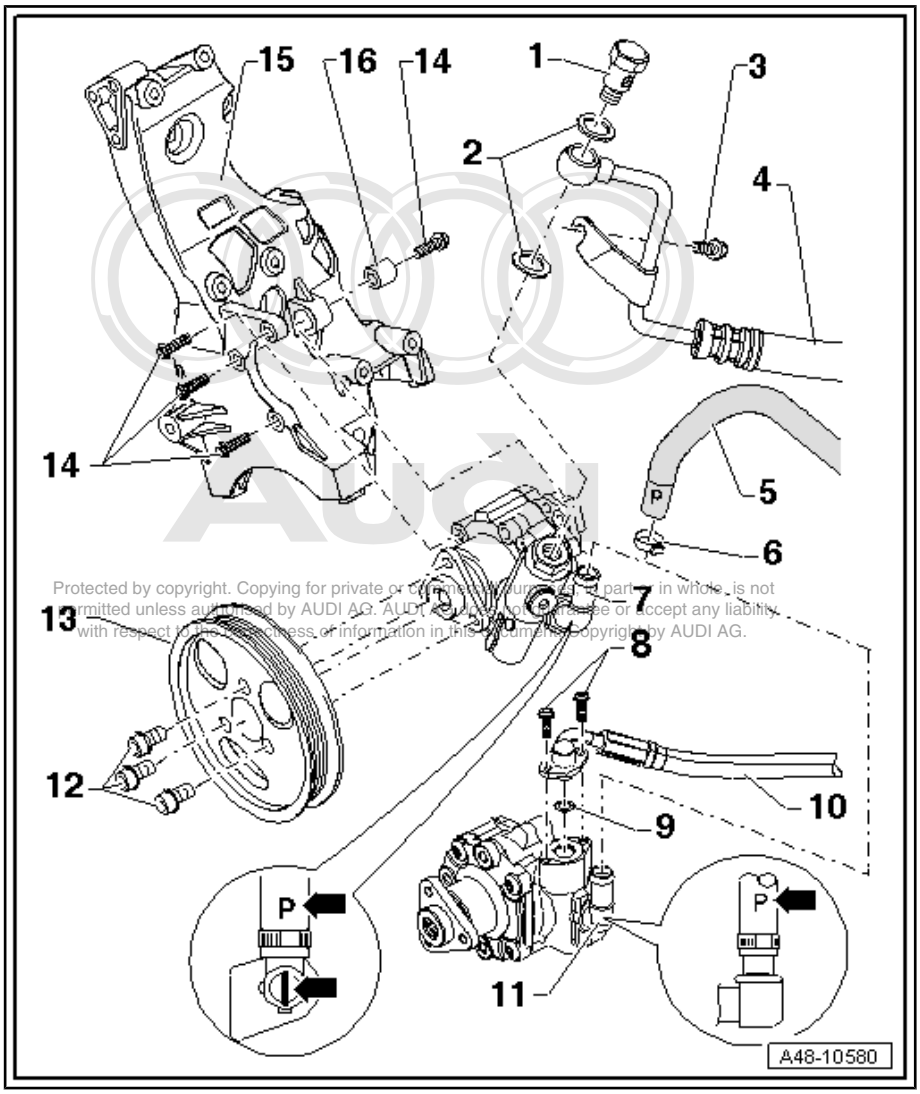
6.4 Removing and installing power steering pump (vehicles with 4-cylinder TFSI engine)

Exploded view of power steering pump

In model year 2009 a new-generation power steering pump was phased into production; refer to ⇒ Electronic parts catalogue .

Note

- *Renew seals.*
- *Do not re-use hydraulic fluid which has been drained off.*
- *Use only hydraulic fluid .*



1 - Banjo bolt

- ❑ 50 Nm

2 - Seal

- ❑ Always renew

3 - Bolt

- ❑ 20 Nm
- ❑ Not installed in all models

4 - Pressure hose

- ❑ Note correct position: Angle between pipe connection and shaft of power steering pump is approx. 75°
- ❑ Connection to power steering pump with banjo bolt

5 - Suction hose

- ❑ Marking -P- on suction hose must be aligned with seam on power steering pump

6 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

7 - Power steering pump

- ❑ Different versions; for correct version refer to ⇒ Electronic parts catalogue
- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure, power steering pump up to model year 2009 ⇒ page 383
- ❑ Removing and installing ⇒ page 392

8 - Bolt

- ❑ 9 Nm

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9 - Seal

- ❑ Always renew

10 - Pressure hose

- ❑ Connection to power steering pump with clamping plate
- ❑ When connecting to power steering pump, fully insert clamping plate and tighten bolts

11 - Power steering pump

- ❑ Different versions; for correct version refer to ⇒ Electronic parts catalogue
- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure, power steering pump from model year 2009 onwards ⇒ page 386
- ❑ Removing and installing ⇒ page 392

12 - Bolt

- ❑ Tightening torque ⇒ Rep. gr. 13

13 - Belt pulley

14 - Bolt

- ❑ 20 Nm

15 - Bracket

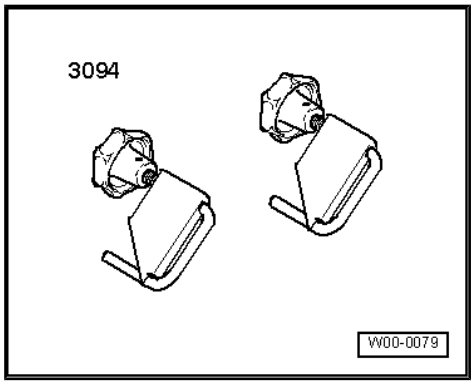
16 - Threaded bush

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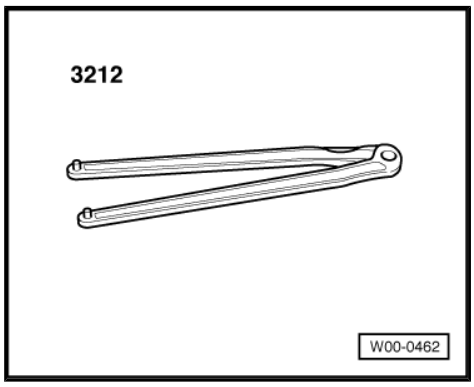
Removing

Special tools and workshop equipment required

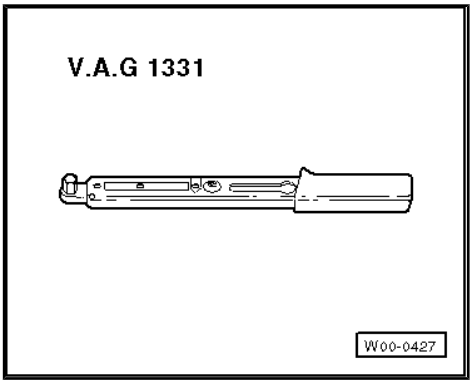
♦ Hose clamps up to 25 mm ∅ - 3094-



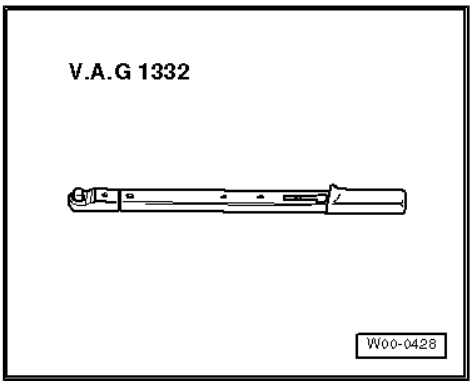
♦ Pin wrench - 3212-



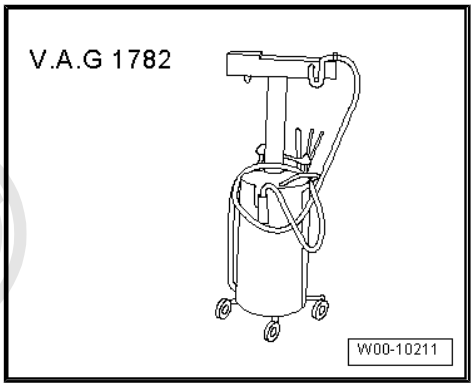
- Torque wrench - V.A.G 1331-



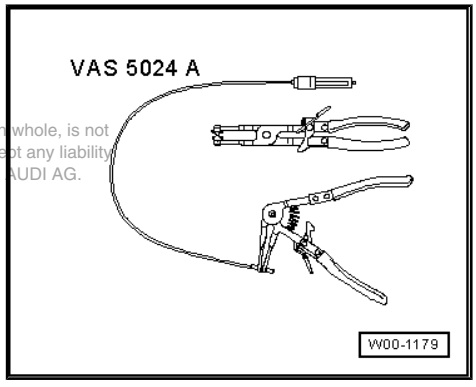
- Torque wrench - V.A.G 1332-



- Used oil collection and extraction unit - V.A.G 1782-

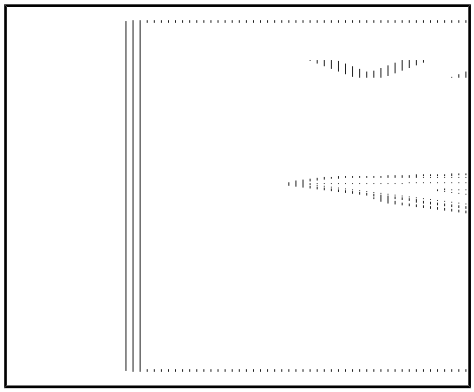


- Spring-type clip pliers - VAS 5024 A-



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- Drip tray for workshop hoist - VAS 6208-



General notes

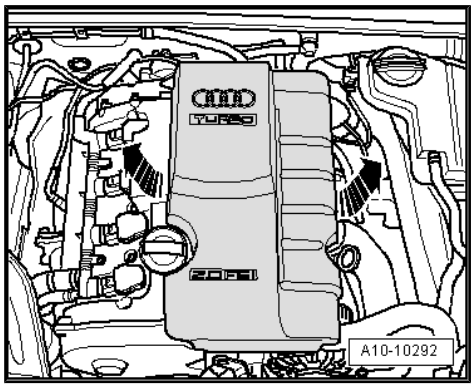
In model year 2009 a new-generation power steering pump was phased into production; refer to ⇒ Electronic parts catalogue .

There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

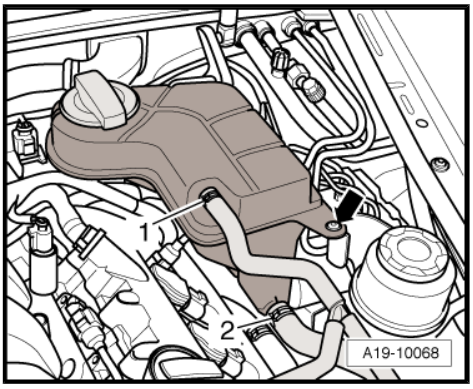
- Always check steering system for leaks if fluid level is low in reservoir.
- If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.
- The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and turned by hand. Otherwise, there is a possibility of pump damage or noise while driving.

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– Extract hydraulic fluid from reservoir using used oil collection and extraction unit - V.A.G 1782- .
– Detach engine cover panel -arrows-.



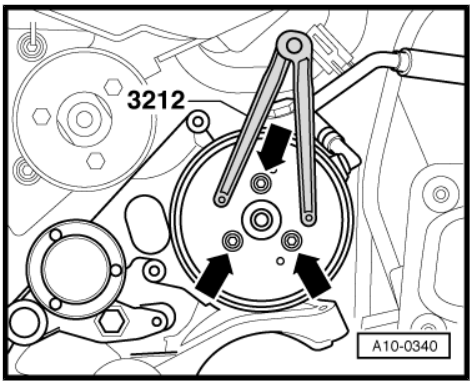
– Unbolt coolant expansion tank -arrow-.
– Unplug electrical connector for coolant shortage indicator sender - G32- on underside of coolant expansion tank and move expansion tank clear to the side with coolant hoses -1- and -2- connected.
– Remove noise insulation ⇒ Rep. gr. 50 .
– Remove poly V-belt ⇒ Rep. gr. 13 .



Note

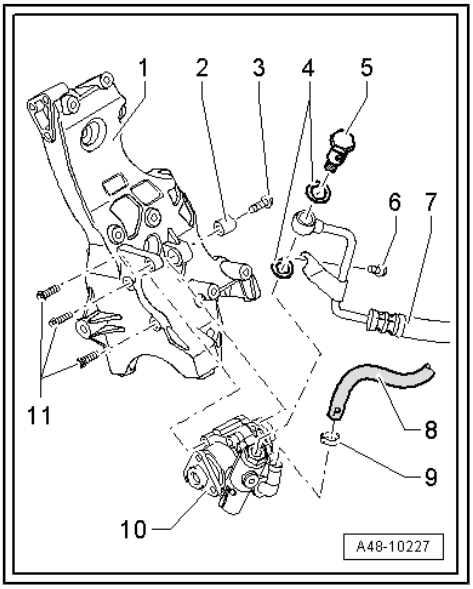
Before removing poly V-belt, mark direction of rotation. A used belt can break if it runs in the opposite direction. Ensure that the belt is properly seated in the pulleys when installing.

– Remove bolts -arrows-. Use pin wrench - 3212- to counterhold pulley.
– Take off power steering pump pulley.
– Place a drip tray underneath to catch hydraulic fluid.



Applies to vehicles up to model year 2009

– Detach hose clip -9- from suction hose -8-. Disconnect suction hose and move hose to one side.
– Remove banjo bolt -5- for pressure line -7- and detach seals -4-.
– Seal off connections with clean plugs.
– Remove bolts -3- and -11- and detach power steering pump -10- from bracket -1-.

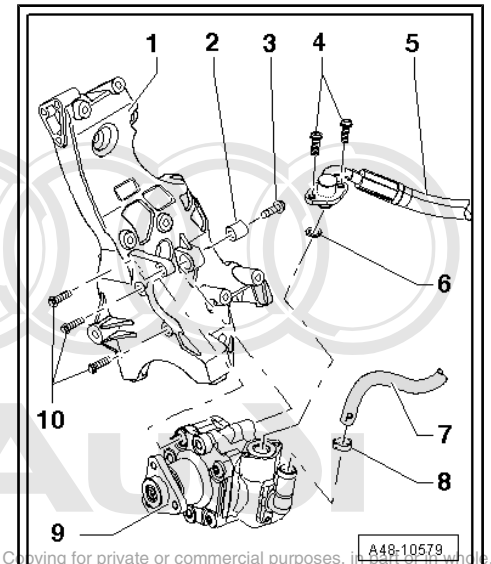


Note

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Bolt -6- can be disregarded.

Applies to vehicles from model year 2009 onwards



- Detach hose clip -8- from suction hose -7-. Disconnect suction hose and move hose to one side.
- Remove bolts -4- securing pressure pipe -5-.
- Pull clamping plate with pressure pipe -5- out of power steering pump and move clear to the side.
- Seal off connections with clean plugs.
- Remove bolts -3- and -10- and detach power steering pump -9- from bracket -1-.

Installing

Installation is carried out in the reverse sequence. Note the following points:

Tightening torques ⇒ page 391

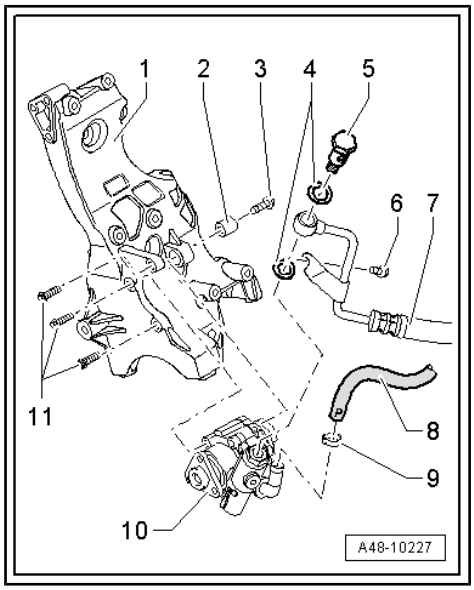
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Note

- *Renew gaskets and seals.*
- *Before fitting a new power steering pump, put in hydraulic fluid at the inlet and turn pump by hand until fluid flows out at the pressure outlet.*
- *Secure all hose connections with new hose clips ⇒ Electronic parts catalogue .*

- Turn hub by hand until fluid comes out at pump outlet.

Applies to vehicles up to model year 2009



- To make it easier to fit power steering pump -10-, knock back threaded bush -2- for bolt -3- in bracket -1- slightly.
- Fit power steering pump -10- in bracket -1-.
- Fit bolts -11- and -3- loosely to start with.
- First tighten bolts -11-. Then tighten bolt -3-.
- Connect pressure pipe -7- with banjo bolt -5- and new seals -4-.

Note

Bolt -6- can be disregarded.

- Connect suction hose -8- and secure with new hose clip -9-. Note correct installation position ⇒ page 391 .

Marking -P- on suction hose -8- must be aligned with seam on power steering pump.

Applies to vehicles from model year 2009 onwards

– To make it easier to fit power steering pump -9-, knock back threaded bush -2- for bolt -3- in bracket -1- slightly.

– Fit power steering pump -9- in bracket -1-.

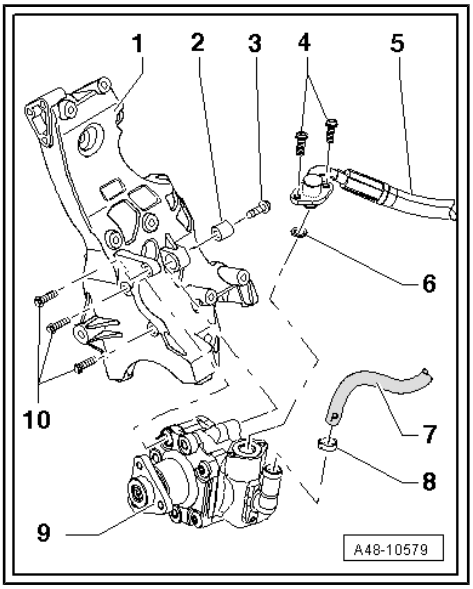
– Fit bolts -10- and -3- loosely to start with.

– First tighten bolts -10-. Then tighten bolt -3-.

– Insert clamping plate and pressure pipe -5- with new seal -6- fully into power steering pump and install bolts -4-.

– Connect suction hose -7- and secure with new hose clip -8-. Note correct installation position ⇒ page 490 .

Marking -P- on suction hose -7- must be aligned with seam on power steering pump.

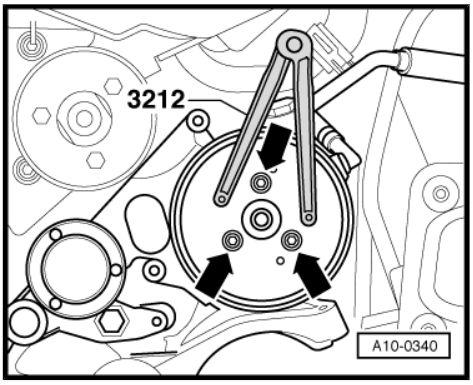


Applies to all vehicles:

– Clean off fluid in engine compartment where necessary.

– Tighten bolts -arrows- for belt pulley ⇒ Rep. gr. 13 .

Install poly V-belt for power steering pump ⇒ Rep. gr. 13 .



– Check hydraulic fluid level ⇒ page 356 .

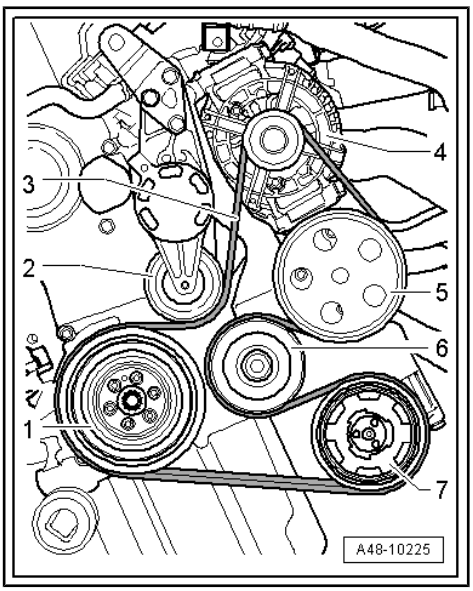
– Bleed steering system ⇒ page 358 .

– Check steering system for leaks ⇒ page 359 .

– Install poly-V-belt and make sure that belt runs straight ⇒ Rep. gr. 13 .

Note

Ensure that the belt is properly seated in the pulleys when installing.



1 - Vibration damper
2 - Tensioner for poly V-belt
3 - Poly V-belt
4 - Alternator
5 - Power steering pump
6 - Idler roller
7 - Air conditioner compressor

– Fit noise insulation ⇒ Rep. gr. 50 .

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7 Power steering pump, hydraulic pipes and hoses, fluid reservoir (vehicles with 6-cylinder diesel engine)

⇒ “7.1 Exploded view (vehicles with 6-cylinder diesel engine)”, page 398 .

⇒ “7.2 Checking delivery pressure of power steering pump up to model year 2009 (vehicles with 6-cylinder diesel engine)”, page 401 .

⇒ “7.3 Checking delivery pressure of power steering pump from model year 2009 onwards (vehicles with 6-cylinder diesel engine)”, page 404

Exploded view of power steering pump (vehicles with 6-cylinder diesel engine) ⇒ page 409

Removing and installing power steering pump (vehicles with 6-cylinder diesel engine) ⇒ page 410

7.1 Exploded view (vehicles with 6-cylinder diesel engine)

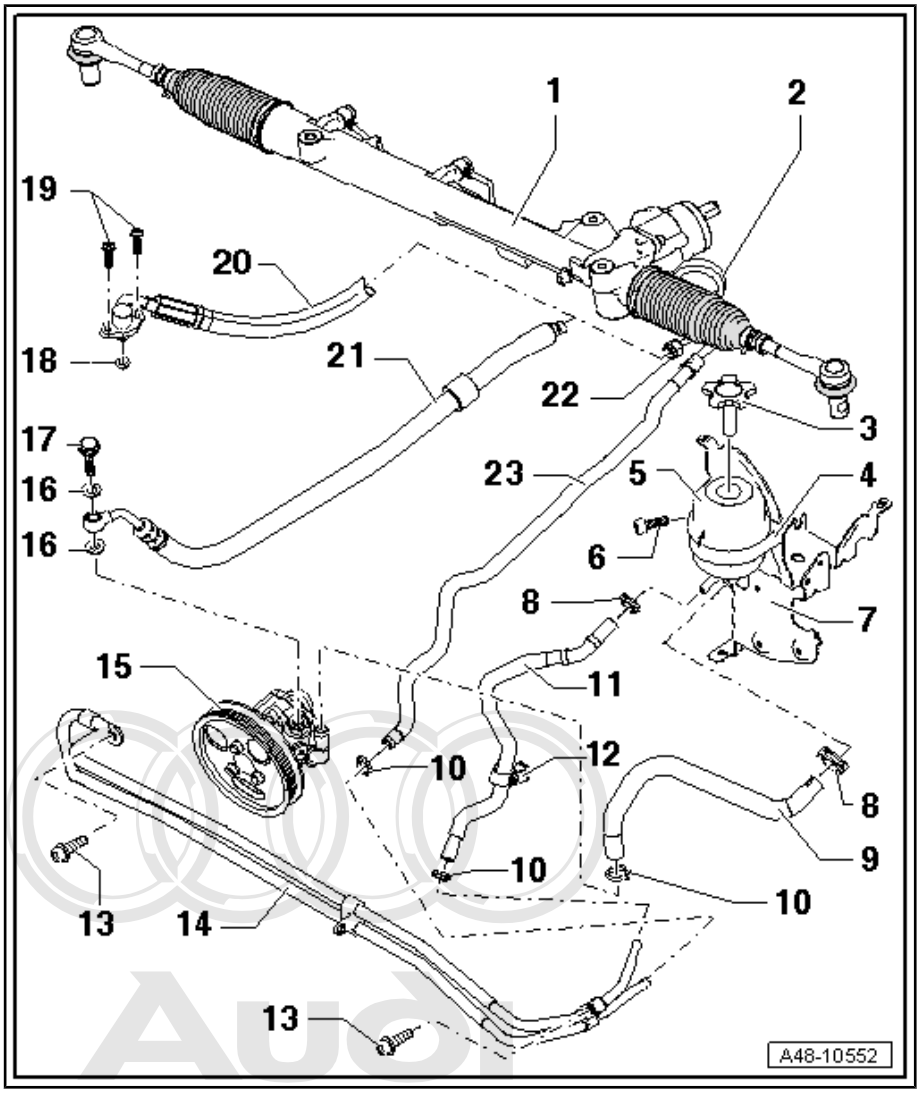
In model year 2009 a new-generation power steering pump was phased into production, refer to ⇒ Electronic parts catalogue .

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There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

Note

- *Always check steering system for leaks if fluid level is low in reservoir.*
- *If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.*
- *The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and turned by hand. Otherwise, there is a possibility of pump damage or noise while driving.*



1 - Power steering rack

- ❑ For correct version refer to ⇒ Electronic parts catalogue

2 - Pressure hose

- ❑ Note correct position on steering rack ⇒ page 401

3 - Cap with dipstick

- ❑ Checking fluid level ⇒ page 356

4 - Securing strap

5 - Reservoir

- ❑ Note correct installation position ⇒ page 490

6 - Bolt

- ❑ 8 Nm

7 - Bracket

- ❑ For reservoir and ESP hydraulic unit

8 - Spring-type clip

- ❑ Use spring-type clip pliers - VAS 5024 A- when removing and installing

9 - Suction hose

- ❑ Note correct position on reservoir ⇒ page 490
- ❑ Note correct position on power steering pump ⇒ page 409

10 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

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11 - Return hose

- ❑ Note correct position on reservoir ⇒ page 490
- ❑ Note attachment on longitudinal member ⇒ page 400

12 - Bracket

- ❑ Clipped onto longitudinal member

13 - Bolt

- ❑ 9 Nm

14 - Cooling pipe

- ❑ Secured to lock carrier together with pressure pipe ⇒ page 401

15 - Power steering pump

- ❑ Different versions; for correct version refer to ⇒ Electronic parts catalogue
- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure, power steering pump up to model year 2009 ⇒ page 401
- ❑ Checking delivery pressure, power steering pump from model year 2009 onwards ⇒ page 404
- ❑ Removing and installing ⇒ page 410

16 - Seal

- ❑ Always renew

17 - Banjo bolt

- ❑ 50 Nm

18 - Seal

- ❑ Always renew

19 - Bolt

- ❑ 9 Nm

20 - Pressure hose

- ❑ Connection to power steering pump with clamping plate
- ❑ When connecting to power steering pump, fully insert clamping plate and tighten bolts

21 - Pressure hose

- ❑ Note correct position on power steering pump ⇒ page 409
- ❑ Connection to power steering pump with banjo bolt

22 - Union nut

- ❑ 40 Nm

23 - Return hose

- ❑ Note correct position on steering rack ⇒ page 401
- ❑ Note installation position on longitudinal member ⇒ page 401
- ❑ Note attachment on longitudinal member ⇒ page 400

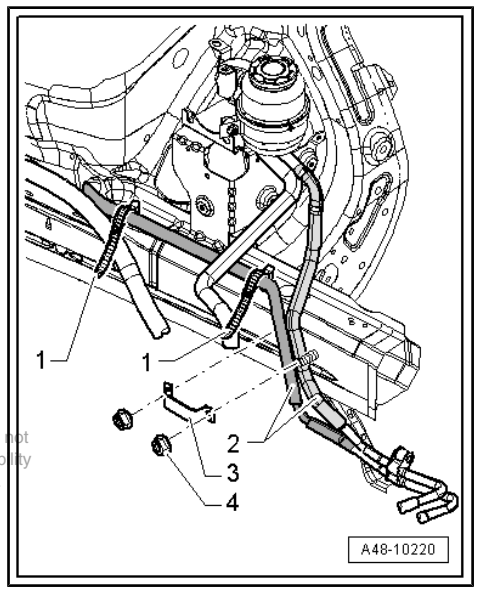
Attachment of return hoses on longitudinal member

– Insert return hoses between studs.

– Secure return hoses -2- on longitudinal member with bracket -3- and nuts -4-.

Tightening torque for nuts -2-: 2 Nm.

– Secure return hoses -2- on longitudinal member with cable tie -1-.

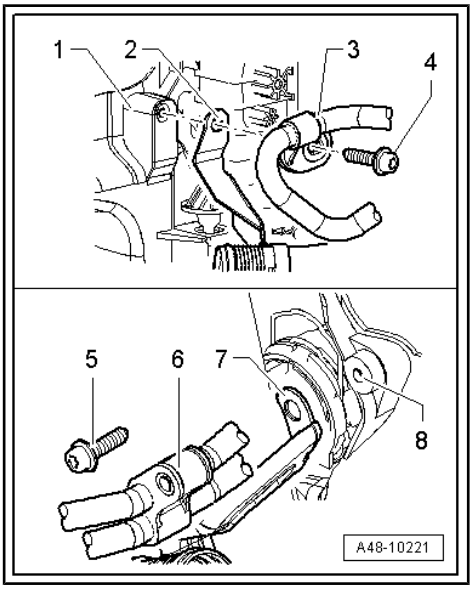


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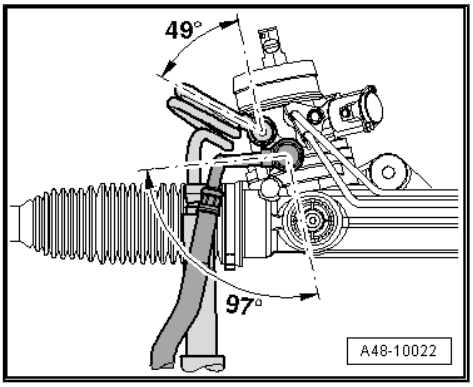
Installing cooling pipe together with pressure pipe on lock carrier

– Secure right lug -3- on cooling pipe and bracket -2- for pressure pipe to lock carrier -1- with bolt -4-.

– Secure left lug -6- on cooling pipe and bracket -7- for pressure pipe to lock carrier -8- with bolt -5-.



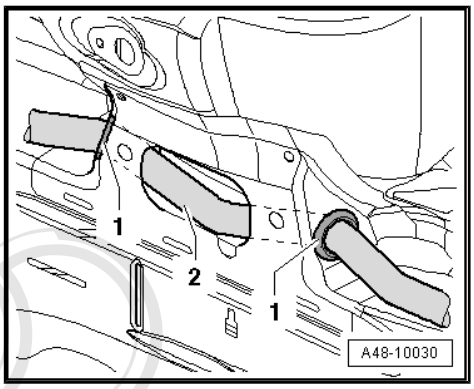
Position of pipe connections on steering rack



Installation position in longitudinal member

– Engage guide bushes -1- in longitudinal member.

– Guide return hose -2- through support after installing bushes -1-.

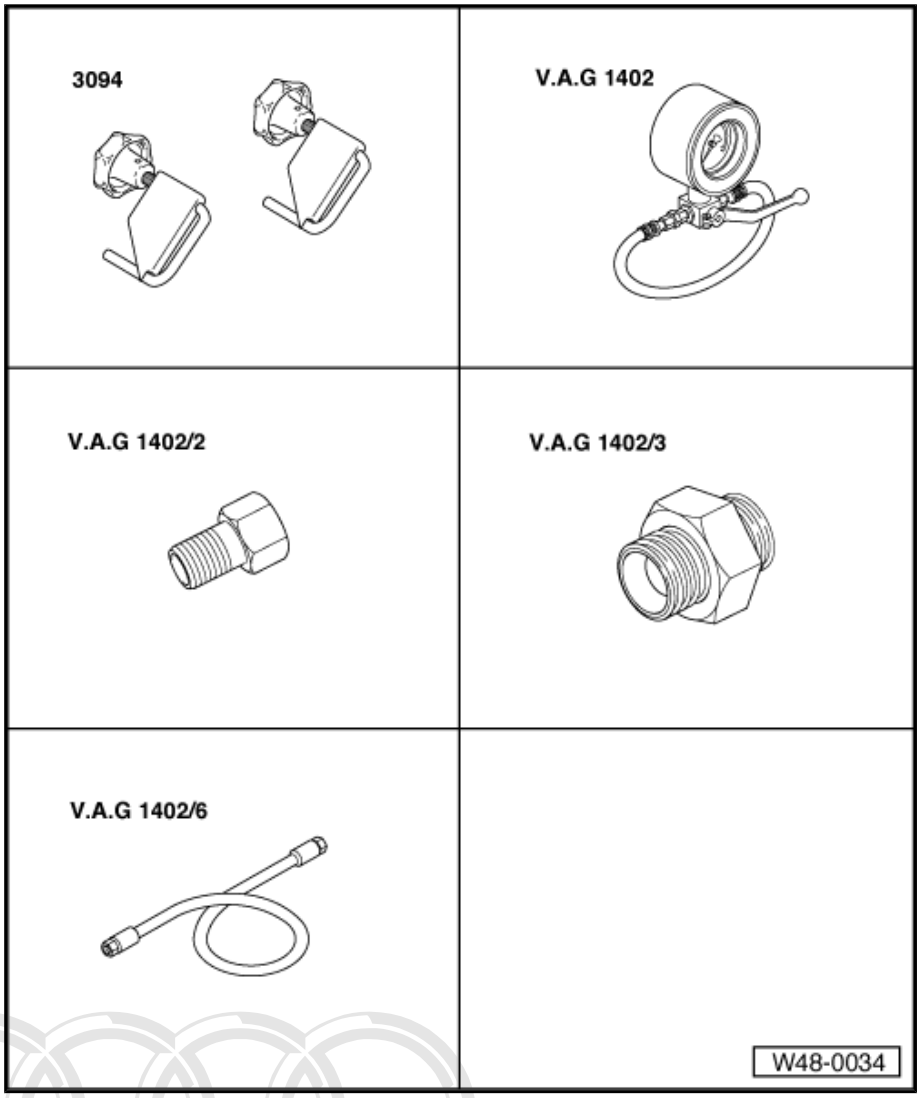


7.2 Checking delivery pressure of power steering pump up to model year 2009 (vehicles with 6-cylinder diesel engine)

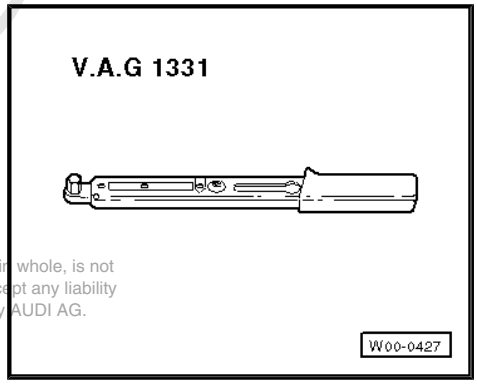
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Special tools and workshop equipment required

- Hose clamps - 3094-
- Power steering tester - V.A.G 1402-
- Adapter - V.A.G 1402/2-
- Adapter - V.A.G 1402/3-
- Adapter set - V.A.G 1402/6-



- Torque wrench - V.A.G 1331-



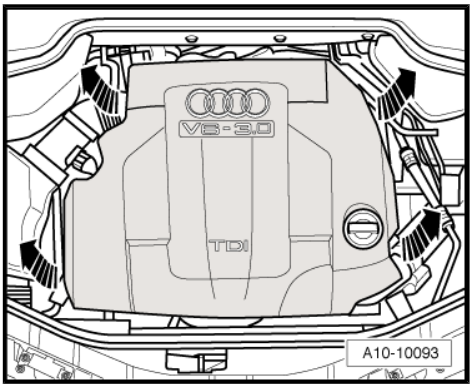
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Test requirements:

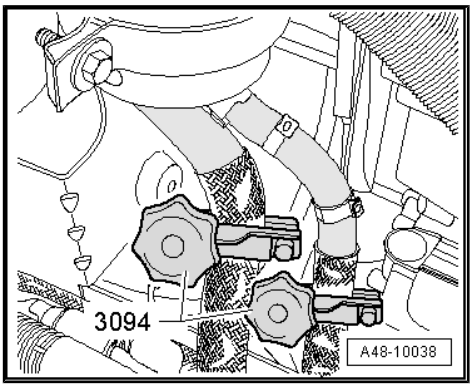
- V-belt and V-belt tension OK.
- No leaks in system
- Hoses and pipes not kinked or constricted

Checking

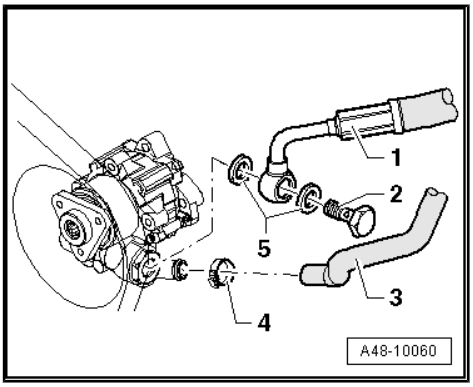
– Carefully pull engine cover panel off 4 mounting studs (one at a time) -arrows-.



– Clamp off suction and return hoses using hose clamps - 3094- .



– Unscrew banjo bolt -2-. Disconnect pressure hose -1- and seals -5- from power steering pump.



– Connect power steering tester - V.A.G 1402- as shown.

1 - Power steering tester - V.A.G 1402-

2 - Hose from adapter set - V.A.G 1402/6-

3 - Adapter - V.A.G 1402/4-

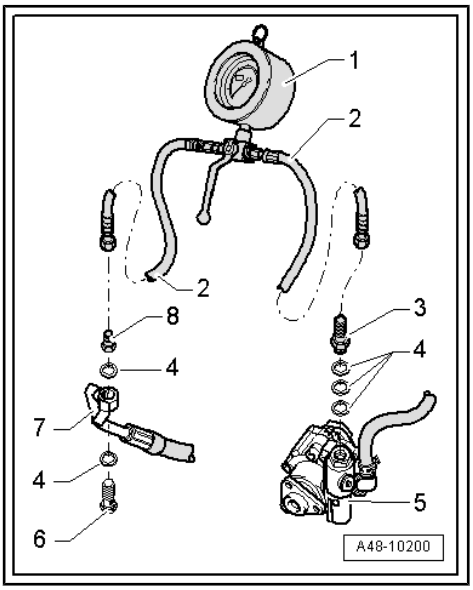
4 - Seal

5 - Pressure line

6 - Banjo bolt

7 - Power steering pump

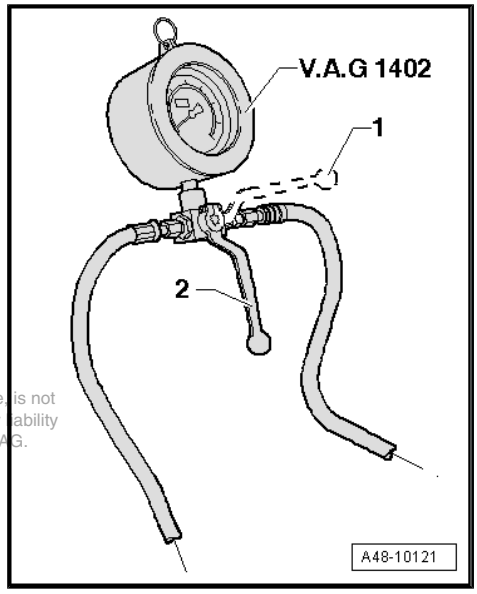
8 - Adapter - V.A.G 1402/2-



Remove hose clamps - 3094- .

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– Make sure lever on pressure gauge is at position -2-.
– Start engine but do not press accelerator.
– Turn steering wheel approx. 10 times from lock to lock.
– Switch off engine and top up hydraulic fluid in reservoir if necessary.



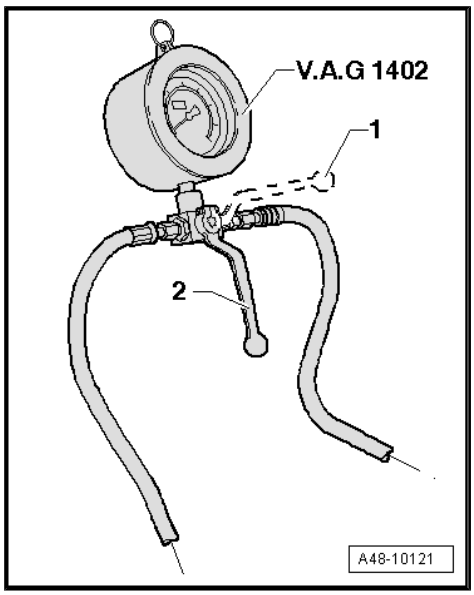
Note

- *To avoid damaging the power steering pump, please note the following points:*
- *Cut-off valve of pressure gauge must not remain closed for more than 10 seconds during this test.*
- *Start engine without pressing accelerator and leave it running at idling speed.*
- *Take pump pressure reading at idling speed immediately after starting engine (have second mechanic take reading).*
- *The pressure will drop during the test; the highest pressure reading is therefore the required test value.*

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– Then check delivery pressure.

– Start engine, close cut-off valve (position -1-) with engine idling and read off pressure (lever must face away from pressure hose). Do not perform measurement for longer than 10 seconds.



Delivery pressure specification: 123…130 bar

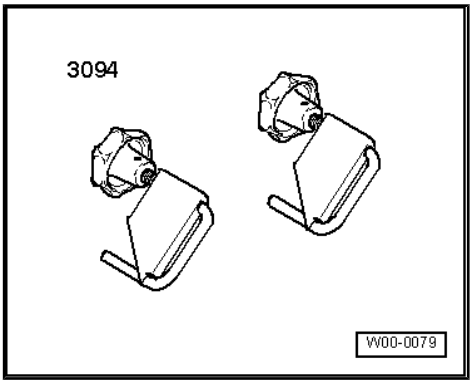
Renew power steering pump if specification is not attained ⇒ page 409 .

– Switch off engine.
– Remove power steering tester - V.A.G 1402- .
– Install banjo bolt ⇒ Item 7 (page 409) .
– Bleed steering system ⇒ page 358 .
– Check hydraulic fluid level ⇒ page 356 .
– Check steering system for leaks ⇒ page 359 .

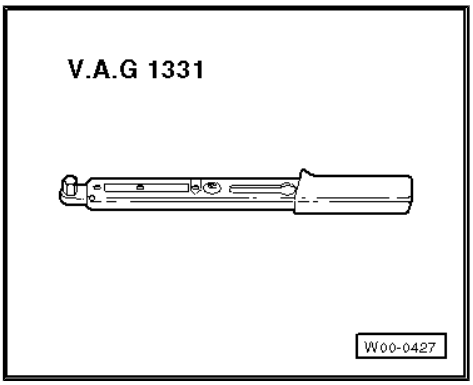
7.3 Checking delivery pressure of power steering pump from model year 2009 onwards (vehicles with 6-cylinder diesel engine)

Special tools and workshop equipment required

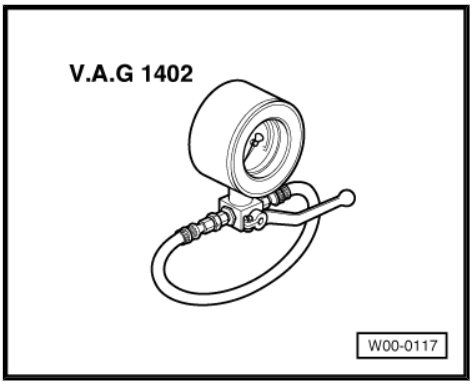
- Hose clamps - 3094-



- Torque wrench - V.A.G 1331-

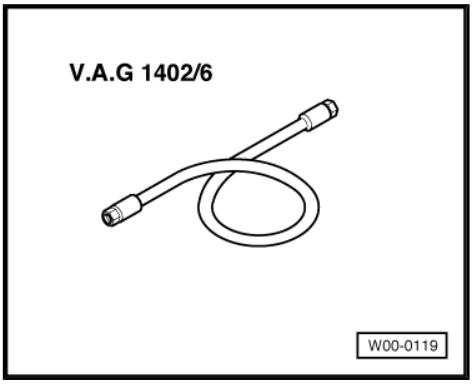


- Power steering tester - V.A.G 1402-

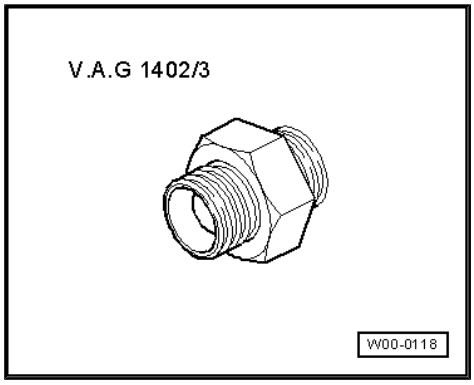


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- Adapter set - V.A.G 1402/6-



♦ Adapter - V.A.G 1402/3-



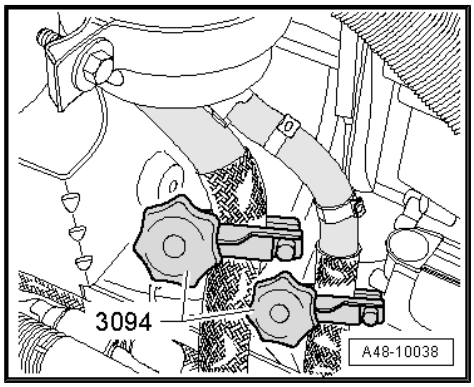
Test requirements:

- V-belt and V-belt tension OK.
- No leaks in system
- Hoses and pipes not kinked or constricted

Checking

– Clamp off suction and return hoses using hose clamps - 3094- .

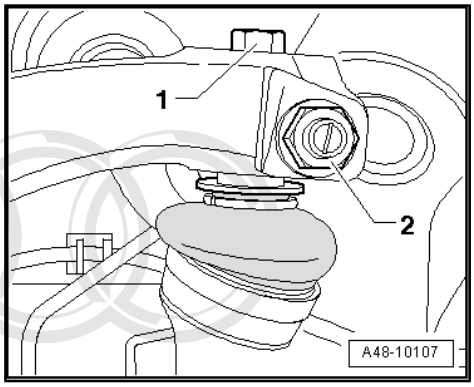
– Remove front left wheel.



– Unscrew bolt -1- and nut -2-.

– Pull or press track rod downwards out of steering arm.

Do not attempt to enlarge slots in wheel bearing housing using a chisel or similar.

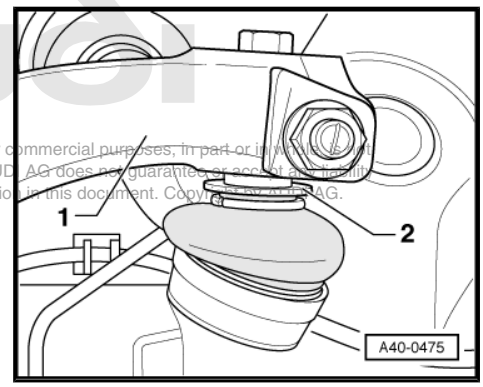


Note

♦ *Do not apply chisel or similar between steering arm -1- and seal -2- on track rod ball joint to press out track rod, as this would damage seal.*

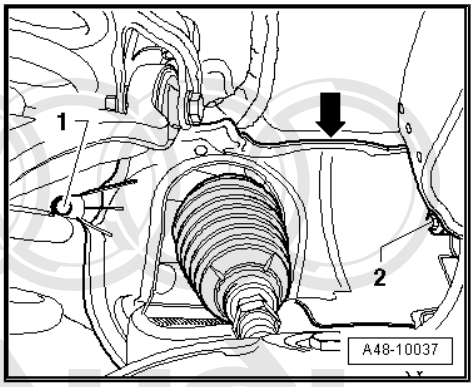
♦ *When pressing track rod out of steering arm, apply pressure only to end of track rod ball joint, or knock out end of joint using a wooden or rubber mallet.*

– Lift track rod clear and tie up.



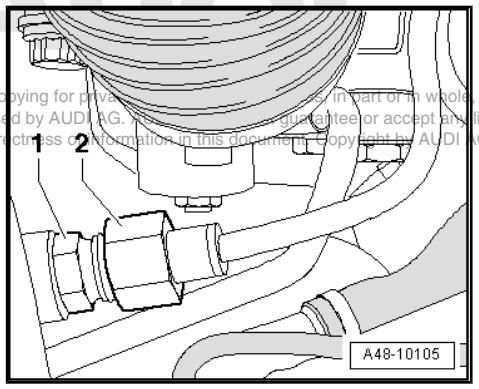
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– Remove spreader rivet -1- and nut -2-, and detach trim -arrow- in wheel housing.
– Place a cloth underneath to catch hydraulic fluid.

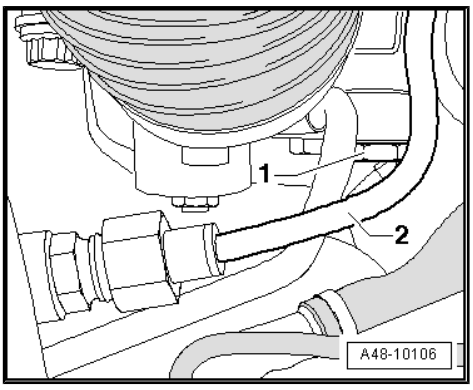


– Unscrew union nut -2- on pipe. Counterhold at hexagon flats -1- on expansion hose.

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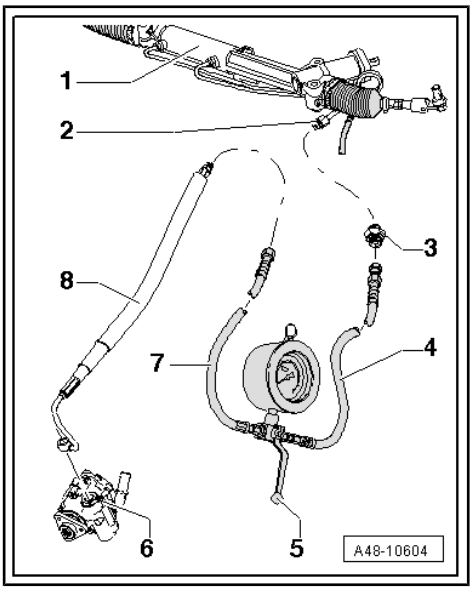


– Slacken banjo bolt -1- on steering rack, but do not remove.
– Turn pipe -2- outwards and tighten banjo bolt -1- again.

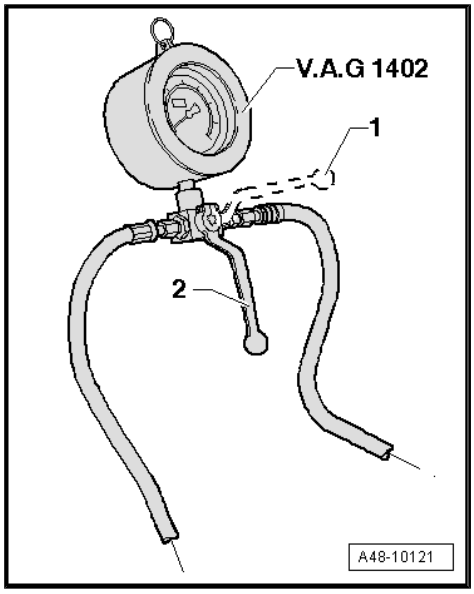


– Connect power steering tester - V.A.G 1402- as shown.

1 - Servotronic steering rack
2 - Union nut, 40 Nm
3 - Adapter - V.A.G 1402/3-
4 - Hose from adapter set - V.A.G 1402/6-
5 - Pressure gauge - V.A.G 1402-
6 - Power steering pump
7 - Hose from adapter set - V.A.G 1402/6-
8 - Expansion hose



– Make sure lever on pressure gauge is at position -2-.
– Start engine but do not press accelerator.
– Turn steering wheel approx. 10 times from lock to lock.
– Switch off engine and top up hydraulic fluid in reservoir if necessary.
– Then check delivery pressure.
– Start engine, close cut-off valve (position -1-) with engine idling and read off pressure.



Note

- *To avoid damaging the pump, please note the following points:*
- *Cut-off valve of pressure gauge must not remain closed for more than 10 seconds during this test.*
- *Start engine and let it idle without pressing accelerator.*
- *Read off pump pressure at idling speed immediately after starting engine (have second mechanic take reading if necessary).*
- *The pressure will drop during the test; the highest pressure reading is therefore the required test value.*

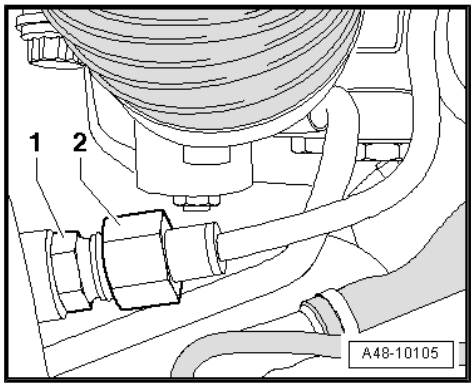
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– Read off gauge pressure with engine running at idling speed (measurement must not take longer than 10 seconds).

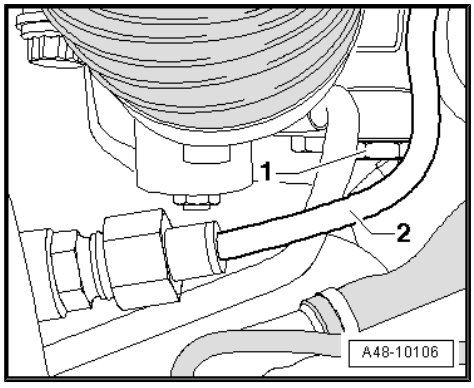
Delivery pressure specification: 123…130 bar

Renew power steering pump if specification is not attained ⇒ page 409 .

– Switch off engine.
– Remove power steering tester - V.A.G 1402- .
– Tighten union nut -2- on pipe ⇒ Item 22 (page 400) . Counterhold at hexagon flats -1- on expansion hose.



– Tighten banjo bolt -1- ⇒ Item 18 (page 332) . Note correct installation position ⇒ page 333 .
– Remove hose clamps - 3094- .
– Fit wheel.
– Bleed steering system ⇒ page 358 .
– Check hydraulic fluid level ⇒ page 356 .
– Check steering system for leaks ⇒ page 359 .



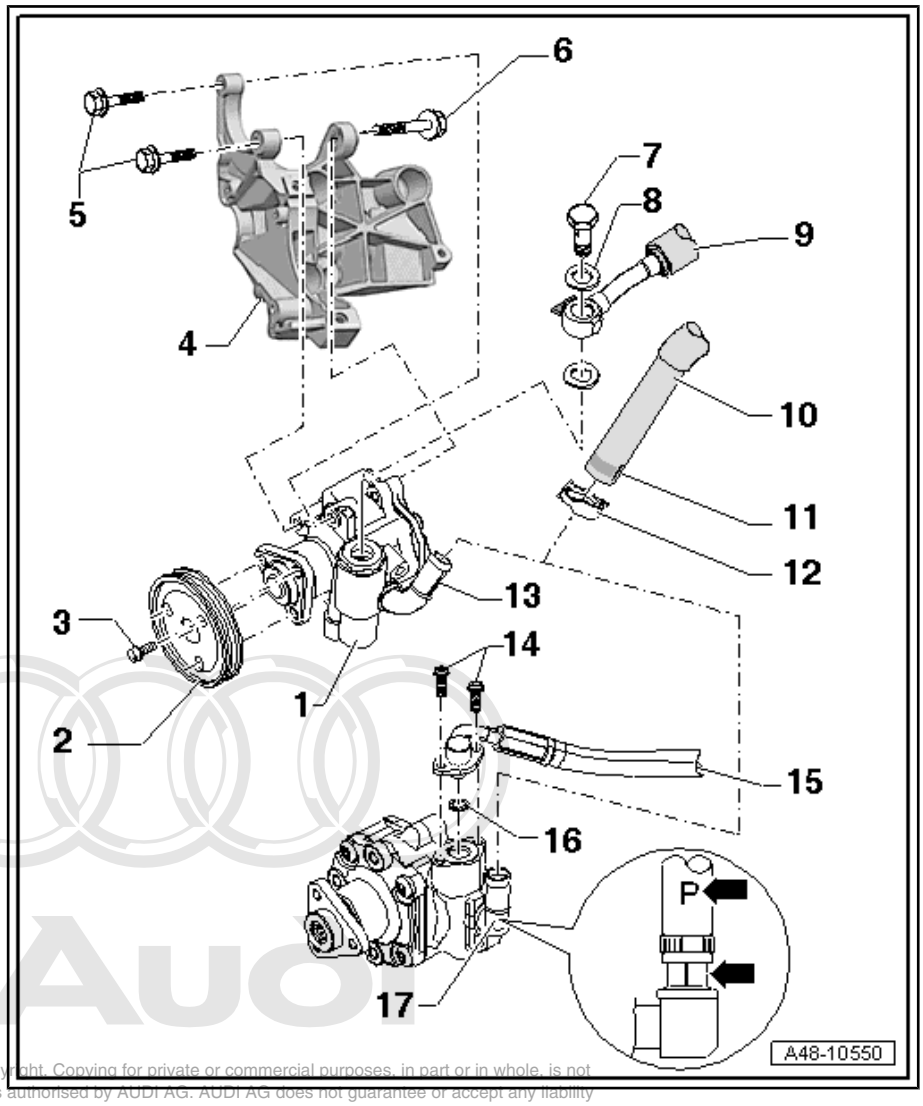
7.4 Removing and installing power steering pump (vehicles with 6-cylinder diesel engine)

Exploded view of power steering pump

In model year 2009 a new-generation power steering pump was phased into production; refer to ⇒ Electronic parts catalogue .

Note

- *Renew seals.*
- *Do not re-use hydraulic fluid which has been drained off.*
- *Use only hydraulic fluid .*



1 - Power steering pump
- ❑ Different versions; for correct version refer to ⇒ Electronic parts catalogue
- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure, power steering pump up to model year 2009 ⇒ page 401
- ❑ Removing and installing ⇒ page 409

2 - Belt pulley

3 - Bolt
- ❑ 23 Nm

4 - Bracket

5 - Bolt
- ❑ 23 Nm

6 - Bolt
- ❑ 23 Nm

7 - Banjo bolt
- ❑ 50 Nm

8 - Seal
- ❑ Always renew

9 - Pressure line
- ❑ Connection to power steering pump with banjo bolt
- ❑ Note correct installation position ⇒ page 410

10 - Suction hose
- ❑ Note correct position on reservoir ⇒ page 490
- ❑ Note correct position on power steering pump ⇒ page 410

11 - Marking
- ❑ On suction hose

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- ❑ Must be in line with marking on power steering pump

12 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers - VAS 6199-
- ❑ Always renew

13 - Marking

- ❑ On power steering pump
- ❑ Must be in line with marking on suction hose

14 - Bolt

- ❑ 9 Nm

15 - Pressure line

- ❑ Connection to power steering pump with clamping plate
- ❑ When connecting to power steering pump, fully insert clamping plate and tighten bolts

16 - Seal

- ❑ Always renew

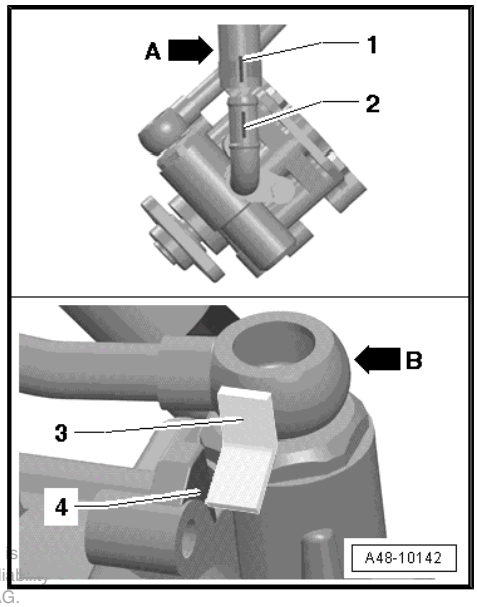
17 - Power steering pump

- ❑ Different versions; for correct version refer to ⇒ Electronic parts catalogue
- ❑ Checking delivery pressure, power steering pump from model year 2009 onwards ⇒ page 404
- ❑ Fill with hydraulic fluid before installing
- ❑ Removing and installing ⇒ page 409
- ❑ Marking -P- on suction hose must be aligned with seam on power steering pump

Installation position of suction hose and pressure line on power steering pump up to model year 2009

– Install suction hose -arrow A- so that markings -1- and -2- are in line.

– Install pressure line -arrow B- so that locating lug -3- contacts pump housing -4-.

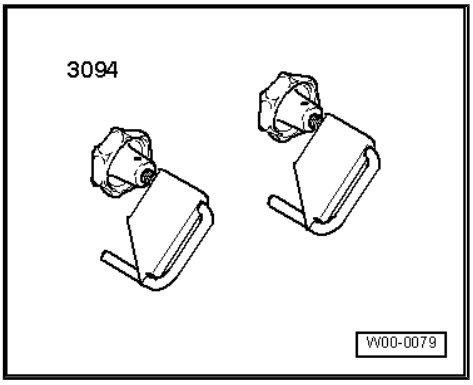


Removing

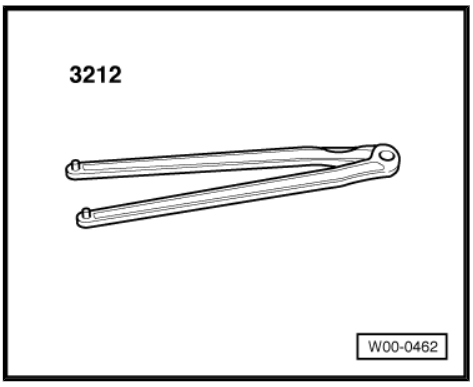
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Special tools and workshop equipment required

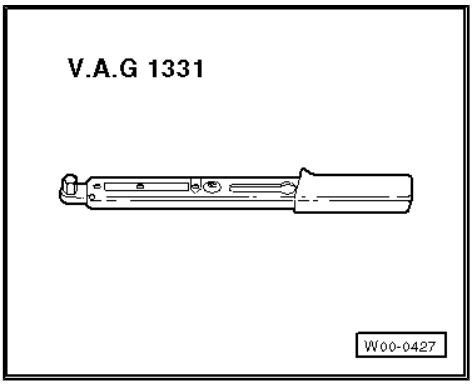
- Hose clamps up to 25 mm ∅ - 3094-



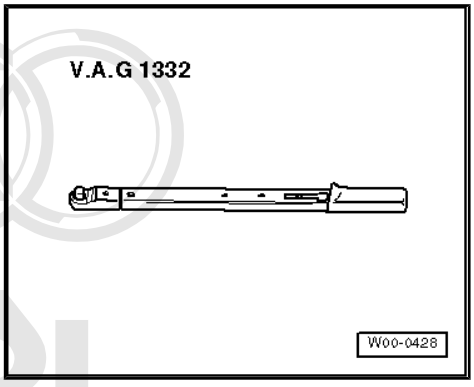
- Pin wrench - 3212-



- Torque wrench - V.A.G 1331-

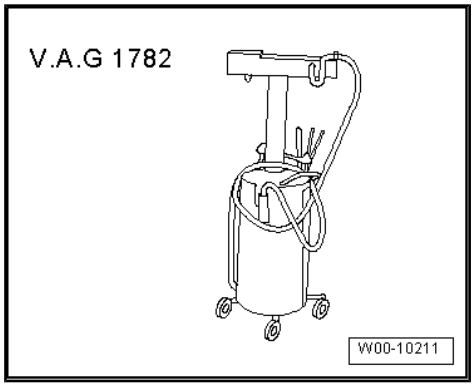


- Torque wrench - V.A.G 1332-

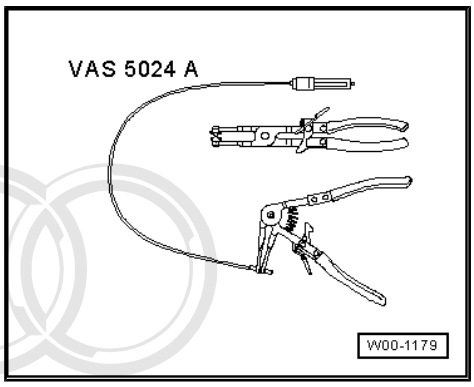


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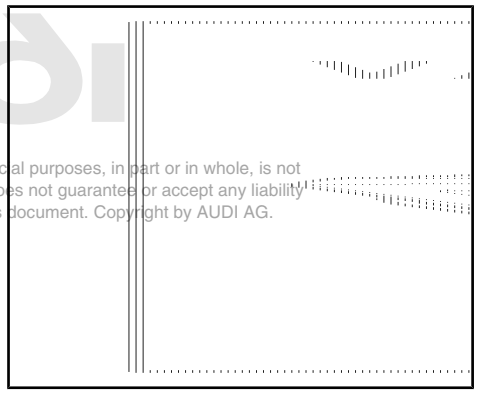
- Used oil collection and extraction unit - V.A.G 1782-



- Spring-type clip pliers - VAS 5024 A-



- Drip tray for workshop hoist - VAS 6208-



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General notes

In model year 2009 a new-generation power steering pump was phased into production; refer to ⇒ Electronic parts catalogue .

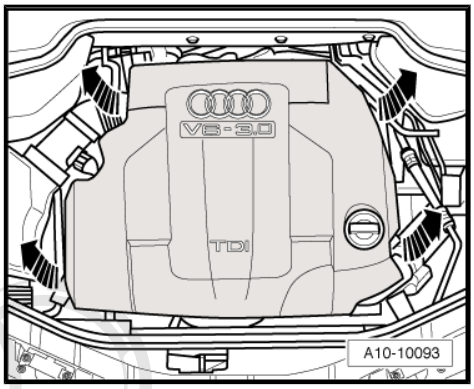
There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

- Always check steering system for leaks if fluid level is low in reservoir.
- If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.
- The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and turned by hand. Otherwise, there is a possibility of pump damage or noise while driving.

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

All vehicles



– Carefully pull engine cover panel off 4 mounting studs (one at a time) -arrows-.
– Extract hydraulic fluid from reservoir with used oil collection and extraction unit - V.A.G 1782- .
– Remove noise insulation ⇒ Rep. gr. 50 .
– Remove bumper ⇒ Rep. gr. 63 .
– Set lock carrier to service position ⇒ Rep. gr. 50 .
– Remove poly V-belt ⇒ Rep. gr. 13 .

Note

- *Note position of spacer sleeves for belt cover.*
- *Before removing poly V-belt, mark direction of rotation. A used belt can break if it runs in the opposite direction. Ensure that the belt is properly seated in the pulleys when installing.*

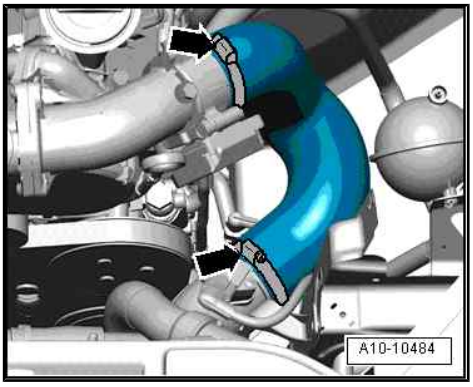
Drain coolant ⇒ Rep. gr. 19 .

Unbolt A/C compressor ⇒ Rep. gr. 87 .

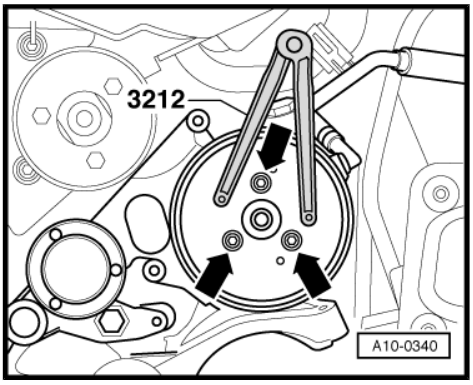
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Note

- *The lines remain connected and must not be bent.*
- *After detaching, tie up A/C compressor on longitudinal member using wire or similar; do not leave it suspended on refrigerant lines.*



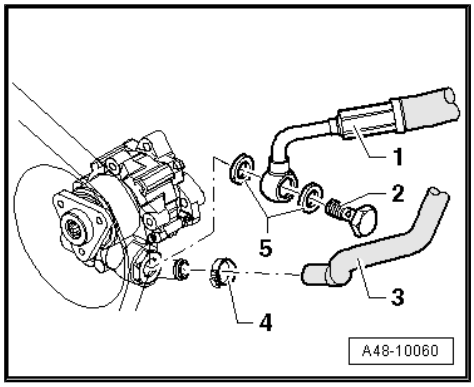
– Release hose clips -arrows- and remove air intake hose.



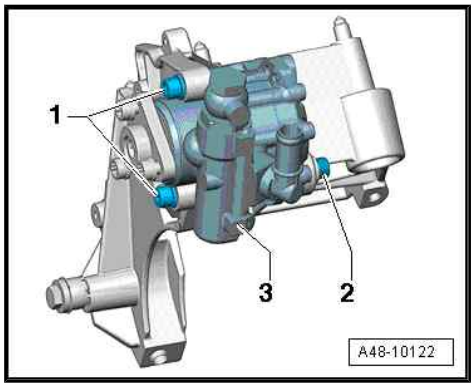
– Remove bolts -arrows-. Use pin wrench - 3212- to counterhold pulley.
– Take off power steering pump pulley.
– Place a drip tray underneath to catch hydraulic fluid.

Applies to vehicles up to model year 2009

– Detach hose clip -4- from suction hose -3-.
– Disconnect suction hose -3- and move to one side.
– Unscrew banjo bolt -2- for pressure hose -1-.
– Seal off connections with plugs.

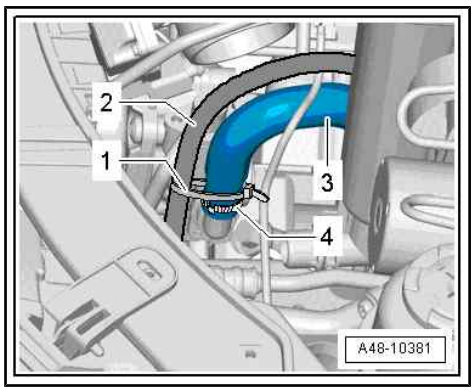


– Remove bolt -2-.
– Unscrew bolts -1- and take off power steering pump -3-.

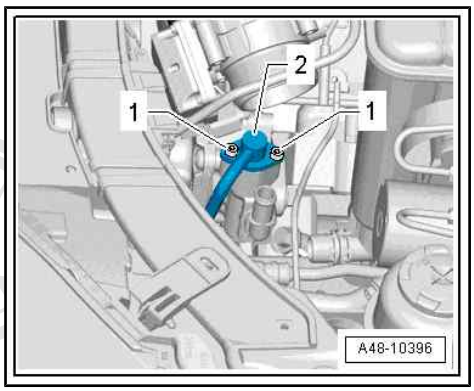


Applies to vehicles from model year 2009 onwards

– If fitted, cut through cable tie -1-.
– Remove hose clip -4- and pull off suction hose -3-.



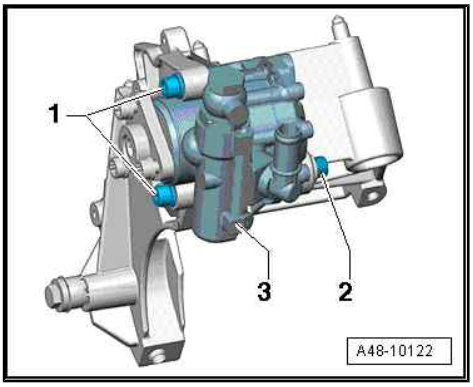
– Unscrew bolts -1- and pull pressure line -2- out of power steering pump.
– Seal off connections of power steering pump and pressure lines with clean plugs.



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– Remove bolt -2-.

– Unscrew bolts -1- and take off power steering pump -3-.



Installing

Installation is carried out in the reverse sequence. Note the following points:

Tightening torques ⇒ page 409

Note

- *Renew gaskets and seals.*
- *Before fitting a new power steering pump, put in hydraulic fluid at the inlet and turn pump by hand until fluid flows out at the pressure outlet.*
- *Secure all hose connections with new hose clips ⇒ Electronic parts catalogue .*

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– Turn hub by hand until fluid comes out at pump outlet.

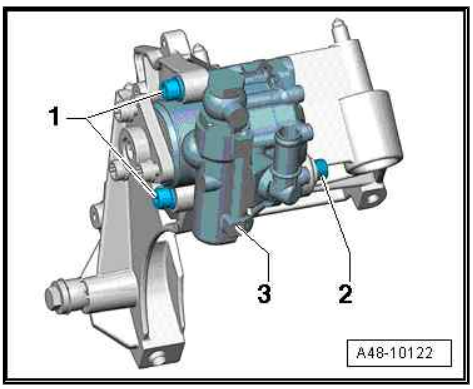
Applies to vehicles up to model year 2009

– To make it easier to fit power steering pump -3-, knock back threaded bush for bolt -2- in bracket slightly.

– Bring power steering pump -3- into position.

– Tighten front bolts -1- first.

– Now tighten rear bolt -2-.

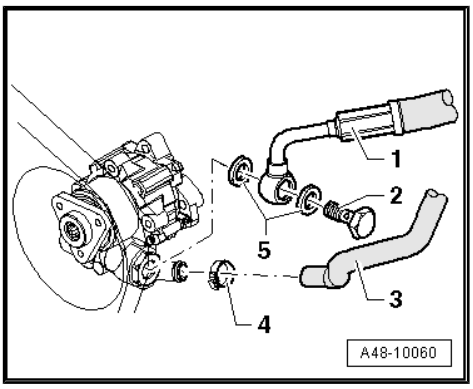


– Fit new seals -5- on banjo bolt.

– Tighten banjo bolt -2-.

– Connect suction hose -3- and secure with new hose clip -4-. Note correct installation position ⇒ page 410 .

Marking on suction hose -3- must be aligned with seam on power steering pump.



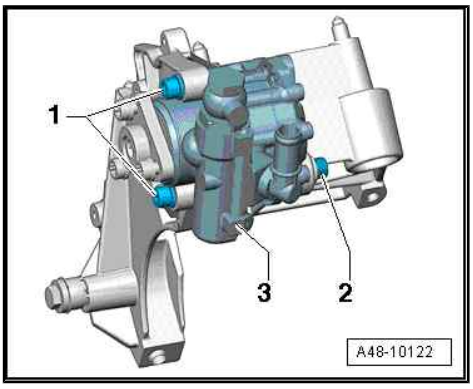
Applies to vehicles from model year 2009 onwards

– To make it easier to fit power steering pump -3-, knock back threaded bush for bolt -2- in bracket slightly.

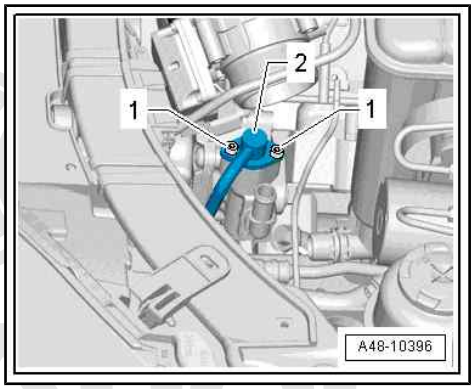
– Bring power steering pump -3- into position.

– Tighten front bolts -1- first.

– Now tighten rear bolt -2-.

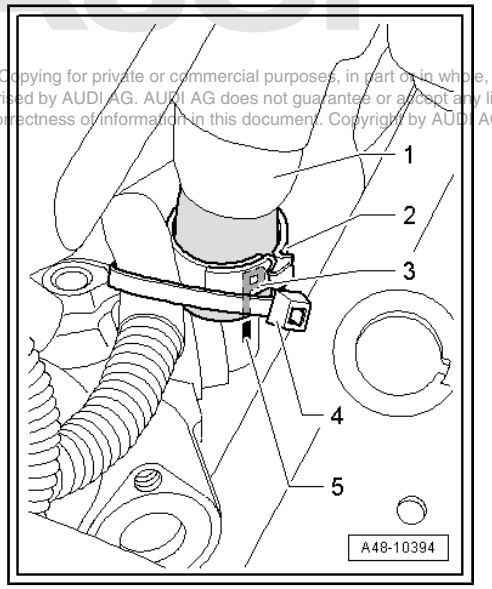


– Press pressure line -2- as far as it will go into power steering pump. Then tighten bolts -1-.



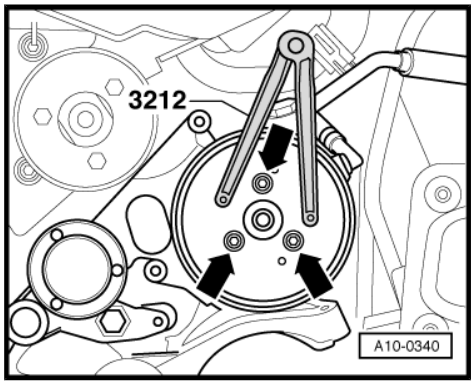
– Fit suction hose -1- and position marking “P” -3- opposite marking -5- on power steering pump.
– Secure suction hose -1- with new hose clip -2-.
– If fitted, attach wiring harness with new cable tie -4- to connection.

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Applies to all vehicles:

– Clean off fluid in engine compartment where necessary.
– Secure pulley to power steering pump.

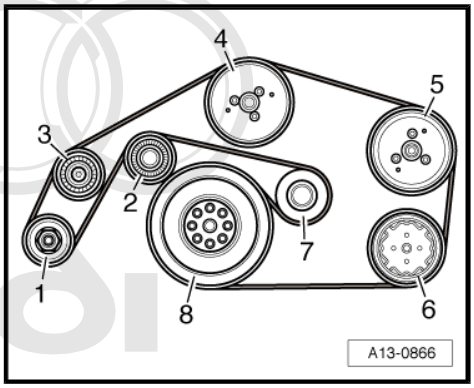


– Tighten bolts -arrows- for belt pulley ⇒ Rep. gr. 13 .
– Install A/C compressor ⇒ Rep. gr. 87 .

Install poly V-belt for power steering pump ⇒ Rep. gr. 13 .

– Attach lock carrier ⇒ Rep. gr. 50 .
– Install bumper ⇒ Rep. gr. 63 .
– Fill up and bleed cooling system ⇒ Rep. gr. 19 .
– Check hydraulic fluid level ⇒ page 356 .
– Bleed steering system ⇒ page 358 .
– Check steering system for leaks ⇒ page 359 .
– Fit noise insulation ⇒ Rep. gr. 50 .
– Stand vehicle on its wheels ⇒ page 11 .

– Install poly-V-belt and make sure that belt runs straight ⇒ Rep. gr. 13 .



Note

Ensure that the belt is properly seated in the pulleys when installing.

1 - Alternator
2 - Idler roller
3 - Idler roller
4 - Coolant pump
5 - Power steering pump
6 - Air conditioner compressor
7 - Tensioner for poly V-belt
8 - Crankshaft

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8 Power steering pump, hydraulic pipes and hoses, fluid reservoir (vehicles with 6-cylinder 2.4 ltr., 2.8 ltr., 3.2 ltr. petrol and 3.0 ltr. TFSI engine)

⇒ “8.1 Exploded view (vehicles with 6-cylinder 2.4 ltr., 2.8 ltr., 3.2 ltr. petrol and 3.0 ltr. TFSI engine)”, page 418

⇒ “8.2 Checking delivery pressure of power steering pump (vehicles with 6-cylinder 2.4 ltr., 2.8 ltr., 3.2 ltr. petrol and 3.0 ltr. TFSI engine)”, page 421

Exploded view of power steering pump - 6-cylinder 2.4 ltr., 2.8 ltr., 3.2 ltr. petrol and 3.0 ltr. TFSI engine ⇒ page 424

Removing and installing power steering pump - 6-cylinder 2.4 ltr., 2.8 ltr., 3.2 ltr. petrol and 3.0 ltr. TFSI engine ⇒ page 425

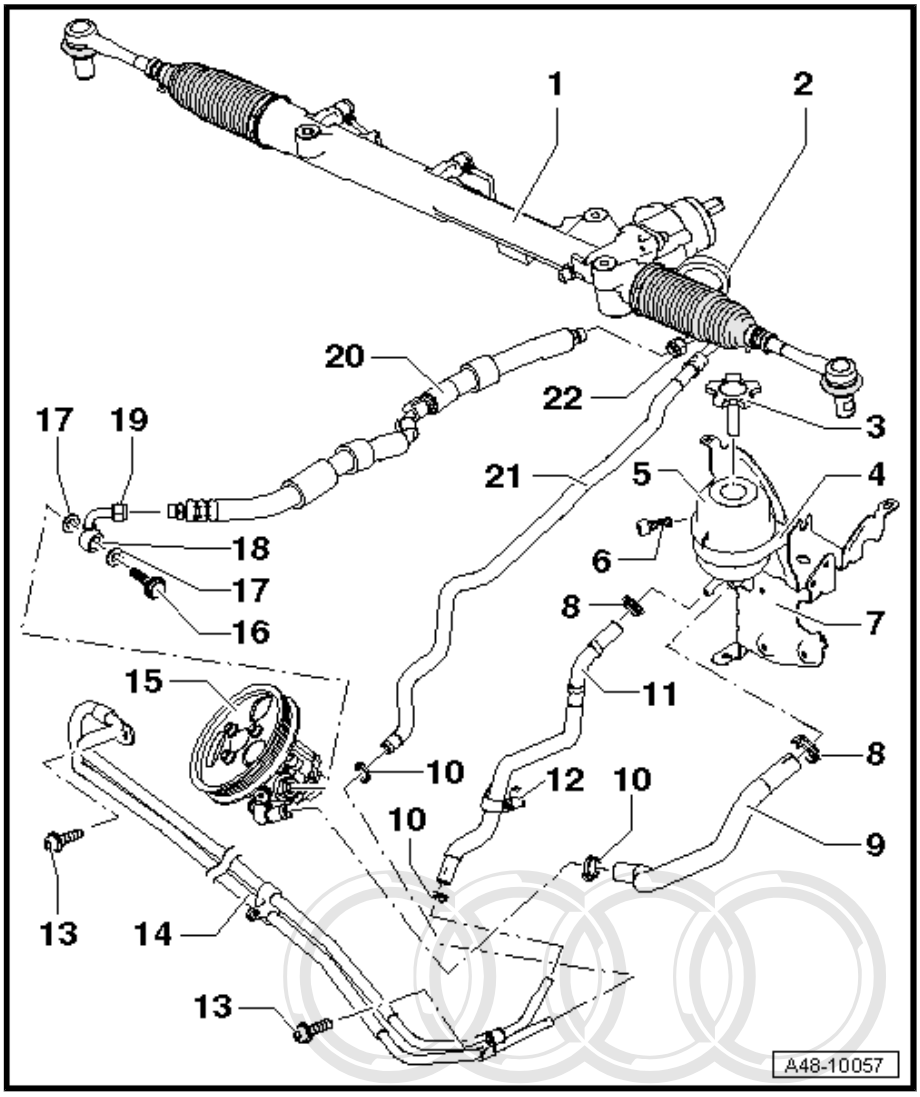
8.1 Exploded view (vehicles with 6-cylinder 2.4 ltr., 2.8 ltr., 3.2 ltr. petrol and 3.0 ltr. TFSI engine)

There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

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Note

- *Always check steering system for leaks if fluid level is low in reservoir.*
- *If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.*
- *The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and turned by hand. Otherwise, there is a possibility of pump damage or noise while driving.*



1 - Power steering rack

- ❑ For correct version refer to ⇒ Electronic parts catalogue

2 - Pressure hose

- ❑ Note correct position on steering rack ⇒ page 420

3 - Cap with dipstick

- ❑ Checking fluid level ⇒ page 356

4 - Securing strap

5 - Reservoir

- ❑ Note correct installation position ⇒ page 490

6 - Bolt

- ❑ 9 Nm

7 - Bracket

- ❑ For reservoir and ESP hydraulic unit

8 - Spring-type clip

- ❑ Use spring-type clip pliers - VAS 5024 A- when removing and installing

9 - Suction hose

- ❑ Note correct position on reservoir ⇒ page 490
- ❑ Note correct position on power steering pump ⇒ page 424

10 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

11 - Return hose

- ❑ Note correct position on reservoir ⇒ page 490
- ❑ Note attachment on longitudinal member ⇒ page 420

12 - Bracket

- ❑ Clipped onto longitudinal member

13 - Bolt

- ❑ 9 Nm

14 - Cooling pipe

15 - Power steering pump

- ❑ For correct version refer to ⇒ Electronic parts catalogue
- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure ⇒ page 421
- ❑ Removing and installing ⇒ page 425

16 - Banjo bolt

- ❑ 50 Nm

17 - Seal

- ❑ Always renew

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18 - Pressure hose

- ❑ Note correct position on power steering pump ⇒ page 424

19 - Union nut

- ❑ 40 Nm

20 - Pressure hose

- ❑ Note correct position on steering rack ⇒ page 420

21 - Return hose

- ❑ Note correct position on steering rack ⇒ page 420
- ❑ Note installation position on longitudinal member ⇒ page 421
- ❑ Note attachment on longitudinal member ⇒ page 420

22 - Union nut

- ❑ 40 Nm

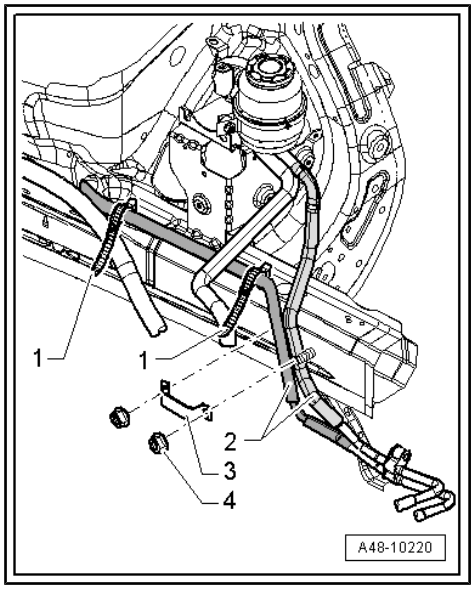
Attachment of return hoses on longitudinal member

– Insert return hoses between studs.

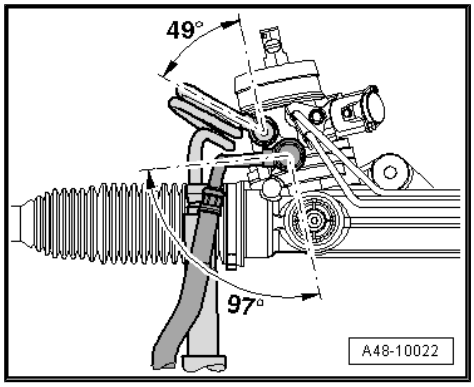
– Secure return hoses -2- on longitudinal member with bracket -3- and nuts -4-.

Tightening torque for nuts -2-: 2 Nm.

– Secure return hoses -2- on longitudinal member with cable tie -1-.



Position of pipe connections on steering rack

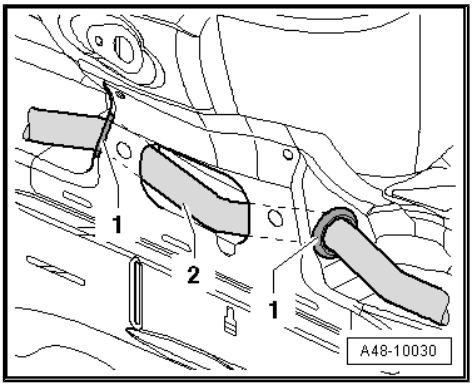


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Installation position in longitudinal member

– Engage guide bushes -1- in longitudinal member.

– Guide return hose -2- through support after installing bushes -1-.

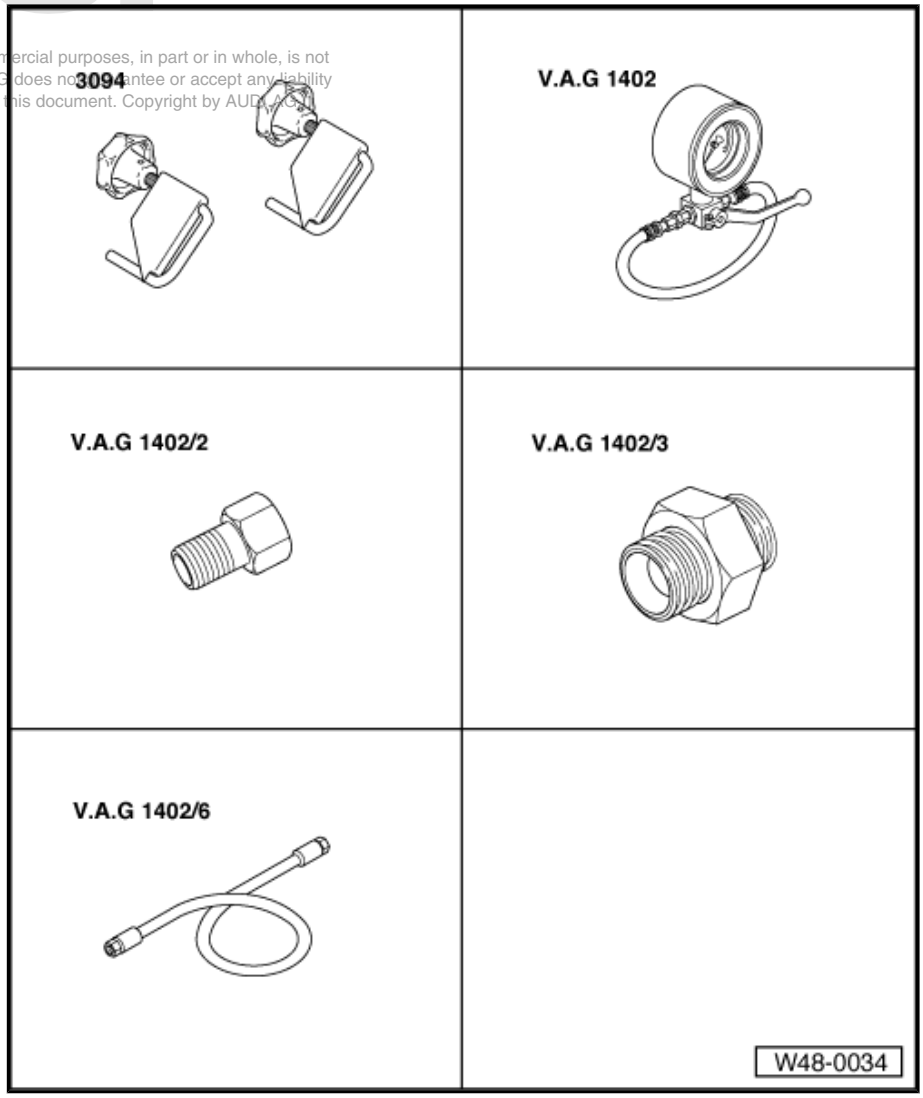


8.2 Checking delivery pressure of power steering pump (vehicles with 6-cylinder 2.4 ltr., 2.8 ltr., 3.2 ltr. petrol and 3.0 ltr. TFSI engine)

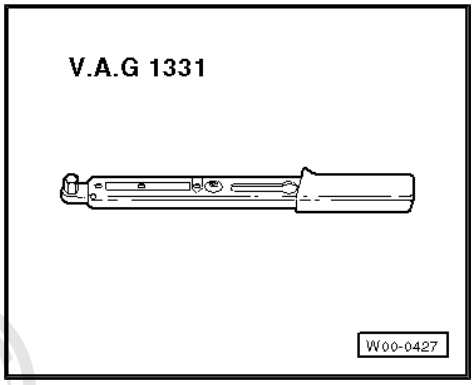
Special tools and workshop equipment required

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- Hose clamps - 3094-
- Power steering tester - V.A.G 1402-
- Adapter - V.A.G 1402/2-
- Adapter - V.A.G 1402/3-
- Adapter set - V.A.G 1402/6-



♦ Torque wrench - V.A.G 1331-



Test requirements:

- V-belt and V-belt tension OK.
- No leaks in system
- Hoses and pipes not kinked or constricted

Checking

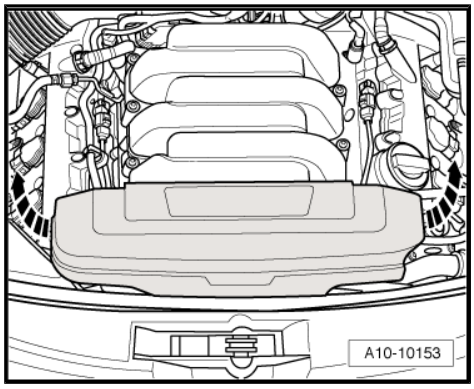
Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11

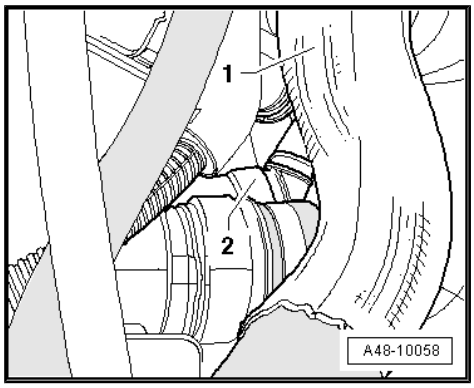
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All vehicles

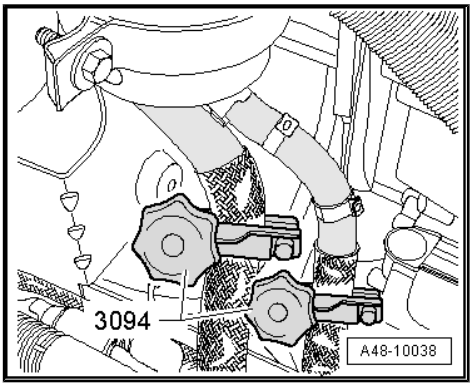
– Pull off front engine cover panel -arrows-.
– Drain coolant ⇒ Rep. gr. 19 .



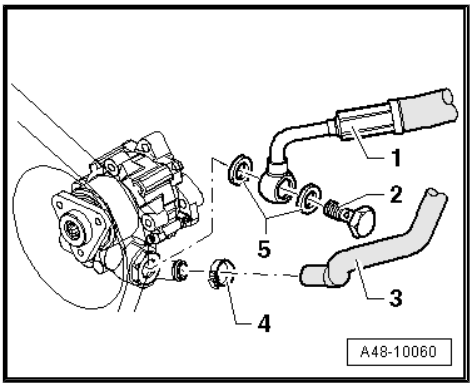
– Remove coolant hose -1-.
– Detach coolant hose -2-.



– Clamp off suction and return hoses using hose clamps - 3094- .



– Unscrew banjo bolt -2-. Disconnect pressure hose -1- and seals -5- from power steering pump.



– Connect power steering tester - V.A.G 1402- as shown.

1 - Pressure gauge - V.A.G 1402-

2 - Hose from adapter set - V.A.G 1402/6-

3 - Adapter - V.A.G 1402/3-

4 - Seal

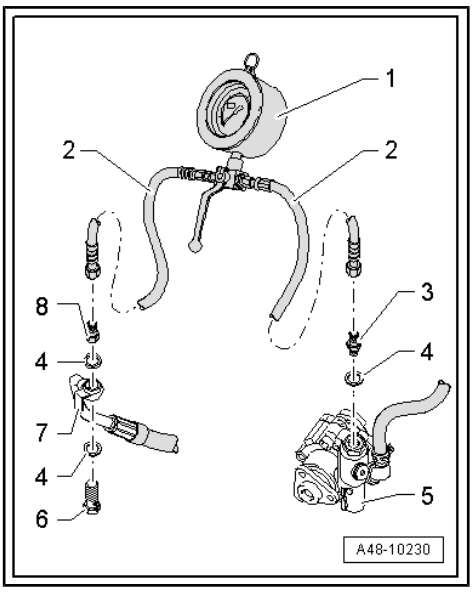
5 - Power steering pump

6 - Banjo bolt

7 - Pressure line

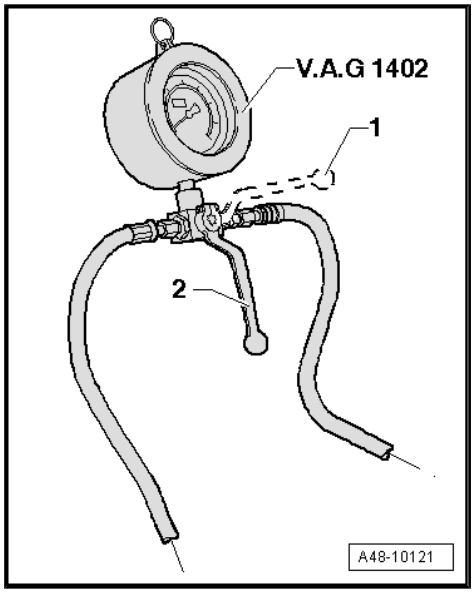
8 - Adapter - V.A.G 1402/2-

– Remove hose clamps - 3094- .



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– Make sure lever on pressure gauge is at position -2-.
– Start engine but do not press accelerator.
– Turn steering wheel approx. 10 times from lock to lock.
– Switch off engine and top up hydraulic fluid in reservoir if necessary.

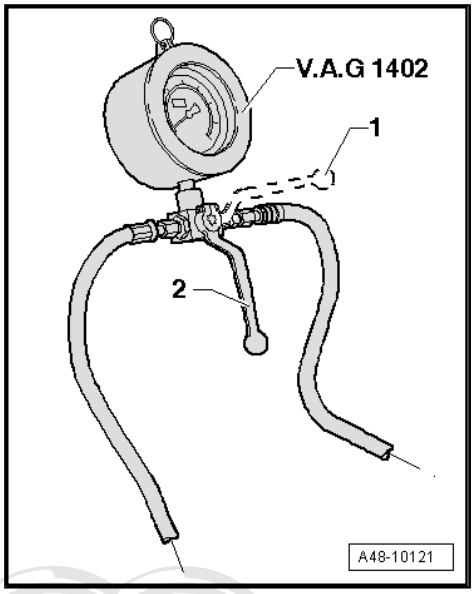


Note

- *To avoid damaging the power steering pump, please note the following points:*
- *Cut-off valve of pressure gauge must not remain closed for more than 10 seconds during this test.*
- *Start engine without pressing accelerator and leave it running at idling speed.*
- *Take pump pressure reading at idling speed immediately after starting engine (have second mechanic take reading).*
- *The pressure will drop during the test; the highest pressure reading is therefore the required test value.*

– Then check delivery pressure.

– Start engine, close cut-off valve (position -1-) with engine idling and read off pressure (lever must face away from pressure hose). Do not perform measurement for longer than 10 seconds.

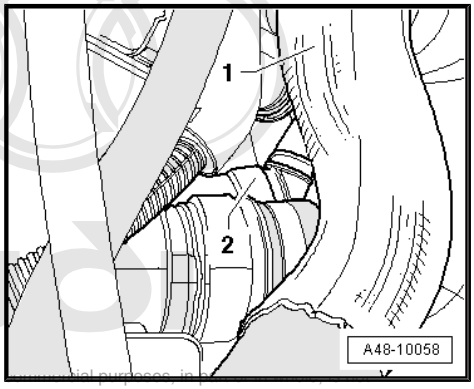


Delivery pressure specification: 120…130 bar

Renew power steering pump if specification is not attained ⇒ page 424 .

– Switch off engine.
– Remove power steering tester - V.A.G 1402- .
– Install banjo bolt ⇒ Item 2 (page 425) .

– Install coolant hoses -1- and -2-.
– Fill up cooling system ⇒ Rep. gr. 19 .
– Bleed steering system ⇒ page 358 .
– Check hydraulic fluid level ⇒ page 356 .
– Check steering system for leaks ⇒ page 359 .
– Stand vehicle on its wheels ⇒ page 11 .



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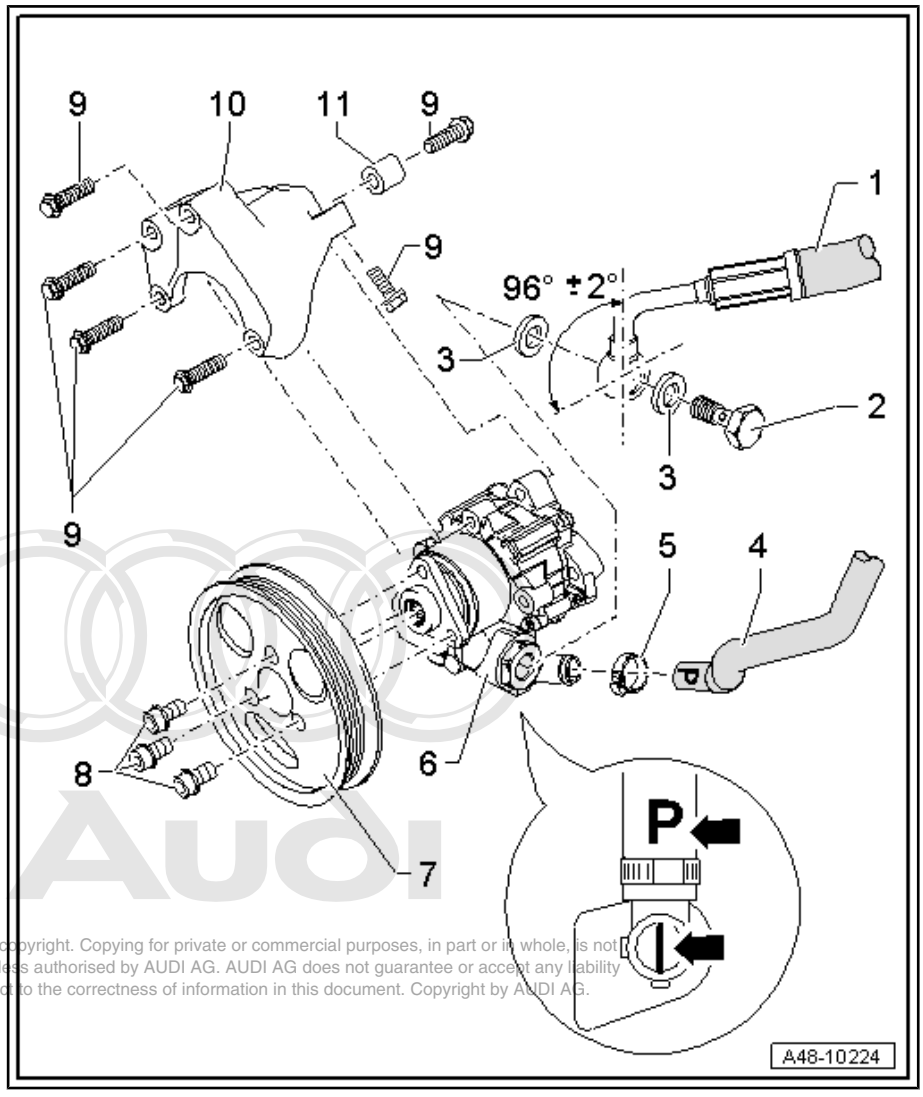
8.3 Removing and installing power steering pump (vehicles with 6-cylinder 2.4 ltr.,

2.8 ltr., 3.2 ltr. petrol and 3.0 ltr. TFSI engine)

Exploded view of power steering pump

Note

- *Renew seals.*
- *Do not re-use hydraulic fluid which has been drained off.*
- *Use only hydraulic fluid .*



1 - Pressure hose

- ❑ Note correct position: Angle between pipe connection and shaft of power steering pump is approx. 96°

2 - Banjo bolt

- ❑ 50 Nm

3 - Seal

- ❑ Always renew

4 - Suction hose

- ❑ Marking -P- on suction hose must be aligned with seam on power steering pump

5 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

6 - Power steering pump

- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure ⇒ page 421
- ❑ Removing and installing ⇒ page 424

7 - Belt pulley

8 - Bolt

- ❑ Tightening torque ⇒ Rep. gr. 13

9 - Bolt

- ❑ 20 Nm

10 - Bracket

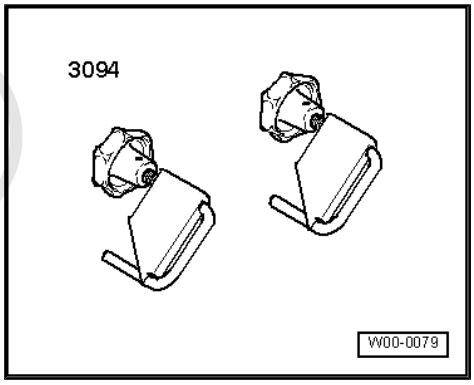
11 - Sleeve

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Removing

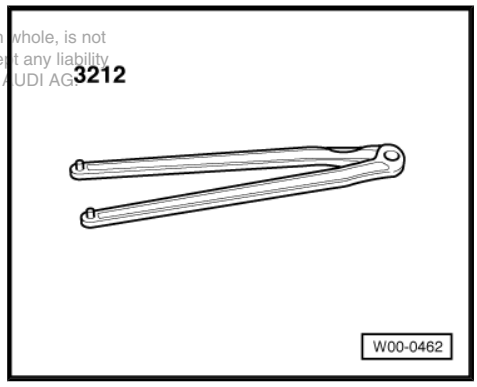
Special tools and workshop equipment required

- Hose clamps up to 25 mm ∅ - 3094-

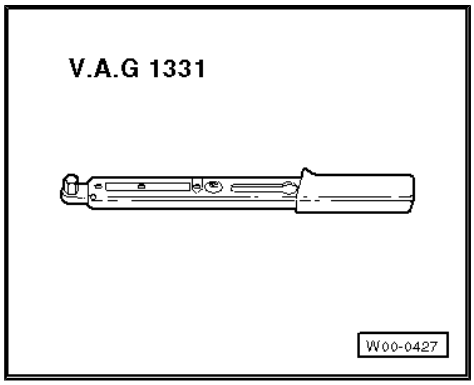


- Pin wrench - 3212-

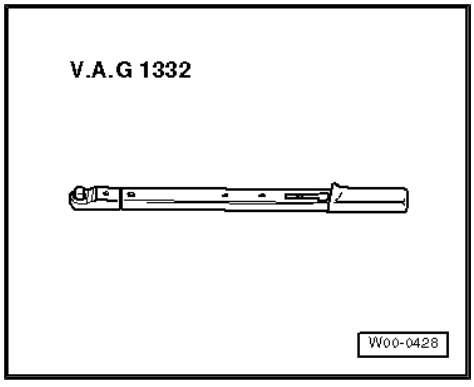
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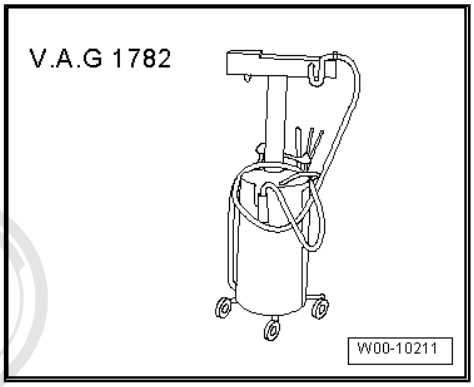
- Torque wrench - V.A.G 1331-



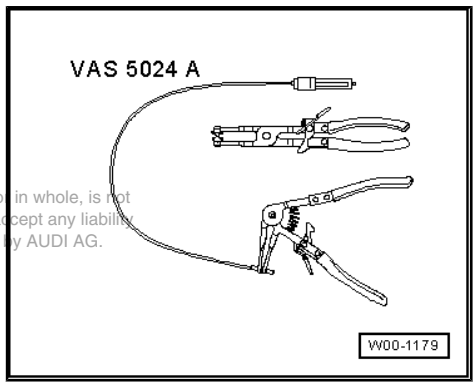
- Torque wrench - V.A.G 1332-



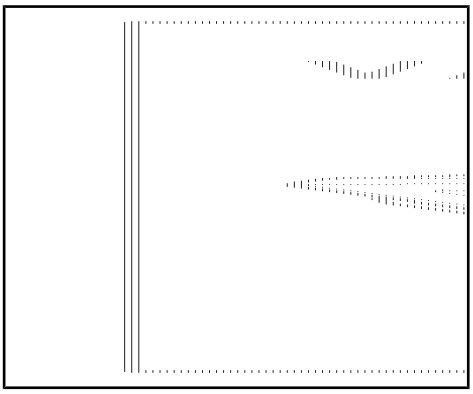
- Used oil collection and extraction unit - V.A.G 1782-



- Spring-type clip pliers - VAS 5024 A-



- Drip tray for workshop hoist - VAS 6208-



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General notes

There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

- Always check steering system for leaks if fluid level is low in reservoir.
- If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.
- The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and turned by hand. Otherwise, there is a possibility of pump damage or noise while driving.

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

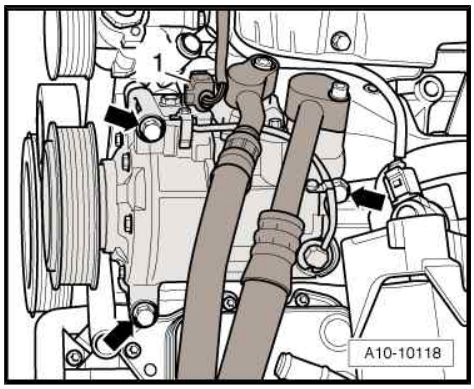
All vehicles

– Extract hydraulic fluid from reservoir using oil extractor - V.A.G 1358 A- or used oil collection and extraction unit - V.A.G 1782- .

– Remove noise insulation ⇒ Rep. gr. 50 .

Detach poly V-belt for power steering pump ⇒ Rep. gr. 13 .

– Unplug electrical connector -1- for air conditioner compressor.



Caution

Do not open refrigerant circuit of air conditioner.

– Unbolt air conditioner compressor from bracket -arrows-.

Note

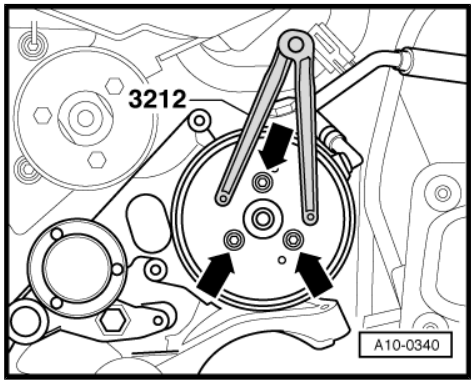
To prevent damage to condenser and refrigerant pipes/hoses, take care to avoid straining, kinking or bending pipes and hoses.

– Suspend air conditioner compressor on left side of vehicle with refrigerant lines connected.

– Remove bolts -arrows-. Use pin wrench - 3212- to counterhold pulley.

– Take off power steering pump pulley.

– Place a drip tray underneath to catch hydraulic fluid.

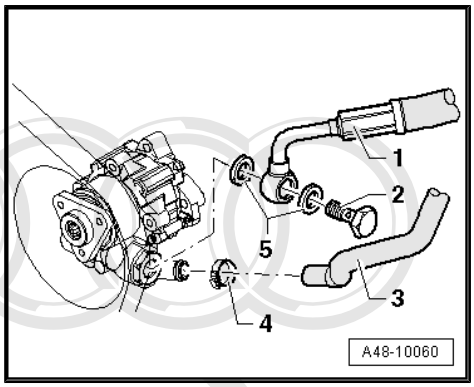


– Detach hose clip -4- from suction hose -3-.

– Disconnect suction hose and move hose to one side.

– Unscrew banjo bolt -2- for pressure hose -1-.

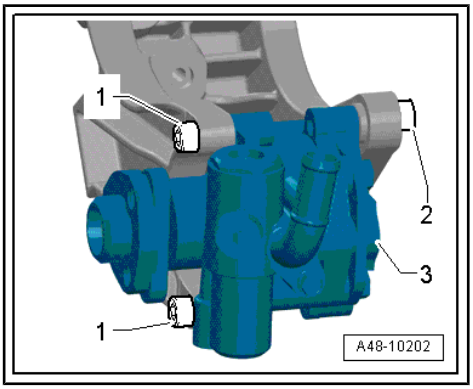
– Seal off connections with plugs.



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– Remove bolts -1-.

– Unscrew bolt -2- and detach power steering pump -3- from bracket.



Installing

Installation is carried out in the reverse sequence. Note the following points:

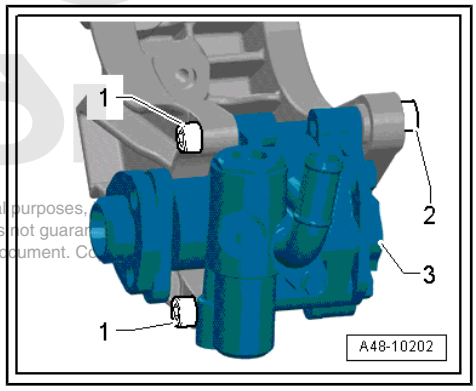
Note

- *Renew gaskets and seals.*
- *Before fitting a new power steering pump, put in hydraulic fluid at the inlet and turn pump by hand until fluid flows out at the pressure outlet.*
- *Secure all hose connections with new hose clips ⇒ Electronic parts catalogue .*

– Turn hub by hand until fluid comes out at pump outlet.

– To make it easier to fit power steering pump, knock back threaded bush for rear bolt in bracket slightly.

– Install power steering pump and tighten bolts -1- and -2- ⇒ Item 9 (page 425) .



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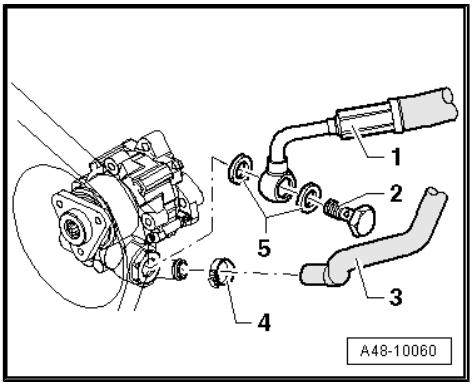
– Fit new seals -5- on banjo bolt.

– Tighten banjo bolt -2- ⇒ Item 2 (page 425) .

– Connect suction hose -3- and secure with new hose clip -4-. Note correct installation position ⇒ page 490 .

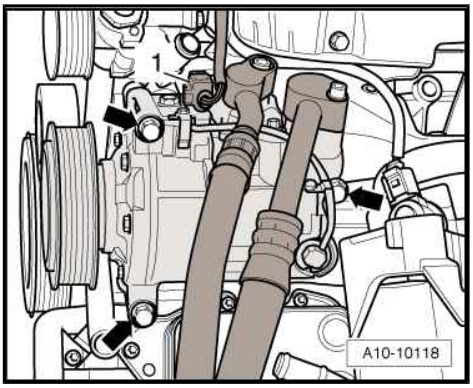
Marking -P- on suction hose -3- must be aligned with seam on power steering pump.

– Clean off fluid in engine compartment where necessary.



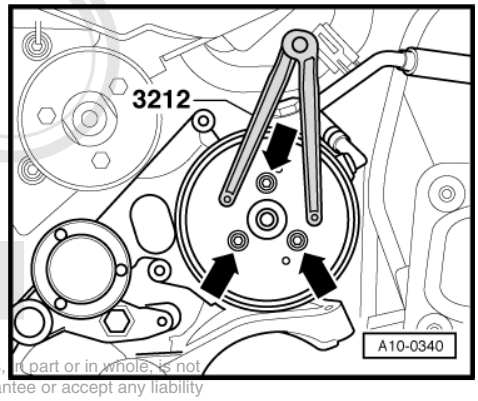
– Bolt air conditioner compressor onto bracket -arrows-.

– Plug in electrical connector -1- for air conditioner compressor.



– Tighten bolts for belt pulley ⇒ Rep. gr. 13 .

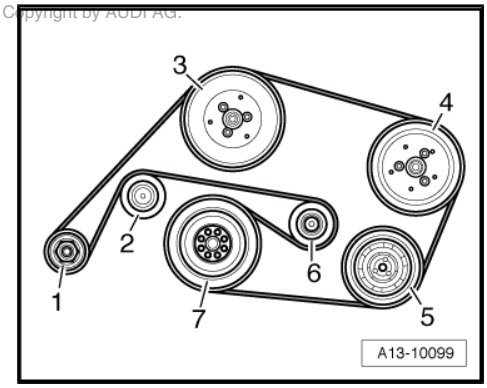
Install poly V-belt for power steering pump ⇒ Rep. gr. 13 ; .



– Fit noise insulation ⇒ Rep. gr. 50 .
– Check hydraulic fluid level ⇒ page 356 .
– Bleed steering system ⇒ page 358 .
– Check steering system for leaks ⇒ page 359 .
– Stand vehicle on its wheels ⇒ page 11 .

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– Install poly-V-belt and make sure that belt runs straight ⇒ Rep. gr. 13 .



Note

Ensure that the belt is properly seated in the pulleys when installing.

1 - Alternator
2 - Idler roller
3 - Coolant pump
4 - Power steering pump
5 - Air conditioner compressor
6 - Tensioning roller
7 - Crankshaft

9 Power steering pump, hydraulic pipes and hoses, fluid reservoir (vehicles with 6-cylinder 3.0 ltr. MPI engine)

⇒ “9.1 Exploded view (vehicles with 6 cylinder 3.0 ltr. MPI engine)”, page 431 .

⇒ “9.2 Checking delivery pressure of power steering pump (vehicles with 6 cylinder 3.0 ltr. MPI engine)”, page 434 .

Exploded view of power steering pump (vehicles with 6 cylinder 3.0 ltr. MPI engine) ⇒ page 437

Removing and installing power steering pump (vehicles with 6 cylinder 3.0 ltr. MPI engine) ⇒ page 439

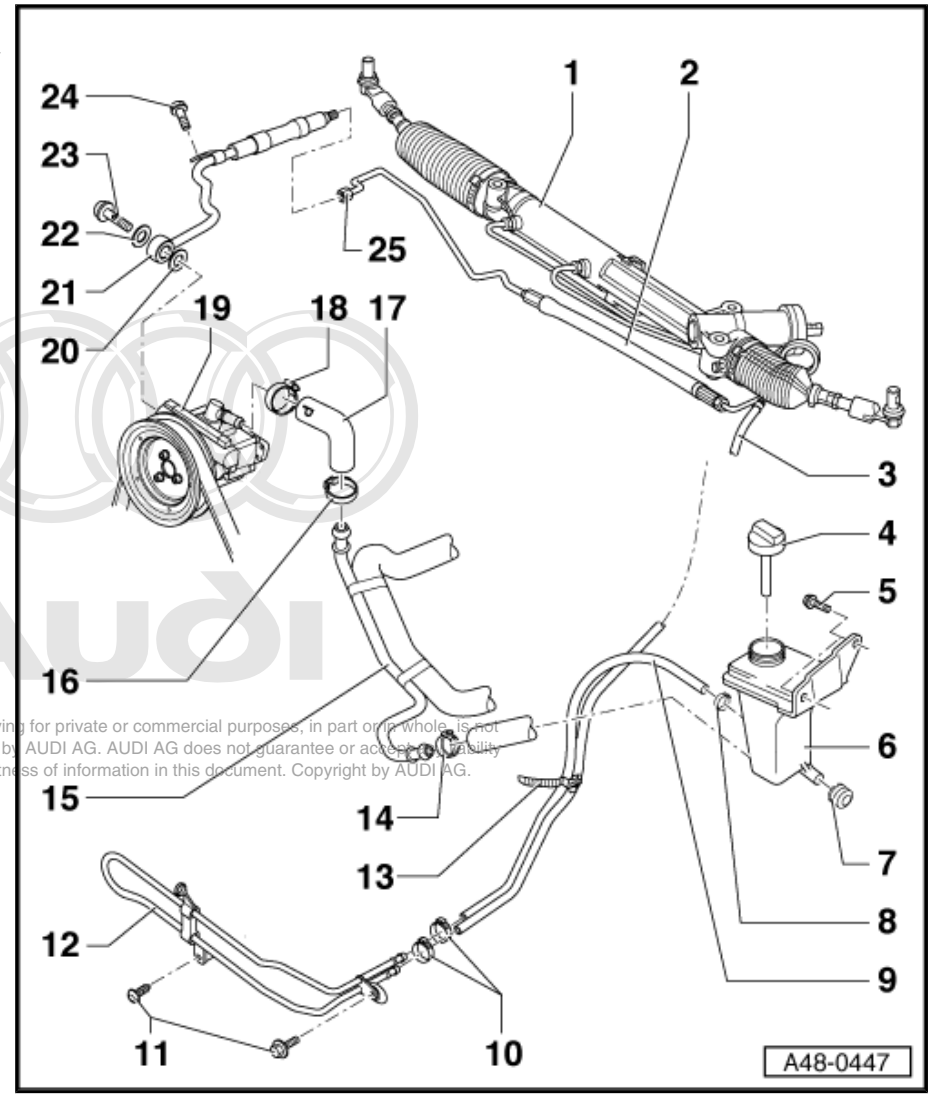
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9.1 Exploded view (vehicles with 6 cylinder 3.0 ltr. MPI engine)

There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

Note

- *Always check steering system for leaks if fluid level is low in reservoir.*
- *If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.*
- *The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and turned by hand. Otherwise, there is a possibility of pump damage or noise while driving.*



1 - Power steering rack

- ❑ For correct version refer to ⇒ Electronic parts catalogue

2 - Pressure hose

- ❑ Note correct position on steering rack ⇒ page 434

3 - Return hose

- ❑ Note correct position on steering rack ⇒ page 434
- ❑ Note attachment on longitudinal member ⇒ page 433

4 - Cap with dipstick

- ❑ Checking fluid level ⇒ page 356

5 - Bolt

- ❑ 5 Nm

6 - Reservoir

7 - Rubber mounting

8 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

9 - Return hose

- ❑ Between reservoir and cooling pipe
- ❑ Note correct position on reservoir ⇒ page 490
- ❑ Note installation position on longitudinal member ⇒ page 434
- ❑ Note attachment on longitudinal member ⇒ page 433

10 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

11 - Bolt

- ❑ 9 Nm

12 - Cooling pipe

13 - Cable tie

14 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

15 - Suction hose

- ❑ Note correct position on reservoir ⇒ page 490

16 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

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17 - Suction hose

- ❑ Note correct position on power steering pump ⇒ page 437

18 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

19 - Power steering pump

- ❑ For correct version refer to ⇒ Electronic parts catalogue
- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure ⇒ page 434
- ❑ Removing and installing ⇒ page 439

20 - Seal

- ❑ Always renew

21 - Pressure hose

- ❑ Note correct position on power steering pump ⇒ page 437
- ❑ Attachment to engine ⇒ page 434

22 - Seal

- ❑ Always renew

23 - Banjo bolt

- ❑ 50 Nm

24 - Bolt

- ❑ 8 Nm

25 - Union nut

- ❑ 40 Nm

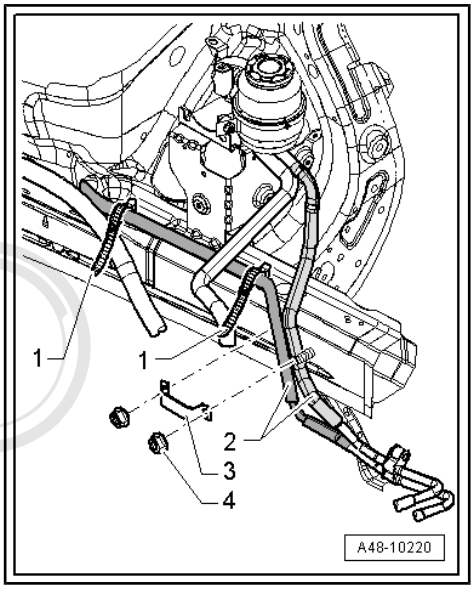
Attachment of return hoses on longitudinal member

– Insert return hoses between studs.

– Secure return hoses -2- on longitudinal member with bracket -3- and nuts -4-.

Tightening torque for nuts -2-: 2 Nm.

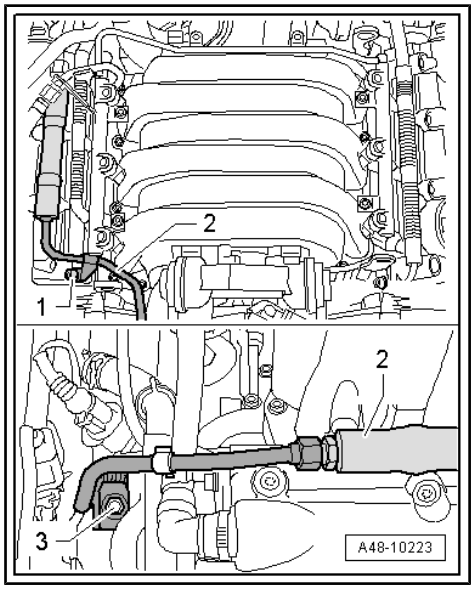
– Secure return hoses -2- on longitudinal member with cable tie -1-.



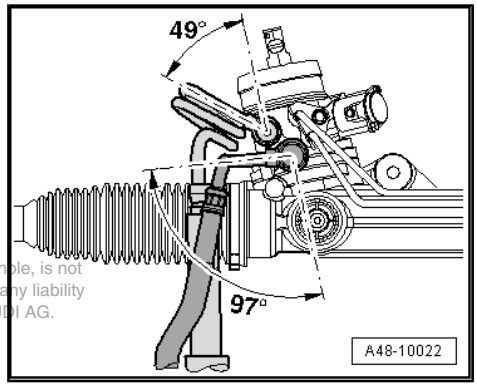
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Attachment of pressure pipe to engine

– Secure pressure pipe -2- with bolt -1- at front right of engine.
– Secure pressure pipe -2- with bolt -3- at rear right of engine.



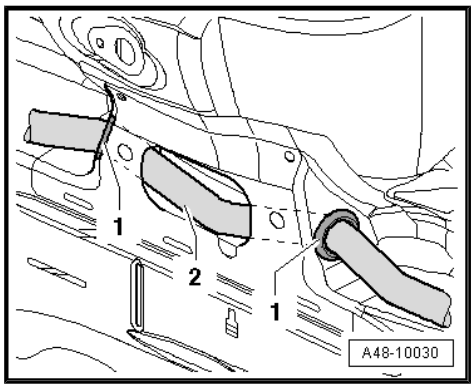
Position of pipe connections on steering rack



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Installation position in longitudinal member

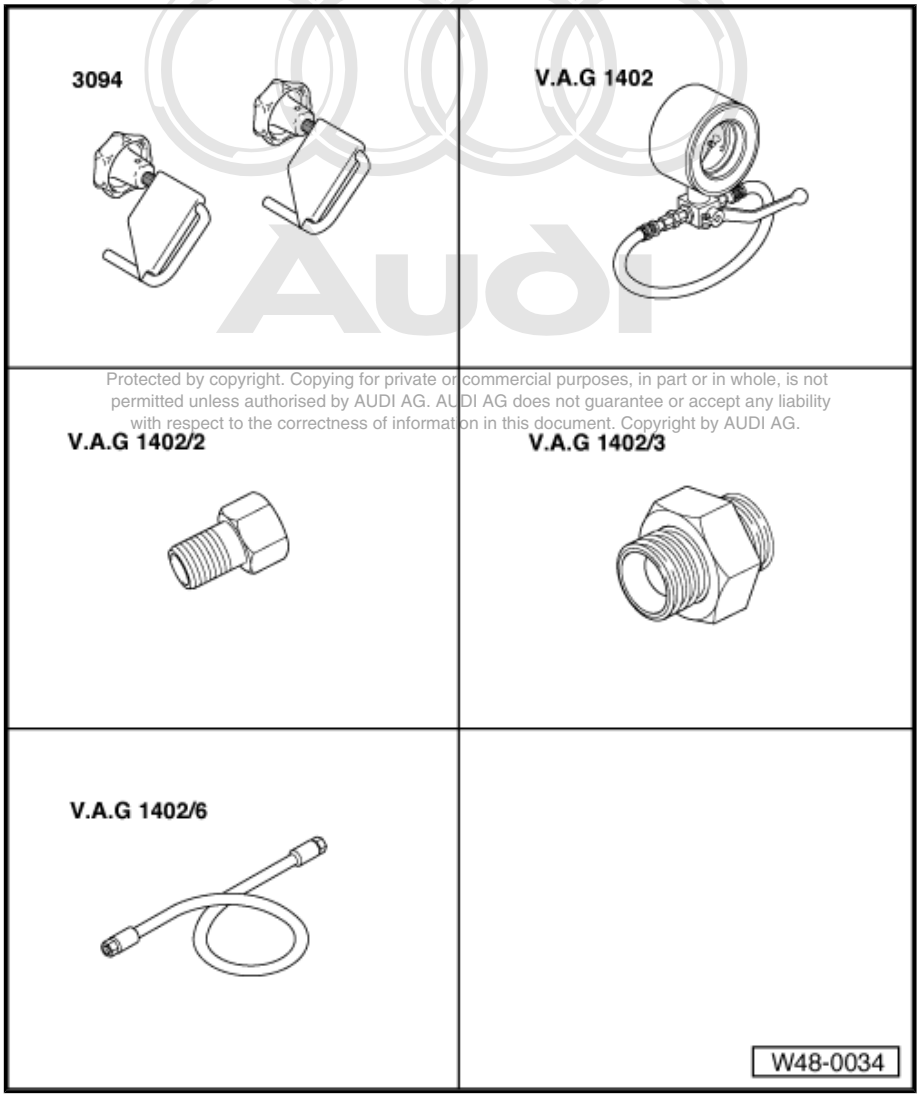
– Engage guide bushes -1- in longitudinal member.
– Guide return hose -2- through support after installing bushes -1-.



9.2 Checking delivery pressure of power steering pump (vehicles with 6 cylinder 3.0 ltr. MPI engine)

Special tools and workshop equipment required

- Hose clamps - 3094-
- Power steering tester - V.A.G 1402-
- Adapter - V.A.G 1402/2-
- Adapter - V.A.G 1402/3-
- Adapter set - V.A.G 1402/6-



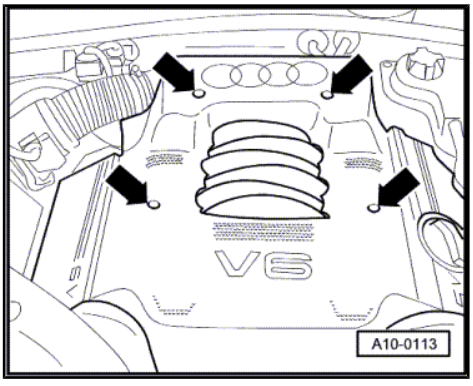
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Test requirements:

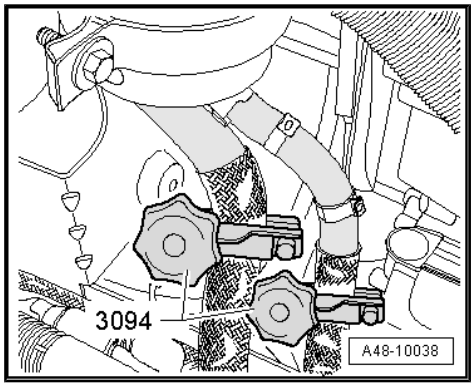
- V-belt and V-belt tension OK.
- No leaks in system
- Hoses and pipes not kinked or constricted

Checking

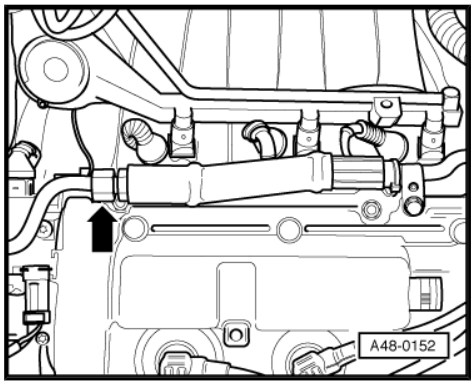
– Unclip the engine cover panel at the top -arrows- and detach.



– Clamp off suction and return hoses using hose clamps - 3094- .



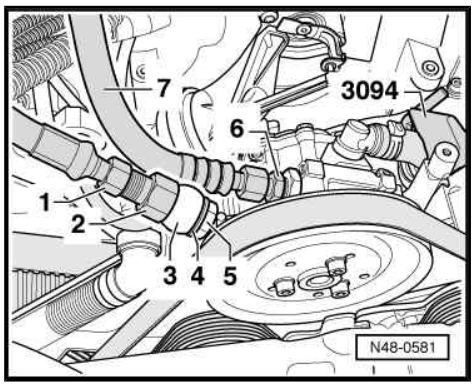
– Unscrew pipe from pressure hose -arrow-. (Counterhold hexagon flats on pressure hose.)



Note

- *Place a cloth under the union to catch escaping hydraulic fluid.*
- *If necessary, unbolt bracket for hydraulic line to give easier access.*

– Connect V.A.G adapters, banjo bolt and pressure hose as shown in illustration.



1 - Adapter set - V.A.G 1402/6-

2 - Adapter - V.A.G 1402/2-

3 - Pressure hose

4 - Seal (4x)

5 - Banjo bolt

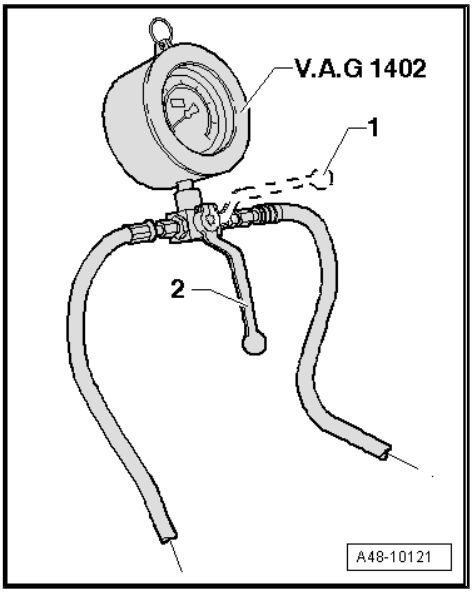
6 - Adapter - V.A.G 1402/3-

7 - Line from power steering tester - V.A.G 1402-

– Remove hose clamps - 3094- .

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– Make sure lever on pressure gauge is at position -2-.
– Start engine but do not press accelerator.
– Turn steering wheel approx. 10 times from lock to lock.
– Switch off engine and top up hydraulic fluid in reservoir if necessary.

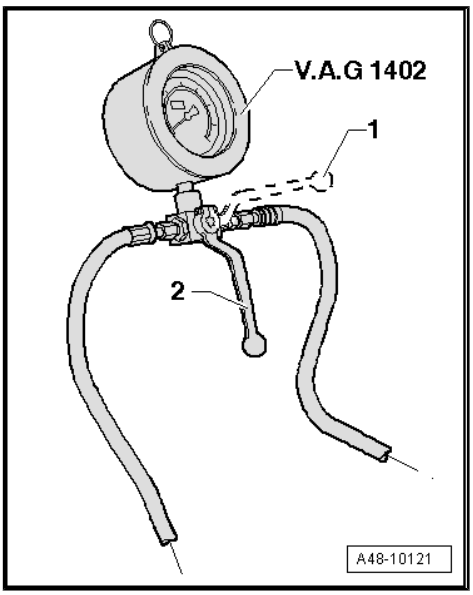


Note

- *To avoid damaging the power steering pump, please note the following points:*
- *Cut-off valve of pressure gauge must not remain closed for more than 10 seconds during this test.*
- *Start engine without pressing accelerator and leave it running at idling speed.*
- *Take pump pressure reading at idling speed immediately after starting engine (have second mechanic take reading).*
- *The pressure will drop during the test; the highest pressure reading is therefore the required test value.*

– Then check delivery pressure.

– Start engine, close cut-off valve (position -1-) with engine idling and read off pressure (lever must face away from pressure hose). Do not perform measurement for longer than 10 seconds.



Delivery pressure specification: 120…130 bar

Renew power steering pump if specification is not attained ⇒ page 437 .

– Switch off engine.
– Remove power steering tester - V.A.G 1402- .
– Install banjo bolt ⇒ Item 2 (page 438) .
– Check hydraulic fluid level ⇒ page 356 .
– Bleed steering system ⇒ page 358 .
– Check steering system for leaks ⇒ page 359 .
– Fit noise insulation ⇒ Rep. gr. 50 .
– Lower vehicle onto its wheels.

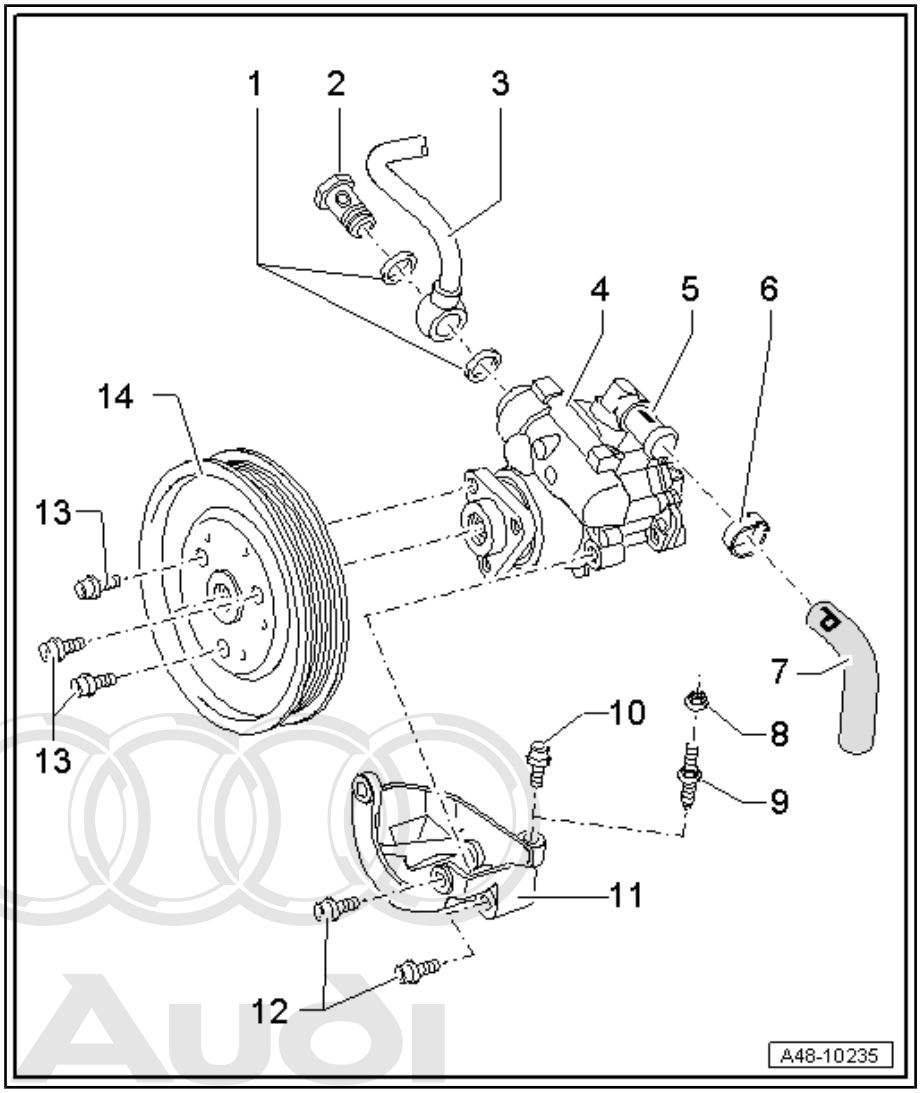
9.3 Removing and installing power steering pump (vehicles with 6 cylinder 3.0 ltr. MPI engine)

Exploded view of power steering pump

Note

- *Renew seals.*
- *Do not re-use hydraulic fluid which has been drained off.*
- *Use only hydraulic fluid .*

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1 - Seal

- ❑ Always renew

2 - Banjo bolt

- ❑ 50 Nm

3 - Pressure hose

- ❑ Note correct installation position ⇒ page 490

4 - Power steering pump

- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure ⇒ page 434
- ❑ Removing and installing ⇒ page 437

5 - Seam

- ❑ For installation position of suction hose

6 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

7 - Suction hose

- ❑ Note correct installation position at power steering pump and suction hose/pipe ⇒ page 439
- ❑ Note correct position on reservoir ⇒ page 490

8 - Nut

- ❑ 22 Nm
- ❑ Depending on engine code, may be fitted with stud ⇒ Item 9 (page 438)

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9 - Stud

- ❑ Apply sealant when installing
- ❑ Depending on engine code, may be fitted with nut ⇒ Item 8 (page 438)

10 - Bolt

- ❑ 23 Nm
- ❑ Apply sealant when installing
- ❑ Depending on engine code, may be fitted instead of stud ⇒ Item 9 (page 438) and nut ⇒ Item 8 (page 438)

11 - Bracket

12 - Bolt

- ❑ 23 Nm

13 - Bolt

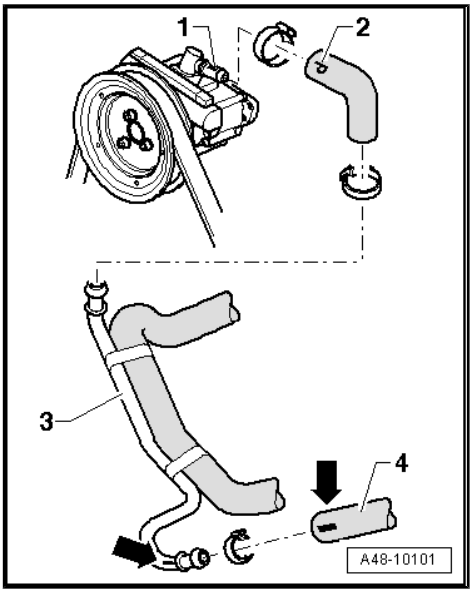
- ❑ Tightening torque ⇒ Rep. gr. 13

14 - Belt pulley

Installation position of suction hose at power steering pump and suction hose/pipe

– Marking -P- on suction hose -2- must be aligned with seam on pump -1-.

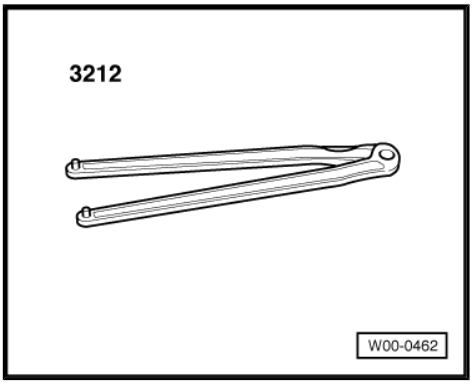
– Marking on suction hose/pipe -3- must be aligned with marking on suction hose -4- -arrows-.



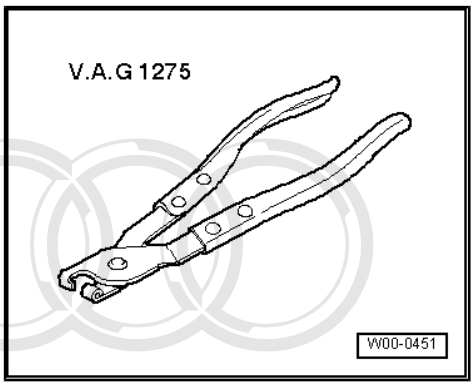
Removing

Special tools and workshop equipment required

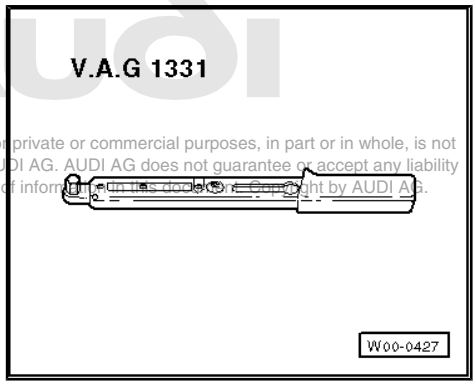
♦ Pin wrench - 3212-



♦ Hose clip pliers - V.A.G 1275-

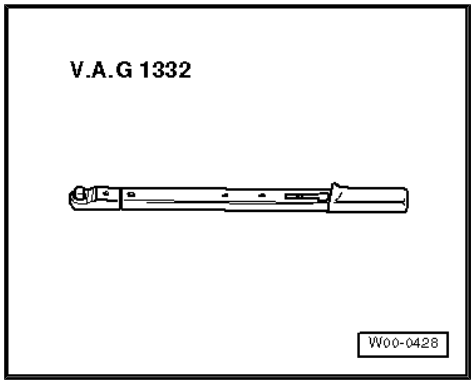


♦ Torque wrench - V.A.G 1331-



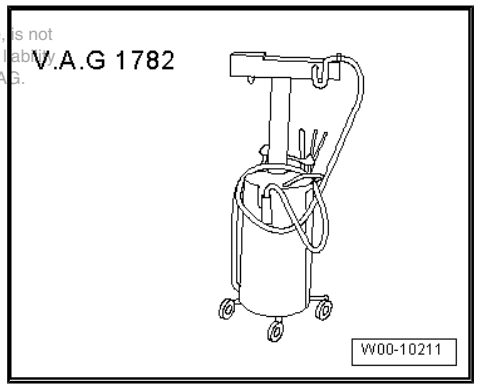
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- Torque wrench - V.A.G 1332-



- Used oil collection and extraction unit - V.A.G 1782-

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General notes

There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

- Always check steering system for leaks if fluid level is low in reservoir.
- If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.
- The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and turned by hand. Otherwise, there is a possibility of pump damage or noise while driving.

– Extract hydraulic fluid from reservoir using oil extractor - V.A.G 1358 A- or used oil collection and extraction unit - V.A.G 1782- .

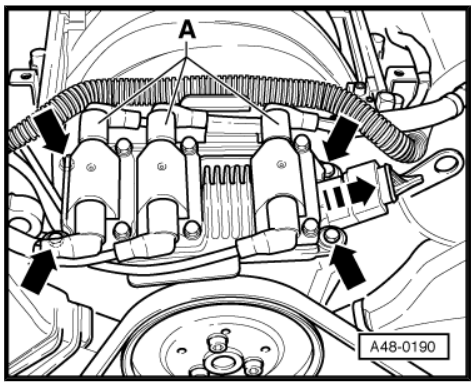
– Remove poly V-belt ⇒ Rep. gr. 13 .

– Unplug connector at ignition coils in direction of -arrow-.

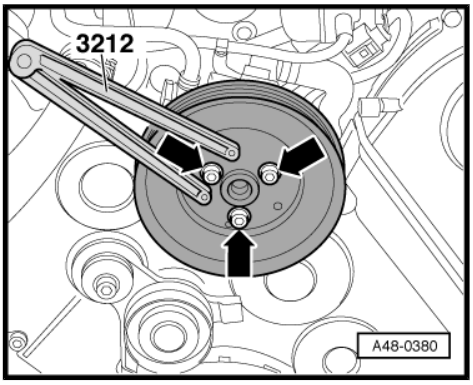
– Unplug three rear connectors -A- from ignition coils.

– Unscrew bolts -arrows-.

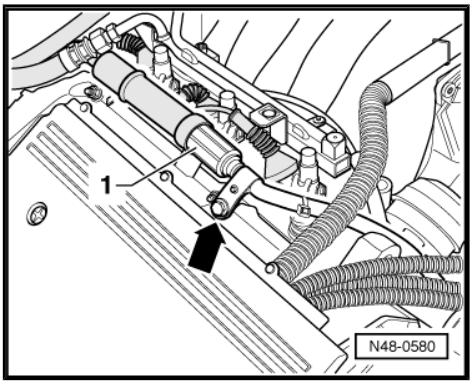
– Swivel ignition coil bracket to the rear.



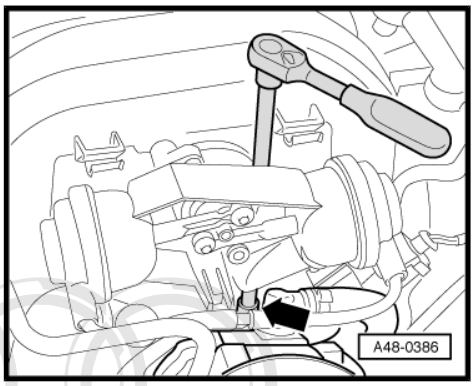
– Unbolt power steering pump pulley -arrows-. Use pin wrench - 3212- to counterhold pulley.



– Remove hexagon bolt -arrow- for pressure hose -1-.

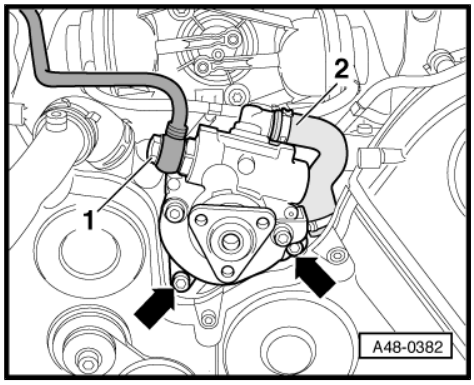


– Unscrew rear power steering pump securing bolt using socket wrench and extension.



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– Remove banjo bolt -1-.



Note

Place a cloth under the unions to catch escaping hydraulic fluid.

– Open clip on suction hose -2-.
– Disconnect suction hose -2-.
– Seal off pressure hose with a plastic bag or similar.
– Unscrew bolts -arrows- and detach power steering pump with bracket.

Installing

Installation is carried out in the reverse sequence. Note the following points:

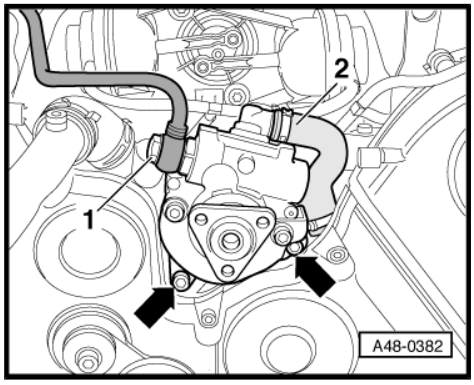
Note

- *Renew gaskets and seals.*
- *Before fitting a new power steering pump, put in hydraulic fluid at the inlet and turn pump by hand until fluid flows out at the pressure outlet.*
- *Secure all hose connections with new hose clips ⇒ Electronic parts catalogue .*

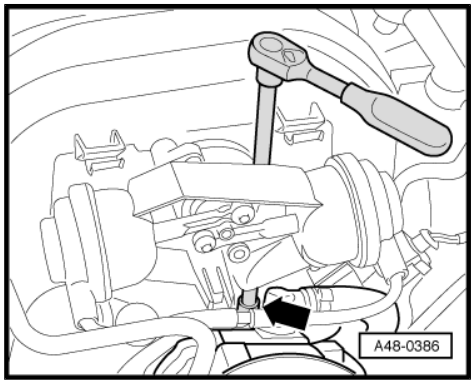
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– Turn hub by hand until fluid comes out at pump outlet.

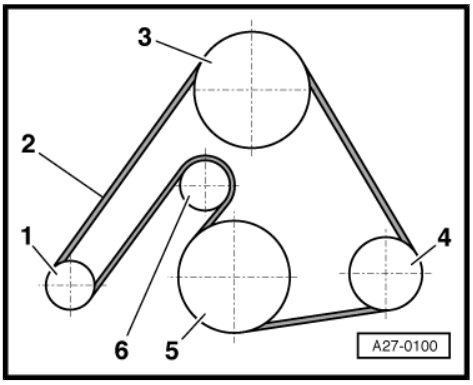
– Fit power steering pump with bracket and tighten front bolts -arrows- ⇒ Item 12 (page 438) .
– Fit new seals on banjo bolt.
– Tighten banjo bolt -1- ⇒ Item 2 (page 438) .
– Connect suction hose -2- and secure with new hose clip. Note correct installation position ⇒ page 490 .



– Tighten rear securing bolt ⇒ Item 10 (page 438) or nut ⇒ Item 8 (page 438) .
– Clean off fluid in engine compartment where necessary.
– Bolt on power steering pump pulley ⇒ Rep. gr. 13 .
– Fit poly V-belt ⇒ Rep. gr. 13 .
– Check hydraulic fluid level ⇒ page 356 .
– Bleed steering system ⇒ page 358 .
– Check steering system for leaks ⇒ page 359 .



– Install poly-V-belt and make sure that belt runs straight ⇒ Rep. gr. 13 .



Note

Ensure that the belt is properly seated in the pulleys when installing.

1 - Alternator
2 - Poly V-belt
3 - Power steering pump
4 - Air conditioner compressor
5 - Crankshaft
6 - Tensioning roller

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10 Power steering pump, hydraulic pipes and hoses, fluid reservoir (vehicles with 8-cylinder petrol engine)

⇒ “10.1 Exploded view (vehicles with 8-cylinder petrol engine)”, page 444 .

⇒ “10.2 Checking delivery pressure of power steering pump (vehicles with 8-cylinder petrol engine)”, page 448 .

⇒ “10.3 Removing and installing power steering pump (vehicles with 8-cylinder petrol engine)”, page 452 .

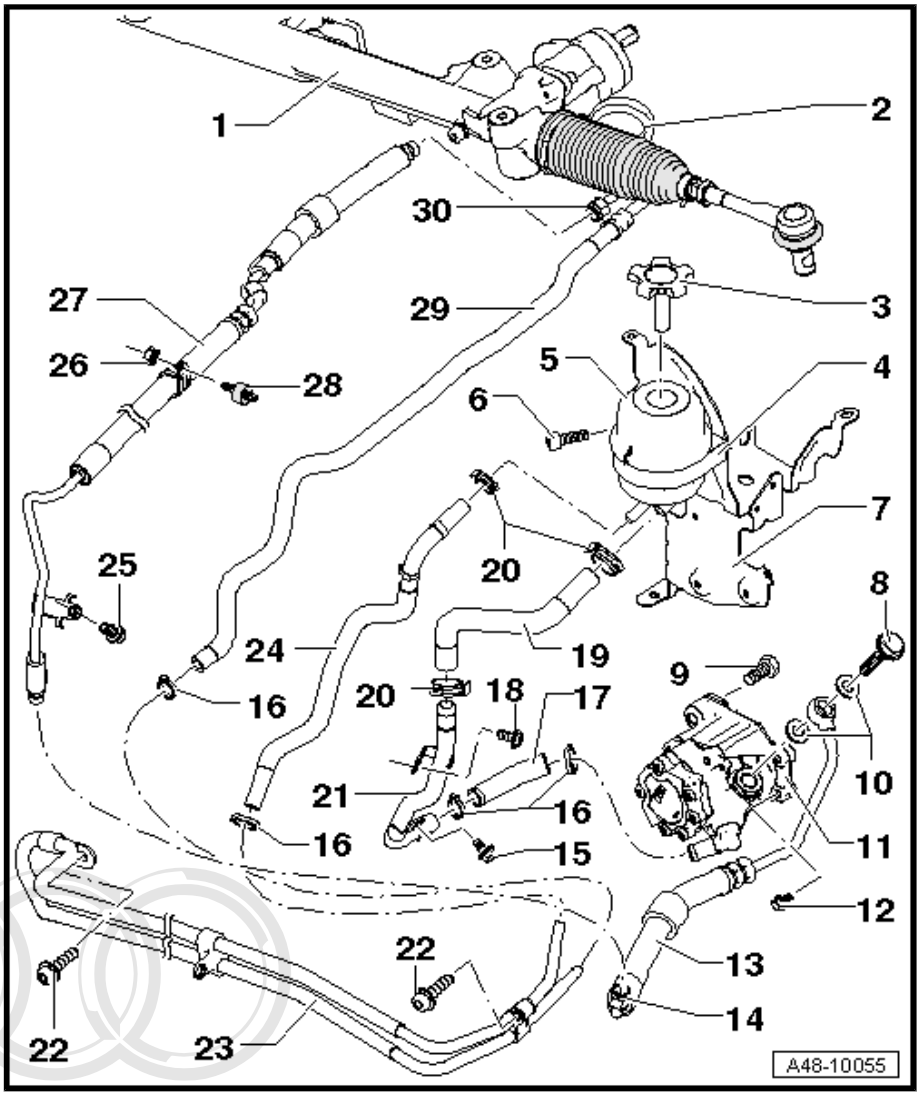
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10.1 Exploded view (vehicles with 8-cylinder petrol engine)

There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

Note

- *Always check steering system for leaks if fluid level is low in reservoir.*
- *If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.*
- *The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and turned by hand. Otherwise, there is a possibility of pump damage or noise while driving.*



1 - Power steering rack

- ❑ For correct version refer to ⇒ Electronic parts catalogue

2 - Pressure hose

- ❑ Note correct position on steering rack ⇒ page 448

3 - Cap with dipstick

- ❑ Checking fluid level ⇒ page 356

4 - Securing strap

5 - Reservoir

- ❑ Note correct installation position ⇒ page 490

6 - Bolt

- ❑ 9 Nm

7 - Bracket

- ❑ For reservoir and ESP hydraulic unit

8 - Banjo bolt

- ❑ 50 Nm

9 - Bolt

- ❑ 65 Nm
- ❑ Securing bolt: gearbox/ engine/ power steering pump

10 - Seal

- ❑ Always renew

11 - Power steering pump

- ❑ For correct version refer to ⇒ Electronic parts catalogue
- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure ⇒ page 448
- ❑ Removing and installing ⇒ page 453

12 - Bolt

- ❑ 20 Nm

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13 - Pressure hose

- ❑ Note correct position on power steering pump ⇒ page 452

14 - Union nut

- ❑ 40 Nm

15 - Bolt

- ❑ 10 Nm

16 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

17 - Suction hose

- ❑ Note correct position on power steering pump ⇒ page 452

18 - Bolt

- ❑ 9 Nm

19 - Suction hose

- ❑ Note correct position on reservoir ⇒ page 490

20 - Spring-type clip

- ❑ Use spring-type clip pliers - VAS 5024 A- when removing and installing

21 - Suction hose

- ❑ Attaching to engine ⇒ page 447

22 - Bolt

- ❑ 9 Nm

23 - Cooling pipe

24 - Return hose

- ❑ Note correct position on reservoir ⇒ page 490
- ❑ Note attachment on longitudinal member ⇒ page 446

25 - Bolt

- ❑ 6 Nm
- ❑ Secures pressure hose to strut/longitudinal member ⇒ page 447

26 - Nut

- ❑ 6 Nm

27 - Pressure hose

- ❑ Secured with bonded rubber mounting ⇒ Item 28 (page 446)
- ❑ Note correct installation position ⇒ page 447

28 - Bonded rubber mounting

- ❑ Tightening torque: 6 Nm
- ❑ Secured to bracket ⇒ Item 7 (page 445) for ESP hydraulic unit ⇒ page 447

29 - Return hose

- ❑ Note correct position on steering rack ⇒ page 448
- ❑ Note installation position on longitudinal member ⇒ page 448
- ❑ Note attachment on longitudinal member ⇒ page 446

30 - Union nut

- ❑ 40 Nm

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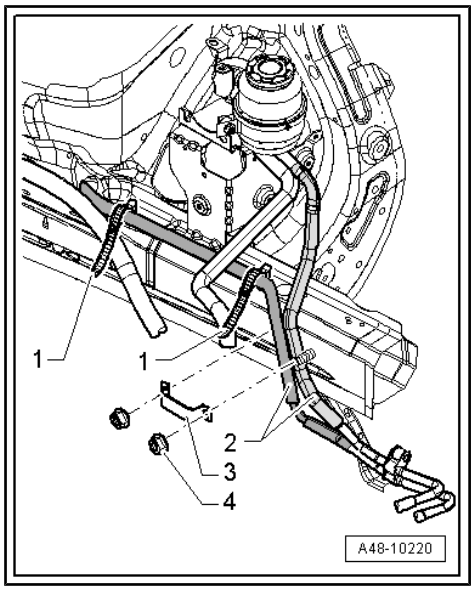
Attachment of return hoses on longitudinal member

– Insert return hoses between studs.

– Secure return hoses -2- on longitudinal member with bracket -3- and nuts -4-.

Tightening torque for nuts -2-: 2 Nm.

– Secure return hoses -2- on longitudinal member with cable tie -1-.



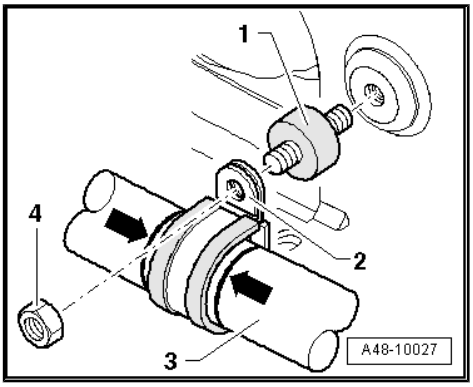
Securing pressure hose at bonded rubber mounting

– Screw bonded rubber mounting -1- into bracket for ESP hydraulic unit.

– Fit clamp -2- on pressure hose -3-.

– Fit clamp -2- on bonded rubber mounting -1- and tighten nut -4- hand-tight.

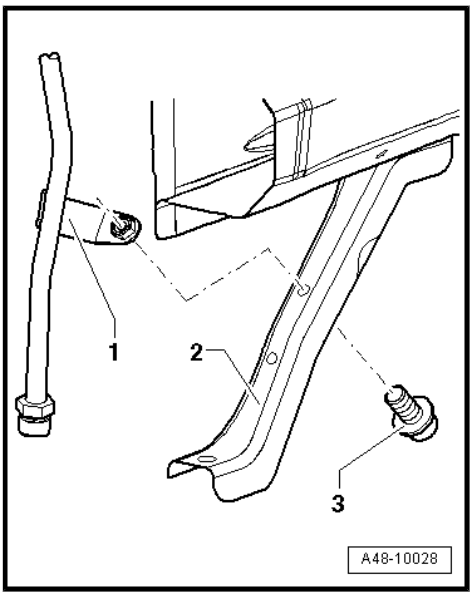
– Align pressure hose -3- so that markings -arrows- are visible on both sides of clamp -2-.



Securing pressure hose at strut/longitudinal member

– Tighten pipe connection for pressure hose -1-.

– Secure pressure hose -1- to strut -2- with bolt -3-.

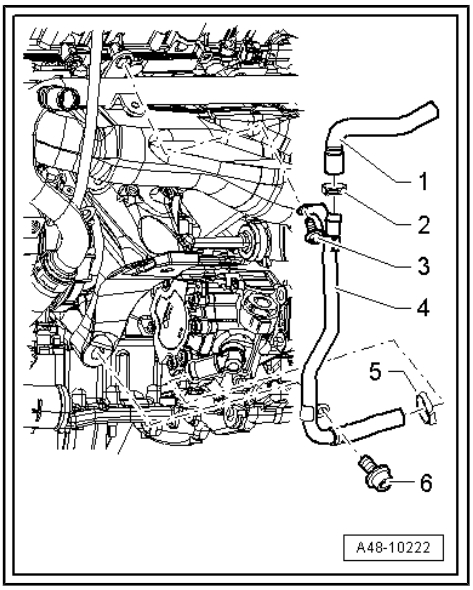


Installing suction pipe on engine

– Secure suction pipe -4- on engine with bolt -6- and bolt -3-.

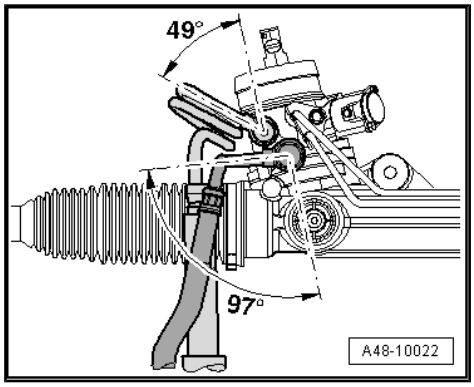
– Secure hose on suction pipe -4- to power steering pump with hose clip -5-.

– Secure suction hose -1- to suction pipe -4- with spring-type hose clip -2-.



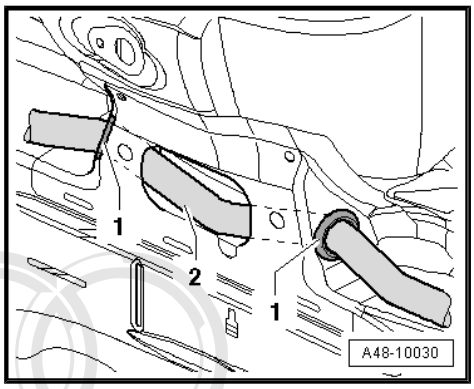
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Position of pipe connections on steering rack



Installation position in longitudinal member

- Engage guide bushes -1- in longitudinal member.
- Guide return hose -2- through support after installing bushes -1-.

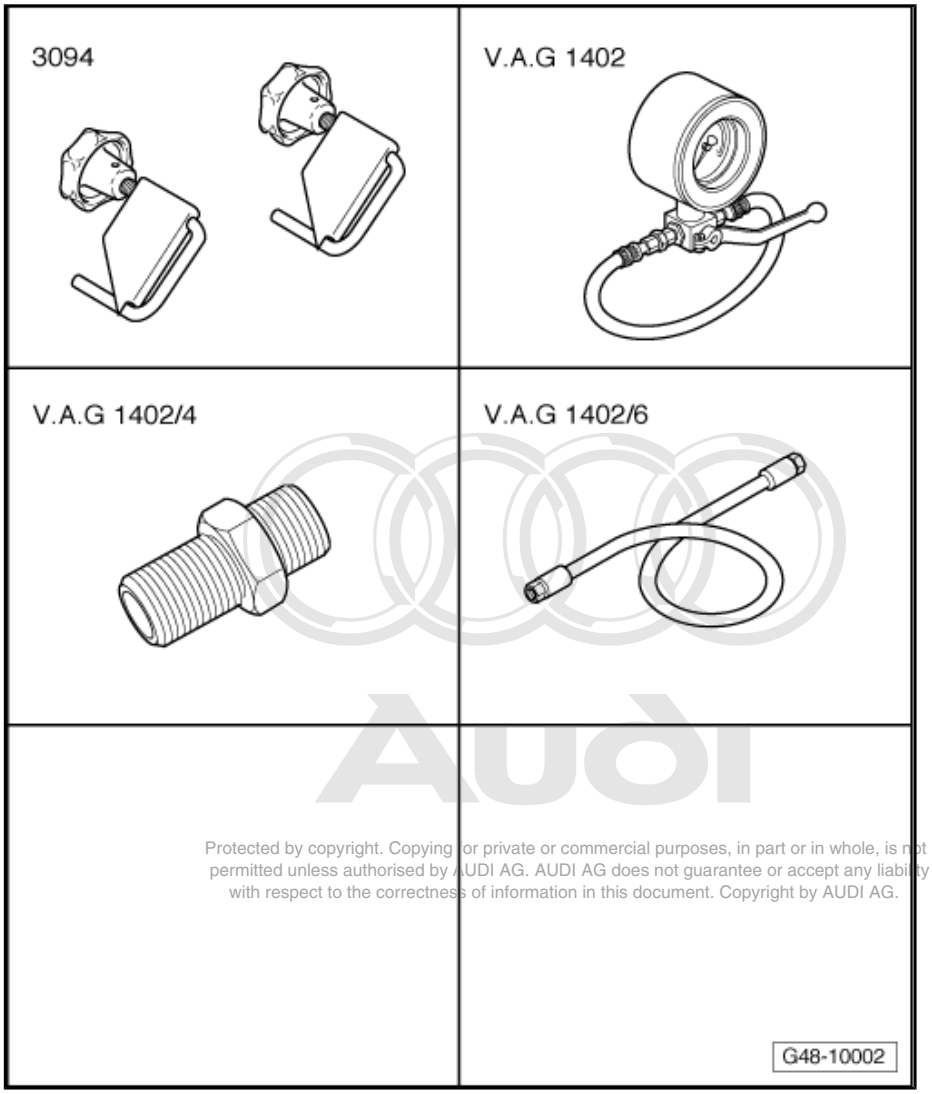


10.2 Checking delivery pressure of power steering pump (vehicles with 8-cylinder petrol engine)

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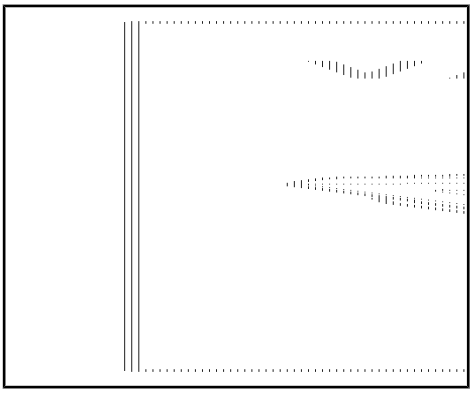
Special tools and workshop equipment required

- Hose clamp - 3094-
- Power steering tester - V.A.G 1402-
- Adapter - V.A.G 1402/2-
- Hose from adapter set - V.A.G 1402/6- (2x)



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- Drip tray for workshop hoist - VAS 6208-



Test requirements:

- V-belt and V-belt tension OK.
- No leaks in system
- Hoses and pipes not kinked or constricted

Checking

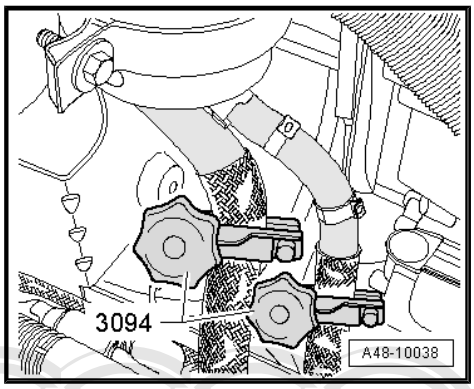
Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

All vehicles

– Clamp off suction and return hoses using hose clamps - 3094- .

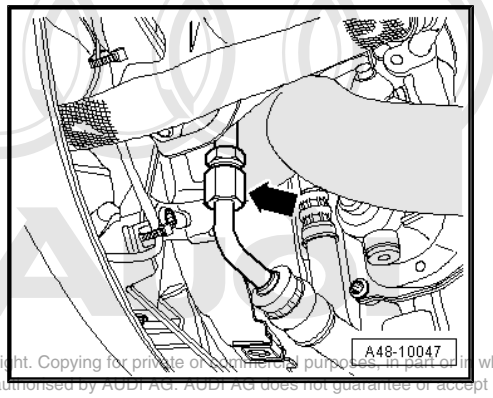
– Remove noise insulation ⇒ Rep. gr. 50 .



The pressure hose is not detached at the power steering pump when checking delivery pressure. Power steering tester - V.A.G 1402- is connected to pipe -arrow- at bottom of engine compartment (left-side).

– Place drip tray under the union to catch escaping hydraulic fluid.

– Disconnect pipe connection -arrow-.



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– Connect power steering tester - V.A.G 1402- as shown.

1 - Pressure gauge - V.A.G 1402-

2 - Hose from adapter set - V.A.G 1402/6-

3 - Adapter - V.A.G 1402/4-

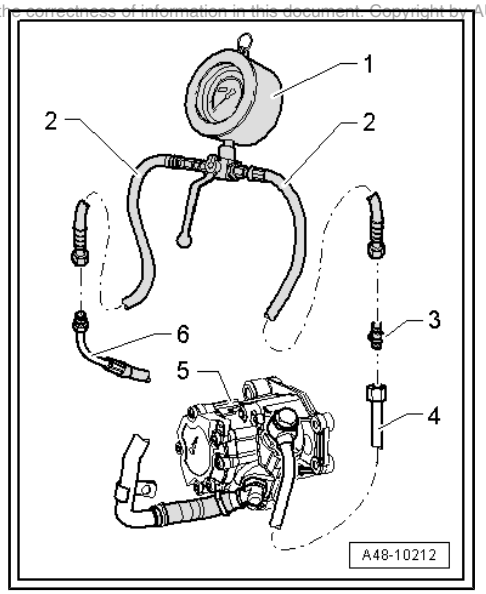
4 - Pressure line

5 - Power steering pump

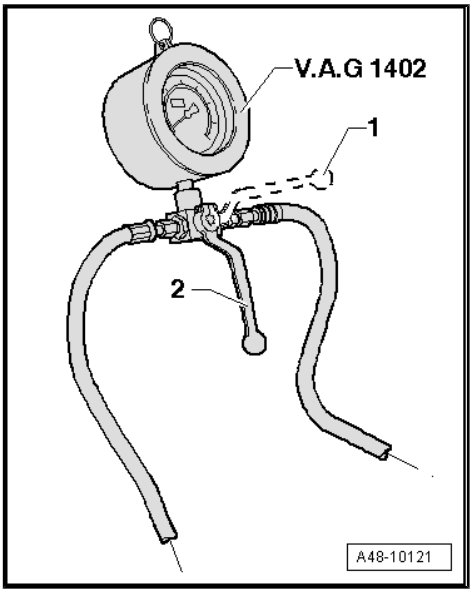
6 - Pressure line

– Screw hose from power steering tester - V.A.G 1402- onto pressure hose.

– Remove hose clamps - 3094- .



– Make sure lever on pressure gauge is at position -2-.
– Start engine but do not press accelerator.
– Turn steering wheel approx. 10 times from lock to lock.
– Switch off engine and top up hydraulic fluid in reservoir if necessary.



Note

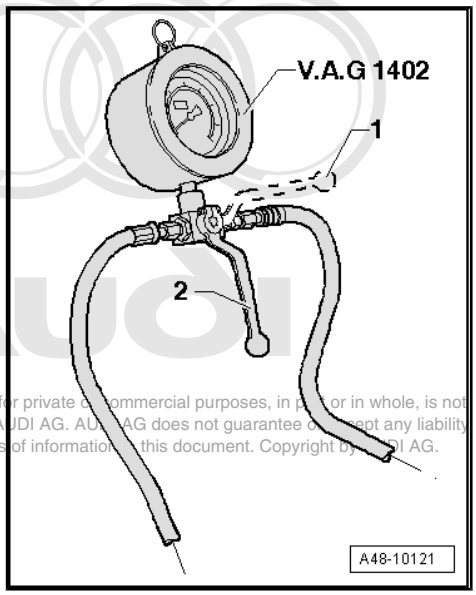
- *To avoid damaging the power steering pump, please note the following points:*
- *Cut-off valve of pressure gauge must not remain closed for more than 10 seconds during this test.*
- *Start engine without pressing accelerator and leave it running at idling speed.*
- *Take pump pressure reading at idling speed immediately after starting engine (have second mechanic take reading).*
- *The pressure will drop during the test; the highest pressure reading is therefore the required test value.*

– Then check delivery pressure.

– Start engine, close cut-off valve (position -1-) with engine idling and read off pressure (lever must face away from pressure hose). Do not perform measurement for longer than 10 seconds.

Delivery pressure specification: 123…130 bar

Renew power steering pump if specification is not attained ⇒ page 452 .



– Switch off engine.
– Remove power steering tester - V.A.G 1402- .
– Connect union on pressure hoses ⇒ Item 30 (page 446) .
– Check hydraulic fluid level ⇒ page 356 .
– Bleed steering system ⇒ page 358 .
– Check steering system for leaks ⇒ page 359 .
– Fit noise insulation ⇒ Rep. gr. 50 .
– Stand vehicle on its wheels ⇒ page 11 .

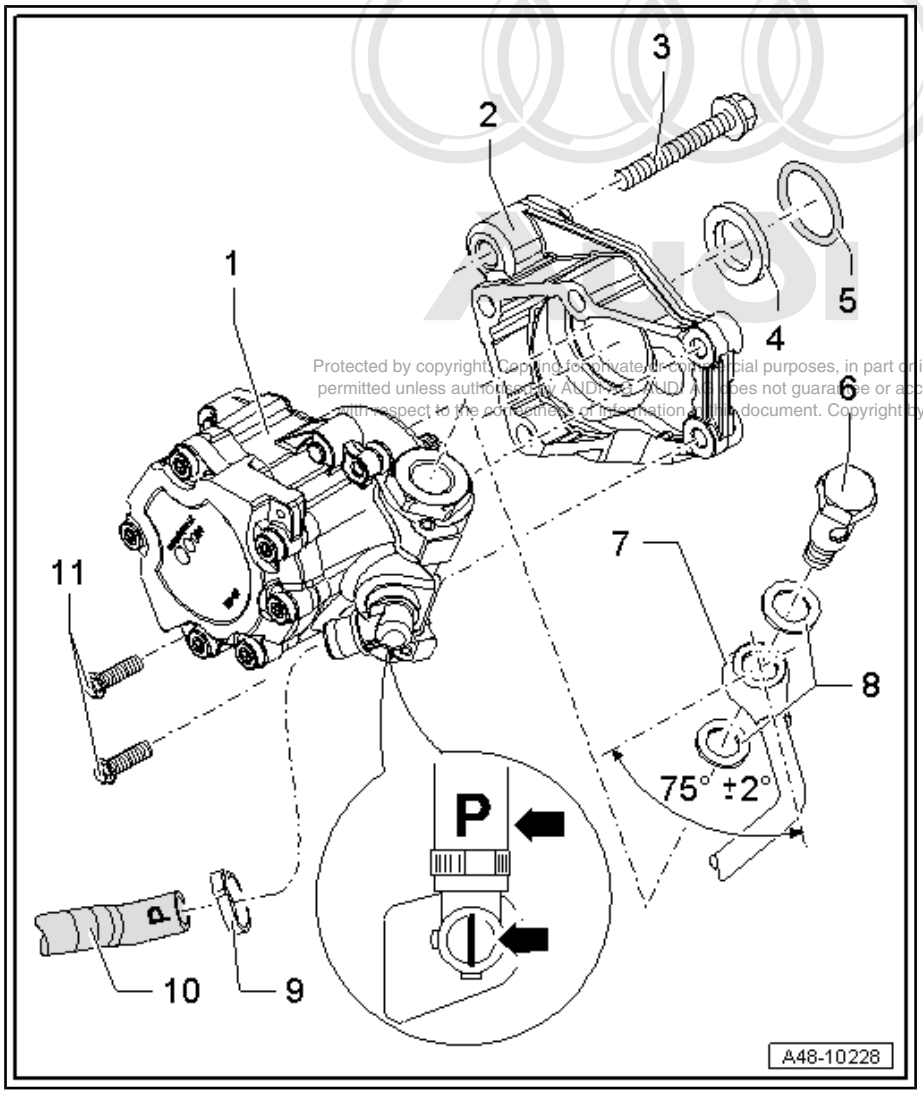
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10.3 Removing and installing power steering pump (vehicles with 8-cylinder petrol engine)

Exploded view of power steering pump

Note

- *Renew seals.*
- *Do not re-use hydraulic fluid which has been drained off.*
- *Use only hydraulic fluid .*
- *When installing new power steering pump, always renew oil seal and O-ring for pump.*



1 - Power steering pump

- ❑ Different versions available ⇒ Electronic parts catalogue
- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure ⇒ page 448
- ❑ Removing and installing ⇒ page 452

2 - Bracket

- ❑ Bracket and power steering pump are combined as one component and must not be separated

3 - Bolt

- ❑ 65 Nm
- ❑ Securing bolt for: gearbox/ engine/ bracket/ power steering pump

4 - Oil seal

- ❑ Renewing ⇒ Rep. gr. 15

5 - O-ring

- ❑ Renewing ⇒ Rep. gr. 15

6 - Banjo bolt

- ❑ 50 Nm

7 - Pressure hose

- ❑ Note correct position: Angle between pipe connection and shaft of power steering pump is approx. 75°

8 - Seal

- ❑ Always renew

9 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-

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- ❑ Always renew

10 - Suction hose

- ❑ Marking -P- on suction hose must be aligned with seam on power steering pump

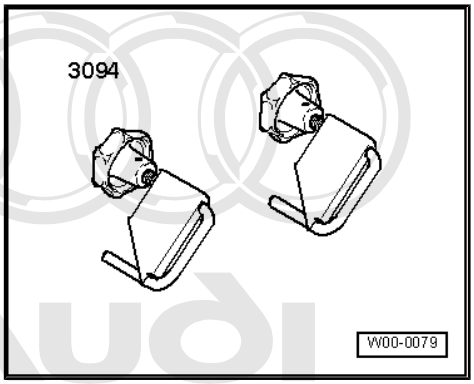
11 - Bolt

- ❑ 20 Nm

Removing

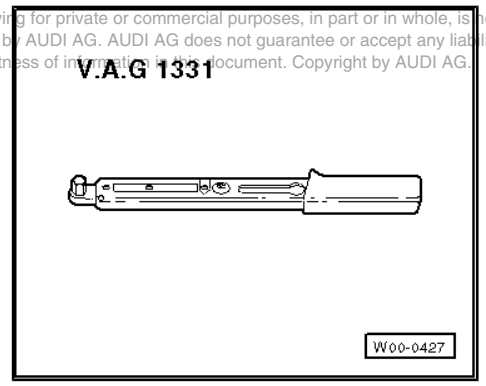
Special tools and workshop equipment required

- ♦ Hose clamps up to 25 mm ∅ - 3094-

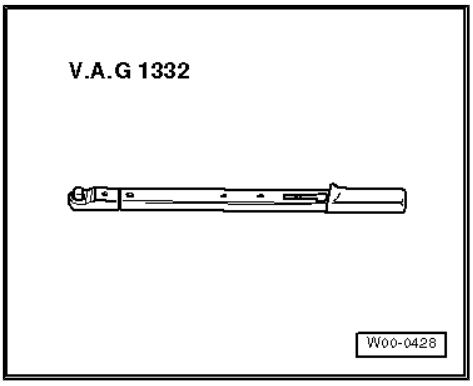


- ♦ Torque wrench - V.A.G 1331-

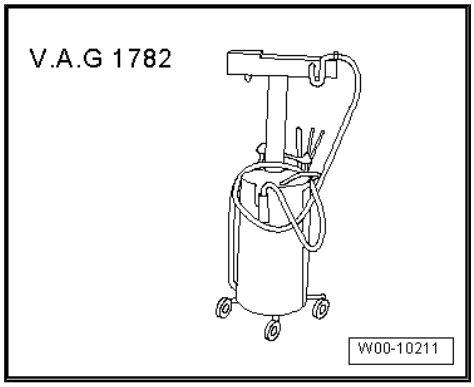
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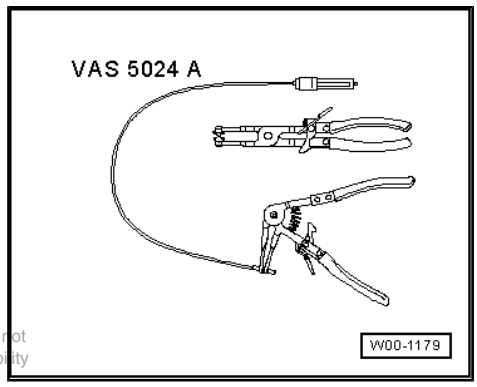
- ♦ Torque wrench - V.A.G 1332-



- Used oil collection and extraction unit - V.A.G 1782-

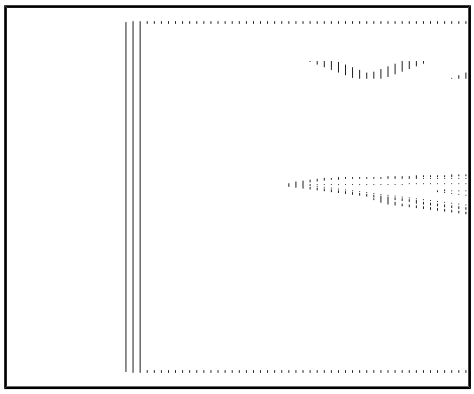


- Spring-type clip pliers - VAS 5024 A-



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- Drip tray for workshop hoist - VAS 6208-



General notes

There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

- Always check steering system for leaks if fluid level is low in reservoir.
- If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.
- The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and turned by hand. Otherwise, there is a possibility of pump damage or noise while driving.
- Renew oil seal and O-ring for power steering pump prior to installation.

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

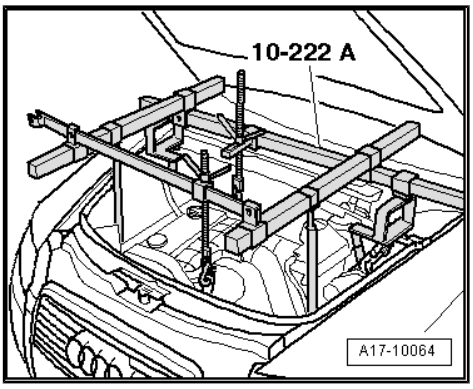
All vehicles

– Extract hydraulic fluid from reservoir with used oil collection and extraction unit - V.A.G 1782- .

– Remove noise insulation ⇒ Rep. gr. 50 .

– Take up weight of engine assembly with support bracket .

– Set up support bracket - 10-222 A- with engine support basic set - T40091- , engine support supplement set - T40092- and engine support supplement set - T40093- on suspension turrets and longitudinal members as illustrated.



Note

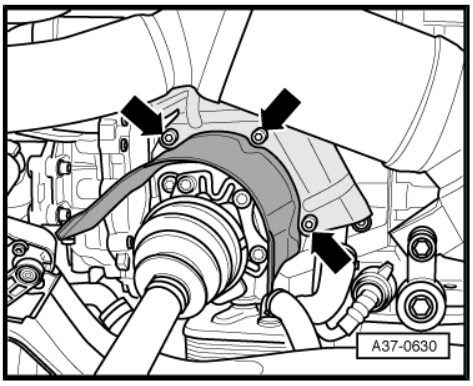
A detailed description of the steps required to support the engine is given in ⇒ Rep. gr. 10 .

– Lower subframe for assembly work.

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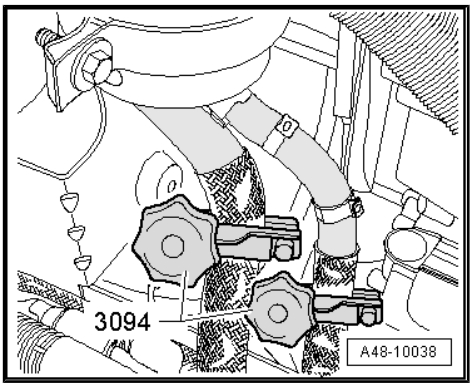
– Remove heat shield for drive shaft (left-side) -arrows-.

– Unbolt drive shaft from gearbox flange (left-side).



– Clamp off suction and return hoses using hose clamps - 3094- .

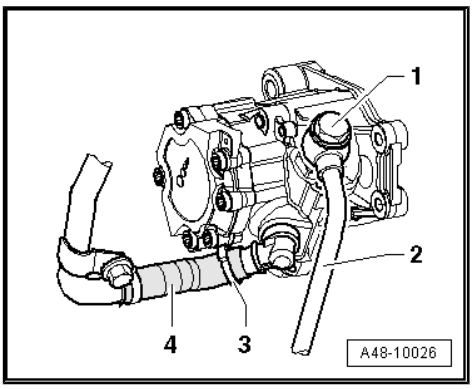
– Place drip tray underneath.



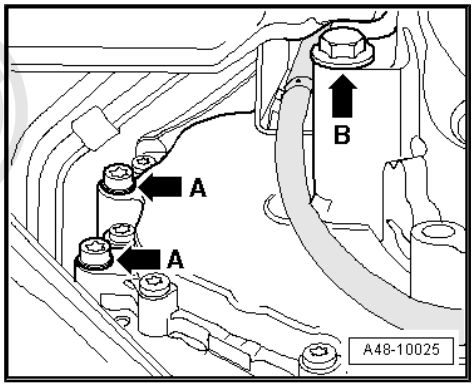
– Detach hose clip from suction hose -3-.

– Disconnect suction hose -4- from power steering pump.

– Unscrew banjo bolt -1- and disconnect pressure hose -2- from power steering pump.

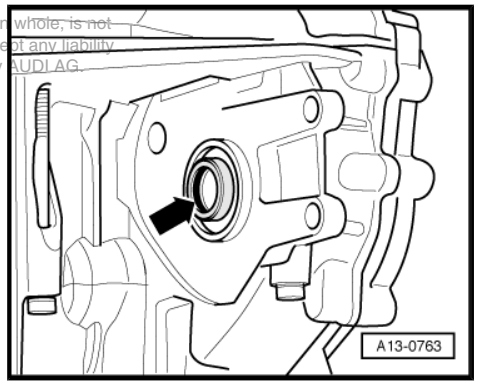


– Remove bolts -A-.
– Remove bolt -B-.
– Take out power steering pump.



– Renew oil seal and O-ring for power steering pump -arrow- ⇒ Rep. gr. 15 .

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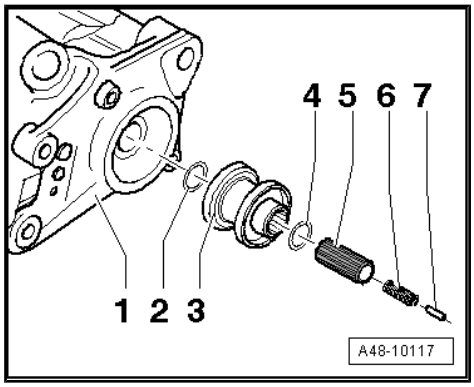
Installing

Installation is carried out in the reverse sequence. Note the following points:

- Renew gaskets and seals.
- Clean off fluid in engine compartment where necessary.
- Always renew O rings for drive shaft of power steering pump and suction hose.
- Before fitting a new power steering pump, put in hydraulic fluid at the inlet and turn pump by hand until fluid flows out at the pressure outlet.
- Hose connections and hoses must be free of oil and grease before fitting.
- Secure all hose connections with new hose clips ⇒ Electronic parts catalogue .

Depending on the type of power steering pump:

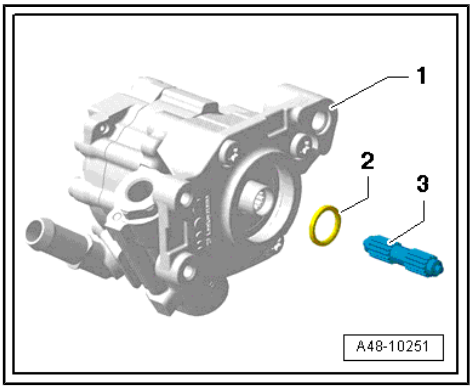
– Fit components of power steering pump as illustrated and install pump on engine.



1 - Power steering pump
2 - O-ring
3 - Sleeve; grease splines all round ⇒ Electronic parts catalogue
4 - O-ring
5 - Drive shaft; grease splines all round ⇒ Electronic parts catalogue
6 - Spring; grease before fitting in drive shaft ⇒ Electronic parts catalogue
7 - Stop

Depending on the type of power steering pump:

– Fit components of power steering pump as illustrated and install pump on engine.



1 - Power steering pump

2 - Oil seal

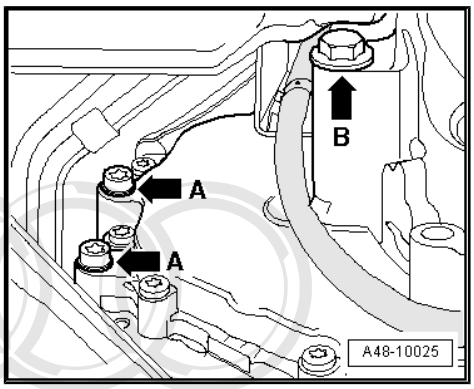
3 - Drive shaft; on installation, grease splines of drive shaft and power steering pump all round; allocation ⇒ Electronic parts catalogue . Apply grease to hole at pump end and either to hole or to end of shaft at engine end; allocation ⇒ Electronic parts catalogue

Installation position of suction hoses at power steering pump and fluid reservoir ⇒ page 490

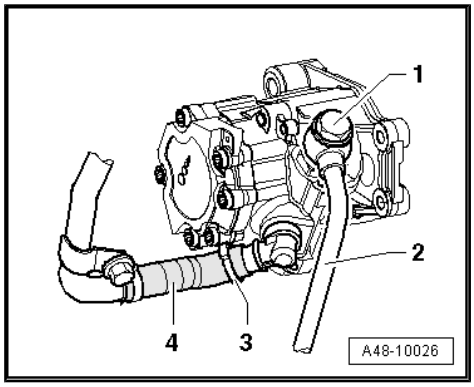
– Turn hub by hand until fluid comes out at pump outlet.

– Tighten bolts -A- ⇒ Item 11 (page 453) .

– Tighten bolt -B- ⇒ Rep. gr. 37 .



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– Connect suction hose -4- to power steering pump and secure with new hose clip -3-.
– Connect pressure hose -2- to power steering pump with banjo bolt -1- ⇒ Item 6 (page 452) .
– Install drive shaft ⇒ page 98 .
– Install subframe.
– Tighten subframe bolts to torque but not to extra angle (only tighten bolts fully after checking wheel alignment).

WARNING

All bolts and nuts must be fully tightened according to specifications before the vehicle is driven on public roads.

– Fill up with hydraulic fluid .
– Bleed steering system ⇒ page 358 .
– Check hydraulic fluid level ⇒ page 356 .
– Check steering system for leaks ⇒ page 359 .
– Fit noise insulation ⇒ Rep. gr. 50 .
– Stand vehicle on its wheels ⇒ page 11 .
– Check and adjust wheel alignment ⇒ page 281 .

WARNING

Tighten subframe bolts to final setting after checking wheel alignment.

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11 Power steering pump, hydraulic pipes and hoses, fluid reservoir (vehicles with 10-cylinder FSI engine)

⇒ “11.1 Exploded view (vehicles with 10-cylinder FSI engine)”, page 459 .

⇒ “11.2 Checking delivery pressure of power steering pump (vehicles with 10-cylinder FSI engine)”, page 464 .

⇒ “11.3 Removing and installing power steering pump (vehicles with 10-cylinder FSI engine)”, page 468 .

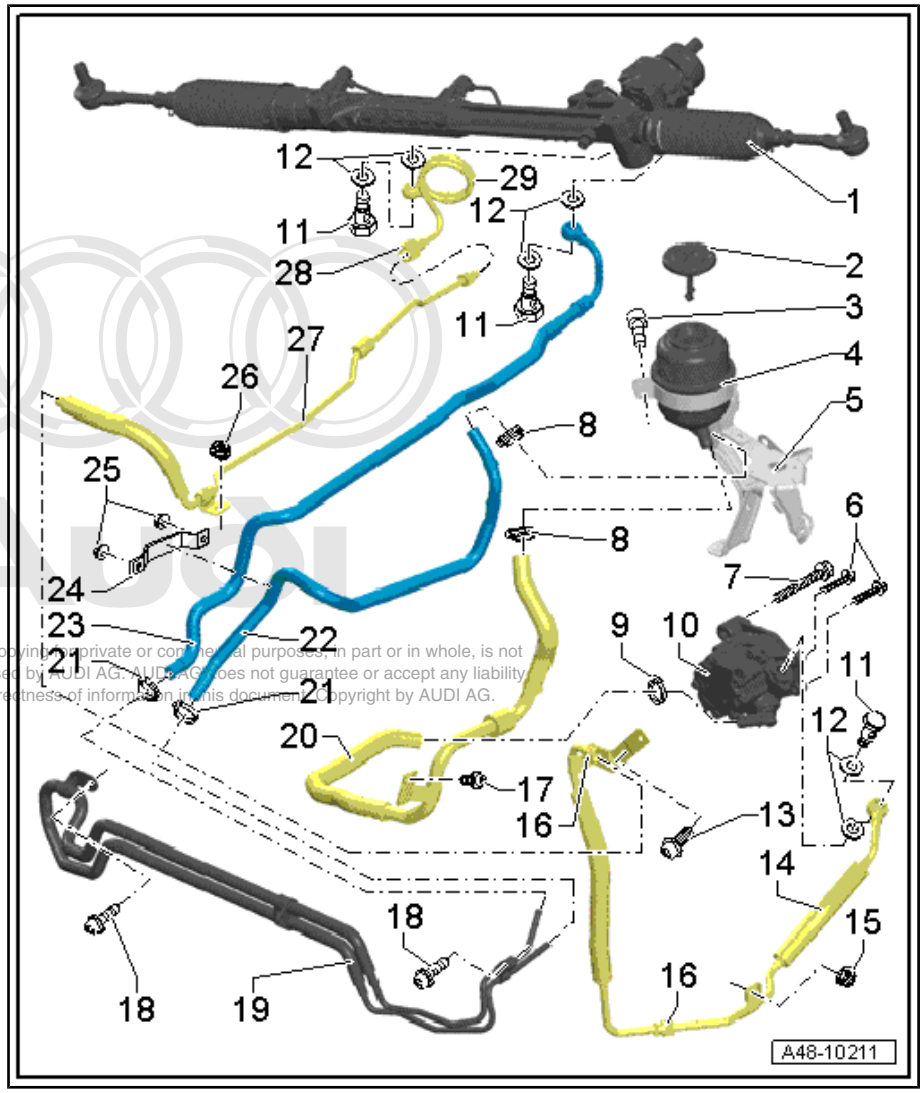
11.1 Exploded view (vehicles with 10-cylinder FSI engine)

There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

Note

- *Always check steering system for leaks if fluid level is low in reservoir.*
- *If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.*
- *The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and turned by hand. Otherwise, there is a possibility of pump damage or noise while driving.*

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1 - Power steering rack

- For correct version refer to ⇒ Electronic parts catalogue

2 - Cap with dipstick

- Checking fluid level ⇒ page 356

3 - Bolt

- 9 Nm

4 - Reservoir

- Note correct installation position ⇒ page 490

5 - Bracket

- For reservoir and ESP hydraulic unit
- With securing strap for reservoir

6 - Bolt

- 23 Nm

7 - Bolt

- 65 Nm
- Securing bolt: gearbox/ engine/ power steering pump

8 - Spring-type clip

- Use spring-type clip pliers - VAS 5024 A- when removing and installing

9 - Hose clip

- Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- Always renew

10 - Power steering pump

- For correct version refer to ⇒ Electronic parts catalogue
- Fill with hydraulic fluid before installing
- Checking delivery pressure ⇒ page 464
- Removing and installing ⇒ page 468

11 - Banjo bolt

- Tightening torque ⇒ “3.1 Exploded view of power steering rack”, page 331
- Always renew if removed

12 - Seal

- Always renew if removed

13 - Bolt

- 9 Nm

14 - Pressure line

- Note correct position on power steering pump ⇒ page 468
- Note attachment on engine (top) ⇒ page 462
- Note attachment on engine (bottom) ⇒ page 462

15 - Nut

- ❑ 9 Nm

16 - Union nut

- ❑ 40 Nm

17 - Bolt

- ❑ 9 Nm

18 - Bolt

- ❑ 9 Nm

19 - Cooling pipe

20 - Suction hose

- ❑ Note correct position on power steering pump ⇒ page 468
- ❑ Note correct position on reservoir ⇒ page 490
- ❑ Note attachment on longitudinal member ⇒ page 463

21 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

22 - Return hose

- ❑ Note correct position on reservoir ⇒ page 490

23 - Return hose

- ❑ Note correct position on steering rack ⇒ page 448
- ❑ Note installation position on longitudinal member ⇒ page 463

24 - Bracket

- ❑ Secures return hose ⇒ Item 22 (page 461) and return hose ⇒ Item 23 (page 461) on longitudinal member
- ❑ Note installation position on longitudinal member ⇒ page 462

25 - Nut

- ❑ 2 Nm

26 - Nut

- ❑ 9 Nm

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27 - Pressure hose

- ❑ Note attachment on longitudinal member ⇒ page 463

28 - Union nut

- ❑ 45 Nm

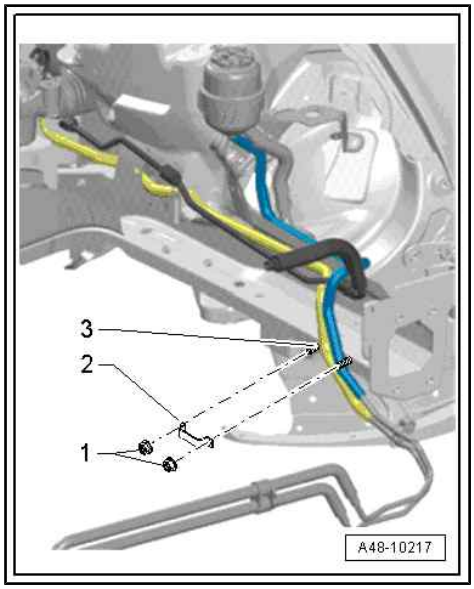
29 - Pipe

- ❑ Note correct position on steering rack ⇒ page 463

Attachment of return hoses on longitudinal member

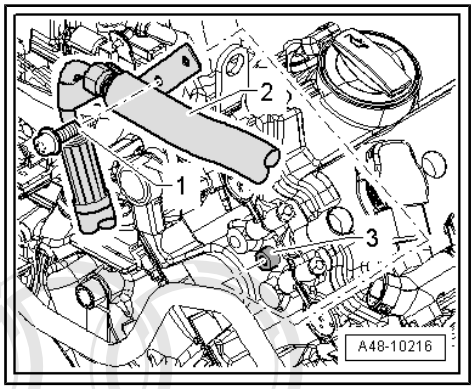
– Insert return hoses between studs -3-.
– Secure return hoses on longitudinal member with bracket -2- and nuts -1-.

  Tightening torque for nuts -1-: 2 Nm.



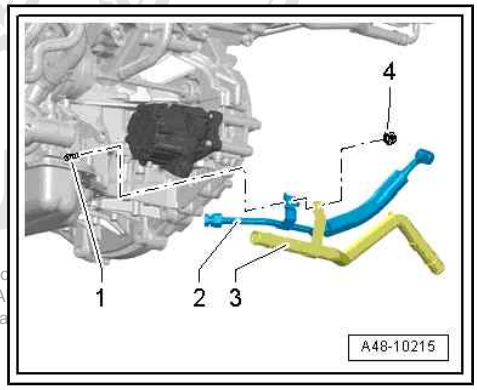
Attachment of pressure pipe on engine (top)

– Fit pressure pipe -2- on mounting -3-.
– Secure pressure pipe -2- with bolt -1-.



Attachment of pressure pipe on engine (bottom)

– Fit pressure pipe -2- on stud -1-.
– Fit coolant pipe -3- on stud -1-.
– Secure pipes with nut -4-.

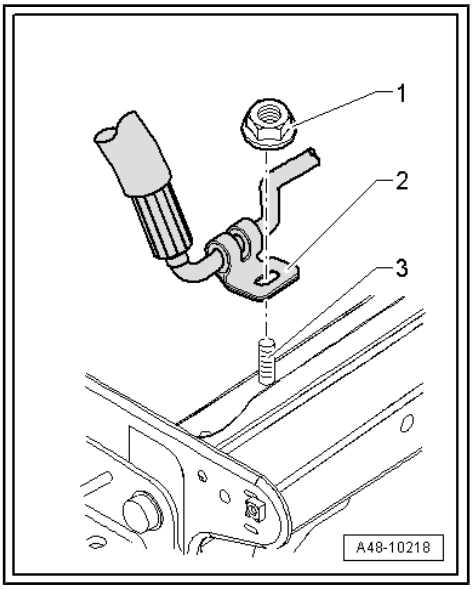


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Attachment of pressure pipe on longitudinal member

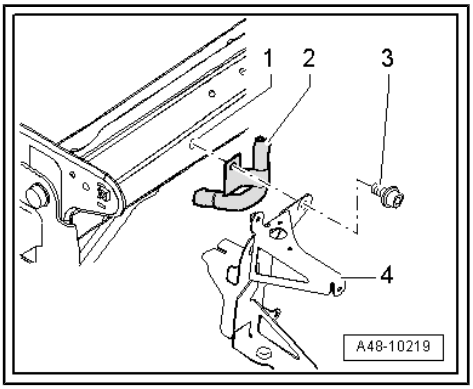
– Fit pressure pipe -2- on stud -3- at front of longitudinal member.

– Secure pressure pipe -2- with nut -1-.



Attachment of suction hose on longitudinal member

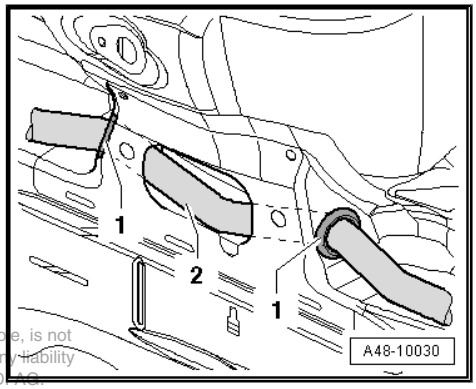
– Secure suction hose -2- and bracket -4- on longitudinal member -1- with bolt -3-.



Installation position in longitudinal member

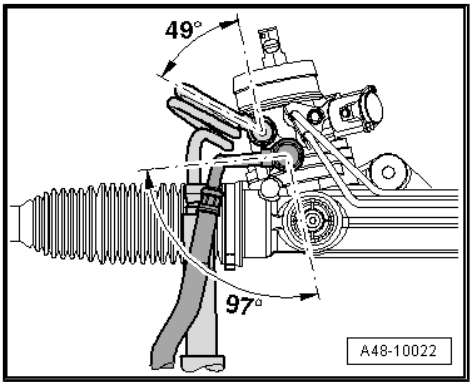
– Engage guide bushes -1- in longitudinal member.

– Guide return hose -2- through support after installing bushes -1-.



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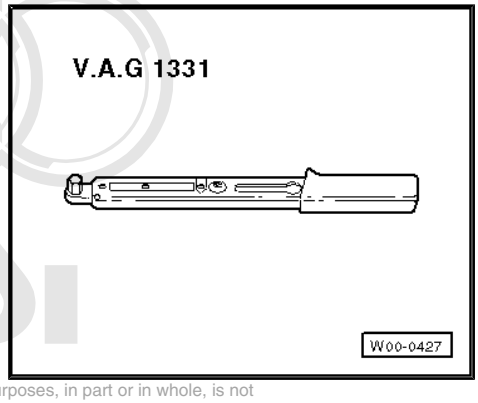
Position of pipe connections on steering rack



11.2 Checking delivery pressure of power steering pump (vehicles with 10-cylinder FSI engine)

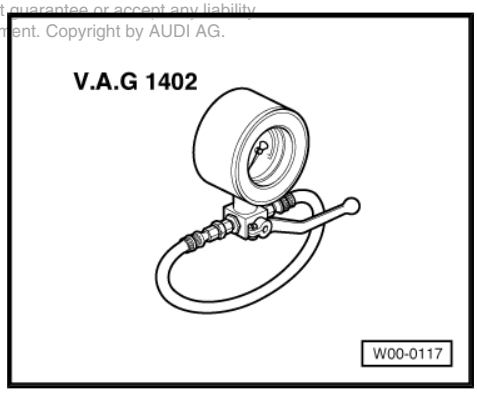
Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-

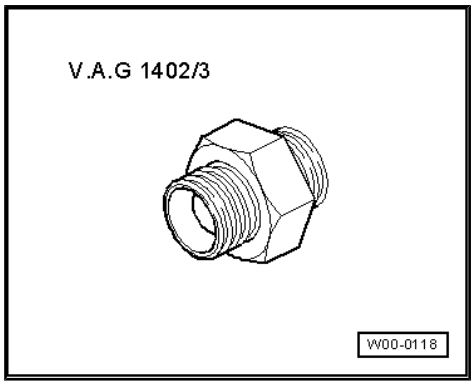


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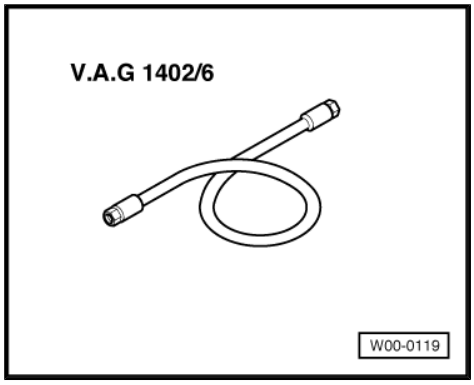
- Power steering tester - V.A.G 1402-



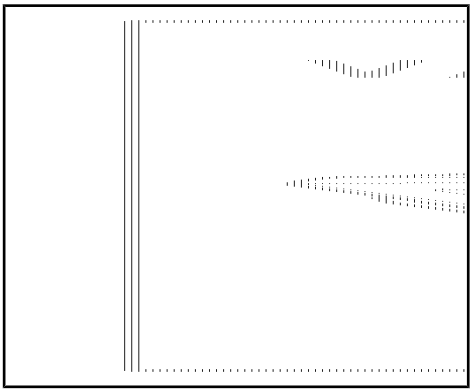
- Adapter - V.A.G 1402/3-



- Hose from adapter set - V.A.G 1402/6- (2x)



♦ Drip tray for workshop hoist - VAS 6208-



Test requirements:

- No leaks in system
- Hoses and pipes not kinked or constricted

Checking

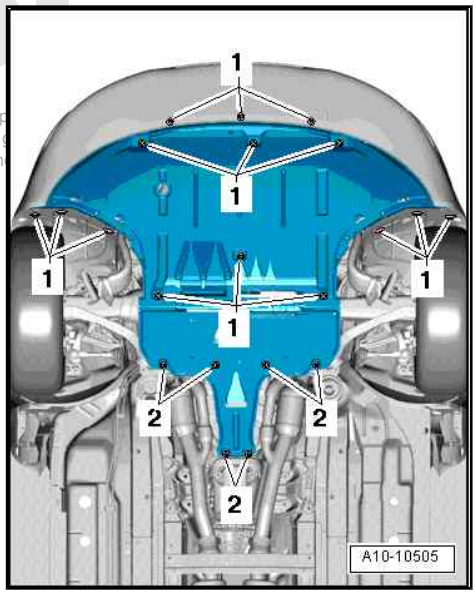
Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

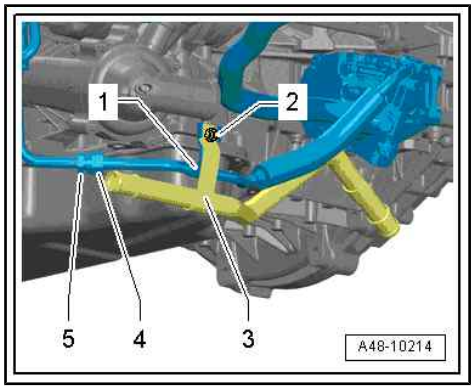
All vehicles

– Open quick-release fasteners -1- and -2- and detach noise insulation panels.

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The pressure hose is not detached at the power steering pump when checking delivery pressure. Power steering tester - V.A.G 1402- is connected to pipe connections -4- and -5- at bottom of engine compartment (left-side).



– Slacken connection -4- only slightly. Counterhold at hexagon flats -5-.

Note

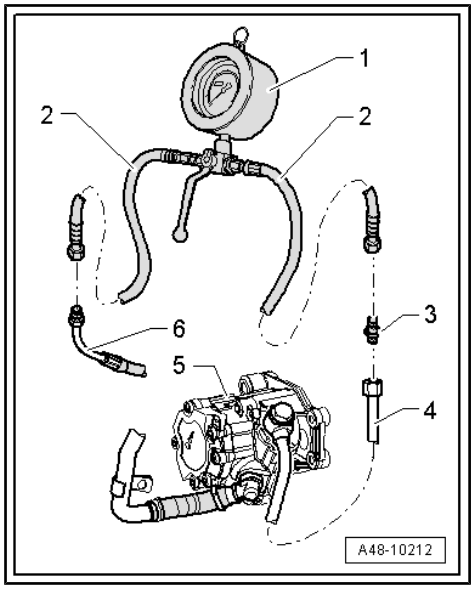
- *The pressure line cannot be clamped off with a hose clamp in the vicinity of the pipe connection.*
- *The power steering tester - V.A.G 1402- is connected with the pressure line »open«.*

– Unscrew nut -2- and detach coolant line -3- and pressure line -1- from engine.

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– Place drip tray for workshop hoist - VAS 6208- under the union to catch escaping hydraulic fluid.

– After disconnecting pressure line, connect power steering tester - V.A.G 1402- as shown.



1 - Power steering tester - V.A.G 1402-

2 - Hose from adapter set - V.A.G 1402/6-

3 - Adapter - V.A.G 1402/3-

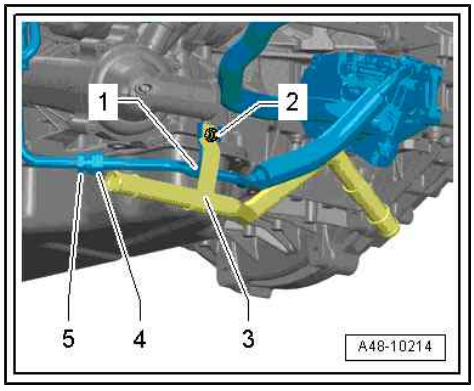
4 - Pressure line

5 - Power steering pump

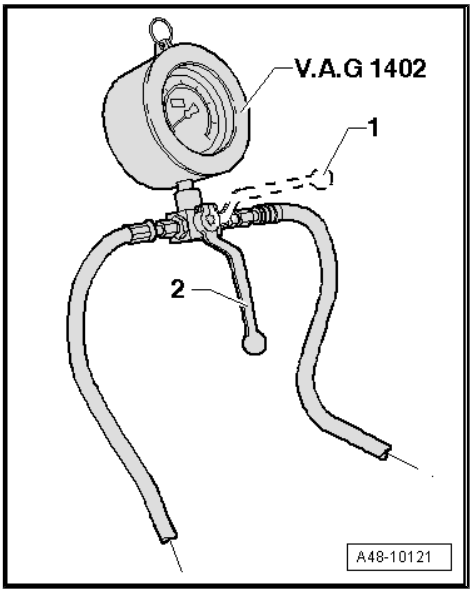
6 - Pressure line

– Detach connection -4- and -5-.

– Screw hose from power steering tester - V.A.G 1402- onto pressure hose.



– Make sure lever on pressure gauge is at position -2-.
– Start engine but do not press accelerator.
– Turn steering wheel approx. 10 times from lock to lock.
– Switch off engine and top up hydraulic fluid in reservoir if necessary.

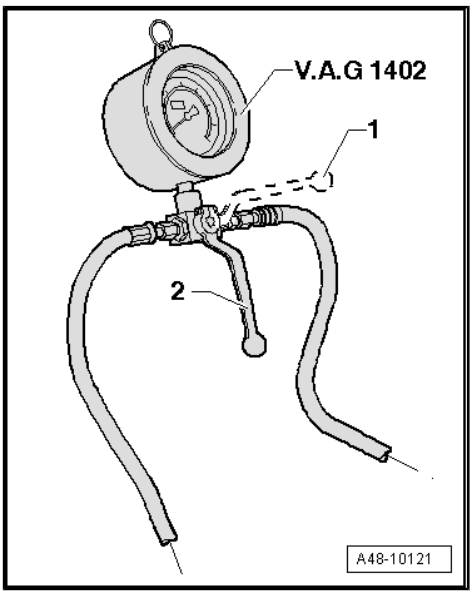


Note

- *To avoid damaging the power steering pump, please note the following points:*
- *Cut-off valve of pressure gauge must not remain closed for more than 10 seconds during this test.*
- *Start engine without pressing accelerator and leave it running at idling speed.*
- *Take pump pressure reading at idling speed immediately after starting engine (if necessary have second mechanic take reading).*
- *The pressure will drop during the test; the highest pressure reading is therefore the required test value.*

– Then check delivery pressure.

– Start engine, close cut-off valve (position -1-) with engine idling and read off pressure (lever must face away from pressure hose). Do not perform measurement for longer than 10 seconds.



Delivery pressure specification: 125…130 bar

Renew power steering pump if specification is not attained ⇒ page 452 .

– Switch off engine.
– Remove power steering tester - V.A.G 1402- .
– Connect union on pressure hoses ⇒ Item 30 (page 446) .
– ⇒ “4.1 Checking power steering fluid level (all engines except 10-cylinder TFSI)”, page 356 .
– ⇒ “4.3 Bleeding steering system after repairs”, page 358 .
– ⇒ “4.4 Checking steering system for leaks”, page 359 .
– Fit noise insulation ⇒ Rep. gr. 50 .
– ⇒ “4 Positioning vehicle on lifting platform and setting down on wheels”, page 11 .

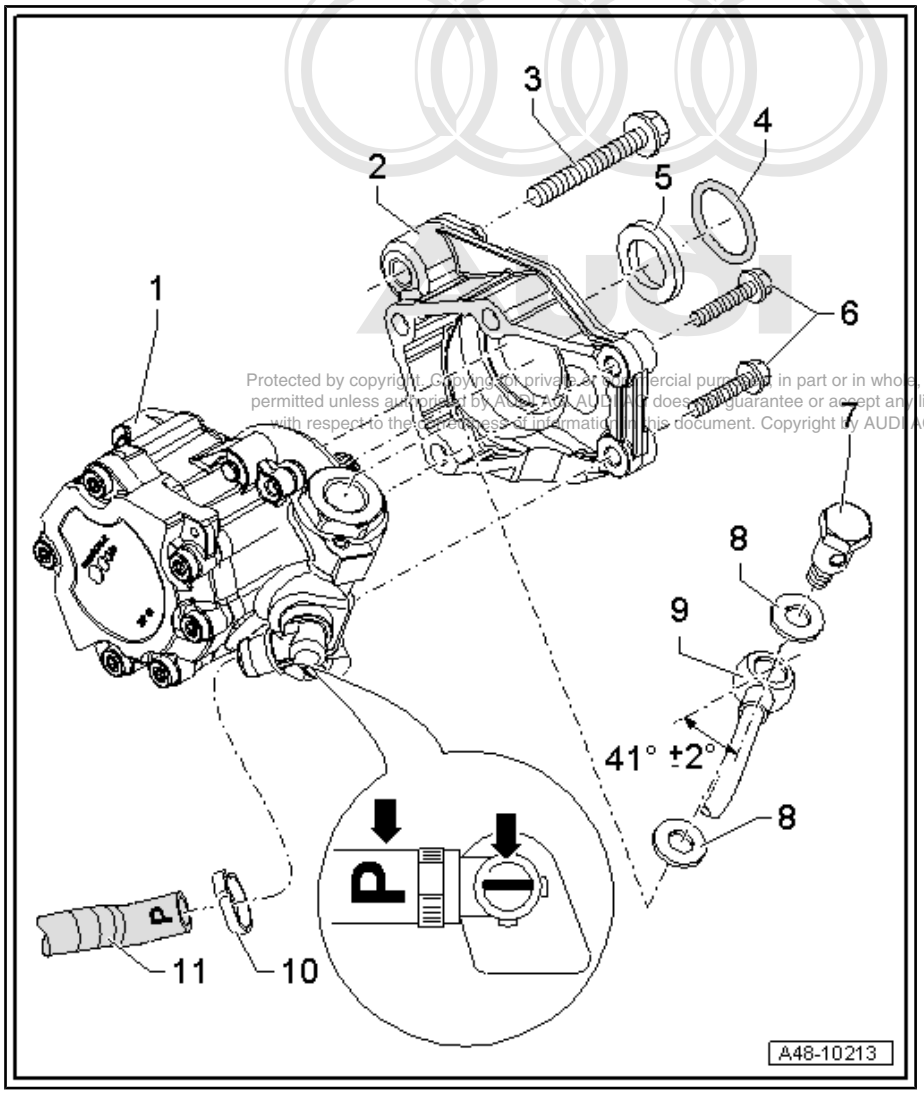
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11.3 Removing and installing power steering pump (vehicles with 10-cylinder FSI engine)

Exploded view of power steering pump

Note

- *Renew seals.*
- *Do not re-use hydraulic fluid which has been drained off.*
- *Use only hydraulic fluid .*
- *When installing new power steering pump, always renew oil seal and O-ring for pump.*



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1 - Power steering pump

- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure ⇒ page 464
- ❑ Removing and installing ⇒ page 469

2 - Bracket

- ❑ Bracket and power steering pump are combined as one component and must not be separated

3 - Bolt

- ❑ 65 Nm
- ❑ Securing bolt for: gearbox/ engine/ bracket/ power steering pump

4 - O-ring

- ❑ Renewing ⇒ Rep. gr. 13

5 - Oil seal

- ❑ Renewing ⇒ Rep. gr. 13

6 - Bolt

- ❑ Note different bolt lengths
- ❑ 22 Nm

7 - Banjo bolt

- ❑ 50 Nm

8 - Seal

- ❑ Always renew

9 - Pressure line

- ❑ Note correct position: Angle between pipe connection and shaft of power steering pump is approx. 41°

10 - Hose clip

- ❑ Tighten using hose clip pliers - V.A.G 1275- or locking pliers for steering rack - VAS 6199-
- ❑ Always renew

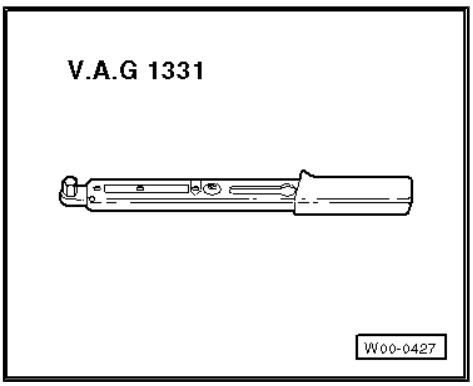
11 - Suction hose

- ❑ Marking -P- on suction hose must be aligned with seam on power steering pump

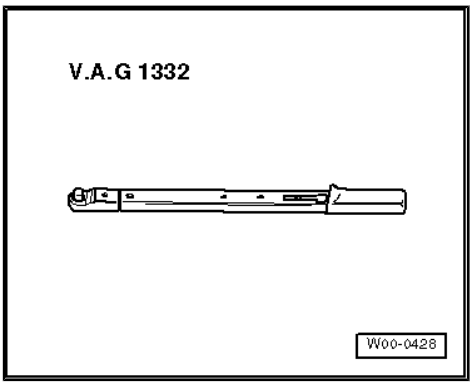
Removing

Special tools and workshop equipment required

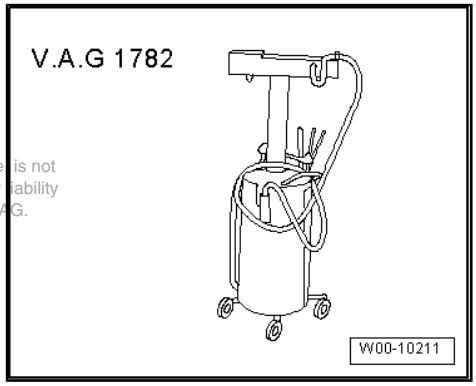
- ♦ Torque wrench - V.A.G 1331-



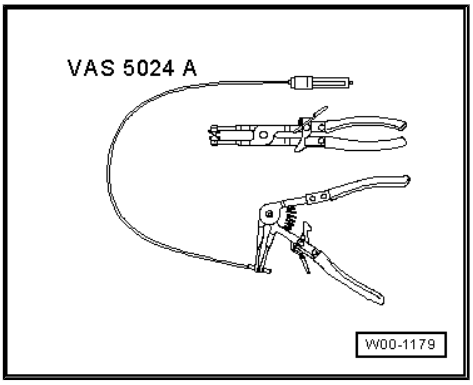
- ♦ Torque wrench - V.A.G 1332-



- ♦ Used oil collection and extraction unit - V.A.G 1782-

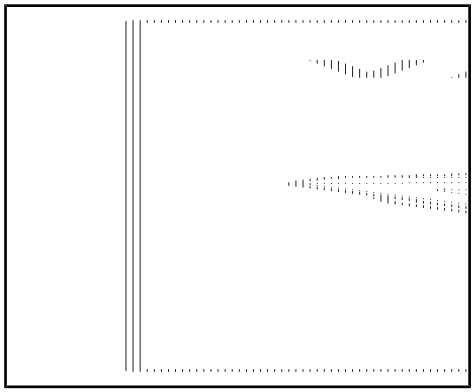


- ♦ Spring-type clip pliers - VAS 5024 A-



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- Drip tray for workshop hoist - VAS 6208-



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General notes

There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

- Always check steering system for leaks if fluid level is low in reservoir.
- If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.
- The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and turned by hand. Otherwise, there is a possibility of pump damage or noise while driving.
- Renew oil seal and O-ring for power steering pump prior to installation.

Vehicles with air suspension

– Position vehicle on lifting platform ⇒ page 11 .

All vehicles

– Extract hydraulic fluid from reservoir with used oil collection and extraction unit - V.A.G 1782- .

– Remove engine ⇒ Rep. gr. 10 .

– Leave engine in place on scissor-type assembly platform - VAS 6131- with gearbox attached.

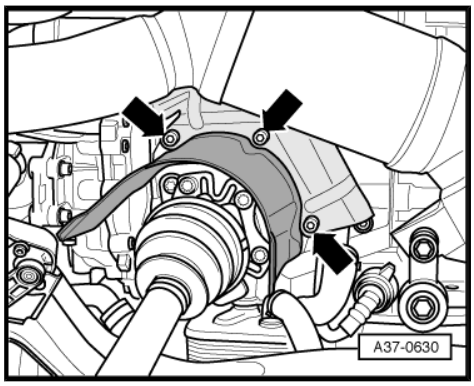
– Remove catalytic converter (left-side) ⇒ Rep. gr. 26 .

– Remove heat shield for drive shaft (left-side) -arrows-.

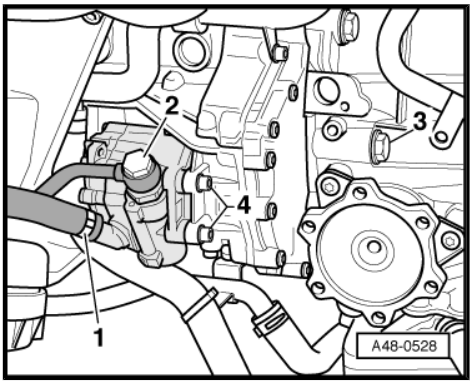
– Unbolt drive shaft from gearbox flange (left-side).

– Remove front wheel (left-side).

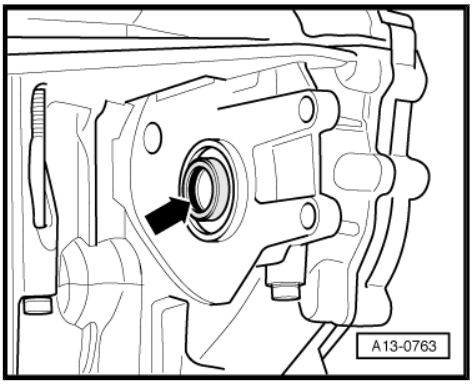
– Place drip tray for workshop hoist - VAS 6208- underneath to catch hydraulic fluid.



– Detach hose clip from suction hose -1-.
– Disconnect suction hose from power steering pump.
– Unscrew pressure pipe -2- from power steering pump.
– Remove bolts -4-.
– Remove bolt -3-.
– Detach power steering pump.



– Renew oil seal and O-ring for power steering pump -arrow- ⇒ Rep. gr. 13 .



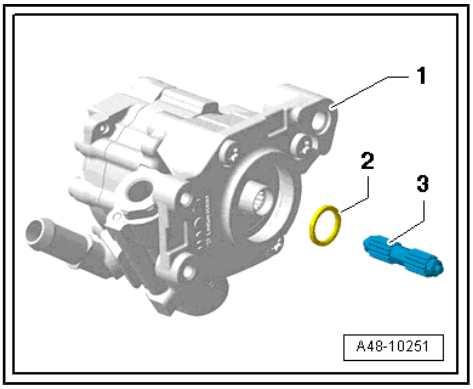
Installing

Installation is carried out in the reverse sequence. Note the following points:

- Renew gaskets and seals.
- Clean off fluid in engine compartment where necessary.
- Always renew O rings for drive shaft of power steering pump and suction hose.
- Before fitting a new power steering pump, put in hydraulic fluid at the inlet and turn pump by hand until fluid flows out at the pressure outlet.
- Hose connections and hoses must be free of oil and grease before fitting.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .

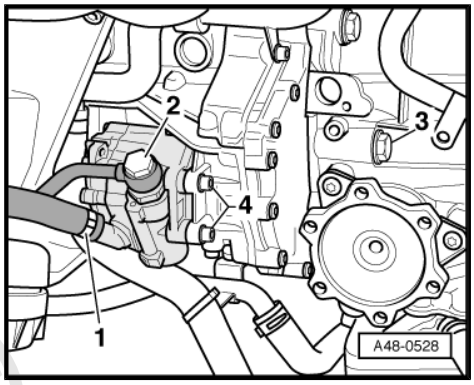
– Fit components of power steering pump as illustrated and install pump on engine.

1 - Power steering pump
2 - Oil seal
3 - Drive shaft; on installation, grease splines of drive shaft and power steering pump all round; allocation ⇒ Electronic parts catalogue



– Turn hub by hand until fluid comes out at pump outlet.

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– Connect pressure pipe -2- to power steering pump ⇒ Item 7 (page 468) .
– Tighten bolts -4- ⇒ Item 6 (page 468) .
– Tighten bolt -3- ⇒ Rep. gr. 37 .
– Connect suction hose -1- to power steering pump and secure with hose clip.
– Fill up with hydraulic fluid .

Installation position of suction hoses at fluid reservoir ⇒ page 490

– Clean off fluid from subframe where necessary.
– Attach drive shaft ⇒ page 98 .
– Install catalytic converter (left-side) ⇒ Rep. gr. 26 .
– Install engine ⇒ Rep. gr. 10 .
– Tighten subframe bolts to torque but not to extra angle (only tighten bolts fully after checking wheel alignment).

WARNING

All bolts and nuts must be fully tightened according to specifications before the vehicle is driven on public roads.

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– ⇒ “4.3 Bleeding steering system after repairs”, page 358 .
– ⇒ “4.1 Checking power steering fluid level (all engines except 10-cylinder TFSI)”, page 356 .
– ⇒ “4.4 Checking steering system for leaks”, page 359 .
– ⇒ “4 Positioning vehicle on lifting platform and setting down on wheels”, page 11 .
– ⇒ “4 Wheel alignment”, page 281 .

12 Power steering pump, hydraulic pipes and hoses, fluid reservoir (vehicles with 10-cylinder TFSI engine)

⇒ “12.1 Exploded view (vehicles with 10-cylinder TFSI engine)”, page 473

⇒ “12.2 Checking delivery pressure of power steering pump (vehicles with 10-cylinder TFSI engine)”, page 477

⇒ “12.3 Removing and installing power steering pump (vehicles with 10-cylinder TFSI engine)”, page 480

⇒ “12.4 Renewing oil seal and flat-section O-ring for power steering pump (vehicles with 10-cylinder TFSI engine)”, page 485

⇒ “12.5 Removing and installing hydraulic fluid cooler”, page 485

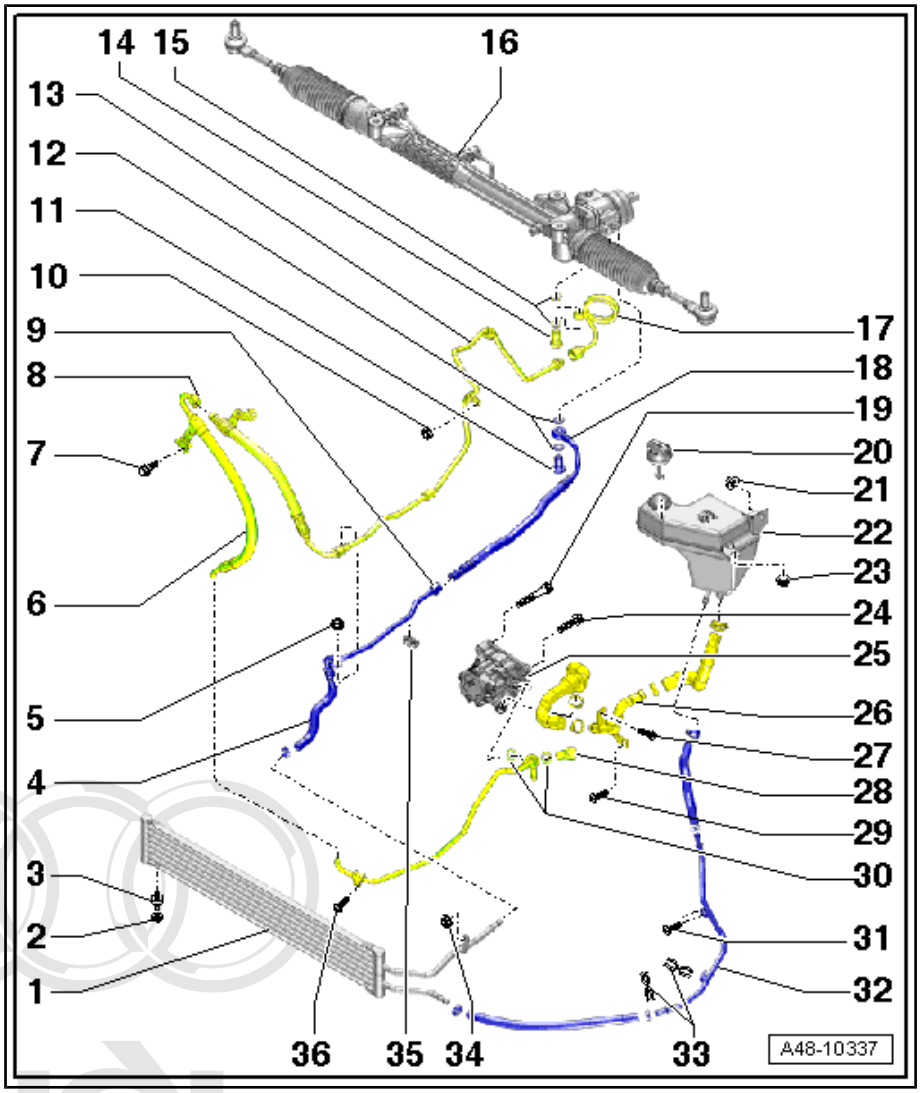
12.1 Exploded view (vehicles with 10-cylinder TFSI engine)

There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

Note

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- *Always check steering system for leaks if fluid level is low in reservoir.*
- *If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.*
- *The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and turned by hand. Otherwise, there is a possibility of pump damage or noise while driving.*



1 - Hydraulic fluid cooler
- ❑ Removing and installing ⇒ page 485

2 - Nut
- ❑ 5.6 Nm

3 - Bonded rubber bush
- ❑ Renew if damaged

4 - Return hose
- ❑ Note installation position on longitudinal member ⇒ page 476

5 - Nut
- ❑ 9 Nm

6 - Hose/pipe assembly
- ❑ Attachment in engine compartment ⇒ page 476

7 - Bolt
- ❑ 8 Nm

8 - Union nut
- ❑ 40 Nm
- ❑ Mark on pipe set to 12 o'clock position

9 - Union nut
- ❑ 40 Nm

10 - Nut
- ❑ 9 Nm

11 - Banjo bolt (return)
- ❑ 47 Nm
- ❑ Always renew

12 - Seals
- ❑ Always renew

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13 - Hose/pipe assembly

14 - Banjo bolt (expansion hose)
- ❑ 35 Nm
- ❑ Always renew

15 - Seals
- ❑ Always renew

16 - Power steering rack
- ❑ For correct version refer to ⇒ Electronic parts catalogue

17 - Pipe
- ❑ Note correct installation position ⇒ page 476

18 - Return hose
- ❑ Note correct installation position ⇒ page 476

19 - Bolt
- ❑ 65 Nm
- ❑ Securing bolt: gearbox/ engine/ power steering pump

20 - Cap with dipstick

- ❑ Checking fluid level ⇒ page 357

21 - Nut

- ❑ 6 Nm

22 - Reservoir

- ❑ Note correct installation position ⇒ page 476

23 - Nut

- ❑ 6 Nm

24 - Bolt

- ❑ 2x
- ❑ 22 Nm

25 - Power steering pump

- ❑ For correct version refer to ⇒ Electronic parts catalogue
- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure ⇒ page 477
- ❑ Removing and installing ⇒ page 480

26 - Pipe

27 - Bolt

- ❑ 9 Nm

28 - Banjo bolt

- ❑ 50 Nm

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29 - Bolt

- ❑ 9 Nm

30 - Seals

- ❑ Renew

31 - Bolt

- ❑ 9 Nm

32 - Return line

- ❑ Note correct installation position ⇒ page 490

33 - Clip

- ❑ 2x

34 - Nut

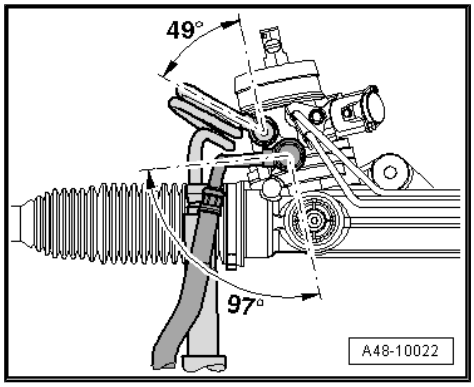
- ❑ 9 Nm

35 - Double clip

36 - Bolt

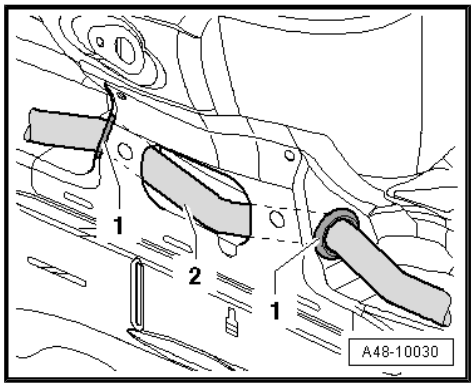
- ❑ 9 Nm

Installation position of pipes at steering rack



Installation position in longitudinal member

– Engage guide bushes -1- in longitudinal member.
– Guide return hose -2- through support after installing bushes -1-.

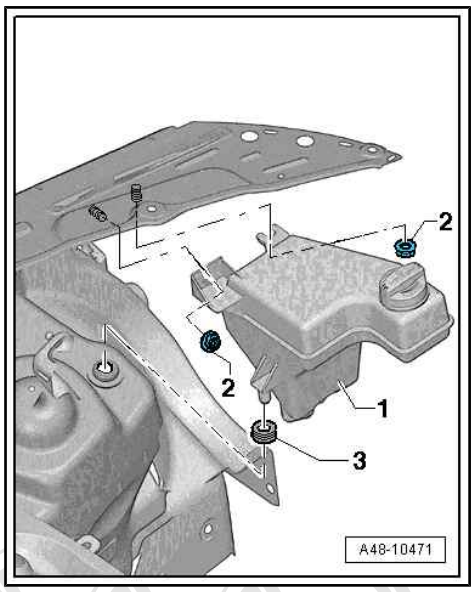


Installation position of reservoir

Reservoir -1-

Nut -2-

Grommet -3-

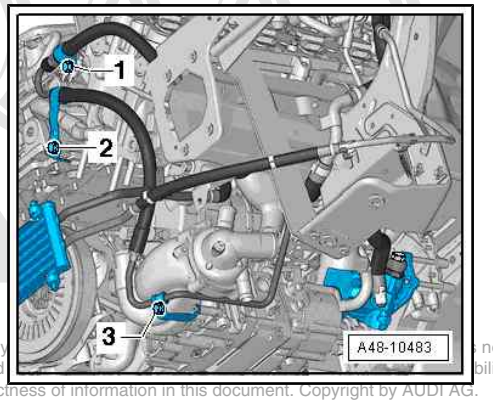


Attachment of pressure pipe to engine at top and coolant pump bracket at bottom

Bracket with nut -1- at front of engine compartment

Bracket with nut -2- at front of engine compartment

Bracket with nut -3- at coolant pump



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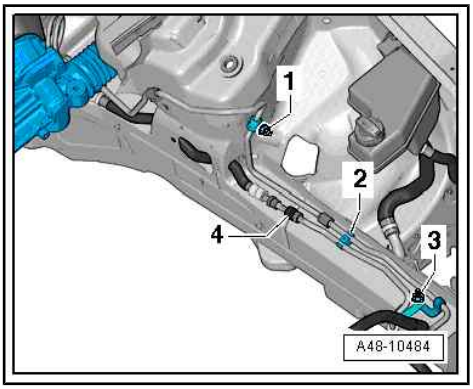
Attachment to longitudinal member

Nut -1-

Double clip -2-

Nut -3-

Pipe connection -4-; tightening torque 40 Nm, mark set to 12 o'clock position



Attachment to wing strut (left-side)

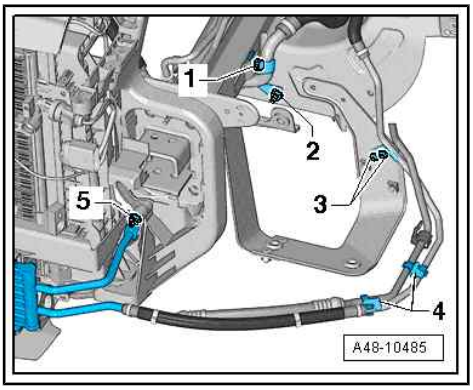
Bolt -1-

Nut -2-

Bolts -3-

Double clip -4- at refrigerant pipe 2x

Nut -5-

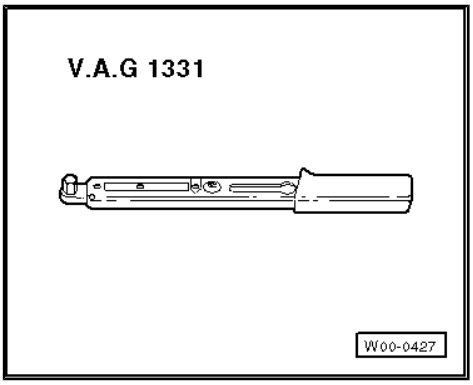


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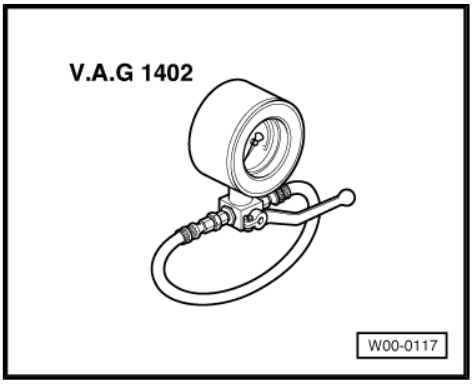
12.2 Checking delivery pressure of power steering pump (vehicles with 10-cylinder TFSI engine)

Special tools and workshop equipment required

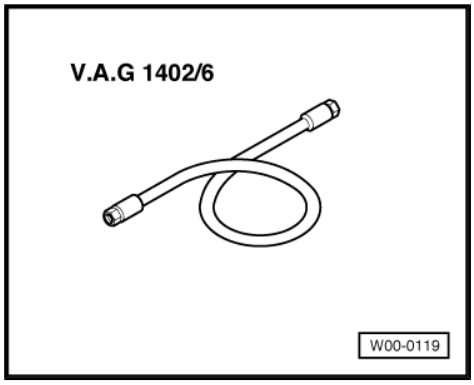
♦ Torque wrench - V.A.G 1331-



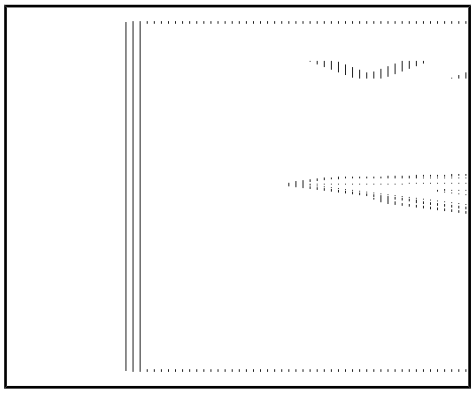
♦ Power steering tester - V.A.G 1402-



♦ Hose from adapter set - V.A.G 1402/6- (2x)



♦ Drip tray for workshop hoist - VAS 6208-



♦ Angle piece with adapter from adapter set - V.A.G 1402/6-

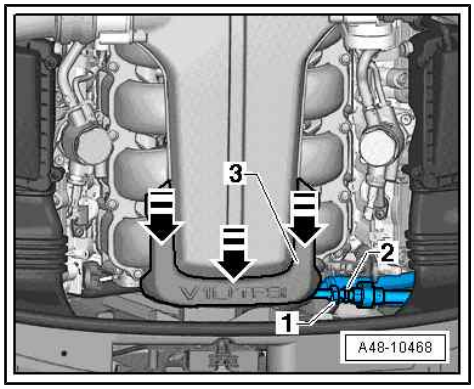
Test requirements:

- No leaks in system
- Hoses and pipes not kinked or constricted

Checking

The pressure hose is not detached at the power steering pump when checking delivery pressure. The power steering tester - V.A.G 1402- is connected to the pipe -1- at the top left of the engine compartment.

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– Detach cover -3- in direction of -arrows-.

– Disconnect pipe connection -1-. Counterhold at hexagon flats -2-.

Note

♦ *The pressure line cannot be clamped off with a hose clamp in the vicinity of the pipe connection.*

♦ *The power steering tester - V.A.G 1402- is connected with the pressure line »open«.*

– After disconnecting pressure line, connect power steering tester - V.A.G 1402- as shown.

1 - Power steering tester - V.A.G 1402-

2 - Hose from adapter set - V.A.G 1402/6-

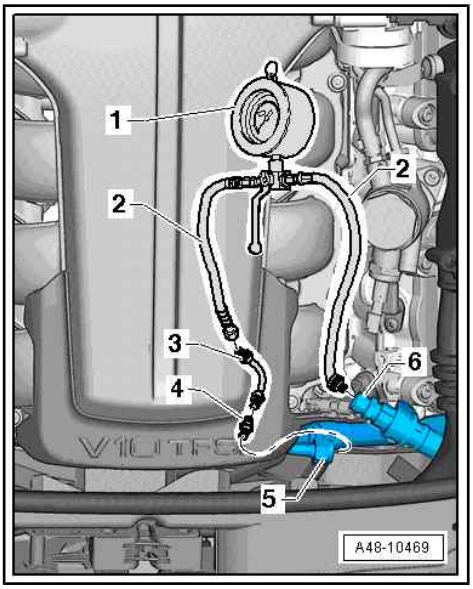
3 - Angle piece from adapter set - V.A.G 1402/6-

4 - Adapter - V.A.G 1402/6-

5 - Pressure line

6 - Pressure line

– Screw hose from power steering tester - V.A.G 1402- onto pressure hose.

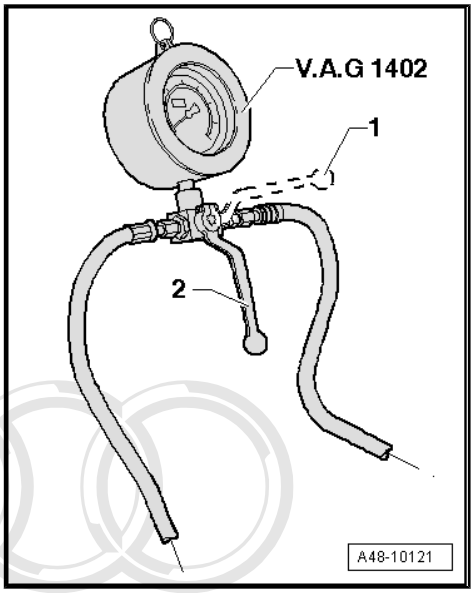


– Make sure lever on pressure gauge is at position -2-.

– Start engine but do not press accelerator.

– Turn steering wheel approx. 10 times from lock to lock.

– Switch off engine and top up hydraulic fluid in reservoir if necessary.



Note

- *To avoid damaging the power steering pump, please note the following points:*
- *Cut-off valve of pressure gauge must not remain closed for more than 10 seconds during this test.*
- *Start engine without pressing accelerator and leave it running at idling speed.*
- *Take pump pressure reading at idling speed immediately after starting engine (if necessary have second mechanic take reading).*
- *The pressure will drop during the test; the highest pressure reading is therefore the required test value.*

– Then check delivery pressure.

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– Start engine, close cut-off valve (position -1-) with engine idling and read off pressure (lever must face away from pressure hose). Do not perform measurement for longer than 10 seconds.

Delivery pressure specification: 128…132 bar

Renew power steering pump if specification is not attained ⇒ page 480 .

– Switch off engine.

– Remove power steering tester - V.A.G 1402- .

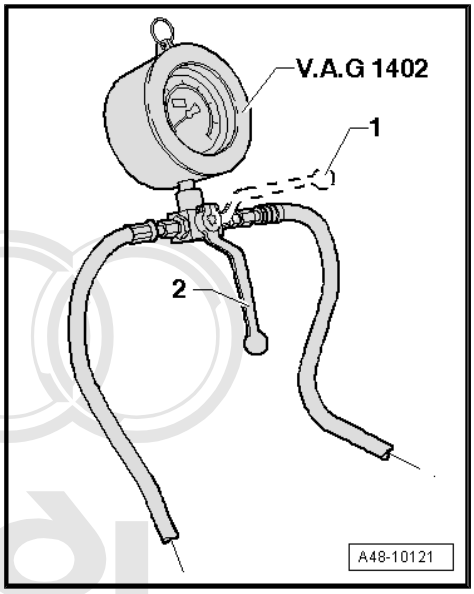
– Connect union on pressure hoses ⇒ Item 8 (page 474) .

– ⇒ “4.3 Bleeding steering system after repairs”, page 358 .

– ⇒ “4.2 Checking power steering fluid level (10-cylinder TFSI engine)”, page 357 .

– ⇒ “4.4 Checking steering system for leaks”, page 359 .

– ⇒ “4 Positioning vehicle on lifting platform and setting down on wheels”, page 11 .



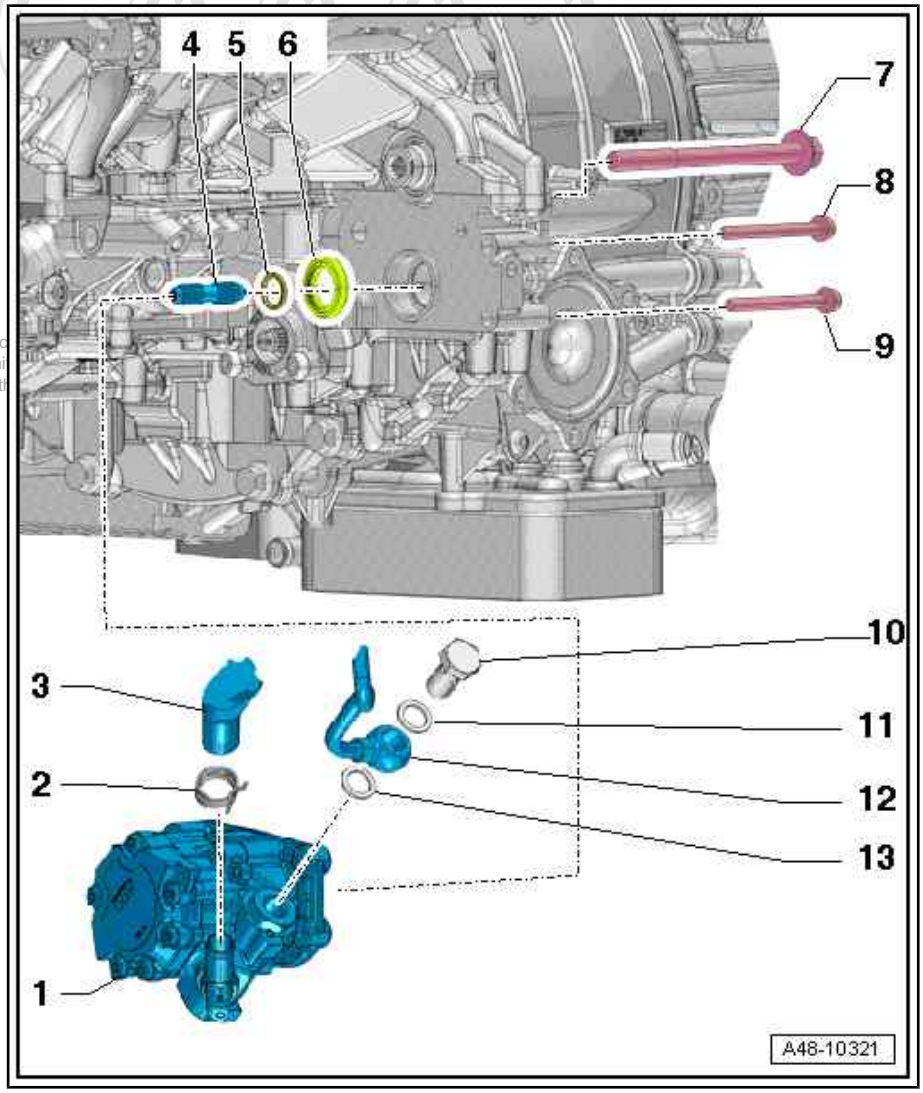
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12.3 Removing and installing power steering pump (vehicles with 10-cylinder TFSI engine)

Exploded view of power steering pump

Note

- *Renew seals.*
- *Do not re-use hydraulic fluid which has been drained off.*
- *Use only hydraulic fluid .*
- *When renewing the power steering pump, always renew the oil seal and the flat-section O-ring for the power steering pump ⇒ page 485 .*



1 - Power steering pump

- ❑ Fill with hydraulic fluid before installing
- ❑ Checking delivery pressure ⇒ page 477
- ❑ Removing and installing ⇒ page 482

2 - Hose clip

- ❑ Secure using hose clip pliers - V.A.G 1275- or locking pliers for steering rack -VAS 6199-
- ❑ Always renew

3 - Suction hose

4 - Drive shaft

- ❑ With rubber buffers
- ❑ On-reinstallation, grease splines of drive shaft all round; allocation ⇒ Electronic parts catalogue

5 - Flat-section O-ring

- ❑ Installation position ⇒ page 482

6 - Oil seal

- ❑ Renewing ⇒ page 485

7 - Bolt

- ❑ 65 Nm
- ❑ Securing bolt for: gearbox/ engine/ bracket/ power steering pump

8 - Bolt

- ❑ 22 Nm

9 - Bolt

- ❑ 22 Nm

10 - Banjo bolt

- ❑ 50 Nm

11 - Seal

- ❑ Always renew

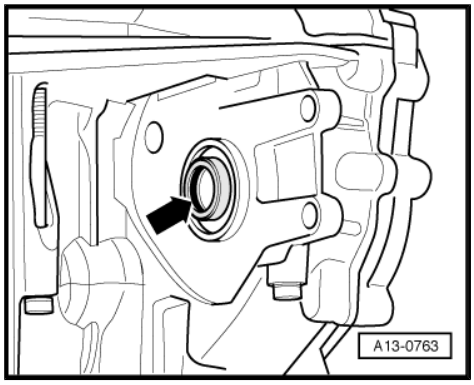
12 - Hose/pipe assembly

13 - Seal

- ❑ Always renew

Installation position of flat-section O-ring

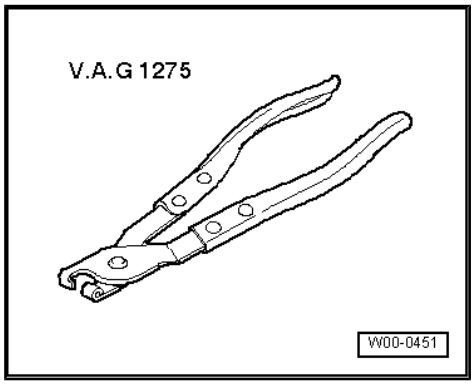
- In power steering pump drive -arrow-



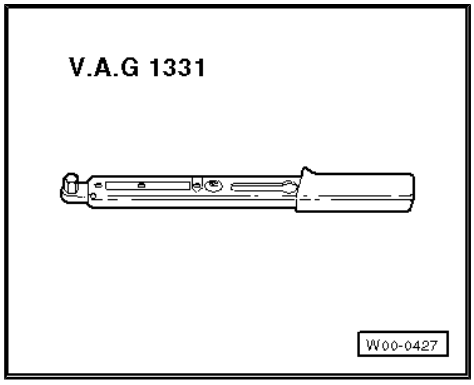
Removing

Special tools and workshop equipment required

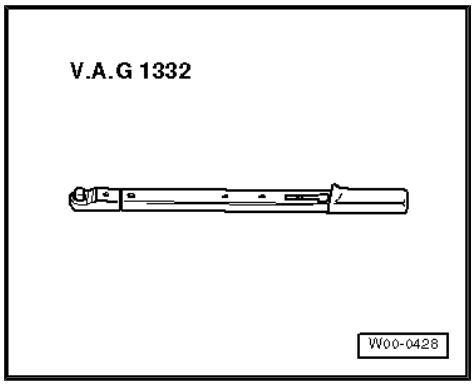
- Hose clip pliers - V.A.G 1275-



- Torque wrench - V.A.G 1331-

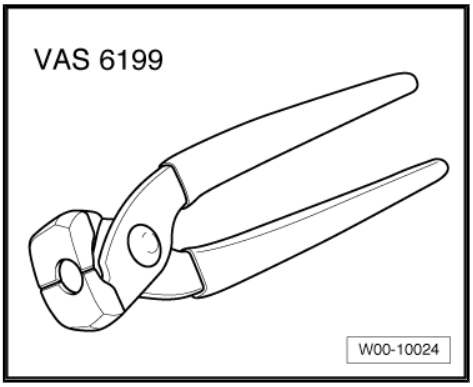


- Torque wrench - V.A.G 1332-

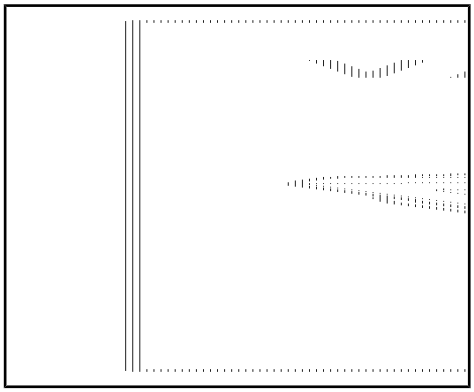


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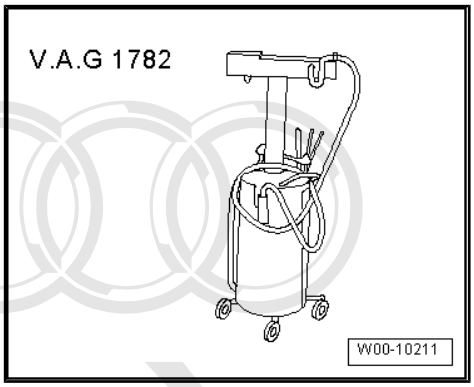
- Locking pliers for steering rack -VAS 6199-



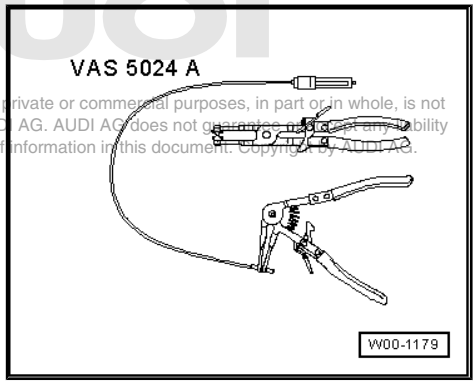
- Drip tray for workshop hoist - VAS 6208-



- Used oil collection and extraction unit - V.A.G 1782-



- Spring-type clip pliers - VAS 5024 A-



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General notes

There is no provision for repairing the power steering pump. If problems are reported, trace the fault by means of a pressure test and a leakage test. Renew the power steering pump if there is a fault.

- ♦ Always check steering system for leaks if fluid level is low in reservoir.
- ♦ If leakage is visible at the pipe connections first tighten connections and wipe dry, then check for leaks again.
- ♦ The power steering pump is supplied without fluid filling. Prior to installation, the pump must therefore always be filled with hydraulic fluid and rotated by hand. Otherwise, there is a possibility of pump damage or noise while driving.
- ♦ Renew oil seal and O-ring for power steering pump prior to installation.

– Extract hydraulic fluid from reservoir with used oil collection and extraction unit - V.A.G 1782- .

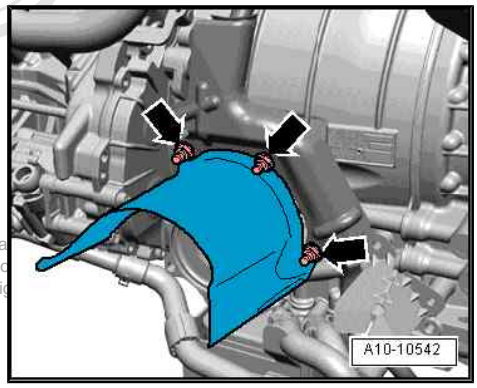
– Remove engine/gearbox assembly ⇒ Rep. gr. 10 .

– Leave engine with gearbox attached on scissor-type assembly platform - VAS 6131 A- .

– Unscrew nuts -arrows- and detach heat shield for drive shaft from gearbox (left-side).

– Detach heat shield for wiring harness.

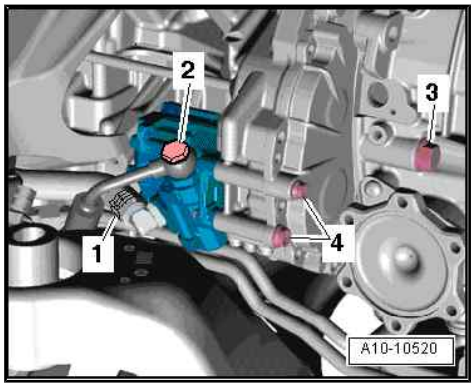
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– Remove oil pump ⇒ Rep. gr. 17 .

– Remove bolts -3- and -4-.

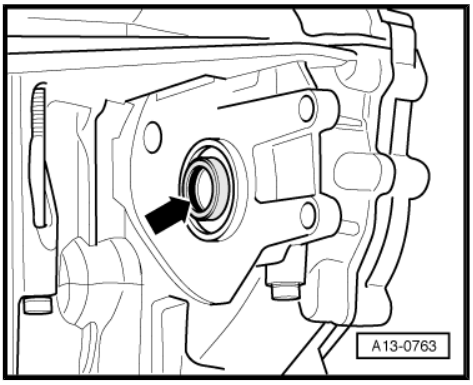
– Detach power steering pump.



Note

-Items 1, 2- can be disregarded.

– Renew oil seal and flat-section O-ring for power steering pump (vehicles with 10-cylinder TFSI engine) ⇒ Rep. gr. 15



Installing

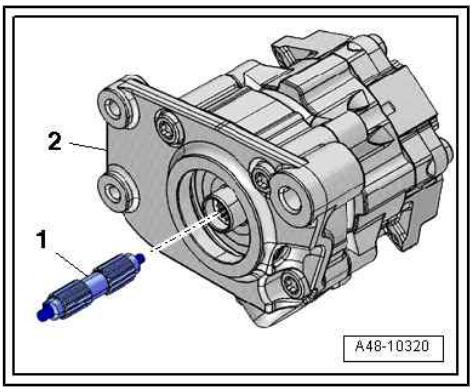
Installation is performed in reverse sequence; note the following:

- Renew gaskets and seals.
- Clean off fluid in engine compartment where necessary.
- Always renew O rings for drive shaft of power steering pump and suction hose.
- Before fitting a new power steering pump, put in hydraulic fluid at the inlet and turn pump by hand until fluid flows out at the pressure outlet.
- Hose connections and hoses must be free of oil and grease before fitting.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .

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– Turn hub by hand until fluid comes out at pump outlet.

– Fit components of power steering pump as illustrated and install pump on engine.



1 - Drive shaft; on installation, grease splines of drive shaft and power steering pump all round; allocation ⇒ Electronic parts catalogue

2 - Power steering pump

– Install oil pump ⇒ Rep. gr. 17 .

– Install engine/gearbox assembly ⇒ Rep. gr. 10 .

– Tighten subframe bolts to torque but not to extra angle (only tighten bolts fully after checking wheel alignment).

WARNING

All bolts and nuts must be fully tightened according to specifications before the vehicle is driven on public roads.

– ⇒ “4.3 Bleeding steering system after repairs”, page 358 .

– ⇒ “4.2 Checking power steering fluid level (10-cylinder TFSI engine)”, page 357

– ⇒ “4.4 Checking steering system for leaks”, page 359 .

– ⇒ “4 Wheel alignment”, page 281 .

12.4 Renewing oil seal and flat-section O-ring for power steering pump (vehicles with 10-cylinder TFSI engine)

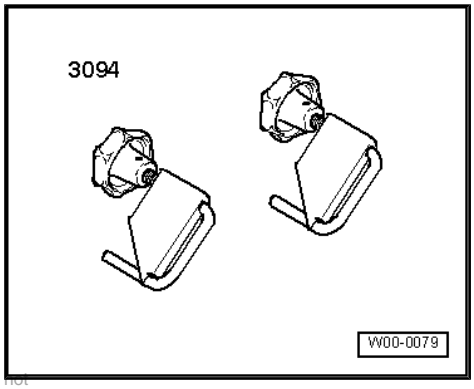
Renewing oil seal and flat-section O-ring for power steering pump (vehicles with 10-cylinder TFSI engine) ⇒ Rep. gr. 15

12.5 Removing and installing hydraulic fluid cooler

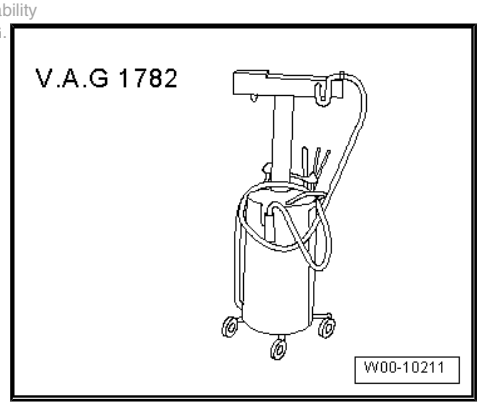
Special tools and workshop equipment required

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- Hose clamps up to 25 mm - 3094-



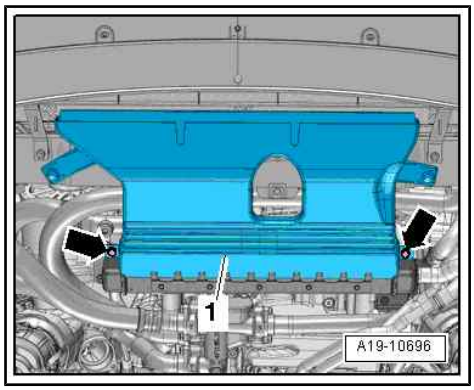
- Used oil collection and extraction unit - V.A.G 1782-



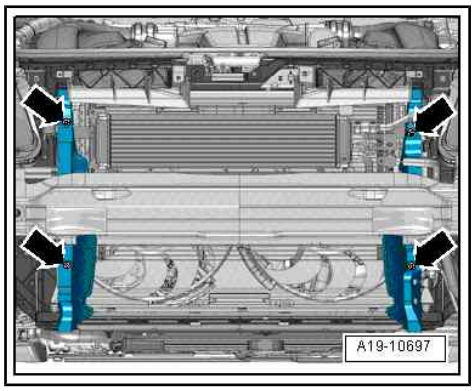
Removing

– Remove front bumper cover ⇒ Rep. gr. 63 .

– Unscrew bolts -arrows- and detach air duct -1- at the bottom.



– Unscrew bolts -bottom arrows- for air ducts (left and right).



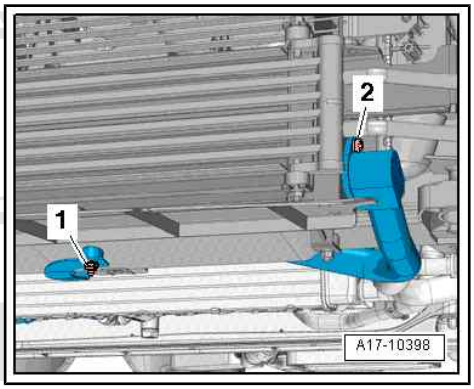
Note

-Top arrows- can be disregarded.

– Unscrew nut -1-.

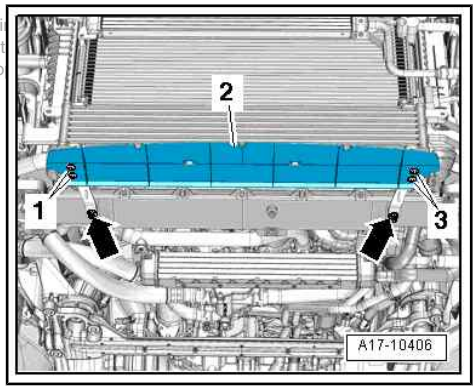
Note

Disregard item -2-.



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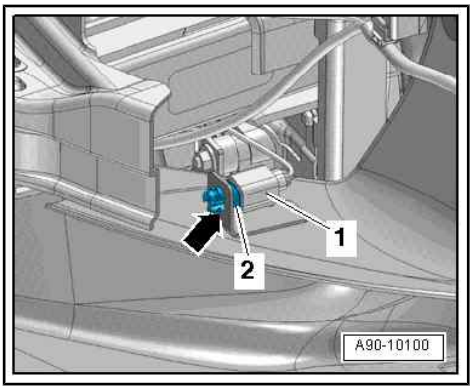
– Remove bolts -1- and -3-.
– Detach air duct -2-.
– Slacken off nuts -arrows-.



– Unplug electrical connector -1- at ambient temperature sensor - G17- -item 2-.

Note

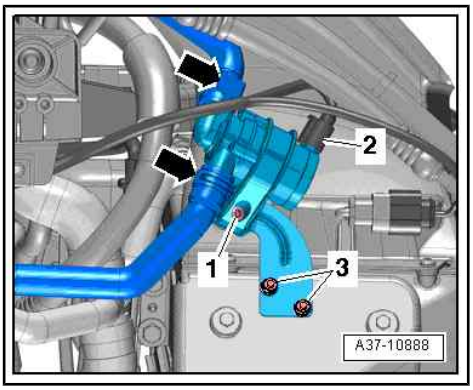
-Arrow- can be disregarded.



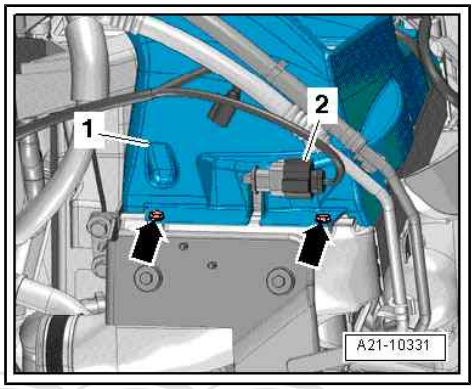
– Unscrew nuts -3-.
– Lay aside circulation pump 2 - V403- with hoses -arrows- and electrical connector -2- connected.

Note

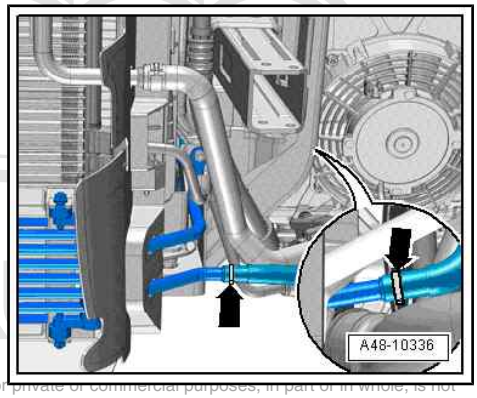
Disregard item -1-.



– Detach electrical connector -2- for left radiator fan - V402- from bracket.
– Unscrew bolts -arrows- and detach air duct.

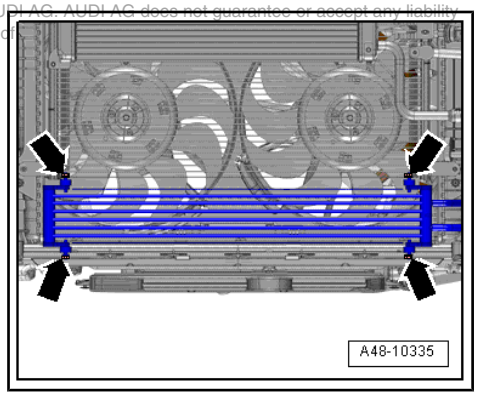


– Place used oil collection and extraction unit - V.A.G 1782- under connection.
– Pinch off hydraulic fluid hoses -arrows- using hose clamps - 3094- and detach.



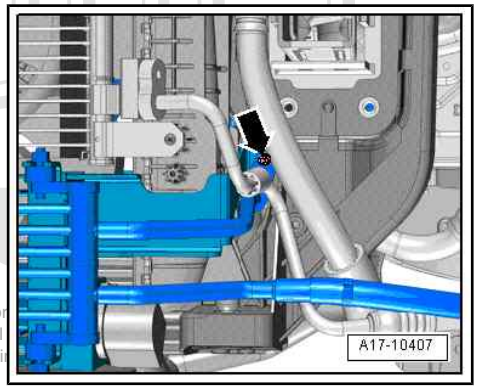
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– Slacken off nuts -arrows-.



– Unscrew nut -arrow- and swivel engine oil cooler on left side slightly to the front.
– Detach hydraulic fluid cooler.
– Secure engine oil cooler again with nut.

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 .*

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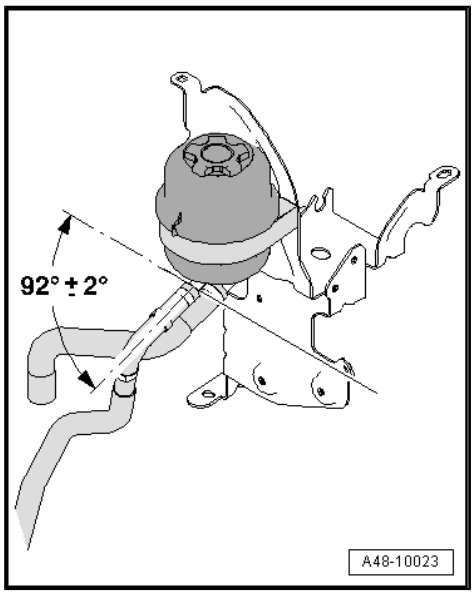
– Install engine oil cooler ⇒ Rep. gr. 17 .
– Install front bumper cover ⇒ Rep. gr. 63 .
– Fit air duct at the bottom ⇒ Rep. gr. 19 .
– Fit left and right air ducts ⇒ Rep. gr. 50 .
– ⇒ “4.3 Bleeding steering system after repairs”, page 358
– ⇒ “4.2 Checking power steering fluid level (10-cylinder TFSI engine)”, page 357 .

13 Suction hoses on reservoir

13.1 Installation position of fluid reservoir, position of suction hoses on reservoir

Installation position of reservoir at bracket - applicable to all engines except 10-cylinder TFSI

– Install fluid reservoir on bracket for ESP hydraulic unit as shown in illustration.

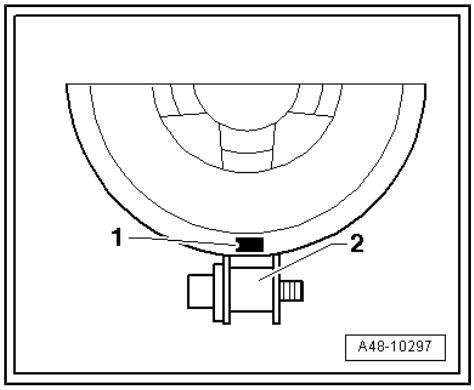


Installation position of reservoir in bracket

– Install reservoir in securing strap as illustrated.

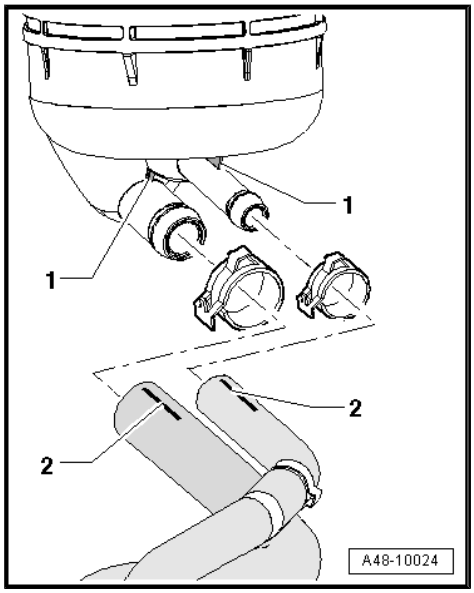
Marking -1- must be in centre of clamp fastener -2-.

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Installation position of suction hose at reservoir - applicable to all engines except 10-cylinder TFSI

The marks -2- on the hoses must coincide with the ribs -1- on the reservoir.

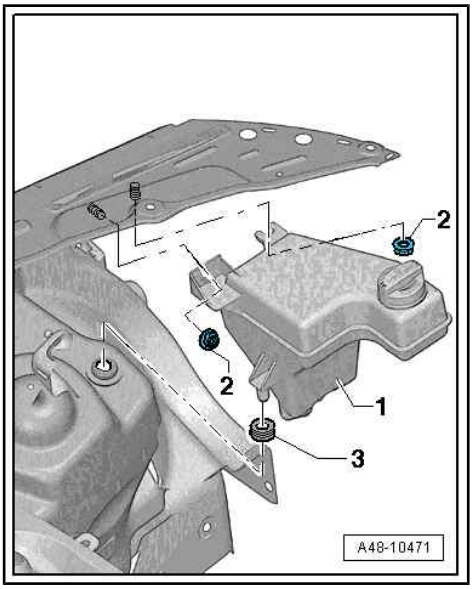


Installation position of reservoir - applicable to 10-cylinder TFSI engines

-1- Reservoir

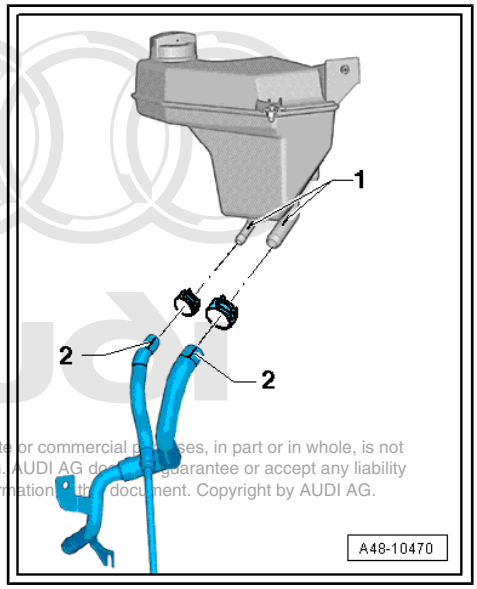
-2- Nut 8 Nm

-3- Grommet



Installation position of suction hose at reservoir - applicable to 10-cylinder TFSI engines

The lines -2- marked on the hoses must coincide with the markings -1- on the reservoir.



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