

ENGINE

1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

00 TECHNICAL DATA**TECHNICAL DATA****Technical data**

Engine number --> Engine number

Engine data --> Engine data

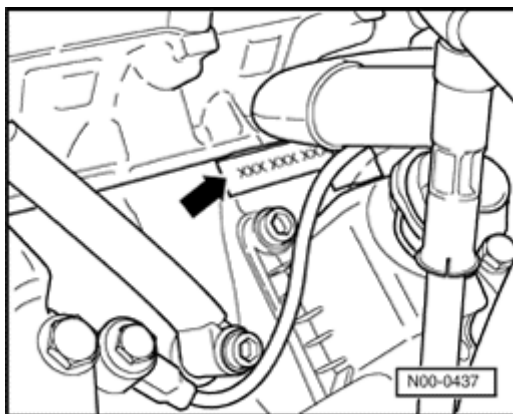
Engine number

Fig. 1: Locating Engine Identification

Courtesy of VOLKSWAGEN UNITED STATES, INC.

The engine number - **arrow** - ("engine code" and "serial number") are located on left of cylinder block.

In addition, a sticker with "engine code" and "serial number" is affixed to cylinder head cover.

The engine number consists of up to nine characters (alphanumeric). The first part (maximum 3 letters) represents the "engine code" , the second (six digit) is the "serial number". If more than 999,999 engines with the same engine code are produced, the first of the six characters is replaced with a letter.

The engine code is also included on the vehicle data plate.

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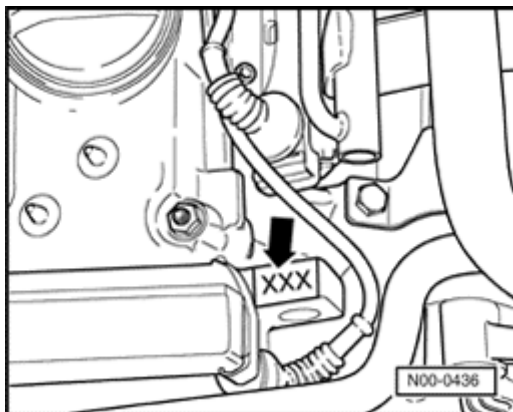


Fig. 2: Locating Engine Code

Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- The engine code - arrow - is also stamped at front engine lifting eyelet (visible after removing cover over fuel injectors).

Engine data

Code letters		AUG	AWM
Manufactured		05.00 --> 10.00	11.00 -->
Displacement	L	1.8	1.8
Output	kW/rpm	110/5700	125/5900
Torque	Nm/rpm	210/17504600	225/19505000
Bore	mm	81.0	81.0
Stroke	mm	86.4	86.4
Compression ratio		9.3	9.3
valves per cylinder		5	5
Recommended fuel (RON)		95 unleaded	95 unleaded
Fuel injection, ignition		Motronic ME7.5	Motronic ME7.5
Emission certification		ULEV	ULEV
Electronic Power Control (EPC) system		yes	yes
Detonation (knock) control		2 sensors	2 sensors
Oxygen sensor regulation		2 sensors	2 sensors
Catalytic converter		yes	yes
Exhaust gas recirculation (EGR)		no	no
Variable valve timing		yes	yes
Turbocharger		yes	yes
Secondary Air Injection (AIR) system		yes	yes

10 ENGINE, REMOVING AND INSTALLING

ENGINE, REMOVING AND INSTALLING

Engine, removing and installing

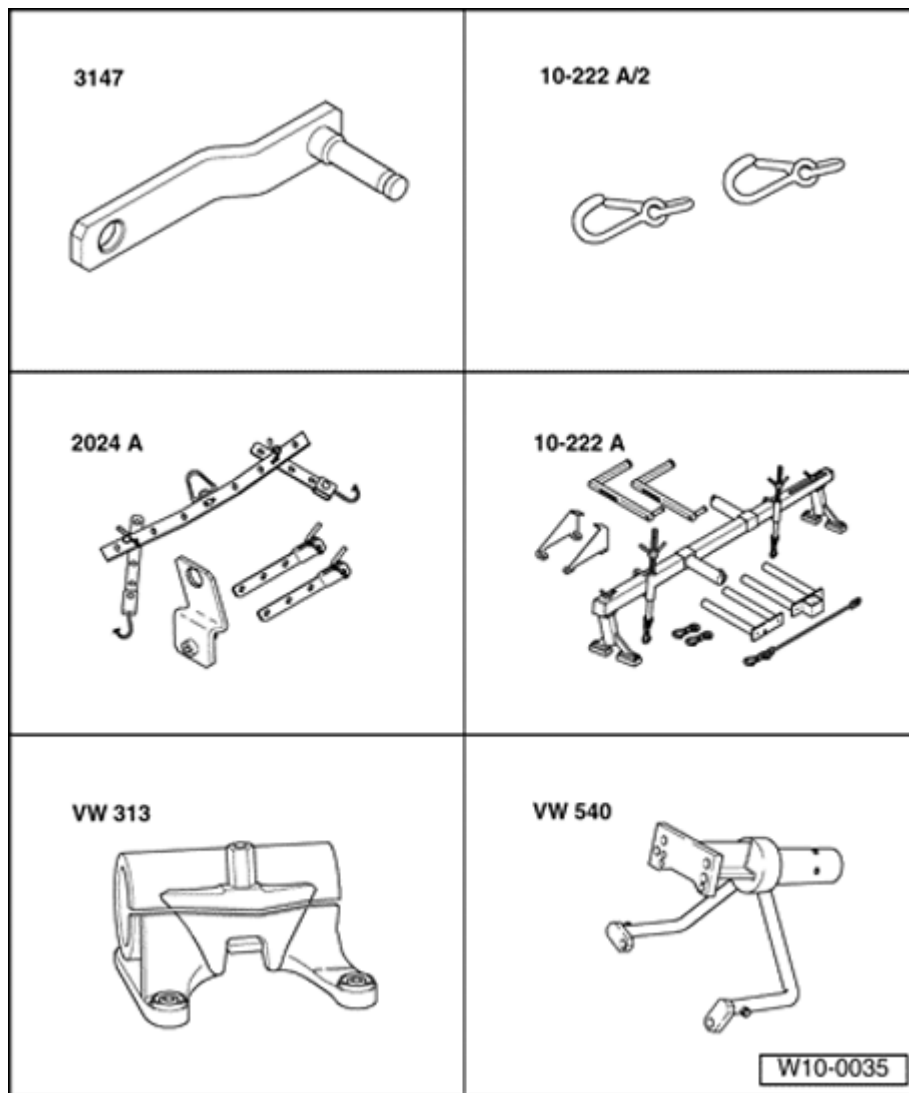


Fig. 3: Identifying Special Tools - Engine, Removing And Installing
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Engine support adapter 3147
- Additional hooks 10-222 A/2
- Engine Sling 2024 A
- Engine support bridge 10-222 A with bracket for engine 10-222 A/1
- Holding fixture VW 313
- Holding fixture VW 540

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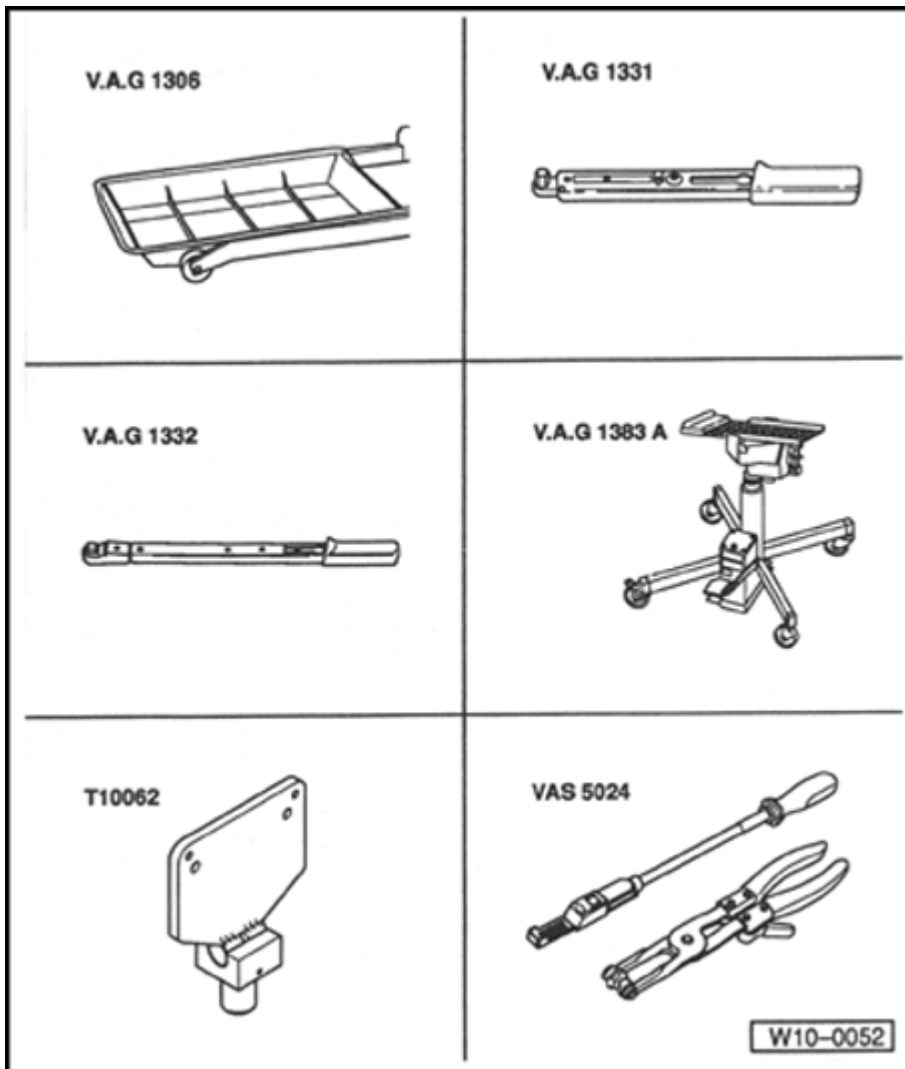


Fig. 4: Identifying Special Tools - Engine, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Drip tray V.A.G 1306
- Torque wrench 5-50 Nm V.A.G 1331
- Torque wrench 40-200 Nm V.A.G 1332
- Engine/gearbox jack V.A.G 1383 A
- Support T10062
- Spring-type clip pliers VAS 5024

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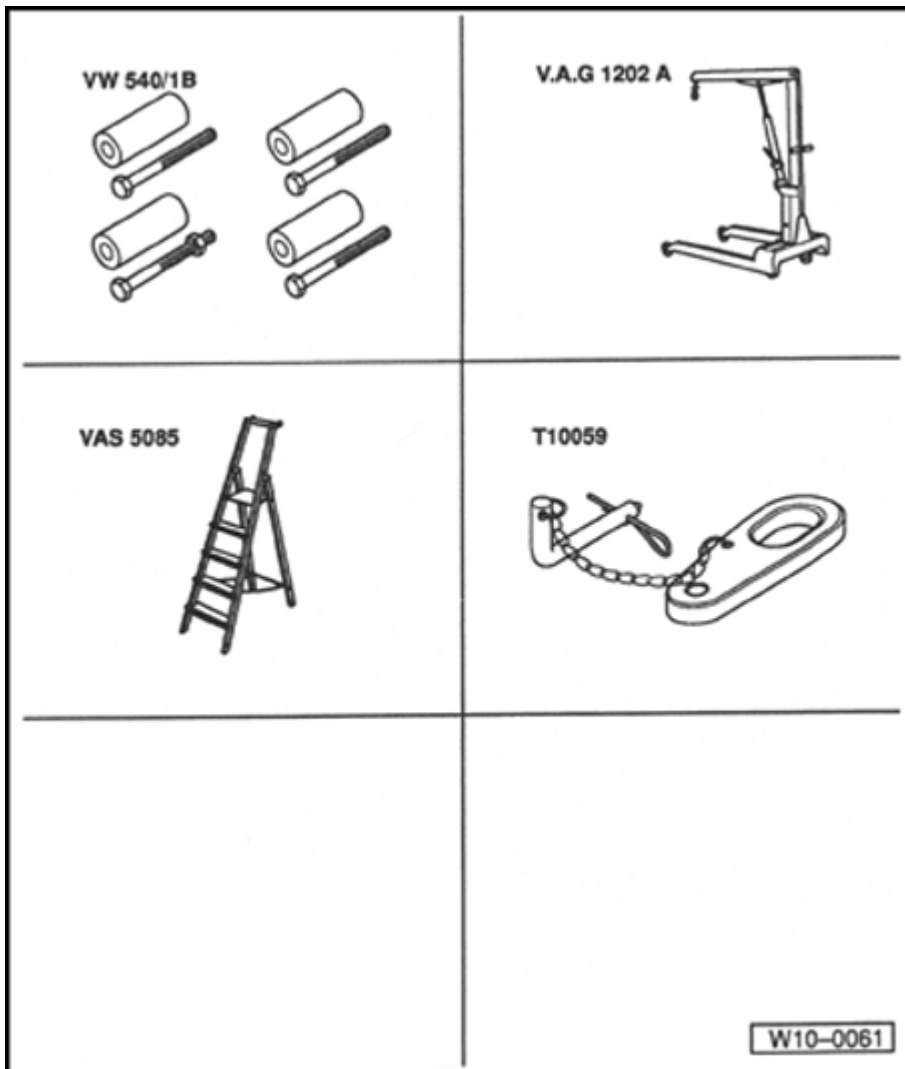


Fig. 5: Identifying Special Tools -- Engine, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Spacers VW 540/1B
- Shop crane V.A.G 1202 A
- Step ladder VAS 5085
- Shackle T10059
- Grease G 000 100 (Vehicles with manual transmission)
- Cable tie

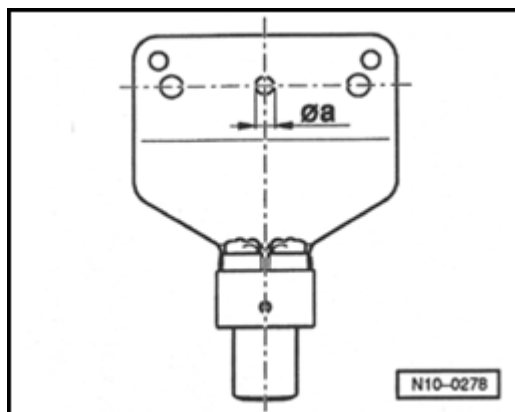


Fig. 6: Modifying Support T10062

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Changing mount T10062

- Drill an additional hole centered at height of lower bore if not yet present.
- $a = 8.5 \text{ mm}$

Notes on removing

CAUTION: When doing any repair work, especially in the engine compartment, pay attention to the following due to clearance issues:

- Route all the various lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum lines and hoses) and electrical wiring so that the original positions are restored.
- All cable ties opened or cut during engine removal must be reinstalled at the same locations.
- Ensure sufficient clearance to all moving or hot components.

NOTE:

- Engine is removed toward the front without transmission.

- First, check whether a coded radio is installed. If necessary, obtain the anti-theft coding.
- Switch off ignition and all electrical consumers.
- Disconnect battery Ground (GND) strap --> **27 - BATTERY, STARTER, GENERATOR, CRUISE CONTROL** .
- Remove noise insulation --> **50 BODY, FRONT** .
- Remove front bumper --> **63 BUMPER**
- Drain coolant --> **Cooling system, draining and filling** .
- Unbolt engine coolant expansion tank and lay aside.

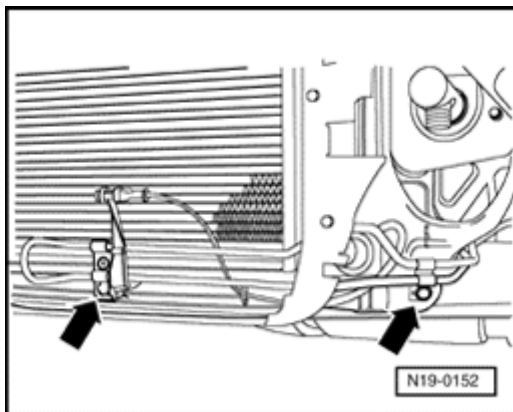


Fig. 7: Identifying Cooling Coil For Power Steering Fluid
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unbolt cooling coil for power steering fluid (arrows) and let hang free; Do not open hydraulic fluid circuit.

Vehicles with automatic transmission:

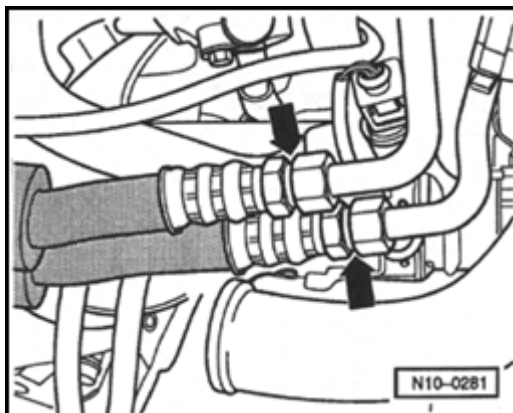


Fig. 8: ATF Lines Connections
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect ATF lines at connections - **arrows** - and catch escaping ATF.

Vehicles with air conditioning:

- Observe additional notes and repair work --> **Additional information and assembly work on vehicles with air conditioning** .

Continued for all vehicles:

- Remove lock carrier with attachments --> **50 BODY, FRONT**
- Remove air pipe between intercooler and throttle valve.
- Remove ribbed belt --> **Ribbed belt, removing and installing** .

- Unbolt power steering pump at bracket and lay to one side, hoses remain attached. --> **48 STEERING** .
- Remove air filter housing --> **Air filter, assembly overview 1.**
- Remove catalytic converter --> **Exhaust system components, removing and installing** by removing front exhaust pipe mounting at transmission.
- Remove starter --> **27 - BATTERY, STARTER, GENERATOR, CRUISE CONTROL**
- Observe the rules for cleanliness --> **Rules for cleanliness** .

CAUTION: Fuel supply line is under pressure! Wear eye protection and protective clothing in order to avoid injuries by contact with fuel. Before removing from hose connection wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

- Disconnect fuel supply- and fuel return lines at fuel distributor. --> **Fuel rail with fuel injectors, assembly overview**
- Seal the lines so that the fuel system is not contaminated by dirt etc.
- Separate the pressure hose of the Secondary Air Injection (AIR) Pump at the connecting tube.

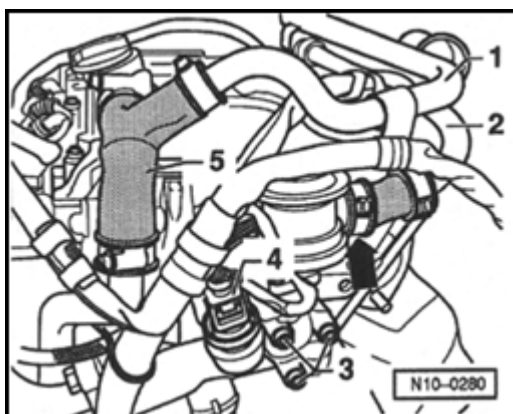


Fig. 9: Identifying Crankcase Ventilation Tube, Pressure Tube And Combination Valve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove crankcase ventilation tube - **1** -.
- Disconnect pressure tube - **2** - at combination valve - **arrow** - and unbolt from cylinder head cover.
- Unbolt combination valve with mount - **3** - and set aside.
- The vacuum hose remains attached.
- Disconnect connector - **4** - from coolant temperature sensor.
- Remove crankcase ventilation T-piece - **5** -.
- Remove the coolant hoses between the heater core and expansion tank.
- Disconnect electrical connectors and vacuum hoses from the engine as necessary.
- Remove Engine Control Module (ECM) --> **Engine Control Module (ECM), replacing** .

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- Disconnect engine wiring harness from central unit and lay aside.
- Pull off/disconnect all electrical connections as necessary from engine and lay aside.
- Remove connecting bolts for engine/transmission.

NOTE:

- Loosen, but do not remove one of the connecting bolts.

- Remove attaching nuts for right and left motor mounts.

Vehicles with automatic transmission

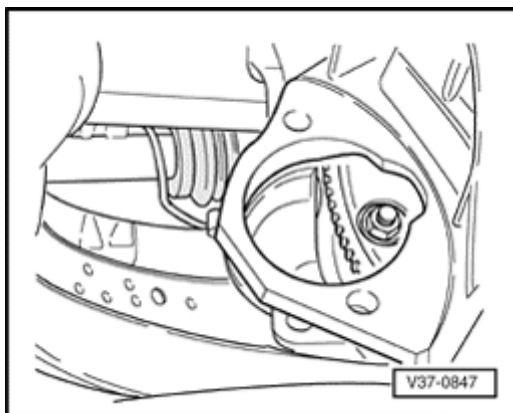


Fig. 10: Torque Converter-To-Drive Plate Screw

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect torque converter from drive plate (3 securing bolts).

NOTE:

- After removing engine, secure the torque converter to prevent it from falling out.

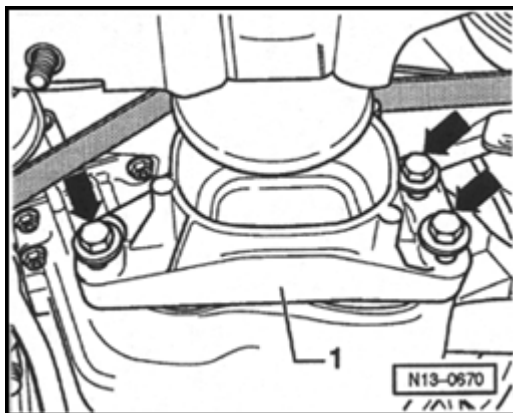


Fig. 11: Identifying Limit Stop

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unbolt stop - 1 - - arrows -.

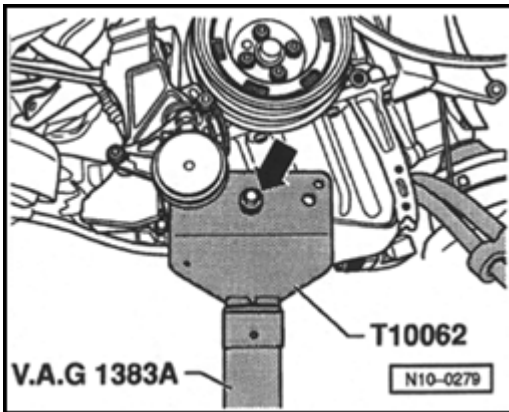


Fig. 12: Installing Modified Support T10062 In Center Hole At Right Side Of Oil Pan
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure changed mount T10062 in center hole at right side of oil pan.
- To do this, tighten original bolt with 3 original washers (each 4 mm thick) - **arrow** - to 30 Nm.
- Using support T10062 and engine/transmission jack V.A.G 1383 A , raise engine and transmission until the lower connecting bolts for engine/transmission can be removed.

NOTE:

- When lifting engine, make sure that the crankcase housing ventilation tube does not touch the bulkhead and that no lines are pinched.
- To do so, use the step ladder VAS 5085.

Continued for all vehicles

- Remove lower connecting bolts for engine/transmission.

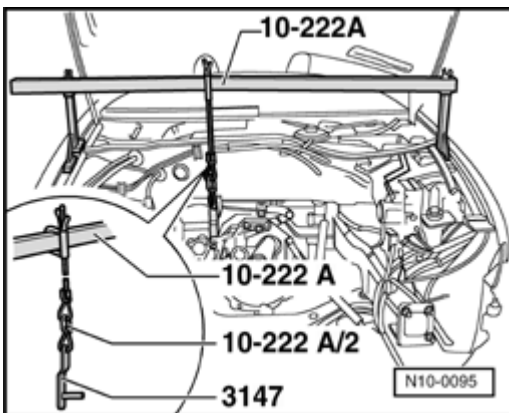


Fig. 13: Identifying Engine Support Bridge 10-222 And Engine Support Adapter 3147
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Attach engine support bridge 10-222 A with additional hooks 10-222 A/2 as shown.
- Hook in engine support adapter 3147 into bolt holes of transmission bell housing (shown in illustration with engine removed).

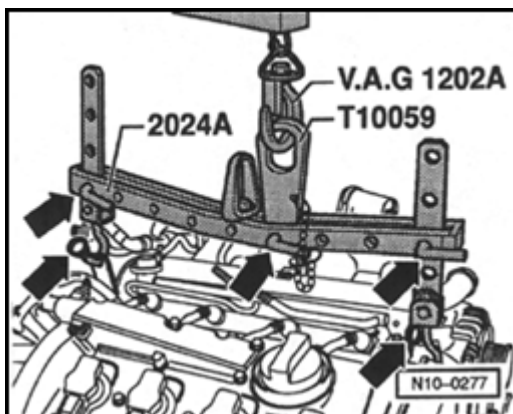


Fig. 14: Raise Slightly Using Engine Sling 2024 A Using Strap T10059

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Hook in engine sling 2024 A using strap T10059 as follows and raise slightly using workshop crane 1202 A :
- Belt pulley side: 2. Hole of rail in position 1
- Dual-mass flywheel side: 1. Hole of rail in position 8

CAUTION: Use securing pins at hooks and pins, to prevent damages to engine and vehicle.

NOTE:

- The peg positions on the carrying strap marked with 1 to 4 face the belt pulley.
- The bores in the hole rail are counted from the hook.

- Lift up engine with transmission far enough until the threaded pins of engine mounts clear the mounts.
- Lift up transmission at the same time using spindle of engine support bridge 10-222A.

NOTE:

- When lifting engine, make sure that the crankcase housing ventilation tube does not touch the bulkhead and that no lines are pinched.

- Remove upper engine/transmission bolt.
- Remove engine toward front.

NOTE:

- Engine must be guided carefully when lifting out, to prevent damage to the body.

Secure engine to assembly stand using holding fixture VW 540 and adapter set VW 540/1B when performing repair work.

Notes on installing

Installation is performed in reverse order. When doing this note the following:

CAUTION: When doing any repair work, especially in the engine compartment, pay attention to the following due to clearance issues:

- **Route all the various lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum lines and hoses) and electrical wiring so that the original positions are restored.**
- **Ensure sufficient clearance to all moving or hot components.**

Vehicles with manual transmission

- Check clutch release bearing for wear and replace if necessary.
- Lubricate clutch release bearing and splines of input shaft with thin coating of grease G 000 100 (do not lubricate guide sleeve for release bearing).
- A pilot needle bearing must be installed in the crankshaft in engines for vehicles with manual transmission. Install needle bearing if necessary --> **Pulling out and driving in needle bearings from crankshaft** .

Vehicles with automatic transmission

- Use original bolts when securing torque converter to drive plate See Parts Catalog.
- Before installing engine, turn torque converter and drive plate such that a hole is level with the starter installation opening.

Continued for all vehicles

- Make sure intermediate plate is properly seated on engine.
- Make sure centering sleeves for engine to transmission are installed in cylinder block. Install if necessary.
- Replace self-locking nuts for securing engine mount.
- Shake the engine in order to align the engine mounts free of stress.
- Install A/C compressor --> **87 - AIR CONDITIONING**
- Install power steering pump. --> **48 STEERING** .
- Install ribbed belt --> **Ribbed belt, removing and installing** .
- Install catalytic converter --> **Exhaust system components, removing and installing** .
- Reconnect all lines, hoses and connections that were disconnected for the removal sequence.
- For harness connectors and routing:.
- Install starter --> **27 - BATTERY, STARTER, GENERATOR, CRUISE CONTROL** .
- Install air filter housing --> **Air filter, assembly overview** .
- Install lock carrier with attachments --> **50 BODY, FRONT** .

- Fill with coolant --> Cooling system, draining and filling .
- Check headlight adjustment, correct if necessary --> 01 - MAINTENANCE .

Vehicles with automatic transmission

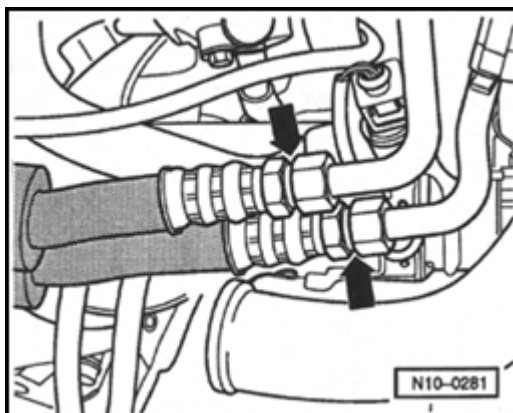


Fig. 15: ATF Lines Connections

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect ATF-lines - **arrows** - Automatic Transmission.
- Check ATF level, top up if necessary --> 5 Spd. Automatic Transmission 01V Front Wheel Drive - 37 AUTOMATIC TRANSMISSION - CONTROLS, HOUSING
- Set ECM adaptations as necessary --> Adapting functions and components

Continued for all vehicles

- Perform "Work steps required after reconnecting battery" --> 27 - BATTERY, STARTER, GENERATOR, CRUISE CONTROL .
- Check DTC memory of all control modules, repair all stored malfunctions, and erase DTC memory afterwards.
- After erasing DTC memory, readiness code must be generated again --> Adapting functions and components .
- Perform road test and check DTC memory of all control modules again.

NOTE:

- **Observe safety precautions that apply to road tests --> Safety precautions .**

Tightening torques

Bolted connections		Tightening torque
Bolts, nuts	M6	10 Nm
	M8	20 Nm
	M10	45 Nm
	M12	60 Nm

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Except for the following:

Catalytic converter to turbocharger	30 Nm
Front exhaust pipe to catalytic converter	25 Nm
Starter to transmission	65 Nm
Stop/torque bracket	30 Nm
Torque converter to drive plate	85 Nm

Front engine mount, assembly overview

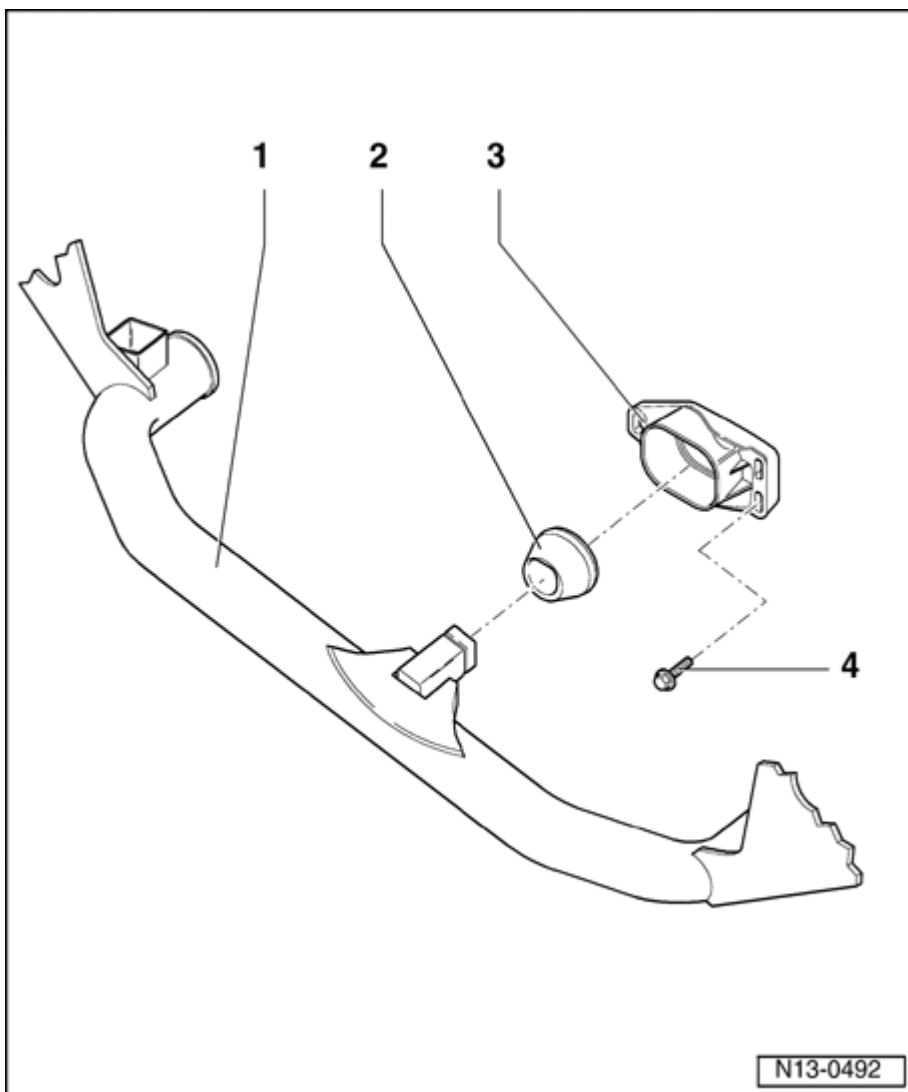


Fig. 16: Front Engine Mount

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Transverse pipe

- with torque bracket

2 - Bump stop

3 - Limit stop

- Rest it on the bump stop under its own weight and fasten the securing bolts

4 - 30 Nm

Additional information and assembly work on vehicles with air conditioning

CAUTION: The air conditioning refrigerant circuit must not be opened.

NOTE:

- **Do not bend or stretch lines or hoses as condenser and/or refrigerant lines/hoses may be damaged.**

To facilitate removal and installation of the engine without having to open the refrigerant circuit:

- Remove retaining clamp(s) from refrigerant lines.
- Remove ribbed belt --> **Ribbed belt, removing and installing** .
- Remove A/C compressor --> **87 - AIR CONDITIONING** .
- Secure A/C compressor and condenser to body so that the refrigerant lines/hoses are not stressed.

13 CRANK DRIVE

ENGINE, DISASSEMBLING AND ASSEMBLING

Engine, disassembling and assembling

Assembly overview --> **Assembly overview**

Ribbed belt for air conditioning compressor, removing and installing --> **Ribbed belt for air conditioning compressor, removing and installing**

Assembly overview

NOTE:

- **If large quantities of metal particles or other deposits (caused, for example, by partial seizure of the crankshaft or connecting rod damage) are found in the engine oil, the oil passages must be cleaned thoroughly and the oil cooler replaced in order to prevent further damage.**

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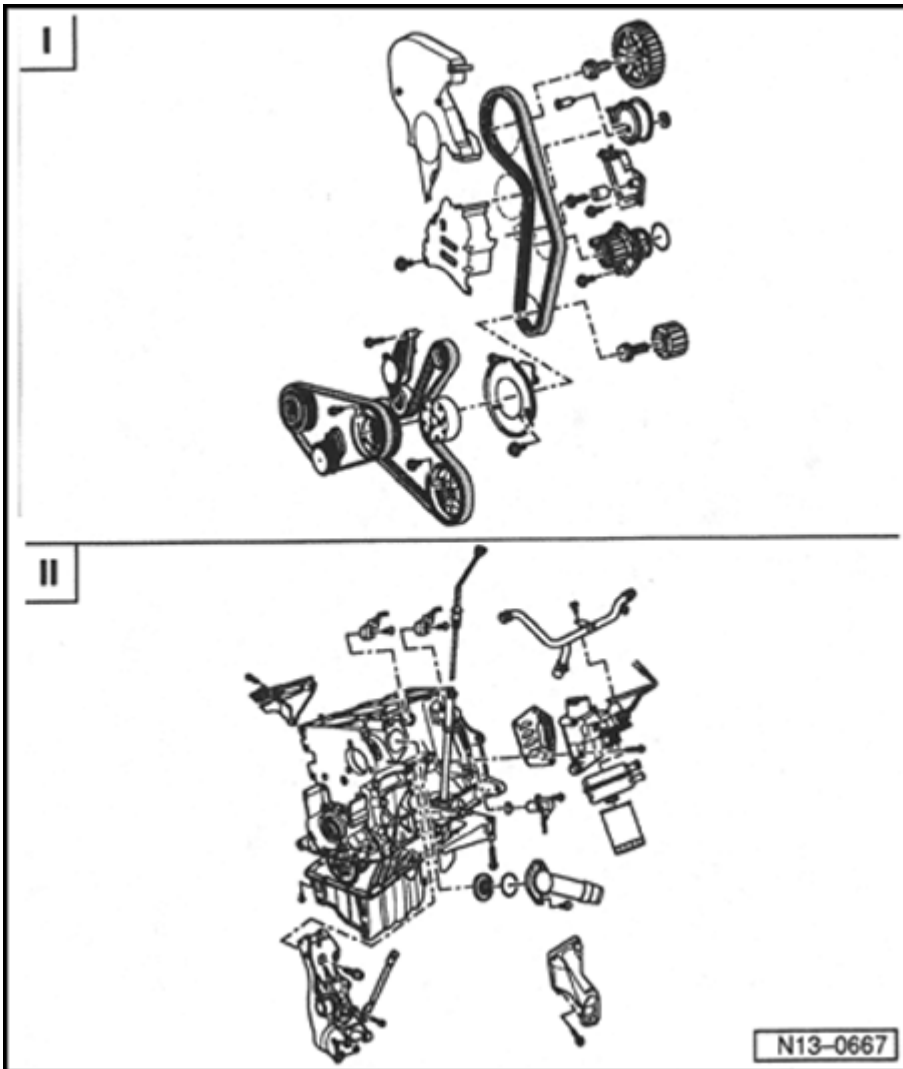


Fig. 17: Engine, Assembly Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Part I

NOTE:

- From 08.00 a new tensioning roller and toothed belt gear are being installed for toothed belt drive. Tensioning roller must be adjusted in order to tension toothed belt.

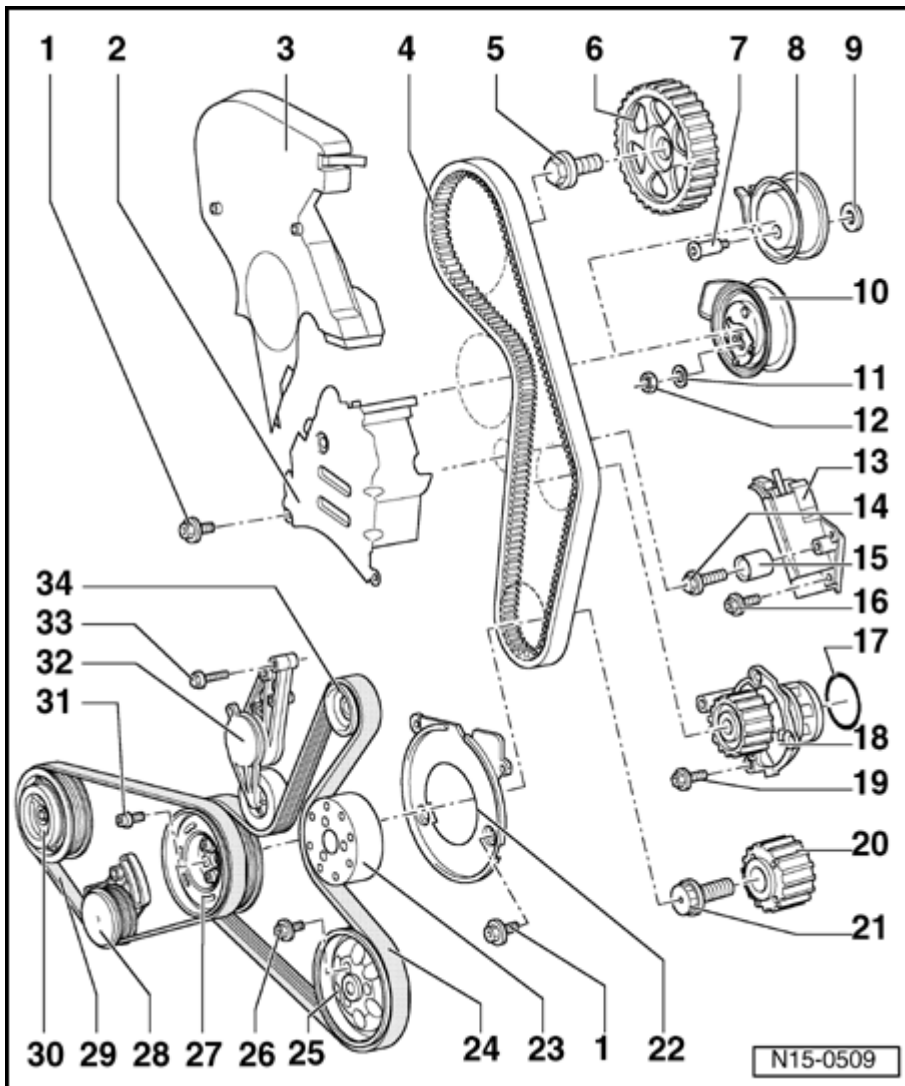


Fig. 18: Engine, Assembly Overview (Part I)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - 10 Nm

- Replace

2 - Toothed belt cover - center part

3 - Toothed belt cover - upper part

4 - Toothed belt

- Mark direction of rotation before removing
- Check for wear
- Do not kink

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- Removing and installing --> **Toothed belt, removing, installing and tensioning**

5 - 65 Nm

- Use retainer 3036 to loosen and tighten

6 - Camshaft sprocket

- Note installed position: Thin rib of camshaft gear points outward and TDC marking cylinder 1 is visible

7 - 27 Nm

8 - Tensioning roller

- up to 07.00: not adjustable

9 - Washer

10 - Tensioning roller

- from 08.00: must be adjusted using a pin wrench 3387

11 - Washer

12 - 27 Nm

13 - Tensioner for toothed belt

- up to 07.00: secure with pin T40011
- from 08.00: secure with a plate T10008

14 - 25 Nm

15 - Idler roller

16 - 15 Nm

17 - O-ring

- replace if damaged

18 - Coolant pump

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

19 - 15 Nm

20 - Crankshaft toothed belt sprocket

21 - 90 Nm plus $\frac{1}{4}$ turn (90 °)

- Replace
- The threads and shoulder must be free of oil and grease
- Use counter-holder 3415 to loosen and tighten

22 - Toothed belt cover - lower part

23 - Pulley

- for viscous fan clutch

24 - Ribbed belt

- Mark direction of rotation before removing
- Removing and installing --> **Ribbed belt, removing and installing**

25 - Pulley

- For power steering pump

26 - 25 Nm

27 - Belt pulley/harmonic balancer

- for 2 belt drives
- Only possible to install in one position - Bores are offset
- Note position when installing toothed belt --> **Toothed belt, removing, installing and tensioning ,**
Toothed belt, removing and installing, tensioning

28 - Ribbed belt tensioner

29 - Ribbed belt

- For air conditioning compressor
- Mark direction of rotation before removing
- Removing and installing --> **Ribbed belt for air conditioning compressor, removing and installing**

30 - Pulley

- For air conditioning compressor
- Securing A/C compressor - bracket - cylinder block --> **87 - AIR CONDITIONING**

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31 - 10 Nm plus $\frac{1}{4}$ turn (90 °)

- Replace

32 - Tensioner for ribbed belt

- To release tension on ribbed belt, swing using open-end wrench --> **Ribbed belt, removing and installing**

33 - 25 Nm

34 - Pulley

- For generator

Part II

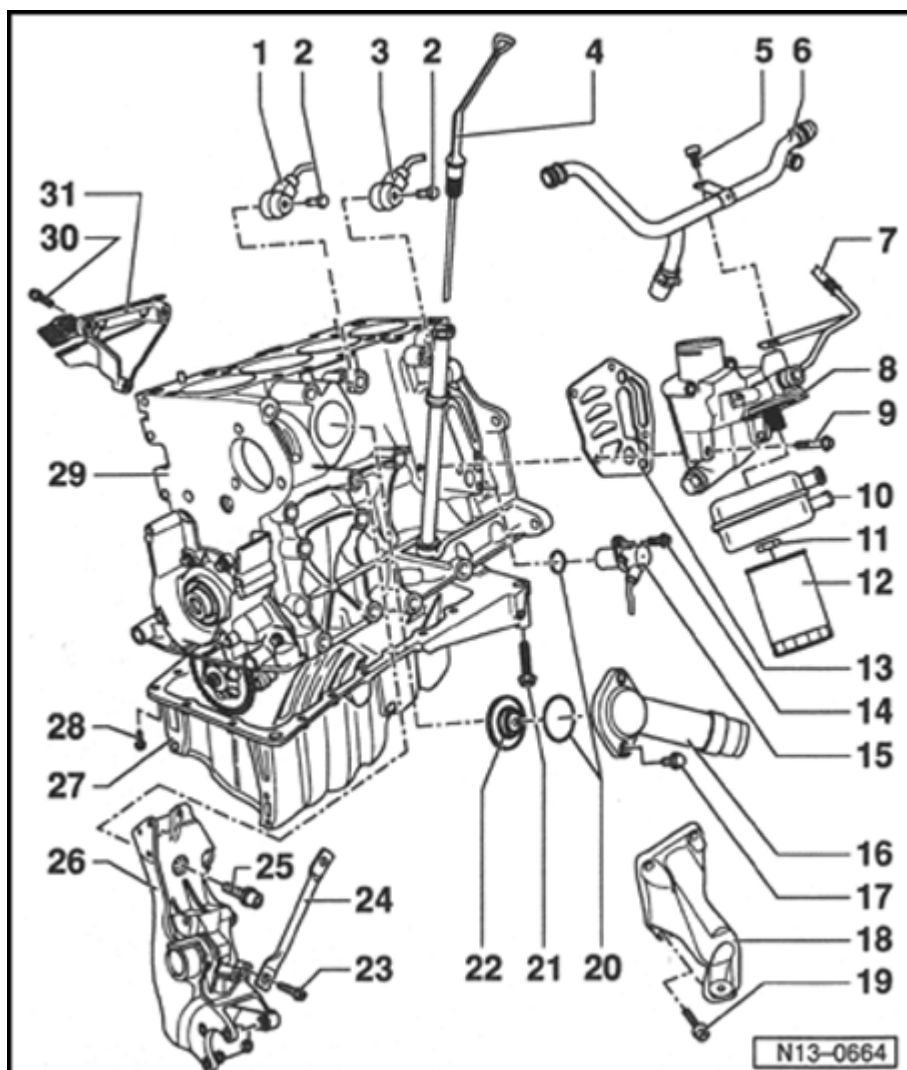


Fig. 19: Engine, Assembly Overview (Part II)**Courtesy of VOLKSWAGEN UNITED STATES, INC.**

1 - Knock Sensor (KS) 1 G61

2 - 20 Nm

- Tightening torque affects function of Knock Sensor (KS)

3 - Knock Sensor (KS) 2 G66

4 - Oil dipstick

- Oil level must not be above the max. mark!

5 - 20 Nm

6 - Lower coolant line

7 - Oil supply line

- To turbocharger

8 - Oil filter bracket

- Disassembling and assembling

9 - 15 Nm plus $\frac{1}{4}$ turn (90 °)

- Replace

10 - Oil cooler

- Coat contact surfaces to oil filter bracket outside seal with *AMV 188 100 02*
- Ensure sufficient clearance to surrounding components
- See note --> **Engine, disassembling and assembling**

11 - 25 Nm

12 - Oil filter housing

- Remove with tension strap
- Fasten by hand
- Observe installation instructions for oil filter

13 - Gasket

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14 - 10 Nm

15 - Engine speed (RPM) sensor G28

16 - Connecting piece

17 - 15 Nm

18 - Left engine mount

19 - 40 Nm

20 - O-ring

- Replace if damaged

21 - 45 Nm

22 - Coolant thermostat

- Checking: Heat up thermostat in water
- Opening begins approx. 86 ° C
- Opening lift min. 7 mm

23 - 20 Nm

24 - Brace

- Between bracket and intake manifold

25 - 50 Nm

- Observe tightening sequence **Tightening sequence, bracket to cylinder block**

26 - Bracket

- Removing and installing --> **Bracket, assembly overview**
- Viscous fan bearing, removing and installing --> **Viscous fan clutch bushing, removing and installing**

27 - Oil pan

- Removing and installing --> **Oil pan, removing and installing**

28 - 15 Nm

29 - Cylinder block

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- Sealing flanges and flywheel/drive plate, removing and installing --> **Sealing flanges and flywheel/drive plate, removing and installing**
- Crankshaft, removing and installing --> **Crankshaft, removing and installing**
- Piston and connecting rod, disassembling and assembling --> **Pistons and connecting rods, disassembling and assembling**

30 - 40 Nm

31 - Engine bracket, right

Ribbed belt for air conditioning compressor, removing and installing

Special tools, testers and auxiliary items required

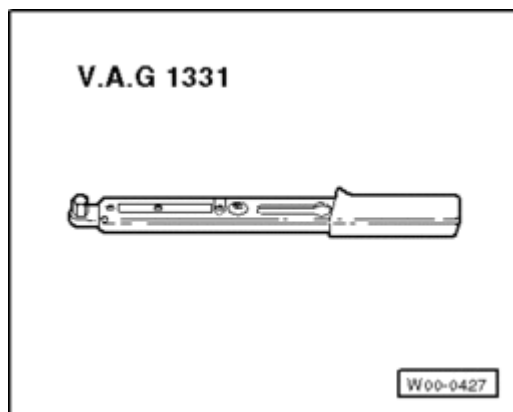


Fig. 20: Torque Wrench V.A.G 1331

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1331

NOTE:

- Before removing ribbed belt, note direction of rotation with chalk or felt-tip marker. When installing the ribbed belt, make sure it is seated correctly on the pulleys.

Removing

- Bring the lock carrier into service position --> **50 BODY, FRONT** .

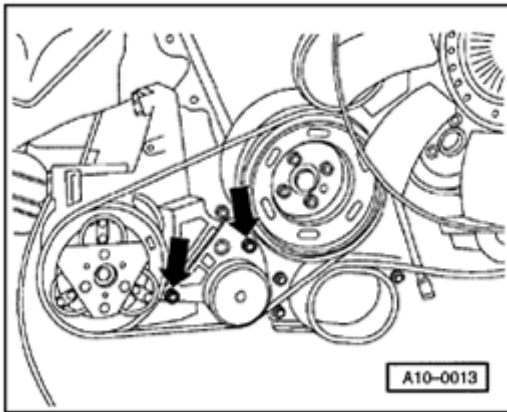


Fig. 21: Locating Securing Bolts For Ribbed Belt Tensioner For A/C Compressor
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen bolts of the air conditioning compressor ribbed belt tensioner and take off ribbed belt.

Installing

- Set ribbed belt onto A/C compressor.

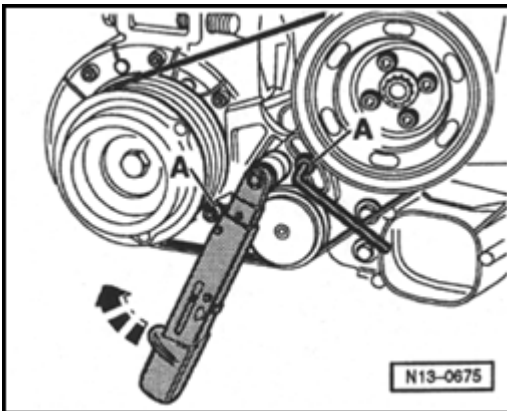
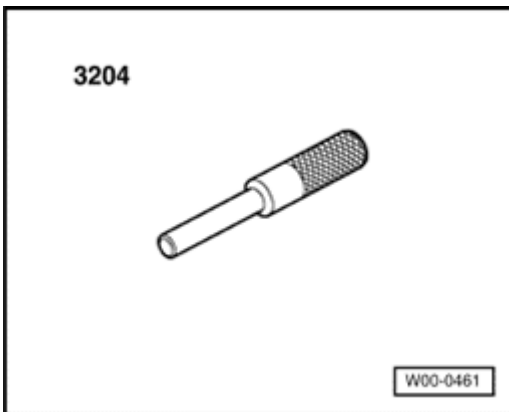


Fig. 22: Tightening Belt Tensioner
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place torque wrench in 7 o'clock position (30 ° from vertical) and tighten belt tensioner to 30 Nm. Hold torque wrench securely and tighten bolts - A - to 20 Nm.

Ribbed belt, removing and installing

Special tools, testers and auxiliary items required

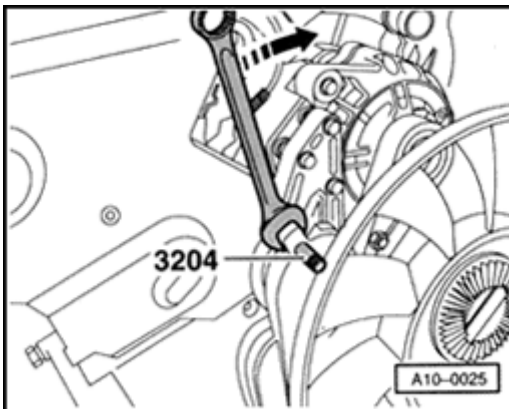
**Fig. 23: Drift 3204**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drift 3204

Ribbed belt, removing and installing

- For vehicles with A/C system, remove ribbed belt for A/C compressor --> **Ribbed belt for air conditioning compressor, removing and installing** .
- Mark rotational direction of ribbed belt.

**Fig. 24: Releasing Tension On Ribbed Belt Tensioner**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Swing tensioner in direction of arrow to relieve tension on ribbed belt.
- Secure tensioner using drift 3204.
- Take off ribbed belt or set it in place.

NOTE:

- **When installing the ribbed belt ensure that the belt is seated correctly in the belt pulleys.**

- Start engine and check belt running.

SEALING FLANGES AND FLYWHEEL/DRIVE PLATE, REMOVING AND INSTALLING

Sealing flanges and flywheel/drive plate, removing and installing

Assembly overview --> [Assembly overview](#)

Seal for crankshaft - belt pulley side, replacing --> [Crankshaft seal \(ribbed belt side\), replacing](#)

Front sealing flange, removing and installing --> [Front sealing flange, removing and installing](#)

Removing and installing drive plate --> [Drive plate, removing and installing](#)

Assembly overview

NOTE:

- Servicing clutch: --> 5 Spd. Manual Transmission 012 / 01W - [30 - MANUAL TRANSMISSION - CLUTCH](#)

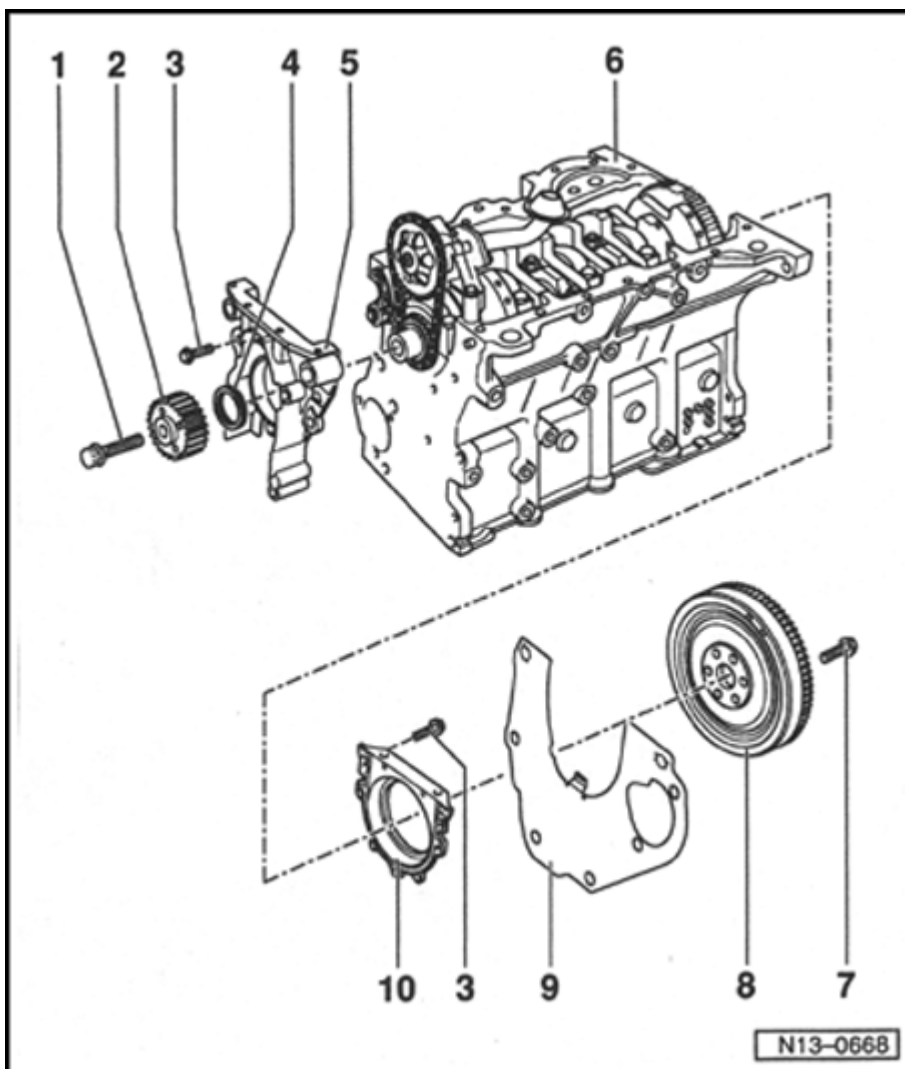


Fig. 25: Sealing Flanges And Flywheel/Drive Plate, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - 90 Nm plus $\frac{1}{4}$ turn (90 °)

- Replace
- Use counter-holder 3415 to loosen and tighten
- The threads and shoulder must be free of oil and grease

2 - Crankshaft toothed belt sprocket

3 - 15 Nm

4 - Oil seal

- Replace --> **Crankshaft seal (ribbed belt side), replacing**
- PTFE seal: Do not additionally oil or grease sealing lip of sealing ring

5 - Sealing flange, front

- Must be located on dowel sleeves
- Removing and installing --> **Front sealing flange, removing and installing**
- To remove and install, remove oil pan

6 - Cylinder block

- Crankshaft, removing and installing --> **Crankshaft, removing and installing**
- Pistons and connecting rods, disassembling and assembling --> **Pistons and connecting rods, disassembling and assembling**

7 - 60 Nm plus $\frac{1}{4}$ turn (90 °)

- Replace

8 - Flywheel/drive plate

- To remove and install flywheel, secure using flywheel retainer 3067
- Drive plate, removing and installing --> **Drive plate, removing and installing**

9 - Intermediate plate

- Must be located on dowel sleeves
- Do not damage or bend when doing assembly work

10 - Sealing flange with sealing ring

- Replace only as complete unit
- To install, use provided support sleeve
- To remove and install, remove oil pan
- Do not additionally oil or grease sealing lip of sealing ring
- Before installing, remove oil remains from crankshaft journal with a clean cloth
- Support sleeve may only be removed after the sealing flange has been slid onto the crankshaft pin.

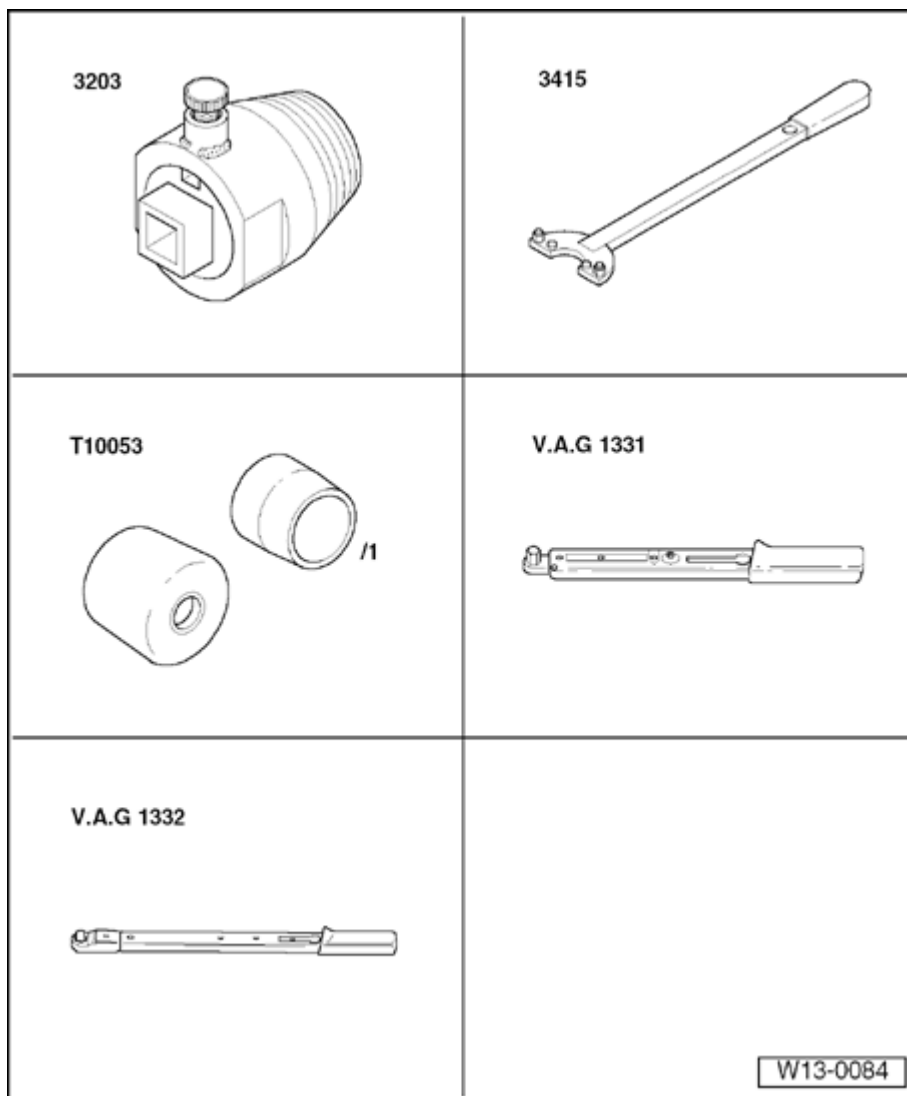
Crankshaft seal (ribbed belt side), replacing

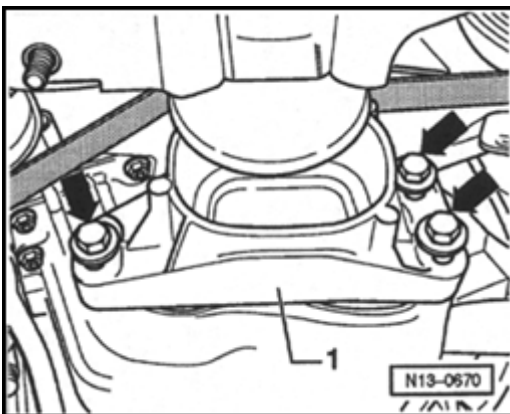
Fig. 26: Identifying Special Tools - Replacing Crankshaft Seal, Ribbed Belt Side
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Seal remover 3203
- Counter Support 3415
- Assembly tool T10053
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332

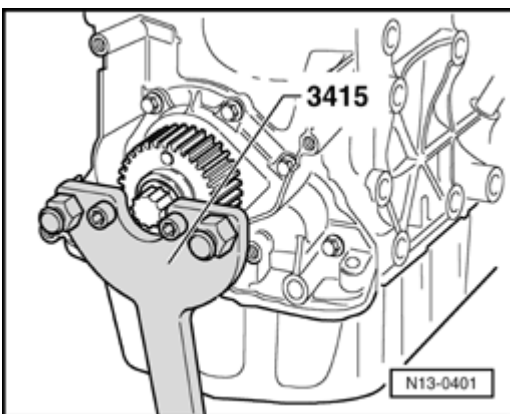
Crankshaft seal, removing

- Remove ribbed belt and tensioner --> **Ribbed belt, removing and installing** .
- Toothed belt, removing --> **Toothed belt, removing, installing and tensioning** .

**Fig. 27: Identifying Limit Stop**

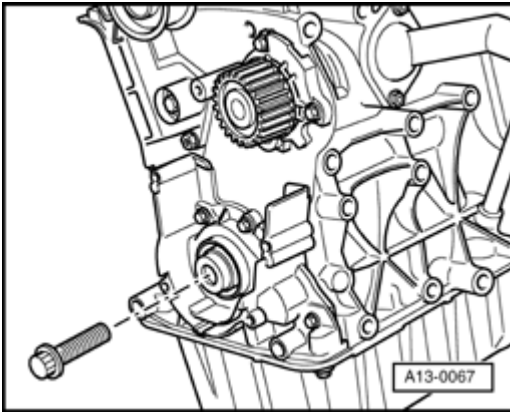
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove stop - 1 - - arrows - .

**Fig. 28: Counter-Holding Crankshaft Toothed Belt Sprocket With 3415**

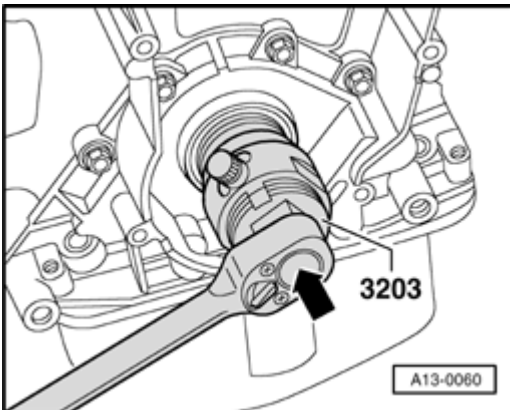
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove toothed belt crankshaft sprocket. Secure toothed belt gear using Counter Support 3415.

**Fig. 29: Identifying Center Bolt & Crankshaft**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- To guide seal puller, thread center bolt into crankshaft by hand until stop.
- Remove inner portion of seal puller 3203 nine rotations (approx. 20 mm) from outer portion and secure with knurled-head bolt.

**Fig. 30: Identifying Special Tool - Seal Puller 3203**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Grease threaded head of seal puller 3203 , position and install into oil seal as far as possible with forced pressure.
- Loosen knurled bolt and turn inner portion against crankshaft until oil seal is pulled out.

Crankshaft seal, installing

NOTE:

- **Use of PTFE sealing rings (Distinguishing feature: Without ring spring, sealing lip designed wider). The sealing lip of this sealing ring may not be oiled or greased.**

- Before installing, remove oil remains from end of crankshaft with a clean cloth.

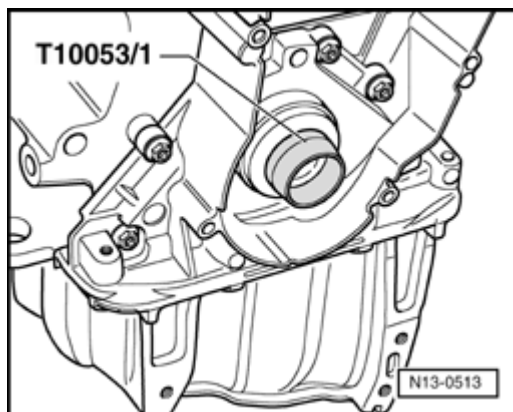


Fig. 31: Identifying Guide Sleeve From Assembly Tool T10053 Installed On Crankshaft Journal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position guide sleeve T10053/1 on crankshaft pin.
- Slide sealing ring over guide sleeve onto crankshaft pin.

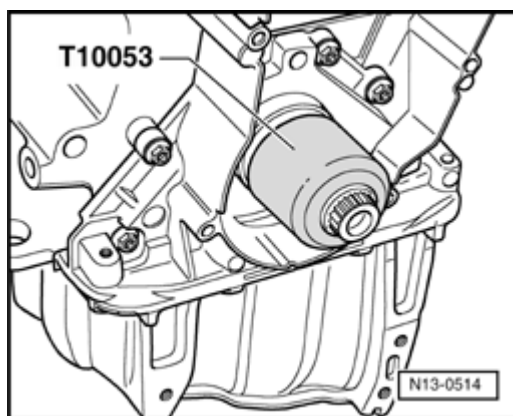


Fig. 32: Pressing In Oil Seal Using Assembly Tool T10053 And Bolt T10053/2
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press in oil seal using pressure sleeve T10053 and bolt T10053/2 (M16 x 1.5 x 60) up to stop.

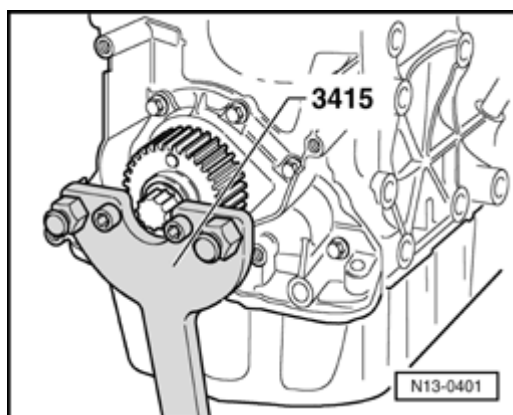


Fig. 33: Counter-Holding Crankshaft Toothed Belt Sprocket With 3415

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install toothed belt gear-crankshaft using a new bolt and secure with Counter Support 3415.
- Torque specification: 90 Nm plus an additional $\frac{1}{4}$ turn (90 °)

NOTE:

- The threads and shoulder must be free of oil and grease.

- Install limit stop for torque support.
- Torque specification: 30 Nm
- Install toothed belt --> **Toothed belt, removing, installing and tensioning** .
- Installing ribbed belt and tensioner --> **Ribbed belt, removing and installing** .

Front sealing flange, removing and installing

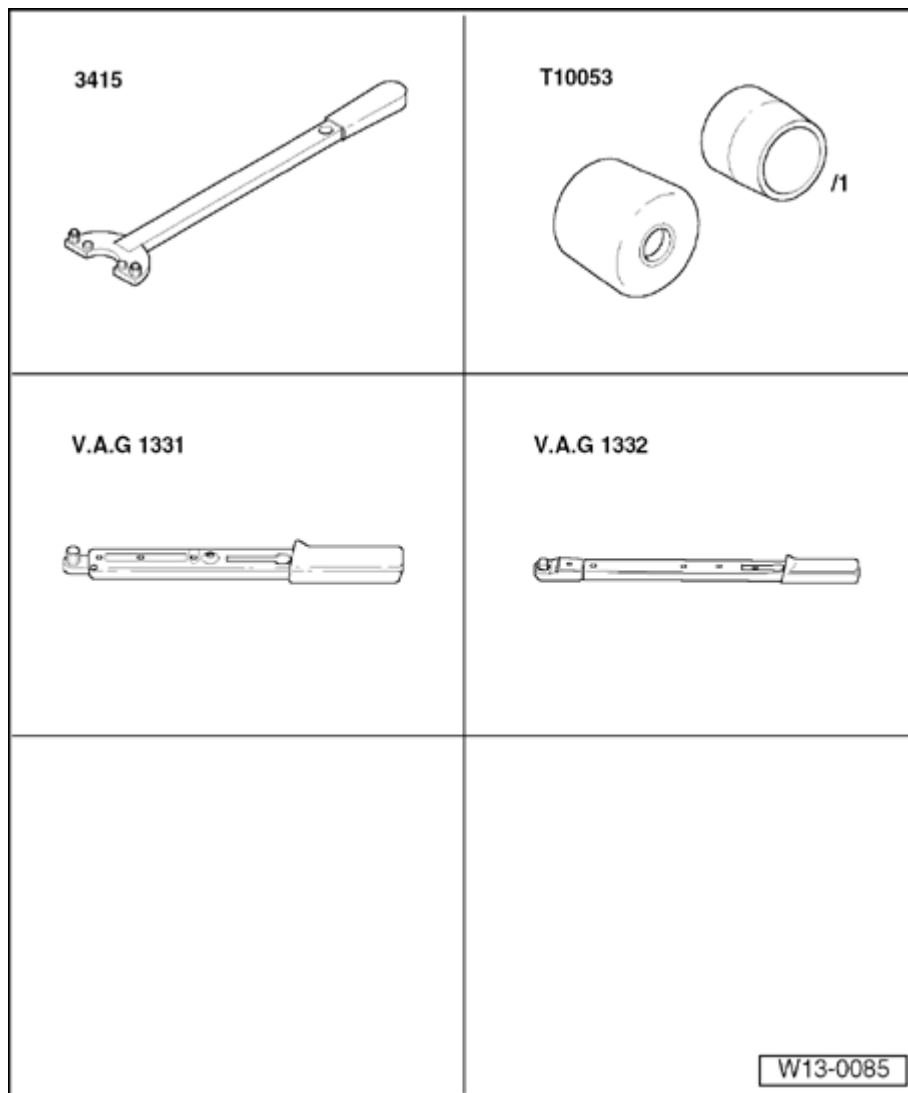


Fig. 34: Identifying Special Tools - Removing And Installing Sealing Flange (Belt Pulley Side)

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Counter-hold tool 3415
- Assembly tool T10053
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332
- *Silicone sealant D 176 404 A2*
- Hand drill with plastic brush attachment
- Flat scraper

Removing

- Remove ribbed belt and tensioner --> **Ribbed belt, removing and installing** .
- Remove toothed belt --> **Toothed belt, removing, installing and tensioning** .

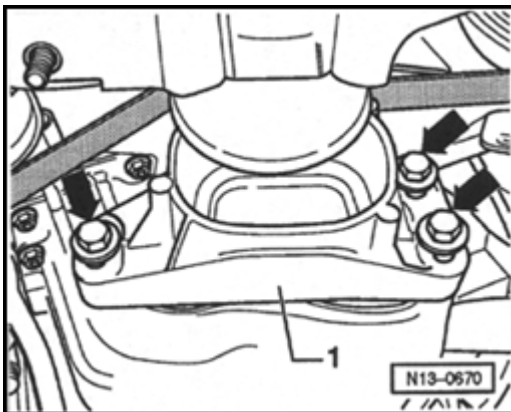


Fig. 35: Identifying Limit Stop

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unbolt stop - **1** - - **arrows** -.

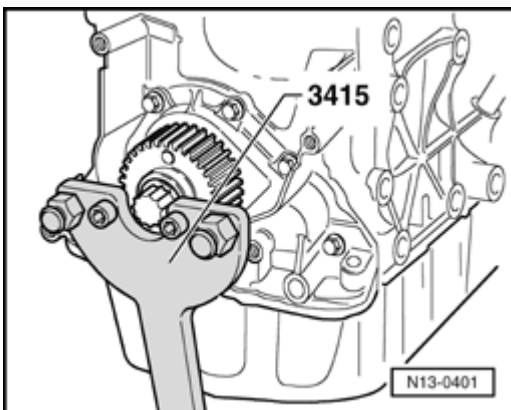


Fig. 36: Counter-Holding Crankshaft Toothed Belt Sprocket With 3415

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove toothed belt crankshaft sprocket. Secure toothed belt gear using counter-hold tool 3415.
- Drain engine oil.
- Remove oil pan --> **Oil pan, removing and installing** .
- Remove front sealing flange bolts.
- Remove sealing flange. If necessary, loosen by tapping lightly with a rubber mallet.
- Remove seal for crankshaft -ribbed belt side-.
- Remove sealant residue from cylinder block with a flat scraper.

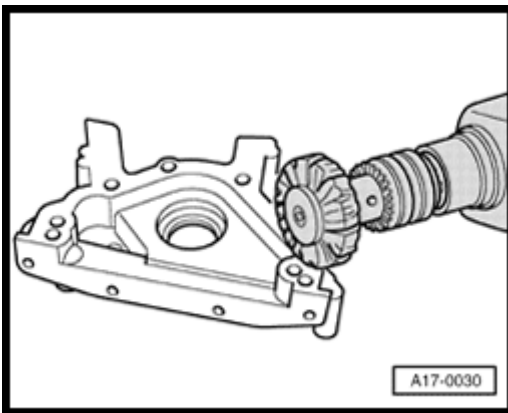


Fig. 37: Removing Sealant Remains On Sealing Flange With A Rotating Plastic Brush
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove sealant residue from sealing flange using a rotating plastic brush (wear safety glasses).
- Clean sealing surfaces so they are completely free of any oil or grease.

Installing**NOTE:**

- **The sealing flange must be installed and tightened within 5 minutes after application of silicon sealant.**

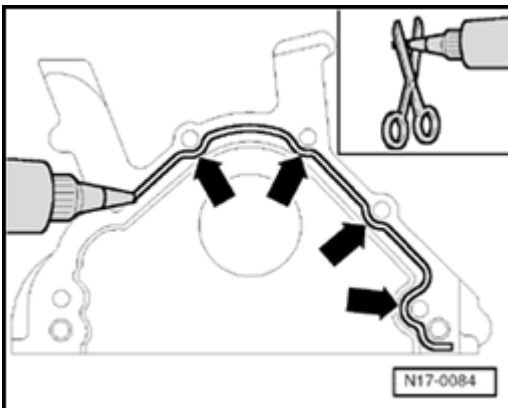


Fig. 38: Cutting Off Tube Nozzle At Front Marking & Applying Silicone Sealing Compound To Clean Sealing Surface Of Sealing Flange
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Cut off nozzle on tube of sealant at front mark (dia. of nozzle approx. 3 mm).
- Apply silicone sealing compound, as shown, to clean sealing surface of the sealing flange.
- Thickness of sealant bead - **arrows** - : 2 to 3 mm

NOTE:

- **The sealing compound bead must not be thicker, otherwise excess sealing compound may enter the oil pan and block the oil suction pipe strainer.**

- Set sealing flange in place immediately and lightly tighten bolts.
- Fasten sealing flange bolts in a diagonal sequence.
- Tightening torque: 15 Nm
- Remove excess sealant.
- Install oil pan --> **Oil pan, removing and installing** .

NOTE:

- **After installing, allow sealant to harden for approximately 30 minutes before replenishing engine oil.**

- Install new seal --> **Crankshaft seal (ribbed belt side), replacing** for crankshaft -ribbed belt side-.

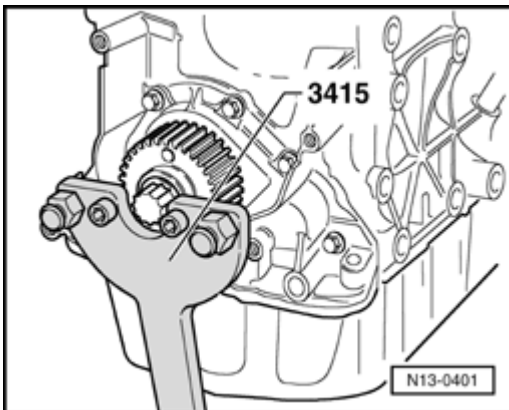


Fig. 39: Counter-Holding Crankshaft Toothed Belt Sprocket With 3415
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install toothed belt gear-crankshaft using a new bolt and secure with counter-hold tool 3415.
- Tightening torque: 90 Nm + $\frac{1}{4}$ turn (90 °)

NOTE:

- **The bolt and threads must be free of oil and grease.**

- Install limit stop for torque support.
- Tightening torque: 30 Nm
- Install toothed belt --> **Toothed belt, removing, installing and tensioning** .
- Installing ribbed belt and tensioner --> **Ribbed belt, removing and installing** .

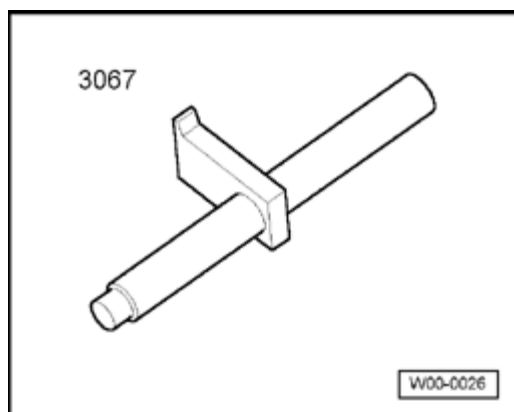
Drive plate, removing and installing**Special tools, testers and auxiliary items required**

Fig. 40: Identifying Special Tools - Drive Plate, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Counter-hold tool 3067
- Depth gauge

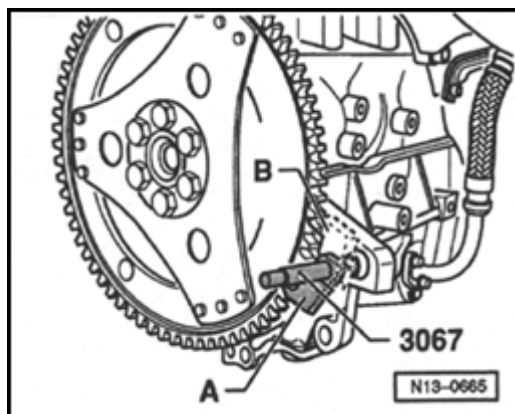
Drive plate, loosening and tightening

Fig. 41: Re-Position Retainer 3067 To Loosen And Tighten Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Reposition flywheel retainer 3067 to loosen and tighten bolts.
- Installation position of retainer: A - to loosen B - to tighten

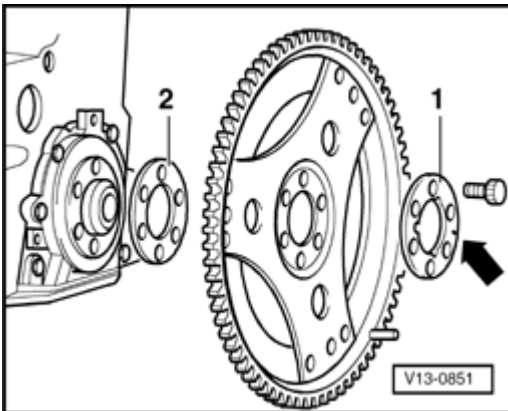
Drive plate, installing

Fig. 42: Identifying Drive Plate, Grooved Washer And New Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position drive plate using grooved washer - 1 -.
- Install new bolts and tighten to 30 Nm.

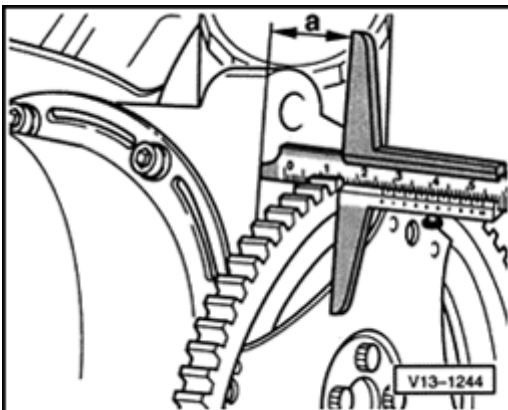


Fig. 43: Checking Drive Plate Dimension
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check dimension - **a** - at three points and calculate mean value.
- Specification: 26 to 28 mm

NOTE:

- **Measure on the milled surface of the cylinder block.**

If specification is not obtained:

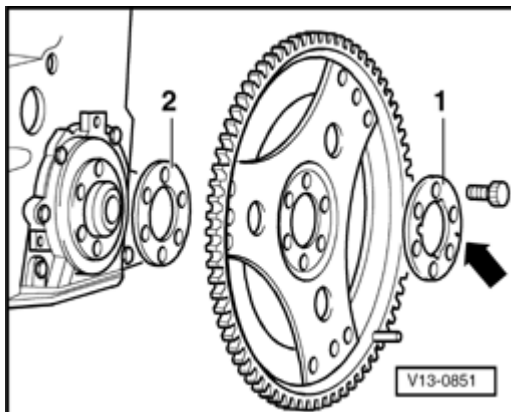


Fig. 44: Identifying Drive Plate, Grooved Washer And New Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove drive plate again and use shim - 2 -. Tighten bolts again to 30 Nm.
- Tighten bolt to 60 Nm and turn an additional 90 ° (1/4 rotation, additional rotation may occur in several stages).

CRANKSHAFT, REMOVING AND INSTALLING

Crankshaft, removing and installing

Assembly overview --> [Assembly overview](#)

Pulling out and driving in needle bearings from crankshaft --> *Transmission input shaft pilot bearing, removing and installing* under [Pulling out and driving in needle bearings from crankshaft](#)

Crankshaft dimensions --> [Crankshaft dimensions](#)

Assembly overview

- Secure engine to assembly stand using holding fixture VW 540 with adapter set for engine and transmission support VW 540/1 B when performing repair work.

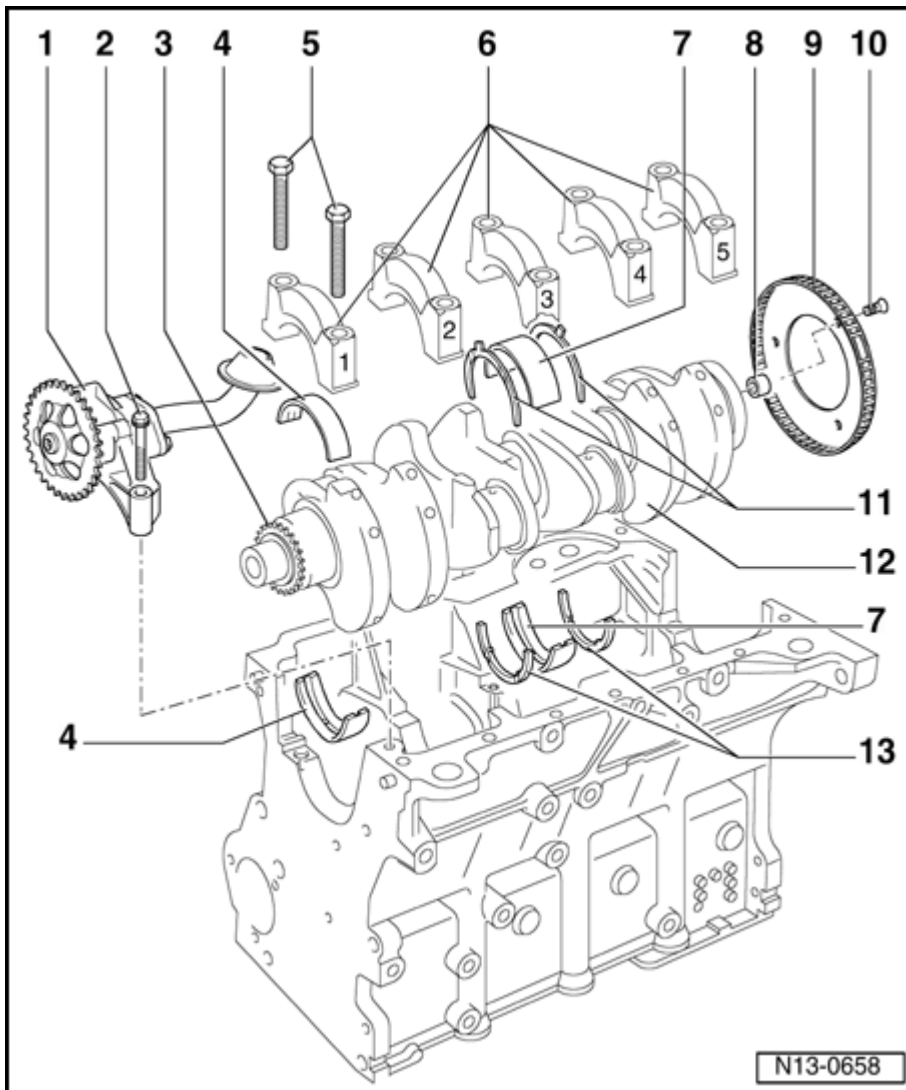


Fig. 45: Crankshaft, Assembly Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Oil pump

- Removing and installing --> **Lubrication system components, removing and installing**

2 - 15 Nm

3 - Chain sprocket

- For oil pump drive

4 - Bearing shells 1, 2, 3, 4 and 5

- Classification for replacement part ordering **Identification on crankshaft bearing, top**
- For bearing cap without oil groove

- For cylinder block with oil groove
- Do not interchange used bearings (mark)

5 - 65 Nm plus 90 ° ($\frac{1}{4}$ turn) additional turn

- Replace
- Fully threaded
- When measuring crankshaft radial play, fasten to 65 Nm

6 - Bearing cap

- Bearing cap 1: Belt pulley side
- Retaining tabs of bearing shells and cylinder block/bearing caps must lie above one another

7 - Bearing shell 3

- Do not interchange used bearings (mark)

8 - Needle bearing

- Only vehicles with manual transmission
- Removing and installing --> *Transmission input shaft pilot bearing, removing and installing* under **Pulling out and driving in needle bearings from crankshaft**

9 - Sensor wheel

- Always replace
- For Engine Speed (RPM) Sensor G28
- Only possible to install in one position - Holes are offset

10 - 10 Nm plus $\frac{1}{4}$ turn (90 °)

- Replace

11 - Thrust washer

- For bearing cap, bearing 3
- Observe locating point

12 - Crankshaft

- Axial play new: 0.07 to 0.23 mm
- Wear limit: 0.30 mm

- Measure radial play with Plastigage
 - New: 0.02 to 0.04 mm Wear limit: 0.15 mm
- Do not turn crankshaft when measuring radial play
- Crankshaft dimensions --> **Crankshaft dimensions**
- Different versions of manual and automatic transmissions; Check part number

13 - Thrust washer

- For bearing support, bearing 3
- Observe locating point
- Version for replacement part (2 part); lower thrust washers are only semicircular

Identification on crankshaft bearing, top

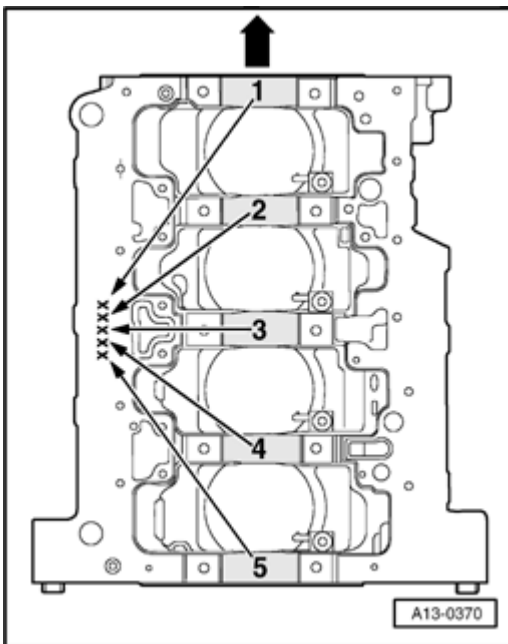


Fig. 46: Cylinder Block Crankshaft Bearing Shells Identification

Courtesy of VOLKSWAGEN UNITED STATES, INC.

From the factory, the upper bearing shells are allocated to the cylinder block with the correct thickness. Color-coded dots serve to identify the bearing thicknesses.

NOTE: • **Arrow points in direction of travel.**

The letters marked on the lower sealing surface of the cylinder block identify which bearing thickness must be installed in which location.

Color identification

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

Letter on cylinder block		Color of bearing
S	=	black
R	=	red
G	=	yellow

The lower crankshaft bearing shells are always shipped as replacement part with "yellow" color marking.

Pulling out and driving in needle bearings from crankshaft

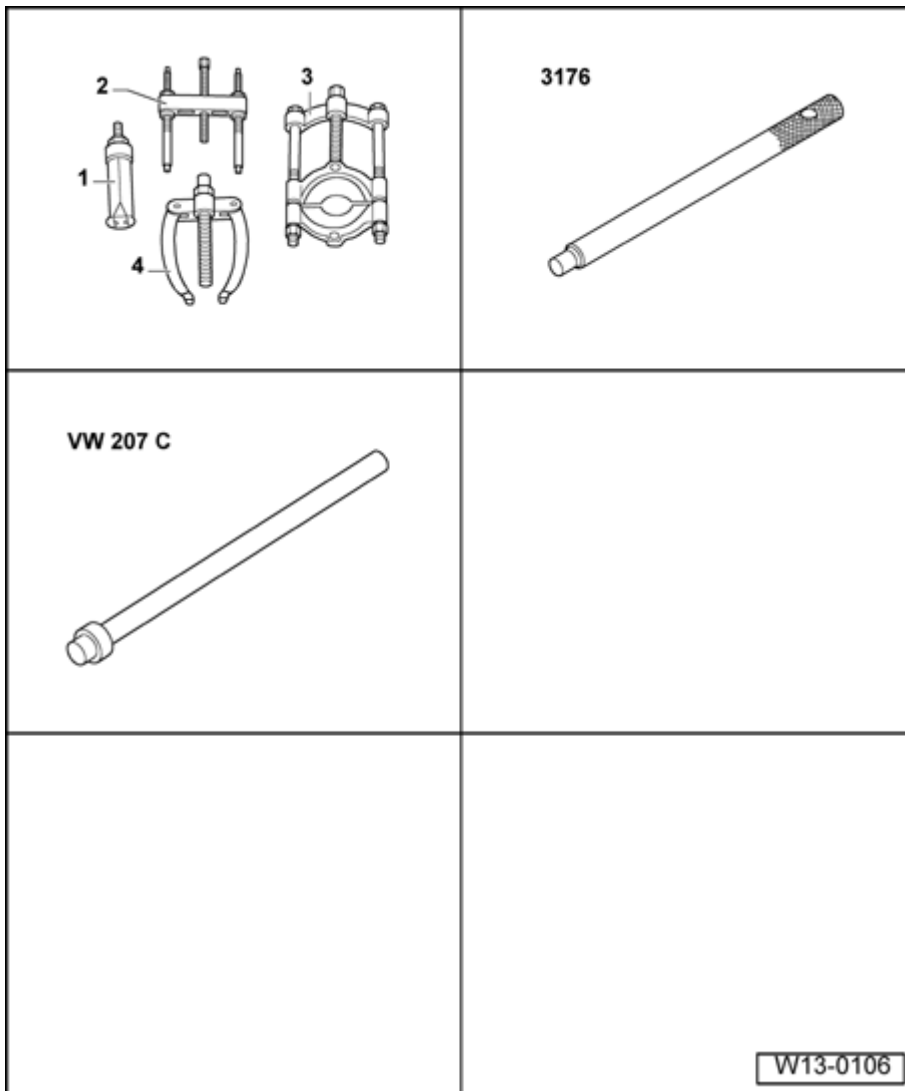


Fig. 47: Identifying Special Tools - Needle Bearings For Crankshaft, Pulling Out And Driving In
Courtesy of VOLKSWAGEN UNITED STATES, INC.

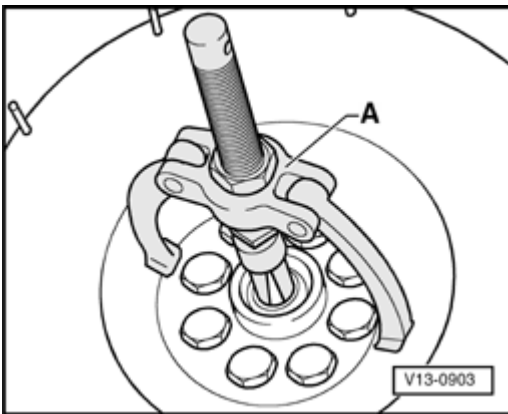
Special tools, testers and auxiliary items required

- Kukko extractor 21/2 and Kukko support 22/1
- Centering mandrel 3176

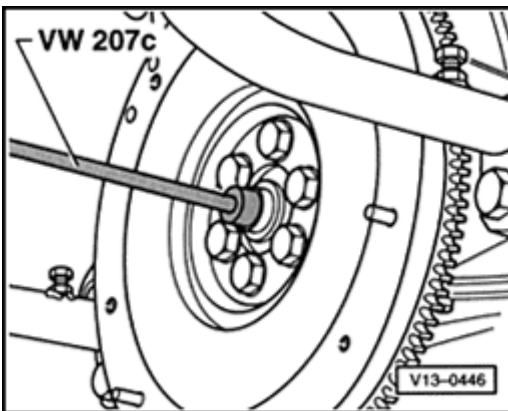
- or Drift VW 207 C

NOTE:

- When installing an engine into a vehicle with manual transmission, check if rear needle bearing is installed. If necessary, install needle bearing.

Removing**Fig. 48: Pulling Out Needle Bearing Using Puller****Courtesy of VOLKSWAGEN UNITED STATES, INC.**

- Using puller - A - , e.g. Kukko extractor 21/2 and Kukko support 22/1 , pull out needle bearing.

Installing**Fig. 49: Driving In Needle Bearing Using Drift VW 207 C****Courtesy of VOLKSWAGEN UNITED STATES, INC.**

- Drive in using drift VW 207 C or centering mandrel 3176.
- Side of needle bearing with writing on it must be readable when installed.

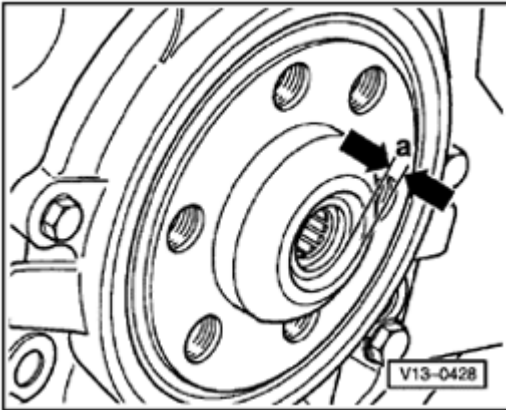


Fig. 50: Installation Depth Of Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installed depth of needle bearing

- Dimension - a - : 1.5 to 1.8 mm

Crankshaft dimensions

(Dimensions in mm)

Reconditioning dimension, dimensions in mm	Crankshaft bearing pins-dia.		Connecting rod pins-dia.	
		-0.017		-0.022
Basic dimension	54.00		47.80	
		-0.037		-0.042
		-0.017		-0.022
1st oversize	53.75		47.55	
		-0.037		-0.042
		-0.017		-0.022
2nd oversize	53.50		47.30	
		-0.037		-0.042
		-0.017		-0.022
Stage III	53.25		47.05	
		-0.037		-0.042

PISTONS AND CONNECTING RODS, DISASSEMBLING AND ASSEMBLING

Pistons and connecting rods, disassembling and assembling

Assembly overview --> [Assembly overview](#)

Piston and cylinder dimensions --> [Piston and cylinder dimensions](#)

Assembly overview

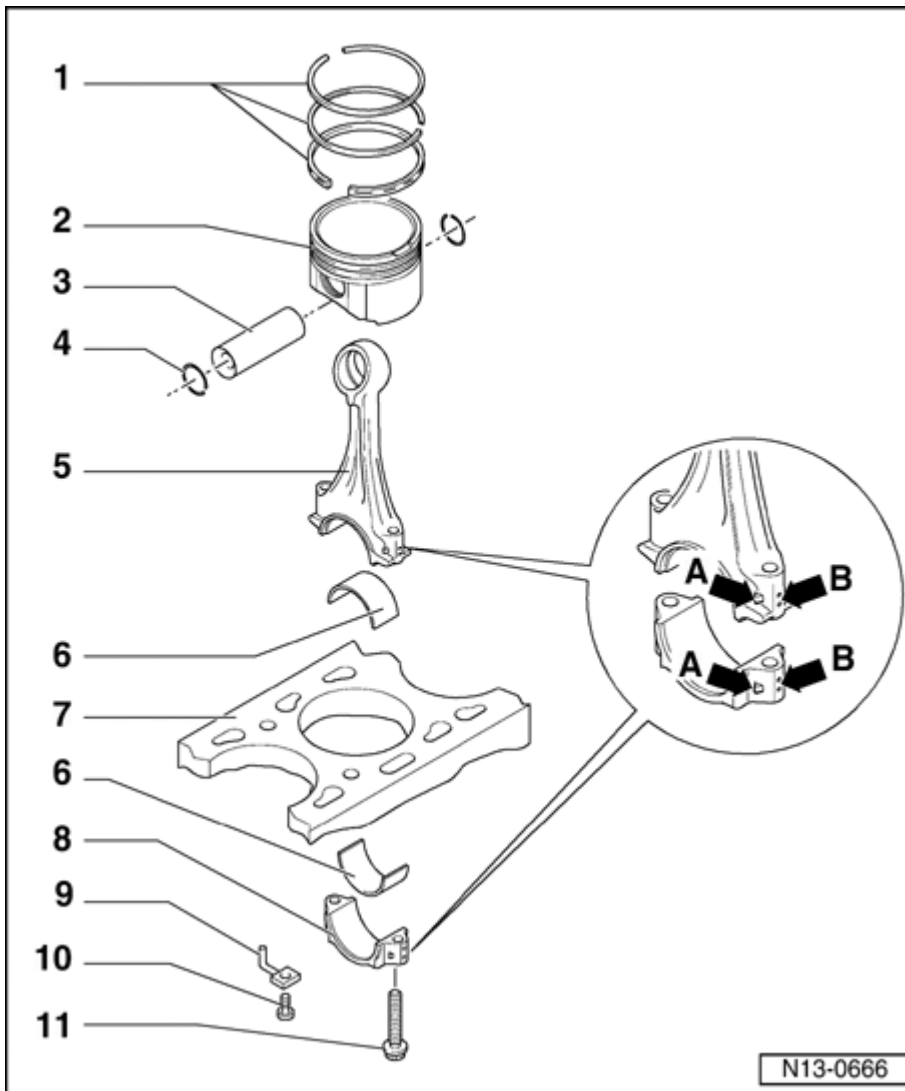


Fig. 51: Pistons And Connecting Rods, Assembly Overview
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Piston rings

- Offset gaps by 120 °
- Use piston ring pliers for removal and installation
- "TOP" faces toward piston crown
- Checking ring gap **Checking piston ring gap**
- Check piston ring groove clearance **Checking ring to groove clearance**
- Oil control ring, 2-part or 3-part, mixed installation is permitted

2 - Piston

- Checking **Checking piston**
- Mark installed position and cylinder allocation
- Arrow on piston face points toward belt pulley side
- Install with piston ring compressor

3 - Piston pin

- If difficult to remove, heat piston to 60 ° C
- Removing and installing using a pilot drift VW 222 A

4 - Circlip

5 - Connecting rod

- Replace only as a set
- If connecting rods are to be reused, use a punch to mark each connecting rod and cap with the cylinder number at location - **B** -.
- Installation position:
 - Markings - **A** - point to belt pulley side

6 - Bearing shell

- Note installation position **Bearing shells - installed positions**
- Do not interchange used bearing shells
- Axial play
 - New: 0.05 to 0.31 mm
 - Wear limit: 0.37 mm
- Measure radial play using Plastigage. Do not turn crankshaft during measurement.
 - New: 0.01 to 0.06 mm
 - Wear limit: 0.12 mm

7 - Cylinder block

- Cylinder bore, checking **Checking cylinder bores**
- Piston and cylinder dimensions --> **Piston and cylinder dimensions**

8 - Connecting rod cap

- Note installation position

9 - Oil spray jet

- For piston cooling

10 - Pressure release valve, 27 Nm

- Opening pressure 1.3 to 1.6 bar positive pressure

11 - Connecting rod bolt, 30 Nm plus $\frac{1}{4}$ turn (90 °)

- Replace
- Lubricate threads and contact surface
- Use old bolt to measure radial play

Checking piston ring gap

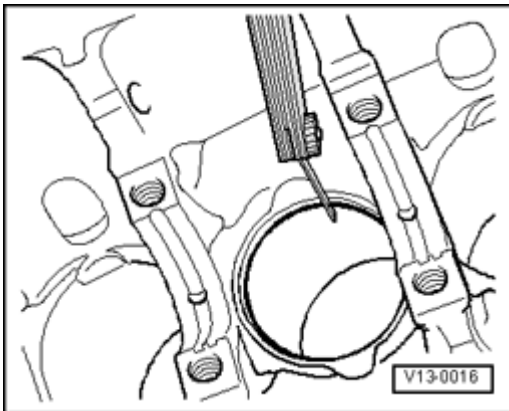


Fig. 52: Checking Piston Ring Gap
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Feeler gauge
- Inner bore gauge 50 to 100 mm
- External micrometer 75 to 100 mm

Test sequence

- Insert ring into lower cylinder bore at a right angle from above, approx. 15 mm from cylinder edge.

Piston ring		Gap	
		New	Wear limit
Compression rings	mm	0.20 to 0.40	0.8
Oil control ring	mm	0.25 to 0.50	0.8

Checking ring to groove clearance

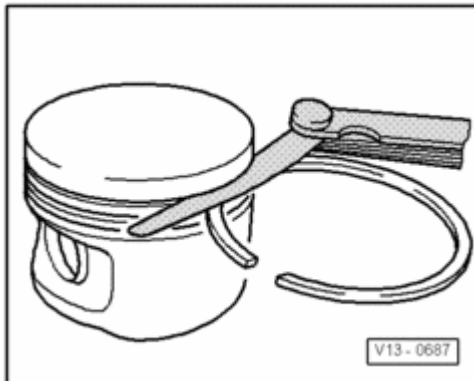


Fig. 53: Checking Ring To Groove Clearance
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Feeler gauge

Test sequence

- Clean ring groove before checking.

Piston ring		Ring to groove clearance	
		New	Wear limit
Compression rings	mm	0.06 to 0.09	0.20
Oil control ring	mm	0.03 to 0.06	0.15

Checking piston

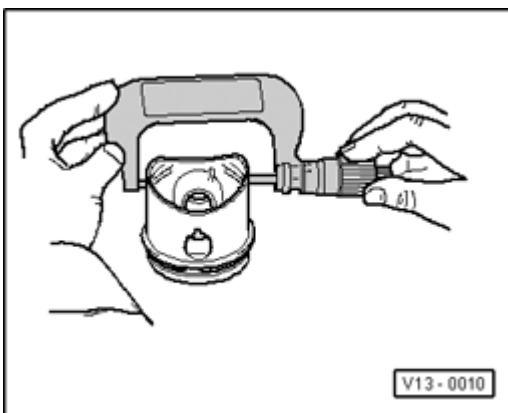


Fig. 54: Checking Piston
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- External micrometer 75 to 100 mm

Test sequence

- Measure pistons approx. 10 mm (3/8 in.) from bottom edge of skirt and at points offset by 90 ° to piston pin axis.
- Deviation from nominal dimension: max. 0.04 mm

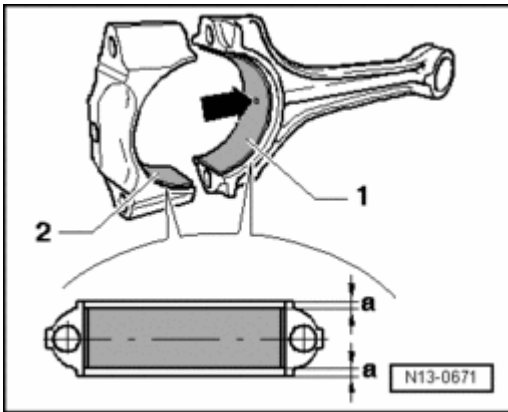
Bearing shells - installed positions

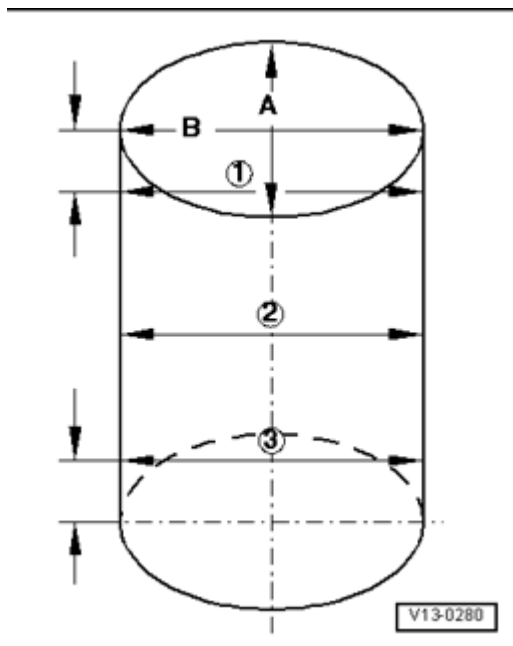
Fig. 55: Installation Position Of Bearing Shells
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Bearing shell - 1 - with oil hole - **arrow** - for connecting rod.

Bearing shell - 2 - without oil hole for connecting rod cap.

- Place bearing shells centrally into connecting rod and connecting rod cap.
- Dimension - **a** - must be the same at right and left. max. deviation: 0.2 mm.

Checking cylinder bores

**Fig. 56: Checking Cylinder Bores**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Inner bore gauge 50 to 100 mm

Test sequence

- Measure bores at 3 locations in both directions - **A** - across engine and - **B** - in line with crankshaft.
- Deviations from nominal dimension: max. 0.08 mm

NOTE:

- **Cylinder bore measurement must not be performed when cylinder block is secured to assembly stand with holding fixture VW 540. Inaccurate measurements will result**

Piston and cylinder dimensions

Honing dimension		Piston dia.	Cylinder bore dia.
Basic dimension	mm	80.965 * See note	81.01
1st oversize	mm	81.465 * See note	81.51

*Measurement does not include graphite coating (thickness = 0.02 mm). The graphite coating wears off.

15 CYLINDER HEAD, VALVE TRAIN**CYLINDER HEAD, REMOVING AND INSTALLING**

Cylinder head, removing and installing

Assembly overview --> **Assembly overview**

Toothed belt, removing, installing and tensioning --> **Toothed belt, removing, installing and tensioning**

Cylinder head, removing and installing --> **Cylinder head, removing and installing**

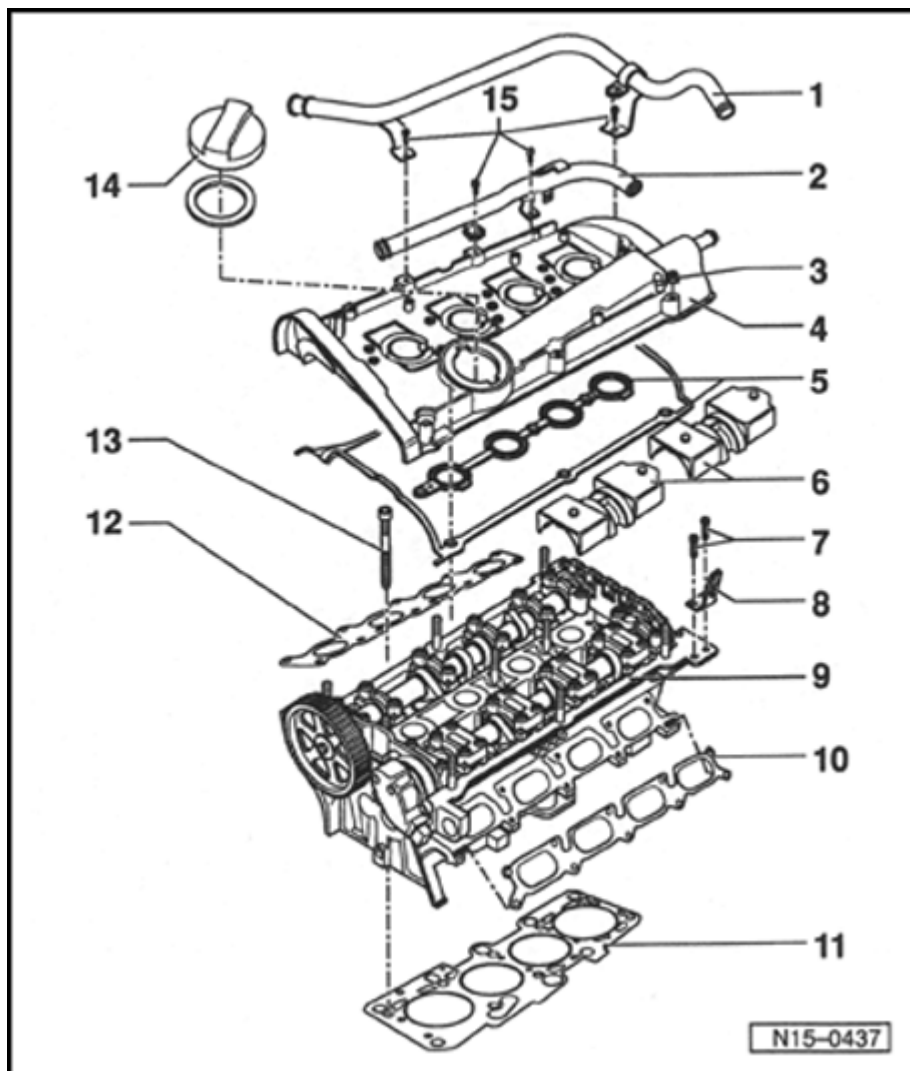
Checking compression pressure --> **Compression pressures, checking**

Assembly overview

Compression, checking --> **Compression pressures, checking** .

NOTE:

- When using an exchanged cylinder head with camshafts installed, the contact surfaces between the lifters and cam lobes must be lubricated before installing the cylinder head cover.
- The plastic protectors installed to protect the open valves must only be removed immediately before fitting the cylinder head.
- When cylinder head or cylinder head gasket is replaced, all coolant must also be replaced.

**Fig. 57: Cylinder Head, Assembly Overview**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Pipe

- For crankcase ventilation

2 - Pressure line

- For combination valve

3 - 10 Nm

4 - Cylinder head cover

5 - Seal for cylinder head cover

- Replace if damaged
- Before installing, coat sealing contact surfaces between bearing cap and cylinder head with *D 454 300 A2*
Seal contact surfaces of double bearing cap/cylinder head and **Seal contact surfaces of camshaft adjuster/cylinder head**

6 - Oil scraper

- Note installed position:
 - Above intake camshaft

7 - 25 Nm

8 - Lifting eye

9 - Cylinder head

- Check for distortion **Checking cylinder head for distortion**
- Resurfacing sealing surfaces **Cylinder head - sealing surface, resurfacing**
- Removing and installing --> **Cylinder head, removing and installing**
- After replacing replace coolant completely

10 - Gasket for intake manifold

- Always replace

11 - Cylinder head gasket

- Always replace
- Metal gasket
- After replacing replace entire amount of coolant
- Note installed position:
 - Part number must be visible from intake side

12 - Gasket for exhaust manifold

- Replace
- Note installation position

13 - Cylinder head bolt

- Replace
- Sequence for loosening and tightening --> **Cylinder head, removing and installing** , Cylinder head, removing and installing

14 - Cap

- Replace seal if damaged

15 - 10 Nm

Checking cylinder head for distortion

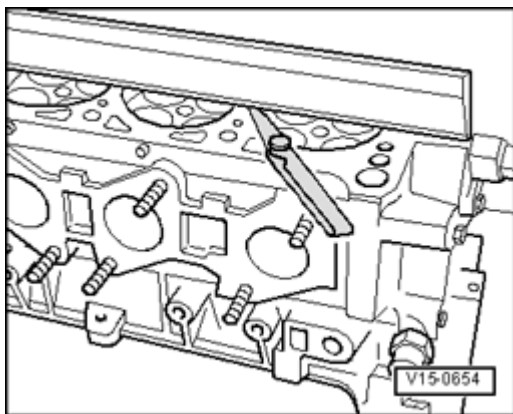


Fig. 58: Checking Cylinder Head For Distortion

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Max. permissible distortion: 0.1 mm

Toothed belt, removing, installing and tensioning

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

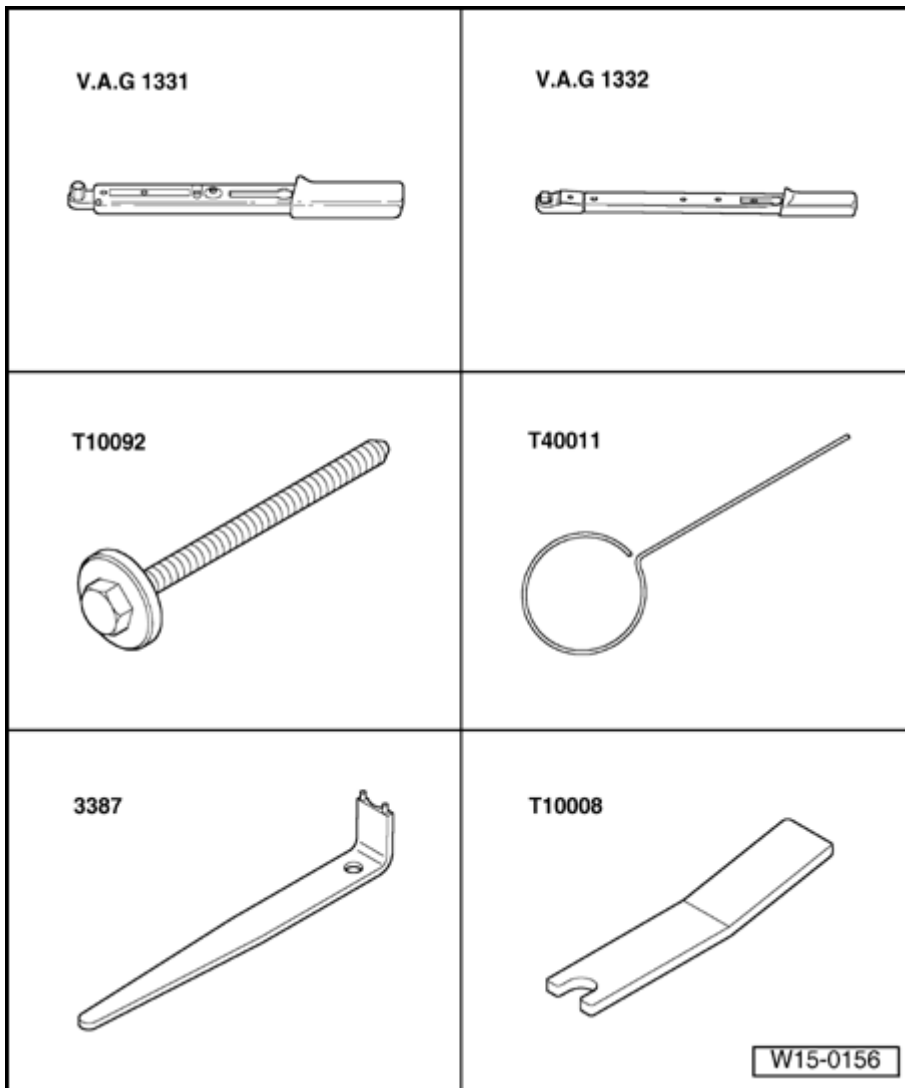


Fig. 59: Identifying Special Tools - Toothed Belt, Removing, Installing And Tensioning
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332
- For tensioner roller up to 07.00 (not adjustable):
- Tensioning bolt T10092
- Locking Pin T40011
- For tensioner roller from 08.00 (must be adjusted):
- Pin wrench 3387
- Marking Plate T10008

Toothed belt, removing

- Bring lock carrier into service position --> **50 BODY, FRONT** .
- Remove ribbed belt --> **Ribbed belt, removing and installing** .
- Remove ribbed belt tensioning element.
- Remove upper toothed belt guard.
- Mark direction of rotation of toothed belt.

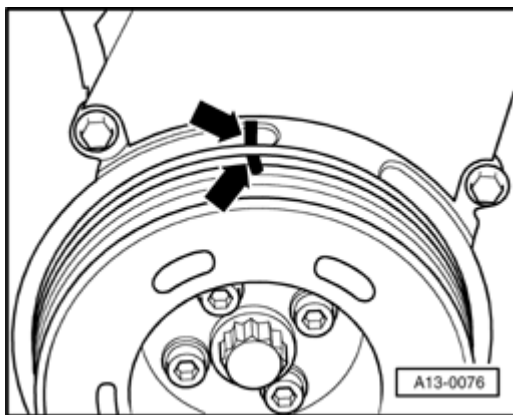


Fig. 60: Identifying Vibration Damper At TDC No. 1 Cylinder
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn crankshaft to set cylinder 1 at TDC.

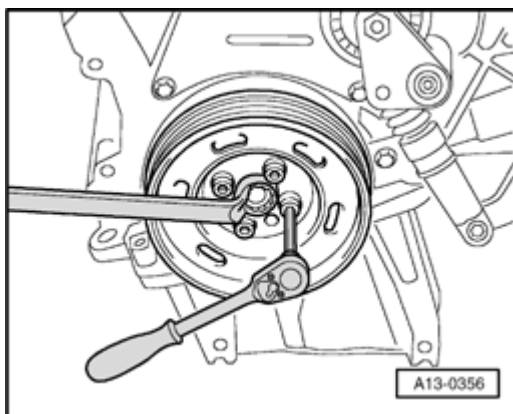


Fig. 61: Removing/Installing Vibration Damper/Belt Pulley
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove vibration damper/belt pulley.
- Remove lower and middle toothed belt cover.

Tensioner roller up to 07.00 (not adjustable)

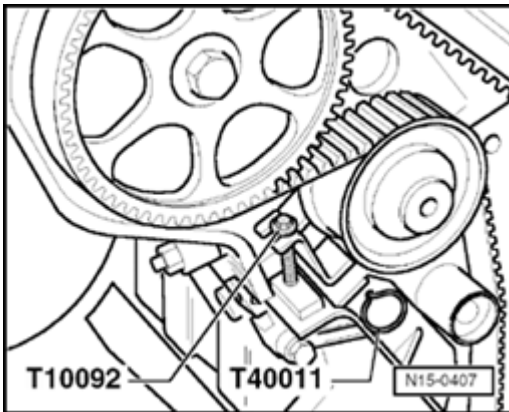


Fig. 62: Tensioning Bolt T10092 And Locking Pin T40011 Installed
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install tensioning bolt T10092 into tensioning device for toothed belt.
- If necessary, align pressure piston before tensioning using needle nose pliers or a thin wire (hole in pressure piston and hole in housing must line up).
- Tension pressure piston of tensioner just enough that the pressure piston can be secured using Locking Pin T40011.

For tensioner roller from 08.00 (must be adjusted)

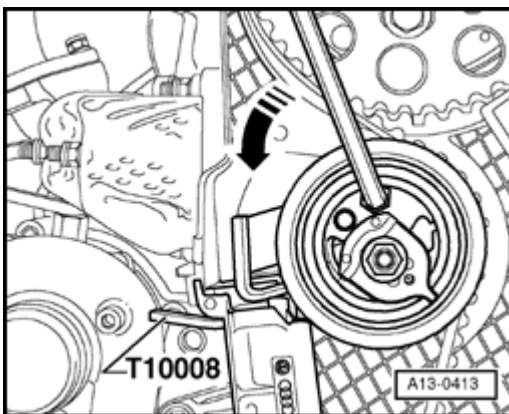
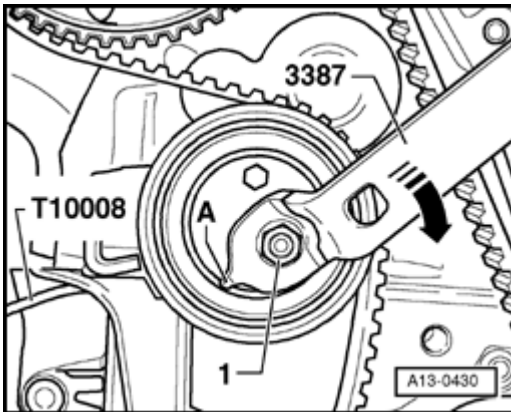


Fig. 63: Inserting An Allen Wrench Into Socket-Head
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert an Allen wrench into socket-head up to stop and press evenly and without much force counterclockwise in direction of - **arrow** - , until tensioning device of toothed belt can be secured using Marking Plate T10008.

NOTE:

- **The toothed belt tensioner is oil-dampened and can only be compressed slowly and by applying constant pressure. Pressing together with too much force can damage the tensioner roller.**

**Fig. 64: Releasing Tension Of Tensioner Roller**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- To release tension on ribbed belt, loosen bolt - **1** - of tensioner roller and rotate eccentric using pin wrench 3387 in direction of - **arrow** -.

NOTE:

- **Stop tab - A - of eccentric must not be bent.**

Continuation for all vehicles

- Remove toothed belt.
- Then, turn crankshaft back slightly.

Toothed belt, installing**Conditions**

- The pistons must not be positioned at TDC.

Work procedure

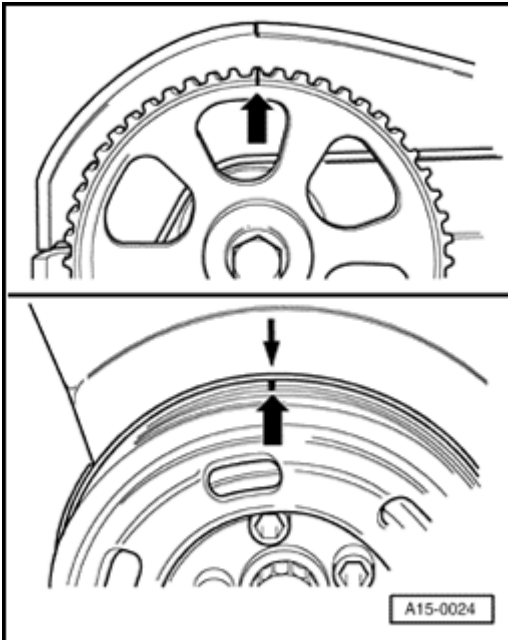


Fig. 65: Marking On Camshaft Gear Aligned With Marking On Cylinder Head Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Align marking on camshaft sprocket with marking on cylinder head cover.
- Place toothed belt onto crankshaft sprocket (observe direction of rotation).
- Install toothed belt cover - lower part.

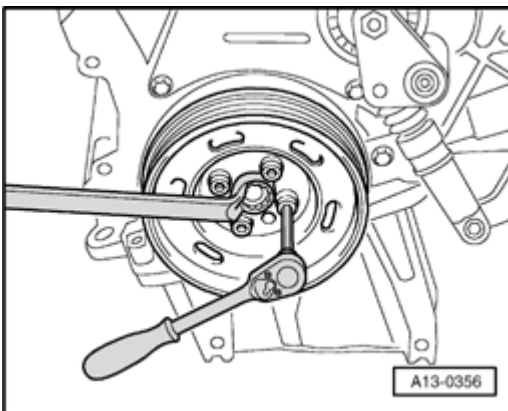


Fig. 66: Removing/Installing Vibration Damper/Belt Pulley
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install vibration damper/belt pulley with new bolts.
- Torque specification: 10 Nm plus an additional $\frac{1}{4}$ turn (90 °)

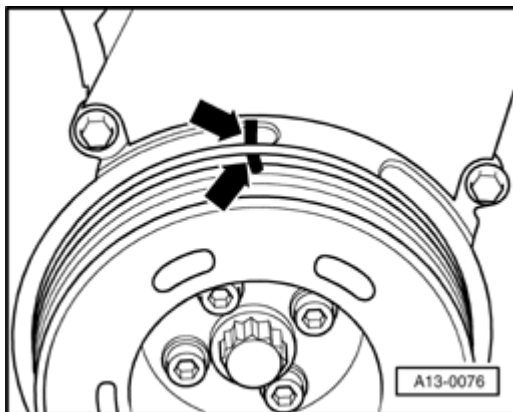


Fig. 67: Identifying Vibration Damper At TDC No. 1 Cylinder
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn crankshaft to set cylinder 1 at TDC.
- Place toothed belt on coolant pump, tensioning roller and camshaft gear (in this order).
- Tension toothed belt.

Toothed belt, tensioning

Requirements

- The engine must be no more than warm to touch.
- Engine cylinder 1 is at TDC.

Work procedure

Tensioner roller up to 07.00 (not adjustable)

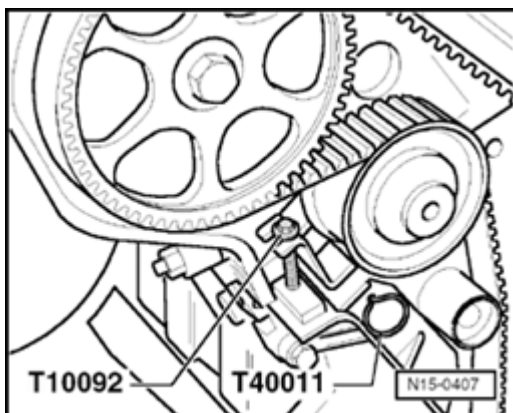


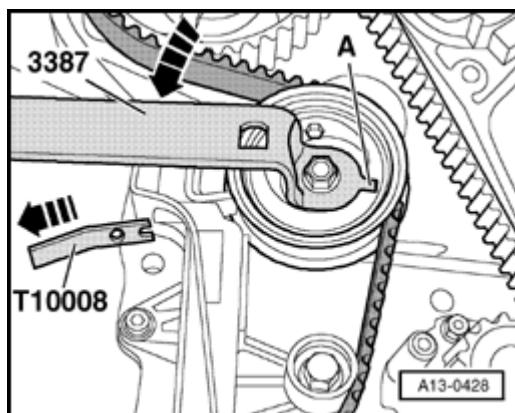
Fig. 68: Tensioning Bolt T10092 And Locking Pin T40011 Installed
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tension toothed belt. To do this, remove Locking Pin T40011 and remove tensioning bolt T10092.

For tensioner roller from 08.00 (must be adjusted)

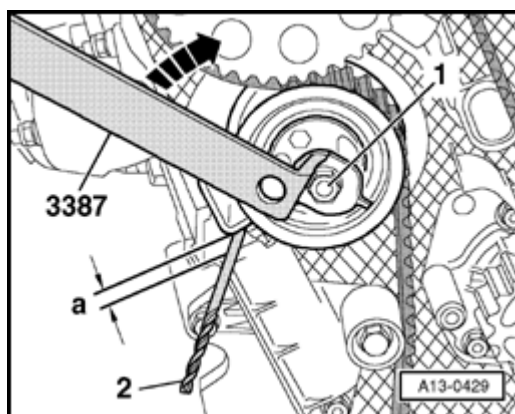
NOTE:

- If toothed belt tensioner is completely driven out, it must be pressed back by tensioner roller when installed. This procedure can last up to approx. 5 minutes. Pressing together with too much force can damage the tensioner roller.


Fig. 69: Adjusting Tensioning Roller

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn eccentric pulley counterclockwise using pin wrench 3387 (tab - A - of eccentric pulley must not be bent), until Marking Plate T10008 can be pulled free of stress.


Fig. 70: Checking Tensioning Roller Specified Dimension

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Rotate eccentric pulley clockwise in direction of - **arrow** - until a drill bit - 2 - with dimension - a - can be pulled through between tensioning lever and housing of tensioning device.
- Specified dimension - a - : 8 mm
- Hold tensioner roller in this position and tighten securing nut - 1 - with tensioner roller to 27 Nm.

Continuation for all vehicles

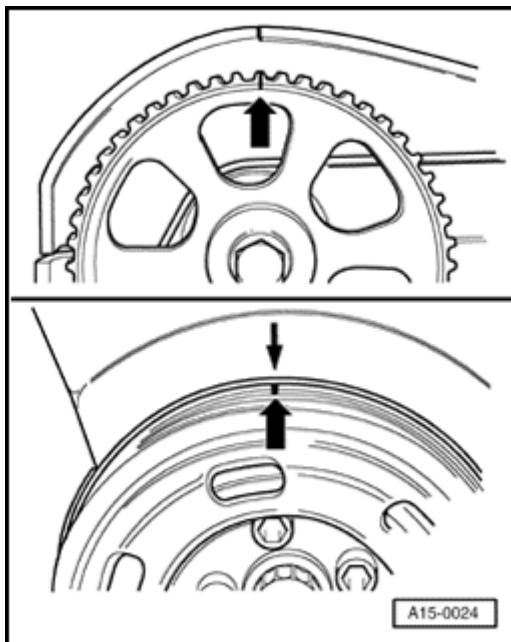


Fig. 71: Marking On Camshaft Gear Aligned With Marking On Cylinder Head Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn over crankshaft twice and check if markings on camshaft and crankshaft still align with their reference points.

For tensioner roller from 08.00 (must be adjusted)

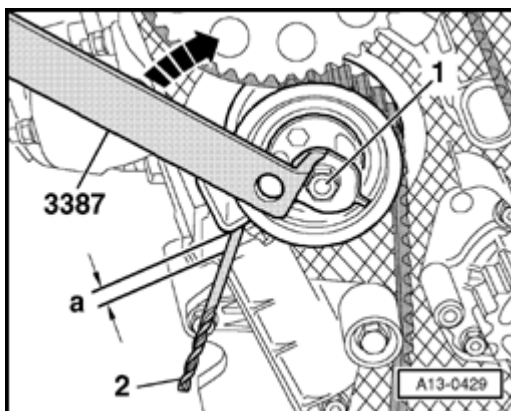


Fig. 72: Checking Tensioning Roller Specified Dimension
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check dimension - **a** - between tensioning lever and housing of tensioning device using a drill bit - **2** -.
- Specified dimension - **a** - : 6 to 10 mm

If dimension - **a** - is not obtained:

- Release tension of toothed belt and tension it again.

If dimension - a - is obtained:

Continuation for all vehicles

- Install center and upper part of toothed belt cover.
- Install tensioner for ribbed belt.
- Torque specification: 25 Nm
- Install ribbed belt --> **Ribbed belt, removing and installing** .

Cylinder head, removing and installing

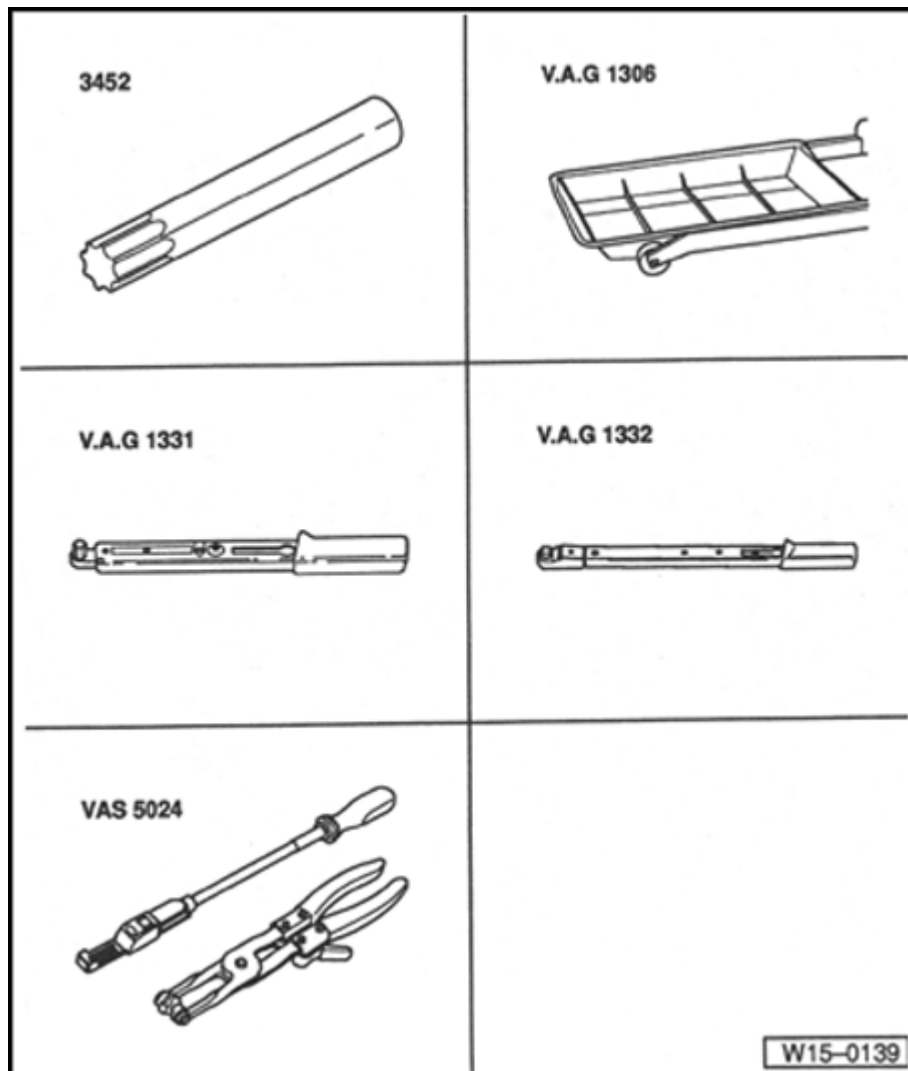


Fig. 73: Identifying Special Tools - Cylinder Head, Removing And Installing
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Polydrive wrench 3452

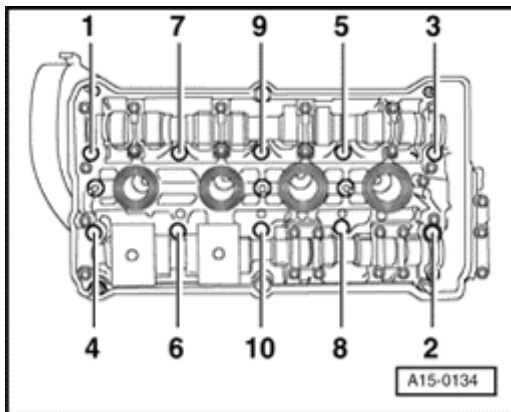
- Drip tray V.A.G 1306
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332
- Spring-type clip pliers VAS 5024

Removing**Requirements**

- The engine must be no more than warm to touch.
- The pistons must not be positioned at TDC.
- First, check whether a coded radio is installed. If necessary, obtain anti-theft coding.
- Switch off ignition and all electrical consumers.
- Disconnect battery Ground (GND) strap --> **27 - BATTERY, STARTER, GENERATOR, CRUISE CONTROL** .
- Drain coolant --> **Cooling system, draining and filling** .
- Observe rules for cleanliness --> **Rules for cleanliness** .

CAUTION: Fuel supply line is under pressure! Before loosening the hose connection, place a rag around the connection point. Then release pressure by carefully loosening the hose connection.

- Disconnect fuel supply and fuel return lines at fuel rail. --> **Fuel rail with fuel injectors, assembly overview**
- Seal lines so that the fuel system is not contaminated by dirt etc.
- Remove catalytic converter from turbocharger.
- Separate all required connections:
 - Cooling system
 - Crankcase ventilation
 - Secondary air injection (AIR) system
 - Turbocharger/regulation
 - Fuel injection and ignition system
- Remove toothed belt from camshaft --> **Toothed belt, removing, installing and tensioning** .
- Remove cylinder head cover.

**Fig. 74: Cylinder Head Bolts Loosening Sequence**

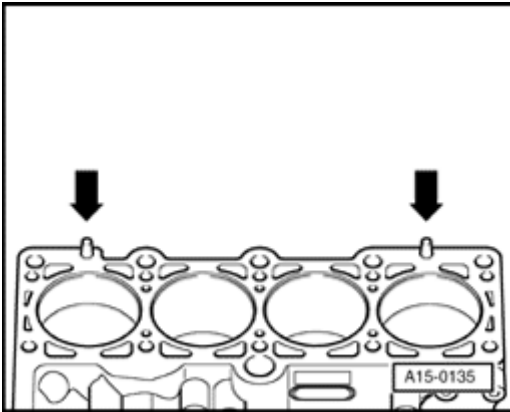
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen and unscrew cylinder head bolts in specified sequence using polydrive wrench 3452.
- Carefully lift cylinder head off.

Installing

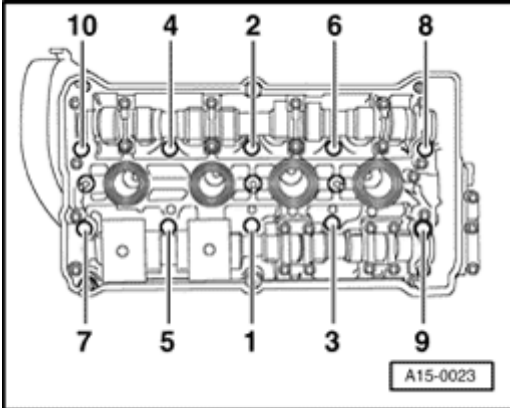
NOTE:

- **There must be no standing oil or coolant in the cylinder head bolts holes of the cylinder block.**
 - **Do not remove new cylinder head gasket from package until immediately before installing.**
 - **Handle the new gasket with extreme care. Damage will result in leaks.**
-
- Place a clean cloth in cylinders so that no dirt or emery cloth particles can get in between cylinder wall and piston.
 - Do not allow dirt or abrasive powder to get into coolant.
 - Carefully clean cylinder head and cylinder block sealing surfaces. Avoid introducing scratches or scoring (do not use sandpaper with grit below 100).
 - Carefully remove metal particles, abrasive residue, and cloths.
 - Set piston of cylinder 1 to TDC and turn crankshaft back again slightly.

**Fig. 75: Installing New Cylinder Head Gasket**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install new cylinder head gasket.
- Pay close attention to centering pins in cylinder block - **arrows** -.
- Pay close attention to cylinder head seal; replacement part number must be legible.
- Set cylinder head in place.
- Insert new cylinder head bolts and tighten by hand.

**Fig. 76: Cylinder Head Bolt Tightening Sequence**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten cylinder head in tightening sequence as follows:
 - Tighten all bolts to 40 Nm.
 - Tighten all bolts to 60 Nm.
 - Tighten all bolts ($\frac{1}{4}$ turn) (90 °) further using a rigid wrench.
- Afterwards, tighten all bolts again $\frac{1}{4}$ turn (90 °) further

The rest of the assembly is basically a reverse of the disassembling sequence.

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

- Install toothed belt --> **Toothed belt, removing, installing and tensioning** .
- Add coolant --> **Cooling system, draining and filling** .
- Check DTC memory of all control modules, repair all stored malfunctions, and erase DTC memory afterwards.
- After erasing DTC memory, readiness code must be generated again --> **Adapting functions and components** .
- Perform road test and check DTC memory of all control modules again.

NOTE:

- **Observe safety precautions that apply to road tests --> Safety precautions .**

Compression pressures, checking

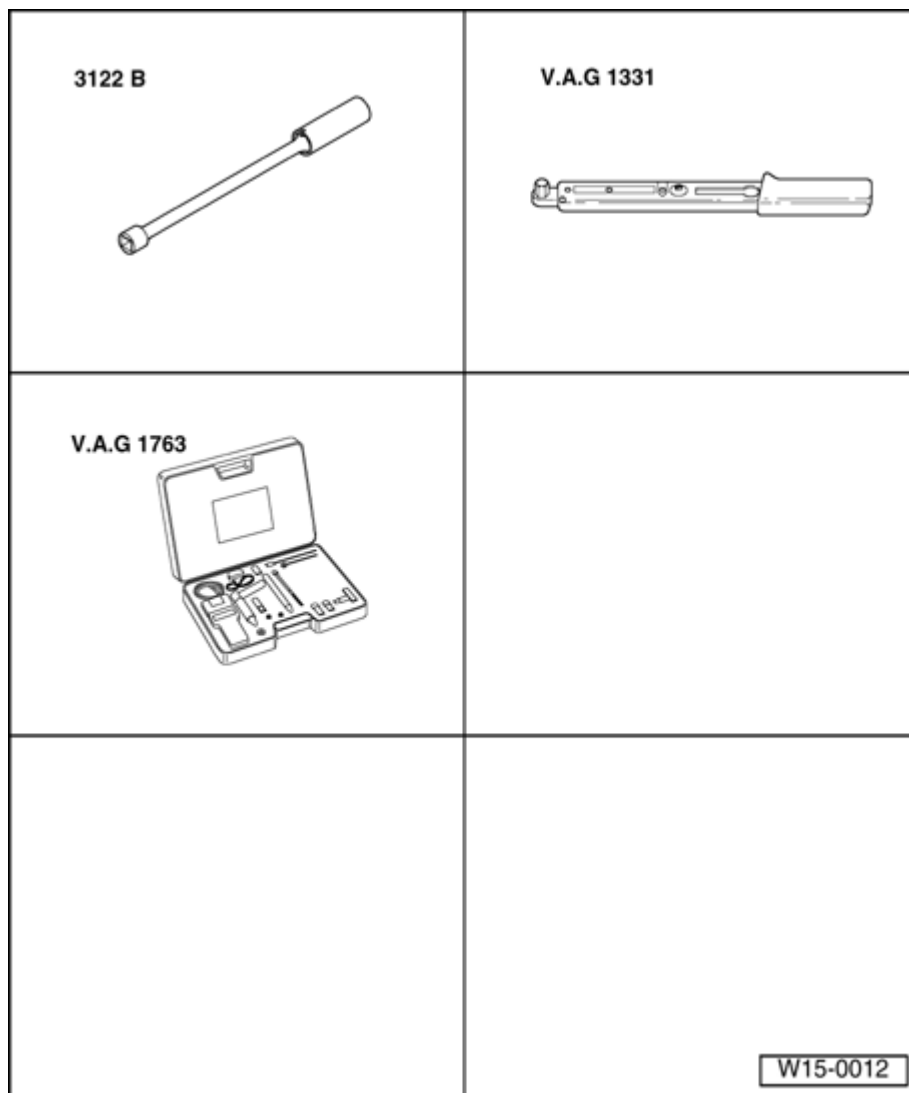


Fig. 77: Identifying Special Tools - Compression Pressure, Checking

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Spark plug removal tool 3122 B
- Torque wrench V.A.G 1331
- Compression tester V.A.G 1763

Test conditions

- Engine oil temperature must be at least 30 ° C.
- Battery voltage must be at least 11.5 Volts.
- All electrical consumers, such as lights and rear window heating must be switched off.
- If vehicle is equipped with an A/C system, it must be switched off.

Test sequence

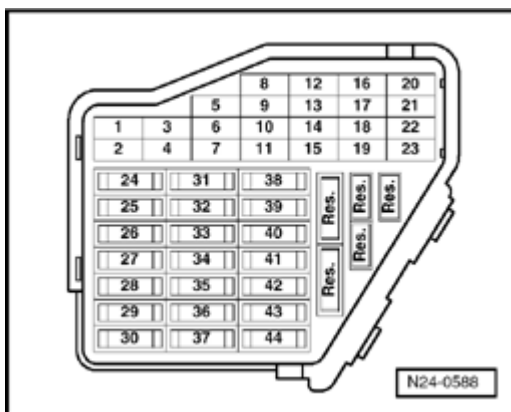


Fig. 78: Identifying Main Fuse Panel

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove fuse No. 32 from fuse holder.

NOTE:

- **Removing fuse No. 32 interrupts the voltage supply to the injectors.**

- Disconnect ignition coil connectors.
- Remove ignition coils with power output stage --> **Ignition coils with power output stage, removing and installing** .
- Remove spark plugs using spark plug removal tool 3122 B.
- Check compression using compression tester V.A.G 1763.

NOTE:

- **Using tester --> Operating instructions.**

- Have a second technician operate starter.
- Operate starter until tester shows no further pressure increase.

Compression pressure:

New engine: 10 to 14 bar positive pressure

Wear limit: 7.0 bar pressure

Permissible difference between all cylinders: max. 3 bar

- Install spark plugs and ignition coils --> **Ignition coils with power output stage, removing and installing** .
- Check DTC memory of Engine Control Module (ECM), repair any stored malfunctions and then erase DTC memory.

VALVE TRAIN, SERVICING**Valve train, servicing**

Assembly overview --> *Assembly overview* under **Valvetrain, assembly overview**

Rework valve seats --> **Valve seats, refacing**

Replacing seal for intake camshaft --> **Oil seal for intake camshaft, replacing**

Replacing seal for exhaust camshaft --> **Oil seal for exhaust camshaft, replacing**

Checking hydraulic valve lifters --> **Hydraulic valve lifters, checking**

Camshaft, removing and installing --> **Camshafts, removing and installing**

Check valve guides --> **Valve guides, checking**

Replacing valve stem oil seals --> **Valve stem seals, replacing**

Valvetrain, assembly overview

NOTE:

- **Cylinder heads with cracks between valve seats, or between valve seat and spark plug threads, can continue to be used without reducing the service life, as long as the cracks have a width of max. 0.3 mm, or only the first 4 threads of the spark plug threads are cracked.**
- **After installing new hydraulic valve lifters, do not start engine for about 30 minutes (otherwise valves will strike pistons). Next, turn crankshaft through 2 rotations.**

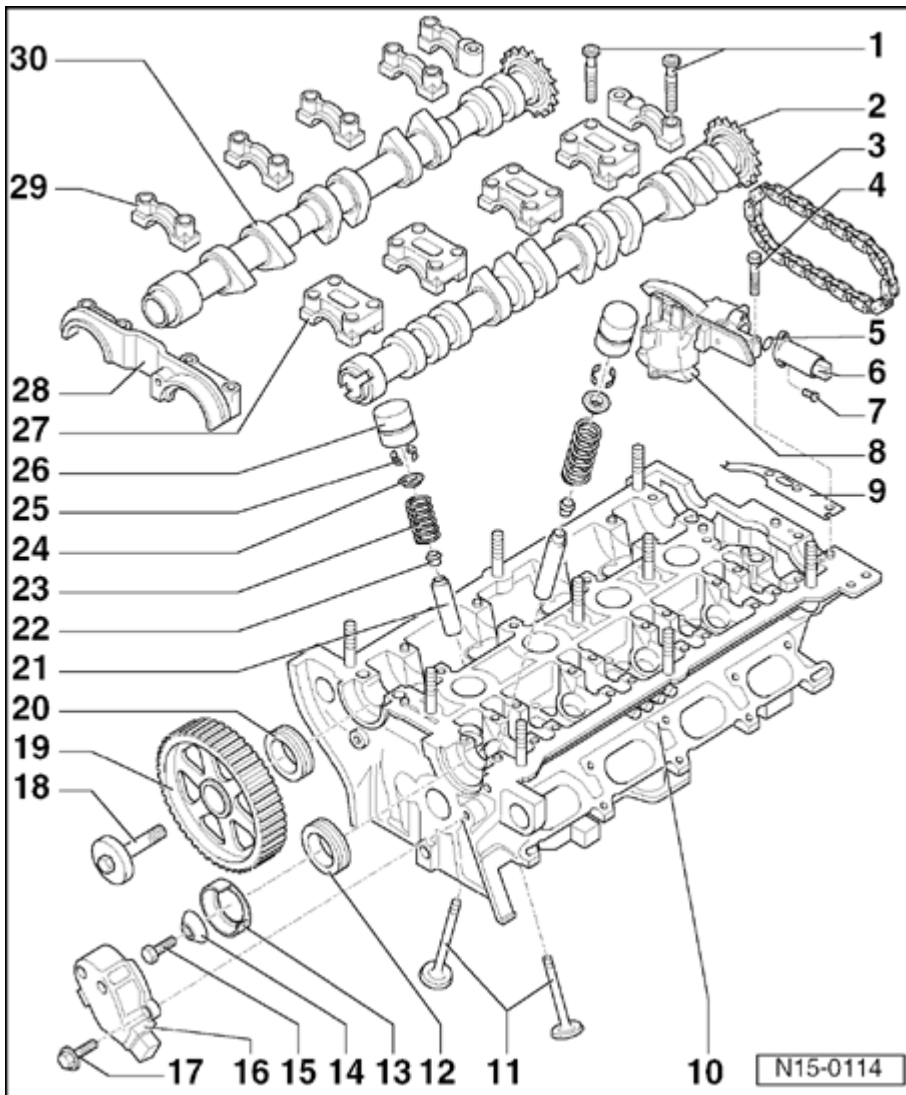


Fig. 79: Valvetrain, Assembly Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - 10 Nm

2 - Intake camshaft

- Checking axial play **Camshaft, checking axial play**
- Removing and installing --> **Camshafts, removing and installing**
- Check radial clearance with Plastigage
 - Wear limit: 0.1 mm
- Run-out: max. 0.035 mm

3 - Drive chain

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

- Mark direction of rotation before removing (installation position) --> **Camshafts, removing and installing**

4 - 10 Nm

5 - O-ring

- Replace

6 - Camshaft Adjustment Valve 1 N205

7 - 3 Nm

8 - Camshaft adjuster

- Secure using Bracket For Chain Adjustment 3366 before removing --> **Camshafts, removing and installing**

9 - Gasket

- Rubber/metal seal
- Replace

10 - Cylinder head

- Reworking valve seat --> **Valve seats, refacing**
- Resurfacing sealing surfaces **Cylinder head - sealing surface, resurfacing**
- Sealing contact surfaces **Seal contact surfaces of double bearing cap/cylinder head** and **Seal contact surfaces of camshaft adjuster/cylinder head**

11 - Valves

- Do not rework, only lapping is permitted
- Valve dimensions **Valve dimensions**

12 - Seal

- For intake camshaft
- Replacing --> **Oil seal for intake camshaft, replacing** .

PTFE seal:

- Do not oil sealing lip of seal

13 - Hood

- For Camshaft Position (CMP) Sensor
- Observe installed location

14 - Washer

- Conical

15 - 25 Nm

16 - Camshaft Position (CMP) sensor G40

17 - 10 Nm

18 - 65 Nm

- Use Retainer 3036 to loosen and tighten

19 - Camshaft sprocket

- Note installation position: Thin rib of camshaft gear points outward and TDC marking cylinder 1 is visible

20 - Seal

- For exhaust camshaft
- Replacing --> **Oil seal for exhaust camshaft, replacing** .

PTFE seal:

- Do not oil sealing lip of seal

21 - Valve guide

- Checking --> **Valve guides, checking**

22 - Valve stem seal

- Replacing --> **Valve stem seals, replacing**.

23 - Valve spring

- Removing and installing:
 - Cylinder head removed: with valve spring compressor 3362
 - Cylinder head installed: --> **Valve stem seals, replacing**

24 - Valve spring plate

25 - Valve keepers

26 - Valve lifter

- Do not interchange
- With hydraulic valve clearance compensation
- Checking --> **Hydraulic valve lifters, checking**
- Place on running surface when setting down
- Before installing, check axial play of camshafts **Camshaft, checking axial play**
- Lubricate contact surface

27 - Intake camshaft bearing cap

- Installation position and installation sequence --> **Camshafts, removing and installing**

28 - Double bearing cap

- Coat contact surface lightly with *sealant AMV 174 004 01*

29 - Exhaust camshaft bearing cap

- Installation position and installation sequence --> **Camshafts, removing and installing**

30 - Exhaust camshaft

- Checking axial play **Camshaft, checking axial play**
- Removing and installing --> **Camshafts, removing and installing**
- Check radial clearance with Plastigage
 - Wear limit: 0.1 mm
- Run-out: max. 0.035 mm

Cylinder head - sealing surface, resurfacing

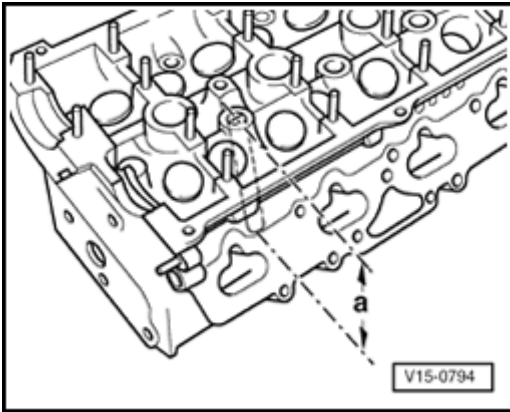


Fig. 80: Refacing Cylinder Head Sealing Surface Measurement "a"
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Resurfacing measurement is made via holes for cylinder head bolts.

- Dimension - **a** - : at least 139.2 mm

Camshaft, checking axial play

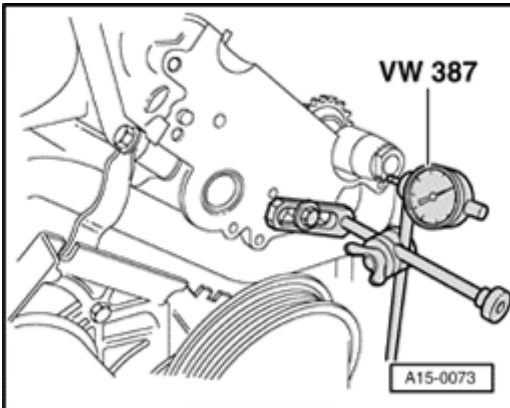


Fig. 81: Camshaft, Checking Axial Play
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Dial gauge holder VW 387
- Dial gauge

Measure with valve lifters removed, chain removed and bearing caps 2 and 4 installed.

Wear limit: 0.2 mm

Valve dimensions

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

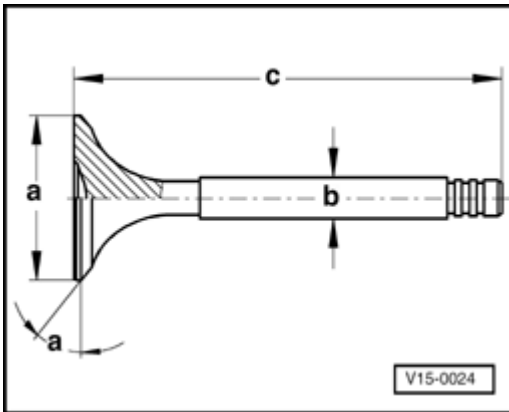


Fig. 82: Identifying Valve Dimensions

Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- Valves must not be reworked. Only lapping is permitted.

Dimension		Intake valve	Exhaust valve
Dia. a	mm	26.9	29.9
Dia. b	mm	5.963	5.943
c	mm	104.84 to 105.34	103.64 to 104.14
a	Angle °	45	45

NOTE:

- Worn sodium-filled exhaust valves must not be scrapped without first being properly treated. The valves must be cut at the middle of the shaft using a metal saw. While doing this, do not come into contact with water. At the very most, throw 10 of the prepared valves into a bucket filled with water. Then, move quickly away, because a sudden chemical reaction will occur during which the sodium is burnt away. The treated parts may then be discarded through conventional disposal channels.

Seal contact surfaces of double bearing cap/cylinder head

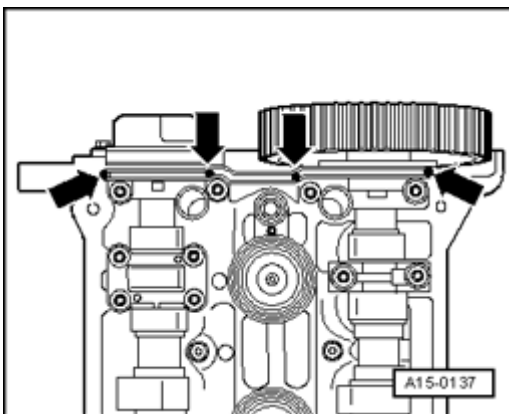


Fig. 83: Double Bearing Cap Contact Surface Sealant Application Areas

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Using a small screwdriver, carefully apply a thin layer of *sealant D 454 300 A2* to both edges of sealing surfaces between double bearing cap and cylinder head - **arrows** -.

Seal contact surfaces of camshaft adjuster/cylinder head

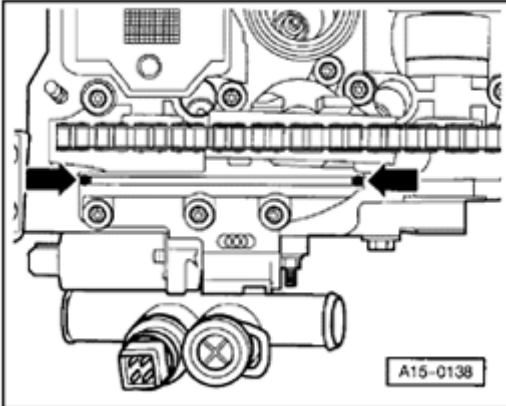


Fig. 84: Chain Tensioner Or Camshaft Adjuster/Cylinder Head Contact Surfaces Sealant Application Areas

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Using a small screwdriver, carefully apply a thin layer of *sealant D 454 300 A2* to both edges of sealing surfaces between camshaft adjuster and cylinder head - **arrows** -.

Valve seats, refacing

Special tools, testers and auxiliary items required

- Depth gauge
- Valve seat refacing tool

NOTE:

- When repairing engines with leaking valves, it is not sufficient to reface valve seats and replace valves. It is also necessary to check the valve guides for wear. This is particularly important on high mileage engines --> [Valve guides, checking](#) .
- Only reface valve seats enough until a perfect contact pattern is obtained. Before refacing, determine maximum refacing dimension. If refaced dimension is exceeded, hydraulic valve lifter function is no longer guaranteed and cylinder head must be replaced.

Maximum Permitted Refacing Dimension Is Calculated As Follows:

- Insert valve and press firmly against seat.

NOTE:

- If the valve is to be replaced as part of a repair, use a new valve for the calculation.

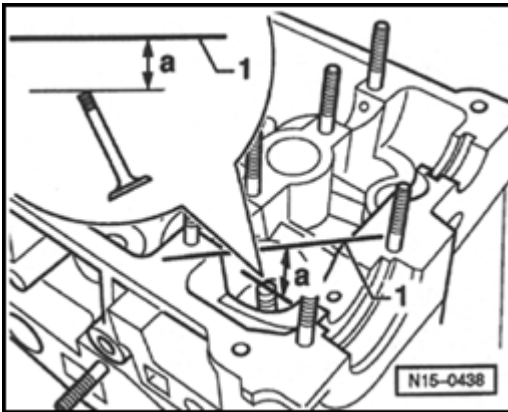


Fig. 85: Measuring Gap Vertically Between Tip Of Valve Stem End And Upper Edge Of Cylinder Head
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Measure gap - **a** - vertically between tip of valve stem end and upper edge of cylinder head - **1** -.
- Calculate max. permissible refacing dimension from measured distance and minimum dimension.

Minimum dimensions:

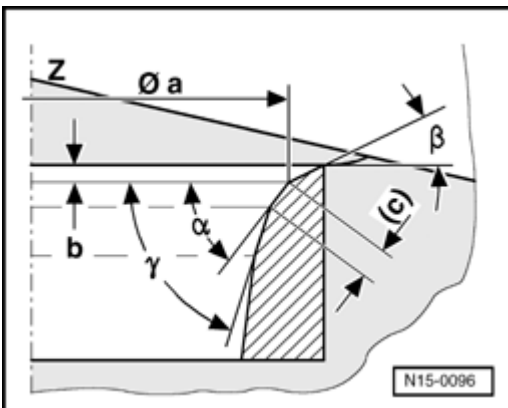
- Outer intake valves: 31.0 mm Center intake valve: 32.3 mm Exhaust valves: 31.9 mm

Measured distance - **a** - minus minimum dimension = max. permissible refaced dimension.

Example:

Measured distance	31.4 mm
- Minimum dimension	31.0 mm
= max. perm. rework dimension * See note	0.4 mm

* Maximum allowable refacing dimension is represented in illustrations for refacing valve seats as dimension "b".



2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

Fig. 86: Intake Valve Seat Measurements

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Refacing intake valve seat

a =	Dia. 26.2 mm
b =	Max. permissible refacing dimension * See note
c =	1.5 1.8 mm
Z =	Cylinder head lower edge
a =	45 ° seat cut angle
β =	30 ° top cut angle
gamma =	60 ° throat cut angle

* How to calculate maximum permissible refacing dimension **Maximum Permitted Refacing Dimension Is Calculated As Follows:** .

Refacing exhaust valve seat	
a =	Dia. 29.0 mm
b =	Max. permissible refacing dimension * See note
c =	Approx. 1.8 mm
Z =	Cylinder head lower edge
a =	45 ° seat cut angle
β =	30 ° top cut angle
gamma =	60 ° throat cut angle

* How to calculate maximum permissible refacing dimension **Maximum Permitted Refacing Dimension Is Calculated As Follows:** .

Oil seal for intake camshaft, replacing

Gasket behind Camshaft Position (CMP) sensor

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

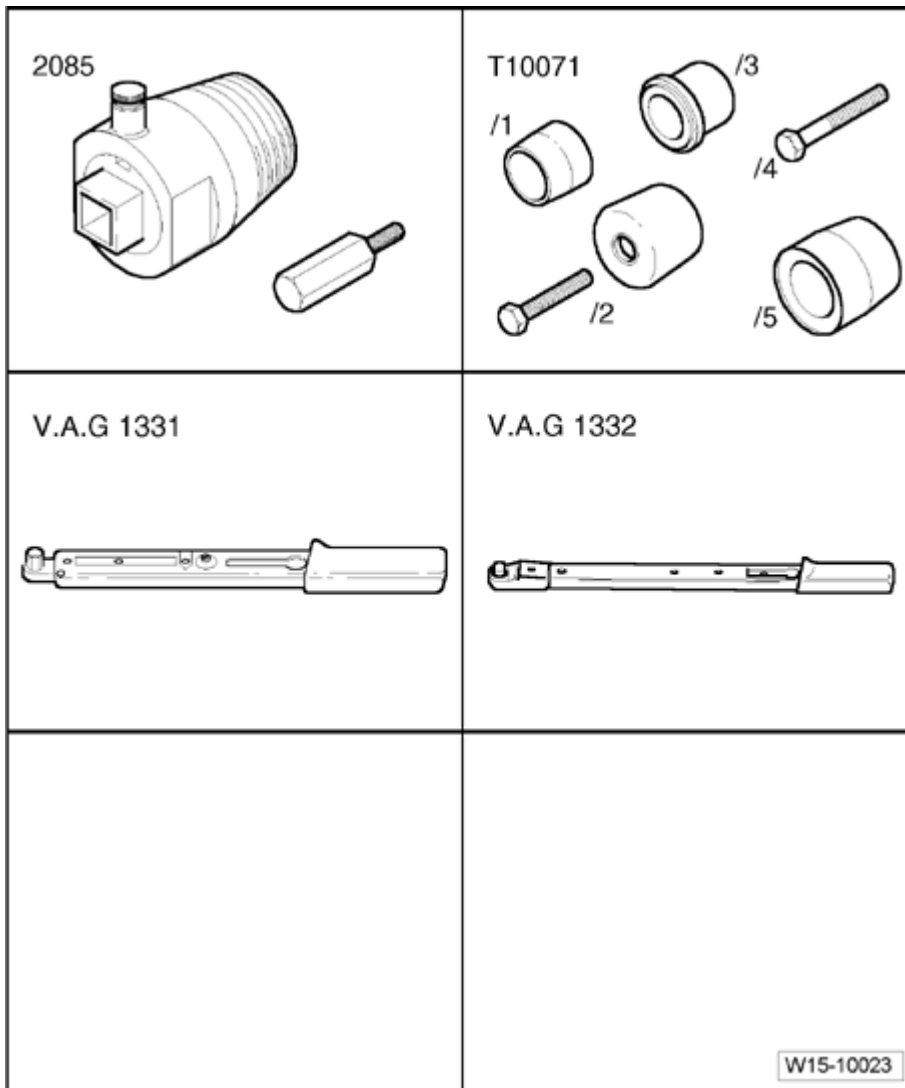


Fig. 87: Identifying Special Tools - Oil Seal For Intake Camshaft, Replacing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Seal remover 2085
- Assembly tool T10071
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332

Removing

- Bring lock carrier into service position --> **50 BODY, FRONT**

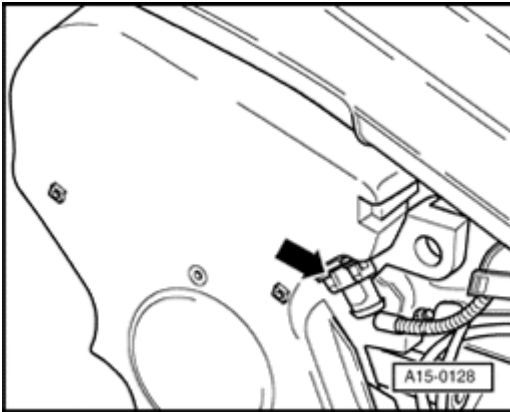


Fig. 88: Locating Connector At Camshaft Position Sensor G40
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect connector from Camshaft Position (CMP) sensor - **arrow** -.
- Remove upper toothed belt guard.
- Remove housing for Hall sensor.
- Remove washer and cover for Hall sensor.

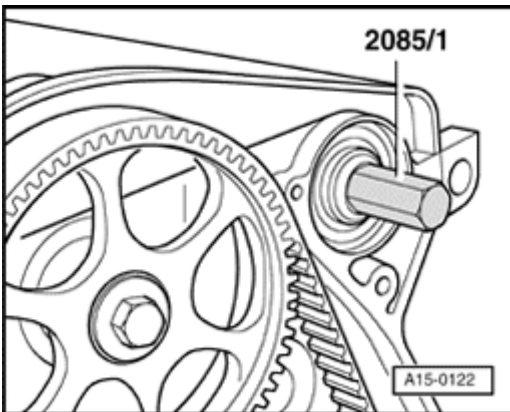


Fig. 89: Adapter 2085/1 Threaded In Camshaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- To guide seal puller, thread adapter 2085/1 in camshaft by hand until stop.
- Remove inner portion of seal puller 2085 two rotations (approx. 3 mm) from outer portion and secure with knurled-head bolt.

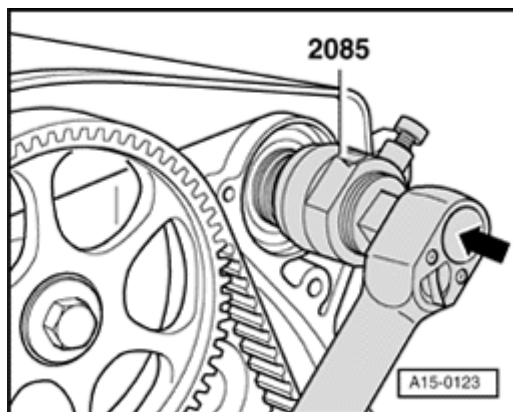


Fig. 90: Screwing Threaded Head Of Seal Extractor With Forced Pressure Into Oil Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lubricate threaded head of seal extractor, position and with forced pressure install into oil seal as far as possible.
- Loosen knurled bolt and turn inner part against camshaft until seal is removed.

Installing

NOTE:

- Use of PTFE sealing rings (Distinguishing feature: Without ring spring, sealing lip designed wider). The sealing lip of this sealing ring may not be oiled or greased.

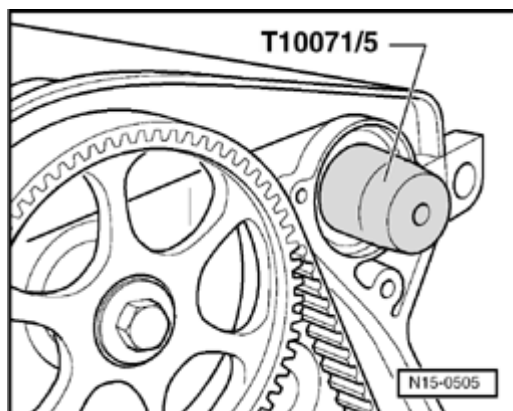


Fig. 91: Guide Sleeve T10071/5 On Camshaft Pin
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place Sleeve T10071/5 on camshaft pin.
- Slide oil seal over sleeve onto camshaft pin.
- Remove sleeve.

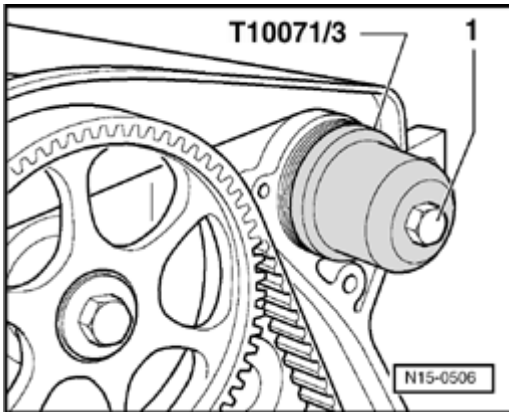


Fig. 92: Pressing In Gasket Up To Stop Using Thrust Sleeve T10071/3 And Bolt M8X60
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press in sealing ring up to stop using Sleeve T10071/3. Use bolt M8x60 - 1 - for this.
- Insert notched shutter wheel for Camshaft Position (CMP) sensor into intake camshaft.
- Install washer (with cone outward) and tighten bolt to 25 Nm.
- Install Camshaft Position (CMP) Sensor and tighten to 10 Nm.
- Install toothed belt cover - upper part.
- Connect connector for Camshaft Position (CMP) sensor.

The rest of assembly is basically a reverse of disassembling sequence.

Oil seal for exhaust camshaft, replacing

Gasket behind camshaft gear

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

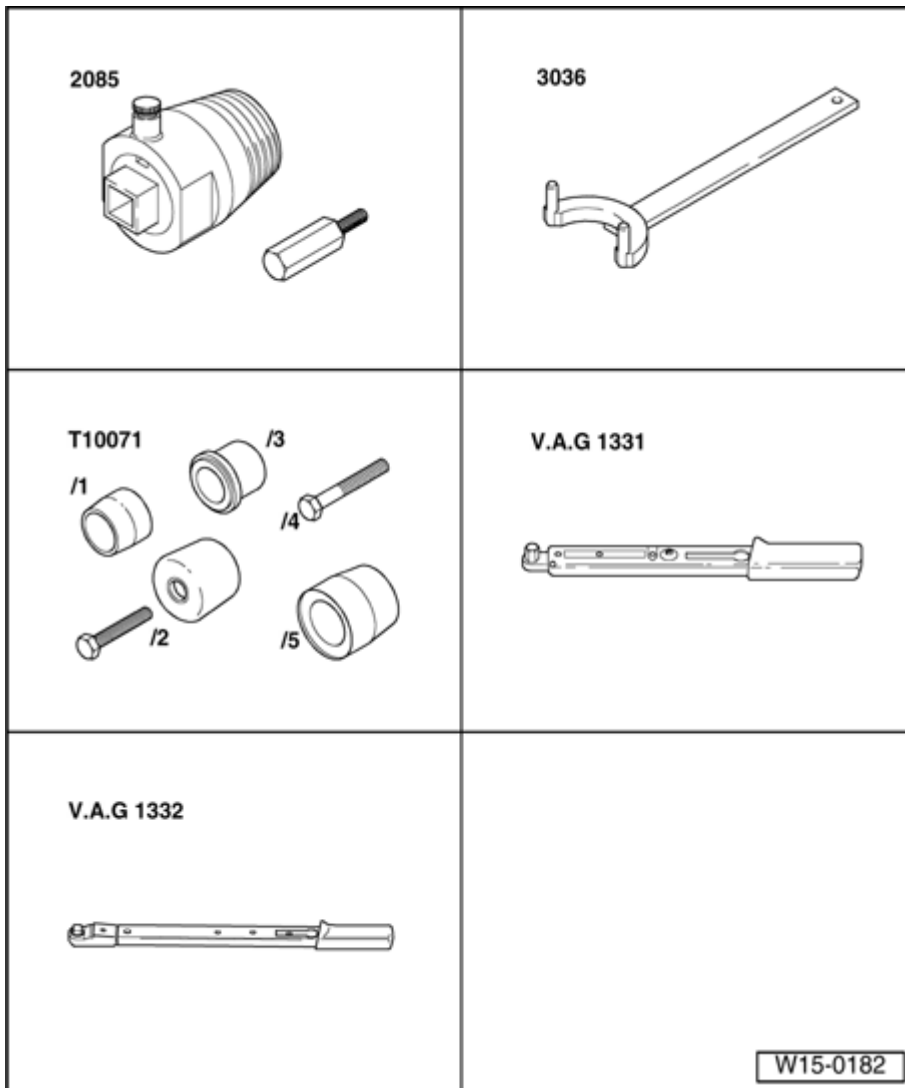


Fig. 93: Identifying Special Tools - Oil Seals For Camshafts, Replacing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Seal remover 2085
- Counter-holder tool 3036
- Assembly tool T10071
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332

Removing

- Bring lock carrier into service position --> **50 BODY, FRONT** .
- Remove upper toothed belt guard.

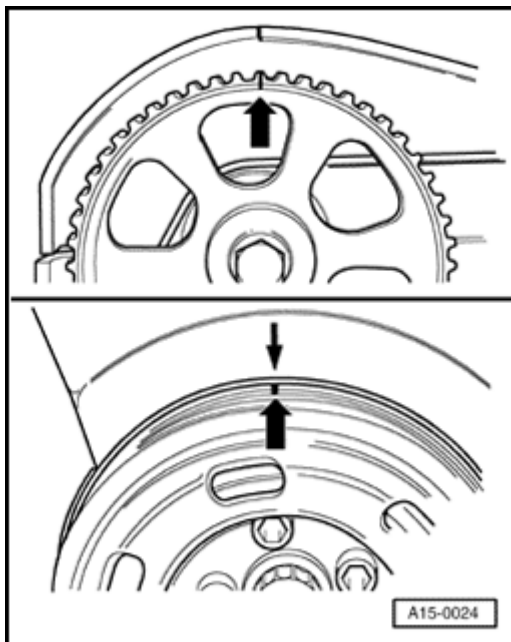


Fig. 94: Marking On Camshaft Gear Aligned With Marking On Cylinder Head Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bring camshaft gear to marking for TDC cylinder 1 by turning crankshaft. 1. Marking on camshaft gear must be flush with marking on cylinder head cover.
- Loosen tensioner and remove toothed belt from camshaft sprocket.
- Turn crankshaft back slightly.
- Remove camshaft sprocket. To loosen bolt, counterhold camshaft gear using retainer 3036.

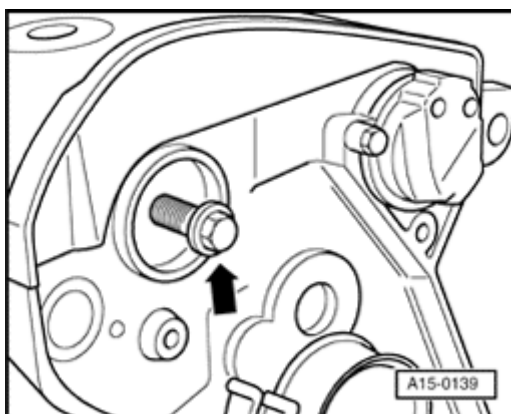


Fig. 95: Camshaft Gear Retaining Bolt Installed Into Camshaft To Stop
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert camshaft gear retaining bolt - **arrow** - into camshaft by hand to stop to guide seal puller.
- Remove inner portion of seal puller 2085 two rotations (approx. 3 mm) from outer portion and secure with knurled-head screw.

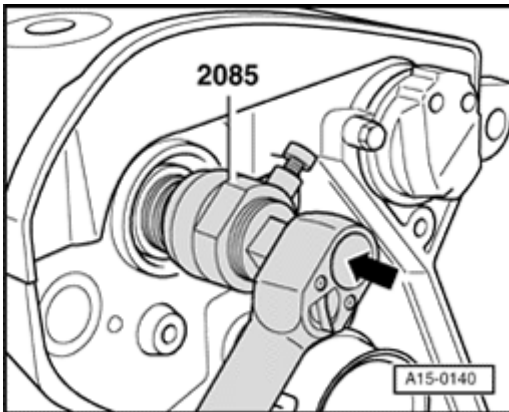


Fig. 96: Positioning And Screwing Bolt Into Oil Seal As Far As Possible With Forced Pressure
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Grease threaded head of 2085 seal puller, position and with forced pressure screw into oil seal as far as possible.
- Loosen knurled bolt and turn inner part against camshaft until seal is removed.

Installing

NOTE:

- **Use of PTFE sealing rings (Distinguishing features: no garter spring, wider sealing lip). The sealing lip of this sealing ring may not be oiled or greased.**

- Before installing, remove oil remains from camshaft journal with a clean cloth.

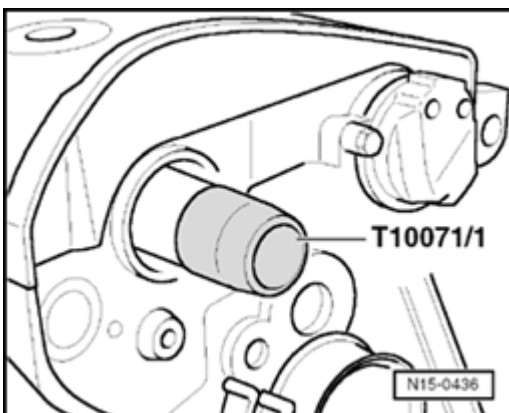


Fig. 97: Guide Sleeve T10071/1 Installed On Camshaft Pin
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place guide sleeve T10071/1 on camshaft pin.
- Slide oil seal over guide sleeve onto camshaft pin.
- Remove guide sleeve.

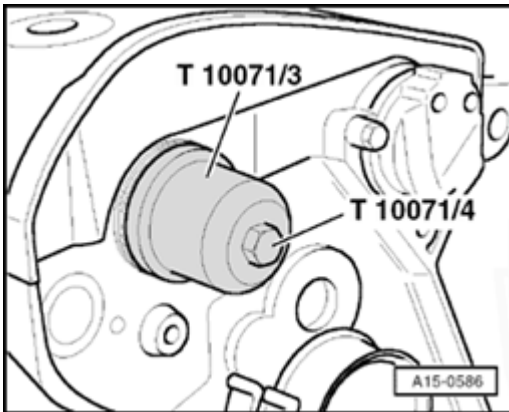


Fig. 98: Pressing In Gasket Up To Stop Using Thrust Sleeve T10071/3 And Bolt T10071/4
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press in gasket up to stop using thrust sleeve T10071/3. To do so, use bolt T10071/4.

The rest of the assembly is basically a reverse of the disassembling sequence.

Toothed belt, installing and tensioning --> **Toothed belt, removing, installing and tensioning**

Hydraulic valve lifters, checking

Special tools, testers and auxiliary items required

- Feeler gauge
- Wooden or plastic wedge

NOTE:

- **Replace complete valve lifters only (cannot be adjusted or serviced).**
- **Irregular valve noises are normal while starting the engine.**

Test sequence

- Start engine and let it run until the radiator fan has cycled once.
- Increase engine speed to approx. 2500 RPM for 2 minutes.

If hydraulic valve lifters are still noisy, determine which lifter or lifters are defective as follows:

- Remove cylinder head cover.
- Turn crankshaft clockwise until camshaft lobe for valve lifter to be tested is pointing upward.
- Measure play between camshaft lobe and valve lifter.
- If play is greater than 0.2 mm, replace valve lifter. If minimal play of 0.1 mm or no play is measured, continue procedure as follows:

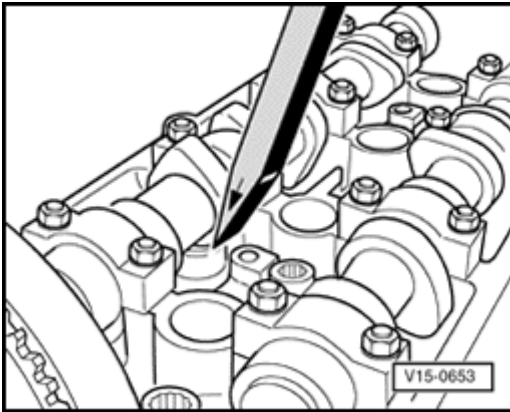


Fig. 99: Pressing Valve Lifter Downward Using Wedge
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lightly press valve lifter downward with a wood or plastic wedge.
- If 0.20 mm thick feeler gauge can be inserted between camshaft and valve lifter, replace valve lifter.

NOTE:

- **After installing new hydraulic valve lifters, do not operate the starter or allow the crankshaft to turn for at least 30 minutes. The hydraulic valve lifters need time to compress, otherwise valves may strike the pistons.**

Camshafts, removing and installing

(with cylinder head installed)

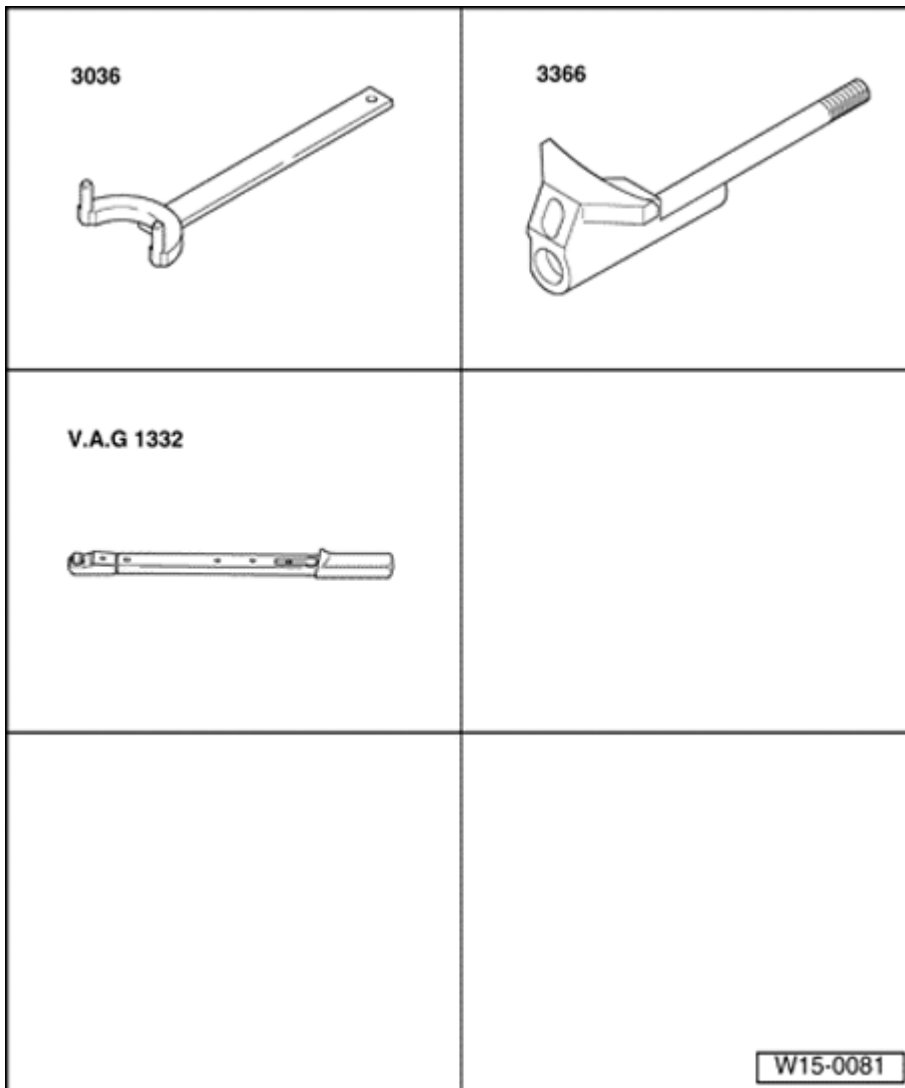


Fig. 100: Identifying Special Tools - Camshaft, Removing And Installing
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Counter-holder tool 3036
- Holder for chain tensioner 3366
- Torque wrench V.A.G 1332
- *Sealant D 454 300 A2*

Removing

- Bring lock carrier into service position --> **50 BODY, FRONT** .
- Remove upper toothed belt guard.

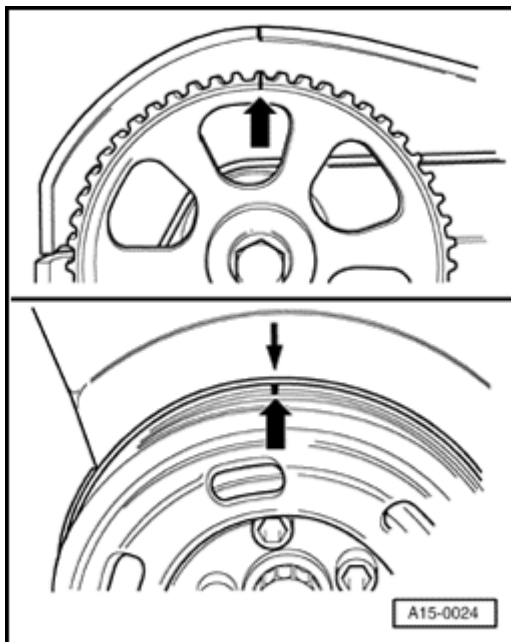


Fig. 101: Marking On Camshaft Gear Aligned With Marking On Cylinder Head Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bring camshaft gear to marking for TDC cylinder 1 by turning crankshaft. 1. Marking on camshaft gear must be flush with marking on cylinder head cover.
- Remove cylinder head cover.
- Loosen tensioner and remove toothed belt from camshaft sprocket.
- Turn crankshaft back slightly.
- Remove camshaft sprocket. To loosen bolt, counterhold camshaft gear using retainer 3036.
- Remove Hall sensor housing.
- Remove washer and cover for Hall sensor.

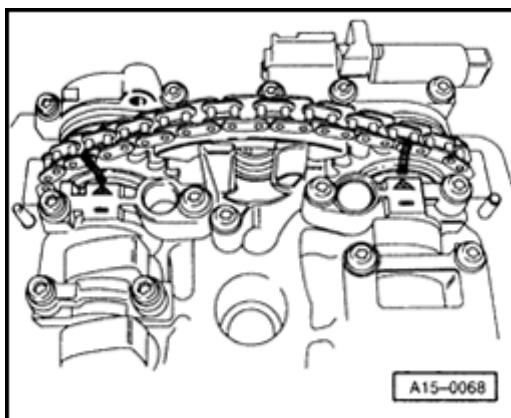


Fig. 102: Drive Chain And Camshaft Chain Sprockets Marked Installed Positions
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clean drive chain and camshaft chain sprockets across from both arrows on bearing caps and mark installed position with paint.

NOTE:

- Do not mark chain with a center punch, metal file, or any similar means.
- The distance between both arrows or colored markings consists of 16 rollers of the drive chain.

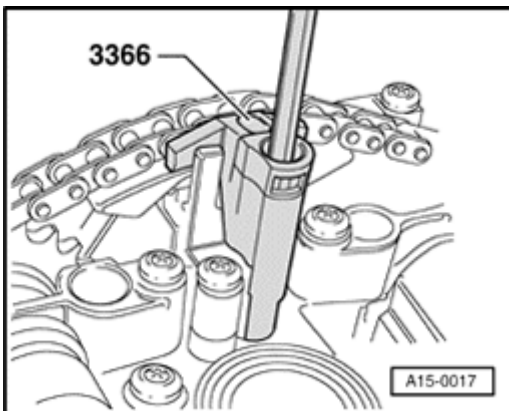


Fig. 103: Securing Camshaft Adjuster Or Chain Tensioner Using Bracket For Chain Adjustment 3366
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure crankshaft adjuster using bracket for chain adjustment 3366.

NOTE:

- If the chain tensioner retainer is fastened too tightly, the camshaft adjuster can be damaged.

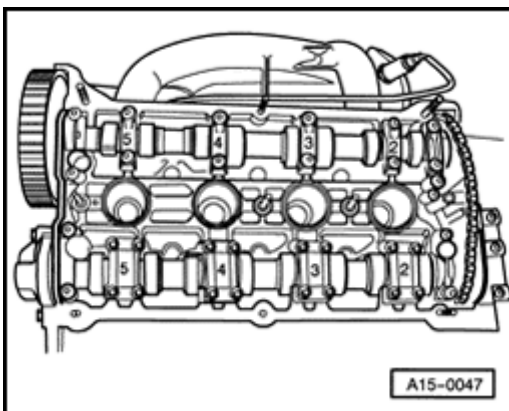


Fig. 104: Identifying Bearing Caps
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- First remove bearing caps 3 and 5 from intake and exhaust camshafts.
- Remove double bearing cap.
- Remove both bearing caps from chain gears on intake and exhaust camshafts.
- Remove bolts for camshaft adjuster.

- Alternating in diagonal sequence, loosen bearing caps 2 and 4 of intake and exhaust camshafts and remove.
- Remove intake and exhaust camshafts along with camshaft position adjuster and bracket for chain adjustment 3366.

Installing**NOTE:**

- **When installing the camshafts, the cam lobes for cylinder 1 must point upward.**
 - **When installing bearing caps, verify marking on cap is readable from intake side of cylinder head.**
- Place drive chain onto both camshaft sprockets according to color markings.

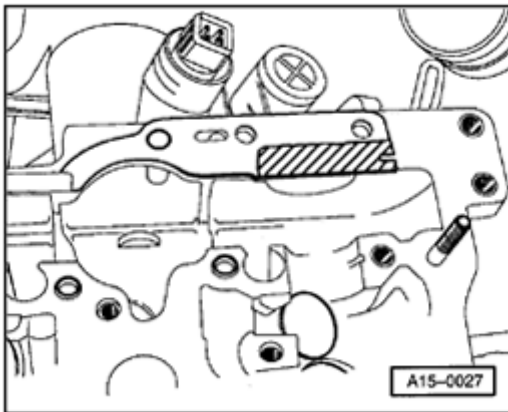
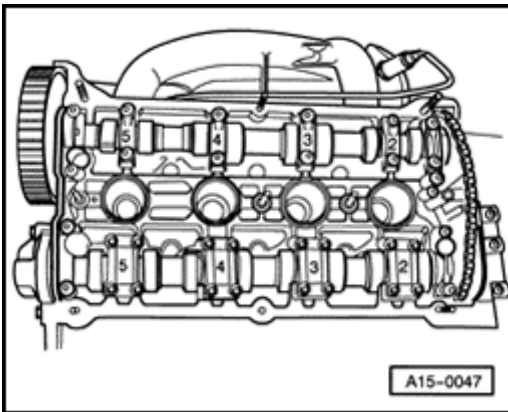


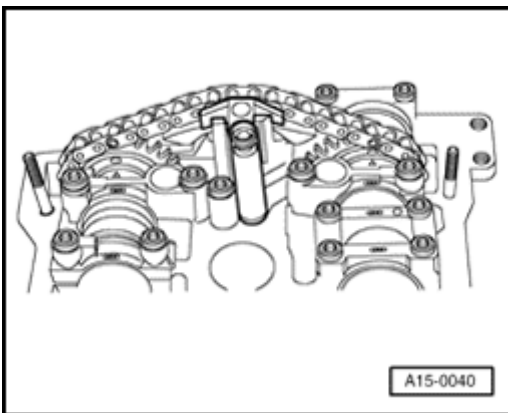
Fig. 105: Sealant Application Area Identified By Hatched Surface
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Replace rubber/metal seal for camshaft adjuster or chain tensioner and coat hatched surface with thin coat of *sealant D 454 300 A2*.
- Push camshaft adjuster in between drive chain.
- Lubricate journal surfaces of both camshafts with clean engine oil.
- Place camshafts with drive chain and camshaft adjuster into cylinder head.
- Tighten camshaft adjuster to 10 Nm (pay attention to bushing).

**Fig. 106: Identifying Bearing Caps**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Alternating in diagonal sequence, tighten bearing caps 2 and 4 of intake and exhaust camshafts and tighten to 10 Nm (pay attention to bushing).

**Fig. 107: Identifying Bearing Caps**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install both bearing caps on chain gears of intake and exhaust camshafts. Check camshaft for proper adjustment and tighten bearing cap to 10 Nm (pay attention to alignment bushing).
- Remove bracket for chain adjustment 3366.

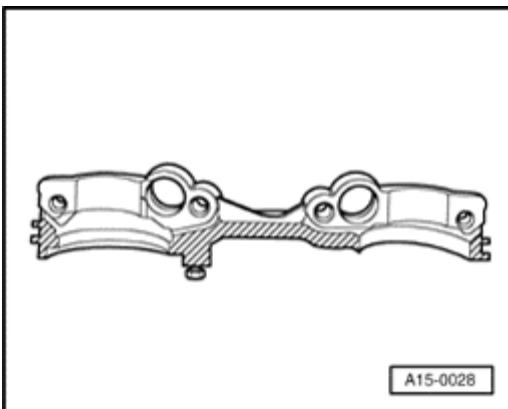
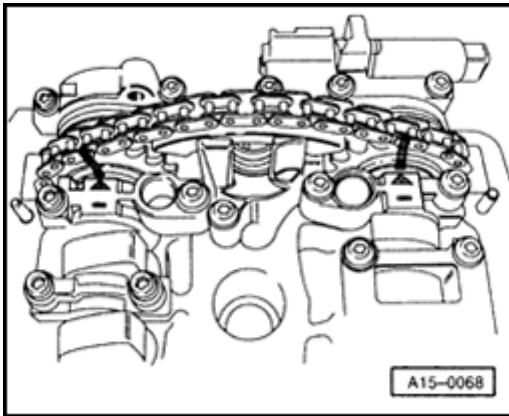


Fig. 108: Identifying Double Bearing Cap Sealant Application Area

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Coat hatched surface of double bearing cap lightly using *sealant D 454 300 A2* , install and tighten to 10 Nm (pay attention to bushing).
- Install remaining bearing cap and tighten to 10 Nm (pay attention to alignment bushing).

**Fig. 109: Drive Chain And Camshaft Chain Sprockets Marked Installed Positions**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check setting of camshafts to each other.

The rest of assembly is basically a reverse of disassembling sequence.

Toothed belt, installing and tensioning --> **Toothed belt, removing, installing and tensioning**

NOTE:

- After installing camshafts, do not operate the starter or allow the crankshaft to turn for at least 30 minutes. The hydraulic valve lifters need time to compress, otherwise valves may strike the pistons.

Valve guides, checking

Special tools, testers and auxiliary items required

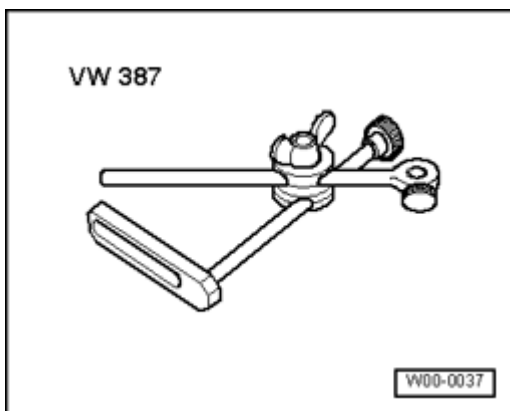
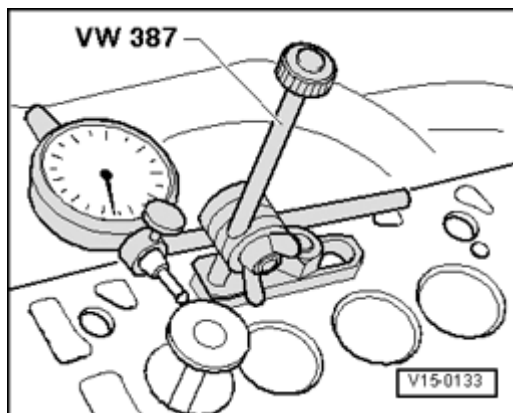


Fig. 110: Dial Gauge Holder VW 387**Courtesy of VOLKSWAGEN UNITED STATES, INC.**

- Dial gauge holder VW 387
- Dial gauge

Test sequence

**Fig. 111: Determining Valve Rock (Wear limit)****Courtesy of VOLKSWAGEN UNITED STATES, INC.**

- Insert new valve into guide. Valve stem tip must seal with guide. Due to slight difference in stem dimensions, ensure that only an intake valve is used in the intake guide and an exhaust valve in the exhaust guide.
- Measure side play.
- Wear limit: 0.8 mm

If side play exceeds 0.8 mm:

- Replace cylinder head.

Valve stem seals, replacing

(with cylinder head installed)

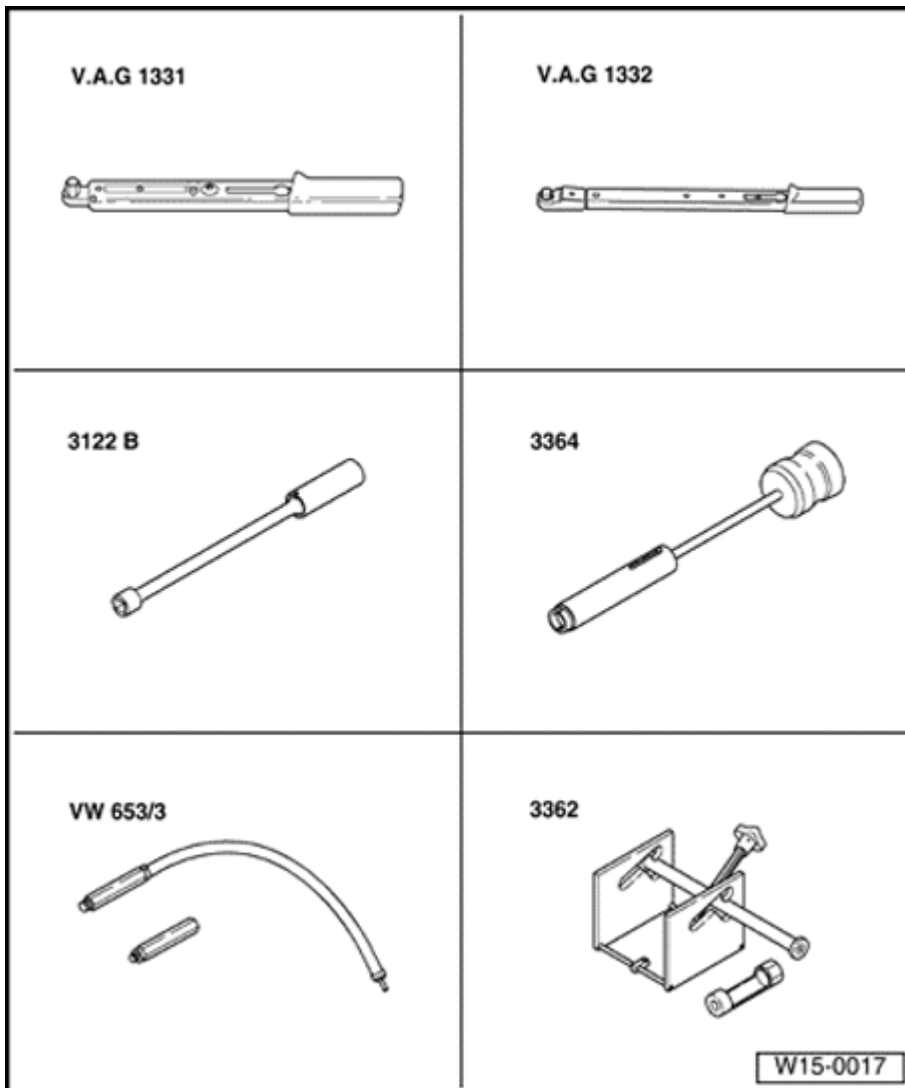


Fig. 112: Identifying Special Tools - Valve Stem Oil Seals, Replacing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332
- Spark plug removal tool 3122B
- Valve seal removal tool 3364
- Pressure hose VW 653/3
- Valve spring compressor 3362 and thrust piece 3362/1

Special tools, testers and auxiliary items required

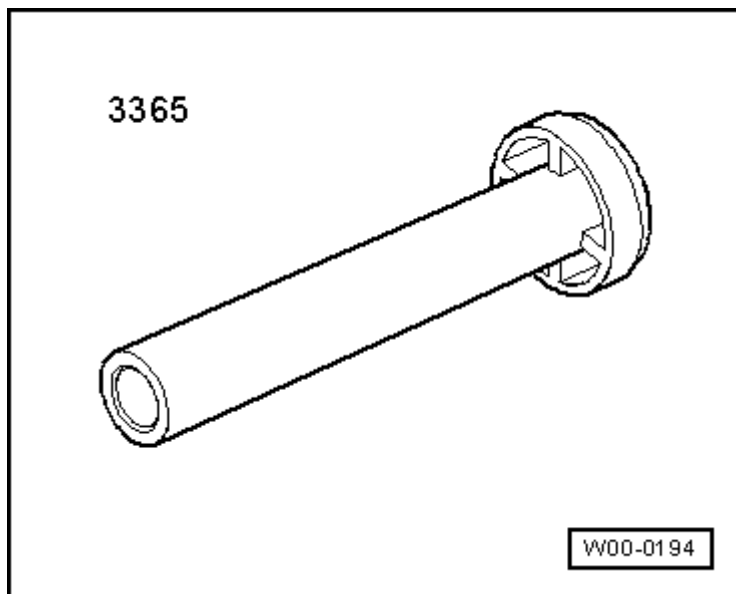


Fig. 113: Valve Stem Seal Driver 3365

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Valve stem seal driver 3365

Removing

- Remove camshafts --> **Camshafts, removing and installing.**
- Remove the valve lifters and place on running surface when setting down. Be careful not to switch valve lifters.
- Remove spark plugs with spark plug removal tool 3122B.
- Move piston for individual cylinder to "Bottom Dead Center (BDC) position".
- Thread pressure hose VW 653/3 into spark plug thread.

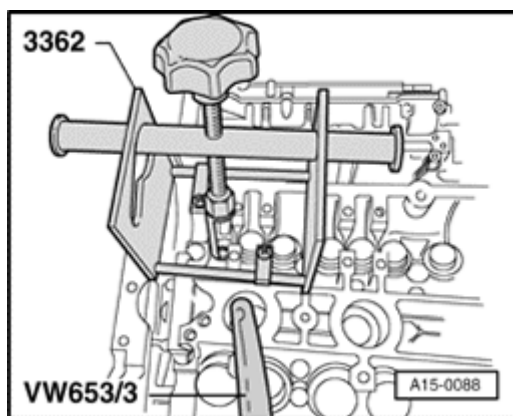


Fig. 114: Secure Valve Spring Compressor 3362 Secured To Cylinder Head

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Using retaining bolts bolted in tool, secure valve spring compressor 3362 to cylinder head.
- Set valve spring compressor in the following position:
- Outer intake valves: Lower position Center intake valve: Upper position Exhaust valves: Lower position
- Connect compressed air hose to a pressure of at least 6 bar and then remove valve springs.

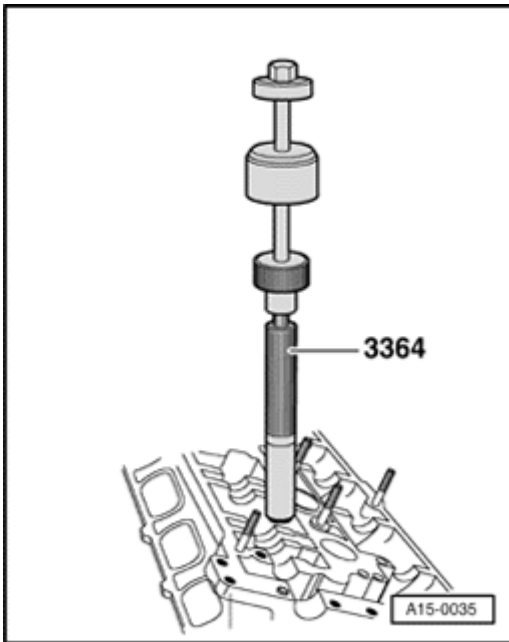


Fig. 115: Removing Valve Stem Seals Using Valve Stem Removal Tool 3364
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull off valve stem seals with valve stem removal tool 3364.

Installing

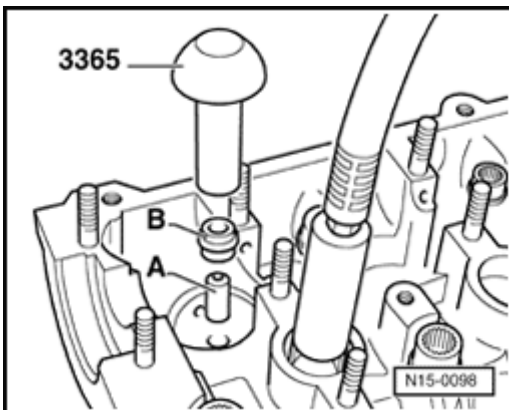


Fig. 116: Identifying Plastic Sleeve, Valve Stem Oil Seal And Valve Stem Seal Diver 3365
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Attach plastic sleeves provided - A - to respective valve stem. This will help avoid damage to new valve stem oil seal - B -.

- Insert new valve stem oil seal - **B** - into valve stem seal driver 3365.
- Grease lip of valve stem oil seal - **B** - and carefully slide onto valve guide.

The rest of assembly is basically a reverse of the disassembling sequence.

17 LUBRICATION

LUBRICATION SYSTEM COMPONENTS, REMOVING AND INSTALLING

Lubrication system components, removing and installing

NOTE:

- The oil level must not be above the max. mark - danger of damage to catalytic converter! Markings Markings on oil dipstick .
- If large quantities of metal particles or abraded material are detected during engine repairs, it may be an indication of damaged crankshaft or rod bearings. To prevent further damage, perform the following steps after the repair.
- Carefully clean oil passages
- Replace oil injection jets
- Replace oil cooler
- Replace oil filter

Engine oil --> Engine oil

Assembly overview --> Assembly overview

Oil pan, removing and installing --> Oil pan, removing and installing

Oil pressure and oil pressure switch, checking --> Oil pressure and oil pressure switch, checking

Engine oil

Oil system capacity:

Without oil filter: 3.0 L * See note

With small oil filter (dia. approx. 76 mm) 3.5 L * See note

With large oil filter (dia. approx. 93 mm) 3.9 L

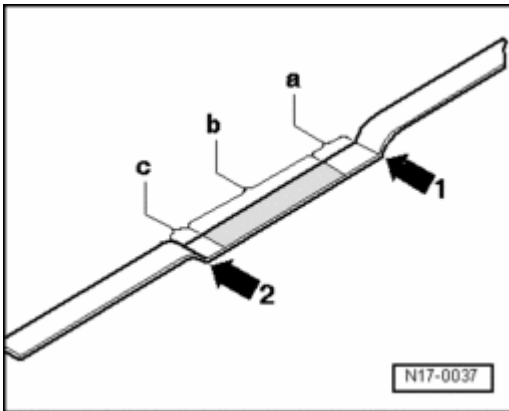
* Actual value:

Engine oil specifications

Use engine oil in compliance with VW standard 503 00.

NOTE:

- Engine oil conforming to VW standard 500 00, 501 01, or 502 00 may continue to be used. The oil must be changed every 12 months or every 15,000 km and the Service Reminder Indicator (SRI) must be programmed accordingly. Procedure 36.
- For vehicles up to model year 1999, engine oil specification VW 503 00 must not be used.

Markings on oil dipstick**Fig. 117: Identifying Dipstick Markings****Courtesy of VOLKSWAGEN UNITED STATES, INC.**

1 - Max. mark

2 - Min. mark

a - Area above hatched field up to Max. mark: Do not replenish with engine oil!

b - Oil level within hatched field: Oil may be topped off.

c - Area from Min. mark up to hatched field: Replenish with max. 0.5 liter. of engine oil!

Assembly overview**Part I**

Part II: Disassemble oil filter bracket.

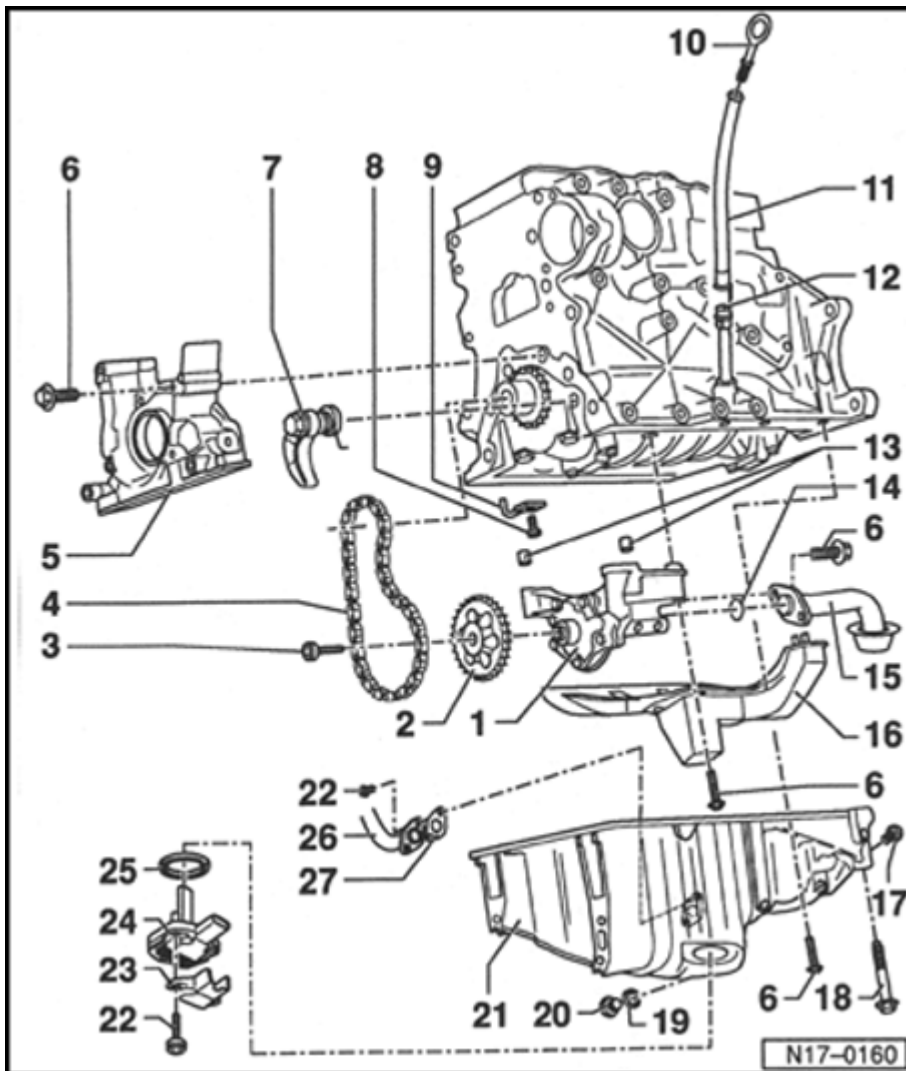


Fig. 118: Lubrication System, Assembly Overview (Part I)
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Oil pump

- With pressure relief valve 12 bar
- Before installing, check to be sure both alignment bushings are present (for centering oil pump/cylinder block)
- Replace if evidence of scoring or striation is present on contact surfaces and gears.

2 - Chain sprocket

3 - 20 Nm

4 - Chain

5 - Sealing flange

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

- With seal
- Must be located on dowel sleeves
- Removing and installing --> **Front sealing flange, removing and installing**
- Insert with *silicone sealant D 176 404 A2* --> **Front sealing flange, removing and installing**

6 - 15 Nm

7 - Chain tensioner with tensioning rail, 15 Nm

- When installing, pretension spring and hook in.

8 - 25 Nm

- Install without sealant

9 - Oil spray jet

- For piston cooling

10 - Oil dipstick

- Oil level must not be above the max. mark!
- Marks **Markings on oil dipstick**

11 - Inlet spout

- For extracting oil

12 - Guide tube

13 - Locating sleeves

14 - O-ring

- Replace

15 - Suction line

- Clean strainer if clogged.

16 - Baffle

17 - 45 Nm

- Connecting bolt oil pan-transmission

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

18 - 45 Nm

19 - Oil seal

- Replace

20 - Oil drain plug, 30 Nm

- Replace screw with permanent sealing ring

21 - Oil pan

- Clean sealing surface before installing
- Install with *silicone sealant D 176 404 A2* --> **Oil pan, removing and installing**

22 - 10 Nm

23 - Cover

24 - Oil level thermal sensor G266

25 - Oil seal

- Replace
- Oil before assembling

26 - Oil return line

- From turbocharger

27 - Seal

- Replace

Part II

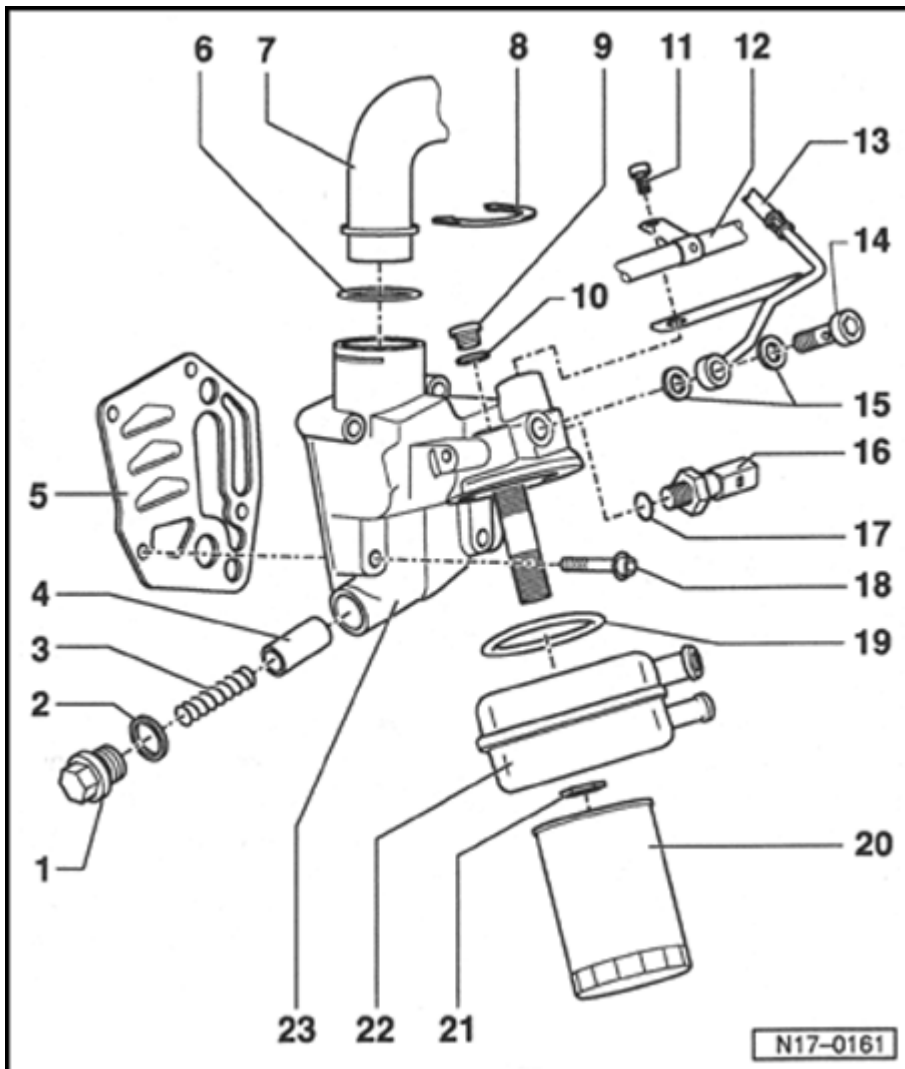


Fig. 119: Lubrication System, Assembly Overview (Part II)
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 1 - Locking bolt, 40 Nm
- 2 - Oil seal
 - If sealing ring is leaking cut open and replace.
- 3 - Spring
 - For pressure relief valve, approx. 4 bar
- 4 - Piston
 - For pressure relief valve, approx. 4 bar

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

5 - Seal

- Replace

6 - Oil seal

7 - Pipe

8 - Retaining clip

9 - Locking bolt, 15 Nm

10 - Oil seal

- If sealing ring is leaking cut open and replace.

11 - 20 Nm

12 - Lower coolant line

13 - Oil supply line

- To turbocharger

14 - Banjo bolt, 30 Nm

15 - Seal

- Replace

16 - Oil pressure switch F1 , 25 Nm

- 1.4 bar
- Checking --> **Oil pressure and oil pressure switch, checking**

17 - Oil seal

- If sealing ring is leaking cut open and replace.

18 - 15 Nm plus $\frac{1}{4}$ turn (90 °)

- Replace

19 - Seal

- Replace

- Snaps into the tabs of oil cooler

20 - Oil filter element

- Remove with tension strap
- Fasten by hand
- Observe installation instructions for oil filter

21 - 25 Nm**22 - Oil cooler**

- Ensure sufficient clearance to surrounding components
- See note --> **Lubrication system components, removing and installing**
- Coat contact surfaces to oil filter bracket outside seal with *AMV 188 100 02*

23 - Oil filter bracket

- With pressure relief valve, approx. 4 bar
- With pressed in check-valve

Oil pan, removing and installing

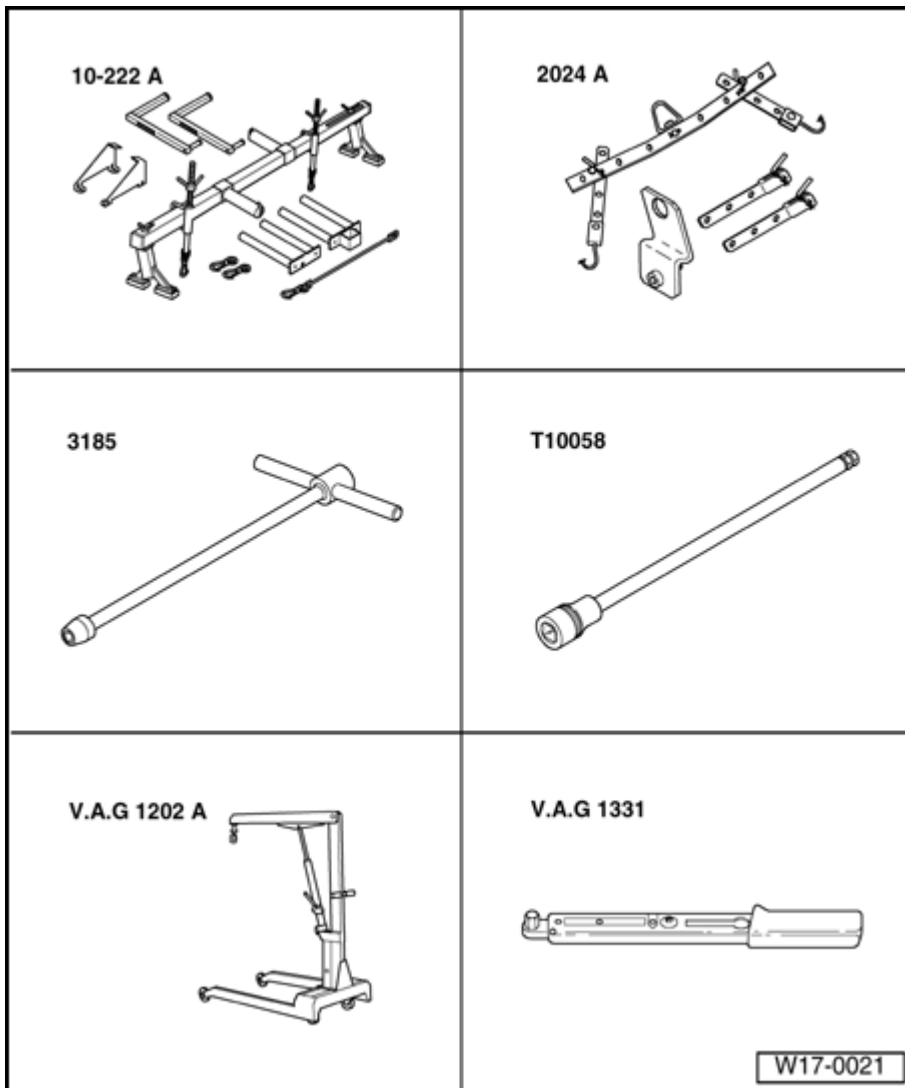


Fig. 120: Identifying Special Tools - Oil Pan, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Engine support bridge 10-222A with feet 10-222 A/1
- Lifting tackle 2024A
- SW 10 hex ball socket 3185
- Hex ball socket T10058
- Shop crane V.A.G 1202A
- Torque wrench V.A.G 1331
- Hand drill with plastic brush attachment
- *Silicone sealant D 176 404 A2*

Removing

- Bring lock carrier into service position --> **50 BODY, FRONT** .
- Drain engine oil.

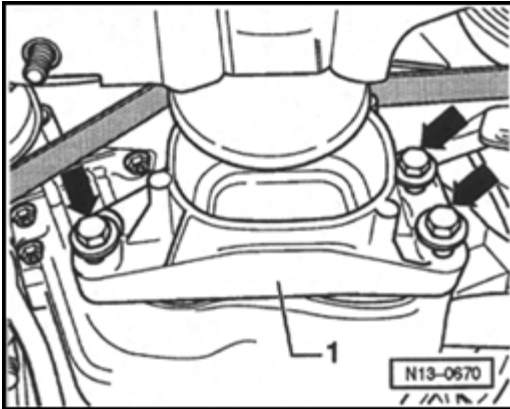


Fig. 121: Identifying Limit Stop

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unbolt stop - **1** - - **arrows** -.

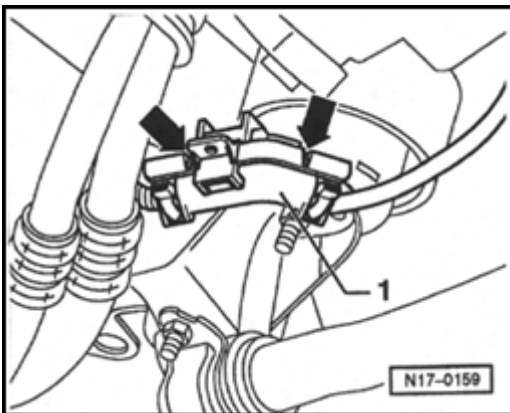
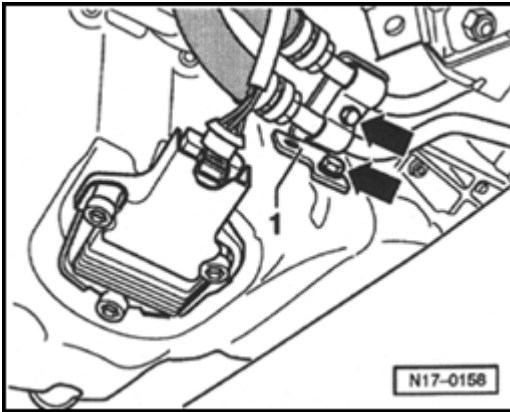


Fig. 122: Starter Wire Mount

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unclip lower section - **1** - of starter wire mount - **arrows** -.
- Disconnect turbocharger oil return line at oil pan.

Vehicles with automatic transmission

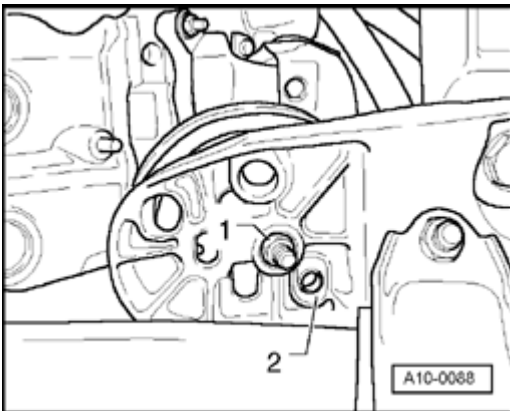
**Fig. 123: ATF Line Bracket**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bracket - **1** - for ATF lines - **arrows** -.

Continued for all vehicles

- Disconnect connector from Oil Level Thermal Sensor G266.

**Fig. 124: Threaded Connections And Positioning Sleeves On Lower Engine Mounts**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Mark installed position of threaded connection - **1** - and lower locating sleeve - **2** - on left and right engine mounts.
- Unbolt both lower engine mounts.

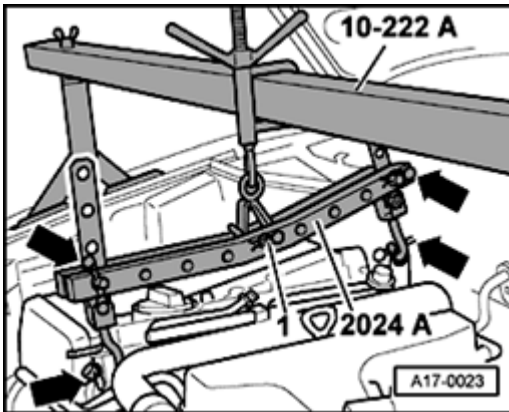


Fig. 125: Installing Engine Support Bridge 10-222A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install engine support bridge 10-222A as shown.
- Remove eyelet for Engine Sling 2024A.
- Insert bolt - 1 - in the center bore of engine sling again and secure with a cotter pin.
- Hook engine sling bolt 2024A into engine support bridge spindle 10-222A.
- Hook engine sling 2024A into sling clamps at front and rear of engine.

CAUTION: Lifting hooks and alignment pins on the engine sling must be secured with securing pins - arrows - in the illustration.

- Lift engine with engine support bridge spindle as far as possible or until T-piece of the crankcase ventilation lies against bulkhead (approx. 20 mm).

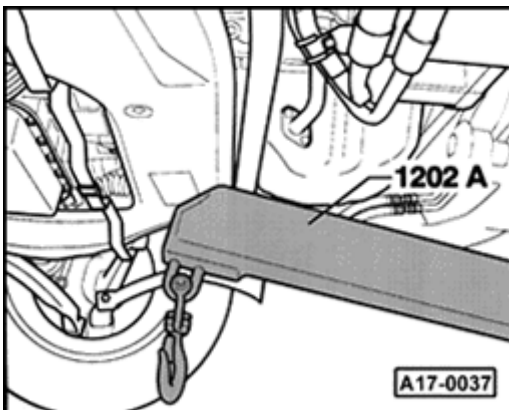


Fig. 126: Subframe Supported Using Workshop Crane V.A.G 1202 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Support subframe with workshop crane V.A.G 1202A.

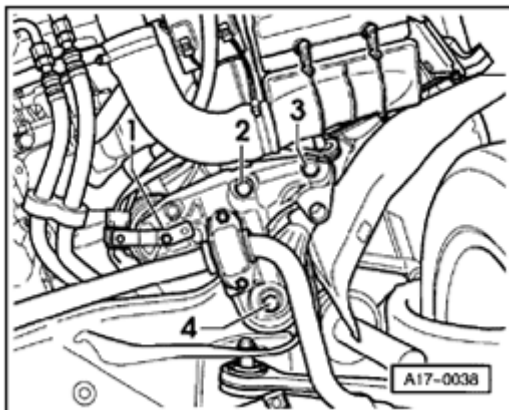


Fig. 127: Front Bolts At Left And Right Sides Of Subframe
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- First remove front bolts - 2 - and - 3 - from left and right sides of subframe. Then remove bolts - 4 -.

NOTE:

- To avoid performing a wheel alignment, the subframe must only be loosened and lowered at the front end.

Vehicles with manual transmission

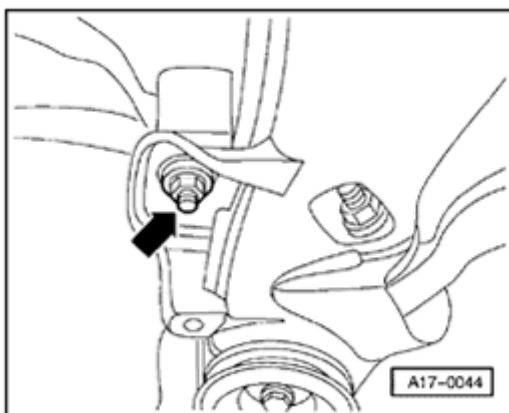


Fig. 128: Left Transmission Mount Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen left transmission mount nut - **arrow** - until it is aligned with lower edge of bolt (approx. 4 turns).

Vehicles with automatic transmission

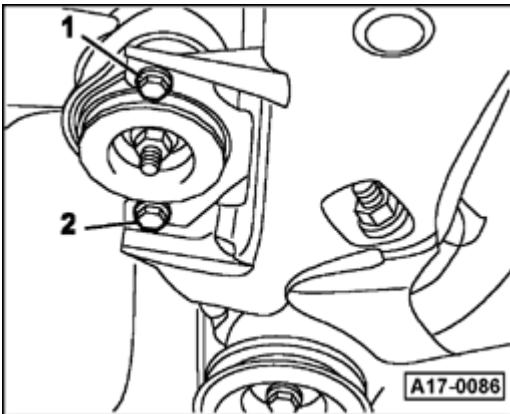


Fig. 129: Identifying Bolt Removal Sequence For Left Transmission Mount
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen rear bolt - **2** - for left transmission mount a few turns and remove front bolt - **1** - for left transmission mount.

Continued for all vehicles

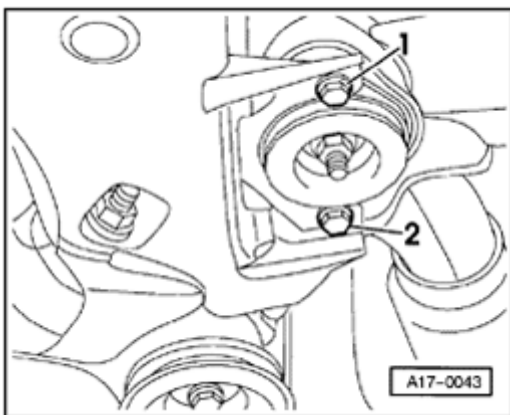


Fig. 130: Right Transmission Mount Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen rear bolt - **2** - of right-hand transmission mount a few turns. Remove front bolt - **1** - of right-hand transmission mount.

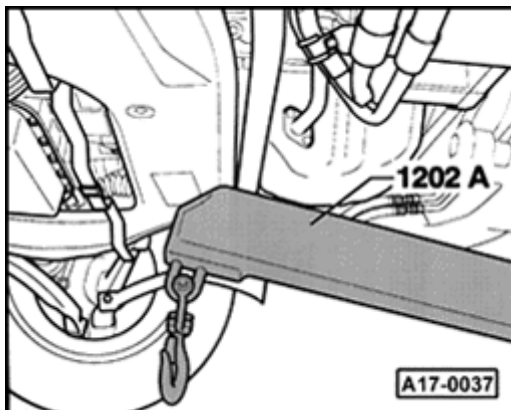


Fig. 131: Subframe Supported Using Workshop Crane V.A.G 1202 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lower subframe slowly with shop crane.
- Remove shop crane and swing stabilizer bar downward.
- Remove oil pan.

NOTE:

- Use SW 10 flex wrench 3185 to loosen and tighten the rear inner oil pan bolts, and use hex ball socket T10058 to remove and drive in bolts.

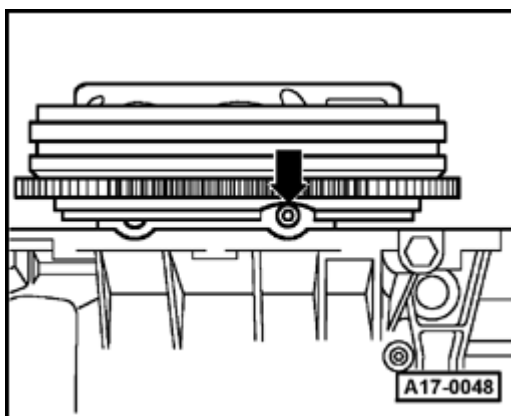


Fig. 132: Identifying Notches In Flywheel
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Both rear inner oil pan bolts can be reached through the notches in the flywheel - **arrow** - on vehicles with manual transmission. To do this, turn the flywheel accordingly.
- Remove oil pan. Loosen oil pan with light blows of a rubber mallet if necessary.
- To swing the oil pan over the subframe, swing rear of oil pan to left and push left side of subframe downward somewhat.
- Remove sealant residue from cylinder block with a flat scraper.

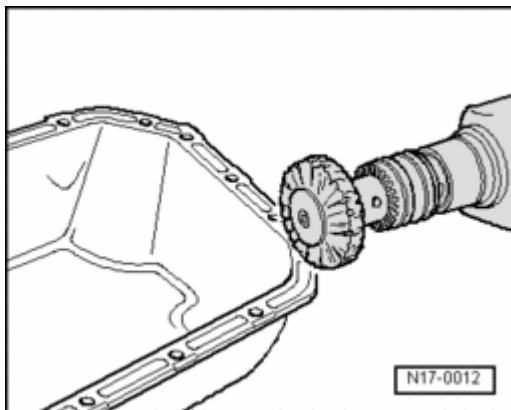


Fig. 133: Removing Sealant Residue From Oil Pan With A Rotating Brush
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove sealant residue from pan with a rotating brush, e.g. a hand drill with a plastic brush attachment (wear eye protection).
- Clean sealing surfaces. Sealing surfaces must be free of oil and grease.

Installing

NOTE:

- When installing the oil pan on a removed engine, make sure that the flywheel end of the oil pan is aligned flush with the intermediate plate, therefore the oil pan must extend beyond the cylinder block by 0.8 mm.
- Note the expiration date of the sealing compound.
- The oil pan must be installed and fastened within 5 minutes after application of silicone sealant.

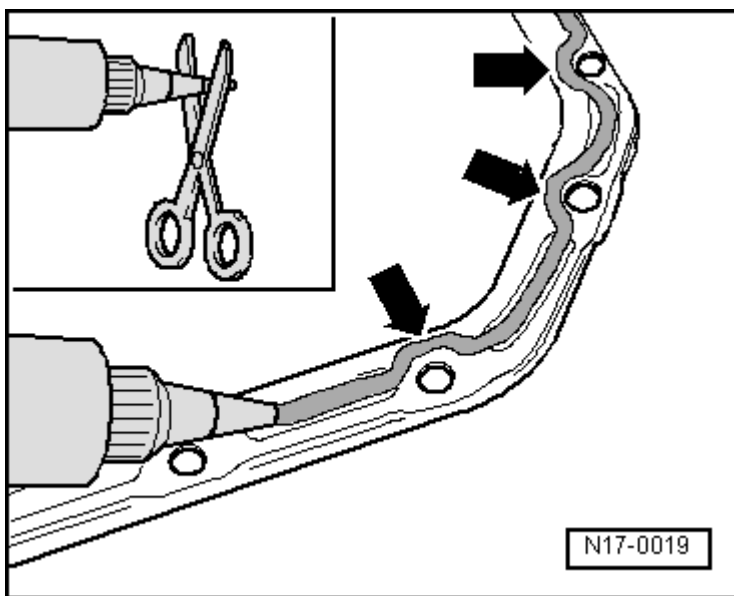


Fig. 134: Applying Sealant To Clean Sealing Surface
Courtesy of VOLKSWAGEN UNITED STATES, INC.

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

- Cut tube nozzle at front marking (nozzle dia. approx. 3 mm).
- Apply *silicone sealant D 176 404 A2* , as shown, to clean oil pan sealing surface. Sealing compound bead must be:
 - 2 to 3 mm thick
 - and run on inside of bolt holes - **arrows** -

NOTE:

- The sealing compound bead must not be thicker, otherwise excess sealing compound may enter the oil pan and block the oil suction pipe strainer.

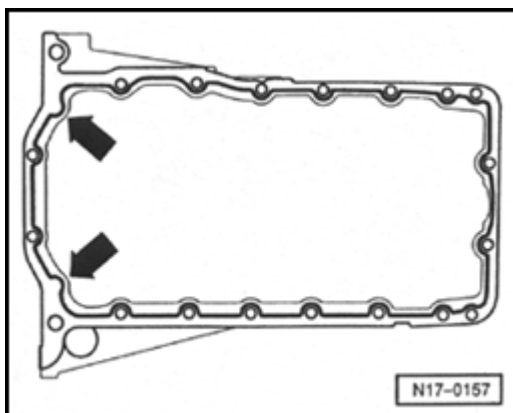


Fig. 135: Applying Sealant To Clean Sealing Surface Of Oil Pan

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Apply *silicone sealant D 176 404 A2* as illustrated to clean sealing surface of oil pan.

NOTE:

- Apply the sealant at the rear area of the sealing flange very carefully. There are two holes in the cylinder block at the areas identified with - **arrows** -.

- Before installing oil pan, insert the right vertical bolt M10 into oil pan.
- Install oil pan immediately and tighten all bolts lightly.
- Tighten the M7 oil pan bolts in a diagonal sequence to 15 Nm.
- Tighten the M10 oil pan/cylinder block bolts to 45 Nm.
- Tighten oil pan/transmission bolts to 45 Nm.

NOTE:

- After installing oil pan, allow sealant to harden for approx. 30 minutes before refilling engine oil.

The rest of assembly is basically a reverse of the disassembling sequence.

- Install subframe --> **40 FRONT SUSPENSION**

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

Tightening torques

Component		Nm
Engine mount to subframe		25
Stop/torque bracket		30
Transmission support to transmission mount	M10	40
Transmission mount to subframe	M8	25
Turbocharger oil return line to oil pan		10

Oil pressure and oil pressure switch, checking

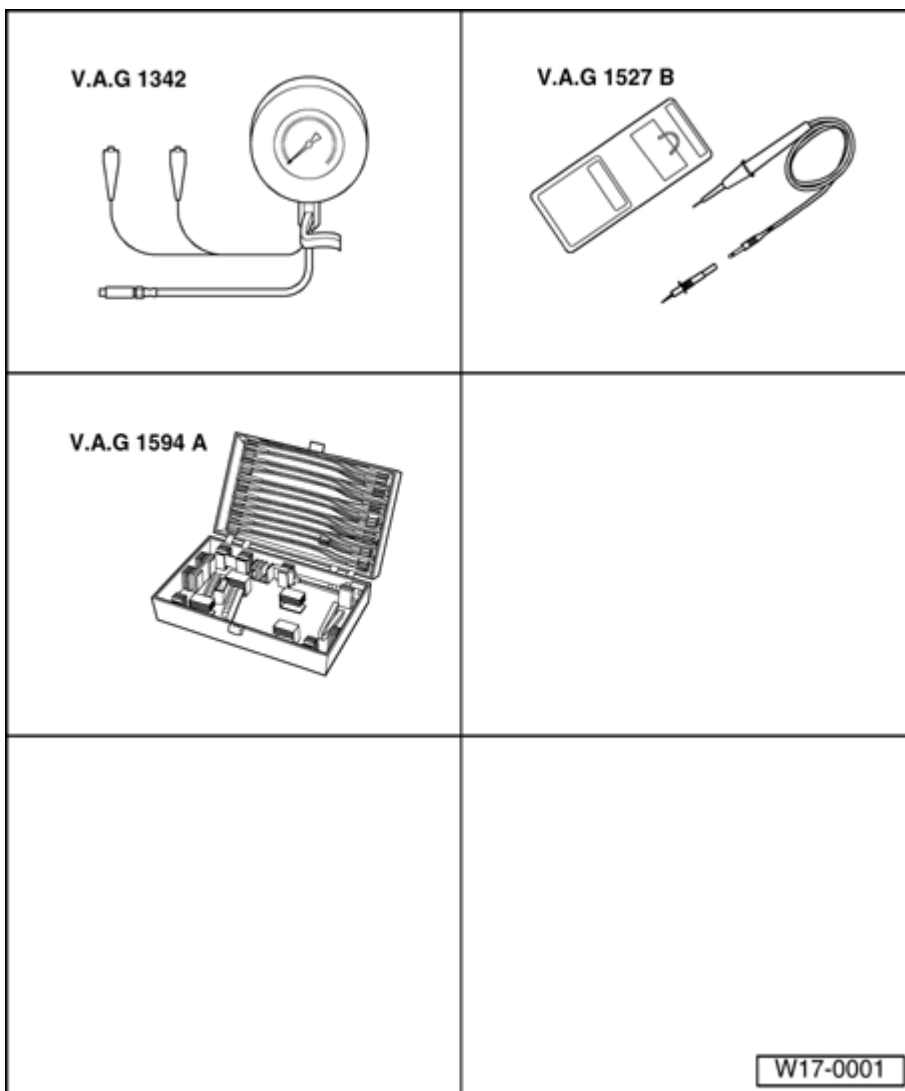


Fig. 136: Identifying Special Tools - Oil Pressure And Oil Pressure Switch, Checking
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

- Oil pressure gauge V.A.G 1342
- Voltage tester V.A.G 1527 B
- Connector test set V.A.G 1594 A

NOTE: • **Function test and servicing the optical and acoustic oil pressure indicator.**

Test sequence

- Remove oil pressure switch F1 and screw into oil pressure gauge.
- Screw oil pressure gauge into the oil filter bracket in place of the oil pressure switch.
- Connect brown wire of tester to ground (-).
- Connect diode test lamp V.A.G 1527 B using adapter cables from connector test kit V.A.G 1594 A to B+ and oil pressure switch.
- LED must not light up.
- If LED lights up, replace 1.4 bar Oil Pressure Switch F1.

If LED does not light up:

- Start the engine and run at idle speed.
- LED must light up at 1.2 to 1.6 bar pressure, otherwise replace oil pressure switch.
- Increase engine speed further.
- At 2000 RPM and a coolant temperature of 80 ° C, oil pressure must be between 2.5 to 4.5 bar.
- At higher engine speeds oil pressure must not exceed 7.0 bar

If specifications are not obtained:

- Examine the pick-up screen for clogging.
- Correct mechanical damage, e.g. bearing damage.

If no condition is found:

- Replace oil filter bracket with pressure relief valve , and oil pump.

19 COOLING SYSTEM

COOLING SYSTEM COMPONENTS, REMOVING AND INSTALLING

Cooling system components, removing and installing

CAUTION: When doing any repair work, especially in the engine compartment, pay attention to the following due to clearance issues:

- Route all the various lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum lines and hoses) and electrical wiring so that the original positions are restored.
- Ensure sufficient clearance to all moving or hot components.

NOTE:

- When the engine is warm the cooling system is under pressure. If necessary release pressure before commencing repair work.
- Hoses are secured with spring-type clips. In cases of repair only use spring-type clips.

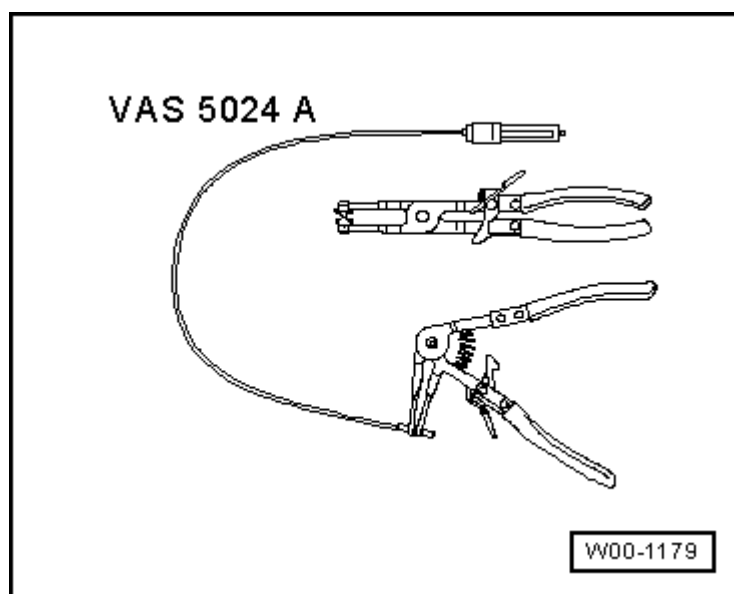


Fig. 137: Spring-Type Clip Pliers VAS 5024A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- The spring-type clip pliers VAS 5024 A are recommended for installing spring-type clips.
- When installing coolant hoses, make sure they are free of stress and do not come into contact with other components (observe markings on coolant connections and hoses).

Perform cooling system leakage test with cooling system tester V.A.G 1274 and adapters V.A.G 1274/8 and V.A.G 1274/9.

Cooling system components (on body), assembly overview --> **Cooling system components (on body), assembly overview.**

Cooling system components (on engine), assembly overview --> **Cooling system components (on engine), assembly overview.**

Coolant hose connection diagram --> **Coolant hose connection diagram.**

Draining and filling with coolant --> **Cooling system, draining and filling** .

Coolant mixture ratios --> **Cooling system, draining and filling** .

Cooling system components (on body), assembly overview

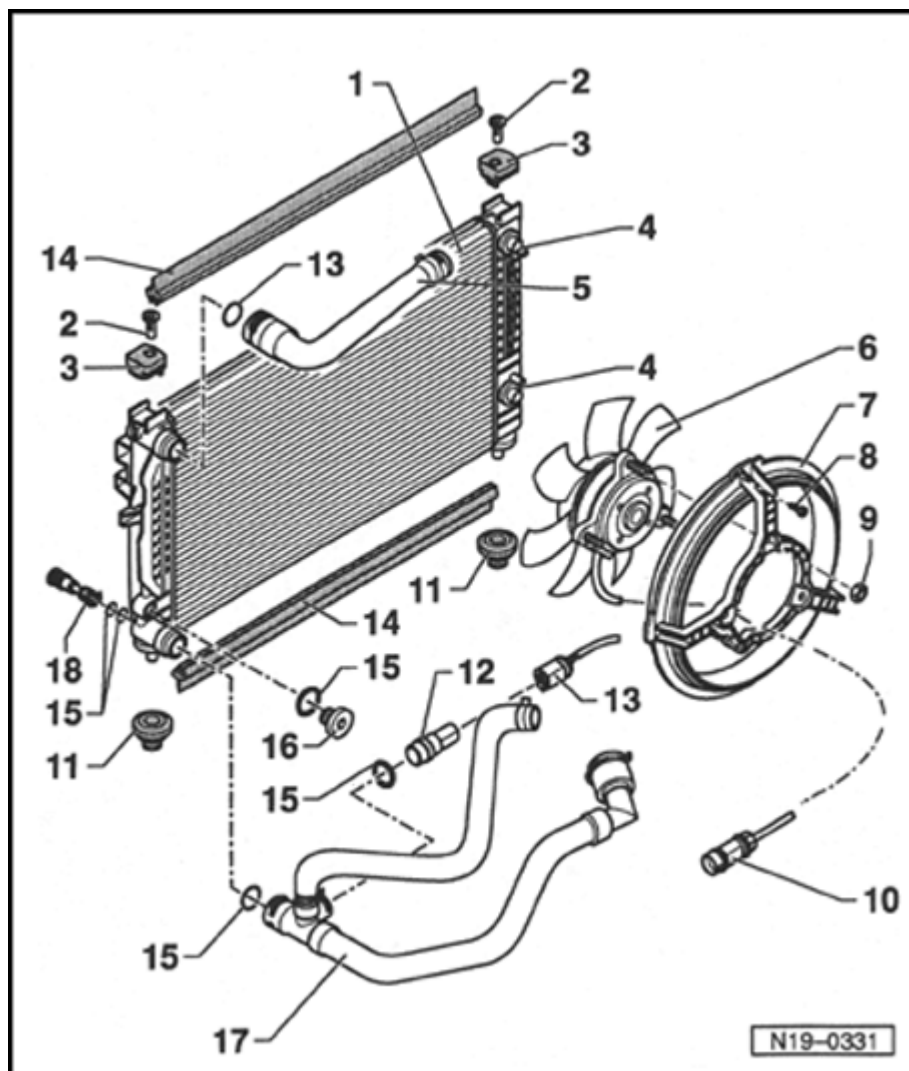


Fig. 138: Cooling System Components (On Body), Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Radiator

- Removing and installing --> **Radiator, removing and installing**
- After replacing replace entire amount of coolant
- With ATF cooler, on vehicles with automatic transmission --> 5 Spd. Automatic Transmission 01V Front Wheel Drive - **37 AUTOMATIC TRANSMISSION - CONTROLS, HOUSING** .
- Clean ATF cooler --> 5 Spd. Automatic Transmission 01V Front Wheel Drive - **37 AUTOMATIC TRANSMISSION - CONTROLS, HOUSING** .

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

2 - Securing pin

3 - Securing rubber

4 - Connection piece for ATF line

- Only for vehicles with automatic transmission

5 - Upper coolant hose

- Secured to radiator with a retaining clip
- Ensure hose is seated tightly
- Coolant hose connection diagram --> Coolant hose connection diagram

6 - Coolant fan V7

7 - Fan ring

8 - Bolt

9 - 10 Nm

10 - 2-pin connector

11 - Rubber bushing

12 - Coolant fan control (FC) thermal switch F18

- For electric fan
- Switch temperatures:
 - Low speed on: 92 to 97 ° C Low speed off: 84 to 91 ° C High speed on: 99 to 105 ° C High speed off: 91 to 98 ° C
- Secured with retaining clip

13 - Connector

- Black, 4-pin
- For Coolant Fan Control (FC) thermal switch

14 - Sealing strip

- On top and bottom of radiator

15 - O-ring

- Replace if damaged

16 - Locking bolt, 10 Nm

17 - Lower coolant hose

- Secured to radiator and connection piece with a retaining clip
- Ensure seated tightly
- Coolant hose connection diagram --> **Coolant hose connection diagram**

18 - Drain plug, 10 Nm

Cooling system components (on engine), assembly overview

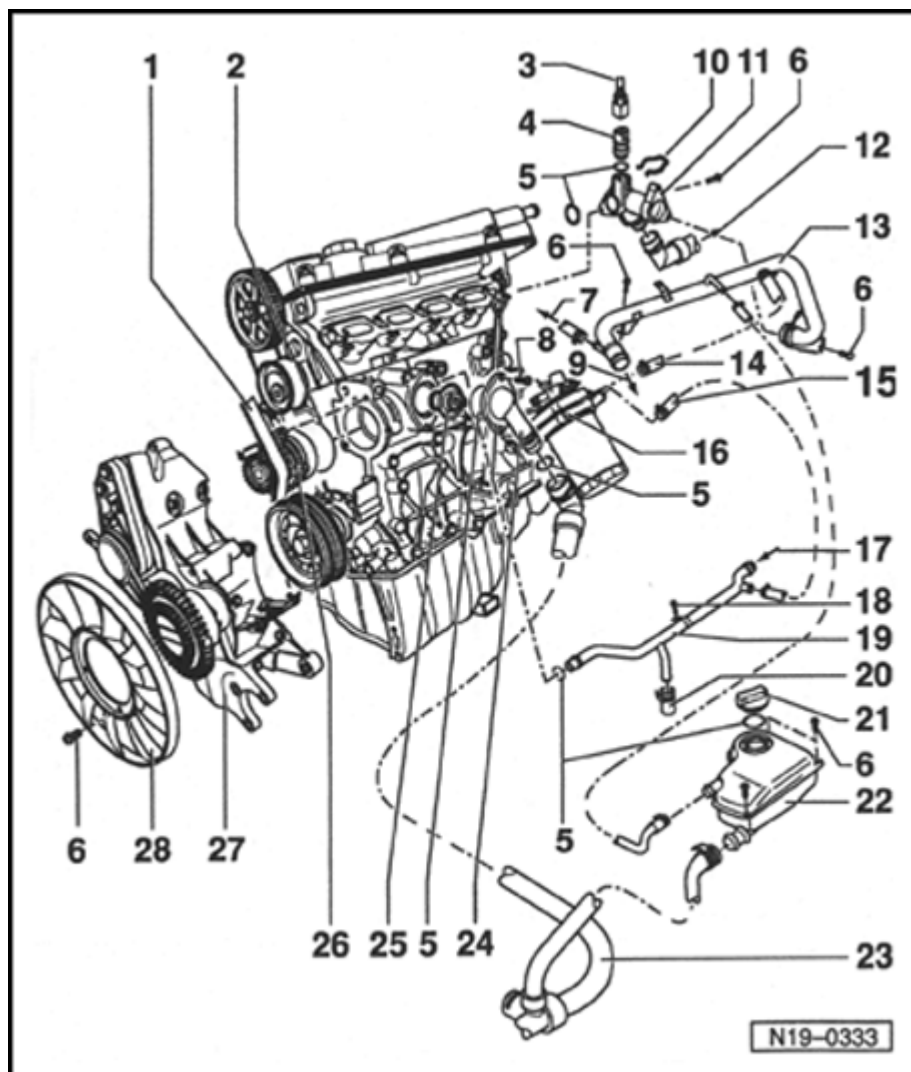


Fig. 139: Cooling System Components (On Engine), Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Toothed belt

- Mark direction of rotation before removing
- Check for wear
- Do not kink
- Removing and installing, tensioning --> **Toothed belt, removing, installing and tensioning**

2 - O-ring

- Replace

3 - Connector

- 4-pin

4 - Engine coolant temperature (ECT) sensor G62

- For engine control module
- If necessary release pressure in cooling system before removing

5 - O-ring

- Replace if damaged

6 - 10 Nm**7 - To turbocharger****8 - 15 Nm****9 - To upper radiator**

- Coolant hose connection diagram --> **Coolant hose connection diagram**

10 - Retaining clip

- Check for secure seat

11 - Connecting piece**12 - To heater core**

- Coolant hose connection diagram --> **Coolant hose connection diagram**

13 - Upper coolant line

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

- Secured to cylinder head
- Coolant hose connection diagram --> **Coolant hose connection diagram**

14 - Coolant hose

- Coolant hose connection diagram --> **Coolant hose connection diagram**

15 - Coolant hose

- Coolant hose connection diagram --> **Coolant hose connection diagram**

16 - Oil cooler

17 - From heater core

- Coolant hose connection diagram --> **Coolant hose connection diagram**

18 - 20 Nm

19 - Lower coolant line

- Fastened to oil filter bracket
- Coolant hose connection diagram --> **Coolant hose connection diagram**

20 - Sealing plugs

- Ensure seated tightly

21 - Cap

- Check using cooling system tester V.A.G 1274 and adapter V.A.G 1274/9
- Test pressure 1.4 to 1.6 bar pressure

22 - Coolant reservoir

- Check using cooling system tester V.A.G 1274 and adapter V.A.G 1274/8

23 - Lower coolant hose

- From lower radiator
- Coolant hose connection diagram --> **Coolant hose connection diagram**
- Secured to radiator and connection piece with a retaining clip
- Ensure seated tightly

24 - Connecting piece

25 - Coolant thermostat

- Installed location:
 - Clip must stand vertical
- Checking:
 - Heat up thermostat in water Opening begins: approx. 86 ° C Opening lift: at least 7 mm

26 - Coolant pump

- Check for ease of movement
- If damaged or leaking replace completely
- Removing and installing --> **Coolant pump, removing and installing**

27 - Compact bracket

- For generator, tensioner, viscous fan clutch and power steering pump
- Removing and installing --> **Bracket, assembly overview**

28 - Fan wheel**Bracket, assembly overview**

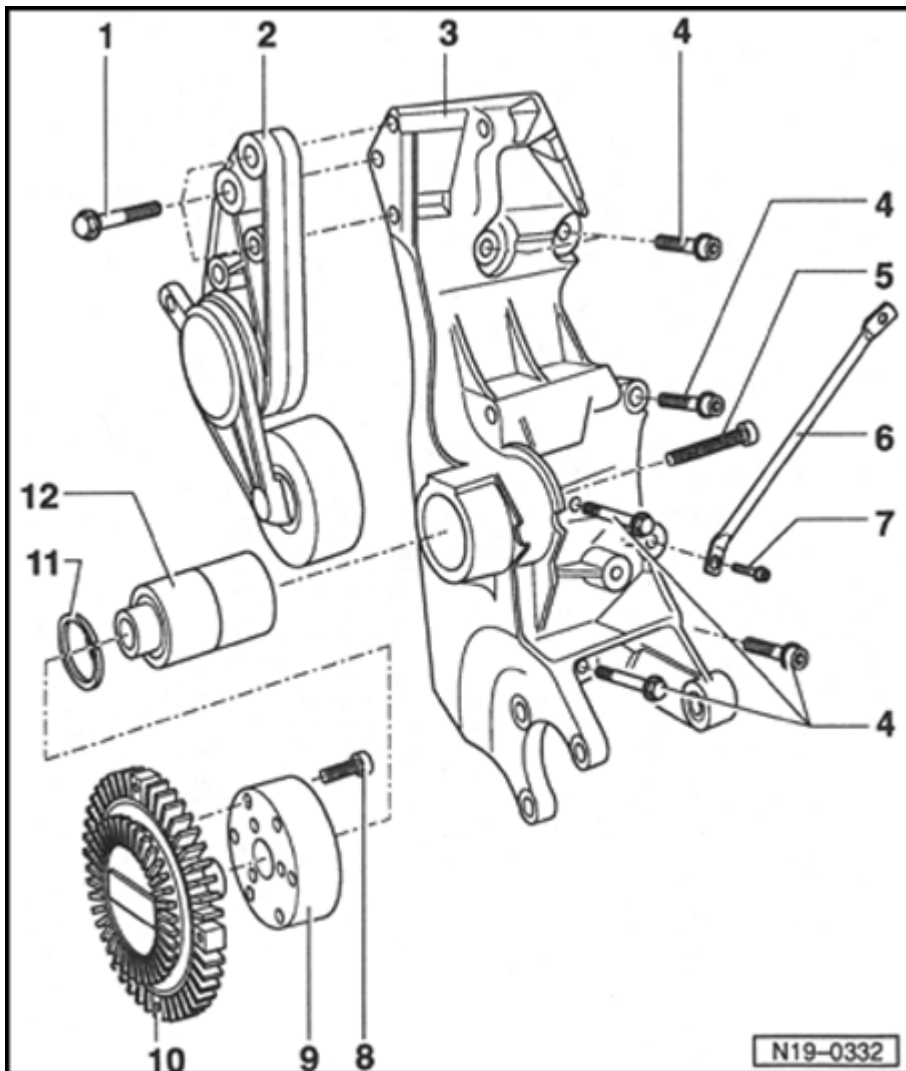


Fig. 140: Bracket, Assembly Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - 25 Nm

2 - Ribbed belt tensioner

- Ribbed belt, removing and installing --> **Ribbed belt, removing and installing**

3 - Compact bracket

- For generator, tensioner, viscous fan clutch and power steering pump

4 - 50 Nm

- Observe tightening sequence **Tightening sequence, bracket to cylinder block**

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

5 - 45 Nm

- For viscous fan clutch

6 - Brace

- Between compact bracket and intake manifold

7 - 20 Nm

8 - 30 Nm

9 - Pulley

- For viscous fan clutch
- Removing and installing --> **Viscous fan clutch, removing and installing**

10 - Viscous fan clutch

- Removing and installing --> **Viscous fan clutch, removing and installing**

11 - Circlip

12 - Bearing bushing

- For viscous fan clutch
- Removing and installing --> **Viscous fan clutch bushing, removing and installing**

Tightening sequence, bracket to cylinder block

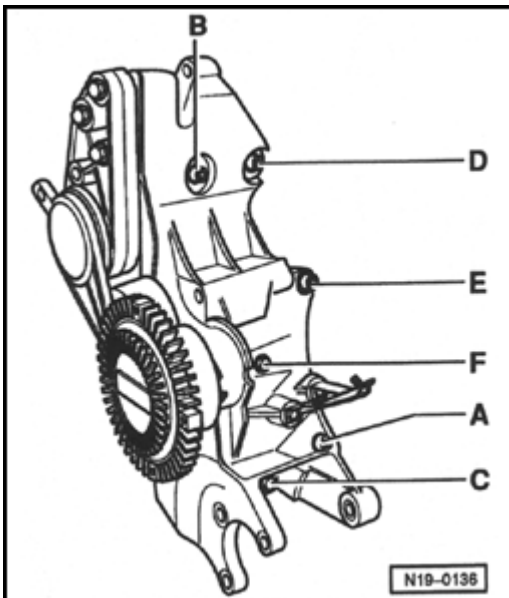


Fig. 141: Bracket To Cylinder Block Tightening Sequence
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Torque wrench V.A.G 1331

Work procedure

- Set compact bracket in place on cylinder block.
- Fasten compact bracket in tightening sequence shown to 50 Nm:

1 - Tighten bolt - **A** -

2 - Tighten bolt - **B** -

3 - Tighten bolt - **C** -

4 - Tighten bolt - **D** -

5 - Tighten bolt - **E** -

6 - Tighten bolt - **F** -

Coolant hose connection diagram

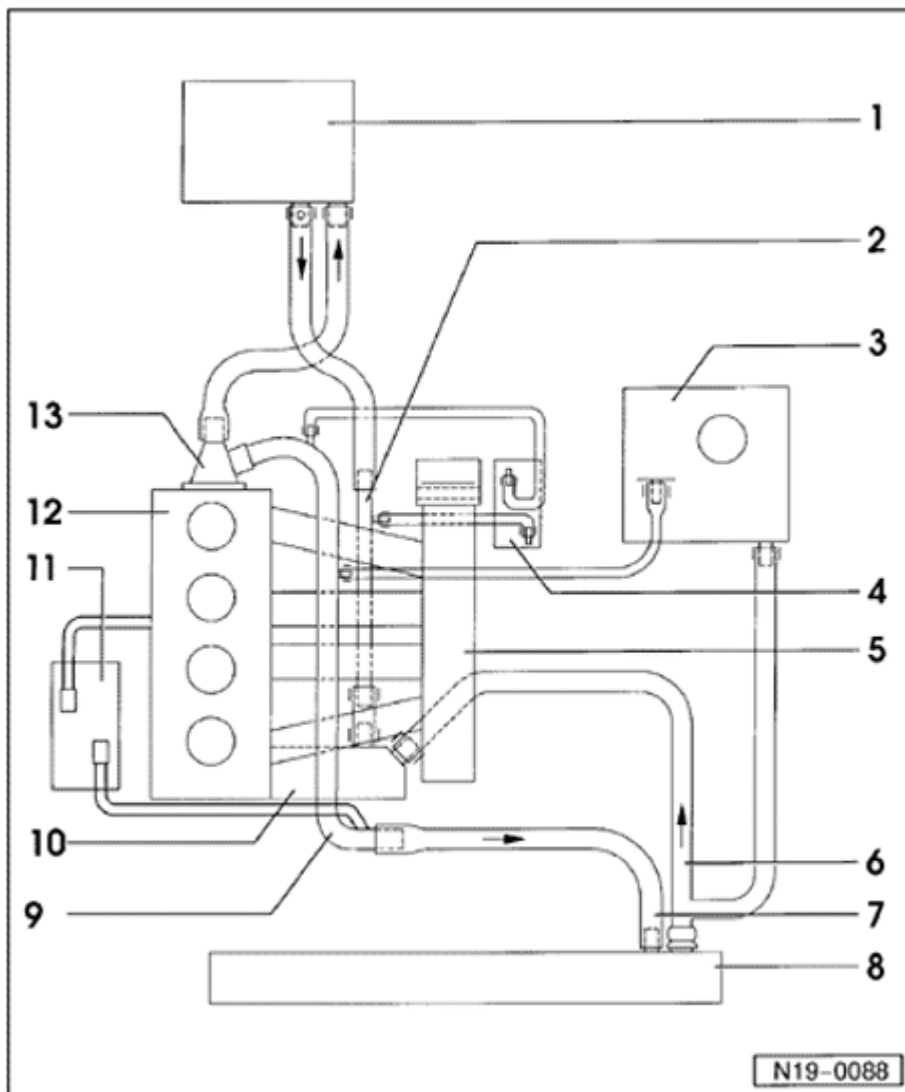


Fig. 142: Connection Diagram For Coolant Hoses
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 1 - Heater core
- 2 - Lower coolant hose
- 3 - Coolant reservoir
- 4 - Oil cooler
- 5 - Intake manifold
- 6 - Lower coolant hose
- 7 - Upper coolant hose

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

8 - Radiator

9 - Upper coolant line

10 - Coolant pump/thermostat

11 - Turbocharger

12 - Cylinder head/cylinder block

13 - Connecting piece

Cooling system, draining and filling

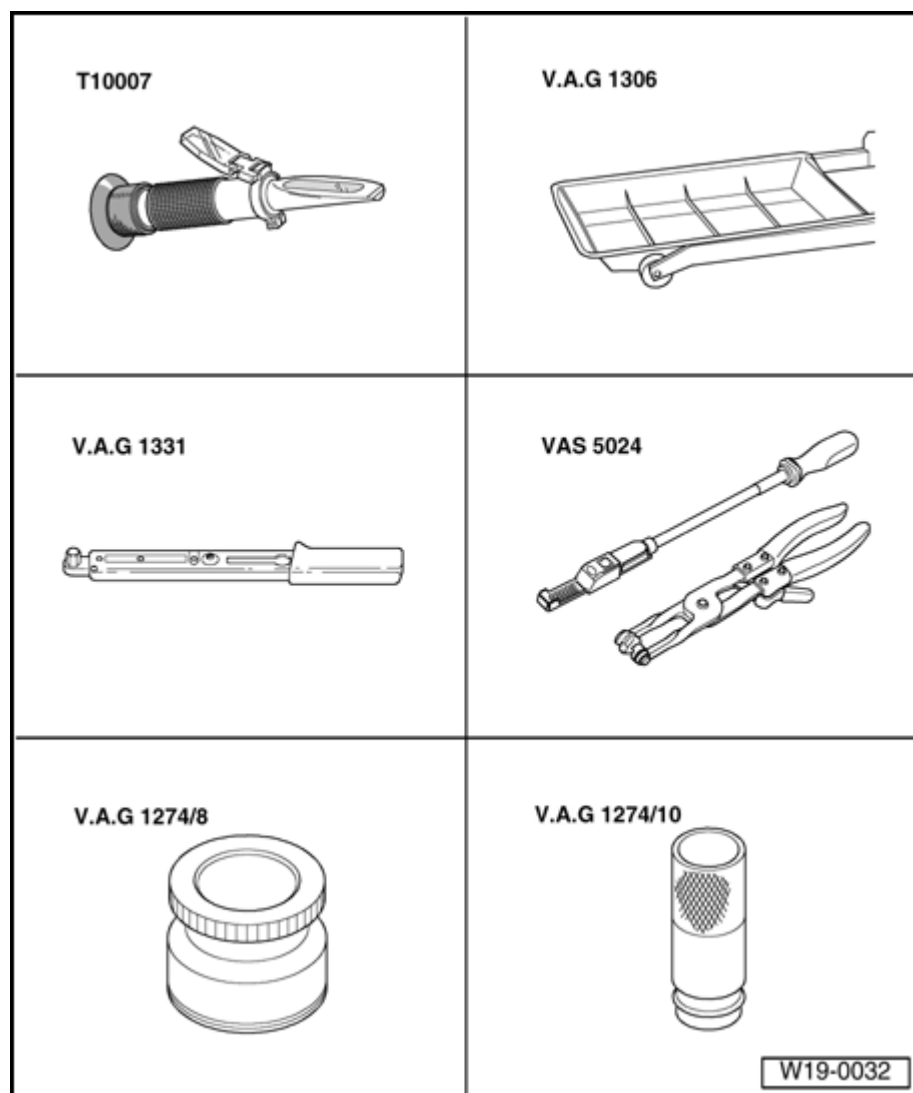


Fig. 143: Identifying Special Tools - Coolant, Draining And Refilling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Refractometer T10007
- Drip tray V.A.G 1306
- Torque wrench V.A.G 1331
- Spring-type clip pliers VAS 5024
- Adapter V.A.G 1274/8
- Adapter V.A.G 1274/10
- Cooling system charge unit VAS 6096 (not pictured)

Draining

CAUTION: Hot steam may escape when opening expansion tank. Wear protective goggles and protective clothing to prevent damage to eyes and scalding. Cover the cap with a rag and open very carefully.

- Open cap for coolant expansion tank.
- Remove noise insulation --> **50 BODY, FRONT**

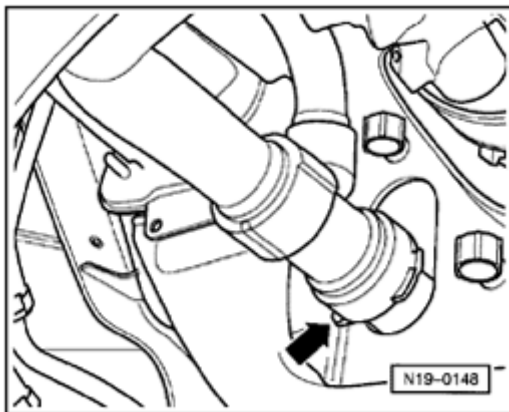


Fig. 144: Lower Coolant Hose At Radiator Retaining Clip
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull coolant hose retaining clip - **arrow** - off downward and remove coolant hose from radiator.

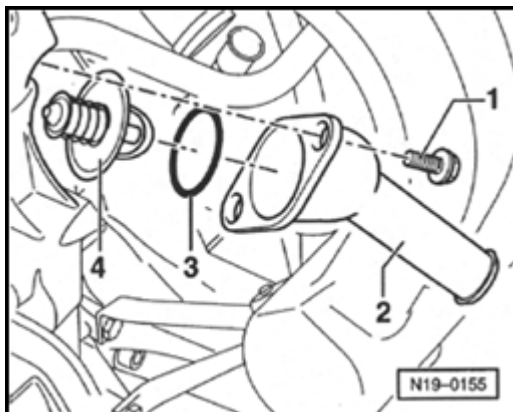


Fig. 145: Identifying Thermostat And Connector Pipe

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove coolant hose from connection piece - 2 -.
- Remove bolts - 1 - , connection pieces - 2 - , O-ring - 3 - and coolant thermostat - 4 -.

NOTE: • **Observe disposal regulations for coolant!**

Filling

- NOTE:**
- Only use coolant additive G 12+ (according to TL VW 774 F).
Distinguishing feature: colored violet
 - "G 12+" and coolant additives marked "In accordance with TL VW 774 F" prevent frost and corrosion damage, scaling and also raise the boiling point of the coolant. For this reason the system must be filled all year round with frost and corrosion protection additives.
 - G 12+ (according to TL VW 774 F) may be mixed with previous coolant additive G 12 (red).
 - Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.
 - Protection against frost must be assured to about -25 ° C (in arctic climatic countries to about -35 ° C).
 - The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. The coolant additive portion must be at least 40%.
 - If for climatic reasons a greater frost protection is required, the amount of G 12 can be increased, but only up to 60% (frost protection to about -40 ° C), as otherwise frost protection is reduced again and cooling effectiveness is also reduced.
 - If radiator, heat exchanger, cylinder head or cylinder head gasket is replaced, do not reuse old coolant.

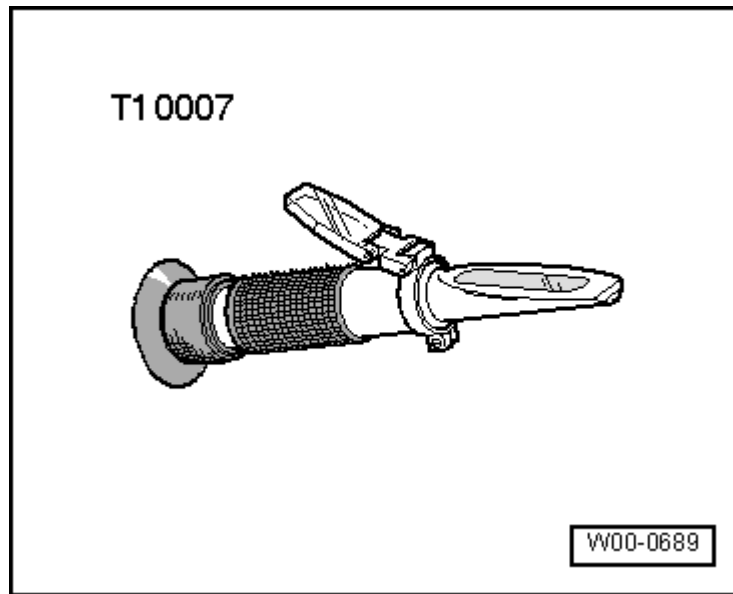


Fig. 146: Refractometer T10007

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- It is recommended to use Refractometer T10007 to determine freezing temperature of coolant.

Recommended mixture ratios:

Frost protection to	Antifreeze portion	G 12+ * See note	Water * See note
-25 ° C -35 ° C	40% 50%	3.0 L 3.5 L	4.0 L 3.5 L

* The quantity of coolant can vary depending upon vehicle equipment.

NOTE:

- Use only clean drinking water for mixing.

Work procedure

- Install lower coolant hose and secure.
- Replace O-ring and install coolant thermostat and connection pieces. The coolant thermostat clip must stand vertical.
- Tightening torque: 15 Nm
- Install coolant hose to connection pieces.

With cooling system charge unit VAS 6096

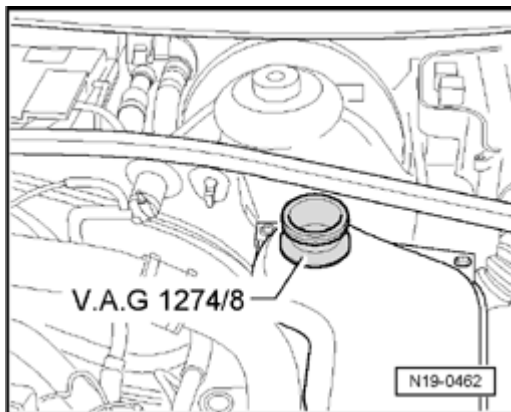


Fig. 147: Adapter V.A.G 1274/8 Installed Onto Expansion Tank
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Screw adapter V.A.G 1274/8 onto expansion tank.
- Fill coolant circuit using cooling system charge unit VAS 6096 , Operating instructions for cooling system charge unit VAS 6096.

Without cooling system charge unit VAS 6096

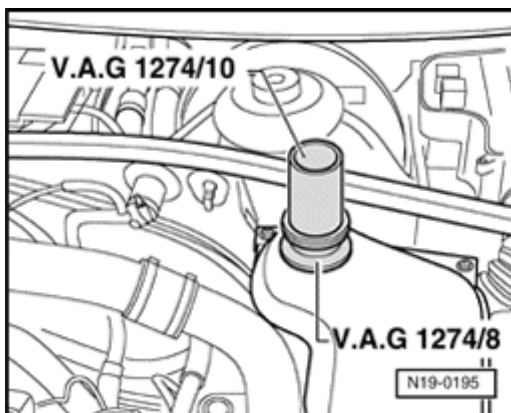


Fig. 148: Adapter V.A.G 1274/8 and V.A.G 1274/10 Installed Onto Expansion Tank
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Screw adapter V.A.G 1274/8 on expansion tank and extend it using adapter for V.A.G 1274 tester V.A.G 1274/10.
- Peel back protective cover for coolant hose at heat exchanger connection.

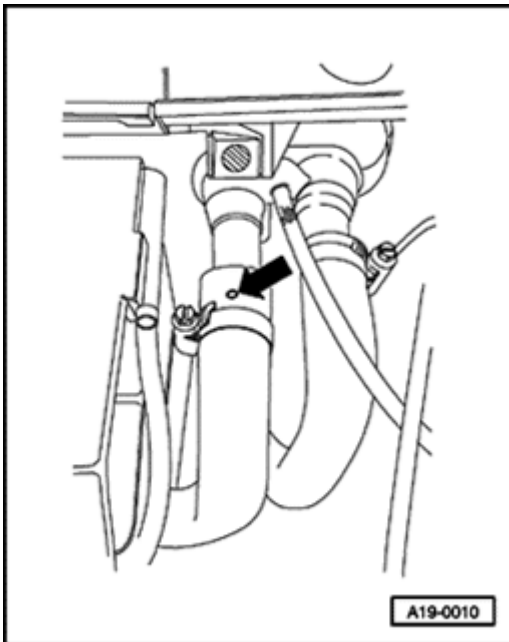


Fig. 149: Locating Bleed Hole In Coolant Hose

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen coolant hose on heater core and pull back hose sufficiently so that the bleed hole in coolant hose - **arrow** - is no longer covered by the connecting piece.
- Fill up coolant until it escapes from coolant hose bleeder hole.
- Push coolant hose on connection and secure it again.

With and without cooling system charge unit VAS 6096 :

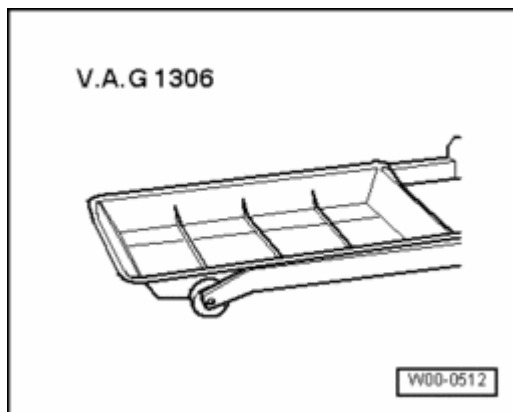
- Install coolant reservoir cap.
- Start engine and maintain an engine speed of about 2000 RPM for approx. 3 minutes.
- Allow engine to run at idle speed until the lower hose on radiator becomes hot.

CAUTION: Hot steam may escape when opening expansion tank. Wear protective goggles and protective clothing to prevent damage to eyes and scalding. Cover the cap with a rag and open very carefully.

- Check coolant level and top off if necessary. With engine at operating temperature, coolant level must be at max. marking, with engine cold, it must be between min. and max. marking.

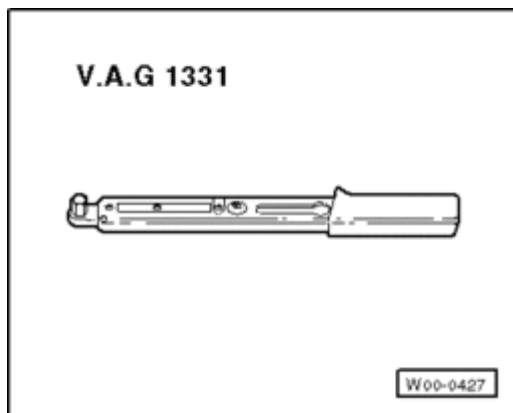
Radiator, removing and installing

Special tools, testers and auxiliary items required

**Fig. 150: Drip Tray V.A.G 1306**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drip tray V.A.G 1306

**Fig. 151: Torque Wrench V.A.G 1331**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1331

Removing

- Drain coolant --> **Cooling system, draining and filling** .
- Remove front bumper --> **63 BUMPER**
- Pull off coolant hoses from radiator.

Vehicles with automatic transmission

- Disconnect ATF-lines from radiator --> 5 Spd. Automatic Transmission 01V Front Wheel Drive - **37 AUTOMATIC TRANSMISSION - CONTROLS, HOUSING** .

Continued for all vehicles

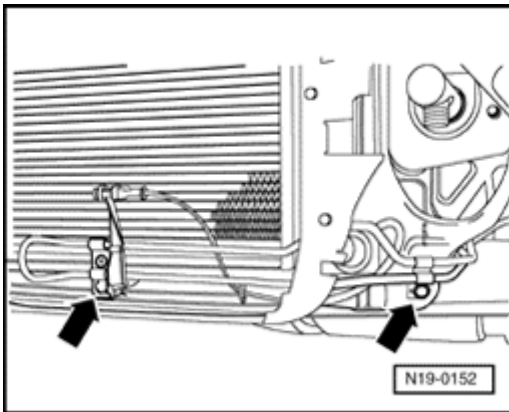


Fig. 152: Identifying Cooling Coil For Power Steering Fluid
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect cooling coil for power steering hydraulic oil - **arrows** - and lay aside. Do not open the hydraulic oil circuit.
- Remove radiator upper securing pin and take radiator out forward.

Vehicles with air conditioning

- Observe additional information and removal work.

Installing

Installation is performed in the reverse order of removal, noting the following:

Vehicles with automatic transmission

- Connect ATF-lines to radiator --> 5 Spd. Automatic Transmission 01V Front Wheel Drive - **37 AUTOMATIC TRANSMISSION - CONTROLS, HOUSING** .
- Check ATF level, top up if necessary --> 5 Spd. Automatic Transmission 01V Front Wheel Drive - **37 AUTOMATIC TRANSMISSION - CONTROLS, HOUSING** .

Continued for all vehicles

- Fill with coolant --> **Cooling system, draining and filling** .
- For harness connectors and routing:.
- Install front bumper --> **63 BUMPER**
- Check headlight adjustment, correct if necessary.

Additional information and assembly work on vehicles with air conditioning

CAUTION: The air conditioning refrigerant circuit must not be opened.

NOTE:

- Do not bend or stretch lines or hoses as condenser and/or refrigerant lines/hoses may be damaged.

- Remove retaining clamp(s) from refrigerant lines.
- Remove condenser from radiator and pull forward as far as possible --> **87 - AIR CONDITIONING** .
- Secure condenser to body so that the refrigerant lines/hoses are not stressed.
- Pull out radiator between condenser and lock carrier.

Coolant pump, removing and installing

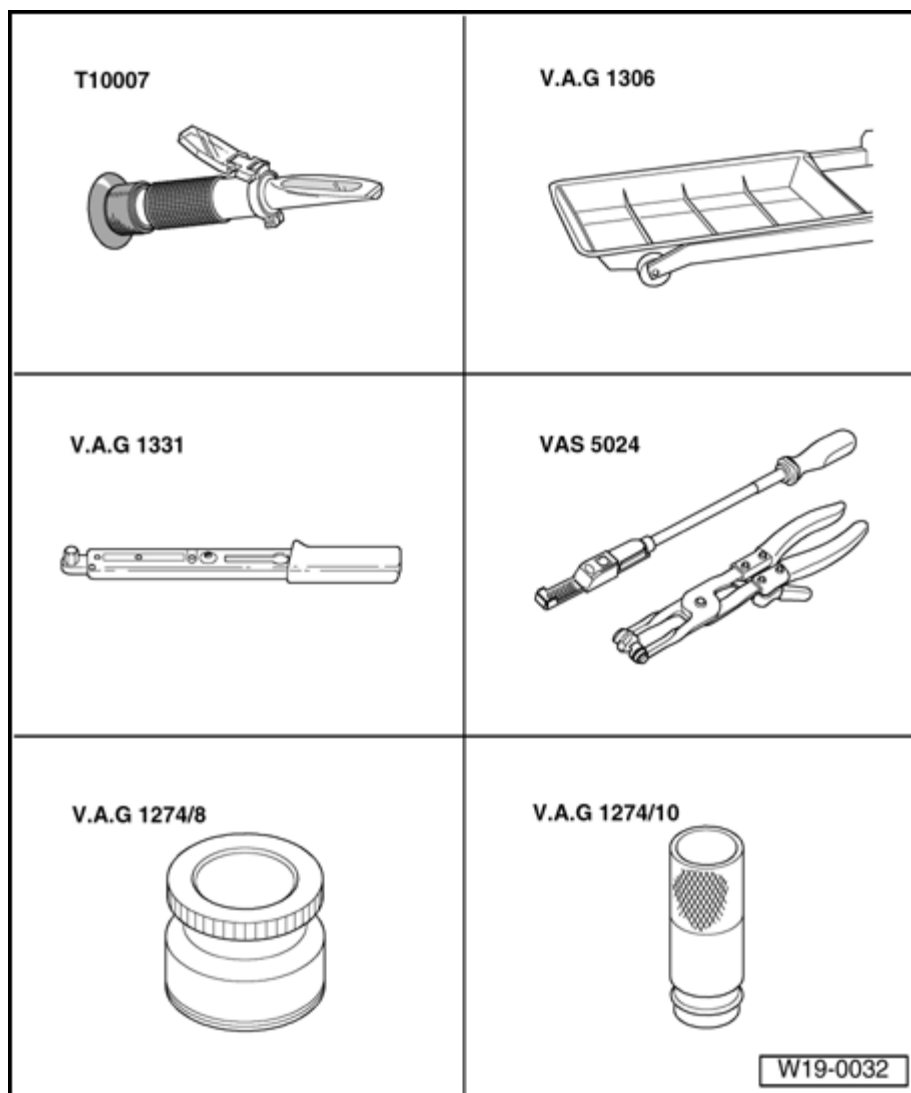


Fig. 153: Identifying Special Tools - Coolant, Draining And Refilling
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Refractometer T10007

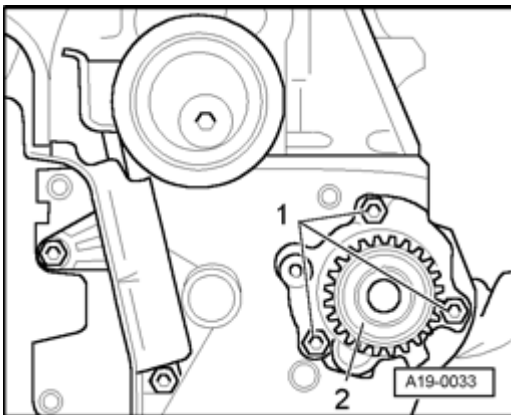
- Drip tray V.A.G 1306
- Torque wrench V.A.G 1331
- Spring-type clip pliers VAS 5024
- Adapter V.A.G 1274/8
- Adapter V.A.G 1274/10
- Cooling system charge unit VAS 6096 (not pictured)

NOTE:

- **Always replace gaskets and seals.**
- **The lower part of the toothed belt cover can remain installed.**
- **The toothed belt remains in position on the crankshaft sprocket.**
- **To protect the toothed belt from coming into contact with coolant, cover the toothed belt with a rag before removing the coolant pump.**

Removing

- Drain coolant --> Cooling system, draining and filling .
- Remove ribbed belt --> Ribbed belt, removing and installing .
- Remove toothed belt from coolant pump sprocket --> Toothed belt, removing, installing and tensioning , Toothed belt, removing, installing, and tensioning.

**Fig. 154: Coolant Pump & Fasteners**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove coolant pump securing bolts - **1** - and remove coolant pump - **2** -.

Installing

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

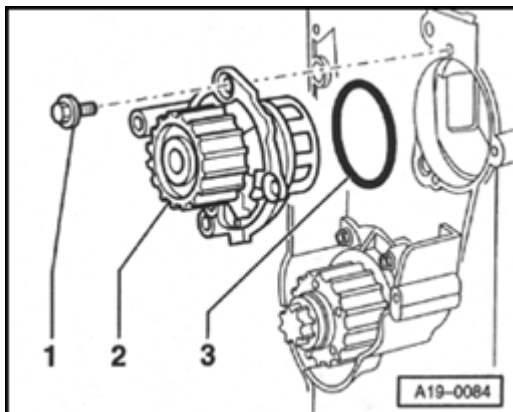


Fig. 155: Coolant Pump, Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Moisten new O-ring - 3 - with coolant.
- Install coolant pump - 2 -.
- Installed location: Sealing plug in housing points downward.
- Tighten bolts - 1 -.
- Tightening torque: 15 Nm
- Toothed belt, installing and tensioning --> Toothed belt, removing, installing and tensioning
- Install ribbed belt --> Ribbed belt, removing and installing .
- Fill with coolant --> Cooling system, draining and filling .

Viscous fan clutch, removing and installing

Special tools, testers and auxiliary items required

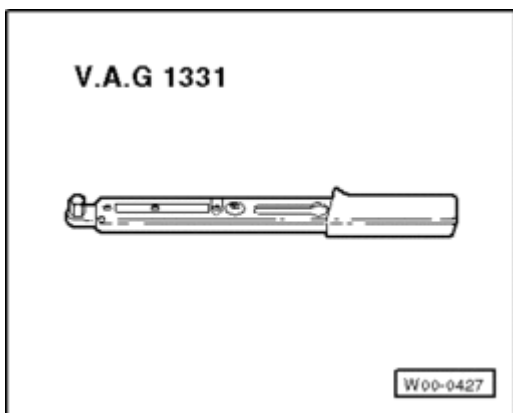


Fig. 156: Torque Wrench V.A.G 1331

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1331
- Drift 5 mm

Removing

- Bring the lock carrier into service position --> **50 BODY, FRONT** .
- Remove ribbed belt --> **Ribbed belt, removing and installing** .
- Remove fan wheel from the viscous fan clutch.

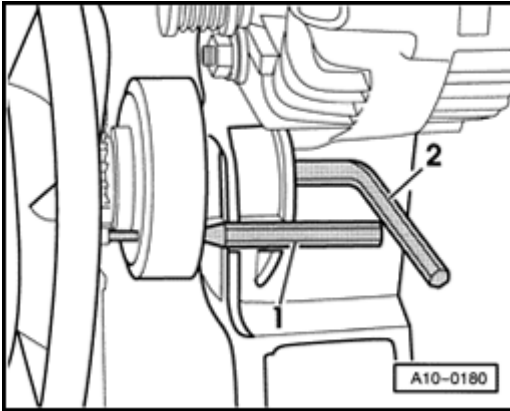


Fig. 157: Locking Belt Pulley To Viscous Fan Pulley Using A Drift
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure belt pulley of viscous-fan clutch using a drift (dia. 5 mm) - **1** -.
- Remove bolt for viscous fan clutch with 8 mm hex wrench - **2** - and remove viscous fan clutch with belt pulley.
- Remove belt pulley from viscous fan clutch.

Installing

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

- Tighten belt pulley to viscous fan clutch to 30 Nm.
- Tighten viscous fan clutch to compact holder to 45 Nm.
- Tighten fan wheel to viscous fan clutch to 10 Nm.
- Install ribbed belt --> **Ribbed belt, removing and installing** .

Viscous fan clutch bushing, removing and installing

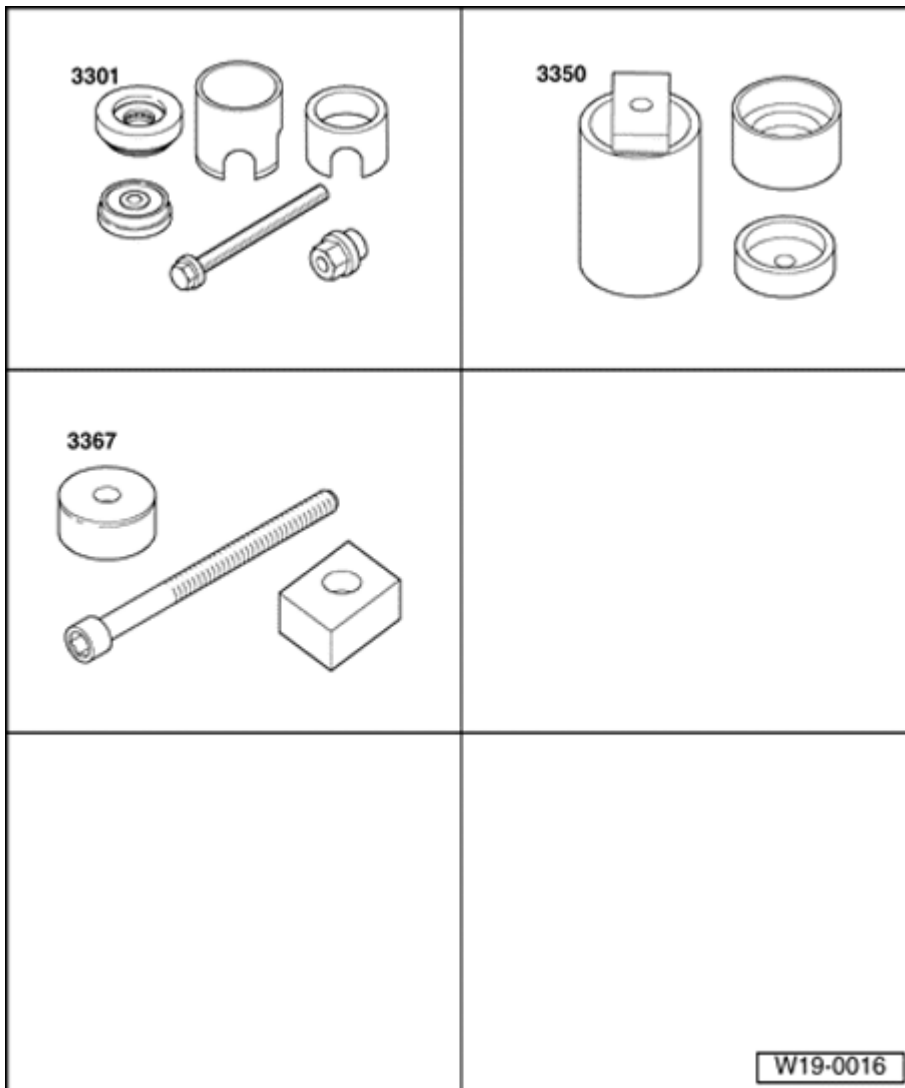


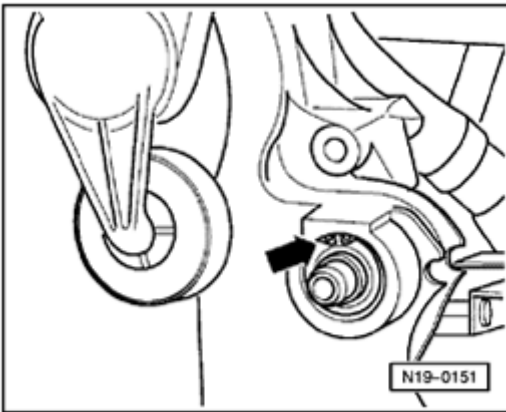
Fig. 158: Identifying Special Tools - Viscous Fan Clutch Bushing, Removing And Installing
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Hex nut from assembly tool 3301
- Extractor pipe from assembly tool 3350
- Press tool for viscous fan 3367

Removing

- Remove viscous fan clutch (with belt pulley) --> **Viscous fan clutch, removing and installing** .

**Fig. 159: Bearing Bushing Circlip**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip - **arrow** - from bearing bushing.

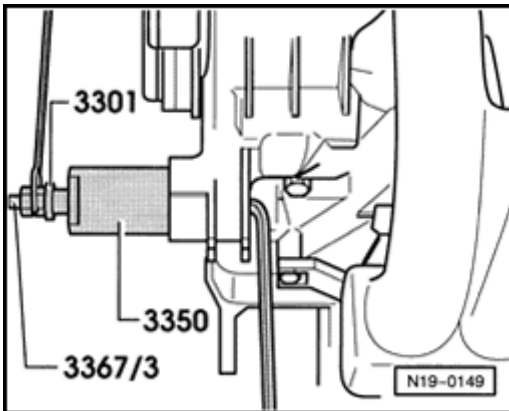


Fig. 160: Pressing Out Bushing From Bracket Using Socket Head Bolt 3367/3 , Extractor Tube From Carrier Bearing Inst. Tool 3350 And Hex Nut From Assembly Tool 3301

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press out bushing from bracket using socket head bolt 3367/3 , extractor tube from carrier bearing inst. tool 3350 and hex nut from assembly tool 3301.

Installing

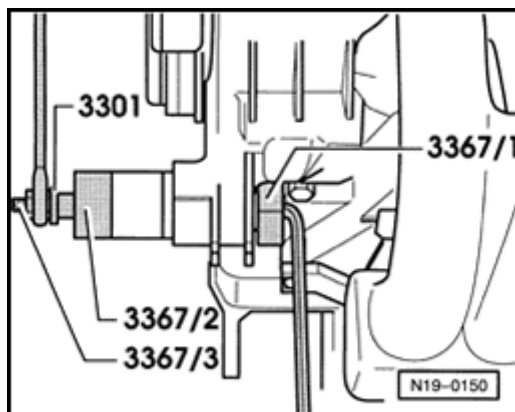


Fig. 161: Pressing In Bearing Bushing In Bracket Until Stop Using Compensation Piece 3367/1 , Thrust Piece 3367/2 , Socket Head Bolt 3367/3 And Hex Nut From Assembly Tool 3301

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press in bearing bushing in bracket until stop using compensation piece 3367/1 , thrust piece 3367/2 , socket head bolt 3367/3 and hex nut from assembly tool 3301.
- After installing, secure bushing with circlip.
- Install viscous fan clutch -->**Viscous fan clutch, removing and installing** .

20 FUEL SUPPLY SYSTEM

FUEL SUPPLY SYSTEM COMPONENTS (VEHICLES WITH FRONT-WHEEL DRIVE), REMOVING AND INSTALLING

Fuel supply system components (vehicles with front-wheel drive), removing and installing

NOTE:

- All hose connections are secured with spring-type clamps or tensioning clamps.
- Always replace tensioning clamps with spring-type clamps See parts catalog.
- Fuel hoses at engine must only be secured with spring-type clamps. The use of clamping collars or screw clamps is not permitted.
- VAS 5024 Assembly tool or VAG 1921 Pliers are recommended for installing spring clips.

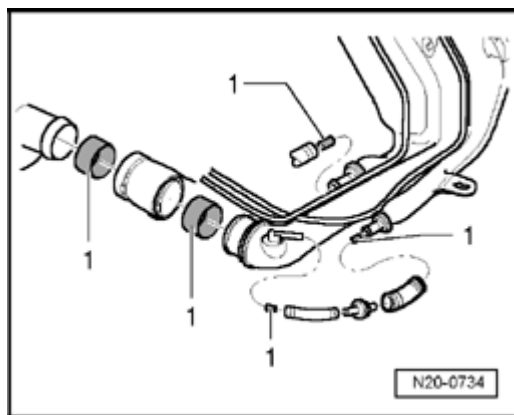


Fig. 162: Identifying Fuel Tank Connections And Metal Sleeves
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- All hose connections at fuel tank have metal sleeves, e.g. - 1 -.

Observe safety precautions --> Safety precautions when working on fuel supply system .

Observe rules for cleanliness --> Rules for cleanliness .

Fuel tank with attachments, assembly overview: --> Fuel tank with attachments (engine codes AUG, AWM), assembly overview

Fuel pump, removing and installing: --> Fuel pump, removing and installing

Fuel gauge sender, removing and installing: --> Fuel Level Sensor G , removing and installing

Fuel tank, removing and installing --> Fuel tank, removing and installing

Crash fuel shut-off --> Crash fuel shut-off

Check fuel pump --> Fuel pump, checking

Electronic power control (EPC) --> Electronic power control (EPC) .

Components of the Evaporative Emissions (EVAP) system: --> Evaporative emissions (EVAP) system

Safety precautions when working on fuel supply system

CAUTION: Fuel supply line is under pressure! Wear eye protection and protective clothing in order to avoid injuries by contact with fuel. Before removing from hose connection wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

Always observe the following when removing and installing the sender for fuel gauge or the Fuel Pump (FP) from full or partially filled fuel tanks:

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

- Before starting work, switch on exhaust extraction system and place an extraction hose close to the installation opening of fuel tank to extract escaping fuel fumes. If no exhaust extraction system is available, a radial fan (as long as motor is not in air flow) with a displacement greater than 15 m³ /h can be used.
- Prevent fuel from contacting skin and eyes. Wear suitable eye protection, protective clothing and fuel-resistant gloves.

Rules for cleanliness

When working on the fuel supply/injection system, pay careful attention to the following "5 rules" :

- Thoroughly clean all connections and the surrounding area before disconnecting.
- Place parts that have been removed on a clean surface and cover them with lint-free cloths.
- Carefully cover over opened components or seal, if repairs are not performed immediately,
- Only install clean components: Only unpack replacement parts immediately prior to installation. Do not use parts that have been stored loose (e.g. in tool boxes etc.).
- When the system is open: Avoid working with compressed air if possible. Do not move vehicle unless absolutely necessary.

Fuel tank with attachments (engine codes AUG, AWM), assembly overview

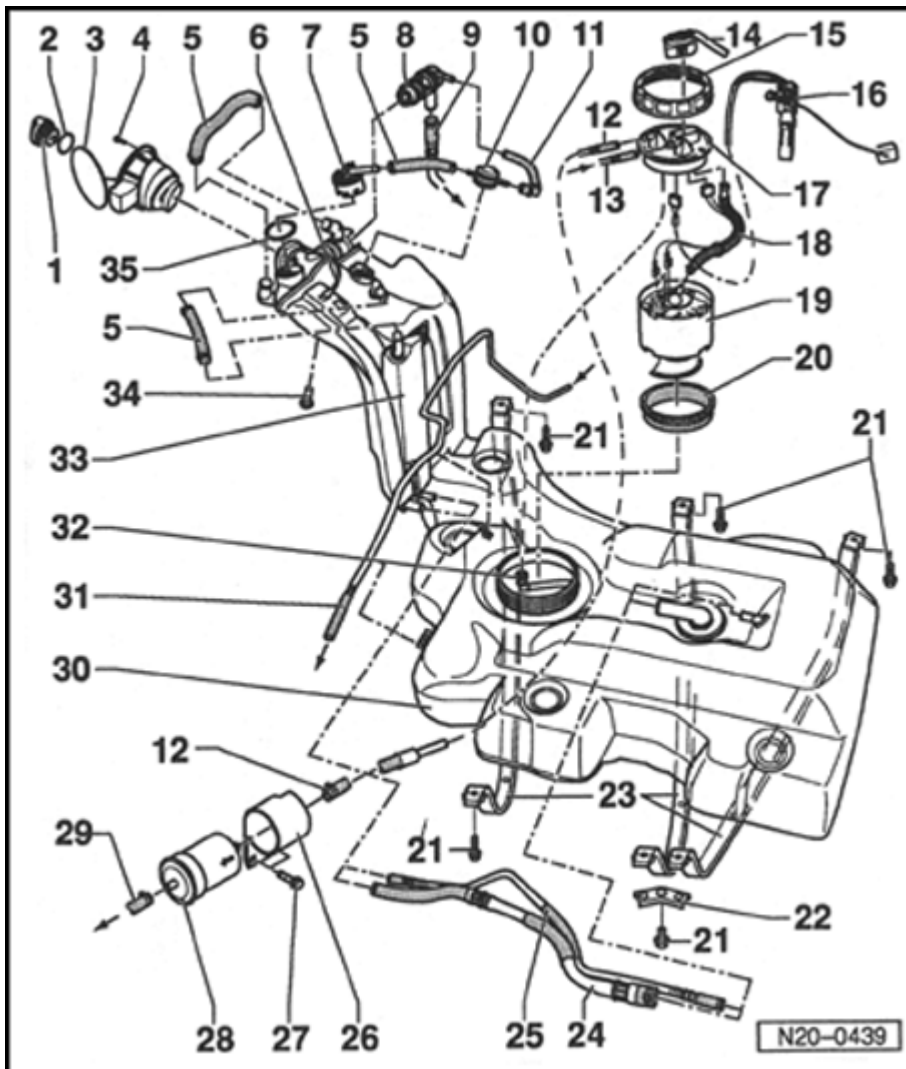


Fig. 163: Fuel Tank With Attachments (Engine Codes AUG, AWM), Assembly Overview
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 1 - Cap
- 2 - Seal
 - Replace if damaged
- 3 - Tank flap unit
 - With rubber gasket
- 4 - Bolt
- 5 - Connecting hose

6 - Ground (GND) connection

- Ensure seated tightly

7 - Gravity valve

- To remove valve unclip upward out of support
- Test valve for through-flow
 - Valve vertical: Open
 - Valve angled at 45 ° : Closed

8 - Switch-over valve

- To remove valve unclip sideways out of support
- Checking **Checking switch-over valve**

9 - Vent line

- Black
- Clipped to side of fuel tank
- Ensure seated tightly
- Secure with clamps Electronic Parts Catalog "ETKA"

10 - Pressure retention valve

- For fuel tank ventilation
- To remove valve unclip upward out of support
- Checking **Checking pressure retention valve**

11 - Vent line**12 - Supply line**

- Black
- Clipped to side of fuel tank
- Ensure seated tightly
- Secure with clamps Electronic Parts Catalog "ETKA"

13 - Return line

- Blue or with blue marking
- Clipped to side of fuel tank
- Ensure seated tightly

- Secure with clamp Electronic Parts Catalog "ETKA"

14 - Connector

- Black, 4-pin
- For Fuel Level Sensor G and Transfer Fuel Pump (FP) G6

15 - Union nut, 80 Nm

- Use ring nut wrench 3217 for removal and installation

16 - Fuel Level Sensor G

- Clipped onto baffle housing in fuel tank
- Removing and installing --> **Fuel Level Sensor G , removing and installing**

17 - Flange

- Note installation position on fuel tank **Installation position of fuel delivery unit flange**

18 - Supply line

- Ensure seated tightly

19 - Fuel delivery unit

- Removing and installing --> **Fuel pump, removing and installing**
- Check fuel pump --> **Fuel pump, checking**
- Clean strainer if soiled

20 - Seal

- To install, place into opening of fuel tank dry
- Replace if damaged
- Moisten with fuel only when installing flange

21 - 25 Nm**22 - Bracket**

- For securing straps
- Note installation position

23 - Securing strap

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

- Observe varying lengths
- Installed location:
 - Locating point (hole) points in driving direction

24 - Vent line

- Ensure seated tightly

25 - Vent line

- From drip reservoir

26 - Retaining ring

- Fastened to body

27 - 10 Nm

28 - Fuel filter

- Installed location: Arrow points in direction of flow

29 - Supply line

- Black
- Ensure seated tightly
- Secure with clamp Electronic Parts Catalog "ETKA"

30 - Fuel tank

- Fuel system, checking for leaks --> **Fuel supply system, checking for leaks .**
- Support using Engine/transmission jack V.A.G 1383 A when removing
- Removing and installing --> **Fuel tank, removing and installing**

31 - Vent line

- From EVAP canister to Evaporative Emission (EVAP) Canister Purge Regulator Valve N80
- Clipped onto fuel tank

32 - Return line

- Ensure seated tightly

33 - Drip reservoir

- Clipped onto fuel filler tube

34 - 25 Nm

35 - O-ring

- Replace if damaged

Installation position of fuel delivery unit flange

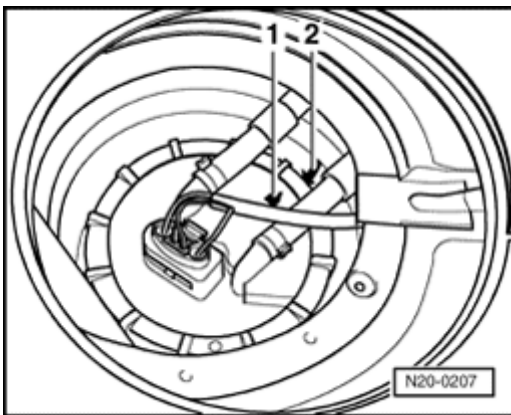


Fig. 164: Installation Position Of Fuel Delivery Unit Flange
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Marking on flange - 1 - must align with marking on fuel tank - 2 -.

NOTE:

- After installing Fuel Pump (FP) flange, check whether supply, return and ventilation lines are still clipped in at fuel tank.

Checking switch-over valve

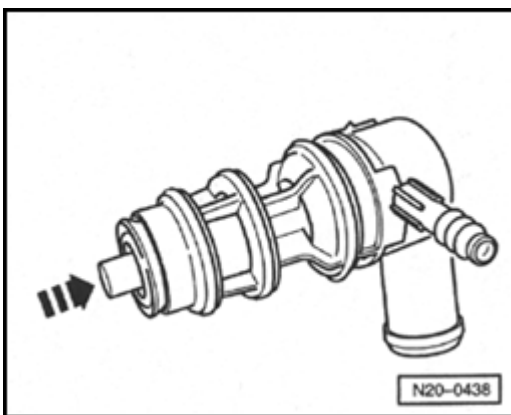


Fig. 165: Checking Switch-Over Valve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pin in rest position: Closed

Pin pressed in direction of - **arrow** - : Open

NOTE:

- Before installing change-over valve, remove cover from fuel tank.

Checking pressure retention valve

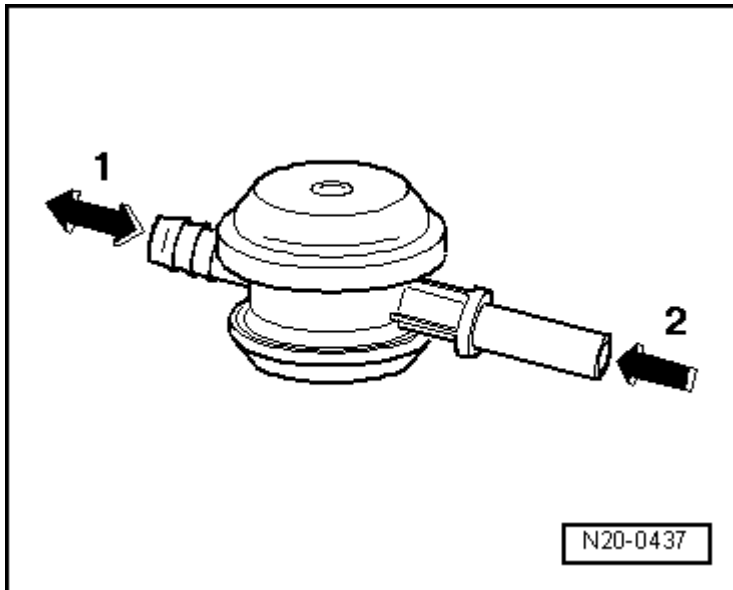


Fig. 166: Checking Pressure Retention Valve

Courtesy of VOLKSWAGEN UNITED STATES, INC.

The pressure retaining valve is opened in both flow directions - **arrow 1** - on gravity valve side.

It is only opened in one flow direction - **arrow 2** - on side of switch-over valve.

Fuel pump, removing and installing

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

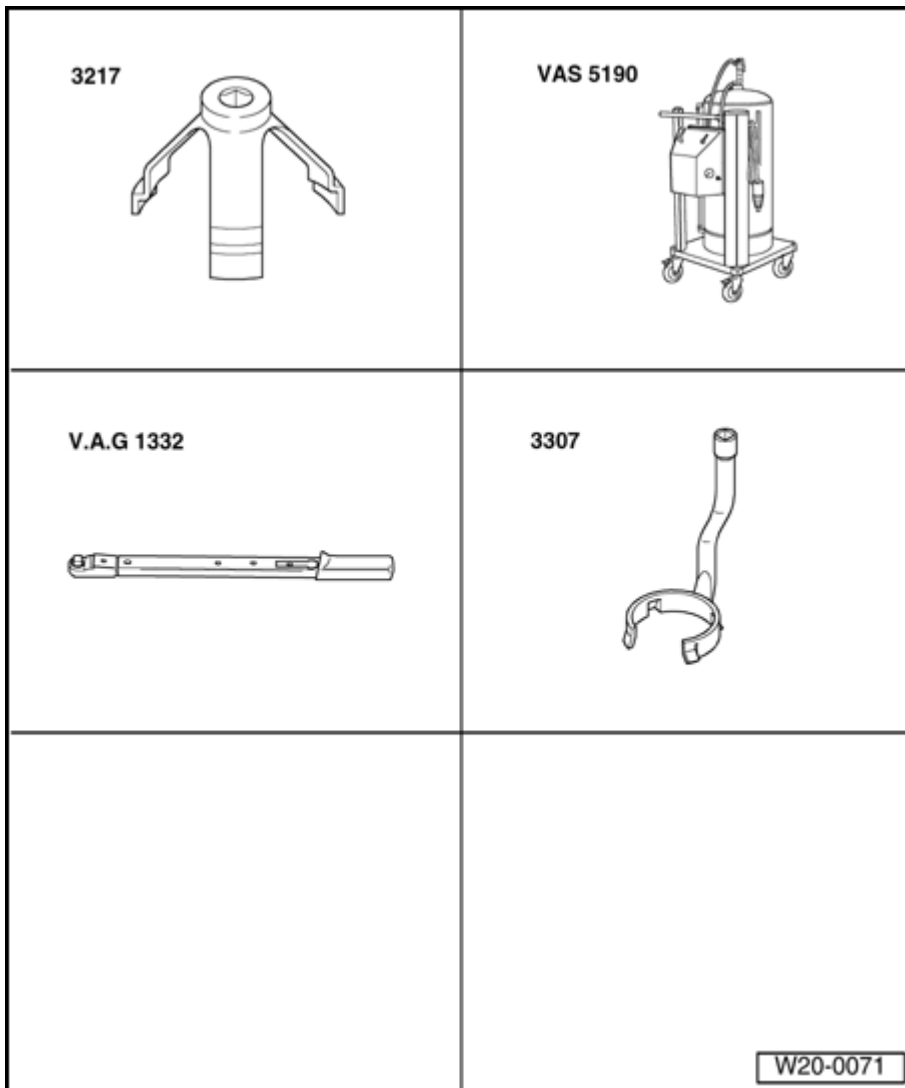
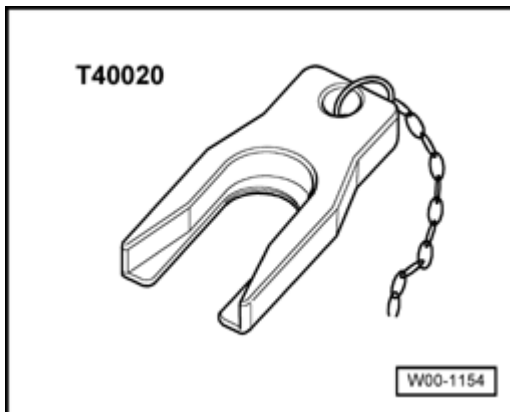


Fig. 167: Identifying Special Tools - Fuel Pump, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Ring nut wrench 3217
- Fuel siphoning device VAS 5190 or FM3000GH Fuel Extractor (not pictured)
- Torque wrench V.A.G 1332
- Fuel pump wrench 3307

Special tools, testers and auxiliary items required

**Fig. 168: Release Tool T40020**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Release tool T40020

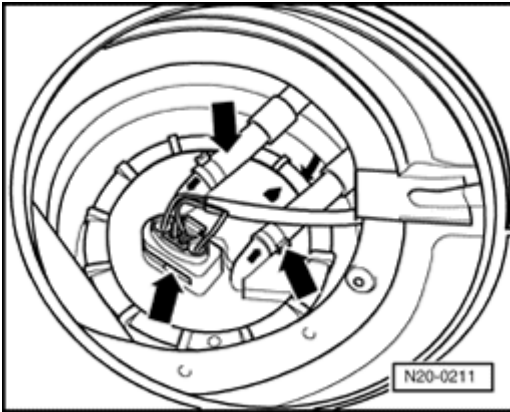
NOTE:

- When removing union nut from flange, fuel tank must not be filled more than 3/4.
- Empty fuel tank if necessary using Fuel siphoning device VAS 5190 or FM3000GH Fuel Extractor
- Observe safety precautions --> Safety precautions when working on fuel supply system and rules of cleanliness --> Rules for cleanliness before beginning work.

Removing

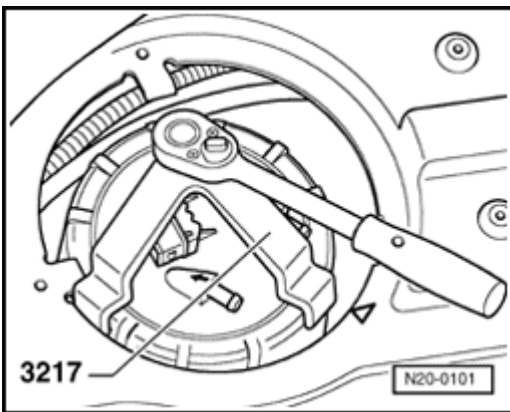
- First, check whether a coded radio is installed. If necessary, obtain the anti-theft coding.
- Switch ignition off and all electrical consumers.
- Disconnect battery Ground (GND) strap --> **27 - BATTERY, STARTER, GENERATOR, CRUISE CONTROL** .
- Open fuel tank cap briefly and then close again.
- Remove luggage compartment floor covering.
- Remove cover from fuel pump.

CAUTION: Fuel supply lines are under pressure! Before removing from hose connection wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

**Fig. 169: Supply And Return Line At Flange**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect 4-pin connector as well as supply and return lines from flange - **arrows** -.
- Seal the lines so that the fuel system is not contaminated by dirt etc.

**Fig. 170: Removing/Installing Union Nut With Union Nut Tool 3217**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Use ring nut spanner 3217 to remove union nut.
- Pull flange and seal out of the opening in fuel tank.

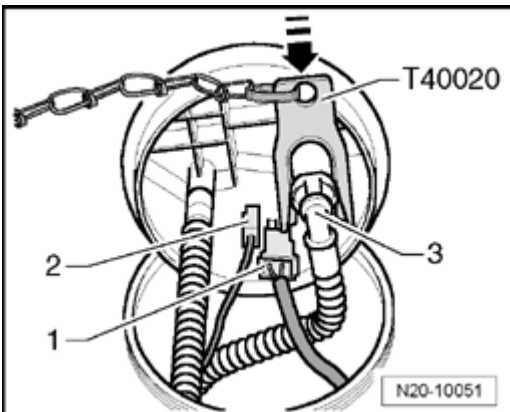


Fig. 171: Disconnect Connector For Fuel Gauge On Inside Of Flange
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect connector - **1** - for fuel gauge on inside of flange.

NOTE:

- **Connector - 2 - to Fuel Pump (FP) can remain connected.**

- Release fuel return line - **3** - inside of flange with release tool T40020 and pull off.
- If necessary, extract fuel down to upper edge of baffle housing.
- Turn fuel pump approx. 15 ° counter-clockwise onto stop using fuel pump wrench 3307 and remove with flange.

NOTE:

- **If the pump is to be replaced then drain old pump before disposal.**

Installing

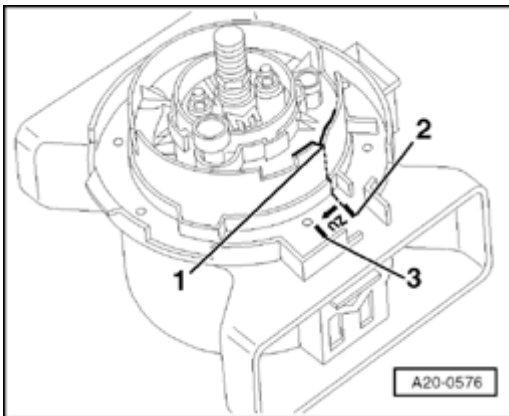


Fig. 172: Installing Fuel Pump Into Baffle Housing In Fuel Tank
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert fuel pump into baffle housing in fuel tank so that the notch - **1** - of the fuel pump aligns with the marking - **2** - of the baffle housing.
- Fuel pump in this position can be pressed downward significantly and noticeably.

NOTE:

- **Baffle housing is shown without fuel tank for the sake of illustration.**

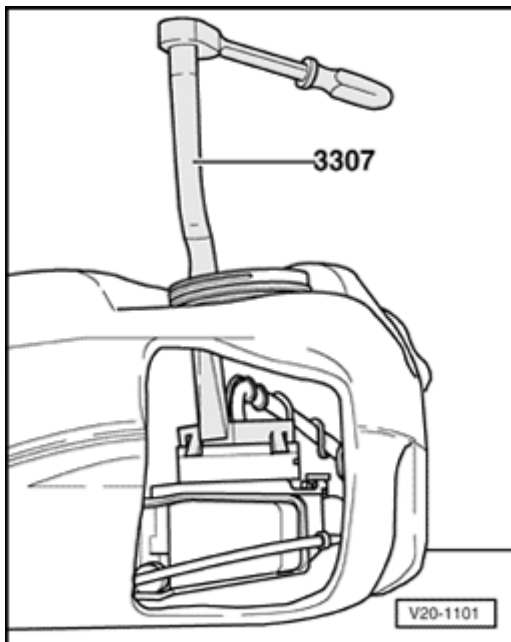


Fig. 173: Removing And Installing In Tank Fuel Pump (FP)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn fuel pump approx. 15 ° clockwise onto stop using fuel pump wrench 3307.

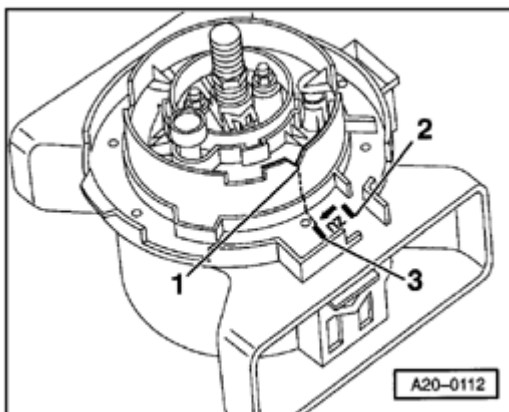


Fig. 174: Inserting Fuel Pump Into Baffle Housing In Fuel Tank
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Notch - 1 - aligns with marking - 3 - (bayonet connection).

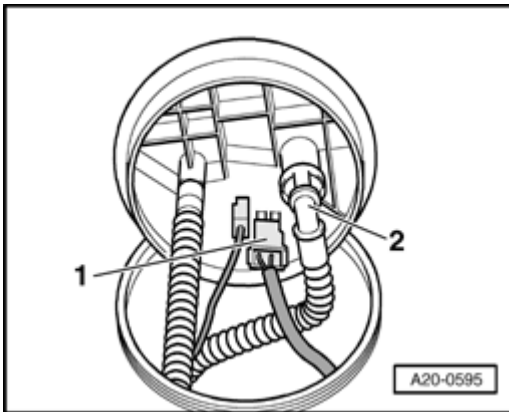


Fig. 175: Connect Fuel Return Line On Inside To Flange
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect fuel return line - 2 - on inside to flange.

NOTE:

- Always use new O-rings for the fuel return line.
- Moisten O-ring for return line with fuel.

- Connect connector - 1 - to sender for fuel gauge on flange.
- Place new flange seal dry into opening of fuel tank and moisten only the inside (contact surface) with fuel.

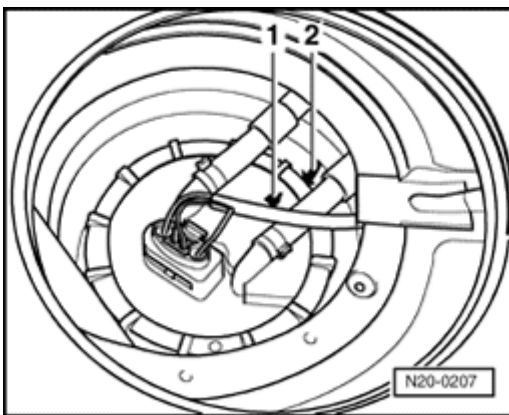


Fig. 176: Installation Position Of Fuel Delivery Unit Flange
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- With flange in installation position, turn counter-clockwise and insert into fuel tank.
- Marking - 1 - on flange must align with marking - 2 - on fuel tank.
- Tighten union nut.
- Tightening torque: 60 Nm

The rest of the assembly is basically a reverse of the disassembling sequence.

NOTE:

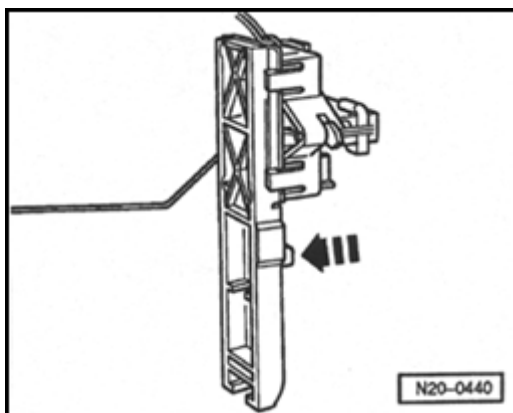
- Do not interchange supply and return hoses (supply hose with white lettering, return hose with blue lettering).
 - Secure fuel hoses with spring-type clamps See parts catalog..
 - Make sure fuel lines are securely fastened.
 - After installing fuel pump flange, check that the supply, return and breather lines are still clipped onto the fuel tank.
- Check DTC memory of all control modules, repair all stored malfunctions, and erase DTC memory afterwards.
 - After erasing DTC memory, readiness code must be generated again --> Adapting functions and components

Fuel Level Sensor G , removing and installing**NOTE:**

- When removing union nut from flange, fuel tank must not be filled more than 1/3.
- Empty fuel tank if necessary using Fuel siphoning device VAS 5190 or FM3000GH Fuel Extractor
- Observe safety precautions --> Safety precautions when working on fuel supply system and rules of cleanliness --> Rules for cleanliness before beginning work.

Removing

- Remove fuel pump --> Fuel pump, removing and installing
- Disconnect fuel gauge sender connector on underside of flange.
- If necessary, extract fuel down to lower edge of locking device on sensor.

**Fig. 177: Identifying Locking Tab**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unclip Fuel Level Sensor G at baffle housing in fuel tank and remove.

- Press locking device on sensor in direction of - **arrow** - and pull upward (illustration shows sensor removed).

Installing

- Insert Fuel Level Sensor G in guide on baffle housing and press down until it engages.
- Reconnect Fuel Level Sensor G connector to flange.
- Install flange and remaining assemblies --> **Fuel pump, removing and installing**

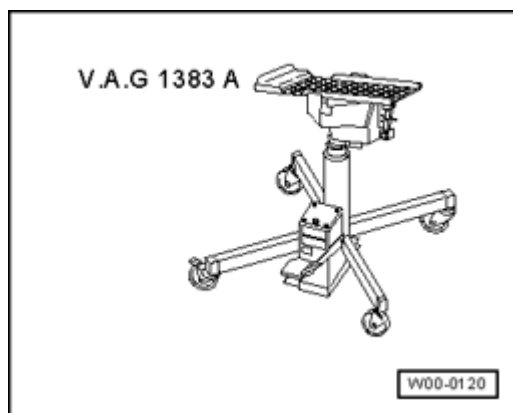
Fuel tank, removing and installing**Special tools, testers and auxiliary items required**

Fig. 178: Engine/Transmission Jack VAG 1383 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

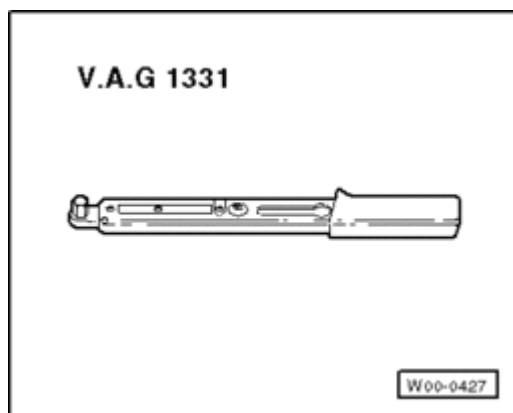


Fig. 179: Torque Wrench V.A.G 1331
Courtesy of VOLKSWAGEN UNITED STATES, INC.

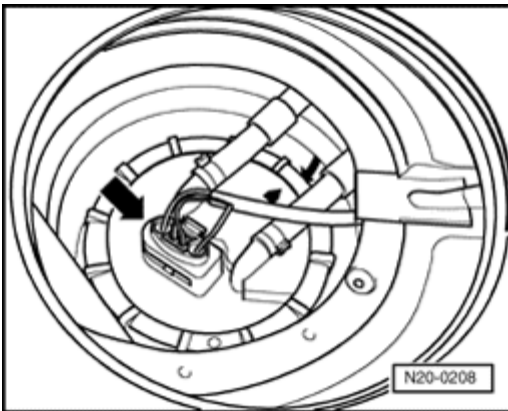
- Torque wrench V.A.G 1331

NOTE:

- The fuel tank must not be more than 1/2 full.
- Empty fuel tank if necessary using Fuel siphoning device VAS 5190 or FM3000GH Fuel Extractor
- Observe safety precautions --> Safety precautions when working on fuel supply system and rules of cleanliness --> Rules for cleanliness before beginning work.

Removing

- Open fuel filler door and remove fuel tank cap.
- First, check whether a coded radio is installed. If necessary, obtain the anti-theft coding.
- Switch off ignition and all electrical consumers.
- Disconnect battery Ground (GND) strap --> **27 - BATTERY, STARTER, GENERATOR, CRUISE CONTROL** .
- Remove luggage compartment floor covering.
- Remove cover from fuel pump.

**Fig. 180: Harness Connector On Flange****Courtesy of VOLKSWAGEN UNITED STATES, INC.**

- Remove 4-pin connector - **arrow** - from flange on fuel tank.
- Remove right rear wheelhouse liner --> **66 EXTERIOR EQUIPMENT** .
- Clean area surrounding fuel filler tube.
- Remove bolts for fuel filler door unit and remove fuel filler door unit with rubber cup.
- Remove securing bolt on filler neck.
- Remove cover in front of rear axle.

CAUTION: Fuel supply lines are under pressure! Before removing from hose connection wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

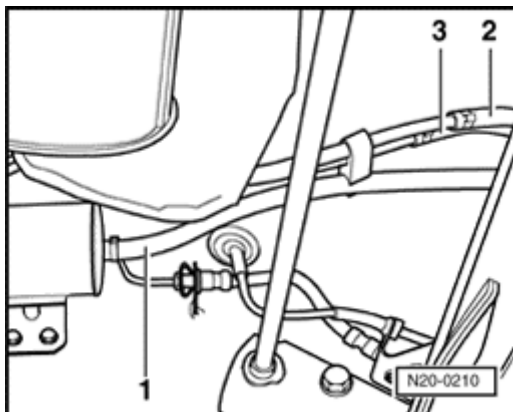


Fig. 181: Fuel Filter Input Supply Line, Return Line And Ventilation Line
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull supply hose - **1** - from inlet to fuel filter.
- Mark return hose - **2** - and breather hose - **3** - and separate at connecting point.
- Seal the lines so that the fuel system is not contaminated by dirt etc.
- Remove cover from EVAP canister.

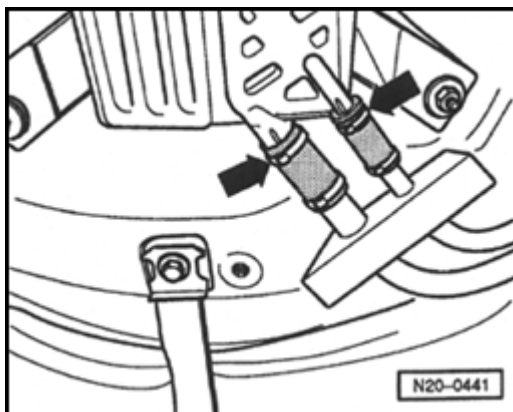


Fig. 182: Location Of Ventilation Lines At EVAP Canister
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect vent lines at EVAP canister - **arrows** -.

Continued for all vehicles

- Remove tensioning strap. While doing so, support fuel tank using engine/transmission jack V.A.G 1383 A
- Lower fuel tank.

Installing

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

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

- Make sure vent and fuel lines are not kinked when installed.
- Make sure fuel lines are securely fastened.
- Secure fuel hoses with spring-type clamps See parts catalog..
- Do not interchange supply and return hoses (supply hose with white lettering, return hose with blue lettering).

NOTE:

- **After installing fuel tank, check that the supply, return and breather lines are still clipped onto the fuel tank.**

- Check DTC memory of all control modules, repair all stored malfunctions, and erase DTC memory afterwards.
- After erasing DTC memory, readiness code must be generated again --> **Adapting functions and components**

Crash fuel shut-off

Function

Vehicles with an airbag are equipped with a crash fuel shut-off system. It reduces the danger of a fire in a crash as the fuel pump is switched off via the fuel pump relay.

At the same time, with this set-up, an improvement in the comfort of engine startability is also attained. When opening the door, the fuel pump is activated for 2 seconds to build pressure in fuel system.

When opening fuel system, observe safety precautions --> **Safety precautions when working on fuel supply system** .

Fuel pump, checking

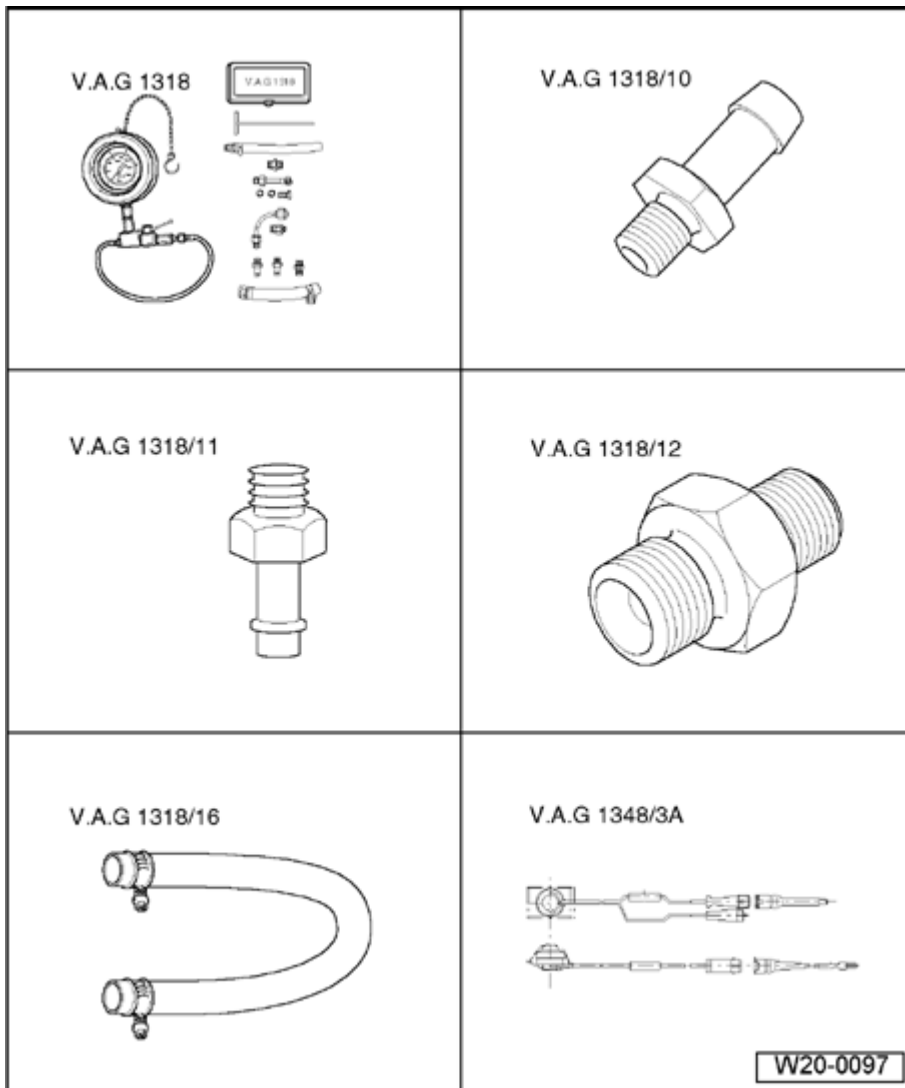


Fig. 183: Identifying Special Tools - Fuel Pump, Checking
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Pressure gauge V.A.G 1318
- Adapter V.A.G 1318/10
- Adapter V.A.G 1318/11
- Adapter V.A.G 1318/12
- Adapter V.A.G 1318/16
- Remote control V.A.G 1348/3A with adapter cable V.A.G 1348/32

Special tools, testers and auxiliary items required

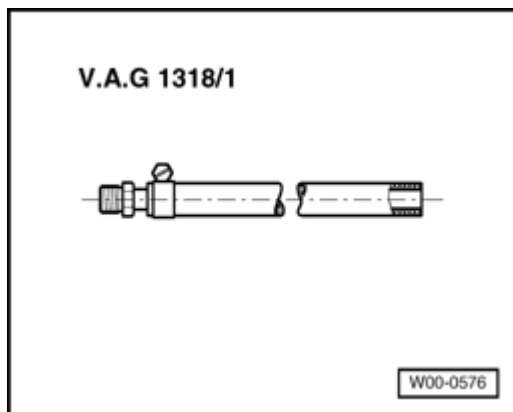


Fig. 184: Adapter V.A.G 1318/1

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Adapter V.A.G 1318/1

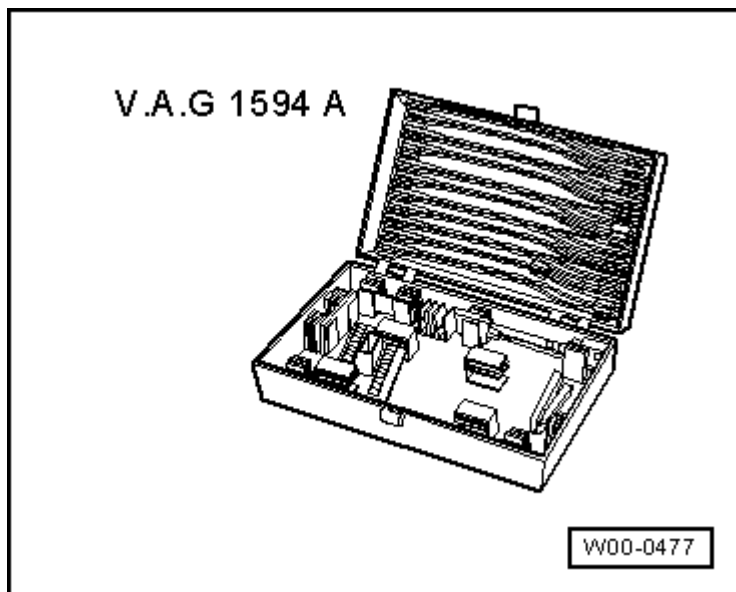


Fig. 185: Connector Test Set V.A.G 1594 A

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connector test set V.A.G 1594 A

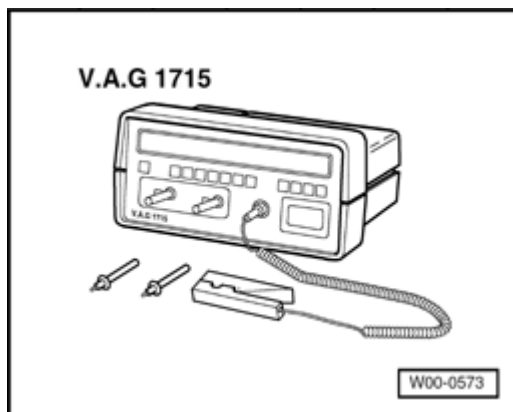


Fig. 186: Multimeter V.A.G 1715

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Multimeter V.A.G 1715

Test conditions

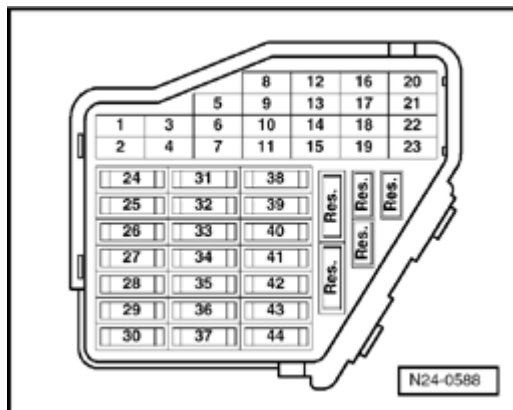


Fig. 187: Identifying Main Fuse Panel

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Fuse 28 must be OK.
- Battery voltage must be at least 11.5 Volts.
- All electrical consumers, such as, lights and rear window defroster must be switched off.
- If vehicle is equipped with an A/C system, it must be switched off.

NOTE:

- **Observe the description of crash fuel shut-off function --> Crash fuel shut-off .**

Checking delivery rate

- Remove fuel filler cap from fuel filler tube.
- Remove engine cover.

CAUTION: Fuel supply lines are under pressure! Before removing from hose connection wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

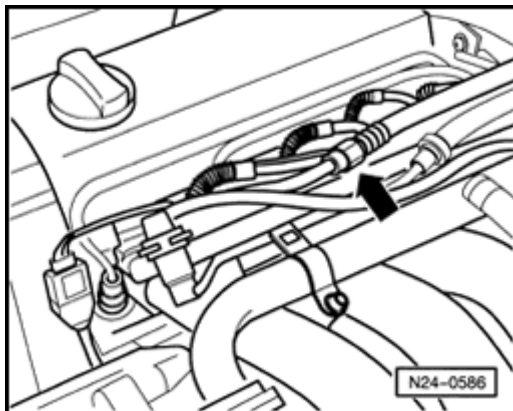


Fig. 188: Identifying Fuel Supply Line Threaded Connection
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Open threaded connection - **arrow** - and catch exiting fuel using a rag.

NOTE:

- To loosen the fastener, counterhold the hex of the fuel rail. Tightening torque: 22 Nm.

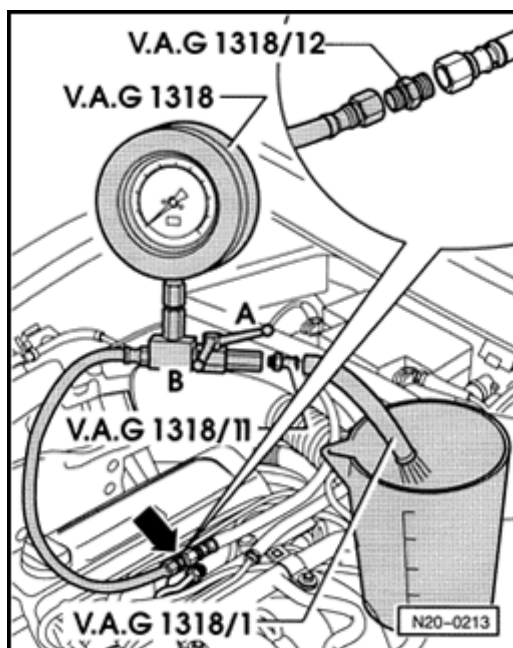


Fig. 189: Installing Fuel Pressure Gauge
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect pressure gauge V.A.G 1318 to fuel supply line using adapter V.A.G 1318/12.
- Install hose V.A.G 1318/1 onto adapter V.A.G 1318/11 on pressure gauge V.A.G 1318 and hold hose in a

measuring container.

- Open shut-off tap on pressure gauge V.A.G 1318. The lever then points in the direction of flow - A -.
- Remove cover in front of fuse holder.

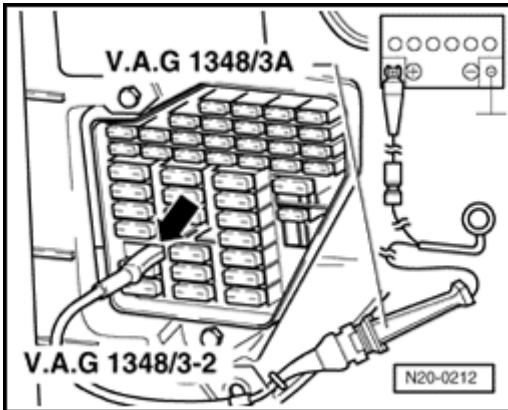


Fig. 190: Connecting VAG 1348/3A With Adapter Cable VAG 1348/3-2 To Contact And Battery Positive
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull fuse No. 28 from the fuse holder.
- Connect remote control V.A.G 1348/3A with adapter cable V.A.G 1348/32 to contact 28a to fuel pump and battery positive (+).
- Operate remote control V.A.G 1348/3A. Slowly close shut-off tap, until pressure gauge shows 3 bar. From this point on do not move position of shut-off tap.
- Empty the measuring container.
- Delivery rate of Fuel Pump (FP) is dependent on battery voltage. Therefore, connect multimeter to vehicle battery using adapter cables from connector test kit V.A.G 1594 A.
- Operate remote control for 30 seconds and measure battery voltage.

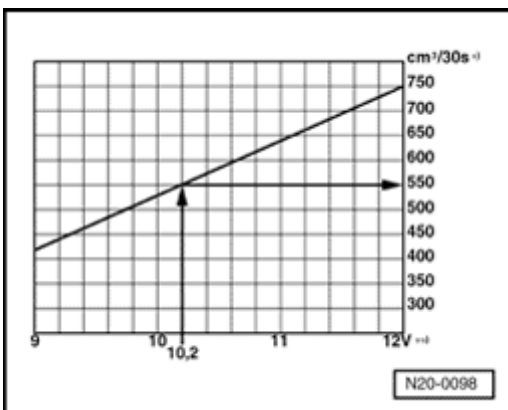


Fig. 191: Fuel Quantity Delivered Graph
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Compare quantity of fuel delivered with specification.

*) Minimum delivery $\text{cm}^3 / 30$ seconds

**) Voltage at fuel pump with engine stopped and pump running (approx. 2 volts less than battery voltage).

Example:

During the test, a voltage of 12.2 volts is measured at the battery. As the voltage at the pump is approx. 2 volts less than the battery voltage then this will equate to a minimum delivery of $550 \text{ cm}^3 / 30 \text{ s}$.

If minimum delivery rate is not attained:

- Check fuel lines for possible restrictions (kinks) or blockages.

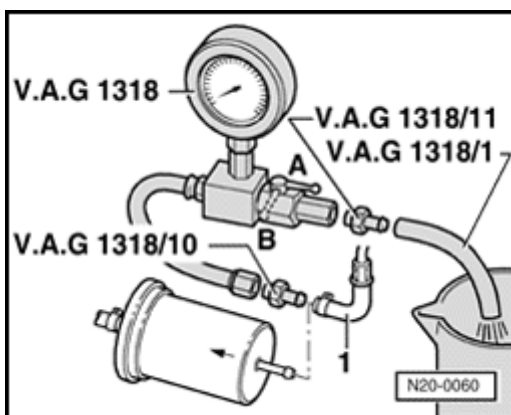


Fig. 192: Pressure Gauge V.A.G 1318 Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull supply hose - 1 - from inlet to fuel filter.
- Connect pressure gauge V.A.G 1318 to hose with adapter V.A.G 1318/10.
- Repeat delivery rate check.

If minimum delivery rate is now attained:

- Replace fuel filter:

If minimum delivery rate is again not attained:

- Remove fuel pump and check fuel strainer for soiling. --> **Fuel pump, removing and installing**

Only when up to now no malfunction has been detected:

- Fuel Pump (FP) faulty, replace fuel pump. --> **Fuel pump, removing and installing**

If delivery rate has been attained, but a fuel supply system malfunction is still suspected, e.g. intermittent failure of fuel supply system:

- Check the current draw of the fuel pump as follows:
- Reconnect all disconnected fuel lines.
- Remove luggage compartment floor covering.
- Remove cover from fuel pump.

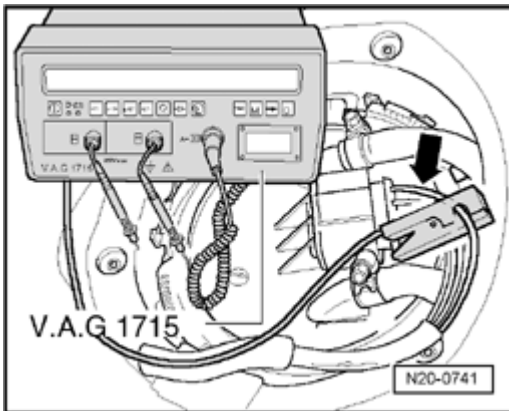


Fig. 193: Measuring Current Draw Of Fuel Pump Using Multimeter V.A.G 1715

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect multimeter V.A.G 1715 with current clamp to wire for contact 1 - **arrow** - of 4-pin connector.
- Start engine and run at idle speed.
- Measure current draw of fuel pump.
- Specification: max. 8 amps.

NOTE:

- If malfunction in fuel system is sporadic, test can also be performed during a road test, but a second person is required.

If current draw is exceeded:

- Fuel Pump (FP) faulty, replace fuel pump. --> Fuel pump, removing and installing

Fuel Pump (FP) check-valve, checking

Test conditions

- Remote control V.A.G 1348/3A connected
- Pressure gauge V.A.G 1318 connected to the fuel supply line from fuel supply tube

Test sequence

NOTE:

- With this check the fuel supply line connections from the fuel pump to the point at which the pressure gauge V.A.G 1318 is connected will be checked for leaks at the same time.

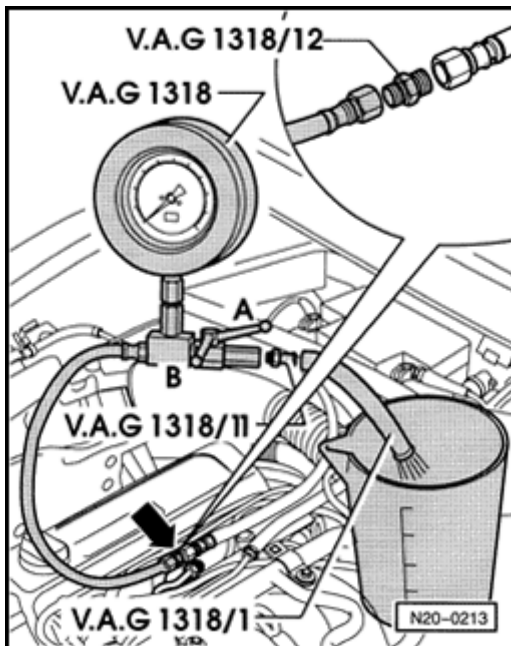


Fig. 194: Installing Fuel Pressure Gauge
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Close pressure gauge shut-off valve (lever perpendicular to direction of flow -position - **B** -).
- Operate remote control at short intervals, until a pressure of approx. 3 bar has built up.

CAUTION: Danger of spray when opening shut-off valve. Hold container in front of open connection on pressure gauge.

- If pressure builds up too high, lower excess pressure by carefully opening the shut-off tap.
- Watch pressure drop on gauge.
- After 10 minutes the pressure must not drop below a 2.5 bar decrease.

If pressure drops further:

- Check line connections for leaks.

If no fault is detected in the wiring:

- Fuel Pump (FP) faulty, replace fuel pump. --> **Fuel pump, removing and installing**

FUEL SUPPLY SYSTEM COMPONENTS (ALL WHEEL DRIVE (AWD) VEHICLES), REMOVING AND INSTALLING

Fuel supply system components (All Wheel Drive (AWD) vehicles), removing and installing

NOTE:

- Hose connections must be secured with clamps Electronic Parts Catalog

"ETKA".

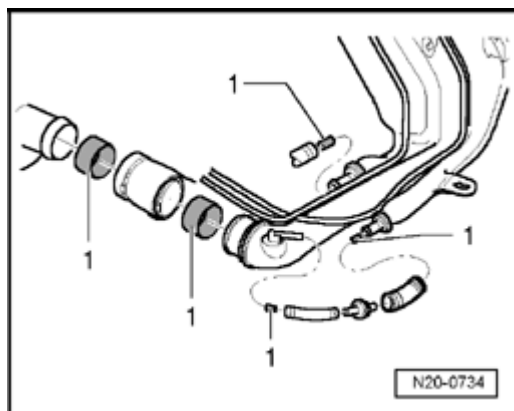


Fig. 195: Identifying Fuel Tank Connections And Metal Sleeves
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **All hose connections at fuel tank have metal sleeves, e.g. - 1 -.**

Observe safety precautions --> **Safety precautions when working on fuel supply system** .

Observe rules for cleanliness --> **Rules for cleanliness** .

Fuel tank with attachments - assembly overview: Engine codes AUG, AWM --> **Fuel tank with attachments (engine codes AUG, AWM), assembly overview** .

Electronic engine power control --> **Electronic power control (EPC)** .

EVAP canister system components

- Engine codes AUG, AWM: --> **Evaporative emissions (EVAP) system**

Fuel tank with attachments (engine codes AUG, AWM), assembly overview

Fuel tank

Connection filler tube

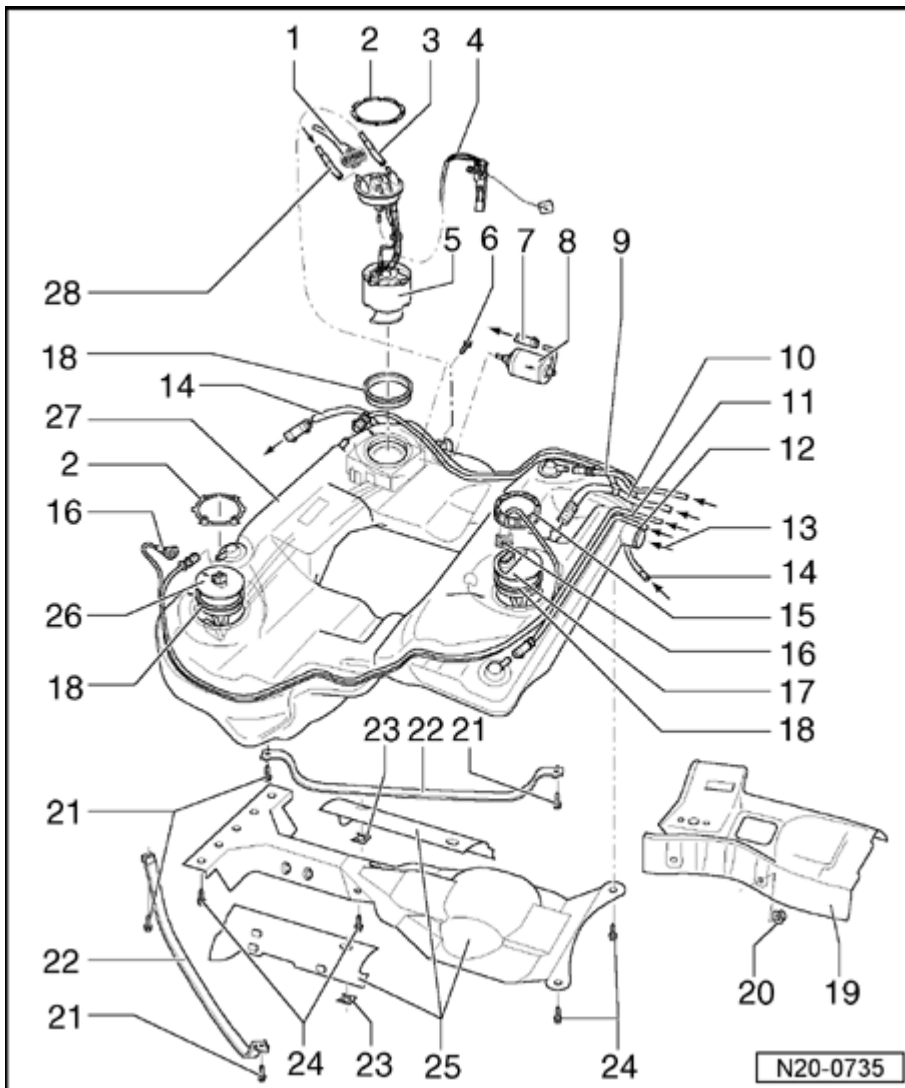


Fig. 196: Fuel Tank With Attachments (Engine Codes AUG, AWM), Assembly Overview
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Connector

- Black, 4-pin
- For Fuel Level Sensor G and Transfer Fuel Pump (FP) G6

2 - Locking ring, 145 Nm

- Ensure seated tightly
- Use wrench 3087 to remove and install

3 - Supply line

- White writing

- Ensure seated tightly

4 - Fuel Level Sensor G

- Removing and installing --> **Fuel Level Sensor G , removing and installing**

5 - Fuel delivery unit

- With flange
- Removing and installing --> **Fuel delivery unit, removing and installing**
- Check fuel pump --> **Fuel pump, checking**
- Clean strainer if soiled

6 - 2 Nm

7 - Supply line

- White marking/writing
- Ensure seated tightly

8 - Fuel filter

- Removing and installing --> **Fuel filter, assembly overview**

9 - Vent line

- Check for proper seating

10 - Vent line

- Check for proper seating

11 - Vent line

- Check for proper seating

12 - Vent line

- Check for proper seating

13 - From connecting hose

- Check for proper seating

14 - Vent line

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

- From EVAP canister to Evaporative Emission (EVAP) Canister Purge Regulator Valve N80
- Clipped onto fuel tank

15 - Union nut, 60 Nm

- Use Wrench 3218 for removal and installation

16 - Connector

- Black, 2-pin
- For Fuel Supply Sensor 3 G237

17 - Fuel Level Sensor 3 G237

Removing and installing --> **Fuel Level Sensor 3 G237 , removing and installing**

18 - Seal

- Replace if damaged
- To install, place into opening of fuel tank dry
- Only coat with fuel when installing sensor or flange

19 - Heat shield

- For fuel delivery connection

20 - 10 Nm

21 - 23 Nm

22 - Securing strap

- Note installation position

23 - Securing clip

- Ensure seated tightly

24 - 23 Nm

25 - Heat shield

- For fuel tank

26 - Fuel Level Sensor 2 G169

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

- Removing and installing --> **Fuel Level Sensor 2 G169 , removing and installing**

27 - Fuel tank

- Support using Engine/transmission jack V.A.G 1383 A when removing
- Removing and installing --> **Fuel tank, removing and installing**

28 - Return line

- Blue writing
- Ensure seated tightly

Filler tube

Connection fuel tank

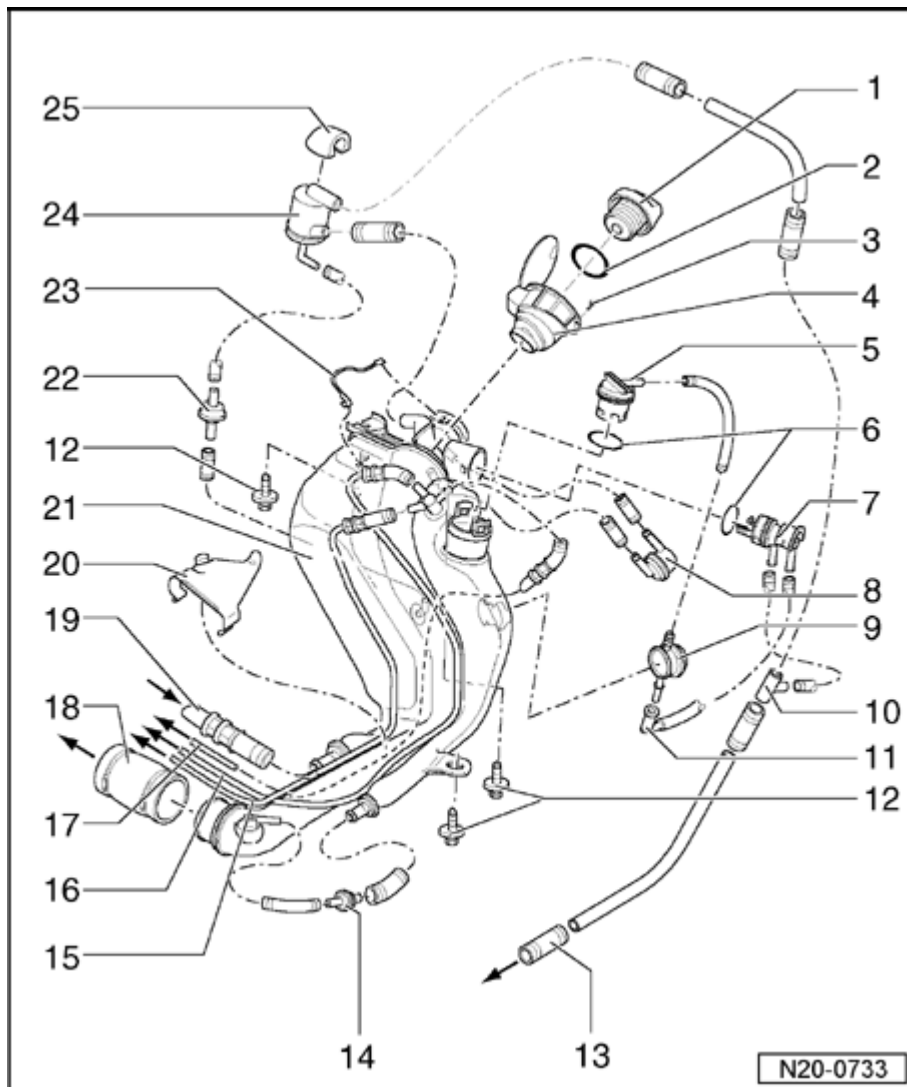


Fig. 197: Filler Tube, Overview**Courtesy of VOLKSWAGEN UNITED STATES, INC.**

1 - Cap

2 - Seal

- Replace if damaged

3 - Bolt

4 - Tank flap unit

- With rubber gasket

5 - Gravity valve

- To remove valve unclip upward out of support
- From 08.2003 as compete part **Complete components**
- Test valve for through-flow
 - Valve vertical: Open
 - Valve angled at 45 ° : Closed

NOTE:

- When checking the complete part **Complete components** , press lever of bleeder valve **Checking breather valve** and blow into line connection using quick acting coupling.

6 - O-ring

- Replace if damaged

7 - Breather valve

- To remove valve unclip sideways out of support
- From 08.2003 as compete part **Complete components**
- Checking **Checking breather valve**

8 - Combination protection valve

- For fueling ventilation
- Note installation position:
 - white valve-side to filler flange bottom

9 - Pressure retention valve

- From 08.2003 as compete part **Complete components**
- Checking **Checking pressure retention valve**

10 - Junction piece

- From 08.2003 as compete part **Complete components**

11 - Connection piece

- Ensure seated tightly
- Press together at front to release

12 - 23 Nm**13 - Vent line**

- Ensure seated tightly

14 - Non-return valve

- Note installation position:
 - grey valve side faces toward sealing cap

15 - Vent line

- Ensure seated tightly

16 - Vent line

- Ensure seated tightly

17 - Vent line

- Ensure seated tightly

18 - Connecting hose

- Ensure seated tightly

19 - Vent line

- Ensure seated tightly

20 - Trim strip

21 - Fuel tank filler tube

22 - Non-return valve

- From 08.2003 as compete part **Complete components**
- Note installation position:
 - gray valve side faces in direction of vent valve

23 - Ground (GND) connection

- Ensure seated tightly

24 - Floater valve

- From 08.2003 as compete part **Complete components**
- For fueling ventilation

25 - Protective cap

Checking breather valve

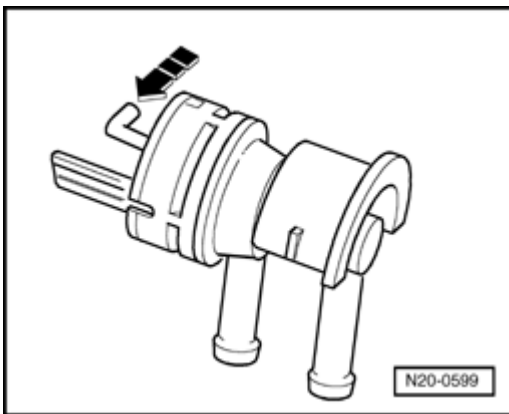


Fig. 198: Checking Breather Valve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Lever in rest position: Closed

Lever pushed in direction of - **arrow** - : Open

- Before installing valve, remove cap from fuel tank.

Checking pressure retention valve

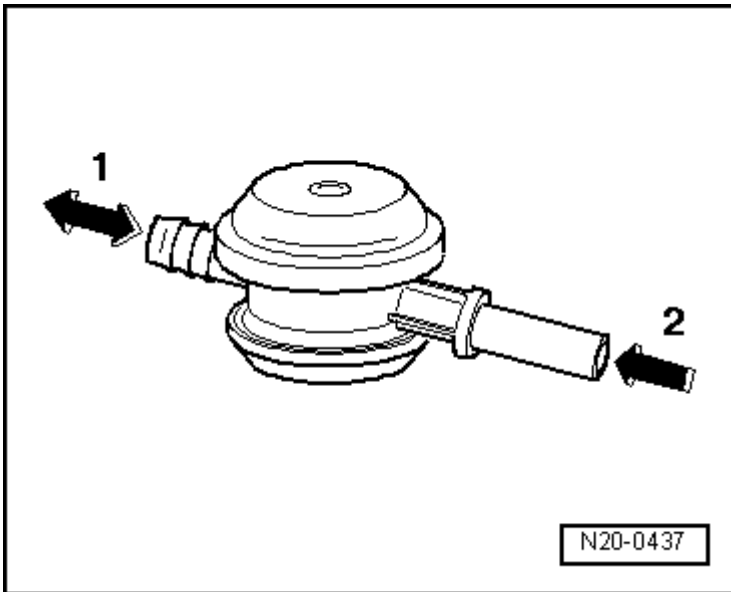


Fig. 199: Checking Pressure Retention Valve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

The pressure retaining valve is opened in both flow directions - **arrow 1** - on gravity valve side.

It is only opened in one flow direction - **arrow 2** - on side of bleeder valve.

Complete components

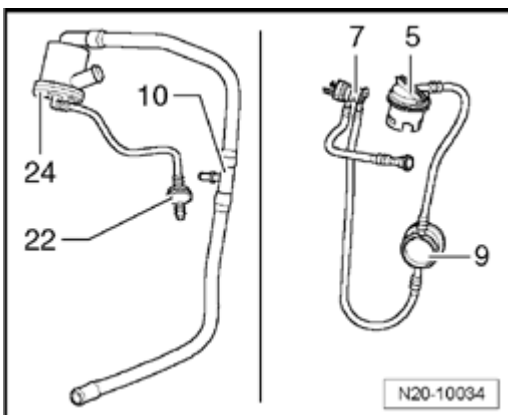
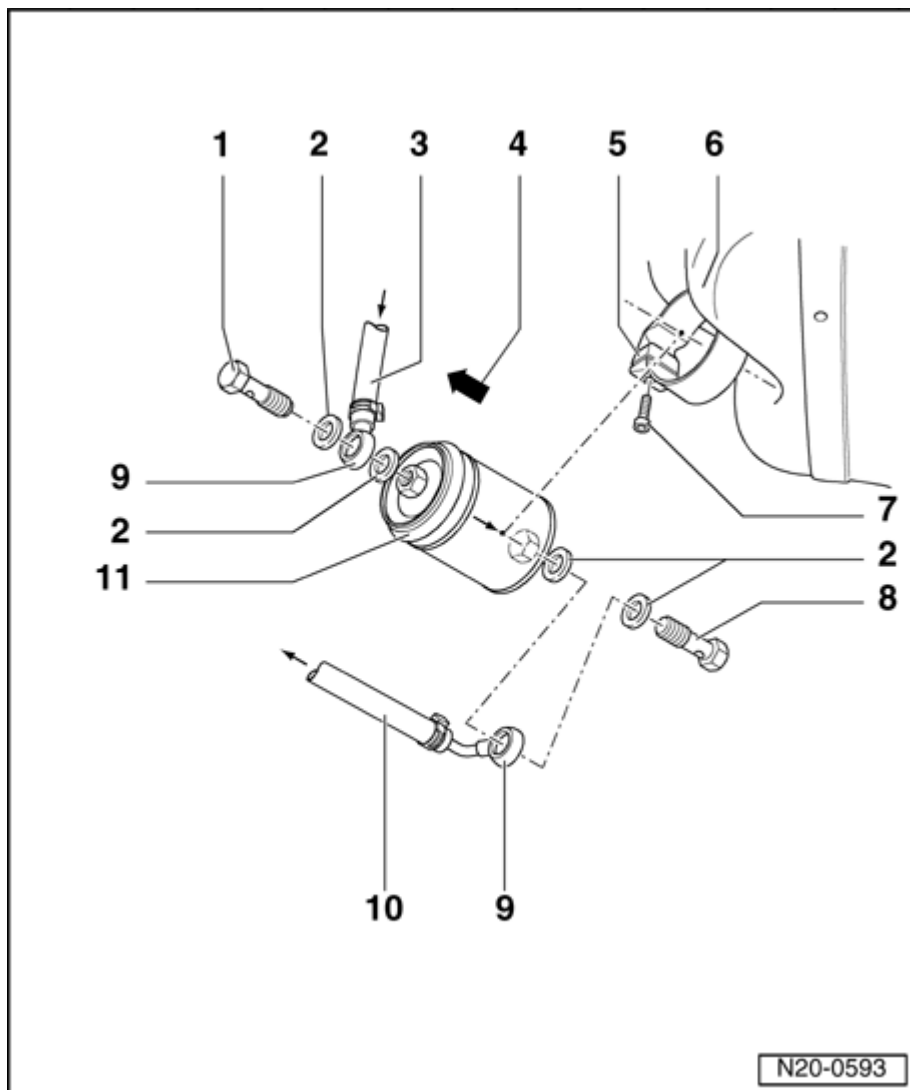


Fig. 200: Complete Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

From 08.2003, the components indicated are installed as complete components.

Fuel filter, assembly overview

**Fig. 201: Fuel Filter, Assembly Overview**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Banjo bolt, 30 Nm

2 - Seal

- Replace

3 - Supply line

- Black
- Ensure seated tightly
- From Fuel Pump (FP)

- Engine codes AUG, AWM:

4 - Direction of travel

5 - Retaining clip

6 - Fuel tank

7 - 2 Nm

8 - Banjo bolt, 23 Nm

9 - Connecting piece

10 - Supply line

- White writing
- Ensure seated tightly

11 - Fuel filter

- Note installation position **Installation position of fuel filter**

Installation position of fuel filter

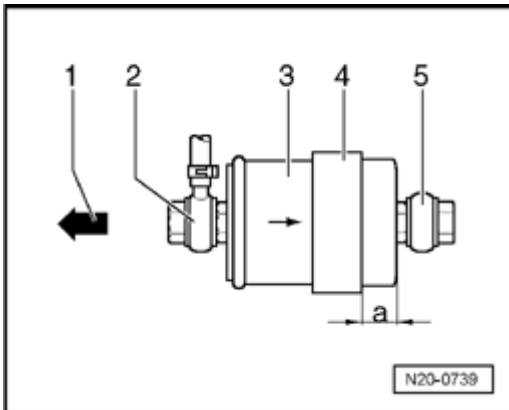


Fig. 202: Installation Position Of Fuel Filter

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1. Direction of travel
2. Connection of Fuel Pump (FP)
3. Fuel filter, installation position: Arrow points in direction of flow
4. Retaining clip
5. Connection to fuel supply line at fuel distributor

Installing

- Install fuel filter so that the dimension - **a** - is 32 to 36 mm.

Fuel tank, emptying

A - Emptying a fuel tank more than 3/4 filled **A - Emptying A Fuel Tank More Than 3/4 Filled**

B - Emptying a fuel tank less than 3/4 filled **B - Emptying A Fuel Tank Less Than 3/4 Filled**

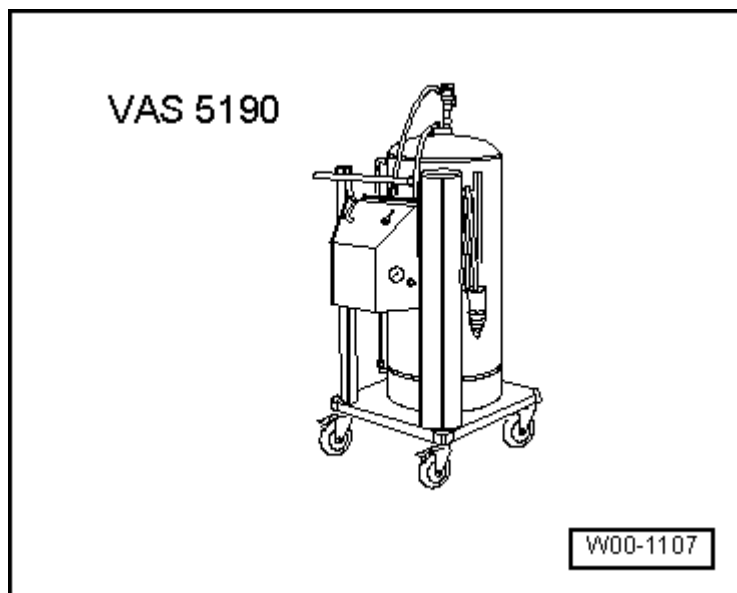
Special tools, testers and auxiliary items required

Fig. 203: Fuel Siphoning Unit VAS 5190
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Fuel siphoning unit VAS 5190

Work procedure

Observe safety precautions --> **Safety precautions when working on fuel supply system** .

Observe rules for cleanliness --> **Rules for cleanliness** .

- First, check whether a coded radio is installed. If necessary, obtain anti-theft coding.
- Switch off ignition and all electrical consumers.
- Disconnect battery Ground (GND) strap --> **27 - BATTERY, STARTER, GENERATOR, CRUISE CONTROL** .

CAUTION: Secure Ground (GND) wire of fuel siphon device VAS 5190 to vehicle Ground (GND).

A - Emptying A Fuel Tank More Than 3/4 Filled

- Remove fuel filler cap from fuel filler tube.

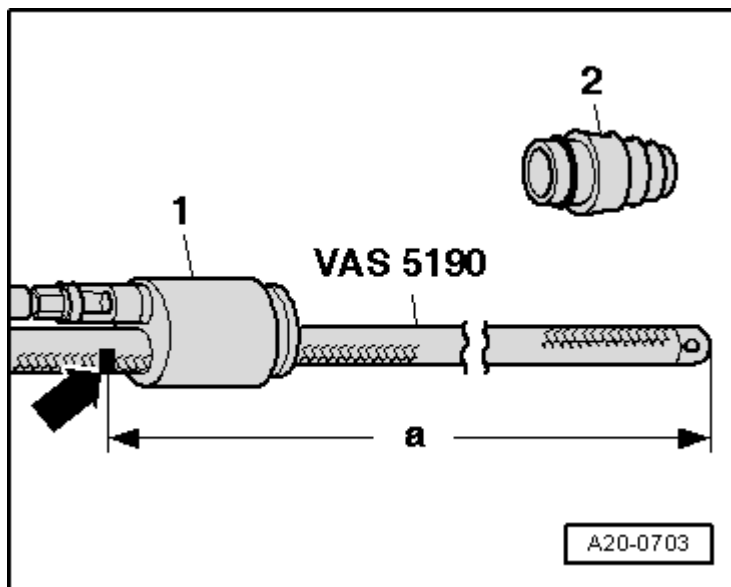


Fig. 204: Fuel Siphoning Device VAS 5190

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull cone piece - 2 - from shaft piece - 1 - of fuel siphoning device VAS 5190.
- Using insulating tape, apply a mark - **arrow** - on suction hose.
- Dimension - a - : 920 mm

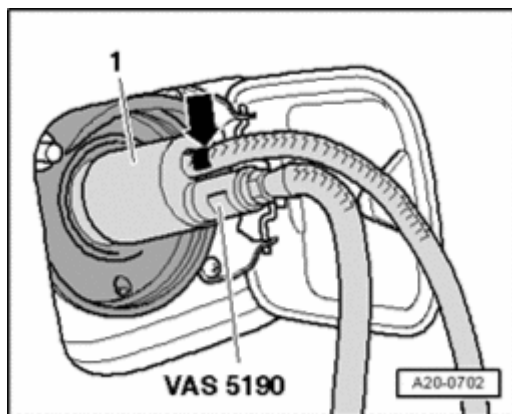


Fig. 205: Installing Fuel Siphoning Device VAS 5190 Onto Fuel Filler Tube Of Fuel Tank

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install shaft piece - 1 - of fuel siphoning device VAS 5190 on to fuel filler tube of fuel tank.
- Slide suction hose as far into fuel tank until mark applied earlier - **arrow** - stands on shaft piece.
- Empty fuel tank as much as possible via fuel filler neck Operating instructions.
- Carefully pull out suction hose.
- Remove fuel level sensor 3 G237 --> **Fuel Level Sensor 3 G237 , removing and installing .**
- Siphon remaining fuel out of left and right fuel tank chambers through sensor opening **B - Emptying A Fuel Tank Less Than 3/4 Filled .**

B - Emptying A Fuel Tank Less Than 3/4 Filled

- Remove Fuel Supply Sensor 3 G237 --> **Fuel Level Sensor 3 G237 , removing and installing .**

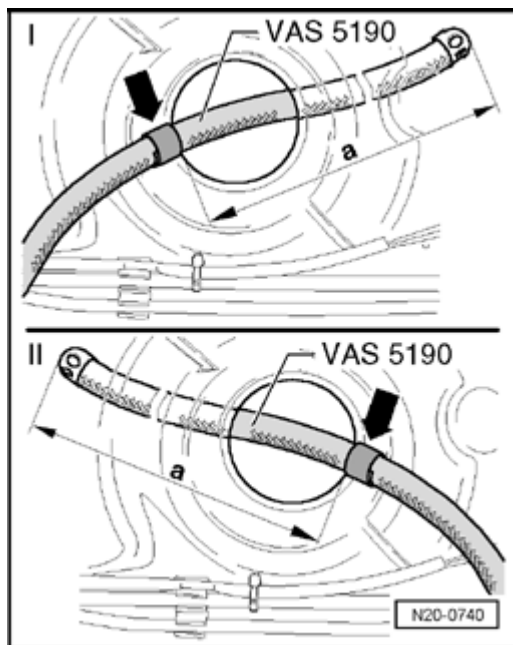


Fig. 206: Using Insulating Tape, Apply A Mark On Suction Hose
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Using insulating tape, apply a mark - **arrow** - on suction hose.
- Dimension - **a** - : 830 mm
- Slide suction hose through sensor opening only as far into right or left fuel tank chamber until mark applied is aligned with threaded connector flange (see **Fig. 206**)

I - Right chamber

II - Left chamber

- Siphon fuel from right or left chamber of fuel tank.
- Install fuel level sensor 3 G237 again --> **Fuel Level Sensor 3 G237 , removing and installing .**

Fuel delivery unit, removing and installing

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

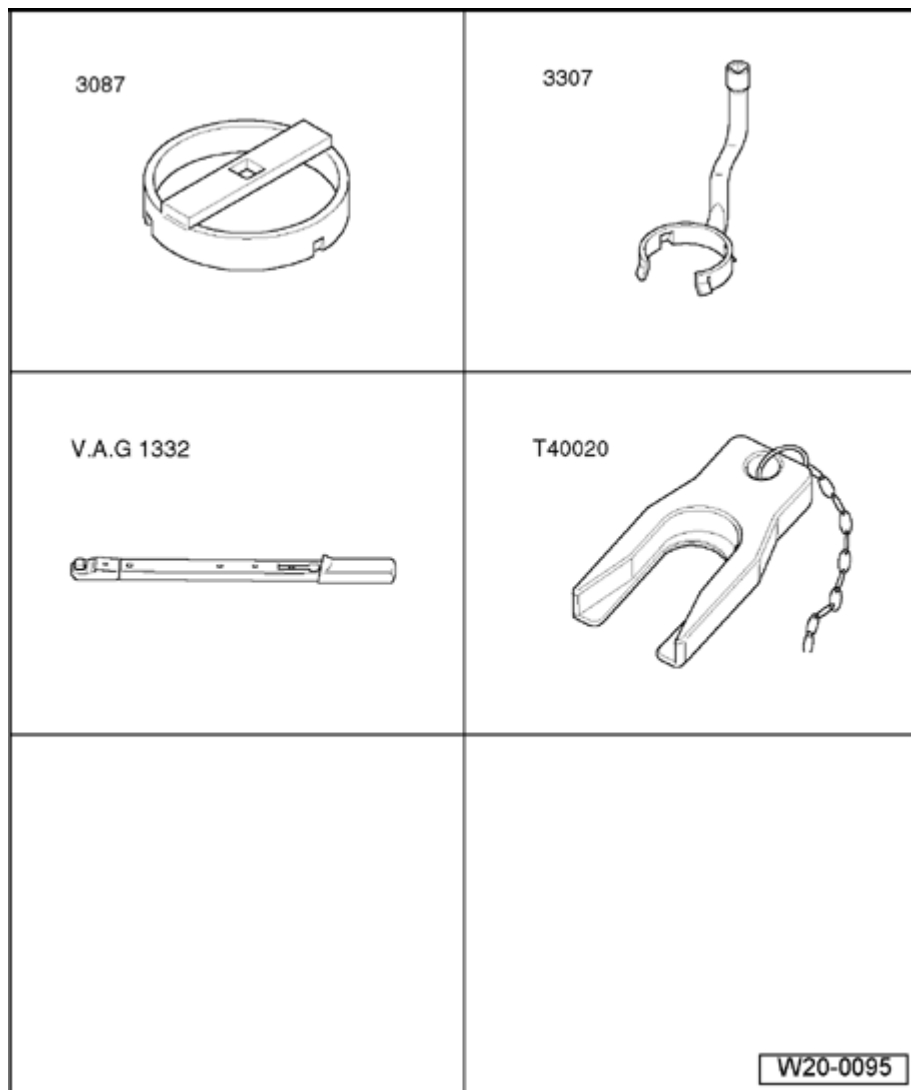


Fig. 207: Identifying Special Tools - Fuel Delivery Unit, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Wrench 3087
- Fuel pump wrench 3307
- Torque wrench V.A.G 1332
- Release tool T40020

NOTE:

- To remove locking ring, fuel tank may be a maximum of 1/4 full.
- Empty right chamber of fuel tank if necessary --> Fuel tank, emptying .
- Read safety precautions --> Safety precautions when working on fuel supply system and rules of cleanliness --> Rules for cleanliness before beginning work.

Fuel delivery unit, removing

- First, check whether a coded radio is installed. If necessary, obtain anti-theft coding.
- Switch off ignition and all electrical consumers.
- Disconnect battery Ground (GND) strap --> **27 - BATTERY, STARTER, GENERATOR, CRUISE CONTROL** .
- Open fuel filler flap briefly and then close again.
- Remove rear seat bench.
- Remove cover from fuel delivery unit.

CAUTION: Fuel supply line is under pressure! Wear protective goggles and protective clothing to prevent injuries and contact with skin. Before removing from hose connection wrap a cloth around connection. Then release pressure by carefully pulling hose off connection.

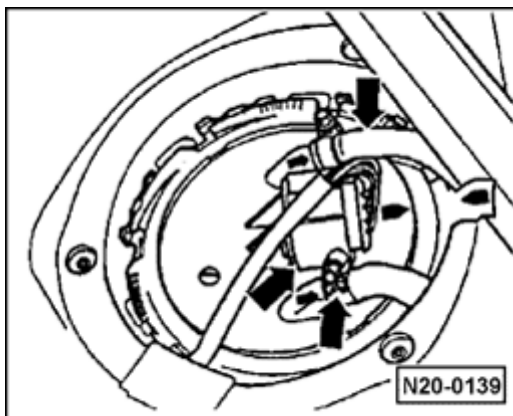


Fig. 208: Identifying Supply And Return Lines & 4 Pin Harness Connector
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Mark supply and return line and disconnect 4-pin connector from flange - **arrows** -.
- Seal lines so that fuel system is not contaminated by dirt etc.

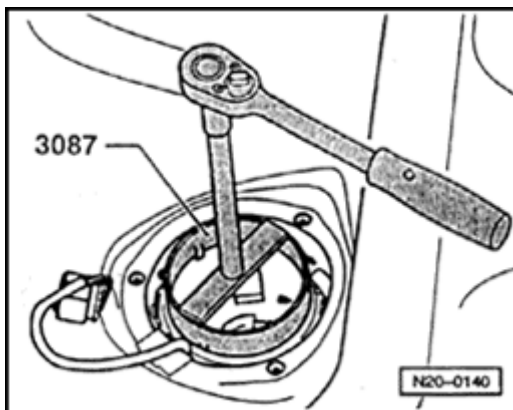


Fig. 209: Sealing Ring Tool - Wrench 3087

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove locking ring using special wrench for tank sensor 3087.
- Pull flange and seal out of opening in fuel tank.

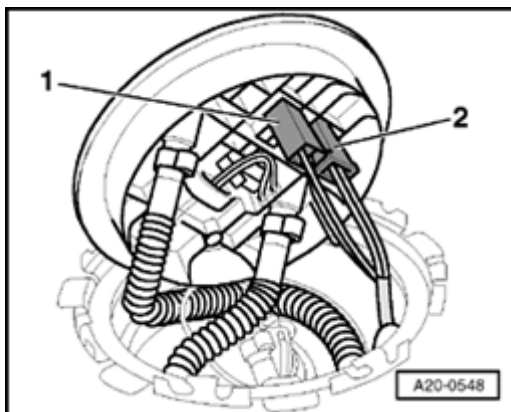


Fig. 210: Identifying Connectors On Inside Of Flange (#1 White And #2 Black)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect connector - 1 - (white) and - 2 - (black) on inside of flange.
- If necessary, siphon fuel from right chamber of fuel tank.

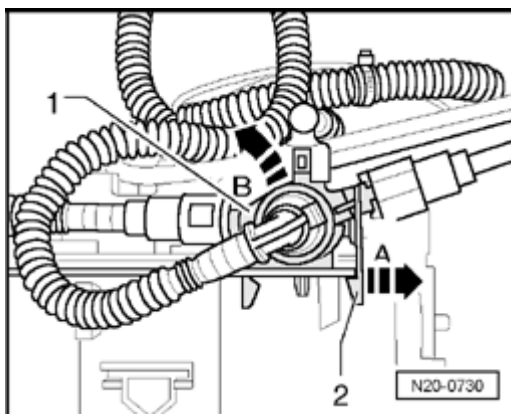


Fig. 211: Identifying Distributor Piece
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unclip distributor piece - 1 - from lower part of baffle housing. To do so, press two catches, positioned one behind the other - 2 -, toward outside - **arrow A** - and disconnect distributor piece - **arrow B** -.

NOTE:

- **Baffle housing is shown without fuel tank for sake of illustration.**

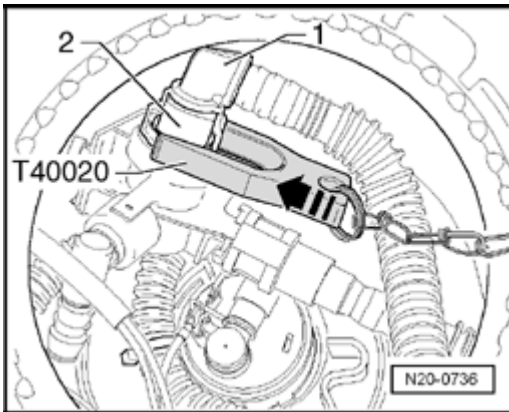


Fig. 212: Releasing Hose Coupling Of Return Line Using Release Tool T40020
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect fuel return line - 1 - from distributor piece - 2 -. To do so, release hose coupling of return line using Release Tool T40020.

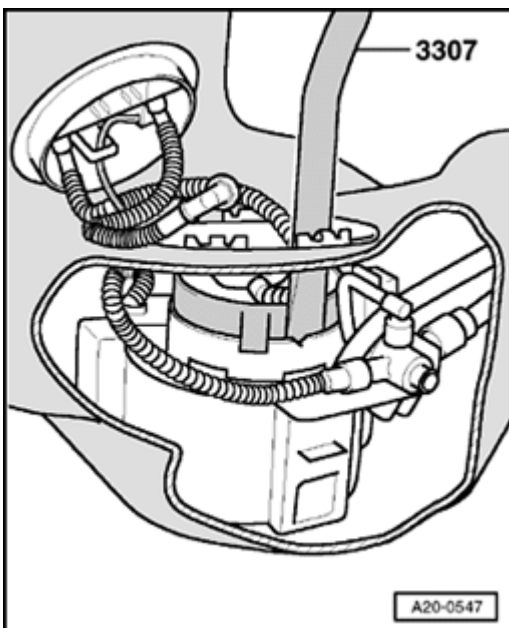


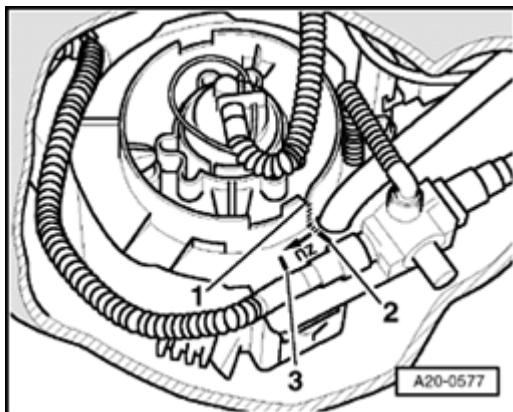
Fig. 213: Turning Fuel Pump (FP) Using Fuel Pump Wrench 3307
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn Fuel Pump (FP) approx. 15 ° toward left to stop using fuel pump wrench 3307 and remove it.

NOTE:

- If delivery unit is to be replaced then drain old delivery unit before disposal.

Fuel delivery unit, installing

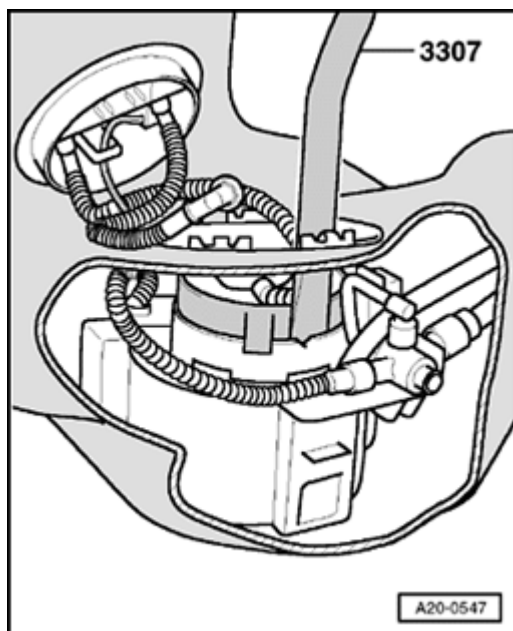
**Fig. 214: Fuel Delivery Unit, Installing**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert fuel delivery unit into baffle housing in tank so that the notch - **1** - at the fuel delivery unit aligns with marking - **2** - at baffle housing.
- In this position, Fuel Pump (FP) can be pressed downward noticeably.

NOTE:

- **Baffle housing is shown without fuel tank for sake of illustration.**

**Fig. 215: Turning Fuel Pump (FP) Using Fuel Pump Wrench 3307**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn Fuel Pump (FP) approx. 15 ° toward right until impact using fuel pump wrench 3307.

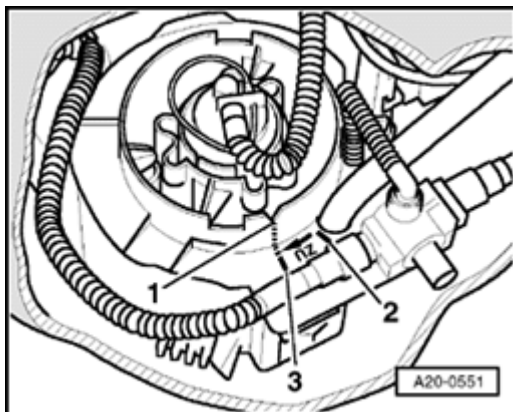


Fig. 216: Fuel Delivery Unit, Installing

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Notch - 1 - aligns with marking - 3 - (bayonet connection).

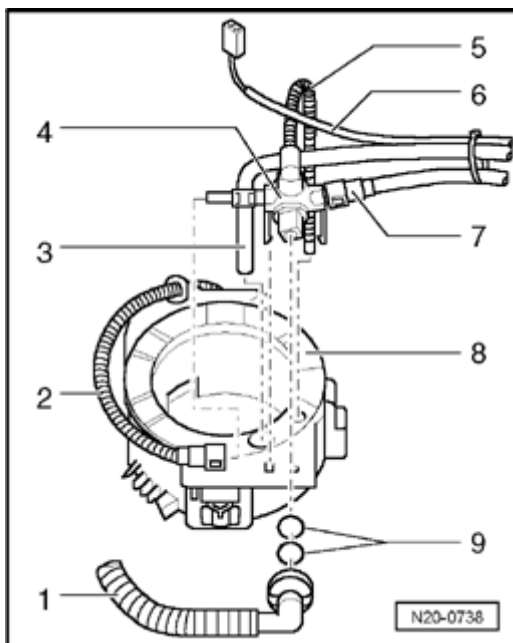


Fig. 217: Fuel Delivery Unit, Distribution Piece And Baffle Housing

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press on return line - 1 - on distributor piece - 4 - until hose coupling engages.

NOTE:

- Always use new O-rings - 9 - for fuel return line.
- Coat O-rings for fuel return line with fuel.

- Connect distributor piece - 4 - to baffle housing - 8 - and check catch (pull against).

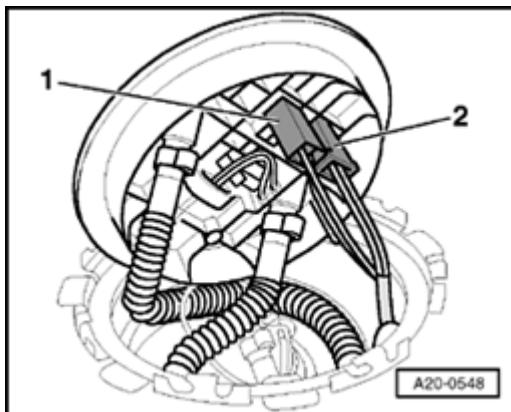


Fig. 218: Identifying Connectors On Inside Of Flange (#1 White And #2 Black)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect connectors - 1 - and - 2 - to inside of flange.
- White connector - 1 - for Fuel Level Sensor G to fuel supply side.
- Black connector - 2 - for fuel level sensor 2 G169 to fuel return side.
- Insert new seal for flange, dry, into opening of fuel tank and coat only inner side (equipment flange) with fuel.

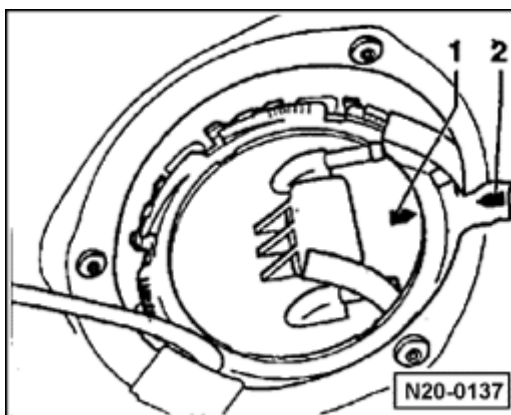


Fig. 219: Identifying Installed Position Of Fuel Delivery Unit Flange
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert lines into fuel tank and install flange.
- Marking on flange - 1 - must align with marking on fuel tank - 2 -.
- Check sealing ring for correct positioning.
- Tighten locking ring using special wrench for tank sensor 3087.
- Torque specification: 145 Nm

The rest of assembly is basically a reverse of disassembling sequence.

NOTE:

- Do not swap supply and return lines (supply line white writing, return line blue writing).
 - Secure fuel hoses with clamps Electronic Parts Catalog "ETKA".
 - Ensure fuel hoses are seated securely.
 - After installing fuel delivery unit flange, check that the supply, return and breather lines are still clipped onto fuel tank.
- Check DTC memory of all control modules, repair all stored malfunctions, and erase DTC memory afterwards Vehicle Diagnosis, Testing and Information System VAS 5051 ; Guided Fault Finding; Vehicle System Test , or Vehicle Diagnosis and Service Information System VAS 5052 ; On Board Diagnostic (OBD).

Fuel Level Sensor G , removing and installing**Removing**

- Remove fuel delivery unit --> **Fuel delivery unit, removing and installing** .

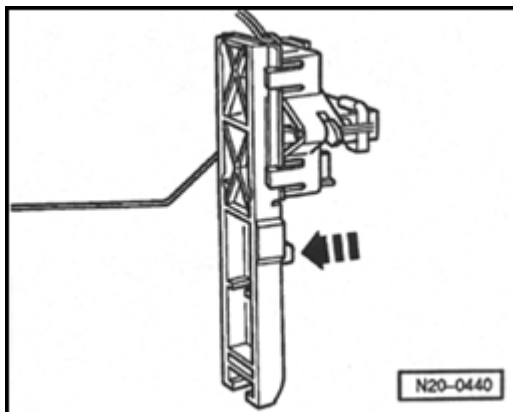


Fig. 220: Identifying Locking Tab

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unclip Fuel Level Sensor G at baffle housing in fuel tank and remove.
- Press locking mechanism at sender in direction of - **arrow** - and pull upward (figure shows sensor removed).

Installing

- Insert Fuel Level Sensor G in guide on baffle housing and press down until it engages.
- Install Fuel Pump (FP) --> **Fuel delivery unit, removing and installing** .

Fuel Level Sensor 2 G169 , removing and installing**Special tools, testers and auxiliary items required**

- Wrench for tank sensor 3087
- Torque wrench V.A.G 1332

NOTE:

- To remove locking ring, fuel tank may be a maximum of 1/4 full.
- Empty right chamber of fuel tank if necessary --> Fuel tank, emptying .
- Read safety precautions --> Safety precautions when working on fuel supply system and rules of cleanliness --> Rules for cleanliness before beginning work.

Removing

- First, check whether a coded radio is installed. If necessary, obtain anti-theft coding.
- Switch off ignition and all electrical consumers.
- Disconnect battery Ground (GND) strap --> **27 - BATTERY, STARTER, GENERATOR, CRUISE CONTROL** .
- Open fuel filler flap briefly and then close again.
- Remove rear seat bench.
- Remove Fuel Level Sensor 2 G169.

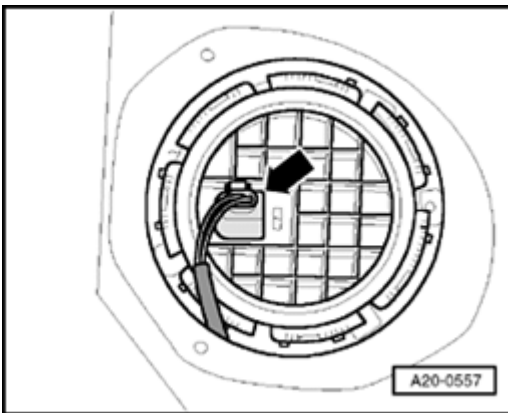


Fig. 221: Identifying Fuel Level Sensor 2 G169
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully disconnect 2-pin connector - **arrow** - from Fuel Level Sensor 2 G169 and remove it.

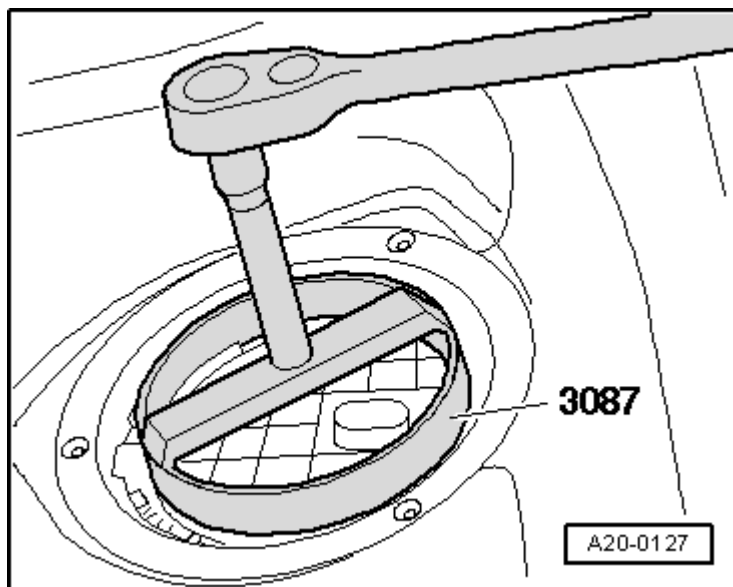


Fig. 222: Removing/Installing Locking Ring Using Wrench 3087
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove locking ring using wrench 3087.
- Carefully pull Fuel Level Sensor 2 G169 and seal slightly out of fuel tank opening.
- Disconnect connector to Fuel Pump (FP) flange (in direction of travel, right) from inside of flange.
- If necessary, siphon fuel from left chamber of fuel tank.

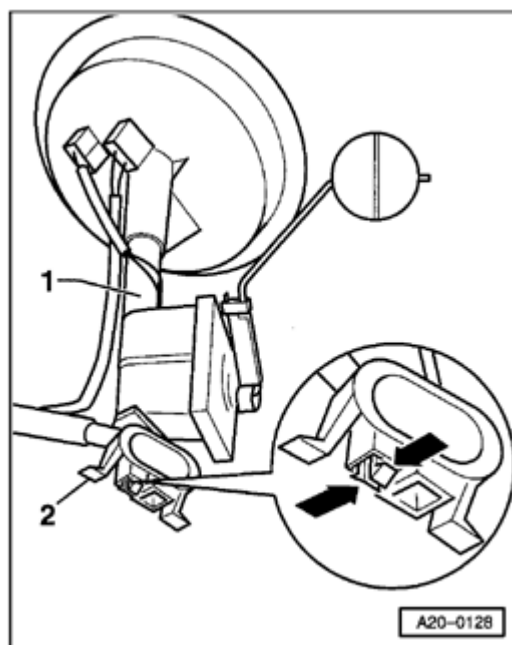


Fig. 223: Identifying Catches At Bottom Of Suction Jet Pump
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Reach into fuel tank and disengage catches - **arrows** - at bottom of suction jet pump - **2** -.

NOTE:

- **Sensor is shown without fuel tank for the sake of illustration.**

Installing

Installation is in reverse order of removal, note the following:

NOTE:

- **Do not bend floater arm of Fuel Level Sensor 2 G169 when installing.**

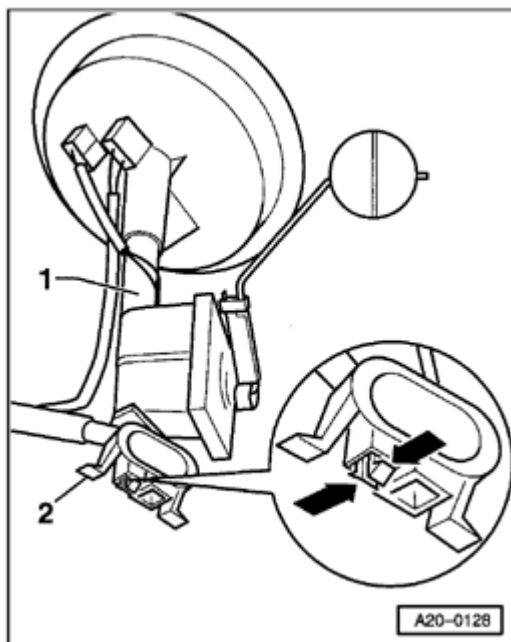


Fig. 224: Identifying Catches At Bottom Of Suction Jet Pump

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert Fuel Level Sensor 2 G169 - **1** - into fuel tank.
- Connect suction jet pump - **2** - to sensor at inside of fuel tank. The catches must engage.
- Connect 2-pin connector to inside of flange.
- Insert new seal for flange, dry, into opening of fuel tank and coat only inner side (equipment flange) with fuel.

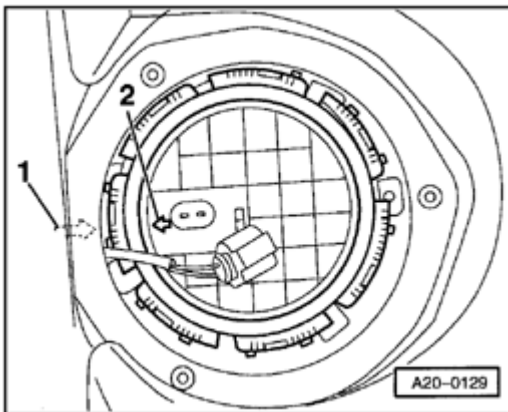


Fig. 225: Installation Position Of Fuel Level Sensor 2 G169
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check installation position of Fuel Level Sensor 2 G169.
- Marking on sensor - **2** - must align with marking on fuel tank - **1** -.
- Check sealing ring for correct positioning.

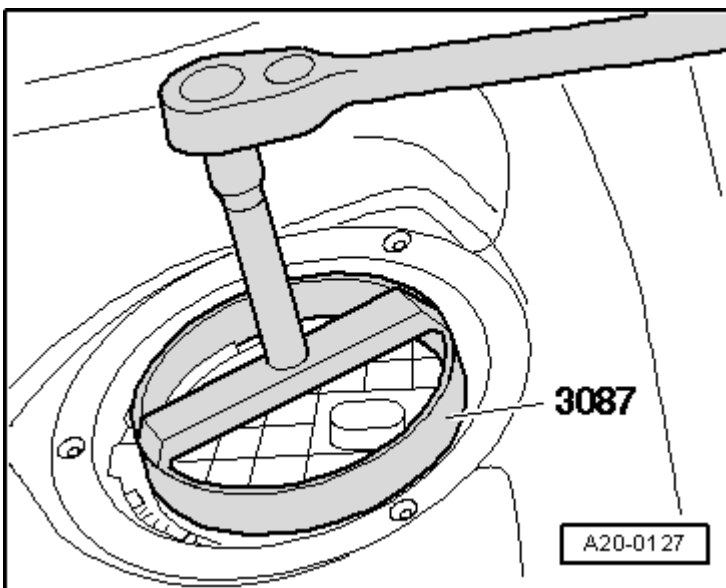


Fig. 226: Removing/Installing Locking Ring Using Wrench 3087
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten locking ring using wrench 3087.
- Torque specification: 145 Nm
- Connect connector.
- Check DTC memory of all control modules, repair all stored malfunctions, and erase DTC memory afterwards Vehicle Diagnosis, Testing and Information System VAS 5051 ; Guided Fault Finding; Vehicle System Test , or Vehicle Diagnosis and Service Information System VAS 5052 ; On Board Diagnostic (OBD).

Fuel Level Sensor 3 G237 , removing and installing**Special tools, testers and auxiliary items required**

- Wrench 3218
- Torque wrench V.A.G 1332

NOTE:

- The fuel tank must not be more than 3/4 full.
- Empty fuel tank --> Fuel tank, emptying if necessary.
- Read safety precautions --> Safety precautions when working on fuel supply system and rules of cleanliness --> Rules for cleanliness before beginning work.

Removing

- First, check whether a coded radio is installed. If necessary, obtain anti-theft coding.
- Switch off ignition and all electrical consumers.
- Disconnect battery Ground (GND) strap --> **27 - BATTERY, STARTER, GENERATOR, CRUISE CONTROL** .
- Open fuel filler flap briefly and then close again.
- Remove luggage compartment floor cover.
- Remove Fuel Level Sensor 3 G237.

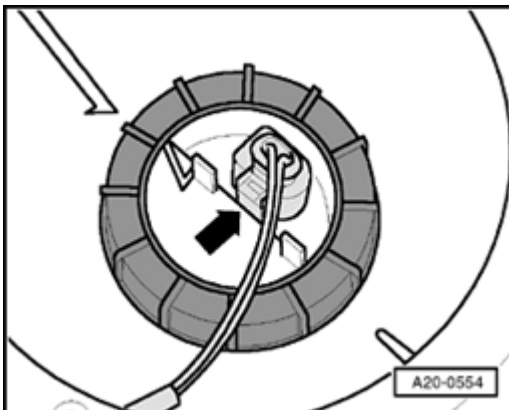


Fig. 227: Identifying Fuel Level Sensor 3 G237 Connector
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disengage 2-pin connector - **arrow** - carefully and remove.

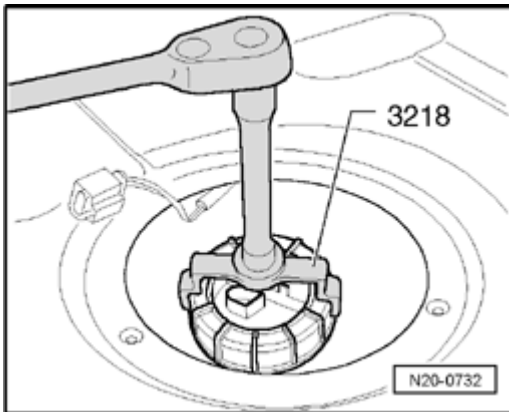


Fig. 228: Removing/Installing Union Nut Using Wrench 3218
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Use Wrench 3218 to remove union nut.
- Remove gasket.

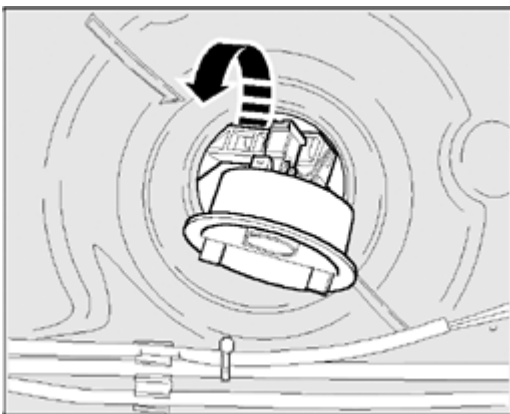


Fig. 229: Removing Fuel Supply Sensor 3 G237
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove Fuel Supply Sensor 3 G237 by turning it counterclockwise about its axle - **arrow** -.

Installing

Installation is in reverse order of removal, note the following:

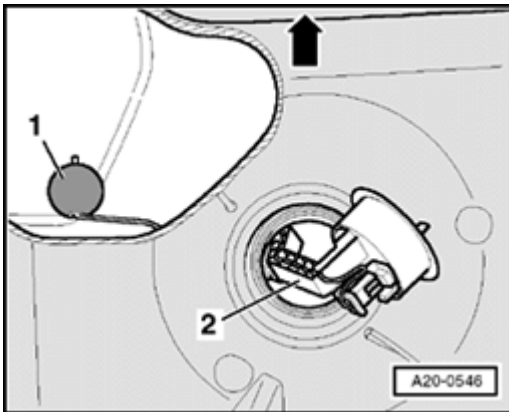


Fig. 230: Inserting Sensor Into Fuel Tank

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert sensor - 2 - in fuel tank as depicted in illustration.
- Floater - 1 - points toward front left.

NOTE:

- - Arrow - points in direction of travel.
- Fuel tank is depicted as cut-out section.

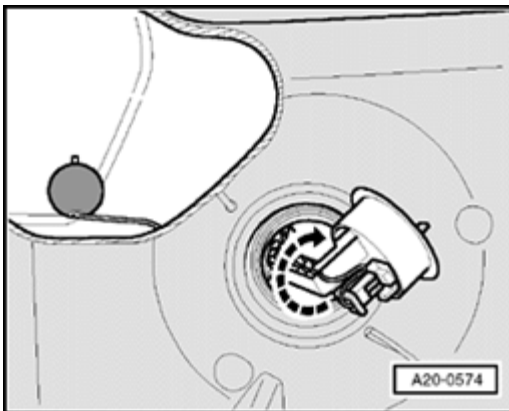


Fig. 231: Inserting Sensor Into Fuel Tank

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- When sliding in, turn sensor clockwise about its own axis - arrow -.

NOTE:

- Do not bend floater arm of sensor when installing.

- Slide new seal for sensor over locking flange.
- Insert new seal for flange, dry, into opening of fuel tank and coat only inner side (equipment flange) with fuel.

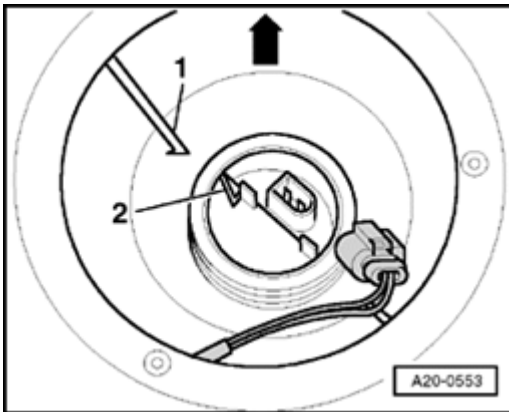


Fig. 232: Check Installation Position Of Fuel Level Sensor 3 G237
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check installation position of Fuel Level Sensor 3 G237.
- Marking - 2 - on sensor must align with marking - 1 - on fuel tank.

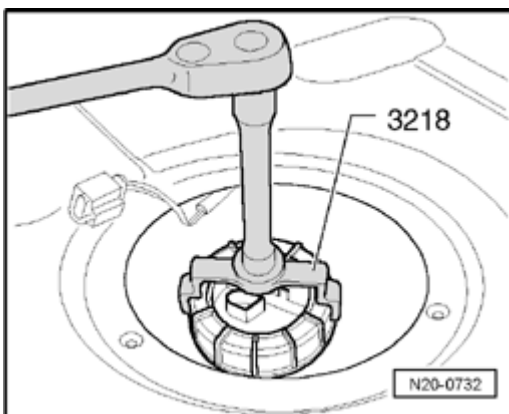


Fig. 233: Removing/Installing Union Nut Using Wrench 3218
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten union nut using Wrench 3218.
- Torque specification: 60 Nm
- Connect connector.
- Check DTC memory of all control modules, repair all stored malfunctions, and erase DTC memory afterwards Vehicle Diagnosis, Testing and Information System VAS 5051 ; Guided Fault Finding; Vehicle System Test , or Vehicle Diagnosis and Service Information System VAS 5052 ; On Board Diagnostic (OBD).

Suction jet pump, removing, installing, and checking

Function

In vehicles with All Wheel Drive (AWD), due to the construction style of the fuel tank, it is required to pump fuel from the area of the Fuel Level Sensor 2 G169 to the Fuel Pump (FP) unit using a suction jet pump. A

second suction jet pump ensures flushing of Fuel Pump (FP) in baffle housing. The suction jet pumps operate according to the principle of fluid entertainment. They are propelled by the fuel return via a distribution piece with pressure relief valve.

NOTE:

- **A test must only be performed, if the engine stops running due to lack of gasoline, even though the fuel gauge indicates the fuel tank is 1/4 full.**

Special tools, testers and auxiliary items required

- Release tool T40020

Conditions

- Fuel Level Sensor G OK
- Fuel Level Sensor 2 G169 OK
- Fuel Level Sensor 3 G237 OK

Work procedure

- Remove fuel level sensor 2 G169 --> **Fuel Level Sensor 2 G169 , removing and installing .**
- Remove flange of fuel delivery unit and distribution piece from baffle housing --> **Fuel delivery unit, removing and installing**

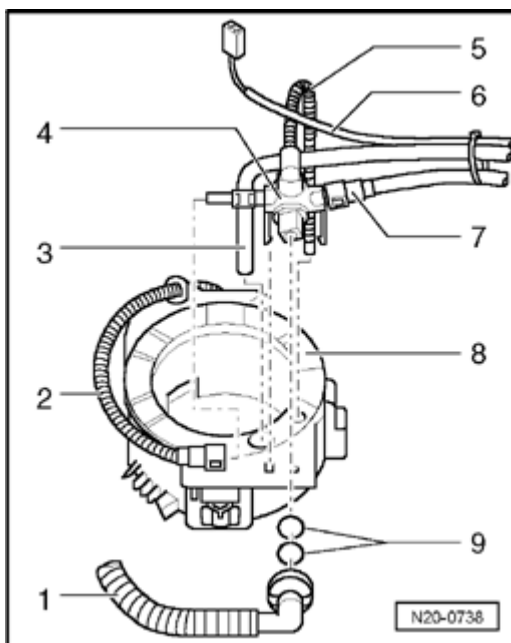


Fig. 234: Fuel Delivery Unit, Distribution Piece And Baffle Housing
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect connector - 6 - from thermal switch.
- Pull distribution piece - 4 - as far as possible toward right.

- Remove return line - 7 - from distribution piece (press catch inward).
- Pull return line - 3 - out of baffle housing.
- Now suction jet pump can be pulled out from Fuel Level Sensor 2 G169 side (left-hand side of vehicle).
- Check that fuel hoses/lines on suction jet pump are installed securely and are not damaged.
- Additionally check suction jet pump for contamination/dirt if necessary.

If no malfunctions are found:

NOTE:

- **In the following work procedure, the return line must be disconnected from the distribution piece. Ensure all O-rings are replaced during this.**

Check distribution piece with pressure relief valve as follows:

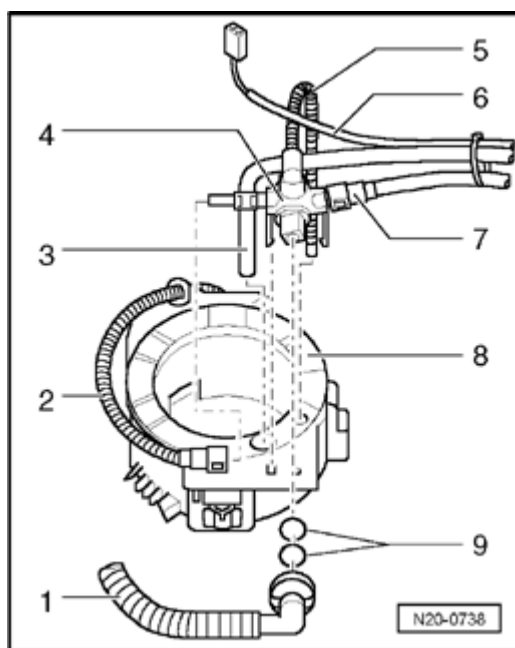


Fig. 235: Fuel Delivery Unit, Distribution Piece And Baffle Housing

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- To do so, remove connection of return line - 1 - as well as connection - 2 - for suction jet pump at distribution piece with pressure relief valve - 4 - (disengage return line - 1 - using releasing tool T40020)
- Take an assisting hose and blow into connection from side of fuel return - 1 -.
- There must be throughput in direction - 2 - and - 7 -.
- If you keep connections - 2 - and - 7 - closed and blow into it, the pressure relief valve must open due to the generated pressure.
- If no pressure can be noticed or pressure relief valve does not open, the distribution piece with pressure relief valve must be replaced.

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

Further installation:

- Install Fuel Pump (FP) --> **Fuel delivery unit, removing and installing** .
- Install Fuel Level Sensor 2 G169 --> **Fuel Level Sensor 2 G169 , removing and installing** .

Fuel tank, removing and installing

Special tools, testers and auxiliary items required

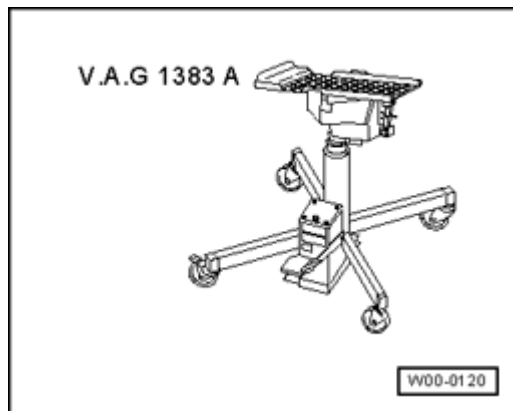


Fig. 236: Engine/Transmission Jack VAG 1383 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

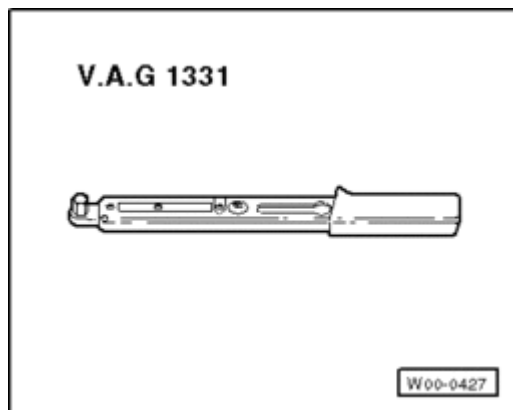


Fig. 237: Torque Wrench V.A.G 1331
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Torque wrench V.A.G 1331

NOTE:

- The fuel tank must not be more than 1/3 full.
- Empty fuel tank --> **Fuel tank, emptying** if necessary.
- Read safety precautions --> **Safety precautions when working on fuel supply system** and rules of cleanliness --> **Rules for cleanliness** before

beginning work.**Removing**

- Open fuel flap and remove fuel tank cap.
- First, check whether a coded radio is installed. If necessary, obtain anti-theft coding.
- Switch off ignition and all electrical consumers.
- Disconnect battery Ground (GND) strap --> **27 - BATTERY, STARTER, GENERATOR, CRUISE CONTROL** .
- Remove rear seat bench.
- Remove cover from fuel delivery unit.

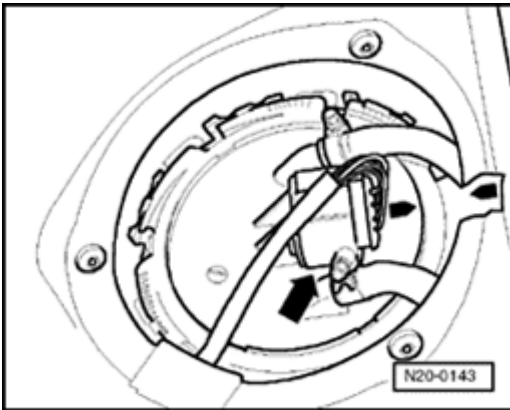


Fig. 238: Identifying 4-Pin Connector At Flange On Fuel Tank
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect 4-pin connector from flange at fuel tank - **arrow** -.
- Center and rear muffler of exhaust system, removing --> **Exhaust system components (vehicles with All Wheel Drive (AWD)), assembly overview** .
- Remove subframe --> **42 REAR SUSPENSION** .
- Remove right rear wheel housing liner --> **66 EXTERIOR EQUIPMENT** .
- Remove shielding plate for fuel filler tube.
- Clean area surrounding fuel filler tube.
- Remove mounting bolt for fuel flap and remove fuel flap unit with rubber gasket.
- Remove securing bolts on filler neck.

CAUTION: Fuel supply line is under pressure! Wear protective goggles and protective clothing to prevent injuries and contact with skin. Before removing from hose connection wrap a cloth around connection. Then release pressure by carefully pulling hose off connection.

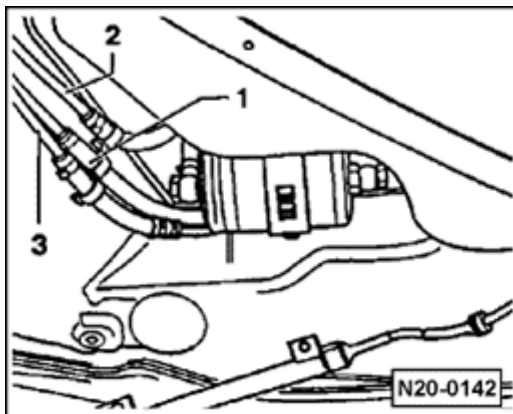


Fig. 239: Identifying Fuel Supply Hose, Return Hose & Breather Hose
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect supply line - **1** - from fuel filter.
- Mark return hose - **2** - and breather hose - **3** - and separate at connecting point.
- Seal lines so that the fuel system is not contaminated by dirt etc.
- Remove shielding plates at left and right on fuel tank and on underbody.
- Remove cover from EVAP canister.

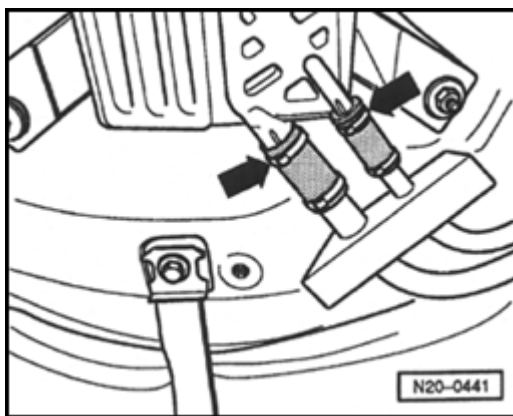


Fig. 240: Location Of Ventilation Lines At EVAP Canister
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect ventilation lines at EVAP canister - **arrows** -.
- Seal lines so that fuel system is not contaminated by dirt etc.
- Remove tensioning strap. Support fuel tank using Engine/transmission jack V.A.G 1383 A while doing so
- Lower fuel tank.

Installing

Installation is in reverse order of removal, note the following:

- Make sure ventilation and fuel lines are not kinked when installed.

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

- Ensure fuel hoses are seated securely.
- Secure fuel hoses with clamps Electronic Parts Catalog "ETKA".
- Do not swap supply and return lines (return line blue writing, supply line white writing).

NOTE:

- **After installing fuel tank, check that the supply, return and breather lines are still clipped onto fuel tank.**
- Check DTC memory of all control modules, repair all stored malfunctions, and erase DTC memory afterwards Vehicle Diagnosis, Testing and Information System VAS 5051 ; Guided Fault Finding; Vehicle System Test , or Vehicle Diagnosis and Service Information System VAS 5052 ; On Board Diagnostic (OBD).

Fuel pump, checking

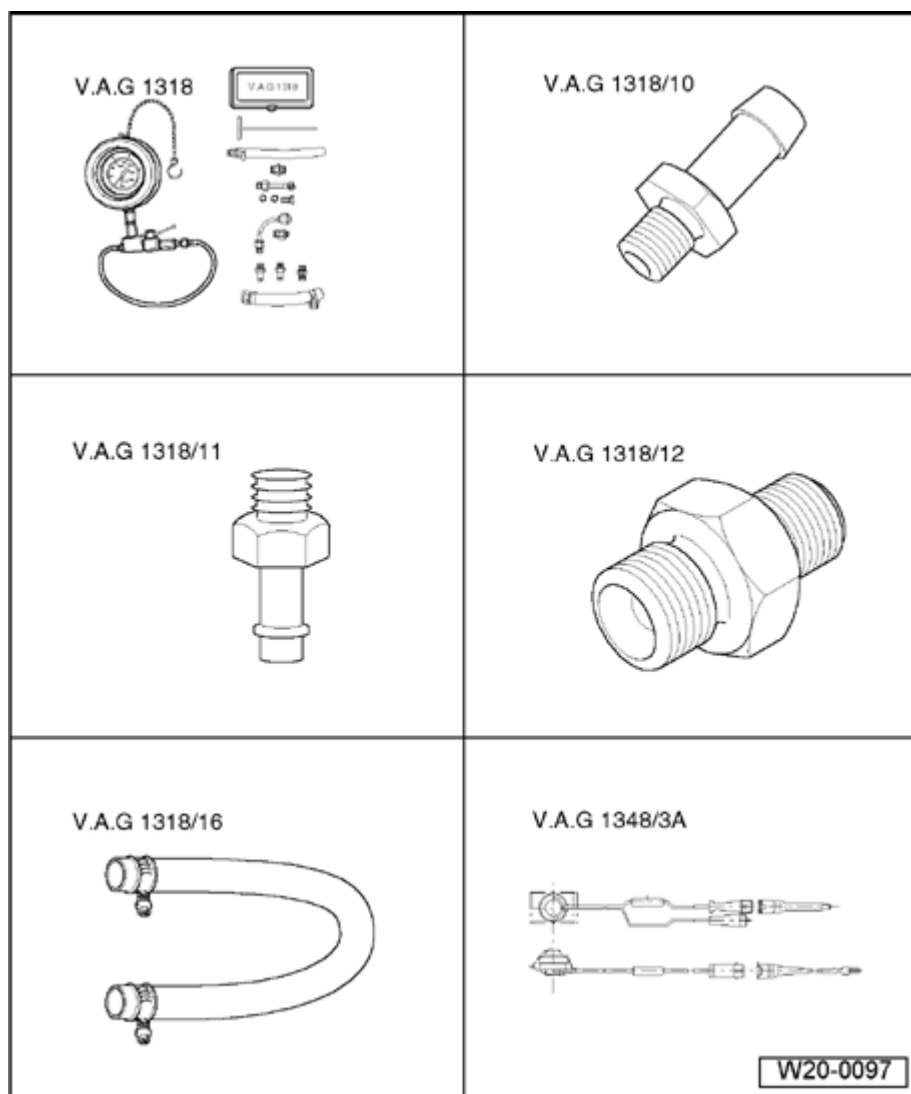
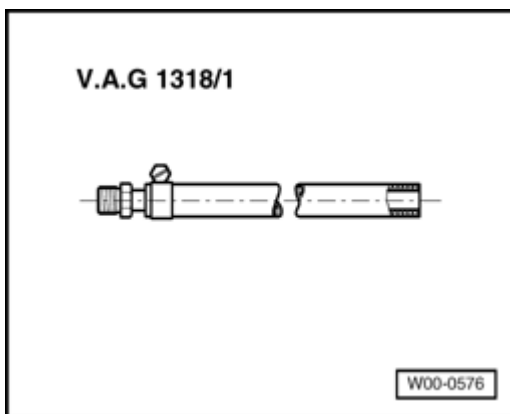


Fig. 241: Identifying Special Tools - Fuel Pump, Checking
Courtesy of VOLKSWAGEN UNITED STATES, INC.

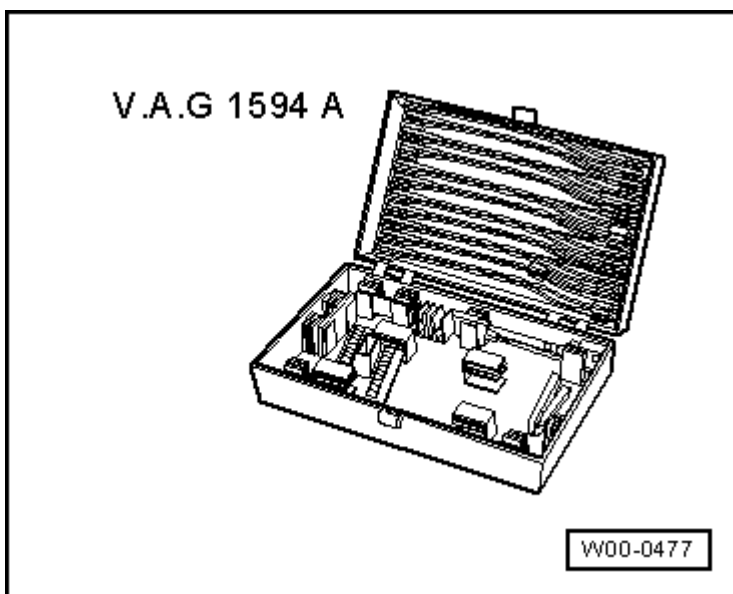
Special tools, testers and auxiliary items required

- Fuel inj. Pressure Gauge-cis VAG1318
- Adapter V.A.G 1318/10
- Adapter V.A.G 1318/11
- Adapter V.A.G 1318/12
- Adapter V.A.G 1318/16
- Remote control V.A.G 1348/3A with adapter cable V.A.G 1348/32

Special tools, testers and auxiliary items required**Fig. 242: Adapter V.A.G 1318/1**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Adapter V.A.G 1318/1

**Fig. 243: Connector Test Set V.A.G 1594 A**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connector test set V.A.G 1594 A

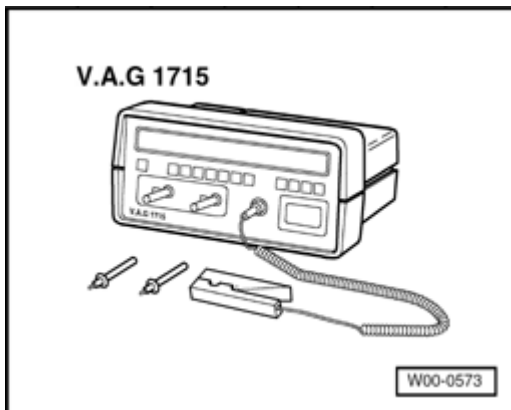


Fig. 244: Multimeter V.A.G 1715

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Multimeter V.A.G 1715

Test conditions

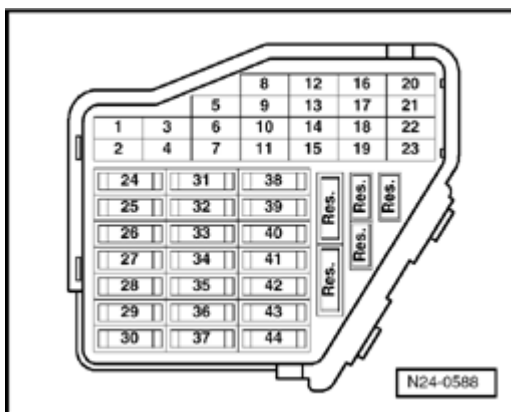


Fig. 245: Identifying Main Fuse Panel

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Fuse no. 28 must be OK.
- Battery voltage must be at least 11.5 Volts.
- All electrical consumers like, for example, lights and rear window heating, must be switched off.
- If vehicle is equipped with an A/C system, it must be switched off.

NOTE:

- **Observe the description of crash fuel shut-off function --> Crash fuel shut-off .**

Checking delivery rate

- Remove fuel filler cap from fuel filler tube.
- Remove engine cover.

CAUTION: Fuel supply line is under pressure! Wear protective goggles and protective clothing to prevent injuries and contact with skin. Before removing from hose connection wrap a cloth around connection. Then release pressure by carefully pulling hose off connection.

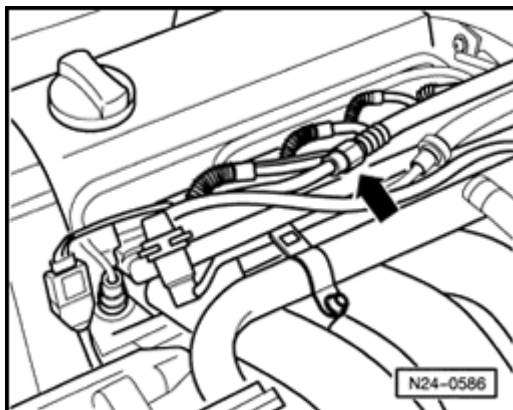


Fig. 246: Identifying Fuel Supply Line Threaded Connection
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Open threaded connection - **arrow** - and catch exiting fuel using a rag.

NOTE:

- Counter hold hex bolt of fuel distributor to release bolt. Torque specification: 22 Nm.

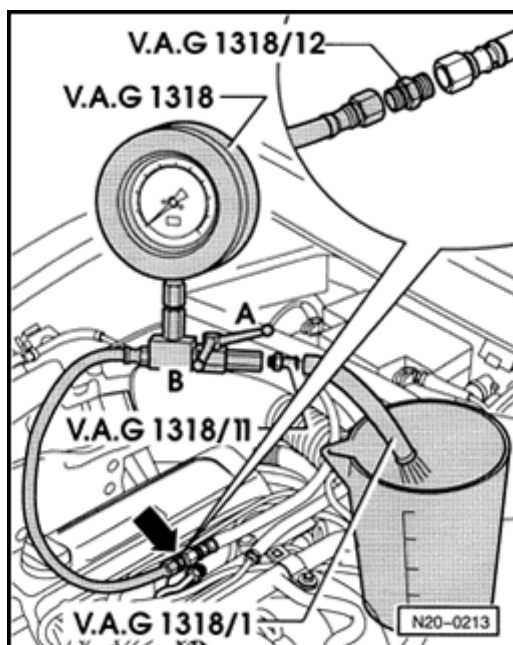
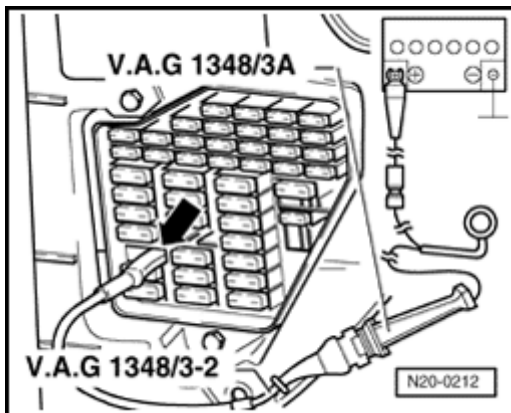


Fig. 247: Installing Fuel Pressure Gauge**Courtesy of VOLKSWAGEN UNITED STATES, INC.**

- Connect Fuel inj. Pressure Gauge-cis VAG1318 with adapter V.A.G 1318/12 to fuel supply line.
- Connect hose V.A.G 1318/1 onto adapter V.A.G 1318/11 of pressure gauge V.A.G 1318 and hold it in a measuring container.
- Open shut-off valve of Fuel inj. Pressure Gauge-cis VAG1318. The lever then points in direction of flow - A -.
- Remove cover in front of fuse holder.

**Fig. 248: Connecting VAG 1348/3A With Adapter Cable VAG 1348/3-2 To Contact And Battery Positive****Courtesy of VOLKSWAGEN UNITED STATES, INC.**

- Pull fuse No. 28 from the fuse holder.
- Connect remote control V.A.G 1348/3A with adapter cable V.A.G 1348/32 to contact 28a to fuel pump and battery positive (+).
- Operate remote control V.A.G 1348/3A. Slowly close shut-off tap, until pressure gauge shows 3 bar. From this point on do not move position of shut-off tap.
- Empty measuring container.
- Delivery rate of Fuel Pump (FP) is dependent on battery voltage. Therefore, connect multimeter to vehicle battery using adapter cables from connector test kit V.A.G 1594 A.
- Operate remote control for 30 seconds and measure battery voltage.

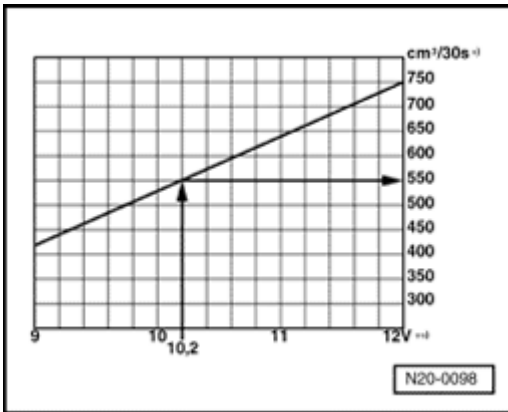


Fig. 249: Fuel Quantity Delivered Graph

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Compare quantity of fuel delivered with specification.

*) Minimum delivery rate $\text{cm}^3 / 30 \text{ s}$

**) Voltage at fuel pump with engine off and pump running (approx. 2 Volts less than battery voltage).

Example:

During test, a voltage of 12.2 volts is measured at the battery. Since voltage at the pump is approx. 2 Volts less than battery voltage, there is a minimum delivery rate of $550 \text{ cm}^3 / 30 \text{ s}$.

If minimum delivery rate is not attained:

- Check fuel lines for possible restrictions (kinks) or blockages.

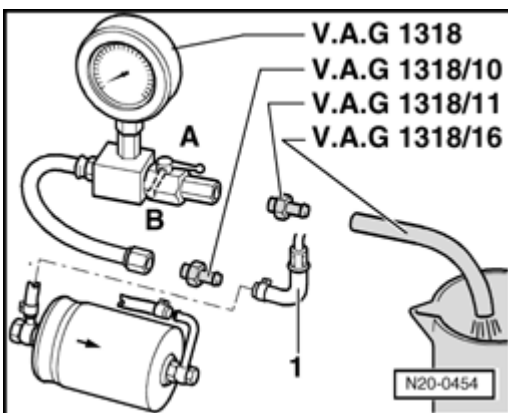


Fig. 250: Checking Fuel Delivery Rate

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull supply hose - 1 - from inlet to fuel filter.
- Connect Fuel inj. Pressure Gauge-cis VAG1318 with adapter V.A.G 1318/10 to hose.

- Repeat delivery rate check.

If minimum delivery rate is now attained:

- Replace the fuel filter:

If minimum delivery rate is again not attained:

- Remove Fuel Pump (FP) and check filter strainer for dirt --> **Fuel delivery unit, removing and installing** .

Only up to now no malfunction has been detected:

- Fuel Pump (FP) faulty, replace fuel delivery unit --> **Fuel delivery unit, removing and installing** .

Delivery rate has been obtained, but malfunctions are still suspected in fuel supply, for example sporadic loss of fuel supply:

- Check current draw of fuel pump as follows:
- Reconnect all disconnected fuel lines.
- Remove rear seat bench.
- Remove cover from Fuel Pump (FP).

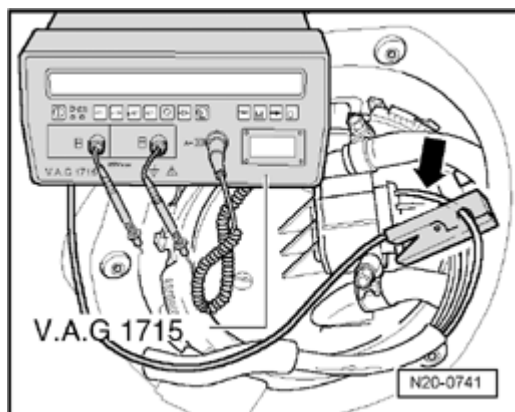


Fig. 251: Measuring Current Draw Of Fuel Pump Using Multimeter V.A.G 1715
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect multimeter V.A.G 1715 to wire of 4-pin connector terminal 1 - **arrow** - using current pick-up.
- Start engine and run at idle speed.
- Measure current draw of fuel pump.
- Specified value: max. 8 amps.

NOTE:

- If malfunction in fuel system is sporadic, test can also be performed during a road test, but a second person is required.

If current draw is exceeded:

- Fuel Pump (FP) faulty, replace fuel delivery unit --> **Fuel delivery unit, removing and installing** .

Fuel Pump (FP) check-valve, checking

Test conditions

- Remote control V.A.G 1348/3A connected
- Fuel inj. Pressure Gauge-cis VAG1318 connected to fuel supply line of fuel supply tube

Test sequence

NOTE:

- This test also checks the connections of the fuel supply line from fuel delivery unit to connection point of Fuel inj. Pressure Gauge-cis VAG1318 for leaks.

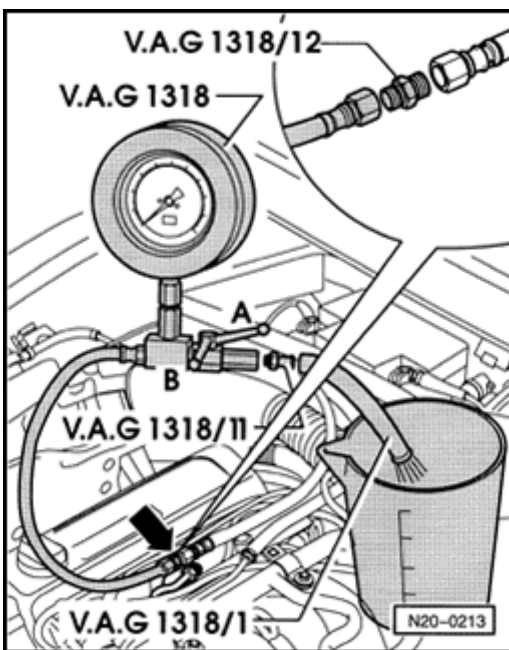


Fig. 252: Installing Fuel Pressure Gauge

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Close pressure gauge shut-off valve (lever perpendicular to direction of flow position - **B** -).
- Operate remote control at short intervals, until a pressure of approx. 3 bar has built up.

CAUTION: Danger of spraying when opening shut-off valve; wear protective goggles and protective clothing to prevent injuries and contact with skin. Hold container in front of free connection of pressure measuring device.

- If pressure builds up too high, lower excess pressure by carefully opening shut-off tap.

- Watch pressure drop on gauge.
- After 10 minutes pressure must not drop below a 2.5 bar decrease.

If pressure drops further:

- Check line connections for leaks.

If no fault is detected in wiring:

- Fuel Pump (FP) faulty, replace fuel delivery unit --> **Fuel delivery unit, removing and installing** .

ELECTRONIC POWER CONTROL (EPC)

Electronic power control (EPC)

Functions of EPC system --> **Functions of EPC system**

Assembly overview --> **Assembly overview**

Functions of EPC system

With EPC, the throttle valve is not actuated through a cable from the accelerator pedal. There is no mechanical connection between the gas pedal and the throttle valve.

The position of the accelerator pedal is transmitted to the engine control module via two accelerator pedal position senders (adjustable resistances, accommodated in one housing), that are connected to the accelerator pedal.

The position of the accelerator pedal (driver controlled) is a main input for the engine control module.

Operation of the throttle valve occurs via an electric motor (throttle valve actuator) in the throttle valve control module. This is true across the entire engine speed and engine load spectrum.

The throttle valve is operated by the throttle drive according to the instructions of the Engine Control Module (ECM).

With the engine at standstill and the ignition switched on, the Engine Control Module (ECM) activates the throttle valve actuator precisely according to the specifications of the Throttle Position (TP) Sensor. This means, if the accelerator pedal is depressed half way, the throttle drive opens the throttle valve to the same degree; i.e. throttle valve is then opened approx. half way.

With engine running (under load) the engine control module can open and close the throttle valve independently of the accelerator pedal position sender.

That way e.g. the throttle valve can already be completely opened, although the accelerator pedal is only depressed half-way. An advantage of this is that throttle losses at the throttle valve are avoided.

The Engine Control Module (ECM) calculates a throttle valve opening angle optimal for the respective situation, after evaluation of torque requirements of the different components (e.g. A/C system, automatic transmission, ABS/ESP, etc.).

Aside from that, it results in optimized emission control and fuel consumption under certain load conditions.

"EPC" is a system containing all components that contribute to recognizing, controlling and monitoring the position of the throttle valve, e.g. sensor for accelerator pedal position, throttle valve control module, EPC warning lamp, Engine Control Module (ECM).

Assembly overview

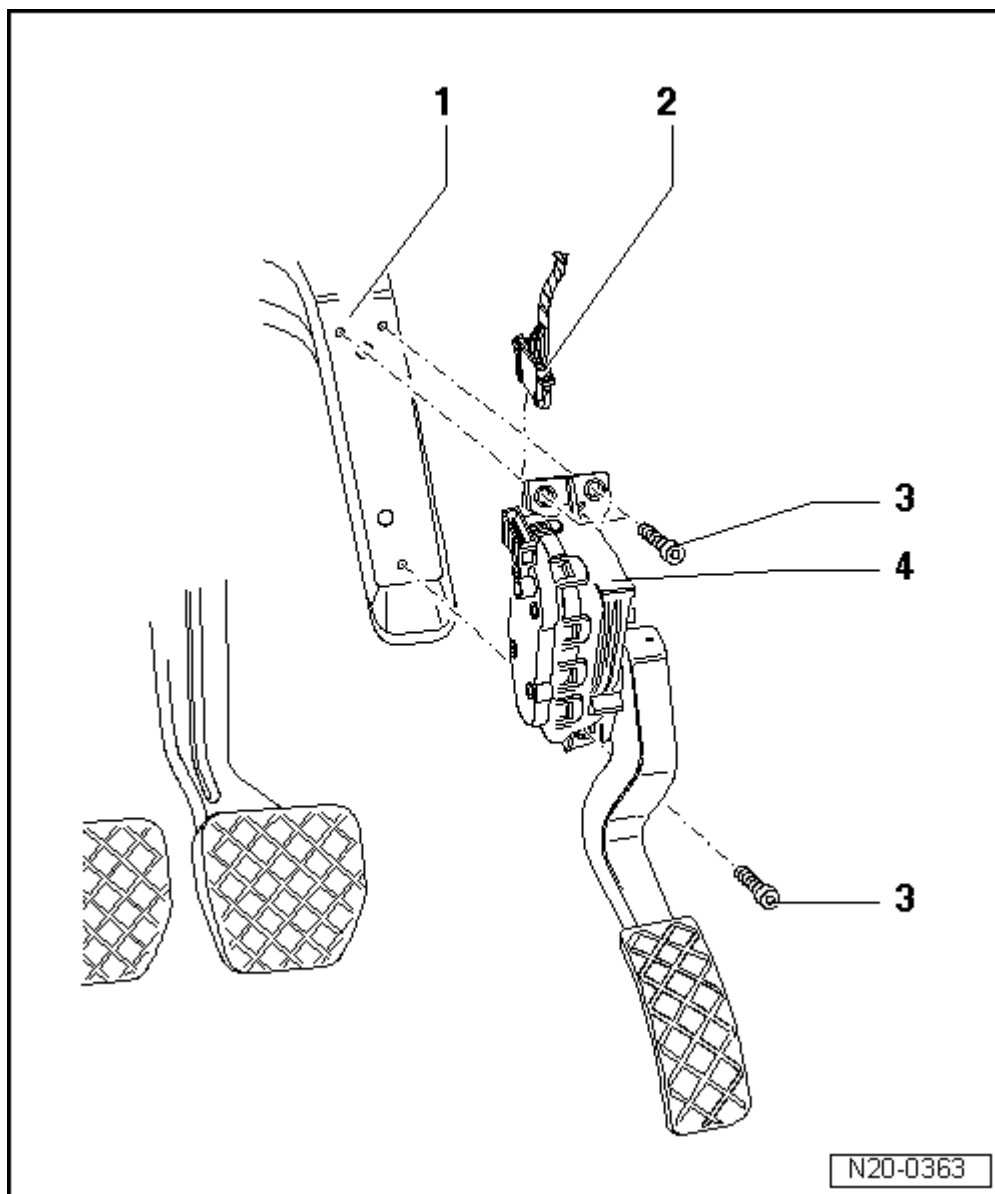


Fig. 253: Throttle Position Sensor And Accelerator Pedal Position Sensor
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Bracket

2 - Connector

- Black, 6-pin

3 - 10 Nm

4 - Throttle position (TP) sensor G79 and Accelerator Pedal Position Sensor 2 G185

- Not adjustable
- Remove footwell cover to remove sensor

EVAPORATIVE EMISSIONS (EVAP) SYSTEM

Evaporative emissions (EVAP) system

NOTE:

- **All hose connections are secured with spring-type clamps or tensioning clamps.**
- **Always replace tensioning clamps with spring-type clamps. See parts catalog..**
- **VAS 5024 Assembly tool or VAG 1921 Pliers are recommended for installing spring clips.**

Observe safety precautions --> **Safety precautions when working on fuel supply system** .

Observe rules for cleanliness --> **Rules for cleanliness** .

Function description of leak diagnosis --> **Function description of leak diagnosis**

Components of the Evaporative Emissions (EVAP) system: Assembly overview --> **EVAP canister system components, assembly overview**

EVAP system, overview --> **Evaporative emissions (EVAP) system, overview**

Function description of leak diagnosis

The EVAP system (including fuel tank) is equipped with leak diagnosis. The leak diagnosis will detect whether the system is leaking.

The diagnosis operates by pressurizing the system and should detect leaks where the damage exceeds 1 mm in diameter.

During the diagnostic, the leak detection pump (LDP) V144 builds up a pressure of approx. 30 millibar in the EVAP system. The pump will switch off when the pressure is attained. When the pressure falls to below a certain figure, the pump will switch on again. On Board Diagnostic monitors the switch intervals and stores a

DTC in DTC memory if the intervals are too short.

EVAP canister system components, assembly overview

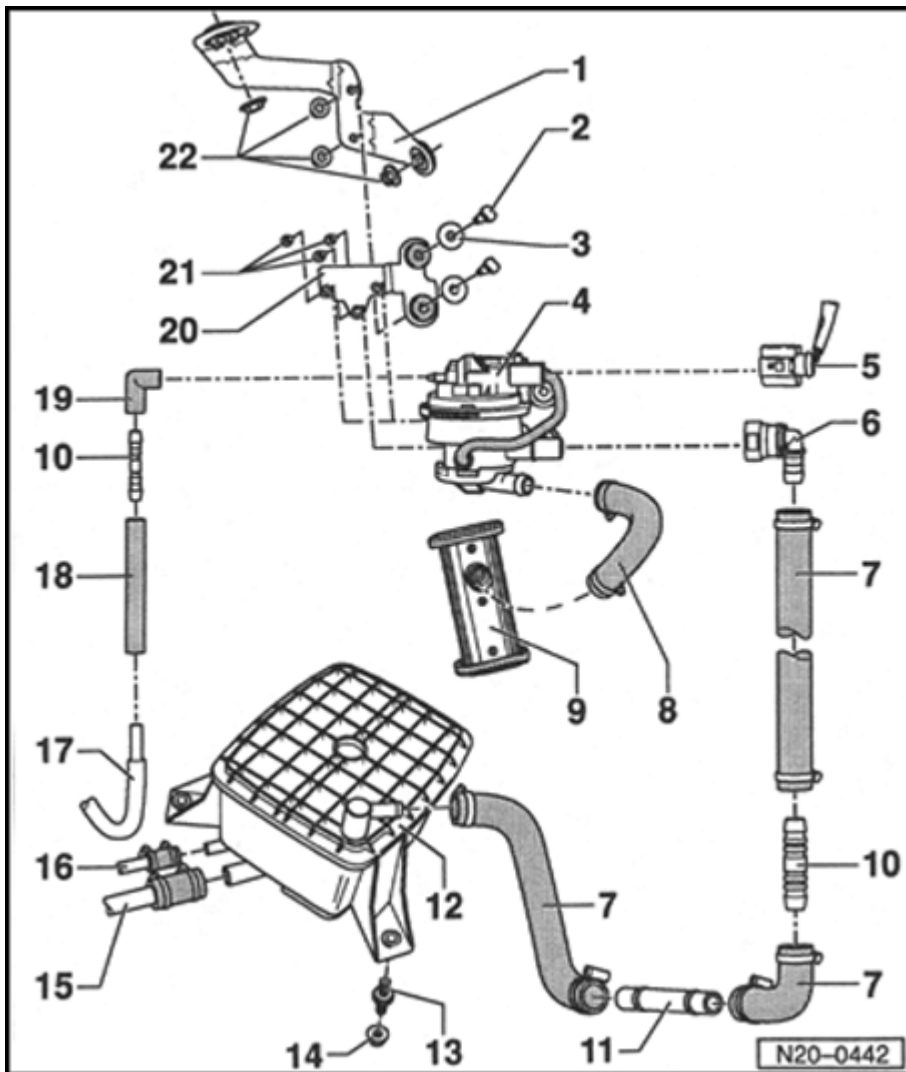


Fig. 254: Evaporative Emissions (EVAP) System Components, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Bracket for leak detection pump

- Bolted to body

2 - Bolt

3 - Washer

4 - Leak detection pump (LDP) V144

- In left rear wheel housing behind wheel housing liner

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ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

5 - Connector

- 3-pin

6 - Clutch

- Press together at front to release

7 - Connecting hose

- Pressure side

8 - Connecting hose

- Intake side

9 - Air filter for Leak detection pump (LDP) V144

10 - Connecting piece

11 - Connecting pipe

12 - EVAP canister

- In spare wheel well on vehicle floor
- Fuel system, checking for proper seal --> **Fuel supply system, checking for leaks .**

13 - 15 Nm

14 - 10 Nm

15 - Vent line

16 - To Evaporative Emission (EVAP) Canister Purge Regulator Valve N80

17 - Vacuum line

18 - Connecting hose

- Vacuum side

19 - Connection angle

20 - Bracket for leak detection pump

21 - 2 Nm

22 - 8 Nm

Evaporative emissions (EVAP) system, overview

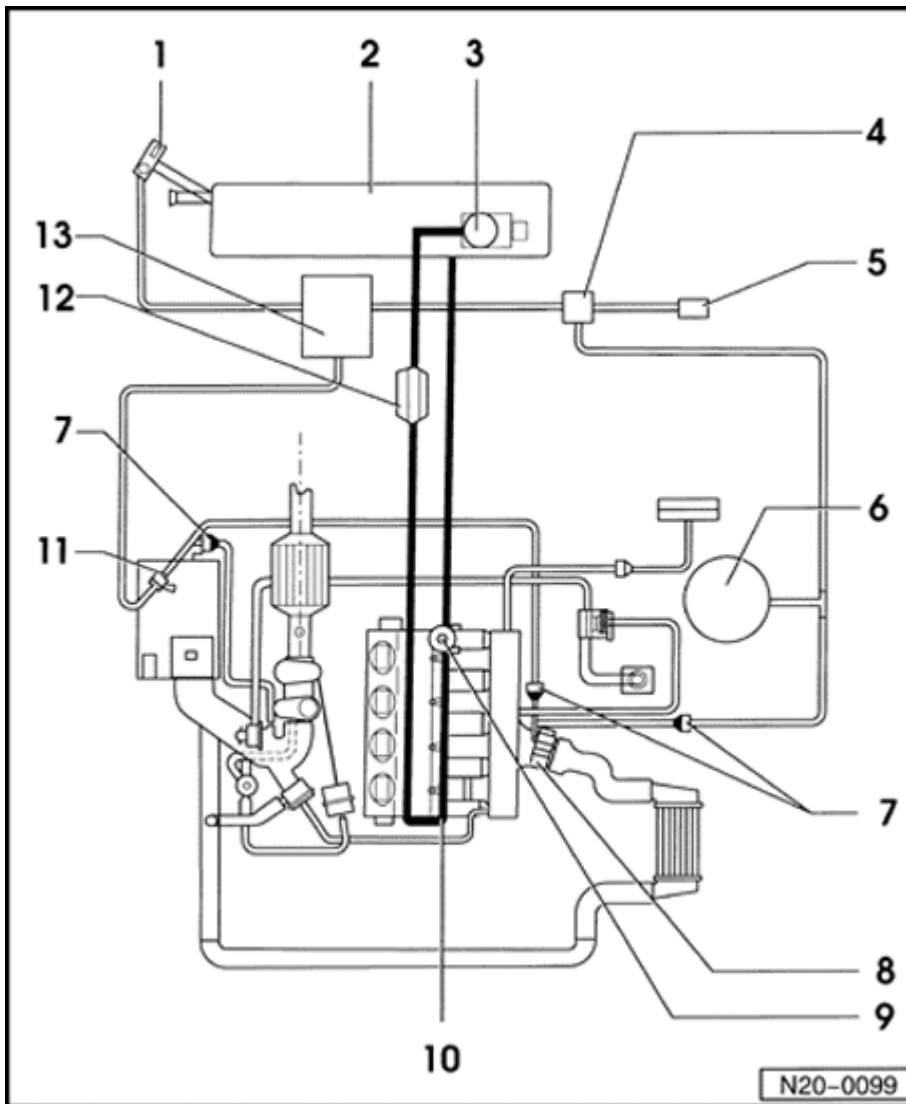


Fig. 255: Evaporative Emissions (EVAP) System, Overview
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Fuel filler door unit

- With rubber cup

2 - Fuel tank

- Support with engine/transmission jack V.A.G 1383 A when removing
- Removing and installing
- Front wheel drive: --> **Fuel tank, removing and installing**

- All wheel drive: --> **Fuel tank, removing and installing**

3 - Fuel pump

- Removing and installing
- Front wheel drive: --> **Fuel pump, removing and installing**
- All wheel drive: --> *Fuel pump, removing and installing* under **Fuel delivery unit, removing and installing**

4 - Leak detection pump (LDP) V144

- In left rear wheel housing behind wheel housing liner

5 - Air filter for diagnosis pump

6 - Vacuum reservoir

- Under left front wheel housing liner

7 - Non-return valve

8 - Throttle valve control module J338

9 - Fuel pressure regulator

10 - Fuel rail with injectors

11 - Evaporative emission (EVAP) canister purge regulator valve N80

12 - Fuel filter

- Installed location: Arrow points in direction of flow

13 - EVAP canister

- In spare wheel well on vehicle floor

EVAP system, checking using tester KLI 9210

Introduction

The KLI90210 EVAP tester allows testing using nitrogen to pressurize the EVAP system and a smoke generator or ultrasonic tester to locate the source of EVAP system concerns.

This procedure is intended as a general guide for the use of the EVAP tester. EVAP systems vary between models.

Special tools, testers and auxiliary items required

- VAS 5051 or VAS 5052 diagnostic tester
- KLI90210 EVAP system tester (set to 14 in. H₂O)
- Light source (for viewing smoke)
- Hose Clamps up to 25 mm dia. 3094 or equivalent

Using the KLI90210 EVAP system tester. --> Tester operating instructions

Calibrating the KLI90210 tester

Determine the vehicle leak threshold:

- Up to and including M.Y. 1999 leak threshold = 0.040 in.
- From M.Y. 2000 leak threshold = 0.020 in.

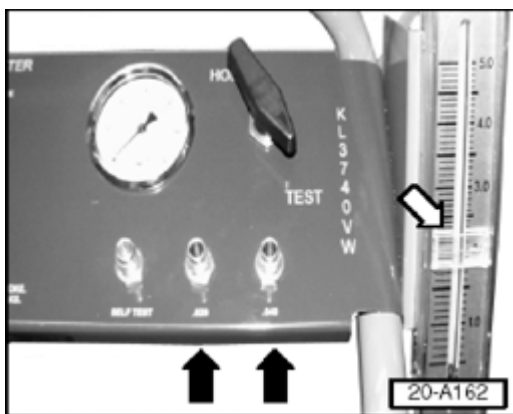
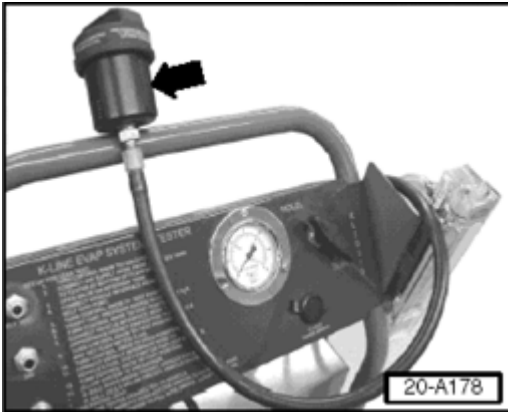


Fig. 256: Identifying Flow Meter Flag At Indicated Value On Flow Meter
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Attach test hose to appropriate preset port (black arrows).
- Turn control valve from "Hold" to "Test".
- Set flow meter flag (white arrow) at indicated value on flow meter.
- Turn control valve to "Hold" ; remove test hose.

Testing the fuel cap

- Remove fuel cap.

**Fig. 257: Testing The Fuel Cap**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect fuel cap receiver (arrow) to hose.
- Screw fuel cap tightly to cap receiver.
- Turn control valve to "Test" pressurizing cap.
- Turn valve to "Hold".
- Watch pressure gauge for drop in pressure from 14 inches H₂O.

If no pressure drop is indicated:

- Proceed to checking Leak Detection Pump (LDP) V144 for internal leaks.

If pressure drop is indicated:

- Replace fuel cap and re-test.
- Proceed to Checking Leak Detection Pump (LDP) V144 for internal leaks.

Checking Leak Detection Pump (LDP) V144 for internal leaks

Basically, in the following procedure the EVAP system will be filled with smoke, the engine started and the LDP activated using the VAS 5051 or VAS 5052. With the LDP activated, and after clearing initial smoke away from the LDP area using compressed air, the system is then filled with smoke again and rechecked for smoke at the LDP filter.

Conditions

- Ignition switched off
- LDP is visible --> Component Locations



Fig. 258: Tester Hose Connected To Fuel Filler Neck
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tester hose connected to fuel filler neck
- VAS 5051 or VAS 5052 Diagnostic tool connected to vehicle
- Smoke generator connected to battery
- Turn KLI90210 valve to "Test" and use smoke generator trigger to fill system with smoke (wait until smoke is coming out of the LDP filter).
- Start engine.
- From VAS 5051 Start-up screen, select "Vehicle self diagnosis".

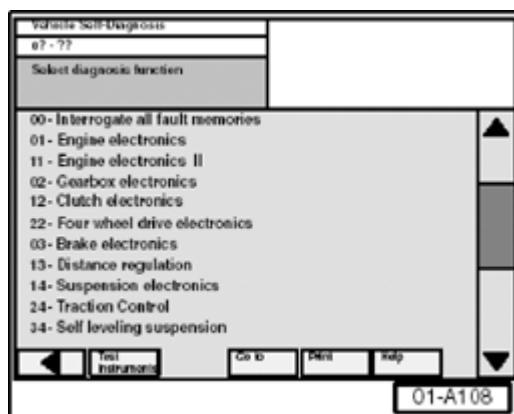


Fig. 259: Display Screen - Select Diagnostic Function
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Select vehicle system "01 - Engine electronics".

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

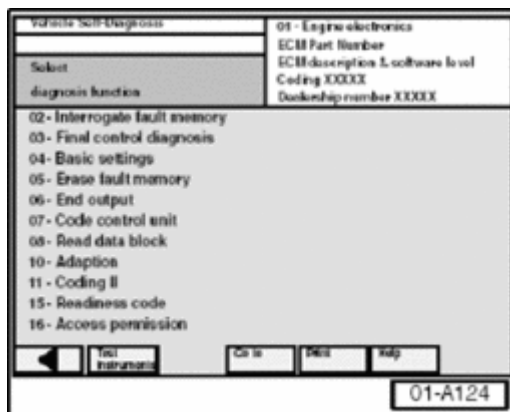


Fig. 260: Display Screen - 01 - Engine Electronics
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Select Diagnosis Function "04 - Basic settings".

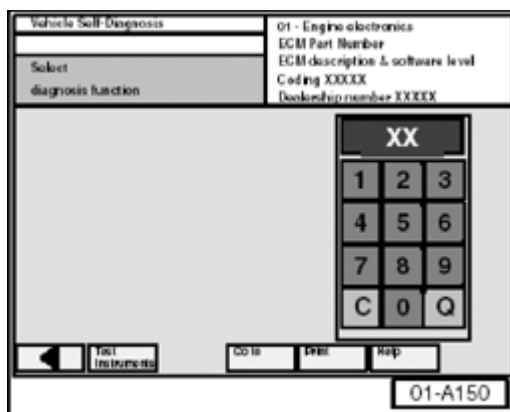


Fig. 261: Display Screen - 01 - Engine Electronics, Basic Settings
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Input appropriate display group from table below on keypad.

Engine code	Display group
AEB, AEG, AFP, AHA, APH, ATQ, ATW, AUG, AWD, AWM, AWP, AWV, AWW, BDC, BDF, BEV, BGD, BGJ	071
AVH, AZG, BAP, BBW, BDP	202

- Press "Q" on keypad to confirm.

LDP should activate

If LDP does not activate:

For some vehicles using Display group 202 a similar screen appears indicating "Test Off".

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ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

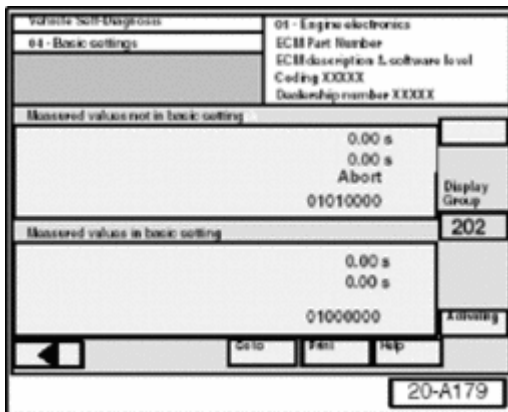


Fig. 262: Display Screen - 01 - Engine Electronics, Basic Settings, LDP Activated
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Select "Activating" button.

If LDP does not activate:

- Check electrical connections to LDP.
- Check vacuum source to LDP.

If LDP activates:

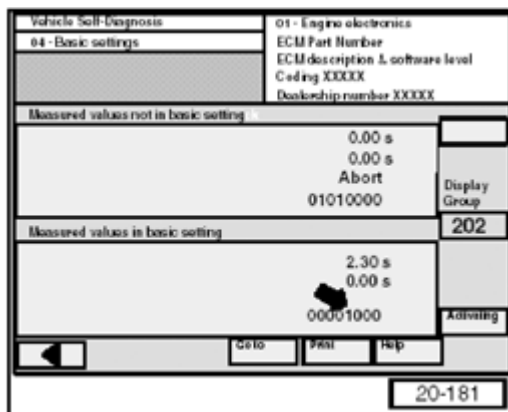


Fig. 263: Identifying Display Screen - 01 - Engine Electronics, Basic Settings, LDP Activated, "1" In Position 5
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A similar screen appears, Test is "ON" (indicated by a "1" in position 5, - **arrow** -).

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

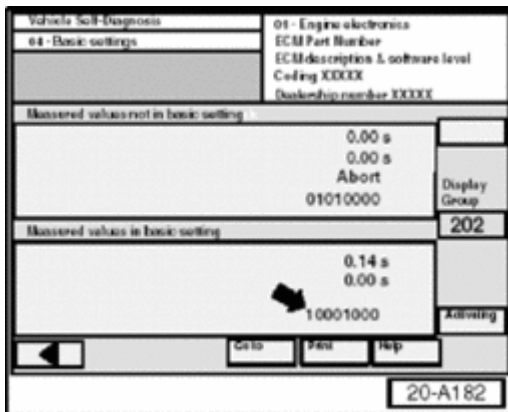


Fig. 264: Identifying Display Screen - 01 - Engine Electronics, Basic Settings, LDP Activated, Position 1
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Position 1 - **arrow** - alternates between "0" and "1" during pump operation.

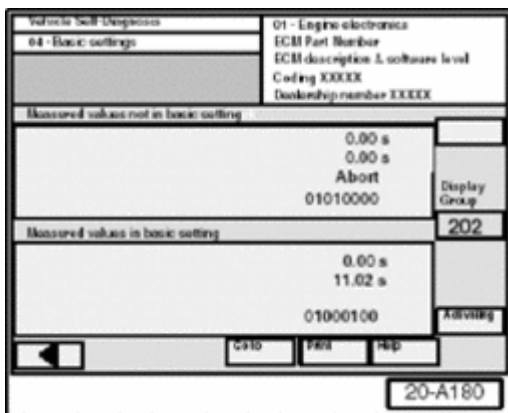


Fig. 265: Identifying Display Screen - 01 - Engine Electronics, Basic Settings, LDP Activated, "1" In Position 6 And "0" In Position 8
Courtesy of VOLKSWAGEN UNITED STATES, INC.

If test is OK:

Indicated by "1" in position 6 and a "0" in position 8 as shown.

LDP has activated and the system is pressurized.

- Using a compressed air blow gun, clear area near LDP and LDP filter of any residual smoke.

If the test aborts and DTCs other than for small or large leaks are stored:

- Check and repair according to DTC listed in DTC table for appropriate engine code.

When "Check end" is indicated on VAS 5051 or VAS 5052 :

NOTE:

- Only check LDP during "Check end" phase when "Test OK" was indicated.

- Use smoke generator trigger to fill system with smoke again.
- Check for smoke doming from LDP filter and LDP hose connections.
- Smoke coming from filter indicates a faulty LDP
- Smoke coming from LDP outlet or hose indicates a faulty hose or clamp
- Make repairs as necessary and check with smoke again.
- No smoke coming from filter indicates LDP is OK and leak is somewhere else in EVAP system

NOTE:

- If the KLI90210 EVAP system tester is connected in "Test" mode and Basic settings (using Self Diagnosis) and Fault finding are activated, a false "System OK" message may be generated.

If the LDP is OK and a DTC was stored for the EVAP system:

- Switch ignition off.
- Continue checking EVAP system as follows:

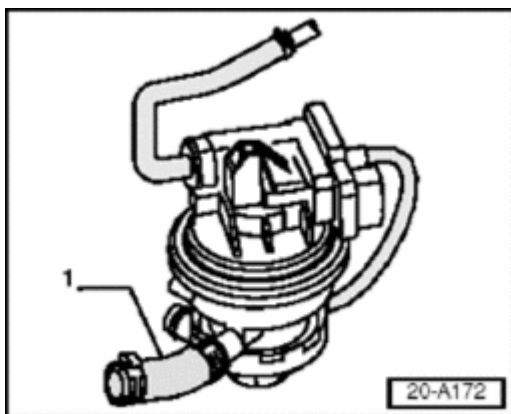
Checking EVAP system for leaks

Fig. 266: Identifying Leak Detection Pump (LDP) Outlet Hose (EVAP side)

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp off LDP outlet (EVAP side) - 1 - using Hose Clamps up to 25 mm dia. 3094 or equivalent.

CAUTION: Clamp only soft rubber lines when isolating a leak. To avoid risk of damage, never clamp hard plastic lines!

- Turn control valve from "Hold" to "Test".
- Allow fuel system to pressurize.

NOTE:

- Fuel system pressurization depends on volume of fuel system and amount

of fuel in tank.

If fuel system pressurization does not stabilize:

- Verify that all fuel system outlets have been sealed before continuing.

NOTE:

- **Any flow shown on flow meter indicates a leak. Flow below flow meter flag set at vehicle leak standard may indicate a sporadic DTC.**

If flow meter on tester registers flow near or above pre-set pressure:

- Clamp off hose leading from EVAP canister purge regulator valve N80 to intake manifold.

If flow stops:

- Replace EVAP canister purge regulator valve N80 and repeat test before continuing.

If meter indicates no flow after test:

- Perform quality check and return vehicle to customer.

If flow continues:

- Use smoke generator trigger to charge fuel system with smoke again.
- Inspect complete EVAP system for escaping smoke.

NOTE:

- **It may be necessary to move, twist, or wiggle EVAP components around to reproduce leak.**

If leak cannot be found using smoke:



Fig. 267: Identifying Ultrasonic Tester
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Locate leak with ultrasonic tester.
- General search: tester only
- Localized search: tester with extension wand (left)

If leak cannot be located:

- Disconnect and plug or clamp shut EVAP lines to isolate fuel tank using Hose Clamps up to 25 mm dia. 3094 or equivalent before continuing.

CAUTION: Clamp only soft rubber lines when isolating a leak. To avoid risk of damage, never clamp hard plastic lines!

If flow stops:

- Reconnect EVAP lines and search area that was isolated.

When leak has been located:

- Repair leak and repeat EVAP system test.

NOTE:

- Because leak may be at top of fuel tank, it may not be possible to locate through fuel pump/sending unit access plate.
- Lower fuel tank if necessary to locate leak.

CAUTION: Do not return vehicle to the customer without having performed a proper diagnosis and repair.

21 TURBOCHARGER, G-CHARGER

CHARGE AIR SYSTEM WITH TURBOCHARGER

Charge air system with turbocharger

NOTE:

- Charge air system must be properly sealed.
 - Replace self-locking nuts.
 - Charge pressure hoses as well as their connections must be free of oil and grease before installation.
 - Do not use lubricants to assist in making hose connections, if necessary moisten with water.
-
- Observe installation markings on hoses and components.
 - Hose connections must be secured with clamps See parts catalog..

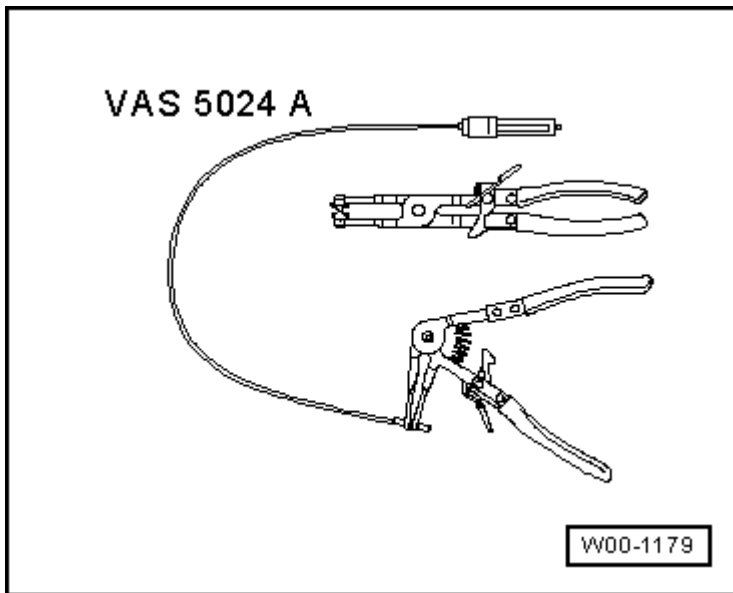


Fig. 268: Spring-Type Clip Pliers VAS 5024A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Spring-type clip pliers VAS 5024 A or hose clip pliers V.A.G 1921 are recommended for installing spring-type clips.

Observe safety precautions --> **Safety precautions** .

Observe rules for cleanliness --> **Rules for cleanliness** .

Turbocharger with attachments, assembly overview --> **Turbocharger with attachments, assembly overview**

Components of charge air cooling system, assembly overview --> **Charge air cooler components, assembly overview**

Overview of turbocharger system --> **Turbocharger system, overview**

Safety precautions

CAUTION: When doing any repair work, especially in the engine compartment, pay attention to the following due to clearance issues:

- **Route all the various lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum lines and hoses) and electrical wiring so that the original positions are restored.**
- **Ensure sufficient clearance to all moving or hot components.**

Observe the following if test and measuring instruments are required during a test drive:

- Test and measuring instruments must be secured to rear seat and operated by a 2nd person from this location.

If test and measuring instruments are operated from the front passenger seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.

Rules for cleanliness

When working on turbocharger, carefully observe the following "5 rules" of cleanliness:

- Thoroughly clean all connections and the surrounding area before disconnecting.
- Place parts that have been removed on a clean surface and cover them with lint-free cloths.
- Carefully cover over opened components or seal, if repairs are not performed immediately.
- Only install clean components: Only unpack replacement parts immediately prior to installation. Do not use parts that have been stored loose (e.g. in tool boxes etc.).
- When the system is open: Avoid working with compressed air if possible. Do not move vehicle unless absolutely necessary.

Turbocharger with attachments, assembly overview

Observe notes --> **Charge air system with turbocharger.**

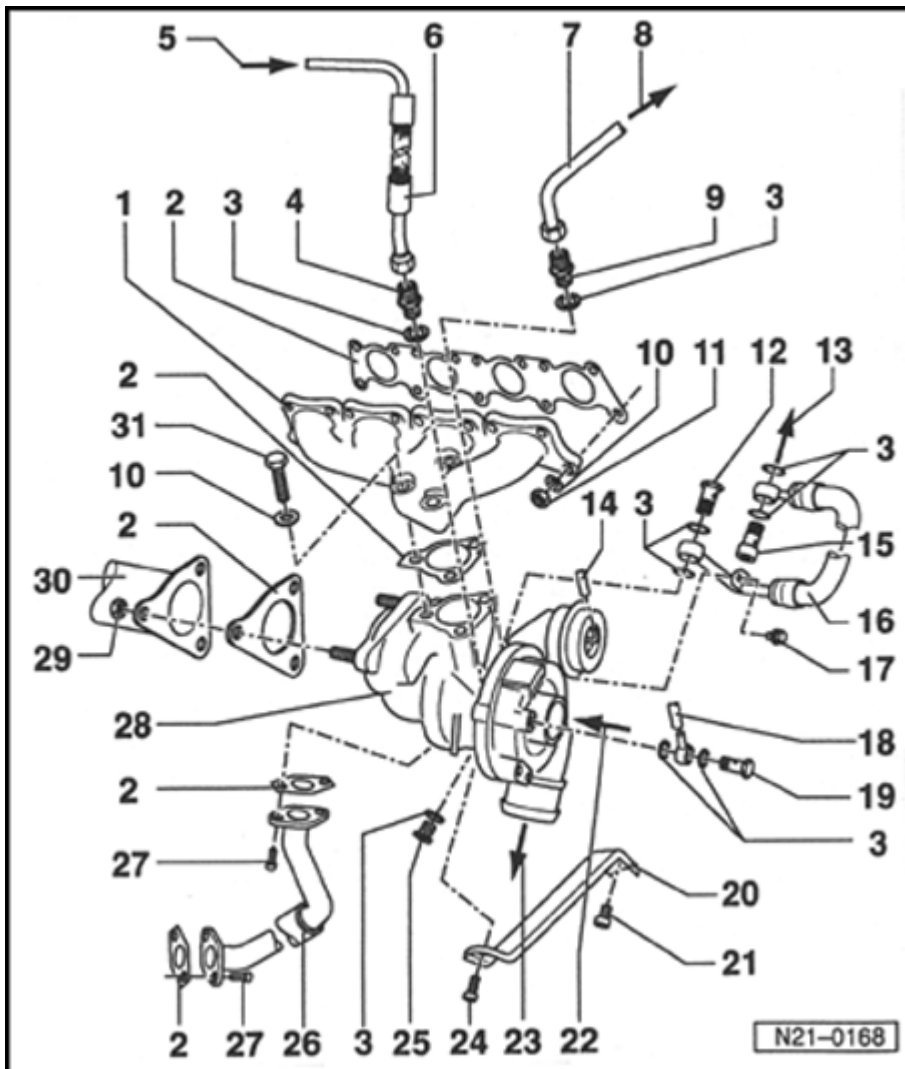


Fig. 269: Turbocharger With Attachments, Assembly Overview
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Exhaust manifold

2 - Seal

- Replace
- Note installation position

3 - Seal

- Replace

4 - Connection, 30 Nm

5 - From oil filter bracket

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

6 - Oil supply line

- Fasten to 25 Nm

7 - Coolant return line

- Fasten to 30 Nm

8 - To upper coolant pipe

9 - Connection, 35 Nm

10 - Washer

11 - 30 Nm

- Replace
- Coat thread with *G 052 112 A3*

12 - Banjo bolt, 35 Nm

13 - To cylinder block

14 - Hose

15 - Banjo bolt, 35 Nm

16 - Coolant supply line

17 - 10 Nm

18 - Hose

19 - Banjo bolt, 15 Nm

20 - Bracket

- Between turbocharger and cylinder block

21 - 25 Nm

22 - From air filter

23 - To intercooler

24 - 10 Nm

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ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

25 - Locking bolt, 15 Nm

26 - Oil return line

- To oil pan

27 - 10 Nm

28 - Turbocharger

- The boost pressure regulator valve and vacuum diaphragm for boost pressure regulator valve are part of the exhaust turbocharger and cannot be replaced individually.
- Before connecting oil supply line, fill turbocharger with oil at filler tube
- After installing turbocharger, let engine idle for approx. 1 minute without increasing engine speed. This ensures adequate oil supply to the turbocharger.

29 - 30 Nm

- Replace
- Coat thread with *G 052 112 A3*

30 - Catalytic converter

31 - 35 Nm

- Replace
- Coat threads and bolt head contact surface with *G 052 112 A3*

CAUTION: Part numbers are for reference only. Always check with your Parts Dept. for the latest parts information.

Charge air cooler components, assembly overview

Observe notes --> Charge air system with turbocharger.

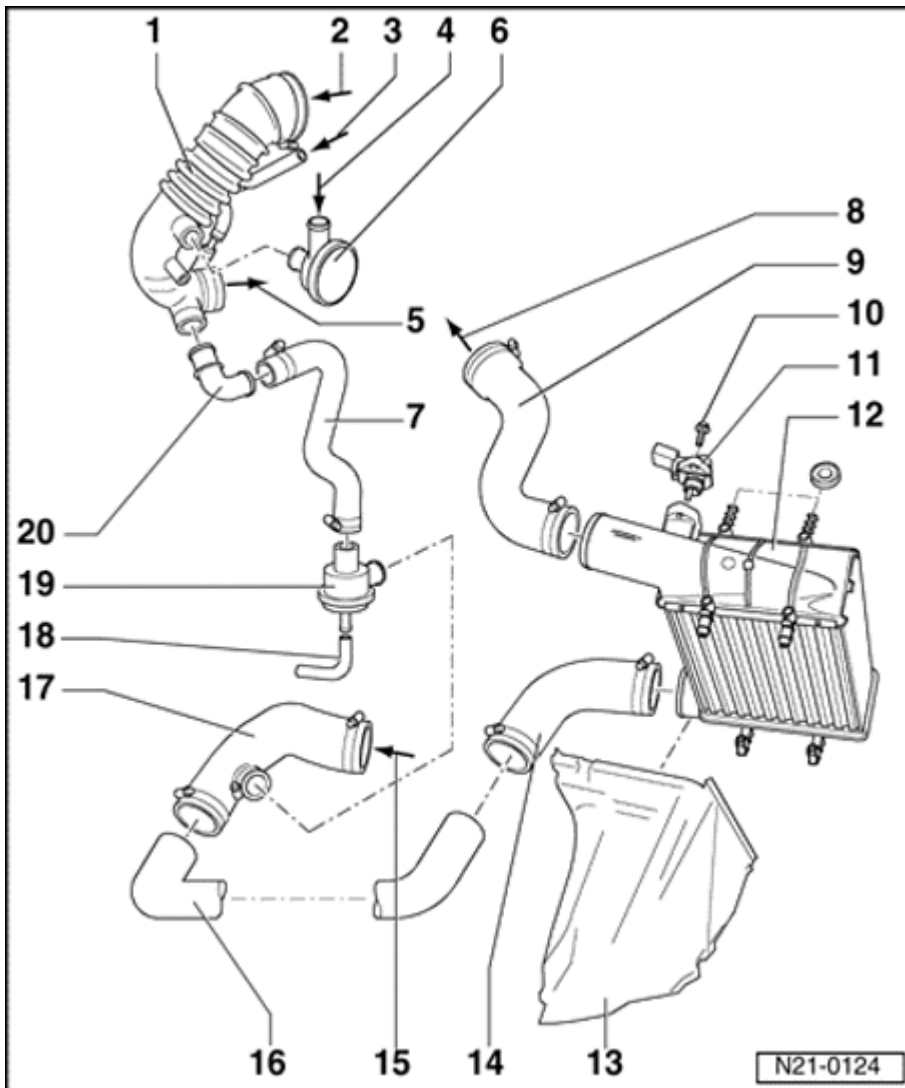


Fig. 270: Charge Air Cooler, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 1 - Intake tube
- 2 - From air filter
- 3 - From EVAP canister
- 4 - From crankcase ventilation
- 5 - To turbocharger
- 6 - Pressure regulator valve
 - For crankcase ventilation

7 - Connecting hose

- Observe installation markings

8 - To throttle valve control module

9 - Connecting hose

- Charge air cooler/throttle valve control module
- Observe installation markings

10 - 10 Nm

11 - Charge Air Pressure Sensor G31

- Replace O-ring if damaged

12 - Air charge cooler

13 - Air duct

14 - Connecting hose

- Transverse pipe/charge air cooler
- Observe installation markings

15 - From turbocharger

16 - Transverse pipe

17 - Connecting hose

- Turbocharger/transverse pipe
- Observe installation markings

18 - Vacuum line

19 - Deceleration shut-off valve

- checking --> **Deceleration shut-off valve, checking**

20 - Angle piece

Turbocharger system, overview

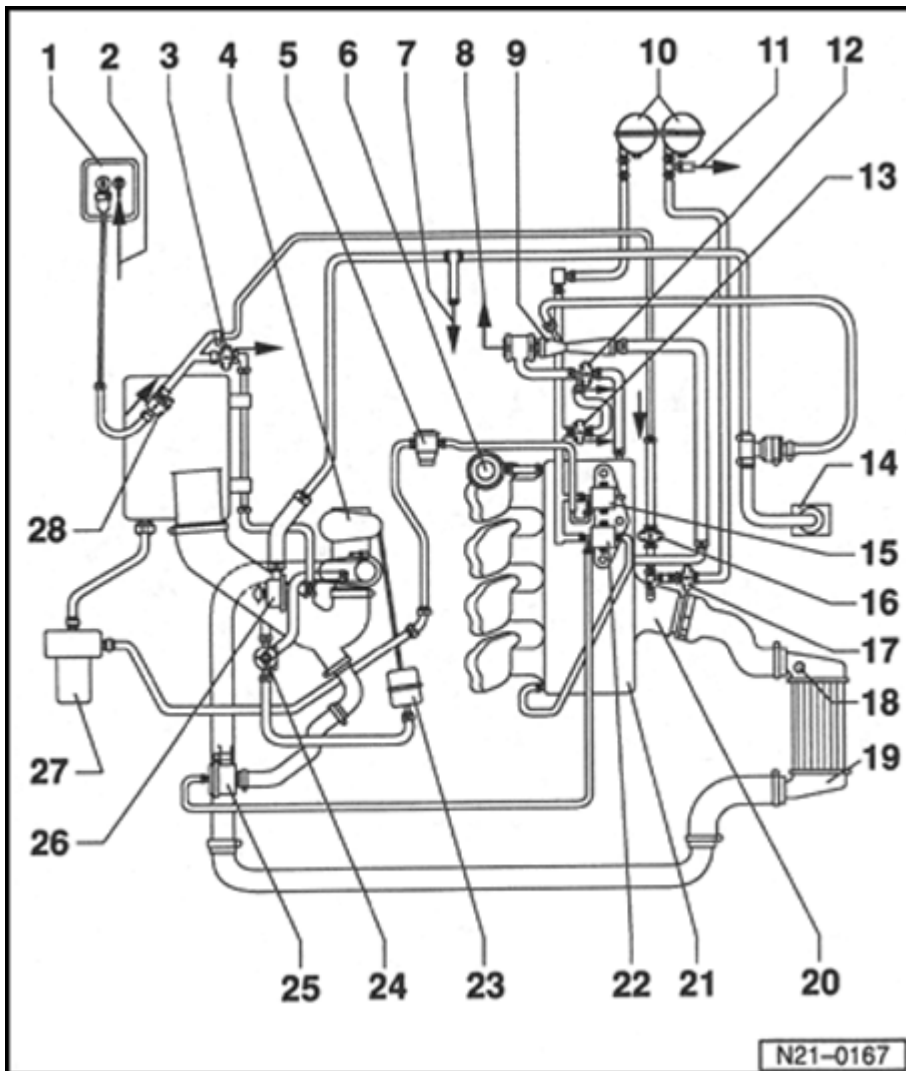


Fig. 271: Turbocharger System, Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - EVAP canister

2 - Vent line

3 - Non-return valve

- For EVAP canister system

4 - Turbocharger

- The boost pressure regulator valve and vacuum diaphragm for boost pressure regulator valve are part of the turbocharger and cannot be replaced individually.

5 - Combi-valve

- For Secondary Air Injection (AIR) system
- Checking --> **Combination valve, checking**

6 - Fuel pressure regulator

7 - To cylinder head cover

- Crankcase ventilation

8 - To brake booster

9 - Vacuum booster

10 - To vacuum reservoir

- Two separate chambers

11 - To leak detection pump (LDP) V144

12 - Check valve

- Bypass for vacuum booster

13 - Check valve

- For engine and vacuum control system

14 - Crankcase ventilation

15 - Secondary air injection (AIR) solenoid valve N112

16 - Non-return valve

- For EVAP canister system

17 - Non-return valve

- For leak detection pump (LDP) V144

18 - Charge Air Pressure Sensor G31

19 - Intercooler

20 - Throttle valve control module J338

21 - Intake manifold

22 - Recirculating valve for turbocharger N249

23 - Pressure unit

- For boost pressure regulator valve
- Component of the turbocharger cannot be replaced

24 - Wastegate bypass regulator valve N75

- Pulse-width modulated operation; duty cycle determined by engine control module
- Closed when no voltage present, limits charge pressure

25 - Deceleration shut-off valve

- Checking --> **Deceleration shut-off valve, checking**

26 - Pressure regulator valve

- For crankcase ventilation

27 - Secondary air injection (AIR) pump motor V101

28 - Evaporative emission (EVAP) canister purge regulator valve N80

CHARGE PRESSURE SYSTEM, CHECKING

Charge pressure system, checking

Vacuum diaphragm for wastegate bypass regulator valve, checking --> **Vacuum diaphragm for wastegate bypass regulator valve, checking**

Deceleration shut-off valve, checking --> **Deceleration shut-off valve, checking**

Vacuum diaphragm for wastegate bypass regulator valve, checking

Test conditions

- Engine oil temperature at least 80 ° C
- No leaks on the intake or exhaust sides

Test sequence

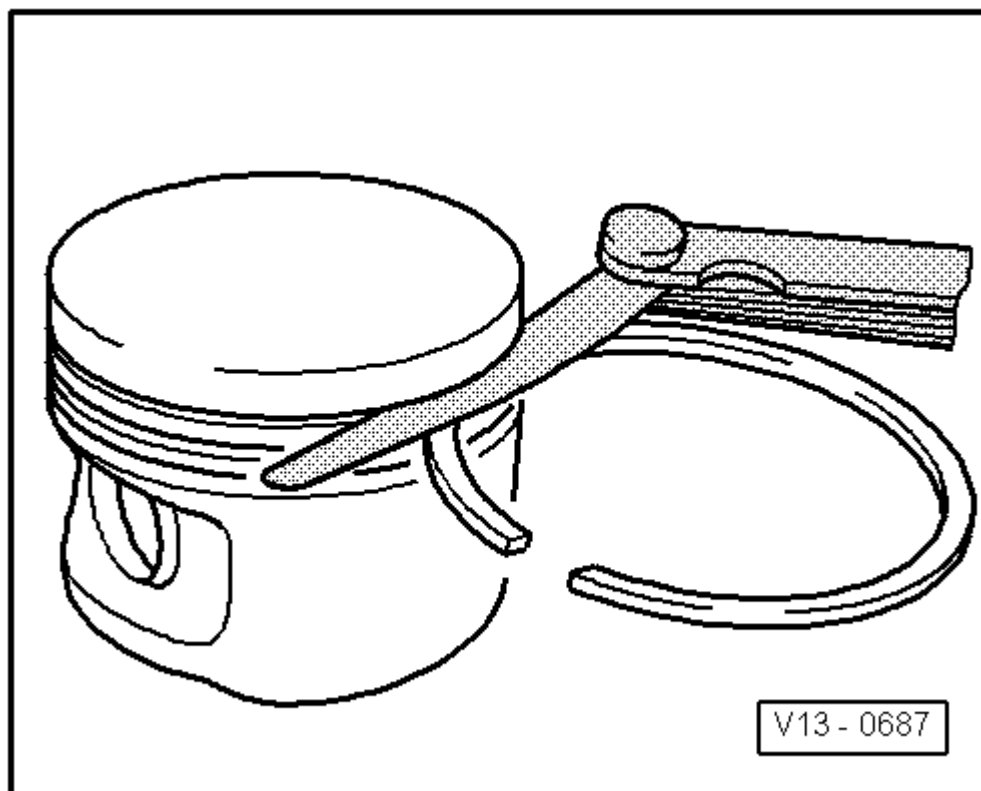


Fig. 272: Identifying Wastegate Bypass Regulator Valve N75 Connector
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect connector - 2 - at Wastegate Bypass Regulator Valve N75 - 1 -.

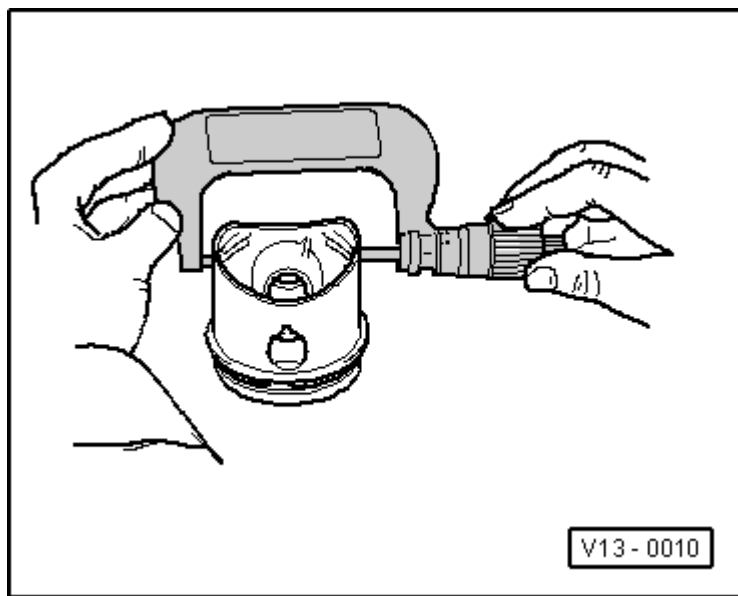


Fig. 273: Operating Rod And Lever For Wastegate Bypass Regulator Valve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

- Start engine and increase speed to maximum RPM by depressing accelerator pedal suddenly.
- Actuator rod - **2** - for wastegate bypass regulator valve must move.

If actuator rod does not move:

- Check lever for wastegate bypass regulator valve - **1** - for ease of movement. If rusted in place, replace turbocharger.

If actuator rod does not move through light prying:

- Check wastegate bypass regulator valve N75 (through-flow in hose from turbocharger via valve to vacuum diaphragm with connector unplugged).

If wastegate bypass regulator valve N75 is OK:

- Replace turbocharger.

Deceleration shut-off valve, checking

Special tools, testers and auxiliary items required

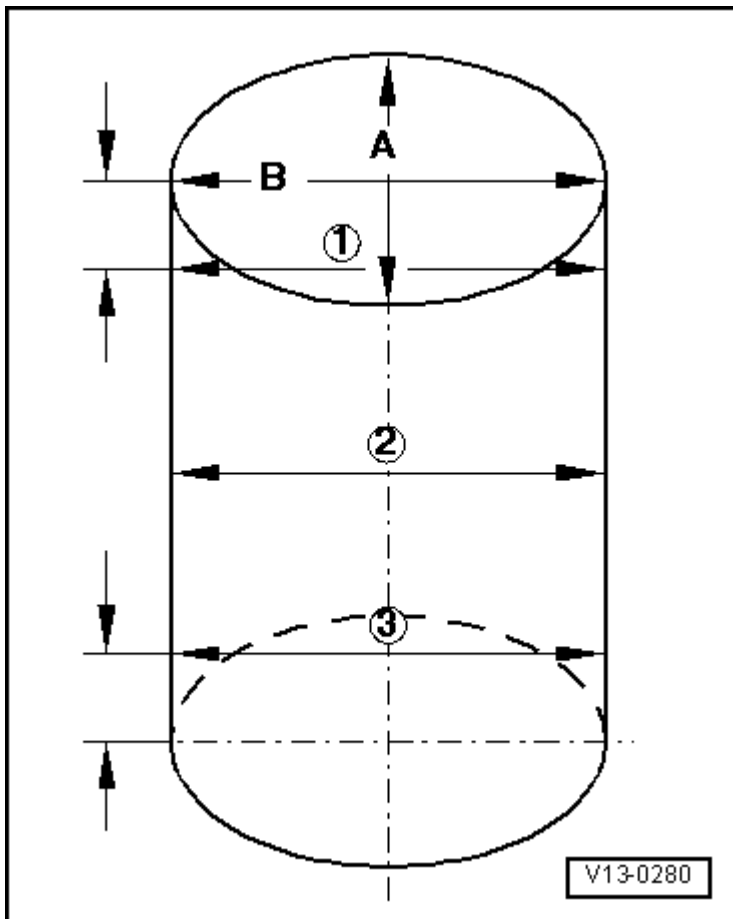


Fig. 274: Hand Vacuum Pump - V.A.G 1390

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Hand vacuum pump V.A.G 1390

Test conditions

- Performance deficiency or load change shocks
- Vacuum hoses checked for porosity and kinks.

Test sequence

NOTE:

- Deceleration shut-off valve is located in front of turbocharger. It is opened by vacuum during deceleration and at idle.

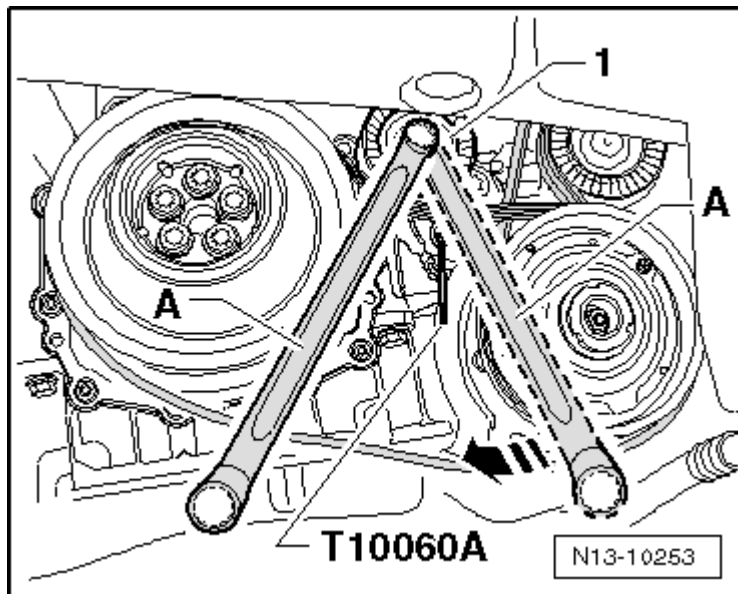


Fig. 275: Checking Through-Flow Of Vacuum Connection On Intake Manifold

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check through-flow of vacuum connection on intake manifold - **arrow** - with the hand vacuum pump V.A.G 1390.
- Remove deceleration shut-off valve.

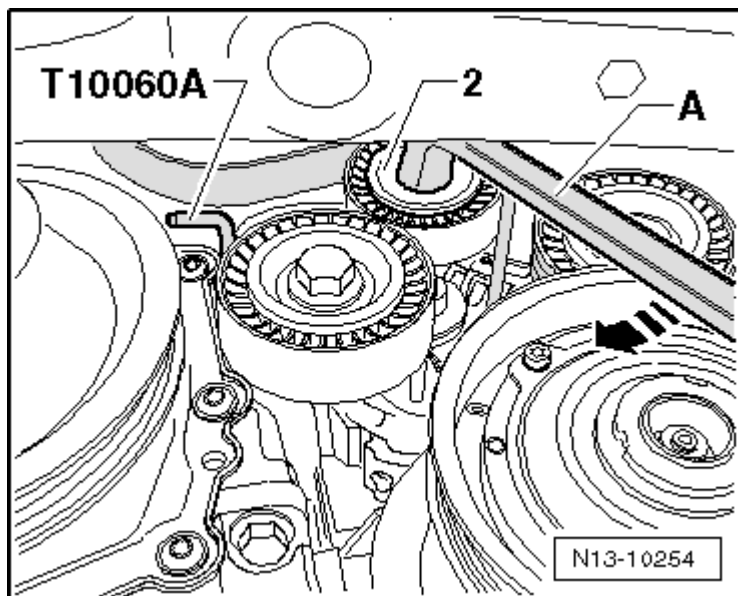


Fig. 276: Hand Vacuum Pump V.A.G 1390 Connect To Vacuum Connection Of Deceleration Shut-Off Valve In Proper Direction

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect hand vacuum pump V.A.G 1390 to vacuum connection of deceleration shut-off valve.
- Operate hand vacuum pump V.A.G 1390.
- Deceleration shut-off valve must open - **arrow** -.
- Operate bleeder valve on hand vacuum pump V.A.G 1390.
- Deceleration shut-off valve must close - **arrow** -.

NOTE:

- Look through the hole - arrow - and observe the movement of the internal plunger while applying and releasing vacuum. The plunger must move when vacuum is applied and return when vacuum is released.
- Leave vacuum applied for a few seconds to check the diaphragm for leaks. Replace the valve if the diaphragm does not hold vacuum.
- Check that the plunger does not stick sideways in the valve by blowing through the valve. (Clean the valve or connect a clean piece of hose in order to avoid skin contact with motor oil.)

If deceleration shut-off valve does not open or does not close, replace valve.

NOTE:

- Connections of deceleration shut-off valve are to be fastened with screw-type clamps.

24 FUEL INJECTION SYSTEM

FUEL INJECTION SYSTEM, SERVICING

Fuel injection system, servicing

General notes on fuel injection --> **General notes on fuel injection**

Safety precautions --> **Safety precautions**

Rules of cleanliness --> **Rules for cleanliness**

Component locations --> **Component locations, overview**

Air filter, assembly overview --> **Air filter, assembly overview**

Fuel rail with fuel injectors, assembly overview --> **Fuel rail with fuel injectors, assembly overview**

Technical data --> **Technical data**

General notes on fuel injection

- The Engine Control Module (ECM) is equipped with an On Board Diagnostic (OBD) Always check DTC memory before performing repairs or troubleshooting. Vacuum hoses and connections should also be checked (unmetered air)
- Fuel hoses in engine compartment must only be secured with spring-type clamps See parts catalog.. The use of clamp or screw type clamps is not permissible.
- Ignition must be switched off when disconnecting the battery. Obtain radio code for radios with anti-theft coding before disconnecting battery.
- For trouble-free operation of the electrical components a voltage of at least 11.5 V is necessary.
- Do not use sealants containing silicone. Silicone drawn into the engine will damage the oxygen sensors.
- If the engine only starts briefly and then shuts down off again after troubleshooting or repairs, the Immobilizer may be blocking the Engine Control Module (ECM). The engine control module must be adapted in order to remove the block --> **Adapting functions and components** .
- It is possible that the control module will recognize a malfunction and store a DTC during some tests. Therefore after completing all checks and repairs the DTC memory must be checked and if necessary erased. --> **Engine control module DTC memory, checking and erasing** .
- Vehicles with an airbag are equipped with a crash fuel shut-off system. It reduces the danger of a fire in a crash as the fuel pump is switched off via the fuel pump relay. At the same time, with this set-up, an improvement in the comfort of engine startability is also attained. When opening the door, the fuel pump is activated for 2 seconds to build pressure in the fuel system.

Safety precautions --> **Safety precautions** .

Rules for cleanliness --> **Rules for cleanliness** .

Technical data --> **Technical data** .

Safety precautions

CAUTION: Fuel supply line is under pressure! Wear eye protection and protective clothing in order to avoid injuries by contact with fuel. Before removing from hose connection wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

To reduce the risk of personal injury and/or damage to the fuel injection and ignition system, always observe the following:

- Do not touch or remove ignition wires when engine is running or turning at cranking RPM.
- The ignition must be switched off before connecting or disconnecting injection and ignition system wiring or tester cables.

Observe the following if test and measuring instruments are required during a test drive:

- Test and measuring instruments must be secured to rear seat and operated by a 2nd person from this location.

If test and measuring instruments are operated from the front passengers seat and the vehicle is involved in a collision, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.

- If engine is to be turned at starter speed without starting:

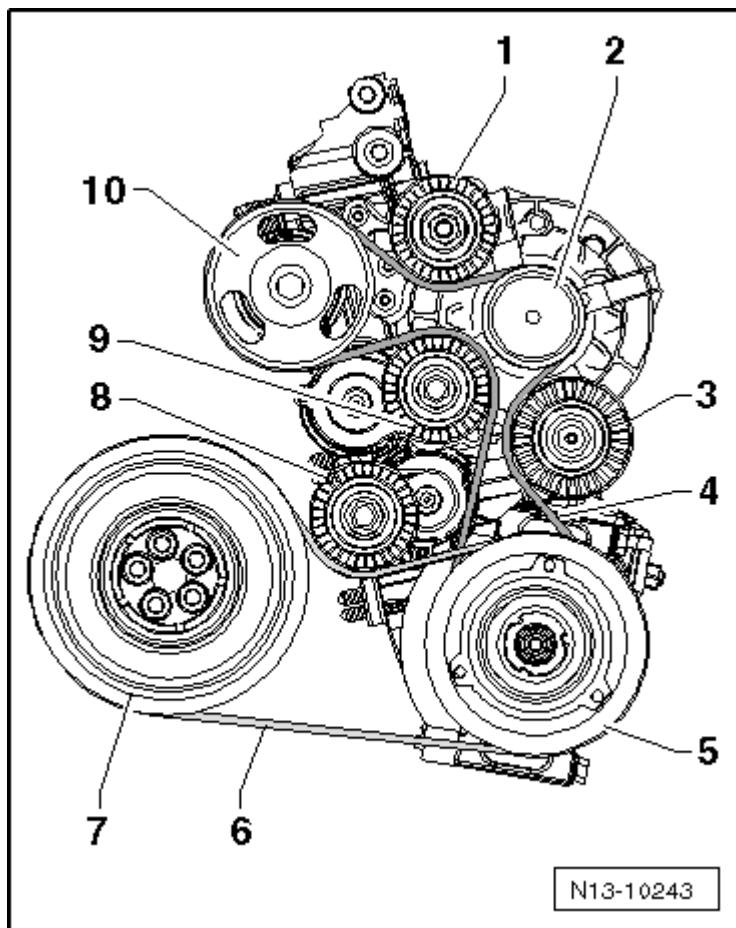


Fig. 277: Identifying Main Fuse Panel

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove fuses 29 ad 32.

NOTE:

- Removing fuse No. 29 interrupts the voltage supply to the ignition coils.
- Removing fuse No. 32 interrupts the voltage supply to the injectors.

Rules for cleanliness

When working on the fuel supply/injection system, pay careful attention to the following "5 rules" :

- Thoroughly clean all connections and the surrounding area before disconnecting.
- Place parts that have been removed on a clean surface and cover them. Use only lint-free cloths.
- Carefully cover over opened components or seal, if repairs are not performed immediately.
- Only install clean components: Only unpack replacement parts immediately prior to installation. Do not use parts that have been stored loose (e.g. in tool boxes etc.).
- When the system is open: Avoid working with compressed air if possible. Do not move vehicle unless absolutely necessary.

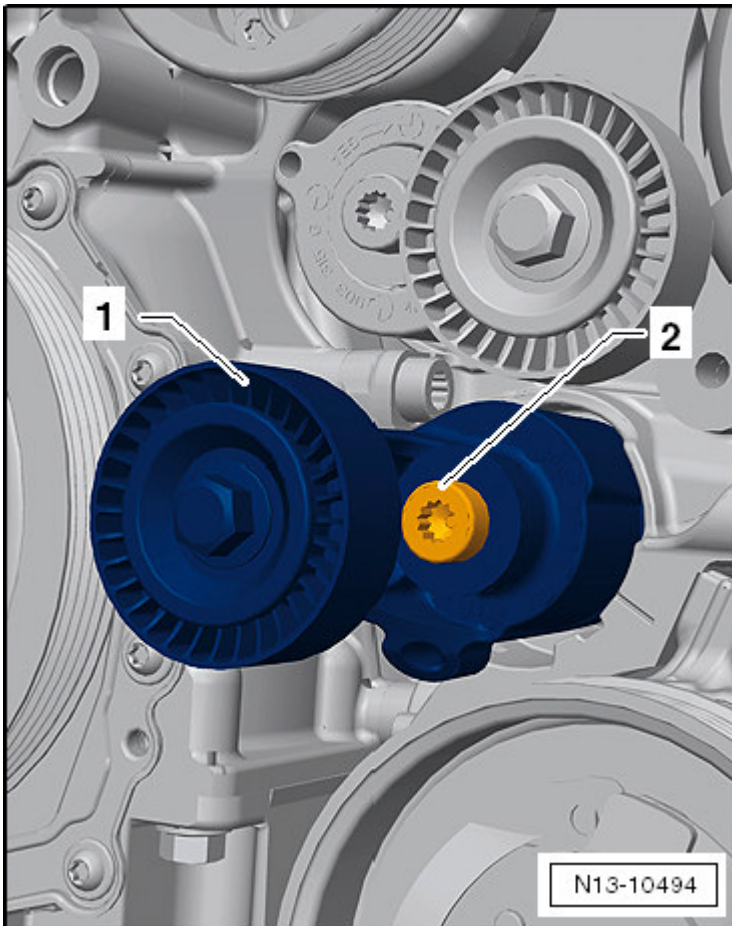
Component locations, overview

Fig. 278: Fuel Injection System, Component Locations, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Air filter housing

- Assembly overview --> [Air filter, assembly overview](#)

2 - Heated Oxygen Sensor (HO2S) G39 , 50 Nm

3 - Oxygen sensor (O2S) behind three way catalytic converter (TWC) G130 , 50 Nm

4 - Engine coolant temperature (ECT) sensor G62

5 - Turbocharger Recalculating Valve N249

6 - Secondary air injection (AIR) solenoid valve N112

7 - Throttle valve control module J338

- Tighten to 10 Nm

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

8 - Clutch Vacuum Vent Valve Switch F36 , Brake Light Switch F , Brake Pedal Switch (cruise control/Diesel Direct Fuel Injection) F47 and Throttle Position (TP) Sensor G79 and G185

- In driver-side footwell

9 - 4-pin harness connector

- Brown for Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) G130 and Oxygen Sensor (O2S) Heater 1 Z29

10 - 6-pin harness connector

- Black for Heated Oxygen Sensor (HO2S) G39 and Oxygen Sensor (O2S) Heater 1 Z19

11 - 3-pin harness connector

- Gray for Engine Speed (RPM) Sensor G28

12 - 3-pin harness connector

- Green for Knock Sensor (KS) 1 G61

13 - 3-pin harness connector

- Blue for Knock Sensor (KS) 2 G66

14 - Secondary Air Injection (AIR) Pump Relay J299

- **Secondary air injection (AIR) pump relay J299**

15 - Motronic engine control module J220

- Replacing --> **Engine Control Module (ECM), replacing** .

16 - Intake Air Temperature (IAT) Sensor G42

- Tighten to 10 Nm

17 - Engine Speed (RPM) Sensor G28

- Inductive sensor
- Tighten to 10 Nm

18 - Charge Air Pressure Sensor G31

19 - Knock Sensor (KS) 2 G66

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ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

20 - Knock Sensor (KS) 1 G61

21 - Fuel pressure regulator

22 - Camshaft Position (CMP) sensor G40

23 - Fuel injector N30, N31, N32, N33

24 - Ignition coil with power output stage N70, N127, N291, N292

25 - Wastegate Bypass Regulator Valve N75

26 - Ground (GND) connection

- At right engine support

27 - Mass air flow (MAF) sensor G70

28 - Secondary Air Injection (AIR) Pump Motor V101

29 - Evaporative Emission (EVAP) Canister Purge Solenoid Valve N80

Air filter, assembly overview

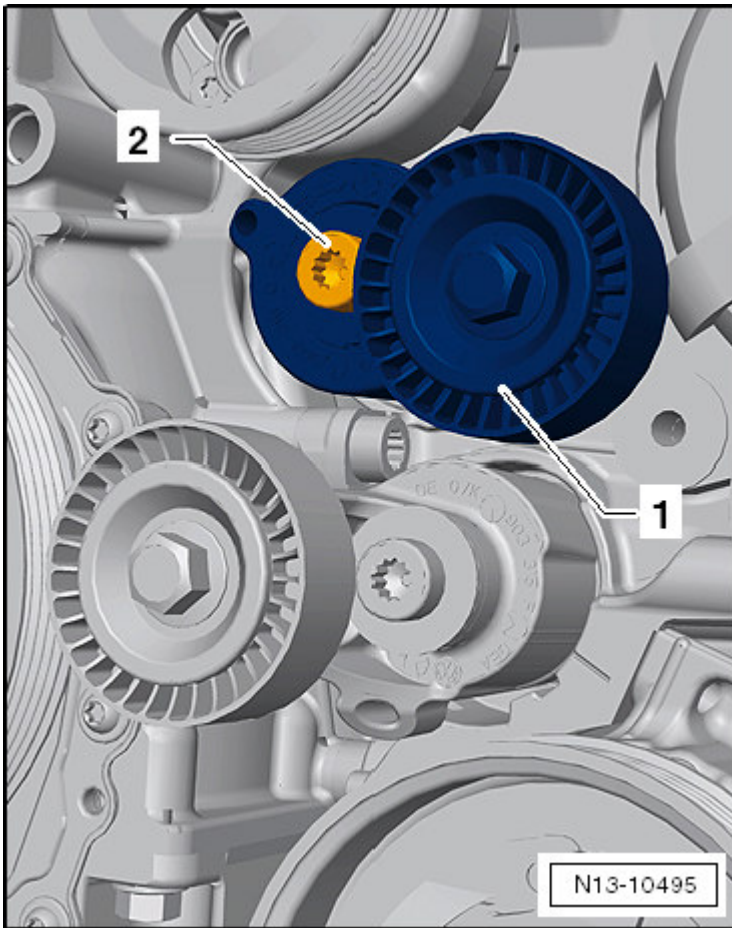


Fig. 279: Air Filter, Assembly Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Air ducts

- To lock carrier

2 - Filter element

3 - Seal

4 - Mass air flow (MAF) sensor G70

5 - Air duct

6 - 6 Nm

7 - Air filter housing, upper part

8 - Cooling material

- Not for engine code AWM

9 - Rubber ring

- Not for engine code AWM

10 - Line

- For EVAP canister system

11 - 10 Nm

12 - Heat shield

13 - Rubber grommet

14 - Spacer sleeve

15 - Rubber mounts

16 - Air filter housing, lower part

Fuel rail with fuel injectors, assembly overview

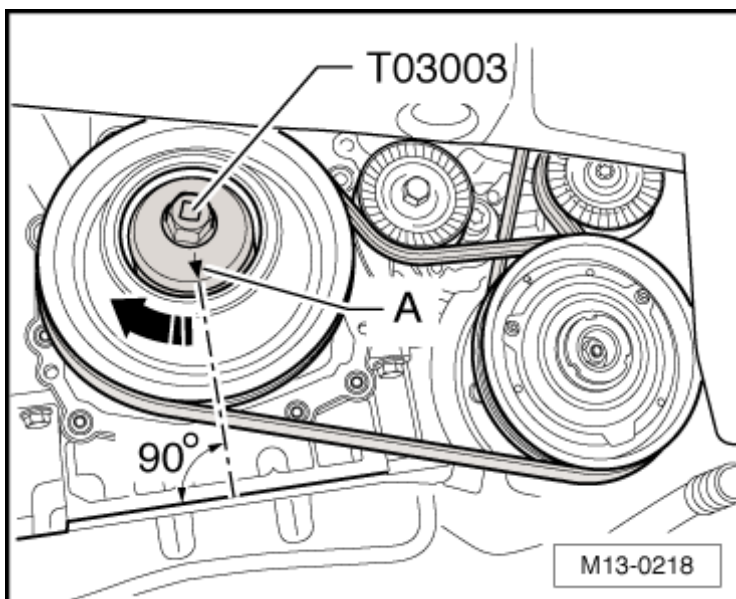


Fig. 280: Fuel Rail With Fuel Injectors, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Fuel pressure regulator

- Checking --> **Fuel pressure regulator and residual pressure, checking**

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

2 - O-ring

- Replace if damaged

3 - Retaining clip

- Make sure clip is correctly seated on fuel injector and fuel distributor

4 - 10 Nm

5 - Fuel rail

6 - Fuel injector N30, N31, N32, N33

- Checking --> **Fuel injectors, checking**

7 - Supply line

- Counter-hold on hex faces of connection when loosening or tightening
- Fasten to 22 Nm

8 - Return line

- Secured with spring-type clamps. See parts catalog.

Technical data

Engine code			AUG	AWM
Idle check				
Engine idle speed * See note	RPM		740 to 920	740 to 920
Engine Control Module (ECM) * See note				
System designation			Motronic ME7.1	Motronic ME7.1
Replacement part number * See note			4B0 906 018 BQ	4B0 906 018 CL
Engine speed (RPM) limitation	RPM		from approx. 6800	from approx. 6800

* Not adjustable, current values:

* Replacing Engine Control Module (ECM) --> **Engine Control Module (ECM), replacing**

* Current replacement part number for Engine Control Module (ECM) Electronic Parts Catalog "ETKA"

COMPONENTS, CHECKING

Components, checking

Check fuel injectors --> **Fuel injectors, checking**

Fuel pressure regulator and residual pressure, checking --> **Fuel pressure regulator and residual pressure, checking**

Fuel injectors, checking

Checking injection quantity and proper seal of fuel injectors

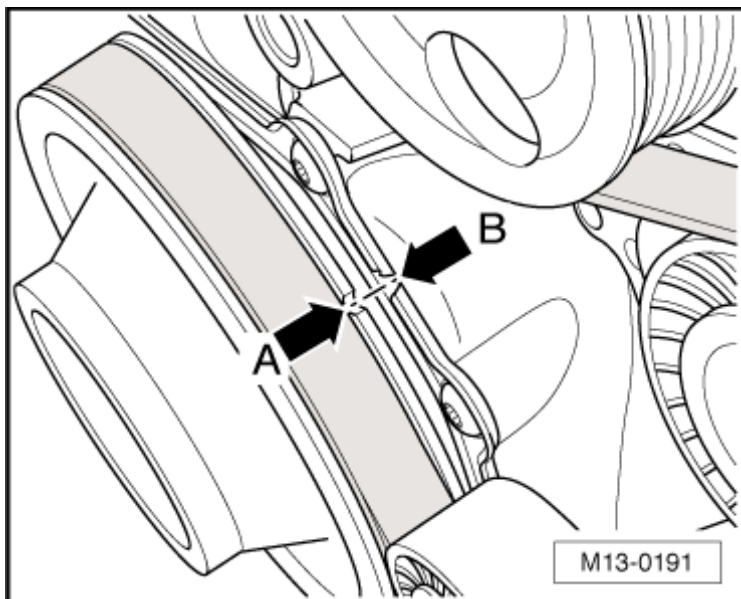


Fig. 281: Special Tools - Fuel Injection Checking
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Remote control connection V.A.G 1348/3
- Adapter V.A.G 1348/3-2
- Injector quantity testing device V.A.G 1602
- Connector test set V.A.G 1594 A
- Test box V.A.G 1598/31

Test conditions

- Fuel pressure must be OK, checking --> **Fuel pressure regulator and residual pressure, checking** .

Test sequence

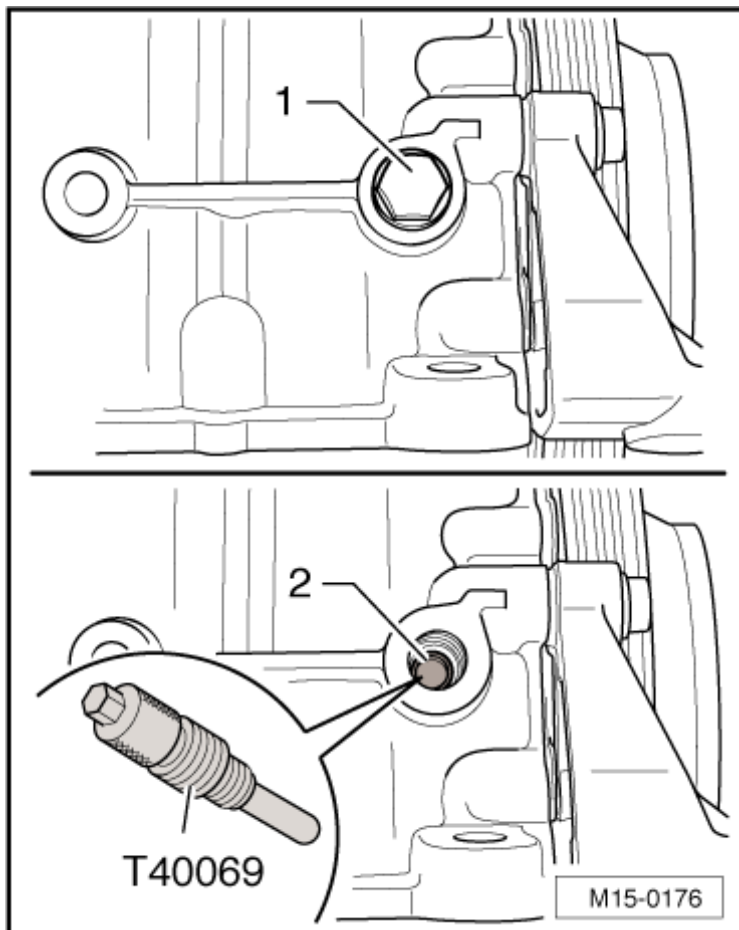


Fig. 282: VAG1598/31 Test Box Connected To Control Module Wiring Harness
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect test box V.A.G 1598/31 to control module wiring harness. The engine control unit remains disconnected.

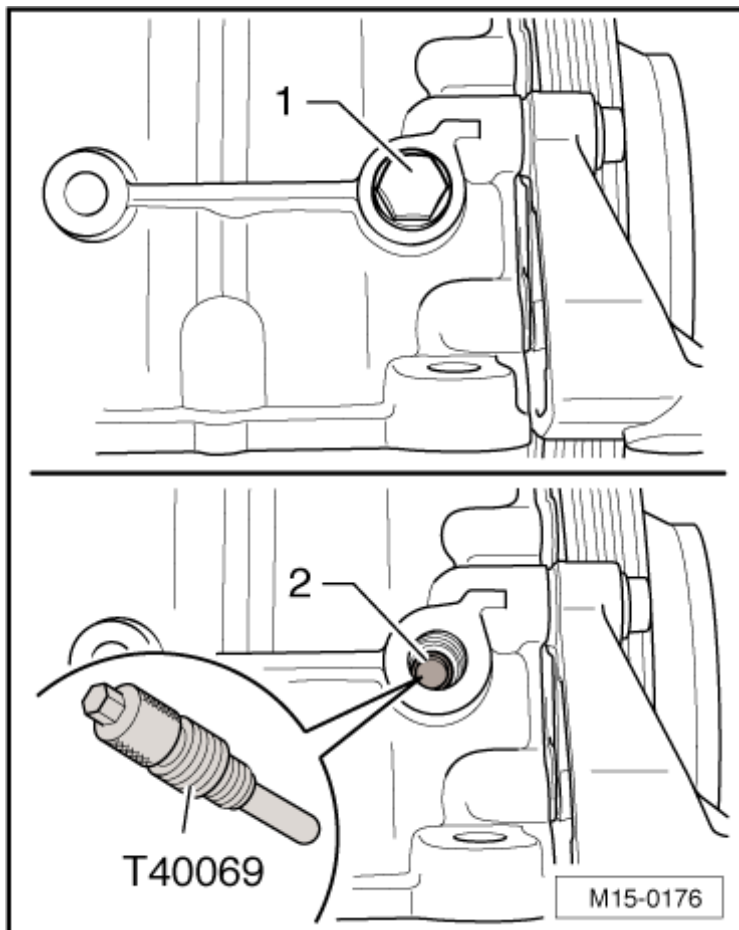


Fig. 283: Identifying Fuel Injector Connectors
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect fuel injector connectors.
- Remove fuel rail securing bolts.
- Disconnect vacuum hose from fuel pressure regulator.
- Lift fuel rail with injectors off intake manifold and support it.
- Bridge test box sockets 1 and 65 using adapter cables from connector test set V.A.G 1594 A.

NOTE: • This work step allows the fuel pump to run when the engine is not running.

- Switch ignition on.

Checking for leaks

- Check injectors for leaks (visual inspection). Only 1 to 2 drops per minute may emit from each valve when fuel pump is running.

If the fuel loss is greater:

- Switch off ignition and replace leaking fuel injector.

NOTE: • **Always use new seals.**

Checking Injection Quantity

Test conditions

- Test box V.A.G 1598/31 still connected and test box sockets 1 and 65 bridged with adapter cable from connector test set V.A.G 1594 A.

Test sequence

- Place a fuel injector to be tested into a graduated measuring glass of injection quantity test device V.A.G 1602.

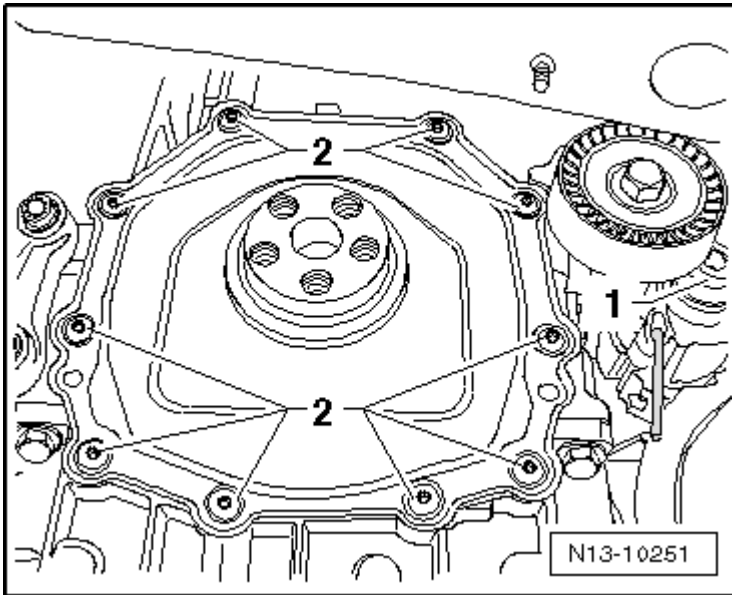


Fig. 284: Checking Fuel Injector

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Using adapter cables from connector test set V.A.G 1594 A , connect one terminal of fuel injector to be checked to engine Ground (GND).
- Connect second fuel injector terminal with adapter cable to remote control V.A.G 1348/3 using adapter cable V.A.G 1348/3-2.
- Connect alligator clip to battery (+).
- Switch ignition on.
- Operate remote control V.A.G 1348/3 for 30 seconds.
- Repeat check on the other injectors. Use new graduated measuring glasses for this.

- After all fuel injectors have been activated, place graduated measuring glasses on a level surface and compare quantity of injected fuel.
- Specification: 133157 ml per injector

If the measured value of one or more fuel injectors is below or above the indicated specified value:

- Replace the defective fuel injector.

Perform installation of injectors in reverse order. When doing this note the following:

- Replace O-rings on all injectors and lightly moisten with clean engine oil.
- Insert fuel injectors into fuel rail perpendicular and in correct position, and secure them with retaining clips.
- Position fuel rail with secured fuel injectors on intake manifold and apply uniform pressure to press it in.
- Check DTC memory of Engine Control Module (ECM), repair any stored malfunctions and then erase DTC memory --> **Engine control module DTC memory, checking and erasing** .
- After erasing DTC memory, readiness code must be generated again --> **Adapting functions and components**

Fuel pressure regulator and residual pressure, checking

The fuel pressure regulator controls the fuel pressure and is dependent on intake manifold pressure.

Special tools, testers and auxiliary items required

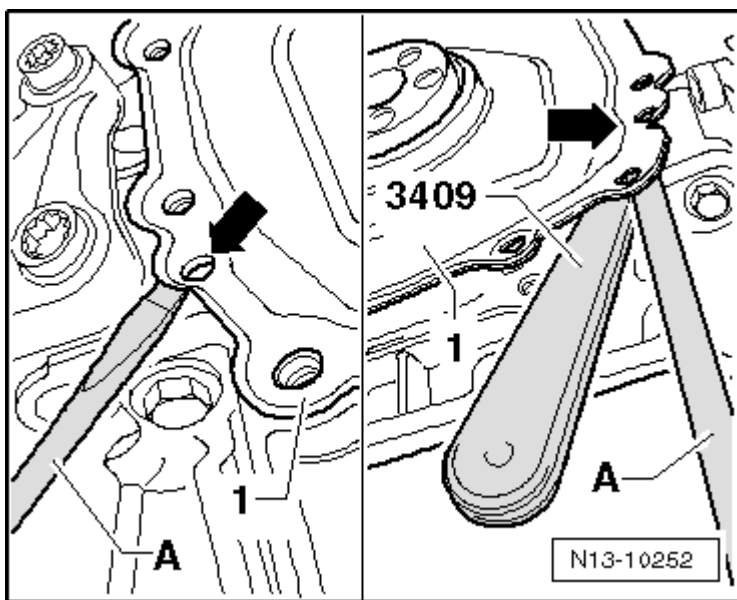


Fig. 285: Pressure Gauge V.A.G 1318

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Fuel inj. Pressure Gauge-cis VAG1318

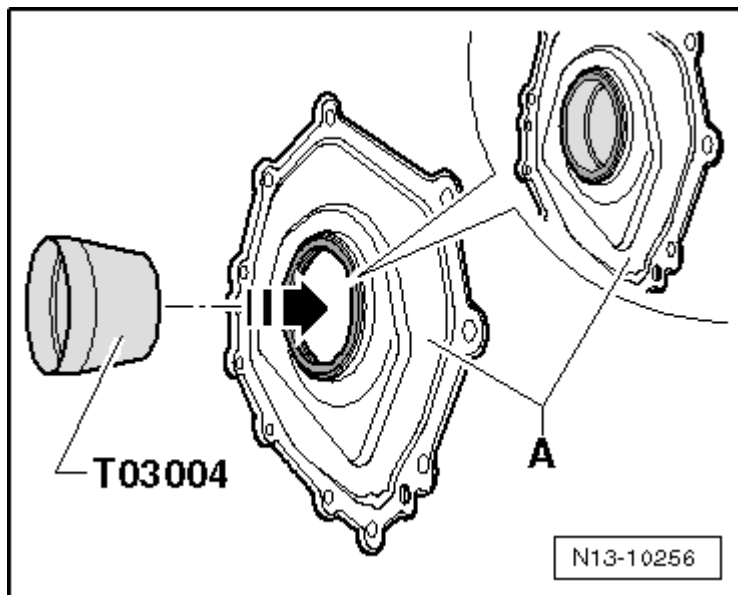


Fig. 286: Pressure Gauge Adapter V.A.G 1318/6 + 7
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pressure gauge adapter V.A.G 1318/6 + 7

Test sequence

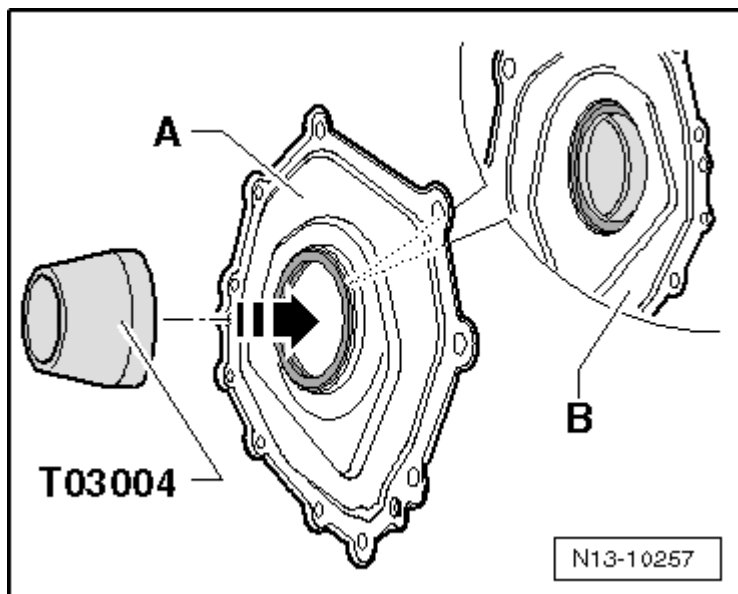


Fig. 287: Identifying Main Fuse Panel
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove fuse No. 28 (fuel pump) from fuse holder.

CAUTION: Fuel supply line is under pressure! Wear protective goggles and protective clothing to prevent injuries and contact with skin. Before removing from hose connection wrap a cloth around connection. Then release pressure by carefully pulling hose off connection.

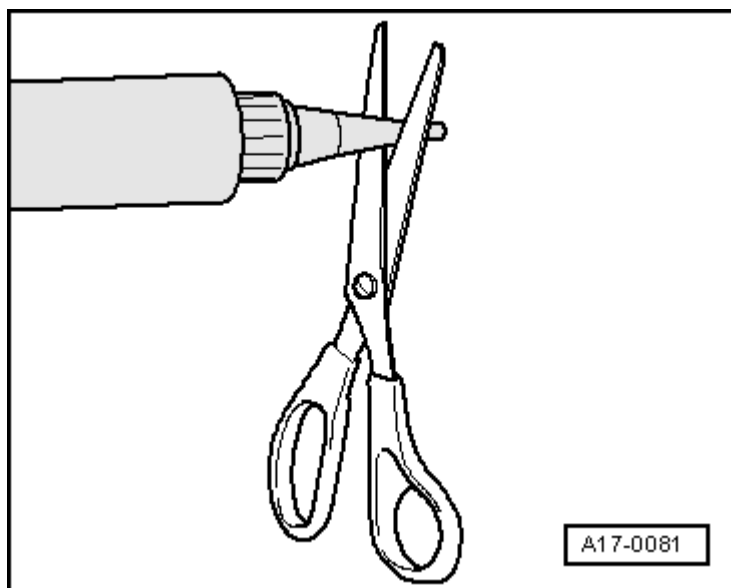


Fig. 288: Identifying Fuel Supply Line From Fuel Distributor
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect fuel supply line from fuel distributor - **arrow** - and catch escaping fuel using a rag.

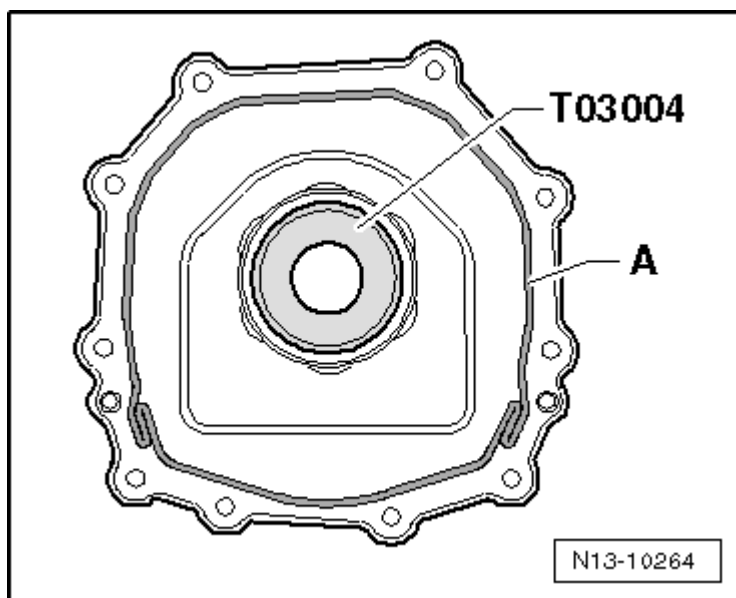


Fig. 289: Measuring Fuel Pressure Using Pressure Gauge V.A.G 1318 With Adapters V.A.G 1318/6+7
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect Fuel inj. Pressure Gauge-cis VAG1318 to supply line - **1** - and to fuel distributor using adapters

V.A.G 1318/6 + 7 7.

- Open shut-off valve of pressure gauge. The lever points in direction of flow.
- Install fuse 28 (fuel pump) into fuse holder.
- Start engine and run at idle speed.
- Measure fuel pressure.
- Specified value: approx. 3.5 bar positive pressure

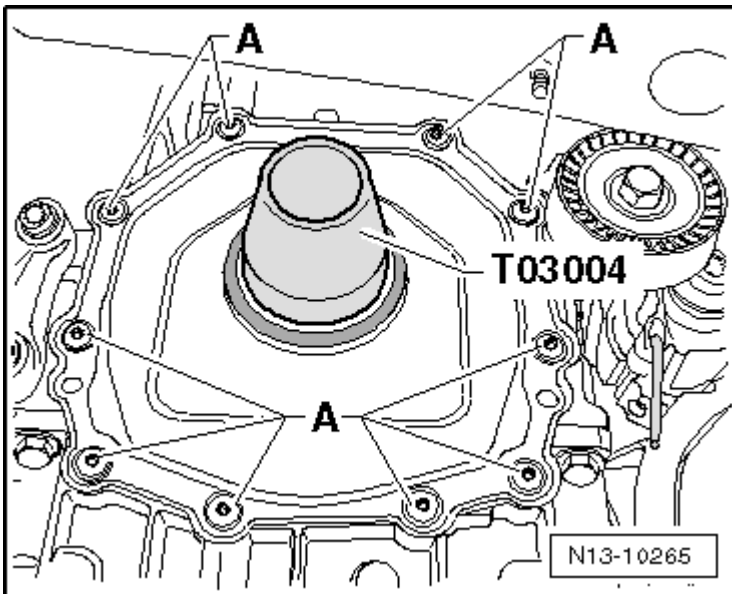


Fig. 290: Identifying Fuel Pressure Regulator
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull vacuum hose off from fuel pressure regulator - **arrow** -.
- Fuel pressure must rise to approx. 4.0 bar positive pressure.

If specification is not obtained:

- Check delivery rate of fuel pump.
- Vehicles with front wheel drive: --> **Fuel pump, checking**
- Vehicles with all wheel drive: --> **Fuel pump, checking**

If specified value is achieved:

- Switch off ignition.
- Check for leaks and residual pressure. Observe pressure drop on pressure gauge.
- After 10 minutes there must be a residual pressure of at least 2.0 bar.

If holding pressure drops below 2 bar:

- Start engine and run at idle speed.

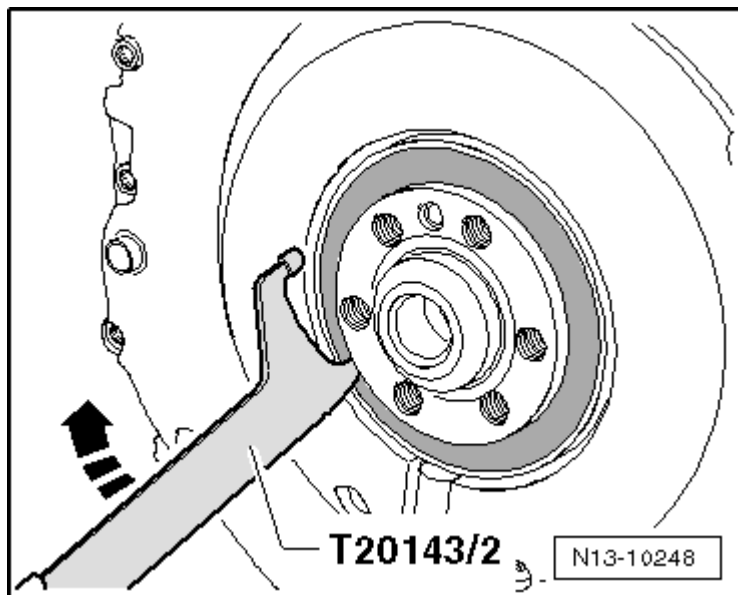


Fig. 291: Locating V.A.G 1318 Shut-Off Tap
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Wait until pressure has built up, then switch off ignition. Simultaneously close shut-off valve of Fuel inj. Pressure Gauge-cis VAG1318 (lever perpendicular to direction of flow - **arrow** -).
- Watch pressure drop on gauge.

If pressure does not drop:

- Test check valve of fuel pump.
- Vehicles with front wheel drive: --> **Fuel pump, checking**
- Vehicles with all wheel drive: --> **Fuel pump, checking**

If pressure drops again:

- Check Fuel inj. Pressure Gauge-cis VAG1318 for leaks.
- Check line connections, O-rings on fuel rail and injectors for leaks.

If no leaks are found:

- Replace fuel pressure regulator.

NOTE:

- **Before removing pressure gauge, place cleaning rags again around line connection which is to be disconnected and remove fuse 28 from fuse holder again.**

ENGINE CONTROL MODULE

Engine control module

DTC memory of Engine Control Module (ECM), erasing and checking --> **Engine control module DTC memory, checking and erasing**

Adapting functions and components --> **Adapting functions and components**

Replacing Engine Control Module (ECM) --> **Engine Control Module (ECM), replacing**

Engine control module DTC memory, checking and erasing

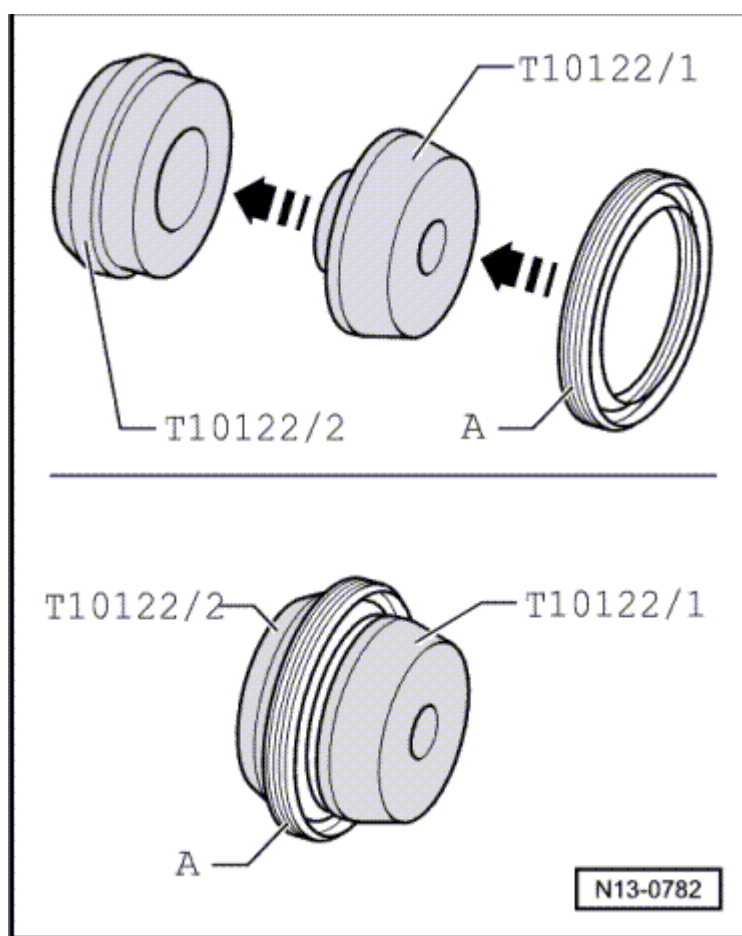
Special tools, testers and auxiliary items required

Fig. 292: VAS 5051 Vehicle Diagnosis, Testing and Information System
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Vehicle diagnostic, testing, and information system VAS 5051
- Diagnosis cable VAS 5051/5A or VAS 5051/6A
- Diagnostic cable VAS 5051/1 or VAS 5051/3 can also be used.

Work procedure

- Connect Vehicle Diagnosis, Testing and Information System VAS 5051 as follows:

Vehicles up to 09.00:

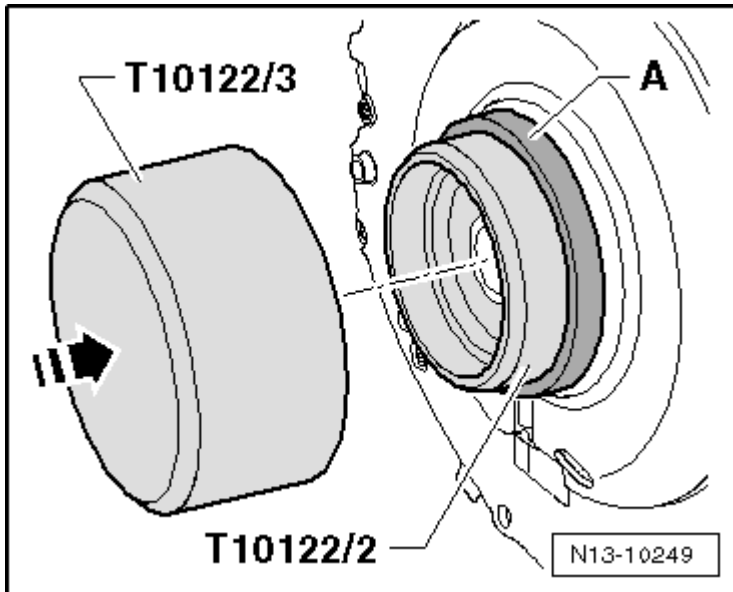


Fig. 293: Connecting Diagnostic Cable Connector To Data Link Connector
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull off cover in direction of - **arrow** -.
- Connect diagnostic cable VAS 5051/5A connector or VAS 5051/6A to Data Link Connector (DLC).

Vehicles as of 10.00

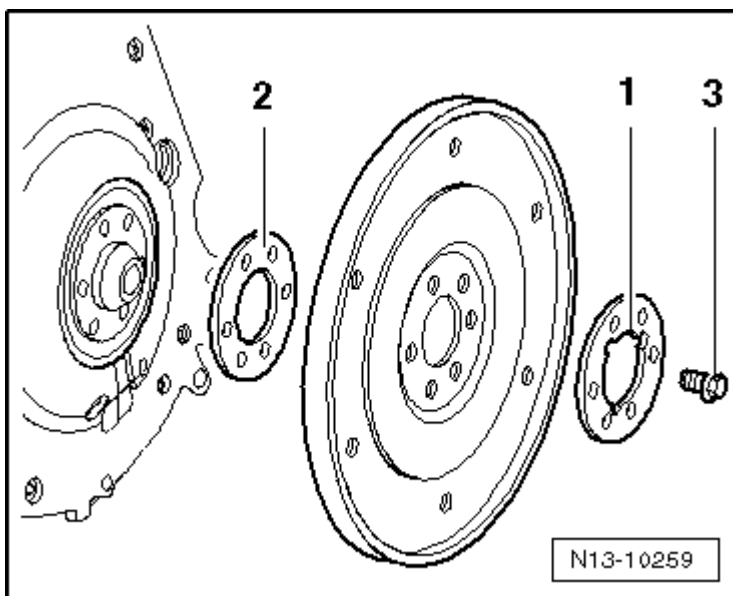


Fig. 294: Location Of Data Link Connector (DLC)

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect diagnostic cable VAS 5051/5A connector or VAS 5051/6A to Data Link Connector (DLC).

Continuation for all vehicles

- Start engine and run at idle speed.

Only if engine does not start:

- Switch ignition on.

Select operating mode

- Press button on display for "Vehicle On Board Diagnostic (OBD)".

Select vehicle system

- Press button "01 - Engine electronics" on display.

Display will indicate control module identification and engine control module coding.

Select diagnostic function

- Press button "02 - Check DTC memory" on display.

If no malfunction is stored in engine control module, "0 DTC(s) detected" is displayed.

If DTCs are stored in Engine Control Module (ECM), they are listed in sequence on display.

- Press <-- key.
- Press button "05 - Erase DTC memory" on display.
- Press function "06 - End output".

Vehicles with engine codes AUG, AWM

- If DTC memory was erased, readiness code must be re-generated --> **Adapting functions and components**

Adapting functions and components

Special tools, testers and auxiliary items required

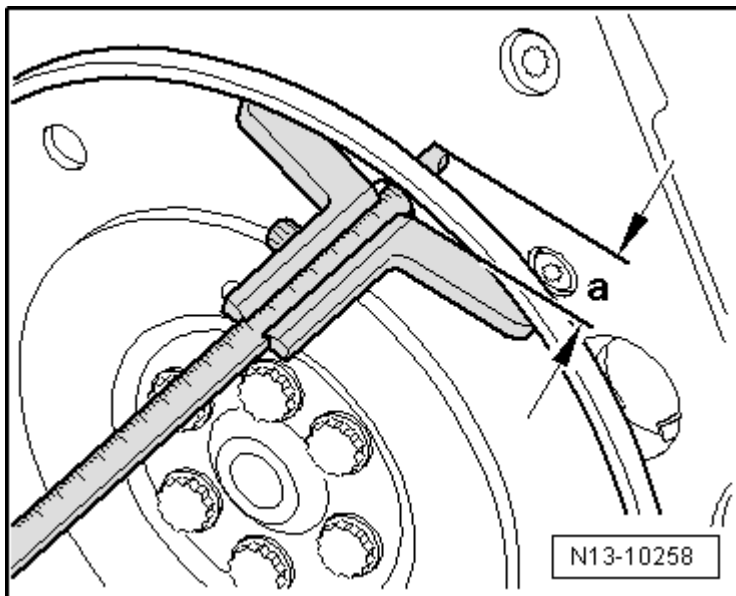


Fig. 295: VAS 5051 Vehicle Diagnostic, Testing and Information System
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Vehicle diagnostic, testing, and information system VAS 5051
- Diagnosis cable VAS 5051/5A or VAS 5051/6A
- The diagnostic cable VAS 5051/1 or VAS 5051/3 can also be used.
- On Vehicle diagnostic, testing, and information system VAS 5051 , select "guided fault finding".

Once all control modules have been checked:

- Press Sprung button
- Select "Function/component selection"
- Select "drivetrain"
- Select "engine code"
- Select "01-Systems capable of On Board Diagnostic (OBD)"
- Select "engine management system"
- Select "Function"
- Select "Function or component"

Engine Control Module (ECM), replacing

Work procedure

- First, print out the old control module identification, and thus also its coding --> **Engine control module DTC memory, checking and erasing** , DTC memory of Engine Control Module (ECM), checking and erasing.

NOTE:

- If the control module version that is appropriate for this vehicle is not indicated, replace the control module. For the current engine control unit part number: See parts catalog..

- Switch off ignition.
- Remove wiper arms and cowl --> **92 - WINDSHIELD WIPER AND WASHER SYSTEM** .

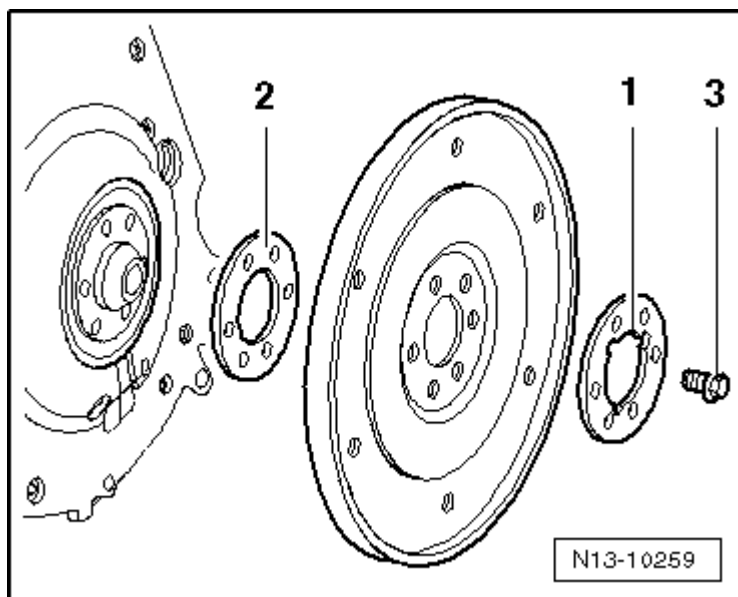


Fig. 296: Identifying Engine Control Module (ECM) Protective Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove cover of protective housing for control units.

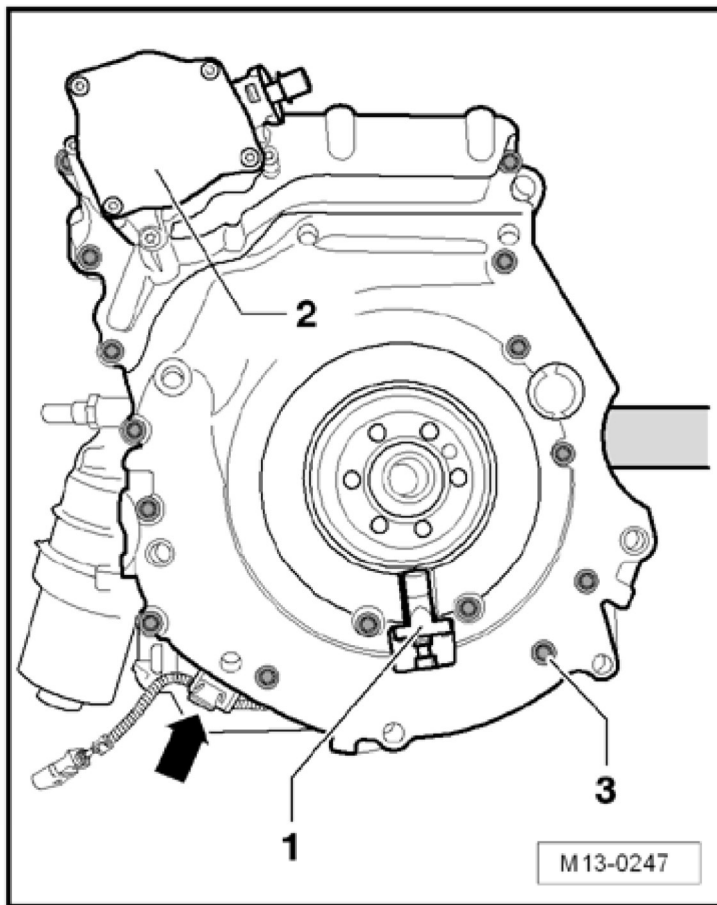


Fig. 297: Removing Engine Control Module
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully pry off the retainer bar with a screwdriver - **arrow** -.
- Disengage connector from control module and then disconnect it.
- Remove old control module and install the new control module.
- The new control module must be coded, and the electronic anti-theft immobilizer and the throttle valve control module must be adapted. Activate the cruise control system if necessary --> **Adapting functions and components**
- Check DTC memory of new Engine Control Module (ECM) and erase if necessary --> **Engine control module DTC memory, checking and erasing**
- After erasing DTC memory, readiness code must be generated again --> **Adapting functions and components**
- Carry out test drive.

Observe safety precautions that apply to road tests --> **Safety precautions** .

- Check control module DTC memory again.

26 EXHAUST SYSTEM

EXHAUST SYSTEM COMPONENTS, REMOVING AND INSTALLING

Exhaust system components, removing and installing

CAUTION: When doing any repair work, especially in the engine compartment, pay attention to the following due to clearance issues:

- Route lines of all types (e.g. for fuel, hydraulic, EVAP canister system, coolant and refrigerant, brake fluid, vacuum) and electrical wiring so that the original path is followed.
- To prevent damages to the lines, make sure there is sufficient clearance to all moving or hot components.

NOTE:

- After exhaust system repairs, make sure exhaust system is not under stress and that it has sufficient clearance from the bodywork. If necessary, loosen double clamps and align exhaust pipe so that sufficient clearance is maintained to the bodywork and support rings carry uniform loads.
- Replace self-locking nuts.

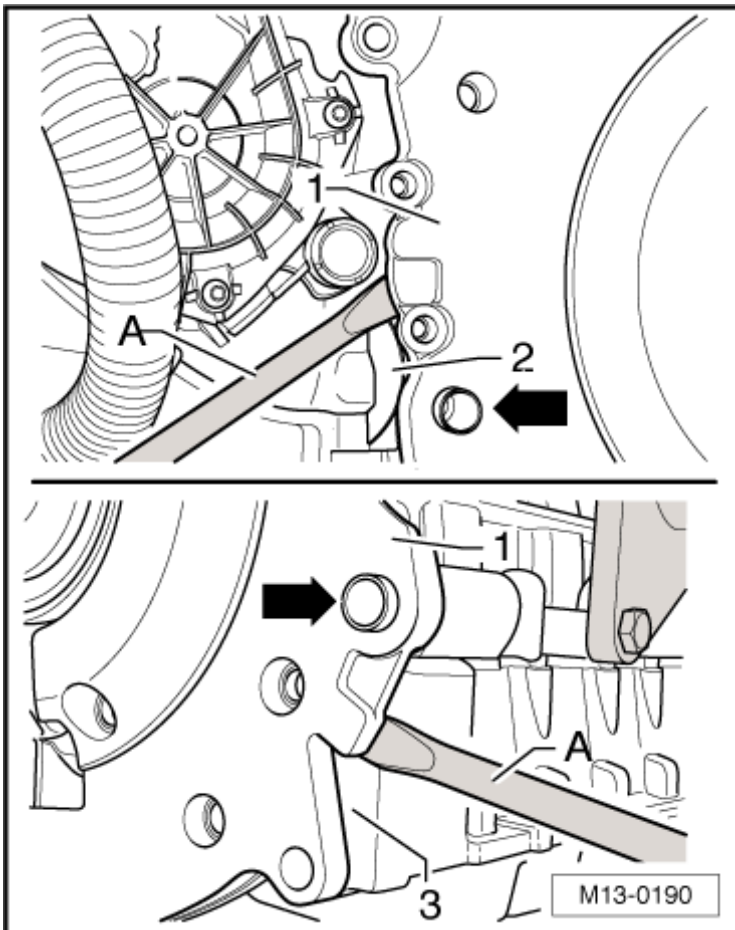


Fig. 298: Identifying Special Tools - Exhaust System Components, Removing And Installing
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Ring Spanner 7-piece Set 3337
- Torque wrench V.A.G 1331
- Body repair saw V.A.G 1523 A
- *Hot bolt paste G 052 112 A3*

Exhaust system components, assembly overview: Vehicles with front wheel drive (FWD)

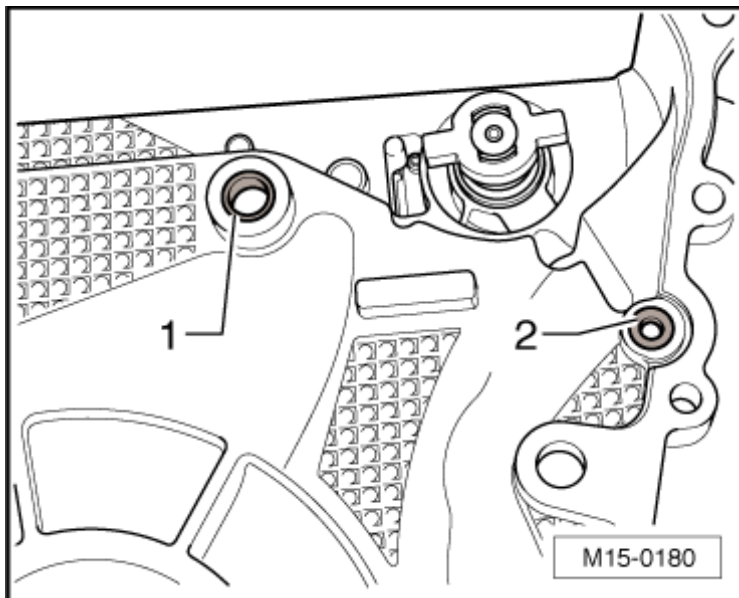


Fig. 299: Exhaust System Components - Vehicles With Front Wheel Drive (FWD) (With Turbocharger)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - 30 Nm

- Replace
- Coat thread with *hot bolt paste G 052 112 A3*

2 - Exhaust manifold

- With turbocharger --> **Turbocharger with attachments, assembly overview**

3 - Seal

- Replace

4 - Heated Oxygen Sensor (HO2S) G39 , 50 Nm

- Use ring spanner set for oxygen sensor 3337 for removal and installation
- If sealing ring is damaged, cut open and replace it
- Only use *hot bolt paste G 052 112 A3* to grease thread; do not let *hot bolt paste G 052 112 A3* get onto slits of oxygen sensor body

5 - Catalytic converter

6 - Oxygen sensor behind catalytic converter G130

- Use ring spanner set for oxygen sensor 3337 for removal and installation
- If sealing ring is damaged, cut open and replace it

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

- Only use *hot bolt paste G 052 112 A3* to grease thread; do not let *hot bolt paste G 052 112 A3* get onto slits of oxygen sensor body

7 - 25 Nm

- Replace
- Coat thread with *hot bolt paste G 052 112 A3*

8 - Marking

- 3x around circumference

9 - Suspended mount

- With retaining ring

10 - Suspended mount

11 - 25 Nm

12 - Rear muffler

- As original equipment, center and rear mufflers are installed as a single component. Replacement center and rear mufflers are supplied separately. connection with a double clamp.
- Removing and installing:
 - Cut at right angle through connecting pipe at separation point using a body repair saw , e.g. V.A.G 1523 A.

13 - Dimension - **a** - approx. 7 to 9 mm

- Exhaust system must be cold
- - **Arrow** - indicates direction of travel

14 - Bolt head must face fuel tank

15 - Angle - **a** - : $30 \pm 5^\circ$

16 - End of screw must not extend below double clamp

- Double clamp viewed in direction of travel

17 - Angle - **B** - : $10 + 5^\circ$

18 - Separating point

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

- approx. 160 to 180 mm in front of rear muffler, marked by a recess in pipe

19 - Repair double clamp

- Fasten evenly to 40 Nm

20 - Center muffler

21 - Double clamp

- Fasten evenly to 40 Nm

22 - Decoupling element

- Max. flex: 10 °

23 - Suspended mount

- Individual components **Individual Components Of Mounting**

24 - Front exhaust pipe

25 - 30 Nm

- Replace
- Coat thread with *hot bolt paste G 052 112 A3*

26 - Washer

Individual Components Of Mounting

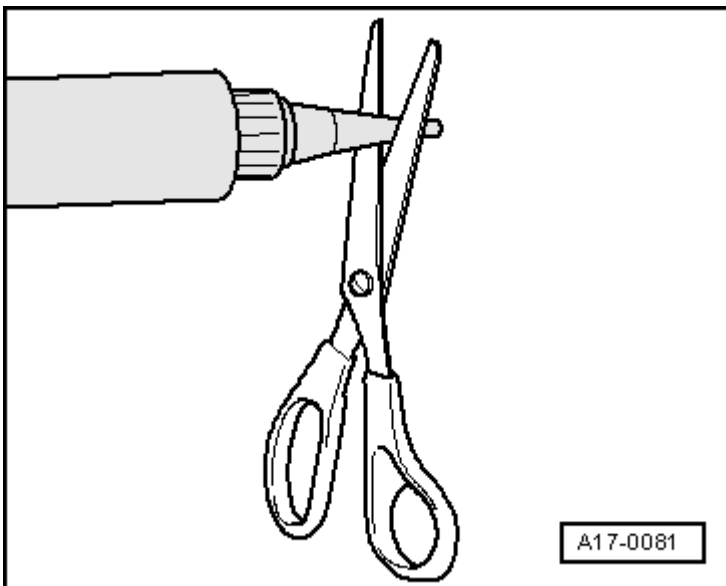


Fig. 300: Exhaust System, Individual Components And Mounting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 1 - Tongue with buffer
- 2 - Exhaust pipe
- 3 - Washer
- 4 - Hex bolt, 25 Nm
- 5 - Self-locking nut, 25 Nm
- 6 - Spacer sleeve
- 7 - Spring
- 8 - Hex bolt

Exhaust system components (vehicles with All Wheel Drive (AWD)), assembly overview

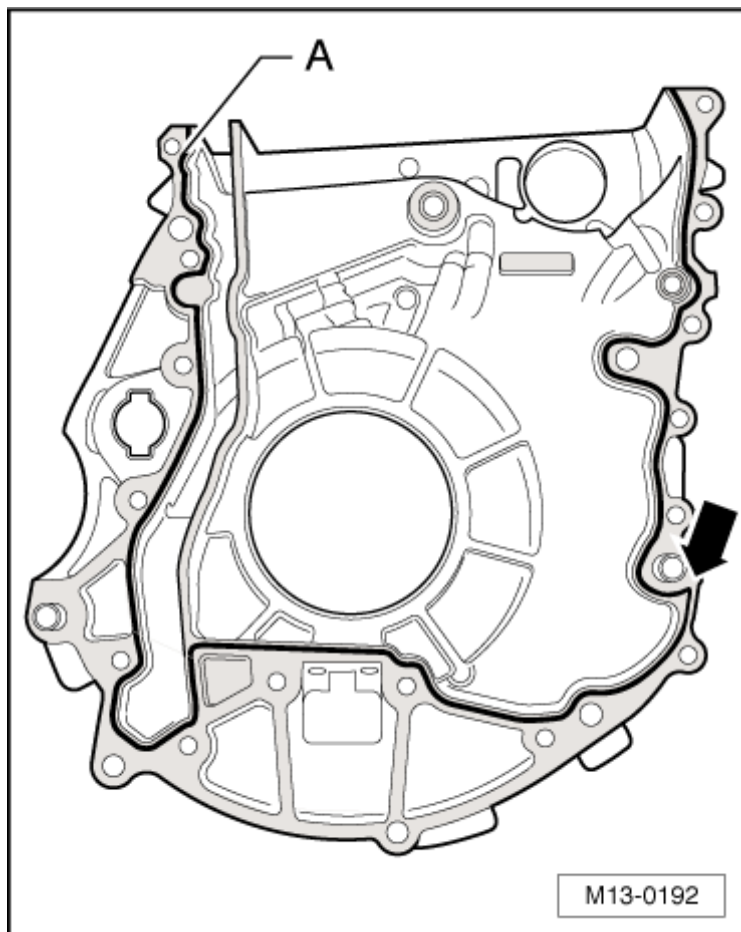


Fig. 301: Exhaust System Components (vehicles With All Wheel Drive (AWD)), Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - 30 Nm

- Replace
- Coat thread with *hot bolt paste G 052 112 A3*

2 - Exhaust manifold

- With turbocharger --> **Turbocharger with attachments, assembly overview**

3 - Gasket

- Replace

4 - Heated Oxygen Sensor (HO2S) G39 , 50 Nm

- Use Ring Spanner 7-piece Set 3337 for removal and installation
- If sealing ring is damaged, cut open and replace it
- Only use *hot bolt paste G 052 112 A3* to grease thread; do not let *hot bolt paste G 052 112 A3* get onto slits of oxygen sensor body

5 - Catalytic converter

6 - Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) G130

- Use Ring Spanner 7-piece Set 3337 for removal and installation
- If sealing ring is damaged, cut open and replace it
- Only use *hot bolt paste G 052 112 A3* to grease thread; do not let *hot bolt paste G 052 112 A3* get onto slits of oxygen sensor body

7 - 25 Nm

- Replace
- Coat thread with *hot bolt paste G 052 112 A3*

8 - Marking

- 3x around circumference

9 - Decoupling element

- Max. flex: 10 °

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

10 - Suspended mount

- Individual components **Individual components of mounting**

11 - Front exhaust pipe

12 - Washer

13 - 30 Nm

- Replace
- Coat thread with *hot bolt paste G 052 112 A3*

14 - Right rear muffler

15 - Suspended mount

16 - Bracket

17 - 25 Nm

18 - Left rear muffler

19 - Separating point

- As standard, center and rear mufflers are installed as a single component. Replacement center and rear mufflers are supplied separately. connection with a double clamp.
- Cut at right angle through connecting pipe at separation point using a body repair saw , e.g. V.A.G 1523
A **Separating point between center and rear muffler**

20 - Double clamps (for repair)

- Note installation position **Installation position of double clamps**

21 - 40 Nm

22 - Carriage bolt

23 - Suspended mount

- With retaining ring

24 - Double clamp

- Note installation position **Installation position of double clamp**

25 - Center muffler

Individual components of mounting

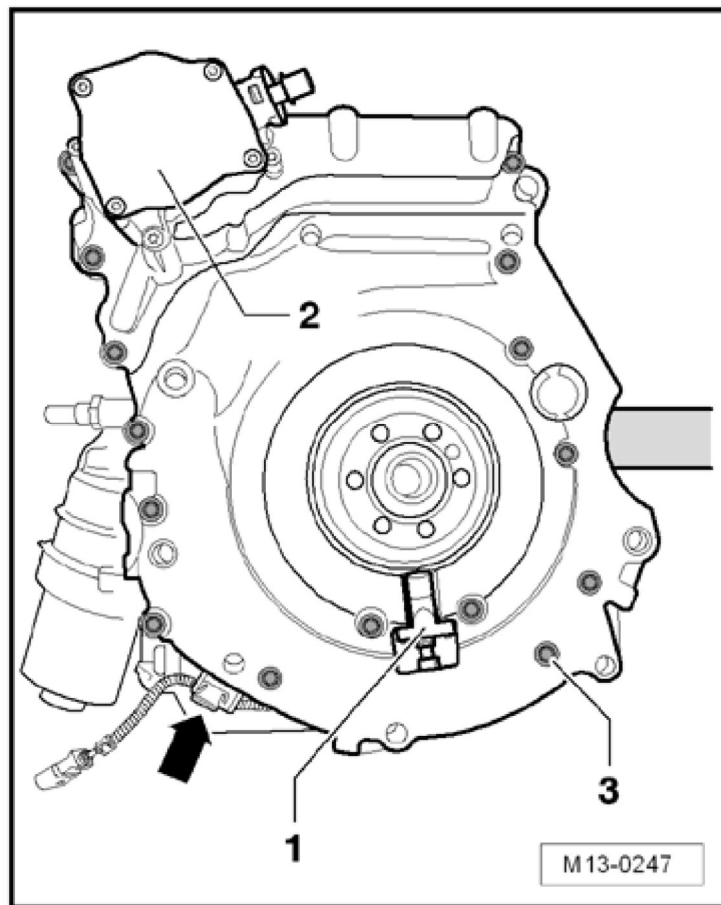


Fig. 302: Exhaust System, Individual Components And Mounting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Tab with buffer

2 - Exhaust pipe

3 - Washer

4 - Hex bolt, 25 Nm

5 - Self-locking nut, 25 Nm

6 - Spacer sleeve

7 - Spring

8 - Hex bolt

Installation position of double clamp

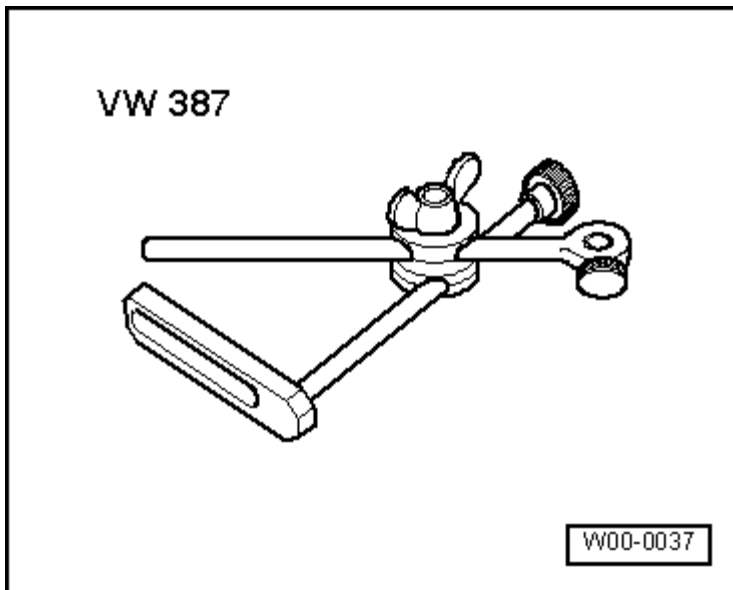


Fig. 303: Installation Position Of Double Clamp
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Double clamp viewed in direction of travel.

- When installing double clamp, ensure that the bolt end does not project over lower edge of double clamp.

Separating point between center and rear muffler

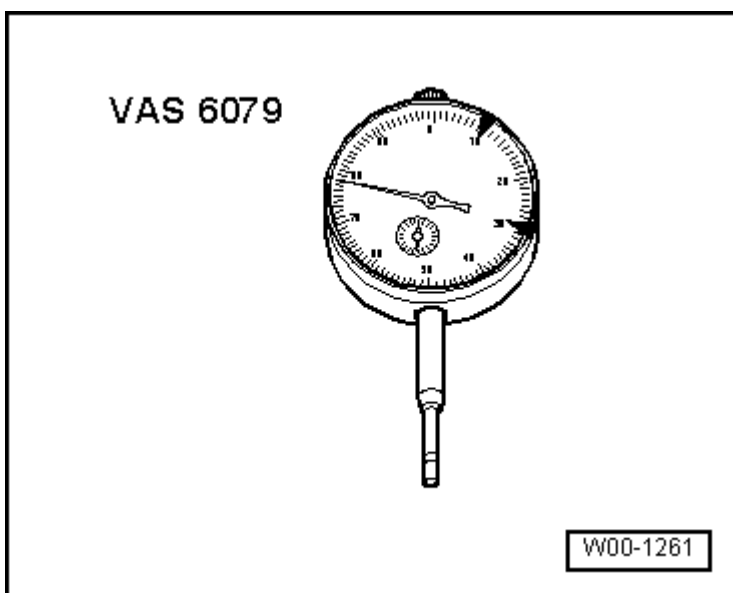


Fig. 304: Separating Point Between Center And Rear Muffler
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools, testers and auxiliary items required

- Body repair saw V.A.G 1523 A

Work procedure

- Separate connecting pipe between center muffler and rear muffler at the location marked with a groove.
- Dimension - **a** - approx. 244 mm

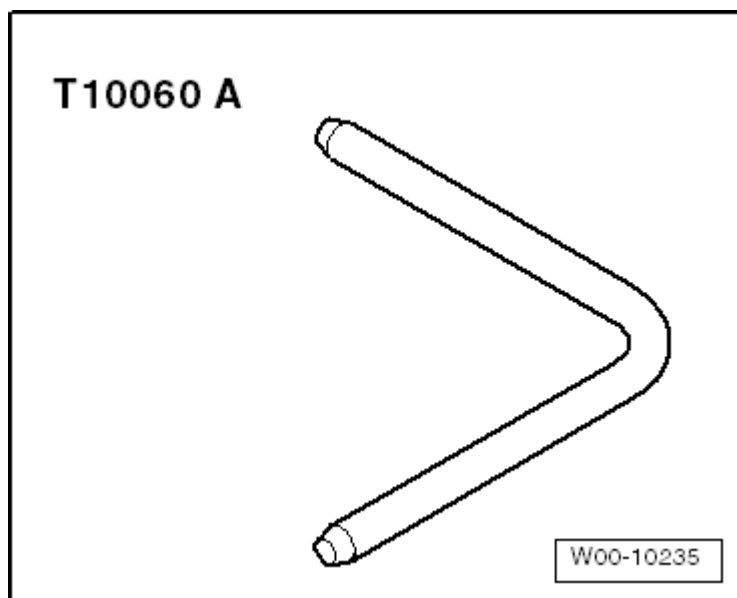
Installation position of double clamps

Fig. 305: Installation Position Of Double Clamps
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Double clamps viewed in direction of travel.

- When installing double clamp (for repair), ensure that the bolt end does not project over lower edge of double clamp.
- The bolts must be positioned on outside.

SECONDARY AIR SYSTEM**Secondary air system**

Function --> **Function**

Secondary Air Injection (AIR) system components, assembly overview --> **Secondary Air Injection (AIR) system components, assembly overview**

Combination valve, checking --> **Combination valve, checking**

Function

Air is blown behind the exhaust valves by the Secondary Air Injection (AIR) system for a maximum of 100 seconds following cold start (coolant temperature of +5 ° C to +33 ° C). This adds oxygen to the exhaust, initiating a secondary combustion, which reduces the light-off time of the catalytic converter. Activation is triggered by the Motronic Engine Control Module (ECM) J220 via Secondary Air Injection (AIR) Pump Relay J299 to Secondary Air Injection (AIR) Solenoid Valve N112 (changeover valve) and combination valve. Additionally after each subsequent engine start (up to max. 96 ° C engine temperature), secondary air system will switch on for 10 seconds at idle and will be checked by On Board Diagnostics. Oxygen sensor control must be active for this.

Secondary Air Injection (AIR) system components, assembly overview

CAUTION: When doing any repair work, especially in the engine compartment, pay attention to the following due to clearance issues:

- Route all the various lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum lines and hoses) and electrical wiring so that the original positions are restored.
- Ensure sufficient clearance to all moving or hot components.

NOTE:

- Secondary Air Injection (AIR) pump relay J299 Secondary air injection (AIR) pump relay J299

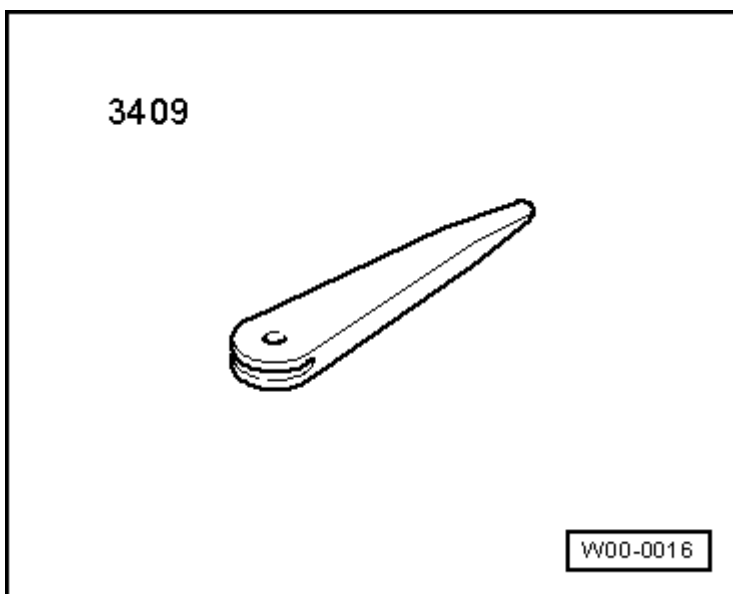


Fig. 306: Secondary Air Injection (Air) System Components, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Combi-valve

- Checking --> Combination valve, checking

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

2 - Seal

- Replace

3 - Bracket

- Fastened to cylinder head

4 - Seal

- Replace

5 - Bracket

- Fastened to intake manifold

6 - 10 Nm

7 - To Recirculating valve for turbocharger N249

8 - From vacuum reservoir/intake manifold connection

9 - 6 Nm

10 - Secondary air injection (AIR) solenoid valve N112

- Resistance: 25 to 35 ohms

11 - Connector

- 2-pin
- Green

12 - O-ring

- Replace if damaged

13 - Pressure hose

- Ensure seated tightly
- Press together at front to release

14 - 8 Nm

15 - Bracket

- For Secondary Air Injection (AIR) pump motor V101

16 - 8 Nm

17 - Secondary air injection (AIR) pump motor V101

18 - Connector

19 - Intake tube

- For secondary air injection pump

20 - From air filter

21 - Connecting pipe

22 - Elbow

- Secure with clamps See parts catalog.

23 - Pressure pipe

24 - Connecting piece

- Secure with clamps See parts catalog.

Secondary air injection (AIR) pump relay J299

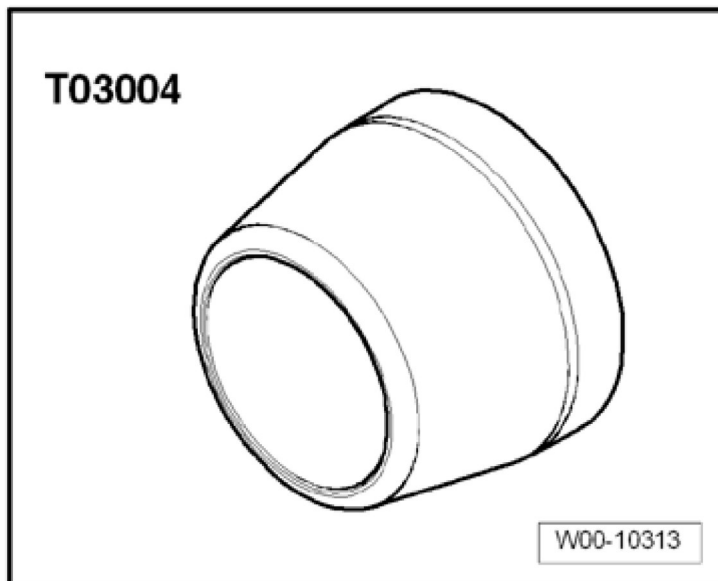


Fig. 307: Identifying Secondary Air Injection (AIR) Pump Relay J299
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- If tools are necessary to pull relays or control modules out of the relay plate, first disconnect battery

Ground (GND) strap.

- Obtain radio code for radios with anti-theft coding before disconnecting battery.

Combination valve, checking

Special tools, testers and auxiliary items required

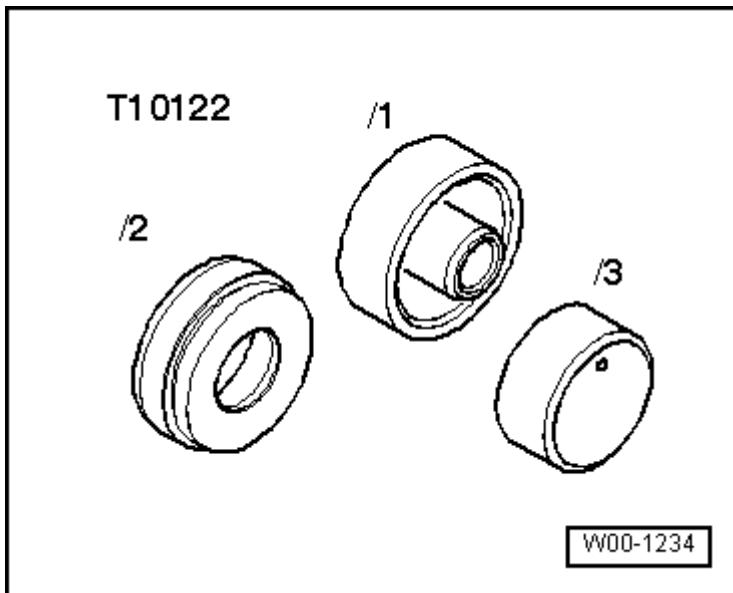


Fig. 308: Hand Vacuum Pump - V.A.G 1390

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Hand vacuum pump V.A.G 1390

Test conditions

- Vacuum lines and hose connections free of leaks
- Vacuum lines not blocked or kinked

Test sequence

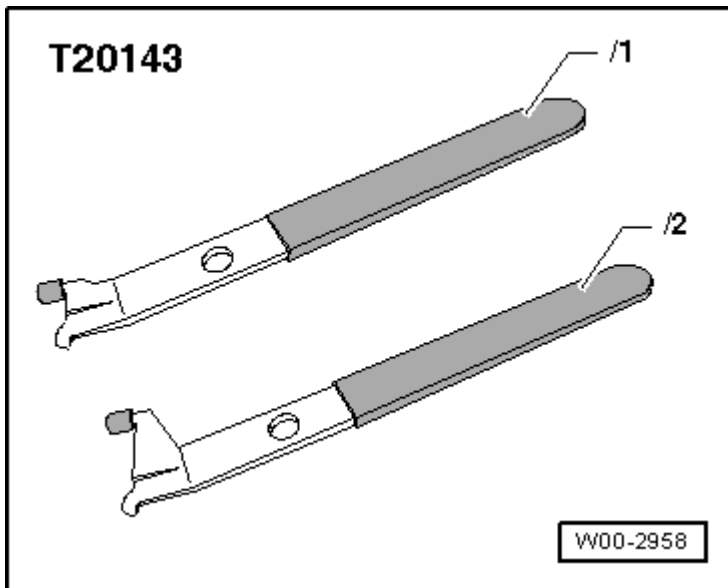


Fig. 309: Vacuum Hose Disconnected At Combination Valve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect vacuum hose at combination valve - **arrow** - and connect the hand vacuum pump V.A.G 1390.
- Remove noise insulation --> **50 BODY, FRONT**

NOTE:

- **Do not use compressed air during following check!**

2005 Volkswagen Passat GL

ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

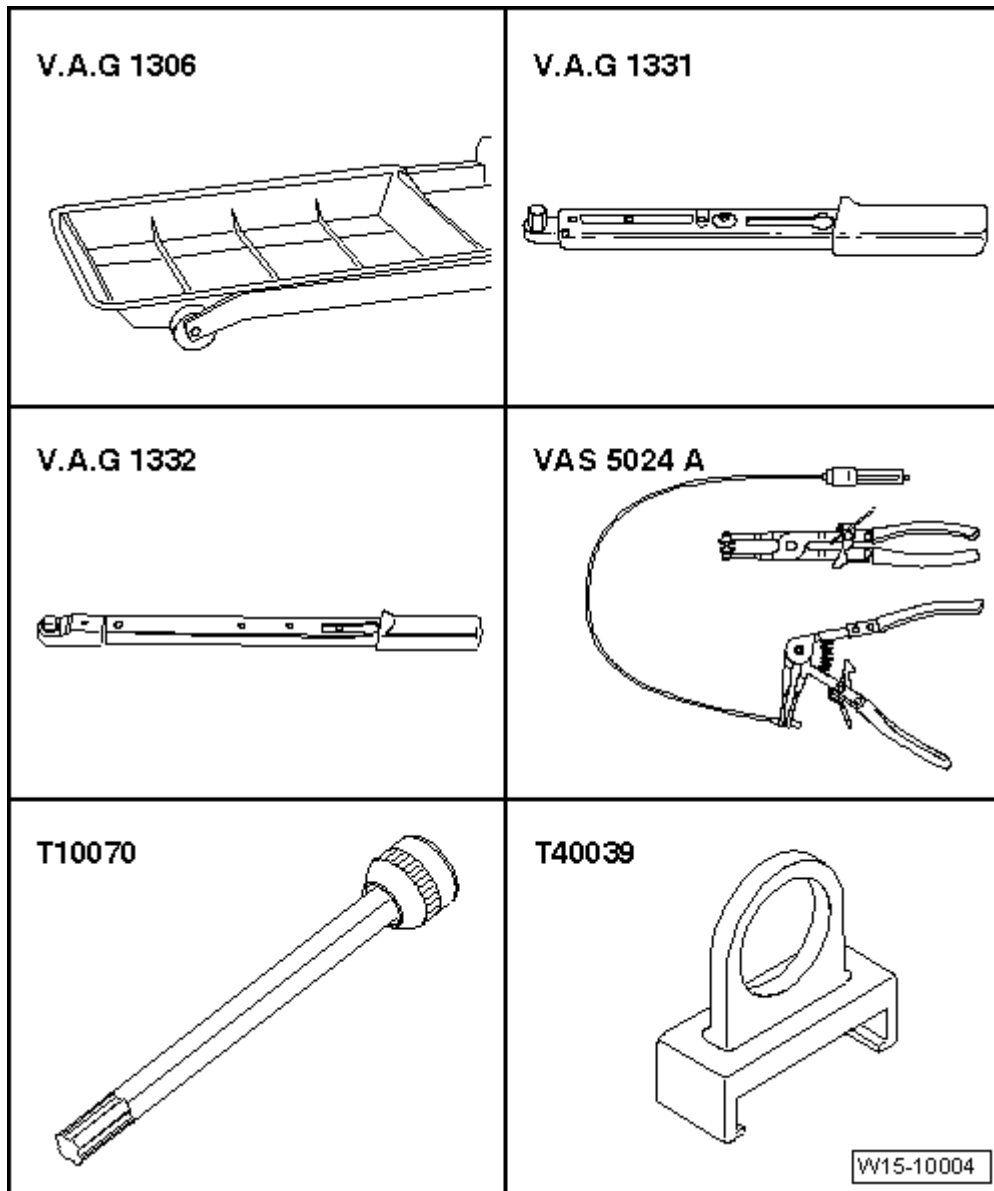


Fig. 310: Pressure Hose Disconnected At Secondary Air Injection (AIR) Pump Motor
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect pressure hose - **arrow** - at Secondary Air Injection (AIR) pump motor V101 and blow air in with light pressure.
- Combination valve must close.
- Operate hand vacuum pump V.A.G 1390.
- Valve must open.

If the combination valve does not open:

- Replace the combination valve.

28 IGNITION SYSTEM

IGNITION SYSTEM, SERVICING

Ignition system, servicing

General notes on ignition system --> General notes on ignition system

Safety precautions --> Safety precautions

Ignition system components, assembly overview --> Ignition components, assembly overview

Ignition coils with power output stage, removing and installing --> Ignition coils with power output stage, removing and installing

Test Data, Spark Plugs --> Technical data, spark plugs

General notes on ignition system

- The engine control unit is equipped with On Board Diagnostics (OBD).
- For trouble-free operation of the electrical components a voltage of at least 11.5 V is necessary.
- It is possible that the control module will recognize a malfunction and store a DTC during some tests. Therefore after completing all checks and repairs the DTC memory must be checked and if necessary erased. --> Engine control module DTC memory, checking and erasing.
- After erasing DTC memory, readiness code must be generated again --> Adapting functions and components

Safety precautions --> Safety precautions

Test Data, Spark Plugs --> Technical data, spark plugs

Safety precautions

To reduce the risk of personal injury and/or damage to the fuel injection and ignition system, always observe the following:

- Do not touch or remove ignition wires when engine is running or turning at cranking RPM.
- The ignition must be switched off before connecting or disconnecting injection and ignition system wiring or tester cables.
- If engine is to be turned at starter speed without starting:

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ENGINE 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Fuel Injection Ignition, Engine Code(s): AUG, AWM

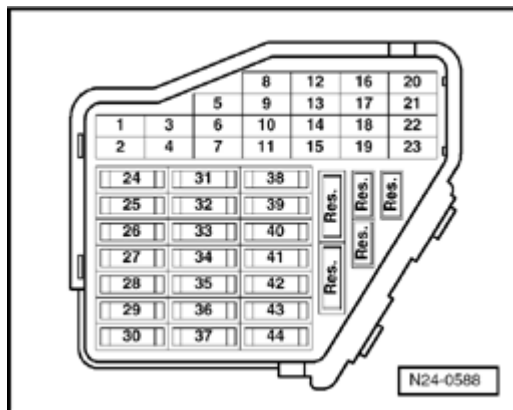


Fig. 311: Identifying Main Fuse Panel

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove fuses 29 ad 32.

NOTE:

- Removing fuse No. 29 interrupts the voltage supply to the ignition coils.
- Removing fuse No. 32 interrupts the voltage supply to the injectors.

Observe the following if test and measuring instruments are required during a test drive:

- Test and measuring instruments must be secured to rear seat and operated by a 2nd person from this location.

If test and measuring instruments are operated from the front passenger seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.

Ignition components, assembly overview

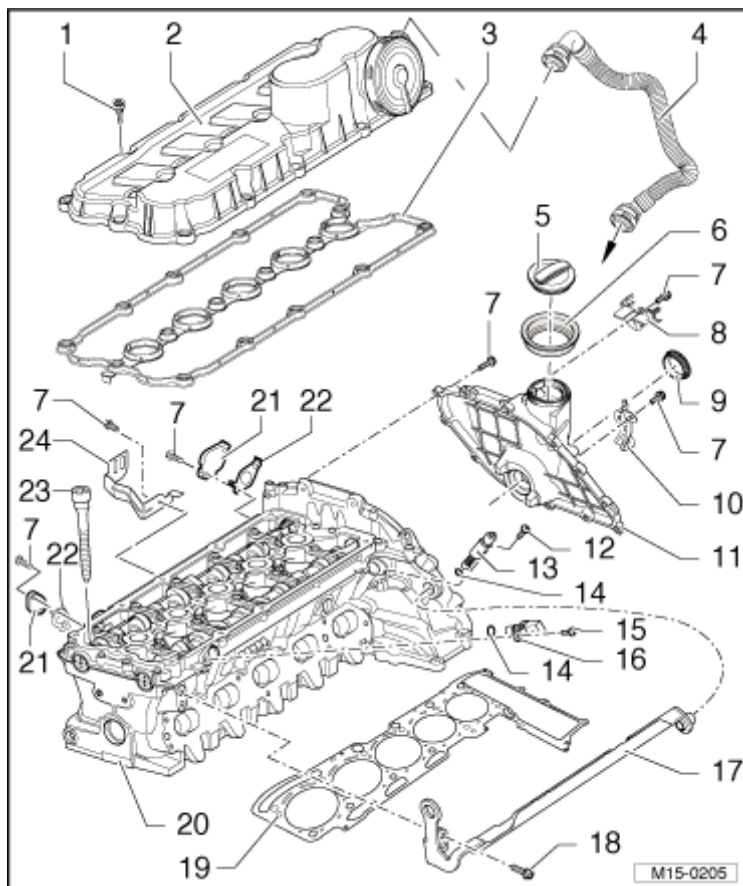


Fig. 312: Ignition Components, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Connector

- Black, 4-pin

2 - Ignition coil with power output stage N70, N127, N291, N292

- Removing and installing --> **Ignition coils with power output stage, removing and installing**

3 - Spark plug, 30 Nm

- Remove and install with 3122B
- Type and spark plug gap --> **Technical data, spark plugs** , test data, spark plugs

4 - 3-pin harness connector

- Contacts gold plated
- For Knock Sensor (KS) 1 G61
- Brown
- For Knock Sensor (KS) 2 G66

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- Black

5 - 20 Nm

- Tightening torque affects function of Knock Sensor (KS)

6 - Knock Sensor (KS) 1 G61

- Terminals of sensor and connector are gold-plated

7 - Knock Sensor (KS) 2 G66

- Terminals of sensor and connector are gold-plated

8 - Connector

- Black, 3-pin

9 - 10 Nm

10 - Camshaft Position (CMP) sensor G40

11 - 25 Nm

12 - Washer

- Conical

13 - Hood

- For Hall sender G40
- Observe installed location

14 - Ground wire

- Do not loosen or tighten unless ignition is switched off

15 - 10 Nm

- Do not loosen or tighten unless ignition is switched off

Ignition coils with power output stage, removing and installing

Special tools, testers and auxiliary items required

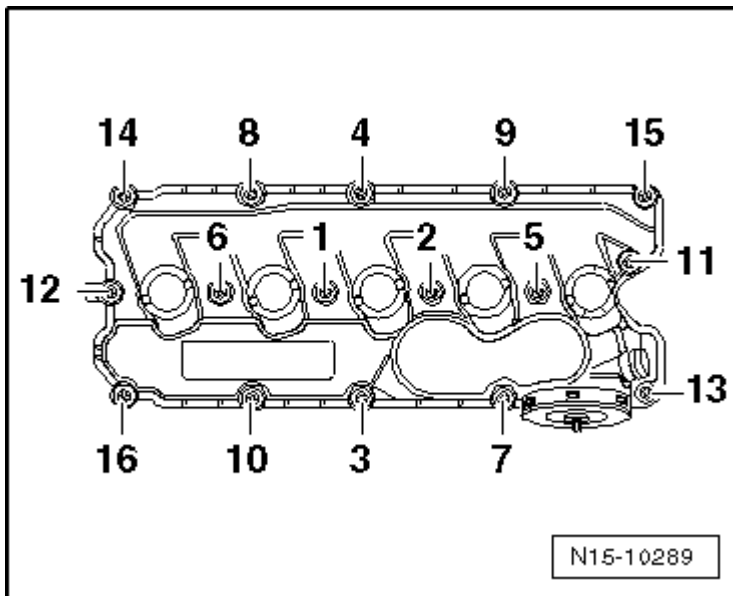


Fig. 313: Puller T40039

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Puller T40039

Removing

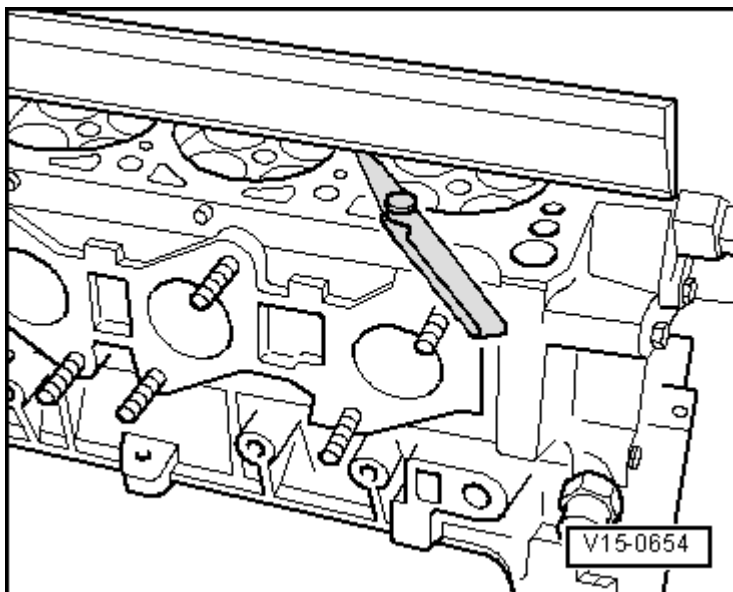


Fig. 314: Identifying Engine Cover Fasteners (1.8L)

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen clamp screws - **arrows** - and remove engine cover upward.

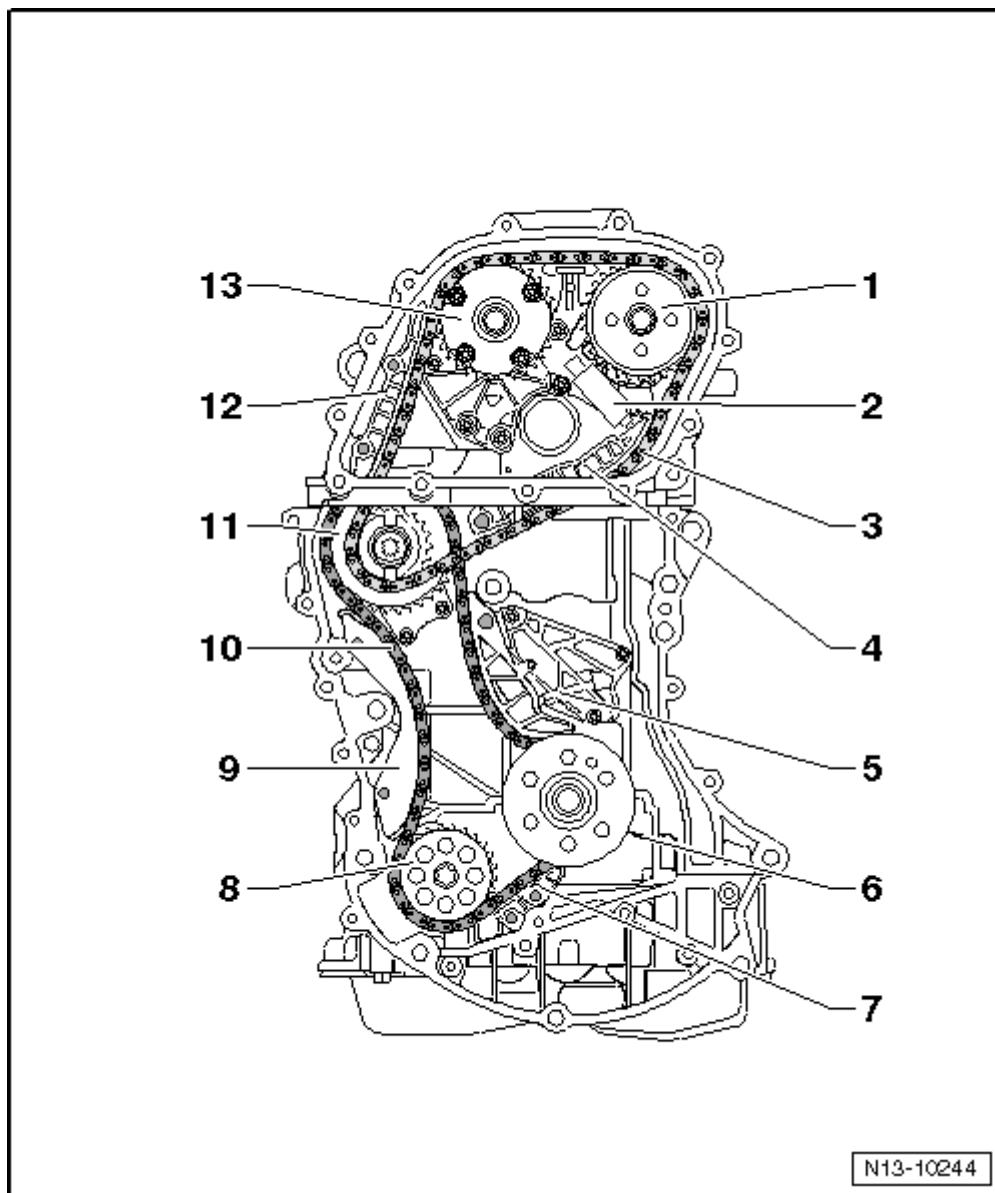


Fig. 315: Identifying Ignition Coil Connector

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect 4-pin connector - 2 - from ignition coil - 1 -.

CAUTION: Use of tool T10094 or T40039 is required to avoid damage to these sensitive components

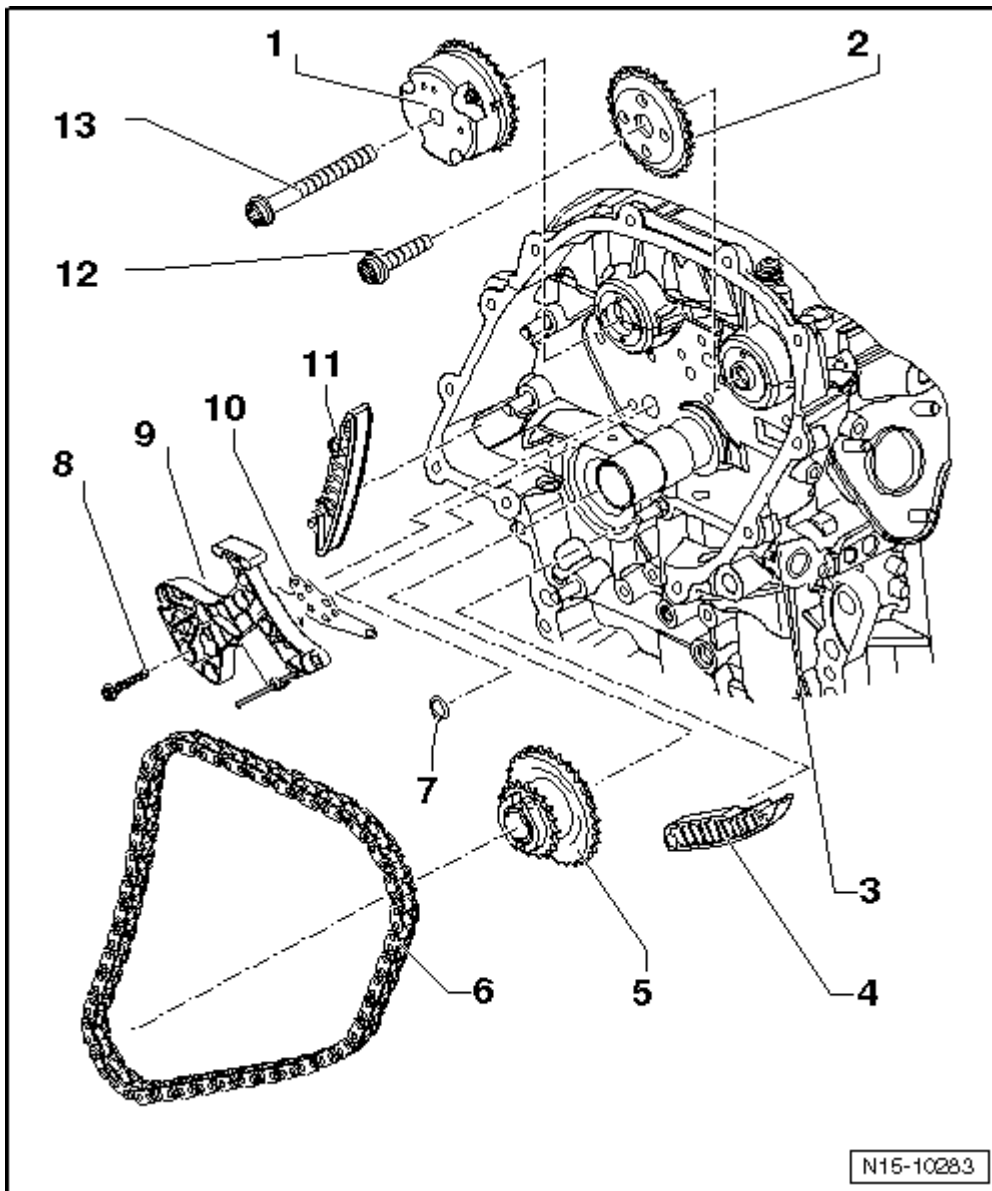


Fig. 316: Removing Ignition Coils With Power Output Stages From Spark Plugs Using Puller T40039
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove ignition coils with power output stages from spark plugs using Puller T40039.

Installing

- Press ignition coil with power output stage vertically onto spark plug by hand.



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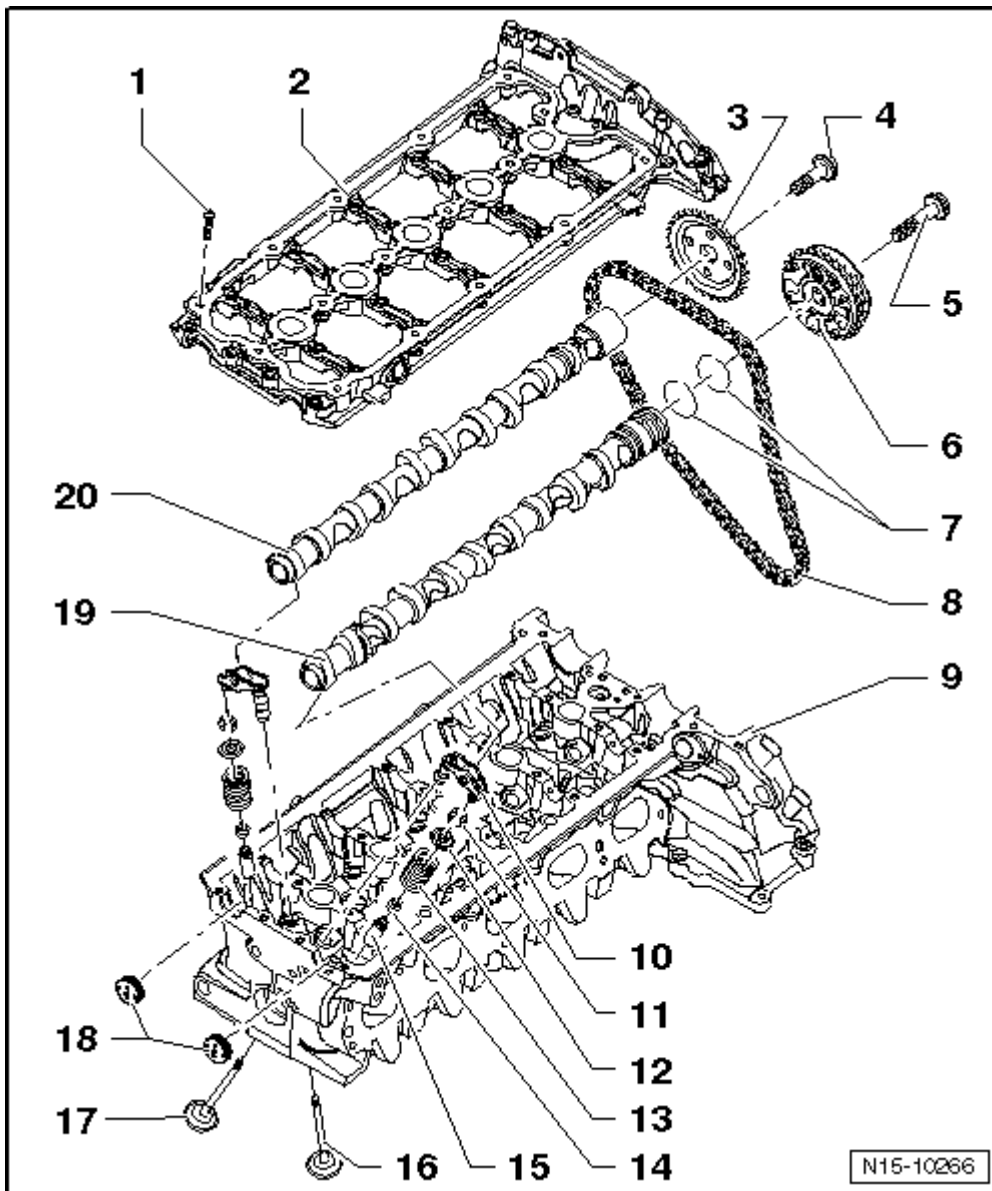


Fig. 318: Identifying Engine Cover Fasteners (1.8L)
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install engine cover and engage clamp screws - **arrows** -.

Technical data, spark plugs

Engine code	AUG, AWM
Ignition sequence	1-3-4-2
Spark plugs * See note* See note	
VW/Audi	101 000 063 AA
Manufacturer designation	PFR 6 Q
Electrode gap	max. 0.8 mm

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Tightening torque	30 Nm
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* Current values and spark plug replacement intervals

* Use Spark plug removal tool 3122 B to remove or install spark plugs