47 - BRAKES - HYDRAULIC COMPONENTS

PRESSURE LEAK TEST

Pressure leak test

Special tools, testers and auxiliary items required

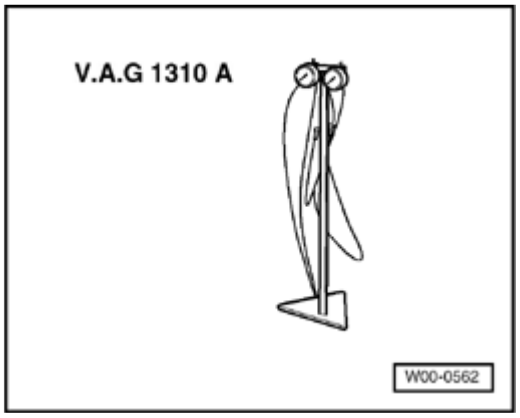

Fig. 117: Brake Pressure Gauge V.A.G 1310 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Brake pressure gauge 0-250 bar V.A.G 1310A

High and low pressure testing

Before beginning:

Check brake system (brake master cylinder, brake hoses, brake lines and brake calipers) for leak and function.

High pressure testing:

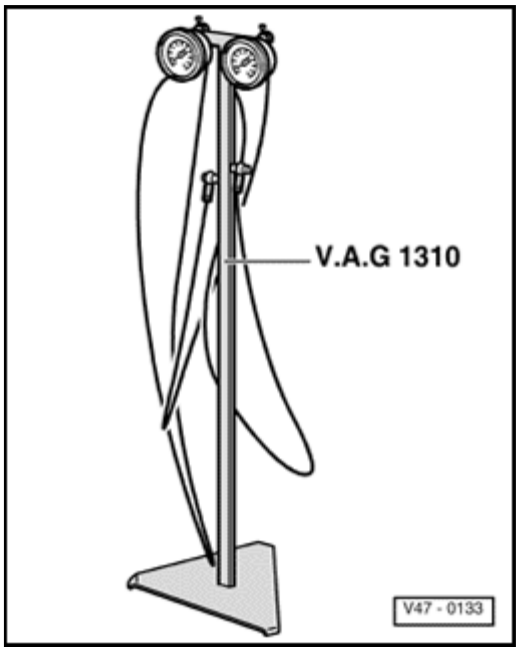

Fig. 118: Brake Pressure Gauge 0-250 Bar V.A.G 1310A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bleeder screw at one of the front brake calipers. Connect brake pressure gauge V.A.G 1310A and bleed.
- Install brake pedal loading device between brake pedal and driver seat. Apply pressure to brake pedal until the gauge indicates a pressure of 50 bar. The pressure must not drop by more than 4 bar during test period of 45 seconds. If pressure drop is large, replace hydraulic unit.

Low pressure testing:

- Set brake pedal loading device back far enough that the pressure gauge indicates 6 bar positive pressure.
- The pressure must not drop by more than 1 bar during a test period of 3 minutes.

If pressure drop is large, replace hydraulic unit.

FN3 BRAKE CALIPER

Brake caliper, servicing

NOTE:

- **Install complete repair kit when servicing.**
- **New brake calipers are filled with brake fluid and are pre-bled.**
- **Apply thin coat of *assembly paste G 052 150 A2* to brake cylinders, pistons and seals.**

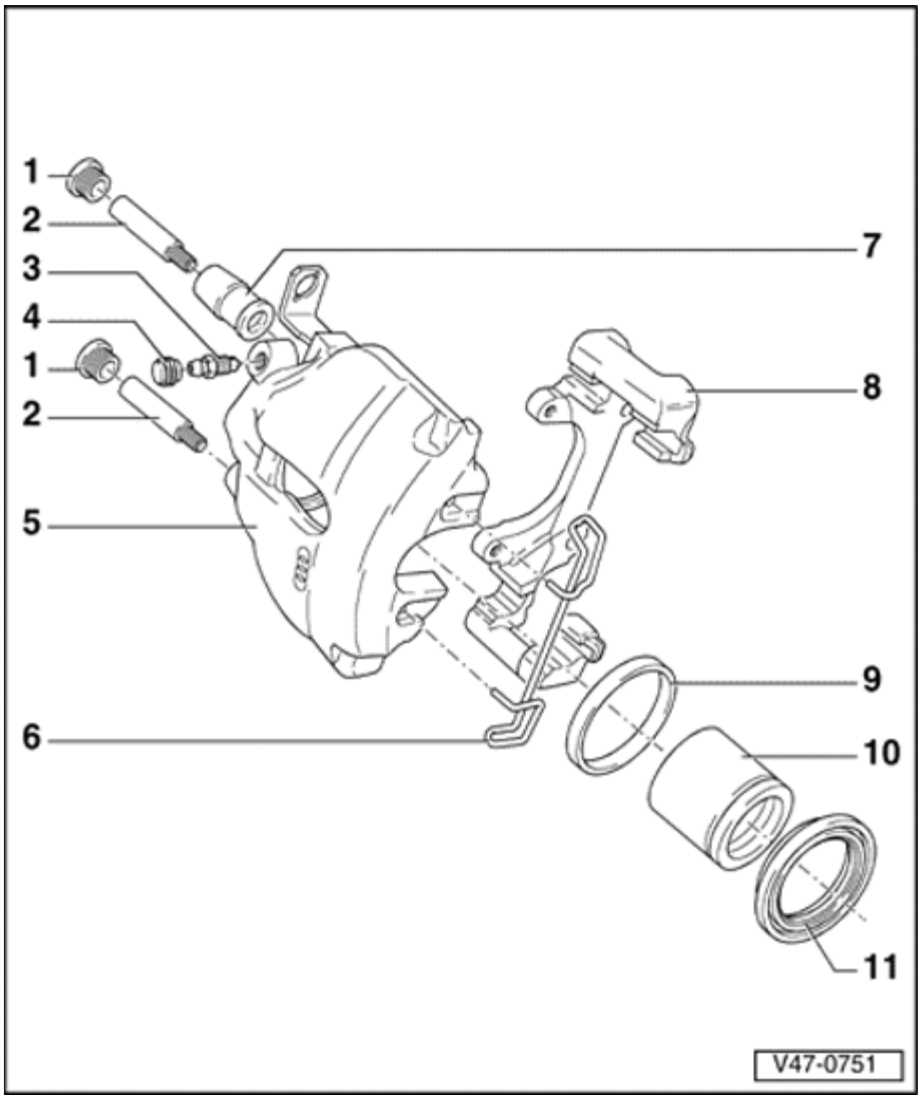

Fig. 119: FN3 Brake Caliper, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Caps

- Insert in bushing

2 - Guide pins, 30 Nm (18 ft lb)

3 - Bleed valve, 10 Nm

- Apply a thin coat of *assembly paste G 052 150 A2* to threads before installing.

4 - Protective cap

- Push onto bleeder valve

5 - Brake caliper housing

6 - Retaining spring

- Insert with both ends in holes of brake caliper housing

NOTE:

- **Retaining spring must be pressed under brake carrier after it is inserted in both holes. If improperly installed, the wear of the outer brake pad cannot be adjusted, thereby increasing brake pedal travel.**

7 - Bushing

- Insert in brake caliper housing

8 - Brake carrier

- Bolt to brake caliper housing

9 - Sealing ring

10 - Pistons

- First apply thin coat of *brake cylinder paste G 052 150 A2* on piston

11 - Protective cap

- Do not damage when installing piston

Front brake caliper piston, removing and installing

Special tools, testers and auxiliary items required

- *Assembly paste G 052 150 A2*

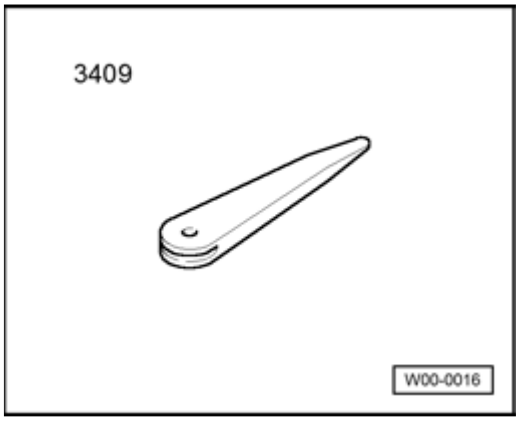

Fig. 120: Wedge 3409
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disassembly wedge 3409

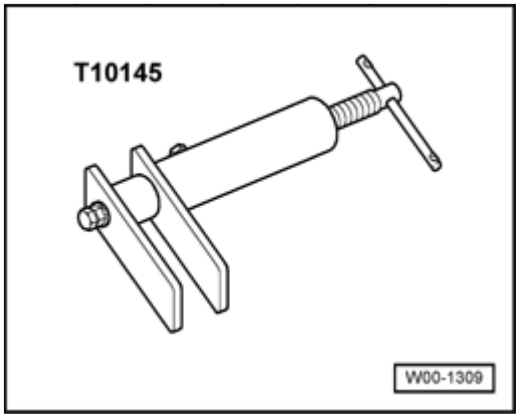

Fig. 121: Piston Resetting Tool T10145
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Piston resetting tool T10145

Removing

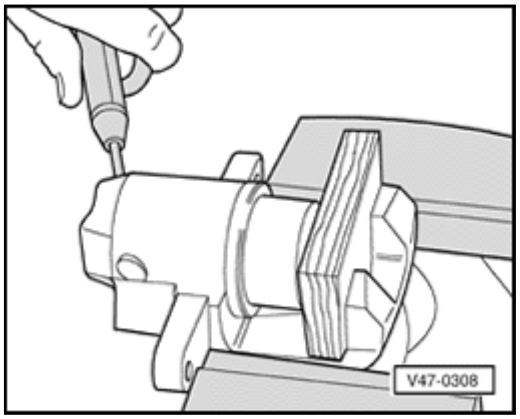

Fig. 122: Force Piston Out Of Brake Caliper Housing Using Compressed Air
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Force piston from brake caliper housing using compressed air.

NOTE:

- **Place a wooden board into recess of the caliper housing so it is not damaged.**

- Remove seal.

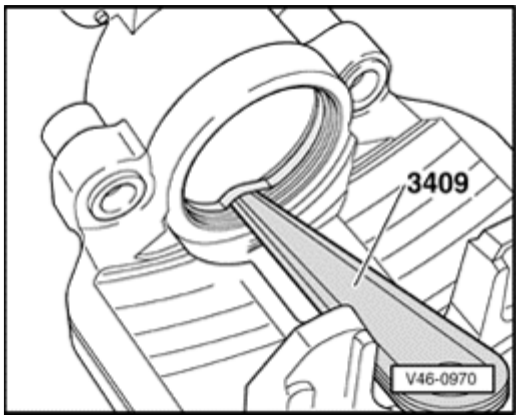

Fig. 123: Removing/Installing Seal Using Trim Removal Wedge 3409
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Use trim removal wedge 3409 for this.

NOTE:

- **When removing, make sure that surface of cylinder is not damaged.**

Installing

- Insert seal

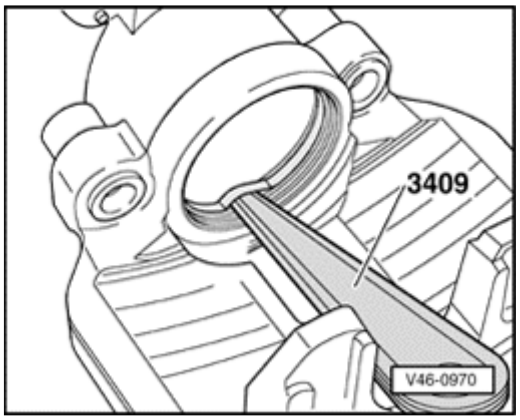

Fig. 124: Removing/Installing Seal Using Trim Removal Wedge 3409
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Use trim removal wedge 3409 for this.

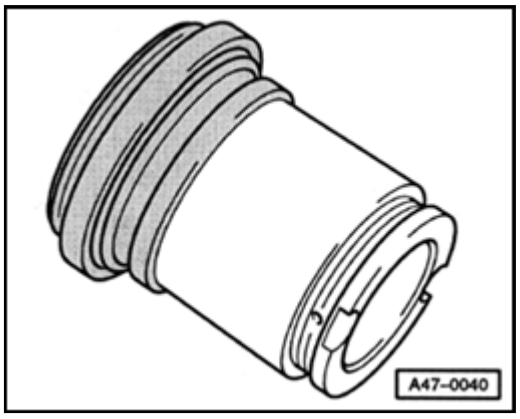

Fig. 125: Placing Protective Cap With Outer Sealing Lip On Piston
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place protective cap with outer sealing lip on piston.
- The surface of piston and seal must only be cleaned with mineral spirits and then dried.
- Thinly coat piston and seal with *assembly paste G 052 150 A2* before inserting.

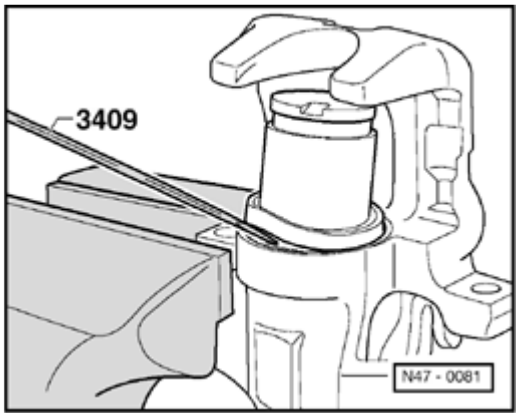

Fig. 126: Inserting The Inner Sealing Lip Into The Grove In Cylinder Using Wedge 3409
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Using trim removal wedge 3409 , insert inner sealing lip into cylinder groove.

NOTE:

- **Hold piston in front of caliper housing for this procedure.**

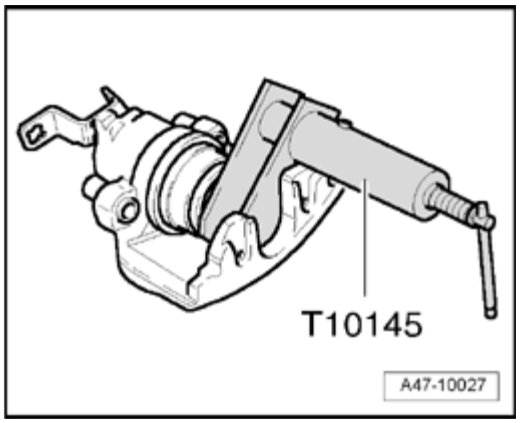

Fig. 127: Pressing Piston Into Brake Caliper Housing Using Piston Resetting Tool T10145
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press piston into brake caliper housing using piston resetting tool T10145.

NOTE:

- **Outer sealing lip of protective cap will then engage in piston groove.**

FNRG60 BRAKE CALIPER

Brake caliper, servicing

NOTE:

- **Install complete repair kit when servicing.**
- **Apply thin coat of *assembly paste G 052 150 A2* to brake cylinders, pistons and seals.**

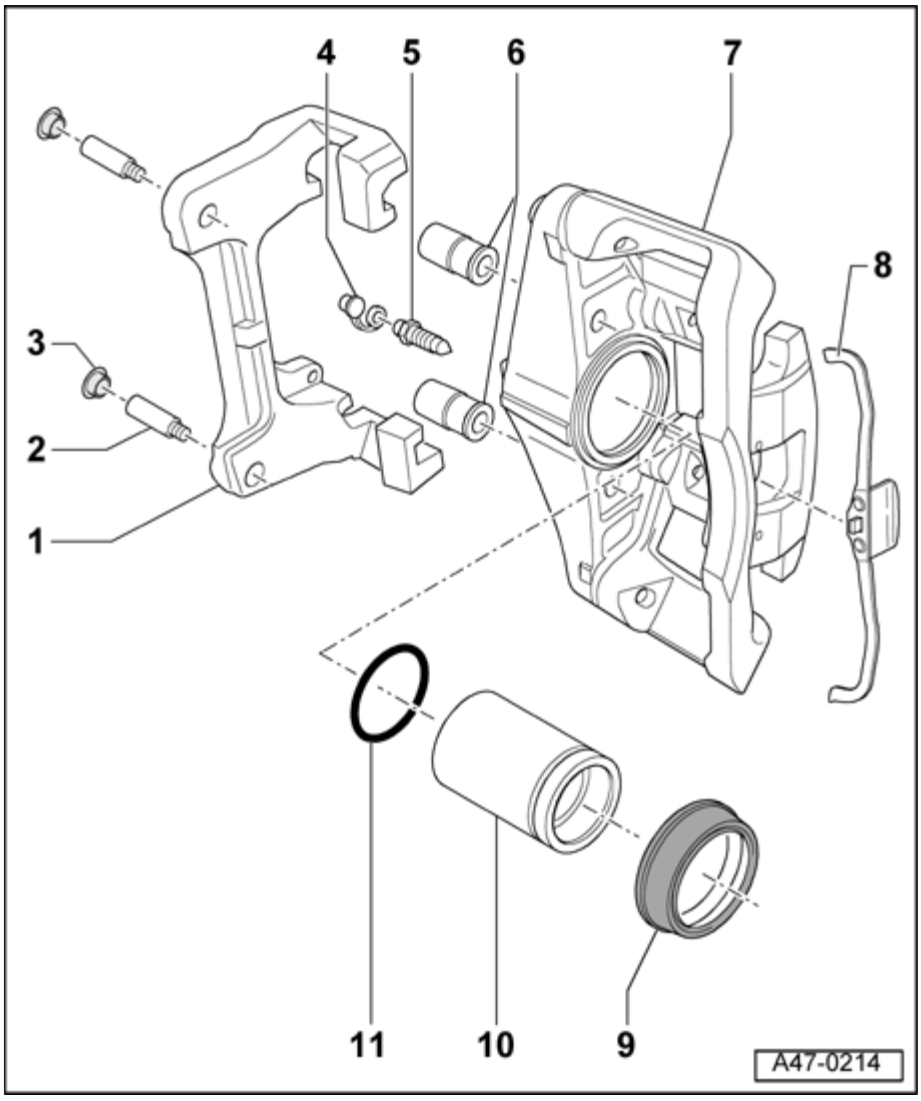

Fig. 128: Exploded View Of Brake Caliper FNR-G60
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Brake carrier

- Bolt to brake caliper housing

2 - Guide pins, 30 Nm (18 ft lb)

3 - Caps

- Insert in bushing

4 - Protective cap

- Push onto bleeder valve

5 - Bleeder valve, 15 Nm

- Apply a thin coat of *assembly paste G 052 150 A2* to threads before installing.

6 - Bushing

- Insert in brake caliper housing

7 - Brake caliper housing

8 - Retaining spring

- Observe correct installed position.
- Hook in at both brake caliper housing studs and at outer brake pad retaining spring.

9 - Protective cap

- Do not damage when installing piston
- Coat with *Assembly Paste G 052 150 A2*

10 - Pistons

- First apply thin coat of *brake cylinder paste G 052 150 A2* on piston

11 - Sealing ring

- Coat with *Assembly Paste G 052 150 A2*

Front brake caliper piston, removing and installing

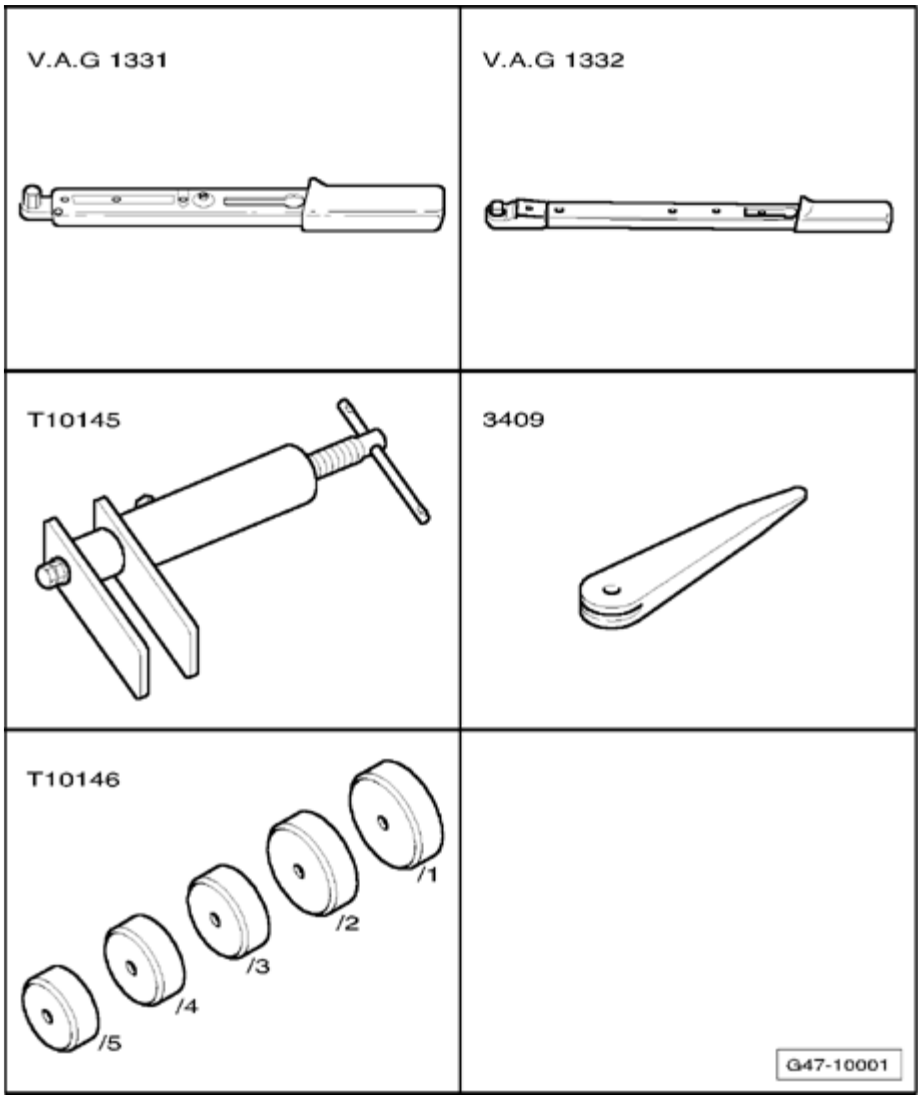

Fig. 129: Identifying Special Tools - Front Brake Caliper Piston, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332
- Piston resetting tool T10145
- Disassembly wedge 3409
- Assembly device for protective cap T10146/5
- *Assembly paste G 052 150 A2*

Removing

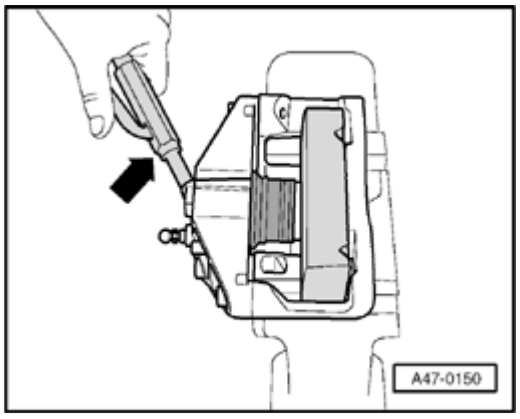

Fig. 130: Using Compressed Air To Force Piston Out Of Brake Caliper Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Force piston from brake caliper housing using compressed air.

NOTE:

- **Place a wooden board into the recess of the caliper housing so it is not damaged.**

- Remove seal.

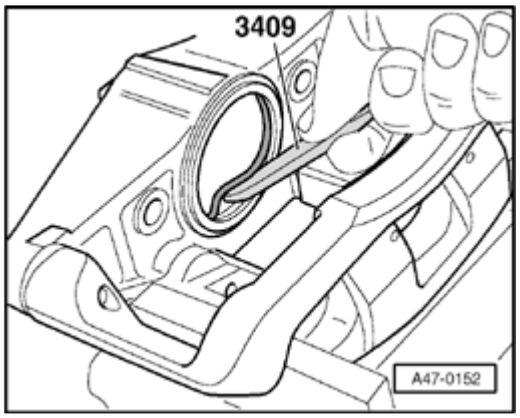

Fig. 131: Removing Seal With Trim Removal Wedge 3409
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Use trim removal wedge 3409 for this.

NOTE:

- **When removing, make sure that surface of cylinder is not damaged.**

Installing

- The surface of the piston and seal must only be cleaned with mineral spirits and then dried.
- Thinly coat piston and seal with *assembly paste G 052 150 A2* before inserting.

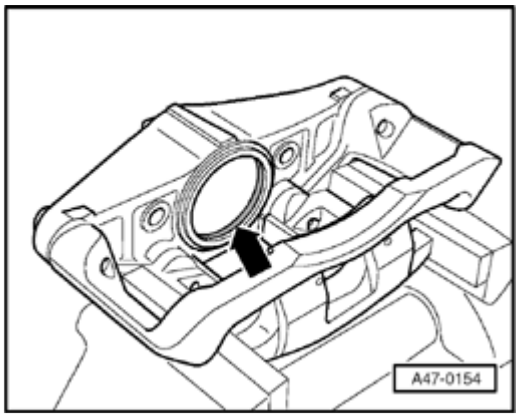

Fig. 132: Installing Sealing Ring In Brake Caliper
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Using Trim Removal Wedge 3409 , insert inner seal into groove in brake caliper.

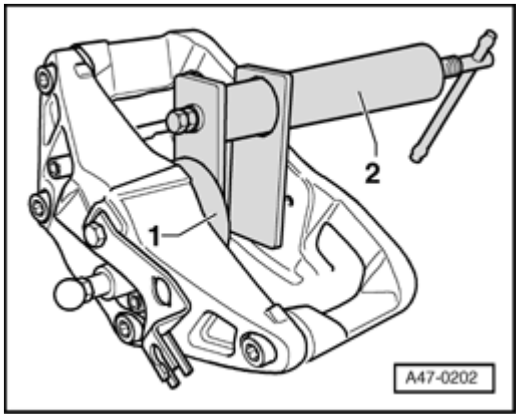

Fig. 133: Pressing Protective Cap With Assembly Tool And Piston Resetting Tool Into Brake Caliper
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press in protective cap using special tool - **1** - and - **2** -.
- Assembly tool for protective caps T10146/1 - **1** -
- Piston resetting tool T10145 - **2** -

Use protective backings

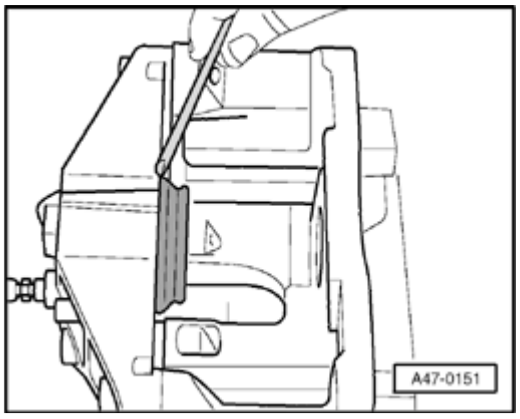

Fig. 134: Pushing Protective Seal Onto Brake Caliper Housing So That It Lies Against Housing All Round
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press protective cap onto brake caliper housing so that it contacts brake caliper housing all around.
- It should no longer be possible to remove protective cap from brake caliper housing by hand.
- Thinly coat piston and seal with *assembly paste G 052 150 A2* before inserting.

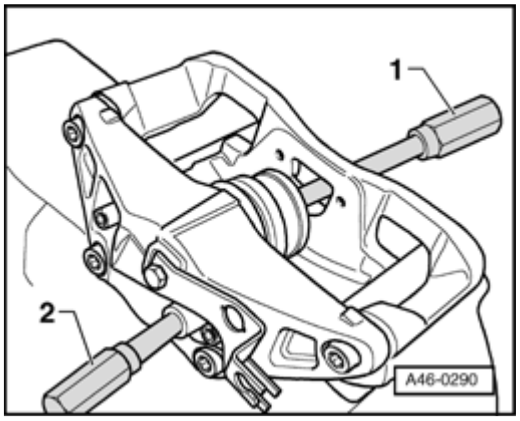

Fig. 135: Lifting Up Piston With Standard Extension And Ratchet Attachment
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift brake piston, as shown, with commercially available extension and ratchet adapter and lightly press against protective cap.

Do not angle piston, to avoid damaging seal sleeve.

- Blow protective cap on with pressurized air (max. 3 bar). The protective cap will thereby jump over the brake piston.

Use protective backings

- Press piston into brake caliper housing by hand.

NOTE:

- **The inner sealing lip of the protective cap slips into the groove on the piston.**

BRAKE CALIPER, 2FNR 42 AL

Brake caliper, servicing

NOTE:

- **Install complete repair kit when servicing.**
- **Apply thin coat of *Assembly Paste* to brake cylinders, pistons and seals .**

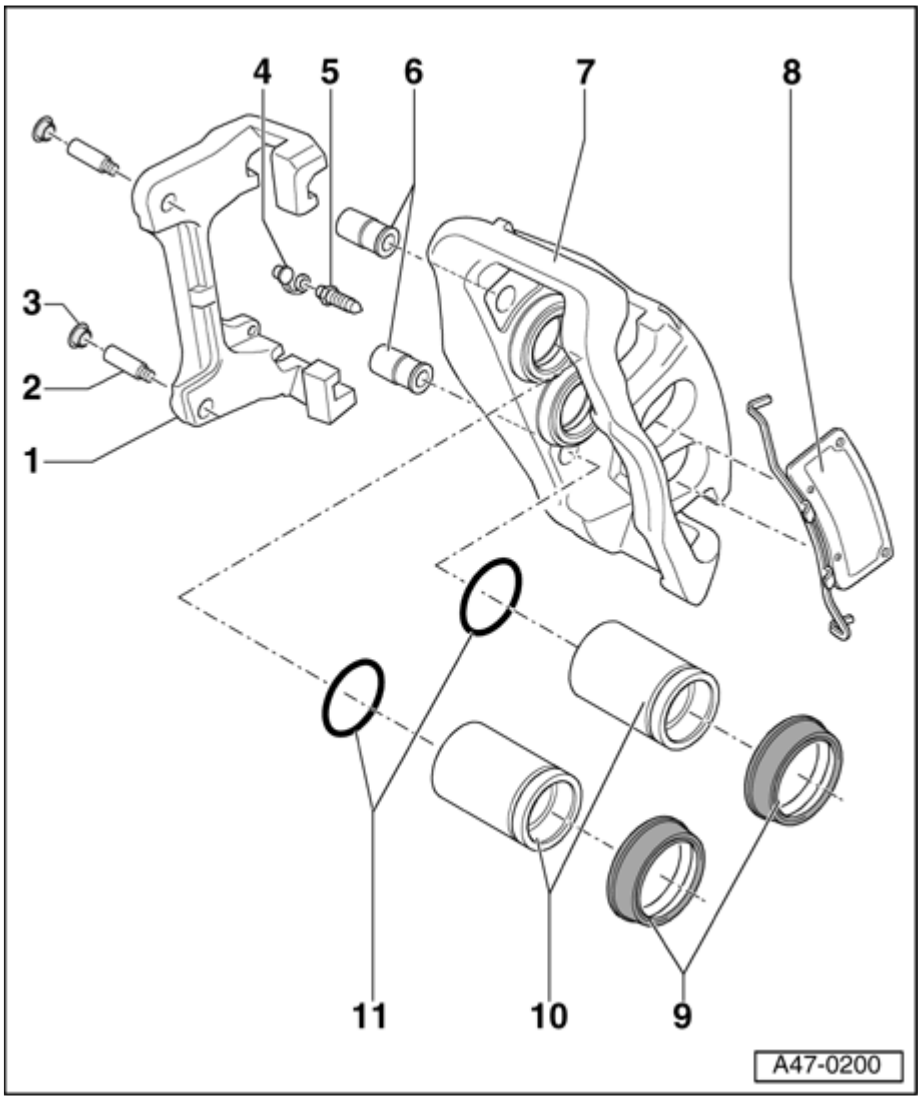

Fig. 136: Brake Caliper, Servicing Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Brake carrier

- Bolt to brake caliper housing

2 - Guide pins

- Torque specification, 30 Nm

3 - Caps

- Insert in bushing

4 - Protective cap

- Push onto bleeder valve

5 - Bleeder valve

- Torque specification, 10 Nm
- Apply a thin coat of *Lithium Grease* to threads before installing .

6 - Bushing

- Insert in brake caliper housing

7 - Brake caliper housing

8 - Retaining spring

- Observe correct installed position.
- Hook in at both brake caliper housing studs and at outer brake pad retaining spring.

9 - Protective cap

- Do not damage when installing piston
- Coat with *lithium grease*

10 - Pistons

- Apply thin coat of *lithium grease* to piston beforehand

11 - Sealing ring

- Coat with Assembly Paste

Front brake caliper piston, removing and installing

Special tools, testers and auxiliary items required

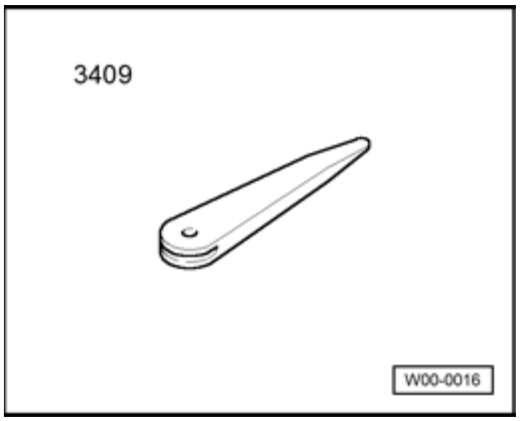

Fig. 137: Wedge 3409
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disassembly wedge VAS 3409
- *Assembly Paste*

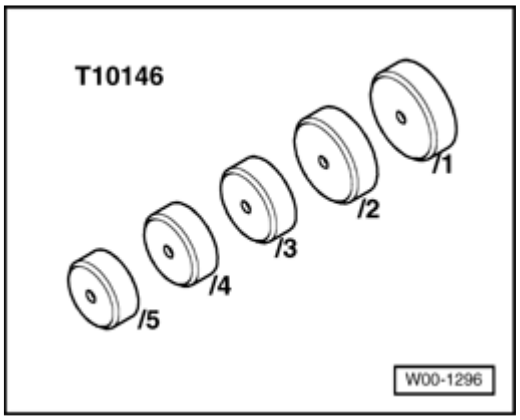

Fig. 138: Assembly Device For Protective Cap T10146/5
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Assembly device for protective cap T10146/5
- Piston Resetting Tool T10145

Removing

- Force piston from brake caliper housing using compressed air.

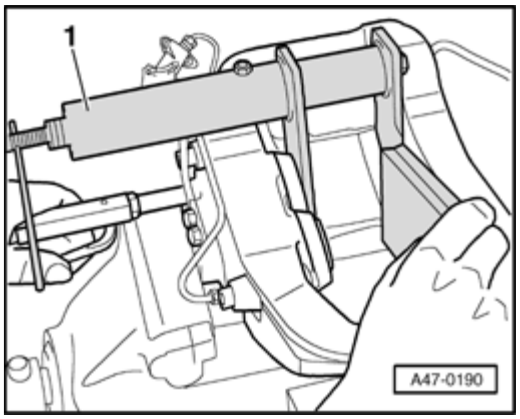

Fig. 139: Piston Resetting Tool Piston Resetting Tool T10145
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Piston resetting tool Piston Resetting Tool T10145 - **1** -

NOTE:

- **Place a wooden board into the recess of the caliper housing so it is not damaged.**

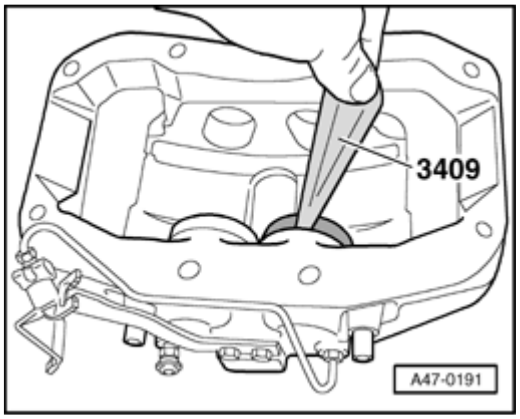

Fig. 140: Removing Protective Cap From Brake Caliper, e.g. With Trim Removal Wedge 3409
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove protective cap from brake caliper, e.g. with Trim Removal Wedge 3409.
- Remove seal.

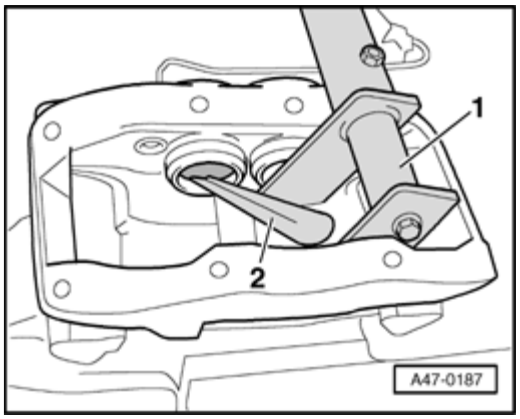

Fig. 141: Using Trim Removal Wedge 3409 & Piston Resetting Tool T10145
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Use Trim Removal Wedge 3409 - **2** - for this.
- Piston Resetting Tool T10145 - **1** -

NOTE:

- **When removing make sure that the surface of the cylinder is not damaged.**

Installing

- The surface of the piston and seal must only be cleaned with mineral spirits and then dried.
- Thinly coat piston and seal with assembly paste before inserting.
- Insert inner seal in brake caliper groove using trim removal wedge 8.658.86 cm.

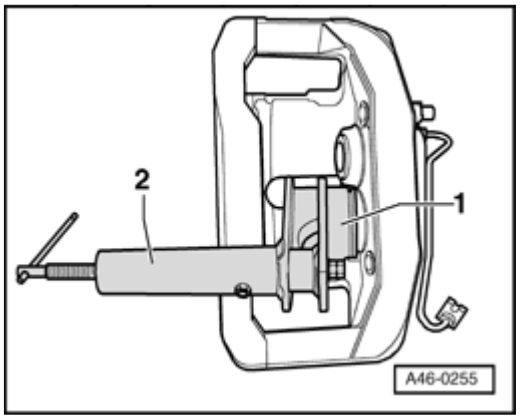

Fig. 142: Pressing In Protective Cap Using Special Tool
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press in protective cap using special tool - **1** - and - **2** -.
- Assembly tool for protective caps T10146/5 - **1** -
- Piston Resetting Tool T10145 - **2** -

Use protective backings

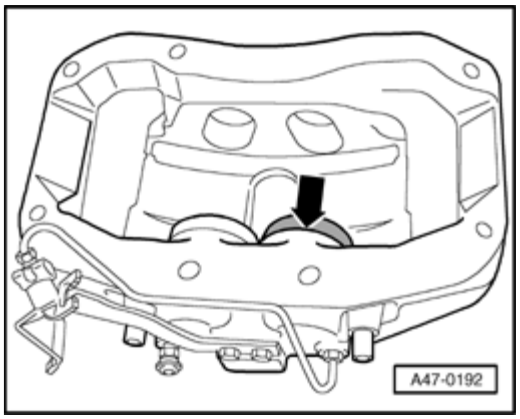

Fig. 143: Pressing Protective Cap Onto Brake Caliper Housing So That It Contacts Brake Caliper Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press protective cap onto brake caliper housing so that it contacts brake caliper housing - **arrow** - all around.

Use protective backings

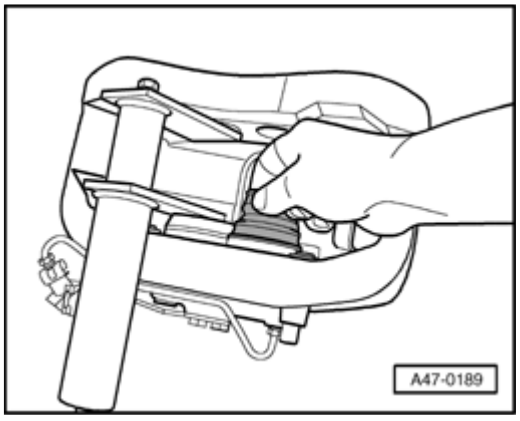

Fig. 144: Inserting Piston And Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- It should no longer be possible to remove protective cap from brake caliper housing by hand.
- Thinly coat piston and seal with *Assembly Paste* before inserting.

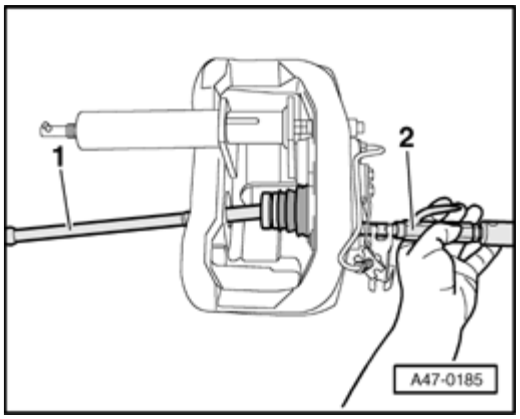

Fig. 145: Lifting Brake Piston With Commercially Available Extension And Ratchet Adapter And Lightly Press Against Protective Cap
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift brake piston, as shown, with commercially available extension and ratchet adapter and lightly press against protective cap.

Do not angle piston, to avoid damaging seal sleeve.

- Blow protective cap on with pressurized air (max. 3 bar). The protective cap will jump over brake piston.

Use protective backings

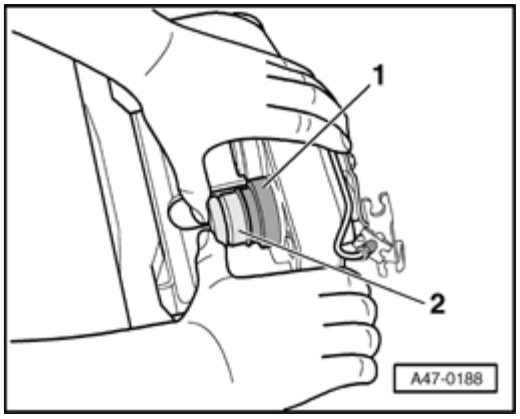

Fig. 146: Pressing Piston Into Brake Caliper Housing By Hand
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press piston into brake caliper housing by hand.

NOTE:

- **The inner sealing lip of the protective cap slips into the groove on the piston.**

ELECTROMECHANICAL PARKING BRAKE (EPB), REAR BRAKE CALIPER

Brake caliper, servicing

NOTE:

- **When performing repairs install all of the parts supplied in repair kit.**
- **Apply thin coat of *assembly paste G 052 150 A2* to brake cylinders, pistons and seals.**

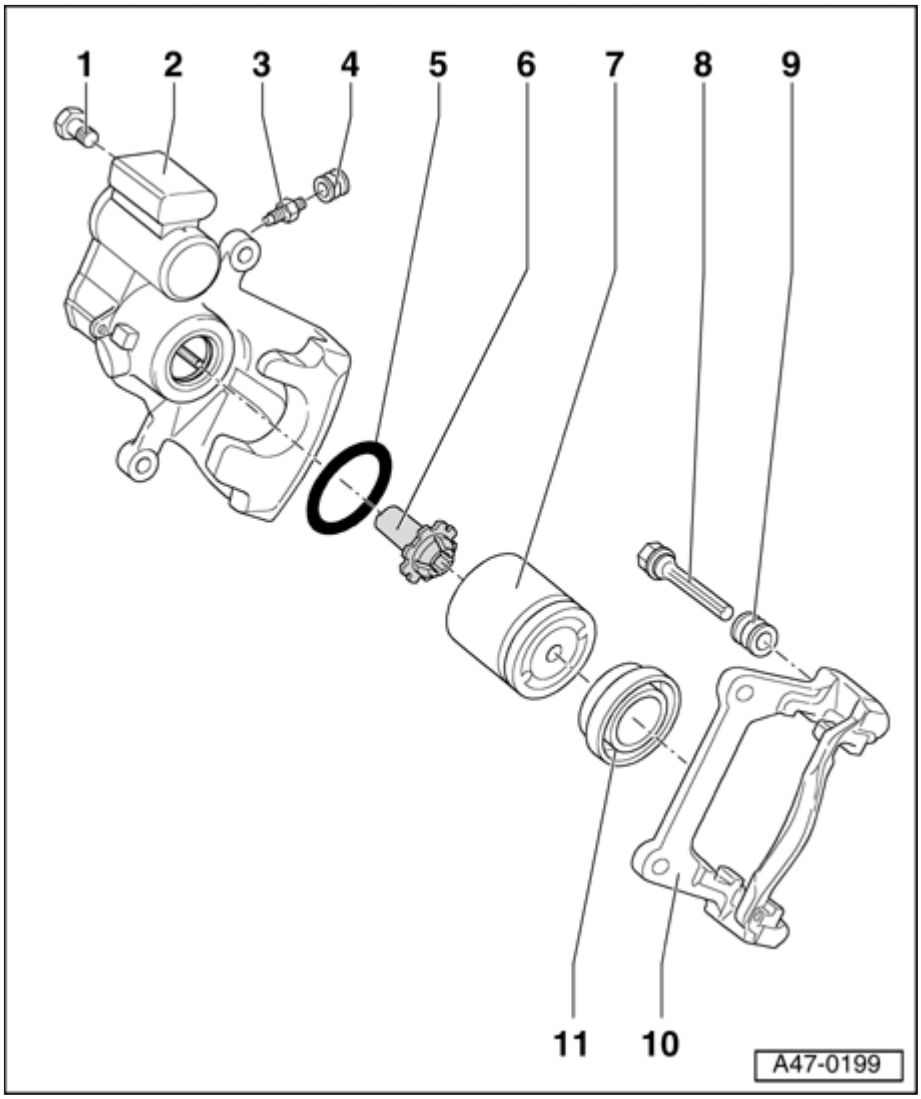

Fig. 147: Brake Caliper, Servicing Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Self-locking bolt, 35 Nm

- Always replace
- When loosening and tightening, counter-hold at guide pin

2 - Brake caliper housing with actuator

- Pre-bleed caliper housing after repairing --> **Bleeding braking system**

3 - Bleeder valve, 10 Nm

4 - Dust cap

- Push onto bleeder valve

5 - Sealing ring

- Removing and installing --> **Rear brake caliper piston, removing and installing**

6 - Pressure nut

- To operate parking brake

7 - Pistons

- Removing and installing --> **Rear brake caliper piston, removing and installing**

8 - Guide pins

- Grease before pulling on protective cap

9 - Protective cap

- Pull onto brake carrier and guide pin

10 - Brake carrier with guide pins and protective cap

- Supplied as pre-assembled replacement part with sufficient grease on guide pins
- If protective caps or guide pins are damaged, install repair kit. Use supplied grease packet to lubricate guide pins.

11 - Protective cap

- Removing and installing --> **Rear brake caliper piston, removing and installing**
- Pull onto piston with outer sealing lip

Rear brake caliper piston, removing and installing

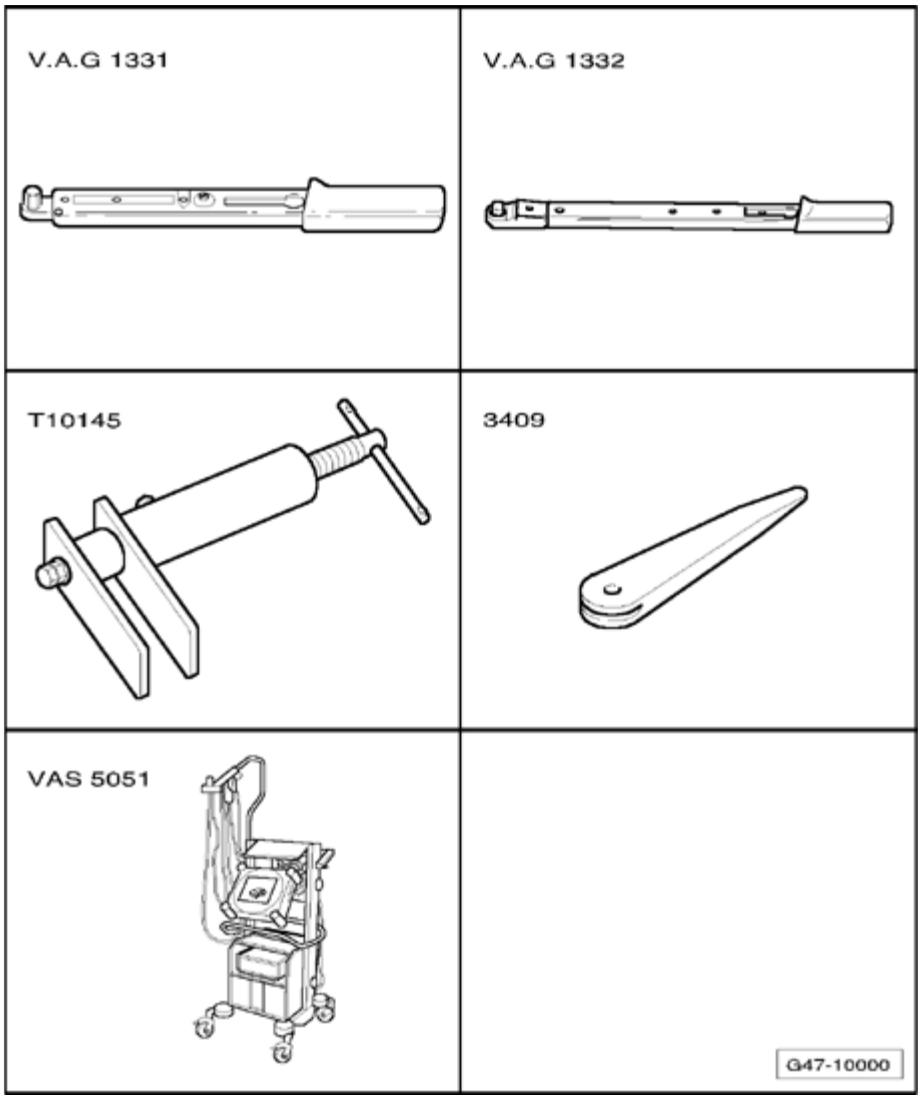

Fig. 148: Identifying Special Tools - Rear Brake Caliper Piston, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332
- Piston resetting tool T10145
- Disassembly wedge 3409
- Vehicle diagnostic, test and information system VAS 5051

Removing

- Remove pistons as far as possible from brake caliper

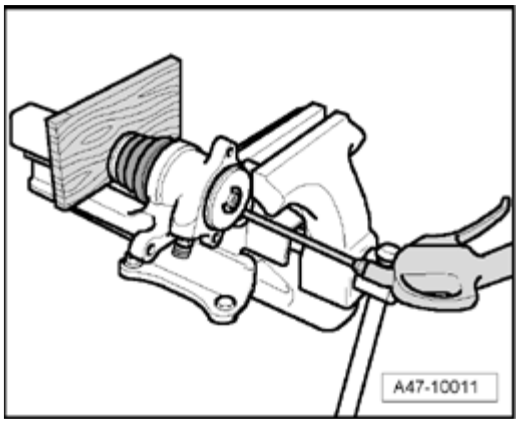

Fig. 149: Forcing Piston Out Of Brake Caliper Housing Using Compressed Air
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

NOTE:

- **When removing, make sure that surface of cylinder is not damaged.**
- **Place a wooden board into recess of the caliper housing so it is not damaged.**

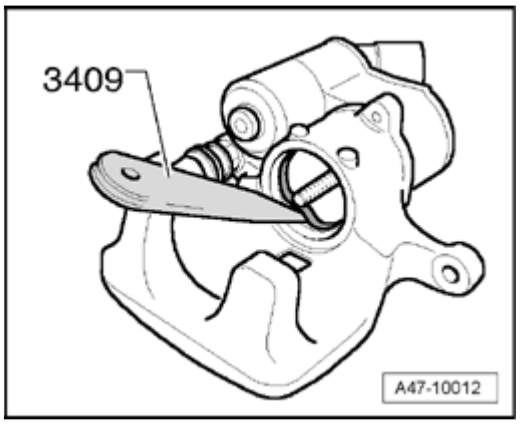

Fig. 150: Removing/Installing Old Seal From Brake Caliper With Trim Removal Wedge 3409
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove old seal from brake caliper with Trim Removal Wedge 3409.

Installing

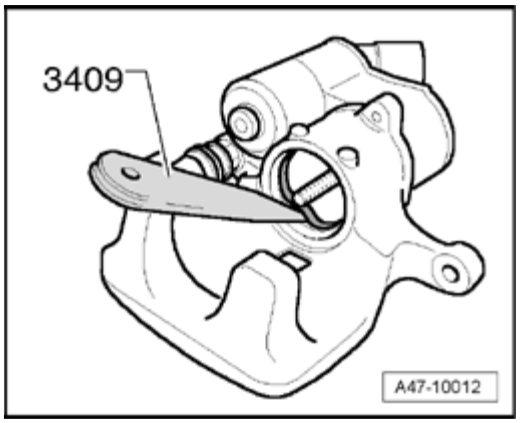

Fig. 151: Removing/Installing Old Seal From Brake Caliper With Trim Removal Wedge 3409
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install new seal in brake caliper.

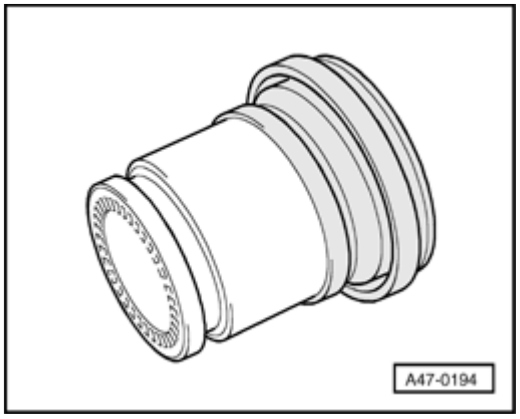

Fig. 152: Placing New Protective Cap On Brake Pistons
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place new protective cap on brake pistons as shown.

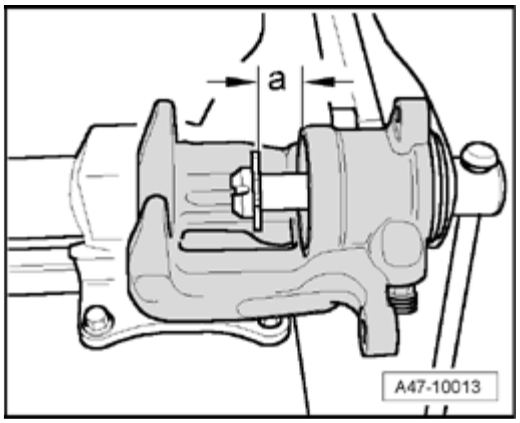

Fig. 153: Installing Pressure Nut To Dimension
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install pressure nut to dimension - **a** - 15 mm.

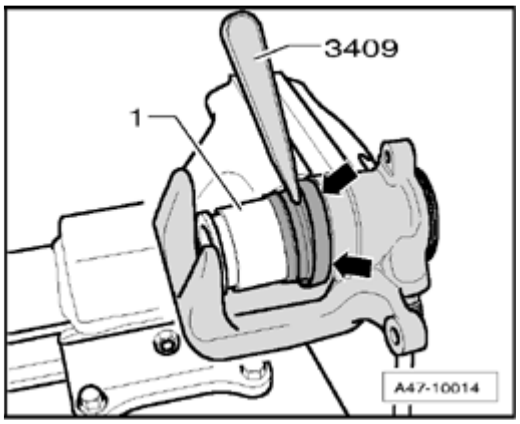

Fig. 154: Inserting Protective Cap In Brake Caliper Groove Using Trim Removal Wedge 3409
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert protective cap in brake caliper groove. Use Trim Removal Wedge 3409.
- Carefully slide brake piston into brake caliper. When doing so move brake piston. Brake piston must be guided over pressure nut, this is only possible in four positions.

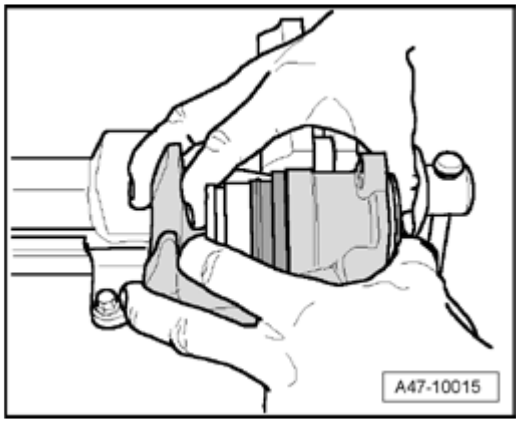

Fig. 155: Pressing Piston Into The Brake Caliper Until It Contacts Pressure Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- After brake piston has been guided onto pressure nut, press it as far as stop into brake caliper.

NOTE:

- **Ensure pressure nut is not damaged.**

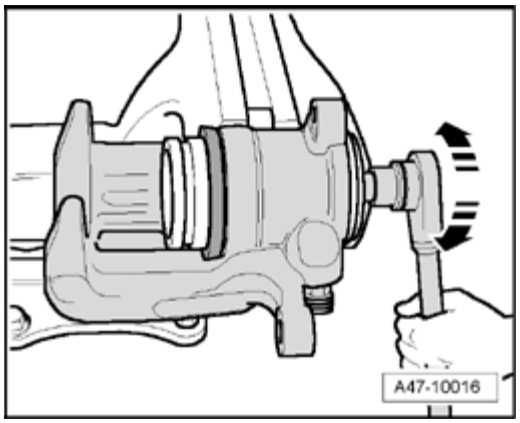

Fig. 156: Installing Pressure Nut Clockwise
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install pressure nut clockwise as far as stop.

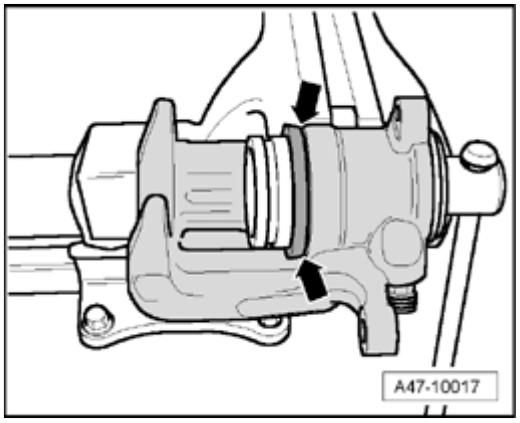

Fig. 157: Ensuring Rubber Makes Contact Around Brake Caliper Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Ensure rubber makes contact around brake caliper housing - **arrows** -

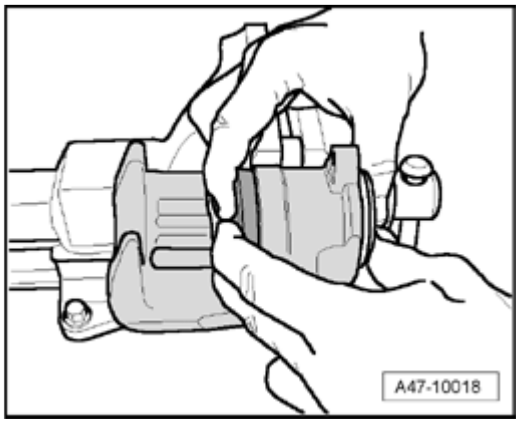

Fig. 158: Pressing Piston Into Brake Caliper By Hand
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press piston into brake caliper by hand

NOTE:

- **The inner sealing lip of the protective cap slips into the groove on the piston.**

BLEEDING BRAKING SYSTEM

Bleeding braking system

CAUTION:

- **Do not, under any circumstances, allow brake fluid to come into contact with any fluids containing mineral oil (oil, gasoline, cleaning solvents). Mineral oil damages the sealing plugs and boots of the brake system.**
- **Brake fluid is poisonous. NEVER siphon brake fluid with your mouth! Also due to its corrosive effect, brake fluid must not come into contact with paint work.**
- **Brake fluid is hygroscopic, meaning that it absorbs moisture from the surrounding air, and must therefore be stored in air-tight containers.**
- **When bleeding, brake fluid that has been flushed through must not be reused and must be disposed of properly.**
- **Observe disposal regulations --> Brake fluid.**

NOTE:

- **Only use new brake fluid conforming to US-Norm FMVSS 116 DOT 4.**
- **Genuine VW/Audi brake fluid conforms to this specification.**
- **Do not use any silicone-based fluid.**
- **Avoid contaminating brake fluid with particles or lint (e.g. from cleaning cloths).**
- **Rinse off spillages, by using plenty of water.**
- **Do not work with compressed air and do not move vehicle while the system is open.**
- **During the final road test, ensure that an ABS-controlled brake test is performed at least once (pulsation must be felt at the brake pedal).**
- **The brake system indicator light blinks when the brake fluid is too low or the ABS system or parking brake is malfunctioning.**

Vehicles with Electronic Stabilization Program (ESP), bleeding procedure

NOTE:

- **To bleed the hydraulic unit, a pressure of at least 2 bar is necessary. Pressure setting must be checked at bleeder device.**
- **Only place brake pedal load device on brake system during assembly,**

then bleed.

Special tools, testers and auxiliary items required

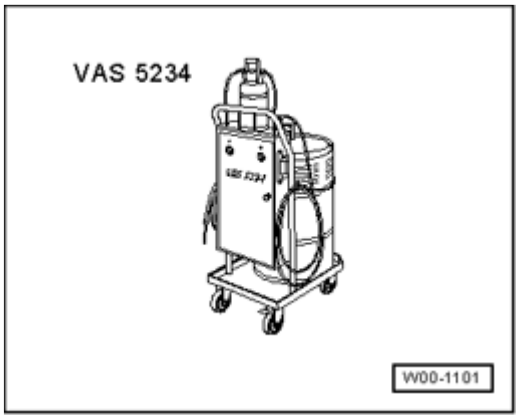

Fig. 159: VAS 5234 Brake Filler And Bleeder Unit
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Brake Filler/Bleeder Unit VAS 5234 or
- Brake filler/bleeder unit suction adapter V.A.G 1869/4

Observe operating instructions for Brake Filler/Bleeder Unit VAS 5234.

- Connect Brake Filler/Bleeder Unit VAS 5234
- Open bleeder screws in specified sequence and bleed brake caliper (support with pedal pressure if necessary).

Bleeding sequence for left and right hand drive vehicles

1 - Left front brake caliper

2 - Right front brake caliper

3 - Left rear brake caliper

4 - Right rear brake caliper

- Bleed until brake fluid escapes with no bubbles and foam.
- Close bleeder screw.

Brake fluid, changing

Brake fluid, changing

405 Work descriptions; changing brake fluid (every 2 years)

BRAKE BOOSTER/MASTER BRAKE CYLINDER, ASSEMBLY OVERVIEW

Brake booster/master brake cylinder, assembly overview

NOTE:

- **Master brake cylinders can no longer be disassembled, servicing is not possible.**
- **Use only new brake fluid. Observe information on brake fluid reservoir!**

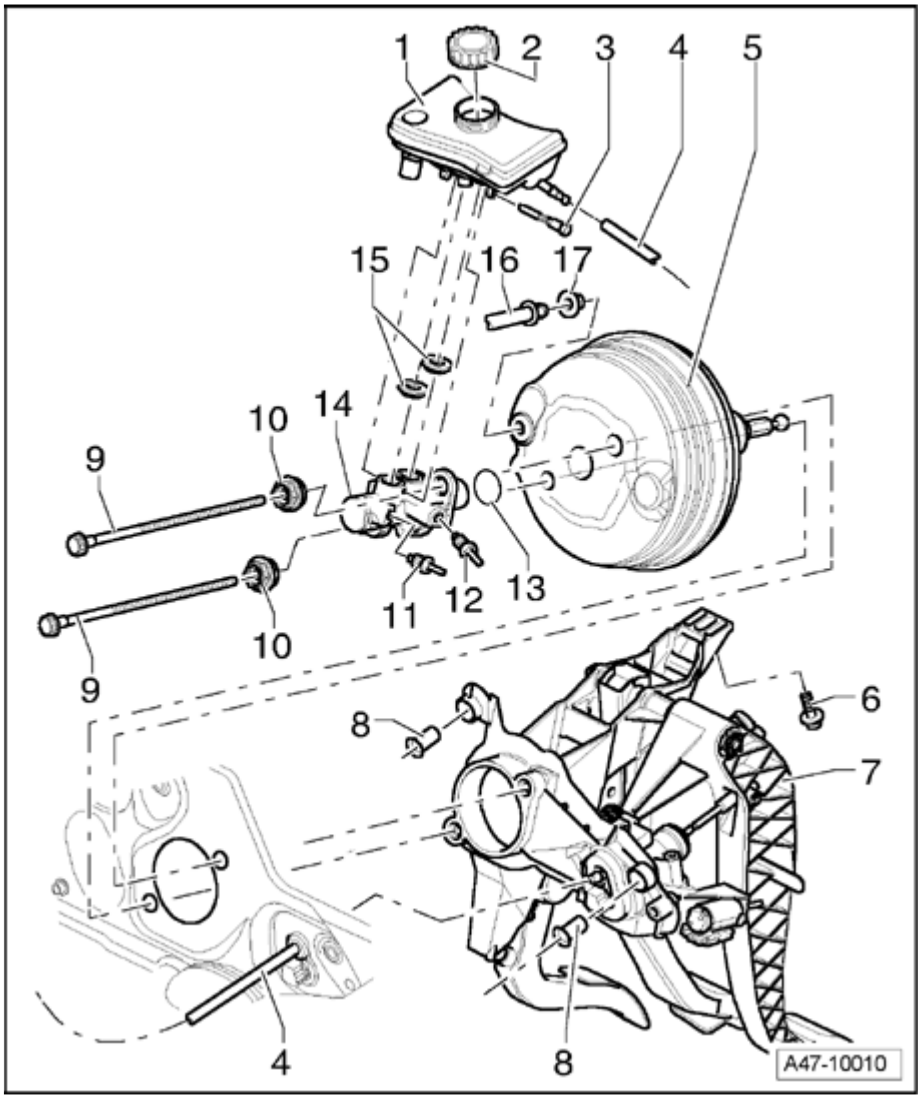

Fig. 160: Brake Booster/Master Brake Cylinder, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Brake fluid reservoir

- Screen in brake fluid reservoir must not be removed.

2 - Sealing cap with seal

3 - Dowel bolt, 10 Nm

4 - Wiring to master cylinder

5 - Tandem brake booster

- Adjusting ball head **Adjusting ball head**
- Functional check: With engine switched off, depress brake pedal firmly several times (to deplete vacuum in tool).
- Depress and hold brake pedal with average foot pressure and start engine. If brake booster is working properly, pedal will be felt to give noticeably under foot (booster assistance becomes effective).
- With adhesive seal
- If malfunctioning: replace as complete unit.
- Removing and installing --> **Brake booster**

6 - Torx flange bolt, 25 Nm

7 - Mounting bracket for pedal assembly

- Removing and installing --> **Mounting bracket**

8 - Sleeves

9 - Bolts (Torx 45), 23 Nm

10 - Self-locking hex nut, 49 Nm

11 - Brake line, 16 Nm

- Master brake cylinder/secondary piston circuit to hydraulic unit

12 - Brake line, 16 Nm

- Master brake cylinder/primary piston circuit to hydraulic control unit

13 - Sealing ring

- Replace

14 - Dual master brake cylinder

- Cannot be serviced. Replace as complete unit if malfunctioning.
- Removing and installing --> **Brake master cylinder**

15 - Sealing plugs

- Moisten with brake fluid and press into brake fluid reservoir

16 - Vacuum hose with ear hose clamp

- Insert into brake booster

17 - Sealing plugs

- Connection for vacuum hose

NOTE:

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

Adjusting ball head

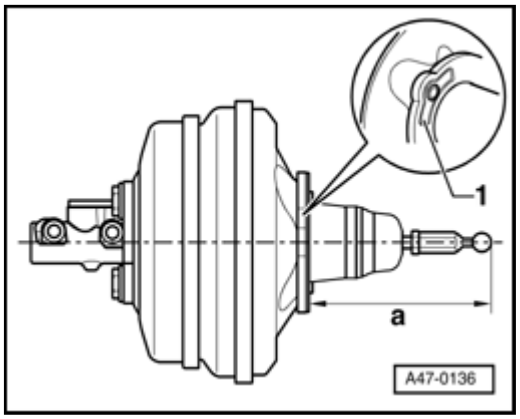

Fig. 161: Adjusting Ball Head
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- a = 178.2 mm ± 0.5mm -

NOTE:

- **Surface - 1 - for measuring.**
- **When measuring the ball head, it must be set at right angles to the surface of the brake booster.**
- **Measure to end of ball head without gasket installed.**
- **Each time push rod adjustment in vehicle is changed, brake light switch must be replaced.**

Tightening torque:	
Ball head to brake booster	30 Nm

BRAKE MASTER CYLINDER

Brake master cylinder, removing and installing

Special tools, testers and auxiliary items required

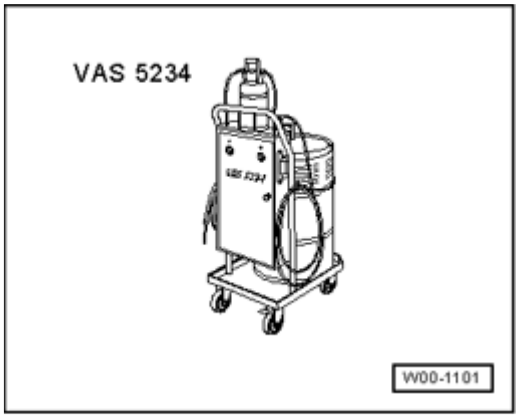

Fig. 162: VAS 5234 Brake Filler And Bleeder Unit
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Brake Filler/Bleeder Unit VAS 5234 or
- Brake filler/bleeder unit suction adapter V.A.G 1869/4
- *Repair kit plugs 1H0 698 311 A*

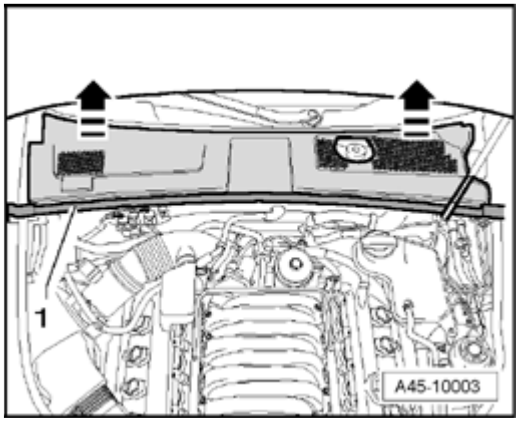

Fig. 163: Removing Plenum Chamber Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove plenum chamber cover

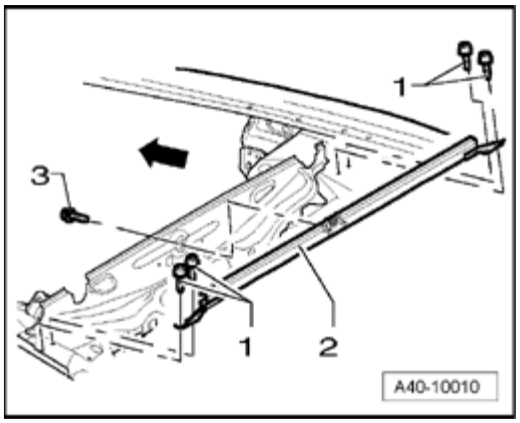

Fig. 164: Removing Multi-Point Socket Head Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove multi-point socket head bolts - **1** - and - **3** - , tightening torque 25 Nm.
- Remove tower brace - **2** -.

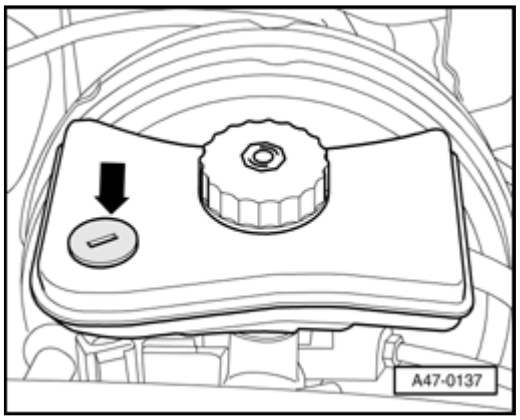

Fig. 165: Opening Brake Fluid Reservoir
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Open brake fluid reservoir.
- To protect against escaping brake fluid, place a lint-free rag in area under brake master cylinder.

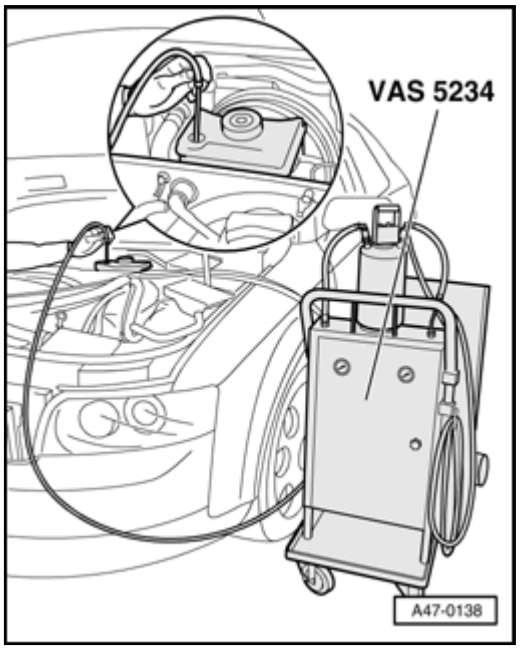

Fig. 166: Extracting Brake Fluid Using Brake Filler And Bleeder Unit VAS 5234
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Draw off as much brake fluid as possible from brake fluid reservoir using Brake Charger/Bleeder Unit Suction Adapter V.A.G 1869/4 or Brake Filler/Bleeder Unit VAS 5234.
- Remove brake fluid reservoir locking bolt - **1** -.

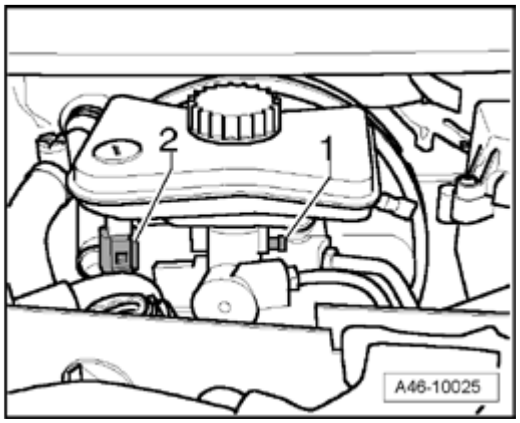

Fig. 167: Removing Brake Fluid Reservoir Locking Bolt & Disconnecting Connector
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect connector - **2** -

NOTE:

- **Protect plenum chamber from escaping brake fluid.**

- Remove brake line and seal off with plugs.
- To remove reservoir, press locking tab down and at the same time, remove brake fluid reservoir from

sealing plugs.

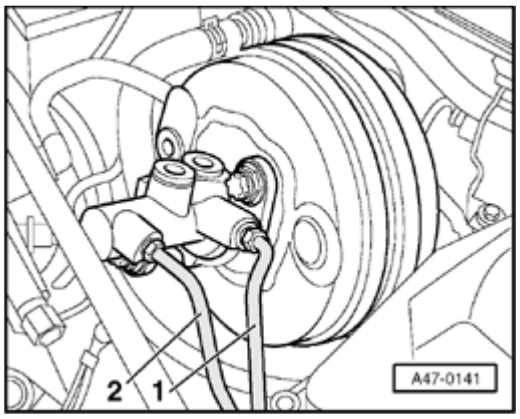

Fig. 168: Detaching Brake Lines From Brake Master Cylinder And Hydraulic Assembly
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Completely detach brake lines - **1** - and - **2** - from brake master cylinder and hydraulic assembly and remove.

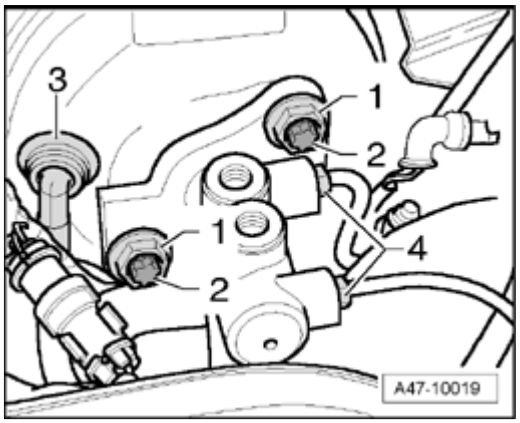

Fig. 169: Removing Brake Master Cylinder Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove brake master cylinder bolts - **1** -.
- Carefully take brake master cylinder out of brake booster.

Installing

When installing, observe the following:

- Before installing brake booster, clean plenum chamber of remaining escaping brake fluid.
- When installing together brake master cylinder and brake booster, make sure that the push rod is correctly located in brake master cylinder.

- Bleed brake system --> **Bleeding braking system**.

BRAKE BOOSTER

Brake booster, removing and installing

Special tools, testers and auxiliary items required

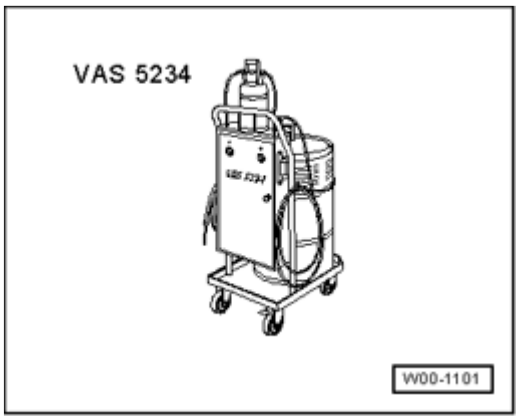

Fig. 170: VAS 5234 Brake Filler And Bleeder Unit
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Brake Filler/Bleeder Unit VAS 5234
- Brake filler/bleeder unit suction adapter V.A.G 1869/4
- *Repair kit plugs 1H0 698 311 A*

- Remove trim on drivers side. --> **68 - INTERIOR EQUIPMENT**
- Move adjustable steering column all the way back (opposite direction of travel)

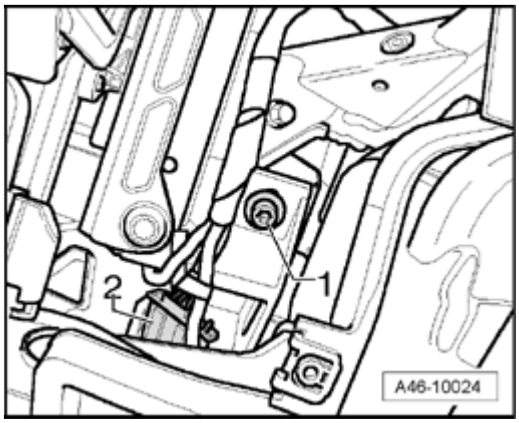

Fig. 171: Identifying Multi-Point Socket Head Bolts & Brake Light Switch
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect brake light switch - **2** - and remove, see --> **Brake light switch, removing and installing**.
- Disconnect brake pedal from brake booster

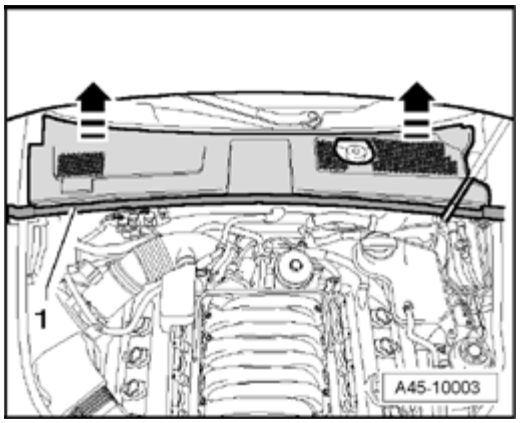

Fig. 172: Removing Plenum Chamber Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove plenum chamber cover

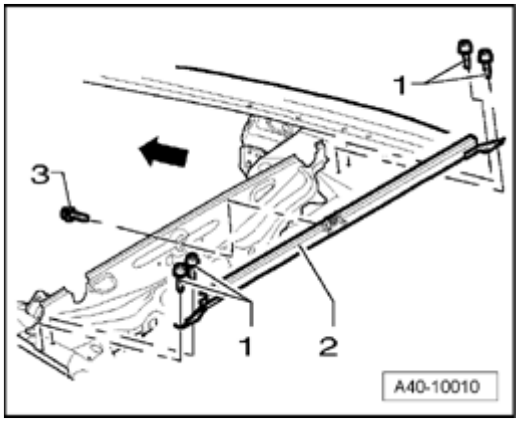

Fig. 173: Removing Multi-Point Socket Head Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove multi-point socket head bolts - **1** - and - **3** - , tightening torque 25 Nm.
- Remove tower brace - **2** -.
- Remove wiper arms --> **92 - WINDSHIELD WIPER AND WASHER SYSTEM**
- Remove rear plenum chamber cover.

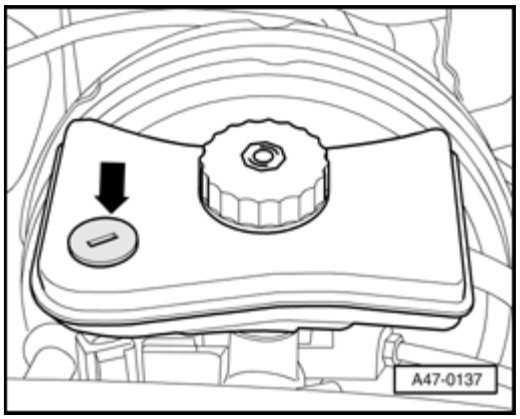

Fig. 174: Open Brake Fluid Reservoir
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Open brake fluid reservoir.
- To protect against escaping brake fluid, place a lint-free rag in the area under the brake master cylinder.

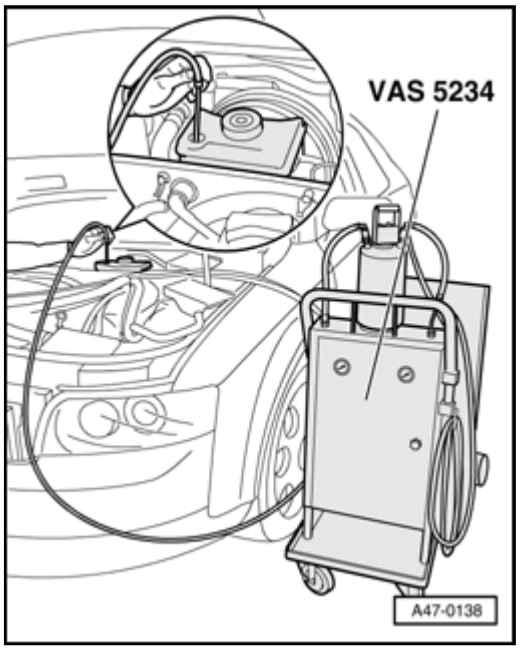

Fig. 175: Extracting Brake Fluid Using Brake Filler And Bleeder Unit VAS 5234
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Draw off as much brake fluid as possible from brake fluid reservoir using Brake Charger/Bleeder Unit Suction Adapter V.A.G 1869/4 or Brake Filler/Bleeder Unit VAS 5234.

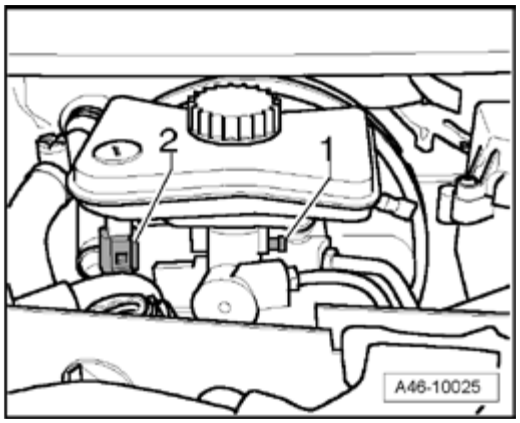

Fig. 176: Removing Brake Fluid Reservoir Locking Bolt & Disconnecting Connector
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove brake fluid reservoir locking bolt - **1** -.
- Disconnect connector - **2** -

NOTE:

- **Protect plenum chamber from escaping brake fluid.**

- Brake line, removing
- To remove reservoir, press locking tab down and at the same time, remove brake fluid reservoir from sealing plugs.

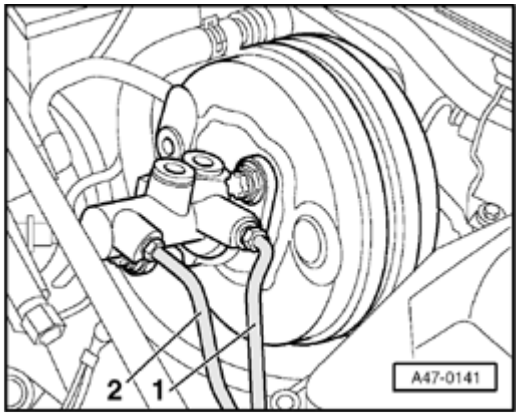

Fig. 177: Detaching Brake Lines From Brake Master Cylinder And Hydraulic Assembly
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Completely detach brake lines - **1** - and - **2** - from brake master cylinder and hydraulic assembly, seal with plugs and remove.
- Remove brake booster bolts - **2** -.

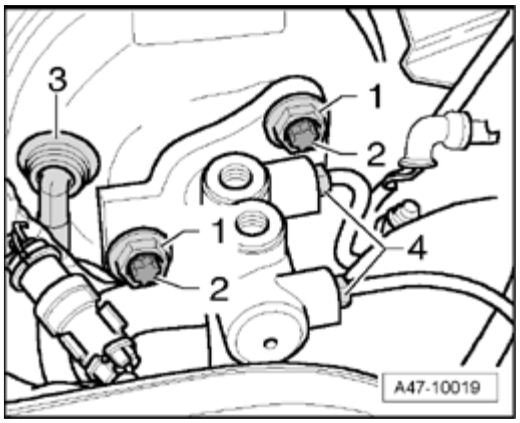

Fig. 178: Removing Brake Master Cylinder Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove vacuum line - **3** -.

NOTE:

- **Ensure no contamination enters vacuum opening.**

- Remove brake booster with brake master cylinder.

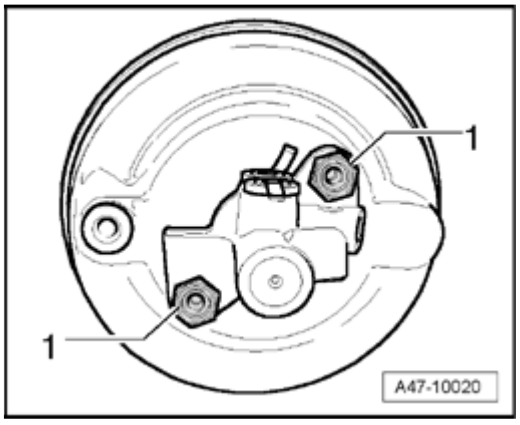

Fig. 179: Removing Brake Master Cylinder Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove brake master cylinder nut - **1** -.
- Carefully take brake master cylinder out of brake booster.

Installing

When installing, observe the following:

- Before installing brake booster, clean plenum chamber of remaining escaping brake fluid.
- When installing together the brake master cylinder and brake booster, make sure that the push rod is correctly located in the brake master cylinder.

Joining brake pedal to brake booster

- Hold ball head of push rod in front of mounting and push brake pedal in direction of brake booster, so the ball head locates audibly.
- Adjust brake light switch --> **Brake light switch, removing and installing**.
- Bleed brake system --> **Bleeding braking system**.

Brake booster vacuum pump, component overview

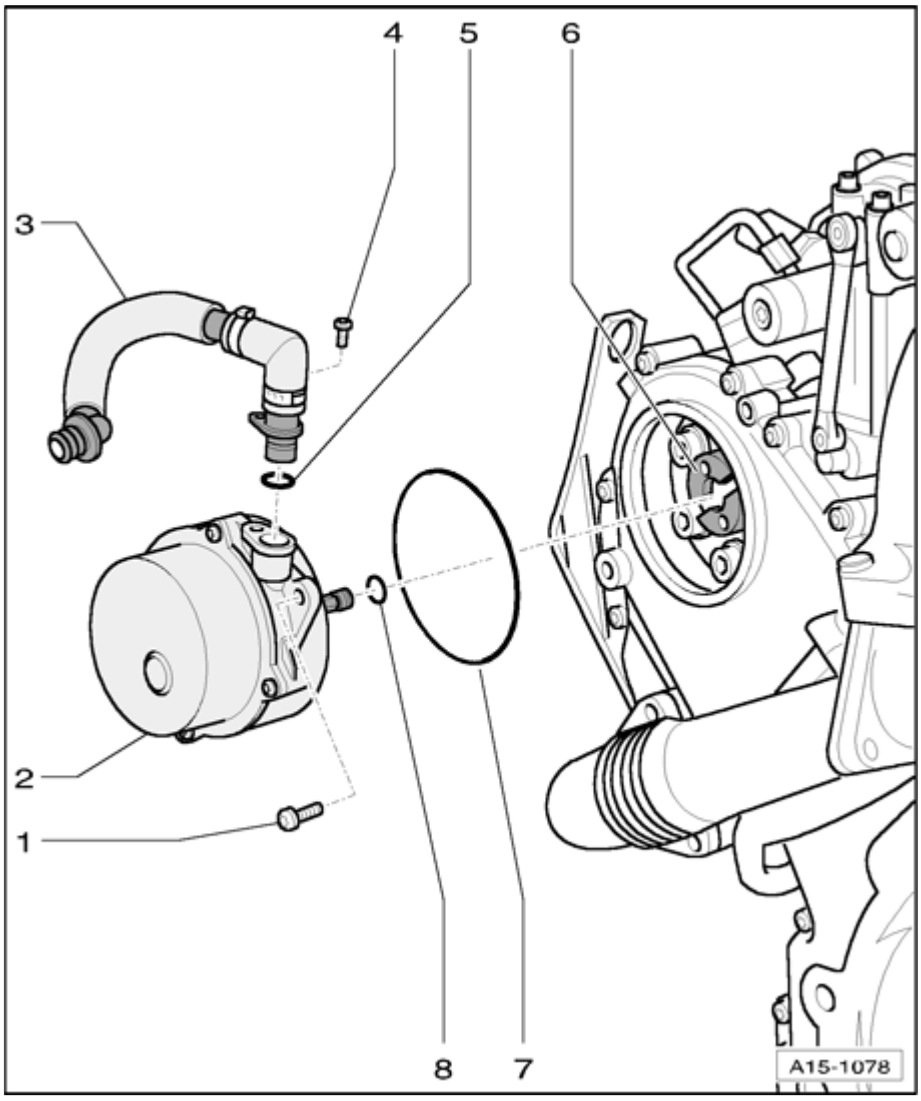

Fig. 180: Identifying Special Tools - Brake Booster Vacuum Pump, Component Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - 9 Nm

2 - Vacuum pump

- Removing and installing --> **Vacuum pump, removing and installing**

3 - Vacuum hose

- Secure with hose clamps that match those used in production

4 - 5 Nm

5 - O-Ring

- Replace

6 - Intake camshaft

7 - O-Ring

- Replace

8 - O-Ring

- Replace

Vacuum pump, removing and installing

Removing

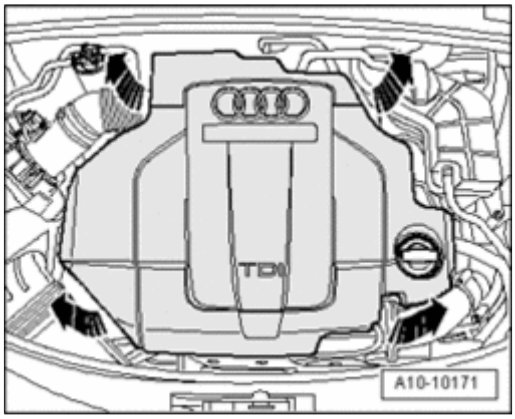

Fig. 181: Removing Engine Cover From Retaining Pins In Succession
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully remove engine cover from 4 retaining pins in succession - **arrows** -.

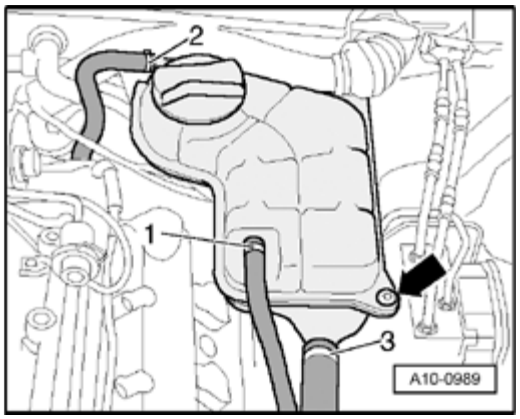

Fig. 182: Removing Coolant Reservoir
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove coolant reservoir - **arrow** -.
- Disconnect electrical connector to Engine Coolant Level (ECL) Warning Switch F66 at bottom of coolant reservoir.
- Lay aside coolant reservoir with coolant hoses - **1 through 3** - connected.

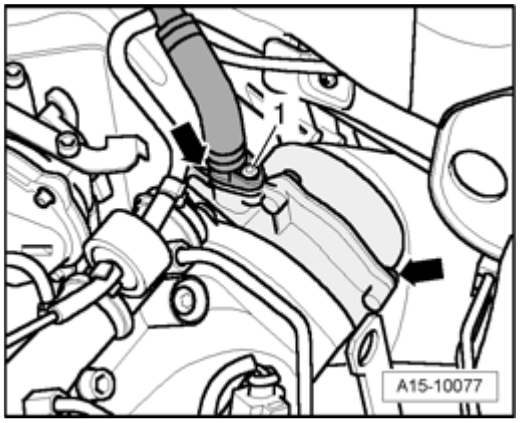

Fig. 183: Removing Bolt, Vacuum Hose & Vacuum Pump
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt - **1** - and remove vacuum hose with support to vacuum pump.
- Remove bolts - **arrows** - and remove vacuum pump.

Installing

Installation is done in reverse order, but observe the following:

NOTE:

- **Replace O-rings.**

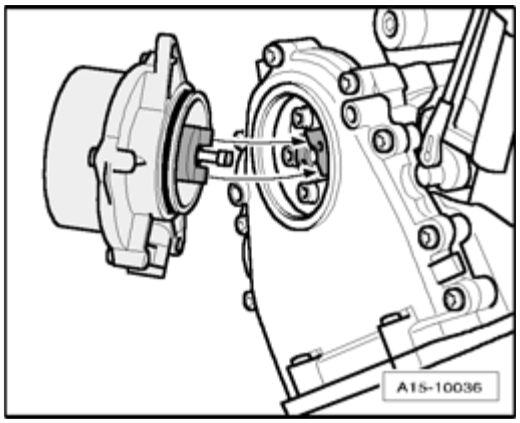

Fig. 184: Positioning Vacuum Pump Drive So That It Engages In Groove On Camshaft When Vacuum Pump
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position vacuum pump drive so that it engages in groove on camshaft - **arrows** - when vacuum pump is installed.

Tightening torques

Component	Nm
Vacuum pump to timing chain cover	9
Vacuum hose support to vacuum pump	5

Brake system vacuum pump V192

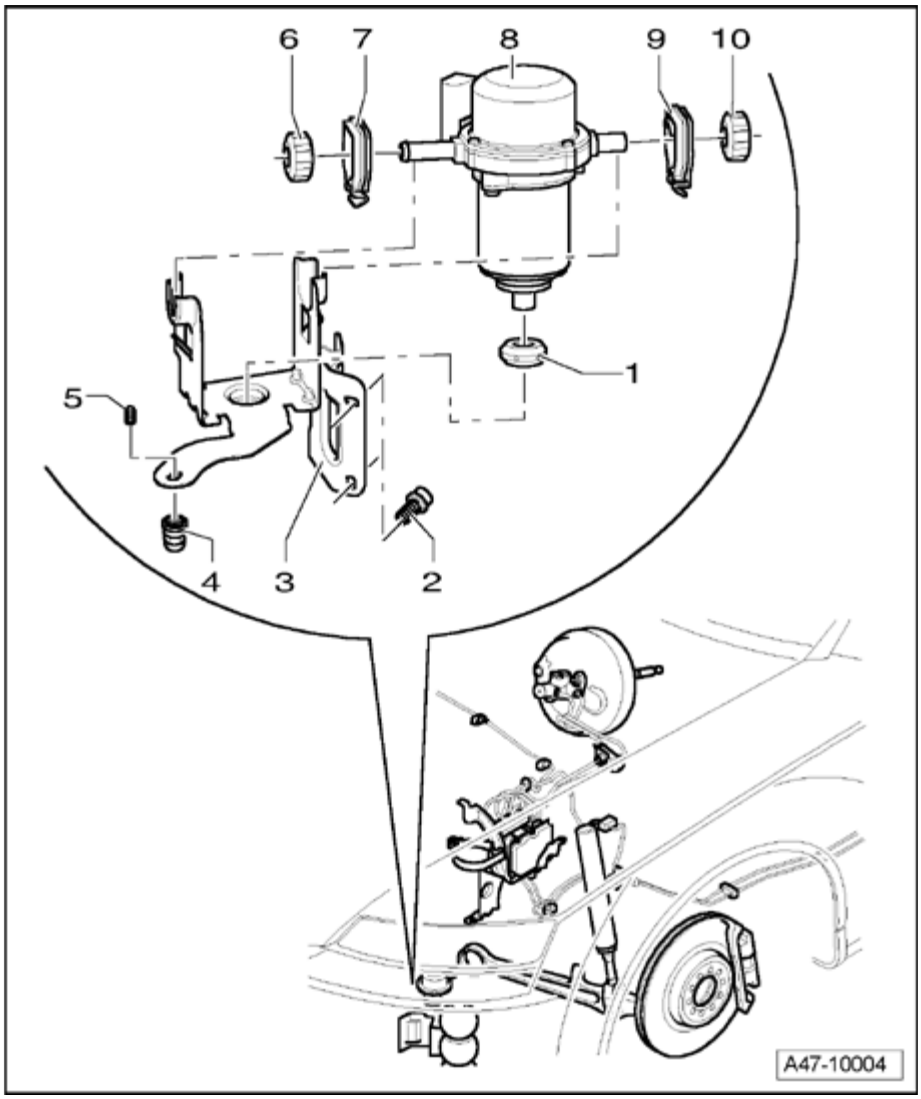

Fig. 185: Brake System Vacuum Pump V192 Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Buffer

2 - Hex socket head bolt Qty. 2

- Torque specification 10 Nm

3 - Bracket

4 - Cap nut

- Torque specification 10 Nm

5 - Threaded pins to body

6 - Buffer

7 - Locking clip

8 - Brake system vacuum pump V192

- Removing and installing **Brake system vacuum pump V192 , removing and installing**
- Checking --> **Brake system vacuum pump V192 , checking**

9 - Locking clip

10 - Buffer

Brake system vacuum pump V192 , removing and installing

Special tools, testers and auxiliary items required

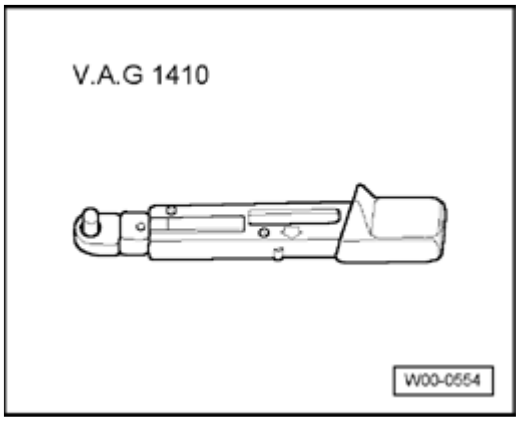

Fig. 186: Torque Wrench V.A.G 1410
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1410

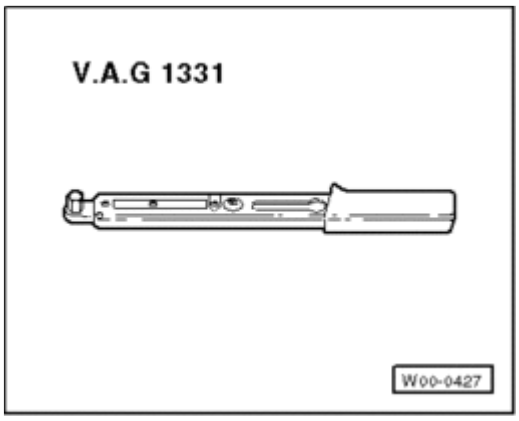

Fig. 187: Torque Wrench V.A.G 1331

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1331

Vacuum pump is not intended to be serviced. In case of complaints, determine cause with help of function or seal test. If there is a malfunction, replace electrical vacuum pump.

Removing:

NOTE:

- **The electrical vacuum pump is located behind the front bumper under the left headlamp.**

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

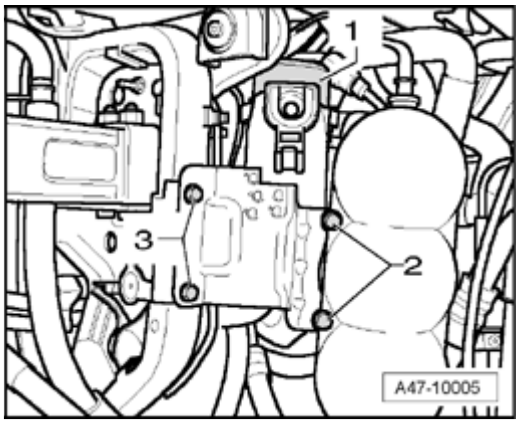

Fig. 188: Pressing Clip Out Of Bracket
Courtesy of VOLKSWAGEN UNITED STATES, INC.

  - Press clip - **1** - out of bracket with hand. 2x

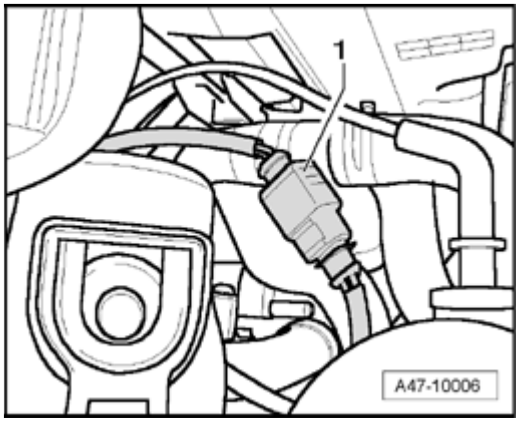

Fig. 189: Disconnecting Electrical Connector
Courtesy of VOLKSWAGEN UNITED STATES, INC.

  - Disconnect electrical connector - **1** -

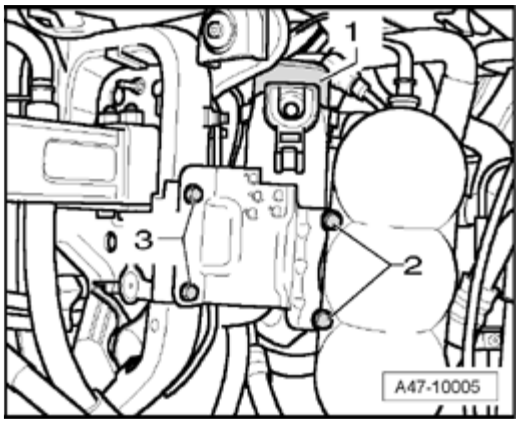

Fig. 190: Pressing Clip Out Of Bracket
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect vacuum hose from vacuum pump.

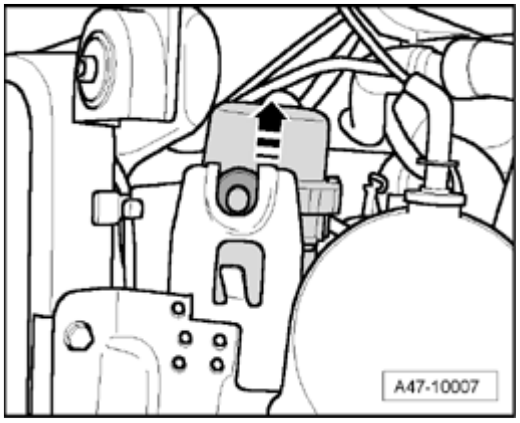

Fig. 191: Removing Electrical Vacuum Pump Upward
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove electrical vacuum pump upward.

Remove electrical vacuum pump bracket.

NOTE:

- **To remove bracket, vacuum pump must first be unclipped from bracket.**

- Remove connections - **2** - and - **3** -.

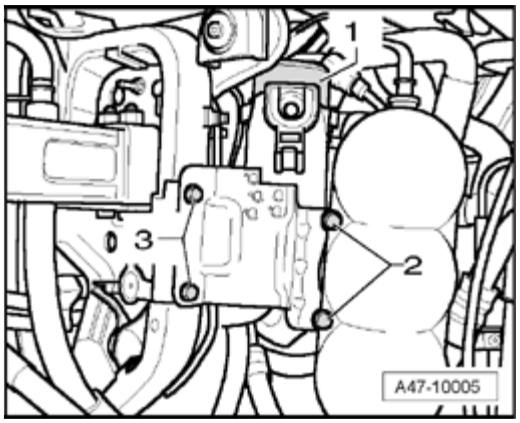

Fig. 192: Pressing Clip Out Of Bracket
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove motor vacuum reservoir sideways.

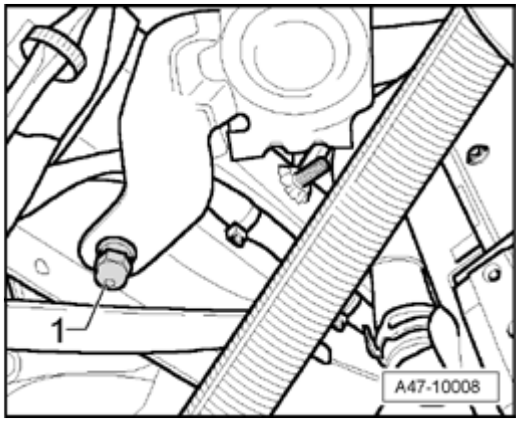

Fig. 193: Removing Connection
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove connection - **1** -.

Installing

Installation is in reverse order of removal.

NOTE:

- **Use new clamps when installing vacuum line.**

Brake system vacuum pump V192 , checking

Description and function

Electric vacuum pump is only installed on vehicles with automatic transmission. It is switched on by engine control module depending on intake line pressure.

Vacuum pump has On Board Diagnostic (OBD) properties. Detected faults are stored in engine control module.

Electric vacuum pump function check can only be carried out using OBD with engine off!

Special tools, testers and auxiliary items required

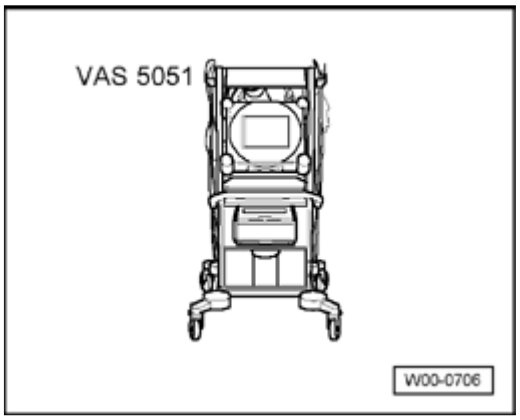

Fig. 194: VAS 5051 Vehicle Diagnosis, Testing & Information System
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Vehicle diagnosis, testing and information system VAS 5051
- Diagnostic cable VAS 5051/1 or diagnostic cable VAS 5051/3

Procedure

- With ignition switched off, connect vehicle diagnostic, test and information system VAS 5051 with diagnostic cable VAS 5051/1 or diagnostic cable VAS 5051/3 to diagnostic connection.

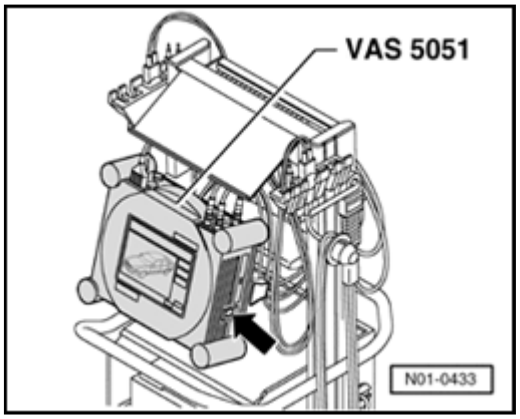

Fig. 195: Identifying Volkswagen Tester VAS 5051, On Switch
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Switch on tester - **arrow** -.

The tester will now require up to 3 minutes to boot up.

- Switch on ignition.
- Select operating mode: On display, select "Vehicle On-Board Diagnosis".
- Select vehicle system: On display, select "01 - Engine electronics".

At upper right of screen, the control module identification and coding are displayed.

- Select diagnostic function: At this point, all diagnostic functions are available.
- On display, select "04 - Basic setting".
- Press buttons 0 , 0 and 8.
- Confirm input with Q button.

Displayed at bottom of the screen:

Base setting	
	Not actuated
	Pump off
	xxx mbar
	Test off

- Actuate brake pedal multiple times with consistent force until test activates.

Displayed at bottom of the screen:

Base setting	
	Not actuated
	Pump on
	xxx mbar
	Test on

The brake pedal may no longer be actuated once the test begins.

The brake system vacuum pump V192 supplies brake booster with vacuum. At the same time, the control module performs a diagnosis of the brake booster system.

If pressure within in the brake booster reaches the cut-off threshold by the time that was predetermined by the diagnostic function, the test has been passed.

Displayed at bottom of the screen:

Base setting		
		Not actuated
		Pump off
		xxx mbar

		Syst. O.K.

- Using the Goto button, the operating mode can be interrupted or ended.

If pressure within in the brake booster does not reach the cut-off threshold by the time that was predetermined by the diagnostic function, the test has been failed.

Displayed at bottom of the screen:

Base setting	
	Not actuated
	Pump off
	xxx mbar
	Syst. not O.K.

- Perform "Guided Fault Finding" using vehicle diagnosis, testing and information system VAS 5051.

Brake booster pressure sensor G294 , removing and installing

Removing

NOTE:

- **Component location: The Brake Booster Pressure Sensor G294 is located in plenum chamber on brake booster.**

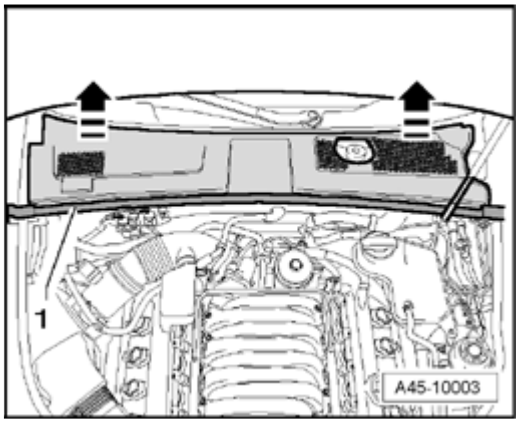

Fig. 196: Removing Plenum Chamber Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove plenum chamber cover
- Disconnect electrical connector - **1** -.

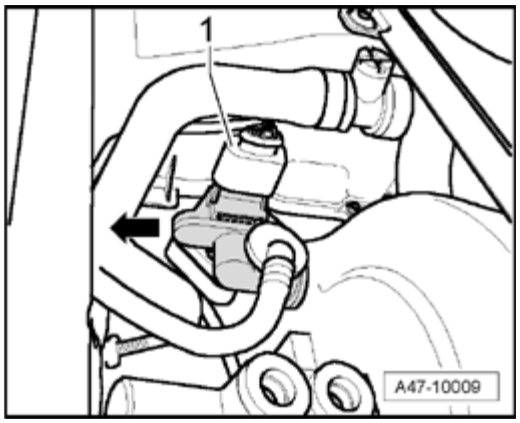

Fig. 197: Removing Pressure Sensor
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove pressure sensor in direction of - **arrow** -.

NOTE:

- **Pressure sensor can also be secured with clips.**

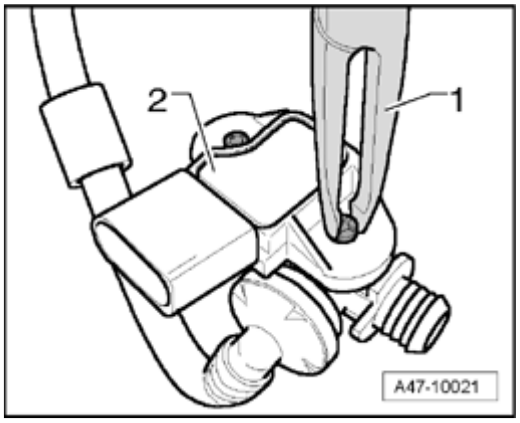

Fig. 198: Removing/Installing Brake Booster Pressure Sensor G294
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Release clips with pliers - **1** -.
- Carefully pry Brake Booster Pressure Sensor G294 off.

Installing

Installation is in reverse order of removal.

Checking check valve

Valve must allow air to flow in direction of arrow.

Valve must remain closed in opposite direction.

Observe correct installation position!

BRAKES AND BRAKE LINES

Line routing

Brakes and brake lines are delivered as ready-to-install replacement parts.

Secure brakes and brake lines at original fastening points when installing.

Lines to hydraulic assembly

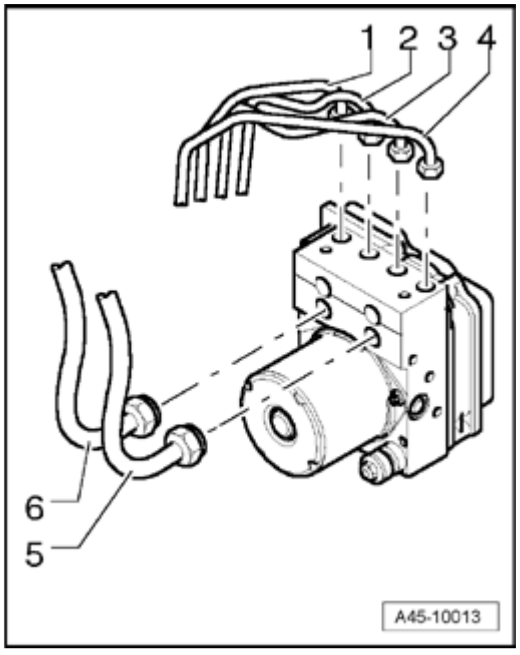

Fig. 199: Connecting Brake Caliper & Piston Circuit Lines
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Items - **1** - through - **4** - hex nuts (M10 and M12 dia. 5 mm brake lines), 12 Nm tightening torque
- Items - **5** - and - **6** - hex nuts (M14 dia. 8 mm brake lines), 16 Nm tightening torque

Brake hose to brake caliper to front axle

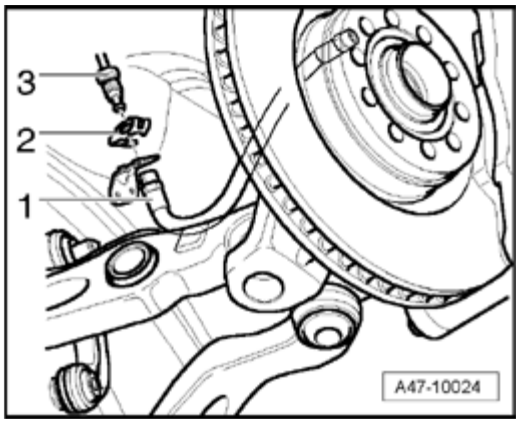

Fig. 200: Identifying Brake Hose, Retaining Spring & Brake Line
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Item - **1** - brake hose, ensure retaining tabs are seated correctly in bracket.
- Item - **2** - retaining spring
- Item - **3** - brake line, 17 Nm tightening torque

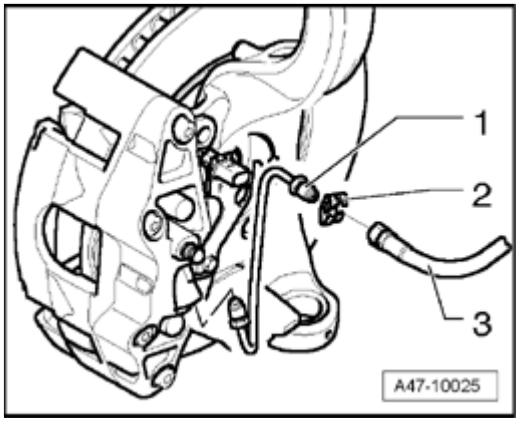

Fig. 201: Identifying Brake Line, Retaining Spring & Brake Hose
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Item - **1** - brake line, 17 Nm tightening torque
- Item - **2** - retaining spring
- Item - **3** - brake hose, ensure retaining tabs are seated correctly in bracket.

Brake line routing in wheel housing to front axle

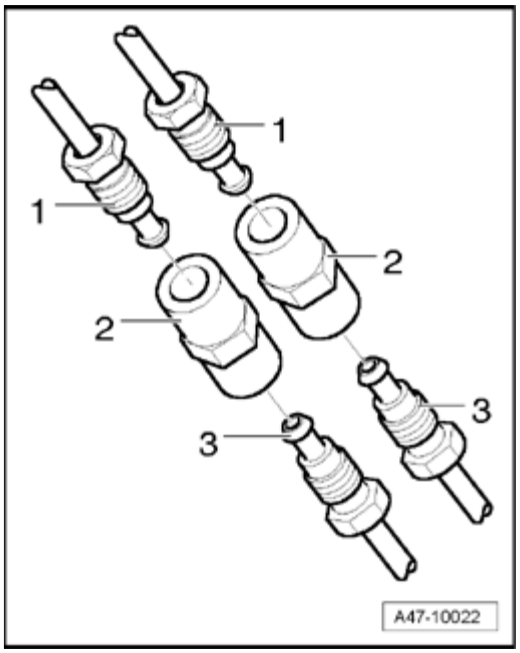

Fig. 202: Identifying Brake Line, Intermediate Piece & Brake Pipe Line
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Item - **1** - brake line, 12 Nm tightening torque
- Item - **2** - intermediate piece
- Item - **3** - brake pipe line, 12 Nm tightening torque

Brake line connecting in wheel housing to front axle

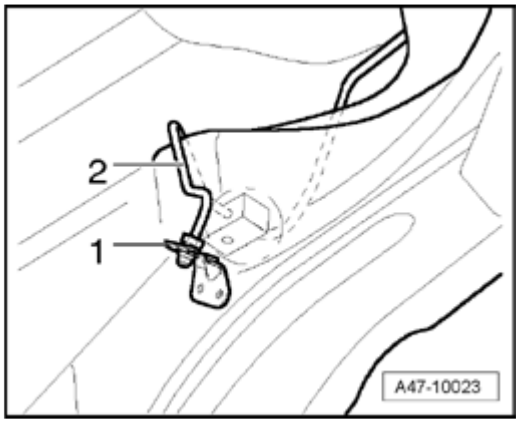

Fig. 203: Identifying Brake Hose Bracket & Brake Line
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Item - **1** - brake hose bracket
- Item - **2** - brake line, 12 Nm tightening torque

Brake line routing to rear axle

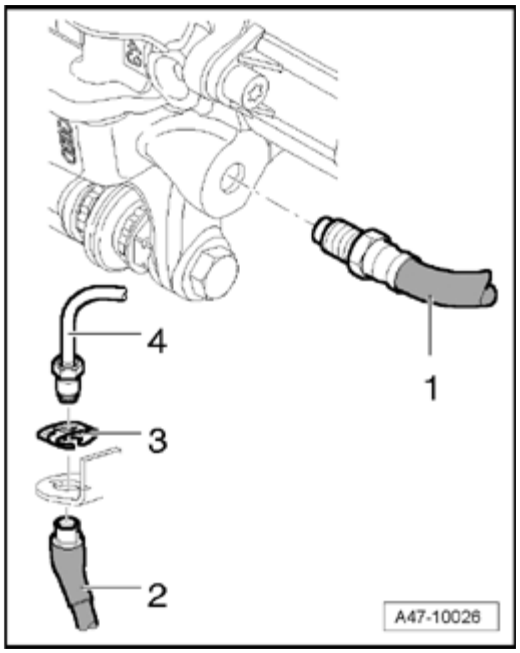

Fig. 204: Identifying Brake Hose, Brake Hose Bracket, Retaining Spring & Brake Line
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Item - **1** - brake hose, 12 Nm tightening torque
- Item - **2** - brake hose bracket, ensure retaining tabs are seated correctly in bracket.
- Item - **3** - retaining spring
- Item - **4** - brake line, 12 Nm tightening torque