ENGINE

2.0 Liter - General, Technical Data - Engine Mechanical - Engine Code(s): CBFA & CCTA

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.

- **Before opening high pressure area of the fuel injection system, fuel pressure must be relieved to residual pressure.**
- **To reduce remaining residual pressure, lay 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 the connectors were disconnected and the engine was started, then the following faults were stored in the engine control modules: generate readiness code in guided functions vehicle diagnosis tester.

CAUTION: Risk of destroying electrical components when battery is disconnected.

- **Observe measures when disconnecting battery.**
- **Only disconnect battery with ignition switched off.**

-- Disconnect 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.

- **When the engine is warm the cooling system is under pressure.**
- **To reduce pressure, cover coolant reservoir cap with cloth and carefully open.**

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

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

When working on a vehicle with the Start/Stop System, note the following:

WARNING: Danger of serious personal injury if the engine starts automatically on vehicles with the Start/Stop System.

- **If the Start/Stop System is activated (message in the instrument cluster), the engine can start automatically.**
- **Make sure the Start/Stop System is deactivated whenever working on the vehicle. Switch off the ignition and switch it on only when necessary.**

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.
- Install only clean parts: remove the replacement parts from their packaging just before installing them. 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.
- Protect disconnected electrical connectors from dirt and moisture and only connect if dry.

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.

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.

ROUTING AND SECURING LINES

- 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, INSTALLING

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.

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.

SPECIFICATIONS

ENGINE DATA

Engine Code		CBFA	CCTA
Displacement	liter	1.984	1.984
Output	kW at RPM	147/5000	147/5000
Torque	Nm at RPM	280/1700	280/1700
Bore	dia. mm	82.5	82.5
Stroke	mm	92.8	92.8
Compression ratio		10.3	9.6
RON		98 1)	98 1)
Fuel injection and ignition system		FSI	FSI
Ignition sequence		1-3-4-2	1-3-4-2
Knock control		yes	yes
Turbocharger		yes	yes
Exhaust gas recirculation		no	no
Variable intake manifold		no	no
Variable valve timing		yes	yes
Secondary air injection (AIR)		yes	no

- 1) Unleaded RON 95 is also permissible, although with reduced power.
- 2) Unleaded RON 91 is also permissible, although with reduced power.

DIAGNOSIS AND TESTING

FUEL SYSTEM LEAK TEST

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

-- Switch off 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 and 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

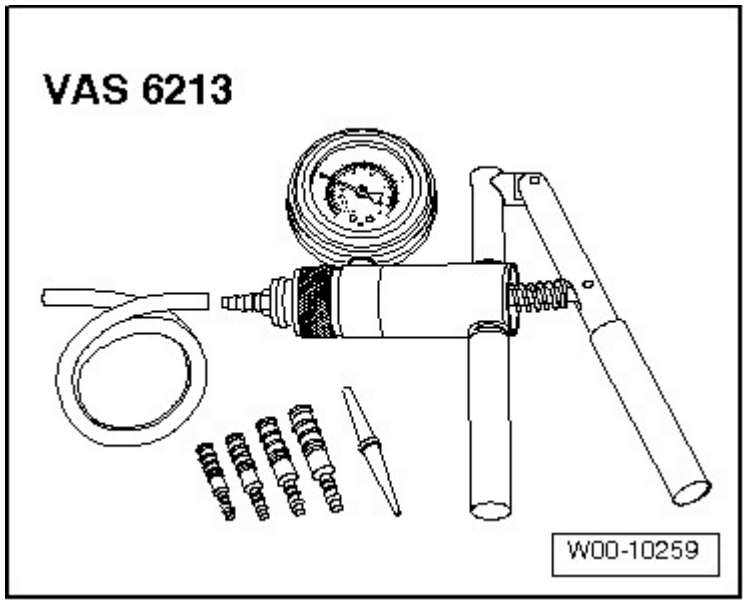

Fig. 1: Hand Vacuum Pump VAS 6213
Courtesy of AUDI OF AMERICA, LLC

Engine

2.0 Liter - Crankshaft, Cylinder Block - Engine Code(s): CBFA & CCTA

13 CRANKSHAFT, CYLINDER BLOCK

GENERAL INFORMATION

CRANKSHAFT BEARING SHELLS ALLOCATION

The bearing shells are allocated to the cylinder block with the correct thickness at the factory. Colored spots serve to identify the bearing thicknesses.

The code letters on the lower contact surface or on the top of the cylinder block identify which bearing shell and where it must be mounted on the cylinder block (upper bearing shell).

The code letters on the crankshaft identify which bearing shells and where they must be installed in the bearing cover (lower bearing shell).

The first letter is for bearing cover one, the second for bearing cover two, etc.

Cylinder block bearing shell identification:

NOTE: The cylinder block identification may be located either on the oil pan sealing surface or on the top (transmission side) of the cylinder block.

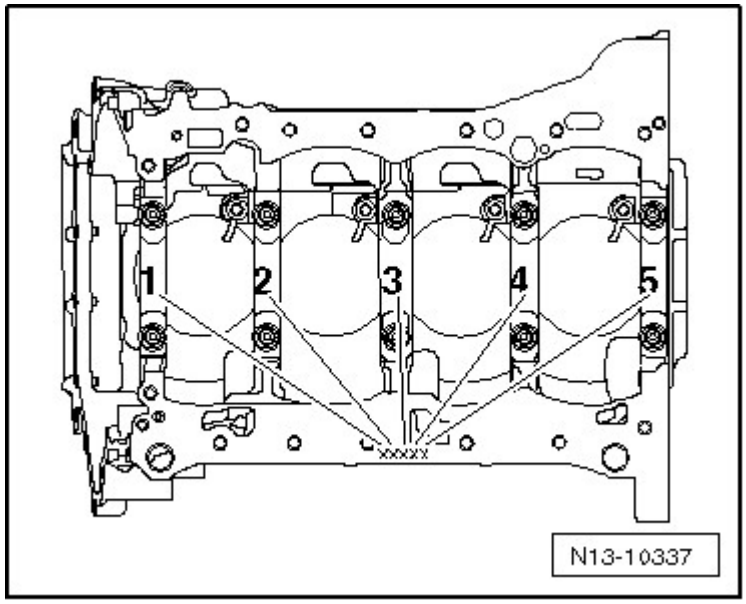

Fig. 1: Locating Cylinder Block Identification On Top (Transmission Side) Of Cylinder Block
Courtesy of AUDI OF AMERICA, LLC

The identification on the cylinder block is for the upper bearing shell.

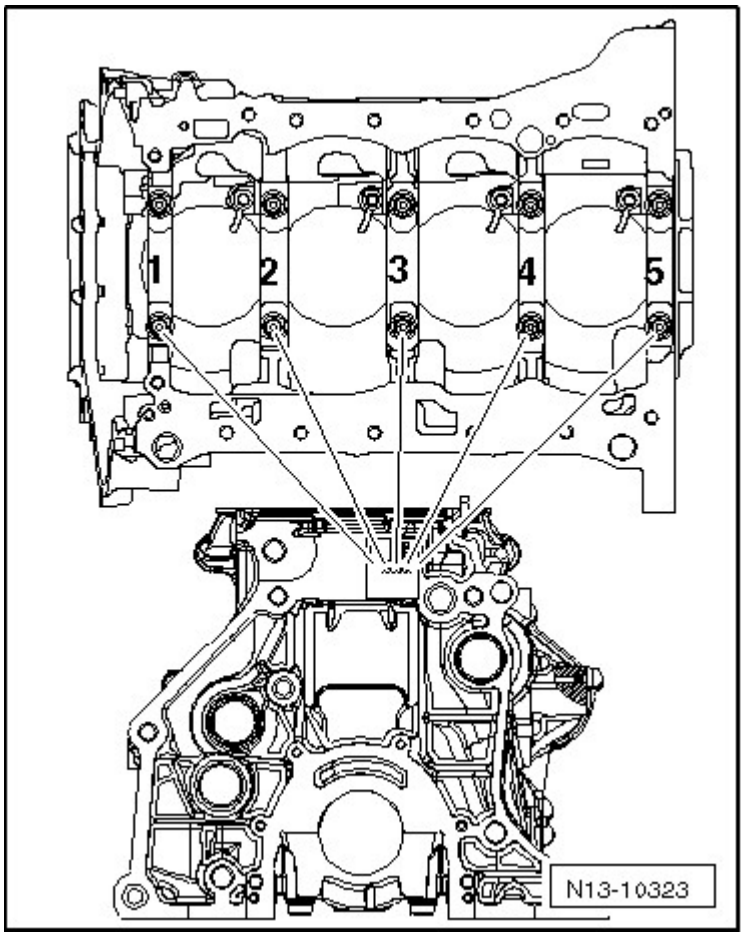

Fig. 2: Locating Identification On Cylinder Block
Courtesy of AUDI OF AMERICA, LLC

-- Note the letters and then match it to the color identification in the table.

Bearing cap bearing shell identification:

The identification on the crankshaft is for the lower bearing shell.

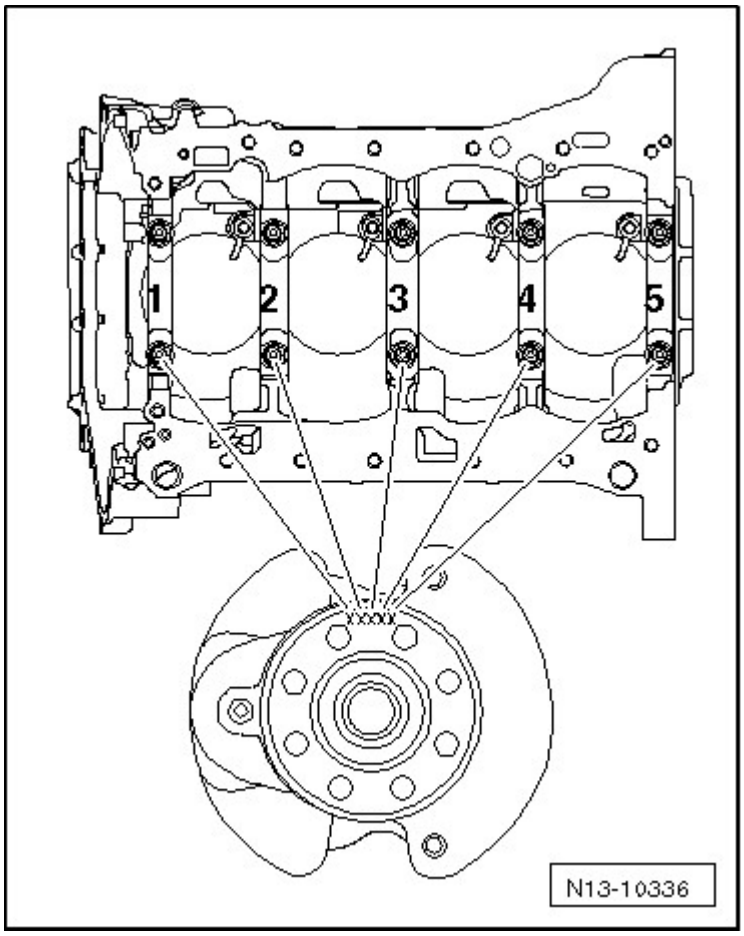

Fig. 3: Locating Identification On Crankshaft
Courtesy of AUDI OF AMERICA, LLC

-- Note the letters and then match it to the color identification in the table.

S	=	Black
R	=	Red
G	=	Yellow
B	=	Blue
W	=	White

DESCRIPTION AND OPERATION

RIBBED BELT DRIVE OVERVIEW

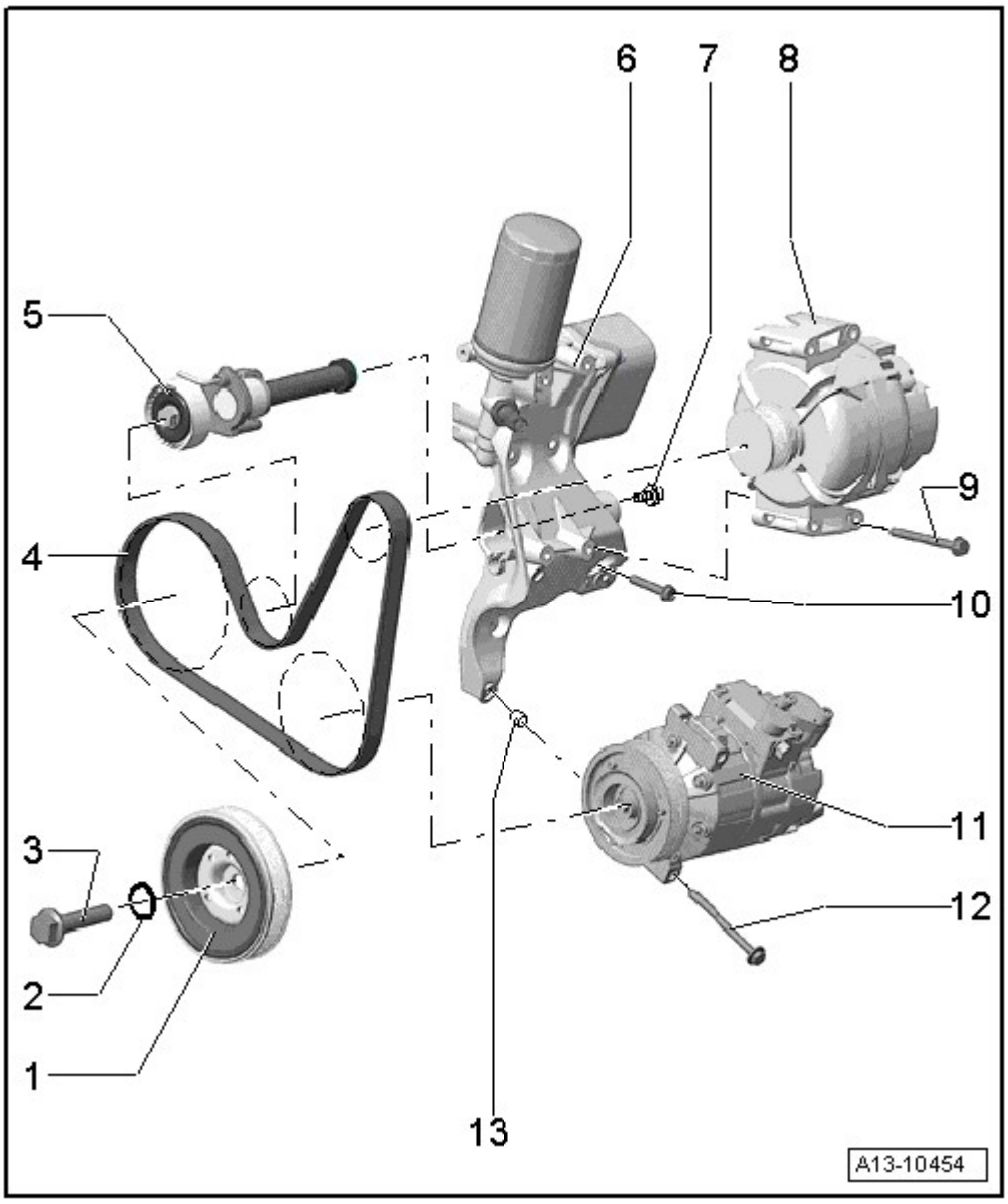

Fig. 4: Identifying Ribbed Belt Drive Assembly Overview
Courtesy of AUDI OF AMERICA, LLC

1. Vibration Damper
   - With ribbed belt pulley
   - Removing and installing, refer to **VIBRATION DAMPER**
2. O-ring
   - Replace
3. Bolt
   - Replace
   - 150 Nm plus an additional 90° turn
   - Coat the O-ring with oil.

- Usecounter hold tool T10355 to loosen and tighten

CAUTION: Danger of causing damage to the engine. D.o not turn the crankshaft when a bolt is removed because this will offset the timing.

4. Ribbed Belt
   - Check for wear
   - Do not kink

CAUTION: Risk of destroying due to reversed running direction on a used ribbed belt.

- **Before removing ribbed belt, marking running direction with chalk or felt-tip pen for reinstallation later.**

   - Removing and installing, refer to **RIBBED BELT**
   - When installing, make sure it is seated correctly on the pulleys
5. Ribbed Belt Tensioning Damper
   - Move the damper using a open-end wrench to release the tension on the ribbed belt
   - Secure with locking pin T10060 A
   - Tensioning device for ribbed belt **RIBBED BELT DRIVE ASSEMBLY OVERVIEW**
   - Removing and installing, refer to **RIBBED BELT TENSIONER**
6. Auxiliary Components Bracket
   - With oil filter and engine oil cooler
   - Accessory Assembly Bracket, Removing and Installing, refer to **ACCESSORY ASSEMBLY BRACKET**
   - For removing and installing engine oil cooler, refer to **ENGINE OIL COOLER**
7. Bolt
   - 10 Nm
8. Generator
   - Removing and installing, refer to **Removal and Installation**
9. Bolt
   - Tightening specifications, refer to **Specifications**
10. Bolt
    - Tightening order **RIBBED BELT DRIVE ASSEMBLY OVERVIEW**
11. A/C Compressor
    - Do not remove or disconnect refrigerant lines
    - Removing and installing, refer to **Removal and Installation**
12. Bolt
    - 25 Nm

13. Alignment Sleeve
    - For air conditioning compressor

Tensioning Device for Ribbed Belt

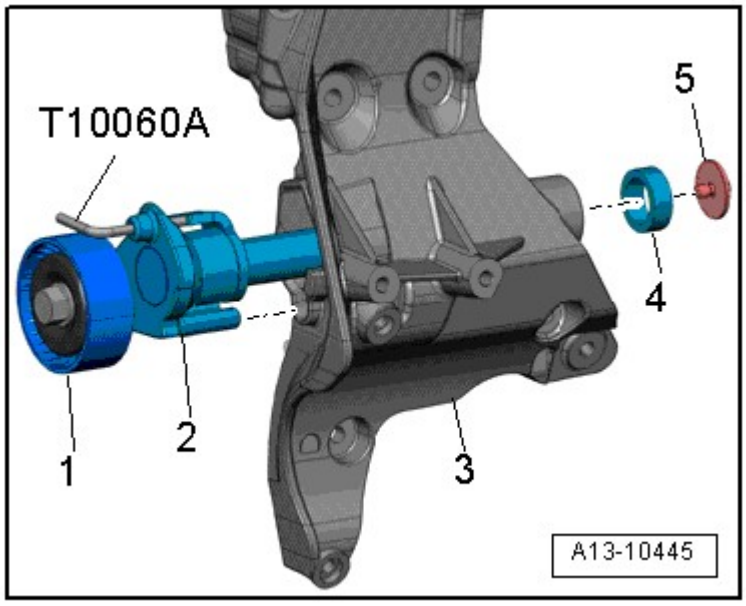

Fig. 5: Identifying Tensioning Device For Ribbed Belt
Courtesy of AUDI OF AMERICA, LLC

1. Ribbed belt tensioning damper
2. Support
3. Auxiliary components bracket
4. Centering sleeve
5. Bolt

Accessory Assembly Bracket Tightening Sequence

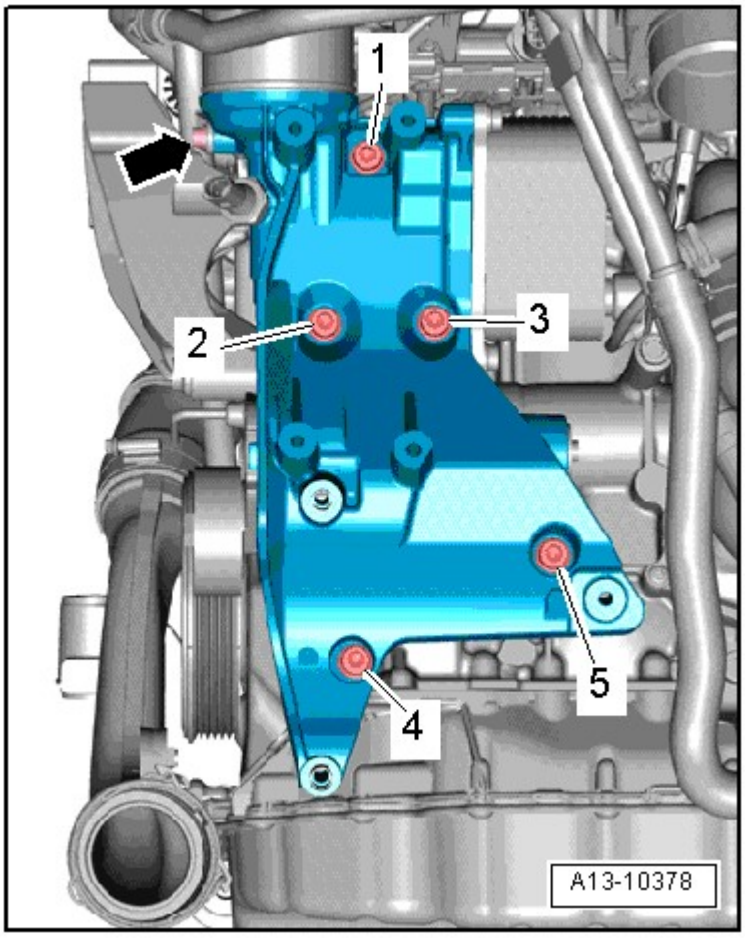

Fig. 6: Accessory Assembly Bracket Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Mount the accessory assembly bracket and then mount the bolts -4-.

-- Tighten bolts in 3 stages in -1 to 5- sequence as follows:

-- Tighten bolts by hand.-- Tighten the bolts to 20 Nm.-- Tighten the bolts an additional 90°.

TRANSMISSION-SIDE SEALING FLANGE AND DUAL-MASS FLYWHEEL OVERVIEW

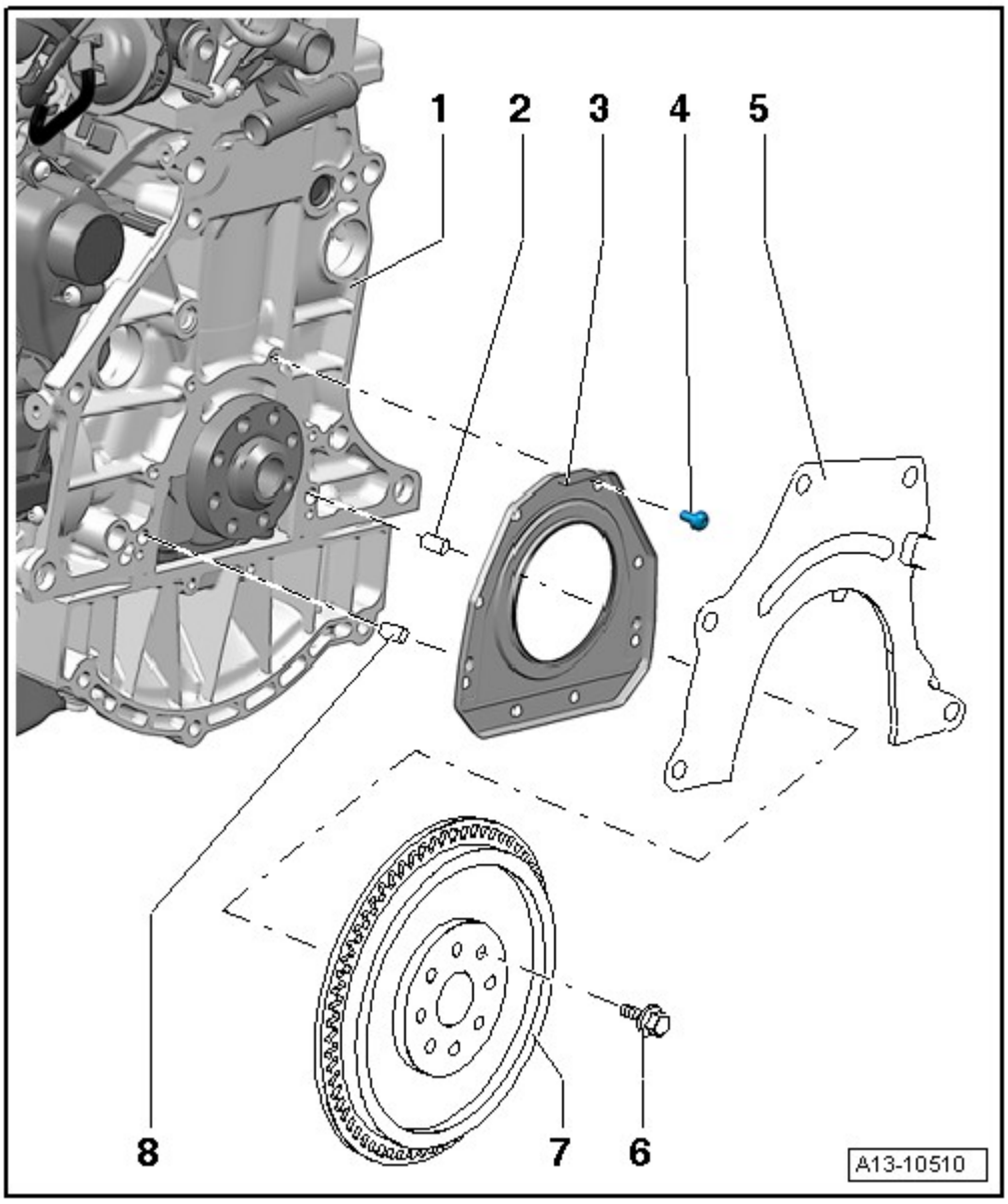

Fig. 7: Identifying Sealing Flange And Dual Mass Flywheel Assembly Overview
Courtesy of AUDI OF AMERICA, LLC

1. Cylinder Block
   - Removing and installing crankshaft, refer to **CRANKSHAFT ASSEMBLY OVERVIEW**
   - Piston and connecting rod, disassembling and assembling, refer to **PISTONS AND CONNECTING ROD ASSEMBLY OVERVIEW**
2. Fitting Pin
3. Transmission Side Sealing Flange
   - With seal
   - Only replaced as complete unit
   - Removing and installing, refer to **TRANSMISSION-SIDE SEALING FLANGE**

- Do not oil or grease the sealing lip of oil seal
- Before installing, remove oil remains from crankshaft journal with a clean cloth
- Guide sleeve may only be removed after the sealing flange has been slid onto the crankshaft pin.

4. Bolt
   - Tightening order **TRANSMISSION-SIDE SEALING FLANGE AND DUAL-MASS FLYWHEEL ASSEMBLY OVERVIEW**
5. Intermediate Plate
   - Must be located on dowel sleeves
   - Do not damage or bend when doing assembly work
   - Is hooked in at sealing flange **TRANSMISSION-SIDE SEALING FLANGE AND DUAL-MASS FLYWHEEL ASSEMBLY OVERVIEW**
6. Bolt
   - Replace
   - 60 Nm plus an additional 90° turn
   - For dual-mass flywheel/drive plate
7. Dual Mass Flywheel
   - Dual Mass Flywheel, Removing and Installing, refer to **DUAL MASS FLYWHEEL**.
   - Only possible to install in one position. The holes are offset.
8. Fitting Pin

Transmission Side Sealing Flange, Tightening Sequence

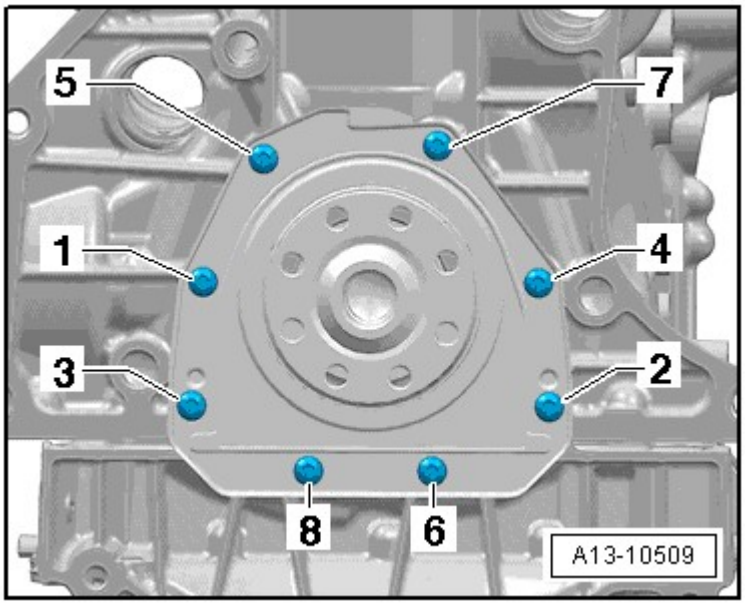

Fig. 8: Identifying Sealing Flange Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts -1 through 8- in the sequence shown:

-- 1. Tighten the bolts hand-tight.

-- 2. Tighten the bolts to 9 Nm.

Installing Intermediate Plate

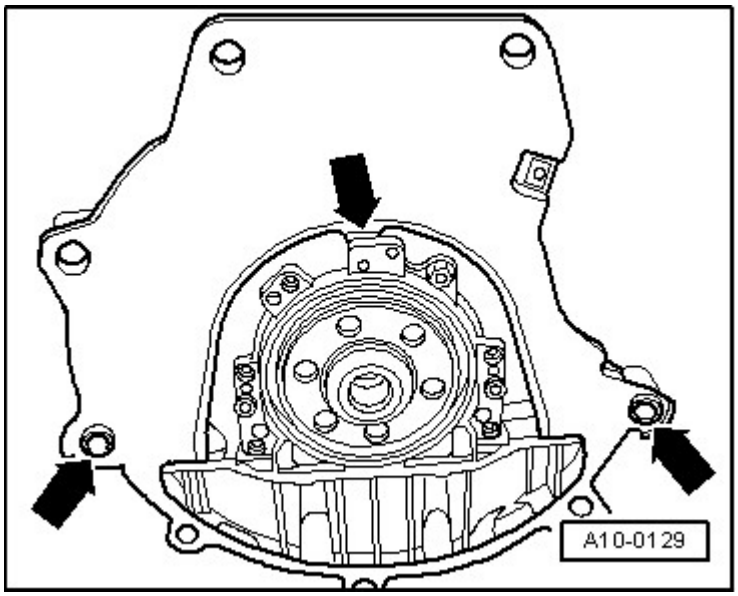

Fig. 9: Identifying Intermediate Plate Alignment Bushings
Courtesy of AUDI OF AMERICA, LLC

-- 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 .

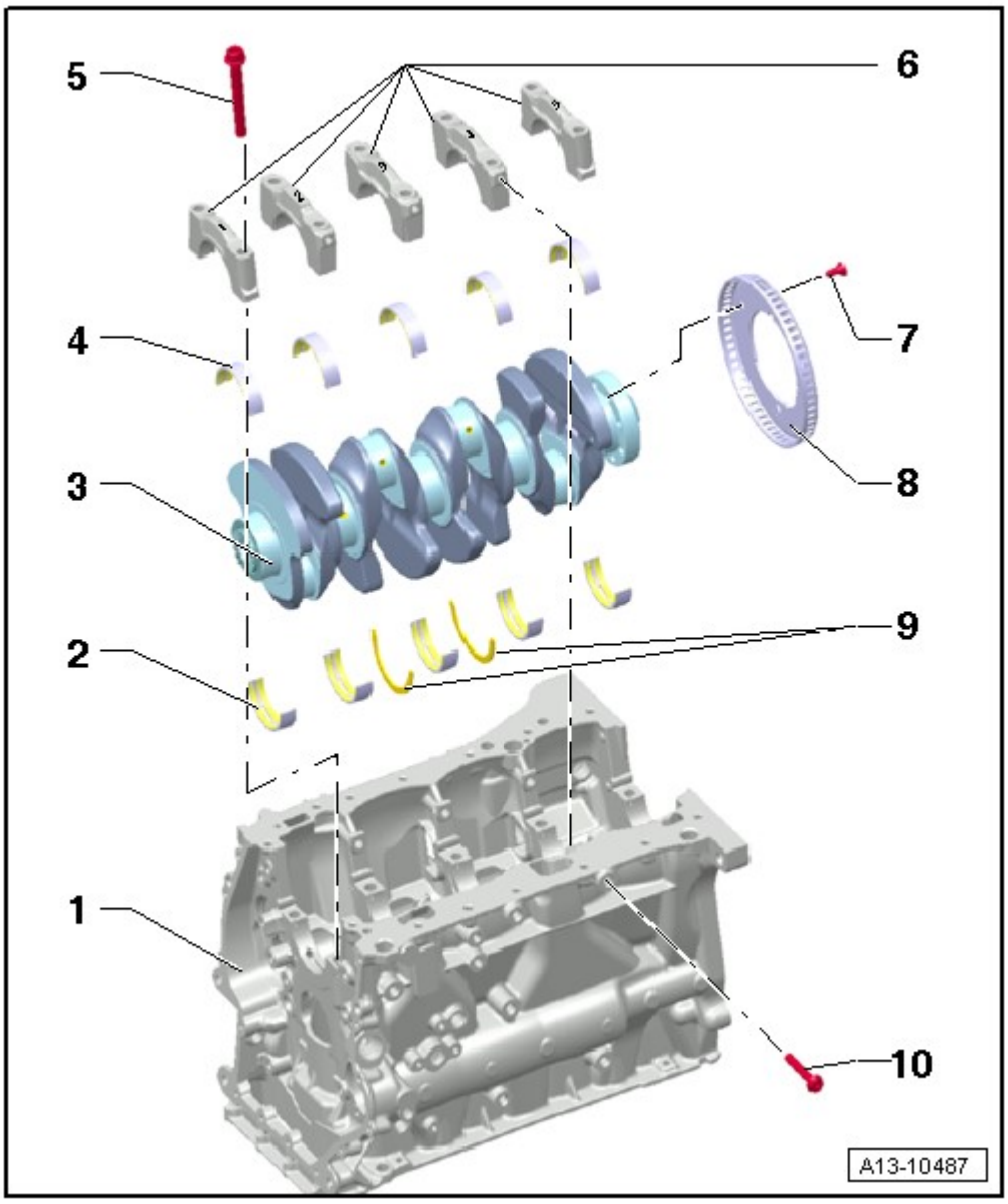

Fig. 10: Crankshaft Assembly Overview
Courtesy of AUDI OF AMERICA, LLC

1. Cylinder Block
2. Bearing Shell for Cylinder Block
   - With lubricating groove
   - Do not interchange used bearing shells (mark)
   - Crankshaft bearing shell identification, refer to **CRANKSHAFT BEARING SHELLS ALLOCATION**
3. Crankshaft
   - After removal, place in such a way it does not rest on sensor wheel -5- and damage it
   - If the crankshaft is being replaced, then the bearing shells must be allocated to the bearing cover,

refer to **CRANKSHAFT BEARING SHELLS ALLOCATION**
- Axial clearance, refer to **CRANKSHAFT, MEASURING AXIAL PLAY**
- Radial clearance, refer to **CRANKSHAFT, MEASURING RADIAL PLAY**
- Do not turn crankshaft when measuring radial play
- Crankshaft dimensions, refer to **CRANKSHAFT DIMENSIONS**

4. Bearing Shell for Bearing Cap
   - Without lubricating groove
   - Do not interchange used bearing shells (mark)
   - Crankshaft bearing shells identification (classification), refer to **CRANKSHAFT BEARING SHELLS ALLOCATION**
5. Bolt
   - Replace
   - Tightening order **CRANKSHAFT ASSEMBLY OVERVIEW**
6. Bearing Cap
   - Bearing cap 1: belt pulley side
   - Retaining tabs of bearing shells and cylinder block/bearing caps must lie above one another
7. Bolt
   - Replace
   - 10 Nm plus an additional 90° turn
   - Replace sensor wheel every time bolts are loosened, refer to **SENSOR WHEEL**
8. Sensor Wheel
   - For engine speed (RPM) sensor -G28-
   - It is possible to install in one position only, the holes are offset.
   - Replace sensor wheel every time bolts are loosened
   - Removing and installing, refer to **SENSOR WHEEL**
9. Thrust Washers
   - For bearing 3
10. Bolt
    - Replace
    - Tightening order **CRANKSHAFT ASSEMBLY OVERVIEW**

Crankshaft, Tightening Sequence

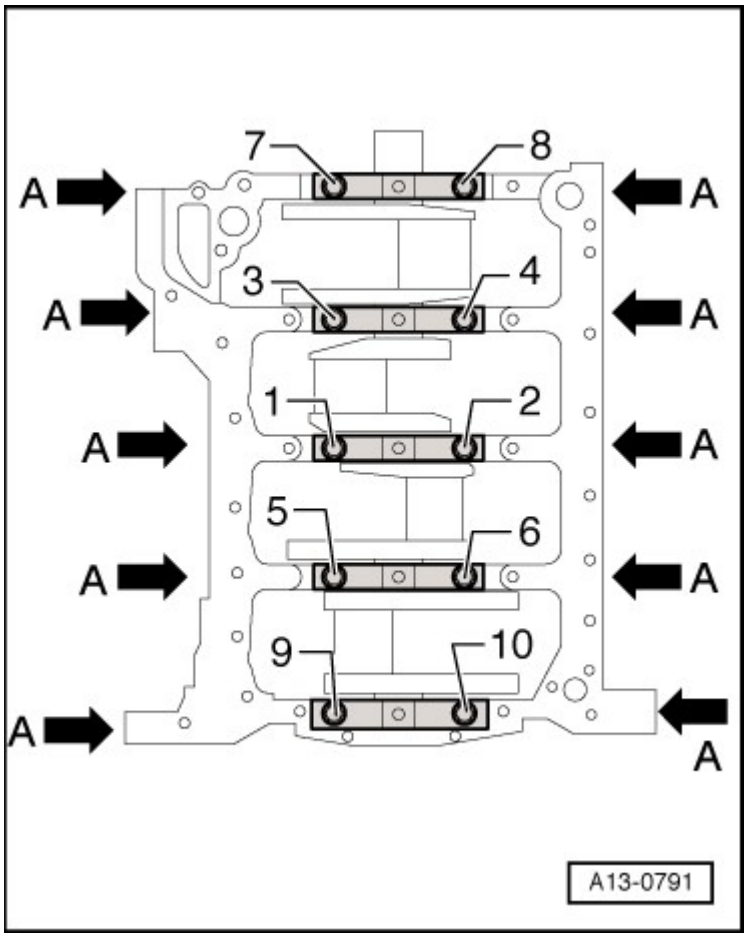

Fig. 11: Crankshaft Bearing Cap, Installing
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the crankshaft bolts in the sequence -1 to 5-.

-- Tighten the bolts -1 through 10- and -arrows- hand-tight.

-- Tighten the bolts -1 through 10- to 65 Nm.

-- Tighten the bolts -1 through 10- 90° further using a rigid wrench.

-- Tighten the bolts -arrows- to 20 Nm.

-- Tighten the bolts -arrows- 90° further using a rigid wrench.

PISTONS AND CONNECTING ROD OVERVIEW

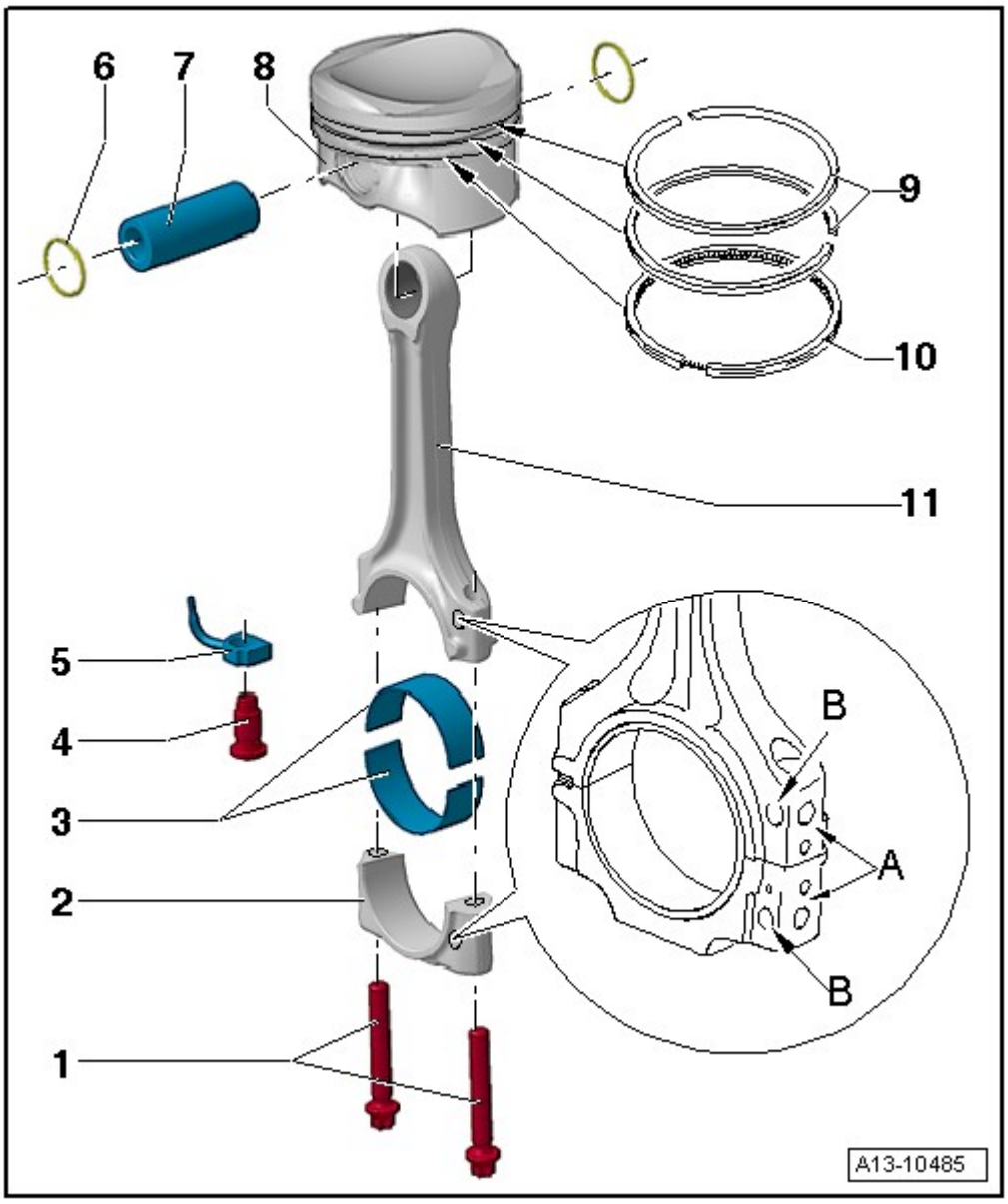

Fig. 12: Identifying Assembly Overview: Pistons And Connecting Rod
Courtesy of AUDI OF AMERICA, LLC

1. Connecting Rod Bolt
   - Replace
   - 45 Nm plus an additional 90°
   - Lubricate the threads and contact surface
   - Use old bolt to measure radial play
   - Tighten to 45 Nm to measure radial play, do not turn further
2. 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.
- Mark affiliation to cylinder -A-
- Installed position: the markings -B- face the belt pulley side
- Separate new connecting rod, refer to **CONNECTING ROD, SEPARATING NEW**

3. Bearing Shells
   - Installed position, refer to **PISTONS AND CONNECTING ROD ASSEMBLY OVERVIEW**
   - Do not interchange used bearing shells (mark)
   - Axial play new: 0.10 to 0.35 mm, wear limit: 0.40 mm
   - Measure radial clearance with Plastigage, new: 0.02 to 0.06 mm, wear limit: 0.09 mm Do not turn crankshaft when checking radial clearance
4. Pressure Relief Valve

   27 Nm

5. Oil Spray Jet
   - For piston cooling
6. Locking Ring
   - Replace
7. Piston Pin
   - Coat with oil before installing
8. Piston
   - Removing and installing, refer to **PISTONS**
   - Mark installed position and cylinder allocation
   - Arrow on piston face points toward belt pulley side
   - Piston and cylinder bore, checking, refer to **PISTONS AND CYLINDER BORE, CHECKING**
9. Compression Rings
   - Offset gaps by 120°
   - Use piston ring pliers (commercially available) for removing and installing
   - Installed position: "TOP" "R" mark must face up toward piston crown
   - Checking ring gap, refer to **PISTONS AND CYLINDER BORE, CHECKING** figure.
   - Check piston ring groove clearance, refer to **PISTONS AND CYLINDER BORE, CHECKING** figure.
10. Oil Scraping Ring
    - 2-part
    - Install offset gaps by 120° to the neighboring compression ring
    - The "TOP" or "R" marking must face toward the piston crown.
    - Checking ring gap, refer to **PISTONS AND CYLINDER BORE, CHECKING** figure.
    - Side clearance cannot be measured.
11. Connecting Rod

- Only replace as set
- Mark affiliation to cylinder -A-
- Installed position: the markings -B- face the belt pulley side
- Separate new connecting rod, refer to **NEW CONNECTING ROD, SEPARATING**
- Radial clearance, measuring, refer to **CONNECTING ROD RADIAL CLEARANCE, MEASURING**

Installed Position of Bearing Shell

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

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

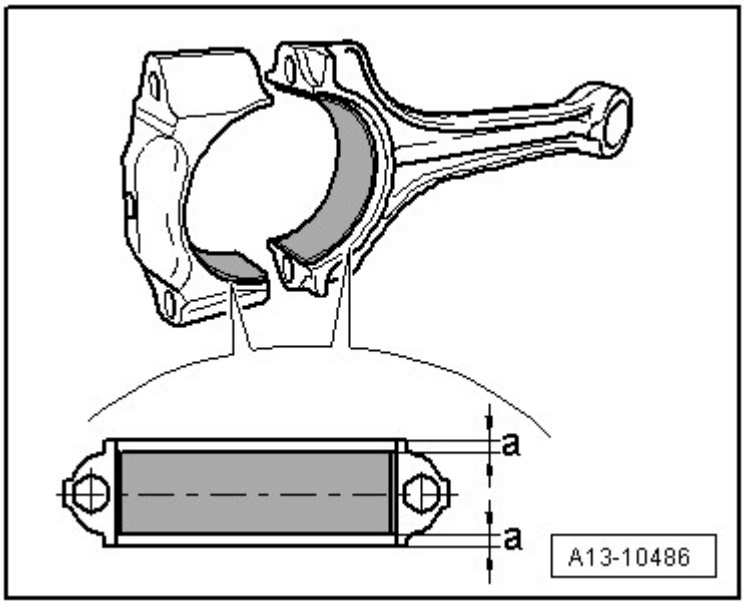

Fig. 13: Dimension -A- Must Be The Same At Left And Right
Courtesy of AUDI OF AMERICA, LLC

Piston Ring Gap, Checking

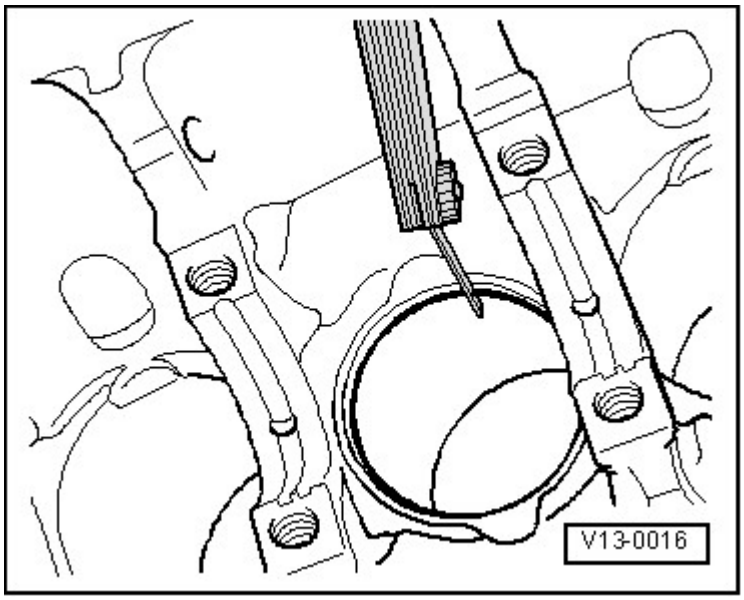

Fig. 14: Checking Piston Ring Gap
Courtesy of AUDI OF AMERICA, LLC

-- 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	0.80
Oil scraping ring	0.25 to 0.50	0.80

Piston Ring Groove Clearance, Checking

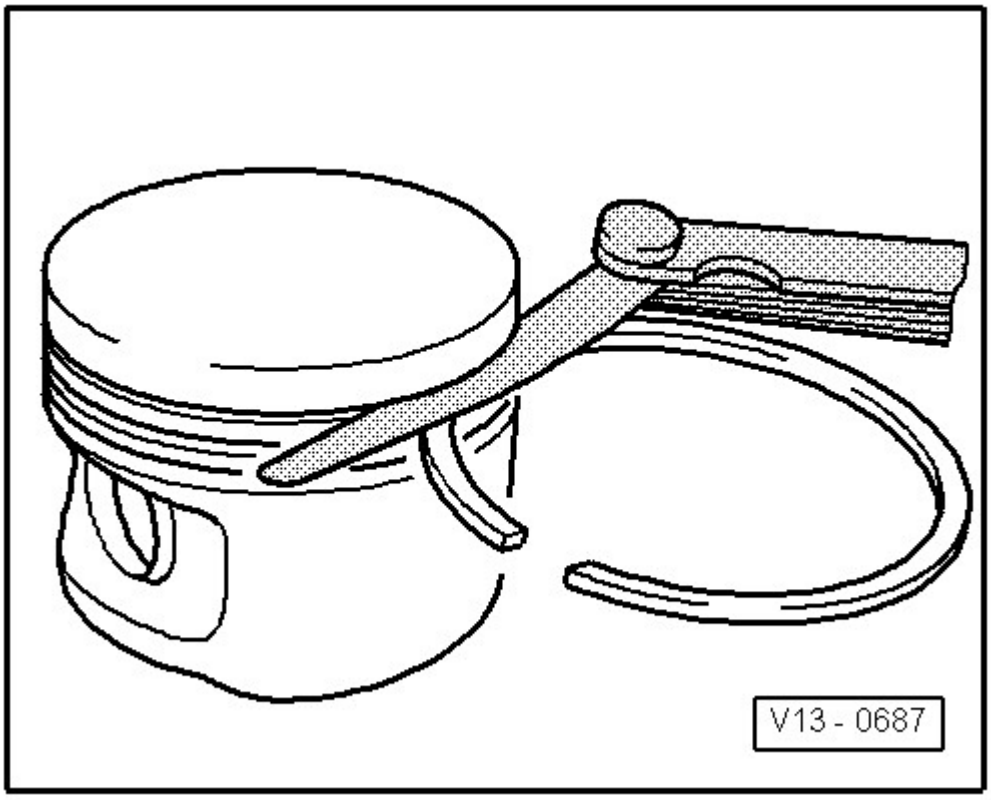

Fig. 15: Checking Piston Ring Gap
Courtesy of AUDI OF AMERICA, LLC

-- Clean the piston ring groove before checking.

Piston ring dimensions in mm	New	Wear limit
1st Compression ring	0.06 to 0.09	0.20
2nd Compression ring	0.03 to 0.06	0.15
Oil scraping rings	Cannot be measured	

Pistons, Checking

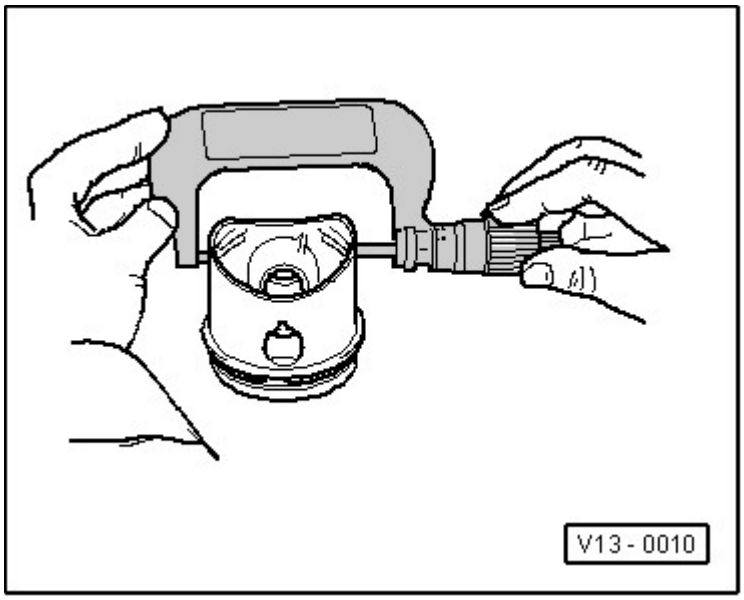

Fig. 16: Checking Piston
Courtesy of AUDI OF AMERICA, LLC

-- Take measurement approximately 10 mm from lower edge of piston skirt and offset 90° to piston axis.

- Deviation from nominal size: max. 0.04 mm.

Cylinder Bore, Checking

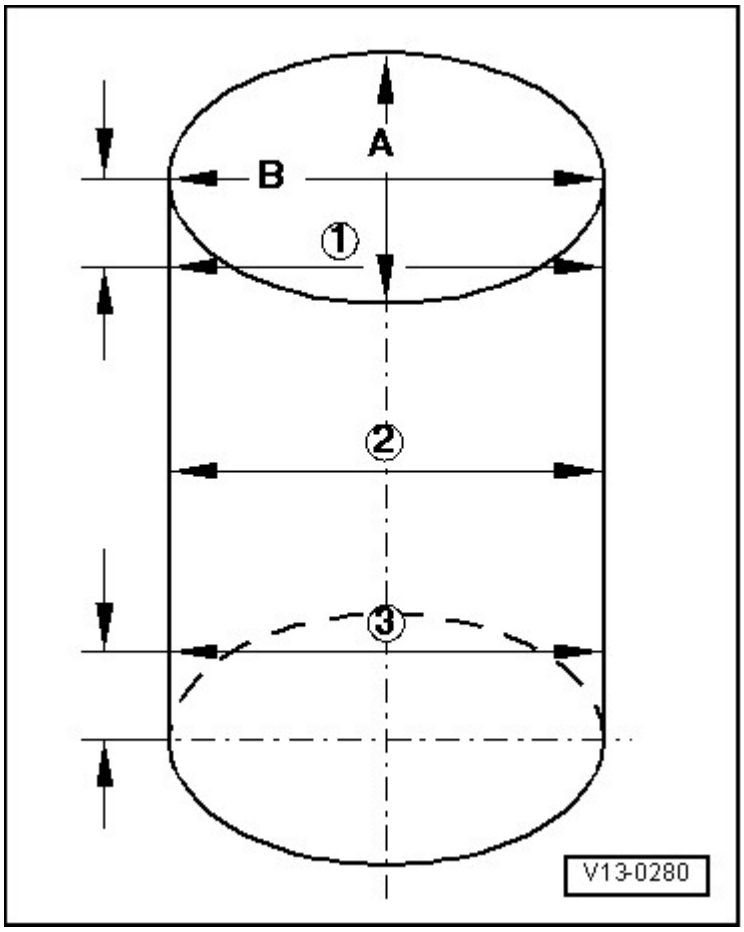

Fig. 17: Checking Cylinder Bores
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Internal dial gauge 50 - 100 mm

CAUTION: Do not bore, hone, grind or rework the cylinder bores with workshop tools. Reworking damages the surface of the cylinder bore.

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

- Deviation from nominal size: max. 0.08 mm.

NOTE: Measurement of cylinder bore may not be performed when the cylinder block is mounted in engine and transmission holder VAS 6095, false measurements are possible.

Installed Position of Bearing Shell

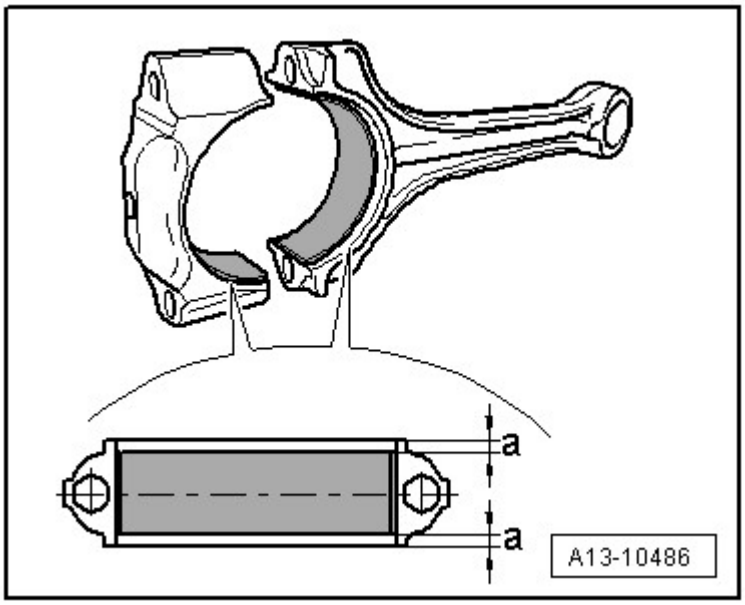

Fig. 18: Identifying Installed Position Of Bearing Shell
Courtesy of AUDI OF AMERICA, LLC

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

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

CONNECTING ROD, SEPARATING NEW

New connecting rods may not be separated at the location where they should be. If the connecting rod bearing cap cannot be removed by hand, proceed as follows:

-- Mark which cylinder belongs to the connecting rod -11- **PISTONS AND CONNECTING ROD ASSEMBLY OVERVIEW**

-- Lightly clamp the connecting rod in a vise equipped with aluminum protective pads.

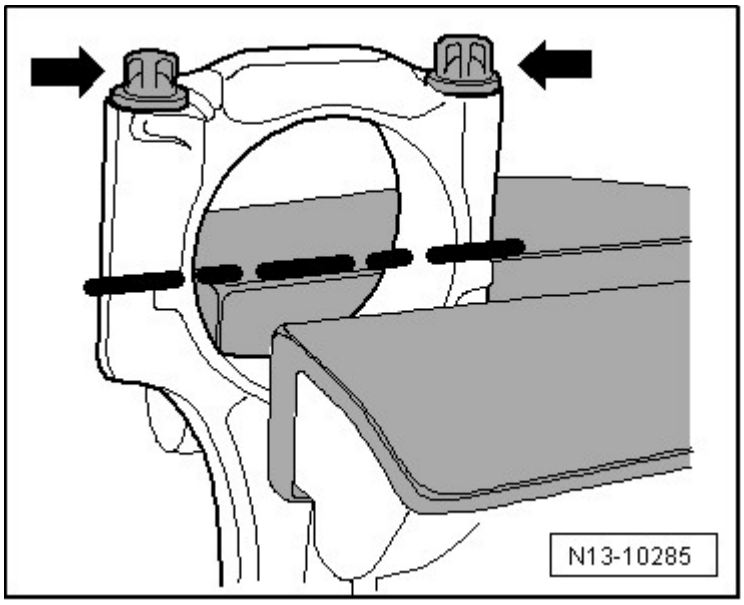

Fig. 19: Clamping Connecting Rod In Vise Equipped With Aluminum Protective Pads
Courtesy of AUDI OF AMERICA, LLC

NOTE: Only clamp the connecting rod lightly to avoid damaging it.

Clamp the connecting rod below the dotted line.

-- Loosen both bolts -arrows- about five turns.

-- Carefully tap against the connecting rod bearing cap in the direction of the -arrow- with a plastic hammer until the cap is loose.

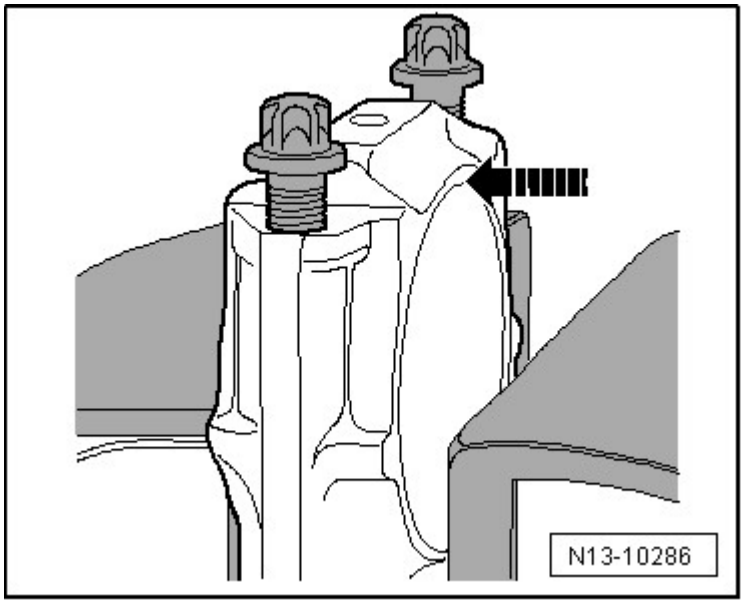

Fig. 20: Carefully Taping Against Connecting Rod Bearing Cap
Courtesy of AUDI OF AMERICA, LLC

SPECIFICATIONS

CRANKSHAFT DIMENSIONS

(Dimensions in mm)

Reconditioning Dimension (1)	Crankshaft Bearing Pins-Diameter	Connecting Rod Pins-Diameter
Basic dimension	58.00	47.80

(1) The preparation of worn crankshafts is not provided.

PISTON AND CYLINDER DIMENSIONS

CAUTION: Do not bore, hone, grind or rework the cylinder bores with workshop tools. Reworking damages the surface of the cylinder bore.

		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
A/C Compressor		25
Connecting Rod Bearing Cap[1]		45 Nm +90°
Dual Mass Flywheel[1]		60 + 90°
Pressure Relief Valve		27
Sensor Wheel[1]		10 +90°
Vibration Damper[1]		150 + 90°

- [1] Always replace

Accessory Assembly Bracket Tightening Sequence

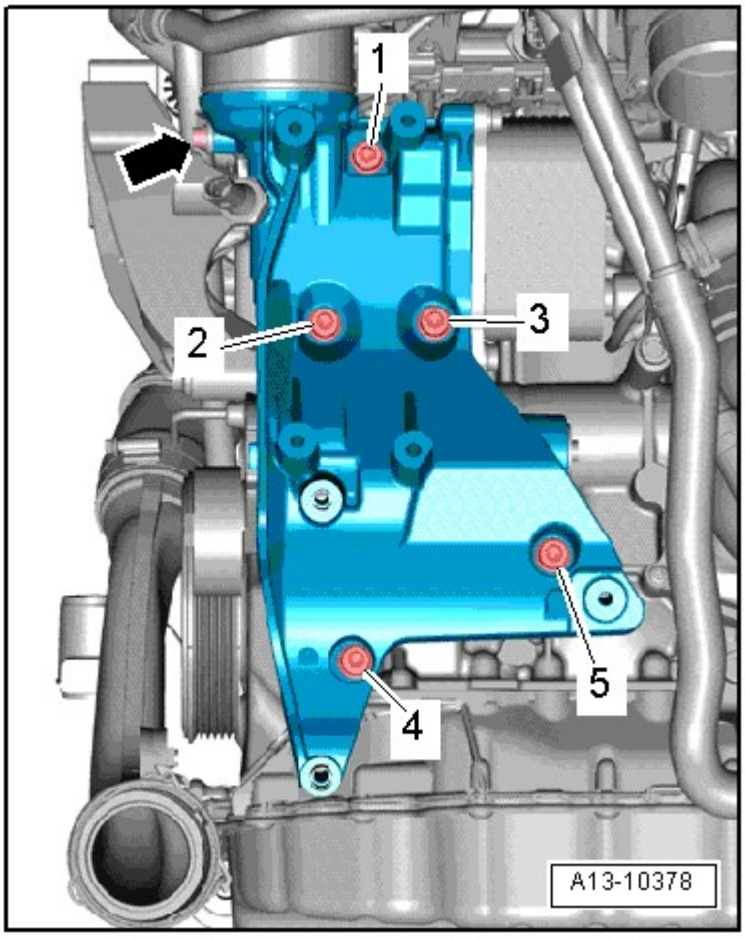

Fig. 21: Accessory Assembly Bracket Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Mount the accessory assembly bracket and then mount the bolts -4-.

-- Tighten bolts in 3 stages in -1 to 5- sequence as follows:

-- Tighten bolts by hand.-- Tighten the bolts to 20 Nm.-- Tighten the bolts an additional 90°.

Transmission Side Sealing Flange, Tightening Sequence

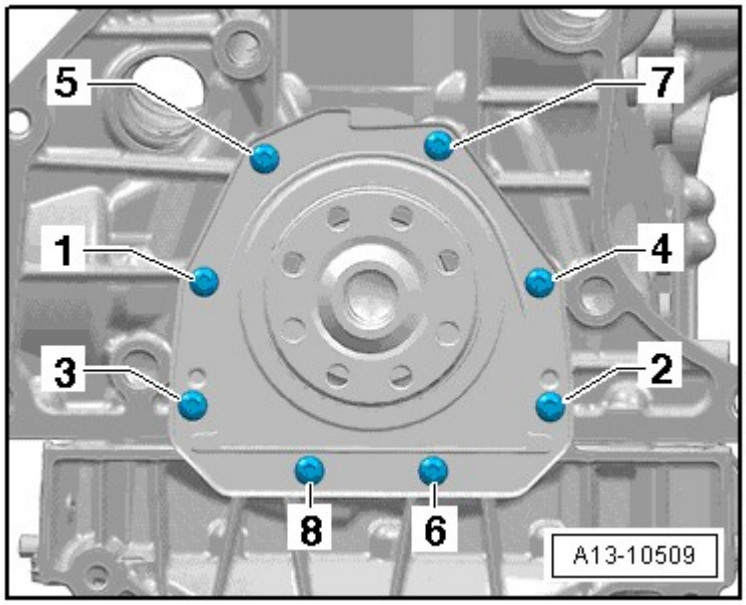

Fig. 22: Identifying Sealing Flange Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts -1 through 8- in the sequence shown:

-- 1. Tighten the bolts hand-tight.

-- 2. Tighten the bolts to 9 Nm.

Crankshaft, Tightening Sequence

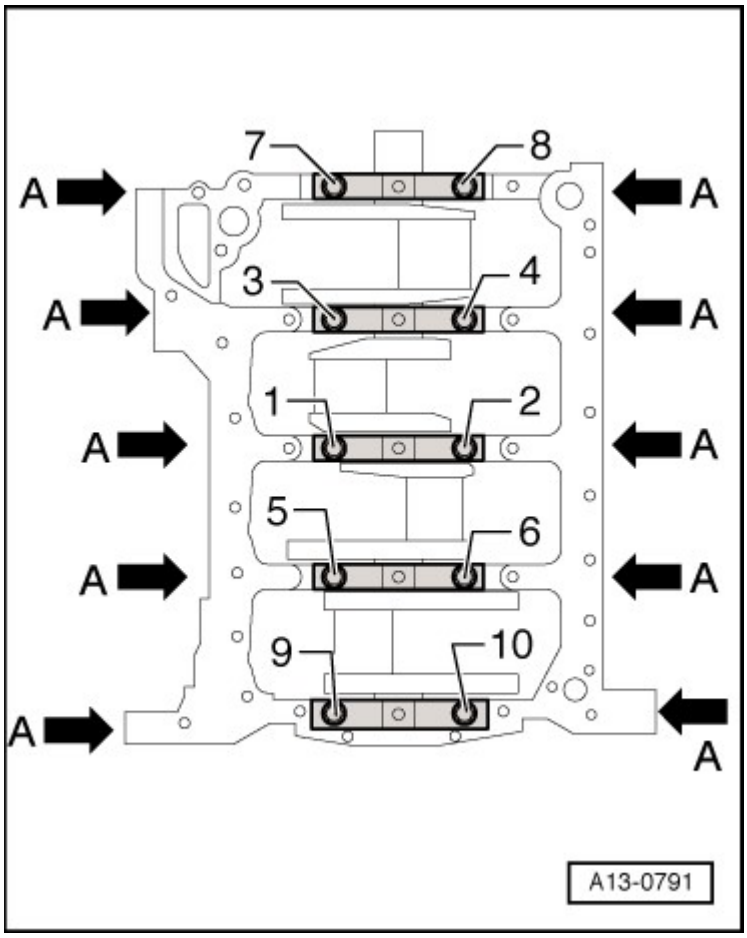

Fig. 23: Crankshaft Bearing Cap, Installing
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the crankshaft bolts in the sequence -1 to 5-.

-- Tighten the bolts -1 through 10- and -arrows- hand-tight.

-- Tighten the bolts -1 through 10- to 65 Nm.

-- Tighten the bolts -1 through 10- 90° further using a rigid wrench.

-- Tighten the bolts -arrows- to 20 Nm.

-- Tighten the bolts -arrows- 90° further using a rigid wrench.

DIAGNOSIS AND TESTING

CRANKSHAFT AXIAL CLEARANCE, MEASURING

Special tools and workshop equipment required

- Dial Gauge Holder VW 387
- Dial Gauge VAS 6079

Procedure

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

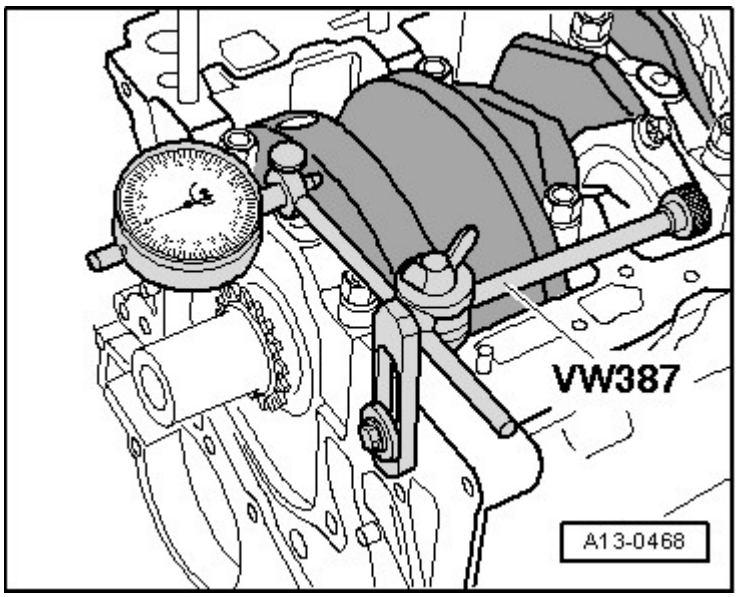

Fig. 24: Attaching Dial Indicator Together With VW387 Dial Gauge Holder To Cylinder Block And Set Indicator Against Crankshaft Counterweight
Courtesy of AUDI OF AMERICA, LLC

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

-- Press the crankshaft off the dial gauge and read the measurement.

Axial clearance:

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

CRANKSHAFT RADIAL CLEARANCE, MEASURING

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 the main bearing cap, clean the bearing cap and journal.

-- 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 60 Nm. Do not rotate the crankshaft when doing so.

-- Remove main bearing cap again.

-- Compare width of Plastigage with calibrated scale.

Radial clearance:

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

PISTONS AND CYLINDER BORE, CHECKING

Pistons, Checking

- With an external micrometer 75 to 100 mm. Take measurement at approximately 15 mm from lower edge of piston skirt and offset 90° to piston axis.

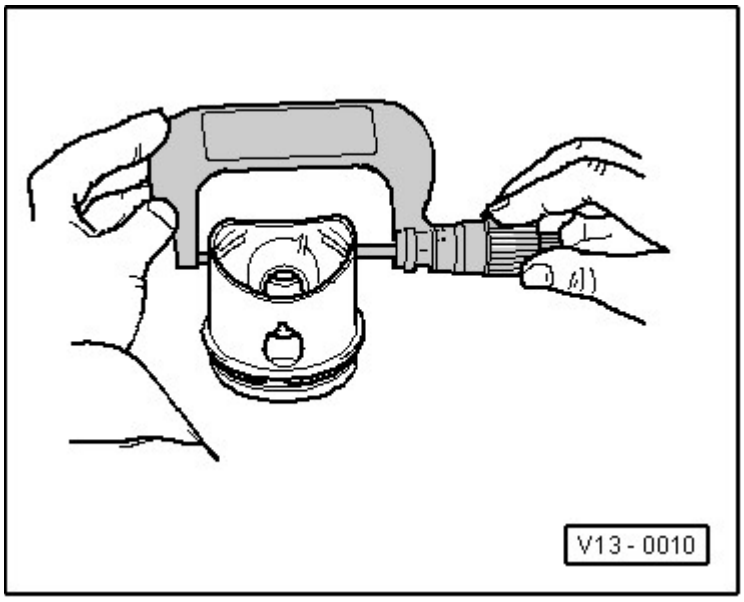

Fig. 25: Checking Piston
Courtesy of AUDI OF AMERICA, LLC

- Deviation from nominal size: Max. 0.04 mm.

Piston Diameter	
Basic dimension mm	82.465 (1)
* 1) Measurements without graphite coating (thickness = 0.02 mm). The graphite coating wears off.	

Piston Ring Gap, Checking

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

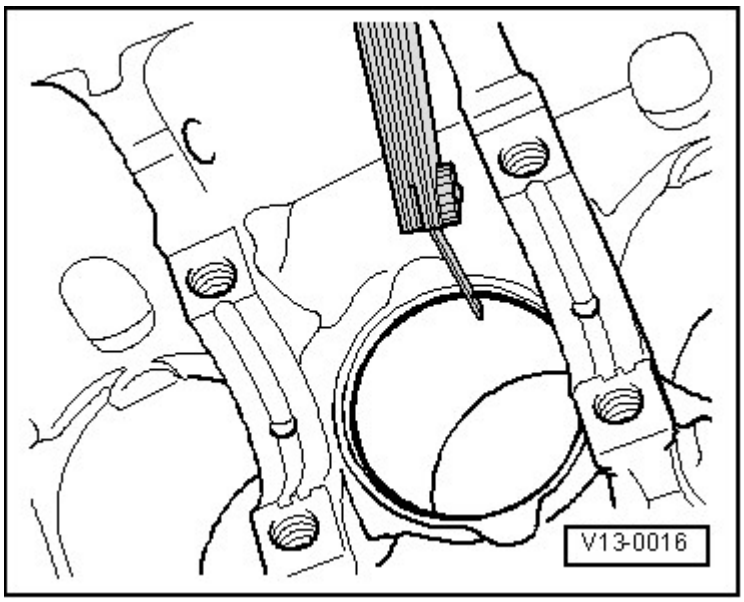

Fig. 26: Checking Piston Ring Gap
Courtesy of AUDI OF AMERICA, LLC

Piston Ring Dimensions in mm	New	Wear Limit
Compression ring	0.20...0.40	0.80
Oil scraping ring	0.25...0.50	0.80

Piston Ring Groove Clearance, Checking

- Clean the ring groove of piston before checking.

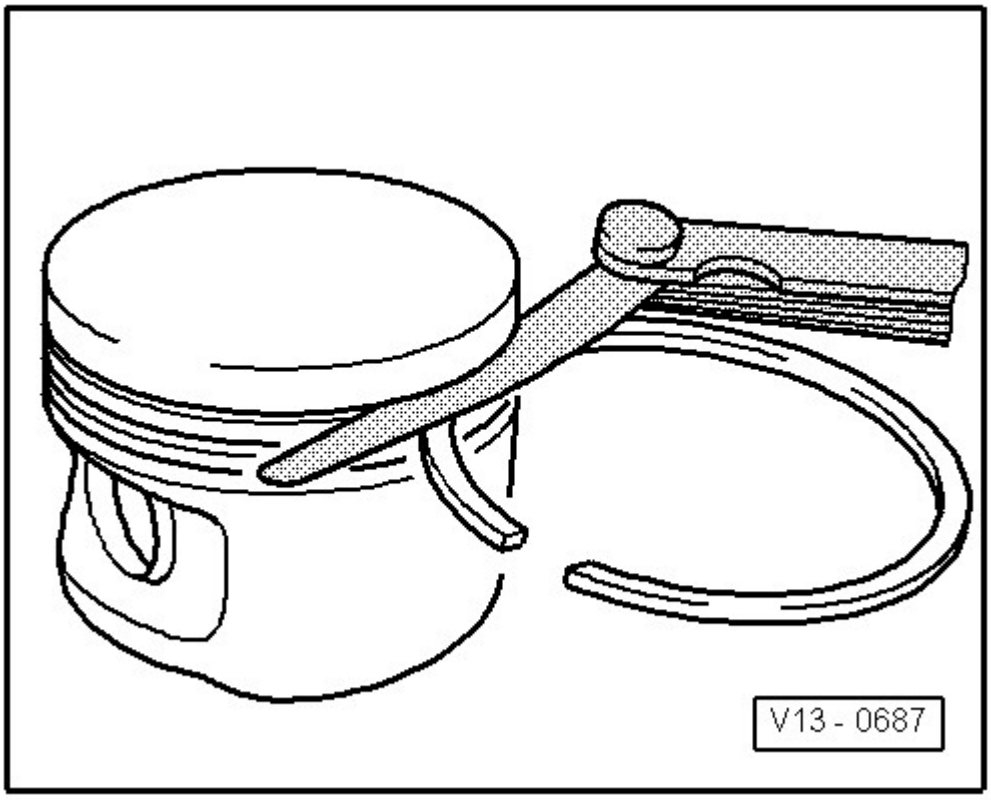

Fig. 27: Checking Piston Ring Gap
Courtesy of AUDI OF AMERICA, LLC

Piston Ring Dimensions in mm	New	Wear Limit
1st Compression ring	0.06 1/2 0.09	0.20
2nd Compression ring	0.03 1/2 0.06	0.15
Oil scraping rings	cannot be measured	cannot be measured

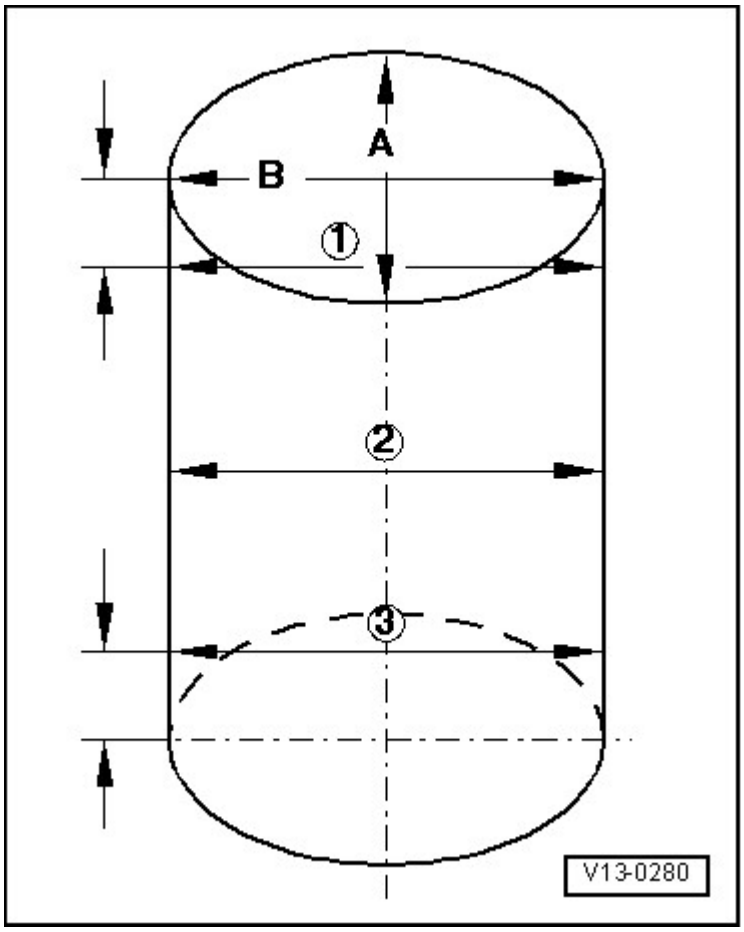

Fig. 28: Checking Cylinder Bores
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Inside Micrometer Set 18-100 mm US1033/S
- Internal Dial Gauge VAS 6078
- Engine and Transmission Holder VAS 6095

CAUTION: Do not bore, hone, grind or rework the cylinder bores with workshop tools. Reworking damages the surface of the cylinder bore.

- Using a US1033/S- or VAS 6078- measure in a diagonal sequence at 3 positions transversely -A- and longitudinally -B-.

- Deviation from nominal size: max. 0.08 mm.

Cylinder Bore Diameter	
Basic dimension mm	82.51

NOTE: Measurement of cylinder bore may not be performed when the cylinder block is mounted in VAS 6095-, false measurements are possible.

CONNECTING ROD RADIAL CLEARANCE, MEASURING

Special tools and workshop equipment required

- Plastigage®

Procedure

- Remove the connecting rod bearing cap.

- Clean the bearing cap and journal.

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

- Position the connecting rod bearing cap and tighten it to 30 Nm without tightening it further; do not turn the crankshaft.

- Install the connecting rod bearing cap.

- Compare width of Plastigage® with calibrated scale.

Radial clearance:

- New: 0.02 to 0.06 mm.
- Wear limit: 0.09 mm.

- Replace connecting rod bolts.

REMOVAL AND INSTALLATION

RIBBED BELT

Special tools and workshop equipment required

- Locking Pin T10060A

Removing

-- Disconnect the vacuum line -1- to the EVAP canister by pressing the release button.

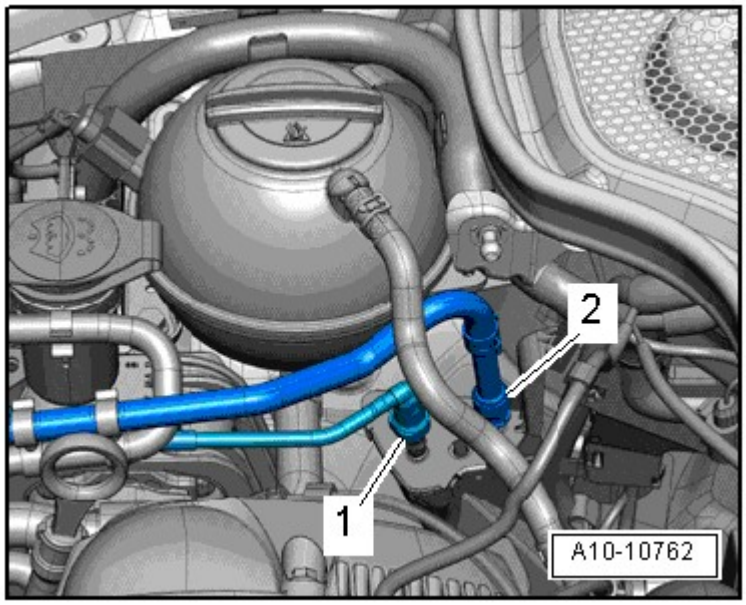

Fig. 29: Fuel Supply Hose And Vacuum Line
Courtesy of AUDI OF AMERICA, LLC

-- Free up the vacuum line on the coolant pipe,

NOTE: Ignore -2-.

-- Remove EVAP canister with connected lines upward out of bracket -arrow- and lay aside.

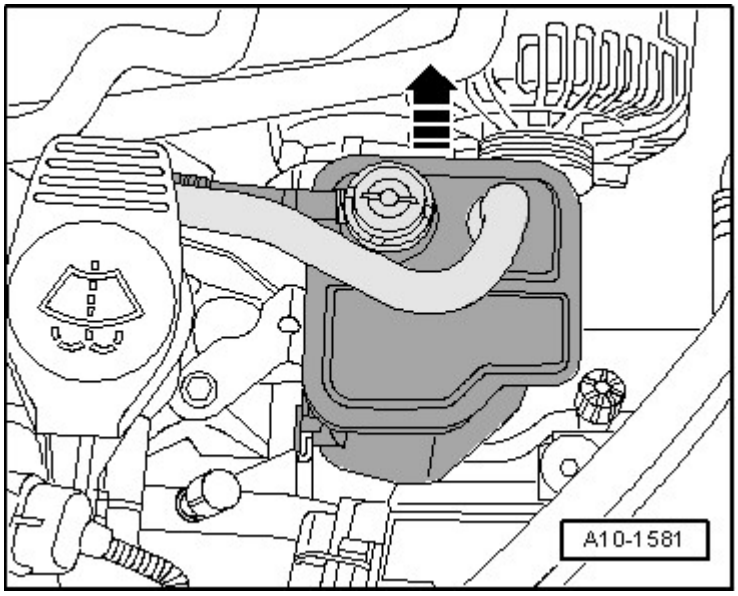

Fig. 30: Identifying EVAP Canister
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of destroying due to reversed running direction on a used ribbed belt.

- **Before removing ribbed belt, marking running direction with chalk or felt-tip pen for reinstallation later.**

-- To release ribbed belt tension, rotate tensioner in direction of -arrow-.

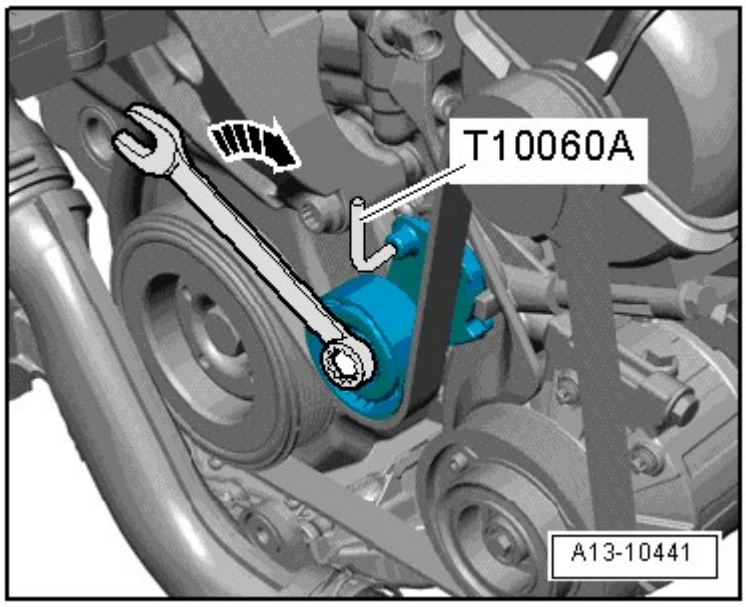

Fig. 31: Rotating Tensioner
Courtesy of AUDI OF AMERICA, LLC

-- Secure tensioner with T10060 A.

-- Remove ribbed belt.

Installing

Installation is in reverse order of removal, note the following:

NOTE: Secure the generator and A/C compressor before installing the ribbed belt.

-- Place the ribbed belt onto the crankshaft, A/C and generator belt pulleys.

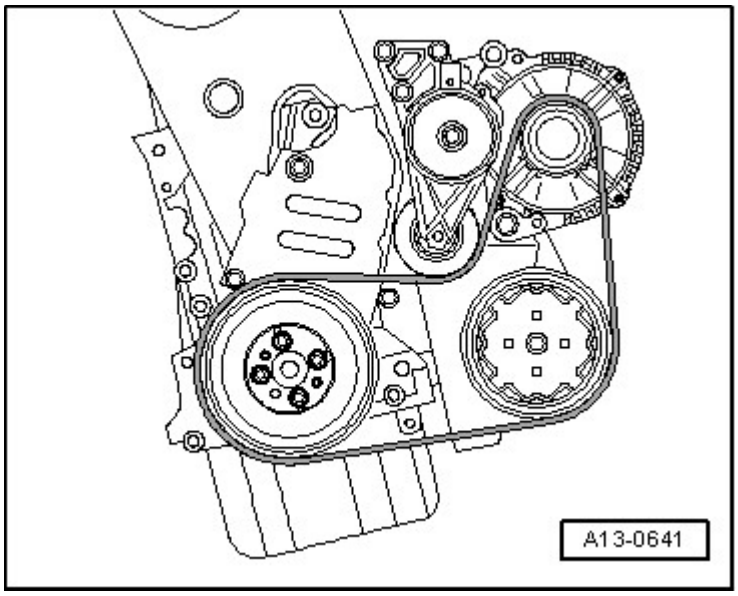

Fig. 32: Identifying Ribbed Belt Routing
Courtesy of AUDI OF AMERICA, LLC

-- Hold tensioner with open end wrench and remove T10060 A.

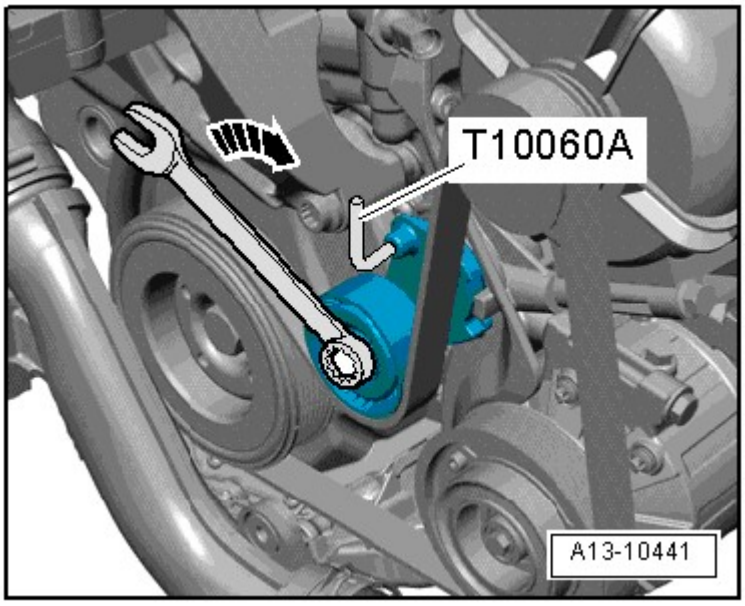

Fig. 33: Rotating Tensioner
Courtesy of AUDI OF AMERICA, LLC

-- Release tensioner.

-- Check whether ribbed belt is routed correctly.

-- Start engine and check whether ribbed belt runs correctly.

RIBBED BELT TENSIONING DAMPER

Special tools and workshop equipment required

- Engine Support Bridge 10 - 222 A with Spindle 10 - 222 A /11
- Bracket for Engine 10 - 222 A /1
- Engine Sling 2024 A
- Lifting Eye 2024 A /2
- Locking Pin T10060 A

Removing

-- Remove the noise insulation in the center by loosening the fasteners -1 and 2-.

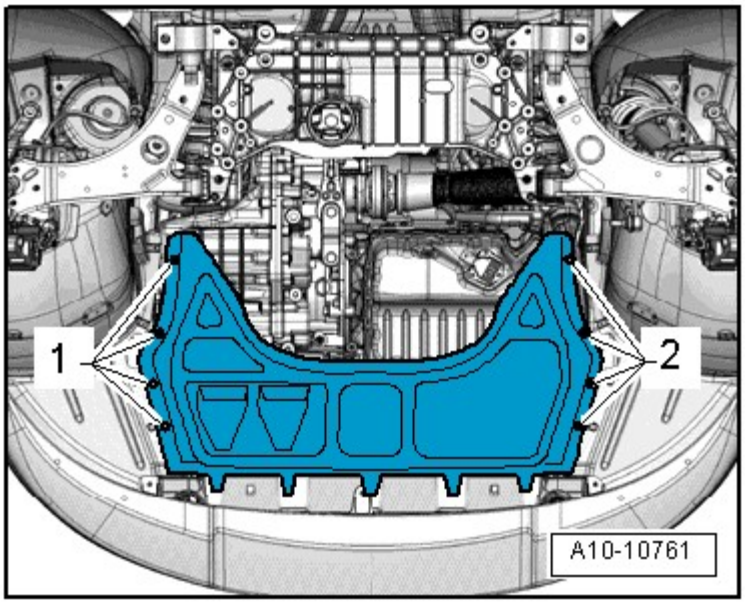

Fig. 34: Center Noise Insulation
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the fasteners -1, 2 and 3- and remove the right noise insulation.

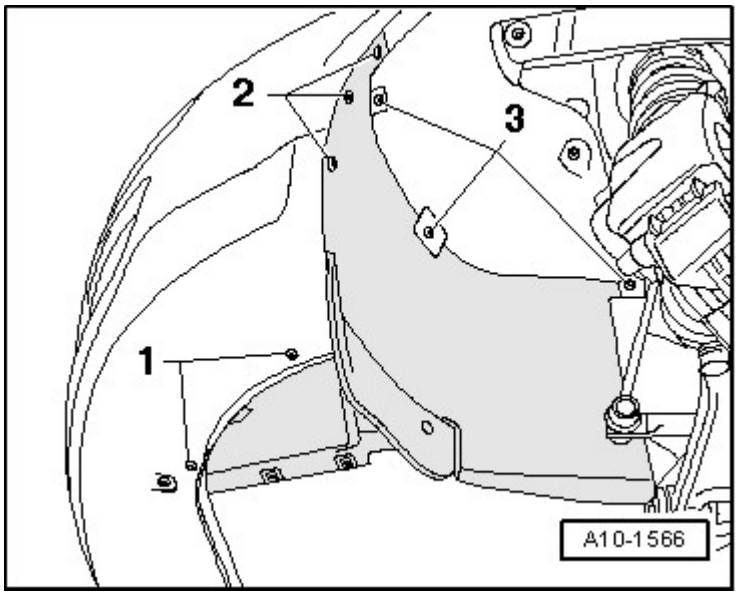

Fig. 35: Identifying Removal Of Left And Right Front Part Of Wheel Housing Liner
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -2- on the bracket for the after-run coolant pump -V51-.

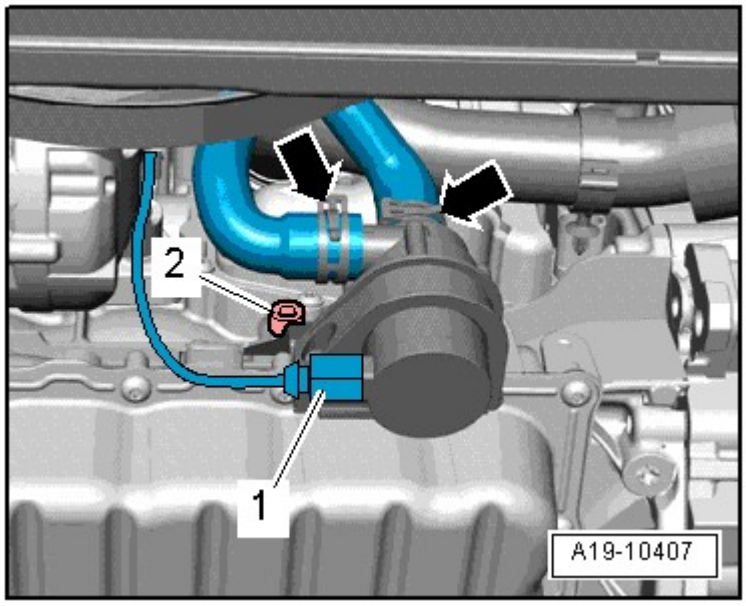

Fig. 36: After-Run Coolant Pump V51 Bracket Bolt
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1 and arrows-.

-- Tighten the lifting eye 2024 A /2 on the engine lifting eye using a collar nut -arrow-.

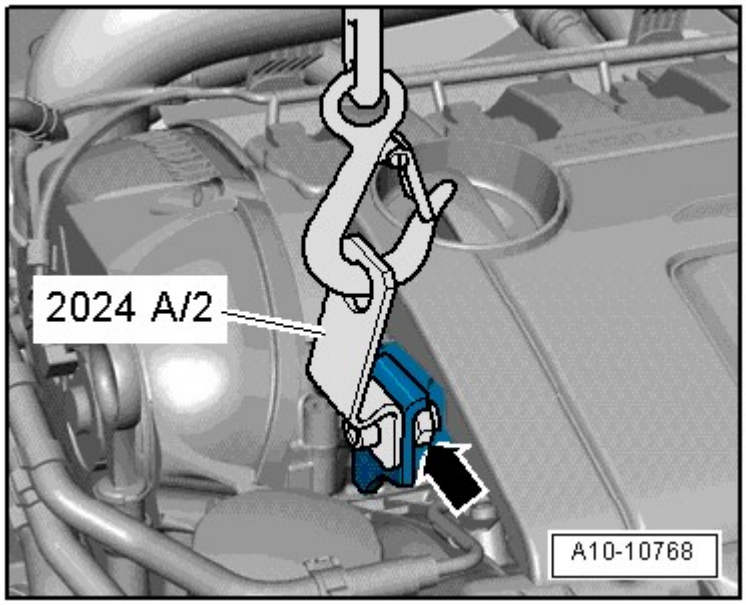

Fig. 37: Lifting Eye 2024 A /2, Engine Lifting Eye And Collar Nut
Courtesy of AUDI OF AMERICA, LLC

-- Place 10 - 222 A on upper edge of web plates with the following tool parts:

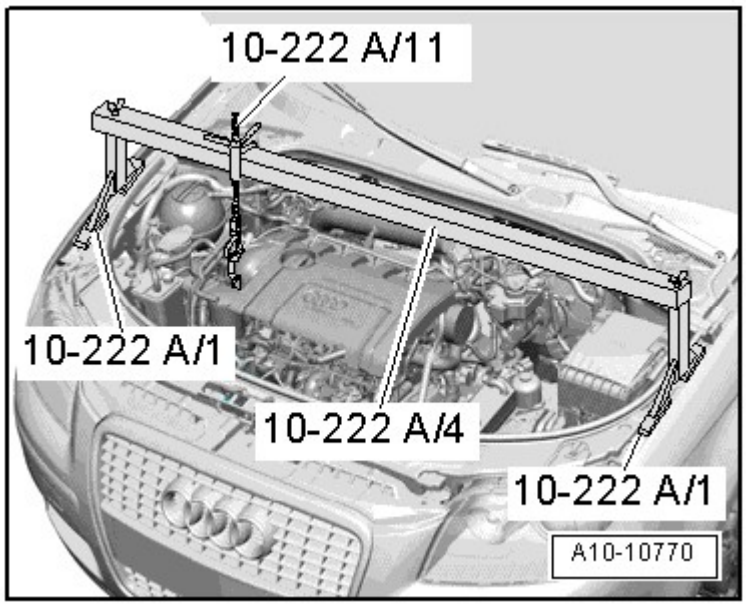

Fig. 38: Engine Support Bridge 10 - 222 Installed
Courtesy of AUDI OF AMERICA, LLC

- Engine brackets 10 - 222 A /1, quantity: 2
- Spindle 10 - 222 A /11

-- Tension the engine with the spindle.

-- Remove the subframe bolts -arrows- on the engine.

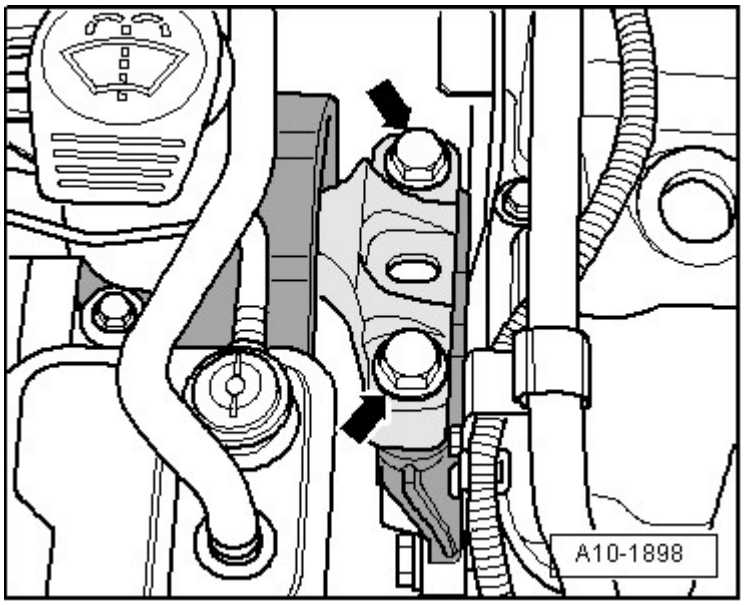

Fig. 39: Identifying Engine Mount To Engine Mount Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Lower the engine approx. 55 mm.

CAUTION: Risk of destroying due to reversed running direction on a used ribbed belt.

- **Before removing ribbed belt, marking running direction with chalk or felt-tip pen for reinstallation later.**

-- To release ribbed belt tension, rotate tensioner in direction of -arrow-.

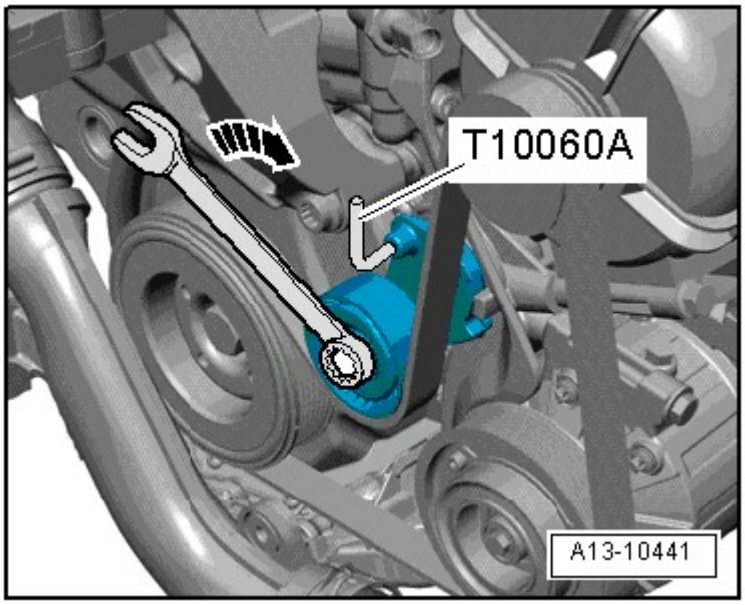

Fig. 40: Rotating Tensioner
Courtesy of AUDI OF AMERICA, LLC

-- Secure tensioner with T10060 A.

-- Remove the ribbed belt from the tensioner.

-- Free up the wiring harness -arrow-.

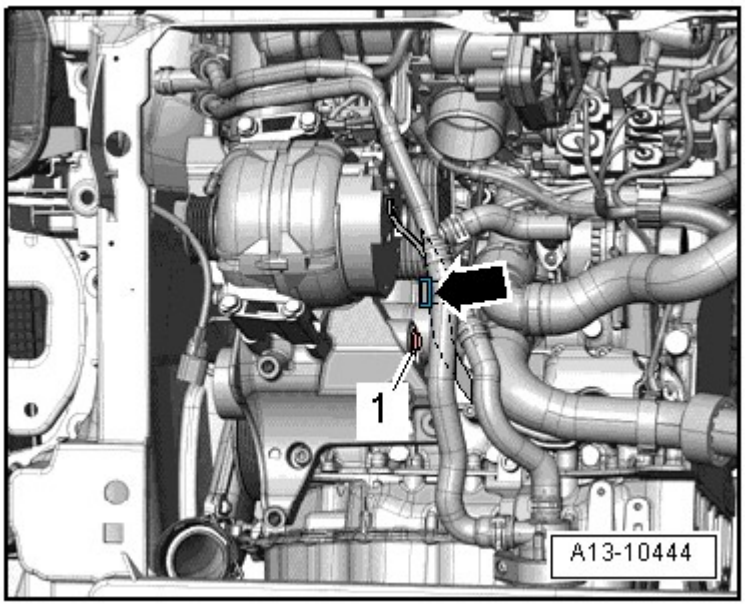

Fig. 41: Identifying Ribbed Belt Tensioner Bolt And Locating Electrical Wiring Harness
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -1- and remove the ribbed belt tensioner from the accessory assembly bracket.

Installing

- Tightening specifications, refer to **RIBBED BELT DRIVE ASSEMBLY OVERVIEW**.

Installation is in reverse order of removal, note the following:

-- Insert the ribbed belt tensioner -1- into the accessory assembly bracket -3- and tighten the bolt -5-.

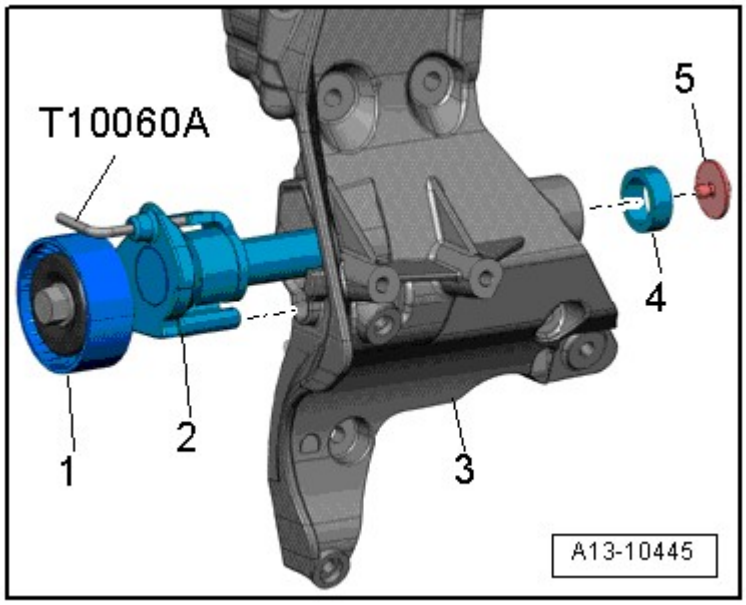

Fig. 42: Identifying Tensioning Device For Ribbed Belt
Courtesy of AUDI OF AMERICA, LLC

- Note the installation position of the support -2- : Insert the tabs on the support into the hole in the accessory assembly bracket.
- Note the centering sleeve -4-.

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

-- Install after-run coolant pump -V51-. Refer to **AFTER-RUN COOLANT PUMP** .

-- Adjust subframe mount. Refer to **SUBFRAME MOUNT, ADJUSTING** .

AUXILIARY COMPONENTS BRACKET

Removing

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

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

-- Remove generator. Refer to **Removal and Installation** .

-- Disconnect solenoid clutch electrical connector -1- on A/C compressor.

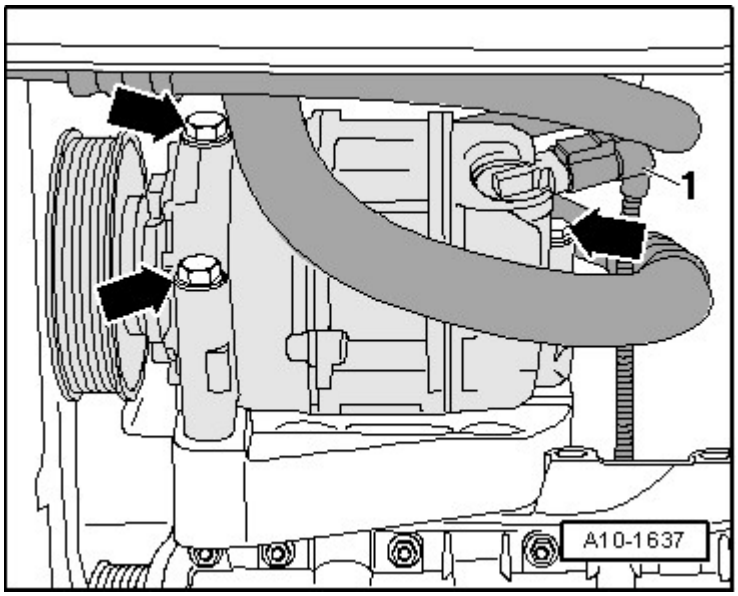

Fig. 43: A/C Compressor Bolts And Solenoid Clutch Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

WARNING: Risk of injury from refrigerant.

- **The air conditioning refrigerant circuit must not be opened.**

-- Remove A/C compressor bolts -arrows-.

CAUTION: Risk of damaging coolant lines and hoses.

- **Do not stretch, kink or bend coolant lines and hoses.**

-- Tie up the compressor with the refrigerant lines attached to the longitudinal member.

-- Remove the bolt -arrow- for the oil dipstick guide tube.

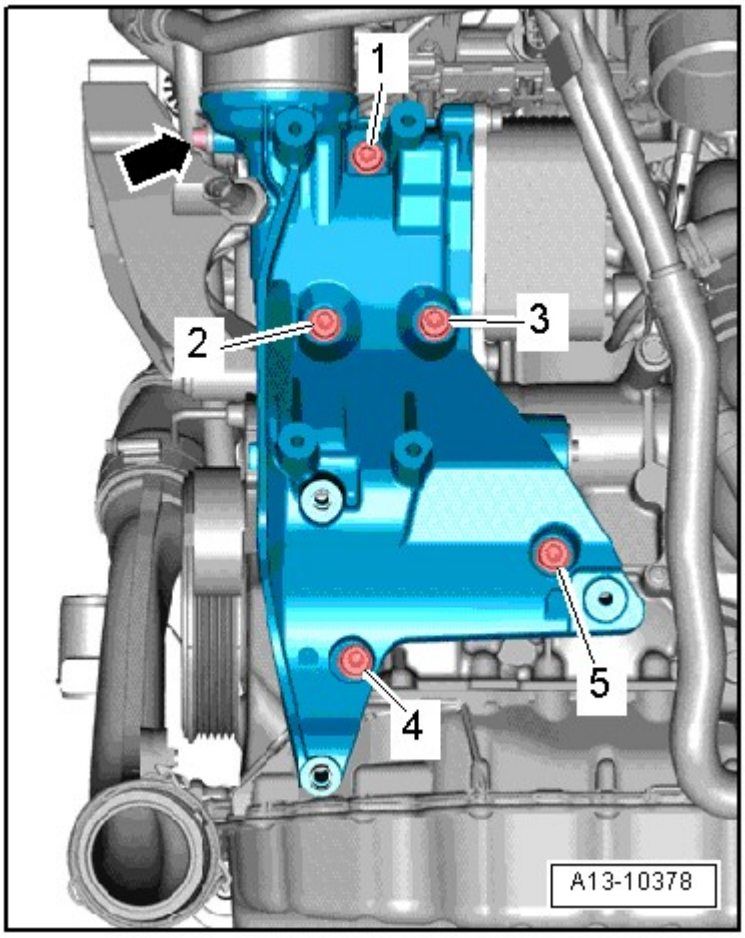

Fig. 44: Accessory Assembly Bracket Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -1 through 5- and pull off the accessory assembly bracket from the coolant pump housing.

Installing

- Tightening specifications, refer to **RIBBED BELT DRIVE ASSEMBLY OVERVIEW**.

Installation is in reverse order of removal, note the following:

NOTE: Replace bolts which have been tightened to an additional torque.

Replace the O-rings and seals.

Coat the O-rings -4- with coolant additive.

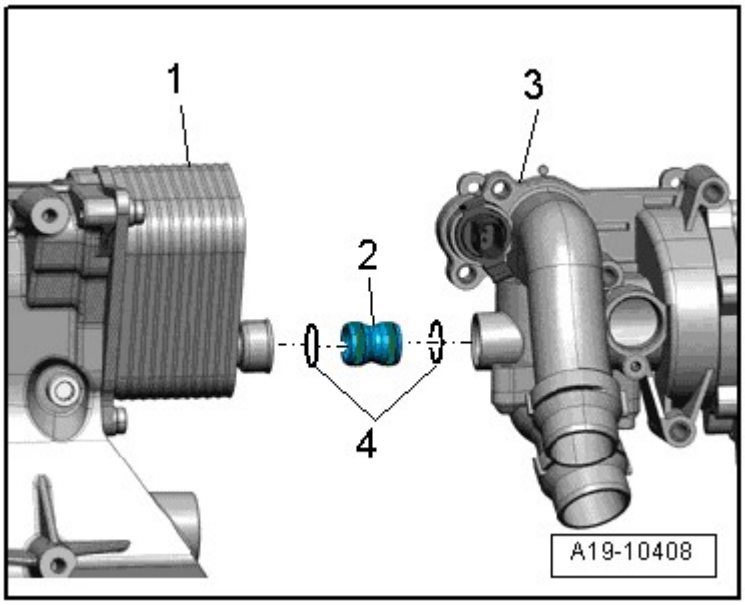

Fig. 45: Accessory Assembly Bracket, Coolant Pump Housing, Connection And O-Rings
Courtesy of AUDI OF AMERICA, LLC

-- Install the connection -2- in the coolant pump housing -3-.

-- Press the accessory assembly bracket -1- onto the connection, mount the bolts and tighten **RIBBED BELT DRIVE ASSEMBLY OVERVIEW Accessory Assembly Bracket Tightening Sequence**.

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

-- Install generator. Refer to **Removal and Installation** .

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

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

VIBRATION DAMPER

Special tools and workshop equipment required

- Locking Pin T10060 A
- Counter Hold Tool T10355

Removing

-- Remove the noise insulation in the center by loosening the fasteners -1 and 2-.

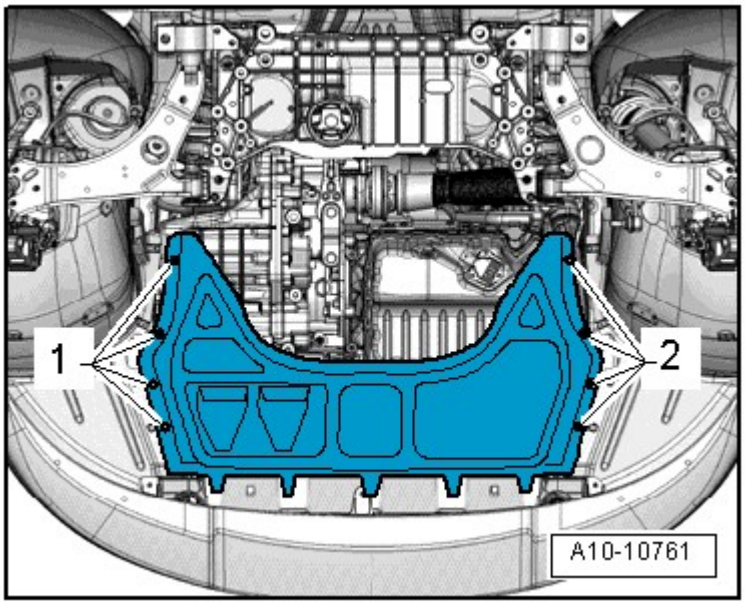

Fig. 46: Center Noise Insulation
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the fasteners -1, 2 and 3- and remove the right noise insulation.

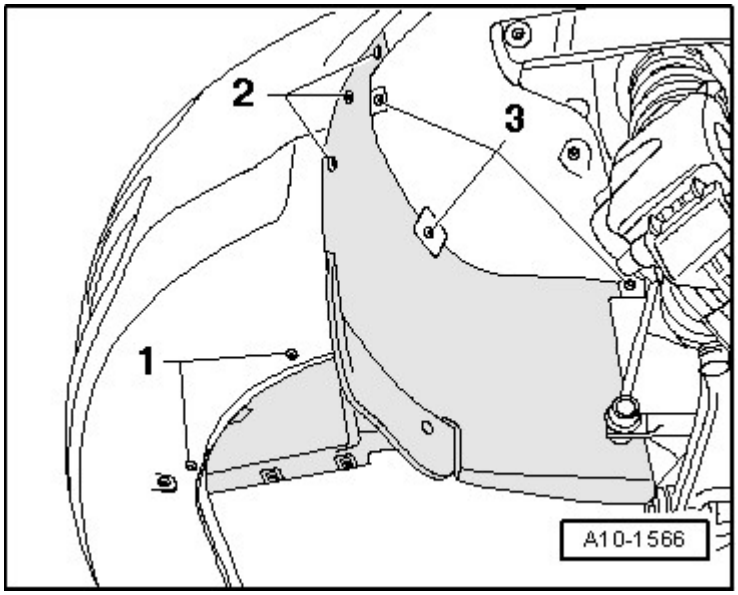

Fig. 47: Identifying Removal Of Left And Right Front Part Of Wheel Housing Liner
Courtesy of AUDI OF AMERICA, LLC

-- Remove bolts -arrows-.

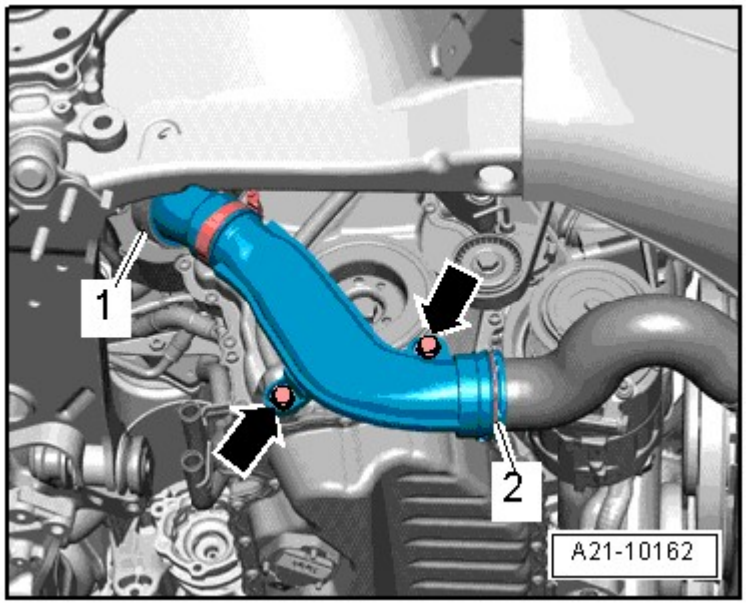

Fig. 48: Air Guide Pipe And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the air guide pipe by lifting the clamps -1 and 2-.

CAUTION: Risk of destroying due to reversed running direction on a used ribbed belt.

- **Before removing ribbed belt, marking running direction with chalk or felt-tip pen for reinstallation later.**

-- To release ribbed belt tension, rotate tensioner in direction of -arrow-.

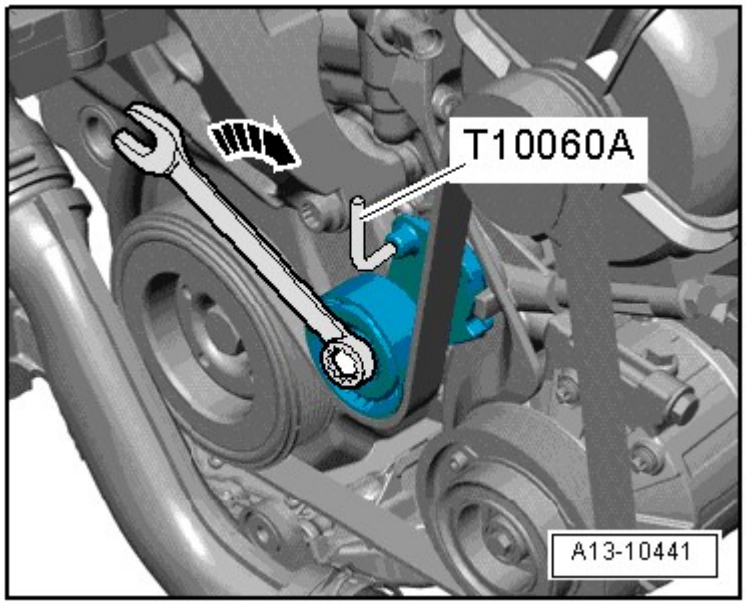

Fig. 49: Rotating Tensioner
Courtesy of AUDI OF AMERICA, LLC

-- Secure tensioner with T10060 A.

-- Remove ribbed belt from vibration damper ribbed belt pulley.

-- Rotate the vibration damper using the T10355 into the TDC position -arrow-.

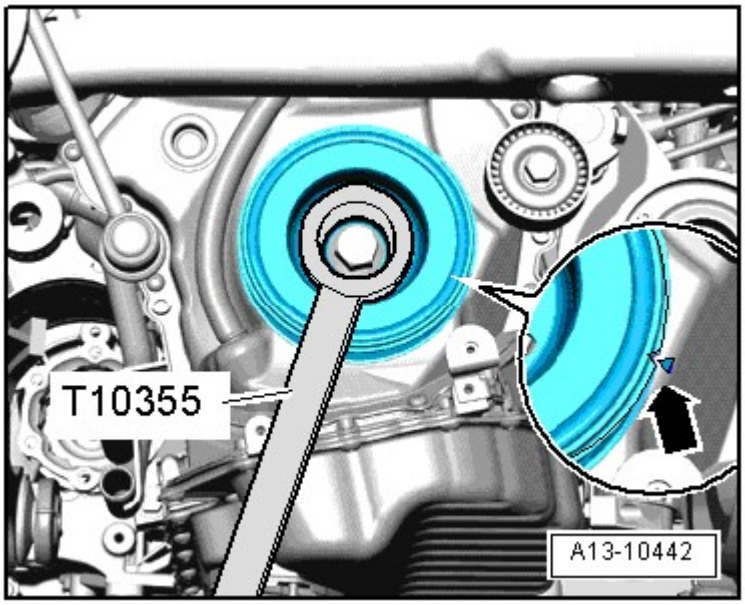

Fig. 50: Identifying Vibration Damper Rotated Into "OT" Position Using Counter Hold Tool T10355
Courtesy of AUDI OF AMERICA, LLC

- The notch on the vibration damper must line up with the arrow marking on the timing chain lower cover.

-- Remove vibration damper bolt using T10355.

CAUTION: The engine could be destroyed.

- **In order not to change the valve timing, the crankshaft must not be moved out of the TDC position when the vibration damper is removed.**

Installing

- Tightening specifications, refer to **RIBBED BELT DRIVE ASSEMBLY OVERVIEW**.

Installation is in reverse order of removal, note the following:

NOTE: Replace the vibration damper bolt.

Replace O-ring -1-.

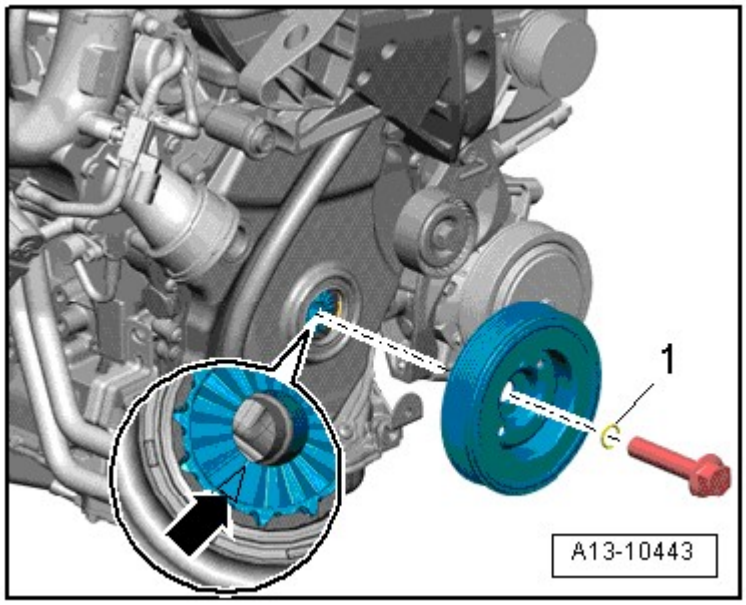

Fig. 51: Identifying O-Ring And Tooth Contour
Courtesy of AUDI OF AMERICA, LLC

-- Coat the sealing lip with transmission oil.

-- Mount the vibration damper; when doing this, pay attention to the tooth contour -arrow-.

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

DUAL MASS FLYWHEEL

Special tools and workshop equipment required

- Flywheel Retainer 3067

Removing

CAUTION: To prevent damage to 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 dual mass flywheel -A- so bolts -B- are centered to holes -arrows-.

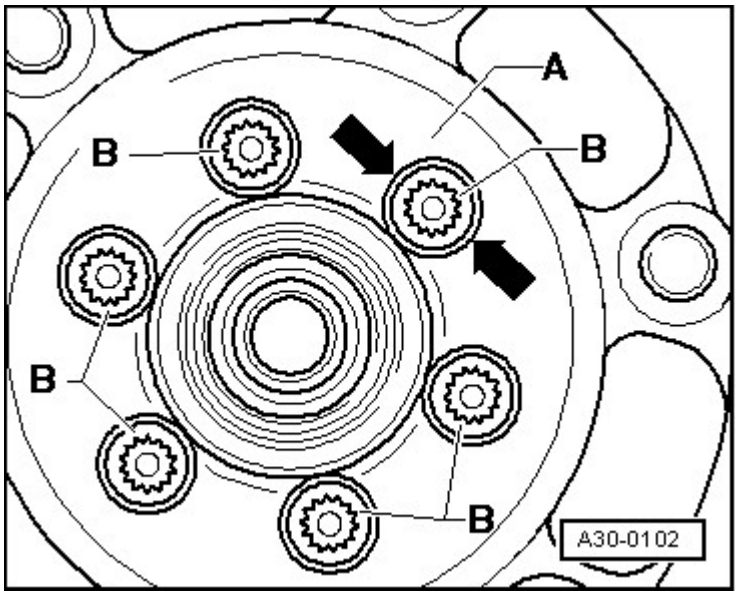

Fig. 52: Identifying Dual-Mass Flywheel & Bolts
Courtesy of AUDI OF AMERICA, LLC

-- When removing the bolts -B- make sure the bolt head does not come in contact with the dual mass flywheel -arrows- which would be damaged if the flywheel is turned further.

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

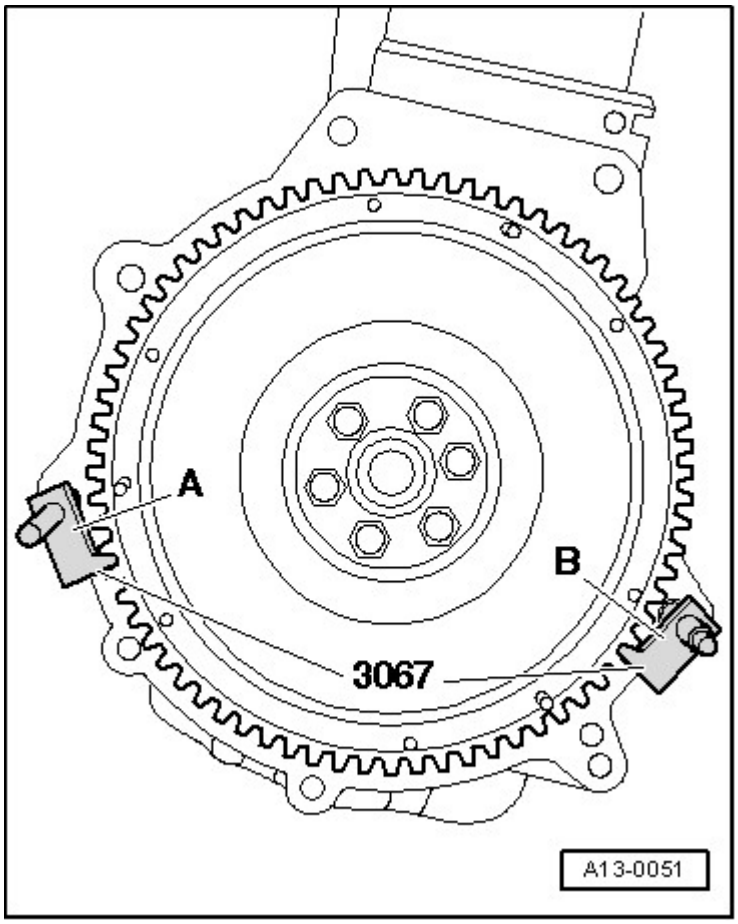

Fig. 53: Identifying Retainer -3067- Inserted In Hole On Cylinder Block
Courtesy of AUDI OF AMERICA, LLC

-- Remove the dual mass flywheel.

Installing

Installation is in reverse order of removal, note the following:

- Tightening specifications, refer to **TRANSMISSION-SIDE SEALING FLANGE AND DUAL-MASS FLYWHEEL ASSEMBLY OVERVIEW**.

-- Use new bolts.

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

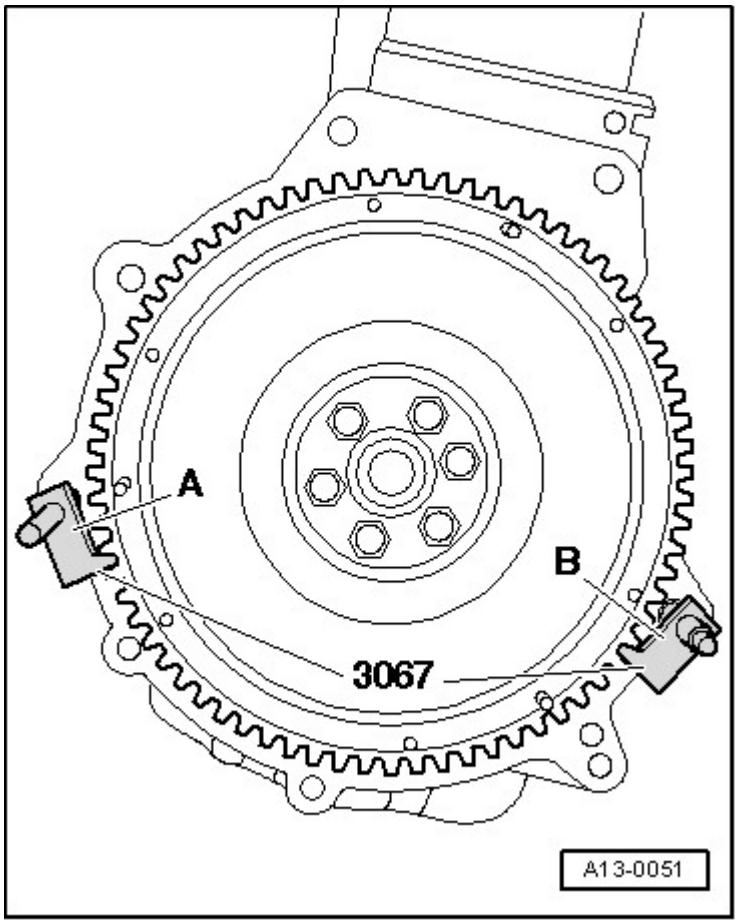

Fig. 54: Identifying Retainer -3067- Inserted In Hole On Cylinder Block
Courtesy of AUDI OF AMERICA, LLC

SEALING FLANGE, TRANSMISSION SIDE

Special tools and workshop equipment required

- Guide Sleeve T20097
- Hand drill with plastic brush attachment.
- Protective eyewear

Removing

- Transmission removed.

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

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

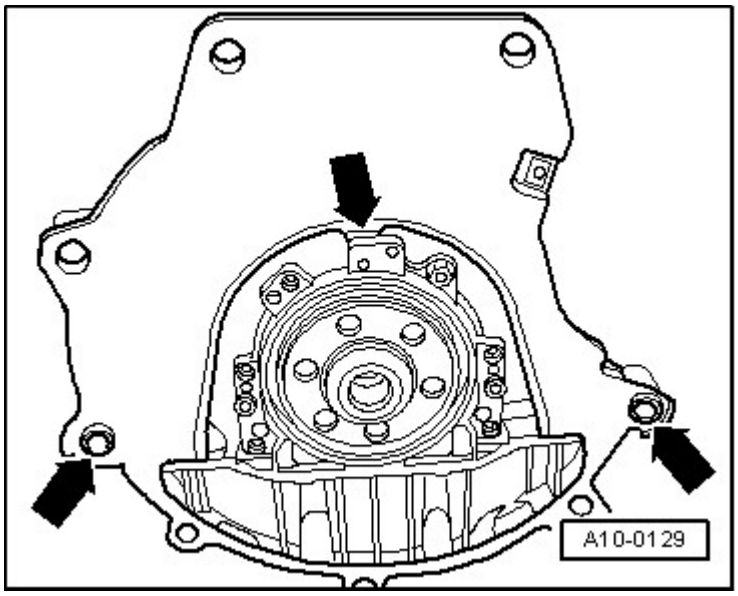

Fig. 55: Identifying Intermediate Plate Alignment Bushings
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -1 through 8-

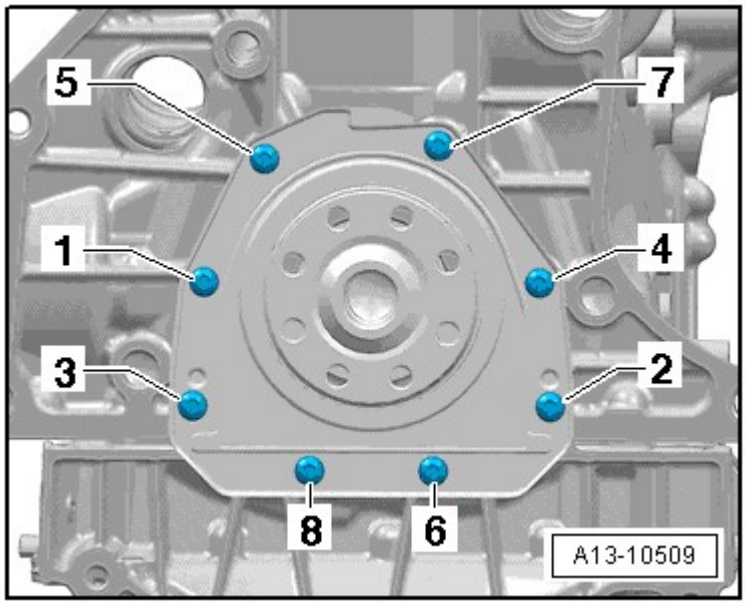

Fig. 56: Identifying Sealing Flange Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Remove the transmission side sealing flange.

Installing

- Tightening specifications, refer to **TRANSMISSION-SIDE SEALING FLANGE AND DUAL-MASS FLYWHEEL ASSEMBLY OVERVIEW**.

NOTE: Note the expiration date of the silicone sealant.

The sealing flange must be installed within 5 minutes after the silicone sealant has been applied.

-- Remove any sealant residue on the cylinder block using a flat blade scraper.

WARNING: Risk of eye injury.

- **Wear safety glasses.**

-- Remove remaining sealant on sealing flange using for example a rotating plastic brush.

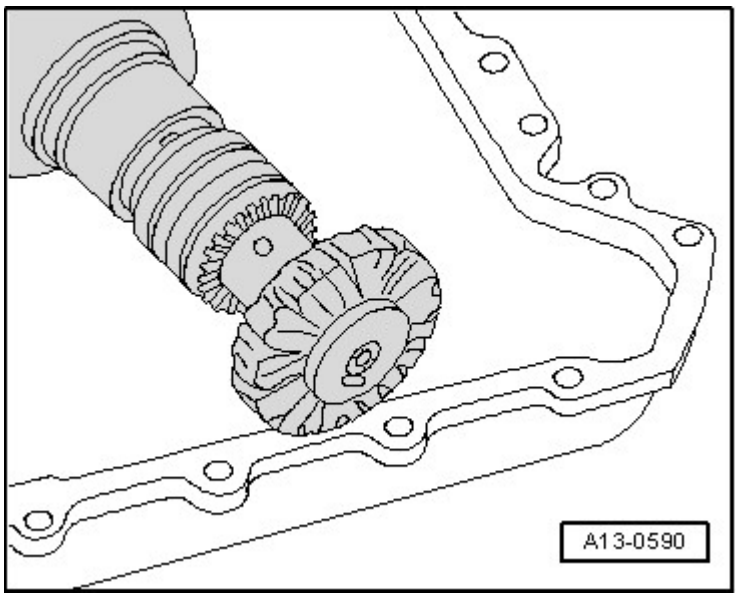

Fig. 57: Identifying Rotating Plastic Brush To Remove Sealant Residue From Sealing Flange, Cylinder Block And Upper Part Of Oil Pan
Courtesy of AUDI OF AMERICA, LLC

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

-- Cut tube nozzle at front marking (jet dia. approximately 2 mm).

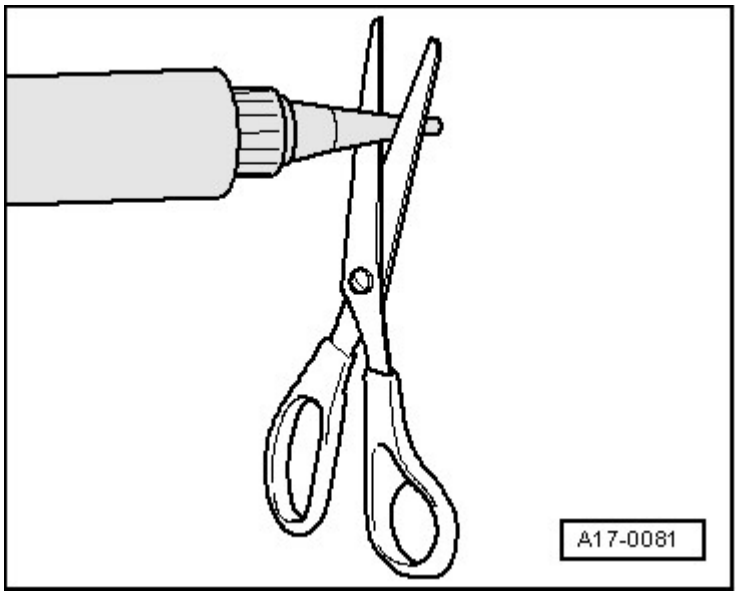

Fig. 58: Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 3 Mm)
Courtesy of AUDI OF AMERICA, LLC

-- Apply the silicone sealant on the clean sealing surface of the cover as illustrated.

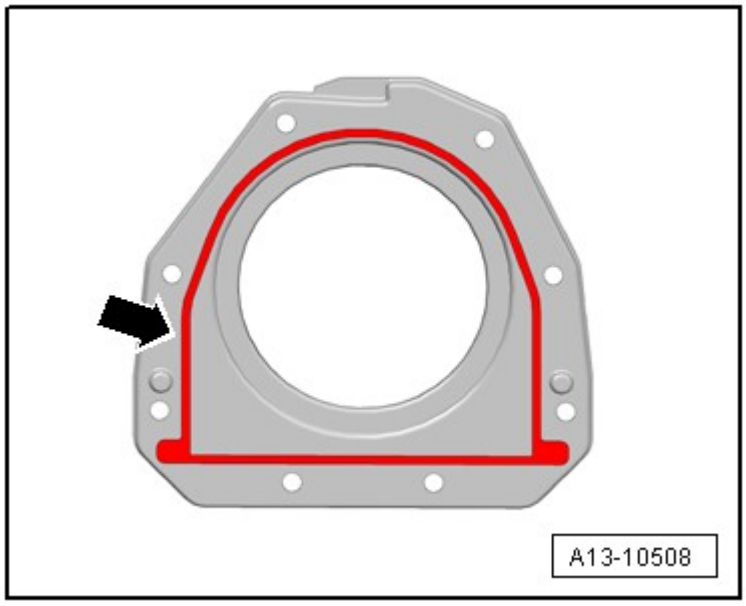

Fig. 59: Identifying Silicone Sealant Applied On Cover Sealing Surface
Courtesy of AUDI OF AMERICA, LLC

- Sealant bead thickness: 2 to 3 mm.

NOTE: The sealing flange must be installed within 5 minutes after the silicone sealant has been applied.

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

-- Position the T20097 on the crankshaft pins.

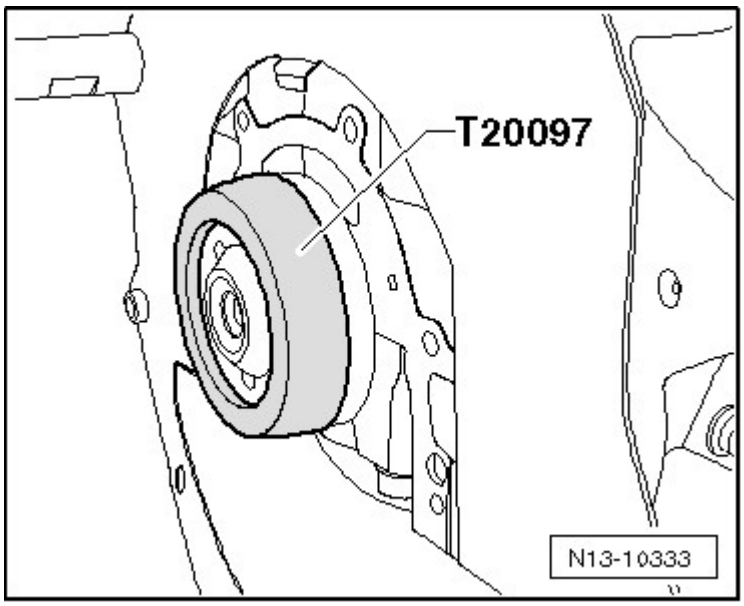

Fig. 60: Identifying Guide Sleeve On Crankshaft
Courtesy of AUDI OF AMERICA, LLC

-- Slide the sealing flange on the crankshaft flange using the T20097 and tighten the bolts right away, tightening sequence **TRANSMISSION-SIDE SEALING FLANGE AND DUAL-MASS FLYWHEEL ASSEMBLY OVERVIEW**.

NOTE: After installing sealing flange, the sealant must dry for approximately 30 minutes. Only after then may the engine oil be replenished.

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

SENSOR WHEEL

-- Remove engine.

-- Remove the transmission-side sealing flange. Refer to **TRANSMISSION-SIDE SEALING FLANGE**.

-- Remove the upper section of the oil pan. Refer to **OIL PAN, UPPER SECTION** .

-- Remove the balance shaft timing chain. Refer to **BALANCE SHAFT TIMING CHAIN** .

-- Remove the connecting rod bearing cover.

-- Remove the crankshaft bearing cover.

-- Remove the crankshaft and then remove the sensor wheel.

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

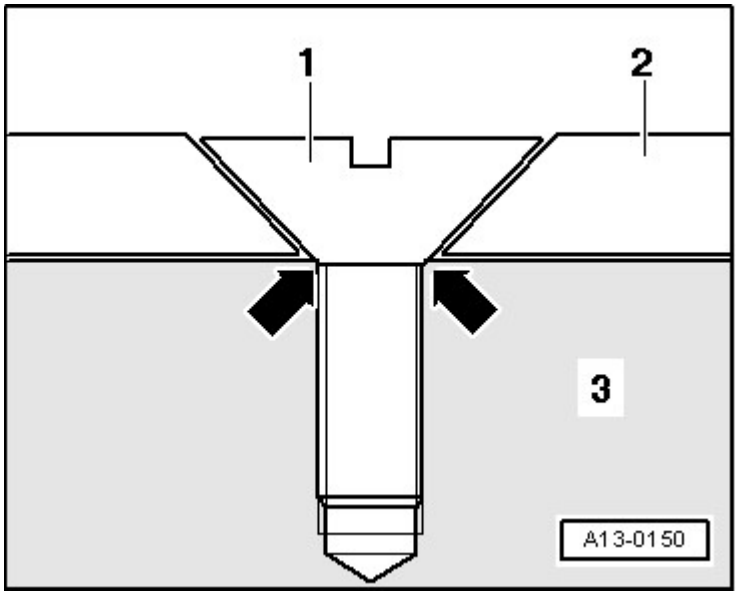

Fig. 61: Identifying Attachment Points, Countersunk Screws, Crankshaft & Sensor Wheel
Courtesy of AUDI OF AMERICA, LLC

NOTE: **After tightening a second time, the attachment point of the countersunk bolts of the sensor wheel are so deformed that the bolt 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 ASSEMBLY OVERVIEW**.

NEEDLE BEARINGS, REMOVING FROM CRANKSHAFT AND INSTALLING

Only for vehicles equipped with Automatic Transmission

Special tools and workshop equipment required

- Puller T10055 with Adapter T10055/3
- Centering Mandrel 3176 or Drift Piston Pin VW 207 C
- Extractor for example: Kukko Extractor 14.5-18.5 mm -21/2

Removing

-- Remove with standard puller, for example Kukko21/2 -arrow-, T10055/3 and T10055.

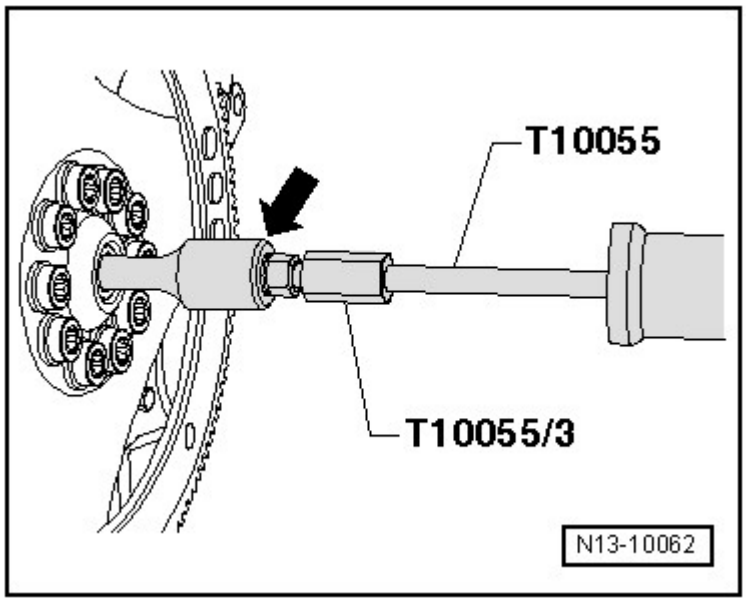

Fig. 62: Identifying Standard Extractor E.G. Kukko 21/2, Adapter T10055/3 And Puller T10055
Courtesy of AUDI OF AMERICA, LLC

Installing:

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

-- Drive in using VW 207 C or 3176.

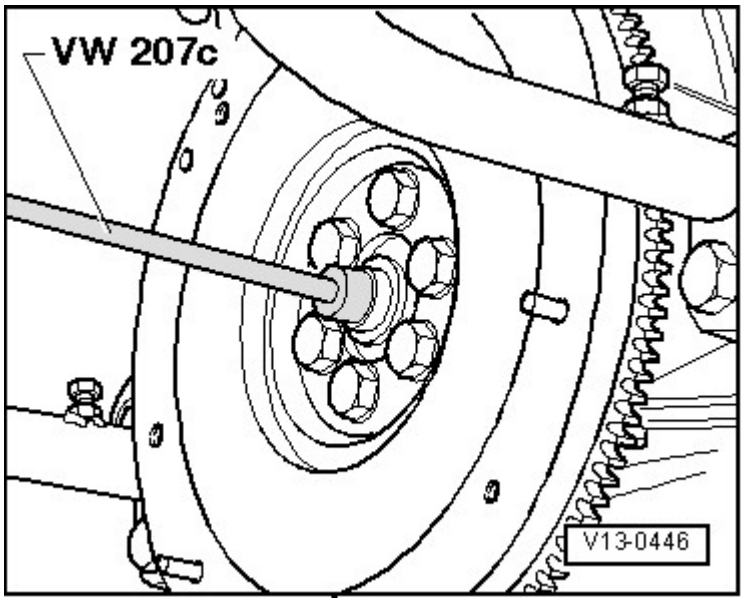

Fig. 63: Driving In Needle Bearing Using Drift VW 207 C
Courtesy of AUDI OF AMERICA, LLC

Installation depth dimension -a- = 2 mm

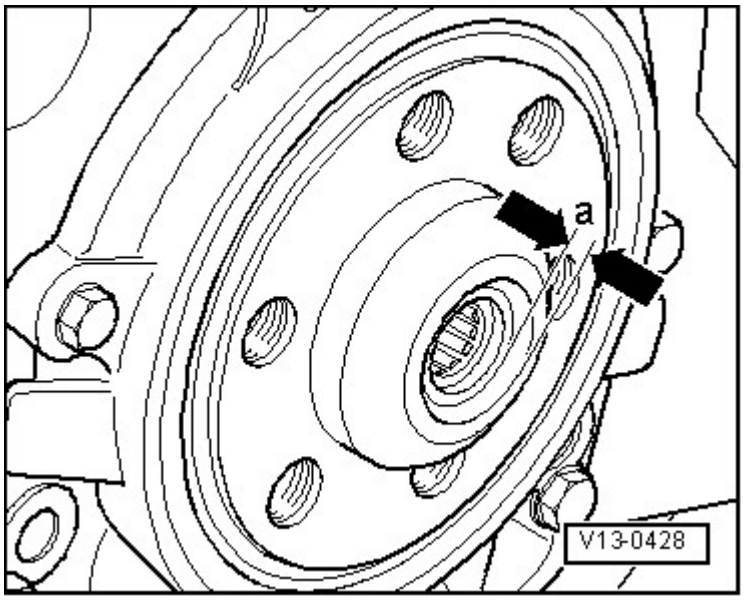

Fig. 64: Identifying Installation Depth Dimension
Courtesy of AUDI OF AMERICA, LLC

PISTONS

Special tools and workshop equipment required

- Pilot Drift VW 222 A
- Engine and Transmission Holder VAS 6095
- Piston ring compressor, commercially available

Removing

- Removing engine. Refer to

Secure engine to the VAS 6095-. Refer to

- Remove the cylinder head.

-
-

Remove the upper oil pan. Refer to

- Mark installed position and cylinder allocation

- Mark installed position and connecting rod cylinder -item 11- **PISTONS AND CONNECTING ROD OVERVIEW**

- Remove the connecting rod bearing cap and pull the piston and connecting rod upward.

NOTE: **Warm the piston to approximately 60 °C (140 °F) if it is difficult to move the piston pin.**

- Remove the locking ring from the eye of the piston bolt.

- Remove the piston pin using VW 222 A

Installing

Install in reverse order of removal. Note the following:

- Tightening specifications, refer to **PISTONS AND CONNECTING ROD OVERVIEW**

NOTE:

- **Replace any bolts that were tightened with an additional turn.**
- **Arrow on piston face points toward belt pulley side.**
- **Offset the piston ring gap by 120°.**

- Coat the contact surfaces on the bearing shells with oil.

- Install the piston with a piston ring compressor. Pay attention to the installed position -item 8- **PISTONS AND CONNECTING ROD OVERVIEW**

- Install the connecting rod bearing cap. Pay attention to the installed position -item 2- **PISTONS AND CONNECTING ROD OVERVIEW**

- Install the cylinder head:

-
-

Install the upper oil pan. Refer to

SPECIAL TOOLS

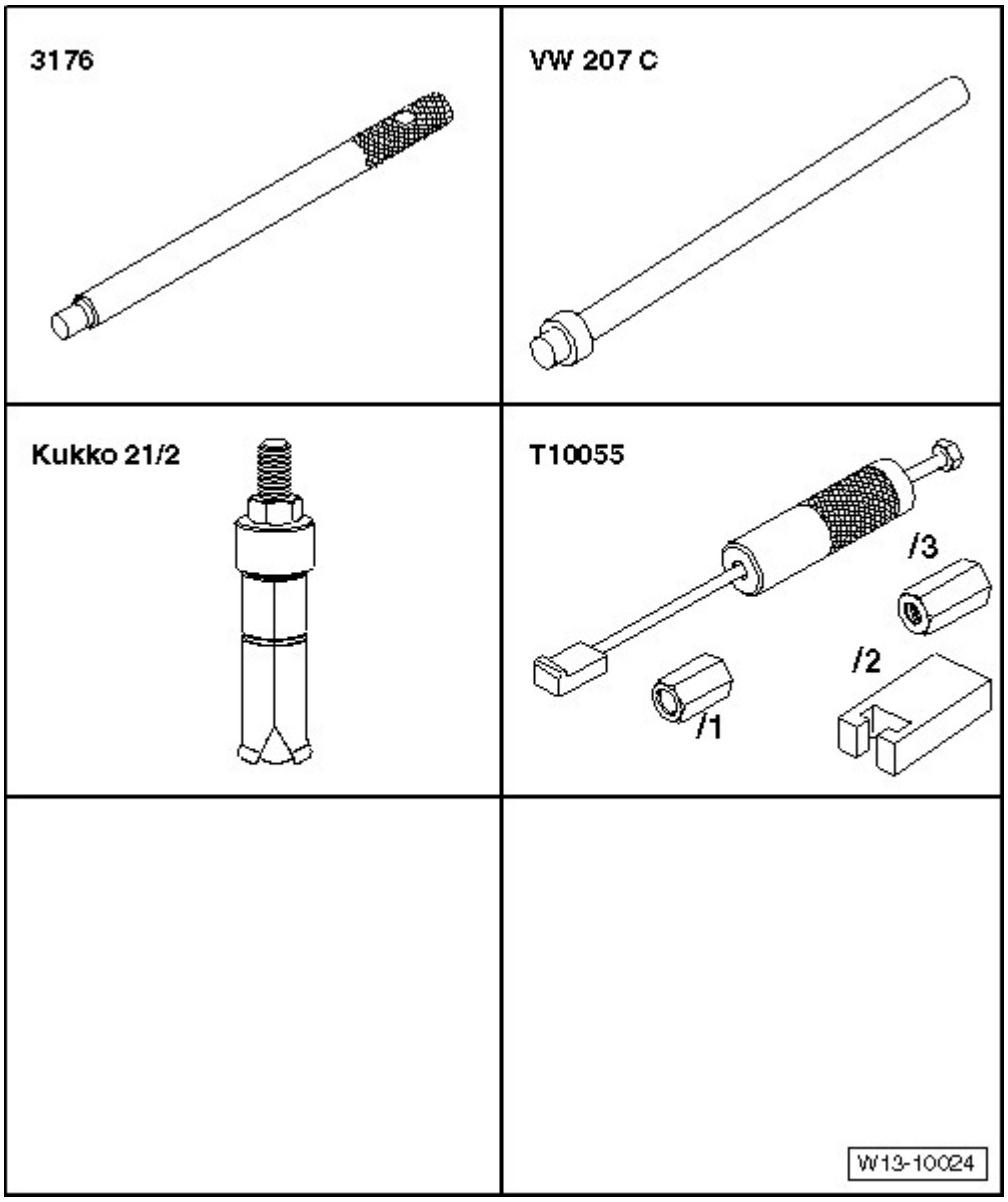

Fig. 65: Identifying Centering Mandrel 3176 And Special Tools
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Puller T10055 with Adapter T10055/3
- Centering Mandrel 3176 or Drift Piston Pin VW 207 C
- Extractor for example Kukko21/2

Special tools and workshop equipment required

- Dial Gauge Holder VW 387

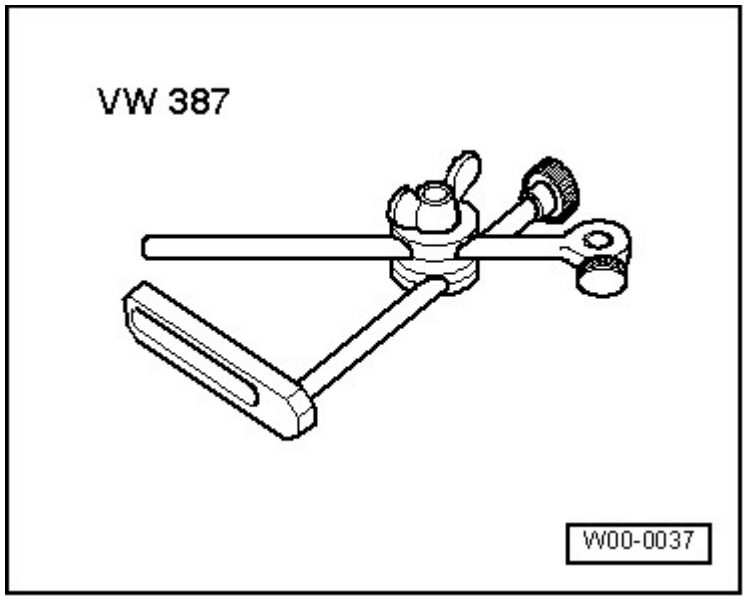

Fig. 66: Dial Gauge Holder VW 387
Courtesy of AUDI OF AMERICA, LLC

- Dial Gauge VAS 6079

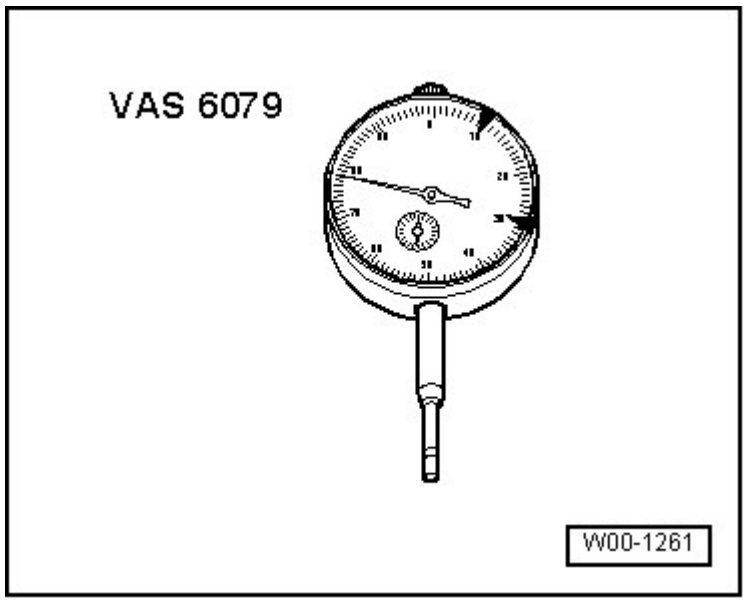

Fig. 67: Dial Gauge VAS 6079
Courtesy of AUDI OF AMERICA, LLC

- Locking Pin T10060A

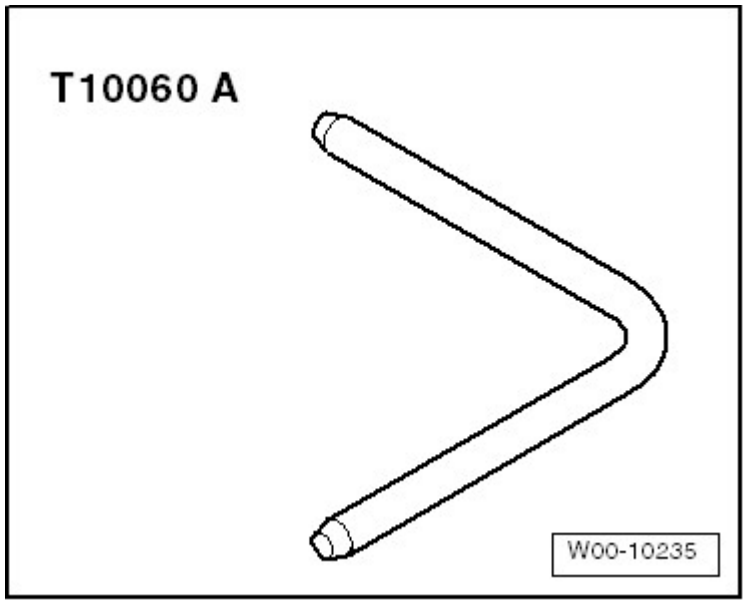

Fig. 68: Identifying Locking Pin T10060 A
Courtesy of AUDI OF AMERICA, LLC

- Engine Support Bridge 10 - 222 A with Spindle 10 - 222 A /11

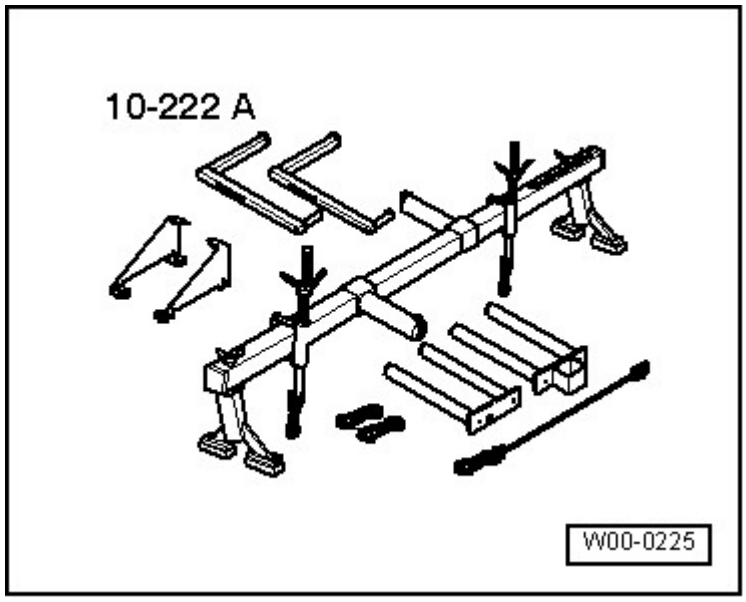

Fig. 69: Engine Support Bridge 10 - 222 A
Courtesy of AUDI OF AMERICA, LLC

- Engine Sling 2024 A

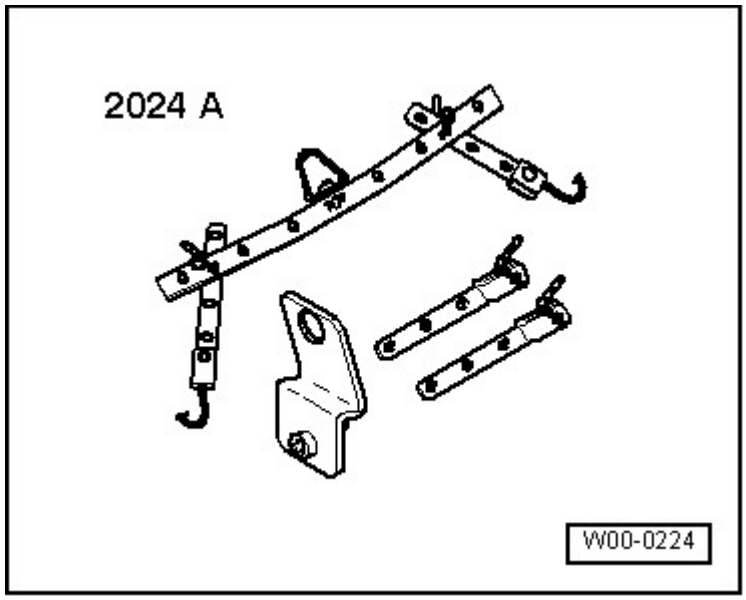

Fig. 70: Engine Sling 2024 A
Courtesy of AUDI OF AMERICA, LLC

- Counter Hold Tool T10355

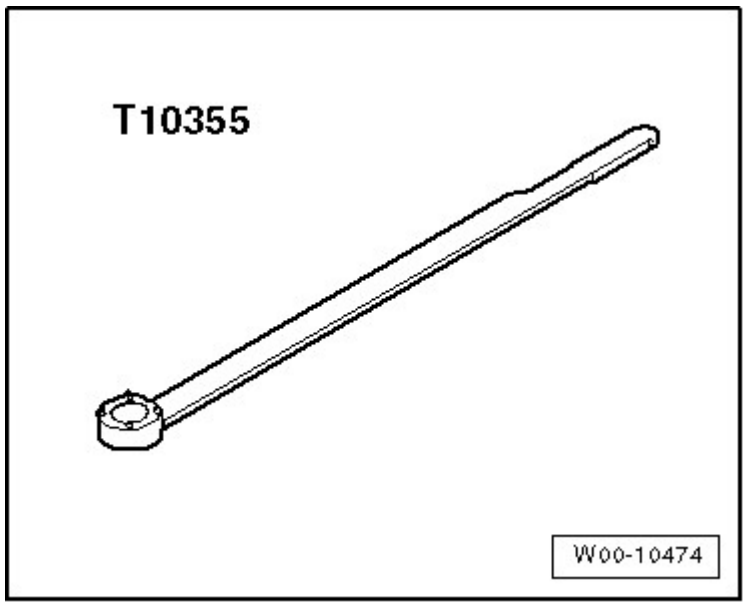

Fig. 71: Counter-Holder Tool T10355
Courtesy of AUDI OF AMERICA, LLC

- Flywheel Retainer 3067

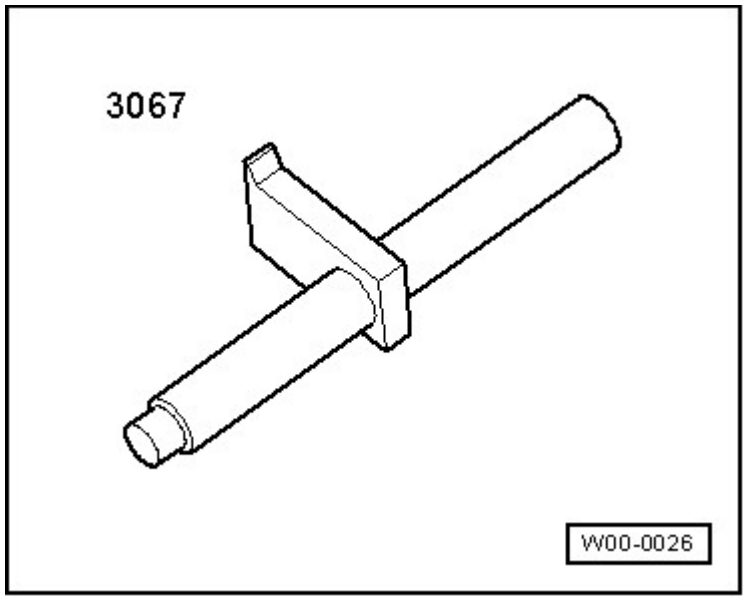

Fig. 72: 3067 Counter-Hold Tool
Courtesy of AUDI OF AMERICA, LLC

- Guide Sleeve T20097

ENGINE

2.0 Liter - Cylinder Head, Valvetrain - Engine Code(s): CBFA & CCTA

15 CYLINDER HEAD, VALVETRAIN

DESCRIPTION AND OPERATION

TIMING CHAINS GUARD, CAMSHAFT ADJUSTMENT VALVE 1 -N205- OVERVIEW

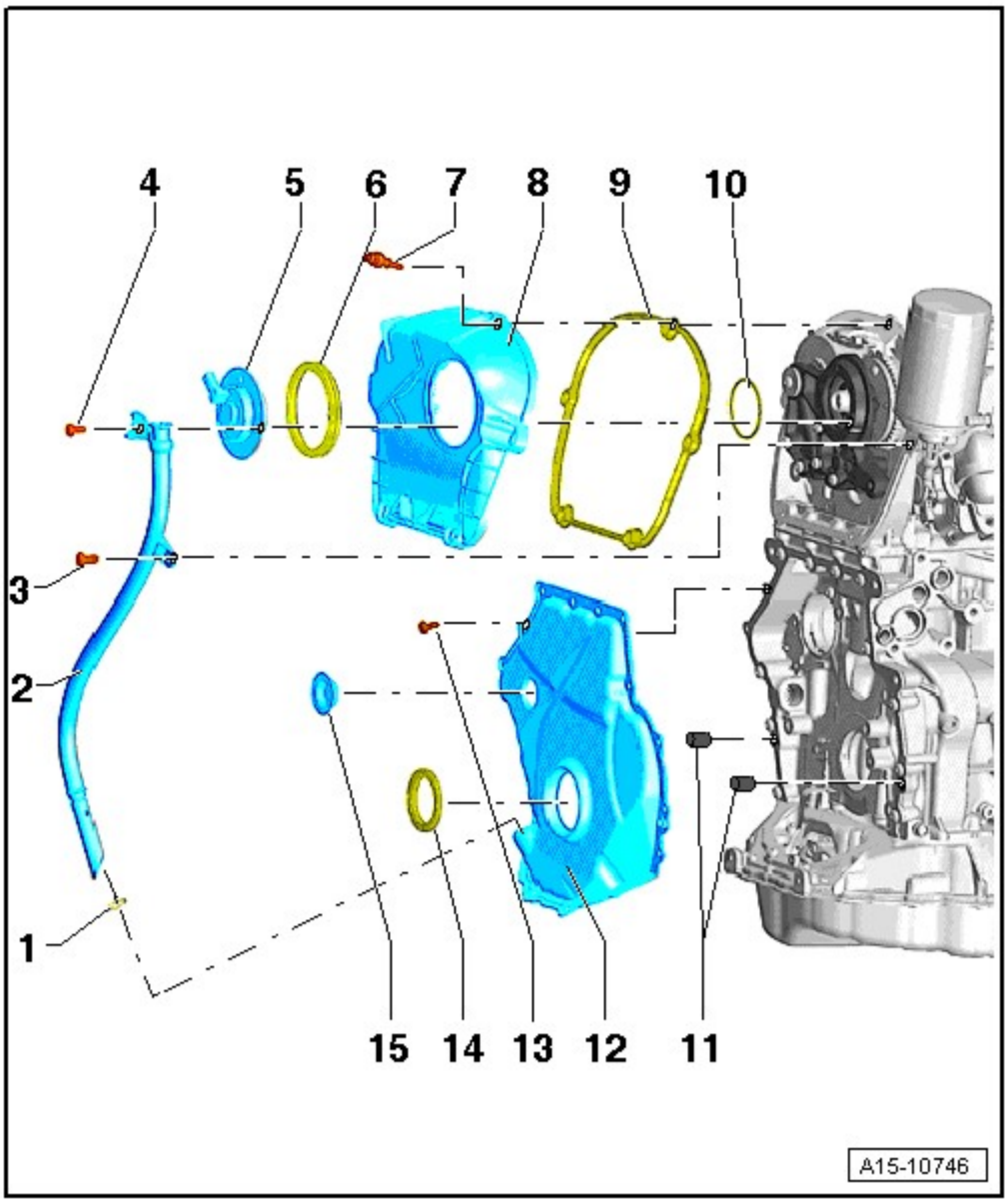

Fig. 1: Identifying Assembly Overview: Timing Chain Covers
Courtesy of AUDI OF AMERICA, LLC

1. O-ring
   - Replace
   - Coat with oil before installing
2. Oil Dipstick Guide Tube
3. Bolt
   - 9 Nm
4. Bolt
   - 9 Nm
5. Camshaft Adjustment Valve 1 -N205-
   - Removing and installing, refer to **CAMSHAFT ADJUSTMENT VALVE**
6. Seal
   - Coat with oil before installing
   - Replace if damaged
7. Bolt
   - Tightening order **TIMING CHAIN COVER ASSEMBLY OVERVIEW**
8. Upper Timing Chain Cover
   - Removing and installing, refer to **TIMING CHAIN COVER ASSEMBLY OVERVIEW**
9. Seal
   - replace if damaged
10. O-ring
    - Replace
    - Oil before assembling
11. Alignment Pins
    - Centering the cover
12. Lower Timing Chain Cover
    - Removing and installing, refer to **LOWER TIMING CHAIN COVER**
13. Bolt
    - Replace
    - Tightening order **TIMING CHAIN COVER ASSEMBLY OVERVIEW**
14. Shaft Seal
    - For the vibration damper
    - Replacing, refer to **VIBRATION DAMPER SHAFT SEAL**.
15. Plug
    - Replace

TIMING CHAIN UPPER COVER - TIGHTENING SEQUENCE

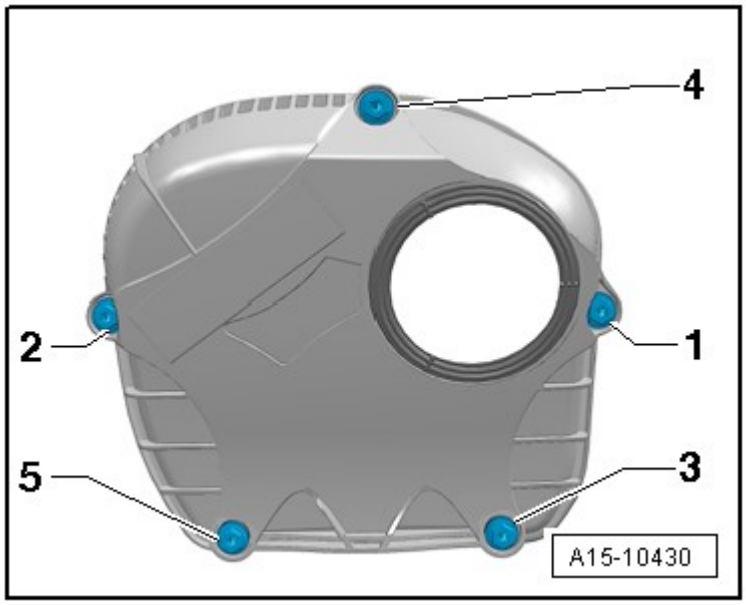

Fig. 2: Identifying Upper Timing Chain Cover - Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts -1 through 5- in the sequence shown:

-- Tighten the bolts to 9 Nm.

TIMING CHAIN LOWER COVER TIGHTENING SEQUENCE

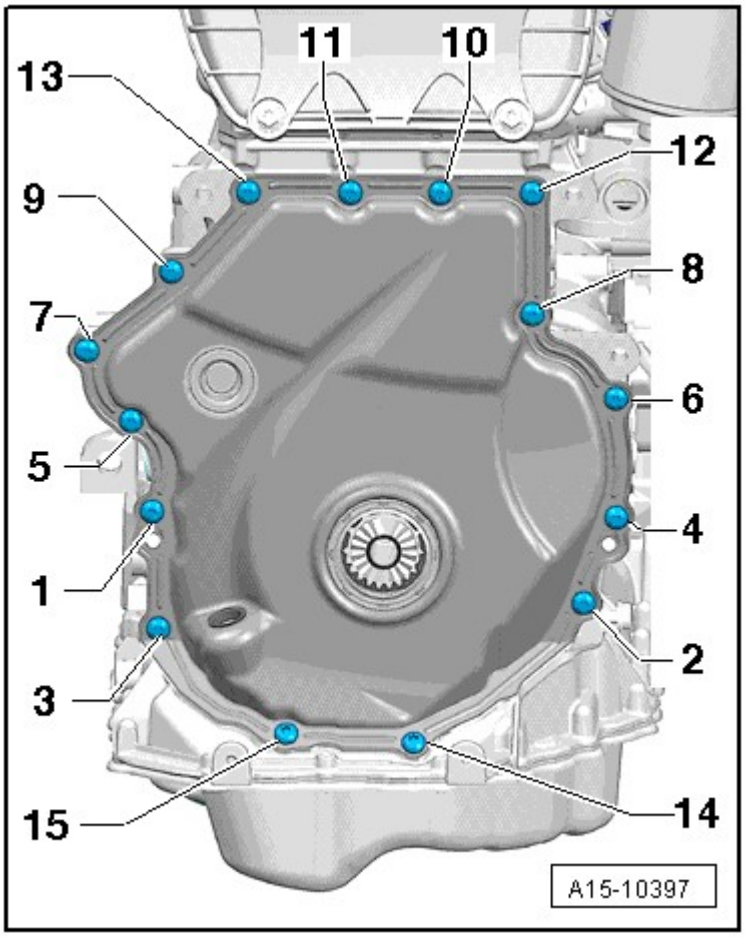

Fig. 3: Identifying Timing Chain Lower Cover Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts -1 through 15 - in 2 stages in the sequence shown:

-- 1. Tighten the bolts to 9 Nm.

-- 2. Tighten the bolts an additional 45°.

Timing Chain Guard Lower Section - Tightening Sequence for 8 Bolts

- Tighten the bolts -1 through 8- in 2 stages

1. Tighten the bolts to 4 Nm.

2. Tighten the bolts an additional 45°.

CAMSHAFT TIMING CHAIN OVERVIEW

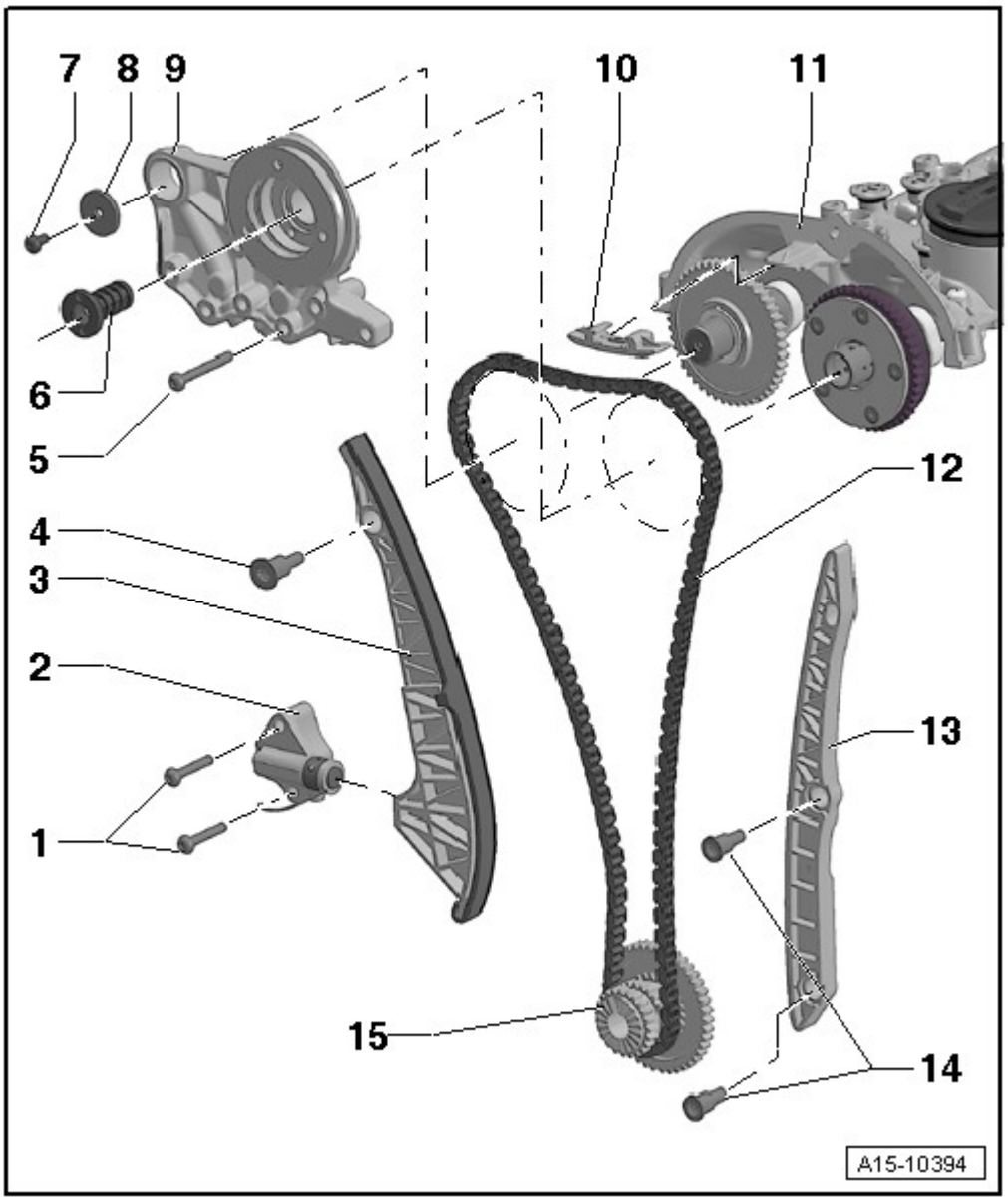

Fig. 4: Camshaft Timing Chain Assembly Overview
Courtesy of AUDI OF AMERICA, LLC

1. Bolt
    - 9 Nm
2. Chain Tensioner
    - Is under tension
    - Disconnect the locking pin T40011 before removing
3. Timing Chain Tensioning Rail
4. Guide Bolt
    - 20 Nm
5. Bolt

- 9 Nm

6. Control Valve
   - 35 Nm
   - Left thread
   - On engine codes CBFA and CCTA with assembly tool T10352
7. Bolt
   - Replace
   - M6: 8 Nm plus and additional 90° turn
   - M8: 20 Nm plus and additional 90° turn
   - Replace
8. Washer
9. Bearing Bracket
10. Camshaft Timing Chain Guide Rail
11. Camshaft Housing
12. Camshaft Timing Chain
    - Before removing, mark the direction of rotation with paint
13. Camshaft Timing Chain Guide Rail
14. Guide Bolt
    - 20 Nm
15. Three Stage Chain Sprocket
    - Crankshaft
    - Installed location **CAMSHAFT TIMING CHAIN ASSEMBLY OVERVIEW**

CHAIN SPROCKET CRANKSHAFT, INSTALLATION POSITION

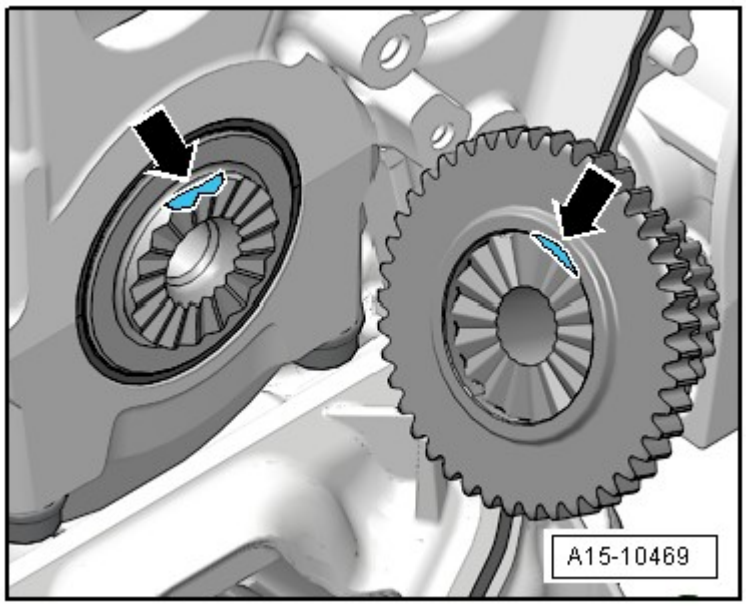

Fig. 5: Identifying Chain Sprocket Crankshaft, Installation Position
Courtesy of AUDI OF AMERICA, LLC

- Both surfaces must -arrows- must line up across from each other.

BALANCE SHAFT TIMING CHAIN ASSEMBLY OVERVIEW

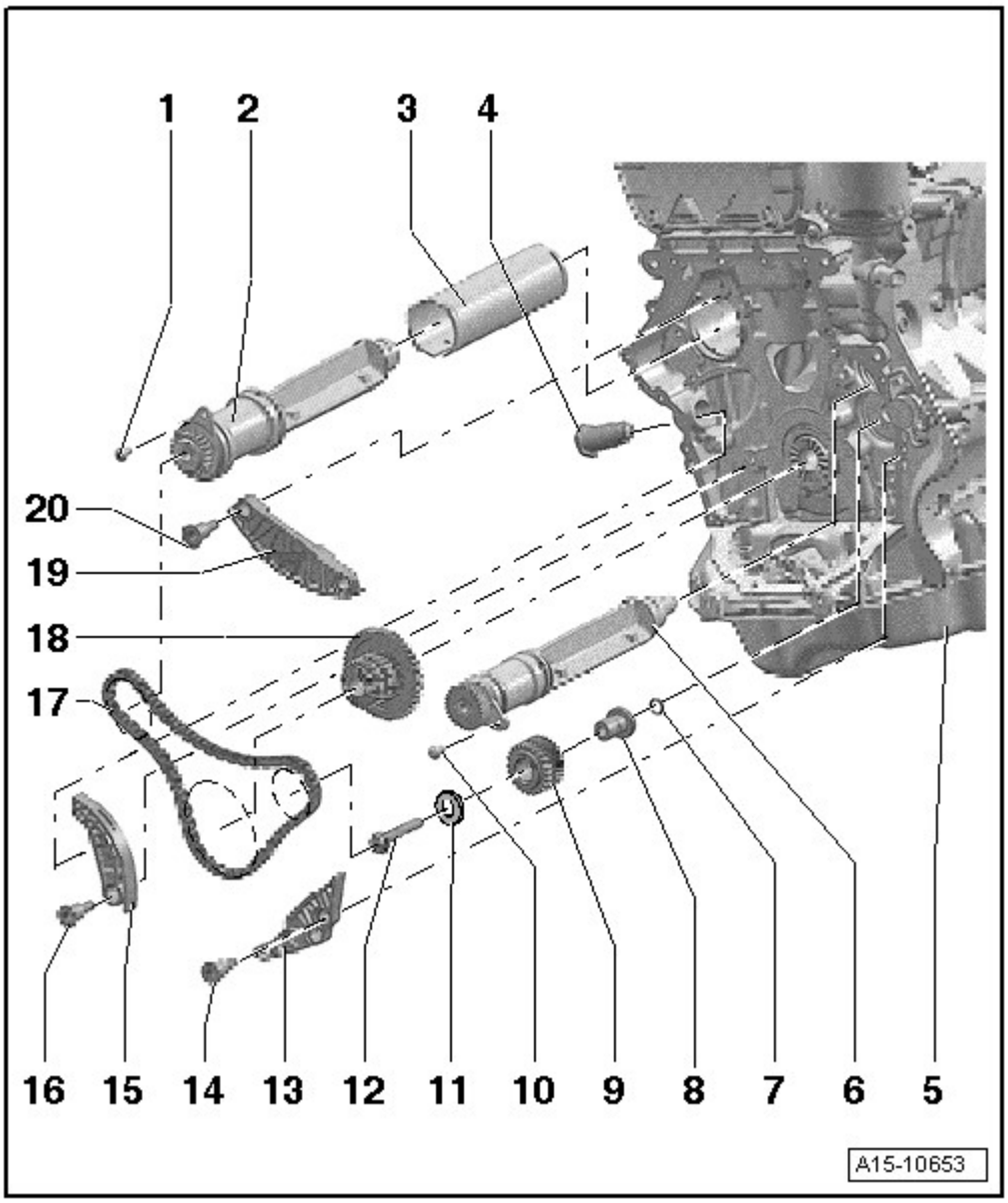

Fig. 6: Identifying Balance Shaft Timing Chain Component Overview
Courtesy of AUDI OF AMERICA, LLC

1. Bolt
    - Replace
    - 9 Nm

2. Balance Shaft
   - Exhaust side
   - Replace after removing
   - Lubricate the bearing with engine oil
   - Replacing, refer to **EXHAUST CAMSHAFT BALANCE SHAFT**.
3. Pipe for the Balance Shaft
   - Installed location **BALANCE SHAFT TIMING CHAIN ASSEMBLY OVERVIEW**
4. Chain Tensioner
   - 65 Nm
5. Cylinder Block
6. Balance Shaft
   - Intake side
   - Replace after removing
   - Lubricate the bearing with engine oil
   - Replacing, refer to **INTAKE CAMSHAFT BALANCE SHAFT**.
7. O-ring
   - Lubricate with engine oil
8. Mounting Pin
   - Lubricate with engine oil
   - Installed location **BALANCE SHAFT TIMING CHAIN ASSEMBLY OVERVIEW**
9. Intermediate Shaft Sprocket
   - For the balance shaft
   - The intermediate shaft sprocket must be replaced if the bolt -12- is loosened.
10. Bolt
    - Replace
    - 9 Nm
11. Washer
12. Bolt
    - The intermediate shaft sprocket must be replaced if the bolt -9- is loosened.
    - Tightening order **INTERMEDIATE SHAFT SPROCKET TIGHTENING SEQUENCE**
13. Guide Rail
    - For timing chain
14. Guide Pins
    - 20 Nm
15. Tensioning Rail
    - For timing chain
16. Guide Pins
    - 20 Nm

17. Timing Chain
    - Removing, refer to **BALANCE SHAFT TIMING CHAIN**
18. Chain Sprocket
    - Installed location **CAMSHAFT TIMING CHAIN ASSEMBLY OVERVIEW**
19. Guide Rail
    - For the balance shaft timing chain
20. Guide Pins
    - 20 Nm

PIPE FOR THE BALANCE SHAFT - INSTALLATION POSITION

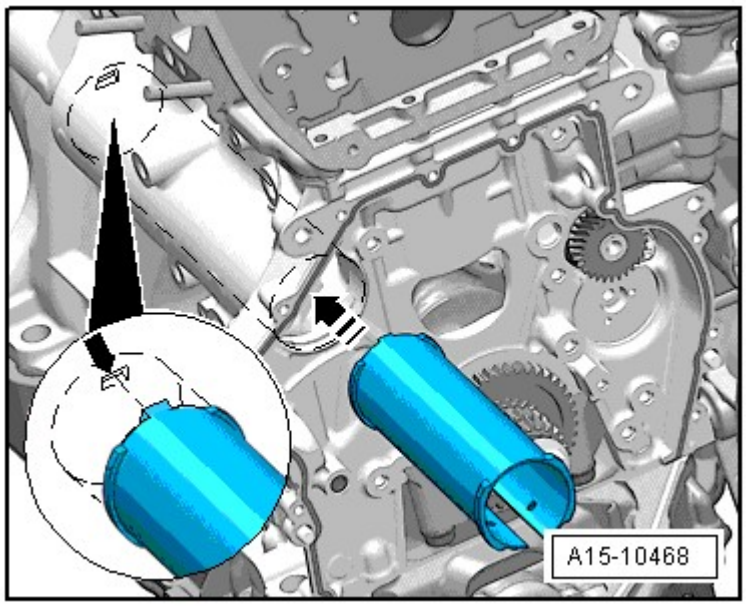

Fig. 7: Identifying Pipe For Balance Shaft - Installation Position
Courtesy of AUDI OF AMERICA, LLC

- The pin from the balance shaft pipe must fit into the groove -arrow-

BEARING PINS, INSTALLATION POSITION

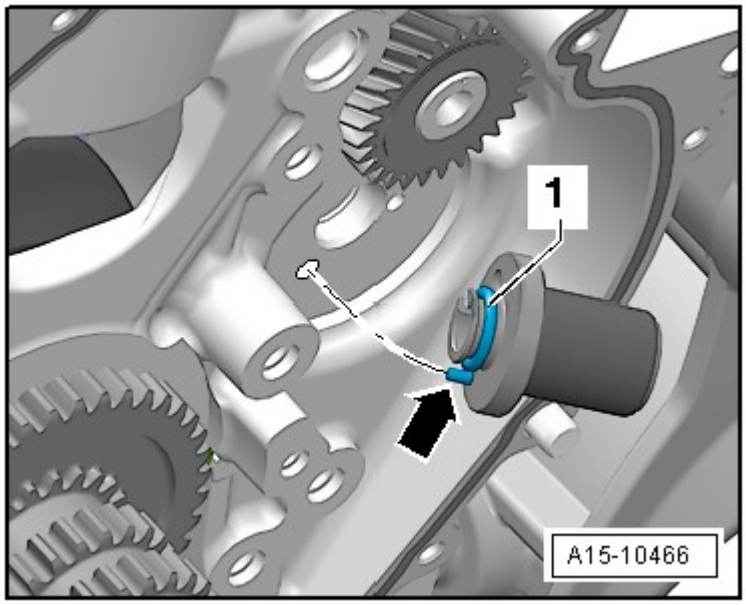

Fig. 8: Identifying Bearing Pins, Installation Position
Courtesy of AUDI OF AMERICA, LLC

- Replace and lubricate the O-ring -1-
- The alignment pin -arrow- for the bearing pins must engage in the hole in the cylinder block.
- Lubricate the bearing pins

INTERMEDIATE SHAFT SPROCKET TIGHTENING SEQUENCE

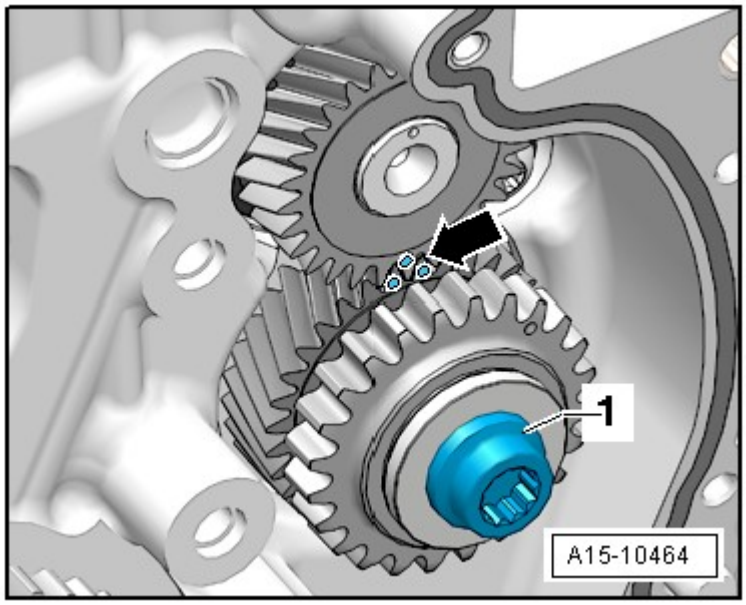

Fig. 9: Identifying Intermediate Shaft Sprocket
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Always replace the intermediate shaft sprocket. Otherwise the backlash will not adjust itself and it could result in engine damage.

The new intermediate shaft sprocket has an anti-friction coating that wears off after a short period of use, which automatically adjusts the backlash.

-- Tighten with a new bolt as follows:

-- Tighten to 10 Nm using a torque wrench.

-- Rotate the intermediate shaft sprocket.

The intermediate shaft sprocket must not have any play. Loosen and tighten it again if necessary.

-- Tighten to 25 Nm using a torque wrench.

-- Tighten further 90° using a rigid wrench.

CYLINDER HEAD ASSEMBLY OVERVIEW

NOTE: Replace cylinder head bolts.

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

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

It is necessary to replace all the coolant and engine oil whenever the cylinder head or the cylinder head gasket are replaced.

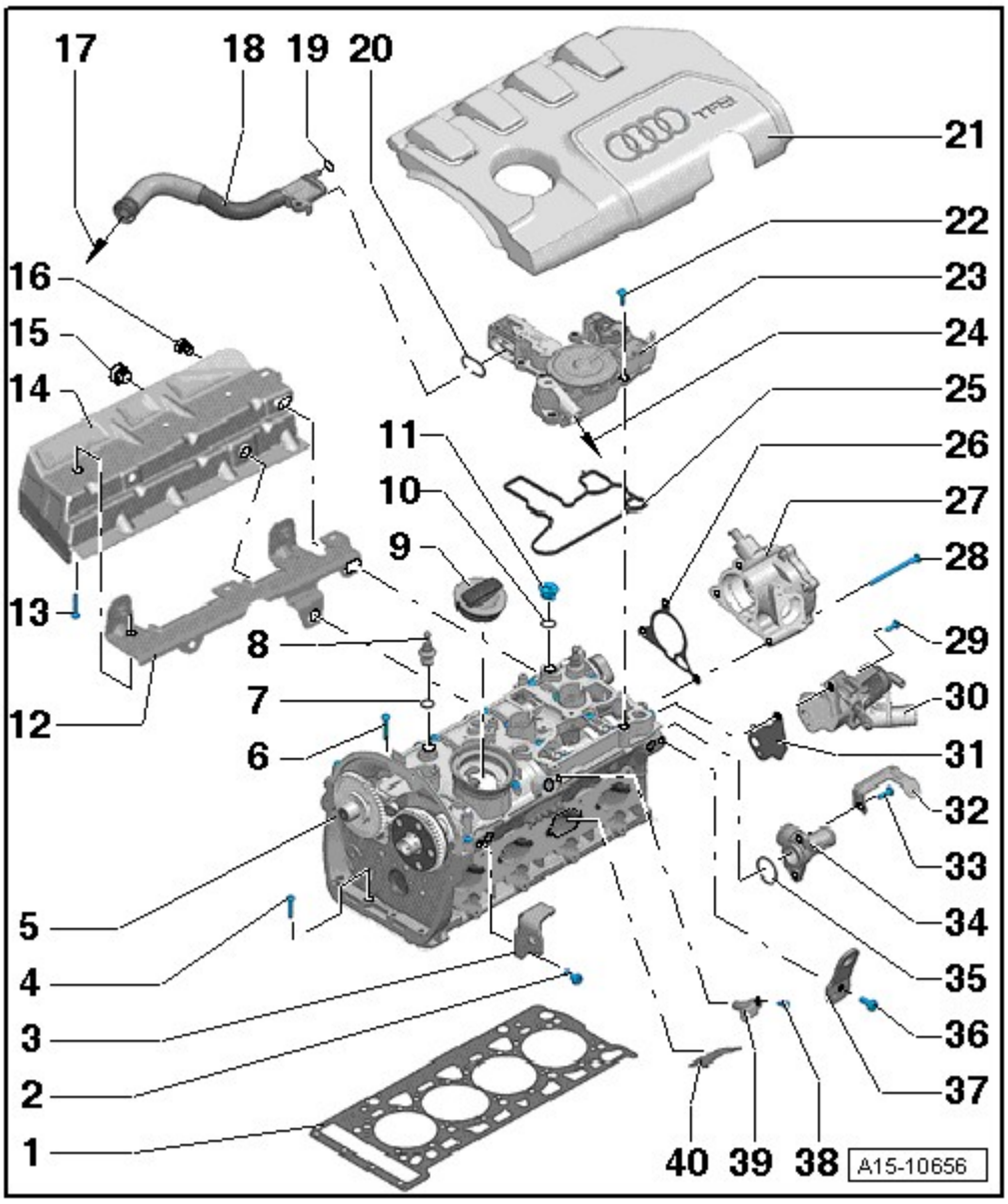

Fig. 10: Identifying Cylinder Head Assembly Overview
Courtesy of AUDI OF AMERICA, LLC

1. Cylinder Head Gasket
   - Replace
   - Installed position: the part number faces the cylinder head
2. Bolt
   - 25 Nm
3. Transport Bracket
4. Bolt
   - Tightening order **CYLINDER HEAD ASSEMBLY OVERVIEW**
5. Cylinder Head

- Removing and installing, refer to **CYLINDER HEAD**
- Check for distortion **CYLINDER HEAD ASSEMBLY OVERVIEW**

6. Cylinder Head Bolt
   - Replace
   - Observe sequence for loosening **CYLINDER HEAD ASSEMBLY OVERVIEW**
   - Observe sequence for tightening **CYLINDER HEAD ASSEMBLY OVERVIEW**
7. O-ring
   - Replace
   - Lubricate with engine oil
8. Sealing Plugs
   - 5 Nm
   - With ball head for the engine cover
9. Cap
   - With gasket
10. O-ring
    - Replace
    - Lubricate with engine oil
11. Sealing Plugs
12. Bracket
13. Bolt
    - 9 Nm
14. Heat Shield
15. Bolt
    - 20 Nm
16. Bolt
    - 20 Nm
17. To the Intake Manifold/Turbocharger
18. Ventilation Pipe
19. O-ring
    - No replacement part
20. Gasket
    - No replacement part
21. Engine Cover
22. Bolt
    - Tightening order **CRANKCASE VENTILATION, TIGHTENING SEQUENCE**
23. Crankcase Ventilation
    - Observe sequence for tightening **CRANKCASE VENTILATION, TIGHTENING SEQUENCE**
24. To Intake Manifold

25. Gasket
    - No replacement part
26. Gasket
    - Replace if damaged
27. Vacuum Pump
    - Removing and installing, refer to **Removal and Installation**
28. Bolt
    - Tightening specifications, refer to **Removal and Installation**
29. 9 Nm
    - Engine code CBFA only
30. Secondary air injection (AIR) solenoid valve -N112-
    - Engine code CBFA only
31. Gasket
    - Replace
    - Engine code CBFA only
32. Mounting plate
33. Bolt
    - 9 Nm
34. Connecting piece
35. O-ring
    - Replace
    - Coat with coolant
36. Bolt
    - 25 Nm
37. Transport Bracket
38. Bolt
    - 9 Nm
39. Camshaft Position Sensor -G40-
40. Partition Plate

CRANKCASE VENTILATION, TIGHTENING SEQUENCE

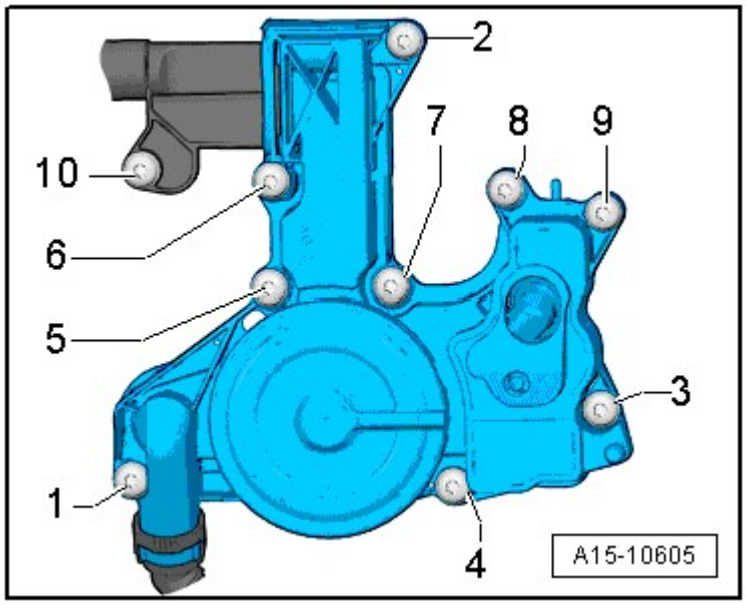

Fig. 11: Identifying Crankcase Ventilation - Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

NOTE: **The bolts are self-tapping. Only use Original bolts when replacing the cylinder head, since the cylinder head is delivered without a thread for the installing the crankcase ventilation.**

It is not permitted to cut the thread with a thread cutter.

-- Tighten the crankcase ventilation bolts to 11 Nm in -1 to 10- sequence.

LOOSENING THE CYLINDER HEAD

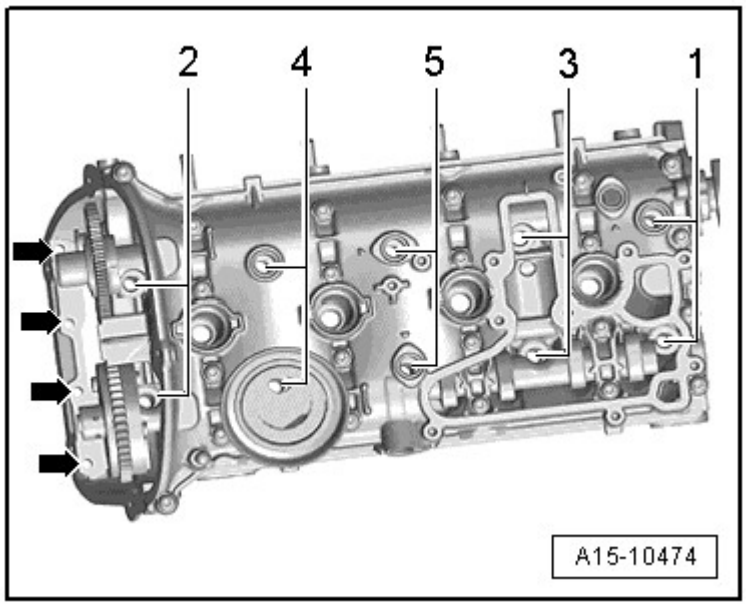

Fig. 12: Identifying Cylinder Head Loosening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows-.

-- Loosen the cylinder head bolts in -1 to 5- sequence

CYLINDER HEAD TIGHTENING SEQUENCE

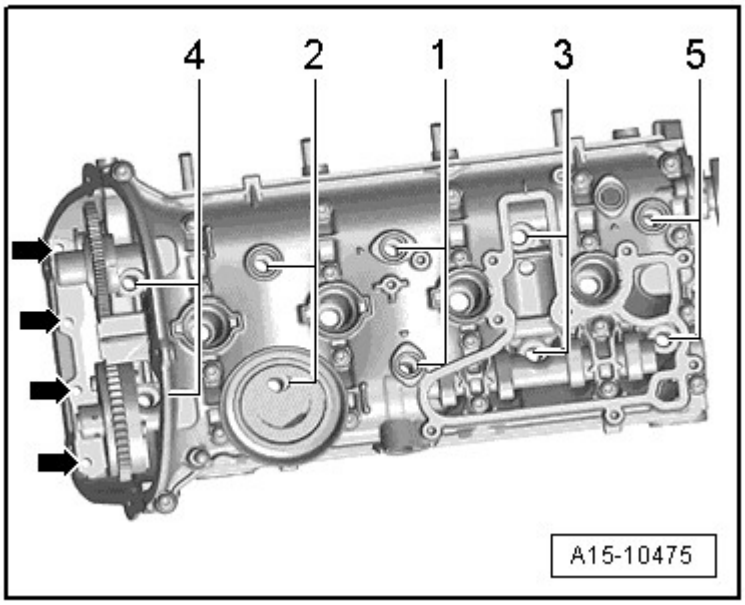

Fig. 13: Identifying Cylinder Head Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the cylinder head bolts in -1 to 5- sequence.

-- Tighten to 40 Nm using a torque wrench.

-- Tighten further 90° using a rigid wrench.

-- Tighten further 90° using a rigid wrench.

-- Tighten the bolts -arrows- to 8 Nm.

-- Tighten the bolts -arrows- 90° further using a rigid wrench.

CHECKING CYLINDER HEAD FOR DISTORTION

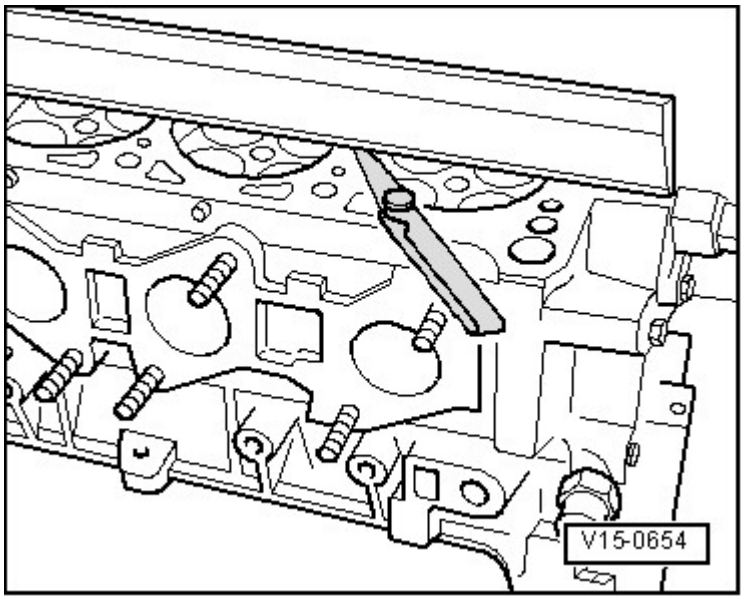

Fig. 14: Checking Cylinder Head For Distortion
Courtesy of AUDI OF AMERICA, LLC

-- Check the cylinder head for distortion with the straight edge and feeler gauge in several places.

- Maximum permissible distortion: 0.05 mm

VALVETRAIN ASSEMBLY OVERVIEW

NOTE: The cylinder head and the cylinder head cover must be replaced together.

After installing the camshafts, the engine may not be started for approximately 30 minutes. The hydraulic equalization elements must seat themselves (otherwise the valves will crash into 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 gaskets and seals.

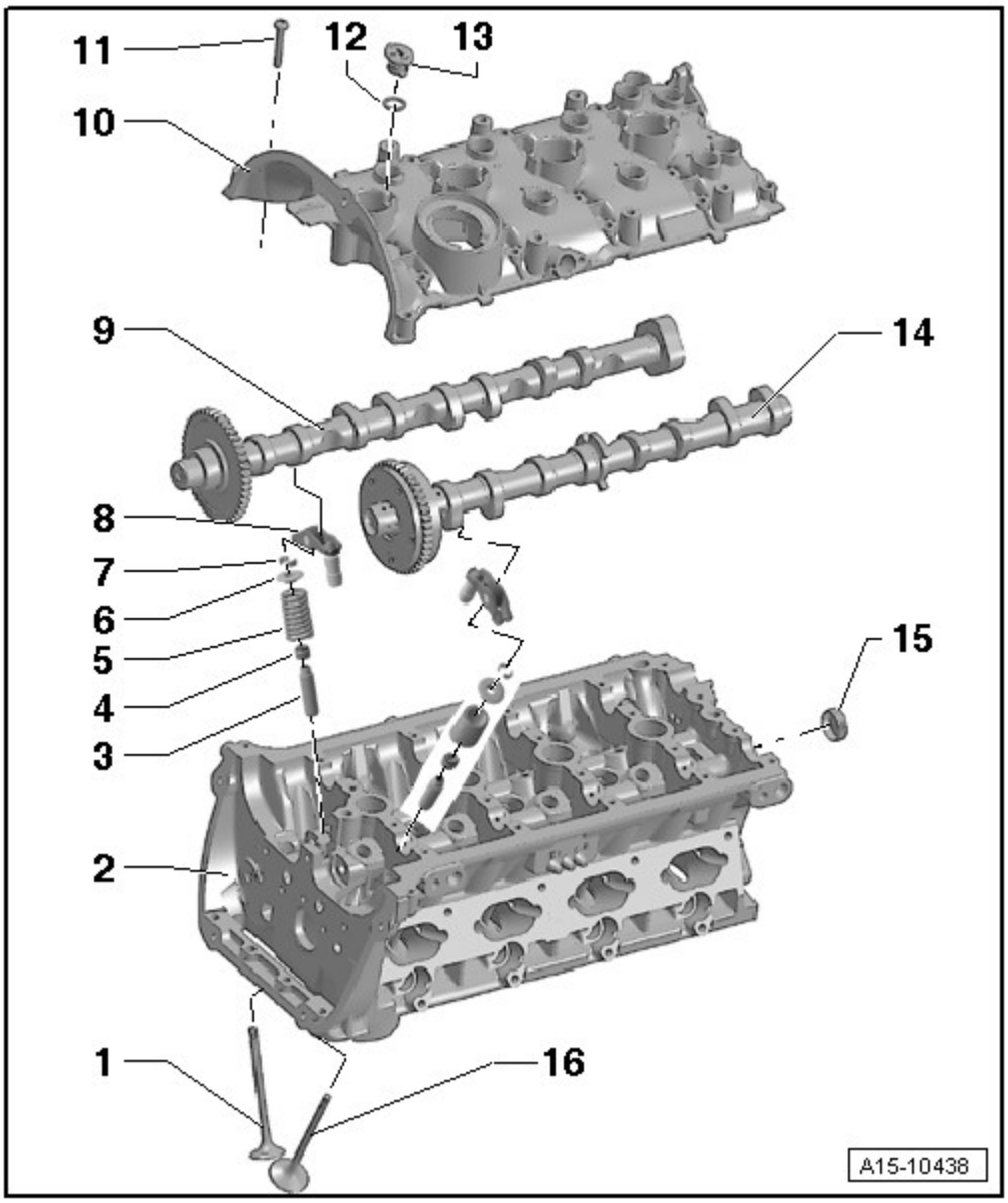

Fig. 15: Identifying Assembly Overview: Valvetrain
Courtesy of AUDI OF AMERICA, LLC

1. Exhaust Valve
   - Do not rework, only lapping is permitted
   - Valve dimensions **VALVETRAIN ASSEMBLY OVERVIEW**
   - Check valve guides, refer to **VALVE GUIDES, CHECKING**
2. Cylinder Head
3. Valve Guide
   - Checking, refer to **VALVE GUIDES, CHECKING**
4. Valve Stem Seal
   - Replacing: cylinder head installed, refer to **VALVE STEM SEALS WITH CYLINDER HEAD**

INSTALLED, REPLACING, cylinder head removed, refer to **VALVE STEM SEALS WITH CYLINDER HEAR REMOVED, REPLACING**

5. Valve Spring
6. Valve Spring Plate
7. Valve Retainers
8. Hydraulic Adjusting Element
   - Do not interchange
   - Lubricate contact surface
9. Exhaust Camshaft
   - Removing and installing, refer to **CAMSHAFTS**
   - Check radial clearance using Plastigage (roller rocker lever removed)
   - Radial play: 0.024 to 0.066 mm
   - Run-out: maximum 0.04 mm
10. Cylinder Head Cover
    - With integrated camshaft bearings
    - Clean sealing surface, refacing is not permitted.
    - Remove old sealant residue.
11. Bolt
    - Replace
    - Loosening **LOOSENING THE CYLINDER HEAD COVER**
    - Tightening order **CYLINDER HEAD COVER TIGHTENING SEQUENCE**
12. O-ring
    - Replace
    - Coat with engine oil
13. Sealing Plugs
14. Intake Camshaft
    - Removing and installing, refer to **CAMSHAFTS**
    - Check radial clearance using Plastigage (roller rocker lever removed)
    - Radial play: 0.024 to 0.066 mm
    - Run-out: maximum 0.04 mm
15. Cap
    - Replace
    - Removing: with the cylinder head cover installed, pierce through one side of the cover with an awl and pry it out
    - Installing **CAMSHAFTS**
16. Intake Valve
    - Do not rework, only lapping is permitted
    - Valve dimensions **VALVETRAIN ASSEMBLY OVERVIEW**

- Check valve guides, refer to **VALVE GUIDES, CHECKING**

LOOSENING THE CYLINDER HEAD COVER

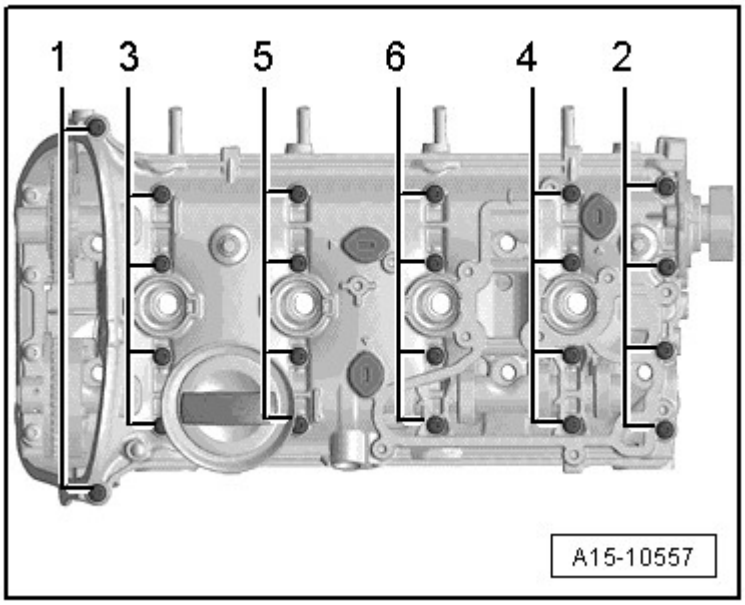

Fig. 16: Identifying Cylinder Head Cover Loosening
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the cylinder head cover in a 1 to 6 sequence.

CYLINDER HEAD COVER TIGHTENING SEQUENCE

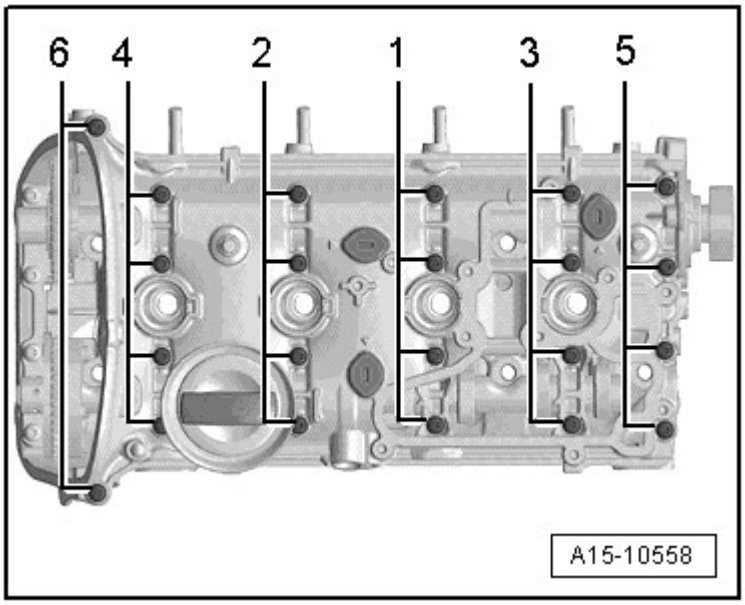

Fig. 17: Identifying Cylinder Head Cover Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Replace bolts.

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

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

-- Tighten the bolts an additional 90° using a rigid wrench in the sequence -1 to 6-.

NOTE: Make sure the cylinder head cover is not tilted.

VALVE DIMENSIONS

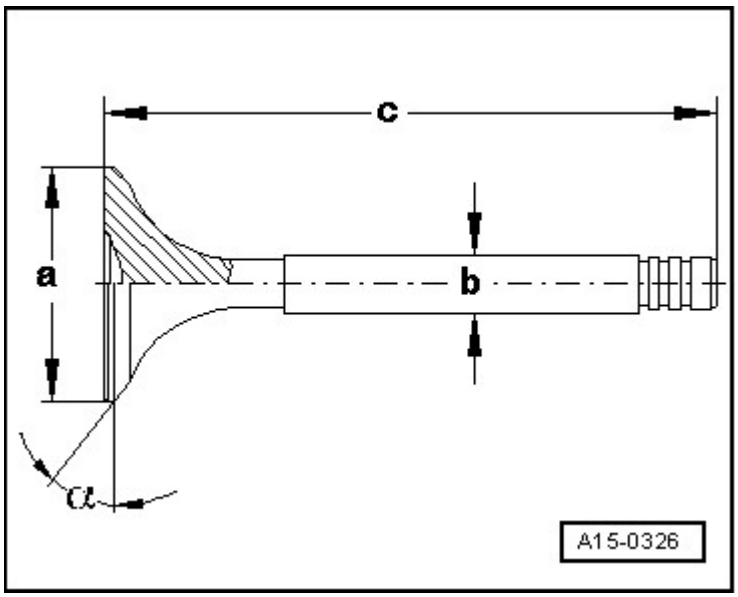

Fig. 18: Identifying Valve Dimensions
Courtesy of AUDI OF AMERICA, LLC

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

Dimension		Intake valve	Exhaust valve
Dia. a	mm	33.85 ± 0.10	28.0 ± 0.1
Dia. 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

Balance Shaft Exhaust side (1)		9
Balance shaft Intake side (1)		9
Bearing Bracket (1)		
		9
	M6	8 + 90°
	M8	20 + 90°
Bracket for Heat Shield		9
Camshaft Position Sensor		9
Camshaft Timing Chain Guide Rail, Guide Pins		20
Chain tensioner		65
Control Valve		35
Guide rail for the balance shaft timing chain, Guide pins		20
Guide rail Guide pins		20
Guide Tube for Oil Dipstick		9
Heat Shield		20
Mounting plate		9
Sealing Plugs		5
Tensioning rail For timing chain, Guide Pins		20
Timing Chain Tensioning Rail		
Bolt		9
Guide Pins		20
Transport Bracket		25
(1) Always replace		

Timing Chain Upper Cover - Tightening Sequence

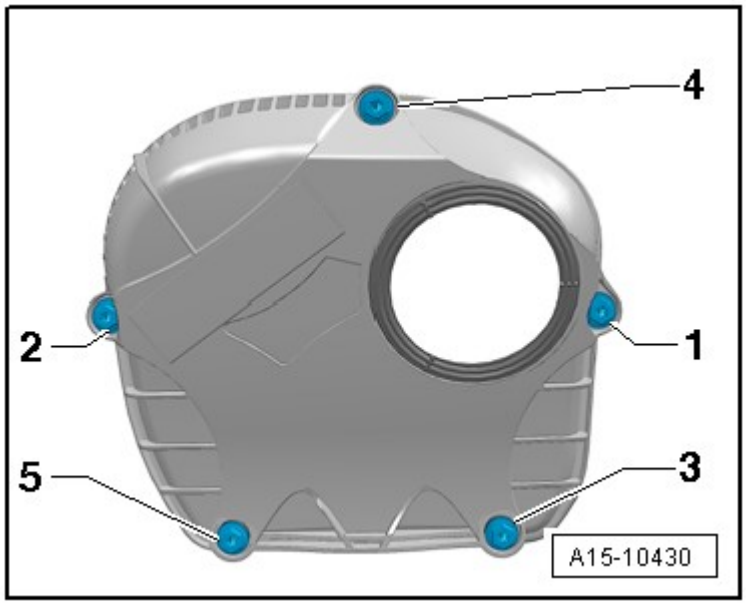

Fig. 19: Identifying Upper Timing Chain Cover - Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts -1 through 5- in the sequence shown:

-- Tighten the bolts to 9 Nm.

Timing Chain Lower Cover Tightening Sequence

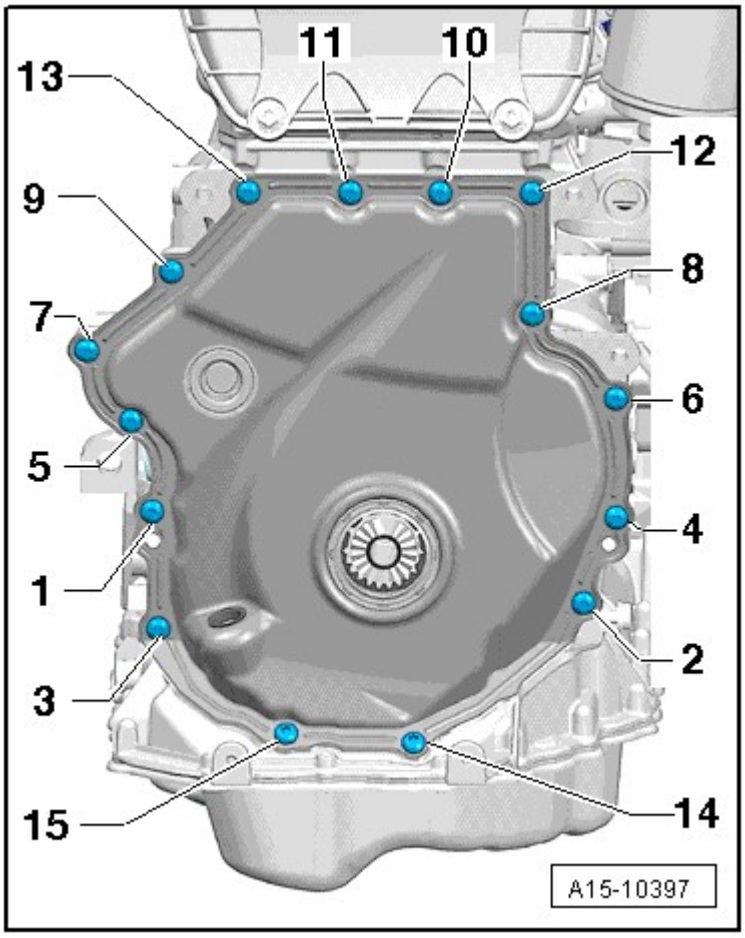

Fig. 20: Identifying Timing Chain Lower Cover Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts -1 through 15- in 2 stages in the sequence shown:

-- 1. Tighten the bolts to 8 Nm.

-- 2. Tighten the bolts an additional 45°.

Intermediate Shaft Sprocket Tightening Sequence

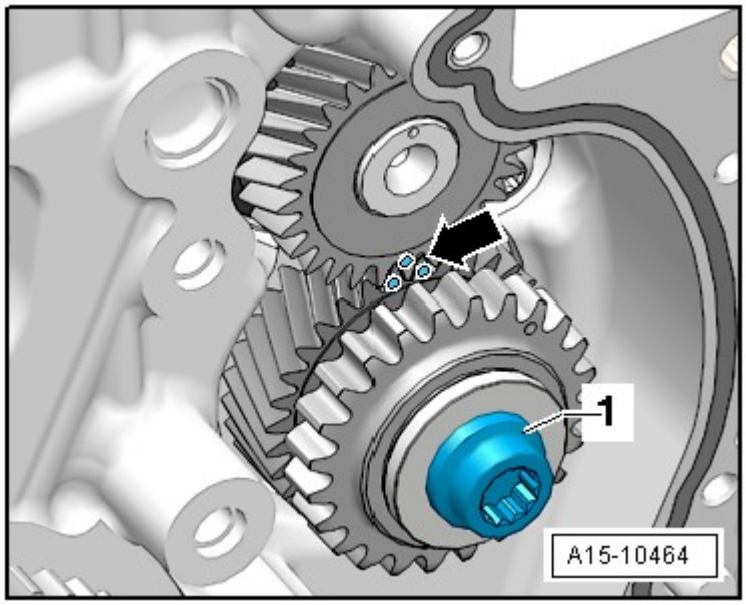

Fig. 21: Identifying Intermediate Shaft Sprocket
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Always replace the intermediate shaft sprocket. Otherwise the backlash will not adjust itself and it could result in engine damage.

The new intermediate shaft sprocket has an anti-friction coating that wears off after a short period of use, which automatically adjusts the backlash.

-- Tighten with a new bolt as follows:

-- Tighten to 10 Nm using a torque wrench.

-- Rotate the intermediate shaft sprocket.

The intermediate shaft sprocket must not have any play. Loosen and tighten it again if necessary.

-- Tighten to 25 Nm using a torque wrench.

-- Tighten further 90° using a rigid wrench.

Cylinder Head Tightening Sequence

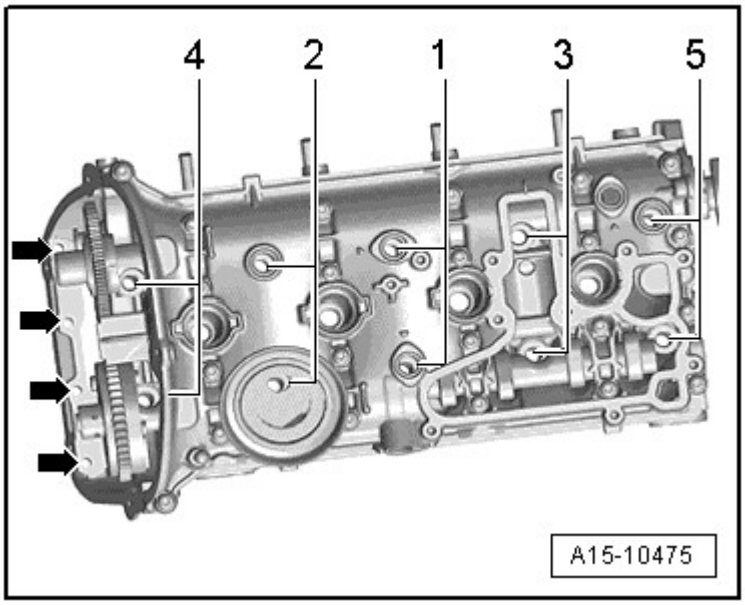

Fig. 22: Identifying Cylinder Head Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the cylinder head bolts in -1 to 5- sequence.

-- Tighten to 40 Nm using a torque wrench.

-- Tighten further 90° using a rigid wrench.

-- Tighten further 90° using a rigid wrench.

-- Tighten the bolts -arrows- to 8 Nm.

-- Tighten the bolts -arrows- 90° further using a rigid wrench.

Crankcase Ventilation, Tightening Sequence

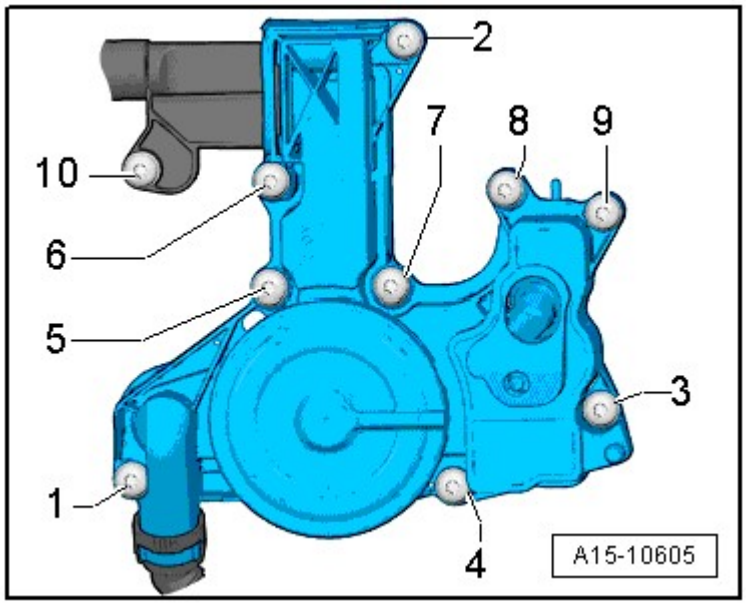

Fig. 23: Identifying Crankcase Ventilation - Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

NOTE: The bolts are self-tapping. Only use Original bolts when replacing the cylinder head, since the cylinder head is delivered without a thread for the installing the crankcase ventilation.

It is not permitted to cut the thread with a thread cutter.

-- Tighten the crankcase ventilation bolts to 11 Nm in -1 to 10- sequence.

DIAGNOSIS AND TESTING

COMPRESSION PRESSURE, CHECKING

Special tools and workshop equipment required

- Spark Plug Removal Tool 3122 B
- Ignition Coil Puller T40039
- Compression Tester V.A.G 1763
- Adapter V.A.G 1763/6

Test Sequence

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

Battery voltage at least 12.7 V

-- Remove the engine cover -arrows-.

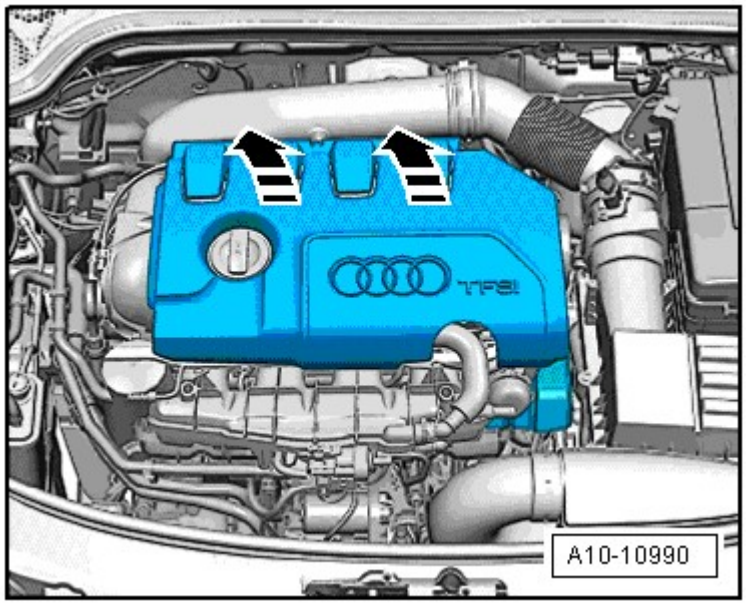

Fig. 24: Identifying Engine Cover, Removal
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the electrical connectors -arrows- on ignition coils.

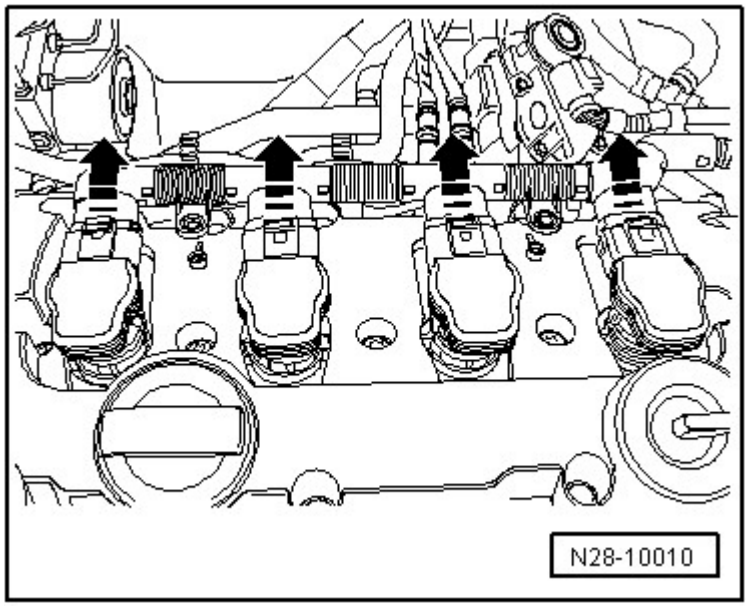

Fig. 25: Disconnecting Connectors Of Ignition Coils
Courtesy of AUDI OF AMERICA, LLC

-- Remove the ignition coils with the T40039.

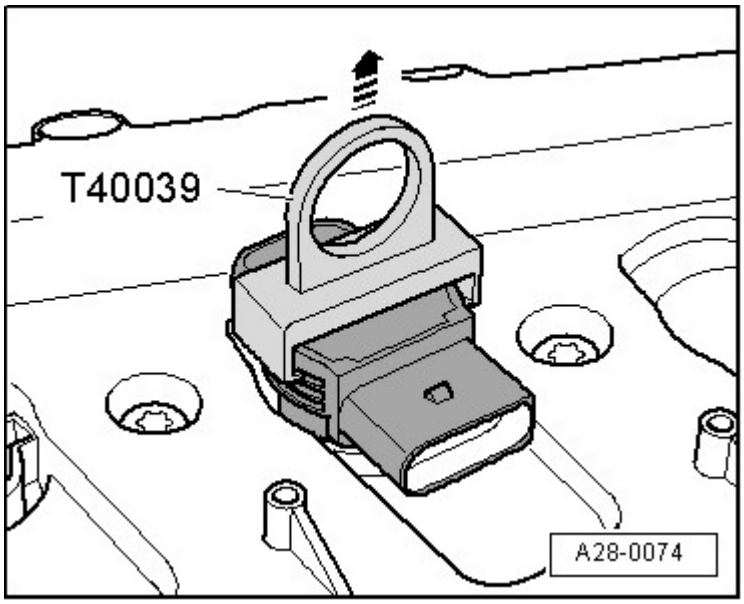

Fig. 26: Identifying Ignition Coil Puller T40039 To Remove Ignition Coils
Courtesy of AUDI OF AMERICA, LLC

-- Remove the spark plugs using a 3122 B.

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

NOTE: Using tester 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 spark plugs. Refer to **SPARK PLUGS, REMOVING AND INSTALLING** .

-- Install the ignition coils with output stages. Refer to **IGNITION COILS WITH POWER OUTPUT STAGES** .

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

-- Check the engine control module DTC memory Vehicle Diagnosis, Testing and Information System VAS 5051 in "Guided Fault Finding".

VALVE TIMING, CHECKING

- Remove timing chain upper cover. Refer to **UPPER TIMING CHAIN COVER**

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

- Remove the bolts -arrows-.

- Lift the clamps -1 and 2- and remove the air guide pipe.

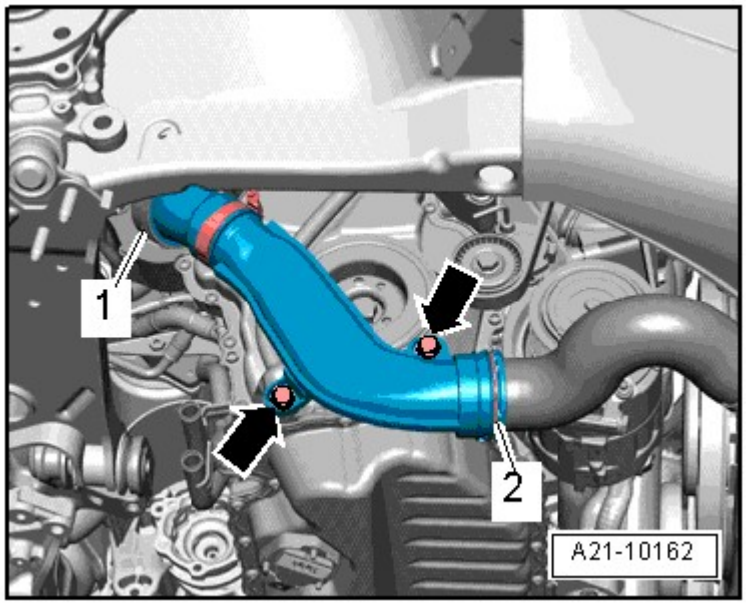

Fig. 27: Identifying Air Guide Pipe And Bolts
Courtesy of AUDI OF AMERICA, LLC

- Turn the vibration damper, from underneath, in direction of engine rotation to Top Dead Center (TDC) -arrow-.

NOTE:

- **Use a ratchet with a 24 mm socket to turn the vibration damper. Always turn vibration damper in direction of engine rotation to TDC. Do not turn the vibration damper backward to get to TDC!**
- **If the arrow marking on the timing chain guard lower section is no longer visible, set the engine at TDC with the dial gauge -VAS 6079-, refer to ENGINE WITH DIAL GAUGE -VAS 6079- AT TDC, POSITIONING**

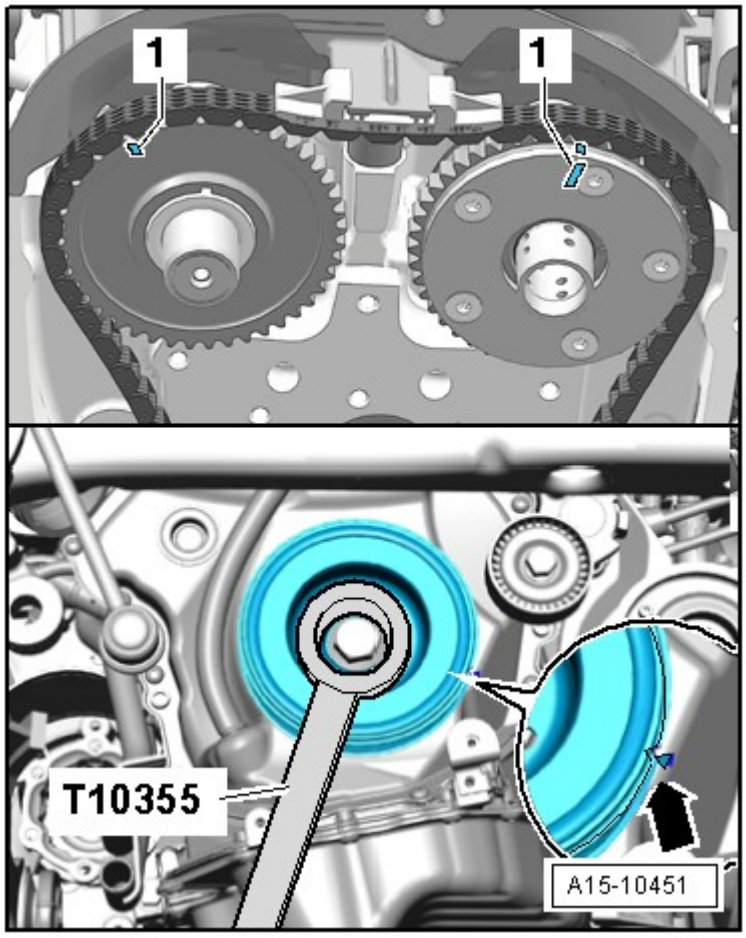

Fig. 28: Identifying Markings -1- On Camshafts Aligned To Point Upward
Courtesy of AUDI OF AMERICA, LLC

- **The notch on the vibration damper and the marking on the timing chain guard lower section must be opposite one another -arrow-.**
- **The markings -1- on the camshafts must point upward.**

- Measure the distance from the outer edge -1- to the marking -2- on the intake camshaft.

* Specified value: 61 to 64 mm.

- Once the specified value is reached, measure the distance between the marking on the intake camshaft -3- and the marking on the exhaust camshaft -4-.

* Specified value: 124 to 126 mm

NOTE: **If one tooth has an offset, there will be a deviation of approximately 6 mm from the specified value. Install the timing chain once again if there is an offset.**

ENGINE WITH DIAL GAUGE -VAS 6079- AT TDC, POSITIONING

Special tools and workshop equipment required

- Dial Gauge 0-10 mm VAS 6079
- Dial Gauge Adapter T10170- or Dial Gauge Adapter T10170 A
- Extending Piece T10170A/1

- Remove timing chain upper cover. Refer to **UPPER TIMING CHAIN COVER**

- Turn the crankshaft with the socket SW 24 on the vibration damper in the direction of the engine rotation until the markings -arrows- are on top.

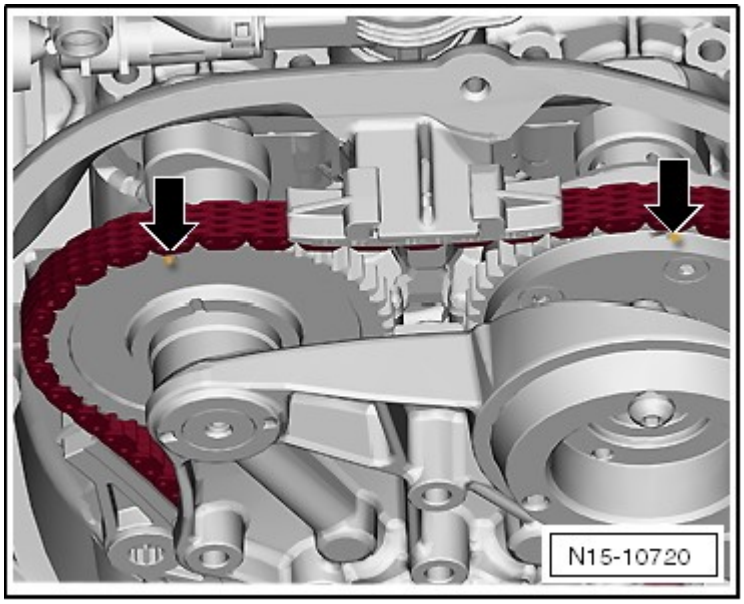

Fig. 29: Turning Crankshaft Until Markings -Arrows- Are On Top
Courtesy of AUDI OF AMERICA, LLC

- Remove the spark plug from cylinder 1.

- Install the T10170/A- all the way into the spark plug thread.

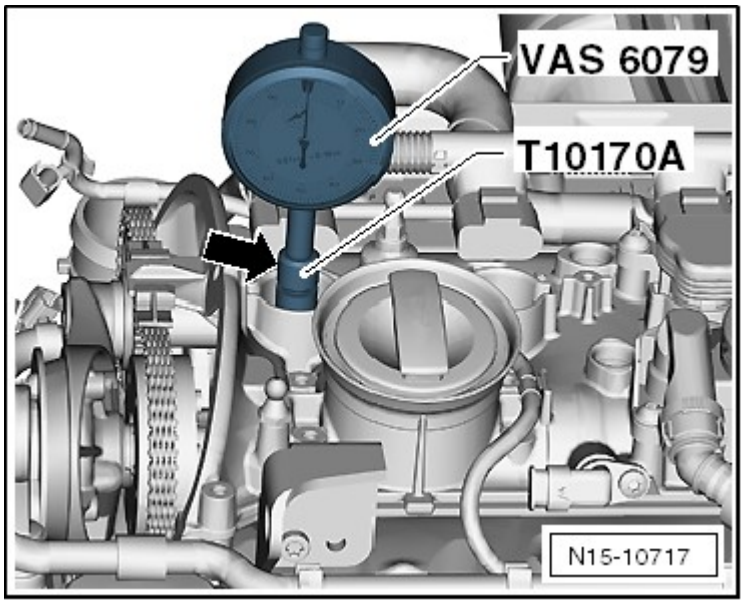

Fig. 30: Identifying T10170/A- Installed Into Spark Plug Thread
Courtesy of AUDI OF AMERICA, LLC

- Insert the VAS 6079- with the T10170A/1- all the way and secure it with the locking nut -arrow-.

- Turn the crankshaft slowly to maximum dial reading in the direction of the engine rotation. When the maximum dial reading is reached (Bottom Dead Center (BDC) of the meter) position the piston at Top Dead Center (TDC).

NOTE: Use a ratchet with a 24 mm socket to turn the vibration damper. Always turn vibration damper in direction of engine rotation to TDC. Do not turn the vibration damper backward to get to TDC!

VALVE GUIDES, CHECKING

Special tools and workshop equipment required

- Dial Gauge Holder VW 387
- Dial Gauge 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.

-- Determine tip clearance.

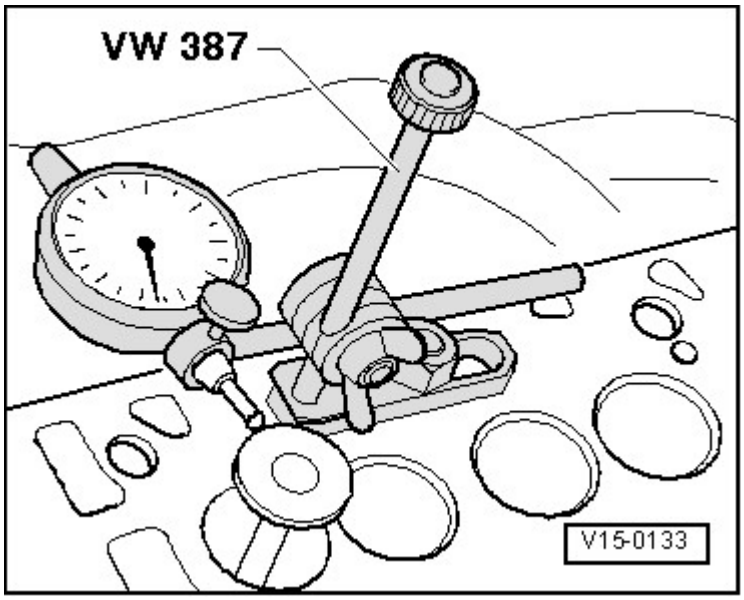

Fig. 31: Determining Valve Rock (Wear limit)
Courtesy of AUDI OF AMERICA, LLC

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

CAMSHAFT ADJUSTMENT VALVE 1 -N205

Removing

-- Disconnect the connector from the camshaft adjustment valve 1 -N205- -1-.

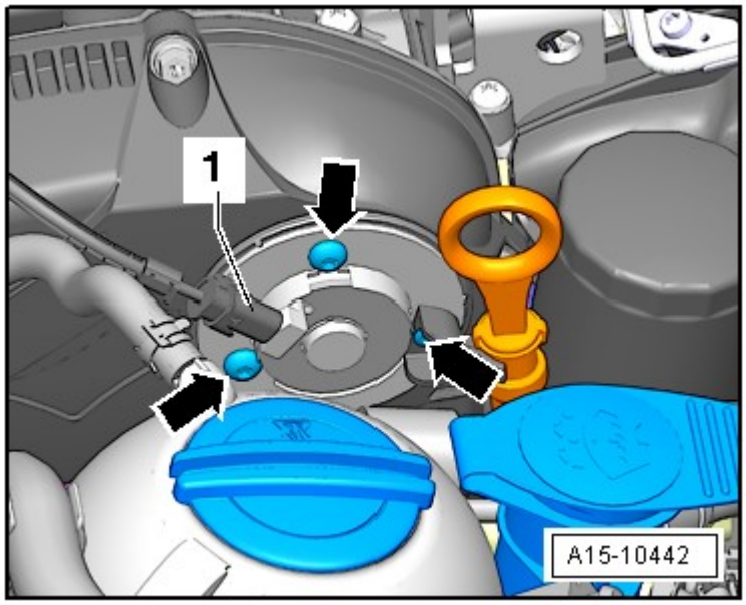

Fig. 32: Identifying Camshaft Adjustment Valve And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and then the camshaft adjustment valve 1 -N205-.

Installing

- Tightening specifications, refer to **TIMING CHAIN COVER ASSEMBLY OVERVIEW**

Installation is in reverse order of removal, note the following:

NOTE: Replace O-ring.

-- Coat the sealing ring and the O-ring with engine oil.

UPPER TIMING CHAIN COVER

Special tools and workshop equipment required

- Torque Wrench V.A.G 1783
- Open End Spanner Insert AF 10 V.A.G 1783/1

Removing

-- Disconnect the connector from the camshaft adjustment valve 1 -N205- -1-.

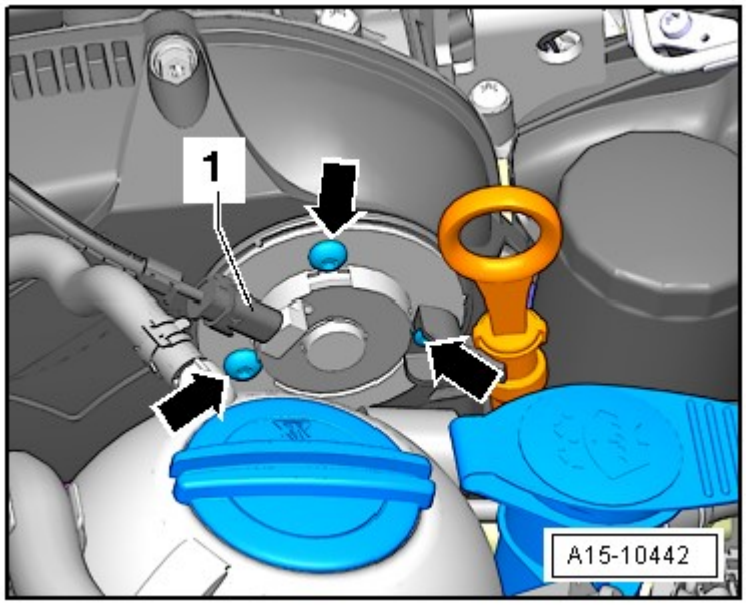

Fig. 33: Identifying Camshaft Adjustment Valve And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and then the camshaft adjustment valve 1.

-- Remove the bolts -1 through 5- and remove the timing chain upper cover.

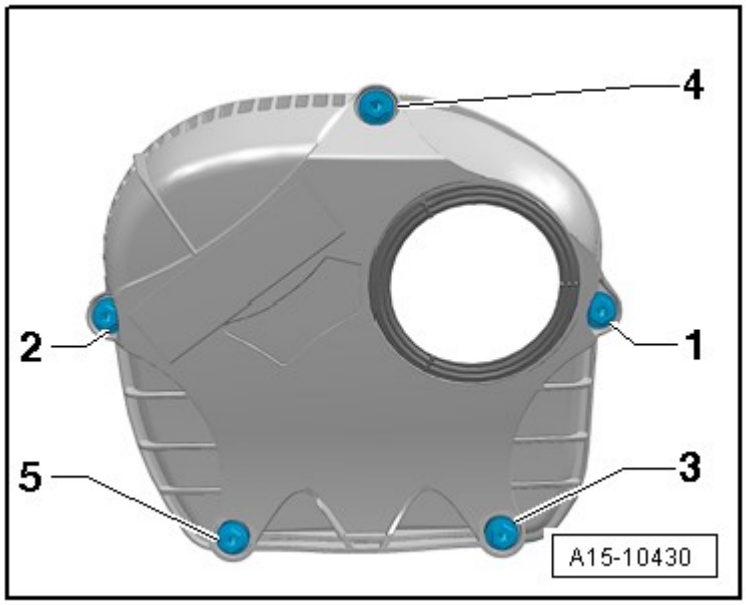

Fig. 34: Identifying Upper Timing Chain Cover - Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

Installing

- Tightening specifications, refer to **TIMING CHAIN COVER ASSEMBLY OVERVIEW**

Installation is in the reverse order of removal, note the following:

NOTE: Replace O-ring.

-- Coat the sealing ring and the O-ring with engine oil.

-- Install the timing chain upper cover using the V.A.G 1783 and V.A.G 1783/1, tightening sequence **TIMING CHAIN COVER ASSEMBLY OVERVIEW**

-- Install the camshaft adjustment valve 1. Refer to **CAMSHAFT ADJUSTMENT VALVE**.

LOWER TIMING CHAIN GUARD SECTION

Special tools and workshop equipment required

- Locking Pin T10060 A
- Counter Hold Tool T10355
- Engine Support Bridge 10 - 222 A with Spindle 10 - 222 A /11
- Lifting Tackle 2024 A
- Bits T10099
- Thrust Piece T10368

Removing

-- Remove the noise insulation in the center by loosening the fasteners -1 and 2-.

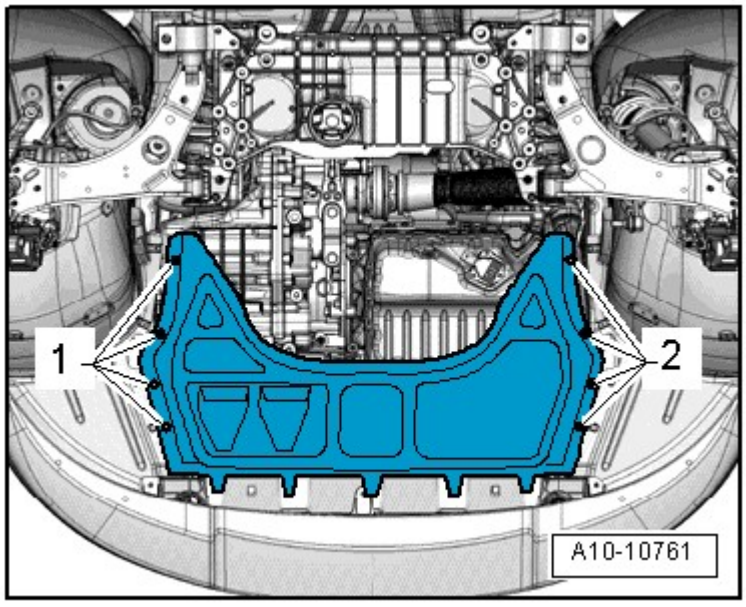

Fig. 35: Identifying Center Noise Insulation
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the fasteners -1, 2 and 3- and remove the right noise insulation.

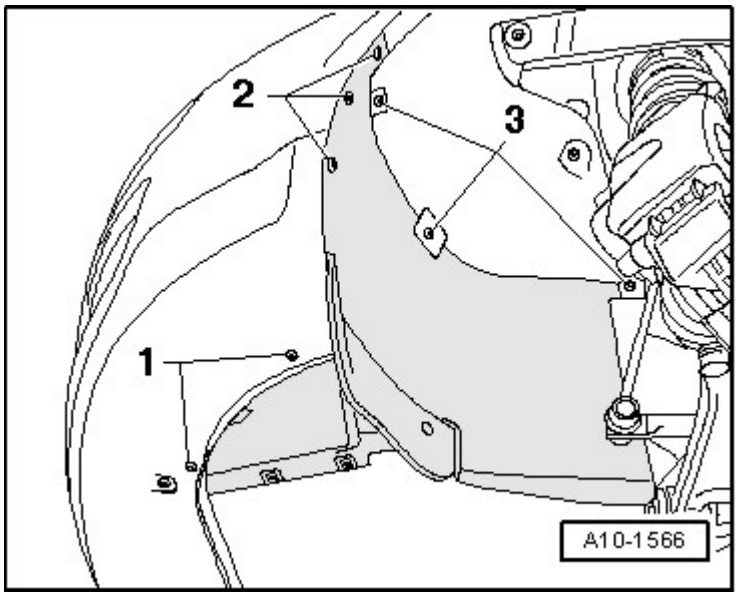

Fig. 36: Identifying Removal Of Left And Right Front Part Of Wheel Housing Liner
Courtesy of AUDI OF AMERICA, LLC

-- Remove bolts -arrows-.

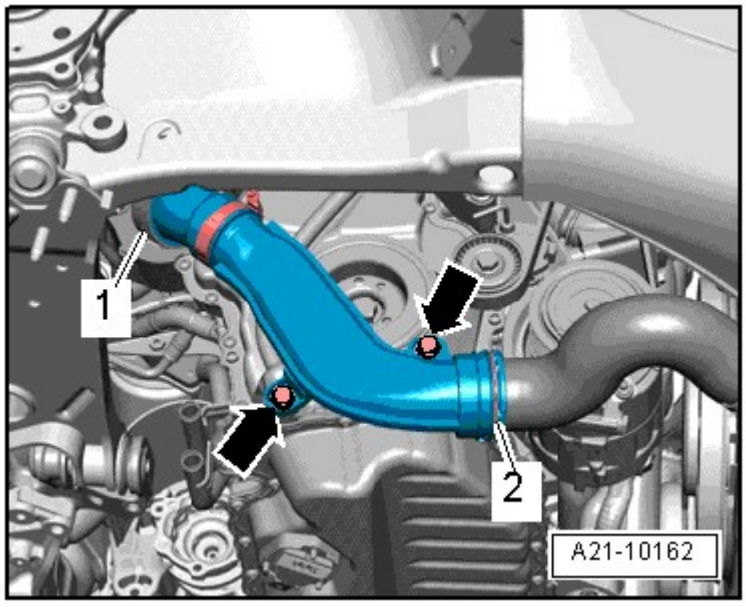

Fig. 37: Identifying Air Guide Pipe And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the air guide pipe by lifting the clamps -1 and 2-.

CAUTION: Risk of destroying due to reversed running direction on a used ribbed belt.

- **Before removing ribbed belt, marking running direction with chalk or felt-tip pen for reinstallation later.**

-- To release ribbed belt tension, rotate tensioner in direction of -arrow-.

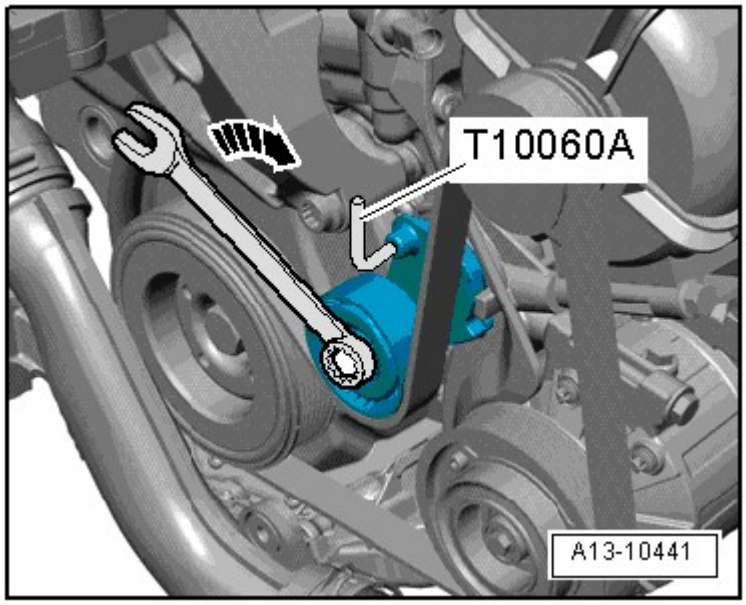

Fig. 38: Rotating Tensioner
Courtesy of AUDI OF AMERICA, LLC

-- Secure tensioner with T10060 A.

-- Remove ribbed belt from vibration damper ribbed belt pulley.

-- Rotate the vibration damper using the T10355 into the "TDC" position -arrow-.

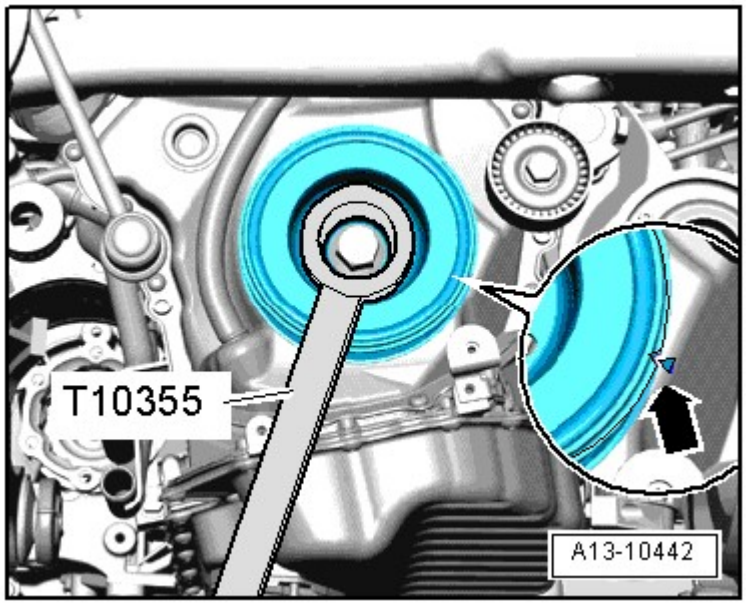

Fig. 39: Identifying Vibration Damper Rotated Into "OT" Position Using Counter Hold Tool T10355
Courtesy of AUDI OF AMERICA, LLC

- The notch on the vibration damper must line up with the arrow marking on the timing chain lower cover.

-- Remove vibration damper bolt using T10355.

-- Remove the vibration damper.

NOTE: To avoid damaging the splines, only install the vibration damper bolt with the T10368.

-- Install the vibration damper bolt and T10368 again.

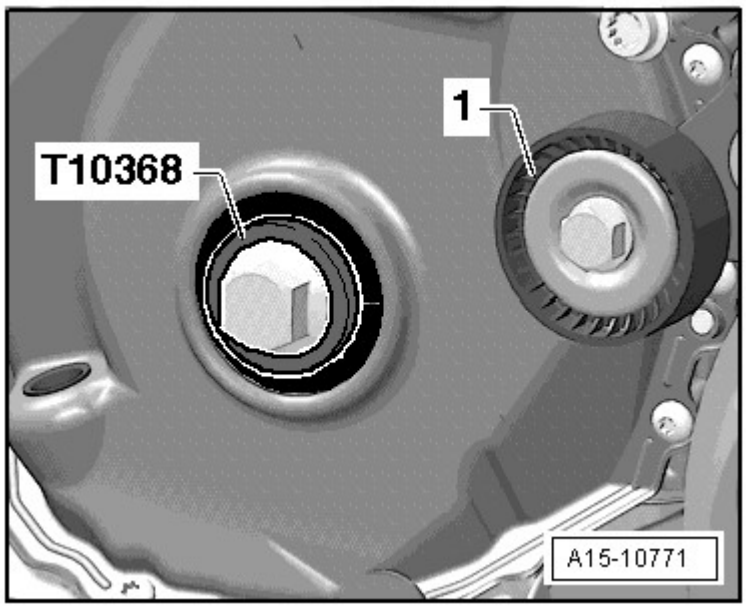

Fig. 40: Identifying Vibration Damper Bolt And T10368
Courtesy of AUDI OF AMERICA, LLC

CAUTION: The engine could be destroyed.

- **In order not to change the valve timing, the crankshaft must not be moved out of the "TDC" position when the vibration damper bolt is removed.**

-- Remove the idler roller -1-.

-- Tighten the lifting eye 2024 A /2 on the engine lifting eye using a collar nut -arrow-.

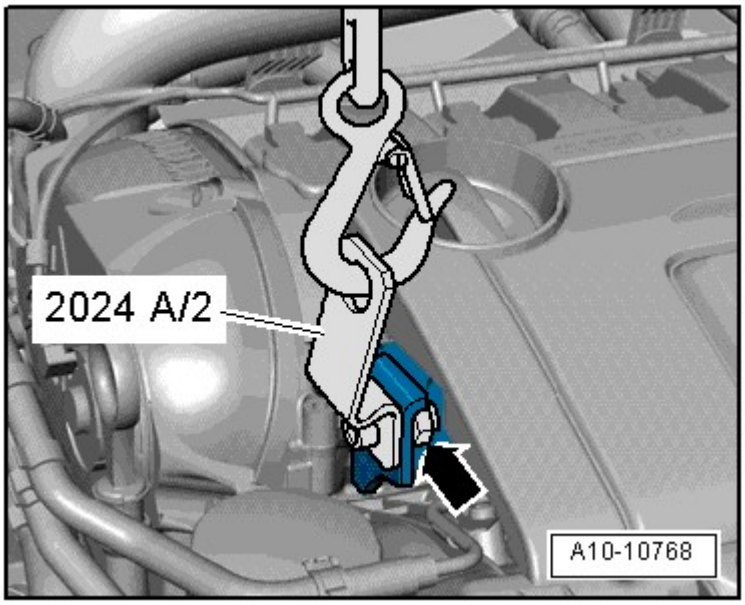

Fig. 41: Identifying Lifting Eye 2024 A /2, Engine Lifting Eye And Collar Nut
Courtesy of AUDI OF AMERICA, LLC

-- Place 10 - 222 A on upper edge of web plates with the following tool parts:

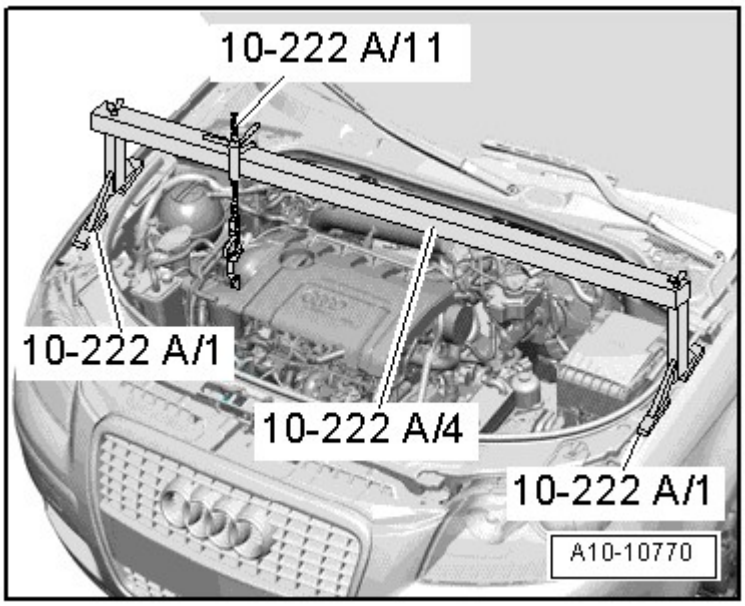

Fig. 42: Identifying Engine Support Bridge 10 - 222 Installed
Courtesy of AUDI OF AMERICA, LLC

- Engine brackets 10 - 222 A /1, quantity: 2
- Spindle 10 - 222 A /11

-- Tension the engine with the spindle.

-- Remove the subframe bolts -arrows- on the engine.

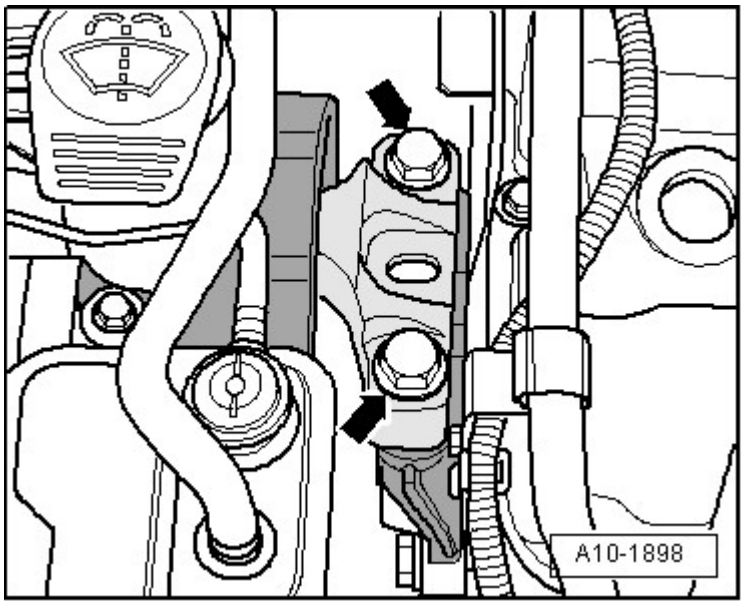

Fig. 43: Identifying Engine Mount To Engine Mount Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Lower the engine approx. 55 mm.

-- Free up the wiring harness -arrow-.

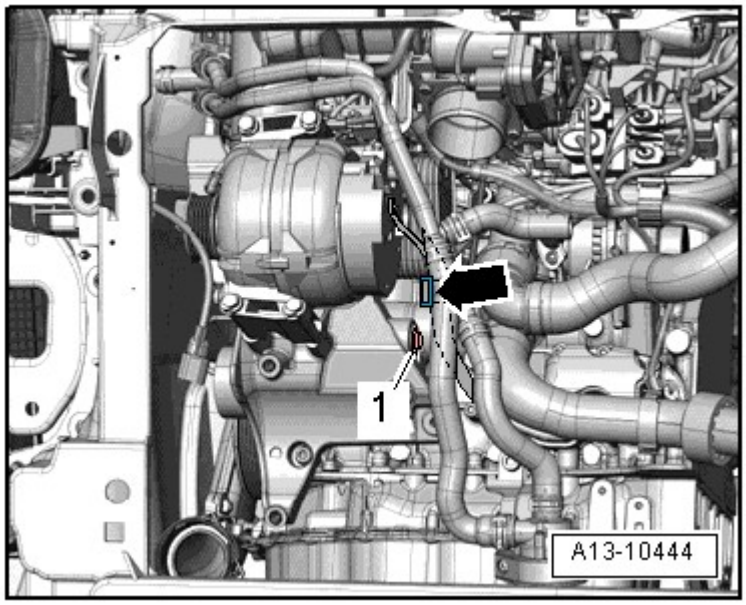

Fig. 44: Identifying Ribbed Belt Tensioner Bolt And Locating Electrical Wiring Harness
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -1- and remove the ribbed belt tensioner from the accessory assembly bracket.

-- Remove the engine support bolts with T10099.

-- Remove the engine support and the bolts.

-- Remove the bolts -arrows- and remove the oil dipstick guide tube from the timing chain cover.

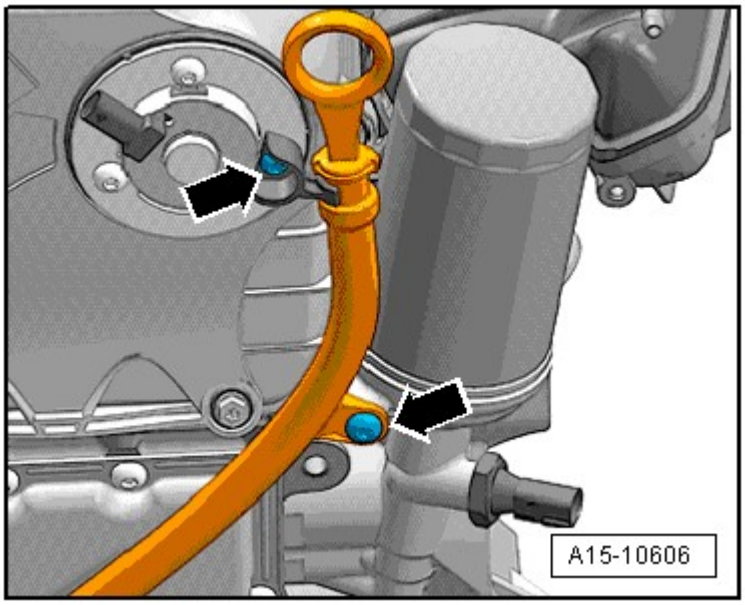

Fig. 45: Identifying Oil Dipstick Guide Tube And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the wastegate bypass regulator valve -N75- from the turbocharger -arrows-.

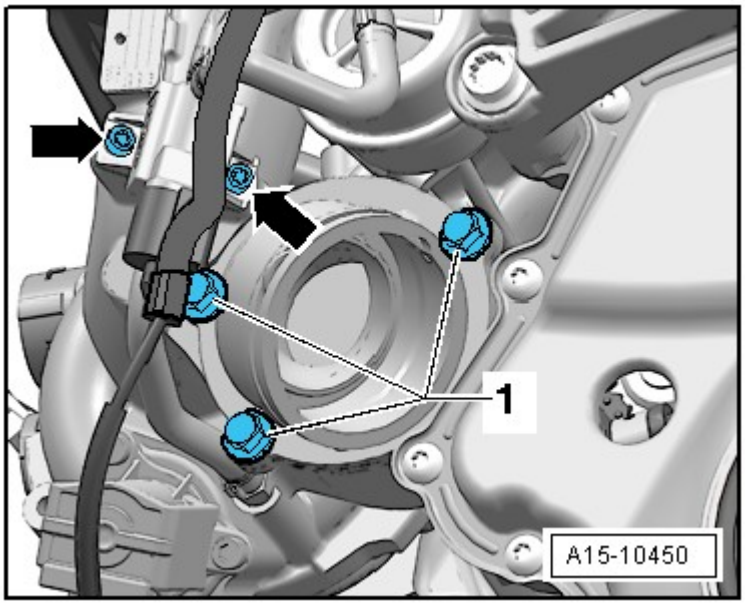

Fig. 46: Identifying Turbocharger And Supports
Courtesy of AUDI OF AMERICA, LLC

-- Remove the turbocharger support -1-.

-- Remove the bolts -1 through 15-.

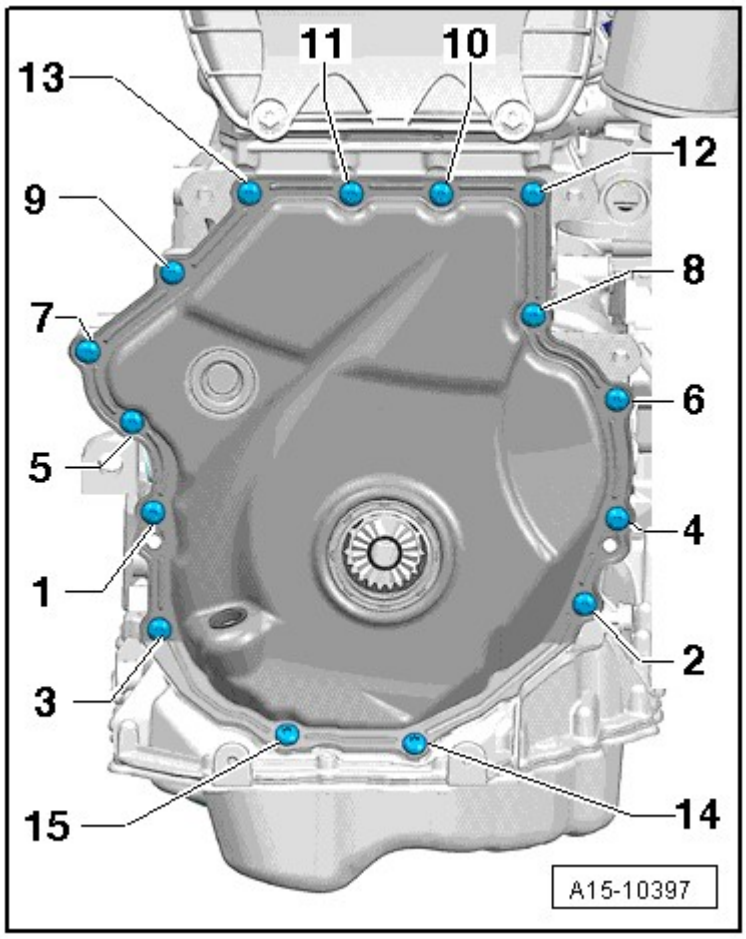

Fig. 47: Identifying Timing Chain Lower Cover Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Pry off the lower timing chain cover; when doing this, begin at -1 and 2-.

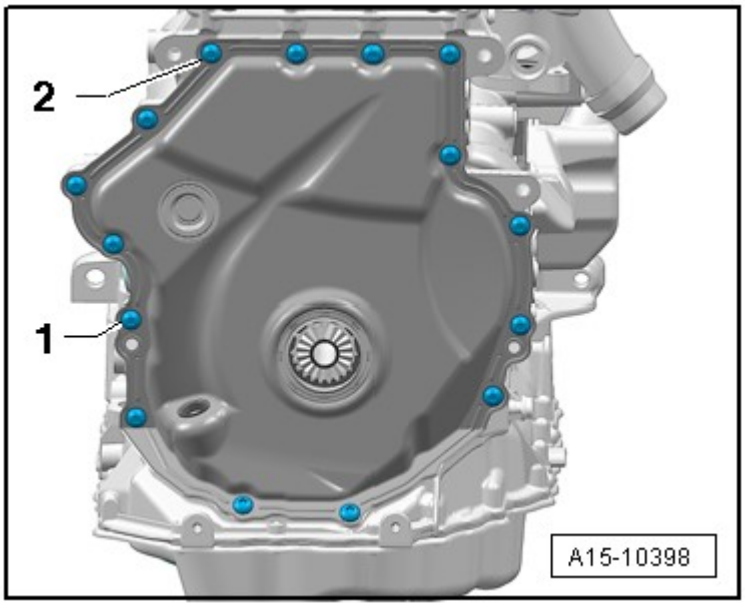

Fig. 48: Identifying Lower Timing Chain Cover
Courtesy of AUDI OF AMERICA, LLC

NOTE: To avoid deformation, do not hold between the bolting points.

Installing

- Tightening specifications, refer to **TIMING CHAIN COVER ASSEMBLY OVERVIEWSUBFRAME ASSEMBLY OVERVIEW**

NOTE: Note the expiration date of the silicone sealant.

The cover must be installed within 5 minutes after the silicone sealant has been applied.

Replace bolts which have been tightened to torque.

Replace sealing rings, seals and self-locking nuts.

-- Spray the sealing surface with sealant remover and allow it to work.

-- Remove any sealant residue on the cylinder block using a flat blade scraper.

WARNING: Risk of eye injury.

- **Wear safety glasses.**

-- Seal off both sides of the seal with tape to prevent contamination.

-- Use a rotating plastic brush to remove any remaining sealing on the cover.

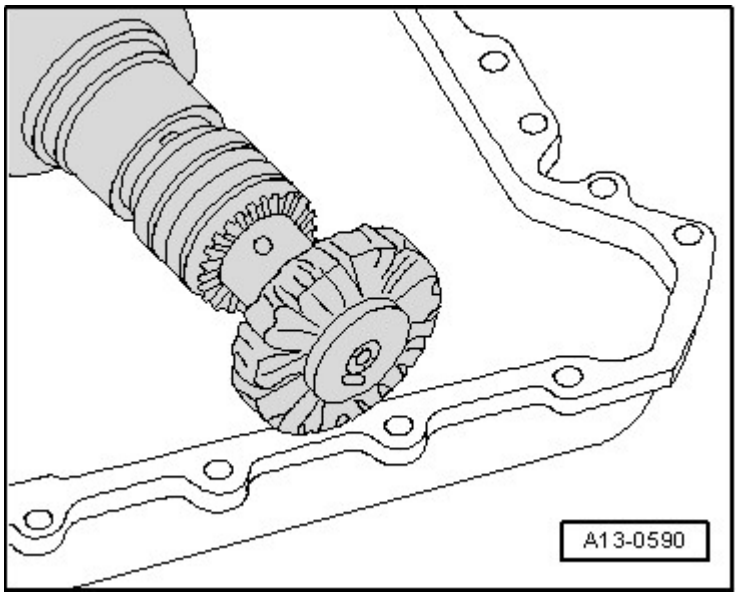

Fig. 49: Identifying Rotating Plastic Brush To Remove Sealant Residue From Sealing Flange, Cylinder Block And Upper Part Of Oil Pan
Courtesy of AUDI OF AMERICA, LLC

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

-- Install the cover using the old bolts and tighten to 8 Nm.

-- Check between the cover and crankcase using a feeler gauge; the gap must not exceed 0.2 mm.

NOTE: If the gap exceed 0.2 mm, replace the cover.

It is not possible to measure between the cover the upper section of the oil pan, however check the sealing surface for evenness.

-- Make sure both alignment bushings for centering the cover -arrows- are present.

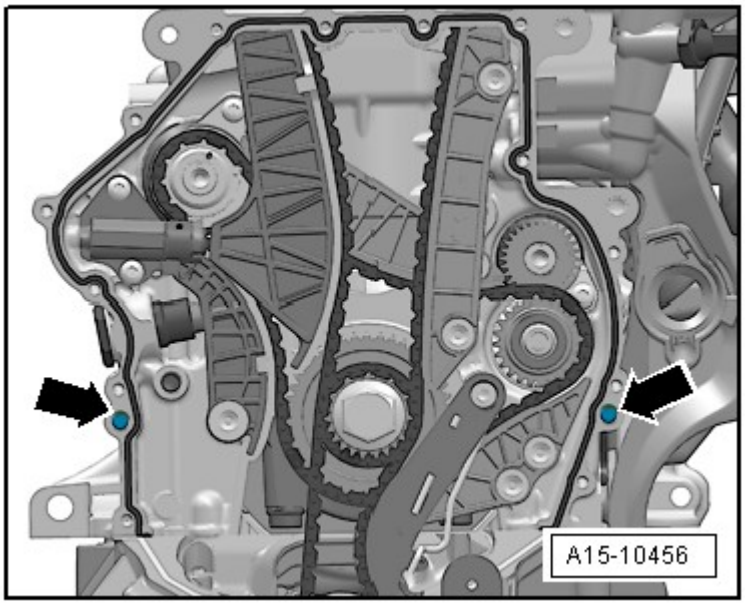

Fig. 50: Locating Centering Cover Alignment Bushings
Courtesy of AUDI OF AMERICA, LLC

-- Cut tube nozzle at front marking (jet dia. approximately 3 mm).

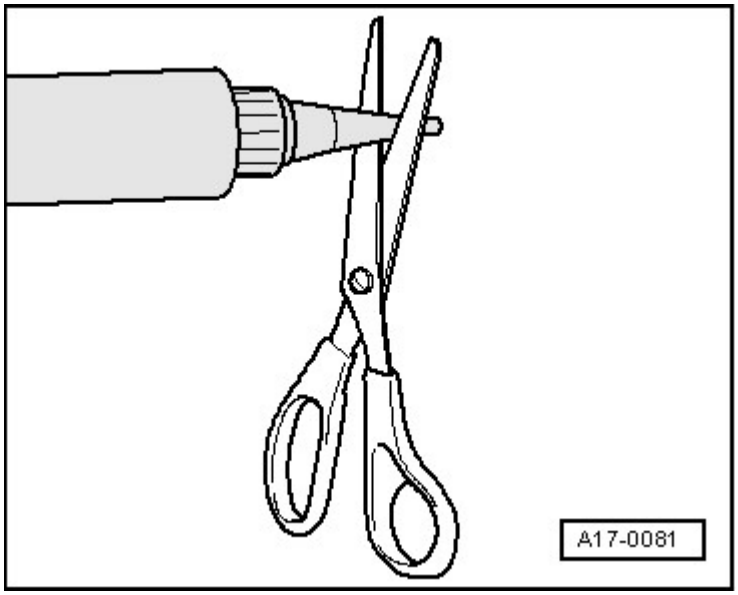

Fig. 51: Identifying Scissors To Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 3 mm)
Courtesy of AUDI OF AMERICA, LLC

-- Apply the silicone sealant on the clean sealing surface of the cover as illustrated.

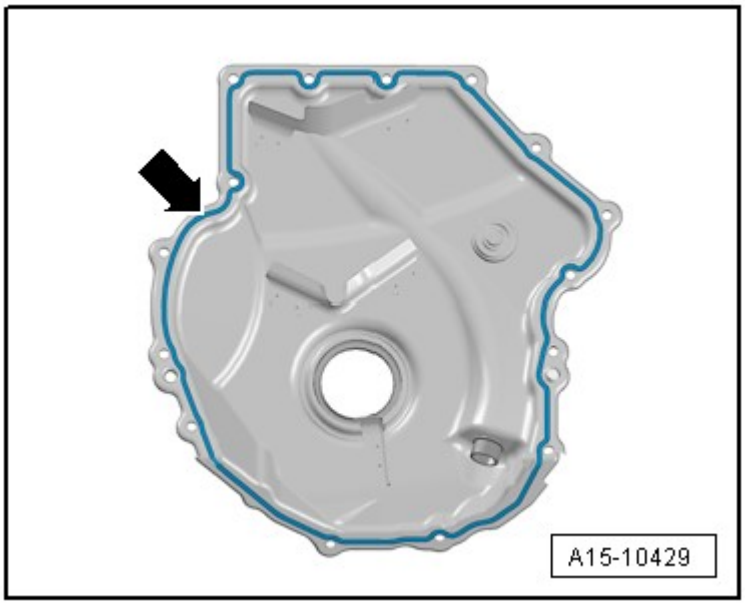

Fig. 52: Identifying Silicone Sealant Application Area For Cover Sealing Surface
Courtesy of AUDI OF AMERICA, LLC

- Sealant bead thickness: 2 to 3 mm.

NOTE: The cover must be installed within 5 minutes after the silicone sealant has been applied.

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

-- Mount the cover immediately and tighten the bolts, tightening sequence **TIMING CHAIN COVER ASSEMBLY OVERVIEW**.

NOTE: After installing cover, allow sealant to dry for approximately 30 minutes. Only after then may the engine oil be replenished.

-- Check oil level. Refer to **ENGINE, CHECKING OIL LEVEL**

Further installation is in reverse order of removal, note the following:

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

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

-- Adjust subframe mount. Refer to **SUBFRAME MOUNT, ADJUSTING** .

VIBRATION DAMPER SHAFT SEAL

Special tools and workshop equipment required

- Locking Pin T10060 A
- Counter Hold Tool T10355
- Thrust Piece T10354
- Thrust Piece T10368
- Pulling Hook T20143

Removing

-- Remove the noise insulation in the center by loosening the fasteners -1 and 2-.

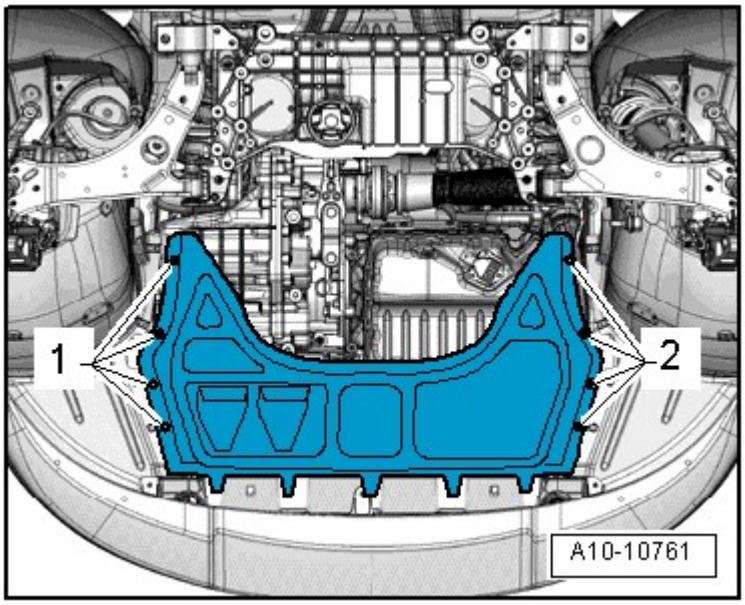

Fig. 53: Identifying Center Noise Insulation
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the fasteners -1, 2 and 3- and remove the right noise insulation.

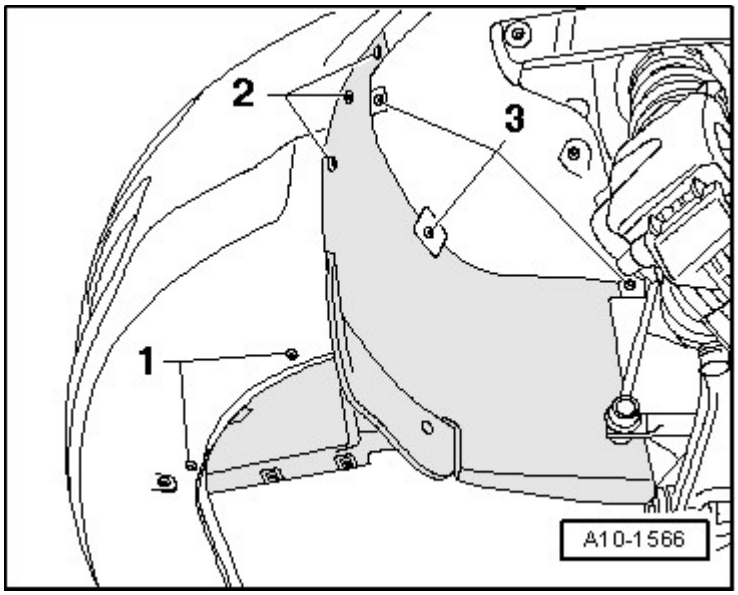

Fig. 54: Identifying Removal Of Left And Right Front Part Of Wheel Housing Liner
Courtesy of AUDI OF AMERICA, LLC

-- Remove bolts -arrows-.

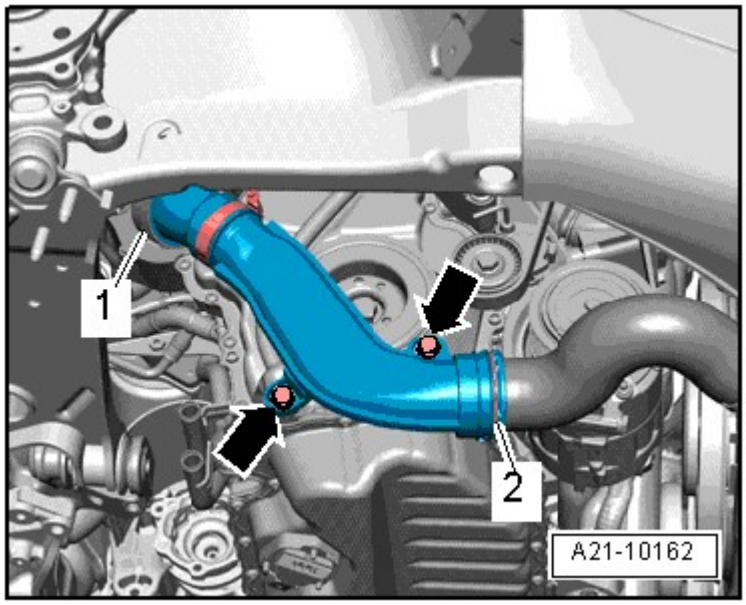

Fig. 55: Identifying Air Guide Pipe And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the air guide pipe by lifting the clamps -1 and 2-.

CAUTION: Risk of destroying due to reversed running direction on a used ribbed belt.

- **Before removing ribbed belt, marking running direction with chalk or**

felt-tip pen for reinstallation later.

-- To release ribbed belt tension, rotate tensioner in direction of -arrow-.

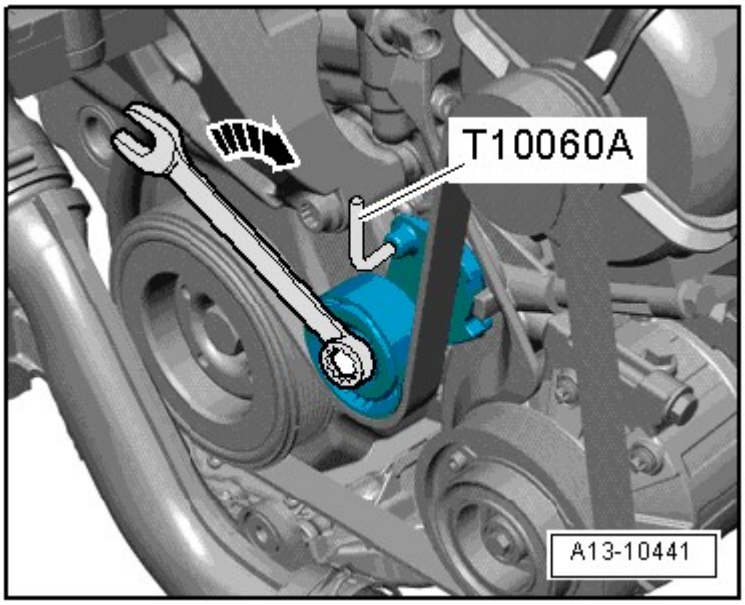

Fig. 56: Rotating Tensioner
Courtesy of AUDI OF AMERICA, LLC

-- Secure tensioner with T10060 A.

-- Remove ribbed belt from vibration damper ribbed belt pulley.

CAUTION: The engine could be destroyed.

- **In order not to change the valve timing, the crankshaft must not be moved out of the "TDC" position when the vibration damper is removed.**

-- Rotate the vibration damper using the T10355 into the TDC position -arrow-.

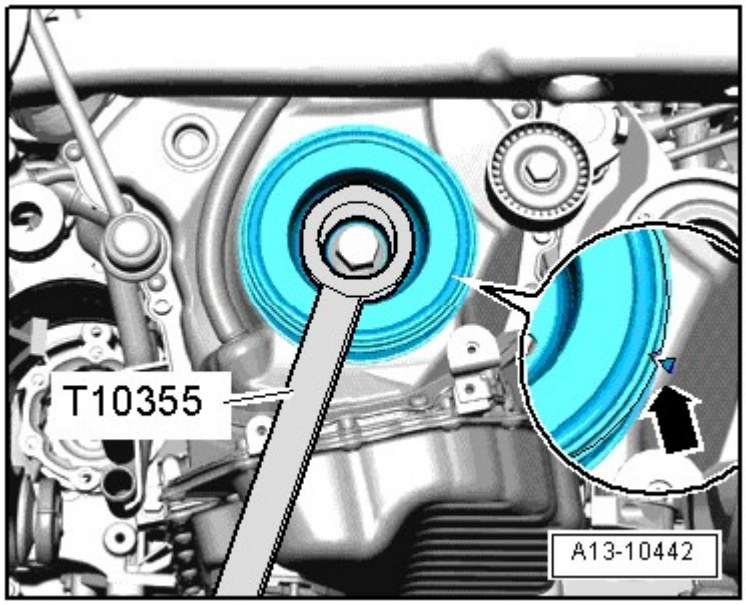

Fig. 57: Identifying Vibration Damper Rotated Into "OT" Position Using Counter Hold Tool T10355
Courtesy of AUDI OF AMERICA, LLC

- The notch on the vibration damper must line up with the arrow marking on the timing chain lower cover.

-- Remove vibration damper bolt using T10355.

-- Remove the vibration damper and attach the T10368.

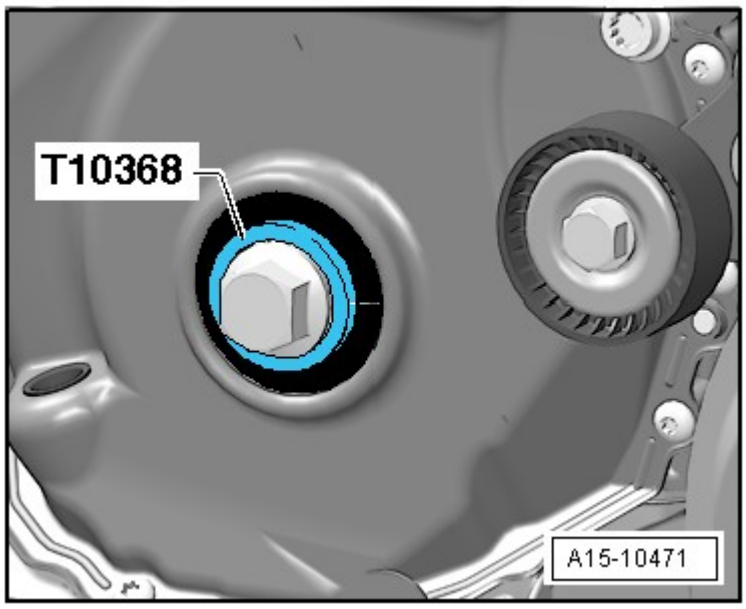

Fig. 58: Identifying Vibration Damper Bolt And Thrust Piece T10368
Courtesy of AUDI OF AMERICA, LLC

-- Remove the shaft seal with the T20143/2.

Installing

- Tightening specifications, refer to **RIBBED BELT DRIVE ASSEMBLY OVERVIEW** .

-- Clean running and sealing surface.

-- Remove the T10368.

-- Pull the sealing ring -arrow- using the T10354 and the vibration damper bolt in all the way.

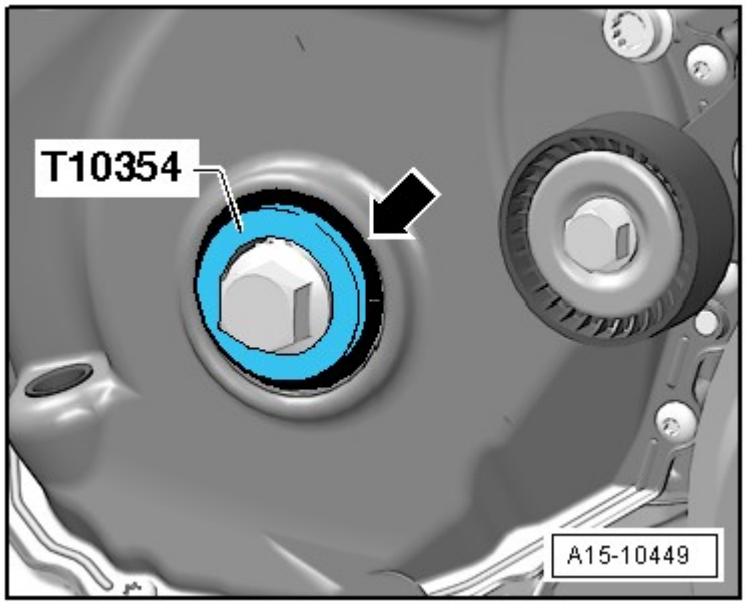

Fig. 59: Identifying Thrust Piece T10354
Courtesy of AUDI OF AMERICA, LLC

NOTE: Replace the vibration damper bolt.

Replace O-ring.

Further installation is in reverse order of removal, note the following:

-- Install vibration damper. Refer to **VIBRATION DAMPER** .

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

CAMSHAFT TIMING CHAIN

Special tools and workshop equipment required

- Assembly Tool T10352
- Counter Hold Tool T10355

- Locking Pin T40011
- Lever T40243
- Locking Tool T40267
- Camshaft Clamp T40271
- Locking Pin T10060 A

Removing

-- Remove timing chain upper cover. Refer to **UPPER TIMING CHAIN COVER**.

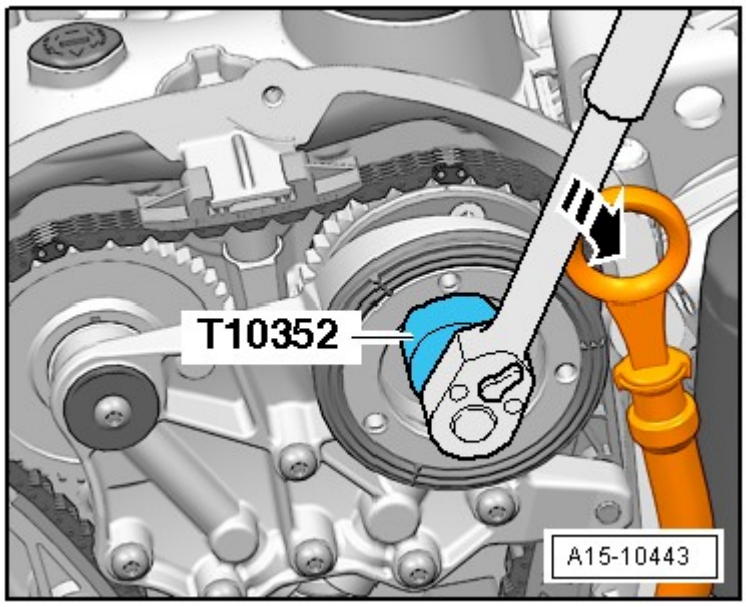

Fig. 60: Identifying Assembly Tool T10352 To Remove Control Valve
Courtesy of AUDI OF AMERICA, LLC

CAUTION: The control valve has a left thread.

-- Remove the control valve using the T10352 or T10352/1 in direction of -arrow- depending on the version.

-- Remove the bolts -arrows- and remove the bearing bracket.

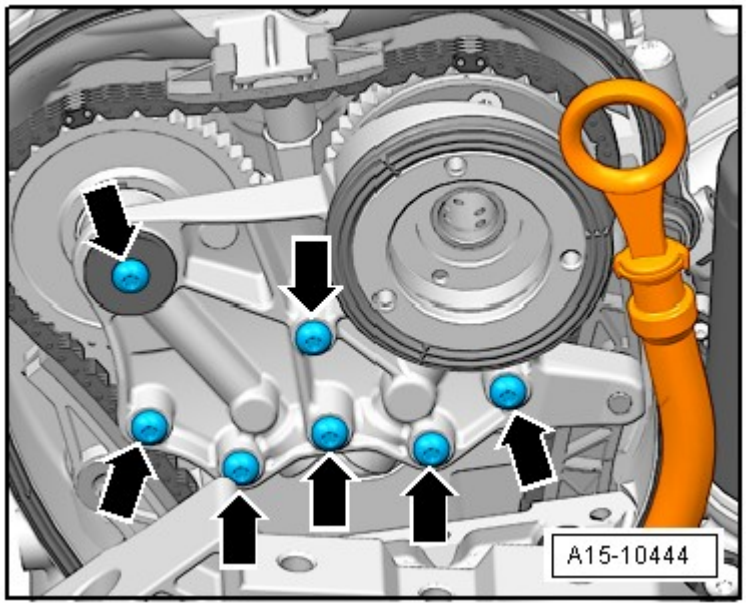

Fig. 61: Identifying Bearing Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Rotate the vibration damper using the T10355 into the TDC position -arrow-.

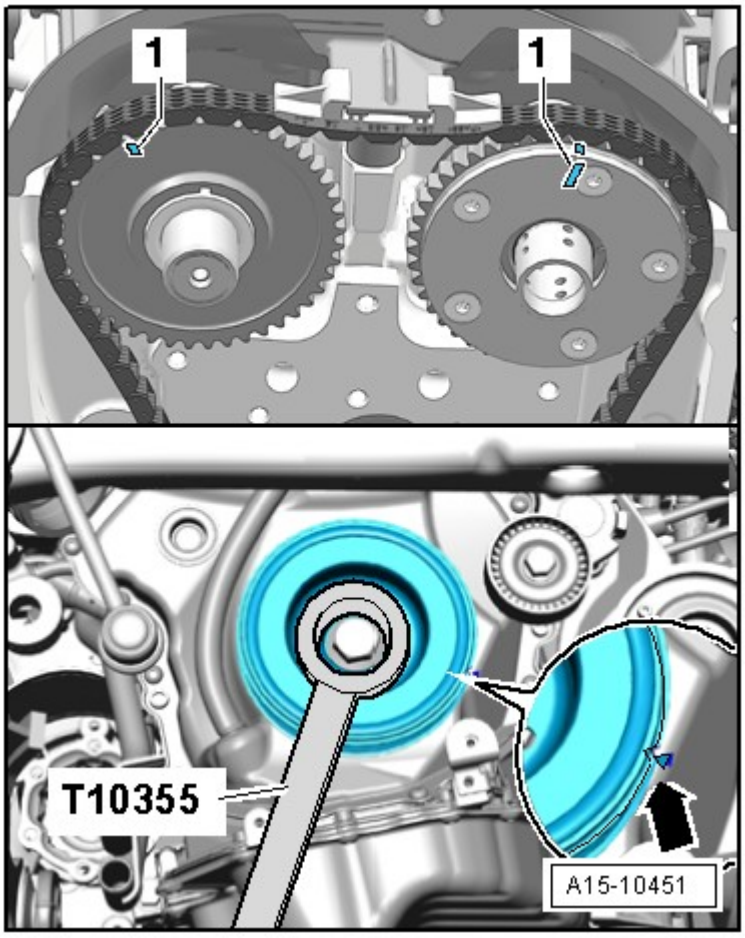

Fig. 62: Identifying Markings -1- On Camshafts Aligned To Point Upward
Courtesy of AUDI OF AMERICA, LLC

- The notch on the vibration damper must line up with the arrow marking on the timing chain lower cover.
- The markings -1- on the camshafts must point upward.

-- Remove the lower timing chain cover. Refer to **LOWER TIMING CHAIN COVER**.

-- Press the oil pump chain tensioner in direction of -arrow- and secure it with a T40011.

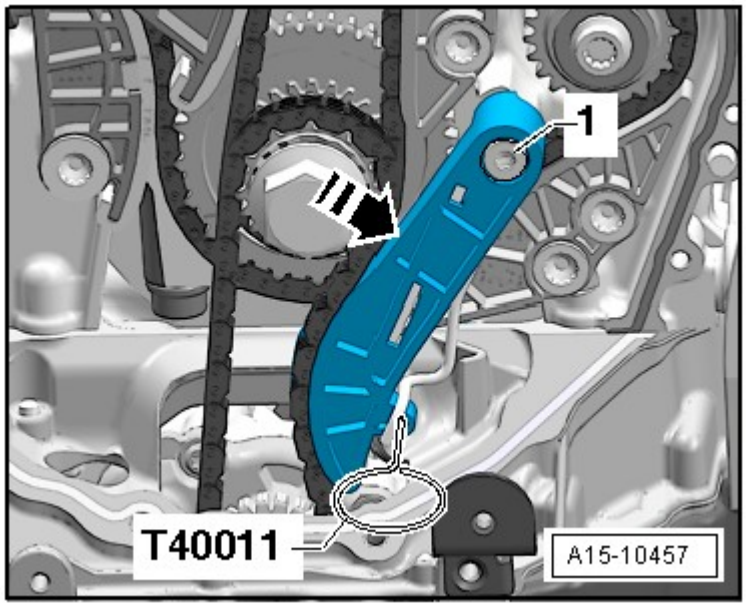

Fig. 63: Identifying Oil Pump Chain Tensioner And Locking Pin T40011
Courtesy of AUDI OF AMERICA, LLC

-- Remove the oil pump chain tensioner -1-.

-- Remove the oil pump chain tensioner.

-- Lift the chain tensioner locking wedge by inserting a scriber or a suitable screwdriver into the hole in the chain tensioner in direction of -arrow 1-.

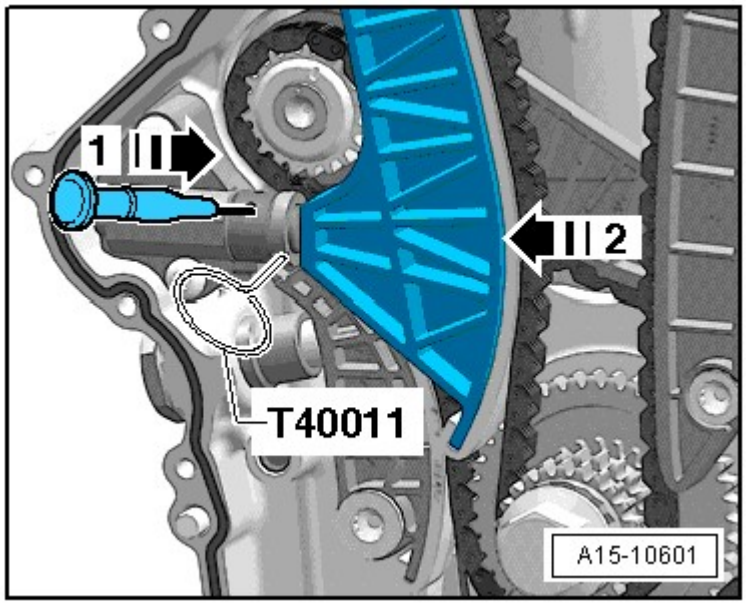

Fig. 64: Inserting Screwdriver Into Chain Tensioner Hole And Pressing Timing Chain Tensioning Rail
Courtesy of AUDI OF AMERICA, LLC

-- Press the timing chain tensioning rail in direction of -arrow 2- and secure it with the T40011.

-- Remove the camshaft timing chain from the cylinder head.

NOTE: The intake camshaft switches in the engine direction of rotation.

-- Remove the timing chain tensioning rail -2-.

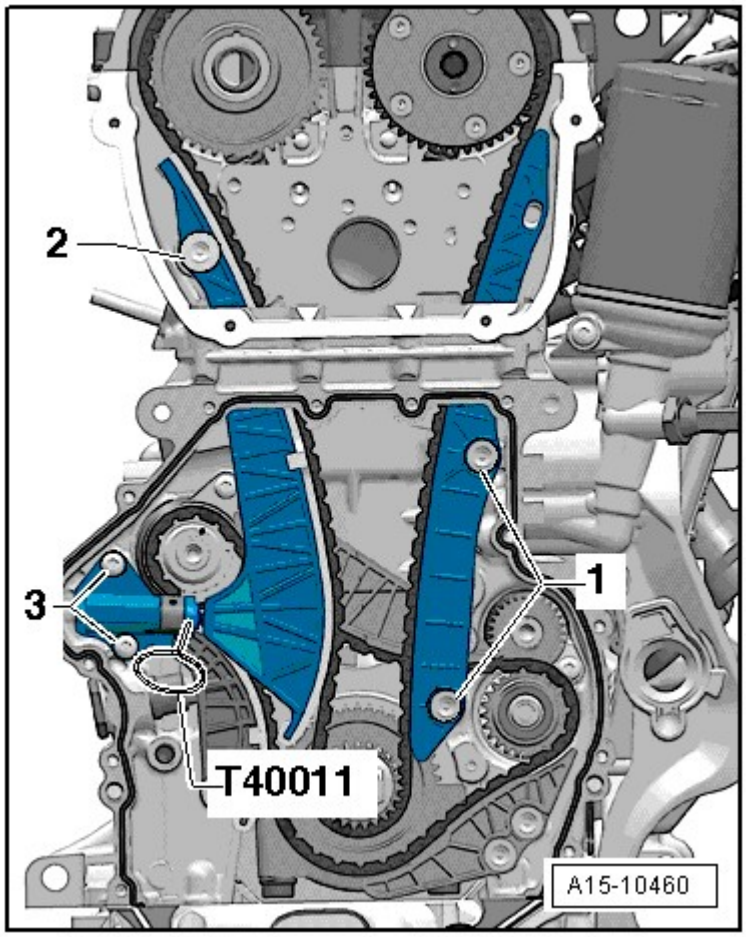

Fig. 65: Identifying Camshaft Timing Chain Tensioner Bolts, Camshaft Timing Chain Guide Rail And Guide Pins
Courtesy of AUDI OF AMERICA, LLC

-- Remove the guide rail for the camshaft timing chain -1-.

-- Remove the timing chain.

Installing

- Tightening specifications, refer to **CAMSHAFT TIMING CHAIN ASSEMBLY OVERVIEW**.

NOTE: **The following must be performed in one sequence. A second technician is required for this.**

The painted links of the timing chain must be positioned on the markings on the chain sprockets.

Hold the wrench tight until the tensioning rail is installed.

-- Mount the timing chain on the exhaust camshaft.

-- Mount the timing chain on the crankshaft.

-- Turn the intake camshaft using the wrench in direction of -arrow- and mount the timing chain.

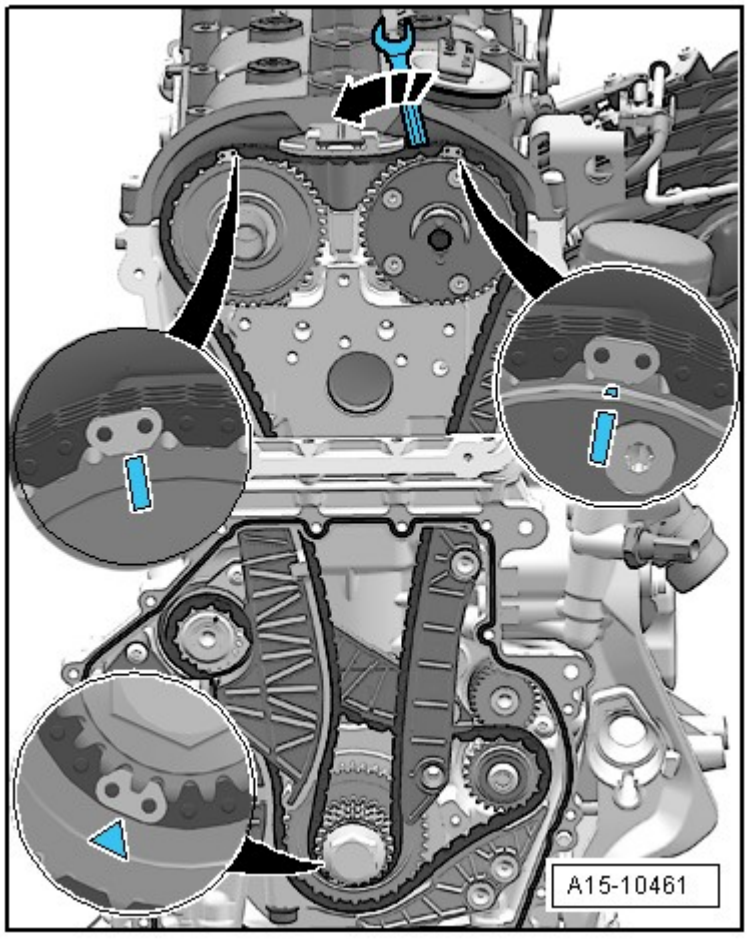

Fig. 66: Identifying Intake Camshaft Turned Using Wrench
Courtesy of AUDI OF AMERICA, LLC

-- Install the timing chain tensioning rail and tighten the bolt -2-.

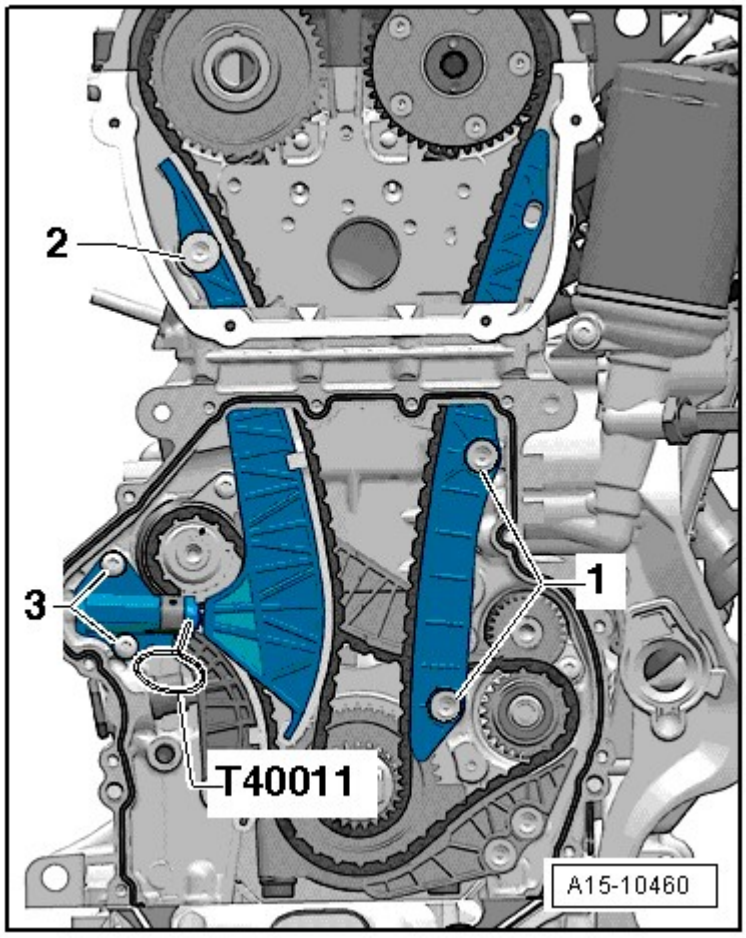

Fig. 67: Identifying Camshaft Timing Chain Tensioner Bolts, Camshaft Timing Chain Guide Rail And Guide Pins
Courtesy of AUDI OF AMERICA, LLC

-- Install the camshaft timing chain guide rail and tighten the bolts -1-.

-- Mount the bearing bracket and the bolts -arrows- hand-tight.

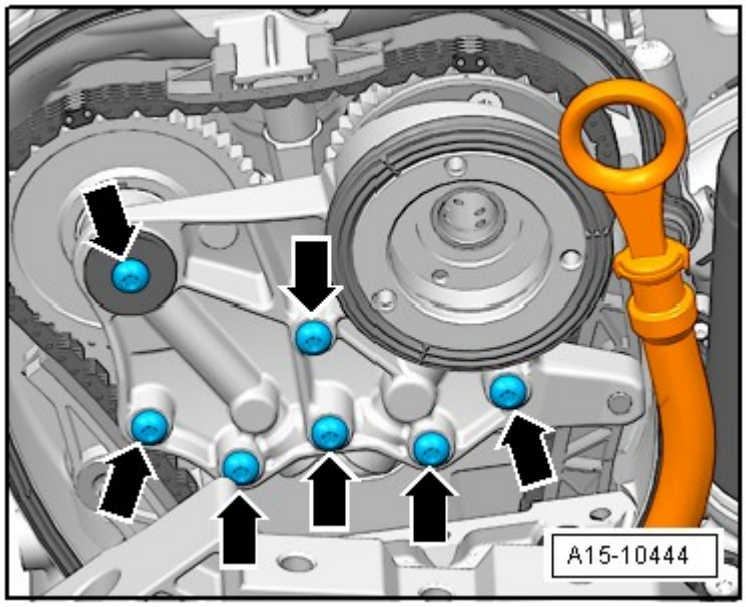

Fig. 68: Identifying Bearing Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the T40011.

-- Tighten the bearing bracket bolts -arrows-. Refer to **CAMSHAFT TIMING CHAIN ASSEMBLY OVERVIEW**.

-- Install the control valve -6- **CAMSHAFT TIMING CHAIN ASSEMBLY OVERVIEW**.

Further installation is performed in reverse order of removal, note the following:

-- Install the lower timing chain cover. Refer to **LOWER TIMING CHAIN COVER**.

-- Install timing chain upper cover. Refer to **UPPER TIMING CHAIN COVER**.

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

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

-- Adjust subframe mount. Refer to **SUBFRAME MOUNT, ADJUSTING** .

BALANCE SHAFT TIMING CHAIN

Removing

-- Remove the camshaft timing chain. Refer to **CAMSHAFT TIMING CHAIN**.

-- Remove the camshaft timing chain tensioner -3-.

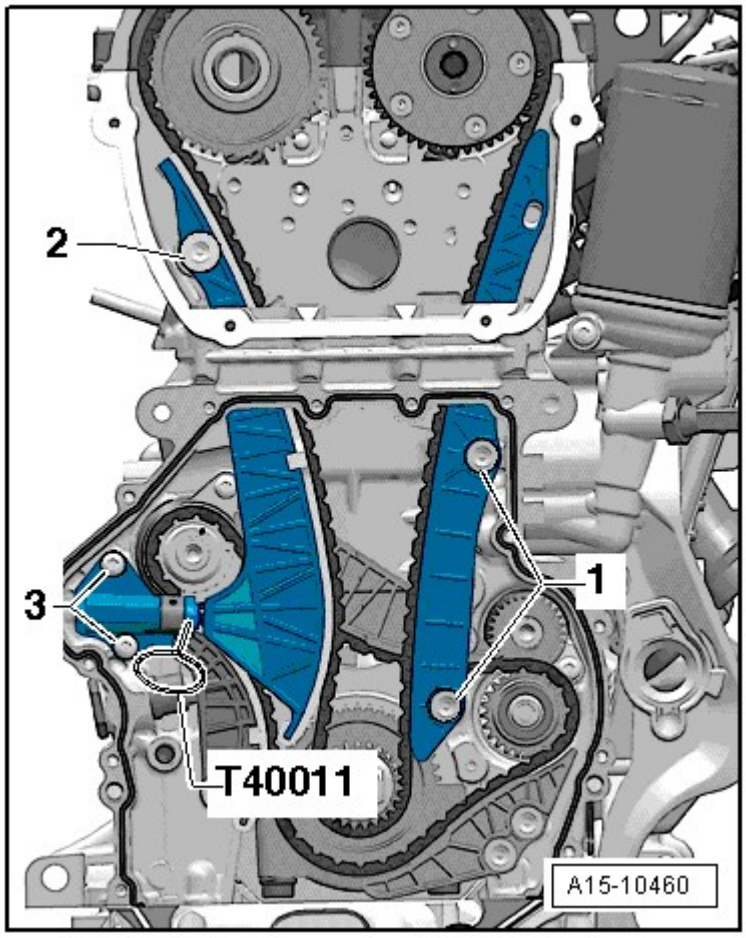

Fig. 69: Identifying Camshaft Timing Chain Tensioner Bolts, Camshaft Timing Chain Guide Rail And Guide Pins
Courtesy of AUDI OF AMERICA, LLC

-- Remove the balance shaft chain tensioner -1-.

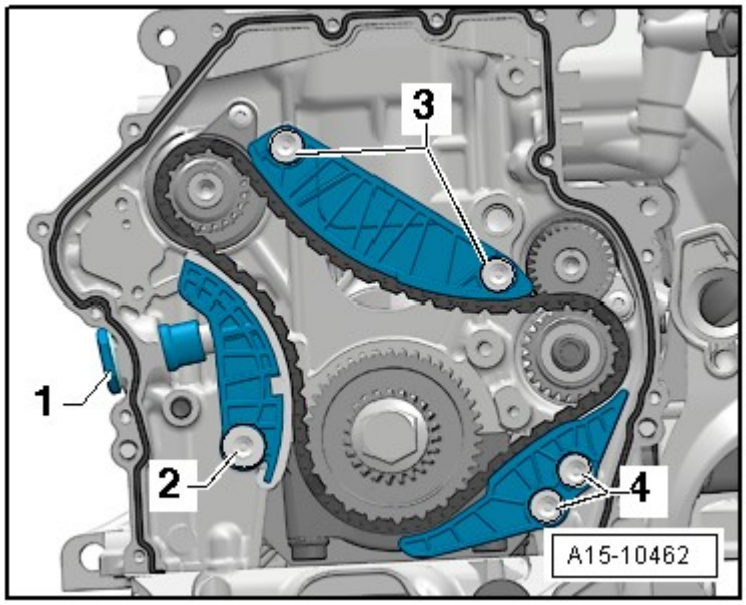

Fig. 70: Identifying Balance Shaft Timing Chain, Tensioning Rail And Guide Rails
Courtesy of AUDI OF AMERICA, LLC

-- Remove the tensioning rail -2-.

-- Remove the guide rail -3-.

-- Remove the guide rail -4-.

-- Remove the timing chain.

Installing

- Tightening specifications, refer to **BALANCE SHAFT TIMING CHAIN ASSEMBLY OVERVIEW**.

-- Turn the intermediate shaft sprocket/balance shaft to the marking -arrow-.

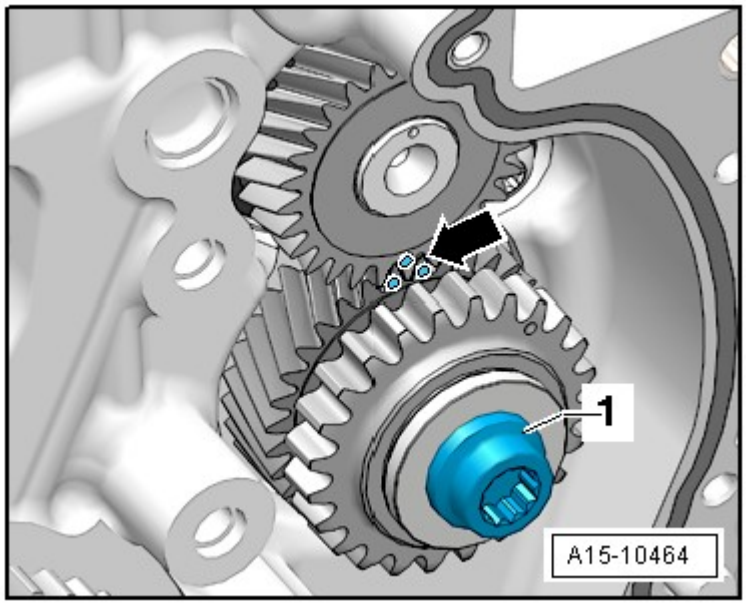

Fig. 71: Identifying Intermediate Shaft Sprocket
Courtesy of AUDI OF AMERICA, LLC

NOTE: The painted links of the timing chain must be positioned on the markings on the chain sprockets.

-- Mount the timing chain; the painted links of the timing chain must be positioned on the markings on the chain sprockets.

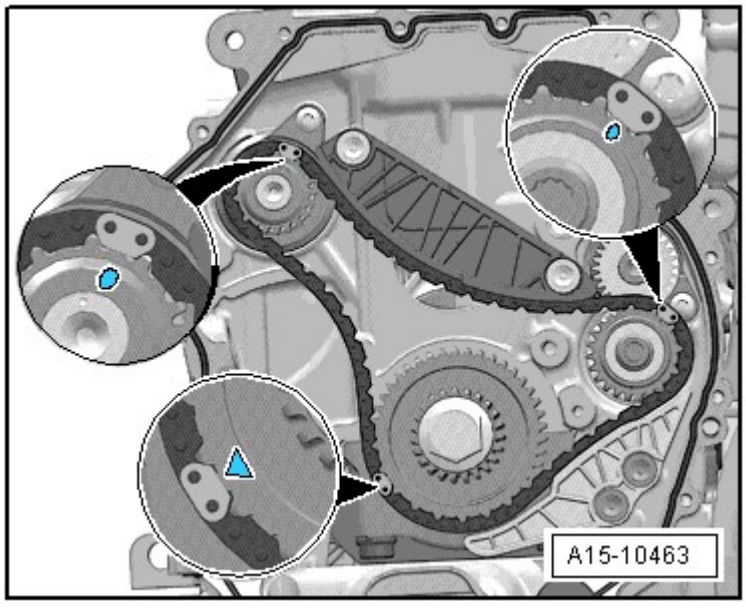

Fig. 72: Identifying Timing Chain Markings
Courtesy of AUDI OF AMERICA, LLC

-- Install the timing chain guide rail and tighten the bolts -4-.

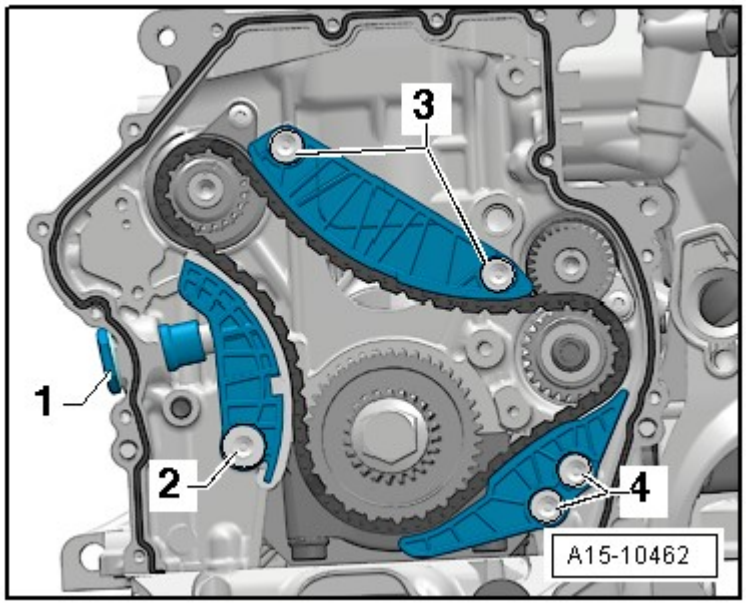

Fig. 73: Identifying Balance Shaft Timing Chain, Tensioning Rail And Guide Rails
Courtesy of AUDI OF AMERICA, LLC

-- Install the timing chain guide rail and tighten the bolts -3-.

-- Install the timing chain tensioning rail and tighten the bolt -2-.

-- Insert the timing chain tensioner -1- with locking compound.

-- Check the setting one more time.

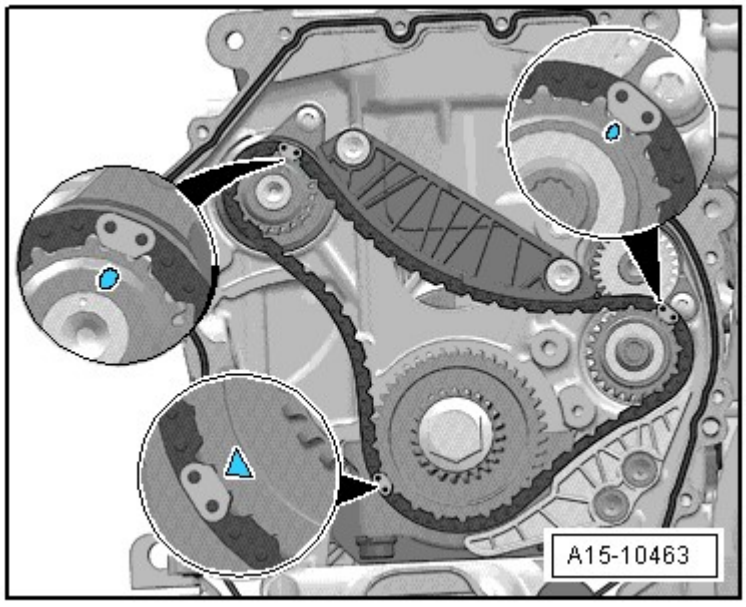

Fig. 74: Identifying Timing Chain Markings
Courtesy of AUDI OF AMERICA, LLC

-- Check the markings on the intermediate shaft sprocket/balance shaft -arrow-.

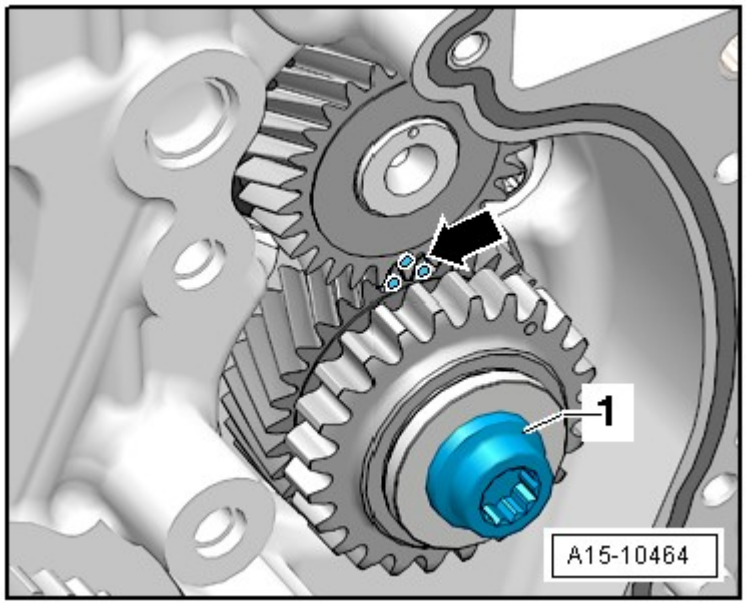

Fig. 75: Identifying Intermediate Shaft Sprocket
Courtesy of AUDI OF AMERICA, LLC

NOTE: The marking on the intermediate shaft sprocket/balance shaft is shown with the chain removed.

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

-- Install camshaft timing chain. Refer to **CAMSHAFT TIMING CHAIN**.

-- Install the lower timing chain cover. Refer to **LOWER TIMING CHAIN COVER**.

-- Install timing chain upper cover. Refer to **UPPER TIMING CHAIN COVER**.

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

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

-- Adjust subframe mount. Refer to **SUBFRAME MOUNT, ADJUSTING** .

BALANCE SHAFT FOR INTAKE SIDE

Special tools and workshop equipment required

- Puller T10394

- Half Shell T10394/1
- Puller T10055

Removing

NOTE: The intake camshaft balance shaft must be replaced after removal.

-- Remove the coolant pump toothed belt. Refer to **COOLANT PUMP TOOTHED BELT** .

-- Remove the camshaft timing chain. Refer to **CAMSHAFT TIMING CHAIN**.

-- Remove the balance shaft timing chain. Refer to **BALANCE SHAFT TIMING CHAIN**.

-- Remove the intermediate shaft sprocket -1-.

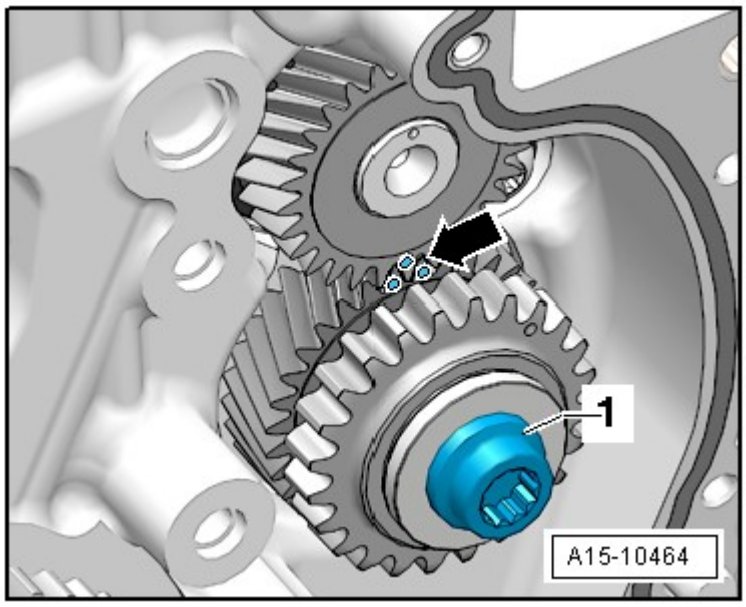

Fig. 76: Identifying Intermediate Shaft Sprocket
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -2- on the intake camshaft balance shaft.

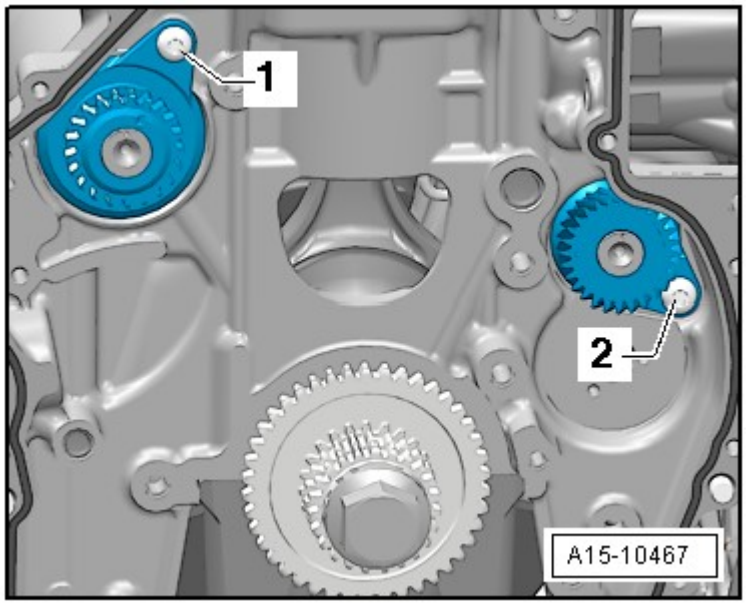

Fig. 77: Identifying Intake Camshaft Balance Shaft
Courtesy of AUDI OF AMERICA, LLC

-- Install the half shell T10394/1 from the T10394 and turn it upward in direction of -arrow-.

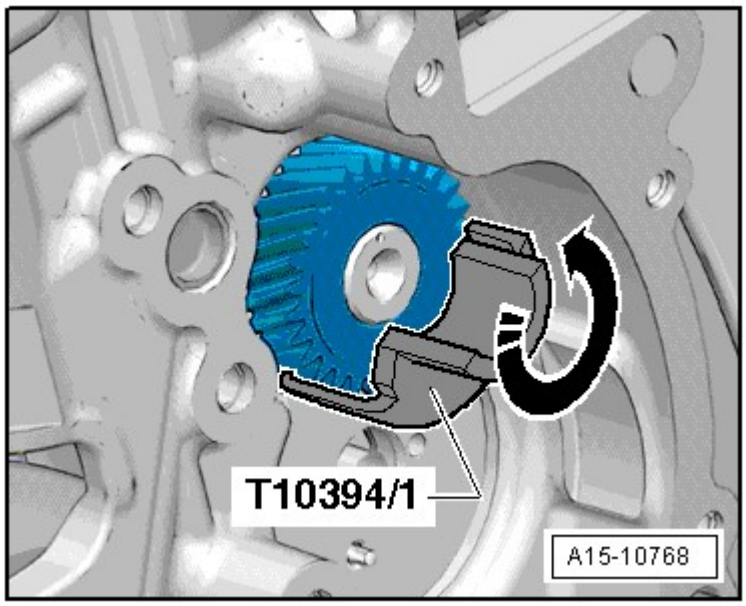

Fig. 78: Identifying Half Shell -T10394/1-
Courtesy of AUDI OF AMERICA, LLC

-- Install the puller T10394 and push the sliding sleeve in direction of -arrow-.

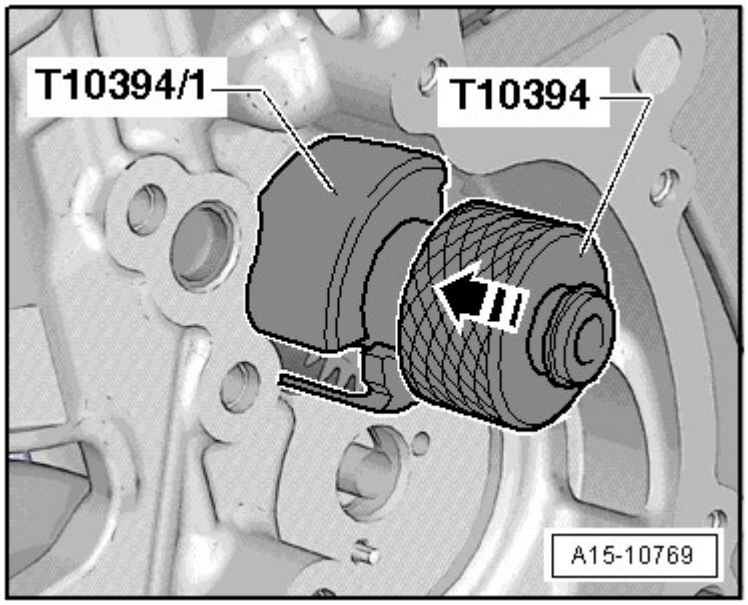

Fig. 79: Identifying Installation Of Puller Pieces -T10394- And -T10394/1-
Courtesy of AUDI OF AMERICA, LLC

-- Install the T10055 into the T10394 and remove the balance shaft in direction -of arrow-.

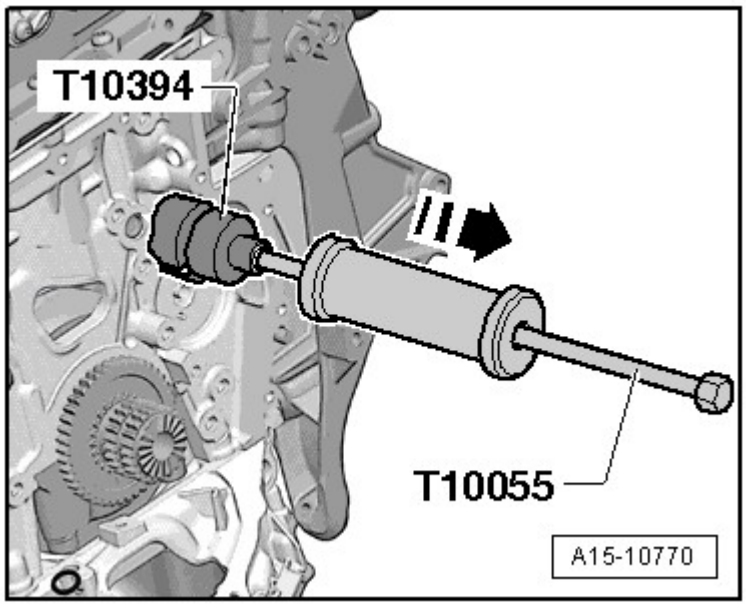

Fig. 80: Identifying Installation And Operation Of Puller -T10055-
Courtesy of AUDI OF AMERICA, LLC

Installing

NOTE: Because of the small clearance between the balance shaft and cylinder block, the balance shaft may need to be cooled in order to install it. Check if the

balance shaft can be inserted into the cylinder block without forcing it in. If this is not the case, then the balance shaft must be installed cooled.

- Tightening specifications, refer to **BALANCE SHAFT TIMING CHAIN ASSEMBLY OVERVIEW**.

-- Place the new balance shaft in a freezer for 30 minutes or spray it with commercially available cooling spray.

-- Lubricate the balance shaft bearing with engine oil.

-- Install the new intake camshaft shim and tighten the bolt -2-.

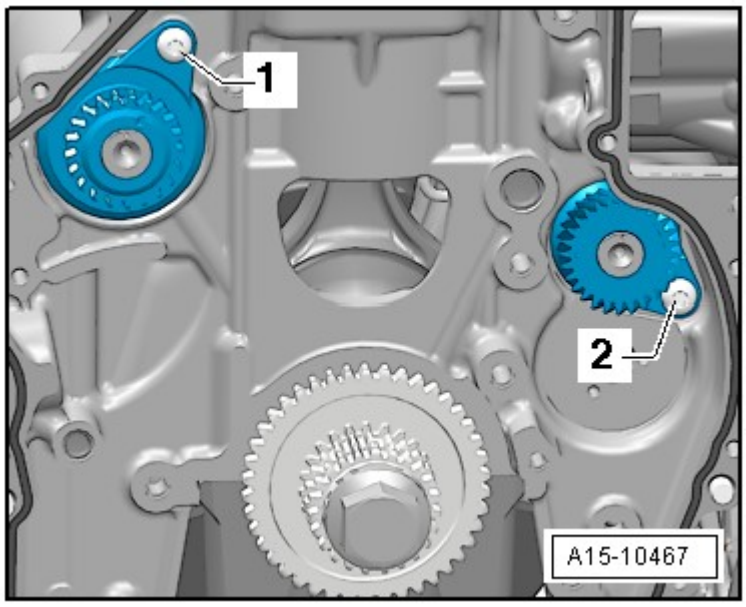

Fig. 81: Identifying Intake Camshaft Balance Shaft
Courtesy of AUDI OF AMERICA, LLC

-- Replace the O-ring -1- and coat with engine oil.

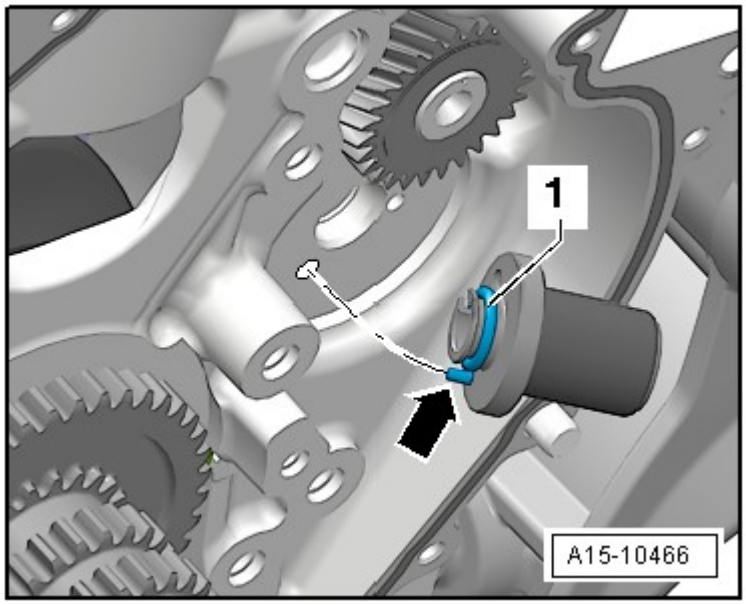

Fig. 82: Identifying Bearing Pins, Installation Position
Courtesy of AUDI OF AMERICA, LLC

-- Coat the mounting pin with engine oil and insert it. The alignment pin -arrow- for the mounting pin must engage in the hole in the cylinder block.

CAUTION: Always replace the intermediate shaft sprocket. Otherwise the backlash will not adjust itself and it could result in engine damage.

The new intermediate shaft sprocket has an anti-friction coating that wears off after a short period of use, which automatically adjusts the backlash.

-- Mark the tooth face on the intermediate shaft sprocket with paint -arrows-.

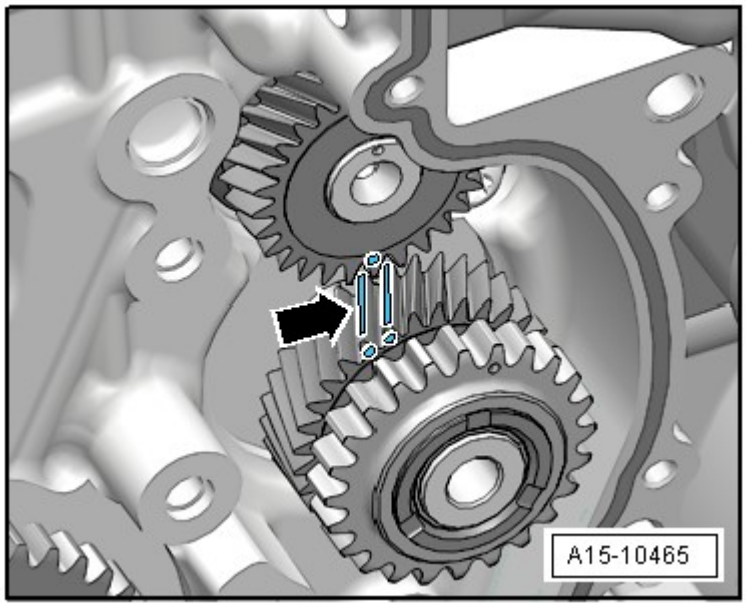

Fig. 83: Identifying Tooth Face On Intermediate Shaft Sprocket Marked With Paint
Courtesy of AUDI OF AMERICA, LLC

-- Install the intermediate shaft sprocket. The marking on the balance shaft must be between the markings on the tooth faces.

-- Tighten the bolt -1- for the intermediate shaft sprocket: tightening sequence **BALANCE SHAFT TIMING CHAIN ASSEMBLY OVERVIEW**.

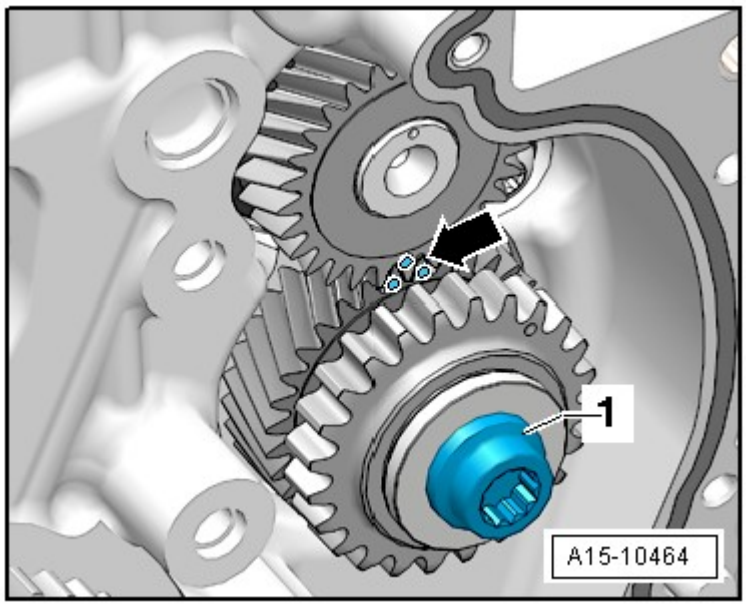

Fig. 84: Identifying Intermediate Shaft Sprocket
Courtesy of AUDI OF AMERICA, LLC

-- Check the markings on the intermediate shaft sprocket/balance shaft -arrow-.

NOTE: Due to the ratio, the marking align only every 7th turn.

Further installation is in reverse order of removal, note the following:

-- Install the balance shaft timing chain. Refer to **BALANCE SHAFT TIMING CHAIN**.

-- Install camshaft timing chain. Refer to **CAMSHAFT TIMING CHAIN**.

-- Install the lower timing chain cover. Refer to **LOWER TIMING CHAIN COVER**.

-- Install timing chain upper cover. Refer to **UPPER TIMING CHAIN COVER**.

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

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

-- Adjust subframe mount. Refer to **SUBFRAME MOUNT, ADJUSTING** .

-- Replace the coolant pump drive seal. Refer to **COOLANT PUMP DRIVE SHAFT SEAL** .

-- Install the coolant pump toothed belt. Refer to **COOLANT PUMP TOOTHED BELT** .

EXHAUST SIDE BALANCE SHAFT

Special tools and workshop equipment required

- Puller T10394
- Half Shell T10394/1
- Puller T10055

Removing

NOTE: The exhaust camshaft balance shaft must be replaced after removal.

-- Remove the camshaft timing chain. Refer to **CAMSHAFT TIMING CHAIN**.

-- Remove the balance shaft timing chain. Refer to **BALANCE SHAFT TIMING CHAIN**.

-- Remove the bolt -1- on the exhaust camshaft balance shaft.

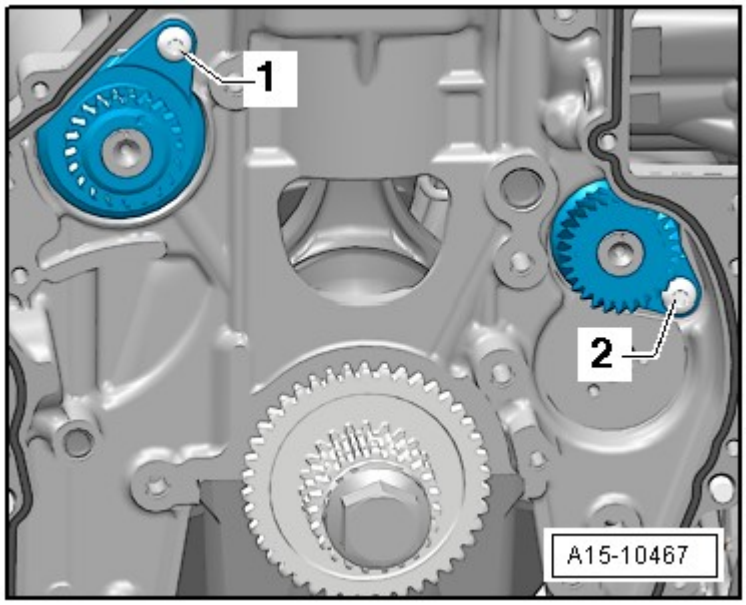

Fig. 85: Identifying Intake Camshaft Balance Shaft
Courtesy of AUDI OF AMERICA, LLC

-- Install the half shell T10394/1 from the T10394.

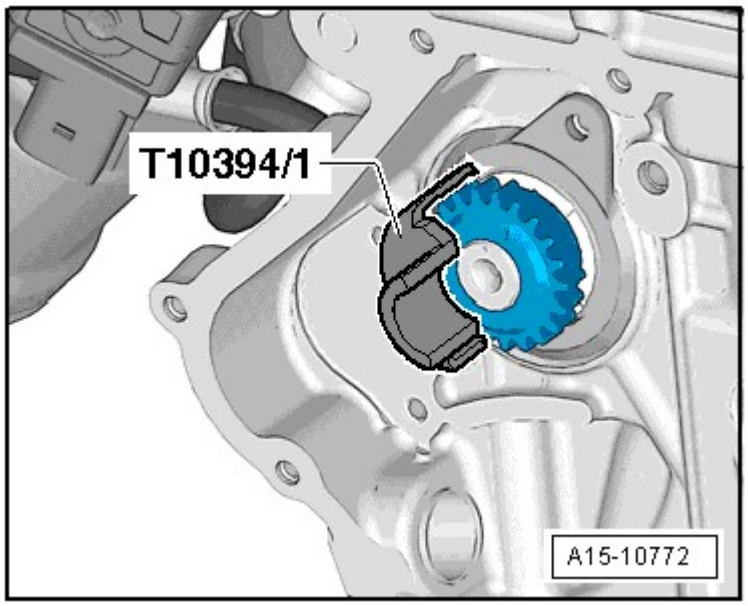

Fig. 86: Identifying Half Shell -T10394/1-
Courtesy of AUDI OF AMERICA, LLC

-- Install the T10394 and push the sliding sleeve in direction of -arrow-.

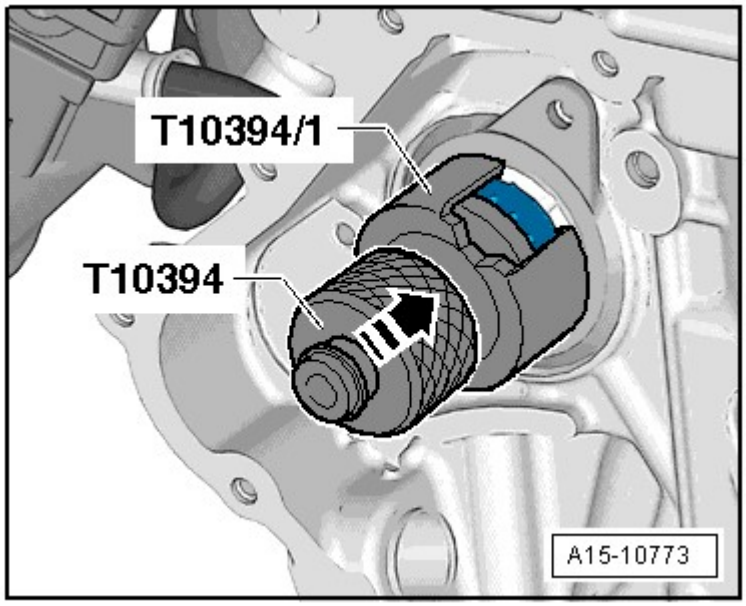

Fig. 87: Identifying Installation Of Puller Pieces -T10394- And -T10394/1-
Courtesy of AUDI OF AMERICA, LLC

-- Install the T10055 into the T10394 and remove the balance shaft.

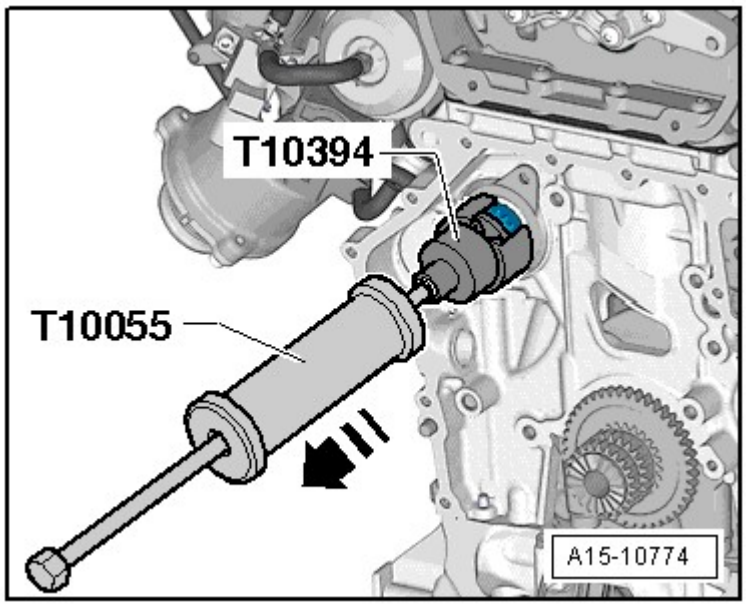

Fig. 88: Identifying Installation And Operation Of Puller -T10055-
Courtesy of AUDI OF AMERICA, LLC

Installing

NOTE: Because of the small clearance between the balance shaft and cylinder block, the balance shaft may need to be cooled in order to install it. Check if the

balance shaft can be inserted into the cylinder block without forcing it in. If this is not the case, then the balance shaft must be installed cooled.

- Tightening specifications, refer to **BALANCE SHAFT TIMING CHAIN ASSEMBLY OVERVIEW**.

-- Check the installation position of the pipe for the balance shaft -arrow-.

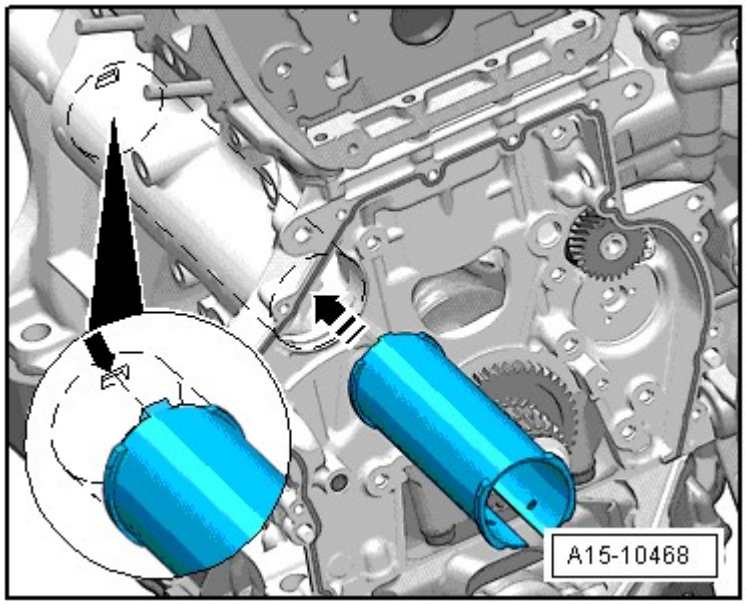

Fig. 89: Identifying Pipe For Balance Shaft - Installation Position
Courtesy of AUDI OF AMERICA, LLC

The pin -arrow- must engage in the groove.

-- Place the new balance shaft in a freezer for 30 minutes or spray it with commercially available cooling spray.

-- Lubricate the balance shaft bearing with engine oil.

-- Before tightening the bolt -1- make sure the balance shaft lies level on the crankshaft.

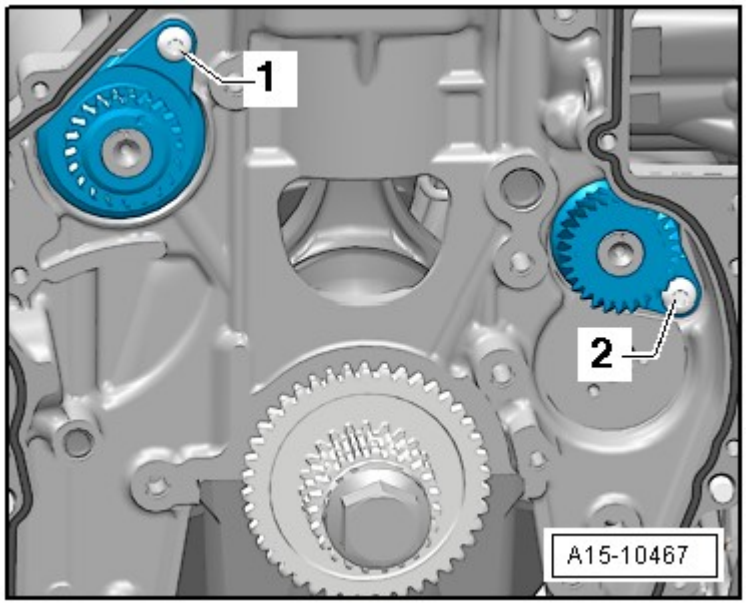

Fig. 90: Identifying Intake Camshaft Balance Shaft
Courtesy of AUDI OF AMERICA, LLC

NOTE: If the balance shaft is not level, then the pipe for the balance shaft must be installed again.

The rest of the assembly is basically a reverse of the disassembling sequence. When doing this note the following:

-- Install the balance shaft timing chain. Refer to **BALANCE SHAFT TIMING CHAIN**.

-- Install camshaft timing chain. Refer to **CAMSHAFT TIMING CHAIN**.

-- Install the lower timing chain cover. Refer to **LOWER TIMING CHAIN COVER**.

-- Install timing chain upper cover. Refer to **UPPER TIMING CHAIN COVER**.

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

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

-- Adjust subframe mount. Refer to **SUBFRAME MOUNT, ADJUSTING** .

CYLINDER HEAD

Special tools and workshop equipment required

- Ignition Coil Puller T40039
- Assembly Tool T10352 and Assembly Tool T10352/1

- Counter Holder Tool T10355
- Locking Pin T40011
- Engine Bung Set VAS 6122
- Polydrive Bit and Drive Socket T10070
- Lever T40243
- Camshaft locator T40271
- Locking Tool T40267

Removing

NOTE: During installation, cable ties must be installed at the same location.

Always seal off any open channels in the intake and exhaust tract with plugs. For example, use the plugs from the VAS 6122.

-- Remove the engine cover -arrows-.

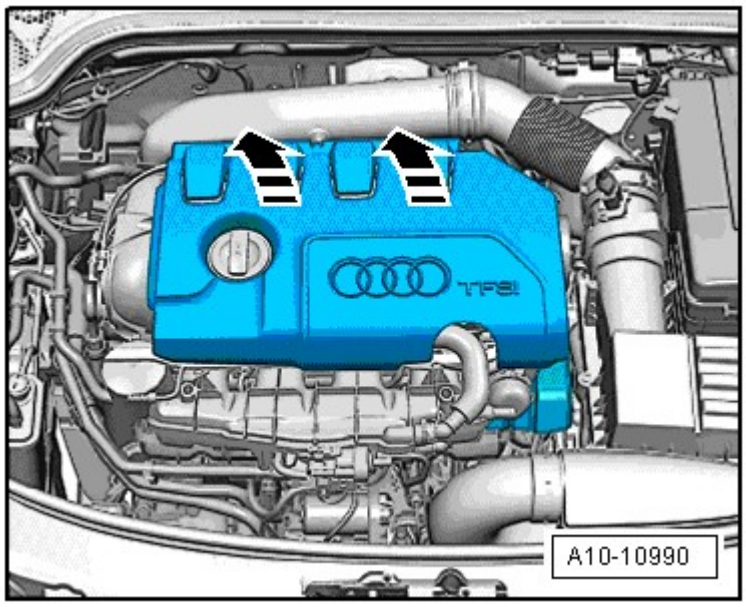

Fig. 91: Identifying Engine Cover, Removal
Courtesy of AUDI OF AMERICA, LLC

-- Remove the cover for the air guide; to do so disengage the side clips -arrows-.

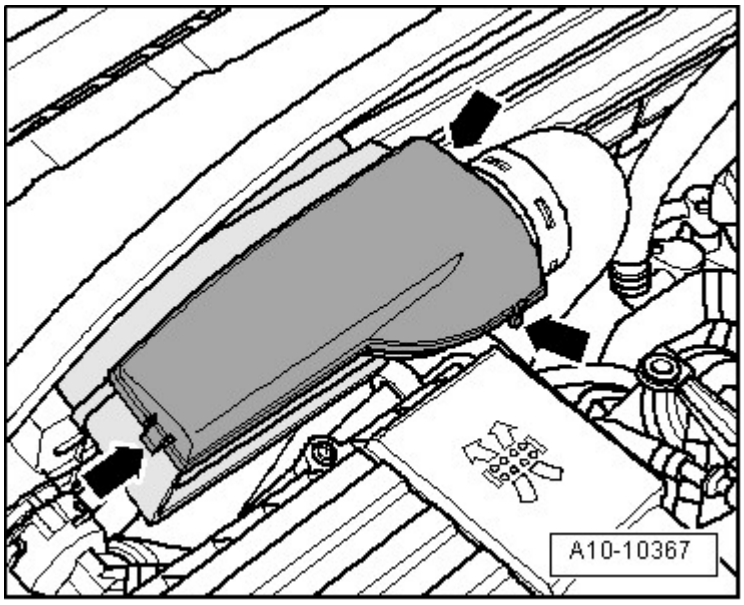

Fig. 92: Identifying Air Duct Cover Slide Clips
Courtesy of AUDI OF AMERICA, LLC

-- Unclip the lower air guide, to do so disengage the clips -arrows-.

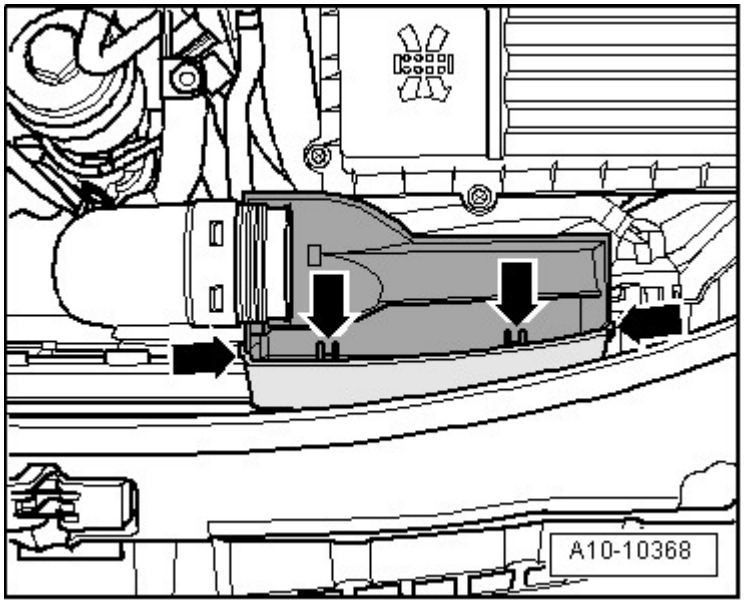

Fig. 93: Identifying Lower Air Guide Clips
Courtesy of AUDI OF AMERICA, LLC

-- Remove the lower air guide together with the air guide hose.

-- Disconnect electrical connector -1- on mass air flow (MAF) sensor -G70-.

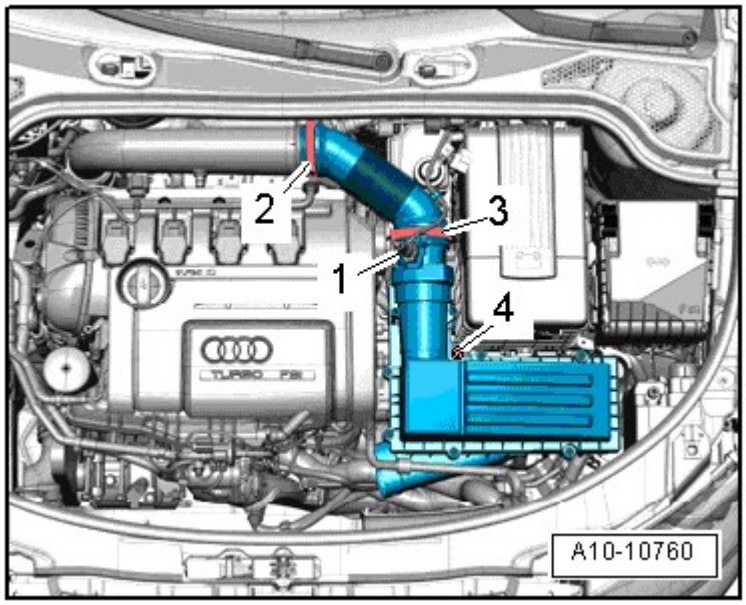

Fig. 94: Identifying Air Flow Housing, Electrical Connector And Guide Hose
Courtesy of AUDI OF AMERICA, LLC

-- Remove the air guide hose -2-.

-- Remove the bolt -4- and the air filter housing.

NOTE: Ignore - 3-.

-- Loosen the hose clamp -2-.

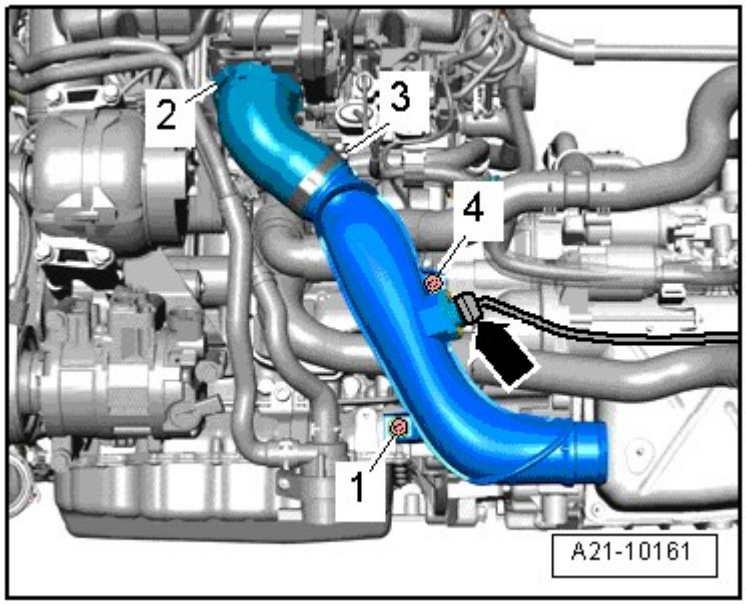

Fig. 95: Identifying Air Guide Hose Bolts, Air Guide Pipe Hose Clamps & Electrical Harness Connector

Courtesy of AUDI OF AMERICA, LLC

-- Remove bolt -4-.

-- Disconnect the connector -arrow- and free up the wire.

NOTE: Ignore -1 and 3-.

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

- **When the engine is warm the cooling system is under pressure.**
- **To reduce pressure, cover coolant reservoir cap with cloth and carefully open.**

-- Open coolant reservoir cap.

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

-- Remove the right front wheel.

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

-- Loosen the fasteners -1, 2 and 3- and remove the right noise insulation.

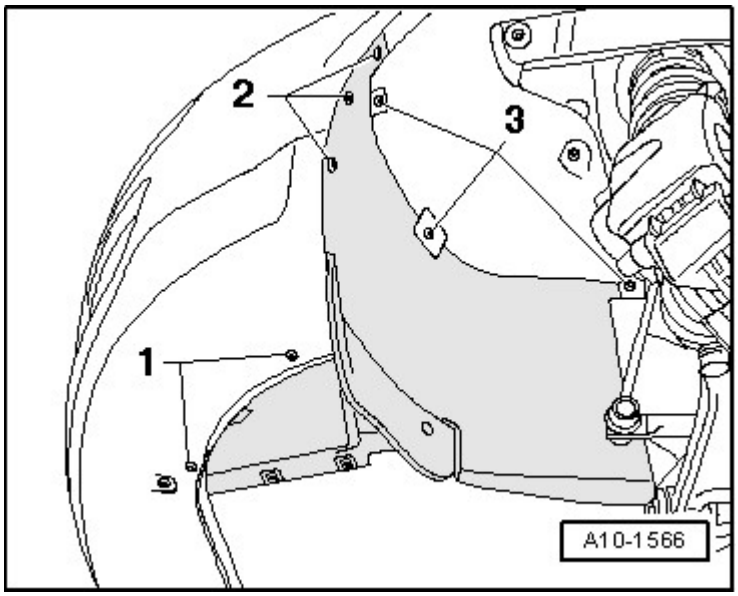

Fig. 96: Identifying Removal Of Left And Right Front Part Of Wheel Housing Liner
Courtesy of AUDI OF AMERICA, LLC

Cabriolet

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

All

-- Remove the air guide pipe -1 and 2-.

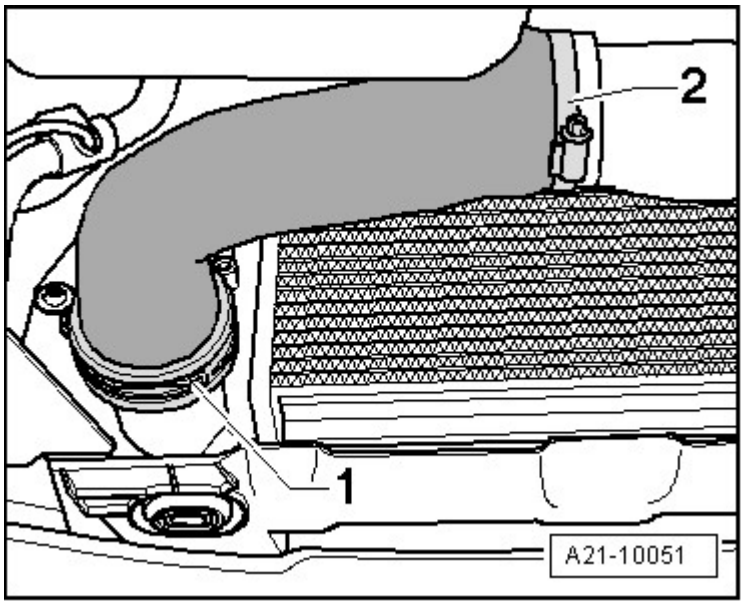

Fig. 97: Identifying Air Cooler Air Duct
Courtesy of AUDI OF AMERICA, LLC

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

-- Remove the bolt -1- and remove the air guide pipe downward.

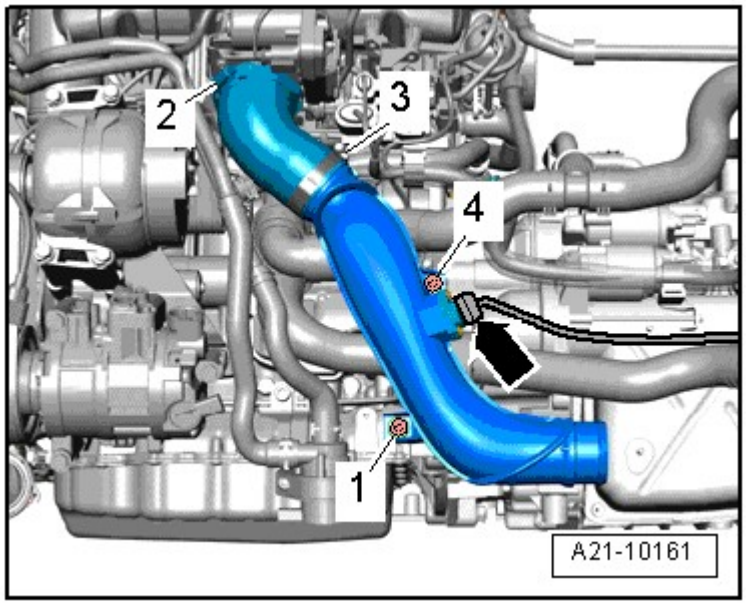

Fig. 98: Identifying Air Guide Hose Bolts, Air Guide Pipe Hose Clamps & Electrical Harness Connector
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -2, 3, 4 and arrow-.

-- Remove bolts -arrows-.

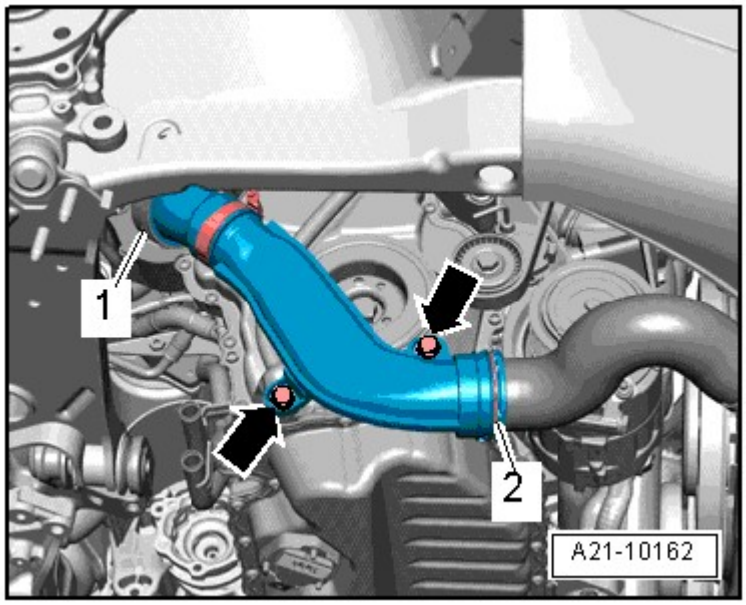

Fig. 99: Identifying Air Guide Pipe And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the air guide pipe by lifting the clamps -1 and 2-.

-- Disconnect the connectors -1 and 2- and free up the wire -arrows-.

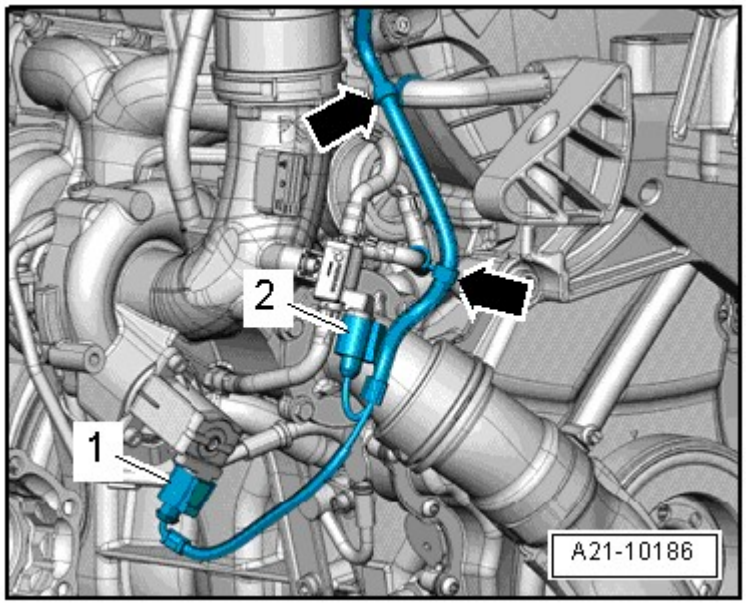

Fig. 100: Identifying Turbocharger Electrical Connectors
Courtesy of AUDI OF AMERICA, LLC

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

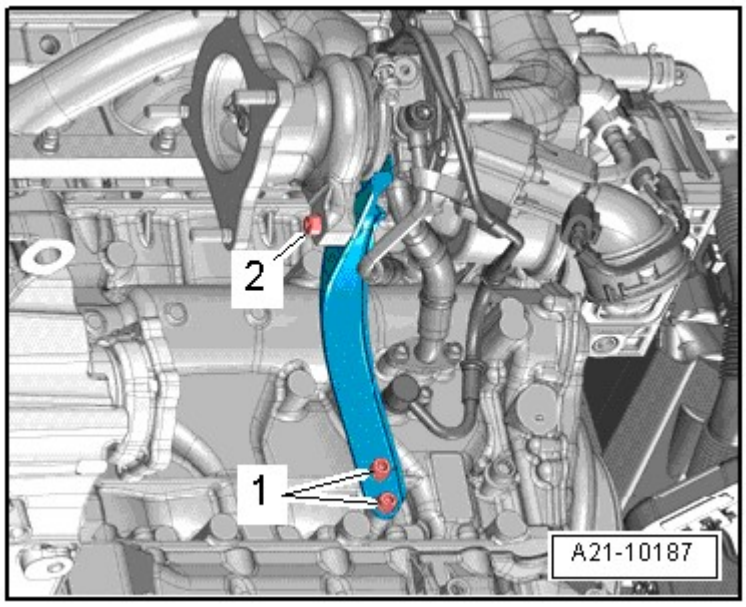

Fig. 101: Identifying Turbocharger Support And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the banjo bolt -2- and move the coolant line to the side.

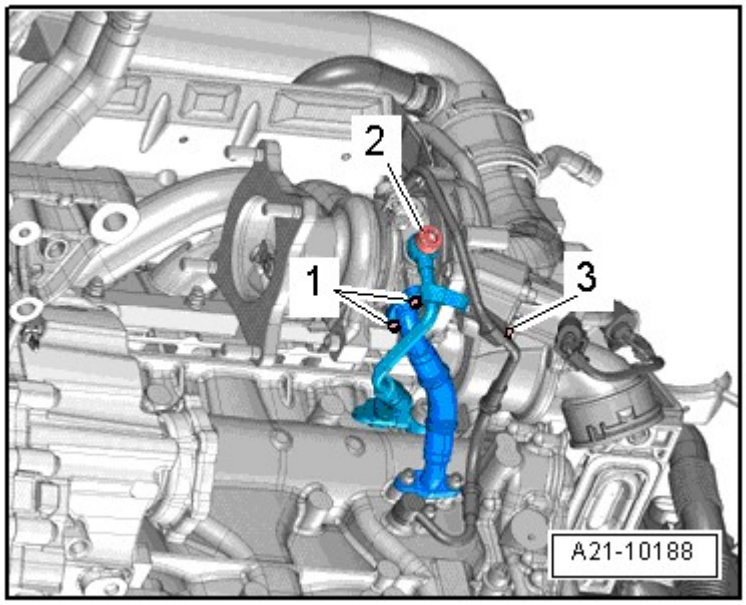

Fig. 102: Identifying Oil Return Line, Coolant Line And Oil Supply Line Fasteners
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -1- on the oil return line.

-- Remove the bolt -3- on the oil supply line.

NOTE: The installation location is shown with the engine removed.

-- Press the release buttons, remove the air guide hose -2- and move them to the side.

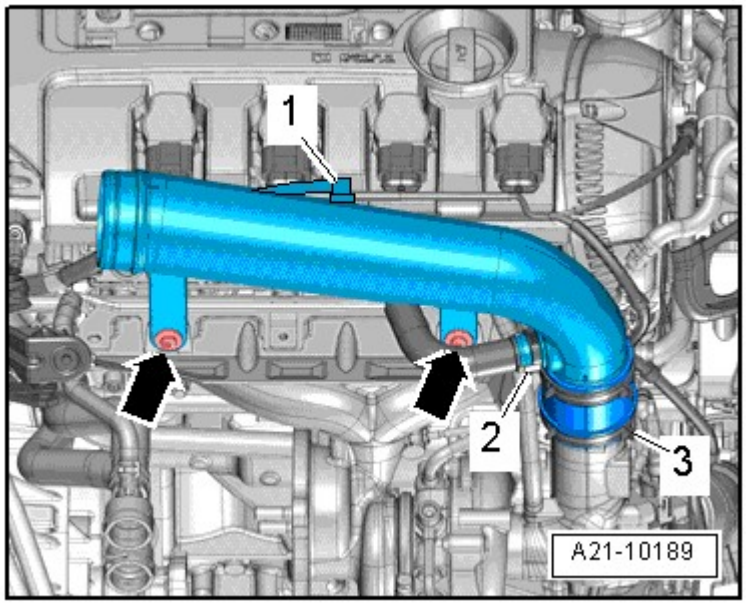

Fig. 103: Identifying Air Guide Hose, Pipe And Bolts

Courtesy of AUDI OF AMERICA, LLC

-- Remove the air guide pipe bolts -arrows-.

CAUTION: Risk of violating emissions legislation.

- **Do not open hose connection -1- !**

-- Lay aside the air guide pipe with the connected crankcase ventilation hose -1-. Loosen the hose clamp -3- to do so.

All:

-- Disconnect the oil supply line from the turbocharger -1-.

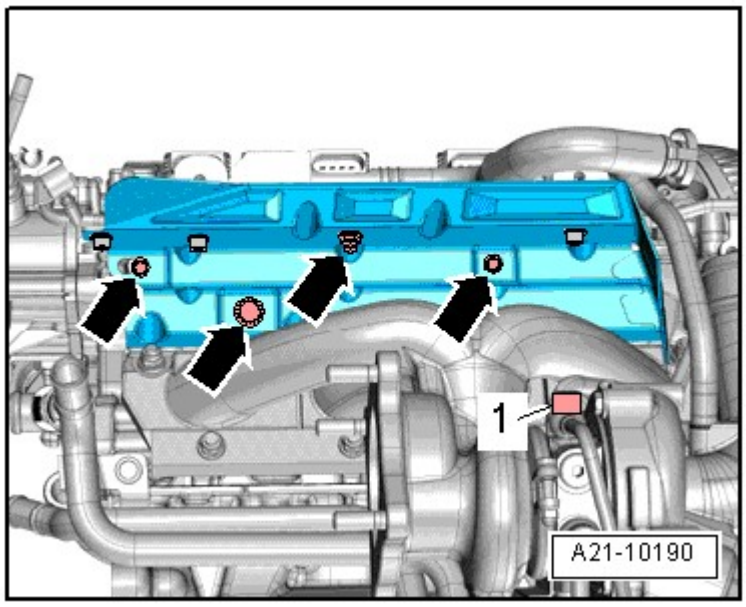

Fig. 104: Identifying Turbocharger And Heatshield
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the electrical connectors -arrows- on ignition coils.

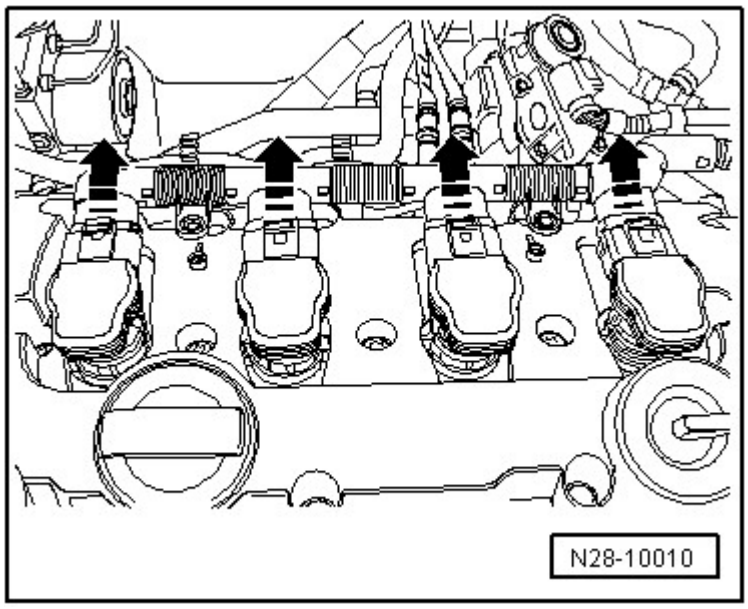

Fig. 105: Disconnecting Connectors Of Ignition Coils
Courtesy of AUDI OF AMERICA, LLC

-- Remove the ignition coils with the T40039.

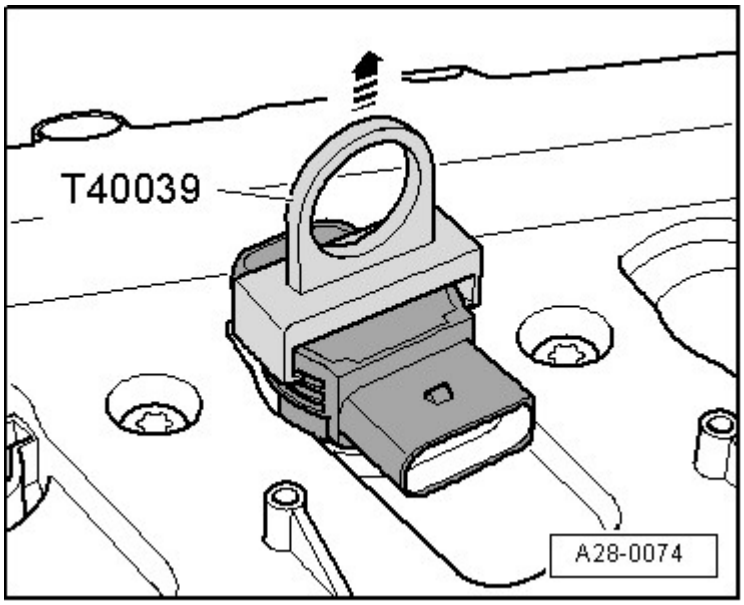

Fig. 106: Identifying Ignition Coil Puller T40039 To Remove Ignition Coils
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the crankcase ventilation hoses -1 and 2-.

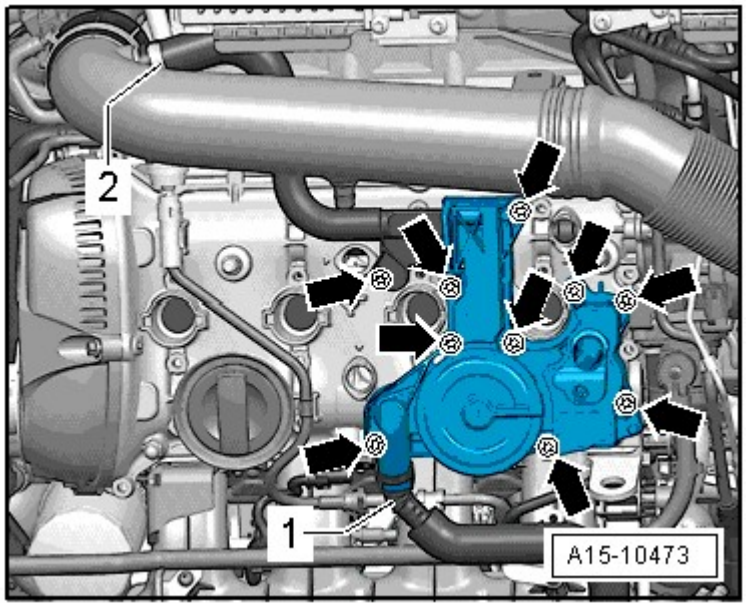

Fig. 107: Identifying Crankcase Ventilation, Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and remove the crankcase ventilation.

-- Remove the vacuum hose from the vacuum pump -1- and free it up.

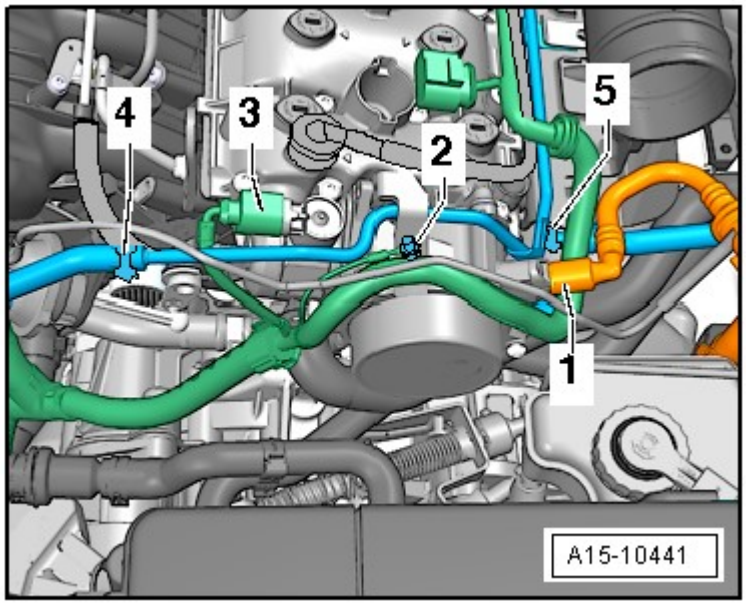

Fig. 108: Identifying Vacuum Pump, Ground Cable, Electrical Connector And Coolant Hoses
Courtesy of AUDI OF AMERICA, LLC

-- Remove Ground (GND) wire -2-.

-- Disconnect the connector -3- and free up the wiring harness.

-- Remove the coolant hoses -4 and 5-.

-- Disconnect the connector -A- and hose -B- from the secondary air injection (AIR) solenoid valve -N112-.

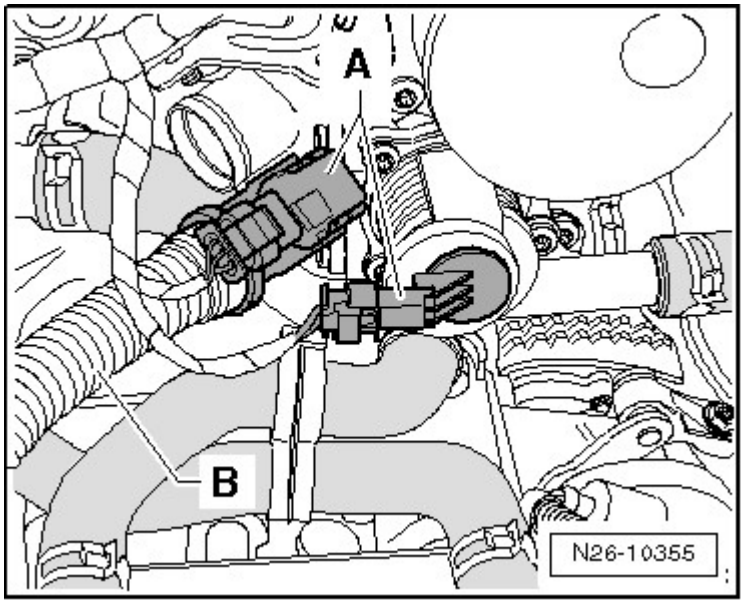

Fig. 109: Identifying Secondary Air Injection (Air) Solenoid Valve N112 Connector And Hose
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the coolant pipe; remove the bolts -arrows-.

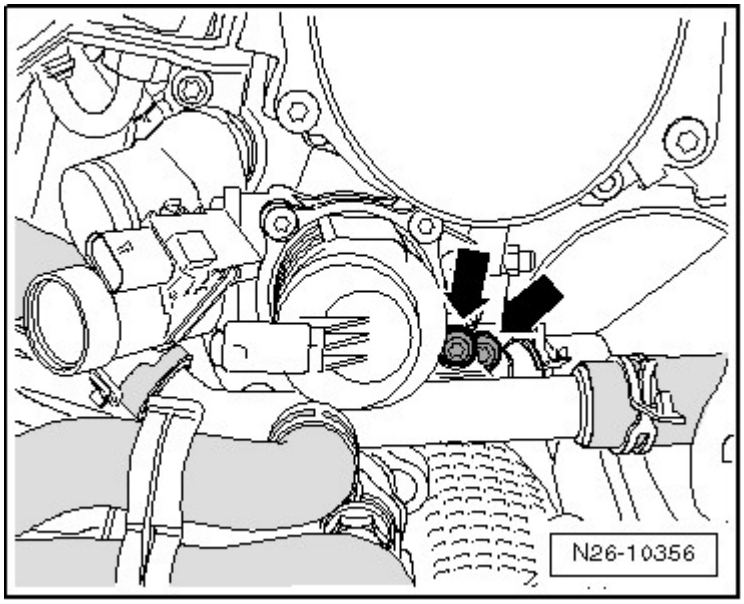

Fig. 110: Identifying Coolant Pipe And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the coolant hoses on the rear of the cylinder head.

-- Disconnect the connectors -1 through 4-.

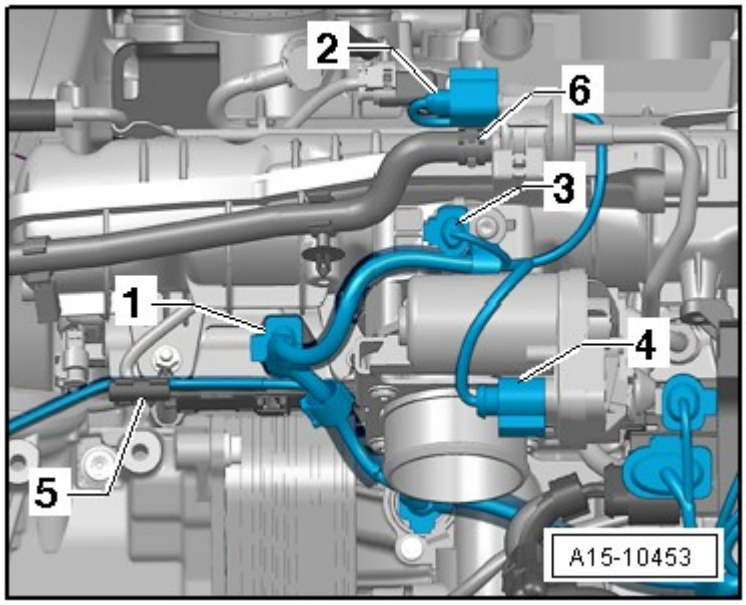

Fig. 111: Identifying EVAP Filter Vacuum Hose, Electrical Connectors And Electrical Cable
Courtesy of AUDI OF AMERICA, LLC

-- Free up the electrical cable -5-.

-- Disconnect the vacuum hose -6- leading to the EVAP filter.

-- Disconnect the electrical connectors -1 - and pull the connectors out of the retainer.

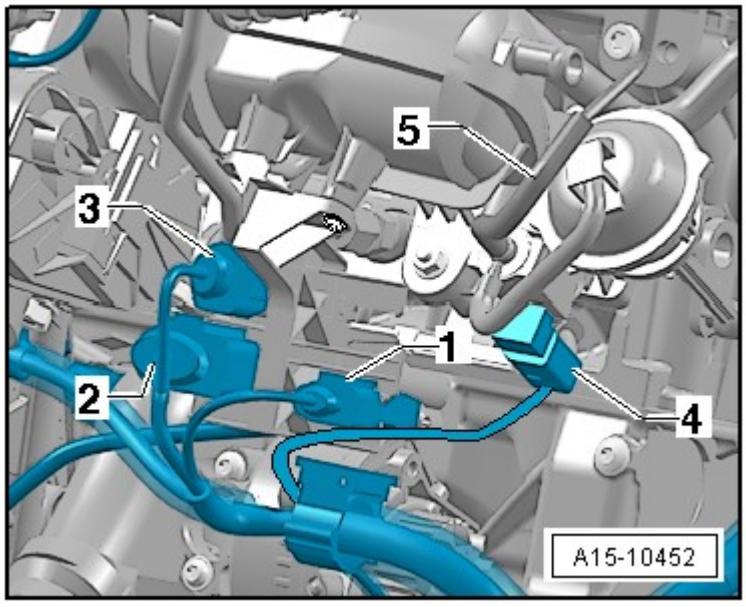

Fig. 112: Identifying Vacuum Line And Electrical Connectors
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connectors -2 through 4-.

-- Remove the vacuum line -5-.

-- Disconnect the coolant line from the intake manifold, when doing this, remove the bolts -arrows-.

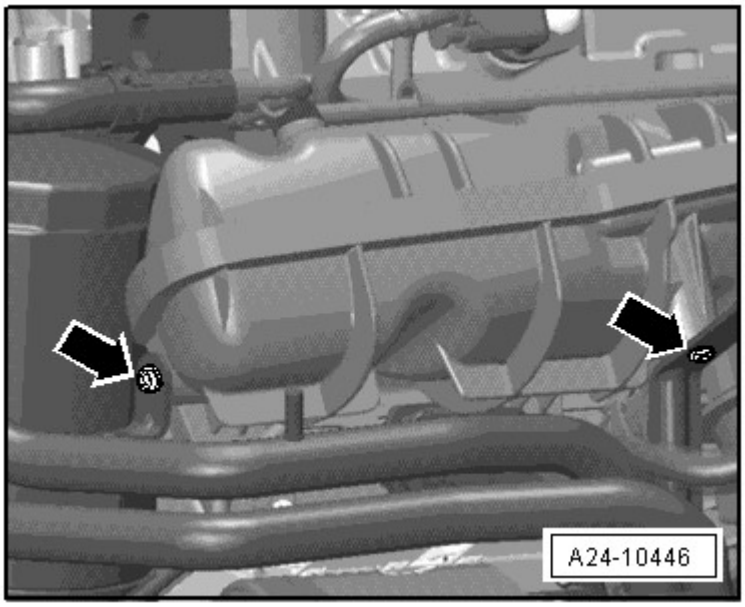

Fig. 113: Identifying Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the intake manifold bracket by removing the mounting nut -1- and bolt -2-.

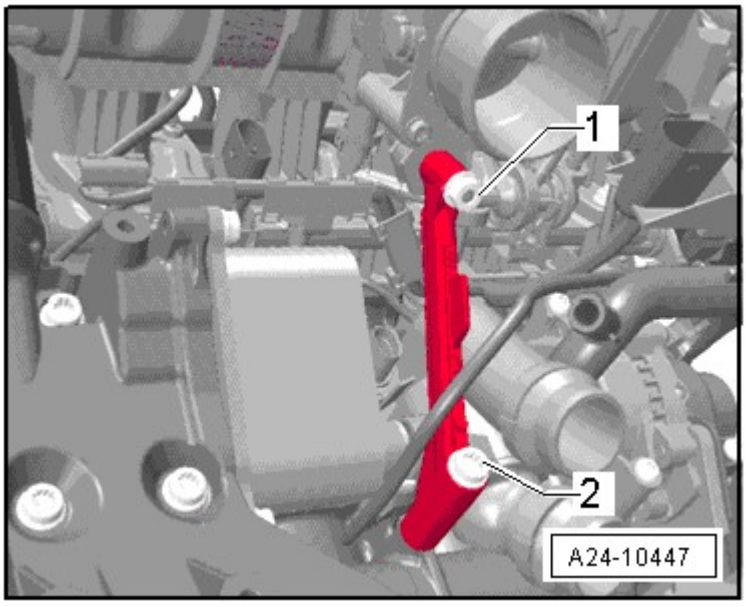

Fig. 114: Identifying Intake Manifold Bracket Mounting Nut And Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Remove the oil filter.

WARNING: Risk of injury from fuel.

- **To reduce fuel pressure, lay cloths around connecting point before opening fuel system and carefully loosen.**

CAUTION: Risk of contamination to the fuel system.

- **Note rules of cleanliness for working on the fuel injection system. Refer to CLEAN WORKING CONDITIONS .**

-- Disconnect fuel supply hose -2- by pressing release ring.

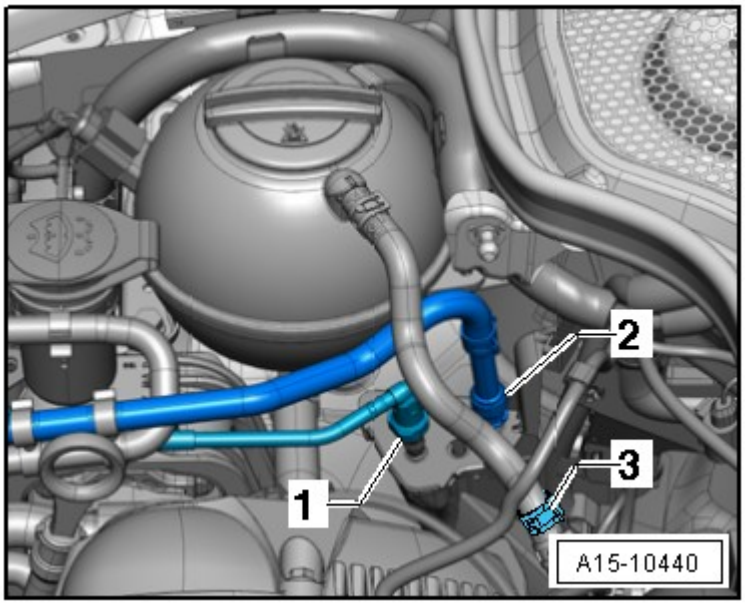

Fig. 115: Identifying Fuel Supply Hose, Vacuum Line And Coolant Hose
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the vacuum line -1- to the EVAP canister by pressing the release button.

-- Remove the coolant hose -3-.

-- Pull the EVAP canister up out of the bracket -arrow- and place it on the engine.

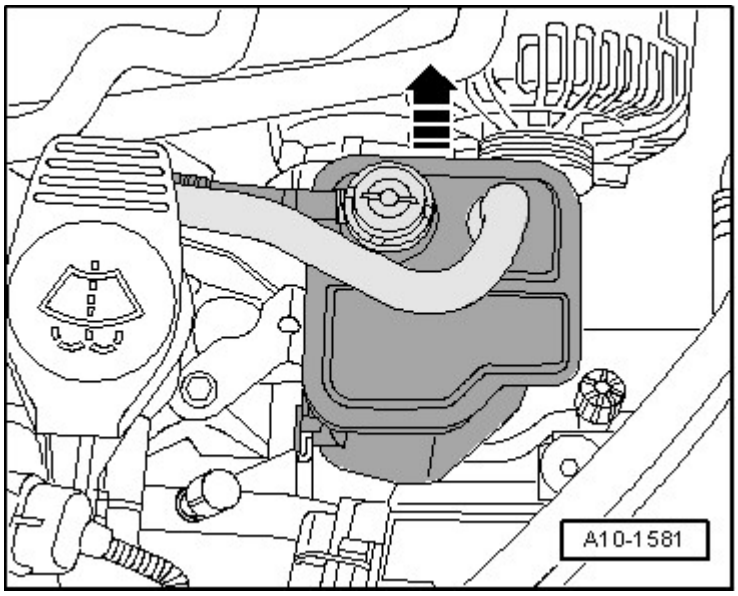

Fig. 116: Identifying EVAP Canister
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the coolant hoses -arrows- and free them up.

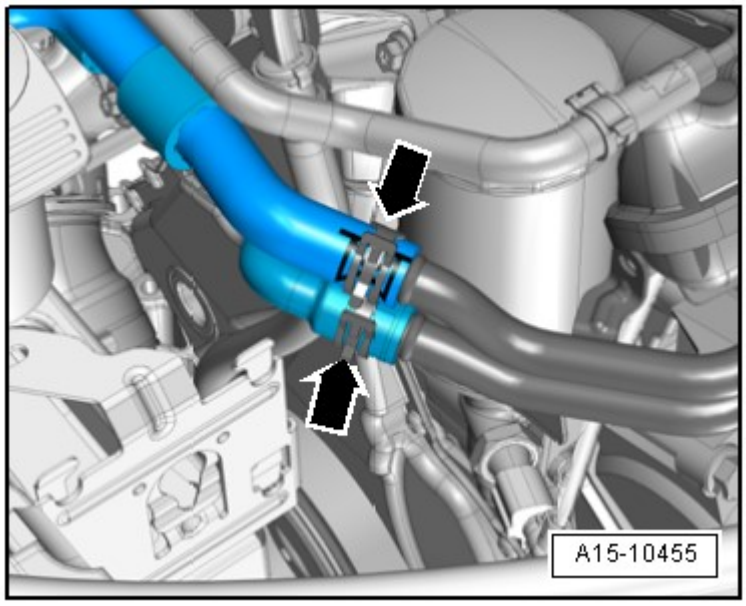

Fig. 117: Identifying Coolant Hoses
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connector from the camshaft adjustment valve 1 -N205- -1-.

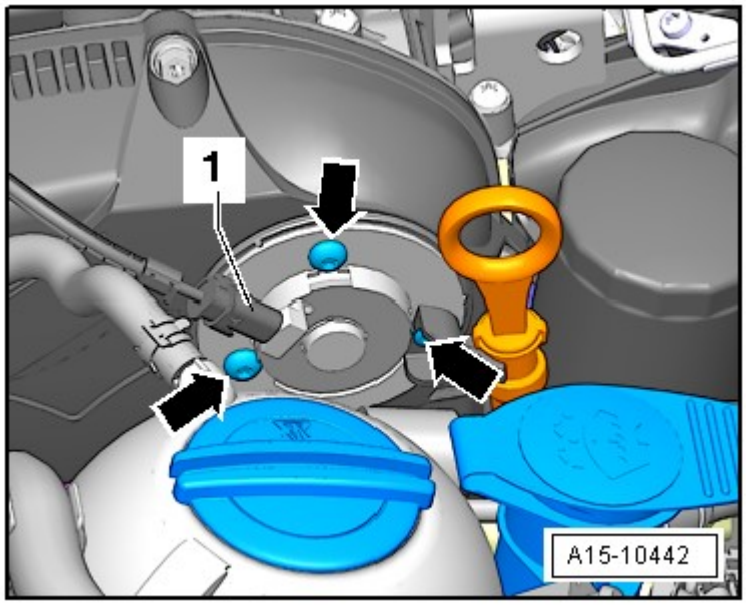

Fig. 118: Identifying Camshaft Adjustment Valve And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and then the camshaft adjustment valve 1.

-- Remove the bolts -1 through 5- and remove the timing chain upper cover.

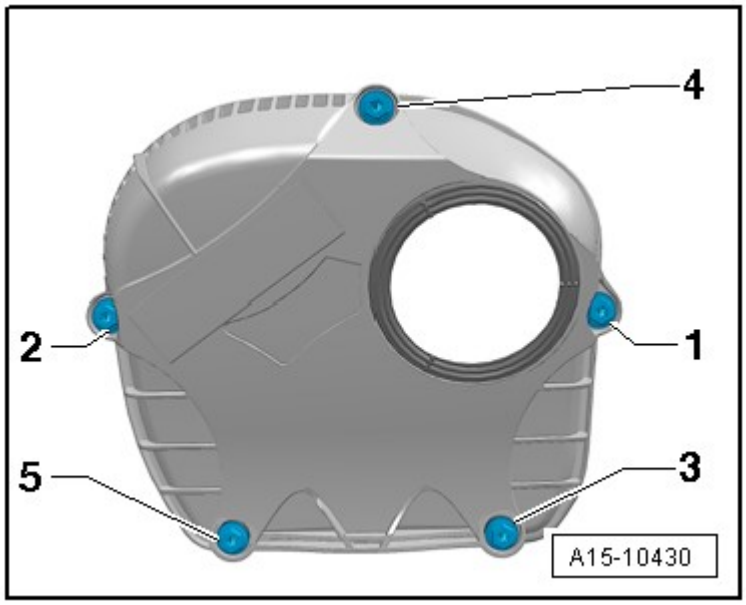

Fig. 119: Identifying Upper Timing Chain Cover - Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

CAUTION: The control valve has a left thread.

-- Remove the control valve using the T10352 or T10352/1 in direction of -arrow- depending on the version.

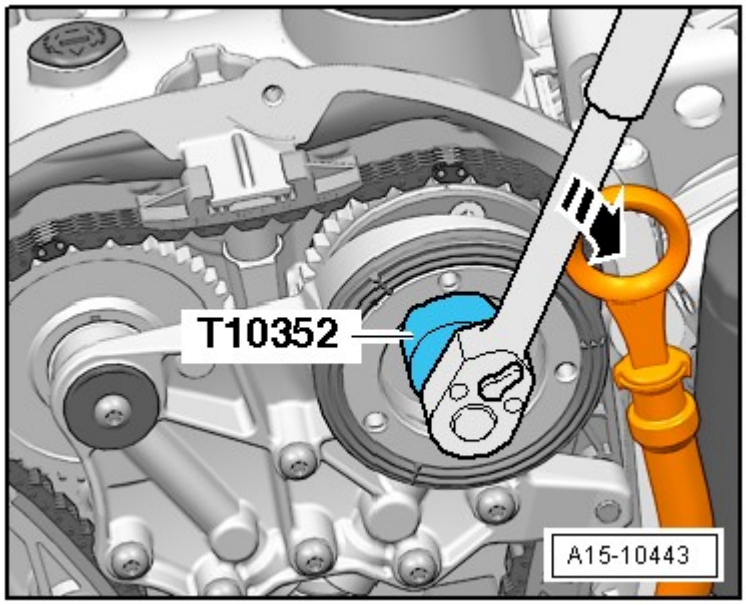

Fig. 120: Identifying Assembly Tool T10352 To Remove Control Valve
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and remove the bearing bracket.

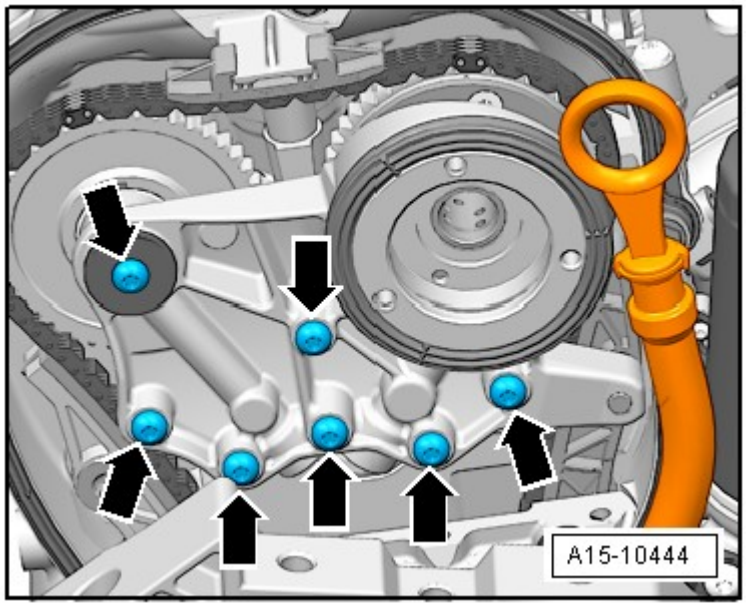

Fig. 121: Identifying Bearing Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Rotate the vibration damper using the T10355 into the TDC position -arrow-.

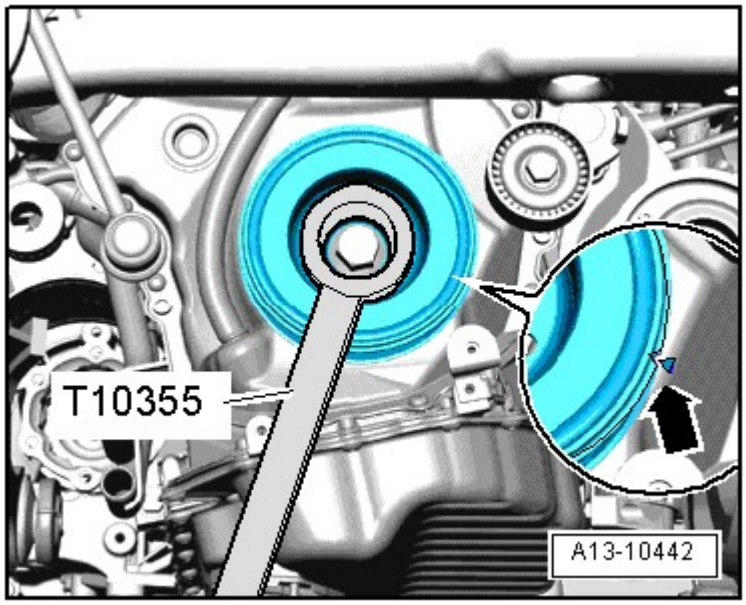

Fig. 122: Identifying Vibration Damper Rotated Into "OT" Position Using Counter Hold Tool T10355
Courtesy of AUDI OF AMERICA, LLC

- The notch on the vibration damper must line up with the arrow marking on the timing chain lower cover.

-- Mark the drive chain on the chain sprocket -arrows- with a waterproof marker.

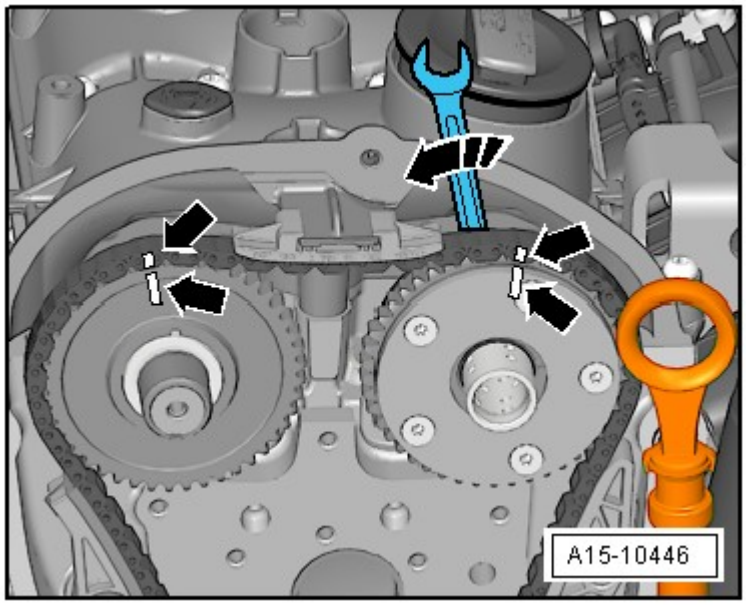

Fig. 123: Identifying Drive Chain/Chain Sprocket Markings And Turning Intake Camshaft Using Wrench
Courtesy of AUDI OF AMERICA, LLC

-- Remove the plug -arrow-.

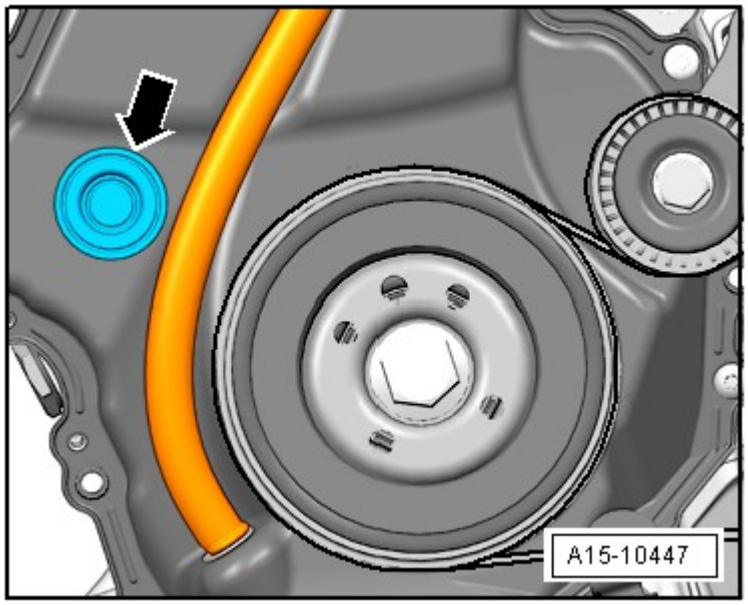

Fig. 124: Locating Plug
Courtesy of AUDI OF AMERICA, LLC

-- Lift the chain tensioner locking wedge by inserting a scriber or a suitable screwdriver into the hole in the chain tensioner in direction of -arrow 1-.

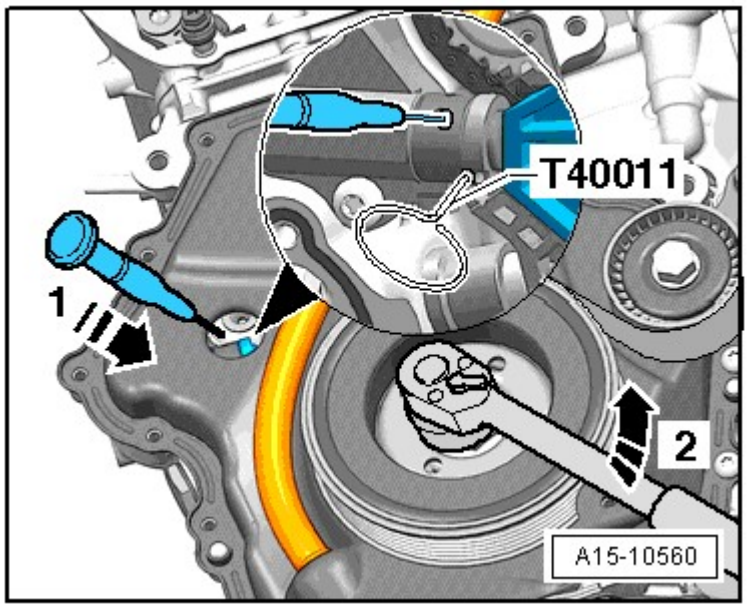

Fig. 125: Identifying Chain Tensioner Locking Wedge, Screwdriver, Crankshaft And Securing Pin T40011
Courtesy of AUDI OF AMERICA, LLC

-- Turn the crankshaft opposite the engine direction of rotation in direction of -arrow 2- and secure it with a T40011.

NOTE: The intake camshaft switches in the engine direction of rotation.

-- Remove the bolt -1- and guide the tensioning rail -2- downward.

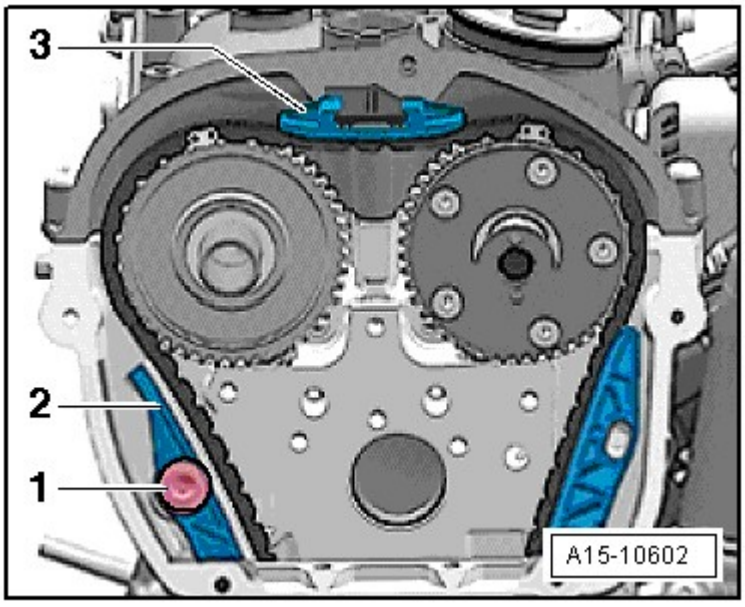

Fig. 126: Identifying Guide Tensioning Rail, Upper Guide Rail And Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Remove the upper guide track -3- by unlocking the latch with a screwdriver and pushing the guide track forward.

-- Remove camshaft timing chain from chain sprockets.

CAUTION: Risk of damaging valves and piston crowns.

- **If the camshaft timing chain was removed form the cylinder head, then the crankshaft may not be turn further.**

-- Turn the sealing plug -arrows- counterclockwise 90° in direction of -arrow- and remove it.

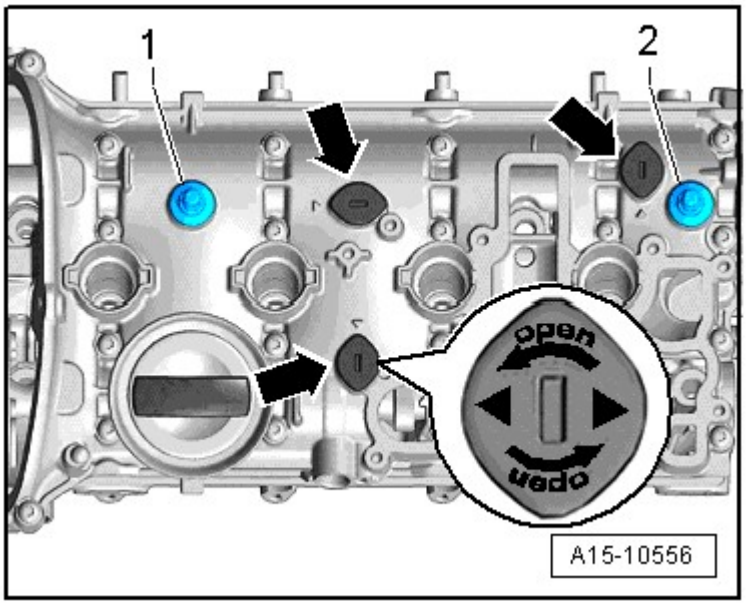

Fig. 127: Identifying Ball Head And Sealing Plug
Courtesy of AUDI OF AMERICA, LLC

-- Remove the ball head -1 through 2-.

-- Remove the cap.

-- Remove the bolts -arrows-.

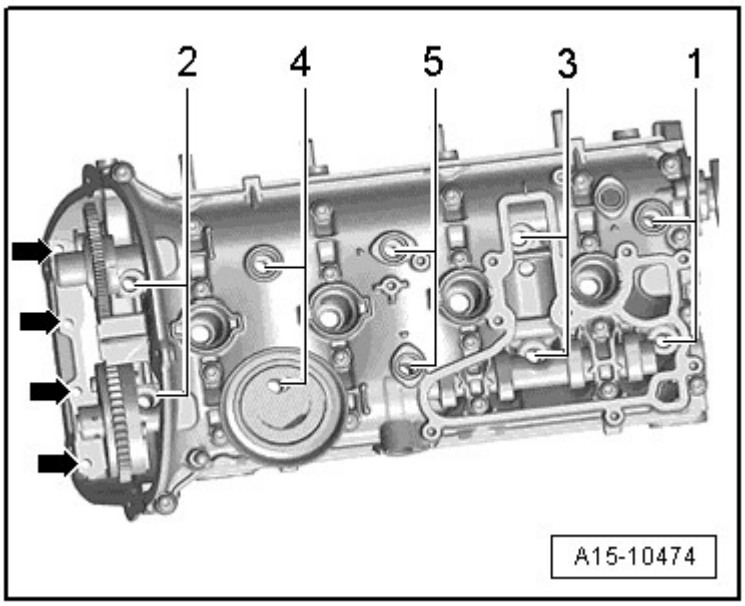

Fig. 128: Identifying Cylinder Head Loosening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Remove the cylinder head bolts with the polydrive bit and drive socket T10070 in the following sequence: -1

through 5-.

NOTE: To remove the cylinder head bolts, turn the camshaft with a wrench if necessary.

Make sure all wires and cables are disconnected!

Pay attention to the tension and guide tracks when lifting the cylinder head.

-- Remove the cylinder head.

-- Lay the cylinder head on a soft surface, such as foam.

Installing

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

CAUTION: The sealing surfaces could be damaged.

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

Risk of damaging cylinder block.

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

Risk of cylinder head seal leaking.

- **Carefully remove all grinding and sanding residue.**
- **Only unpack new cylinder head gasket immediately prior to installation.**
- **To prevent cylinder head seal silicone layer and recessed area from being damaged, always handle seal extremely carefully.**

Risk of damaging open valves.

- **If a replacement cylinder is installed, only remove plastic base right before cylinder head is installed to protect open valves.**

Risk of damaging valves and piston heads after working on valvetrain.

- **To ensure valves do not strike pistons when starting, carefully rotate engine at least 2 full revolutions.**

NOTE: Replace bolts which have been tightened to torque.

Replace sealing rings, seals and self-locking nuts.

Note different sealant for cylinder head sealing surfaces and bolts.

Secure all hose connections with hose clamps appropriate for the model.

The engine oil and coolant must be changed if the cylinder head or cylinder head seal are replaced.

-- Set cylinder head gasket in place.

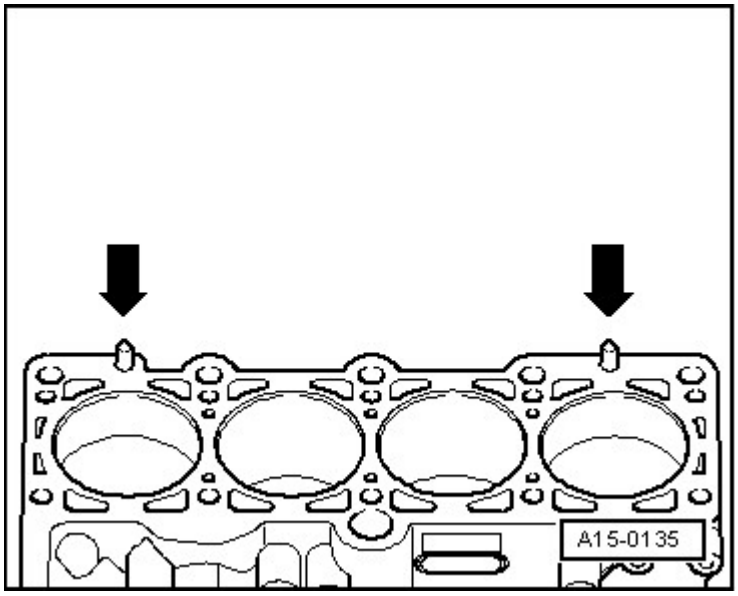

Fig. 129: Identifying Cylinder Block Centering Pins
Courtesy of AUDI OF AMERICA, LLC

- Pay attention to centering pins in cylinder block -arrows-.
- Cylinder head gasket installed position: the part number must be readable from the intake side.

WARNING: When rotating the crankshaft, make sure the timing chain cannot damage any other components.

-- If the crankshaft was turned in the meanwhile: bring the piston for cylinder 1 to TDC and then turn the crankshaft back just a little.

-- Set cylinder head in place.

-- Insert cylinder head bolts and tighten by hand.

NOTE: In order to be able to turn the cylinder head bolts, the intake camshaft must be turned with a wrench.

-- Cylinder head tightening sequence **CYLINDER HEAD ASSEMBLY OVERVIEW**:

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

WARNING: When rotating the crankshaft, make sure the timing chain cannot damage any other components.

-- Rotate the vibration damper using the T10355 into the TDC position -arrow-.

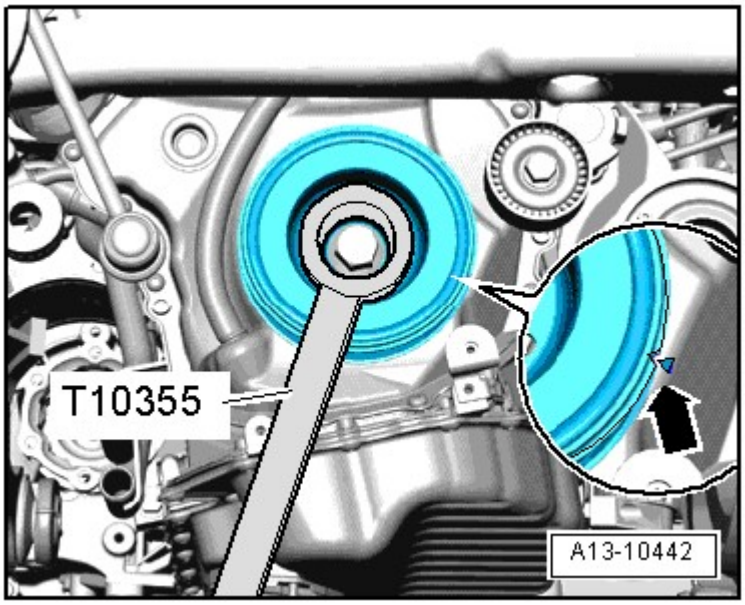

Fig. 130: Identifying Vibration Damper Rotated Into "OT" Position Using Counter Hold Tool T10355
Courtesy of AUDI OF AMERICA, LLC

- The notch on the vibration damper must line up with the arrow marking on the timing chain lower cover.

NOTE: The marked links of the timing chain must be positioned on the markings on the chain sprockets.

-- Mount the camshaft timing chain: the drive chain/chain sprocket markings -arrows- must align.

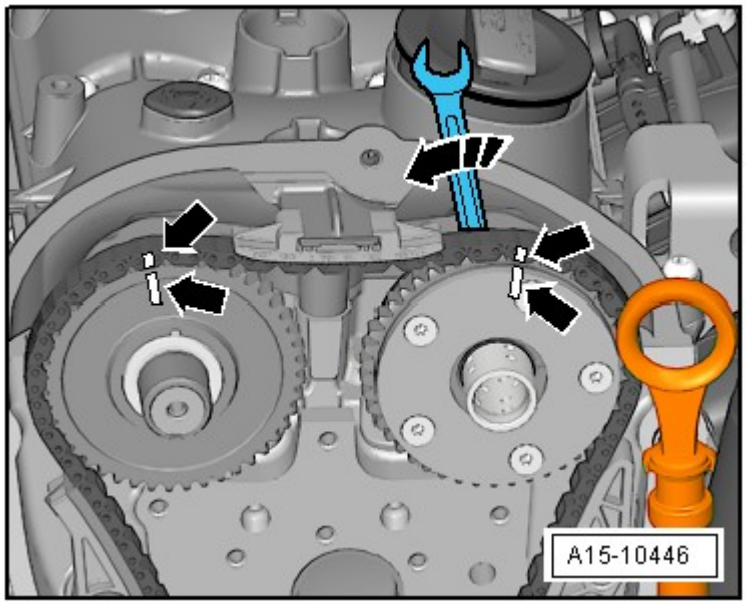

Fig. 131: Identifying Drive Chain/Chain Sprocket Markings And Turning Intake Camshaft Using Wrench
Courtesy of AUDI OF AMERICA, LLC

-- Mount the bearing bracket and the bolts -arrows- hand-tight.

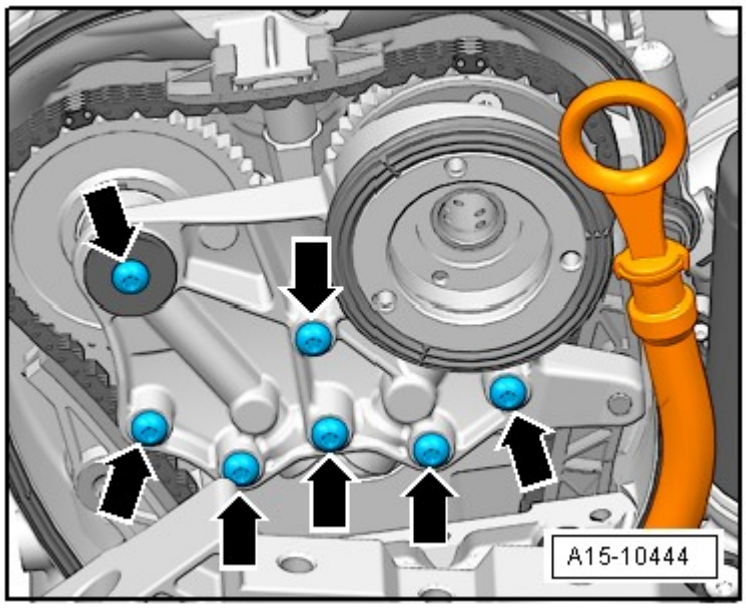

Fig. 132: Identifying Bearing Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the T40011.

-- Tighten the bearing bracket bolts -arrows-. Refer to **CAMSHAFT TIMING CHAIN ASSEMBLY OVERVIEW**.

-- Install the control valve -6- **CAMSHAFT TIMING CHAIN ASSEMBLY OVERVIEW**.

-- Turn the intake camshaft using the wrench in the -direction of the arrow- and mount the timing chain.

Further assembly is in the reverse order of removal, thereby observing the following:

-- Install timing chain upper cover. Refer to **UPPER TIMING CHAIN COVER**.

-- Change engine oil. Refer to **ENGINE OIL, DRAINING AND REPLACING OIL FILTER** and refer to **ENGINE OIL, FILLING** .

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

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

Cylinder Head Cover Tightening Sequence

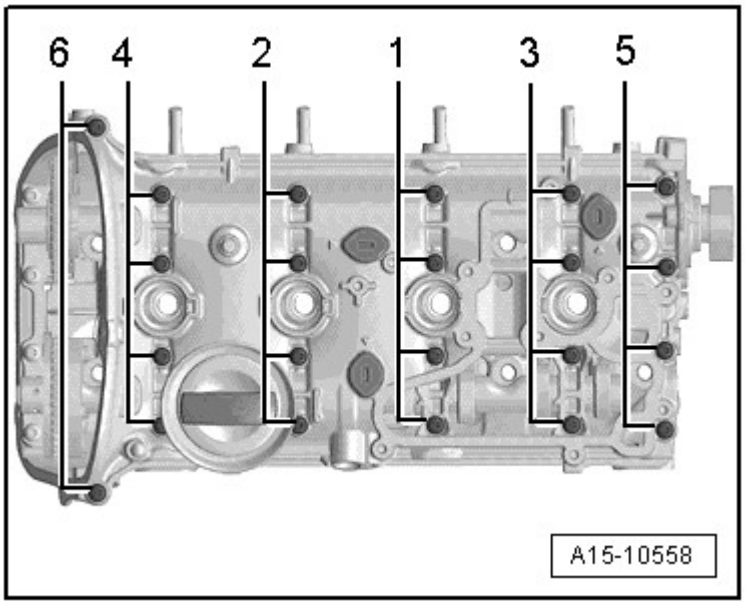

Fig. 133: Identifying Cylinder Head Cover Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Replace bolts.

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

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

-- Tighten the bolts an additional 90° using a rigid wrench in the sequence -1 to 6-.

NOTE: Make sure the cylinder head cover is not tilted.

Valve Dimensions

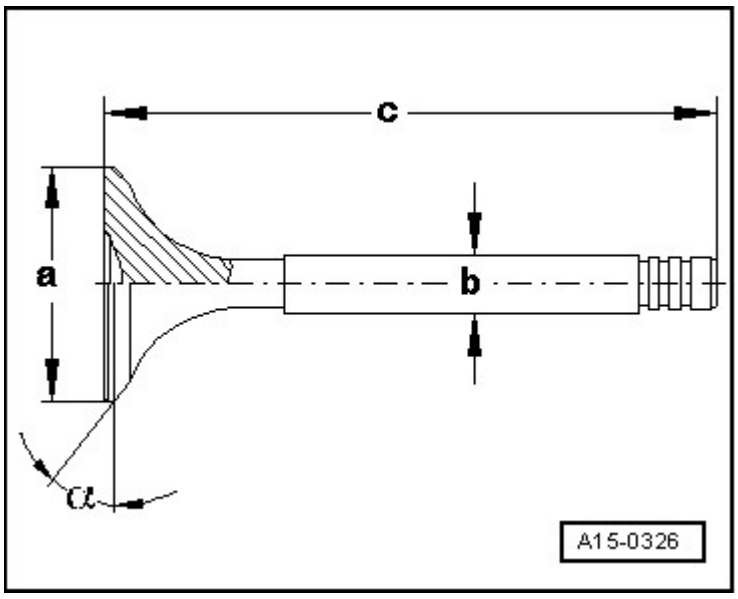

Fig. 134: Identifying Valve Dimensions
Courtesy of AUDI OF AMERICA, LLC

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

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

CAMSHAFTS

Special tools and workshop equipment required

- Ignition Coil Puller T40039
- Assembly Tool T10352 and Assembly Tool T10352/1
- Counter Holder Tool T10355
- Locking Pin T40011
- Thrust Piece T10174

Removing

NOTE: **The sealing surfaces of the lower cylinder head cover and on the upper cylinder head must not be reworked.**

The camshaft bearings are integrated in the cylinder head or cylinder head cover. The tension must be released from the camshaft timing chain before removing the cylinder head cover.

If the cylinder head cover was loosened, then the cap must be replaced.

During installation, cable ties must be installed at the same location.

Removing

-- Remove the engine cover -arrows-.

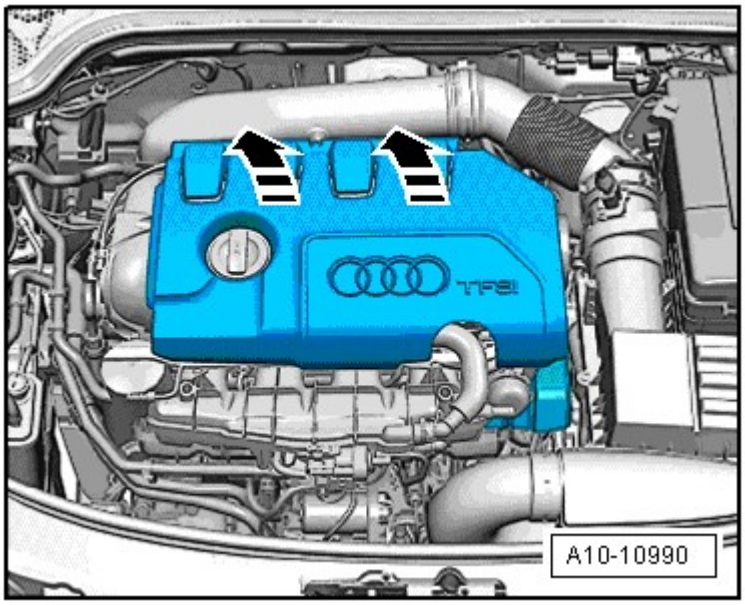

Fig. 135: Identifying Engine Cover, Removal
Courtesy of AUDI OF AMERICA, LLC

-- Remove the cover for the air guide; to do so disengage the side clips -arrows-.

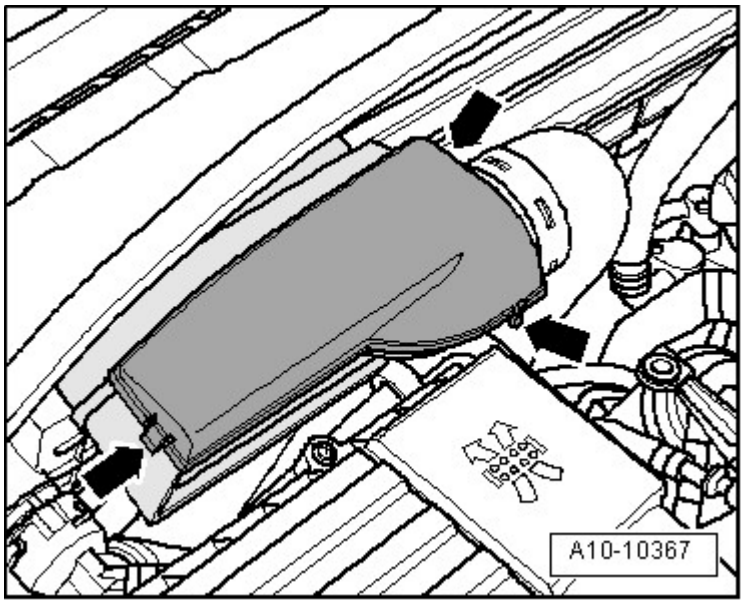

Fig. 136: Identifying Air Duct Cover Slide Clips
Courtesy of AUDI OF AMERICA, LLC

-- Unclip the lower air guide, to do so disengage the clips -arrows-.

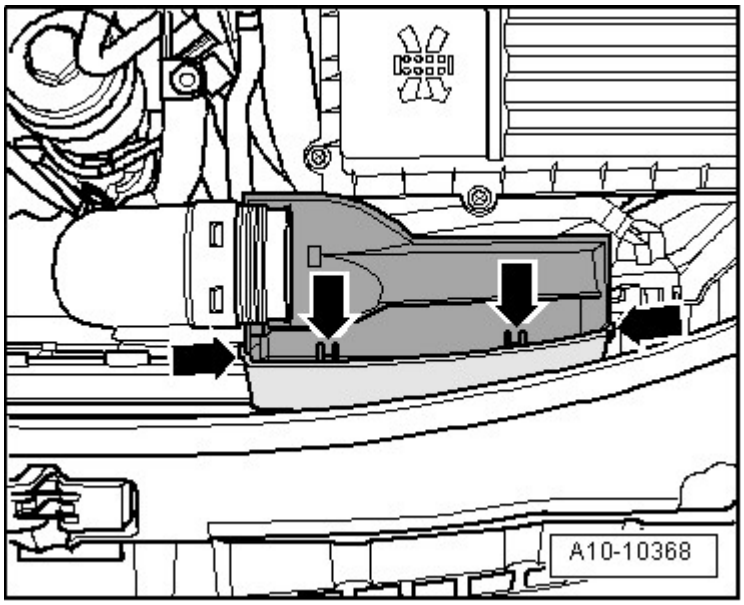

Fig. 137: Identifying Lower Air Guide Clips
Courtesy of AUDI OF AMERICA, LLC

-- Remove the lower air guide together with the air guide hose.

-- Disconnect electrical connector -1- on mass air flow (MAF) sensor -G70-.

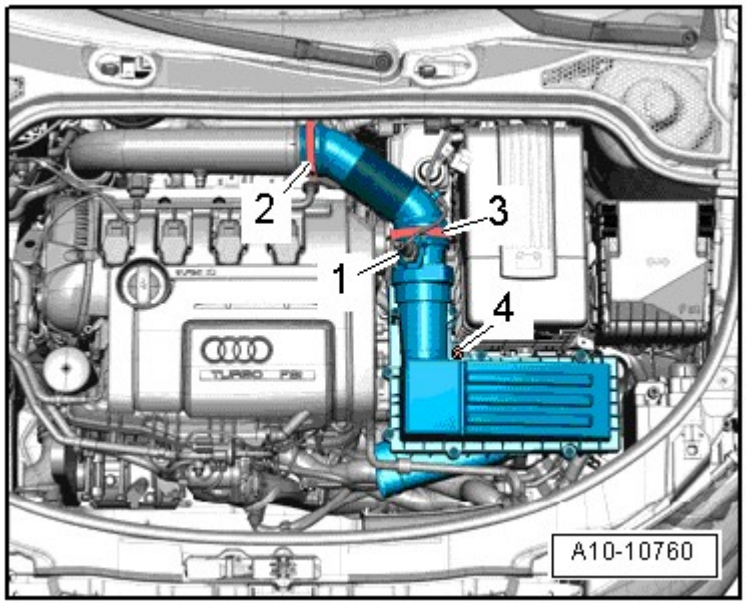

Fig. 138: Identifying Air Flow Housing, Electrical Connector And Guide Hose
Courtesy of AUDI OF AMERICA, LLC

-- Remove the air guide hose -2-.

-- Remove the bolt -4- and the air filter housing.

NOTE: Ignore -3-.

-- Remove bolts -arrows-.

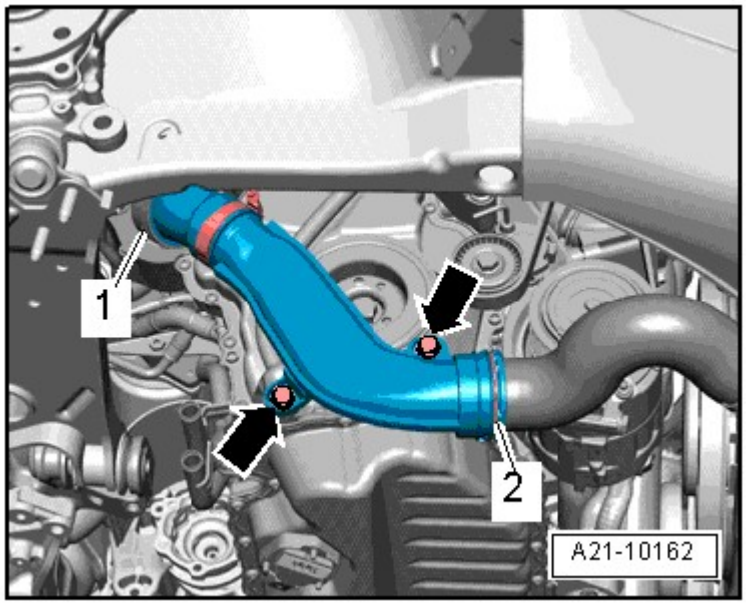

Fig. 139: Identifying Air Guide Pipe And Bolts

Courtesy of AUDI OF AMERICA, LLC

-- Remove the air guide pipe by lifting the clamps -1 and 2-.

-- Disconnect the connector from the camshaft adjustment valve 1 -N205- -1-.

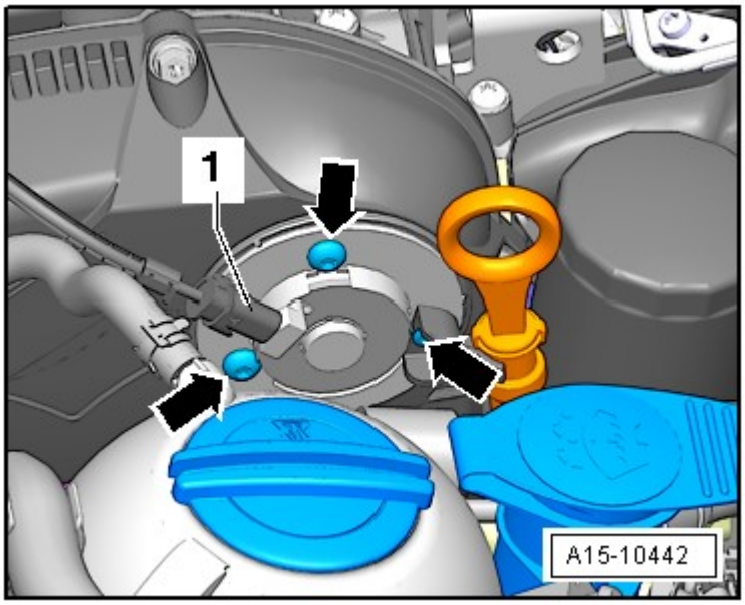

Fig. 140: Identifying Camshaft Adjustment Valve And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and then the camshaft adjustment valve 1.

-- Remove the bolts -1 through 5- and remove the timing chain upper cover.

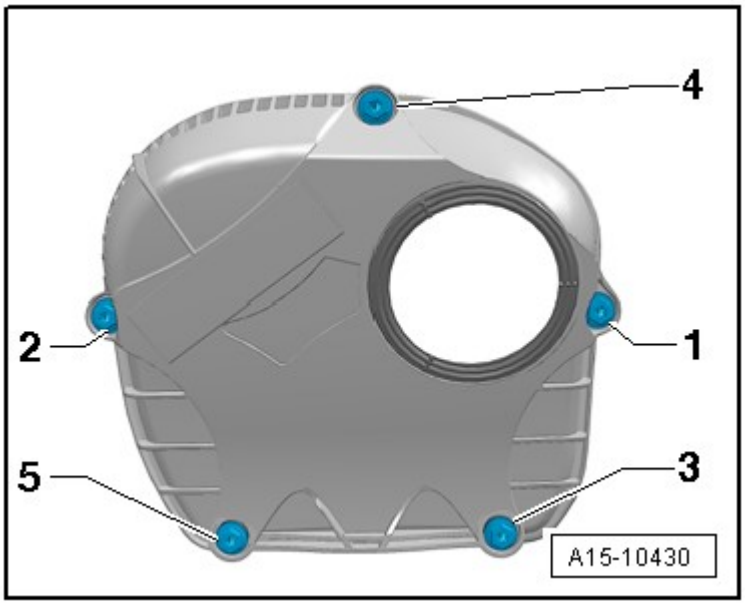

Fig. 141: Identifying Upper Timing Chain Cover - Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

CAUTION: The control valve has a left thread.

-- Remove the control valve using the T10352 or T10352/1 in direction of -arrow- depending on the version.

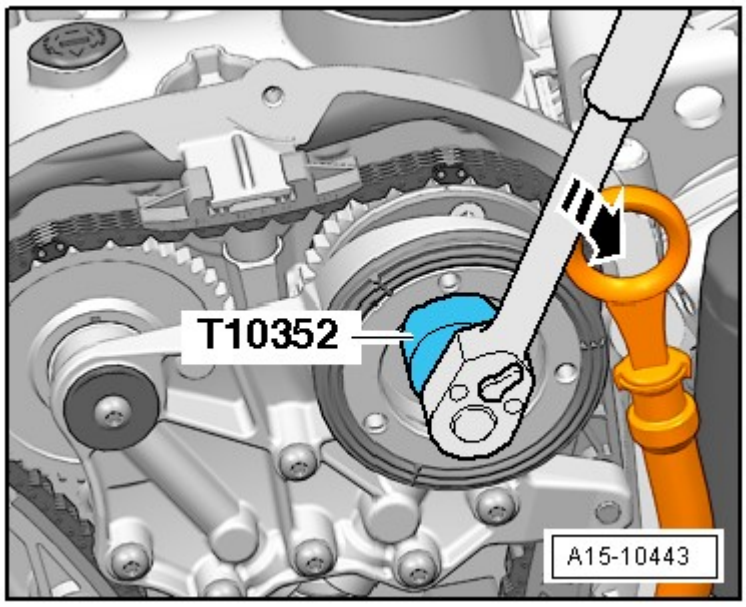

Fig. 142: Identifying Assembly Tool T10352 To Remove Control Valve
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and remove the bearing bracket.

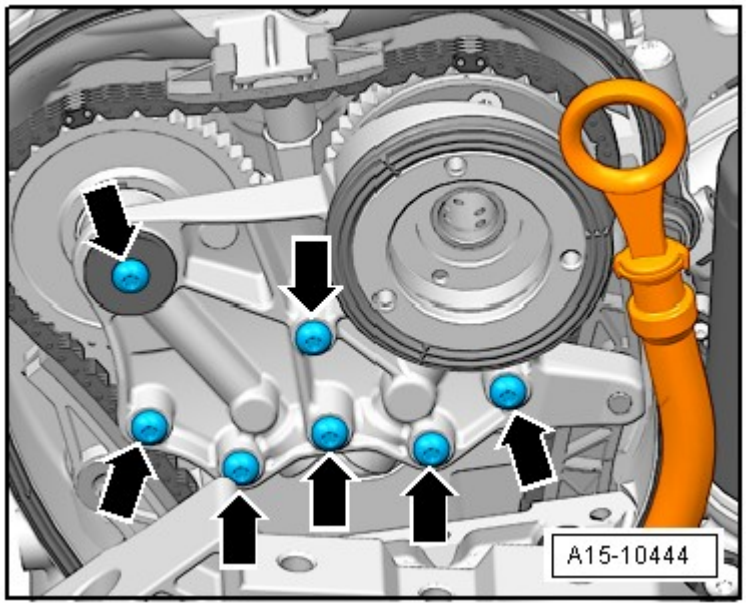

Fig. 143: Identifying Bearing Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Rotate the vibration damper using the T10355 into the TDC position -arrow-.

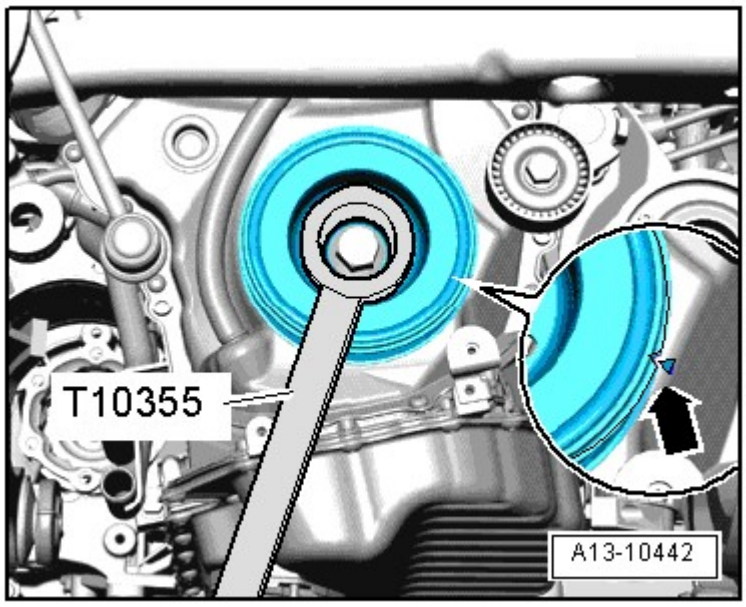

Fig. 144: Identifying Vibration Damper Rotated Into "OT" Position Using Counter Hold Tool T10355
Courtesy of AUDI OF AMERICA, LLC

- The notch on the vibration damper must line up with the arrow marking on the timing chain lower cover.

-- Mark the drive chain on the chain sprocket -arrows- with a waterproof marker.

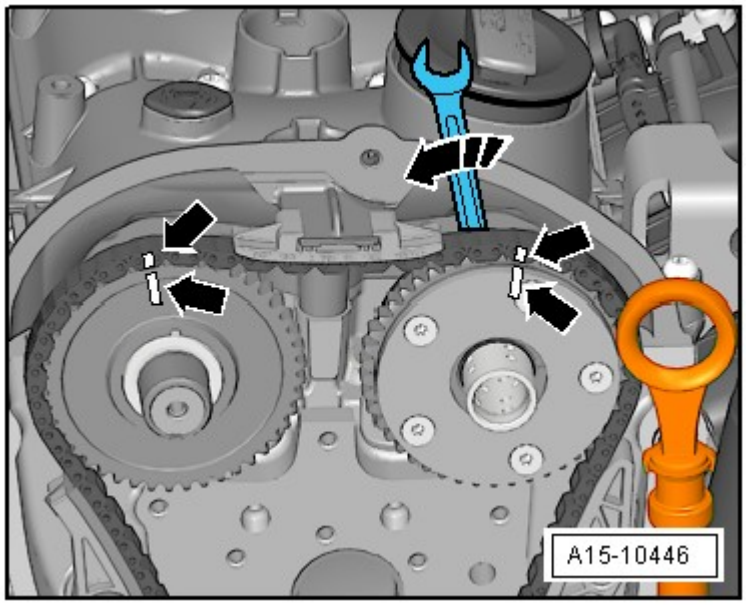

Fig. 145: Identifying Drive Chain/Chain Sprocket Markings And Turning Intake Camshaft Using Wrench
Courtesy of AUDI OF AMERICA, LLC

-- Remove the plug -arrow-.

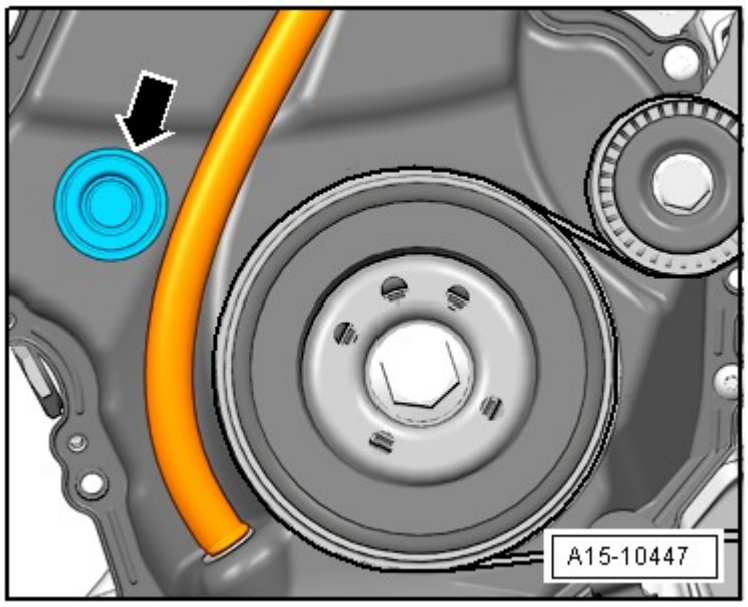

Fig. 146: Locating Plug
Courtesy of AUDI OF AMERICA, LLC

-- Lift the chain tensioner locking wedge by inserting a scriber or a suitable screwdriver into the hole in the chain tensioner direction of -arrow 1-.

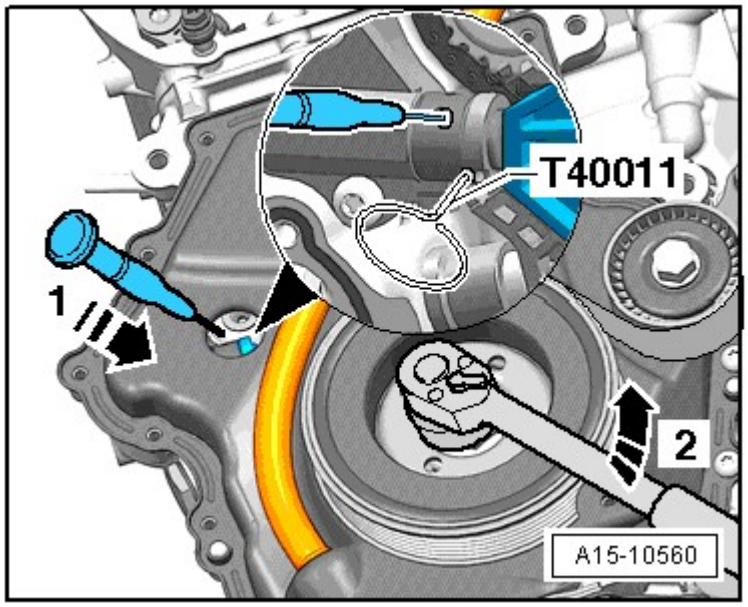

Fig. 147: Identifying Chain Tensioner Locking Wedge, Screwdriver, Crankshaft And Securing Pin T40011
Courtesy of AUDI OF AMERICA, LLC

-- Turn the crankshaft opposite the engine direction of rotation in arrow direction -2- and secure it with a T40011.

NOTE: The intake camshaft switches in the engine direction of rotation.

-- Remove the bolt -1- and guide the tensioning rail -2- downward.

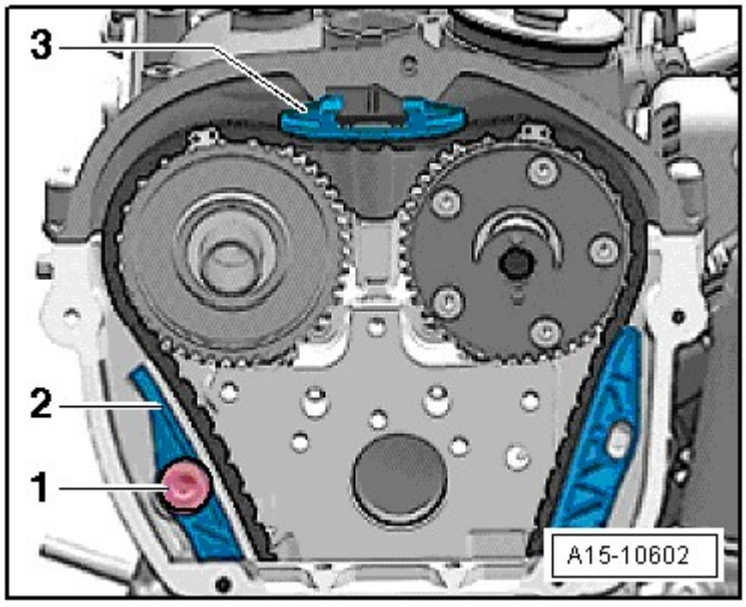

Fig. 148: Identifying Guide Tensioning Rail, Upper Guide Rail And Bolt

Courtesy of AUDI OF AMERICA, LLC

-- Remove the upper guide track -3- by unlocking the latch with a screwdriver and pushing the guide track forward.

-- Remove camshaft timing chain from chain sprockets.

CAUTION: Risk of damaging valves and piston crowns.

- **If the camshaft timing chain was removed form the cylinder head, then the crankshaft may not be turn further.**

-- Disconnect the connector on the ignition coils and free up the wiring harness.

-- Remove the ignition coils with the T40039.

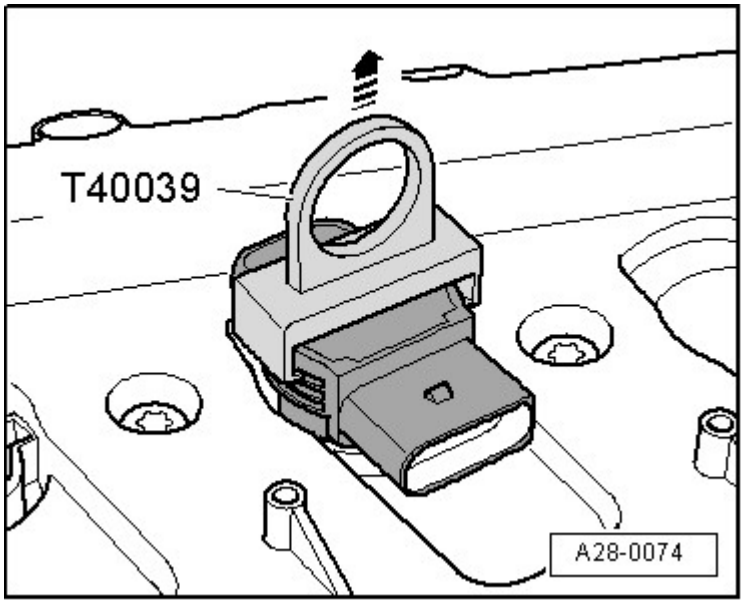

Fig. 149: Identifying Ignition Coil Puller T40039 To Remove Ignition Coils
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the crankcase ventilation hoses -1 and 2-.

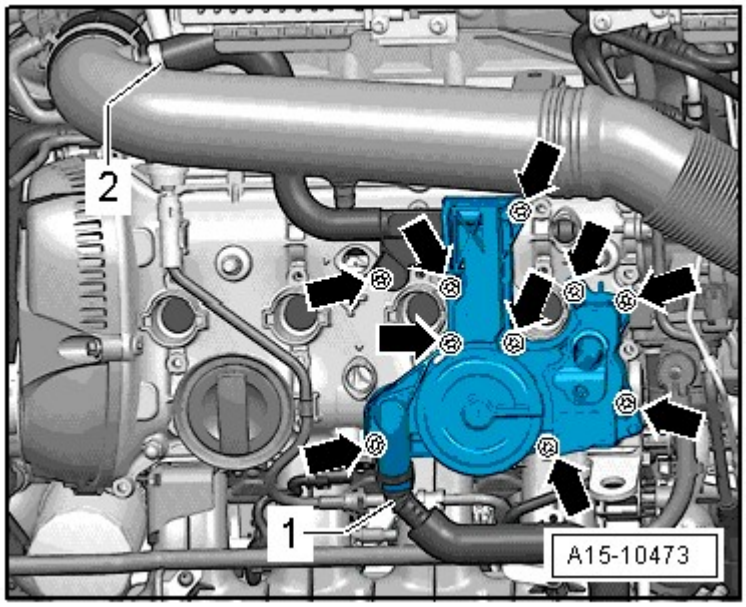

Fig. 150: Identifying Crankcase Ventilation, Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and remove the crankcase ventilation.

-- Disconnect the lines -1 and 3-.

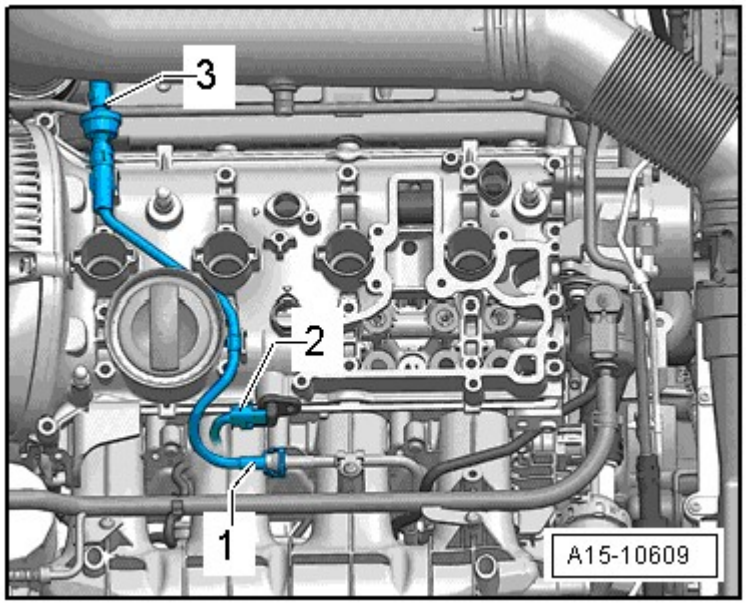

Fig. 151: Identifying Camshaft Position Sensor Electrical Harness Connector
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the electrical connector -2- from the camshaft position (CMP) sensor -G40-.

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

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

-- Remove the cylinder head cover bolts in -1 to 6- sequence.

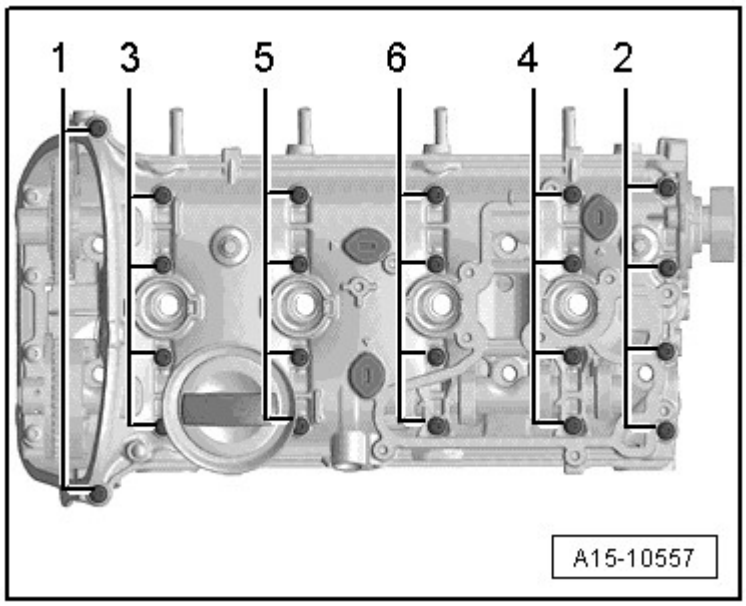

Fig. 152: Identifying Cylinder Head Cover Loosening
Courtesy of AUDI OF AMERICA, LLC

-- Remove the cylinder head cover.

-- Remove the camshafts.

CAUTION: Risk of contaminating lubricating system and bearing.

- **Cover open parts of engine.**

Installing

- Tightening specifications, refer to **VALVETRAIN ASSEMBLY 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.

Note the expiration date of the silicone sealant.

The cover must be installed within 5 minutes after the silicone sealant has been

applied.

-- Remove any sealant residue on the cylinder head using the flat blade scraper.

WARNING: Risk of eye injury.

- **Wear safety glasses.**

CAUTION: Risk of contaminating lubricating system and bearing.

- **Cover open parts of engine.**

-- Remove any seal out of the groove in the cylinder head cover as well as from any sealing surface using, for example, a rotating plastic brush.

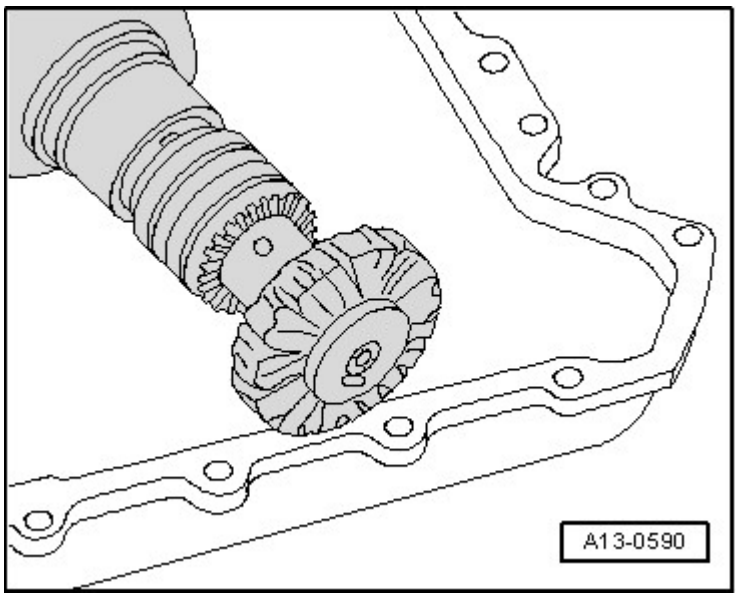

Fig. 153: Identifying Rotating Plastic Brush To Remove Sealant Residue From Sealing Flange, Cylinder Block And Upper Part Of Oil Pan
Courtesy of AUDI OF AMERICA, LLC

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

-- Cut tube nozzle at front marking (jet dia. approximately 2 mm).

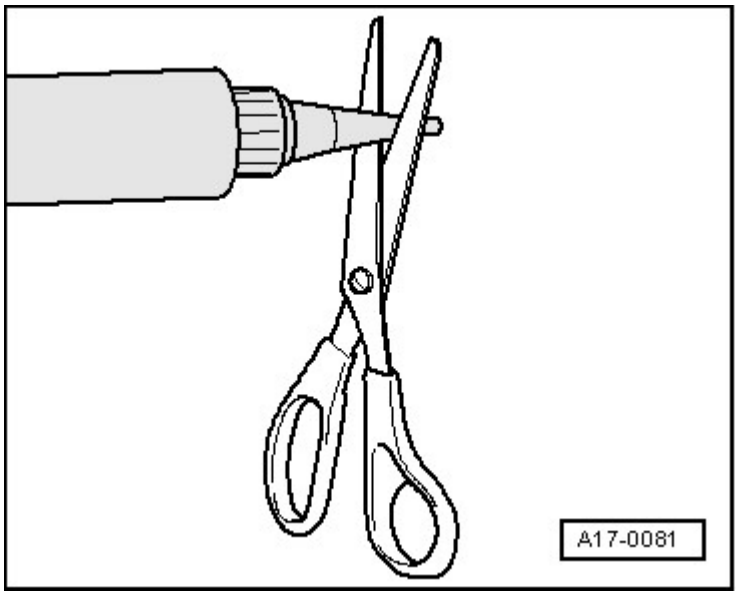

Fig. 154: Identifying Scissors To Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 2 mm)
Courtesy of AUDI OF AMERICA, LLC

-- Lubricate the running surfaces of both camshafts.

-- Place the camshaft into the cylinder head; the recesses -arrows- must be perpendicular to each other.

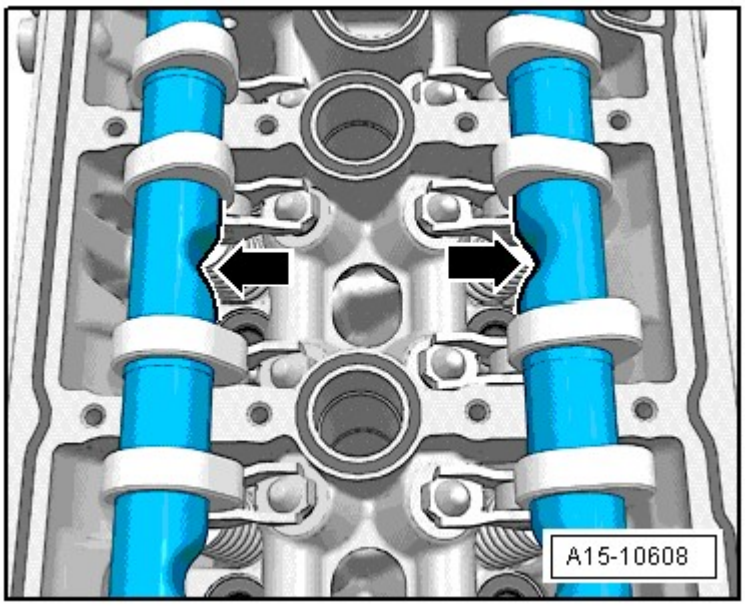

Fig. 155: Identifying Camshaft Recesses
Courtesy of AUDI OF AMERICA, LLC

-- Replace the cylinder head cover bolts.

-- Apply the silicone sealant on the clean sealing surface of the cylinder head cover as shown in the illustration -arrows-.

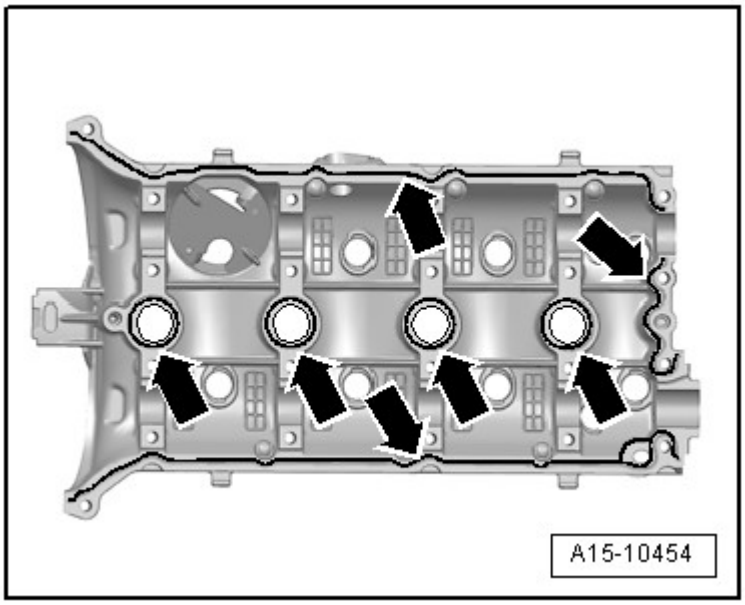

Fig. 156: Identifying Clean Cylinder Head Cover Sealing Surface Silicone Sealant Locations
Courtesy of AUDI OF AMERICA, LLC

- Sealant bead thickness: 2 to 3 mm.

NOTE: The cylinder head cover must be installed within 5 minutes after the silicone sealant has been applied.

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

Note the expiration date of the sealing compound.

-- Tighten the bolts in several steps, tightening sequence **VALVETRAIN ASSEMBLY OVERVIEW**.

NOTE: Make sure the cylinder head cover is not tilted.

Drive the cap -1- in without sealing using the T10174.

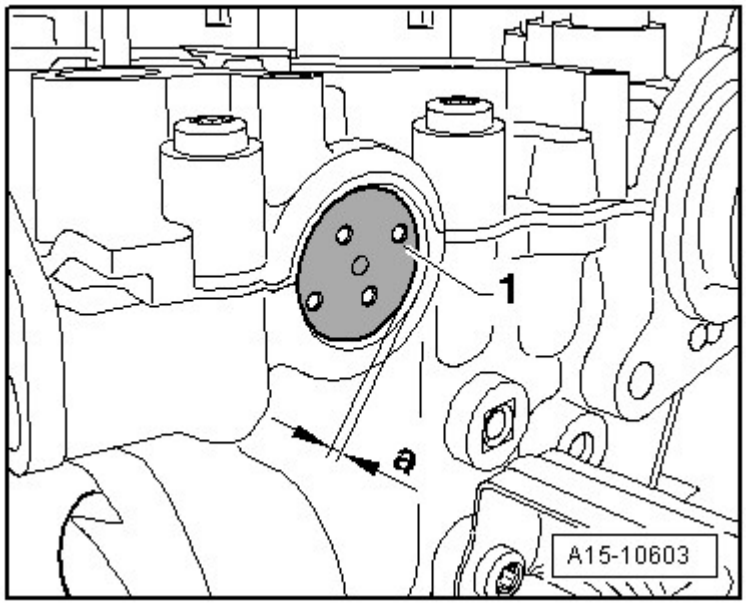

Fig. 157: Driving Cap In Using Thrust Piece T10174
Courtesy of AUDI OF AMERICA, LLC

-a- : 1 to 2 mm

WARNING: When rotating the crankshaft, make sure the timing chain cannot damage any other components.

-- Rotate the vibration damper using the T10355 into the TDC position -arrow-.

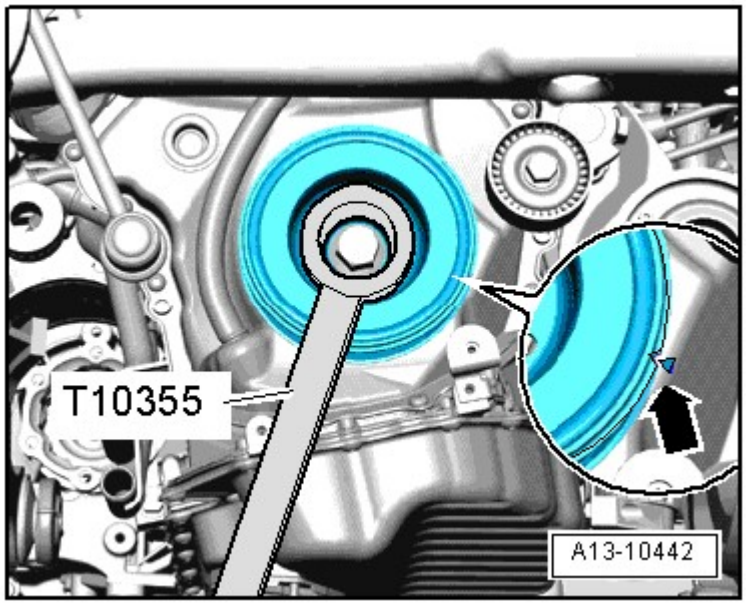

Fig. 158: Identifying Vibration Damper Rotated Into "OT" Position Using Counter Hold Tool T10355

Courtesy of AUDI OF AMERICA, LLC

- The notch on the vibration damper must line up with the arrow marking on the timing chain lower cover.

NOTE: The marked links of the timing chain must be positioned on the markings on the chain sprockets.

-- Mount the camshaft timing chain: the drive chain/chain sprocket markings -arrows- must align.

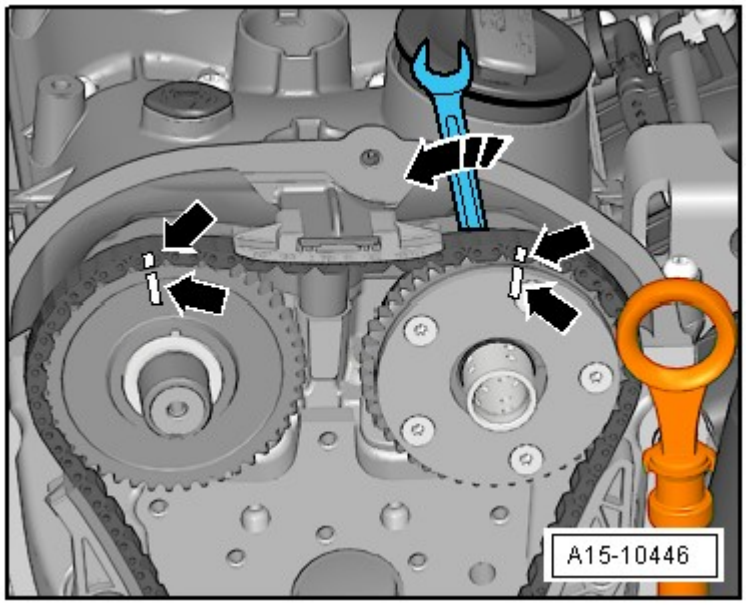

Fig. 159: Identifying Drive Chain/Chain Sprocket Markings And Turning Intake Camshaft Using Wrench
Courtesy of AUDI OF AMERICA, LLC

-- Turn the intake camshaft using the wrench in direction of -arrow- and mount the timing chain.

-- Mount the bearing bracket and the bolts -arrows- hand-tight.

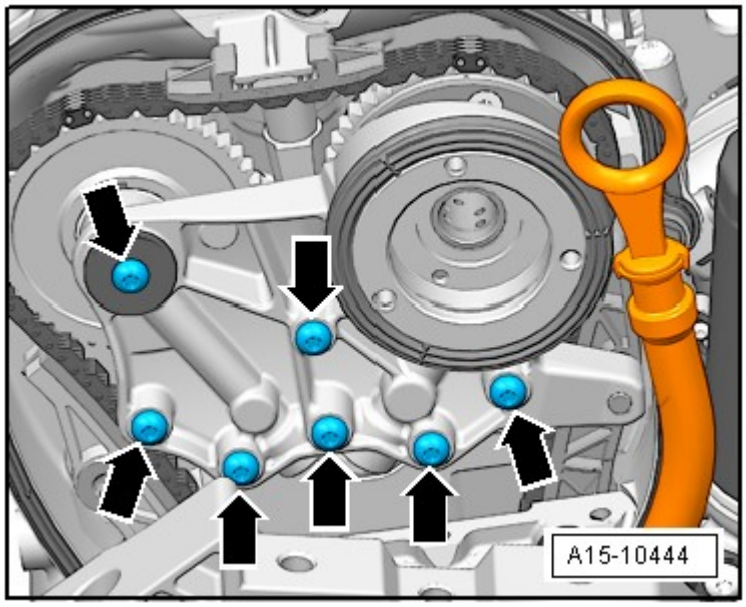

Fig. 160: Identifying Bearing Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the T40011.

-- Tighten the bearing bracket bolts -arrows-. Refer to **CAMSHAFT TIMING CHAIN ASSEMBLY OVERVIEW**.

-- Install the control valve -6- **CAMSHAFT TIMING CHAIN ASSEMBLY OVERVIEW**.

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

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

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

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 V.A.G 1331
- Valve Retainer Disassembly and Assembly Device VAS 5161
- Guide Plate for 2.0L and 3.0L FSI Engine VAS 5161/19B

Removing.

-- Remove the camshafts, refer to **CAMSHAFTS**.

-- Remove the roller rocker lever and place it on a clean surface. Make sure that roller cam followers are not interchanged.

-- Remove the spark plugs using a 3122 B.

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

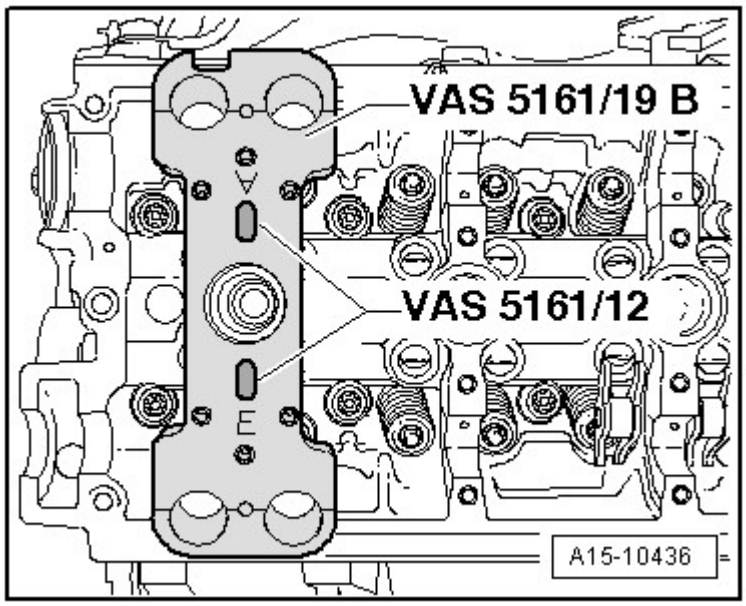

Fig. 161: Identifying FSI Engine VAS 5161/19B Guide Plate Tightened On Cylinder Head Using Knurled Bolts VAS 5161/12
Courtesy of AUDI OF AMERICA, LLC

-- Move piston for respective cylinder to "Bottom Dead Center (BDC) position".

-- Install the T40012 in the spark plug threads.

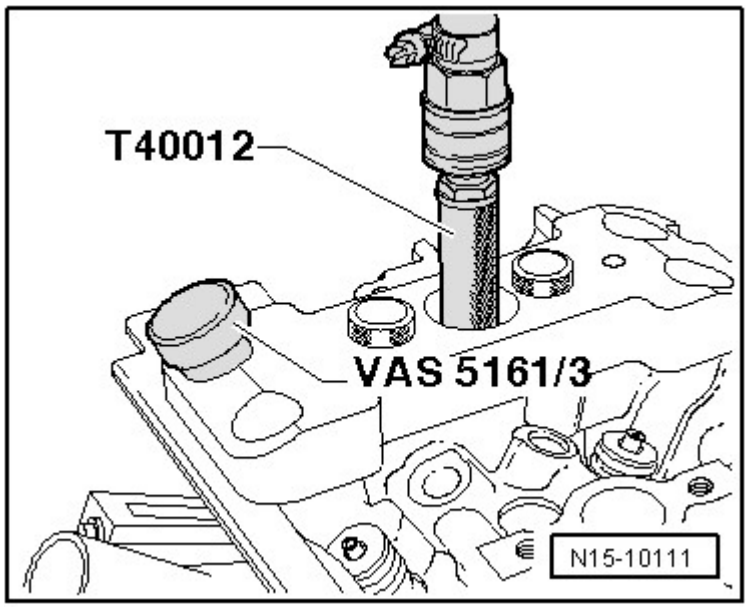

Fig. 162: Identifying Drift VAS 5161/3 And Plastic Mallet To Loosen Stuck Valve Keepers
Courtesy of AUDI OF AMERICA, LLC

-- Connect compressed air with at least 6 bar pressure.

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

For the intake side

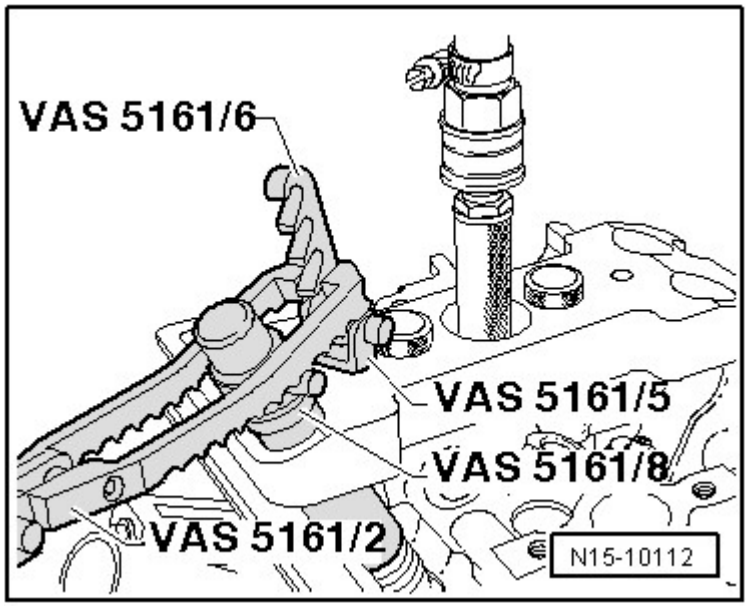

Fig. 163: Identifying Engaging Device VAS 5161/6 With Installation Forks VAS 5161/5 Installed Into Guide Plate VAS 5161/19
Courtesy of AUDI OF AMERICA, LLC

-- Install the engaging device VAS 5161/6 with the installation fork VAS 5161/5 in the center threads of the

guide plate for FSI engine VAS 5161/19B.

-- Insert the installation cartridge VAS 5161/8 in the guide plate for FSI engine VAS 5161/19B.

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

For the exhaust side

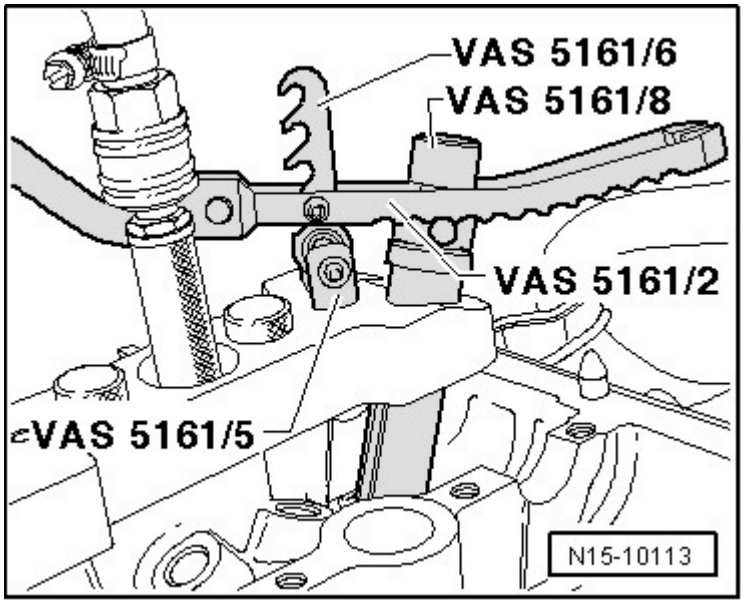

Fig. 164: Identifying Pressure Forks VAS 5161/2 Engaged
Courtesy of AUDI OF AMERICA, LLC

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

-- 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 3364.

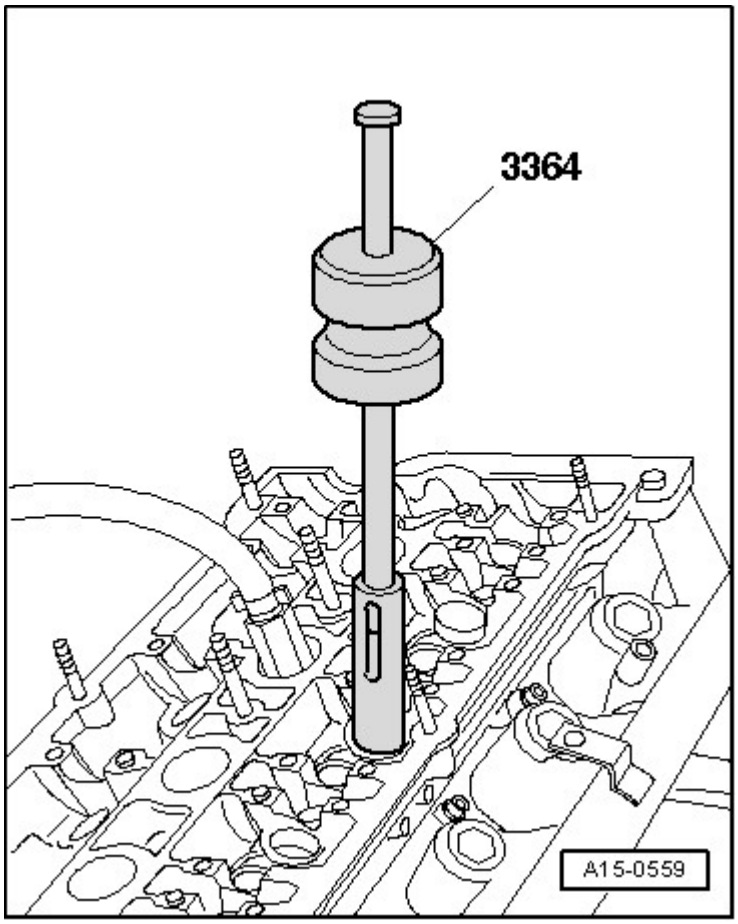

Fig. 165: Identifying Valve Seal Removal Tool 3364
Courtesy of AUDI OF AMERICA, LLC

-- If the 3364 cannot be used because there is not enough space, drive the roll pin -arrow- out using a drift and remove the impact attachment.

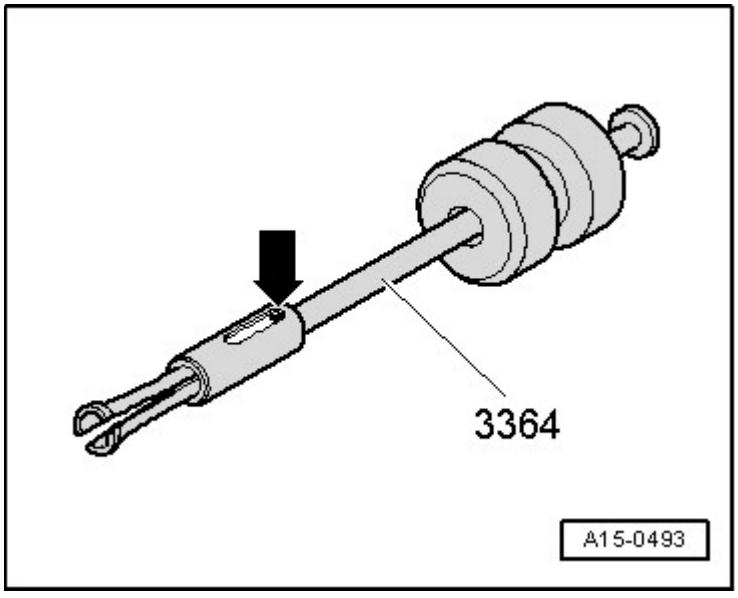

Fig. 166: Driving Out Spring Dowel Sleeve
Courtesy of AUDI OF AMERICA, LLC

-- Position the lower section of the 3364 on the valve stem seal.

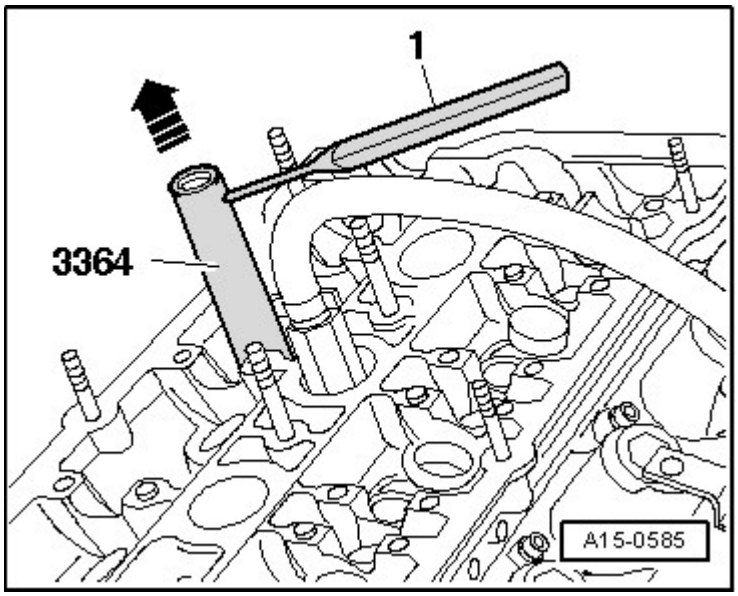

Fig. 167: Identifying Placement Of Lower Part Of Valve Seal Removal Tool 3364 On To Valve Stem Oil Seal
Courtesy of AUDI OF AMERICA, LLC

-- Place the drift -1- in the hole in the lower section of the removal tool.

-- Position the lever on the removal tool and remove the valve stem seal -arrow-.

Installing

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

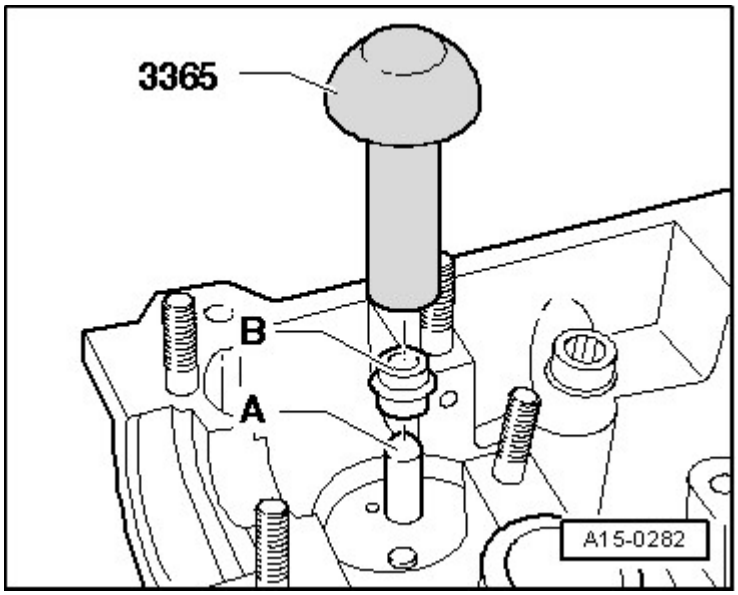

Fig. 168: Identifying Plastic Sleeve, New Valve Stem Oil Seals & Valve Stem Seal Driver 3365
Courtesy of AUDI OF AMERICA, LLC

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

-- Remove plastic sleeve -A-.

-- Insert the valve spring and valve spring plate.

-- Connect the VAS 5161 as illustrated.

For the intake side

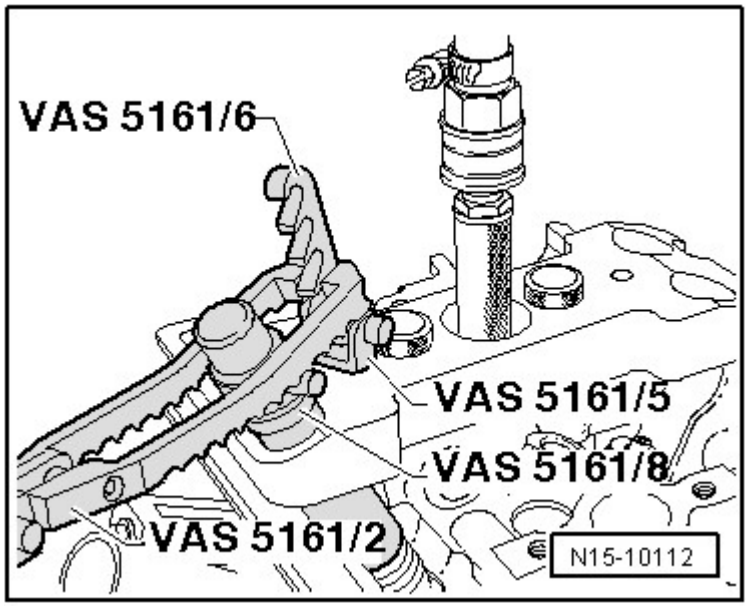

Fig. 169: Identifying Engaging Device VAS 5161/6 With Installation Forks VAS 5161/5 Installed Into

Guide Plate VAS 5161/19
Courtesy of AUDI OF AMERICA, LLC

For the exhaust side

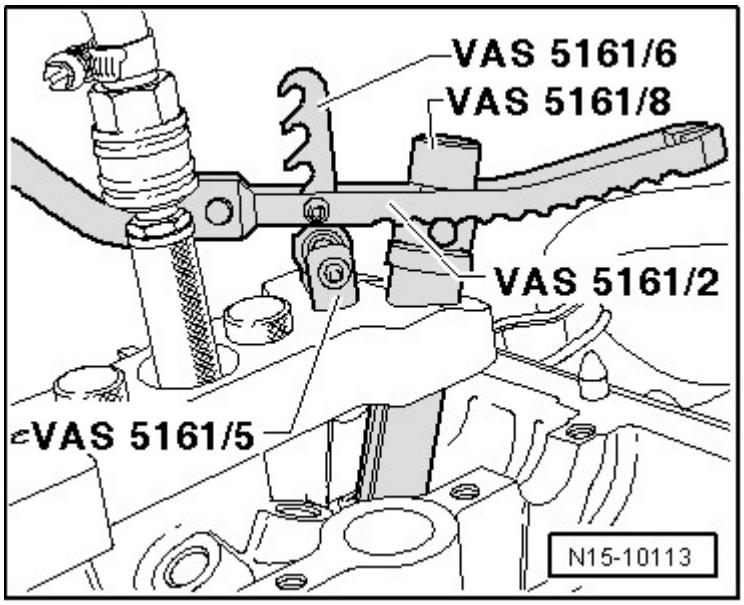

Fig. 170: Identifying Pressure Forks VAS 5161/2 Engaged
Courtesy of AUDI OF AMERICA, LLC

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

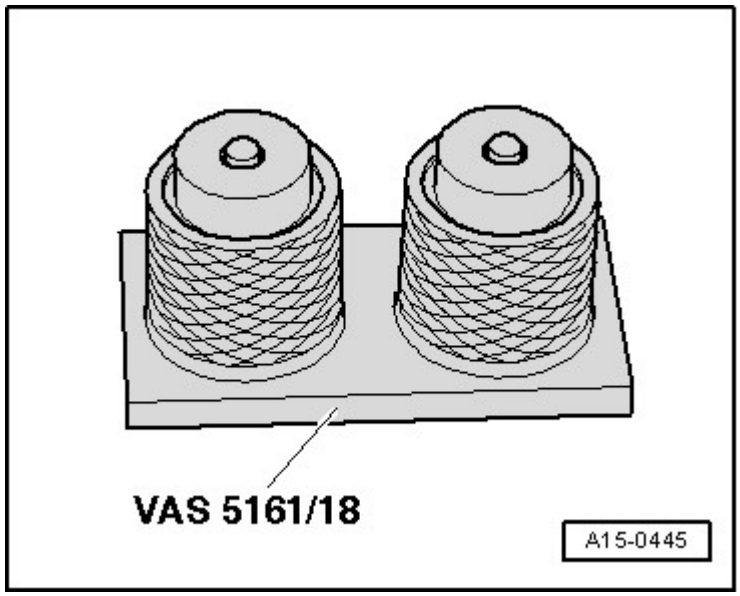

Fig. 171: Identifying Installation Cartridge VAS 5161/8
Courtesy of AUDI OF AMERICA, LLC

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

-- Install the VAS 5161/8 using the pressure fork VAS 5161/2. Turn the knurled bolt on the installation cartridge back and forth and remove it upward.

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

-- Remove the VAS 5161.

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

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

VALVE STEM SEALS, CYLINDER HEAR REMOVED

Special tools and workshop equipment required

- Valve Seal Removal Tool 3364
- Valve Stem Seal Driver 3365
- Valve Retainer Disassembly and Assembly Device VAS 5161
- Guide Plate for 2.0L and 3.0L FSI Engine VAS 5161/19B
- Engine and Transmission Holder VAS 6095
- Cylinder Head Tension Device VAS 6419

Procedure

-- Camshafts, removing. 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.

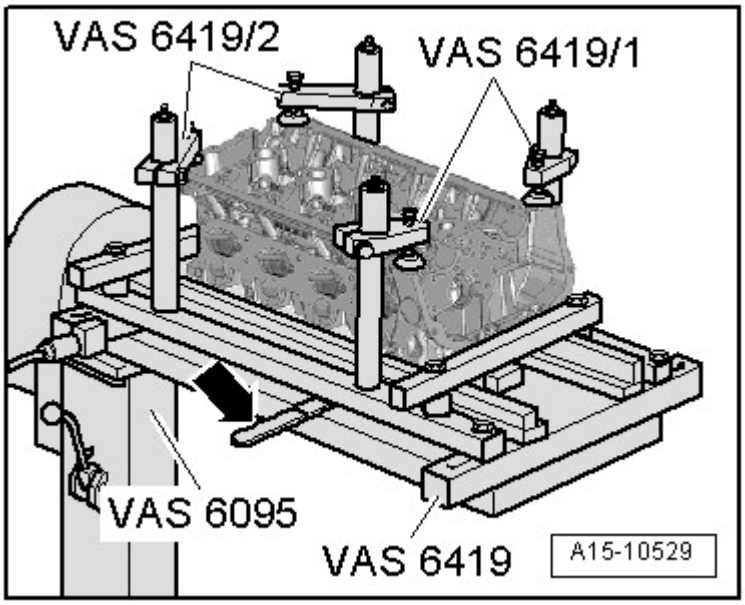

Fig. 172: Identifying VAS 6419
Courtesy of AUDI OF AMERICA, LLC

-- 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 guide plate VAS 5161/19B from the VAS 5161 on the cylinder head.

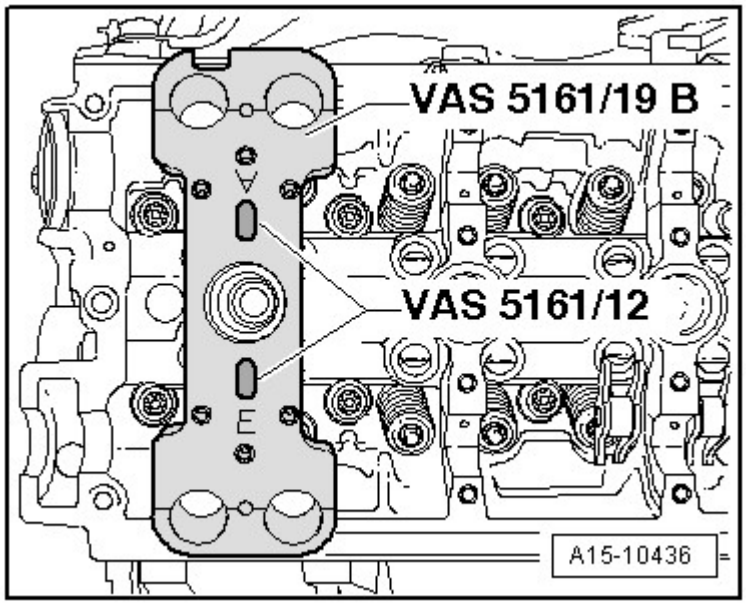

Fig. 173: Identifying FSI Engine VAS 5161/19B Guide Plate Tightened On Cylinder Head Using Knurled Bolts VAS 5161/12
Courtesy of AUDI OF AMERICA, LLC

-- 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 retainers with a plastic mallet.

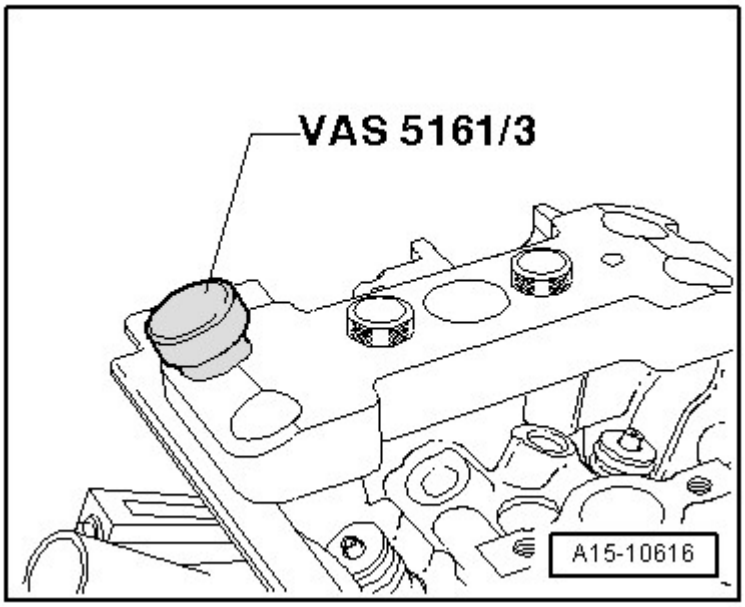

Fig. 174: Identifying VAS 5161/3
Courtesy of AUDI OF AMERICA, LLC

-- Install engaging device VAS 5161/6 with installation fork VAS 5161/5 in guide plate.

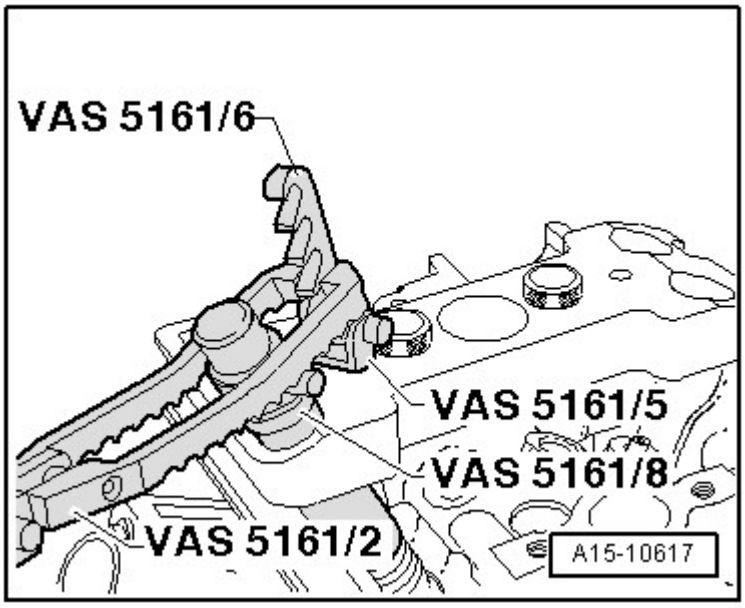

Fig. 175: Engaging Device Vas 5161/6
Courtesy of AUDI OF AMERICA, LLC

-- 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.

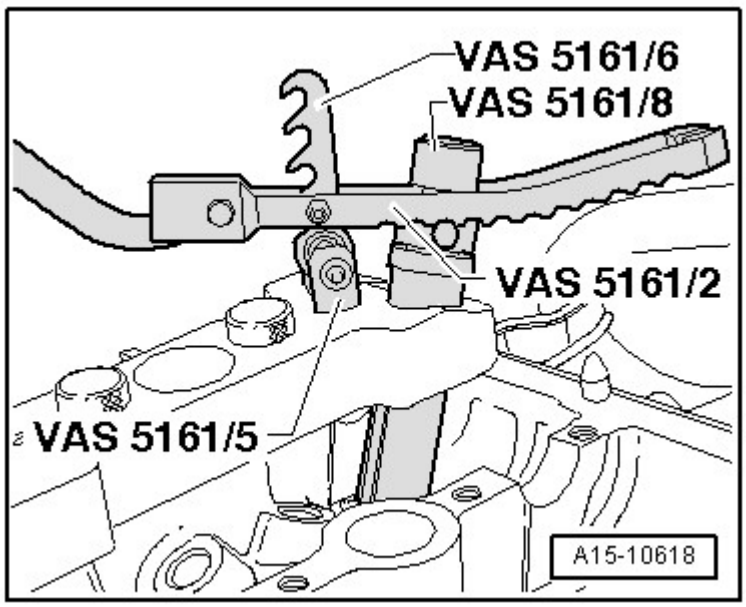

Fig. 176: Engaging Pressure Fork VAS 5161/2
Courtesy of AUDI OF AMERICA, LLC

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 retainers are pressed against each other and capture in the installation cartridge.

-- Release pressure fork.

-- Remove installation cartridge.

-- Unfasten guide plate and turn it aside.

-- Remove valve spring with valve spring plate.

-- Remove the valve stem seal with the 3364.

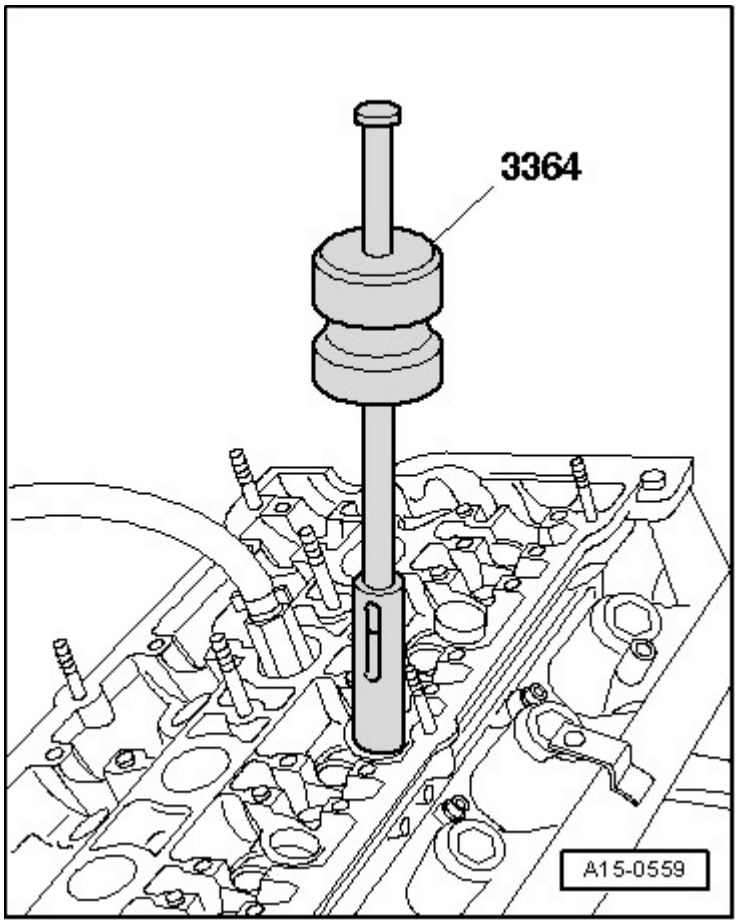

Fig. 177: Identifying Valve Seal Removal Tool 3364
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of damage when installing valve stem seals.

- **Place plastic sleeve -A- that is attached to valve stem seals -B- on valve stem.**

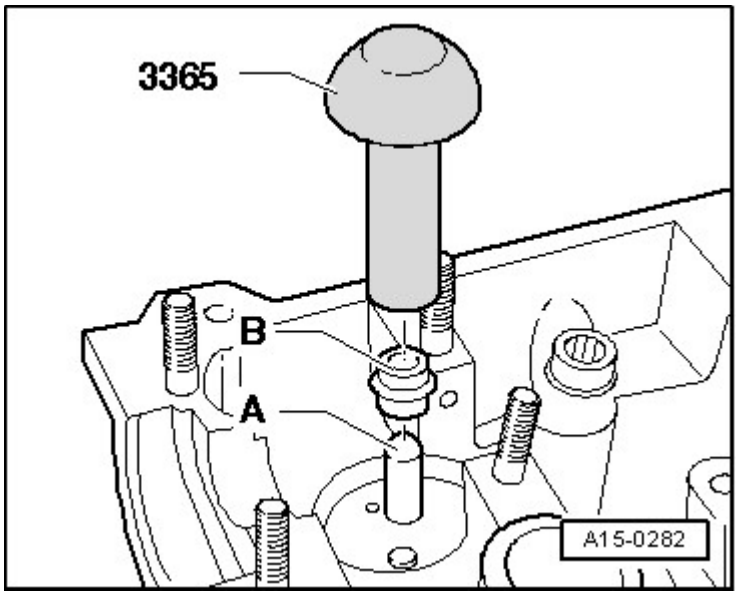

Fig. 178: Identifying Plastic Sleeve, New Valve Stem Oil Seals & Valve Stem Seal Driver 3365
Courtesy of AUDI OF AMERICA, LLC

-- 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 5161/18 next.

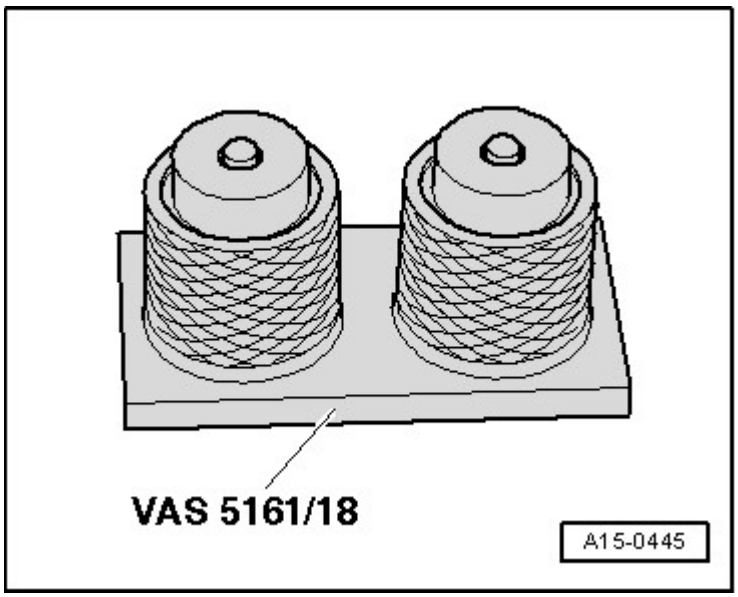

Fig. 179: Identifying Installation Cartridge VAS 5161/8
Courtesy of AUDI OF AMERICA, LLC

- 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 retainers are inserted in this manner.

-- Release pressure fork with knurled screw still raised.

-- Repeat the procedure on each valve.

Assembly is in reverse order of removal, note the following:

-- Install camshafts. Refer to **CAMSHAFTS**.

SPECIAL TOOLS

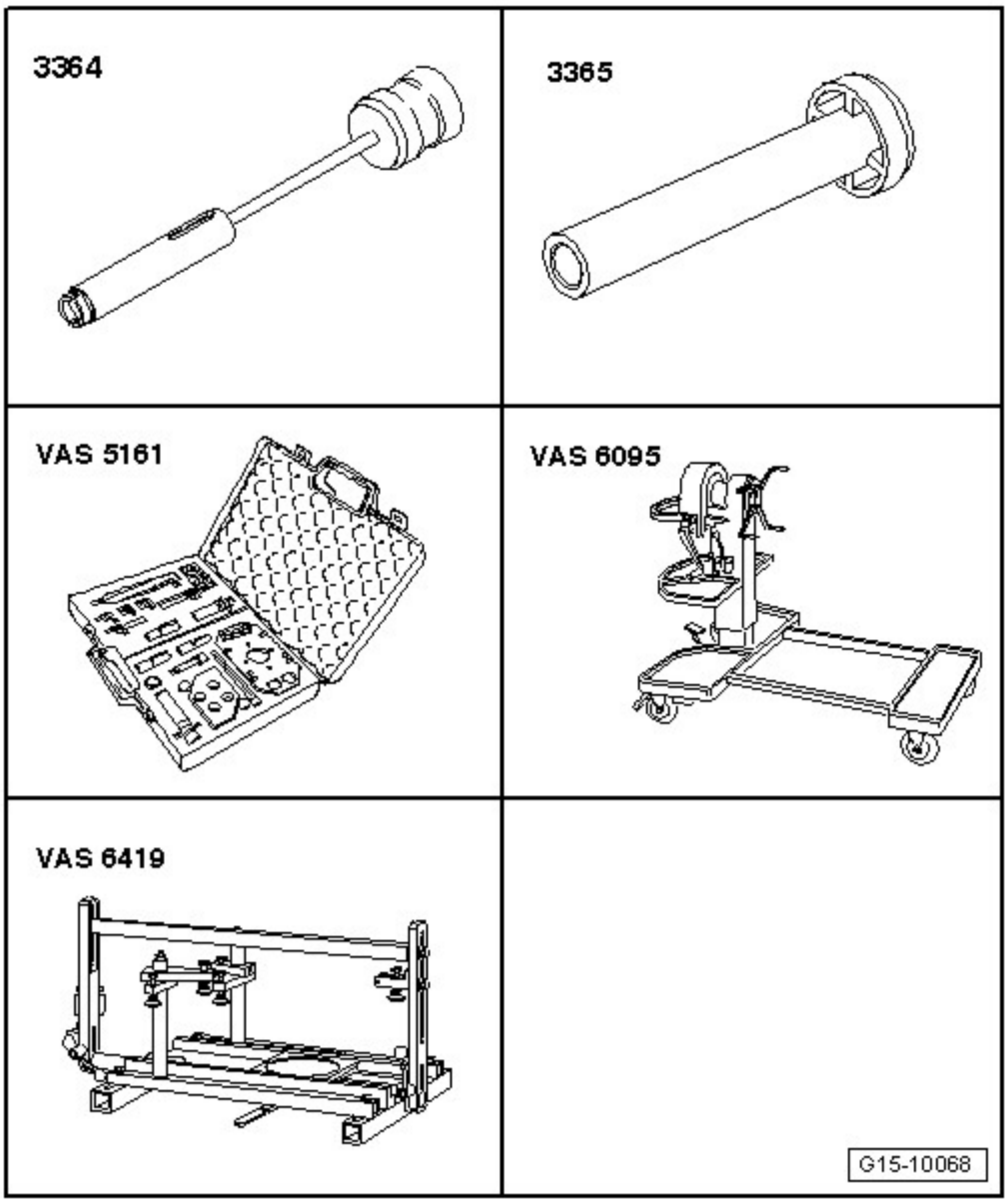

Fig. 180: Identifying Special Tools -- Valve Stem Seals, Cylinder Hear Removed
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Valve Seal Removal Tool 3364
- Valve Stem Seal Driver 3365
- Valve Retainer Disassembly and Assembly Device VAS 5161
- Guide Plate for 2.0L and 3.0L FSI Engine VAS 5161/19B
- Engine and Transmission Holder VAS 6095
- Cylinder Head Tension Device VAS 6419

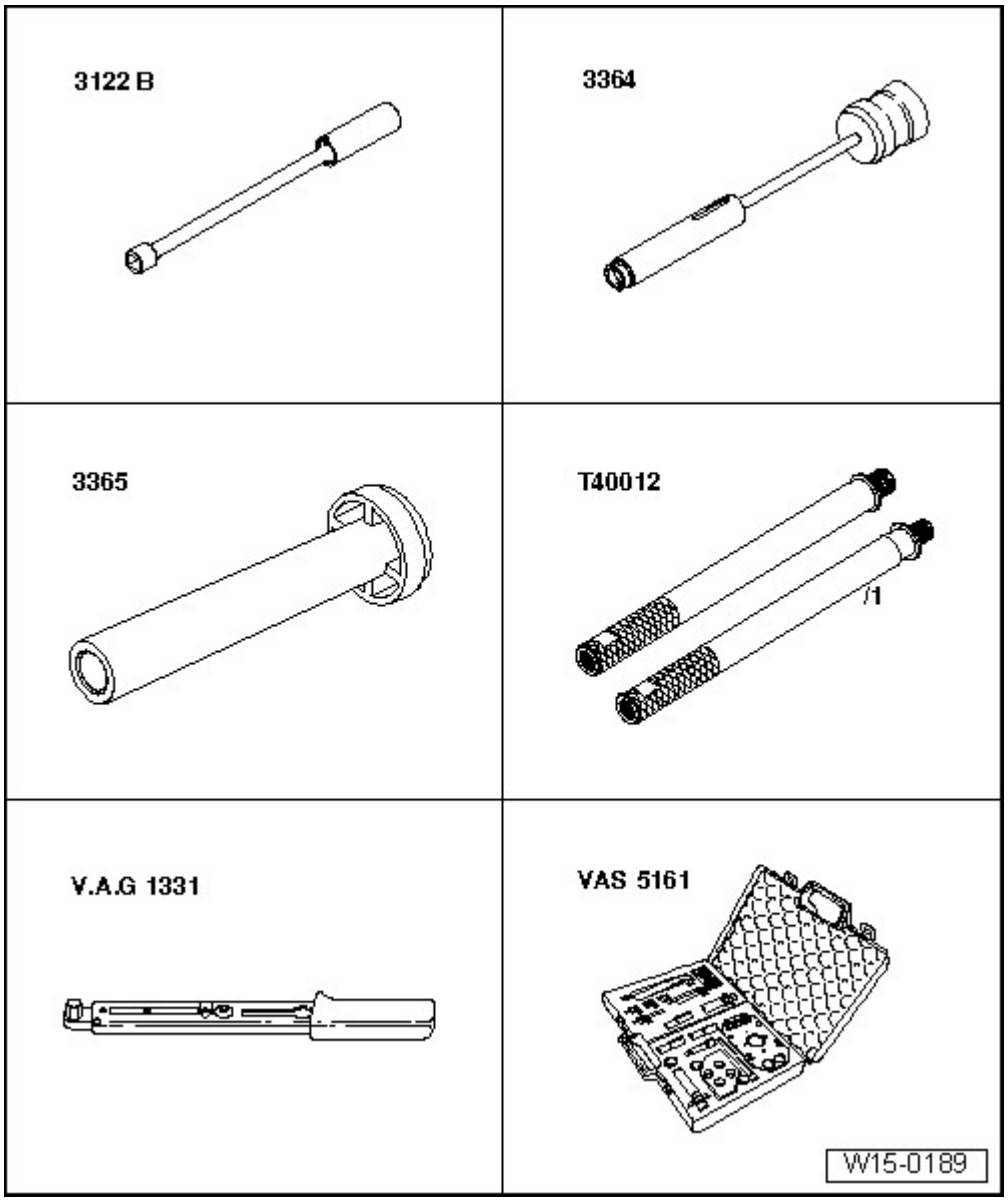

Fig. 181: Identifying Special Tools -- Valve Stem Seals, Replacing
Courtesy of AUDI OF AMERICA, LLC

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 V.A.G 1331
- Valve Retainer Disassembly and Assembly Device VAS 5161
- Guide Plate for 2.0L and 3.0L FSI Engine VAS 5161/19B

Special tools and workshop equipment required

- Spark Plug Removal Tool 3122 B

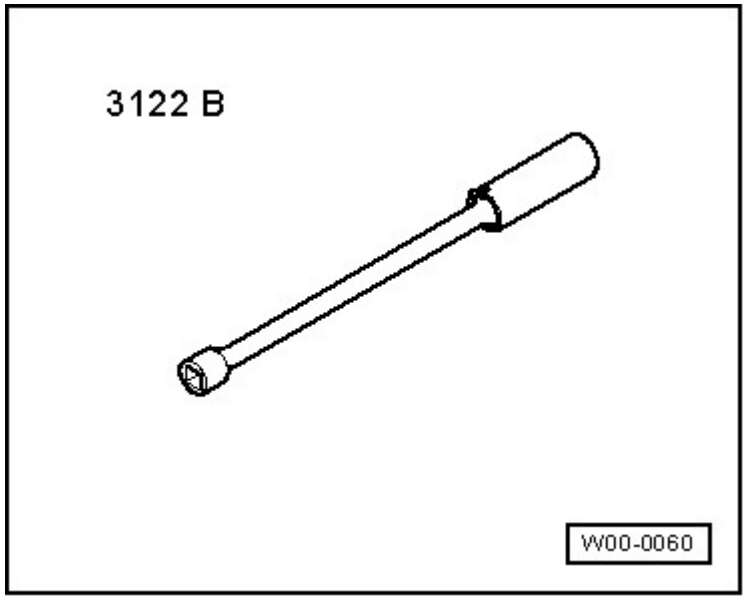

Fig. 182: Identifying Spark Plug Wrench 3122 B
Courtesy of AUDI OF AMERICA, LLC

- Ignition Coil Puller T40039

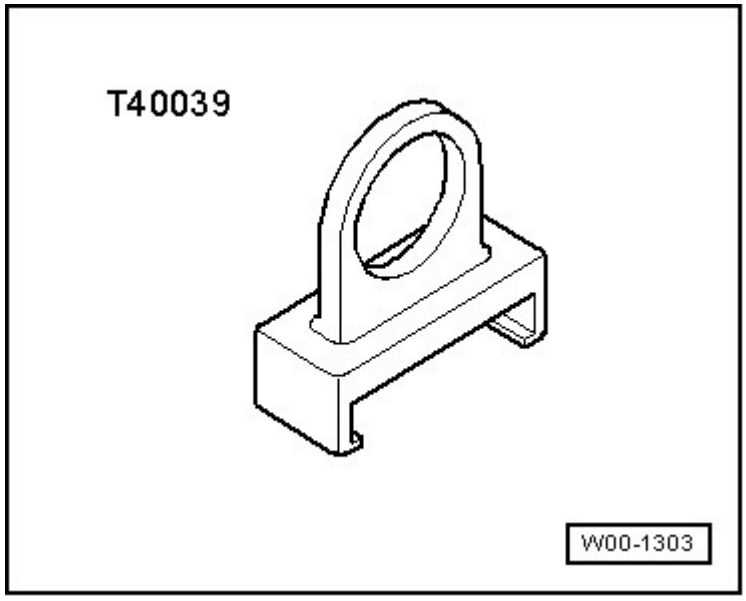

Fig. 183: Identifying Extractor T40039
Courtesy of AUDI OF AMERICA, LLC

- Compression Tester V.A.G 1763

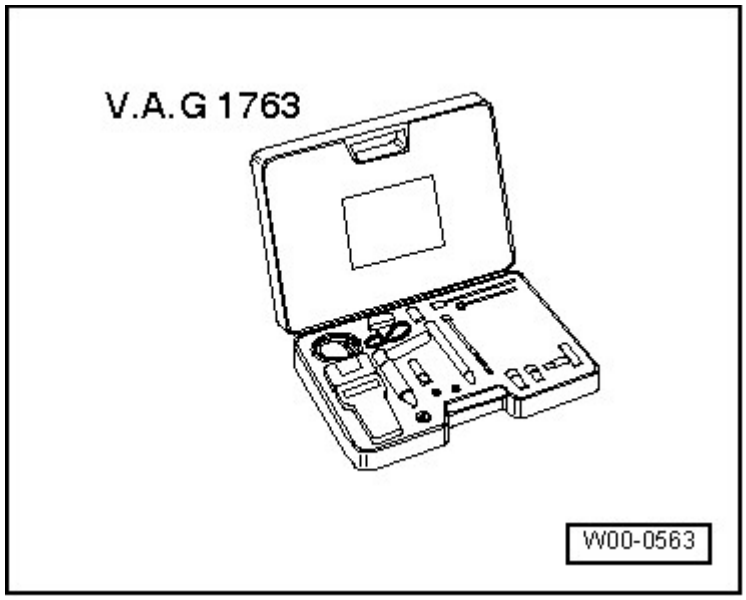

Fig. 184: Identifying Compression Tester V.A.G 1763
Courtesy of AUDI OF AMERICA, LLC

- Dial Gauge Holder VW 387

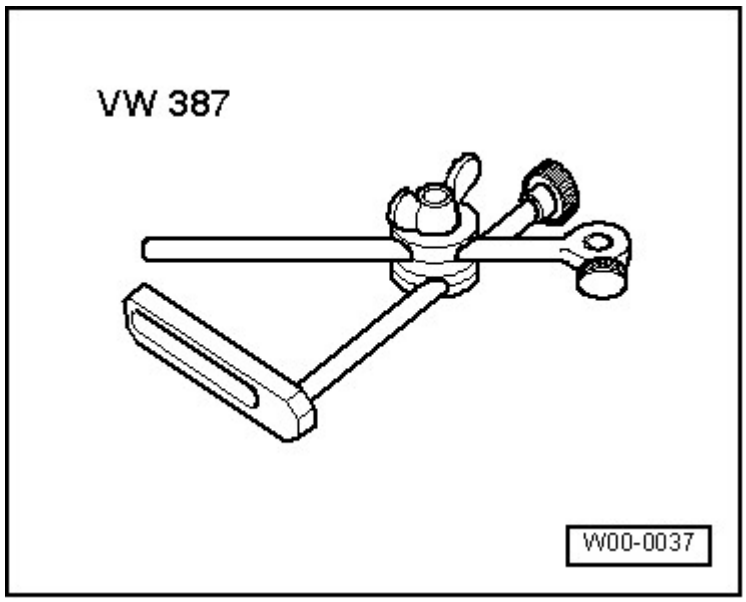

Fig. 185: Identifying Dial Gauge Holder VW 387
Courtesy of AUDI OF AMERICA, LLC

- Dial Gauge VAS 6079

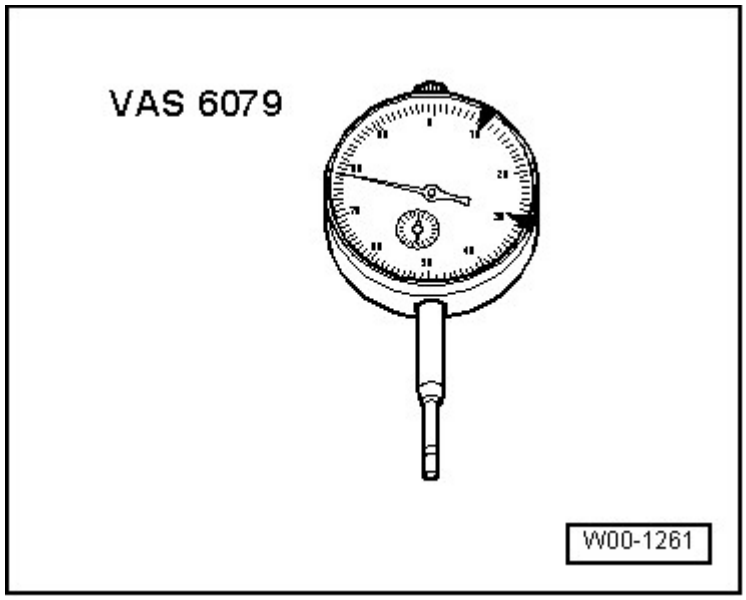

Fig. 186: Identifying Dial Gauge VAS 6079
Courtesy of AUDI OF AMERICA, LLC

- Torque Wrench V.A.G 1783

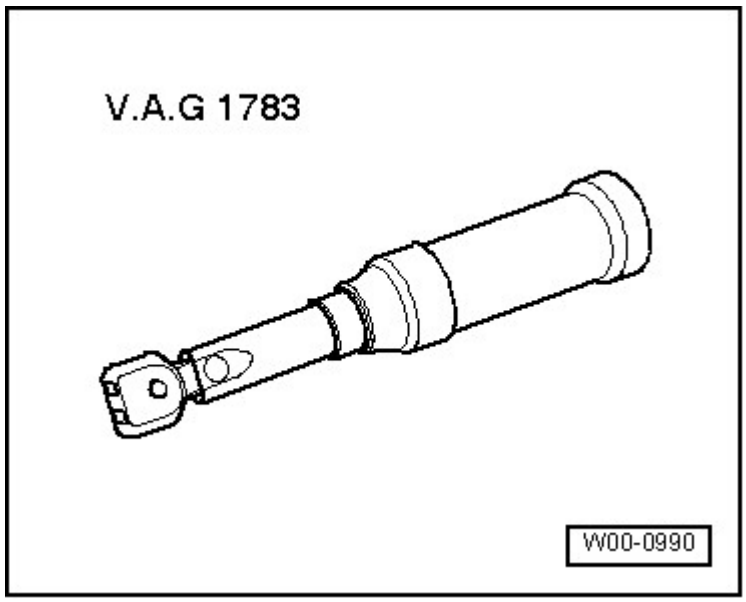

Fig. 187: Identifying Torque Wrench V.A.G 1783
Courtesy of AUDI OF AMERICA, LLC

- Locking Pin T10060 A

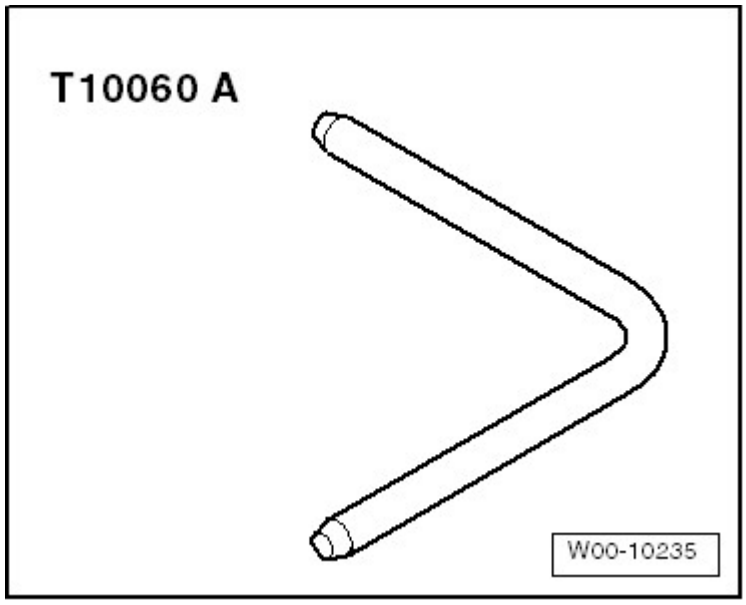

Fig. 188: Identifying Locking Pin T10060 A
Courtesy of AUDI OF AMERICA, LLC

- Counter Hold Tool T10355

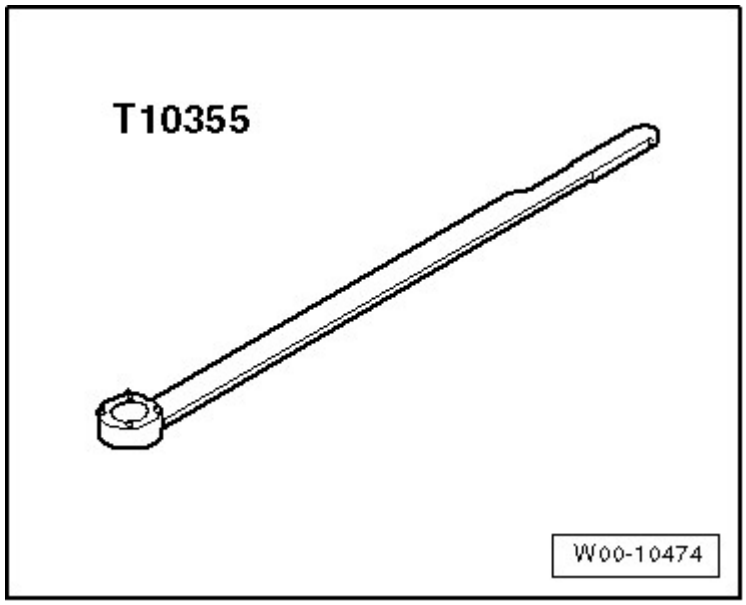

Fig. 189: Identifying Counter-Holder Tool T10355
Courtesy of AUDI OF AMERICA, LLC

- Engine Support Bridge 10 - 222 A with Spindle 10 - 222 A /11

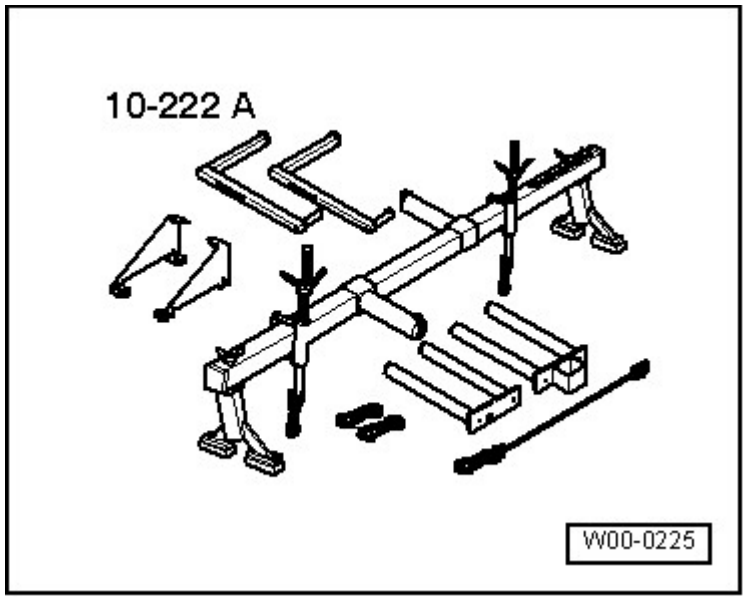

Fig. 190: Identifying Engine Support Bridge 10 - 222 A
Courtesy of AUDI OF AMERICA, LLC

- Lifting Tackle 2024 A

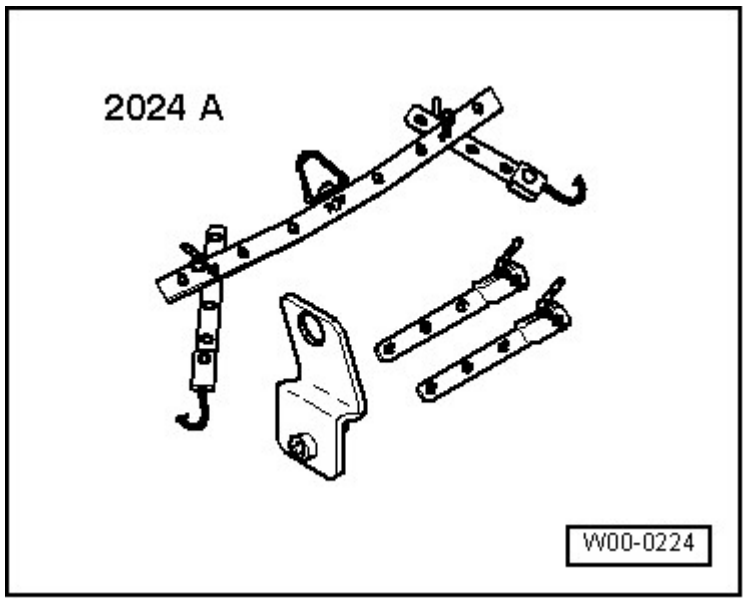

Fig. 191: Identifying Engine Sling 2024 A
Courtesy of AUDI OF AMERICA, LLC

- Bits T10099

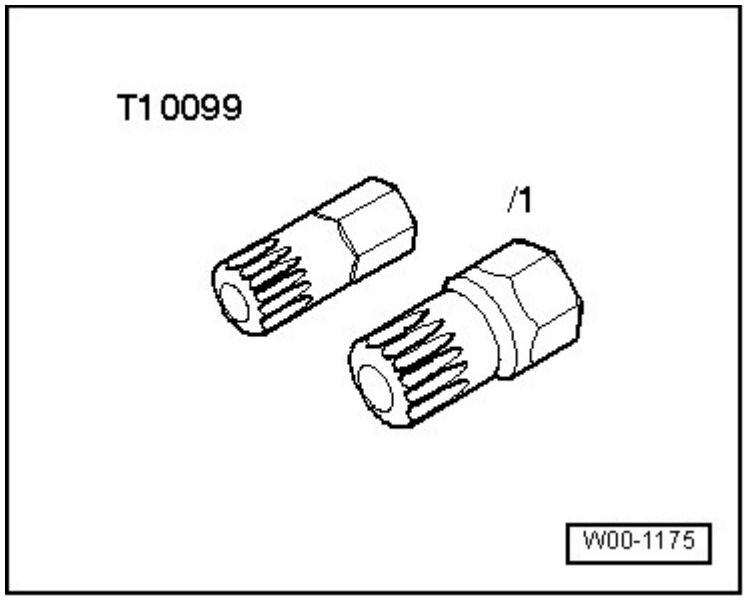

Fig. 192: Identifying Bits T10099
Courtesy of AUDI OF AMERICA, LLC

- Thrust Piece T10368

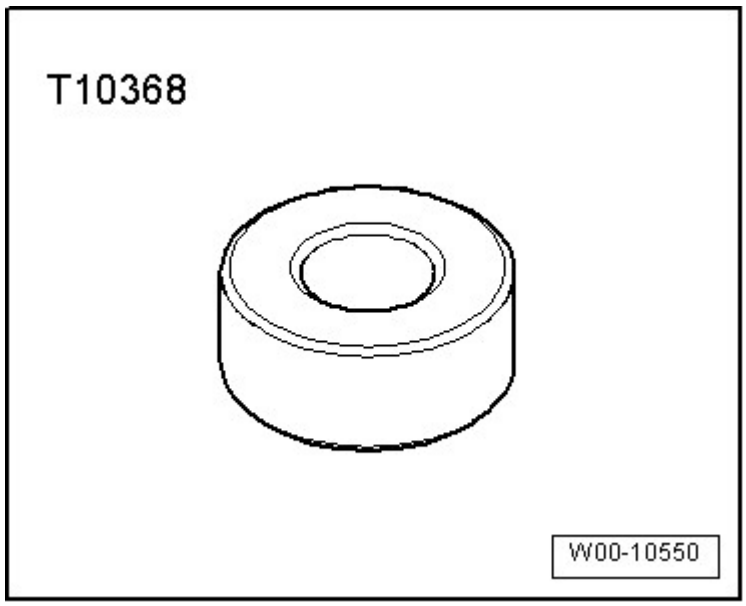

Fig. 193: Identifying Thrust Piece T10368
Courtesy of AUDI OF AMERICA, LLC

- Thrust Piece T10354

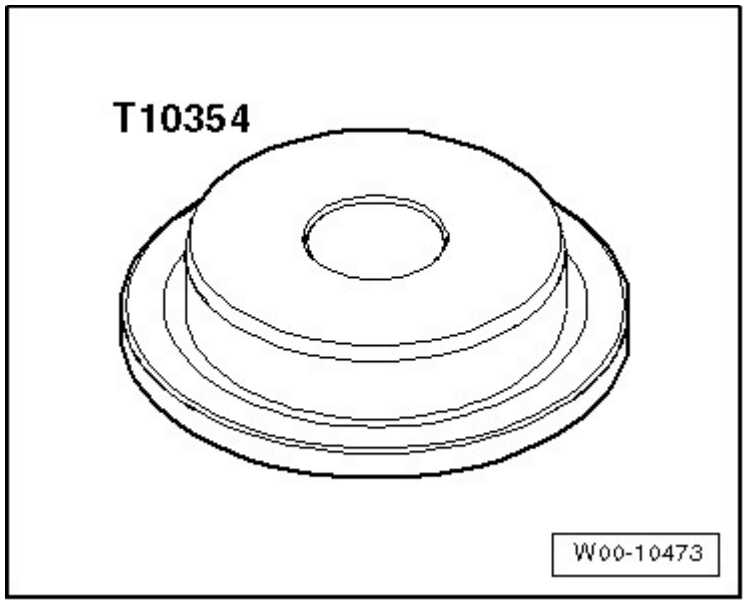

Fig. 194: Identifying Thrust Piece T10354
Courtesy of AUDI OF AMERICA, LLC

- Pulling Hook T20143

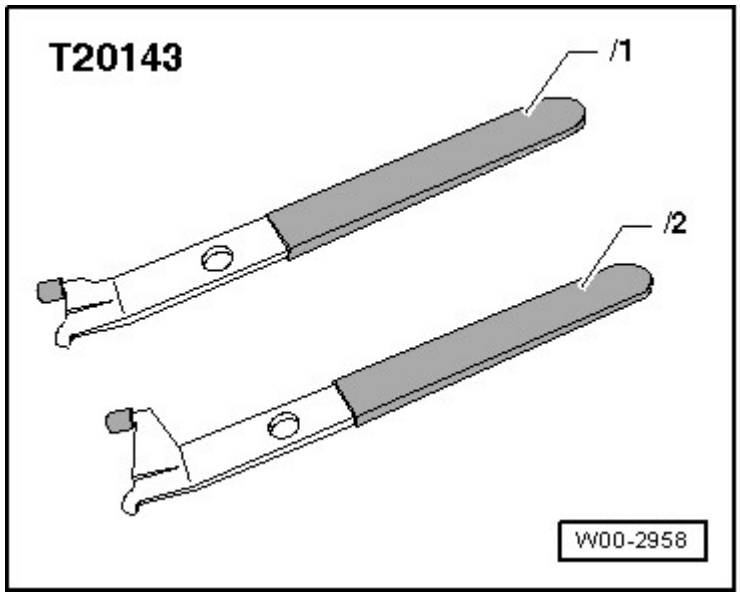

Fig. 195: Identifying Extractor Hook T20143
Courtesy of AUDI OF AMERICA, LLC

- Assembly Tool T10352 and Assembly Tool T10352/1

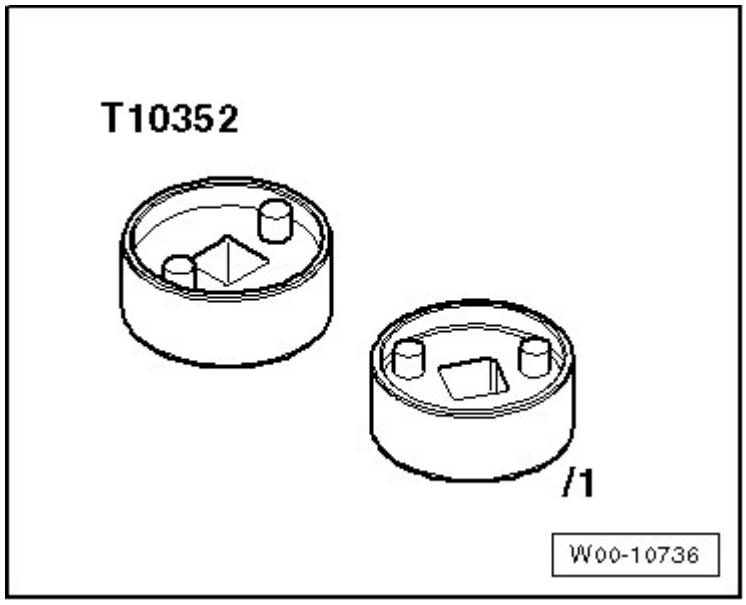

Fig. 196: Identifying Assembly Tool T10352 And Assembly Tool T10352/1
Courtesy of AUDI OF AMERICA, LLC

- Locking Pin T40011

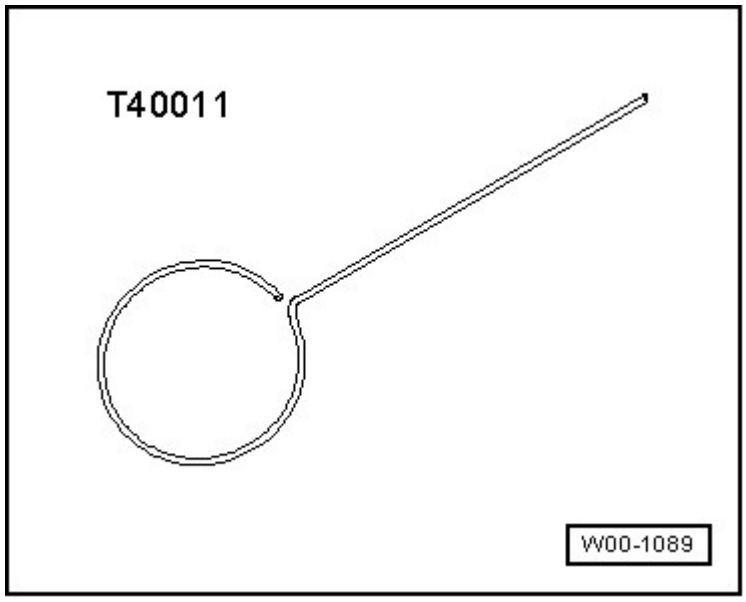

Fig. 197: Identifying Locking Pin T40011
Courtesy of AUDI OF AMERICA, LLC

- Puller T10394

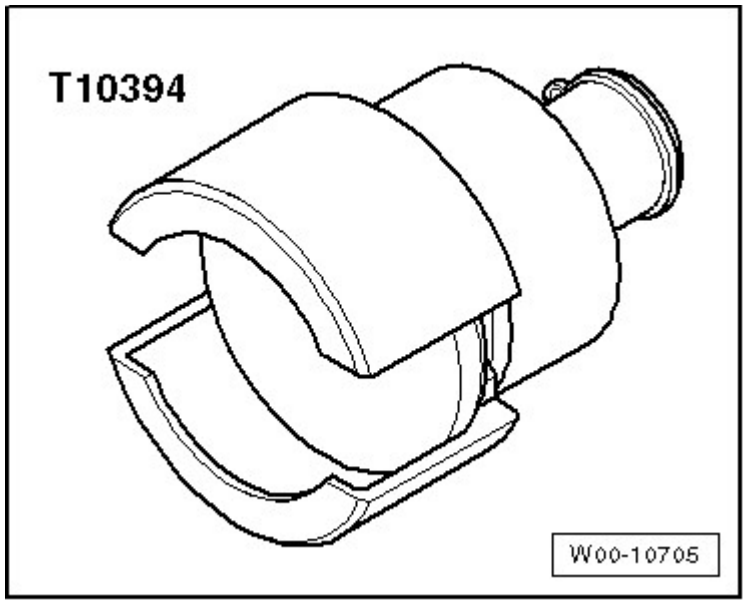

Fig. 198: Identifying Puller T10055
Courtesy of AUDI OF AMERICA, LLC

- Puller T10055

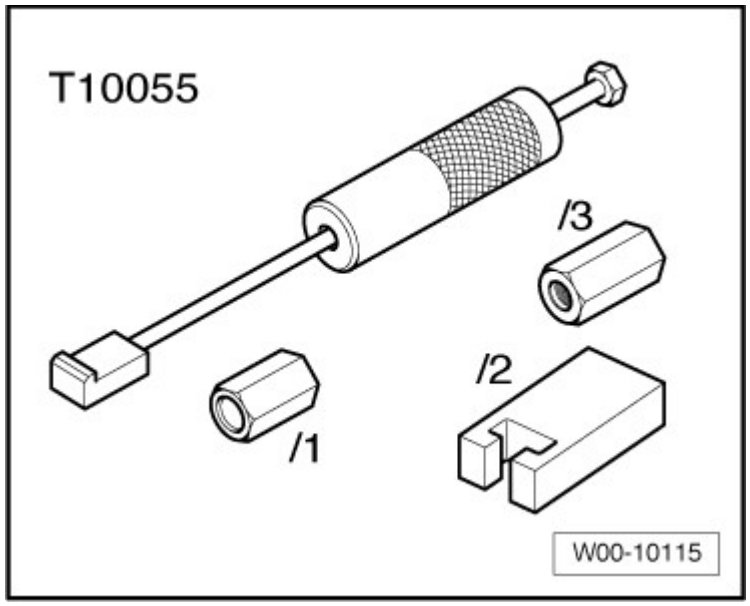

Fig. 199: Identifying Puller T10055 With Adapter T10055/3
Courtesy of AUDI OF AMERICA, LLC

- Engine Bung Set VAS 6122

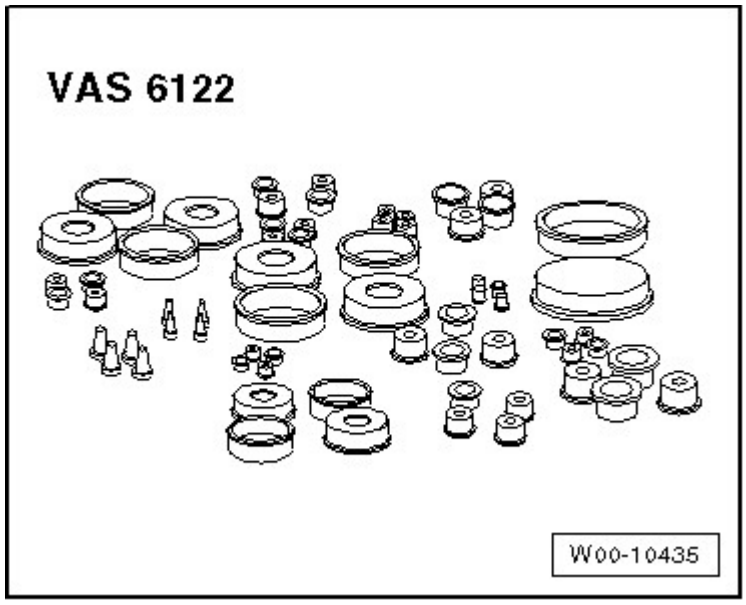

Fig. 200: Identifying Engine Bung Set Plugs VAS 6122
Courtesy of AUDI OF AMERICA, LLC

- Thrust Piece T10174

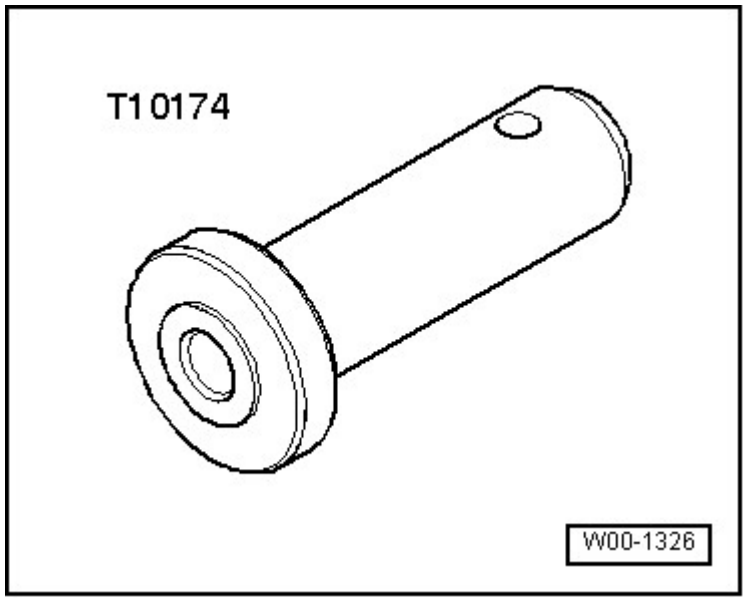

Fig. 201: Identifying Thrust Piece T10174
Courtesy of AUDI OF AMERICA, LLC

- Open End Spanner Insert AF 10 V.A.G 1783/1

ENGINE

2.0 Liter - Engine Assembly - Engine Code(s): CBFA & CCTA

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-/Gearbox Jack V.A.G 1383 A

Procedure

- The transmission is separated from the engine. Refer to **ENGINE AND MANUAL TRANSMISSION, SEPARATING** or **ENGINE AND AUTOMATIC TRANSMISSION, SEPARATING**.

-- Remove the engine cover.

-- Hook 2024 A to engine and to VAS 6100.

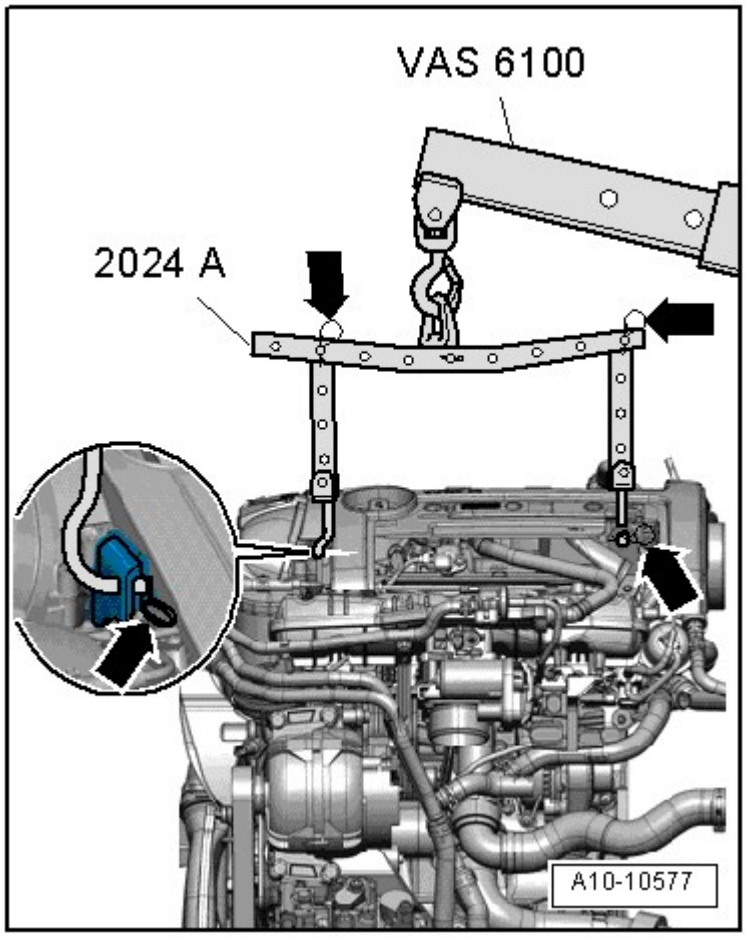

Fig. 1: Engine Lifted
Courtesy of AUDI OF AMERICA, LLC

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: Loose engine Support bridge components could cause an accident.

- **Secure the mounting Hooks and Pins on the engine Support bridge using securing Pins -arrows-.**

-- Lower the engine from the engine/transmission jack V.A.G 1383 A using the VAS 6100.

-- Secure the transmission side of the engine to the VAS 6095 as illustrated.

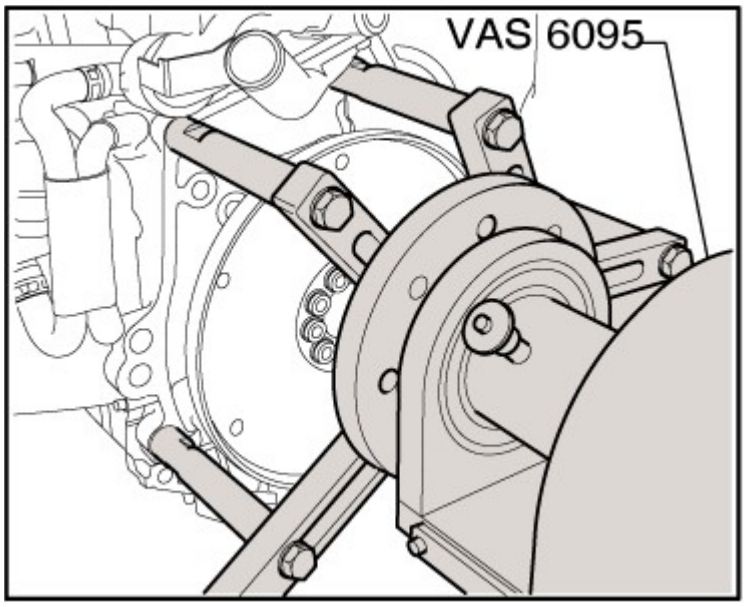

Fig. 2: Identifying Engine And Transmission Holder VAS 6095
Courtesy of AUDI OF AMERICA, LLC

SUBFRAME MOUNT, ADJUSTING

Special tools and workshop equipment required

- Engine Support Bridge 10 - 222 A with the Spindle 10 - 222 A /11 and the Special Hook 10 - 222 A /20
- Engine Sling 2024 A
- Engine Support Supplement Set T40093
- Lifting Eye 2024 A /2
- Engine Support T10359

Adjusting

- Tightening specifications, refer to **SUBFRAME ASSEMBLY OVERVIEW**.

-- Remove the cover for the air guide; to do so disengage the side clips -arrows-.

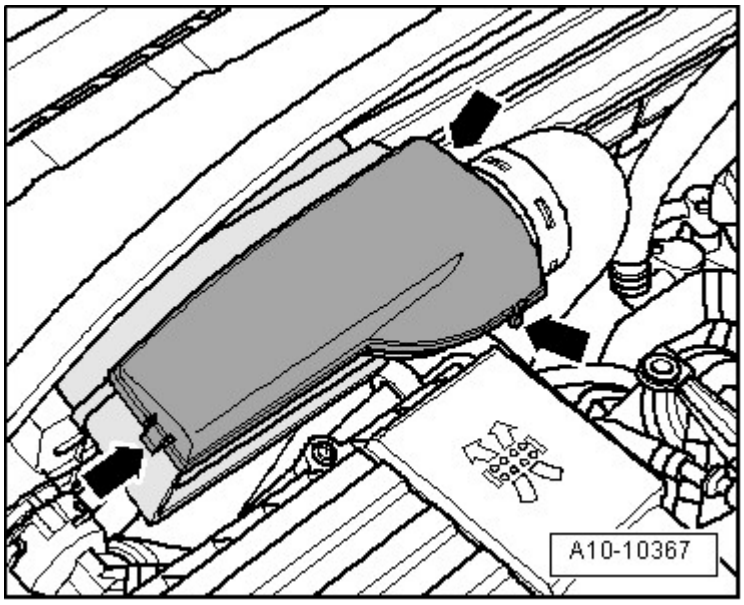

Fig. 3: Air Duct Cover Slide Clips
Courtesy of AUDI OF AMERICA, LLC

-- Unclip the lower air guide, to do so disengage the clips -arrows-.

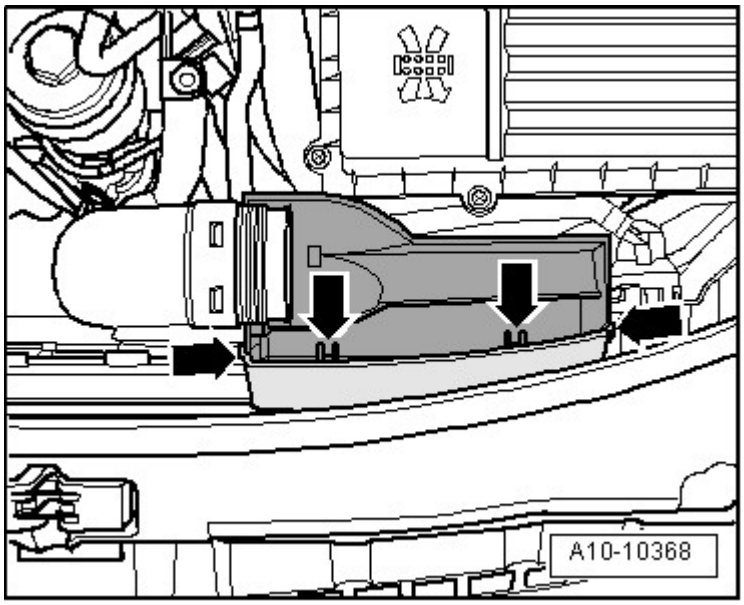

Fig. 4: Identifying Lower Air Guide Clips
Courtesy of AUDI OF AMERICA, LLC

-- Remove the lower air guide together with the air guide hose.

-- Disconnect electrical connector -1- on mass air flow (MAF) sensor -G70-.

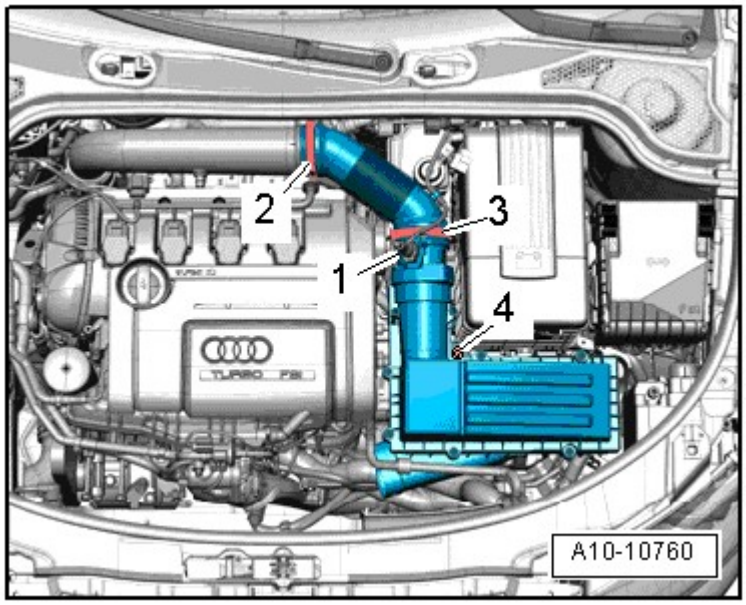

Fig. 5: Air Flow Housing, Electrical Connector And Guide Hose
Courtesy of AUDI OF AMERICA, LLC

-- Remove the air guide hose -2-.

-- Remove the bolt -4- and the air filter housing.

NOTE: Ignore -3-.

-- Remove the cover over the battery by pressing the release button -arrow-.

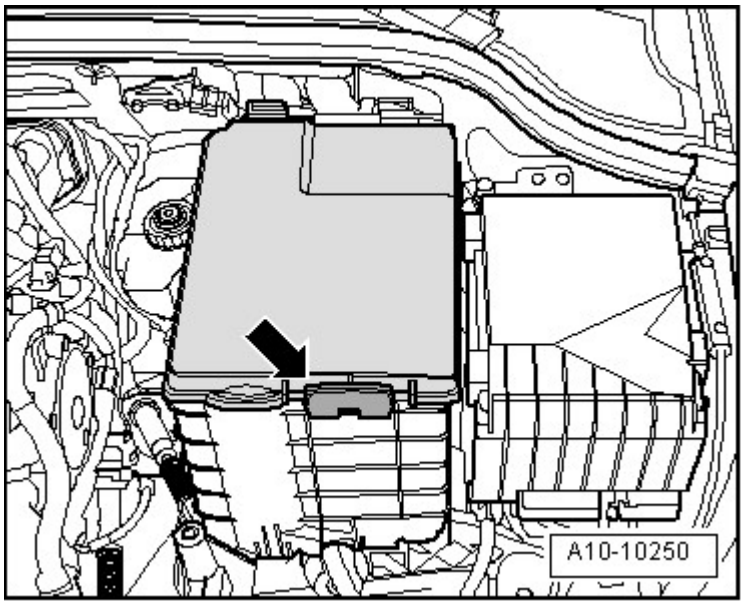

Fig. 6: Battery Cover
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of destroying electrical components when battery is disconnected.

- **Observe measures when disconnecting battery.**

-- With the ignition switched off, disconnect the Ground (GND) cable -arrow- on the battery.

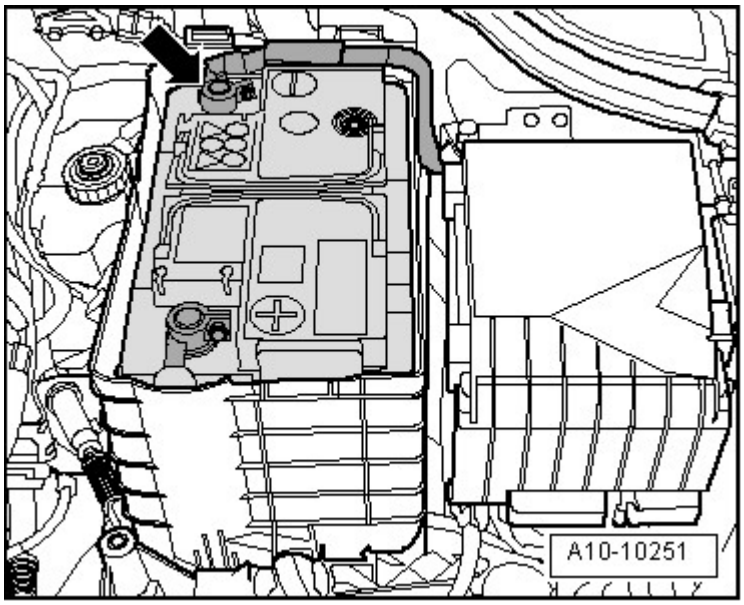

Fig. 7: Battery Ground Strap
Courtesy of AUDI OF AMERICA, LLC

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

-- Remove the battery tray -arrows-.

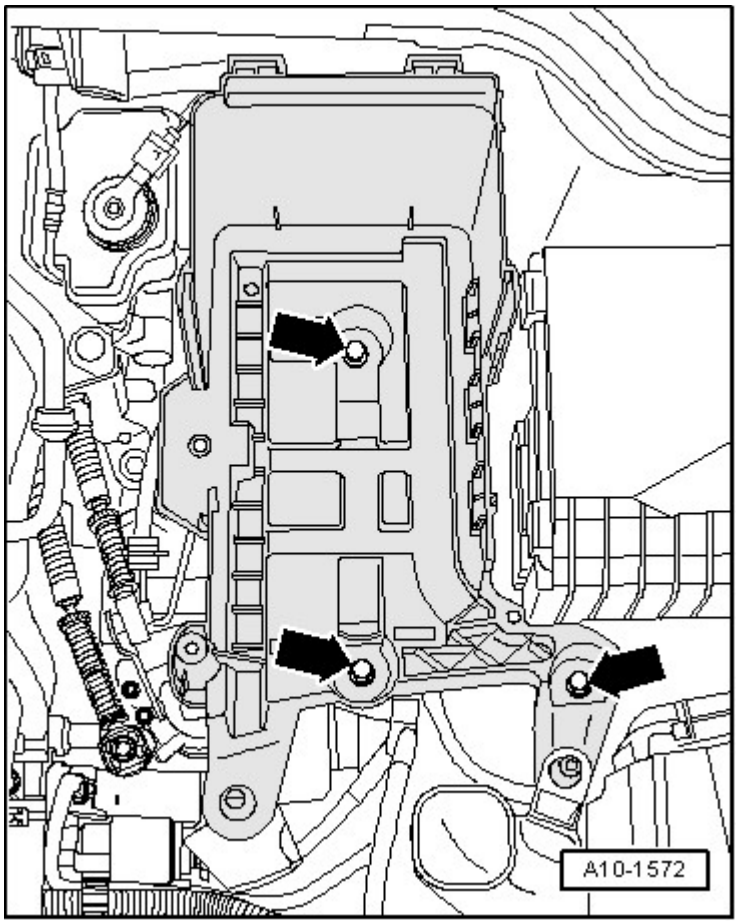

Fig. 8: Battery Carrier Nuts
Courtesy of AUDI OF AMERICA, LLC

Manual Transmission

-- Remove the transmission Support -A arrows-.

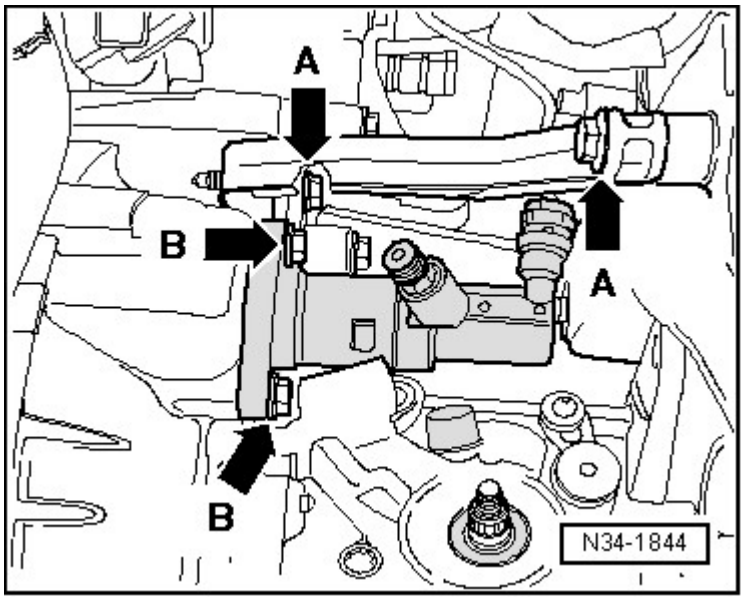

Fig. 9: Identifying Transmission Support And Slave Cylinder
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore the -B arrows-.

All Vehicles:

-- Tighten the 2024 A /2 on the engine lifting eye using a collar nut -arrow-.

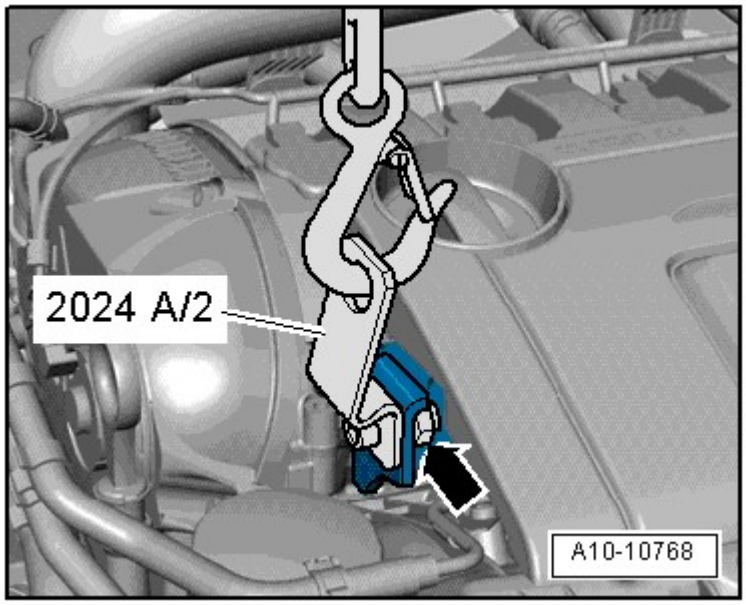

Fig. 10: Lifting Eye 2024 A /2, Engine Lifting Eye And Collar Nut
Courtesy of AUDI OF AMERICA, LLC

-- Place 10 - 222 A on upper edge of web plates with the following tool parts:

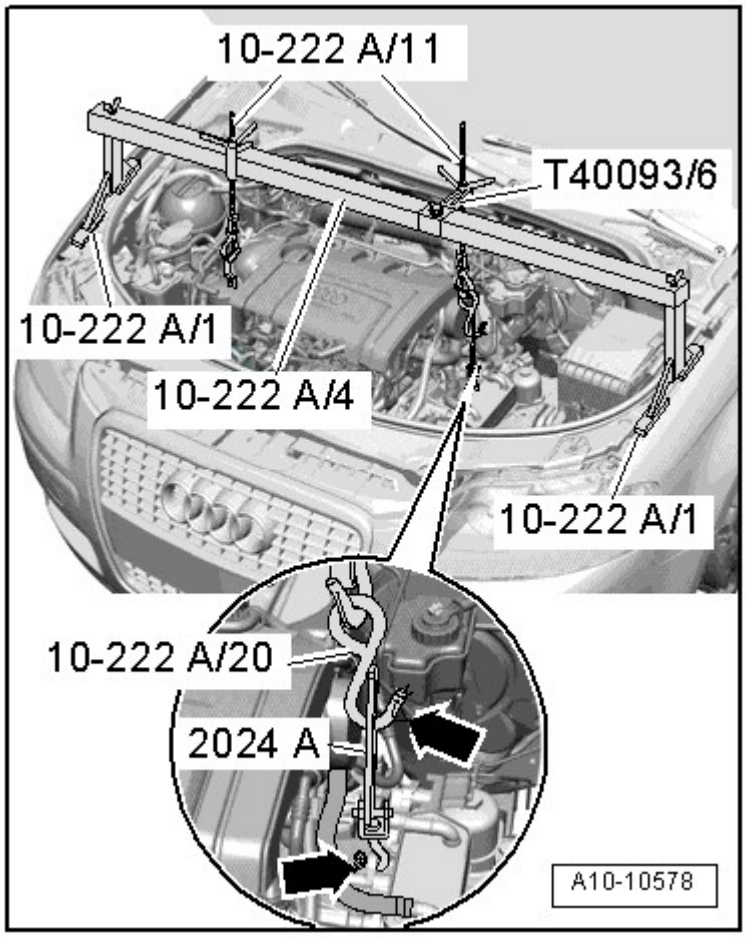

Fig. 11: Support Bridge 10 - 222 Installed On Engine
Courtesy of AUDI OF AMERICA, LLC

- Engine brackets 10 - 222 A /1, quantity: 2
- Spindle 10 - 222 A /11; quantity: 2
- Adapter 10 - 222 A /20
- Mounting Hooks from 2024 A
- Adapter T40093/6

-- Engage the Spindle 10 - 222 A /11 with the adapter 10 - 222 A /20 and mounting Hooks from the 2024 A on the transmission lifting eye.

WARNING: Risk of accident due to loose engine Support bridge Spindles.

- **Secure the mounting Hooks and Pins on the engine Support bridge using securing Pins -arrows-.**

-- Engage the 10 - 222 A /11 at the lifting eye 2024 A /2 on the engine lifting eye.

-- Tension engine/transmission subframe by evenly tightening the 2 Spindles.

Manual Transmission

-- Remove the engine mount bolts from the engine Support -arrows- one after the other and replace them (if the engine has not been installed yet).

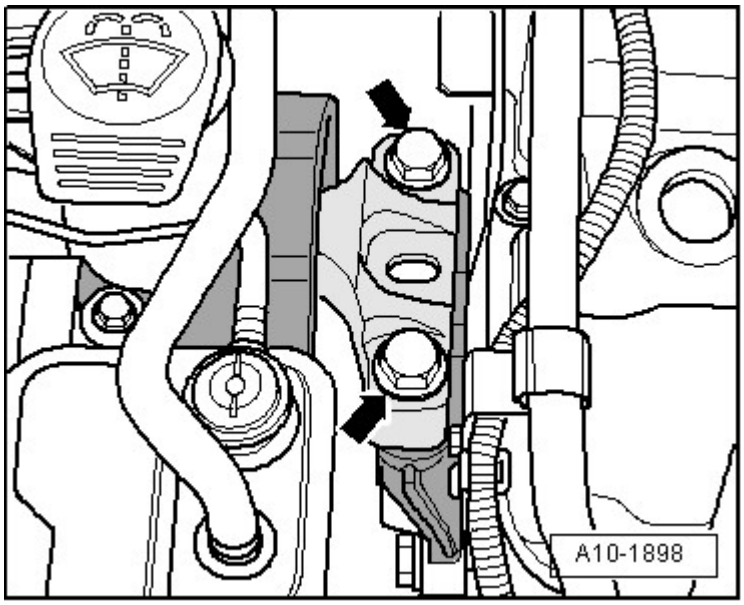

Fig. 12: Identifying Engine Mount To Engine Mount Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Install the bolts loosely.

-- Remove the transmission mount bolts from the transmission bracket -arrows- one after the other and replace them (if the engine has not been installed yet).

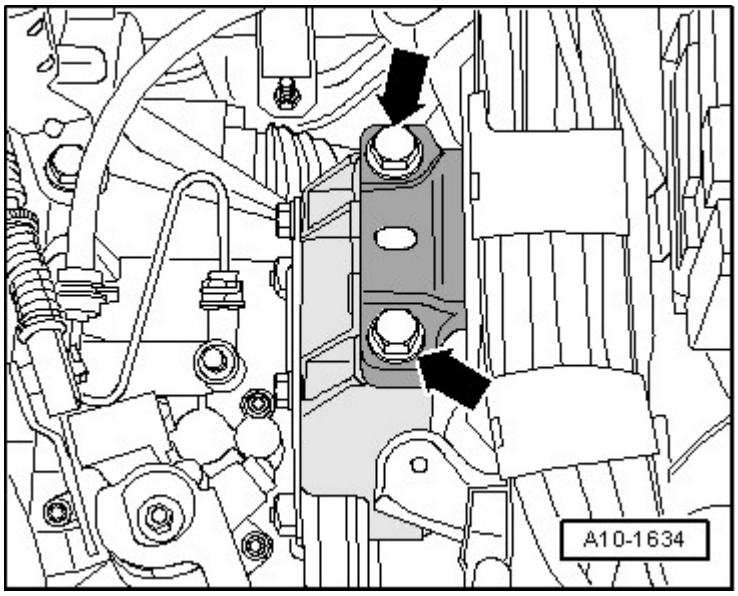

Fig. 13: Identifying Bolts For Subframe Mount At Transmission
Courtesy of AUDI OF AMERICA, LLC

-- Slide the engine/transmission assembly between the engine mount -1- and Support arm -3- using a pry bar until the following dimensions are established:

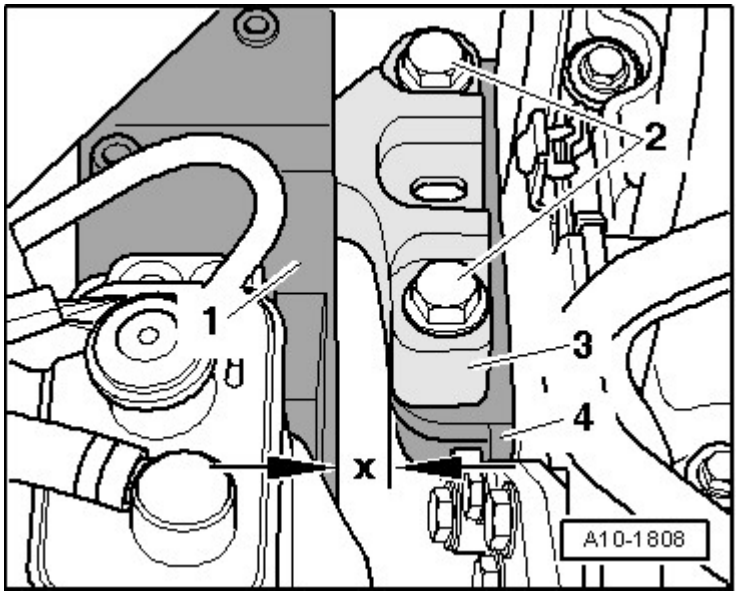

Fig. 14: Checking Dimensions At Engine/Transmission Assembly Mounting
Courtesy of AUDI OF AMERICA, LLC

- Both bolt heads -2- must be parallel to edge of engine mount 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 corresponding round stock.

-- Tighten the bolts that connect the engine mount to the engine Support.

-- The edges on the Support arm -1- and transmission mount -2- are parallel on the transmission side.

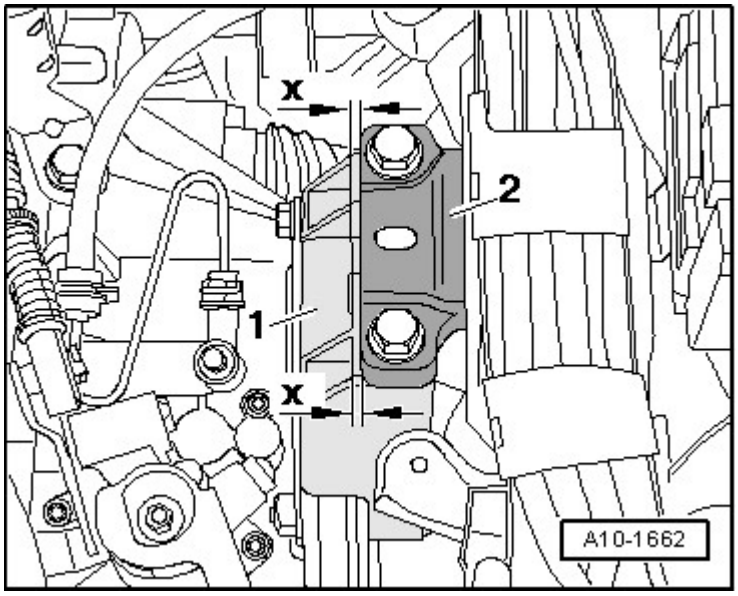

Fig. 15: Identifying Transmission Support Adjustment
Courtesy of AUDI OF AMERICA, LLC

- Dimension -x- same size on both sides of bracket.

-- Tighten the bolts that connect the transmission mount to the transmission bracket -arrows-.

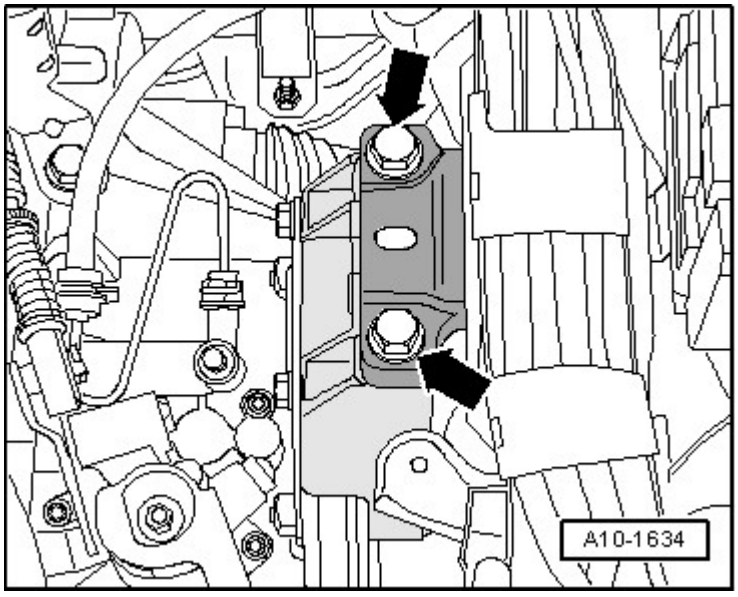

Fig. 16: Identifying Bolts For Subframe Mount At Transmission
Courtesy of AUDI OF AMERICA, LLC

Vehicles with S-Tronic Transmission :

-- Remove the engine mount bolts from the engine Support -arrows- one after the other and replace them (if the engine has not been installed yet).

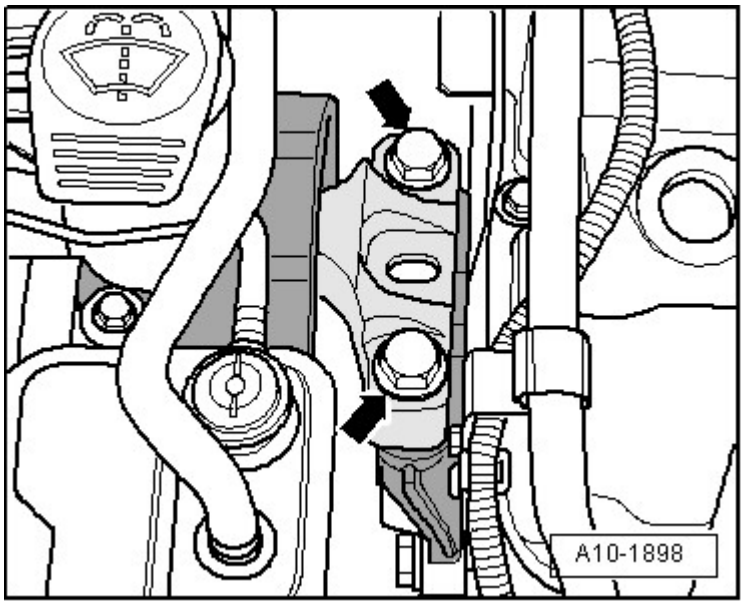

Fig. 17: Identifying Engine Mount To Engine Mount Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Install the bolts loosely.

-- Remove the transmission mount bolts from the transmission bracket -arrows- one after the other and replace them (if the engine has not been installed yet).

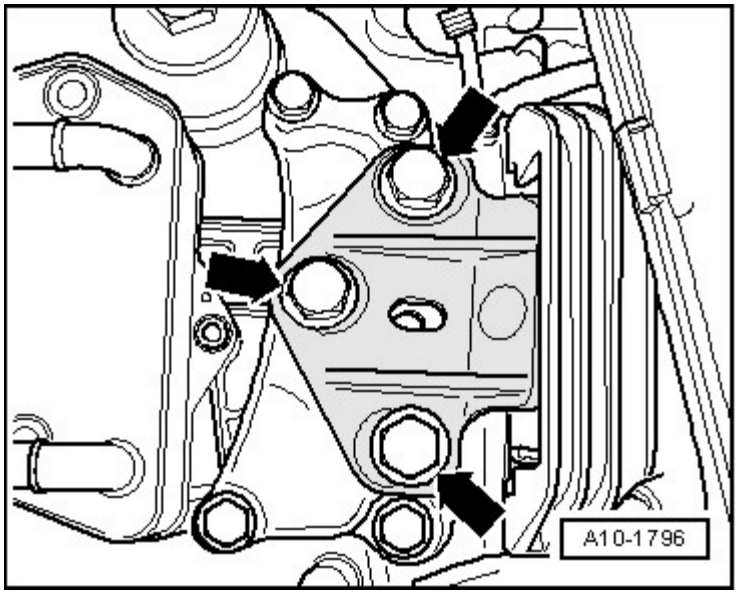

Fig. 18: Identifying Engine Mount To Engine Mount Bracket Bolts

Courtesy of AUDI OF AMERICA, LLC

-- Slide the engine/transmission assembly between the engine mount -1- and Support arm -3- using a pry bar until the following dimensions are established:

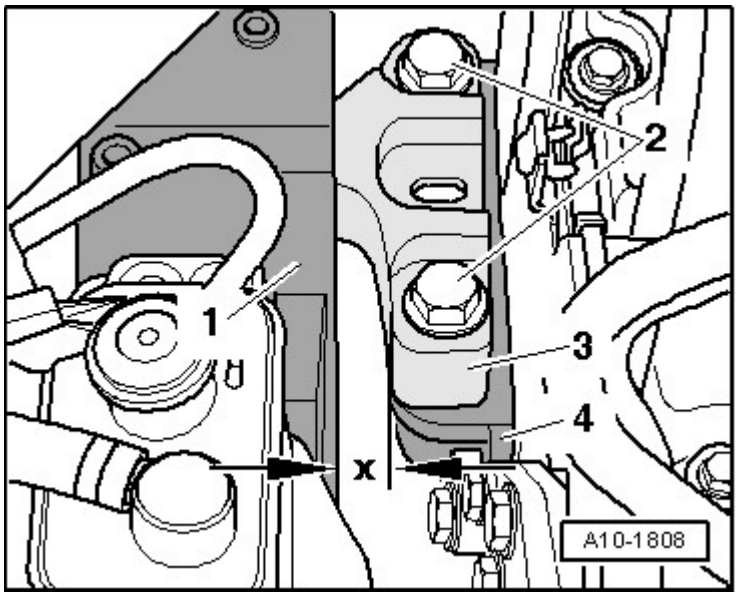

Fig. 19: Checking Dimensions At Engine/Transmission Assembly Mounting
Courtesy of AUDI OF AMERICA, LLC

- Both bolt heads -2- must be parallel to edge of engine mount 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 corresponding round stock.

-- Tighten the bolts that connect the engine mount to the engine Support.

-- On transmission side, edges on the Support arm -1- and transmission mount -2- are parallel.

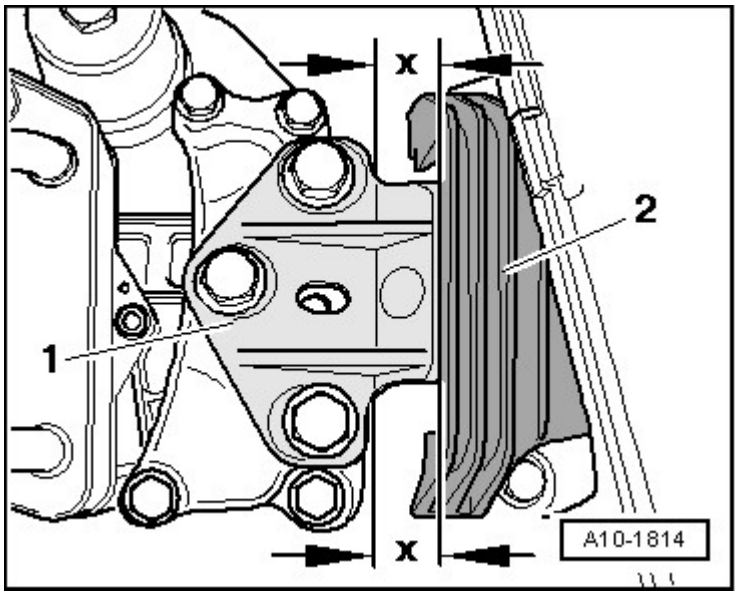

Fig. 20: Ensuring Edges On Support Arm And Transmission Mount Are Parallel
Courtesy of AUDI OF AMERICA, LLC

- Dimension -x- same size on both sides of bracket.

-- Tighten the bolts that connect the transmission mount to the transmission bracket -arrows-.

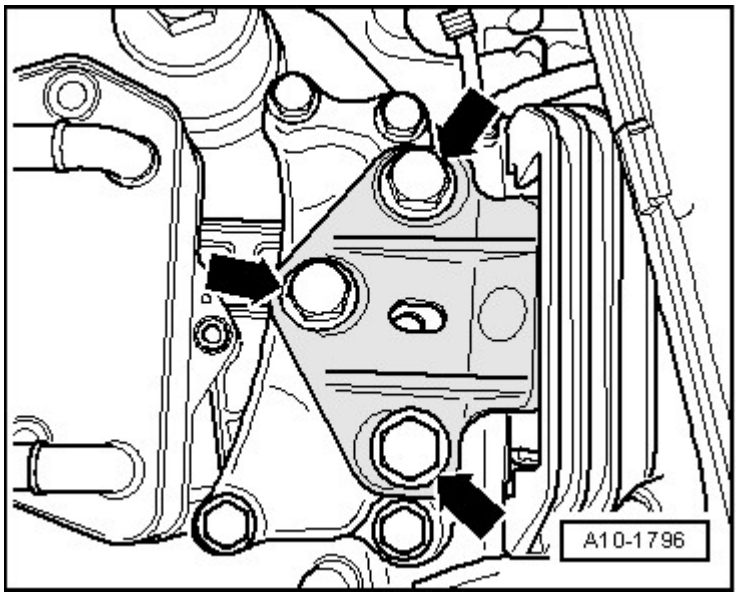

Fig. 21: Identifying Engine Mount To Engine Mount Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

All Vehicles :

Assembly is performed in the reverse order of removal, note the following:

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

-- Install air filter housing. Refer to **Removal and Installation** .

DESCRIPTION AND OPERATION

SUBFRAME ASSEMBLY OVERVIEW

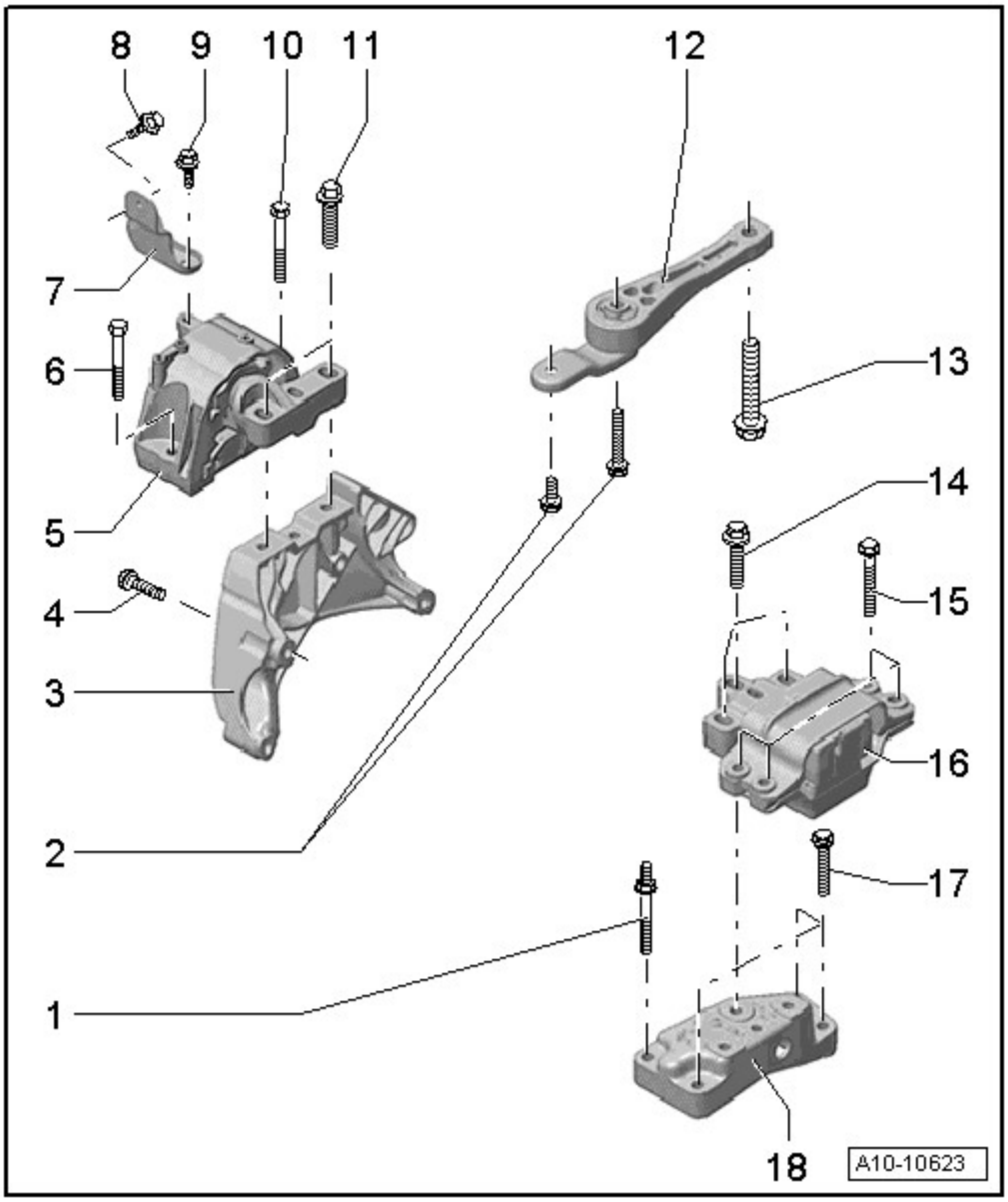

Fig. 22: Identifying Assembly Overview: Engine And Transmission Mount
Courtesy of AUDI OF AMERICA, LLC

1. Bolt
    - Bracket to transmission

- Tightening specification, manual transmission, refer to **FASTENER TIGHTENING SPECIFICATIONS**
- Tightening specification, automatic transmission, refer to **FASTENER TIGHTENING SPECIFICATIONS**

2. Bolts
   - Pendulum Support s to transmission
   - Tightening specification, manual transmission, refer to **FASTENER TIGHTENING SPECIFICATIONS**
   - Tightening specification, automatic transmission, refer to **FASTENER TIGHTENING SPECIFICATIONS**
3. Engine Support
4. Bolt
   - Replace
   - 40 Nm plus an additional 180° turn
   - 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 s

13. Bolt
    - Pendulum Support s to subframe
    - Tightening specification, manual transmission, refer to **FASTENER TIGHTENING SPECIFICATIONS**
    - Tightening specification, automatic transmission, refer to **FASTENER TIGHTENING SPECIFICATIONS**
14. Bolt
    - Transmission mount to transmission console
    - Tightening specification, manual transmission, refer to **FASTENER TIGHTENING SPECIFICATIONS**
    - Tightening specification, automatic transmission, refer to **FASTENER TIGHTENING SPECIFICATIONS**
15. Bolt
    - Transmission mount to body
    - Tightening specification, manual transmission, refer to **FASTENER TIGHTENING SPECIFICATIONS**
    - Tightening specification, automatic transmission, refer to **FASTENER TIGHTENING SPECIFICATIONS**
16. Transmission Mount
    - The illustration shows the S-Tronic transmission
17. Bolt
    - Transmission console to transmission
    - Tightening specification, manual transmission, refer to **FASTENER TIGHTENING SPECIFICATIONS**
    - Tightening specification, automatic transmission, refer to **FASTENER TIGHTENING SPECIFICATIONS**
18. Transmission Bracket

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Component	Bolt Size	Nm
Bolts/Nuts		
	M6	10
	M7	15
	M8	22
	M10	40
	M12	65
Bracket to engine mount[1]		20 + 90°
Engine Mount[1, 2]		

		40 + 90°
		60 + 90°
Engine Support [1]		40 Nm +180°

- [1] Always replace
- [2] For bolt tightening clarification, refer to **SUBFRAME ASSEMBLY OVERVIEW** and see items -6, 10 and 11-

Secures the Manual Transmission to the Engine

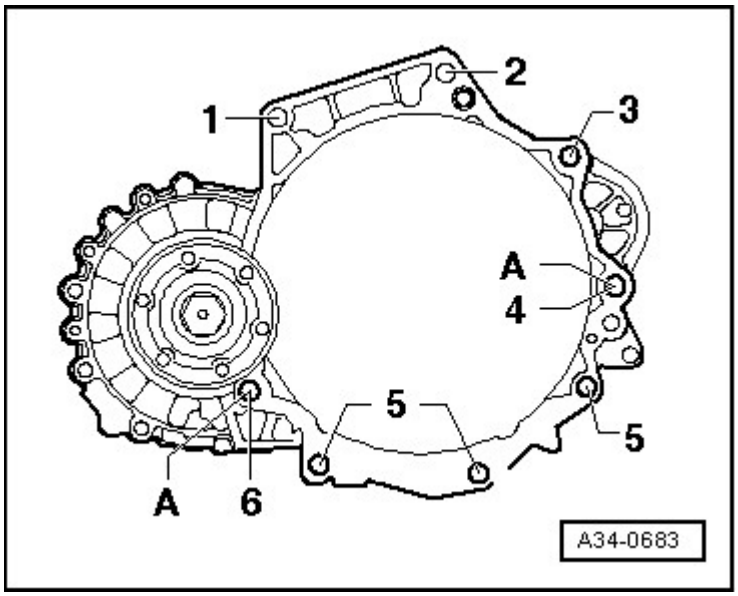

Fig. 23: Manual Transmission To Engine Bolts
Courtesy of AUDI OF AMERICA, LLC

Item	Bolt	Nm
1, 2	M12x65	80
3 [1)2)]	M12x150	80
4 [1)2)]	M12x165	80
5	M10x50	40
6	M12x85	80
A	Alignment sleeves for centering	

- [1)] Bolt with threaded Pin M8.
- [2)] Also starter to transmission.

Mounting, Automatic Transmission to Engine

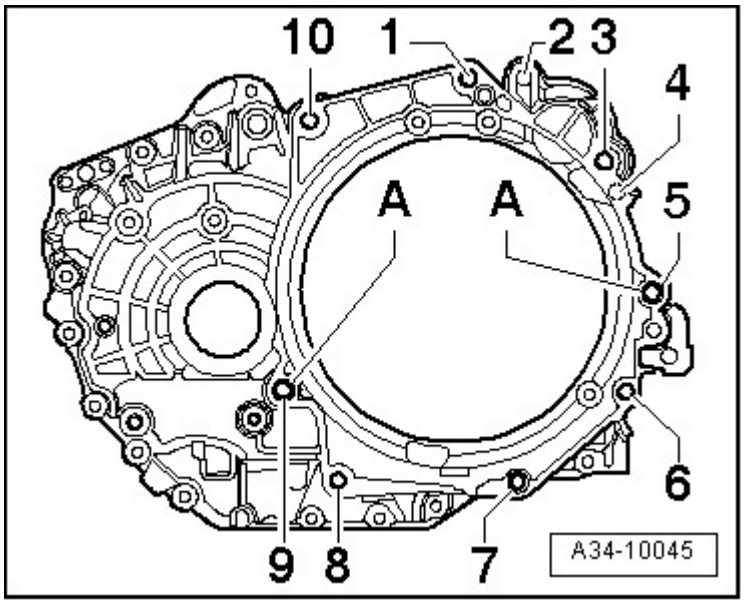

Fig. 24: Direct Shift Automatic Transmission To Engine Mounting Bolts
Courtesy of AUDI OF AMERICA, LLC

Item	Bolt	Nm
1, 3, 10	M12x55	80
5, 9	M12x70	80
6, 7, 8	M10x50	40
A	Alignment sleeves for centering	
• Bolts -2 and 4- : secures the starter to the transmission. Refer to **REMOVAL AND INSTALLATION** .		

DIAGNOSIS AND TESTING

SUBFRAME MOUNT, CHECKING ADJUSTMENT

Procedure

-- Check dimensions on right mount for engine and transmission:

- Both bolt heads -2- must be parallel to edge of engine mount Support arm -3-.

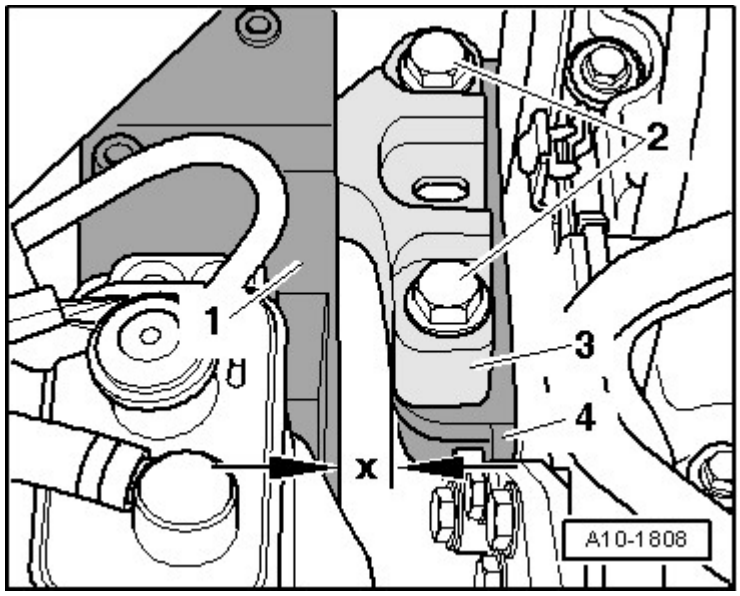

Fig. 25: Checking Dimensions At Engine/Transmission Assembly Mounting
Courtesy of AUDI OF AMERICA, LLC

- 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 corresponding round stock.

-- Adjust the subframe if the distance measured is too small or too large. Refer to **SUBFRAME MOUNT, ADJUSTING**.

REMOVAL AND INSTALLATION

ENGINE, REMOVING

Special tools and workshop equipment required

- Pry Lever - Rmv Outside Mirror 80 - 200
- Engine Support T10359
- Engine/Transmission Jack V.A.G 1383 A
- Hose Clip Pliers V.A.G 1921
- Step Ladder VAS 5085
- Drip Tray VAS 6208
- Locking Pin T10060A
- Puller T10369
- Engine Bung Set VAS 6122
- Engine-/Gearbox Jack V.A.G 1383 A

Procedure

NOTE:

- **Assemble engine with transmission downward.**
- **During installation, cable ties must be installed at the same location.**
- **Collect escaping g coolant in a clean container for disposal or reuse.**
- **Always seal off any open channels in the intake and exhaust tract with plugs. For example, use the plugs from the VAS 6122.**

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

- **When removing the engine, the high pressure area of the fuel injection system is not opened.**
- **If the engine is removed and the high pressure area is opened for the following steps, the fuel pressure in the injection system must be reduced to a residual pressure before opening the high pressure area.**

-- Reduce fuel pressure in high pressure area. Refer to **General Information** .

-- Remove the cover for the air guide; disengage the side clips to do so -arrows-.

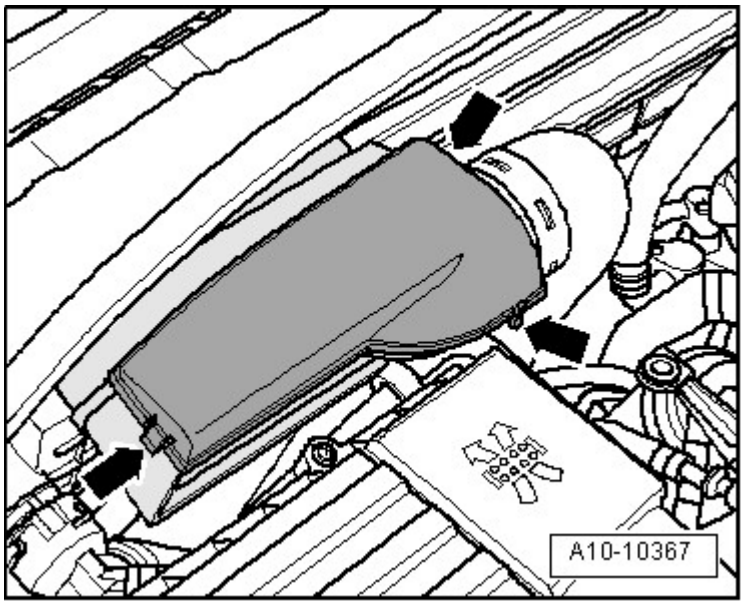

Fig. 26: Air Duct Cover Slide Clips
Courtesy of AUDI OF AMERICA, LLC

-- Unclip the lower air guide, to do so disengage the clips -arrows-.

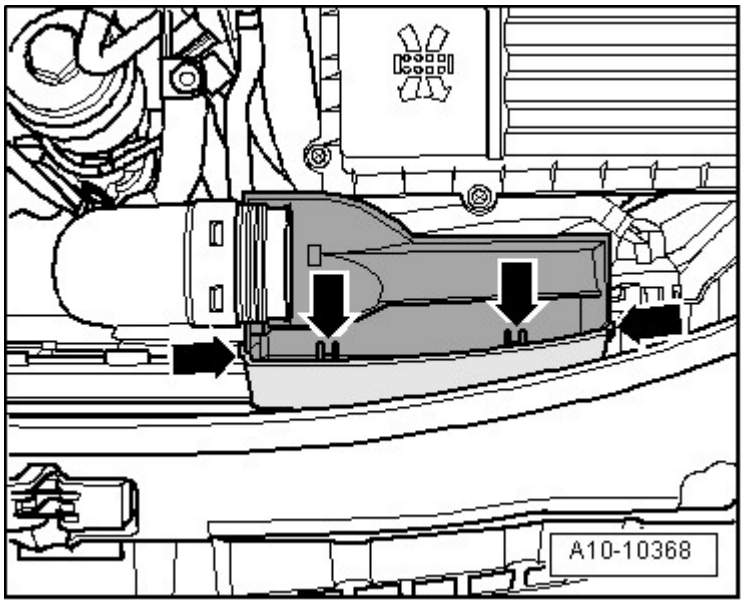

Fig. 27: Identifying Lower Air Guide Clips
Courtesy of AUDI OF AMERICA, LLC

-- Remove the lower air guide together with the air guide hose.

-- Disconnect electrical connector -1- on mass air flow (MAF) sensor -G70-.

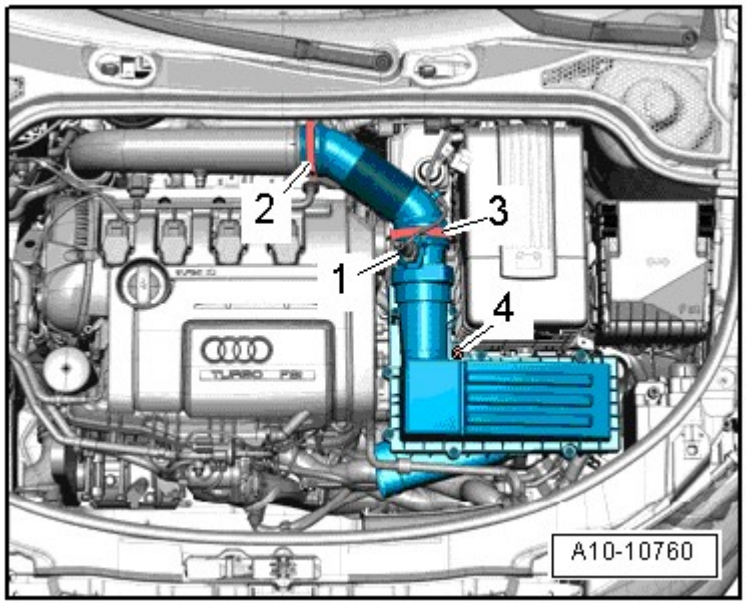

Fig. 28: Air Flow Housing, Electrical Connector And Guide Hose
Courtesy of AUDI OF AMERICA, LLC

-- Remove the air guide hose -2-.

-- Remove the bolt -4- and the air filter housing.

NOTE: Ignore -3-.

-- Remove the cover over the battery by pressing the release button -arrow-.

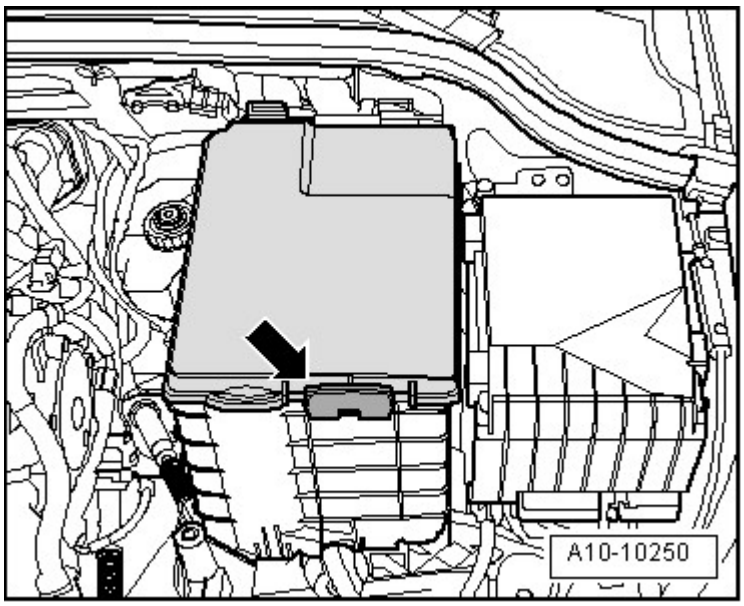

Fig. 29: Battery Cover
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of destroying electrical components when battery is disconnected.

- **Observe measures when disconnecting battery.**

-- With the ignition switched off, disconnect the Ground (GND) cable -arrow- on the battery.

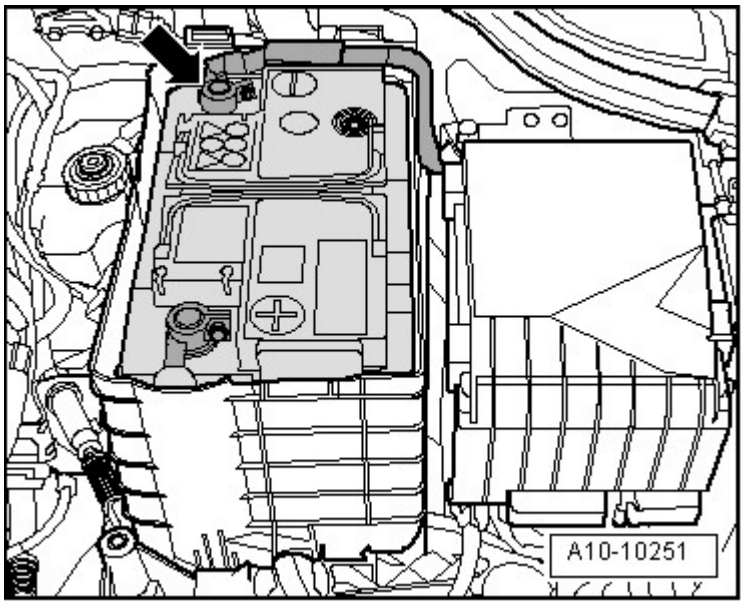

Fig. 30: Battery Ground Strap
Courtesy of AUDI OF AMERICA, LLC

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

-- Remove the battery tray -arrows-.

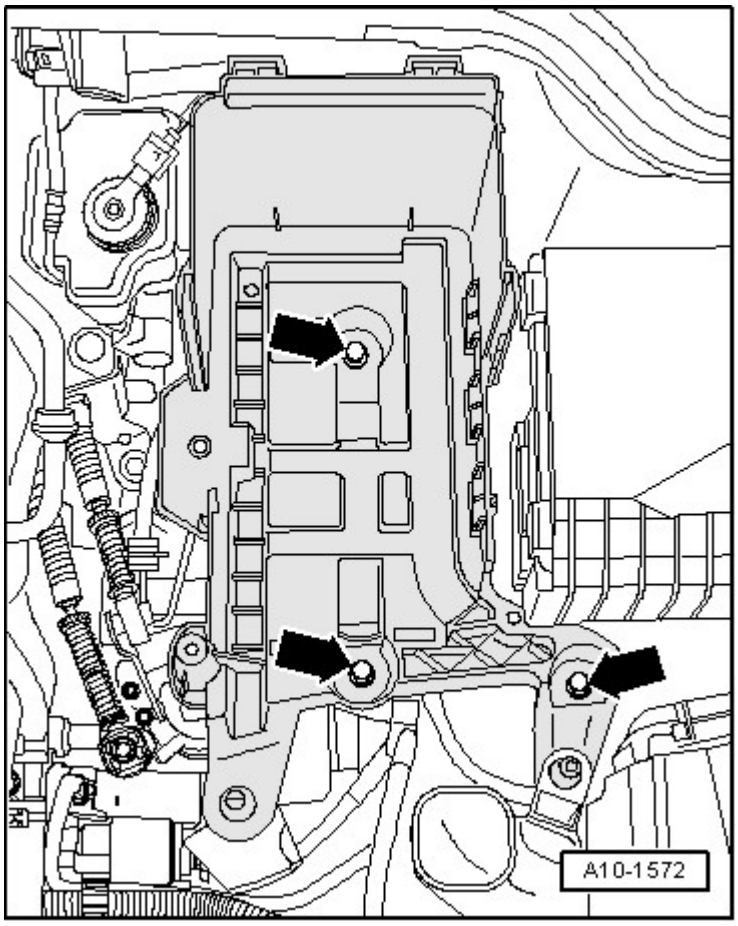

Fig. 31: Battery Carrier Nuts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the fan shroud bolts -1- from above.

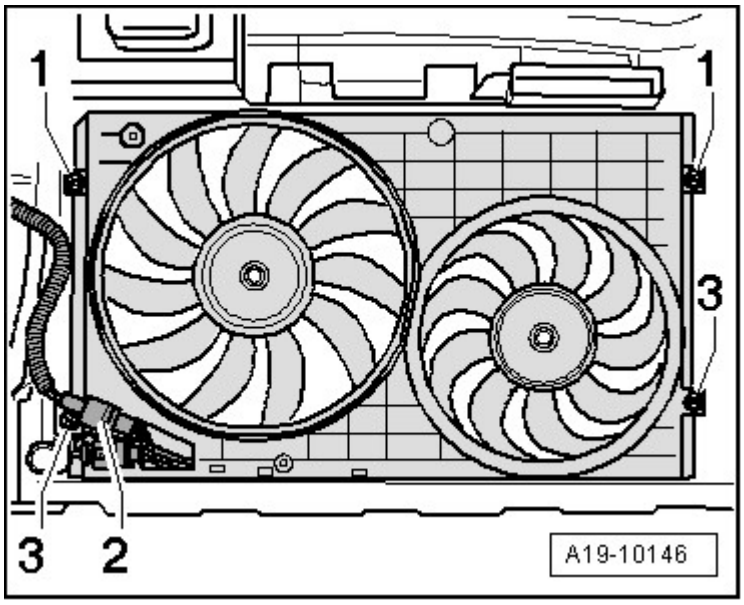

Fig. 32: Fan Shroud Bolts And Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -2 and 3-.

-- Loosen the hose clamp -2-.

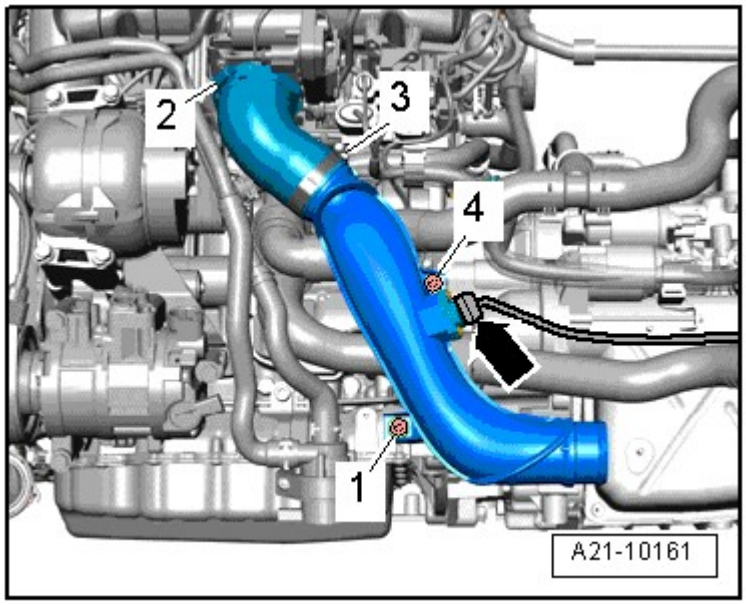

Fig. 33: Air Guide Hose Bolts, Air Guide Pipe Hose Clamps & Electrical Harness Connector
Courtesy of AUDI OF AMERICA, LLC

-- Remove bolt -4-.

-- Disconnect the connector -arrow- and free up the wire.

NOTE: Ignore -1 and 3-.

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

- **When the engine is warm the cooling system is under pressure.**
- **To reduce pressure, cover coolant reservoir cap with cloth and carefully open.**

-- Open coolant reservoir cap.

-- Remove both front wheels.

-- Remove the noise insulation in the center by loosening the fasteners -1 and 2-.

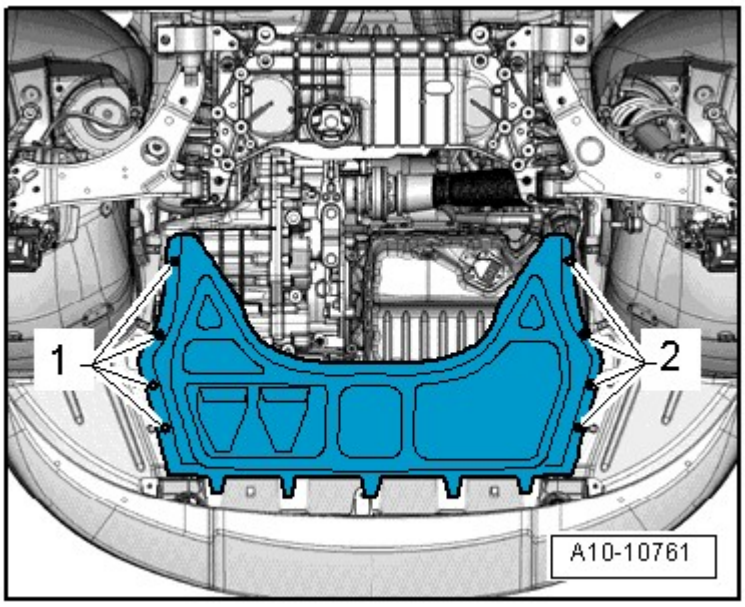

Fig. 34: Center Noise Insulation
Courtesy of AUDI OF AMERICA, LLC

-- Open the fasteners -1, 2 and 3- and remove the left and right noise insulation.

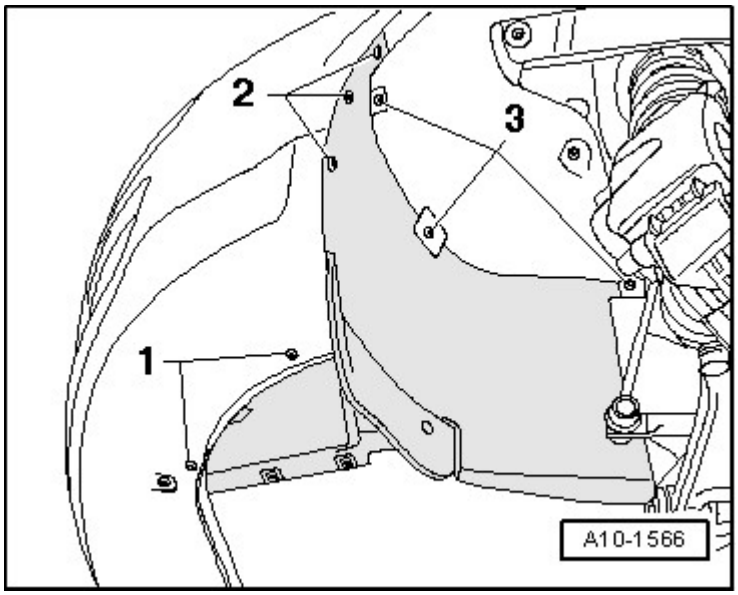

Fig. 35: Identifying Removal Of Left And Right Front Part Of Wheel Housing Liner
Courtesy of AUDI OF AMERICA, LLC

-- Remove the air guide pipe -1 and 2-.

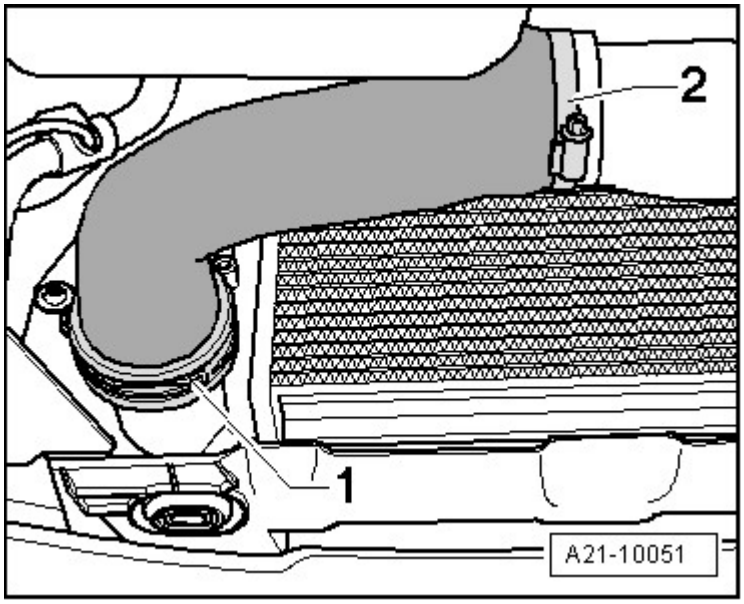

Fig. 36: Air Cooler Air Duct
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -1- and remove the air guide pipe downward.

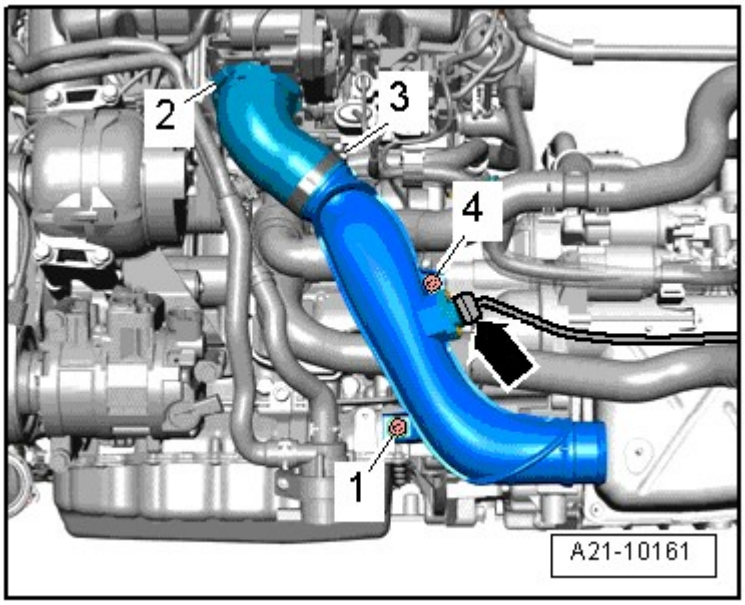

Fig. 37: Air Guide Hose Bolts, Air Guide Pipe Hose Clamps & Electrical Harness Connector
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore items -2, 3, 4 and arrow-.

-- Disconnect electrical connector -2-.

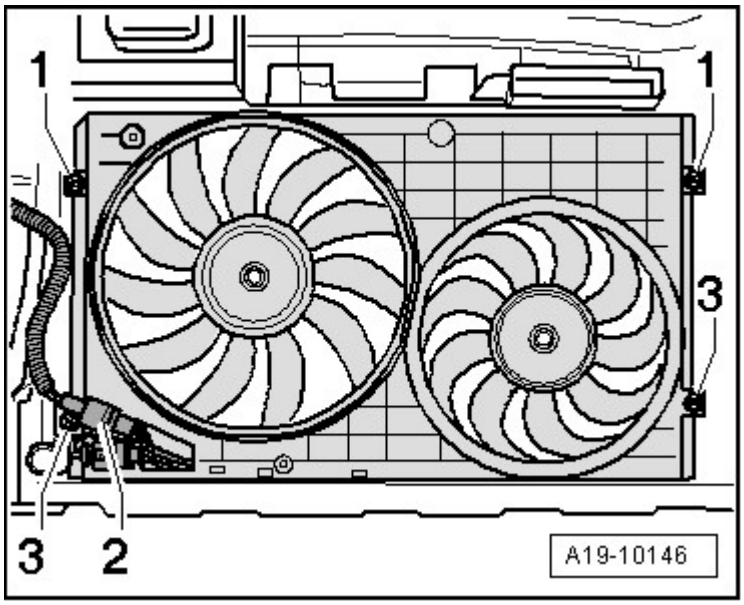

Fig. 38: Fan Shroud Bolts And Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -3- and remove the fan shroud downward.

NOTE: Ignore -1-.

-- Remove air guide hose -arrows-.

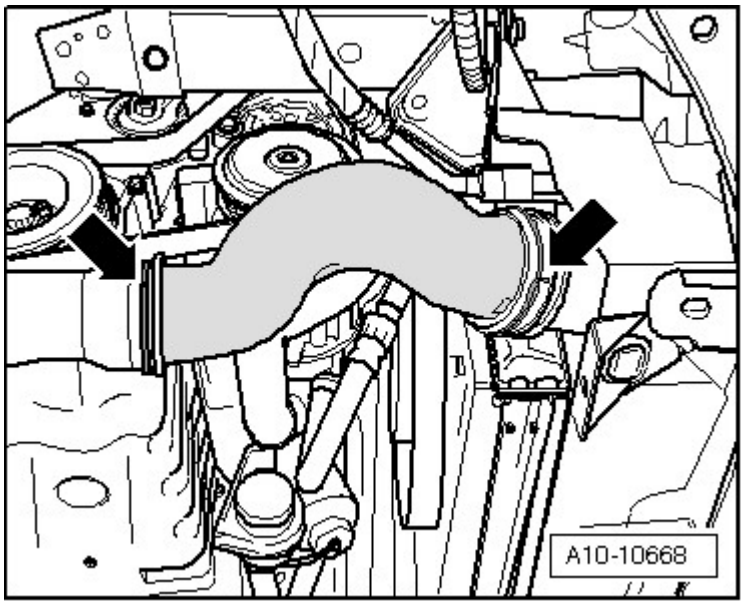

Fig. 39: Air Guide Hose
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the electrical connector -2- for the engine coolant temperature (ECT) sensor (on radiator) -G83-.

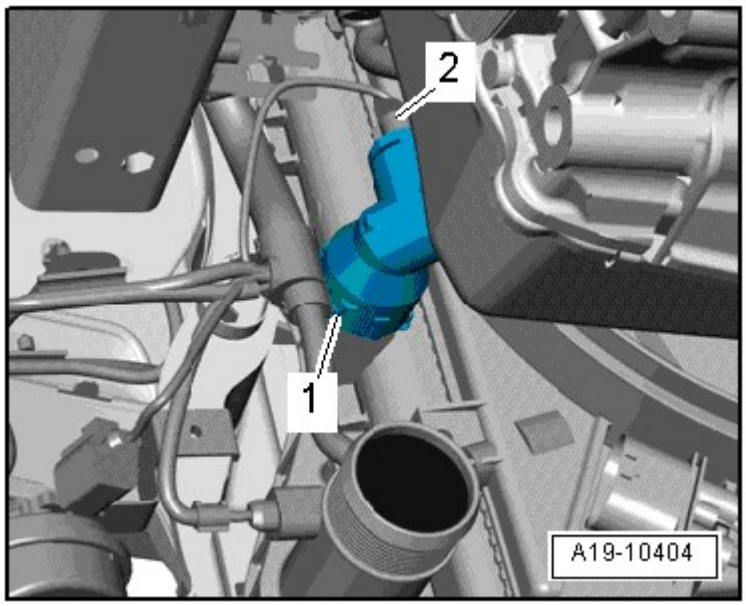

Fig. 40: ECT Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

NOTE: Collect escaping coolant in a clean container for disposal or reuse.

-- Place VAS 6208 under engine.

-- Remove the coolant hose -1- by pulling the retaining clip out and letting the coolant drain.

-- Remove the coolant hose from the after-run coolant pump -V51- -arrow- and drain the remaining coolant.

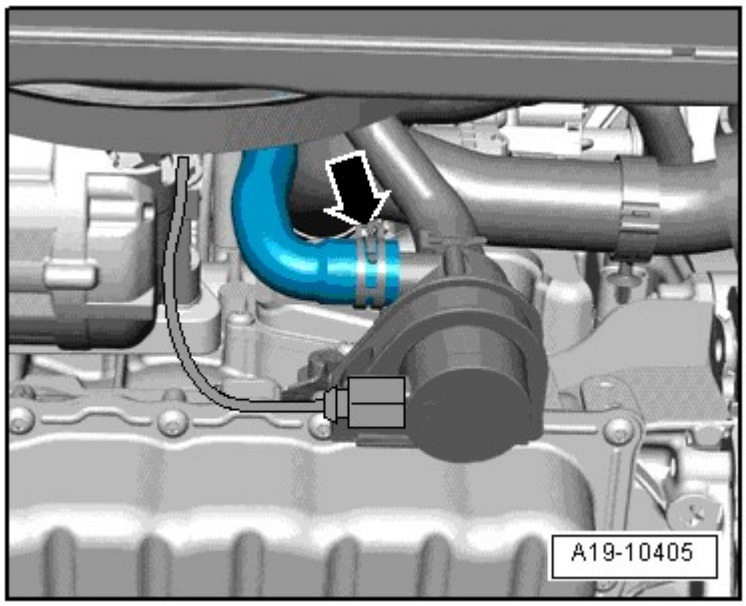

Fig. 41: Coolant Hose After-Run Coolant Pump V51
Courtesy of AUDI OF AMERICA, LLC

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

- **Before opening the fuel system, lay a clean cloth around the connection point and carefully loosen it, which lowers the pressure.**

CAUTION: Follow cleanliness precautions when working on the fuel supply system. Refer to CLEAN WORKING CONDITIONS .

-- Disconnect fuel supply hose -2- by pressing release ring.

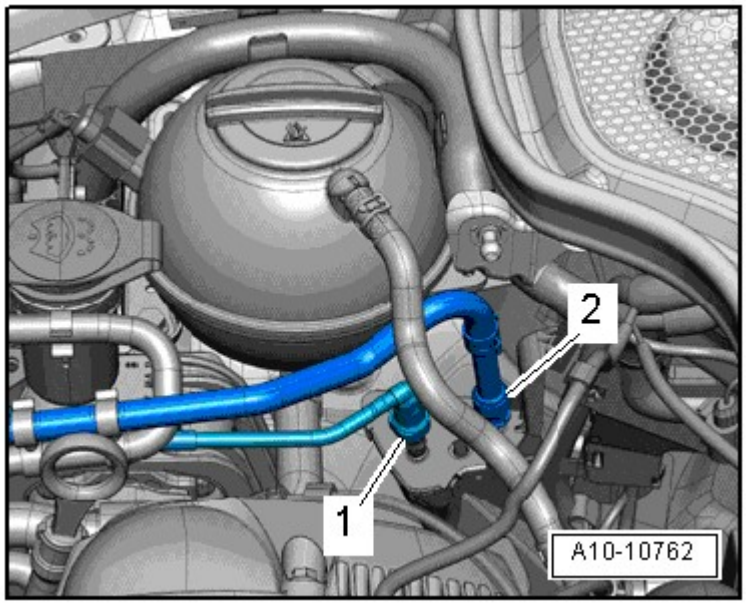

Fig. 42: Fuel Supply Hose And Vacuum Line
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the vacuum line -1- to the EVAP canister by pressing the release button.

-- Pull the EVAP canister up out of the bracket -arrow- and place it on the engine.

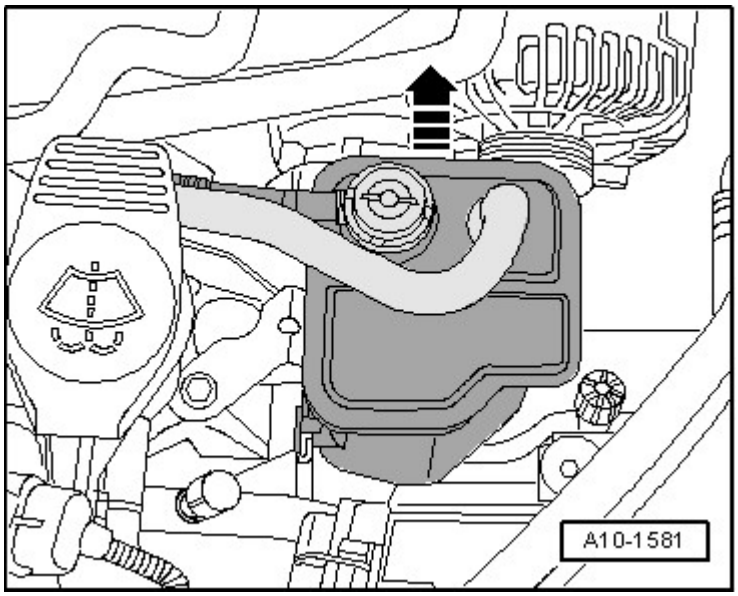

Fig. 43: Identifying EVAP Canister
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of destroying due to reversed running direction on a used ribbed belt.

- **Before removing ribbed belt, marking running direction with chalk or**

felt-tip pen for reinstallation later.

-- To release ribbed belt tension, rotate tensioner in direction of -arrow-.

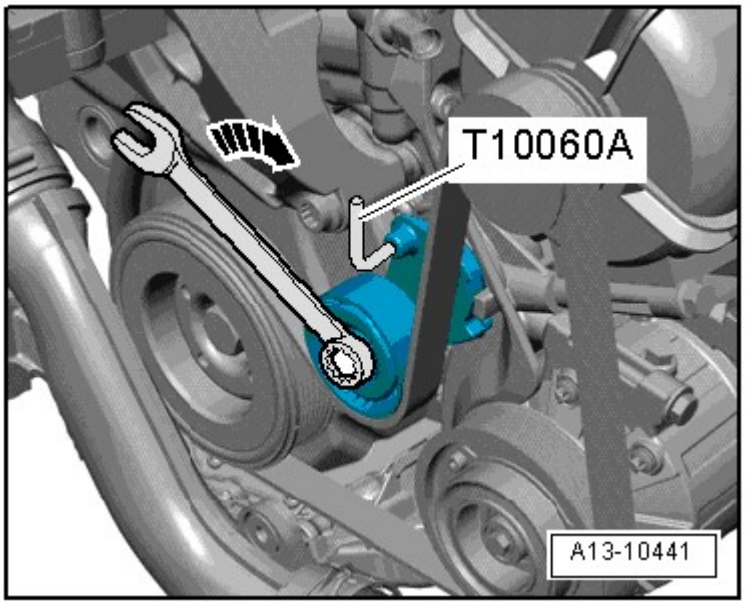

Fig. 44: Rotating Tensioner
Courtesy of AUDI OF AMERICA, LLC

-- Remove ribbed belt and release tensioning device.

NOTE: Ignore the T10060 A.

-- Remove coolant hoses -1 and 2-.

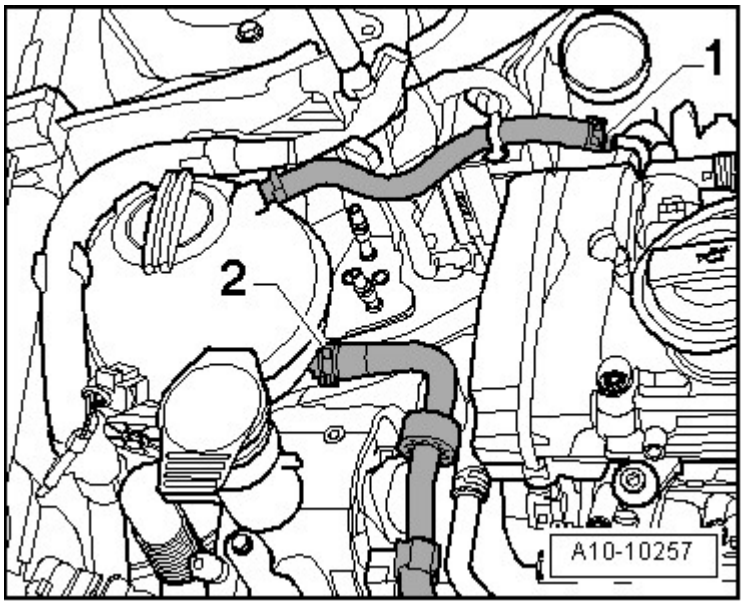

Fig. 45: Identifying Coolant Hoses
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect electrical connector -1- on throttle valve control module -J338-.

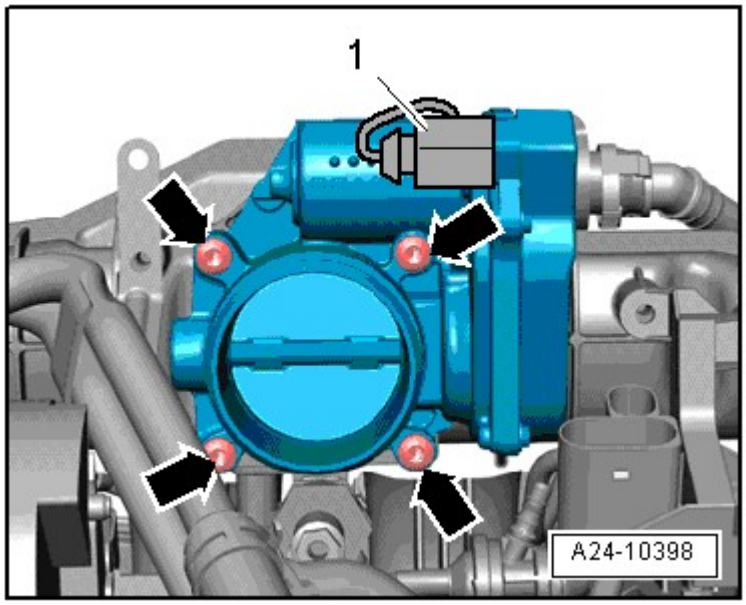

Fig. 46: Identifying Throttle Valve Control Module Electrical Connector And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove bolts -arrows- and remove throttle valve control module.

-- Remove the upper coolant hose from the radiator -arrow-.

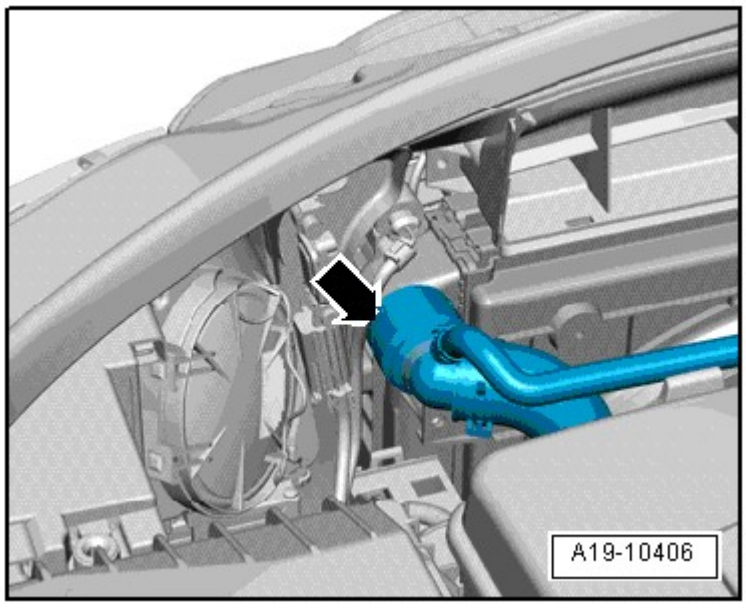

Fig. 47: Identifying Radiator Upper Coolant

Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the heat exchanger coolant hoses -arrows-.

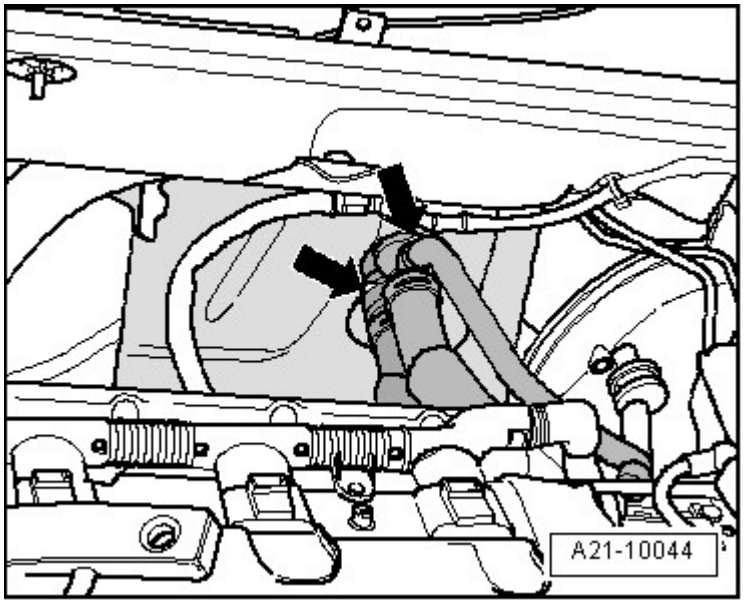

Fig. 48: Disconnecting Coolant Hoses To Heater Core At Bulkhead
Courtesy of AUDI OF AMERICA, LLC

-- From above, remove the nuts -arrows- on the front exhaust pipe connection to the turbocharger.

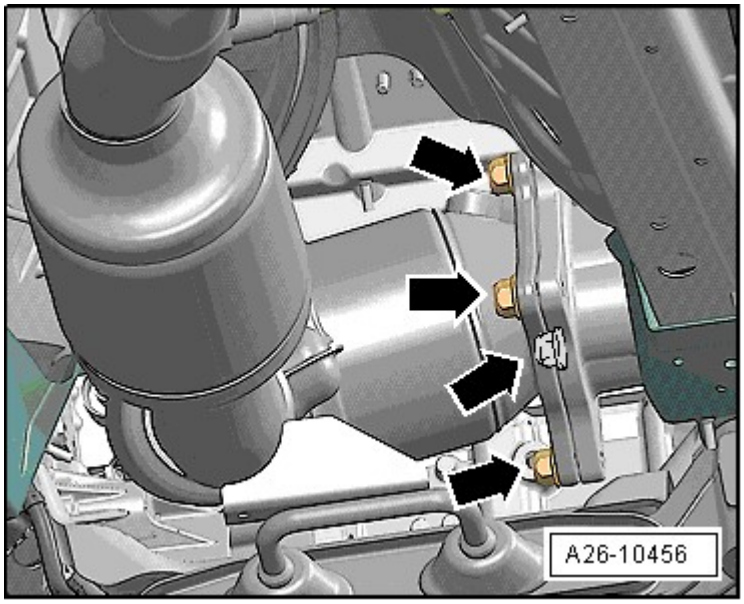

Fig. 49: Front Exhaust Pipe/Turbocharger Nuts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the vacuum hose from the brake booster -arrow-.

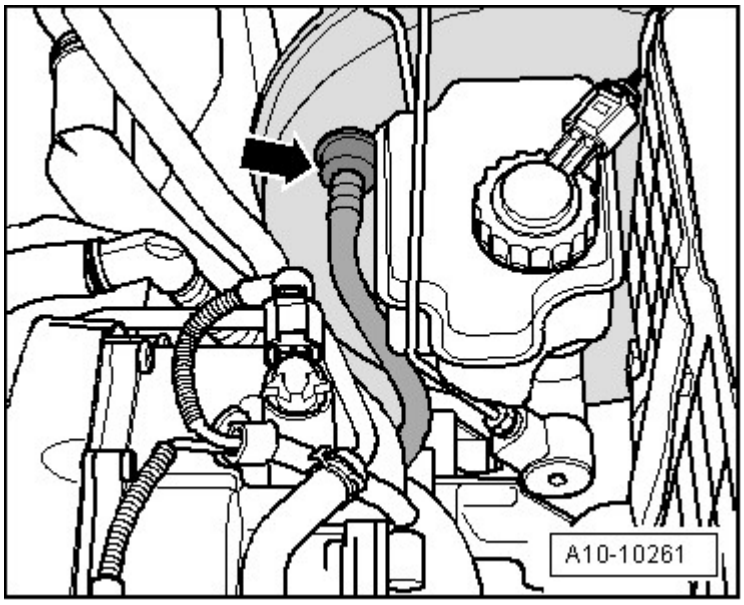

Fig. 50: Brake Booster Vacuum Hose
Courtesy of AUDI OF AMERICA, LLC

-- Pry cover caps off windshield wiper arms with screwdriver.

-- Loosen nuts -arrows- a few turns.

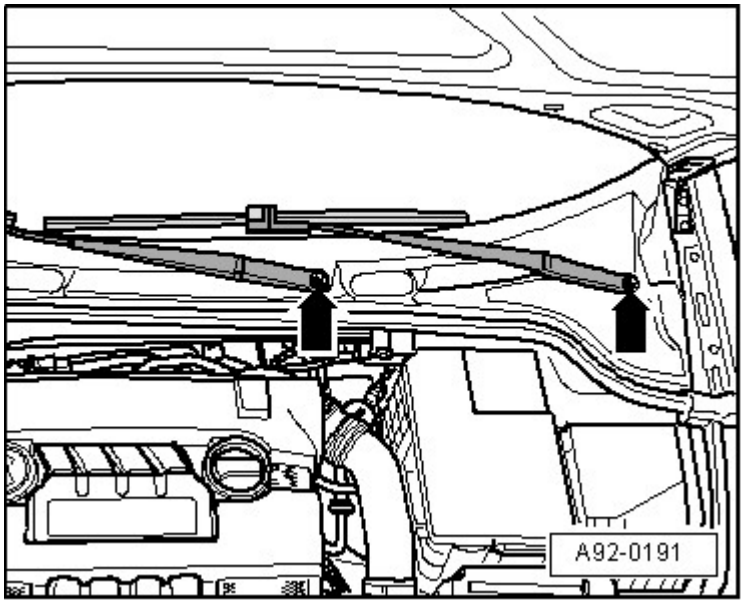

Fig. 51: Identifying Wiper Arm Nuts
Courtesy of AUDI OF AMERICA, LLC

-- Position the Puller T10369/1 on the windshield wiper arm -1- as illustrated.

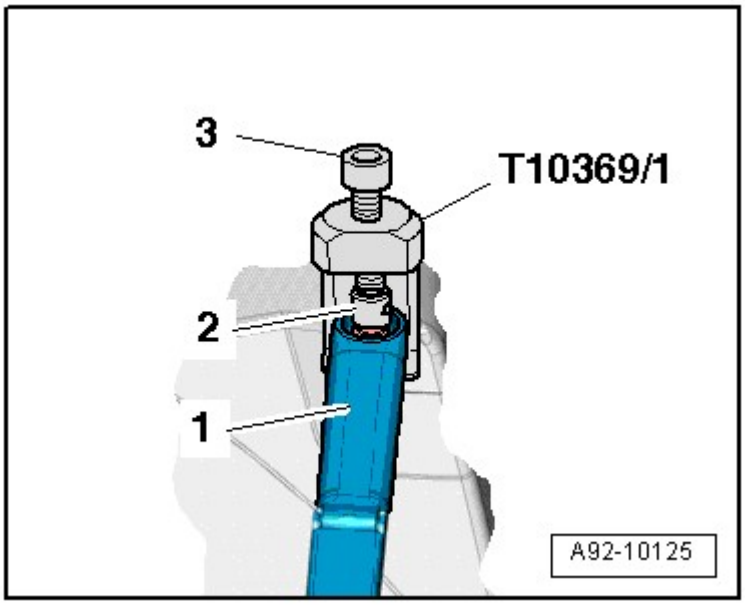

Fig. 52: Removing Windshield Wiper Arm With Puller T10369/1
Courtesy of AUDI OF AMERICA, LLC

-- Mount the pressure piece -2- on the wiper axle.

-- Turn the screw -3- clockwise until the wiper arm is pulled off the wiper axle.

-- Remove nuts completely and remove wiper arms.

-- Unclip the spray nozzles -arrow-.

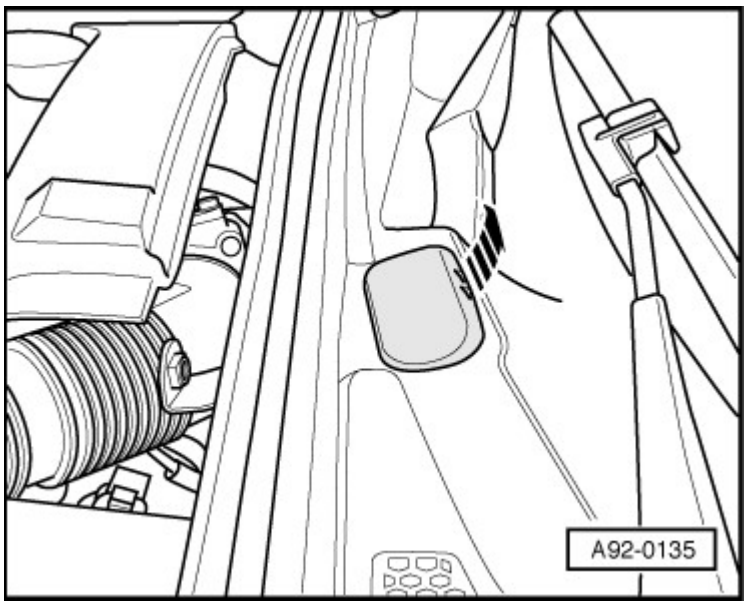

Fig. 53: Removing Spray Nozzle
Courtesy of AUDI OF AMERICA, LLC

-- Slide the spray nozzles with the lines connected through the assembly opening in the plenum chamber.

-- Remove gasket -1-.

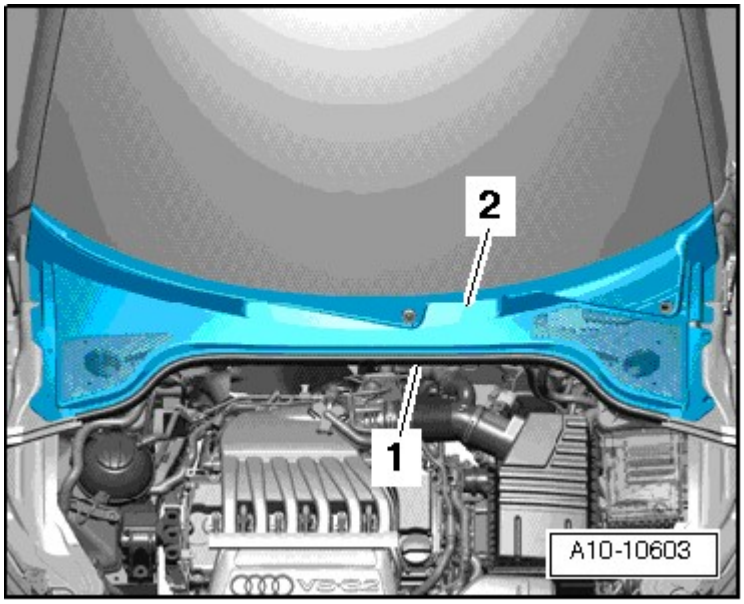

Fig. 54: Rubber Seal & Plenum Chamber Cover
Courtesy of AUDI OF AMERICA, LLC

CAUTION: The plenum chamber cover could be damaged.

- **Coat the transition area between the windshield and plenum chamber cover -2- with soapy water and carefully pull the cover vertically up out of the retainers on the windshield, beginning at the edge of the window.**

-- Remove plenum chamber cover -2- by carefully pulling cover out of retainer on windshield.

-- Free up the rear engine wiring harness on the plenum chamber bulkhead.

-- Remove the plenum chamber bulkhead -arrows-.

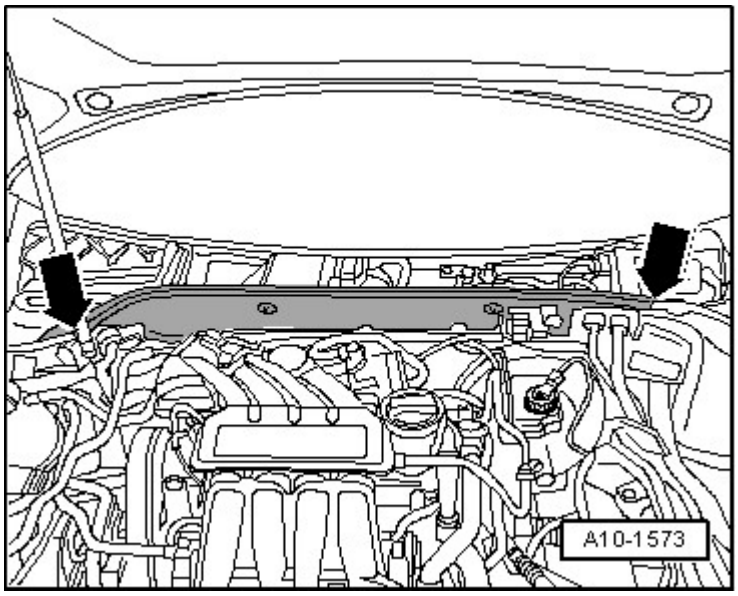

Fig. 55: Plenum Chamber Partition
Courtesy of AUDI OF AMERICA, LLC

-- Remove Engine Control Module (ECM). Refer to **Removal and Installation** .

-- Disconnect the engine wiring harness electrical connector -1- -arrow-.

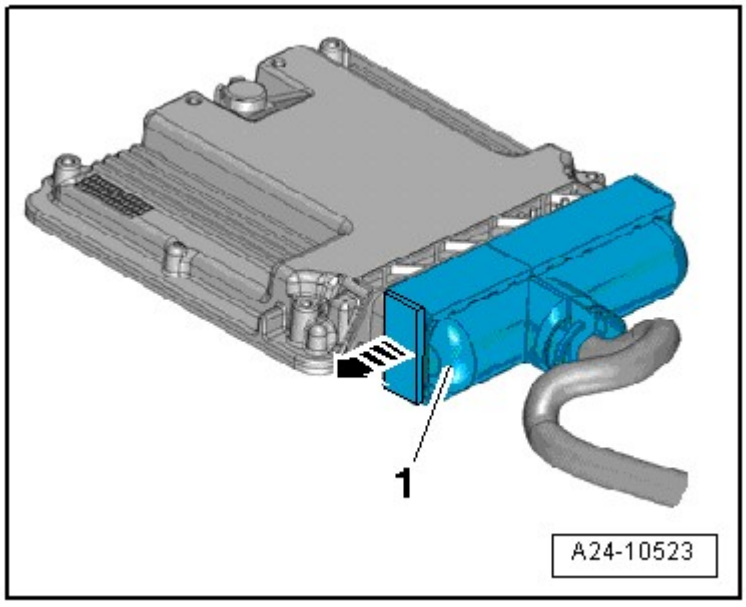

Fig. 56: Disconnecting Engine Wiring Harness Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

-- Release pass-through for engine wiring harness -arrow- and pull off upward.

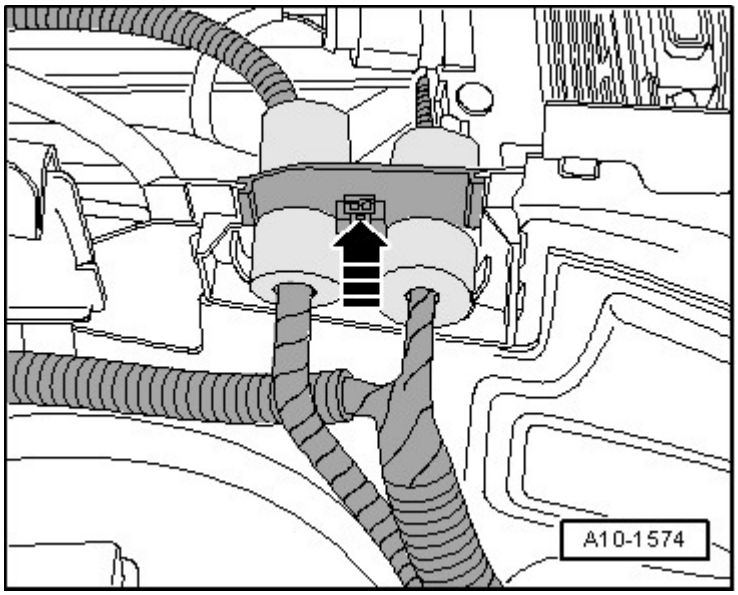

Fig. 57: Engine Wiring Harness
Courtesy of AUDI OF AMERICA, LLC

-- Remove E-box cover by slide both latches in direction of -arrow-.

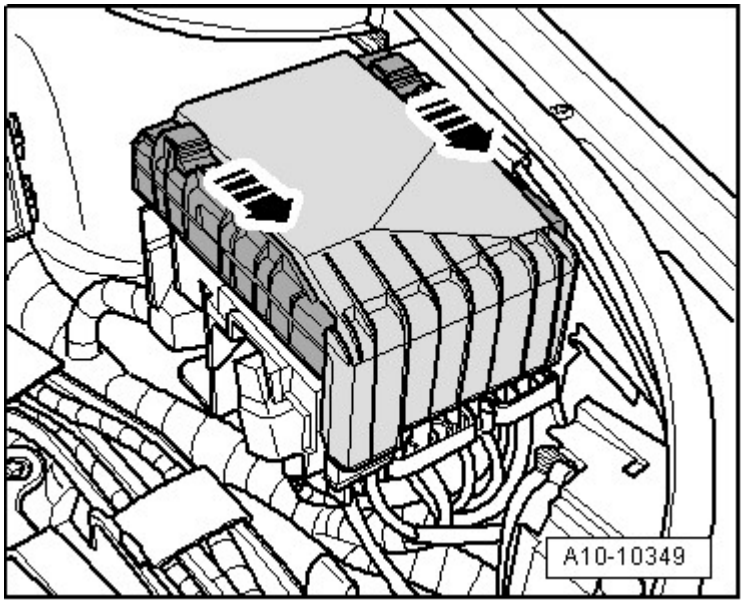

Fig. 58: Identifying E-Box Cover And Latches
Courtesy of AUDI OF AMERICA, LLC

-- Remove terminal 30 wiring -arrow- at engine compartment E-box and free up.

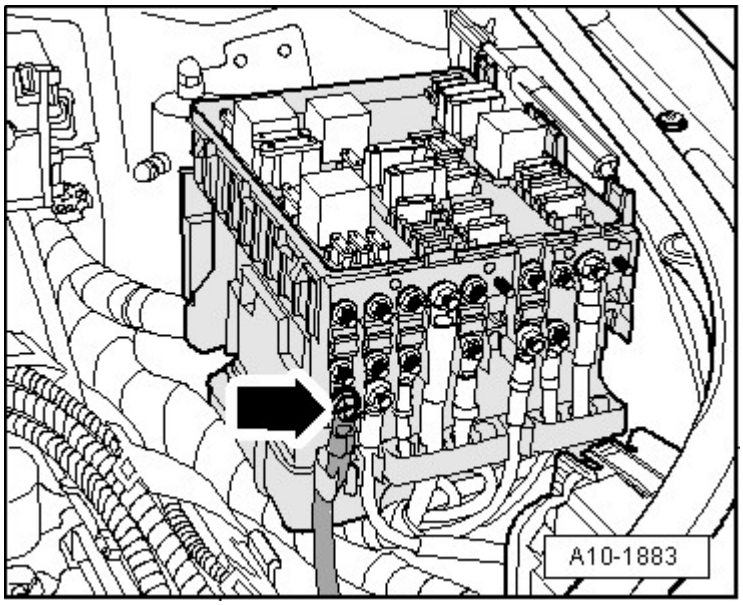

Fig. 59: Engine Compartment E-Box, Terminal 30
Courtesy of AUDI OF AMERICA, LLC

-- Open wiring router bracket -arrows-.

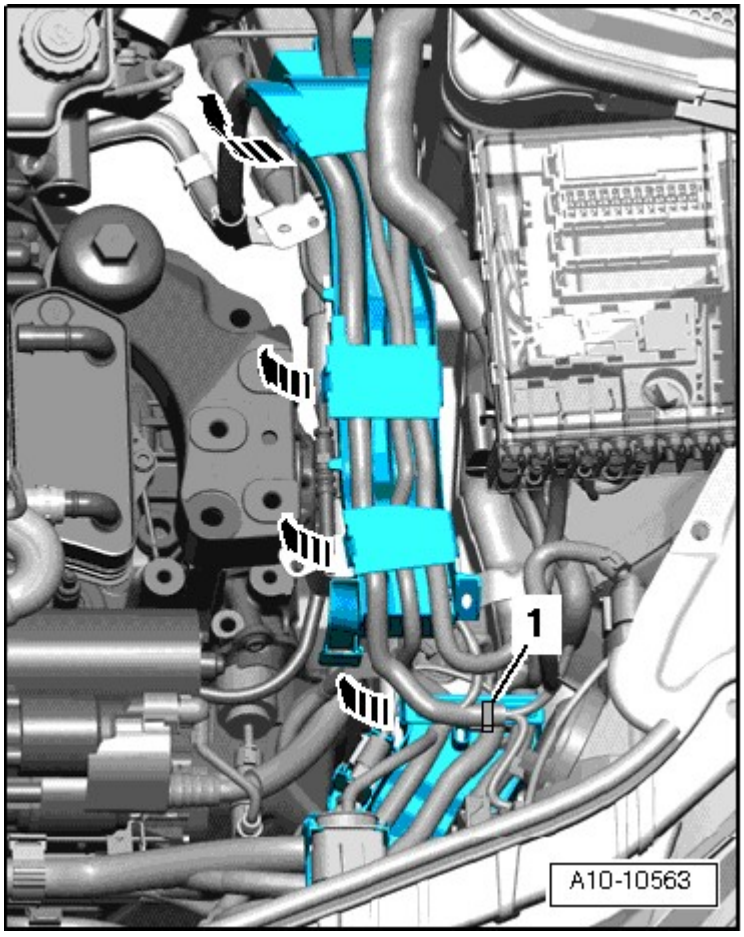

Fig. 60: Open Wiring Router Bracket And Locating Cable Ties
Courtesy of AUDI OF AMERICA, LLC

-- Cut off cable ties -1-.

-- Disconnect the connectors -1- and free them up.

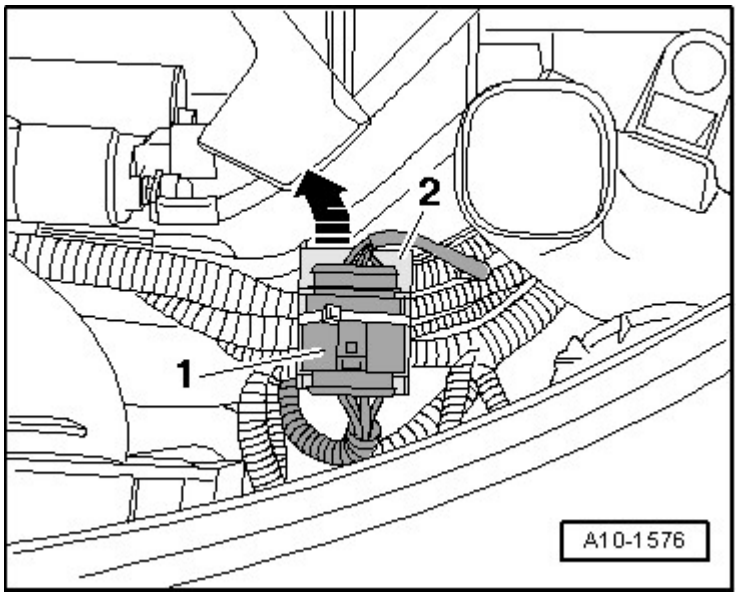

Fig. 61: Identifying Electrical Connector -1- And Wiring Guide Bracket -2-
Courtesy of AUDI OF AMERICA, LLC

-- Open the underlying wiring guide bracket -2-.

-- Take the ECM wiring harness out of the wiring router and lay it on the engine.

NOTE: To unclip spiral clip, use 80 - 200.

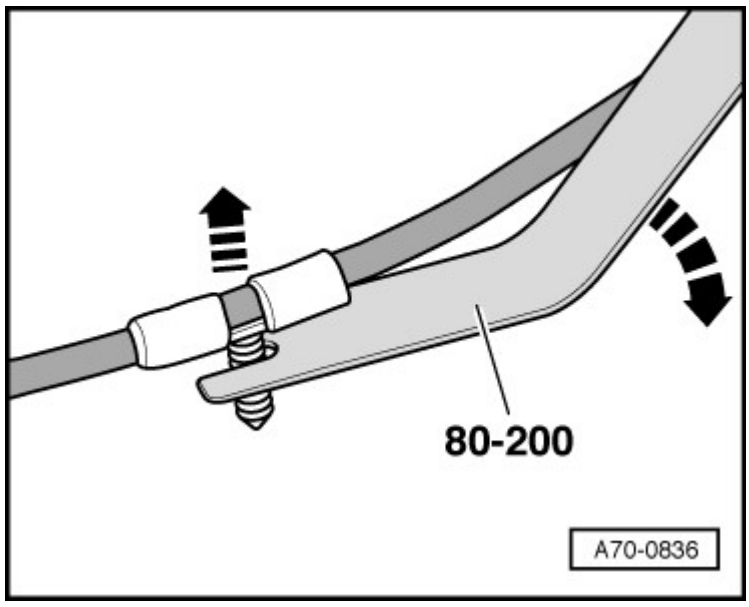

Fig. 62: Free Electrical Wiring Up To Generator Using Pry Lever - Rmv Outside Mirror 80-200
Courtesy of AUDI OF AMERICA, LLC

Manual Transmission

-- Remove cable bracket from transmission -arrows-.

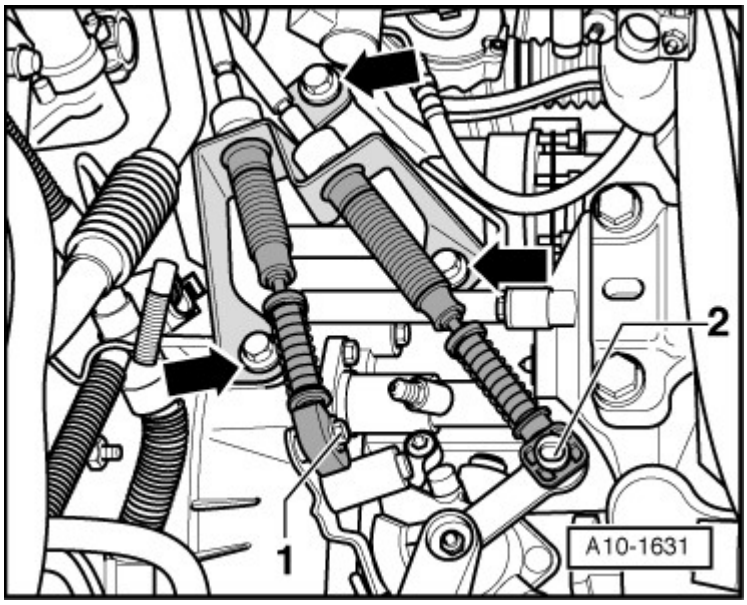

Fig. 63: Transmission Cable Bracket, Washer And Lock Washer
Courtesy of AUDI OF AMERICA, LLC

-- Unclip the lock washer -1- from the shift cable and the lock washer -2- from the selector cable.

-- Remove the cable retainers and the cables from the transmission shift lever and shift relay lever.

-- Tie cables with cable bracket off to side.

-- Remove the brace -1-.

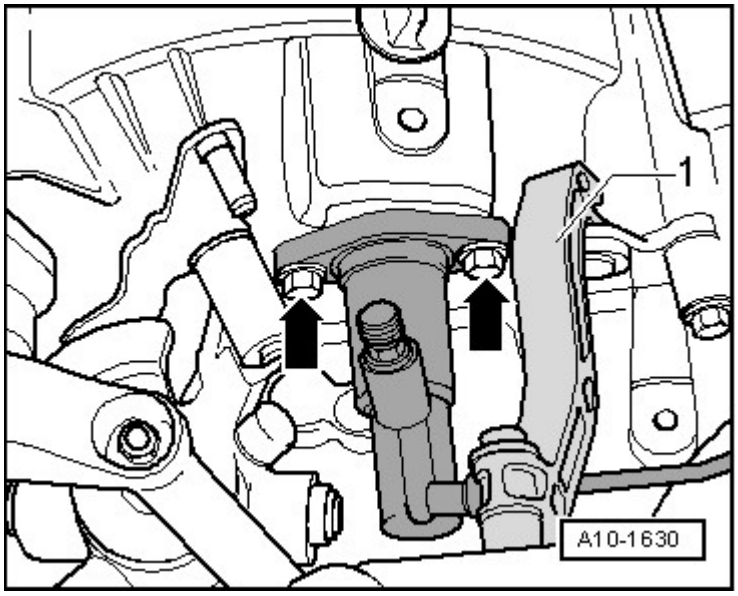

Fig. 64: Clutch Slave Cylinder And Brace
Courtesy of AUDI OF AMERICA, LLC

-- Free up the hydraulic pipe to the clutch slave cylinder.

-- Remove the clutch slave cylinder -arrows- and Set it aside. Do not open the line system.

CAUTION: Risk of damaging clutch slave cylinder.

- **Do not press the clutch pedal when the clutch slave cylinder is removed.**

-- Remove the protective boot cable tie -arrow- if applicable.

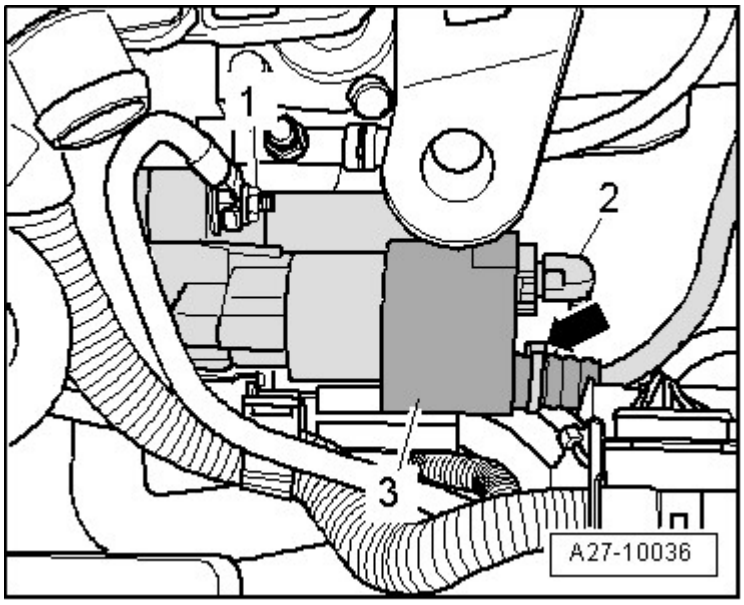

Fig. 65: Ground (GND) Cable, Electrical Connector, Cable Tie & Protective Boot
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect electrical connector -2-.

-- Fold back protective boot and remove battery positive wire from starter solenoid.

-- Remove Ground (GND) cable -1-.

Vehicles with S-Tronic Transmission :

-- Disconnect the connectors -1, 3 and 5-.

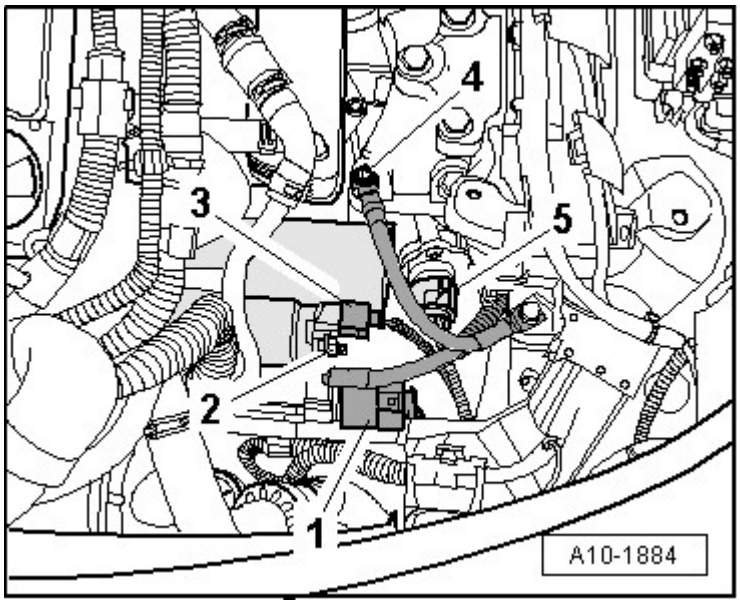

Fig. 66: Electrical Connectors, Starter Solenoid Switch And Ground Cable

Courtesy of AUDI OF AMERICA, LLC

-- Remove the protective boot and remove the electrical wire -2- from the starter solenoid switch.

-- Remove Ground (GND) cable -4-.

All Vehicles :

-- Disconnect the electrical connector -arrow- on the lower left longitudinal member.

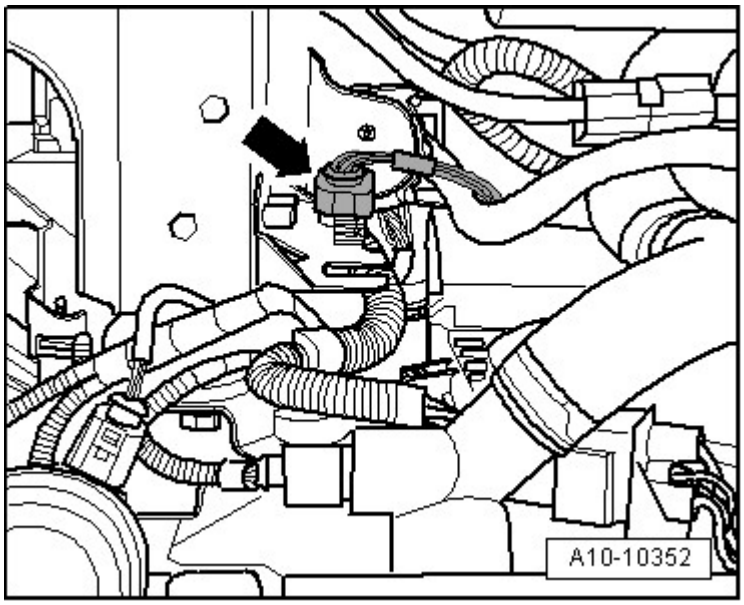

Fig. 67: Lower Left Longitudinal Member Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

NOTE: The illustration shows the installation location from below.

-- Loosen the subframe mount bolts -arrows- on the engine approximately two turns.

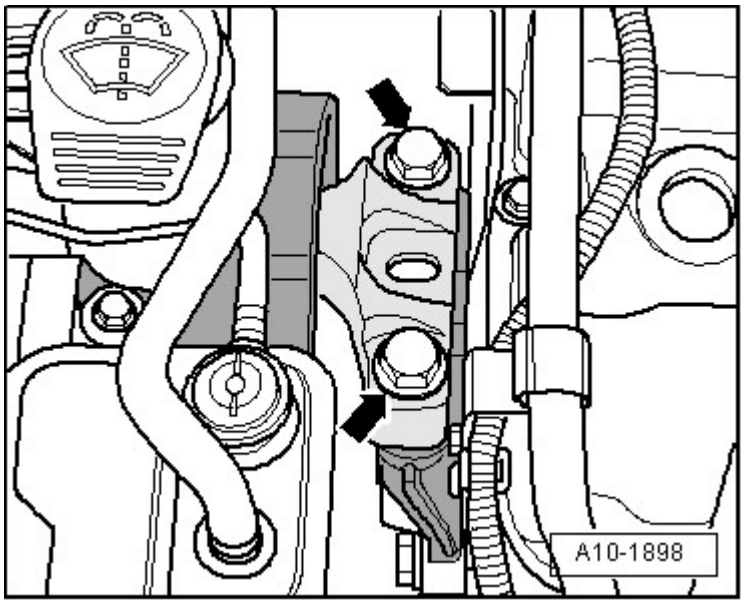

Fig. 68: Identifying Engine Mount To Engine Mount Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

Manual Transmission

-- Loosen the subframe mount bolts -arrows- on the transmission approximately two turns.

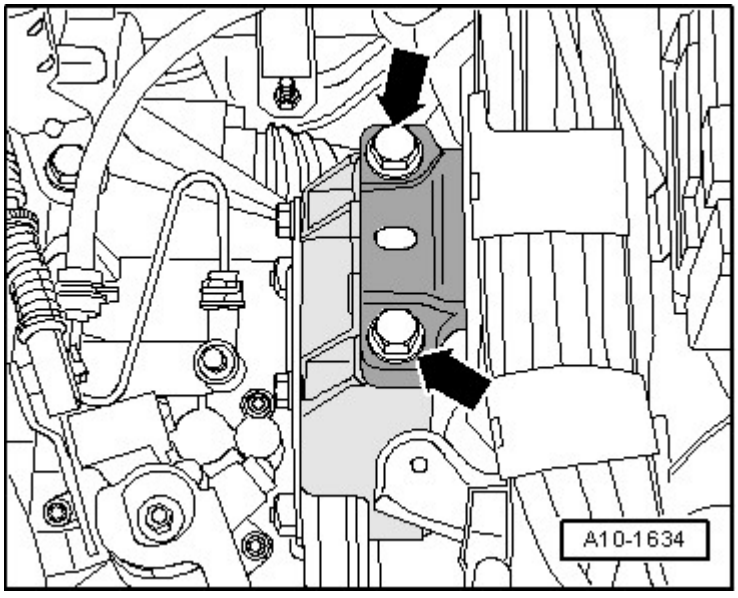

Fig. 69: Identifying Bolts For Subframe Mount At Transmission
Courtesy of AUDI OF AMERICA, LLC

Vehicles with S-Tronic Transmission:

-- Loosen the subframe mount bolts -arrows- on the transmission approximately two turns.

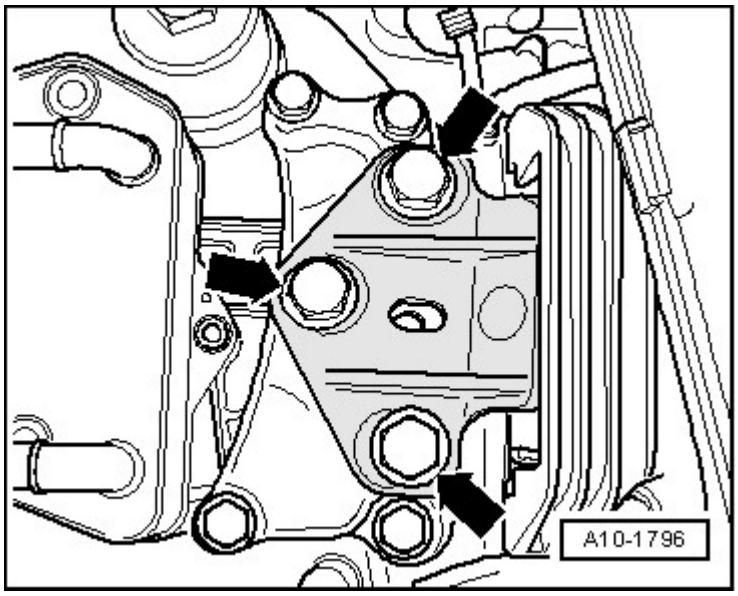

Fig. 70: Identifying Engine Mount To Engine Mount Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

All Vehicles:

-- Disconnect solenoid clutch electrical connector -1- on A/C compressor.

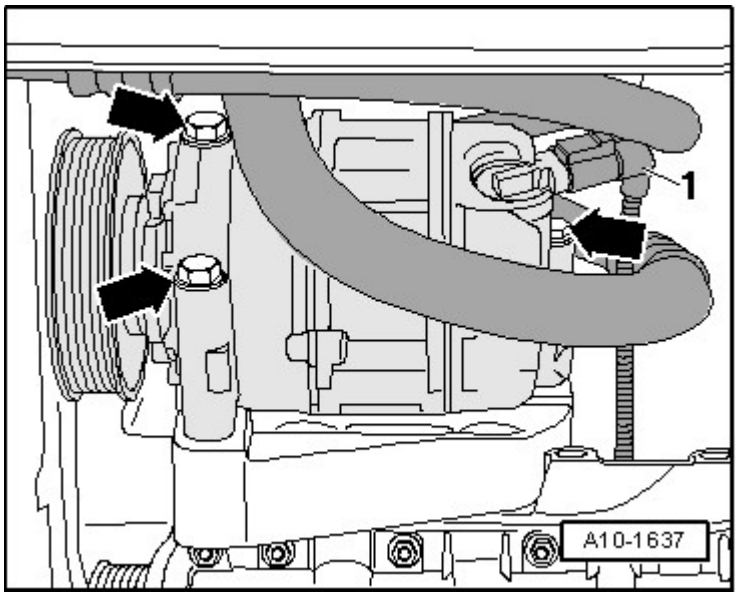

Fig. 71: A/C Compressor Bolts And Solenoid Clutch Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

WARNING: Risk of injury from refrigerant.

- **The air conditioning refrigerant circuit must not be opened.**

-- Remove A/C compressor bolts -arrows-.

CAUTION: Risk of damaging coolant lines and hoses.

- **Do not stretch, kink or bend coolant lines and hoses.**

-- Tie up the compressor with the refrigerant lines attached to the longitudinal member.

-- Remove the bolt -2- on the bracket for the after-run coolant pump -V51-.

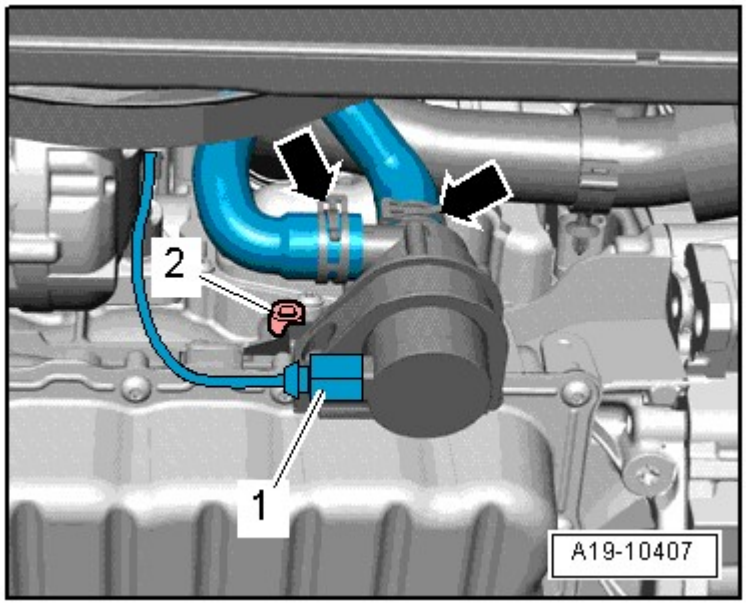

Fig. 72: After-Run Coolant Pump V51 Bracket Bolt
Courtesy of AUDI OF AMERICA, LLC

NOTE: The after-run coolant pump stays in the installation position.

Ignore -1 and arrows-.

Manual Transmission

-- Disconnect the electrical connector on the back-up light switch -F4-.

-- Remove the nut -1- and the electrical wiring bracket.

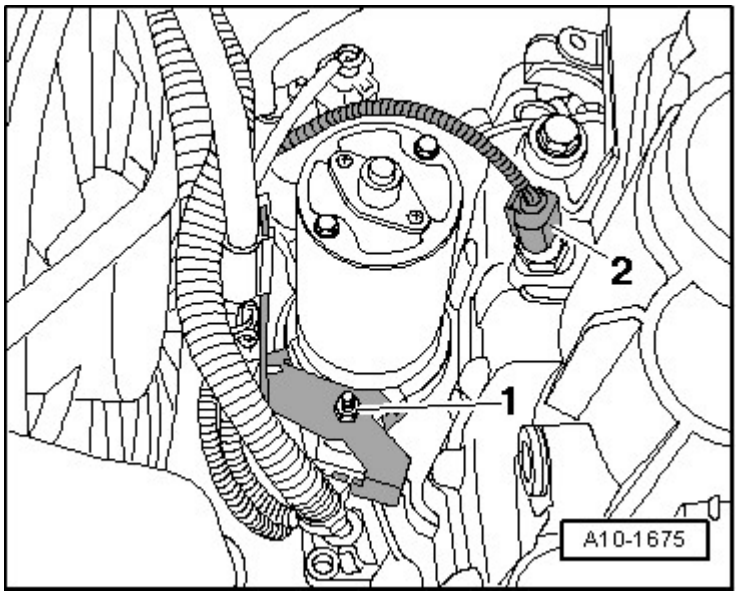

Fig. 73: Back-Up Light Switch F4 Electrical Connector & Nut
Courtesy of AUDI OF AMERICA, LLC

All Vehicles:

-- Free up the wiring harness on the body.

-- Disconnect the electrical connector -1- on the oil level thermal sensor -G266-.

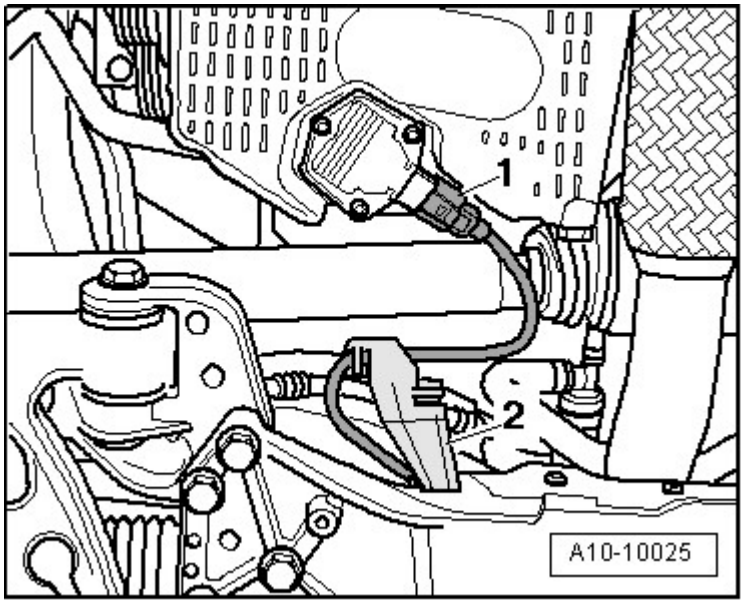

Fig. 74: Identifying Oil Level Thermal Sensor G266 Wire On Subframe
Courtesy of AUDI OF AMERICA, LLC

-- Unclip the electrical wiring bracket -2- to the oil level thermal sensor on the subframe.

-- Disconnect the connector on the heated oxygen sensor (HO2S) --. Refer to **Removal and Installation** .

AWD

-- Mark position of flexible disc to bevel box flange for reinstallation.

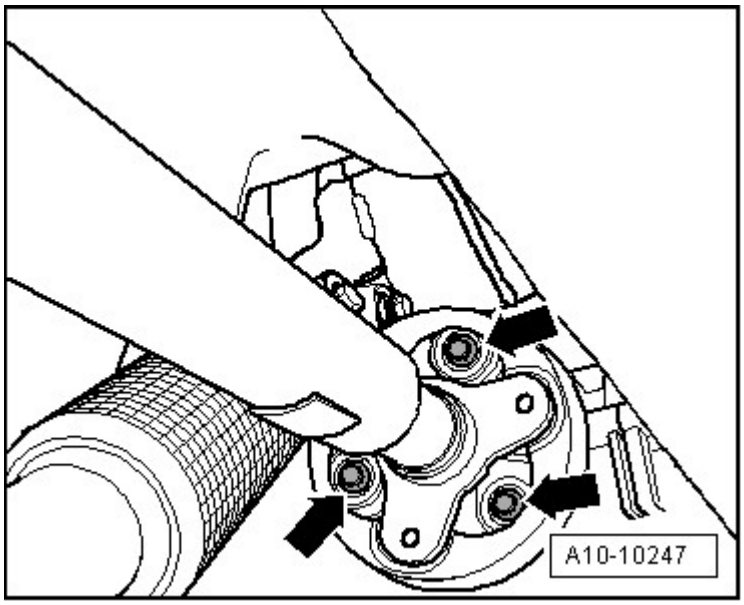

Fig. 75: Removing Driveshaft Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the driveshaft flexible disc bolts -arrows- from the bevel box while counter holding at the triangular flange with a lever.

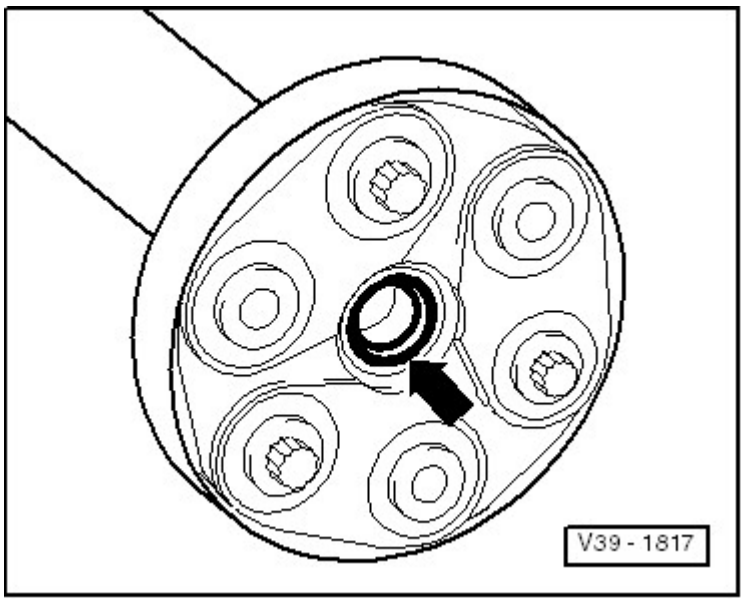

Fig. 76: Identifying Driveshaft Flange Shaft Seal
Courtesy of AUDI OF AMERICA, LLC

CAUTION: The shaft seal -arrow- in the driveshaft flange could be damaged.

- **Press driveshaft horizontally as far back and to right side of vehicle as possible.**

All Vehicles

-- Remove the rest of the nuts accessible from below that connect the front exhaust pipe to the turbocharger -arrows-.

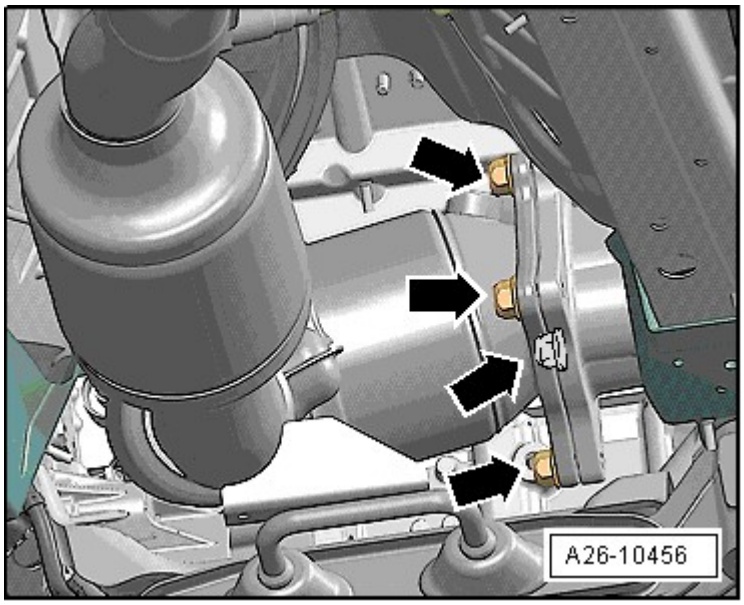

Fig. 77: Front Exhaust Pipe/Turbocharger Nuts
Courtesy of AUDI OF AMERICA, LLC

-- Remove exhaust system bracket -arrows-.

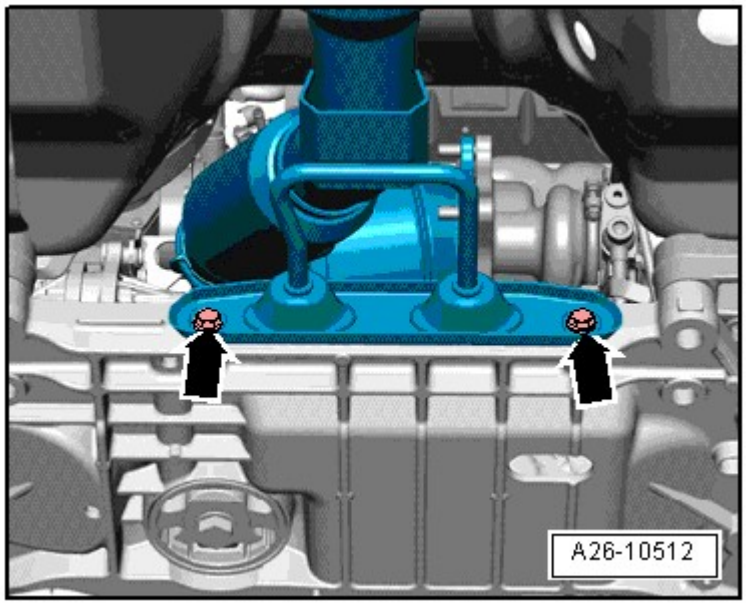

Fig. 78: Exhaust System Bracket
Courtesy of AUDI OF AMERICA, LLC

-- Remove the front cross member for the vehicle floor -arrows-.

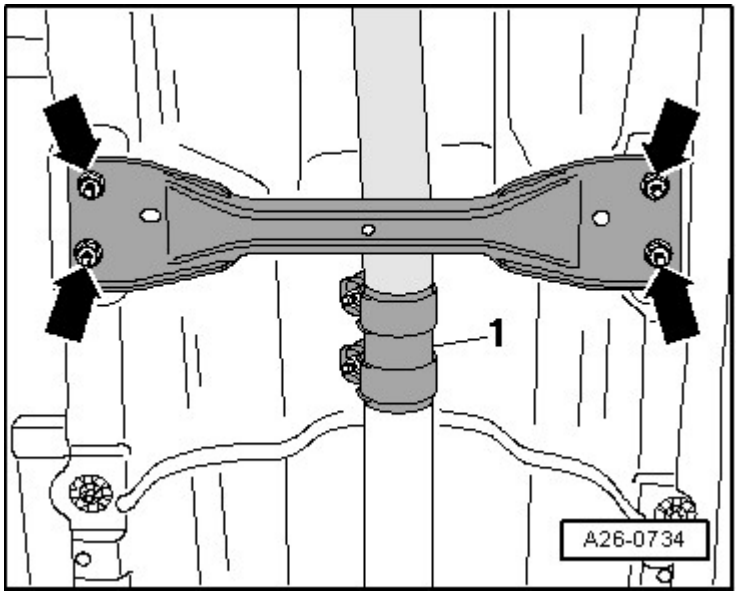

Fig. 79: Front Cross Member
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of damaging decoupling elements.

- **Do not bend decoupling element in front exhaust pipe more than 10°.**

-- Loosen clamping sleeve -1- and push it rearward.

-- Remove the front exhaust pipe with the catalytic converter.

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

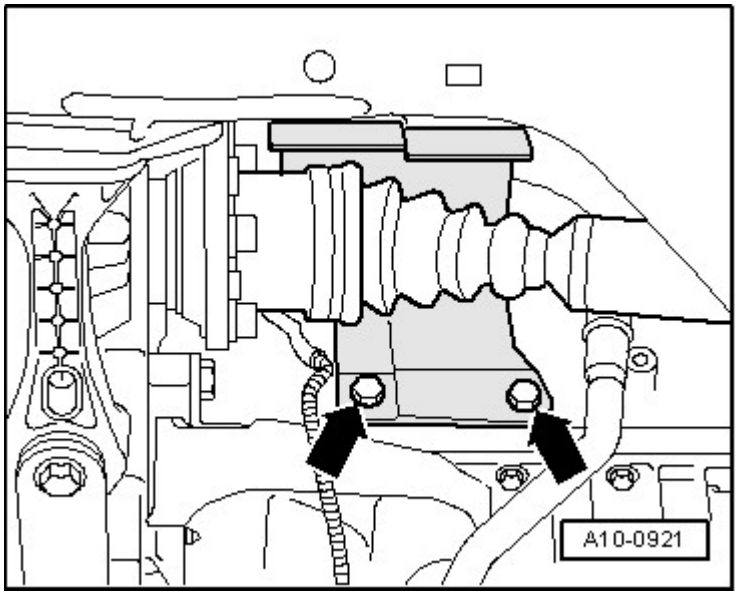

Fig. 80: Identifying Right Drive Axle Heat Shield And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right drive axles from the transmission flange shafts.

-- Remove bolts -1, 2, 3- and remove pendulum Support.

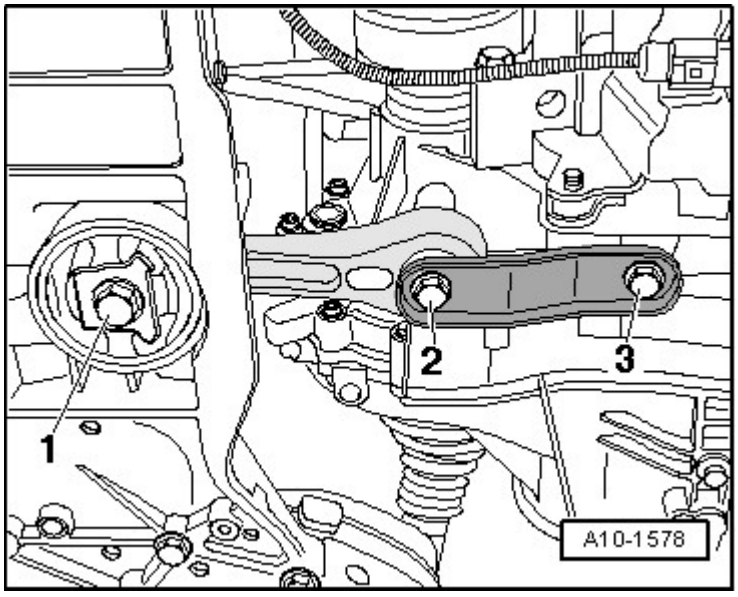

Fig. 81: Identifying Pendulum Support & Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right nuts -arrow- and the coupling rod from the stabilizer bar.

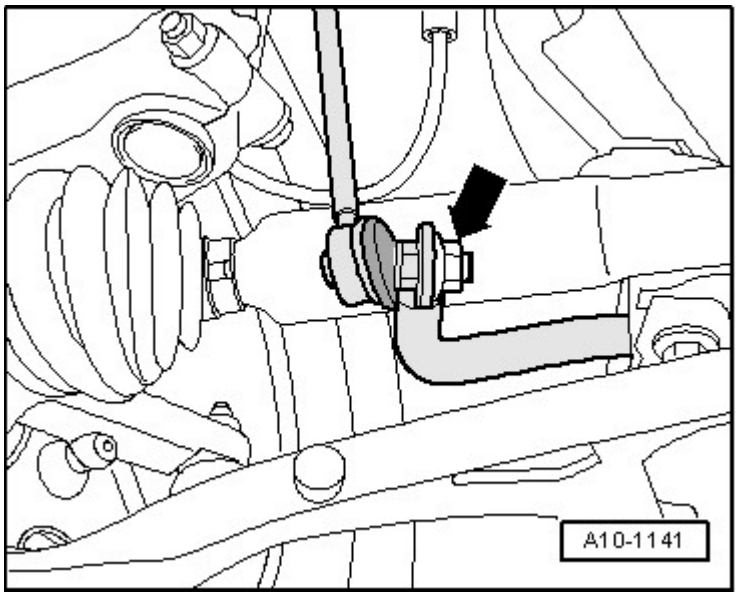

Fig. 82: Left/Right Coupling Rods From Stabilizer Bar
Courtesy of AUDI OF AMERICA, LLC

Vehicles with S-Tronic Transmission:

-- Remove the nuts -arrows- on the left control arm.

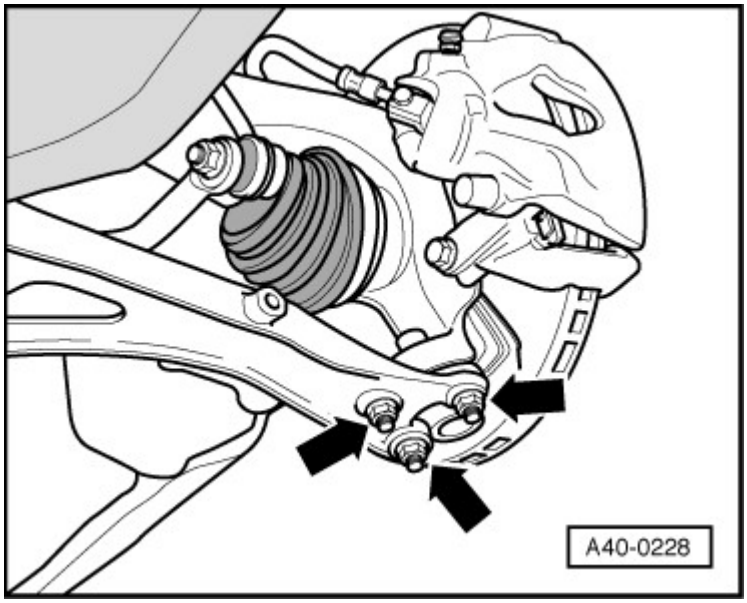

Fig. 83: Ball Joint Lower Nuts
Courtesy of AUDI OF AMERICA, LLC

-- If applicable, remove the bolt on the left front level control system sensor -G78- bracket.

-- Disengage the control arm from the transverse link.

-- Tilt the left suspension strut outward and Support it with the extension 2024 A /1 as shown in the illustration.

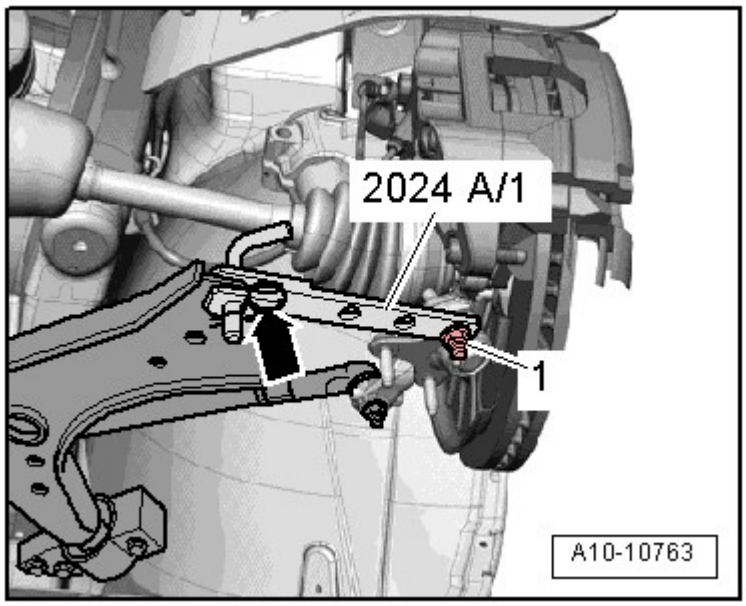

Fig. 84: Securing Pin And Control Arm Secured Using Securing Pin And Nut
Courtesy of AUDI OF AMERICA, LLC

WARNING: Loose Support components could cause an accident.

- **Secure the securing Pin and control arm using the securing Pin -arrow- and nut -1-.**

Manual Transmission

-- Secure the left drive axle as high as possible.

NOTE: Make sure the drive axle surface protection is not damaged.

All Vehicles:

-- Remove the nuts -arrows- on the right control arm.

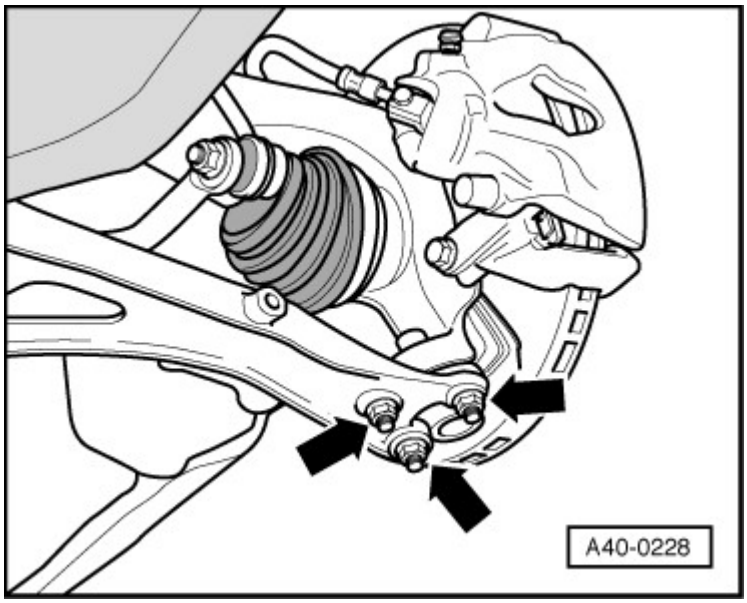

Fig. 85: Ball Joint Lower Nuts
Courtesy of AUDI OF AMERICA, LLC

-- Disengage the control arm from the transverse link.

-- Tilt the right drive axle forward while pressing the engine/transmission subassembly forward.

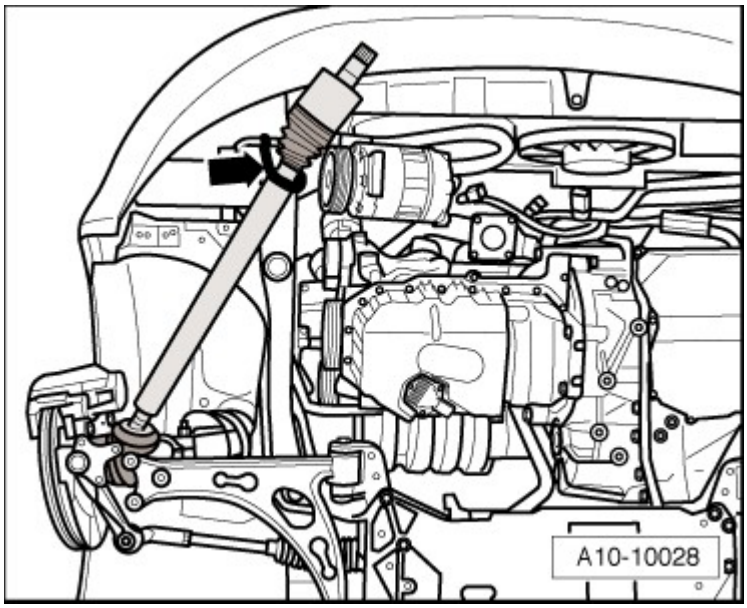

Fig. 86: Drive Axle Secured To Longitudinal Member
Courtesy of AUDI OF AMERICA, LLC

-- Secure the drive axle to the longitudinal member -arrow-.

NOTE: Make sure the drive axle surface protection is not damaged.

Vehicles with S-Tronic Transmission:

-- Remove the bolts on the selector lever cable bracket -1-.

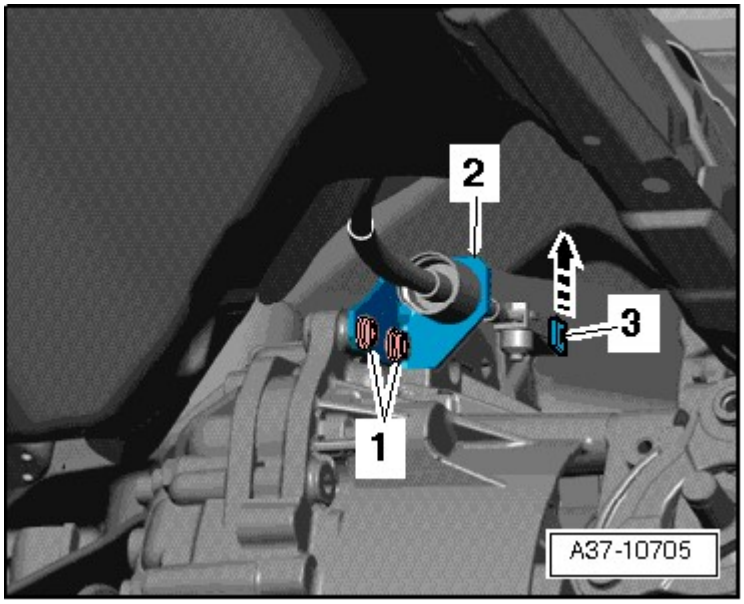

Fig. 87: Elector Lever Cable Bracket Bolts And Locking Washer
Courtesy of AUDI OF AMERICA, LLC

-- Remove locking washer -3- -arrow- and remove selector lever cable from transmission.

NOTE:

- **Do not bend or kink the selector lever cable.**
- **Ignore -2-.**

All Vehicles:

-- Tighten the T10359 to the cylinder block using the bolt -1- to approx. 20 Nm.

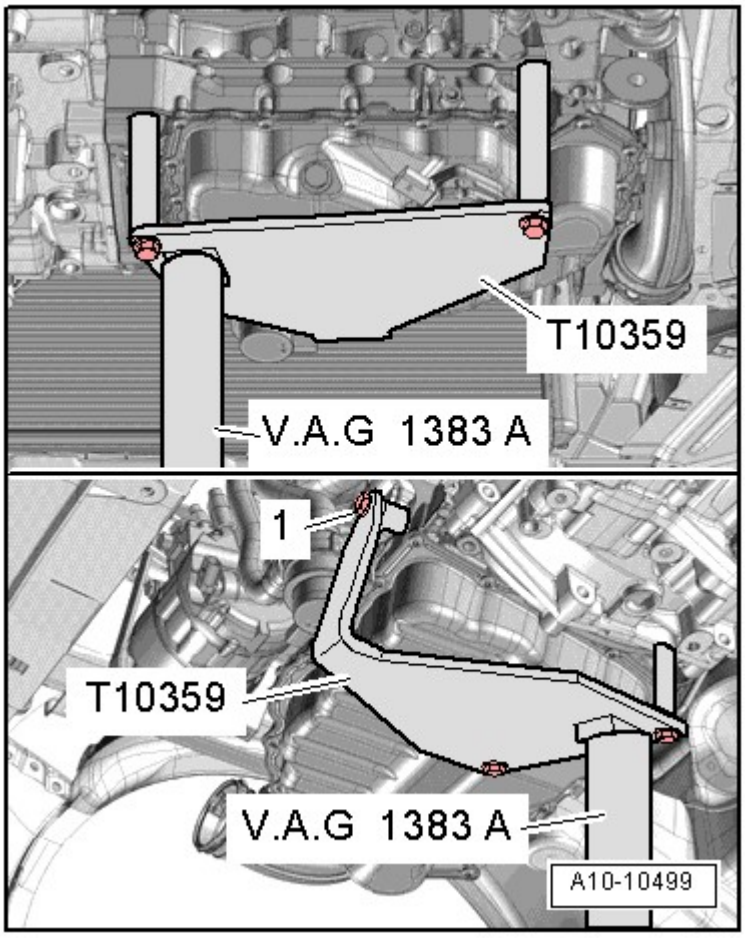

Fig. 88: Engine Bracket T10359 And Cylinder Block
Courtesy of AUDI OF AMERICA, LLC

NOTE: The threaded hole in the bolt -1- serves to secure the after-run coolant pump - V51-.

-- Mount the V.A.G 1383 A on the T10359.

-- Slightly lift the engine/transmission subassembly.

NOTE: Use VAS 5085 to remove bolts for assembly mounting.

-- Remove the engine mount bolts from the engine Support -arrows-.

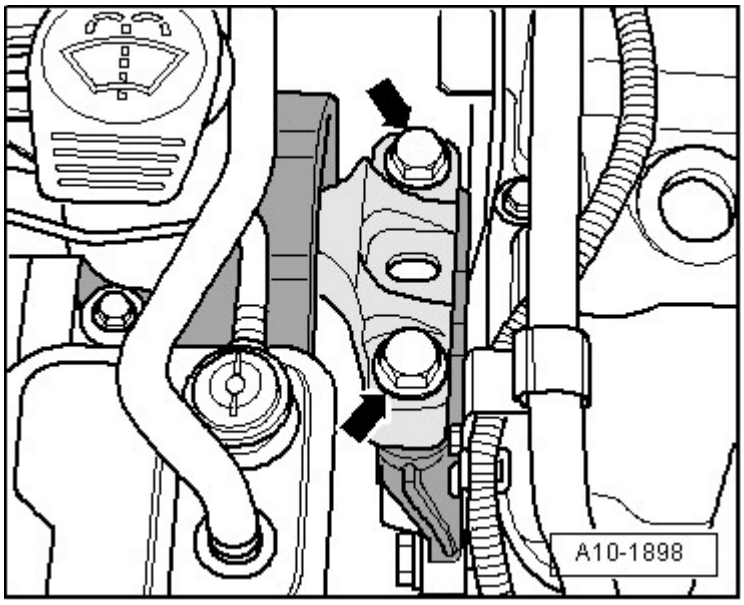

Fig. 89: Identifying Engine Mount To Engine Mount Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

Manual Transmission

-- Remove the transmission mount bolts from the transmission bracket -arrows-.

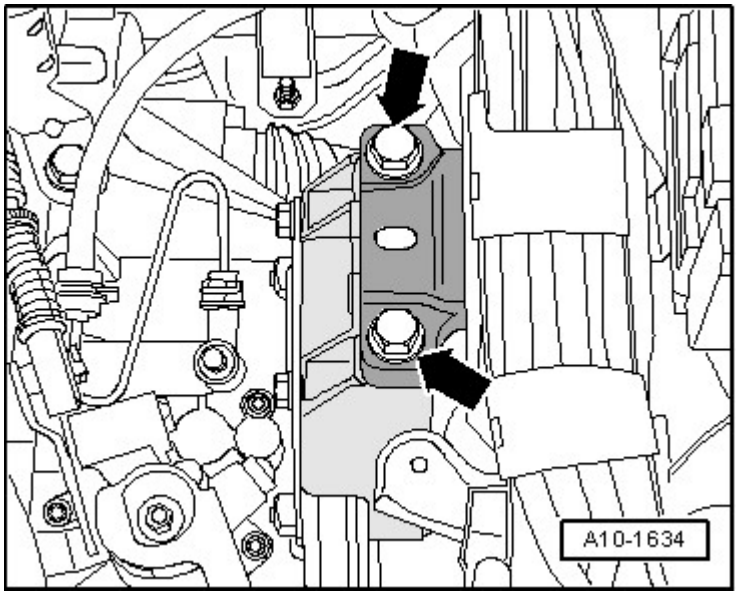

Fig. 90: Identifying Bolts For Subframe Mount At Transmission
Courtesy of AUDI OF AMERICA, LLC

Vehicles with S-Tronic Transmission:

-- Remove the transmission mount bolts from the transmission bracket -arrows-.

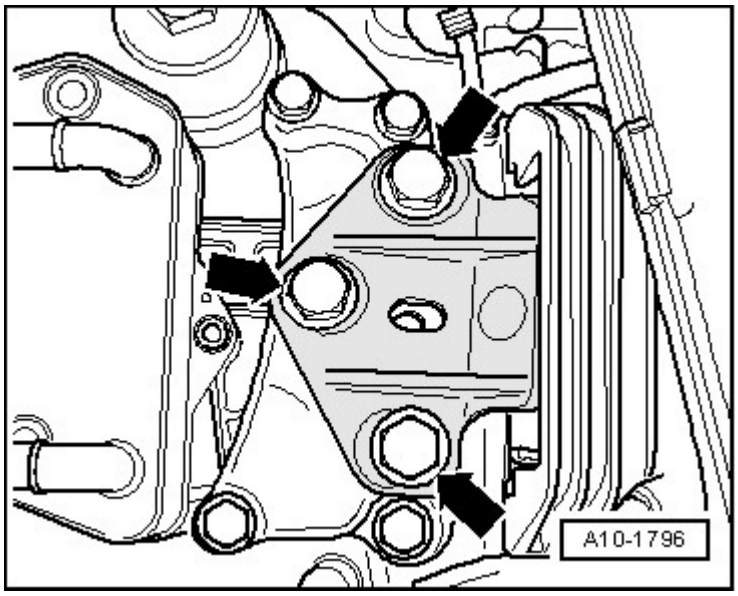

Fig. 91: Identifying Engine Mount To Engine Mount Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

All Vehicles:

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 the engine/transmission as far as possible to the front and left and slowly lower it.

ENGINE AND MANUAL TRANSMISSION, SEPARATING

Special tools and workshop equipment required

- Additional Hooks 10 - 222 A /2
- Shop Crane VAS 6100
- Transmission Lift Hook T40013

Procedure

- Engine/transmission assembly is removed and mounted on engine mount.

-- Install T40013 at transmission and close locking device.

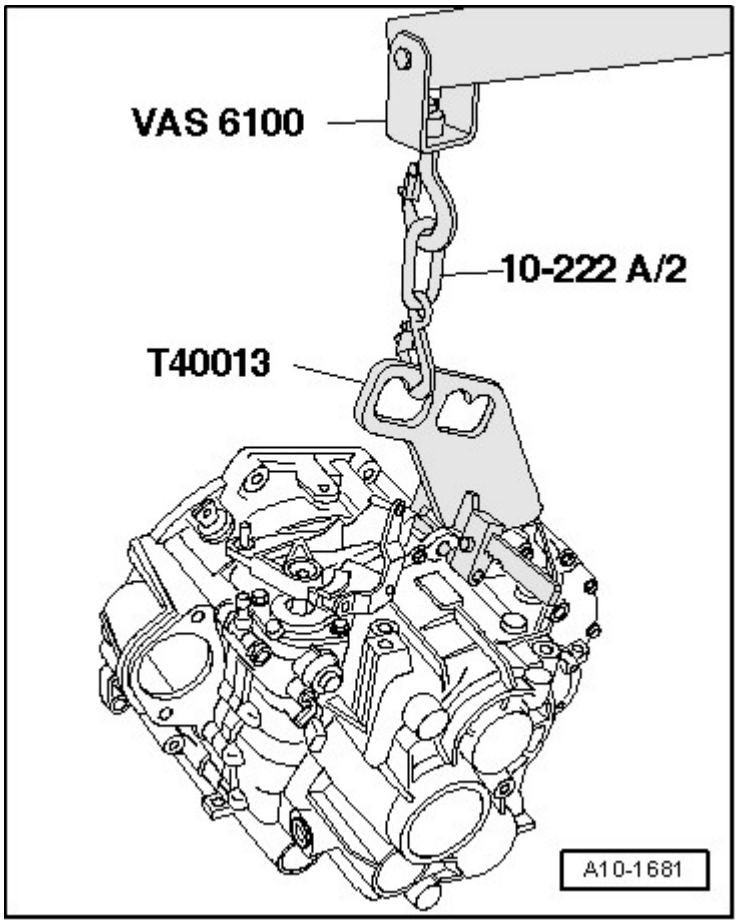

Fig. 92: Engaging Workshop Crane VAS 6100 With Additional Hooks 10-222 A/2 At Lifting Tackle
Courtesy of AUDI OF AMERICA, LLC

-- Engage VAS 6100 with 10 - 222 A /2 on lifting tackle.

-- Remove the bolts -3 and 4- and the starter.

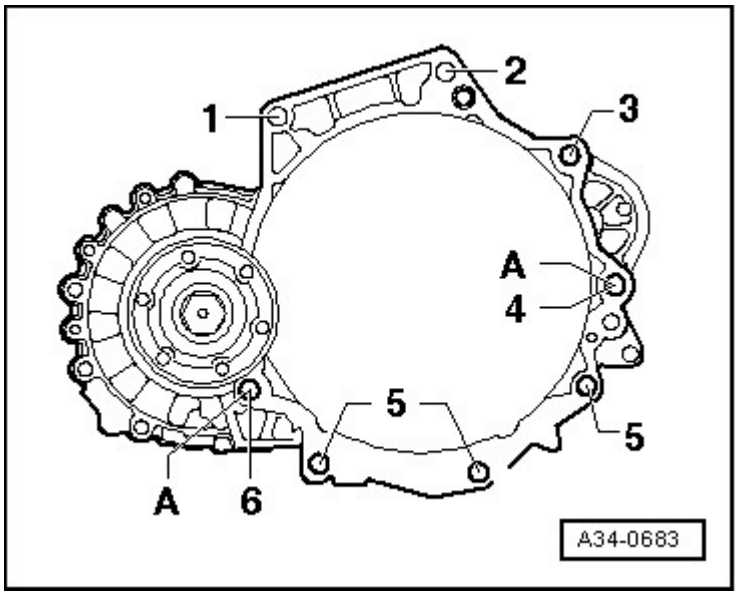

Fig. 93: Manual Transmission To Engine Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -1, 2, 5, 6, 7 and 8- connecting the transmission to the engine.

NOTE: Ignore - A-.

-- Remove transmission from engine.

ENGINE AND S-TRONIC TRANSMISSION, SEPARATING

Special tools and workshop equipment required

- Engine Sling 2024 A
- Lifting Eyebolt 3368
- Shop Crane VAS 6100
- Self-locking collar nut M10

Procedure

- Engine/transmission assembly removed and mounted on engine Support T10359.

-- Free up the wires -arrows-.

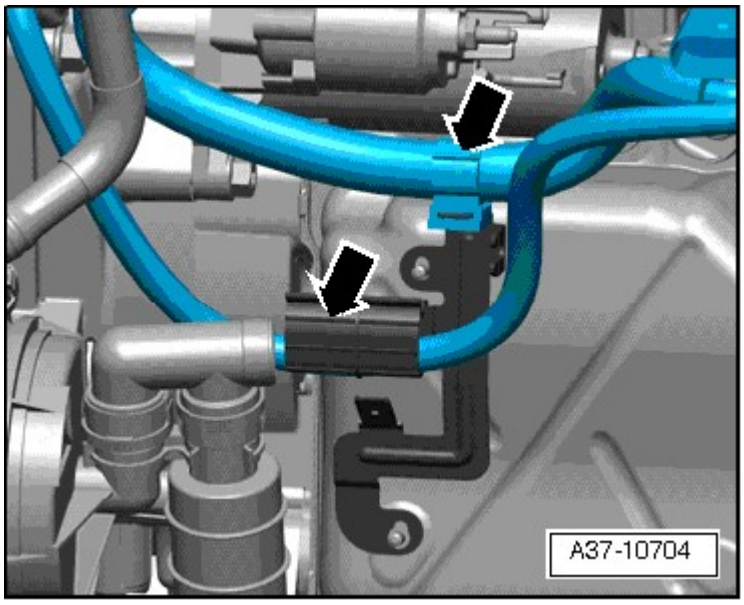

Fig. 94: Electrical Wiring
Courtesy of AUDI OF AMERICA, LLC

-- Remove the coolant hoses from the transmission oil cooler -arrows-.

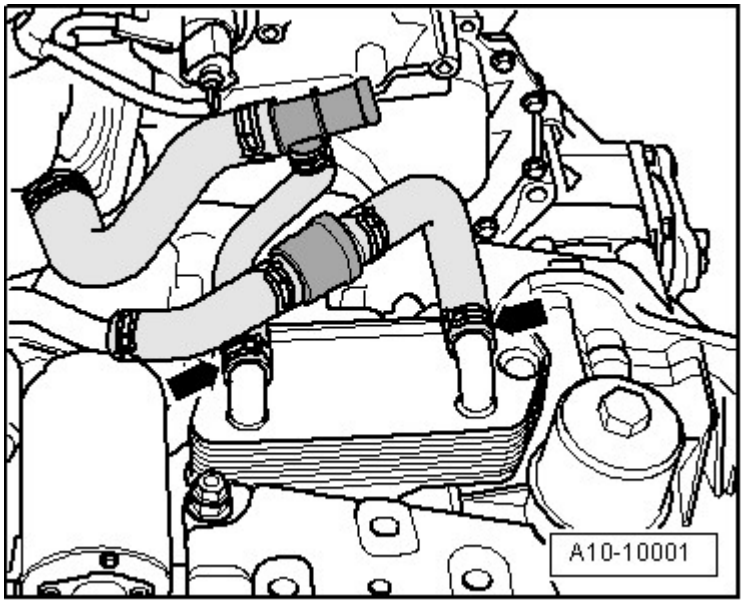

Fig. 95: Transmission Oil Cooler Coolant Hoses
Courtesy of AUDI OF AMERICA, LLC

NOTE: To prevent dirt from entering, seal open lines and connections with clean plugs or protective caps.

-- Remove the bolts -1 and 2- and the starter.

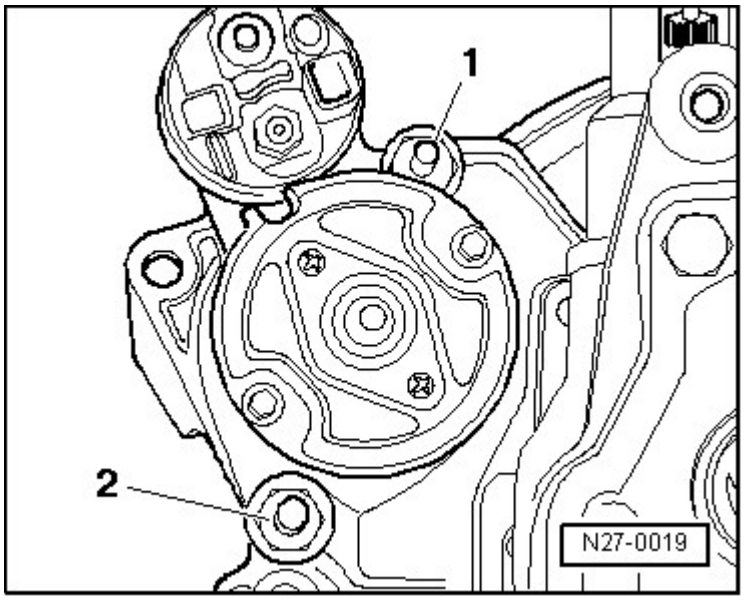

Fig. 96: Identifying Starter Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the 3368 a few turns on the transmission bracket with an M10 self-locking collar nut -arrow-.

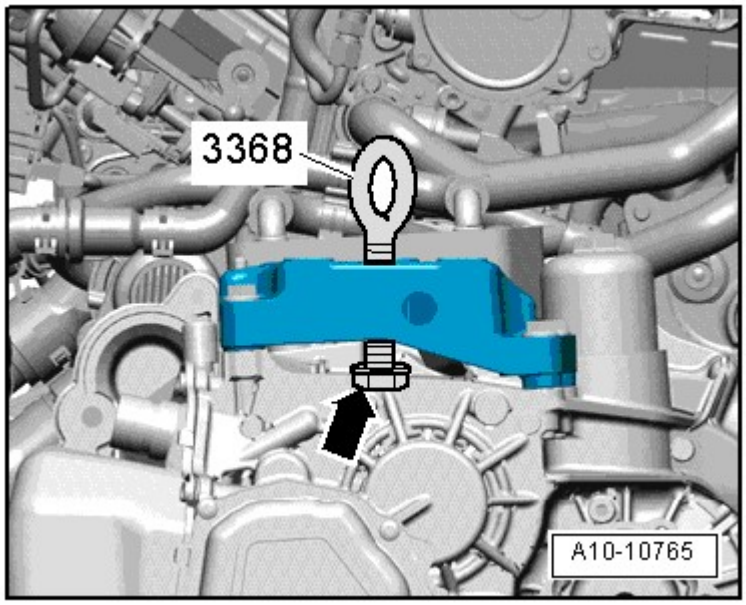

Fig. 97: Lifting Eyebolt 3368
Courtesy of AUDI OF AMERICA, LLC

-- Engage the 2024 A on the VAS 6100 and on the transmission as shown in the illustration.

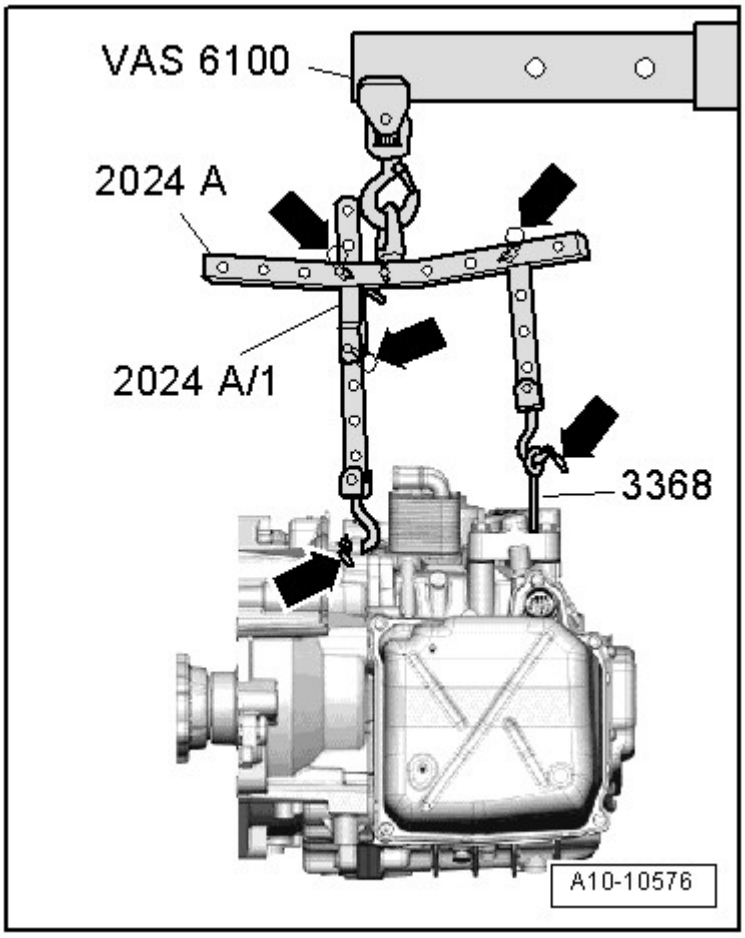

Fig. 98: Transmission Lifted
Courtesy of AUDI OF AMERICA, LLC

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: Loose engine Support bridge components could cause an accident.

- **Secure the mounting Hooks and Pins on the engine Support bridge using securing Pins -arrows-.**

-- Raise the transmission slightly.

-- Remove engine to transmission connecting bolts -1, 3, 5, 6, 7, 8, 9, 10-.

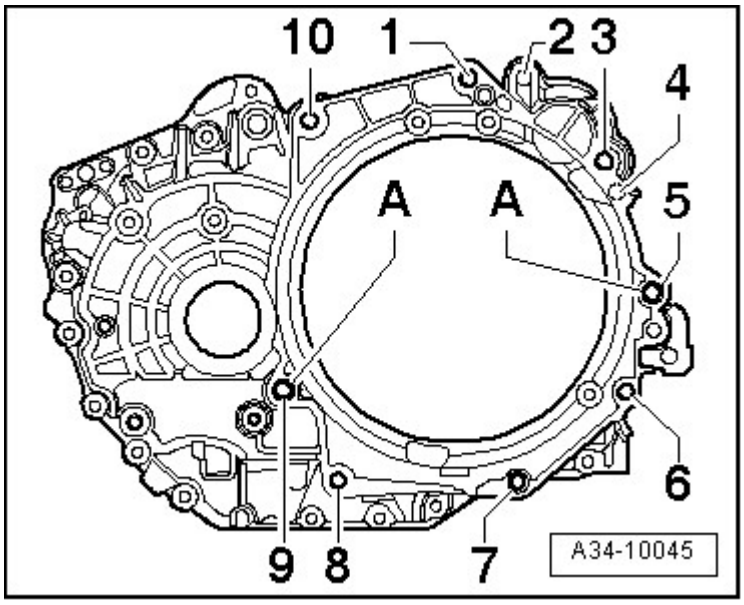

Fig. 99: Direct Shift Automatic Transmission To Engine Mounting Bolts
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -2, 4 and A-.

-- Remove transmission from engine.

ENGINE, INSTALLING

Tightening Specifications

NOTE:

- **Tightening specifications only apply to lightly greased, oiled, phosphated 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 torque specifications ±15%.**

Tightening specifications, refer to **SUBFRAME ASSEMBLY OVERVIEW**.

Additional Tightening Specifications

Component		Nm
Bolts/nuts	M6	10
	M7	15
	M8	22
	M10	40
	M12	65

Secures the Manual Transmission to the Engine

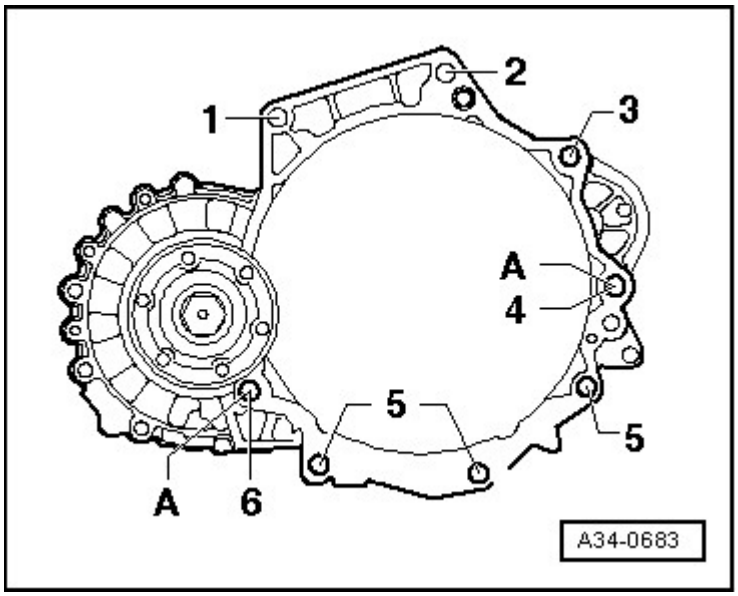

Fig. 100: Manual Transmission To Engine Bolts
Courtesy of AUDI OF AMERICA, LLC

Item	Bolt	Nm
1, 2	M12x65	80
3 1)2)	M12x150	80
4 1)2)	M12x165	80
5	M10x50	40
6	M12x85	80
A	Alignment sleeves for centering	

- 1) Bolt with threaded Pin M8.
- 2) Also starter to transmission.

Mounting, Automatic Transmission to Engine

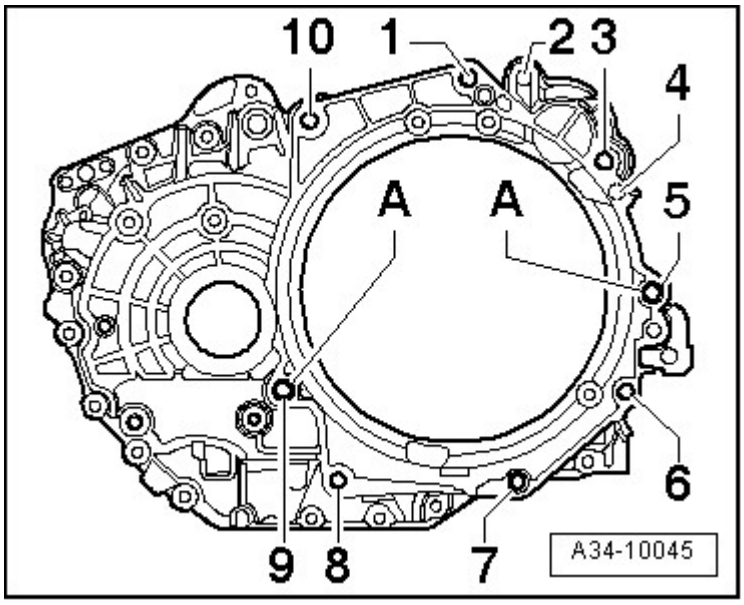

Fig. 101: Direct Shift Automatic Transmission To Engine Mounting Bolts
Courtesy of AUDI OF AMERICA, LLC

Item	Bolt	Nm
1, 3, 10	M12x55	80
5, 9	M12x70	80
6, 7, 8	M10x50	40
A	Alignment sleeves for centering	
• Bolts -2 and 4- : secures the starter to the transmission. Refer to **REMOVAL AND INSTALLATION** .		

Procedure

Installation is in the reverse order of removal, note the following:

- Engine mounted on the engine Support T10359.

NOTE:

- **Replace self-locking nuts and bolts.**
- **Always replace bolts that are tightened to torque as well as O-rings and gaskets.**
- **Secure all hose connections with hose clamps appropriate for the model.**
- **During installation, cable ties must be installed at the same location.**

-- If no alignment sleeves for center engine and transmission are present in cylinder block, insert sleeves.

-- Make sure the intermediate plate is engaged on the sealing flange and slid onto the guide sleeves -arrows-.

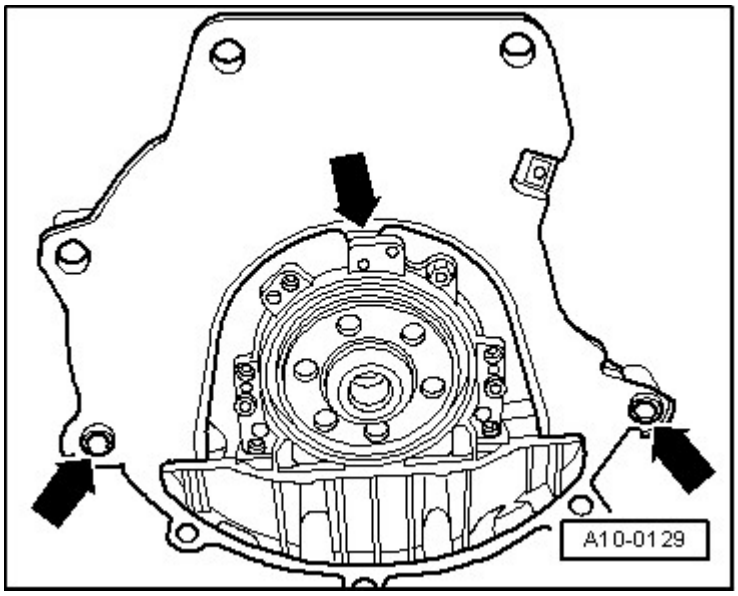

Fig. 102: Identifying Intermediate Plate Alignment Bushings
Courtesy of AUDI OF AMERICA, LLC

-- Attach transmission to engine.

-- Guide the engine/transmission subassembly into the body.

-- Then install engine mounting to engine Support bolts -arrows- and tighten by hand.

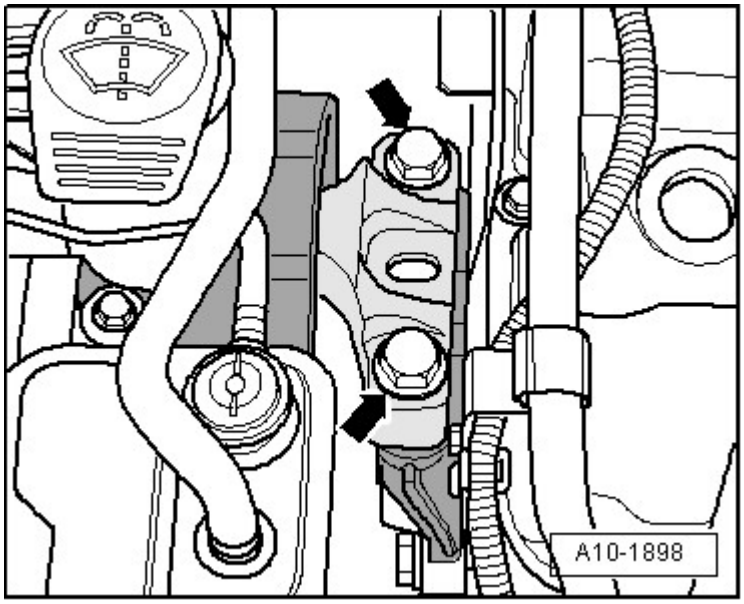

Fig. 103: Identifying Engine Mount To Engine Mount Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

Manual Transmission

-- Install the transmission mount bolts in the transmission bracket -arrows- and tighten them by hand.

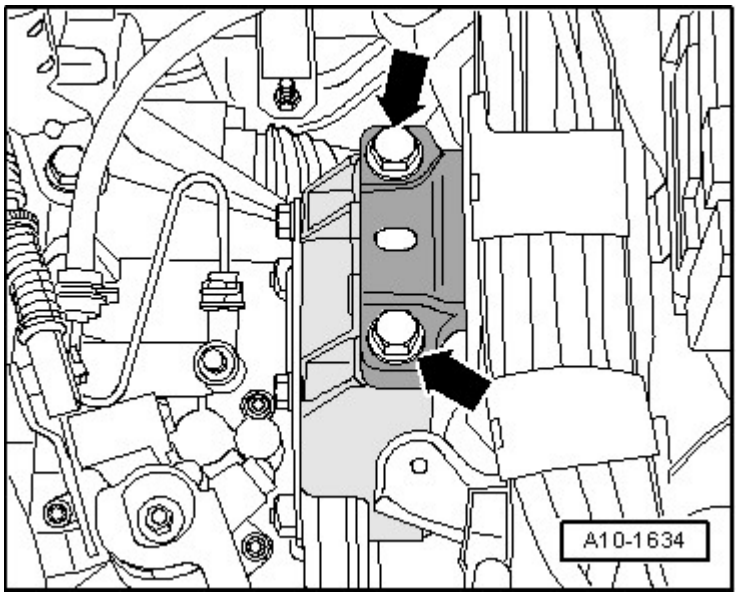

Fig. 104: Identifying Bolts For Subframe Mount At Transmission
Courtesy of AUDI OF AMERICA, LLC

Vehicles with S-Tronic Transmission:

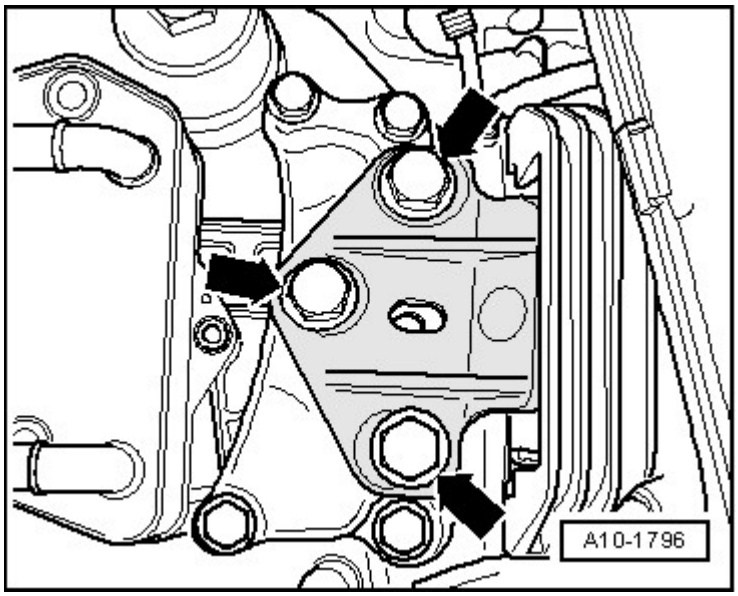

Fig. 105: Identifying Engine Mount To Engine Mount Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Install the transmission mount bolts in the transmission bracket -arrows- and tighten them by hand.

All Vehicles:

NOTE: Only tighten the bolts to the specification when installing the subframe mount. Refer to SUBFRAME ASSEMBLY OVERVIEW.

-- Remove the engine Support T10359 from the engine.

-- Install drive axles. Refer to **Removal and Installation** .

-- Install drive axle heat shield. Refer to **REMOVAL AND INSTALLATION** .

-- Install the control arms. Refer to **Removal and Installation** .

-- Install the pendulum Support. Refer to **SUBFRAME ASSEMBLY OVERVIEW**.

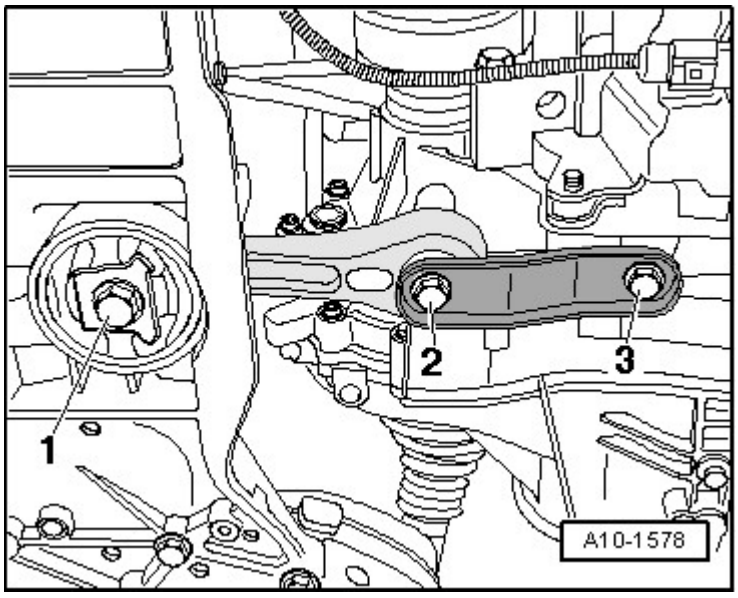

Fig. 106: Identifying Pendulum Support & Bolts
Courtesy of AUDI OF AMERICA, LLC

Manual Transmission

-- Selector mechanism, installing and adjusting. Refer to **REMOVAL AND INSTALLATION** .

CAUTION: Risk of damaging clutch slave cylinder.

- **Do not press the clutch pedal when the clutch slave cylinder is removed.**

-- Install clutch slave cylinder. Refer to **REMOVAL AND INSTALLATION** .

Vehicles with S-Tronic Transmission :

-- Install selector lever cable. Refer to **REMOVAL AND INSTALLATION** .

All:

-- Installing front exhaust pipe with catalytic converter. Refer to **FRONT EXHAUST PIPE WITH CATALYTIC CONVERTER** .

-- Install exhaust system free of stress. Refer to **EXHAUST SYSTEM, ALIGNING** .

-- Install after-run coolant pump -V51-. Refer to **AFTER-RUN COOLANT PUMP** .

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

-- Install fan shroud. Refer to **FAN SHROUD** .

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

-- Install starter. Refer to **REMOVAL AND INSTALLATION** .

-- Install throttle valve control module -J338-. Refer to **Removal and Installation** .

-- Adjust subframe mount. Refer to **SUBFRAME MOUNT, ADJUSTING**.

-- Electrical connections and routing. Refer to the appropriate SYSTEM WIRING DIAGRAMS information.

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

-- Install wiper arms. Refer to **REMOVAL AND INSTALLATION** .

-- Check oil level. Refer to **03 MAINTENANCE, DIAGNOSIS**

CAUTION: Risk of destroying control modules with excess voltage.

- **Do not use a battery charger for starting assistance!**

-- Connect the coolant hose with the connector coupling **RADIATOR AND COOLANT FAN ASSEMBLY OVERVIEW => Connect the Coolant Hose with the Connector Coupling** .

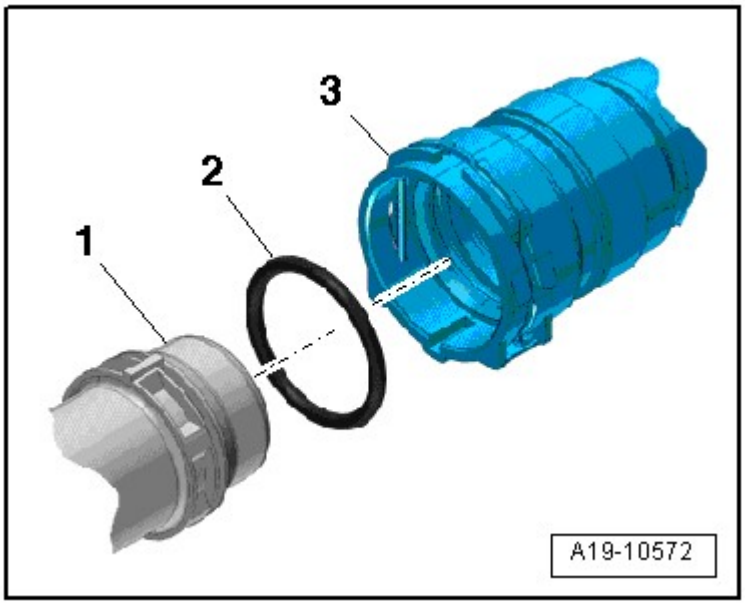

Fig. 107: Connecting the Coolant Hose to the Coupling
Courtesy of AUDI OF AMERICA, LLC

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

NOTE:

- **Do not use drained coolant in the following situations:**
- **If the cylinder head or cylinder block was replaced.**
- **If the coolant is contaminated.**

SPECIAL TOOLS

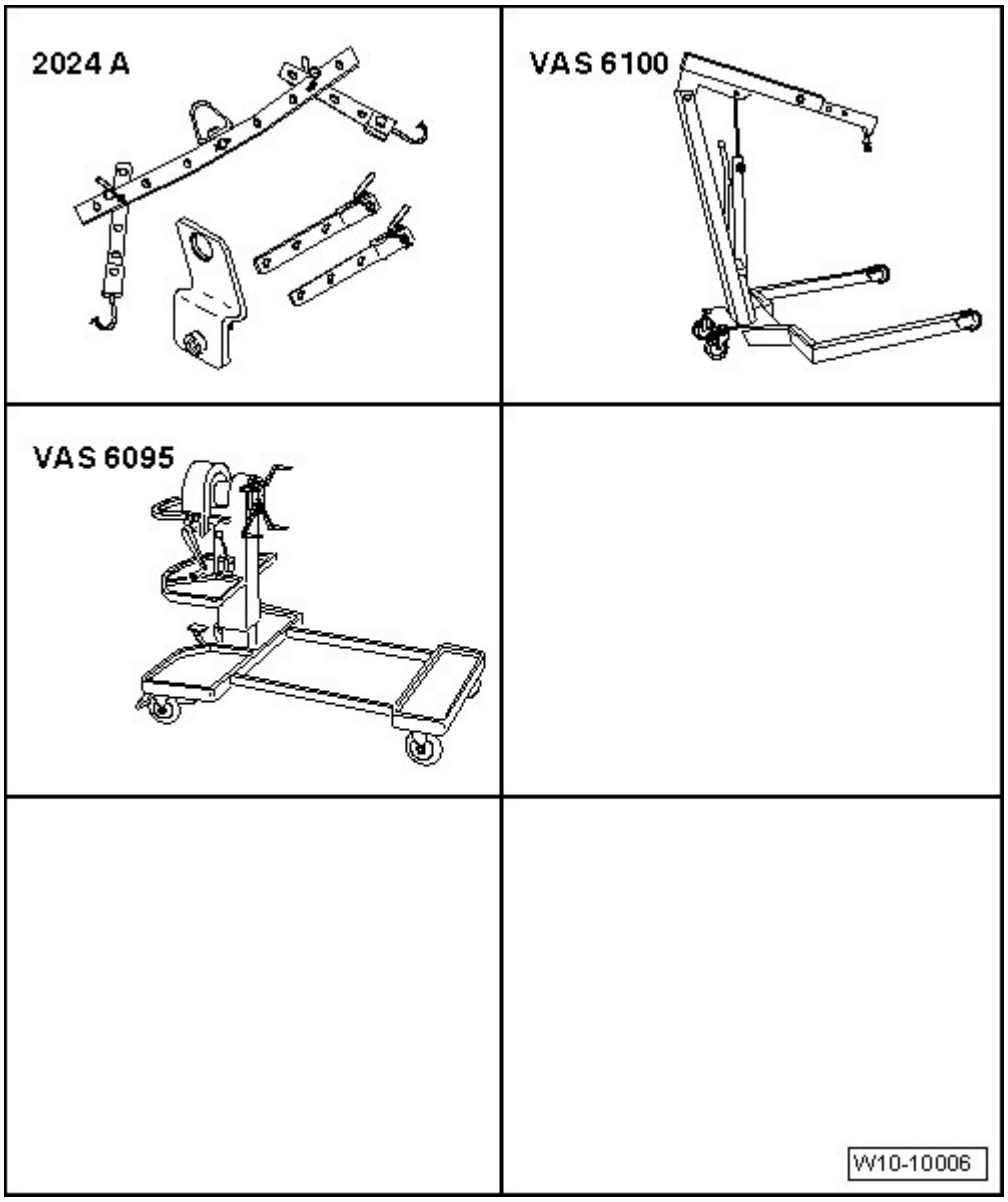

Fig. 108: Identifying Special Tools -- Engine, Securing To Assembly Stand
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Engine Sling 2024 A
- Shop Crane VAS 6100
- Engine and Transmission Holder VAS 6095

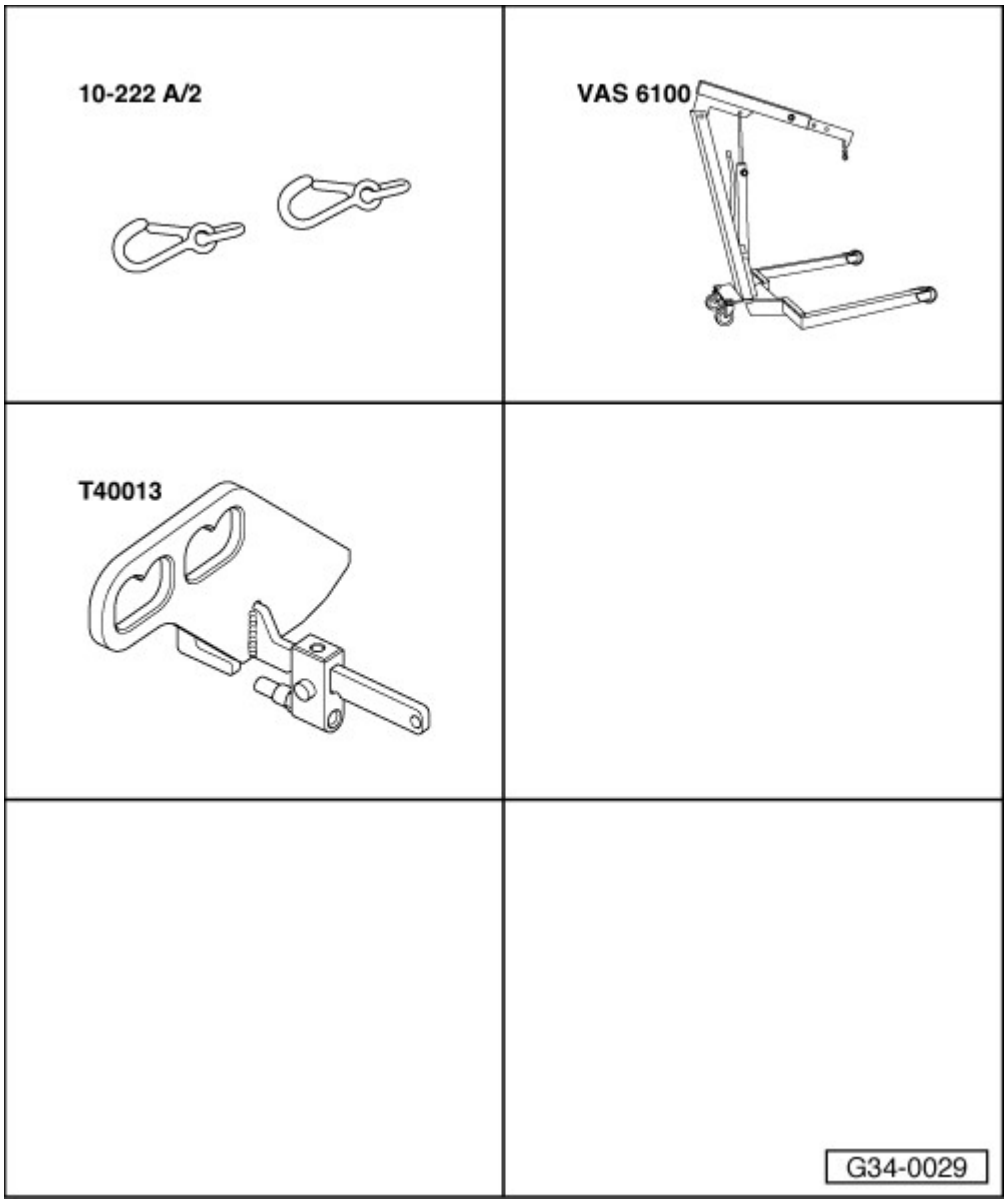

Fig. 109: Identifying Engine And Transmission, Separating - Special Tools, Testers And Auxiliary Items Required
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Additional Hooks 10 - 222 A /2
- Shop Crane VAS 6100
- Transmission Lift Hook T40013

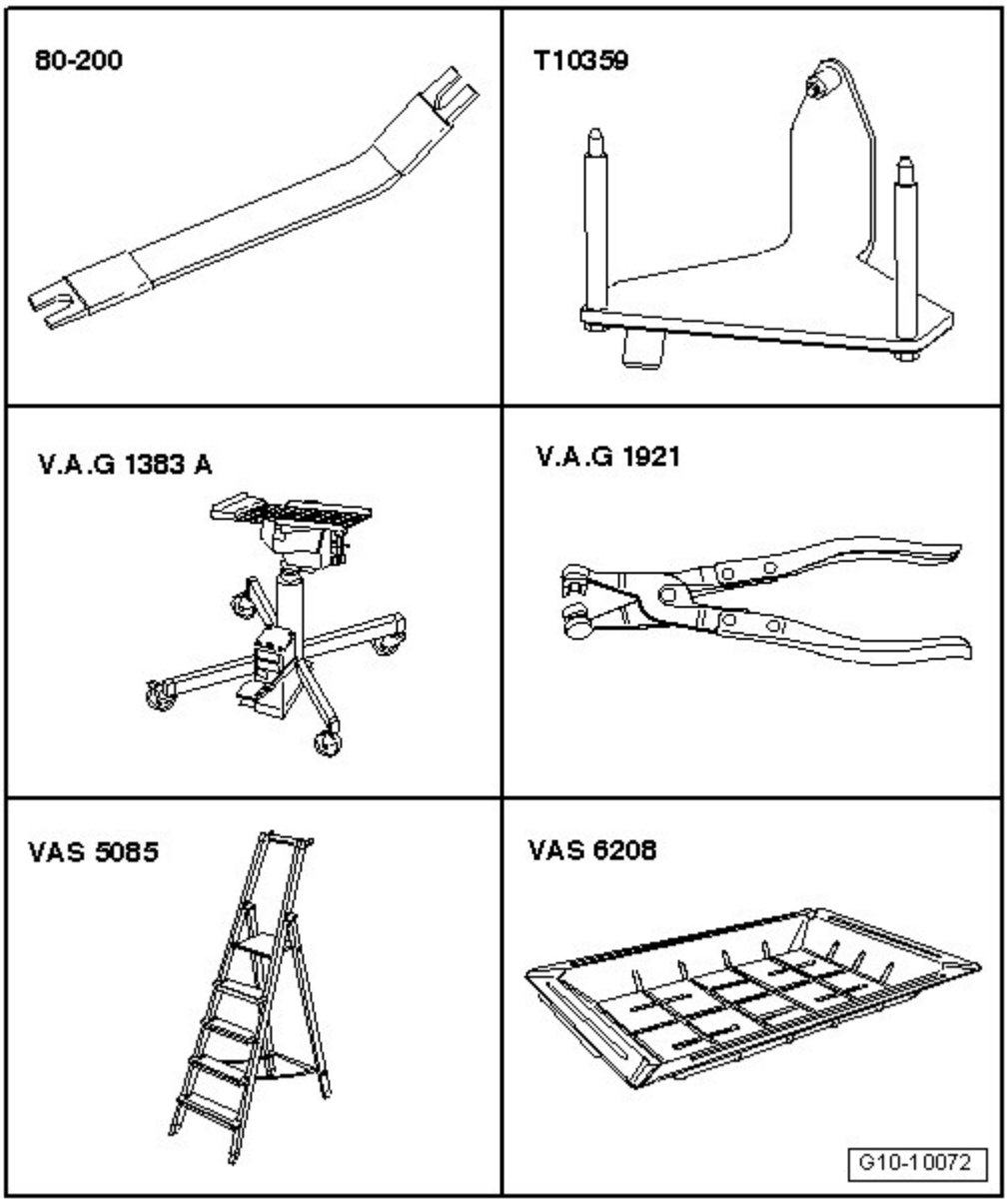

Fig. 110: Identifying Special Tools, Engine Support
Courtesy of AUDI OF AMERICA, LLC

and workshop equipment required

- Pry Lever - Rmv Outside Mirror 80 - 200
- Engine Support T10359
- Engine/Transmission Jack V.A.G 1383 A
- Hose Clip Pliers V.A.G 1921
- Step Ladder VAS 5085
- Drip Tray VAS 6208

Special tools and workshop equipment required

- Engine Support Bridge10 - 222 A with the Spindle 10 - 222 A /11 and the Special Hook 10 - 222 A /20

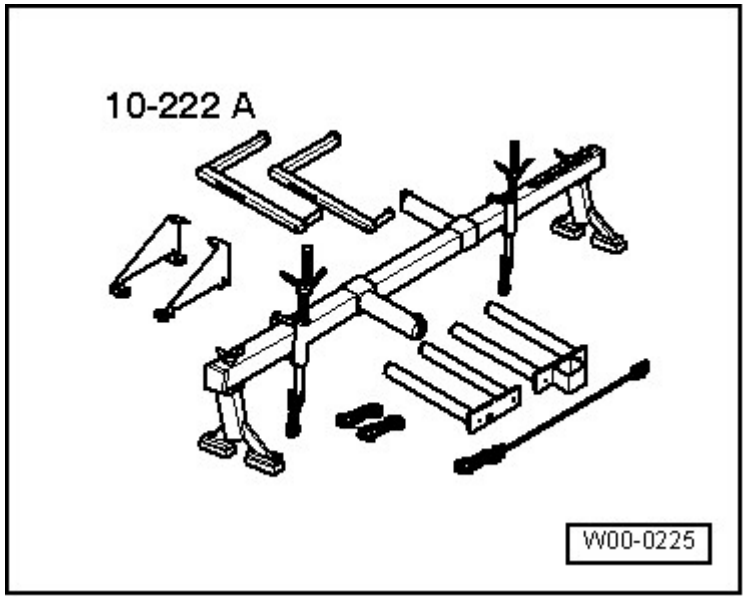

Fig. 111: Engine Support Bridge 10 - 222 A
Courtesy of AUDI OF AMERICA, LLC

- Engine Support Supplement Set T40093

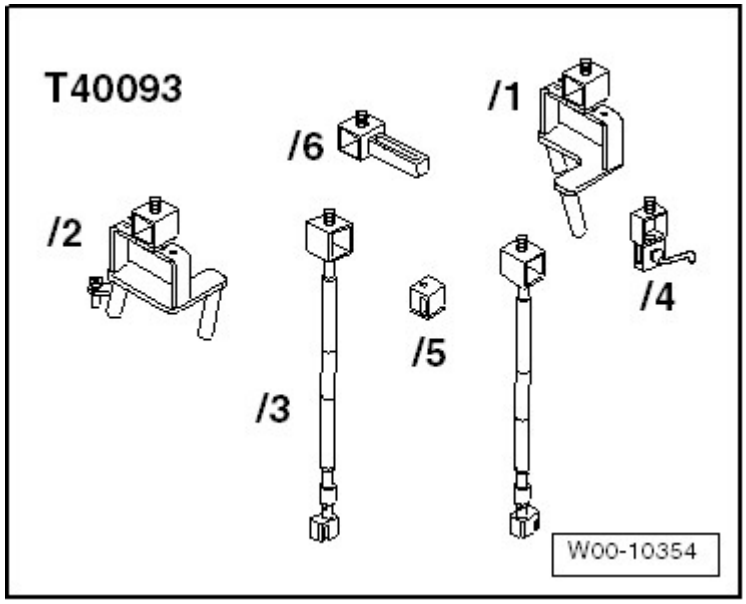

Fig. 112: Engine Support Supplement Set T40093
Courtesy of AUDI OF AMERICA, LLC

- Locking Pin T10060A

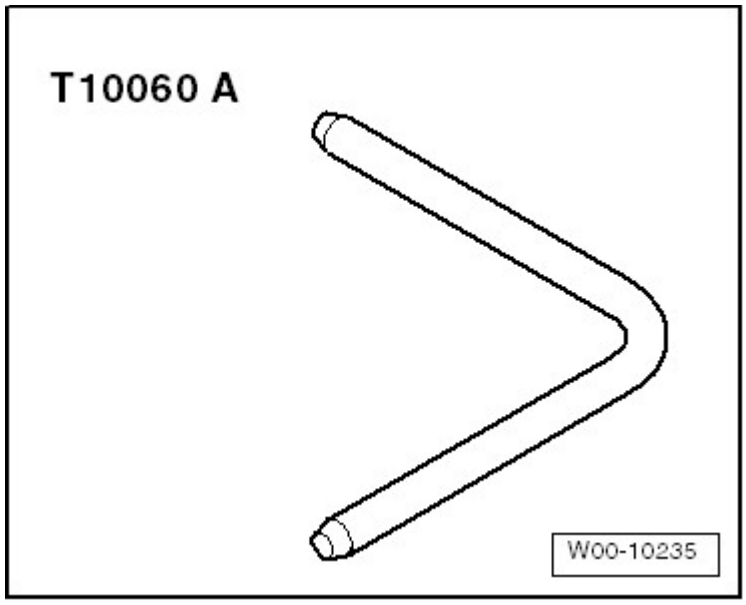

Fig. 113: Identifying Locking Pin T10060 A
Courtesy of AUDI OF AMERICA, LLC

- Puller T10369

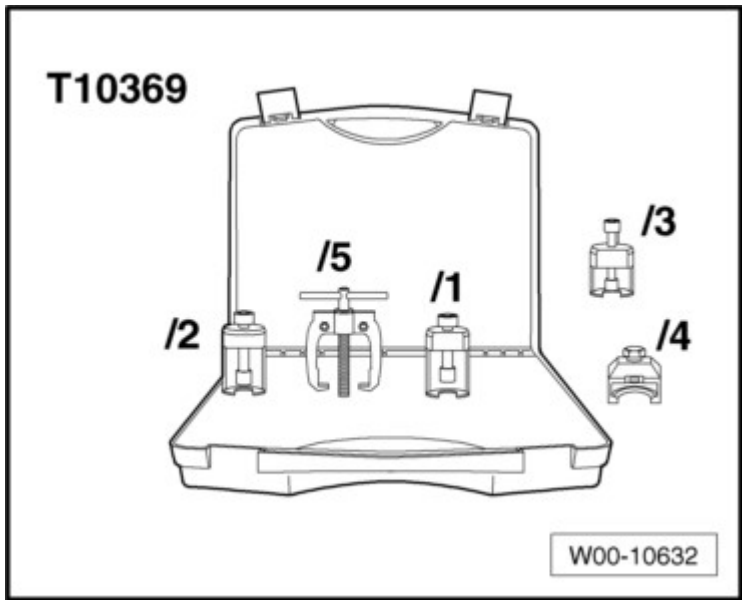

Fig. 114: Identifying Puller T10369
Courtesy of AUDI OF AMERICA, LLC

- Engine Bung Set VAS 6122

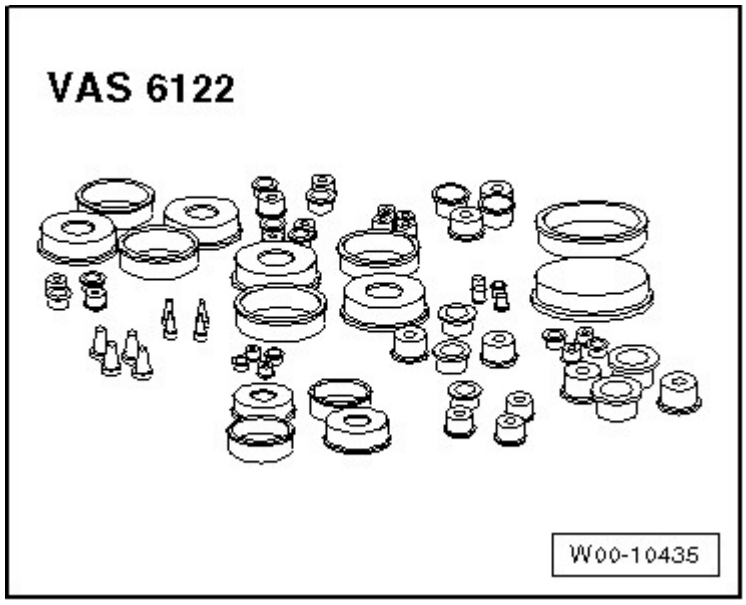

Fig. 115: Engine Bung Set Plugs VAS 6122
Courtesy of AUDI OF AMERICA, LLC

- Lifting Eyebolt 3368

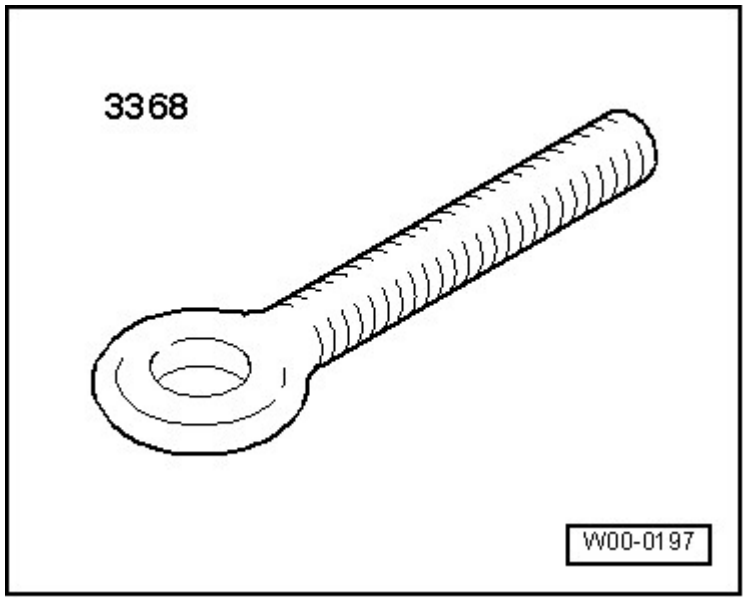

Fig. 116: Lifting Eyebolt 3368
Courtesy of AUDI OF AMERICA, LLC

