

Volkswagen Jetta, Golf, GTI 1999, 2000
Brake System
45 Anti-lock Brake System (ABS) (Page GR-45)

[Anti-lock brake system \(ABS\) and anti-lock brake system with electronic differential lock \(ABS/EDL\) ITT Mark 20 IE](#)

[Distinguishing features of ABS ITT Mark 20 IE and the ABS/EDL ITT Mark 20 IE](#)

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[Hydraulic unit/ABS control module, removing and installing](#)

[ABS system components for front axle, removing and installing](#)

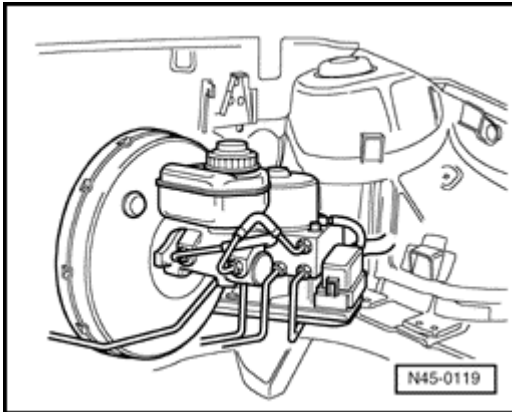
[ABS system components on rear axle, removing and installing](#)

Volkswagen Jetta, Golf, GTI 1999, 2000

Brake System

Anti - lock brake system (ABS) and anti - lock brake system with electronic differential lock (ABS/EDL) ITT Mark 20 IE (Page 45-1)

General



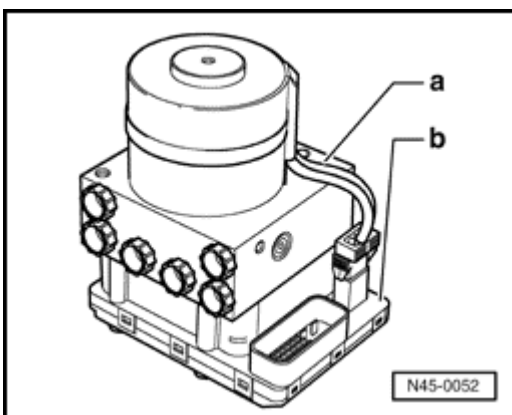
A

ABS layout

The ABS or ABS/EDL brake system is divided diagonally. Brake pedal pressure is assisted pneumatically by the vacuum brake booster.

Vehicles with ITT Mark 20 IE ABS do not have a mechanical brake pressure regulator. Specially matched software in the control module controls the rear axle brake pressure regulation.

Malfunctions of the ABS or ABS/EDL systems do not influence the brake system or the vacuum assistance. The conventional braking system remains functional even if the ABS is not operating.



A

The hydraulic part -a- and the control module part -b- form one component. Separating the two parts is only possible when the complete component has been removed from the vehicle.

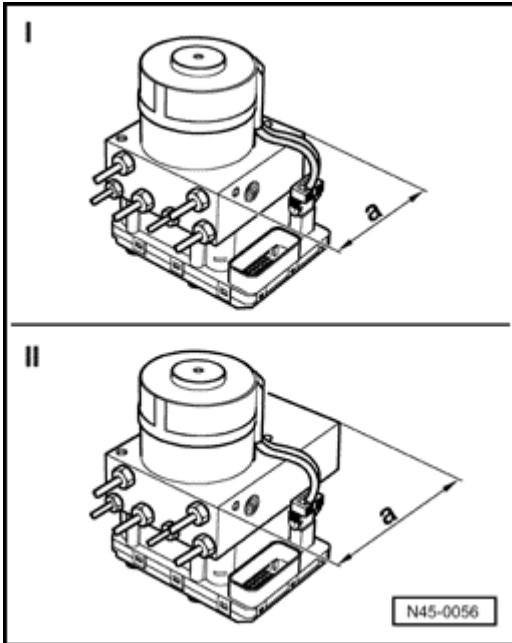
New control modules (replacement parts) are not coded and must be coded after installation.

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Brake System

Anti - lock brake system (ABS) and anti - lock brake system with electronic differential lock (ABS/EDL) ITT Mark 20 IE (Page 45-2)

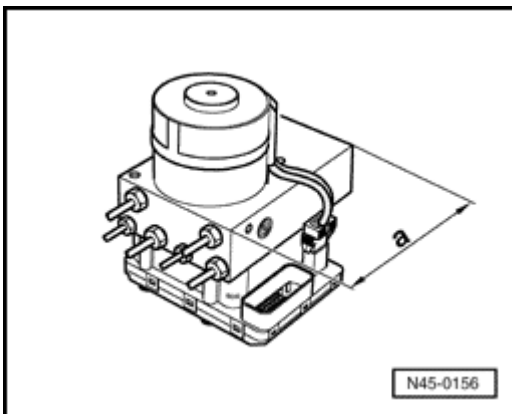
Distinguishing features of ABS ITT Mark 20 IE and the ABS/EDL ITT Mark 20 IE



A

I - ABS - ITT Mark 20 IE

Dimension a = 100 mm (3.9 in.)



A

II - ABS/EDL - ITT Mark 20 IE

Dimension a = 130 mm (5.1 in.)

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Brake System

Anti - lock brake system (ABS) and anti - lock brake system with electronic differential lock (ABS/EDL) ITT Mark 20 IE (Page 45-3)

Notes for repair work on ABS, ABS/EDL

WARNING!

Brake fluid is poisonous.

Notes:

- ◆ *Before working on the ABS system, determine the cause of the malfunction using On Board Diagnostic (OBD) ⇒ [Repair Manual, "ABS, ABS/EDL On Board Diagnostic \(OBD\)," Repair Group 01](#)*
- ◆ *Before working on the ABS system, disconnect the battery ground strap. Obtain the radio code for vehicles with a coded radio.*
- ◆ *Before doing any welding work with an electric welding unit, disconnect the ABS control module.*
- ◆ *When working with brake fluid, observe the relevant safety precautions and notes ⇒ [Page 47-26](#).*
- ◆ *If the brake hydraulic system had to be opened during the course of repair, bleed the brake system after completion of the repair ⇒ [Page 47-26](#).*
- ◆ *During the final road test perform at least one controlled brake test where the brake pedal is felt to pulsate (ABS operation).*
- ◆ *Absolute cleanliness is required when working on the ABS system. It is not permitted to use any products which contain mineral oil, greases, etc.*

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Brake System

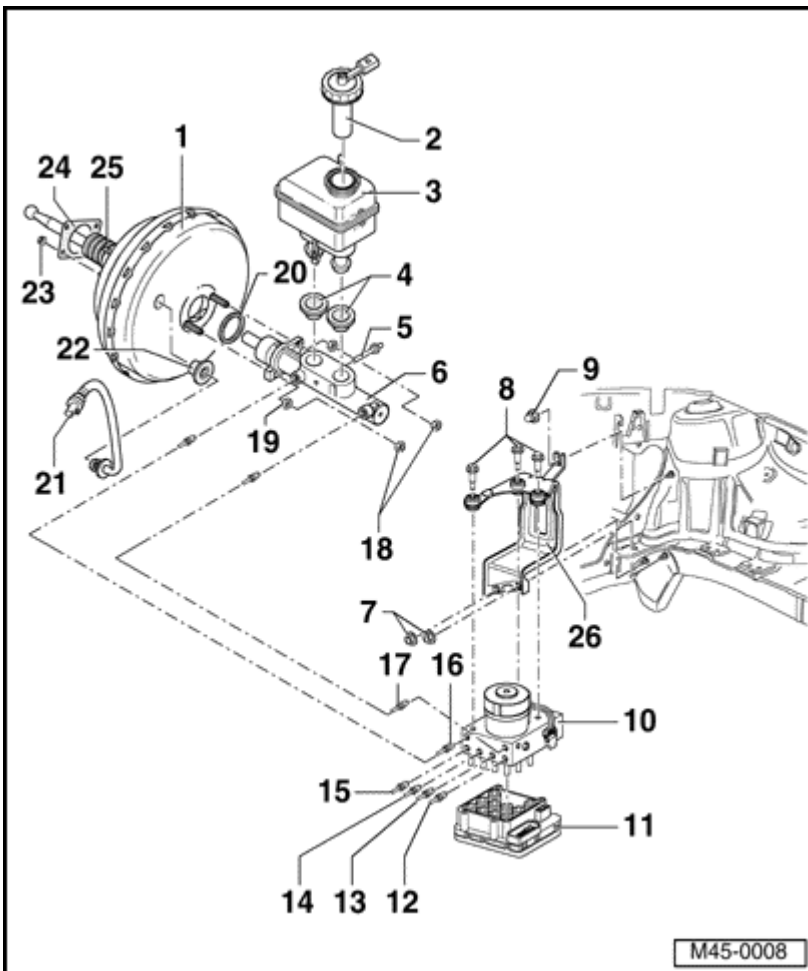
Anti - lock brake system (ABS) and anti - lock brake system with electronic differential lock (ABS/EDL) ITT Mark 20 IE (Page 45-4)

- ◆ *Thoroughly clean all connections and the adjacent areas before loosening. Do not use aggressive cleaning agents such as brake cleaner, gasoline, thinners or similar.*
- ◆ *Place removed parts on a clean surface and cover them. Only use clean plastic covering or paper. Do not use rags that may contain lint.*
- ◆ *After separating the control module from the hydraulic unit, use the transportation protection for the valve dome.*
- ◆ *Carefully cover or seal open components if repairs cannot be carried out immediately. Use the sealing plugs contained in repair kit, Part No. 1 H0 693 311 A.*
- ◆ *Do not use rags that may contain lint.*
- ◆ *Only remove replacement parts from packaging immediately prior to installation.*
- ◆ *Only use genuine packed parts.*
- ◆ *When the system is open do not work with compressed air and do not move the vehicle.*
- ◆ *Ensure that no brake fluid enters electrical connectors.*

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Brake System

Hydraulic unit, brake booster/master cylinder, overview (Page 45-5)



Notes:

Complete brake master cylinders and brake boosters can be replaced separately.

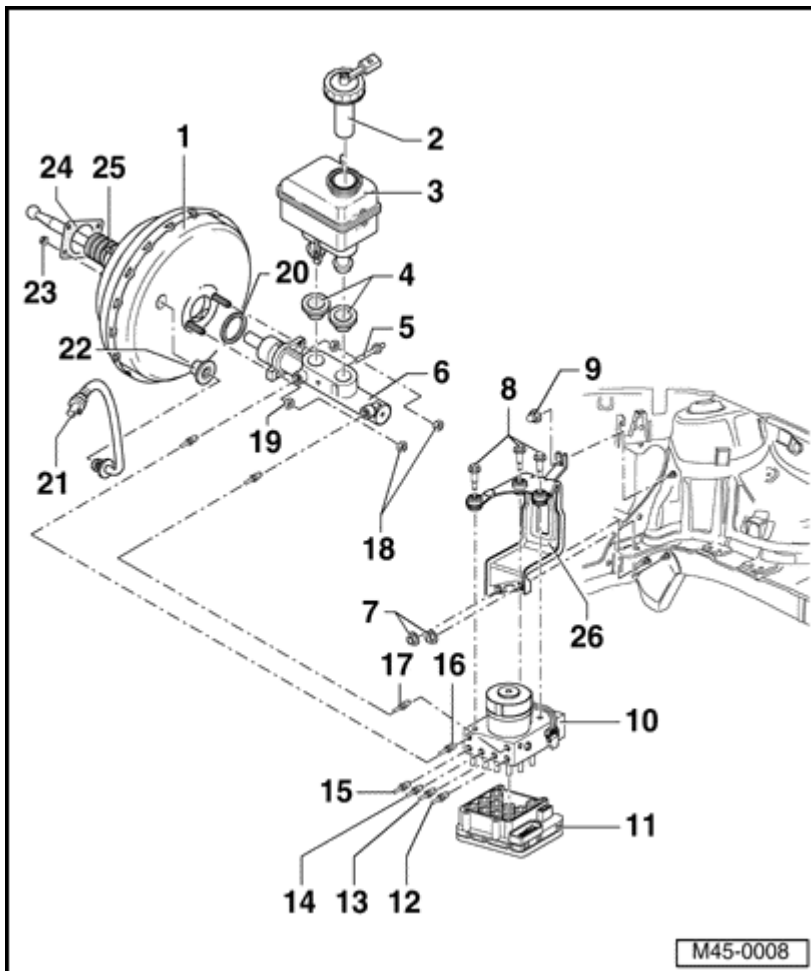
1 - Brake Booster

- ◆ For gasoline engines vacuum is taken from the intake manifold
- ◆ Diesel engines have a vacuum pump to create the required vacuum
- ◆ Functional check:
 - With engine switched off, depress brake pedal firmly several times (to exhaust vacuum in the unit)
 - Hold brake pedal with average foot pressure in brake position and start engine. If brake booster is functioning properly, brake pedal should give noticeably underfoot.
- ◆ If pedal does not give, replace brake booster

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Brake System

Hydraulic unit, brake booster/master cylinder, overview (Page 45-6)



- ◆ Check valve (in vacuum hose ⇒ [Page 47-33](#)
Functional check ⇒ [Page 47-33](#))
- ◆ Separating from brake pedal ⇒ [Page 46-39](#).
- ◆ removing and installing ⇒ [Page 47-37](#)

2 - Cap

3 - Brake fluid reservoir

4 - Plug

- ◆ Coat with brake fluid and press into reservoir

5 - Retaining pin

- ◆ Insert through brake master cylinder

6 - Brake master cylinder

- ◆ Cannot be repaired. If faulty, replace as complete unit

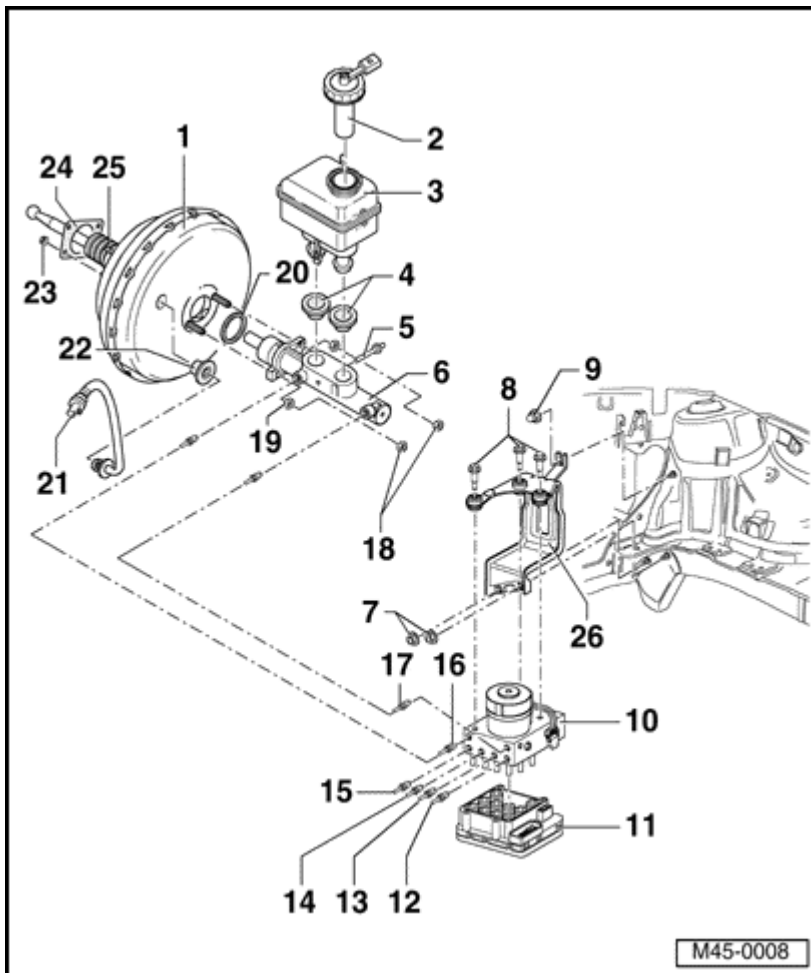
7 - Hex nut, self-locking 20 Nm (15 ft lb)

8 - Bolt, 8 Nm (70 in. lb)

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Brake System

Hydraulic unit, brake booster/master cylinder, overview (Page 45-7)



9 - Cap nut, 20 Nm (15 ft lb)

10 - ABS/EDL hydraulic unit

11 - ABS control module

- ◆ Control module connector is not disconnected before On Board Diagnostic (OBD)

12 - Connection for brake line

- ◆ Hydraulic unit to left front brake caliper ⇒ [Page 45-9](#)

13 - Connection for brake line

- ◆ Hydraulic unit to right rear wheel cylinder/ brake caliper ⇒ [Page 45-9](#)

14 - Connection for brake line

- ◆ Hydraulic unit to left rear wheel cylinder/ brake caliper ⇒ [Page 45-9](#)

15 - Connection for brake line

- ◆ Hydraulic unit to right front brake caliper ⇒ [Page 45-9](#)

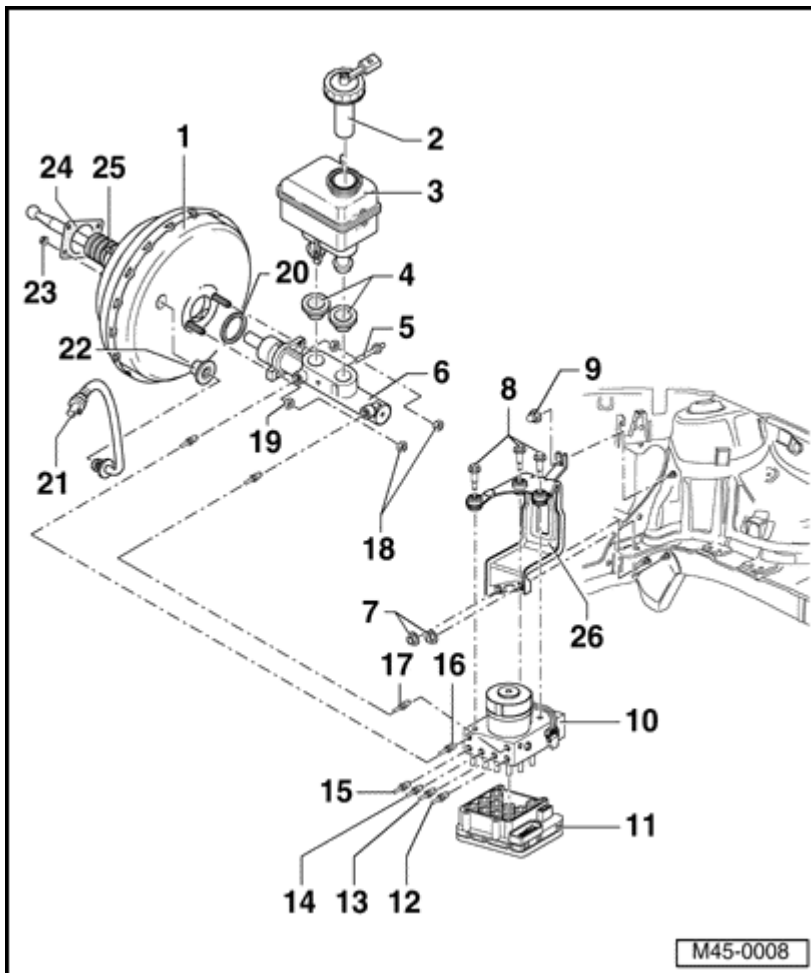
16 - Brake line

- ◆ Brake master cylinder/pressure rod piston circuit to hydraulic unit ⇒ [Page 45-9](#)

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Brake System

Hydraulic unit, brake booster/master cylinder, overview (Page 45-8)



17 - Brake line

- ◆ Brake master cylinder/floating piston circuit to hydraulic unit ⇒ [Page 45-9](#)

18 - Hex nut, self-locking, 20 Nm (15 ft lb)

19 - Hex nut, self-locking, 20 Nm (15 ft lb)

20 - Seal

- ◆ Always replace

21 - Vacuum hose

- ◆ Install in brake booster

22 - Sealing plug

23 - Hex nut, self-locking, 20 Nm (15 ft lb)

24 - Seal

- ◆ For brake booster

25 - Boot

- ◆ Ensure boot is properly seated or suction noises may be noticed

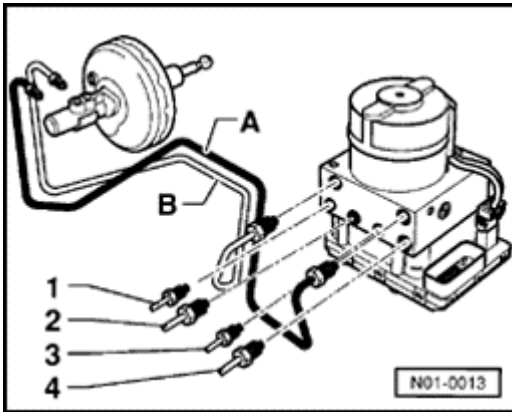
26 - Bracket

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Brake System

Hydraulic unit, brake booster/master cylinder, overview (Page 45-9)

Brake lines from brake master cylinder to hydraulic unit, connecting



A

Fig. 1 Vehicles with ABS

A- Secondary piston circuit

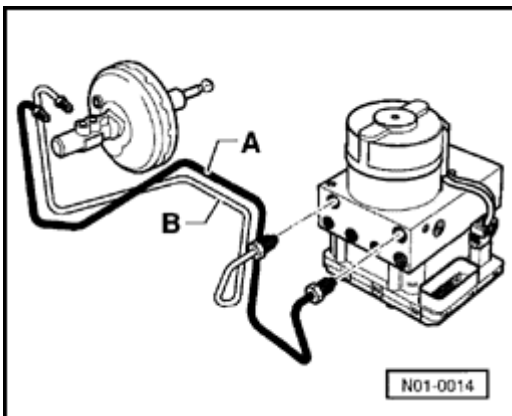
B- Primary piston circuit

1- Hydraulic unit to right front brake caliper

2- Hydraulic unit to left rear wheel cylinder/brake caliper

3- Hydraulic unit to right rear wheel cylinder/brake caliper

4- Hydraulic unit to left front brake caliper



A

Fig. 2 Vehicles with ABS/EDL

A- Secondary piston circuit

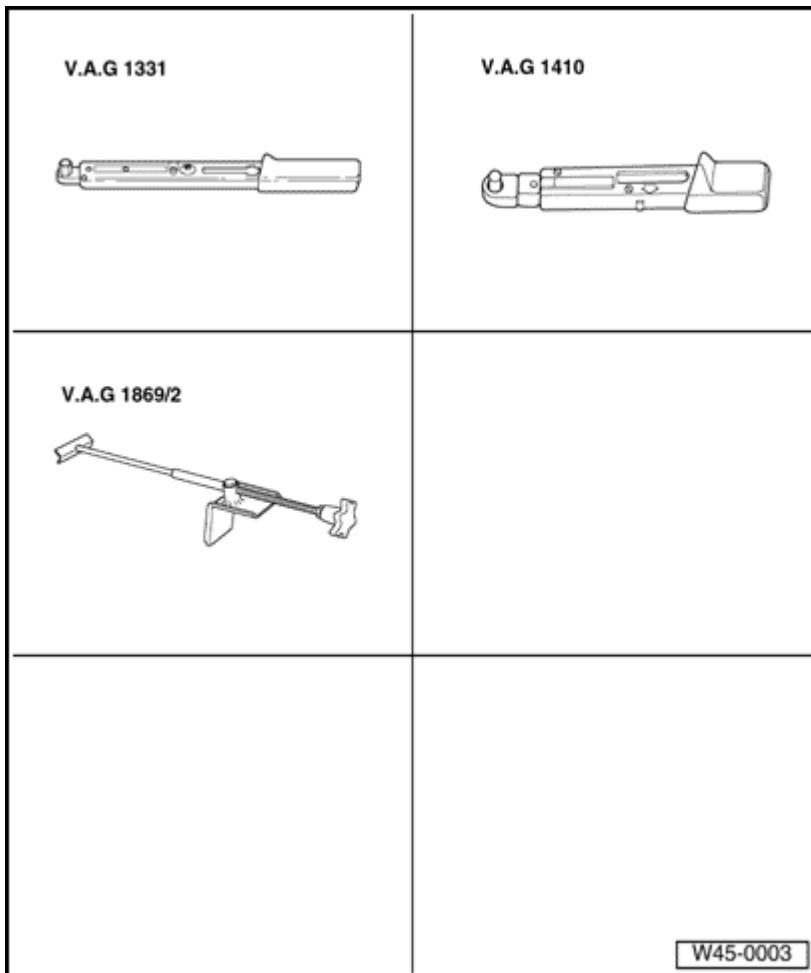
B- Primary piston circuit

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Brake System

Hydraulic unit, brake booster/master cylinder, overview (Page 45-10)

Hydraulic unit/ABS control module, removing and installing



Required special tools and equipment

- ◆ VAG 1331 Torque wrench or equivalent
- ◆ VAG 1410 Torque wrench or equivalent
- ◆ VAG 1869/2 Brake pedal depressor or equivalent

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Brake System

Hydraulic unit, brake booster/master cylinder, overview (Page 45-11)

Additional required information sources

- ♦ [Repair Manual, ABS, ABS/EDL On Board Diagnostic \(OBD\)](#)

Component location:

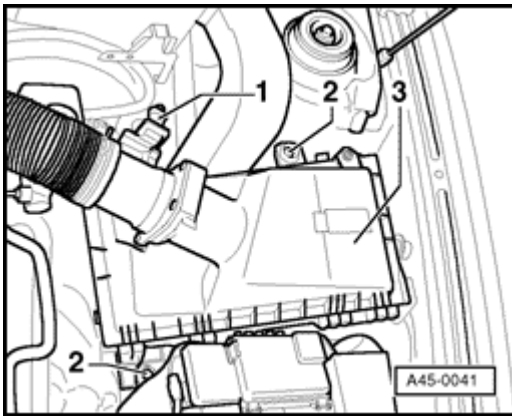
The ABS control module is bolted together with the hydraulic unit and is located in the engine compartment, left side.

CAUTION!

Brake lines in the area of the hydraulic unit should not be bent!

Removing

- For vehicles with a coded radio, obtain code.
- Disconnect battery.



A

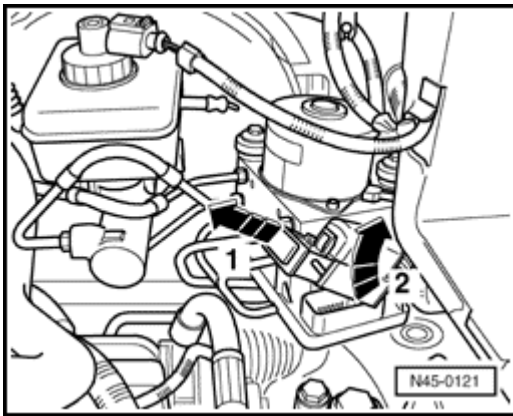
- Disconnect connector -1- of Mass Air Flow MAF sensor from air filter tube
- Remove bolts -2- at air filter -3- and move filter to left side.
- On vehicles with Diesel engines, remove relay panel above brake booster.

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Brake System

Hydraulic unit, brake booster/master cylinder, overview (Page 45-12)

- Remove as much brake fluid as possible from brake fluid reservoir using a brake bleeder bottle.
- Insert brake pedal depressor VAG 1869/2 or equivalent.
- Activate brake pedal booster with brake pedal depressor.
- Connect bleeder bottle hose to bleed screw of left front brake caliper and open bleed screw.
- Close left front bleed screw.



A

- Release ABS control module connector (arrow-1-) and remove (arrow -2-).
- Place plastic covering under control module and hydraulic unit. Do not use rags.

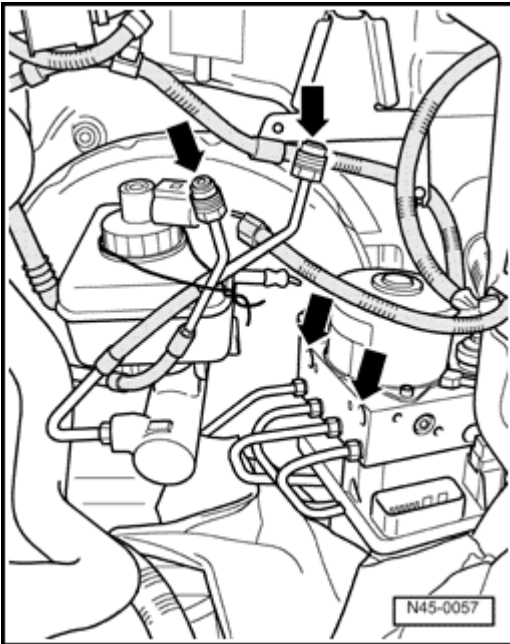
Notes:

Do not let brake fluid enter electrical connectors.

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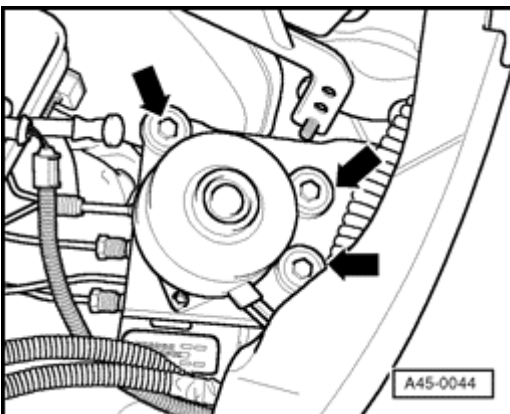
Brake System

Hydraulic unit, brake booster/master cylinder, overview (Page 45-13)



A

- Disconnect brake lines from hydraulic unit to brake master cylinder (arrows) and suspend with wire.
- Disconnect remaining brake lines from hydraulic unit.
- Seal brake lines and threaded holes (arrows) using plugs from repair kit, Part No. 1H0 698 311 A.



A

- Remove bolts from bracket for hydraulic unit (arrows).
- Remove hydraulic unit with control module.

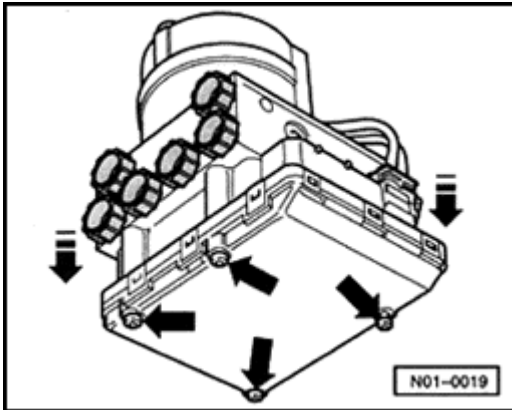
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Brake System

Hydraulic unit, brake booster/master cylinder, overview (Page 45-14)

ABS control module, removing from hydraulic unit

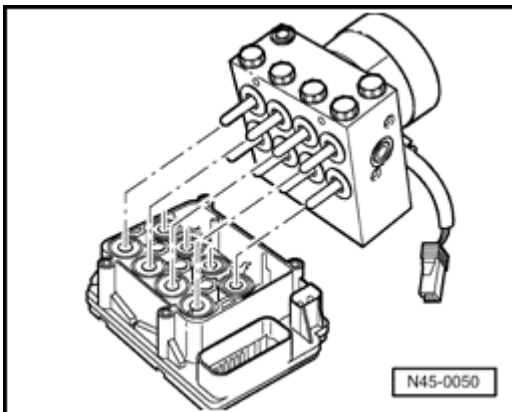
- Disconnect electrical connector for hydraulic pump motor from control module.



A

- Remove bolts (arrows) from control module and remove control module.

Notes:



A

- ◆ *When removing the control module make sure that the hydraulic unit valve dome does not contact the control module solenoid valves.*
- ◆ *Cover the control module magnet coils with a plastic cover. Do not use rags.*
- ◆ *After separating the control module and hydraulic unit use transportation protection for the valve dome.*

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Brake System

Hydraulic unit, brake booster/master cylinder, overview (Page 45-15)

Installing

Notes:

- ◆ *Only remove the sealing plugs on the new hydraulic unit just before installing the corresponding brake line.*
- ◆ *If the sealing plugs are removed from the hydraulic unit too early, brake fluid can escape. It can then no longer be guaranteed that the unit is sufficiently filled or adequately bled.*
- ◆ *When assembling the control module and hydraulic unit, be sure that the hydraulic unit valve dome does not come in contact with the control module solenoid valves.*
- Using new bolts, install control module to hydraulic unit. Do not tighten more than max. 4 Nm (35 in. lb).
- Re-connect electrical connector for hydraulic pump motor.
- Install ABS unit to bracket.

Notes:

Hand-tighten bolts at first to make attaching the individual brake lines easier.

- After tightening brake lines, tighten hydraulic unit.
- Continue installation in reverse order of removal.

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Brake System

Hydraulic unit, brake booster/master cylinder, overview (Page 45-16)

- Bleed brake system ⇒ [Page 47-26](#)
 - Enter radio code.
 - Code control module.
- ⇒ [Repair Manual, ABS, ABS/EDL On Board Diagnostic \(OBD\), Repair Group 01](#)

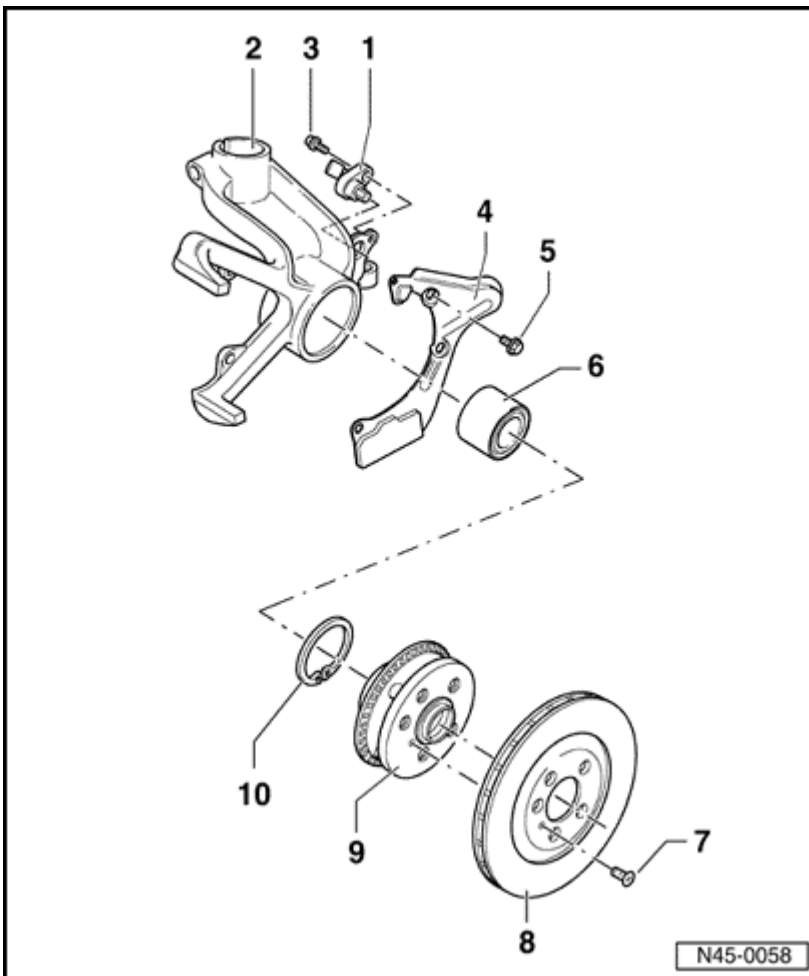
Tightening Torques:

Control module to hydraulic unit	max. 4 Nm (35 in. lb)
Hydraulic unit to bracket	8 Nm (70 in. lb)
Nut for brake master cylinder to brake booster	20 Nm (15 ft lb)
Brake lines at ABS unit:	
Thread M10 x 1	14 Nm (10 ft lb)
Thread M12 x 1	14 Nm (10 ft lb)
Nut to body	20 Nm (15 ft lb)
Cap nut to body	20 Nm (15 ft lb)

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Brake System

ABS system components for front axle, removing and installing (Page 45-17)



Notes:

Removing and installing ABS system components is identical for FS III and FN 3 brake calipers.

1 - ABS wheel speed sensor

- ◆ Before inserting sensor, clean mounting hole inner surface and coat with lubricant, G 000 650

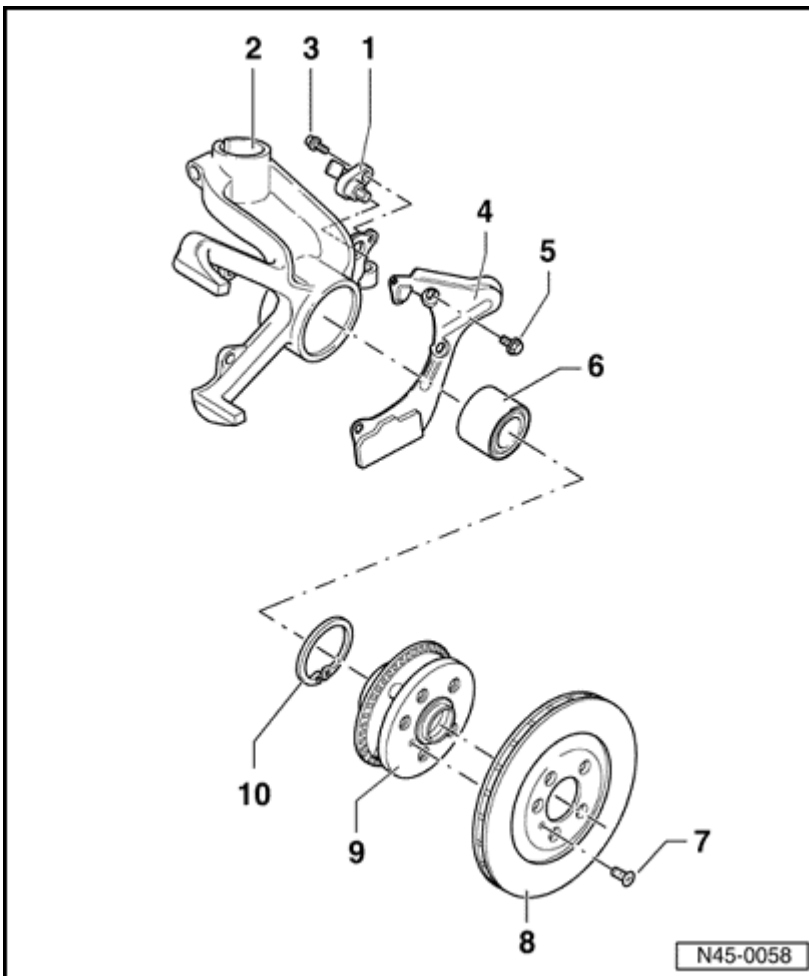
2 - Wheel bearing housing

3 - Hex socket head bolt, 8 Nm (70 in. lb)

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Brake System

ABS system components for front axle, removing and installing (Page 45-18)



4 - Splash shield

5 - Hex bolt, 7 Nm (62 in. lb)

6 - Wheel bearing

- ◆ Replace each time after removing
- ◆ Removing and installing

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)

7 - Screw

8 - Brake disc

9 - Wheel hub with ABS wheel speed sensor rotor

- ◆ Pressing out and in

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)

11 - Circlip

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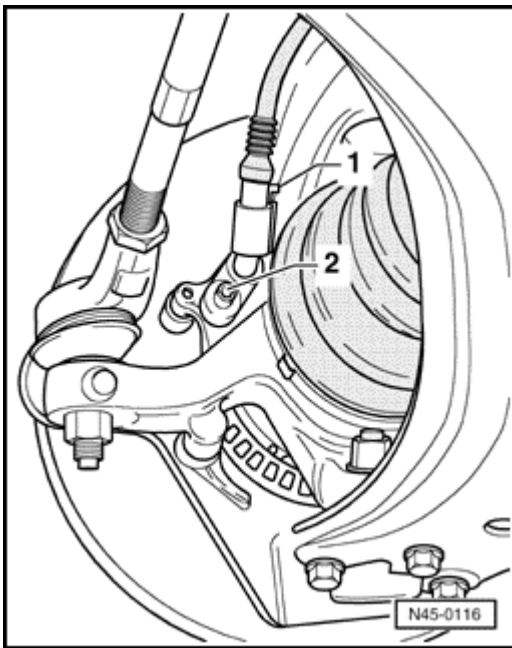
Brake System

ABS system components for front axle, removing and installing (Page 45-19)

Wheel speed sensor for front axle, removing and installing

Removing

- Raise vehicle.



A

- Disconnect wheel speed sensor wiring connector -1-.
- Remove bolt -2- from wheel bearing housing.
- Remove wheel speed sensor from wheel bearing housing.

Installing

- Before inserting speed sensor, clean mounting hole inner surface and coat sensor with lubricant G 000 650.
- Insert speed sensor into mounting hole in wheel bearing housing and tighten bolt to 8 Nm (70 in. lb).
- Connect wheel speed sensor wiring connector.
- Turn wheels fully to left and right lock and check clearance of speed sensor wiring.

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Brake System

ABS system components for front axle, removing and installing (Page 45-20)

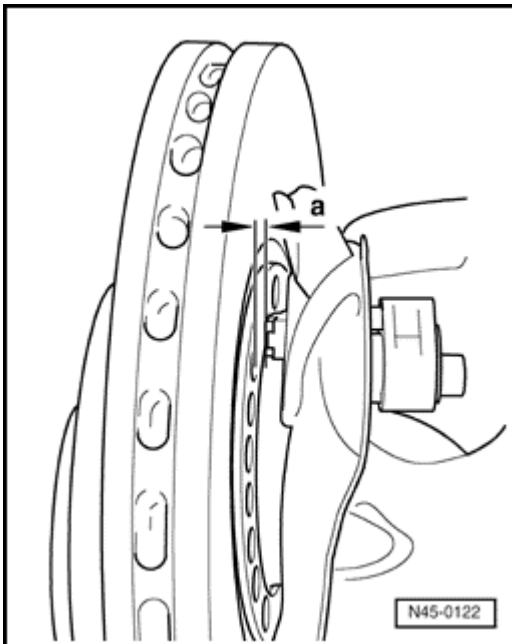
ABS wheel speed sensor rotor for front axle, checking

- Raise vehicle.
- Remove wheel.
- Rotate brake disc and check whether wheel speed sensor rotor is damaged or dirty.
- If rotor is damaged, remove wheel hub with rotor and replace.

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)

Rotor runout, checking

- Raise vehicle.
- Remove wheel.



A

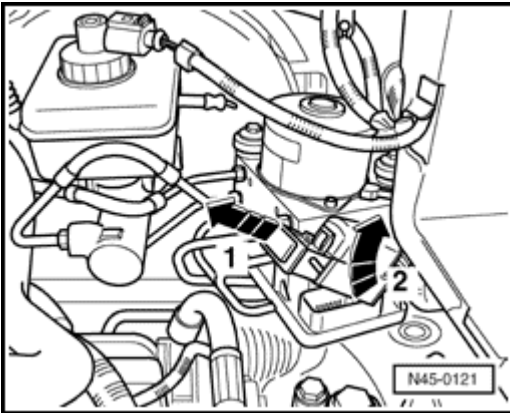
- Turn wheel hub and measure distance between rotor and speed sensor, -dimension a-, all around.
 - Dimension a = 0.3 mm (0.0118 in.)
- If the rotor is not true, remove wheel hub with rotor and replace.

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)

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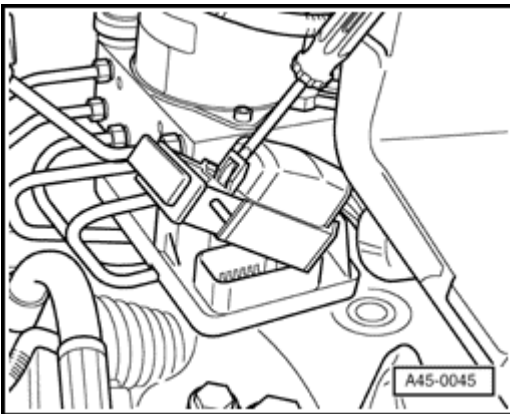
Brake System

ABS system components for front axle, removing and installing (Page 45-22)



A

- Release connector from control module (arrow -1-) and pull off (arrow -2-)



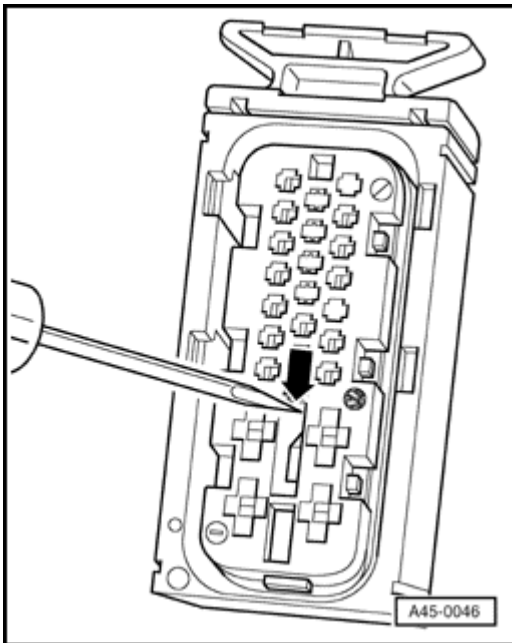
A

- Using a screwdriver, lift cover of multi-pin connector and remove.

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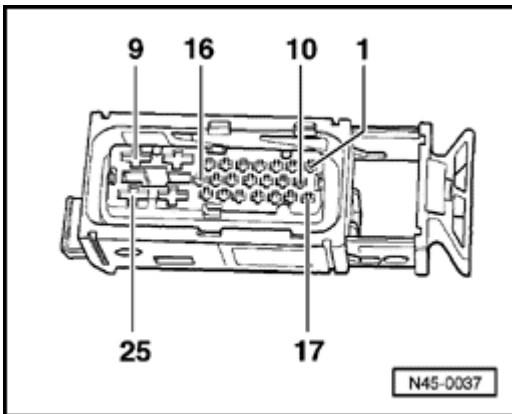
Brake System

ABS system components for front axle, removing and installing (Page 45-23)



A

- Using a small screwdriver, push purple latch in direction of arrow.



A

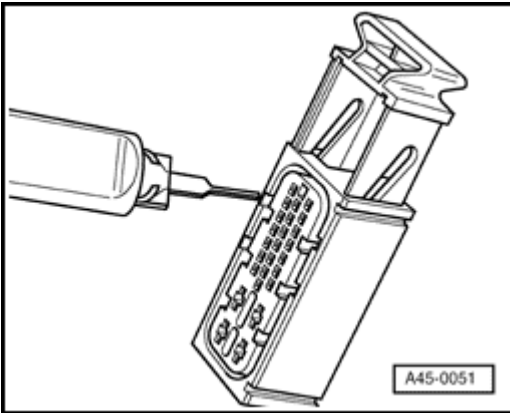
Pin assignment of harness connector T25 and ABS Control Module (w/EDL) -J104-

Pin	Connected to component:
19 + 20	Right Front ABS Wheel Speed Sensor -G45-
1 + 2	Left Front ABS Wheel Speed Sensor -G47-

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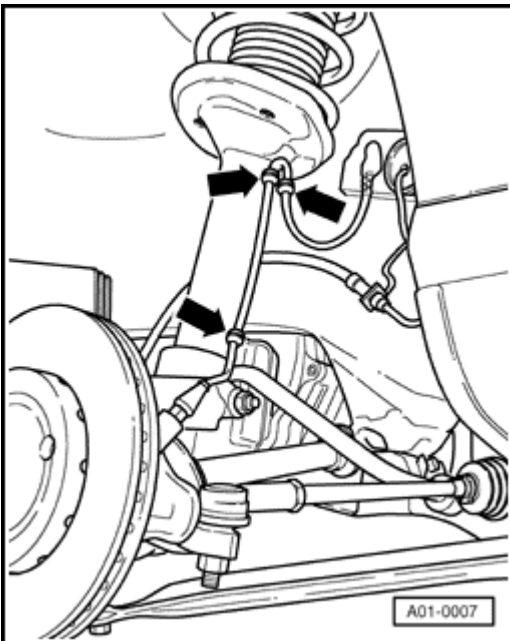
Brake System

ABS system components for front axle, removing and installing (Page 45-24)



A

- Using extractor tool from wiring harness repair set VAS 1978, push out applicable terminals.
- Disconnect wheel speed sensor wiring connector.
- Replace faulty wheel speed sensor wiring.
- Connect speed sensor to speed sensor wiring.



A

- Secure speed sensor wiring (arrows).

Notes:

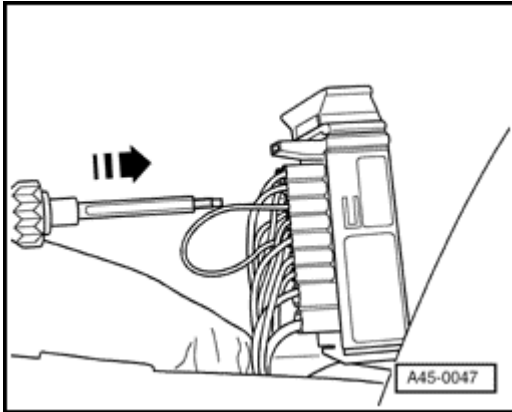
Make sure the wiring is not twisted in the wheel well.

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Brake System

ABS system components for front axle, removing and installing (Page 45-25)

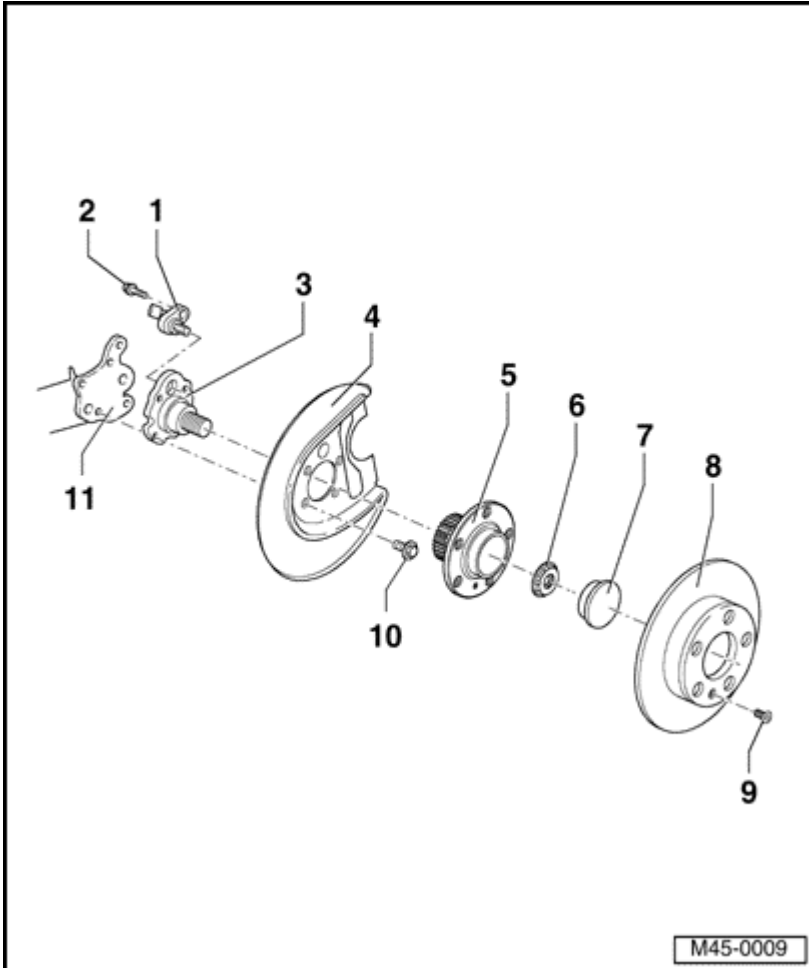
- Install pin connectors in connector housing.



A

- Using installation tool from VAS 1978, push individual wire seals to stop.
- Secure terminals by engaging purple latch and install cover of multi-pin connector.

ABS system components on rear axle, removing and installing



1 - ABS wheel speed sensor

- ◆ Before inserting sensor, clean mounting hole inner surface and coat with lubricant G 000 650

2 - Hex socket head bolt, 8 Nm (70 in. lb)

3 - Stub axle

4 - Splash shield

5 - Wheel hub with wheel bearing and speed sensor rotor

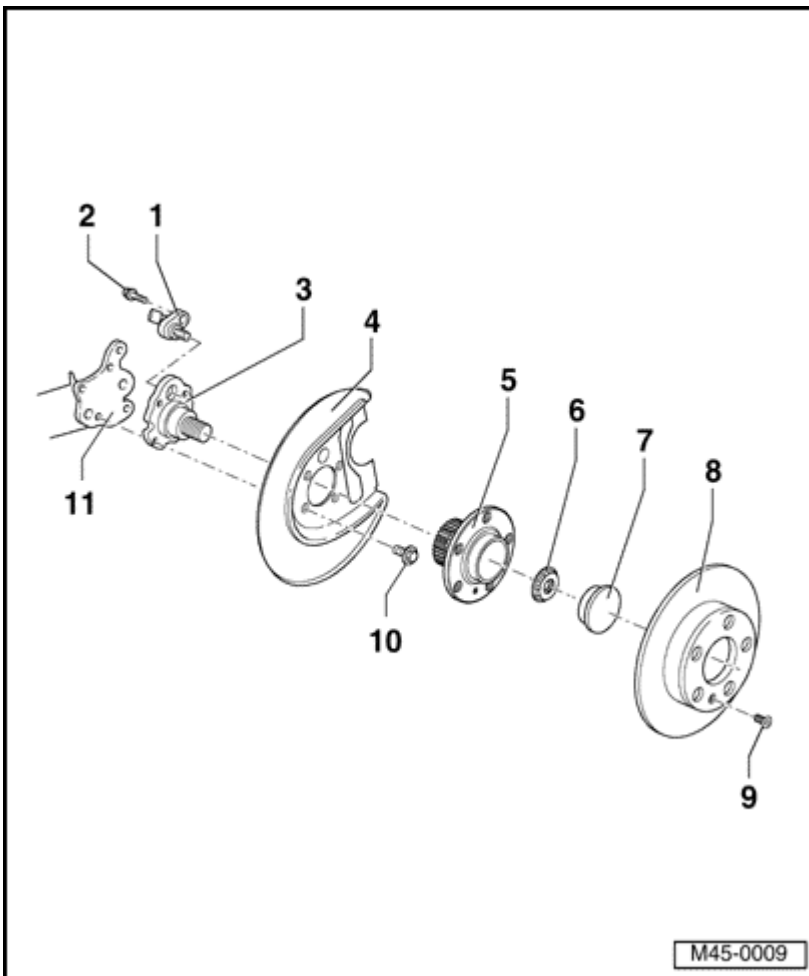
- ◆ Replace each time after disassembly
- ◆ Only replace complete
- ◆ Removing and installing

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 42](#)

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Brake System

ABS system components for front axle, removing and installing (Page 45-27)



6 - Self-locking 12-point nut, 175 Nm (129 ft lb)

- ◆ Replace each time after removing

7 - Cap

- ◆ Pressing off and driving in

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 42](#)

8 - Brake disc

9 - Screw

10 - Hex bolt, 60 Nm (44 ft lb)

- ◆ With dished spring

11 - Axle beam

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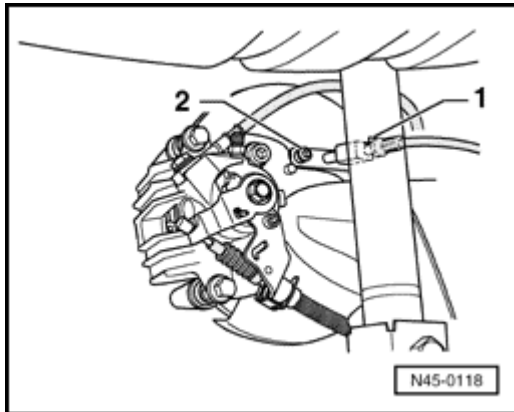
Brake System

ABS system components for front axle, removing and installing (Page 45-28)

Wheel speed sensor on rear axle, removing and installing

Removing

- Raise vehicle.



- Disconnect wheel speed sensor and speed sensor wiring connector -1-.
- Remove bolt -2- from stub axle.
- Pull ABS wheel speed sensor out of stub axle.

Installing

- Before inserting wheel speed sensor, clean mounting hole inner surface and coat speed sensor with lubricant G 000 650.
- Insert wheel speed sensor into hole in stub axle and tighten bolt to 8 Nm (70 in. lb).
- Connect wheel speed sensor to speed sensor wiring.

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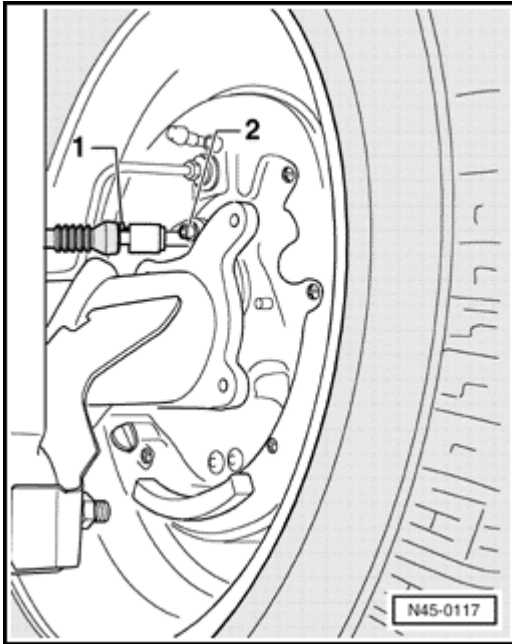
Brake System

ABS system components for front axle, removing and installing (Page 45-29)

Wheel speed sensor on rear axle (drum brakes), removing and installing

Removing

- Raise vehicle.



A

- Disconnect wheel speed sensor and speed sensor wiring connector -1-.
- Remove bolt -2- from stub axle.
- Pull ABS wheel speed sensor out of stub axle.

Installing

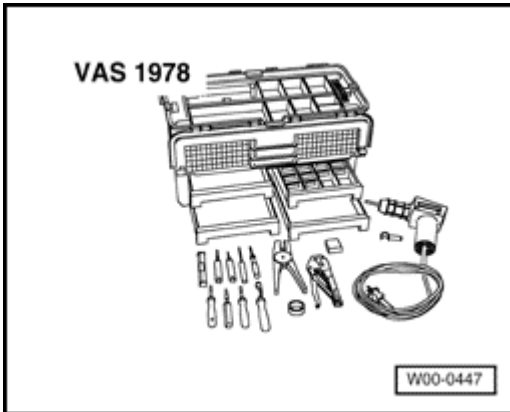
- Before inserting speed sensor, clean mounting hole inner surface and coat speed sensor with lubricant G 000 650.
- Insert speed sensor into hole in stub axle and tighten bolt to 8 Nm (70 in. lb).
- Connect speed sensor to speed sensor wiring.

Volkswagen Jetta, Golf, GTI 1999, 2000

Brake System

ABS system components for front axle, removing and installing (Page 45-30)

ABS wheel speed sensor wiring to rear axle, removing and installing



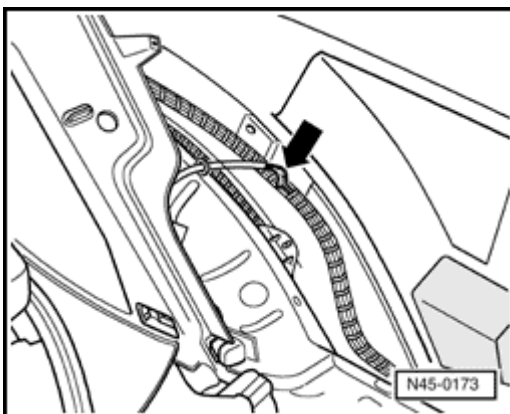
Required special tools

- ◆ VAS 1978 Wirng harness repair set

Removing

- Obtain radio code on vehicles with coded radio.
- Disconnect battery
- Disconnect wheel speed sensor wiring connector.
- Remove rear interior side panel trim.

⇒ [Repair Manual, Body-Interior, Repair Group 70](#)

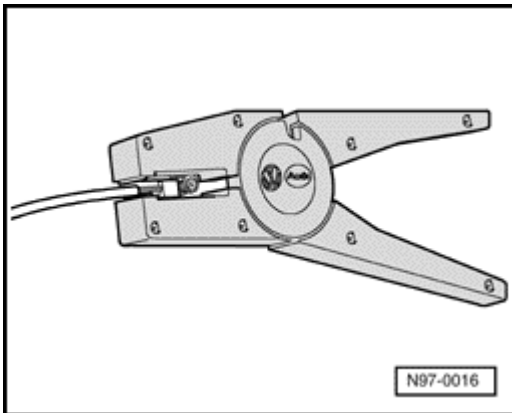


- Strip insulation (arrow) from shrink connection.
- Cut speed sensor wiring in front of spliced connection with stripping pliers from VAS 1978 wiring repair kit and remove faulty wiring.

Volkswagen Jetta, Golf, GTI 1999, 2000

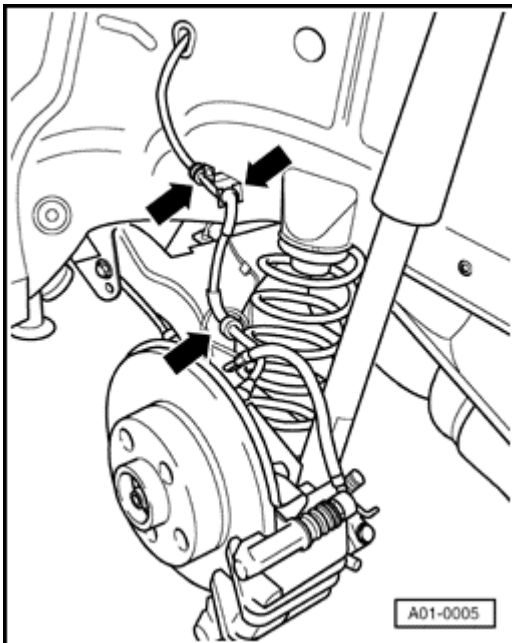
Brake System

ABS system components for front axle, removing and installing (Page 45-31)



A

- Strip insulation at wiring end by 15 mm (5/8 in.) using stripping pliers from repair kit and fold over stripped wire portion.
- install new speed sensor wiring.
- Connect wheel speed sensor to speed sensor wiring.



A

- Secure wheel speed sensor wire (arrows).

Notes:

Do not twist wires in the wheel well.

- Cut 2-pin connector at new speed sensor wire (if installed) using stripping pliers from repair kit.
- Strip 15 mm (5/8 in.) insulation off wire end and fold over stripped wire.

- Connect wheel speed sensor wire using correct connector from wiring repair kit VAS 1978.