ENGINE

2.0 Liter - General, Technical Data - Engine Code(s): BPY

00 GENERAL, TECHNICAL DATA

GENERAL INFORMATION

SAFETY PRECAUTIONS

Note the following when working on the fuel system:

WARNING: There is a risk of injury because the fuel is under very high pressure.

- **Reduce the fuel pressure down to residual pressure before opening high pressure area of the fuel injection system.**
- **To reduce remaining residual pressure, place a clean cloth around the connector and carefully loosen connector.**

-- Procedures before opening high pressure fuel injection system. Refer to **General Information** .

To prevent personal injury and damage to the injection and ignition system, observe the following:

- The ignition must be switched off before connecting or disconnecting injection and ignition system wiring or tester cables.
- Only clean engine with ignition switched off.
- If electrical connectors were disconnected and the engine was started, then malfunctions have been stored in the engine control modules.

CAUTION: Danger of causing damage to electrical components when disconnecting the battery.

- **Complete the steps for disconnecting the battery.**
- **Turn off the ignition and disconnect the battery.**

-- Disconnect the battery. Refer to **Removal and Installation** .

Before Opening High Pressure Fuel Injection System

WARNING:

- **The injection system is separated into a high-pressure section (maximum approximately 120 bar) and a low-pressure section (approximately 6 bar).**
- **Before opening high pressure area, fuel pressure must be reduced to a residual pressure of approximately 6 bar. Refer to General**

Information .

Note the following when working on the cooling system:

WARNING: Risk of scalding due to hot steam and hot coolant.

- **The cooling system is under pressure when the engine is warm.**
- **Cover the coolant reservoir cap with a cloth and then open it slowly to release the pressure in the system.**

CAUTION: The vehicle could overheat if the cap is installed incorrectly.

- **The cap must engage noticeably when sealing.**

If it is necessary to use testing and measuring devices on road tests, observe the following:

WARNING: Distraction and improperly secured test equipment can lead to accidents.

There is a risk that the passenger airbag could deploy in a collision.

- **Operating testing and measuring equipment while driving creates a distraction.**
- **There is an increased risk of injury due to unsecured testing and measuring equipment.**
- **Always secure testers on the rear seat with a strap and have a second person on the rear seat operate them.**

Note the following when working on the exhaust system:

CAUTION: Danger of damaging the decoupling element.

- **Decoupling element must not be bent more than 10°.**
- **Do not load decoupling element on cable.**
- **Do not damage wire mesh at decoupling element.**

CLEAN WORKING CONDITIONS

Even a little contamination can lead to faults. Observe the following guidelines for cleanliness when working on the fuel system, injection system and turbocharger:

- Before loosening, connections and surrounding areas must be cleaned thoroughly with engine or brake cleaner, and then cleaned area must be dried completely.
- Seal the open lines and connections immediately with clean plugs, for example, from the engine bung set

VAS 6122.

- Place removed parts 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 out of their original packaging (for example in tool boxes etc.).
- If system is open, do not work with compressed air and do not move the vehicle.
- Make sure no fuel gets onto the fuel hoses. If necessary, wipe off the fuel hoses immediately.
- Protect disconnected electrical connectors from dirt and moisture and only connect if dry.

ENGINE NUMBER

The engine number ("engine code" and "serial number") are located at the front of the engine/transmission joint.

In addition, a sticker with "engine code" and "serial number" is affixed to the toothed belt guard.

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

ENGINE CONTAMINANTS

- To prevent foreign objects from entering when working on the engine, seal open intake and exhaust channels with suitable plugs, for example from the engine bung set VAS 6122.

CONTACT CORROSION

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

For this reason, only install connecting elements that are treated with a special coating.

Also, rubber or plastic parts and adhesive consist of non-conductive materials.

If there are doubts about the suitability of parts, generally use new parts.

NOTE: Only original replacement parts are recommended, they are checked and compatible with aluminum.

Audi accessories are recommended.

Damage due to contact corrosion is not covered by warranty.

LINES, ROUTING AND SECURING

- Mark the individual fuel, hydraulic and vacuum lines for the EVAP canister system as well as the electrical wires before disconnecting and/or removing them. This will prevent a mix-up when reconnecting them. If necessary, draw sketches or take pictures.
- Due to the limited space inside the engine compartment, be especially careful when working near moving or hot parts. This will also prevent damaging the lines.

COOLERS, CONDENSERS AND CHARGE AIR COOLERS

When assembled correctly, the radiator, condenser and turbocharger may have slight impressions on their fins. This is not damage. Do no replace the cooler, condenser or turbocharger because of impressions like that.

SPECIFICATIONS

ENGINE DATA

Code Letters		AXX	BPY	BWA
Displacement	liter	1.984	1.984	1.984
Output	kW at RPM	147/5700	147/5700	147/5100
Torque	Nm at RPM	280/2000	280/2000	280/1800
Bore	diameter mm	82.5	82.5	82.5
Stroke	mm	92.8	92.8	92.8
Compression ratio		10.5	10.5	10.3
RON		98 1)	98 1)	98 1)
Fuel injection and ignition system		FSI	FSI	FSI
Ignition sequence		1-3-4-2	1-3-4-2	1-3-4-2
Knock control		yes	yes	yes
Turbocharger		yes	yes	yes
Exhaust gas recirculation (EGR)		no	no	no
Variable intake manifold		no	no	no
Variable valve timing		yes	yes	yes
Secondary air injection (AIR)		no	no	no

- 1) Unleaded RON 95 is also permissible, although with reduced power.

DIAGNOSIS AND TESTING

FUEL SYSTEM, CHECKING FOR LEAKS

-- Let the engine run a few minutes at a moderate speed.

-- Turn off the ignition.

-- Check the entire fuel system for leaks.

-- If there are leaks in spite of correct tightening specifications, the corresponding component must be replaced.

-- Then perform a road test and depress the accelerator pedal all the way at least one time.

-- Then check the high pressure area again for leaks.

VACUUM SYSTEM, CHECKING

Special tools and workshop equipment required

- Hand Vacuum Pump VAS 6213

Procedure

-- Check all vacuum lines in the vacuum system for:

- Cracks
- Damage caused by animals
- Crimps
- Leaks and leakage

-- Check the vacuum line leading to and from the solenoid valve.

-- If there is a fault, check the vacuum lines for the named component, but also all the vacuum lines.

-- If using the VAS 6213 does not produce any pressure or if the pressure drops again right away, then check the hand vacuum pump and the connection hoses for leaks.

SPECIAL TOOLS

Special tools and workshop equipment required

- Hand Vacuum Pump VAS 6213

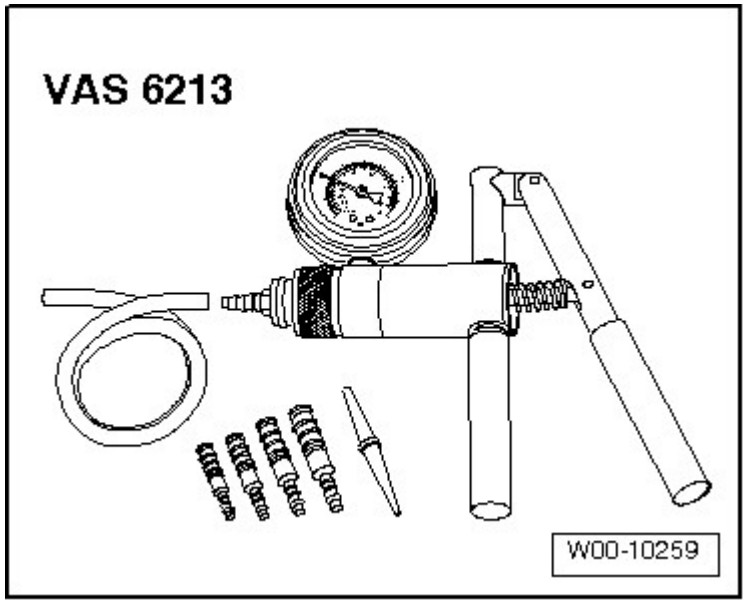

Fig. 1: Hand Vacuum Pump VAS 6213
Courtesy of AUDI OF AMERICA, LLC

ENGINE

2.0 Liter - Crankshaft, Cylinder Block - Engine Code(s): BPY

13 CRANKSHAFT, CYLINDER BLOCK

DESCRIPTION AND OPERATION

RIBBED BELT AND ASSEMBLY BRACKET OVERVIEW

NOTE: Before removing the ribbed belt, mark the turning direction on it with chalk or a felt tip pen. A reversed turning direction can cause damage to the belt under operating conditions. When installing, make sure the belt is correctly seated in the belt pulley.

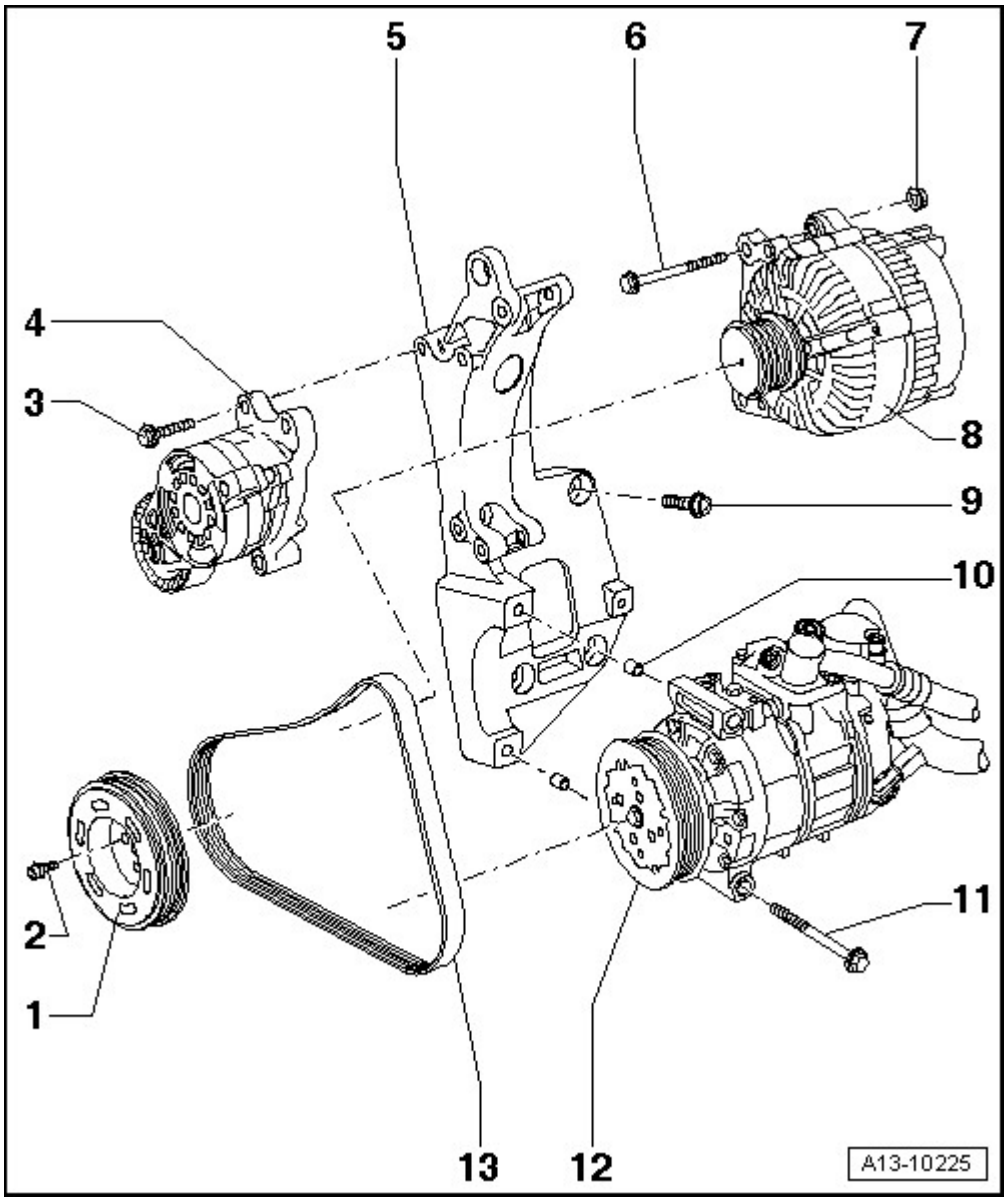

Fig. 1: Ribbed Belt And Assembly Bracket Overview
Courtesy of AUDI OF AMERICA, LLC

1. Belt Pulley
   - For the ribbed belt
   - **Removing and installing** , refer to **VIBRATION DAMPER**
2. Special Bolt
   - Replace
   - **20 Nm plus an additional 90° turn**
3. Bolt
   - **23 Nm**
4. Ribbed Belt Tensioning Damper

- To release tension on ribbed belt, pivot using open-end wrench.
- Secure tensioner with special tool locking pin T10060A

5. Bracket for Assemblies
   - **Removing and installing** , refer to **ACCESSORY ASSEMBLY BRACKET**
6. Bolt
   - **23 Nm**
7. Bolt
   - **23 Nm**
8. Generator
   - **Removing and installing** , refer to **REMOVAL AND INSTALLATION**
   - Moving the threaded bushings on the generator slightly to the rear will make is easier to install the generator.
9. Bolt
   - Insert with locking fluid
   - Locking fluid
   - Follow the tightening sequence, refer to **ACCESSORY ASSEMBLY BRACKET**
10. Bushing
    - 2 pieces
11. Bolt
    - **25 Nm**
12. Air Conditioner (A/C) Compressor
    - **Removing and installing** . Refer to **Removal and Installation**
13. Ribbed Belt
    - Ribbed belt routing, refer to **Fig. 2**
    - Check for wear
    - Do not kink
    - **Removing and installing** , refer to **RIBBED BELT**

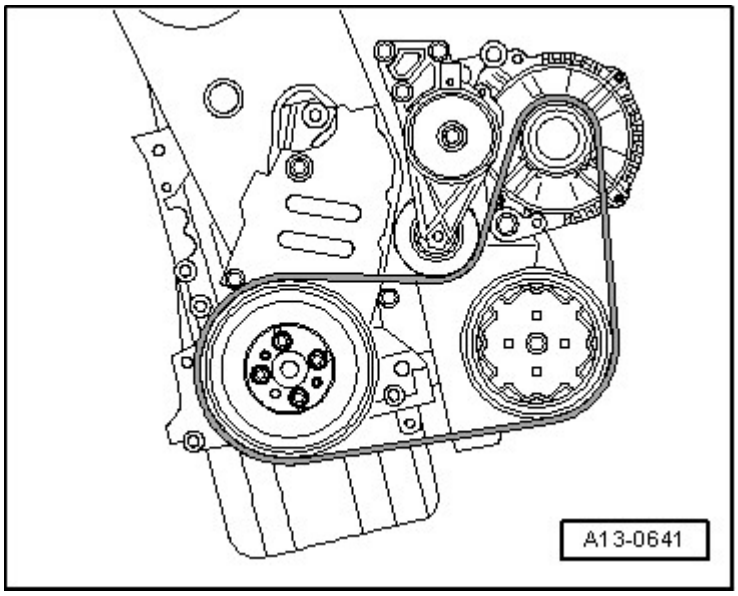

Fig. 2: Identifying Ribbed Belt Routing
Courtesy of AUDI OF AMERICA, LLC

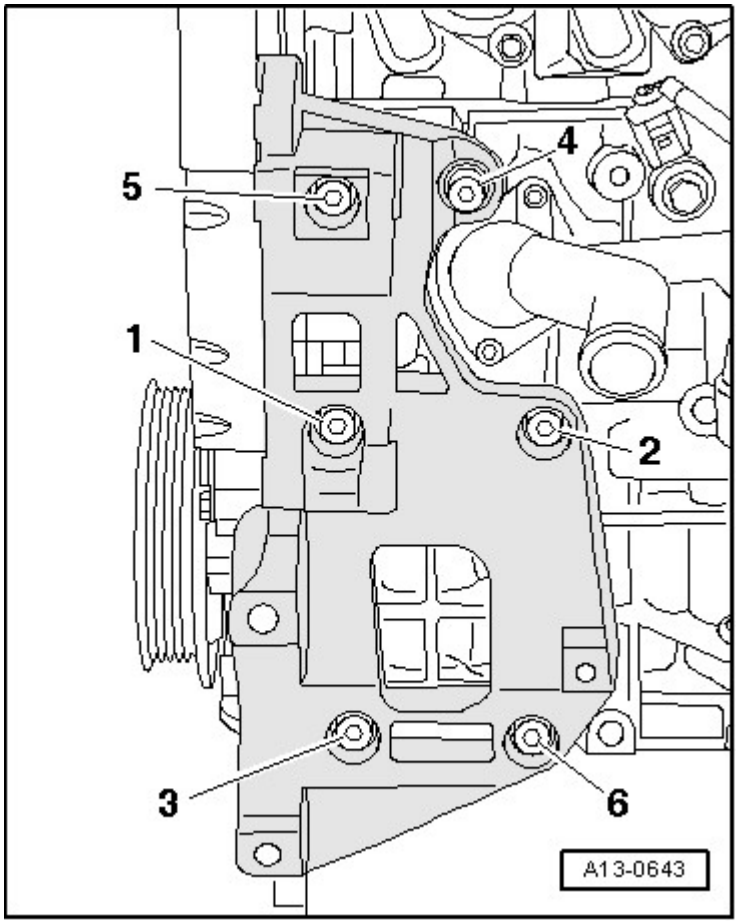

Fig. 3: Removing/Installing Accessory Assembly Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Install bolts -1 through 6- and tighten by hand.

-- Tighten bolts -1 through 6- to 40 Nm.

FRONT SEALING FLANGE OVERVIEW

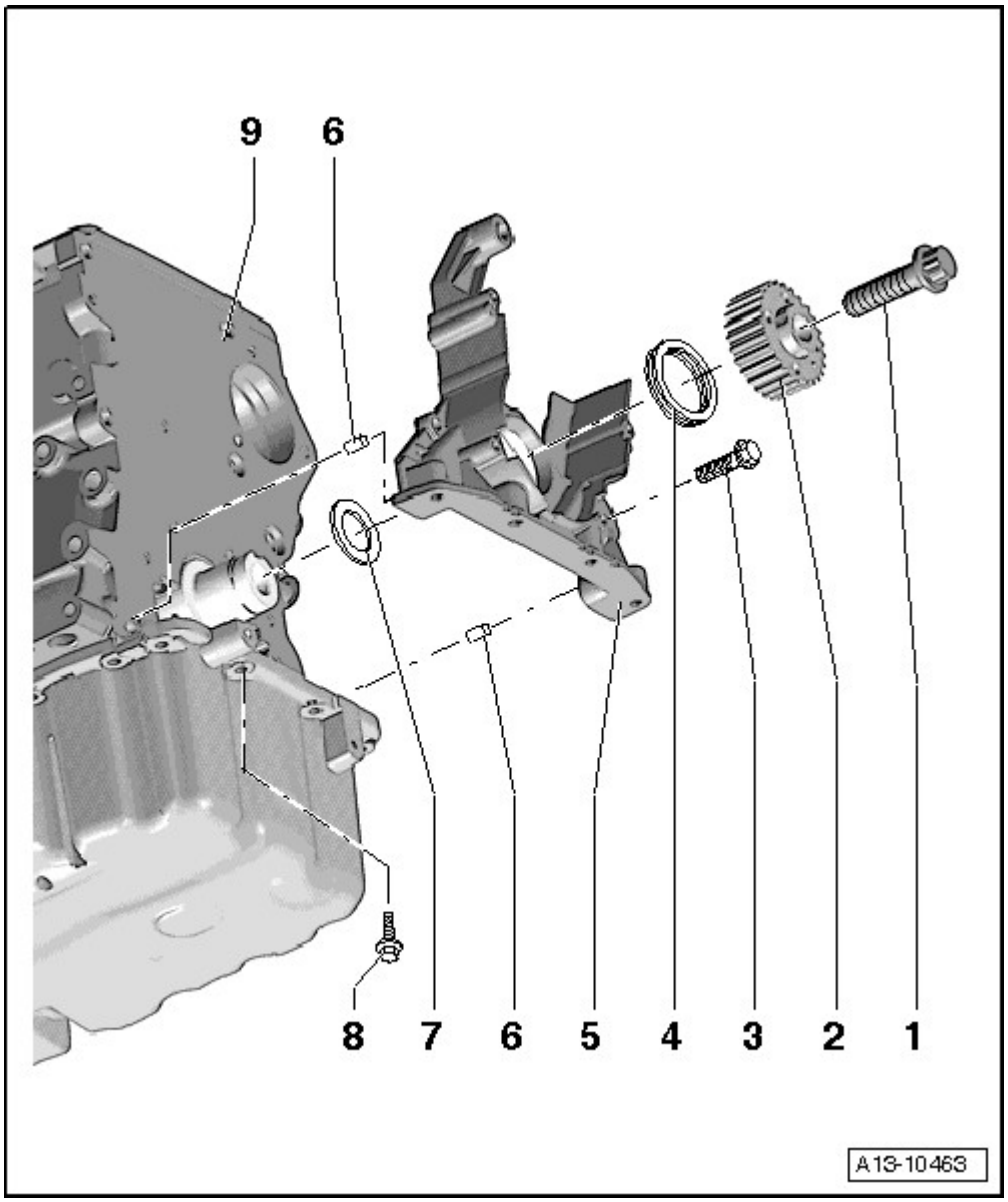

Fig. 4: Front Sealing Flange Assembly Overview
Courtesy of AUDI OF AMERICA, LLC

1. Bolt
    - Replace
    - **90 Nm plus an additional 90° turn**
    - Do not oil

- Fastening counter support 3415, refer to **Fig. 6**

2. Crankshaft Toothed Belt Sprocket
   - There must be no oil on the contact surface between the toothed belt sprocket and crankshaft
   - Only possible to install in one position
3. Bolt
   - Tightening sequence, refer to **Fig. 5**
4. Seal
   - **Removing and installing** , refer to **CRANKSHAFT SEAL**.
   - Do not oil
5. Sealing Flange, Front
   - Must sit on alignment pins
   - **Removing and installing** , refer to **FRONT SEALING FLANGE**
6. Alignment Pins
7. Toothed Belt Gear Diamond Disc
   - Replace after removing toothed belt gear
8. Bolt
   - **Tightening sequence** , refer to **Fig. 5**
9. Cylinder Block
   - Crankshaft, **removing and installing** , refer to **CRANKSHAFT OVERVIEW**
   - Piston and connecting rod, disassembling and assembling, refer to **PISTONS AND CONNECTING ROD OVERVIEW**

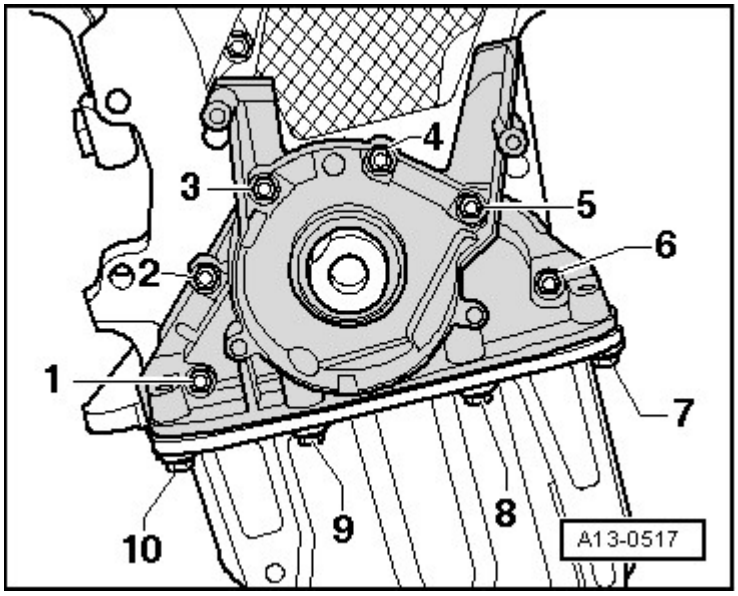

Fig. 5: Fastening Bolts In Specified Order
Courtesy of AUDI OF AMERICA, LLC

-- Install bolts -1 to 10- and tighten by hand.

-- Tighten the bolts -1 to 6- in a diagonal sequence in stages to 15 Nm.

-- Tighten bolts -7 to 10- to 15 Nm.

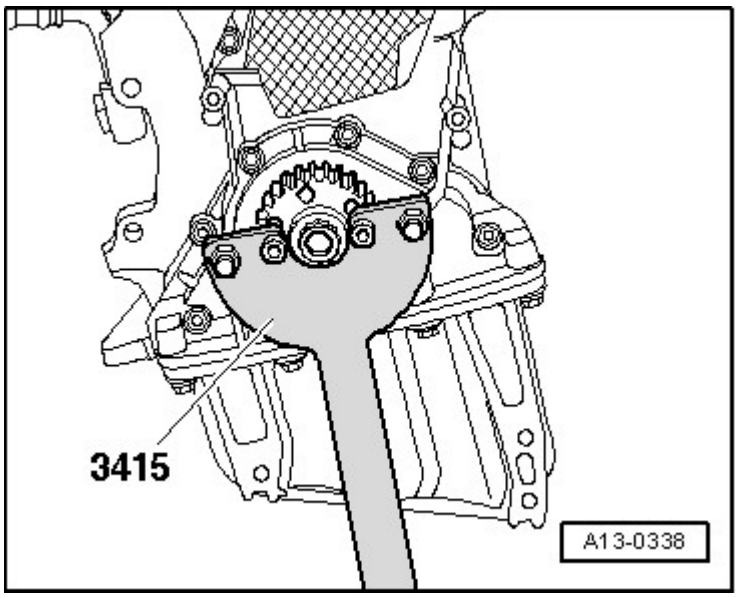

Fig. 6: Crankshaft Toothed Belt Sprocket, Removing And Installing
Courtesy of AUDI OF AMERICA, LLC

REAR SEALING FLANGE AND DUAL-MASS FLYWHEEL OVERVIEW

NOTE: Servicing clutch, refer to DESCRIPTION AND OPERATION .

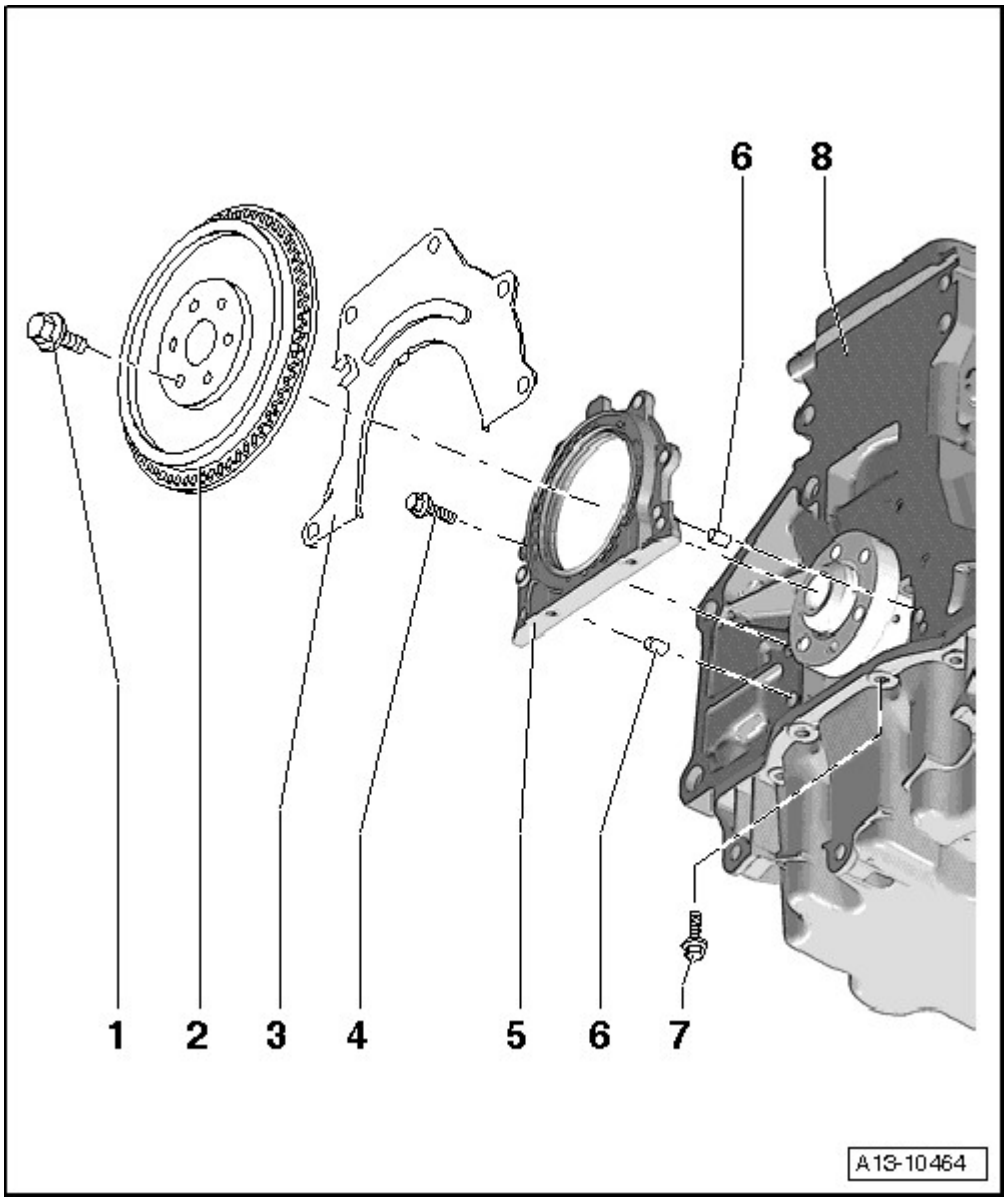

Fig. 7: Rear Sealing Flange And Dual-Mass Flywheel Assembly Overview
Courtesy of AUDI OF AMERICA, LLC

1. Bolt
   - Replace
   - **60 Nm plus additional 90° turn**
   - For dual-mass flywheel/drive plate
2. Dual Mass Flywheel
   - Dual mass flywheel, removing and installing, refer to **DUAL MASS FLYWHEEL**.
   - Only possible to install in one position - Bores are offset
3. Intermediate Plate
   - Must be located on dowel sleeves

- Be careful not to damage or bend when installing
- Is hooked in at sealing flange, refer to **Fig. 9**

4. Bolt
   - **Tightening sequence** , refer to **Fig. 8**
5. Sealing Flange with Rear Seal
   - Always replace as a complete unit
   - To install, use provided guide sleeve
   - **Removing and installing** , refer to **REAR SEALING FLANGE**
   - Do not oil or grease the sealing lip of seal
   - Wipe off any oil on the crankshaft bearing pin with a clean cloth before installing.
   - Guide sleeve may only be removed after the sealing flange has been slid onto the crankshaft pin.
6. Fitting Pin
7. Bolt
   - **Tightening sequence** , refer to **Fig. 8**
8. Cylinder Block
   - Crankshaft, removing and installing, refer to **CRANKSHAFT OVERVIEW**
   - Piston and connecting rod, disassembling and assembling, refer to **PISTONS AND CONNECTING ROD OVERVIEW**

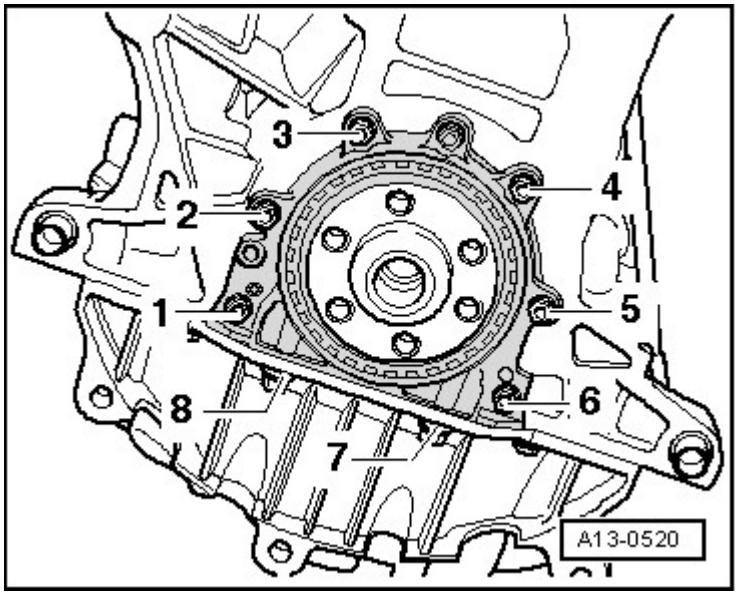

Fig. 8: Rear Sealing Flange Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Install bolts -1 to 8- and tighten by hand.

-- Tighten the bolts -1 to 6- in a diagonal sequence in stages to 15 Nm.

-- Tighten bolts -7 to 8- to 15 Nm.

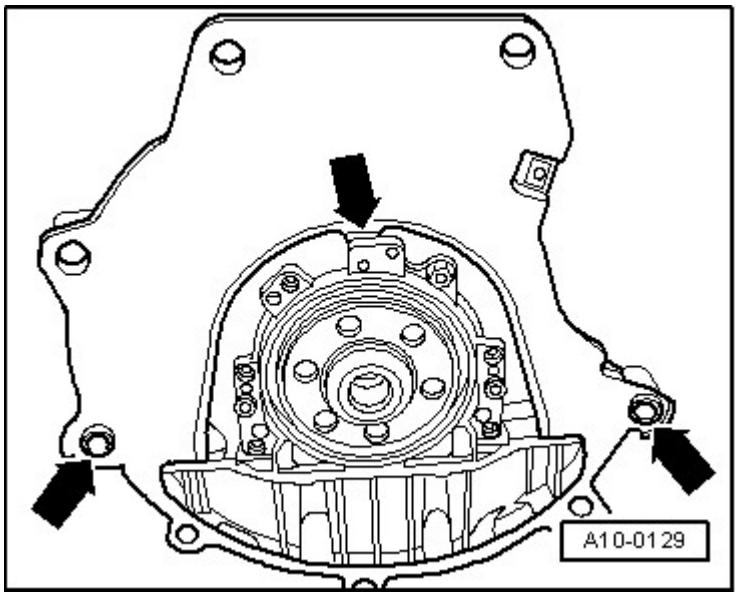

Fig. 9: Identifying Intermediate Plate Alignment Bushings
Courtesy of AUDI OF AMERICA, LLC

-- Hook in intermediate plate at sealing flange and push it onto the alignment sleeves -arrows-.

CRANKSHAFT OVERVIEW

NOTE: Secure engine to assembly stand using engine and transmission holder VAS 6095 when performing repair work. Refer to ENGINE, SECURING ON ASSEMBLY STAND .

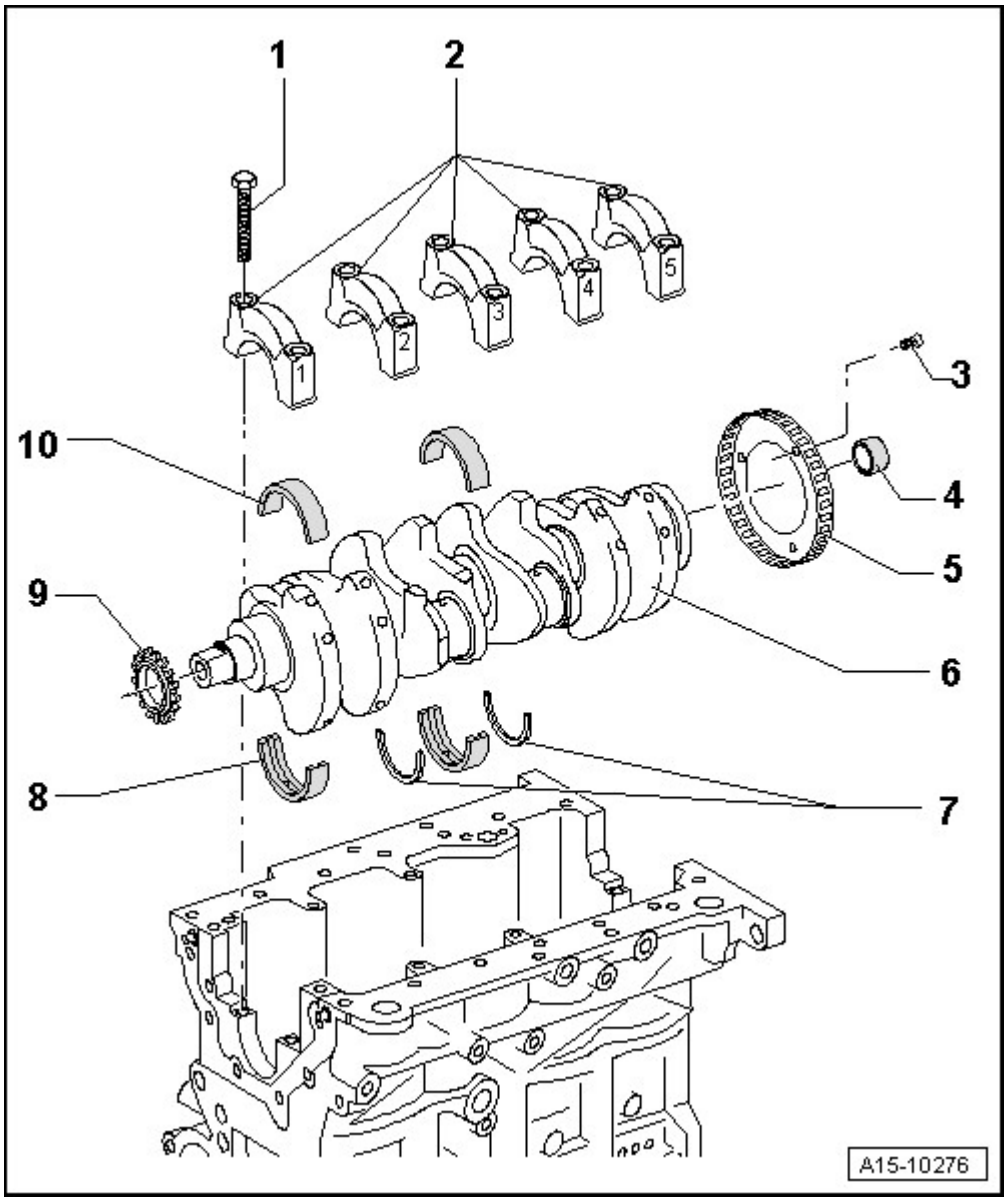

Fig. 10: Crankshaft Assembly Overview
Courtesy of AUDI OF AMERICA, LLC

1. Bolt
   - **65 Nm plus an additional 90° turn**
2. Bearing Cap
   - Bearing cap 1: Belt pulley side
   - Retaining tabs of bearing shells and cylinder block/bearing caps must lie above one another
3. Bolt
   - Replace
   - **10 Nm plus an additional 90° turn**
   - Replace sensor wheel every time bolts are loosened, refer to **Fig. 11**

4. Needle Bearing
   - For vehicles with manual transmission
   - Pulling out and driving in, refer to **NEEDLE BEARINGS FROM CRANKSHAFT**
5. Sensor Wheel
   - For engine speed (RPM) sensor -G28-
   - Only possible to install in one position - Bores are offset
   - Replace sensor wheel every time bolts are loosened
   - **Removing and installing** , refer to **Fig. 11**
6. Crankshaft
   - Axial play new: 0.07 to 0.23 mm; Wear limit: 0.30 mm
   - Check radial clearance with Plastigage 0.017 to 0.037 mm, Wear limit: 0.15 mm
   - Do not turn crankshaft when measuring radial play
   - Crankshaft dimensions, refer to **CRANKSHAFT DIMENSIONS**
7. Thrust Washers
   - For bearing 3
8. Bearing Shell for Cylinder Block
   - With lubricating groove
   - Do not interchange used bearing shells (mark)
   - Classification for replacement part ordering, refer to **NEEDLE BEARINGS FROM CRANKSHAFT**
9. Chain Sprocket
   - For chain for oil pump
   - **Removing and installing** , refer to **CHAIN SPROCKET**
10. Bearing Shell
    - Without lubricating groove
    - Do not interchange used bearing shells (mark)
    - The crankshaft bearing shells in the bearing caps are only available as a replacement part with a "yellow" color marking.

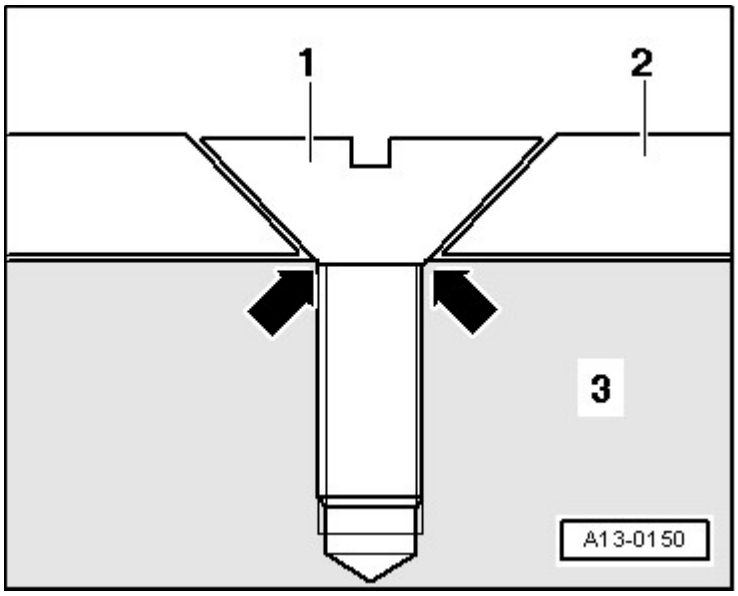

Fig. 11: Identifying Attachment Points, Countersunk Screws, Crankshaft & Sensor Wheel
Courtesy of AUDI OF AMERICA, LLC

-- Always replace sensor wheel -2- whenever bolts are removed -1-.

NOTE: After tightening a second time, the attachment point of the countersunk screws of the sensor wheel are so deformed that the screw heads lie on the crankshaft -3- -arrows- and the sensor wheel is loose underneath the screws.

Installation of sensor wheel is only possible in one position - the bores are offset.

- **Tightening specifications** , refer to **CRANKSHAFT OVERVIEW**

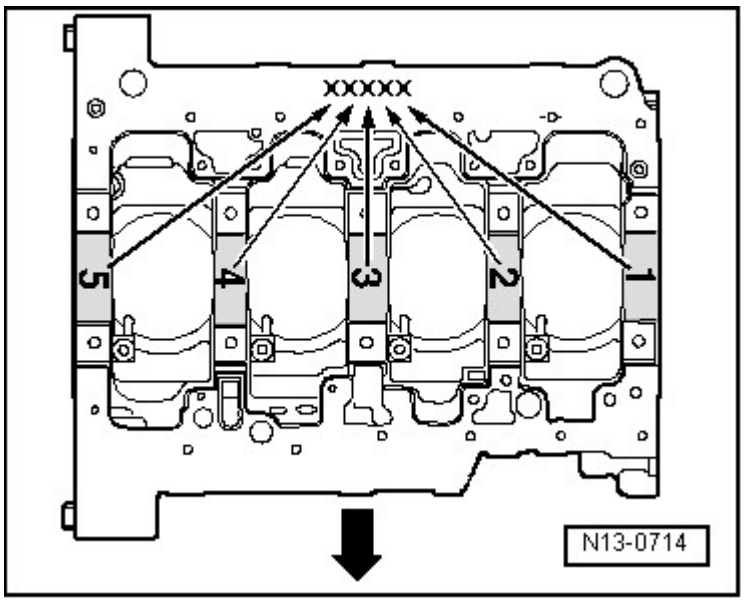

Fig. 12: Identification Of Crankshaft Bearing Shells For Cylinder Block (Gradual Introduction) - Engine Codes AEG, AVH, AZG, BEV
Courtesy of AUDI OF AMERICA, LLC

NOTE: Arrow points in direction of travel.

From the factory, the upper bearing shells are allocated to the cylinder block with the correct thickness. Colored spots serve to identify the bearing thicknesses.

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

G	=	Yellow
B	=	Blue
W	=	White

NOTE: If color markings can no longer be read, use the blue bearing shell.

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

PISTONS AND CONNECTING ROD OVERVIEW

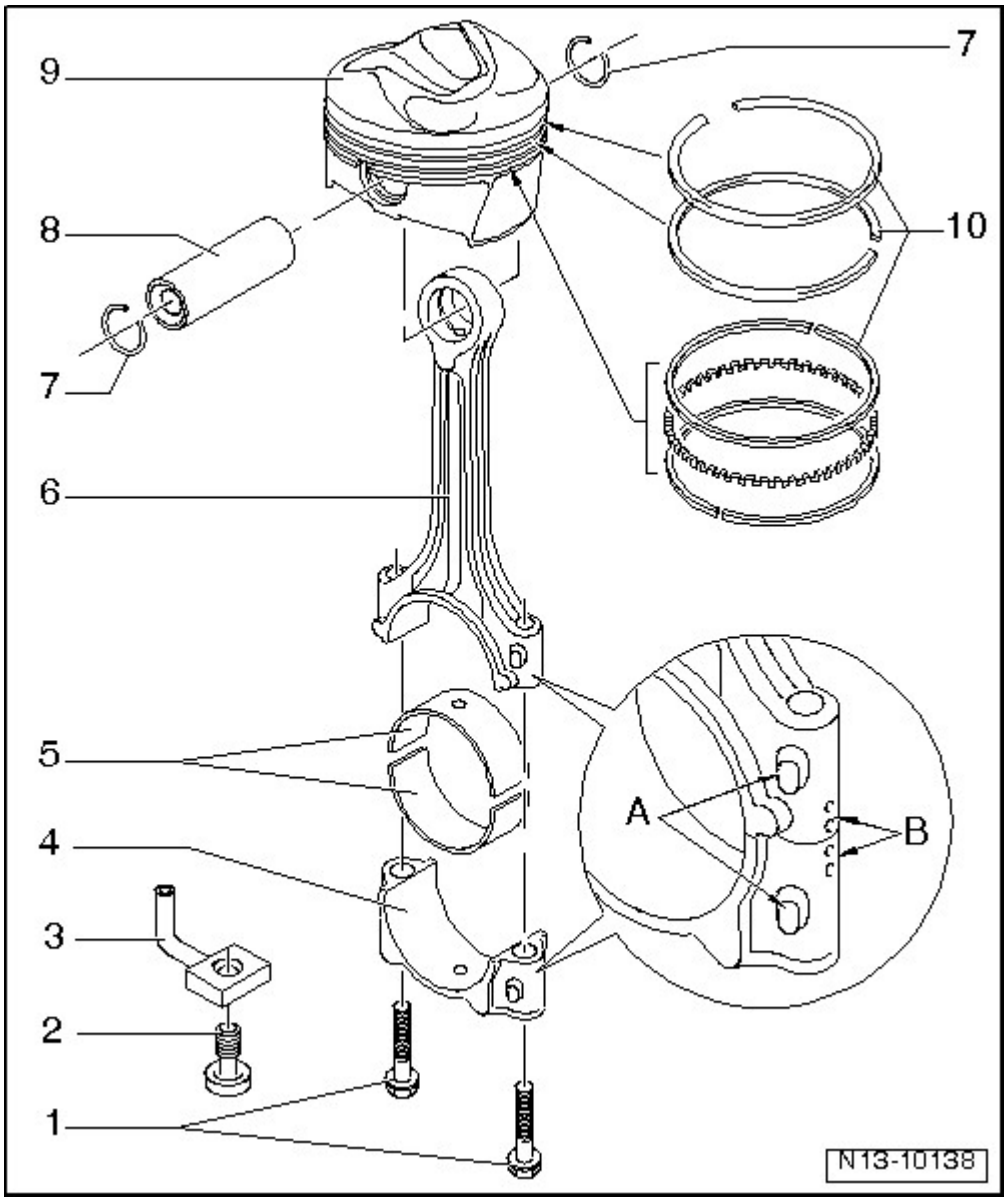

Fig. 13: Identifying Piston And Connecting Rod, Assembly Overview
Courtesy of AUDI OF AMERICA, LLC

1. Connecting Rod Bolt
   - Replace
   - **30 Nm plus an additional 90° turn**
   - Lubricate threads and contact surface
   - Use old bolt to measure radial play
   - Tighten to 30 Nm to measure radial play, do not turn further
2. Pressure Relief Valve

   27 Nm

- Opening pressure 1.6 to 1.9 bar

3. Oil Spray Jet
   - For piston cooling
4. Connecting Rod Bearing Cap
   - Pay attention to the installed position
   - Due to the separation procedure (cracking) of the connecting rod, the cap only fits in one position and only to the corresponding connecting rod.
   - Affiliation to the cylinder mark -B-
   - Installation position: Markings -A- point to belt pulley side
5. Bearing Shells
   - Upper bearing shell with oil hole for piston pin lubrication
   - Installed location, refer to **Fig. 18**
   - Do not interchange used bearing shells (mark)
   - Axial play new: 0.10 to 0.30 mm; Wear limit: 0.40 mm
   - Measure radial clearance with Plastigage: New: 0.02 to 0.06 m; Wear limit: 0.09 mm. Do not turn crankshaft when checking radial clearance
6. Connecting Rod
   - Only replace as set
   - Affiliation to the cylinder mark -B-
   - Installation position: Markings -A- point to belt pulley side
   - With oil hole for piston pin lubrication
7. Circlip
8. Piston Pin
   - If difficult to move, heat piston to approximately 60 °C (140 °F)
   - Removing and installing using a pilot drift VW 222 A
9. Piston
   - Checking, refer to **Fig. 16**
   - Mark installed position and cylinder allocation
   - Arrow on piston face points toward belt pulley side
   - Install with piston ring compressor
   - For the correct piston and cylinder dimensions, refer to **PISTON AND CYLINDER DIMENSIONS**
   - Cylinder bore, checking, refer to **Fig. 17**
10. Piston Rings
    - Offset gaps by 120°
    - Use piston ring pliers for removing and installing
    - "TOP" mark must face up toward piston crown
    - Checking ring gap, refer to **Fig. 14**

- Check piston ring groove clearance, refer to **Fig. 15**

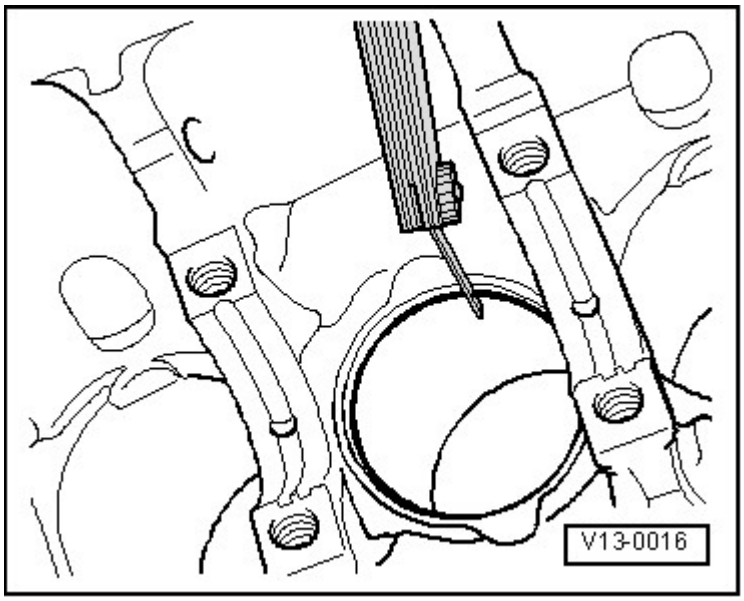

Fig. 14: Checking Piston Ring Gap
Courtesy of AUDI OF AMERICA, LLC

-- Push ring squarely from above down to approximately 15 mm from bottom end of cylinder. To do this use a piston without rings.

Piston Ring Dimensions in mm	New	Wear Limit
Compression ring	0.20 to 0.40	0.8
Oil scraping ring	0.25 to 0.55	0.8

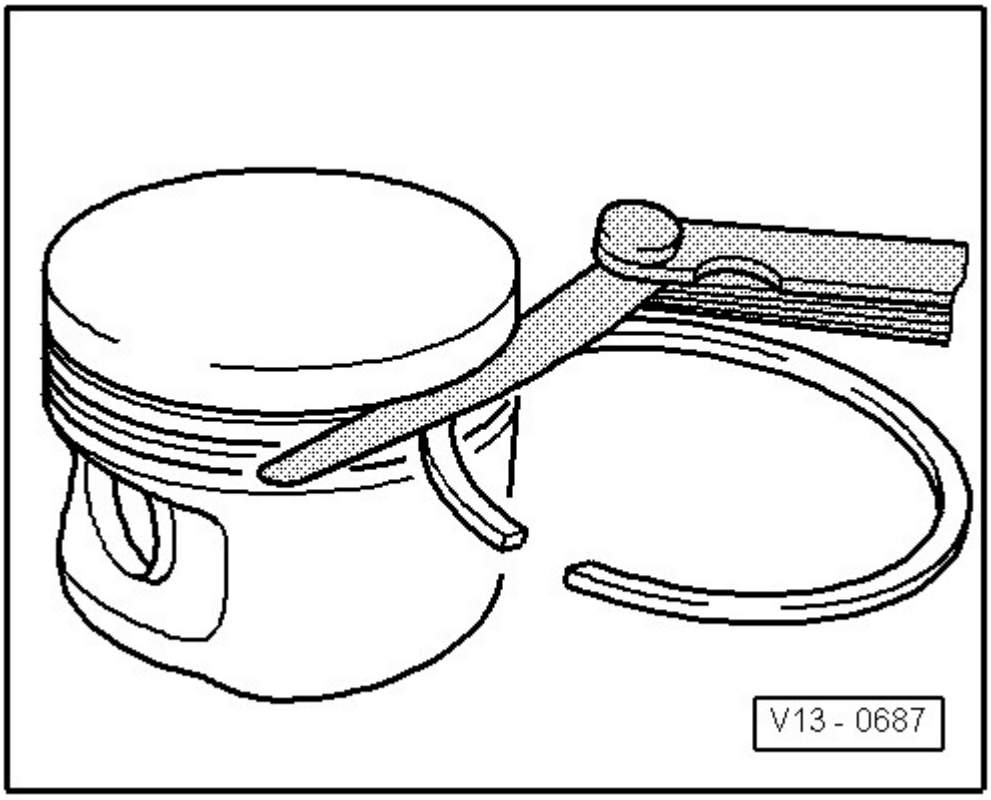

Fig. 15: Checking Piston Ring Gap
Courtesy of AUDI OF AMERICA, LLC

-- Clean the ring groove of piston before checking.

Piston Ring Dimensions in mm	New	Wear Limit
Compression ring	0.035 to 0.075	0.15
Oil scraping ring	0.03 to 0.065	0.15

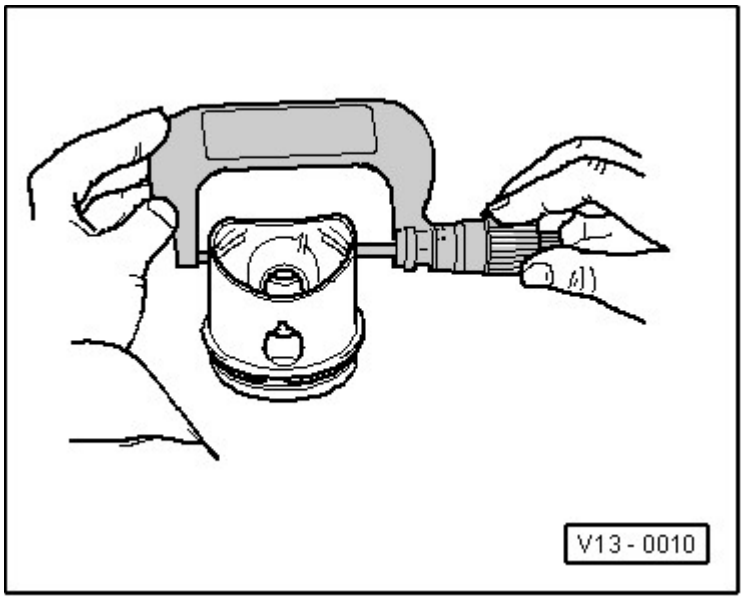

Fig. 16: Checking Piston
Courtesy of AUDI OF AMERICA, LLC

-- Measure pistons approximately 10 mm from bottom edge and at points offset by 90° to piston pin axis.

- Deviation from nominal size: Max. 0.04 mm.

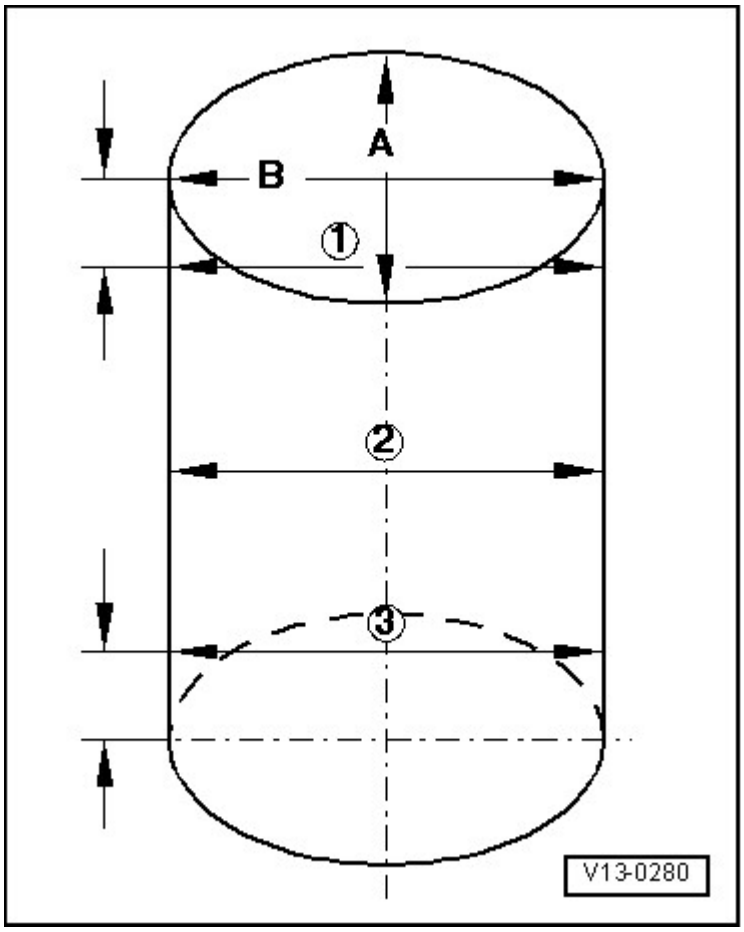

Fig. 17: Checking Cylinder Bores
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Internal dial gauge 50 to 100 mm.
- Inside Micrometer Set 18-100 mm US 1033/S

-- Measure diagonally at 3 positions transversely -A- and longitudinally -B-.

- Deviation from nominal size: Max. 0.08 mm.

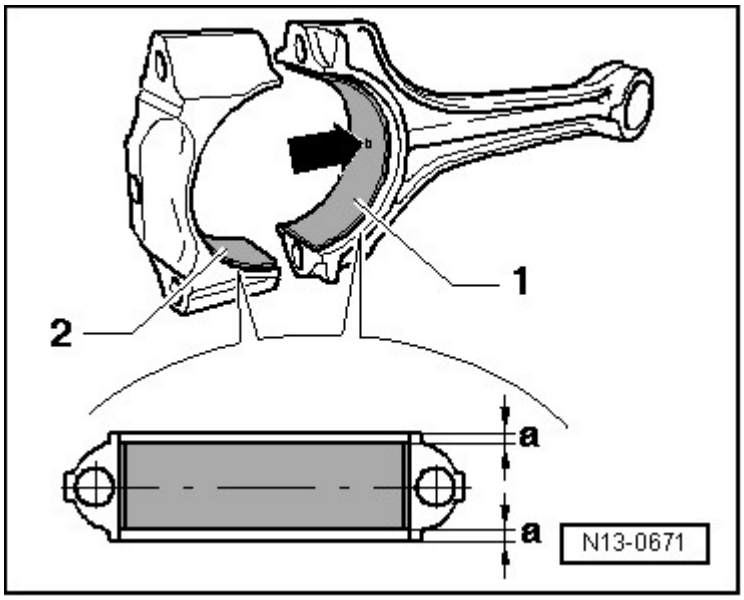

Fig. 18: Bearing Shells - Installed Positions
Courtesy of AUDI OF AMERICA, LLC

Bearing shell -1- with connecting rod oil bore -arrow-.

Bearing shell -2- without connected rod cover oil bore.

-- Place bearing shells centrally into connecting rod and connecting rod cover.

Dimension -a- must be the same at left and right.

SPECIFICATIONS

CRANKSHAFT DIMENSIONS

(Dimensions in mm)

Honing Dimension	Crankshaft Bearing Pin Diameter		Connecting Rod Bearing Pin Diameter	
Basic dimension	54.00	-0.017 -0.037	47.80	-0.022 -0.042

PISTON AND CYLINDER DIMENSIONS

Honing Dimension	Piston Diameter	Cylinder Bore Diameter
Basic dimension mm	82.465 [1)]	82.51

- [1)] Measurements without graphite coating (thickness = 0.02 mm). The graphite coating wears off.

FASTENER TIGHTENING SPECIFICATIONS

Component	Bolt Size	Nm
Air Conditioner (A/C) Compressor	-	25
Bearing Cap	-	65 + 90°
Belt Pulley for the Ribbed Belt[1]	-	20 + 90°
Connecting Rod Bolt[1]	-	30 + 90°
Crankshaft Toothed Belt Sprocket[1]	-	90 + 90°
Dual-Mass Flywheel/Drive Plate[1]	-	60 + 90°
Generator	-	23
Pressure Relief Valve	-	27
Ribbed Belt Tensioning Damper	-	23
Sensor Wheel[1]	-	10 + 90°

- [1] Replace

Accessory Assembly Bracket Tightening Sequence

-- Install bolts -1 through 6- and tighten by hand.

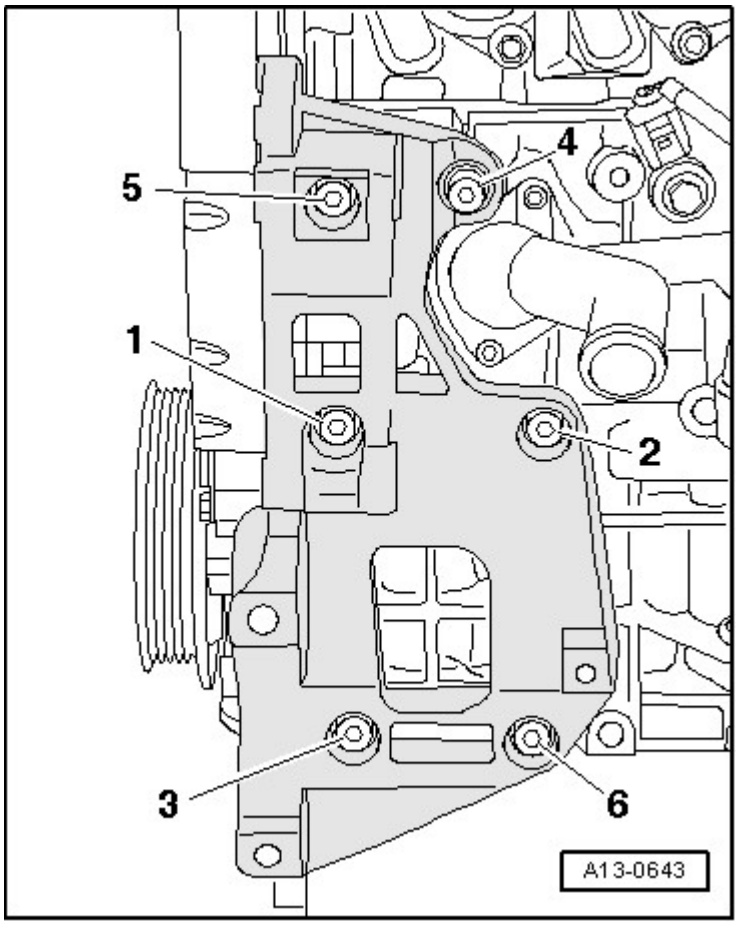

Fig. 19: Removing/Installing Accessory Assembly Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Tighten bolts -1 through 6- to 40 Nm.

Tightening Sequence of Front Sealing Flange

-- 1. Install bolts -1 to 10- and tighten by hand.

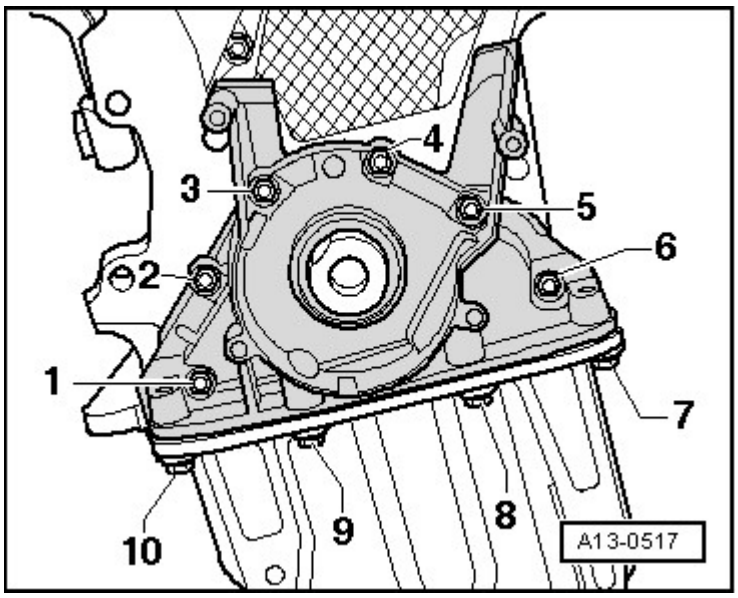

Fig. 20: Fastening Bolts In Specified Order
Courtesy of AUDI OF AMERICA, LLC

-- 2. Tighten the bolts -1 to 6- in a diagonal sequence in stages to 15 Nm.

-- 3. Tighten bolts -7 to 10- to 15 Nm.

Rear Tightening Sequence

-- 1. Install bolts -1 to 8- and tighten by hand.

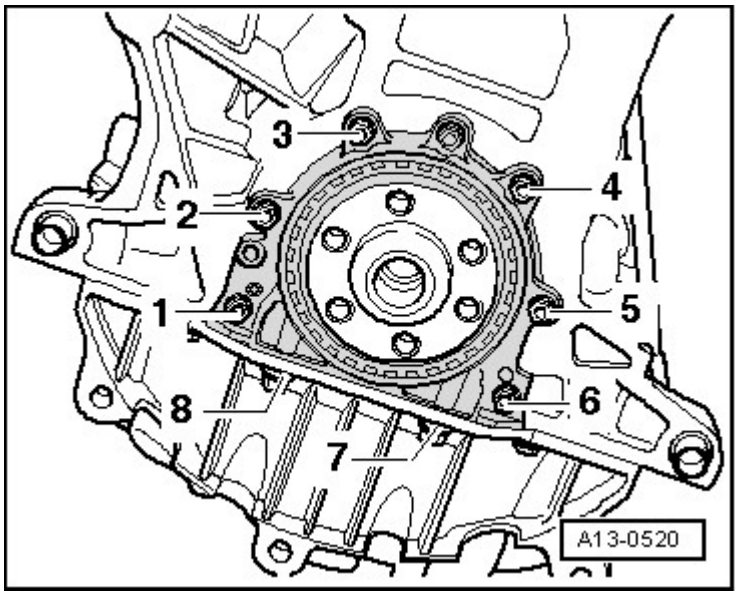

Fig. 21: Rear Sealing Flange Bolts
Courtesy of AUDI OF AMERICA, LLC

-- 2. Tighten the bolts -1 to 6- in a diagonal sequence in stages to 15 Nm.

-- 3. Tighten bolts -7 to 8- to 15 Nm.

DIAGNOSIS AND TESTING

CRANKSHAFT, MEASURING AXIAL PLAY

Special tools and workshop equipment required

- Dial Gauge Holder VW 387
- Dial Gauge 0-10 mm VAS 6079

Procedure

-- Attach the VAS 6079 together with VW 387 to cylinder block and set indicator against crankshaft counterweight.

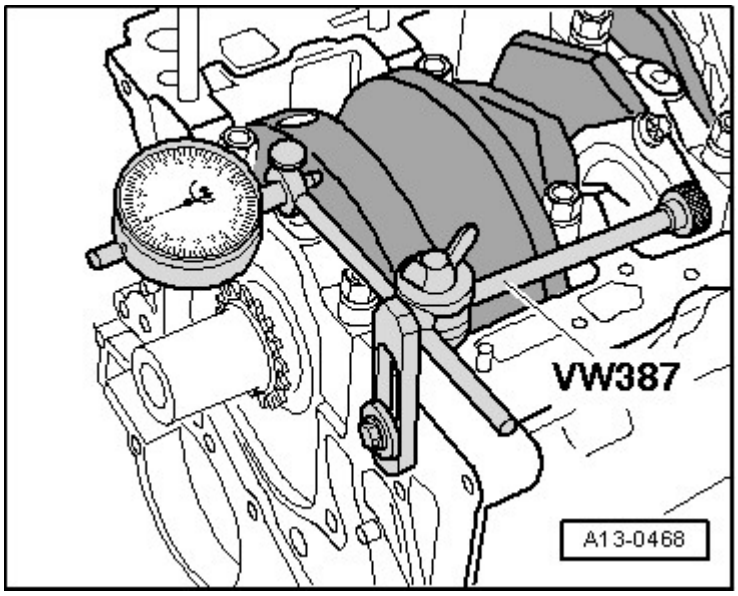

Fig. 22: Attaching Dial Indicator Together With VW387 Dial Gauge Holder To Cylinder Block And Set Indicator Against Crankshaft Counterweight
Courtesy of AUDI OF AMERICA, LLC

-- Press crankshaft by hand against gauge and set gauge to "0".

-- Press crankshaft off gauge and read value.

Axial clearance:

- New: 0.07 to 0.23 mm.
- Wear limit: 0.30 mm.

CRANKSHAFT, MEASURING RADIAL PLAY

Special tools and workshop equipment required

- Plastigage

Procedure

NOTE: Do not interchange used bearings

Bearing shells that are worn down to the nickel layer must be replaced.

-- Remove main bearing cap and clean bearing cap and pins.

-- Place Plastigage over entire width of bearing journal or into bearing shells.

- Plastigage must rest in center of bearing shell.

-- Position the main bearing cap and tighten it to 65 Nm. Do not rotate the crankshaft when doing so.

-- Remove main bearing caps again.

-- Compare width of Plastigage with measuring scale.

Radial Clearance:

- New: 0.017 to 0.037 mm
- Wear limit: 0.15 mm

REMOVAL AND INSTALLATION

RIBBED BELT

Special tools and workshop equipment required

- Locking Pin T10060A
- Spring Type Clip Pliers VAS 5024 A

Removing

-- Remove the engine cover and air filter. Refer to **Removal and Installation** .

-- Pull the EVAP canister with connected lines upward -arrow- out of the retainer and lay it aside.

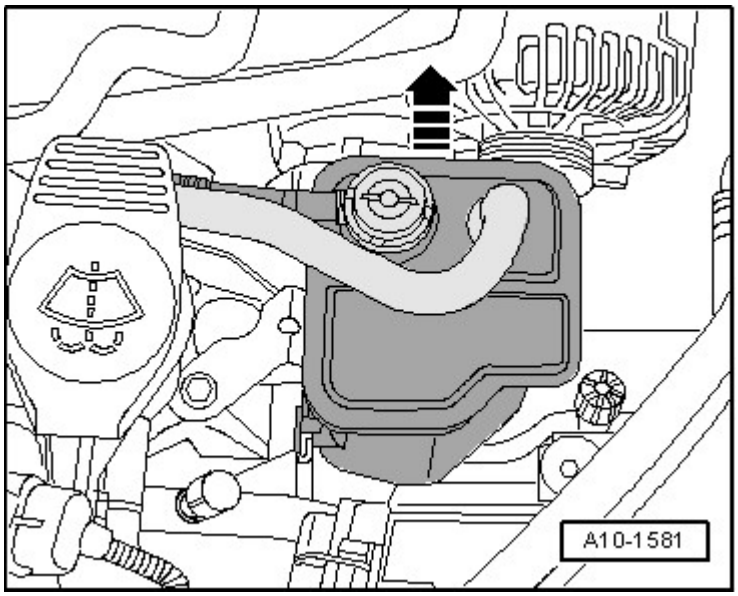

Fig. 23: Identifying EVAP Canister
Courtesy of AUDI OF AMERICA, LLC

NOTE: Before removing the ribbed belt, mark the turning direction on it with chalk or a

felt tip pen. A reversed turning direction can cause damage to the belt under operating conditions.

-- Mark the rotation direction on the ribbed belt.

-- Pivot the ribbed belt tensioner in direction of -arrow- to relieve tension on the ribbed belt.

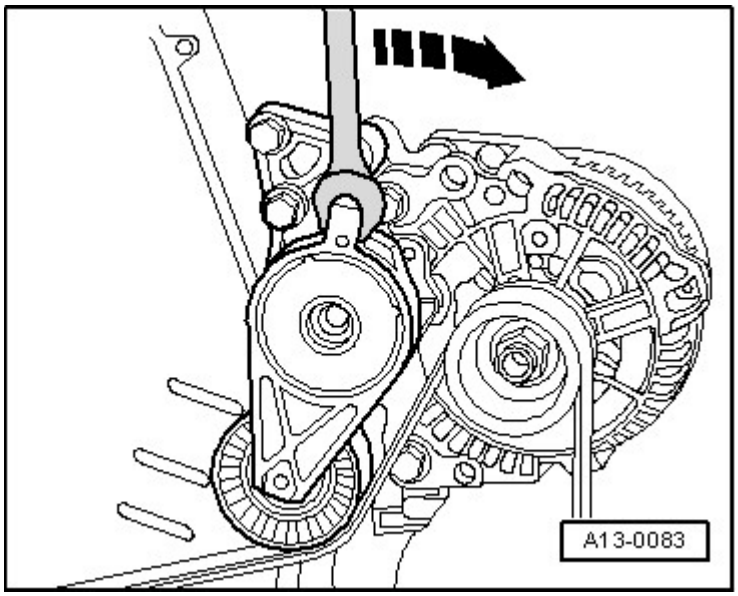

Fig. 24: Identifying Method To Relieve Tension On Poly V-Belt
Courtesy of AUDI OF AMERICA, LLC

-- Secure tensioning element using the T10060A.

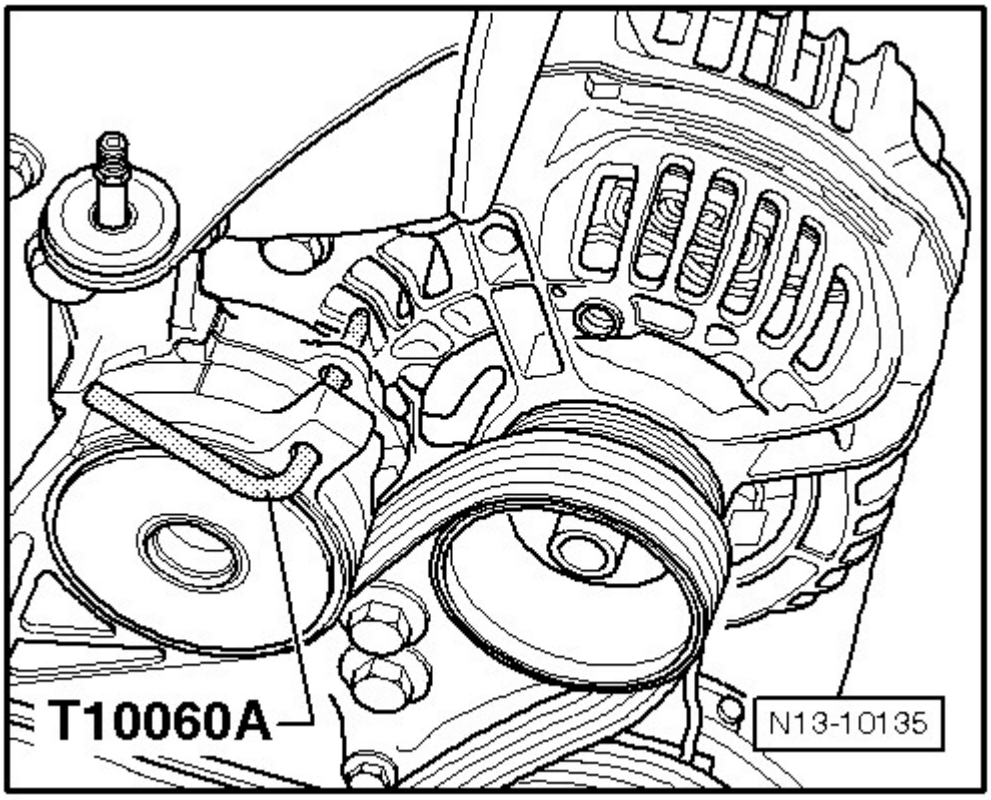

Fig. 25: Identifying Lock Tensioner With Locking Pin T10060 A
Courtesy of AUDI OF AMERICA, LLC

-- Remove the ribbed belt.

Installing

Install in reverse order of removal. Note the following:

NOTE: Make sure, before installing ribbed belt, that all ancillaries (generator and A/C compressor) are secured tightly.

-- Place ribbed belt onto belt pulleys of crankshaft and A/C compressor.

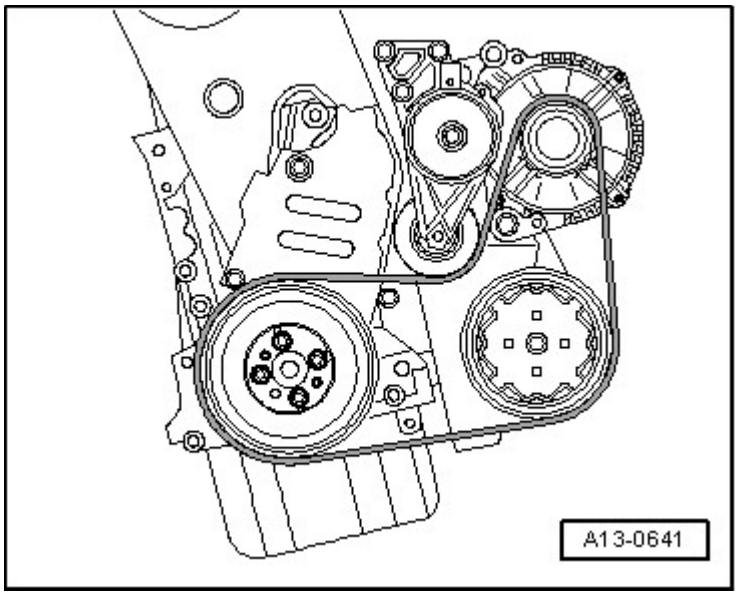

Fig. 26: Identifying Ribbed Belt Routing
Courtesy of AUDI OF AMERICA, LLC

-- Place ribbed belt onto generator belt pulley lastly, and release tensioner.

-- Check ribbed belt for correct positioning.

-- Start the engine and check the belt running.

ACCESSORY ASSEMBLY BRACKET

Special tools and workshop equipment required

- Locking Pin T10060A
- Spring Type Clip Pliers VAS 5024 A

Removing

-- Remove the engine cover and air filter. Refer to **Removal and Installation** .

-- Remove cover from above the battery, by pressing the release buttons -arrows-.

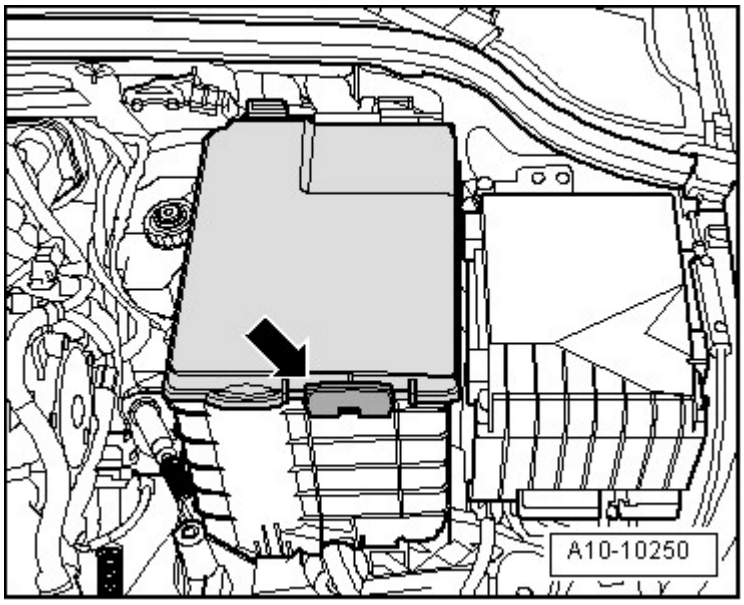

Fig. 27: Battery Cover
Courtesy of AUDI OF AMERICA, LLC

WARNING: Follow the steps for disconnecting the battery. Refer to REMOVAL AND INSTALLATION .

-- With ignition switched off, disconnect battery ground (GND) cable -arrow-.

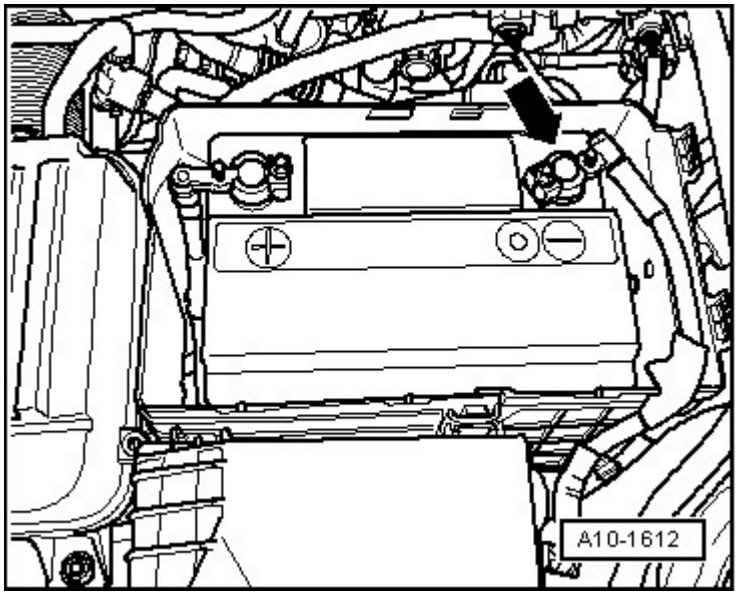

Fig. 28: Battery Ground Strap
Courtesy of AUDI OF AMERICA, LLC

-- Pull the EVAP canister with connected lines upward -arrow- out of the retainer and lay it aside.

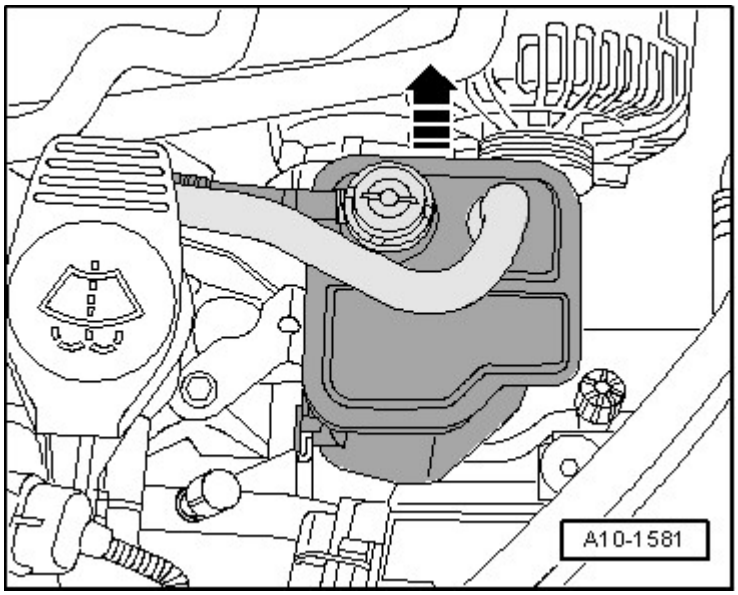

Fig. 29: Identifying EVAP Canister
Courtesy of AUDI OF AMERICA, LLC

NOTE: Before removing the ribbed belt, mark the turning direction on it with chalk or a felt tip pen. A reversed turning direction can cause damage to the belt under operating conditions.

-- Pivot the ribbed belt tensioner in direction of -arrow- to relieve tension on the ribbed belt.

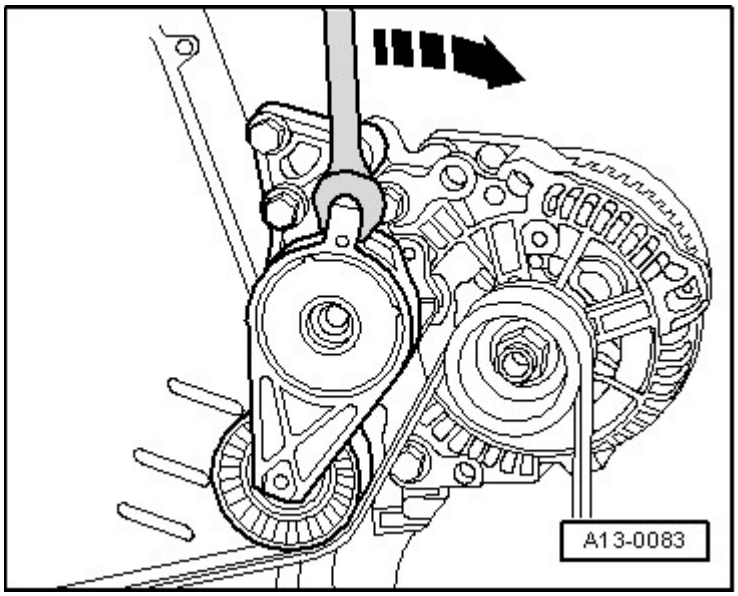

Fig. 30: Identifying Method To Relieve Tension On Poly V-Belt
Courtesy of AUDI OF AMERICA, LLC

-- Secure tensioning element using the T10060A.

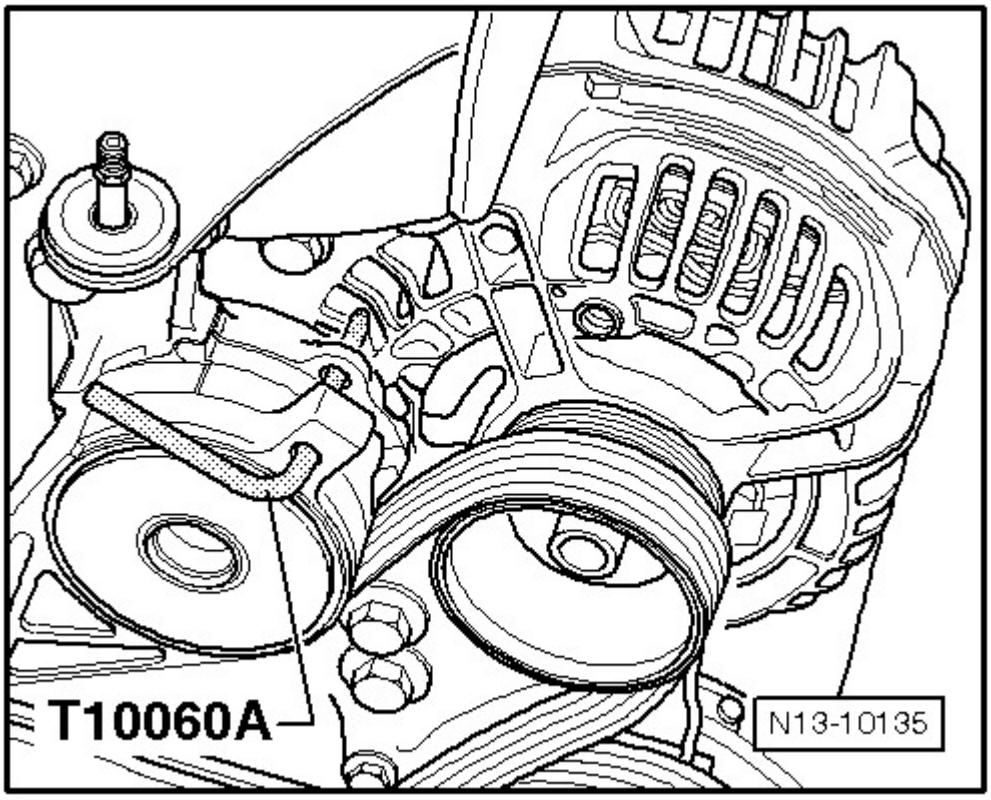

Fig. 31: Identifying Lock Tensioner With Locking Pin T10060 A
Courtesy of AUDI OF AMERICA, LLC

-- Remove ribbed belt.

-- Remove ribbed belt tensioner -arrows-.

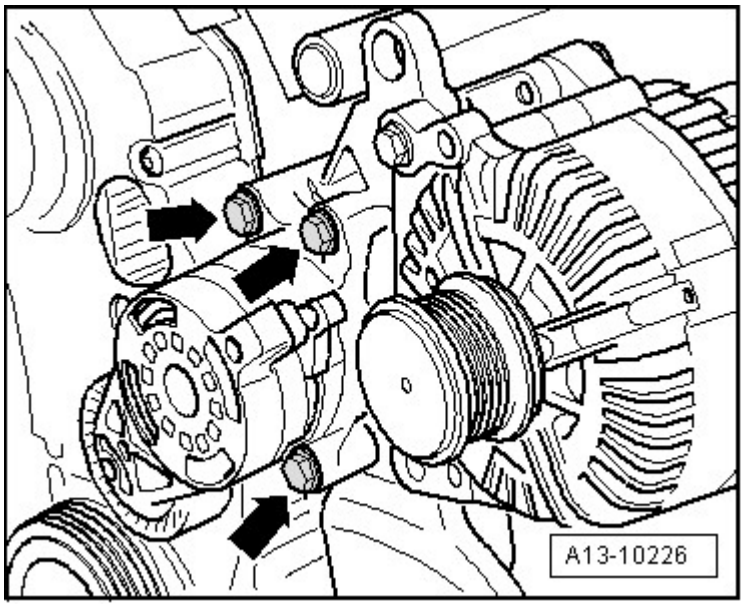

Fig. 32: Ribbed Belt Tensioner Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Discharge the refrigerant circuit. Refer to **Description and Operation** .

-- Remove the generator. Refer to **REMOVAL AND INSTALLATION**

-- Remove noise insulation. Refer to **Removal and Installation** .

-- Remove right noise insulation fasteners -1 to 3-.

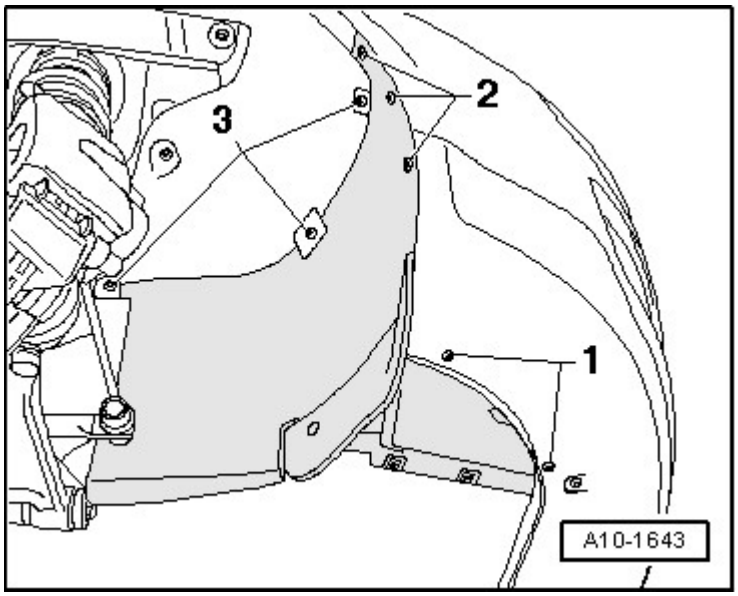

Fig. 33: Identifying Fasteners
Courtesy of AUDI OF AMERICA, LLC

-- Remove the A/C compressor. Refer to **Removal and Installation**

-- Remove the accessory assembly bracket - bolts -1 to 6-.

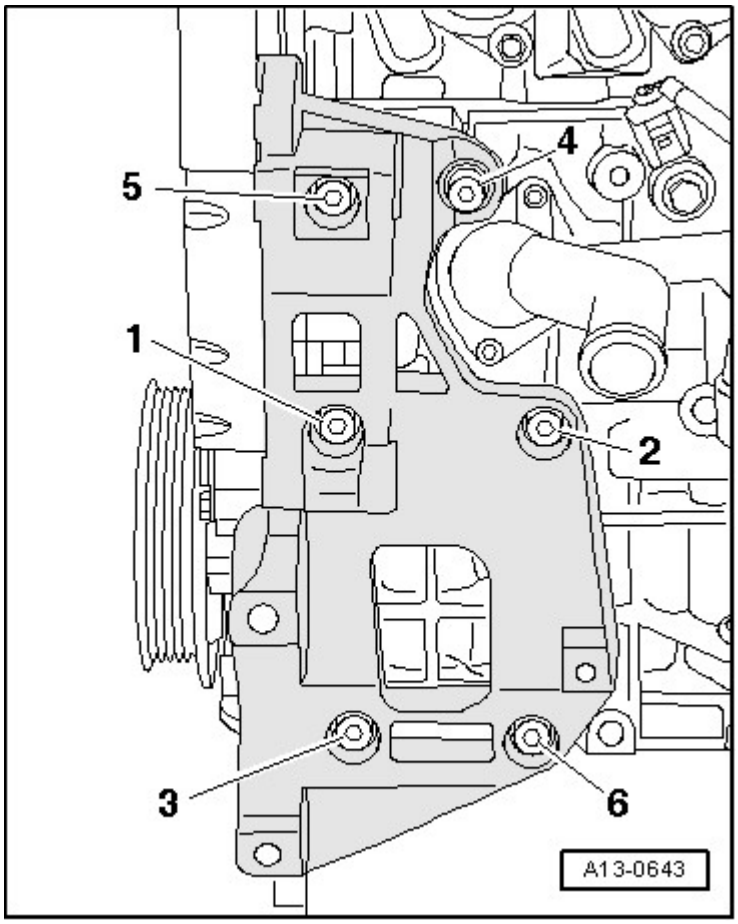

Fig. 34: Removing/Installing Accessory Assembly Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

Installing

Installation is in the reverse order of removal, noting the following.

- For the correct tightening specifications, refer to **RIBBED BELT AND ASSEMBLY BRACKET OVERVIEW**

-- Tighten the bolts in the sequence -1 to 6-.

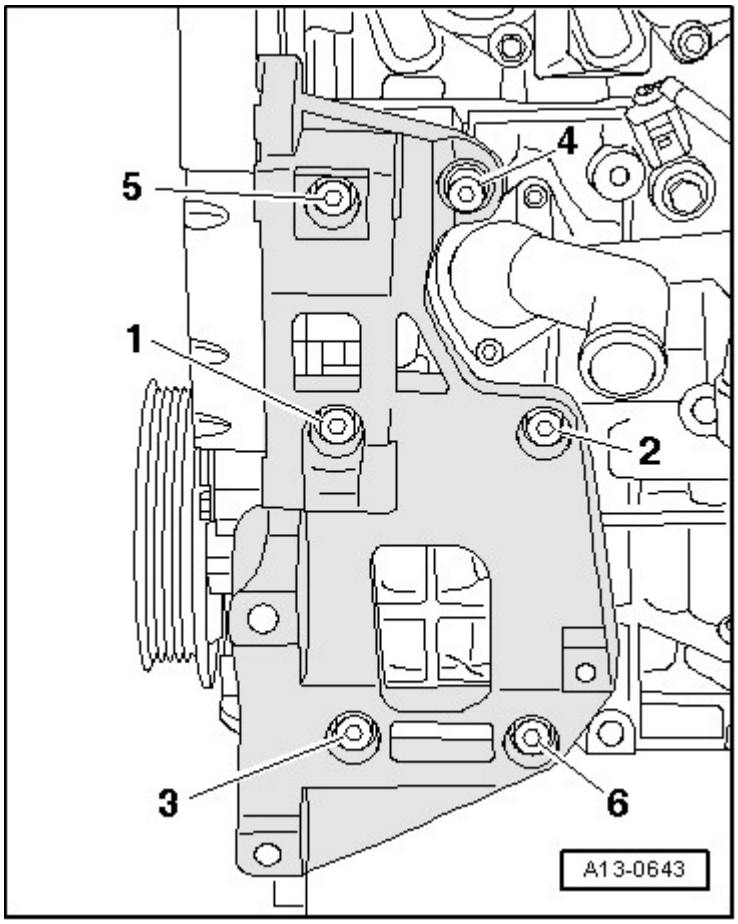

Fig. 35: Removing/Installing Accessory Assembly Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Install the generator. Refer to **REMOVAL AND INSTALLATION**

-- Install A/C compressor. Refer to **Removal and Installation** .

-- Install the ribbed belt. Refer to **RIBBED BELT**.

-- Connect the battery. Refer to **REMOVAL AND INSTALLATION** .

VIBRATION DAMPER

Removing

- Ribbed belt removed. Refer to **RIBBED BELT**.

-- Remove the center noise insulation -1 to 3-.

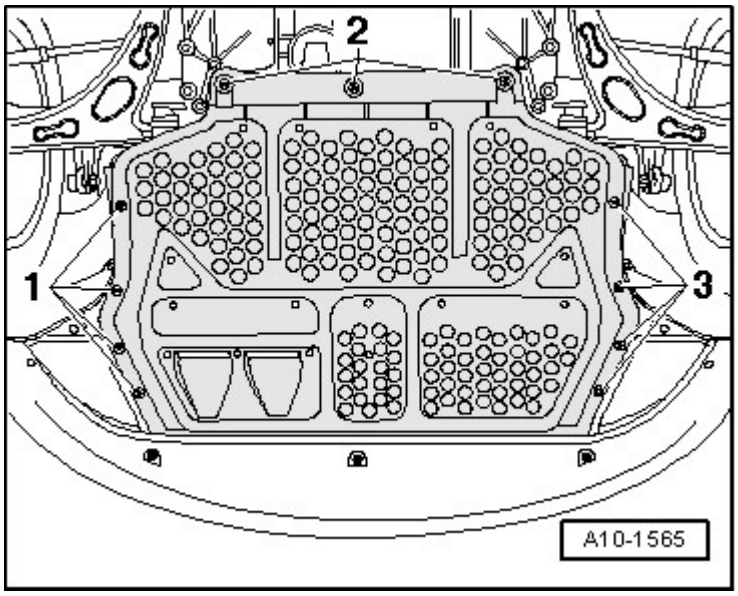

Fig. 36: Center Noise Insulation Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove right noise insulation fasteners -1 to 3-.

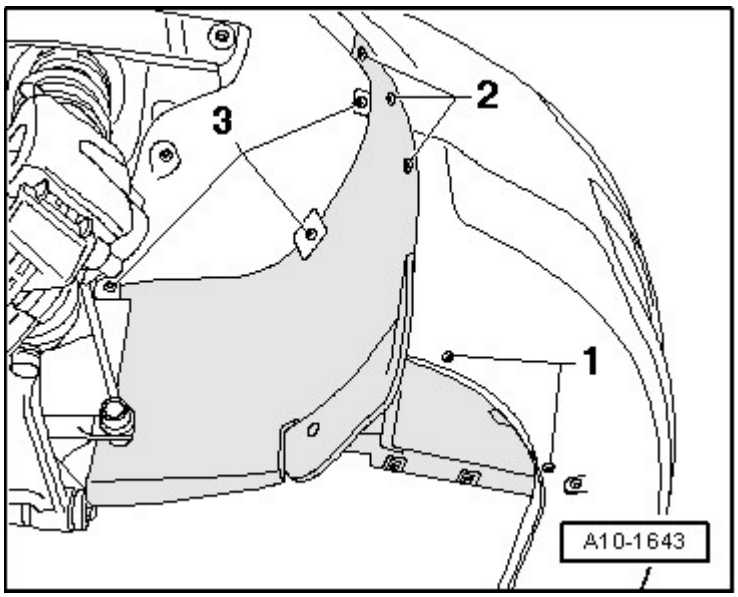

Fig. 37: Identifying Fasteners
Courtesy of AUDI OF AMERICA, LLC

-- Remove vibration damper/belt pulley.

NOTE: To loosen and tighten the crankshaft belt pulley, counter-hold at the center bolt using a offset box wrench.

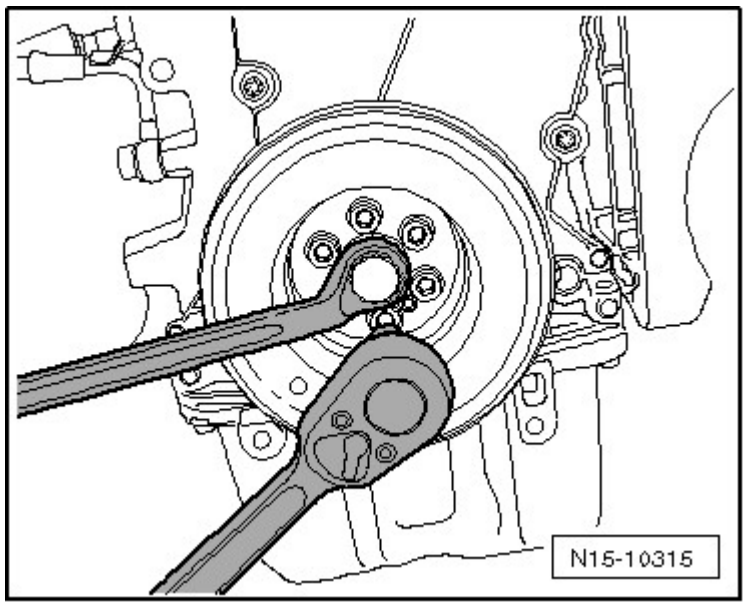

Fig. 38: Identifying Vibration Damper/Belt Pulley
Courtesy of AUDI OF AMERICA, LLC

Installing

Install in reverse order of removal. Note the following:

- For the correct tightening specifications, refer to **RIBBED BELT AND ASSEMBLY BRACKET OVERVIEW**

-- Install the crankshaft belt pulley using only original equipment bolts

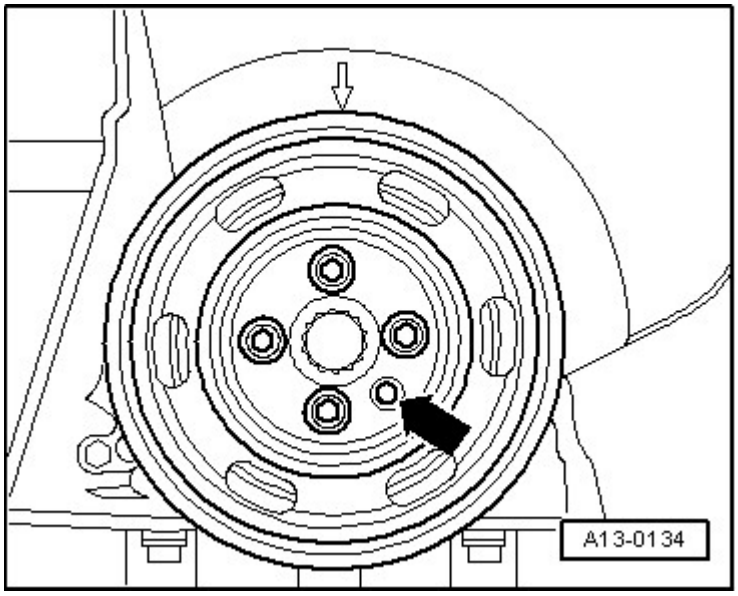

Fig. 39: Installing Crankshaft Belt Pulley With Original Bolts
Courtesy of AUDI OF AMERICA, LLC

- Only possible to install in one position: The hole -arrow- in the crankshaft belt pulley must be positioned over the raised area on the toothed belt sprocket

CRANKSHAFT SEAL

Special tools and workshop equipment required

- Seal Remover 3203
- Counter Support 3415
- Assembly Tool T10053
- Torque Wrench 5-50 Nm V.A.G 1331
- Torque Wrench 40-200 Nm V.A.G 1332

Removing

-- Remove ribbed belt. Refer to **RIBBED BELT**.

-- Toothed belt, removing. Refer to **TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD** or **TOOTHED BELT, WITH DIVIDED TOOTHED BELT GUARD** .

-- Loosen crankshaft toothed belt gear. To do this, lock toothed belt sprocket with the 3415.

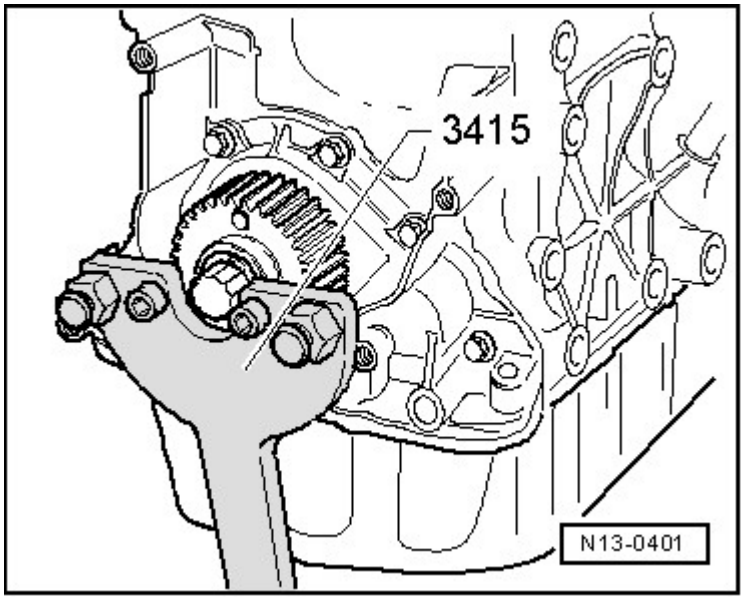

Fig. 40: Counter-Holding Crankshaft Toothed Belt Sprocket With 3415
Courtesy of AUDI OF AMERICA, LLC

-- Remove the crankshaft-toothed belt sprocket center bolt -1- and remove the toothed belt sprocket -2-.

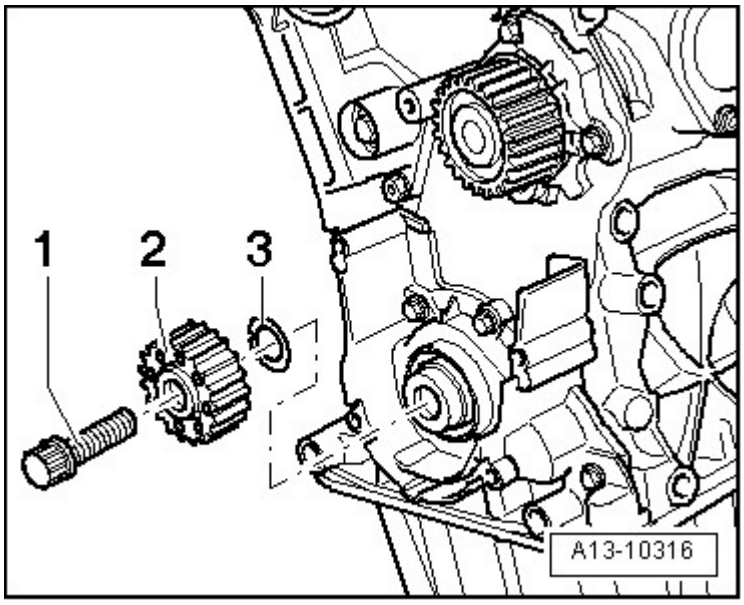

Fig. 41: Identifying Center Bolt, Crankshaft Toothed Belt Gear & Diamond Disc
Courtesy of AUDI OF AMERICA, LLC

-- Remove diamond disc -3- from toothed belt gear.

-- To guide seal puller, thread center bolt into crankshaft by hand until stop.

-- Unscrew inner part of the 3203 nine rotations (approximately 20 mm) from outer part and secure with knurled-head screw.

-- Lubricate threaded head of 3203, position and forcefully screw into seal as far as possible.

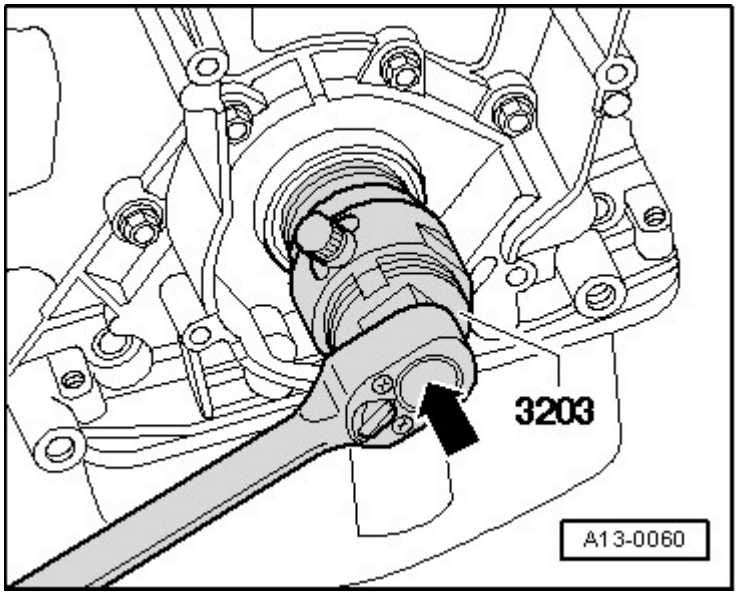

Fig. 42: Exerting Firm Pressure To Oil Seal Extractor 3203 Into Oil Seal
Courtesy of AUDI OF AMERICA, LLC

-- Loosen knurled screw and turn inner portion against crankshaft until the seal is pulled out.

-- Secure the seal remover in a vise at the flat spots. Remove seal using pliers.

Installing

- For the correct tightening specifications, refer to **FRONT SEALING FLANGE OVERVIEW**

-- Clean running and sealing surface.

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

-- Position guide sleeve T10053/1 of the T10053 on the end of crankshaft.

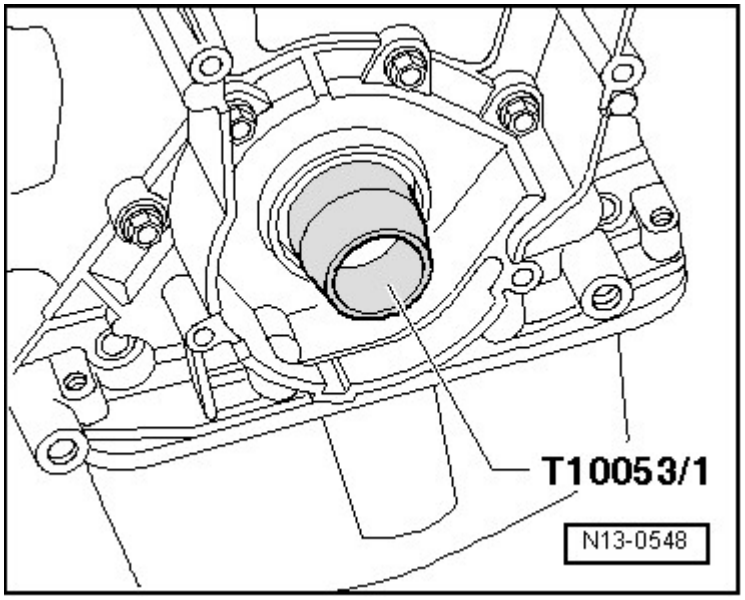

Fig. 43: Fitting Guide Sleeve T10053/1 Onto Crankshaft Journal
Courtesy of AUDI OF AMERICA, LLC

-- Slide seal over guide sleeve onto the crankshaft pin.

-- Press in the seal using center bolt of the toothed belt sprocket and pressure sleeve of the T10053 until it is flush.

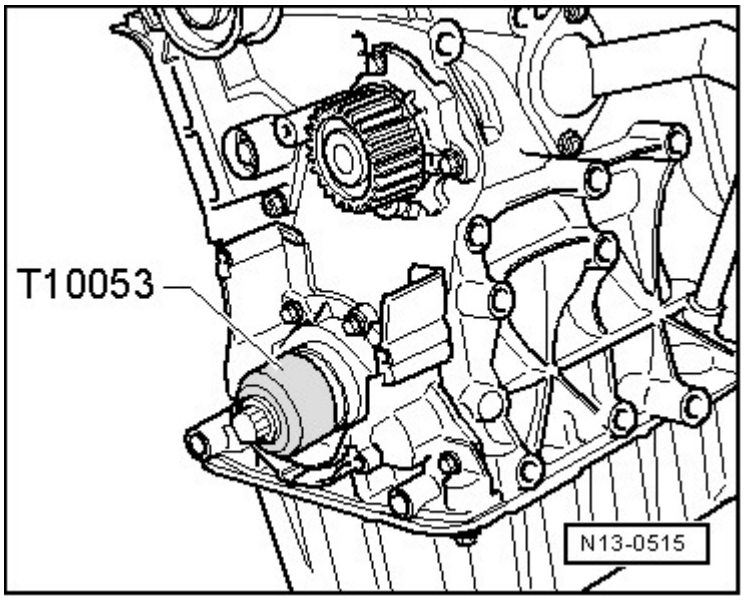

Fig. 44: Identifying Press Sleeve T10053 & Bolt Mounted
Courtesy of AUDI OF AMERICA, LLC

-- Install crankshaft toothed belt gear -2- with new diamond disc -3- and new center bolt -1-.

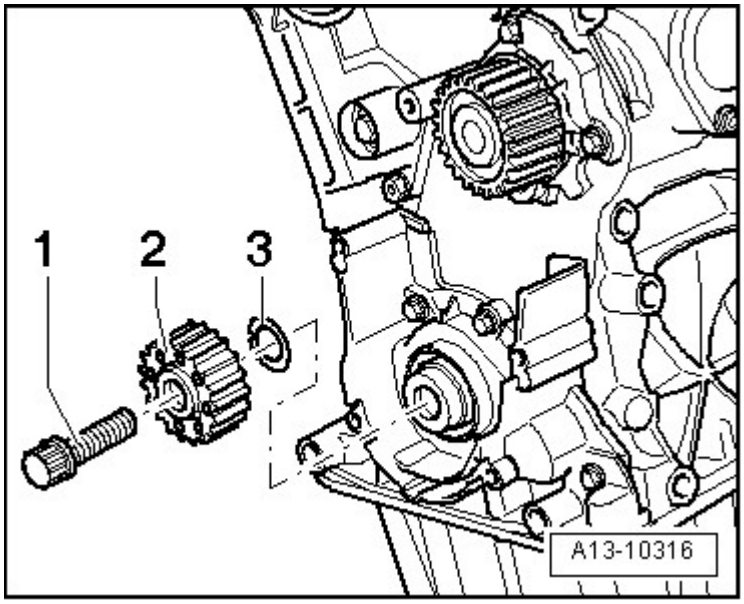

Fig. 45: Identifying Center Bolt, Crankshaft Toothed Belt Gear & Diamond Disc
Courtesy of AUDI OF AMERICA, LLC

NOTE: Contact surface between toothed belt gear, diamond disc and crankshaft must be free of oil.

Do not oil the bolt for crankshaft toothed belt sprocket.

-- Use the 3415 to tighten crankshaft toothed belt gear.

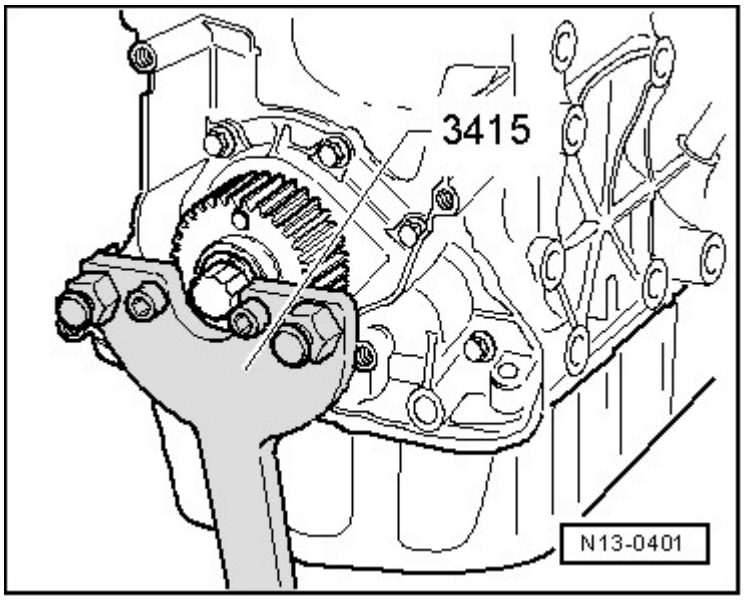

Fig. 46: Counter-Holding Crankshaft Toothed Belt Sprocket With 3415
Courtesy of AUDI OF AMERICA, LLC

-- Install toothed belt. Refer to **TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD TOOTHED BELT, WITH DIVIDED TOOTHED BELT GUARD** .

-- Install the ribbed belt. Refer to **RIBBED BELT**.

FRONT SEALING FLANGE

Special tools and workshop equipment required

- Counter Support 3415
- Assembly Tool T10053
- Torque Wrench 5-50 Nm V.A.G 1331
- Torque Wrench 40-200 Nm V.A.G 1332
- Hand drill with plastic brush attachment
- Protective eyewear
- Sealant

Removing

-- Remove ribbed belt. Refer to **RIBBED BELT**.

-- Remove toothed belt. Refer to **TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD** or **TOOTHED BELT, WITH DIVIDED TOOTHED BELT GUARD** .

-- Loosen crankshaft toothed belt gear. To do this, lock toothed belt sprocket with 3415.

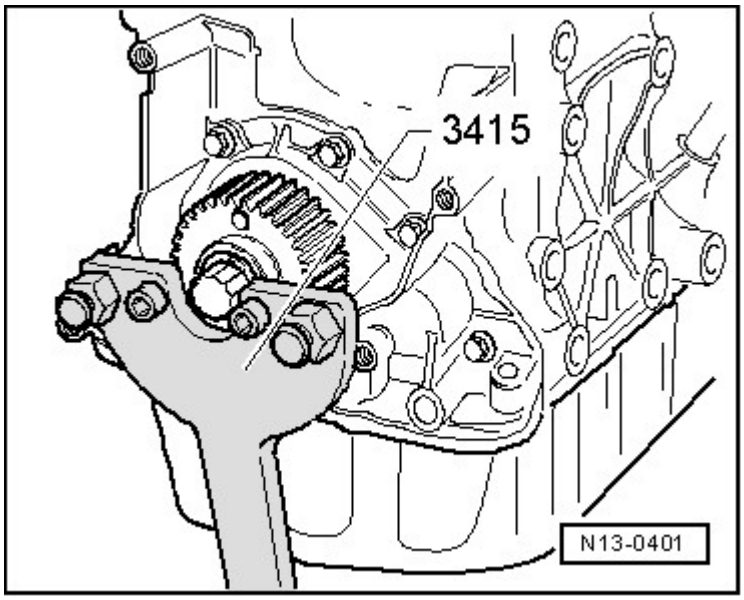

Fig. 47: Counter-Holding Crankshaft Toothed Belt Sprocket With 3415
Courtesy of AUDI OF AMERICA, LLC

-- Remove the crankshaft-toothed belt sprocket center bolt -1- and remove the toothed belt sprocket -2-.

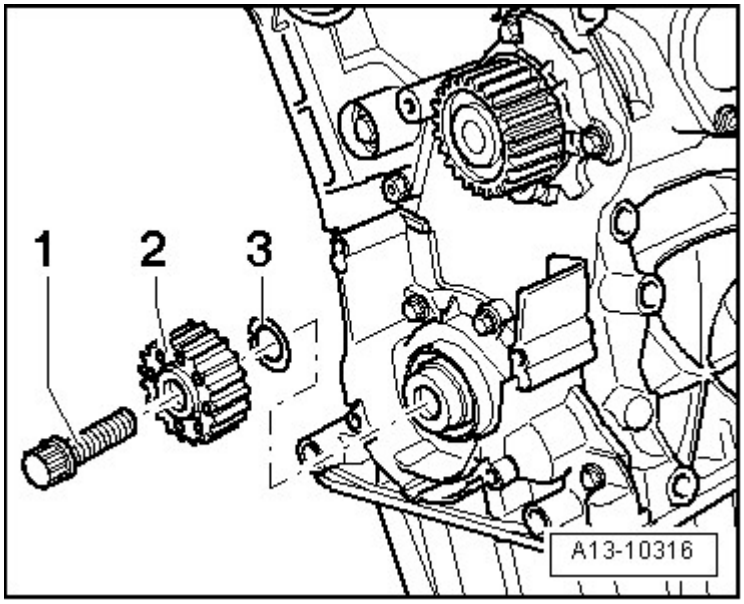

Fig. 48: Identifying Center Bolt, Crankshaft Toothed Belt Gear & Diamond Disc
Courtesy of AUDI OF AMERICA, LLC

-- Remove diamond disc -3- from toothed belt gear.

-- Remove the bolts -1 through 10-.

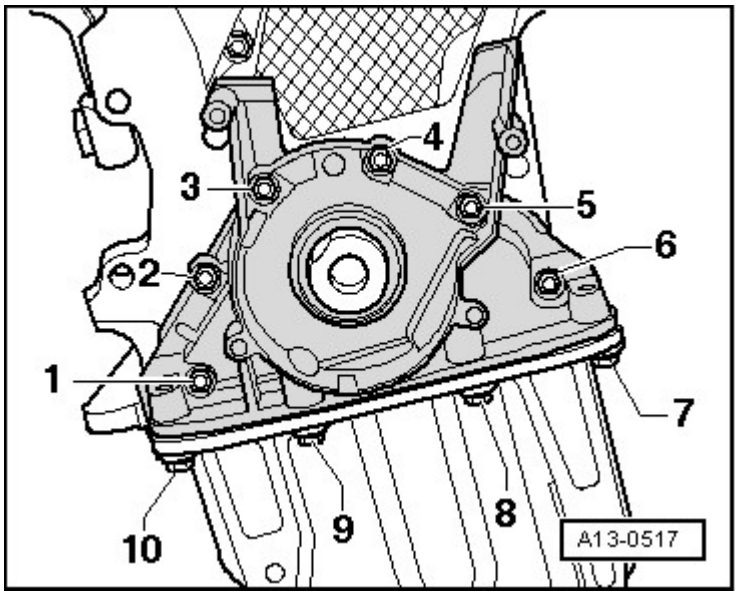

Fig. 49: Fastening Bolts In Specified Order
Courtesy of AUDI OF AMERICA, LLC

-- Pry off and remove front sealing flange.

-- Drive out the seal from the removed flange.

Installing

- **Tightening specifications** , refer to **FRONT SEALING FLANGE OVERVIEW**

NOTE: Place a rag over open part of oil pan.

-- Carefully remove any sealant residue from the cylinder block and oil pan.

WARNING: Wear safety glasses.

-- Remove sealant residue from sealing flange for example with a rotating plastic brush.

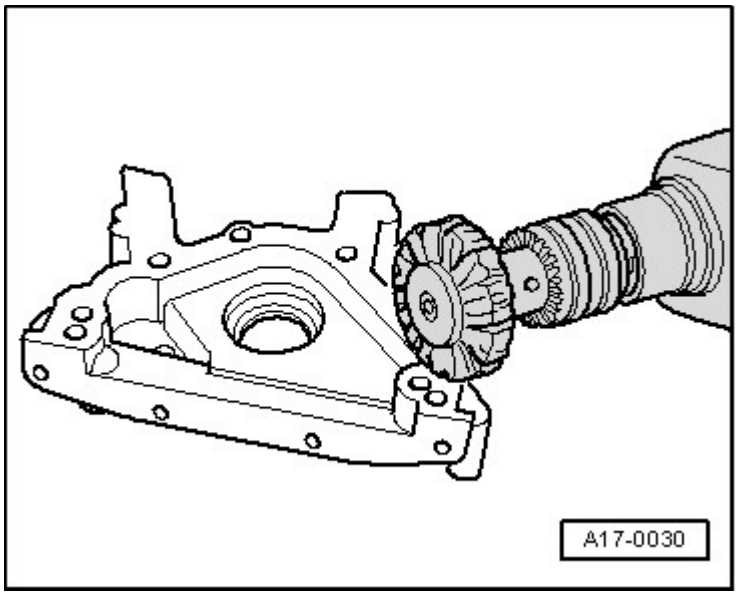

Fig. 50: Identifying Rotating Plastic Brush
Courtesy of AUDI OF AMERICA, LLC

-- Clean the sealing surfaces, they must be free of oil and grease.

-- Cut tube nozzle at front marking (nozzle diameter: approximately 2 mm).

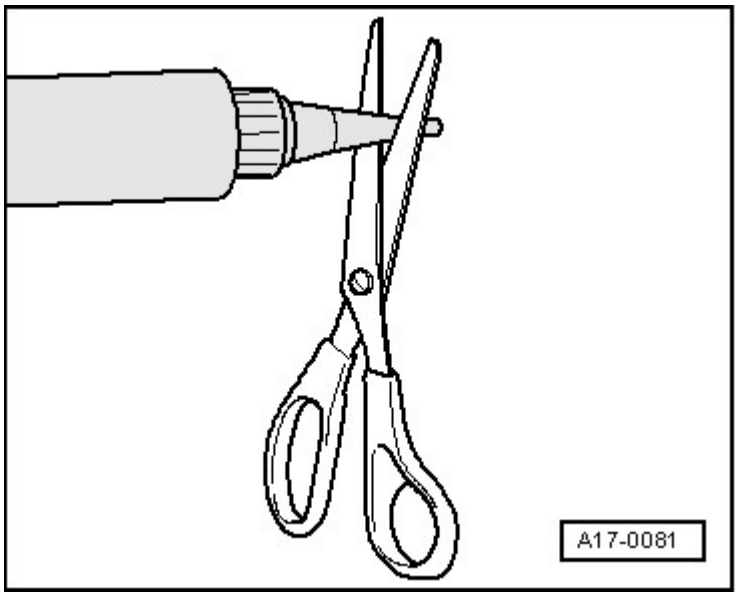

Fig. 51: Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 3 Mm)
Courtesy of AUDI OF AMERICA, LLC

-- Apply a thin bead of sealant to the edge between cylinder block and oil pan -arrow-.

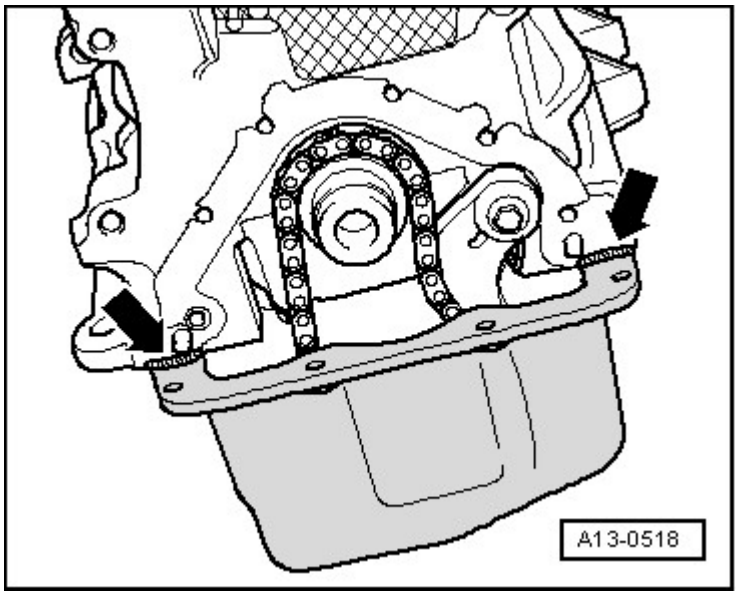

Fig. 52: Applying Thin Bead Of Sealant To Edge Between Cylinder Block And Oil Pan
Courtesy of AUDI OF AMERICA, LLC

-- Apply a thin bead of sealant -arrow- to the clean sealing surface of the sealing flange, as shown in the illustration.

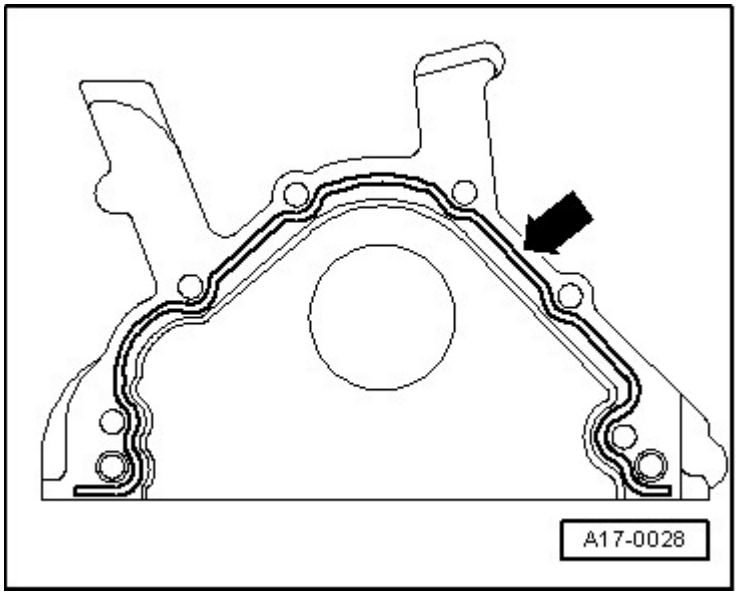

Fig. 53: Applying Silicone Sealant Bead To Clean Sealing Surface Of Sealing Flange
Courtesy of AUDI OF AMERICA, LLC

- Thickness of sealant bead: 2 to 3 mm.

CAUTION: Risk of plugging oil pump strainer with excess sealant.

- **Do not apply sealant bead thicker than indicated.**

NOTE: The sealant bead may not be thicker than 3 mm, otherwise excess sealant could enter the oil pan and clog the oil intake tube.

-- Lightly coat the lower sealing surface of the sealing flange with sealant -shaded area-.

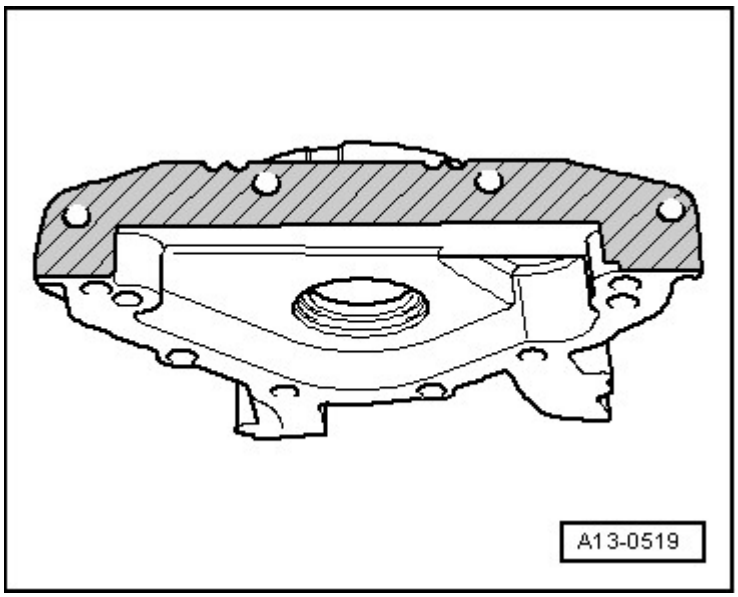

Fig. 54: Lightly Coating Lower Sealing Surface Of Sealing Flange With Sealant
Courtesy of AUDI OF AMERICA, LLC

NOTE: The sealing flange must be installed within 5 minutes of being applied with sealant.

-- Carefully slide sealing flange onto reamed bolt at cylinder block.

NOTE: To install the sealing flange with installed seal, use the guide sleeve T10053/1.

-- Tighten sealing flange bolts in 3 stages as follows:

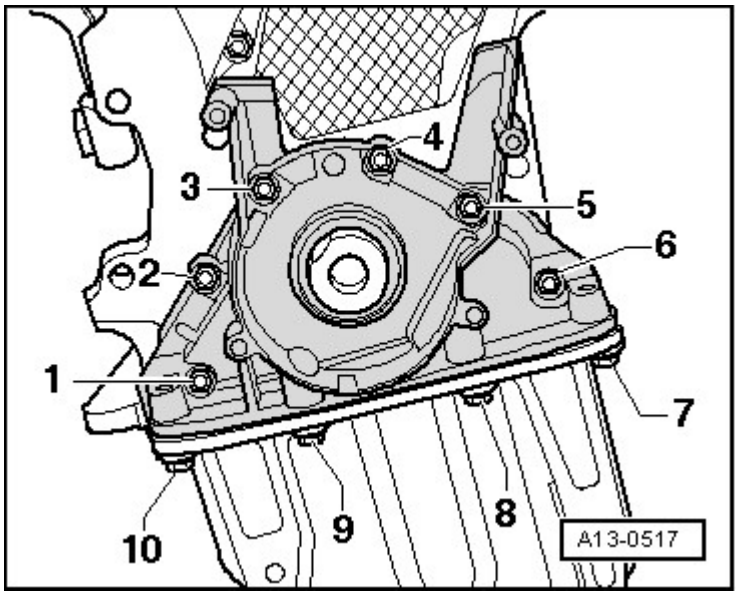

Fig. 55: Fastening Bolts In Specified Order
Courtesy of AUDI OF AMERICA, LLC

-- Install bolts -1 through 10- and tighten by hand.

-- Tighten bolts -1 to 6- in a diagonal sequence in stages.

-- Tighten bolts -7 through 10-.

-- Install the crankshaft seal belt pulley side **CRANKSHAFT SEAL**.

-- Install crankshaft toothed belt gear -2- with new diamond disc -3- and new center bolt -1-.

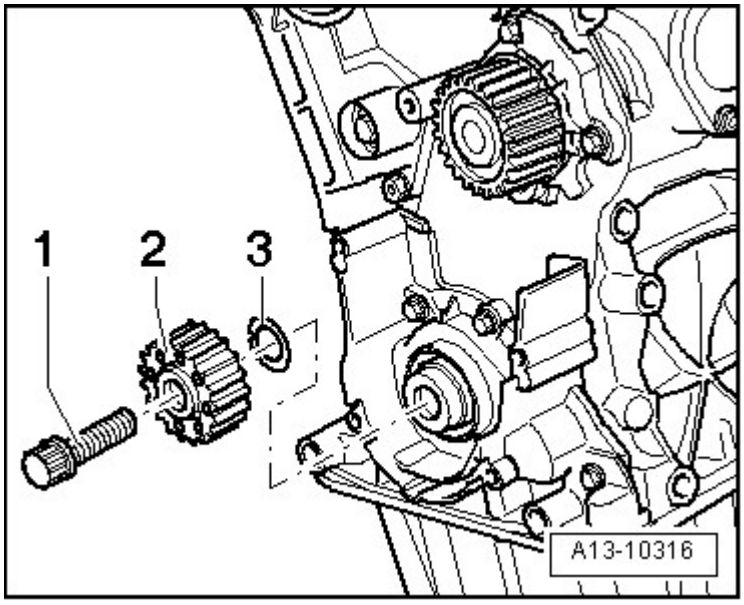

Fig. 56: Identifying Center Bolt, Crankshaft Toothed Belt Gear & Diamond Disc

Courtesy of AUDI OF AMERICA, LLC

NOTE: Contact surface between toothed belt gear, diamond disc and crankshaft must be free of oil.

Do not oil the bolt for crankshaft toothed belt sprocket.

-- Use the 3415 to tighten crankshaft toothed belt gear.

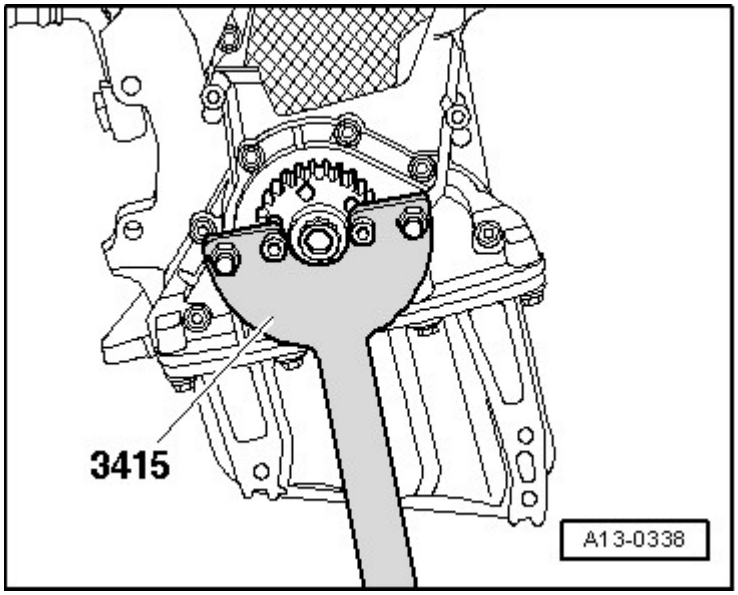

Fig. 57: Crankshaft Toothed Belt Sprocket, Removing And Installing
Courtesy of AUDI OF AMERICA, LLC

The rest of the installation is in reverse order of removal, noting the following:

-- Install toothed belt. Refer to **TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD** or **TOOTHED BELT, WITH DIVIDED TOOTHED BELT GUARD** .

-- Install the crankshaft belt pulley. Refer to **VIBRATION DAMPER**.

-- Install the ribbed belt. Refer to **RIBBED BELT**.

NOTE: The threads and shoulder must be free of oil and grease.

DUAL MASS FLYWHEEL

Special tools and workshop equipment required

- Flywheel Retainer 3067

Removing

- Transmission and clutch removed

CAUTION: To prevent damage to the dual-mass flywheel when removing, bolts -B- must not be removed using an air-powered or impact wrench. Only removing bolts by hand is permitted.

-- Mark the dual-mass flywheel to the engine.

-- Rotate the dual-mass flywheel -A- so that the bolts -B- stand centered to the holes -arrows-.

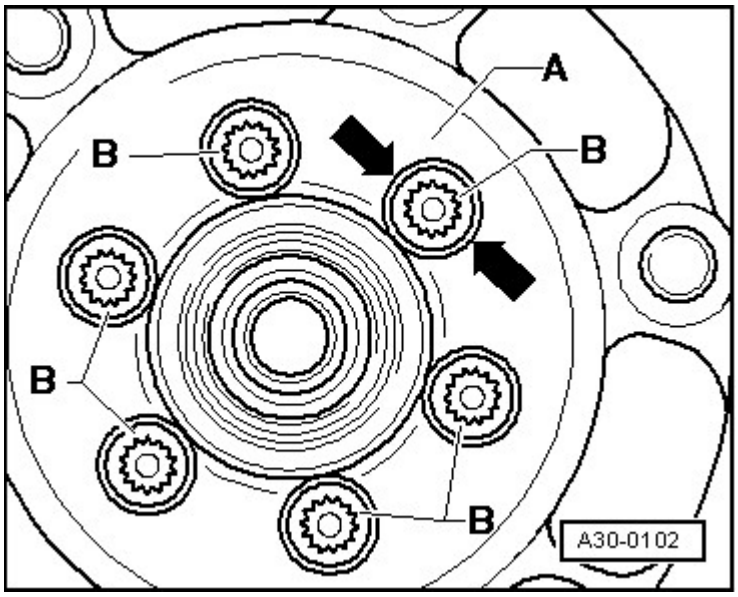

Fig. 58: Identifying Dual-Mass Flywheel & Bolts
Courtesy of AUDI OF AMERICA, LLC

-- When removing bolts -B-, make sure the bolt head does not come into contact with the dual-mass flywheel -arrows- or the flywheel could be damaged when turning the bolt.

-- Insert 3067 into the hole in cylinder block -B-.

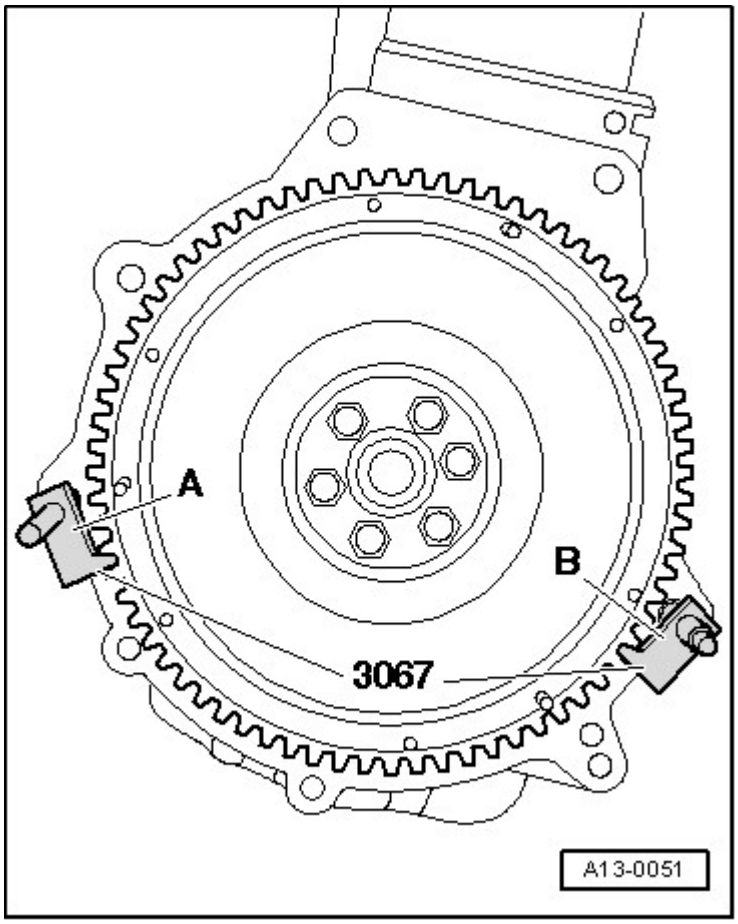

Fig. 59: Identifying Retainer -3067- Inserted In Hole On Cylinder Block
Courtesy of AUDI OF AMERICA, LLC

-- Remove the dual-mass flywheel.

Installing

Install in reverse order of removal. Note the following:

- **Tightening specifications** , refer to **REAR SEALING FLANGE AND DUAL-MASS FLYWHEEL OVERVIEW**

-- Secure with new bolts.

-- Insert the 3067 into hole in cylinder block -A-.

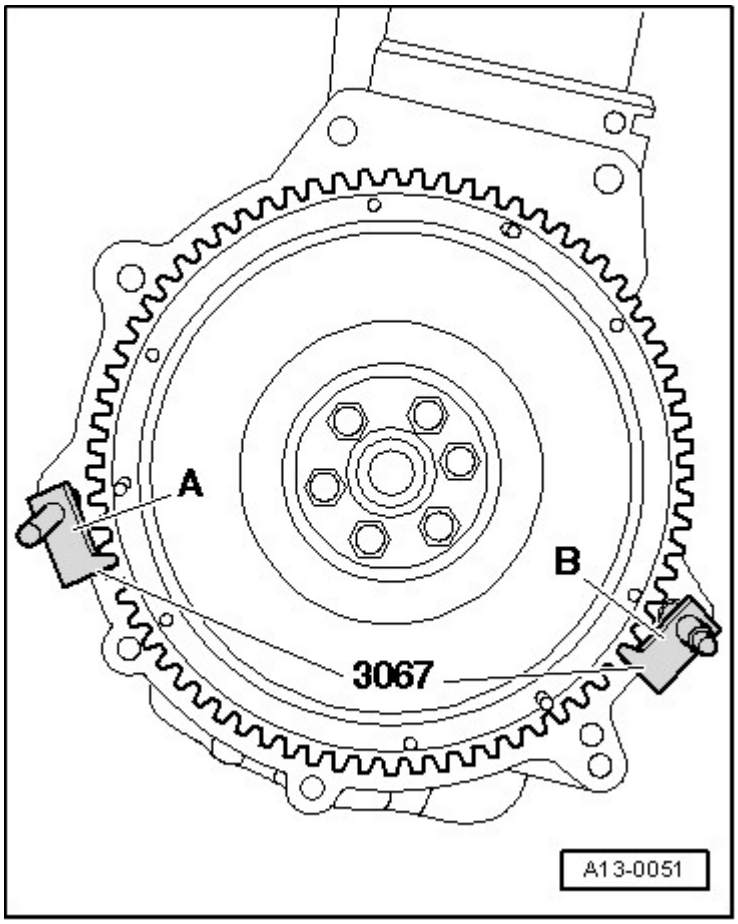

Fig. 60: Identifying Retainer -3067- Inserted In Hole On Cylinder Block
Courtesy of AUDI OF AMERICA, LLC

REAR SEALING FLANGE

Special tools and workshop equipment required

- Hand drill with plastic brush attachment
- Protective eyewear
- Sealant

Removing

- Transmission removed

-- Remove the dual-mass flywheel. Refer to **DUAL MASS FLYWHEEL**.

-- Unhook the intermediate plate at sealing flange and at the alignment sleeves -arrows-.

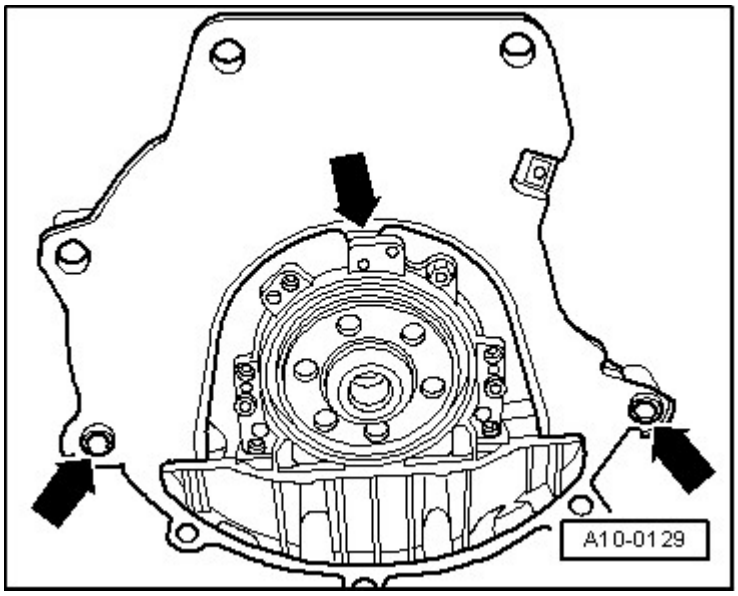

Fig. 61: Identifying Intermediate Plate Alignment Bushings
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -1 through 8-.

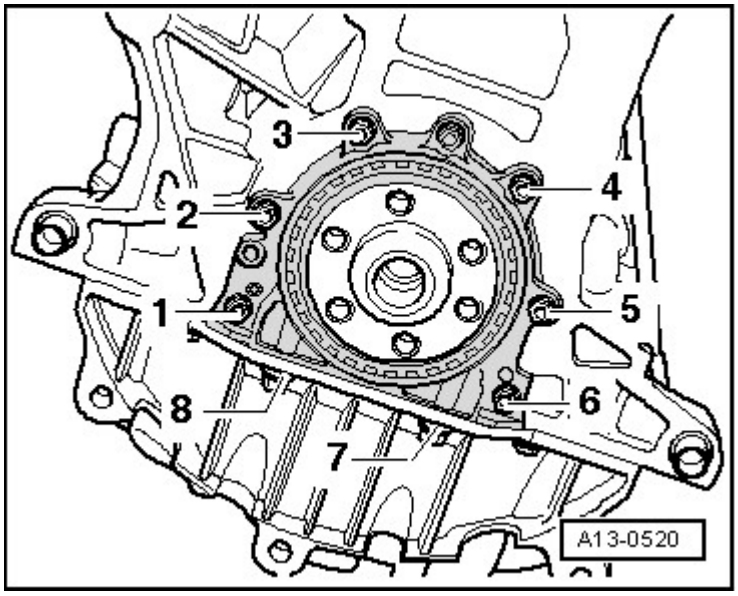

Fig. 62: Rear Sealing Flange Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Pull off the rear sealing flange.

Installing

- For the correct tightening specifications, refer to **REAR SEALING FLANGE AND DUAL-MASS FLYWHEEL OVERVIEW**.

NOTE: Place a rag over open part of oil pan.

-- Carefully remove any sealant residue from the cylinder block and oil pan.

-- Clean the sealing surfaces, they must be free of oil and grease.

-- Cut the tube nozzle at front marking (nozzle diameter: approximately 2 mm).

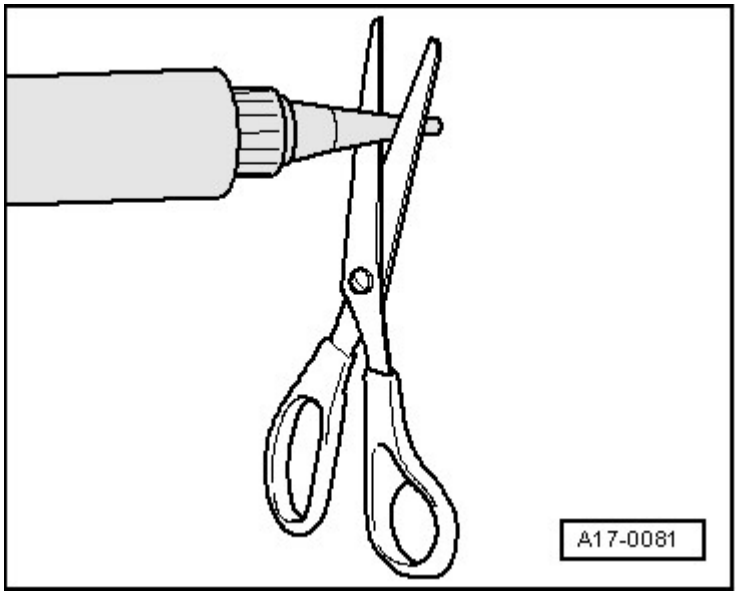

Fig. 63: Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 3 Mm)
Courtesy of AUDI OF AMERICA, LLC

-- Apply a thin bead of sealant -arrow- to the edge between cylinder block and oil pan.

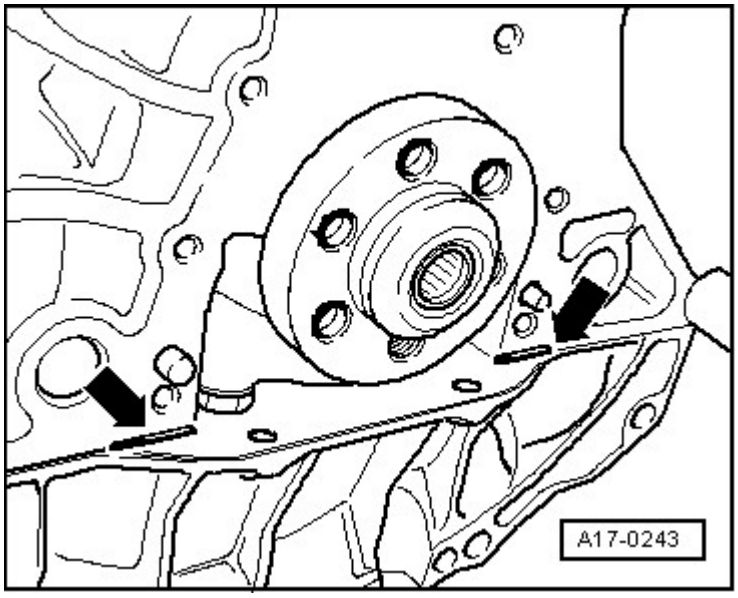

Fig. 64: Sealant Applied To Edge Between Cylinder Block And Oil Pan

Courtesy of AUDI OF AMERICA, LLC

-- Lightly coat the lower sealing surface of the sealing flange with sealant -shaded area-.

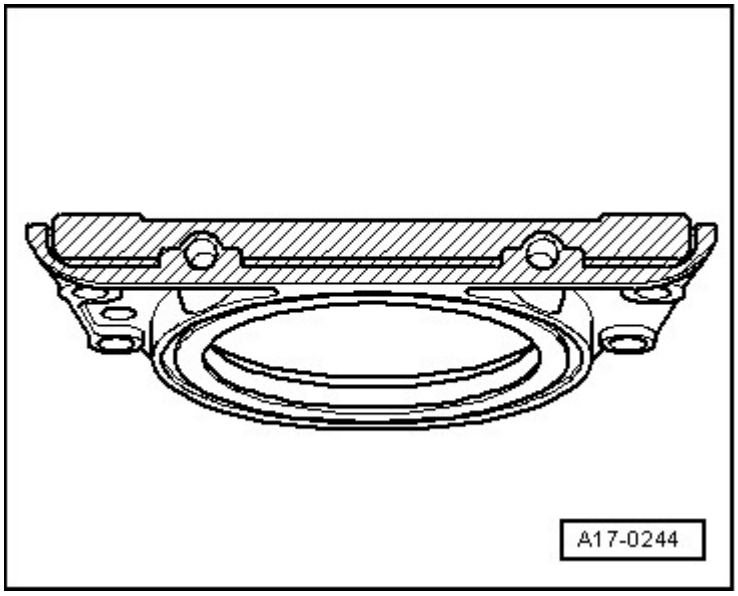

Fig. 65: Sealing Flange Sealing Surface
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of plugging oil pump strainer with excess sealant.

- **Do not apply sealant bead thicker than indicated.**

NOTE: The sealing flange must be installed within 5 minutes of being applied with sealant.

-- To install, push the sealing flange -2- together with the guide sleeve -1- (included with replacement part) onto the crankshaft.

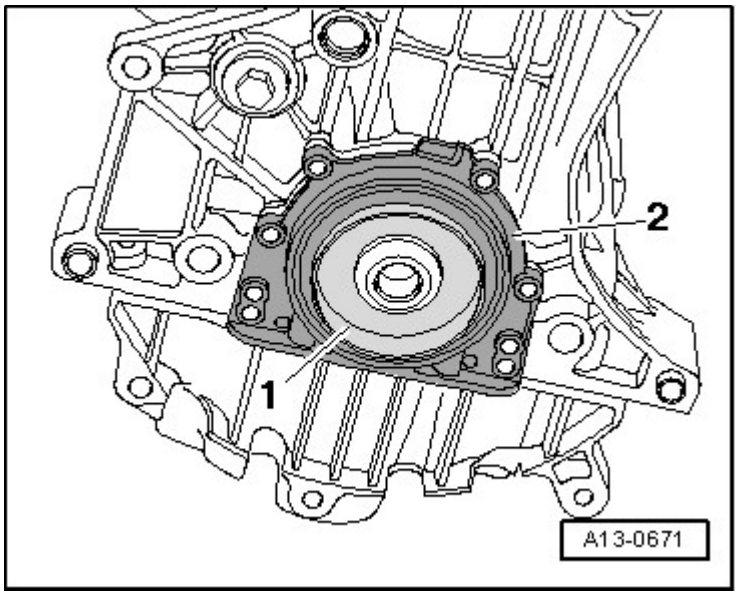

Fig. 66: Sealing Flange And Guide Sleeve
Courtesy of AUDI OF AMERICA, LLC

-- Then carefully push the sealing flange onto the locating pins on the cylinder block.

-- Fasten the bolts in the specified order:

-- Install bolts -1 through 8- and tighten by hand.

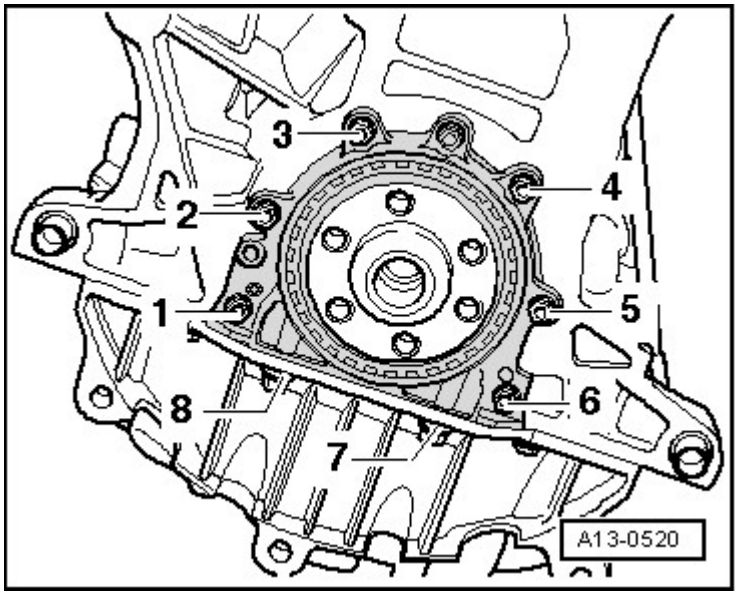

Fig. 67: Rear Sealing Flange Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Tighten bolts -1 through 6- in a diagonal sequence in stages.

-- Tighten bolts -7 and 8-.

The rest of the installation is performed in reverse order of removal, noting the following:

-- Hook in intermediate plate at sealing flange and push it onto the alignment sleeves -arrows-.

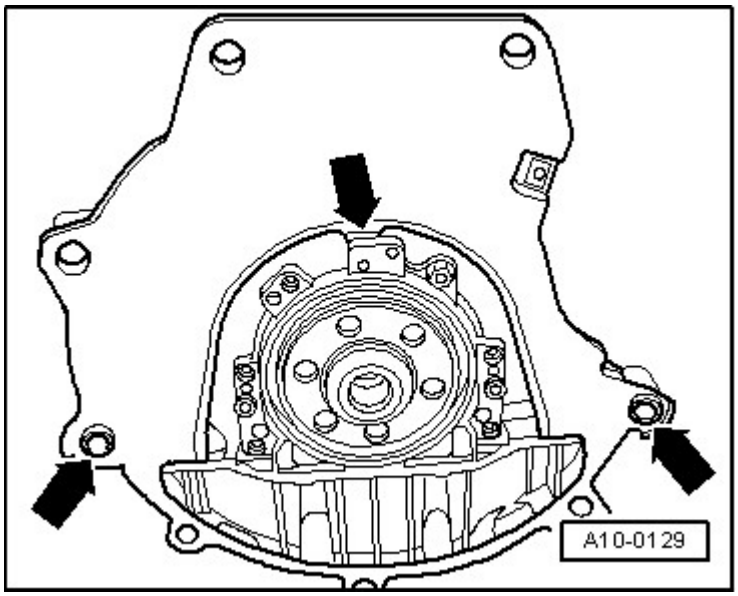

Fig. 68: Identifying Intermediate Plate Alignment Bushings
Courtesy of AUDI OF AMERICA, LLC

-- Install dual-mass flywheel. Refer to **DUAL MASS FLYWHEEL**.

NEEDLE BEARINGS FROM CRANKSHAFT

Special tools and workshop equipment required

- Puller T10055
- With Adapter T10055/3
- Centering Mandrel 3176
- or Drift VW 207 C.
- Puller for example Kukko 21/2.

Removing

-- Pull out using standard extractor for example Kukko 21/2 -arrow-, T10055/3 and T10055.

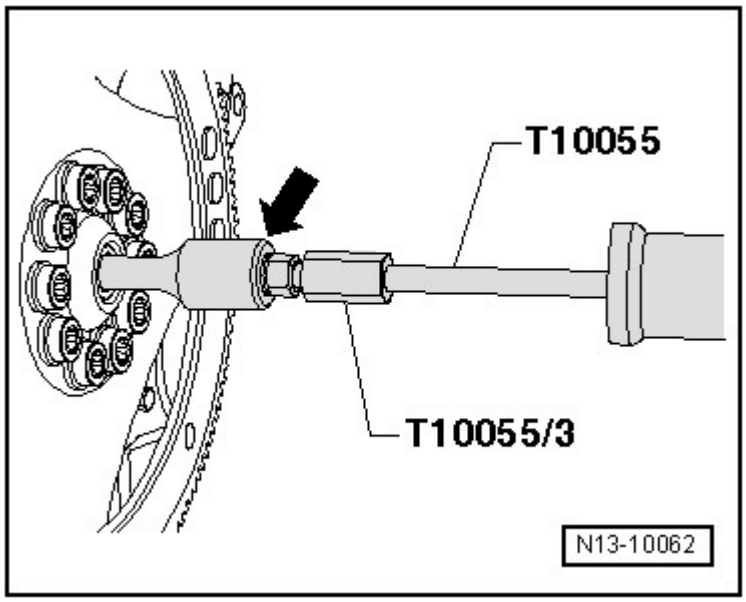

Fig. 69: Identifying Standard Extractor E.G. Kukko 21/2, Adapter T10055/3 And Puller T10055
Courtesy of AUDI OF AMERICA, LLC

Installing

NOTE: Side of needle bearing with writing on it must be readable when installed.

-- Drive in using the VW 207 C or 3176.

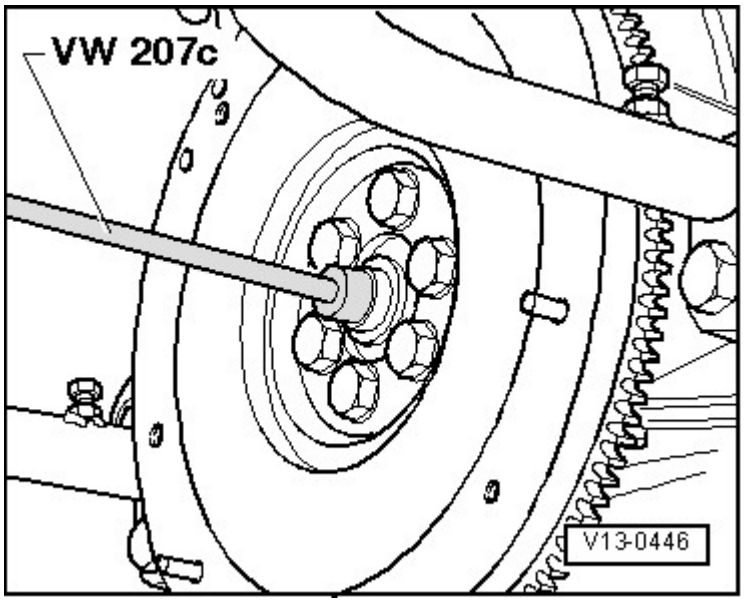

Fig. 70: Driving In Needle Bearing Using Drift VW 207 C
Courtesy of AUDI OF AMERICA, LLC

Installation depth dimension -a- = 2 mm

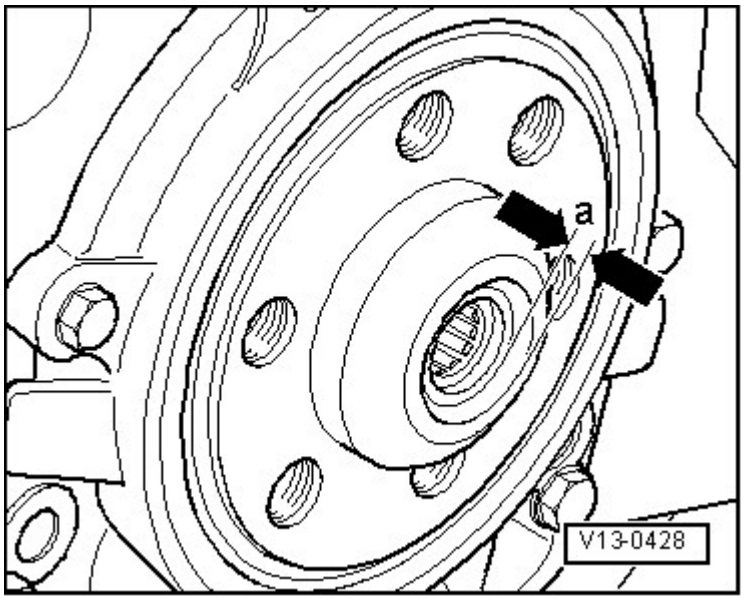

Fig. 71: Identifying Installation Depth Dimension
Courtesy of AUDI OF AMERICA, LLC

CHAIN SPROCKET

Special tools and workshop equipment required

- Press Tube 30 - 100
- Thrust Piece 40 - 105
- Two-arm puller, commercially available
- Protective gloves

Removing

-- Remove oil pan with oil pump. Refer to **OIL PAN** .

-- Remove front sealing flange. Refer to **FRONT SEALING FLANGE**.

-- Pull off crankshaft chain sprocket with claw puller -2- for example Kukko 44-1, while protecting end of crankshaft with the 40 - 105.

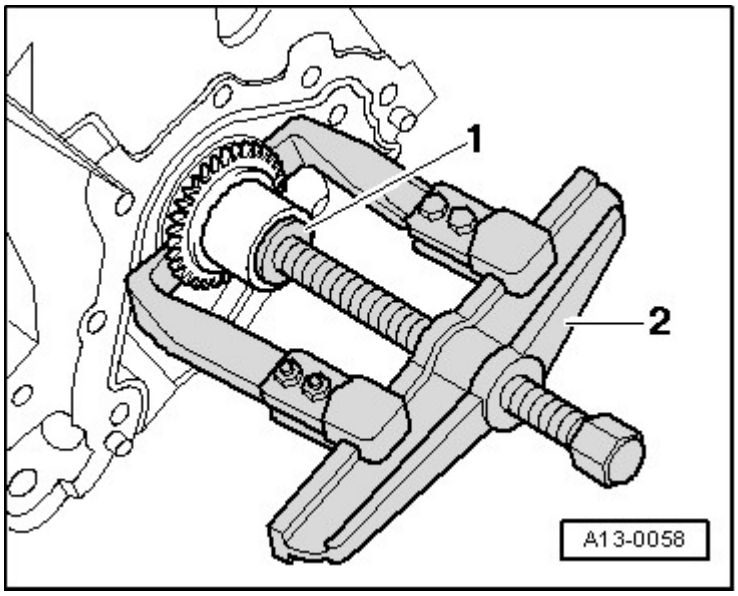

Fig. 72: Pulling Off Chain Sprocket From Crankshaft
Courtesy of AUDI OF AMERICA, LLC

Installing

Install in reverse order of removal. Note the following:

WARNING: Wear protective gloves!

-- Heat up the chain sprocket in an oven for approximately 15 minutes at 220 °C (428 °F).

NOTE: Installation position: Wider shoulder of chain sprocket faces toward engine.

-- Using pliers, install chain sprocket on crankshaft end and slide onto crankshaft to stop using the 30 - 100.

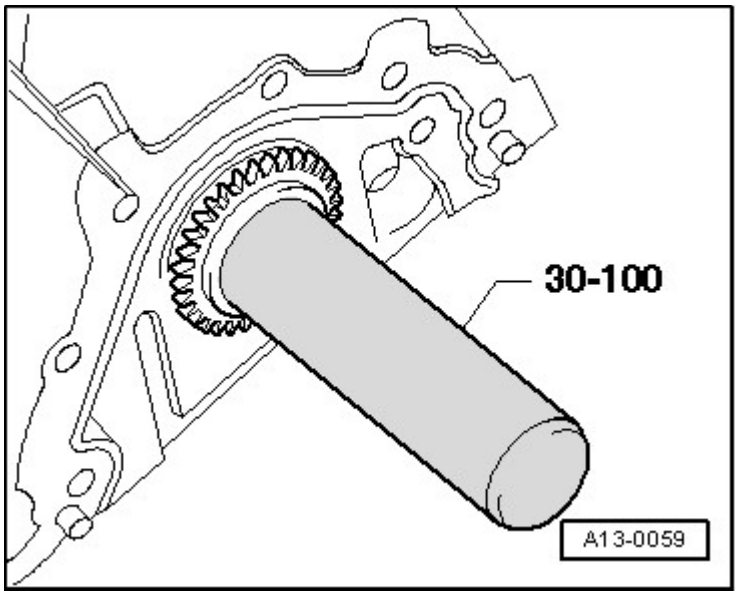

Fig. 73: Installing Chain Sprocket Onto Crankshaft Up To Limit Stop Using Press Tube 30-100
Courtesy of AUDI OF AMERICA, LLC

-- Install oil pan with oil pump. Refer to **OIL PAN** .

SPECIAL TOOLS

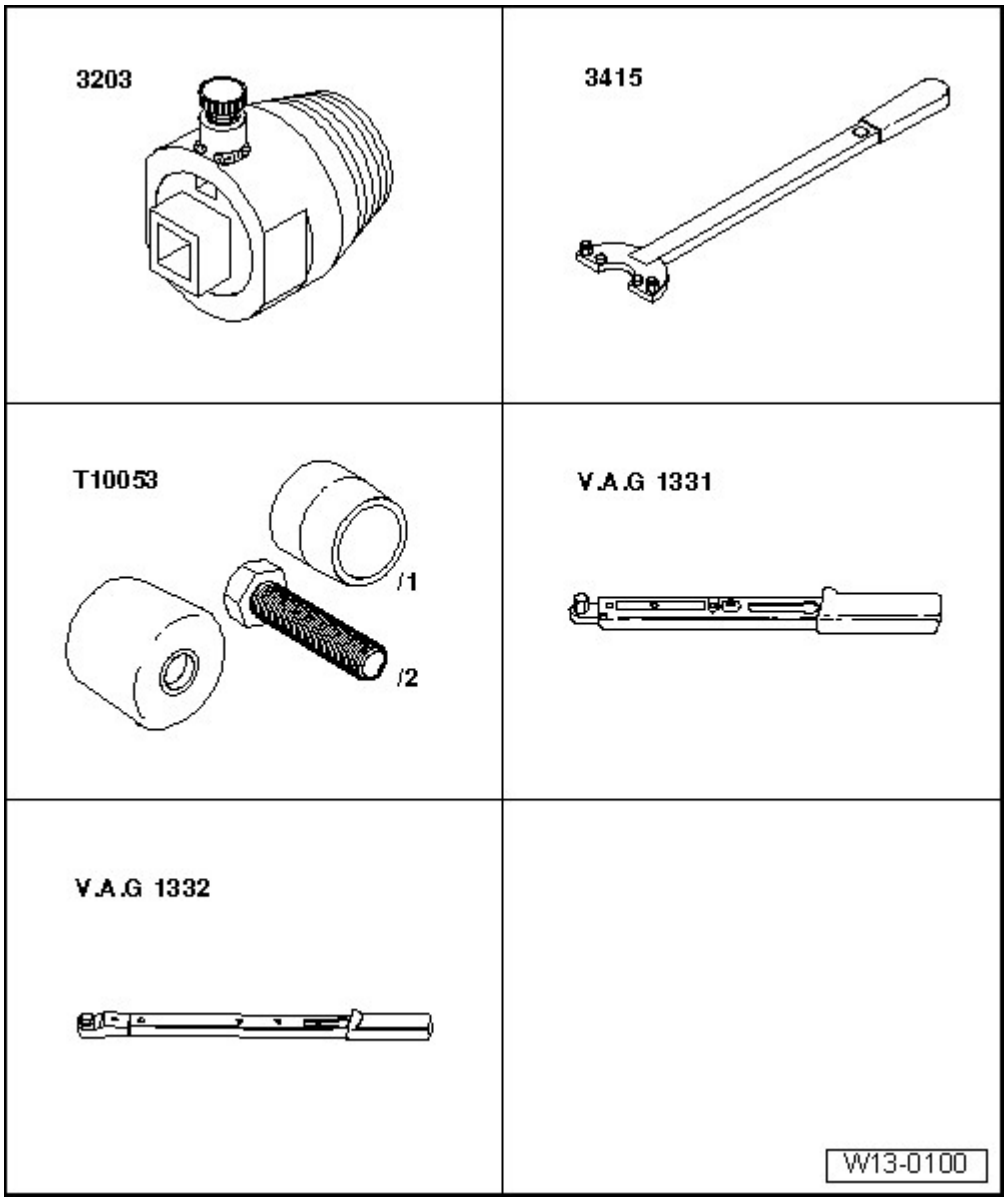

Fig. 74: Identifying Special Tools - Crankshaft Oil Seal - Belt Pulley End, Replacing (For PTFE Seals)
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Seal Remover 3203
- Counter Support 3415
- Assembly Tool T10053
- Torque Wrench 5-50 Nm V.A.G 1331
- Torque Wrench 40-200 Nm V.A.G 1332

Special tools and workshop equipment required

- Dial Gauge Holder VW 387

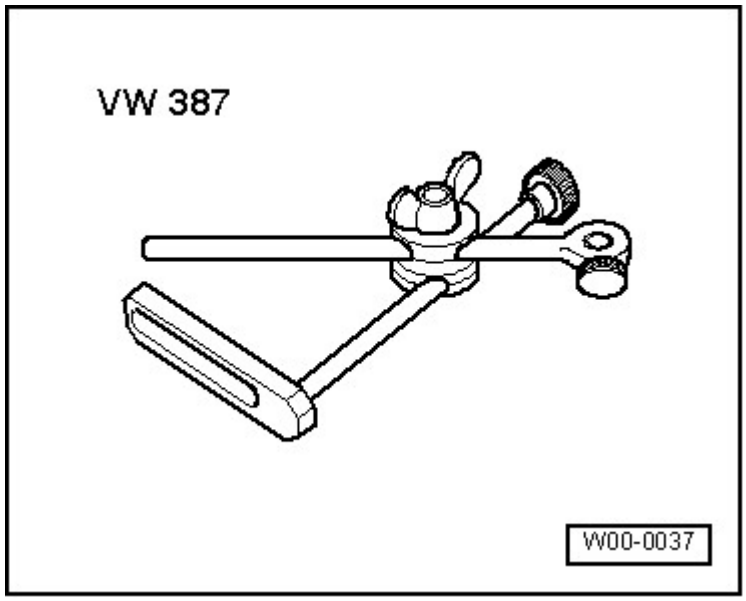

Fig. 75: Dial Gauge Holder VW 387
Courtesy of AUDI OF AMERICA, LLC

- Dial Gauge 0-10 mm VAS 6079

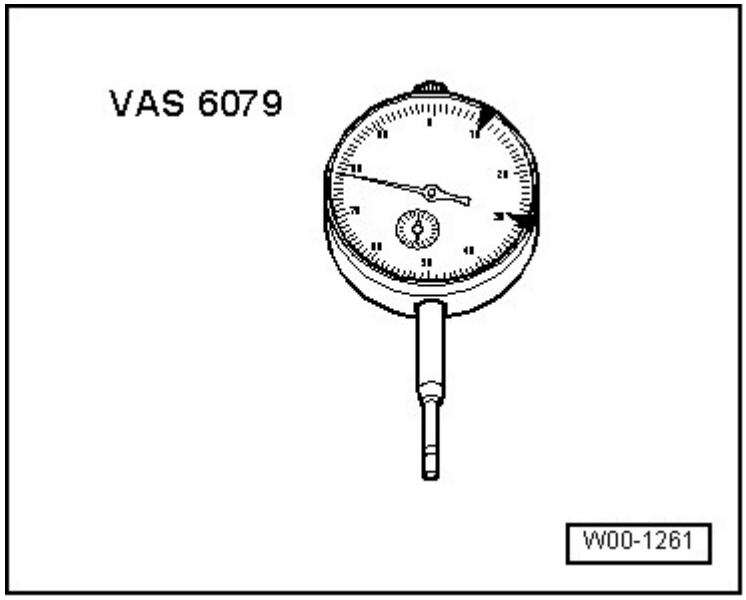

Fig. 76: Dial Gauge VAS 6079
Courtesy of AUDI OF AMERICA, LLC

- Locking Pin T10060A

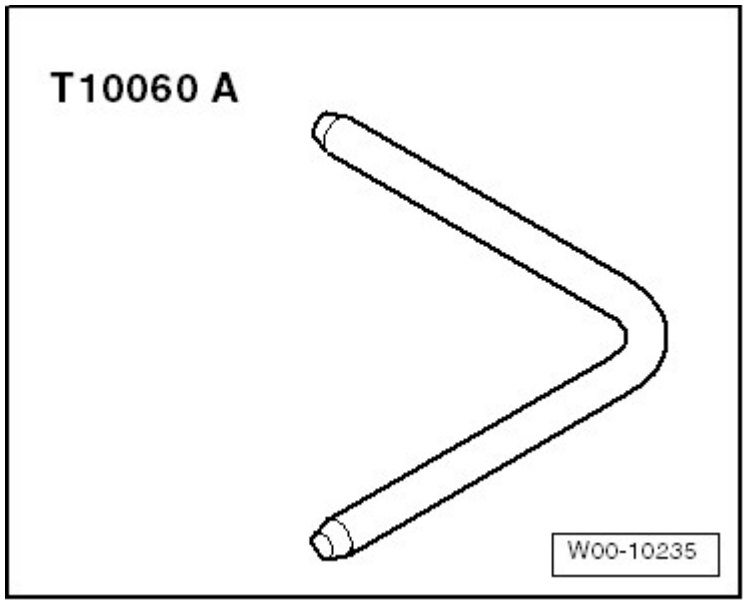

Fig. 77: Identifying Locking Pin T10060 A
Courtesy of AUDI OF AMERICA, LLC

- Spring Type Clip Pliers VAS 5024 A

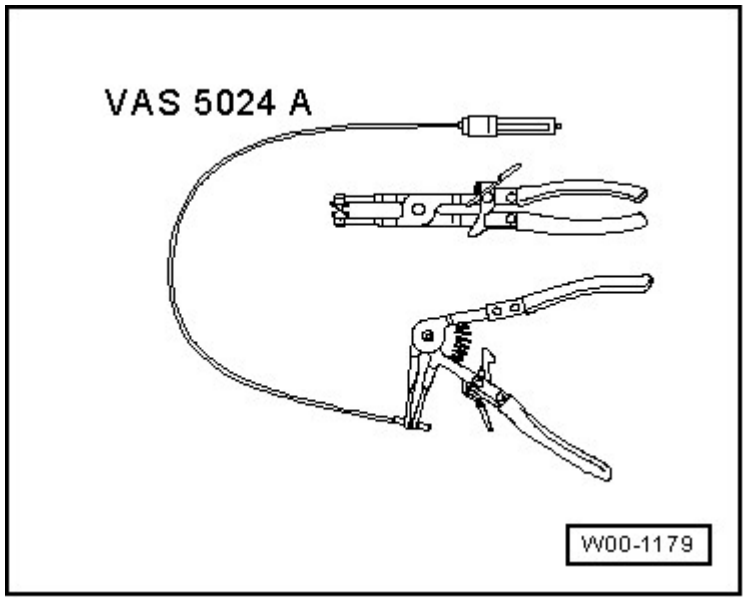

Fig. 78: Identifying Spring Clamps VAS 5024A
Courtesy of AUDI OF AMERICA, LLC

- Flywheel Retainer 3067

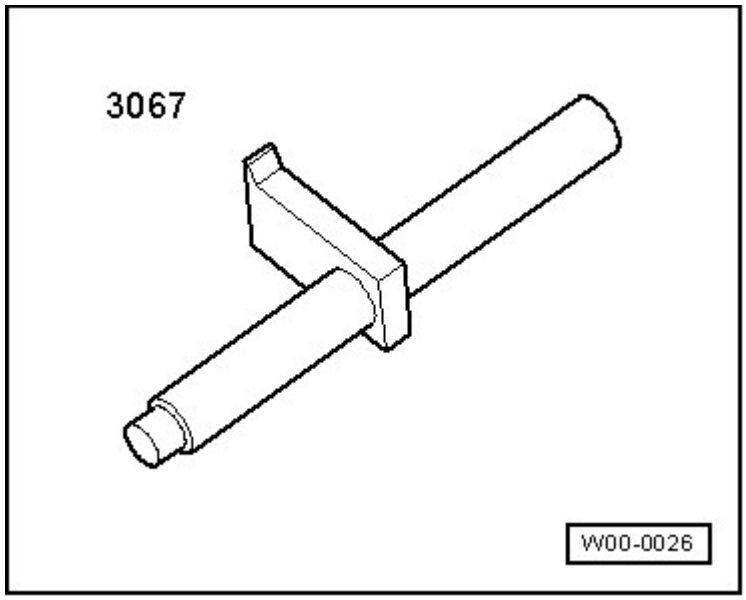

Fig. 79: 3067 Counter-Hold Tool
Courtesy of AUDI OF AMERICA, LLC

- Puller T10055

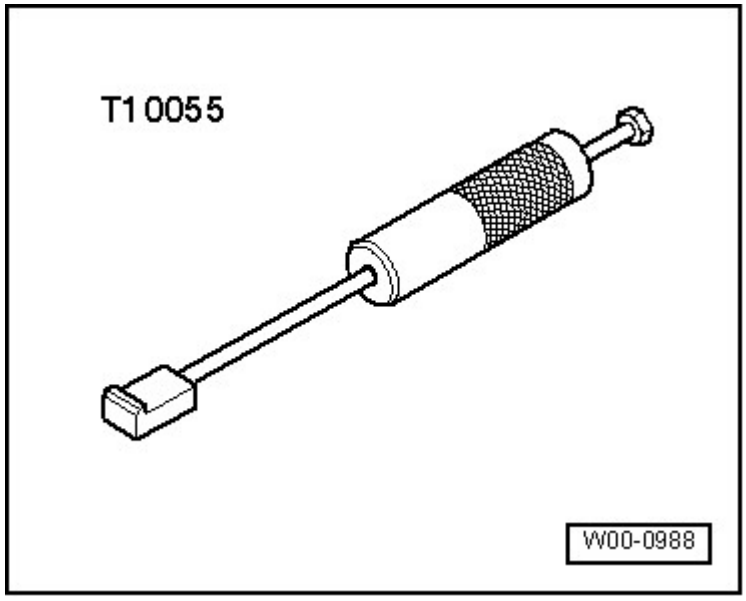

Fig. 80: Identifying Puller T10055
Courtesy of AUDI OF AMERICA, LLC

- With Adapter T10055/3
- Centering Mandrel 3176

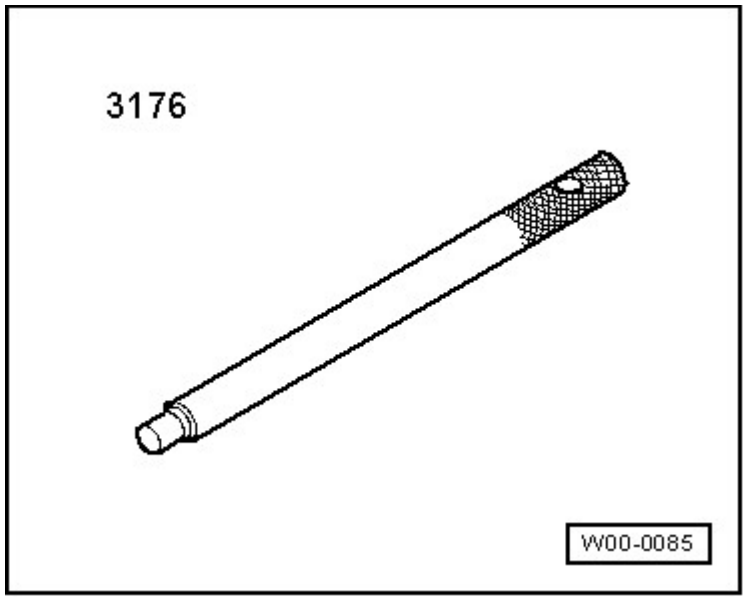

Fig. 81: 3176 Centering Mandrel
Courtesy of AUDI OF AMERICA, LLC

- Press Tube 30 - 100

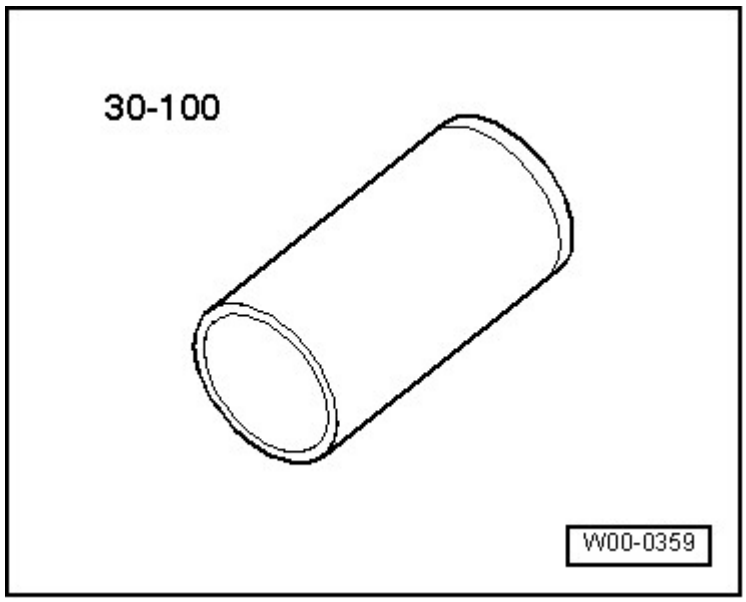

Fig. 82: Press Tube 30 - 100
Courtesy of AUDI OF AMERICA, LLC

- Thrust Piece 40 - 105

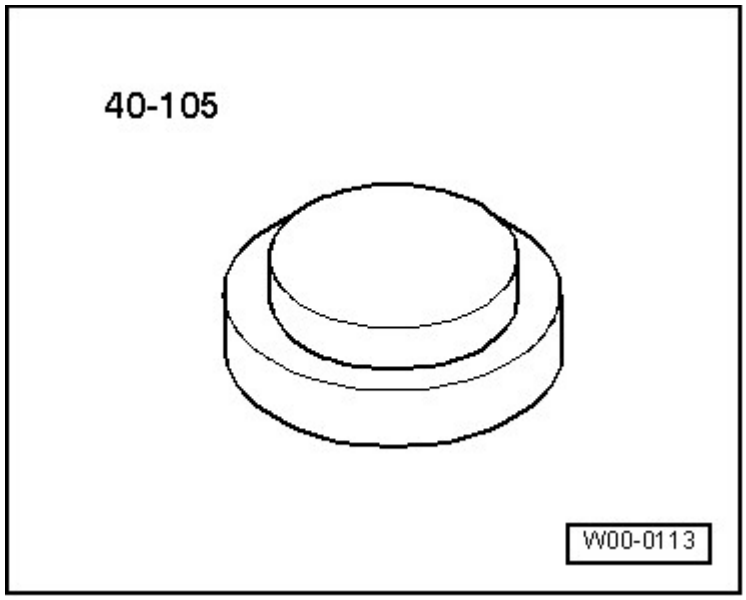

Fig. 83: Identifying Thrust Piece 40-105
Courtesy of AUDI OF AMERICA, LLC

- Not illustrated:
- Drift VW 207 C

ENGINE

2.0 Liter - Cylinder Head, Valvetrain - Engine Code(s): BPY

15 CYLINDER HEAD, VALVETRAIN

DESCRIPTION AND OPERATION

TOOTHED BELT DRIVE, WITHOUT DIVIDED TOOTHED BELT GUARD OVERVIEW

NOTE: Vehicles from 01/2006 have a new toothed belt guard. Identification: The upper toothed belt guard does not have cover 25 and guard is divided in engine bracket area. Vehicles with divided toothed belt guard - assembly overview. Refer to TOOTHED BELT, WITH DIVIDED TOOTHED BELT GUARD.

Before removing the ribbed belt, mark the running direction with chalk or felt tip marker. A reversed turning direction can cause damage to the belt under operating conditions.

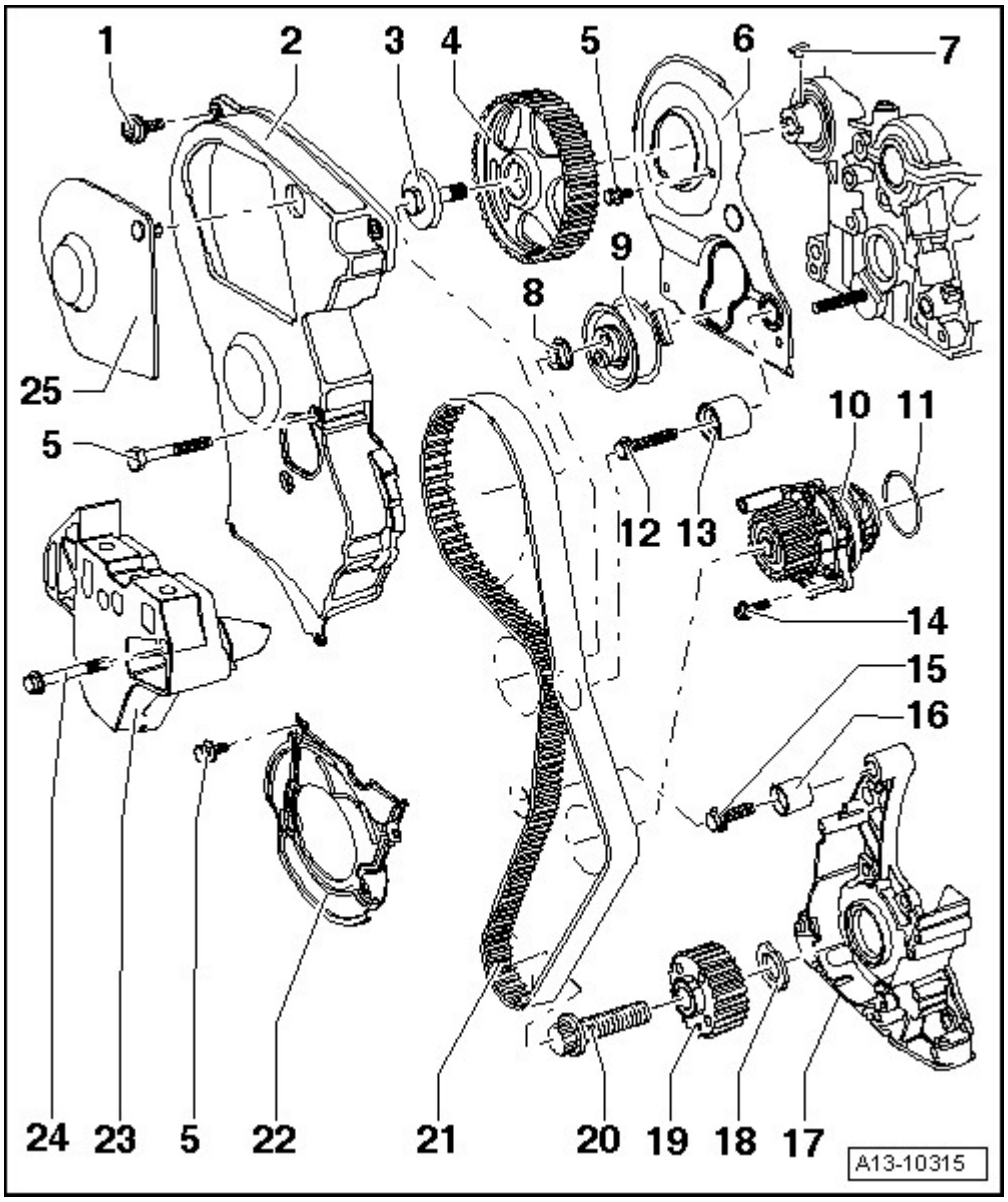

Fig. 1: Toothed Belt Drive, Without Divided Toothed Belt Guard Overview
Courtesy of AUDI OF AMERICA, LLC

1. Bolt
   - **10 Nm**
   - Insert with locking fluid
   - Locking fluid
2. Upper Toothed Belt Guard
3. Bolt
   - Replace
   - **50 Nm plus an additional 180° turn**
   - Use retainer 3036 for loosening and tightening, refer to **Fig. 2**

4. Camshaft Sprocket
   - When removing and installing, remove toothed belt, refer to **TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD**
   - Installed position is fixed by woodruff key, refer to 7
   - Camshaft sprocket, removing, refer to **Fig. 3**
5. Bolt
   - **10 Nm**
   - Insert with locking fluid
   - Locking fluid
6. Rear Toothed Belt Guard
7. Woodruff Key
   - Make sure it is secure
8. Nut
   - **25 Nm**
9. Semi-Automatic Tensioning Roller
10. Coolant Pump
    - **Removing and installing** , refer to **COOLANT PUMP**
11. O-ring
    - Replace
    - Coat with coolant
12. Bolt
    - **25 Nm**
13. Damper Roller
14. Bolt
    - **15 Nm**
15. Bolt
    - **35 Nm**
16. Damper Roller
17. Sealing Flange
    - Removing and installing, refer to **FRONT SEALING FLANGE**
18. Toothed Belt Gear Diamond Disc
    - Replace after removing toothed belt gear
19. Crankshaft Toothed Belt Sprocket
    - There must be no oil on the contact surface between the toothed belt sprocket and crankshaft
    - Only possible to install in one position
20. Bolt
    - Replace
    - **90 Nm plus an additional 90° turn**

- Do not oil
- Fastening counter support 3415, refer to **Fig. 4**

21. Toothed Belt
    - Before removing, mark direction of rotation using chalk or felt-tip marker
    - Check for wear
    - **Removing** , refer to **TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD**
    - **Installing** (adjusting valve timing), refer to **TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD**
22. Lower Toothed Belt Guard
23. Engine Support
    - **Removing** : Toothed belt, removing and installing, refer to **TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD**
24. Bolt
    - **40 Nm**
    - Follow the tightening sequence **Fig. 47**
25. Cover for Toothed Belt Guard

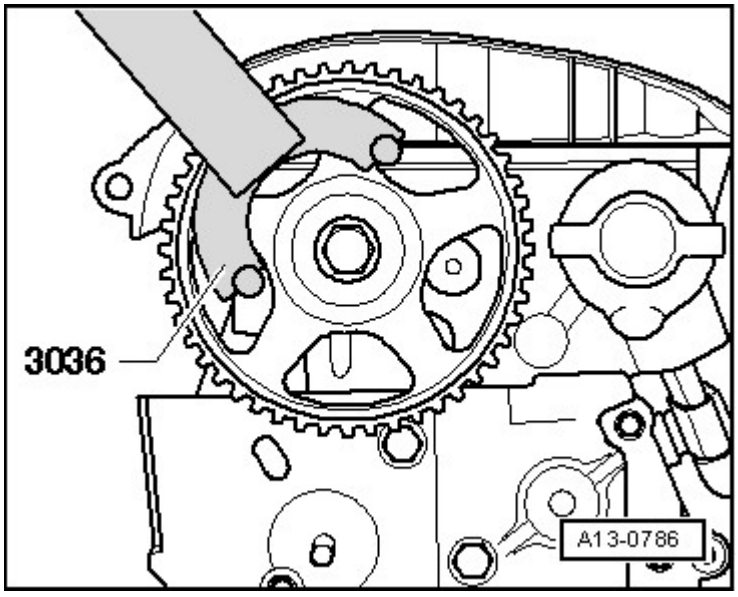

Fig. 2: Loosening Bolt For Camshaft Sprocket Using Retainer 3036
Courtesy of AUDI OF AMERICA, LLC

-- When loosening and tightening the center bolt, use retainer 3036.

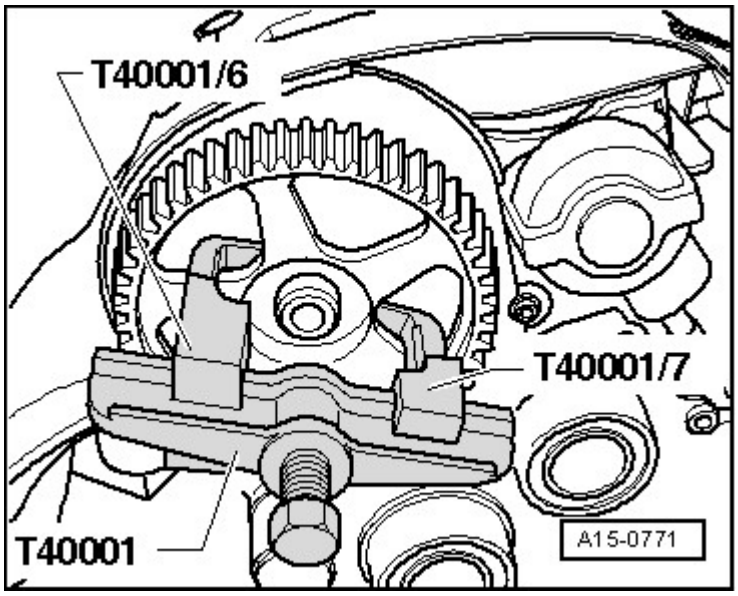

Fig. 3: Identifying Puller T40001, Claw T40001/6 And Claw T40001/7
Courtesy of AUDI OF AMERICA, LLC

-- Pulling off camshaft sprocket with puller T40001 and claws T40001/6 and T40001/7.

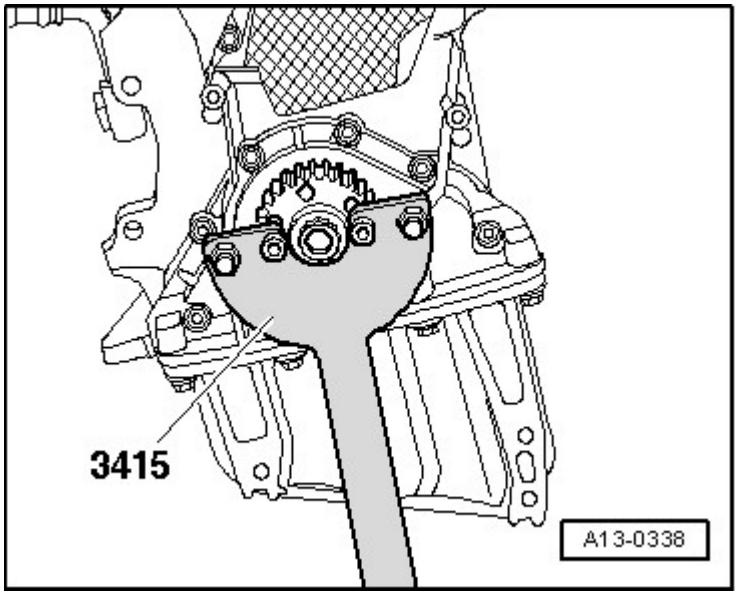

Fig. 4: Crankshaft Toothed Belt Sprocket, Removing And Installing
Courtesy of AUDI OF AMERICA, LLC

-- When loosening and tightening the center bolt, use counter support 3415.

TOOTHED BELT DRIVE, WITH DIVIDED TOOTHED BELT GUARD OVERVIEW

NOTE: Vehicles from 01/2006 have a new toothed belt guard. Identification: The upper toothed belt guard does not have cover 25 and guard is divided in engine

bracket area. Vehicles without divided toothed belt guard - assembly overview. Refer to TOOTHED BELT DRIVE, WITHOUT DIVIDED TOOTHED BELT GUARD OVERVIEW.

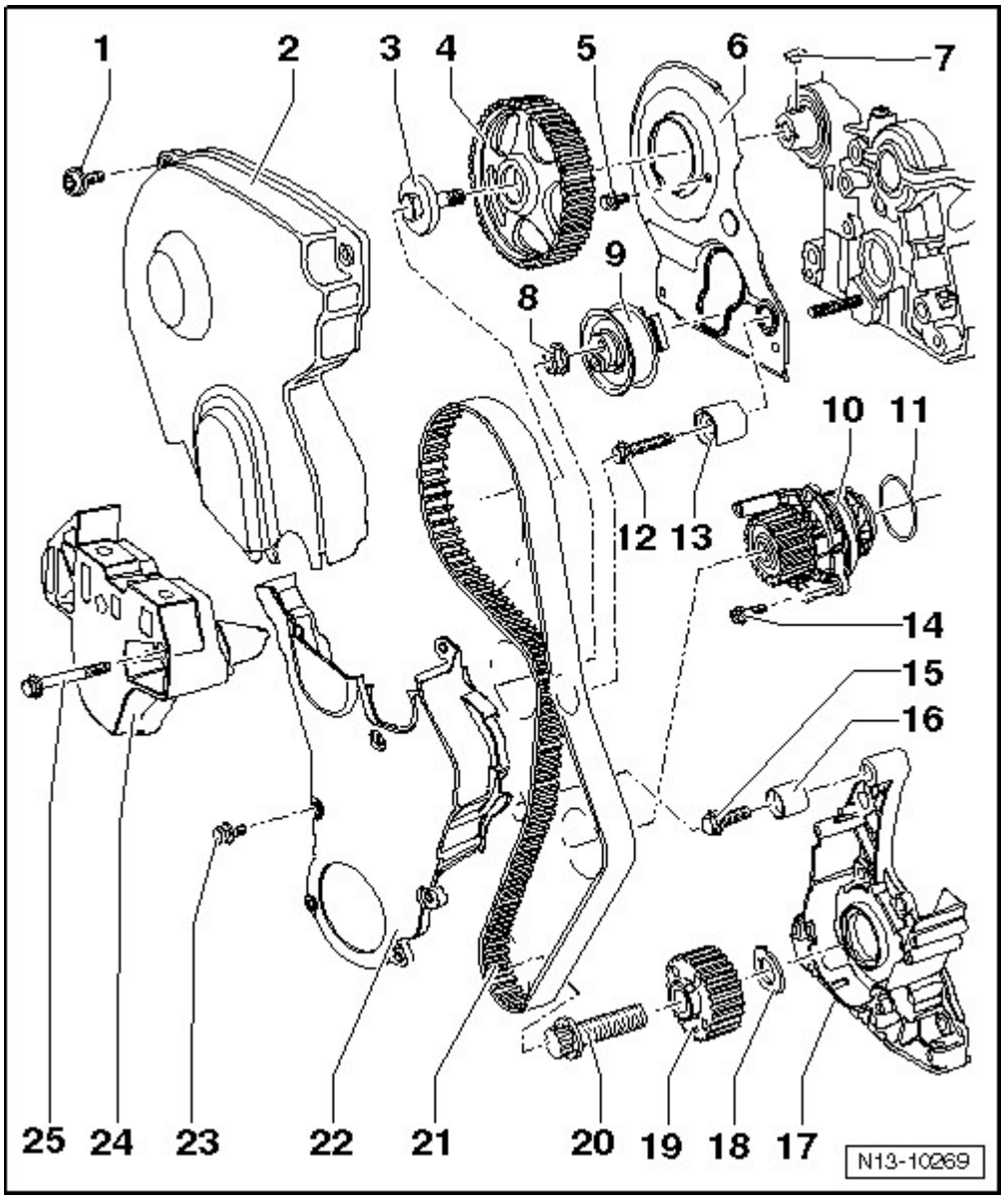

Fig. 5: Toothed Belt Drive, With Divided Toothed Belt Guard Overview
Courtesy of AUDI OF AMERICA, LLC

1. Bolt
   - **10 Nm**
2. Upper Toothed Belt Guard
3. Bolt
   - **50 Nm plus an additional 180°**
   - Use retainer 3036 for loosening and tightening, refer to **Fig. 6**

4. Camshaft Sprocket
    - Installation position secured by woodruff key 7
    - Camshaft sprocket, removing, refer to **Fig. 7**
5. Bolt
    - **10 Nm**
    - Insert with locking fluid
6. Rear Toothed Belt Guard
7. Woodruff Key
    - Make sure it is secure
8. Bolt
    - **25 Nm**
9. Semi-Automatic Tensioning Roller
10. Coolant Pump
    - **Removing and installing** , refer to **COOLANT PUMP**
11. O-ring
    - Replace
12. Bolt
    - **25 Nm**
13. Damper Roller
14. Bolt
    - **15 Nm**
15. Bolt
    - **35 Nm**
16. Damper Roller
17. Sealing Flange
    - **Removing and installing** , refer to **FRONT SEALING FLANGE**
18. Diamond Disc
    - Replace
19. Crankshaft Toothed Belt Sprocket
    - There must be no oil on the contact surface between toothed belt gear, diamond disc and crankshaft
    - Only possible to install in one position
20. Bolt
    - Replace
    - **90 Nm plus an additional 90° turn**
    - Do not oil
    - Use counter support 3415 for loosening and tightening, refer to **Fig. 8**
21. Toothed Belt
    - Before removing, mark direction of rotation using chalk or felt-tip marker

- Check for wear
- **Removing and installing** , refer to **TOOTHED BELT, WITH DIVIDED TOOTHED BELT GUARD**

22. Lower Toothed Belt Guard
23. Bolts
    - **8 Nm**
    - 7 pieces
    - For lower toothed belt guard
24. Engine Mount
25. Bolt
    - **45 Nm**

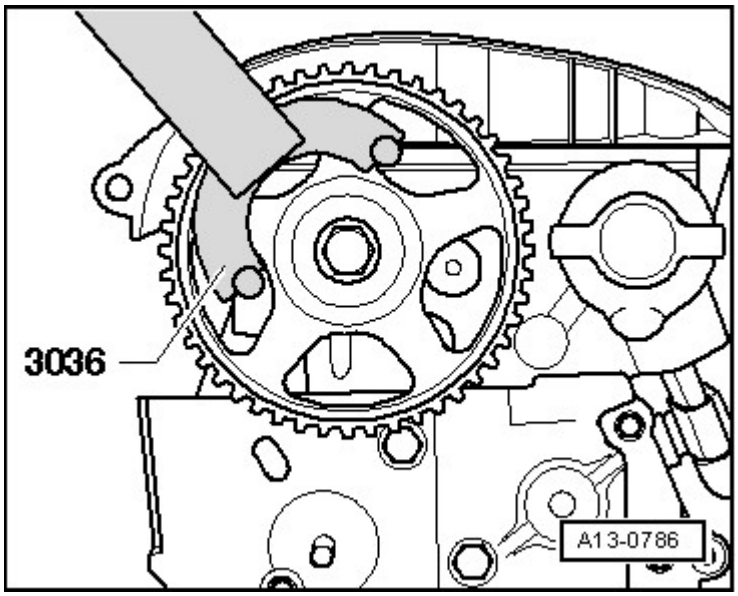

Fig. 6: Loosening Bolt For Camshaft Sprocket Using Retainer 3036
Courtesy of AUDI OF AMERICA, LLC

-- When loosening and tightening the center bolt, use retainer 3036.

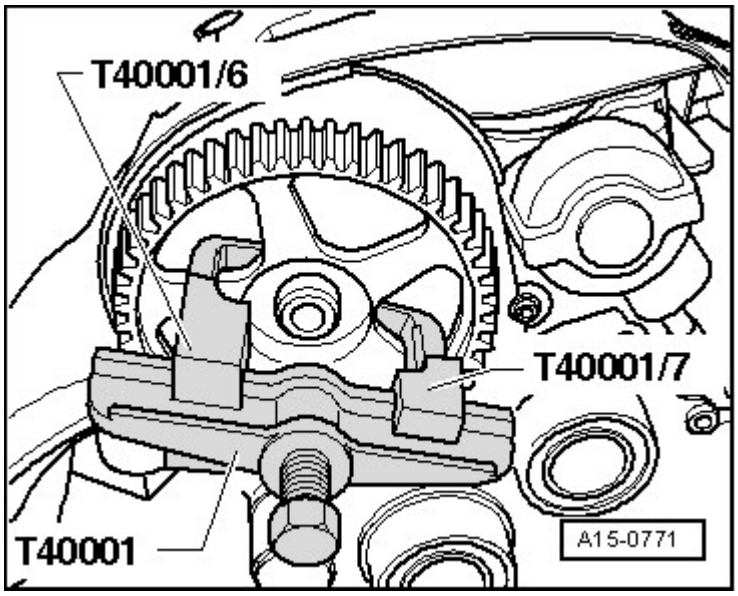

Fig. 7: Identifying Puller T40001, Claw T40001/6 And Claw T40001/7
Courtesy of AUDI OF AMERICA, LLC

-- Pulling off camshaft sprocket with puller T40001 and claws T40001/6 and T40001/7.

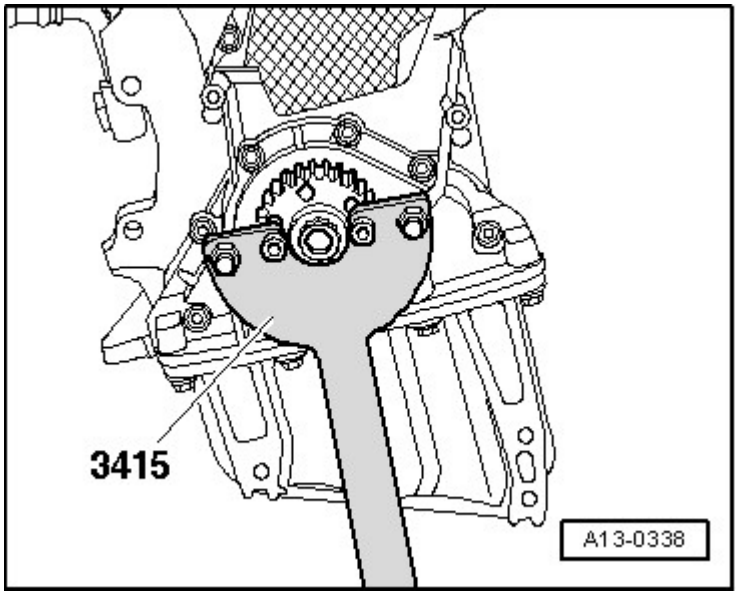

Fig. 8: Crankshaft Toothed Belt Sprocket, Removing And Installing
Courtesy of AUDI OF AMERICA, LLC

-- When loosening and tightening the center bolt, use retainer 3415.

CYLINDER HEAD OVERVIEW

NOTE: Replace the cylinder head bolts.

Always replace self-locking nuts, bolts which have been tightened to tightening specifications as well as gaskets and O-rings.

When installing a replacement cylinder head with camshafts installed, contact surfaces between roller rocker lever and cam running surfaces must be oiled.

The plastic protectors installed to protect the open valves must only be removed immediately before installing the cylinder head.

When replacing the cylinder head or cylinder head gasket, coolant must be completely replaced.

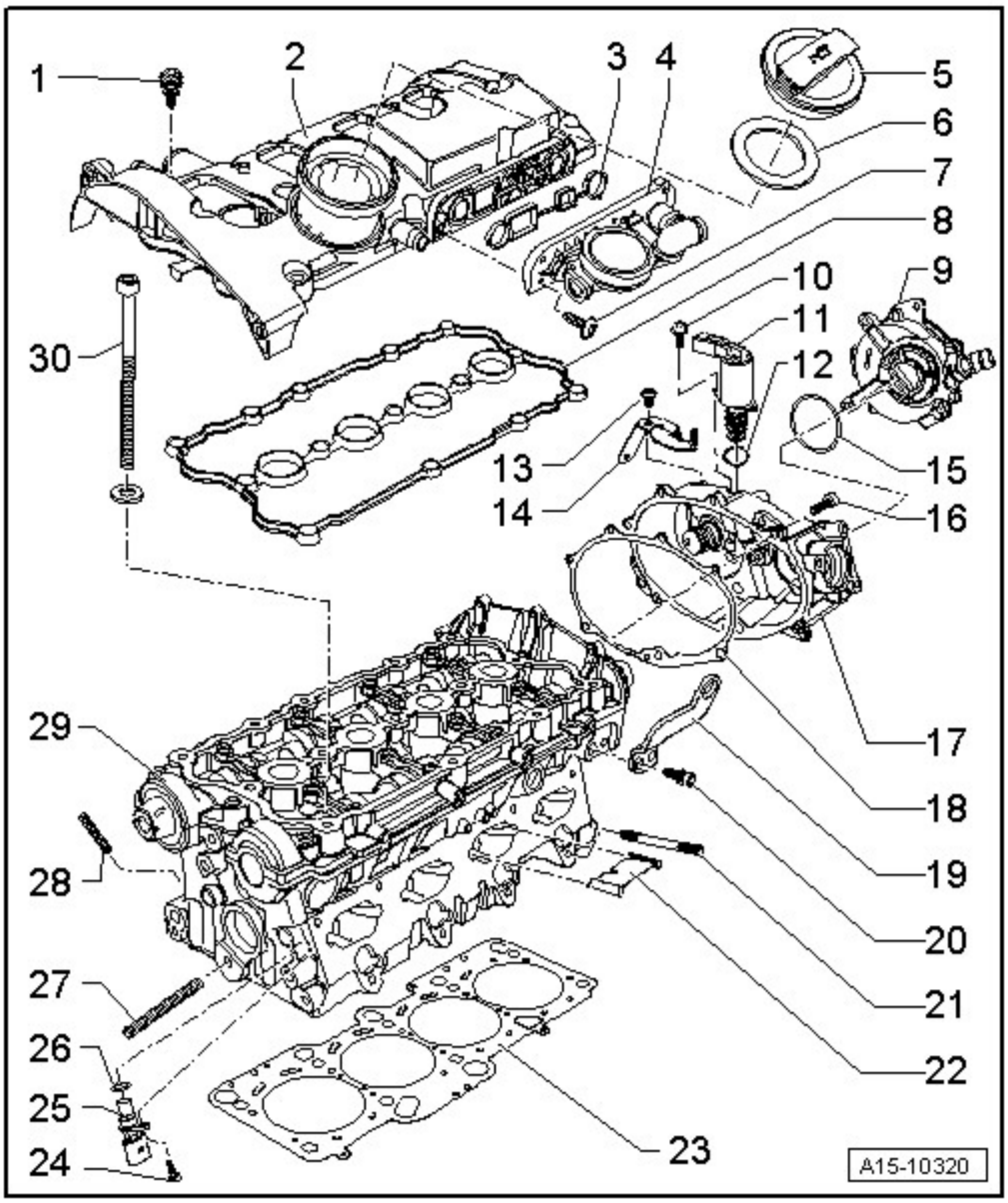

Fig. 9: Cylinder Head Assembly Overview

Courtesy of AUDI OF AMERICA, LLC

1. Bolt
    - Tightening sequence, refer to **Fig. 10**
2. Cylinder Head Cover
3. Gasket
    - Replace if damaged or leaking
4. Valve Housing
5. Oil Filler Cap
6. Gasket
    - Replace if damaged or leaking
7. Bolt
    - **4 Nm**
8. Cylinder Head Cover Gasket
    - Replace if damaged or leaking
9. Vacuum Pump
10. Bolt
    - **4 Nm**
11. Camshaft Adjustment Valve 1 -N205-
    - **Removing** , refer to **CAMSHAFT ADJUSTMENT VALVE 1**
12. Seal
    - Replace
13. Bolt
    - **10 Nm**
14. Cable Bracket
15. Seal
    - Replace if damaged or leaking
16. Bolt
    - **10 Nm**
17. Housing
18. Gasket
    - Replace
19. Transport Strap
20. Bolt
    - **25 Nm**
21. Intake Manifold Stud Bolt
    - **10 Nm**
22. Partition Plate

23. Cylinder Head Gasket
    - Replace
    - Note installation position: The part number faces the cylinder head
24. Bolt
    - **10 Nm**
25. Camshaft Position Sensor -G40-
26. Seal
27. Tensioning Roller Stud Bolt
    - **10 Nm**
28. Exhaust Manifold Stud Bolt
    - **20 Nm**
29. Cylinder Head
    - Check for distortion, refer to **Fig. 13**
30. Cylinder Head Bolt
    - Replace
    - **Tightening specification: 40 Nm plus an additional 180° turn**
    - Observe sequence for loosening, refer to **Fig. 11**
    - Observe sequence for tightening, refer to **Fig. 12**

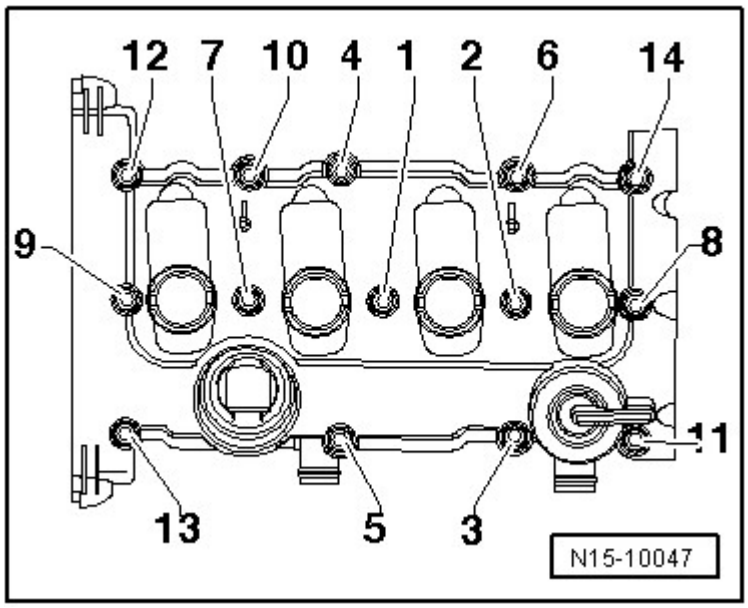

Fig. 10: Identifying Cylinder Head Cover Bolts Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Install bolts -1 through 14- and tighten by hand.

-- Tighten the bolts -1 through 14- diagonally to 10 Nm.

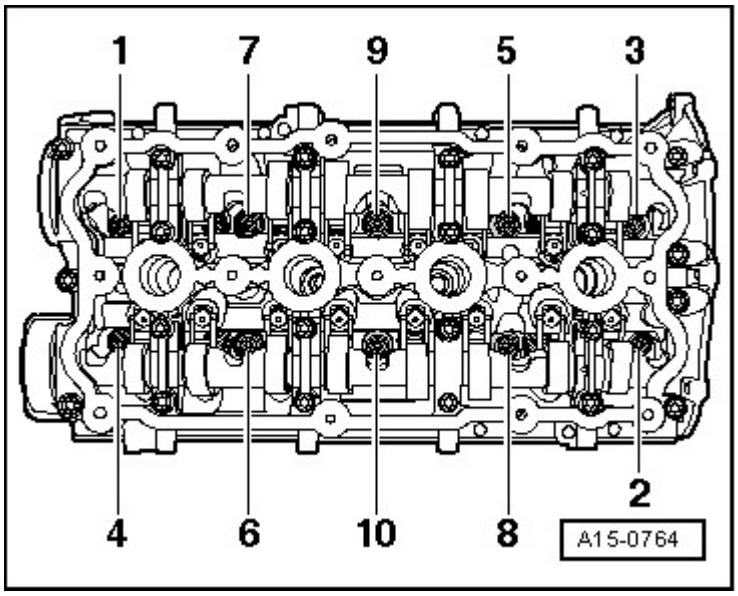

Fig. 11: Cylinder Head Bolt Loosening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Loosen cylinder head bolts in sequence shown and remove.

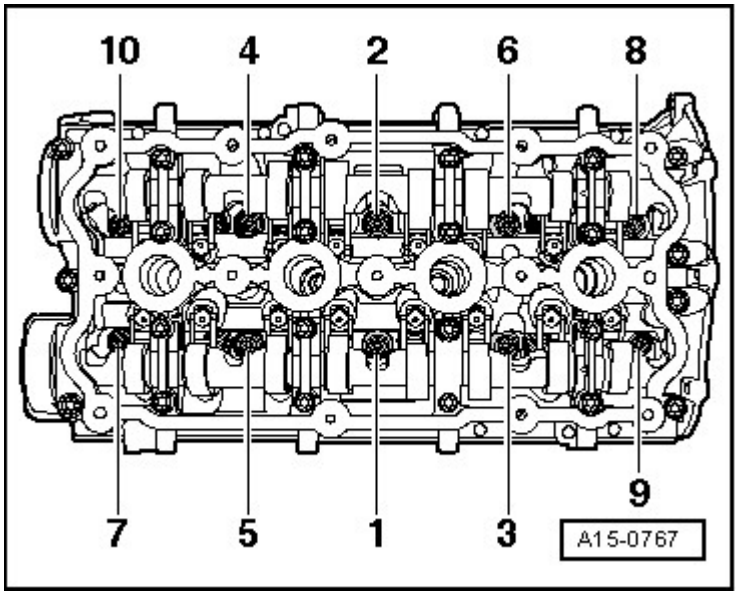

Fig. 12: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten cylinder head bolts in -1 through 10- sequence as follows

-- 1. Tighten to **40 Nm** using a torque wrench.

-- 2. Tighten further **90°** using a rigid wrench.

-- 3. Tighten further **90°** using a rigid wrench.

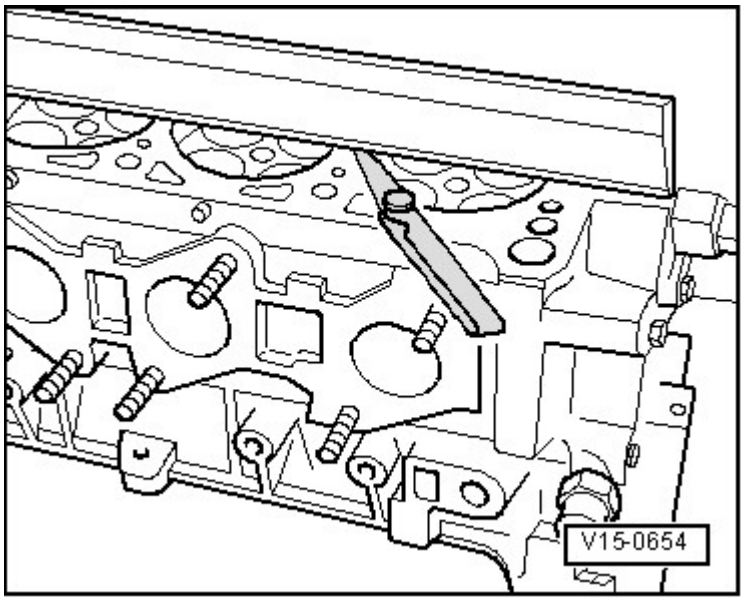

Fig. 13: Checking Cylinder Head For Distortion
Courtesy of AUDI OF AMERICA, LLC

-- Check cylinder head at multiple points for distortion, using straight edge and feeler gauges.

- Maximum permissible distortion: 0.05 mm.

VALVETRAIN OVERVIEW

NOTE: The cylinder head and guide frame must be replaced together.

Do not start the engine for approximately 30 minutes after installing the camshafts. The hydraulic adjusting elements must seat themselves (otherwise the valves will seat themselves on the pistons).

After working on the valvetrain and lifters, carefully rotate the crankshaft by hand at least 2 full revolutions before starting to be sure that valves do not strike the pistons.

Always replace the gaskets and seals.

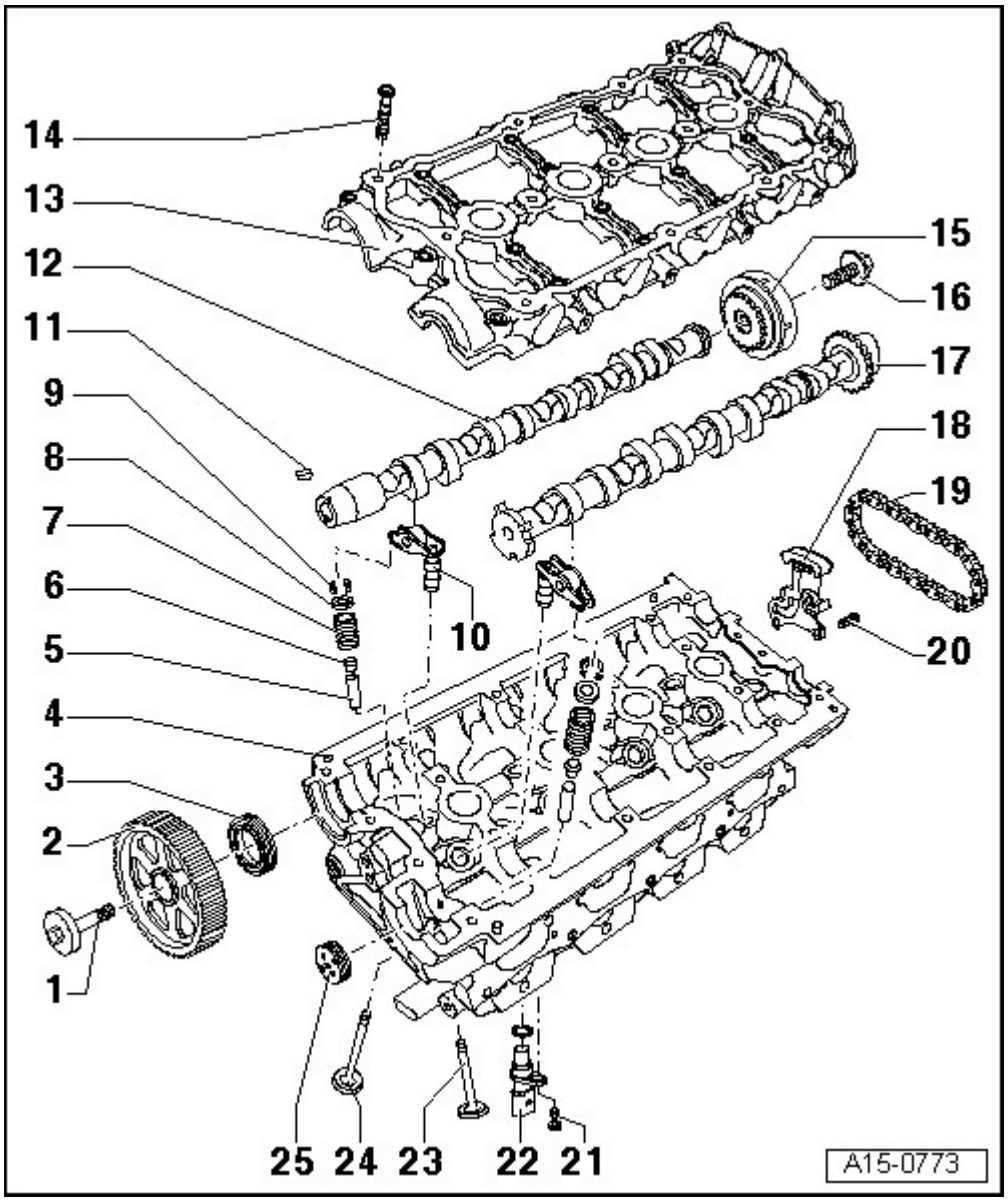

Fig. 14: Valvetrain Overview
Courtesy of AUDI OF AMERICA, LLC

1. 1 - Bolt
   - Replace
   - **50 Nm plus an additional 180° turn**
   - Use retainer 3036 for loosening and tightening, refer to **Fig. 2**
2. 2 - Camshaft Sprocket
3. 3 - Seal
   - **Removing and installing** , refer to **EXHAUST CAMSHAFT SEAL**
4. 4 - Cylinder Head
   - Reworking dimension, refer to **Fig. 15**

5. 5 - Valve Guide
   - Checking, refer to **VALVE GUIDES, CHECKING**
6. 6 - Valve Stem Seal
7. 7 - Valve Spring
8. 8 - Top Valve Spring Retainer
   - Replace, refer to **VALVE STEM SEALS, CYLINDER HEAD INSTALLED** or **VALVE STEM SEALS WITH CYLINDER HEAD REMOVED**
9. 9 - Valve Retainers
10. 10 - Hydraulic Valve Play Balancing Element
    - Do not interchange
    - Lubricate contact surface
11. 11 - Fitted Key
    - Make sure it is secure
12. 12 - Exhaust Camshaft
    - Check radial clearance using Plastigage (roller rocker lever removed)
    - Radial play with bearing diameter 24 mm: 0.024 to 0.066 mm
    - Radial play with bearing diameter 32 mm: 0.030 to 0.051 mm
    - Run-out: max. 0.04 mm
13. 13 - Guide Frame
    - With integrated camshaft bearings
    - Clean sealing surface, reworking is not permitted.
    - Remove old sealant residue.
14. 14 - Bolt
    - Replace
    - Tightening sequence, refer to **Fig. 16**
15. 15 - Camshaft Adjuster
16. 16 - Bolt
    - Replace
    - **20 Nm plus an additional 45° turn**
17. 17 - Intake Camshaft
    - Check radial clearance using Plastigage (roller rocker lever removed)
    - Radial play with bearing diameter 24 mm: 0.024 to 0.066 mm
    - Run-out: max. 0.04 mm
18. 18 - Chain Tensioner
    - Removing and installing, refer to **CAMSHAFT ADJUSTER**
    - Before removing, secure with locking pin T10115
19. 19 - Drive Chain
20. 20 - Bolt

- **10 Nm**

21. 21 - Bolt
    - **10 Nm**
22. 22 - Phase Sensor
23. 23 - Exhaust Valve
    - Do not reface, only lapping is permitted
    - For the correct valve dimensions, refer to **Fig. 17**
    - Valve guides, checking, refer to **VALVE GUIDES, CHECKING**
24. 24 - Intake Valve
    - Do not reface, only lapping is permitted
    - For the correct valve dimensions, refer to **Fig. 17**
    - Valve guides, checking, refer to **VALVE GUIDES, CHECKING**
25. 25 - Cap
    - Replace
    - Removing: When guide frame is installed: Pierce through one side of the cover with an awl and pry it out
    - Installing: Without sealant, press in 1 to 2 mm using the thrust piece 3334

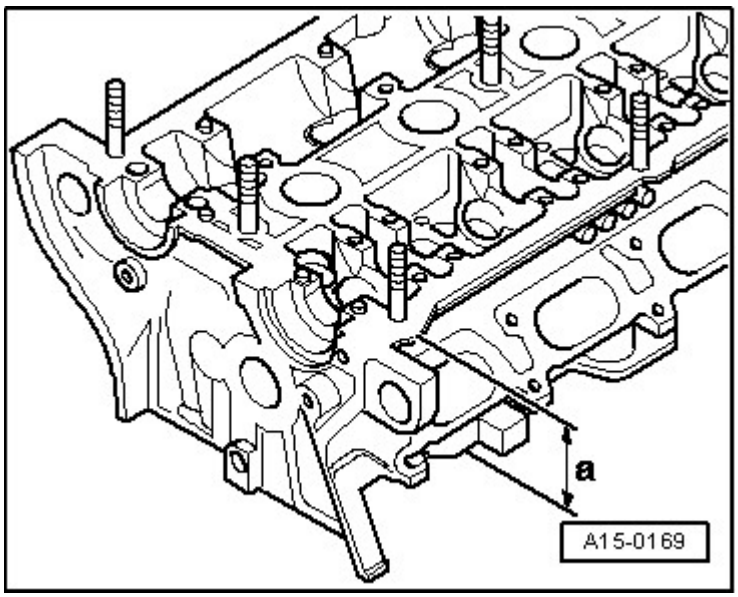

Fig. 15: Cylinder Head Refacing Dimension
Courtesy of AUDI OF AMERICA, LLC

-- Resurfacing cylinder head (face grinding) is only permissible to minimum dimension a.

- Minimum dimension: a = 139.20 mm

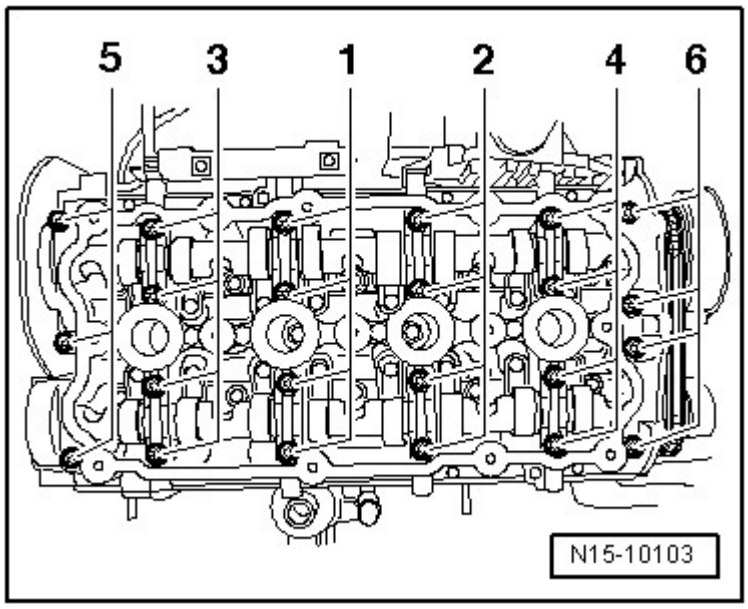

Fig. 16: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Replace bolts

-- Hand-tighten bolts in several stages -1 to 6- in sequence.

-- Tighten the bolts in sequence -1 to 6- to 8 Nm using a torque wrench.

-- Give 90° ($^{1}/_{4}$ turn) additional turn in sequence -1 to 6- using rigid wrench.

NOTE: Ensure guide frame is not tilted.

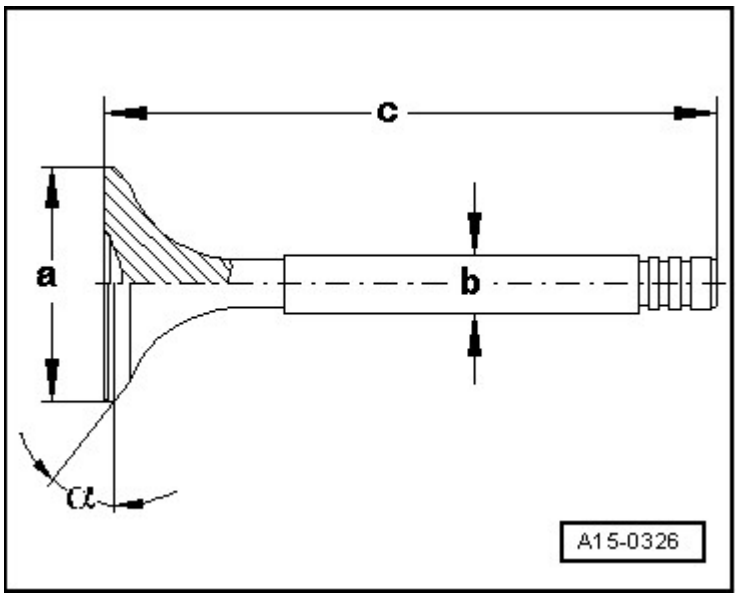

Fig. 17: Identifying Valve Dimensions
Courtesy of AUDI OF AMERICA, LLC

NOTE: Intake and exhaust valves must not be refaced by grinding. Only lapping is permitted.

Dimension		Intake Valve	Exhaust Valve
Diameter a	mm	33.85 ± 0.10	28.0 ± 0.1
Diameter b	mm	5.98 ± 0.01	5.96 ± 0.01
c	mm	104.0 ± 0.2	101.9 ± 0.2
a	Angle°	45	45

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Component	Bolt Size	Nm
Cable Bracket	-	10
Camshaft Adjuster[1]	-	20 + 45°
Camshaft Adjustment Valve 1	-	4
Camshaft Position Sensor	-	10
Camshaft Sprocket[1]	-	50 + 180°
Chain Tensioner	-	10
Cylinder Head Bolt	-	40 + 180°
Exhaust Manifold Stud Bolt	-	20
Housing	-	10
Intake Manifold Stud Bolt	-	10
Phase Sensor	-	10
Tensioning Roller Stud Bolt	-	10
Transport Strap	-	25
Valve Housing	-	4
Toothed Belt Drive, with Divided Toothed Belt Guard		
-Camshaft Sprocket	-	50 Nm + 180°
-Coolant Pump	-	15
-Crankshaft Toothed Belt Sprocket[1]	-	90 + 90°
-Damper Roller for Rear Toothed Belt Guard	-	25
-Damper Roller for Sealing Flange	-	35
-Engine Mount	-	45
-Lower Toothed Belt Guard	-	8
-Rear Toothed Belt Guard[2]	-	10
-Semi-Automatic Tensioning Roller, Nut	-	25

-Upper Toothed Belt Guard	-	10
Toothed Belt Drive, without Divided Toothed Belt Guard		
-Camshaft Sprocket[1]	-	50 + 180°
-Coolant Pump	-	35
-Crankshaft Toothed Belt Sprocket[1]	-	90 + 90°
-Damper Roller	-	25
-Engine Support	-	40
-Rear Toothed Belt Guard[2]	-	10
-Semi-Automatic Tensioning Roller, Nut	-	25
-Upper Toothed Belt Guard[2]	-	10

- [1] Replace
- [2] Insert with locking fluid

Cylinder Head Cover Tightening Sequence

-- Install bolts -1 through 14- and tighten by hand.

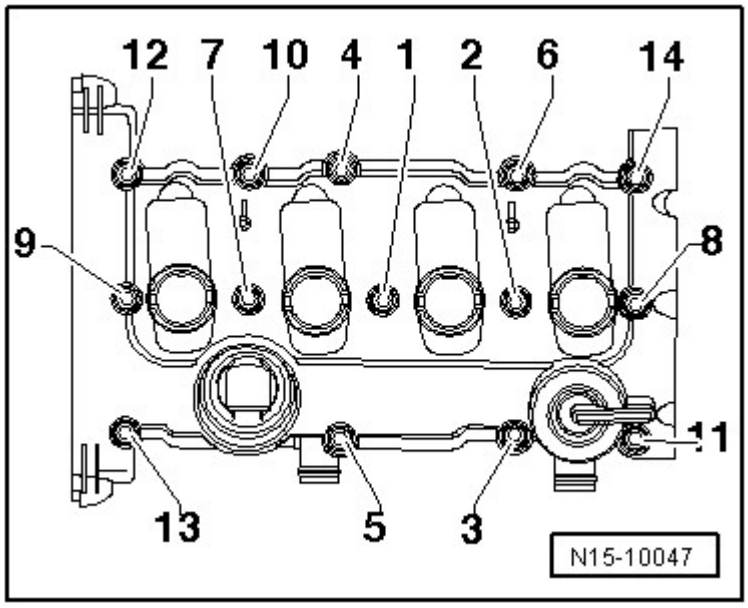

Fig. 18: Identifying Cylinder Head Cover Bolts Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts -1 through 14- diagonally to **10 Nm** .

Cylinder Head Tightening Sequence

-- Tighten cylinder head bolts in -1 through 10- sequence as follows

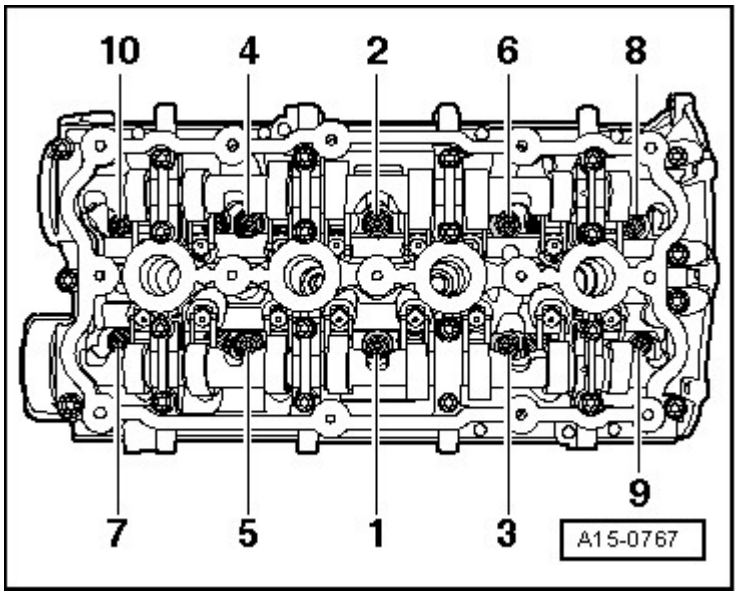

Fig. 19: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- 1. Tighten to **40 Nm** using a torque wrench.

-- 2. Tighten further **90°** using a rigid wrench.

-- 3. Tighten further **90°** using a rigid wrench.

Guide Frame Tightening Sequence

-- Replace bolts

-- 1. Hand-tighten bolts in several stages -1 to 6- in sequence.

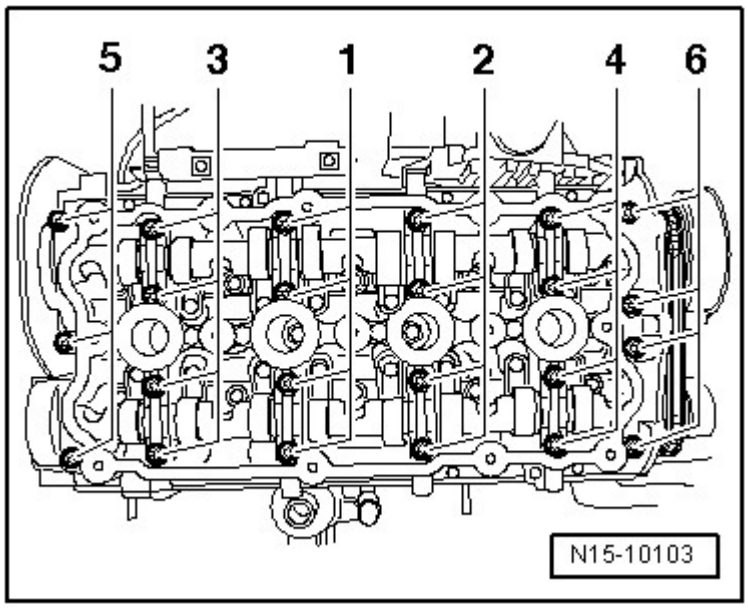

Fig. 20: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- 2. Tighten the bolts in sequence -1 to 6- to **8 Nm** using a torque wrench.

-- 3. Give **90°** ($^{1}/_{4}$ turn) additional turn in sequence -1 to 6- using rigid wrench.

Valve Dimensions

NOTE: Intake and exhaust valves must not be refaced by grinding. Only lapping is permitted.

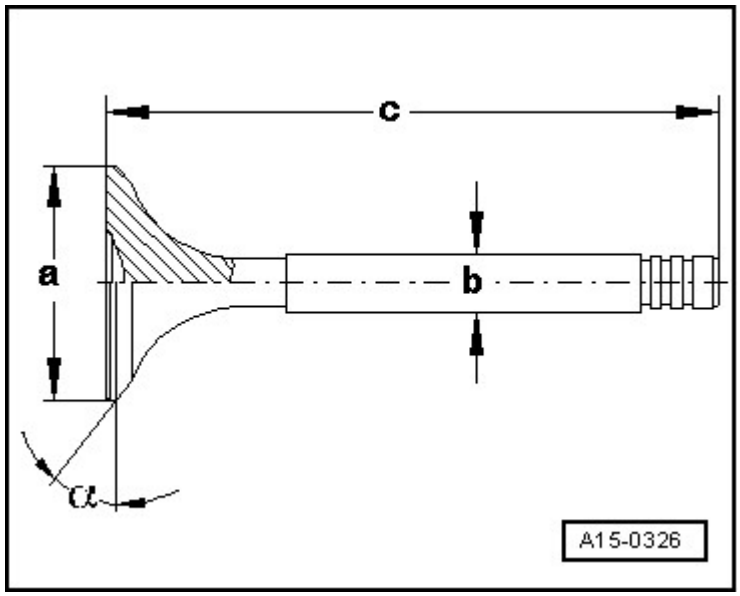

Fig. 21: Identifying Valve Dimensions

Courtesy of AUDI OF AMERICA, LLC

Dimension		Intake Valve	Exhaust Valve
Diameter a	mm	33.85 ± 0.10	28.0 ± 0.1
Diameter b	mm	5.98 ± 0.01	5.96 ± 0.01
c	mm	104.0 ± 0.2	101.9 ± 0.2
a	Angle°	45	45

DIAGNOSIS AND TESTING

COMPRESSION, CHECKING

Special tools and workshop equipment required

- Compression Tester V.A.G 1763
- Spark Plug Removal Tool 3122 B
- Ignition Coil Puller T40039
- Spring Type Clip Pliers VAS 5024 A

Test Sequence

NOTE: Engine oil temperature min. 30 °C (86 °F)

Battery voltage at least 12.7 V.

-- Remove the engine cover and air filter. Refer to **Removal and Installation** .

-- Remove the ignition coils with power output stage. Refer to **REMOVAL AND INSTALLATION** .

-- Remove spark plugs, using the 3122 B.

-- Disconnect 8-pin connector from fuel injectors. Refer to **Removal and Installation**

-- Check compression using the V.A.G 1763 and adapter V.A.G 1763/6.

NOTE: Using tester see operating instructions.

-- Operate starter until tester shows no further pressure increase.

Compression Pressure:

New Bar Positive Pressure	Wear Limit Bar Positive Pressure	Difference Between Cylinders Bar Positive Pressure
11.0 to 14.0	7.0	Max. 3.0

-- Install sparks plugs.

-- Install ignition coils with power output stage. Refer to **REMOVAL AND INSTALLATION** .

NOTE: By separating the connections, DTCs are stored to memory. After the test, check the fault memory and erase, if necessary.

-- Read out the DTC memory of engine control module (ECM).

CAMSHAFTS, CHECKING AXIAL CLEARANCE

Special tools and workshop equipment required

- Dial Gauge Holder VW 387
- Dial Gauge 0-10 mm VAS 6079

Test Sequence

-- Perform measurement with guide frame removed.

-- Place camshaft to be checked in guide frame.

-- Secure the VAS 6079 to cylinder head with the VW 387.

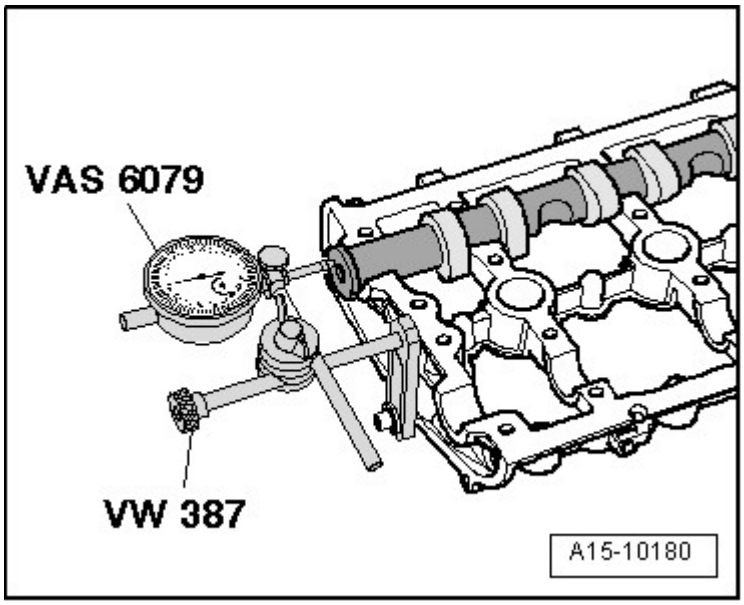

Fig. 22: Dial Gauge VAS 6079 Secured To Cylinder Head With Universal Dial Gauge Holder VW 387
Courtesy of AUDI OF AMERICA, LLC

-- Press camshaft against dial gauge by hand.

-- Set dial gauge to "0".

-- Press camshaft off dial gauge and read the value:

- Axial clearance: 0.05 to 0.17 mm.

VALVE GUIDES, CHECKING

Special tools and workshop equipment required

- Dial Gauge Holder VW 387
- Dial Gauge 0-10 mm VAS 6079

Test Sequence

-- Insert valve into guide. Valve stem end must be flush with the guide. Due to the 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.

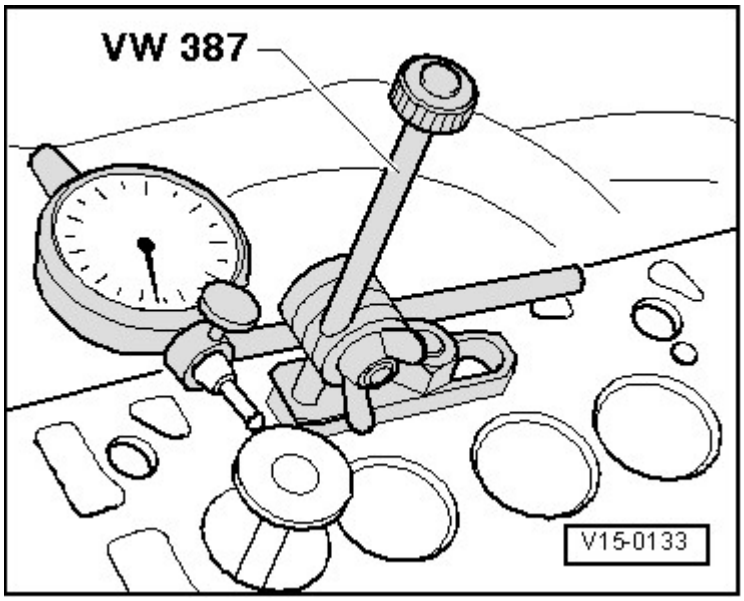

Fig. 23: Determining Valve Rock (Wear limit)
Courtesy of AUDI OF AMERICA, LLC

-- Determine tip clearance.

Wear Limit

Intake Valve Guide	Exhaust Valve Guide
0.80 mm	0.80 mm

NOTE: If wear limit is exceeded, measure again using new valves. If wear limit is still exceeded, replace cylinder head.

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

REMOVAL AND INSTALLATION

TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD

NOTE: Vehicles from 01/2006 have a new toothed belt guard. Identification: The upper toothed belt guard does not have a cover 25 and guard is divided in engine bracket area. Toothed belt, vehicles with divided toothed belt guard, removing and installing. Refer to TOOTHED BELT, WITH DIVIDED TOOTHED BELT GUARD.

Special tools and workshop equipment required

- Engine Support Bridge 10 - 222 A
- Shackle (1 Set=2 Pieces) 10 - 222 A /12
- Toothed Belt Tensioner T10020
- Locking Pin T10060A

Removing

-- Remove the engine cover and air filter. Refer to **Removal and Installation** .

WARNING: Cover cap of expansion tank with rag and open carefully, as hot steam for example hot coolant may escape when opened.

-- Open cap of coolant expansion tank.

-- Remove noise insulation. Refer to **Removal and Installation** .

-- Remove right noise insulation fasteners -1 to 3-.

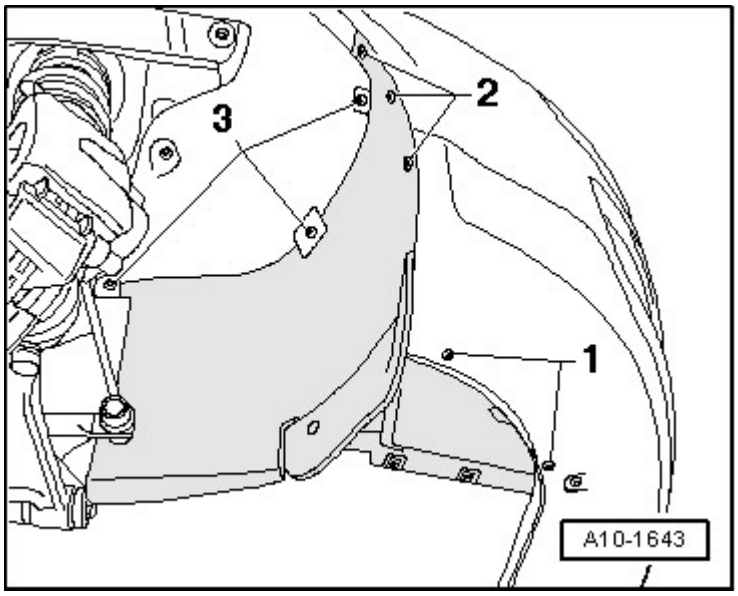

Fig. 24: Identifying Fasteners
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -1 to 3- and the pendulum support.

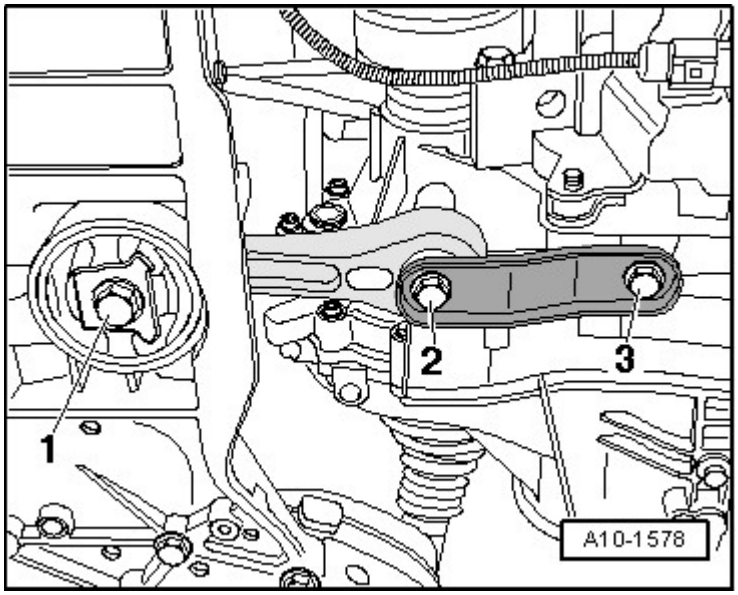

Fig. 25: Identifying Pendulum Support & Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and disconnect charge air pipe with hoses.

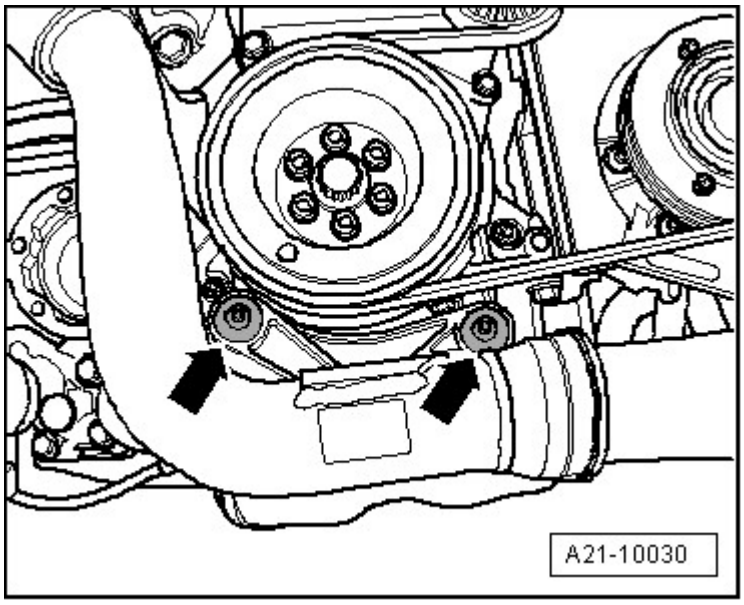

Fig. 26: Identifying Charge Air Pipe Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Drain engine coolant. Refer to **COOLING SYSTEM, DRAINING AND FILLING** .

WARNING: The fuel supply line is under pressure. Always wear protective eyewear and protective clothing to prevent injuries and fuel from coming in contact with your skin. Wrap a cloth around the connection before removing a fuel hose. Then release pressure by carefully pulling hose off connection.

-- Mark the fuel line -1- and the EVAP line -2-.

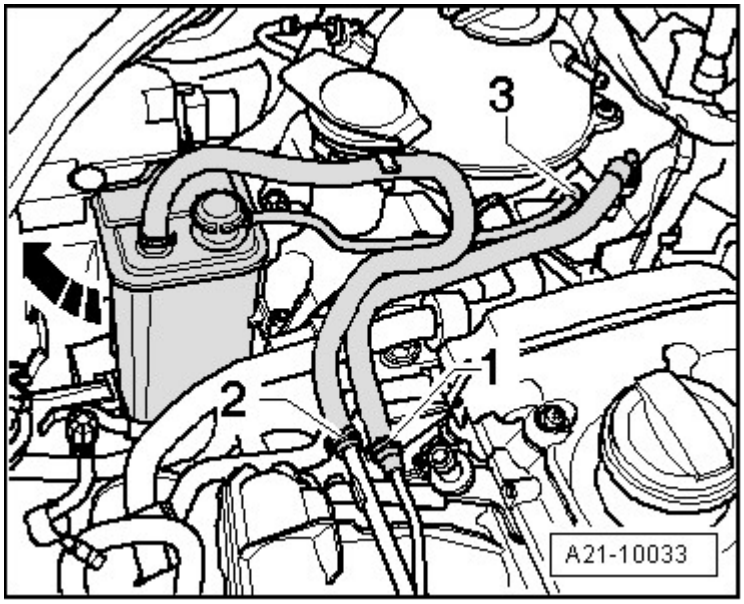

Fig. 27: Fuel Line, EVAP Line And Fuel Tank

Courtesy of AUDI OF AMERICA, LLC

-- Disconnect fuel line -1-.

-- Disconnect the EVAP line -2-.

-- Disconnect the EVAP line to fuel tank -3-.

-- Remove EVAP canister upward in direction of -arrow-.

-- Loosen the coolant hose from the retainer -1-.

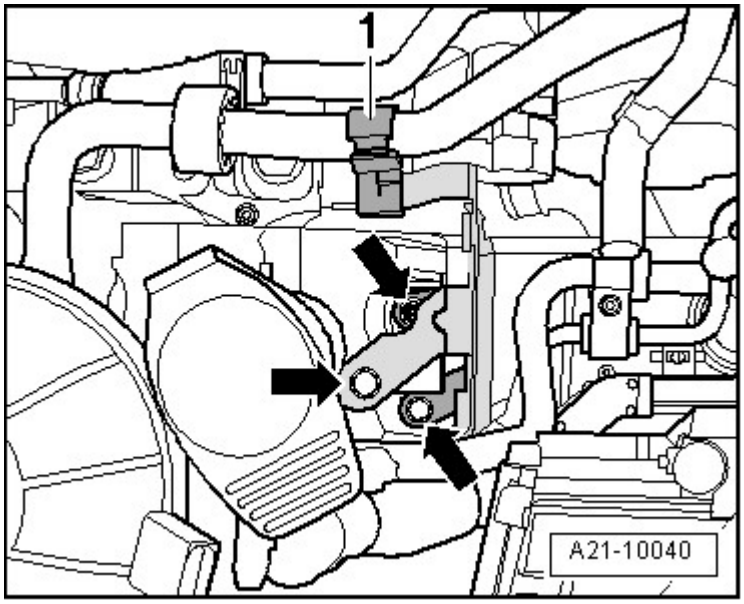

Fig. 28: EVAP Filter And Retainer
Courtesy of AUDI OF AMERICA, LLC

-- Remove bracket for EVAP filter -arrows-.

-- Remove the filler tube bolt -1- for the windshield washer fluid reservoir.

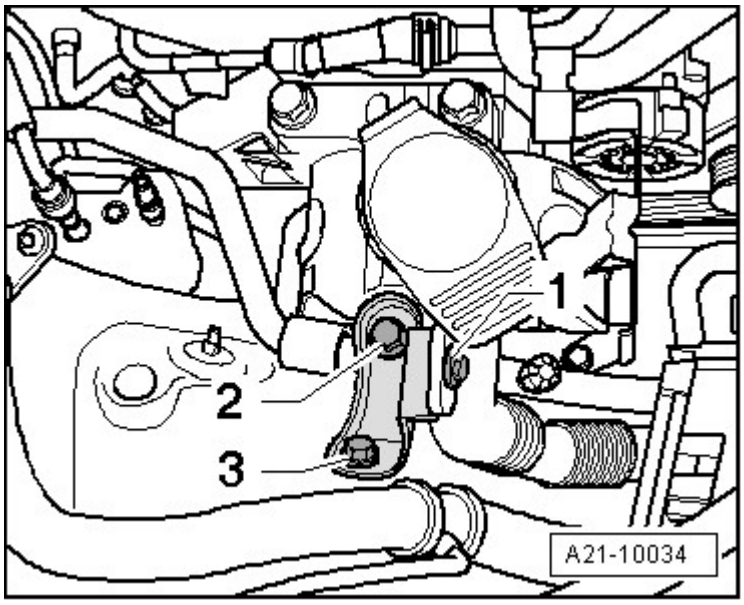

Fig. 29: Windshield Washer Fluid Reservoir And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the retaining clip, by removing bolts -2 and 3-.

-- Disconnect the electrical connector -1- from coolant level indicator.

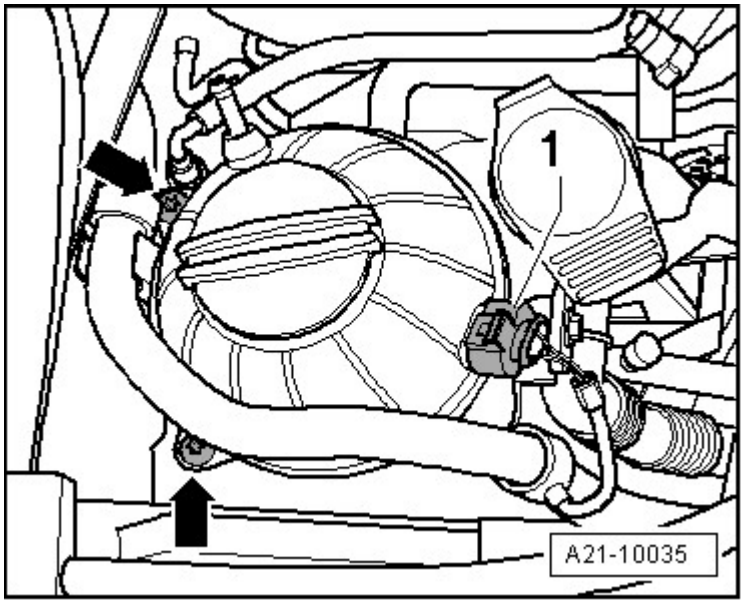

Fig. 30: Coolant Expansion Tank And Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

-- Remove coolant expansion tank -arrows-.

-- Disconnect coolant pipe -arrow-.

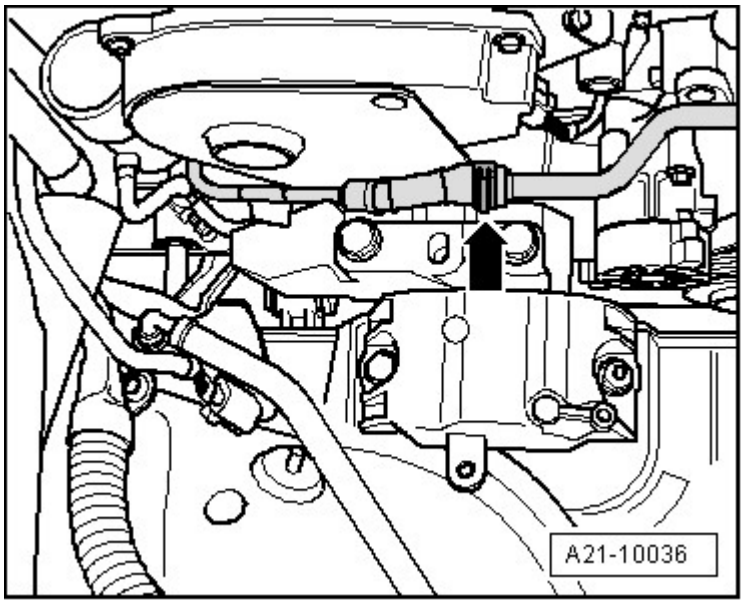

Fig. 31: Coolant Pipe
Courtesy of AUDI OF AMERICA, LLC

-- Remove ribbed belt and remove the T10060A. Refer to **RIBBED BELT** .

-- Install the 10 - 222 A onto fender bolting edge. The spindles are positioned forward.

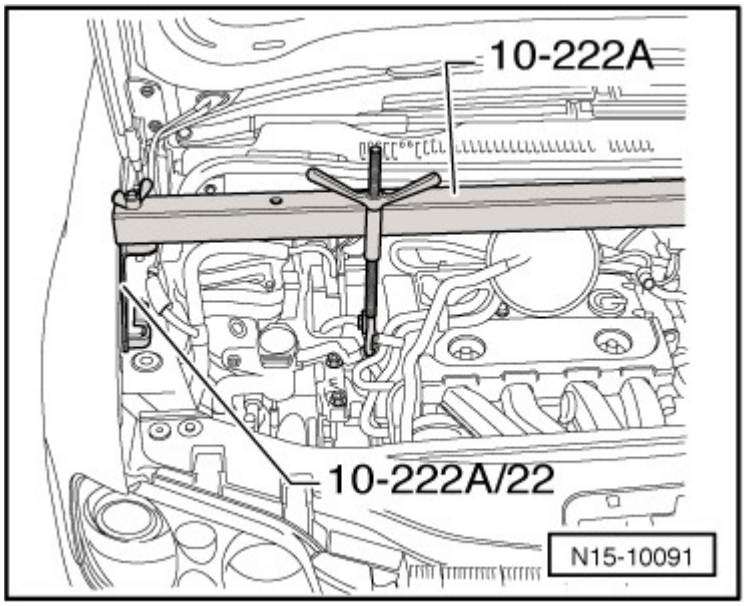

Fig. 32: Engine Support Bridge 10 - 222 A Installed Onto Fender Bolting Edge
Courtesy of AUDI OF AMERICA, LLC

-- Hook the carabiner hooks of the spindles with the 10 - 222 A /12 into the lifting eyes.

-- Remove bolts from assembly mount/engine support -arrows- remove assembly mount completely.

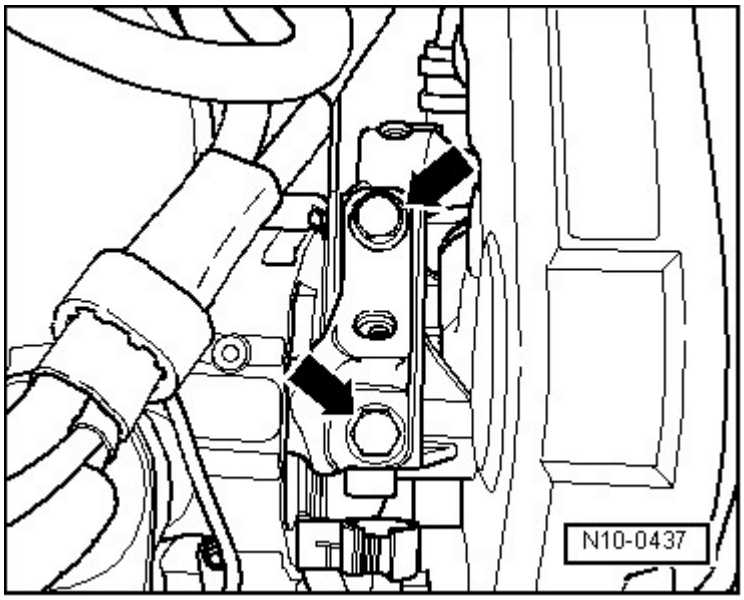

Fig. 33: Identifying Mounting Bolts Of Subframe Mount/Engine Bracket
Courtesy of AUDI OF AMERICA, LLC

CAUTION: When lifting the engine with the 10-222A, make sure that no components/hoses are damaged, overstressed or torn off.

-- Raise the engine with the 10-222A until both engine support upper bolts -1 and 2- can be loosened and removed.

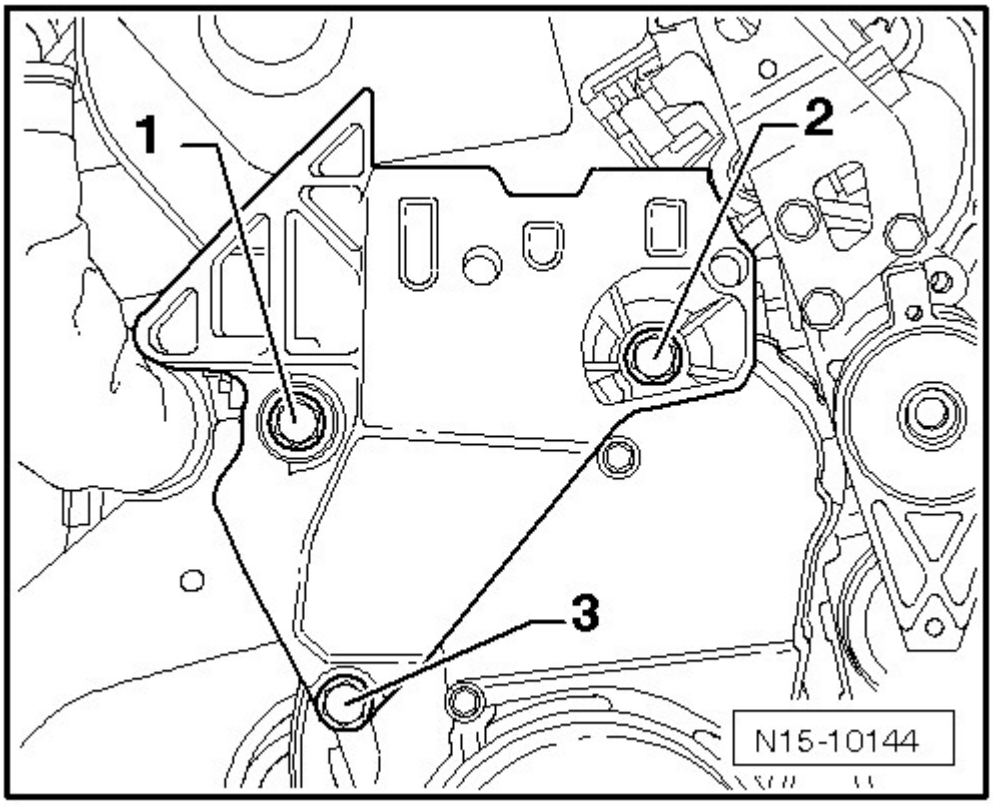

Fig. 34: Identifying Engine Bracket Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Bring camshaft gear to marking for TDC cylinder 1 by turning crankshaft. Marking on camshaft gear must align with arrow on toothed belt guard.

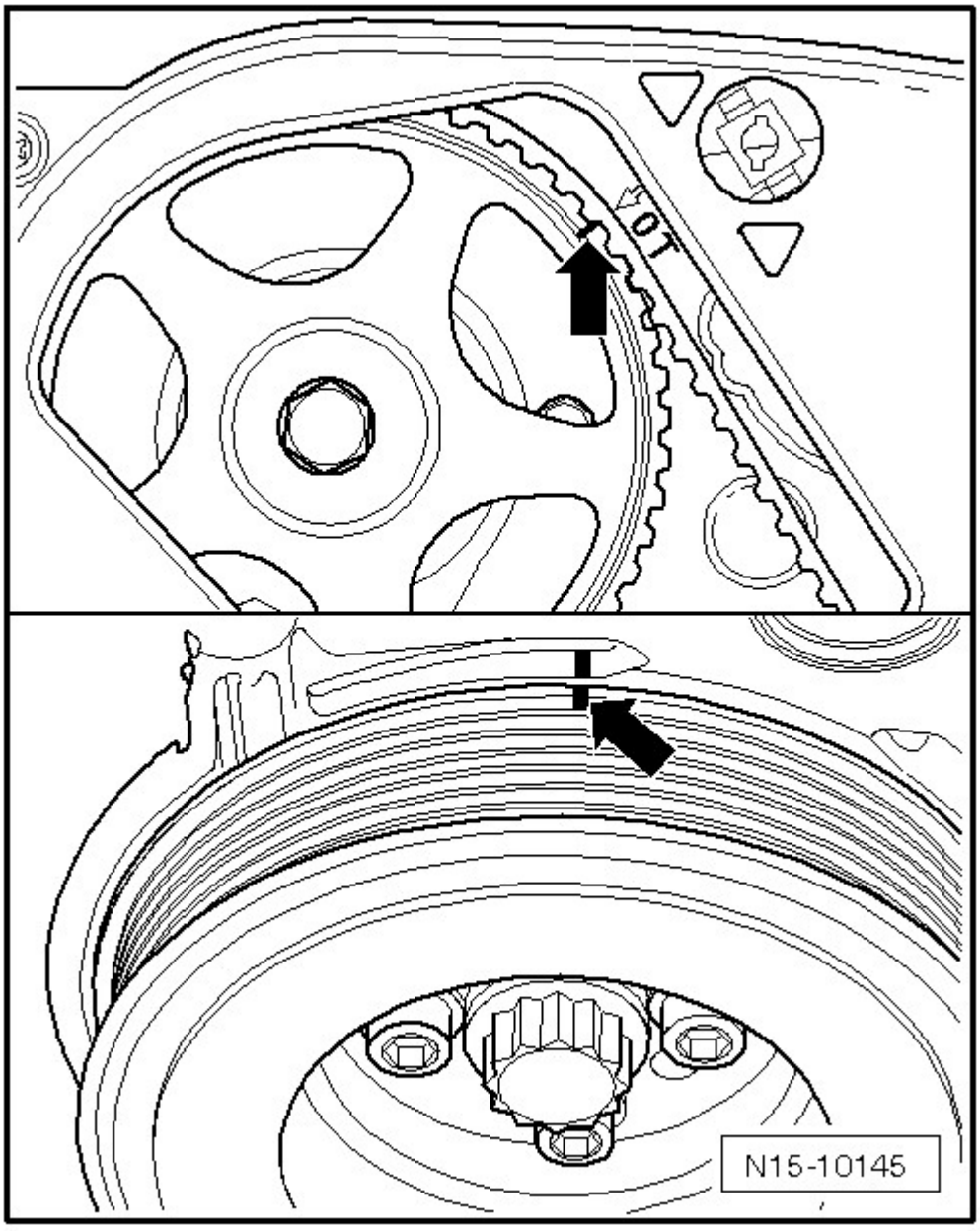

Fig. 35: Bringing Camshaft Gear To Marking For TDC Cylinder 1
Courtesy of AUDI OF AMERICA, LLC

-- Remove vibration damper/belt pulley.

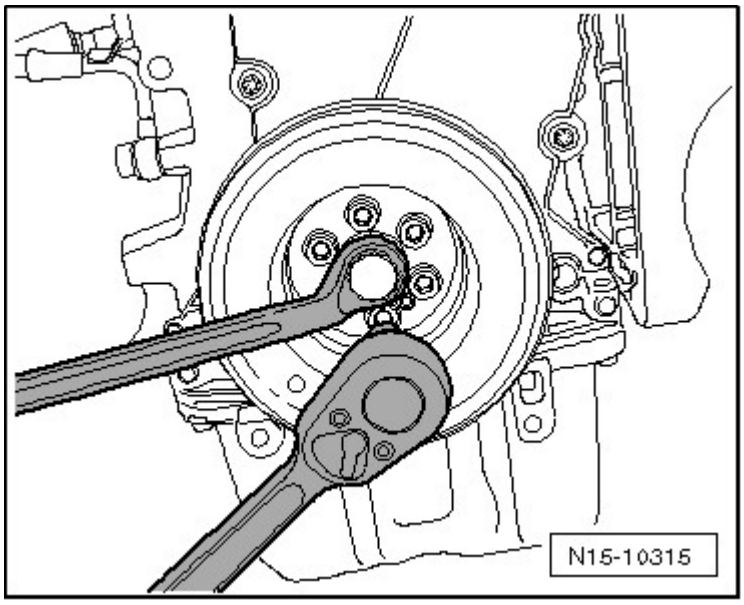

Fig. 36: Identifying Vibration Damper/Belt Pulley
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts from the lower section of the toothed belt guard -arrows-.

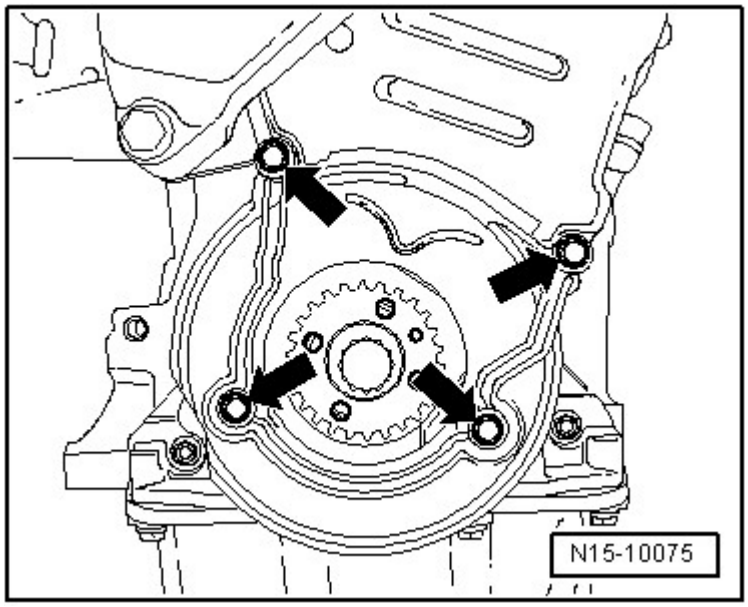

Fig. 37: Identifying Bolts From Lower Section Of Toothed Belt Guard
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the lower bolt -3- and remove the engine support downward and out.

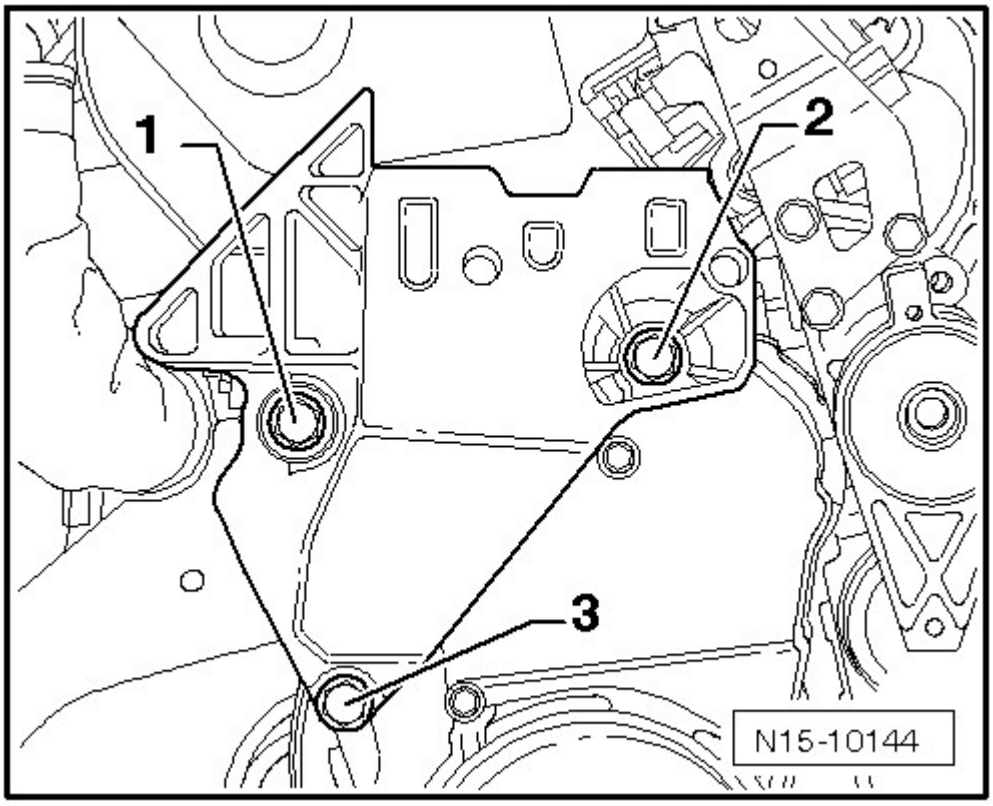

Fig. 38: Identifying Engine Bracket Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Remove remaining bolts from toothed belt guard -arrows- and remove toothed belt guard from engine.

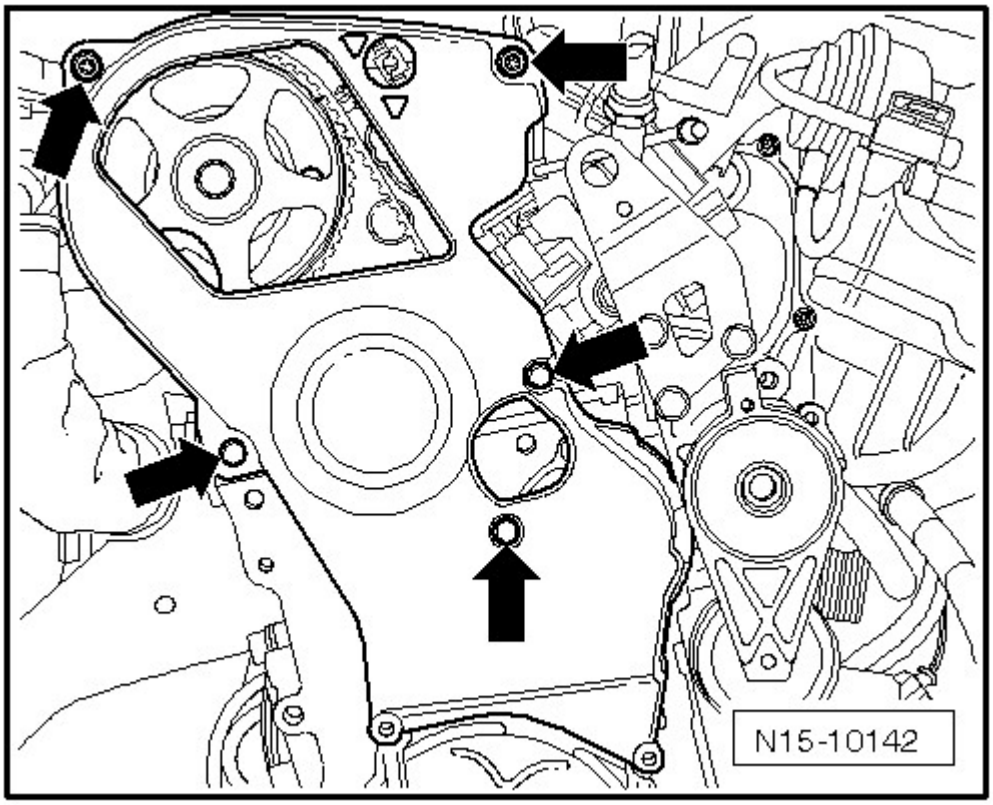

Fig. 39: Identifying Remaining Bolts From Toothed Belt Guard
Courtesy of AUDI OF AMERICA, LLC

-- Mark rotational direction of toothed belt.

-- Loosen tensioning roller and remove toothed belt.

-- Then, turn the crankshaft back slightly.

Installing

- For the correct tightening specifications, refer to **TOOTHED BELT DRIVE, WITHOUT DIVIDED TOOTHED BELT GUARD OVERVIEW**

NOTE: When turning camshaft, crankshaft must not be at TDC. Valves and/or pistons may be damaged.

The engine must be no more than warm to touch.

-- Place the toothed belt onto the crankshaft sprocket (observe direction of rotation).

-- Secure the lower toothed belt guard with the two lower bolts.

-- Install vibration damper/belt pulley with new bolts.

-- Set the crankshaft and camshaft to TDC at cylinder 1 -arrows-.

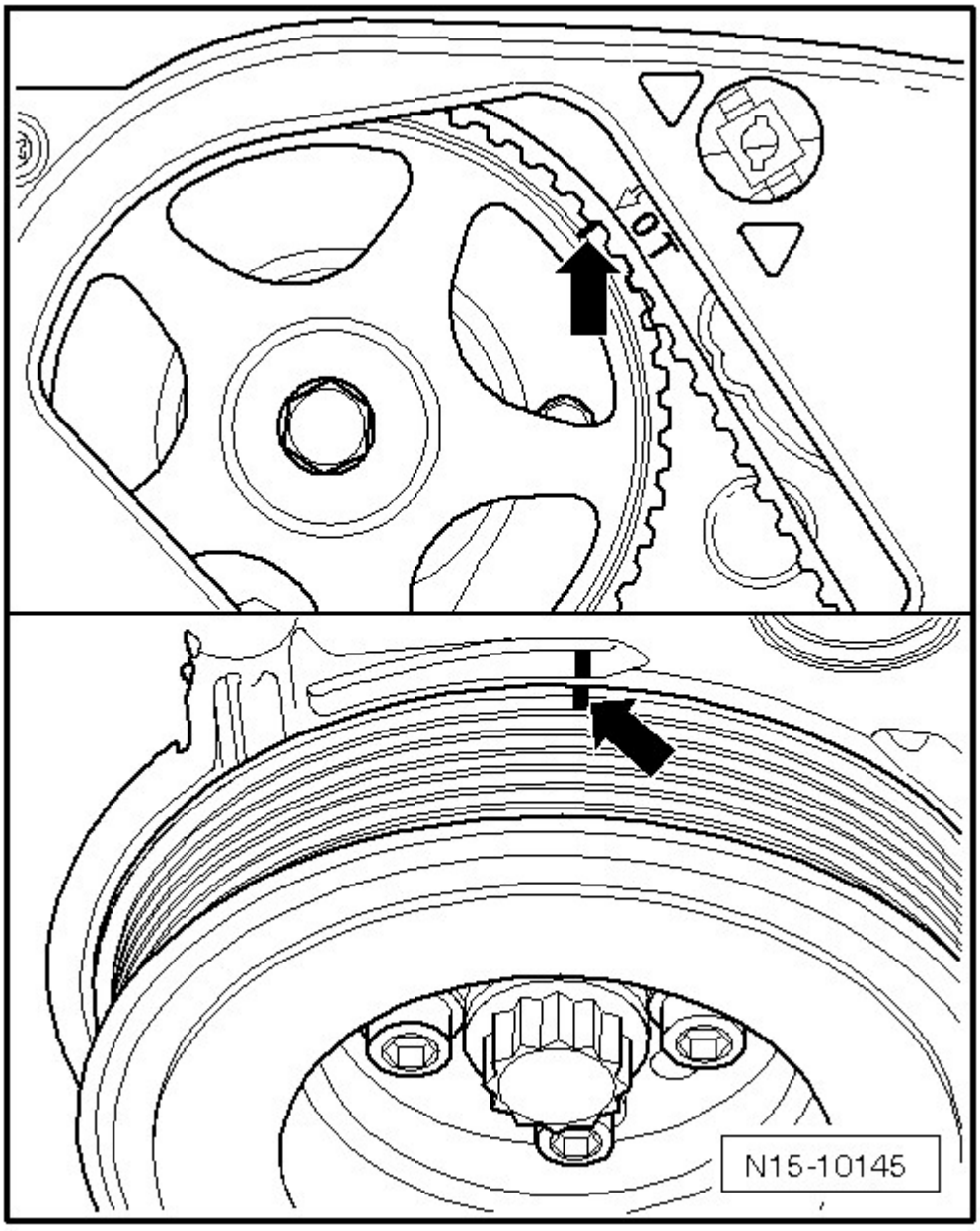

Fig. 40: Bringing Camshaft Gear To Marking For TDC Cylinder 1
Courtesy of AUDI OF AMERICA, LLC

-- Route toothed belt in the sequence: Tensioning roller, camshaft gear, coolant pump and last over the relay pulley -arrow-.

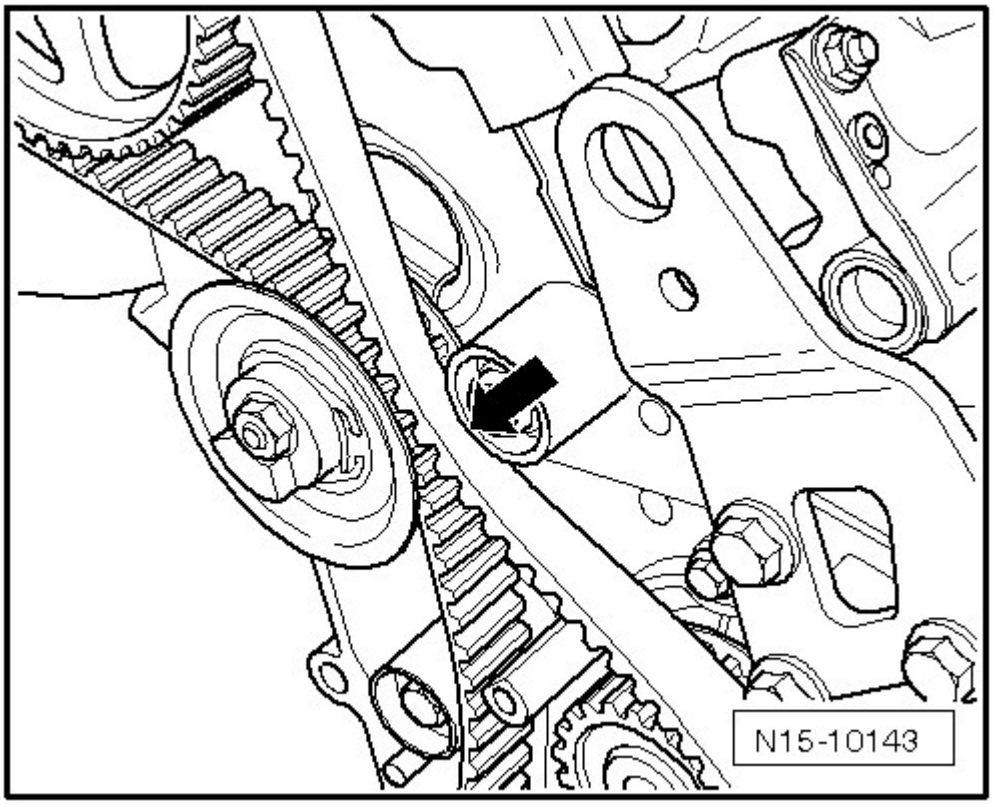

Fig. 41: Identifying Routing Of Toothed Belt
Courtesy of AUDI OF AMERICA, LLC

NOTE: Be sure tensioning roller is properly seated in cylinder head.

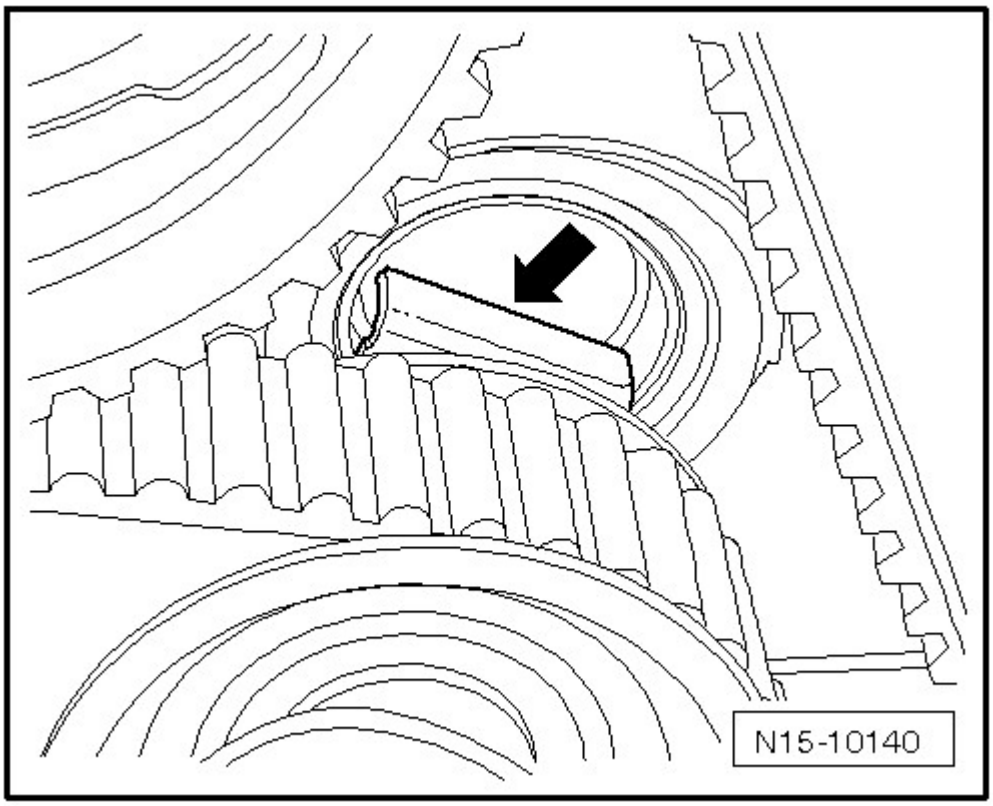

Fig. 42: Identifying Tensioning Roller Is Properly Seated In Cylinder Head
Courtesy of AUDI OF AMERICA, LLC

-- Tension toothed belt. To do this by turning the hex key at the eccentric toward the right (in direction of -arrow-) until the notch is positioned above the tab.

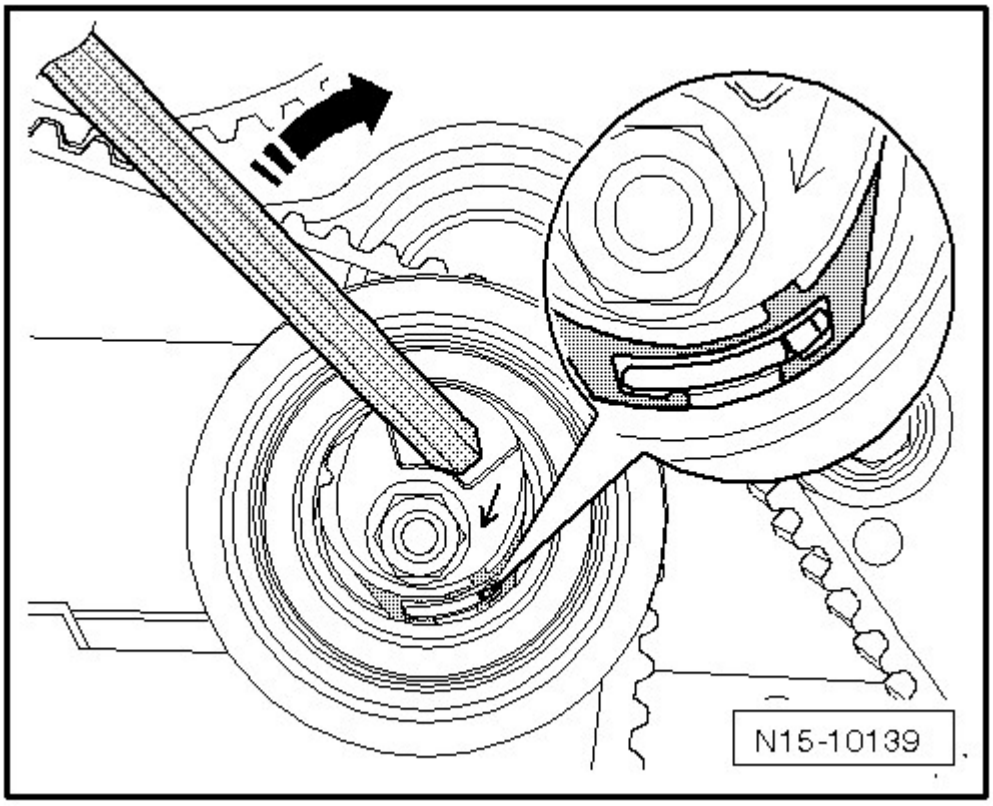

Fig. 43: Identifying Tensioning Of Toothed Belt
Courtesy of AUDI OF AMERICA, LLC

-- Release tension on toothed belt again.

-- Now tension toothed belt until notch and tab align.

-- Tighten mounting nut.

-- Turn the crankshaft 2 revolutions further in direction of engine rotation until the engine is positioned at TDC again. For this it is necessary that the last 45° ($^{1}/_{8}$ rotation) is turned without interruption.

-- Check tension of toothed belt again. Specified value: Tab and notch align.

-- Check the valve timing again.

If the markings do not match:

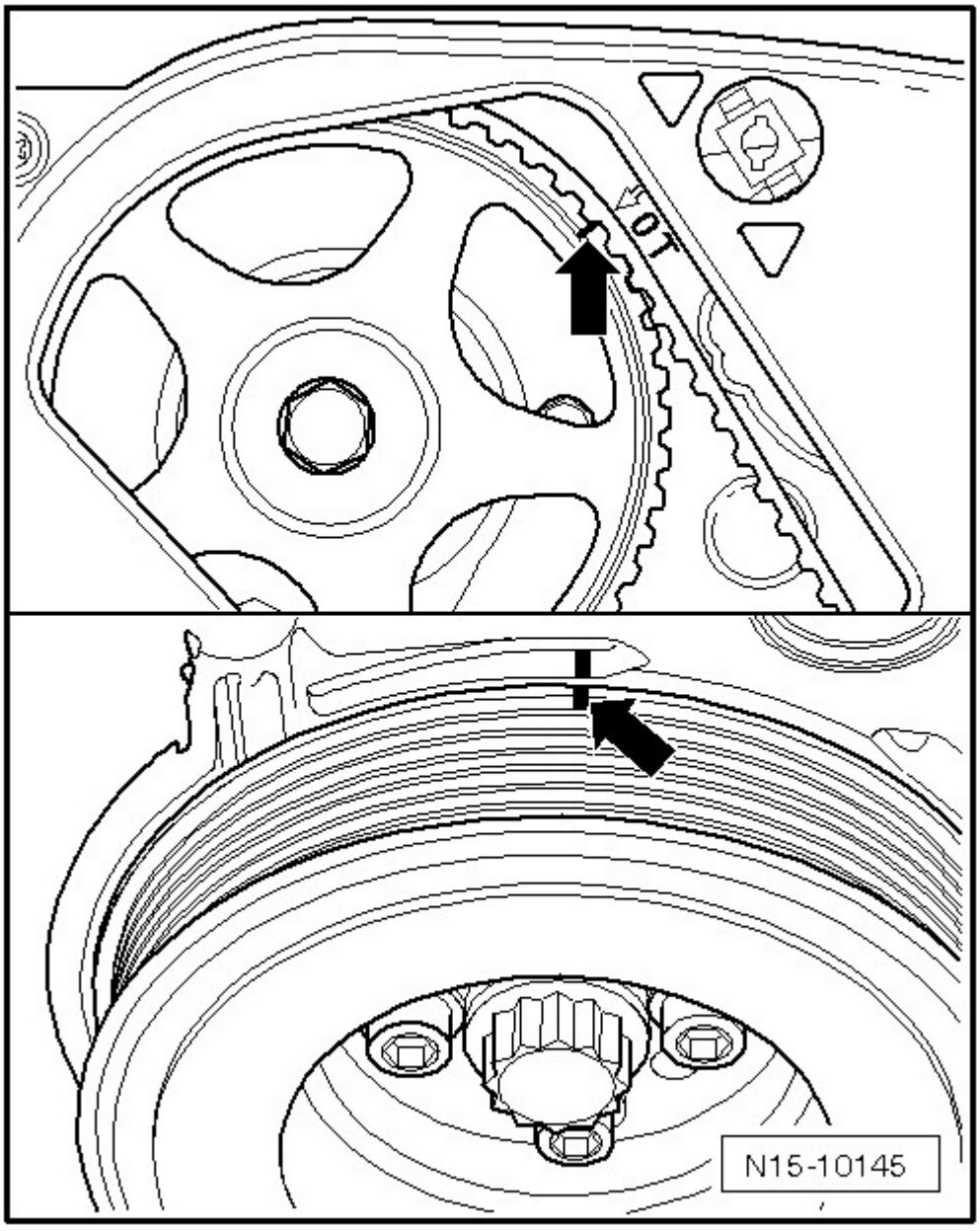

Fig. 44: Bringing Camshaft Gear To Marking For TDC Cylinder 1
Courtesy of AUDI OF AMERICA, LLC

-- Repeat valve timing adjustment.

If the markings match:

-- Install the toothed belt guard -arrows-.

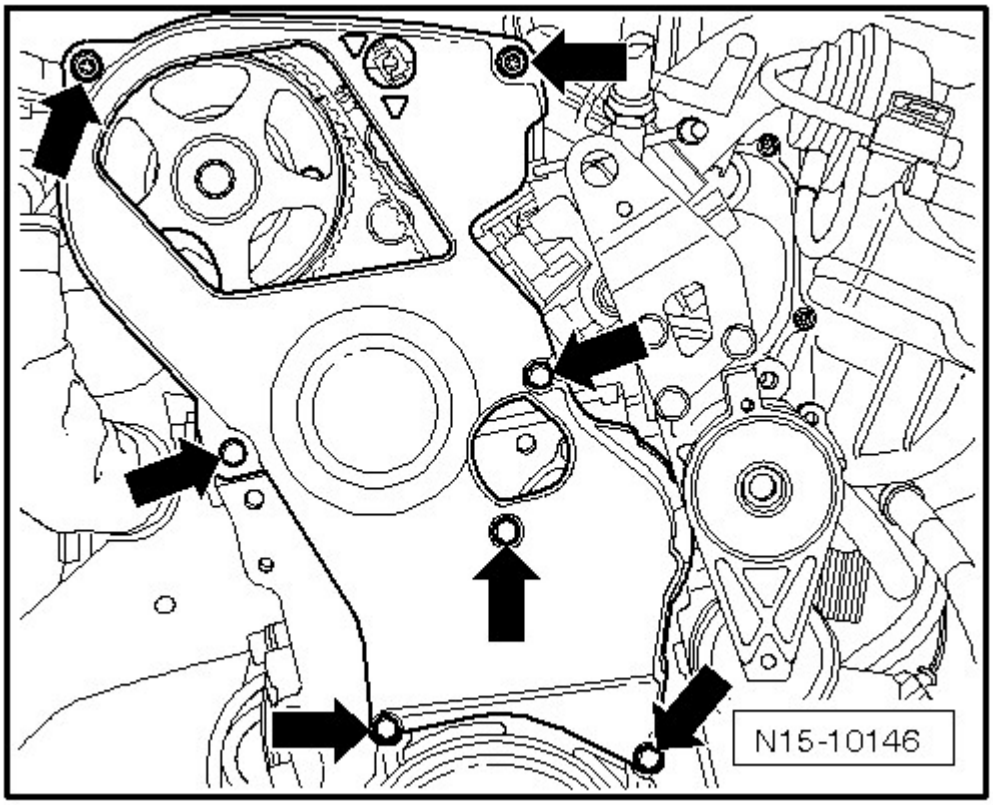

Fig. 45: Identifying Toothed Belt Guard Bolts
Courtesy of AUDI OF AMERICA, LLC

NOTE: Note different length of bolts. Bolt -3- is approximately 25 mm shorter than bolts -1 and 2-.

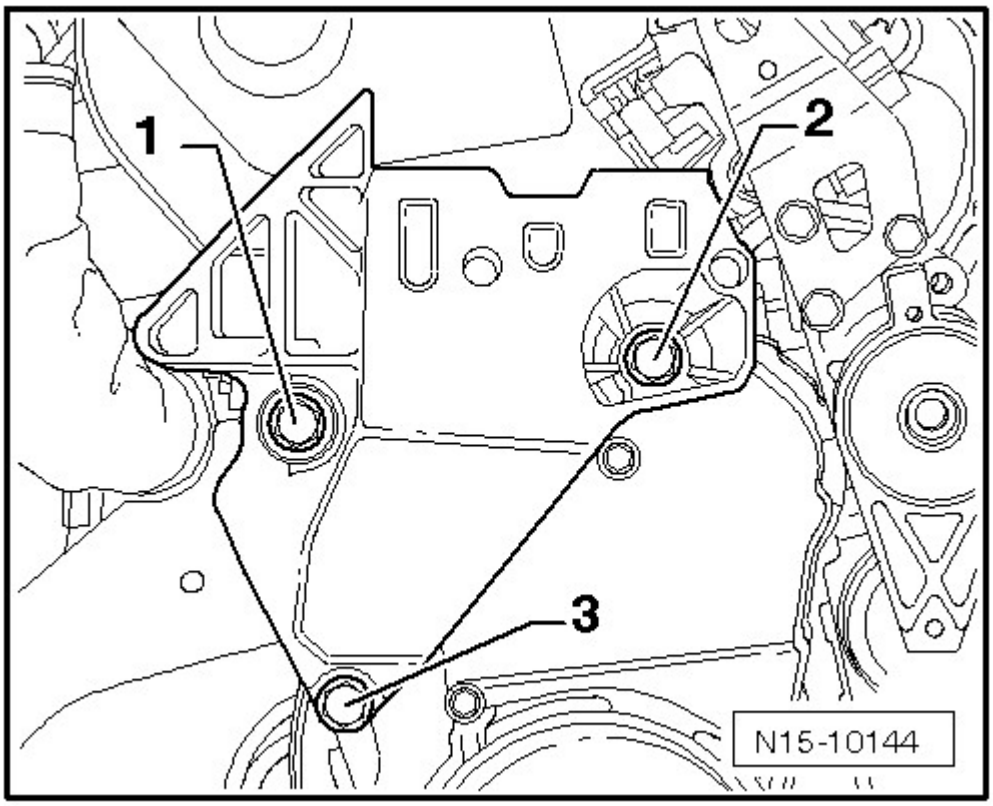

Fig. 46: Identifying Engine Bracket Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Insert lower bolt -3- into engine support.

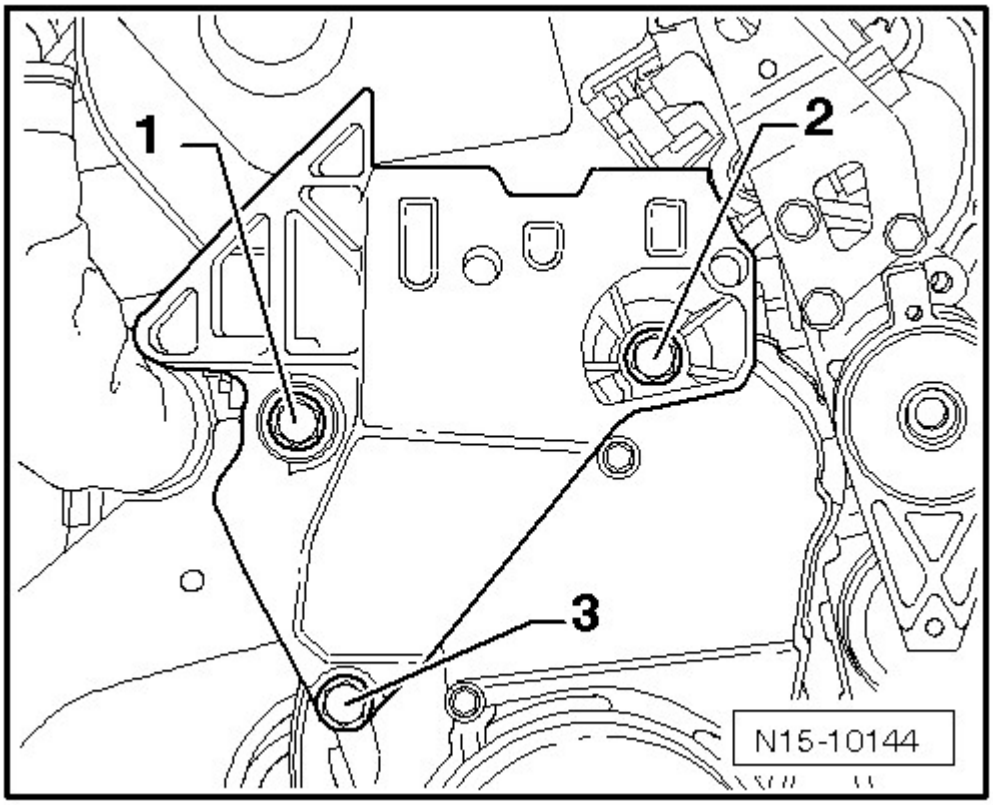

Fig. 47: Identifying Engine Bracket Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Install the engine support from below onto the cylinder block and hand-tighten the bolt.

-- Raise the engine with the 10-222A until both upper bolts -1 and 2- can be installed.

-- Tighten all bolts.

-- Lower engine to installation position.

-- Fasten engine assembly mount to engine support -arrows-, bringing the contact surfaces into contact using the 10-222A.

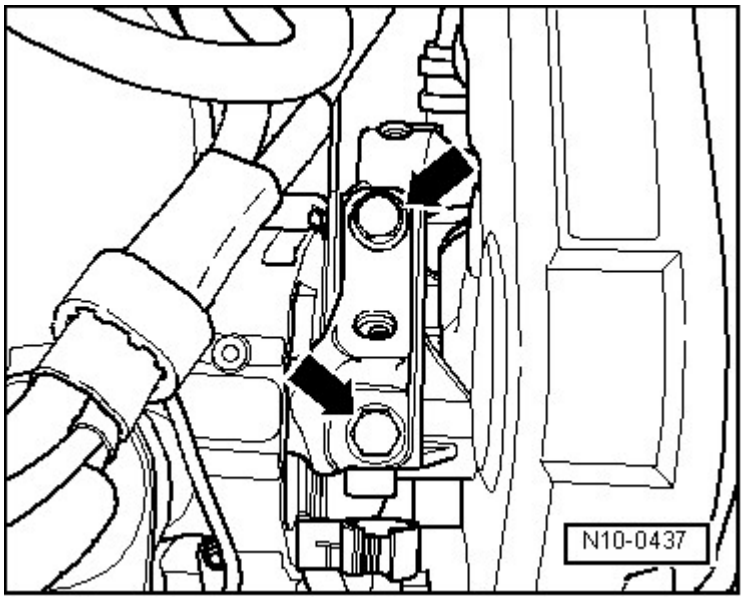

Fig. 48: Identifying Mounting Bolts Of Subframe Mount/Engine Bracket
Courtesy of AUDI OF AMERICA, LLC

-- Remove the 10-222A.

-- Connect fuel hoses to connections. Make sure connector couplings are securely fastened.

-- Install coolant expansion tank.

-- Connect battery. Refer to **REMOVAL AND INSTALLATION**

-- Install the engine cover.

-- Install the crankshaft belt pulley. Refer to **VIBRATION DAMPER** .

-- Adjust the engine mounts. Refer to **SUBFRAME MOUNT, ADJUSTING** .

-- Install the ribbed belt. Refer to **RIBBED BELT** .

-- Install air guide pipes and connector. Refer to **HOSE CONNECTIONS WITH CONNECTOR COUPLINGS** .

-- Install fuel system. Refer to **Removal and Installation** .

-- Install noise insulation pan.

TOOTHED BELT, WITH DIVIDED TOOTHED BELT GUARD

NOTE: Vehicles from 01/2006 have a new toothed belt guard. Identification: The upper toothed belt guard does not have cover 25 and guard is divided in engine

bracket area. Toothed belt, vehicles without divided toothed belt guard, removing and installing. Refer to TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD.

Special tools and workshop equipment required

- Engine Support Bridge 10 - 222 A
- Shackle (1 Set=2 Pieces) 10 - 222 A /12
- Toothed Belt Tensioner T10020
- Locking Pin T10060A

Removing

-- Remove the engine cover and air filter. Refer to **Removal and Installation** .

WARNING: Cover cap of expansion tank with rag and open carefully, as hot steam for example hot coolant may escape when opened.

-- Open cap of coolant expansion tank.

-- Remove noise insulation. Refer to **Removal and Installation** .

-- Remove right noise insulation fasteners -1 to 3-.

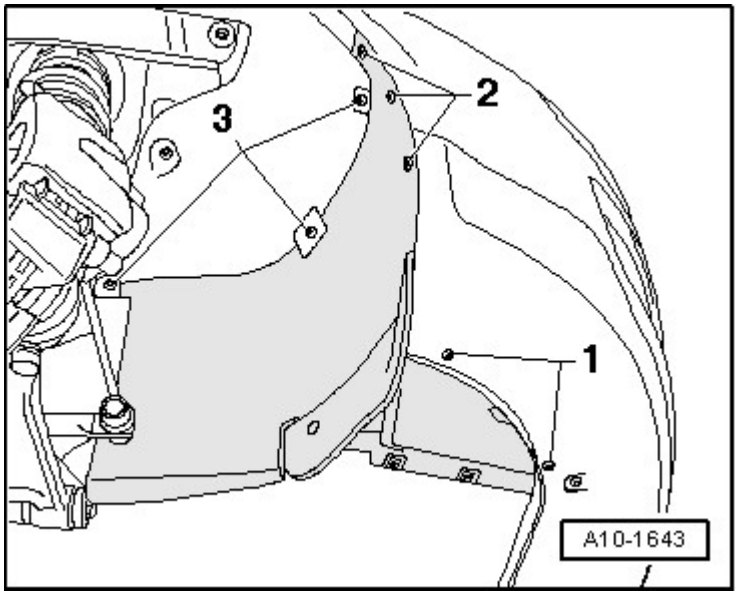

Fig. 49: Identifying Fasteners
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -1 to 3- and the pendulum support.

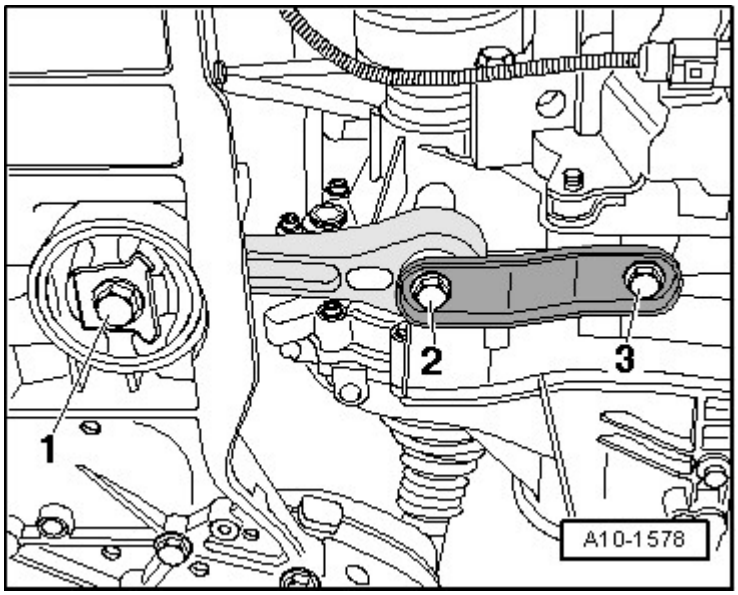

Fig. 50: Identifying Pendulum Support & Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Drain the coolant. Refer to **COOLING SYSTEM, DRAINING AND FILLING** .

WARNING: The fuel supply line is under pressure. Always wear protective eyewear and protective clothing to prevent injuries and fuel from coming in contact with your skin. Wrap a cloth around the connection before removing a fuel hose. Then release pressure by carefully pulling hose off connection.

-- Mark the fuel line -1- and the EVAP line -2-.

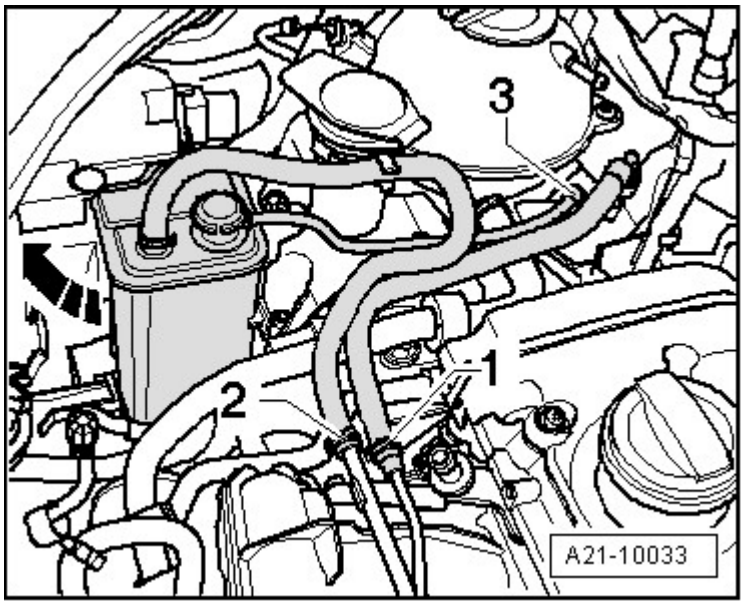

Fig. 51: Fuel Line, EVAP Line And Fuel Tank

Courtesy of AUDI OF AMERICA, LLC

-- Disconnect fuel line -1-.

-- Disconnect the EVAP line -2-.

-- Disconnect the EVAP line to fuel tank -3-.

-- Remove EVAP canister upward in direction of -arrow-.

-- Loosen the coolant hose from the retainer -1-.

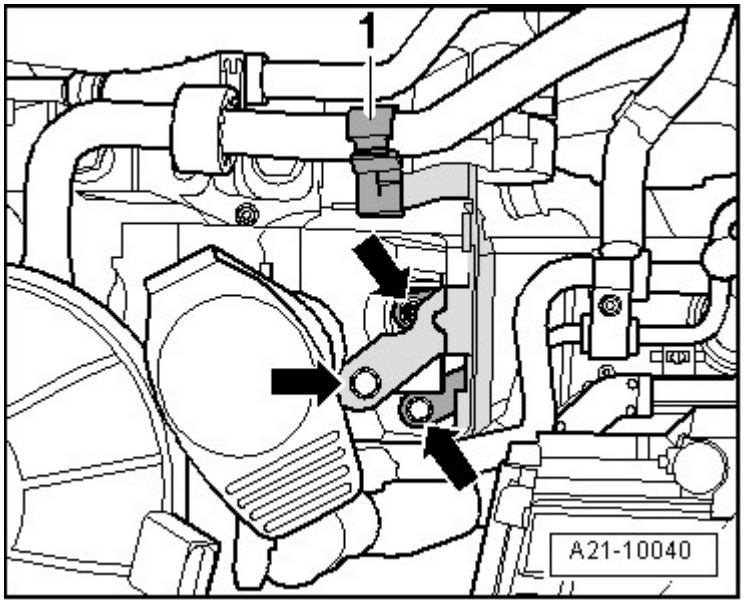

Fig. 52: EVAP Filter And Retainer
Courtesy of AUDI OF AMERICA, LLC

-- Remove bracket for EVAP filter -arrows-.

-- Remove the filler tube bolt for the windshield washer fluid reservoir -1-.

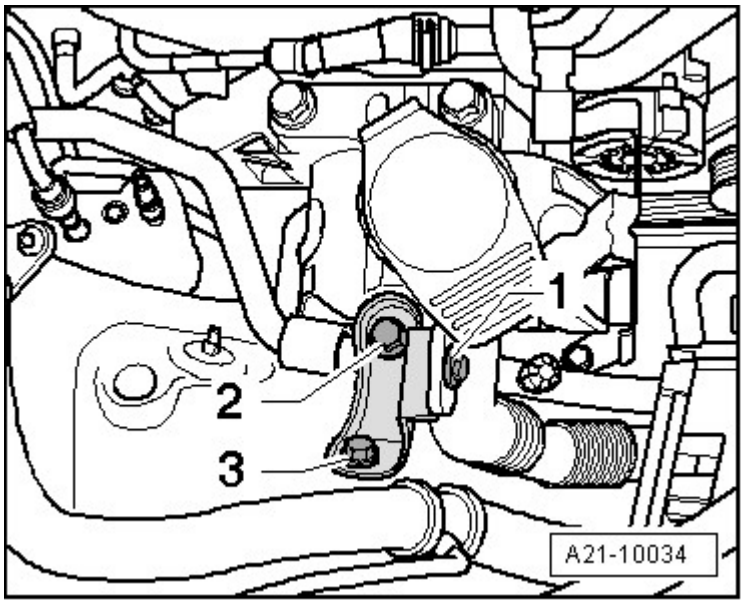

Fig. 53: Windshield Washer Fluid Reservoir And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the retaining clip, by removing bolts -2 and 3-.

-- Disconnect the electrical connector -1- from coolant level indicator.

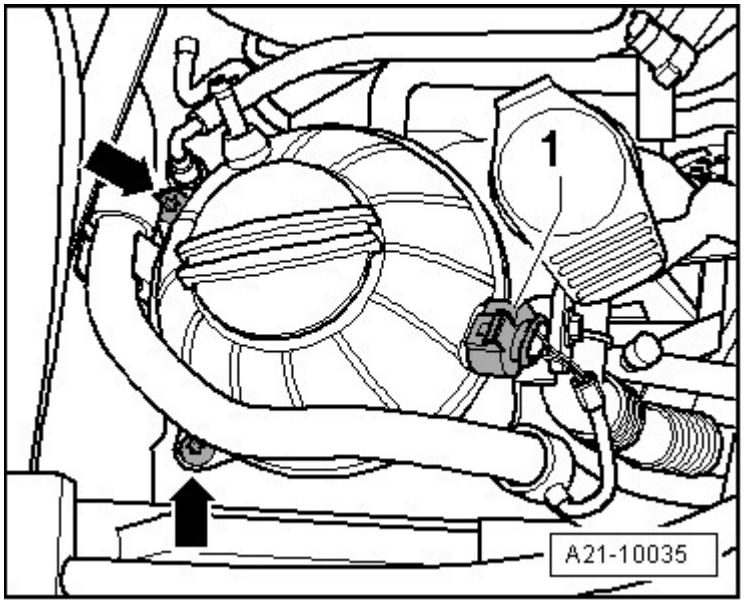

Fig. 54: Coolant Expansion Tank And Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

-- Remove coolant expansion tank -arrows-.

-- Disconnect coolant pipe -arrow-.

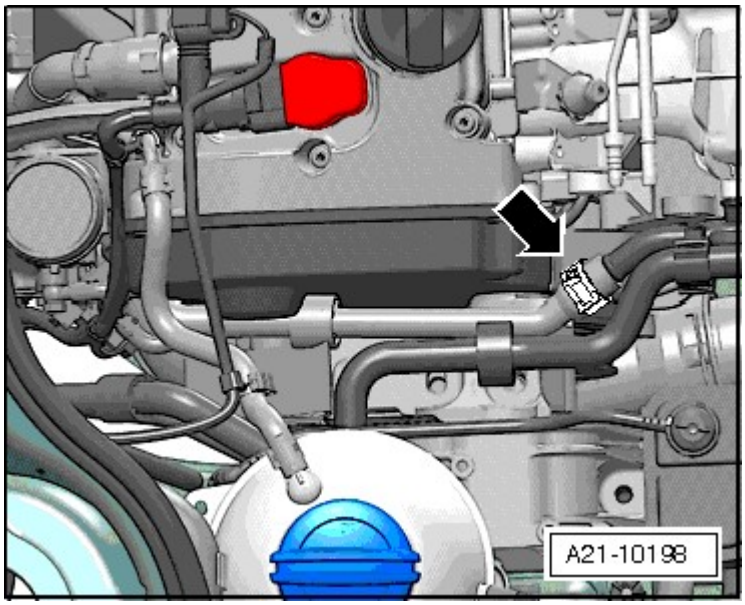

Fig. 55: Coolant Pipe
Courtesy of AUDI OF AMERICA, LLC

-- Remove the ribbed belt. Refer to **RIBBED BELT** .

-- Remove ribbed belt tensioner -arrows-.

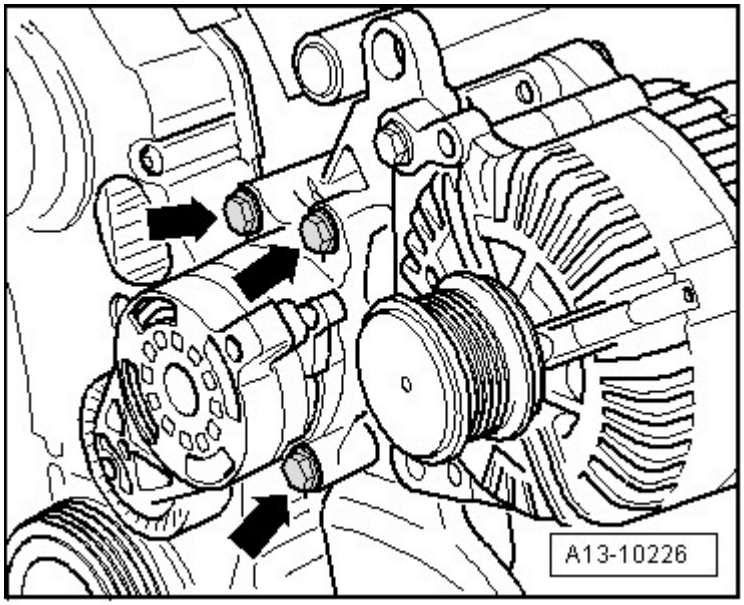

Fig. 56: Ribbed Belt Tensioner Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Loosen coolant pipe -arrows-.

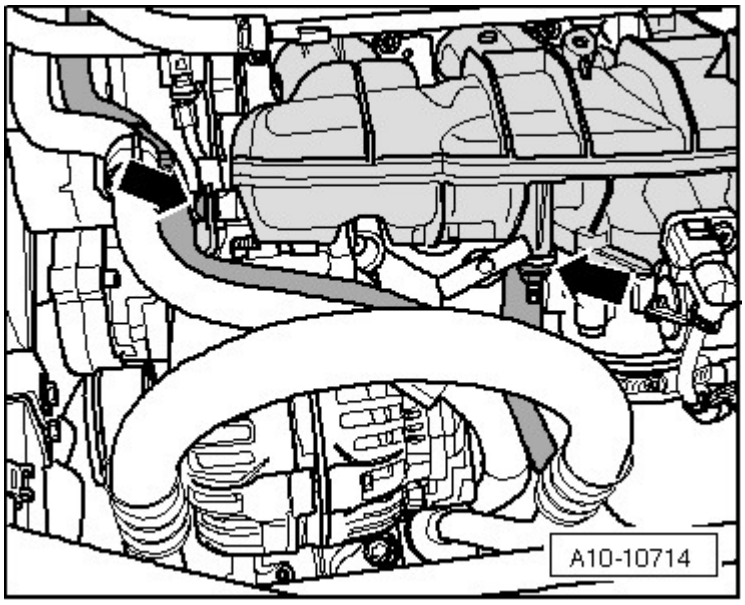

Fig. 57: Locating Coolant Pipes
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and the toothed belt guard.

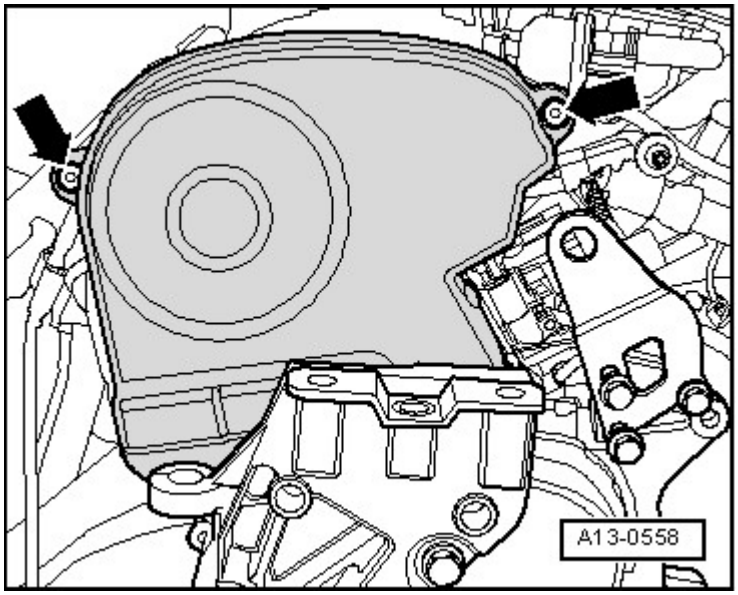

Fig. 58: Identifying Toothed Belt Guard Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Install the 10 - 222 A onto fender bolting edge. The spindles are positioned forward.

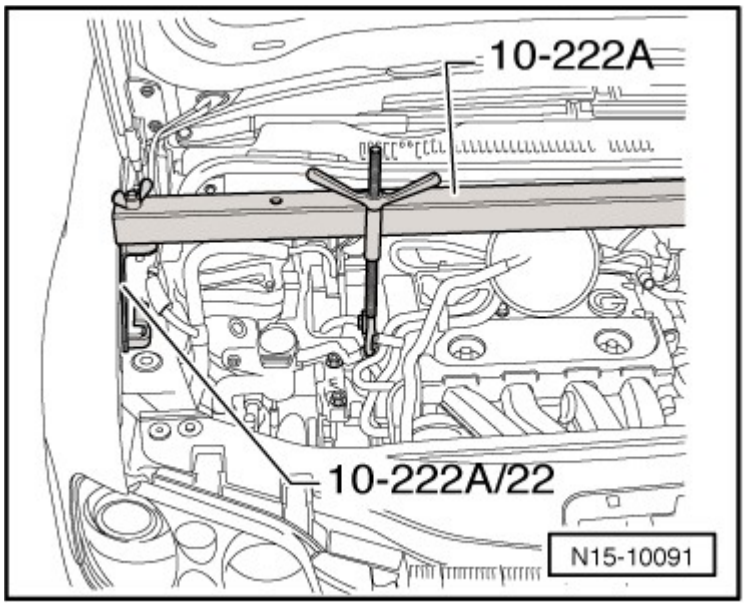

Fig. 59: Engine Support Bridge 10 - 222 A Installed Onto Fender Bolting Edge
Courtesy of AUDI OF AMERICA, LLC

-- Hook the carabiner hooks of the spindles with the 10 - 222 A /12 into the lifting eyes.

-- Remove bolts from assembly mount/engine support -arrows- remove assembly mount completely.

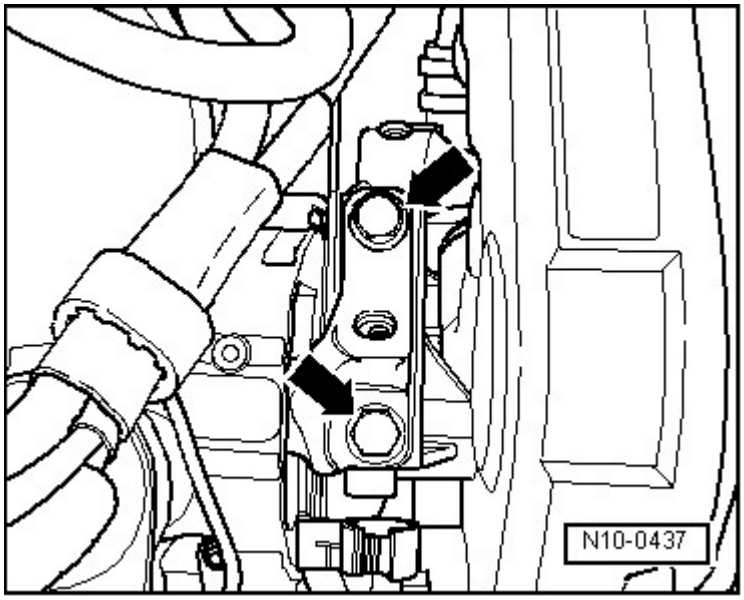

Fig. 60: Identifying Mounting Bolts Of Subframe Mount/Engine Bracket
Courtesy of AUDI OF AMERICA, LLC

CAUTION: When lifting the engine with the 10-222A, make sure that no components/hoses are damaged, overstressed or torn off.

-- Raise the engine with the 10-222A until both engine support upper bolts -1 and 2- can be loosened and removed.

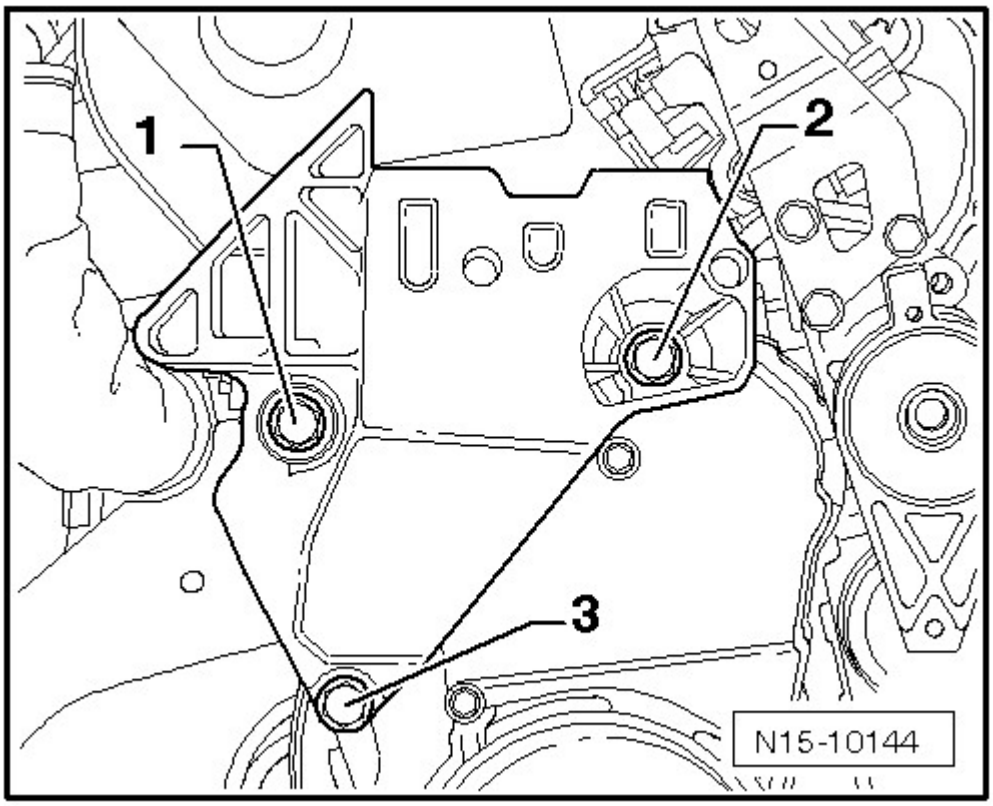

Fig. 61: Identifying Engine Bracket Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and disconnect charge air pipe with hoses.

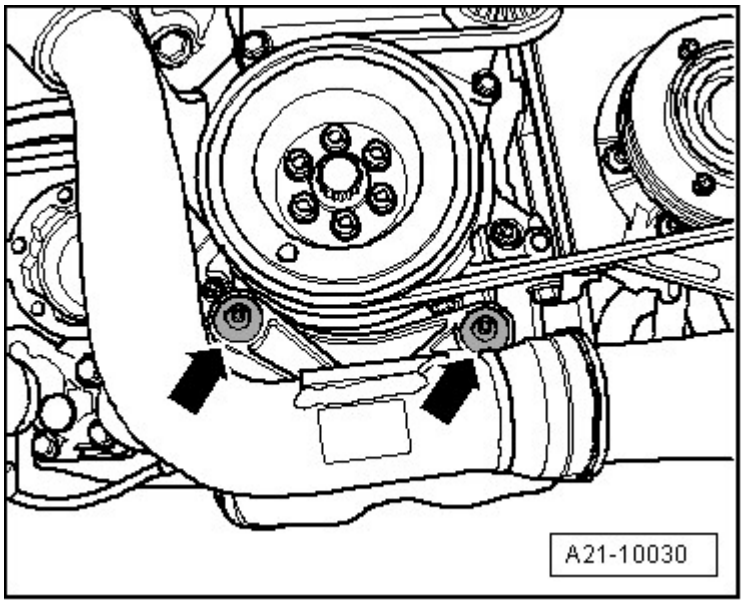

Fig. 62: Identifying Charge Air Pipe Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the lower bolts -3- and remove the engine support downward and out.

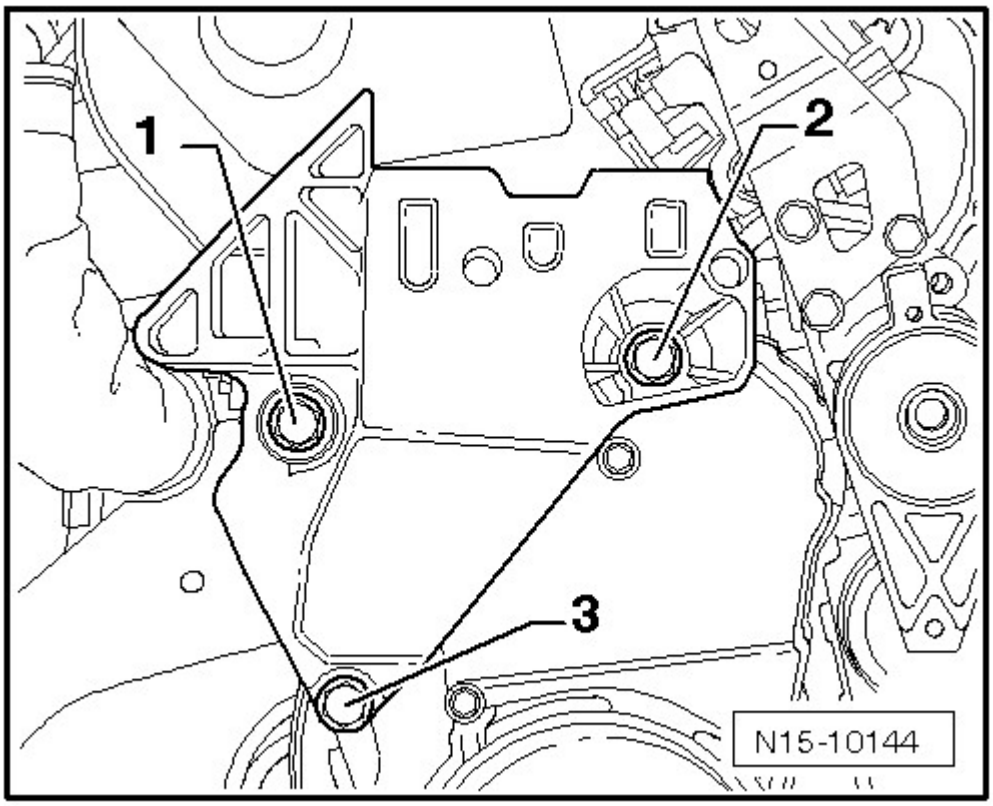

Fig. 63: Identifying Engine Bracket Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Bring camshaft gear to marking for TDC cylinder 1 by turning crankshaft. Marking on camshaft gear must align with arrow on toothed belt guard.

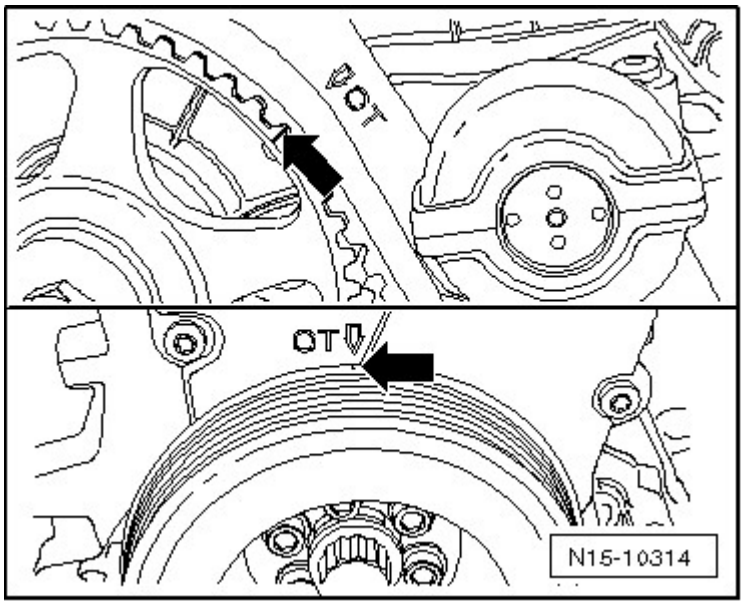

Fig. 64: Bringing Camshaft Gear To Marking For TDC Cylinder 1
Courtesy of AUDI OF AMERICA, LLC

-- Remove vibration damper/belt pulley.

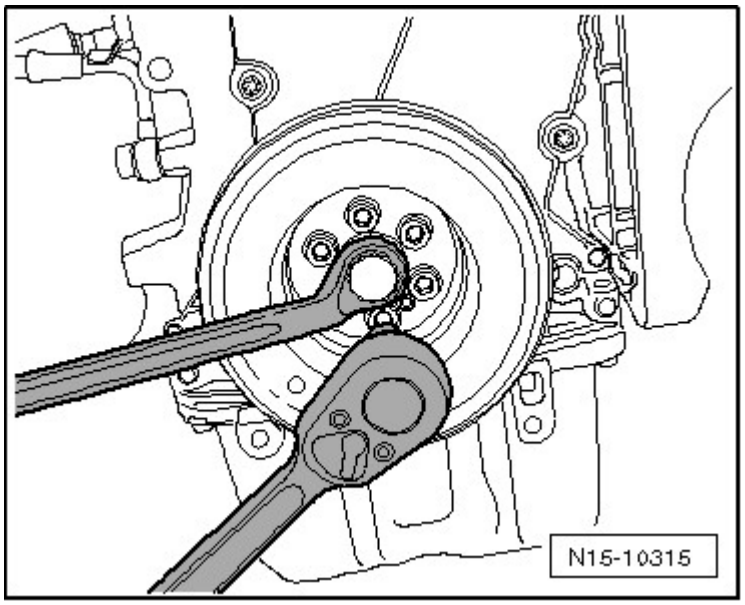

Fig. 65: Identifying Vibration Damper/Belt Pulley
Courtesy of AUDI OF AMERICA, LLC

NOTE: The TDC markings must align before removing vibration damper.

Crankshaft must not be rotated any more until TDC position is marked with an

assisting mark.

-- Remove lower bolts from lower section of toothed belt guard -arrows-.

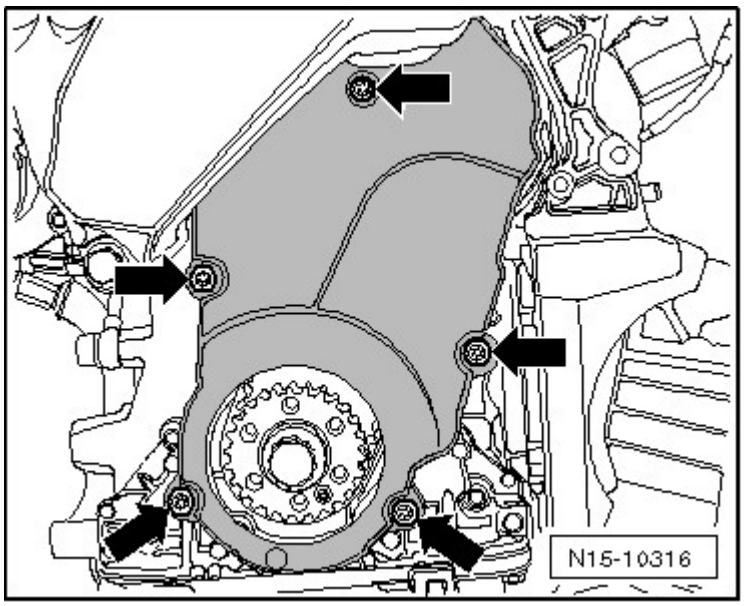

Fig. 66: Identifying Toothed Belt Guard
Courtesy of AUDI OF AMERICA, LLC

-- Identify TDC position -arrow-.

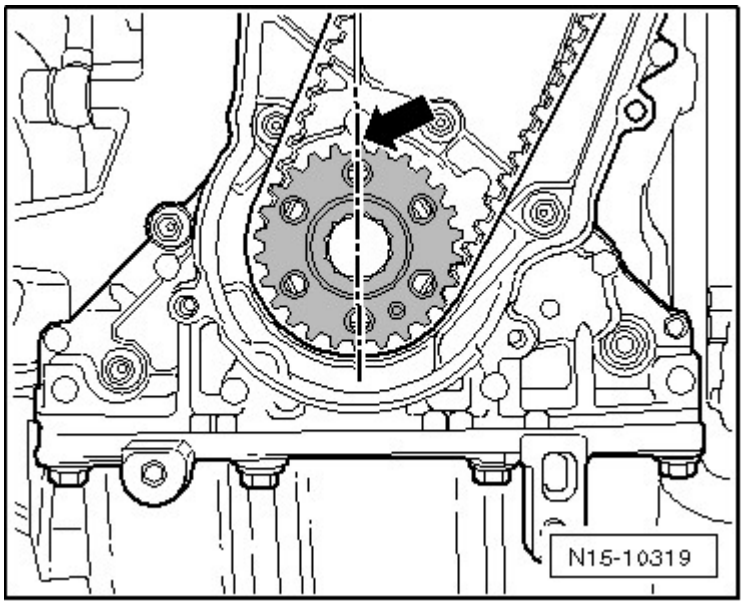

Fig. 67: Identifying TDC Position
Courtesy of AUDI OF AMERICA, LLC

-- Remove both upper bolts from toothed belt guard -arrows- and remove guard downward from engine.

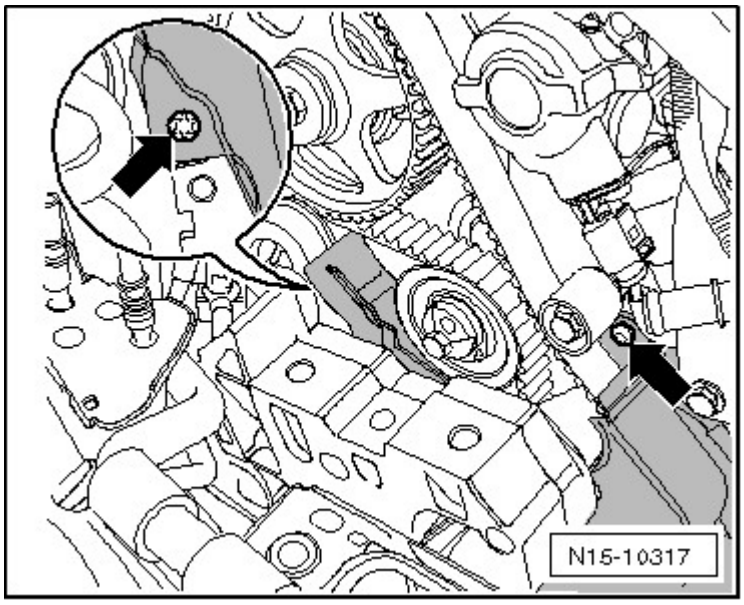

Fig. 68: Identifying Toothed Belt Guard Upper Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Now remove engine bracket upward from engine.

-- Mark rotational direction of toothed belt.

-- Loosen tensioning roller and remove toothed belt.

-- Then, turn the crankshaft back slightly.

Installing

- For the correct tightening specifications, refer to **TOOTHED BELT DRIVE, WITH DIVIDED TOOTHED BELT GUARD OVERVIEW**.

NOTE: When turning camshaft, crankshaft must not be at TDC. Valves and/or pistons may be damaged.

The engine must be no more than warm to the touch.

-- Position camshaft and crankshaft on TDC marking.

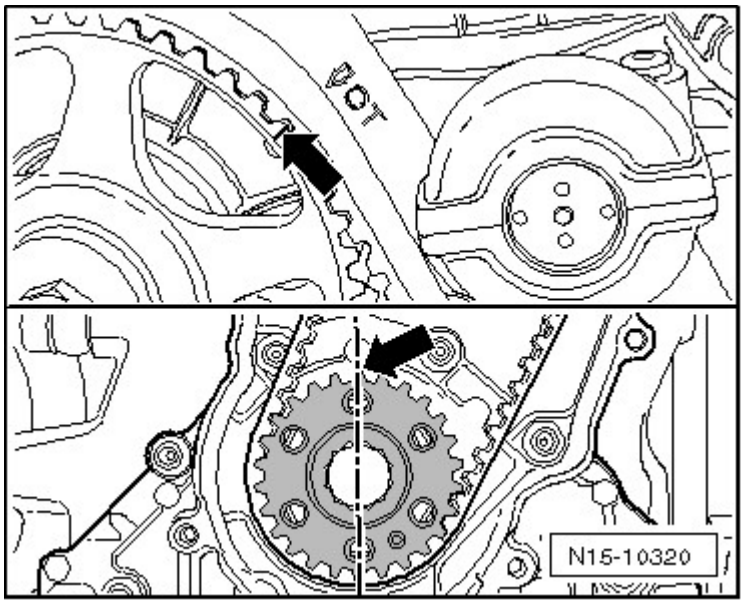

Fig. 69: Checking Valve Timing
Courtesy of AUDI OF AMERICA, LLC

-- Place the toothed belt onto the crankshaft sprocket (observe direction of rotation).

-- Route toothed belt in the sequence: Tensioning roller, camshaft gear, coolant pump and last over the relay pulley -arrow-.

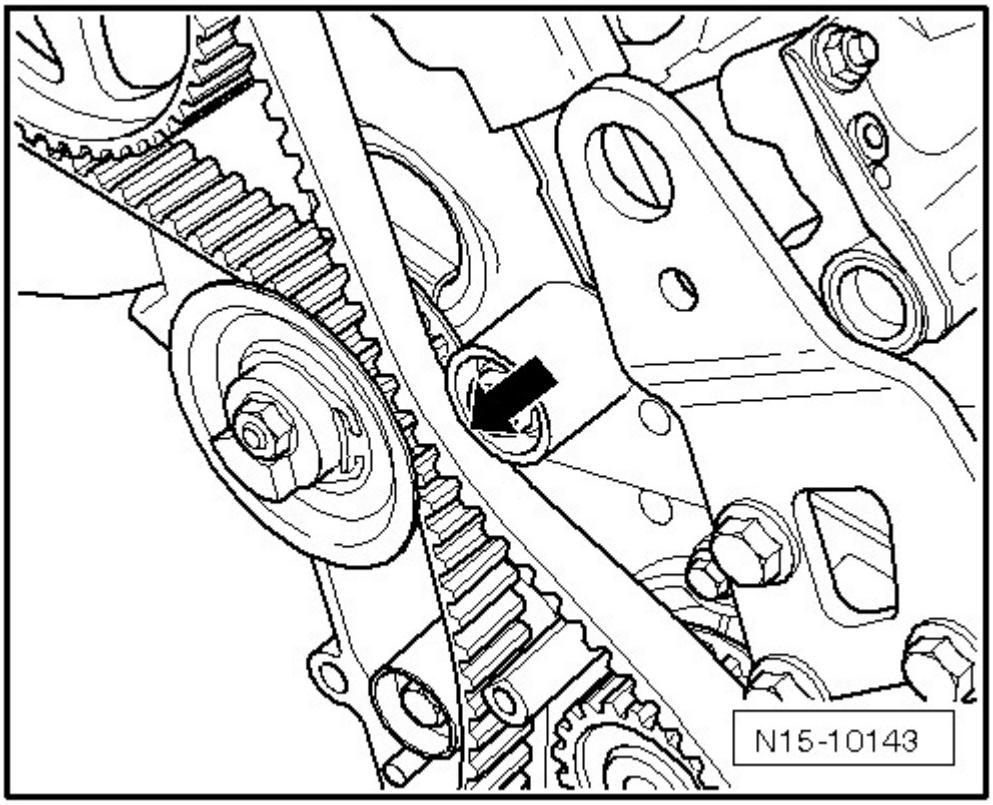

Fig. 70: Identifying Routing Of Toothed Belt
Courtesy of AUDI OF AMERICA, LLC

NOTE: Be sure tensioning roller is properly seated in cylinder head.

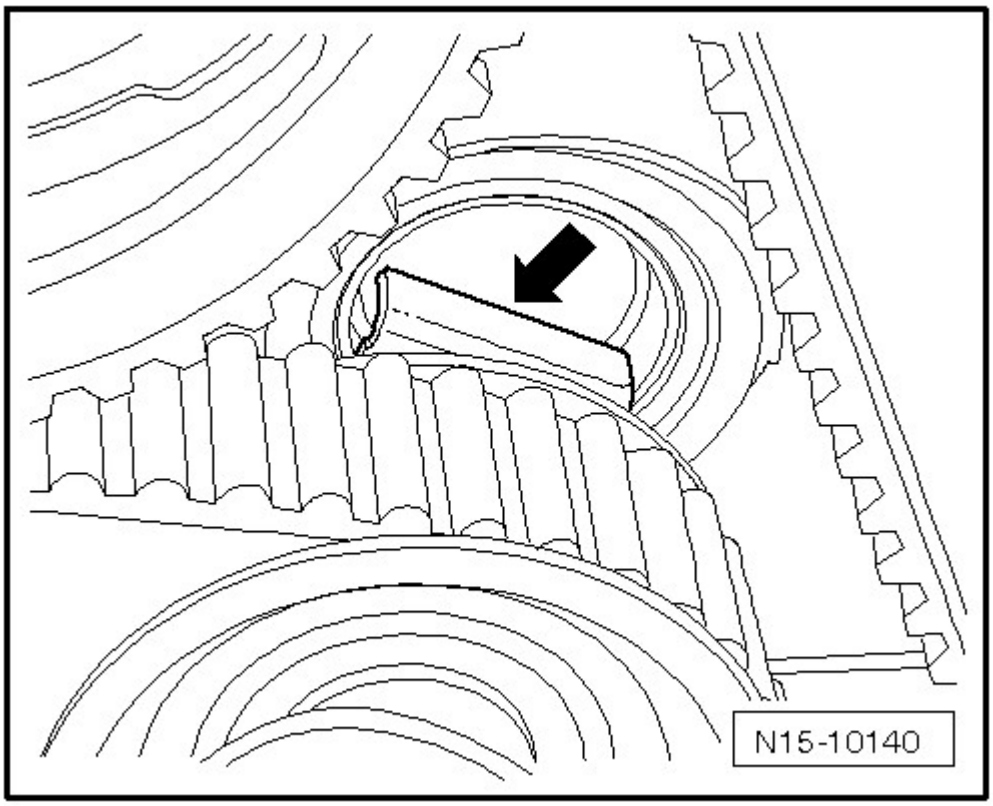

Fig. 71: Identifying Tensioning Roller Is Properly Seated In Cylinder Head
Courtesy of AUDI OF AMERICA, LLC

-- Tension toothed belt. To do so, turn socket head wrench on eccentric clockwise in direction of -arrow- until notch stands above the tab (toothed belt excessively tensioned).

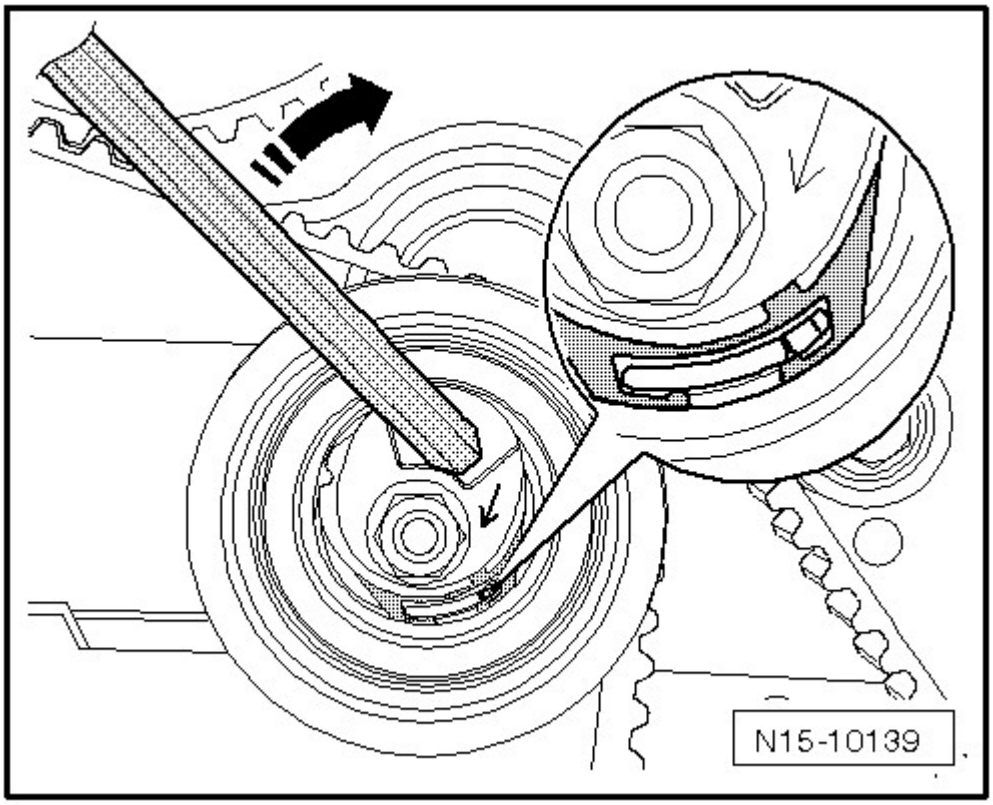

Fig. 72: Identifying Tensioning Of Toothed Belt
Courtesy of AUDI OF AMERICA, LLC

-- Release tension on toothed belt again.

-- Now tension toothed belt until notch and tab align.

-- Tighten mounting nut.

-- Turn the crankshaft 2 revolutions further in direction of engine rotation until the engine is positioned at TDC again. For this it is necessary that the last **45°** ($^{1}/_{8}$ rotation) is turned without interruption.

-- Check toothed belt tension. Specified value: Tab and notch align.

-- Check valve timing. The markings must align -arrows-.

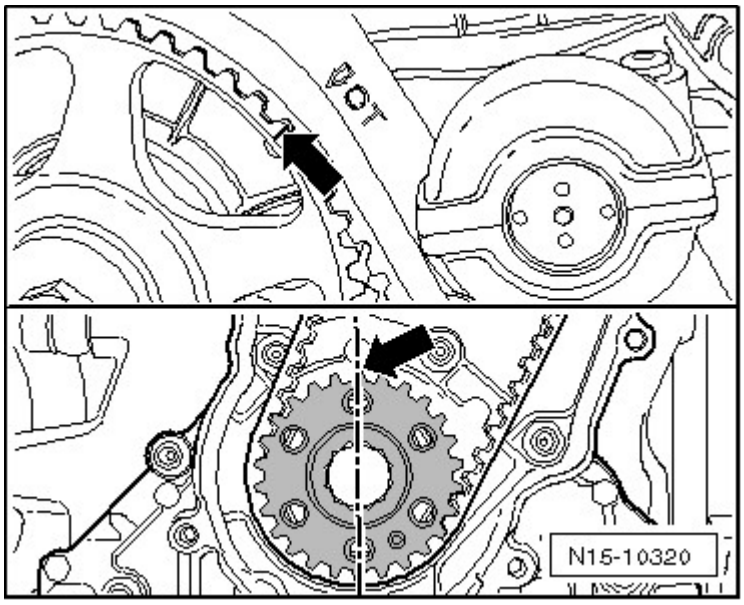

Fig. 73: Checking Valve Timing
Courtesy of AUDI OF AMERICA, LLC

If the markings do not match:

-- Repeat valve timing adjustment.

If the markings match:

-- Install engine bracket on cylinder block and tighten bolts hand-tight.

NOTE: Note different length of bolts. Bolt -3- is approximately 25 mm shorter than bolts -1 and 2-.

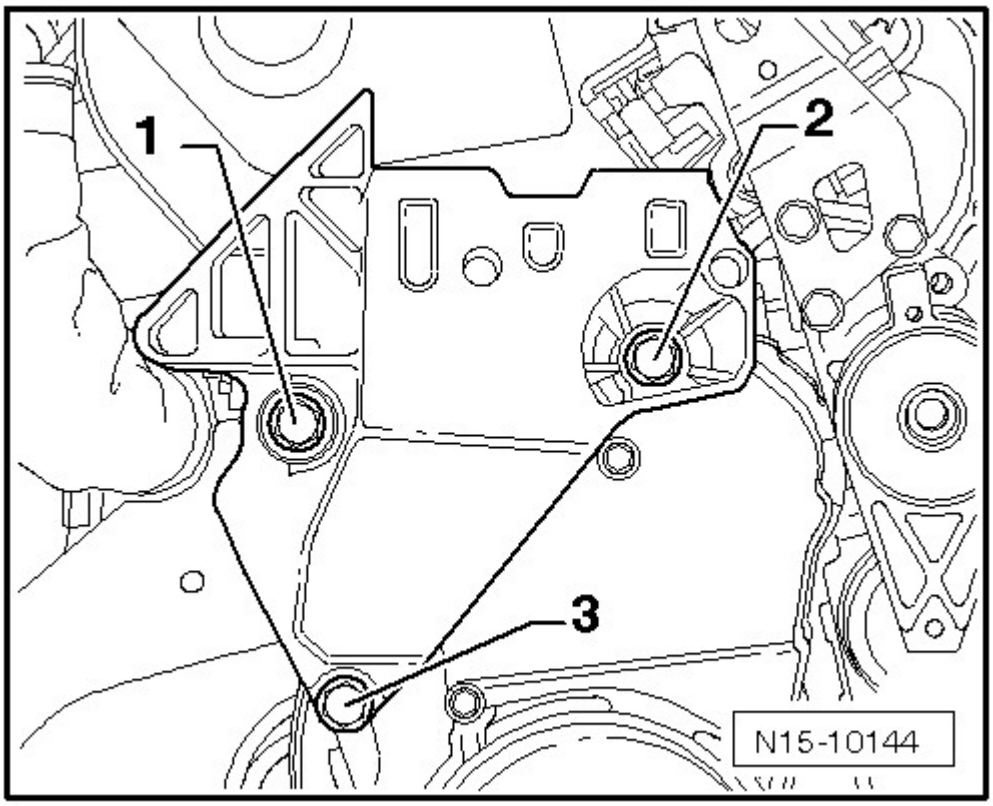

Fig. 74: Identifying Engine Bracket Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Lower the engine using the 10-222A until lower bolt -3- can be tightened.

-- Tighten all bolts.

-- Install engine mounting.

-- Tighten engine subframe mount and engine bracket bolts hand-tight -arrows-, by bringing the contact surfaces into contact using 10 - 222 A.

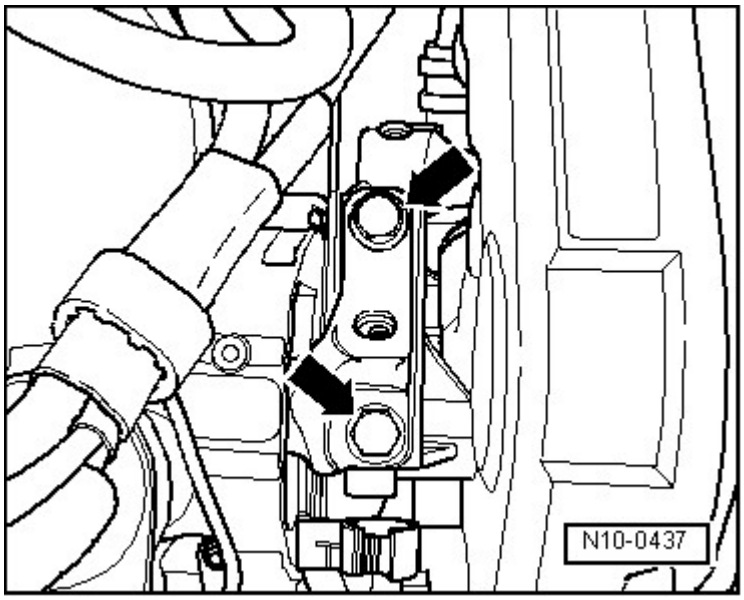

Fig. 75: Identifying Mounting Bolts Of Subframe Mount/Engine Bracket
Courtesy of AUDI OF AMERICA, LLC

-- Remove the 10 - 222 A.

-- Reconnect fuel and ventilation lines. Make sure connector couplings are securely fastened.

-- Install coolant expansion tank.

-- Install the crankshaft belt pulley. Refer to **VIBRATION DAMPER** .

-- Adjust the engine mounts. Refer to **SUBFRAME MOUNT, ADJUSTING** .

-- Install the ribbed belt. Refer to **RIBBED BELT** .

-- Install air guide pipes and connector. Refer to **HOSE CONNECTIONS WITH CONNECTOR COUPLINGS** .

-- Install fuel system. Refer to **Removal and Installation** .

-- Install noise insulation. Refer to **Removal and Installation** .

-- Install engine cover/air filter.

CAMSHAFT ADJUSTMENT VALVE 1

Special tools and workshop equipment required

- Torque Wrench 5-60 Nm V.A.G 1783
- Torx® Bit Set V.A.G 1766

- Ratchet Insert 1/4" VAS 6234
- Spring Type Clip Pliers VAS 5024 A

Removing

NOTE: Always replace gaskets and seals.

-- Remove the engine cover and air filter. Refer to **Removal and Installation** .

-- Separate electrical connector -1-.

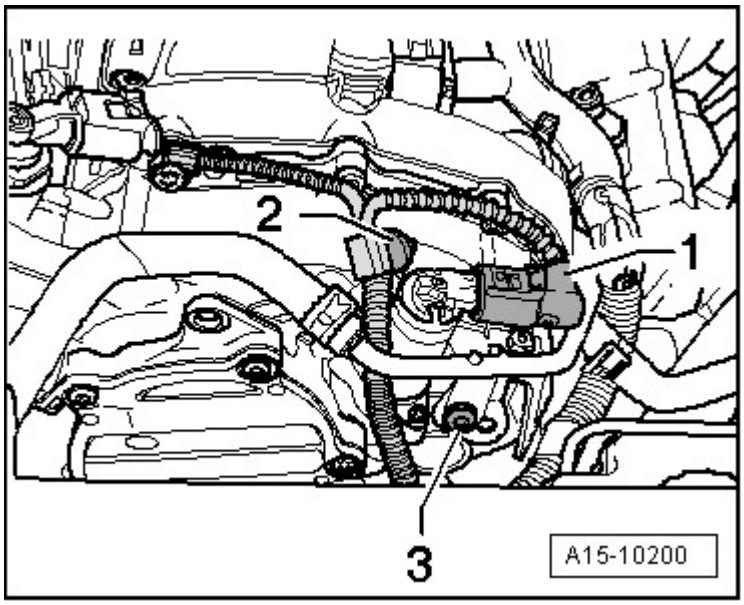

Fig. 76: Identifying Camshaft Adjustment Valve 1 Connector, Wiring Harness & Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Disengage wiring harness -2- from bracket.

-- Remove the bolt -3-.

NOTE: Do not pull out the camshaft adjustment valve 1 -N205- at connector.

-- Remove bolts -arrows- and remove camshaft adjustment valve 1 from housing.

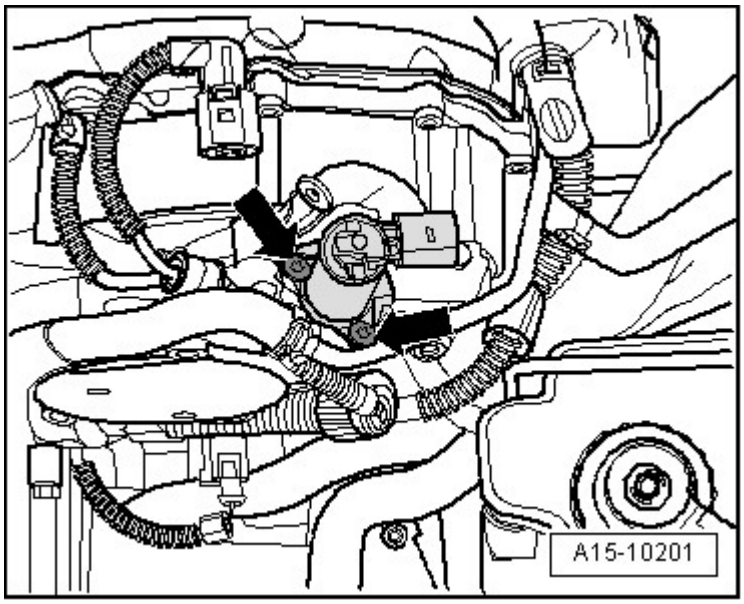

Fig. 77: Identifying Camshaft Adjustment Valve 1 N205 Bolts
Courtesy of AUDI OF AMERICA, LLC

Installing

- Tightening specifications, refer to **CYLINDER HEAD OVERVIEW**.

NOTE: **Camshaft adjustment valve 1 as well as housing must be free of dirt and contamination.**

Remove the new camshaft adjustment valve 1 from packaging only prior to installation.

CAUTION:
- **The camshaft adjustment valve 1 must not experience any hits or impacts.**

-- Coat sealing ring with engine oil.

-- Carefully insert camshaft adjustment valve 1 into housing and press it in perpendicular to valve axle by hand as far as stop.

-- Install bolts and tighten to 4 Nm with the V.A.G 1783, VAS 6234, Torx® bit T20 and bit holder from V.A.G 1766.

Assemble in reverse order of disassembly.

CYLINDER HEAD COVER

Removing

Special tools and workshop equipment required

- Ignition Coil Puller T40039
- Spring Type Clip Pliers VAS 5024 A

-- Remove the engine cover and air filter. Refer to **Removal and Installation** .

-- Remove the bolts -arrows-.

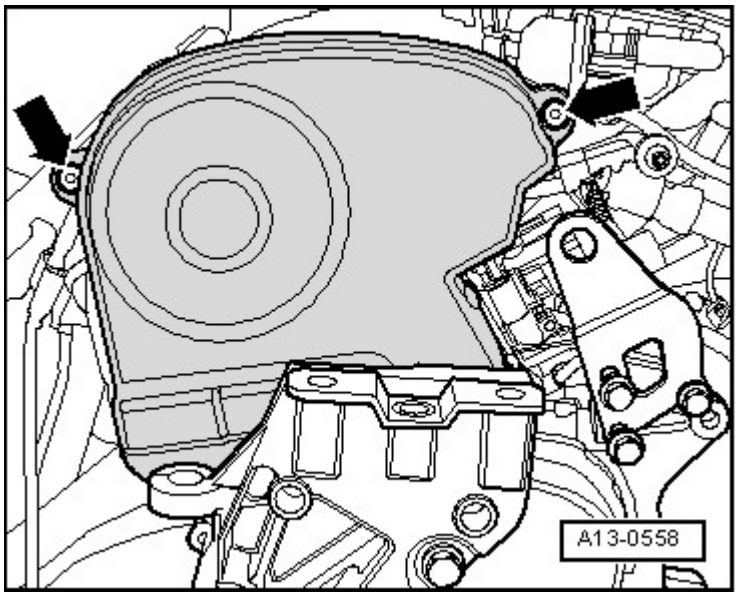

Fig. 78: Identifying Toothed Belt Guard Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the ignition coils with power output stage. Refer to **Removal and Installation** .

-- Disconnect the EVAP line from the cylinder head cover -1-.

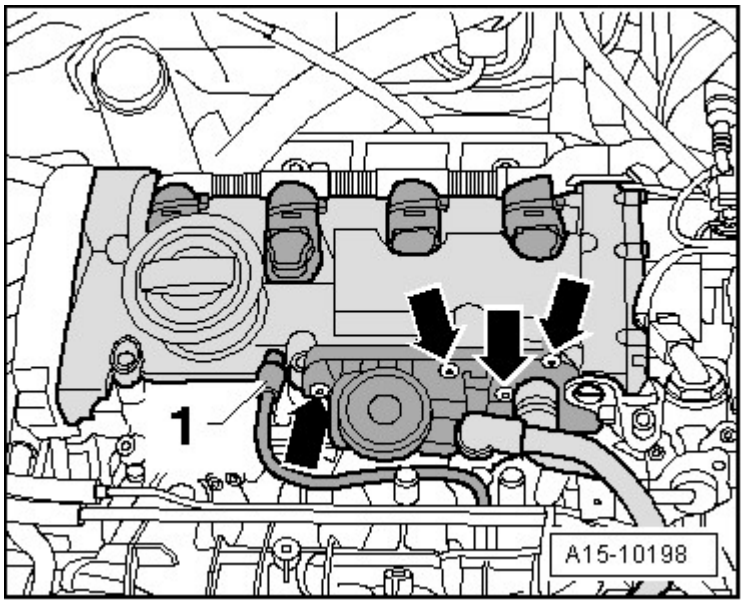

Fig. 79: Identifying Valve Housing And Cylinder Head Cover
Courtesy of AUDI OF AMERICA, LLC

-- Remove valve housing from cylinder head cover -arrows-.

-- Remove crankcase ventilation line with heat shield from turbocharger -1-.

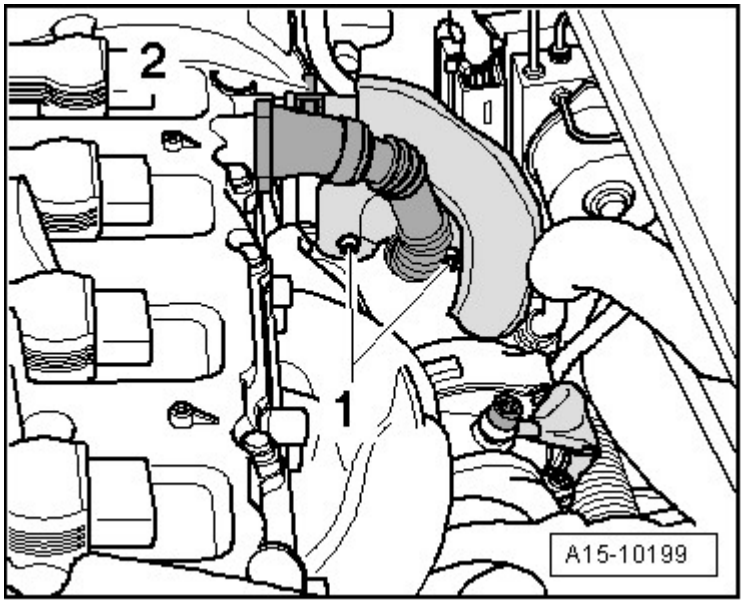

Fig. 80: Identifying Line For Crankcase Ventilation With Heat Shield From Turbocharger
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect EVAP line to turbocharger from the cylinder head cover -2-.

-- Loosen the cylinder head cover starting from the outside and working toward the inside.

-- Remove the cylinder head cover.

Installing

Install in reverse order of removal. Note the following:

- Tightening specifications, refer to **CYLINDER HEAD OVERVIEW**

NOTE: Replace the cylinder head cover gaskets if they are damaged.

-- Tighten cylinder head cover from inside toward outside.

-- Make sure the upper toothed belt guard is installed correctly.

-- Install ignition coils with power output stage. Refer to **Removal and Installation** .

CYLINDER HEAD

Special tools and workshop equipment required

- Drip Tray VAS 6208
- Retainer 3036
- Puller T40001
- Ignition Coil Puller T40039
- Hose Clip Pliers V.A.G 1921
- Engine Support Bridge 10 - 222 A
- Shackle (1 Set=2 Pieces) 10 - 222 A /12
- Locking Pin T10060A
- Toothed Belt Tensioner T10020
- Polydrive Bit and Drive Socket T10070
- Engine Bung Set VAS 6122

Removing

- Engine installed.

NOTE: All cable ties which are opened or cut open when removing, must be replaced in the same position when installing.

Change the engine oil if it is dirty.

When using sealant, observe the current descriptions

-- Note radio code (for vehicles equipped with coded anti-theft radio / radio navigation system), obtain if

necessary.

-- Remove the engine cover and air filter. Refer to **Removal and Installation** .

WARNING: Cover cap of expansion tank with rag and open carefully, as hot steam for example hot coolant may escape when opened.

-- Open cap of coolant expansion tank.

-- Remove noise insulation. Refer to **Removal and Installation** .

-- Remove the right noise insulation - fasteners -1 to 3-.

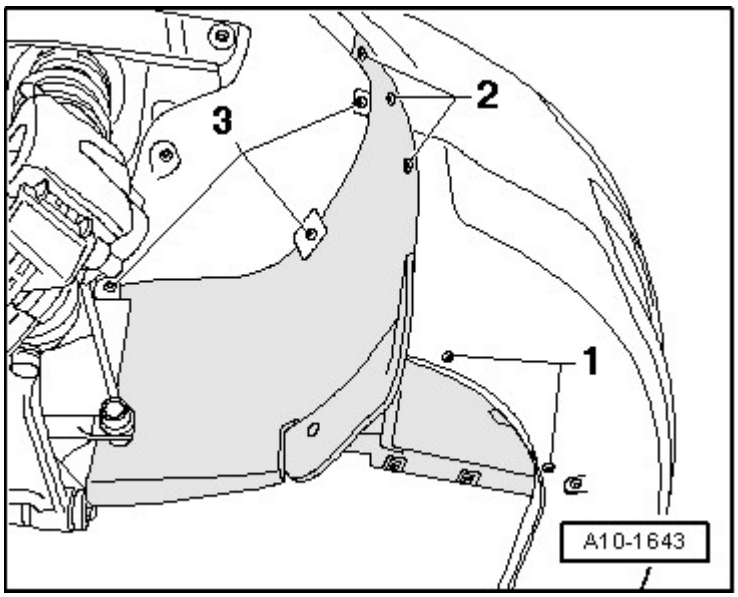

Fig. 81: Identifying Fasteners
Courtesy of AUDI OF AMERICA, LLC

-- Drain engine coolant. Refer to **COOLING SYSTEM, DRAINING AND FILLING** .

-- Pry off the caps on the wiper arms with a screwdriver and remove the nuts.

-- Pull off and remove wiper arms from wiper axles.

-- Unclip the spray nozzles -arrow-.

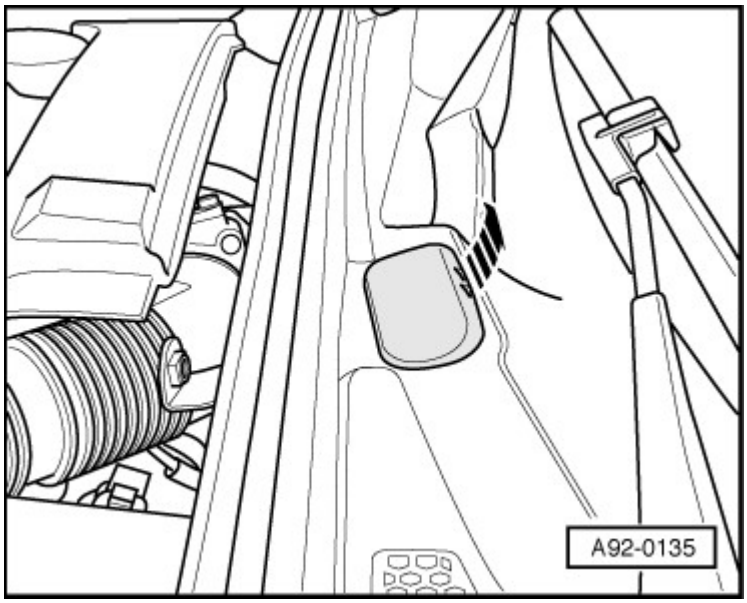

Fig. 82: Removing Spray Nozzle
Courtesy of AUDI OF AMERICA, LLC

-- Push the spray nozzles, with lines still attached, back through the opening and into the plenum chamber.

-- Remove rubber seal -1- for plenum chamber cover.

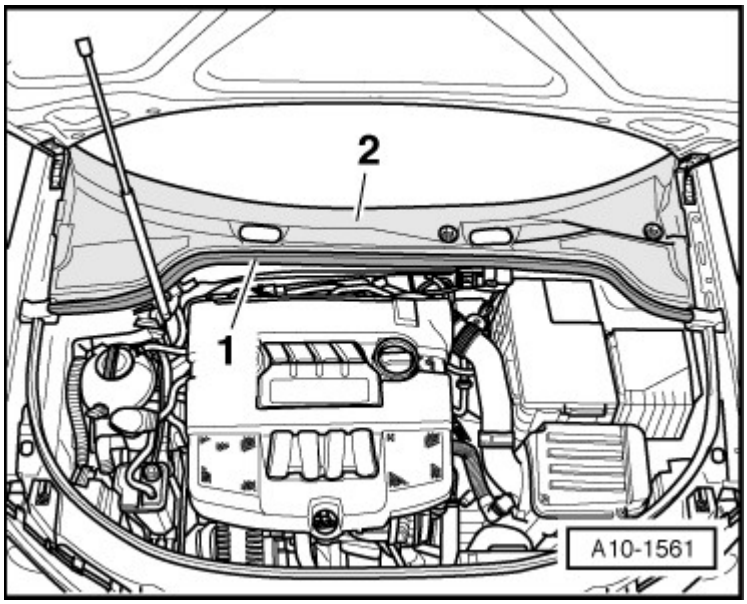

Fig. 83: Plenum Chamber Cover And Rubber Seal
Courtesy of AUDI OF AMERICA, LLC

-- Remove the plenum chamber cover -2-.

-- Free up the rear engine wiring harness at the partition for plenum chamber.

-- Remove electrical connector -arrow- for oxygen sensor before catalytic converter from the bracket, disconnect it and lay it aside.

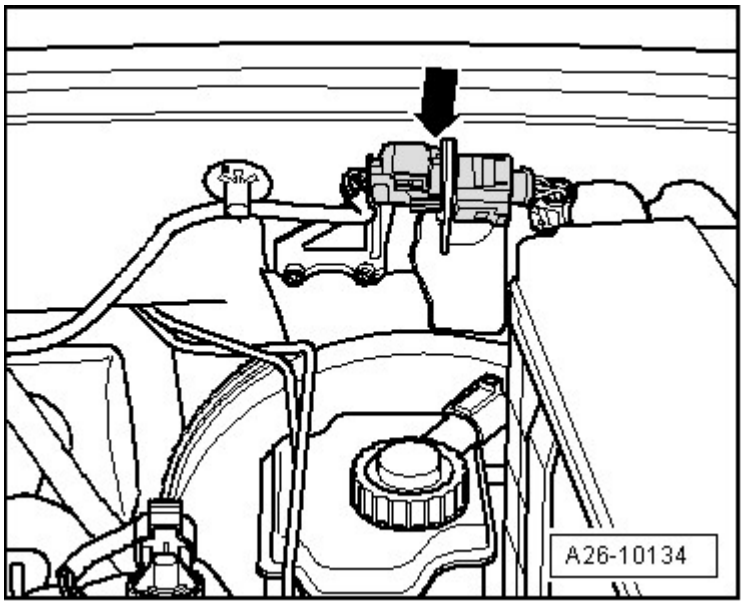

Fig. 84: Disconnecting Heated Oxygen Sensor (HO2S) G39 Harness Connector
Courtesy of AUDI OF AMERICA, LLC

-- Remove partition for plenum chamber -arrows-.

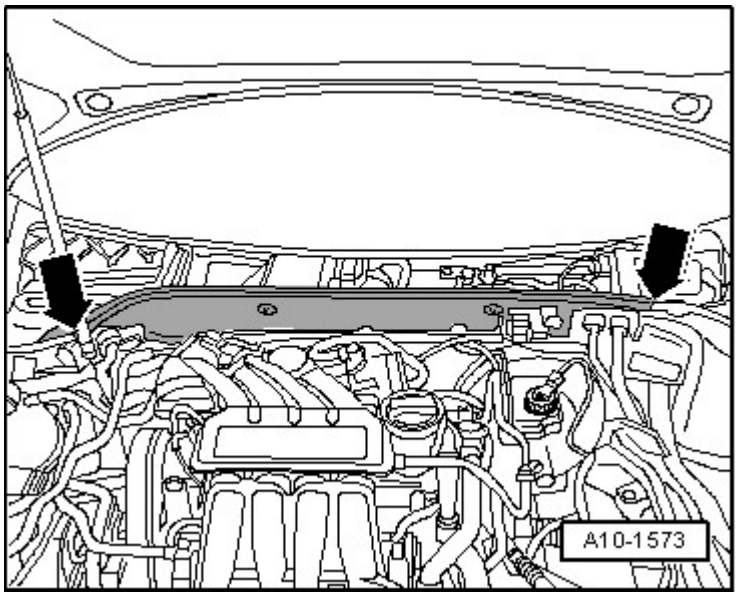

Fig. 85: Plenum Chamber Partition
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the coolant line to coolant expansion tank -arrow-.

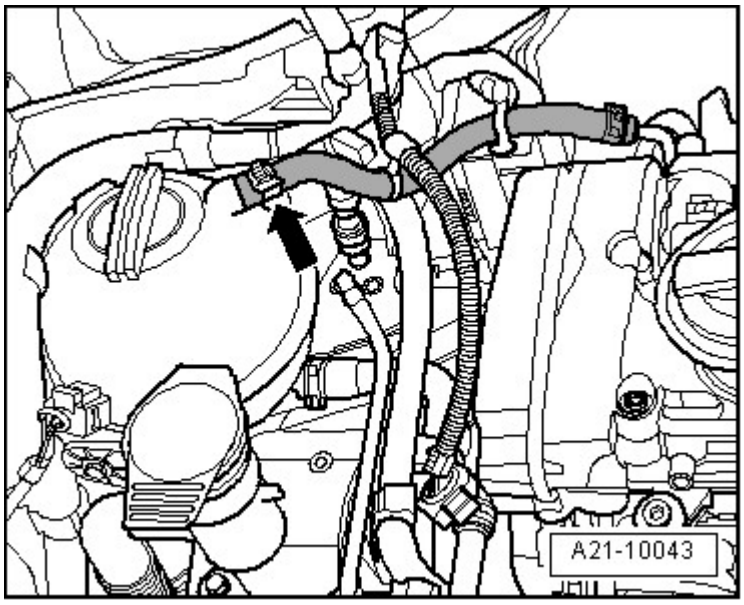

Fig. 86: Disconnecting Coolant Line To Coolant Expansion Tank
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect coolant hose -1-.

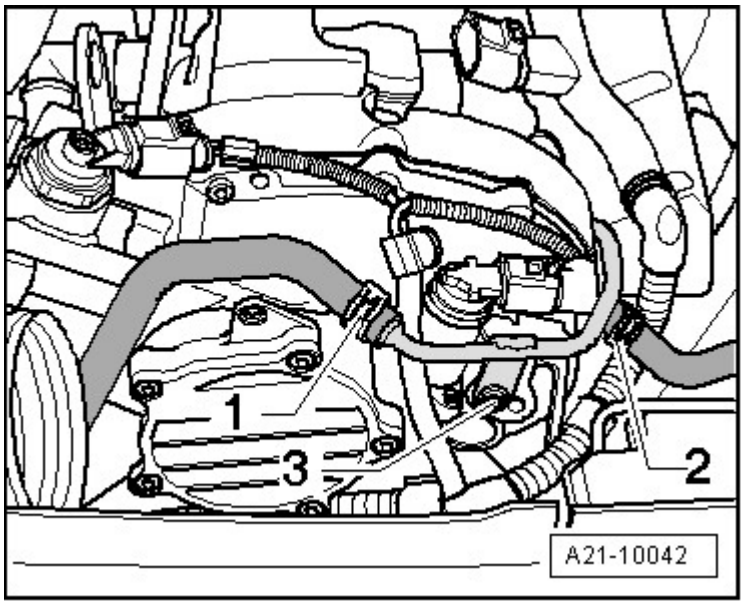

Fig. 87: Identifying Coolant Hoses
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect coolant hose -2-.

-- Remove ground (GND) wire bolt -1-.

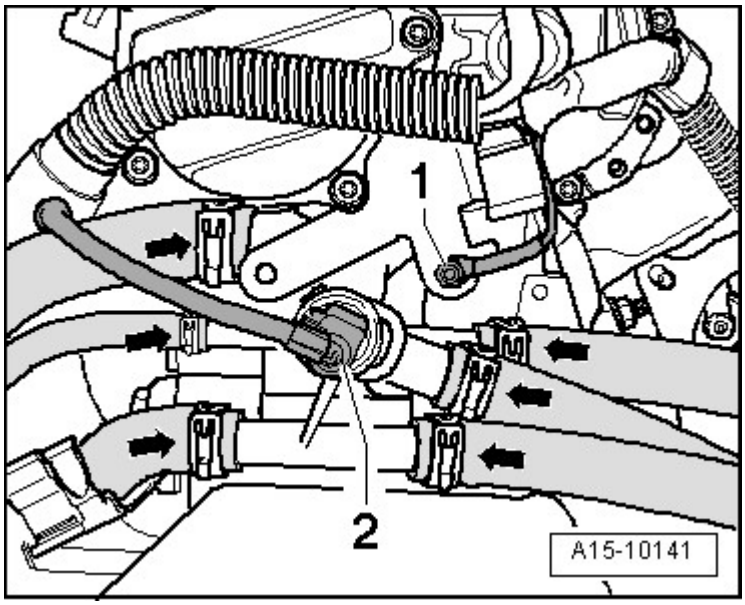

Fig. 88: Identifying Ground (GND) Wire & Connector
Courtesy of AUDI OF AMERICA, LLC

-- Separate electrical connector -2-.

-- Disconnect coolant hoses -arrows-.

-- Remove the intake manifold. Refer to **Removal and Installation** .

-- Remove catalytic converter with front exhaust pipe. Refer to **FRONT EXHAUST PIPE WITH CATALYTIC CONVERTERS AND FRONT MUFFLER** .

-- Remove right drive axle. Refer to **Removal and Installation** .

-- Remove the right drive axle heat shield -arrows-.

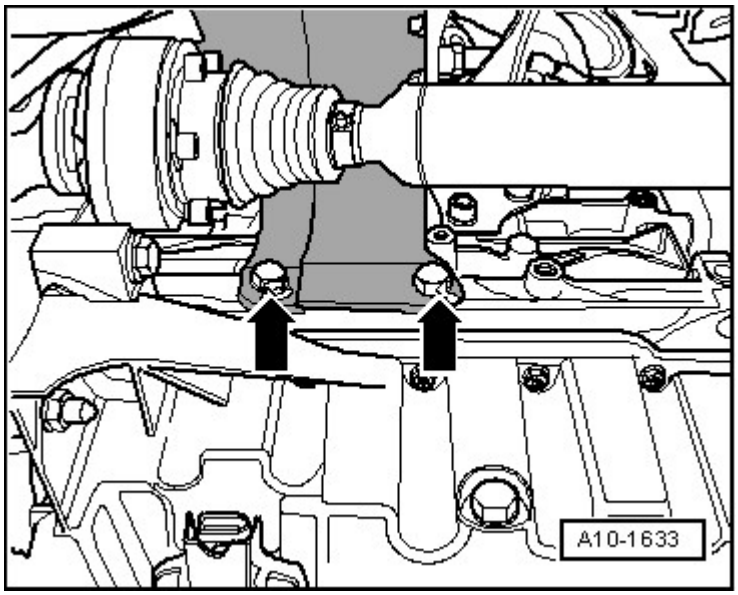

Fig. 89: Identifying Protective Cap For Drive Axle On Engine
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect air guide pipe -arrow- from charge air cooler.

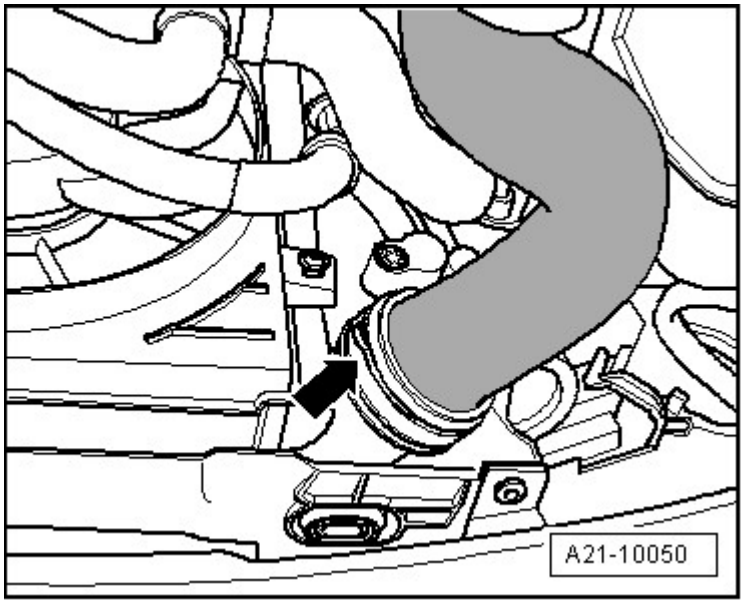

Fig. 90: Charge Air Cooler Air Guide Pipe
Courtesy of AUDI OF AMERICA, LLC

-- Unfasten air duct from turbocharger -arrows-.

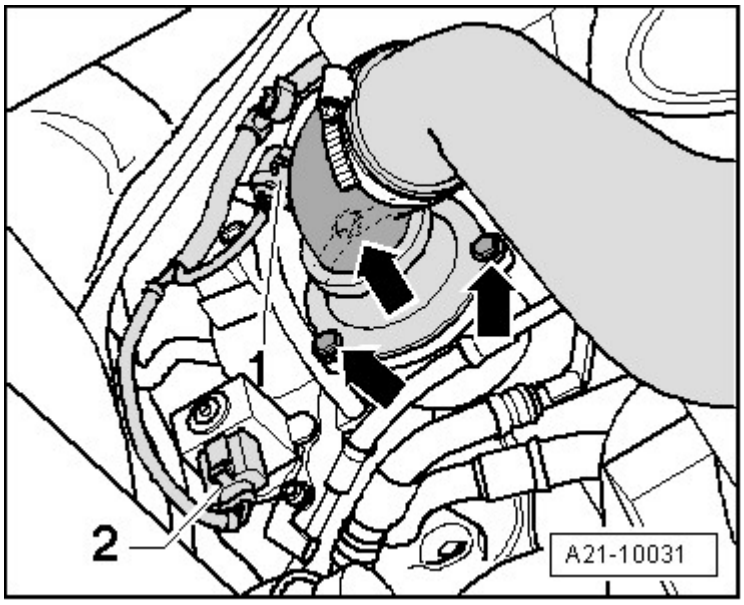

Fig. 91: Turbocharger Air Duct And Connector
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connectors -1 and 2- and free up the cable.

-- Remove bolts -arrows- and remove air guide pipe.

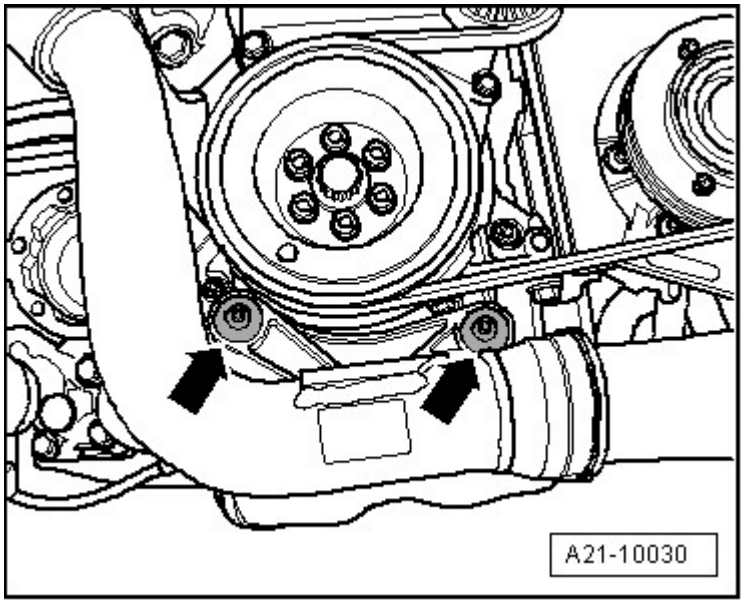

Fig. 92: Identifying Charge Air Pipe Bolts
Courtesy of AUDI OF AMERICA, LLC

NOTE: The illustration depicts the engine removed from behind.

-- Unfasten turbocharger oil supply line at cylinder block -1-.

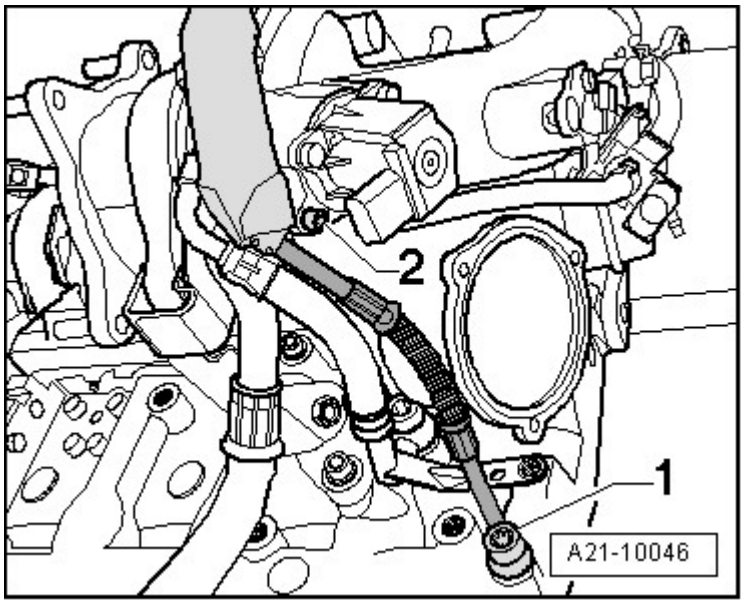

Fig. 93: Cylinder Block And Turbocharger Oil Supply Line
Courtesy of AUDI OF AMERICA, LLC

-- Remove turbocharger oil supply line -2-.

-- Unfasten turbocharger coolant supply line at cylinder block -1-.

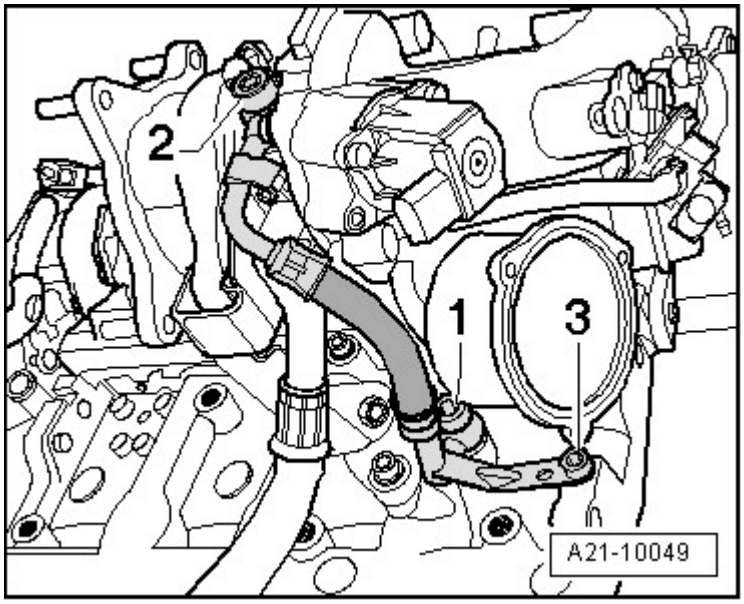

Fig. 94: Turbocharger Coolant Supply Line Connections
Courtesy of AUDI OF AMERICA, LLC

-- Remove coolant supply line to turbocharger -2-.

-- Remove the coolant supply line for turbocharger -3- at the cylinder block.

-- Disconnect oil return line -arrows- on turbocharger.

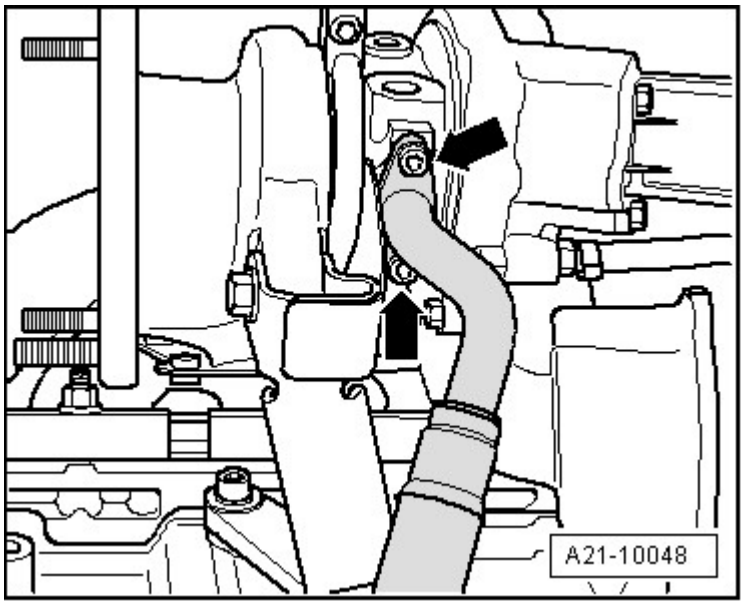

Fig. 95: Identifying Oil Return Line
Courtesy of AUDI OF AMERICA, LLC

-- Remove bolts -1- and -2- and remove support for turbocharger.

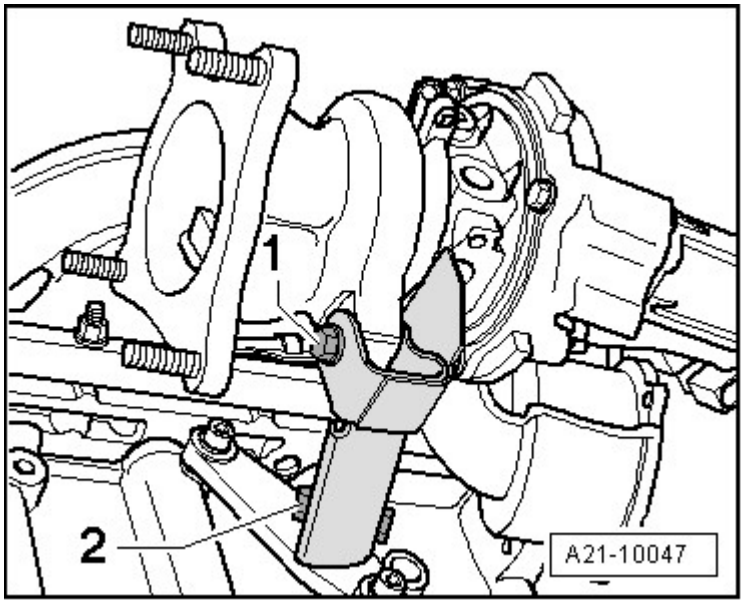

Fig. 96: Identifying Bolts And Support For Turbocharger
Courtesy of AUDI OF AMERICA, LLC

-- Remove toothed belt. Refer to **TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD** or **TOOTHED BELT, WITH DIVIDED TOOTHED BELT GUARD**.

-- Loosen the bolt for camshaft sprocket using the 3036.

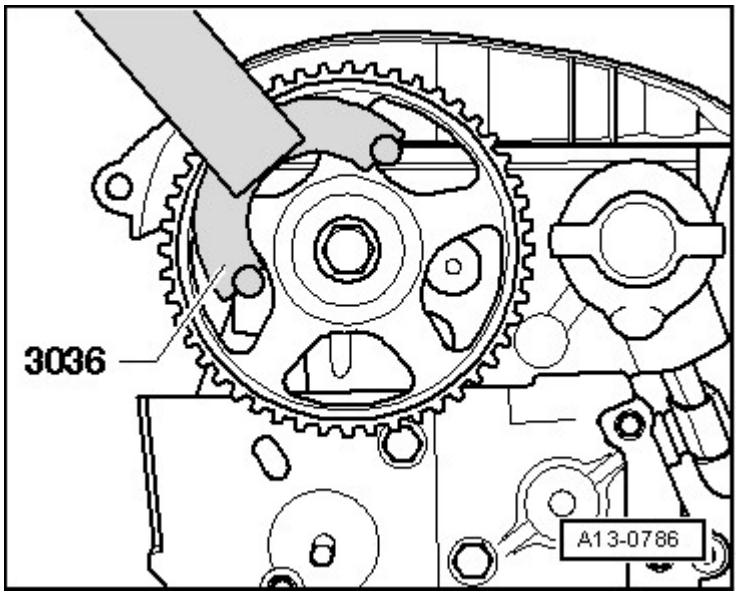

Fig. 97: Loosening Bolt For Camshaft Sprocket Using Retainer 3036
Courtesy of AUDI OF AMERICA, LLC

-- Pull off the camshaft sprocket using the T40001 and claws T40001/6 and T40001/7.

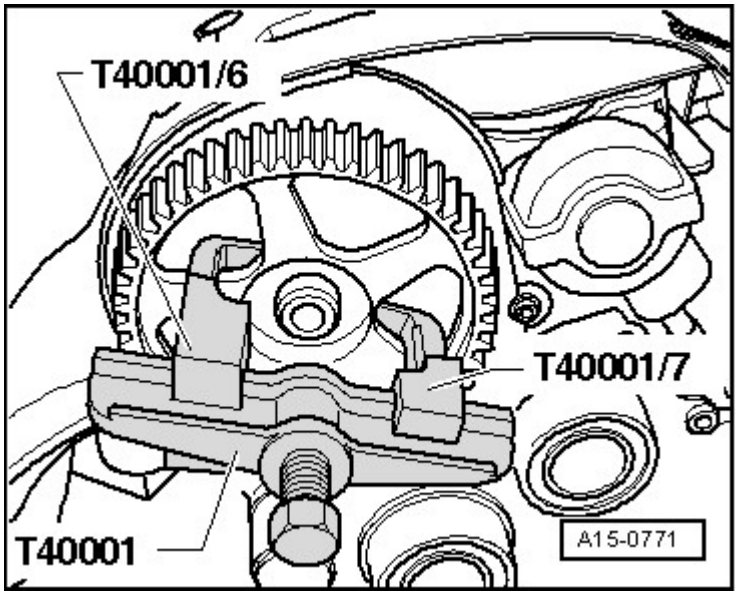

Fig. 98: Identifying Puller T40001, Claw T40001/6 And Claw T40001/7
Courtesy of AUDI OF AMERICA, LLC

-- Remove the rear toothed belt guard -arrows- from cylinder head.

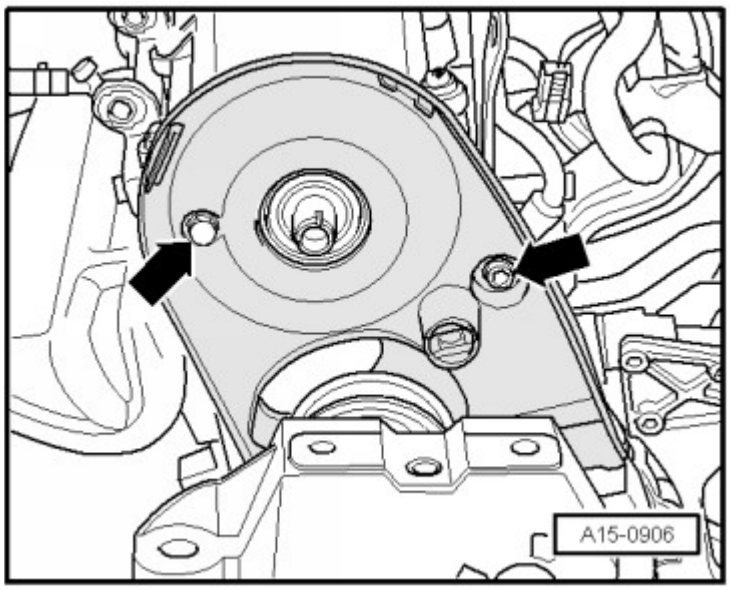

Fig. 99: Rear Toothed Belt Housing And Cylinder Head
Courtesy of AUDI OF AMERICA, LLC

-- Remove the cylinder head cover. Refer to **CYLINDER HEAD COVER**.

-- Loosen the cylinder head bolts using a T10070, paying attention to the sequence of the cylinder head bolts.

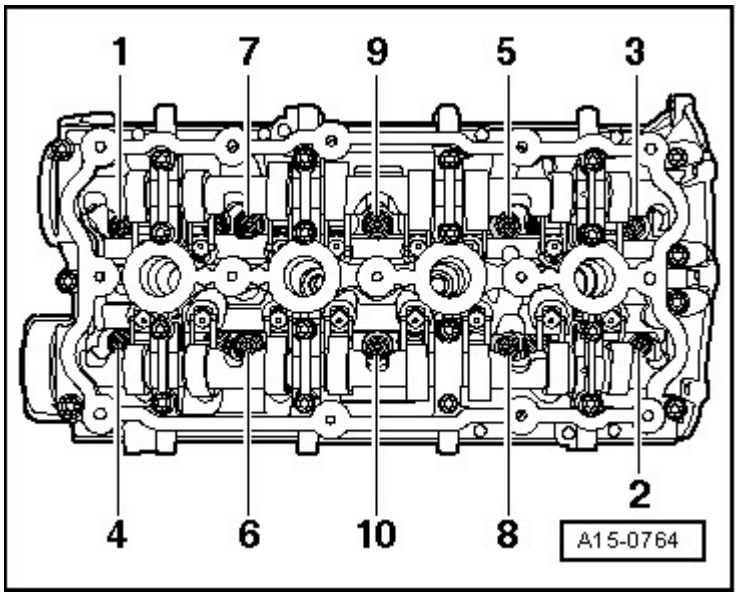

Fig. 100: Cylinder Head Bolt Loosening Sequence
Courtesy of AUDI OF AMERICA, LLC

NOTE: Verify that all hose and line connections between engine, transmission and body have been disconnected.

-- Remove cylinder head.

Cylinder Head, Installing

- Tightening specifications and tightening sequence, refer to **CYLINDER HEAD OVERVIEW**
- For the correct tightening specifications, refer to **EXHAUST SYSTEM OVERVIEW**

NOTE: **Replace the cylinder head bolts.**

Always replace self-locking nuts, bolts which have been tightened to tightening specifications as well as gaskets and O-rings.

Secure all hose connections using hose clamps of series-production status

Carefully remove residual sealant from cylinder head and cylinder block. Make sure that no long scrapes or scratches result.

Carefully remove all grinding and sanding residue.

Only unpack new cylinder head gasket immediately prior to installation.

Handle gasket carefully. Damages to the silicone layer and in areas of recesses may result in leaks.

There must be no oil or coolant in the blind holes for the cylinder head bolts in the cylinder block.

Hot bolt paste

WARNING: **Only turn over the engine at the crankshaft in direction of engine rotation (clockwise).**

NOTE: **Turning over the engine is performed at the center bolt of the crankshaft.**

-- Bring marking on camshaft gear to alignment with marking on toothed belt guard. The notches of the camshafts -arrows- now face toward each other vertically.

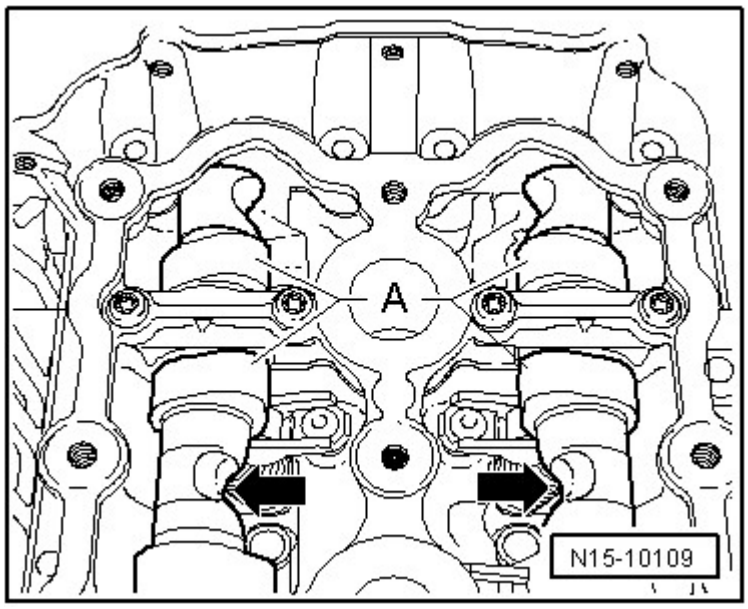

Fig. 101: Bringing Marking On Camshaft Gear To Alignment With Marking On Toothed Belt Guard
Courtesy of AUDI OF AMERICA, LLC

-- In the event the crankshaft has been rotated in the meantime: Set piston of cylinder 1 to TDC and turn crankshaft back again slightly.

-- Set cylinder head gasket in place.

- Pay attention to alignment pins -arrows- in cylinder block.

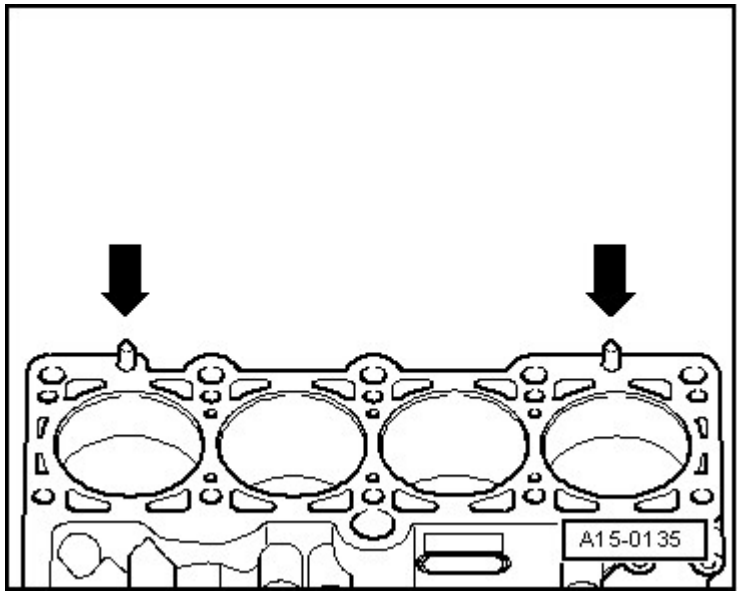

Fig. 102: Cylinder Block Centering Pins
Courtesy of AUDI OF AMERICA, LLC

- Observe cylinder head seal location, identification: Replacement part number must be visible from intake

side.

-- Set cylinder head in place.

-- Insert cylinder head bolts and tighten by hand.

-- Cylinder head tightening sequence **TURBOCHARGER OVERVIEW** :

NOTE: There is no requirement to tighten the cylinder head bolts after repairs.

-- Install cylinder head cover. Refer to **CYLINDER HEAD**.

-- Install wiper arm. Refer to **Removal and Installation** .

-- Install toothed belt. Refer to **TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD** or **TOOTHED BELT, WITH DIVIDED TOOTHED BELT GUARD**.

-- Install the ribbed belt. Refer to **RIBBED BELT** .

-- Electrical connections and routing. Refer to appropriate SYSTEMS WIRING DIAGRAM.

-- Install the intake manifold. Refer to **Removal and Installation** .

-- Install air guide pipes and connector. Refer to **HOSE CONNECTIONS WITH CONNECTOR COUPLINGS** .

-- Connect the battery. Refer to **Removal and Installation** .

-- Install fuel system. Refer to **Removal and Installation** .

-- Check oil level.

-- Fill with coolant. Refer to **COOLING SYSTEM, DRAINING AND FILLING** .

NOTE: Only reuse drained coolant if cylinder head or engine block was not replaced.

Dirty coolant may not be used again.

WARNING: Do not use a battery charger for starting assistance! There is the risk that the vehicle control modules could be damaged.

CAMSHAFT ADJUSTER

Special tools and workshop equipment required

- Socket T40080

- Camshaft Clamp T10252
- Toothed Belt Tensioner T10020
- Locking Pin T10115

Removing

-- Remove the high pressure pump. Refer to **Removal and Installation** .

-- Remove the cylinder head cover. Refer to **CYLINDER HEAD COVER**.

-- Remove the vacuum pump.

-- Remove camshaft adjuster housing -arrows-.

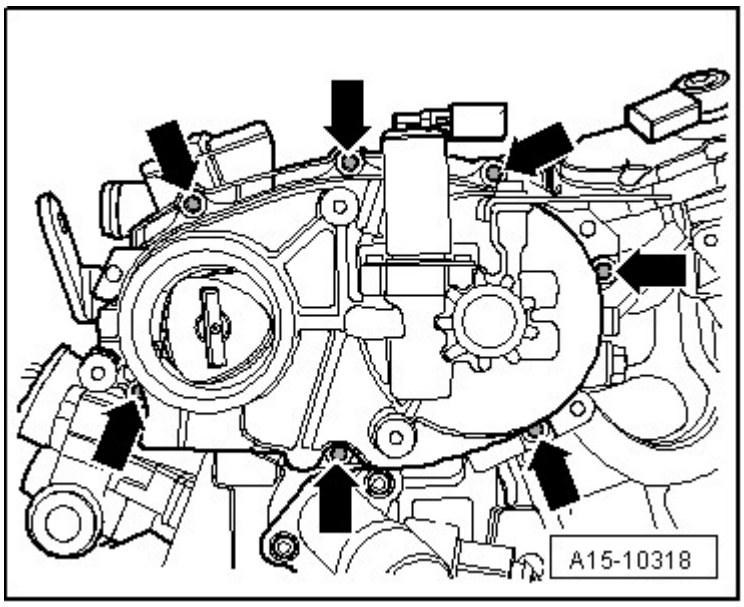

Fig. 103: Removing Camshaft Adjuster Housing
Courtesy of AUDI OF AMERICA, LLC

-- Bring marking on camshaft gear to alignment with marking on toothed belt guard. The notches of the camshafts -arrows- now face toward each other vertically.

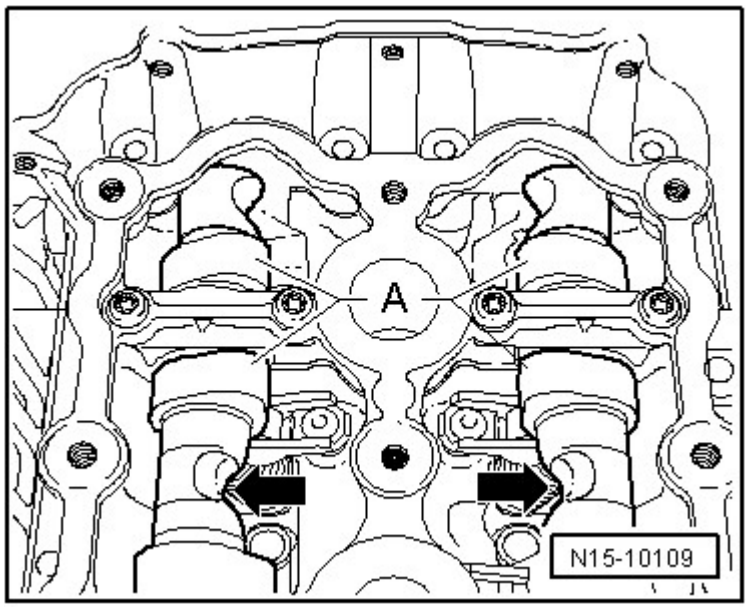

Fig. 104: Bringing Marking On Camshaft Gear To Alignment With Marking On Toothed Belt Guard
Courtesy of AUDI OF AMERICA, LLC

-- Install the T10252 -arrows- as shown and secure.

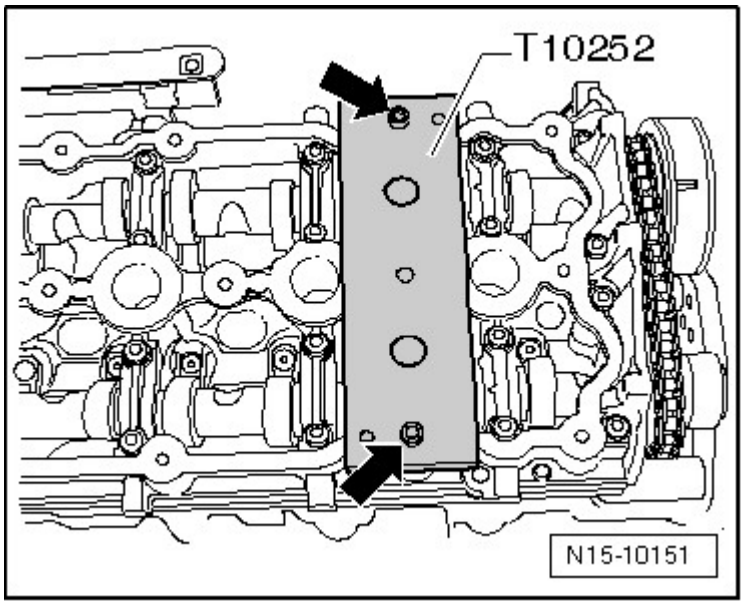

Fig. 105: Identifying Camshafts Secured Using Camshaft Locator T10252
Courtesy of AUDI OF AMERICA, LLC

-- Loosen mounting bolt from camshaft adjuster using the T40080.

-- Compress chain tensioner -arrow A- and secure it using the T10115 -arrow B-.

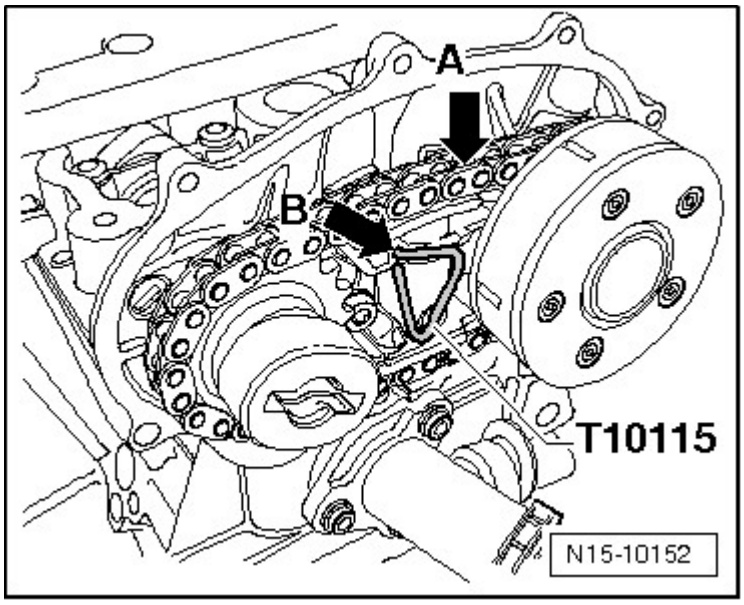

Fig. 106: Chain Tensioner And Locking Pin T10115
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt from the camshaft adjuster and then remove the adjuster and the chain.

Installing

- For the correct tightening specifications, refer to **VALVETRAIN OVERVIEW**.
- For the correct tightening specifications, refer to **CYLINDER HEAD OVERVIEW**.
- The camshafts must be fixed in place with the T10252.

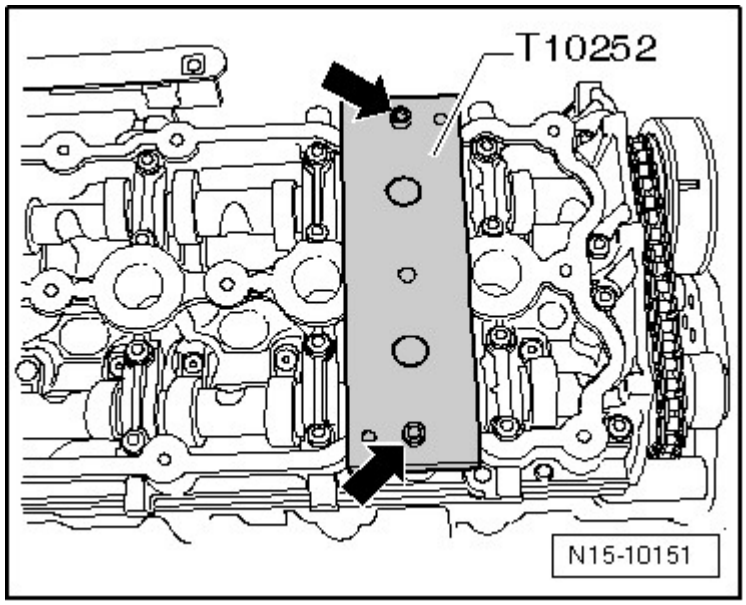

Fig. 107: Identifying Camshafts Secured Using Camshaft Locator T10252
Courtesy of AUDI OF AMERICA, LLC

-- Place chain on to camshaft adjuster.

-- Hold camshaft adjuster in front of exhaust camshaft so that notch -A- and pin -B- align.

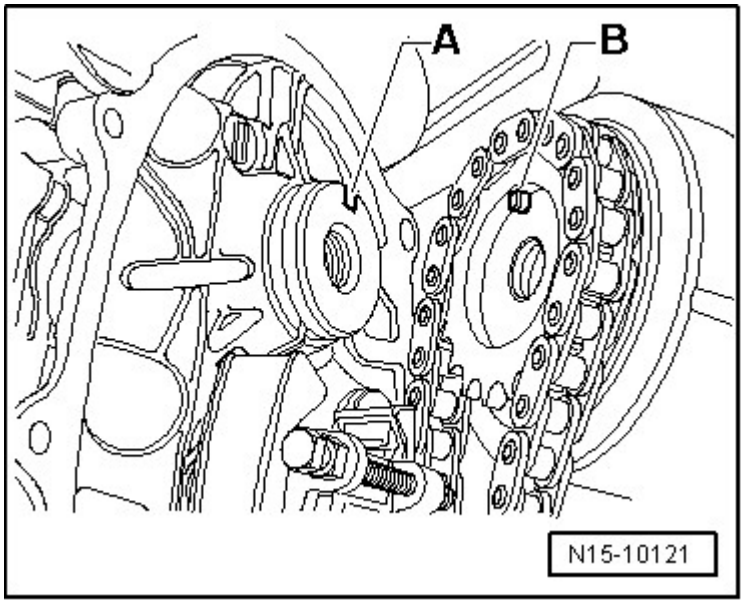

Fig. 108: Identifying Camshaft Adjuster & Exhaust Camshaft Notch And Pin
Courtesy of AUDI OF AMERICA, LLC

-- Place chain in this position on to the intake camshaft chain sprocket, first at top -arrow-.

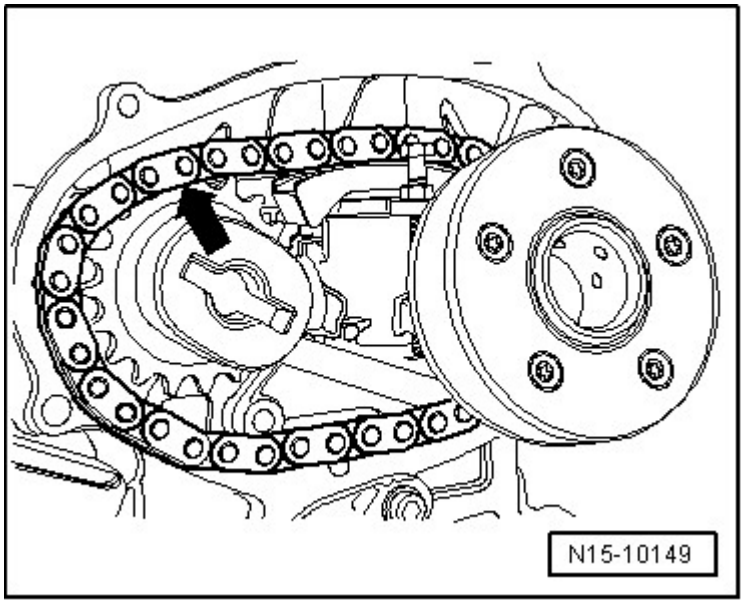

Fig. 109: Identifying Intake Camshaft Chain Position
Courtesy of AUDI OF AMERICA, LLC

-- Slowly turn the intake camshaft with the T10020 in direction of -arrow A- until the camshaft adjuster fits onto the camshaft.

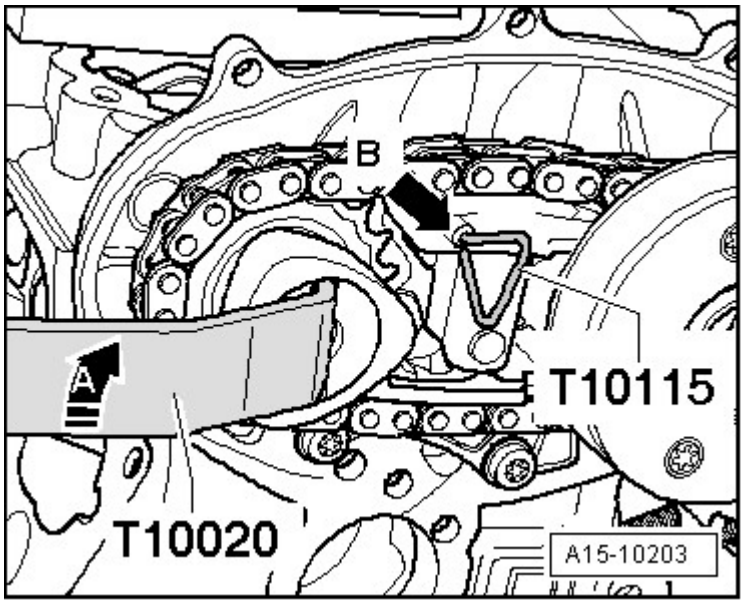

Fig. 110: Identifying Pin Wrench T10020 To Turn Intake Camshaft Until Camshaft Adjuster Fits On Camshaft
Courtesy of AUDI OF AMERICA, LLC

NOTE: If the pin does not fit into notch: Remove chain and place the chain on again.

-- Replace camshaft adjuster mounting bolt.

-- Tighten camshaft adjuster bolt. To do this, use the T40080.

-- Remove the T10115 -arrow B-.

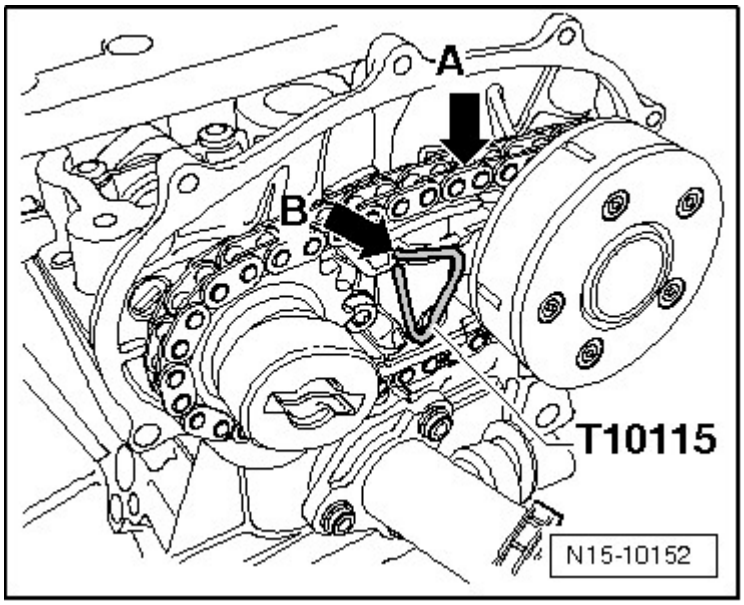

Fig. 111: Chain Tensioner And Locking Pin T10115
Courtesy of AUDI OF AMERICA, LLC

Assemble in reverse order of disassembly.

-- Install cylinder head cover. Refer to **CYLINDER HEAD COVER**.

-- Install high pressure pump. Refer to **Removal and Installation** .

-- Install vacuum pump. Refer to **Removal and Installation** .

CAMSHAFTS

Special tools and workshop equipment required

- Puller T40001
- Retainer 3036
- Camshaft Clamp T10252
- Thrust Piece 3334

Removing

NOTE: Sealing surfaces on guide frame at bottom and on cylinder head at top must not be worked.

Camshaft bearings are integrated in cylinder head or in guide frame. Before removing guide frame, tension on toothed belt must be released.

If guide frame was loosened, camshaft sealing ring and sealing cap must be replaced.

-- Remove the cylinder head cover. Refer to **CYLINDER HEAD COVER**.

-- Remove camshaft adjuster. Refer to **CAMSHAFT ADJUSTER**.

-- Remove toothed belt. Refer to **TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD** or **TOOTHED BELT, WITH DIVIDED TOOTHED BELT GUARD**.

-- Loosen camshaft gear with the 3036.

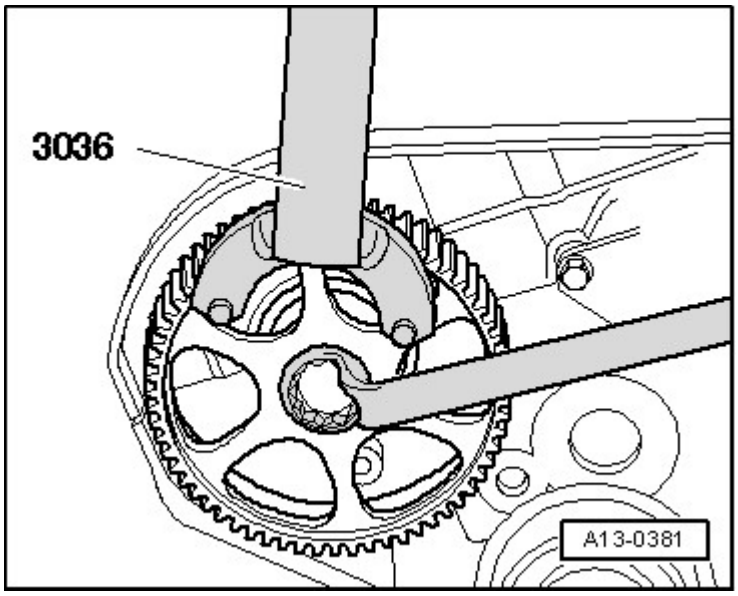

Fig. 112: Counterholding Camshaft Gear Using 3036 Retainer
Courtesy of AUDI OF AMERICA, LLC

-- Pull off camshaft gear using T40001, claw T40001/6 and claw T40001/7.

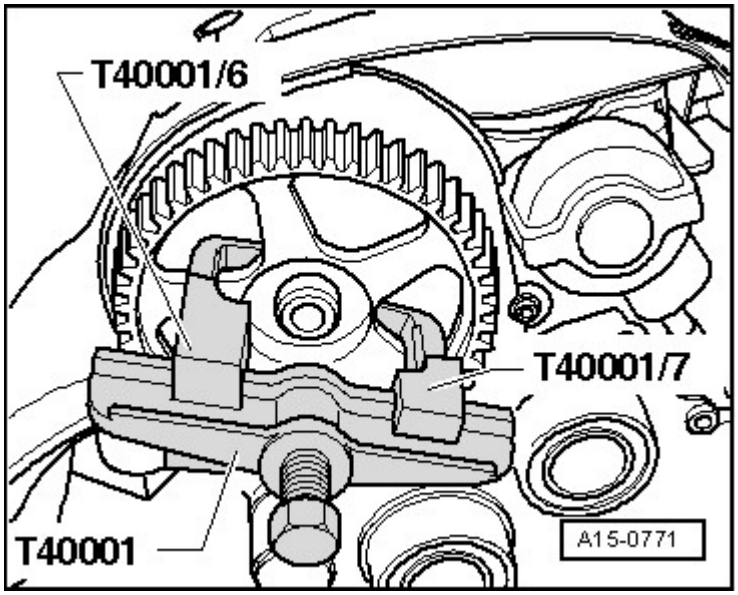

Fig. 113: Identifying Puller T40001, Claw T40001/6 And Claw T40001/7
Courtesy of AUDI OF AMERICA, LLC

-- Remove toothed belt guard at rear of cylinder head.

-- Remove guide frame bolts in sequence -6 to 1- and carefully remove guide frame.

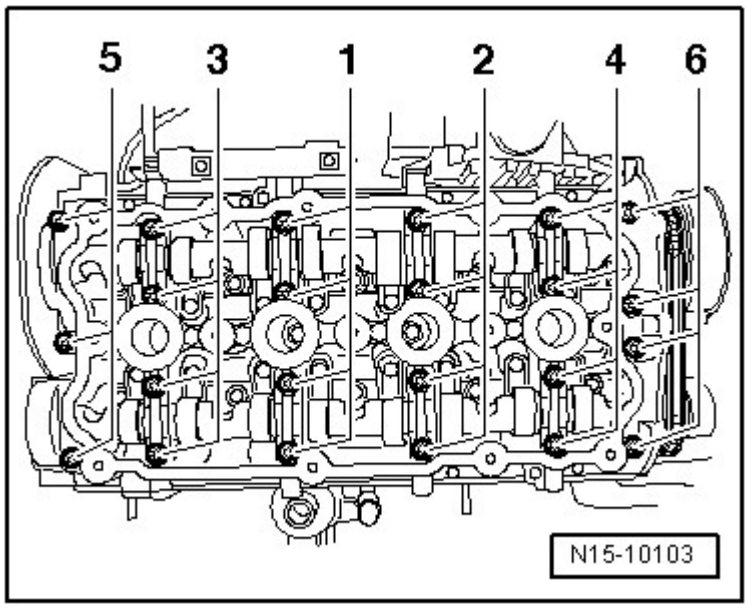

Fig. 114: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Remove camshafts together with drive chain from cylinder head.

-- Prevent dirt and adhesive residue from entering cylinder head.

Installing

- For the correct tightening specifications, refer to **VALVETRAIN OVERVIEW**.
- For the correct tightening specifications, refer to **CYLINDER HEAD OVERVIEW**.

NOTE: Sealing surfaces must be completely free of oil and grease.

The pistons must not be positioned at TDC.

Make sure that all roller cam followers make contact correctly on valve stem ends.

-- Remove the old sealant from the guide frame groove and from sealing surfaces.

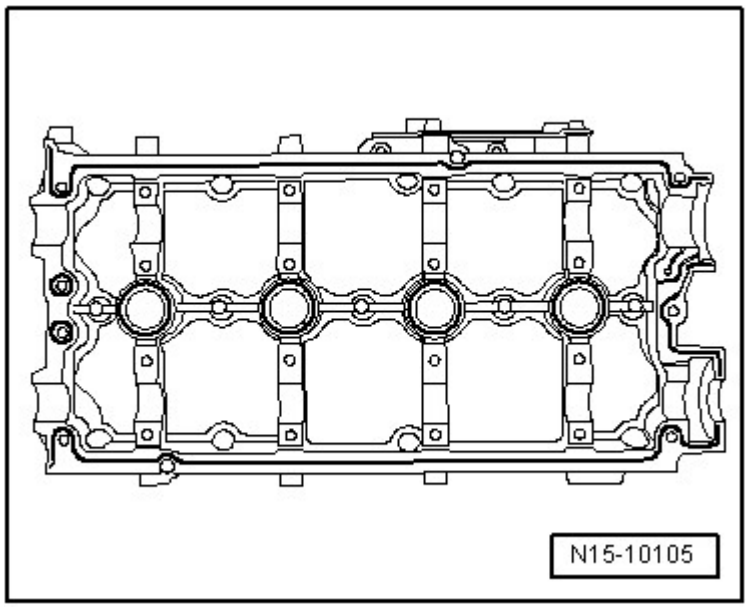

Fig. 115: Identifying Old Sealant On Guide Frame Groove And From Sealing Surfaces
Courtesy of AUDI OF AMERICA, LLC

-- Prevent dirt and adhesive residue from entering cylinder head.

-- Oil journal surfaces of camshafts.

-- Place the drive chain onto the removed camshaft chain sprockets as follows:

-- Oil journal surfaces of camshafts.

- Cams -A- of cylinder 4 must face each other.

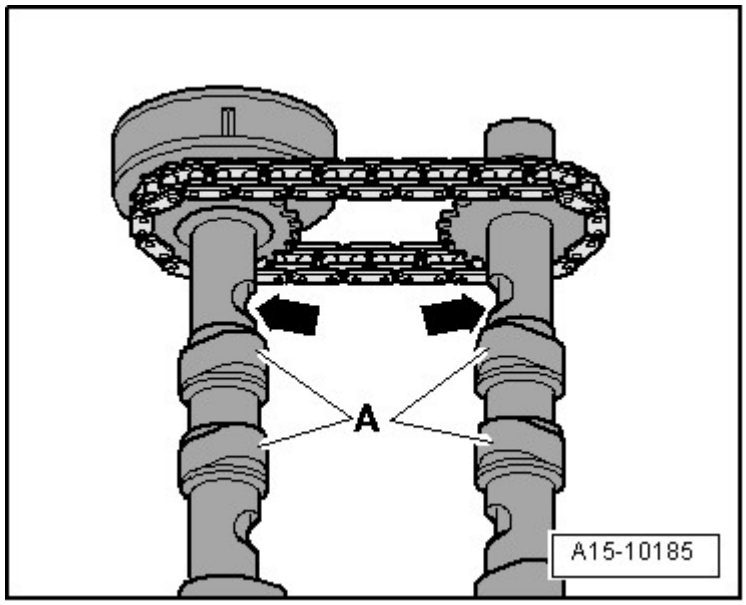

Fig. 116: Cams And Notches

Courtesy of AUDI OF AMERICA, LLC

- The notches -arrows- on both camshafts must align.
- The side surfaces of the notches must be exactly vertical.

-- Place camshafts together with drive chain in cylinder head and in chain tensioner.

-- Verify TDC position of camshafts again.

- Cams -A- of cylinder 4 must face each other.

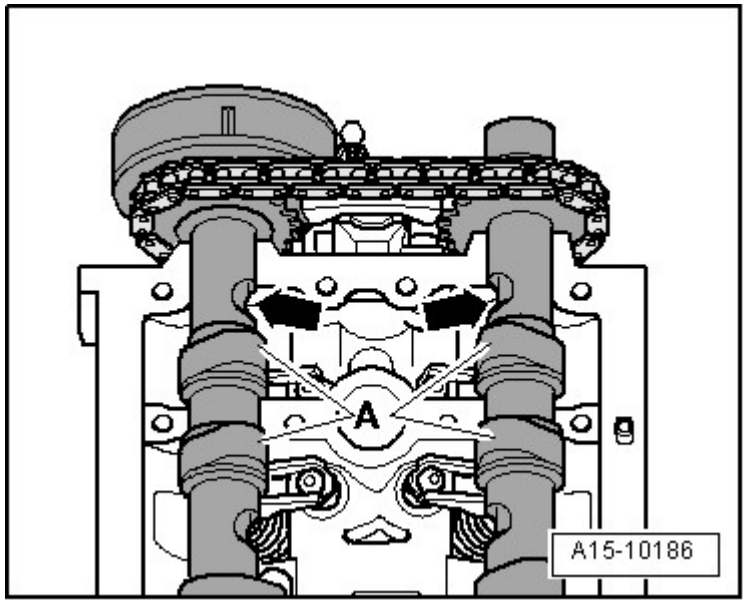

Fig. 117: Cams And Notches Installed
Courtesy of AUDI OF AMERICA, LLC

- The notches -arrows- on both camshafts must align.
- The side surfaces of the notches must be exactly perpendicular to the cylinder head.

-- Oil journal surfaces of camshafts.

-- Apply an even, light sealant bead into the clean groove of the guide frame.

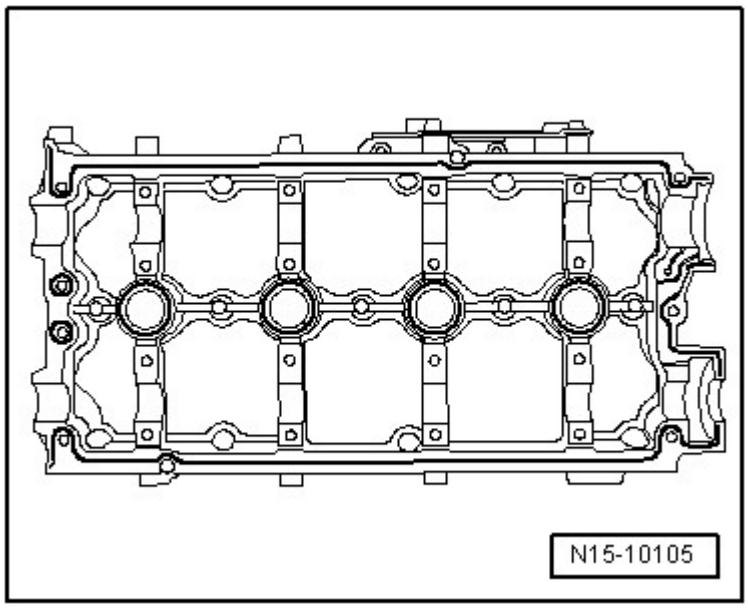

Fig. 118: Identifying Old Sealant On Guide Frame Groove And From Sealing Surfaces
Courtesy of AUDI OF AMERICA, LLC

Sealant

NOTE: Sealant must not be applied too thick.

Attaching and bolting the guide frame should be performed without interruption because the sealant begins to harden immediately as soon as it contacts the sealing surfaces.

Note the expiration date of the sealing compound.

-- Set the guide frame in place so that it can get by the EGR vacuum regulator solenoid valve -N18- -arrow-.

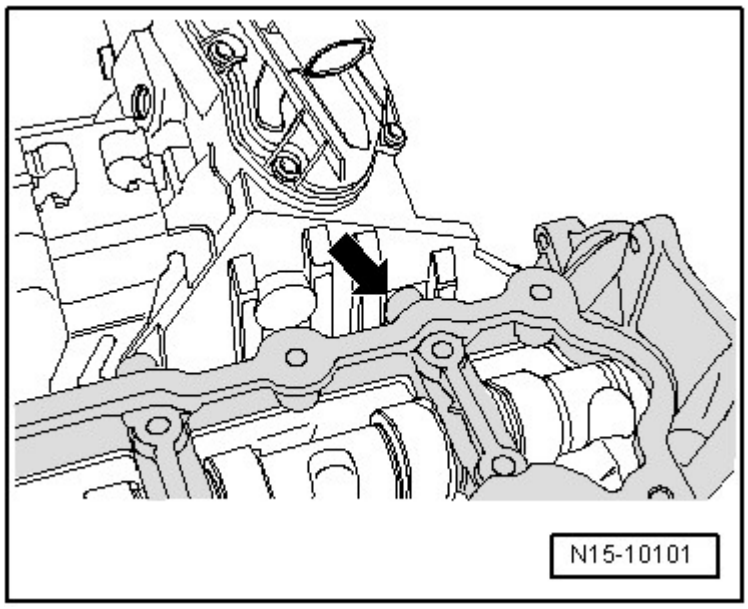

Fig. 119: Setting Guide Frame In Place So That It Can Get By EGR Vacuum Regulator Solenoid Valve N18
Courtesy of AUDI OF AMERICA, LLC

-- Replace guide frame bolts.

-- Gently tighten bolts from inside working toward outside in several stages.

-- Tighten bolts in several stages in tightening sequence. Refer to **Fig. 16**.

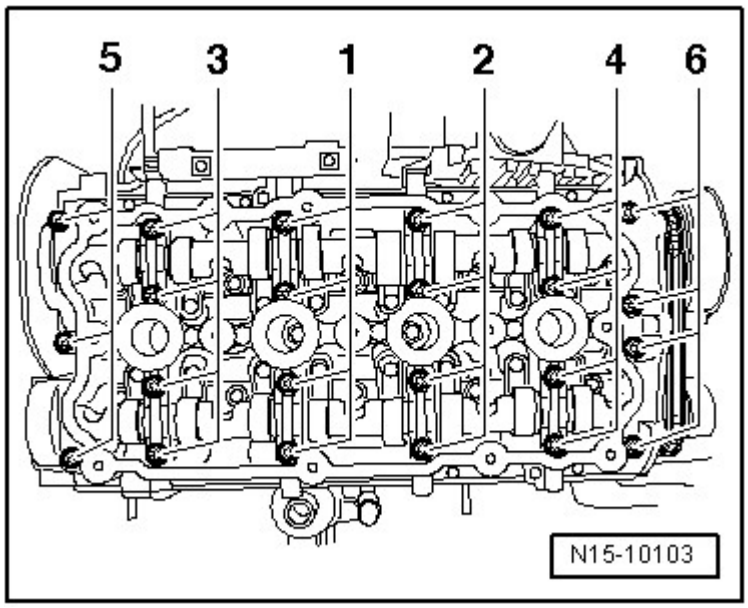

Fig. 120: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ensure guide frame is not tilted.

-- Then check TDC position of camshafts by inserting the -T10252- as far as stop.

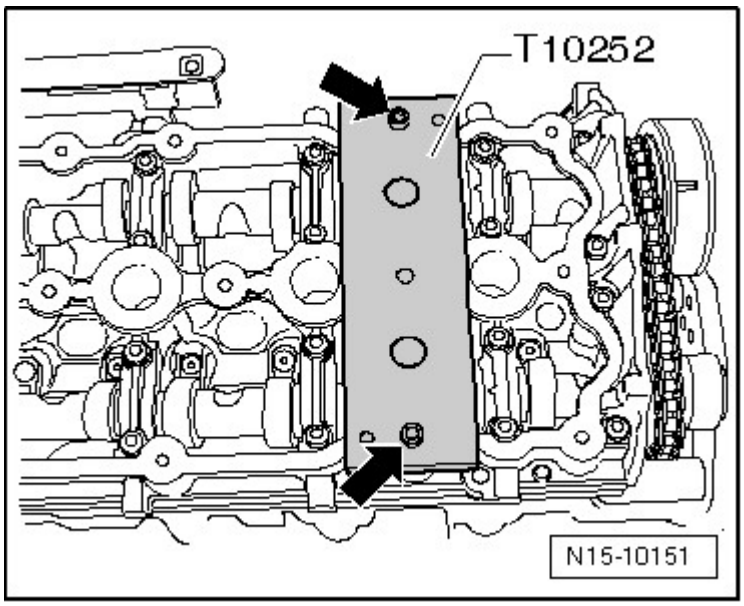

Fig. 121: Identifying Camshafts Secured Using Camshaft Locator T10252
Courtesy of AUDI OF AMERICA, LLC

NOTE: Rotate camshafts back and forth slightly if necessary to insert the -T10252-.

Ignore -arrows-.

-- If the -T10252- cannot be inserted, remove guide frame again and repeat camshaft installation **Fig. 116**.

-- Remove the -T10252-.

-- Drive in the sealing cap 25 with the 3334 approximately 1 to 2 mm deep.

-- Install camshaft sealing ring. Refer to **EXHAUST CAMSHAFT SEAL**.

-- Install the rear toothed belt guard.

-- Insert fitting key into camshaft.

-- Install the camshaft sprocket. Hold the camshaft sprocket with the 3036 and tighten the bolt

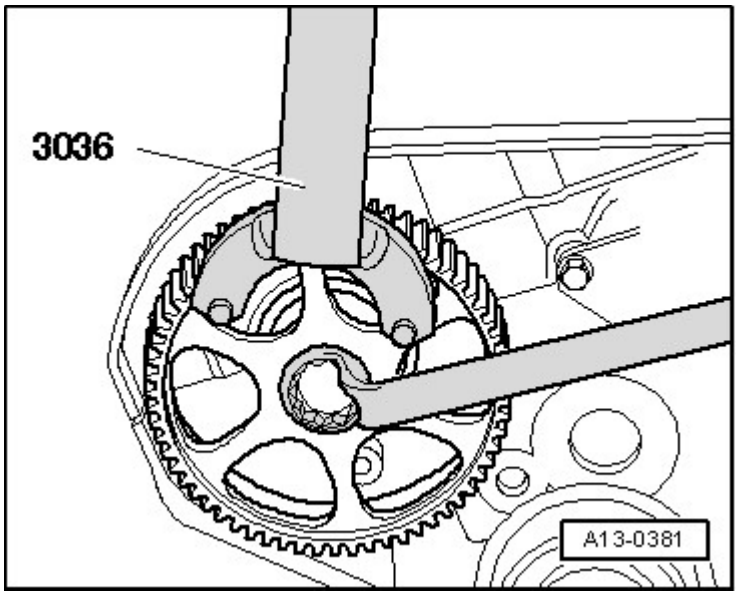

Fig. 122: Counterholding Camshaft Gear Using 3036 Retainer
Courtesy of AUDI OF AMERICA, LLC

NOTE: When turning camshaft, pistons may not be at TDC for any cylinder. Valves/pistons may be damaged.

Be sure fitting keys are properly seated.

-- Install toothed belt. Refer to **TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD**, **TOOTHED BELT, WITH DIVIDED TOOTHED BELT GUARD**.

-- Install camshaft adjuster. Refer to **CAMSHAFT ADJUSTER**.

-- Install cylinder head cover. Refer to **CYLINDER HEAD COVER**.

Assemble in reverse order of disassembly.

VALVE STEM SEALS, CYLINDER HEAD INSTALLED

Special tools and workshop equipment required

- Spark Plug Removal Tool 3122 B
- Valve Seal Removal Tool 3364
- Valve Stem Seal Driver 3365
- Adapter T40012
- Torque Wrench 5-50 Nm V.A.G 1331
- Valve Cotters Asm/Dis-Asm Device VAS 5161
- Guide Plate for FSI Engine VAS 5161/19B
- 2 Knurled Thumb Screws VAS 5161/12

Valve Stem Seals, Removing

-- Remove the camshafts. Refer to **CAMSHAFTS**.

NOTE: To replace the valve stem seals of the exhaust valves for cylinder 3 and 4, the EGR vacuum regulator solenoid valve -N18- must also be removed.

-- Remove roller rocker levers and place them on a clean surface. Make sure that roller cam followers are not interchanged.

-- Remove the spark plugs with the 3122 B.

-- Tighten the VAS 5161/19B on the cylinder head as shown using the VAS 5161/12.

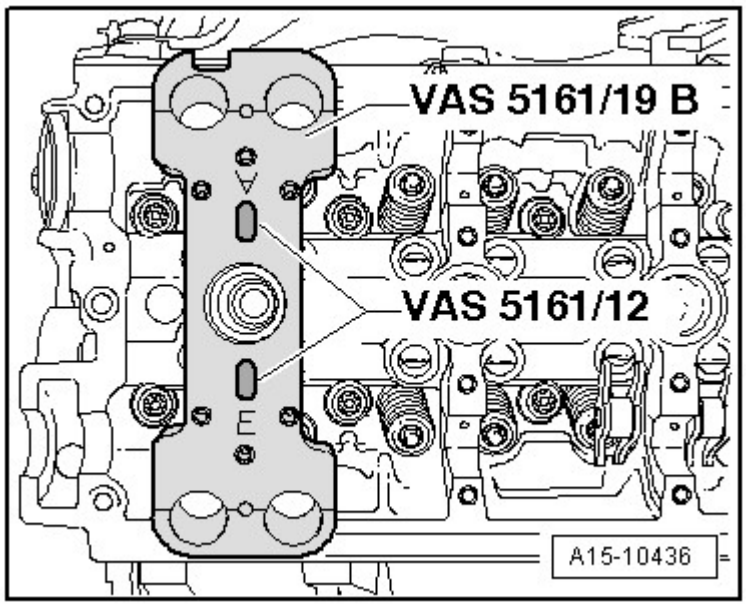

Fig. 123: FSI Engine VAS 5161/19B Guide Plate Tightened On Cylinder Head Using Knurled Bolts VAS 5161/12
Courtesy of AUDI OF AMERICA, LLC

-- Adjust piston of the respective cylinder to "bottom dead center".

-- Install the T40012 into the spark plug thread and connect compressed air (minimum 6 bar).

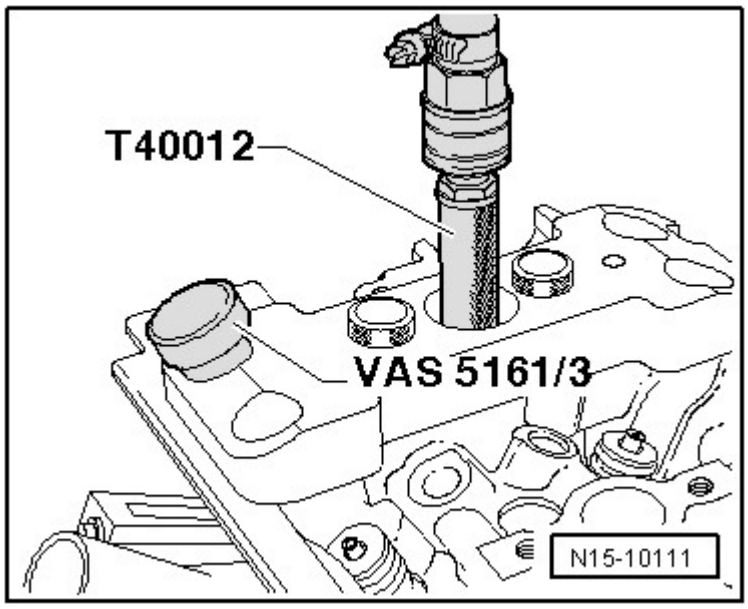

Fig. 124: Identifying Drift VAS 5161/3 And Plastic Mallet To Loosen Stuck Valve Keepers
Courtesy of AUDI OF AMERICA, LLC

-- Loosen any stuck valve retainers using a drift VAS 5161/3 and a plastic hammer.

For the Intake Side

-- Install the engaging device VAS 5161/6 with the VAS 5161/5 in the center threads of the VAS 5161/19B.

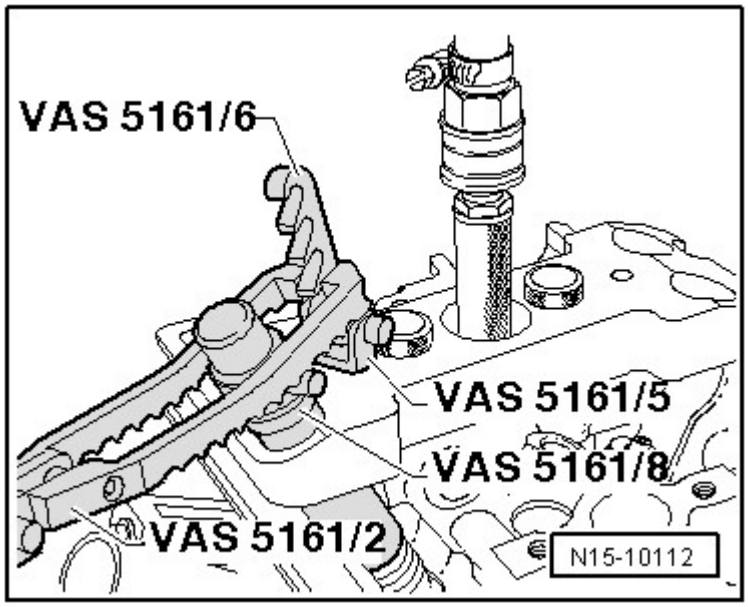

Fig. 125: Identifying Engaging Device VAS 5161/6 With Installation Forks VAS 5161/5 Installed Into Guide Plate VAS 5161/19
Courtesy of AUDI OF AMERICA, LLC

-- Insert the installation cartridge VAS 5161/8 in the VAS 5161/19B.

-- Engage the pressure fork VAS 5161/2 on the engaging device VAS 5161/6.

For the Exhaust Side

-- Install the engaging device VAS 5161/6 with the installation fork VAS 5161/5 in the outer threads of the VAS 5161/19B.

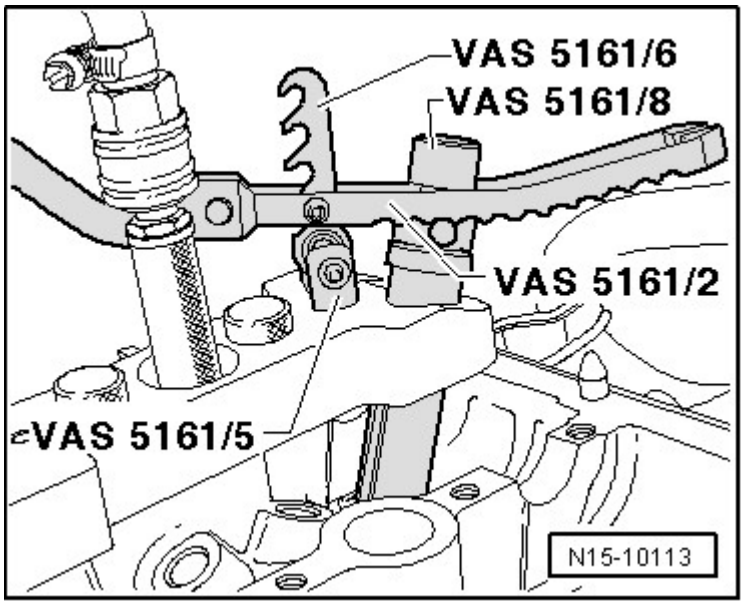

Fig. 126: Identifying Pressure Forks VAS 5161/2 Engaged
Courtesy of AUDI OF AMERICA, LLC

-- Press the installation cartridge VAS 5161/8 down while rotating its knurled bolt to the right until the points engage in the valve retainers.

-- Move the knurled wheel back and forth slightly. This presses the valve retainers apart and captures them in the installation cartridge.

-- Release the pressure fork VAS 5161/2.

-- Remove the installation cartridge VAS 5161/8.

-- Remove valve stem seals using the 3364.

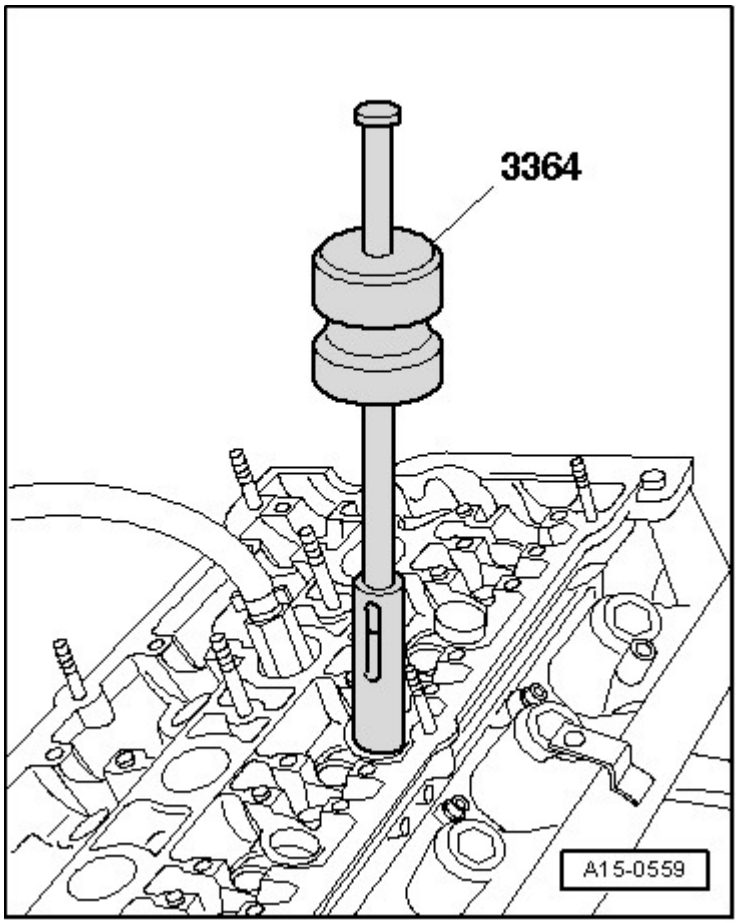

Fig. 127: Identifying Valve Seal Removal Tool 3364
Courtesy of AUDI OF AMERICA, LLC

-- In the event the 3364 cannot be used due to constrained spatial arrangements, drive out spring dowel sleeve -arrow- using a drift and remove impact device.

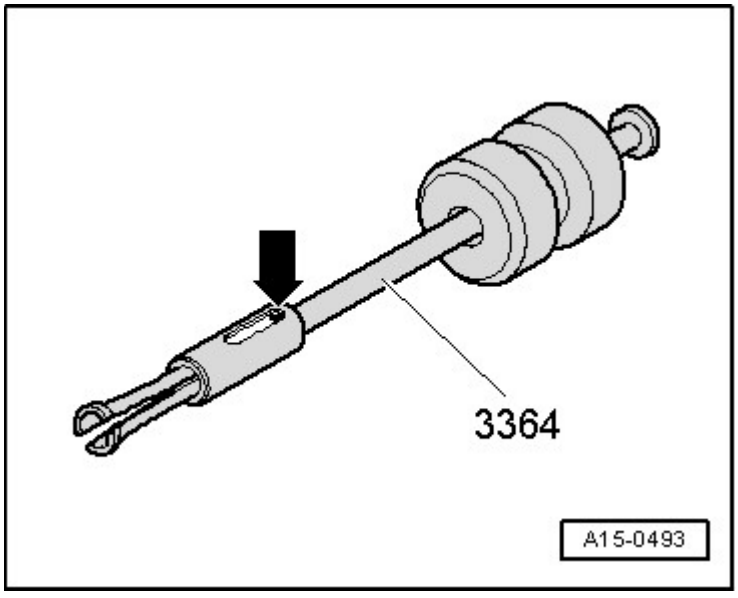

Fig. 128: Driving Out Spring Dowel Sleeve
Courtesy of AUDI OF AMERICA, LLC

-- Place the lower part of the 3364 onto the valve stem seal.

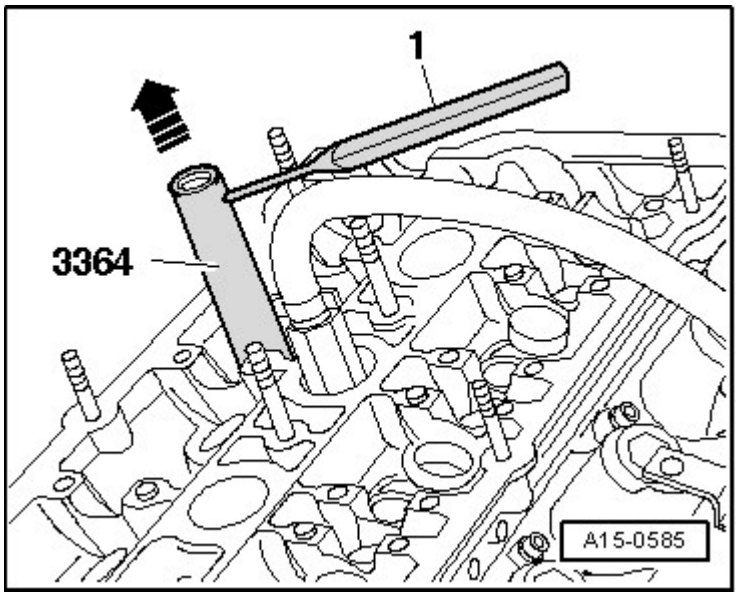

Fig. 129: Identifying Placement Of Lower Part Of Valve Seal Removal Tool 3364 On To Valve Stem Oil Seal
Courtesy of AUDI OF AMERICA, LLC

-- Insert a drift -1- into bore in lower part of extractor device.

-- Place a lever at the removal tool and pull out the valve stem seal -arrow-.

Valve Stem Seals, Installing

-- Place plastic sleeve -A- on valve stem to prevent damage to new valve stem seals -B-.

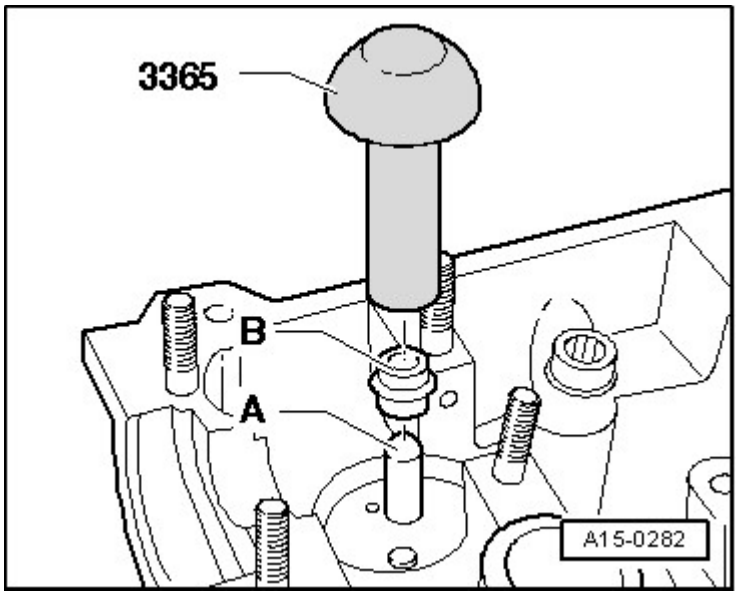

Fig. 130: Identifying Plastic Sleeve, New Valve Stem Oil Seals & Valve Stem Seal Driver 3365
Courtesy of AUDI OF AMERICA, LLC

-- Oil the sealing lip of valve stem seal -B-, insert into 3365 and carefully slide onto valve guide.

-- Remove the plastic sleeve -A-.

-- Insert valve spring and valve spring retainer.

-- Install the VAS 5161 as shown.

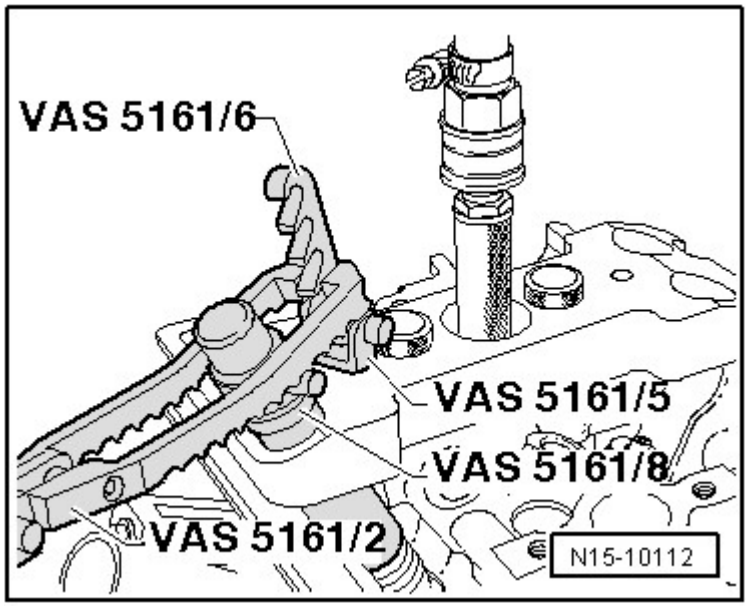

Fig. 131: Identifying Engaging Device VAS 5161/6 With Installation Forks VAS 5161/5 Installed Into Guide Plate VAS 5161/19
Courtesy of AUDI OF AMERICA, LLC

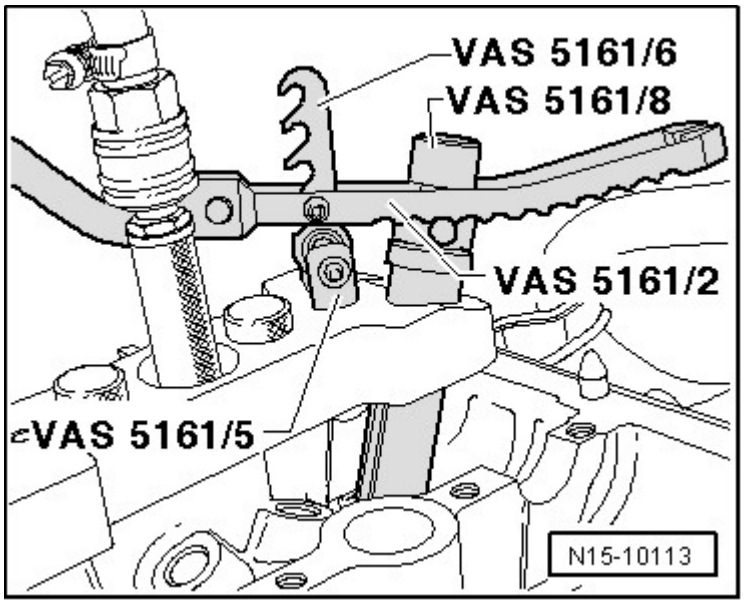

Fig. 132: Identifying Pressure Forks VAS 5161/2 Engaged
Courtesy of AUDI OF AMERICA, LLC

NOTE: If the valve retainers were removed from the installation cartridge, they must then be inserted into the insertion device VAS 5161/18.

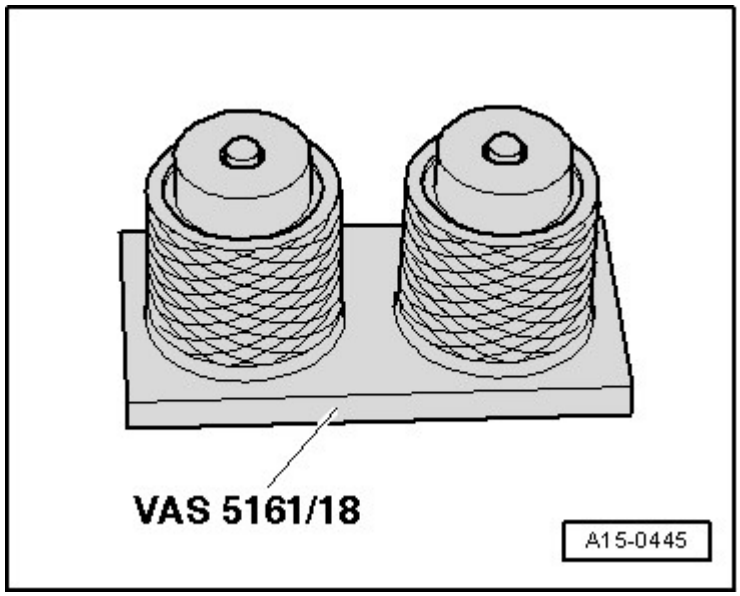

Fig. 133: Identifying Installation Cartridge VAS 5161/8
Courtesy of AUDI OF AMERICA, LLC

Press the installation cartridge VAS 5161/8 onto the insertion device from above and capture the valve retainers.

-- Press down the installation cartridge VAS 5161/8 with the pressure fork VAS 5161/2 and turn the knurled screw of the installation cartridge back and forth while pulling it upward at the same time.

-- Release pressure fork VAS 5161/2 with the knurled bolt pulled.

-- Remove the VAS 5161.

Assemble in reverse order of disassembly.

-- Install the camshafts. Refer to **CAMSHAFTS**.

VALVE STEM SEALS WITH CYLINDER HEAD REMOVED

Special tools and workshop equipment required

- Valve Seal Removal Tool 3364
- Valve Stem Seal Driver 3365
- Valve Cotters Asm/Dis-Asm Device VAS 5161
- Guide Plate for FSI Engine VAS 5161/19B
- Engine and Transmission Holder VAS 6095
- Cylinder Head Tensioning Device VAS 6419

Procedure

-- Remove the camshafts. Refer to **CAMSHAFTS**.

-- Mark the allocation of the roller rocker lever and the hydraulic adjusting elements so they can be installed again.

-- If necessary, remove the roller rocker levers with the hydraulic adjusting elements and place them on a clean surface.

-- Mount the VAS 6419 into the VAS 6095.

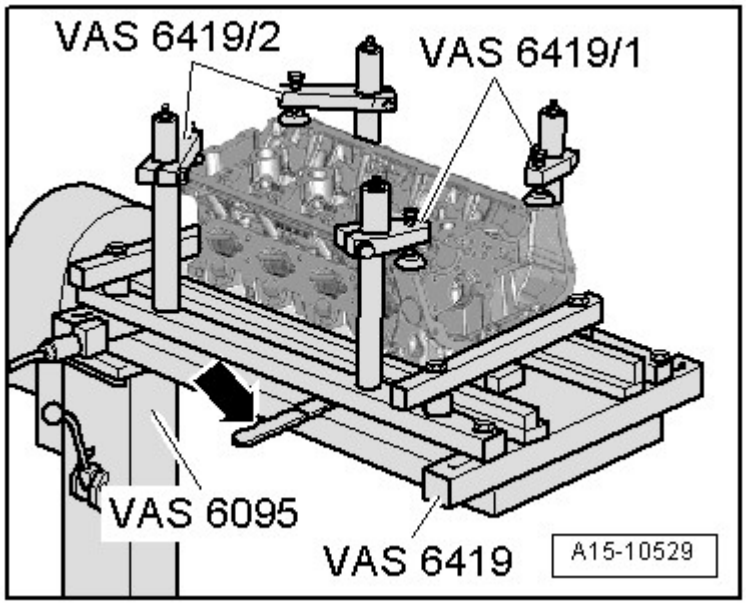

Fig. 134: VAS 6419
Courtesy of AUDI OF AMERICA, LLC

-- Tension the cylinder head on the VAS 6419 as illustrated.

-- Connect the VAS 6419 to the compressed air.

-- Slide the air cushion with the lever -arrow- under the combustion chamber onto the valve stem seals that will be removed.

-- Let enough compressed air flow into the air cushion until it contacts the valve plate.

-- Place the VAS 5161/19B from the VAS 5161 on the cylinder head.

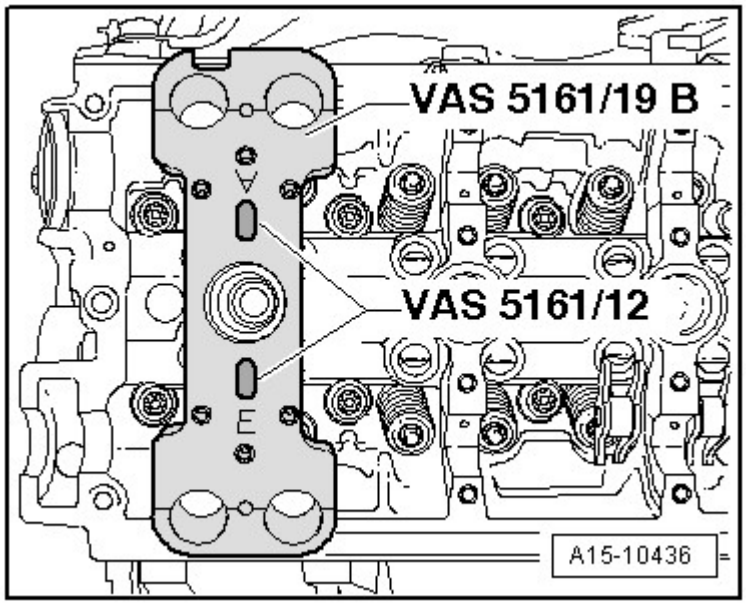

Fig. 135: FSI Engine VAS 5161/19B Guide Plate Tightened On Cylinder Head Using Knurled Bolts VAS 5161/12
Courtesy of AUDI OF AMERICA, LLC

-- Secure the guide plate with the knurled screws VAS 5161/12.

-- Insert the drift VAS 5161/3 in the guide plate and loosen the stuck valve keepers with a plastic mallet.

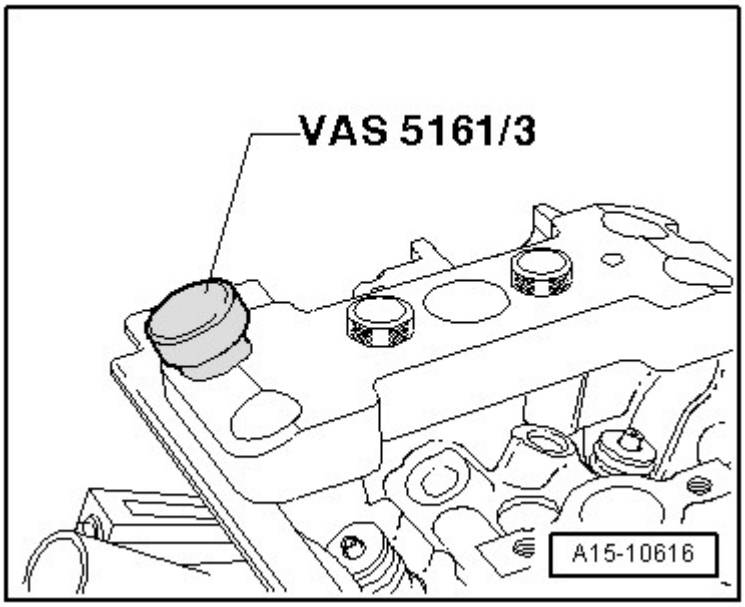

Fig. 136: VAS 5161/3
Courtesy of AUDI OF AMERICA, LLC

-- Install engaging device VAS 5161/6 with installation fork VAS 5161/5 in guide plate.

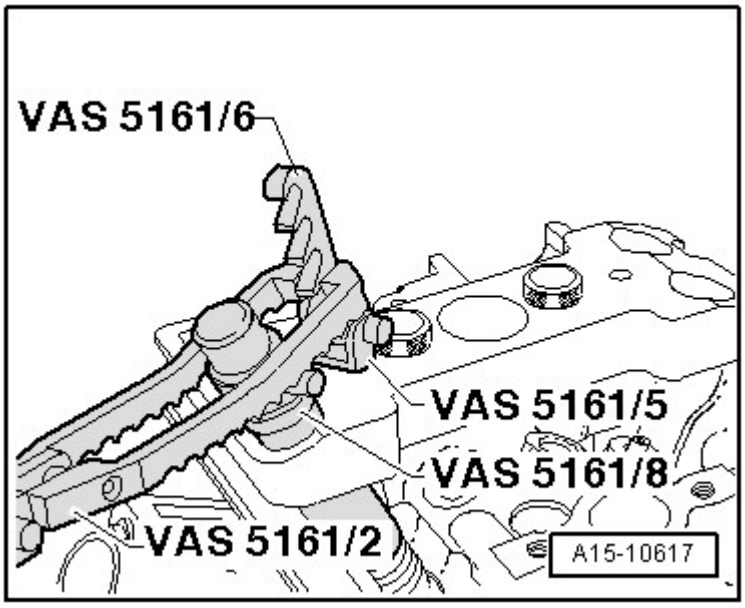

Fig. 137: Engaging Device Vas 5161/6
Courtesy of AUDI OF AMERICA, LLC

-- Slide installation cartridge VAS 5161/8 in guide plate.

Intake Side:

-- Engage the pressure fork VAS 5161/2 on the engaging device as illustrated.

Exhaust Side:

-- Engage the pressure fork VAS 5161/2 on the engaging device as illustrated.

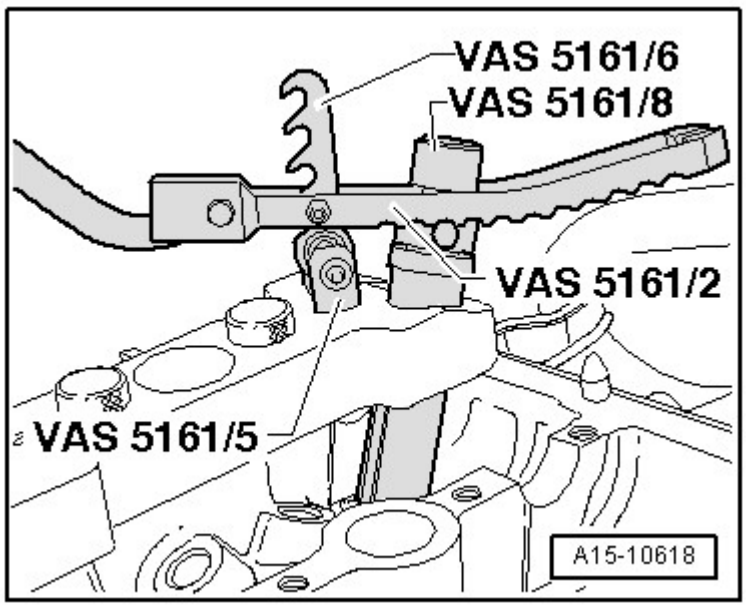

Fig. 138: Engaging Pressure Fork Vas 5161/2
Courtesy of AUDI OF AMERICA, LLC

Continued for Both Sides:

-- Press the installation cartridge down with the pressure fork.

-- At the same time, rotate installation cartridge knurled screw right until points engage in valve retainers.

-- Move the knurled bolt to the left and right.

- Valve keeper are pressed against each other and capture in the installation cartridge.

-- Release the pressure fork.

-- Remove installation cartridge.

-- Unfasten guide plate and turn it aside.

-- Remove the valve spring and the valve spring plate.

-- Remove the valve stem seal with the 3364.

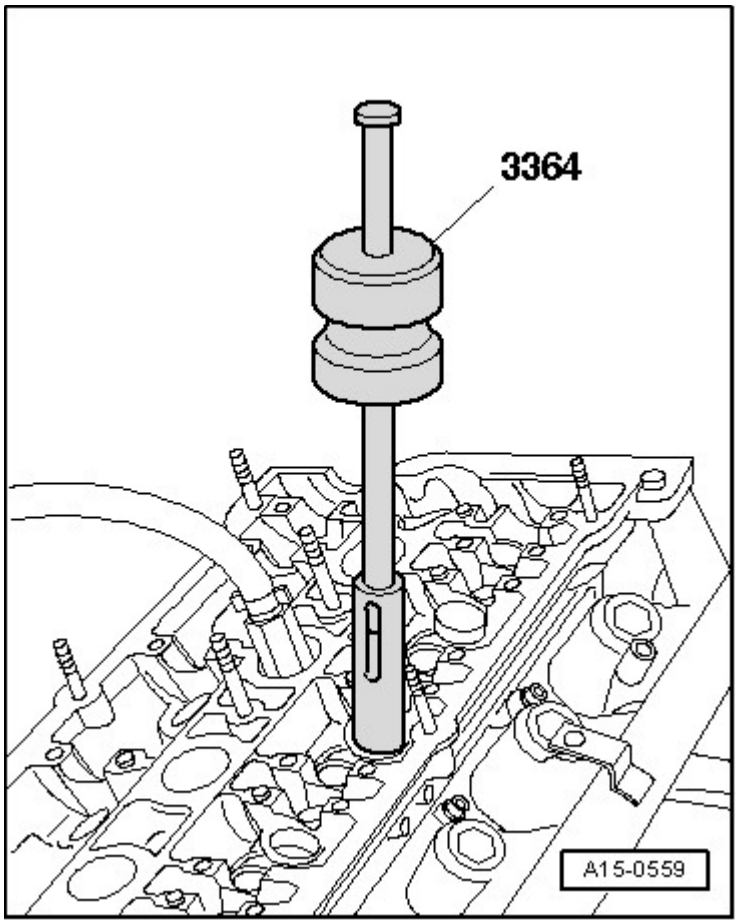

Fig. 139: Identifying Valve Seal Removal Tool 3364
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of damage when installing valve stem seals.

- **Place plastic sleeve -A- that is attached to valve stem seals -B- on valve stem.**

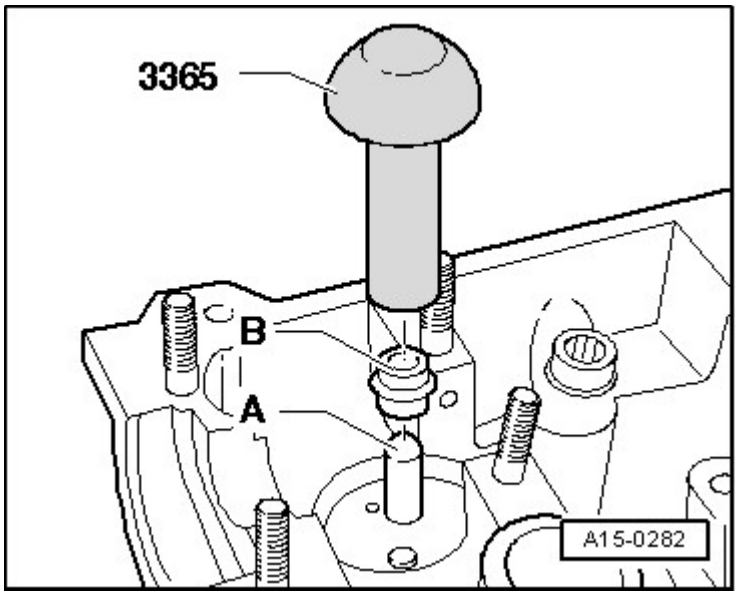

Fig. 140: Identifying Plastic Sleeve, New Valve Stem Oil Seals & Valve Stem Seal Driver 3365
Courtesy of AUDI OF AMERICA, LLC

-- Lightly oil valve stem seal.

-- Slide valve shaft seal onto plastic sleeve.

-- Carefully press valve stem seal onto valve guide with 3365.

-- Remove plastic sleeve again.

When the valve retainers were removed from the installation cartridge, they must be inserted in the valve retainer inserting tool VAS 5161/18l next.

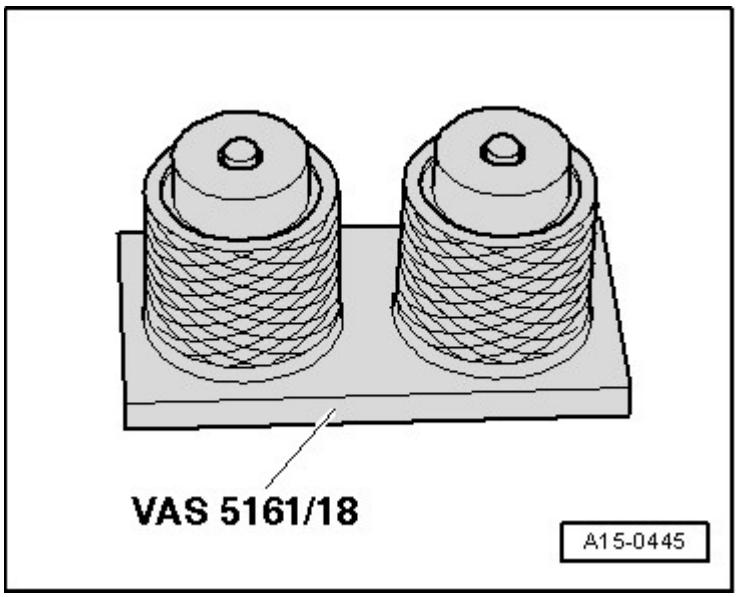

Fig. 141: Identifying Installation Cartridge VAS 5161/8
Courtesy of AUDI OF AMERICA, LLC

- The large diameter of the valve retainers point upward.

-- Press installation cartridge from above onto valve retainer inserting tool and capture retainers.

-- Insert valve spring and valve spring plate.

-- Install the guide plate on the cylinder head.

-- Insert installation cartridge with knurled spacer ring in guide plate.

-- Press pressure fork down and pull knurled screw up, turning left and right.

- The valve keepers are inserted in this manner.

-- Release pressure fork with knurled screw still raised.

-- Repeat the procedure on each valve.

Assemble in reverse order of disassembling. Note the following:

-- Install the camshafts. Refer to **CAMSHAFTS**.

EXHAUST CAMSHAFT SEAL

Special tools and workshop equipment required

- Seal Puller - General Usage 2085
- Retainer 3036
- Assembly Tool T10071
- Puller T40001
- Engine Support Bridge 10 - 222 A
- Shackle (1 Set=2 Pieces) 10 - 222 A /12
- Toothed Belt Tensioner T10020
- Locking Pin T10060A

Removing

-- Remove the engine cover and air filter. Refer to **Removal and Installation** .

WARNING: Cover cap of expansion tank with rag and open carefully, as hot steam for example hot coolant may escape when opened.

-- Open cap of coolant expansion tank.

-- Remove noise insulation. Refer to **Removal and Installation** .

-- Drain the coolant. Refer to **COOLING SYSTEM, DRAINING AND FILLING** .

-- Remove toothed belt. Refer to **TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD** or **TOOTHED BELT, WITH DIVIDED TOOTHED BELT GUARD**.

-- Loosen camshaft sprocket, using 3036.

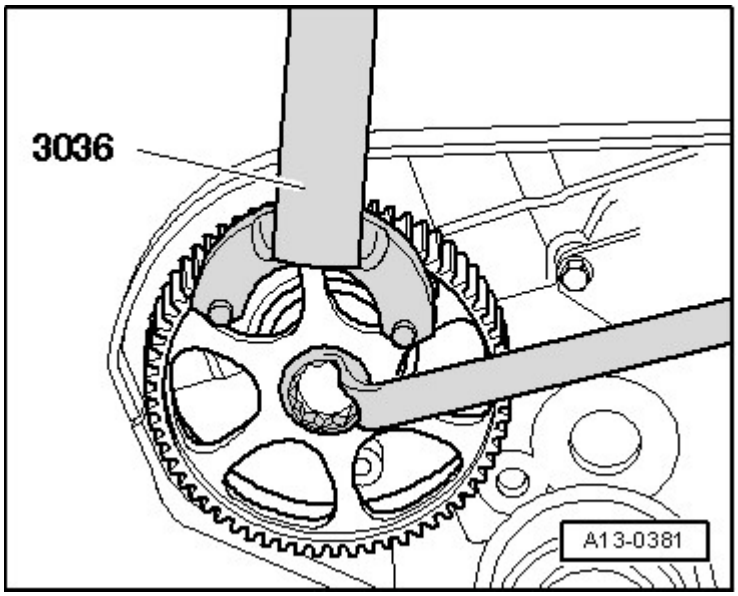

Fig. 142: Counterholding Camshaft Gear Using 3036 Retainer
Courtesy of AUDI OF AMERICA, LLC

-- Pull off the camshaft sprocket using the T40001 and claws T40001/6 and T40001/7.

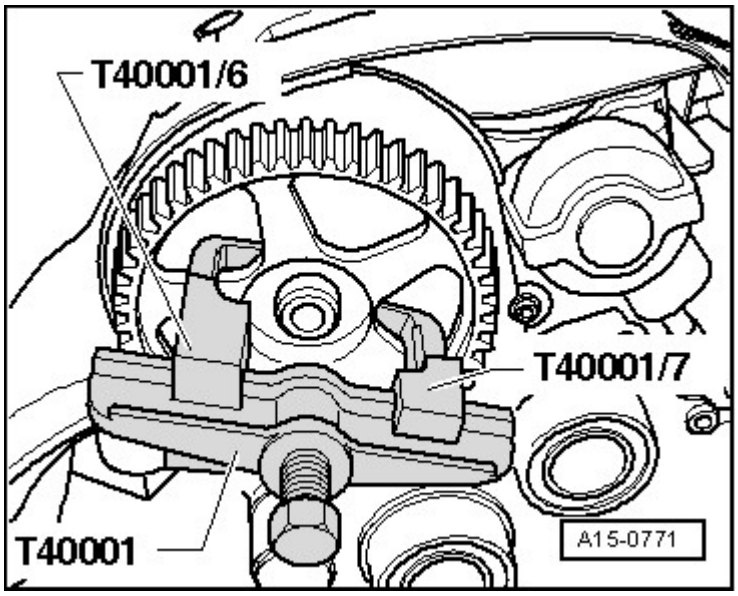

Fig. 143: Identifying Puller T40001, Claw T40001/6 And Claw T40001/7
Courtesy of AUDI OF AMERICA, LLC

-- To guide seal puller, thread special tool 2085/2 of the 2085 into the camshaft by hand up to the stop.

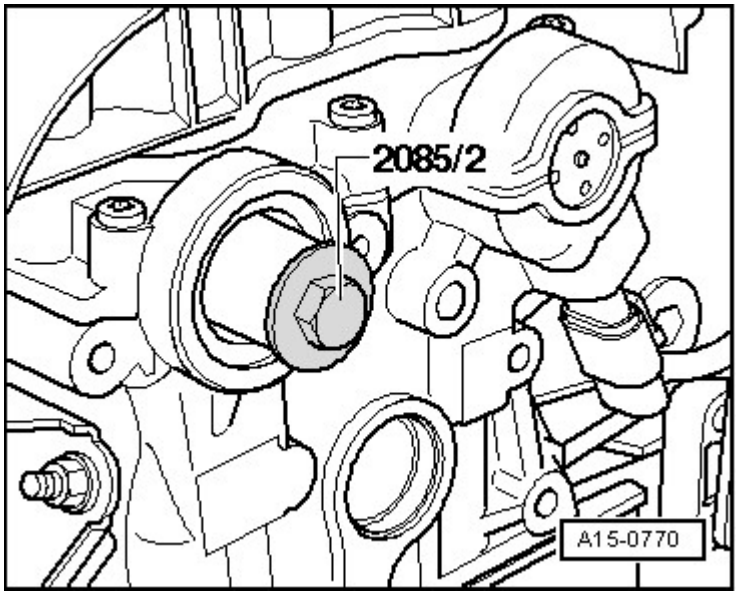

Fig. 144: Identifying Thread Adapter 2085/2
Courtesy of AUDI OF AMERICA, LLC

-- Unscrew inner portion of 2085 two rotations (approximately 3 mm) from outer portion and secure with knurled-head screw.

-- Lubricate threaded head of 2085, position and forcefully screw into seal as far as possible.

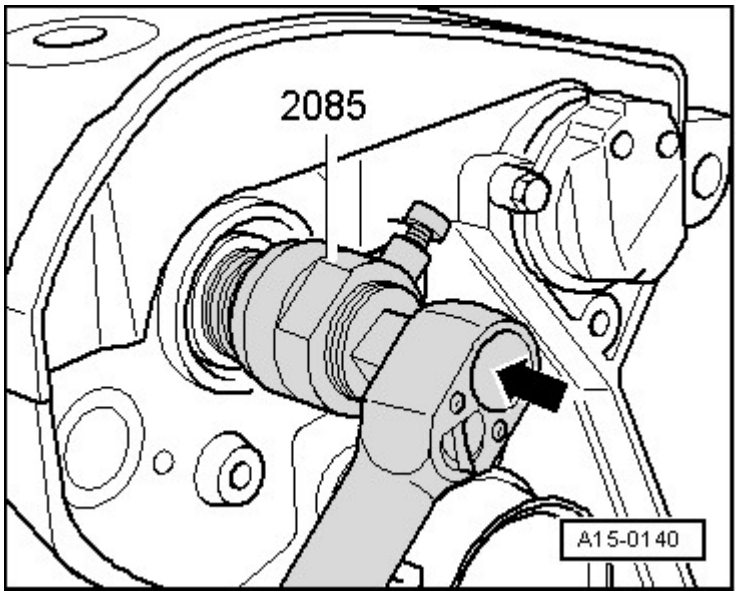

Fig. 145: Identifying Positioning And Screwing Of Bolt Into Oil Seal As Far As Possible With Forced Pressure
Courtesy of AUDI OF AMERICA, LLC

-- Loosen knurled bolt and turn inner part against camshaft until seal is removed.

-- Secure the seal remover in a vise at the flat spots. Remove seal using pliers

Installing

- For the correct tightening specifications, refer to **VALVETRAIN OVERVIEW**.

-- Do not oil sealing ring sealing lip.

-- Place the guide sleeve T10071/1 from T10071 on camshaft pin.

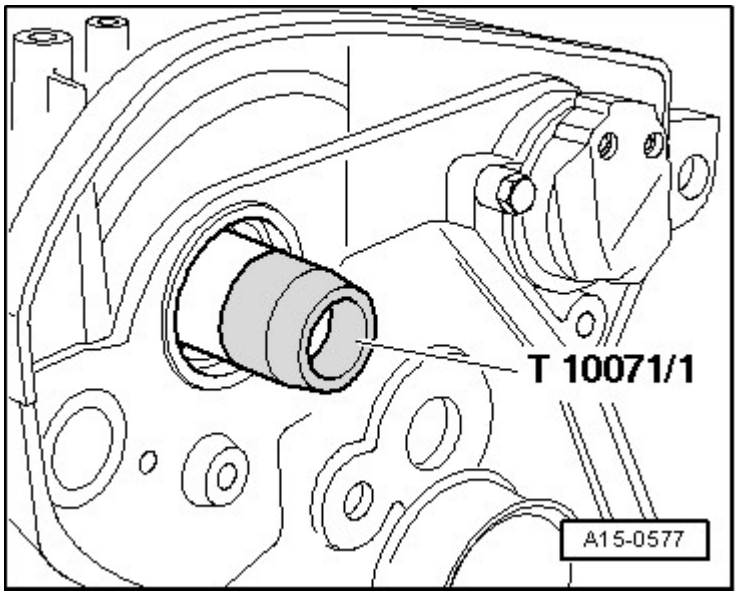

Fig. 146: Identifying Guide Sleeve T10071/1 Placed On Camshaft Pin
Courtesy of AUDI OF AMERICA, LLC

-- Slide seal over guide sleeve onto shaft pin.

-- Remove the guide sleeve.

-- Press sealing ring on as far as stop with guide sleeve T10071/3 and screw T10071/4 from the T10071.

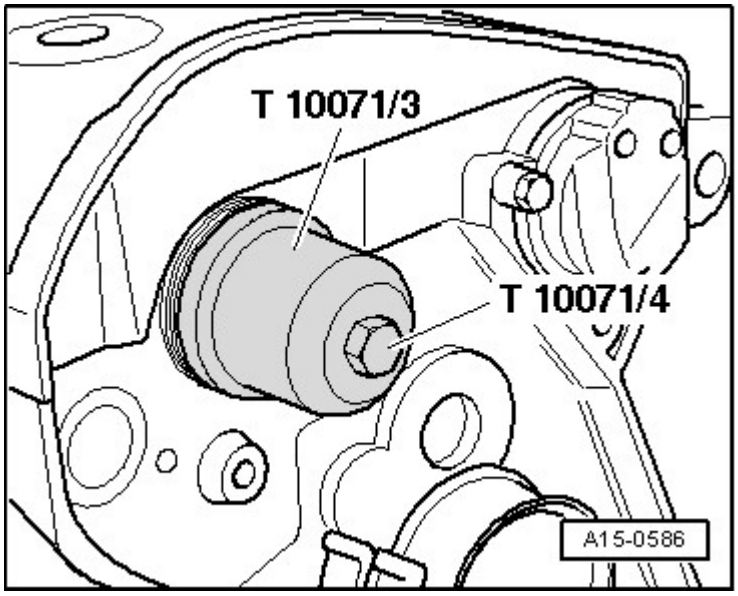

Fig. 147: Pressing In Gasket Up To Stop Using Thrust Sleeve T10071/3 And Bolt T10071/4
Courtesy of AUDI OF AMERICA, LLC

-- Install camshaft sprocket.

- Note installation position: Thin rib on the camshaft gear points outward -arrows- and the TDC marking on cylinder 1 is visible.

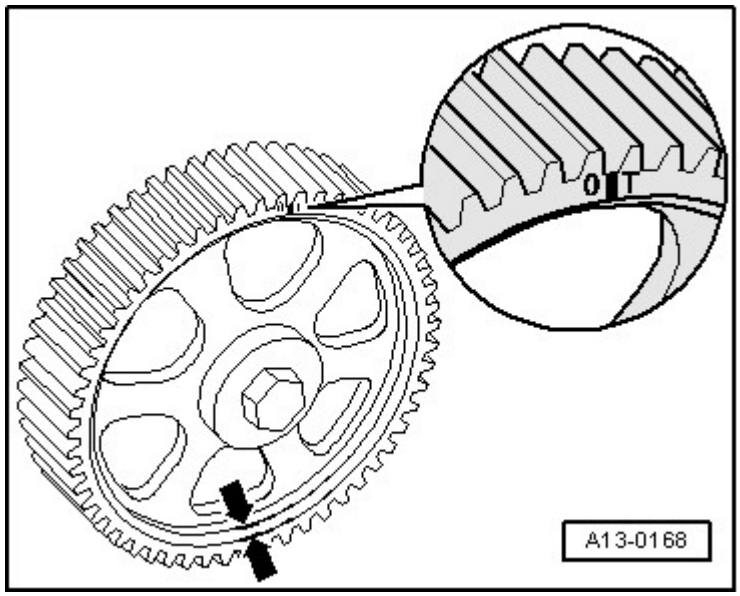

Fig. 148: Identifying Camshaft Gear Thin Rib Toward Outside And TDC Marking Visible
Courtesy of AUDI OF AMERICA, LLC

-- Install the bolt for camshaft sprocket using the 3036.

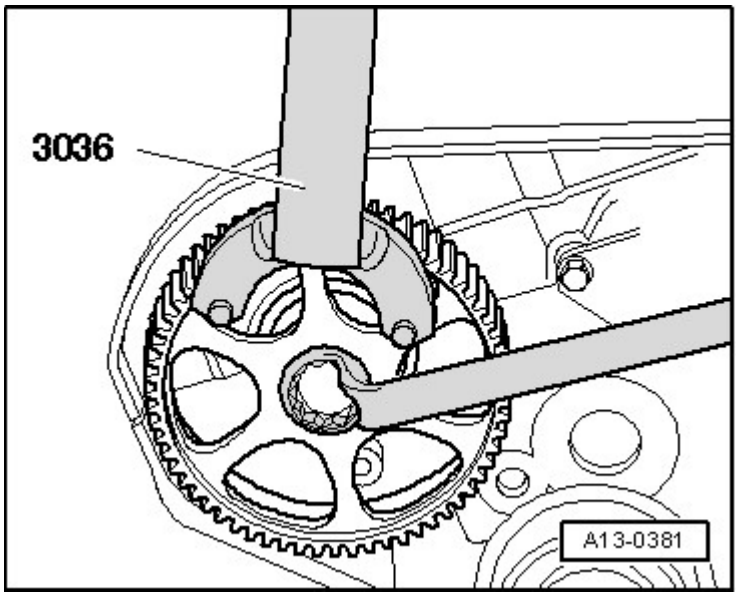

Fig. 149: Counterholding Camshaft Gear Using 3036 Retainer
Courtesy of AUDI OF AMERICA, LLC

NOTE: By turning the camshaft, the valves could contact the stationary pistons at TDC. Therefore, the pistons must not be at TDC. Valves/pistons may be damaged.

-- Install toothed belt. Refer to **TOOTHED BELT, WITHOUT DIVIDED TOOTHED BELT GUARD** or **TOOTHED BELT, WITH DIVIDED TOOTHED BELT GUARD**.

SPECIAL TOOLS

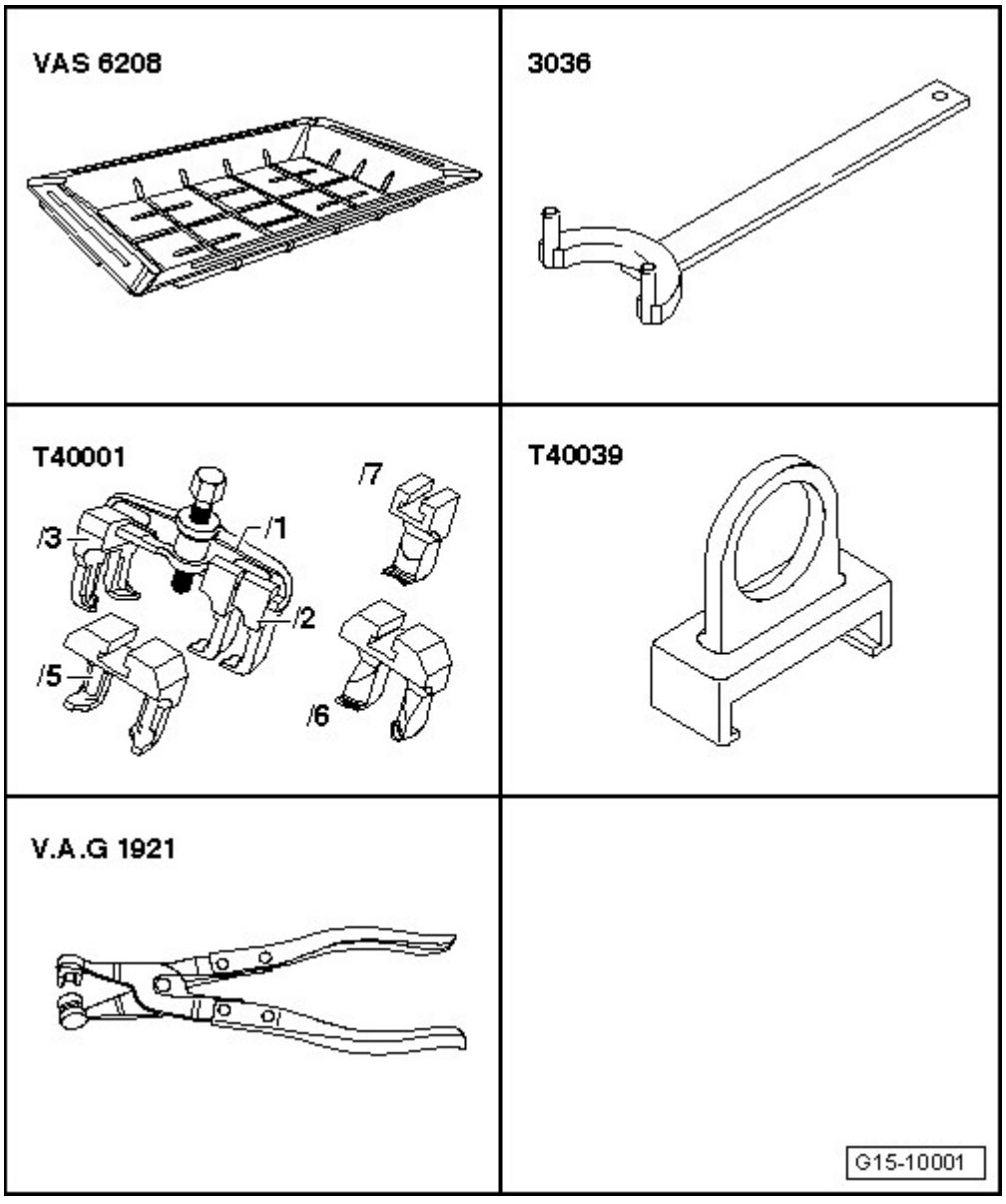

Fig. 150: Special Tools And Workshop Equipment (1 Of 8)
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Drip Tray VAS 6208
- Retainer 3036
- Puller T40001

- Ignition Coil Puller T40039
- Hose Clip Pliers V.A.G 1921

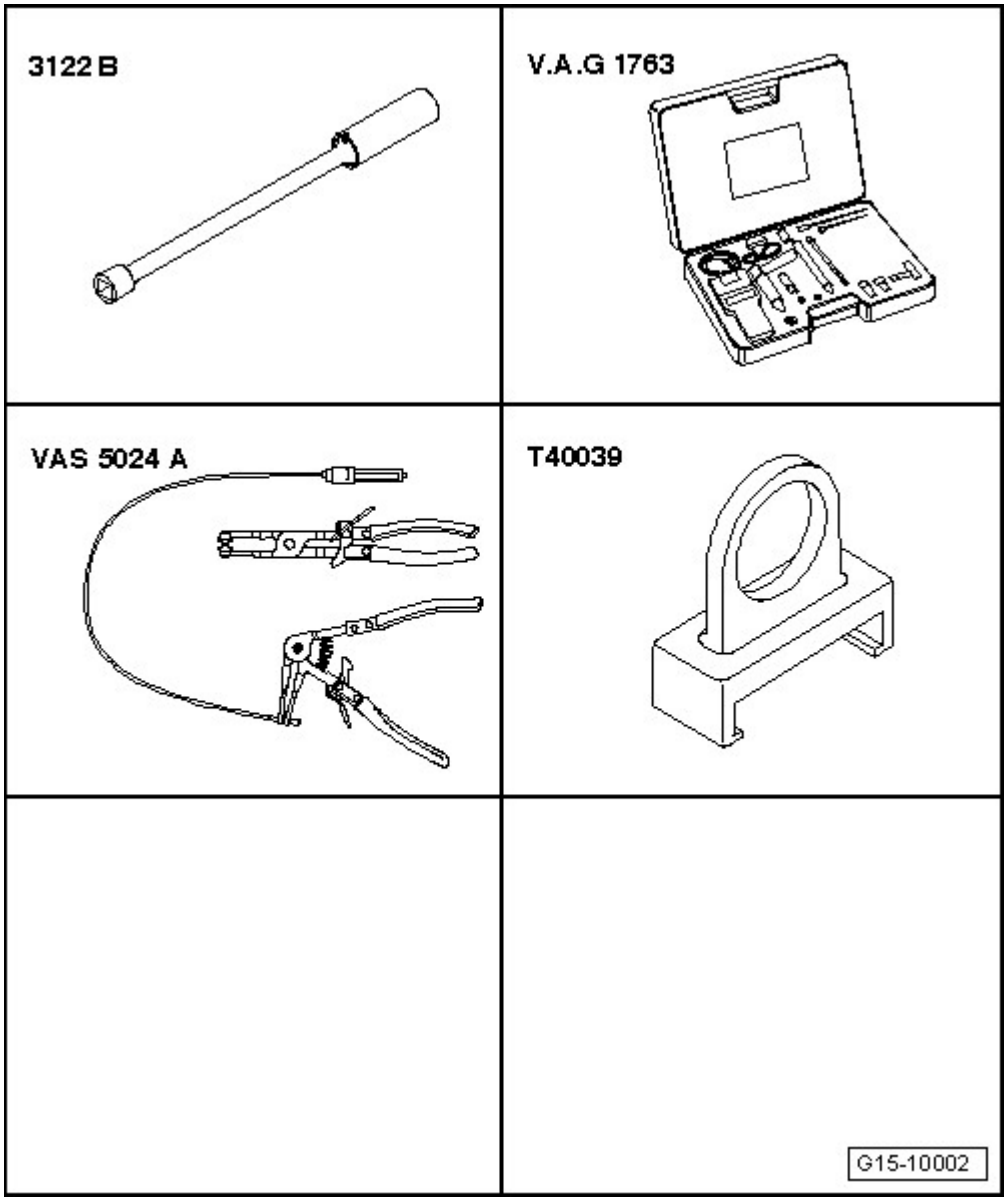

Fig. 151: Special Tools And Workshop Equipment (2 Of 8)
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Compression Tester V.A.G 1763
- Spark Plug Removal Tool 3122 B
- Ignition Coil Puller T40039
- Spring Type Clip Pliers VAS 5024 A

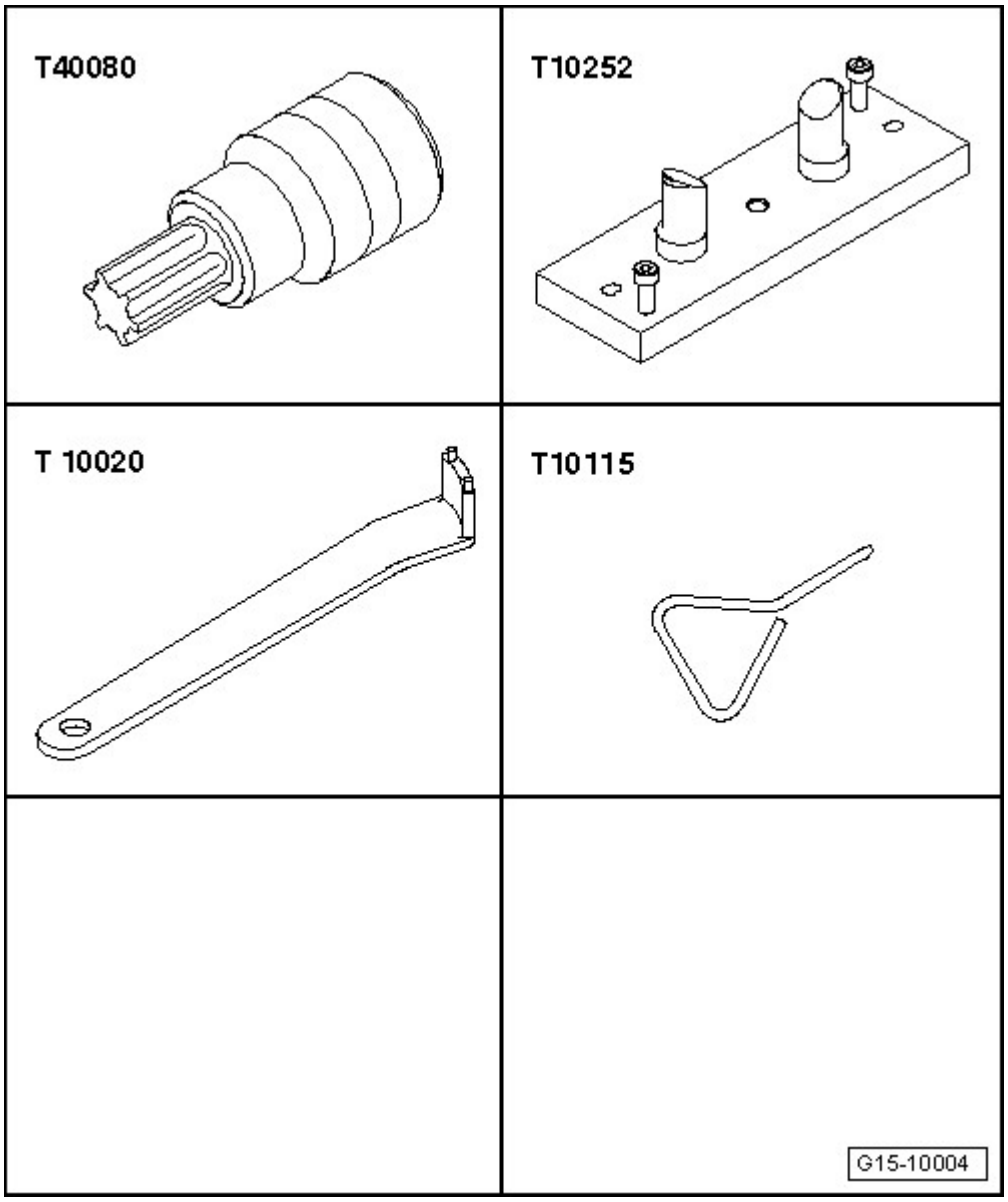

Fig. 152: Special Tools And Workshop Equipment (3 Of 8)
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Socket T40080
- Camshaft Clamp T10252
- Toothed Belt Tensioner T10020
- Locking Pin T10115

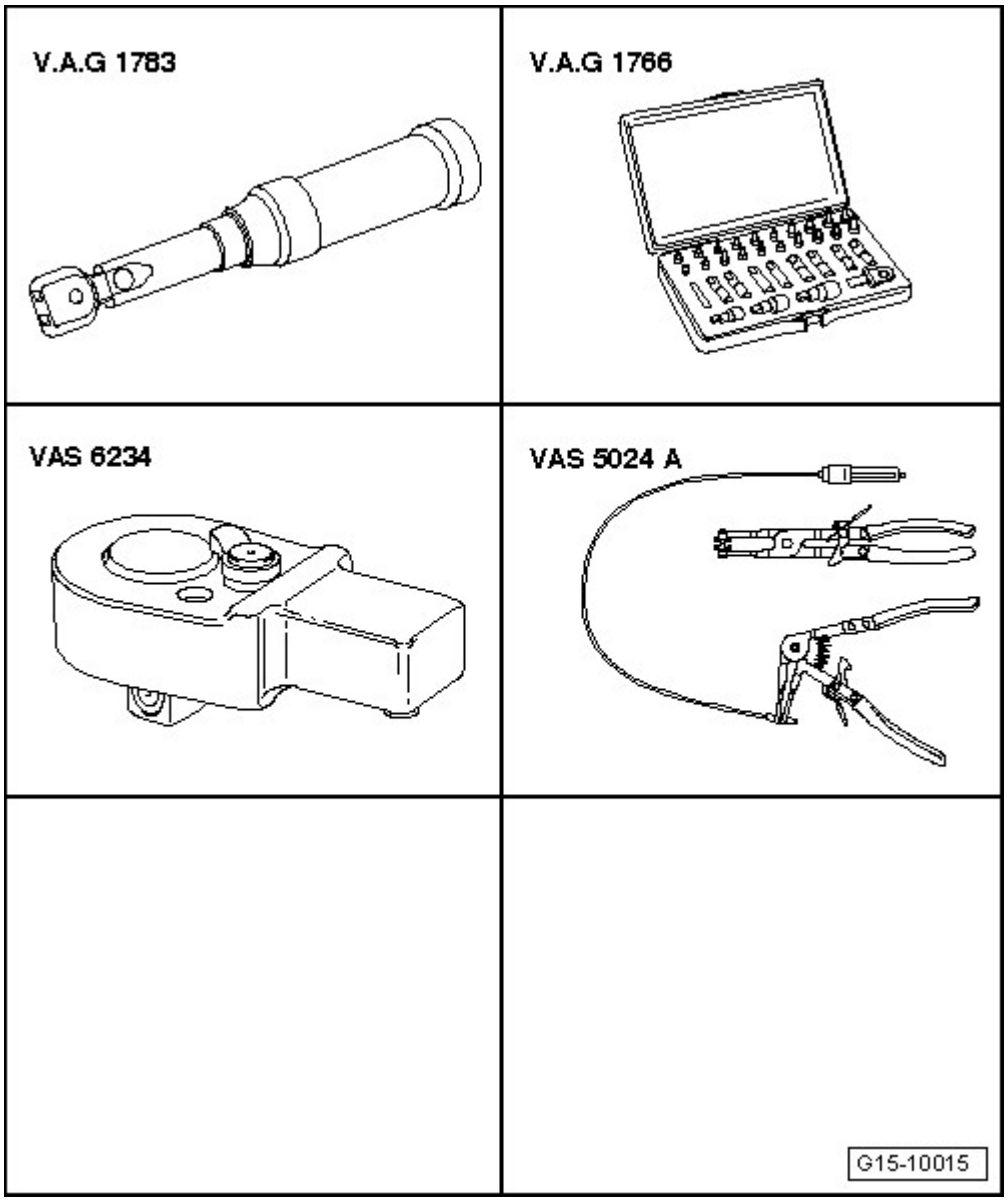

Fig. 153: Special Tools And Workshop Equipment (4 Of 8)
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Torque Wrench 5-60 Nm V.A.G 1783
- Torx® Bit Set V.A.G 1766
- Ratchet Insert 1/4" VAS 6234
- Spring Type Clip Pliers VAS 5024 A

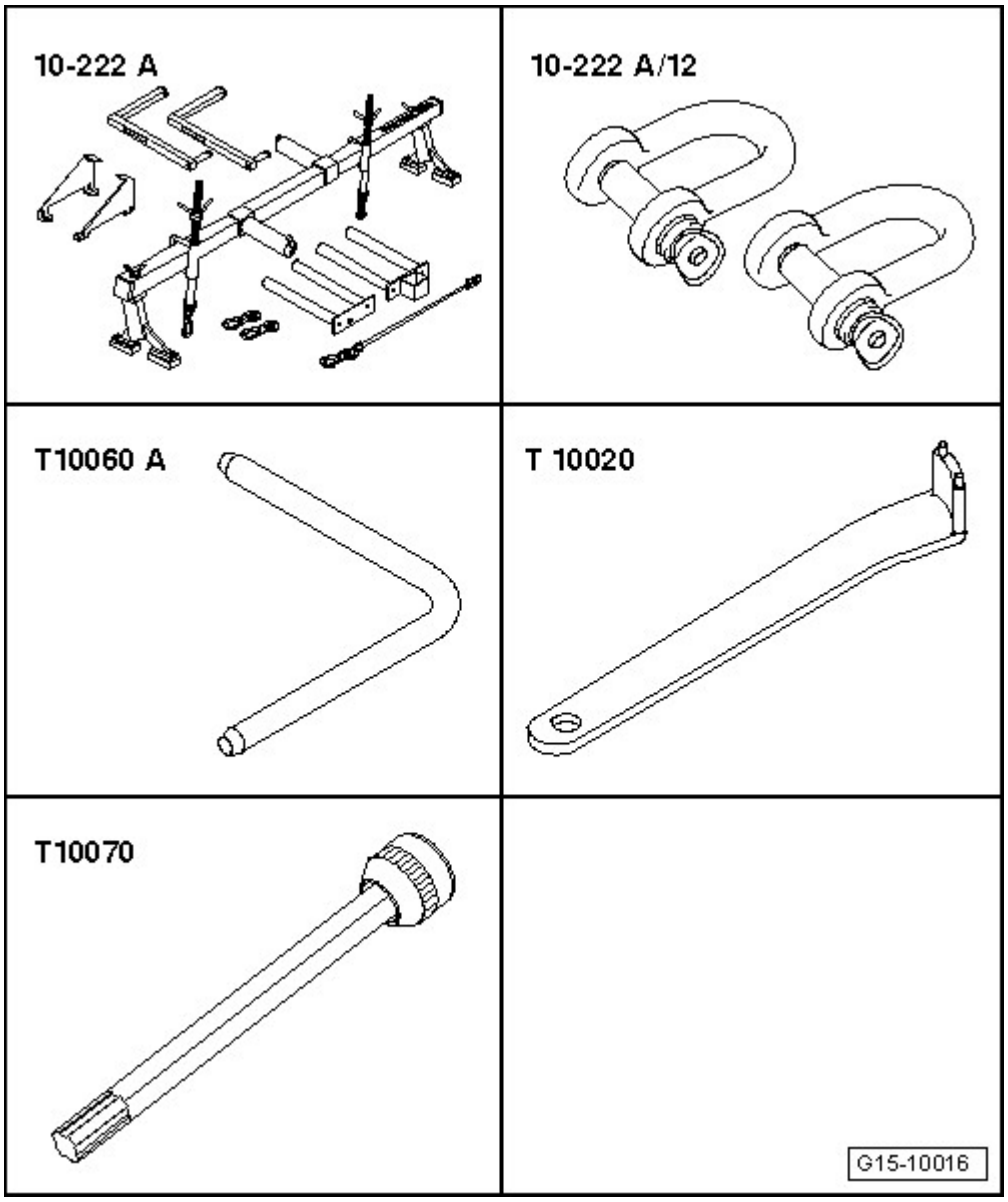

Fig. 154: Special Tools And Workshop Equipment (5 Of 8)
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Engine Support Bridge 10 - 222 A
- Shackle (1 Set=2 Pieces) 10 - 222 A /12
- Locking Pin T10060A
- Toothed Belt Tensioner T10020
- Polydrive Bit And Drive Socket T10070

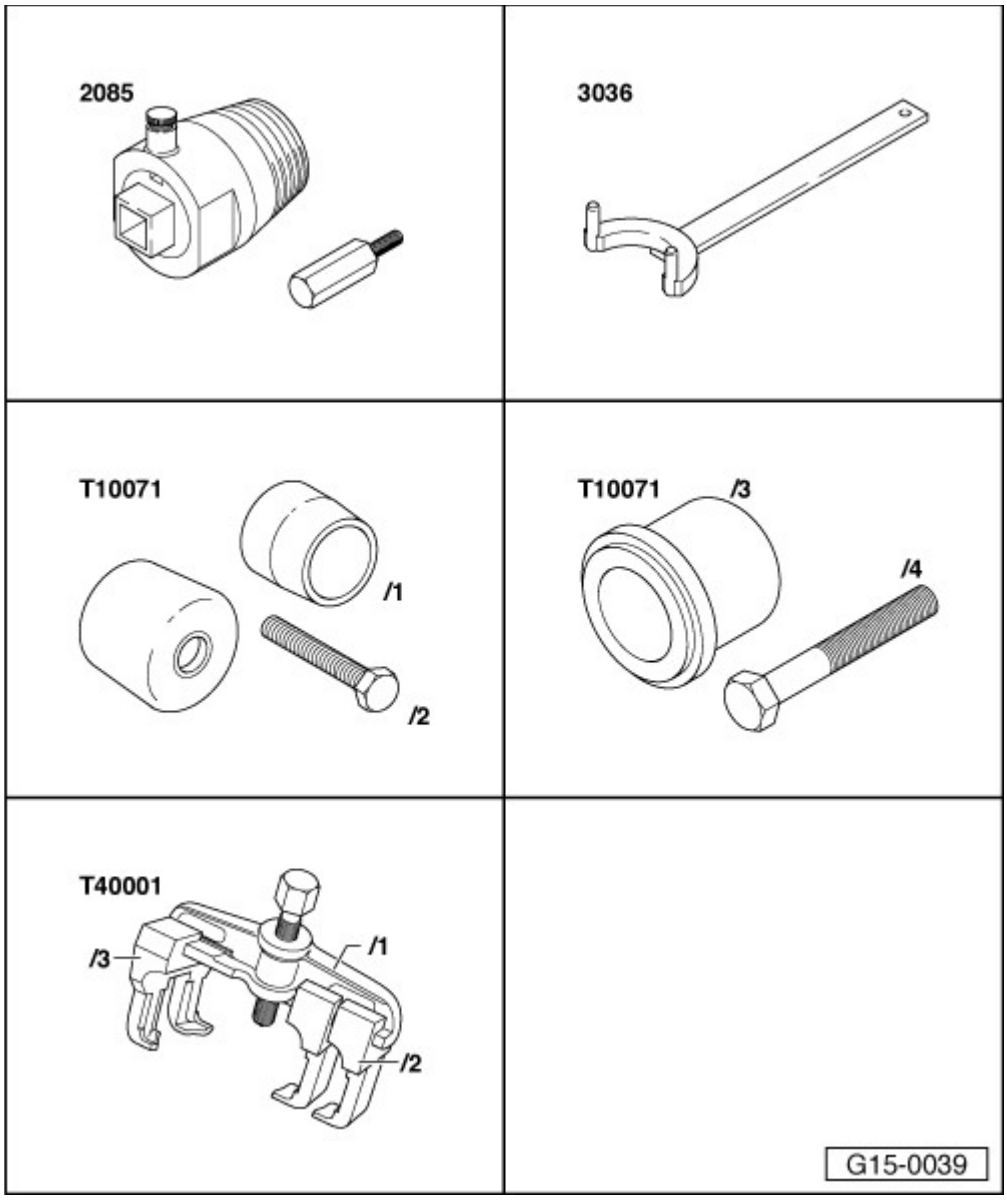

Fig. 155: Special Tools And Workshop Equipment (6 Of 8)
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Seal Puller - General Usage 2085
- Retainer 3036
- Assembly Tool T10071
- Puller T40001

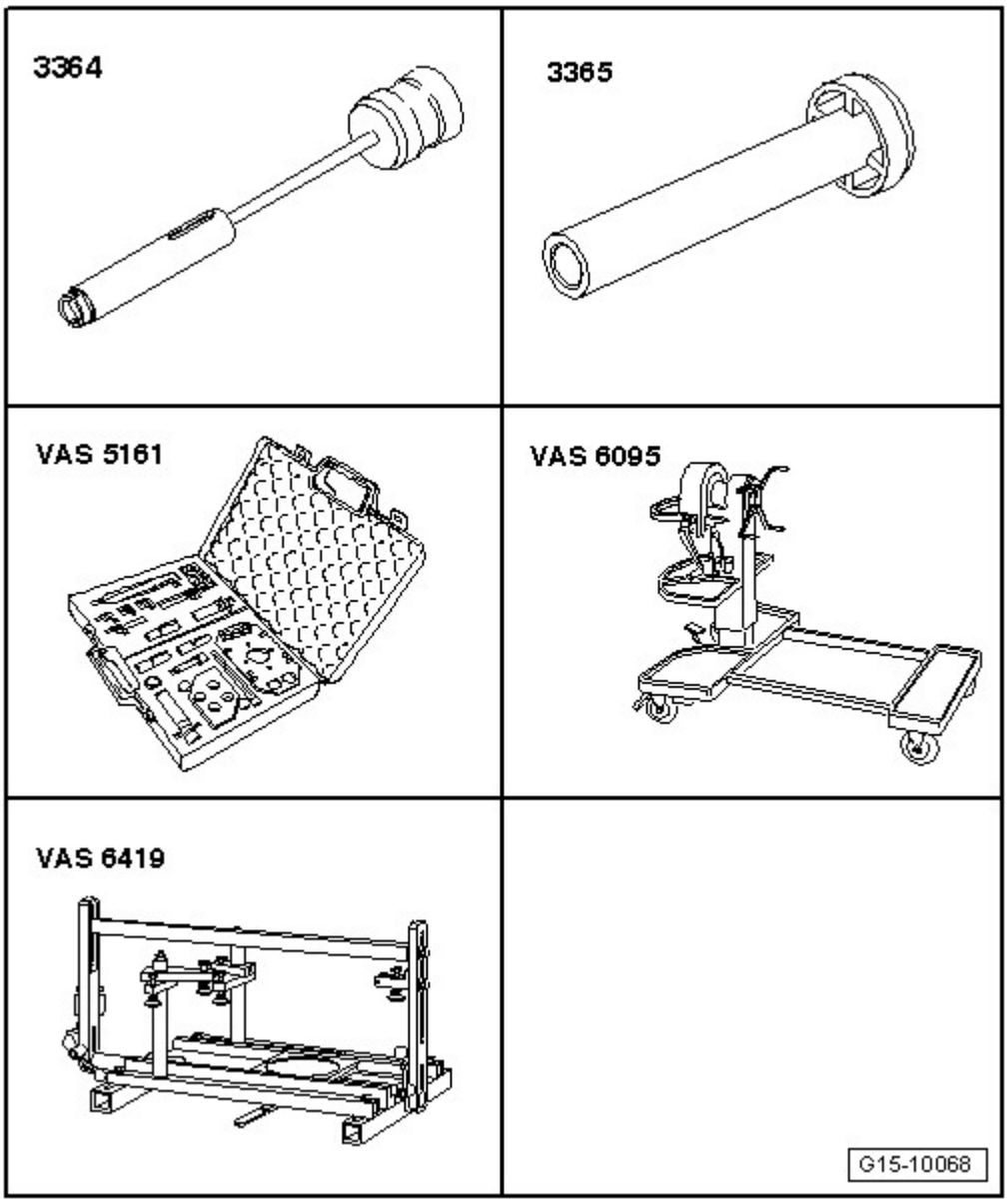

Fig. 156: Special Tools And Workshop Equipment (7 Of 8)
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Valve Seal Removal Tool 3364
- Valve Stem Seal Driver 3365
- Valve Cotters Asm/Dis-Asm Device VAS 5161
- Guide Plate for FSI Engine VAS 5161/19B
- Engine and Transmission Holder VAS 6095
- Cylinder Head Tensioning Device VAS 6419

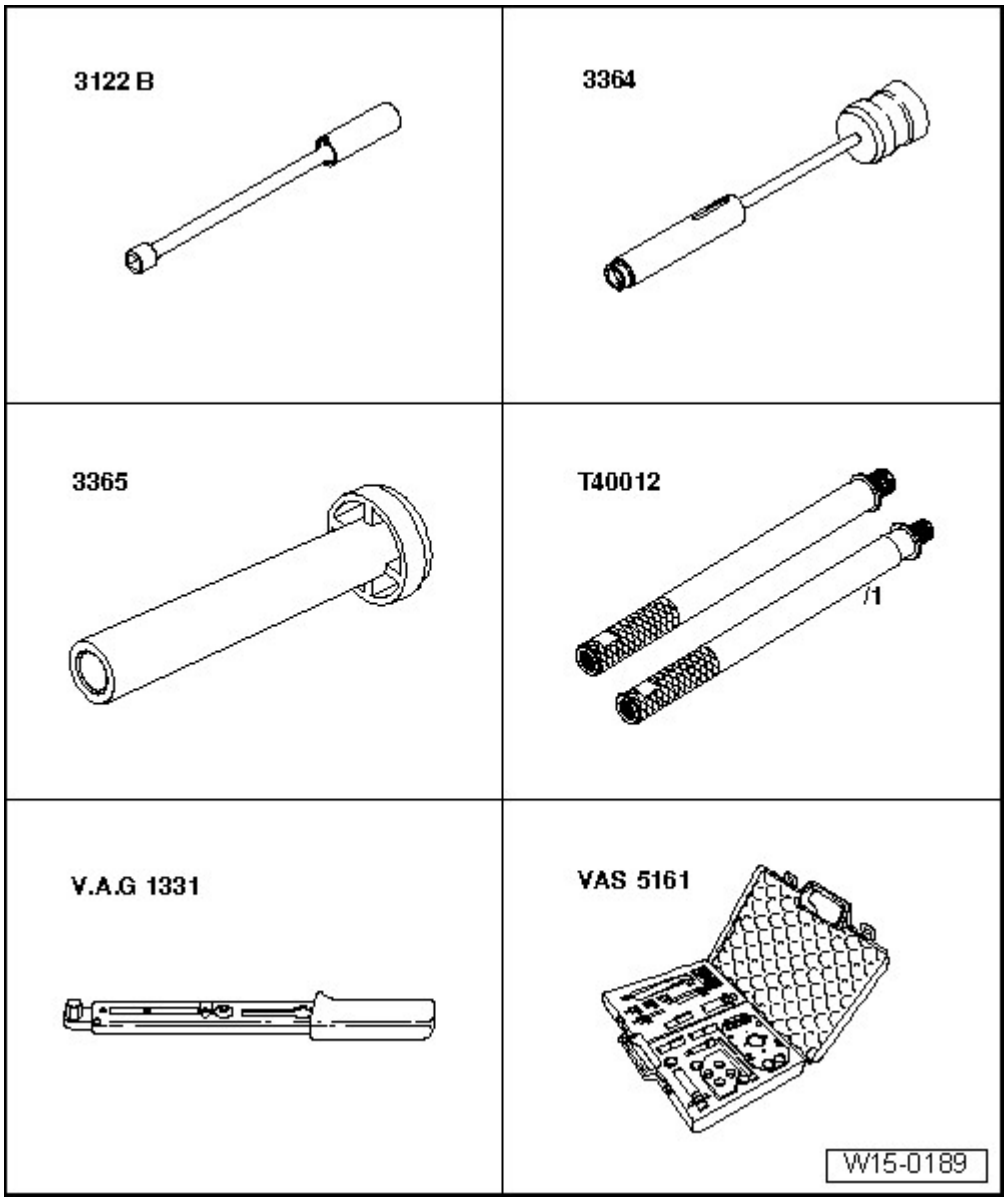

Fig. 157: Special Tools And Workshop Equipment (8 Of 8)
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Spark Plug Removal Tool 3122 B
- Valve Seal Removal Tool 3364
- Valve Stem Seal Driver 3365
- Adapter T40012
- Torque Wrench 5-50 Nm V.A.G 1331
- Valve Cotters Asm/Dis-Asm Device VAS 5161
- Guide Plate for FSI Engine VAS 5161/19B

Special tools and workshop equipment required

- Dial Gauge Holder VW 387

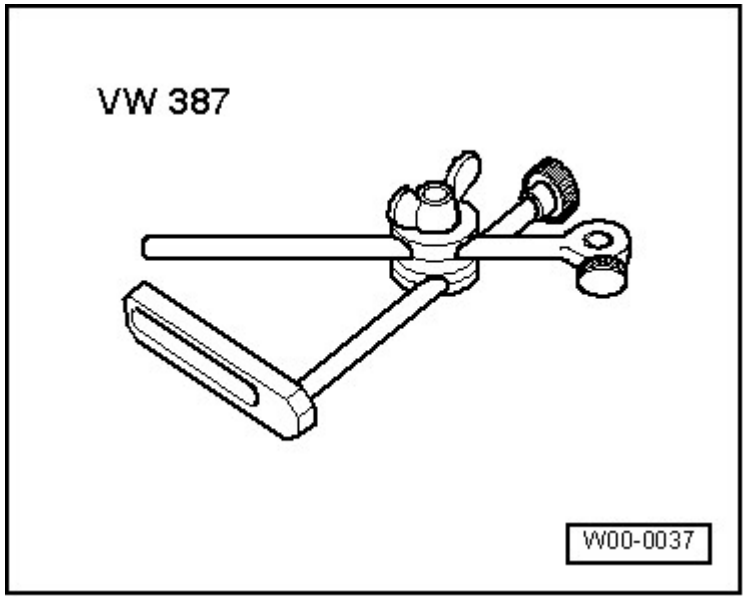

Fig. 158: Dial Gauge Holder VW 387
Courtesy of AUDI OF AMERICA, LLC

- Dial Gauge 0-10 mm VAS 6079

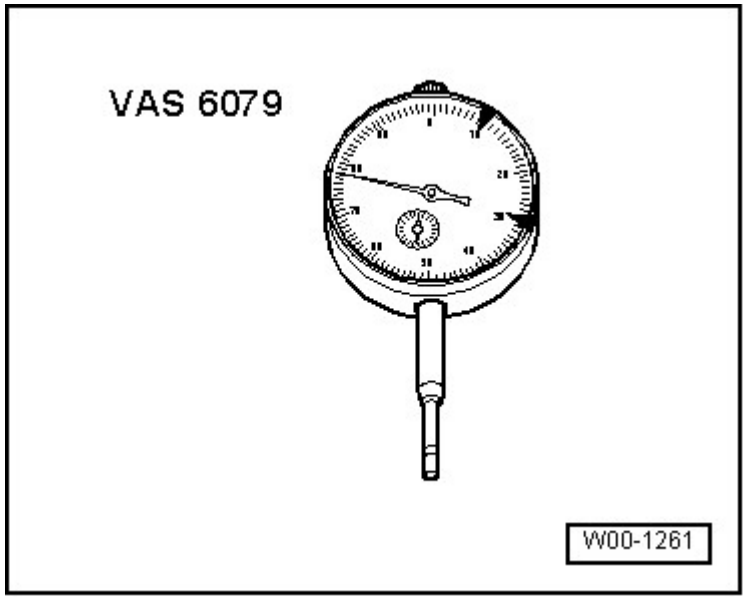

Fig. 159: Dial Gauge VAS 6079
Courtesy of AUDI OF AMERICA, LLC

- Engine bung set VAS 6122

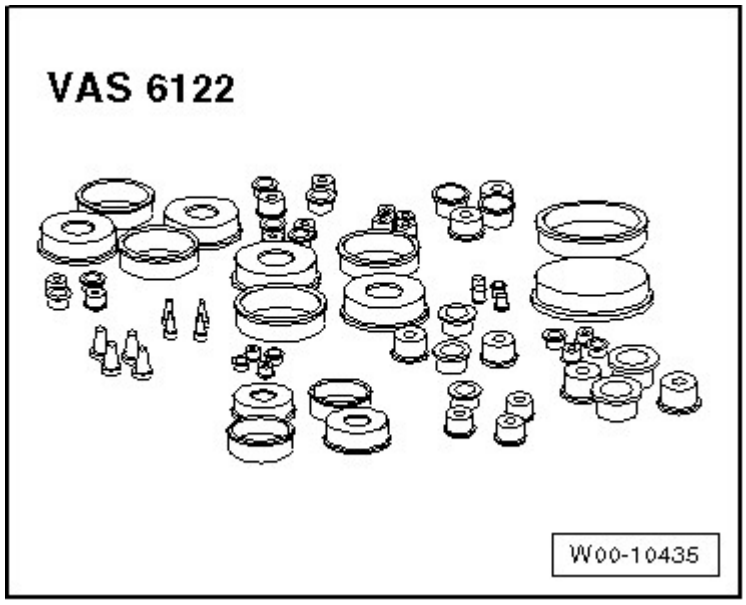

Fig. 160: Engine Bung Set Plugs Vas 6122
Courtesy of AUDI OF AMERICA, LLC

- Not illustrated:
- Thrust Piece 3334
- 2 Knurled Thumb Screws VAS 5161/12

ENGINE

2.0 Liter - Engine Assembly - Engine Code(s): BPY

10 ENGINE ASSEMBLY

GENERAL INFORMATION

ENGINE, SECURING ON ASSEMBLY STAND

Special tools and workshop equipment required

- Engine Sling 2024 A
- Shop Crane VAS 6100
- Engine and Transmission Holder VAS 6095
- Engine/Transmission Support T10012

- Transmission separated from engine.

-- Hook the 2024 A to engine and to the VAS 6100.

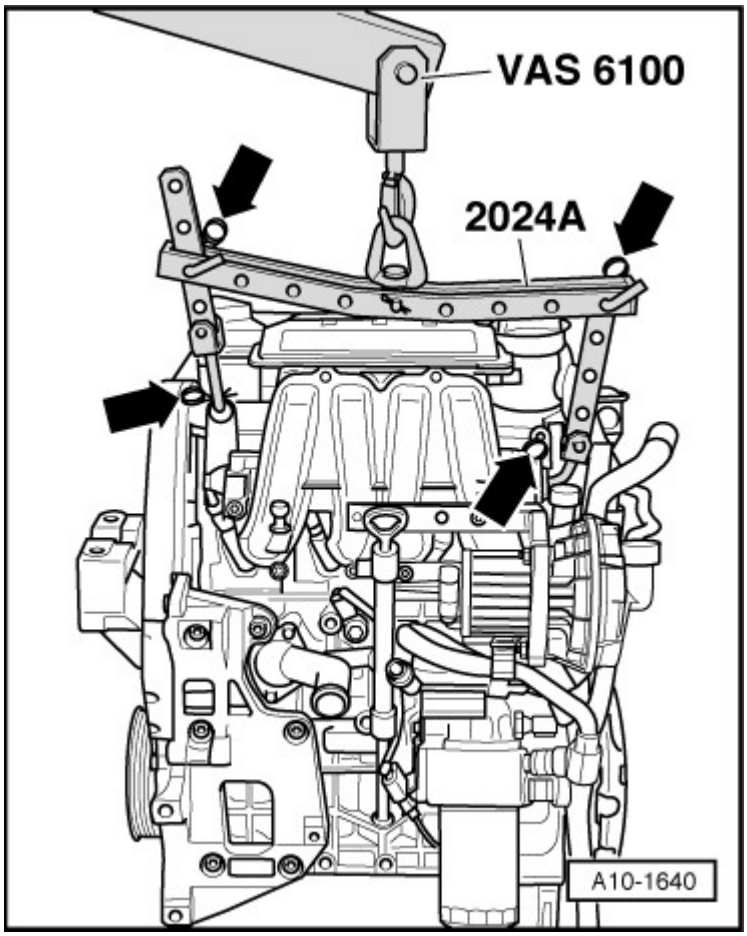

Fig. 1: Engine Sling 2024 A Hooked To Engine And To Workshop Crane VAS 6100
Courtesy of AUDI OF AMERICA, LLC

NOTE: To be aligned to the center of gravity of the engine assembly, the hole rails of the lifting hook must be inserted as shown in the illustration.

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

-- Lift the engine off from the T10012 using the VAS 6100.

Secure engine on VAS 6095 when working on engine.

DESCRIPTION AND OPERATION

SUBFRAME OVERVIEW

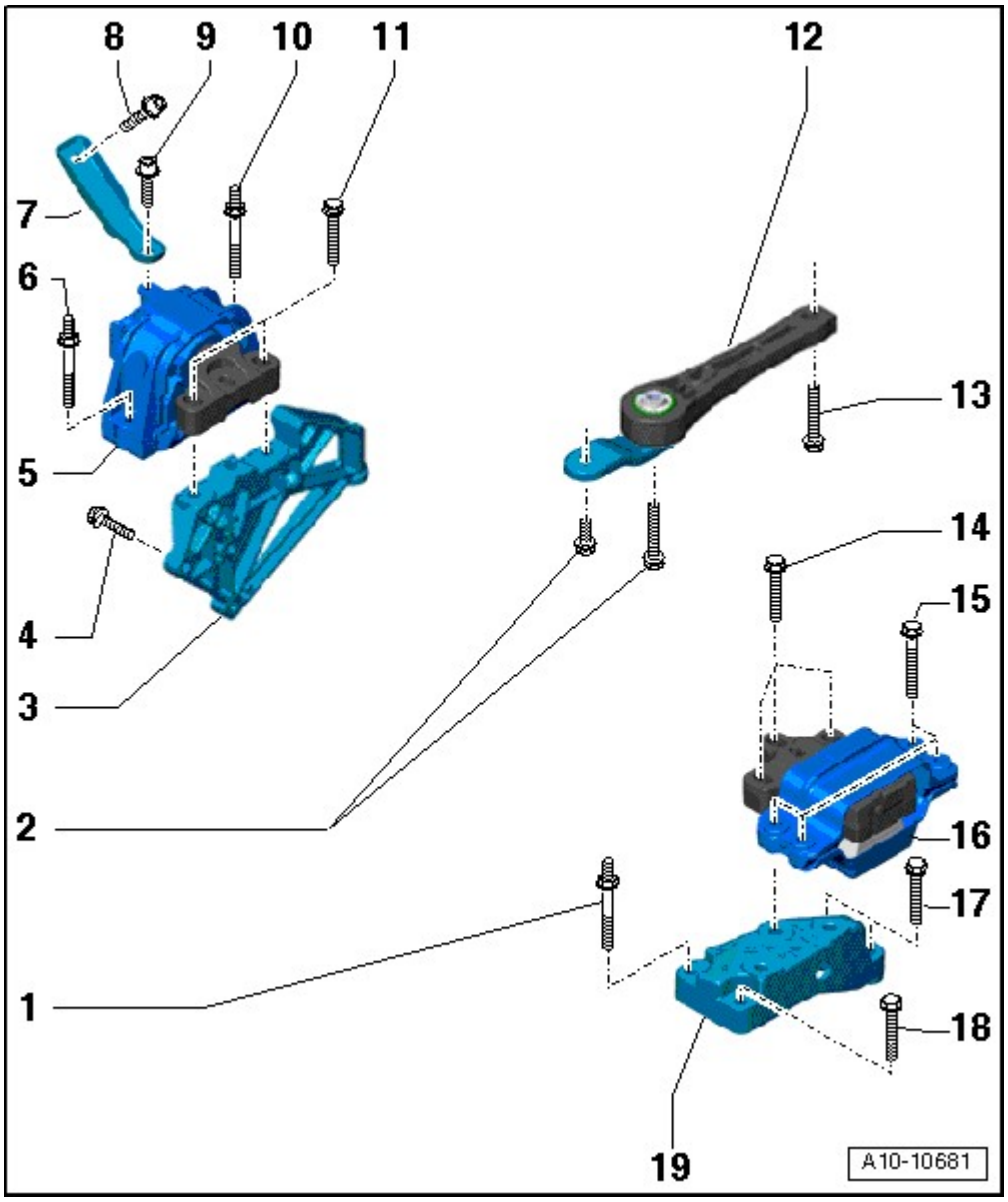

Fig. 2: Subframe Assembly Overview
Courtesy of AUDI OF AMERICA, LLC

1. Bolt
   - Transmission support to transmission
   - Tightening specification, refer to **SUBFRAME MOUNT ASSEMBLY OVERVIEW**
   - Tightening specification, refer to **SUBFRAME MOUNT OVERVIEW**
2. Bolts
   - Pendulum supports to transmission
   - Tightening specification, refer to **SUBFRAME MOUNT ASSEMBLY OVERVIEW**
   - Tightening specification, refer to **SUBFRAME MOUNT OVERVIEW**
3. Engine Support

- With support arm

4. Bolt
   - 45 Nm
   - Engine support to engine
5. Engine Mount
6. Bolt
   - Replace
   - 40 Nm plus an additional 90° turn.
   - Engine mount to body
7. Bracket
8. Bolt
   - Replace
   - 20 Nm plus an additional 90° turn.
   - Bracket to engine mount
9. Bolt
   - Replace
   - 20 Nm plus an additional 90° turn.
   - Bracket to body
10. Bolt
    - Replace
    - 40 Nm plus an additional 90° turn.
    - Engine mount to body
11. Bolts
    - Replace
    - 60 Nm plus an additional 90° turn.
    - Engine mount to engine support
12. Pendulum Support
13. Bolt
    - Pendulum supports to subframe
    - Tightening specification, refer to **SUBFRAME MOUNT ASSEMBLY OVERVIEW**
    - Tightening specification, refer to **SUBFRAME MOUNT OVERVIEW**
14. Bolt
    - Transmission mount to transmission support
    - Tightening specification, refer to **SUBFRAME MOUNT ASSEMBLY OVERVIEW**
    - Tightening specification, refer to **SUBFRAME MOUNT OVERVIEW**
15. Bolt
    - Transmission mount to body
    - Tightening specification, refer to, **SUBFRAME MOUNT ASSEMBLY OVERVIEW**

- Tightening specification, refer to **SUBFRAME MOUNT OVERVIEW**

16. Transmission Mount
    - With support arm
17. Bolt
    - Transmission support to transmission
    - Tightening specification, refer to **SUBFRAME MOUNT ASSEMBLY OVERVIEW**
    - Tightening specification, refer to **SUBFRAME MOUNT OVERVIEW**
18. Bolt
    - Transmission support to transmission
    - Tightening specification, refer to **SUBFRAME MOUNT ASSEMBLY OVERVIEW**
    - Tightening specification, refer to **SUBFRAME MOUNT OVERVIEW**
19. Transmission Support

SUBFRAME MOUNT, ADJUSTING

Special tools and workshop equipment required

- Engine Support Bridge 10 - 222 A
- Shackles 10 - 222 A /12

- For the correct tightening specifications, refer to **SUBFRAME OVERVIEW**.
- Remove the engine cover and air filter. Refer to **Removal and Installation** .

-- Remove the battery. Refer to **REMOVAL AND INSTALLATION** .

-- Remove the battery carrier -arrows-.

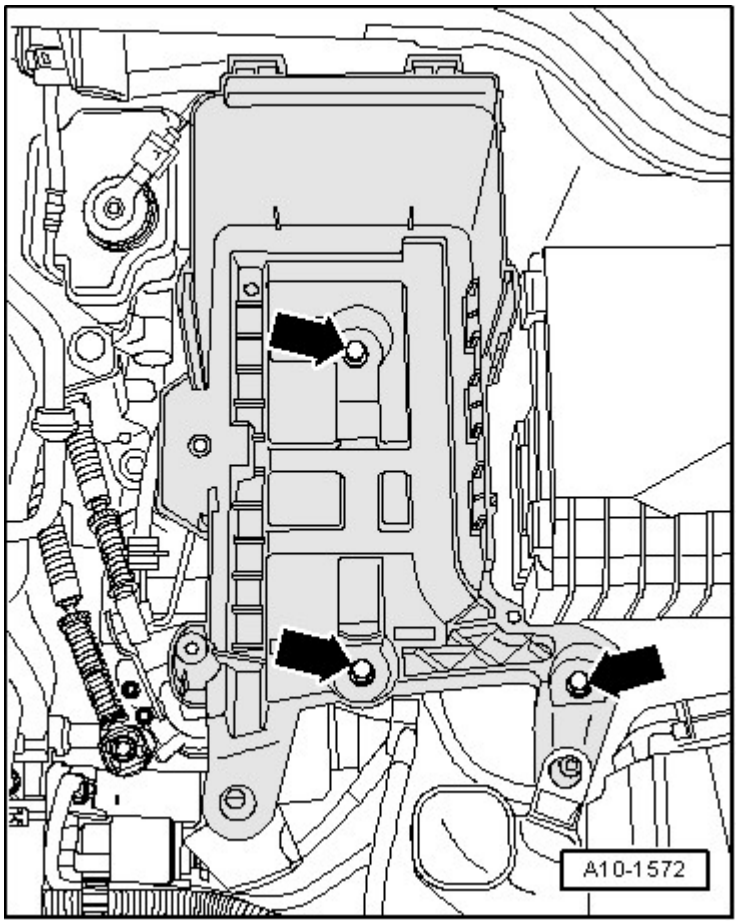

Fig. 3: Identifying Battery Holder Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove EVAP canister with connected lines upward out of bracket -arrow- and lay aside.

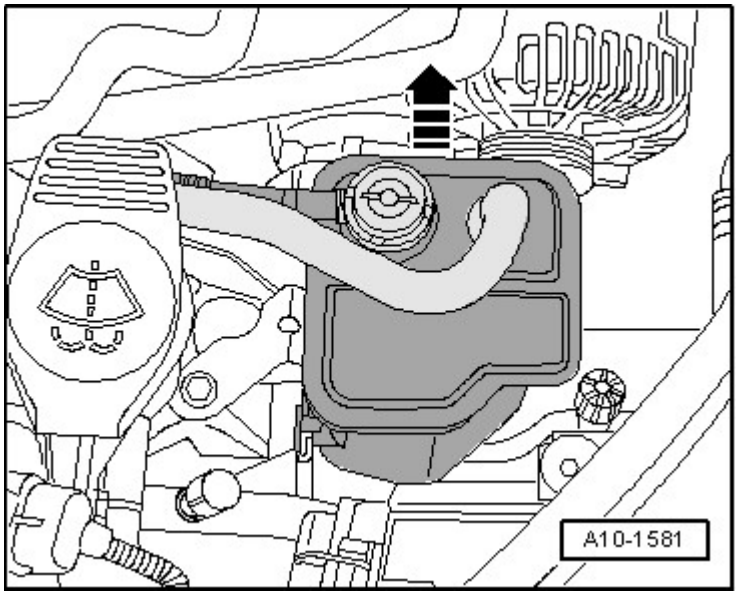

Fig. 4: Identifying EVAP Canister
Courtesy of AUDI OF AMERICA, LLC

-- Remove EVAP canister bracket.

-- Unhook the front of the battery carrier from the air guide.

-- Install the 10 - 222 A onto the fender bolting edge. The spindles are positioned forward.

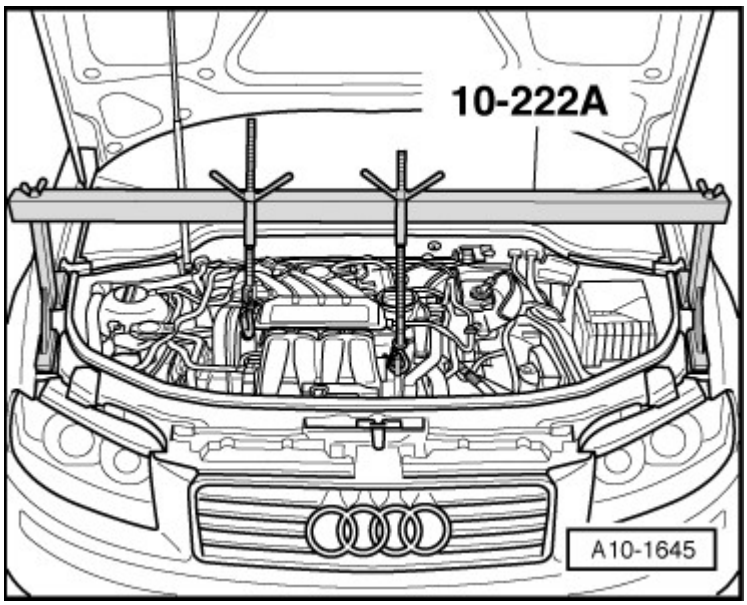

Fig. 5: Engine Support Bridge 10 - 222 A Installed Onto Fender Bolting Edge
Courtesy of AUDI OF AMERICA, LLC

-- Hook the carabiner hooks of the spindles with the 10 - 222 A /12 into the engine lifting eyes.

-- Uniformly pre-load engine using both spindles but do not lift it.

-- Remove the bolts -arrows- from the engine assembly mounts one after the other, replace them (unless already done during engine installation) and screw them in loosely.

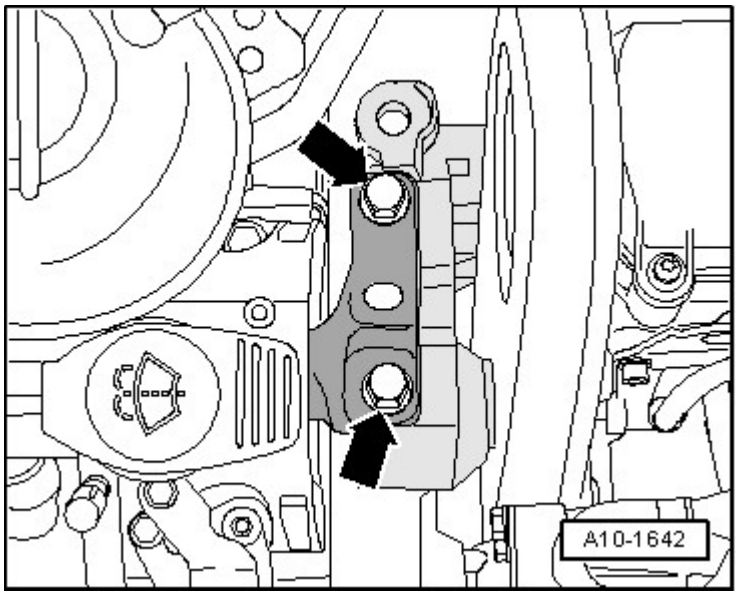

Fig. 6: Engine Mountings Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- from the transmission assembly mounts one after the other, replace them (unless already done during engine installation) and screw them in loosely.

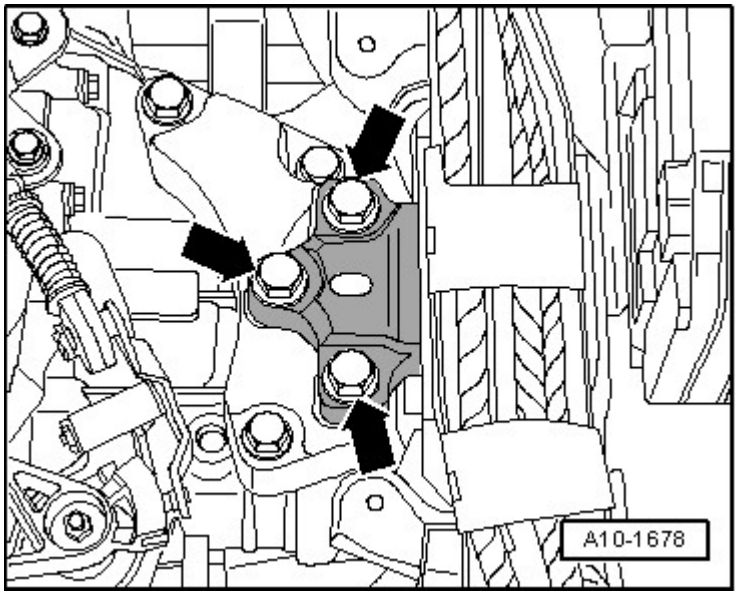

Fig. 7: Identifying Bolts To Assembly Mounting On Transmission
Courtesy of AUDI OF AMERICA, LLC

-- Loosen left and right support arm bolts approximately 2 turns.

-- Slide engine/transmission assembly with a pry bar between engine mount -1- and engine support -4- until the following dimensions are set:

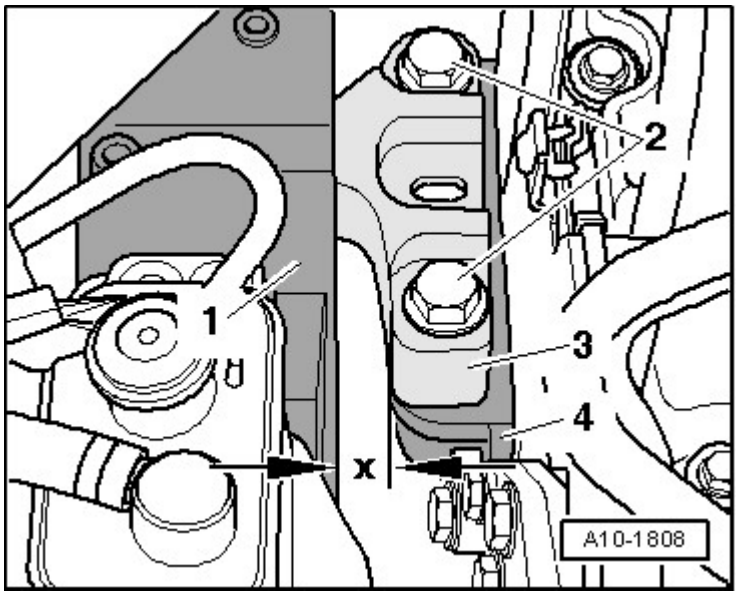

Fig. 8: Checking Dimensions At Engine/Transmission Assembly Mounting
Courtesy of AUDI OF AMERICA, LLC

- Both bolts -2- must be parallel to edge of support arm -3-.
- A distance of -x- = 16 mm must be present between engine mount -1- and engine support -4-.

NOTE: Distance -x- = 16 mm can also be checked with suitable round stock.

-- Tighten subframe mount to transmission bolts.

-- The edges on the support arm -1- and transmission mount -2- are parallel on the transmission side.

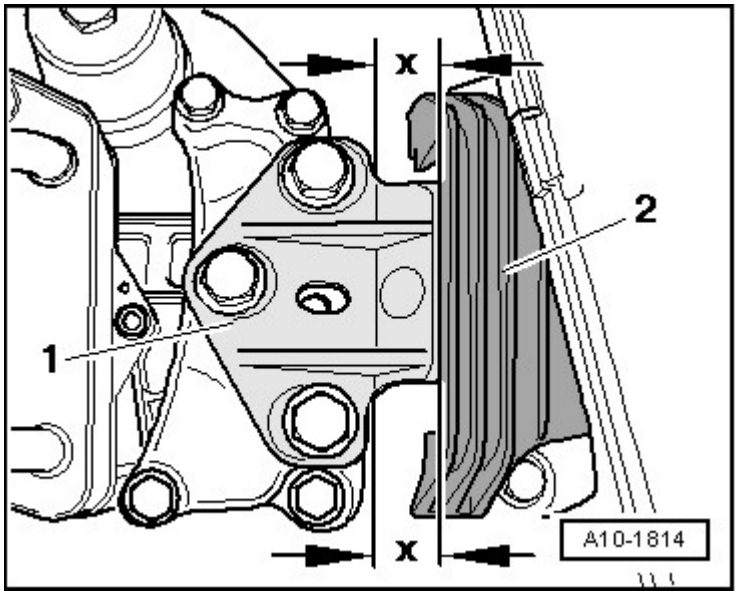

Fig. 9: Ensuring Edges On Support Arm And Transmission Mount Are Parallel
Courtesy of AUDI OF AMERICA, LLC

- Dimension -x- same size on both sides of bracket.

-- Tighten subframe mount bolts.

The rest of the installation is performed in reverse order of removal, noting the following:

-- Tighten bolts for front part of longitudinal member.

-- Install the battery. Refer to **REMOVAL AND INSTALLATION** .

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Component	Bolt Size	Nm
Bracket to Body[1, 2]	-	20 + 90°
Bracket to Engine Mount[1, 2]	-	20 + 90°
Bolts and Nuts		
	M6	10
	M8	20
	M10	45
	M12	65
Engine Mount to Body[1, 2]	-	40 + 90°
Engine Mount to Engine Support[1, 2]	-	60 + 90°
Engine Support to Engine	-	45
Exceptions:		
Clamp B+ to Starter	-	16
Ground (GND) Cable to Transmission	-	23
Pendulum Supports to Transmission[1, 2]	-	40 + 90°
Pendulum Supports to Subframe[1, 2]	-	100 + 90°

- [1] Replace bolt
- [2] 90° corresponds to a quarter turn.

Engine/Transmission Fastening

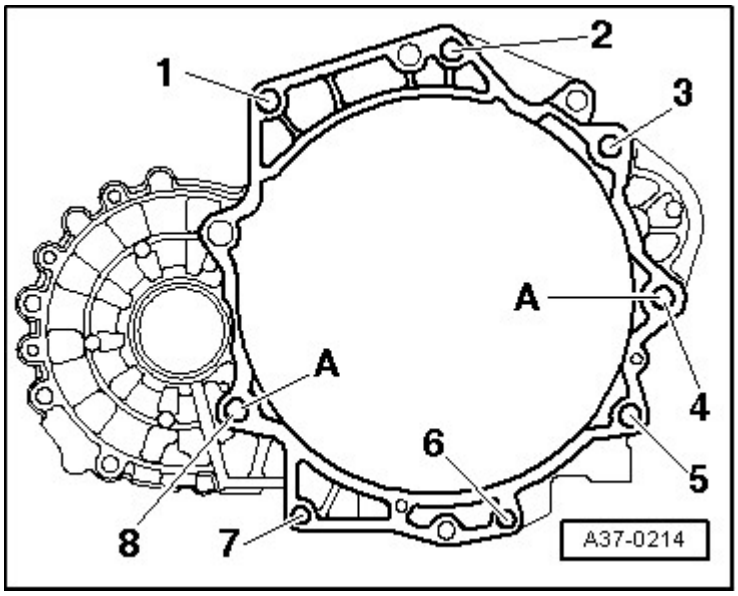

Fig. 10: Removing Bolts On Engine/Transmission Flange
Courtesy of AUDI OF AMERICA, LLC

Item	Bolt	Nm
1, 2	M12 X 65	80
3 [1], 4 [1]	M12 X 135	80
5 through 7	M10 X 60	40
8	M12 X 90	65

- [1] Bolt with threaded pin M8

DIAGNOSIS AND TESTING

SUBFRAME MOUNT, CHECKING ADJUSTMENT

-- Remove the engine cover and air filter. Refer to **Removal and Installation** .

-- Pull the EVAP canister with connected lines upward in direction of the -arrow- out of the retainer and lay it aside.

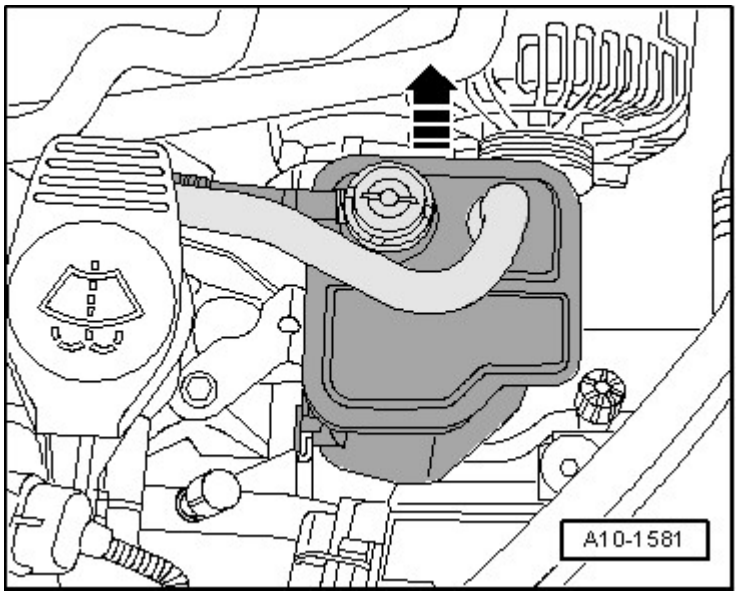

Fig. 11: Identifying EVAP Canister
Courtesy of AUDI OF AMERICA, LLC

The following dimensions must be attained:

- The clearance between the engine support -2- and the right longitudinal member must be -a- = 16 mm.

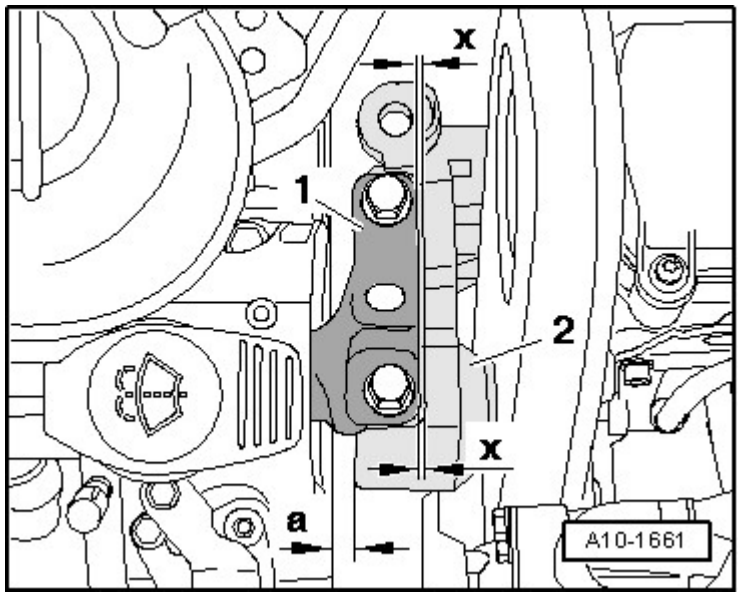

Fig. 12: Identifying Casting Edge On Engine Support Location
Courtesy of AUDI OF AMERICA, LLC

- The casting edge of the engine support -2- must be parallel to the support arm -1- (dimension x = dimension x).

NOTE: The dimension a = 16 mm, can for example also be checked with a suitable

cylindrical rod.

If a clearance dimension is too small or too large, proceed as follows:

REMOVAL AND INSTALLATION

ENGINE, REMOVING

Special tools and workshop equipment required

- Drip Tray VAS 6208
- Engine/Transmission Jack V.A.G 1383 A
- Spring Type Clip Pliers VAS 5024A
- Step Ladder VAS 5085
- Engine/Transmission Support T10012
- Hex Ball Socket 3247
- Engine Bung Set VAS 6122

NOTE: The engine is removed downward together with the transmission.

All cable ties which are opened or cut open when removing engine, must be replaced in the same position when installing engine.

Drained coolant must be stored in a clean container for disposal or reuse.

-- Remove the engine cover and air filter. Refer to **Removal and Installation** .

-- Remove electrical connector -arrow- for oxygen sensor before catalytic converter from the bracket, disconnect it and lay it aside.

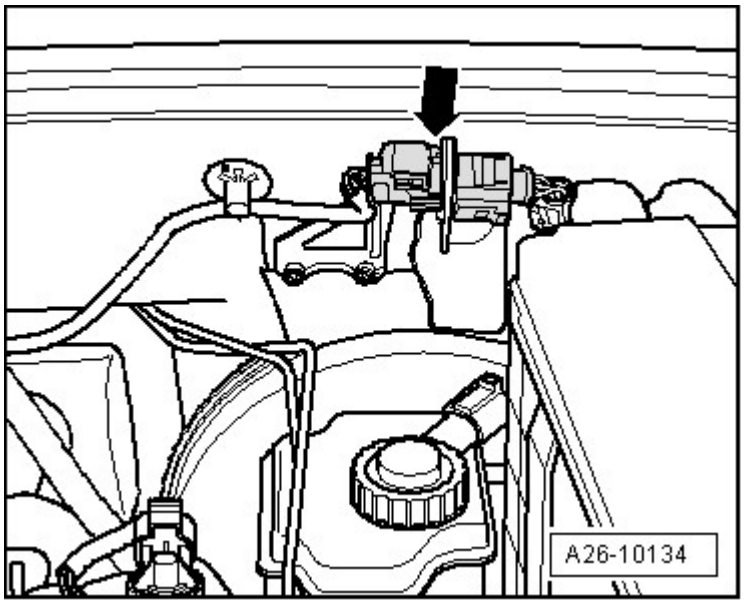

Fig. 13: Disconnecting Heated Oxygen Sensor (HO2S) G39 Harness Connector
Courtesy of AUDI OF AMERICA, LLC

WARNING: Risk of scalding due to hot steam and hot coolant.

- **The coolant system is under pressure when the engine is warm.**
- **Cover the coolant reservoir cap with a cloth and then open it slowly to release the pressure in the system.**

-- Open the cap of the coolant expansion tank.

-- Remove the cover from above battery, by pressing the release button -arrow-.

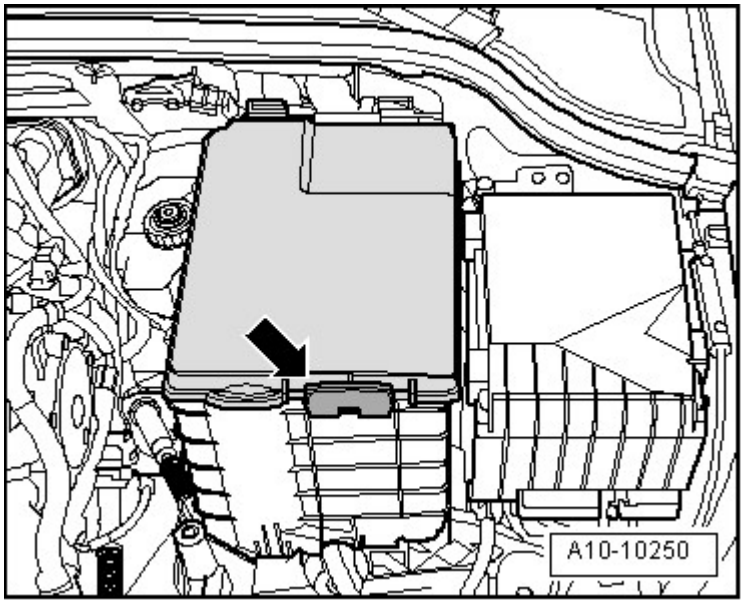

Fig. 14: Battery Cover
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Danger of causing damage to electrical components when disconnecting the battery.

- **Complete the steps for disconnecting the battery.**

-- With ignition switched off, disconnect battery ground (GND) cable -arrow-.

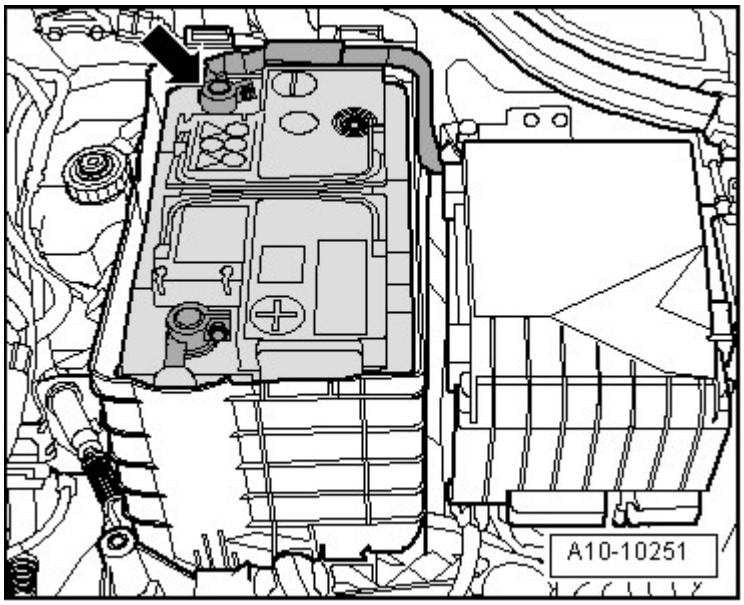

Fig. 15: Battery Ground Strap
Courtesy of AUDI OF AMERICA, LLC

-- Remove the battery. Refer to **REMOVAL AND INSTALLATION**

-- Remove the battery carrier -arrows-.

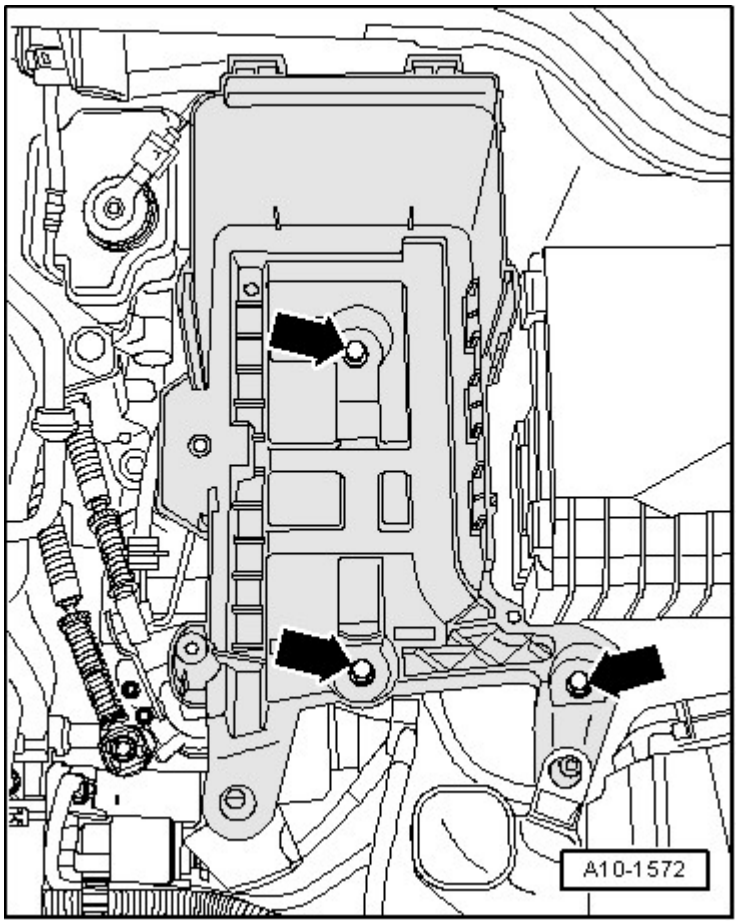

Fig. 16: Identifying Battery Holder Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Pry off the caps on the wiper arms with a screwdriver and remove the nuts.

-- Pull off and remove wiper arms from wiper axles.

-- Unclip the spray nozzles -arrow-.

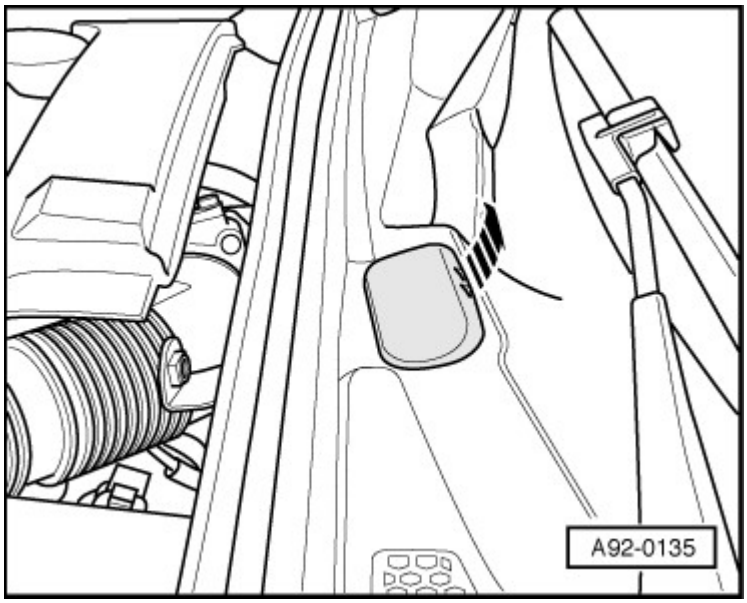

Fig. 17: Removing Spray Nozzle
Courtesy of AUDI OF AMERICA, LLC

-- Push the spray nozzles, with lines still attached, back through the opening and into the plenum chamber.

-- Remove rubber seal -1- for plenum chamber cover.

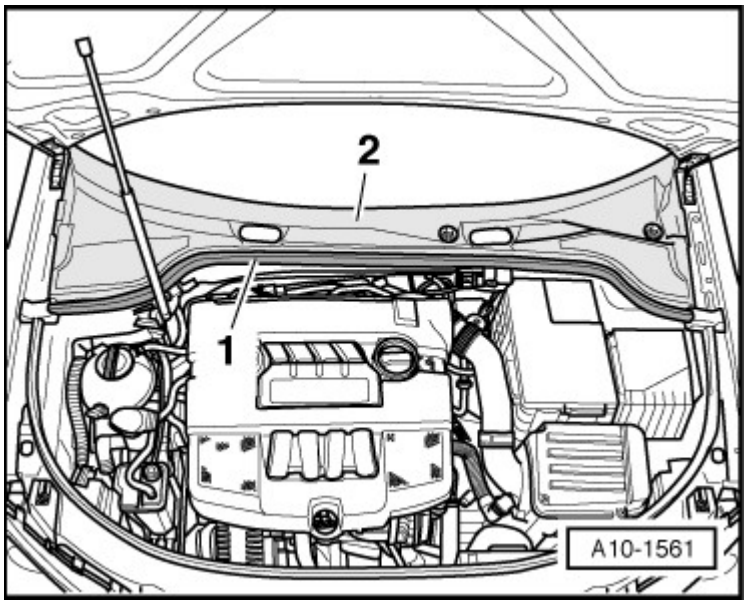

Fig. 18: Plenum Chamber Cover And Rubber Seal
Courtesy of AUDI OF AMERICA, LLC

-- Remove the plenum chamber cover -2-.

-- Free up the rear engine wiring harness at the partition for plenum chamber.

-- Remove partition for plenum chamber -arrows-.

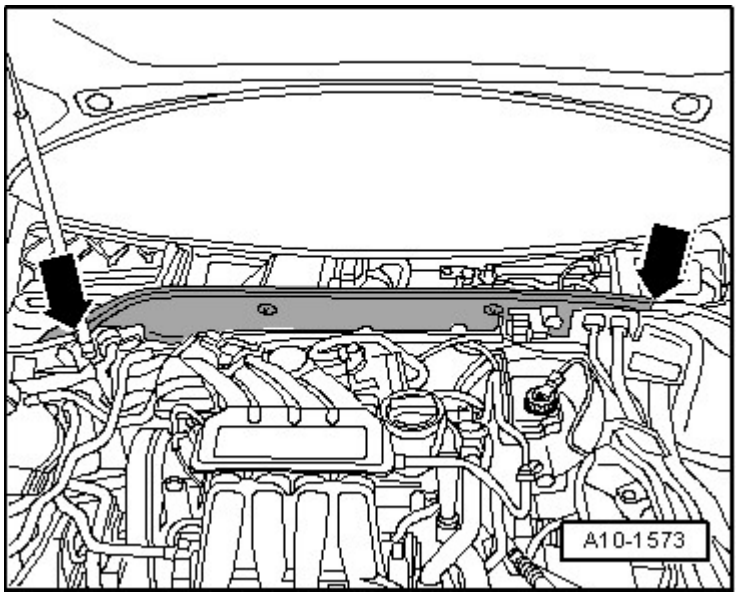

Fig. 19: Plenum Chamber Partition
Courtesy of AUDI OF AMERICA, LLC

-- Remove engine control module (ECM). Refer to **Removal and Installation** .

-- Separate the electrical connector -1- for the engine wiring harness.

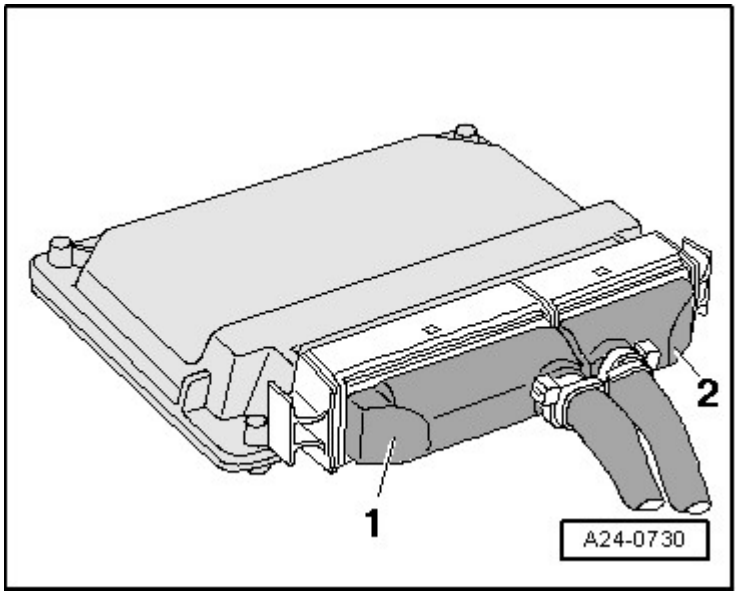

Fig. 20: Engine Wiring Harness Connector
Courtesy of AUDI OF AMERICA, LLC

-- Release pass-through for engine wiring harness -arrow- and pull off upward.

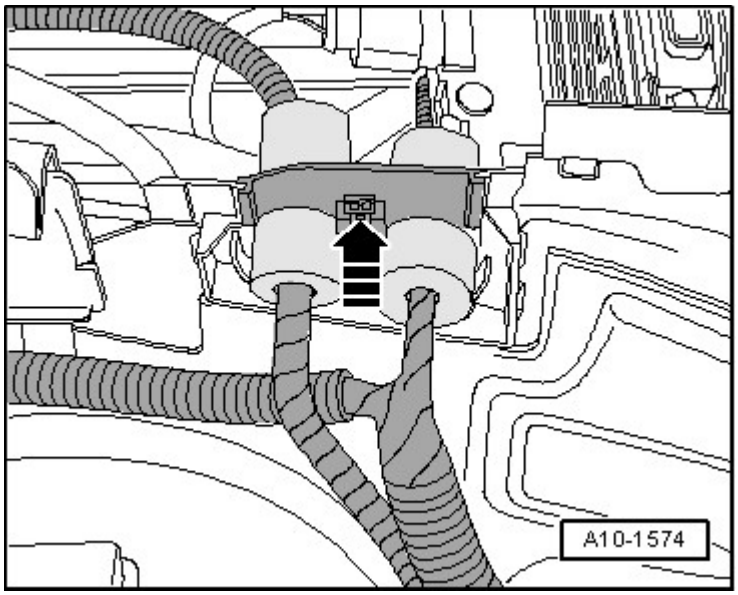

Fig. 21: Engine Wiring Harness
Courtesy of AUDI OF AMERICA, LLC

-- Open bracket for wiring -arrows-.

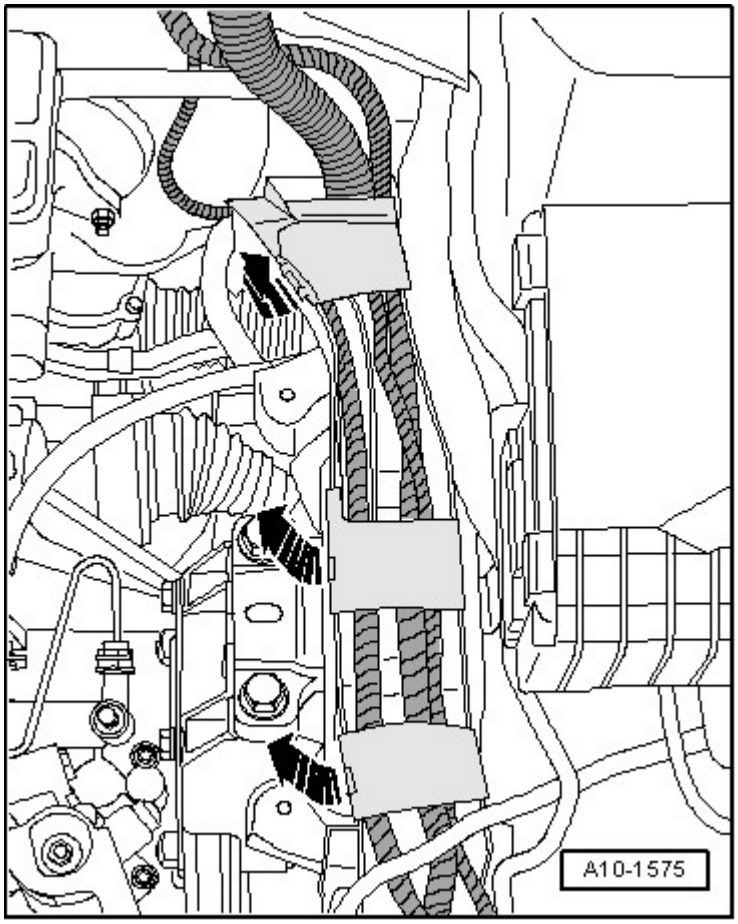

Fig. 22: Engine Wiring Harness Bracket
Courtesy of AUDI OF AMERICA, LLC

-- Free up and disconnect the electrical connector -1-.

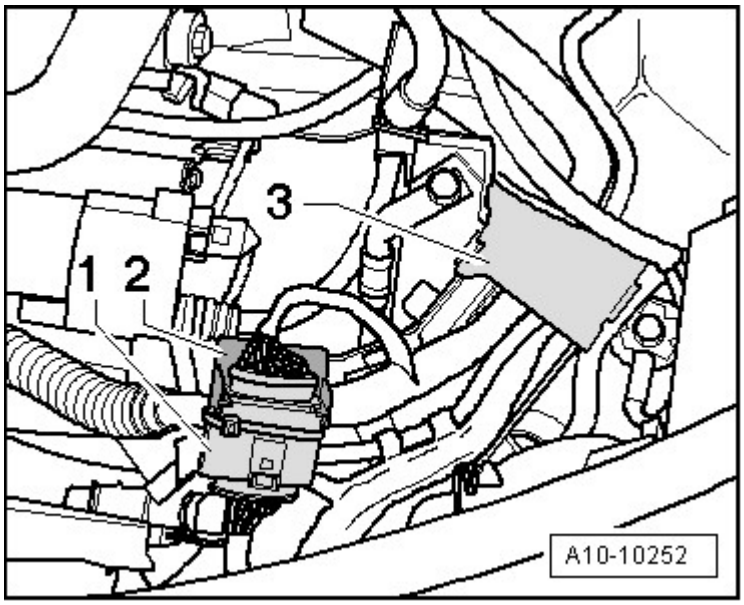

Fig. 23: Engine Wiring Harness Connector And Guide Brackets
Courtesy of AUDI OF AMERICA, LLC

-- Open the underlying wiring guide bracket -2-.

-- Open the wiring guide bracket -3-.

-- Remove engine wiring harness to control module from wiring.

-- Separate the electrical connector -1- for the backup lamp switch.

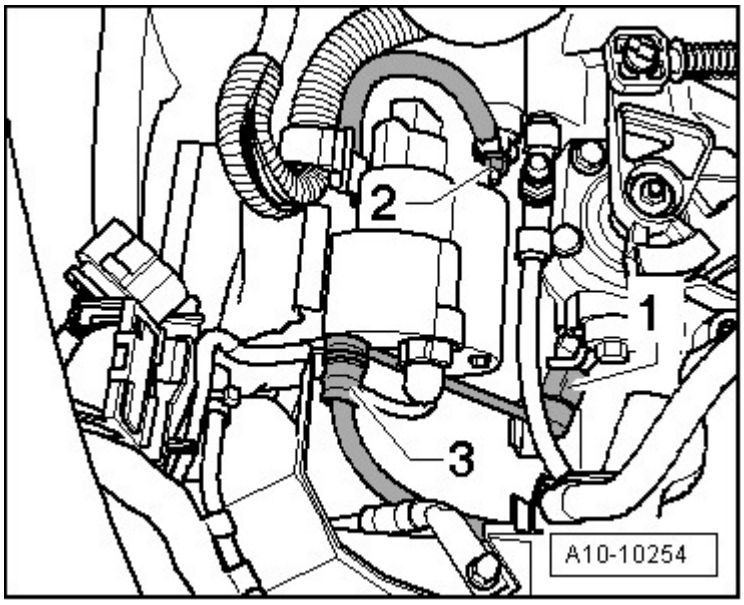

Fig. 24: Backup Light Switch Electrical Connector, Ground Wire And Cover
Courtesy of AUDI OF AMERICA, LLC

-- Remove the ground (GND) cable -2-.

-- Push cover -3- toward rear.

-- Remove the wires -1 and 2- at the starter and free them up.

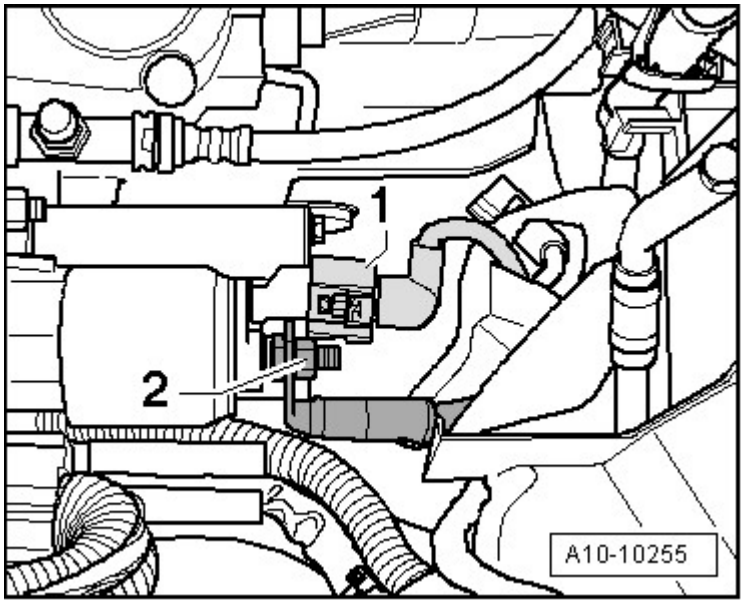

Fig. 25: Starter Wires
Courtesy of AUDI OF AMERICA, LLC

-- Remove the cover from above the battery, by pressing the release buttons -arrows-.

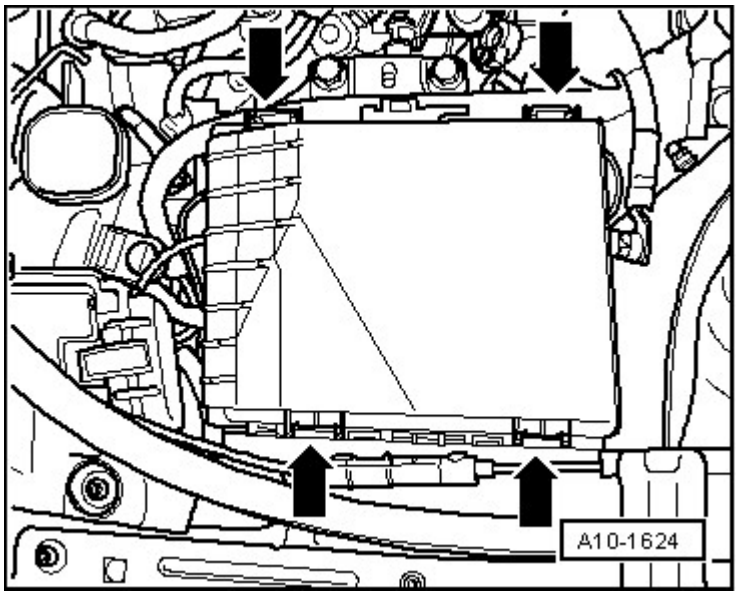

Fig. 26: Battery Cover Release Buttons
Courtesy of AUDI OF AMERICA, LLC

-- Remove the electrical harness -arrow- and free up the wiring to the generator.

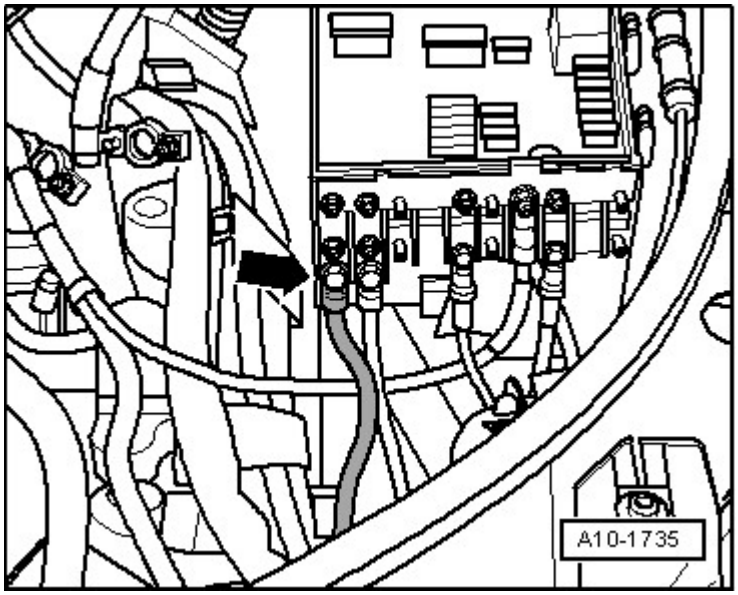

Fig. 27: Generator Wiring
Courtesy of AUDI OF AMERICA, LLC

-- Remove both front wheels.

-- Remove noise insulation. Refer to **Removal and Installation** .

-- Remove the left and right noise insulation fasteners -1 to 3-.

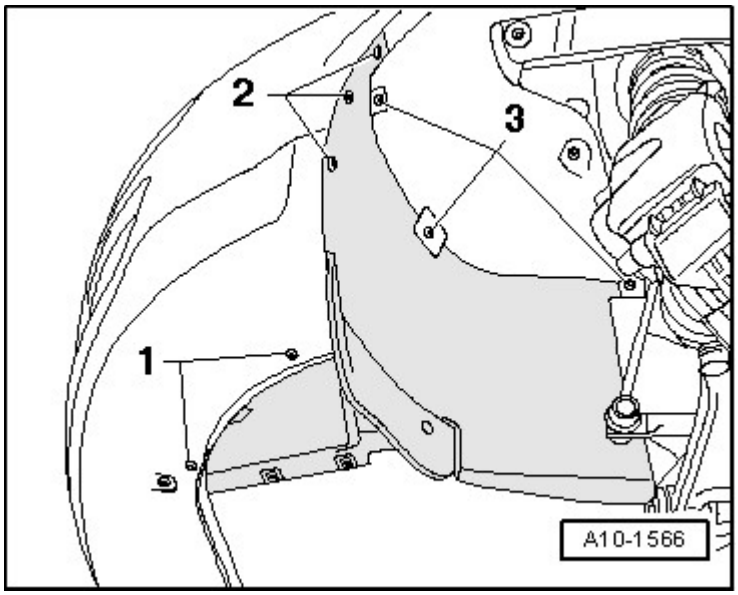

Fig. 28: Identifying Removal Of Left And Right Front Part Of Wheel Housing Liner
Courtesy of AUDI OF AMERICA, LLC

-- Place the VAS 6208 under engine.

-- Drain the coolant, by pulling off the lower coolant hose -arrows-.

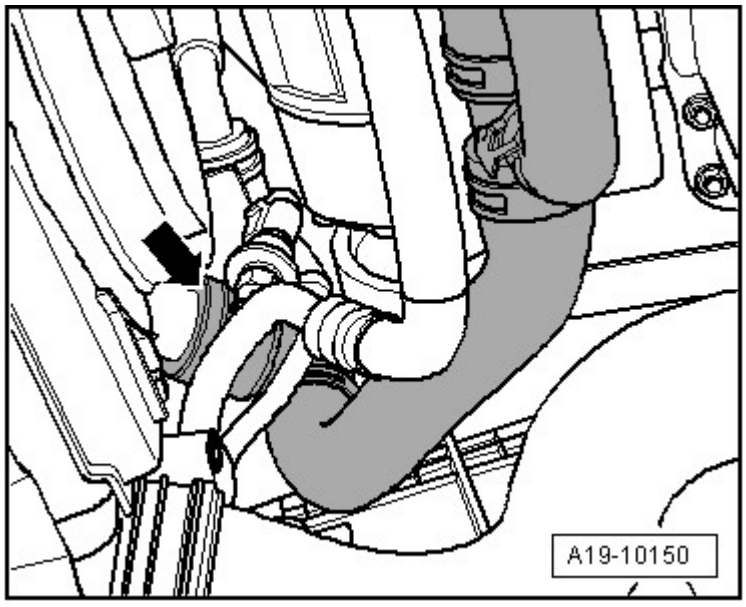

Fig. 29: Identifying Coolant Hose Quick Acting Coupling
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect upper coolant hose from radiator -2-.

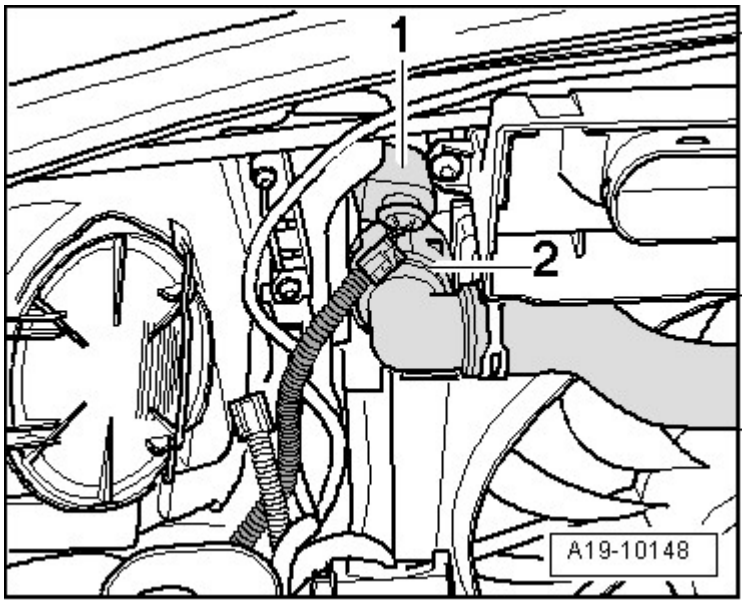

Fig. 30: Radiator Coolant Hose
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect coolant hoses to heat exchanger -arrows-.

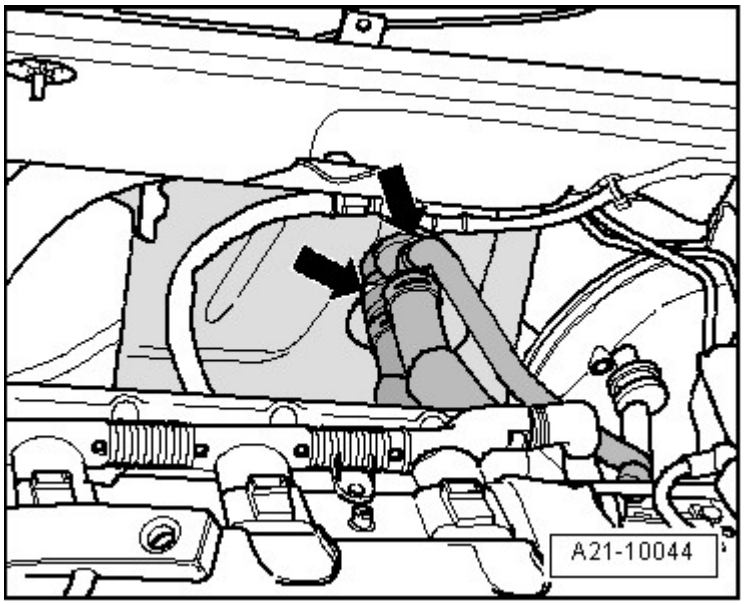

Fig. 31: Disconnecting Coolant Hoses To Heater Core At Bulkhead
Courtesy of AUDI OF AMERICA, LLC

NOTE: The illustration depicts the engine removed from behind.

-- Remove the accessible nuts -arrows- for the front exhaust pipe/turbocharger from above.

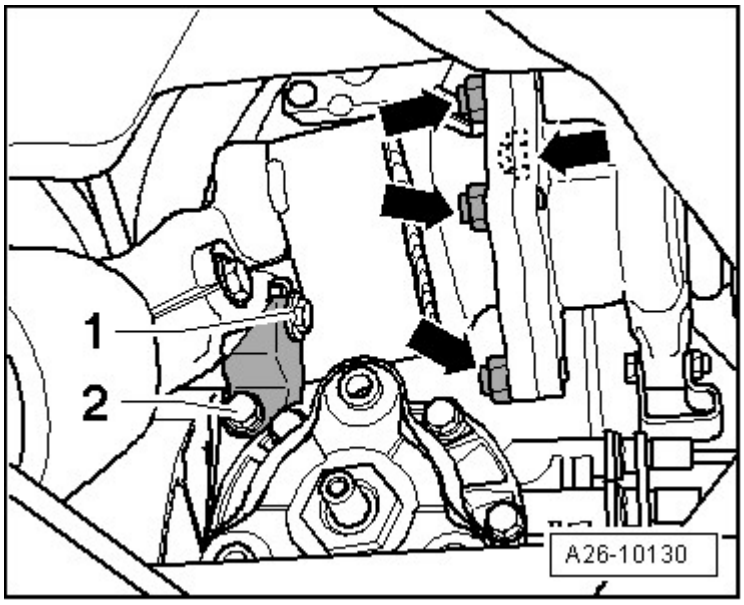

Fig. 32: Front Exhaust Pipe With Catalytic Converter Support Bolts And Font Exhaust Nuts
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect vacuum hose -arrow- from the brake booster.

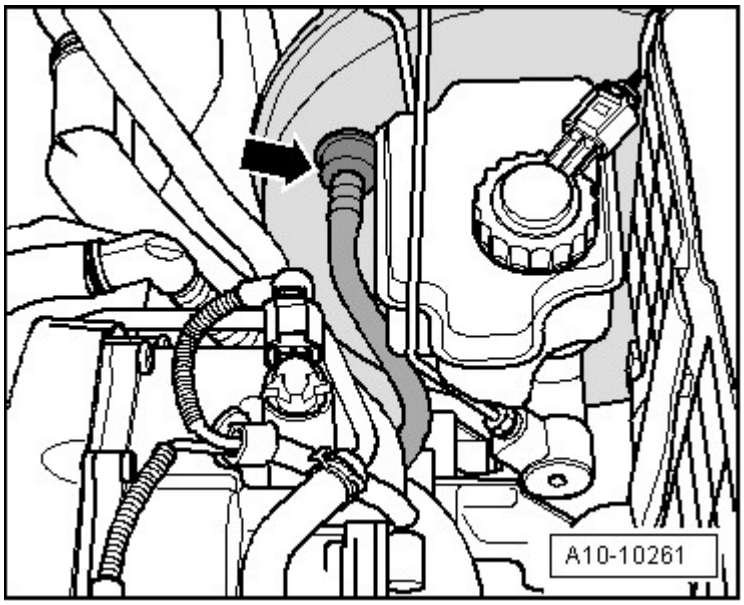

Fig. 33: Brake Booster Vacuum Hose
Courtesy of AUDI OF AMERICA, LLC

-- Unclip the lock washers -1- and -2- at both cables.

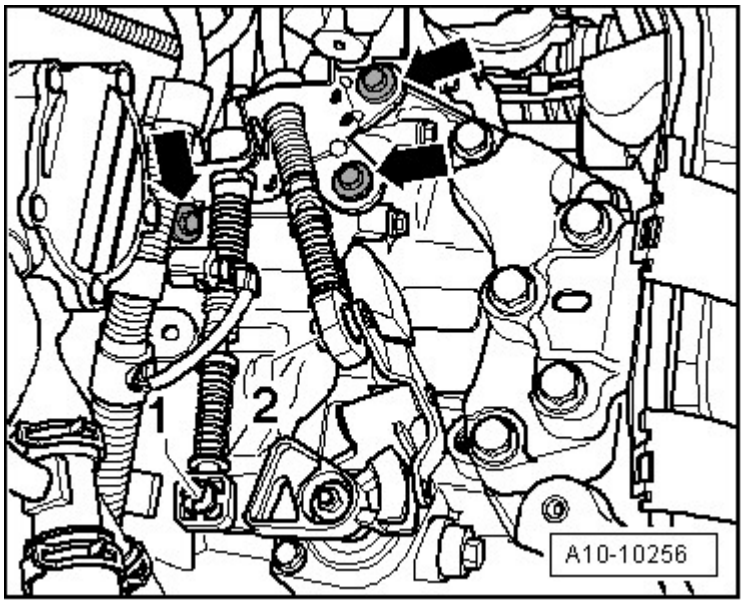

Fig. 34: Transmission Cable Mounting And Lock Washers
Courtesy of AUDI OF AMERICA, LLC

-- Pull off the cable retainers from the transmission selector lever and relay lever.

-- Remove cable mounting bracket from transmission and lay aside -arrows-.

WARNING: Do not operate the clutch pedal anymore after hose for slave cylinder has been disconnected.

-- Pull out clip -2- to the stop in direction of the -arrow- and pull off hose line -1-.

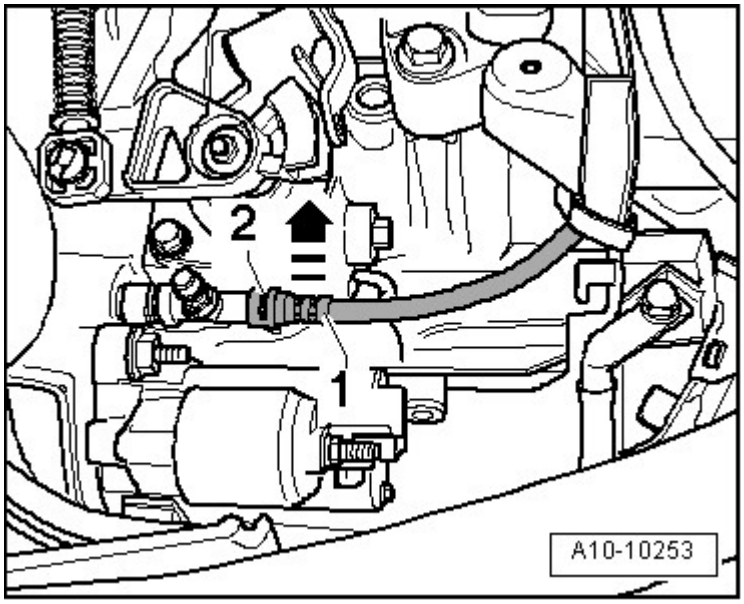

Fig. 35: Pulling Out Clip And Pulling Off Hose Line

Courtesy of AUDI OF AMERICA, LLC

WARNING: The fuel supply line is under pressure. Always wear protective eyewear and protective clothing to prevent injuries and fuel from coming in contact with your skin. Wrap a cloth around the connection before removing a fuel hose. Then release pressure by carefully pulling hose off connection.

-- Mark the fuel line -2- and the EVAP line -1-.

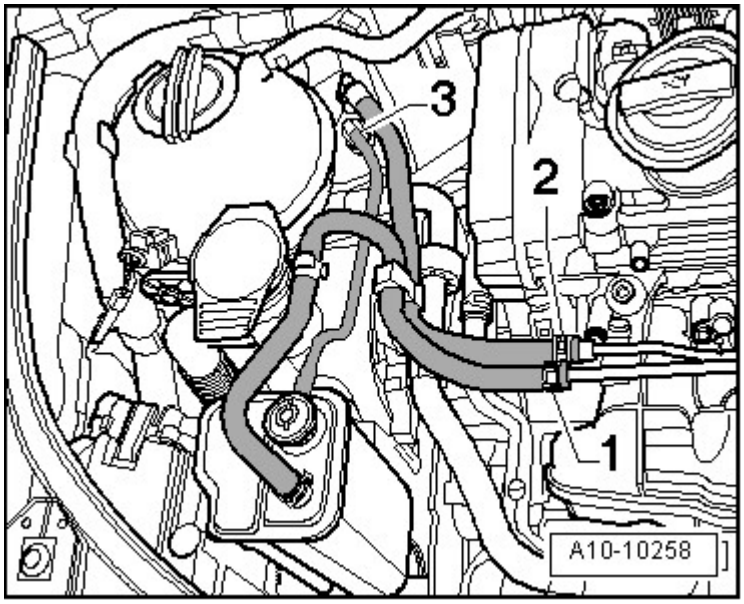

Fig. 36: EVAP Line, Fuel Line And Vacuum Line
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the fuel line -2- and lay it free.

-- Disconnect the EVAP line -1- and lay it free.

-- Disconnect the vacuum line -3- to EVAP canister (press release buttons).

-- Remove EVAP canister upward.

-- Disconnect coolant hoses -1 and 2-.

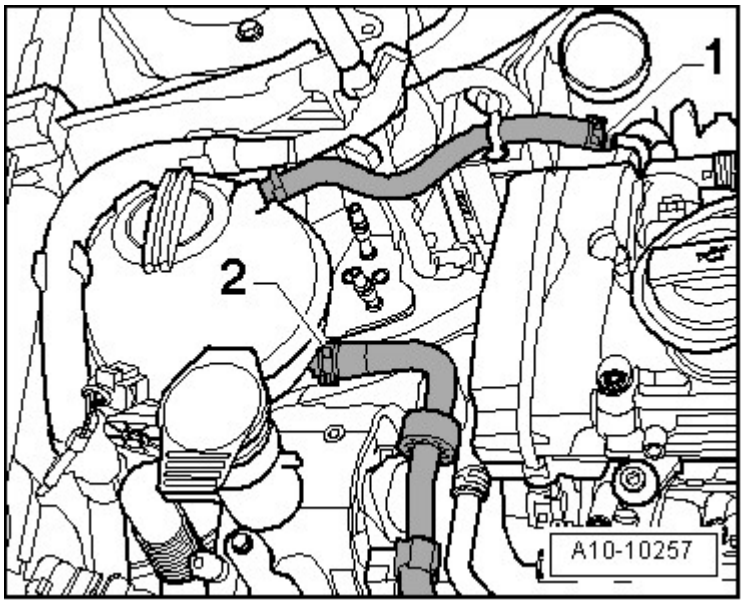

Fig. 37: Coolant Hoses
Courtesy of AUDI OF AMERICA, LLC

-- Discharge the air conditioning system. Refer to **DESCRIPTION AND OPERATION** .

-- Remove A/C line -arrow- from compressor.

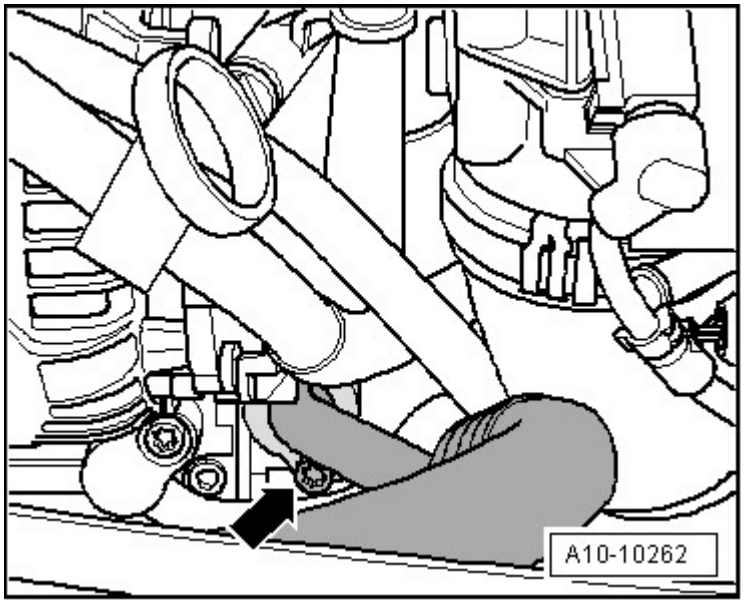

Fig. 38: Compressor Refrigerant Line
Courtesy of AUDI OF AMERICA, LLC

-- Unscrew the bolts -arrows- of the engine mountings approximately 2 turns.

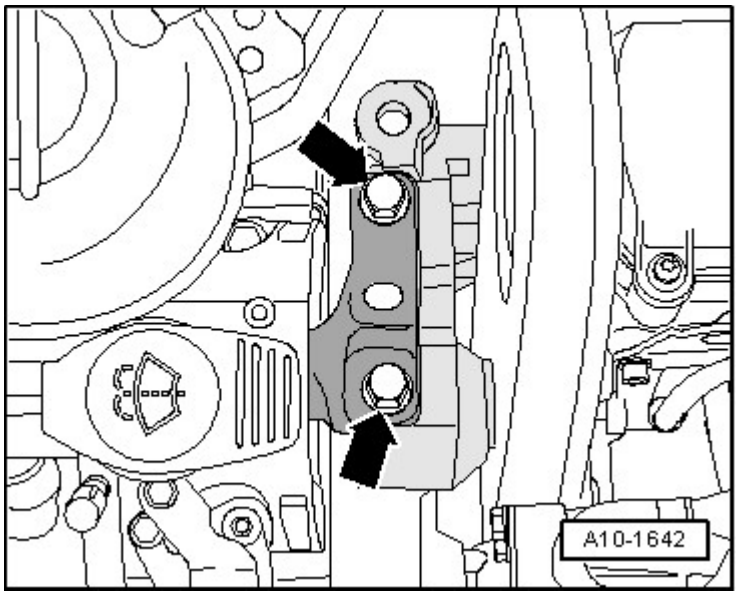

Fig. 39: Engine Mountings Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Unscrew the bolts -arrows- of the transmission mountings approximately 2 turns.

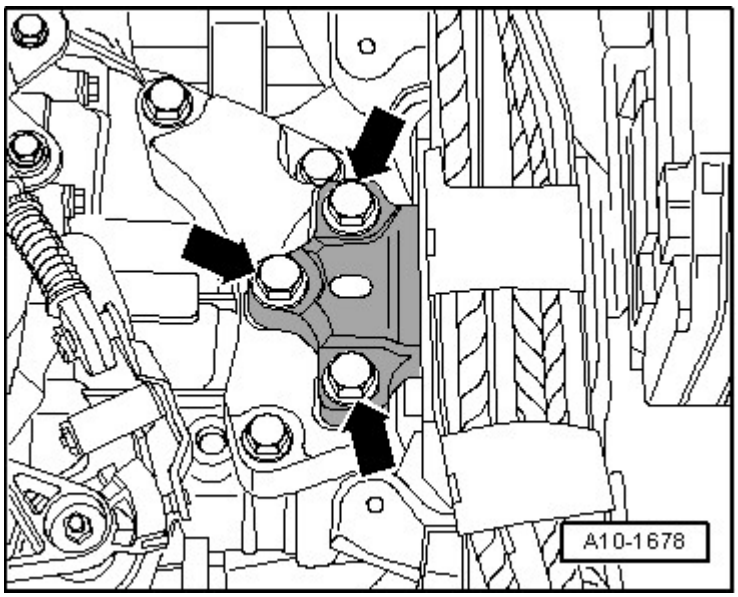

Fig. 40: Identifying Bolts To Assembly Mounting On Transmission
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the electrical connector -1-.

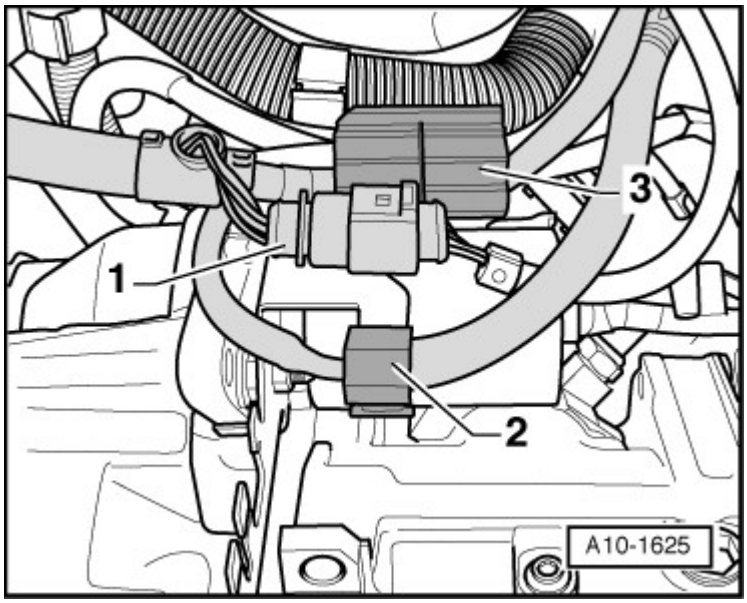

Fig. 41: Cable Retainer And Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

-- Open the cable retainer -2 and 3- and free up the electrical wiring.

-- Remove the bolts -1- from above.

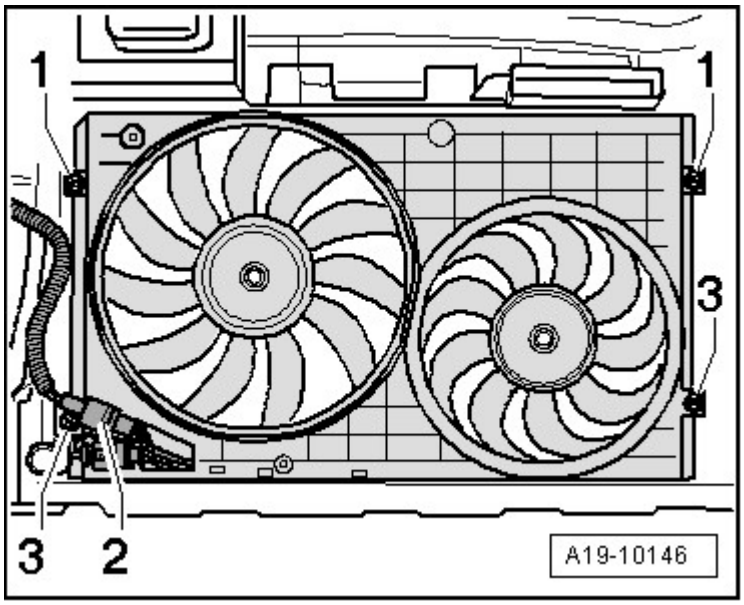

Fig. 42: Fan Shroud Bolts And Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

-- Remove the air duct clamps -1 and 2- for charge air cooler.

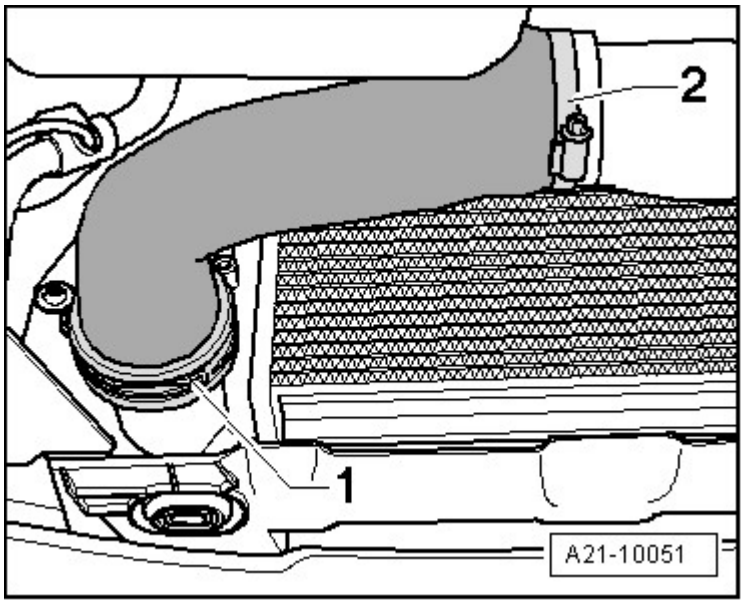

Fig. 43: Air Cooler Air Duct
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connector -2-.

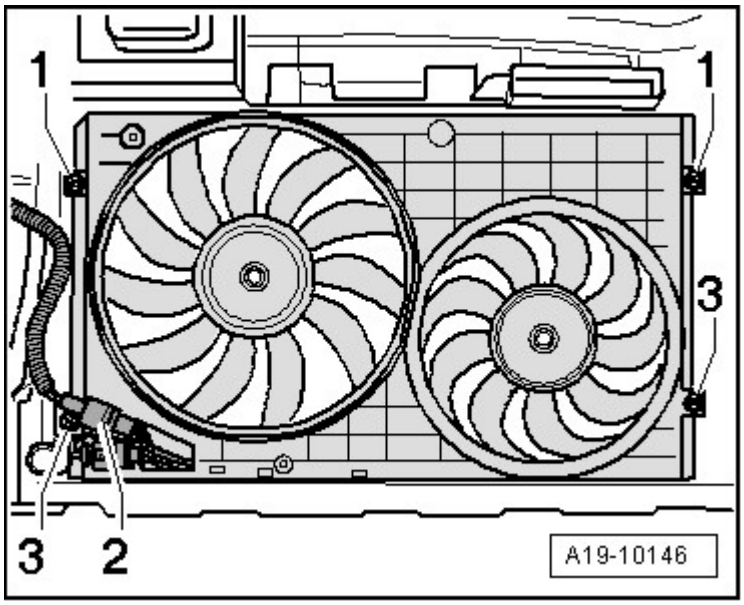

Fig. 44: Fan Shroud Bolts And Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

-- Remove bolts -3- and remove the fan shroud downward and off.

-- Disconnect the connector -1- at left longitudinal member and free up the cable.

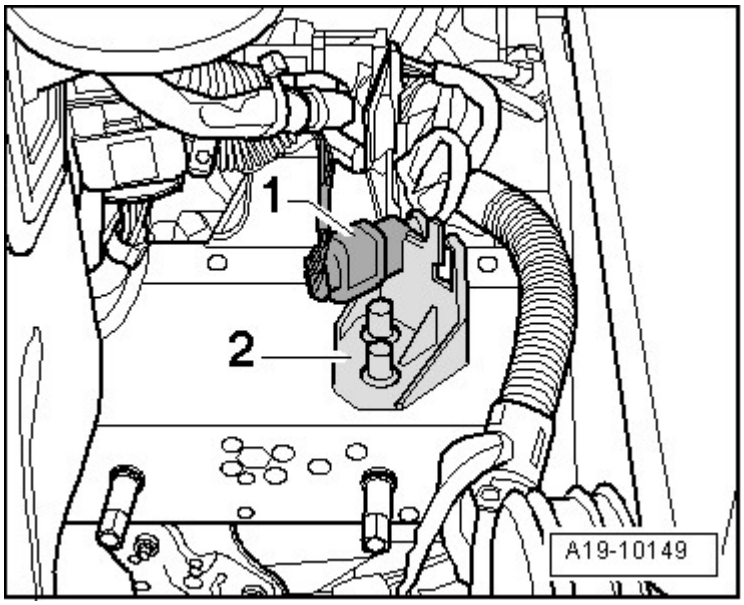

Fig. 45: Connector And Longitudinal Member
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect air guide pipe -arrow- from charge air cooler.

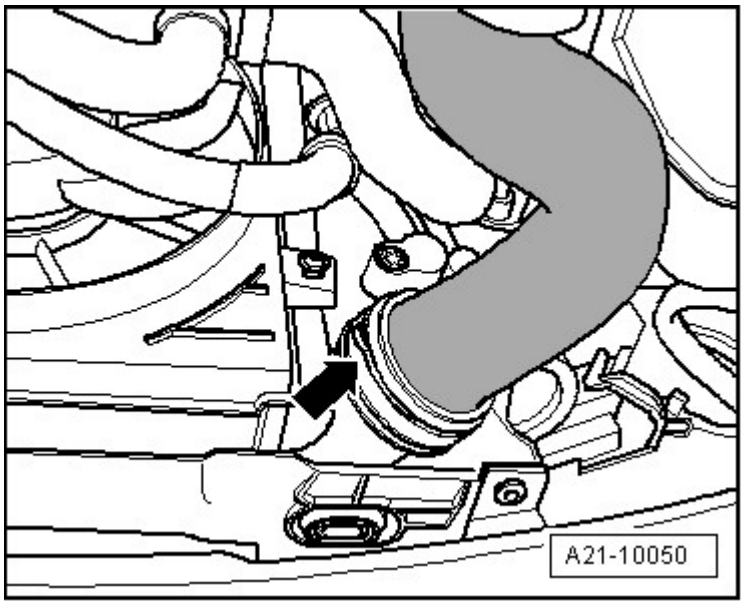

Fig. 46: Charge Air Cooler Air Guide Pipe
Courtesy of AUDI OF AMERICA, LLC

-- Remove the A/C pipe from the condenser -arrow-.

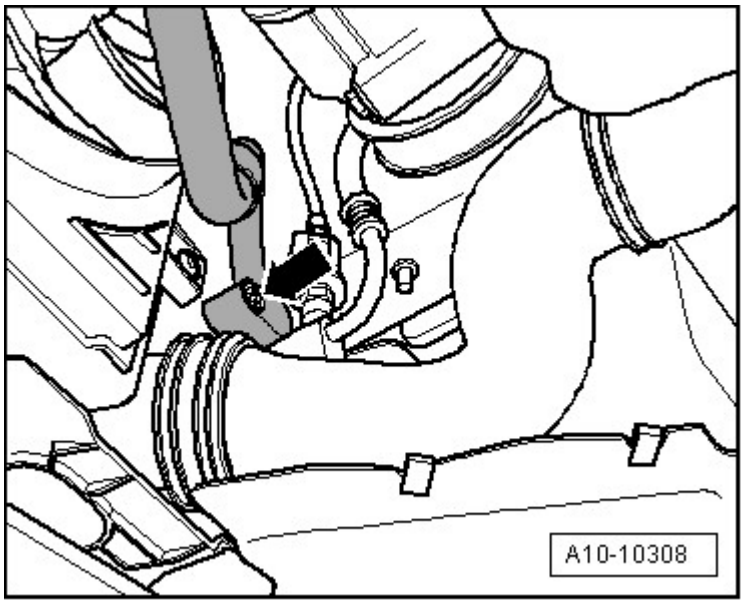

Fig. 47: Condenser Refrigerant Line
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connector from charge air pressure sensor -G31-. Refer to **Description and Operation** .

-- Disconnect the electrical connector on the oil level sensor -1-.

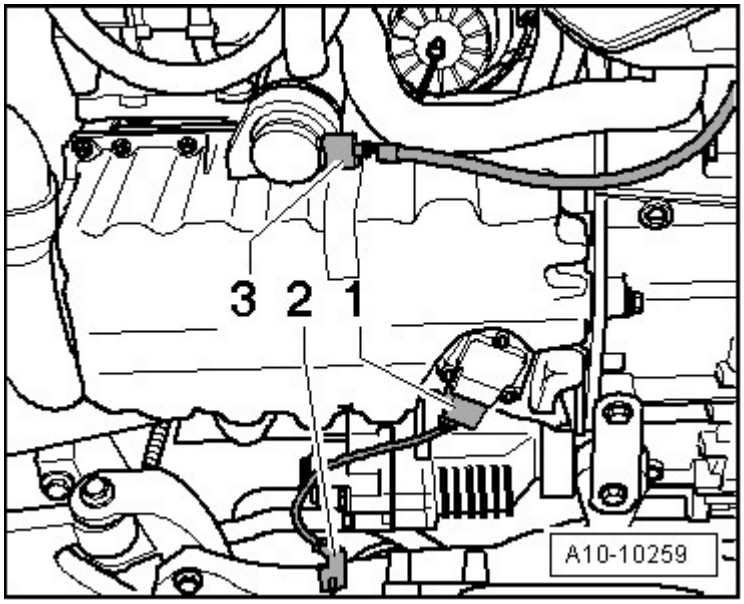

Fig. 48: Oil Level Sensor, Retainer And Coolant Pump Motor
Courtesy of AUDI OF AMERICA, LLC

-- Unclip the retainer -2-.

-- Disconnect the electrical connector on the after-run coolant pump motor -3- and free up the wires.

-- Remove heat shield from above the drive axle with the 3247.

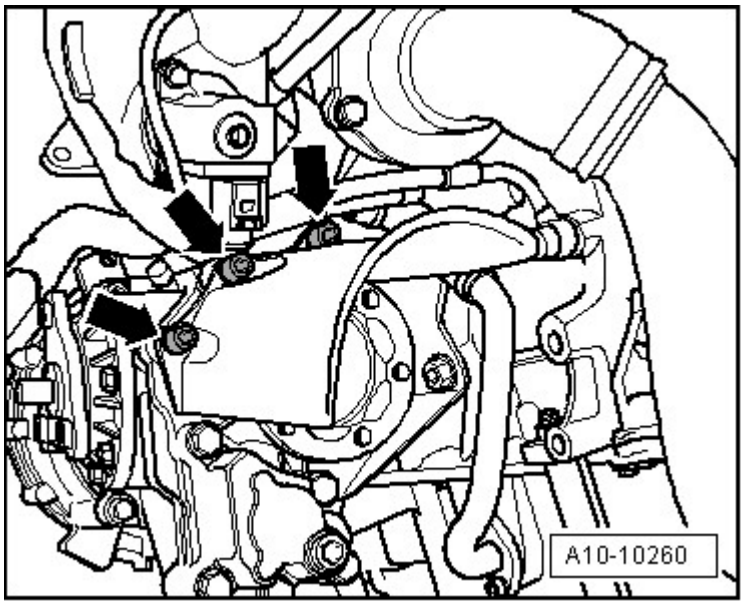

Fig. 49: Drive Axle Heat Shield
Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right drive axles. Refer to **Removal and Installation** .

-- Remove the right vehicle underbody cover -arrows-.

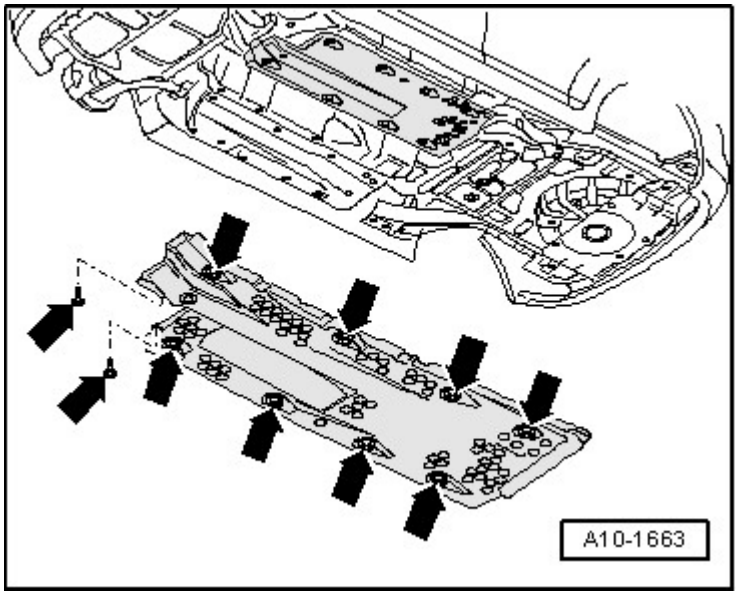

Fig. 50: Identifying Right Vehicle Floor Cover
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the oxygen sensor connector -arrow- after the catalytic converter and free up the wire.

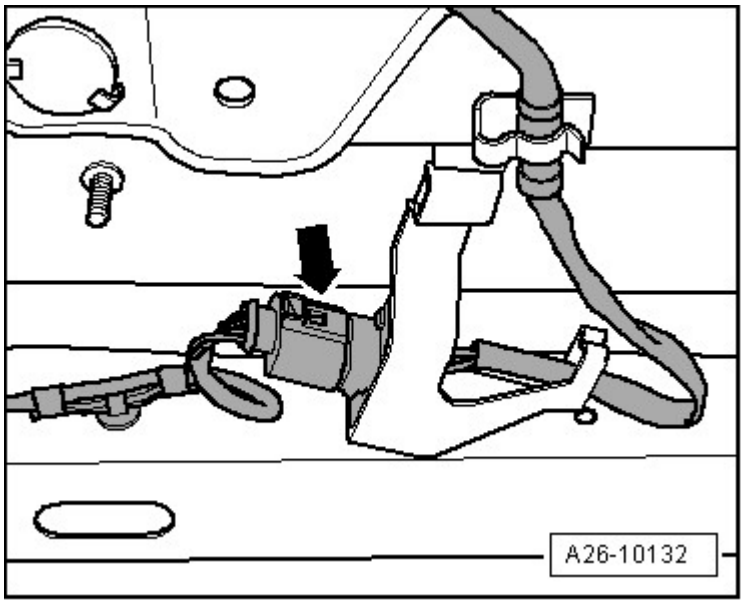

Fig. 51: Disconnecting Connector For Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) G130
Courtesy of AUDI OF AMERICA, LLC

-- Remove the remaining nuts -arrows- for the front exhaust pipe/turbocharger from below.

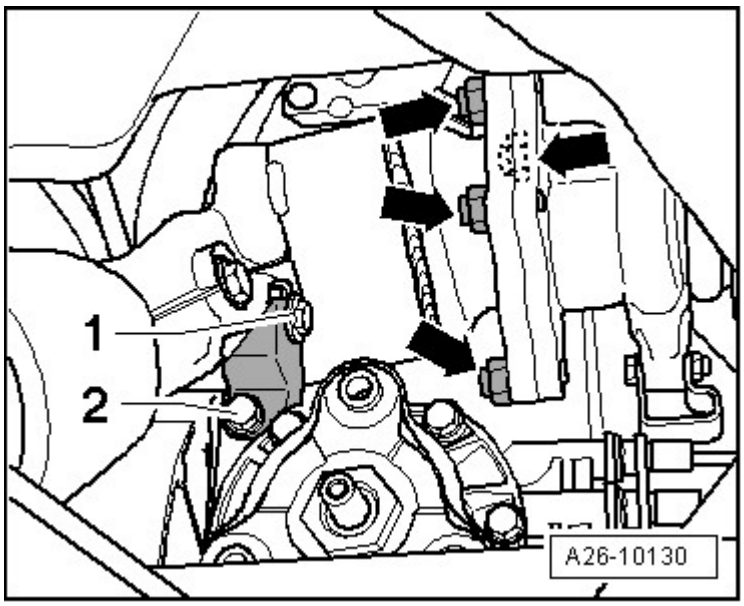

Fig. 52: Front Exhaust Pipe With Catalytic Converter Support Bolts And Font Exhaust Nuts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the supports for front exhaust pipe with catalytic converter, by removing bolts -1 and 2-.

NOTE: Flex joints in front exhaust pipe must not be bent more than 10°, otherwise they may be damaged.

-- Disconnect the exhaust system at the clamping sleeve -arrows-.

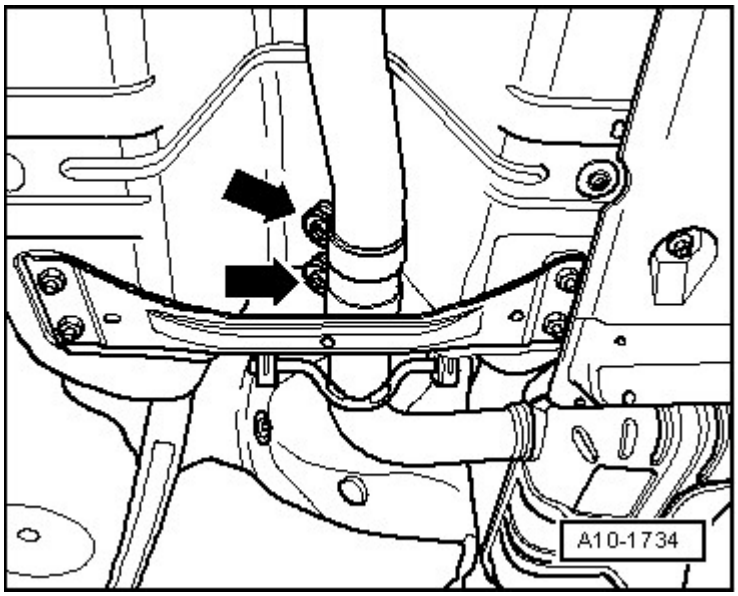

Fig. 53: Disconnecting Exhaust System At Clamping Sleeve
Courtesy of AUDI OF AMERICA, LLC

-- Remove crossmember for vehicle floor -arrows-.

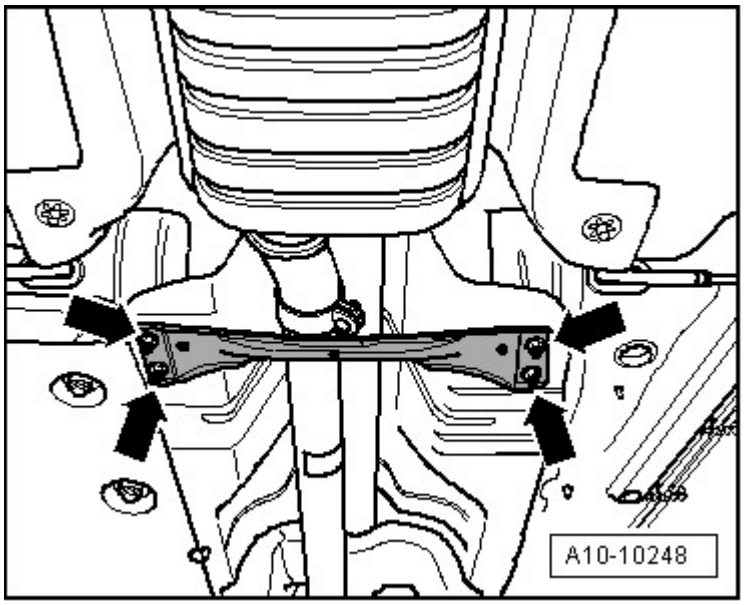

Fig. 54: Front Underbody Cross Member
Courtesy of AUDI OF AMERICA, LLC

-- Remove bracket for exhaust system -arrows-.

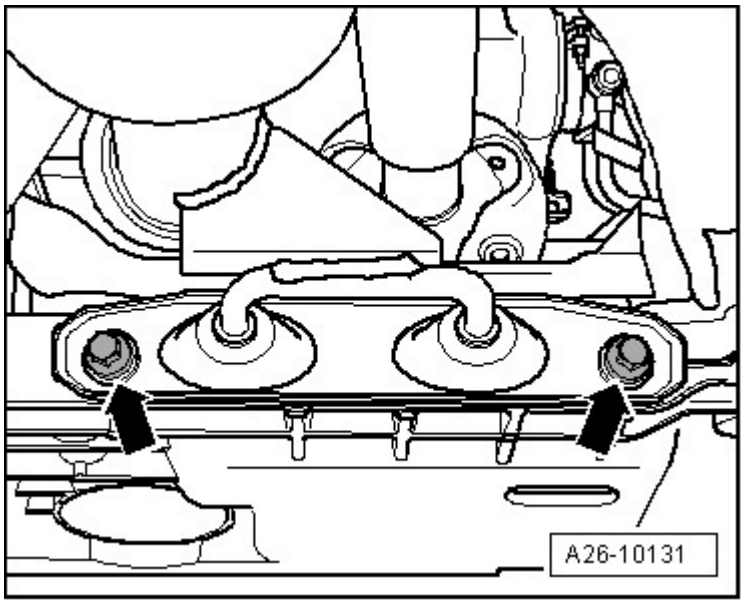

Fig. 55: Exhaust System Bracket
Courtesy of AUDI OF AMERICA, LLC

-- Remove catalytic converter with front exhaust pipe.

-- Remove the bolts -1 to 3- and the pendulum support.

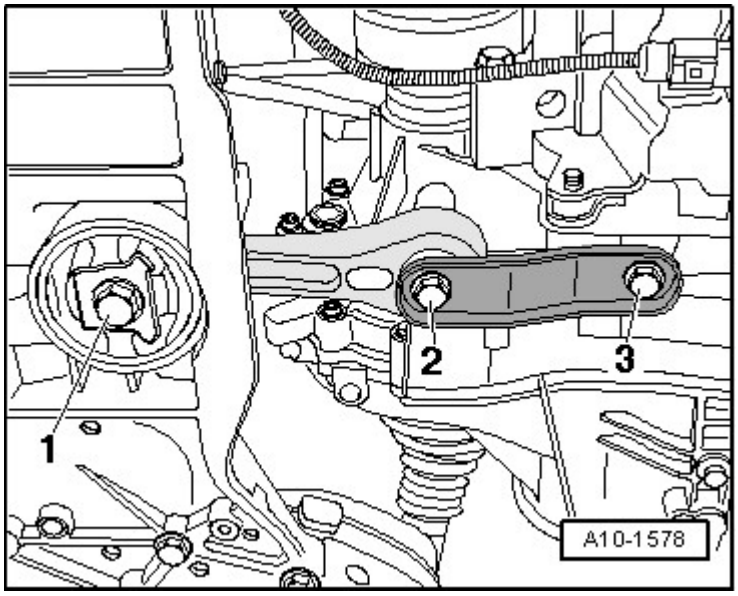

Fig. 56: Identifying Pendulum Support & Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove auxiliary coolant pump -arrows-.

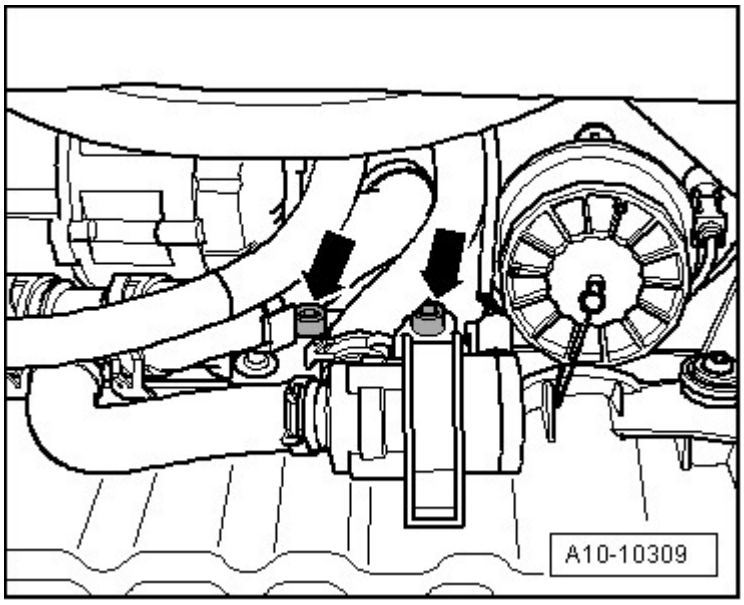

Fig. 57: Auxiliary Coolant Pump Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Attach the T10012 to the cylinder block using the bolt -1- and nut -2- and tighten to approximately 20 Nm.

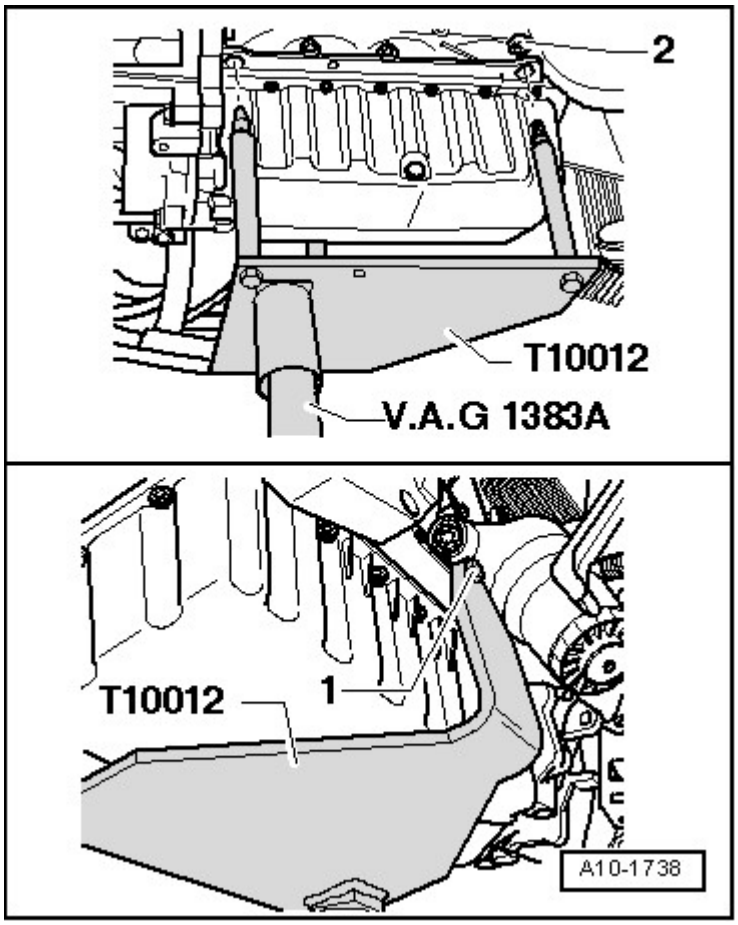

Fig. 58: Attaching Engine Support T10012 On Engine
Courtesy of AUDI OF AMERICA, LLC

-- Insert the V.A.G 1383 A into the T10012 and lift slightly.

NOTE: Use the VAS 5085 to remove bolts for assembly mounting.

-- Remove bolts -arrows- at engine assembly mounting.

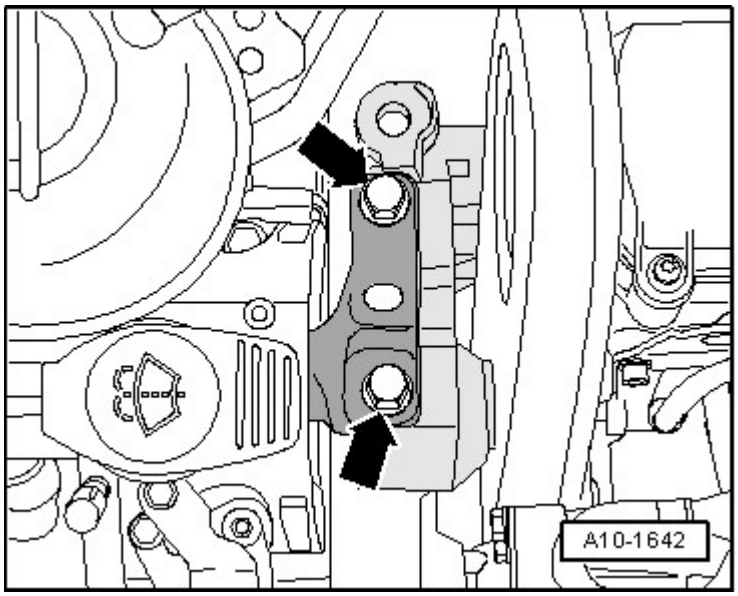

Fig. 59: Engine Mountings Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove bolts -arrows- at transmission assembly mounting.

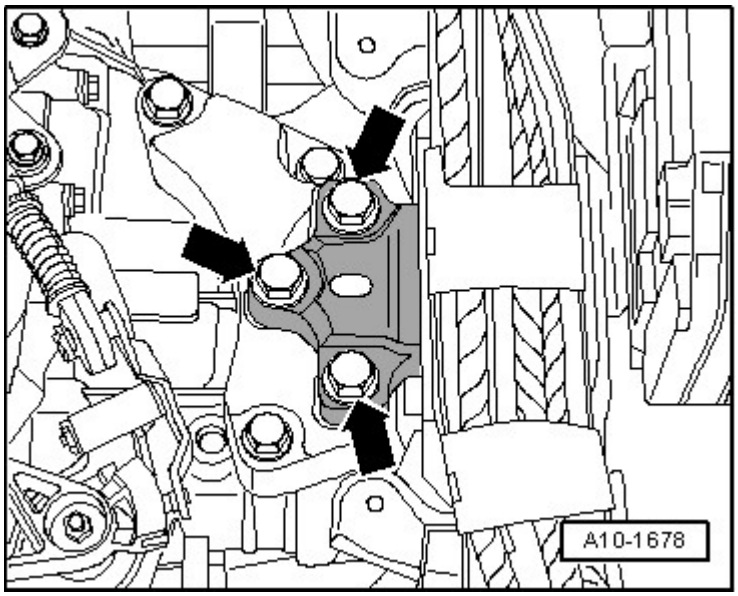

Fig. 60: Identifying Bolts To Assembly Mounting On Transmission
Courtesy of AUDI OF AMERICA, LLC

NOTE: Verify that all hose and line connections between engine, transmission and body have been disconnected.

While lowering, carefully guide engine/transmission assembly in order to prevent damages.

-- Pull engine/transmission assembly as far forward as possible and slowly lower it.

ENGINE AND TRANSMISSION, SEPARATING

- Engine/transmission assembly removed and mounted on engine/transmission support T10012.

-- Remove the bolt -1- from mounted transmission.

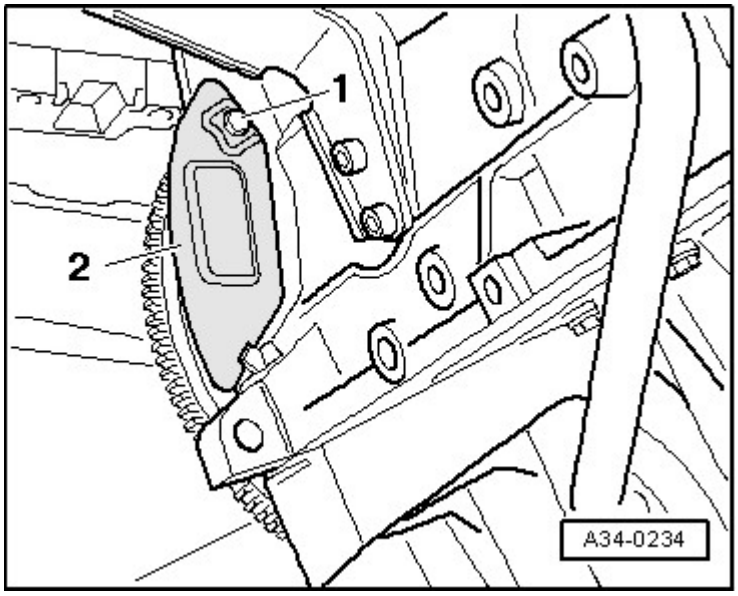

Fig. 61: Removing/Installing Bolt & Small Cover Plate
Courtesy of AUDI OF AMERICA, LLC

-- Remove the shield -2- upward and out.

NOTE: Shown in the illustration with transmission removed.

-- Remove bolts -1 through 8- at engine/transmission flange.

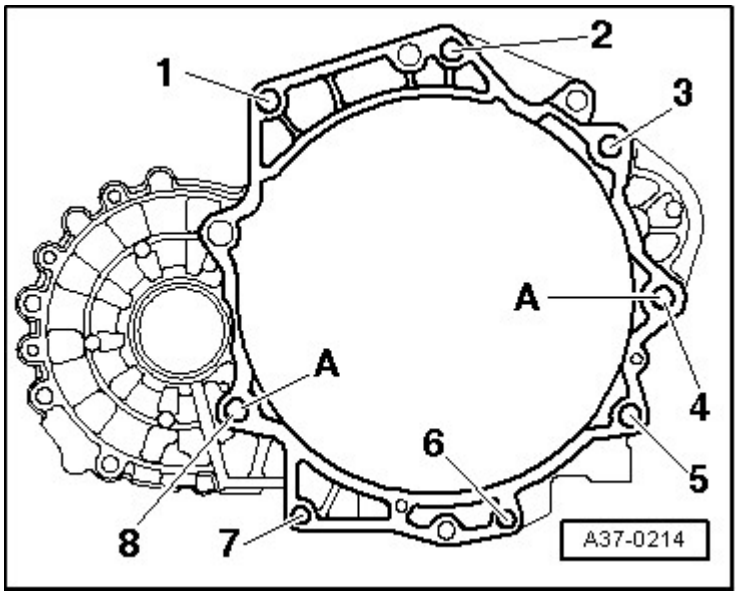

Fig. 62: Removing Bolts On Engine/Transmission Flange
Courtesy of AUDI OF AMERICA, LLC

-- Remove the starter.

NOTE: The manual transmission can be pulled off from the engine without the use of the shop crane; the assistance of a second technician is required.

-- Pull transmission off from engine.

ENGINE, INSTALLING

- Engine mounted on engine/transmission support T10012.

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

NOTE: During installation, all cable ties must be re-installed at the same location.

Secure all hose connections using hose clamps appropriate for the model type.

During assembly, replace self-locking nuts and bolts.

Always replace bolts that are tightened to torque as well as O-rings and gaskets.

Clean input shaft splines and (in case of used clutch plates) clean hub splines, remove corrosion and apply only a very thin coating of lubricant on splines. Then move the clutch plate back and forth on the input shaft, until the hub can be easily moved on the shaft. Remove all excess grease.

-- Make sure alignment sleeves for engine to transmission are installed in cylinder block. Install if necessary.

-- Make sure that the intermediate plate is hooked in at the sealing flange and is pushed onto the alignment sleeves -arrows-.

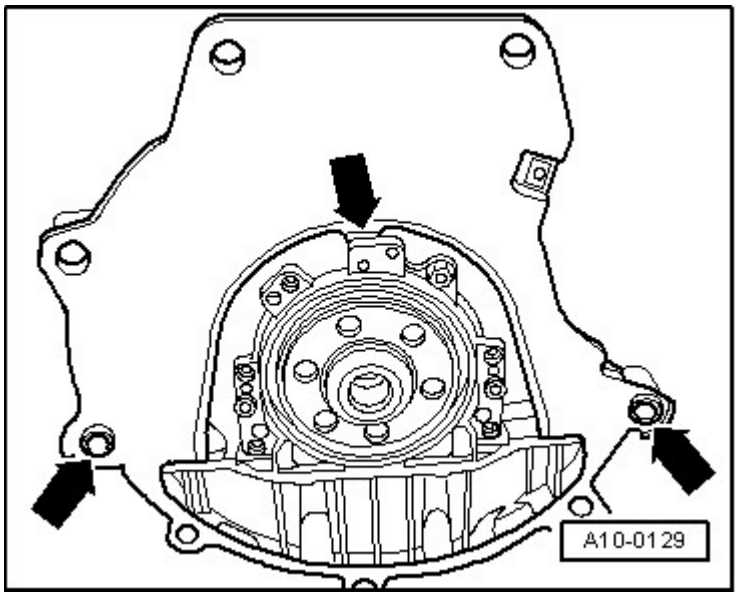

Fig. 63: Identifying Intermediate Plate Alignment Bushings
Courtesy of AUDI OF AMERICA, LLC

-- Check clutch release bearing for wear and replace if necessary.

-- Bolt transmission to engine.

NOTE: **Tightening specifications only apply to lightly greased, oiled, phosphate or blackened nuts and bolts.**

Additional lubricants, such as engine or transmission oil are permissible, although lubricants containing graphite are not.

Do not use any degreased parts.

Tolerance for tightening specifications 15%.

Securing the engine/transmission

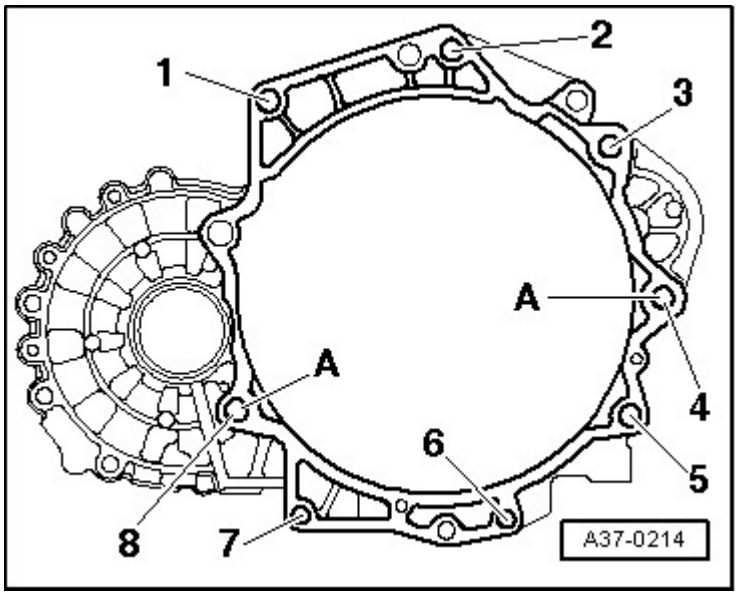

Fig. 64: Removing Bolts On Engine/Transmission Flange
Courtesy of AUDI OF AMERICA, LLC

Item	Bolt	Nm
1, 2	M12 X 65	80
3 [1], 4 [1]	M12 X 135	80
5 through 7	M10 X 60	40
8	M12 X 90	65

- [1] Bolt with threaded pin M8
- A: Alignment bushings for centering

-- Push the cover plate -2- in so that the lower tab hooks in at the cylinder block, and fasten it at the top with the bolt -1-.

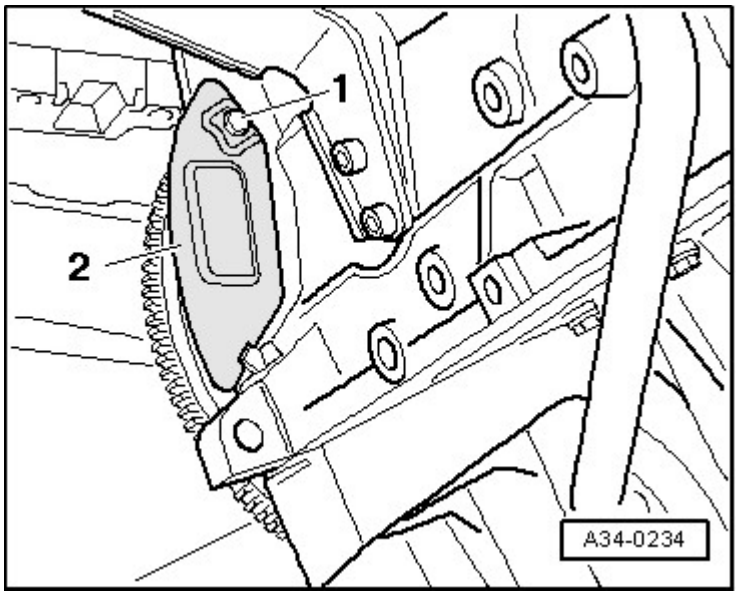

Fig. 65: Removing/Installing Bolt & Small Cover Plate
Courtesy of AUDI OF AMERICA, LLC

NOTE: Shown in the illustration with transmission removed.

-- Guide the engine/transmission assembly into the body.

-- Hand-tighten the bolts -arrows- at engine assembly mounting.

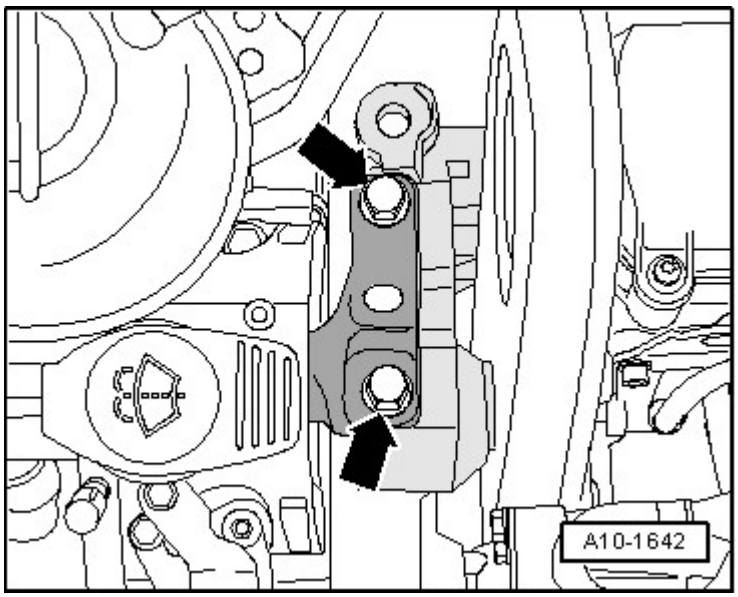

Fig. 66: Engine Mountings Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Hand-tighten the bolts -arrows- at transmission assembly mounting.

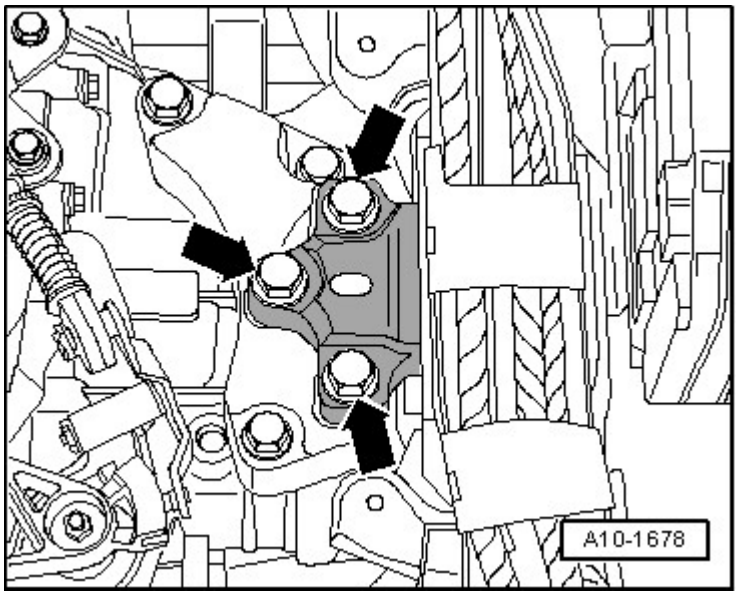

Fig. 67: Identifying Bolts To Assembly Mounting On Transmission
Courtesy of AUDI OF AMERICA, LLC

-- Secure with new bolts.

NOTE: The bolts are first tightened to final torque after the engine mounts have been adjusted. Refer to SUBFRAME MOUNT, ADJUSTING.

-- Remove the T10012 from engine.

-- Fasten the pendulum supports to the transmission and subframe -1 to 3-.

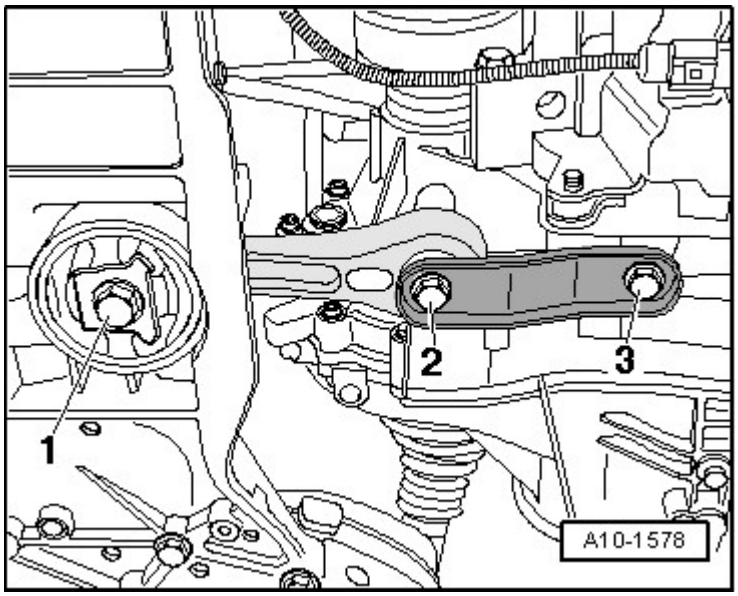

Fig. 68: Identifying Pendulum Support & Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Install the drive axles. Refer to **Removal and Installation** .

-- Install exhaust system and align it free of tension. Refer to **EXHAUST SYSTEM, ALIGNING** .

-- Fill the refrigerant circuit. Refer to **Description and Operation** .

-- Install the shift mechanism on the transmission and adjust. Refer to **REMOVAL AND INSTALLATION** or **REMOVAL AND INSTALLATION** .

-- Install engine control module (ECM). Refer to **Removal and Installation** .

-- Adjust the engine mounts. Refer to **SUBFRAME MOUNT, ADJUSTING**.

-- Electrical connections and routing. Refer to the appropriate System Wiring Diagram information.

-- Install air guide pipes and connector. Refer to **HOSE CONNECTIONS WITH CONNECTOR COUPLINGS** .

-- Install wiper arm. Refer to **REMOVAL AND INSTALLATION** .

-- Install the battery. Refer to **REMOVAL AND INSTALLATION** .

-- Install fuel system. Refer to **Removal and Installation** .

-- Check oil level.

-- Fill with coolant. Refer to **COOLING SYSTEM, DRAINING AND FILLING** .

NOTE: Only reuse drained coolant if cylinder head or engine block was not replaced.

Dirty coolant may not be used again.

WARNING: Do not use a battery charger for starting assistance! There is the risk that the vehicle control modules could be damaged.

Tightening Specification

Component		Nm
Bolts/nuts	M6	10
	M8	20
	M10	45
	M12	65
Exceptions:		
Pendulum supports to transmission		40 + 90° 1)2)

Pendulum supports to subframe	100 + 90° 1)2)
Clamp B+ to starter	16
Ground (GND) cable to transmission	23

- 1) Replace bolt.
- 2) 90° corresponds to a quarter turn.

SPECIAL TOOLS

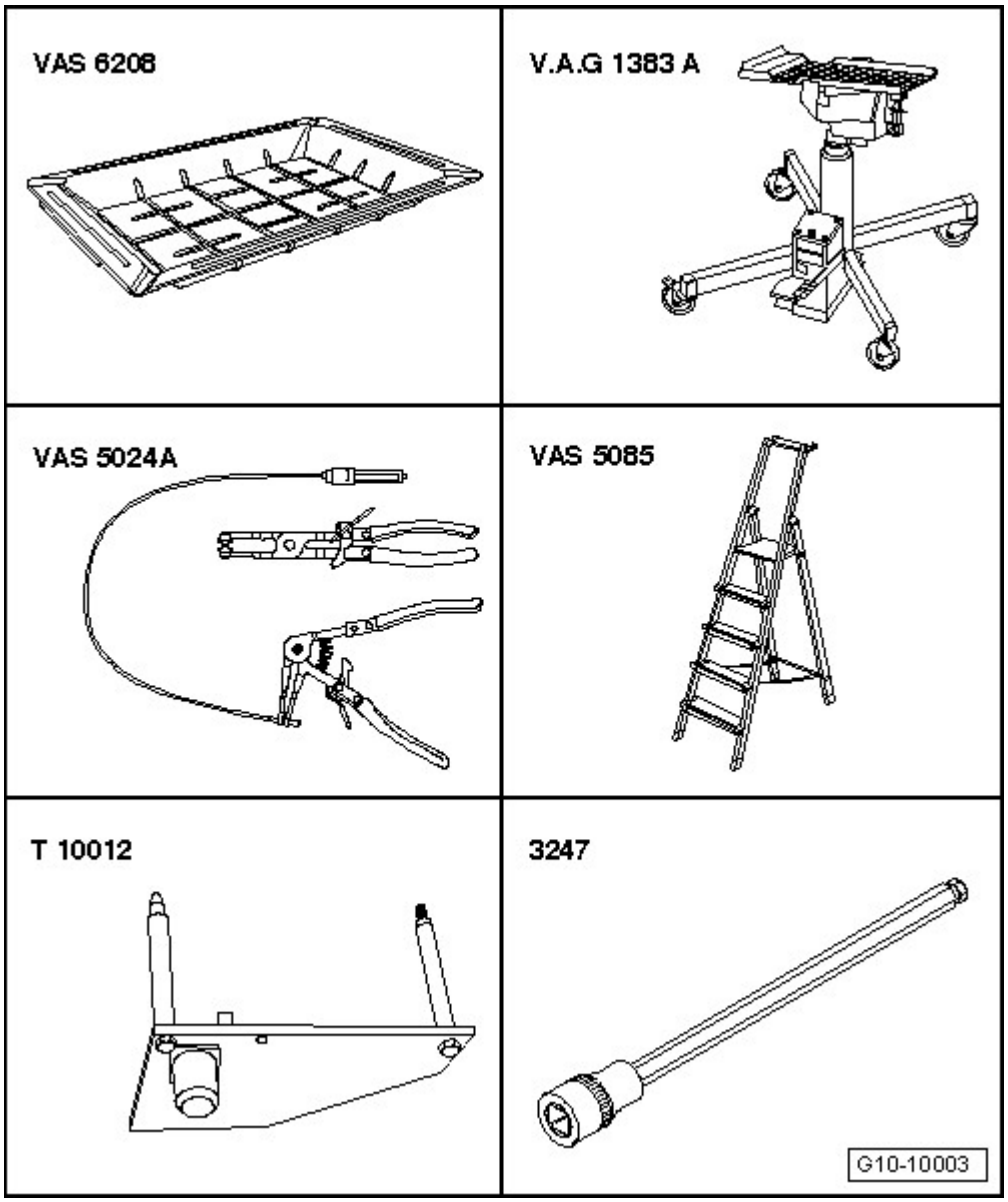

Fig. 69: Engine Removing - Special Tools
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Drip Tray VAS 6208
- Engine/Transmission Jack V.A.G 1383 A
- Spring Type Clip Pliers VAS 5024A
- Step Ladder VAS 5085
- Engine/Transmission Support T10012
- Hex Ball Socket 3247

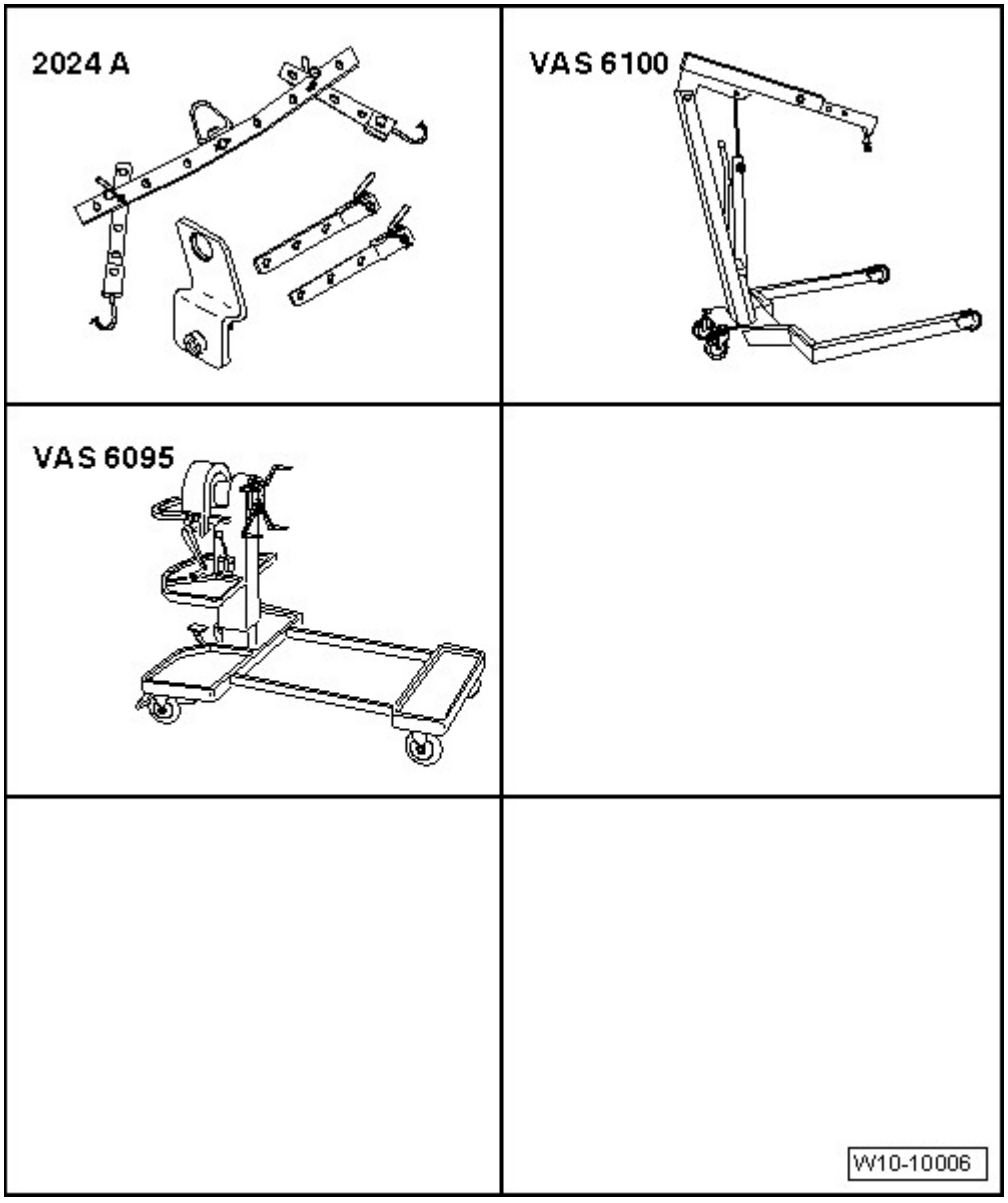

Fig. 70: Identifying Special Tools -- Engine, Securing To Assembly Stand
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Engine Sling 2024 A

- Shop Crane VAS 6100
- Engine and Transmission Holder VAS 6095

Special tools and workshop equipment required

- Engine Support Bridge 10 - 222 A

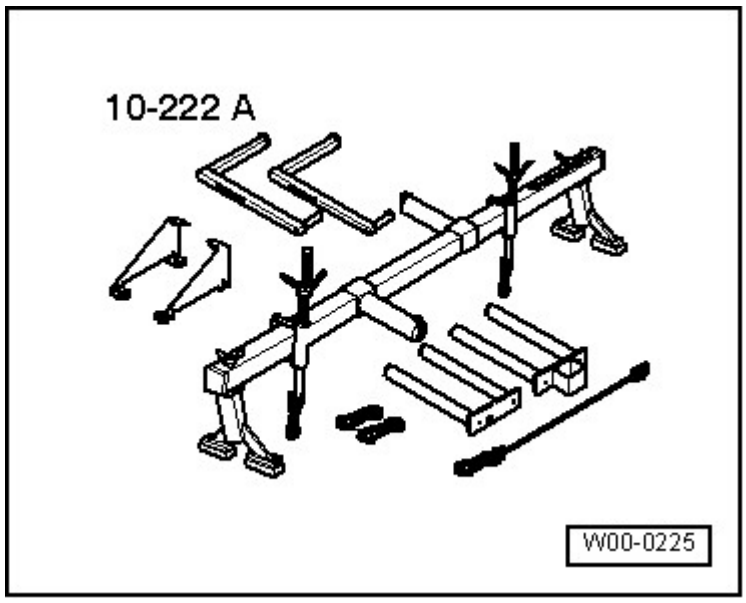

Fig. 71: Engine Support Bridge 10 - 222 A
Courtesy of AUDI OF AMERICA, LLC

- Engine Bung Set VAS 6122

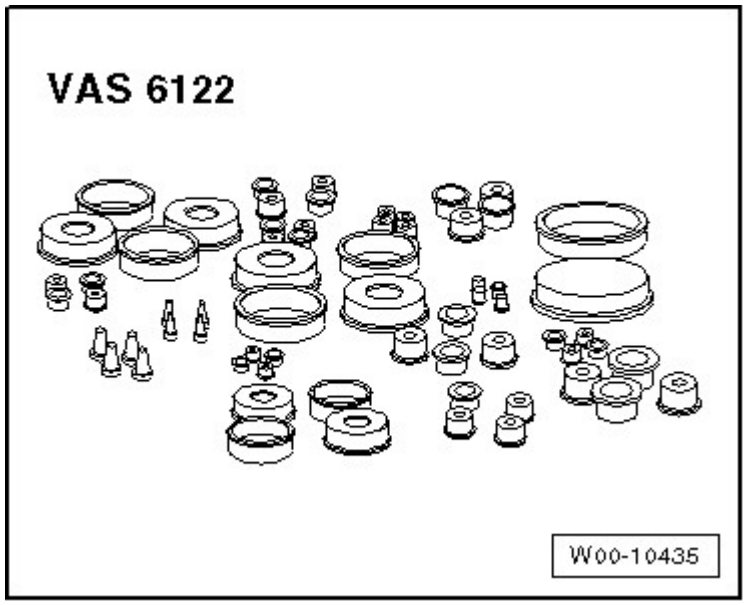

Fig. 72: Engine Bung Set Plugs VAS 6122

Courtesy of AUDI OF AMERICA, LLC

- Not illustrated:
- Shackles 10 - 222 A /12

