00 - TECHNICAL DATA

TECHNICAL DATA

Suspension

Front axle	Four-link lightweight suspension with virtual steering axis, transverse stabilizer, twin gas-filled struts and coil springs, control arm with hydraulic damping mounts
Rear axle	Trapezoidal control arm - rear axle, independent suspension

Vehicles up to VIN 400 000

		Front Wheel Drive (FWD)/All Wheel Drive (AWD)			
Model:		Sedan/Wagon			Convertible
		Standard suspension 1BA	**Sport suspension 1BE Sport suspension 1BV (quattro GmbH) Audi S4 1BD**	**Comfort heavy duty suspension 1BR**	**Standard suspension 1BA Sport suspension 1BE**
Wheelbase:	mm	2645	2651	2642	2650
Front track	mm	1524 [1] * See note	1528 [1] * See note	1521 [1] * See note	1522 [2] * See note
Rear track	mm	1517 [1] * See note	1523 [1] * See note	1513 [1] * See note	1517 [2] * See note
Maximum steering angle at inner wheel	Degree	38	38	38	38

*[1] These specified values correspond to a wheel offset of ET 39 mm and a load condition "empty without driver".

*[2] These specified values correspond to a wheel offset of ET 42 mm and a load condition "empty without driver".

Vehicles from VIN 400 001

Front Wheel Drive (FWD)/All Wheel Drive (AWD)						
Model:		Sedan/Wagon				
		Standard	**Sport**	**Comfort**	**Basic**	**Sport**

		suspension 1BA	suspension 1BE Sport suspension 1BV (quattro GmbH) Audi S4 1BD	heavy duty suspension 1BR	suspension 2MC (quattro GmbH RS4)	suspension 2ME (quattro GmbH RS4)
Wheelbase:	mm	2644	2649	2640	2649	2652
Front track	mm	1522 [1]	1524 [1]	1517 [1]	1523 [1]	1525 [1]
Rear track	mm	1515 [1]	1521 [1]	1510 [1]	1533 [1]	1535 [1]
Maximum steering angle at inner wheel	Degree	38	38	38	38	38

*[1] These specified values correspond to a wheel offset of ET 42 mm and a load condition "empty without driver".

NOTE:

- **The specified values apply to all engine versions.**
- **Tracks change with use of wheels with different offset.**

Steering

Steering gear	Power assist, maintenance-free rack-and-pinion steering
Turning diameter	approx. 11 m

DISPOSAL OF FLUID-FILLED COMPONENTS TO MEET ENVIRONMENTAL REQUIREMENTS

Front gas-filled strut, venting and emptying

A - Venting through drill holes

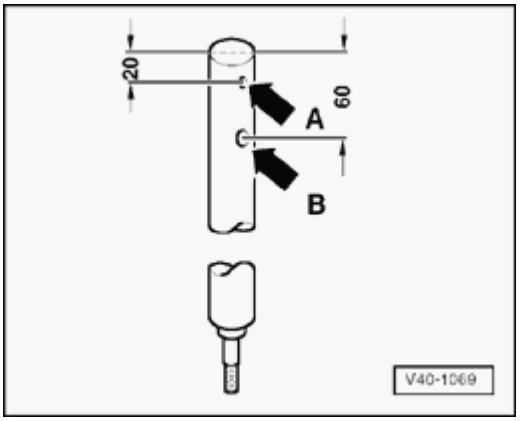

Fig. 1: Venting Through Drill Holes
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp gas-filled strut vertically in vise, with piston ends facing downward.

CAUTION: Wear protective eye wear while drilling.

- Drill a 3 mm diameter hole - **arrow A** - through outer strut tube.

NOTE:

- **Gas escapes when drilling.**

- Continue drilling until tube inside is drilled through (approx. 25 mm deep).
- Drill a second hole, 6 mm diameter - **arrow B** - , through outer and inner strut tubes.
- Hold strut over oil collecting pan and move piston rod back and forth several times over entire range until no more oil escapes.

B - Open with pipe cutter

Special tools, testers and auxiliary items required

- Pipe cutter, e.g. Stahlwille Express 150/3

CAUTION: Wear protective eye wear when drilling or sawing.

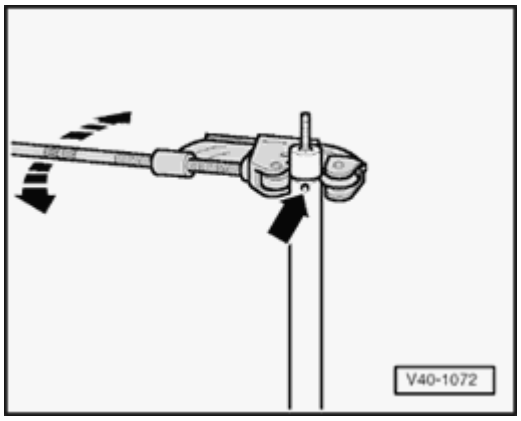

Fig. 2: Cutting Through Outer Tube Using Pipe Cutter
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drill a 3 mm diameter hole - **arrow** - through outer strut tube or saw through tube wall.

NOTE:

- **Gas escapes when drilling or sawing.**

- Position a pipe cutter (e.g. Stahlwille Express 150/3) as shown in illustration and cut through outer tube.

- Pull piston rod upward, hold inner tube in place with pliers and push it downward so that it remains in outer tube when piston rod is slowly raised.
- Remove piston rod from inner tube.
- Empty strut tube.

Rear gas-filled strut, venting

A - venting through drill holes

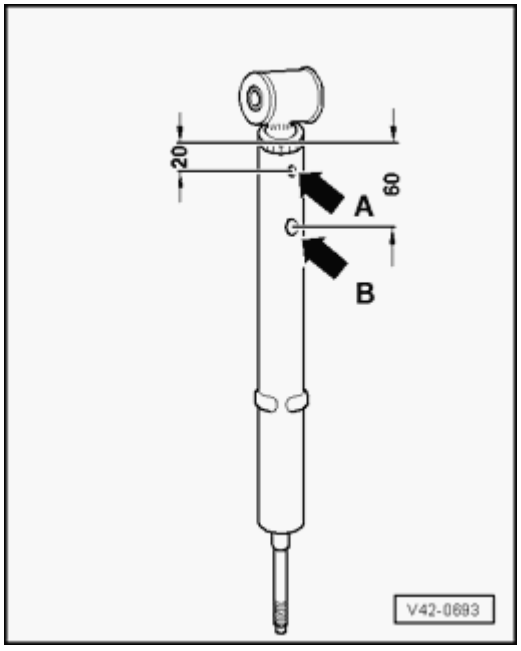

Fig. 3: Emptying Rear Gas-Filled Struts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp gas-filled strut vertically in vise, with piston ends facing downward.

CAUTION: Wear protective eye wear while drilling.

- Drill a 3 mm diameter hole - **arrow A** - through outer strut tube.

NOTE:

- **Gas escapes when drilling.**

- Continue drilling until tube inside is drilled through (approx. 25 mm deep).
- Drill a second hole, 6 mm in diameter - **arrow B** - , through outer and inner strut tubes.
- Hold strut over oil collecting pan and move piston rod back and forth several times over entire range until no more oil escapes.

B - Open with pipe cutter

Special tools, testers and auxiliary items required

- Pipe cutter, e.g. Stahlwille Express 150/3

CAUTION: Wear protective eye wear when drilling or sawing.

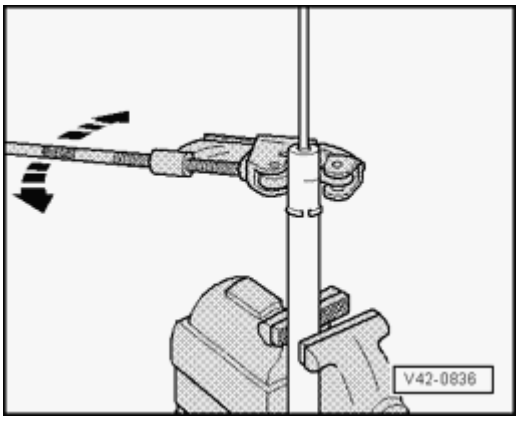

Fig. 4: Cutting Through Outer Tube Using Pipe Cutter
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drill a 3 mm diameter hole - **arrow** - through outer strut tube or saw through tube wall.

NOTE:

- **Gas escapes when drilling or sawing.**

- Position a pipe cutter (e.g. Stahlwille Express 150/3) as shown in illustration and cut through outer tube.
- Pull piston rod upward, hold inner tube in place with pliers and push it downward so that it remains in outer tube when piston rod is slowly raised.
- Remove piston rod from inner tube.
- Empty strut tube.

Power steering gear, emptying

NOTE:

- **Room temperature should be at least 20°C to empty steering gear.**

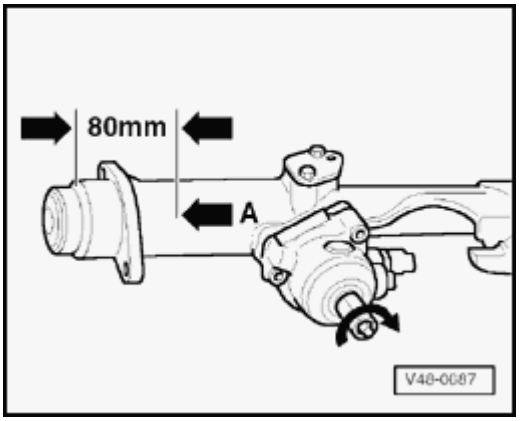

Fig. 5: Turning Steering Pinion
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn steering pinion in direction of - **arrow** - to stop.

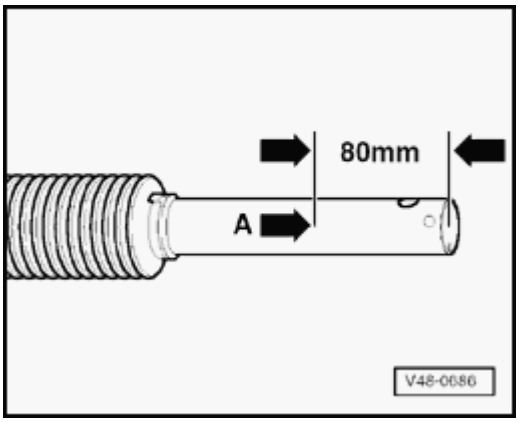

Fig. 6: Identifying Steering Gear Saw Dimensions
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp steering gear horizontally in vise.
- Place collecting reservoir under steering gear.
- Saw steering gear at place indicated by - **arrow A** -.
- Hold cut steering gear over oil collecting pan and allow hydraulic oil to drain. If necessary, turn steering pinion to opposite stop.

STRUT, CHECKING

Strut leak

Struts are frequently rejected and exchanged because of leaks. Examinations on test stand and on the vehicle have shown that the replacement of a large number of rejected strut was not justified.

Slight leaking of oil ("sweating") at piston rod seal is no reason to replace a strut. A strut with oil is OK under the following circumstances:

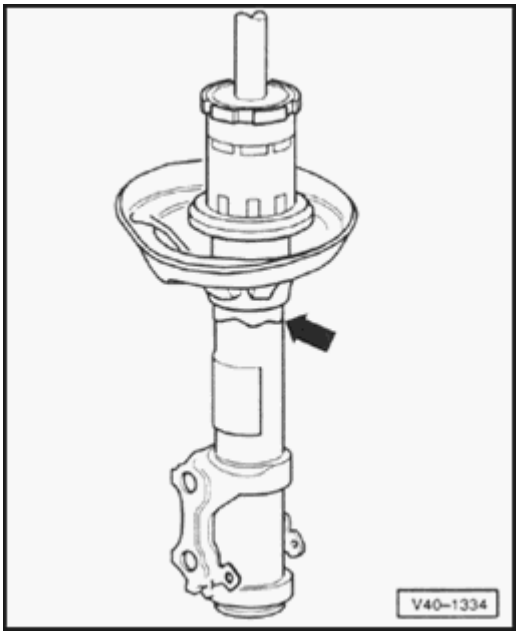

Fig. 7: Identifying Fluid Seepage
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Oil leak (shown screened in illustration) is visible, but dull, matte and possibly dry from dust
- Oil leak reaches at most, from upper shock absorber seal (piston rod seal) to lower spring plate - **arrow** -.

NOTE:

- **A slight oil leak is advantageous because it lubricates the piston rod seal and extends its service life. This applies to struts on front and rear axles**

Strut, noises

Struts are frequently rejected and exchanged because of rumbling noises. Examinations on the test stand and vehicle have shown that there was not a complaint with approx. 70% of the rejected shock absorbers and the replacement was not justified.

With complaints that are interpreted as rumbling or knocking sounds, proceed as follows.

- Determine on a road test with the customer - if possible on a dry stretch of road with irregularities - where, when and how these sounds change.

NOTE:

- **In the rarest cases, the strut is the cause of the noises.**

Strut, checking while removed

Faulty struts are noticeable when driving due to loud rumbling noises - a result of wheel hopping - especially on poor stretches of road. Moreover, they can be recognized by a large loss of oil.

NOTE:

- **Struts are maintenance-free, shock absorber oil cannot be topped off.**

A removed strut can be checked by hand as follows:

- Press strut together by hand.
- Piston rods must move smoothly and with uniform difficulty over the entire range
- Release piston rods.
- On struts with sufficient gas pressure, piston rods return to initial position by themselves.

NOTE:

- **If this is not the case, strut must be replaced. As long as there is no large loss of oil, the mode of operation corresponds to that of a conventional strut.**
- **The damping function is also completely available without gas pressure, as long as there is no large loss of oil. However, noise may increase.**

Struts, testing on shock tester

Struts can be checked while installed using the shock tester (strut testing device). The damping effect can be evaluated based on the dial reading or print-out.

Special tools, testers and auxiliary items required

- Boge shock tester or
- Sachs shock tester V.A.G 1975 or
- Maha shock absorber tester VAS 1990

NOTE:

- **Temperature +10 to +40°C.**
- **Driver in vehicle.**
- **Tire pressure OK.**
- **Drive vehicle straight onto center of wheel contact plates.**
- **Front wheels in straight position.**
- **Parking not engaged, foot brake not activated.**

Threshold

Strut condition can only be judged as follows:

- Sufficient damping effect

or

- Insufficient damping effect

NOTE:

- **Intermediate values for reduced damping performance cannot be read out.**
- **A prognosis on service life is not permitted.**
- **Measured values that come about from involvement of suspension travel end stops are incorrect.**

The following values apply only to the test stands named above. If the specified values are exceeded, the strut action has weakened enough that a replacement is recommended.

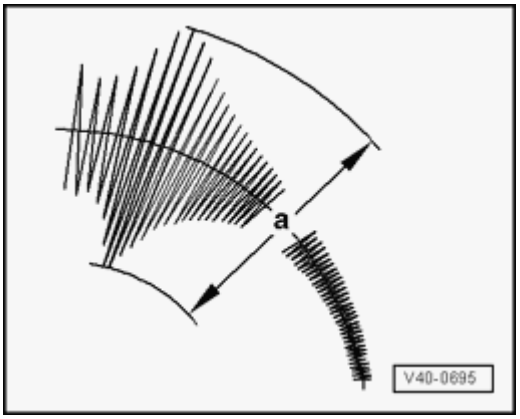

Fig. 8: Damping Effect Measurement
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Example:

Threshold = 70

- a = greater than 70: Insufficient damping effect
- a = less than 70: Sufficient damping effect

Strut combination installed in vehicle is indicated by corresponding PR number on vehicle data plate.

Clarification of weight Production Relevant numbers (PR no.) **Clarification of Production Control numbers (PR No.)**

Threshold "a" in mm

NOTE:

- **If the readout value is greater than the limit value "a" (table value): Damping effect insufficient --> replace strut.**
- **If the readout value is less than the limit value "a" (table value): Damping effect sufficient --> strut does not need to be replaced.**

Vehicles up to VIN 400 000

Vehicle type	Front axle	Rear axle	Comment
A4 standard VA sedan/wagon	44	/	Up to and including support spring OJJ (up to VA weight 918 Kg)
A4 standard VA sedan/wagon	46	/	from support spring OJK (from VA weight 919 Kg)
A4 standard HA sedan/wagon	/	66	Applies to front and Quattro
A4 Standard VA convertible	44	/	No weight difference
A4 Standard HA convertible	/	60	Applies to front
A4 Sport VA sedan/wagon	43	/	Up to and including support spring OJG (up to VA weight 923 Kg)
A4 Sport VA sedan/wagon	45	/	from support spring OJH (from VA weight 924 Kg)
A4 Sport HA sedan/wagon	/	65	Applies to front and Quattro
A4 Sport VA convertible	40	/	Up to and including support spring OJG (up to VA weight 923 Kg)
A4 Sport VA convertible	42	/	from support spring OJH (from VA weight 924 Kg)
A4 Sport HA convertible		65	Applies to front and Quattro
A4 heavy duty VA sedan/wagon	48	/	Up to and including support spring OJJ (up to VA weight 918 Kg)
A4 heavy duty VA sedan/wagon	48	/	from support spring OJK (from VA weight 919 Kg)
A4 heavy duty HA sedan/wagon	/	66	Applies to front and Quattro
A4 S4 VA sedan/wagon	42	/	No weight difference
A4 S4 HA sedan/wagon	/	55	Applies to Quattro

Vehicles from VIN 400 001

Vehicle type	Front axle	Rear axle	Comment
A4 standard VA sedan/avant	42	/	Up to and including support spring OJJ (up to VA weight 918 Kg)
A4 standard VA sedan/wagon	44	/	from support spring OJK (from VA weight 919 Kg)
A4 standard HA sedan/wagon	/	47	Applies to front and Quattro
A4 Sport VA sedan/wagon	50	/	Up to and including support spring OJG (up to VA weight 923 Kg)
A4 Sport VA sedan/wagon	52	/	from support spring OJH (from VA weight 924 Kg)
A4 Sport HA sedan/wagon	/	42	Applies to front and Quattro
A4 heavy duty VA sedan/wagon	48	/	Up to and including support spring OJJ (up to VA weight 918 Kg)
A4 heavy duty VA sedan/wagon	48	/	from support spring OJK (from VA weight 919 Kg)
A4 heavy duty HA sedan/wagon	/	66	Applies to front and Quattro

SUBFRAME, SECURING TO BODY

Damaged threads, repairing

Damaged threads can be repaired with wire inserts (Heli-Coil).

See component overviews to learn which threads can be repaired.

Shavings that remain in the body must be imbedded in wax.

Longmember thread, servicing

It is possible to service the threads of weld nuts in longitudinal member depending on certain conditions.

- Servicing work may only be performed once per thread.
- If servicing is necessary after this, the nuts must be replaced.

CAUTION: When drilling, it is essential that eye protection be worn!

- Have thread repair checked by the responsible foreman or next person in charge.
- Thread insert must be same length as thread in body.
- Correct any damage to the underbody sealant layer.

40 - FRONT SUSPENSION

FRONT SUSPENSION, SERVICING

General Information:

When installing waxed components, contact surfaces must be cleaned. Contact surfaces must be free of wax and grease.

Torque specifications for unoiled bolts and nuts are given.

Welding or straightening operations are not permitted on load-bearing or wheel-controlling components.

Always avoid the following actions with coil springs: Hammer stroke, welding beads, applying color identification later.

Do not perform any welding or grinding (separating work) in coil spring or suspension strut area! Cover coil spring or suspension struts if necessary.

Vehicles without drive axle must not be moved, otherwise wheel bearing will be damaged. If vehicle must be moved, observe the following:

- Install an outer joint in place of the drive axle.
- Tighten outer joint to 115 Nm (screw M14) or 200 Nm (screw M16).

Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at control arms if vehicle is in curb weight position --> **Wheel bearing, lifting to curb weight position**

If the vehicle must still be aligned, every bolt and nut that must be loosened for adjustment is only tightened to torque specification. After measurement/adjustment is complete, tighten bolts and nuts to prescribed additional torque angle.

CAUTION: If vehicle will be driving on the streets, all bolts and nuts must be tightened properly!

Wheel bearing, lifting to curb weight position

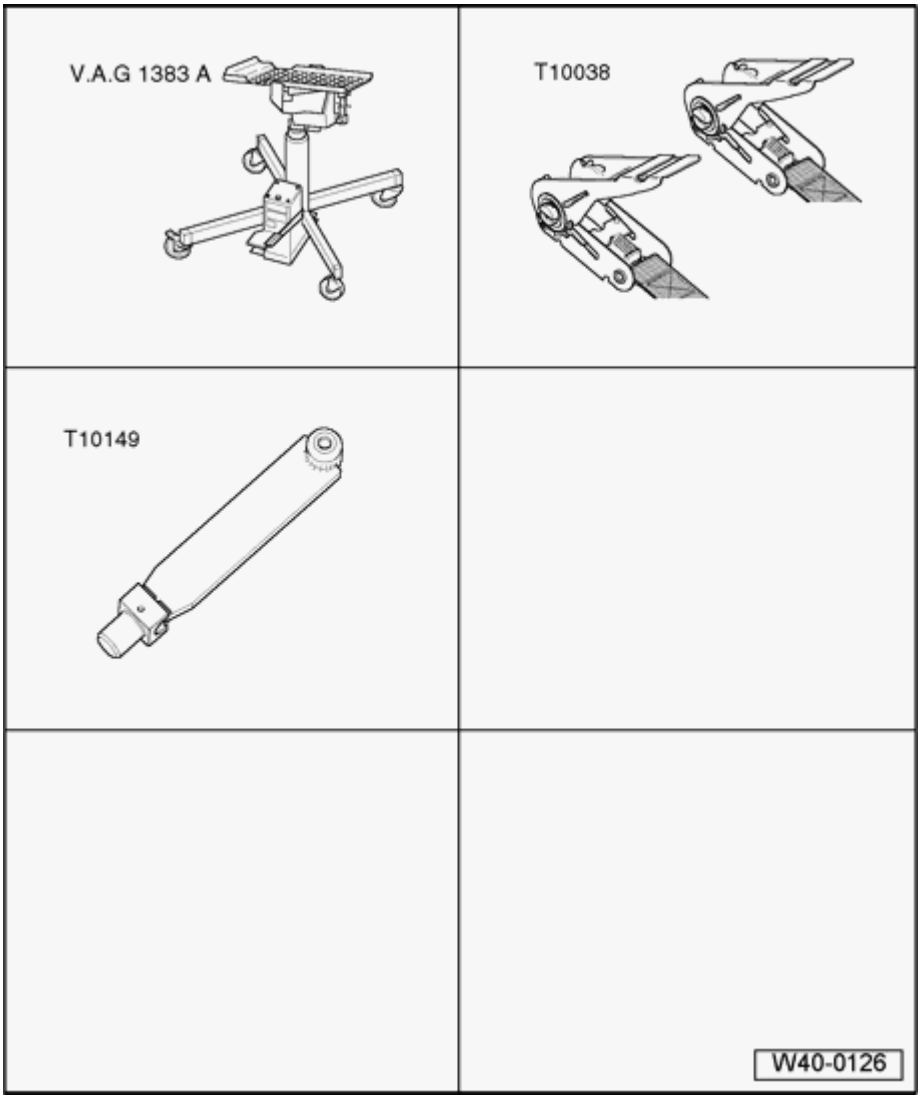

Fig. 9: Identifying Special Tools - Axle And Wheel Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Engine/transmission jack V.A.G 1383 A
- Tensioning Strap T10038
- Wheel hub support T10149

NOTE:

- **All bolts at suspension parts with bonded rubber bushings must always be tightened in curb weight position (unloaded condition).**

Bonded rubber bushings have a limited torsional range.

Parts with bonded rubber bushings must be brought into a position that corresponds to the position in driving

mode before being tightened (curb weight position)

Otherwise, bonded rubber bushing will be stressed resulting in a shortened service life.

By raising appropriate suspension using engine/transmission jack V.A.G 1383 A and Wheel Hub Support T10149 , this position can be simulated on the hoist.

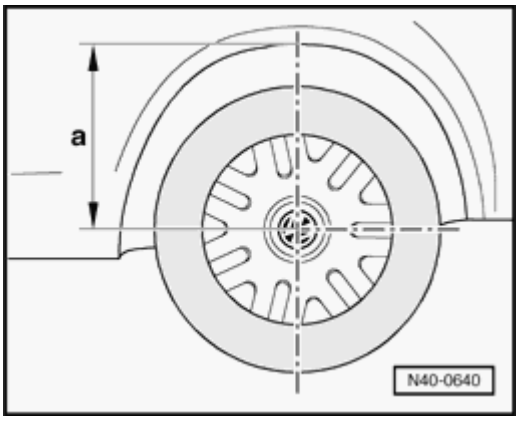

Fig. 10: Measuring Dimension From Center Of Wheel To Lower Edge Of Wheelhousing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before starting work, take measurement - **a** - , e.g. with tape measure, from center of wheel to lower edge of wheelhouse.

The measurement must be taken in curb weight position (unloaded).

- Make a note of the measurement. It will be needed for tightening the bolts/nuts.

Before appropriate suspension is raised, vehicle must be strapped to lift arms of hoist using tensioning straps T10038.

If a vehicle is not secured, there is danger that the vehicle could slip off the lift!

- Turn wheel hub until one of the holes for the wheel bolts is at the 12 o'clock position.
- Install wheel hub support T10149 with wheel bolt on wheel hub.

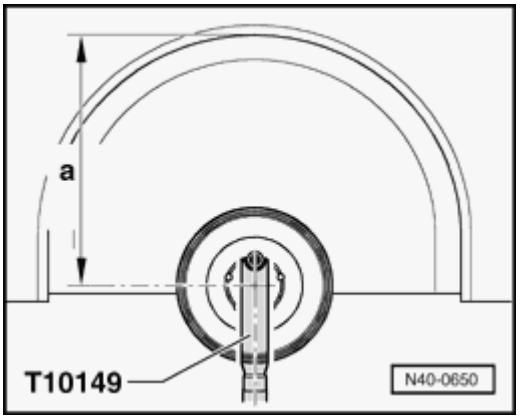

Fig. 11: Measuring Wheel Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Using engine/transmission jack V.A.G 1383 A , lift wheel bearing housing until dimension - **a** - is reached.

Tightening of the respective bolts/nuts must then only occur after dimension - a - , which was measured before installation between the wheel hub center and the lower edge of wheelhousing, has been attained

CAUTION:

- **Do not lift or lower vehicle with engine/transmission jack below vehicle.**
- **Do not leave engine/transmission jack V.A.G 1383 A below vehicle any longer than necessary.**

- Tighten respective bolts/nuts.
- Lower steering knuckle.
- Move engine/transmission jack away from under vehicle.
- Remove wheel hub support T10149.

Component, assembly overview

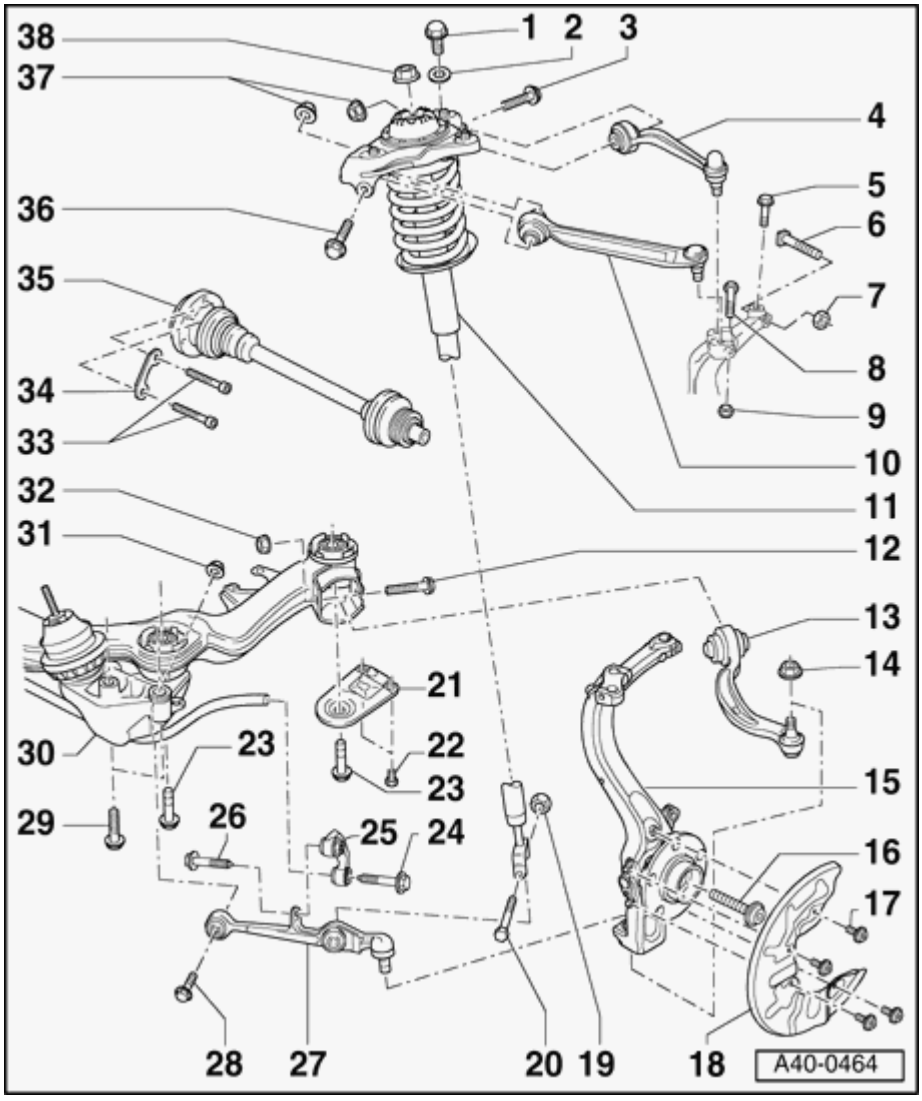

Fig. 12: Front Suspension Component, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Hex bolt, 75 Nm

2 - Washer

3 - Hex bolt

- Always replace if removed

4 - Upper rear link

- Removing and installing --> **Upper links, removing and installing**
- Replace bearing --> **Top front and rear link bearings, replacing**

5 - Hex bolt, 7 Nm

- For adjusting track constants "S"

6 - Bolt

7 - Hex nut, self-locking, 45 Nm

- Always replace if removed

8 - Hex bolt, 40 Nm

9 - Nut, self-locking

- Always replace if removed

10 - Upper front link

- Mounting bracket, removing and installing --> **Mounting bracket and upper links**
- Replace bearing --> **Top front and rear link bearings, replacing**

11 - Suspension strut

- Note different vehicle versions, see vehicle data plate. **Clarification of Production Control numbers (PR No.)**
- On vehicles with Dynamic Ride Control (DRC II), empty and fill system --> **Dynamic Ride Control (DRC II), emptying and filling**
- Removing and installing --> **Suspension strut**
- Servicing --> **Suspension strut, servicing**
- Mounting bracket, removing and installing --> **Mounting bracket and upper links**

12 - Hex head screw, 70 Nm plus an additional 180° turn.

- Always replace if removed

13 - Lower guide link

- Guide link, removing and installing --> **Guide link, removing and installing**

If hydro-mount leaks, it must be replaced --> **Guide link mountings, replacing**

14 - Hex nut, self-locking, 110 Nm

- Always replace if removed

15 - Wheel bearing housing

- On vehicles with headlight range control module, note sensor removal and installation --> **Vehicles with automatic headlight vertical aim control, vehicle level sensor**.
- Removing and installing --> **Wheel bearing housing**
- Servicing --> **Wheel bearing housing with bolted wheel bearing, servicing**

16 - Collar bolt

- Always replace if removed
- Note work sequence when loosening **Remove drive axle** , when tightening **Install drive axle**.
- Torque specification **Install drive axle**

17 - Flange bolt, 10 Nm

18 - Shield plate

19 - Nut, self-locking

- Always replace if removed

20 - Hex bolt 90 Nm

21 - Subframe support

- A tunnel crossmember can also be installed instead of subframe supports.
- Tunnel crossmember, removing and installing --> **Tunnel crossmember**

22 - Hex bolt, 55 Nm

23 - Hex bolt

- 110 Nm plus an additional 90° ($^{1}/_{4}$ turn)
- Always replace if removed
- Threads in body can be repaired according to DIN 8140 using wire thread inserts (Heli-Coil). The thread insert must be same length as the threads in the body.

24 - Hex bolt

- 40 Nm plus an additional 90° ($^{1}/_{4}$ turn)
- Always replace if removed

25 - Connecting link

26 - Hex bolt

- 40 Nm plus an additional 90°($^{1}/_{4}$ turn)
- Always replace if removed

27 - Lower link

- On vehicles with headlight range control module, note sensor removal and installation --> **Vehicles with automatic headlight vertical aim control, vehicle level sensor**.
- Control arm, removing and installing on vehicles with 3.0L TDI and 3.2L FSI --> **Control arm, removing and installing (vehicles with 3.0L TDI and 3.2L FSI)**

28 - Hex bolt 70 Nm plus an additional 180° turn.

- Always replace if removed

29 - Hex bolt, 75 Nm

- Always replace if removed
- Threads in body can be repaired according to DIN 8140 using wire thread inserts (Heli-Coil). Thread insert must be same length as thread in body.

30 - Subframe

- Various versions --> **Subframe bushings, replacing**
- On vehicles with headlight range control module, note sensor removal and installation --> **Vehicles with automatic headlight vertical aim control, vehicle level sensor**.
- Removing and installing --> **Subframe**

- Bonded rubber bushings for subframe, replacing --> **Subframe bushings, replacing**
- Tunnel crossmember, removing and installing --> **Tunnel crossmember**

31 - Nut, self-locking

- Always replace if removed

32 - Nut, self-locking

- Always replace if removed

33 - Multi-point socket head bolt

- First pre-tighten all screws to 15 Nm, then tighten all screws to specified torque.
- Torque specifications:

Bolt M 8: 40 Nm

Bolt M10: 70 Nm

34 - Backing plate

35 - Drive axle

- Removing and installing --> **Front drive axle, servicing**

36 - Hex bolt

- Always replace if removed

37 - Nut, self-locking

- 50 Nm plus an additional 90°($^1/_4$ turn)
- Always replace if removed

38 - Collar nut

- 50 Nm
- Always replace if removed

SUSPENSION STRUT

Suspension strut, removing and installing

Special tools, testers and auxiliary items required

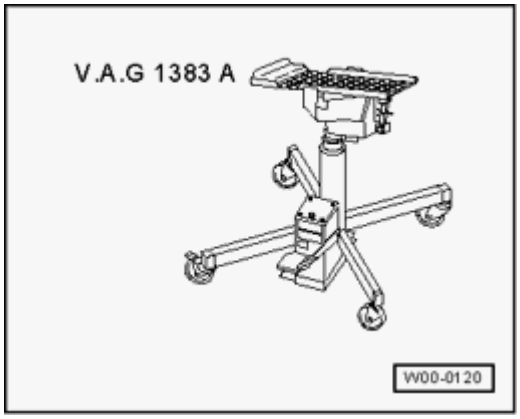

Fig. 13: Identifying Engine/Transmission Jack V.A.G. 1383 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Engine/transmission jack V.A.G 1383 A

- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332

Removing

On vehicles with Dynamic Ride Control (DRC II), empty and fill system --> **Dynamic Ride Control (DRC II), emptying and filling**

- Remove wheel covers, remove cover cap on light-alloy wheels (removal hook in vehicle tool kit).
- Remove wheel.
- Secure brake disc with a wheel bolt.
- Before removing left suspension strut, level control system sensor link must be loosened from link on vehicles with headlight range control module by opening retaining clip --> **Vehicles with automatic headlight vertical aim control, vehicle level sensor**.

- Unclip ABS line from bracket at brake caliper.

Vehicles with brake caliper HP-2

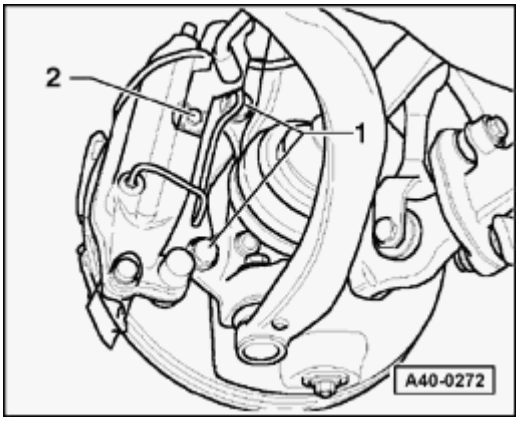

Fig. 14: Identifying Hex Bolt, Brake Line Bracket, Brake Caliper Bolts And Brake Caliper
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove hex bolt - **2** - and remove brake line bracket.
- Remove bolts - **1** - from brake caliper and remove brake caliper.
- Reinstall brake line bracket. Install hex bolt - **2** - and tighten.
- Secure brake caliper to body so that caliper weight does not bend or damage brake line.

Continued for all vehicles

- Remove brake caliper and secure to body so that weight of caliper does not stress or damage brake hose or brake line.

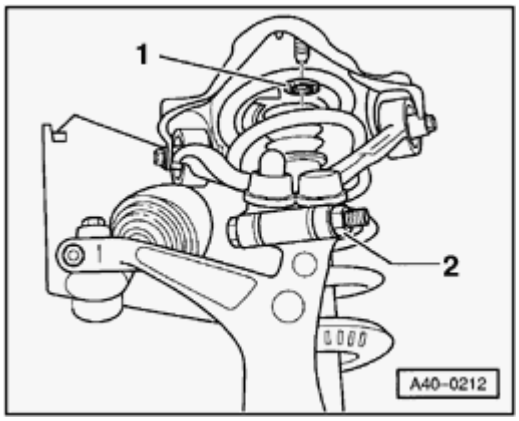

Fig. 15: Removing Clip, Nut, Hex Bolt And Control Arms
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

This clip does not need to be inserted again.

- Remove - **2** - , remove hex bolt and remove both control arms upward.

The slits in the wheel bearing housing must not be widened using a chisel or similar tool!

- Protect steering gear boot from damage with a protective sleeve.

For clarity the illustration shows a steering gear that has been removed.

Protective sleeve - **1** - can be ordered under part number 893 512 137.

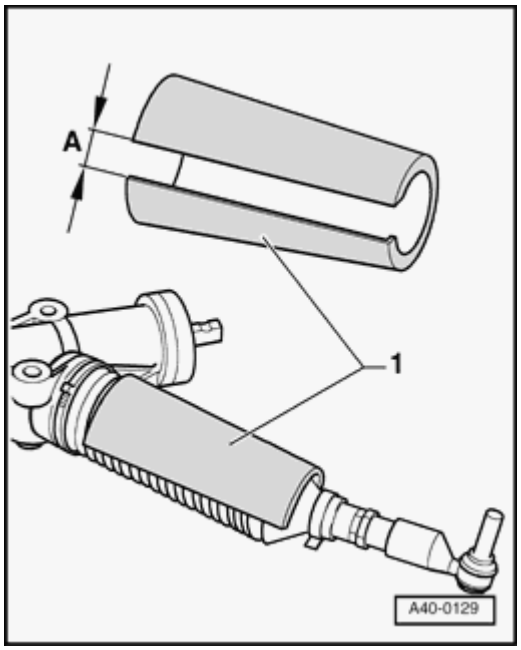

Fig. 16: Identifying Protective Sleeve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- A 20 to 25 mm strip, dimension - **A** - , must be cut out of protective sleeve - **1** -.
- Carefully deburr cut surfaces.
- Slide protective sleeve over steering gear boot. The open side of sleeve must point downward.

In order not to damage lower link joints, it is necessary to brace against too strong rebound, e.g. using engine/transmission jack V.A.G 1383 A.

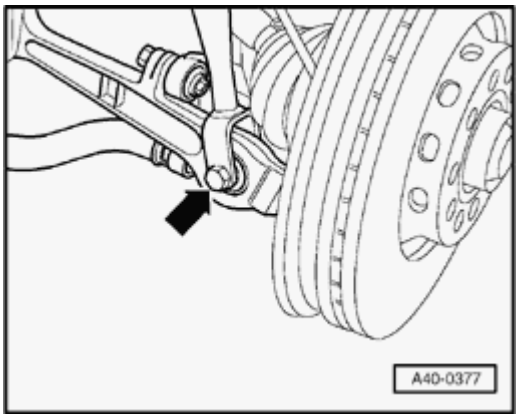

Fig. 17: Removing Hex Bolt From Suspension Strut/Control Link
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove hex bolt - **arrow** - from suspension strut/control link.
- Swing wheel bearing housing to side.
- Loosen coolant reservoir connection.
- Remove plenum chamber cover.

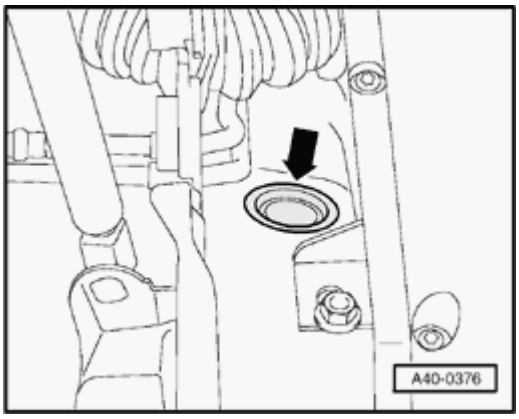

Fig. 18: Remove Screw Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove screw cover - **arrow** -.

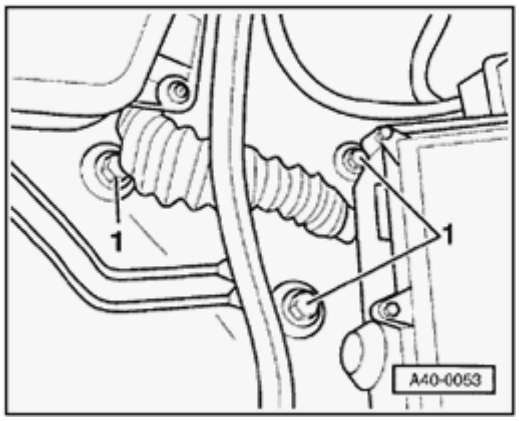

Fig. 19: Removing/Installing Hex Bolts In Plenum Chamber
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove hex bolts - **1** - in plenum chamber.
- Take out suspension strut with mounting bracket.

Do not damage protective joint boot when doing this!

Installing

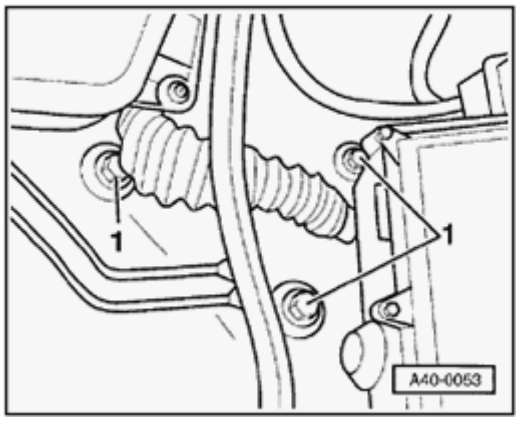

Fig. 20: Removing/Installing Hex Bolts In Plenum Chamber
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert suspension strut with mounting bracket into suspension turret. Tighten hex bolts - **1** -.

NOTE:

- **Make sure that washers are seated correctly.**

- Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at control arms if vehicle is in curb weight position --> **Wheel bearing, lifting to curb weight position**

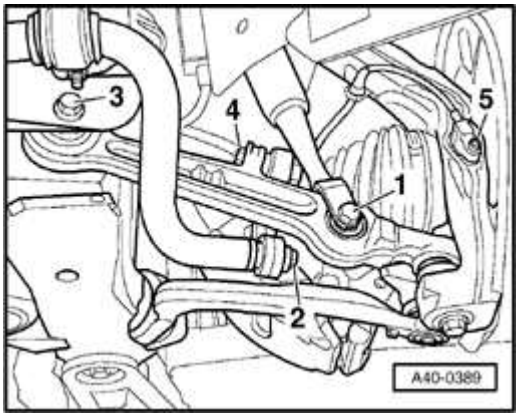

Fig. 21: Identifying Guide Link/Subframe Connection Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert suspension strut forked head into control arm and tighten threaded connection - **1** -

NOTE:

- **Bolt must be inserted opposite direction of travel.**

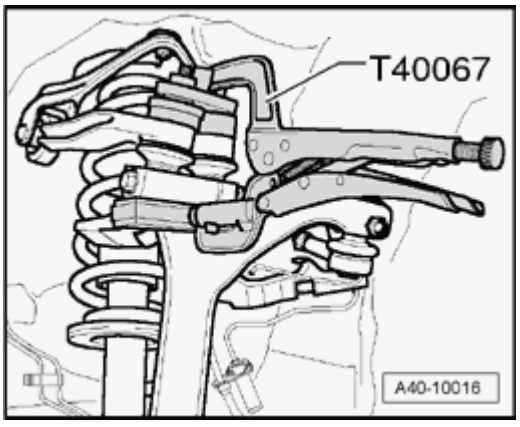

Fig. 22: Inserting Both Upper Link Joint Pins In Wheel Bearing Housing And Bend Downward As Much As Possible Using Pliers T40067
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert both upper link joint pins in wheel bearing housing and bend downward as much as possible using pliers T40067.

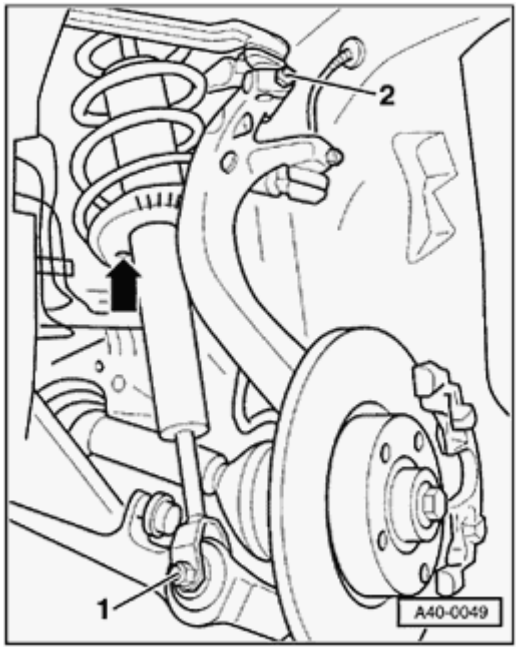

Fig. 23: Inserting Suspension Strut Forked Head Into Link
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert new bolt - **2** - and self-locking nut and tighten
- Insert ABS wiring into retainer on brake caliper.
- Install brake disc, install and tighten brake caliper. --> **46 - BRAKES - MECHANICAL COMPONENTS**
- On vehicles with headlight range control, install vehicle level sensor link at control arm --> **Vehicles with automatic headlight vertical aim control, vehicle level sensor**.

- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

Suspension strut, servicing

Special tools, testers and auxiliary items required

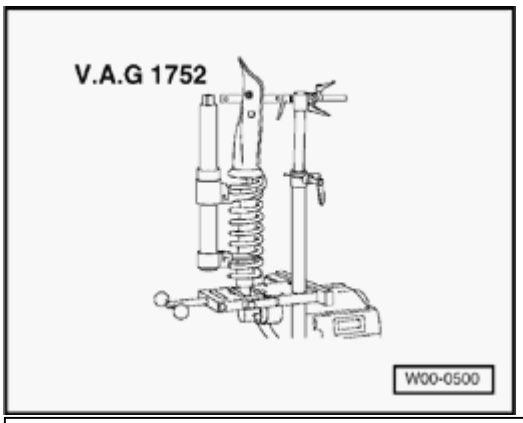

Fig. 24: Spring Compressor Kit V.A.G 1752
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Spring compressor V.A.G 1752/1
- Spring mounting tool V.A.G 1752/2
- Spring holder V.A.G 1752/4
- Spring holder V.A.G 1752/6

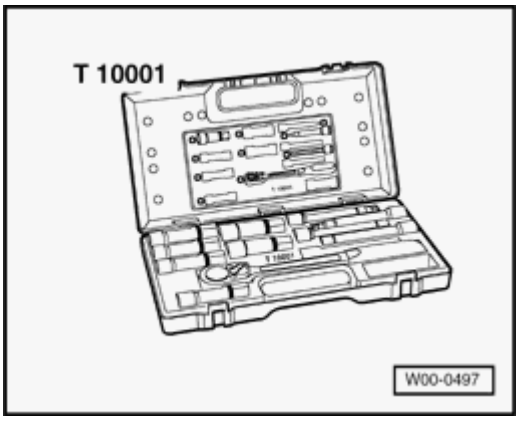

Fig. 25: Shock Absorber Set T10001
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Shock absorber set T10001/3
- Shock absorber set T10001/4
- Shock absorber set T10001/7
- Shock absorber set T10001/11

Assembly overview

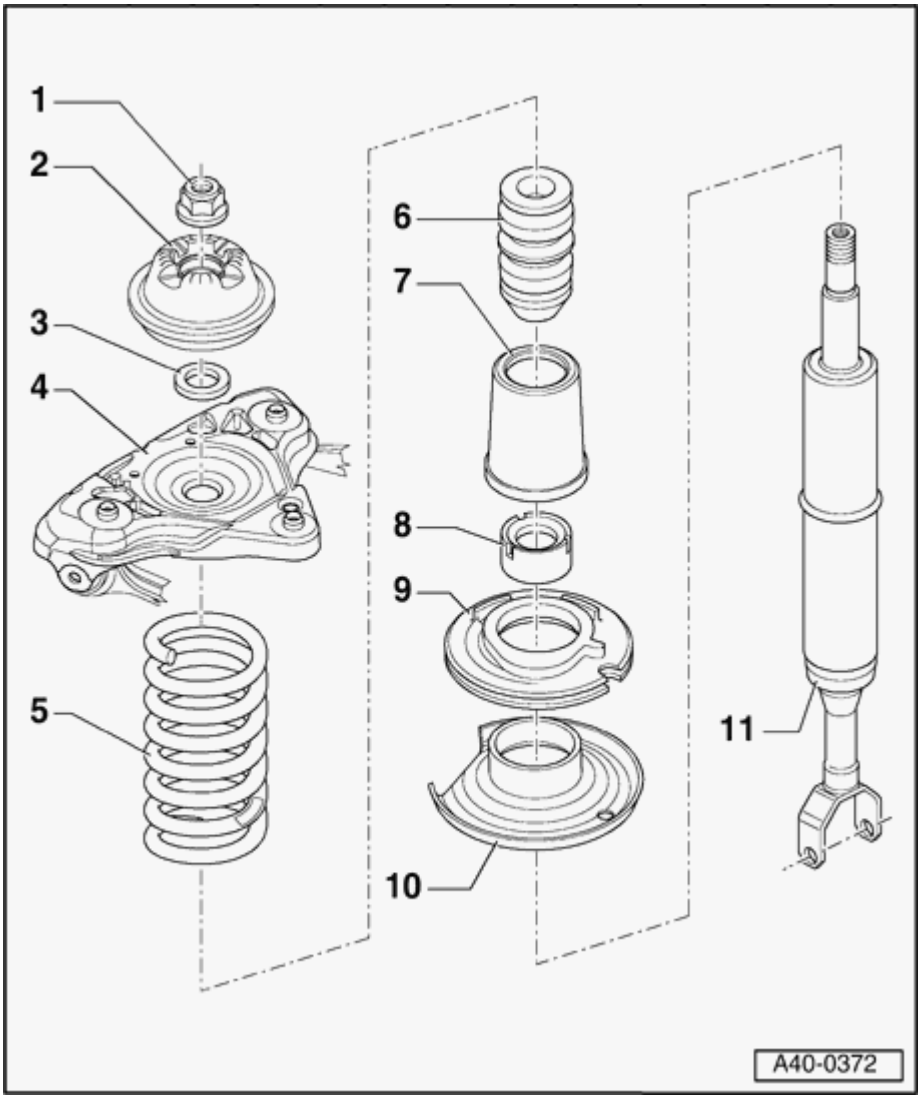

Fig. 26: Suspension Strut Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Collar nut, 50 Nm

- Always replace

2 - Strut mounting

3 - Washer

4 - Mounting bracket

- Installed location **Mounting bracket location**

5 - Coil spring

- Removing **Coil spring, removing** and **Coil spring, removing**
- Installing **Coil spring, installing**
- Note different vehicle versions, see vehicle data plate. **Clarification of Production Control numbers (PR No.)**

6 - Additional spring

7 - Protective sleeve

8 - Protective cap

9 - Lower spring support

10 - Lower spring seat

- Installed location **Lower suspension strut installation location**

11 - Strut

- Replacing **Strut, replacing**
- Note different vehicle versions, see vehicle data plate. **Clarification of Production Control numbers (PR No.)**
- Faulty strut must be vented and emptied before disposal --> **Disposal of fluid-filled components to meet environmental requirements**

Clarification of Production Control numbers (PR No.)

Strut combination installed in vehicle is indicated by corresponding PR number on vehicle data plate.

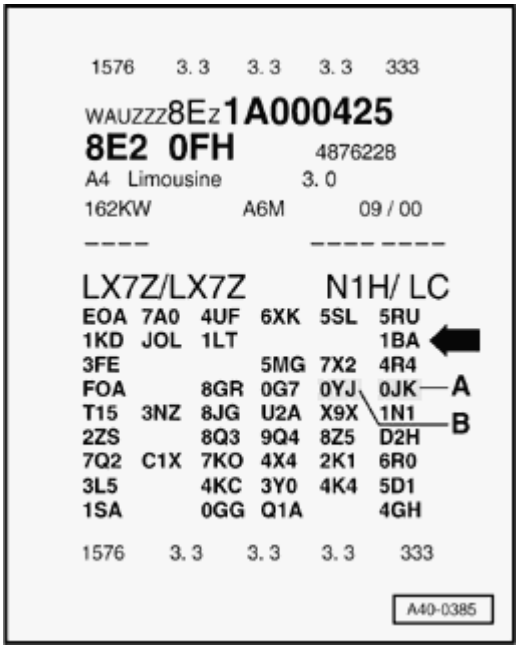

Fig. 27: Example Of Vehicle Data Sticker
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Example of a vehicle data sticker

- Front axle PR no. is item - **A** -.
- Rear axle PR no. is item - **B** -.

The vehicle data sticker is located in spare wheel well and in Maintenance booklet.

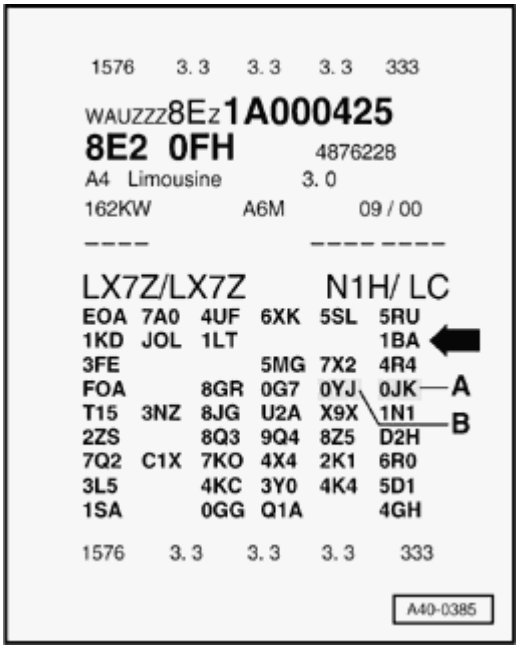

Fig. 28: Example Of Vehicle Data Sticker

Courtesy of VOLKSWAGEN UNITED STATES, INC.

You can find the suspension version PR no. in illustration see - **arrow** -.

1BA = Standard suspension

1BE = Sport suspension (20 mm lower than 1BA)

1BD = Sport suspension S4

1BR = Comfort - heavy duty suspension (13 mm higher than 1BA)

1BV = Sport suspension (quattro GmbH)

2MC = Basic suspension (quattro GmbH RS4)

2ME = Sport suspension (quattro GmbH RS4)

Coil spring, removing

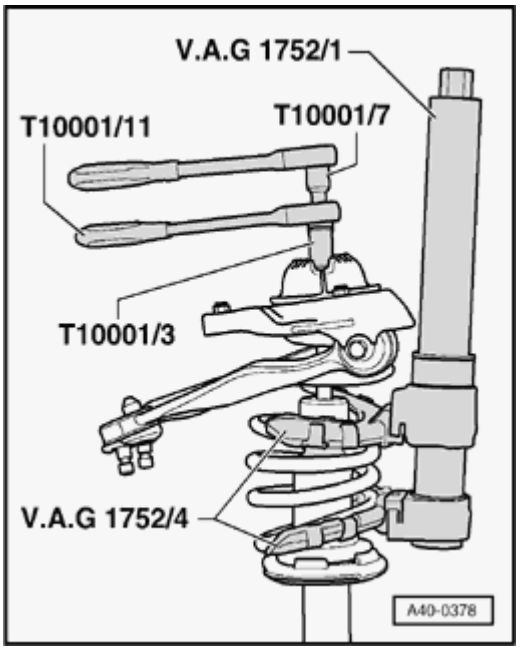

Fig. 29: Coil Spring, Removing/Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Suspension strut, clamping in vise
- Pretension coil spring using spring compressor V.A.G 1752/1 and spring holder V.A.G 1752/4 until upper suspension strut is free.

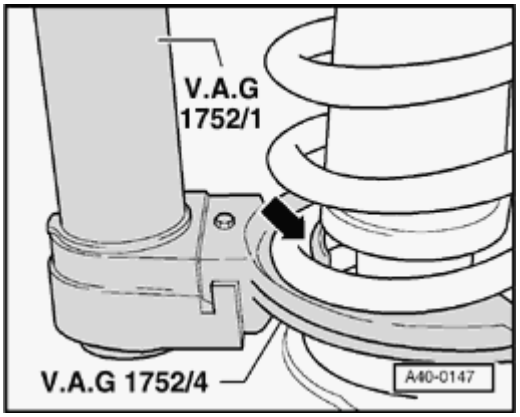

Fig. 30: Ensuring Correct Seating Of Coil Spring In Spring Holder V.A.G 1752/4
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Coil spring, removing

- When doing so, ensure correct seating of coil spring in spring holder V.A.G 1752/4 - **arrow** -.

Coil spring, removing

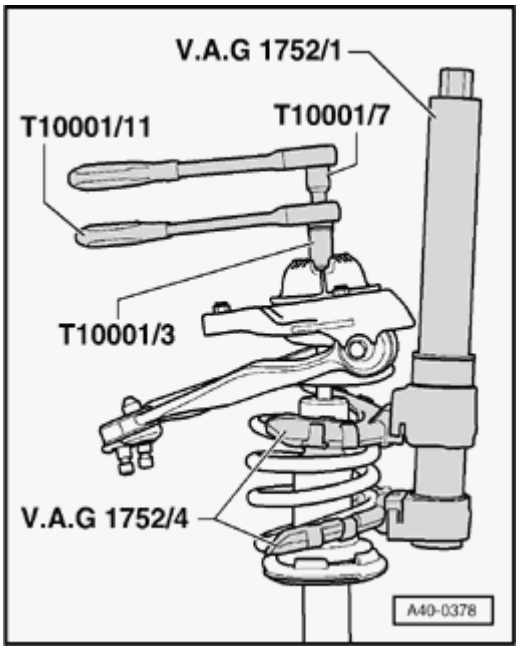

Fig. 31: Coil Spring, Removing/Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove collar nut from piston rod with special tools T10001/3 , T10001/11 and T10001/7.
- Remove individual components of suspension strut and pretension coil spring using spring compressor V.A.G 1752/1.

Strut, replacing

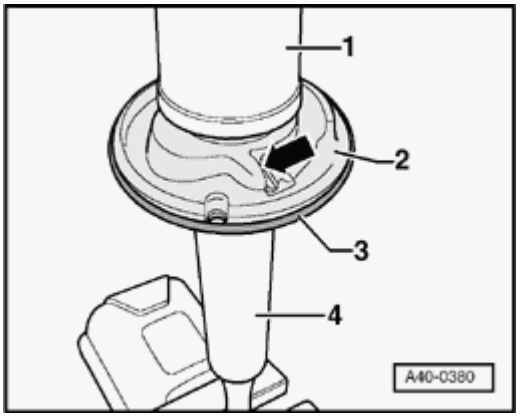

Fig. 32: Strut, Replacing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove protective cap - **1** - and lower spring support - **2** -.
- Mark installation position of lower suspension strut to strut.
- Loosen suspension strut - **3** - using plastic hammer and remove upward.

Lower suspension strut installation location

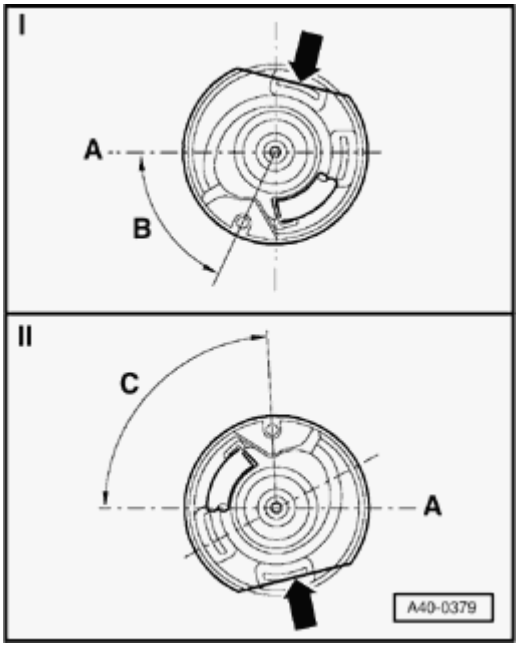

Fig. 33: Lower Suspension Strut Installation Location
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - strut/control arm bolt axis

I = left, B = 65° ± 2°

II = right, C = 87° ± 2°

- Drive suspension strut downward using plastic hammer according to self-provided marking.

With a new damper, transfer marking from old damper.

Note different installation locations on left and right sides.

Suspension strut trimming - **arrow** - must result in clearance to body.

Coil spring, installing

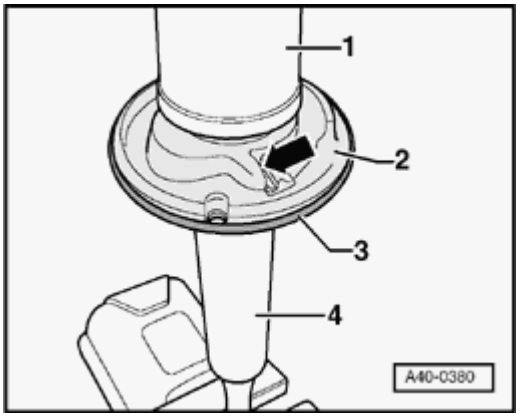

Fig. 34: Strut, Replacing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install suspension strut, lower spring support and protective cap.
- Position pre-tensioned coil spring on lower spring support using spring holder V.A.G 1752/4. End of spring coil must rest against stop - **arrow** -.

Permissible deviation: ± 2°.

Upper spring support location

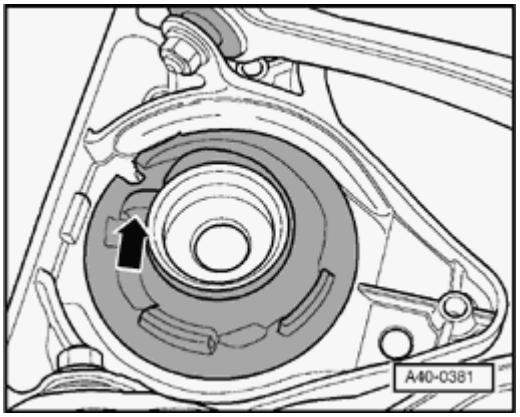

Fig. 35: Upper Spring Support Location
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Position mounting bracket with spring support on pre-tension spring so that spring supports rests against end of coil spring - **arrow** -.

Permissible deviation: ± 2°.

Coil spring, installing

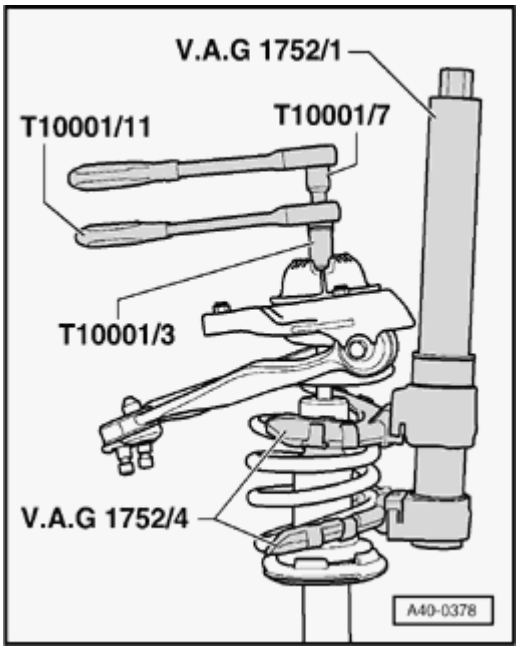

Fig. 36: Coil Spring, Removing/Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position individual suspension strut components. Ensure end of spring rests against upper spring support stop.
- Tighten collar nut with special tools ,
- Do not release spring tension yet

Mounting bracket location

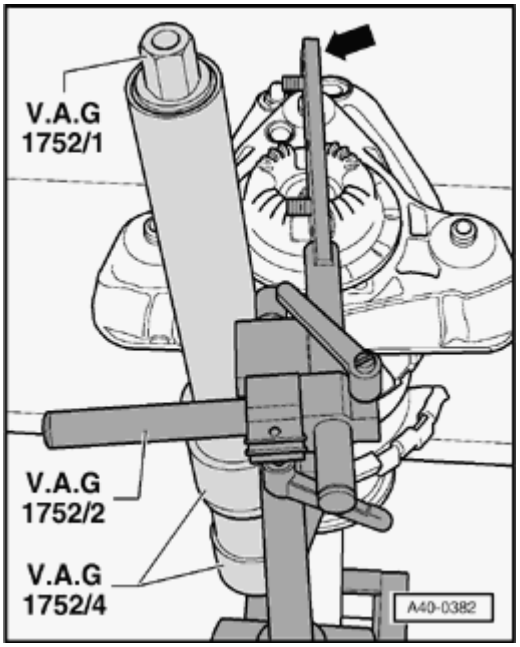

Fig. 37: Tensioning Suspension Strut With Spring Compressor Vertically In Spring Mounting Tool V.A.G 1752/2
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tension suspension strut with spring compressor vertically in spring mounting tool V.A.G 1752/2.

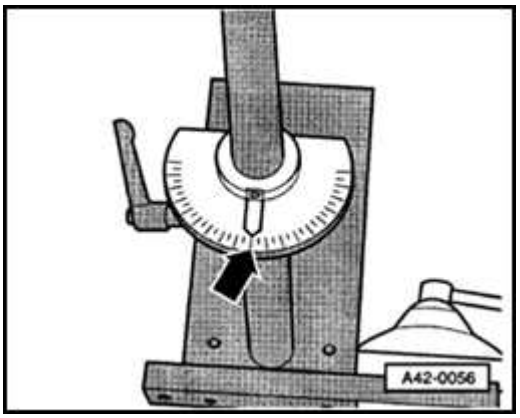

Fig. 38: Loosening Lower Locking Lever And Turn Upper Suspension Strut Until Spring Mounting Tool V.A.G 1752/2 scale is at 7°
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen lower locking lever and turn upper suspension strut until spring mounting tool V.A.G 1752/2 scale is at 7°.
- Ensure ends of spring rest against spring seat and spring support stops.
- Lock locking lever.

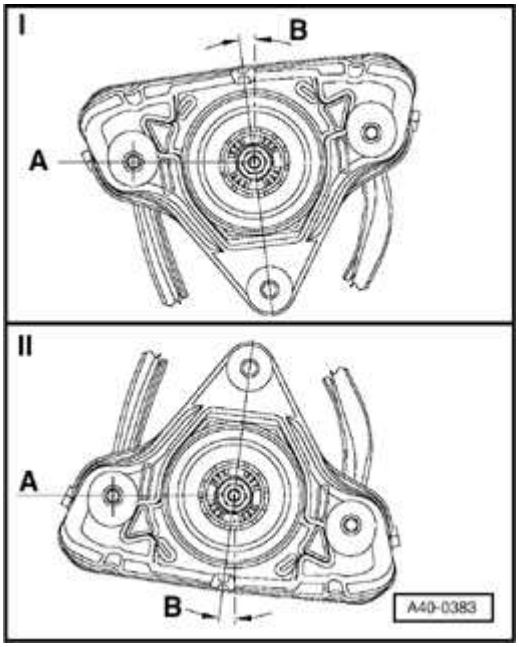

Fig. 39: Identifying Strut/Control Arm Direction Of Travel
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Seen in direction of travel

I = left

II = right

A - strut/control arm bolt axis

- Adjust angle B.

B = 7°

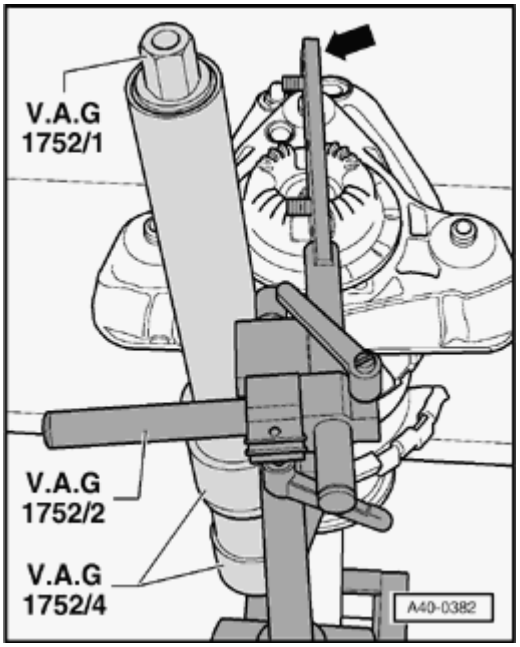

Fig. 40: Tensioning Suspension Strut With Spring Compressor Vertically In Spring Mounting Tool V.A.G 1752/2
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Spring mounting tool V.A.G 1752/2 arm - **arrow** - must be aligned with center of mounting bracket.
- Release tension on spring tensioner 1752/1 and remove.
- Check adjustment, repeat procedure if necessary.

Permissible deviation: ± 2°.

WHEEL BEARING HOUSING

Wheel bearing housing, removing and installing

Special tools, testers and auxiliary items required

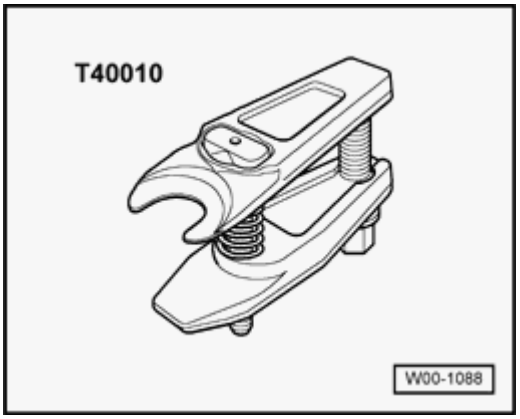

Fig. 41: Ball Joint Puller T40010

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Ball joint puller T40010
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332

Removing

- Remove wheel covers, remove cover cap on light-alloy wheels (removal hook in vehicle tool kit).
- Remove drive axle bolt (only loosen on vehicle resting on wheels -risk of accident-) **Remove drive axle**
- Remove ABS speed sensor wiring from wheel bearing housing bracket.

Vehicles with brake caliper HP-2

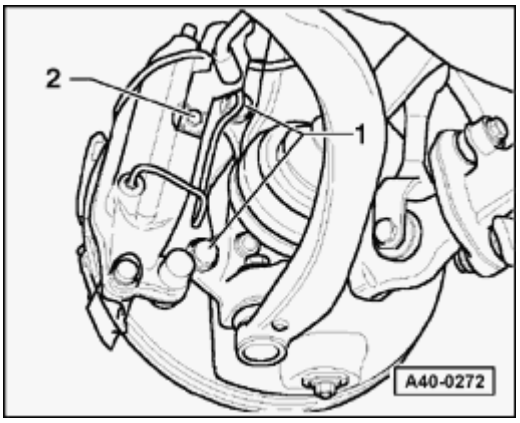

Fig. 42: Removing Hex Bolt, Brake Line Bracket, Bolts From Brake Caliper And Brake Caliper
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove hex bolt - **2** - and remove brake line bracket.
- Remove bolts - **1** - from brake caliper and remove brake caliper.
- Reinstall brake line bracket. Install hex bolt - **2** - and tighten.
- Secure brake caliper to body so that caliper weight does not bend or damage brake line.

Continued for all vehicles

- Remove brake caliper and secure to body so that weight of caliper does not stress or damage brake hose or brake line.

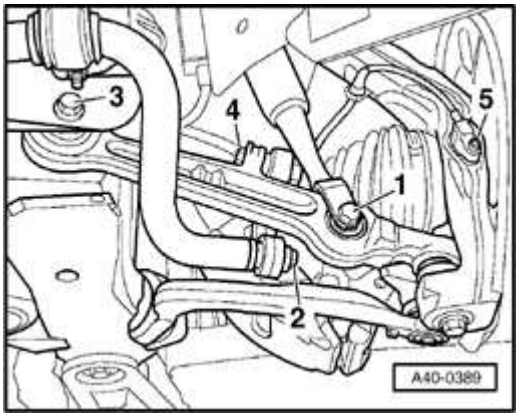

Fig. 43: Identifying Guide Link/Subframe Connection Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove ABS speed sensor bolt - **5** -.
- Disengage ABS cable at wheel bearing housing
- Remove disc brake.

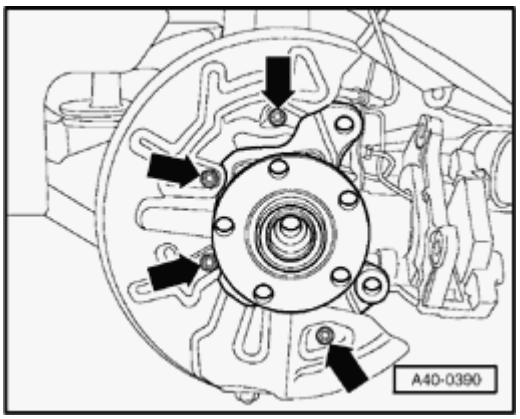

Fig. 44: Removing/Installing Bolts And Cover Plate
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **arrows** - and remove shield.

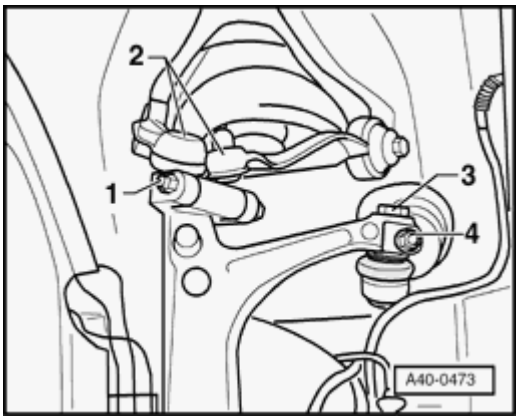

Fig. 45: Identifying Nut, Control Links & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove combi-bolt - **3** - and bolt - **4** -.

NOTE:

- **Align vehicle after repair --> Wheel alignment.**

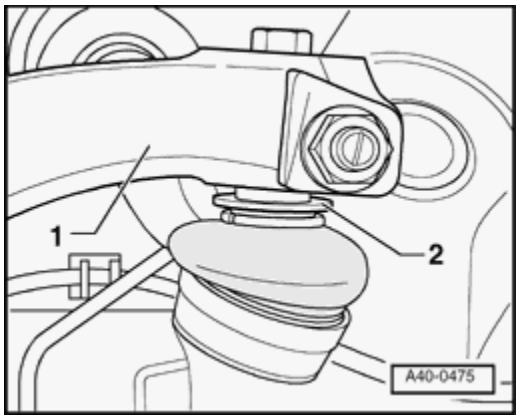

Fig. 46: Identifying Steering Arm & Tie Rod Ball Joint Sealing Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **Do not use a chisel or similar tool between steering arm - 1 - and tie rod ball joint sealing washer - 2 - when removing tie rod, otherwise sealing washer could be damaged.**
- **Tie rod may only be pressed off steering arm over tie rod ball joint pin ends or driven with a wooden or rubber hammer.**

- Press or pull tie rod downward to remove.
- Remove nut from guide link joint pins enough so that it is flush with joint pin threads. Use 4 mm socket wrench to hold joint pin, if necessary.

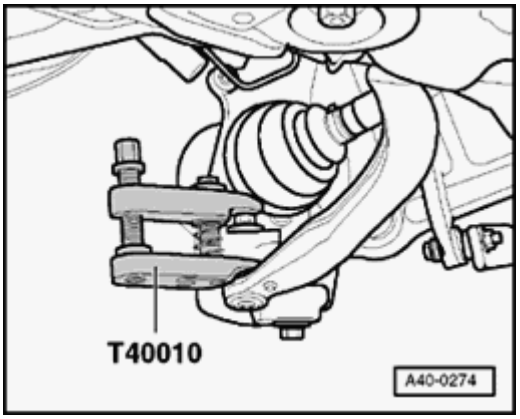

Fig. 47: Separating Guide Link Joint Pin From Tapered Seat Using Ball Joint Puller T40010
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separate guide link joint pin from tapered seat using ball joint puller T40010.

NOTE:

- **Do not damage protective joint boot when doing this!**
- **Ensure both puller lever arms are parallel to each other when using greatest force.**

- On vehicles with headlight range control, remove vehicle level sensor link from link --> **Vehicles with automatic headlight vertical aim control, vehicle level sensor**.
- Remove nut from control arm guide link joint pins enough so that it is flush with joint pin threads. Use 4 mm socket wrench to hold joint pin, if necessary.

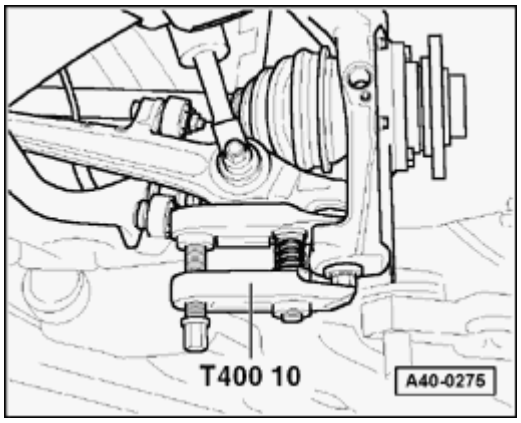

Fig. 48: Separating Lower Link Joint Pin From Tapered Seat Using Ball Joint Puller T40010
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separate lower link joint pin from tapered seat using ball joint puller T40010.

NOTE:

- **Ensure both puller lever arms are parallel to each other when using the greatest force.**

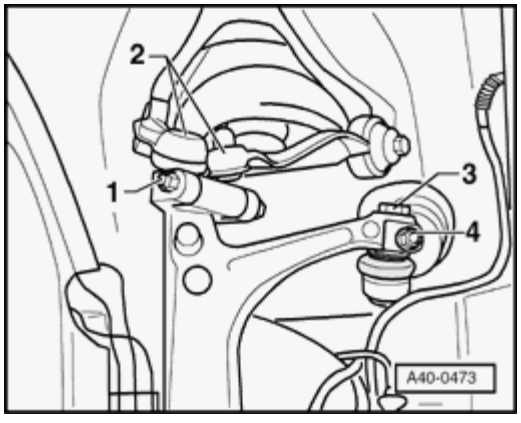

Fig. 49: Identifying Nut, Control Links & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove nut - **1** - , remove hex bolt and lift out both links - **2** - upward.

The slits in the wheel bearing housing must not be widened using a chisel or similar tool!

- Swing wheel bearing housing in direction of arrow away to side, when doing this remove drive axle pin from wheel hub.
- Secure drive axle to body, e.g. with wire.
- Remove nut from joint pin of track control link.
- Remove wheel bearing housing.

Installing

- Install wheel bearing housing.
- Install outer drive axle joint into hub and hand tighten with a new hex bolt.
- Insert control arm and guide link joint pins in wheel bearing housing.
- Install new self-locking nuts and tighten counterhold joint pins, e.g. with hex socket wrench 4 mm.

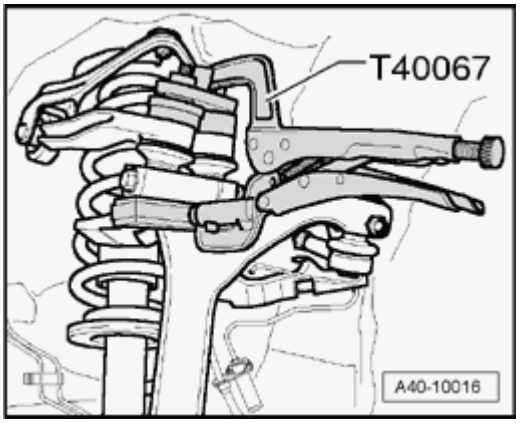

Fig. 50: Inserting Both Upper Link Joint Pins In Wheel Bearing Housing And Bend Downward As Much As Possible Using Pliers T40067
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert both upper link joint pins in wheel bearing housing and bend downward as much as possible using assembly tool Pliers T40067.

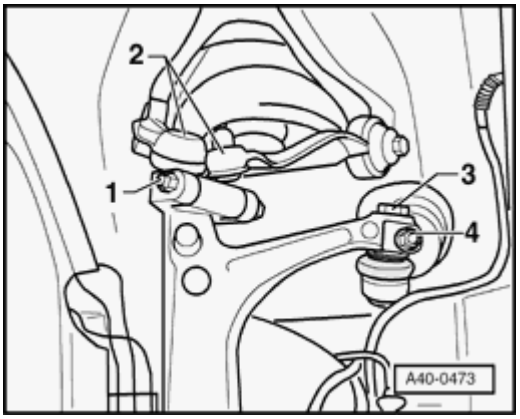

Fig. 51: Identifying Nut, Control Links & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert new bolt - **1** - and self-locking nut and tighten

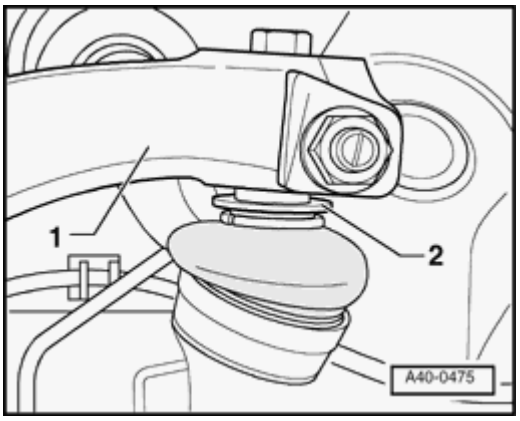

Fig. 52: Identifying Steering Arm & Tie Rod Ball Joint Sealing Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- **Tie rod (tie rod ball joint) must only be inserted in steering arm - 1 - by hand. Sealing washer - 2 - must not be stressed under any circumstances.**

- Install tie rod.

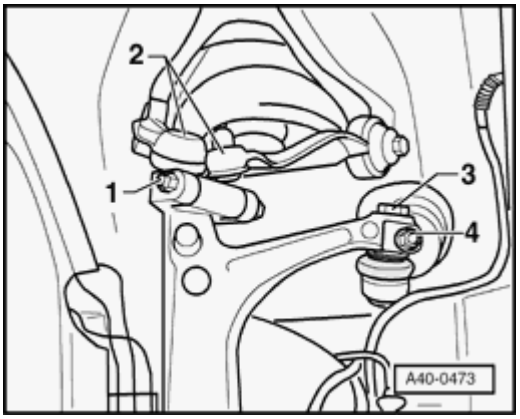

Fig. 53: Identifying Nut, Control Links & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install new self-locking nuts - **4** - and tighten
- Tighten hex bolt - **3** - ,
- Install ABS speed sensor. --> **45 - ANTI-LOCK BRAKE SYSTEM**
- On vehicles with headlight range control, install vehicle level sensor link at control arm --> **Vehicles with automatic headlight vertical aim control, vehicle level sensor**.

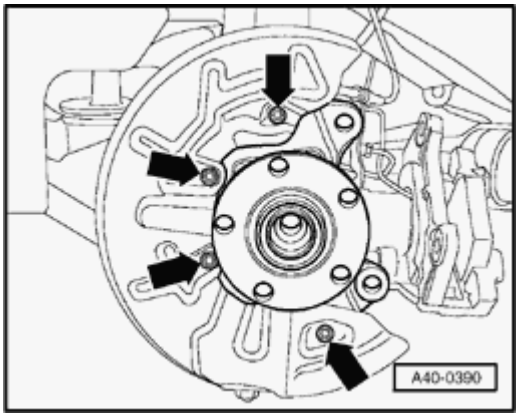

Fig. 54: Removing/Installing Bolts And Cover Plate
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install cover plate and tighten
- Fit brake disc, screw on brake caliper. --> **46 - BRAKES - MECHANICAL COMPONENTS**
- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide
- Tighten drive axle hex bolt (only with vehicle resting on wheels -risk of accident-) **Install drive axle**
- Perform vehicle alignment --> **Wheel alignment**.

Check front axle, alignment must take place on a VW/Audi recommended alignment stand.

Wheel bearing housing with bolted wheel bearing, servicing

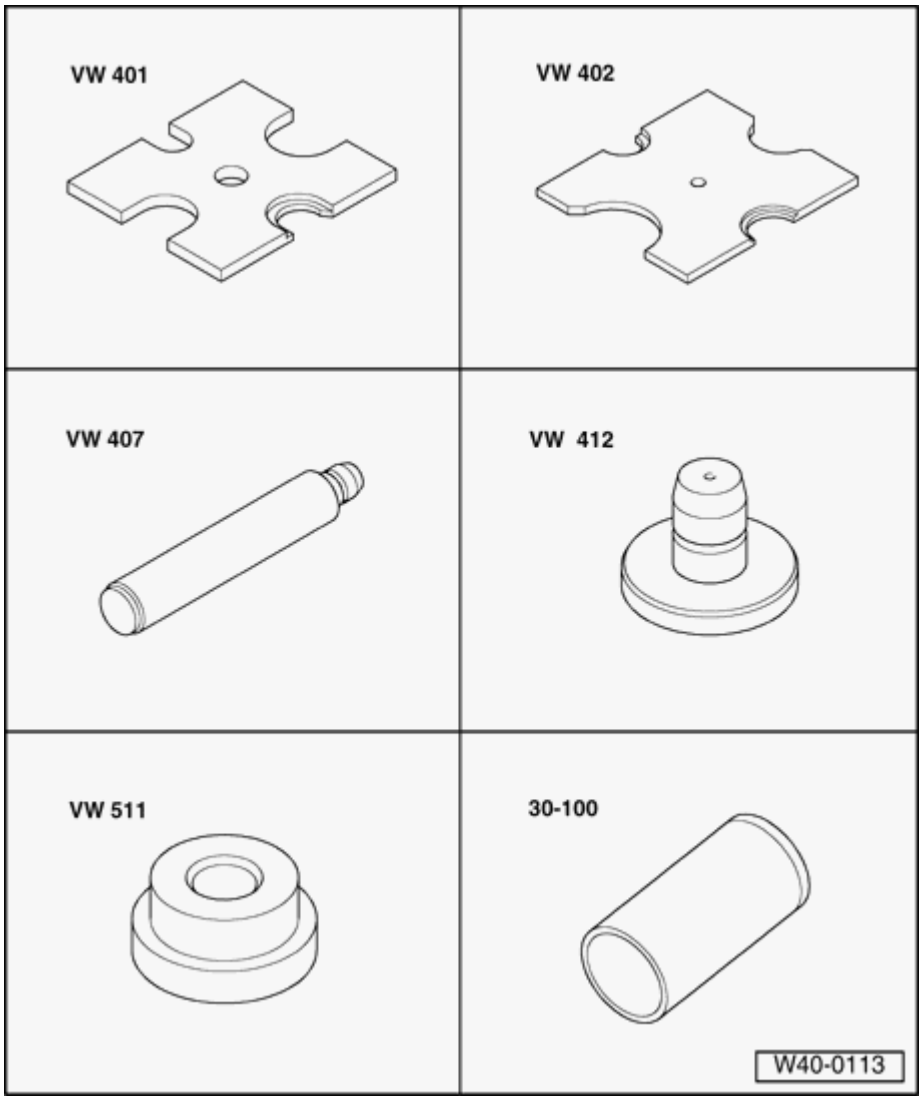

Fig. 55: Identifying Special Tools - Wheel Bearing Housing With Bolted Wheel Bearing, Servicing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Thrust plate VW 401
- Thrust plate VW 402
- Punch VW 407
- Punch VW 412

- Thrust pad VW 511
- Press tube 30 - 100

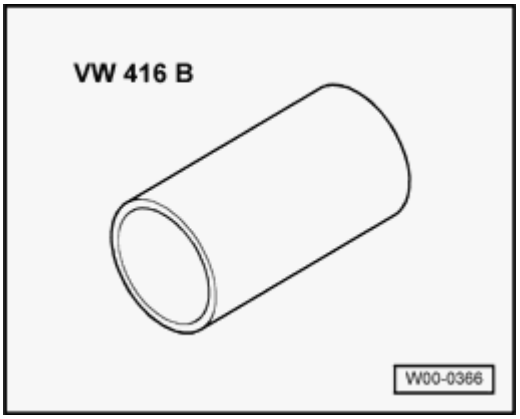

Fig. 56: Sleeve VW 416 B
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Sleeve VW 416 B

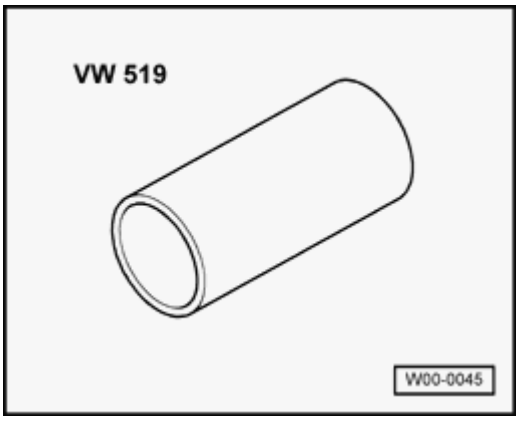

Fig. 57: Sleeve VW 519
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Sleeve VW 519
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332
- Separating tool Kukko 15-17

Assembly overview

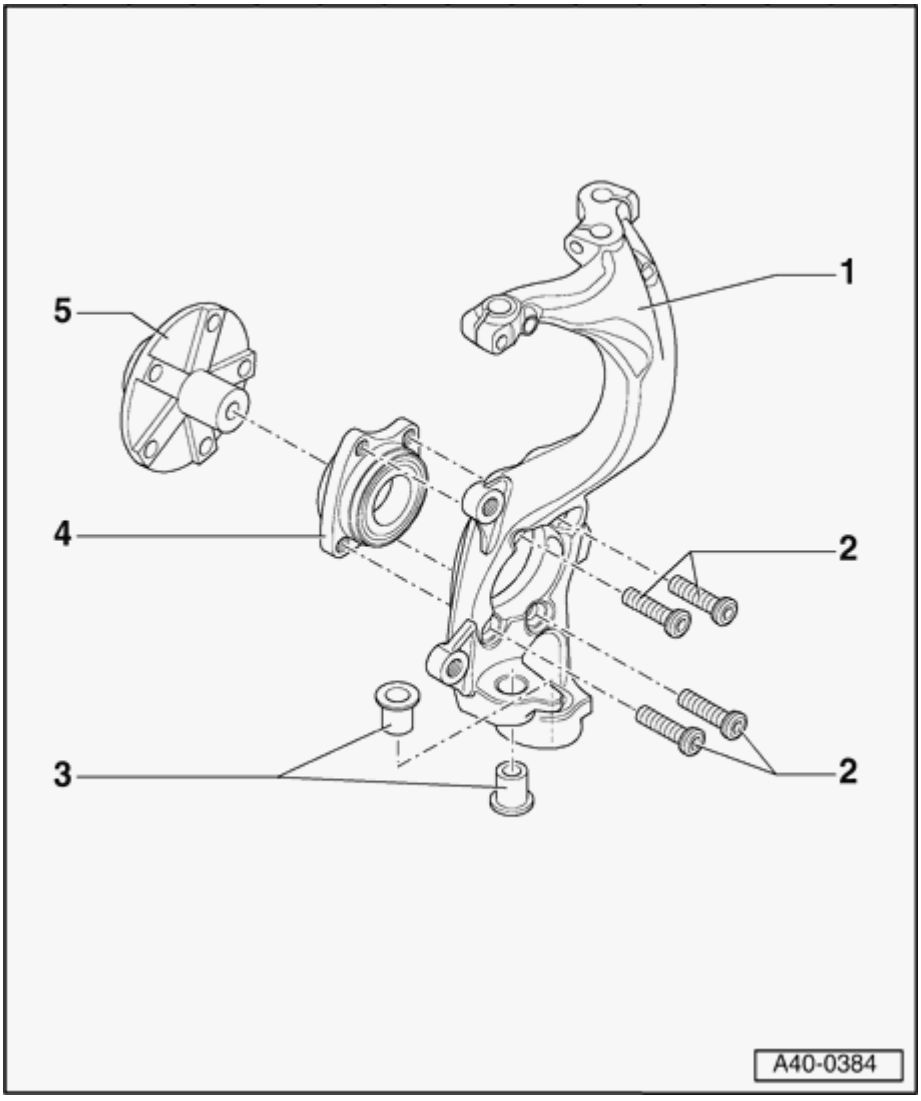

Fig. 58: Wheel Bearing Housing With Bolted Wheel Bearing Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Wheel bearing housing

2 - Cap bolts

- 80 Nm plus an additional 90°($^{1}/_{4}$ turn)

3 - Sockets

4 - Ball bearing

- Pressing out 82 mm dia. **Pressing wheel hub out of 82 mm diameter wheel bearing housing**
- Pressing in 82 mm dia.--> **Pressing wheel hub into 82 mm diameter wheel bearing**

- Bearing inner ring, pressing off --> **Press bearing inner race from hub**
- Removing and installing **Removing**

- Installed location:
- The larger diameter of the wheel bearing faces the hub

5 - Wheel hub

- Pressing out **Pressing wheel hub out of 82 mm diameter wheel bearing housing**
- Pulling off bearing inner race --> **Press bearing inner race from hub**
- Tie rod version
- Wheel hub/brake disc contact surfaces and threaded holes are to be free of paint and dirt

- Light weight wheel hub --> **Light weight wheel hub**

Removing

- Remove wheel covers, remove cover cap on light-alloy wheels (removal hook in vehicle tool kit).

Remove drive axle

- Remove drive axle hex bolts (only loosen if vehicle is standing on wheels -risk of accident-).
- Remove wheel.
- Secure brake disc with a wheel bolt.
- Remove ABS speed sensor wiring from wheel bearing housing bracket.

Vehicles with brake caliper HP-2

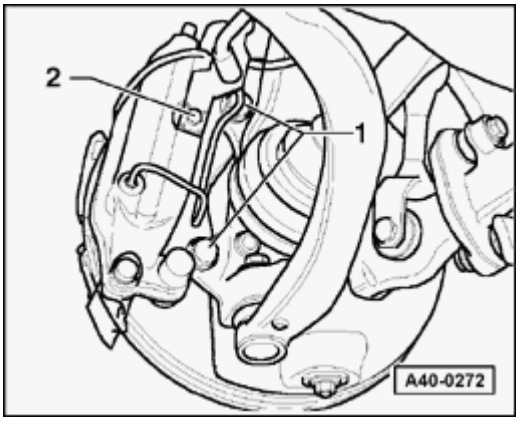

Fig. 59: Removing Hex Bolt, Brake Line Bracket, Bolts From Brake Caliper And Brake Caliper
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove hex bolt - **2** - and remove brake line bracket.
- Remove bolts - **1** - from brake caliper and remove brake caliper.

- Reinstall brake line bracket. Install hex bolt - **2** - and tighten.
- Secure brake caliper to body so that caliper weight does not bend or damage brake line.

Continued for all vehicles

- Remove brake caliper and secure to body so that weight of caliper does not stress or damage brake hose or brake line.

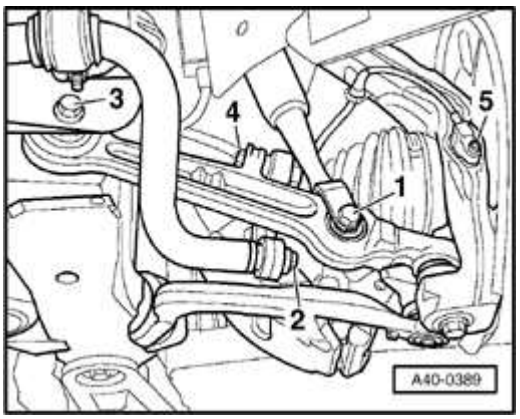

Fig. 60: Identifying Guide Link/Subframe Connection Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove ABS speed sensor screw - **5** -.
- Remove disc brake.

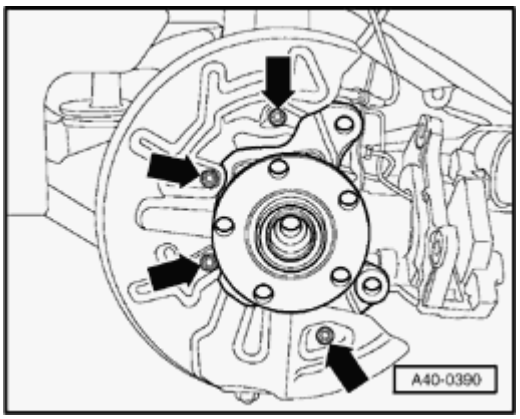

Fig. 61: Removing/Installing Bolts And Cover Plate
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **arrows** -
- Remove cover plate

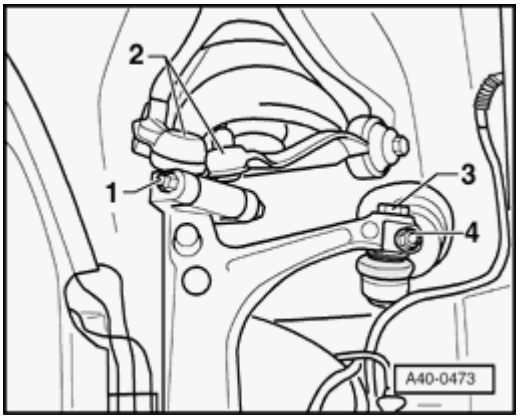

Fig. 62: Identifying Nut, Control Links & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen nut - **1** - , remove hex bolt and lift out both control arms - **2** - upward.

The slits in wheel bearing housing must not be widened using a chisel or similar tool!

- Swing wheel bearing housing in direction of arrow away to side, when doing this remove drive axle pin from wheel hub.
- Secure drive axle to body, e.g. with wire.

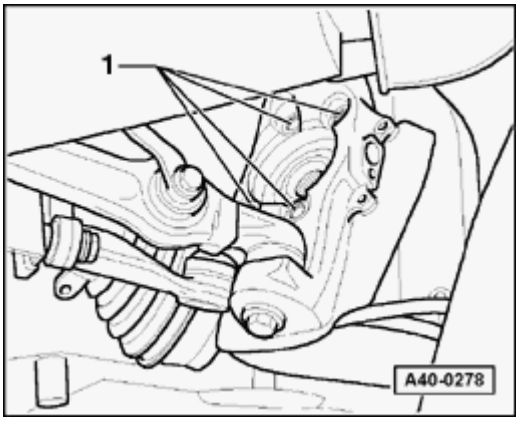

Fig. 63: Removing/Installing Cap Bolts & Wheel Bearing Unit
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove cap bolts - **1** -
- Remove wheel bearing unit.

Pressing wheel hub out of 82 mm diameter wheel bearing housing

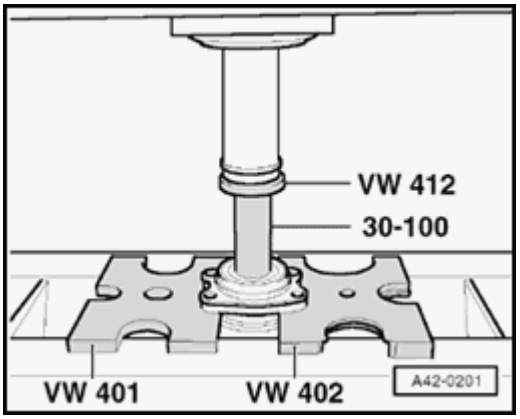

Fig. 64: Pressing Wheel Hub Out Of 82 Mm Diameter Wheel Bearing Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Press bearing inner race from hub

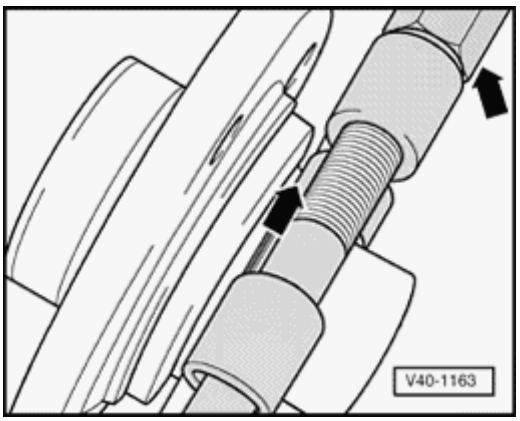

Fig. 65: Installing Separating Device In Notch Between Inner Bearing Ring, Hub And Pretension
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert separating device, e.g. Kukko 15-17, in bearing inner race ring groove - **arrow** - and pretension with spindle.

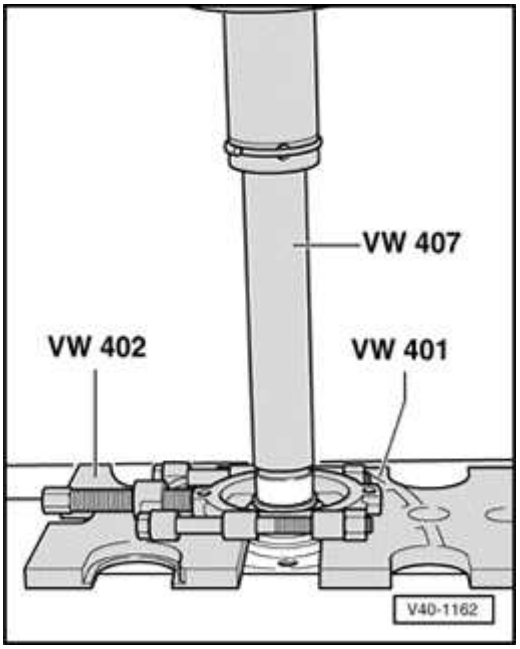

Fig. 66: Pressing Bearing Inner Race From Hub
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press bearing inner race off from wheel hub.

Light weight wheel hub --> **Light weight wheel hub**

Pressing wheel hub into 82 mm diameter wheel bearing

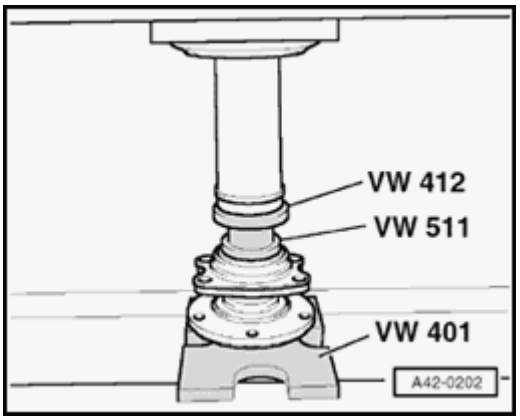

Fig. 67: Pressing Wheel Hub Into 82 mm Diameter Wheel Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- When pressing on, thrust piece VW 511 must bear only against inner race.

Installing

- Insert wheel bearing unit in wheel bearing housing.

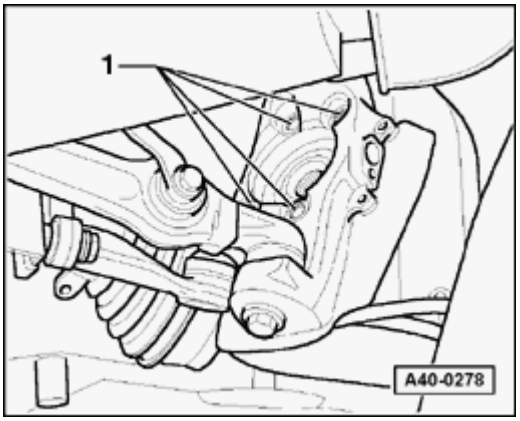

Fig. 68: Removing/Installing Cap Bolts & Wheel Bearing Unit
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install cap bolts - **1** - and tighten
- Install outer drive axle joint into hub and hand tighten with a new hex bolt.

- Remove any adhesive residue on joint pin threads.

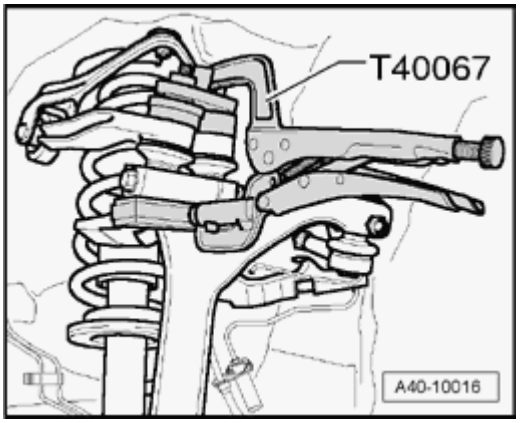

Fig. 69: Inserting Both Upper Link Joint Pins In Wheel Bearing Housing And Bend Downward As Much As Possible Using Pliers T40067
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert both upper link joint pins in wheel bearing housing and bend downward as much as possible using assembly tool T40067.

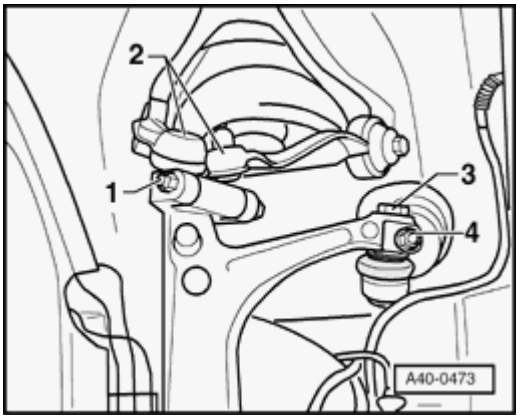

Fig. 70: Identifying Nut, Control Links & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert new bolt - **1** - and self-locking nut and tighten
- Install ABS speed sensor.
- Install brake disc, fasten brake caliper. --> **46 - BRAKES - MECHANICAL COMPONENTS**
- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

- Tighten drive shaft hex screw (only with vehicle resting on wheels -risk of accident-) **Install drive axle**.

Alignment must take place on a VW/Audi recommended alignment stand.

LIGHT WEIGHT WHEEL HUB

Characteristics

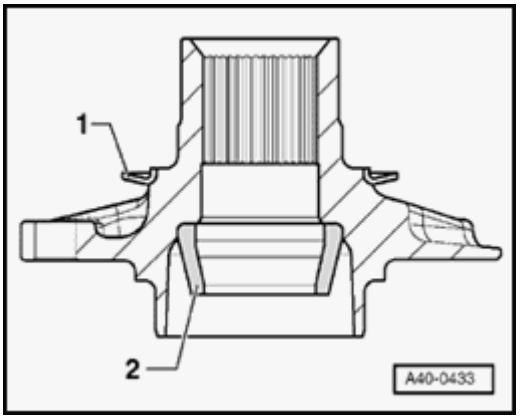

Fig. 71: Identifying Conventional Wheel Hub & Slide Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

The light weight wheel hub is different from conventional wheel hub - **1** - due to the slide washer - **2** - and sleeve.

The light weight wheel hub must only be used in conjunction with the corresponding wheel bearing.

Slide washer - **1** - should be replaced if deformed or damage during wheel bearing removal.

Slide washer, removal and installation

Special tools, testers and auxiliary items required

- Assembly tool T40089/1

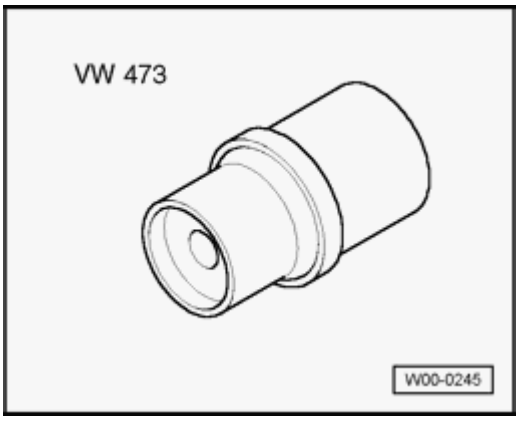

Fig. 72: Press Piece VW 473
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press piece VW 473

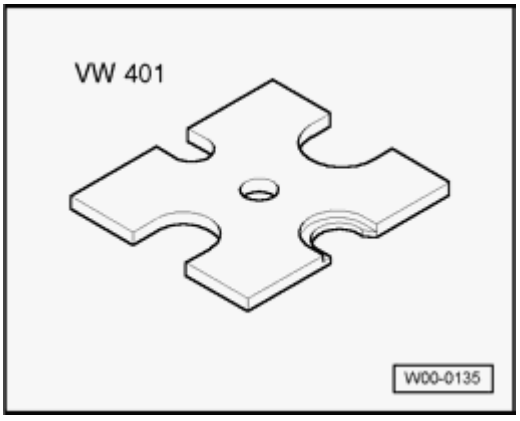

Fig. 73: Thrust Plate VW 401
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Thrust plate VW 401

Slide washer, replacing

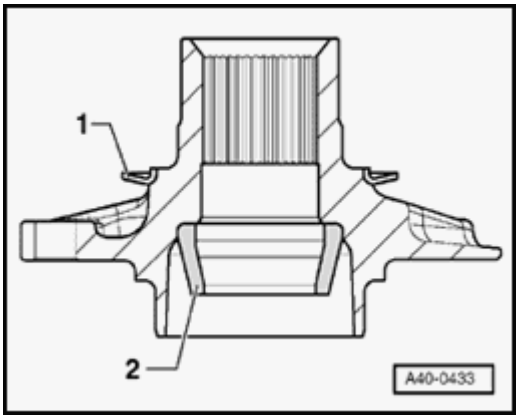

Fig. 74: Identifying Conventional Wheel Hub & Slide Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully pry off slide washer - **1** - , e.g. with a screwdriver.
- Position slide washer on wheel hub.

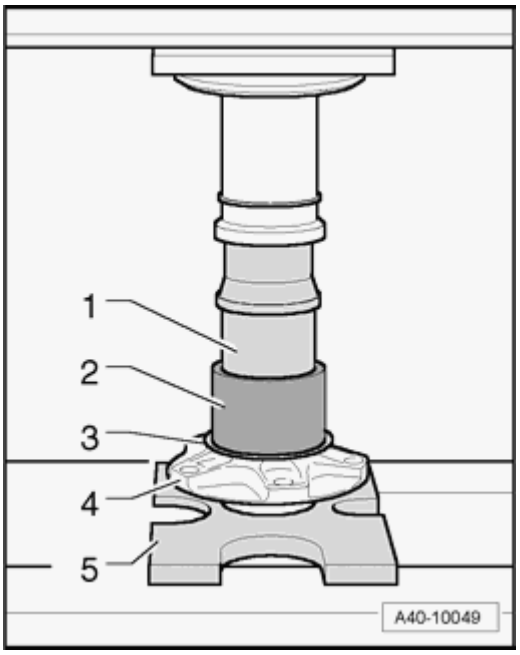

Fig. 75: Installing Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install special tools as shown in illustration.

1. Press piece VW 473
2. Assembly tool T40089/1
3. Slide washer
4. Wheel hub
5. Thrust plate VW 401

- Press slide washer off using assembly tool T40089/1 as shown in illustration up to wheel bearing hub radius.

NOTE:

- **Slide washer must be pressed on up to wheel bearing hub radius.**

MOUNTING BRACKET AND UPPER LINKS

Mounting bracket, removing and installing

Removing

- Remove suspension strut --> **Suspension strut, removing and installing**
- Remove mounting bracket from suspension strut --> **Suspension strut, servicing**

Installing

- Fasten mounting bracket to suspension strut --> **Suspension strut, servicing**
- Install suspension strut --> **Suspension strut, removing and installing**.

Upper links, removing and installing

Removing

- Remove suspension strut --> **Suspension strut, removing and installing**

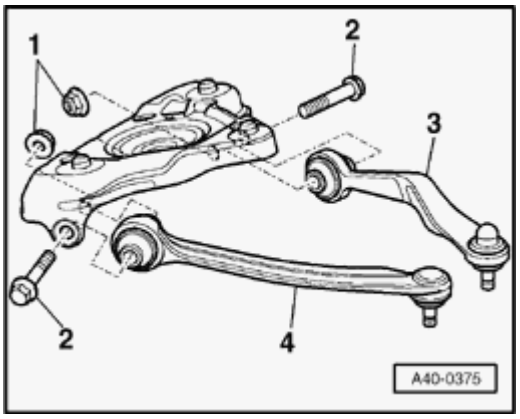

Fig. 76: Removing/Installing Nuts, Bolts & Links
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove nuts - **1** - and remove bolts - **2** -
- Remove links - **3** - and - **4** -

Installing

- Secure upper links - **3** - and - **4** - using new bolts - **2** - and new nuts - **1** - just enough so that links cannot

move in their positions.

Upper front link

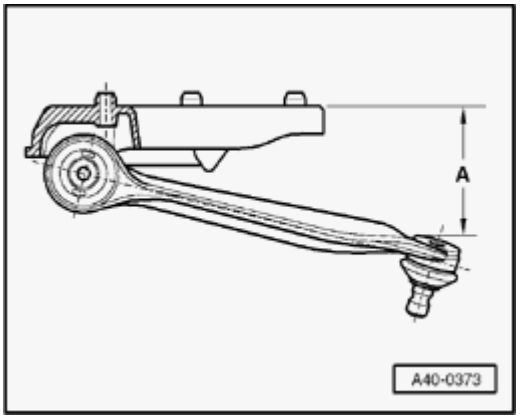

Fig. 77: Adjusting Upper Front Link Height
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Adjust height - **A** -.

A = 81 mm ± 2 mm

Upper rear link

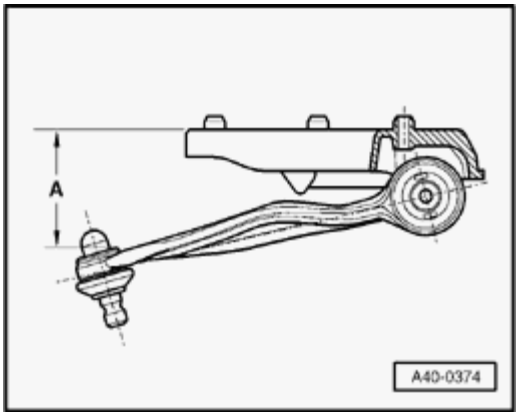

Fig. 78: Adjust Upper Rear Link Height
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Adjust height - **A** -.

A = 70 mm ± 2 mm

Procedure for upper front and rear links

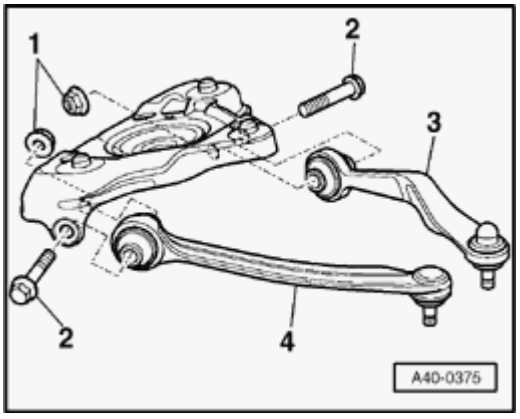

Fig. 79: Removing/Installing Nuts, Bolts & Links
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten nuts - **1** - ,
- Check upper control arm positions
- Repeat adjustment, if necessary
- Reinstall mounting bracket --> **Suspension strut, servicing**.

Top front and rear link bearings, replacing

Special tools, testers and auxiliary items required

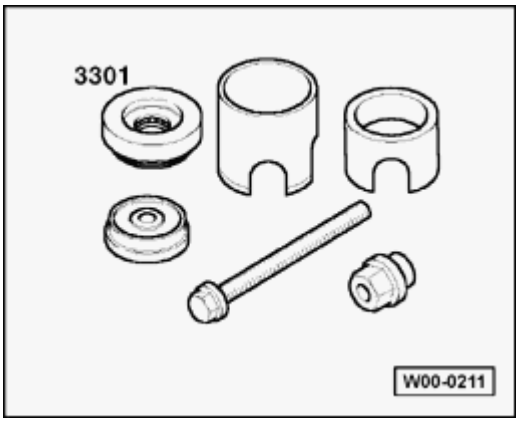

Fig. 80: Identifying Assembly Tool 3301
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Assembly tool 3301
- Assembly tool 3301/1
- Assembly tool 3301/3

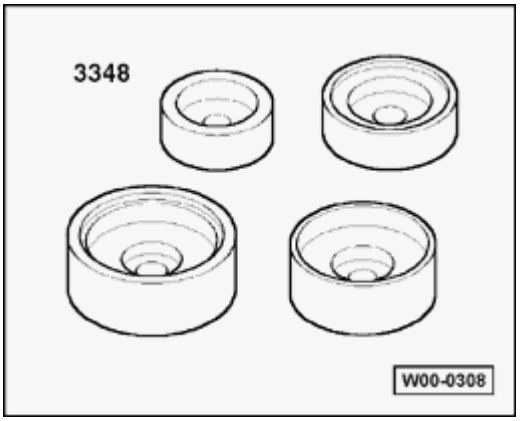

Fig. 81: Identifying Front And Rear Bearing Tool 3348
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Assembly tool 3348/2
- Assembly tool 3348/3

NOTE:

- **Use protective covers when clamping aluminum links.**

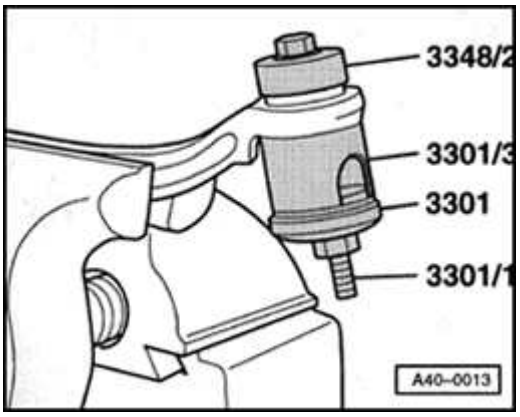

Fig. 82: Pulling Out Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling out bushing

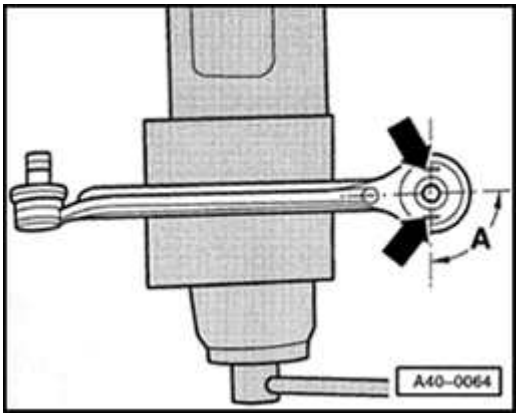

Fig. 83: Identifying Installation Location Of Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installed location of bushing

A = 90° ± 5°

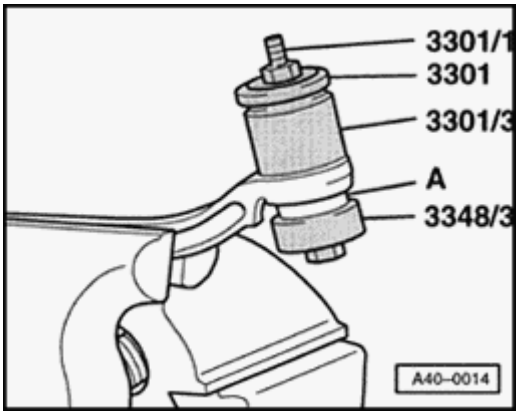

Fig. 84: Pulling In Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling in bushing

A - Bushing

SUBFRAME

Subframe, removing and installing

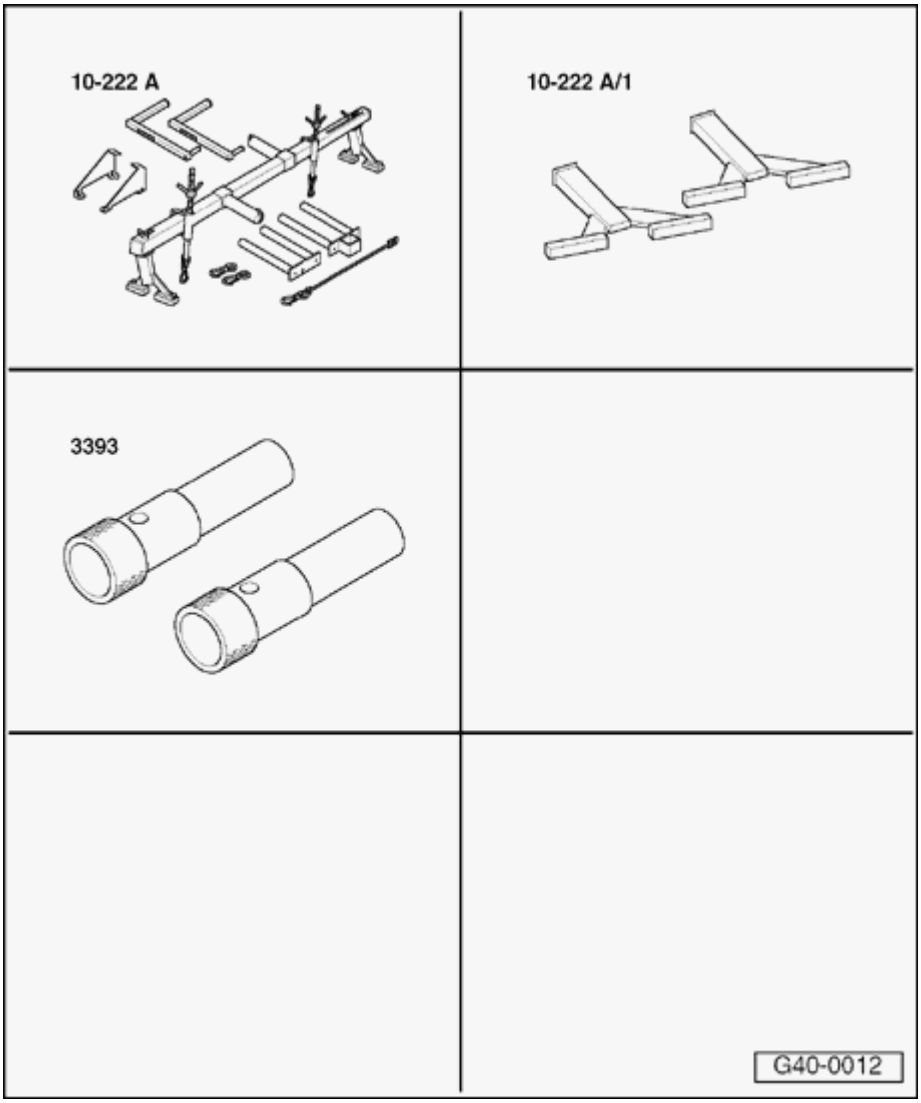

Fig. 85: Identifying Special Tools - Subframe, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Engine support bridge 10 - 222 A
- Support 10 - 222 A/1
- Testing mandrel 3393
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332
- Engine/transmission jack V.A.G 1383 A

Removing

- Support engine entirely with engine support bridge.
- Remove wheel covers, remove cover cap on light-alloy wheels (removal hook in vehicle tool kit).
- Remove wheels.
- Secure brake disc with a wheel bolt.

- Remove sound insulation. -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET

Convertible only

- Remove front diagonal brace --> **Diagonal braces**.

Continued for all vehicles

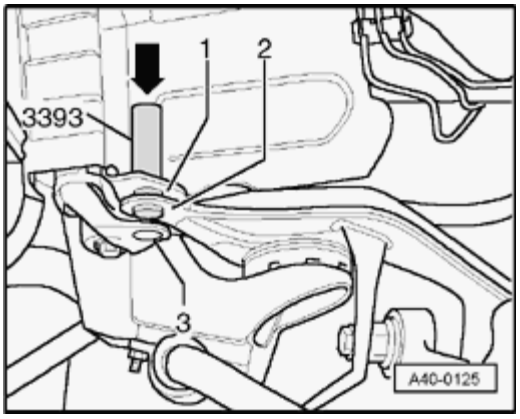

Fig. 86: Checking Holes Align Using Testing Mandrel 3393
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before removing subframe, check whether holes - **1** - and - **2** - are aligned using special tool 3393.

If this is not the case, a vehicle alignment must be performed after carrier is installed.

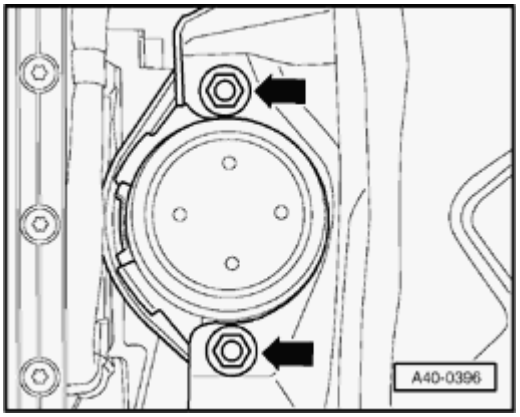

Fig. 87: Removing/Installing Bolts For Left/Right Transmission Mount
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove nuts - **arrows** - at transmission mounts if necessary.

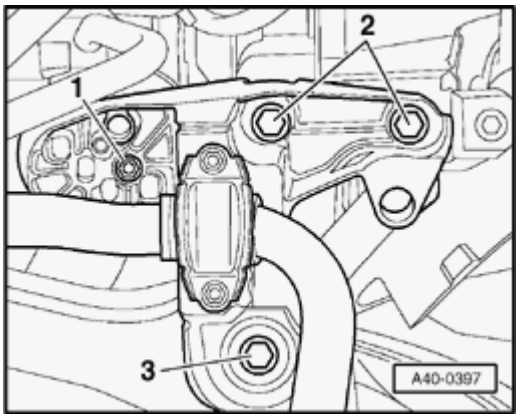

Fig. 88: Identifying Nut & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove nuts - **1** -
- On vehicles with headlight range control, remove vehicle level sensor link from link --> **Vehicles with automatic headlight vertical aim control, vehicle level sensor**.

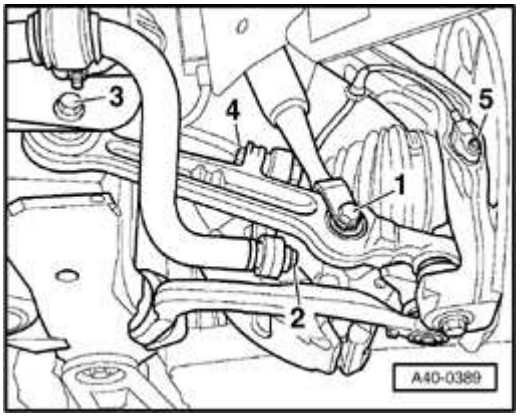

Fig. 89: Identifying Guide Link/Subframe Connection Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove ABS speed sensor screw - **5** -.
- Remove ABS speed sensor wiring from wheel bearing housing bracket.

Vehicles with brake caliper HP-2

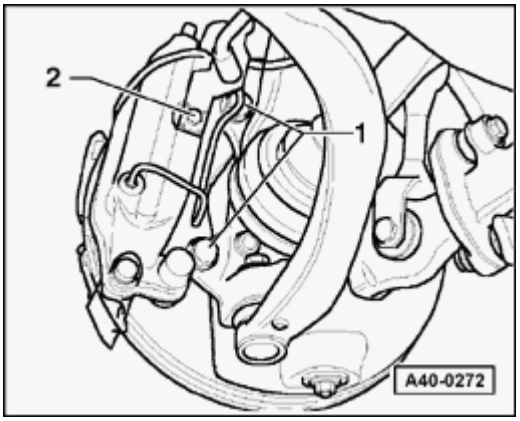

Fig. 90: Removing Hex Bolt, Brake Line Bracket, Bolts From Brake Caliper And Brake Caliper
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove hex bolt - **2** - and remove brake line bracket.
- Remove bolts - **1** - from brake caliper and remove brake caliper.
- Reinstall brake line bracket. Reinstall hex bolt - **2** - and tighten.
- Secure brake caliper to body so that caliper weight does not bend or damage brake line.

Continued for all vehicles

- Remove brake caliper and secure to body so that weight of caliper does not stress or damage brake hose or brake line.

To avoid damaging upper link joints, wheel bearing housing must be braced against a rebound that is too strong, e.g. using engine/transmission jack V.A.G 1383 A

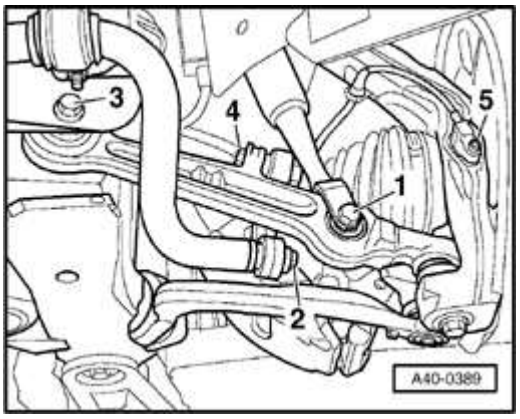

Fig. 91: Identifying Guide Link/Subframe Connection Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - **1** -
- Remove bolt - **4** -
- Remove bolt - **3** -

- Loosen guide link/subframe connection.
- Remove tunnel crossmember if necessary --> **Tunnel crossmember, removing and installing**.
- Place engine/transmission jack V.A.G 1383 A with wooden block under subframe and press lightly against.

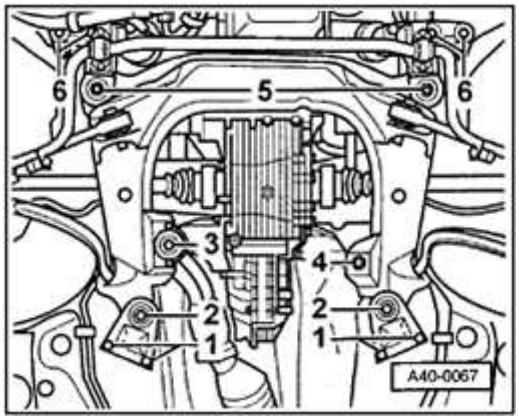

Fig. 92: Removing/Installing Lower Rear Subframe Hex Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove hex bolts - **1** -.
- Remove hex bolts - **2** - and lower rear subframe.
- Remove guide link hex bolts.
- Remove guide links from subframe.

NOTE:

- **To prevent link and guide link pins from being over flexed, they should be secured with a wire or something similar during removal.**

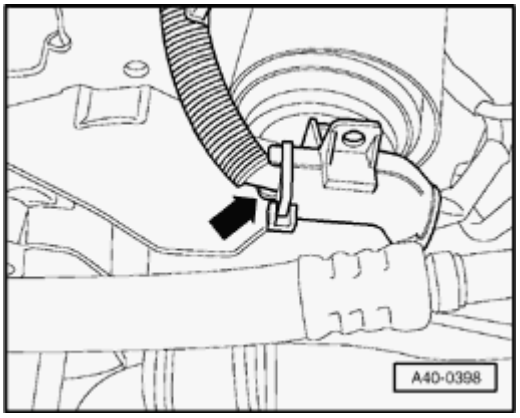

Fig. 93: Removing/Installing Power Steering Line From Console
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove power steering line - **arrow** - from console.

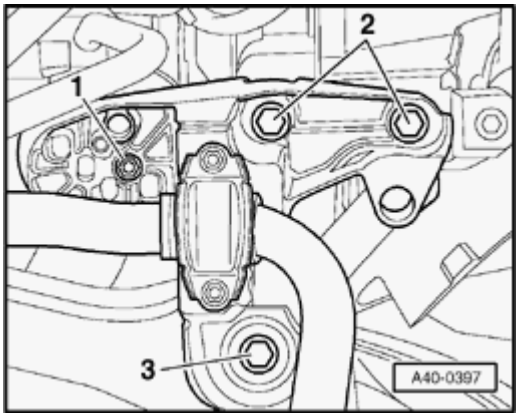

Fig. 94: Identifying Nut & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - **3** -.
- Loosen hex bolts - **2** - until subframe can be removed.

Installing

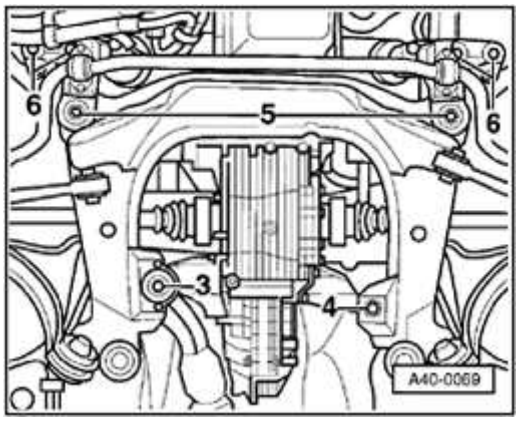

Fig. 95: Inserting Subframe And Installing Hex Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert subframe and install hex bolts - **5** - and - **6** -.
- Insert suspension strut hex bolts at link.
- Guide control arms and guide links into subframe.

Before tightening subframe, it must be fixed to body using Testing Mandrel 3393.

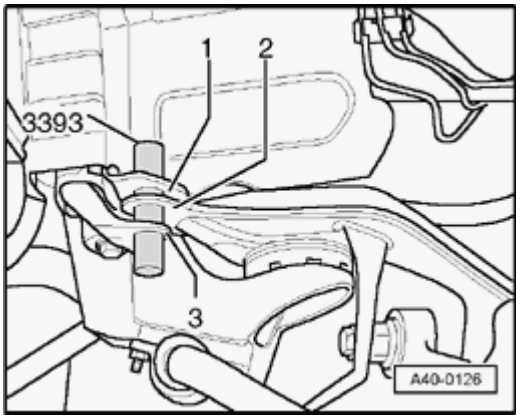

Fig. 96: Identifying Hole, Sub-Frame Hole And Aluminum Console Hole Align On Both Sides
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Holes - **1** - and - **2** - of subframe and hole - **3** - of aluminum bracket must line up on both sides.

NOTE:

- **This attachment only replaces subsequent vehicle alignment measurements when:**
- **The subframe is removed completely and installed.**
- **Holes - 1 - and - 2 - lined up before the repair.**

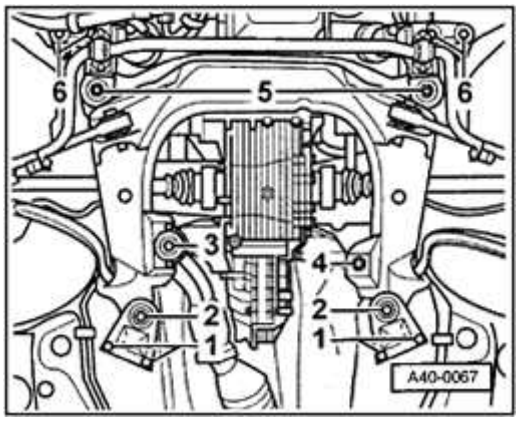

Fig. 97: Removing/Installing Lower Rear Subframe Hex Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position hex bolts - **1** - and - **2** -.
- Protect holes in body for mounting Testing Mandrel 3393 against corrosion.

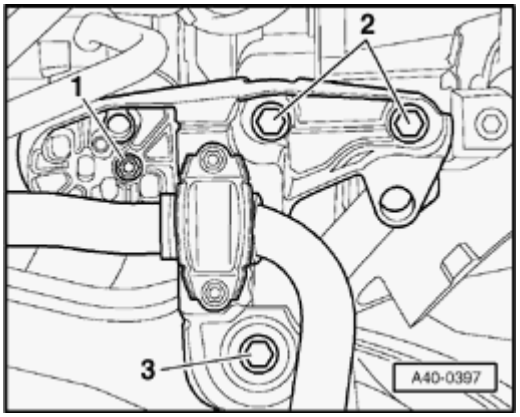

Fig. 98: Identifying Nut & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install nut - **1** -.

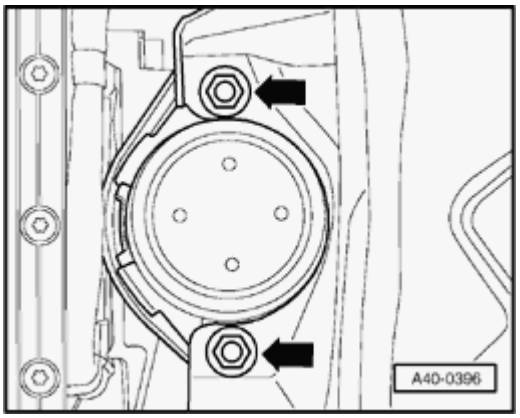

Fig. 99: Removing/Installing Bolts For Left/Right Transmission Mount
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install transmission mount nuts - **arrows** - if necessary.

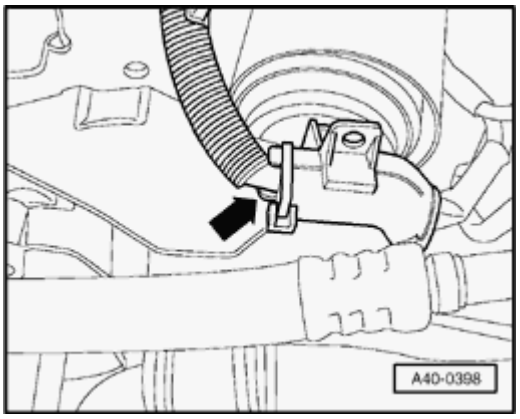

Fig. 100: Removing/Installing Power Steering Line From Console
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clip cable - **arrow** - into console.

Tightening sequence

NOTE:

- **Threads in body can be repaired according to DIN 8140 using wire thread inserts (Heli-Coil). Thread insert must be same length as thread in body.**
- **Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at control arms if vehicle is in curb weight position - -> Wheel bearing, lifting to curb weight position**

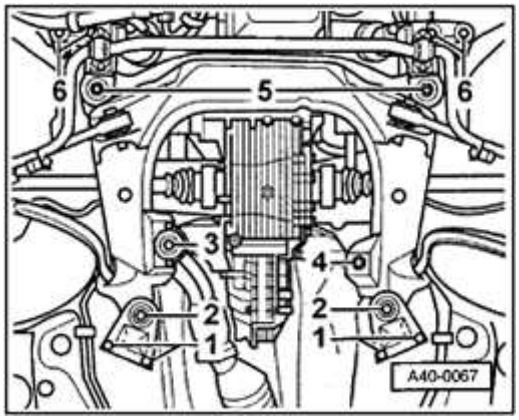

Fig. 101: Removing/Installing Lower Rear Subframe Hex Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten hex bolts - **2** - and - **5** -
- Tighten hex bolts - **1** -.

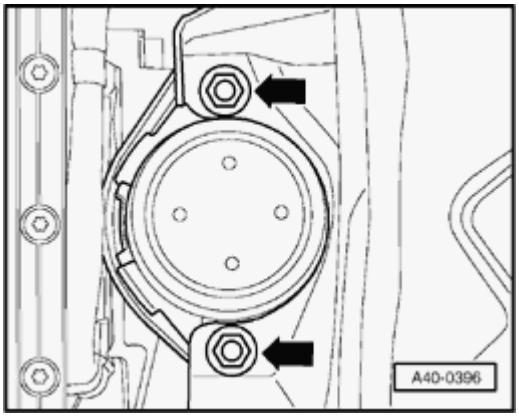

Fig. 102: Removing/Installing Bolts For Left/Right Transmission Mount
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten transmission mount nuts - **arrows** - -->
  - **34 MANUAL TRANSMISSION - CONTROLS, HOUSING** for 5 SPD. MANUAL TRANSMISSION 012/01W FRONT WHEEL DRIVE

- **34 MANUAL TRANSMISSION - CONTROLS, HOUSING** for 6 SPD. MANUAL TRANSMISSION 01E ALL WHEEL DRIVE
- **34 CONTROLS, HOUSING** for 6-SPEED MANUAL TRANSMISSION 01X, FRONT-WHEEL DRIVE
- **34 CONTROLS, HOUSING** for 6-SPEED MANUAL TRANSMISSION 02X, FOUR-WHEEL DRIVE
- **34 CONTROLS, HOUSING** for 6-SPEED MANUAL TRANSMISSION 0A3, ALL WHEEL DRIVE

or -->

- **37 - AUTOMATIC TRANSMISSION - CONTROLS, HOUSING** for 5 SPD. AUTOMATIC TRANSMISSION 01V
- **37 CONTROLS, HOUSING** for 6 SPD. AUTOMATIC TRANSMISSION 09L ALL WHEEL DRIVE

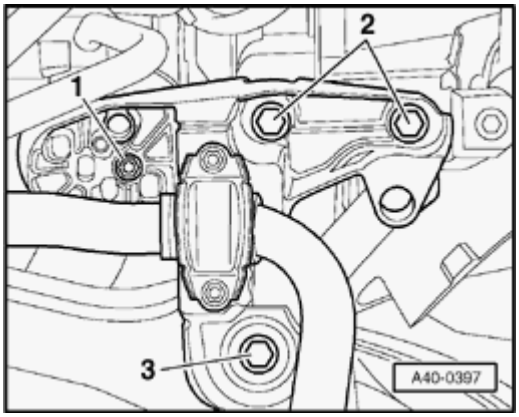

Fig. 103: Identifying Nut & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten bolt - **2** - ,
- Tighten engine mount nuts - **1** -. -->
  - **10 - ENGINE - ASSEMBLY** for 1.8 LITER 4-CYL. 5V TURBO ENGINE MECHANICAL, ENGINE CODE(S): AMB
  - **10 - ENGINE - ASSEMBLY** for 2.0 LITER 4-CYL. 4V TURBO ENGINE MECHANICAL, ENGINE CODE(S): BPG, BWT
  - **10 ENGINE - ASSEMBLY** for 3.0 LITER 6-CYL. 5V ENGINE MECHANICAL, ENGINE CODE(S): AVK, BGN
  - **10 - ENGINE - ASSEMBLY** for 3.2 V6 4V ENGINE MECHANICAL, ENGINE CODE(S): BKH
  - **10 - ENGINE - ASSEMBLY** for 4.2 LITER V8 4V ENGINE MECHANICAL, ENGINE CODE (S): BNS
  - **10 - ENGINE - ASSEMBLY** for 4.2 LITER V8 5V ENGINE MECHANICAL, ENGINE CODE (S): BHF

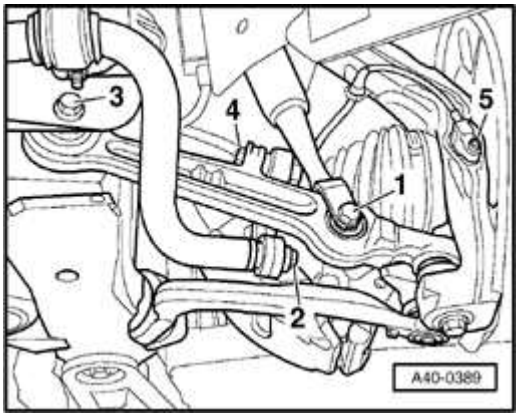

Fig. 104: Identifying Guide Link/Subframe Connection Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten control arm hex head screws - **3** -
- Tighten guide link hex bolts ,
- Tighten connecting link to stabilizer bar - **4** - ,
- Suspension strut to link ,

- Install tunnel crossmember if necessary --> **Tunnel crossmember, removing and installing**.

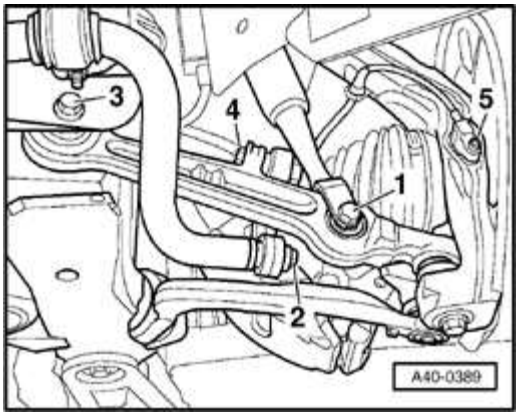

Fig. 105: Identifying Guide Link/Subframe Connection Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten ABS speed sensor screw - **5** -. --> **45 - ANTI-LOCK BRAKE SYSTEM**
- Tighten brake caliper to wheel bearing housing --> **46 - BRAKES - MECHANICAL COMPONENTS**
- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

Convertible only

- Install front diagonal brace --> **Diagonal braces**.

Continued for all vehicles

NOTE:

- **If the subframe has been located to the body with Testing Mandrel 3393 before subframe removal and installation (before tightening bolts), vehicle alignment does not have to be done.**
- **If the subframe was not located, vehicle alignment must be done.**

- Perform vehicle alignment --> **Wheel alignment**.

Alignment must take place on a VW/Audi recommended alignment stand.

Subframe bushings, replacing

NOTE:

- **Various subframe versions are installed.**
- **Subframe with bonded rubber bushings in subframe/body mounting points (all vehicles except convertible). Bonded rubber bushings cannot be replaced.**
- **Subframe without bonded rubber bushings in subframe/body mounting points, rather with welded steel bushings (convertible only). Steel bushings cannot be replaced, replace subframe if damaged.**

Special tools, testers and auxiliary items required

- Assembly tool 3291
- Puller 3351/1
- Puller 3351/4
- Installation device 3372

- Installation device 3372/1
- Installation device 3372/2
- Thrust pad 30 - 205

To replace subframe bushing, subframe must be removed --> **Subframe, removing and installing**

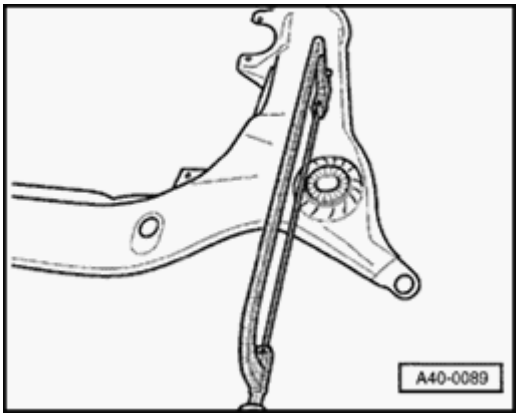

Fig. 106: Sawing Off/Cut-Off Rubber Shoulder On Sub-Frame Mounting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling out bonded rubber bushing

- Saw or cut rubber shoulder off subframe bushing up to outer bushing.

NOTE:

- **If the paint on the surface of the subframe should be damaged, the surface should be protected against corrosion.**

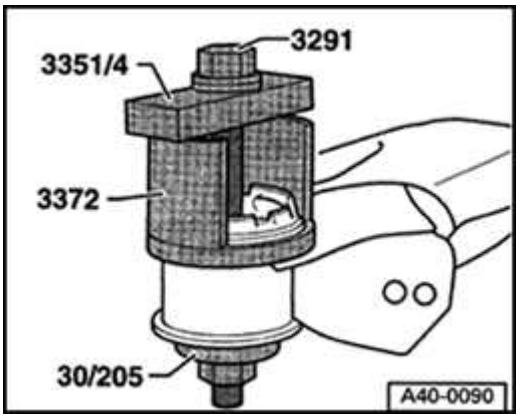

Fig. 107: Ensuring Installation Device 3372 Is Seated Correctly And Cannot Tilt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling out rear bonded rubber bushing

Ensure installation device - **3372** - is seated correctly and cannot tilt.

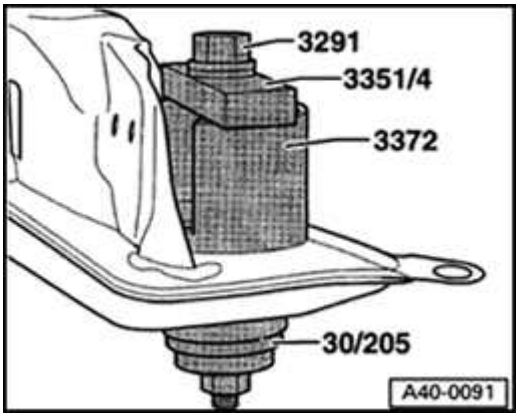

Fig. 108: Identifying All Bonded Rubber Bushings On Subframe Are Pulled Out Using Same Special Tool
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling out bonded rubber bushing

All bonded rubber bushings on subframe are pulled out using same special tool.

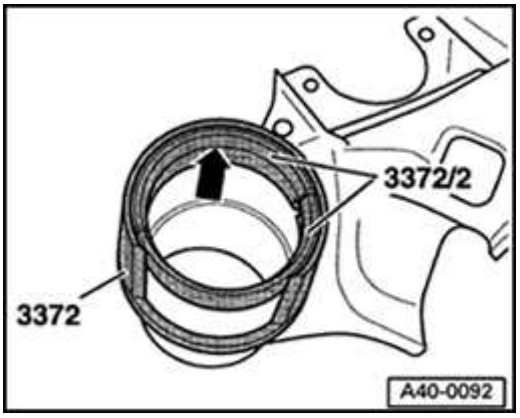

Fig. 109: Preparing To Pull-In Subframe Mounting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Preparing to pull-in subframe bushing

- Position installation device Installation Device 3372 and insert segments 3372/2.

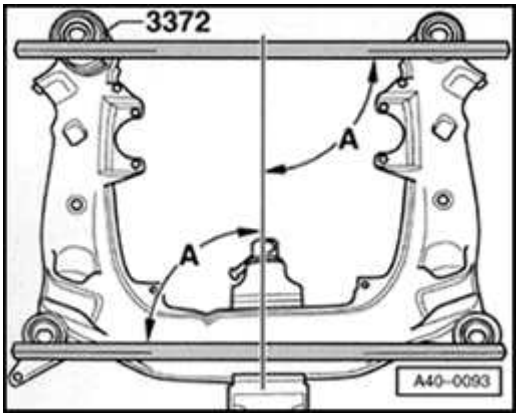

Fig. 110: Aligning Bonded Rubber Mounting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Bonded rubber bushing, aligning

The bonded rubber bushings must be aligned with a long rectangular tube or straightedge.

A = 90° ± 5°

Only tension subframe in a vise using protective clamps!

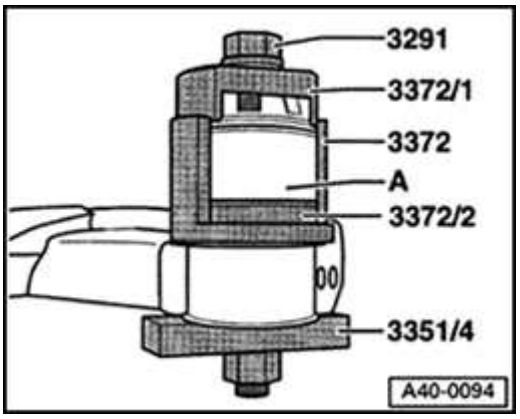

Fig. 111: Pulling In Rear Bonded Rubber Mounting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling in rear bonded rubber bushing

To press on bonded rubber bushing, use installation lubricant G 294 421 A1.

- Pull in bushing - **A** - until thrust piece -3372/1- is flush with upper edge of installation device Installation Device 3372.
- Remove Installation Device 3372 and segments 3372/2 upward.

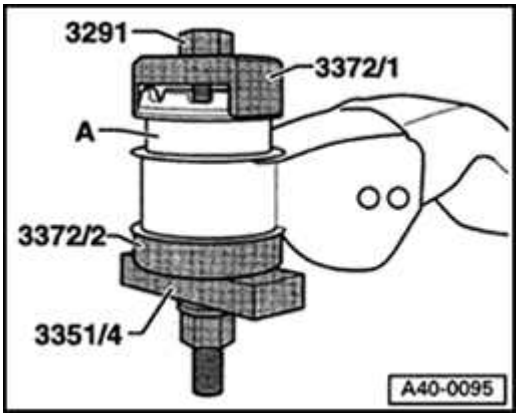

Fig. 112: Pulling In Rear Bonded Rubber Mounting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling in rear bonded rubber bushing

- Insert segments -3372/2- between bridge -3351/4- and subframe.
- Pull mounting in onto stop.

If paint on the surface of subframe should be damaged, the surface should be protected against corrosion.

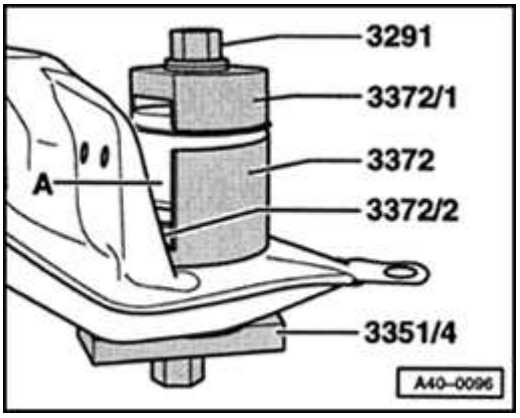

Fig. 113: Pulling In Front Bonded Rubber Mounting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling in front bonded rubber bushing

To press on bonded rubber bushing, use installation lubricant G 294 421 A1.

- Insert segments -3372/2- in tube - **3372** -.
- Pull in mount - **A** - until thrust piece -3372/1- is flush with upper edge of Installation Device 3372.

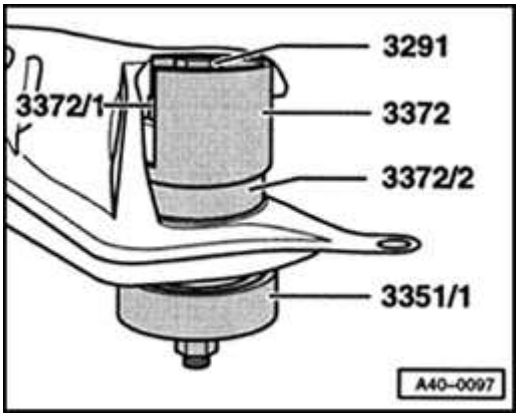

Fig. 114: Push Mounting In Onto Stop
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling in front bonded rubber bushing

- Raise Installation Device 3372 and remove segments -3372/2-.
- Replace bridge -3351/41 with thrust piece -3351/1 and then push mounting in onto stop.

If paint on the surface of subframe should be damaged, the surface should be protected against corrosion.

Bonded rubber bushing stop wedges, removing and installing

Removing

- Remove subframe supports.
- Pull stop wedges downward out of bonded rubber bushings.

Installing

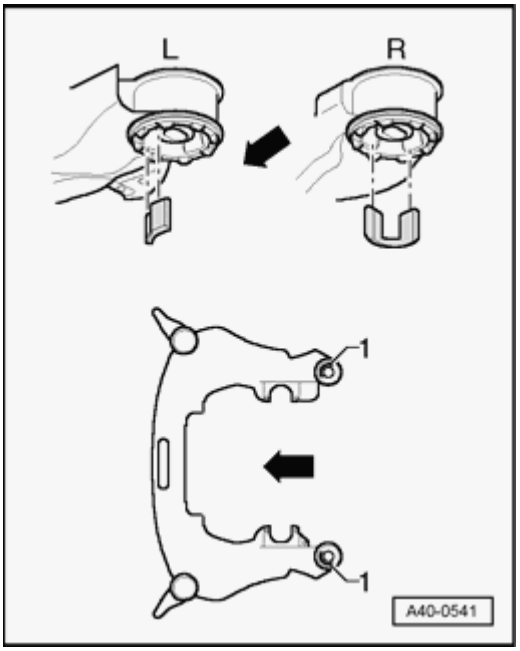

Fig. 115: Pushing Stop Wedges Positioned In Bonded Rubber Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Push stop wedges - **1** - positioned in bonded rubber bushing as shown in illustration in to stop.

Illustration shows subframe from below.

- Install subframe supports.

TUNNEL CROSSMEMBER

Tunnel crossmember, removing and installing

Special tools, testers and auxiliary items required

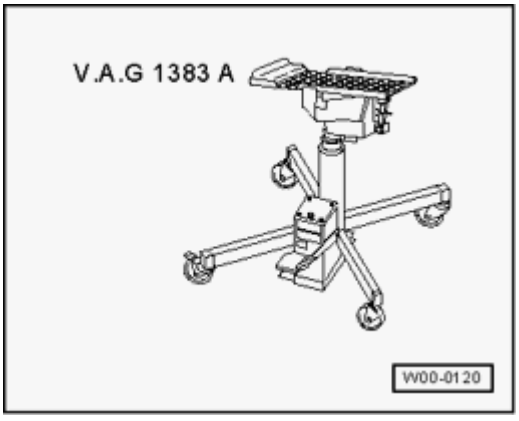

Fig. 116: Identifying Engine/Transmission Jack V.A.G. 1383 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Engine/transmission jack V.A.G 1383 A
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332

Removing

- Remove sound insulation. -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET

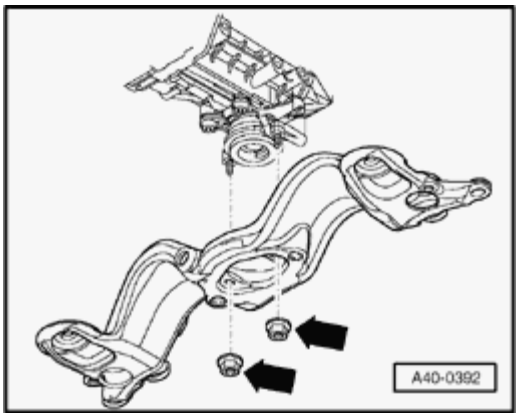

Fig. 117: Removing/Installing Combi-Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove combi-bolts - **arrows** -
- Support transmission with engine and transmission jack V.A.G 1383 A and a wooden block.

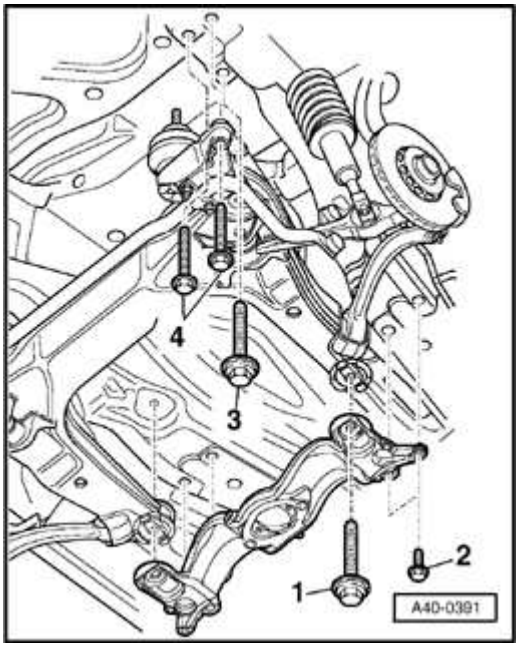

Fig. 118: Removing Bolts & Tunnel Crossmember
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **1** - and - **2** -.
- Remove tunnel crossmember

Installing

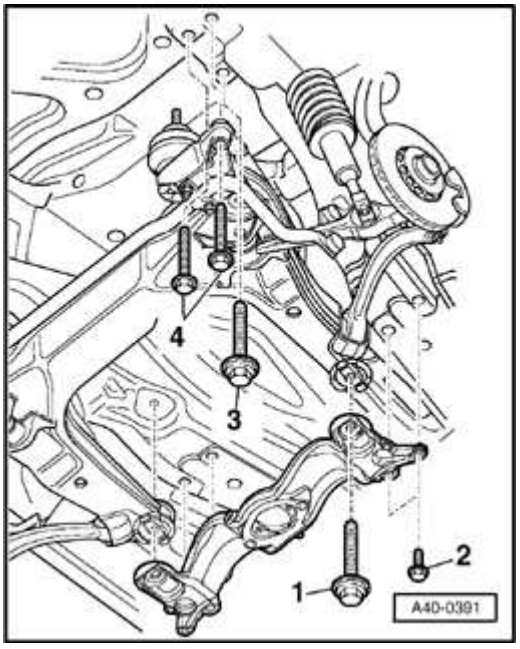

Fig. 119: Removing/Installing Bolts & Tunnel Crossmember
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten combi-bolt - **1** - to 110 Nm + 90 °.

Use new washer and bolt.

- Tighten combi-bolt - **2** - to 65 Nm.

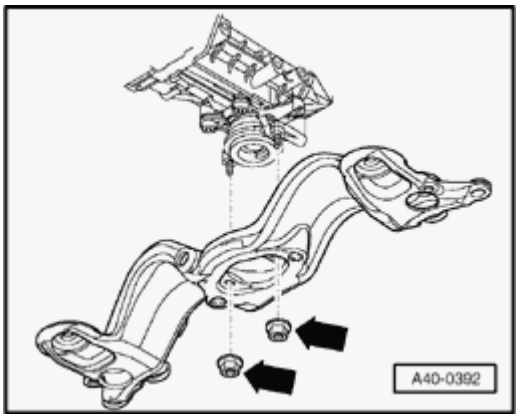

Fig. 120: Removing/Installing Combi-Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten combi-bolts - **arrows** - to 23 Nm.
- Install sound insulation. -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET

VEHICLES WITH AUTOMATIC HEADLIGHT VERTICAL AIM CONTROL, VEHICLE LEVEL SENSOR

Vehicles with automatic headlight vertical aim control, vehicle level sensor

Vehicles with gas discharge headlights come standard with automatic headlight range control. -->

- **94 LIGHTS, SWITCHES - EXTERIOR**
- **94 LIGHTS, SWITCHES - EXTERIOR** for ELECTRICAL EQUIPMENT, CABRIOLET

To function properly, the automatic vertical aim control system needs information about compression travel or rebound travel at the front and rear axles.

For this, the position of the lower left link relative to the body is transferred to Left Front Level Control System Sensor G78 via a coupling rod. This transmits electrical signals to the Headlamp Range Control Module J431.

Headlamp Range Control Module J431 -->

- **94 LIGHTS, SWITCHES - EXTERIOR**
- **94 LIGHTS, SWITCHES - EXTERIOR** for ELECTRICAL EQUIPMENT, CABRIOLET

On the rear axle, the signals are transmitted to Headlamp Range Control Module J431 from G76 Left Rear Level Control System Sensor G76.

These signals are required for determining vehicle level.

The automatic headlight range control reacts independently to changes in vehicle level.

The vehicle level can change in the following situations:

- Towing a trailer
- Different load conditions; vehicle empty, vehicle partially or fully loaded
- Slow or fast driving habit

CAUTION: Adjustment of headlights!

Checking the headlight basic setting is necessary when:

- The track control link has been removed and reinstalled or replaced,
- Assembly work was performed on level control system sensor,
- The level control system sensor was replaced,
- The retaining clip for the coupling rod on track control link has been loosened.

Headlight basic setting -->

- **94 LIGHTS, SWITCHES - EXTERIOR**
- **94 LIGHTS, SWITCHES - EXTERIOR** for ELECTRICAL EQUIPMENT, CABRIOLET

Component overview

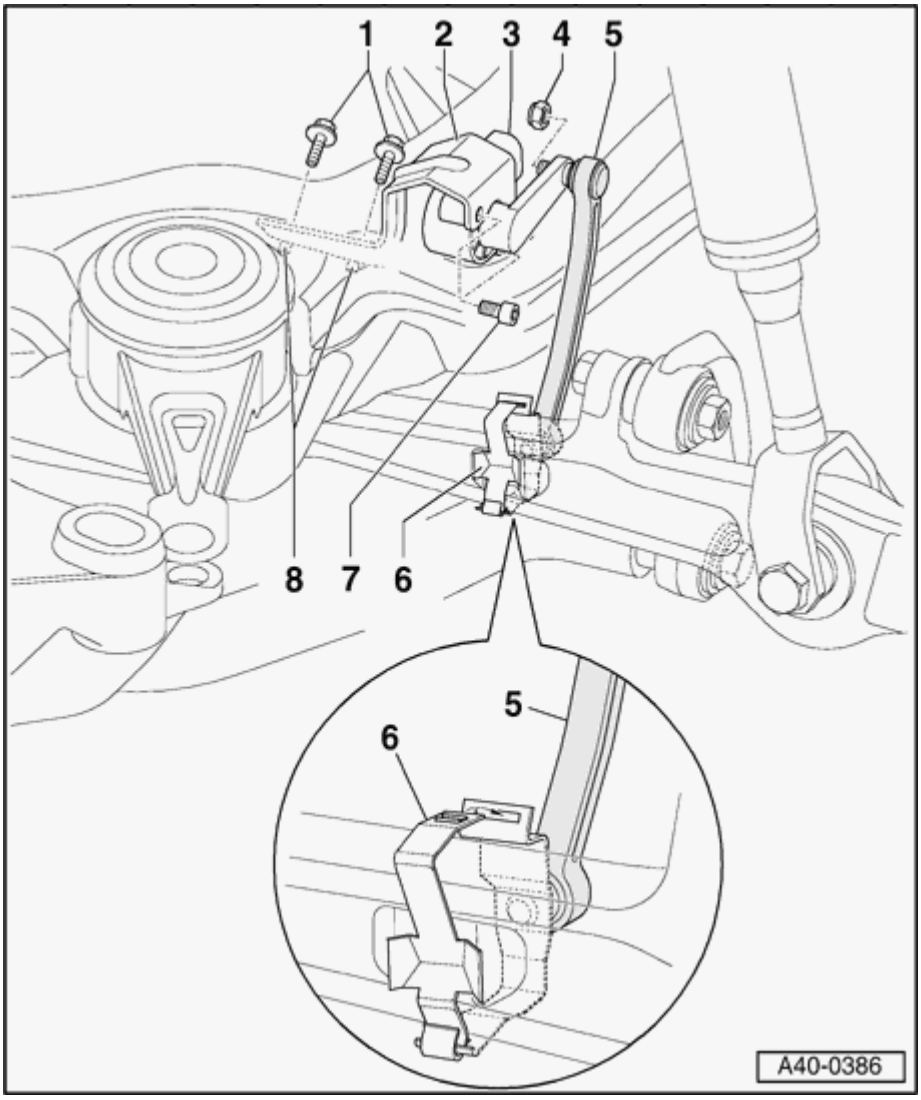

Fig. 121: Vehicles With Automatic Headlight Vertical Aim Control, Vehicle Level Sensor Component

Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Hex bolt, 9 Nm

2 - Bracket

3 - Left Front Level Control System Sensor G78

- Is checked electrically through On Board Diagnostics (OBD)
- In the event of complaints, perform --> "Guided Fault Finding" using Vehicle Diagnosis, Testing and Information System VAS 5051A
- Removing and installing **Removing and installing**

4 - Hex nut, self-locking, 10 Nm

- Always replace if removed

5 - Connecting link from Left Front Level Control System Sensor G78

- Do not remove connecting link from Left Front Level Control System Sensor G78 ball head!

6 - Retaining clip

- Retaining clip closure must face upward at control arm and backward in direction of travel.

7 - Hex socket head bolt, 4 Nm

8 - Pop rivet

Removing and installing

Special tools, testers and auxiliary items required

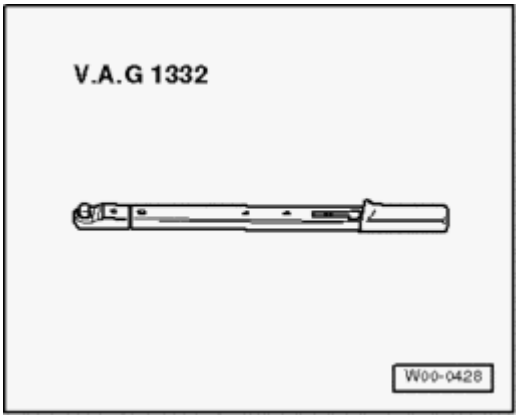

Fig. 122: Identifying Torque Wrench V.A.G. 1332

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1332

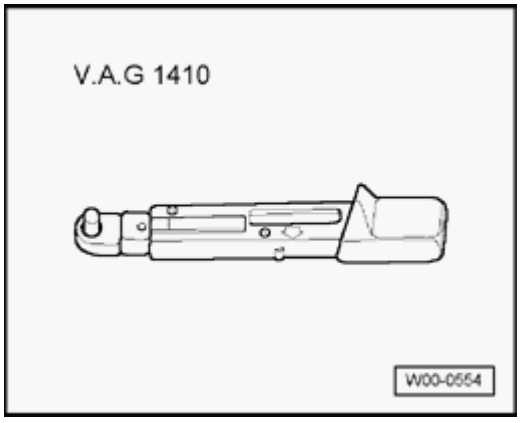

Fig. 123: Torque Wrench V.A.G 1410
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1410

When removing and installing control arm, it is necessary to loosen Left Front Level Control System Sensor G78 retaining clip.

NOTE:

- **To install connecting link to Left Front Level Control System Sensor G78 crank, use an open-end wrench (wrench width 10) with dimension - A - = 4 mm to avoid damaging the seal.**

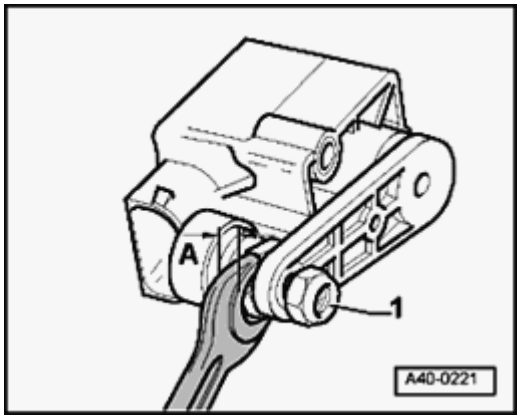

Fig. 124: Linkage Attached To Sensor And New Transverse Link Installed
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Dimension - **A** - = 4 mm
- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

- Left Front Level Control System Sensor G78 connecting link retaining clip is secured at control arm between stops with a clamp.

When installing headlight range control, ensure correct position of crank and connecting link to each other.

NOTE:

- **Connecting link must face forward diagonally.**
- **Crank must face rearward.**

LOWER CONTROL LINK

Control link, removing and installing, (all engine versions except 3.0L TDI and 3.2L FSI)

Special tools, testers and auxiliary items required

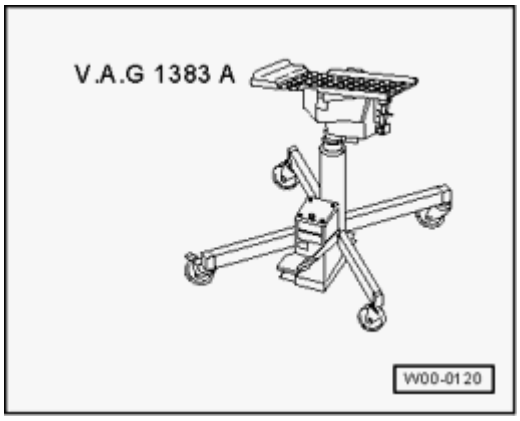

Fig. 125: Identifying Engine/Transmission Jack V.A.G. 1383 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Engine/transmission jack V.A.G 1383 A

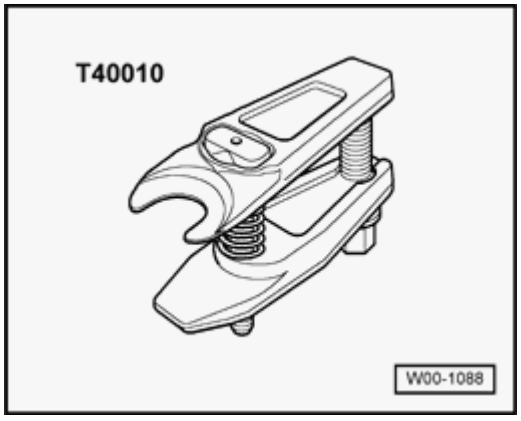

Fig. 126: Ball Joint Puller T40010
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Ball joint puller T40010

- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332

Removing

- Remove wheel covers, remove cover cap on light-alloy wheels (removal hook in vehicle tool kit).
- Remove wheel.
- Remove sound insulation. -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET
- On vehicles with headlight range control, remove Left Front Level Control System Sensor G78 from control link --> **Vehicles with automatic headlight vertical aim control, vehicle level sensor**.
- Secure brake disc with a wheel bolt.
- Remove nut from guide link joint pins enough so that it is flush with joint pin threads. Use 4 mm socket wrench to hold joint pin, if necessary.

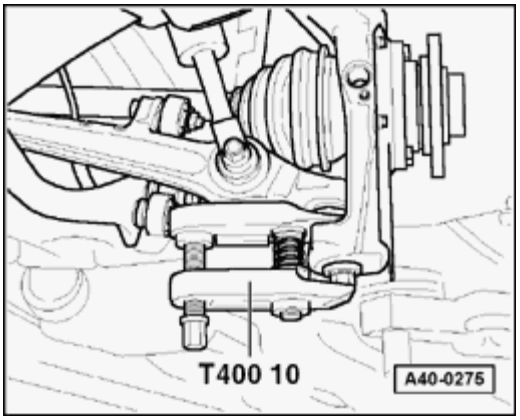

Fig. 127: Separating Lower Link Joint Pin From Tapered Seat Using Ball Joint Puller T40010
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separate control link joint pin from tapered seat using ball joint puller T40010.

NOTE:

- **Ensure both puller lever arms are parallel to each other when using greatest force, adjust if necessary.**
- **To avoid damaging upper link joints, wheel bearing housing must be braced against a rebound that is too strong, e.g. using engine/transmission jack V.A.G 1383 A**

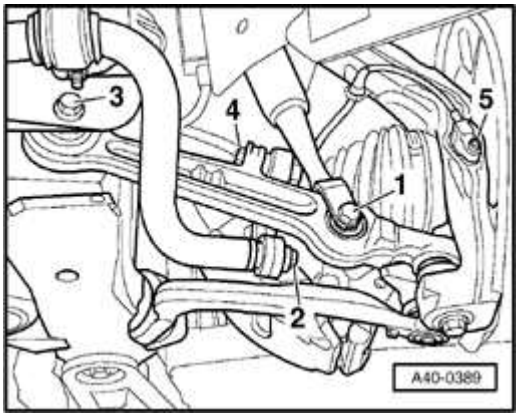

Fig. 128: Identifying Guide Link/Subframe Connection Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove hex bolt - **1** -.
- Remove bolts - **2** - and - **4** - , remove connecting link.
- Remove hex bolt - **3** -.
- Remove lower control link.

Installing

NOTE:

- **Bolts and nuts must be replaced.**
- **Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at control links if vehicle is in curb weight position --> Wheel bearing, lifting to curb weight position**

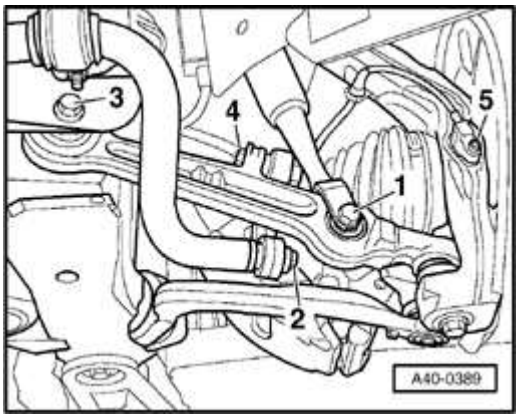

Fig. 129: Identifying Guide Link/Subframe Connection Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install new hex head bolt - **3** - and new hex nut and tighten
- Remove adhesive residue at joint pins from control link
- Tight nut at joint pins (control link)

- Tighten threaded connection - **1** -
- Tighten bolt - **2** -
- Tighten bolt - **4** -
- On vehicles with headlight range control, install vehicle level sensor link at control link --> **Vehicles with automatic headlight vertical aim control, vehicle level sensor**.
- Install sound insulation. -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET
- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

Control arm, removing and installing (vehicles with 3.0L TDI and 3.2L FSI)

Special tools, testers and auxiliary items required

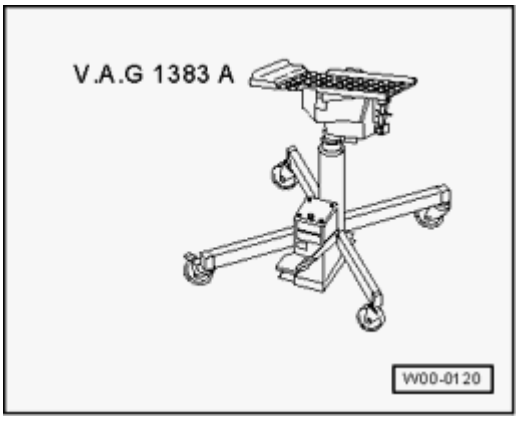

Fig. 130: Identifying Engine/Transmission Jack V.A.G. 1383 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Engine/transmission jack V.A.G 1383 A

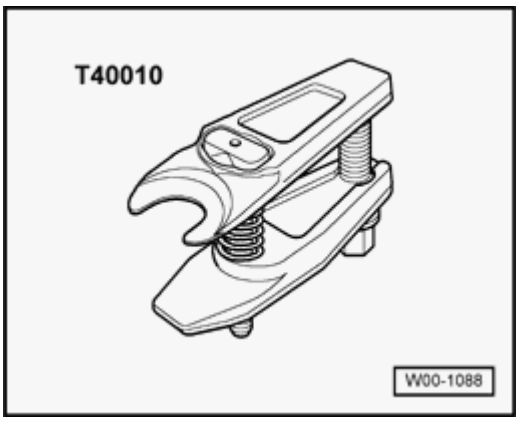

Fig. 131: Ball Joint Puller T40010
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Ball joint puller T40010
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332
- Engine support bridge 10 - 222 A

Removing

Removal of right control link with 3.0L TDI engine is performed as already described for all engine versions --> **Control link, removing and installing, (all engine versions except 3.0L TDI and 3.2L FSI)**

- Support engine entirely with engine support bridge.
- Remove wheel covers, remove cover cap on light-alloy wheels (removal hook in vehicle tool kit).
- Remove wheel.
- Remove sound insulation. -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET
- Install sound insulation. -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET
- On vehicles with headlight range control, remove Left Front Level Control System Sensor G78 from control arm --> **Vehicles with automatic headlight vertical aim control, vehicle level sensor**.
- Secure brake disc with a wheel bolt.
- Remove nut from guide link joint pins enough so that it is flush with joint pin threads. Use 4 mm socket wrench to hold joint pin, if necessary.

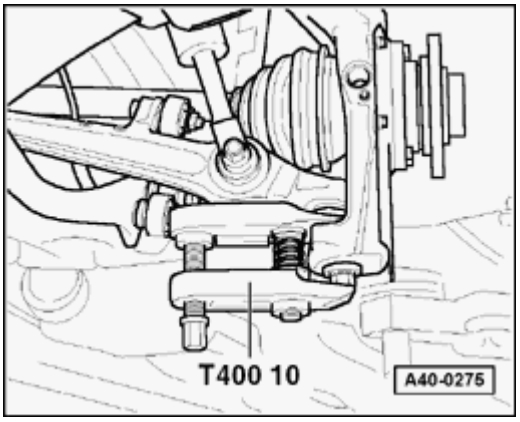

Fig. 132: Separating Lower Link Joint Pin From Tapered Seat Using Ball Joint Puller T40010
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separate control link joint pin from tapered seat using ball joint puller T40010.

NOTE:

- **Ensure both puller lever arms are parallel to each other when using greatest force, adjust if necessary.**
- **To avoid damaging upper control link joints, wheel bearing housing must be braced against a rebound that is too strong, e.g. using engine/transmission jack V.A.G 1383 A**

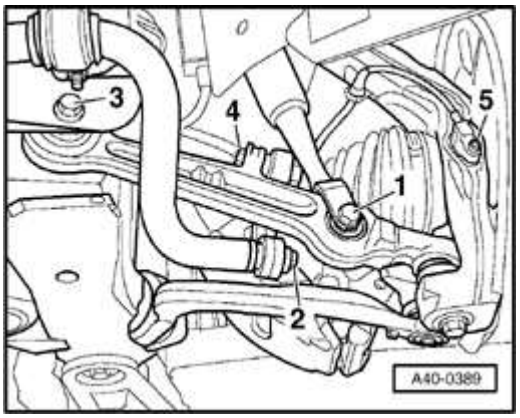

Fig. 133: Identifying Guide Link/Subframe Connection Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove hex bolt - **1** -.
- Remove bolts - **2** - and - **4** - , remove connecting link.
- Remove nut from threaded connection - **3** -.

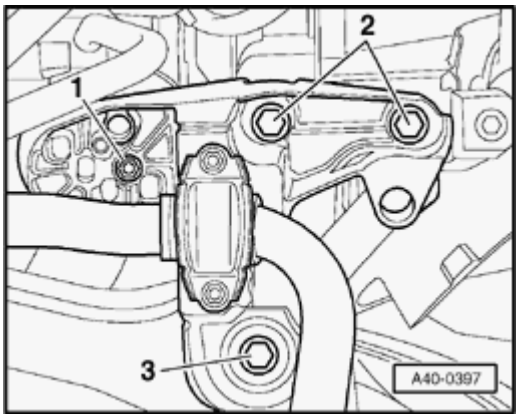

Fig. 134: Identifying Nut & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove nut - **1** -.
- Remove bolts - **2** - and - **3** -.

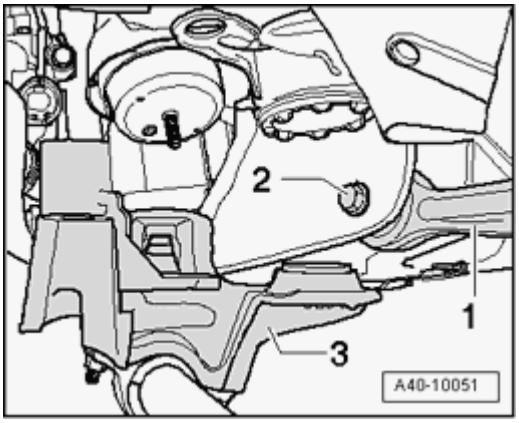

Fig. 135: Pulling Engine Mount And Stabilizer Bar Console Downward And Removing Bolts & Control Link
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull engine mount and stabilizer bar console - **3** - downward and remove bolts - **2** -.
- Remove control link - **1** -.

Installing

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

NOTE:

- **Bolts and nuts must be replaced.**
- **Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at control arms if vehicle is in curb weight position --> Wheel bearing, lifting to curb weight position**

- Remove adhesive residue at joint pins from control link
- On vehicles with headlight range control, install vehicle level sensor link at control arm --> **Vehicles with automatic headlight vertical aim control, vehicle level sensor**.

Torque specifications --> **Component, assembly overview**

- Install sound insulation. -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET
- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

Control link bushings, replacing

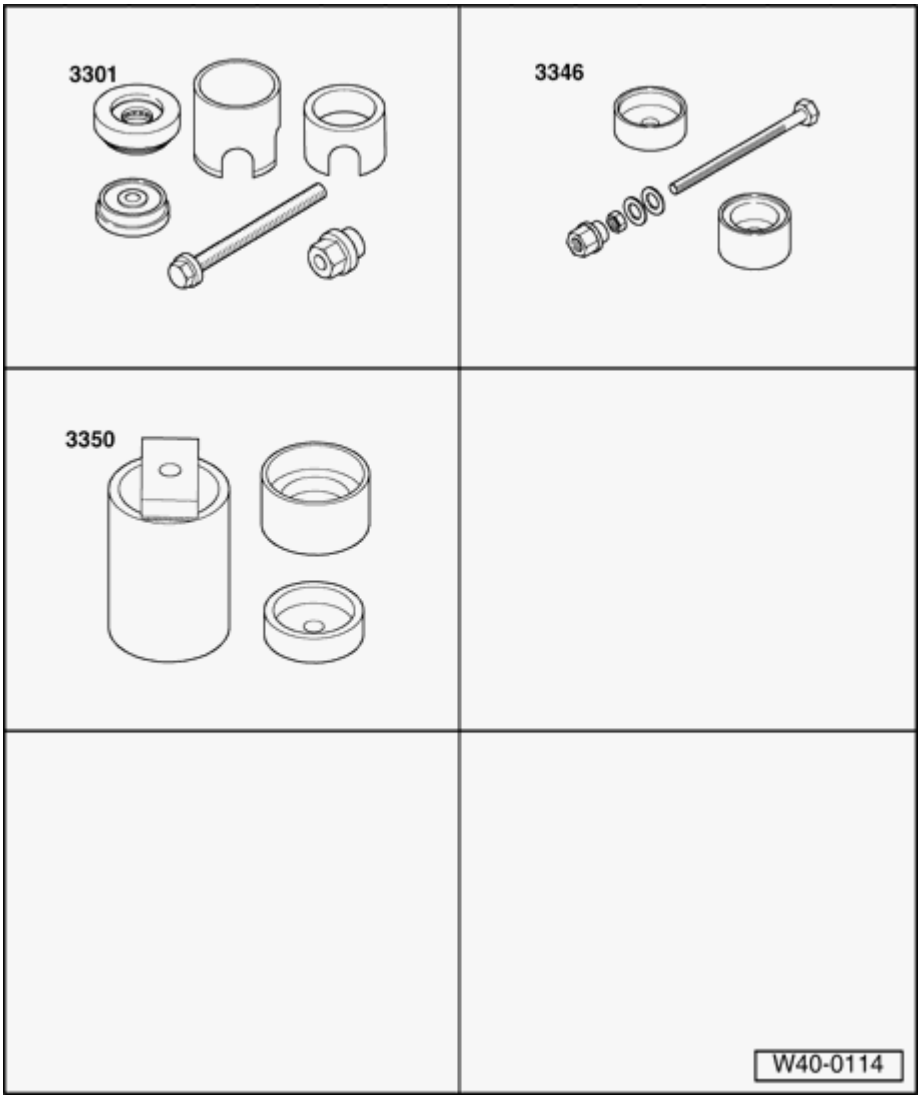

Fig. 136: Identifying Special Tools - Control Link Bushings, Replacing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Assembly tool 3301
- Assembly tool 3301/3
- Assembly tool 3301/4
- Support Arm Bearing Inst. Tool 3346

- Assembly tool 3346/1
- Assembly tool 3346/2
- Assembly tool 3346/3
- Assembly tool 3350/1

NOTE:

- **Use protective covers when clamping aluminum control links.**

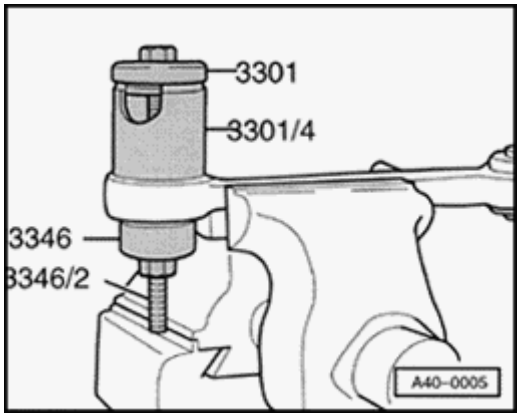

Fig. 137: Inner Bushing, Removing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Inner bushing, removing

- Mark location of old bushing.

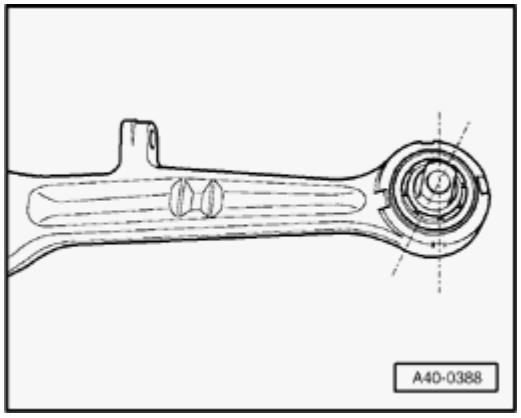

Fig. 138: Bushing Installation Location
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Bushing installation location

- Transfer installation mark for old bushing to new bushing

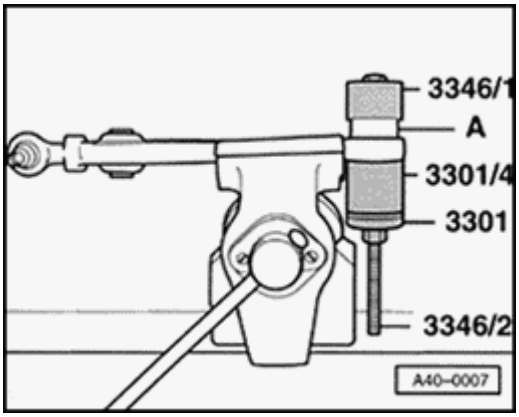

Fig. 139: Inner Bushing, Pulling In
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Inner bushing, pulling in

- Insert bearing - **A** - in thrust piece (3346/1) to a depth of 3.2 mm.
- Pull bushing in onto stop.

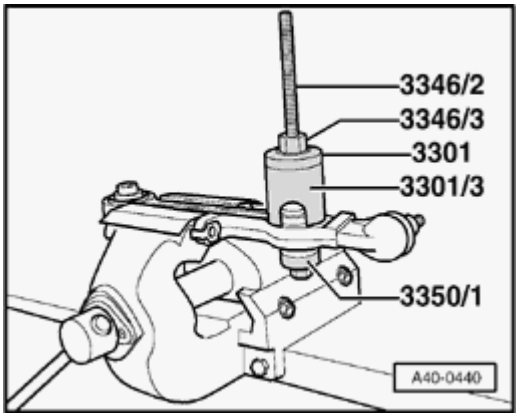

Fig. 140: Pull Out Outer Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pull out outer bushing

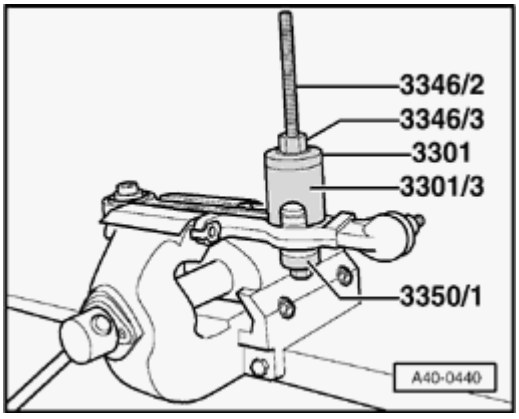

Fig. 141: Pull In Outer Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pull in outer bushing

To press in, use installation lubricant G 294 421 A1 thinned with water at a ratio of 1:100.

- Pull in bushing in center.

Chamfers on bushing and control link must align.

GUIDE LINK

Guide link, removing and installing

Special tools, testers and auxiliary items required

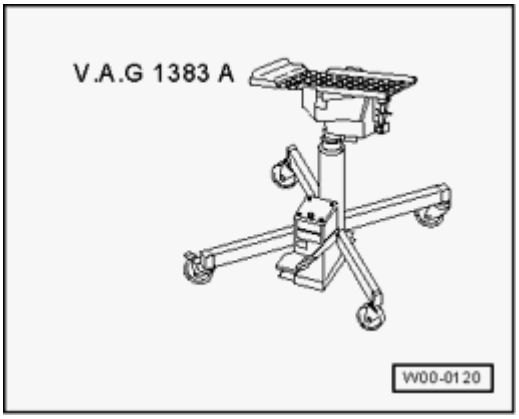

Fig. 142: Identifying Engine/Transmission Jack V.A.G. 1383 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Engine/transmission jack V.A.G 1383 A

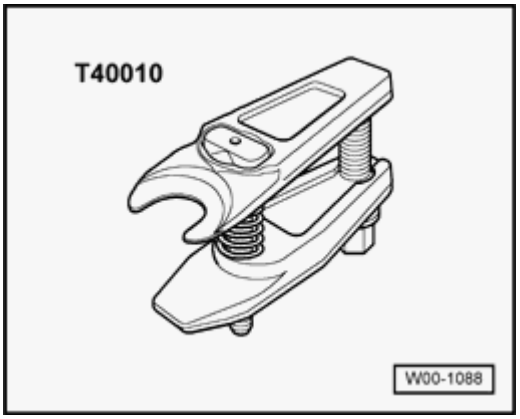

Fig. 143: Ball Joint Puller T40010
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Ball joint puller T40010
- Torque wrench V.A.G 1332

Removing

- Remove wheel covers, remove cover cap on light-alloy wheels (removal hook in vehicle tool kit).
- Remove wheel.
- Secure brake disc with a wheel bolt.
- Remove brake caliper and secure to body if ball joint puller T40010 cannot be installed.

NOTE:

- **Install brake line bracket on brake caliper HP-2 before securing to body to avoid damaging brake lines.**
- **Secure brake caliper to body so that caliper weight does not stress or damage brake hose or brake line.**

- Remove nut from guide link joint pins enough so that it is flush with joint pin threads. Use 4 mm socket wrench to hold joint pin, if necessary.

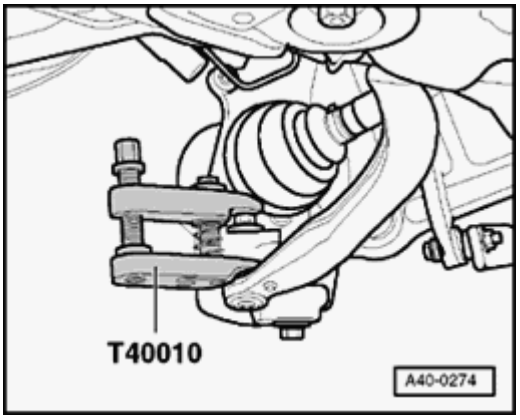

Fig. 144: Separating Guide Link Joint Pin From Tapered Seat Using Ball Joint Puller T40010

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separate guide link joint pin from tapered seat using ball joint puller T40010.

NOTE:

- **Do not damage protective joint boot when doing this!**
- **Ensure both puller lever arms are parallel to each other when using greatest force.**

- Place engine/transmission jack V.A.G 1383 A with wooden block under subframe and press lightly against.
- Remove hex head bolts - **2** - and - **3** - on both sides.
- Lower subframe slightly using engine/transmission jack V.A.G 1383 A.

Ensure brake line surface and underbody protection is not damaged!

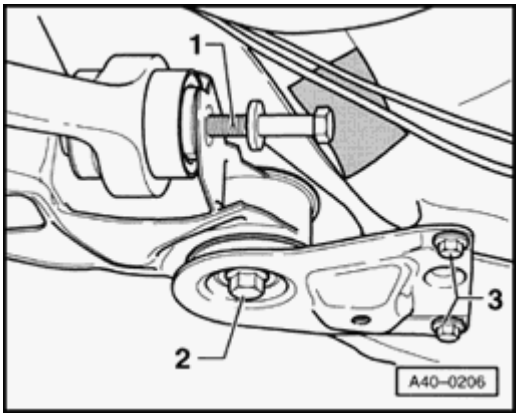

Fig. 145: Removing Hex Bolt & Guide Link
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove hex bolt - **1** -.
- Remove guide link.

Installing

NOTE:

- **Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at control links if vehicle is in curb weight position --> Wheel bearing, lifting to curb weight position**

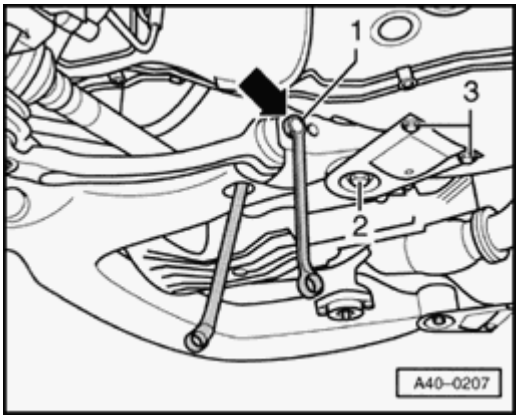

Fig. 146: Tightening Nut On Joint Pin & Hex Head Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten nut on joint pin
- Tighten hex head bolt - **2** - ,
- Tighten hex head bolt - **3** - ,
- Install brake caliper, if necessary. Refer to --> **46 - BRAKES - MECHANICAL COMPONENTS**
- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

Guide link mountings, replacing

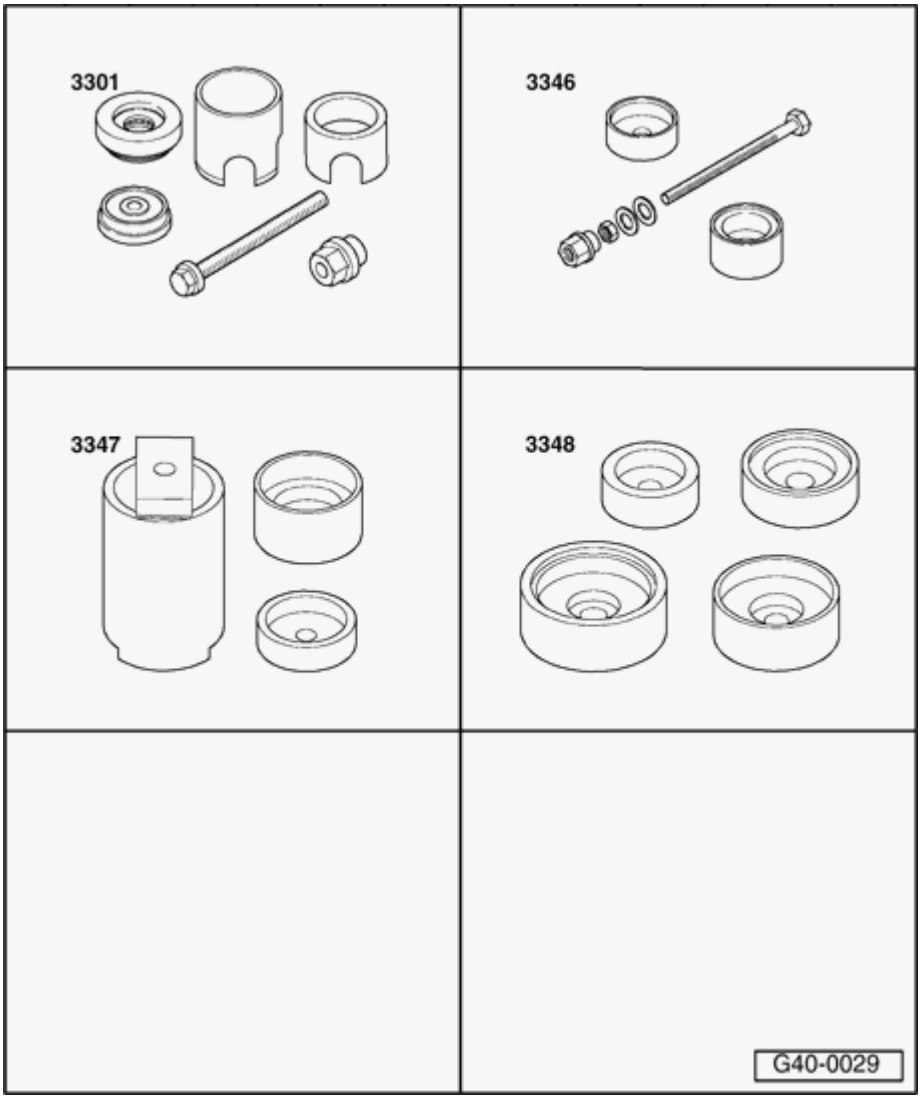

Fig. 147: Identifying Special Tools - Guide Link Mountings, Replacing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Assembly tool 3301
- Assembly tool 3346/2
- Assembly tool 3346/3
- Assembly tool 3347

- Assembly tool 3347/2
- Assembly tool 3348

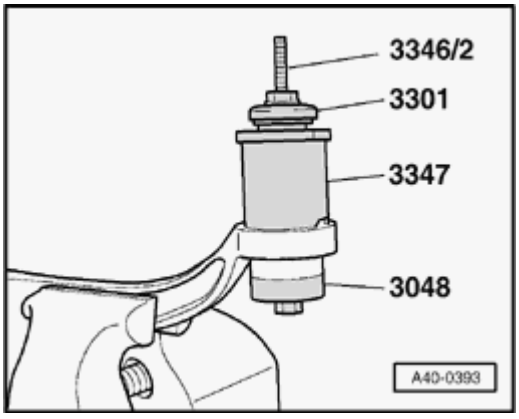

Fig. 148: Remove Hydraulic Mount At Control Link
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Remove hydraulic mount at control link

NOTE:

- **Use protective covers when clamping aluminum control links.**

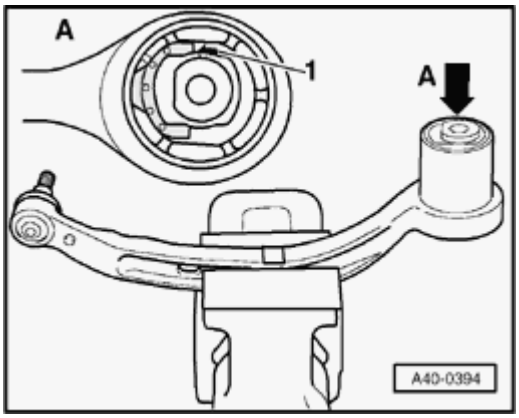

Fig. 149: Installation Position Of Hydro-Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installation position of hydro-bushing

Arrow applied to hydraulic bushing - **1** - points in joint pin direction.

The permissible deviation is ± 5°.

A = View - **arrow A** -

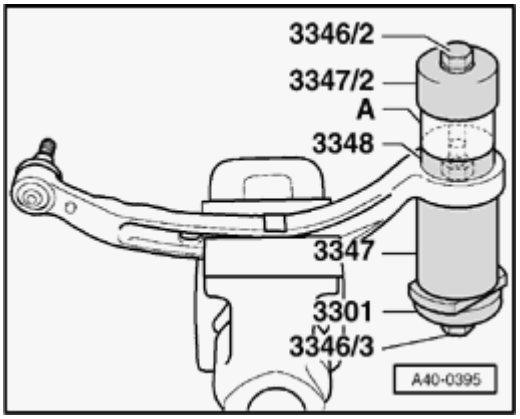

Fig. 150: Pull In Hydro-Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pull in hydro-bushing

- Insert hydro-bushing - **A** - into special tool (3347/2).
- Tighten together with sleeve - **3348** - , spindle -3346/2- and hex nut.
- Pull in hydro-bushing - **A** - until it stops.

STABILIZER BAR

Stabilizer bar, removing and installing

Special tools, testers and auxiliary items required

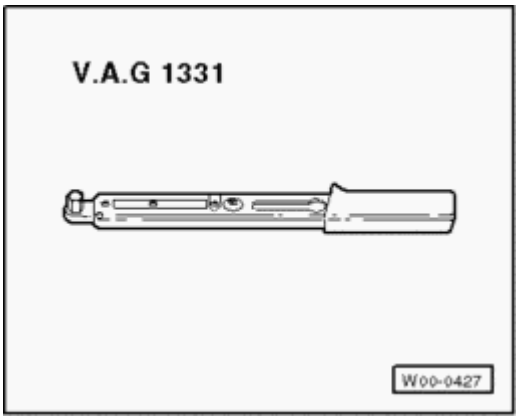

Fig. 151: Identifying Torque Wrench V.A.G. 1331
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1331

Removing

- Remove sound insulation.

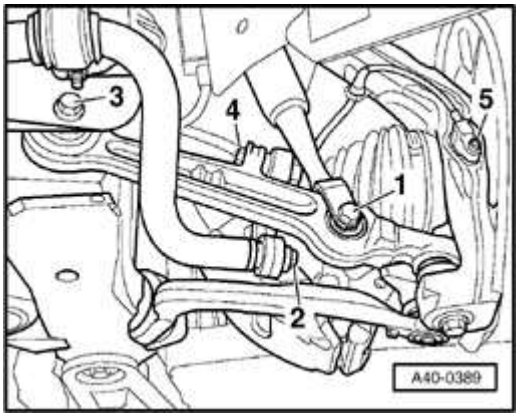

Fig. 152: Identifying Guide Link/Subframe Connection Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt -2-

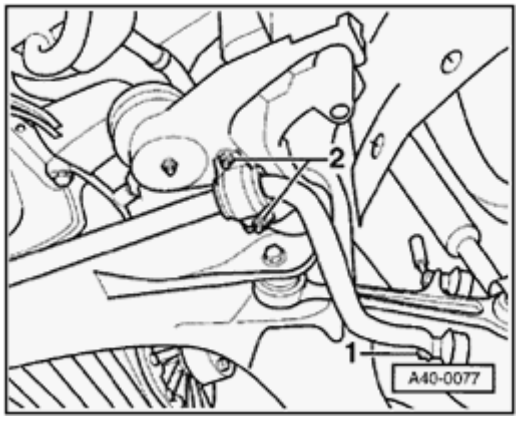

Fig. 153: Identifying Front Stabilizer Bar Brackets
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove hex nut - **2** -.
- Remove stabilizer

Installing

NOTE:

- **If you replace stabilizer, note chassis version.**
- **Stabilizer and bushing must be free of grease.**

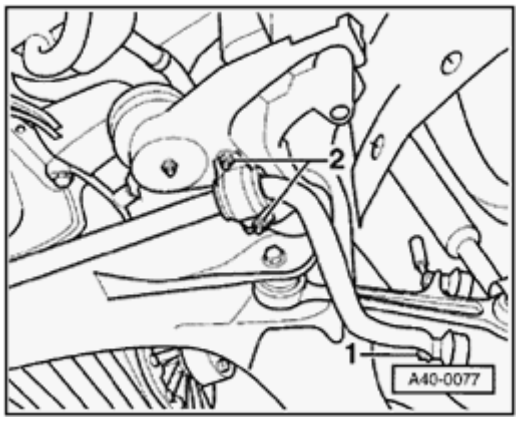

Fig. 154: Identifying Front Stabilizer Bar Brackets
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install new nuts - **2** - but do not tighten.

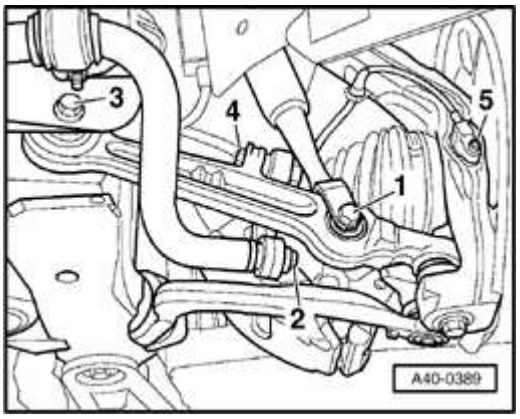

Fig. 155: Identifying Guide Link/Subframe Connection Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten new bolts - **2** -

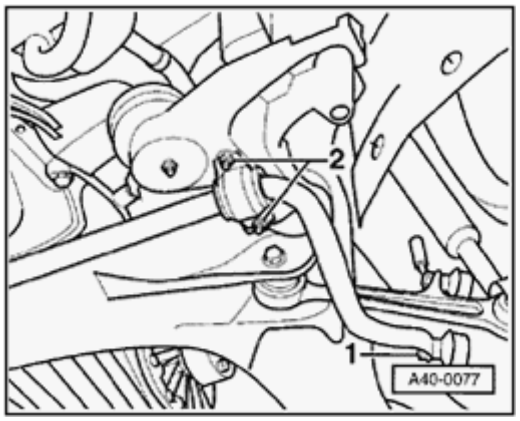

Fig. 156: Identifying Front Stabilizer Bar Brackets
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten nuts - **2** - to 25 Nm.
- Install sound insulation. -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET

CROSS BRACE

Cross brace, removing and installing

NOTE:

- **Cross brace is only installed on certain vehicle versions. It is located on front plenum chamber cross panel.**

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1331

Removing

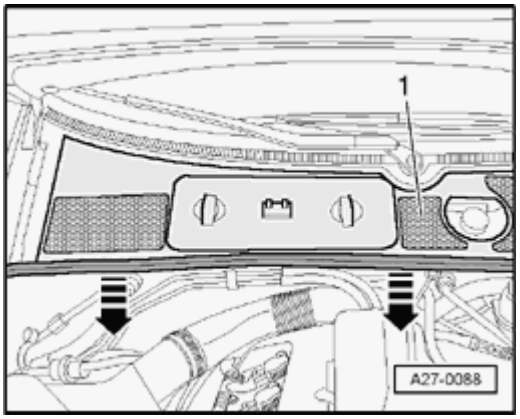

Fig. 157: Identifying Plenum Chamber Cover & Removing Rubber Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove plenum chamber cover rubber seal in direction of - **arrow** -.
- Remove plenum chamber cover - **1** - forward.

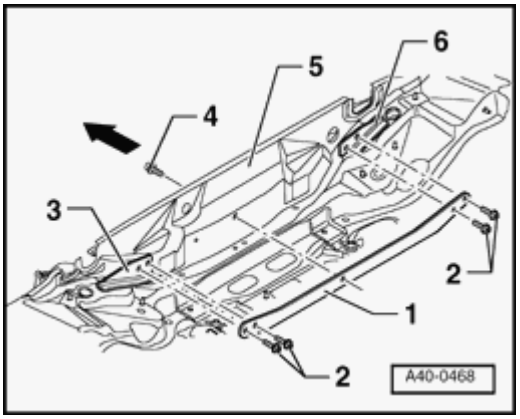

Fig. 158: Removing Combi-Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove combi-bolts - **2** - and - **4** -.
- Remove cross brace - **1** - upward out of plenum chamber - **5** -.

3 - Left mounting bracket welded to body

6 - Right mounting bracket welded to body

- **Arrow** - points in direction of travel

Installing

Installation is in reverse order of removal.

Combi-bolt torque specification: 25 Nm

FRONT DIAGONAL BRACES, REMOVING AND INSTALLING

Front diagonal braces, removing and installing

Front diagonal braces, removing and installing --> **Front or rear diagonal braces, removing and installing**

FRONT DRIVE AXLE, SERVICING

Drive axle, removing and installing

Special tools, testers and auxiliary items required

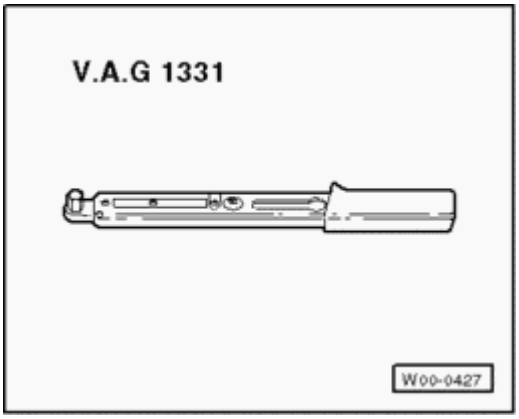

Fig. 159: Identifying Torque Wrench V.A.G. 1331
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1331

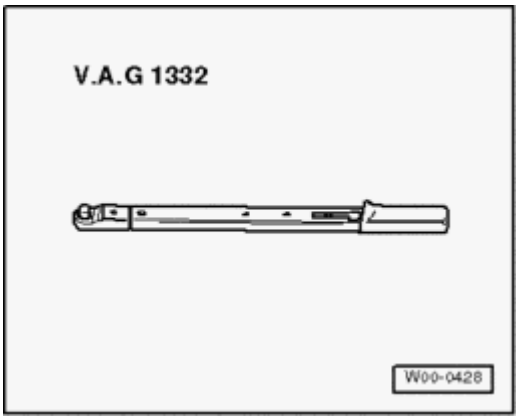

Fig. 160: Identifying Torque Wrench V.A.G. 1332
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1332

Remove drive axle

- Remove wheel covers, remove cover cap on light-alloy wheels (removal hook in vehicle tool kit).
- Loosen outer drive axle joint bolt a maximum of 90° (only loosen with vehicle resting on wheels -risk of accident-).
- Remove wheel.
- Install all five wheel bolts hand-tight.

- Remove drive axle outer joint screw.
- Remove drive axle from flange shaft/transmission.

If there is not enough room available to remove drive axle, perform following steps:

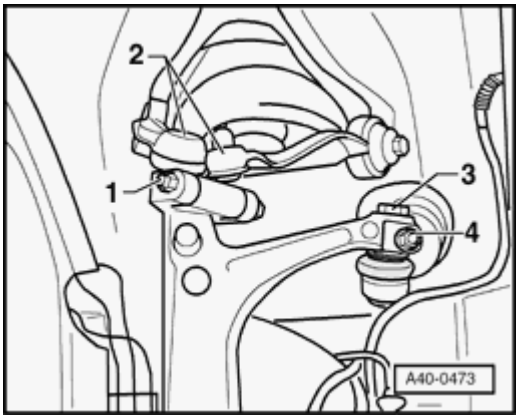

Fig. 161: Identifying Nut, Control Links & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove nut - **1** - , remove hex bolt and lift out both control links - **2** - upward.

The slits in the wheel bearing housing must not be widened using a chisel or similar tool!

NOTE:

- **Do not loosen bolts - 3 - and - 4 - , otherwise the adjustment of the front axle will change!**

- Swing wheel bearing housing to side.
- Remove drive axle.

Install drive axle

- Insert drive axle in wheel bearing housing.
- Insert both upper control links, insert new bolt and tighten new nut ; while tightening, press control link as far as possible toward wheel bearing housing.
- Fasten drive axle to flange shaft/transmission.
- Fasten drive axle outer joint

NOTE:

- **When tightening drive axle outer joint to pre-tightening torque specification, vehicle must not come in contact with floor; otherwise wheel bearing can be damaged.**

A second technician is needed for next step:

- 1st Technician: Sit in vehicle and operate foot brake
- 2nd Technician: Tighten drive axle hex bolt to pre-tightening torque

Hex bolt M14: 115 Nm

Hex bolt M16: 200 Nm

- Install wheel and place vehicle on floor.
- Turn drive axle bolt an additional 180°. (Only turn additional turn on vehicle resting on wheels -risk of accident-).

DRIVE AXLE WITH TRIPLE ROLLER JOINT AAR 2000, SERVICING

Tools

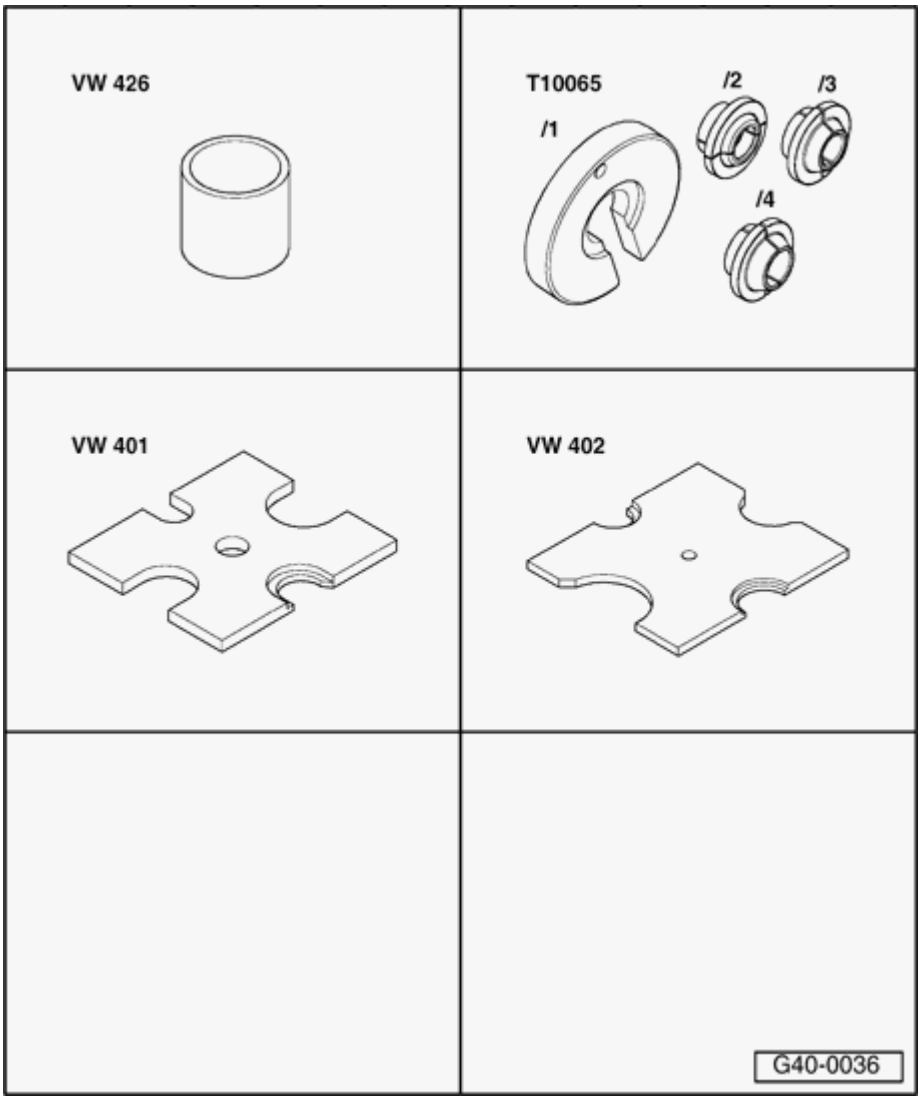

Fig. 162: Identifying Special Tools - Drive Axle With Triple Roller Joint Aar 2000, Servicing (1 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Sleeve VW 426
- Thrust plate VW 401

- Thrust plate VW 402
- Assembly tool T10065
- Punch VW 408 A

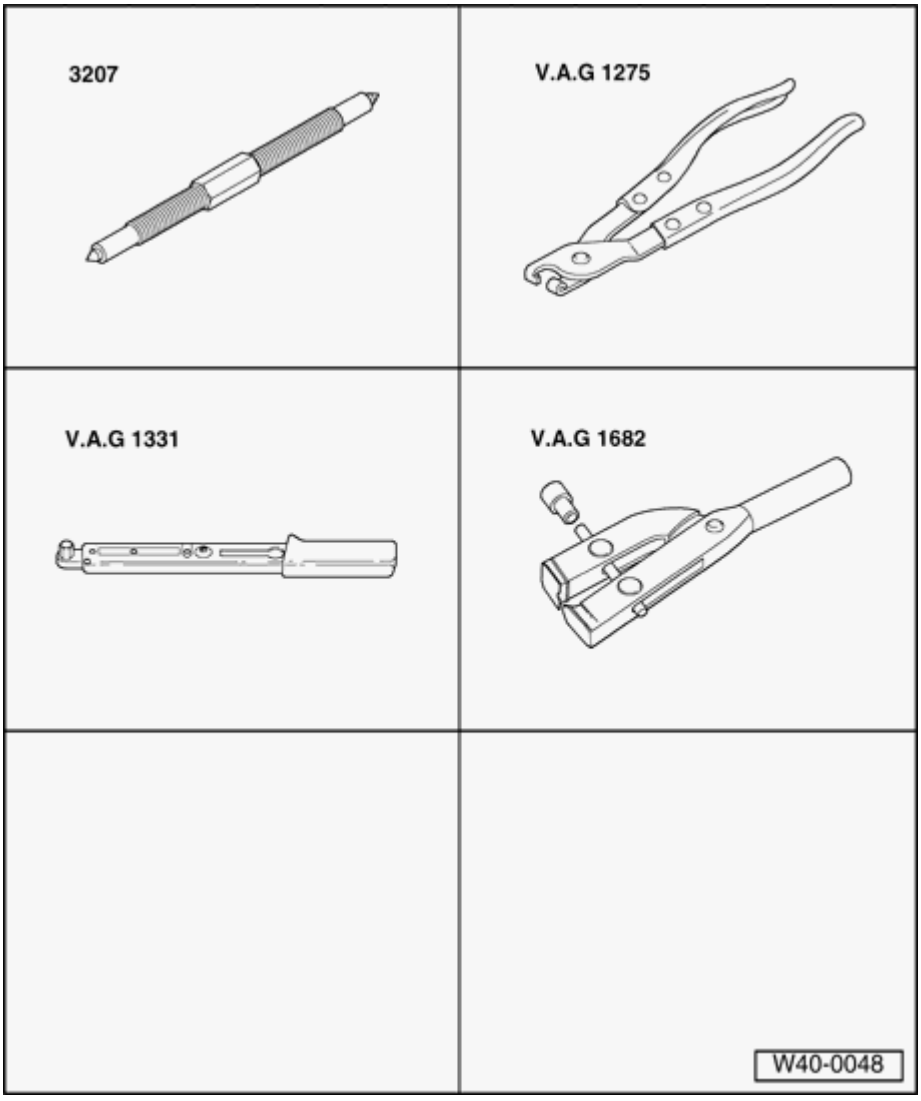

Fig. 163: Identifying Special Tools - Drive Axle With Triple Roller Joint Aar 2000, Servicing (2 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Pressure spindle 3207
- Hose clamp pliers V.A.G 1275
- Torque wrench V.A.G 1331
- CV joint boot clamp tool V.A.G 1682

Component, overview

Filling outer joint with grease G 000 603.

Filling triple roller joint with grease G 000 605.

Grease quantity and type

	Grease quantity	Amount if:	
Outer joint	Total quantity	Joint	Boot
[mm]	[g]	[g]	[g]
88	90	50	40
Inner joint			
72	110	80	30

Grease joint again when replacing protective joint boot.

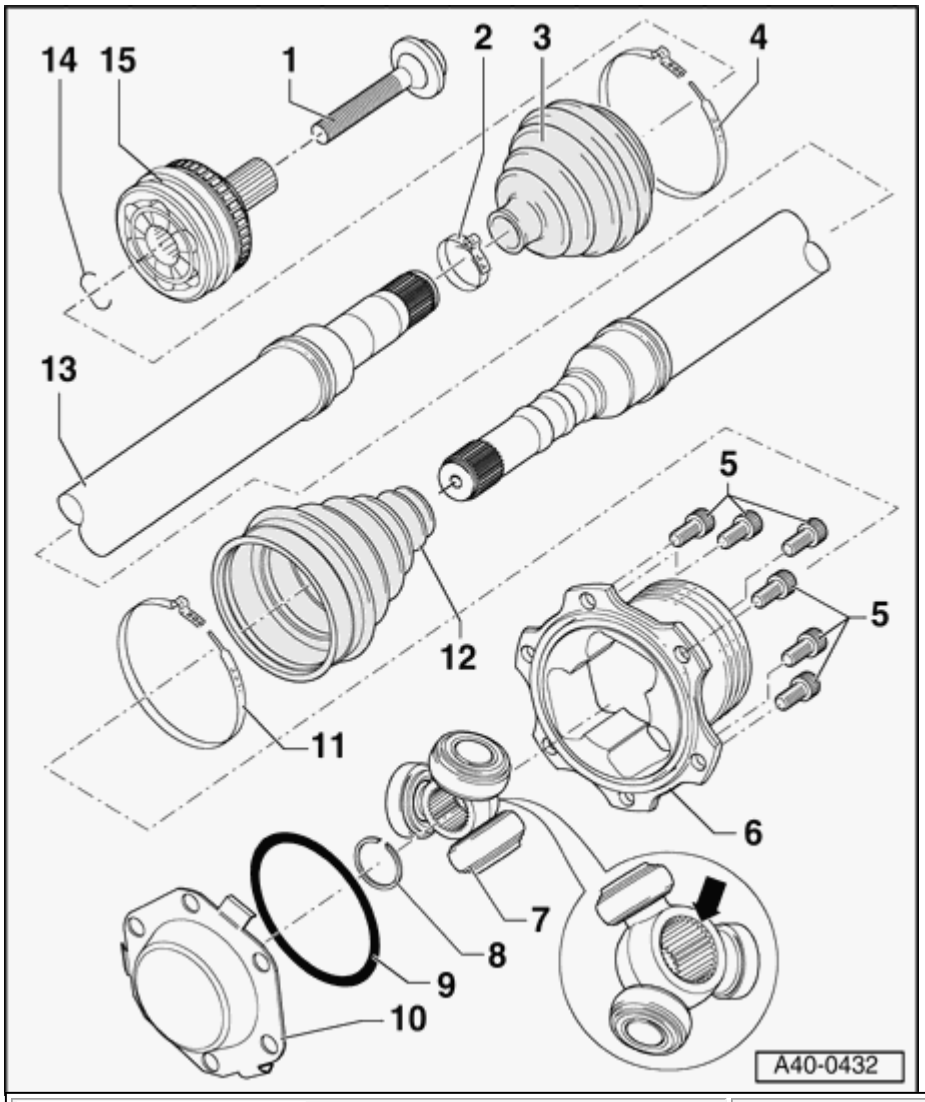

Fig. 164: Drive Axle With Triple Roller Joint AAR 2000 Component, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Bolt

- Always replace if removed
- Loosen **Remove drive axle**
- Fastening **Install drive axle**
- Torque specification **Install drive axle**.

2 - Clamp

- Replace

3 - Constant velocity (CV) joint boot

- Check for tears and chafing
- Before clamping hose clamp, raise protective joint boot briefly to balance pressure.

4 - Clamp

- Replace

5 - Multi-point socket head bolt

6 - Triple roller joint housing

7 - Triple rotor star with rollers

- Chamfer - **arrow** - faces splines drive axle splines
- When installing triple roller star on profile shaft, profile shaft splines must be lightly coated with grease used in joint.

8 - Circlip

- Replace

9 - O-ring

- Replace

10 - Cover

- Replace

11 - Clamp

- For triple roller joint
- Replace

12 - CV boot for triple roller joint

- Check for tears and chafing
- Before clamping hose clamp, raise protective joint boot briefly to balance pressure. Joint must be in center position.

13 - Axle shaft

14 - Circlip

- Replace
- Insert in shaft groove

15 - Outer constant velocity joint

- Replace only as a unit
- Installing: Drive onto shaft using plastic hammer until compressed circlip seats.
- Greasing **Grease quantity and type**
- Checking --> **Outer constant velocity (CV) joint, checking**

- When installing joint on profile shaft, profile shaft splines must be lightly coated with grease used in joint.

Triple roller joint, disassembling

- Axle shaft, clamping in vise

Use protective vise covers!

- Open clamp on joint and slide back protective boot.

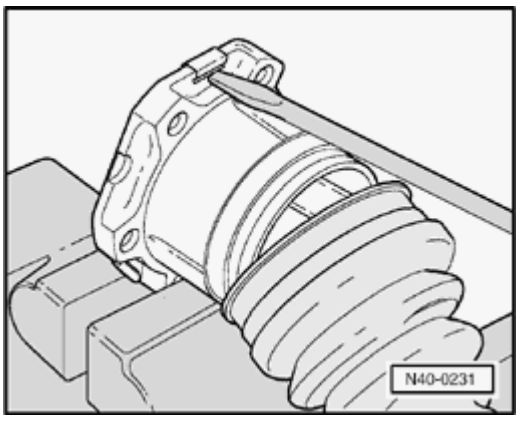

Fig. 165: Bending Open Metal Tabs With Flat-Head Screwdriver And Prying Off Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bend open metal tabs with flat-head screwdriver and pry off housing.

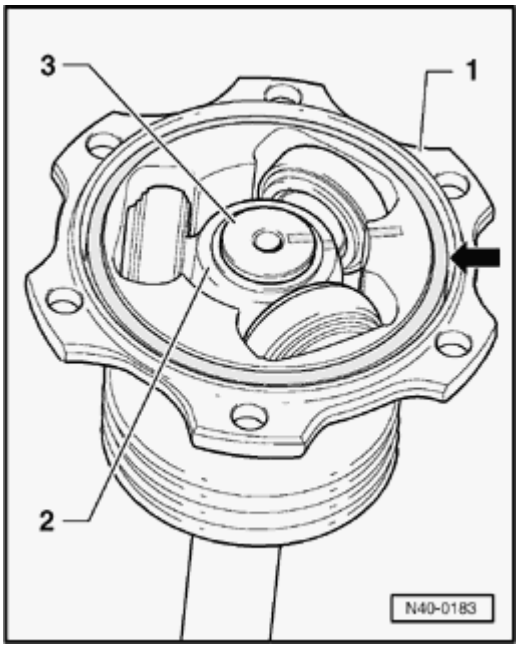

Fig. 166: Identifying Joint Piece, Triple Roller Star, Driveshaft And Marking
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Mark installation position of parts - **1** - to - **3** - with lines.

If the parts are not marked when assembling, the components are not brought back to their previous installation position, then it is possible that it will be noisy when driving.

A waterproof felt tipped pen is suitable for marking.

1 - Triple roller joint housing

2 - Triple roller star

3 - Axle shaft

- Take O-ring - **arrow** - out of groove.
- Hold joint and take drive axle out of vise.

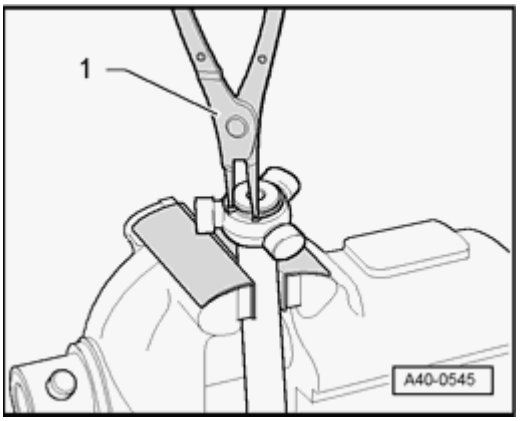

Fig. 167: Removing Circlip From Triple Roller Joint/Drive Axle
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip from triple roller joint/drive axle.

1 - Circlip pliers (commercially-available)

- If protective boot is damaged, remove, e.g. with shears. Otherwise, carefully turn back.
- Insert drive axle in press.

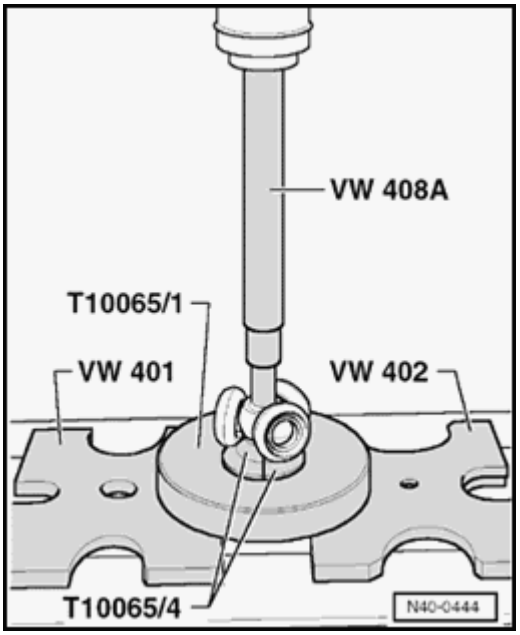

Fig. 168: Pressing Triple Roller Star Off Drive Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Hold drive axle, then press triple roller star off drive axle.

Ensure roller bodies are free when pressing off.

- Remove triple roller star with rollers and set aside on a clean surface.
- Remove joint from drive axle.
- Pull joint protective boot off from drive axle.
- Clean drive axle, joint piece and groove for oil seal.

Triple roller joint, assembling

- Slide joint protective boot onto drive axle.
- Slide joint piece onto drive axle.

Mount triple roller star

The chamfer on star faces toward shaft, this is used as an assembly aid.

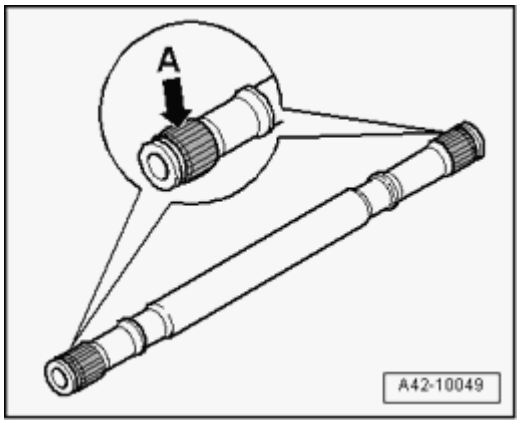

Fig. 169: Identifying Joint/Triple Roller Star Splines
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before installing joint or triple roller star, splines - **A** - must be lightly coated with grease used in joint.

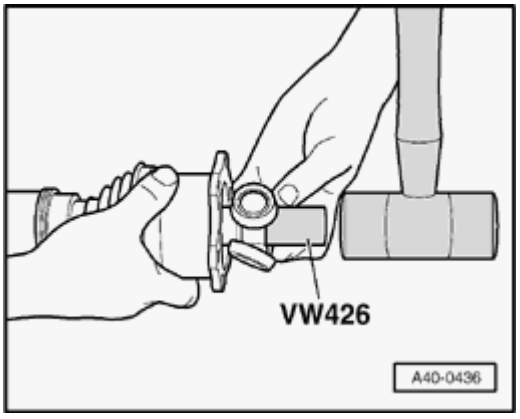

Fig. 170: Installing Triple Roller Star Onto Shaft As Per Markings
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install triple roller star onto shaft as per markings and drive in to stop.

A second technician is needed to slide protective boot back.

Use Tube Trans. Drive Shaft VW 426 shown in illustration.

- Insert circlip, make sure seated correctly.
- Press 80 grams of joint grease from repair kit, into triple roller joint.
- Slide joint piece over rollers and secure.
- Press 30 grams of joint grease, from repair kit, into reverse side of triple roller joint.

- Install joint protective boot. The bead in CV boot must engage in joint piece groove.
- Remove drive axle from vise and tighten joint in vise.

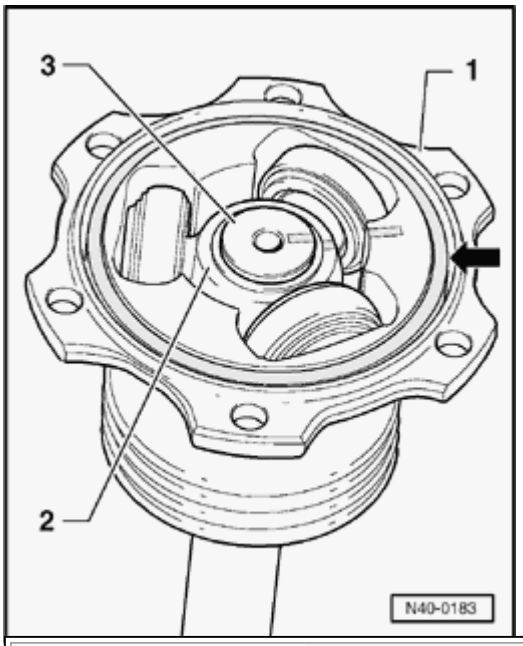

Fig. 171: Identifying Joint Piece, Triple Roller Star, Driveshaft And Marking
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert new sealing ring - **arrow** - from repair kit into groove.

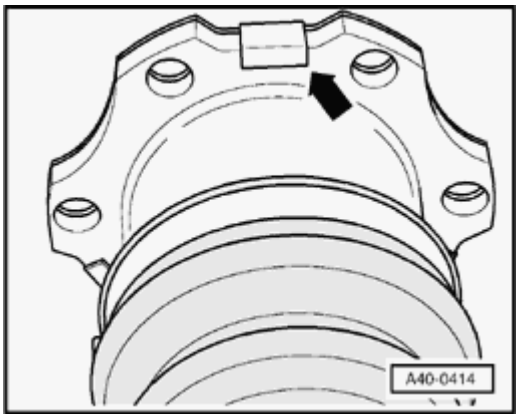

Fig. 172: Installing New Cover On Joint
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install new cover on joint. The holes of the cover and joint must align.
- Install clamp.

Observe note *Install clamp.* under **Triple roller joint AAR 2600 i or 3300 i, assembling**.

Outer constant velocity joint, servicing

Outer CV joint, removing

- Secure drive shaft with protective covers in vise clamp.
- Remove clamp and slide boot back.

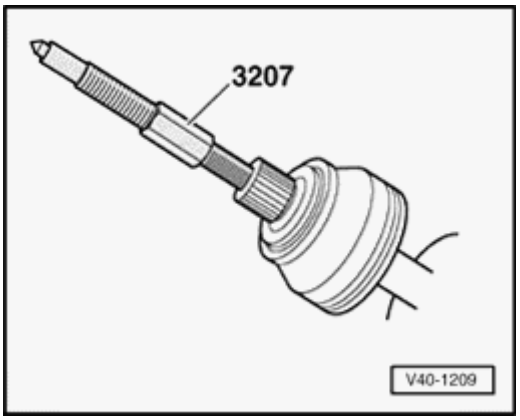

Fig. 173: Identifying Tighten Pressure Spindle 3207
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Screw Pressure Spindle 3207 with M 16/M14 thread version into joint pins until constant velocity joint is press off of drive axle.
- Remove circlip

Outer CV joint, installing

- Slide joint protective boot onto drive axle.

Protective boot and boot seat on drive axle must be free of grease.

- Install new circlip

Circlip (snap ring) must be replaced.

- Apply 50 g joint grease in inside of joint.

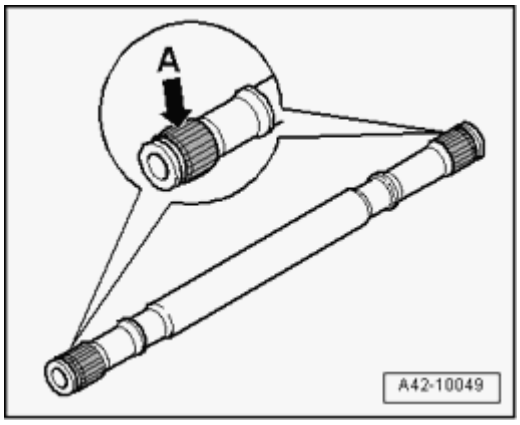

Fig. 174: Identifying Joint/Triple Roller Star Splines
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before installing joint or triple roller star, splines - **A** - must be lightly coated with grease used in joint.

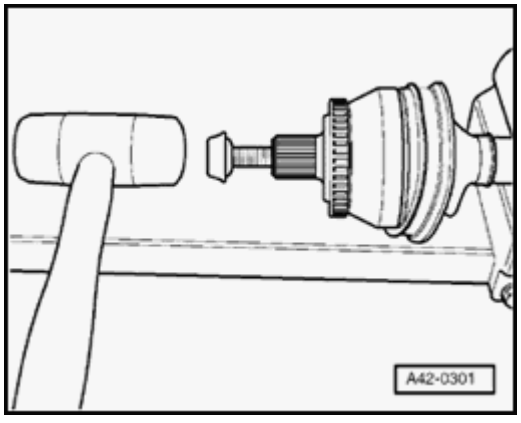

Fig. 175: Installing Outer Constant Velocity (CV) Joint With Flange Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Screw old drive axle bolt into joint as shown in illustration.
- Drive joint onto drive axle with plastic hammer until circlip engages.
- Apply 40 g joint grease in boot side of joint.

Grease quantities, see table **Grease quantity and type**

- Bleed protective joint boot.
- Close clamp.

Outer constant velocity (CV) joint, checking

In order to replace grease in case of strong soiling, joint must be disassembled or if journal surface of balls must be checked for wear and damage.

Removing

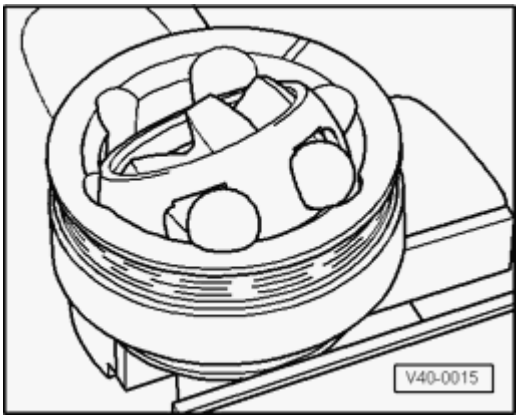

Fig. 176: Ball Hub And Ball Cage Swiveled
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before disassembling mark ball hub position in relation to ball cage and housing using an electric scriber or oil stone.
- Swivel ball hub and ball cage.
- Remove balls one after another.

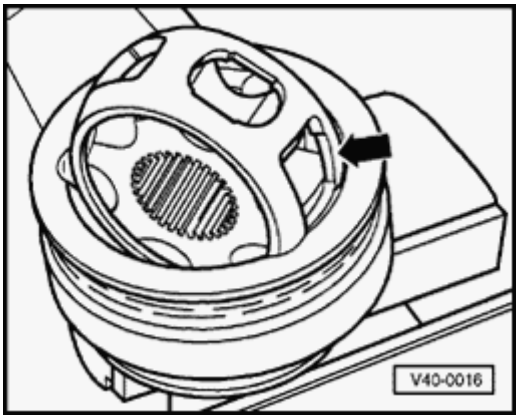

Fig. 177: Two Rectangular Windows Aligned With Joint Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn cage, until two rectangular windows - **arrow** - contact joint body.
- Lift out cage together with hub.

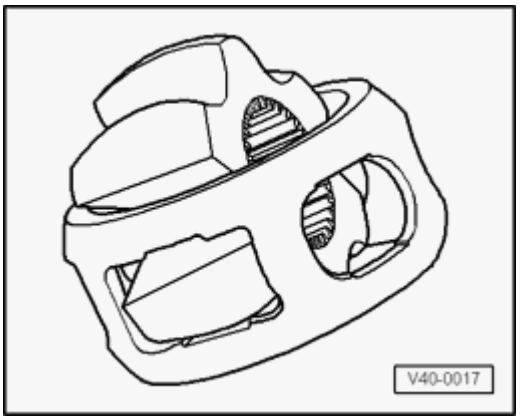

Fig. 178: Tilting Hub Out Of Cage
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Swing segment of hub into rectangular window of cage.
- Tilt hub out of cage.

6 balls for each joint belong to a tolerance group. Check stub axle, hub, cage and balls for small indentations (pitting) and signs of seizure. Excessive backlash in the joint will cause knocking or jolts under load change. In such cases joint should be replaced. Flattening and running marks of balls are no reason to replace joint.

Installing

- Install cage with hub in joint housing.
- Press in opposing balls in sequence, during this, previous position of ball hub to ball cage and to joint body must be re-established.

PEENED TRIPLE ROLLER JOINT AAR 2600 I OR 3300 I, DISASSEMBLING AND ASSEMBLING

Tools

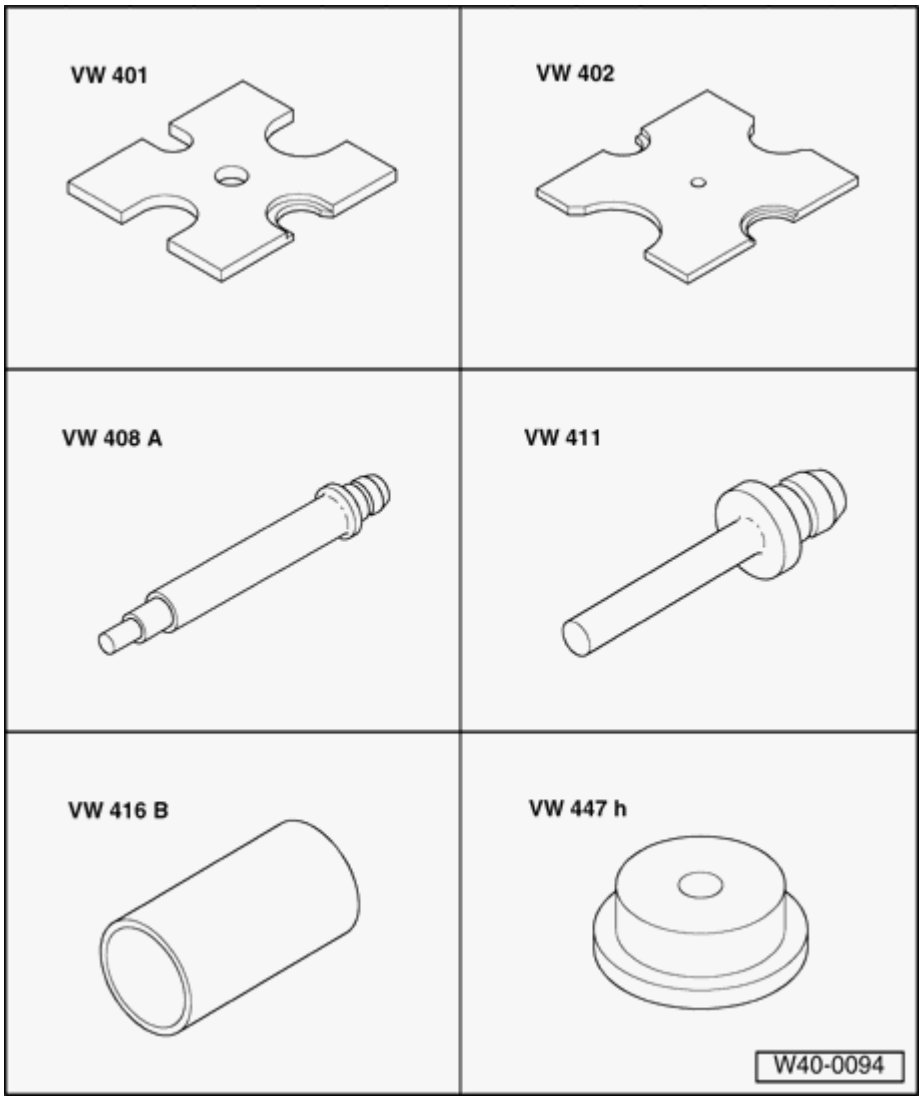

Fig. 179: Identifying Special Tools - Peened Triple Roller Joint AAR 2600 i Or 3300 i, Disassembling And Assembling (1 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Thrust plate VW 401
- Thrust plate VW 402
- Punch VW 408 A
- Punch VW 411

- Sleeve VW 416 B
- Thrust pad VW 447 H

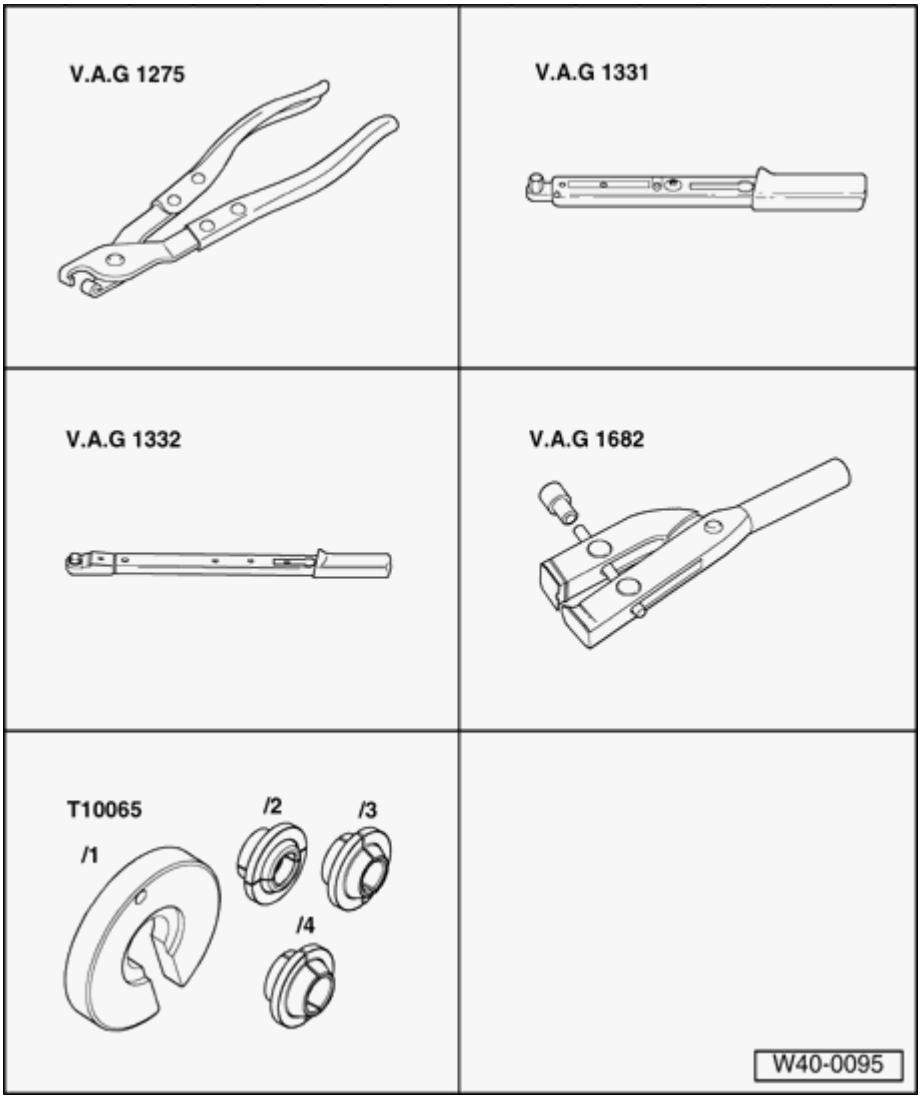

Fig. 180: Identifying Special Tools - Peened Triple Roller Joint AAR 2600 i Or 3300 i, Disassembling And Assembling (2 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Hose clamp pliers V.A.G 1275
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332
- CV joint boot clamp tool V.A.G 1682
- Assembly tool T10065

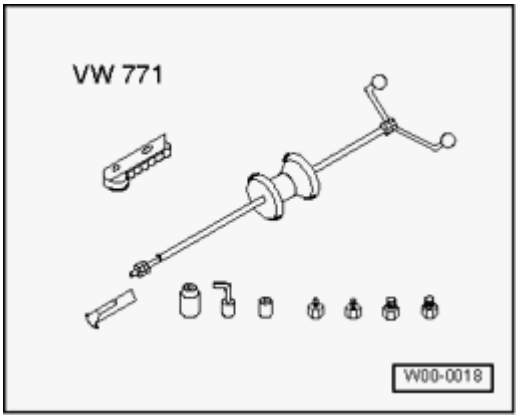

Fig. 181: Slide Hammer-Multi-Purpose Tool Set VW 771
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Slide hammer - complete set VW 771

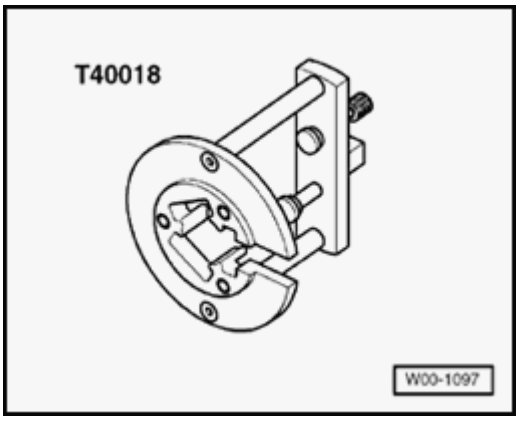

Fig. 182: Assembly Device T40018 For Triple Roller Joint AAR 3300 i
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Assembly device T40018 for triple roller joint AAR 3300 i
- or Assembly device T40084 for triple roller joint AAR 2600 i

Component overview

Filling triple roller joint shaft with grease:

	Grease	Amount in:	
Outer joint	**Total quantity**	**Joint**	**Boot**
mm	[g]	[g]	[g]
100	120	80	40
88	90	50	40
Inner joint			
	130	70	60

Grease joint again when replacing protective joint boot.

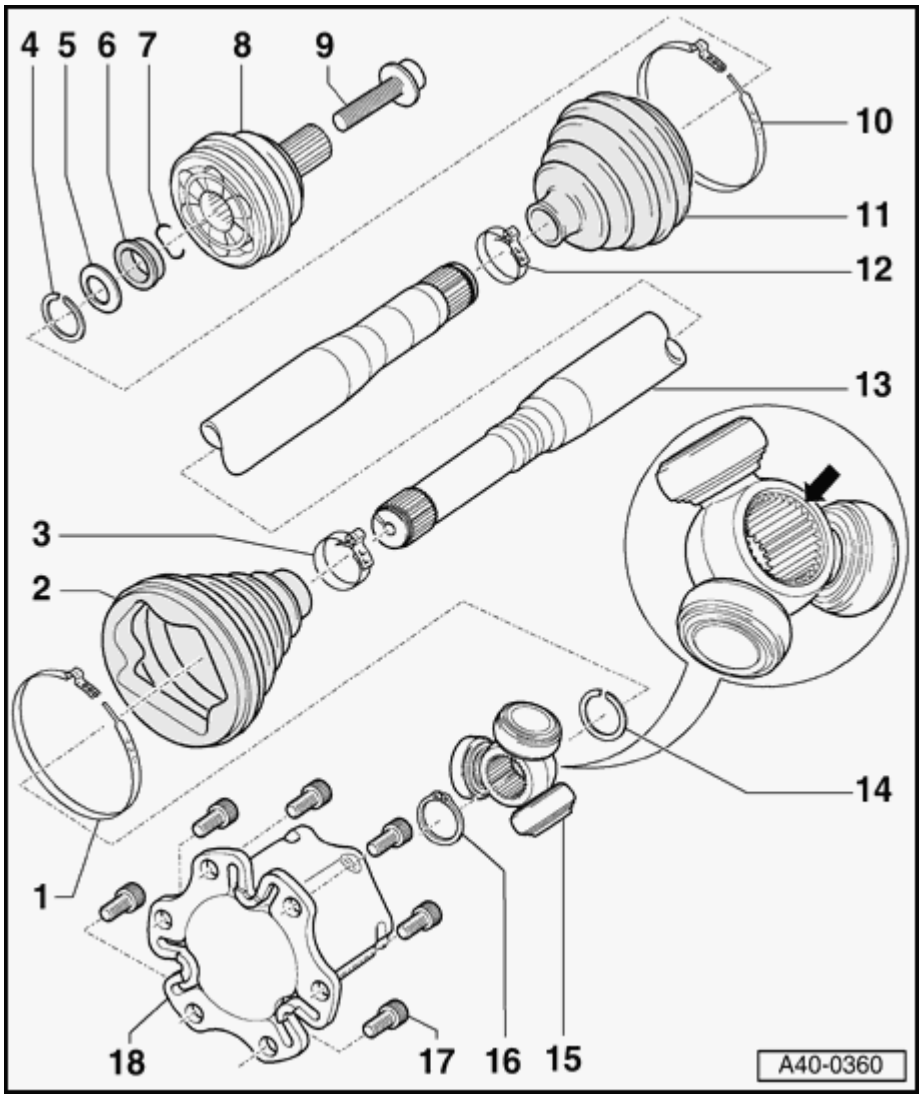

Fig. 183: Peened Triple Roller Joint AAR 2600 i Or 3300 i Component Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Clamp

- Always replace
- Different clamps possible depending on model
- Can also be installed with pliers 3340

2 - CV boot for triple roller joint

- Protective joint boot must fit in groove and on joint contour.

3 - Clamp

- Always replace

4 - Circlip

- Only present on certain versions

5 - Spring washer

- Only present on certain versions
- Installed location **Location of spacer and spring washer (wheel side)**

6 - Spacer ring (plastic)

- Only present on certain versions
- Installed location **Location of spacer and spring washer (wheel side)**

7 - Circlip

- Always replace
- Insert before mounting in ring groove (not visible with joint installed)

8 - Outer constant velocity joint

- Replace only as a unit
- Pressing off **Driving outer constant velocity joint down**
- **Installing:**
- Drive joint onto shaft with a plastic hammer until circlip engages.

- Greasing --> **Component overview**
- When installing joint on profile shaft, profile shaft splines must be lightly coated with grease used in joint.

9 - Bolt

- Always replace if removed
- Loosen **Remove drive axle**
- Fastening **Install drive axle**
- Torque specification **Install drive axle**

10 - Clamp

- Different versions for protective joint boot in rubber or Hytrel
- Replace

11 - Outer constant velocity protective joint boot

- Check for tears and chafing
- Before clamping hose clamps, raise protective joint boot briefly to balance pressure **Protective joint boot, ventilating**
- Different version in rubber or Hytrel

12 - Clamp

- Replace

13 - Axle shaft

- Different versions

14 - Circlip

15 - Triple roller star

- Chamfer - **arrow** - faces splines drive axle splines
- When installing triple roller star on profile shaft, profile shaft splines must be lightly coated with grease used in joint.

16 - Circlip

- Replace
- Insert in shaft groove

17 - Multi-point socket head bolt

18 - Triple roller joint housing

Joint protective boots made from rubber are tightened with hose clamp pliers V.A.G 1275.

Tightening clamp on inner joint

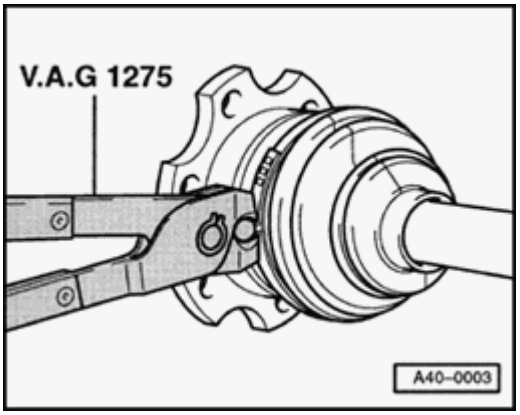

Fig. 184: Tightening Clamp On Inner Joint
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Driving outer constant velocity joint down

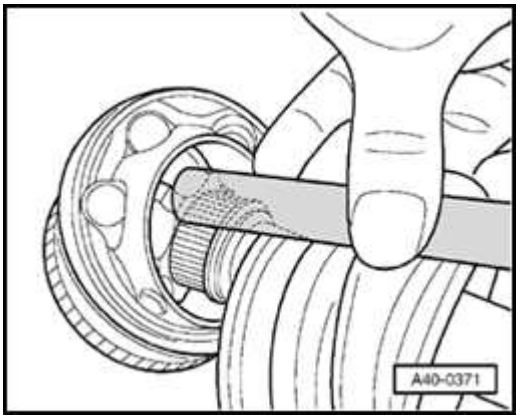

Fig. 185: Striking Copper Or Brass Drift On CV Joint Inner Race With Hammer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure drive axle with protective covers in vise clamp.
- Remove large clamping sleeve and turn back protective joint boot.
- Strike a copper or brass drift on CV joint inner race with a hammer

Protective joint boot, ventilating

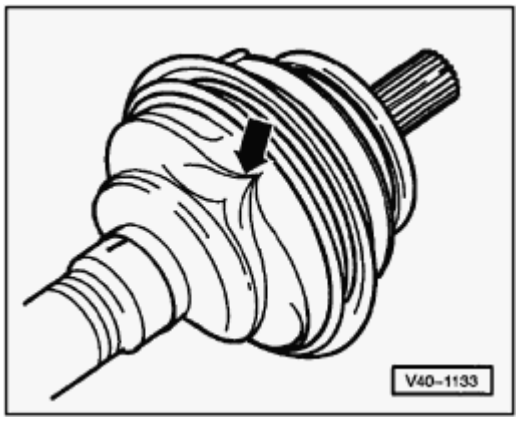

Fig. 186: Protective Joint Boot, Ventilating
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Only for joint protective boot of rubber

A vacuum can form in joint when installing protective joint boot.

This pressure pulls a fold in while driving, see - **arrow** -.

Note the following:

- Before clamping, clamping sleeves, balance pressure by raising protective joint boot.

Location of spacer and spring washer (wheel side)

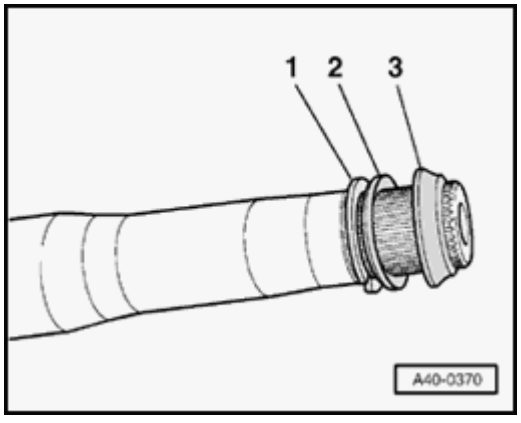

Fig. 187: Location Of Spacer And Spring Washer (Wheel Side)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Items 1 to 3 only present on certain versions.

1 - Circlip

2 - Spring washer

3 - Spacer ring (plastic)

Instructions only apply to stainless steel clamps.

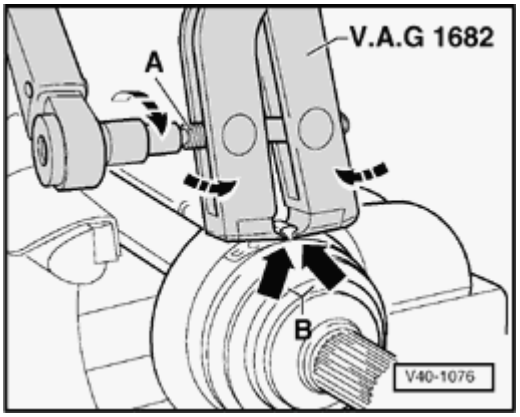

Fig. 188: Tightening Hose Clamp On Outer Joint
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Tightening hose clamp on outer joint

- Position CV Joint Boot Clamp Tool VAG 1682 as shown in illustration. Make sure that the jaws of tension clamp seat in corners - **arrows B** - of hose clip.
- Tighten hose tie by turning spindle using a torque wrench (do not bend tensioning clamp).

- Torque specification: 20 Nm
- Use torque wrench with a range of 5 to 50 Nm (e.g. torque wrench V.A.G 1331).
- Ensure the spindle thread is not tight. If necessary lubricate with MOS 2 grease.
- If the thread is tight e.g. dirty, the required tensioning force for the hose clamp will not be achieved in spite of correct torque specification settings.

Triple roller joint AAR 2600 i or 3300 i, disassembling

Removal

- Clamp drive axle horizontally in vise.

NOTE:

- **Use protective vise covers.**
- **Ensure drive axle is not damaged.**

- Mark location of joint to drive axle

If parts are not marked when assembling, the components are not brought back to their previous installation position then it is possible that it will be noisy when driving.

A waterproof felt tipped pen is suitable for marking.

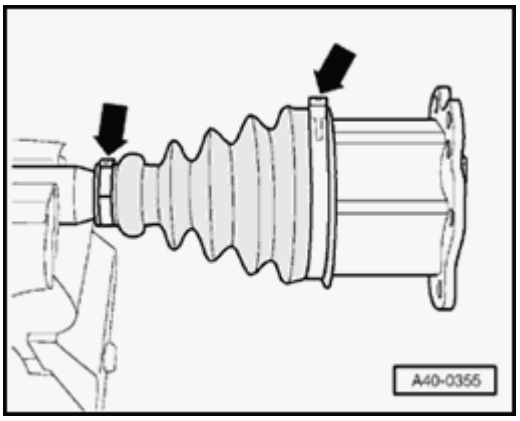

Fig. 189: Identifying Clamps & Protective Boot
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Open clamps - **arrows** -.
- Slide back protective boot.

Distinguishing characteristic of drive axle AAR 2600 i to AAR 3300 i

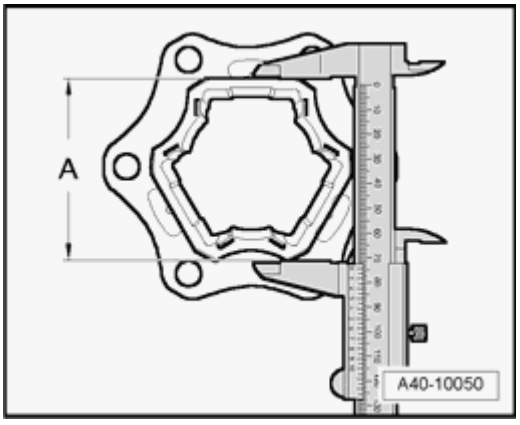

Fig. 190: Determine Dimension Of Drive Axle AAR 2600 i To AAR 3300 i
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine dimension - **A** - as shown in illustration.

- Dimension - **A** - 74 mm = driveshaft AAR 2600 i
- Dimension - **A** - 77 mm = driveshaft AAR 3300 i

CAUTION: Ensure correct special tool allocation for each drive axle.

- Guide triple roller joint AAR 3300 i assembly device T40018 or triple roller joint AAR 2600 i assembly

device T40084 behind joint.

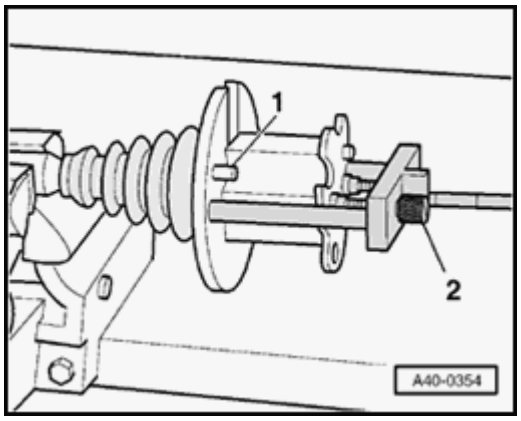

Fig. 191: Bringing Installation Device Into Contact With Joint By Turning Knurled Thumb Screws
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Guide pins - **1** - must contact joint.

- Bring installation device into contact with joint by turning knurled thumb screws - **2** -.

NOTE:

- **Joint must be secured without play in assembly device T40018 or T40084.**
- **Only install screws - 2 - hand-tight.**

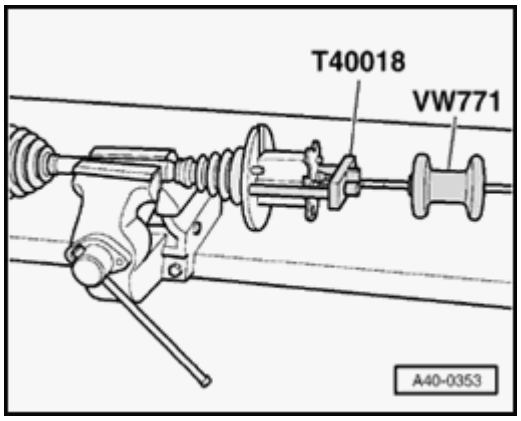

Fig. 192: Screwing Multi-Purpose Tool VW 771 Into Assembly Device T40018 Or T40084
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Screw multi-purpose tool VW 771 into assembly device T40018 or T40084.

Drive axle AAR 3300 i assembly device T40018 is shown in illustration.

Use assembly device T40084 with drive axle AAR 2600 i.

- Pull joint out horizontally with impact tool.

Leave joint in assembly device T40018 or T40084.

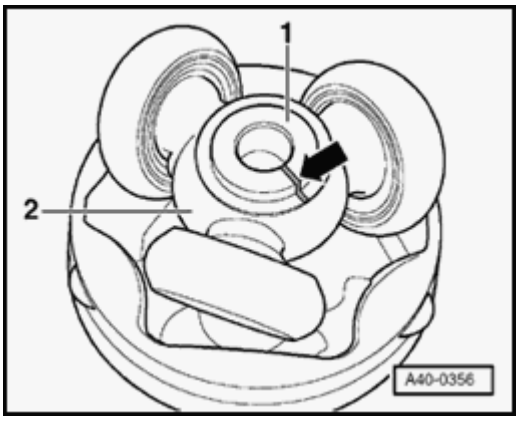

Fig. 193: Identifying Drive Axle & Triple Roller Star & Mark
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Mark installation position of parts 1 and 2 with lines.

If parts are not marked when assembling, the components are not brought back to their previous installation position then it is possible that it will be noisy when driving.

A waterproof felt tipped pen is suitable for marking.

1 - Drive axle

2 - Triple roller star

- Remove grease with lint-free cloth.

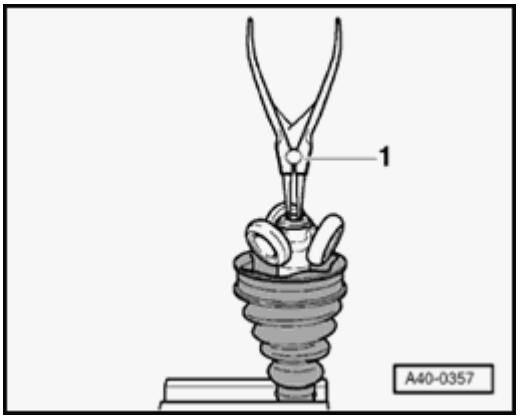

Fig. 194: Removing/Installing Circlip
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip.

1 - Pliers (commercially available)

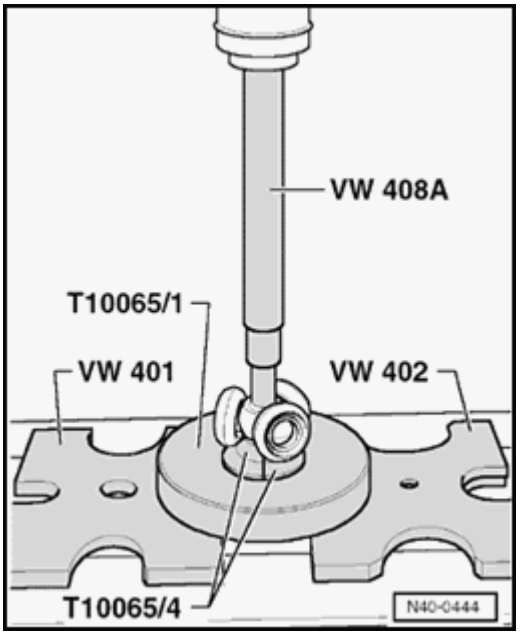

Fig. 195: Pressing Triple Roller Star Off Drive Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press triple roller star off of drive axle

Assembly tool T10065/4 must not be applied to roller body.

- Remove protective boot
- Remove grease on shaft splines
- Check roller body and ball cage for wear
- Clean drive axle and housing.

Triple roller joint AAR 2600 i or 3300 i, assembling

Assembly

- Slide new protective boot onto drive axle.

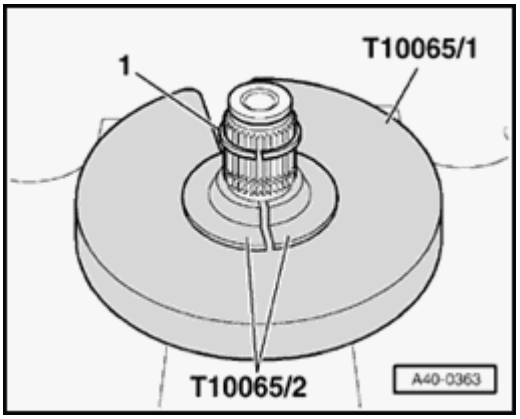

Fig. 196: Pressing On Circlip To Center Of Splines
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press on circlip - **1** - to center of splines

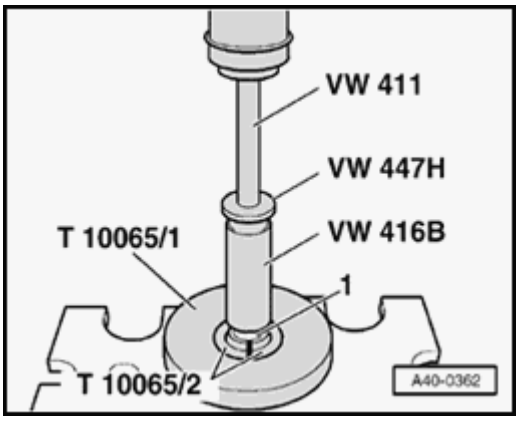

Fig. 197: Assembling Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Use special tool shown in illustration.

Depending on drive axle version, T10065/3 must be used instead of assembly device T10065/2.

Triple roller star, pressing onto drive axle

The chamfer on star faces toward drive axle, this is used as an assembly aid.

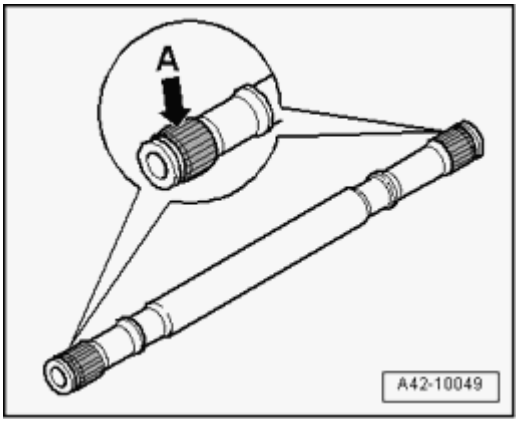

Fig. 198: Identifying Joint/Triple Roller Star Splines
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before installing joint or triple roller star, splines - **A** - must be lightly coated with grease used in joint.
- Install triple roller star onto shaft as per markings and drive in to stop.

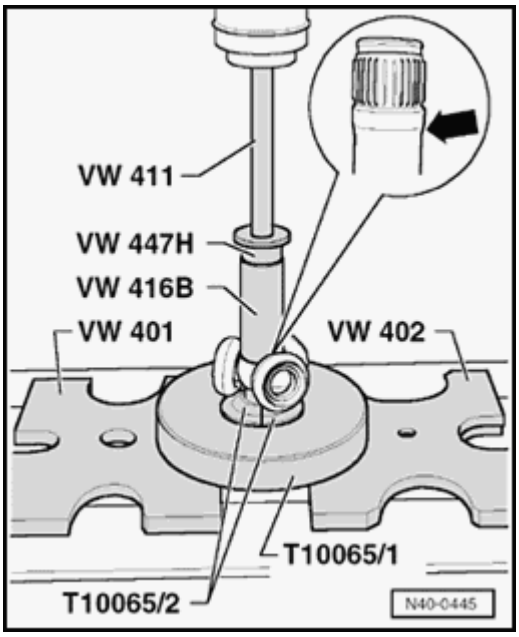

Fig. 199: Pressing Triple Roller Star Onto Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

This illustration only applies to conical drive axle - **arrow** - !

- Use special tool shown in illustration.

Special tool T10065/2 must not come in contact with roller body

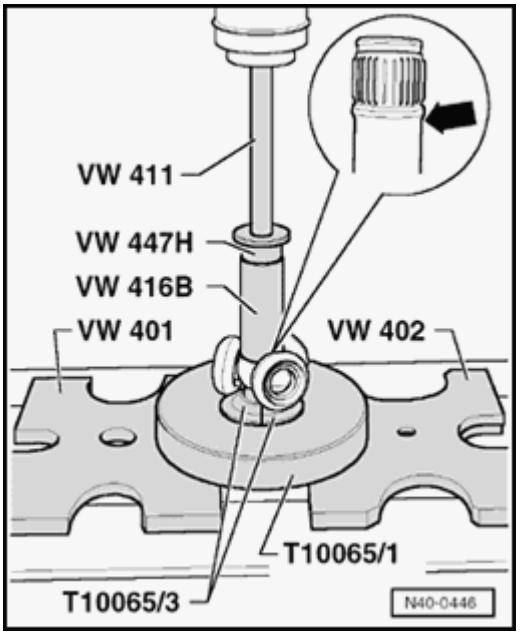

Fig. 200: Pressing Triple Roller Star Axle Shaft With Cylindrical Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

This illustration only applies to cylindrical drive axle - **arrow** - !

- Use special tool shown in illustration.

Special tool T10065/3 must not come in contact with roller body

- Press triple roller joint onto drive axle
- Circlip must engage audibly, triple roller star must lie against circlip with no gap.

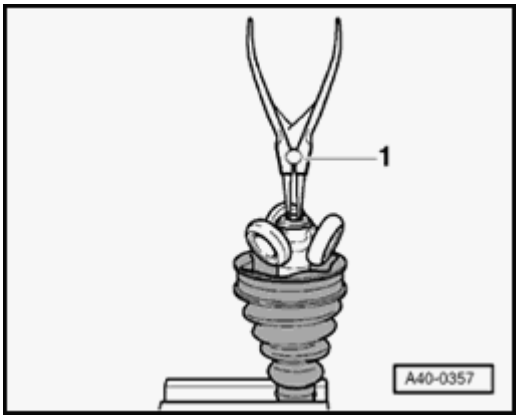

Fig. 201: Removing/Installing Circlip
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install circlip.

1 - Pliers (commercially available)

- Press 70 grams of joint grease, from repair kit, into reverse side of triple roller joint.
- Lightly lubricate roller body

Make sure roller body does not tilt!

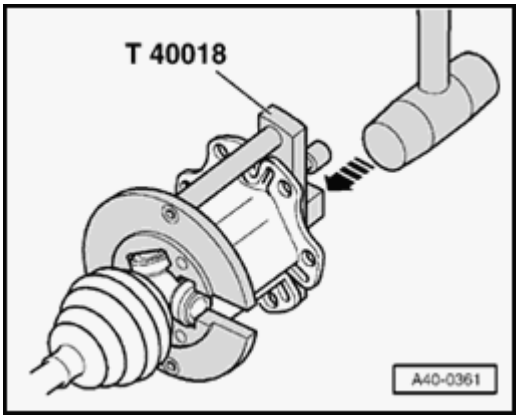

Fig. 202: Pressing Joint Over Triple Roller Start With Plastic Hammer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press joint over triple roller start with plastic hammer

Drive axle AAR 3300 i assembly device T40018 is shown in illustration.

- Press remaining quantity of grease in protective boot.
- Ensure correct seating of boot on joint.
- Boot must fit in groove and on joint contour

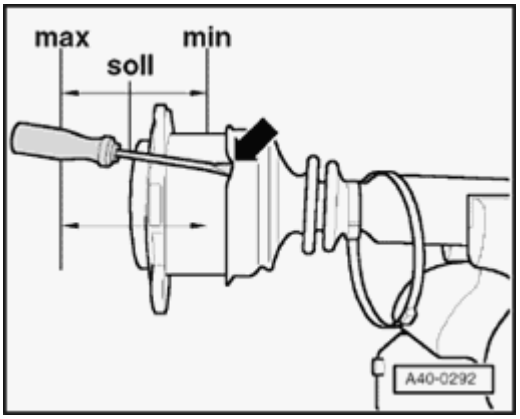

Fig. 203: Triple Roller Joint Positioned Approximately In The Middle Of The Sliding Part
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position joint in center position. See min - max position

NOTE:

- **While positioning joint in center position, it is necessary to bleed protective boot, e.g. with a screwdriver. - Arrow -**

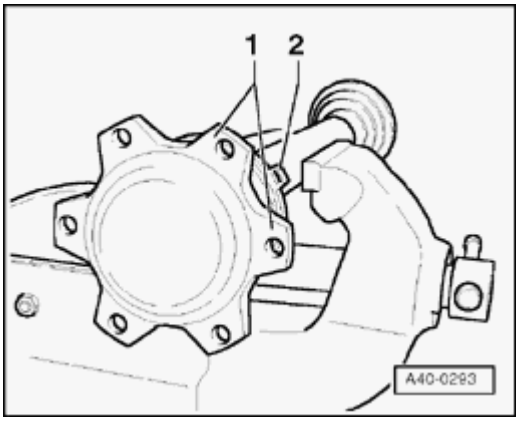

Fig. 204: Identifying Clamping Sleeve Connecting Tube & Flanges
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install clamp.

NOTE:

- **For a better alignment of multi-point socket head bolts when installing drive axle, clamping sleeve connecting tube - 2 - must be between joint connecting flanges - 1 -.**

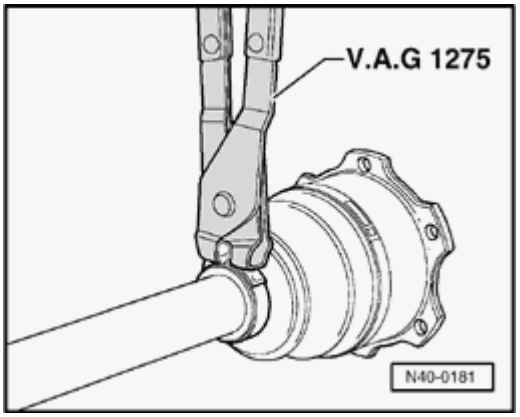

Fig. 205: Tightening Clamp With Hose Clamp Pliers V.A.G 1275
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tension small clamp using hose clamp pliers V.A.G 1275.

DRIVE AXLE WITH CONSTANT VELOCITY INNER JOINT (DIAMETER 100 MM), SERVICING

Tools

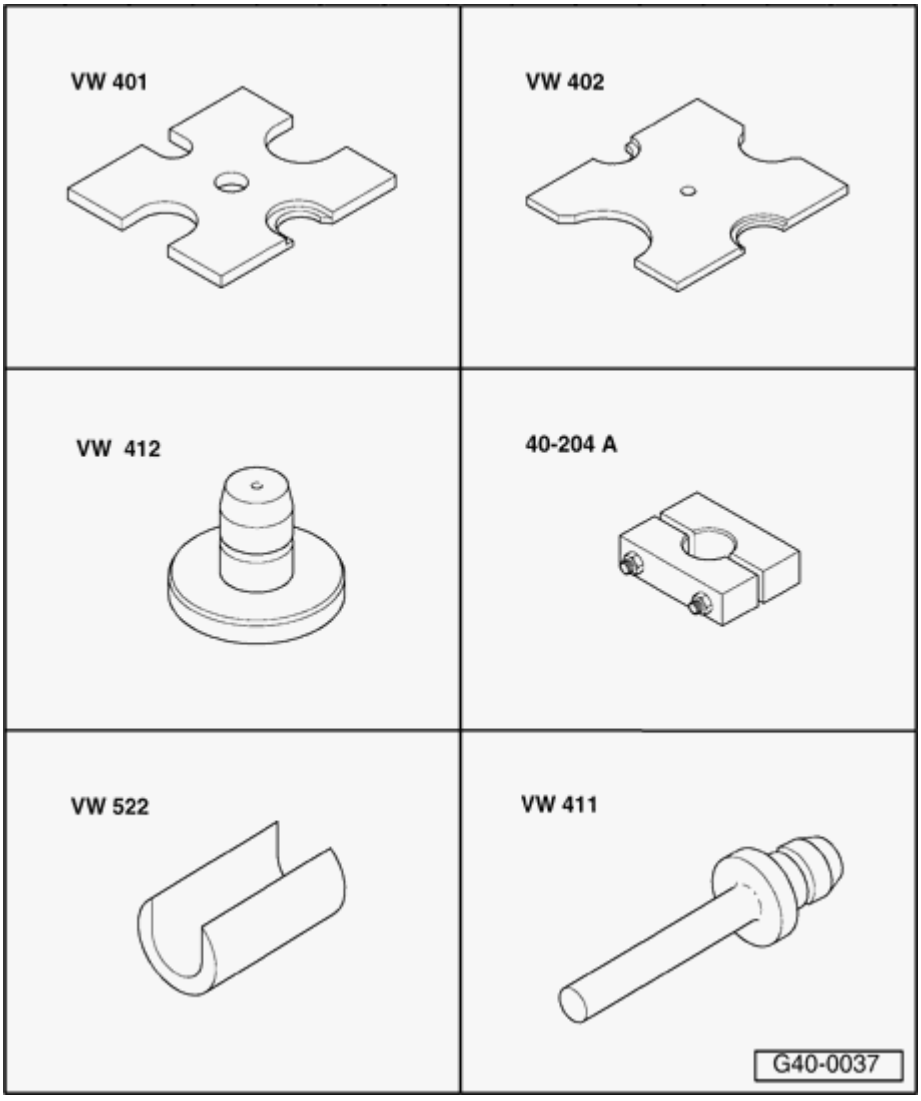

Fig. 206: Identifying Special Tools - Drive Axle With Constant Velocity Inner Joint (Diameter 100 mm), Servicing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Thrust plate VW 401
- Thrust plate VW 402
- Punch VW 412
- Clamp 40 - 204 A
- Support sleeve VW 522
- Punch VW 411

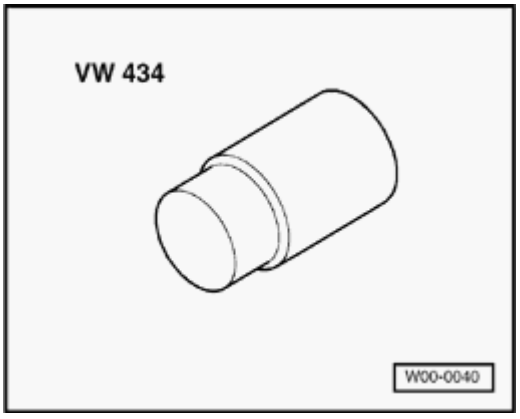

Fig. 207: Identifying Thrust Piece VW 434
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press piece VW 434

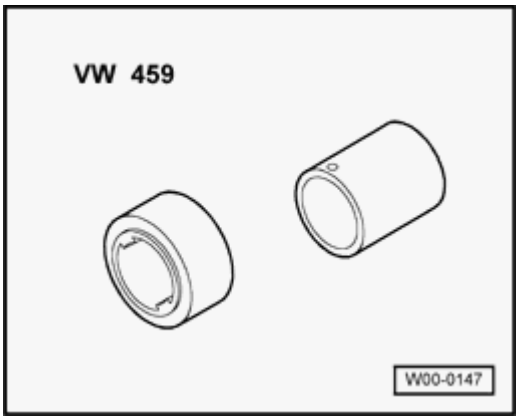

Fig. 208: Pressing Appliance VW 459
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pressing appliance VW 459

Individual component overview

Constant velocity joints are packed with grease G 000 603:

Grease quantity and type

	Grease quantity	Amount in:	
Outer joint	Total quantity	Joint	Boot
[mm]	[g]	[g]	[g]
88	90	50	40
Inner joint		Apply grease through ball paths	
100	80	30	50

Grease joint again when replacing protective joint boot.

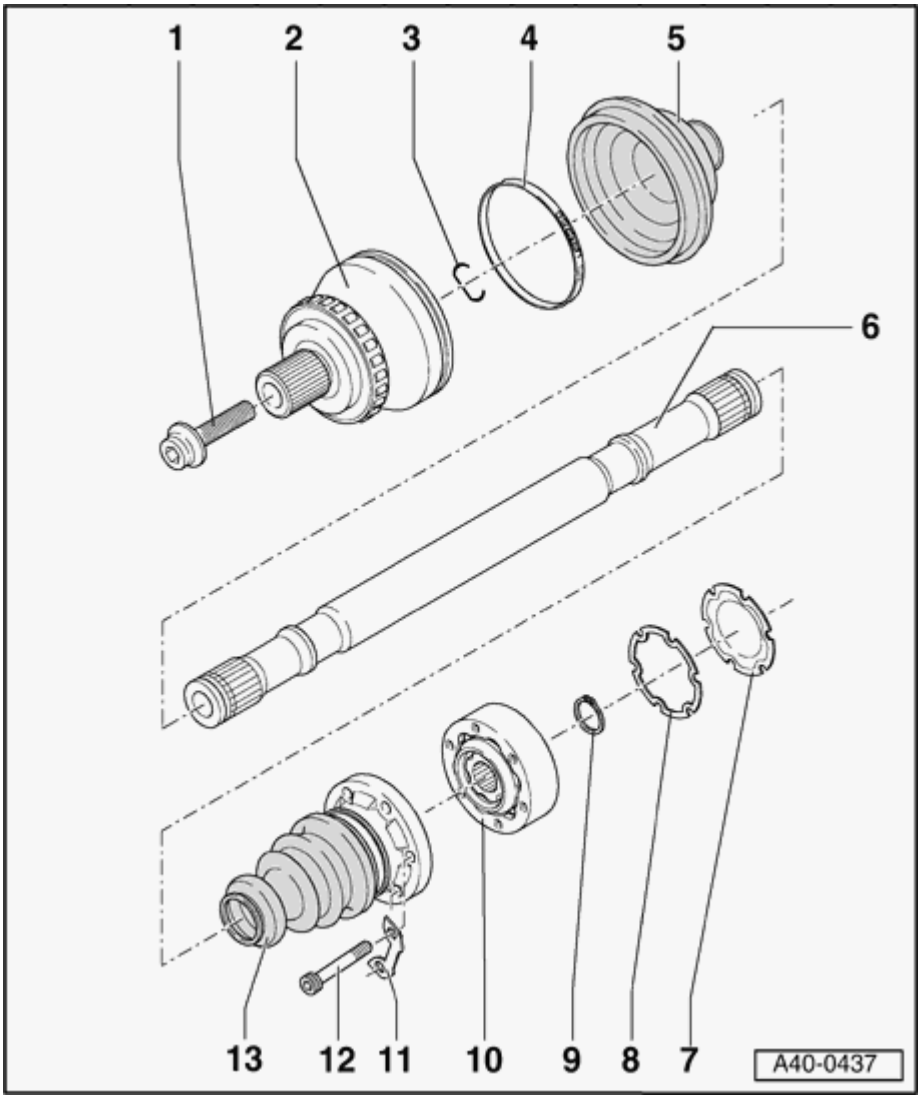

Fig. 209: Drive Axle With Constant Velocity Inner Joint (Diameter 100 mm) Individual Component Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Bolt

- Always replace if removed
- Loosen **Remove drive axle**
- Fastening **Install drive axle**
- Torque specification **Install drive axle**.

2 - Outer constant velocity joint

- Replace only as a unit
- Removing **Outer CV joint, removing**

- Installing **Outer CV joint, installing**
- Greasing **Grease quantity and type**

- Checking --> **Outer constant velocity (CV) joint, checking**
- When installing joint on profile shaft, profile shaft splines must be lightly coated with grease used in joint.

3 - Circlip

- Always replace
- Insert before mounting in ring groove (not visible with joint installed)

4 - Clamp

- Replace

5 - Outer constant velocity protective joint boot

- Check for tears and chafing, replace if necessary
- In case of damage, check outer constant velocity joint --> **Outer constant velocity (CV) joint, checking**
- Before clamping hose clamps, raise protective joint boot briefly to balance pressure.
- Sealing surfaces must be free of grease when installing.

6 - Axle shaft

7 - Cover

- Always replace

8 - Gasket

- Always replace

9 - Circlip

- Replace
- Insert in shaft groove

10 - Inner constant velocity joint

- Exterior diameter: 100 mm
- Replace only as a unit
- Removing **Inner CV joint, removing**
- Installing **Inner CV joint, installing**

- Greasing **Grease quantity and type**
- Adhesive surface must be free of oil and grease
- Checking --> **Inner constant velocity (CV) joint, checking**
- When installing joint on profile shaft, profile shaft splines must be lightly coated with grease used in joint.

11 - Backing plate

12 - Multi-point socket head bolt

13 - Protective boot with cap

- In case of damage, check inner constant velocity joint --> **Inner constant velocity (CV) joint, checking**
- Check for tears and chafing
- Replace only as a unit
- Removing **Inner CV joint, removing**
- Installing **Inner CV joint, installing**
- Protective boot-drive axle sealing surfaces and cap must be free of grease when installing

Inner CV joint, servicing

Inner CV joint, removing

- Drive axle, clamping in vise

Use protective vise covers for this.

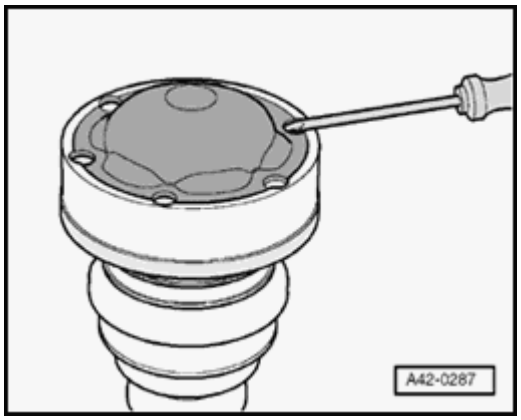

Fig. 210: Prying Off Cap With Screwdriver
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pry off cap, e.g. with a screwdriver.

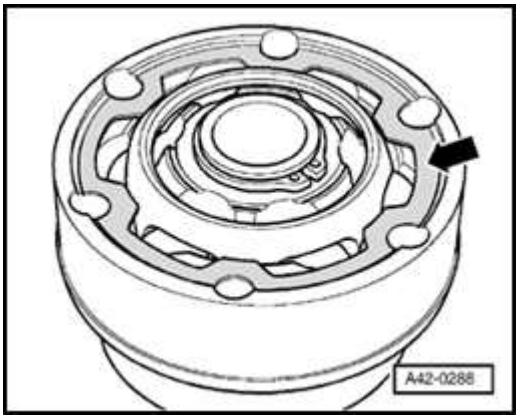

Fig. 211: Identifying Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove seal - **arrow** -

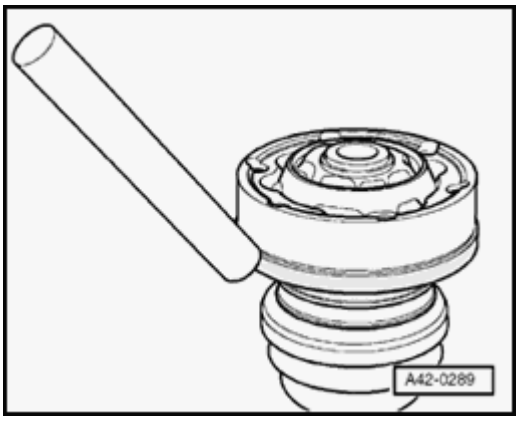

Fig. 212: Driving Protective Joint Boot Cap Under With Brass
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drive protective joint boot cap under with a brass or copper drift

Clamping sleeves must not be loosened.

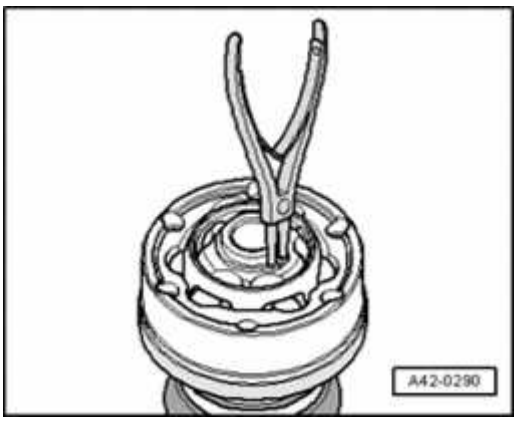

Fig. 213: Removing/Installing Circlip
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip

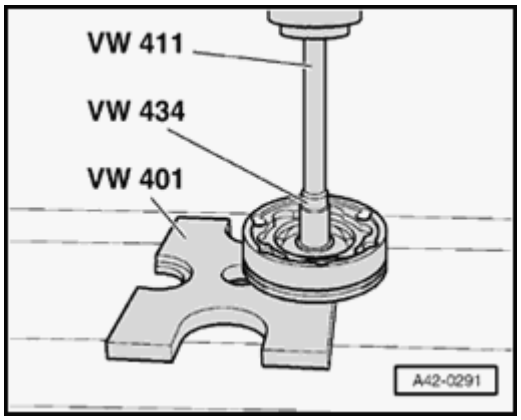

Fig. 214: Pressing Inner CV Joint Off Of Drive Axle With Special Tool
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press inner CV joint off of drive axle with special tool shown in illustration.
- Remove inner CV joint protective boot from drive axle.

Inner CV joint, installing

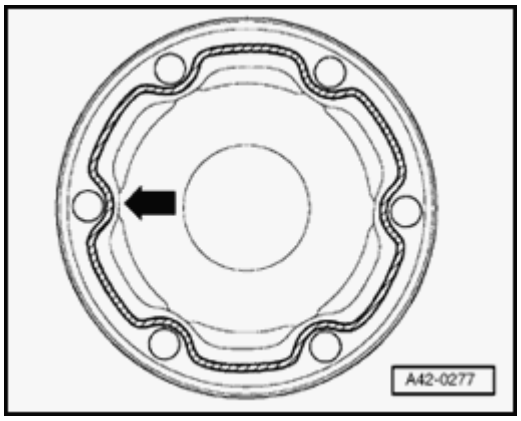

Fig. 215: Identifying Sealing Surface To Be Covered With D 454 300 A2
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Apply sealant - **hatched surface** - to clean surface on inner side of protective joint boot cap: Sealant bead: unbroken, 2 to 3 mm dia. Skirt area around inner holes - **arrow** -.
- Use sealant D 454 300 A2 for this
- Slide joint protective boot onto drive axle.

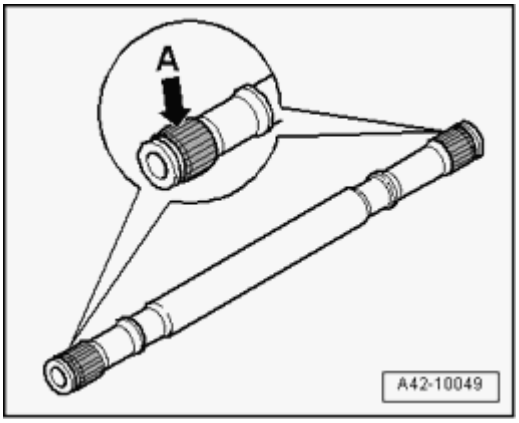

Fig. 216: Identifying Joint/Triple Roller Star Splines
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before installing joint or triple roller star, splines - **A** - must be lightly coated with grease used in joint.

Protective boot and cap contact surfaces must be free of grease!

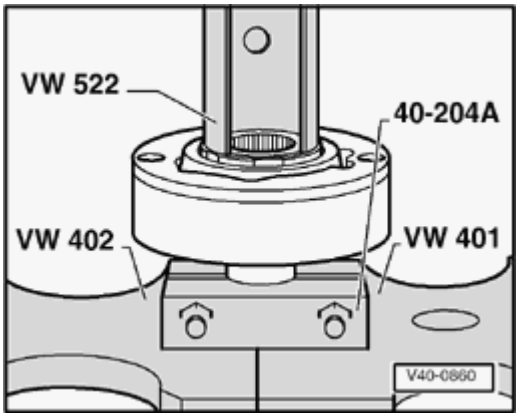

Fig. 217: Pressing On Inner Constant Velocity Joint
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press on joint until stop.

Chamfer on inner diameter of ball hub (splines) must face contact shoulder of drive axle.

Use special tool shown in illustration.

Press block 40-204 A and clamping surfaces on drive axle must be free of grease.

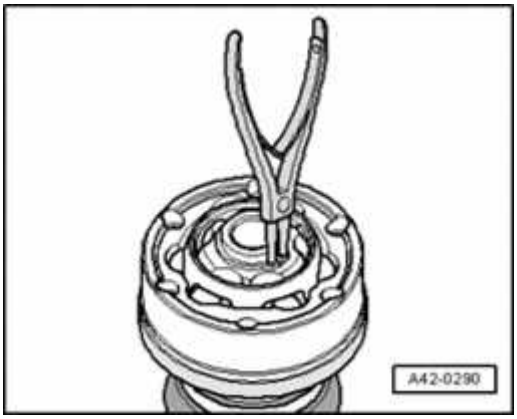

Fig. 218: Removing/Installing Circlip
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install circlip
- Check circlip for correct seating.

Circlip must be replaced

- Apply 50 g joint grease in boot.

Make sure you do not damage sealant bead.

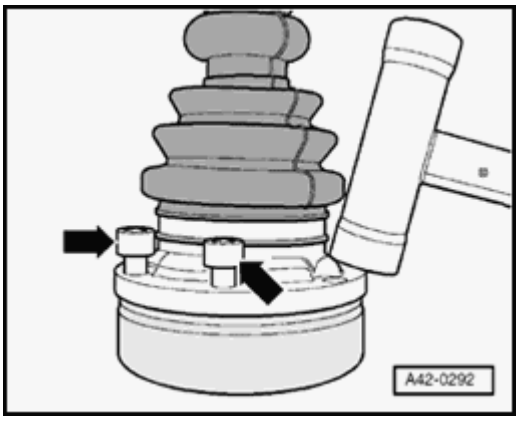

Fig. 219: Using Bolts To Align Protective Boot And Cap With Screw Holes
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Using bolts - **arrows** - , align protective boot and cap with screw holes.

It must be aligned exactly because it cannot be aligned after driving on.

- Drive off protective boot with cap using plastic hammer.
- Clear away leaking sealing immediately.
- Apply 30 g joint grease in CV joint through ball paths.

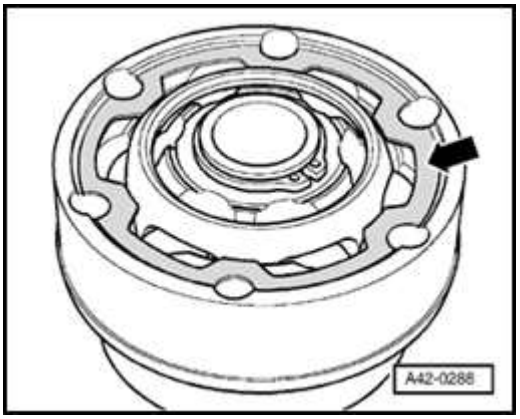

Fig. 220: Identifying Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Grease seal contact surface - **arrow** -.
- Remove adhesive foil from seal and adhere to CV joint.
- Align new cover with screw holes.

It must be aligned exactly because it cannot be aligned after pressing on.

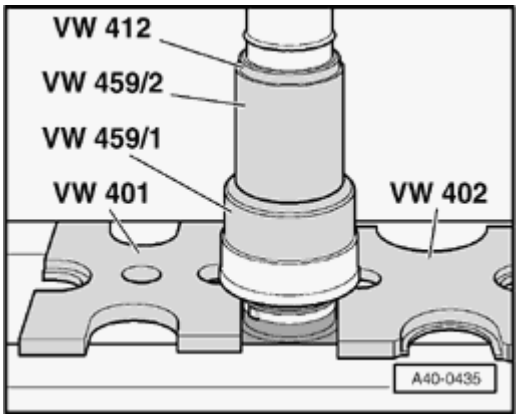

Fig. 221: Pressing Cover On With Special Tool
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press cover on with special tool shown in illustration.

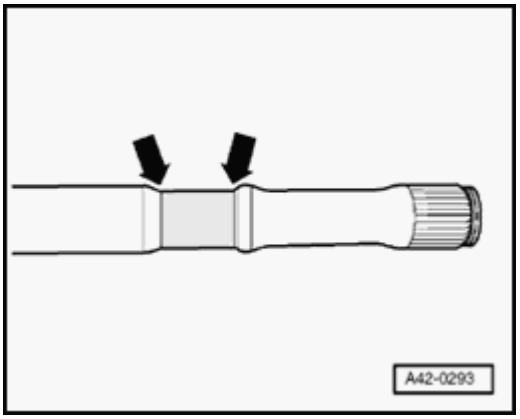

Fig. 222: Positioning Protective Joint Boot
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position protective joint boot between - **arrows** -.

Outer constant velocity joint, servicing

Outer CV joint, removing

- Drive axle, clamping in vise

Use protective vise covers for this.

- Open clamps.
- Slide back protective boot

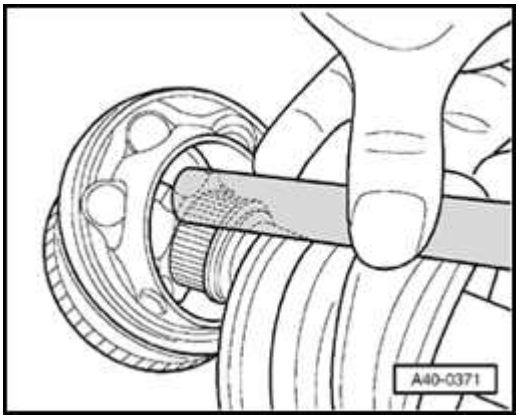

Fig. 223: Striking Copper Or Brass Drift On CV Joint Inner Race With Hammer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Strike a copper or brass drift on CV joint inner race with a hammer
- Remove joint

Outer CV joint, installing

- Slide joint protective boot onto drive axle.
- Insert new circlip

Circlip (snap ring) must be replaced

- Apply 50 g joint grease in inside of joint.

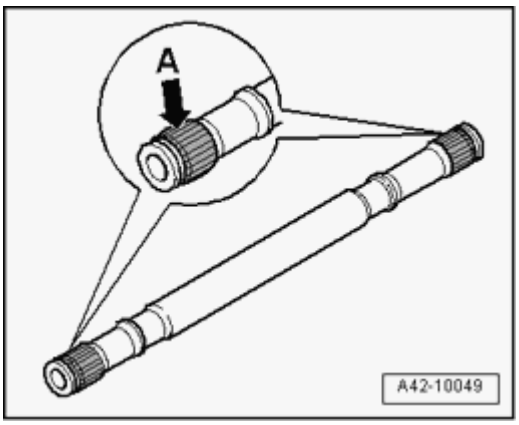

Fig. 224: Identifying Joint/Triple Roller Star Splines
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before installing joint or triple roller star, splines - **A** - must be lightly coated with grease used in joint.

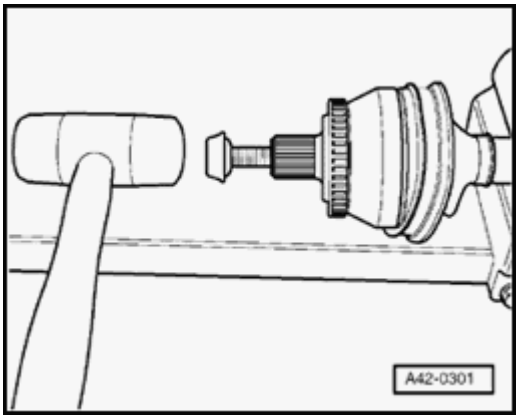

Fig. 225: Installing Outer Constant Velocity (CV) Joint With Flange Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Screw old drive axle bolt into joint as shown in illustration.
- Drive joint onto drive axle with plastic hammer until circlip engages.
- Apply 40 g joint grease in boot side of joint.
- Bleed protective joint boot.

- Close clamp.

Outer constant velocity (CV) joint, checking

In order to replace grease in case of strong soiling, joint must be disassembled or if journal surface of balls must be checked for wear and damage.

Disassembling

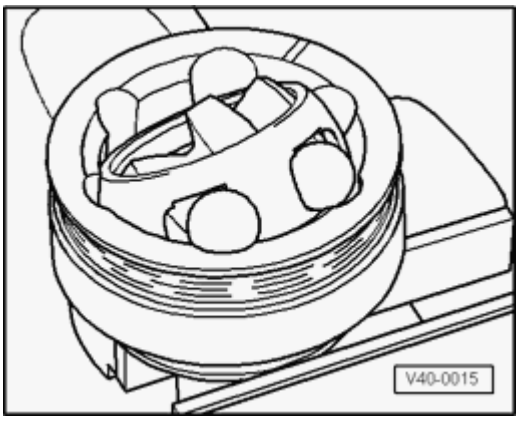

Fig. 226: Ball Hub And Ball Cage Swiveled
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before disassembling mark ball hub position in relation to the ball cage and housing using an electric scriber or oil stone.
- Swivel ball hub and ball cage.
- Remove balls one after another.

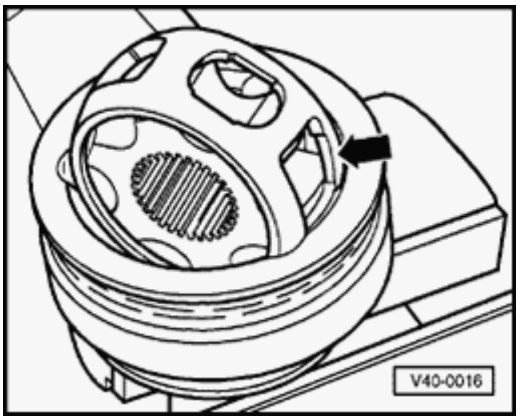

Fig. 227: Two Rectangular Windows Aligned With Joint Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn cage, until two rectangular windows - **arrow** - contact joint body.
- Lift out cage together with hub.

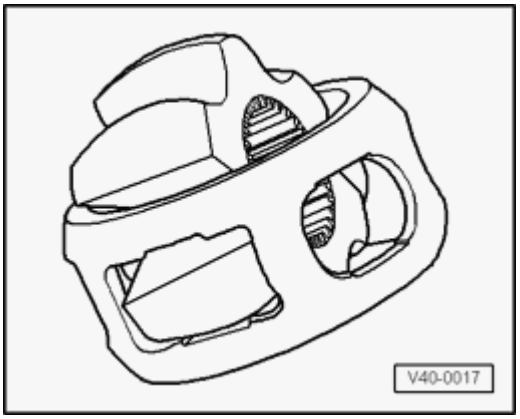

Fig. 228: Tilting Hub Out Of Cage
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Swing segment of hub into rectangular window of cage.
- Tilt hub out of cage.

Checking

6 balls for each joint belong to a tolerance group. Check stub axle, hub, cage and balls for small indentations (pitting) and signs of seizure. Excessive backlash in the joint will cause knocking or jolts under load change. In such cases joint should be replaced. Flattening and running marks of balls are no reason to replace joint.

Assembling

- Install cage with hub in the joint housing.

NOTE:

- **Cage must be installed laterally correct.**

- Press in opposing balls in sequence, during this, previous position of ball hub to ball cage and to joint body must be re-established.
- Pack grease into joint body, grease quantity and type **Grease quantity and type**.

Inner constant velocity (CV) joint, checking

In order to replace grease in case of strong soiling, joint must be disassembled and if journal surfaces and balls must be checked for wear and damage.

Disassembling

NOTE:

- **Ball hub and joint are paired and should be identified before removal. Do not interchange cage allocation.**

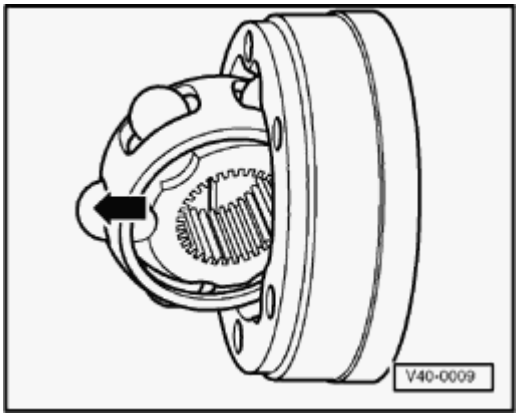

Fig. 229: Pressing Out Ball Joint Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Swivel ball hub and ball cage.
- Press out ball joint housing in direction of - **arrow** -.
- Press balls out of cage.

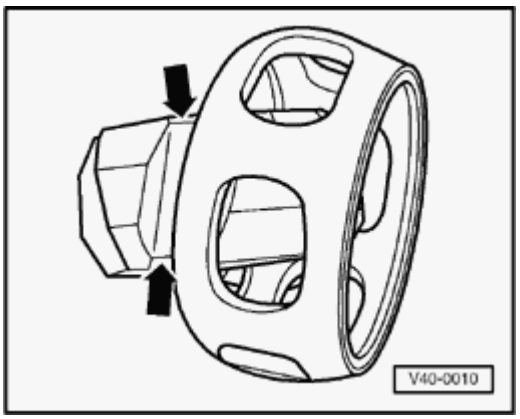

Fig. 230: Tilting Ball Hub Out Of Ball Cage Over Ball Track
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Flip out ball hub from ball cage via running path of ball - **arrows** -.
- Check joint housing, ball hub, ball cage and balls for indentations (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 replaced. Flattening and running marks of balls are no reason to replace joint.**

Assembling

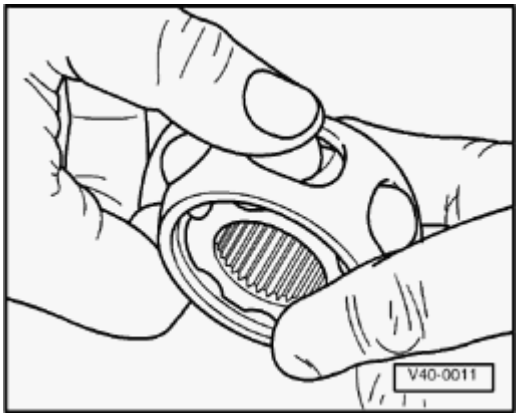

Fig. 231: Inserting Ball Hub Over Both Chamfers Into Ball Cage
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert ball hub into ball cage via two chamfers. The hub can be installed in any position. Press balls into cage.
- Insert hub with cage and balls at right angle to joint.

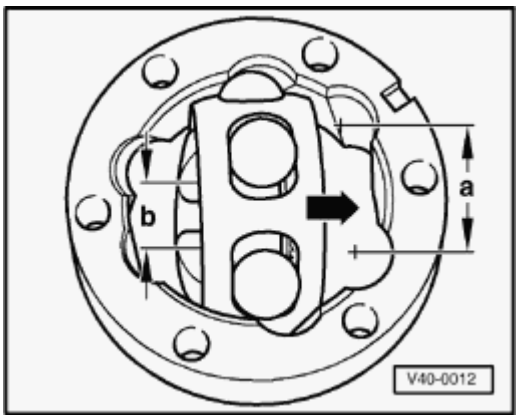

Fig. 232: Identifying Wide Space On Joint Housing Aligned With The Narrow Space On The Hub
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- When inserting make sure that the wide space - **a** - on joint housing is aligned with the narrow space - **b** - on hub after swiveling in.
- Chamfer on inner diameter of wheel hub (splines) must face toward drive axle.

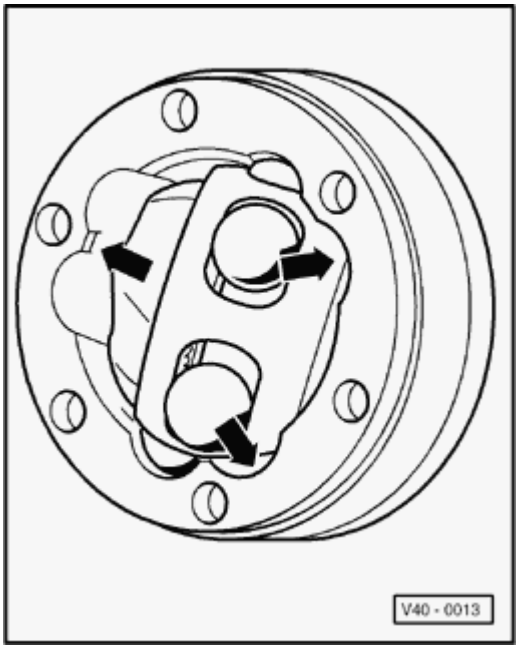

Fig. 233: Ball Hub Installed With Hub Able To Be Swivelled Out Of Cage
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install ball hub, whereby hub must be swiveled out of cage - **arrows** - far enough to allow balls to fit into ball tracks.

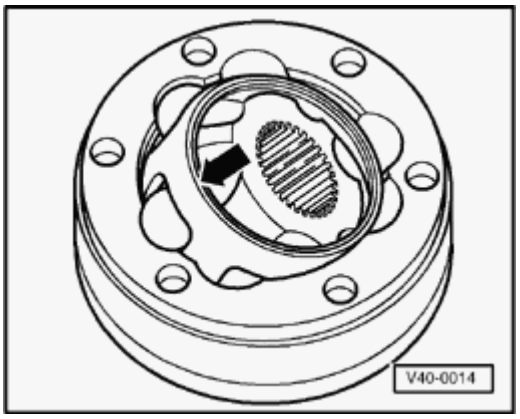

Fig. 234: Pressing Cage Firmly Until Hub Is In Position
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press cage firmly - **arrow** - until hub swings fully in position.

Constant velocity joint, checking for function:

Constant velocity joint is properly assembled, if ball hub can be slid back and forth by hand over whole compensation length.

DRIVE AXLE WITH CONSTANT VELOCITY INNER JOINT (DIAMETER 108 MM), SERVICING

Tools

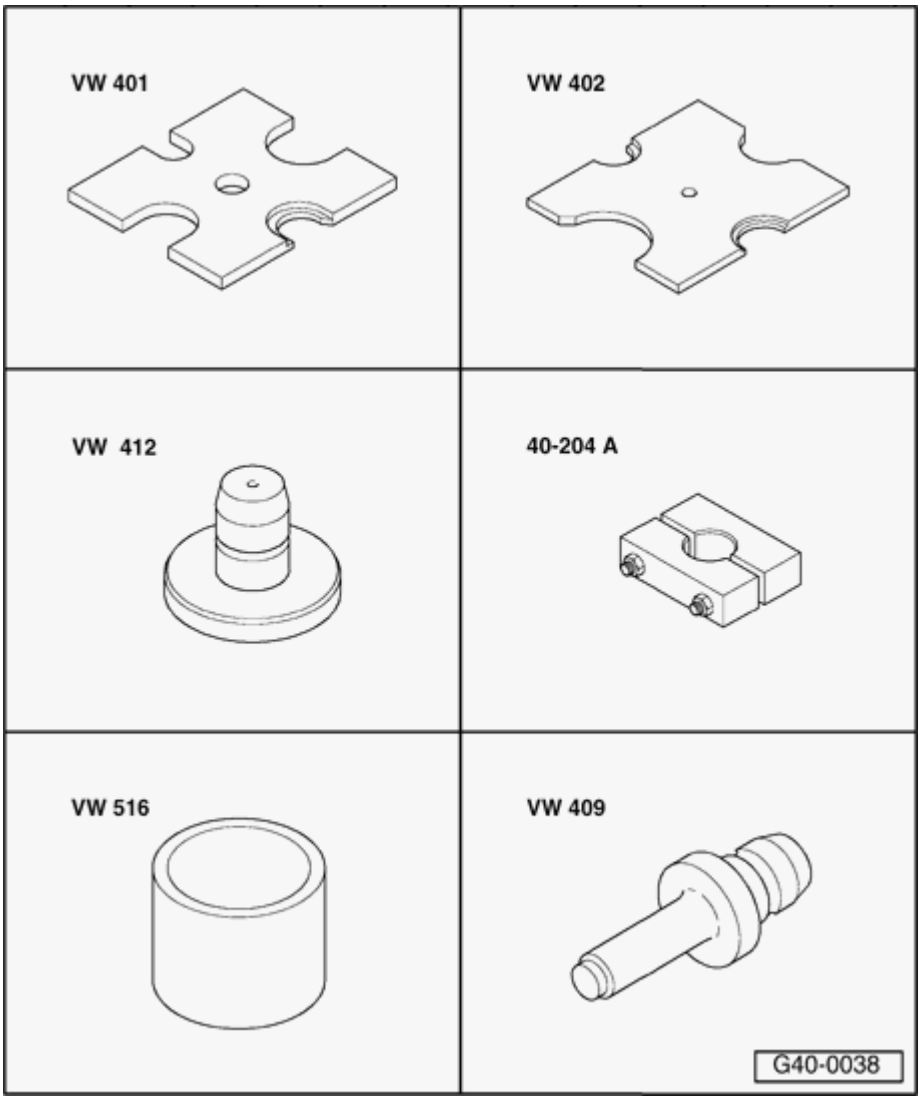

Fig. 235: Identifying Special Tools - Drive Axle With Constant Velocity Inner Joint (Diameter 108 mm), Servicing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Thrust plate VW 401
- Thrust plate VW 402
- Punch VW 412
- Clamp 40 - 204 A

- Support sleeve VW 516
- Punch VW 409

Component overview

Constant velocity joints are packed with grease G 000 603:

Grease quantity and type

	Grease quantity	Amount in:	
Outer joint	Total quantity	Joint	Boot
[mm]	[g]	[g]	[g]
100	120	80	40
Inner joint		Apply grease through ball paths	
108	120	35	85

Grease joint again when replacing protective joint boot.

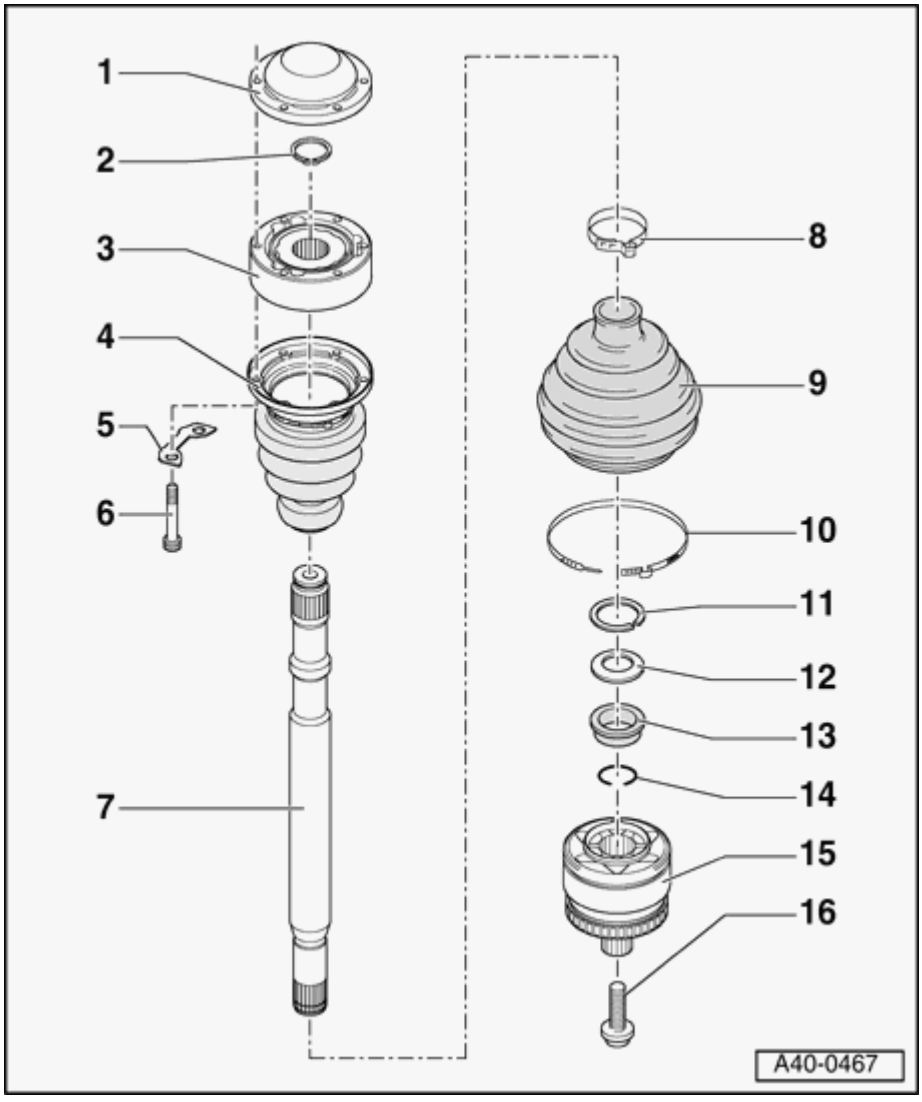

Fig. 236: Drive Axle With Constant Velocity Inner Joint Component Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Cover

- Always replace

2 - Circlip

- Remove and install with commercially-available circlip pliers

3 - Inner constant velocity joint

- Exterior diameter: 108 mm
- Replace only as a unit
- Removing **Inner CV joint, removing**
- Installing **Inner CV joint, installing**
- Greasing **Grease quantity and type**
- Adhesive surface must be free of oil and grease
- Checking --> **Inner constant velocity (CV) joint, checking**
- When installing joint on profile shaft, profile shaft splines must be lightly coated with grease used in joint.

4 - Protective boot with cap

- In case of damage, check inner constant velocity joint --> **Inner constant velocity (CV) joint, checking**
- Check for tears and chafing
- Replace only as a unit
- Protective boot-drive axle sealing surfaces and cap must be free of grease when installing

5 - Backing plate

6 - Multi-point socket head bolt

7 - Axle shaft

8 - Clamp

- Always replace

9 - Outer constant velocity protective joint boot

- Without ventilation bore
- Check for tears and chafing; replace if necessary.

- In case of damage, check outer constant velocity joint --> **Outer constant velocity (CV) joint, checking**
- Sealing surfaces must be free of grease when installing.

10 - Clamp

- Always replace

11 - Circlip

- Replace
- Installed location **Location of spacer and spring washer (wheel side)**

12 - Spring washer

- Installed location **Location of spacer and spring washer (wheel side)**

13 - Spacer ring (plastic)

- Installed location **Location of spacer and spring washer (wheel side)**

14 - Circlip

- Always replace
- Insert in shaft groove

15 - Outer constant velocity joint

- Replace only as a unit
- Servicing --> **Outer constant velocity joint, servicing**
- Installing: Drive onto shaft using plastic hammer until compressed circlip seats.
- Circlip must lie in joint chamfer when guiding in, guide with pliers if necessary.

- Greasing **Grease quantity and type**
- Checking --> **Outer constant velocity (CV) joint, checking**
- When installing joint on profile shaft, profile shaft splines must be lightly coated with grease used in joint.

16 - Bolt

- Always replace if removed
- Loosen **Remove drive axle**
- Fastening **Install drive axle**
- Torque specification **Install drive axle**.

Inner CV joint, servicing

Inner CV joint, removing

- Drive axle, clamping in vise

Use protective vise covers for this.

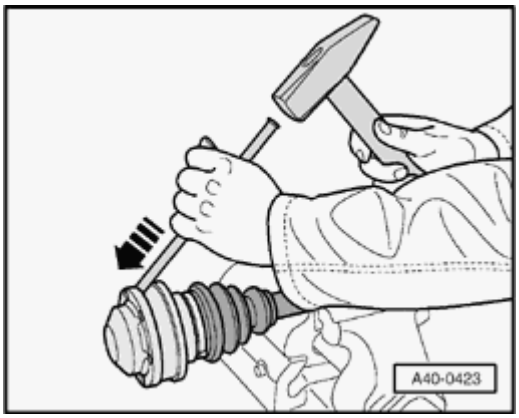

Fig. 237: Driving Cover Down With Copper Or Brass Drift
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drive cover down with copper or brass drift

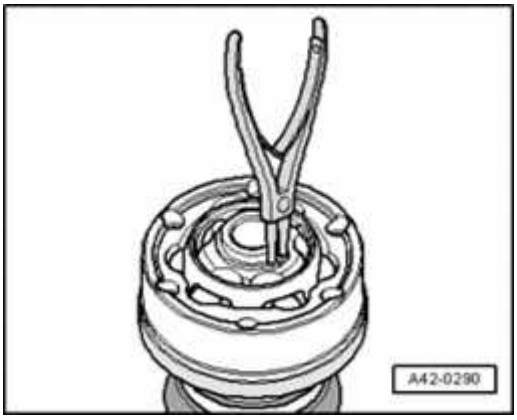

Fig. 238: Removing/Installing Circlip
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip
- Remove joint grease and mark location of CV joint to drive axle.

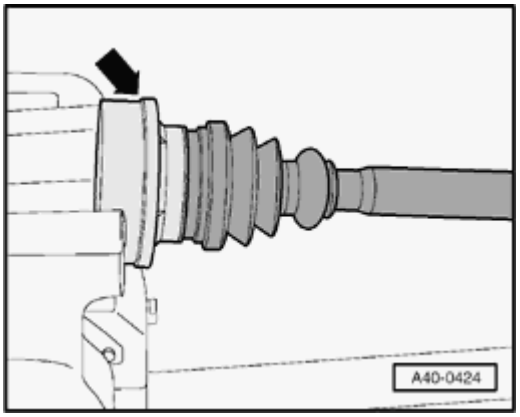

Fig. 239: Clamping Drive Axle In Vise At CV Joint
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp drive axle in vise at CV joint, as shown in illustration.
- A 2nd technician must hold drive axle horizontally so that CV joint is not damaged.
- Bend edge - **arrow** - of cap up slightly with small flat chisel.
- Drive cap down with copper or brass drift

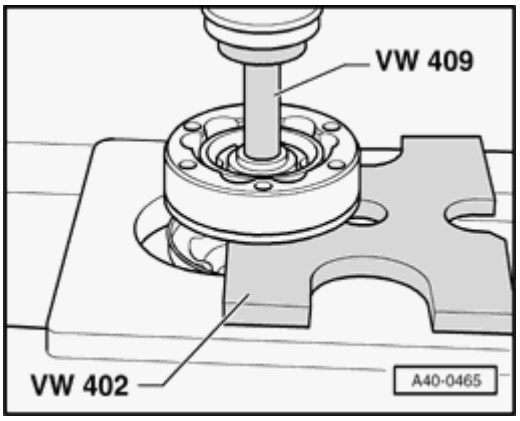

Fig. 240: Pressing CV Joint Off Of Drive Axle
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press CV joint off of drive axle.
- Remove protective boot with cap.

Inner CV joint, installing

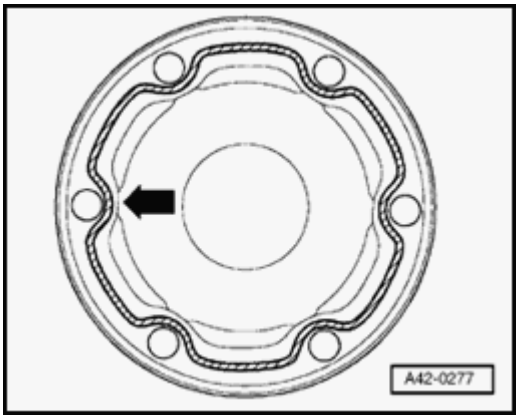

Fig. 241: Identifying Sealing Surface To Be Covered With D 454 300 A2
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Apply sealant D 454 300 A2 - **hatched surface** - to clean surface on inner side of protective boot cover or cap, and. Sealant bead: unbroken, 2 to 3 mm dia., skirt area around inner holes - **arrow** -.

Protective boot and cap contact surfaces must be free of grease!

- Slide new protective boot with cap onto drive axle.
- Pack 85 g joint grease into boot.

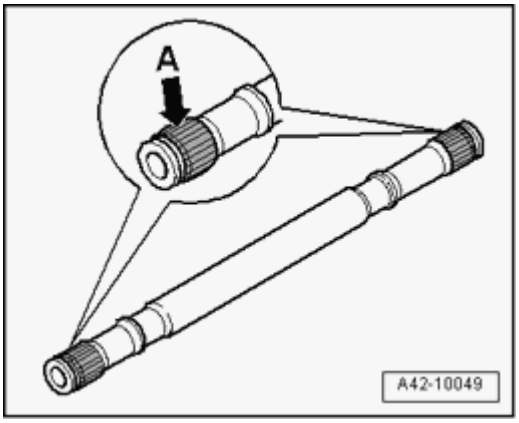

Fig. 242: Identifying Joint/Triple Roller Star Splines
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before installing joint or triple roller star, splines - **A** - must be lightly coated with grease used in joint.

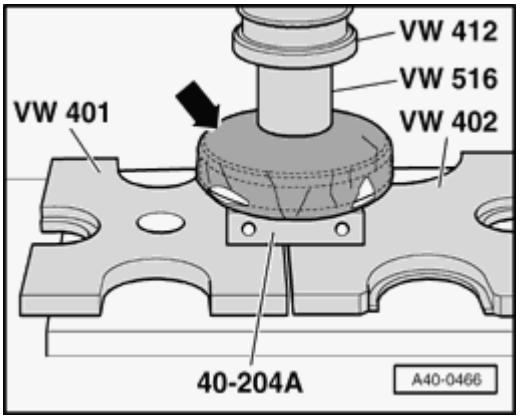

Fig. 243: Securing CV Joint From Coming Apart With Adhesive Tape
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure CV joint from coming apart, e.g. with adhesive tape - **arrow** -.
- Press off CV joint.

NOTE:

- **Position ball hub with chamfer on inner diameter (splines) on drive axle.**

Use special tool shown in illustration.

Press block 40-204 A and clamping surfaces on drive axle must be free of grease.

- Install circlip
- Press 35 g joint grease into joint through ball races.

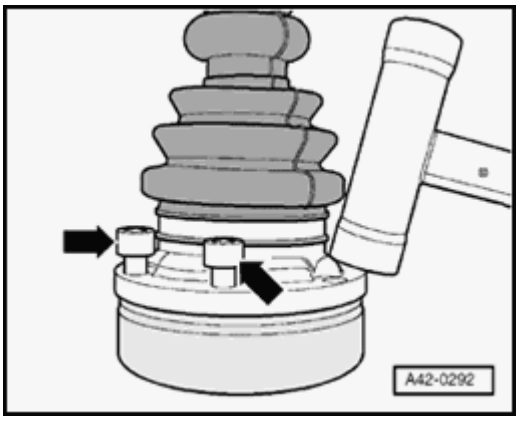

Fig. 244: Using Bolts To Align Protective Boot And Cap With Screw Holes
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Using bolts - **arrows** - , align protective boot and cap with screw holes.

It must be aligned exactly because it cannot be aligned after driving on.

- Drive off protective boot with cap using plastic hammer.
- Clear away leaking sealant immediately.

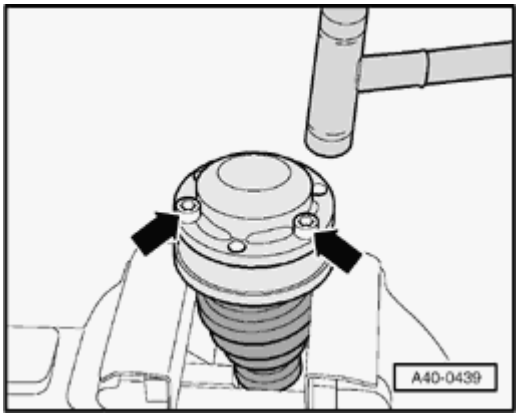

Fig. 245: Aligning New Cover With Bolts To Screw Holes
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Align new cover with bolts - **arrows** - to screw holes.

It must be aligned exactly because it cannot be aligned after driving on.

- Drive cover on with a plastic hammer.
- Clear away leaking sealing immediately.

Outer constant velocity joint, servicing

Outer CV joint, removing

- Drive axle, clamping in vise

Use protective vise covers for this.

- Open clamps.
- Slide back protective boot

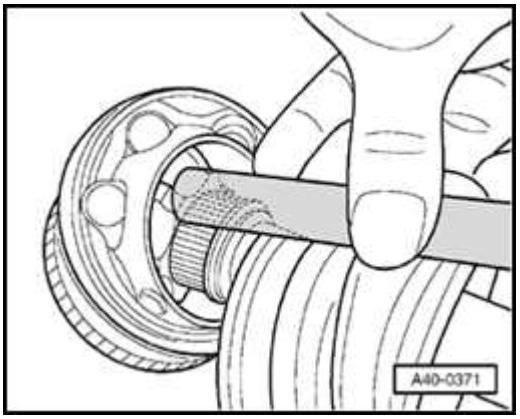

Fig. 246: Striking Copper Or Brass Drift On CV Joint Inner Race With Hammer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Strike a copper or brass drift on CV joint inner race with a hammer.
- Remove joint

Outer CV joint, installing

- Slide joint protective boot onto drive axle.
- Insert new circlip

Circlip (snap ring) must be replaced

- Pack 80 g joint grease in inside of joint.

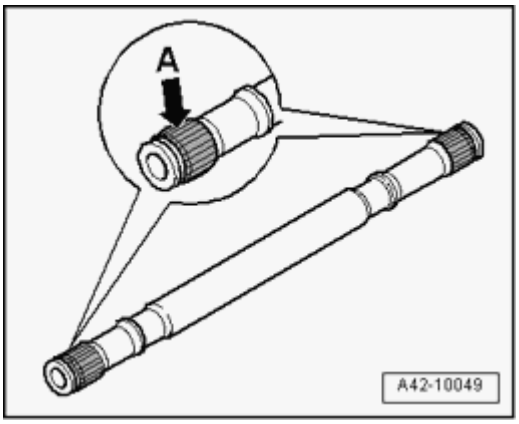

Fig. 247: Identifying Joint/Triple Roller Star Splines
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before installing joint or triple roller star, splines - **A** - must be lightly coated with grease used in joint.
- Screw old drive axle bolt into joint as shown in illustration.

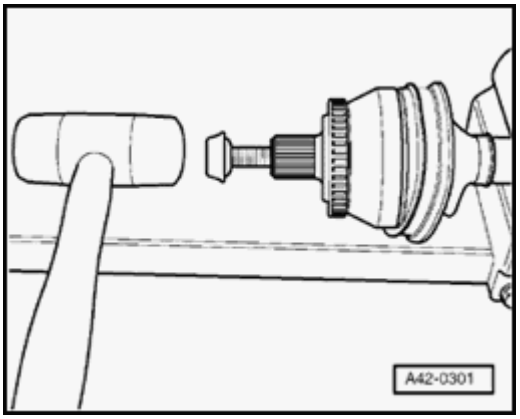

Fig. 248: Installing Outer Constant Velocity (CV) Joint With Flange Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drive joint onto drive axle with plastic hammer until circlip engages.
- Apply 40 g joint grease in boot side of joint.
- Bleed protective joint boot.
- Close clamp.

Outer constant velocity (CV) joint, checking

In order to replace grease in case of strong soiling, joint must be disassembled or if journal surface of balls must be checked for wear and damage.

Disassembling

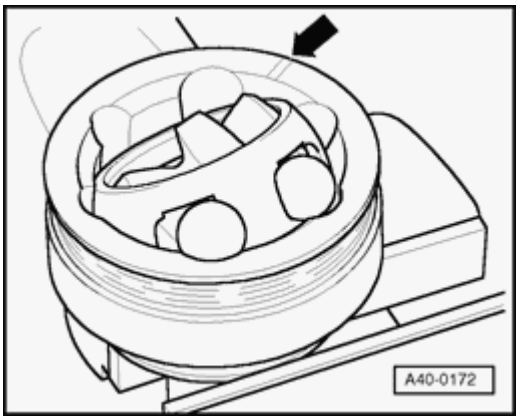

Fig. 249: Identifying Joint Body Marking
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before disassembling mark ball hub position in relation to the ball cage and housing with an electric scriber or oil stone. (see - **arrow** -)
- Swivel ball hub and ball cage.
- Remove balls one after another.

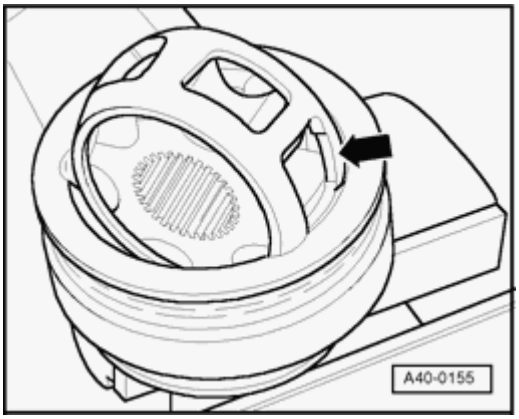

Fig. 250: Turning Cage Until Two Cage Windows Rest On Joint Body
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn cage until two cage windows - **arrow** - rest on joint body.
- Lift out cage together with hub.

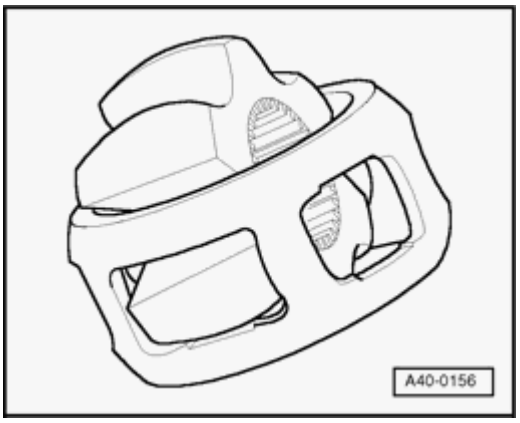

Fig. 251: Swinging Hub Segment In Cage Window
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Swing a hub segment in a cage window.
- Tilt hub out of cage.

Checking

6 balls for each joint belong to a tolerance group. Check stub axle, hub, cage and balls for small indentations (pitting) and signs of seizure. Excessive backlash in the joint will cause knocking or jolts under load change. In such cases joint should be replaced. Flattening and running marks of balls are no reason to replace joint.

Assembling

- Install cage with hub in joint housing.

NOTE:

- **Cage must be installed laterally correct.**

- Press in opposing balls in sequence, during this, previous position of ball hub to ball cage and to joint body must be re-established.
- Pack grease into joint body, grease quantity and type **Grease quantity and type**.

Inner constant velocity (CV) joint, checking

In order to replace grease in case of strong soiling, joint must be disassembled and if journal surfaces and balls must be checked for wear and damage.

Disassembling

NOTE:

- **Ball hub and joint are paired and should be identified before removal. Do not interchange cage allocation.**

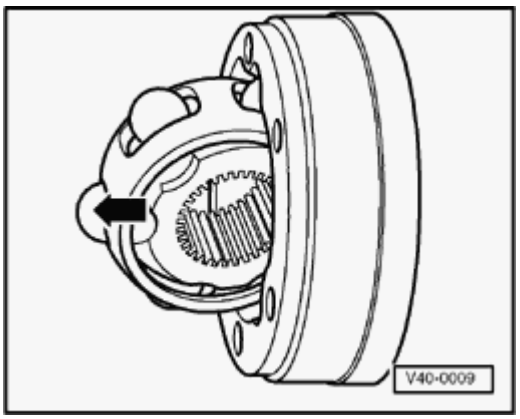

Fig. 252: Pressing Out Ball Joint Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Swing ball hub and ball cage and pull out of joint in direction of - **arrow** -.
- Press balls out of cage.

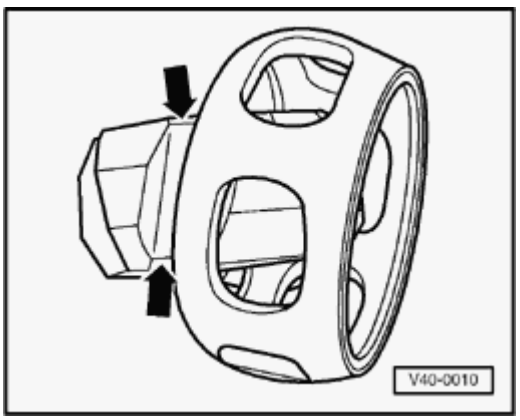

Fig. 253: Tilting Ball Hub Out Of Ball Cage Over Ball Track
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Flip out ball hub from ball cage via running path of ball - **arrows** -.

Checking

- Check joint housing, ball hub, ball cage and balls for indentations (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 replaced. Flattening and running marks of balls are no reason to replace joint.**

Assembling

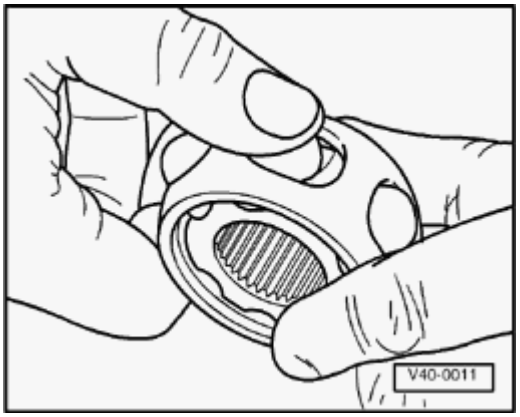

Fig. 254: Inserting Ball Hub Over Both Chamfers Into Ball Cage
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert ball hub into ball cage via two chamfers. The hub can be installed in any position. Press balls into cage.
- Insert hub with cage and balls at right angle to joint.

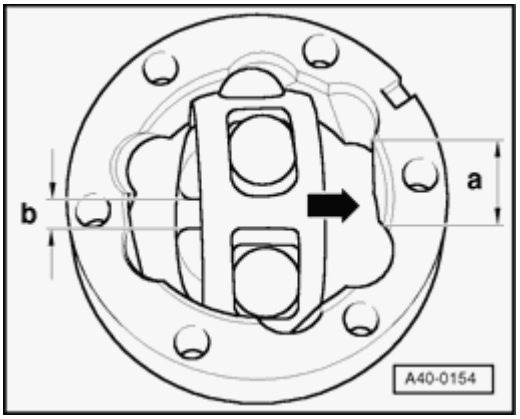

Fig. 255: Wide Spacing On The Joint Body Aligned With The Narrow Spacing On Hub

Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- **When inserting make sure that the wide space - a - on joint housing is aligned with the narrow space - b - on the hub after swiveling in.**

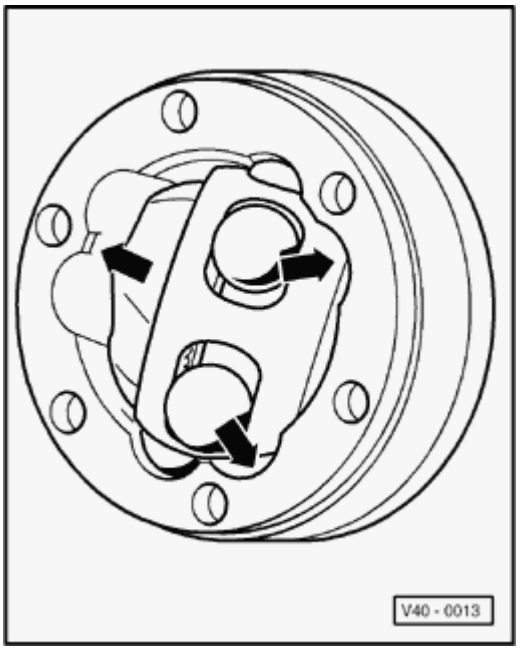

Fig. 256: Ball Hub Installed With Hub Able To Be Swivelled Out Of Cage
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install ball hub, whereby the hub must be swiveled out of the cage - **arrows** - far enough to allow the balls to fit into the ball tracks.

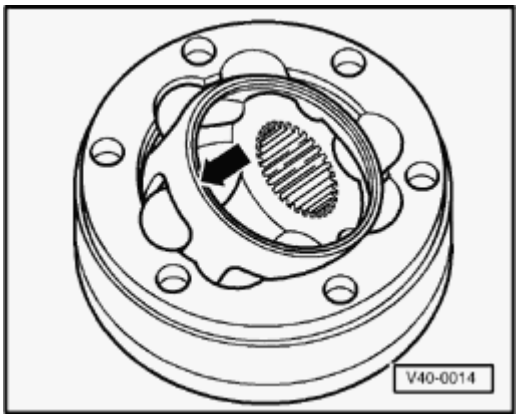

Fig. 257: Pressing Cage Firmly Until Hub Is In Position
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press cage firmly - **arrow** - until hub swings fully in position.

Constant velocity joint, checking for function:

Constant velocity joint is properly assembled, if ball hub can be slid back and forth by hand over whole compensation length.

42 - REAR SUSPENSION

REAR AXLE COMPONENT ALLOCATION

General information

When installing waxed components, contact surfaces must be cleaned. Contact surfaces must be free of wax and grease.

Torque specifications for unoiled bolts and nuts are given.

Welding or straightening operations are not permitted on load-bearing or wheel-controlling components.

Always avoid the following actions with coil springs: Hammer stroke, welding beads, applying color identification later.

Do not perform any welding or grinding (separating work) in coil spring or suspension strut area! Cover coil spring or suspension struts if necessary.

Vehicles without drive axle must not be moved, otherwise wheel bearing will be damaged. If vehicle must be moved, observe the following:

- Install an outer joint in place of drive axle.
- Tighten outer joint to 115 Nm (bolt M14) or 200 Nm (bolt M16).

Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at control arms if vehicle is in curb weight position --> **Wheel bearing, lifting to curb weight position**

If the vehicle must still be aligned, every bolt and nut that must be loosened for adjustment is only tightened to torque specification. After measurement/adjustment is complete, tighten bolt and nuts to prescribed additional torque angle.

CAUTION: If the vehicle will be driven on the streets, all bolts and nuts must be tightened properly!

Wheel bearing, lifting to curb weight position

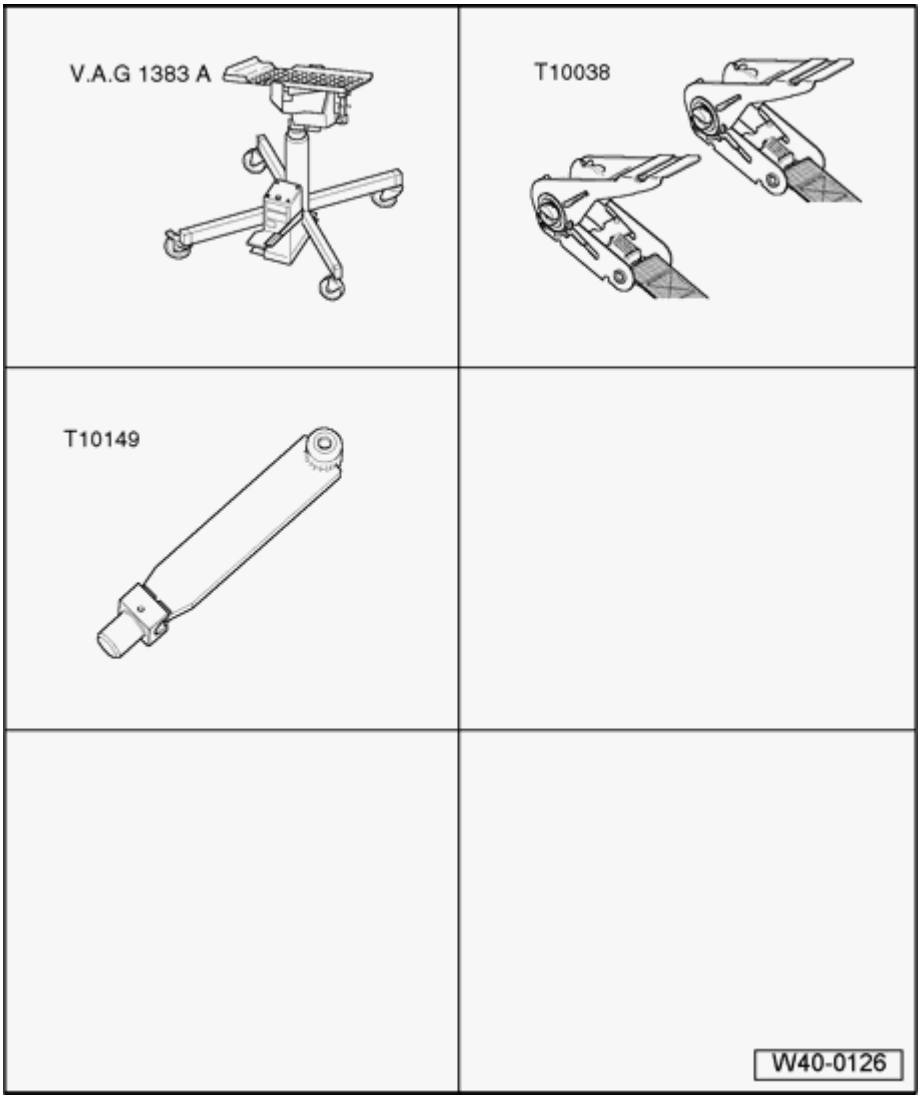

Fig. 258: Identifying Special Tools - Axle And Wheel Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Engine/transmission jack V.A.G 1383 A
- Tensioning strap T10038
- Wheel hub support T10149

NOTE:

- **All bolts on suspension parts with bonded rubber bushings must always be tightened in curb weight position (unloaded condition).**

Bonded rubber bushings have a limited torsional range.

Parts with bonded rubber bushings must be brought into a position that corresponds to the position in driving

mode before being tightened (curb weight position)

Otherwise, bonded rubber bushing will be stressed resulting in a shortened service life.

By raising appropriate suspension using engine/transmission jack V.A.G 1383 A and Wheel Hub Support T10149 , this position can be simulated on hoist.

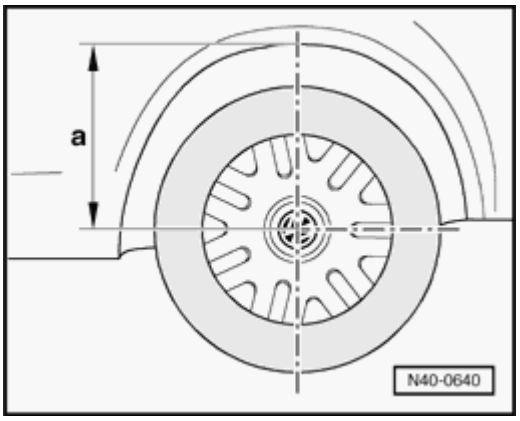

Fig. 259: Measuring Dimension From Center Of Wheel To Lower Edge Of Wheelhousing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before starting work, take measurement - **a** - , e.g. with tape measure, from center of wheel to lower edge of wheelhousing.

The measurement must be taken in curb weight position (unloaded).

- Make a note of measurement. It will be needed for tightening bolts/nuts.

Before appropriate suspension is raised, vehicle must be strapped to lift arms of hoist using tensioning straps T10038.

If a vehicle is not secured, there is danger that the vehicle could slip off the lift!

- Turn wheel hub until one of the holes for the wheel bolts is at the 12 o'clock position.
- Install wheel hub support T10149 with wheel bolt on wheel hub.

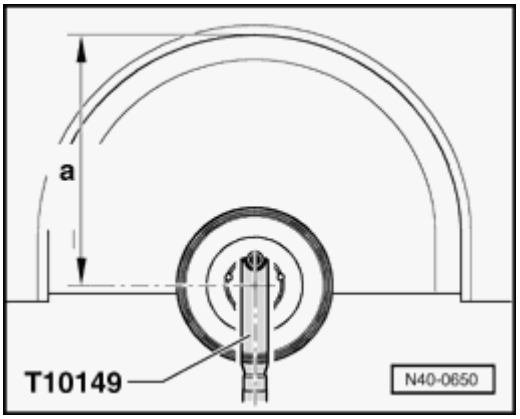

Fig. 260: Measuring Wheel Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Using engine/transmission jack V.A.G 1383 A , lift wheel bearing housing until dimension - **a** - is reached.

Tightening of the respective bolts/nuts must then only occur after dimension - a - , which was measured before installation between the wheel hub center and the lower edge of wheelhousing, has been attained

CAUTION:
- **Do not lift or lower vehicle with engine/transmission jack below vehicle.**
- **Do not leave engine/transmission jack V.A.G 1383 A below vehicle any longer than necessary.**

- Tighten respective bolts/nuts.
- Lower steering knuckle.
- Move engine/transmission jack away from under vehicle.
- Remove wheel hub support T10149.

Component groups

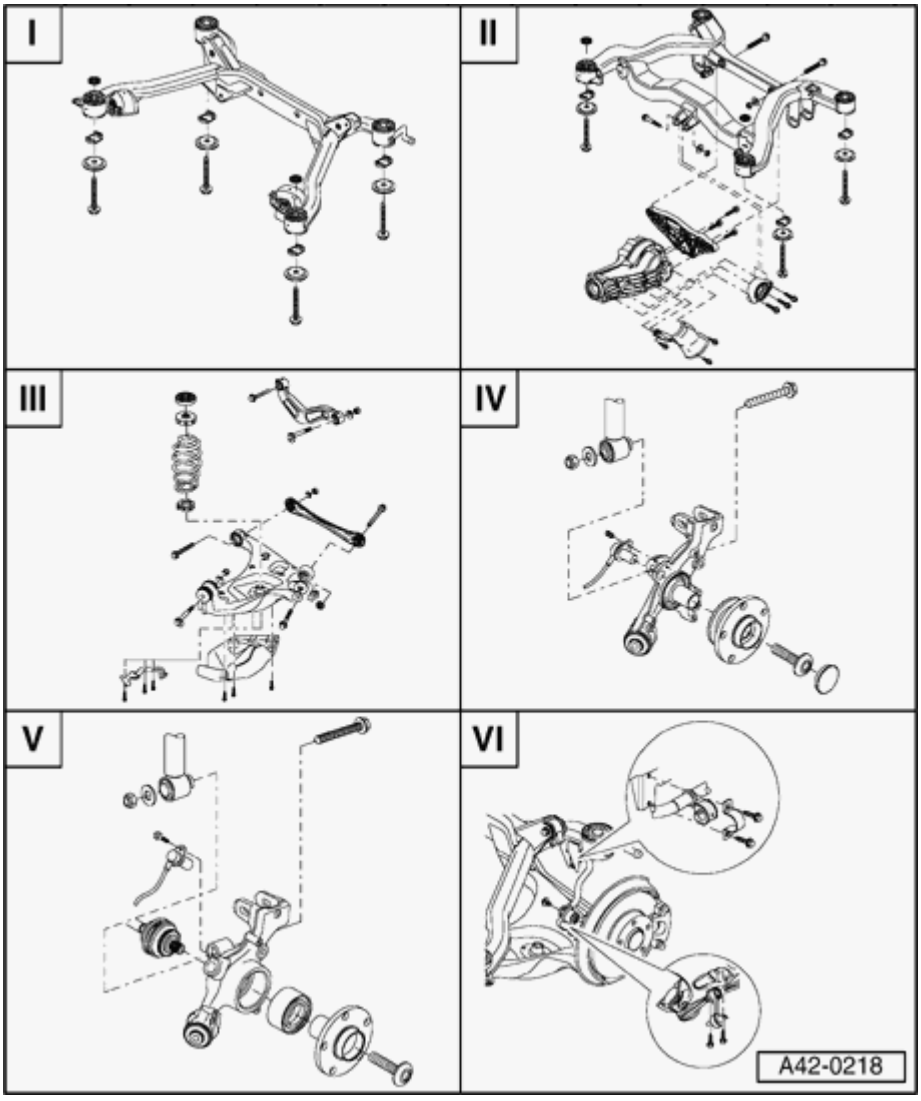

Fig. 261: Rear Axle Component Groups
Courtesy of VOLKSWAGEN UNITED STATES, INC.

I - Subframe - front wheel drive --> **Part I, Subframe - front wheel drive**

II - Subframe - all wheel drive --> **Part II, Subframe - all wheel drive**

III - Trapezoidal control arm, transverse link, tie rod --> **Part III, Trapezoidal control arm, transverse link, tie rod**

IV - Stub axle carrier - front wheel drive --> **Part IV, Stub axle carrier - front wheel drive**

V - Wheel bearing housing (steel) - all wheel drive --> **Part V, wheel bearing housing (steel) - all wheel drive**

VI - Stabilizer bar --> **Part VI, Stabilizer bar**

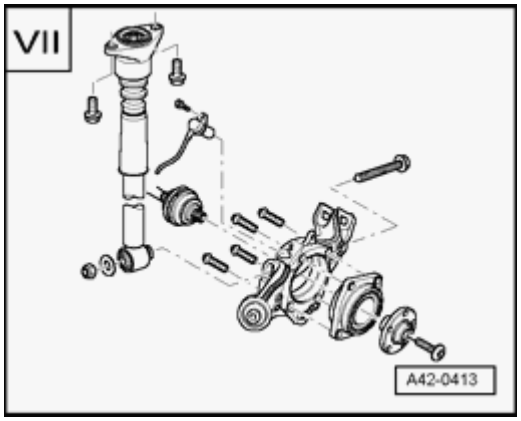

Fig. 262: Wheel Bearing Housing (Aluminum) - All Wheel Drive
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Wheel bearing housing (aluminum) - all wheel drive

VII - Wheel bearing housing aluminum - all wheel drive --> **Part VII, Wheel bearing housing (aluminum) - all wheel drive**

Part I, Subframe - front wheel drive

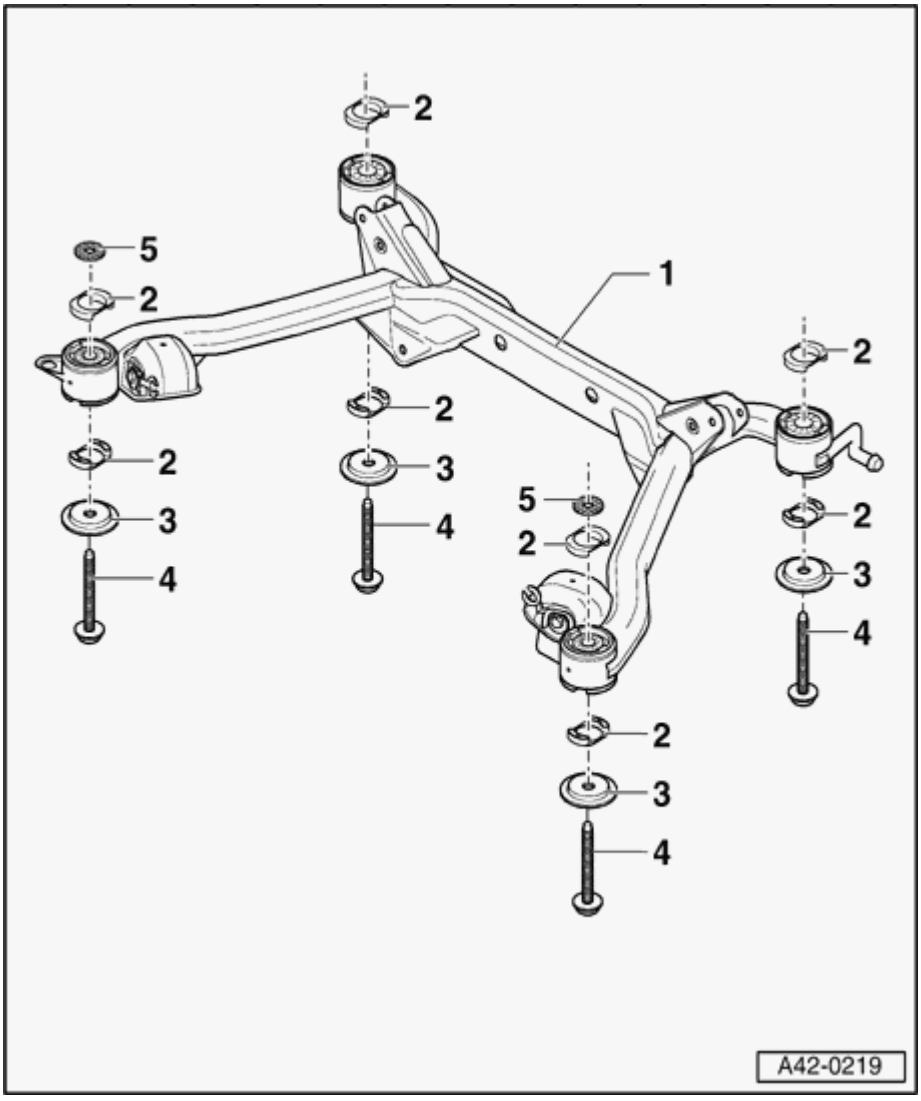

Fig. 263: Rear Axle Part I, Subframe - Front Wheel Drive
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Subframe

- Removing and installing --> **Subframe, removing and installing**
- Subframe bushings, replacing --> **Subframe bushings, replacing**

2 - Plastic insert

- Part of purchased bushing assembly

3 - Washer

- Always replace

4 - Combi-bolt

- Always replace
- Tighten to 110 Nm plus an additional 90° turn
- Threads in body can be repaired according to DIN 8140 using wire thread inserts (Heli-Coil). Thread insert must be same length as thread in body.

5 - Washer

- Front only
- Corrugation face toward body
- Only installed with hydraulic mounting 8E0 505 145 AQ
- Discontinued from KW 48/00 with introduction of new hydraulic bushing

Part II, Subframe - all wheel drive

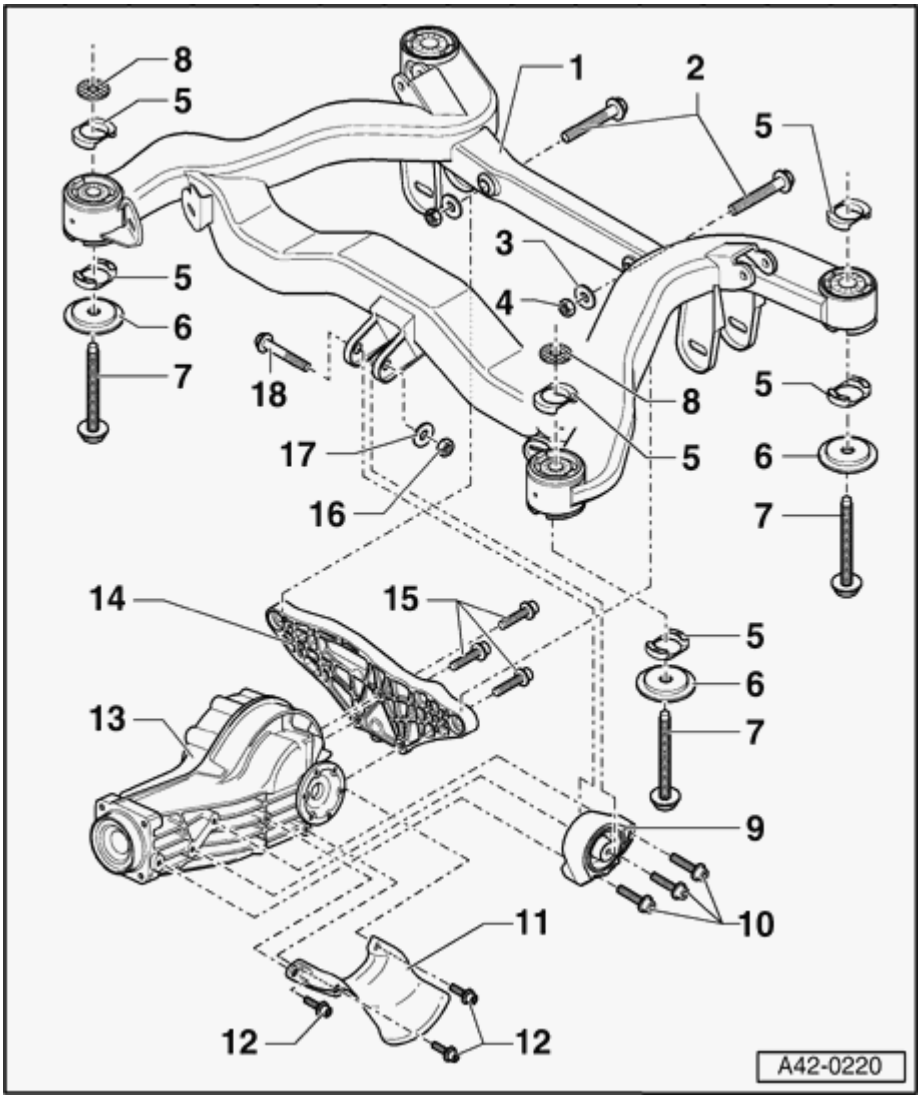

Fig. 264: Rear Axle Part II, Subframe - All Wheel Drive
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Subframe

- Removing and installing --> **Subframe, removing and installing**
- Subframe bushings, replacing --> **Subframe bushings, replacing**
- Rear differential bushing, replacing --> **Rear differential bushing, replacing**

2 - Combi-bolt, 55 Nm

3 - Washer

4 - Hex nut

5 - Plastic insert

- Part of purchased bushing assembly

6 - Washer

- Always replace

7 - Combi-bolt

- Always replace
- Tighten to 110 Nm plus an additional 90° turn
- Threads in body can be repaired according to DIN 8140 using wire thread inserts (Heli-Coil). Thread insert must be same length as thread in body.

8 - Washer

- Front only
- Corrugation face toward body
- Only installed with hydraulic mounting 8E0 505 145 AQ
- Discontinued from KW 48/00 with introduction of new hydraulic bushing

9 - Front transmission support

10 - Combi-bolt, 40 Nm

11 - Cover

12 - Combi-bolt, 25 Nm

13 - Rear final drive

14 - Rear crossmember

15 - Combi-bolt, 40 Nm

16 - Hex nut, 40 Nm

17 - Washer

18 - Combi-bolt

Part III, Trapezoidal control arm, transverse link, tie rod

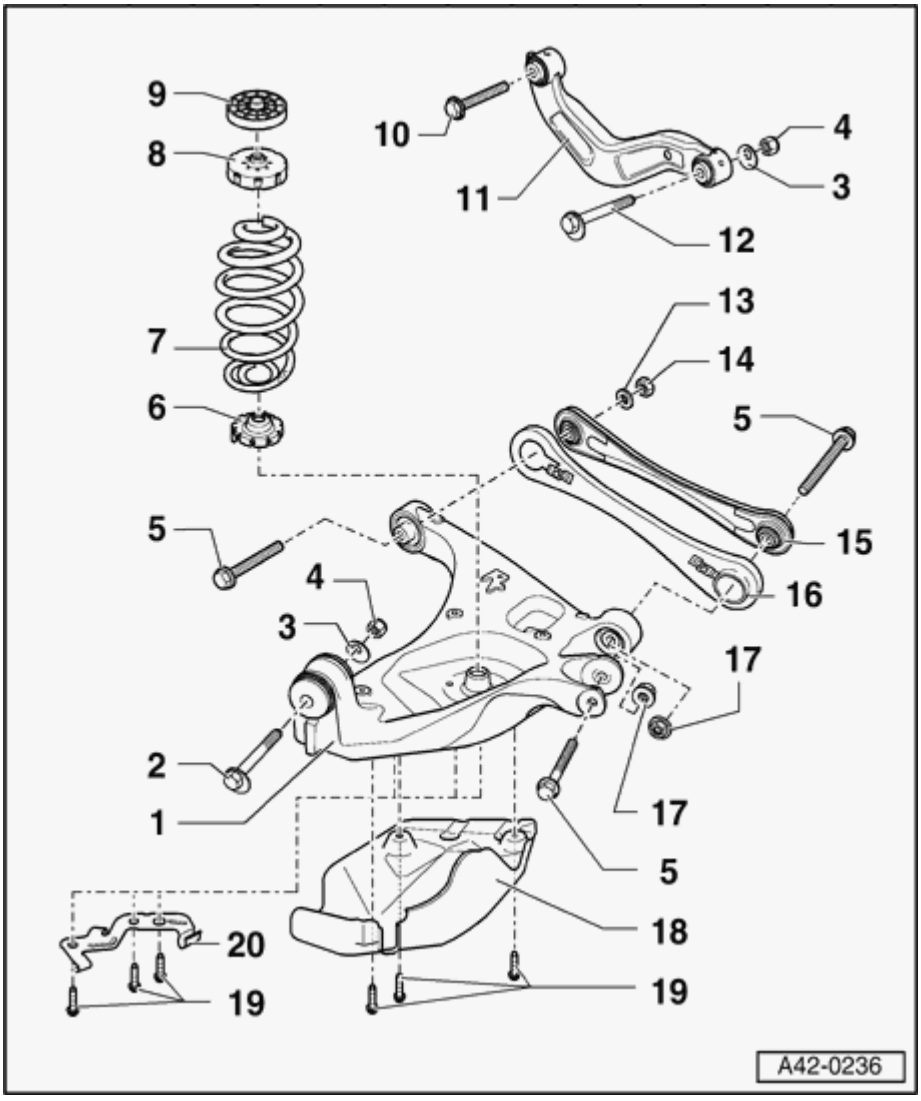

Fig. 265: Rear Axle Part III, Trapezoidal Control Arm, Transverse Link, Tie Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Trapezoidal control arm

- Various versions --> **Trapezoidal control arm**
- Mixed installation not permissible
- Removing and installing --> **Trapezoidal control arm**
- Trapezoidal control arm bushings must not be replaced, if bushing is damaged, replace trapezoidal control arm

2 - Eccentric bolt

- Vehicle alignment must be performed after loosening. --> **Wheel alignment**
- Do not turn more than 90° left or right (that is, smallest to largest possible adjustment)

3 - Eccentric washer

- Inner bore with tab

4 - Hex nut, self-locking, 95 Nm

- Always replace
- Tighten bolts only in curb weight position

5 - Combi-bolt

- Always replace
- Tighten to 85 Nm plus an additional 90° turn

6 - Lower spring support

- End of spring turned to stop

7 - Coil spring

- Note different vehicle versions, see vehicle data plate. **Clarification of Production Control numbers (PR No.)**
- Removing and installing --> **Rear coil spring**

8 - Upper spring support

9 - Upper spring support

10 - Combi-bolt

- Always replace
- Tighten to 85 Nm plus an additional 90° turn

11 - Transverse link

- Removing and installing --> **Transverse link**
- Replace bearing --> **Transverse link bracket, replacing**

12 - Eccentric bolt

- Vehicle alignment must be performed after loosening. --> **Wheel alignment**
- Do not turn more than 90° left or right (that is, smallest to largest possible adjustment)

13 - Washer

14 - Nut, self-locking

- Always replace
- Tighten to 85 Nm plus an additional 90° turn
- Tighten bolts only in curb weight position

15 - Tie rod

- Various versions
- Removing and installing --> **Tie rod**
- Vehicle alignment must be performed after installing. --> **Wheel alignment**

16 - Stone protection plate

- Various versions
- Only for heavy duty suspension
- Removing and installing (old version 8E0 501 561) --> **Tie rod (three-piece version) stone protection 8E0 501 561 (old version), removing and installing**
- Removing and installing (new version) --> **Tie rod** and --> **Tie rod (one-piece version) stone protection (new version), removing and installing**

17 - Collar nut, self-locking

- Always replace
- Tighten bolts only in curb weight position

18 - Trapezoidal control arm stone protection

- Only for heavy duty suspension

19 - Collar bolt, 25 Nm

20 - Bracket

- For parking cable

Part IV, Stub axle carrier - front wheel drive

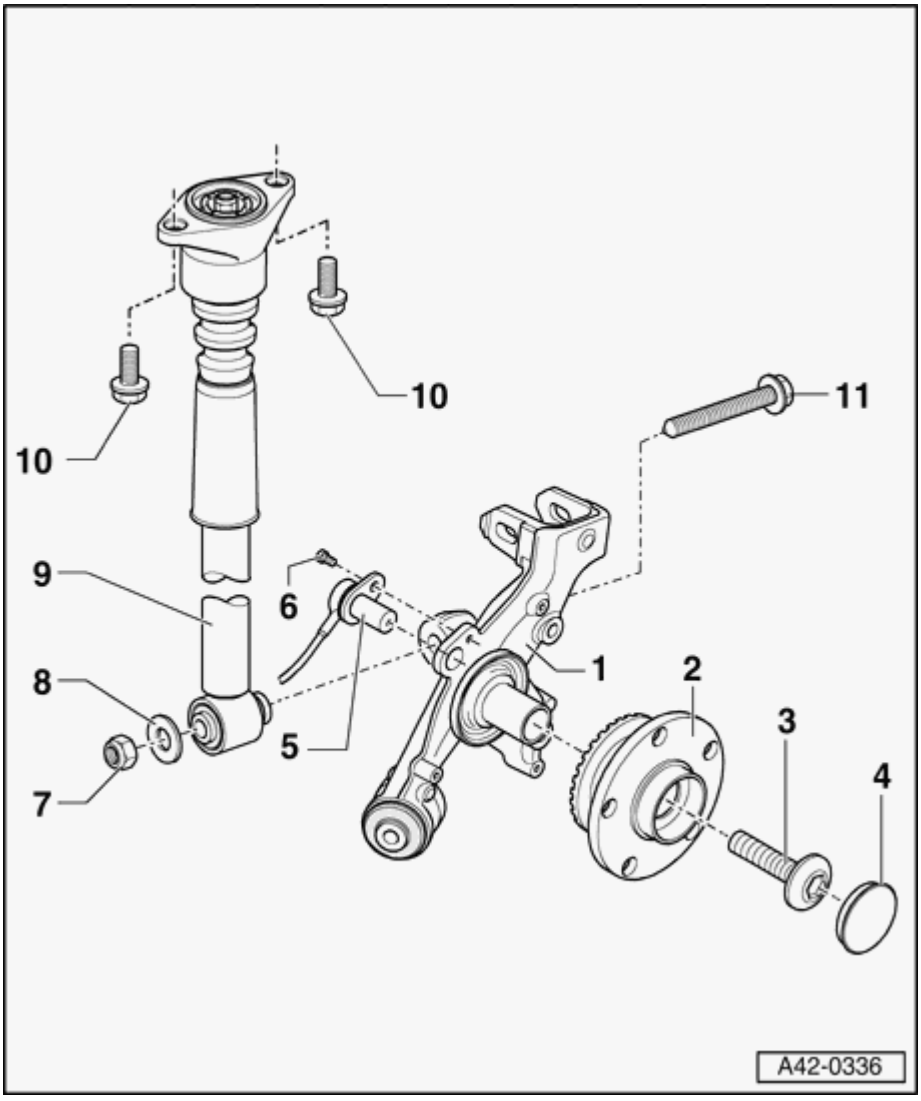

Fig. 266: Rear Axle Part IV, Stub Axle Carrier - Front Wheel Drive
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Stub axle carrier

- Vehicles with front wheel drive
- Removing and installing --> **Stub axle carrier/wheel bearing housing and wheel bearing unit**
- Servicing --> **Stub axle carrier - front wheel drive, servicing**

2 - Wheel bearing unit

- Removing and installing --> **Stub axle carrier/wheel bearing housing and wheel bearing unit**
- The wheel bearing and wheel hub are installed together in a housing.
- This wheel bearing/hub unit is maintenance and adjustment free. Adjusting and servicing is not possible!
- Does not need to be replaced

- If wheel bearing unit can be removed from stub axle carrier by hand, wheel bearing unit is OK and can be reinstalled.
- If it cannot be removed by hand, wheel bearing unit must be replaced.
- Replace only as a unit

3 - Collar screw

- Always replace
- Tighten to 200 Nm plus 180° additional turn
- Tighten to 200 Nm, if vehicle is raised, only tighten with additional turn when vehicle is on floor
- If vehicle is resting on floor, do not loosen more than 90°

4 - Dust cap

- Always replace if removed
- An appropriate seal can only be achieved with a new dust cap.
- Only then is an optimum function and long service life guaranteed.

5 - Speed sensor

- Wire routing **Speed sensor wire routing on trapezoidal control arm**

6 - Hex socket head bolt, 10 Nm

7 - Nut, self-locking

- Always replace

8 - Washer

9 - Strut

- On vehicles with Dynamic Ride Control (DRC II), empty and fill system --> **Dynamic Ride Control (DRC II), emptying and filling**
- Removing and installing --> **Strut**
- Observe installed location **Strut location**
- Note different vehicle versions, see vehicle data plate. **Clarification of Production Control numbers (PR No.)**

- Faulty struts must be vented and emptied before disposal --> **Rear gas-filled strut, venting**
- Check removed strut --> **Strut, checking**

10 - Combi-bolt, 36 Nm

11 - Combi-bolt

- Always replace
- Tighten to 150 Nm plus an additional 90° turn
- Tighten bolts only in curb weight position

Speed sensor wire routing on trapezoidal control arm

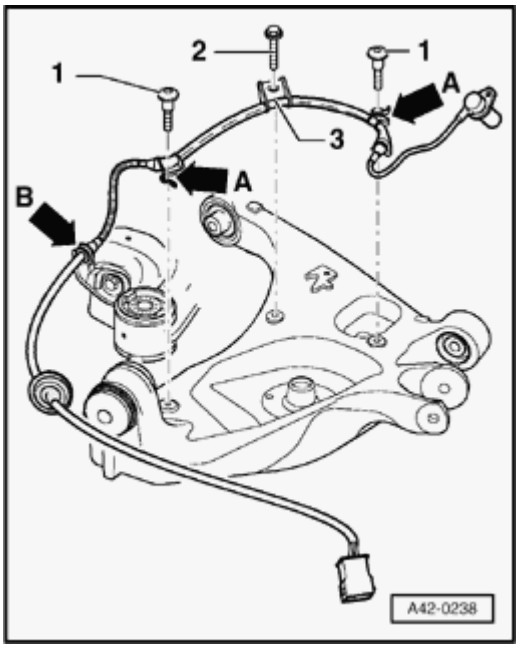

Fig. 267: Speed Sensor Wire Routing On Trapezoidal Control Arm
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Screw with cylindrical shoulder, 10 Nm

2 - Collar bolt, 10 Nm

3 - Cable guide

- To remove, remove collar bolt - **2** - and carefully slide cable guide off of screws - **1** - - **arrow A** -.

- To remove complete wiring, unclip at subframe - **arrow B** -.

Strut location

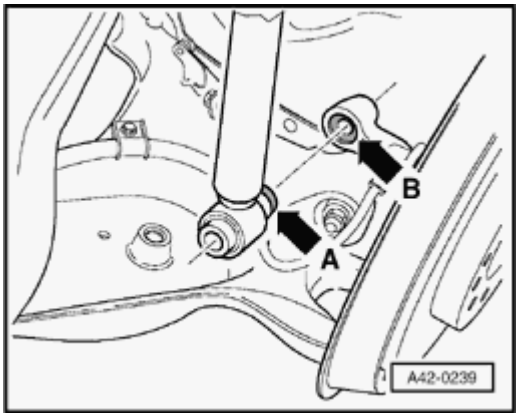

Fig. 268: Identifying Longer Collar On Strut Must Sit In Centering Seat On Stub Axle Carrier/Wheel Bearing Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Longer collar on strut - **arrow A** - must sit in centering seat on stub axle carrier/wheel bearing housing - **arrow B** -.

Part V, wheel bearing housing (steel) - all wheel drive

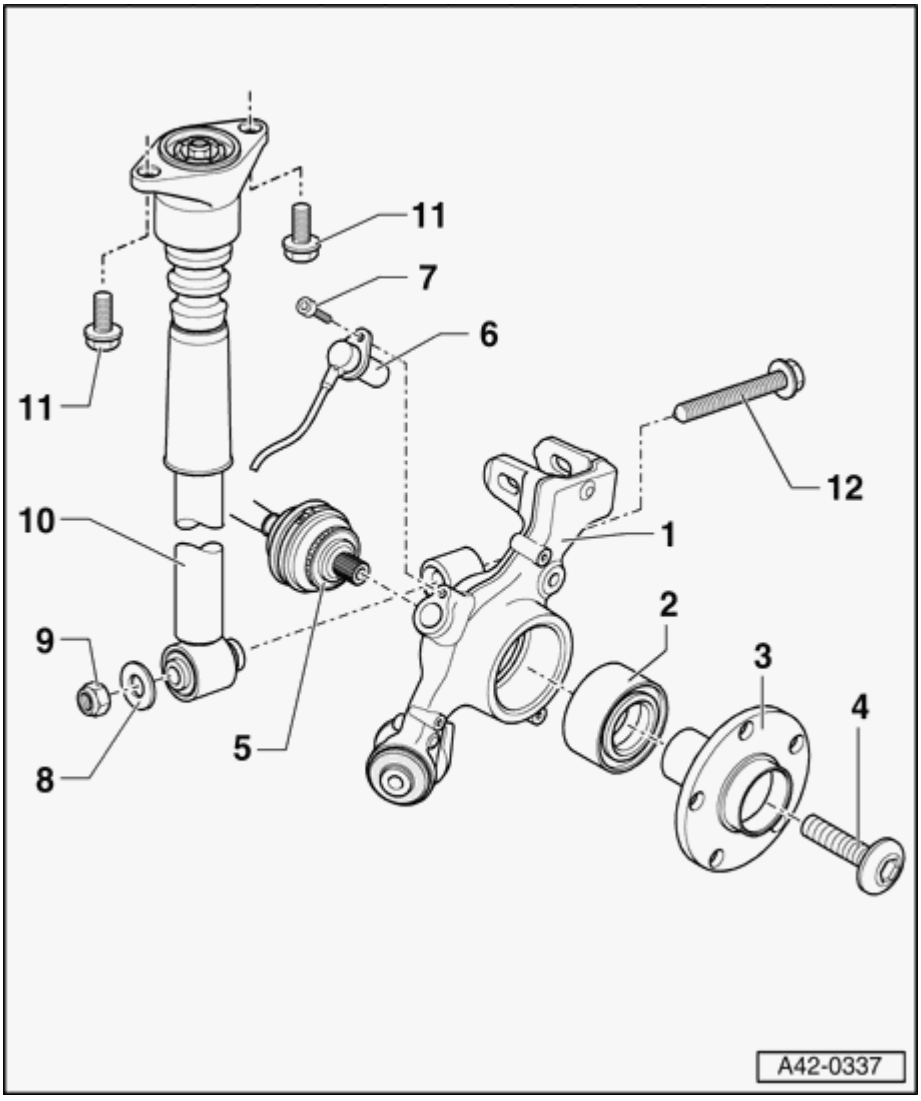

Fig. 269: Rear Axle Part V, Wheel Bearing Housing (Steel) - All Wheel Drive
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Wheel bearing housing

- Vehicles with all-wheel drive
- Removing and installing --> **Stub axle carrier/wheel bearing housing and wheel bearing unit**
- Servicing --> **Wheel bearing housing (steel) - all wheel drive, servicing**

2 - Wheel bearing

- Removing and installing with wheel bearing housing removed --> **Wheel bearing housing (steel) - all wheel drive, servicing**
- Removing and installing in vehicle --> **Wheel bearing (with wheel bearing housing (steel) installed - all wheel drive), removing and installing**

3 - Wheel hub

- Removing and installing with wheel bearing housing removed --> **Wheel bearing housing (steel) - all wheel drive, servicing**
- Removing and installing in vehicle --> **Wheel bearing (with wheel bearing housing (steel) installed - all wheel drive), removing and installing**

4 - Collar bolt

- Always replace
- Tighten to 200 Nm plus an additional 180° turn
- Tighten to 200 Nm, if vehicle is raised, only tighten with additional turn when vehicle is on floor
- If vehicle is resting on floor, do not loosen more than 90°

5 - Drive axle

- Removing and installing --> **Drive axles, removing and Installing**
- Servicing (with inner joint 100 mm dia.) --> **Drive axle with constant velocity inner joint (diameter 100 mm), servicing**
- Servicing (with inner joint dia. mm 108) --> **Driveshaft with constant velocity inner joint (diameter 108 mm), servicing**

6 - Speed sensor

- Wire routing **Speed sensor wire routing on trapezoidal control arm**

7 - Hex socket head bolt, 10 Nm

8 - Washer

9 - Nut, self-locking

- Always replace

10 - Strut

- Removing and installing --> **Strut**
- Observe installed location **Strut location**
- Note different vehicle versions, see vehicle data plate. **Clarification of Production Control numbers (PR No.)**
- Faulty struts must be vented and emptied before disposal --> **Strut, checking**
- Check removed strut --> **Strut, checking**

11 - Combi-bolt, 36 Nm

12 - Combi-bolt

- Always replace
- Tighten to 150 Nm plus an additional 90° turn
- Tighten bolts only in curb weight position

Part VI, Stabilizer bar

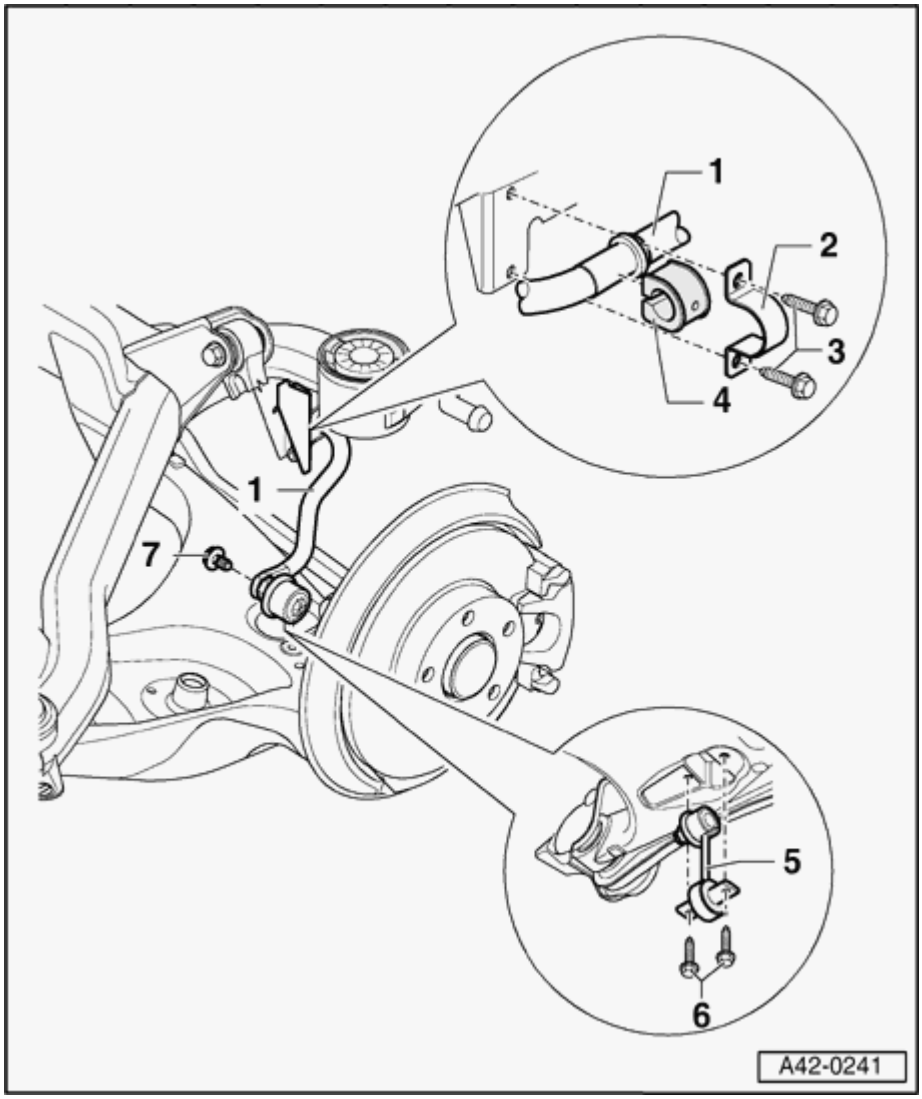

Fig. 270: Rear Axle Part VI, Stabilizer Bar
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Stabilizer bar

- Be aware of the various suspension versions, **Clarification of Production Control numbers (PR No.)**

Vehicle data plate.

- Removing and installing --> **Stabilizer bar, removing and installing**
- Replace bearing --> **Stabilizer bushings, replacing**
- Always replace mounts on both sides of vehicle

2 - Clamp

3 - Collar bolt, 25 Nm

4 - Bushing

- Replacing --> **Stabilizer bushings, replacing**
- Always replace mounts on both sides of vehicle

5 - Coupling rod

- Connects stabilizer with trapezoidal control arm

6 - Collar bolt, 25 Nm

7 - Collar bolt, 45 Nm

Part VII, Wheel bearing housing (aluminum) - all wheel drive

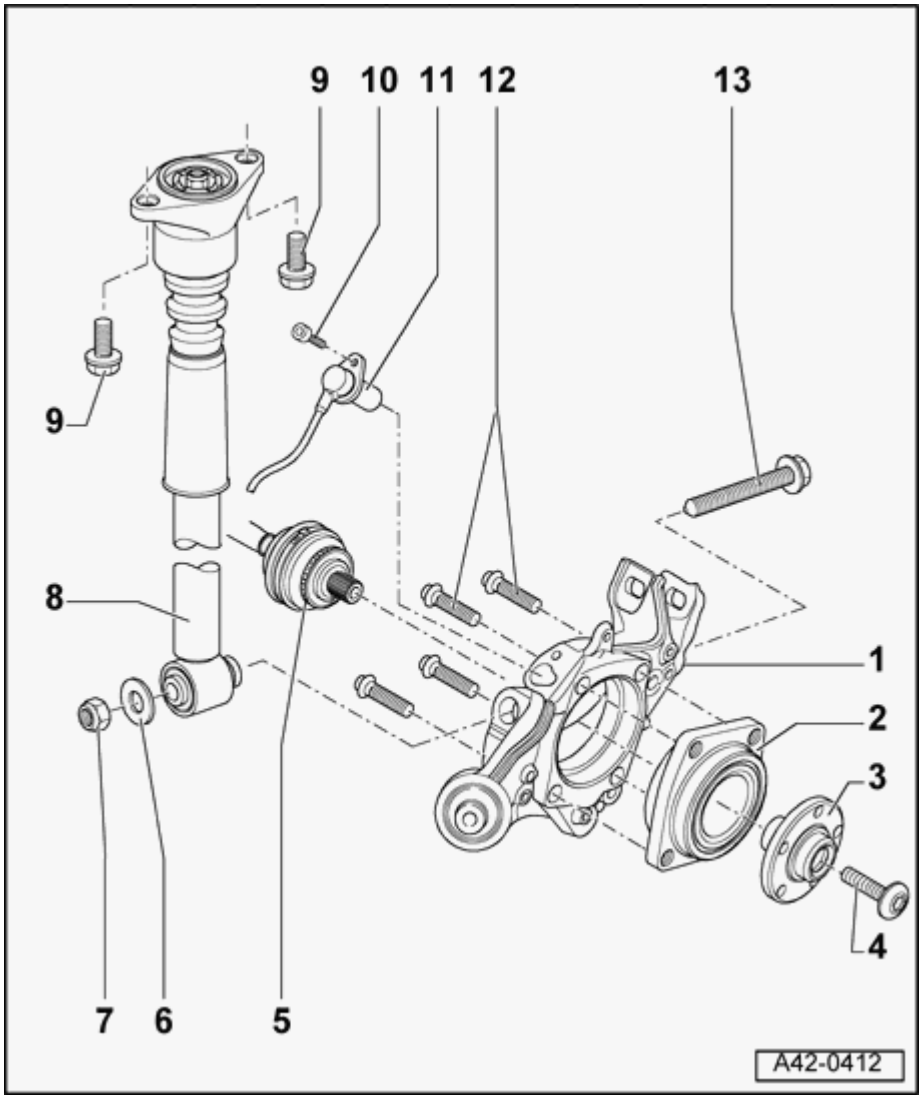

Fig. 271: Rear Axle Part VII, Wheel Bearing Housing (Aluminum) - All Wheel Drive
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Wheel bearing housing

- Vehicles with all-wheel drive
- Removing and installing --> **Stub axle carrier/wheel bearing housing and wheel bearing unit**
- Servicing --> **Wheel bearing housing (steel) - all wheel drive, servicing**

2 - Wheel bearing

- Removing and installing --> **Bolted wheel bearing unit, removing and installing**

3 - Wheel hub

- Removing and installing --> **Bolted wheel bearing unit, removing and installing**

4 - Collar bolt

- Always replace
- Tighten to 200 Nm plus an additional 180° turn
- Tighten to 200 Nm, if vehicle is raised, only tighten with additional turn when vehicle is on floor
- If vehicle is resting on floor, do not loosen more than 90°

5 - Drive axle

- Removing and installing --> **Drive axles, removing and Installing**
- Servicing (with inner joint 100 mm dia.) --> **Drive axle with constant velocity inner joint (diameter 100 mm), servicing**
- Servicing (with inner joint 108 mm dia.) --> **Driveshaft with constant velocity inner joint (diameter 108 mm), servicing**

6 - Washer

7 - Nut, self-locking

- Always replace

8 - Strut

- Removing and installing --> **Strut**
- Observe installed location **Strut location**
- Note different vehicle versions, see vehicle data plate. **Clarification of Production Control numbers (PR No.)**
- Faulty struts must be vented and emptied before disposal --> **Strut, checking**
- Check removed strut --> **Strut, checking**

9 - Combi-bolt, 36 Nm

10 - Hex socket head bolt, 10 Nm

11 - Speed sensor

- Wire routing **Speed sensor wire routing on trapezoidal control arm** , **Speed sensor wire routing on trapezoidal control arm**

12 - Cap bolts (4x) 80 Nm plus an additional 90° turn

- Always replace

13 - Combi-bolt

- Always replace
- Tighten to 150 Nm plus additional 90° turn
- Tighten bolts only in curb weight position

VEHICLE LEVEL SENSOR IN VEHICLES WITH AUTOMATIC HEADLIGHT VERTICAL AIM CONTROL

Vehicle level sensor in vehicles with automatic headlight vertical aim control

NOTE:

- **General information --> Vehicles with automatic headlight vertical aim control, vehicle level sensor.**
- **As a replacement part, vehicle level sensor is only available together with coupling rod and lower retaining plate. To remove it completely, subframe must be removed.**
- **Replacing with subframe installed --> Vehicle level sensor in vehicle, replacing.**
- **Headlamp Range Control Module J431 -->**
  - **94 LIGHTS, SWITCHES - EXTERIOR**
  - **94 LIGHTS, SWITCHES - EXTERIOR for ELECTRICAL EQUIPMENT, CABRIOLET**

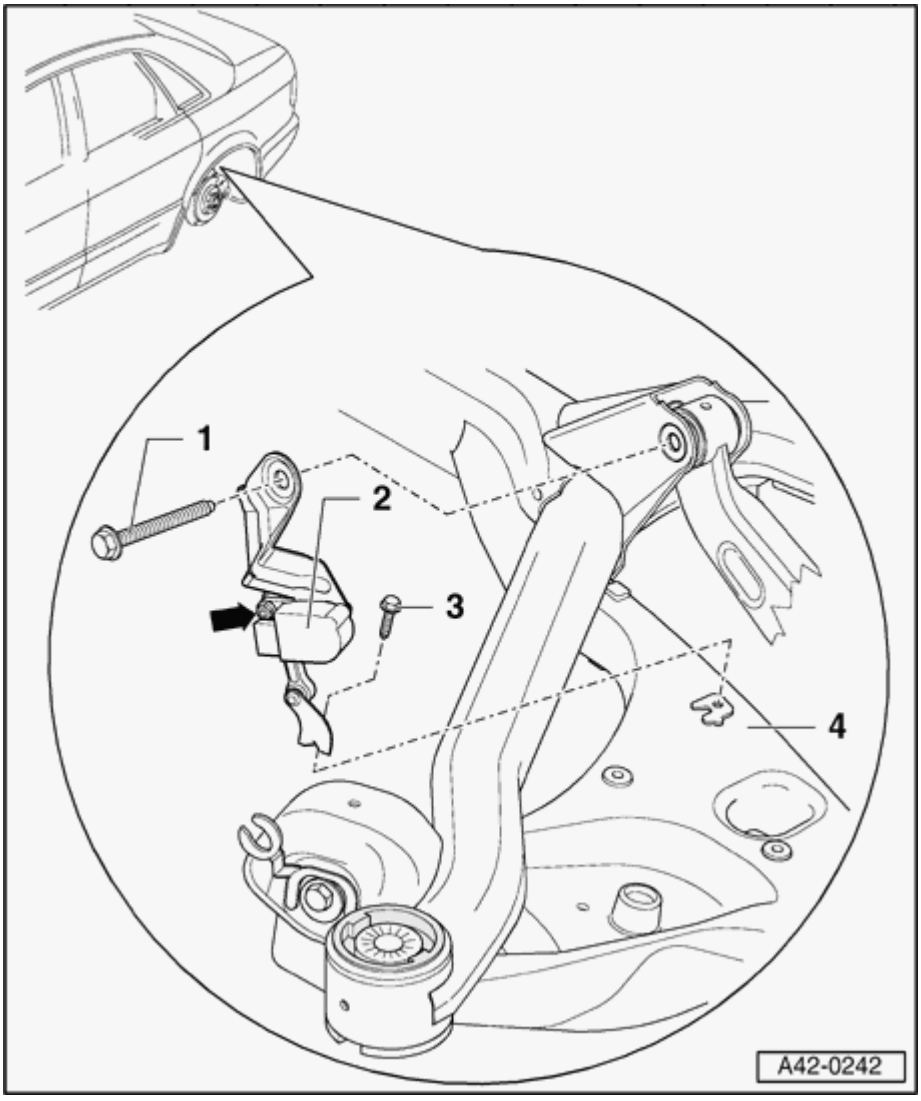

Fig. 272: Identifying Combi-Bolt, Left Rear Level Control System Sensor G76 Or G77 Right Rear Level Control System Sensor G77, Collar Bolt & Trapezoidal Control Arm
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Combi-bolt

- Always replace
- Tighten to 85 Nm plus an additional 90° turn

2 - Left Rear Level Control System Sensor G76 or G77 Right Rear Level Control System Sensor G77

- Complete with components
- Lever - **arrow** - must face toward center of vehicle
- Replace in vehicle --> **Vehicle level sensor in vehicle, replacing**
- After replacing, perform headlight basic setting -->

- **94 LIGHTS, SWITCHES - EXTERIOR**
- **94 LIGHTS, SWITCHES - EXTERIOR** for ELECTRICAL EQUIPMENT, CABRIOLET

3 - Collar bolt, 10 Nm

4 - Trapezoidal control arm

Vehicle level sensor in vehicle, replacing

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1331

- Remove tire.

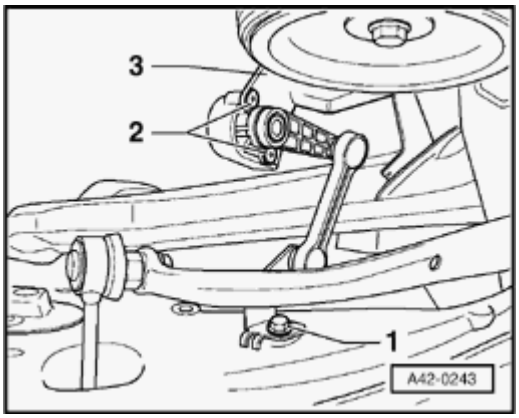

Fig. 273: Removing/Installing Bolts With Angled Wrench
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - **1** -.
- Remove bolts - **2** - with angled wrench. When doing so, do not bend upper retaining plate.

Transverse control arm is not shown.

- Adapt replacement part accordingly and install.

NOTE:

- **Hold Level Control System Sensor securely when tightening bolts - 2 -.**

Torque specifications:

- Item 1: 10 Nm

- Item 2: 5 Nm

- After replacing, perform basic setting for headlights. -->

- **94 LIGHTS, SWITCHES - EXTERIOR**
- **94 LIGHTS, SWITCHES - EXTERIOR** for ELECTRICAL EQUIPMENT, CABRIOLET

- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

REAR COIL SPRING

Coil spring, removing and installing

Special tools, testers and auxiliary items required

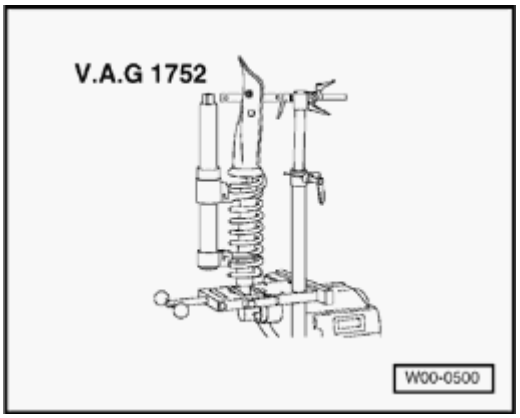

Fig. 274: Spring Compressor Kit V.A.G 1752
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Spring compressor V.A.G 1752/1
- Adapter V.A.G 1752/9
- Spring holder A4, rear axle V.A.G 1752/16

Removing

- Remove wheel.

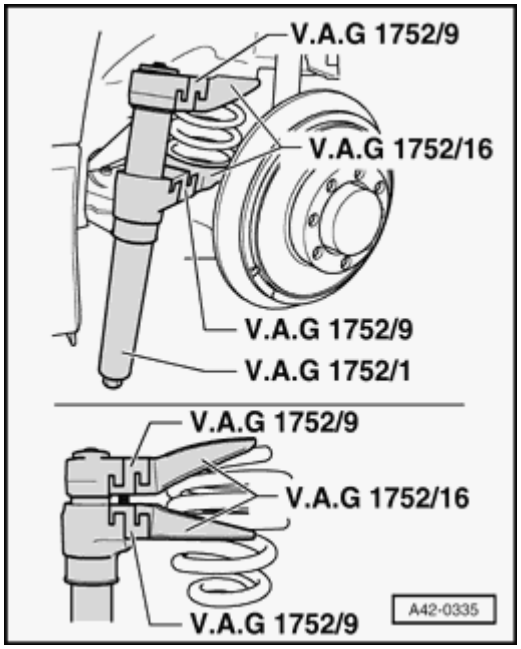

Fig. 275: Identifying Spring Compressor V.A.G 1752/1 With Adapter V.A.G 1752/9 And Spring Holder A4, Rear Axle V.A.G 1752/16 In Coil Spring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert spring compressor V.A.G 1752/1 with adapter V.A.G 1752/9 and spring holder A4, rear axle V.A.G 1752/16 in coil spring; if necessary, guide spring holder individually into windings and then fasten to spring compressor. When doing so, do not damage trapezoidal control arm.

It must be compressed 4 turns.

If this is not possible, compress only 3 turns and turn coil spring until 4 turns prescribed can be compressed.

CAUTION: Ensure correct seating of coil spring in spring holder A4, rear axle V.A.G 1752/16 (risk of accident).

- Compress spring compressor to stop and remove spring.

Installing

NOTE:

- **When installing new spring, ensure conical end points downward.**

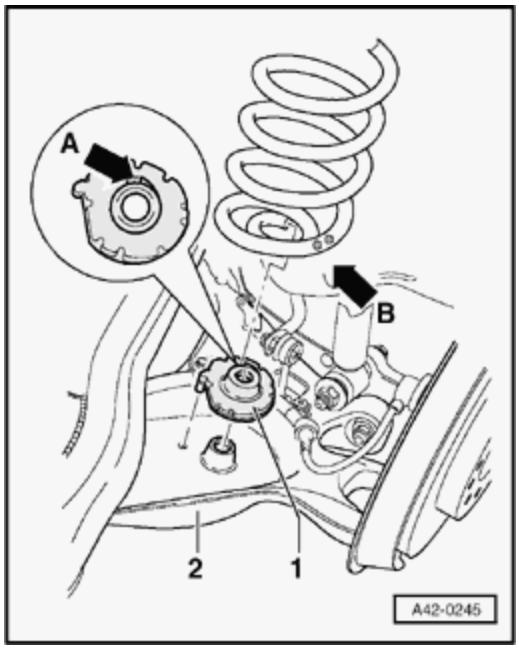

Fig. 276: Identifying Trapezoidal Control Arm Hole, Spring Seat, Colored Markings & Spring Seat Stop
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **- Arrow B - : Colored markings must be at bottom.**

- Lower spring seat - **1** - has a pin.
- Insert this pin in trapezoidal control arm hole - **2** -.
- Turn ends of coil spring so that it rests on spring seat stop - **arrow A** -.
- Insert upper spring seat (not in illustration) in upper spring end.

- Tension spring. Align upper spring seat in body hole.
- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

STRUT

Strut, removing and installing

Special tools, testers and auxiliary items required

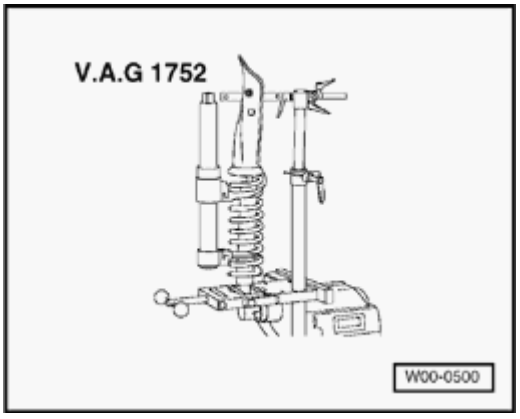

Fig. 277: Spring Compressor Kit V.A.G 1752
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Spring compressor V.A.G 1752/1
- Adapter V.A.G 1752/9
- Spring holder A4, rear axle V.A.G 1752/16
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332

Removing

On vehicles with Dynamic Ride Control (DRC II), empty and fill system --> **Dynamic Ride Control (DRC II), emptying and filling**

- Remove tire.
- Remove coil spring --> **Rear coil spring**.

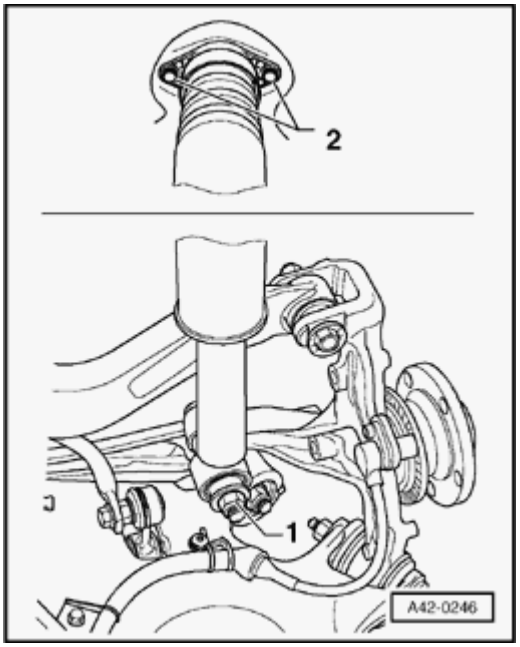

Fig. 278: Removing/Installing Strut Nut & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove nut - **1** - and remove bolt (Illustration without cover plate).
- Remove bolts - **2** -.

NOTE:

- **Wheel housing liner remains installed.**

- Remove strut.

Installing

NOTE:

- **Replace bolts and self-locking nuts --> Notes in exploded view diagrams at --> Part V, wheel bearing housing (steel) - all wheel drive**

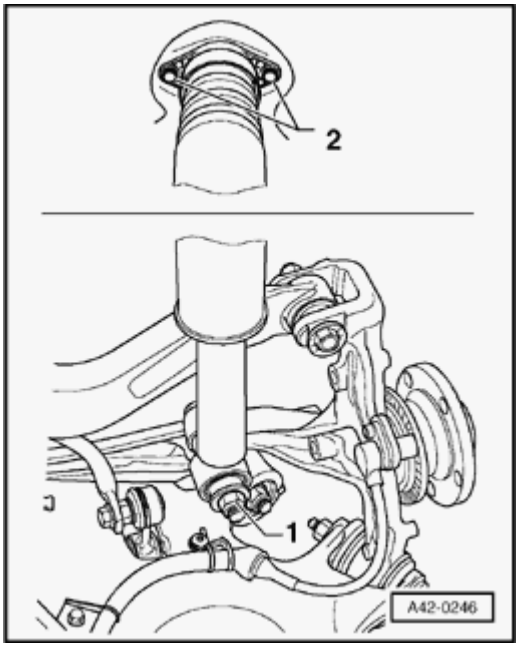

Fig. 279: Removing/Installing Strut Nut & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten bolts - **2** -.

Note location of lower mounting **Strut location**

- Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at control arms if vehicle is in curb weight position --> **Wheel bearing, lifting to curb weight position**
- Tighten connection - **1** - , (front wheel drive) or , (all wheel drive).
- Install coil spring --> **Rear coil spring**.
- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

Strut, servicing

Special tools, testers and auxiliary items required

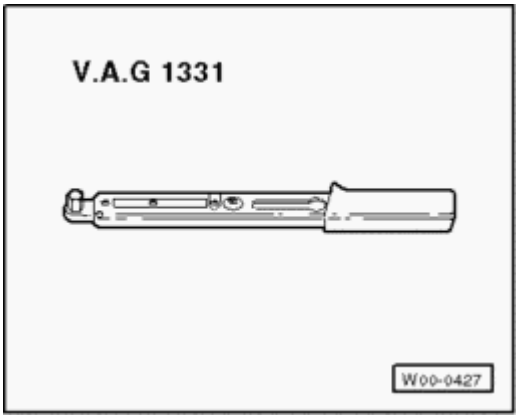

Fig. 280: Identifying Torque Wrench V.A.G. 1331
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1331

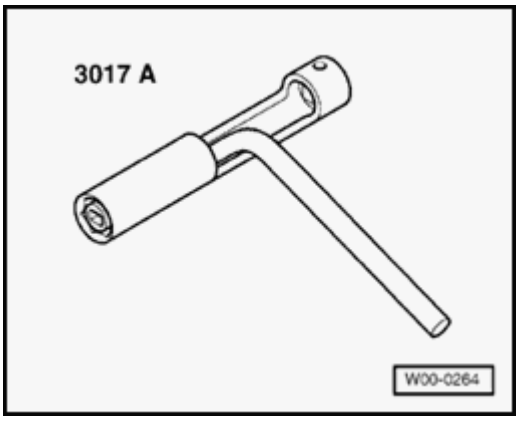

Fig. 281: Special Wrench 3017 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Special wrench 3017 A

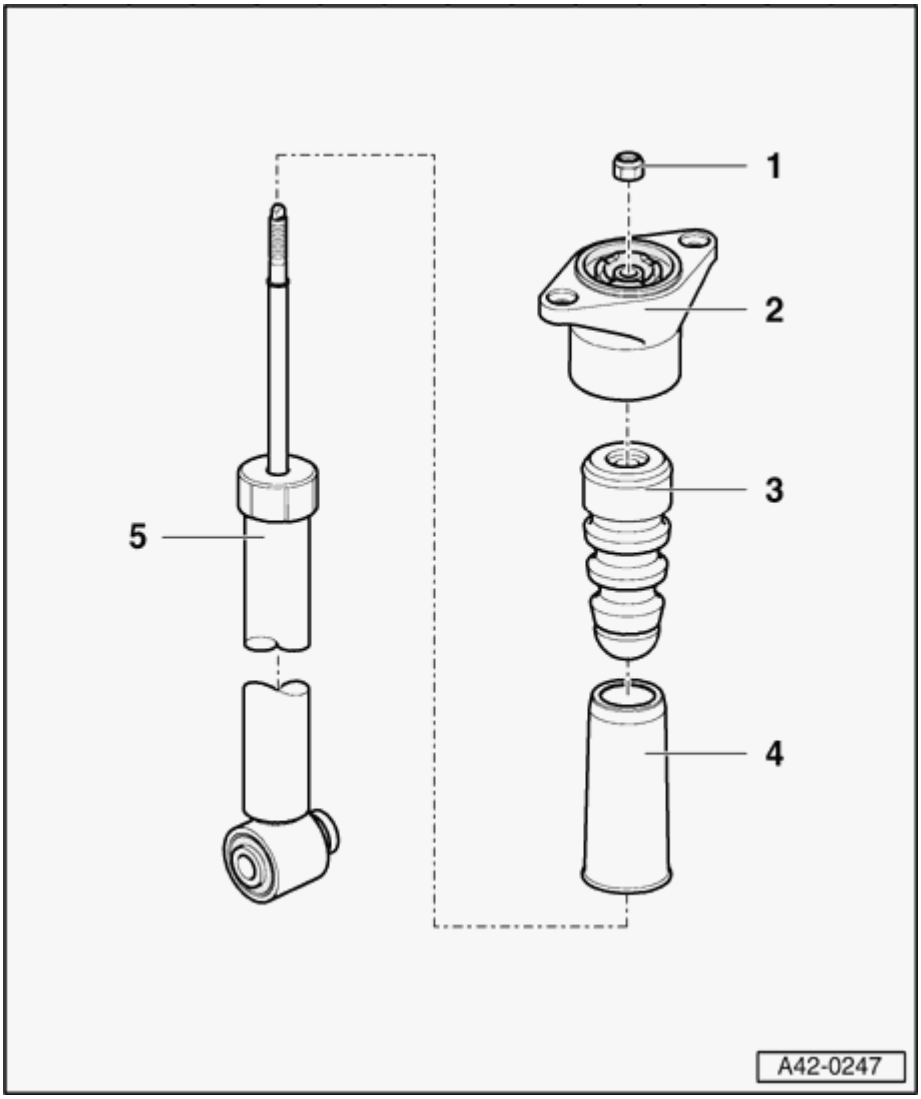

Fig. 282: Exploded View Of Strut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Hex nut, self-locking, 25 Nm

- Always replace
- Loosening and tightening **Loosening and tightening bolted connection for strut mount**

2 - Strut mounting

3 - Buffer stop

4 - Protective sleeve

5 - Strut

- Removing and installing --> **Strut**
- Note different vehicle versions, see vehicle data plate. **Clarification of Production Control numbers (PR No.)**
- Faulty struts must be vented and emptied before disposal --> **Strut, checking**
- Check removed strut --> **Strut, checking**

Loosening and tightening bolted connection for strut mount

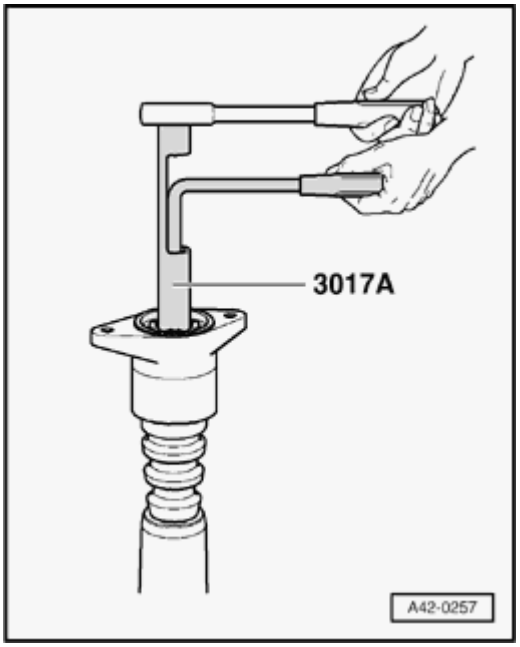

Fig. 283: Loosening And Tightening Bolted Connection For Strut Mount
Courtesy of VOLKSWAGEN UNITED STATES, INC.

STUB AXLE CARRIER/WHEEL BEARING HOUSING AND WHEEL BEARING UNIT

Stub axle carrier/wheel bearing housing (steel), removing and installing

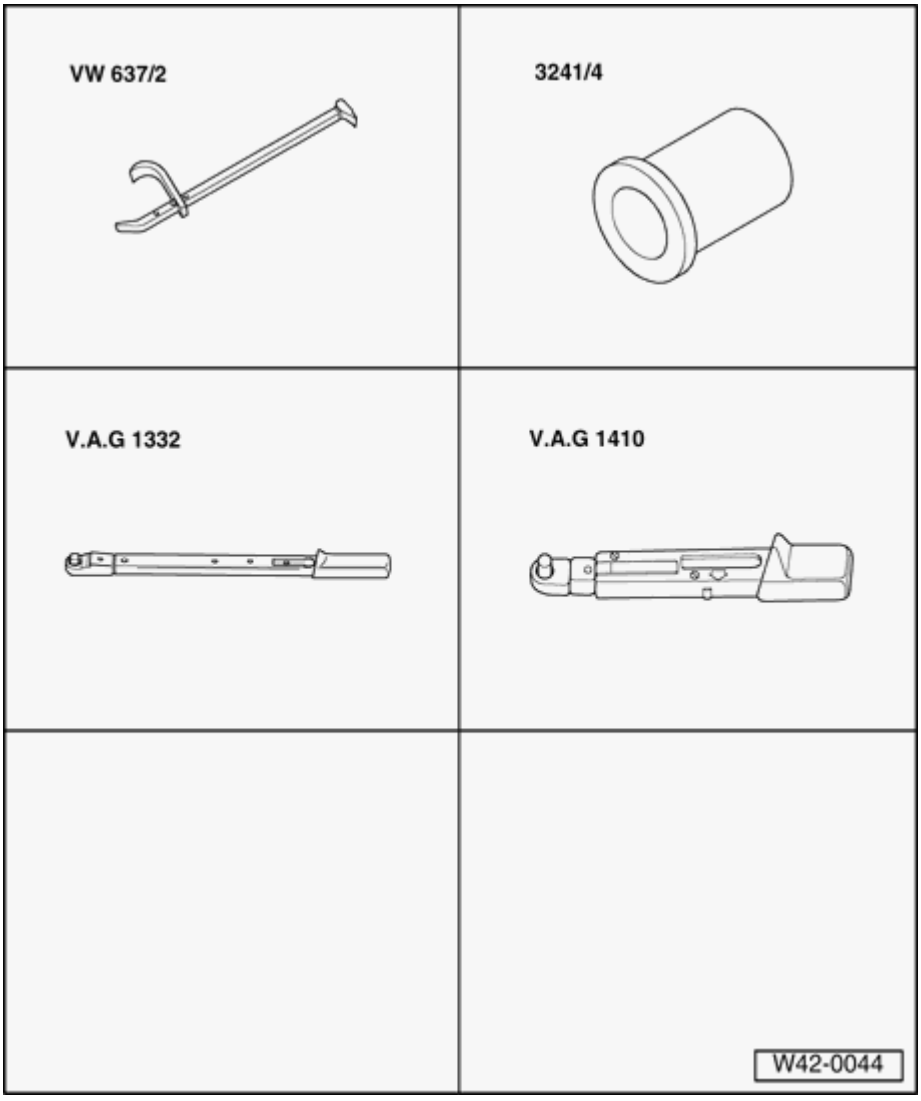

Fig. 284: Identifying Special Tools - Stub Axle Carrier/Wheel Bearing Housing (Steel), Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Grease cap puller VW 637/2
- Fitting sleeve 3241/4
- Torque wrench V.A.G 1332
- Torque wrench V.A.G 1410
- Bit XZN 18 T40027

Removing

- Remove wheel covers, remove cover cap on light-alloy wheels (removal hook in vehicle tool kit).

Vehicles with front wheel drive

NOTE:

- **If wheel bearing unit is not replaced, do not remove collar bolt and dust cap.**

- Remove wheel.

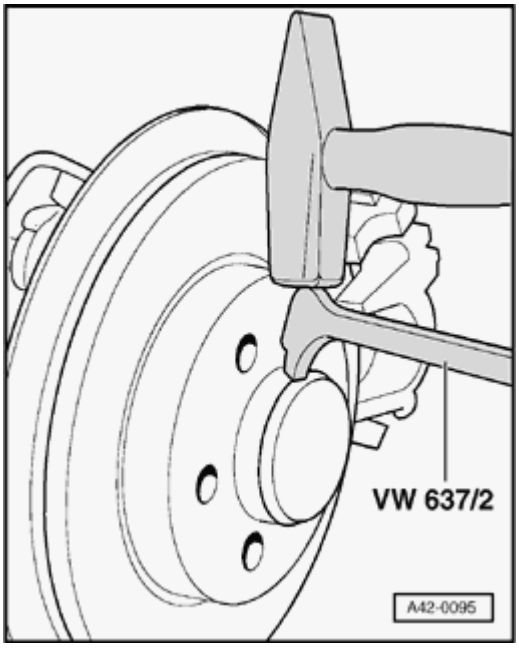

Fig. 285: Tapping Lightly On The Claws Of The Grease Cap Puller VW 637/2
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen dust cap from seat by lightly tapping on claws.

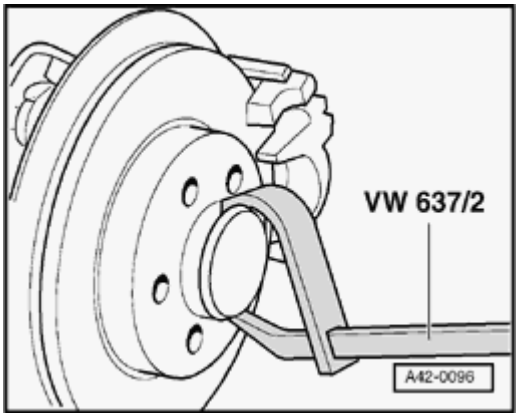

Fig. 286: Pulling Off Dust Cap
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press of dust cap.
- Mount wheel and place vehicle on wheels.

Continued for all vehicles

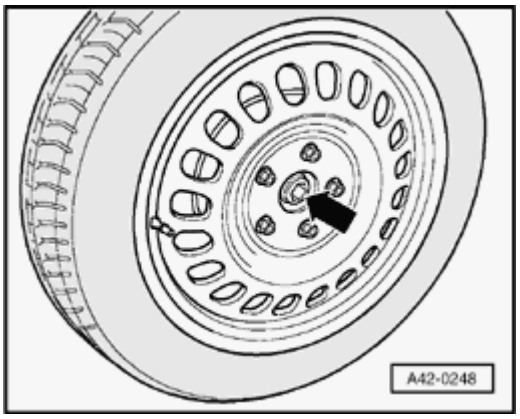

Fig. 287: Wheel Hex Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Only loosen collar bolt - **arrow** - 90°, otherwise wheel bearing is damaged.

CAUTION: When loosening and tightening collar bolt, vehicle must stand on wheels.

-risk of accident-

- Remove tire.
- Secure brake disc with a wheel bolt.

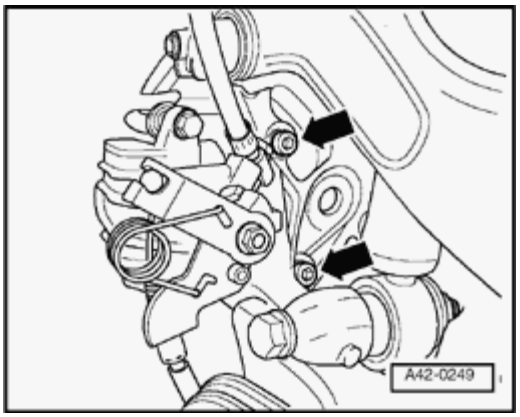

Fig. 288: Removing Brake Caliper
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove brake caliper - **arrows** -. To do so, use socket insert T40027.

NOTE:

- **Secure brake caliper to body with wire.**
- **Do not allow brake caliper to hang from brake line.**

- Remove disc brake.
- Remove coil spring --> **Rear coil spring**.

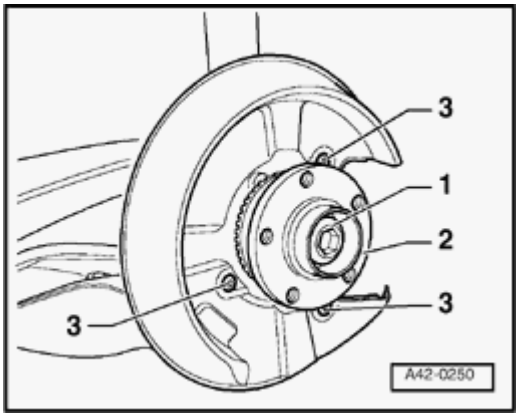

Fig. 289: Identifying Collar Bolt, Cover Plate & Wheel Bearing Unit
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove collar bolt - **1** -.
- Remove cover plate - **3** -.

Vehicles with front wheel drive

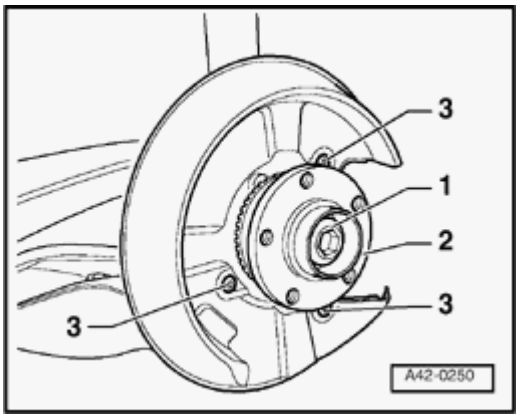

Fig. 290: Identifying Collar Bolt, Cover Plate & Wheel Bearing Unit
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove wheel bearing unit - **2** -.

NOTE:

- **If wheel bearing unit can be removed from stub axle carrier by hand, wheel bearing unit is OK and can be reinstalled.**

Continued for all vehicles

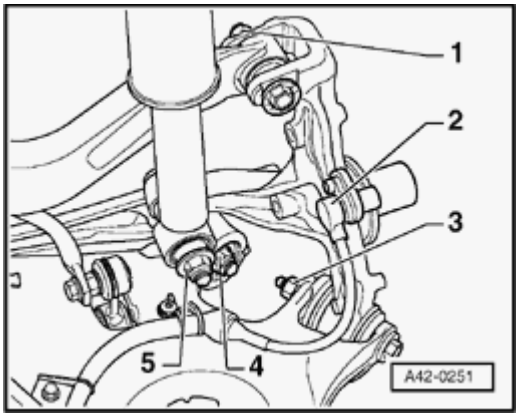

Fig. 291: Identifying Speed Sensor, Eccentric Screw Position & Connections
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove speed sensor - **2** -.
- Mark eccentric screw position - **1** - at top of stub axle carrier/wheel bearing housing, e.g. with a felt-tip pen.
- Separate connections listed in sequence: Item 5, item 3, item 4, item 1.
- Remove stub axle carrier or wheel bearing housing.

NOTE:

- **Carefully press drive axle off on all wheel drive vehicles.**

Installing

NOTE:

- **Replace bolts and self-locking nuts --> Notes in exploded view diagrams at --> Part I, Subframe - front wheel drive.**

Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at control arms if vehicle is in curb weight position --> **Wheel bearing, lifting to curb weight position**

Vehicles with front wheel drive

- Install new wheel bearing unit if necessary --> Note *If wheel bearing unit can be removed from stub axle carrier by hand, wheel bearing unit is OK and can be reinstalled.* under **Stub axle carrier/wheel bearing housing (steel), removing and installing**.

Continued for all vehicles

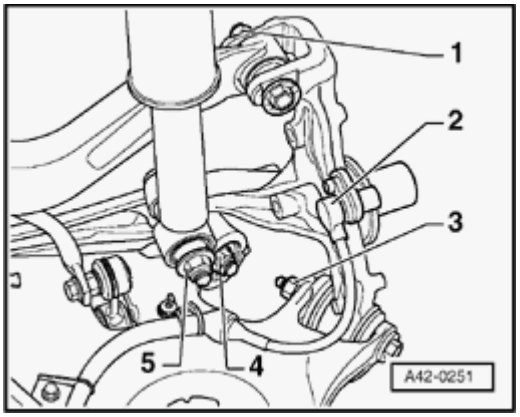

Fig. 292: Identifying Speed Sensor, Eccentric Screw Position & Connections
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten connections - **1** - , - **3** - , - **4** - and - **5** -.
- Secure speed sensor - **2** - , (front wheel drive) or , (all wheel drive).
- Install cover plate and brake caliper at stub axle carrier or wheel bearing housing. Refer to --> **46 - BRAKES - MECHANICAL COMPONENTS** ; Rear brakes C38; Brake caliper, servicing

Vehicles with all-wheel drive

- Tighten 5 wheel bolts and tighten parking brake.

Continued for all vehicles

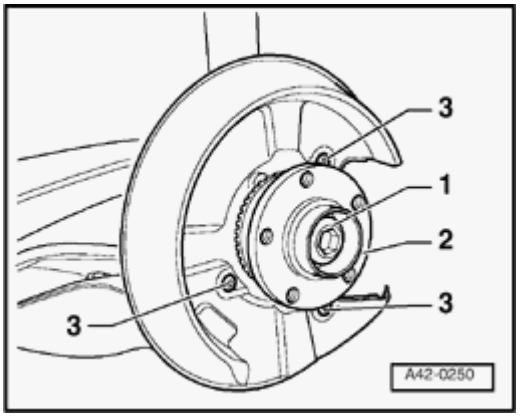

Fig. 293: Identifying Collar Bolt, Cover Plate & Wheel Bearing Unit
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- First tighten collar screw - **1** - only to pre-tightening torque without additional turning (turn additionally when vehicle is resting on wheels), (front wheel drive) or (all wheel drive).
- Install coil spring --> **Rear coil spring**.
- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

Torque specifications:

- Tighten collar bolt - **1** - **Fig. 293** , with prescribed additional turn , (front wheel drive) or (all wheel drive).

Vehicles with front wheel drive

- Remove tire.

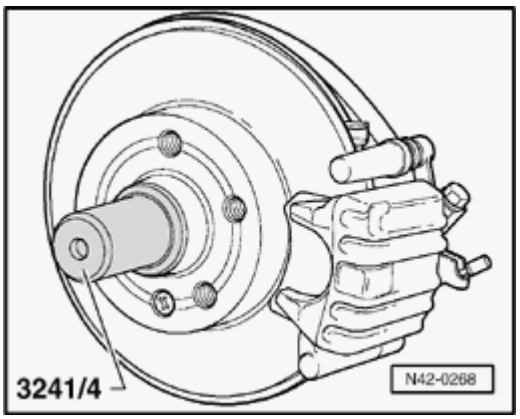

Fig. 294: Driving In Dust Cap
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drive on a new dust cap.
- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

NOTE:

- **Damaged (dented) protective caps must be replaced.**
- **Damaged (dented) protective caps allow moisture to enter. Always use tool illustrated to reduce chance of damage to dust cap.**

Continued for all vehicles

- Perform vehicle alignment --> **Wheel alignment**.

Alignment must take place on a VW/Audi recommended alignment stand.

Stub axle carrier - front wheel drive, servicing

Special tools, testers and auxiliary items required

- Thrust plate VW 402
- Punch VW 411
- Punch VW 412

- Sleeve VW 415 A
- Press piece VW 434
- Assembly tool VW 792
- Assembly tool 3301/4

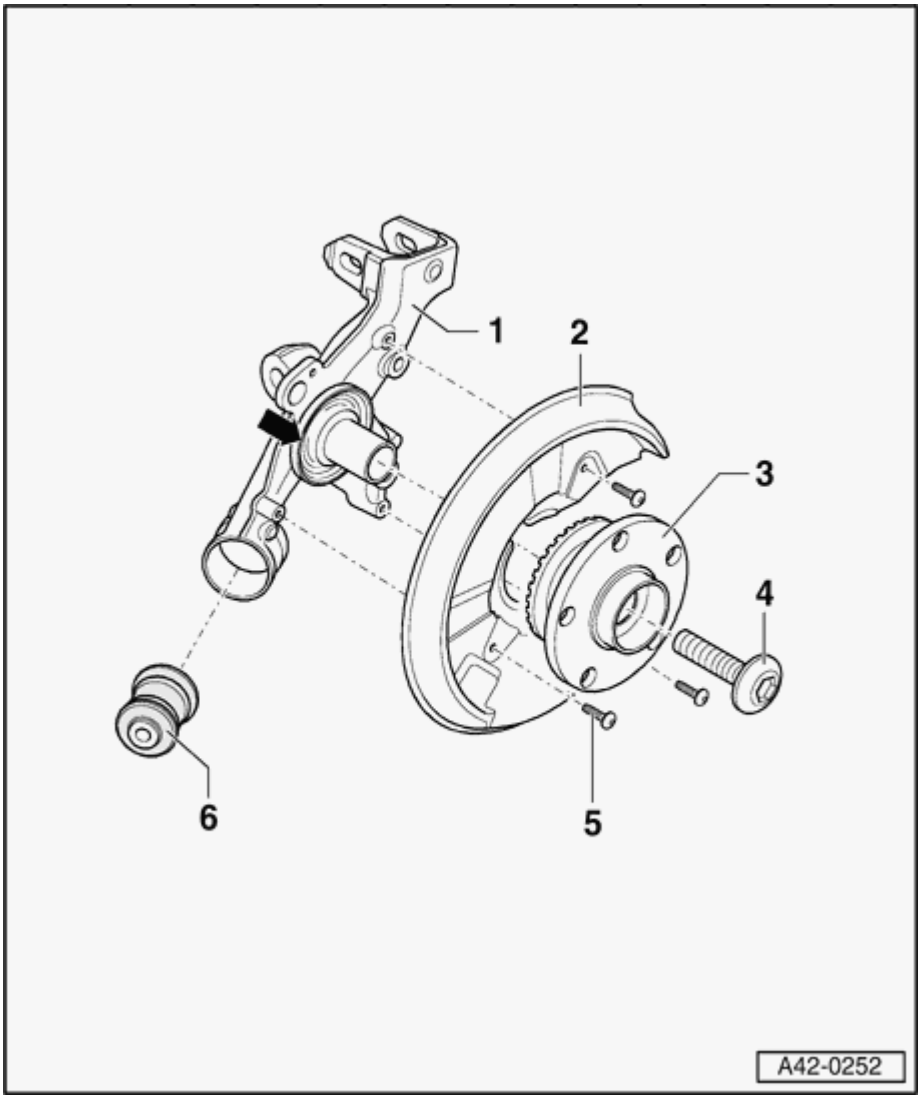

Fig. 295: Exploded View Of Stub Axle Carrier - Front Wheel Drive
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Stub axle carrier

- Removing and installing --> **Stub axle carrier/wheel bearing housing and wheel bearing unit**
- Front seal - **arrow** - must not grind against wheel bearing unit
- Do not remove front seal

2 - Shield plate

3 - Wheel bearing unit

- Does not need to be replaced
- If wheel bearing unit can be removed from stub axle carrier by hand, wheel bearing unit is OK and can be reinstalled.
- If it cannot be removed by hand, wheel bearing unit must be replaced.
- Replace only as a unit

4 - Collar bolt

- Always replace

5 - Torx bolt

- Torque specification --> **46 - BRAKES - MECHANICAL COMPONENTS**

6 - Rubber bushing

- Removing **Rubber bushing, removing**
- Installing **Rubber bushing, installing**

Rubber bushing, removing

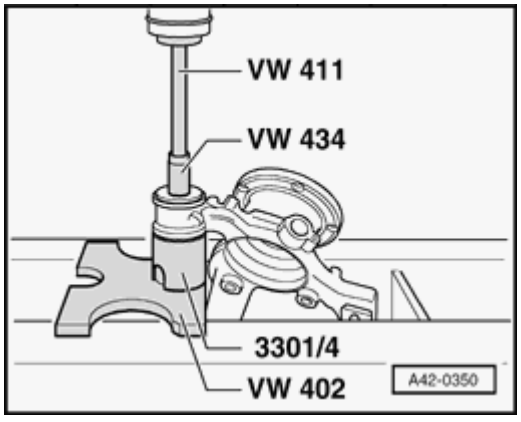

Fig. 296: Rubber Bushing, Removing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Continuously press out rubber bushing.

NOTE:

- **Securely hold stub axle carrier/wheel bearing housing when pressing out.**

Rubber bushing, installing

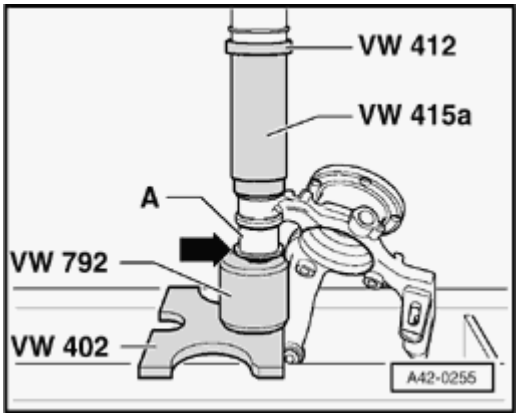

Fig. 297: Rubber Bushing, Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clean bearing seat in stub axle carrier/wheel bearing housing.
- Completely coat rubber bushing and stub axle carrier/wheel bearing housing bearing set using installation lubricant G 294 421 A1 (thin with water at a ratio of 1:100).
- Position rubber bushing - **A** - so that wide collar faces downward - **arrow** -.

- Continuously press rubber bushing into stub axle carrier or wheel bearing housing until rubber bushing collar rests on installation arbor VW 792 and is pressed (noticeable increase of pressure).

NOTE:

- **If pressing process is interrupted, rubber expands and bushing cannot be pressed in farther without damaging it.**
- **Securely hold stub axle carrier/wheel bearing housing when pressing on.**

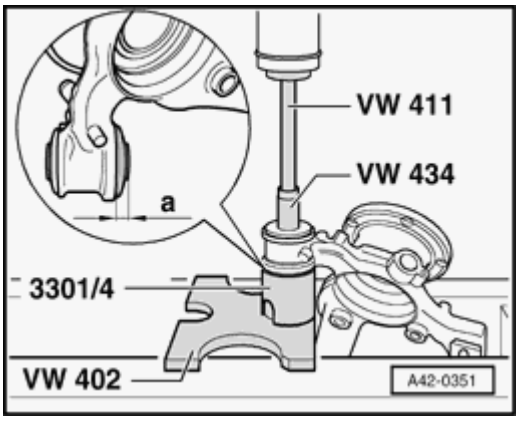

Fig. 298: Pressing Rubber Bushing Back Again Until Dimension
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press rubber bushing back again until dimension a = 10 ± 0.8 mm.

Wheel bearing housing (steel) - all wheel drive, servicing

Special tools, testers and auxiliary items required

- Thrust plate VW 401
- Punch VW 408 A
- Punch VW 412
- Sleeve VW 415 A

- Press piece 2050
- Thrust pad 3005
- Assembly tool 3253/1
- Press tool 3345

- Press tube 30-100

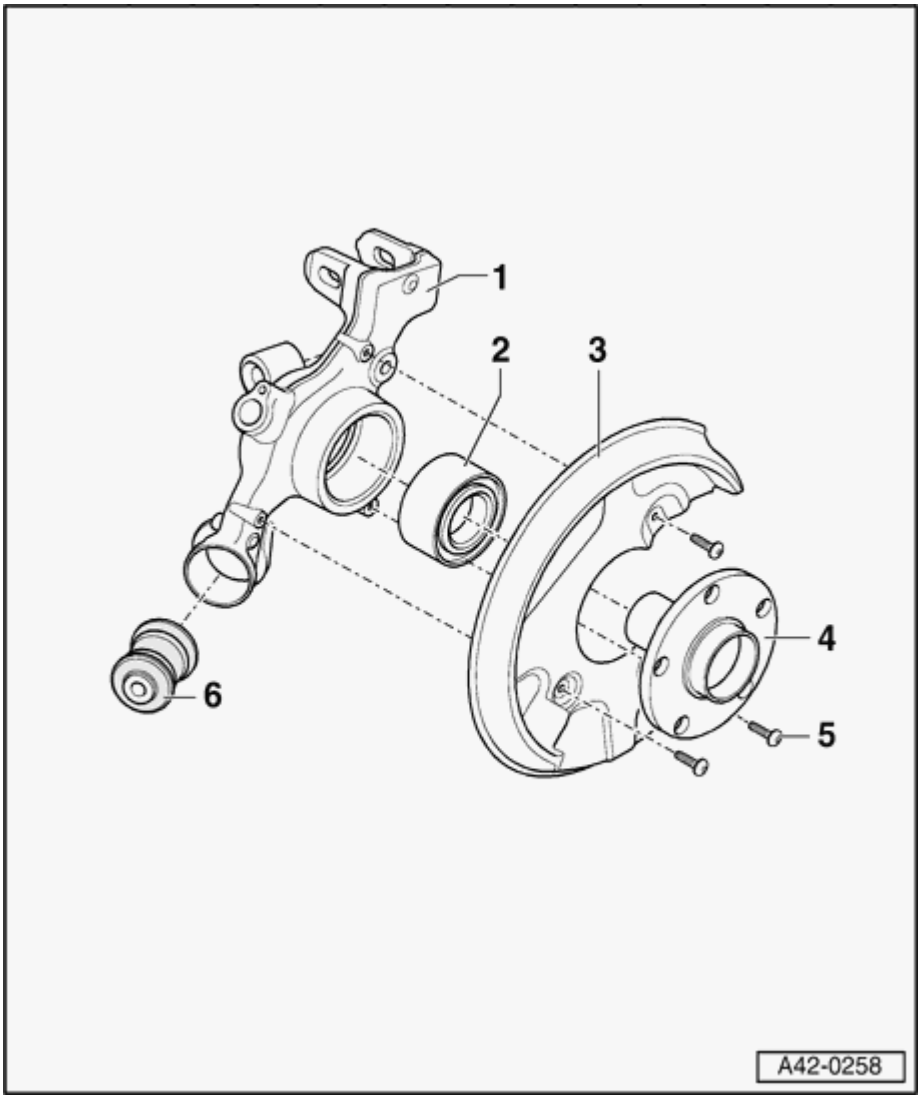

Fig. 299: Exploded View Of Wheel Bearing Housing (Steel) - All Wheel Drive

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Wheel bearing housing

- Removing and installing --> **Stub axle carrier/wheel bearing housing and wheel bearing unit**

2 - Wheel bearing

- Interior diameter in tiered version
- Installed location: Larger internal diameter of wheel bearing faces wheel hub
- Pressing out **Pressing wheel bearing out of wheel bearing housing**
- Pressing in **Pressing wheel bearing into wheel bearing housing**

3 - Shield plate

4 - Wheel hub

- Tiered version
- Pressing out **Wheel hub, removing**
- Pressing in **Pressing wheel hub into wheel bearing**
- Light weight wheel hub --> **Light weight wheel hub**

5 - Torx bolt

- Torque specification --> **46 - BRAKES - MECHANICAL COMPONENTS**

6 - Rubber bushing

- Removing **Rubber bushing, removing** ,
- Installing **Rubber bushing, installing** ,

Wheel hub, removing

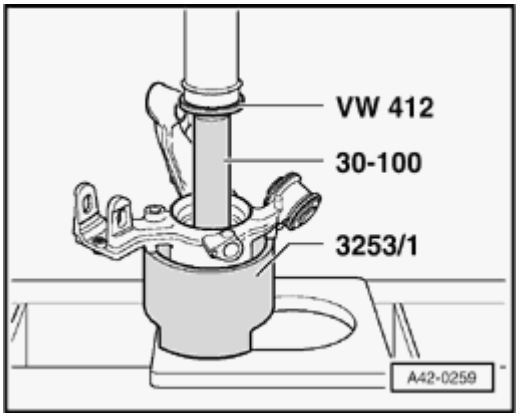

Fig. 300: Wheel Hub, Removing

Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- **Wheel bearing housing must rest on machined screw hole surface.**

Pressing wheel bearing out of wheel bearing housing

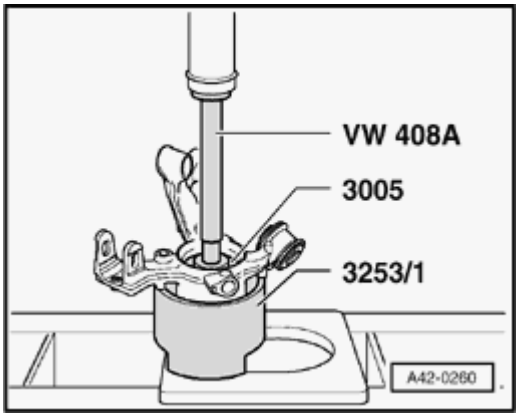

Fig. 301: Pressing Wheel Bearing Out Of Wheel Bearing Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- **Wheel bearing housing must rest on machined screw hole surface.**

Pressing wheel bearing into wheel bearing housing

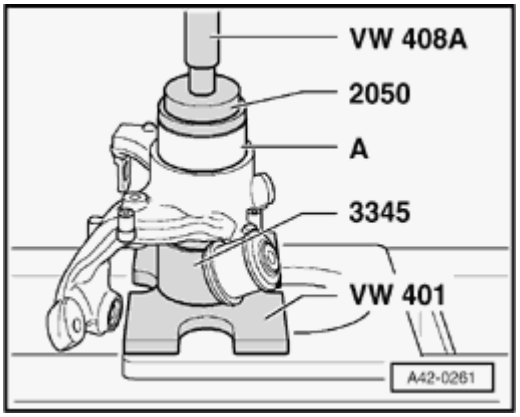

Fig. 302: Pressing Wheel Bearing Into Wheel Bearing Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Wheel bearing in tiered version

NOTE:

- **Large internal diameter of wheel bearing faces wheel hub**

- Press wheel bearing - **A** - on to stop.

Pressing wheel hub into wheel bearing

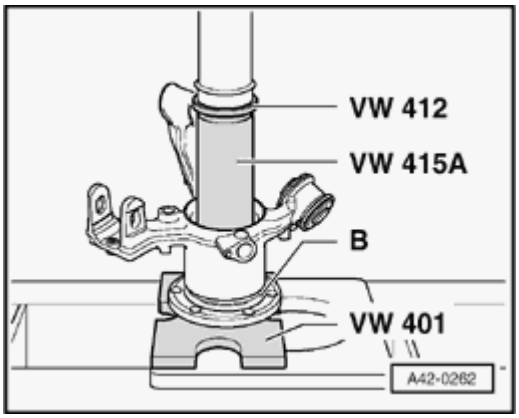

Fig. 303: Pressing Wheel Hub Into Wheel Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install wheel hub - **B** - and press on over wheel bearing inner race to stop.

NOTE:

- **Tube VW 415 A must press onto center of bearing inner race.**

Wheel bearing (with wheel bearing housing (steel) installed - all wheel drive), removing and installing

Special tools, testers and auxiliary items required

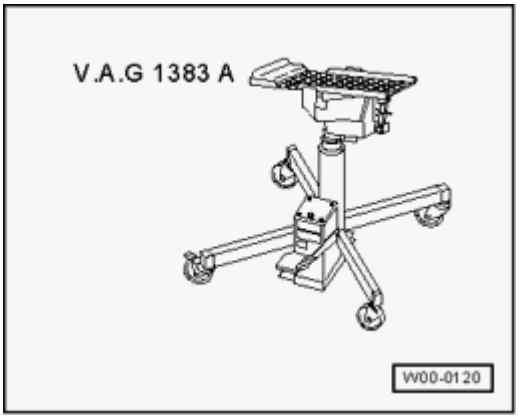

Fig. 304: Identifying Engine/Transmission Jack V.A.G. 1383 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Engine/transmission jack V.A.G 1383 A with universal transmission mount V.A.G 1359/2

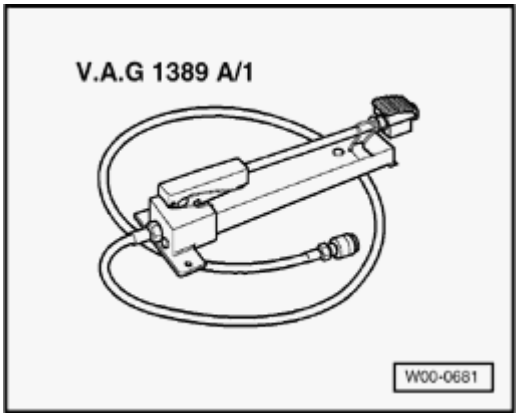

Fig. 305: Identifying Foot Pump With High Pressure Hose V.A.G 1389 A/1
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Foot pump with high pressure hose V.A.G 1389 A/1

If available in shop, hand pump V.A.G 1389/1 can also be modified for use as a foot pump.

To do so, use conversion kit V.A.G 1389/3.

Special tools, testers and auxiliary items required

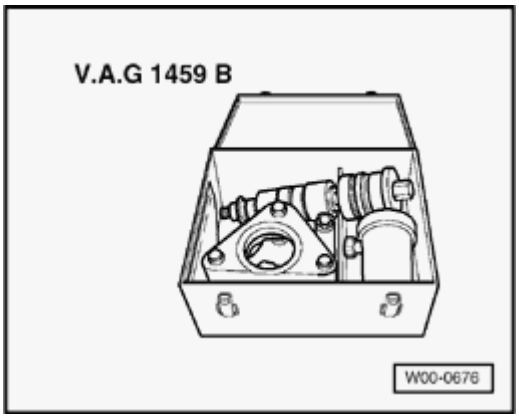

Fig. 306: Identifying wheel bearing V.A.G 1459 B
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Wheel bearing tool V.A.G 1459B
- Hollow piston cylinder HKZ-15 with hydraulic thrust piece E-0-204-T
- Tie bolt E-0-217+218
- Special nut E-8-214
- Press piece E-5

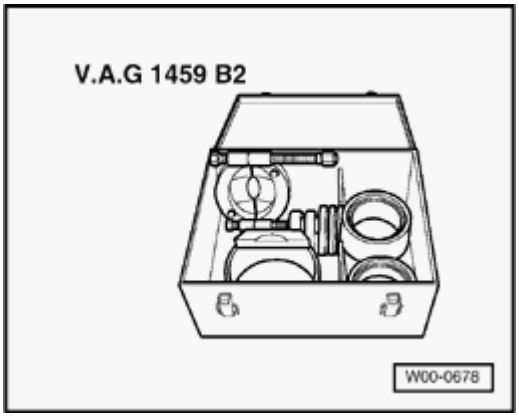

Fig. 307: Identifying Supplementary Set V.A.G 1459 B/2
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Supplementary set V.A.G 1459 B/2
- Bell E-40
- Press piece E-43
- Thrust sleeve E-44-1

- Remove brake caliper, brake disc and brake disc cover. --> **46 - BRAKES - MECHANICAL COMPONENTS**
- Remove drive axle --> **Drive axles, removing and Installing**.

Place engine/transmission jack V.A.G 1383 A underneath (danger of accident from falling parts when removing the wheel hub and the wheel bearing).

Wheel hub, pulling out

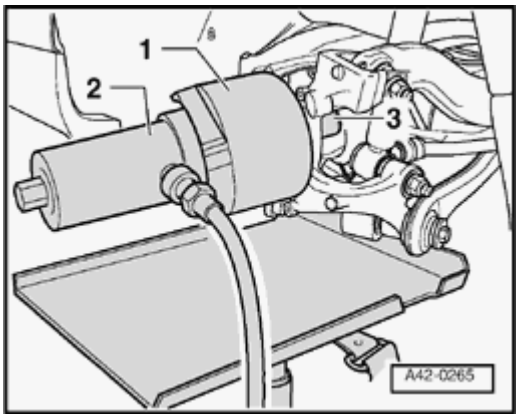

Fig. 308: Attaching Bell, Hollow Piston Cylinder With Tie Bolt And Special Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Attach bell - **1** - , hollow piston cylinder - **2** - with tie bolt, and special nut - **3** -.
- Remove wheel hub by operating pump while holding tool securely.

1 - Bell E-40

2 - Hollow piston cylinder HKZ-15

3 - Special nut E-8-214 and tie bolt

Wheel bearing, pulling out

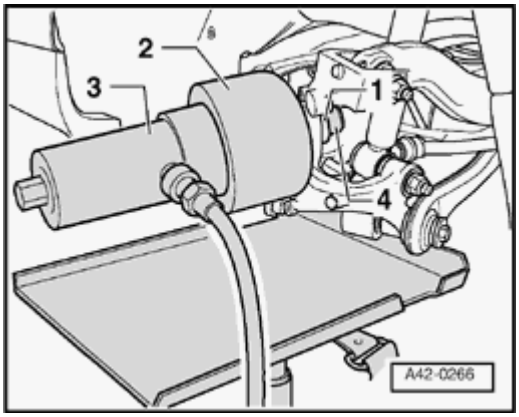

Fig. 309: Attaching Pressure Piece With Collar To Bearing, Pressure Sleeve With Four Tiered Interior Diameters To Wheel Bearing Housing, Hollow Piston Cylinder With Tie Bolt & Special Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Attach pressure piece - **1** - with collar to bearing, pressure sleeve - **2** - with four tiered interior diameters to wheel bearing housing, hollow piston cylinder - **3** - with tie bolt and special nut - **4** -.
- Operate pump and remove wheel bearing.

1 - Thrust piece E-5

2 - Thrust sleeve E-44-1

3 - Hollow piston cylinder HKZ-15

4 - Special nut E-8-214 and tie bolt

Wheel bearing, pressing in

Installed location: Larger internal diameter of wheel bearing faces outward.

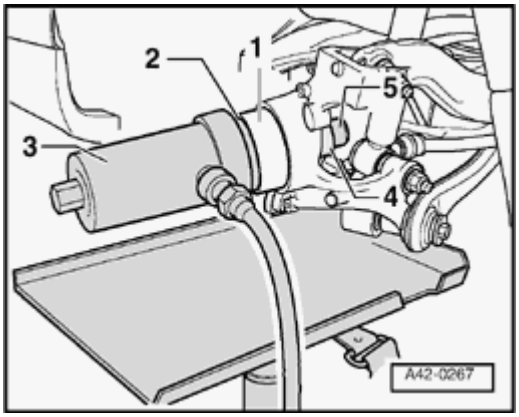

Fig. 310: Putting Wheel Bearing , Pressure Piece (Put Collar Into Bearing) And Hollow Piston Cylinder With Tie Bolt On Wheel Bearing Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Put wheel bearing - **1** - , pressure piece - **2** - (put collar into bearing), and hollow piston cylinder - **3** - with tie bolt on wheel bearing housing.
- Attach pressure piece - **4** - with angles toward wheel bearing housing and special nut - **5** - from inside.
- Press wheel bearing in by operating the pump.

1 - Wheel bearing

2 - Thrust piece E-14-1

3 - Hollow piston cylinder HKZ-15

4 - Thrust piece E-43

5 - Special nut E-8-214 and tie bolt

Wheel hub, pressing in

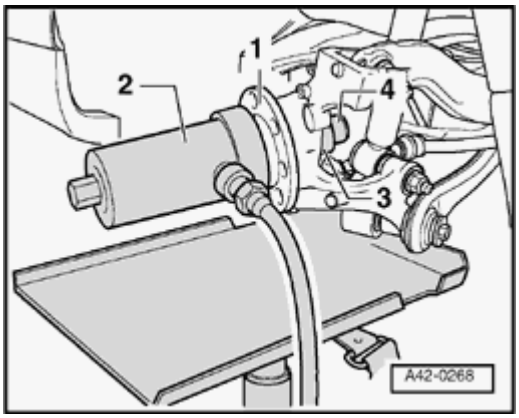

Fig. 311: Identifying Wheel Hub, Hollow Piston Cylinder, Pressure Piece & Special Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Put wheel hub - **1** - and hollow piston cylinder - **2** - with tie bolt onto wheel bearing.
- Attach pressure piece - **3** - with collar to special nut - **4** - from inside.
- Press in hub by operating the pump.

1 - Wheel hub

2 - Hollow piston cylinder HKZ-15

3 - Thrust piece E-5

4 - Special nut E-8-214 and tie bolt

Installation is in reverse order of removal.

- Install drive axle --> **Drive axles, removing and Installing**.
- Install brake caliper, brake disc and brake disc cover. --> **46 - BRAKES - MECHANICAL COMPONENTS**

Bolted wheel bearing unit, removing and installing

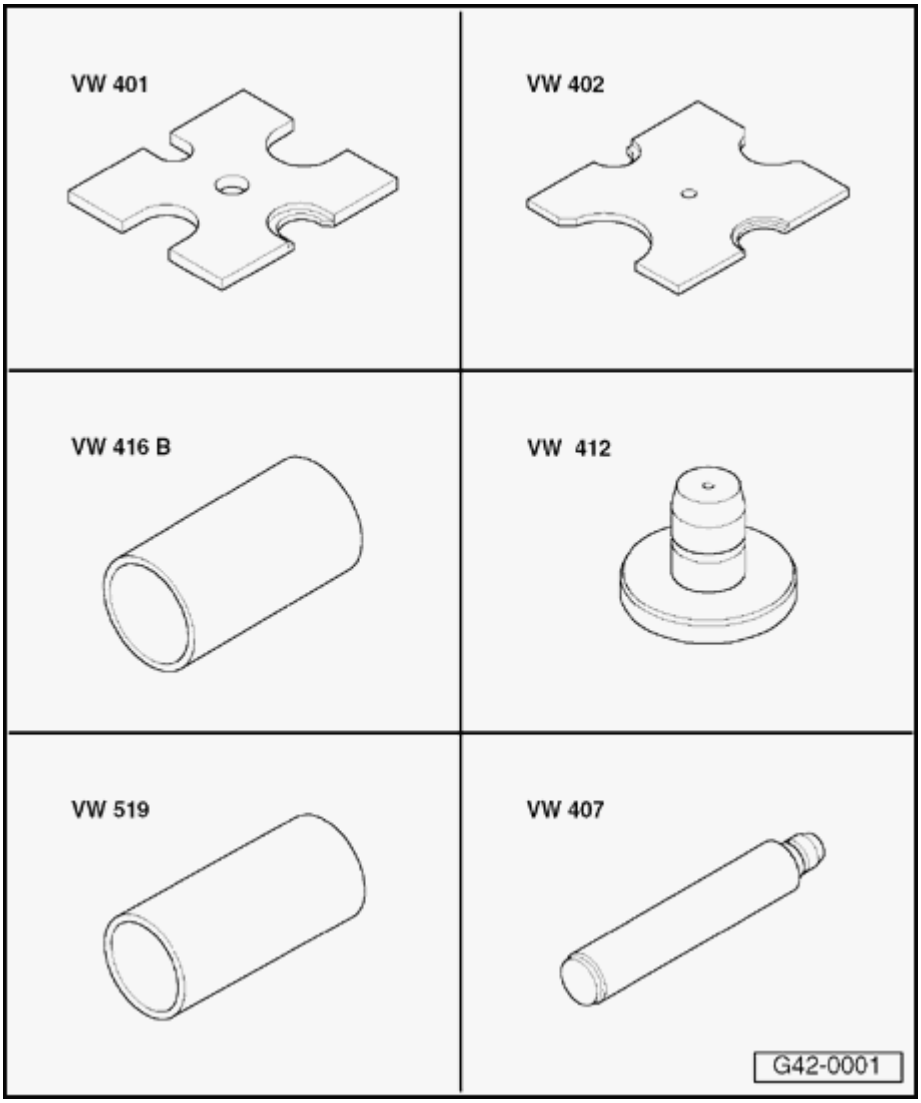

Fig. 312: Identifying Special Tools - Bolted Wheel Bearing Unit, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Thrust plate VW 401
- Thrust plate VW 402
- Sleeve VW 416 B
- Punch VW 412
- Punch VW 407
- Sleeve VW 519

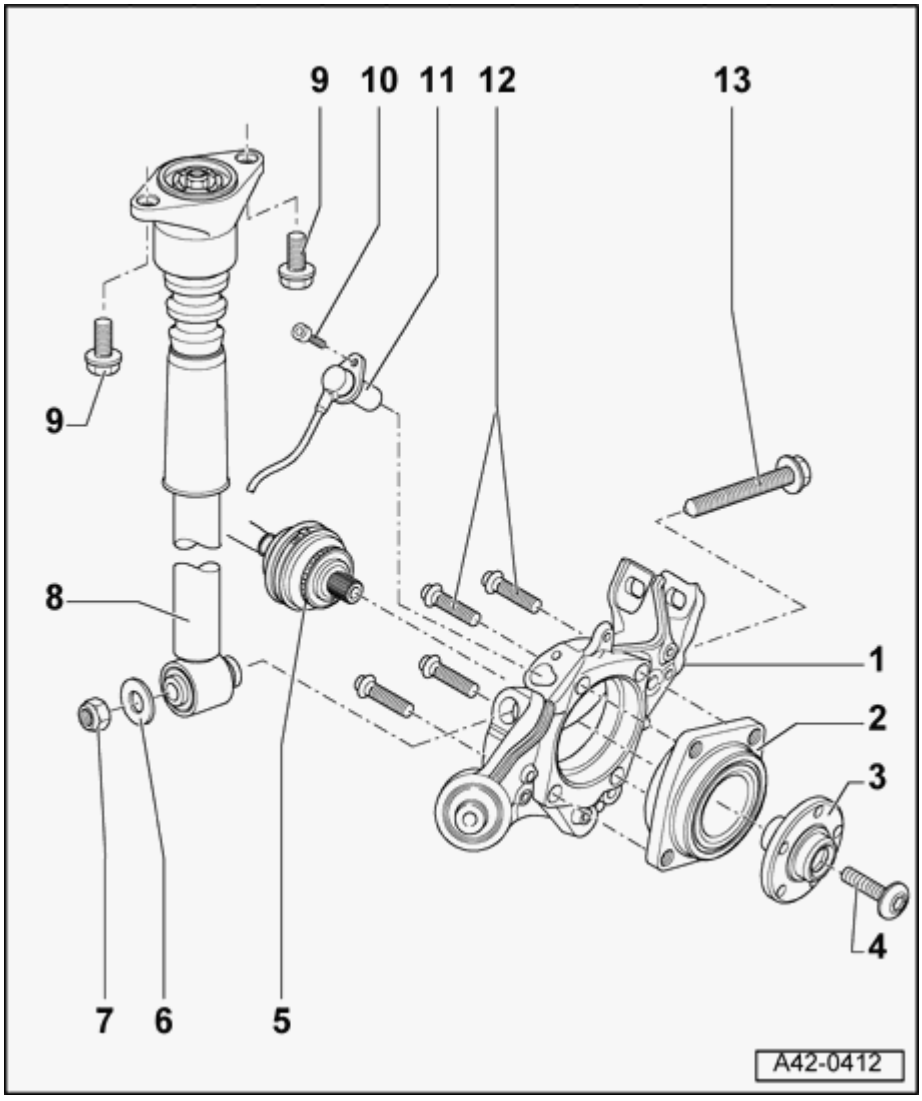

Fig. 313: Rear Axle Part VII, Wheel Bearing Housing (Aluminum) - All Wheel Drive
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Wheel bearing housing

- Wheel bearing housing, removing and installing --> **Wheel bearing housing (aluminum) - all wheel drive, removing and installing**

2 - Wheel bearing

3 - Wheel hub

- Removing and installing --> **Bolted wheel bearing unit, removing and installing**

4 - Collar screw

- Always replace
- Tighten to 200 Nm plus an additional 180° turn
- Tighten to 200 Nm, if vehicle is raised, only tighten with additional turn when vehicle is on floor
- If vehicle is resting on floor, do not loosen more than 90°

5 - Drive axle

- Removing and installing --> **Drive axles, removing and Installing**
- Servicing (with inner joint 100 mm dia.) --> **Drive axle with constant velocity inner joint (diameter 100 mm), servicing**
- Servicing (with inner joint 108 mm dia.) --> **Driveshaft with constant velocity inner joint (diameter 108 mm), servicing**

6 - Washer

7 - Nut, self-locking

- Always replace

8 - Strut

- Removing and installing --> **Strut**
- Observe installed location **Strut location**
- Note different vehicle versions, see vehicle data plate. **Clarification of Production Control numbers (PR No.)**
- Faulty struts must be vented and emptied before disposal --> **Strut, checking**
- Check removed strut --> **Strut, checking**

9 - Combi-bolt, 36 Nm

10 - Hex socket head bolt, 10 Nm

11 - Speed sensor

- Wire routing **Speed sensor wire routing on trapezoidal control arm** , **Speed sensor wire routing on trapezoidal control arm**

12 - Cap bolts (4x) 80 Nm plus an additional 90° turn

- Always replace

13 - Combi-bolt

- Always replace
- Tighten to 150 Nm plus an additional 90° turn
- Tighten bolt only in curb weight position

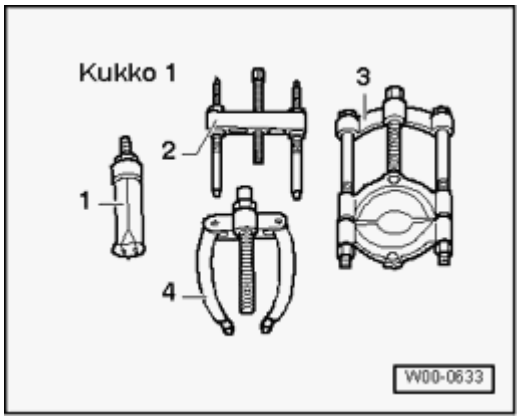

Fig. 314: Kukko 21/2 Internal puller, Kukko 21/4 Internal puller, Kukko 22/2 Counter support
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Puller 3- Kukko 15-17

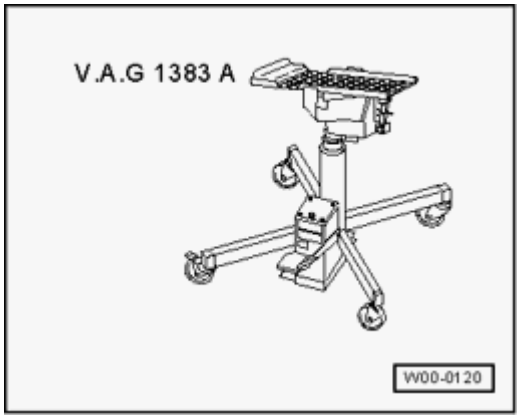

Fig. 315: Identifying Engine/Transmission Jack V.A.G. 1383 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Engine/transmission jack V.A.G 1383 A

Removing

- Drive axle, removing and installing --> **Drive axles, removing and Installing**

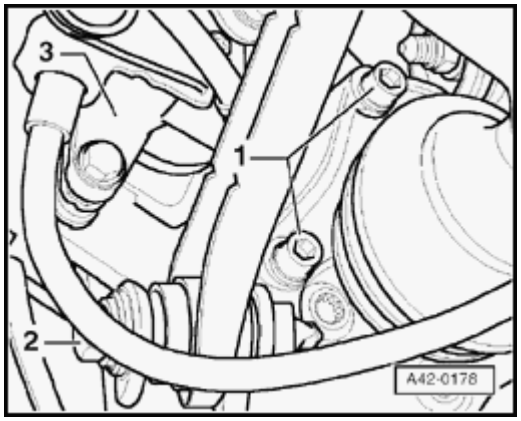

Fig. 316: Removing Securing Bolts From Brake Caliper
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove mounting bolts - **1** - from brake caliper.
- Remove brake caliper and hang up on body.
- Remove disc brake.

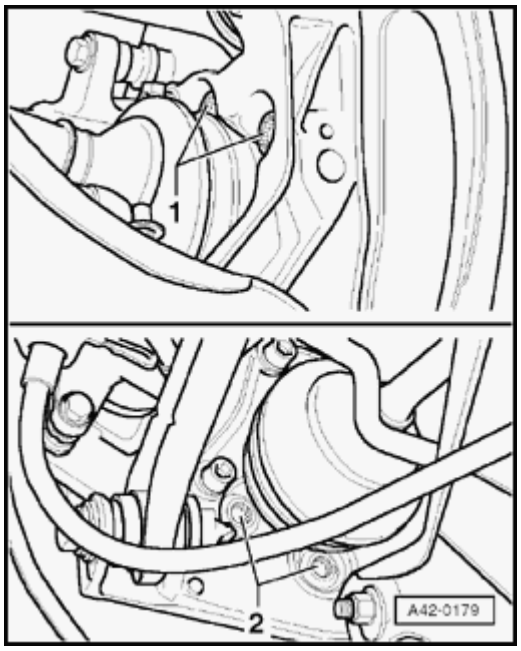

Fig. 317: Removing Multi-Point Key Head Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove cap bolts - **1** - and - **2** -

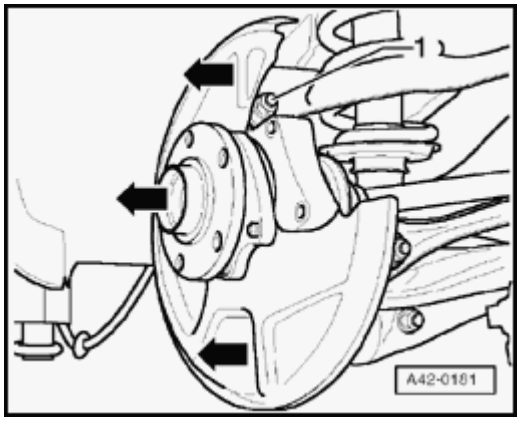

Fig. 318: Pulling Wheel Bearing Unit Outward
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull wheel bearing unit outward.

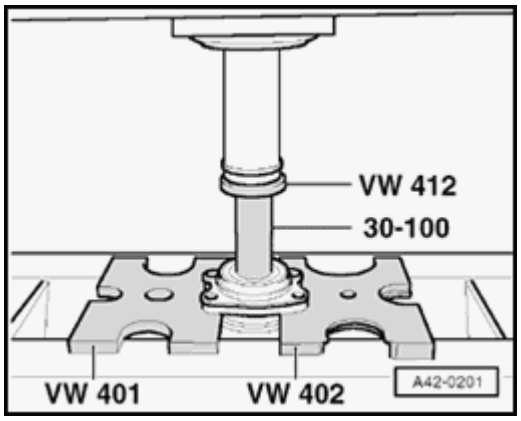

Fig. 319: Pressing Wheel Hub Out Of 82 Mm Diameter Wheel Bearing Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing wheel hub out of 82 mm diameter wheel bearing housing

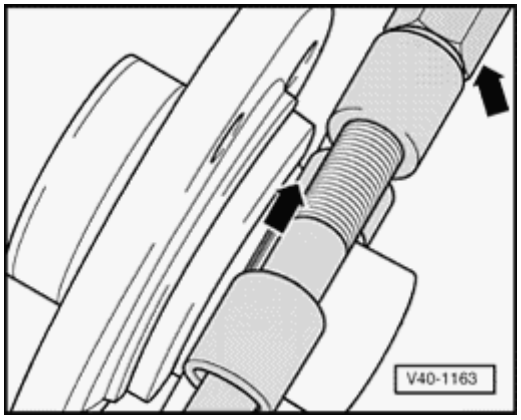

Fig. 320: Installing Separating Device In Notch Between Inner Bearing Ring, Hub And Pretension
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Press bearing inner race from hub.

- Insert separator into of bearing inner race ring groove - **arrow** - , and pre-tension with spindle.

NOTE:

- **Use commercially available separating device e.g. Kukko 15-17.**

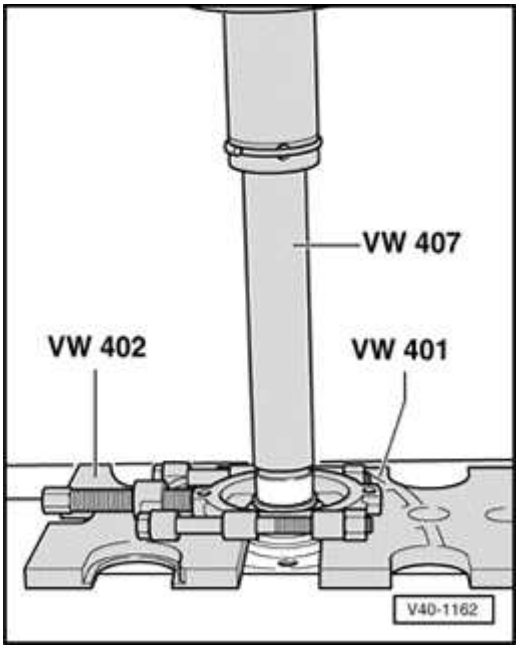

Fig. 321: Pressing Bearing Inner Race From Hub
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press bearing inner race off from wheel hub.

With light weight wheel hubs, slide washer must be replaced. --> **Slide washer, removing and installing**

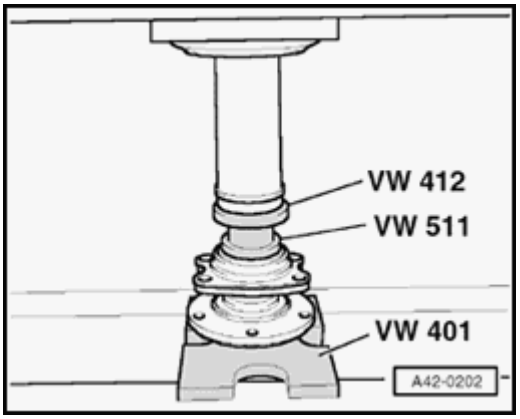

Fig. 322: Pressing Wheel Hub Into 82 mm Diameter Wheel Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing wheel hub into 82 mm diameter wheel bearing

- When pressing on, thrust piece VW 511 must bear only against inner race.

Installing

Installation is in reverse order of removal.

Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at control arms if vehicle is in curb weight position --> **Wheel bearing, lifting to curb weight position**

- Drive axle, removing and installing --> **Drive axles, removing and Installing**

Torque specifications:	
Drive axle to wheel hub M14, use new bolt!	115 Nm plus an additional $^{1}/_{2}$ turn (180°)
Drive axle to wheel hub M16, use new bolt!	200 Nm plus an additional $^{1}/_{2}$ turn (180°)
Drive axle to flange shaft M8	40 Nm
Drive axle to flange shaft M10	70 Nm
Brake caliper to stub axle carrier	70 Nm plus an additional $^{1}/_{4}$ turn (90°)
Wheel bearing unit to stub axle carrier	80 Nm plus an additional $^{1}/_{4}$ turn (90°)

Wheel bearing housing (aluminum) - all wheel drive, removing and installing

Removing

- Remove drive axle hex socket head bolt --> **Rear drive axle, servicing**.
- Remove wheels.

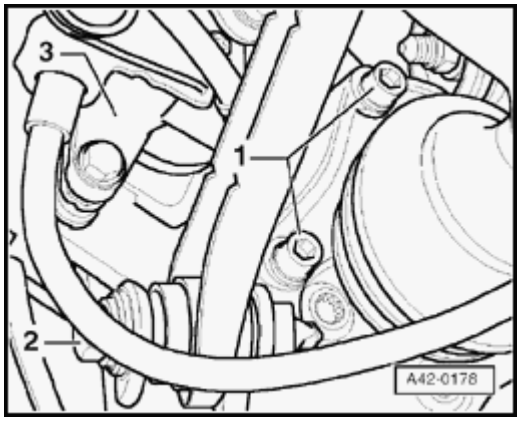

Fig. 323: Removing Securing Bolts From Brake Caliper
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove mounting bolts - **1** - from brake caliper.
- Remove brake caliper and hang up on body.

- Remove disc brake.

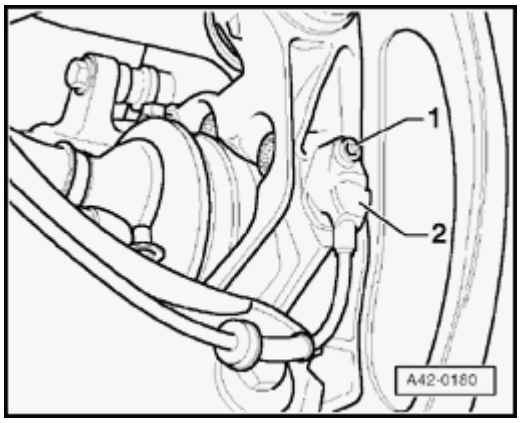

Fig. 324: Identifying Socket Head Bolt & ABS Vehicle Speed Sensor
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove hex socket head bolt - **1** -.
- Remove ABS wheel speed sensor - **2** - from wheel bearing housing.

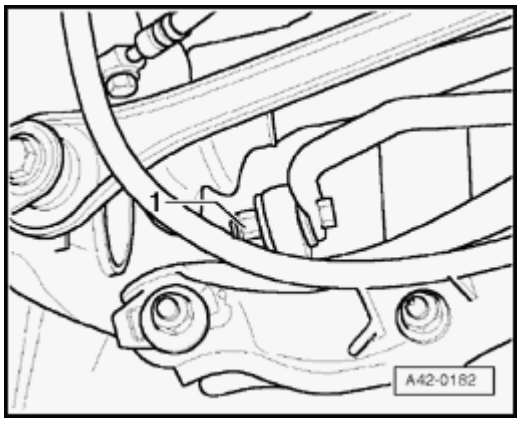

Fig. 325: Removing Connecting Link From Stabilizer Bar
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - **1** - for coupling rod.

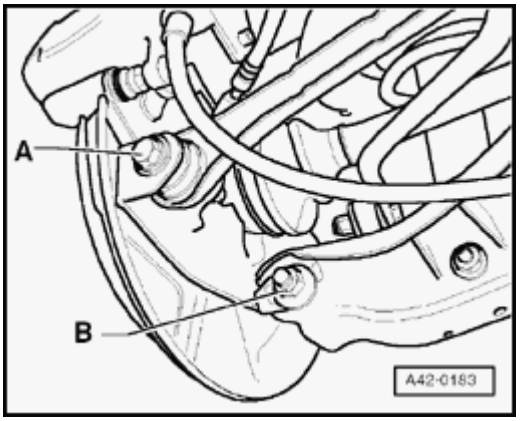

Fig. 326: Removing Bolts For Tie Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - **A** - for tie rod.
- Mark installation position of eccentric washer for bolt - **B** -.
- Remove bolt - **B** -.

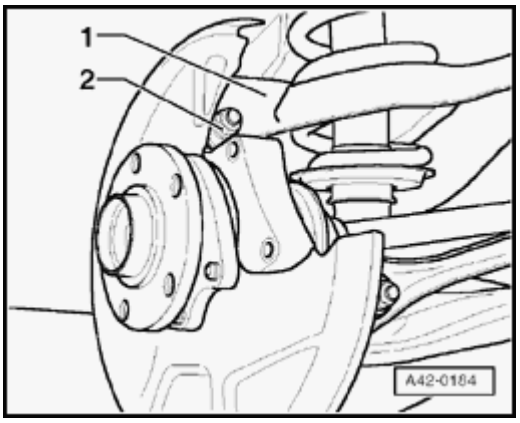

Fig. 327: Removing Bolt For Control Arm
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - **2** - for transverse link - **1** -.
- Pull wheel bearing housing off drive axle.

Installing

Installation is in reverse order of removal.

Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at links if vehicle is in curb weight position --> **Wheel bearing, lifting to curb weight position**

Otherwise rubber mounting will be stressed, resulting in a reduced service life.

- Drive axle, removing and installing --> **Drive axles, removing and Installing**

- Perform vehicle alignment --> **Wheel alignment**.

Alignment must take place on a VW/Audi recommended alignment stand.

LIGHT WEIGHT WHEEL HUB

Characteristics

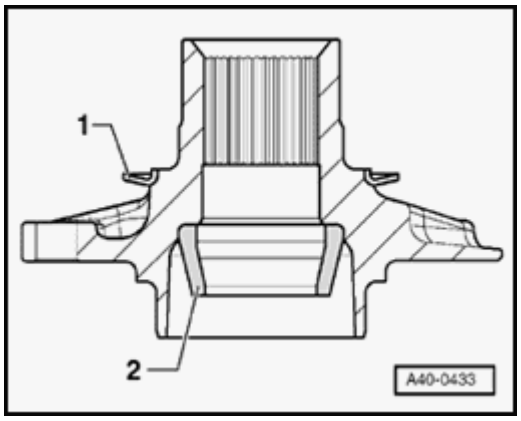

Fig. 328: Identifying Conventional Wheel Hub & Slide Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

The light weight wheel hub is different from the conventional wheel hub - **1** - due to the slide washer - **2** - and sleeve.

The light weight wheel hub must only be used in conjunction with the corresponding wheel bearing.

Slide washer - **1** - should be replaced if deformed or damage during wheel bearing removal.

Slide washer, removing and installing

Special tools, testers and auxiliary items required

- Assembly tool T40089/1

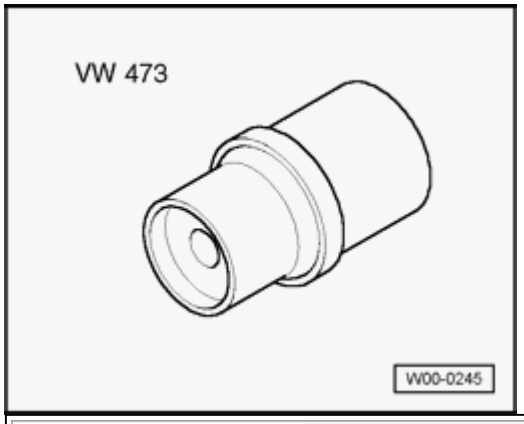

Fig. 329: Press Piece VW 473
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press piece VW 473

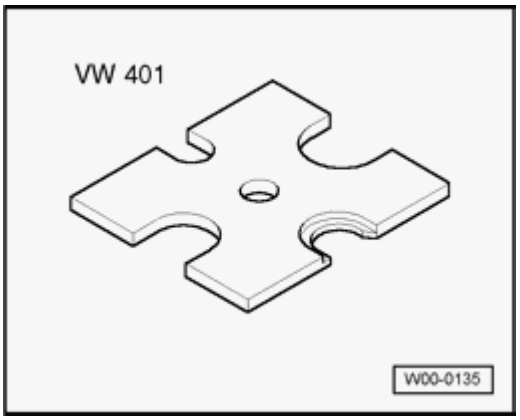

Fig. 330: Thrust Plate VW 401
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Thrust plate VW 401

Slide washer, replacing

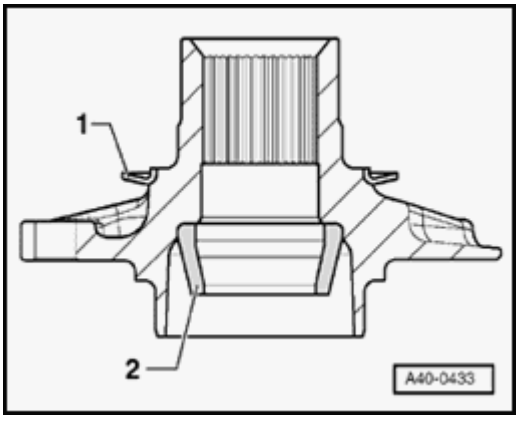

Fig. 331: Identifying Conventional Wheel Hub & Slide Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully pry off slide washer - **1** - , e.g. with a screwdriver.
- Position slide washer on wheel hub.

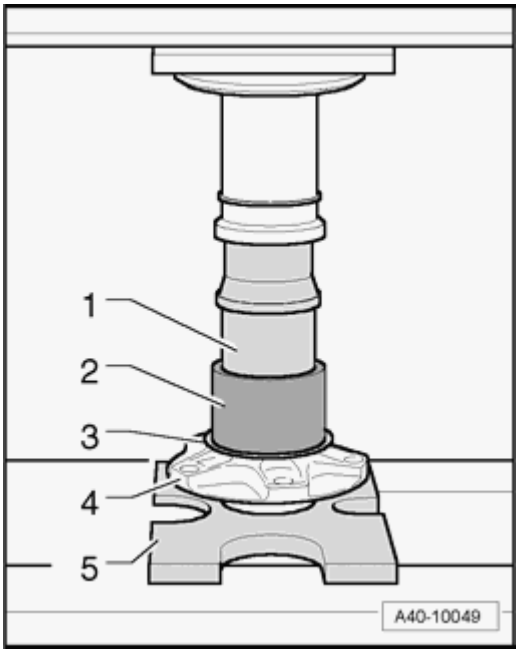

Fig. 332: Installing Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install special tools as shown in illustration.

1. Press piece VW 473
2. Assembly tool T40089/1
3. Slide washer
4. Wheel hub
5. Thrust plate VW 401

- Press slide washer off using assembly tool T40089/1 as shown in illustration up to wheel bearing hub radius.

NOTE:

- **Slide washer must be pressed on up to wheel bearing hub radius.**

TRANSVERSE LINK

Transverse link, removing and installing

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332

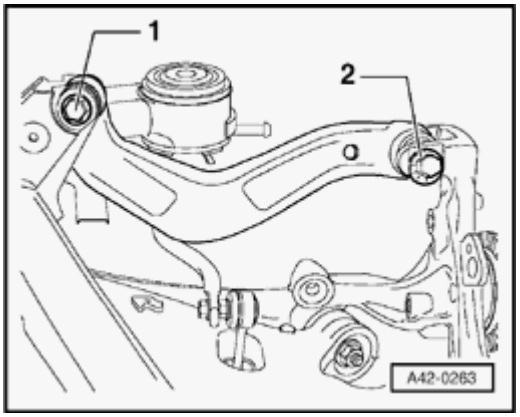

Fig. 333: Identifying Inner Bolt & Eccentric Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- **Because of poor accessibility to inner bolt - 1 - when vehicle is resting on wheels, transverse link can only be removed when subframe is removed.**
- **Align vehicle after repair --> Wheel alignment.**

Removing

- Remove subframe --> **Subframe, removing and installing**.
- Mark eccentric bolt - **2** - to stub axle carrier/wheel bearing housing, e.g. with a felt-tip pen.
- Separate connections - **1** - and - **2** -.

Installing

NOTE:

- **Replace bolts and self-locking nuts --> Notes in exploded view diagrams at --> Part I, Subframe - front wheel drive.**
- **Do not interchange right and left parts. "R" or "L" is marked on back of transverse link.**

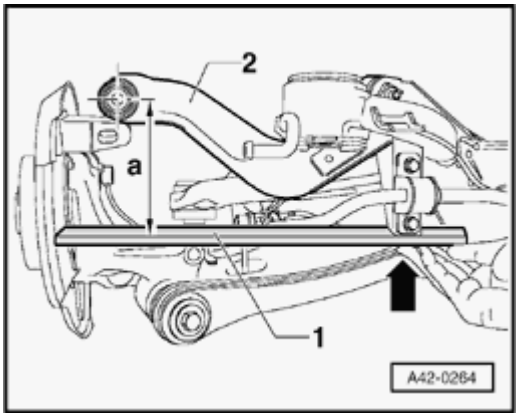

Fig. 334: Location Of Transverse Link To Subframe

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Location of transverse link to subframe

- Loosely bolt transverse link - **2** - to subframe.
- Lay a ruler or straight edge - **1** - flat against stabilizer bar mounting bracket - **arrow** -.
- Position transverse link so that dimension a = 142 ± 1 mm.
- Fasten transverse link to subframe in this position.

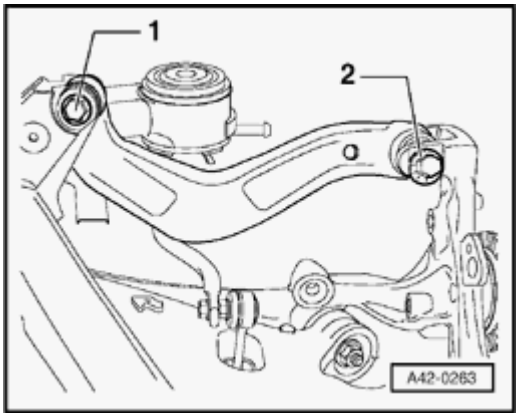

Fig. 335: Identifying Inner Bolt & Eccentric Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Attach stub axle carrier or wheel bearing housing to transverse link and tighten new nuts to 20 Nm. Note location of eccentric bolt - **2** -.
- Install subframe --> **Subframe, removing and installing**.
- Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at links if vehicle is in curb weight position --> **Wheel bearing, lifting to curb weight position**
- Loosen connection - **2** - and retighten.
- Perform vehicle alignment --> **Wheel alignment**.

Alignment must take place on a VW/Audi recommended alignment stand.

Transverse link bracket, replacing

Special tools, testers and auxiliary items required

- Thrust plate VW 401
- Punch VW 412
- Sleeve 2040
- Impact sleeve 41 - 501

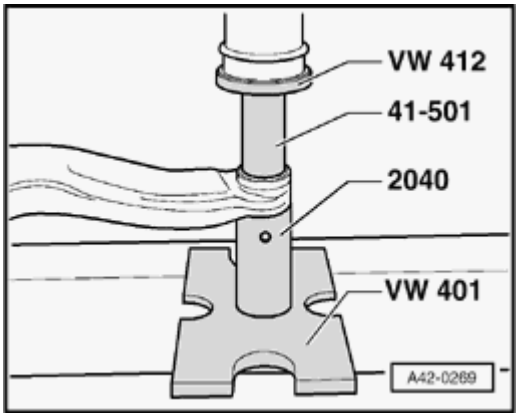

Fig. 336: Removing Bonded Rubber Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing bonded rubber bushing

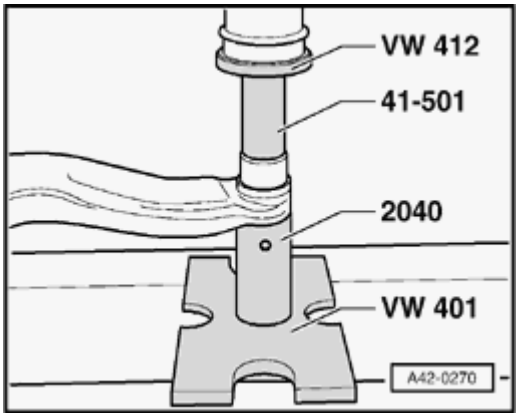

Fig. 337: Installing Bonded Rubber Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installing bonded rubber bushing

- Press bracket on until ends project evenly on both sides.

Nut for securing transverse link to subframe, replacing

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1332

NOTE:

- **Replace nut for securing transverse link to subframe if damaged.**

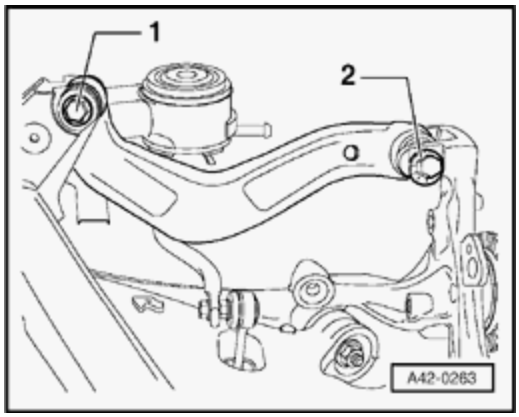

Fig. 338: Identifying Inner Bolt & Eccentric Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **Because of poor accessibility to inner bolt - 1 - when vehicle is resting on wheels, transverse link can only be removed when subframe is removed.**
- **Align vehicle after repair --> Wheel alignment.**

Removing

- Remove subframe --> **Subframe, removing and installing**.
- Separate connection - **1** -.
- Swing transverse link upward out of subframe console.

NOTE:

- **When installing cylinder bolt, ensure transverse link is not damaged.**

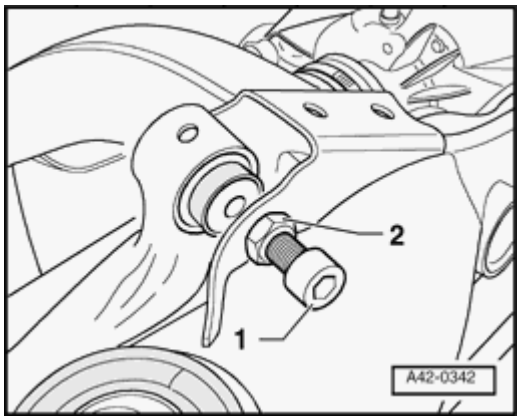

Fig. 339: Install Cylinder Bolt & Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install, for example, a cylinder bolt with hex socket head M12x1.5 x 20 (ET No. N902 268 01) - **1** - in nut - **2** - up to stop.

As an emergency solution, you can also use hex head bolt M12.1.5 x 20.

- Turn cylinder screw more until damaged nut unscrews from subframe console.

Installing

NOTE:

- **Replace bolts and self-locking nuts --> Notes in exploded view diagrams at --> Part I, Subframe - front wheel drive.**

- Insert transverse link in subframe console.

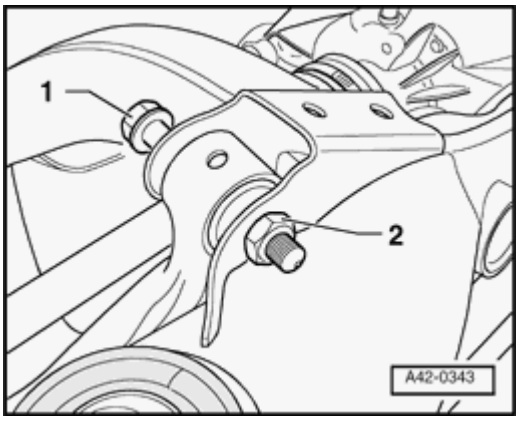

Fig. 340: Inserting Replacement Nut In Subframe Console Using New Combi-Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert replacement nut - **2** - in subframe console using new combi-bolt - **1** -.
- Tighten combi-bolt - **1** -.
- Install subframe --> **Subframe, removing and installing**.
- Perform vehicle alignment --> **Wheel alignment**.

Alignment must take place on a VW/Audi recommended alignment stand.

TRAPEZOIDAL CONTROL ARM

General information

- Modified trapezoidal links are installed in Audi A4 with front or all wheel drive.
- A mixed installation between old and new trapezoidal control arms in a vehicle is not permitted.

Old trapezoidal control arm version:

8E0 505 311 S
8E0 505,312 S

New trapezoidal control arm version:

8E0 505 311 S/8E0 505 312 S	Also identified with yellow dot (dia. approx. 15 mm)
8E0 505 311 T	
8E0 505 312 T	

NOTE:

- **Measure vehicle after repair --> Wheel alignment.**

Trapezoidal control arm, removing and installing

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332

Removing

- Remove underbody trim in front of trapezoidal control arm.

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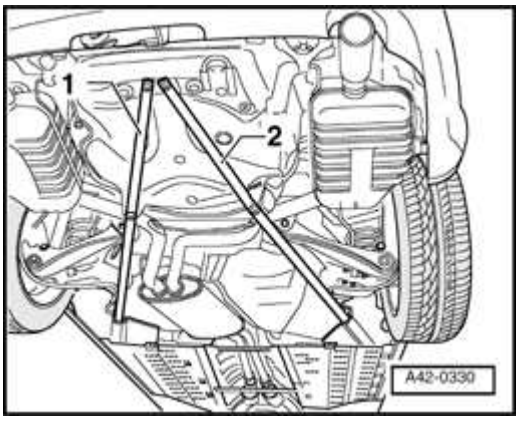

Fig. 341: Identifying Diagonal Braces
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove diagonal braces - **1** - and - **2** - --> **Diagonal braces**.

Continued for all vehicles

- Remove coil spring --> **Rear coil spring**.

Vehicles with heavy duty suspension

- Remove stone protection from trapezoidal control arm.

Continued for all vehicles

- Disengage parking brake cable from bracket under trapezoidal control arm. Loosen bolts to do this.

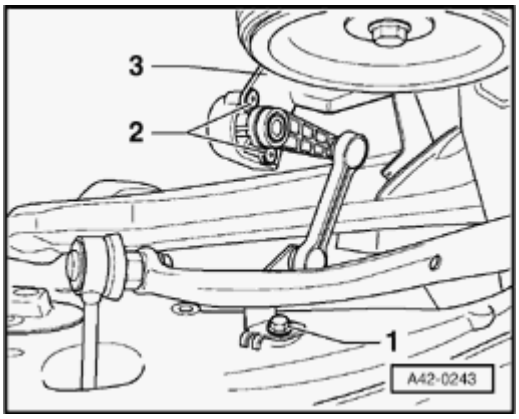

Fig. 342: Removing/Installing Bolts With Angled Wrench
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - **1** - on vehicles with headlight range control.

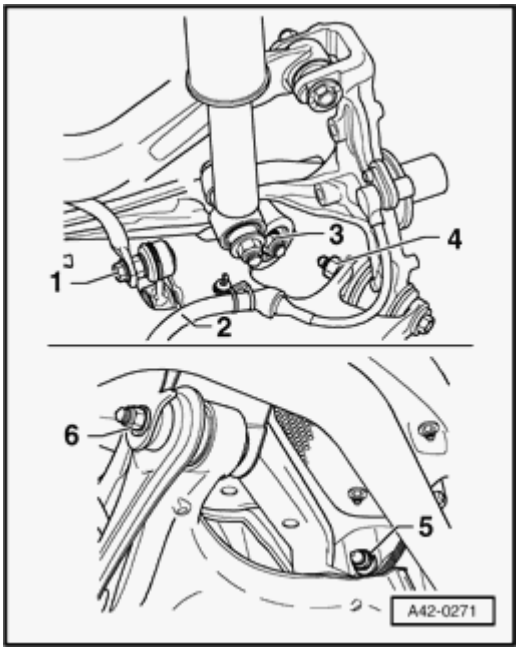

Fig. 343: Identifying Speed Sensor Cable Guide, Bolts & Trapezoidal Control Arm
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove speed sensor cable guide - **2** - **Speed sensor wire routing on trapezoidal control arm**
- Remove bolt - **1** -. Counterhold joint with open-end wrench.
- Mark eccentric bolt - **5** - to subframe.
- Loosen trapezoidal control arm (items 3 to 6).

NOTE:

- **On vehicle with all wheel drive and with right trapezoidal control arm on**

vehicles with front wheel drive, subframe should be lowered slightly before removing bolts.

Vehicles with all-wheel drive

- Remove drive shaft from rear final drive. --> **39 - FINAL DRIVE, DIFFERENTIAL**
- Secure drive shaft to body with wire.
- Remove strut from wheel bearing housing.
- Disengage parking brake cable at fuel tank.
- Remove brake caliper. --> **46 - BRAKES - MECHANICAL COMPONENTS**
- Remove right drive axle cover (remove right trapezoidal control arm).
- Lower subframe slightly --> **Subframe, removing and installing**.

Vehicles with front wheel drive, removing left trapezoidal control arm

- Remove heat shield from body eccentric bolt and press to side.

Vehicles with front wheel drive, removing right trapezoidal control arm

- Remove strut from wheel bearing housing.
- Remove brake caliper. --> **46 - BRAKES - MECHANICAL COMPONENTS**
- Lower subframe slightly --> **Subframe, removing and installing**.

Continued for all vehicles

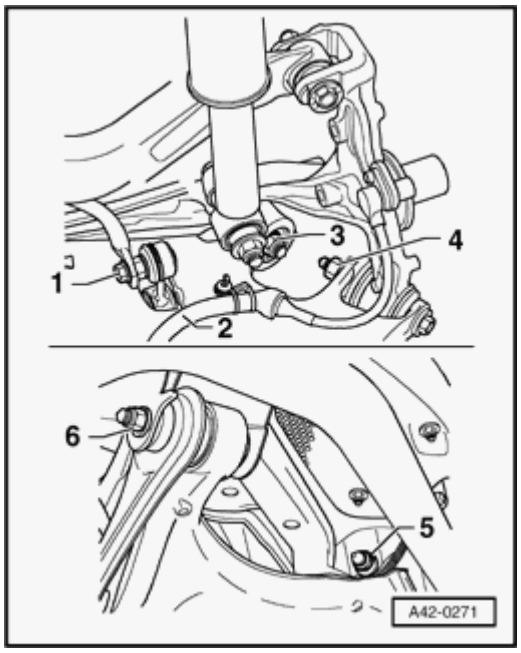

Fig. 344: Identifying Speed Sensor Cable Guide, Bolts & Trapezoidal Control Arm

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove trapezoidal control arm (items 3 to 6).

NOTE:

- **When doing so, ensure subframe is held securely.**

Installing

Replace bolts and self-locking nuts --> Notes in exploded view diagrams at --> **Part I, Subframe - front wheel drive**.

- Install subframe --> **Subframe, removing and installing**.
- Install strut --> **Strut**.
- Install brake caliper. --> **46 - BRAKES - MECHANICAL COMPONENTS**
- Install drive shaft to rear final drive. -->**39 - FINAL DRIVE, DIFFERENTIAL**
- Install driveshaft shield.

Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at links if vehicle is in curb weight position --> **Wheel bearing, lifting to curb weight position**

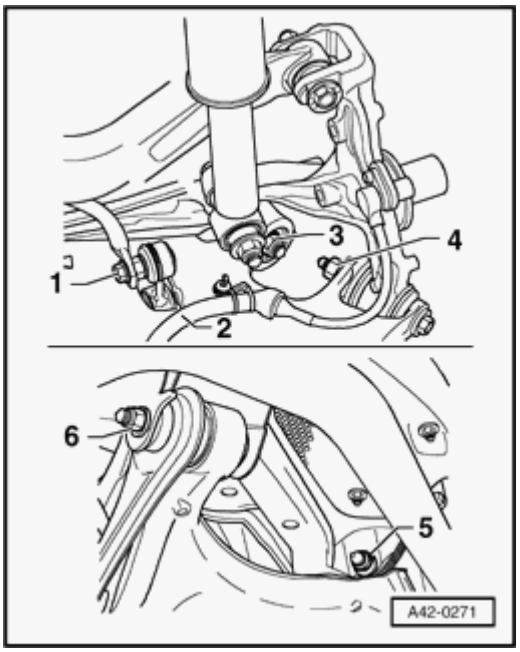

Fig. 345: Identifying Speed Sensor Cable Guide, Bolts & Trapezoidal Control Arm
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten threaded connections - **3** - , - **4** - and - **6** - --> **Part III, Trapezoidal control arm, transverse link, tie rod**.
- Tighten nut - **5** - (bring eccentric bolt into previous position).

- Install speed sensor cable guide - **2** - **Speed sensor wire routing on trapezoidal control arm**
- Tighten bolt - **1** -.

- Install coil spring --> **Rear coil spring**.
- Engage parking brake cable in bracket.

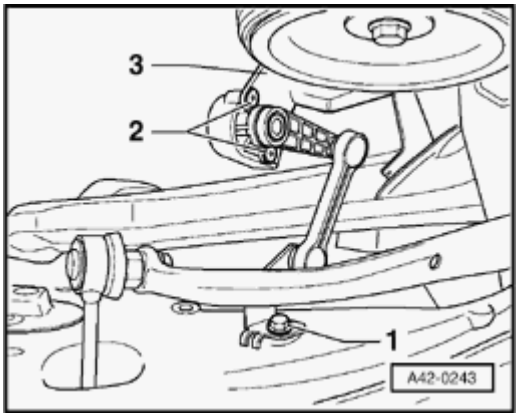

Fig. 346: Removing/Installing Bolts With Angled Wrench
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten bolt - **1** - on vehicles with headlight range control :
- Perform vehicle alignment --> **Wheel alignment**.

Alignment must take place on a VW/Audi recommended alignment stand.

Vehicles with heavy duty suspension

- Install stone protection and tighten bolts.

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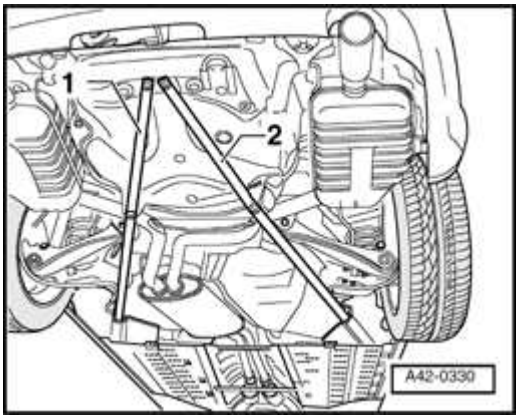

Fig. 347: Identifying Diagonal Braces
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install diagonal braces - **1** - and - **2** - --> **Diagonal braces**.

Continued for all vehicles

- Install underbody trim.

REAR SUBFRAME

Subframe, removing and installing

NOTE:

- **The procedure steps show you how you can remove the subframe as a complete unit (that is, with rear final drive, stub axle carrier/wheel bearing housing, trapezoidal control arm).**
- **Align vehicle after repair --> Wheel alignment.**

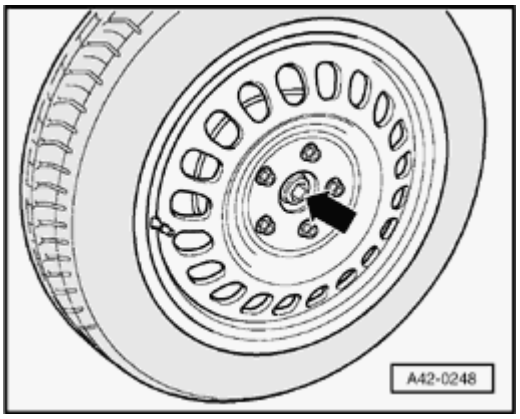

Fig. 348: Wheel Hex Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen collar bolt - **arrow** - only 90° on vehicle resting on wheels if you want to remove components that require removal of collar bolt.

CAUTION: When loosening and tightening collar bolt, vehicle must stand on wheels.

-Risk of accident-

Special tools, testers and auxiliary items required

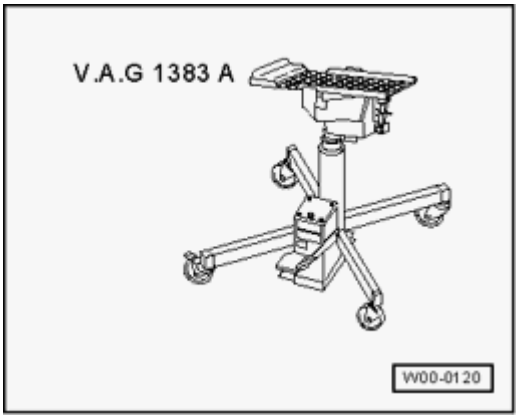

Fig. 349: Identifying Engine/Transmission Jack V.A.G. 1383 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Engine/transmission jack V.A.G 1383 A

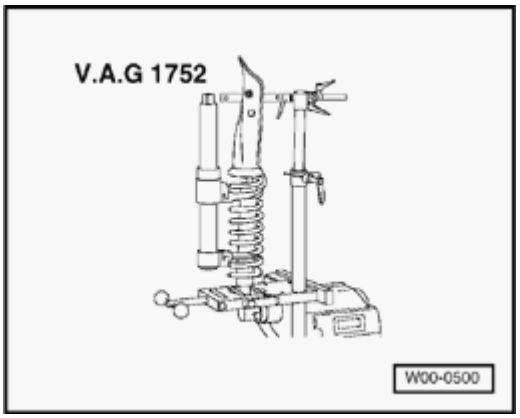

Fig. 350: Spring Compressor Kit V.A.G 1752
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Spring compressor V.A.G 1752/1
- Adapter V.A.G 1752/9
- Spring holder A4, rear axle V.A.G 1752/16
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332
- Bit XZN 18 T40027

Removing

CAUTION: Before -LOOSENING- subframe bolts, secure vehicle against tipping over (e.g. load luggage compartment with approx. 50 kg).

Convertible only

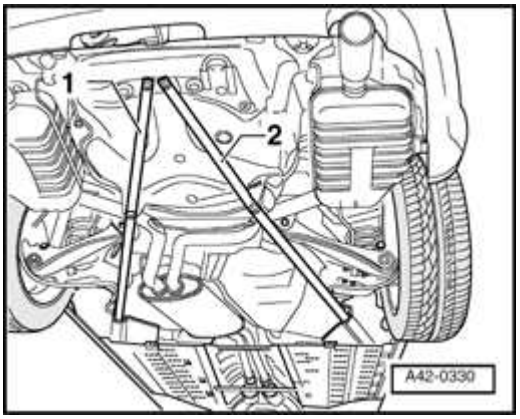

Fig. 351: Identifying Diagonal Braces
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove diagonal braces - **1** - and - **2** - --> **Diagonal braces**.

Continued for all vehicles

- Remove rear and side underbody trim in front of subframe.
- Dismount tires.
- Secure brake discs with a wheel bolt.
- Remove rear portion of exhaust system. -->
  - **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 1.8 LITER 4-CYL. 5V TURBO ENGINE MECHANICAL, ENGINE CODE(S): AMB
  - **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 2.0 LITER 4-CYL. 4V TURBO ENGINE MECHANICAL, ENGINE CODE(S): BPG, BWT
  - **26 EXHAUST SYSTEM, EMISSION CONTROLS** for 3.0 LITER 6-CYL. 5V ENGINE MECHANICAL, ENGINE CODE(S): AVK, BGN
  - **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 3.2 V6 4V ENGINE MECHANICAL, ENGINE CODE(S): BKH
  - **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 4.2 LITER V8 4V ENGINE MECHANICAL, ENGINE CODE(S): BNS
  - **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 4.2 LITER V8 5V ENGINE MECHANICAL, ENGINE CODE(S): BHF

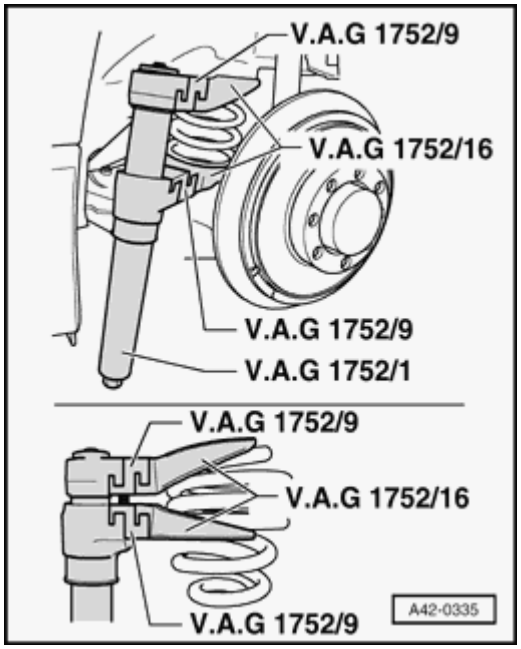

Fig. 352: Identifying Spring Compressor V.A.G 1752/1 With Adapter V.A.G 1752/9 And Spring Holder A4, Rear Axle V.A.G 1752/16 In Coil Spring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove coil spring --> **Rear coil spring**.

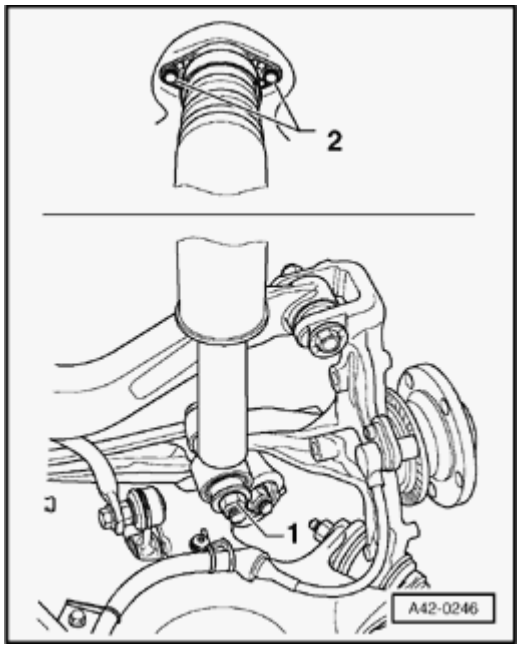

Fig. 353: Removing/Installing Strut Nut & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove strut from wheel bearing housing - **1** -.

Vehicles with heavy duty suspension

- Remove stone protection from trapezoidal control arm.

Continued for all vehicles

- Disengage parking brake cable from bracket under trapezoidal control arm. To do this, loosen bolts.

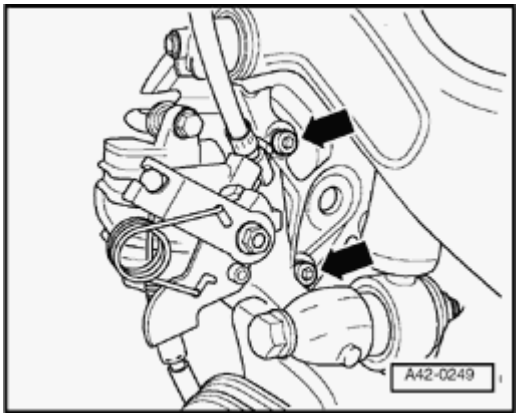

Fig. 354: Removing Brake Caliper
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove brake caliper - **arrows** -. To do so, use socket insert T40027.

NOTE:

- **Secure brake caliper to body with wire.**
- **Do not allow brake caliper to hang from brake line.**

- Remove speed sensor and cable guide **Speed sensor wire routing on trapezoidal control arm**
- On vehicles with headlight range control, remove connector from level control system sensor.

Vehicles with all-wheel drive

- Remove drive shaft from rear final drive. -->**39 - FINAL DRIVE, DIFFERENTIAL**
- Secure drive shaft to body with wire.
- Disengage parking brake cable at fuel tank.

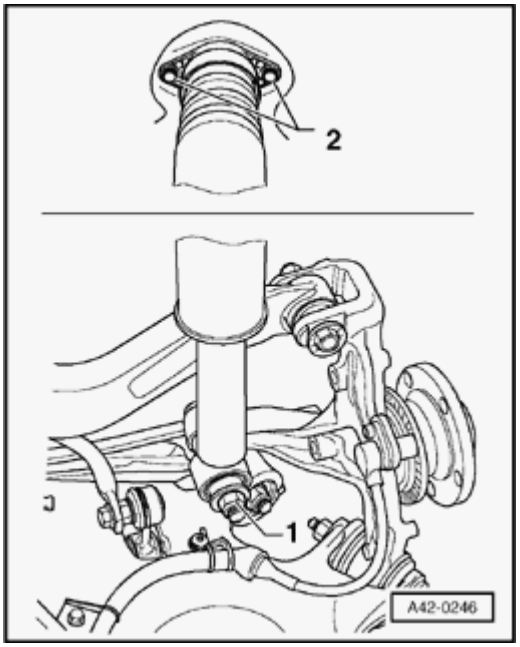

Fig. 355: Removing/Installing Strut Nut & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **2** - and remove strut.
- Remove brake disc and brake disc cover.

Continued for all vehicles

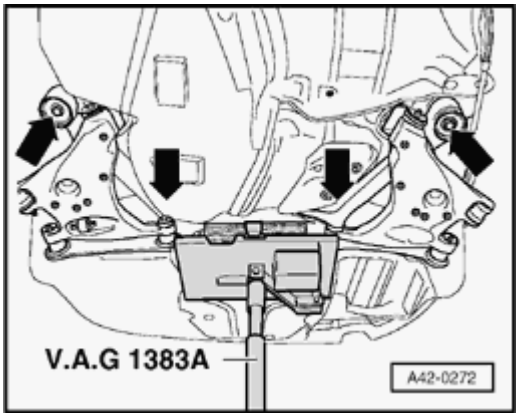

Fig. 356: Positioning Engine And Transmission Jack V.A.G 1383 A With Universal Transmission Support V.A.G 1359/2 And Corresponding Wooden Block At Subframe Or Final Drive
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position engine and transmission jack V.A.G 1383 A with universal transmission support V.A.G 1359/2 and a corresponding wooden block at subframe or final drive (Fig. for vehicles with front wheel drive).
- Tighten band around subframe or final drive.

CAUTION: Before -LOOSENING- subframe bolts, secure vehicle against tipping over

(e.g. load luggage compartment with approx. 50 kg).

- Remove subframe bolts - **arrows** -.

Vehicles with front wheel drive

- Lay parking brake cable with brake caliper over transverse link.
- Carefully lower subframe. Guide subframe so it does not shift.

Vehicles with all-wheel drive

- Carefully lower subframe approx. 15 cm. Guide subframe so it does not shift.
- Slide subframe left so that right parking brake cable with brake caliper can be laid over transverse link.

NOTE:

- **Ensure brake hose is not stretched.**

- Slide subframe right so that left parking brake cable with brake caliper can be laid over transverse link.
- Lower subframe.

Installing

NOTE:

- **Replace bolts and self-locking nuts --> Notes in exploded view diagrams at --> Part I, Subframe - front wheel drive.**

Installation of subframe occurs in reverse order of removal.

- Center subframe over four bearing holes to body.
- Install new subframe bolts and washers and tighten --> **Part I, Subframe - front wheel drive** , and (front wheel drive) or and (all wheel drive).

Vehicles with all-wheel drive

- Install brake disc cover. --> **46 - BRAKES - MECHANICAL COMPONENTS**
- Install brake disc and secure with wheel bolt.
- Install drive shaft to rear final drive. -->**39 - FINAL DRIVE, DIFFERENTIAL**
- Install strut on body.

- Engage parking brake cable at fuel tank.

Continued for all vehicles

- Install and align exhaust system -->
  - **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 1.8 LITER 4-CYL. 5V TURBO

ENGINE MECHANICAL, ENGINE CODE(S): AMB

- **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 2.0 LITER 4-CYL. 4V TURBO ENGINE MECHANICAL, ENGINE CODE(S): BPG, BWT
- **26 EXHAUST SYSTEM, EMISSION CONTROLS** for 3.0 LITER 6-CYL. 5V ENGINE MECHANICAL, ENGINE CODE(S): AVK, BGN
- **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 3.2 V6 4V ENGINE MECHANICAL, ENGINE CODE(S): BKH
- **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 4.2 LITER V8 4V ENGINE MECHANICAL, ENGINE CODE(S): BNS
- **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 4.2 LITER V8 5V ENGINE MECHANICAL, ENGINE CODE(S): BHF

- Place headlight range control connector on level control system sensor.
- Install speed sensor and cable guide **Speed sensor wire routing on trapezoidal control arm**
- Secure brake caliper to stub axle carrier or wheel bearing housing. --> **46 - BRAKES - MECHANICAL COMPONENTS**
- Install parking brake cable with bracket below trapezoidal control arm and tighten bolts.

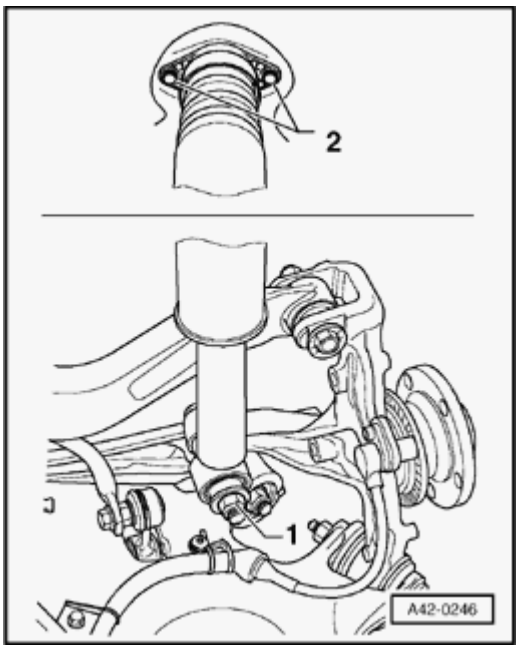

Fig. 357: Removing/Installing Strut Nut & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- First tighten strut nut - **1** - to 20 Nm.
- Install coil spring --> **Rear coil spring**.

Only when you have loosed collar bolt:

Always use a new collar bolt!

- On vehicles with all wheel drive, install 5 wheel bolts hand tight and apply parking brake.
- Tighten collar bolt to specified torque without additional turning (front wheel drive) or (all wheel drive).
- Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at links if vehicle is in curb weight position --> **Wheel bearing, lifting to curb weight position**
- Tighten connection - **1** - , (front wheel drive) or (all wheel drive).

- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

Only when you have loosed collar screw:

- Tighten collar screw with specified additional turning (front wheel drive) or (all wheel drive).

CAUTION: When loosening and tightening collar bolt, vehicle must stand on wheels.

-risk of accident-

- Install rear and side underbody trim.
- Perform vehicle alignment --> **Wheel alignment**.

Alignment must take place on a VW/Audi recommended alignment stand.

Vehicles with heavy duty suspension

- Install stone protection and tighten bolts ,

Convertible only

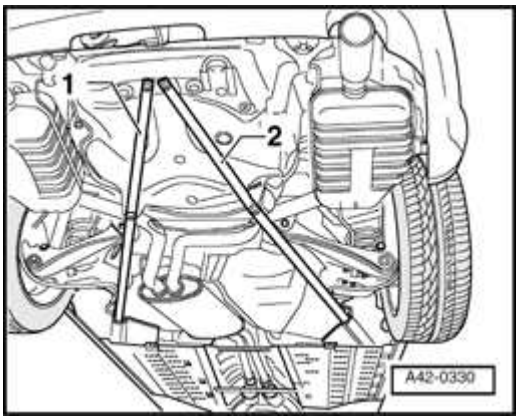

Fig. 358: Identifying Diagonal Braces
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install diagonal braces - **1** - and - **2** - --> **Diagonal braces**.

Subframe bushings, replacing

Special tools, testers and auxiliary items required

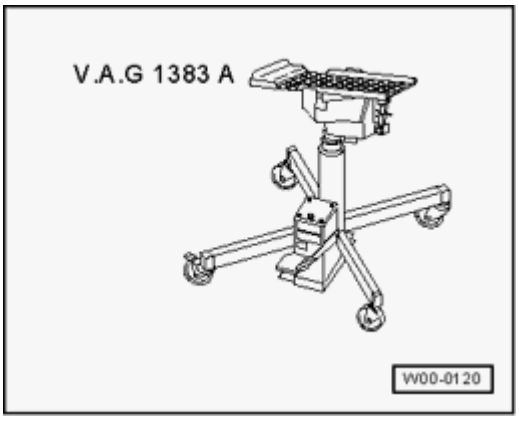

Fig. 359: Identifying Engine/Transmission Jack V.A.G. 1383 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Engine/transmission jack V.A.G 1383 A with universal transmission mount V.A.G 1359/2
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332

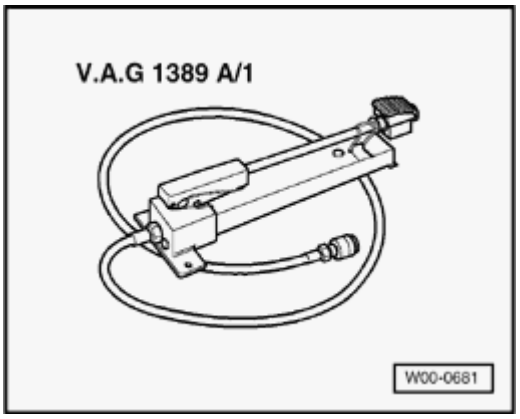

Fig. 360: Identifying Foot Pump With High Pressure Hose V.A.G 1389 A/1
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Foot pump with high pressure hose V.A.G 1389 A/1

If available in shop, hand pump V.A.G 1389/1 can also be modified for use as a foot pump.

To do so, use conversion kit V.A.G 1389/4.

Special tools, testers and auxiliary items required

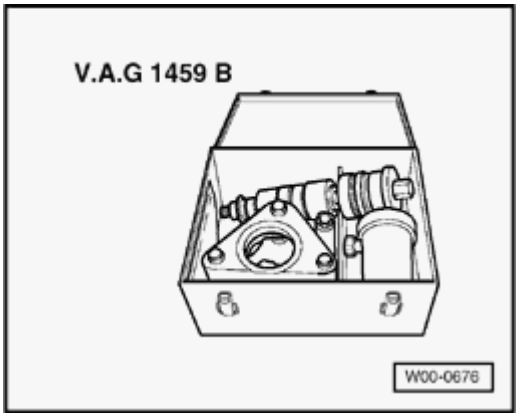

Fig. 361: Identifying wheel bearing V.A.G 1459 B
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Wheel bearing tool V.A.G 1459 B
- Hollow piston cylinder HKZ-15 mit Druckstuck E-0-204-T hydraulisch
- Tie bolt E-0-217+218
- Special nut E-8-214

- Press piece E-5
- Press piece T40033/1
- Support ring T40033/2
- Tube T40033/3

- Wheel hub support T40033/4
- Press piece T40033/5
- Wheel hub support T40033/6
- Spindle T40034

- Nut T40034/1
- Nut T40034/2

NOTE:

- **The same special tools and workshop equipment can be used to replace subframe mounting on vehicles with front and all wheel drive.**
- **The subframe does not have the usual bonded rubber bushings, but rather has hydraulic bushings.**
- **The bushings can only be removed and installed with the subframe lowered.**
- **Identify bushing location to subframe before removing.**

Remove front or rear hydraulic bushings

- Remove wheels.
- Remove left and right coil spring --> **Rear coil spring**.

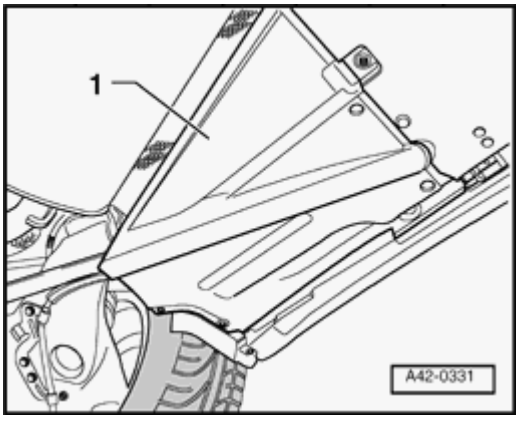

Fig. 362: Identifying Left/Right Underbody Trim
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Only remove rear left/right underbody trim if front hydraulic mounting will be replaced.

1 - Left underbody trim

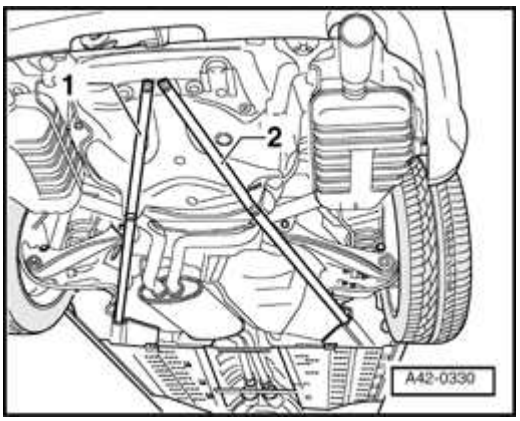

Fig. 363: Identifying Diagonal Braces
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- If present, remove diagonal braces - **1** - and - **2** - --> **Diagonal braces**.

Only with rear hydraulic bushing

- Remove stabilizer bar --> **Stabilizer bar, removing and installing**.

Procedure for front and rear hydraulic bushings

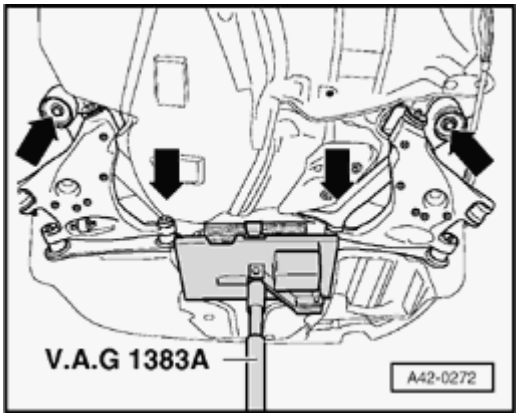

Fig. 364: Positioning Engine And Transmission Jack V.A.G 1383 A With Universal Transmission Support V.A.G 1359/2 And Corresponding Wooden Block At Subframe Or Final Drive
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position engine/transmission jack V.A.G 1383 A with universal transmission support V.A.G 1359/2 and a corresponding wooden block at subframe or final drive (Fig. for vehicles with front wheel drive).
- Tighten band around subframe or final drive.

NOTE:

- **If a front hydraulic bushing is to be replaced, only loosen front subframe bolts.**
- **If a rear hydraulic bushing is to be replaced, only loosen rear subframe bolts.**
- **If you loosen an additional front or rear subframe bolt, a vehicle alignment will be necessary after installation.**

- Loosen front or rear subframe bolts.
- Carefully lower subframe approx. 5 cm.
- Only remove subframe bolt where hydraulic mounting must be replaced.

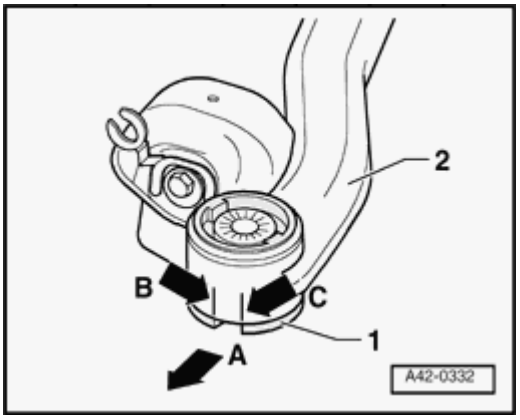

Fig. 365: Ensuring Ends Of Rubber Beads On Hydraulic Bushing Align With Markings On Subframe
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Mark location of hydraulic mounting - **1** - to subframe - **2** - , e.g. with a felt-tip pen (Fig. shows subframe on front wheel drive vehicle).

Arrow A: Driving direction

Arrows B and C: Marking

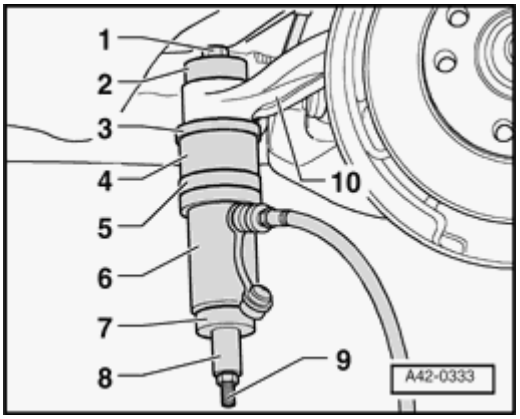

Fig. 366: Installing Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install special tools as shown in illustration.

1 - Nut T40034/1 or T40034/2

2 - Press piece T40033/1

3 - Support ring T40033/2

4 - Tube T40033/3

5 - Wheel hub support T40033/4

6 - Hollow piston cylinder HKZ-15

7 - Press piece E-5

8 - Special nut E-8-214

9 - Spindle T40034

10- Subframe

- Pretension special tool.
- Remove hydraulic bushing by operating pump.

NOTE:

- **When removing hydraulic bushing with special tool wheel bearing tool V.A.G 1459 B , you must cut back.**

Pull in front or rear hydraulic bushing

Front and hydraulic bushings are different. Ensure correct allocation when installing.

Hydraulic bushing must be installed in correct direction, note marking on subframe.

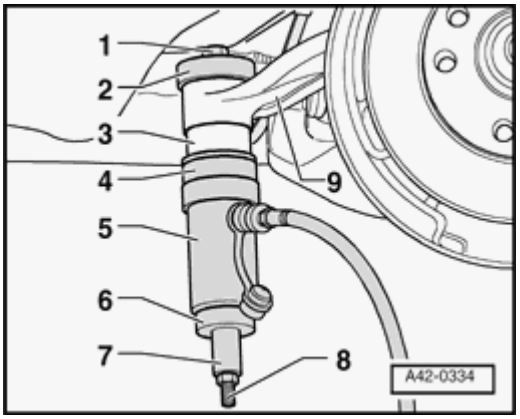

Fig. 367: Inserting Special Tool With Hydraulic Bushing In Subframe
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert special tool with hydraulic bushing in subframe as shown.

Ensure correct location when inserting mount T40033/6.

1 - Nut T40034/1 or T40034/2

2 - Wheel hub support T40033/6

3 - Hydraulic mounting

4 - Press piece T40033/5

5 - Hollow piston cylinder HKZ-15

6 - Press piece E-5

7 - Special nut E-8-214

8 - Spindle T40034

9- Subframe

- Pre-tension special tool with hydraulic bushing.
- Completely coat hydraulic bushing with installation lubricant G 294 421 A1 -thin with water at a ratio of 1:100-.

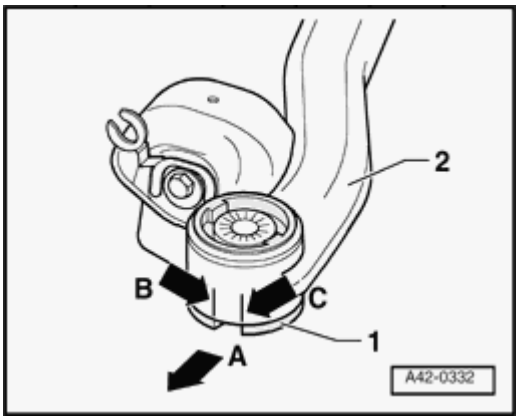

Fig. 368: Ensuring Ends Of Rubber Beads On Hydraulic Bushing Align With Markings On Subframe
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Ensure ends of rubber beads on hydraulic bushing - **1** - align with markings - **arrows B and C** - on subframe - **2** -.

- **Arrow A** - direction of travel

- Pull in hydraulic pump to stop by operating pump.

NOTE:

- **When pulling in hydraulic bushing with special tool V.A.G 1459 B you must cut back.**
- **Ensure hydraulic bushing does not tilt while it is being pulled in, otherwise outer ring could be damaged!**

- Raise subframe using engine/transmission jack V.A.G 1383 A.
- Install new subframe bolts and washers and tighten and (front wheel drive) or and (all wheel drive).

Only rear hydraulic bushing

- Install stabilizer bar --> **Stabilizer bar, removing and installing**.

Procedure for front and rear hydraulic bushings

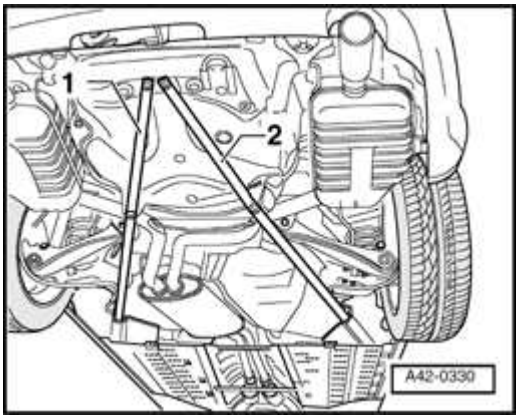

Fig. 369: Identifying Diagonal Braces
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- If present, install diagonal braces - **1** - and - **2** - --> **Diagonal braces**.
- Install right and left underbody trim.
- Install left and right coil spring --> **Rear coil spring**.
- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

- Perform vehicle alignment if more than 2 hydraulic bushing bolts were loosened --> **Wheel alignment**.

Alignment must take place on a VW/Audi recommended alignment stand.

Subframe bushing, component overview

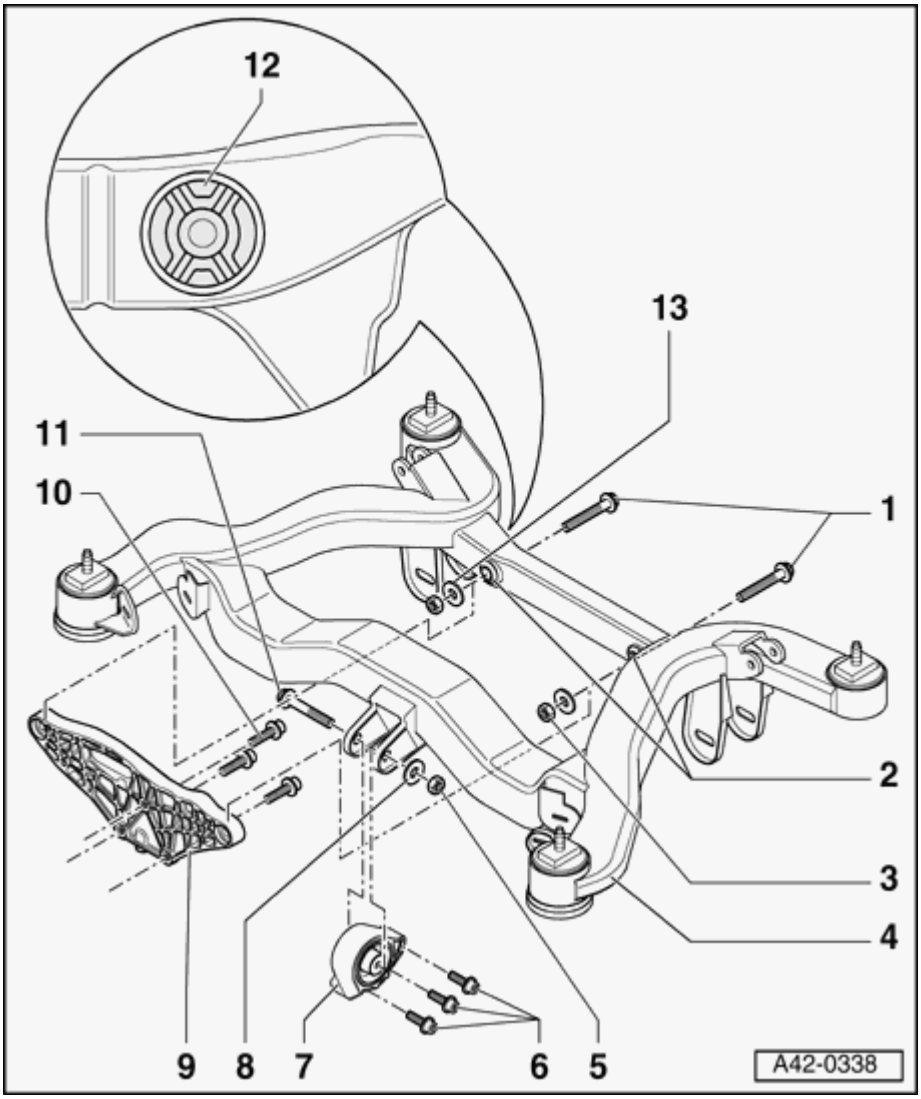

Fig. 370: Subframe Bushing, Component Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Combi-bolt

2 - Rear differential mount

3 - Hex nut

4 - Subframe

5 - Hex nut

6 - Combi-bolt

7 - Final drive support

8 - Washer

9 - Rear crossmember

10 - Combi-bolt

11 - Combi-bolt

12 - Rear differential bushing web alignment

13 - Washer

Rear differential bushing, replacing

Special tools, testers and auxiliary items required

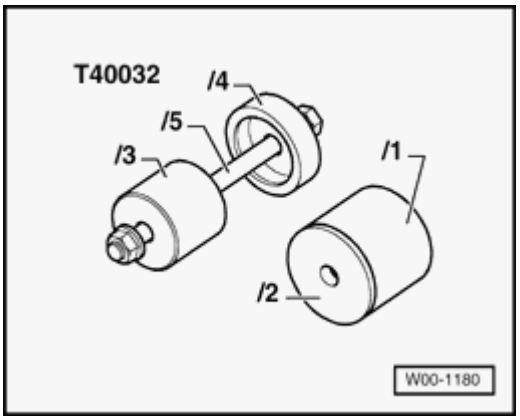

Fig. 371: Assembly Tool T40032
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Assembly tool T40032

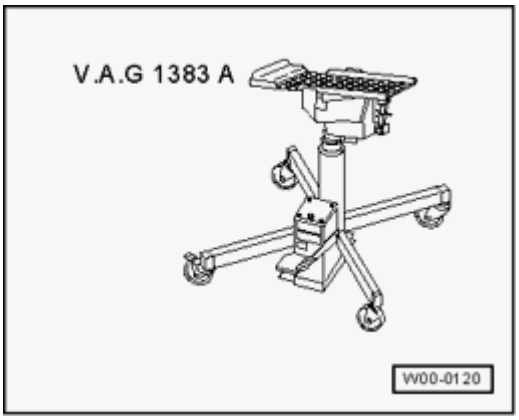

Fig. 372: Identifying Engine/Transmission Jack V.A.G. 1383 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Engine/transmission jack V.A.G 1383 A
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332

Removing

- Place engine/transmission jack V.A.G 1383 A with universal transmission support 1359/2 under rear final drive and secure rear final drive.

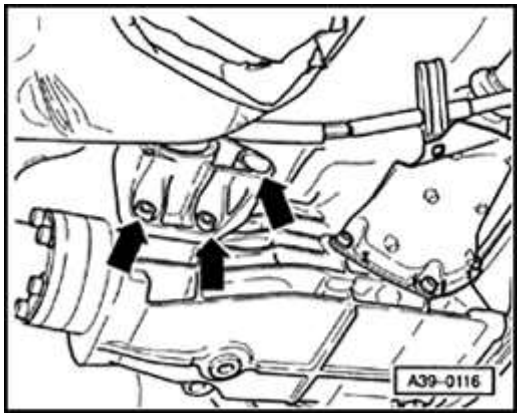

Fig. 373: Removing/Installing Securing Bolts At Transmission Support
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts from transmission supports and rear final drive - **arrows** -.
- Remove drive shaft from rear final drive. -->**39 - FINAL DRIVE, DIFFERENTIAL**
- Secure drive shaft to body with wire.
- Remove combi-bolts on differential bushing.
- Remove rear crossmember/rear final drive bolts.

NOTE:

- **Lower rear final drive enough so that upper bolt can be removed.**

- Remove rear crossmember downward.

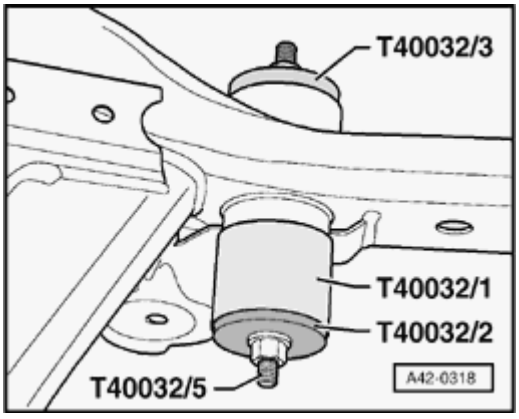

Fig. 374: Using Removal And Assembly Tool T40032 To Differential Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Use Removal And Assembly Tool T40032 as shown in illustration and remove differential bushing.

NOTE:

- **To provide a better illustration, subframe is shown removed.**

Installing

- Align differential bushing as shown on.

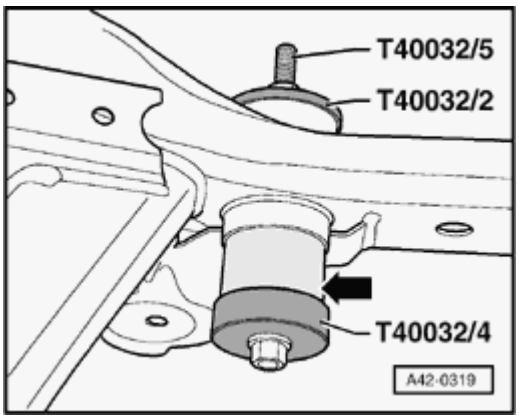

Fig. 375: Using Removal And Assembly Tool T40032 To Remove Differential Mount
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Use Removal And Assembly Tool T40032 as shown in illustration and remove differential mount -**arrow** -.

NOTE:

- **Installation device from front.**
- **Bearing outer race flush with sleeve on subframe.**

- Place rear crossmember on rear final drive and tighten combi-bolts
- Fasten rear crossmember with subframe.

- Fasten front transmission support to rear final drive ,
- Install drive shaft to rear final drive. -->**39 - FINAL DRIVE, DIFFERENTIAL**

- Remove engine/transmission jack V.A.G 1383 A.

TIE ROD

General information

The three-part tie rod (old version) is replaced by a one-piece tie rod (new version) with or without stone protection.

A mixed installation of a three-piece and a one-piece tie rod on one vehicle is not permitted.

A mixed installation of tie rod (new version) with old stone impact protection (old version) or vice versa is not possible.

Stone protection 8E0 501 561 (old version) is now offered as a replacement part on finished vehicles with heavy duty suspension.

Tie rod, removing and installing

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1332

NOTE:

- **Align vehicle after repair --> Wheel alignment.**

Removing

- Remove tire.
- Remove coil spring --> **Rear coil spring**.

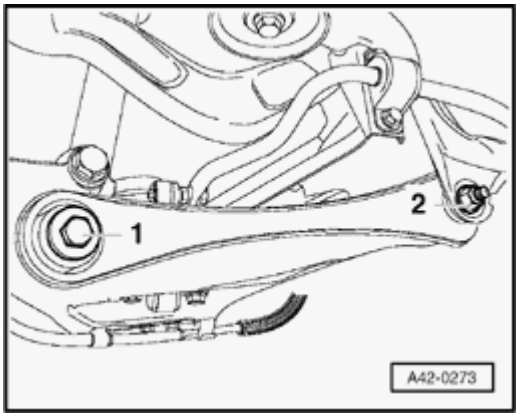

Fig. 376: Removing Threaded Connections And Tie Rod

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove threaded connections - **1** - and - **2** - and remove tie rod.

Installing

NOTE:

- **Replace bolts and self-locking nuts --> Notes in exploded view diagrams at --> Part I, Subframe - front wheel drive.**

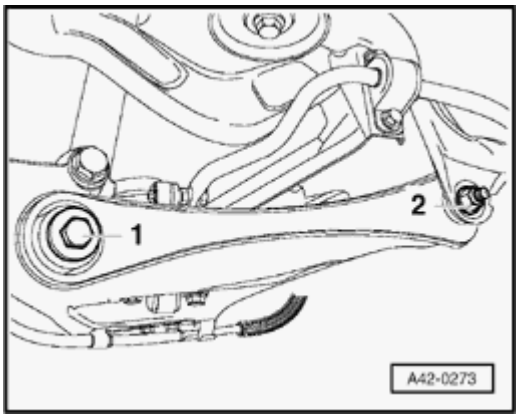

Fig. 377: Removing/Installing Threaded Connections And Tie Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- First tighten threaded connections nuts - **1** - and - **2** - only to 20 Nm.
- Install coil spring --> **Rear coil spring**.

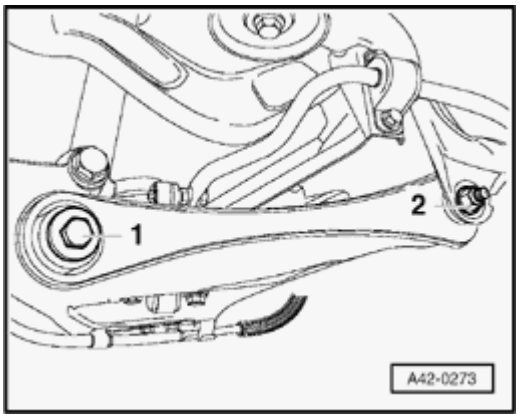

Fig. 378: Removing/Installing Threaded Connections And Tie Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten threaded connections - **1** - and - **2** - and
- Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at links if vehicle is in curb weight position --> **Wheel bearing, lifting to curb weight position**
- Perform vehicle alignment --> **Wheel alignment**.

Alignment must take place on a VW/Audi recommended alignment stand.

Tie rod (three-piece version) stone protection 8E0 501 561 (old version), removing and installing

Special tools, testers and auxiliary items required

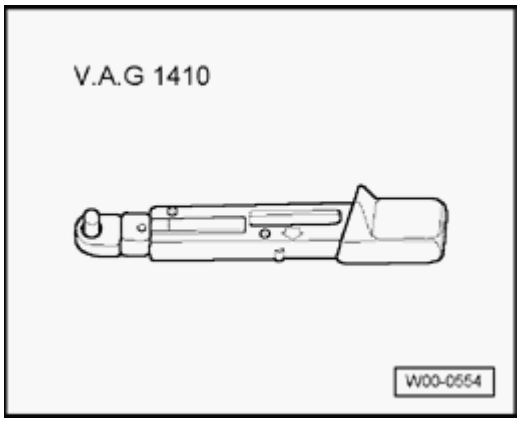

Fig. 379: Torque Wrench V.A.G 1410
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1410

NOTE:

- **Tie rod stone protection suspension is only installed on vehicles with heavy duty suspension.**
- **Stone protection 8E0 501 561 (old version) can only be installed on vehicles with a three-piece tie rod (old version).**

Stone protection, replacing with tie rod removed

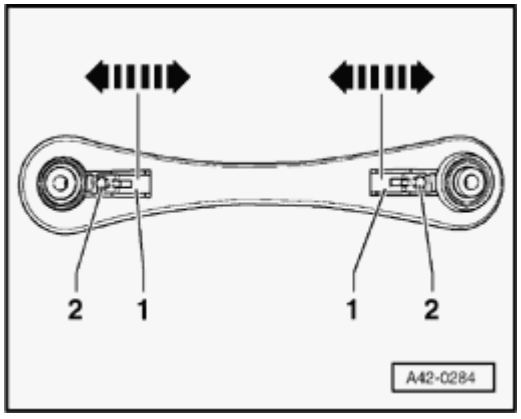

Fig. 380: Stone Protection, Replacing With Tie Rod Removed
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen bolts - **2** -.
- Slide clamping parts - **1** - inward.

- Unclip stone protection from tie rod.

Installation is in reverse order of removal.

Torque specification item 2: 5 Nm

Stone protection, replacing with tie rod installed

Removing

- Cut stone protection with a knife in threaded connection area at trapezoidal control arm. Do not damage tie rod.

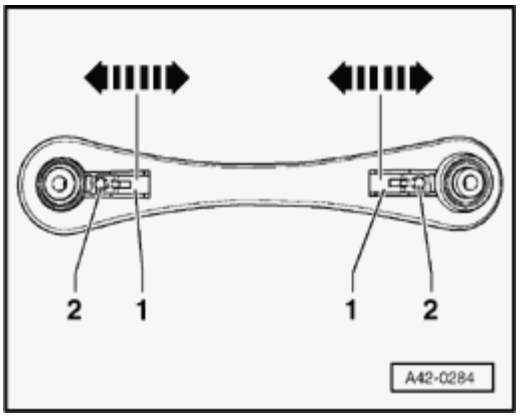

Fig. 381: Stone Protection, Replacing With Tie Rod Removed
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen bolts - **2** -.
- Slide clamping parts - **1** - inward.
- Unclip stone protection from tie rod.

Installing

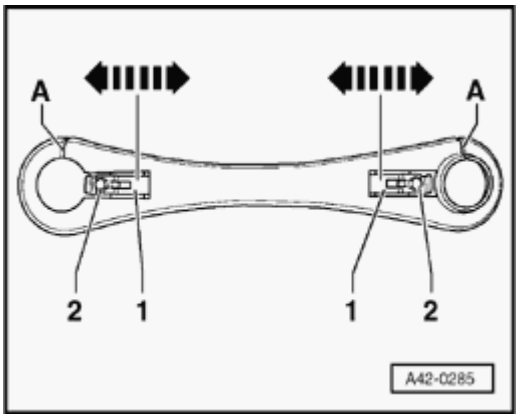

Fig. 382: Sliding Clamping Parts Outward

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Cut in new stone protection at top - **A** -.
- Slide clamping parts - **1** - inward.
- Clip stone protection onto tie rod.
- Slide clamping parts - **1** - outward and tighten bolts - **2** - to 5 Nm.

Tie rod (one-piece version) stone protection (new version), removing and installing

NOTE:

- **Tie rod stone suspension is only installed on vehicles with heavy duty suspension.**

Stone protection, replacing with tie rod removed

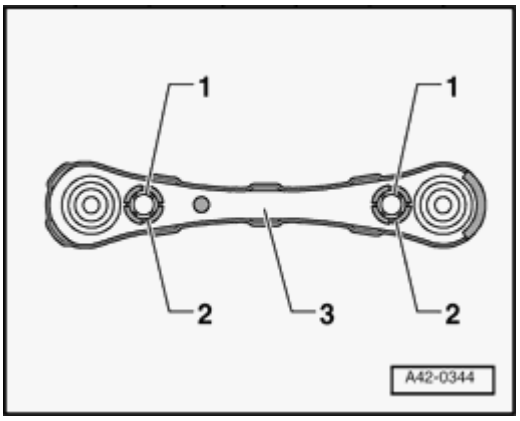

Fig. 383: Pressing Clips Forward In Direction Of Travel Out Of Stone Protection
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press clips - **1** - forward in direction of travel out of stone protection - **2** -.
- Unclip stone protection - **2** - from tie rod - **3** -.

Installation is in reverse order of removal.

When installing stone impact protection, ensure it engages correctly with tie rod.

Stone impact protection, replacing with tie rod installed

NOTE:

- **Replacement of stone protection on right side of vehicle is described and shown in illustration.**

Removing

- Cut stone protection with a knife in threaded connection area at trapezoidal control arm/tie rod. Do not damage tie rod or other suspension components.

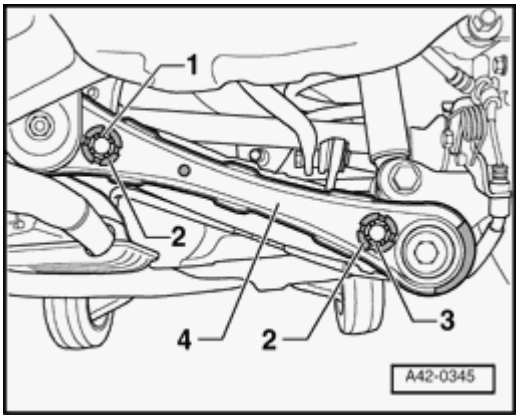

Fig. 384: Pressing Clip Forward In Direction Of Travel Out Of Stone Protection
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press clip - **3** - forward in direction of travel out of stone protection - **2** -.
- Press clip - **1** - forward in direction of travel out of stone protection - **2** - until head of clip rests on trapezoidal control arm.

4 - Tie rod

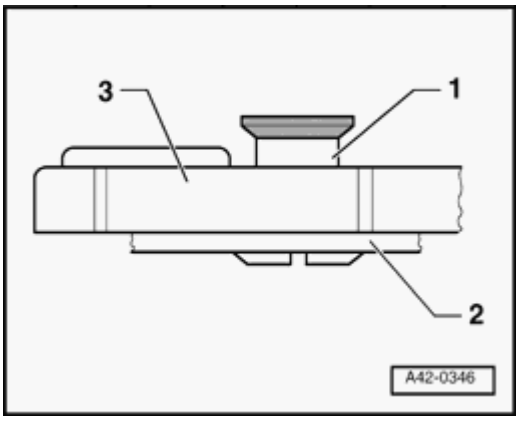

Fig. 385: Identifying Clip Head, Tie Rod & Stone Protection Plate
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Cut clip head - **1** - at --> area marked in illustration. Do not damage any other suspension components when doing this.

2 - Tie rod

3 - Stone protection plate

- Pull rest of clips - **1** - back in direction of travel out of stone protection.
- Unclip stone protection from tie rod.

Installing

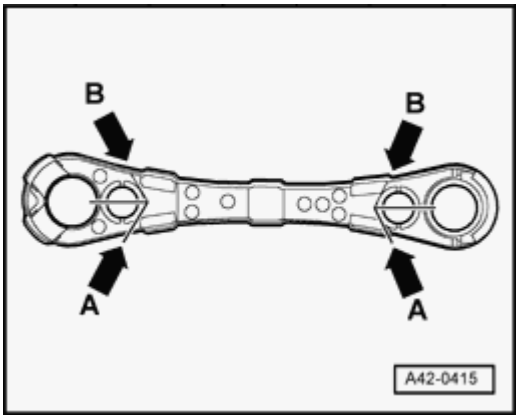

Fig. 386: Cutting New Stone Protection For Right Side At Markings And For Left Side At Markings
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Cut new stone protection for right side at markings - **A** - and for left side at markings - **B** -.
- First insert stone protection on interior side (side facing center of vehicle), then on exterior side.

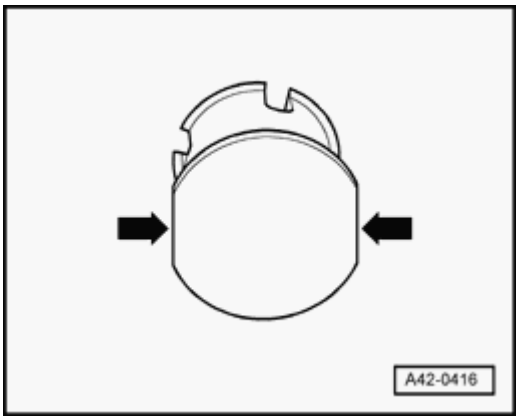

Fig. 387: Filing Clip Off About 2 mm On Interior Side At Both Marks
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- File clip off about 2 mm on interior side at both marks - **arrows** -.

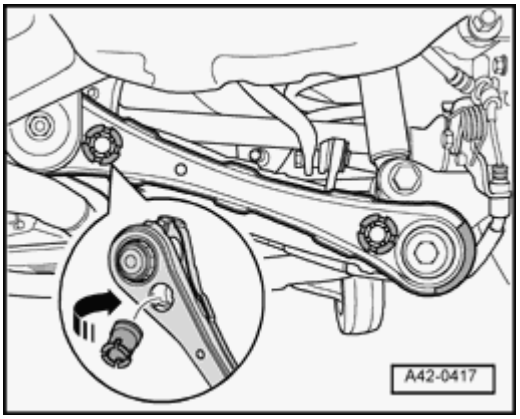

Fig. 388: Pressing filed clip from behind in direction of on vehicle interior side through tie rod and stone

impact protection
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press filed clip from behind in direction of - **arrow** - on vehicle interior side through tie rod and stone impact protection.
- Clip stone impact protection onto tie rod. Ensure stone protection engages correctly.

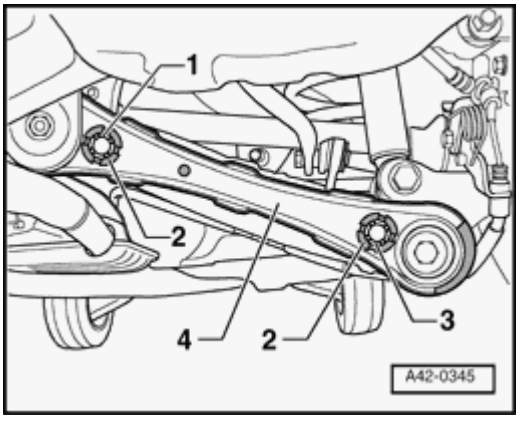

Fig. 389: Pressing Clip Forward In Direction Of Travel Out Of Stone Protection
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press clip - **1** - and - **3** - back in direction of travel in stone protection - **2** -.

STABILIZER BAR

Stabilizer bar, removing and installing

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1331

Removing

- Remove rear underbody trim.

Convertible only

- Remove rear diagonal brace --> **Diagonal braces**.

Vehicles with exhaust system with 2 rear mufflers

- Remove rear portion of exhaust system. -->
  - **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 1.8 LITER 4-CYL. 5V TURBO ENGINE MECHANICAL, ENGINE CODE(S): AMB
  - **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 2.0 LITER 4-CYL. 4V TURBO ENGINE MECHANICAL, ENGINE CODE(S): BPG, BWT

- **26 EXHAUST SYSTEM, EMISSION CONTROLS** for 3.0 LITER 6-CYL. 5V ENGINE MECHANICAL, ENGINE CODE(S): AVK, BGN
- **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 3.2 V6 4V ENGINE MECHANICAL, ENGINE CODE(S): BKH
- **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 4.2 LITER V8 4V ENGINE MECHANICAL, ENGINE CODE(S): BNS
- **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 4.2 LITER V8 5V ENGINE MECHANICAL, ENGINE CODE(S): BHF

Vehicles with heavy duty suspension

- Remove stone protection from trapezoidal control arm.

Continued for all vehicles

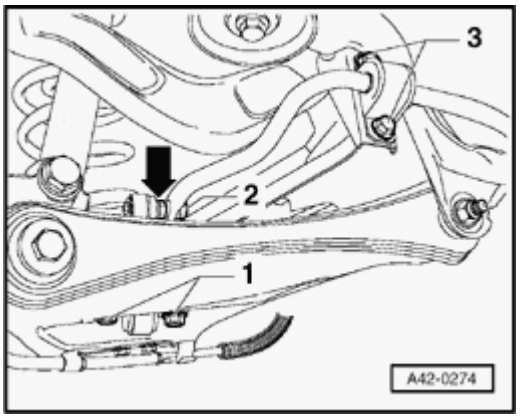

Fig. 390: Identifying Stabilizer & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **1** -.
- Remove bolts - **2** -. Counterhold joint with open-end wrench.
- Remove bolts - **3** -.
- Remove stabilizer with bushing.

Installing

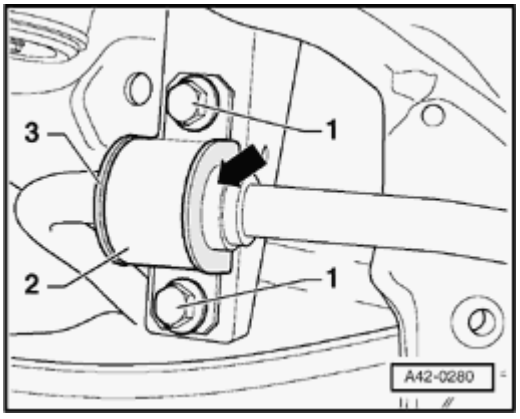

Fig. 391: Identifying Bolt, Clamp & Rubber Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Rubber bushing must rest on stabilizer bar collar - **arrow** -.

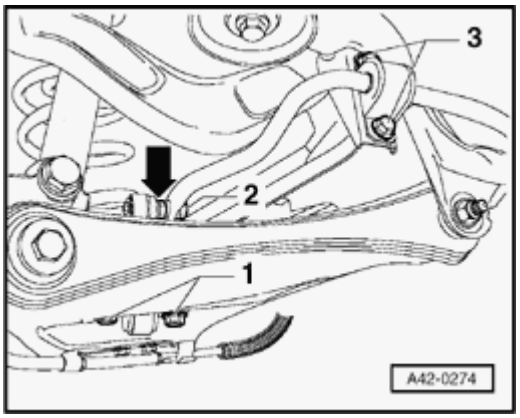

Fig. 392: Identifying Stabilizer & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install bolts - **3** - and only hand tighten for the time being.
- Install and tighten bolt - **2** -.
- Install and tighten bolt - **1** -.
- Place vehicle on wheels and bounce several times.

- Tighten bolts - **3** - to specified torque.

Vehicles with heavy duty suspension

- Install stone protection and tighten bolts ,

Vehicles with exhaust system with 2 rear mufflers

- Install and align exhaust system -->
  - **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 1.8 LITER 4-CYL. 5V TURBO

ENGINE MECHANICAL, ENGINE CODE(S): AMB

- **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 2.0 LITER 4-CYL. 4V TURBO ENGINE MECHANICAL, ENGINE CODE(S): BPG, BWT
- **26 EXHAUST SYSTEM, EMISSION CONTROLS** for 3.0 LITER 6-CYL. 5V ENGINE MECHANICAL, ENGINE CODE(S): AVK, BGN
- **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 3.2 V6 4V ENGINE MECHANICAL, ENGINE CODE(S): BKH
- **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 4.2 LITER V8 4V ENGINE MECHANICAL, ENGINE CODE(S): BNS
- **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 4.2 LITER V8 5V ENGINE MECHANICAL, ENGINE CODE(S): BHF

Convertible only

- Install rear diagonal brace --> **Diagonal braces**.

Continued for all vehicles

- Install rear underbody trim.

Stabilizer bushings, replacing

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1331

Removing

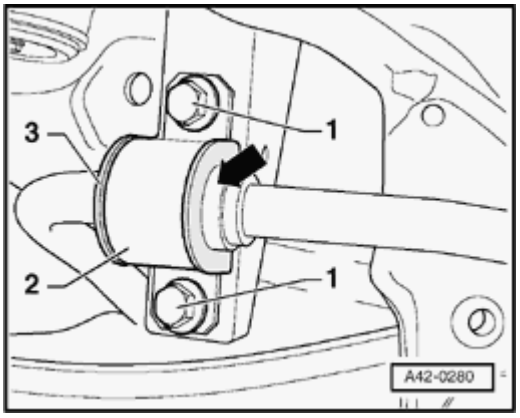

Fig. 393: Identifying Bolt, Clamp & Rubber Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - **1** -.
- Remove clamp - **2** - and rubber bushing - **3** -.

Installing

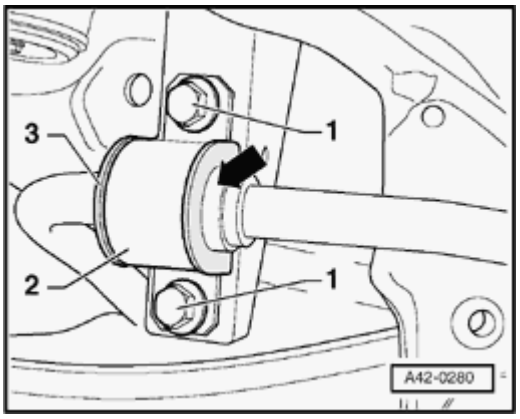

Fig. 394: Identifying Bolt, Clamp & Rubber Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Rubber bushing must rest on stabilizer bar collar - **arrow** -.
- Only hand-tighten bolts - **1** - for the time being.
- Place vehicle on wheels and bounce several times.
- Tighten bolts - **1** -.

Coupling rod for stabilizer bar, removing and installing

Removing

- Remove wheel.

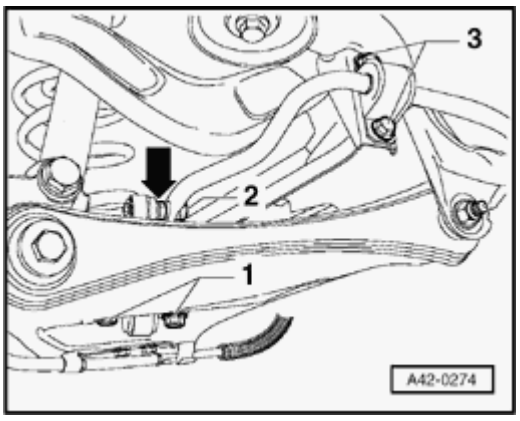

Fig. 395: Identifying Stabilizer & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **1** -.
- Remove bolts - **2** -. Counterhold joint with open-end wrench.
- Remove connecting link.

Installing

Installation is in reverse order of removal.

Torque specifications --> **Part VI, Stabilizer bar**

DIAGONAL BRACES

Front or rear diagonal braces, removing and installing

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1332

Front and rear diagonal braces are only installed in the convertible.

Removing

- Remove front underbody trim before removing front diagonal braces. -->
  - **66 EXTERIOR EQUIPMENT**
  - **66 - EXTERIOR EQUIPMENT** for BODY EXTERIOR - CABRIOLET

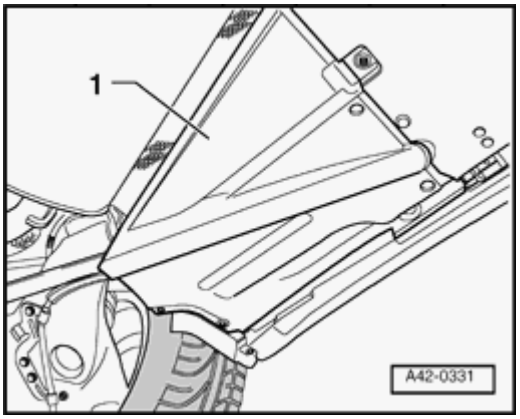

Fig. 396: Identifying Left/Right Underbody Trim
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove rear underbody trim before removing rear diagonal braces **- 1** -. -->
  - **66 EXTERIOR EQUIPMENT**
  - **66 - EXTERIOR EQUIPMENT** for BODY EXTERIOR - CABRIOLET

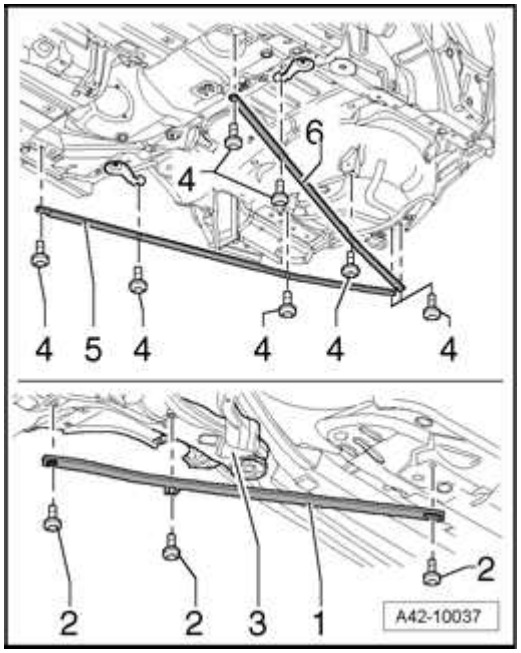

Fig. 397: Removing/Installing Diagonal Brace & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- If the same diagonal braces - **1** - , - **5** - or - **6** - are to be reinstalled, identify location of braces to body, e.g. with a felt-tip pen.

3 - Subframe

- Put vehicle on its wheels.
- Loosen bolts - **2** - and - **4** -.
- Raise vehicle.
- Remove bolts - **2** - or - **4** -.

- Remove diagonal brace - **1** - , - **5** - or - **6** -.

Installing

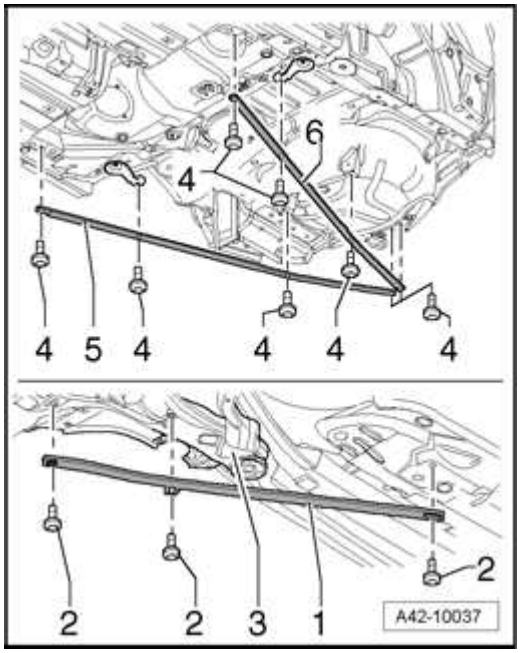

Fig. 398: Removing/Installing Diagonal Brace & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Align diagonal brace - **1** - , - **5** - or - **6** - according to threaded holes or markings on body.
- Insert new bolts - **2** - or - **4** - but do not tighten yet.
- Place vehicle on wheels and bounce several times.
- Tighten bolts - **2** - or - **4** -.

Torque specification: 65 Nm

- Install front or rear underbody trim. -->
  - **66 EXTERIOR EQUIPMENT**
  - **66 - EXTERIOR EQUIPMENT** for BODY EXTERIOR - CABRIOLET

REAR DRIVE AXLE, SERVICING

Drive axles, removing and Installing

Special tools, testers and auxiliary items required

- Spring compressor V.A.G 1752/1
- Adapter V.A.G 1752/9
- Spring holder A4, rear axle V.A.G 1752/16
- Torque wrench V.A.G 1331

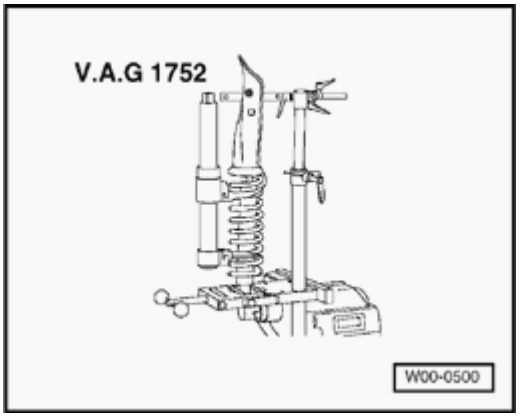

Fig. 399: Spring Compressor Kit V.A.G 1752
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1332

Removing

- Remove wheel covers, remove cover cap on light-alloy wheels (removal hook in vehicle tool kit).

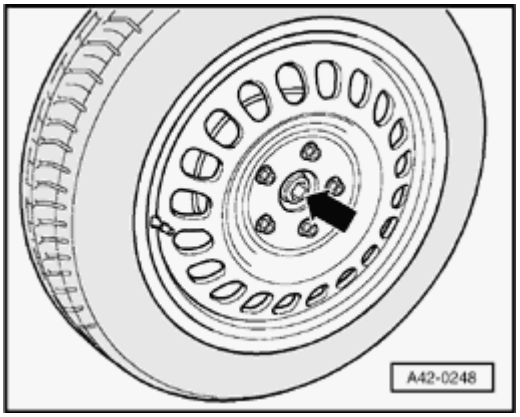

Fig. 400: Wheel Hex Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Only loosen collar bolt - **arrow** - 90°, otherwise wheel bearing is damaged.

CAUTION: When loosening and tightening collar bolt, vehicle must stand on wheels.

-risk of accident-

- Remove wheel.
- Install all 4 wheel bolts hand-tight.
- Engage parking brake.
- Remove collar bolt - **arrow** -.

- Remove coil spring --> **Rear coil spring**.

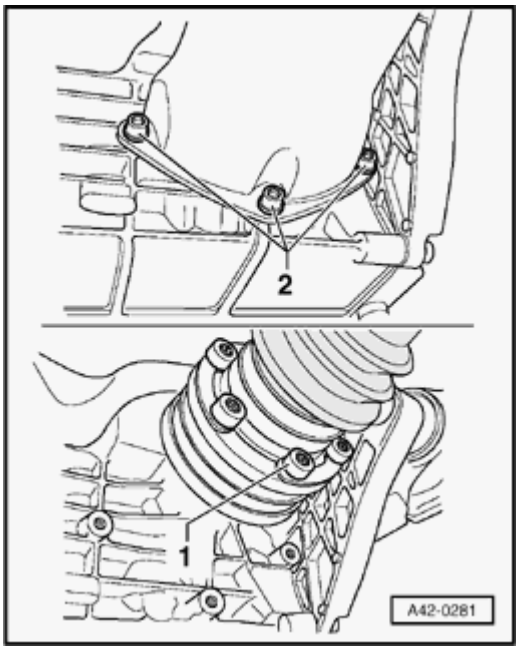

Fig. 401: Removing/Installing Combi-Bolts & Trapezoidal Control Arm
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove combi-bolts - **2** - and cover.
- Remove bolts - **1** -.
- Raise trapezoidal control arm with hand until drive axle can be taken forward out of flange shaft/transmission.

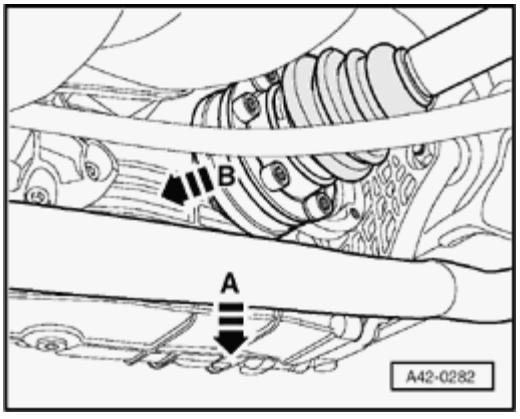

Fig. 402: Pressing Exhaust Pipe Downward Slightly And Slide Driveshaft Inward Until It Can Be Removed From Wheel Hub
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press exhaust pipe downward slightly - **arrow A** - and slide driveshaft inward - **arrow B** - until it can be removed from wheel hub.

- Press exhaust pipe down again slightly and guide drive axle outward over cover plate.

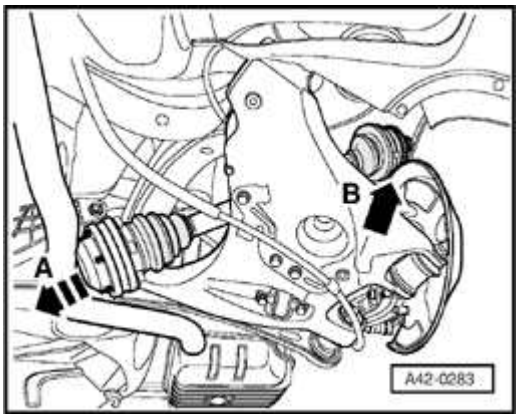

Fig. 403: Removing Drive Axle Downward & Ensuring Cover Plate And Body Are Not Damaged
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove drive axle downward - **arrow A** -.

NOTE:

- **Ensure cover plate - arrow B - and body are not damaged.**

Installing

NOTE:

- **Replace bolts and self-locking nuts --> Notes in exploded view diagrams at --> Part I, Subframe - front wheel drive.**

Installation is in reverse order of removal.

- Insert drive axle from below and slide into wheel hub up to stop.

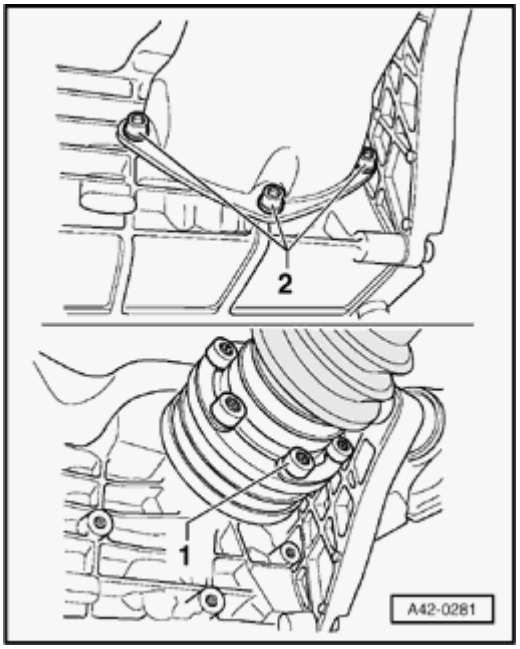

Fig. 404: Removing/Installing Combi-Bolts & Trapezoidal Control Arm
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Align drive axle holes and flange shaft/transmission holes with each other, install bolts - **1** - and tighten , (100 mm dia.) or (108 mm dia.).
- Insert cover, install combi-bolts - **2** - and tighten.
- Install coil spring --> **Rear coil spring**.
- Install new collar bolt and tighten to specified torque without turning any farther.

- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide
- Lower vehicle onto its wheels.
- Tighten collar bolt to specified additional turn angle.

Drive axle with constant velocity inner joint (diameter 100 mm), servicing

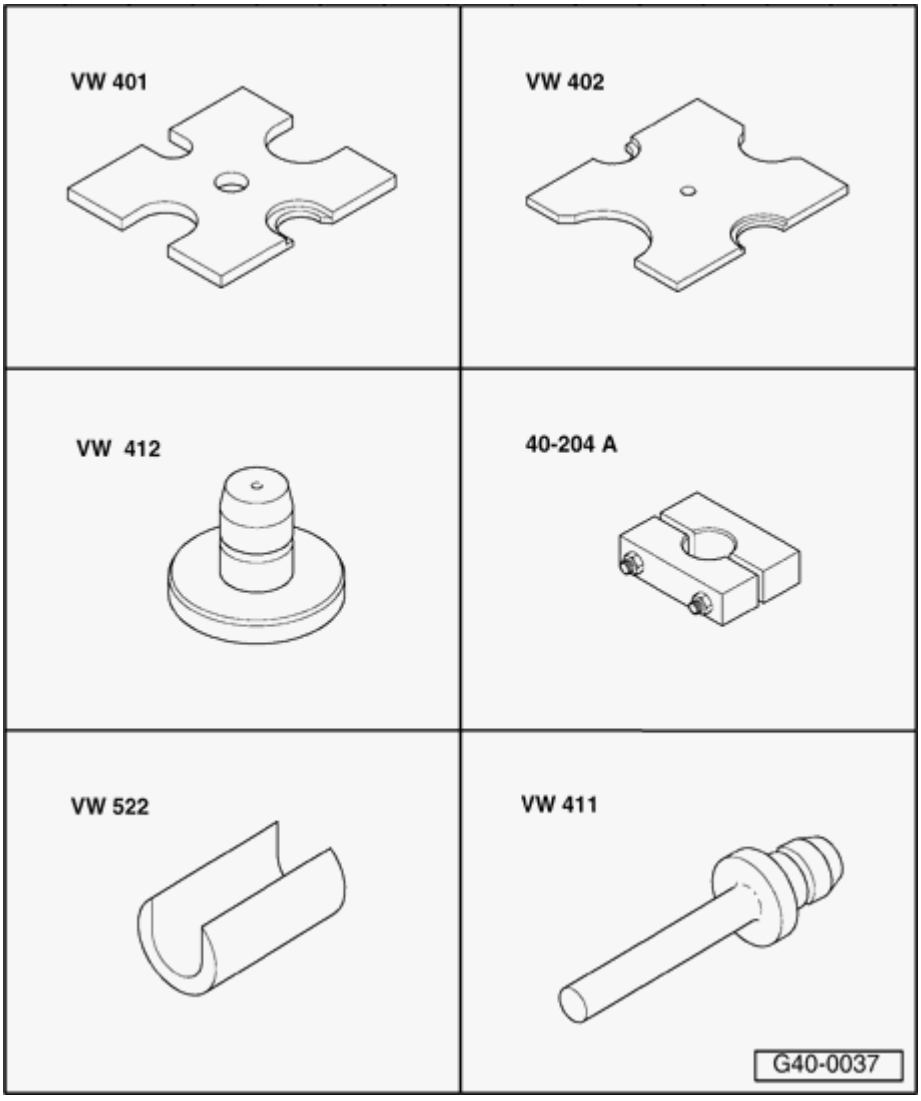

Fig. 405: Identifying Special Tools - Drive Axle With Constant Velocity Inner Joint (Diameter 100 mm), Servicing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Thrust plate VW 401
- Thrust plate VW 402
- Punch VW 412
- Clamp 40-204 A
- Support sleeve VW 522
- Punch VW 411

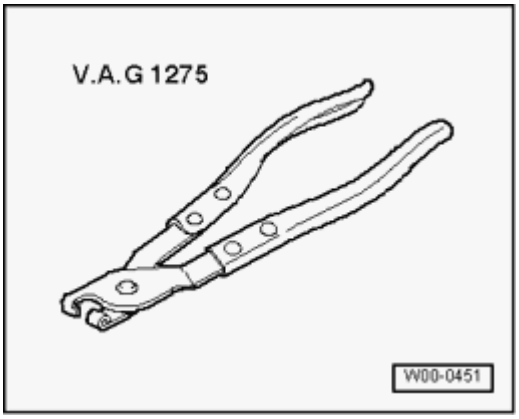

Fig. 406: Identifying Hose Clamp Pliers V.A.G 1275
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Hose clamp pliers V.A.G 1275

Constant velocity joints are packed with grease G 000 603:

Grease quantity and type

	Grease quantity	Amount in:	
Outer joint	Total quantity	Joint	Boot
[mm]	[g]	[g]	[g]
88	90	40	50
Inner joint		Apply grease through ball paths	
100	80		

Grease joint again when replacing protective joint boot.

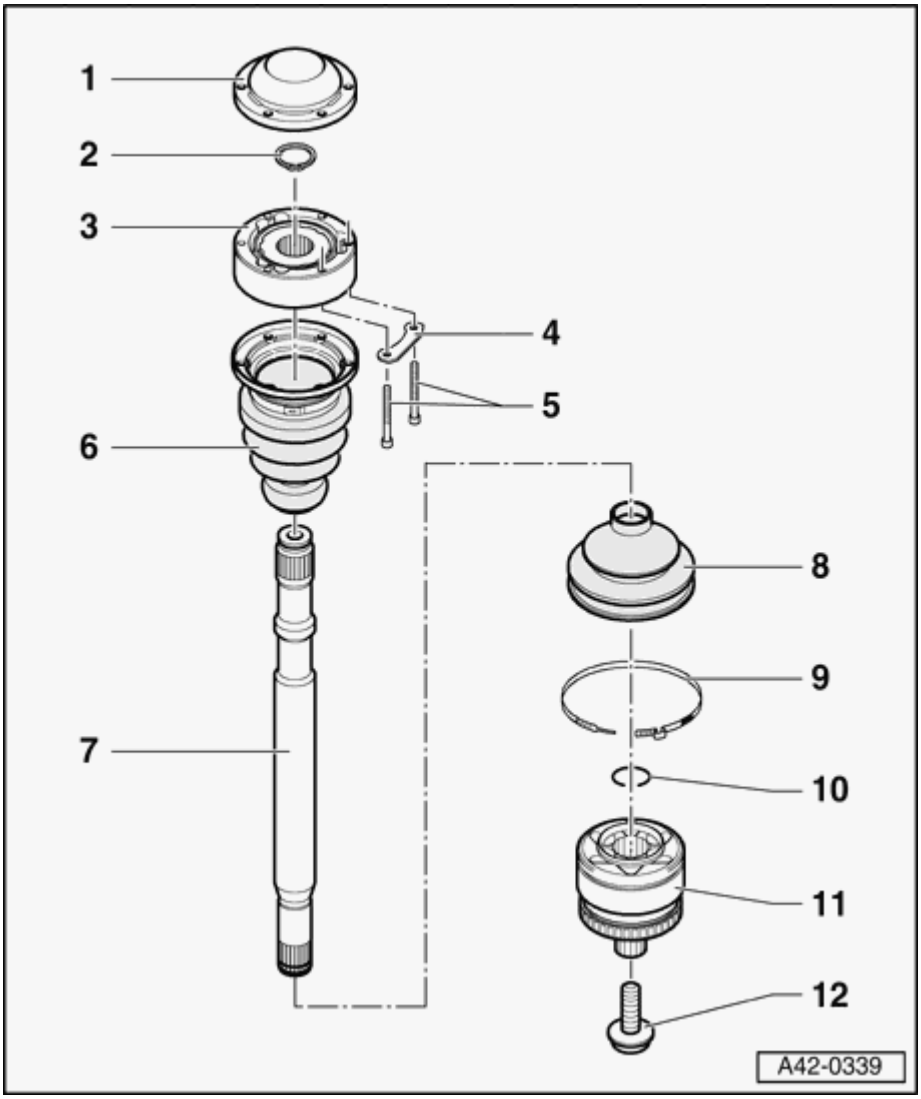

Fig. 407: Exploded View Of Drive Axle With Constant Velocity Inner Joint
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Cover

- Carefully drive off using a drift **Drive off cover for inner joint**
- Always replace
- Coat sealing surface with D 454 300 A2 before installing on constant velocity joint **Coat cover or cap sealing surface with D 454 300 A2**
- Align cover to screw holes

2 - Circlip

- Remove and install with commercially-available circlip pliers
- Always replace

3 - Inner constant velocity joint

- Exterior diameter: 100 mm
- Replace only as a unit
- Pressing off **Pressing off inner constant velocity joint**
- Pressing on **Pressing on inner constant velocity joint**

- Greasing **Grease quantity and type**
- Adhesive surface must be free of oil and grease
- When installing joint on profile shaft, profile shaft splines must be lightly coated with grease used in joint.

4 - Backing plate

5 - Multi-point socket head bolt

- Torque specifications:

Screw M 8: 40 Nm

Screw M10: 65 Nm

6 - Protective boot for inner CV joint with cap

- With vent hole
- Carefully drive off cap with drift
- Always replace
- In case of damage, check inner constant velocity joint --> **Inner constant velocity (CV) joint, checking**

- Coat sealing surface with D 454 300 A2 before installing on constant velocity joint --> **Fig. 215**
- Align cover to screw holes
- Protective boot/drive axle sealing surfaces must be free of grease at installation

7 - Axle shaft

8 - Outer constant velocity protective joint boot

- Without ventilation bore
- Check for tears and chafing; replace if necessary
- In case of damage, check outer constant velocity joint --> **Outer constant velocity (CV) joint, checking**
- Protective boot/drive axle/joint sealing surfaces must be free of grease at installation

9 - Clamp

- Always replace
- Tensioning **Tighten clamp**

10 - Circlip

- Always replace
- Insert in shaft groove

11 - Outer constant velocity joint

- Exterior diameter: 88 mm
- Replace only as a unit
- Driving off **Pressing off outer constant velocity joint**
- Installing: Drive onto shaft using plastic hammer until compressed circlip seats.
- Circlip must lie in joint chamfer when guiding in, guide with pliers if necessary.
- Greasing **Grease quantity and type**
- When installing joint on profile shaft, profile shaft splines must be lightly coated with grease used in joint.

12 - Collar bolt

- Always replace

Pressing off outer constant velocity joint

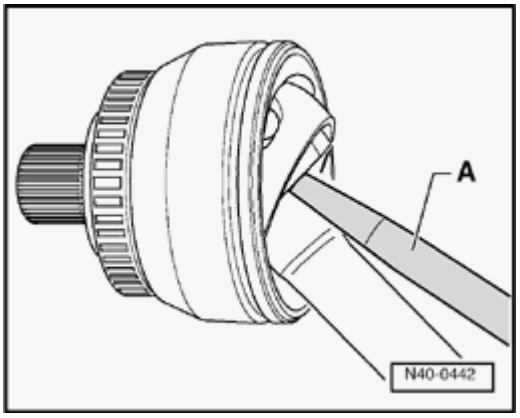

Fig. 408: Pressing Off Outer Constant Velocity Joint
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure drive shaft with protective covers in vise clamp.
- Loosen clamp and turn back protective boot.
- Drive CV joint from drive axle using a drift - **A** -.

Drift must be placed precisely on star of CV joint.

Driving joint on

- Drive onto shaft with plastic hammer until securing ring engages.

Tighten clamp

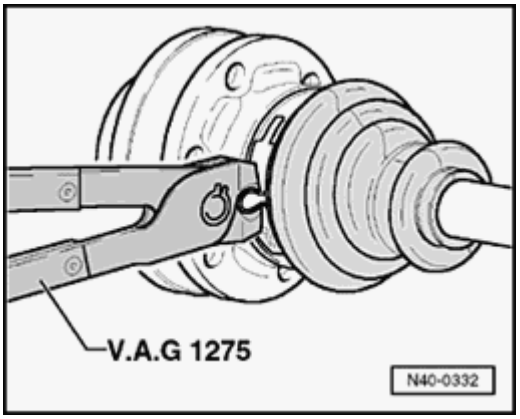

Fig. 409: Tightening Clamp
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Drive off cover for inner joint

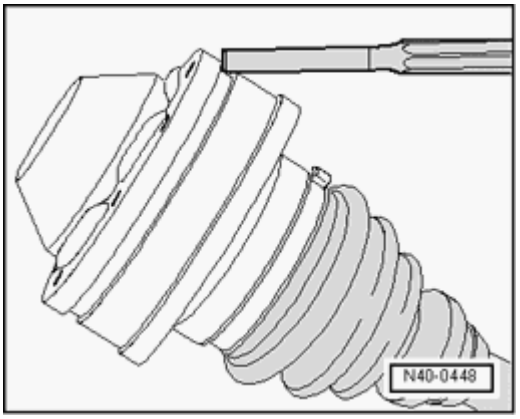

Fig. 410: Driving Off Cover For Inner Joint
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing off inner constant velocity joint

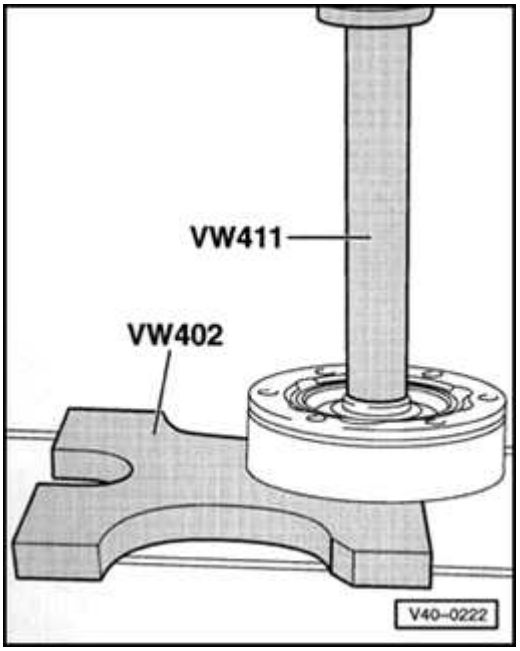

Fig. 411: Pressing Off Inner Constant Velocity Joint
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Rebound circlip
- Drive off protective boot with drift.

NOTE:

- **Support ball hub with Thrust Plate VW402.**

Pressing on inner constant velocity joint

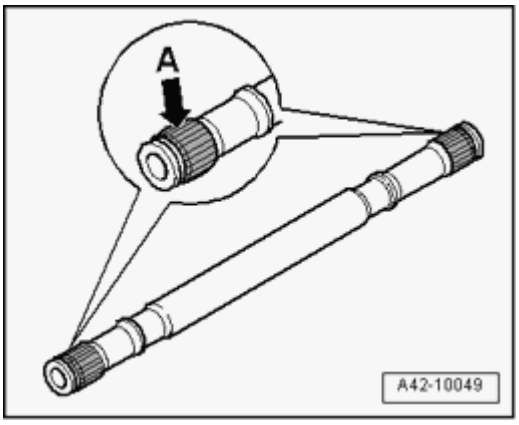

Fig. 412: Identifying Joint/Triple Roller Star Splines
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before installing joint or triple roller star, splines - **A** - must be lightly coated with grease used in joint.

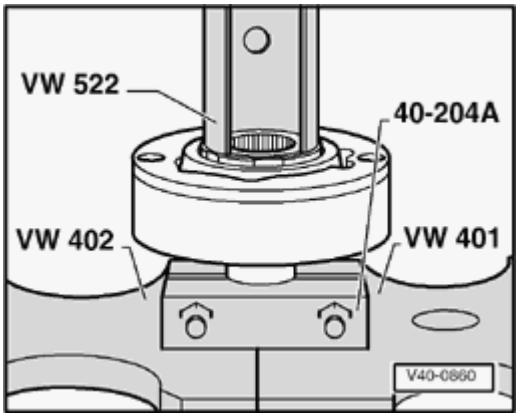

Fig. 413: Pressing On Inner Constant Velocity Joint
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press on joint until stop.

Use support sleeve VW 522

- Insert circlip.

NOTE:

- **Position ball hub with chamfer on inner diameter (splines) on drive axle.**

Coat cover or cap sealing surface with D 454 300 A2

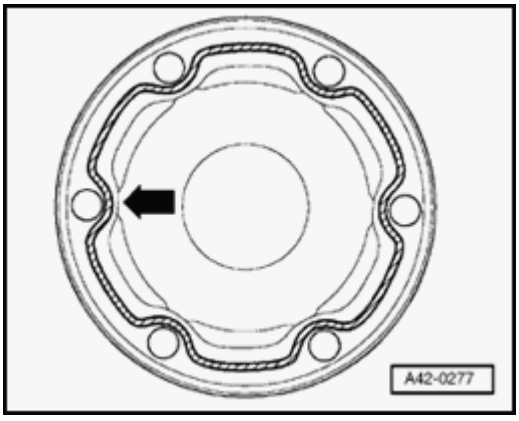

Fig. 414: Identifying Sealing Surface To Be Covered With D 454 300 A2
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Apply sealant - **hatched surface** - to clean cover or cap surface. Sealant bead: unbroken, dia. 2 to 3 mm, skirt area around inner holes - **arrow** -.
- Align cover and cap to screw holes and drive or press onto joint.
- Clear away leaking sealant immediately.

Driveshaft with constant velocity inner joint (diameter 108 mm), servicing

Special tools, testers and auxiliary items required

- Thrust plate VW 401
- Thrust plate VW 402
- Punch VW 409
- Punch VW 412

- Support sleeve VW 522
- Clamp 40-204 A
- Assembly tool T10065/4

Constant velocity joints are packed with grease G 000 603:

Grease quantity and type

	Grease quantity	**Amount in:**	
Outer joint	Total quantity	Joint	Boot
[mm]	[g]	[g]	[g]
88	90	40	50
Inner joint		Apply grease through ball paths	
108	120		

Grease joint again when replacing protective joint boot.

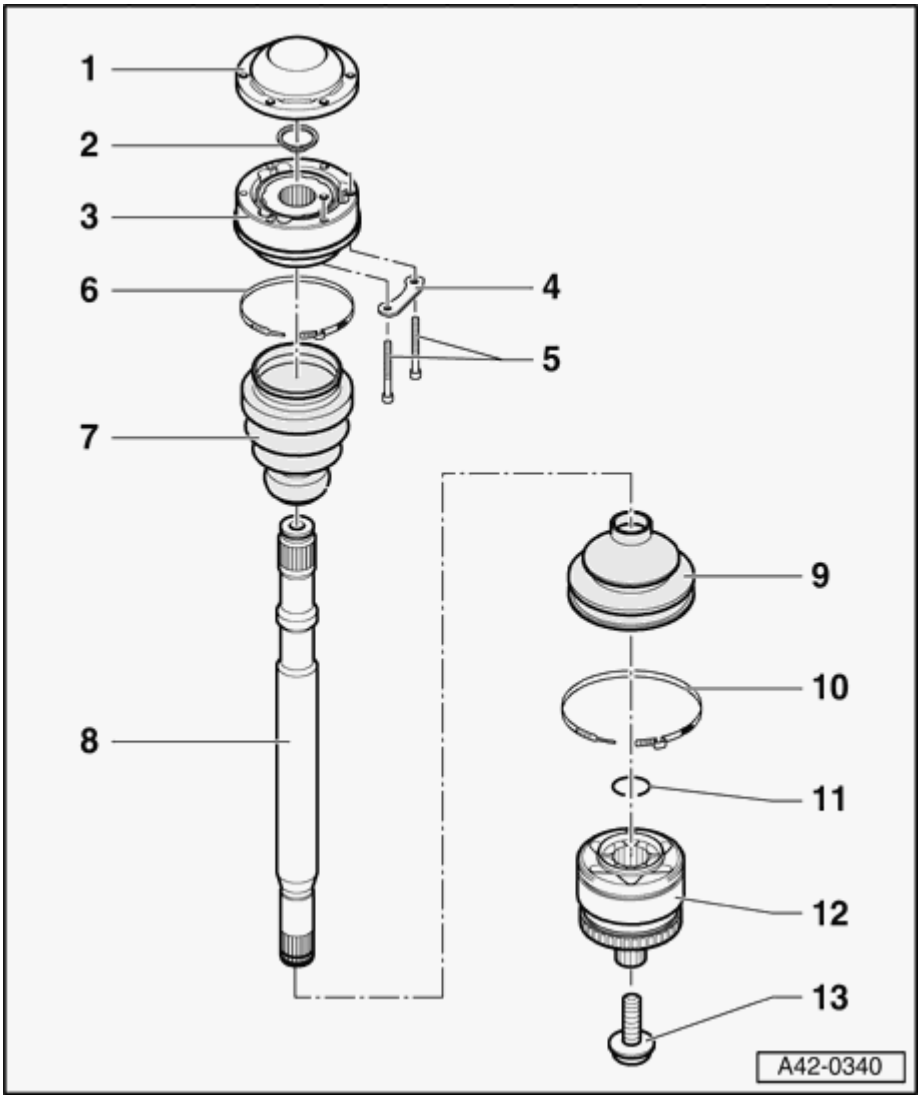

Fig. 415: Exploded View Of Driveshaft With Constant Velocity Inner Joint
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Cover

- Carefully drive off using a drift **Drive off cover for inner joint**
- Always replace
- Coat sealing surface with D 454 300 A2 before installing on constant velocity joint --> **Fig. 215**
- Align cover to screw holes

2 - Circlip

- Remove and install with commercially-available circlip pliers
- Always replace

3 - Inner CV joint with protective boot cap

- Exterior diameter: 108 mm
- Replace only as a unit
- Pressing off **Pressing off inner constant velocity joint**
- Pressing on **Pressing on inner constant velocity joint**

- Greasing **Grease quantity and type**
- Adhesive surface must be free of oil and grease
- When installing joint on profile shaft, profile shaft splines must be lightly coated with grease used in joint.

4 - Backing plate

5 - Multi-point socket head bolt

- Torque specifications:

Screw M 8: 40 Nm

Screw M10: 65 Nm

6 - Clamp

- Always replace
- Tensioning **Tighten clamp**

7 - Protective boot for inner constant velocity joint

- With vent hole
- Check for tears and chafing; replace if necessary
- In case of damage, check inner constant velocity joint --> **Inner constant velocity (CV) joint, checking**
- Protective boot/drive axle/cap sealing surfaces must be free of grease at installation

8 - Axle shaft

9 - Outer constant velocity protective joint boot

- Exterior diameter: 88 mm
- Without ventilation bore
- Check for tears and chafing; replace if necessary
- In case of damage, check outer constant velocity joint --> **Outer constant velocity (CV) joint, checking**

- Protective boot/drive axle/joint sealing surfaces must be free of grease at installation

10 - Clamp

- Always replace
- Tensioning **Tighten clamp**

11 - Circlip

- Always replace
- Insert in shaft groove

12 - Outer constant velocity joint

- Replace only as a unit
- Driving off --> **Pressing off outer constant velocity joint**
- Installing: Drive onto shaft using plastic hammer until compressed circlip seats.
- Circlip must lie in joint chamfer when guiding in, guide with pliers if necessary.
- Greasing **Grease quantity and type**
- When installing joint on profile shaft, profile shaft splines must be lightly coated with grease used in joint.

13 - Collar bolt

- Always replace

Pressing off inner constant velocity joint

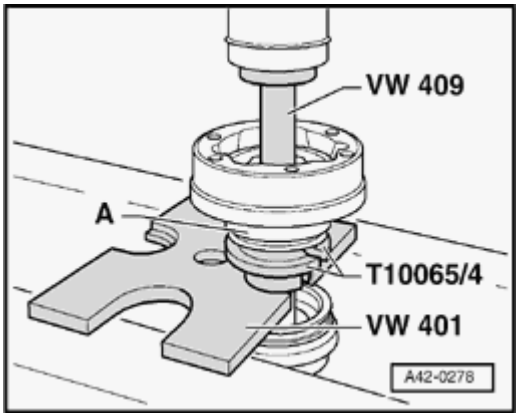

Fig. 416: Pressing Off Inner Constant Velocity Joint
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Rebound circlip
- Drive off protective boot with drift.

NOTE:

- **Cap - A - must not be supported on thrust plate VW 401. Use segments T10065/4 as spacers.**

Pressing on inner constant velocity joint

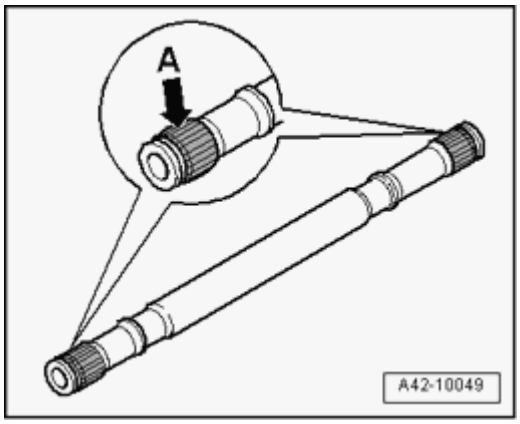

Fig. 417: Identifying Joint/Triple Roller Star Splines
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before installing joint or triple roller star, splines - **A** - must be lightly coated with grease used in joint.

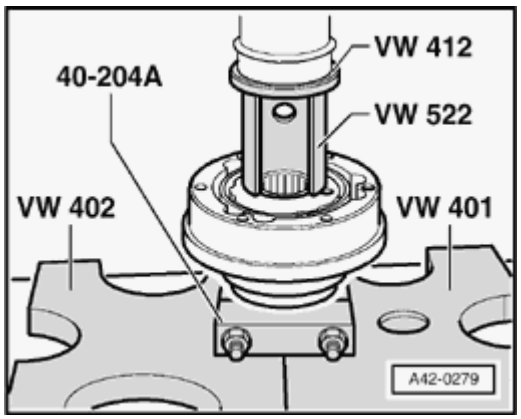

Fig. 418: Pressing On Joint Until Stop
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press on joint until stop.
- Insert circlip.

NOTE:

- **Position ball hub with chamfer on inner diameter (splines) on driveshaft.**

Outer constant velocity (CV) joint, checking

In order to replace grease in case of strong soiling, joint must be disassembled or if journal surface of balls must be checked for wear and damage.

Disassembling

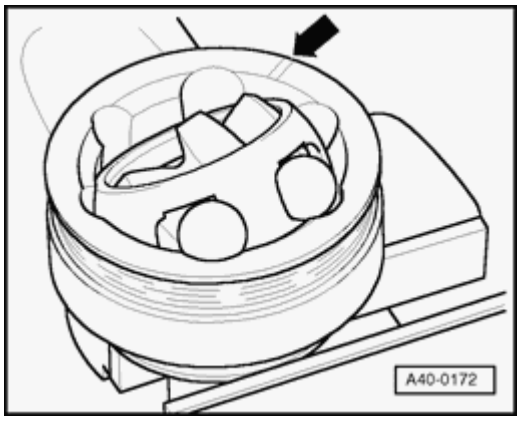

Fig. 419: Identifying Joint Body Marking
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before disassembling mark ball hub position in relation to the ball cage and housing with an electric scriber or oil stone. (see arrow)
- Swivel ball hub and ball cage.
- Remove balls one after another.

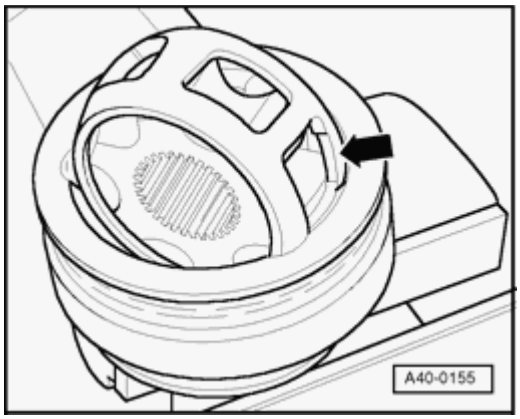

Fig. 420: Turning Cage Until Two Cage Windows Rest On Joint Body
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn cage until two cage windows - **arrow** - rest on joint body.
- Lift out cage together with hub.

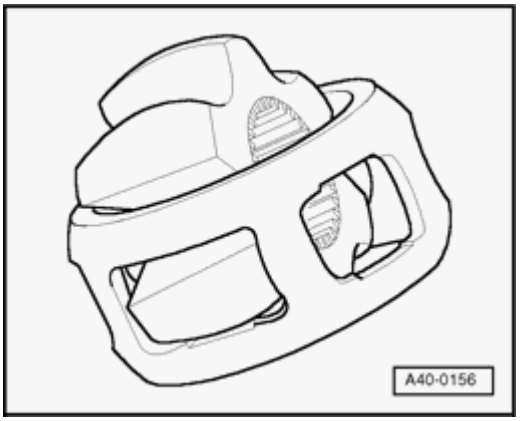

Fig. 421: Swinging Hub Segment In Cage Window
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Swing a hub segment in a cage window.
- Tilt hub out of cage.

Checking

6 balls for each joint belong to a tolerance group. Check stub axle, hub, cage and balls for small indentations (pitting) and signs of seizure. Excessive backlash in the joint will cause knocking or jolts under load change. In such cases joint should be replaced. Flattening and running marks of balls are no reason to replace joint.

Assembling

- Press quantity of grease into joint body **Grease quantity and type** (100 mm dia.) or **Grease quantity and type** (108 mm dia.), grease quantity and type.
- Install cage with hub in the joint housing.

NOTE:

- **Cage must be installed laterally correct.**

- Press in opposing balls in sequence, during this, previous position of ball hub to ball cage and to joint body must be re-established.

Inner constant velocity (CV) joint, checking

In order to replace grease in case of strong soiling, joint must be disassembled and if journal surfaces and balls must be checked for wear and damage.

Disassembling

NOTE:

- **Ball hub and joint are paired and should be identified before removal. Do not interchange cage allocation.**

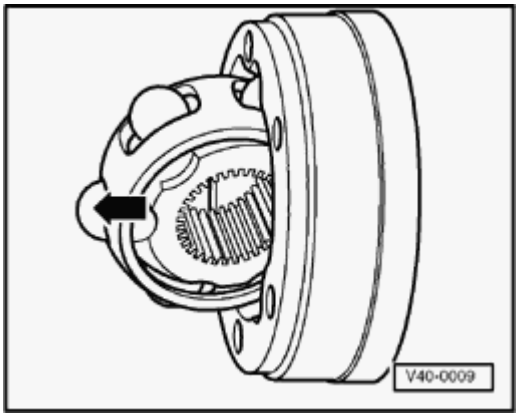

Fig. 422: Pressing Out Ball Joint Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Swing ball hub and ball cage and pull out of joint in direction of - **arrow** -.
- Press balls out of cage.

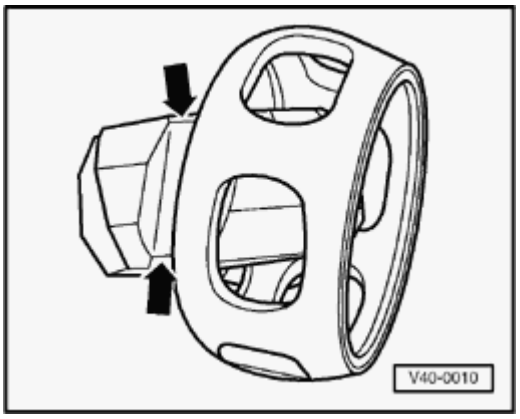

Fig. 423: Tilting Ball Hub Out Of Ball Cage Over Ball Track
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Flip out ball hub from ball cage via running path of ball - **arrows** -.

Checking

- Check joint housing, ball hub, ball cage and balls for indentations (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 replaced. Flattening and running marks of balls are no reason to replace joint.**

Assembling

- Press quantity of grease into joint body **Grease quantity and type** (100 mm dia.) or **Grease quantity and type** (108 mm dia.), grease quantity and type.

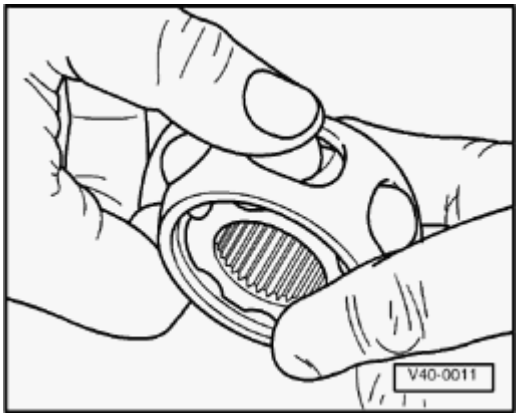

Fig. 424: Inserting Ball Hub Over Both Chamfers Into Ball Cage
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert ball hub into ball cage via two chamfers. The hub can be installed in any position. Press balls into cage.
- Insert hub with cage and balls at right angle to the joint.

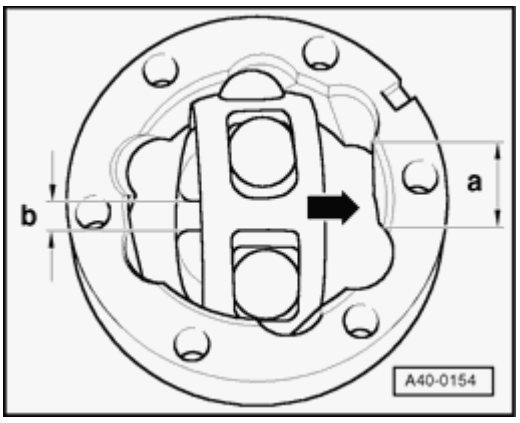

Fig. 425: Wide Spacing On The Joint Body Aligned With The Narrow Spacing On Hub
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- **When inserting make sure that the wide space - a - on joint housing is aligned with the narrow space - b - on the hub after swiveling in.**

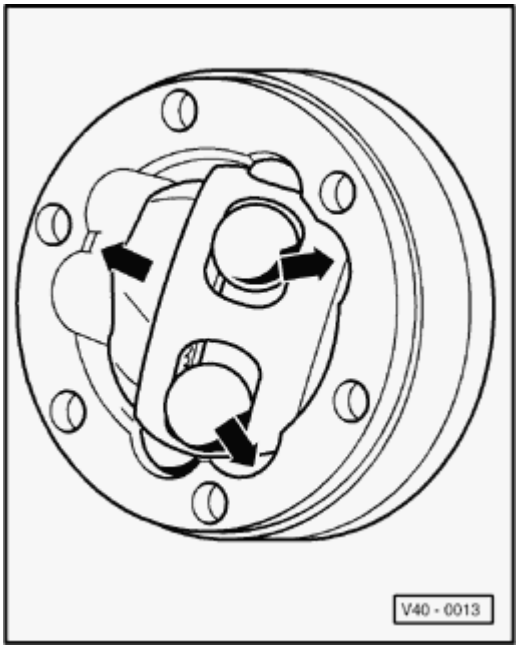

Fig. 426: Ball Hub Installed With Hub Able To Be Swivelled Out Of Cage
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install ball hub, whereby the hub must be swiveled out of cage - **arrows** - far enough to allow balls to fit into ball tracks.

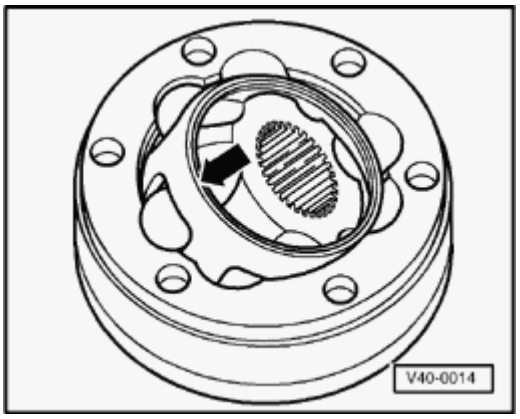

Fig. 427: Pressing Cage Firmly Until Hub Is In Position
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press cage firmly - **arrow** - until hub swings fully in position.

Constant velocity joint, checking for function:

Constant velocity joint is properly assembled, if ball hub can be slid back and forth by hand over whole compensation length.

43 - SELF-LEVELING SUSPENSION

DYNAMIC RIDE CONTROL (DRC II)

General information

Only approved oil should be used for filling or topping off.

To attach or detach charging device V.A.S 6209/2 , system line to be checked must be locked at central valve to limit the quantity of oil leaked to a minimum and to prevent pressurized central valve from emptying.

Before removal or separation, the corresponding line for every DRC component is to be locked at central valve. If work on DRC with unlocked central valve results in even a small amount of oil, a system pressure check with comparison to specified values must be performed in every case. If minimum pressure is not met, central valve must be replaced.

Small oil leak with locked central valve which results from connecting or disconnected charging device V.A.S 6209/2 at connection is not critical. Avoid repeating measurements because a small quantity of oil is removed from the system every time V.A.S 6209/2 is connected. Every connection results in a pressure decrease of approx. 0.3 bar from the previous reading. In this way, multiple repeats of measurements cause pressure to fall below minimum level or malfunction.

Dampers and lines are delivered empty as replacement parts.

Filling must only be done at room temperature (approx. 20° Celsius).

Dampers must only be filled when installed.

Vehicle must never be placed on wheels with closed, filled system and locked central valves. This inevitably leads to leaks and system malfunction.

Lines must not be bent.

Installation location

Dynamic Ride Control (DRC II).

Illustration applies to sedan and wagon.

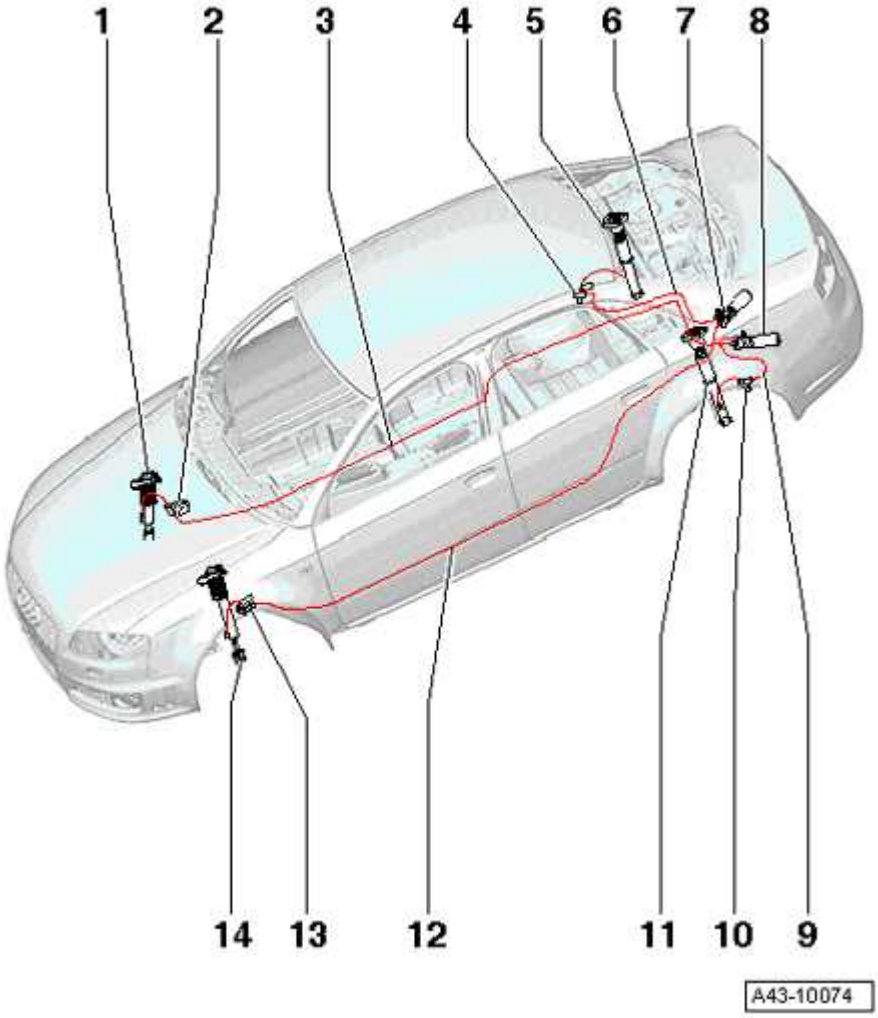

Fig. 428: Dynamic Ride Control (DRC II) Installation Location
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Right front suspension strut

2 - Front right extraction/filling valve

3 - DRC line to front right suspension strut

4 - Right rear extraction/filling valve

5 - Right rear strut

Rear strut

6 - DRC line to right rear strut

7 - Left front and right rear central valve

- Central valve is installed in direction of travel at right --> **Central valve and connections to suspension struts**

8 - Right front and left rear central valve

- Central valve is installed in direction of travel at left --> **Central valve and connections to suspension struts**

9 - DRC line to left rear strut

10 - Left rear extraction/filling valve

11 - Left rear strut

Rear strut

12 - DRC line to left front suspension strut

13 - Left front extraction/filling valve

14 - Left front suspension strut

Central valve and connections to suspension struts

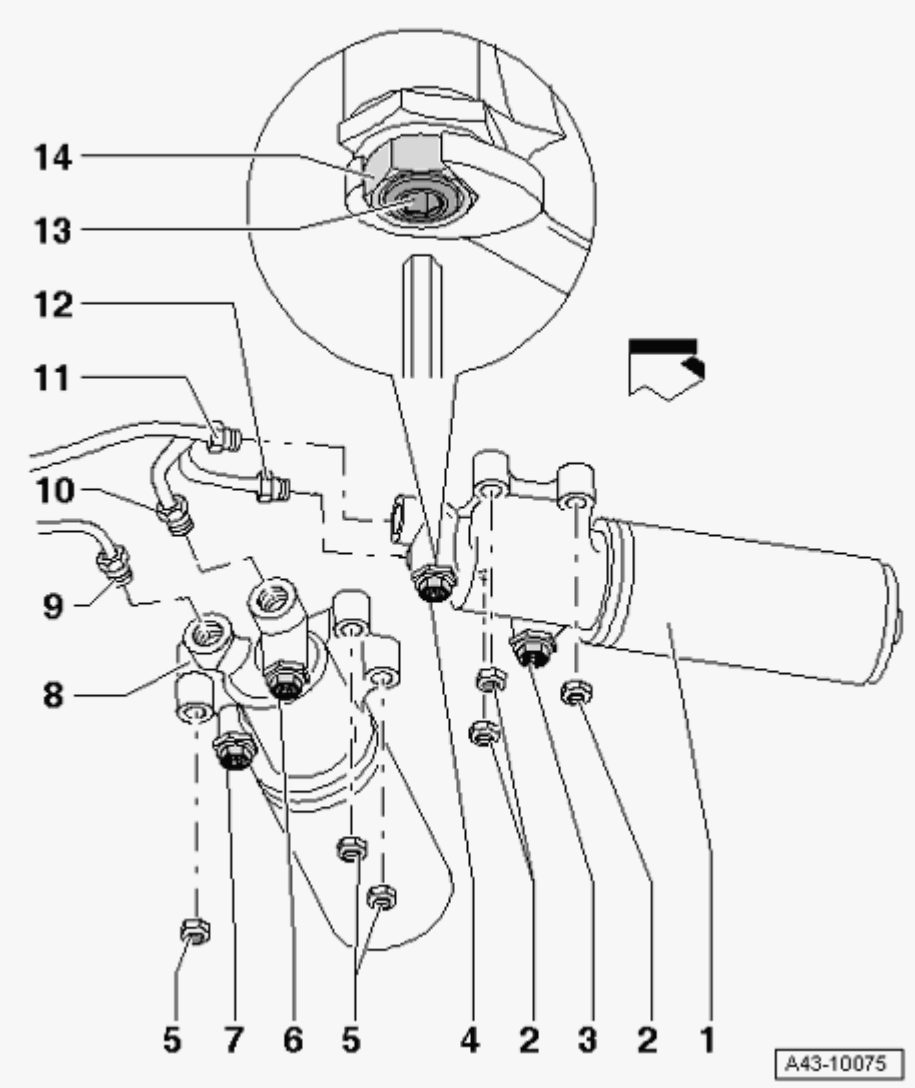

Fig. 429: Central Valve And Connections To Suspension Struts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Right front and left rear central valve

- Central valve is installed in direction of travel at left

2 - Nut, 23 Nm

3 - Rear wiring harness shut-off valve

4 - Front right wiring harness shut-off valve

5 - Nut 23 Nm

6 - Front left wiring harness shut-off valve

7 - Left rear right wiring harness shut-off valve

8 - Left front and right rear central valve

- Central valve is installed in direction of travel at right

9 - DRC line to right rear strut

10 - DRC line to left front suspension strut

11 - DRC line to right front suspension strut

12 - DRC line to left rear strut

13 - Shut-off screw

- To shut off, turn clockwise to stop
- To open, turn counter-clockwise to stop

14 - Lock nut, 12 Nm

Front suspension strut

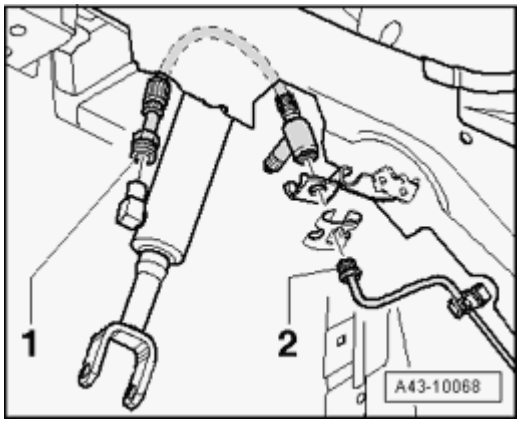

Fig. 430: Front Suspension Strut Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Torque specifications:

NOTE:

- **When fastening item - 2 - , ensure lug is seated properly in bracket.**

Torque specifications:

- **1** - torque specification: 19 Nm

- **2** - torque specification: 19 Nm

Rear strut

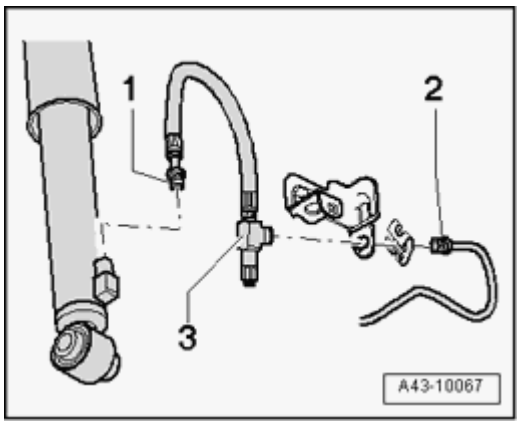

Fig. 431: Rear Strut Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- **When fastening item - 2 - , ensure lug is seated properly in bracket.**
- **When tighten, item - 2 - must be counterheld at connection block - 3 -.**

Torque specifications:

- **1** - torque specification: 19 Nm

- **2** - torque specification: 19 Nm

DRC II fault finding

Start				
Rattling noise from suspension area or rear of vehicle when driving on poor stretches of road				Body pulls strongly to side when turning
-->	Oil loss identifiable?			<--
	?		?	
• Check components • Check connections to central valves, struts and wiring	<-- Yes		No -->	Check all connections to central valves, struts and wiring harnesses.

<table>
<tr><td>harnesses.

• Replace leaking dampers</td><td></td><td></td><td></td><td></td></tr>
<tr><td>?</td><td colspan="2"></td><td></td><td>?</td></tr>
<tr><td>?</td><td></td><td></td><td colspan="2">Complaint fixed?</td></tr>
<tr><td>?</td><td>?</td><td>?</td><td colspan="2" rowspan="4"></td></tr>
<tr><td>?</td><td>No ?</td><td>Yes ?</td></tr>
<tr><td>?</td><td>Check system pressure in both lines. (Central valve must be locked when connecting and disconnecting charging device.)</td><td>?</td></tr>
<tr><td>?</td><td colspan="2"></td><td>?</td><td>?</td></tr>
<tr><td>?</td><td></td><td colspan="2">System pressure greater than 12.0 bar?</td><td>?</td></tr>
<tr><td>?</td><td></td><td>No ?</td><td>Yes ?</td><td>?</td></tr>
<tr><td colspan="3">Replace central valve</td><td>?</td><td>?</td></tr>
<tr><td colspan="3">?</td><td>?</td><td>?</td></tr>
<tr><td colspan="4">Suction, evacuate and fill front and rear dampers and connection lines.</td><td>?</td></tr>
<tr><td colspan="5">?</td></tr>
<tr><td colspan="5">End</td></tr>
</table>

DRC II system pressure check

Special tools, testers and auxiliary items required

- Charging device V.A.S 6209/2
- Hand vacuum pump VAS 6213

Bleed charging device V.A.S 6209/2

Use only approved oil for the bleeding process.

NOTE:

- **Charging device V.A.S 6209/2 must always be bled at initial use.**
- **If charging device V.A.S 6209/2 still shows a pressure greater than 0.5 bar (e.g. from a previous reading), bleeding must not be done.**

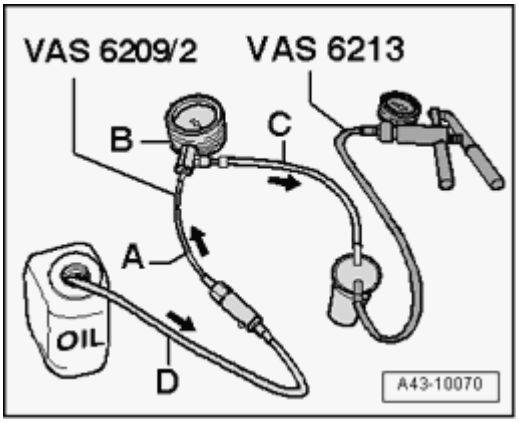

Fig. 432: Bleeding Pressure Gauge And Line Section
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- To bleed pressure gauge - **B** - and line section - **A** - , install special tool as shown in illustration.

NOTE:

- **Illustration shows bleeding process by extracting hydraulic oil with hand vacuum pump VAS 6213**

- Bleed process must be performed until air bubbles are no longer visible in hose - **C** -.
- Disconnect hose - **C** - and - **D** - and perform system pressure check.

System pressure check is performed on front strut of respective DRC line.

NOTE:

- **To attach or detach charging device V.A.S 6209/2 , system line to be checked must be locked at central valve to limit the quantity of oil leaked to a minimum and to prevent pressurized central valve from emptying.**

- Remove wheel.

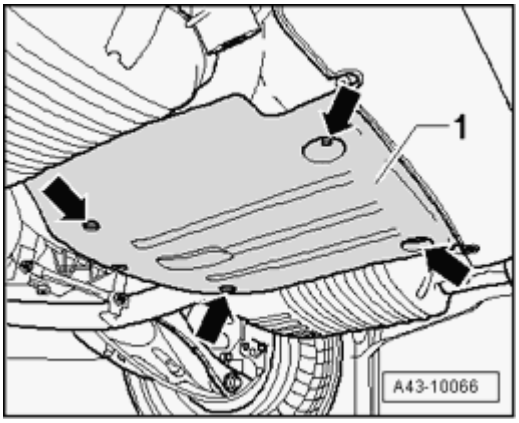

Fig. 433: Removing/Installing Plastic Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove plastic cover - **1** -.

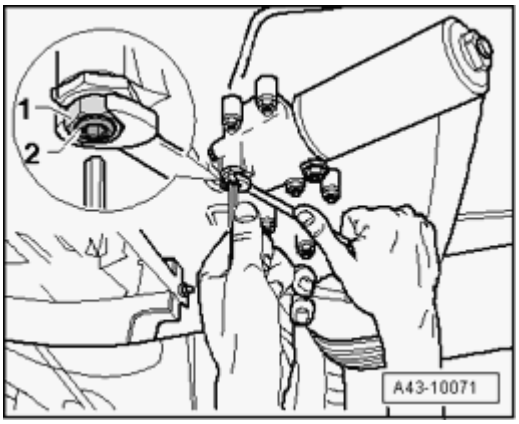

Fig. 434: Loosening Lock Nut On Line To Be Checked & Screwing In Shut-Off Screw Until It Is Hand Tight
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen lock nut - **1** - on line to be checked, screw in shut-off screw - **2** - until it is hand tight and lock nut - **1** - again.

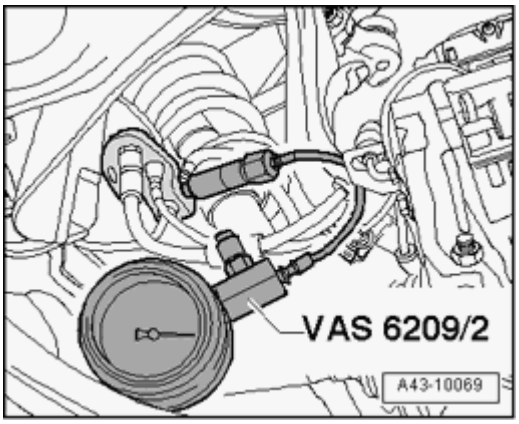

Fig. 435: Reading System Pressure At Charging Device V.A.S 6209/2
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove dust cap and connect charging device V.A.S 6209/2.

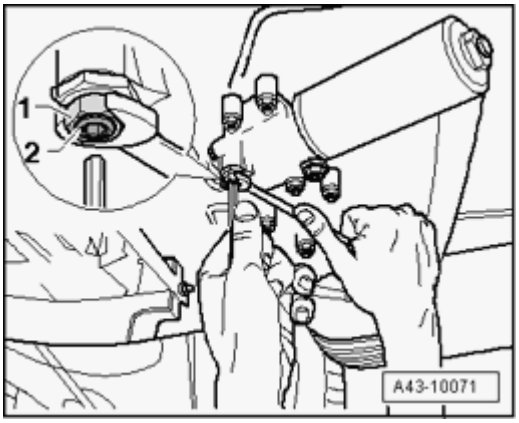

Fig. 436: Loosening Lock Nut On Line To Be Checked & Screwing In Shut-Off Screw Until It Is Hand Tight
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen lock nut - **1** - on line to be checked, unscrew shut-off screw - **2** - until it is hand tight and lock nut - **1** - again.

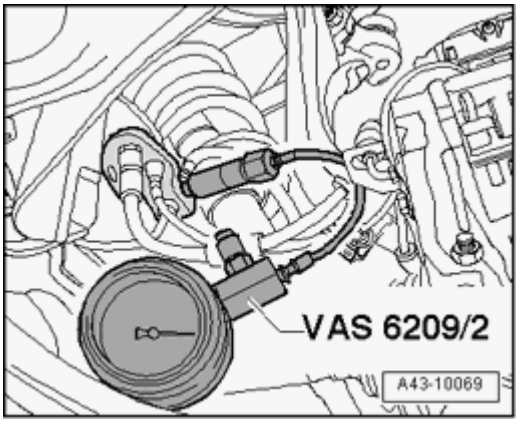

Fig. 437: Reading System Pressure At Charging Device V.A.S 6209/2
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Read system pressure at charging device V.A.S 6209/2.

NOTE:

- **Pressure increase at charging device V.A.S 6209/2 occurs slowly and takes approx. 2 minutes. DRC system pressure can only be read when V.A.S 6209/2 needle has finally come to a stop.**

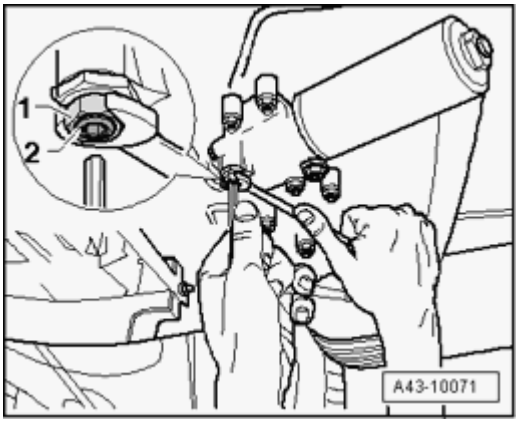

Fig. 438: Loosening Lock Nut On Line To Be Checked & Screwing In Shut-Off Screw Until It Is Hand Tight
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen lock nut - **1** - on line to be checked, screw in shut-off screw - **2** - until it is hand tight and lock nut - **1** - again.

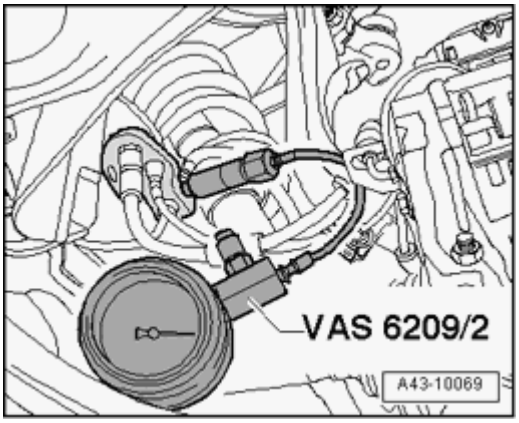

Fig. 439: Disconnecting Charging Device V.A.S 6209/2 And Installing Dust Cap
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect charging device V.A.S 6209/2 and install dust cap.

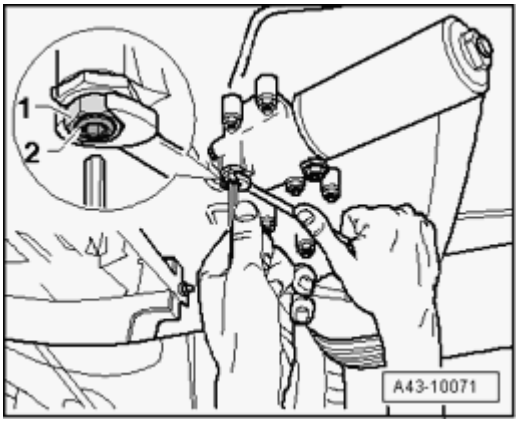

Fig. 440: Loosening Lock Nut On Line To Be Checked & Screwing In Shut-Off Screw Until It Is Hand Tight
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen lock nut - **1** - on line to be checked, unscrew shut-off screw - **2** - until it is hand tight and lock nut - **1** - again.

NOTE:

- **Small oil leak which results from connecting or disconnected charging device V.A.S 6209/2 at connection is not critical. Avoid repeating measurements because a small quantity of oil is removed from the system every time V.A.S 6209/2 is connected. Every connection results in a pressure decrease of approx. 0.3 bar from the previous reading. In this way, multiple repeats of measurements cause pressure to fall below minimum level or malfunction.**

- If pressure is not OK, determine cause of malfunction and service system.

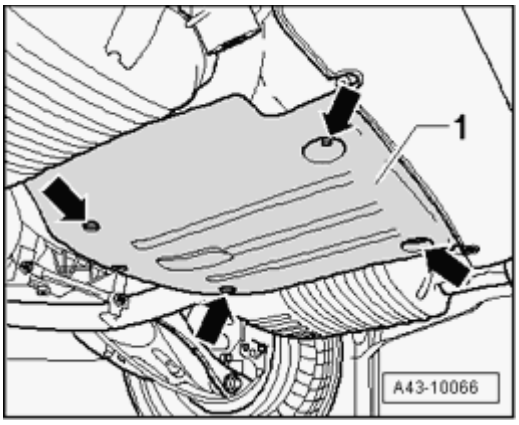

Fig. 441: Removing/Installing Plastic Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install plastic cover - **1** -.

DRC system pressure values

Pressure values are based on a reference temperature of 20°C.

- 16 bar = maximum pressure
- 15 - 16 bar = Central valve new or in like new condition
- 12 - 15 bar = Normal range of operation, system OK
- 12 bar = System leaking or not filled completely, air entering system, central valve faulty.

Dynamic Ride Control (DRC II), emptying and filling

Special tools, testers and auxiliary items required

- Charging device V.A.S 6209
- Vehicle connection adapter V.A.S 6209/1

Only approved oil should be used for filling or topping off.

Filling must only be done at room temperature (approx. 20°Celsius).

Vehicle must never be placed on wheels with closed, filled system and locked central valves. This inevitably leads to leaks and system malfunction.

Equipment valves are open when locking levers are longitudinal to direction of flow.

Workshop equipment needed

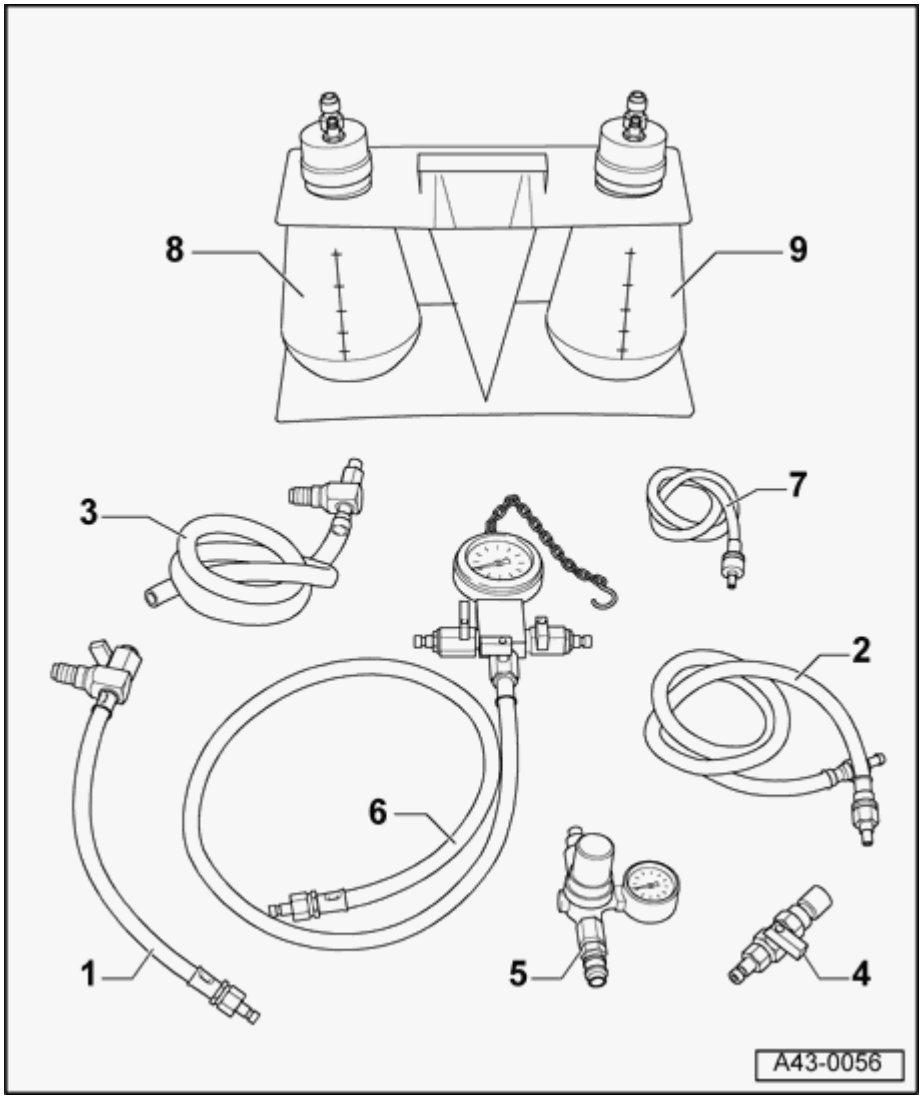

Fig. 442: Dynamic Ride Control (DRC II), Emptying And Filling Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Vehicle connection adapter with ventilation valve V.A.S 6209/1

2 - Connecting hose

3 - Venturi with exhaust hose

4 - Valve

5 - Pressure reducer

6 - Pressure gauge with valves and filler hose

7 - Intake hose

8 - Used oil container

Identification: red dot

9 - New oil container

Identification: green dot

Fill new oil container

CAUTION: Protective eye wear must be worn for all procedures!

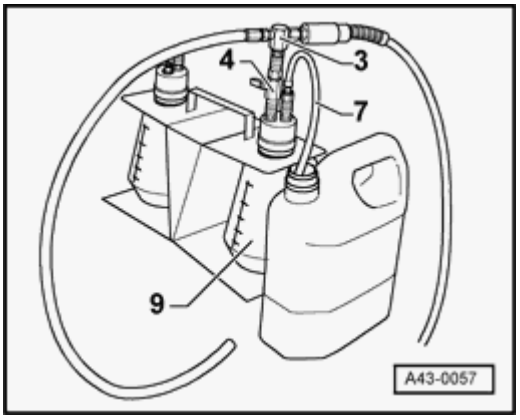

Fig. 443: Fill New Oil Container
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect suction hose - **7** - to new oil container - **9** -.
- Immerse free end of hose - **7** - in oil in storage container.
- Close valve - **4** -.
- Connect valve - **4** - to new oil container.

- Connect venturi - **3** - to valve - **4** -.
- Connect compressed air hose to venturi - **3** -.
- Slowly open valve - **4** - and draw oil out of storage container into new oil container.

Maximum quantity 1.5 liters.

NOTE:

- **Oil can foam up when it is drawn out.**
- **Stop suction process so that foam can settle.**

Empty used oil container

CAUTION: Protective eye wear must be worn for all procedures!

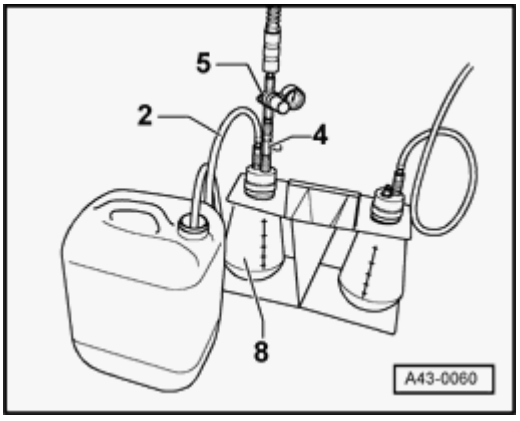

Fig. 444: Empty Used Oil Container
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place suitable container for collecting used oil near used oil container - **8** -.
- Connect connecting hose - **2** - to used oil container - **8** - and keep free end in collection container.
- Close valve - **4** - (lever perpendicular to direction of flow).
- Attach valve - **4** - to used oil container - **8** -.

- Connect pressure reducer - **5** - to valve - **4** -.
- Pull out rotary knob at pressure reducer - **5** - and turn left to stop.
- Connect compressed air connector to pressure reducer - **5** -.
- Adjust pressure to 0.1 bar.

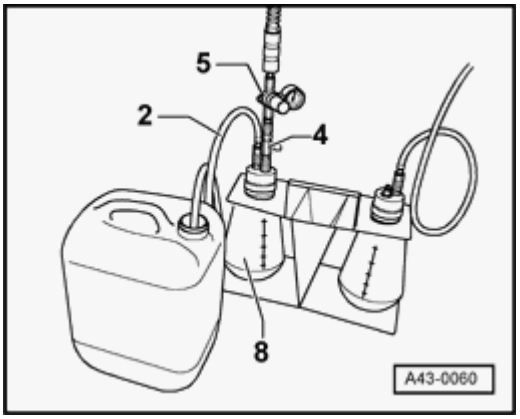

Fig. 445: Empty Used Oil Container
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Slowly open valve - **4** - and press oil out of used oil container - **8** - as completely as possible.
- Close valve - **4** -.
- Turn pressure reducer - **5** - back to 0 bar.

NOTE:

- **A small quantity of remaining oil is permitted.**
- **An empty used oil container is necessary for the next step, "evacuation" !**

Suctioning oil from damper and line, evacuating and filling

Procedure is described for front axle, same procedure applies to rear axle.

CAUTION: Protective eye wear must be worn for all procedures!

NOTE:

- **Fill new oil container ahead of time Fill new oil container**
- **Empty used oil container ahead of time Empty used oil container**

Suctioning:

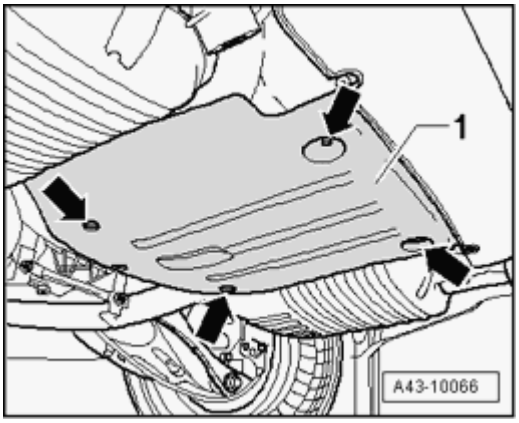

Fig. 446: Removing/Installing Plastic Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove plastic cover - **1** -.

NOTE:

- **To attach or detach adapter V.A.S 6209/1 , system line must be locked at central valve to limit the quantity of oil leaked to a minimum and to prevent pressurized central valve from emptying.**
- **Allocation of central valves and wiring harnesses --> Central valve and connections to suspension struts**

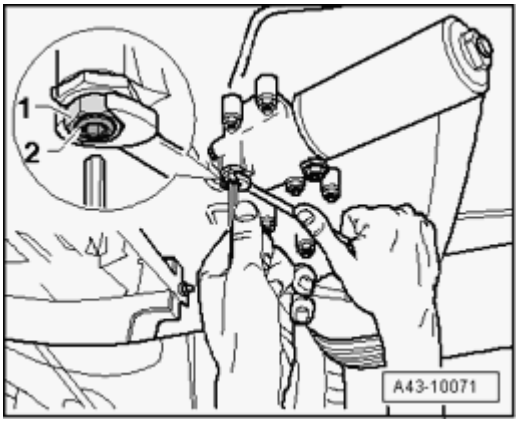

Fig. 447: Loosening Lock Nut On Line To Be Checked & Screwing In Shut-Off Screw Until It Is Hand Tight
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen lock nut - **1** - on line to be suctioned, screw in shut-off screw - **2** - until it is hand tight and lock nut - **1** - again.

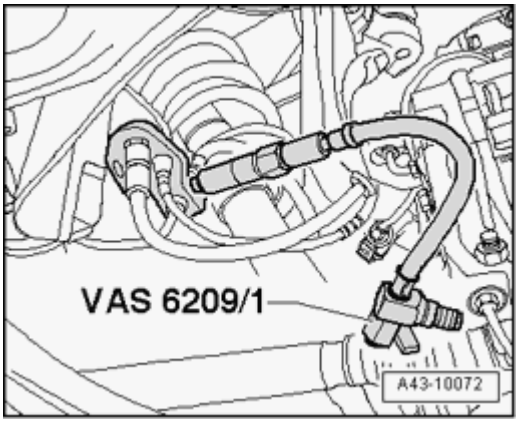

Fig. 448: Connecting Adapter V.A.S 6209/1 To Line To Be Suctioned
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect adapter V.A.S 6209/1 to line to be suctioned.

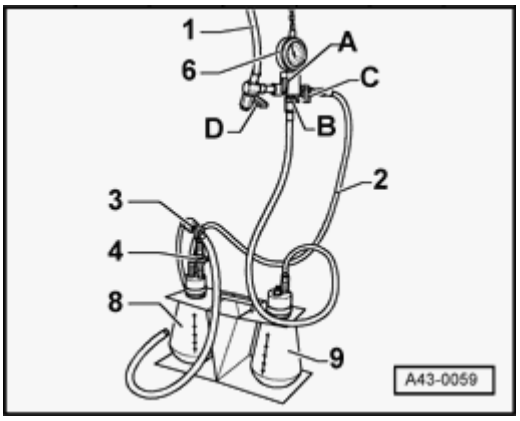

Fig. 449: Performing Suction Procedure
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure pressure gauge - **6** - with chain to vehicle in an appropriate place and connect filler hose to new oil container - **9** -.
- Connect adapter V.A.S 6209/1 , item - **1** - in illustration, to pressure gauge - **6** -.
- Connect connecting hose - **2** - to pressure gauge - **6** - and connect free end to used oil container - **8** -.
- Attach valve - **4** - to used oil container - **8** - , valve closed.

- Connect venturi - **3** - to valve - **4** -.

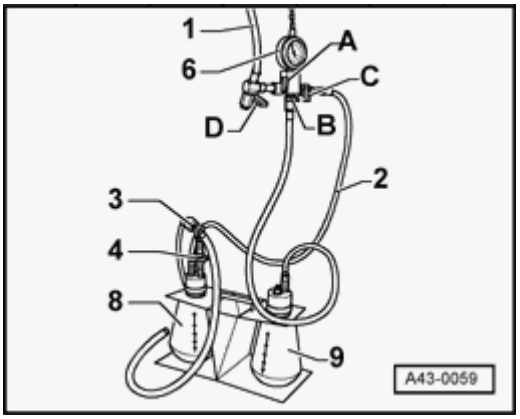

Fig. 450: Performing Suction Procedure
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Adjust valve as follows:

- **A** - = Open (lever longitudinal to direction of flow)

- **B** - = Closed (lever perpendicular to direction of flow)

- **C** - = Open (lever longitudinal to direction of flow)

- **D** - = Closed (lever perpendicular to direction of flow)

- Connect compressed air hose to venturi - **3** -.
- Slowly open valve - **4** - at used oil container completely.

Oil is suctioned.

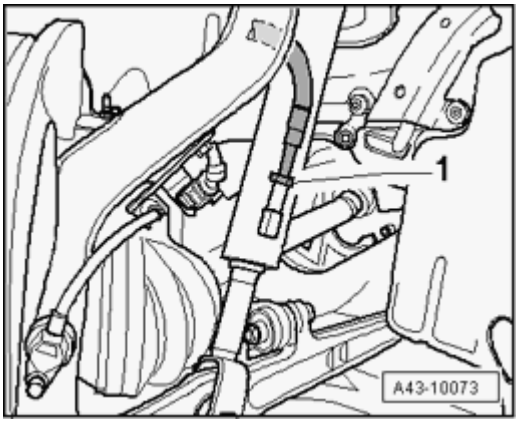

Fig. 451: Opening Line Connection At Strut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Open line connection - **1** - at strut approx. one turn and suction oil out until as little remains as possible.

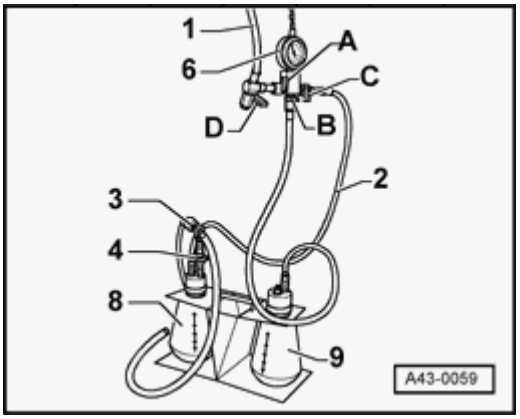

Fig. 452: Performing Suction Procedure
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- To shorten suction process, valve - **D** - should be quickly and regularly opened lightly and closed again immediately during the suction process.

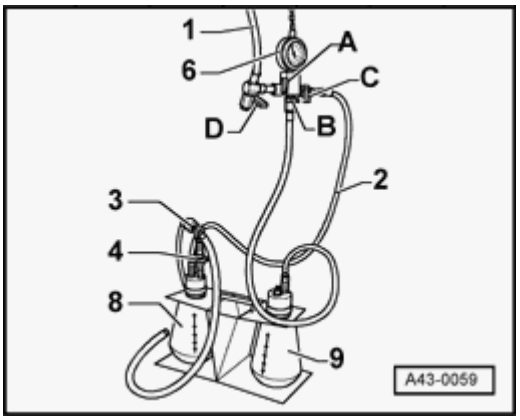

Fig. 453: Performing Suction Procedure
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Perform suction procedure until there is no more oil in connecting hose - **2** -.

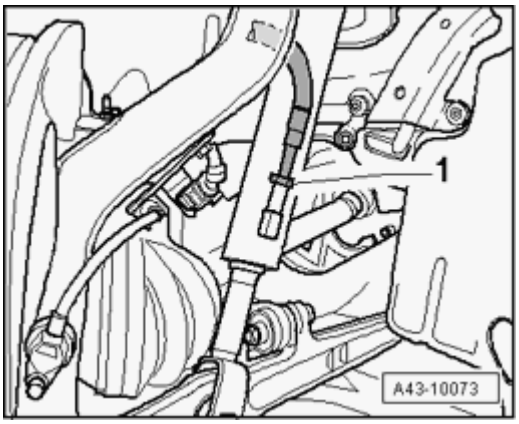

Fig. 454: Opening Line Connection At Strut

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Close line connection - **1** - to strut again.

Evacuating:

"Suctioning" step must be performed.

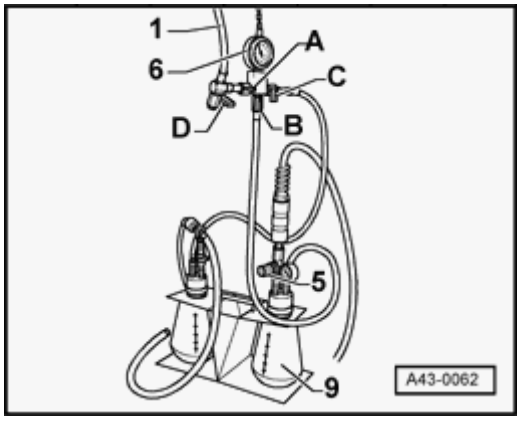

Fig. 455: Performing Evacuating Procedure
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Create a vacuum of at least -0.9 bar at pressure gauge - **6** -.
- Continue evacuation process at minimum -0.9 bar for at least 2 minutes.

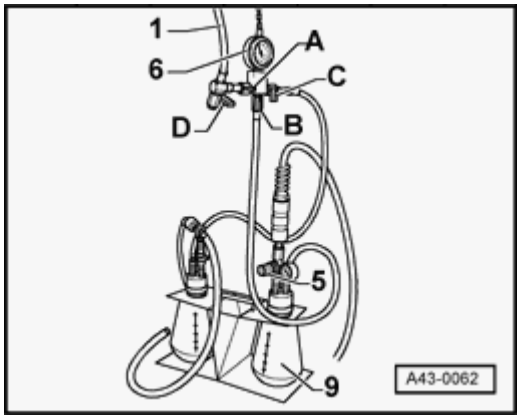

Fig. 456: Performing Evacuating Procedure
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bleed pressure gauge filler line - **6** -.

NOTE:

- **During the evacuation process, only open valve lightly - B - and allow oil to be suctioned without bubbles from new oil container - 9 - to pressure gauge.**

- Close valve - **C** -.
- Close valve - **4** -.
- Disconnect compressed air line.
- Perform leak test.

NOTE:

- **Vacuum must remain stable at -0.9 bar for at least 2 minutes.**

Filling

NOTE:

- **"Evacuating" step must be performed.**
- **Vacuum must be created for "evacuating" step.**

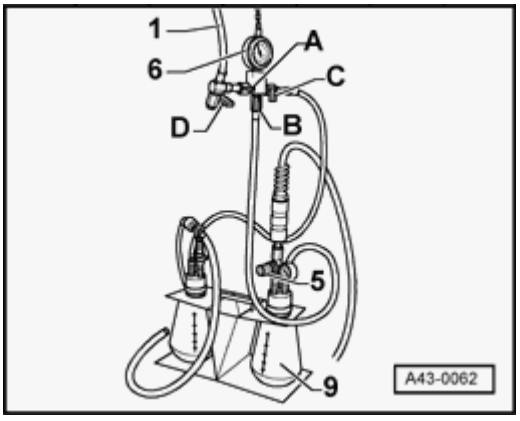

Fig. 457: Performing Evacuating Procedure
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Valve - **A** - is open.
- Valves - **B** - to - **D** - are closed.
- Connect compressed air connector to pressure reducer - **5** -.
- Close pressure reducer completely.

Display 0 bar

- Place pressure reducer - **5** - together with connected compressed air connection on new oil container - **9** -.
- Set pressure reducer to 2 bar.

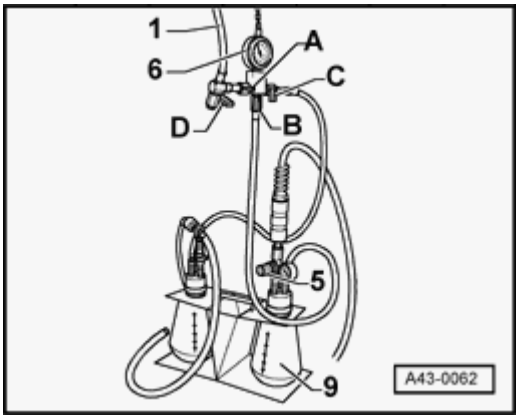

Fig. 458: Performing Evacuating Procedure
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Valve - **B** - open.

Oil flows out of new oil container - **9** - into connected component. Recognizable with decreasing oil level in new oil container.

- Slowly increase pressure at pressure reducer - **5** - to 5 bar.

NOTE:

- **At this point, read pressure only at pressure gauge - 6 - , not at pressure reducer.**

Component is filled.

- Close valve - **A** -.
- Close valve - **B** -.
- Close pressure reducer - **5** - (pull out rotary knob on pressure reducer - **5** - and turn it left to stop).
- Remove adapter V.A.S 6209/1 from vehicle.

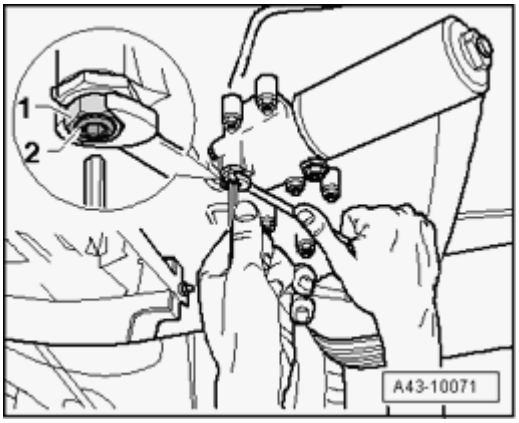

Fig. 459: Loosening Lock Nut On Line To Be Checked & Screwing In Shut-Off Screw Until It Is Hand Tight

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen lock nut - **1** - on filled line, unscrew shut-off screw - **2** - until it is hand tight and lock nut - **1** - again.
- After filling process, perform pressure check on respective DRC line --> **DRC II system pressure check**

48 - STEERING

STEERING WHEEL WITH AIRBAG

Steering wheel with airbag, assembly overview

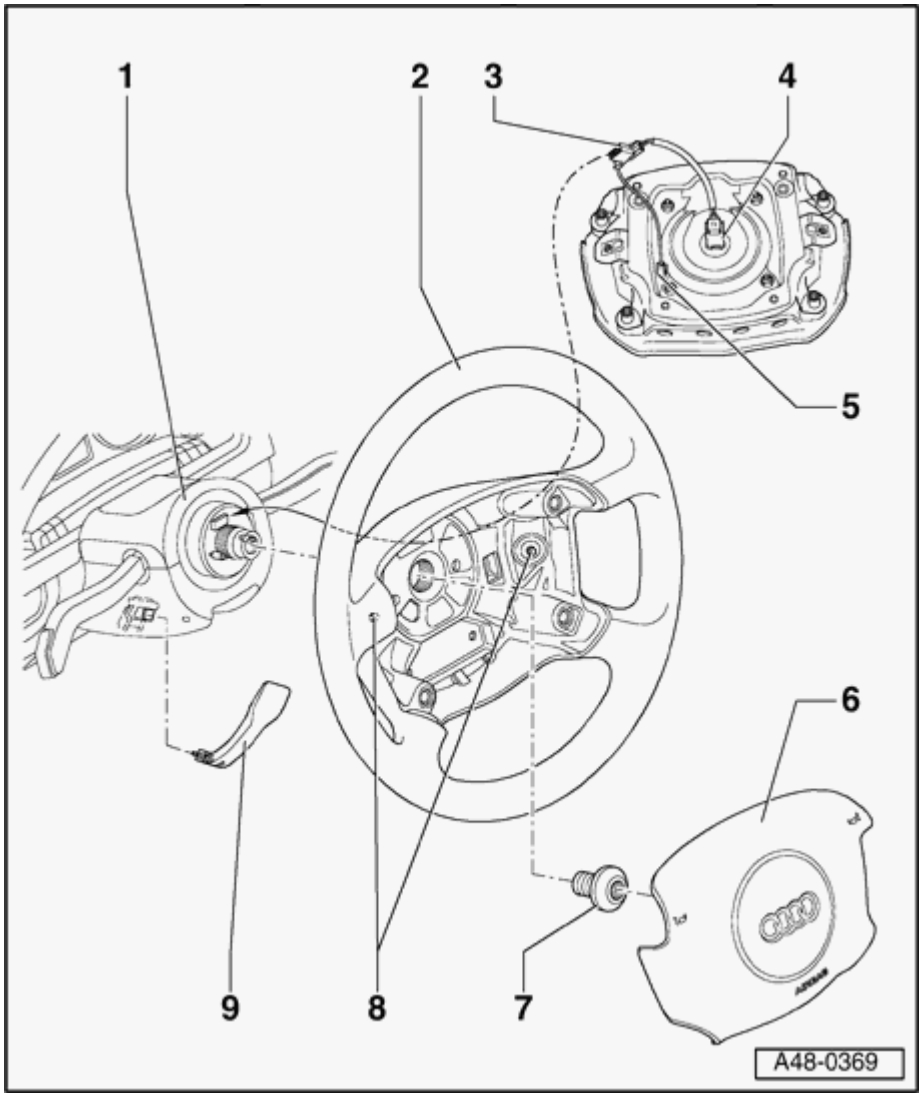

Fig. 485: Steering Wheel With Airbag, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Steering column switch trim

- Removing and installing -->
  - **70 - INTERIOR TRIM**
  - **70 - INTERIOR TRIM** for BODY INTERIOR - CABRIOLET

2 - Steering wheel

- Removing and installing --> **Airbag steering wheel, removing and installing**
- Various versions

3 - Spiral spring connector

4 - Airbag unit connector

5 - Signal horn connector

6 - Airbag unit

- Observe safety precautions -->
  - **69 - PASSENGER PROTECTION - AIRBAGS, SEAT BELTS**
  - **69 - PASSENGER PROTECTION - AIRBAGS, SEAT BELTS** for BODY INTERIOR - CABRIOLET
- Removing and installing -->
  - **69 - PASSENGER PROTECTION - AIRBAGS, SEAT BELTS**
  - **69 - PASSENGER PROTECTION - AIRBAGS, SEAT BELTS** for BODY INTERIOR - CABRIOLET

7 - Multi-point socket head screw, 50 Nm

- Always replace

8 - Screw (see torque) -->

- **69 - PASSENGER PROTECTION - AIRBAGS, SEAT BELTS**
- **69 - PASSENGER PROTECTION - AIRBAGS, SEAT BELTS** for BODY INTERIOR - CABRIOLET

9 - Steering column adjustment lever

Airbag steering wheel, removing and installing

Removing airbag steering wheel:

- Bring wheels to straight position
- Remove airbag unit -->
  - **69 - PASSENGER PROTECTION - AIRBAGS, SEAT BELTS**
  - **69 - PASSENGER PROTECTION - AIRBAGS, SEAT BELTS** for BODY INTERIOR - CABRIOLET
- Remove multi-point socket head screw

Installing airbag steering wheel

When installing, observe the following:

Before positioning steering wheel, make sure wheels are in straight position.

- Position steering wheel and tighten to 50 Nm.
- Always replace screws.

STEERING COLUMN

Steering column, assembly overview:

The steering column is delivered only as a complete replacement part. Service is not possible.

Steering lock with ignition switch without lock cylinder can be transferred.

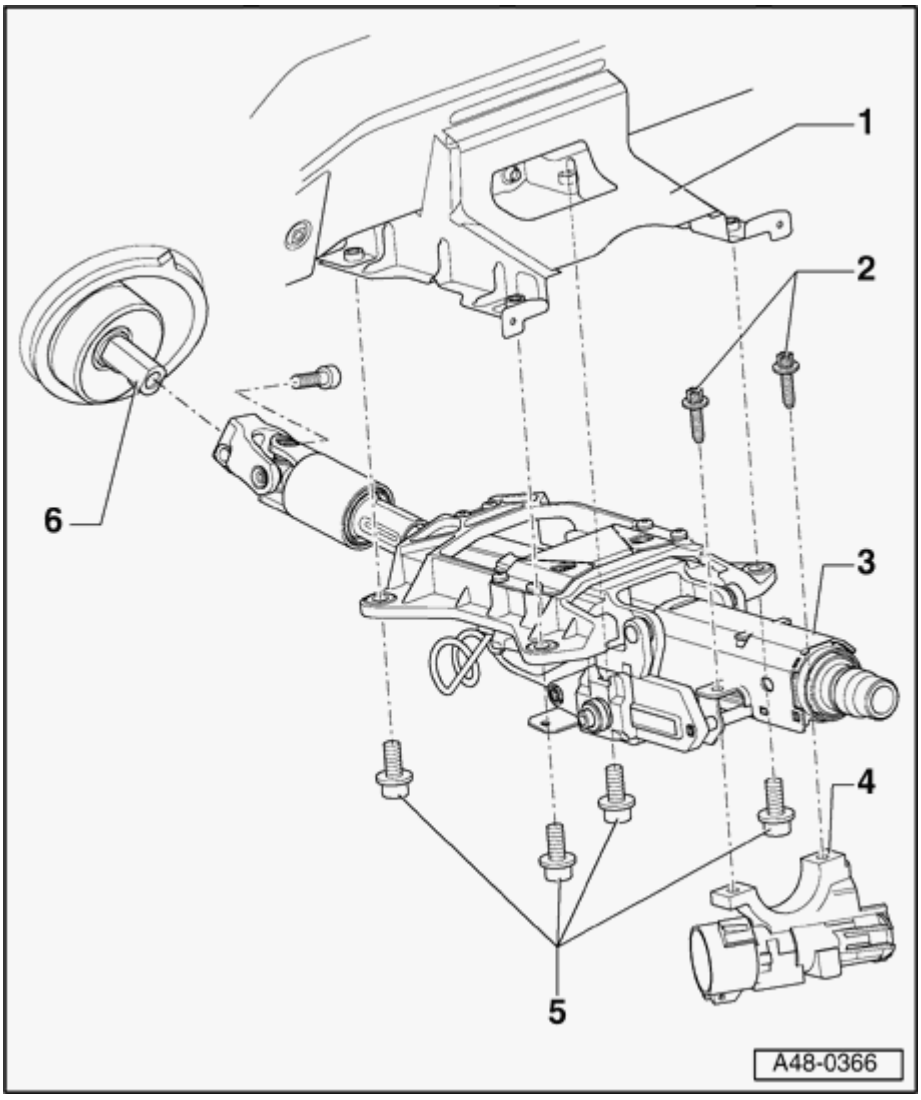

Fig. 486: Steering Column, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Retainer plate

2 - Shear head screw, 15 Nm

3 - Steering column

4 - Steering lock with ignition switch without lock cylinder

5 - Combi-screw, 22 Nm

6 - Power-assist steering gear

NOTE:

- **Sliding splines between upper and lower parts if steering column should never be separated.**
- **Sliding up over an area of ± 5 cm can cause damage to steering column.**
- **To avoid damage, observe --> Transportation securing device.**

Transportation securing device

New replacement steering columns are secured with transportation protection.

This transport protection must be removed after installing steering column in vehicle.

If a used steering column is to be removed and reinstalled, an assembly aid is useful in preventing upper and lower part of steering column from separating when removing from steering gear. Use e.g. a cable tie or wire as an assembly aid.

If the upper and lower parts of the steering column are pulled too far apart or pushed too close together the splines separate.

It is possible that rattling noises are created later if the splines are not in their original installation position.

Steering column, checking for damage

Visual check

- Check whether parts of steering column indicate damage.

Functional check

- Check whether steering column can be turned without catching or difficulty of movement.
- Check that steering column can be adjusted for height and reach.

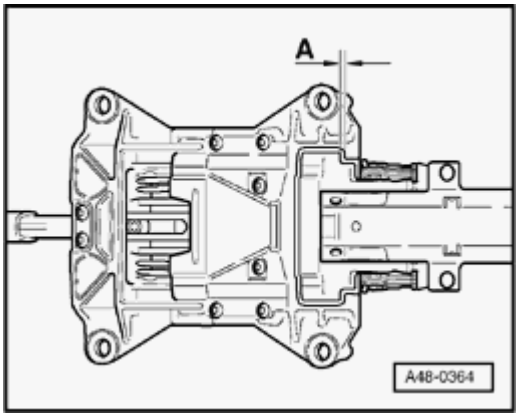

Fig. 487: Checking Gap Dimension Between Slits And Mounting Bracket
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check gap dimension - **A** - between slits and mounting bracket.

- Dimension - **A** - ; Maximum 0.5 mm or smaller

- If dimension - **A** - is greater than 0.5 mm, steering column is damaged and must be replaced.

Steering column, removing and installing

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1331

Removing

- Remove driver side airbag unit. -->
  - **69 - PASSENGER PROTECTION - AIRBAGS, SEAT BELTS**
  - **69 - PASSENGER PROTECTION - AIRBAGS, SEAT BELTS** for BODY INTERIOR - CABRIOLET

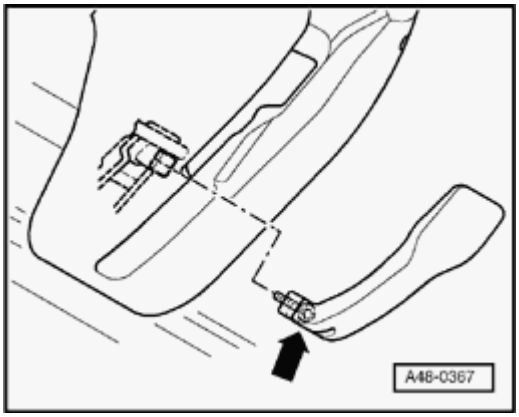

Fig. 488: Removing Steering Column Adjustment Lever

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove steering column adjustment lever.
- Remove airbag steering wheel --> **Airbag steering wheel, removing and installing**.
- Remove steering column switch trim. -->
  - **70 - INTERIOR TRIM**
  - **70 - INTERIOR TRIM** for BODY INTERIOR - CABRIOLET
- Remove steering column switch -->
  - **94 LIGHTS, SWITCHES - EXTERIOR**
  - **94 LIGHTS, SWITCHES - EXTERIOR** for ELECTRICAL EQUIPMENT, CABRIOLET

An assembly aid is required so that the upper and lower parts of the steering column do not pull apart when pulling off steering gear.

If the upper and lower parts of the steering column are pulled too far apart or pushed too close together the splines separate.

It is possible that rattling noises are created later if the splines are not in their original installation position.

Securing steering column before removal

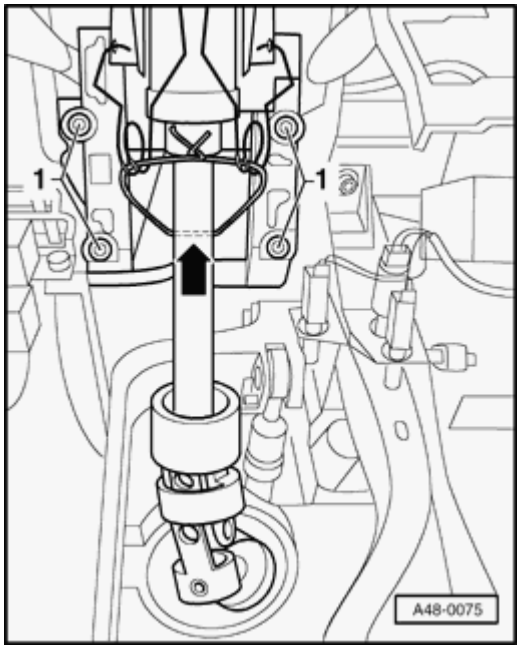

Fig. 489: Locating Steering Column Allen Head Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull wire or cable tie through hole in lower section of steering column - **arrow** - and spring.
- Wire or cable tie can also be pulled through spring and universal joint.

- Remove connectors from ignition switch and coil.

Locking cable must be disengaged on vehicles with automatic transmission:

- Bring selector lever into park position.

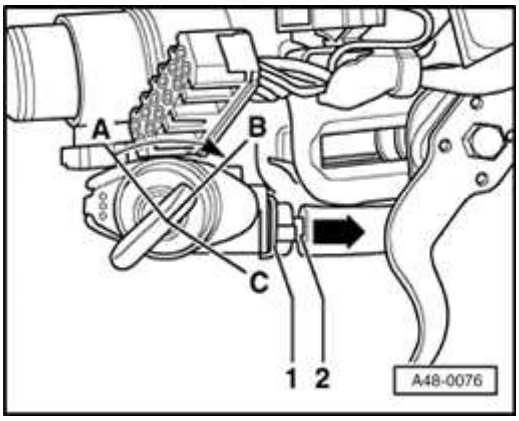

Fig. 490: Raising Locking Bracket Slightly And Removing Locking Cable From Ignition Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Ignition key in position "B" , ignition on.
- Raise locking bracket - **1** - slightly and remove locking cable - **2** - from ignition housing.

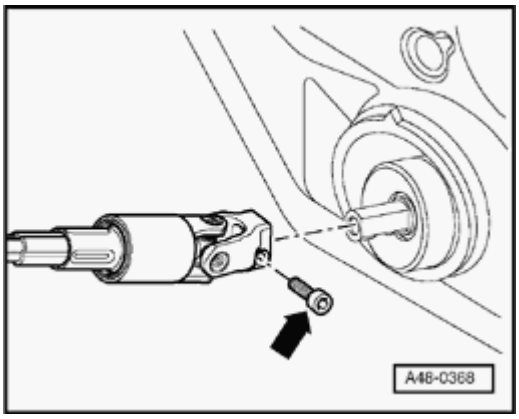

Fig. 491: Removing/Installing Lower Part Of Steering Column From Power Steering Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen bolt - **arrow** -.
- Remove lower part of steering column from power steering gear.

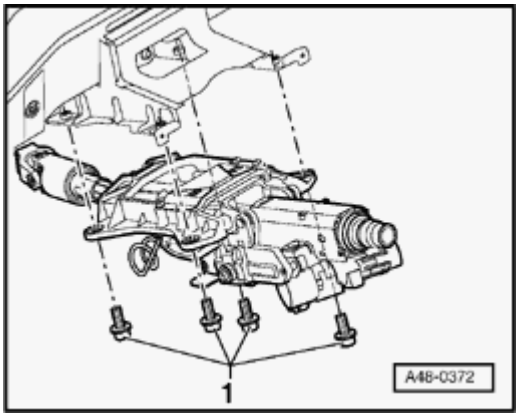

Fig. 492: Removing/Installing Steering Column
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **1** -
- Remove steering column.

Installing

Installation is in reverse order of removal.

Observe the following when installing:

New replacement steering columns are secured with transportation protection.

This transport protection must be removed after installing steering column in vehicle.

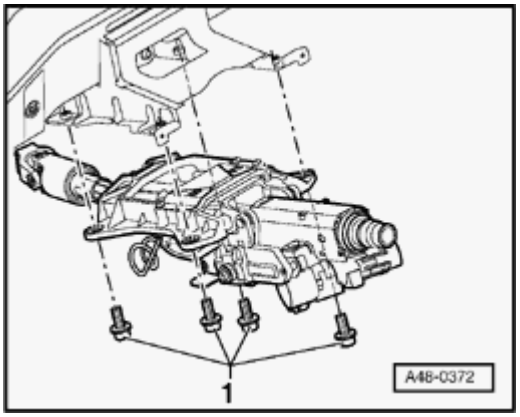

Fig. 493: Removing/Installing Steering Column
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert steering column and install bolts - **1** - but do not tighten.

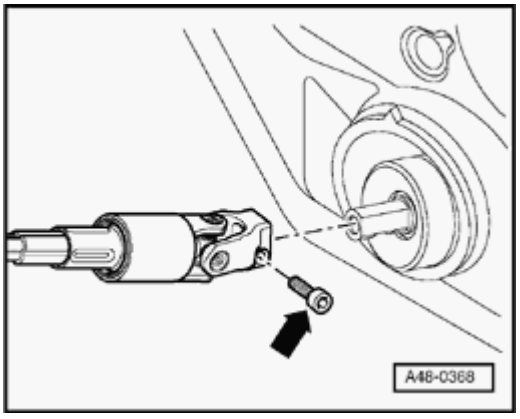

Fig. 494: Removing/Installing Lower Part Of Steering Column From Power Steering Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position steering column joint on power steering gear and install bolt - **arrow** -.
- Align steering column free of tension on steering gear pinion
- Tighten steering column/retaining plate bolts
- Tighten joint bolts at power steering gear

- Remove transport protection or assembly aid.

Engage locking cable on vehicles with automatic transmission:

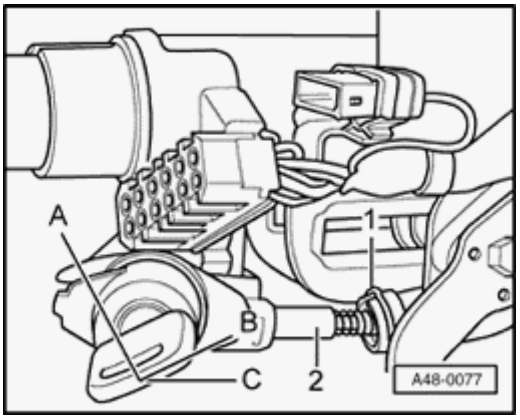

Fig. 495: Engaging Locking Cable
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- To engage locking cable, ignition key in position "B" , ignition on.
- Bring selector lever into park position.
- Place locking cable - **2** - in ignition lock housing. When doing so, ensure locking bracket - **1** - engages.

Checking locking cable function:

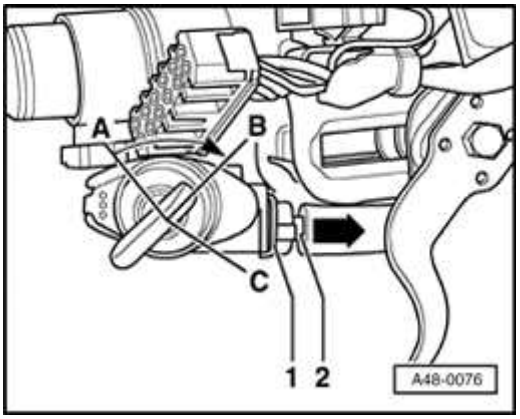

Fig. 496: Raising Locking Bracket Slightly And Removing Locking Cable From Ignition Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Ignition key in position "B" , ignition on.

- Selector lever must be able to be shifted out of park position without catching.
- Ignition key should only be removable with selector lever in park position.

Bring selector lever into park position.

- Ignition lock must be operable without catching.
- With ignition key in position "A" , ignition off, selector lever should not be able to be shifted out of park position. Ignition key can be removed.
- Place connector on coil and ignition switch.
- Install steering column switch. -->
  - **94 LIGHTS, SWITCHES - EXTERIOR**
  - **94 LIGHTS, SWITCHES - EXTERIOR** for ELECTRICAL EQUIPMENT, CABRIOLET
- Install steering column switch trim. -->
  - **70 - INTERIOR TRIM**
  - **70 - INTERIOR TRIM** for BODY INTERIOR - CABRIOLET
- Install airbag steering wheel --> **Airbag steering wheel, removing and installing**.
- Install steering column adjustment lever.
- Install driver side airbag unit. -->
  - **69 - PASSENGER PROTECTION - AIRBAGS, SEAT BELTS**
  - **69 - PASSENGER PROTECTION - AIRBAGS, SEAT BELTS** for BODY INTERIOR - CABRIOLET

Steering lock with ignition switch without lock cylinder, removing and installing

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1331

Removing

- Steering column, removing --> **Steering column, removing and installing**

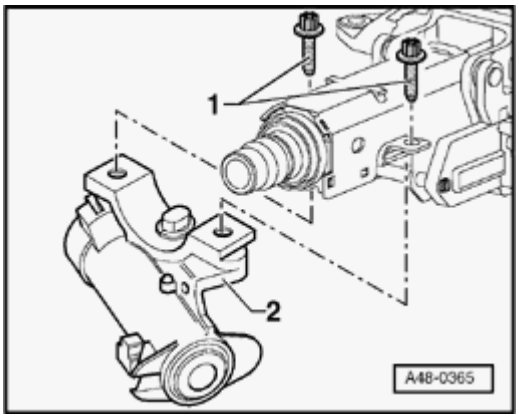

Fig. 497: Drilling Out Shear Head Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drill out shear head bolts

NOTE:

- **To drill out shear head bolt, steering column must be clamped in a vise.**
- **With steering column installed, mounting bracket will be damaged.**

- Remove steering lock with ignition switch without lock cylinder.

Installing

- Place steering lock with ignition switch without lock cylinder on steering column and install shear head bolts.
- Tighten shear head bolts to 20 Nm.

Screw head must be sheared off this torque range

Installation is in reverse order of removal

- Install steering column --> **Steering column, removing and installing**.

POWER-ASSIST STEERING GEAR

Power-assist steering gear, assembly overview

Illustration applies to 4-6 and 8-cylinder engines.

Power steering gear is completely removed and installed with tie rods.

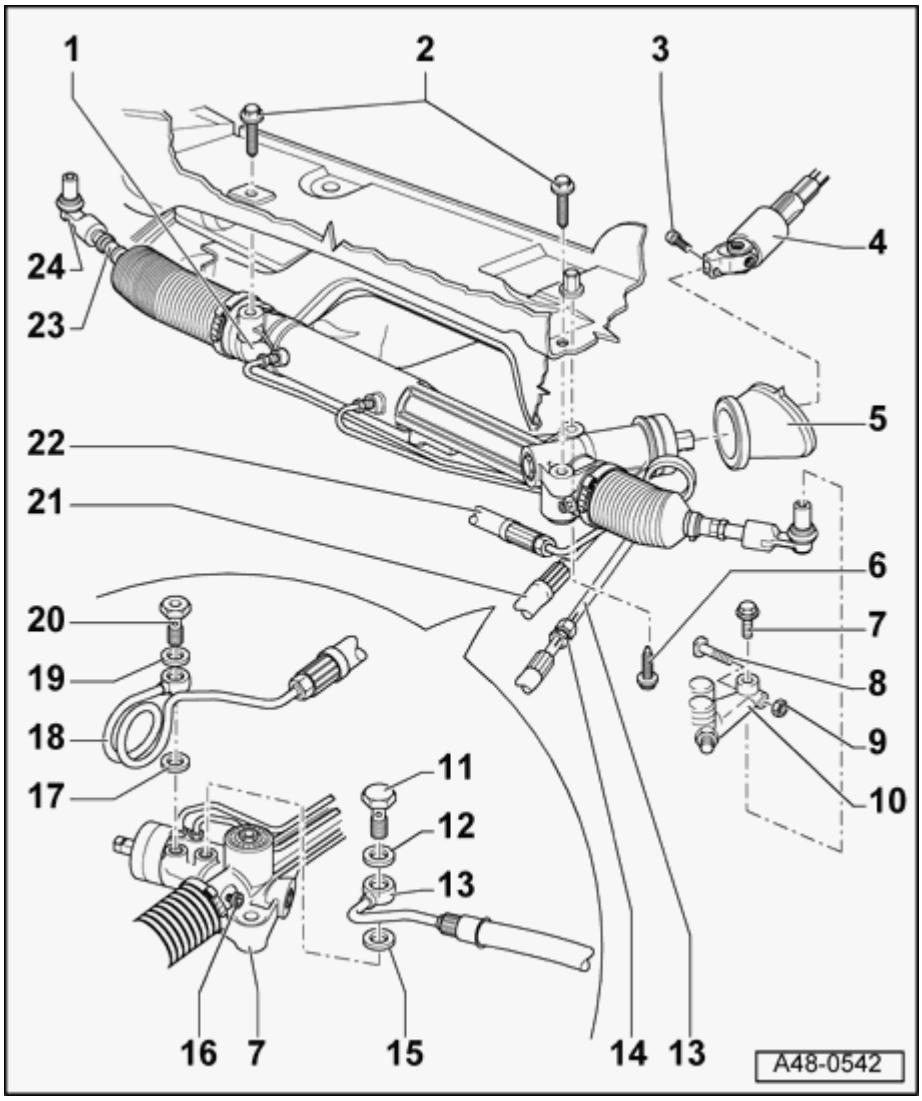

Fig. 498: Power-Assist Steering Gear, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Power assist steering gear with tie rods

- Removing and installing --> **Power steering gear, removing and installing**
- Servicing --> **Power steering gear, servicing**
- Different versions

2 - Combi-bolt, 40 Nm plus an additional 90° turn

- Always replace

3 - Bolt, 30 Nm

4 - Steering column

5 - Bulkhead boot

- Check for tears and chafing
- Note installation location --> **Power steering gear, removing and installing**

6 - Combi-bolt, 40 Nm plus an additional 90° turn

- Always replace

7 - Hex head bolt

8 - Bolt

9 - Nut, self-locking

10 - Stub axle carrier (steering arm)

11 - Banjo bolt, 47 Nm

12 - Sealing ring

- Always replace

13 - Return hose

14 - Return line connection 40 Nm

- Colored marks must align

15 - Sealing ring

- Always replace

16 - Cylinder bolt, 22 Nm

- Screw plug **Steering centering:**

17 - Sealing ring

- Always replace

18 - Extension hose

19 - Sealing ring

- Always replace

20 - Banjo bolt with check valve, 35 Nm

21 - Extension hose

- For 4-cylinder engines

22 - Extension hose

- For 6-cylinder engines

23 - Tie rod

- Removing and installing --> **Tie rod, removing and installing**

24 - Tie rod end

- Removing and installing --> **Tie rod ball joint and tie rod**

Steering centering:

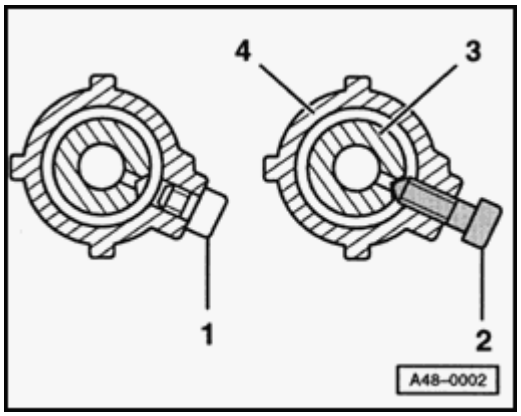

Fig. 499: Steering Centering
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1331
- Bolt for steering centering VAS 6224

Steering gear in sectional view:

1 - Screw plug 22 Nm

2 - Install steering centering screw VAS 6224 as far as possible by hand.

3 - Steering rack

4 - Steering gear housing

- Move steering wheel slightly around center position.
- A second technician turns steering centering screw VAS 6224 in steering gear until it noticeably engages in center hole.

Power steering gear, removing and installing

Special tools, testers and auxiliary items required

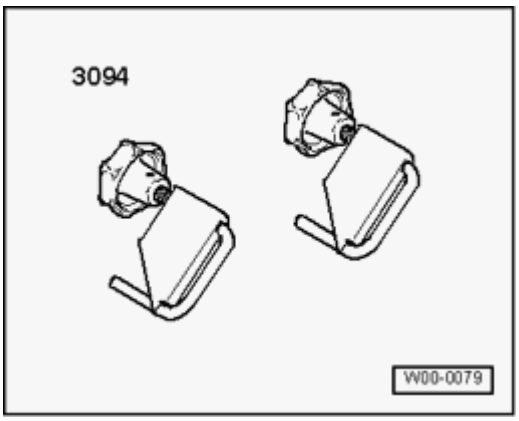

Fig. 500: Identifying Hose Clamps 3094
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Hose clamps up to 25 mm dia. 3094

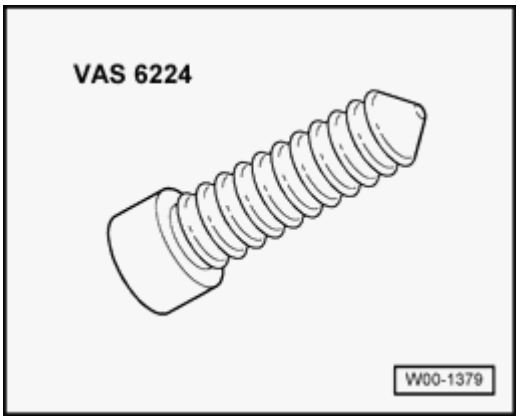

Fig. 501: Bolt For Steering Centering VAS 6224
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bolt for steering centering VAS 6224
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332

- Open socket insert SW 19 (commercially available)

Removing

- Remove plenum chamber cover -->
  - **27 BATTERY, STARTER, GENERATOR, CRUISE CONTROL**
  - **27 BATTERY, STARTER, GENERATOR, CRUISE CONTROL** for ELECTRICAL EQUIPMENT, CABRIOLET
- Disconnect battery and remove if necessary. -->
  - **27 BATTERY, STARTER, GENERATOR, CRUISE CONTROL**
  - **27 BATTERY, STARTER, GENERATOR, CRUISE CONTROL** for ELECTRICAL EQUIPMENT, CABRIOLET

CAUTION: Bring steering wheel into center position and do not turn during repairs because this may damaged airbag unit spiral spring.

- Remove ignition key with steering wheel in center position.
- Move steering wheel slightly to engage steering lock.
- Remove drivers side storage compartment. -->
  - **68 - INTERIOR EQUIPMENT**
  - **68 - INTERIOR EQUIPMENT** for BODY INTERIOR - CABRIOLET

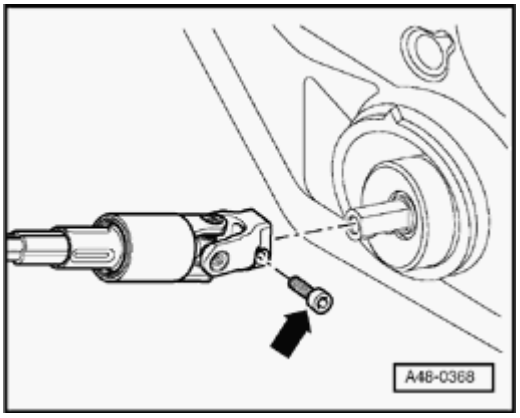

Fig. 502: Removing/Installing Lower Part Of Steering Column From Power Steering Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen bolt - **arrow** -.
- Secure steering column against slipping apart **Securing steering column before removal** , secure steering column before removal.

- Ensure bulkhead boot is seated correctly.

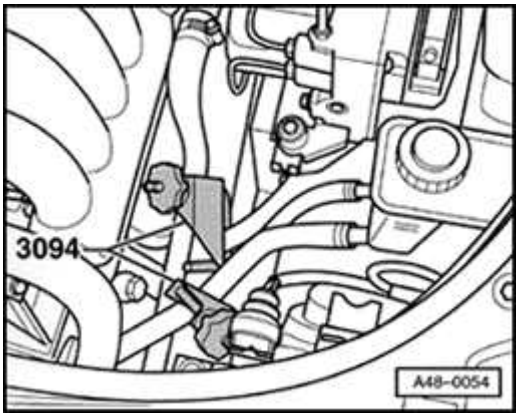

Fig. 503: Identifying Hose Clamps 3094
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp off suction and return line using hose clamps Hose Clamps Up to 25 mm dia. 3094.
- Remove front wheels.

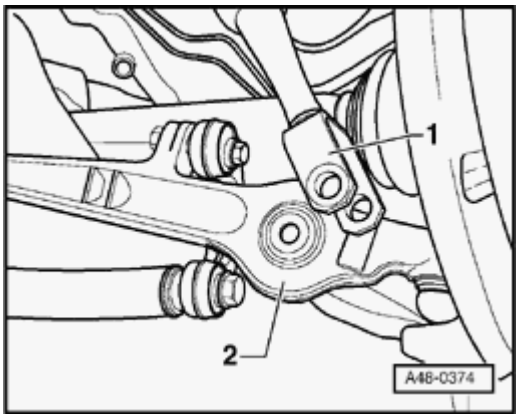

Fig. 504: Positioning Suspension Strut In Front Of Link As Seen In Direction Of Travel
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen suspension strut/link threaded connection (only on left side of vehicle)
- Position suspension strut - **1** - in front of link - **2** - as seen in direction of travel.

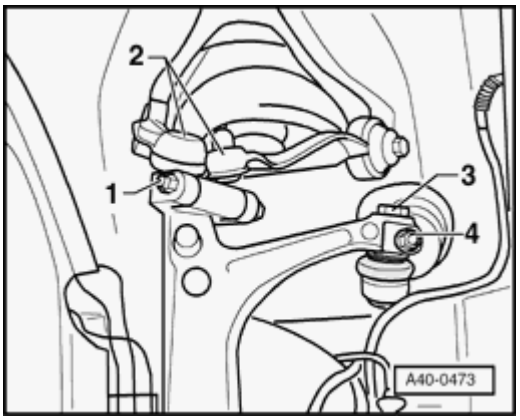

Fig. 505: Identifying Nut, Control Links & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen nut - **1** - , remove hex head bolt and remove both links - **2** - upward (only on left side of vehicle).

The slits in wheel bearing housing must not be widened using a chisel or similar tool!

- Remove hex head bolt - **3** - and remove threaded connection - **4** -.
- Remove tie rod downward out of steering arm or press out.

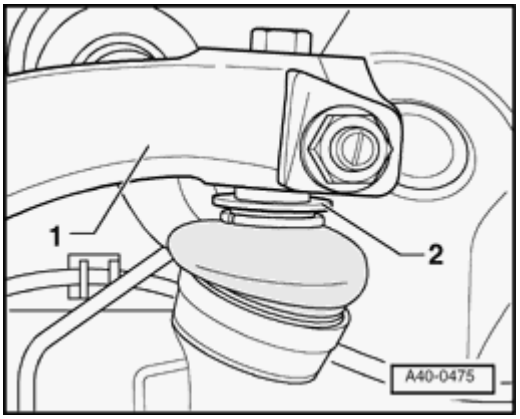

Fig. 506: Identifying Steering Arm & Tie Rod Ball Joint Sealing Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- **Do not use a chisel or similar tool between steering arm - 1 - and tie rod ball joint sealing washer - 2 - when removing tie rod, otherwise sealing washer could be damaged.**
- **Tie rod may only be pressed off steering arm over tie rod ball joint pin ends or driven with a wooden or rubber hammer.**

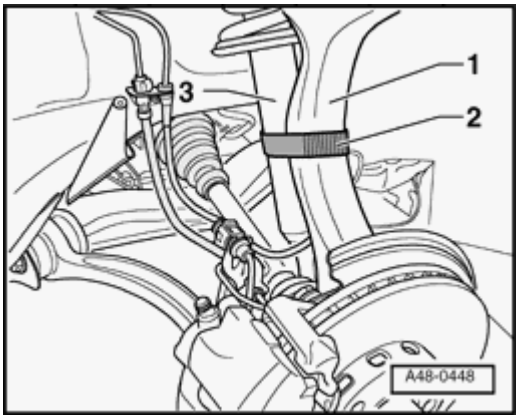

Fig. 507: Securing Wheel Bearing Housing At Left With Help Of Tensioning Band At Suspension Strut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure wheel bearing housing - **1** - at left with help of tensioning band - **2** - at suspension strut - **3** -.

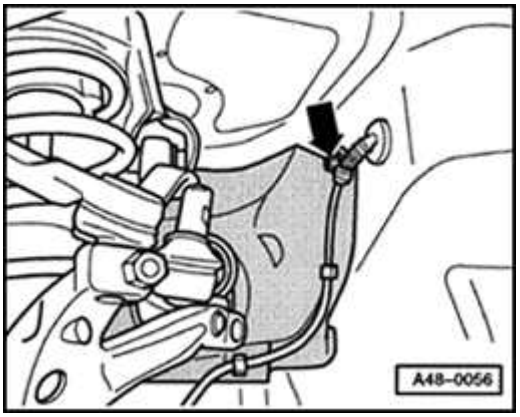

Fig. 508: Removing Panel Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove panel nut - **arrow** -.
- Pry out clips.
- Disengage electrical line
- Remove plastic cover

- On 6- and 8-cylinder engines, shield on driver side must be removed --> **Shield, removing and installing**.

- In order to remove shield on driver side with 6-cylinder engines, front catalytic converter must be removed.
- In order to remove shield on driver side with 8-cylinder engines, front exhaust pipe must be removed.

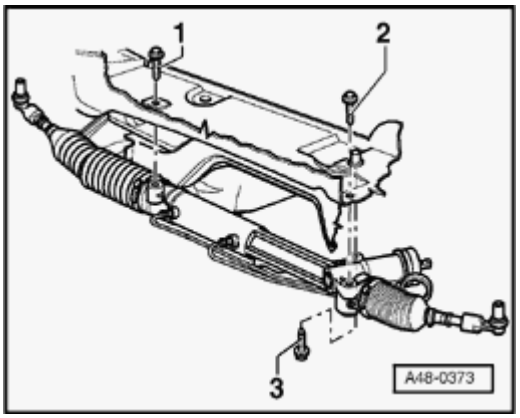

Fig. 509: Identifying Bolts & Steering Lock
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen bolt - **1** - approx. one turn
- Remove bolts - **2** - and - **3** -
- Swing steering gear on driver side forward in direction of travel
- Place a pan underneath to catch hydraulic oil.

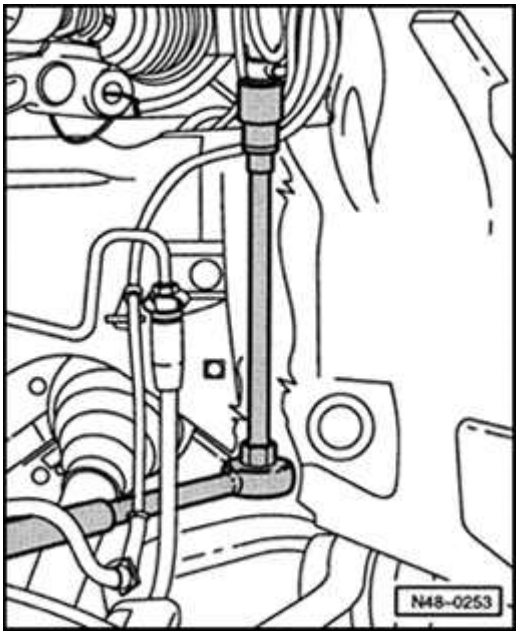

Fig. 510: Removing Return Line Banjo Bolt (22 mm AF) From Steering Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove return line banjo bolt (22 mm AF) from steering gear.

With certain engine-transmission versions, banjo bolt can only be loosened from wheel housing.

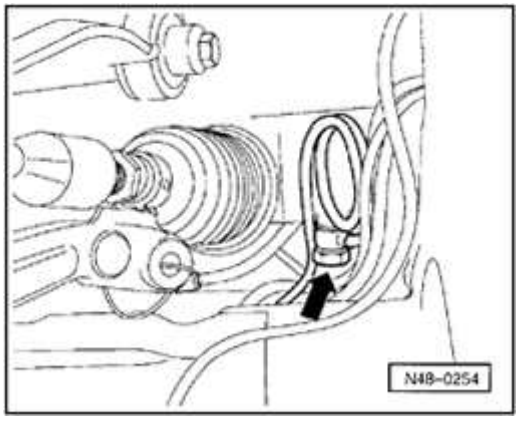

Fig. 511: Identifying Pressure Line Banjo Bolt (19 mm AF)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove pressure line banjo bolt (SW 19 mm) - **arrow** - from steering gear.

With certain engine-transmission versions, banjo bolt can only be loosened from wheel housing.

To do this, use an open socket insert SW 19 (commercially available).

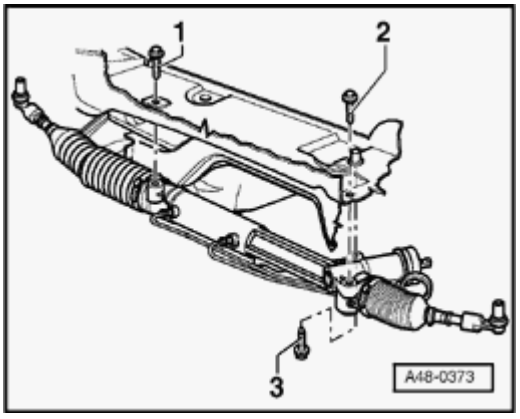

Fig. 512: Identifying Bolts & Steering Lock
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - **1** -.
- Take out steering gear through left-hand wheel housing (second technician required).

NOTE:

- **Ensure bulkhead boot is not damaged by steering gear pinion.**

Installing

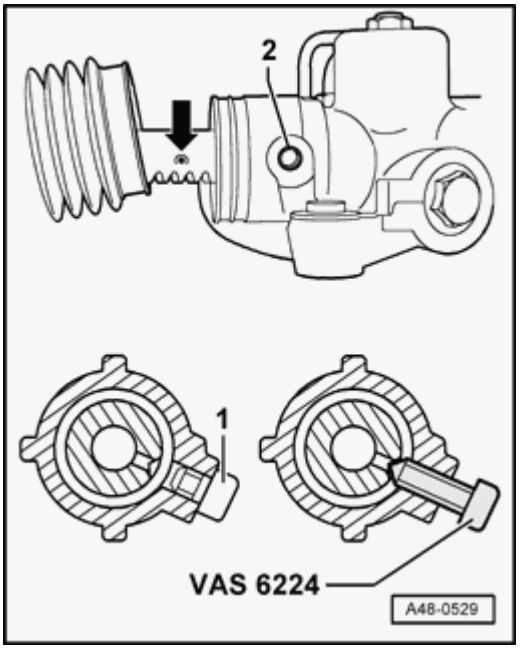

Fig. 513: Centering Removed Steering Gear With Steering Centering Screw VAS 6224
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Center removed steering gear with steering centering screw VAS 6224.

- To do this, remove hex socket-head bolt - **1** - from steering gear.

- Move steering rack until centering position on rack - **arrow** - aligns with thread - **2** -.
- Install steering centering screw VAS 6224 hand tight.
- Steering gear in area of bulkhead boot seat is lubricated with lubricant G 052 745 A3.

- Position steering gear at plenum chamber (2nd technician needed).

Make sure threads and contact surfaces of bolts are free of oil and grease.

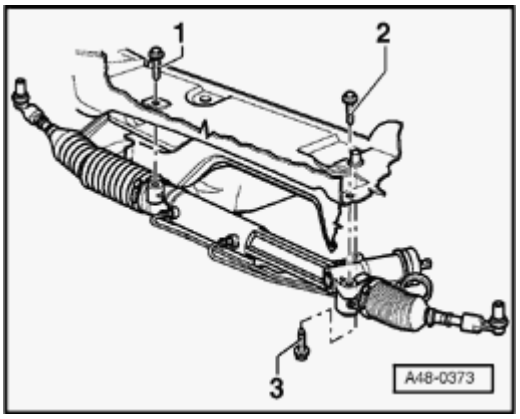

Fig. 514: Identifying Bolts & Steering Lock
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position bolt - **1** - but do not tighten yet.
- Swing steering gear on driver side forward in direction of travel

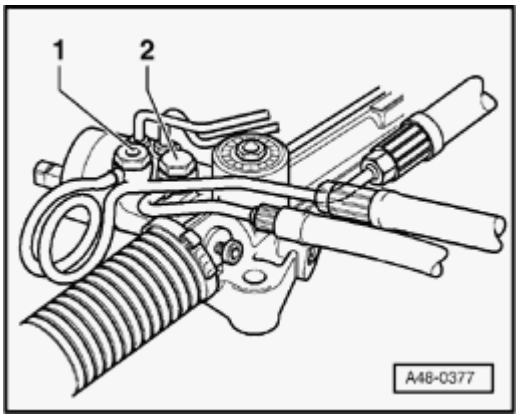

Fig. 515: Installing Return Hose And Tighten Banjo Bolt & Pressure Hose And Tighten Banjo Bolt With Check Valve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install return hose and tighten banjo bolt - **2** - (SW 22)
- Install pressure hose and tighten banjo bolt with check valve - **1** - (SW 19).

NOTE:

- **Always use new seals for banjo bolt.**

- **Pressure and return hose must not touch or come in contact with other parts!**

With certain engine-transmission versions, banjo bolts can only be tightened from wheel housing.

To do this, use an open socket insert SW 19 (commercially available)

- Reinsert bulkhead boot while noting installation location.

Tab on bulkhead boot must align with marking on body.

NOTE:

- **Replace damaged bulkhead boot if necessary.**
- **Ensure bulkhead boot is seated correctly!**

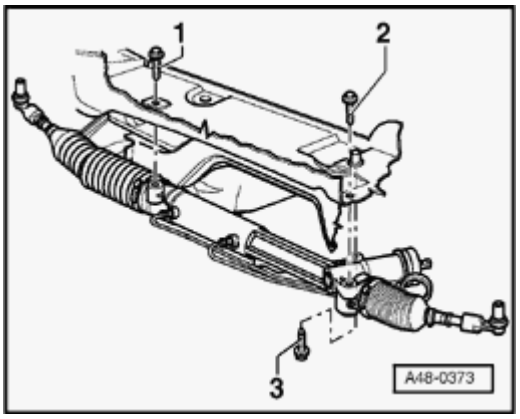

Fig. 516: Identifying Bolts & Steering Lock
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position bolt - **2** - but do not tighten yet.
- Install and fasten bolt - **3** -
- Tighten bolts - **1** - and - **2** -
- Release steering lock.

- Bring steering wheel to center position then place universal joint on steering pinion.

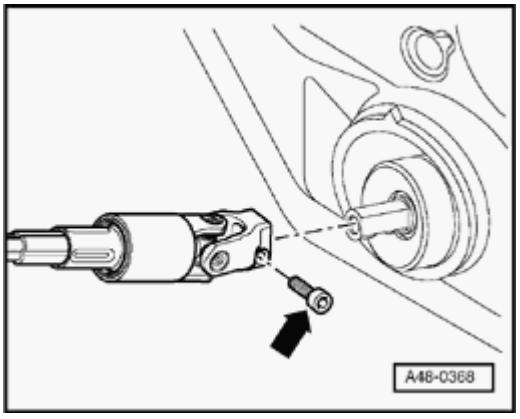

Fig. 517: Removing/Installing Lower Part Of Steering Column From Power Steering Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten bolt - **arrow** -
- Remove mounting device from steering column.
- Install drivers side stowage compartment. -->
  - **68 - INTERIOR EQUIPMENT**
  - **68 - INTERIOR EQUIPMENT** for BODY INTERIOR - CABRIOLET
- On 6-cylinder engines, install shield on driver side --> **Shield, removing and installing**.
- Install plastic cover in wheel liner.
- Engage electrical line.

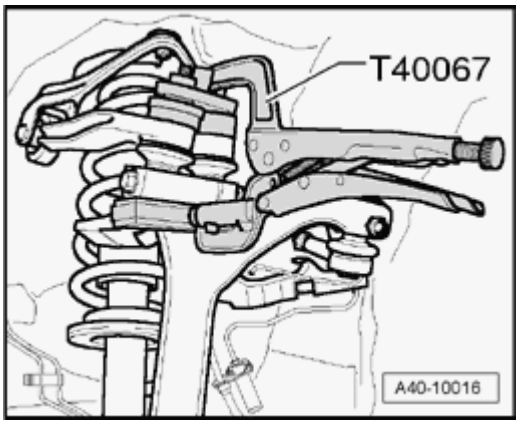

Fig. 518: Inserting Both Upper Link Joint Pins In Wheel Bearing Housing And Bend Downward As Much As Possible Using Pliers T40067
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert both upper link joint pins in wheel bearing housing and bend downward as much as possible using assembly tool T40067.

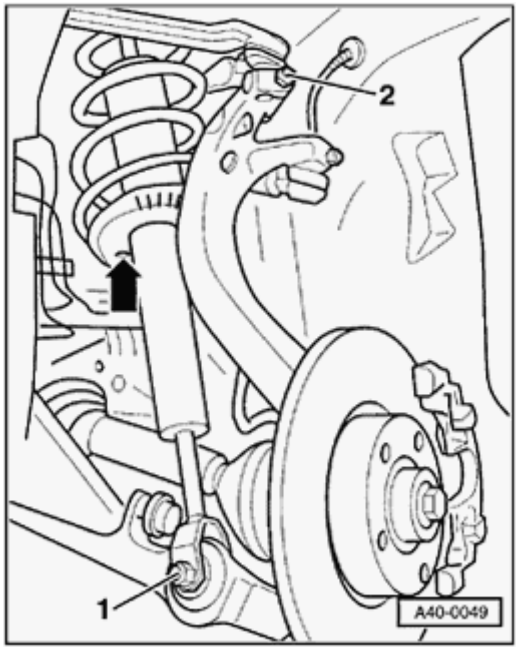

Fig. 519: Inserting Suspension Strut Forked Head Into Link
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert new bolt - **2** - and self-locking nut and tighten
- Insert fork-head suspension strut in link and hand tighten threaded connection - **1** -.

Bonded rubber bushings have a limited torsional range. Only tighten threaded connections at links if vehicle is in curb weight position --> **Wheel bearing, lifting to curb weight position**

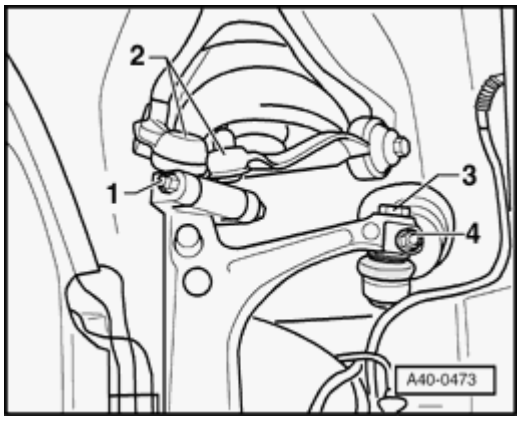

Fig. 520: Identifying Nut, Control Links & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert tie rod in steering arm to stop.

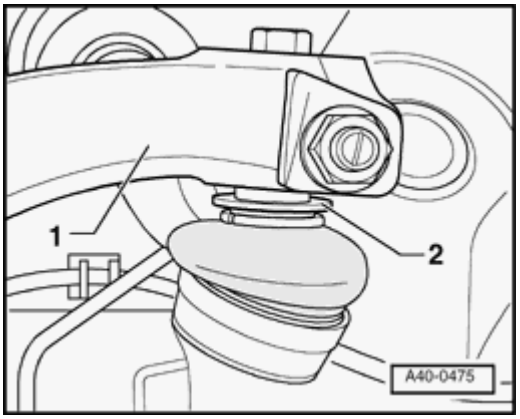

Fig. 521: Identifying Steering Arm & Tie Rod Ball Joint Sealing Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- **Install tie rod in steering arm - 1 - when doing so, only by hand and do not stress tie rod end seal - 2 -.**

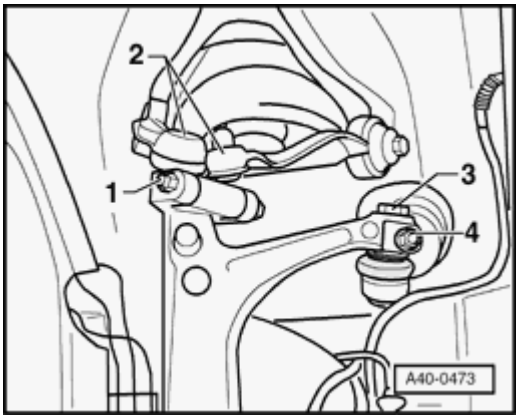

Fig. 522: Identifying Nut, Control Links & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install threaded connection - **4** - and tighten nut.
- Install screw - **3** - and tighten

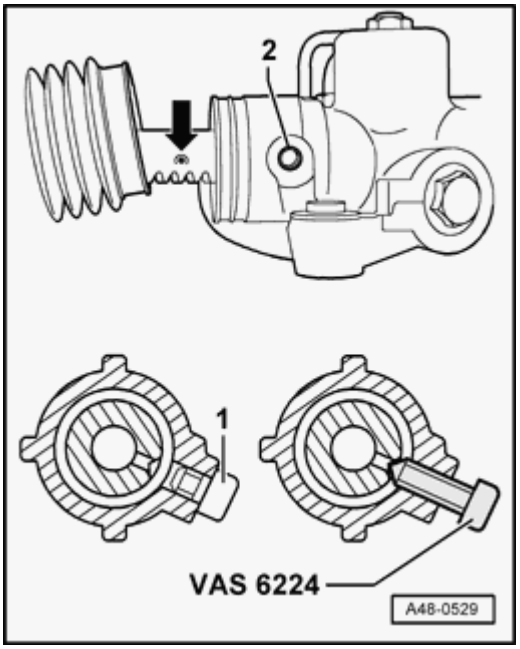

Fig. 523: Centering Removed Steering Gear With Steering Centering Screw VAS 6224
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove steering centering screw VAS 6224 from steering gear.

1 - Socket head bolt

2 - Threaded hole in steering gear

- Seal steering gear using hex socket head bolt **- 1 - Steering centering:**
- After completing installation of steering gear, remove hose clamps Hose Clamps Up to 25 mm dia. 3094.
- Connect or install battery and install plenum chamber cover. -->
  - **27 BATTERY, STARTER, GENERATOR, CRUISE CONTROL**
  - **27 BATTERY, STARTER, GENERATOR, CRUISE CONTROL** for ELECTRICAL EQUIPMENT, CABRIOLET
- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

- Tighten suspension strut/control arm threaded connection to specified torque
- Check power steering fluid level --> **Power steering fluid level, checking**.
- Bleed steering system --> **Steering system, bleeding after reconstructing**
- Check steering system for leaks --> **Steering system, checking for leaks**.

- Perform vehicle alignment --> **Wheel alignment**.

Alignment must take place on a VW/Audi recommended alignment stand.

Power steering gear, servicing

Special tools, testers and auxiliary items required

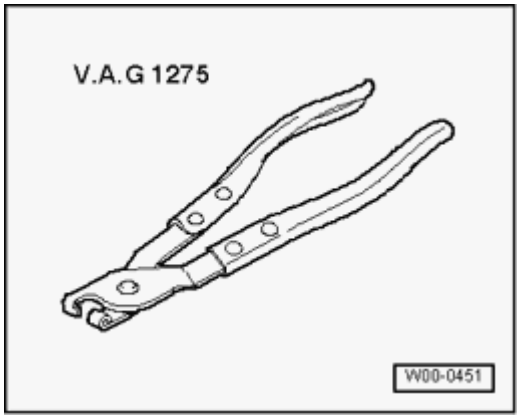

Fig. 524: Identifying Hose Clamp Pliers V.A.G 1275
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Hose clamp pliers V.A.G 1275
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332

This overview is provisionally for all vehicles.

NOTE:

- **Replace self-locking nuts and bolts.**
- **Welding and straightening work on steering components is not permitted.**
- **Only use steering gear grease, Part No. AOF 063 000 04 to grease the rack.**

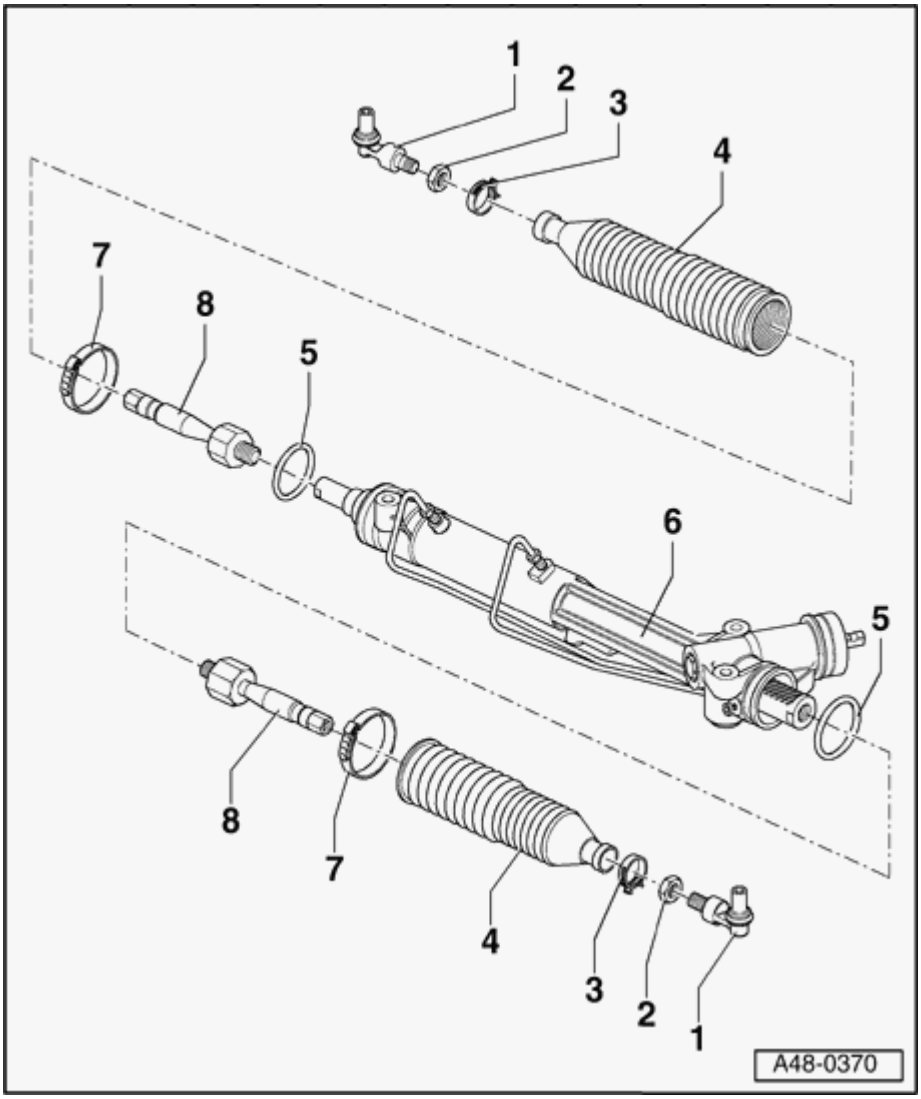

Fig. 525: Exploded View Of Power Steering Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Tie rod end

- Removing and installing --> **Tie rod ball joint and tie rod**
- Check dust caps for damage and correct seating

2 - Lock nut, 40 Nm

3 - Spring clamp

- Always replace
- Version Parts

4 - Boot

- Check for damage
- Must not be twisted after toe is adjusted
- Can be replaced with steering gear installed
- Remove to replace tie rods --> **Tie rod, removing and installing**.

5 - O-ring

- Always replace

6 - Power-assist steering gear

- Grease rack with steering gear grease A0F 063 000 04
- Different versions

7 - Ear hose clamp

- Always replace
- Tension using V.A.G 1275

8 - Tie rod, 100 Nm

- Removing and installing --> **Tie rod, removing and installing**.
- Grease joint with steering gear grease A0F 063 000 04

Shield, removing and installing

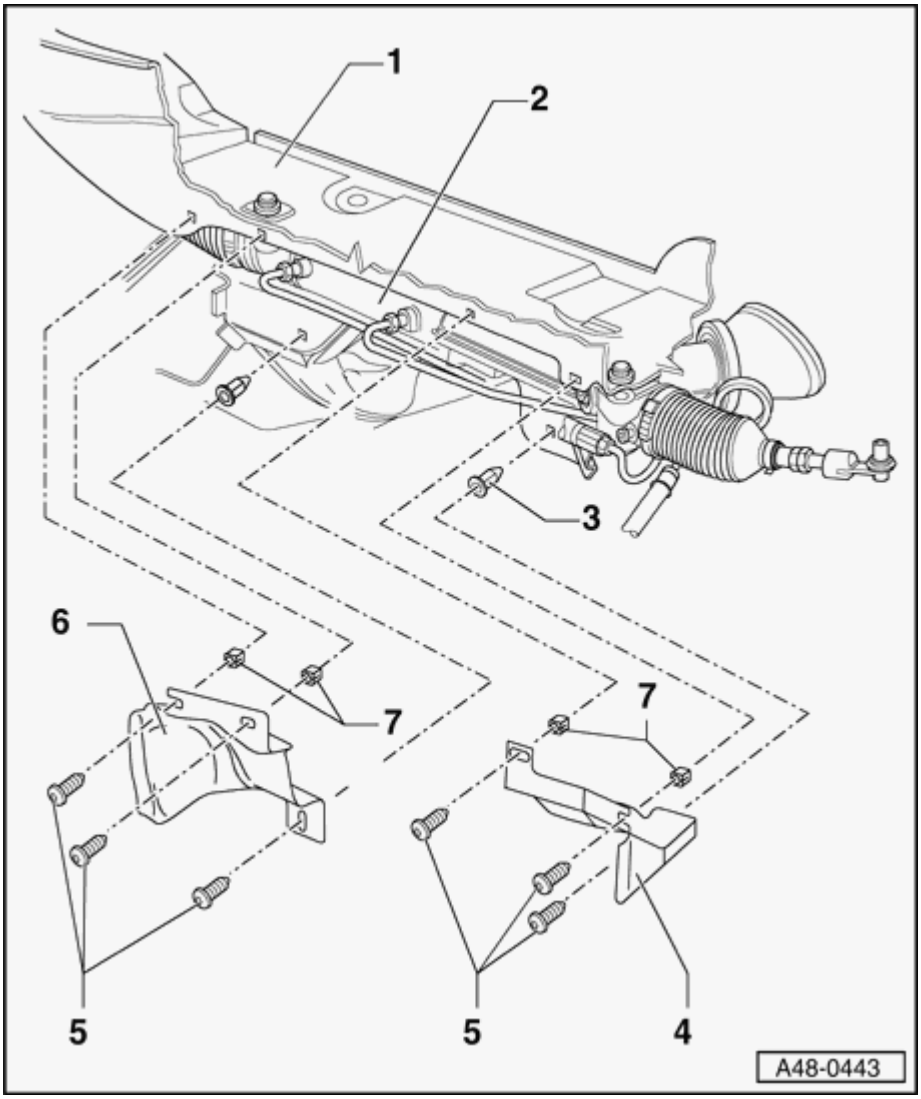

Fig. 526: Shield Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Plenum chamber

2 - Power-assist steering gear

3 - Spreader nut

4 - Shield

- With 6 and 8-cylinder gasoline engines, remove front exhaust pipe -->
  - **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 1.8 LITER 4-CYL. 5V TURBO ENGINE MECHANICAL, ENGINE CODE(S): AMB
  - **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 2.0 LITER 4-CYL. 4V TURBO ENGINE MECHANICAL, ENGINE CODE(S): BPG, BWT

- **26 EXHAUST SYSTEM, EMISSION CONTROLS** for 3.0 LITER 6-CYL. 5V ENGINE MECHANICAL, ENGINE CODE(S): AVK, BGN
- **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 3.2 V6 4V ENGINE MECHANICAL, ENGINE CODE(S): BKH
- **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 4.2 LITER V8 4V ENGINE MECHANICAL, ENGINE CODE(S): BNS
- **26 - EXHAUST SYSTEM, EMISSION CONTROLS** for 4.2 LITER V8 5V ENGINE MECHANICAL, ENGINE CODE(S): BHF

5 - Sheet metal screw, 2 Nm

6 - Shield

- For all vehicles

7 - Spreader nut

POWER STEERING GEAR, ADJUSTING

Power steering gear, adjusting

Two technicians are required when adjusting. Adjust with engine switched off.

- Raise vehicle on hoist.
- Wheels in straight-ahead position.
- By turning the steering wheel back and forth (about 30° from center axis) a knocking noise will be heard if there is excessive play.
- The second mechanic must carefully screw the adjustment screw - **arrow** - until knocking noise can no longer be heard inside the vehicle.

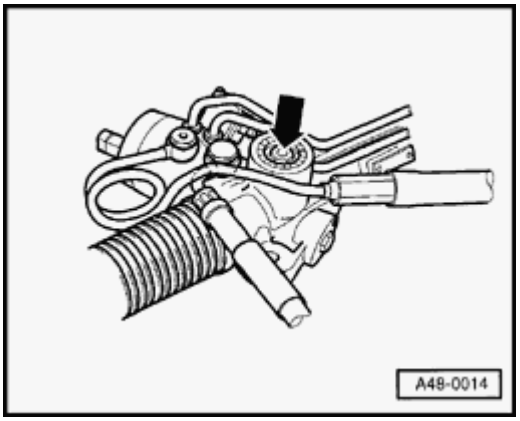

Fig. 527: Identifying Adjustment Screw
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carry out a road test.
- Ensure that when maneuvering or negotiating corners the steering self-centers without sticking, re-adjust if necessary.

SERVOTRONIC STEERING GEAR

Servotronic steering gear, assembly overview

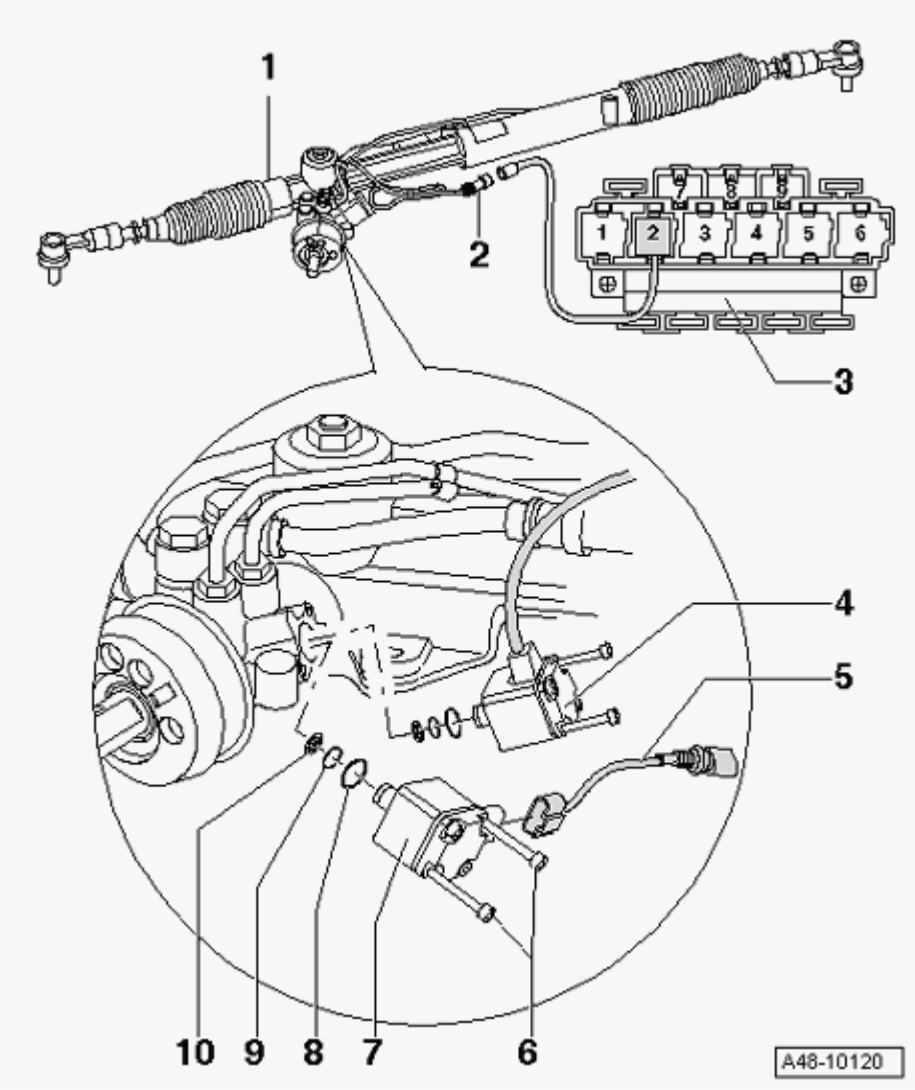

Fig. 528: Servotronic Steering Gear, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Power assist steering gear with tie rods

- Assembly overview: --> **Power-assist steering gear, assembly overview**

2 - Servotronic Solenoid Valve N119 connector

- Location: in left front wheel housing

3 - Relay carrier, 9-pin

- Located under trim in driver footwell --> Electrical Wiring Diagrams, Troubleshooting and Component Locations
- Servotronic Control Module J236 item 2
- Check voltage supply --> **Servotronic voltage supply, checking**
- Check speed signal --> **Speed signal, checking**

4 - Servotronic Solenoid Valve N119 with fused connector cable

- Steering gear must be removed to exchange Servotronic Solenoid Valve
- Checking --> **Servotronic Solenoid Valve , checking**

Do not open Torx screws!

5 - Adapter cable

6 - Hex socket head screw, 3 Nm

- SW 2.5 mm

Do not open Torx screws!

7 - Servotronic Solenoid Valve N119 with connector

- Steering gear must be removed to exchange Servotronic Solenoid Valve
- Checking --> **Servotronic Solenoid Valve , checking**

Do not open Torx screws!

8 - Sealing ring

- Always replace

9 - Sealing ring

- Always replace

10 - Strainer

- Always replace

Servotronic steering gear, servicing

- On vehicles with Servotronic steering gear, power steering is controlled electronically and is dependent on vehicle speed.
- If electronics malfunction, steering works like the normal power steering.
- Servotronic Control Module J236 does not have On Board Diagnostic (OBD) capabilities.

Fault table

Possible fault	Possible cause of fault	Corrective action
• When maneuvering the vehicle, stronger steering force is needed than usual. • Steering is unusually easy at higher speeds.	• Voltage supply interrupted • Speed signal interrupted • Servotronic Solenoid Valve faulty	• Check voltage supply --> **Servotronic voltage supply, checking** • Check speed signal --> **Speed signal, checking** • Check Servotronic Solenoid Valve --> **Servotronic Solenoid Valve , checking**
• Power steering difficult to move on one side of vehicle, e.g.: steering to left is easy and to right is difficult	• Hydraulic faulty in power steering gear	• Replace power steering gear Left-hand drive vehicles: --> **Power steering gear, removing and installing**

Servotronic voltage supply, checking

- Remove driver side storage compartment -->
  - **68 - INTERIOR EQUIPMENT**
  - **68 - INTERIOR EQUIPMENT** for BODY INTERIOR - CABRIOLET

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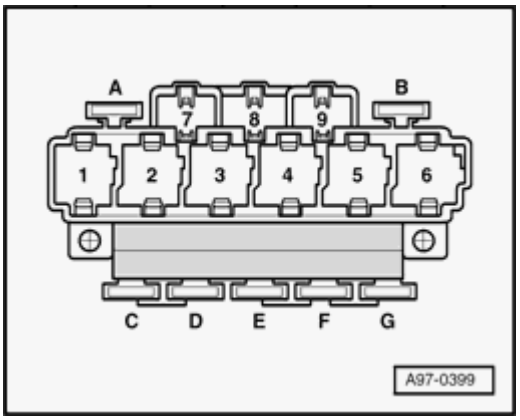

Fig. 529: Identifying Servotronic Control Module J236
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove Servotronic Control Module J236 , item 2.
- Switch on ignition
- Set digital multimeter V.A.G 1526 on voltage measurement area up to 20 Volt.
- Measure control module connector between contacts 6 and 8.

Specification: approx. 12 Volt.

- If specified value is not reached, check electrical lines --> Electrical Wiring Diagrams, Troubleshooting and Component Locations.

Speed signal, checking

Speed signal comes from Instrument Cluster Control Module J285.

- Remove driver side storage compartment -->
  - **68 - INTERIOR EQUIPMENT**
  - **68 - INTERIOR EQUIPMENT** for BODY INTERIOR - CABRIOLET

.

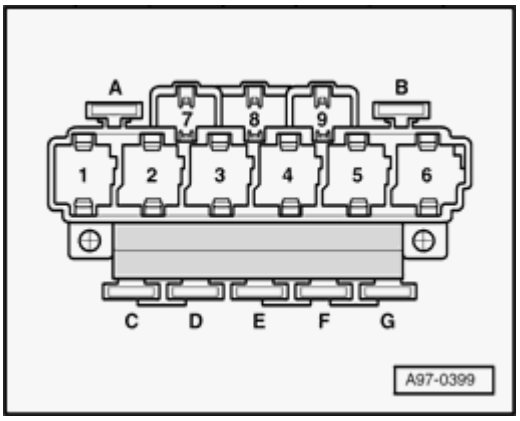

Fig. 530: Identifying Servotronic Control Module J236
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove Servotronic Control Module J236 , item 2.
- If voltage supply, Servotronic Solenoid Valve and speed display on tachometer are OK, check electrical line between Servotronic Control Module J236 contact 4 and Instrument Cluster Control Module J285 --> Electrical Wiring Diagrams, Troubleshooting and Component Locations.
- If electrical line between contact 4 and Instrument Cluster Control Module J285 is OK, replace Servotronic Control Module J236.

Servotronic Solenoid Valve , checking

- Remove driver side storage compartment -->
  - **68 - INTERIOR EQUIPMENT**

- **68 - INTERIOR EQUIPMENT** for BODY INTERIOR - CABRIOLET

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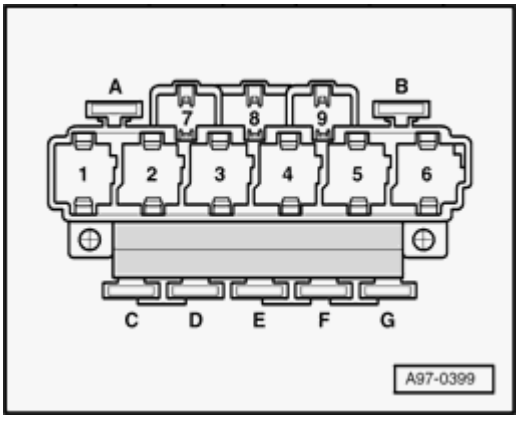

Fig. 531: Identifying Servotronic Control Module J236
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove Servotronic Control Module J236 , item 2.
- Set digital multimeter V.A.G 1526 on Ohm measuring area to 200 Ohm.
- Measure control module connector between contacts 2 and 5.

Specification: 5 to 20 Ohm.

If specified value is not reached:

- Disconnect Servotronic Solenoid Valve connector (in left wheel housing).
- Check line between control module connector and Servotronic Solenoid Valve connector for short circuit and interruption --> Electrical Wiring Diagrams, Troubleshooting and Component Locations.
- If electric line to wiring harness in left wheel housing is OK, remove steering gear.
- Vehicles with fused connector cable at Servotronic Solenoid Valve , replace solenoid valve.

- Vehicles with unfused connector cable at Servotronic Solenoid Valve , disconnect connector and check connector cable for short circuit and interruption.
- If connector cable is OK, replace Servotronic Solenoid Valve.

TIE ROD BALL JOINT AND TIE ROD

Tie rod ball joint, removing and installing

Special tools, testers and auxiliary items required

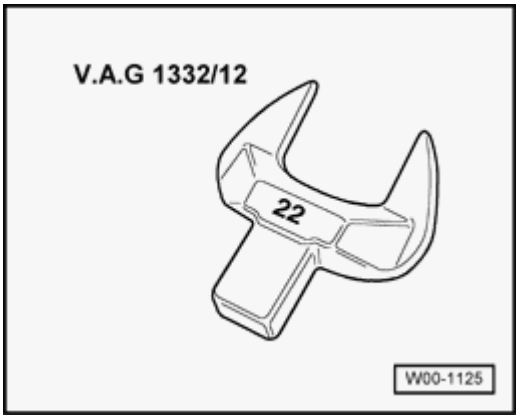

Fig. 532: Socket V.A.G 1332/12
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Socket V.A.G 1332/12
- Torque wrench V.A.G 1332

Removing

- Remove wheel.

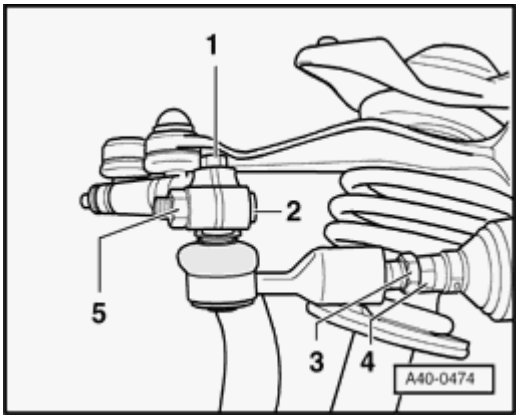

Fig. 533: Removing/Installing Hex Head Nut And Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - **1** -.
- Remove hex head nut - **5** - and remove bolt - **2** -.

NOTE:

- **The slits in the wheel bearing housing must not be widened using a chisel or similar tool!**

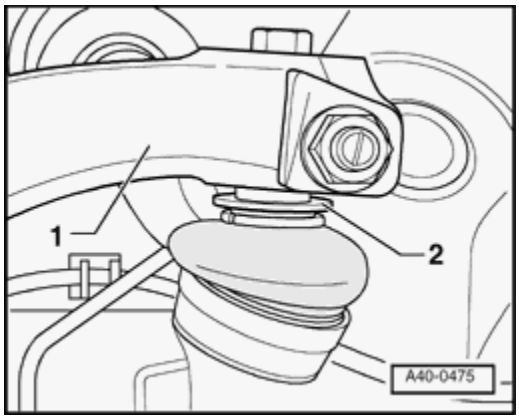

Fig. 534: Identifying Steering Arm & Tie Rod Ball Joint Sealing Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **Do not use a chisel or similar tool between steering arm - 1 - and tie rod ball joint sealing washer - 2 - when removing tie rod, otherwise sealing washer could be damaged.**
- **Tie rod may only be pressed off steering arm over tie rod ball joint pin ends or driven with a wooden or rubber hammer.**

- Press tie rod downward

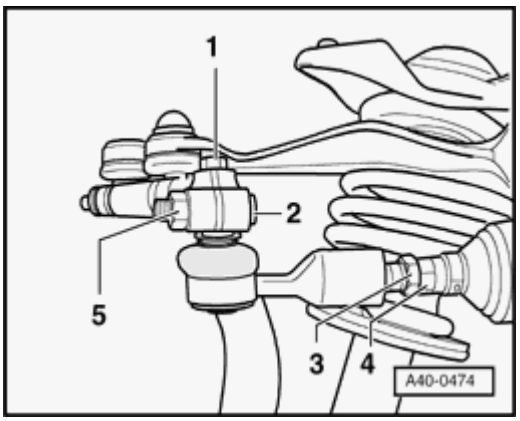

Fig. 535: Removing/Installing Hex Head Nut And Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen hex head nut - **3** - and remove tie rod ball joint. Hex head - **4** - on tie rod aids in counterholding.
- Ensure tie rod ball joint and clamp hole on wheel bearing housing are free of grease.

Installing

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

- Screw tie rod ball joint onto tie rod to stop.

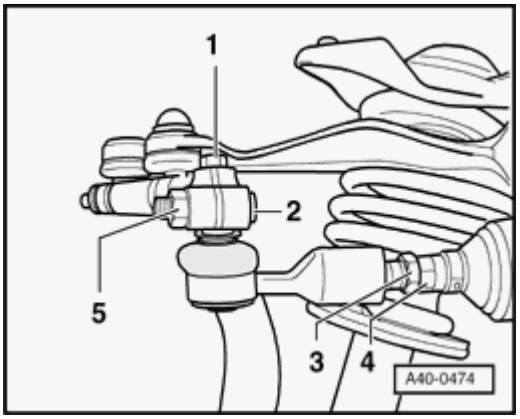

Fig. 536: Removing/Installing Hex Head Nut And Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten combi-nut - **3** - , to do this, use socket V.A.G 1332/12. When tightening, counterhold at tie rod hex head - **4** -.
- Align tie rod so that tie rod ball joint pints are in installation location.
- Insert tie rod in steering arm to stop.

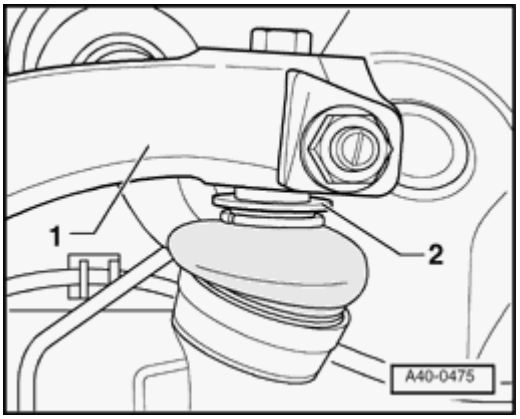

Fig. 537: Identifying Steering Arm & Tie Rod Ball Joint Sealing Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- **Install tie rod in steering arm - 1 - only by hand and do not stress tie rod end seal - 2 -.**

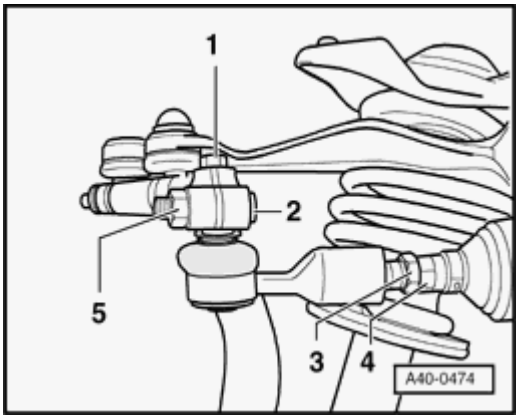

Fig. 538: Removing/Installing Hex Head Nut And Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert bolt - **2** - and screw on nut - **5** - and tighten
- Install bolt - **1** - and tighten.
- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide
- Perform vehicle alignment --> **Wheel alignment**.

Alignment must take place on a VW/Audi recommended alignment stand.

Tie rod, removing and installing

Special tools, testers and auxiliary items required

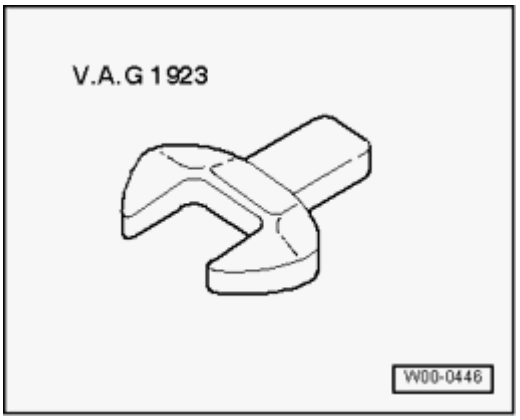

Fig. 539: Identifying Box End Wrench Insert V.A.G 1923
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Box end wrench insert V.A.G 1923
- Torque wrench V.A.G 1332

The left and right tie rods are identical.

They can be removed and installed with the steering gear in vehicle.

Removing

- Remove front wheel.

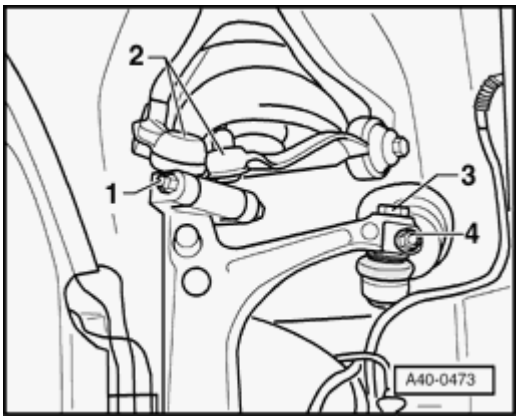

Fig. 540: Identifying Nut, Control Links & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove hex head bolt - **3** - and remove threaded connection - **4** -.

NOTE:

- **The slits in the wheel bearing housing must not be widened using a chisel or similar tool!**

- Remove tie rod downward out of steering arm or press out.

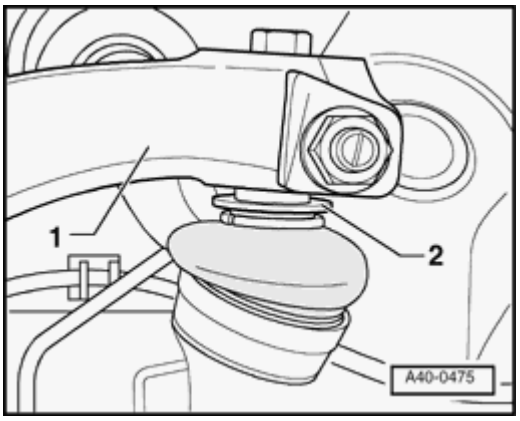

Fig. 541: Identifying Steering Arm & Tie Rod Ball Joint Sealing Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- **Do not use a chisel or similar tool between steering arm - 1 - and tie rod ball joint sealing washer - 2 - when removing tie rod, otherwise sealing washer could be damaged.**

- **Tie rod may only be pressed off steering arm over tie rod ball joint pin ends or driven with a wooden or rubber hammer.**

- Remove cover for tie rod.

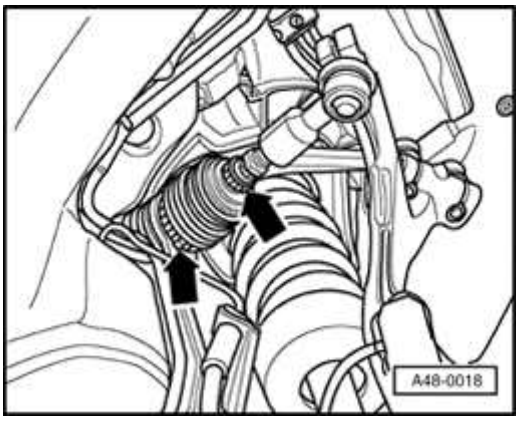

Fig. 542: Opening Clips On Boot
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Open spring hose clamp and ear hose clamp - **arrows** - at boot.
- Pull boot toward outside as far as possible.

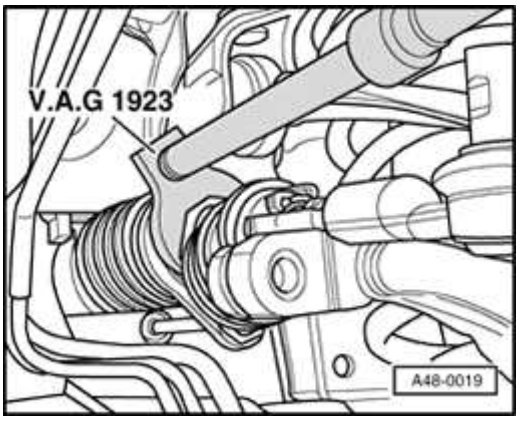

Fig. 543: Identifying Tie Rod Using V.A.G 1923
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove tie rod using Open-Jaw Torque Wrench Insert VAG 1923.

Installing

- Install tie rod and tighten
- When installing boot, ensure that:

- Smaller boot diameter snaps into groove on tie rod,

- Boot does not twist.

- Replace spring hose clamp and ear hose clamp.
- Install tie rod cover.
- Align tie rod so that tie rod ball joint pints are in installation location.
- Insert tie rod in steering arm to stop.

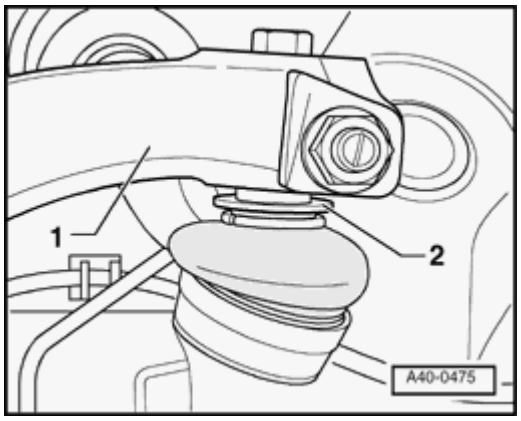

Fig. 544: Identifying Steering Arm & Tie Rod Ball Joint Sealing Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- **Install tie rod in steering arm - 1 - only by hand and do not stress tie rod end seal - 2 -.**

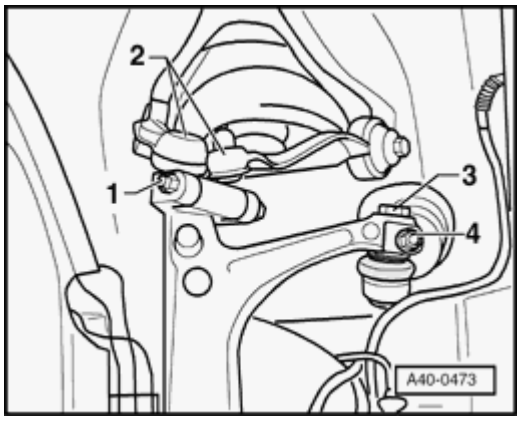

Fig. 545: Identifying Nut, Control Links & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install threaded connection - **4** - and tighten nut ,
- Install and fasten bolt - **3** -
- Mount wheel and tighten. This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide
- Perform vehicle alignment --> **Wheel alignment**.

Alignment must take place on a VW/Audi recommended alignment stand.

CHECKING OIL LEVEL, BLEEDING STEERING SYSTEM, CHECKING FOR LEAKS

Power steering fluid level, checking

- Do not run engine and turn front wheels to straight ahead position.

Cold oil (exterior temperature approx. +20°C)

- Remove cap.
- Wipe dipstick off with a clean cloth.
- Screw cap on hand-tight and remove again.

The cap must be fully screwed in order to obtain an accurate fluid level reading.

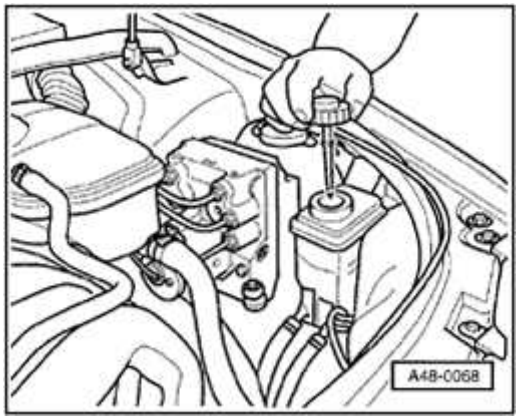

Fig. 546: Checking Fluid Level
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check fluid level: Oil level must be in "MAX" marking area.

Warm oil (Oil temperature +80°C)

- Check fluid level: Oil level must be 10 mm above "MAX" marking.

NOTE:

- **Fluid must be drawn off if the level is above the specified range.**
- **If oil level is below aforementioned area, then the hydraulic system must be checked for leaks. It is not sufficient to merely top off the fluid.**
- **Do not use drained hydraulic oil.**

Steering system, bleeding after reconstructing

After steering system reconstruction, system must be bled differently depending on extent of reconstruction.

After exchanging entire steering system or exchanging steering gear:

- Check hydraulic fluid level and top off if necessary.
- Raise vehicle until front wheels are off the ground.
- Briefly start engine (max. 2 sec.)

Pump must not draw in any air and steering wheel must not be turned under any circumstances.

Approx. 30 sec. wait between individual engine starts.

- Check hydraulic fluid level and top off if necessary.
- Repeat this process until oil level remains constant.
- Turn steering wheel from lock to lock 10 times, with engine switched off.
- Check hydraulic fluid level and top off if necessary.

- Start engine.
- Turn steering wheel 10 times from stop to stop.
- Check hydraulic fluid level and top off if necessary.

Any remaining air in steering system will dissipate by itself when driving over the next 10 to 20 km.

When reconstruction a component of the steering system besides the steering gear (pump, hoses, etc.):

- Check hydraulic fluid level and top off if necessary.
- Briefly start engine (max. 2 sec.)

Pump must not draw in any air and steering wheel must not be turned under any circumstances.

Approx. 30 sec. wait between individual engine starts.

- Check hydraulic fluid level and top off if necessary.
- Repeat this process until oil level remains constant.
- Start engine and allow to run 2 - 3 minutes, do not turn steering wheel.

Any remaining air in steering system will dissipate by itself when driving over the next 10 to 20 km.

Steering system, checking for leaks

NOTE:

- **Following installation operations and with no hydraulic fluid in the expansion tank, the steering system must be checked for leaks.**

- Start engine.
- Turn steering wheel in both directions to full lock and hold briefly. This builds up the maximum possible

pressure.

To avoid damage to pump, steering wheel must not be held at stop longer than 10 seconds during this test.

In this position, the following components must be checked for leaks.

- Seal ring for steering pinion at steering gear valve housing.
- All line connections
- Rack sealing rings

This test can only be performed with boots slid back.

- Open boot spring hose clamp and ear hose clamp.
- Slide boot back.

If fluid is visible in steering gear housing and/or in boots, steering gear must be replaced.

POWER STEERING PUMP, RESERVOIR AND HYDRAULIC LINES, ASSEMBLY OVERVIEW

Vehicles with 4-cylinder engines, assembly overview

There is no provision for servicing the power steering pump. If there are customer complaints, the cause must be determined using a pressure and leak test. If a malfunction is present, the power steering pump must be replaced.

NOTE:

- **If the fluid level in the reservoir is low, the steering system must be inspected for leaks.**
- **If there are leaks in the area of the line connections, the lines/connections must first be inspected for leaks, tightened as necessary and wiped dry.**
- **Pumps from service parts inventory do not contain fluid. They must be filled with hydraulic fluid before installation and turned by hand, otherwise pump noise or damage can result in operation.**

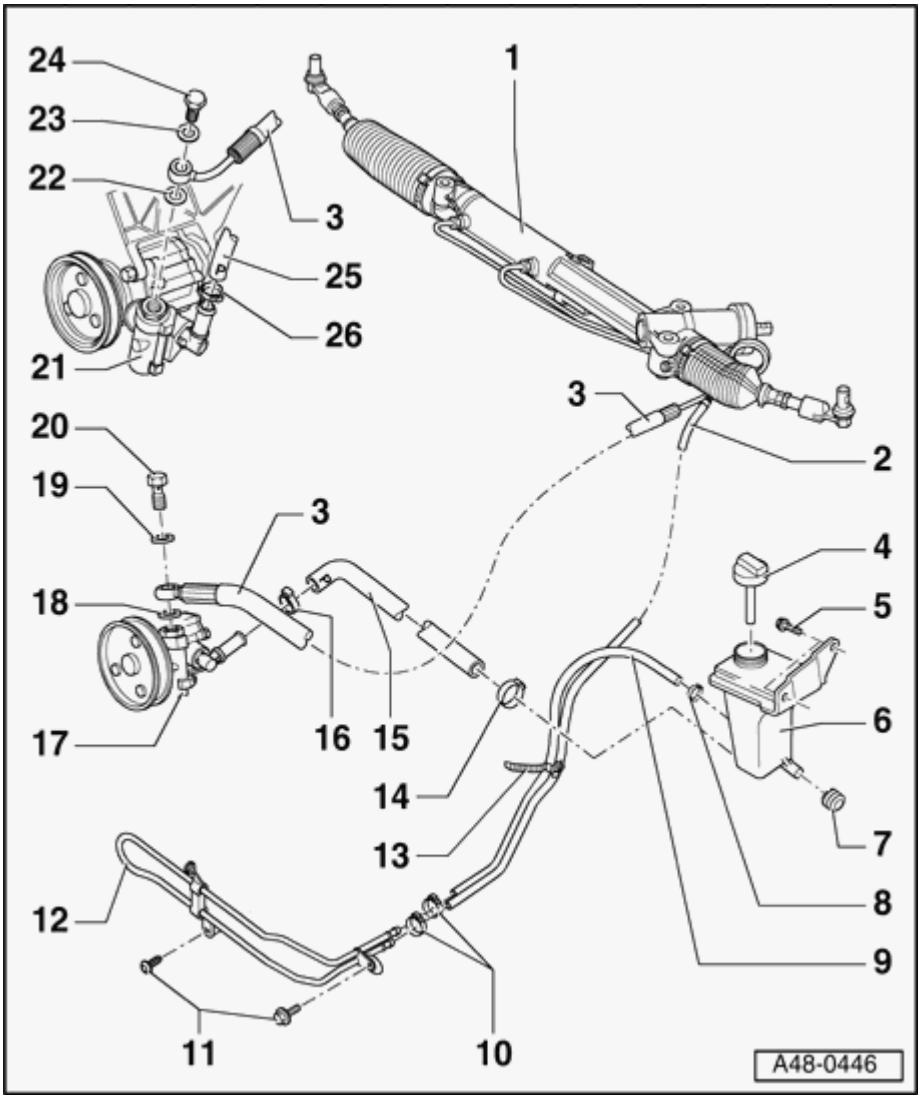

Fig. 547: Vehicles With 4-Cylinder Engines, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Power-assist steering gear

2 - Return hose

3 - Extension hose

4 - Cap with dip stick

- Check fluid level --> **Power steering fluid level, checking**

5 - Hex head bolt, 5 Nm

6 - Reservoir

- Refilling with hydraulic oil

7 - Rubber bushing

8 - Clamp

- Tension using V.A.G 1275
- Always replace

9 - Return hose

- Between reservoir and cooling line

10 - Clamp

- Tension using V.A.G 1275
- Always replace

11 - Hex head bolt, 10 Nm

12 - Cooling line

13 - Cable tie

14 - Clamp

- Tension using V.A.G 1275
- Always replace

15 - Intake hose

- Installed location --> **Intake hose**

16 - Clamp

- Tension using V.A.G 1275
- Always replace

17 - Power steering pump

- Not for US market

18 - Sealing ring

- Always replace

19 - Sealing ring

- Always replace

20 - Banjo bolt, 50 Nm

21 - Power steering pump

- For 4-cylinder engines
- Fill with oil before installing --> Note --> **Power steering pump, reservoir and hydraulic lines, assembly overview**

22 - Sealing ring

- Always replace

23 - Sealing ring

- Always replace

24 - Banjo bolt, 50 Nm

25 - Intake hose

- Installed location --> **Intake hose**

26 - Clamp

- Tension using V.A.G 1275
- Always replace

6-cylinder gasoline engine, assembly overview

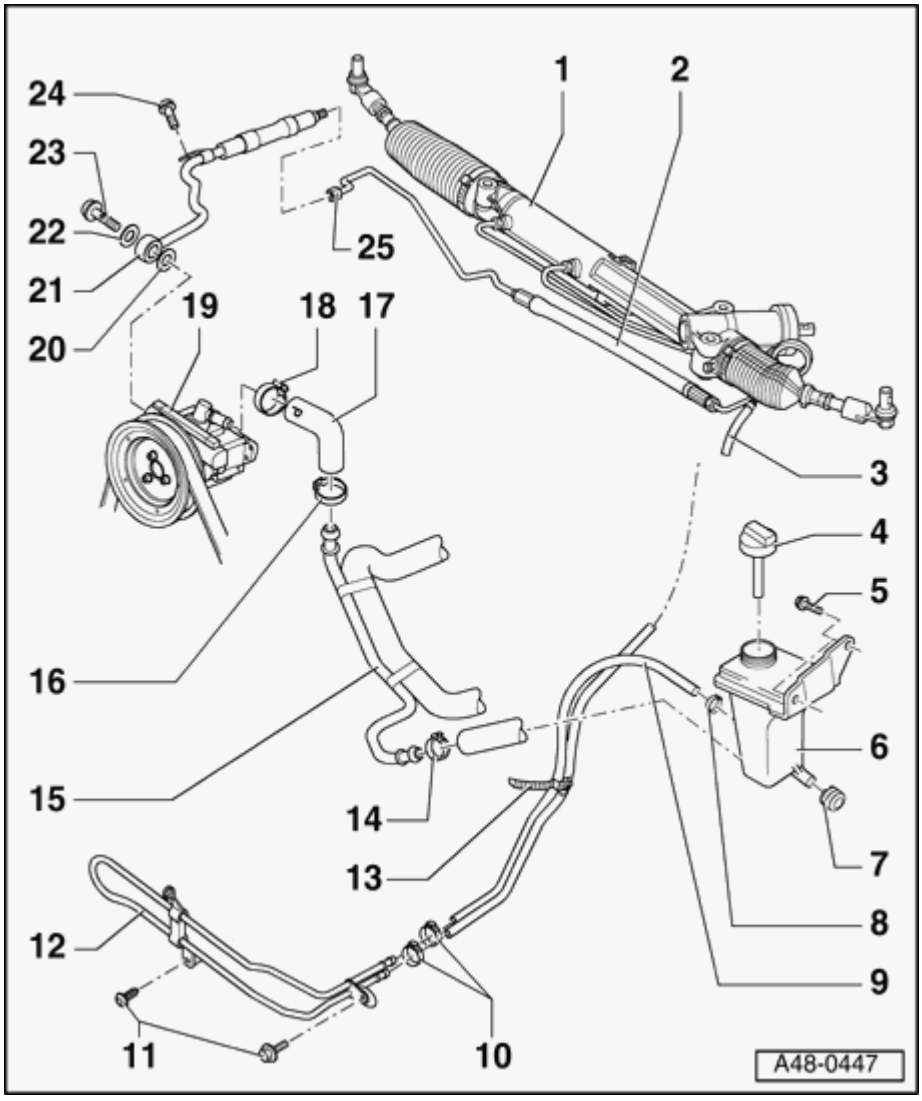

Fig. 548: 6-Cylinder Gasoline Engine, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Power-assist steering gear

2 - Extension hose

3 - Return hose

4 - Cap with dip stick

- Check fluid level --> **Power steering fluid level, checking**

5 - Hex head bolt, 5 Nm

6 - Reservoir

- Refilling with hydraulic oil

7 - Rubber bushing

8 - Clamp

- Tension using V.A.G 1275
- Always replace

9 - Return hose

- Between reservoir and cooling line

10 - Clamp

- Tension using V.A.G 1275
- Always replace

11 - Hex head bolt, 10 Nm

12 - Cooling line

13 - Cable tie

14 - Clamp

- Tension using V.A.G 1275
- Always replace

15 - Intake hose

- Installed location --> **Intake hose**

16 - Clamp

- Tension using V.A.G 1275
- Always replace

17 - Intake hose

- Installed location --> **Intake hose**

18 - Clamp

- Tension using V.A.G 1275

- Always replace

19 - Power steering pump

- Fill with oil before installing --> Note --> **Power steering pump, reservoir and hydraulic lines, assembly overview**

20 - Sealing ring

- Always replace

21 - Extension hose

22 - Sealing ring

- Always replace

23 - Banjo bolt, 50 Nm

24 - Hex head bolt, 8 Nm

25 - Extension hose connection, 40 Nm

POWER STEERING PUMP DELIVERY PRESSURE, CHECKING

Vehicles with 4-cylinder engine

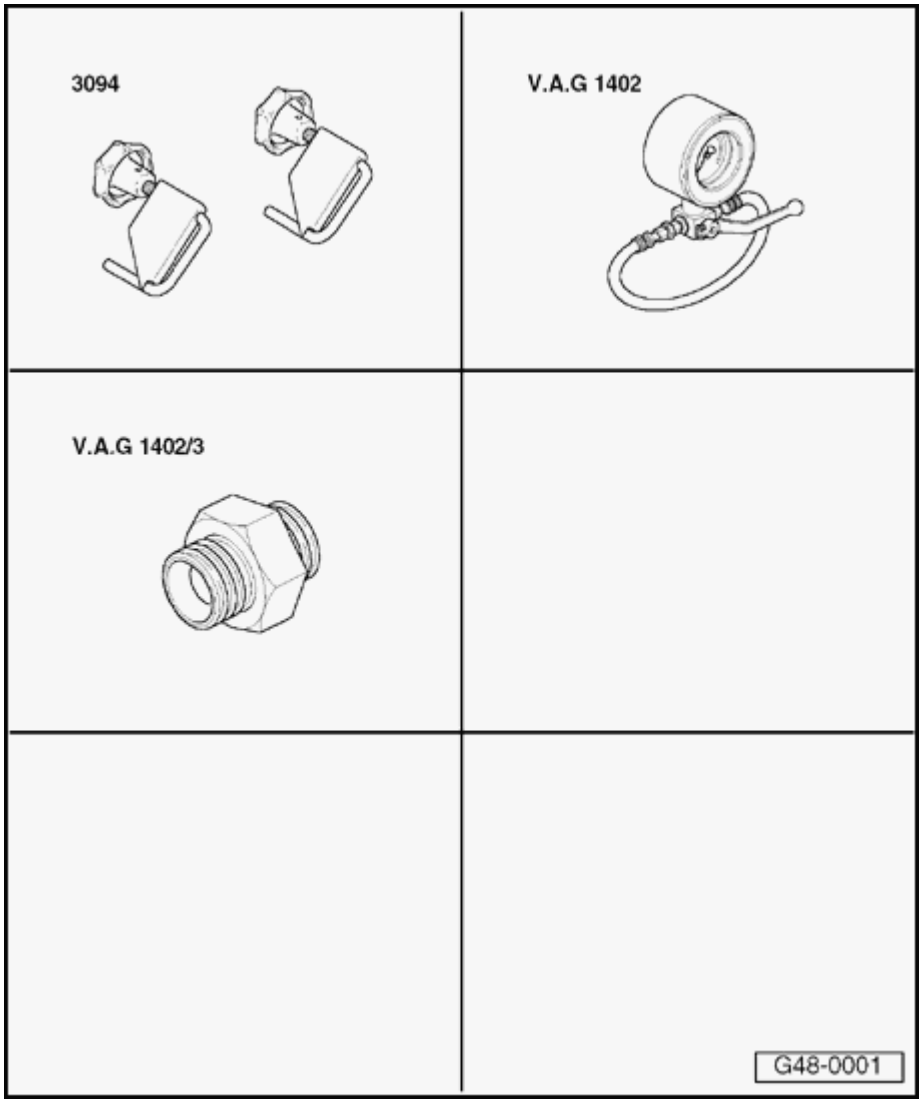

Fig. 549: Identifying Special Tools - Power Steering Pump Delivery Pressure
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Hose clamps up to 25 mm dia. 3094
- Power steering test unit V.A.G 1402
- Adapter V.A.G 1402/3

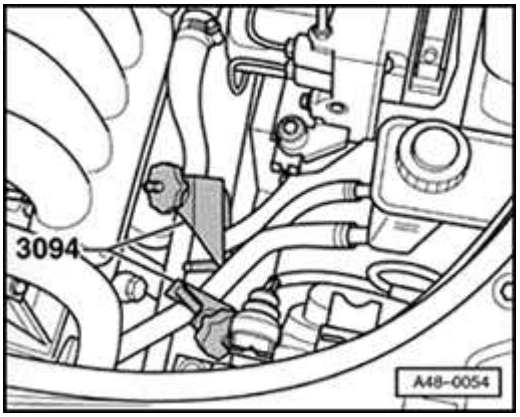

Fig. 550: Identifying Hose Clamps 3094
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp off suction and return line using hose clamps Hose Clamps Up to 25 mm dia. 3094.
- Remove pressure hose from power steering pump.
- Screw adapter V.A.G 1402/3 into power steering pump in place of banjo bolt.

NOTE:

- **If adapter V.A.G 1402/3 threads are too long, use more seals.**

- Screw pressure gauge V.A.G 1402 hose on adapter V.A.G 1402/3.
- Close gauge shut-off valve (lever to left).
- Remove hose clamps up to 25 mm dia. 3094.

NOTE:

- **To avoid damage to pump, observe the following:**
- **Pressure gauge shut-off valve must not remained closed longer than 10 seconds during this test.**
- **Start engine without giving gas and run at idle.**
- **Read pump pressure immediately after starting at idle speed (have it read by second technician, if necessary).**
- **Because pressure falls over the course of the test, the highest pressure shown is the decisive measurement.**

- Start engine and top off fluid level in reservoir if necessary.
- At idle speed, read off pressure on pressure gauge (measurement no longer than 10 seconds).

Pump pressure specified value (positive pressure)

Engine	Pump	Pump pressure (bar
4-cylinder gasoline engines	8E0 145 153 B 8E0 145 153 8E0 145 155 L	110 to 118 110 to 118 110 to 118

If pressure is not to specification, replace pump --> **Power steering pump, removing and installing**.

- Switch off engine.
- Remove pressure gauge.
- Connect pressure line to power steering pump with banjo bolt.
- Check power steering fluid level --> **Power steering fluid level, checking**.
- Check steering system for leaks --> **Steering system, checking for leaks**.
- Bleed steering system --> **Steering system, bleeding after reconstructing**

Vehicles with 6-cylinder gasoline engine

Special tools, testers and auxiliary items required

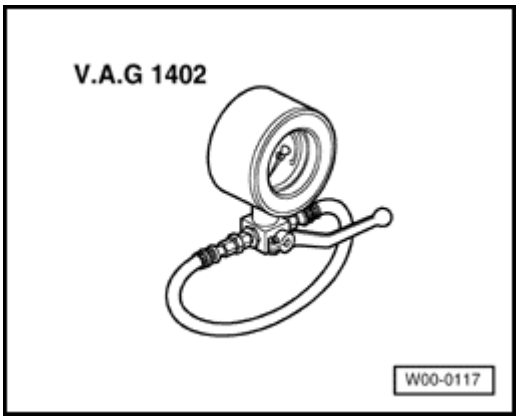

Fig. 551: Power Steering Test Unit V.A.G 1402
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Power steering test unit V.A.G 1402

- Remove engine cover.

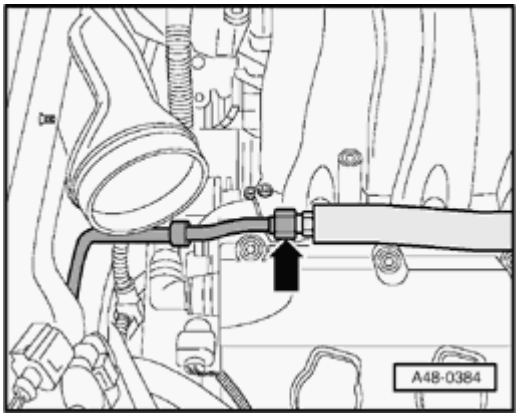

Fig. 552: Disconnecting Extension Hose While Counterholding Extension Hose Hex Head
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect extension hose - **arrow** - while counterholding extension hose hex head.

NOTE:

- **Place a cloth under separation point to absorb escaping hydraulic oil.**
- **Remove hydraulic line bracket if necessary to make work easier.**

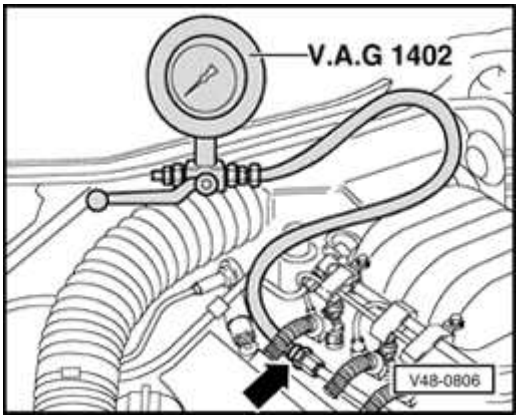

Fig. 553: Screwing Power Steering Test Unit V.A.G 1402 Onto Adapter V.A.G 1402/3
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Screw pressure gauge V.A.G 1402 hose onto extension hose.
- Close gauge shut-off valve (lever to left).

NOTE:

- **To avoid damage to pump, observe the following:**
- **Pressure gauge shut-off valve must not remained closed longer than 10 seconds during this test.**
- **Start engine without giving gas and run at idle.**
- **Read pump pressure immediately after starting at idle speed (have it read by second technician, if necessary).**
- **Because pressure falls over the course of the test, the highest pressure shown is the decisive measurement.**

- Start engine and top off fluid level in reservoir if necessary.
- At idle speed, read off pressure on pressure gauge (measurement no longer than 10 seconds).

Pump pressure specified value (positive pressure)

Engine	Pump	Pump pressure (bar
6-cylinder gasoline engines	8E0 145 155 E 8E0 145 155 F 8E0 145 155 P	120 to 127 120 to 127 120 to 127

If pressure is not to specification, replace pump --> **Power steering pump, removing and installing**.

- Switch off engine.
- Remove pressure gauge.
- Connect extension hose while counterholding hose hex head.
- Check power steering fluid level --> **Power steering fluid level, checking**.

- Check steering system for leaks --> **Steering system, checking for leaks**.
- Bleed steering system --> **Steering system, bleeding after reconstructing**

Vehicles with 8-cylinder gasoline engine with chain drive

Fig. 554: Identifying Special Tools - Vehicles With 8-Cylinder Gasoline Engine With Chain Drive
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Hose clamp 3094
- Power steering test unit V.A.G 1402
- Adapter V.A.G 1402/2
- Hose from adapter kit V.A.G 1402/6 (qty. 2)

Special tools, testers and auxiliary items required

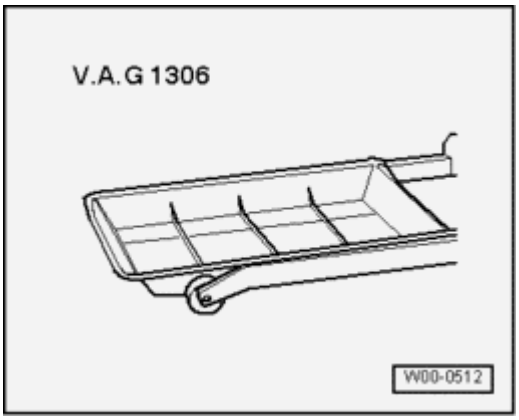

Fig. 555: Identifying Drip Tray V.A.G 1306
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drip tray V.A.G 1306

Test requirements:

- Ribbed belt/ribbed belt tension OK
- System has no leaks
- Hoses/lines not kinked or restricted

Checking

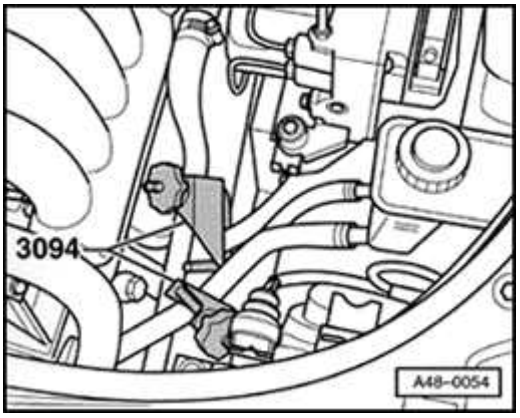

Fig. 556: Identifying Hose Clamps 3094
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp off suction and return line with hose clamps up to 25 mm dia. 3094.
- Remove noise insulation -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET

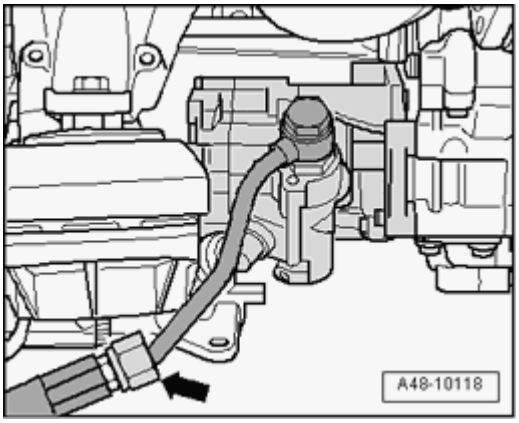

Fig. 557: Identifying Connection Of Power Steering Test Unit V.A.G 1402
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressure hose is not removed at power steering pump to check delivery pressure. Connection of Power steering test unit V.A.G 1402 takes place at line connection - **arrow** - at lower left of engine compartment.

- Place drip pan V.A.G 1306 under separation point to collect escaping hydraulic oil.
- Disconnect line connection - **arrow** -.

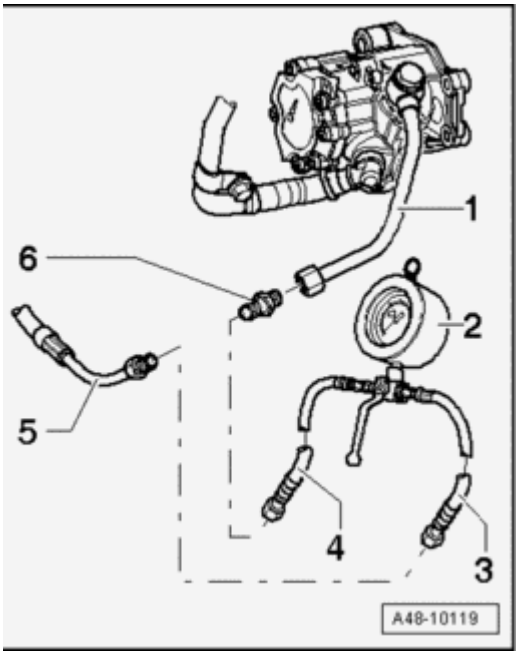

Fig. 558: Installing Power Steering Test Unit V.A.G 1402
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install Power steering test unit V.A.G 1402 as shown in illustration.

1 - Pressure hose

2 - Adapter V.A.G 1402/4

3 - Pressure hose

4 - Hose from adapter set V.A.G 1402/6

5 - Pressure gauge V.A.G 1402

- Remove Power steering test unit V.A.G 1402 from pressure hose.
- Remove hose clamps up to 25 mm dia. 3094.

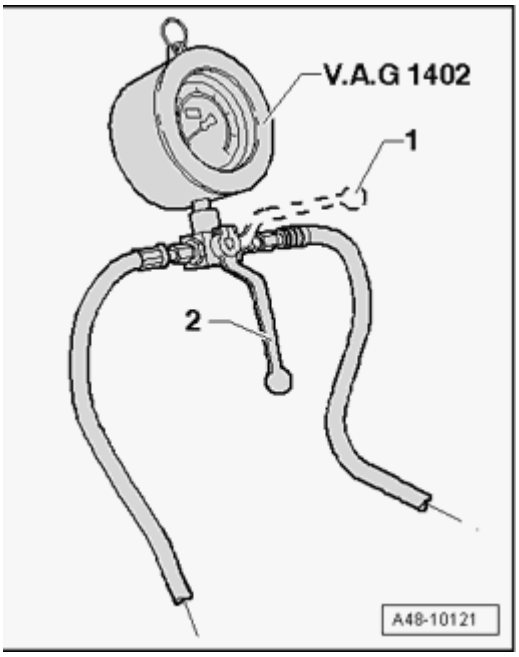

Fig. 559: Ensuring Lever On Pressure Gauge Stands In Open/Closed Position
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Ensure lever on pressure gauge stands in the open position - **1** -.
- Start engine without giving gas.
- Turn steering wheel from lock to lock about 10 times.
- Switch off engine and, if needed, top off hydraulic fluid in reservoir.

NOTE:

- **To avoid damage to pump, observe the following:**
- **Pressure gauge shut-off valve must not remained closed longer than 10 seconds during this test.**

- **Start engine without giving gas and run at idle.**
- **Read pump pressure immediately after starting at idle speed (have it read by second technician, if necessary).**
- **Because pressure falls over the course of the test, the highest pressure shown is the decisive measurement**

- Check delivery pressure.

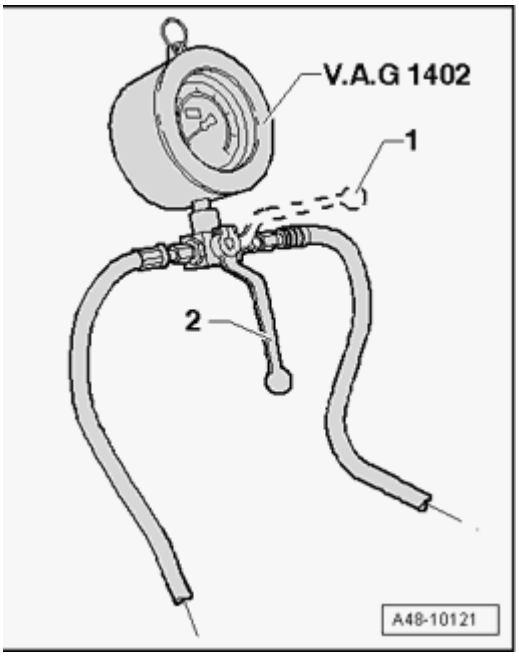

Fig. 560: Ensuring Lever On Pressure Gauge Stands In Open/Closed Position
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Start engine and close shut-off valve to the closed position - **2** - while engine is idling and read pressure (lever must face away from pressure hose). Do not perform measurement longer than 10 seconds.

Specification for delivery pressure: 123 to 130 bar

If pressure is not to specification, replace pump --> **Power steering pump (vehicles with 8-cylinder gasoline engine with chain drive), removing and installing**.

- Switch off engine.
- Remove Power steering test unit V.A.G 1402.
- Tighten connection for pressure hoses to 40 Nm.
- Check power steering fluid level --> **Power steering fluid level, checking**.

- Check steering system for leaks --> **Steering system, checking for leaks**.
- Bleed steering system --> **Steering system, bleeding after reconstructing**

- Install noise insulation -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET

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POWER STEERING PUMP, REMOVING AND INSTALLING

General information

There is no provision for servicing the power steering pump. If there are customer complaints, the cause must be determined using a pressure and leak test. If a malfunction is present, the power steering pump must be replaced.

- If the fluid level in the reservoir is low, the steering system must be inspected for leaks.
- If there are leaks in the area of the line connections, the lines/connections must first be inspected for leaks, tightened as necessary and wiped dry.
- Pumps from service parts inventory do not contain fluid. They must be filled with hydraulic fluid before installation and turned by hand, otherwise pump noise or damage can result in operation.

- Power steering pump, removing and installing, vehicles with 4-cylinder engine --> **Power steering pump (vehicles with 4-cylinder engine), removing and installing**.
- Power steering pump, removing and installing, vehicles with 6-cylinder gasoline engine --> **Power steering pump (vehicles with 6-cylinder gasoline engine), removing and installing**.
- Power steering pump, removing and installing, vehicles with 8-cylinder gasoline engine with chain drive --> **Power steering pump (vehicles with 8-cylinder gasoline engine with chain drive), removing and installing**
- Check power steering fluid level --> **Power steering fluid level, checking**.

- Bleed steering system --> **Steering system, bleeding after reconstructing**
- Check steering system for leaks --> **Steering system, checking for leaks**.

Power steering pump (vehicles with 4-cylinder engine), removing and installing

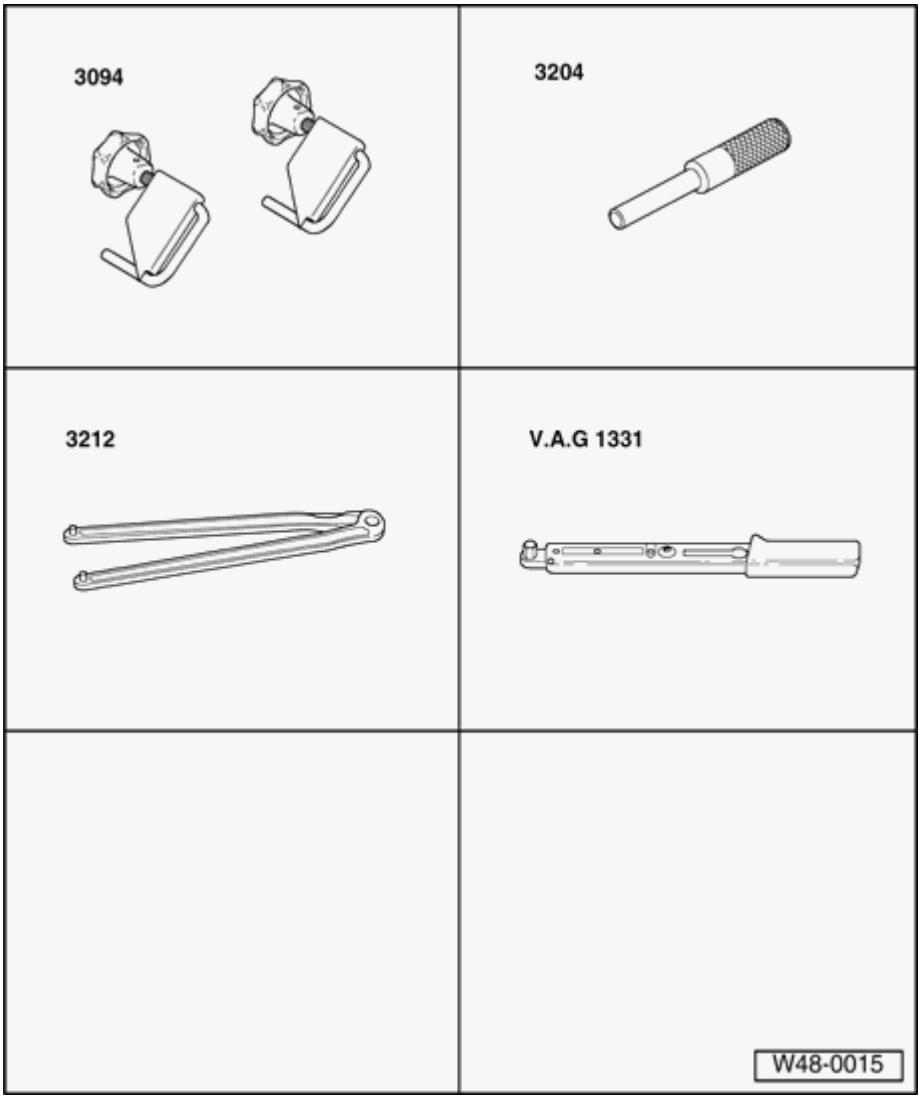

Fig. 561: Identifying Special Tools - Power Steering Pump (Vehicles With 4-Cylinder Engine), Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Hose clamps up to 25 mm dia. 3094
- Drift 3204
- Use spanner wrench 3212 or water pump wrench V.A.G 1590 if necessary
- Torque wrench V.A.G 1331

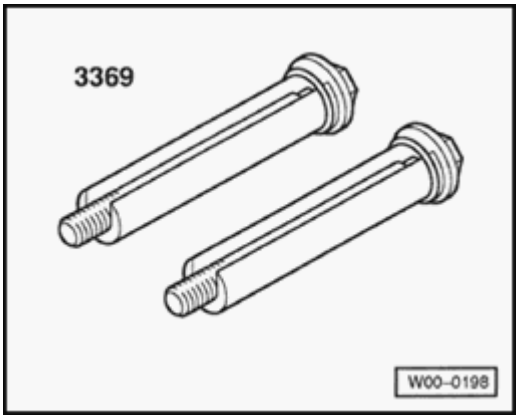

Fig. 562: Support Tool 3369
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Support tool 3369

Removing

For all vehicles.

- Remove noise insulation. -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET

For all vehicles except TFSI

- Remove front bumper -->
  - **63 BUMPER**
  - **63 - BUMPERS** for BODY EXTERIOR - CABRIOLET
- Bring lock carrier into service position. -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET

For all vehicles.

- Tension ribbed belt -->
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 1.8 LITER 4-CYL. 5V TURBO ENGINE MECHANICAL, ENGINE CODE(S): AMB
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 2.0 LITER 4-CYL. 4V TURBO ENGINE MECHANICAL, ENGINE CODE(S): BPG, BWT
  - **13 ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 3.0 LITER 6-CYL. 5V ENGINE MECHANICAL, ENGINE CODE(S): AVK, BGN
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 3.2 V6 4V ENGINE

MECHANICAL, ENGINE CODE(S): BKH

- **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 4.2 LITER V8 4V ENGINE MECHANICAL, ENGINE CODE(S): BNS
- **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 4.2 LITER V8 5V ENGINE MECHANICAL, ENGINE CODE(S): BHF

- Remove ribbed belt from power steering pump belt pulley.

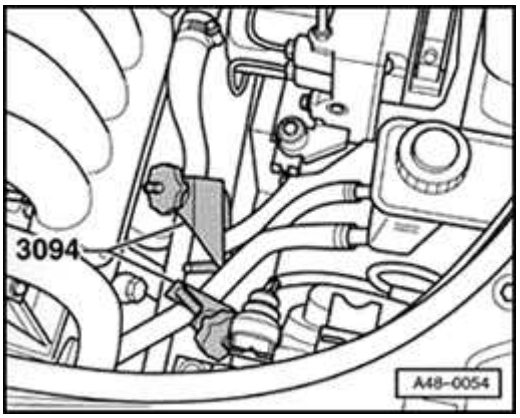

Fig. 563: Identifying Hose Clamps 3094
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp off suction and return line using hose clamps Hose Clamps Up to 25 mm dia. 3094.
- Position drip tray underneath.
- Remove suction line.
- Remove pressure hose, SW 22 mm.

For all vehicles except TFSI

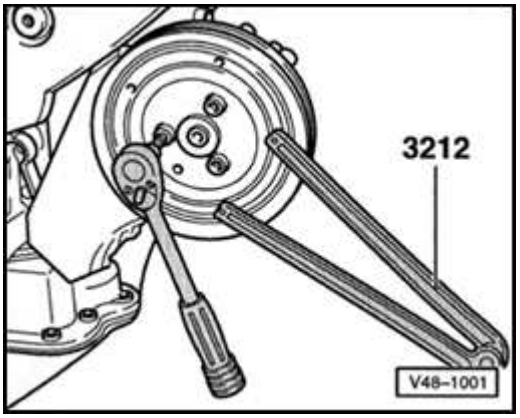

Fig. 564: Removing/Installing Power Steering Pump Belt Pulley While Using Spanner Wrench 3212 As Counterhold
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Depending on version, remove power steering pump belt pulley while using Spanner Wrench 3212 as a

counterhold.

For all vehicles with TFSI

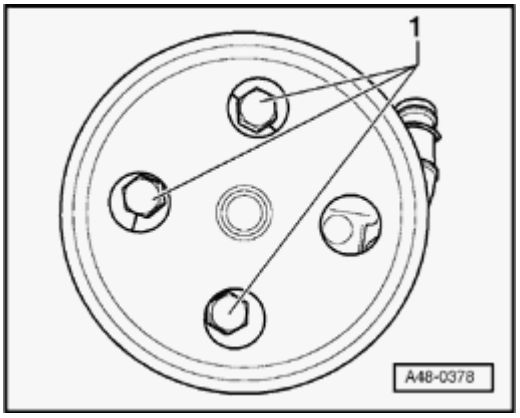

Fig. 565: Removing/Installing Power Steering Pump Connections Through Holes In Ribbed Belt Pulley
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove power steering pump connections - **1** - through holes in ribbed belt pulley.

For all vehicles.

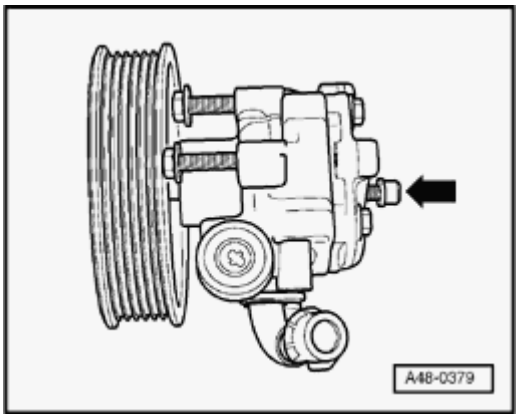

Fig. 566: Removing Threaded Connection On Backside Of Power Steering Pump
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove connections - **arrow** - on back side of power steering pump.
- Remove power steering pump

Installing

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

- Replace seals and gaskets.
- Before installing new pump on intake side, fill hydraulic oil and screw in by hand until oil escapes on

pressure side.

- Secure all hose connections with new hose clamps.

- Turn hub by hand until oil runs out of pressure side.

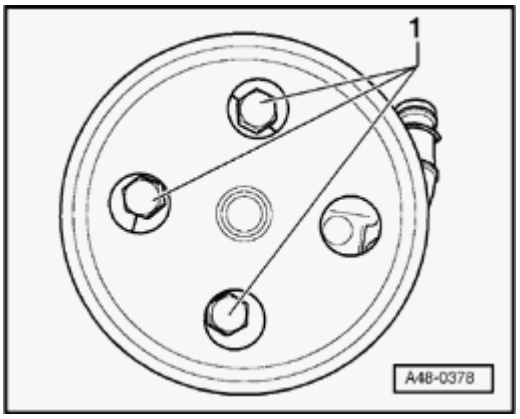

Fig. 567: Removing/Installing Power Steering Pump Connections Through Holes In Ribbed Belt Pulley
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Fasten power steering pump to bracket.
- Install and fasten bolts - **1** -. -->
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 1.8 LITER 4-CYL. 5V TURBO ENGINE MECHANICAL, ENGINE CODE(S): AMB
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 2.0 LITER 4-CYL. 4V TURBO ENGINE MECHANICAL, ENGINE CODE(S): BPG, BWT
  - **13 ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 3.0 LITER 6-CYL. 5V ENGINE MECHANICAL, ENGINE CODE(S): AVK, BGN
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 3.2 V6 4V ENGINE MECHANICAL, ENGINE CODE(S): BKH
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 4.2 LITER V8 4V ENGINE MECHANICAL, ENGINE CODE(S): BNS
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 4.2 LITER V8 5V ENGINE MECHANICAL, ENGINE CODE(S): BHF

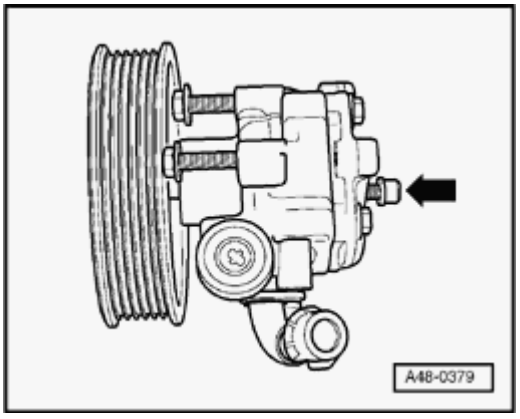

Fig. 568: Removing/Installing Threaded Connection On Backside Of Power Steering Pump
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten screw - **arrow** - on back side of power steering pump. -->
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 1.8 LITER 4-CYL. 5V TURBO ENGINE MECHANICAL, ENGINE CODE(S): AMB
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 2.0 LITER 4-CYL. 4V TURBO ENGINE MECHANICAL, ENGINE CODE(S): BPG, BWT
  - **13 ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 3.0 LITER 6-CYL. 5V ENGINE MECHANICAL, ENGINE CODE(S): AVK, BGN
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 3.2 V6 4V ENGINE MECHANICAL, ENGINE CODE(S): BKH
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 4.2 LITER V8 4V ENGINE MECHANICAL, ENGINE CODE(S): BNS
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 4.2 LITER V8 5V ENGINE MECHANICAL, ENGINE CODE(S): BHF
- Install new sealing rings onto banjo bolt.
- Tighten pressure hose banjo bold
- Install intake line. Installation location --> **Intake hose**.

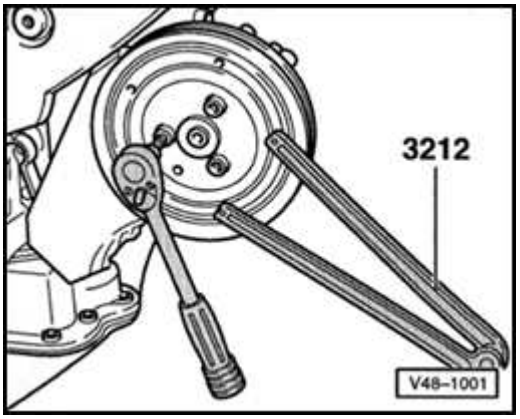

Fig. 569: Removing/Installing Power Steering Pump Belt Pulley While Using Spanner Wrench 3212 As Counterhold

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten power steering pump belt pulley. -->
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 1.8 LITER 4-CYL. 5V TURBO ENGINE MECHANICAL, ENGINE CODE(S): AMB
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 2.0 LITER 4-CYL. 4V TURBO ENGINE MECHANICAL, ENGINE CODE(S): BPG, BWT
  - **13 ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 3.0 LITER 6-CYL. 5V ENGINE MECHANICAL, ENGINE CODE(S): AVK, BGN
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 3.2 V6 4V ENGINE MECHANICAL, ENGINE CODE(S): BKH
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 4.2 LITER V8 4V ENGINE MECHANICAL, ENGINE CODE(S): BNS
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 4.2 LITER V8 5V ENGINE MECHANICAL, ENGINE CODE(S): BHF
- Install ribbed belt. -->
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 1.8 LITER 4-CYL. 5V TURBO ENGINE MECHANICAL, ENGINE CODE(S): AMB
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 2.0 LITER 4-CYL. 4V TURBO ENGINE MECHANICAL, ENGINE CODE(S): BPG, BWT
  - **13 ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 3.0 LITER 6-CYL. 5V ENGINE MECHANICAL, ENGINE CODE(S): AVK, BGN
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 3.2 V6 4V ENGINE MECHANICAL, ENGINE CODE(S): BKH
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 4.2 LITER V8 4V ENGINE MECHANICAL, ENGINE CODE(S): BNS
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 4.2 LITER V8 5V ENGINE MECHANICAL, ENGINE CODE(S): BHF

When installing the belt, ensure it is correctly seated in the pulley.

- Install lock carrier. -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET
- Install bumper. -->
  - **63 BUMPER**
  - **63 - BUMPERS** for BODY EXTERIOR - CABRIOLET
- Install noise insulation. -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET
- Fill hydraulic oil.

- Start engine and check belt running.
- Check power steering fluid level --> **Power steering fluid level, checking**.
- Bleed steering system --> **Steering system, bleeding after reconstructing**
- Check steering system for leaks --> **Steering system, checking for leaks**.

Power steering pump (vehicles with 6-cylinder gasoline engine), removing and installing

Special tools, testers and auxiliary items required

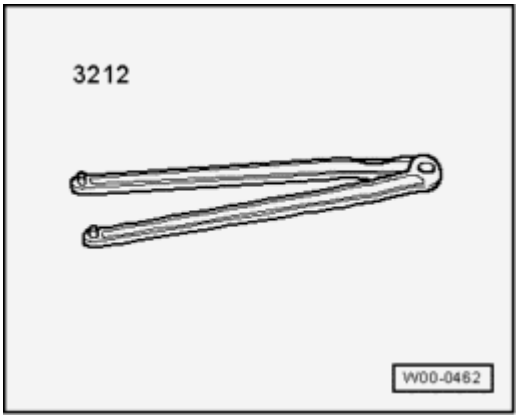

Fig. 570: Identifying Special Tool - Panner Wrench 3212
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Spanner wrench 3212
- Torque wrench V.A.G 1331

Removing

- Remove ribbed belt. -->
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 1.8 LITER 4-CYL. 5V TURBO ENGINE MECHANICAL, ENGINE CODE(S): AMB
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 2.0 LITER 4-CYL. 4V TURBO ENGINE MECHANICAL, ENGINE CODE(S): BPG, BWT
  - **13 ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 3.0 LITER 6-CYL. 5V ENGINE MECHANICAL, ENGINE CODE(S): AVK, BGN
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 3.2 V6 4V ENGINE MECHANICAL, ENGINE CODE(S): BKH
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 4.2 LITER V8 4V ENGINE MECHANICAL, ENGINE CODE(S): BNS
  - **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK** for 4.2 LITER V8 5V ENGINE MECHANICAL, ENGINE CODE(S): BHF

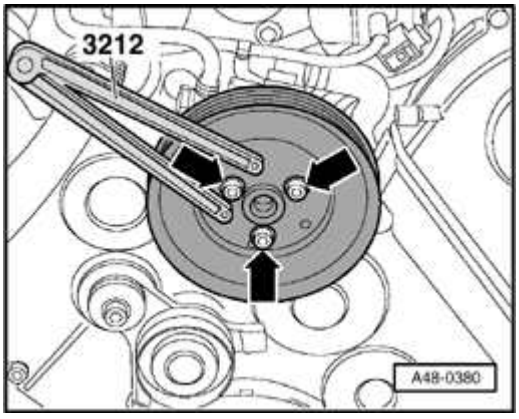

Fig. 571: Unbolting Power Steering Pump Pulley & Counterholding Using Spanner Wrench 3212
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unbolt power steering pump pulley - **arrows** - , counterholding using Spanner Wrench 3212.
- Remove ignition coil.

Not for A4 with 3.0L engine

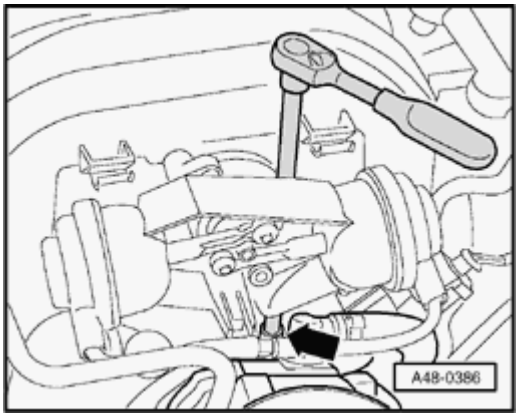

Fig. 572: Removing Rear Power Steering Pump Bolt With Socket And Extension
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove rear power steering pump bolt with socket and extension.

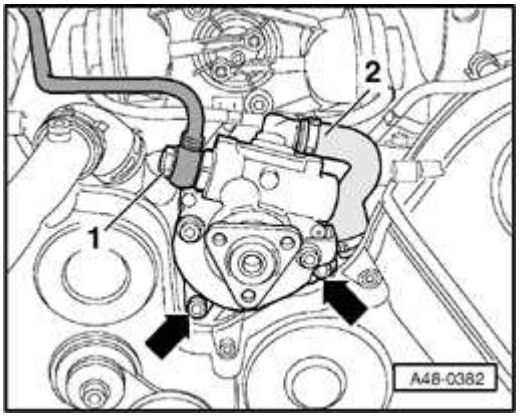

Fig. 573: Removing Banjo Bolt, Suction Hose & Power Steering Pump With Bracket
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove banjo bolt - **1** -.
- Remove suction hose - **2** -.
- Remove bolts - **arrows** - and remove power steering pump with bracket.

NOTE:

- **Place a cloth under hydraulic pressure lines to absorb escaping hydraulic oil.**

Installing

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

NOTE:

- **Replace seals and gaskets.**
- **Before installing new pump on intake side, fill hydraulic oil and screw in by hand until oil escapes on pressure side.**
- **Secure all hose connections with new hose clamps.**

- Turn hub by hand until oil runs out of the pressure side.
- Install power steering pump. --> **13 ENGINE - CRANKSHAFT, CYLINDER BLOCK**
- Install new sealing rings onto banjo bolt.
- Tighten pressure hose banjo bolt

- Install intake line. Installation location --> **Intake hose**.
- Tighten power steering pump belt pulley. --> **13 ENGINE - CRANKSHAFT, CYLINDER BLOCK**
- Install ribbed belt. --> **13 ENGINE - CRANKSHAFT, CYLINDER BLOCK**
- Check power steering fluid level --> **Power steering fluid level, checking**.

- Bleed steering system --> **Steering system, bleeding after reconstructing**
- Check steering system for leaks --> **Steering system, checking for leaks**.

Power steering pump (vehicles with 8-cylinder gasoline engine with chain drive), removing and installing

Special tools, testers and auxiliary items required

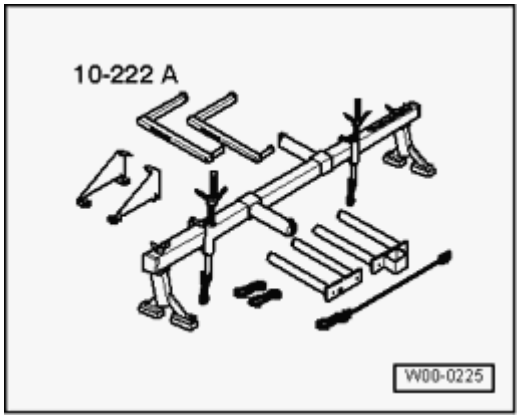

Fig. 574: Identifying 10-222A Engine Support Bridge With 10-222A/8 Bracket For Engine
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Engine support bridge 10-222 A

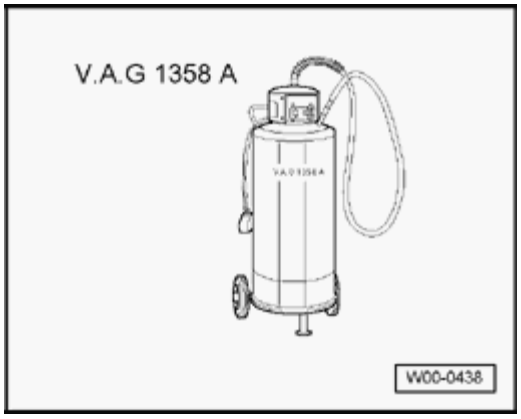

Fig. 575: Special Tool - Oil Extraction Unit V.A.G 1358 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Oil extractor V.A.G 1358 A or used oil collection and extraction device V.A.G 1782

Removing

- Remove power steering hydraulic oil from reservoir using V.A.G 1358 A or V.A.G 1782.
- Remove engine cover.

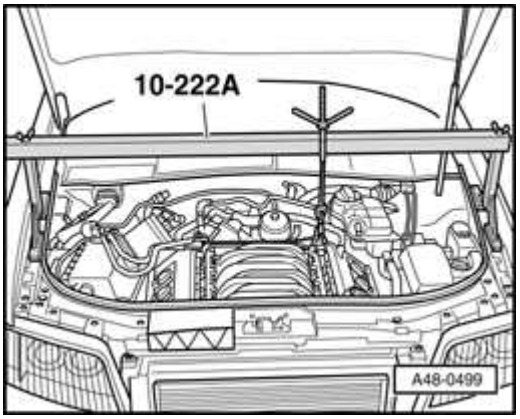

Fig. 576: Positioning Support Bridge 10-222 A On Bolted Fender Edges
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position support bridge 10-222 A on bolted fender edges.
- Engage support bridge hooks on engine lifting eyes.
- Tension engine slightly with support bridge spindle but do not lift.
- Remove from left wheel.

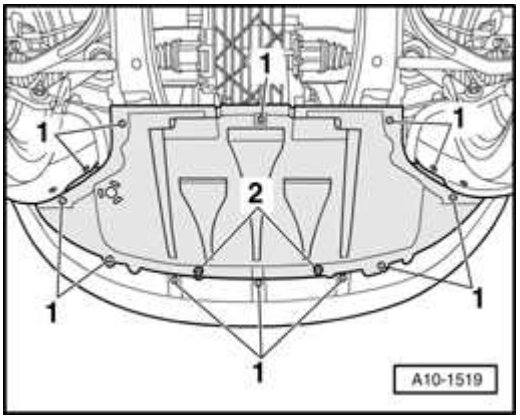

Fig. 577: Removing Quick-Release Fasteners, Screws And Noise Insulation
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen quick-release connectors - **1** - , remove screws - **2** - and remove noise insulation.

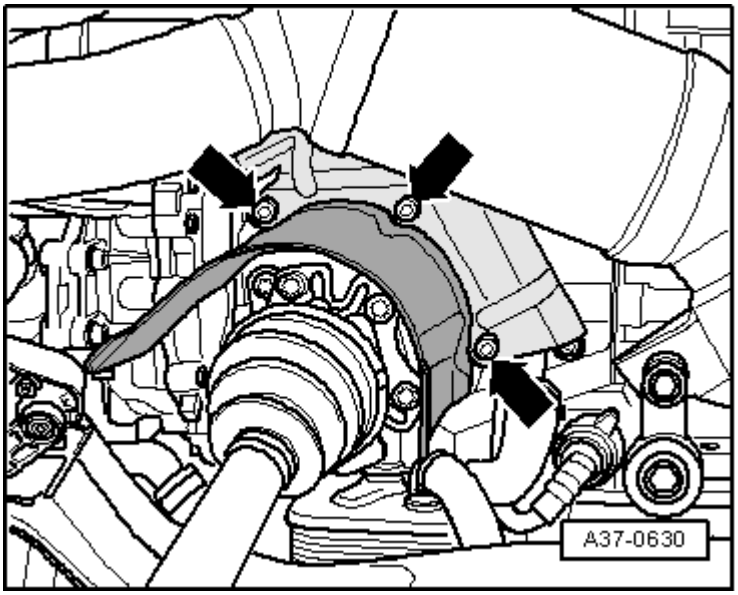

Fig. 578: Removing Left Drive Axle Heat Shield
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove left drive axle heat shield - **arrows** -.

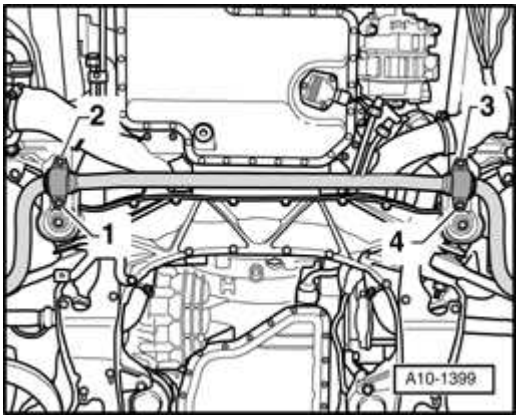

Fig. 579: Removing Left And Right Stabilizer Bar Bracket Nuts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove left and right stabilizer bar bracket nuts - **1** - to - **4** -.

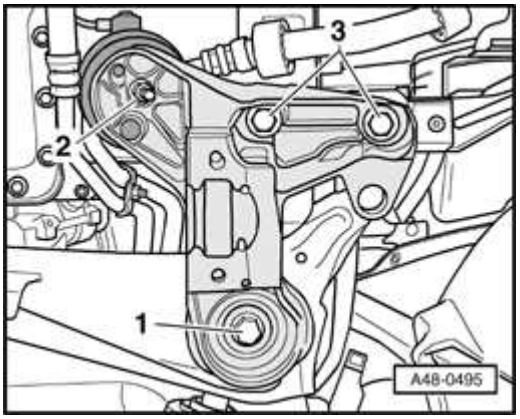

Fig. 580: Removing Nuts, Bolts & Left Engine Console
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove nuts - **2** -.
- Remove bolts - **1** - and - **3** - and remove left engine console.

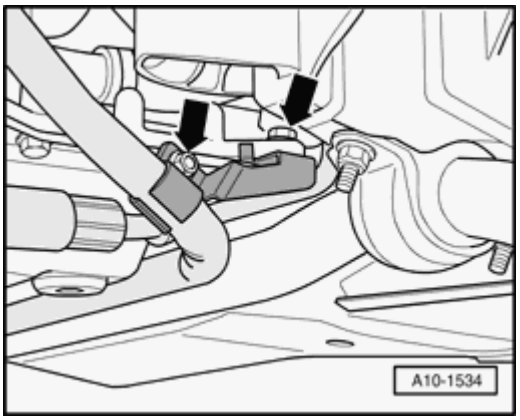

Fig. 581: Removing Left Coolant Line Bracket
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove left coolant line bracket - **arrows** -.

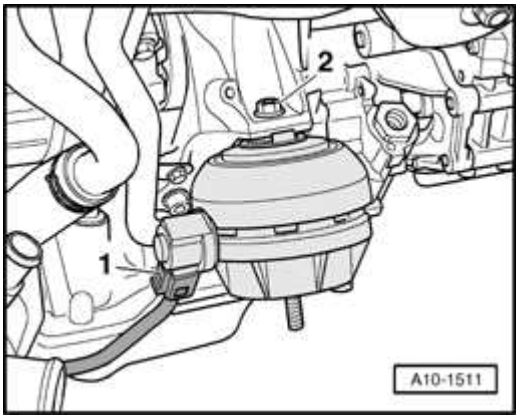

Fig. 582: Disconnecting Electrical Connector, Removing Nut And Engine Mount

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect electrical connector - **1** - at left engine mount.
- Remove nut - **2** - and remove engine mount. (If nut - **2** - cannot be loosened due to poor accessibility, skip this step)

NOTE:

- **Shown in illustration with engine removed.**

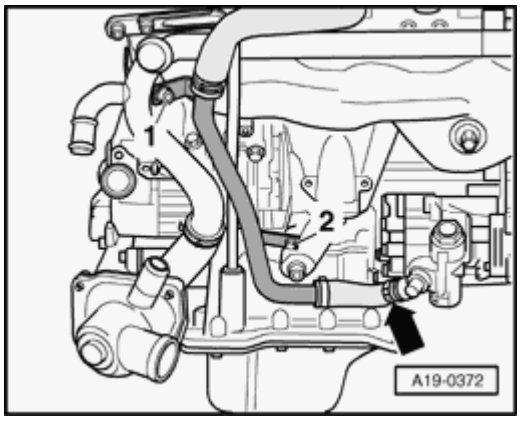

Fig. 583: Removing Bolts & Return Line From Power-Steering Pump
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **1** - and - **2** -.
- Remove return pipe from power steering pump - **arrow** -.

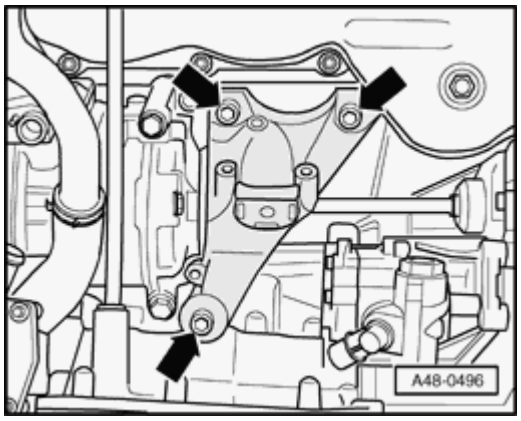

Fig. 584: Removing Left Engine Support
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove left engine support - **arrows** -.

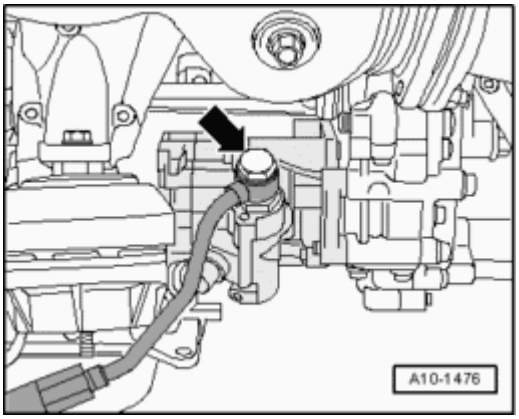

Fig. 585: Removing Hydraulic Pressure Line At Power Steering Pump
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove hydraulic pressure line at power steering pump - **arrow** -.
- Lay aside hydraulic pressure line.

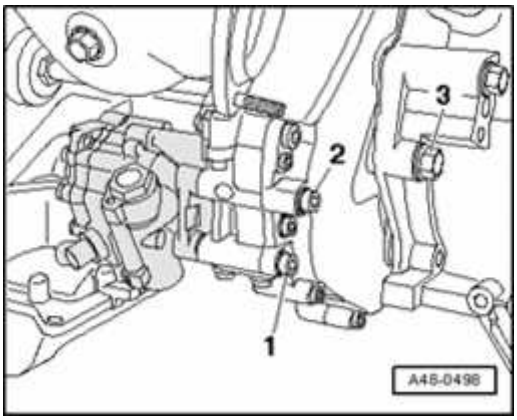

Fig. 586: Removing Bolts & Power Steering Pump
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - **3** -.
- Remove bolts - **1** - and - **2** - and remove power steering pump.

NOTE:

- **When removing power steering pump, note location of input shaft.**

Installing

When installing, note the following:

- Clean oiled places in engine compartment.
- Before installing new pump on intake side, fill hydraulic oil and screw in by hand until oil escapes on pressure side.
- O-rings on power steering pump input shaft must be replaced.

- Replace sealing rings.

On vehicles that did not have spring - **6** - installed, repair kit with spring cannot be installed.

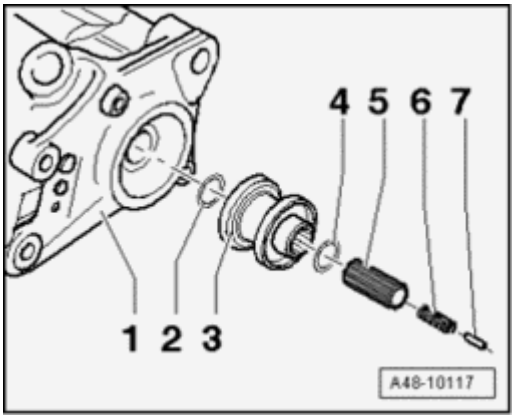

Fig. 587: Exploded View Of Power Steering Pump
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Complete power steering pump as shown in illustration and install engine.

1 - Power steering pump

2 - O-Ring

3 - Sleeve

4 - O-Ring

5 - Input shaft

6 - Spring

7 - Buffer stop

- Secure all hose connections with hose clamps appropriate to the model
- Install engine console and tighten subframe --> **Component, assembly overview**.
- Install stabilizer bar --> **Stabilizer bar, removing and installing**.
- Check power steering fluid level --> **Power steering fluid level, checking**.

- Bleed steering system --> **Steering system, bleeding after reconstructing**
- Checking steering system for proper seal --> **Steering system, checking for leaks**

Torque specifications

Component					Nm
Power steering pump to engine				M8	22
				M12	65
Engine supports to cylinder block					42
Coolant line bracket to					
	Upper part of oil pan				10
	Bracket				10
Hydraulic pressure line to power steering pump					50
Return line	Engine support				10
to	Coolant line				10
Engine mount	Engine support				23
to	Engine console				23
Drive axle heat shield to transmission					23

INTAKE HOSE

Intake hose to power steering pump location

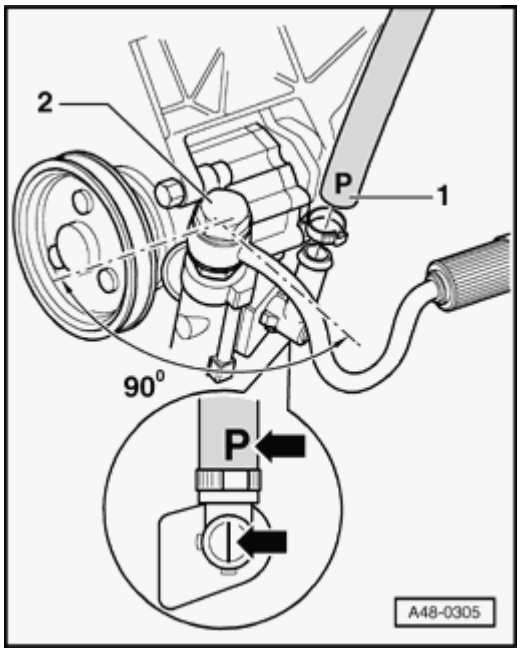

Fig. 588: Intake Hose To Power Steering Pump Location
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Illustration shows power steering pump and pressure line - **2** - as well as intake hose - **1** - on a 6-cylinder TDI engine. Location of pressure line and intake hose may differ from illustration on other engines.

- Marking - **P** - on intake hose - **1** - must align with formed seam on pump.

Intake hose to power steering oil reservoir (applies to all engines), location

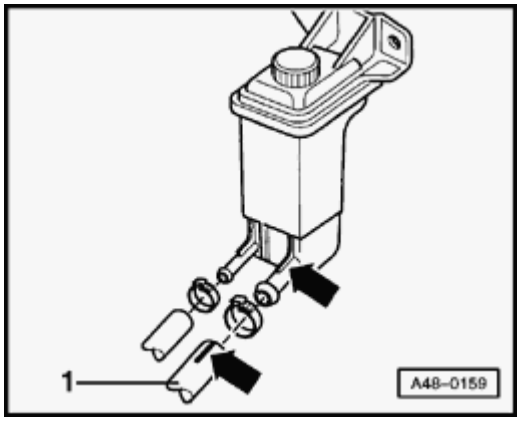

Fig. 589: Intake Hose To Power Steering Oil Reservoir (Applies To All Engines), Location
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Marking on intake hose - **1** - must align with formed seam on power steering oil reservoir - **arrows** -.

44 - WHEELS, TIRES, VEHICLE ALIGNMENT

WHEELS, TIRES

This information is contained in AESIS; Library; Additional Information; Wheels and Tire Guide

TIRE PRESSURE MONITORING SYSTEM

General information

Observe notes about usage in your Owners Manual.

Damaged wheel electronics or valves should be replaced for safety reasons.

Do not clean wheel electronics with steam blasting or strong compressed air.

Replace wheel electronics after using tire sealant as the accumulation of sealant on the pressure sensor can cause false readings.

The Tire Pressure Monitoring System monitors the pressure of the 4 tires while driving.

If wheel positions on vehicle are changed or wheels or wheel sensors replaced, this must be confirmed using the steering column or the control module in the center console. Finally, the system has to relearn the wheel sensors.

NOTE:

- **When changing wheels with wheel electronics (summer/winter tires), pressure must be checked and control module must relearn wheel electronics.**

A fault may be saved in the DTC memory if:

Less than three wheels with wheel electronics are installed.

Winter tires without wheel electronics are installed. (If this is the case, the yellow warning lamp in instrument cluster is set and cannot be deactivated by the system.)

Tire Pressure Monitoring System, component overview

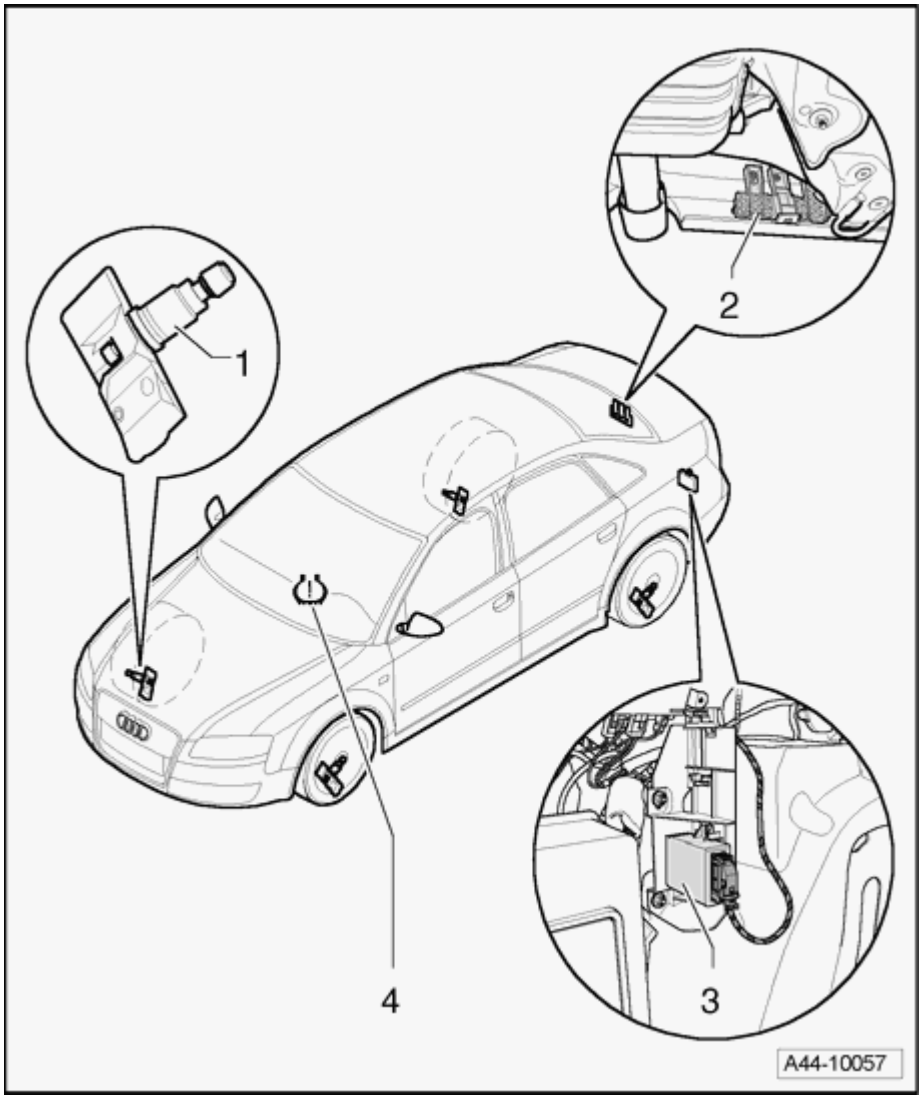

Fig. 460: Tire Pressure Monitoring System, Component Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Left Front Tire Pressure Monitoring Sensor G222 , Right Front G223 , Left Rear G224 and Right Rear G225

- Spare Tire Pressure Monitoring Sensor G226
- Removing and installing --> **Metal valve body, removing and installing**

2 - Rear Tire Pressure Monitoring Antenna R96

- Removing and installing --> **Rear Tire Pressure Monitoring System antenna, removing and installing**

3 - Tire Pressure Monitoring Control Module J502

- If Tire Pressure Monitoring Control Module J502 is replaced, system must be recorded.

4 - Display in instrument cluster

- See Vehicle diagnostic, test and information system VAS 5051

Wheel electronics, assembly overview

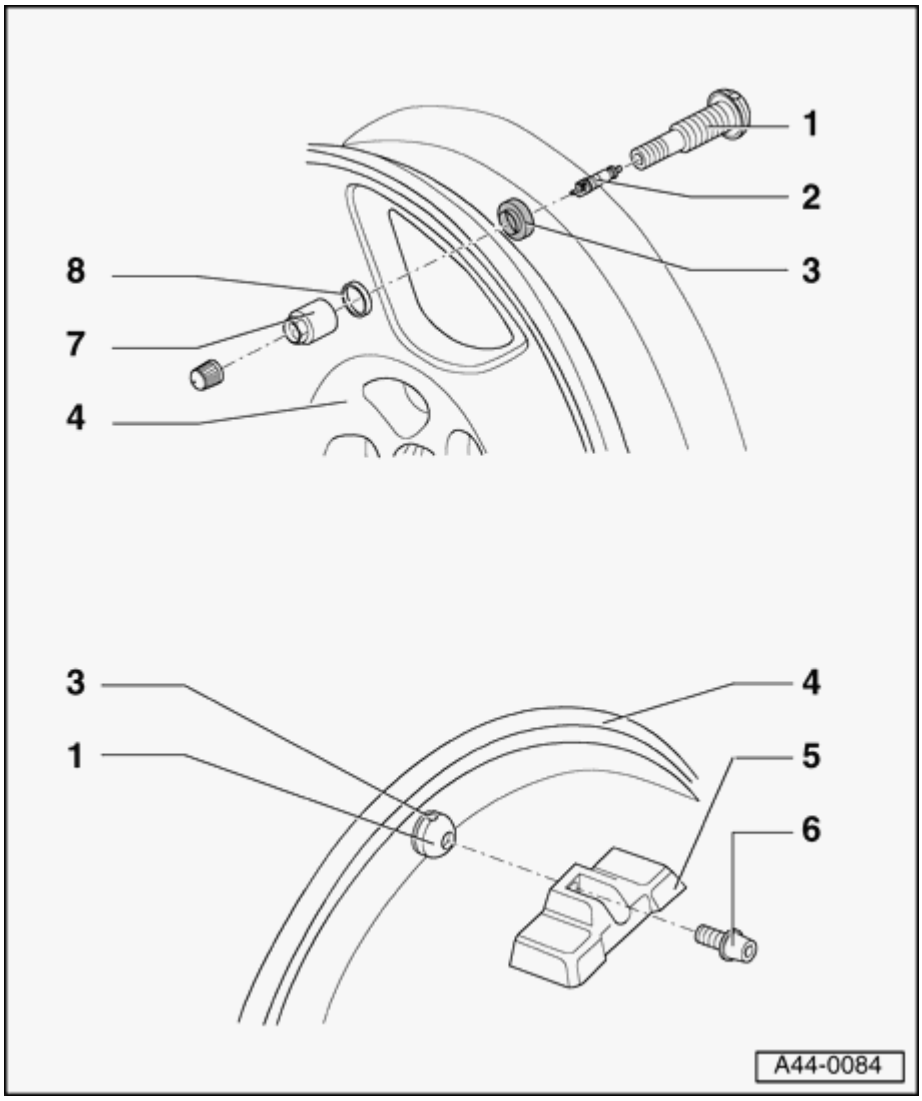

Fig. 461: Wheel Electronics, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Metal valve body

- Delivered complete
- Replace valve insert with every tire change
- Removing and installing --> **Metal valve body, removing and installing**

2 - Valve core

3 - Sealing ring

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

4 - Rim

- Tires, mounting and dismounting **Dismounting tire** and **Mounting tire**

5 - Wheel electronics

- Must be completely replaced
- Battery life approx. 7 years
- Remaining battery life, temperature and pressure can be read via diagnosis with Vehicle Diagnostic, Measuring and Information System VAS 5051A

6 - Microencapsulated screws Torx T20

- Torque specification 4 Nm
- Screws must be replaced
- Can only be obtained as a replacement part with wheel electronics

7 - Union nut

- Torque specification 4 Nm
- Removing and installing --> **Metal valve body, removing and installing**

8 - Bevelled washer

Changing tires

Nickel-plated valve insert must be replaced with every tire change.

Metal valve and wheel electronics can be reused

- Let air out of tire by removing nickel-plated valve insert.
- Tires, dismounting **Dismounting tire**
- Perform a visual inspection for loose or damaged parts. If there are loose threaded connections, replace entire valve unit.

Damaged wheel electronics must be replaced.

- Tires, mounting **Mounting tire**
- Install new nickel-plated valve insert.
- Fill tires, reinstall plastic cap.

- Balance tires.

Dismounting tire

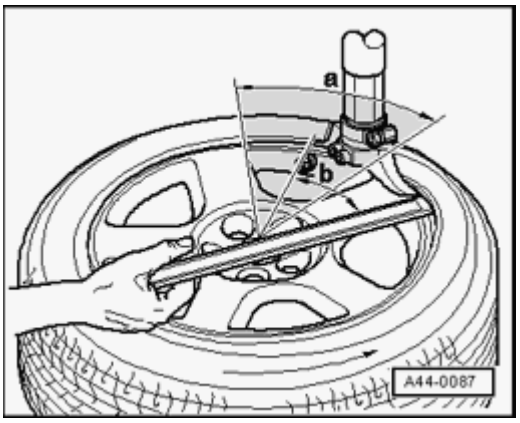

Fig. 462: Dismounting Tire
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Roll or press tires off.

When using pressure paddles, first separate tires from side opposite of valve.

Do not use pressure paddles in hatched area - a -.

- Position mounting head near valve so that so that tire iron can be put on approx. 30° - **b** - next to tire valve.
- Then remove tire in valve area first.

Mounting tire

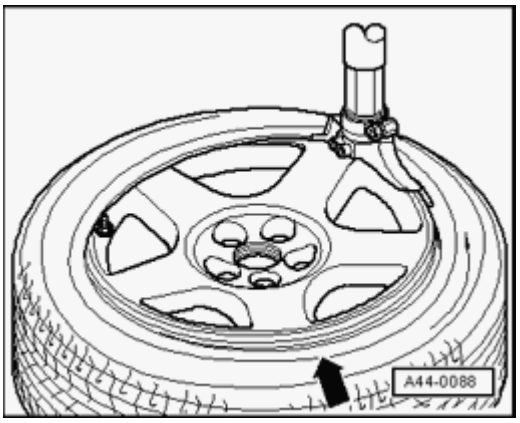

Fig. 463: Mounting Tire
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Do not use pressure paddles in valve area.

- Position wheel electronics approx. 180° opposite of mounting head.
- Press tire in bed approx. 90° in front of mounting head - **arrow** -.
- Mount tire.

Metal valve body, removing and installing

Special tools, testers and auxiliary items required

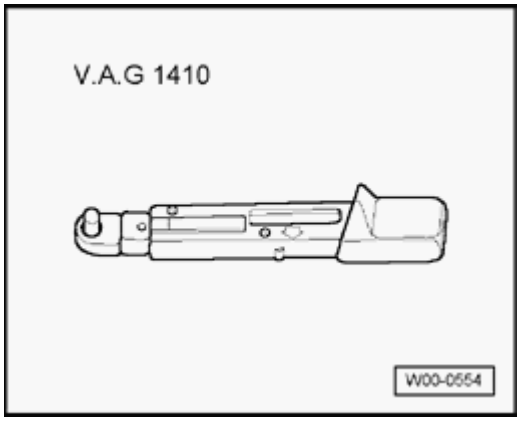

Fig. 464: Torque Wrench V.A.G 1410
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1410

- Place metal valve with rubber seal through rim from inside.
- Position beveled washer and union nut from outside and tighten.

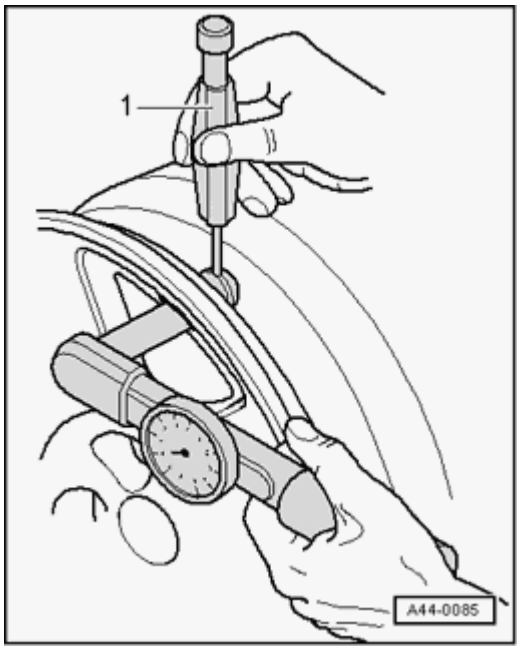

Fig. 465: Securing Against Turning With Counterhold
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure against turning with counterhold - **1** - (e.g. drill bit 2 mm dia.).

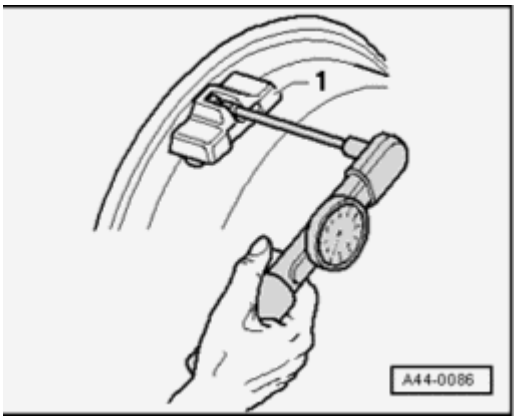

Fig. 466: Pressing Wheel Electronics Into Bed And Fasten At Rear Of Valve With Microencapsulated Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press wheel electronics - **1** - into bed and fasten at rear of valve with microencapsulated screw.

Tire Pressure Monitoring Control Module J502 , removing and installing

Removing

Tire Pressure Monitoring Control Module J502 is located behind side trim at left of luggage compartment.

- Remove side trim at left of luggage compartment.

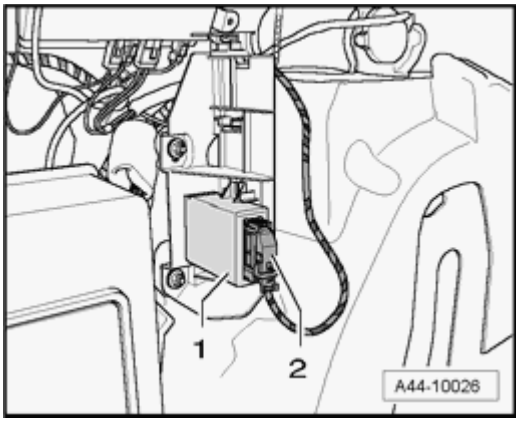

Fig. 467: Unclipping Control Module, Disconnecting Connector And Removing Control Module
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unclip control module - **1** -.

- Disconnect connector - **2** - and remove control module.

Installing

Installation is in reverse order of removal.

Rear Tire Pressure Monitoring System antenna, removing and installing

Removing

Reception antenna is found at bottom of rear bumper.

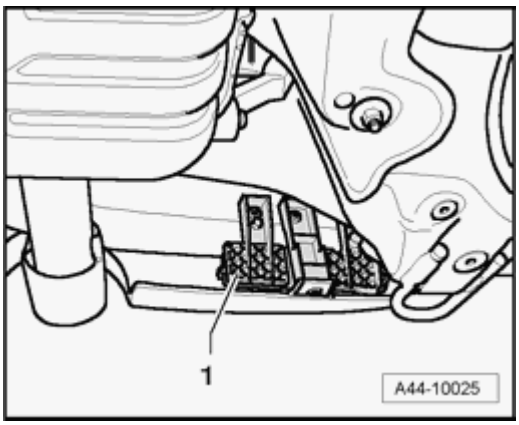

Fig. 468: Identifying Rear Tire Pressure Monitoring Antenna R96
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unclip Rear Tire Pressure Monitoring Antenna R96 - **1** - in direction of vehicle center.
- Disconnect connector from antenna.
- Remove antenna - **1** -.

Installing

Installation is in reverse order of removal.

Tire Pressure Monitoring System, system usage

Function:

Tire Pressure Monitoring System is controlled via steering column or control module in center console.

The system monitors tire pressure you have set and entered for monitoring.

- You must first check, correct and save tire pressures.
- Check and correct tire pressure for tires on vehicle (including spare tire) according to specifications on the sticker on the fuel filler flap.

Recode Tire Pressure Monitoring Control Module J502.

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

- Connect vehicle diagnosis, testing, and information system VAS 5051 and select function test using "Functions/Component selection".

Then

- "Chassis"
- "Tire Pressure Monitoring System"
- "01- On Board Diagnostic (OBD) capable systems"
- "J502 - Tire Pressure Monitoring Control Module"
- "Tire Pressure Monitoring functions"
- "J502 - Code control module"

Save tire change or tire pressure via right steering column from steering wheel.

The correct saving of the specified values in the basic requirement for dependable tire pressure monitoring. Afterwards, the system automatically carries out a learning process.

To do this, proceed as follows:

- Switch ignition on.
- Press rest button on steering column.
- Using rocker switch, select "set" function in instrument cluster and acknowledge this with reset button.
- Using rocker switch, select "tire pressure" function in instrument cluster and acknowledge this with reset button.
- Using rocker switch, select "save pressures" or "tire change" function in instrument cluster and acknowledge with reset button.

Saving of tire pressures must be started after every change desired to specified values and after every tire change.

Save tire change or tire pressures via control module in center console.

The correct saving of the specified values in the basic requirement for dependable tire pressure monitoring. Afterwards, the system automatically carries out a learning process.

- Switch ignition on.
- Press Menu button in center console.

- Using rotary switch, select "Systems" in CAR menu and acknowledge by pressing rotary switch.
- Using rotary switch, select "Set" in CAR menu and acknowledge by pressing rotary switch.
- Using rotary switch, select "Tire pressure" in CAR menu and acknowledge by pressing rotary switch.
- Using rotary switch, select "Save pressures" or "Tire change" in CAR menu and acknowledge by pressing rotary switch.

Saving of tire pressures must be started after every change desired to the specified values and after every tire change.

WHEEL ALIGNMENT

General information

Wheel alignment must only performed using VW/Audi-approved wheel alignment equipment!

Each time wheels are aligned, both front and rear wheels must be aligned.

Otherwise correct vehicle performance is not guaranteed and an off center steering wheel may exist.

NOTE:

- **Do not perform wheel alignment until the vehicle has been driven 1000 to 2000 km, because the coil springs will not have settled until then.**
- **The individual specifications should be followed as exactly as possible when making adjustments.**

Test Requirements:

Clarification of Production Control numbers (PR No.): **Clarification of Production Control numbers (PR No.)**

Suspension version installed in vehicle is indicated by the corresponding PR. No. on the vehicle data plate - **arrow** -.

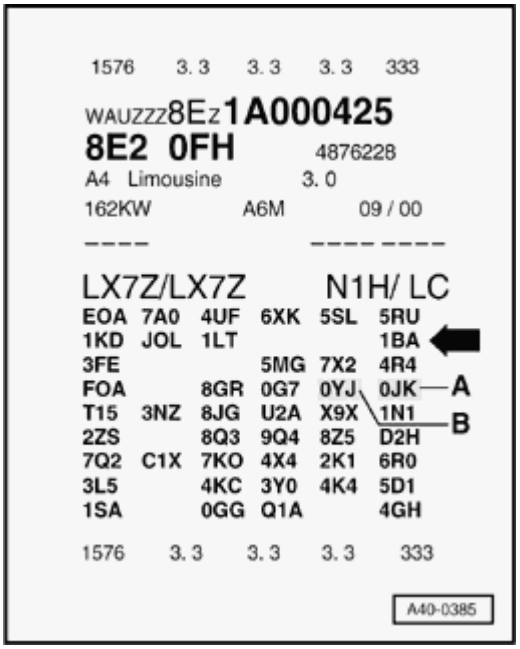

Fig. 469: Example Of Vehicle Data Sticker
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Example of a vehicle data sticker

In this example the vehicle is equipped with the standard suspension - **arrow** -.

The vehicle data sticker is located at rear of spare wheel well and in Maintenance booklet.

1BA = standard suspension

1BE = sport suspension (20 mm lower than 1BA)

1BD = sport suspension S4

1BR = comfort - heavy duty suspension (13 mm higher than 1BA)

1BV = sport suspension (quattro GmbH)

2MC = basic suspension (quattro GmbH RS4)

2ME = sport suspension (quattro GmbH RS4)

- The measurement sensor must be properly adjusted and attached to the vehicle; observe device manufacturers operating instructions.
- Tread depth difference may be no more than 2 mm on an axle.
- Tires inflated to correct pressure
- Be sure that sliding plates and turn tables are not touching end stop when checking wheel alignment

- Vehicle empty weight * See note

* Empty weight means: Weight of the vehicle ready for the road (fuel tank and fluid reservoir for window/headlamp washer system completely filled, spare wheel, vehicle tools and vehicle jack) and without driver.

Spare wheel, vehicle tools and vehicle jack must be located in the position specified by the vehicle manufacturer.

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

Wheel alignment is necessary when:

- Vehicle shows handling problems.
- Involved in an accident.
- Axle components were removed.
- Tire wear patterns are uneven.

Front axle components	Wheel alignment check required		Toe constant "S" adjusting necessary		Rear axle components	Wheel alignment check required	
	Yes	No	Yes	No		Yes	No
Upper rear link		X		X	Strut		X
Upper front link		X		X			
Lower guide link		X		X	Coil spring		X
Suspension strut		X		X			
Track control link		X		X	Transverse link	X	
Mounting bracket		X		X	Tie rod	X	
Wheel bearing housing	X		X		Stub axle carrier/wheel bearing housing	X	
Tie rod	X		X		Trapezoidal control arm	X	
Steering	X		X		Subframe	X	

gear							
Subframe	X		X				
Stabilizer bar		X		X	Stabilizer bar		X

Specifications for wheel alignment

Sedan and wagon (front and all wheel drive)

Specifications valid for all engine versions

Front axle	Standard suspension (1BA)	Sport suspension (1BE) sport suspension quattor GmbH (1BV)	Sport suspension (1BD) basic suspension quattro GmbH RS4 (2MC)	Comfort heavy duty suspension (1BR)	Sport suspension quattro GmbH RS4 (2ME)
Camber	- 30' ± 25'	- 47' ± 25'	- 50' ± 25'	- 21' ± 25'	- 76' ± 25'
Maximum permissible difference between both sides	30'	30'	30'	30'	30'
Toe setting for each wheel (unladen)	+ 10' ± 2'	+ 10' ± 2'	+ 10' ± 2'	+ 10' ± 2'	+ 10' ± 2'
Toe check value for each wheel (unladen)	+ 10' ± 5'	+ 10' ± 5'	+ 10' ± 5'	+ 10' ± 5'	+ 10' ± 5'
Toe constant per wheel (setting value)	+ 9' ± 2' * See note + 14' ± 2' * See note	+ 9' ± 2' * See note + 14' ± 2' * See note	+ 14' ± 2'	+ 9' ± 2' * See note + 14' ± 2' * See note	+ 14' ± 2'
Toe constant for each wheel (check value)	+ 9' ± 7' * See note + 14' ± 7' * See note	+ 9' ± 7' * See note + 14' ± 7' * See note	+ 14' ± 7'	+ 9' ± 7' * See note + 14' ± 7' * See note	+ 14' ± 7'
Toe constant difference between both sides	max. 10'	max. 10'	max. 10'	max. 10'	max. 10'
Toe angle difference at 20 degrees * See note	1° 6' ± 30'	1° 6' ± 30'	1° 6' ± 30'	1° 6' ± 30'	1° 6' ± 30'

* Data applies to market introduction sedan up to VIN 8E_2_025687.

* Data applies to Sedan from VIN 8E_2_025688 as well as to wagon.

*Wheel stop on outer wheel is reduced by this amount. It can also be indicated negatively in alignment computer, depending on manufacturer.

Rear axle	Standard suspension (1BA)	Sport suspension (1BE) sport suspension quattor GmbH (1BV)	Sport suspension (1BD), basic suspension quattro GmbH RS4 (2MC)	Comfort heavy duty suspension (1BR)	Sport suspension quattro GmbH RS4 (2ME)
Camber	- 1° 20' ± 30'	- 1° 20' ± 30'	- 1° 20' ± 30'	- 1° 20' ± 30'	- 1° 20' ± 30'
Maximum permissible difference between both sides	30'	30'	30'	30'	30'
Total toe	+ 20' ± 10' / 5'	+ 20' ± 10' / 5'	+ 20' ± 10' / 5'	+ 20' ± 10' / 5'	+ 20' ± 10' / 5'
Individual toe	+ 10' ± 5' / 2,5'	+ 10' ± 5' / 2,5'	+ 10' ± 5' / 2,5'	+ 10' ± 5' / 2,5'	+ 10' ± 5' / 2,5'
Maximum permissible deviation in direction of travel relative to vehicle longitudinal axis	7'	7'	7'	7'	7'

Additional vehicle data for vehicles with front and all wheel drive:

This additional vehicle data only serves for a faster diagnosis in the case of accidents.

Table --> **Technical data**

Convertible (front and all wheel drive)

Specifications valid for all engine versions

Front axle	Standard suspension (1BA)	Sport suspension (1BE)
Camber	- 47' ± 25'	- 47' ± 25'
Maximum permissible difference between both sides	30'	30'
Toe setting for each wheel (unladen)	+ 10' ± 2'	+ 10' ± 2'
Toe check value for each wheel	+ 10' ± 5'	+ 10' ± 5'

(unladen)		
Toe constant per wheel (setting value)	+ 14' ± 2'	+ 14' ± 2'
Toe constant for each wheel (check value)	+ 14' ± 7'	+ 14' ± 7'
Toe constant difference between both sides	max. 10'	max. 10'
Toe angle difference at 20 degrees * See note	1° 6' ± 30'	1° 6' ± 30'

* Wheel stop on outer wheel is reduced by this amount. It can also be indicated negatively in alignment computer, depending on manufacturer.

Rear axle	**Standard suspension (1BA)**	**Sport suspension (1BE)**
Camber	- 1° 20' ± 30'	- 1° 20' ± 30'
Maximum permissible difference between both sides	30'	30'
Total toe	+ 20' ± $^{10'}_{5'}$	+ 20' ± $^{10'}_{5'}$
Individual toe	+ 10' ± $^{5'}_{2,5'}$	+ 10' ± $^{5'}_{2,5'}$
Maximum permissible deviation in direction of travel relative to vehicle longitudinal axis	10'	10'

Additional vehicle data for vehicles with front and all wheel drive:

This additional vehicle data only serves for a faster diagnosis in the case of accidents.

Table --> **Technical data**

Measurement preparations

Special tools and workshop equipment required

- Wheel alignment computer V.A.G 1813
- Brake pedal actuator V.A.G 1869/2
- Bolt for steering centering VAS 6224
- Spacer unit V.A.G 1925

Rim run-out compensation

The lateral run-out of the wheel must be compensated for. Otherwise, measurement will result in false readings.

A correct toe-in adjustment will not be possible without performing lateral run-out compensation!

- Carry out wheel run-out compensation. For this, observe notes by manufacturer of wheel alignment equipment.

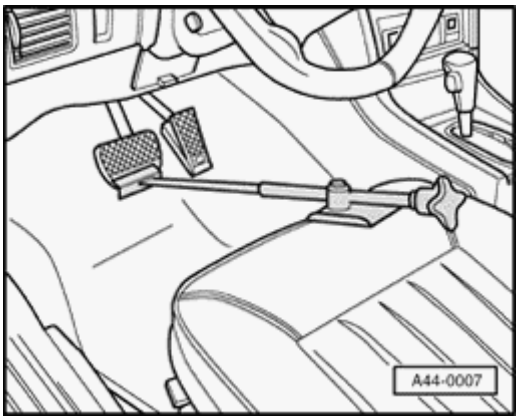

Fig. 470: Inserting Brake Pedal Depressor V.A.G 1869/2
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install brake pedal loading device V.A.G 1869/2.

Application of adapters to suspension for measurement

Adapter	Standard suspension (1BA)	Sport suspension (1BE, 1BD)	Sport suspension quattro GmbH (1BV), basic suspension quattro GmbH RS4 (2MC), sport suspension quattro GmbH RS4 (2ME)	Comfort heavy duty suspension (1BR)
V.A.G 1925	X	X	X	X
V.A.G 1925/4	X	X	X	X
V.A.G 1925/6		X	X	X
V.A.G 1925/3 * See note	X	X	X	X

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

Overview of work procedure for vehicle alignment

NOTE:

- **Vehicle must only be measured at empty weight --> Test Requirements: !**
- **Exception: Measurement of toe-in curve according to instructions from measuring program.**

- **Check which suspension is installed in the vehicle. This information can be found on the vehicle data plate. Refer to Clarification of Production Control numbers (PR No.)**

Observe the following work sequence!

1 - Check rear axle camber and adjust if necessary --> **Front axle camber, checking and adjusting if necessary**

2 - Check rear axle camber and adjust if necessary --> **Rear axle camber, adjusting**.

3 - Check rear axle toe and adjust if necessary --> **Toe at rear axle, adjusting**.

4 - If necessary, check toe-in curve behavior at front axle.

- If and when toe-in curve/toe constant "S" must be adjusted, it is described in the table on **Wheel alignment is necessary when:** and on --> **Front axle toe-in curve, adjusting**.

5 - Check toe in initial position at front axle and adjust if necessary --> **Front axle toe, adjusting**.

6 - If settings were changed at front axle, perform user adjustment on Steering Angle Sensor G85. Vehicle diagnostic, test and information system VAS 5051

Mechanical steering rack center position, checking

Mechanical center position (steering centering) of the steering rack can be checked with VAS 6224 **Steering centering:**

Front axle camber, checking and adjusting if necessary

Camber cannot be adjusted.

By moving subframe, it is possible to center camber evenly within the specified/tolerance range.

In some cases it may be necessary to elevate the engine with an engine support to relieve some tension and weight from the subframe in order to move it.

- Remove sound insulation.

Convertible only

- Remove front diagonal brace --> **Diagonal braces**.

Continued for all vehicles

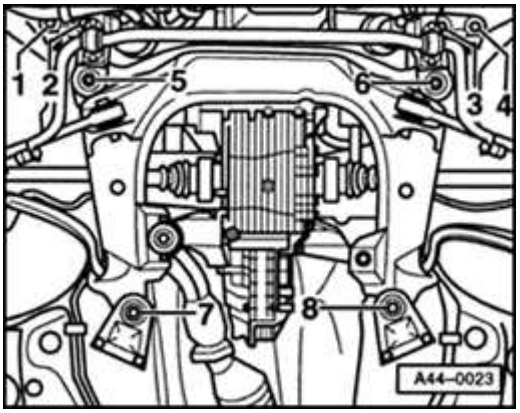

Fig. 471: Identifying Front Axle Camber Hex Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen hex head bolt - **1** - , - **2** - , - **3** - , - **4** - , - **5** - , - **6** - , - **7** - and - **8** -.

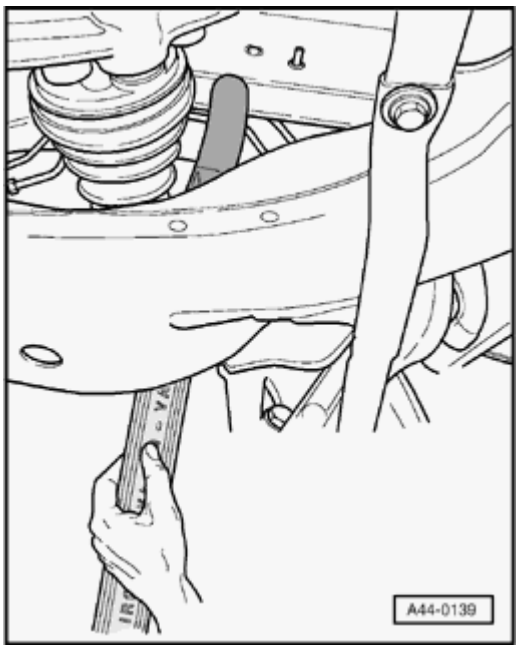

Fig. 472: Moving Subframe With Plastic Coated Pry Bar
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Using a plastic-coated tire iron, slide subframe in corresponding location.

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

If you do not have a plastic-coated tire iron, wrap a standard tire iron in adhesive tape.

CAUTION: Do not damage any parts!

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

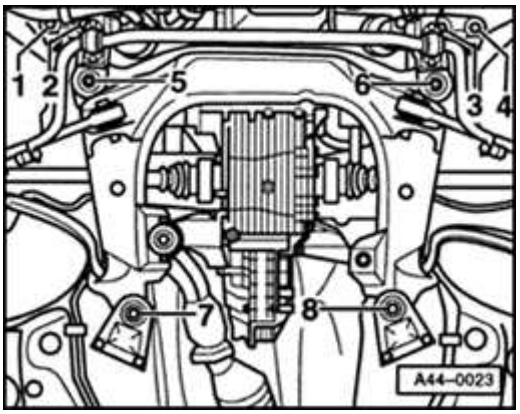

Fig. 473: Identifying Front Axle Camber Hex Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install new hex head bolts - **7** - and - **8** - and tighten.
- Install new hex head bolts - **5** - and - **6** - and tighten.
- Install new hex head bolts - **1** - , - **2** - , - **3** - and - **4** - and tighten.

Convertible only

- Install front diagonal brace --> **Diagonal braces**.

Continued for all vehicles

- Install noise insulation. -->
  - **50 BODY, FRONT**
  - **50 - BODY - FRONT** for BODY EXTERIOR - CABRIOLET

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

Rear axle camber, adjusting

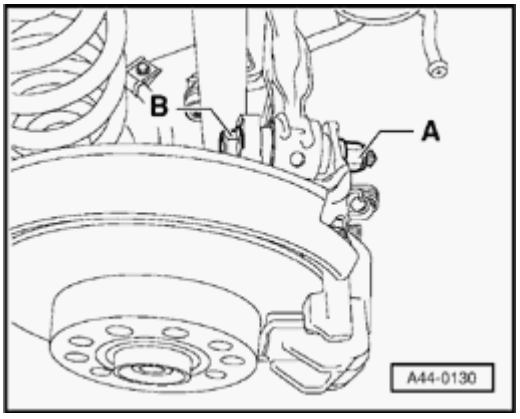

Fig. 474: Removing Wheel Bearing Housing/Transverse Link Connection Nut & Adjusting Camber
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove wheel bearing housing/transverse link connection nut - **A** -.
- Adjust camber by turning eccentric bolt - **B** -.

NOTE:

- **The maximum adjustment range is 90° to left or right of center position.**
- **For a better illustration, camber adjustment is shown with wheel removed.**

- Install new nut - **A** - and tighten
- After tightening nut - **A** - , check camber value again --> **Specifications for wheel alignment**.

Toe at rear axle, adjusting

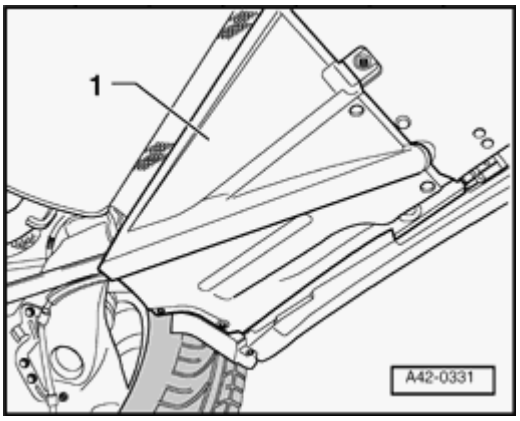

Fig. 475: Identifying Left/Right Underbody Trim
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install underbody trim - **1** - in front of trapezoidal control arm. -->
  - **66 EXTERIOR EQUIPMENT**
  - **66 - EXTERIOR EQUIPMENT** for BODY EXTERIOR - CABRIOLET

Convertible only

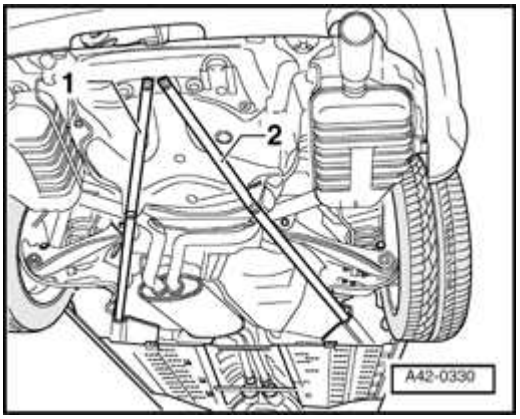

Fig. 476: Identifying Diagonal Braces
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove diagonal brace - **1** - or - **2** - on side with toe to be adjusted --> **Diagonal braces**.

Continued for all vehicles

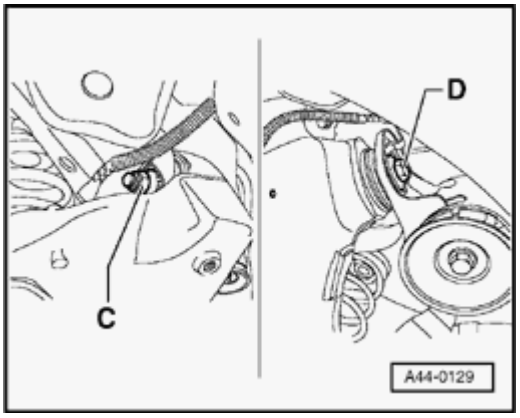

Fig. 477: Removing Front Interior Trapezoidal Control Arm/Subframe Connection Nut & Installing New Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove front interior trapezoidal control arm/subframe connection nut - **C** -.
- Adjust toe accordingly by turning eccentric bolt - **D** -.
- Install new nut - **C** - and tighten

NOTE:

- **The maximum adjustment range is 90° to left or right of center position.**
- **The geometric drive axle is automatically changed when individual toe settings are changed.**

- After tightening nut - **C** - , check toe value again.

Convertible only

- Install diagonal brace --> **Diagonal braces**.

Continued for all vehicles

- Install underbody trim.

Front axle toe-in curve, adjusting

Explanation:

When the wheel compresses or rebounds, the wheel s toe changes as a function of the compression and rebound travel. The resulting toe measurements are described as the toe curve.

The change in the toe constants "S" is adjusted when the vehicle is raised by vertically shifting the tie rod end --> **Toe constant "S" , adjusting**

The wheel alignment computer determines the toe constant "S" using values measured in the initial and raised positions. The computer compares the measured values with the specifications and displays them on the screen.

Depending on the suspension, various adapters are necessary for raising the vehicle --> **Application of adapters to suspension for measurement**.

NOTE:

- **An incorrectly adjusting toe constant causes vehicle to turn when braking/accelerating or when driving over bumps.**

Vehicle, bringing into initial position for measurement

NOTE:

- **Due to differing measuring lifts, it may be necessary to raise vehicle at front axle in order to be able to insert the spacer unit V.A.G 1925. Bounce vehicle after lowering.**

Vehicles with suspension 1BA, 1BR

- Insert spacer unit V.A.G 1925 with adapter V.A.G 1925/3 or V.A.G 1925/4.

Vehicles with suspension 1BE, 1BV, 1BD, 2MC, 2ME

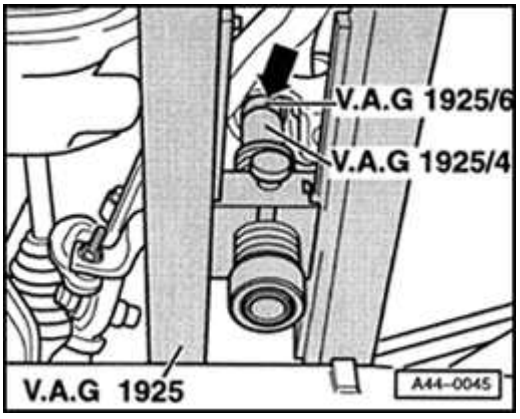

Fig. 478: Installing Adapter V.A.G 1925/6 Onto Adapters V.A.G 1925/3 Or V.A.G 1925/4 Of Spacer Gauge
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position axle lift under front jacking points and raise vehicle.
- Place adapter V.A.G 1925/6 on to adapter V.A.G 1925/3 or V.A.G 1925/4 of spacer.
- Turn spacer unit V.A.G 1925 threaded spindles all the way down.
- Lower vehicle.

NOTE:

- **When lowering, ensure subframe does not rest on adapter - arrow -.**

All suspension versions

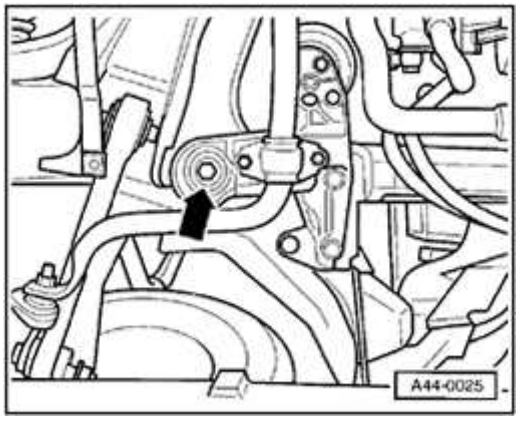

Fig. 479: Inserting Spacer V.A.G 1925 With Adapters V.A.G 1925/3 Or V.A.G 1925/4
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unscrew spacer unit V.A.G 1925 threaded spindles until they come in contact with subframe front bolts - **arrow** -.

The vehicle must not be raised by doing this!

The vehicle is now in the initial position.

With all suspension versions

Check of whether the present toe-in value of each wheel matches the specification is performed in this position by the alignment program on the alignment computer. If necessary, correct toe-in using tie rod length adjuster.

Setting toe on front axle to start position --> **Front axle toe, adjusting**.

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

The alignment program will display a message only if a correction is necessary.

Vehicle, lifting with suspension 1BA, 1BR, 1BE, 1BV, 1BD, 2MC, 2ME

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

If this should happen, turntables should not be moved. This would give a false results!

- Position axle lift under front jacking points and raise vehicle.

NOTE:

- **The vehicle is raised by 60 mm.**

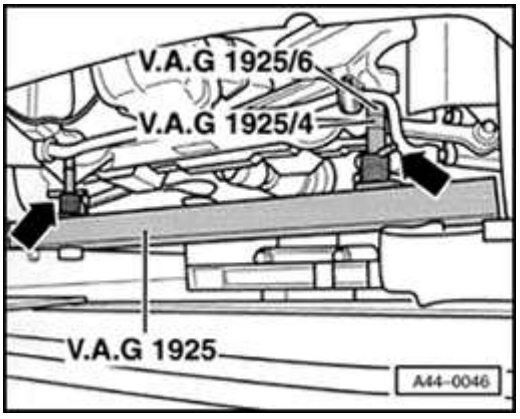

Fig. 480: Ensuring Securing Pins Are Correctly Positioned
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Move cylinder in threaded spindles and secure with bolts.

Ensure bolts - arrows - are correctly positioned!

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

Toe constant "S" , adjusting

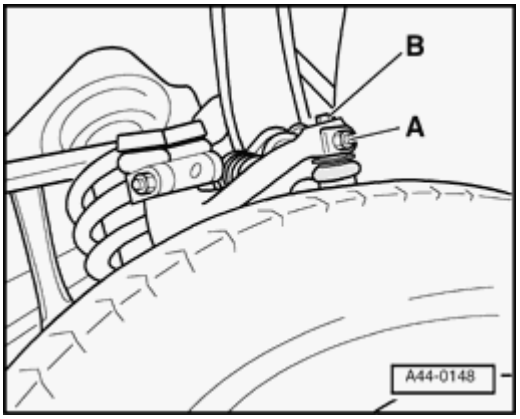

Fig. 481: Loosening Hex Head Nut & Unscrewing Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen hex head nut - **A** -.
- Unscrew bolt - **B** - approx. 4 mm.
- Push toe rod joint downwards onto stop.

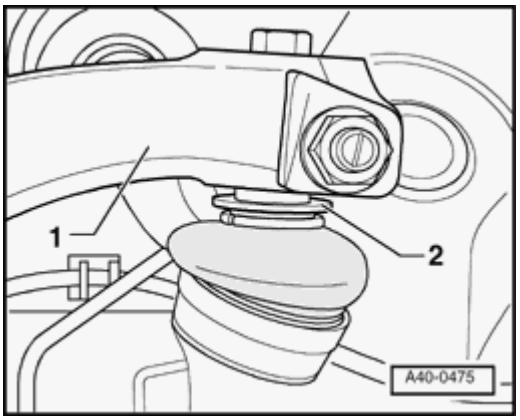

Fig. 482: Identifying Steering Arm & Tie Rod Ball Joint Sealing Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- **Do not use a chisel or similar tool between steering arm - 1 - sealing washer - 2 - when removing tie rod, otherwise sealing washer could be damaged.**
- **Tie rod may only be pressed off steering arm over tie rod ball joint pin ends or driven with a wooden or rubber hammer.**

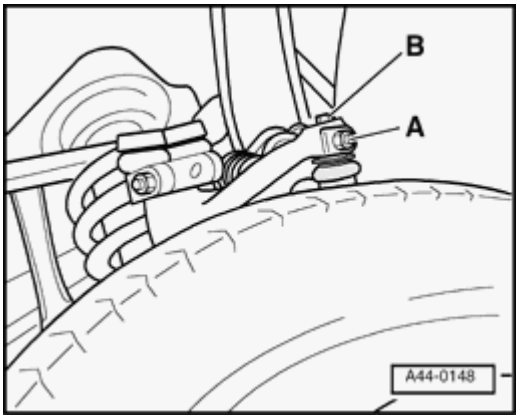

Fig. 483: Loosening Hex Head Nut & Unscrewing Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Screw in bolt - **B** - until specified value is reached exactly.
- Tighten hex head nut - **A** - , and check value.
- Tighten bolt - **B** -
- Lower vehicle to initial position again.

- Screw threaded spindle down.
- Bounce suspension of vehicles with standard suspension several times.

Checking toe constant after adjusting

The alignment unit checks toe constant again.

If measured values for the second check are within the check value tolerances then adjustment is OK.

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

Front axle toe, adjusting

- Loosen lock nut - **B** -.

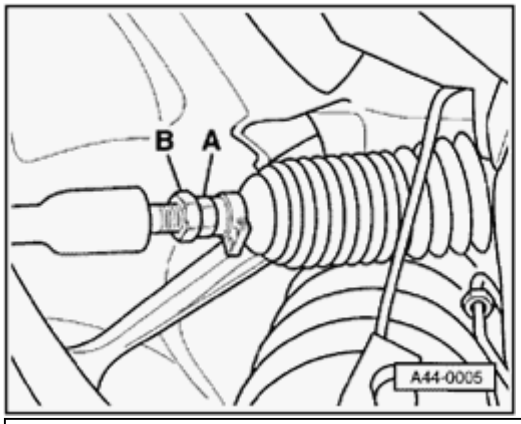

Fig. 484: Identifying Lock Nut & Hex Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Adjust toe on left and right-hand wheels at hex - **A** -.

Be sure that boot is not twisted after turning tie rods.

Twisted boots wear out quickly.

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

After tightening lock nut - **B** - it is possible that the value deviates slightly.

If measured toe lies within the tolerance, the adjustment is correct.

TIRE PRESSURE MONITOR SYSTEMS

Audi - 2005 A4 & S4

DESCRIPTION & OPERATION

TIRE PRESSURE MONITOR (TPM) SYSTEM

The Tire Pressure Monitor (TPM) system is used for continuous monitoring of tire pressure in all 4 road wheels and the spare tire while the vehicle is moving. It assists the driver in checking tire pressures, and provides warning messages on the instrument cluster and in a center instrument cluster display in case of loss of tire pressure.

As soon as the tire pressure monitoring system senses a significant loss of air pressure in one or more tires, text messages and Yellow symbols appear in the instrument cluster display. The system continuously receives radio signals from sensors located inside each tire.

The low pressure warning light in the instrument cluster illuminates when:

- Tire pressure is 7 psi (48 kPa) lower than it should be.
- Tire pressure falls below 23 psi (159 kPa).
- Tire pressure is 25 percent lower than what is specified on tire pressure label.

The center instrument cluster display will also show a flat tire symbol, along with a text message which reads "PLEASE CHECK TYRE PRESSURE". After a few seconds, message is replaced by the regular display (press CHECK button to show message again).

RESET PROCEDURES

NOTE: Whenever tire pressure is adjusted (i.e., when readjusting tire pressure for a load condition), or after every wheel change, the adjusted pressure has to be stored again. See STORING TIRE INFLATION PRESSURES . If tire was changed, the new tire must be initialized. See WHEEL CHANGE INITIALIZATION .

TIRE PRESSURE MONITOR WARNING DISPLAY

CAUTION: DO NOT adjust tire pressure when tire temperature is excessive. This could lead to serious tire damage or cause the tire to burst, with the additional danger of an accident.

NOTE: Tire pressure is also dependent on temperature of the tire. For every 18°F (10°C) increase in tire temperature, tire pressure increases about 1.5 psi (10 kPa). Tire pressure should only be adjusted when tires are cold (about the same as ambient air temperature).

Check and correct tire inflation pressures of wheels on vehicle (including spare tire). Tire pressure information is provided on the tire pressure label located on driver's side door pillar.

After checking inflation pressures and properly inflating tires, current pressures have to be stored in monitoring system. System then implements automatic adaptation process. See **STORING TIRE INFLATION PRESSURES** .

If the tire pressure monitoring system is not available, a tire symbol with a slash through it appears in the center instrument cluster display. This could be caused by the following:

- If this symbol is displayed at the end of a learning phase, it means that the system cannot recognize which wheels are mounted on the vehicle. This may be because one or more wheels were mounted lacking a wheel sensor.
- A wheel sensor or other component may have failed.
- The system recognizes more than 5 wheels are present on the vehicle (i.e., when additional winter tires are being transported on the vehicle and are transmitting data).
- A wheel was changed, and the new tire was not initialized. See **WHEEL CHANGE INITIALIZATION** .
- If vehicle is being operated with snow chains, system function can be affected by the shielding effect of the chains.
- System is not available due to a malfunction.
- Other transmitting devices with the same frequency (i.e., headphones with integrated radio) are emitting an electro-magnetic field which can cause temporary interference in the system.

NOTE: If system is malfunctioning due to interference, eliminate cause of interference and re-initialize system. See WHEEL CHANGE INITIALIZATION .

STORING TIRE INFLATION PRESSURES

NOTE: Whenever tire pressure is adjusted (i.e., when readjusting tire pressure for a load condition), or after every wheel change, the adjusted pressure has to be stored again.

NOTE: In order for the tire pressure monitoring system to work, the specified pressures (provided on tire pressure label located on driver's side door pillar) must be reprogrammed after every change in air pressure.

1. Ensure air pressure in all tires (including spare tire) is properly adjusted to specification.
2. On the center instrument cluster display, press the MENU button. See **Fig. 1** .
3. Push the turn-switch to select "SET" option. See **Fig. 2** .
4. Turn the switch to scroll to "TYRE PRESSURE", then push switch. See **Fig. 3** .
5. Push the switch again to select "STORE PRESSURES". See **Fig. 4** . After the tire pressures have been

saved, the system will measure the actual pressures once again, and then save these as the new pressures.

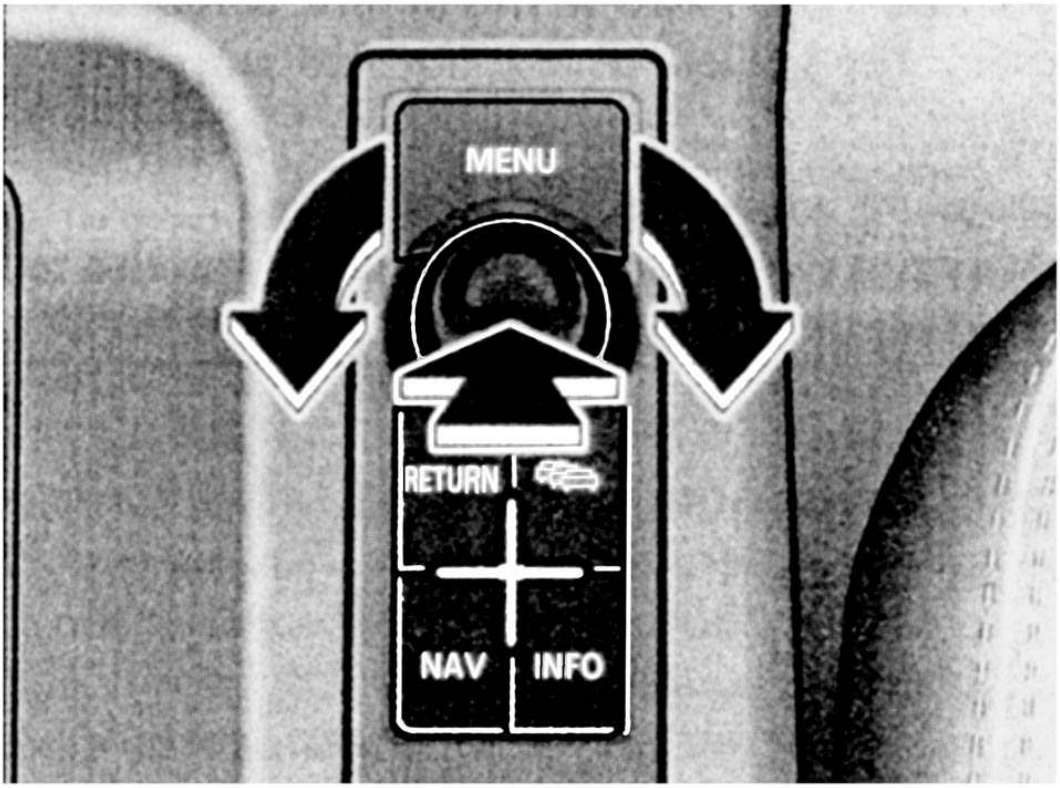

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Fig. 1: Identifying Tire Pressure Menu
Courtesy of AUDI OF AMERICA, INC.

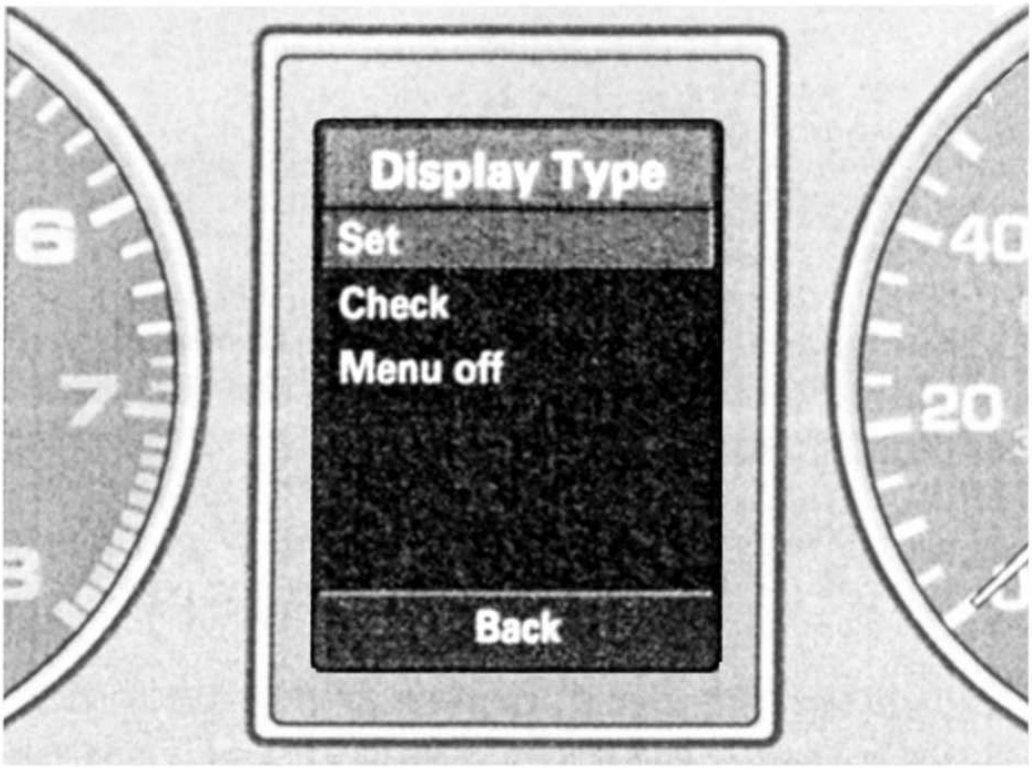

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Fig. 2: Identifying Starting Menu
Courtesy of AUDI OF AMERICA, INC.

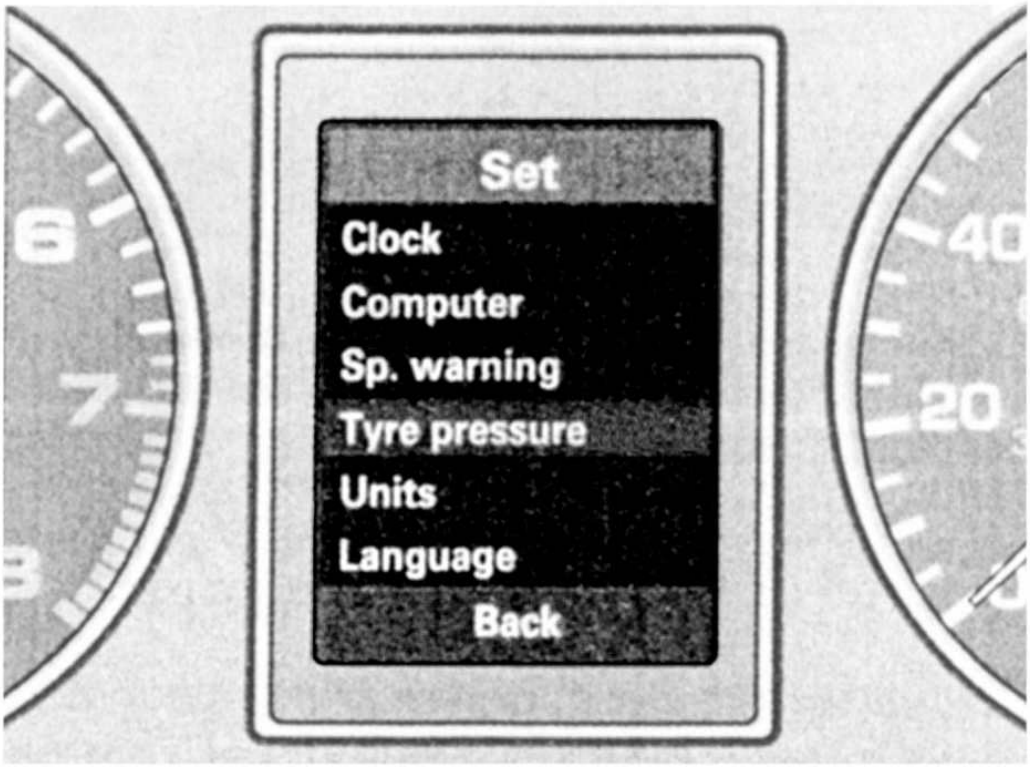

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Fig. 3: Storing Tire Pressure (1 Of 2)
Courtesy of AUDI OF AMERICA, INC.

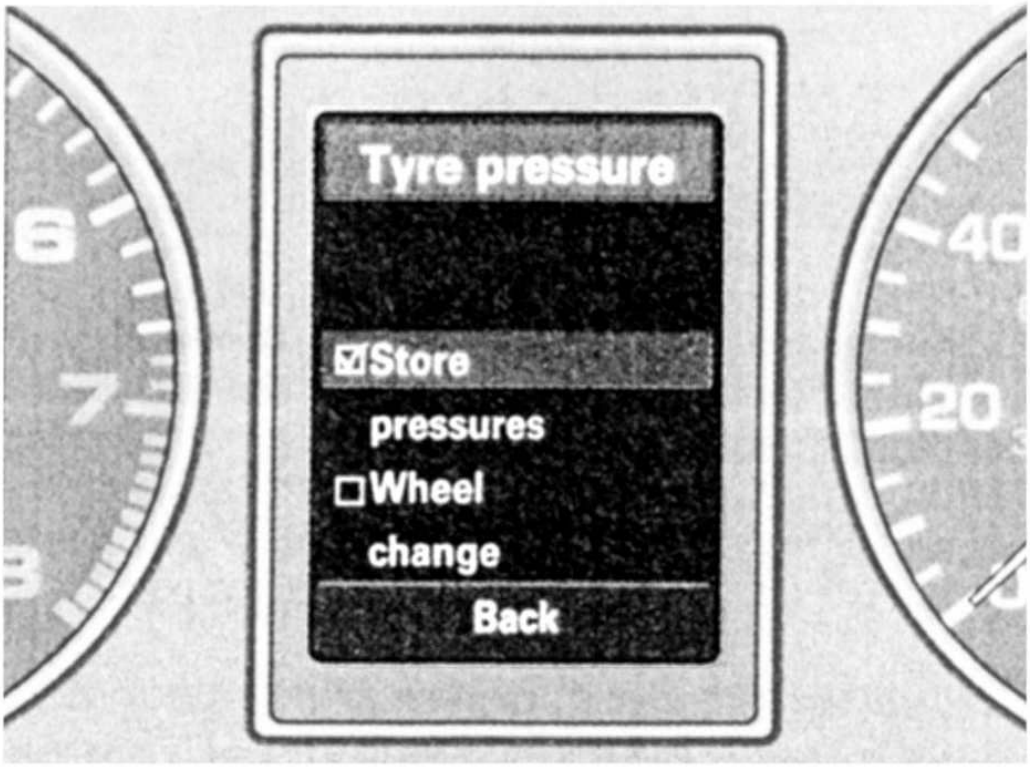

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Fig. 4: Storing Tire Pressure (2 Of 2)
Courtesy of AUDI OF AMERICA, INC.

WHEEL CHANGE INITIALIZATION

NOTE: If tire was changed, the new tire must be initialized. Tire change is incomplete if initialization process is not performed.

NOTE: Initialization process can take up to 20 minutes. During this time, the sensors are readjusting to the new wheel/tire combination and the monitoring system is operating at reduced sensitivity. The system will only warn when tire pressure drops below the minimum permissible specified pressure (warning symbol and message will appear).

1. Ensure air pressure in all tires (including spare tire) is properly adjusted to specification.
2. On the center instrument cluster display, press the MENU button. See **Fig. 1** .
3. Push the turn-switch to select "SET" option. See **Fig. 2** .
4. Turn the switch to scroll to "TYRE PRESSURE", then push switch. See **Fig. 3** .
5. Push the switch again to select "WHEEL CHANGE". See **Fig. 5** .

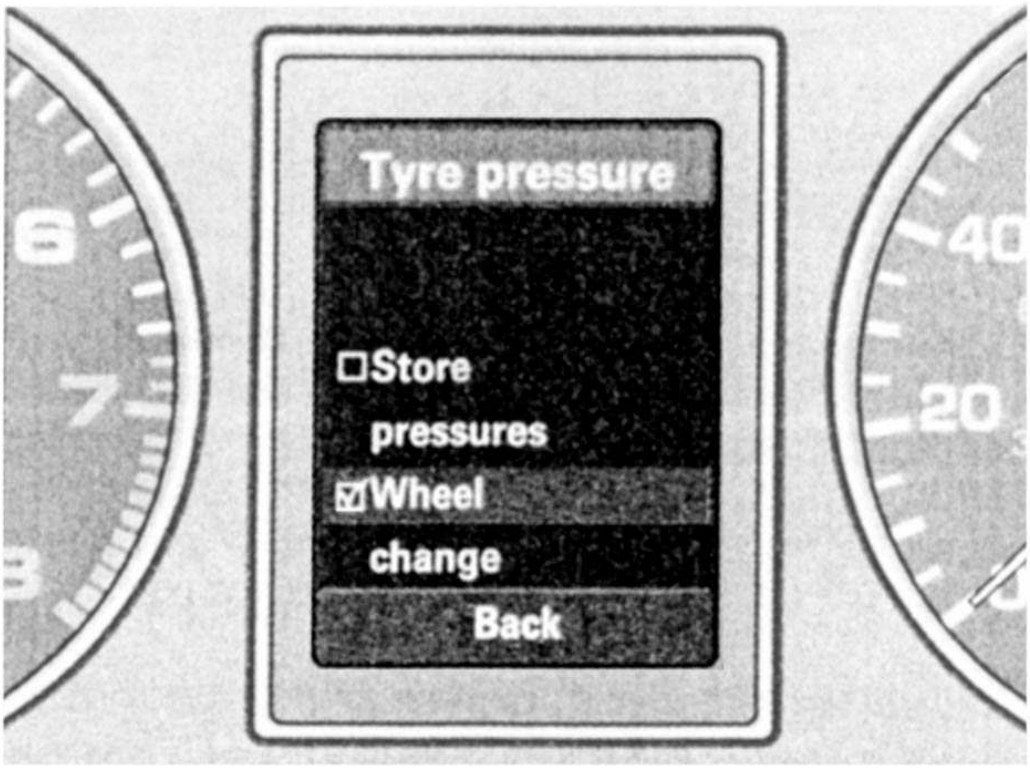

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Fig. 5: Initializing New Wheels
Courtesy of AUDI OF AMERICA, INC.

DISMOUNTING/MOUNTING PROCEDURES

CAUTION: The tire should be dismounted from the wheel using the tire changer manufacturer's instructions. Use the following information to avoid damage during the dismounting/mounting procedures.

CAUTION: When tires are replaced, the sensors and valves must not be detached or exchanged. Only the valve core needs to be replaced. DO NOT replace the valve and wheel electronics unless necessary.

NOTE: The valve insert of the tire pressure sensor must be replaced each time tire is changed. See TIRE PRESSURE SENSOR .

NOTE: Tire pressure is also dependent on temperature of the tire. For every 18°F (10°C) increase in tire temperature, tire pressure increases about 1.5 psi (10 kPa). Tire pressure should only be adjusted when tires are cold (about the same as ambient air temperature).

NOTE: In order for the tire pressure monitoring system to work, the specified pressures (provided on tire pressure label located on driver's side door pillar) must be reprogrammed after every change in air pressure or after every wheel change. See STORING TIRE INFLATION PRESSURES under RESET PROCEDURES.

NOTE: If tire was changed, the new tire must be initialized. See WHEEL CHANGE INITIALIZATION under RESET PROCEDURES.

TIRE PRESSURE SENSOR

Removal

CAUTION: The tire pressure sensor must not come into contact with water or be blown with compressed air when cleaning the wheel or wheel rim.

NOTE: To perform this procedure, Torque Wrench (V.A.G. 1410) is required.

1. Remove tire and wheel assembly from vehicle.
2. Dismount tire from wheel following tire changer manufacturer's instructions while paying special attention to the following to avoid damaging the pressure sensor:
   - Remove valve insert to release air from tire before removing tire.
   - Press tire off both rim edges on opposite side to metal valve.
   - Turn wheel on tire mounting equipment so that the valve/tire pressure sensor is opposite the mounting head.
3. While counterholding sensor (for example, with a 2-mm twist drill), remove tire pressure sensor. See **Fig. 6** .
4. While counterholding sensor, remove nut and metal valve. See **Fig. 7** and **Fig. 8** .

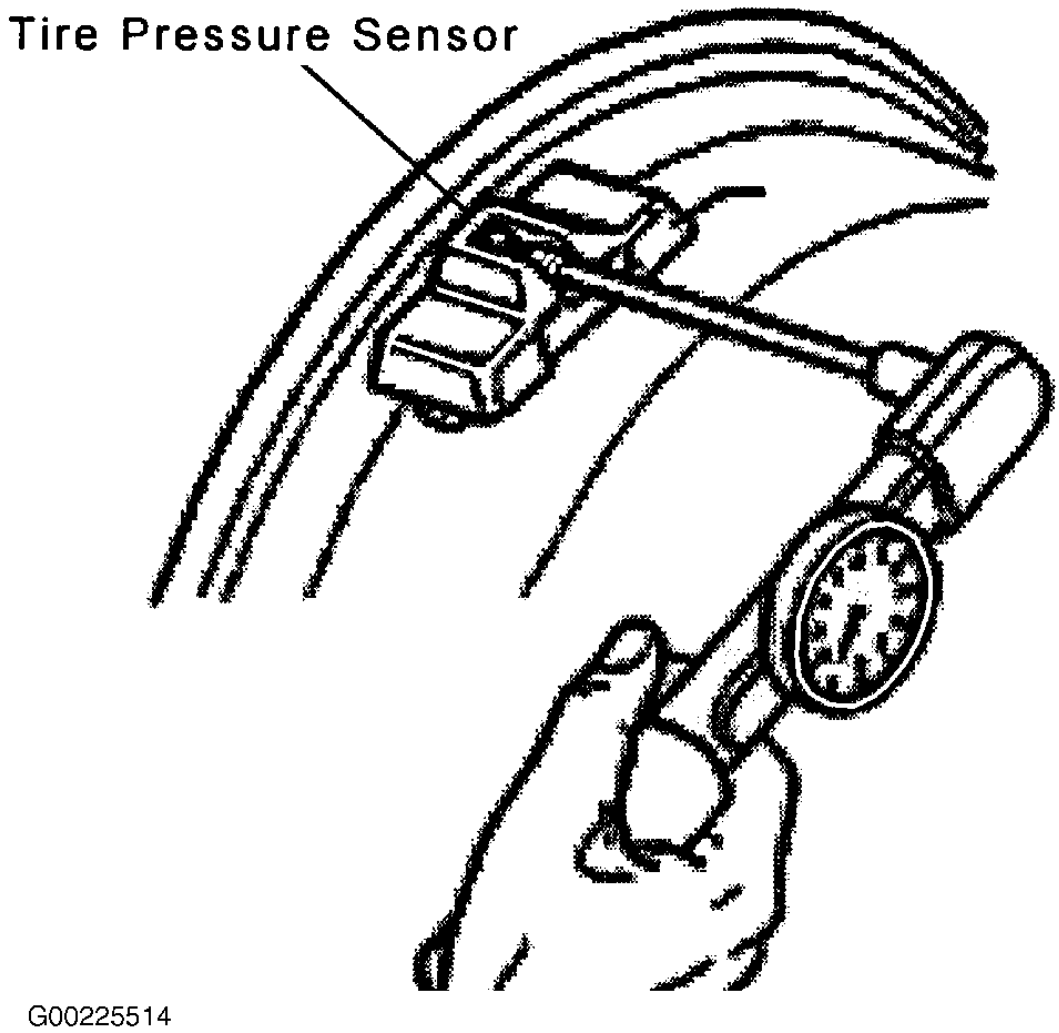

Fig. 6: Removing & Installing Tire Pressure Sensor
Courtesy of VOLKSWAGEN UNITED STATES, INC.

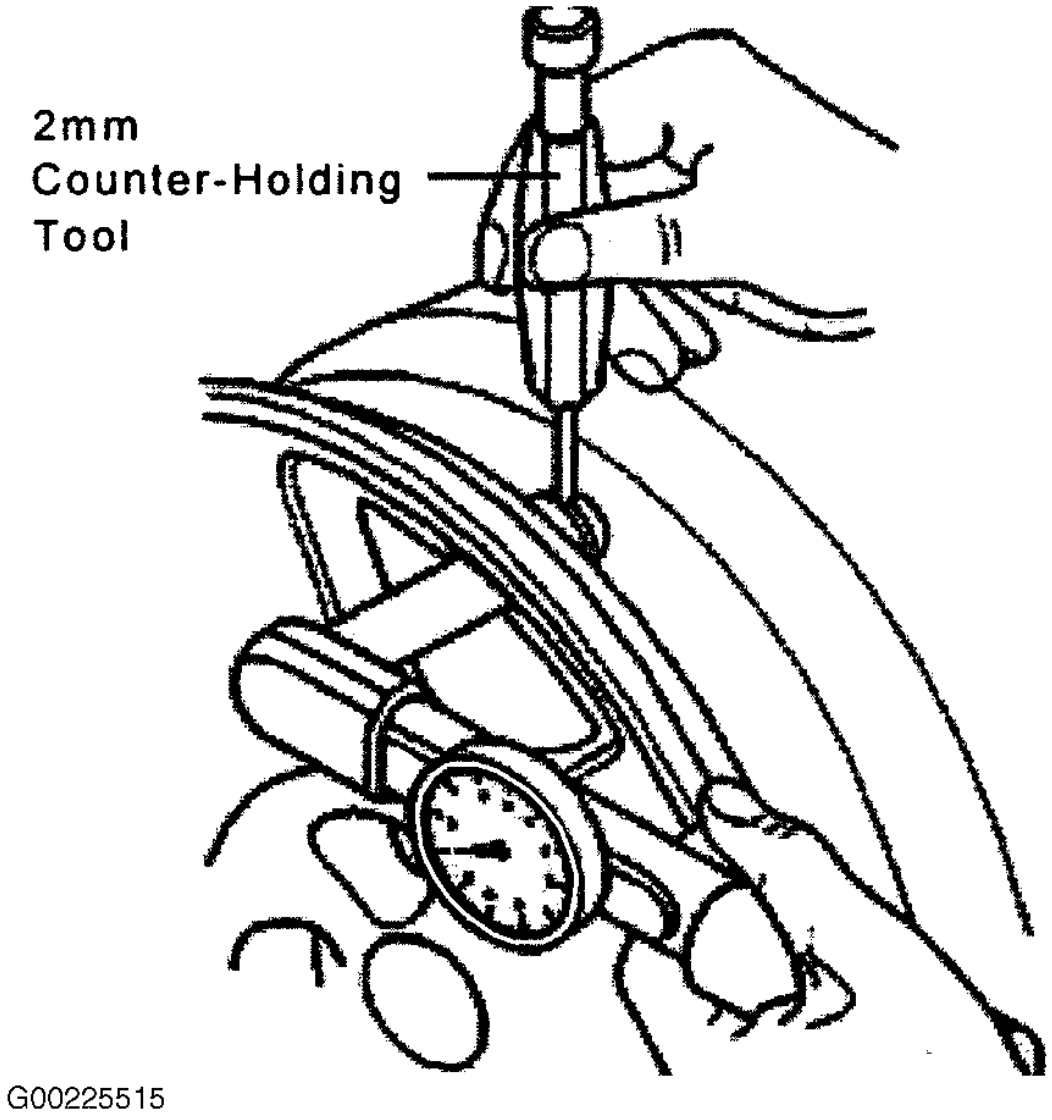

Fig. 7: Removing & Installing Tire Pressure Sensor Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

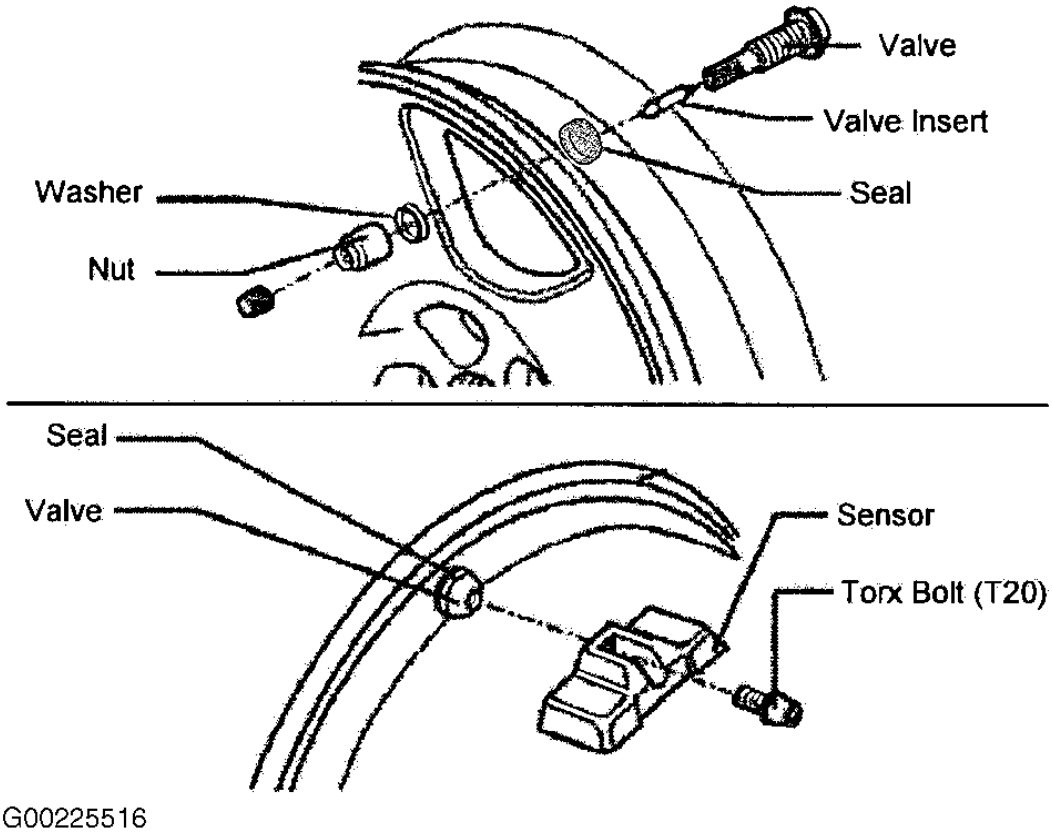

Fig. 8: Exploded View Of Tire Pressure Sensor
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installation

1. To identify replacement tire pressure sensors, see **TIRE PRESSURE SENSOR PART IDENTIFICATION** table.

   NOTE: The valve insert of the tire pressure sensor must be replaced each time tire is changed.

2. While counterholding sensor, install metal valve and tighten nut to 35 INCH lbs. (4 N.m). See **Fig. 7** .
3. While counterholding sensor, press tire pressure sensor against wheel rim and tighten nut to 35 INCH lbs. (4 N.m). See **Fig. 6** .
4. Mount tire on wheel following tire changer manufacturer's instructions, paying special attention to the following to avoid damaging tire pressure sensor:
   - Make sure that tire does not contact tire pressure sensor while mounting tire.
   - Turn the wheel on the tire mounting equipment so that valve/tire pressure sensor is opposite the mounting head.
5. Install tire and wheel assembly to vehicle.
6. Adjust inflation pressures of all tires (including spare tire), and balance tires. Store new tire pressures in

system. See **STORING TIRE INFLATION PRESSURES** under RESET PROCEDURES.

TIRE PRESSURE SENSOR PART IDENTIFICATION

Application	Part No.
Left Front	G222
Right Front	G223
Left Rear	G224
Right Rear	G225
Spare Tire	G226

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Component	Ft. Lbs. (N.m)
Wheel Nut	89 (120)
	INCH Lbs. (N.m)
Tire Pressure Sensor Nut	35 (4)
Torx Fastener (T20)	35 (4)