

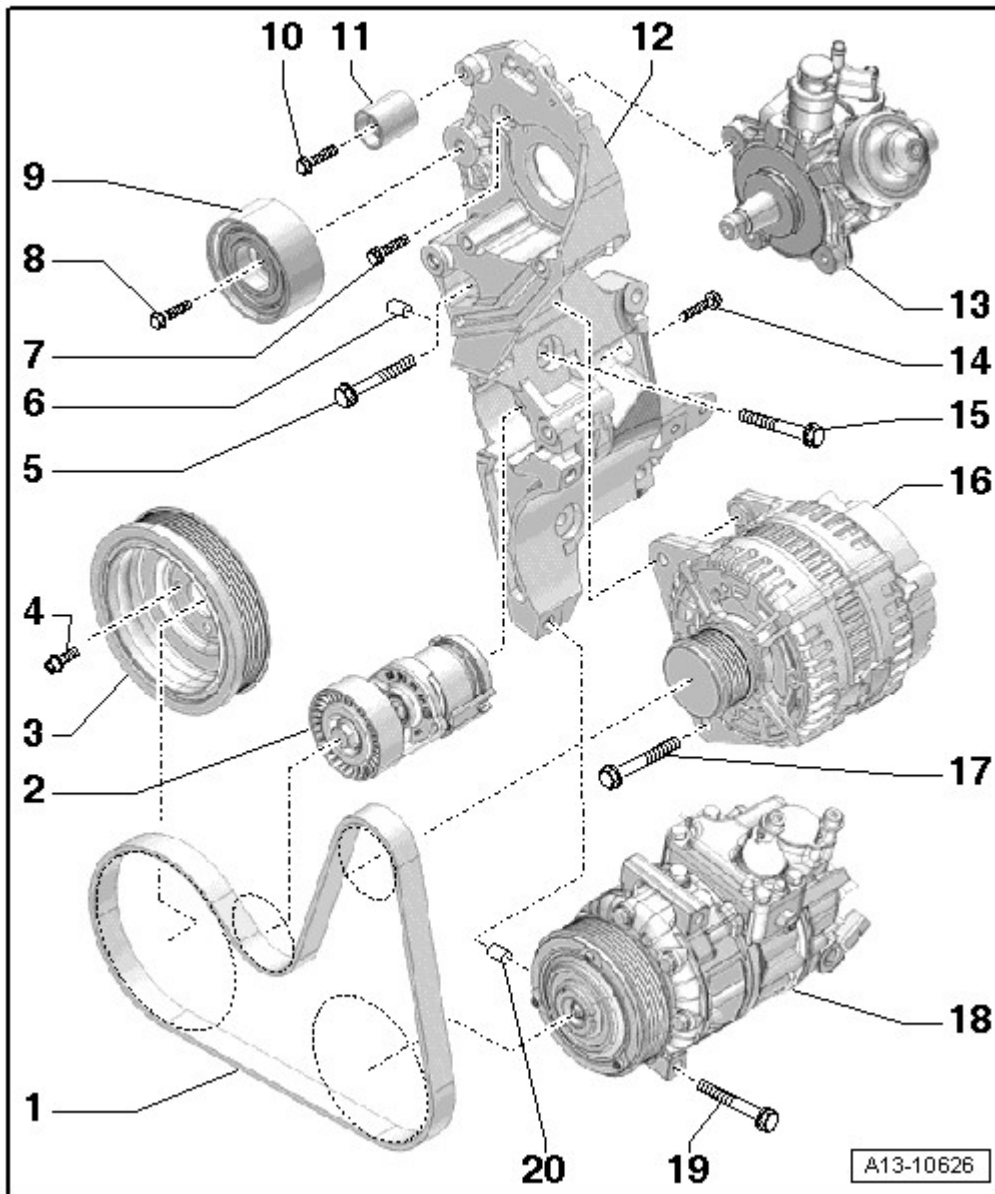
ENGINE**2.0 Liter - Crankshaft, Cylinder Block - Engine Code(s): CBEA****13 CRANKSHAFT, CYLINDER BLOCK****DESCRIPTION AND OPERATION****RIBBED BELT DRIVE WITH TENSIONER AND A/C COMPRESSOR ASSEMBLY OVERVIEW**

Fig. 1: Ribbed Belt Drive With Tensioner And A/C Compressor Assembly Overview
Courtesy of AUDI OF AMERICA, LLC

1. Ribbed Belt
 - Check for wear
 - Before removing, mark direction of rotation using chalk or felt-tip marker
 - Removing and installing, refer to **RIBBED BELT, VEHICLES WITH TENSIONING DAMPER AND A/C COMPRESSOR** or **RIBBED BELT, VEHICLES WITHOUT A/C COMPRESSOR**
 - Do not kink
 - When installing, make sure it is seated correctly on the pulleys
2. Tensioning Element for Ribbed Belt
 - Removing and installing, refer to **RIBBED BELT TENSIONER**
 - Deleted on vehicles with A/C, depending on the date of manufacture
3. Vibration Damper
 - With ribbed belt pulley
 - The hole inside the vibration damper must be positioned over the protrusion on the crankshaft toothed belt gear.
 - Removing and installing, refer to **VIBRATION DAMPER**
4. Bolt
 - Replace
 - 10 Nm plus an additional 90° turn
 - Use Original bolts only,
5. Bolt
 - For the correct tightening specification, refer to **SPECIFICATIONS**
6. Alignment Bushing
 - Make sure the auxiliary component bracket fits correctly.
7. Bolt
 - Tightening specifications, refer to **SPECIFICATIONS**
8. Bolt
 - Tightening specifications -20- **TOOTHED BELT ASSEMBLY OVERVIEW**
9. Idler Roller
 - For the toothed belt
10. Bolt
 - Tightening specifications -6- **TOOTHED BELT ASSEMBLY OVERVIEW**
11. Idler Roller
 - For the toothed belt
12. Bracket for Assemblies
 - Removing and installing, refer to **ACCESSORY ASSEMBLY BRACKET**
13. High Pressure Pump
 - Removing and installing, refer to **Removal and Installation**

14. Bolt
 - 23 Nm
15. Bolt
 - Tightening specification and sequence **RIBBED BELT DRIVE WITH TENSIONER AND A/C COMPRESSOR ASSEMBLY OVERVIEW**
16. Generator
 - Removing and installing, refer to **[For engine(s) CBRA, BPY, CCTA, CBFA] Removal and Installation**
17. Bolt
 - For the correct tightening specification, refer to **SPECIFICATIONS**
18. A/C Compressor
 - Removing and installing, refer to **Removal and Installation**
19. Bolt
 - Tightening specifications, refer to **Removal and Installation**
20. Alignment Bushing
 - Make sure the bracket fits correctly.

Accessory Assembly Bracket - Tightening Specifications and Tightening Sequence

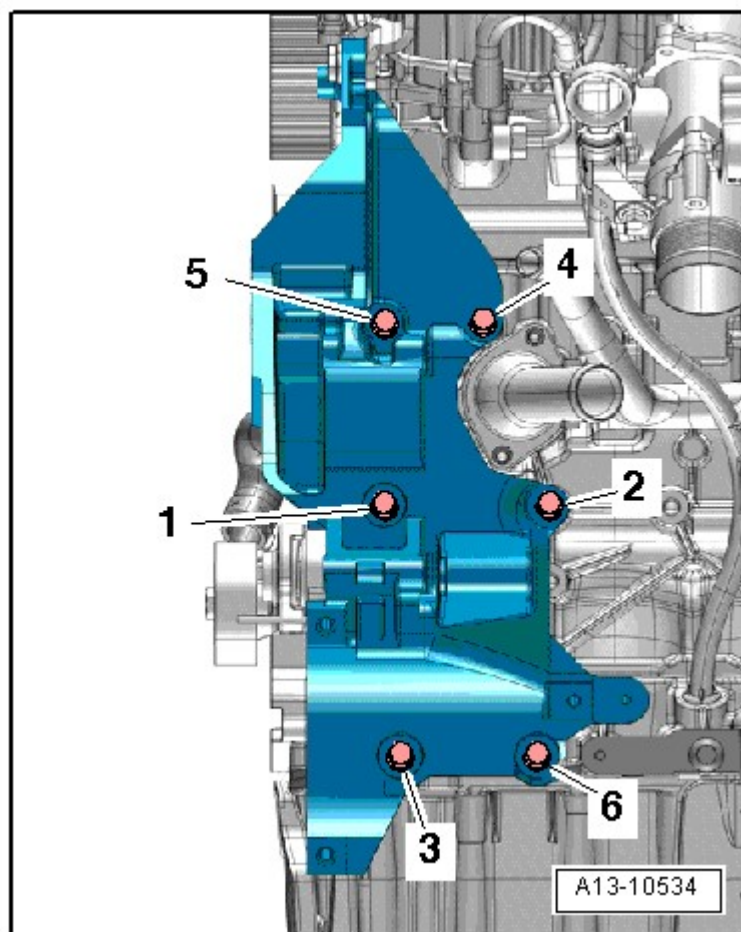


Fig. 2: Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

-- Replace the bolts for the auxiliary component bracket as follows:

- Bolts -1- and -2- M10 x 52.
- Bolts -3- and -6- M10 x 30.
- Bolts -4- and -5- M10 x 60.

-- Tighten the auxiliary component bracket bolts in 2 steps in sequence -1 through 6- :

-- Install the bolts all the way by hand.

-- Tighten the bolts to 40 Nm.

-- Tighten the bolts -3- and -6- 45° further.

-- Tighten the bolts -1, 2, 4 and 5- 90° further.

RIBBED BELT DRIVE WITH TENSIONING ROLLER AND A/C COMPRESSOR ASSEMBLY OVERVIEW

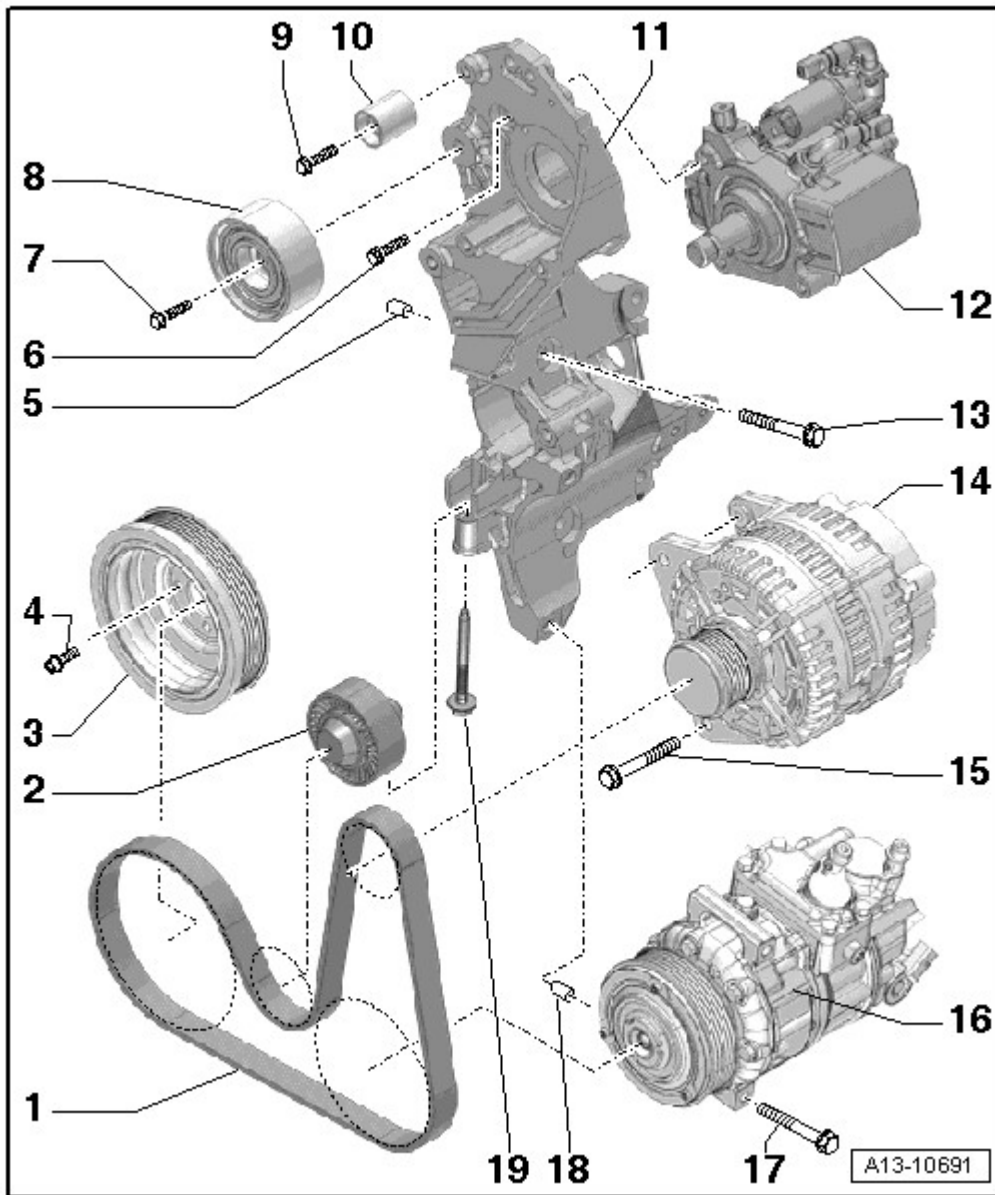


Fig. 3: Identifying Ribbed Belt With Tensioning Roller, Overview
 Courtesy of AUDI OF AMERICA, LLC

1. Ribbed Belt

- Check for wear
- Before removing, mark direction of rotation using chalk or felt-tip marker
- Removing and installing, refer to **RIBBED BELT, VEHICLES WITH TENSIONING DAMPER AND A/C COMPRESSOR** or **RIBBED BELT, VEHICLES WITHOUT A/C COMPRESSOR**
- Do not kink
- When installing, make sure it is seated correctly on the ribbed belt pulleys

2. Tension Roller for Ribbed Belt

- Removing and installing, refer to **RIBBED BELT, VEHICLES WITH TENSIONING DAMPER AND A/C COMPRESSOR**
 - Apply some adhesive lubricating paste to the guide surfaces; for the paste,
3. Vibration Damper
 - With ribbed belt pulley
 - The hole inside the vibration damper must be positioned over the protrusion on the crankshaft toothed belt gear.
 - Removing and installing, refer to **VIBRATION DAMPER**
 4. Bolt
 - Replace
 - 10 Nm plus an additional 90° turn
 - Use Original bolts only,
 5. Alignment Bushing
 - Make sure the auxiliary component bracket fits correctly.
 6. Bolt
 - Tightening specifications, refer to **Description and Operation**
 7. Bolt
 - Tightening specifications -20- **TOOTHED BELT ASSEMBLY OVERVIEW**
 8. Idler Roller
 - For the toothed belt
 9. Bolt
 - Tightening specifications -6- **TOOTHED BELT ASSEMBLY OVERVIEW**
 10. Idler Roller
 - For the toothed belt
 11. Bracket for Assemblies
 - Removing and installing, refer to **ACCESSORY ASSEMBLY BRACKET**
 12. High Pressure Pump
 - Removing and installing, refer to **Removal and Installation**
 13. Bolt
 - Tightening specification and sequence **RIBBED BELT DRIVE WITH TENSIONER AND A/C COMPRESSOR ASSEMBLY OVERVIEW**
 14. Generator
 - Removing and installing, refer to **REMOVAL AND INSTALLATION**
 15. Bolt
 - For the correct tightening specification, refer to **[For engine(s) CBRA, BPY, CCTA, CBFA] Specifications**
 16. A/C Compressor
 - Removing and installing, refer to **Removal and Installation**

17. Bolt

- Tightening specifications, refer to **Description and Operation**

18. Alignment Bushing

- Make sure the auxiliary component bracket fits correctly.

19. Bolt

- Tightening specification and sequence **RIBBED BELT DRIVE WITH TENSIONING ROLLER AND A/C COMPRESSOR ASSEMBLY OVERVIEW**

Ribbed Belt Tensioning Roller - Tightening Specification and Sequence

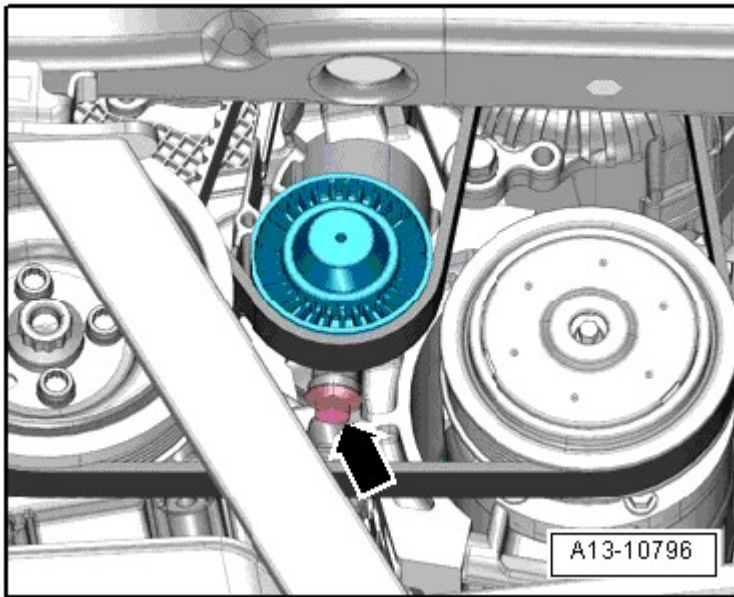


Fig. 4: Identifying Tensioning Roller Bolt

Courtesy of AUDI OF AMERICA, LLC

NOTE: Replace the tensioning roller bolt.

Apply some adhesive lubricating paste to the guide surfaces on the tensioning roller using a paint brush. For the adhesive lubricating paste,

-- Tighten the bolt in 5 steps:

Step	Bolt	Tightening Specification
1.	-arrow-	Install all the way in by hand. • The ribbed belt will

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

		become tensioned.
2.	-arrow-	Turn until the tensioning roller bolt is all the way in. • The ribbed belt will be tensioned further.
3.	-arrow-	Loosen 90°
4.	-arrow-	30 Nm
5.	-arrow-	Tighten an additional 90°.

RIBBED BELT DRIVE WITHOUT A/C COMPRESSOR ASSEMBLY OVERVIEW

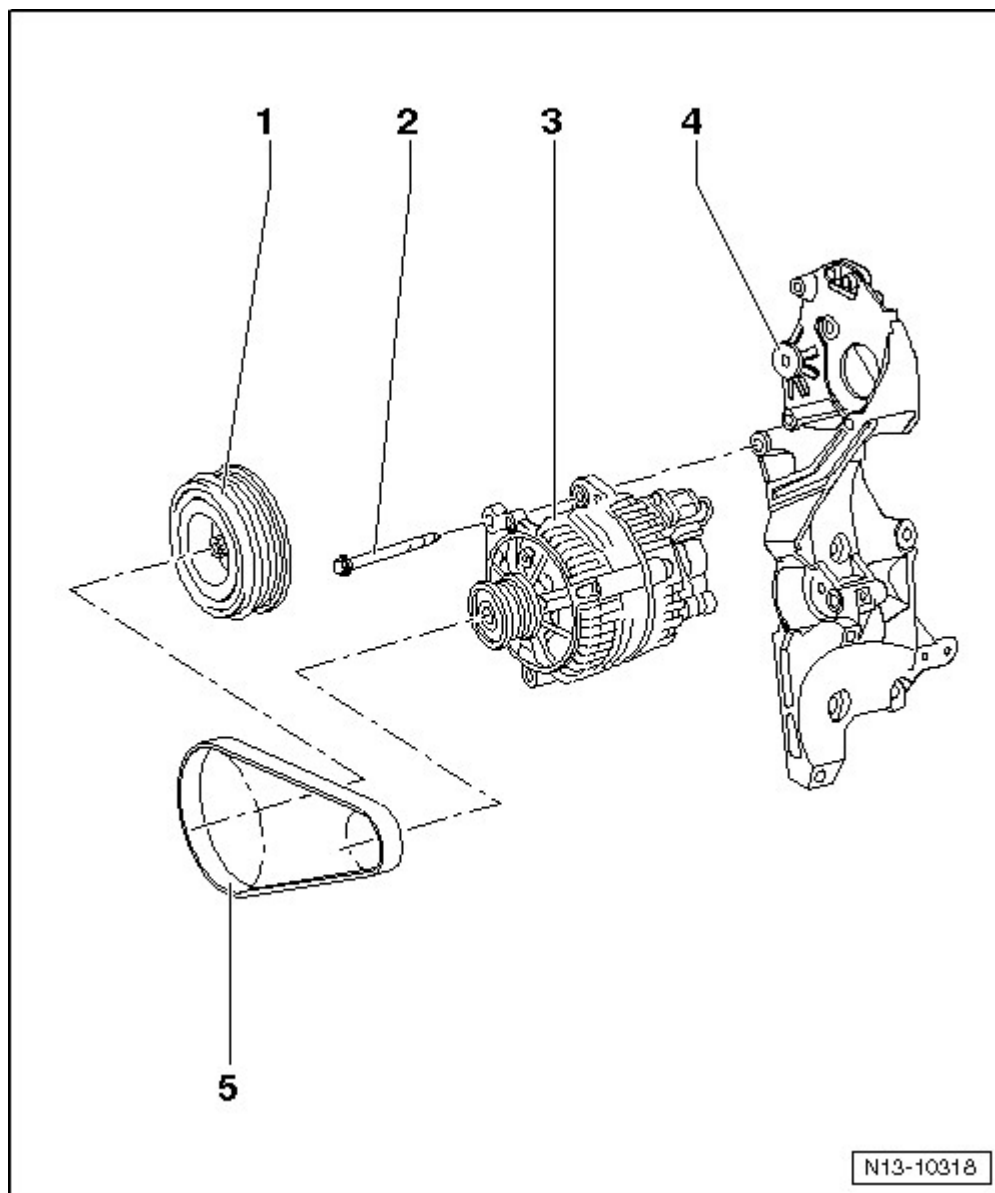


Fig. 5: Ribbed Belt Drive Without A/C Compressor Assembly Overview
 Courtesy of AUDI OF AMERICA, LLC

1. Vibration Damper
 - With ribbed belt pulley
 - The hole inside the vibration damper must be positioned over the protrusion on the crankshaft toothed belt gear.
 - Removing and installing, refer to **VIBRATION DAMPER**
2. Bolt
 - For the correct tightening specification, refer to **[For engine(s) CBRA, BPY, CCTA, CBFA] Specifications**
3. Generator

4. Bracket for Assemblies

- Removing and installing, refer to **ACCESSORY ASSEMBLY BRACKET**

5. Ribbed Belt

- Replace
- Removing and installing, refer to **RIBBED BELT, VEHICLES WITHOUT A/C COMPRESSOR**

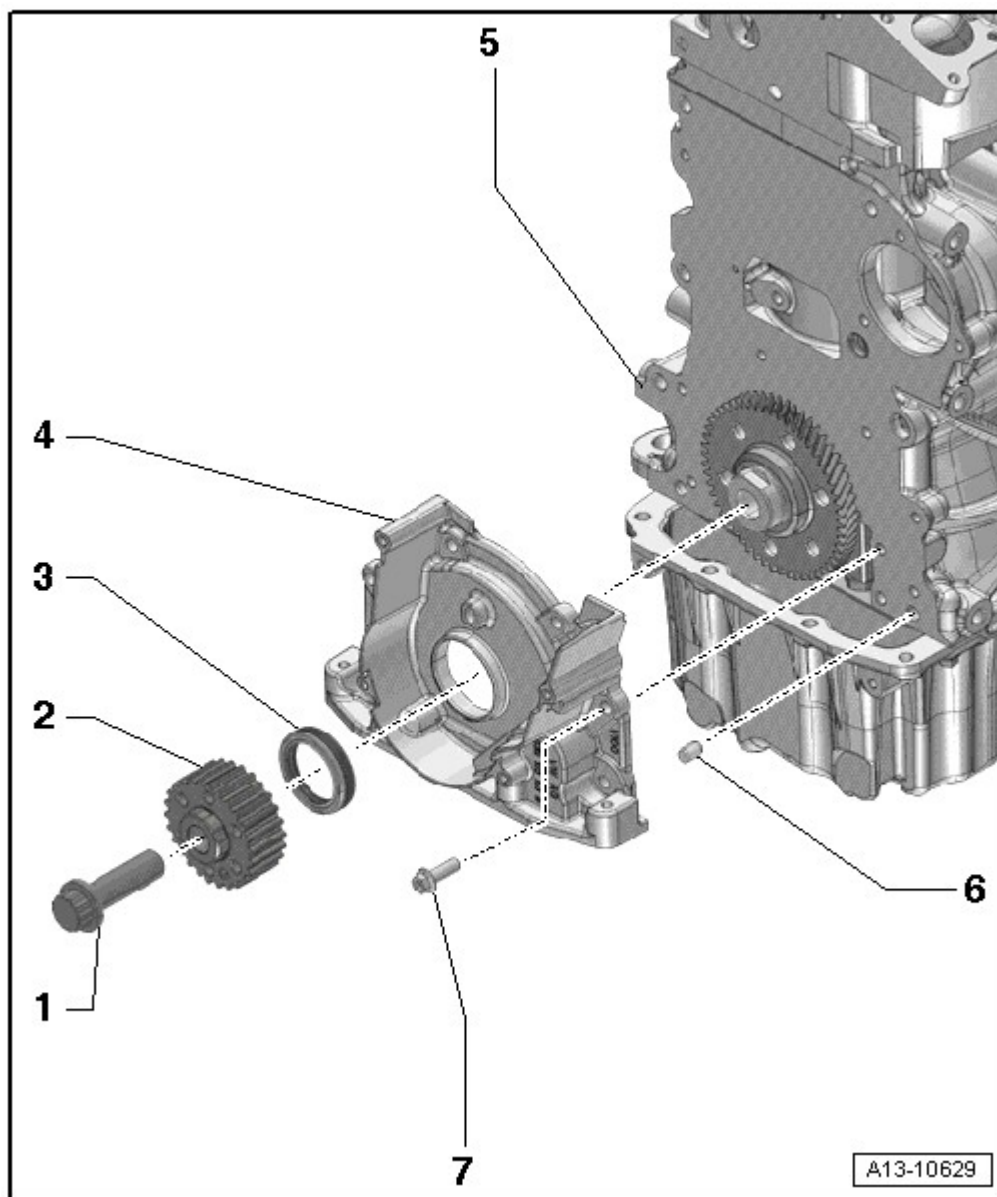
SEALING FLANGE, RIBBED BELT SIDE ASSEMBLY OVERVIEW

Fig. 6: Sealing Flange, Ribbed Belt Side Assembly Overview
Courtesy of AUDI OF AMERICA, LLC

1. Bolt

- Tightening specifications -25- **TOOTHED BELT ASSEMBLY OVERVIEW**
- 2. Crank Shafts - Toothed Belt Gear
 - There must be no oil on the contact surface between the toothed belt sprocket and crankshaft
 - Only possible to install in one position
- 3. Crankshaft Shaft Seal, Belt Pulley Side
 - Replacing, refer to **CRANKSHAFT SHAFT SEAL, BELT PULLEY SIDE, REPLACING.**
 - Do not oil
- 4. Sealing Flange (belt pulley side)
 - Must be located on alignment pins
 - Removing and installing, refer to **SEALING FLANGE, BELT PULLEY SIDE**
- 5. Cylinder Block
- 6. Fitting Pin
 - 2 pieces
- 7. Bolt
 - Tightening specification and sequence **SEALING FLANGE, RIBBED BELT SIDE ASSEMBLY OVERVIEW**

Ribbed Belt Pulley Side Sealing Flange - Tightening Specifications and Sequence

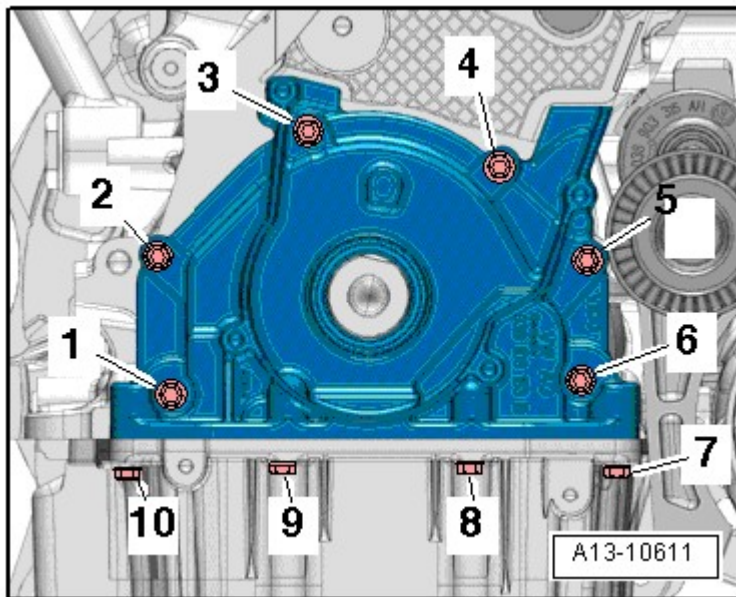


Fig. 7: Tightening Sequence
 Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts for the sealing flange on the pulley side -1 through 10- in steps as follows:-- Install bolts -1 through 10- all the way in by hand.-- Then tighten the bolts -1 to 6- diagonally in stages to 15 Nm.-- Tighten bolts -7 to 10- to 15 Nm.

DUAL MASS FLYWHEEL AND SEALING FLANGE, TRANSMISSION SIDE ASSEMBLY OVERVIEW

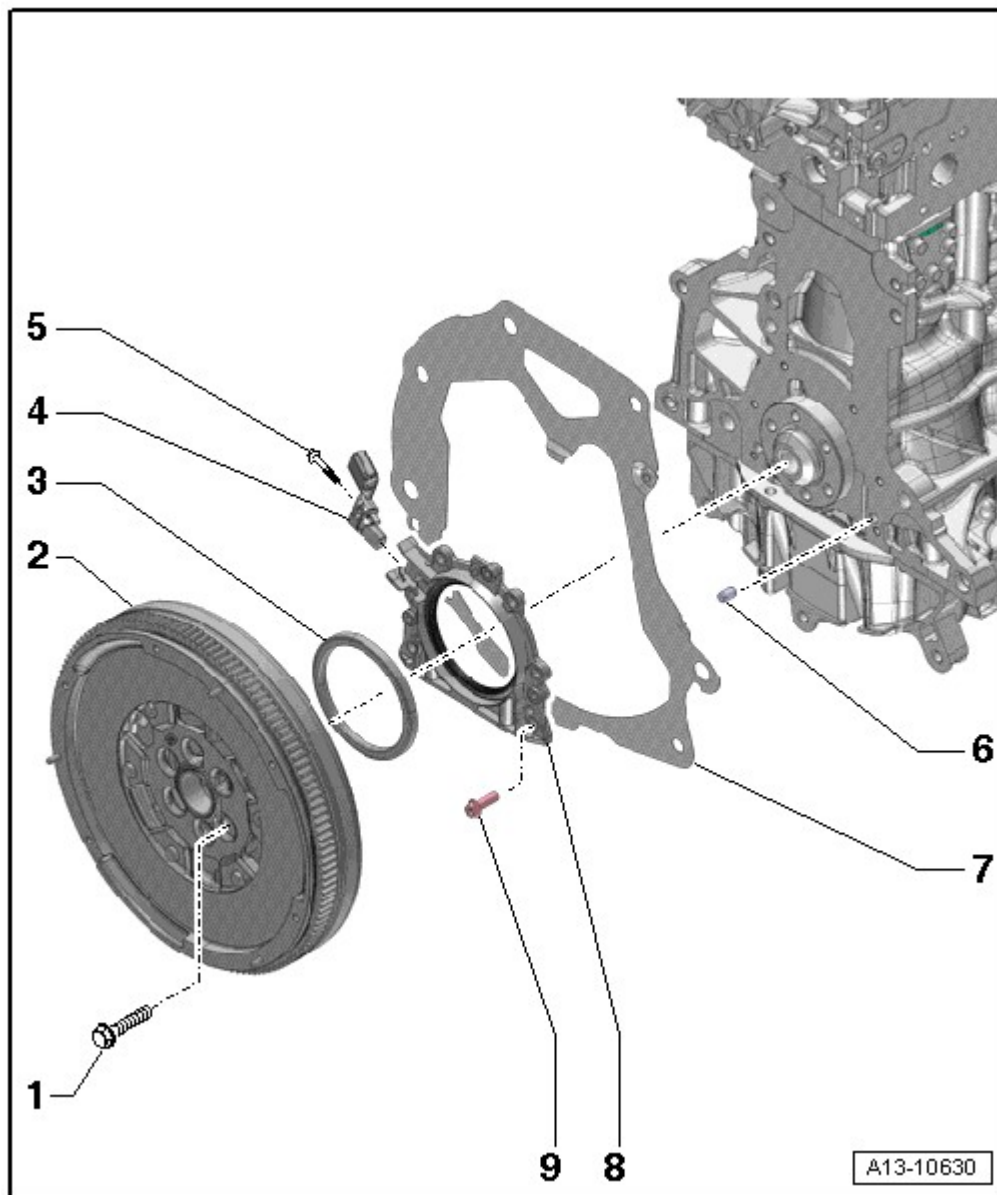


Fig. 8: Dual Mass Flywheel And Sealing Flange, Transmission Side Assembly Overview
 Courtesy of AUDI OF AMERICA, LLC

1. Bolt
 - Replace
 - 60 Nm plus an additional 90° turn
2. Dual Mass Flywheel
 - Removing and installing, refer to **DUAL MASS FLYWHEEL**
 - Assembly is only possible in one position because of the offset holes
3. Sensor Wheel

- For engine speed sensor -G28-
 - Removing and installing, refer to **TRANSMISSION SIDE SEALING FLANGE**
4. Engine Speed Sensor -G28-
 - Removing and installing, refer to **Removal and Installation**
 5. Bolt
 - 4.5 Nm
 6. Fitting Pin
 - 2 pieces
 7. Intermediate Plate
 - Be careful not to damage or bend it when installing.
 - Installing **DUAL MASS FLYWHEEL AND SEALING FLANGE, TRANSMISSION SIDE ASSEMBLY OVERVIEW**
 8. Sealing Flange, Transmission Side
 - With seal
 - Replacing, refer to **TRANSMISSION SIDE SEALING FLANGE.**
 9. Bolt
 - Tightening specification and sequence **DUAL MASS FLYWHEEL AND SEALING FLANGE, TRANSMISSION SIDE ASSEMBLY OVERVIEW**

Installing Intermediate Plate

-- Attach the intermediate plate to the sealing flange -upper arrow- and then push it onto the alignment pins - lower arrows-.

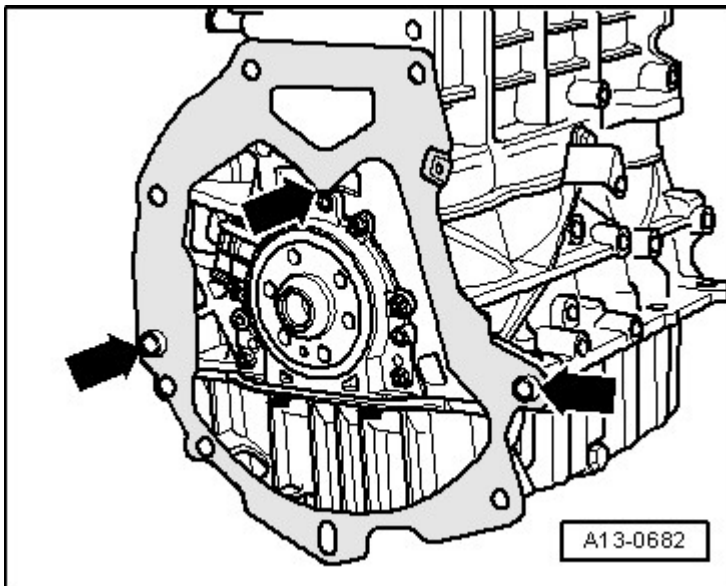


Fig. 9: Identifying Intermediate Plate Is Hooked In At Sealing Flange And Is Pushed Onto Alignment Sleeves

Courtesy of AUDI OF AMERICA, LLC

Ribbed Belt Transmission Side Sealing Flange - Tightening Specifications and Sequence

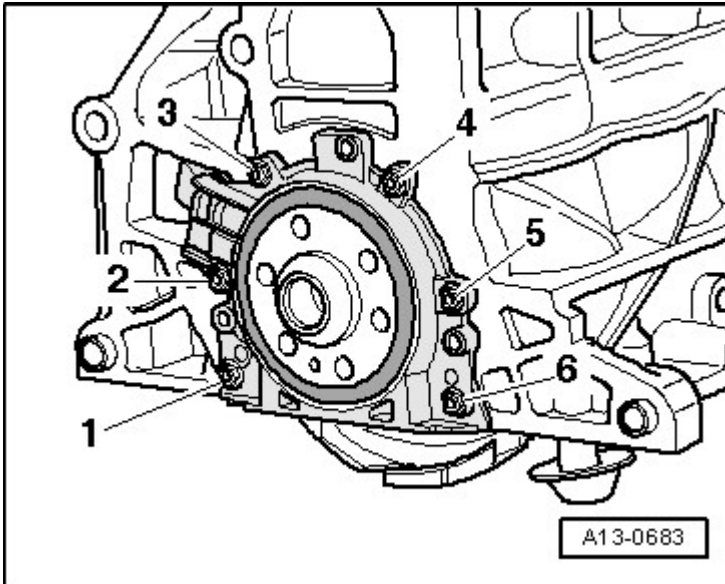


Fig. 10: Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts -1 through 6- in 2 stages as follows:-- Install bolts by hand as far as stop.-- Tighten diagonally and in steps to 15 Nm.

NOTE: Ignore -7 and 8-.

CRANKSHAFT ASSEMBLY OVERVIEW

NOTE: Secure the engine to the engine/transmission holder VW 540. Refer to ENGINE, SECURING TO ENGINE AND TRANSMISSION HOLDER .

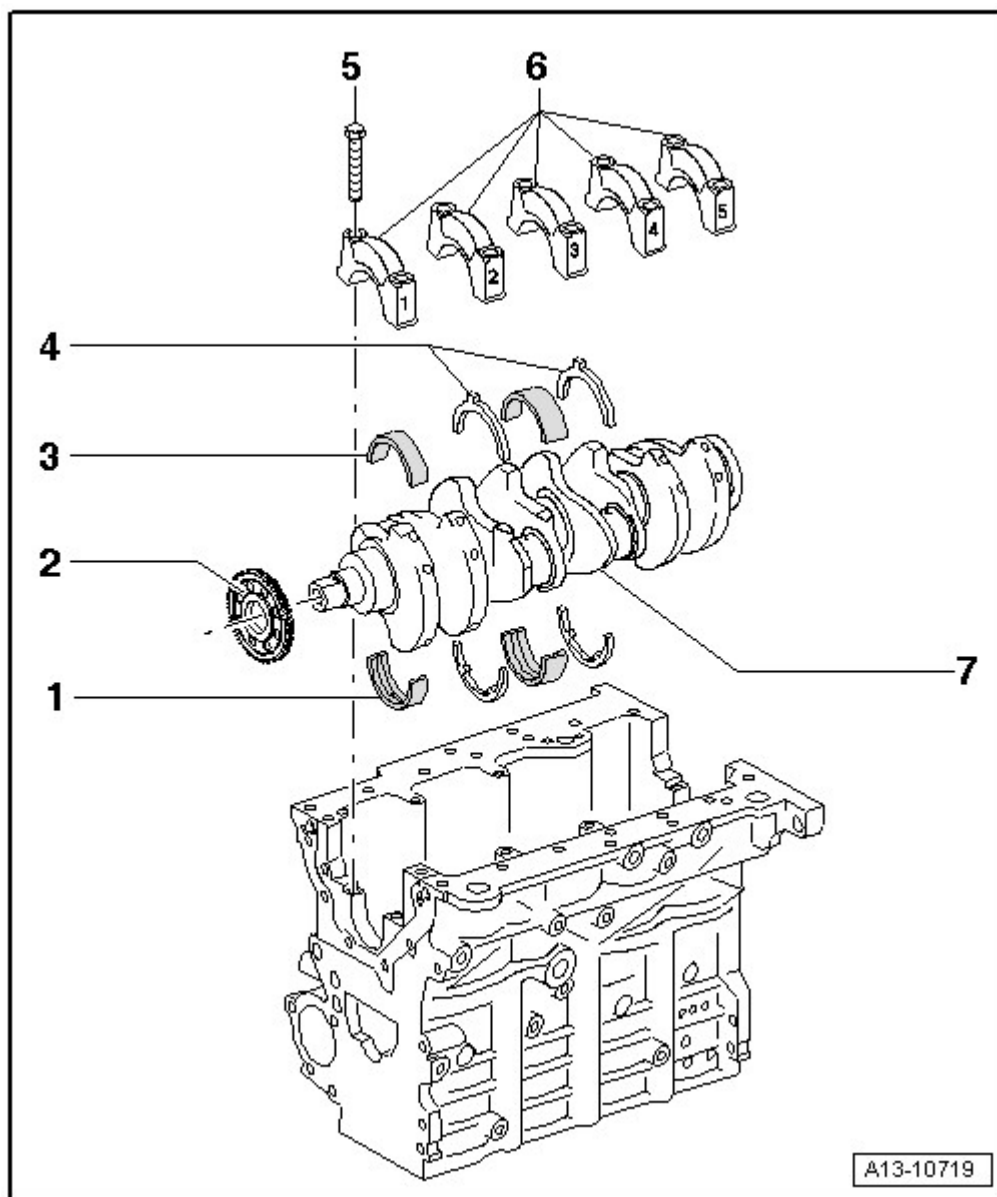


Fig. 11: Crankshaft Assembly Overview

Courtesy of AUDI OF AMERICA, LLC

1. Bearing Shell
 - For cylinder block with oil groove
 - Replace any worn bearing shells
2. Spur Gear
 - Replacing, refer to **SPUR GEAR, REMOVING FROM CRANKSHAFT AND INSTALLING.**
3. Bearing Shell
 - For bearing cap without oil groove
 - Replace any worn bearing shells
4. Thrust Washers

- For bearing 3
- There are different versions of the cylinder block and bearing caps.
- Observe locating point

5. Bolts

- Replace
- 65 Nm plus an additional 90° turn

6. Bearing Cap

- Bearing cap 1: belt pulley side
- Bearing cap 3 with notches for thrust washers
- Installation position: bearing shell retaining tabs in cylinder block and in bearing cap must align

7. Crankshaft

- If the vehicle has a manual transmission, then do not install a needle bearing inside the crankshaft. Remove the needle bearing if necessary. Refer to **NEEDLE BEARING ON CRANKSHAFT**.
- Measuring axial play, refer to **CRANKSHAFT, MEASURING AXIAL PLAY**
- Radial clearance, measuring, refer to **CRANKSHAFT, MEASURING RADIAL PLAY**
- Crankshaft dimensions, refer to **CRANKSHAFT DIMENSIONS**
- With the spur gear for the balance shaft assembly

PISTONS AND CONNECTING ROD ASSEMBLY OVERVIEW

NOTE: Oil spray nozzle and pressure relief valve **PISTONS AND CONNECTING ROD ASSEMBLY OVERVIEW**.

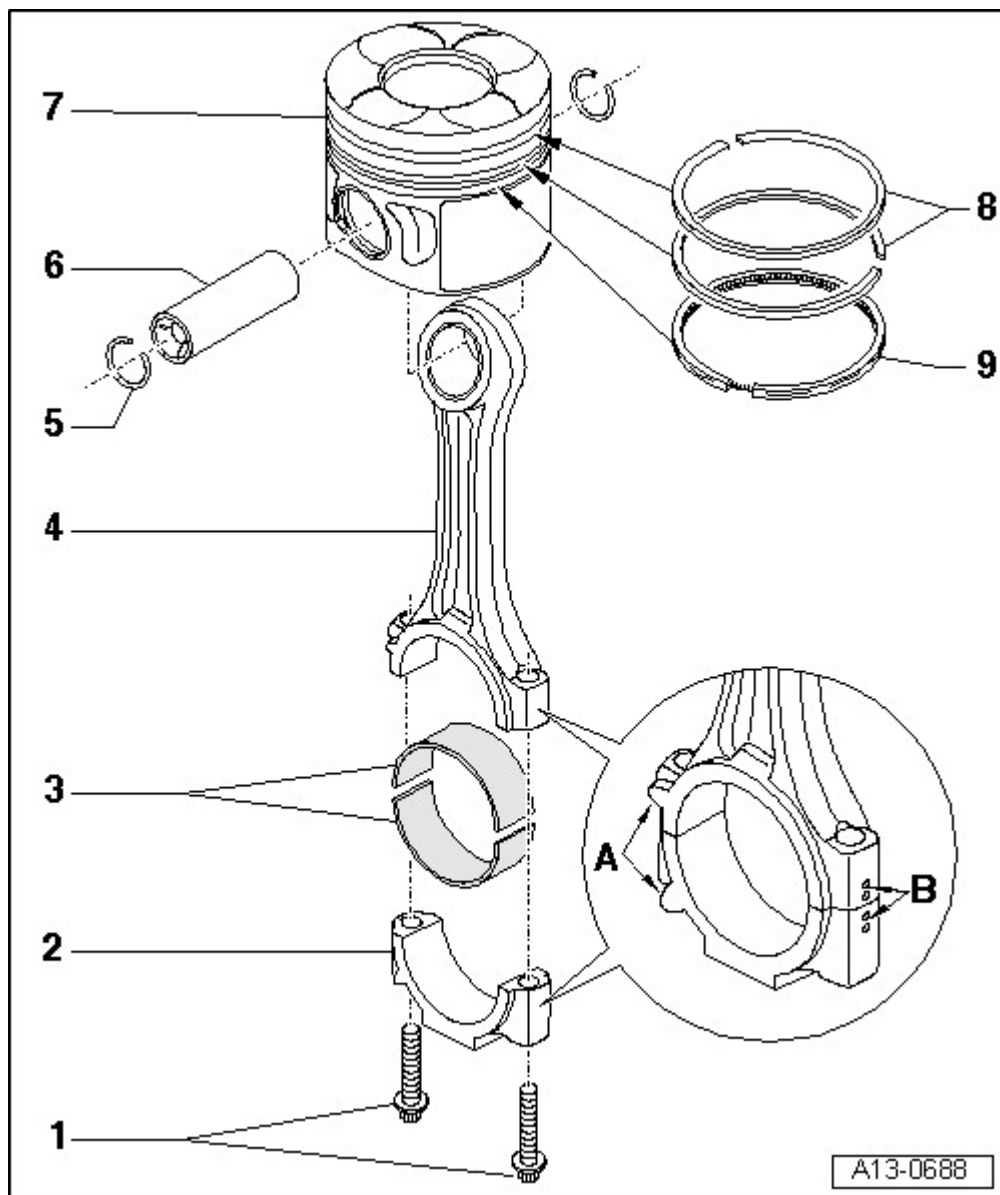


Fig. 12: Pistons And Connecting Rod Assembly Overview

Courtesy of AUDI OF AMERICA, LLC

1. Bolt

- Replace
- 30 Nm plus an additional 90° turn
- Lubricate the threads and contact surface

2. Connecting Rod Bearing Cap

- Due to the separation procedure (cracking) of the connecting rod, the connecting rod bearing cap only fits in one position and only to the corresponding connecting rod.
- Mark allocation to cylinder with paint -B-
- Installed position: markings -A- face the pulley side

3. Bearing Shell

- Installed location **PISTONS AND CONNECTING ROD ASSEMBLY OVERVIEW**
- Replace any worn bearing shells
- Note the version: the upper bearing shell (to piston) is made of wear-resistant material. How to recognize new bearing shells: there is a black line on the contact surface near the separating point.
- Ensure seated tightly

4. Connecting Rod

- Only replace as set
- With a cracked connecting rod bearing cap
- Separate new connecting rod **PISTONS AND CONNECTING ROD ASSEMBLY OVERVIEW**
- Mark allocation to cylinder with paint -B-
- Installation position: markings -A- face the pulley side
- Axial play wear limit: 0.37 mm
- Radial clearance, measuring, refer to **CONNECTING ROD, MEASURING RADIAL CLEARANCE**

5. Circlip

- Replace

6. Piston Pin

- If tight, heat piston to 60 °C (95 °F)
- Removing and installing using a pilot drift VW 222 A

7. Piston

- With combustion chamber
- Mark the installation position and cylinder allocation **PISTONS AND CONNECTING ROD ASSEMBLY OVERVIEW**
- Checking **PISTONS AND CONNECTING ROD ASSEMBLY OVERVIEW**
- Install with piston ring compressor
- Piston and cylinder dimensions, refer to **PISTON AND CYLINDER DIMENSIONS**
- Measuring cylinder bore **PISTONS AND CONNECTING ROD ASSEMBLY OVERVIEW**
- Measure the piston projection at TDC, refer to **PISTON PROJECTION, MEASURING AT TDC**

8. Piston Rings

- Compression rings
- Offset gaps by 120°
- Use piston ring pliers for removal and installation
- Installed position: TOP marking or side with writing faces the piston crown.
- Gap, measuring **PISTONS AND CONNECTING ROD ASSEMBLY OVERVIEW**
- Measuring side clearance **PISTONS AND CONNECTING ROD ASSEMBLY OVERVIEW**

9. Piston Ring

- Oil scraping ring
- Offset gaps by 120° on the lower compression ring
- Use piston ring pliers for removal and installation
- Gap, measuring **PISTONS AND CONNECTING ROD ASSEMBLY OVERVIEW**
- Measuring side clearance **PISTONS AND CONNECTING ROD ASSEMBLY OVERVIEW**

Measuring the Piston Ring Gap

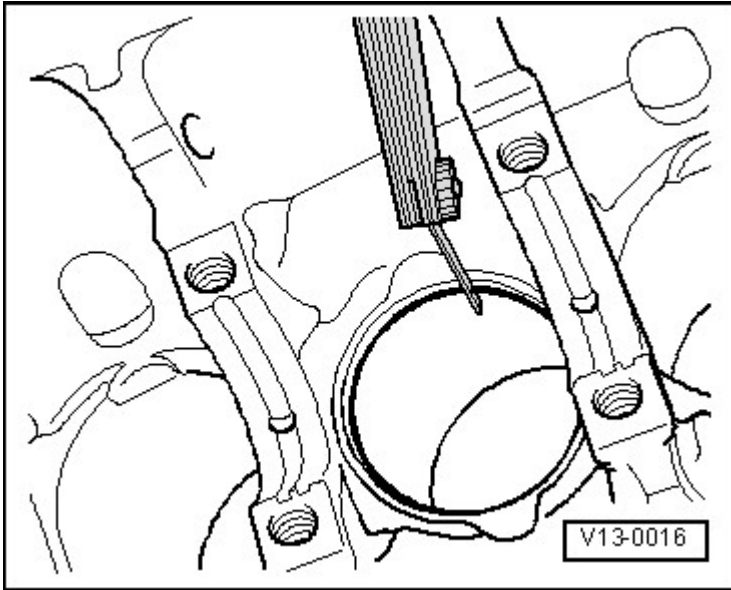


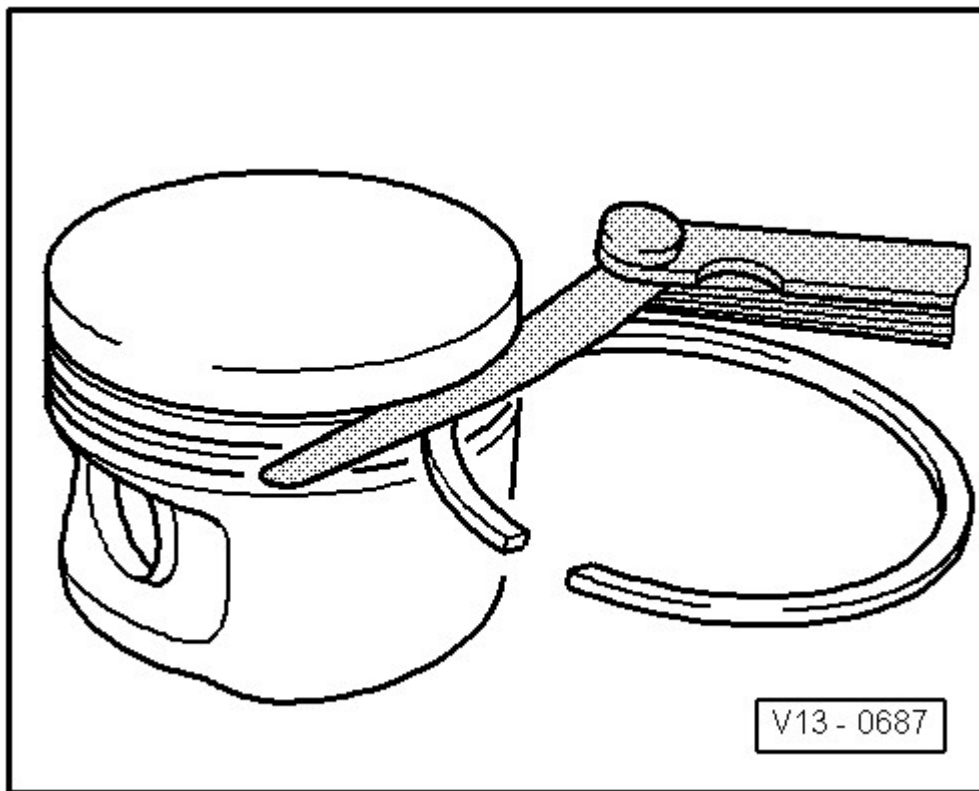
Fig. 13: Checking Piston Ring Gap
Courtesy of AUDI OF AMERICA, LLC

- Push the piston ring squarely from above down to approximately 15 mm from the bottom end of the cylinder.
- Use a piston without a piston ring for sliding in.

Piston ring	New mm	Wear Limit mm
1st Compression ring	0.25 to 0.40	1.00
2nd Compression ring	0.25 to 0.40	1.00
Oil scraping ring	0.25 to 0.50	1.00

Measuring the Ring to Groove Clearance

- Clean the piston ring groove before checking.

**Fig. 14: Checking Piston Ring Gap**

Courtesy of AUDI OF AMERICA, LLC

Piston ring	New mm	Wear Limit mm
1st Compression ring	0.06 to 0.09	0.25
2nd Compression ring	0.05 to 0.08	0.25
Oil scraping ring	0.03 to 0.06	0.15

Pistons, Checking

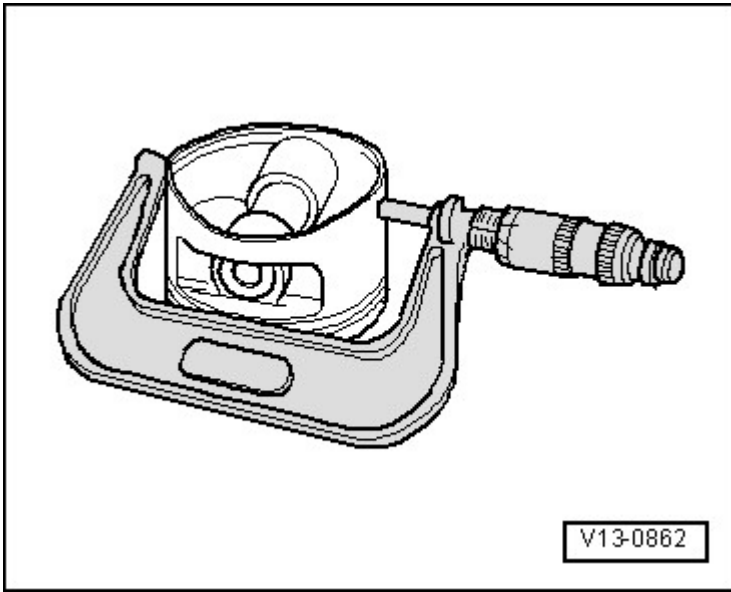


Fig. 15: Checking Piston

Courtesy of AUDI OF AMERICA, LLC

-- Measure approximately 15 mm from the lower edge at a 90° angle to the piston pin axis using a 75 to 100 mm external micrometer.

- Maximum deviation from the specified dimension: 0.04 mm.

Nominal dimension, refer to **PISTON AND CYLINDER DIMENSIONS**.

NOTE: **A piston must be replaced if there are cracks on the piston shaft.**

Piston Installed Location and Allocation, Piston to Cylinder

- Arrow on the piston crown -arrows- facing the pulley side.

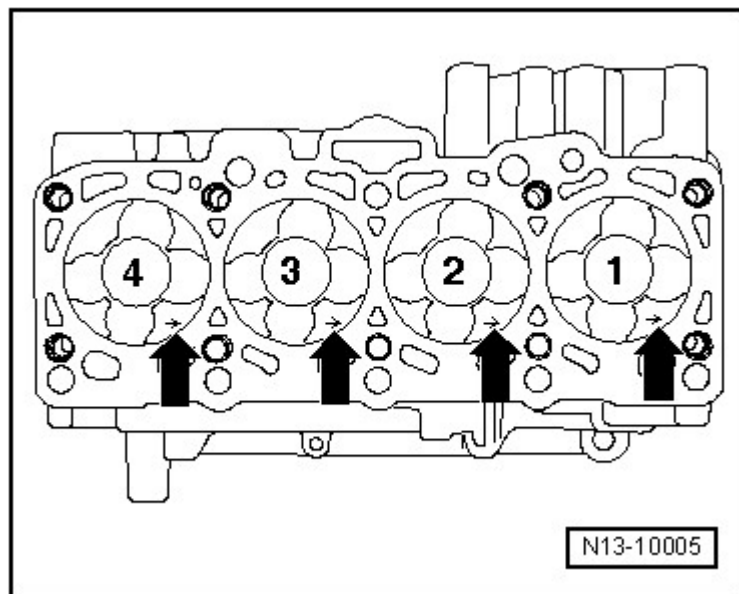


Fig. 16: Identifying Installed Position of the Piston and Piston/Cylinder Allocation
Courtesy of AUDI OF AMERICA, LLC

Measuring Cylinder Bore

-- Using a cylinder gauge VAS 6078 measure diagonally at 3 positions transversely -A- and longitudinally -B-.

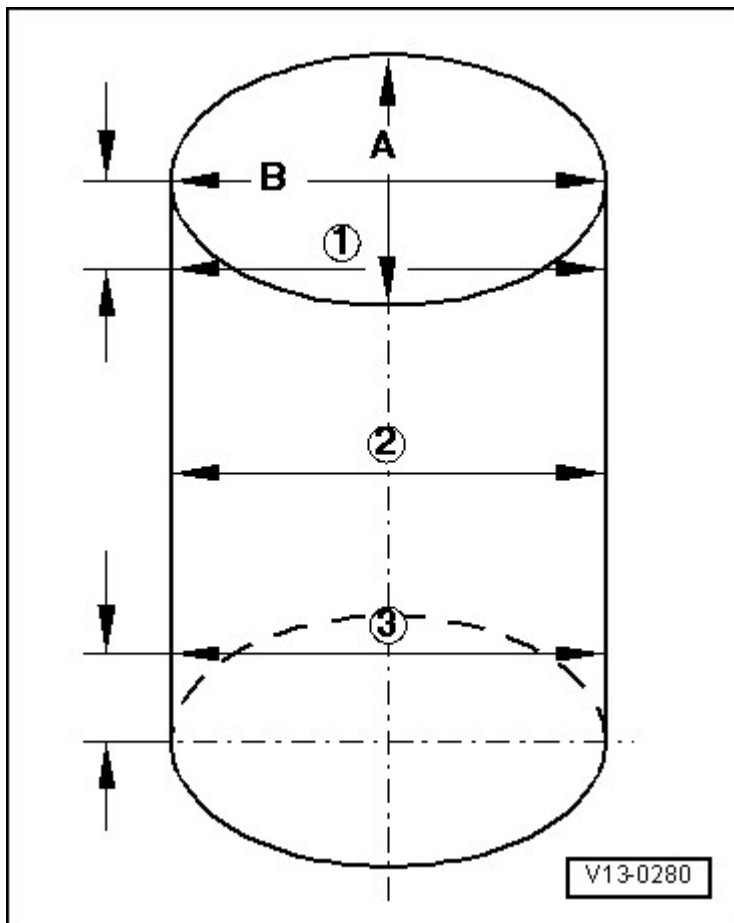


Fig. 17: Checking Cylinder Bores

Courtesy of AUDI OF AMERICA, LLC

- Maximum deviation from the specified dimension: 0.10 mm.

Nominal dimension, refer to **PISTON AND CYLINDER DIMENSIONS**.

Bearing Shell Installation Position in the Connecting Rods

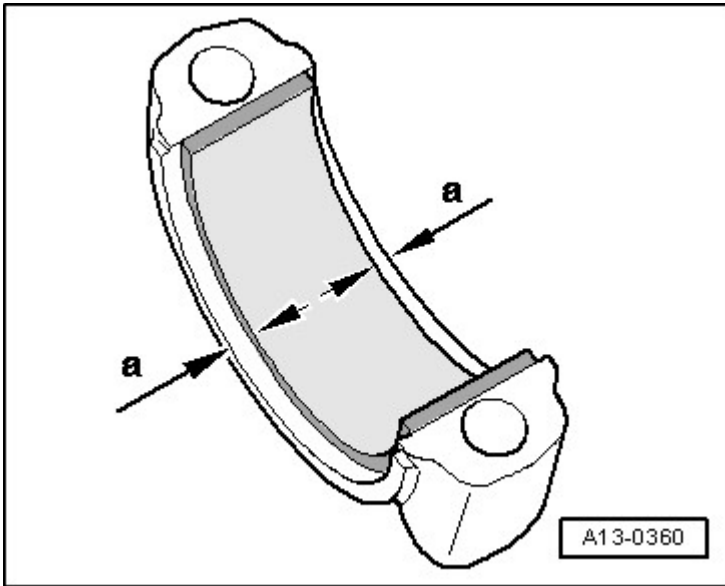


Fig. 18: Installation Position Of Bearing Shells
Courtesy of AUDI OF AMERICA, LLC

-- Install the bearing shells into the center of the connecting rod and into the connecting rod bearing cap.

- Dimension -a- = 2.5 mm.

Separating the New Connecting Rod

New connecting rods may not be separated at the location where they should be. If it difficult to remove the connecting rod bearing cap by hand, do the following:

-- Clamp the connecting rod in a vise, which has protectors over the grips to prevent damage.

- Clamp the connecting rod below the dotted line.

-- Remove the bolts -arrows- approximately 5 turns.

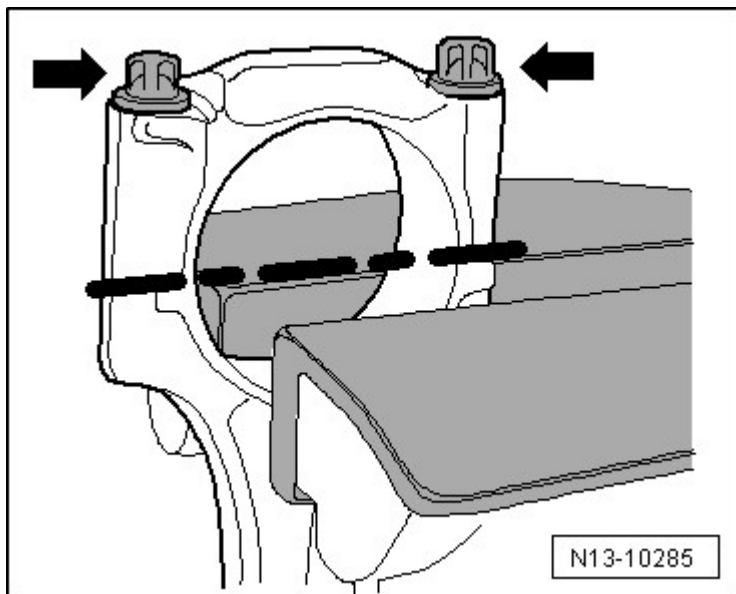


Fig. 19: Clamping Connecting Rod In Vise Equipped With Aluminum Protective Pads
Courtesy of AUDI OF AMERICA, LLC

-- Carefully tap the connecting rod bearing cap with a plastic hammer -arrow- until it comes loose.

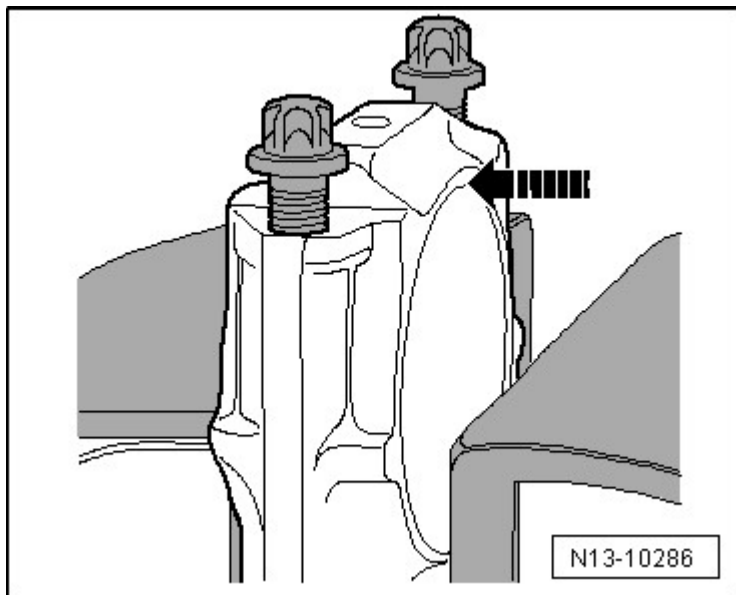
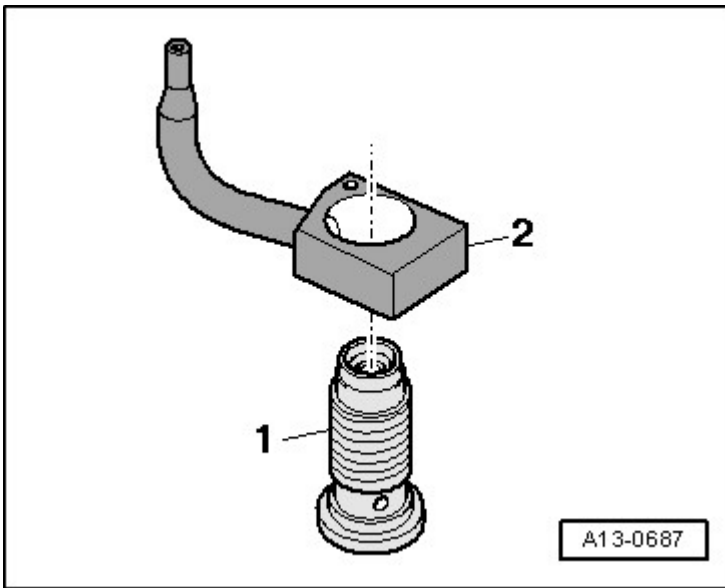


Fig. 20: Carefully Tapping Against Connecting Rod Bearing Cap
Courtesy of AUDI OF AMERICA, LLC

Oil Spray Jet and Pressure Relief Valve

**Fig. 21: Oil Spray Jet and Pressure Relief Valve**

Courtesy of AUDI OF AMERICA, LLC

1. Bolt with pressure relief valve - 27 Nm
 2. Oil spray jet (for piston cooling)
- Installation position: the guiding edge of the oil spray jet to the machined surface of the cylinder block.

NOTE: Do not bend the oil spray nozzles.**Replace the oil spray nozzles if they are bent.****SPECIFICATIONS****CRANKSHAFT DIMENSIONS**

Honing Dimension	Crankshaft Bearing Pin Diameter mm	Connecting Rod Pins-Diameter mm
Basic dimension	54.00-0.022 -0.042	50.90-0.022 -0.042

PISTON AND CYLINDER DIMENSIONS

Honing Dimension	Piston Diameter mm	Cylinder Bore Diameter mm
Basic dimension	80.96 ¹⁾	81.01

- ¹⁾ Measurement with coating (thickness = 0.02 mm). The coating wears off.

FASTENER TIGHTENING SPECIFICATIONS

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

Component	Bolt Size	Nm
Bearing Cap		65 + 90° ¹
Bracket for Assemblies		23 ²
Connecting Rod		30 + 90° ¹
Dual Mass Flywheel ¹		60 + 90°
Engine Speed (RPM) Sensor		4.5
Generator		25
Pressure Relief Valve		27
Sealing Flange, Transmission Side		15
Vibration Damper		10 + 90° ¹
¹ Always replace ² For bolt tightening clarification, refer to <u>RIBBED BELT DRIVE WITH TENSIONER AND A/C COMPRESSOR ASSEMBLY OVERVIEW</u> and see items -5, 7, 14 and 15-		

Accessory Assembly Bracket - Tightening Specifications and Tightening Sequence

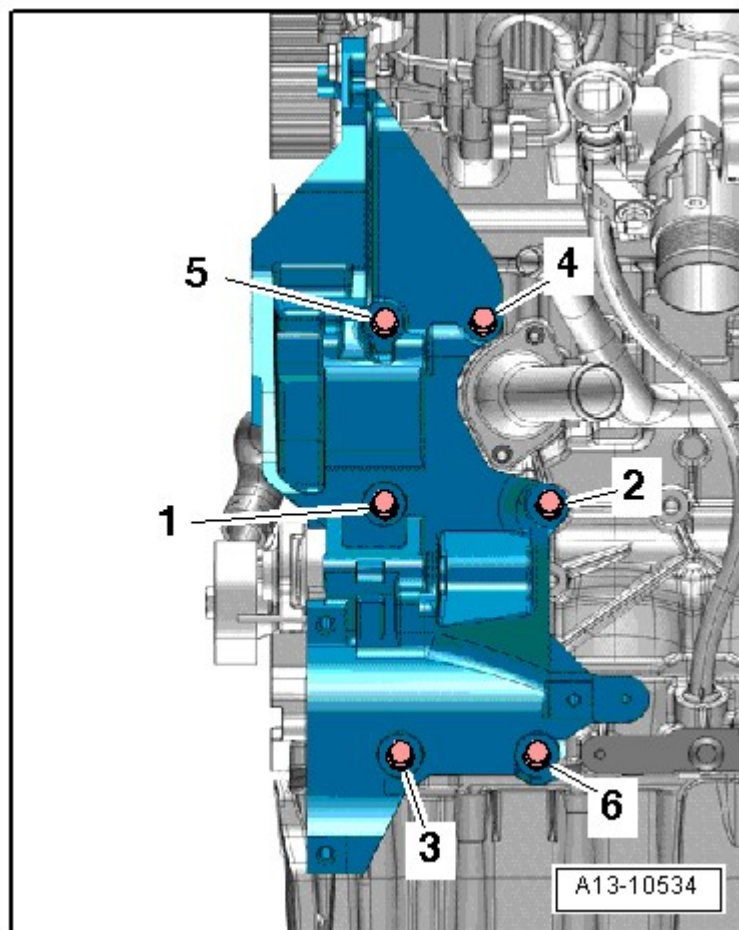


Fig. 22: Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

-- Replace the bolts for the auxiliary component bracket as follows:

- Bolts -1- and -2- M10 x 52.
- Bolts -3- and -6- M10 x 30.
- Bolts -4- and -5- M10 x 60.

-- Tighten the auxiliary component bracket bolts in 2 steps in sequence -1 through 6- :

-- Install the bolts all the way by hand.

-- Tighten the bolts to 40 Nm.

-- Tighten the bolts -3- and -6- 45° further.

-- Tighten the bolts -1, 2, 4 and 5- 90° further.

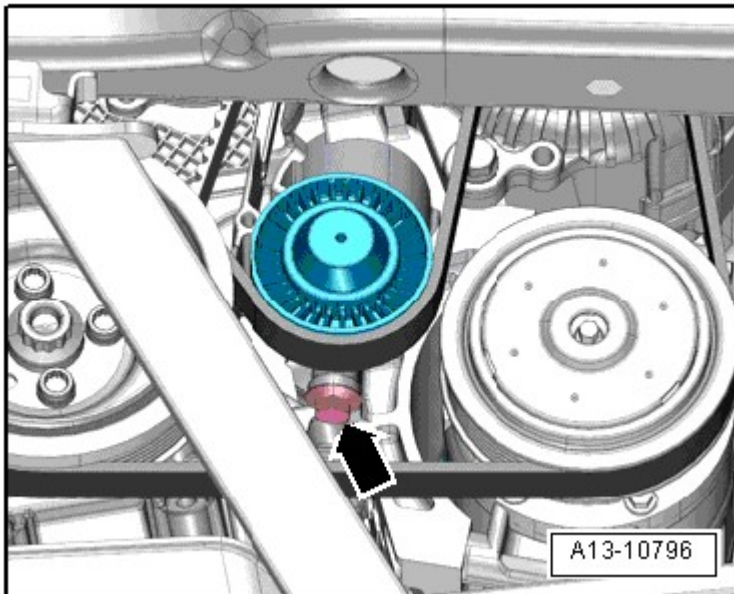
Ribbed Belt Tensioning Roller - Tightening Specification and Sequence

Fig. 23: Identifying Tensioning Roller Bolt

Courtesy of AUDI OF AMERICA, LLC

NOTE: **Replace the tensioning roller bolt.**

Apply some adhesive lubricating paste to the guide surfaces on the tensioning roller using a paint brush. For the adhesive lubricating paste,

-- Tighten the bolt in 5 steps:

Step	Bolt	Tightening Specification
1	-arrow-	Install all the way in by hand. The ribbed belt will become tensioned.
2	-arrow-	Turn until the tensioning roller bolt is all the way in. The ribbed belt will be tensioned further.
3	-arrow-	Loosen 90°
4	-arrow-	30 Nm
5	-arrow-	Tighten an additional 90°.

Ribbed Belt Pulley Side Sealing Flange - Tightening Specifications and Sequence

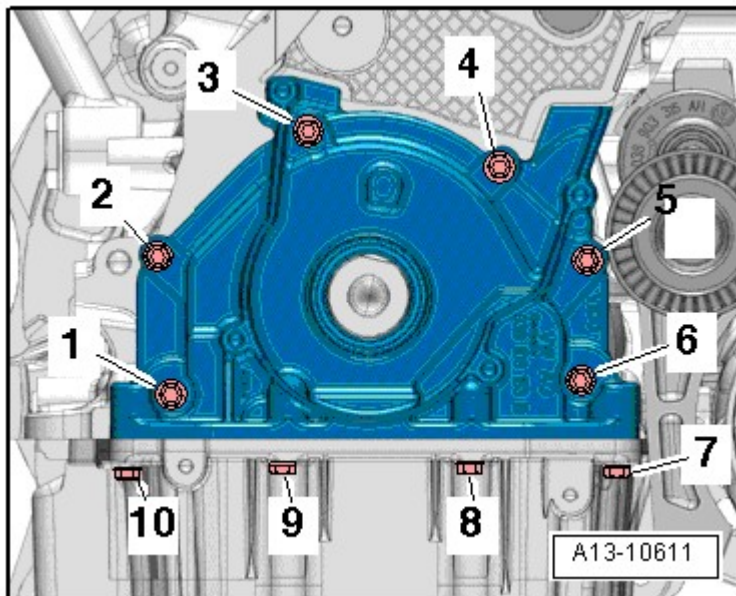


Fig. 24: Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts for the sealing flange on the pulley side -1 through 10- in steps as follows:-- Install bolts -1 through 10- all the way in by hand.-- Then tighten the bolts -1 to 6- diagonally in stages to 15 Nm.-- Tighten bolts -7 to 10- to 15 Nm.

Ribbed Belt Transmission Side Sealing Flange - Tightening Specifications and Sequence

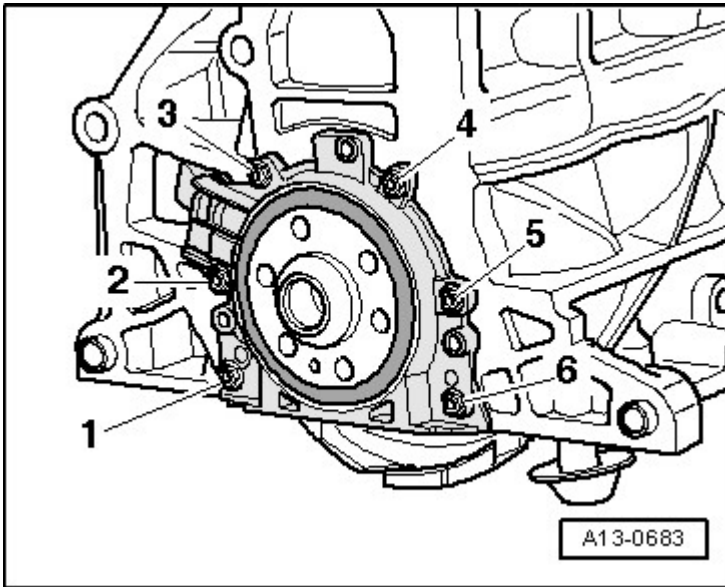


Fig. 25: Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts -1 through 6- in 2 stages as follows:-- Install bolts by hand as far as stop.-- Tighten diagonally and in steps to 15 Nm.

DIAGNOSIS AND TESTING

CRANKSHAFT, MEASURING AXIAL PLAY

Special tools and workshop equipment required

- Dial Gauge Holder VW 387
- Dial Gauge VAS 6079

Procedure

-- Secure the VAS 6079 with the VW 387 to the cylinder block, as illustrated, place it against the crankshaft counterweight.

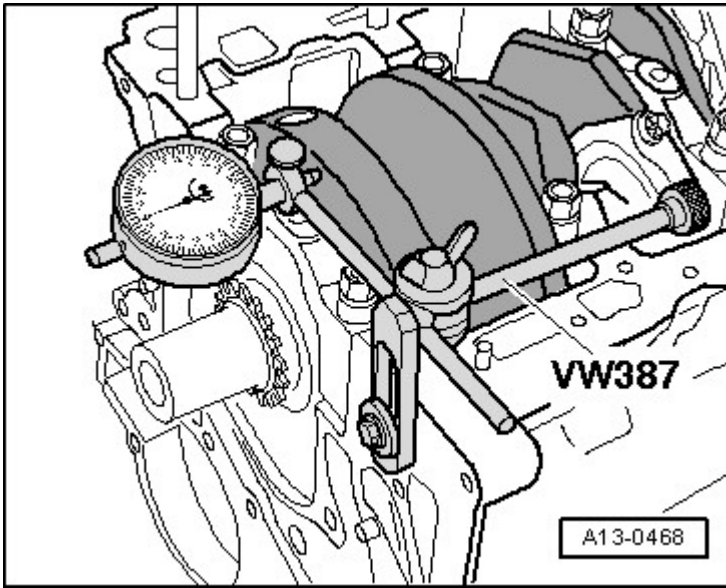


Fig. 26: Attaching Dial Indicator Together With VW387 Dial Gauge Holder To Cylinder Block And Set Indicator Against Crankshaft Counterweight
Courtesy of AUDI OF AMERICA, LLC

- Press crankshaft against dial gauge by hand.
- Set dial gauge to 0.
- Press crankshaft off dial indicator and read the value.

Axial clearance:

- New: 0.07 to 0.17 mm
- Wear limit: 0.37 mm.

CRANKSHAFT, MEASURING RADIAL PLAY

Special tools and workshop equipment required

- Plastigage

Procedure

- Remove the bearing covers and clean the bearing journals.
- Place the Plastigage over the entire width of the bearing journal or into the bearing shells.
 - Plastigage must rest in center of bearing shell.
- Install the bearing cap and tighten it to 65 Nm without any additional turns. Do not turn crankshaft.

-- Reinstall bearing cap.

-- Compare width of Plastigage with calibrated scale.

Radial clearance:

- New: 0.03 to 0.08 mm.
- Wear limit: 0.17 mm.

PISTON PROJECTION, MEASURING AT TDC

NOTE: Check the piston projection at TDC whenever installing a new piston or new part of the engine.

If varying values occur when measuring the projection, use the cylinder head gasket for the largest value.

Depending on the piston projection, install the cylinder head seal according to the following table.

Special tools and workshop equipment required

- Measuring Bar VW 382/7 from the Special Socket and Measuring Tools VW 382
- Magnetic Plate 50 mm Dia. VW 385/17 from Universal Measuring Tool VW 385
- Dial Gauge VAS 6079

Procedure

-- Mount the VAS 6079 together with the VW 382/7 and the VW 385/17 to the cylinder block as illustrated.

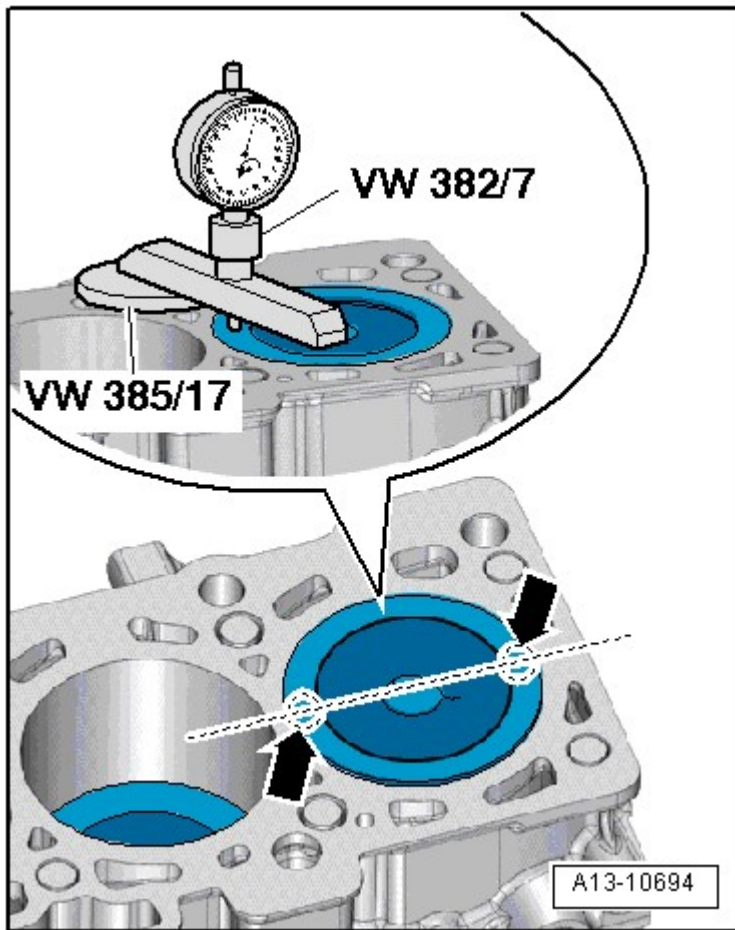


Fig. 27: Identifying Measuring Bar VW 382/7 And VW 385/17 On Cylinder Block
 Courtesy of AUDI OF AMERICA, LLC

-- Measure the projection on each piston at both spots identified with -arrows- (at the front and back of the piston).

-- Depending on the piston projection, install the correct cylinder head seal according to the following table:

Piston Projection Above the Upper Edge of the Cylinder Block mm	Identification Holes
0.91 to 1.00	1
1.01 to 1.10	2
1.11 to 1.20	3

Cylinder Head Seal Identification

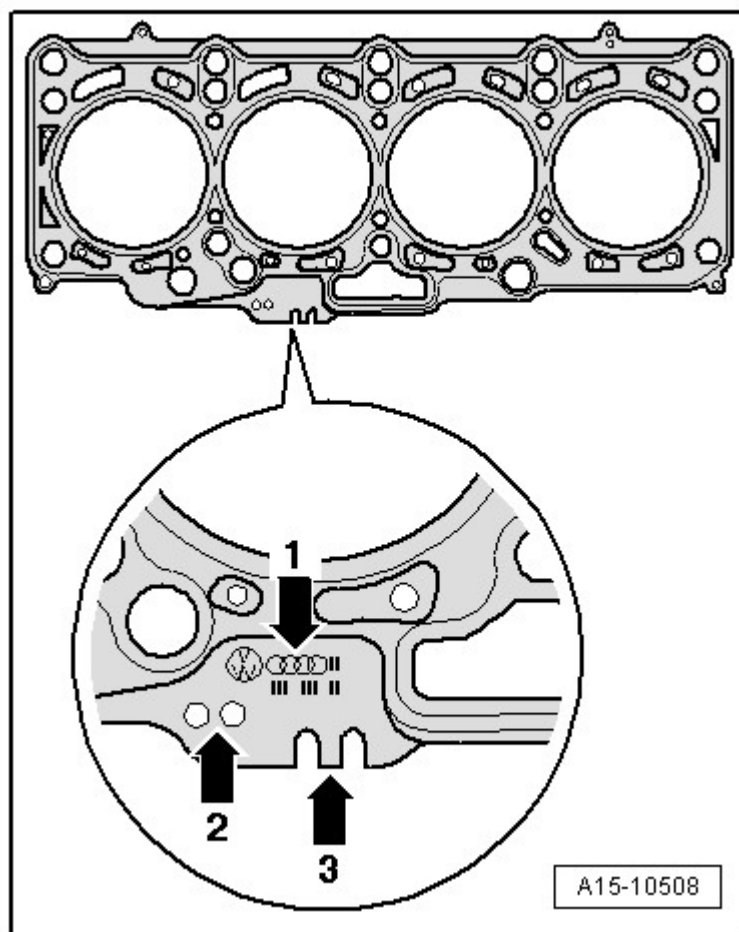


Fig. 28: Identifying Cylinder Head Gasket Identification
Courtesy of AUDI OF AMERICA, LLC

1. Part number:
2. Holes
3. ignore.

NOTE: If varying values occur when measuring the projection, use the cylinder head gasket for the largest value.

CONNECTING ROD, MEASURING RADIAL CLEARANCE

Special tools and workshop equipment required

- Plastigage

Procedure

-- Remove 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.
- Reinstall connecting rod cover.
- Compare width of Plastigage with calibrated scale.

Radial clearance:

- Wear limit: 0.08 mm.

- Replace connecting rod bolts.

REMOVAL AND INSTALLATION

RIBBED BELT, VEHICLES WITH TENSIONING DAMPER AND A/C COMPRESSOR

Special tools and workshop equipment required

- Locking Pin T10060 A

Removing

- Remove the noise insulation -1-. Refer to **Removal and Installation** .

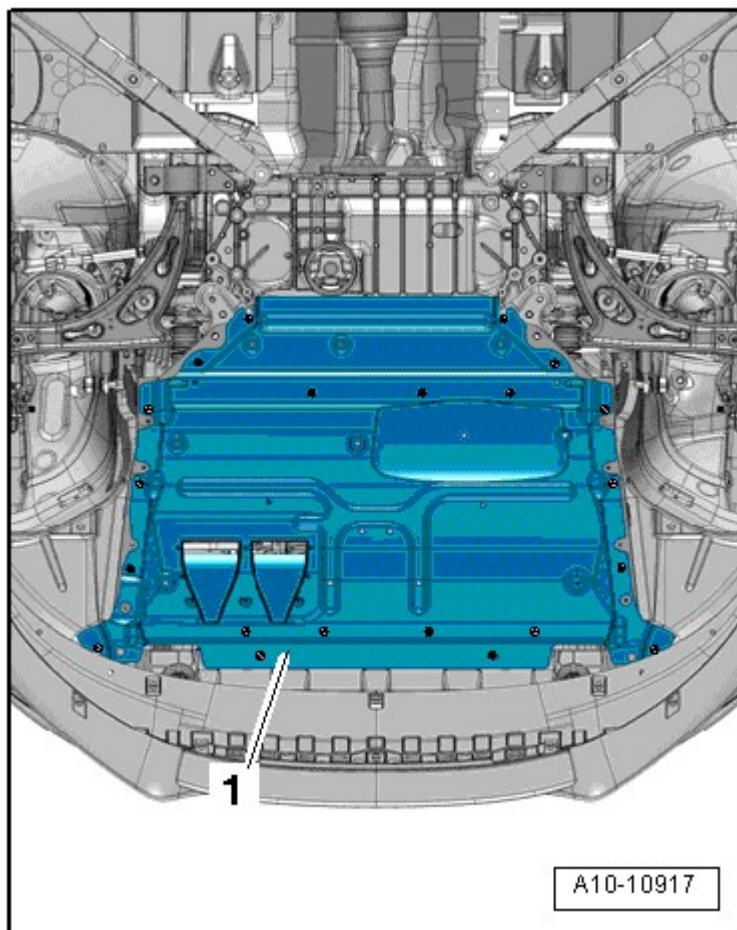


Fig. 29: Noise Insulation

Courtesy of AUDI OF AMERICA, LLC

-- Remove the front section of the right front wheel housing liner. Refer to **Removal and Installation** .

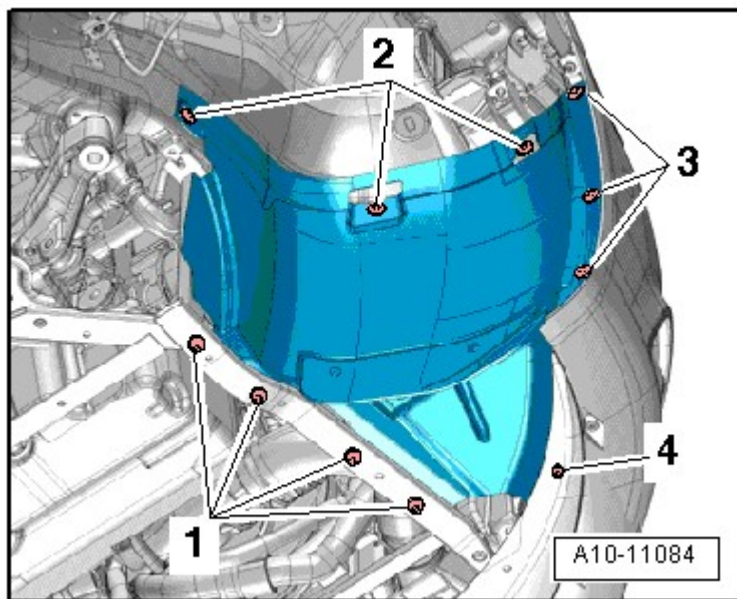


Fig. 30: Front Section Of The Right Front Wheel Housing Liner
Courtesy of AUDI OF AMERICA, LLC

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.

-- Pivot the tensioner clockwise -arrow- to release the tension on the ribbed belt.

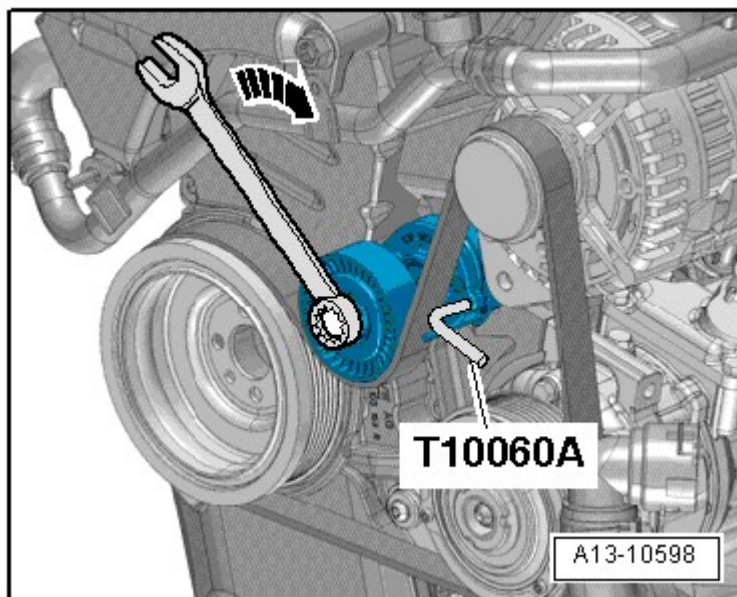


Fig. 31: Pivoting Tensioner And Securing Tensioning Element With T10060 A
Courtesy of AUDI OF AMERICA, LLC

-- Secure the tensioning element with T10060 A.

-- Remove ribbed belt.

Installing

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

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

-- Mount the ribbed belt on the ribbed belt pulley.

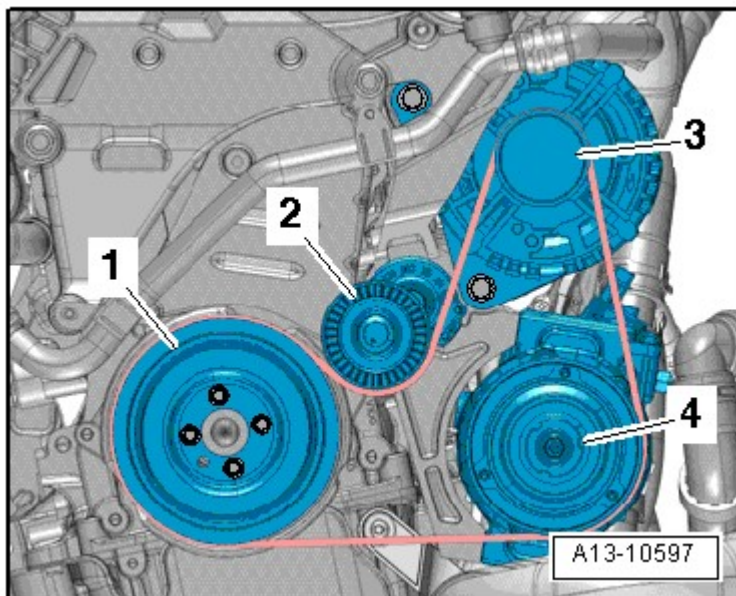


Fig. 32: Identifying Vibration Damper, Belt Tensioner, Generator And A/C Compressor
Courtesy of AUDI OF AMERICA, LLC

1. Vibration damper
2. Tensioning element
3. Generator
4. A/C Compressor

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

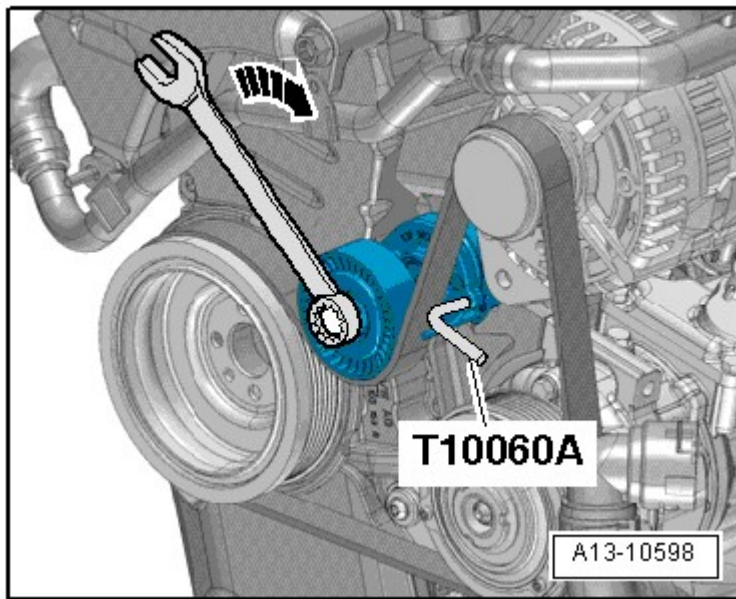


Fig. 33: Pivoting Tensioner And Securing Tensioning Element With T10060 A
Courtesy of AUDI OF AMERICA, LLC

- Release the tension on the tensioner.
- Check ribbed belt for correct positioning.
- Start the engine and check the belt routing.
- Install the front section of the front wheel housing liner. Refer to **Removal and Installation** .
- Install the noise insulation. Refer to **Removal and Installation** .

RIBBED BELT TENSIONER

Removing

- Remove the ribbed belt from the tensioning element. Refer to **RIBBED BELT, VEHICLES WITH TENSIONING DAMPER AND A/C COMPRESSOR**.
- Loosen the hose clamp -2-, lift the retaining clamp -1- just a little and remove the air guide hose.

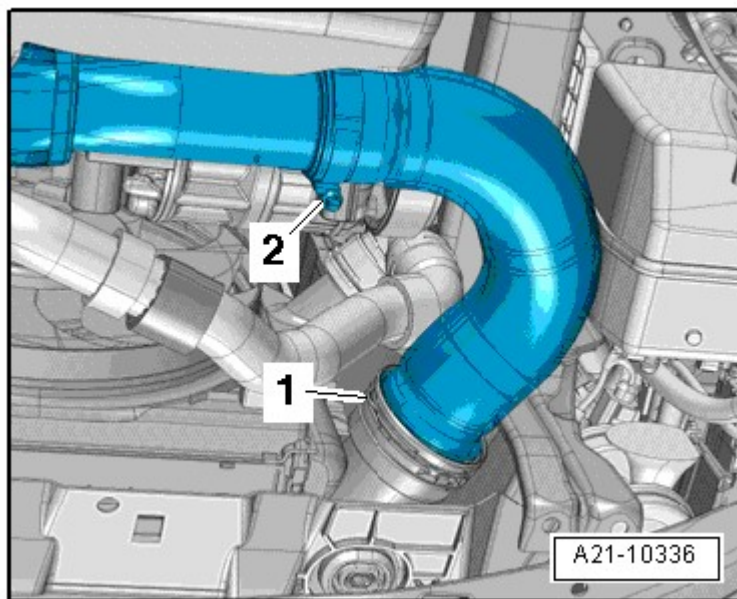


Fig. 34: Identifying Clamp -2- And Circlip -1-
Courtesy of AUDI OF AMERICA, LLC

-- Remove bolts -arrows-.

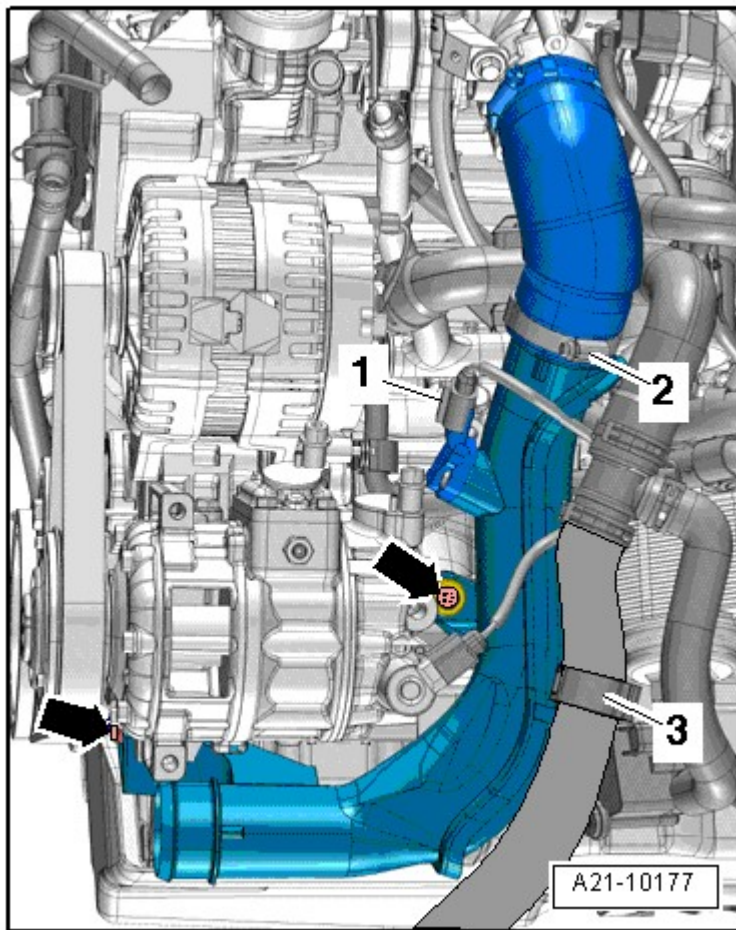


Fig. 35: Identifying Charge Air Pipe Bolts
 Courtesy of AUDI OF AMERICA, LLC

- Free up the coolant hose -3-.
- Loosen the hose clamp -2-.
- Disconnect the connector -1- on the charge air pressure sensor -G31- and then remove the air guide pipe.
- Remove the bolt -2- and remove the ribbed belt tensioner -1-.

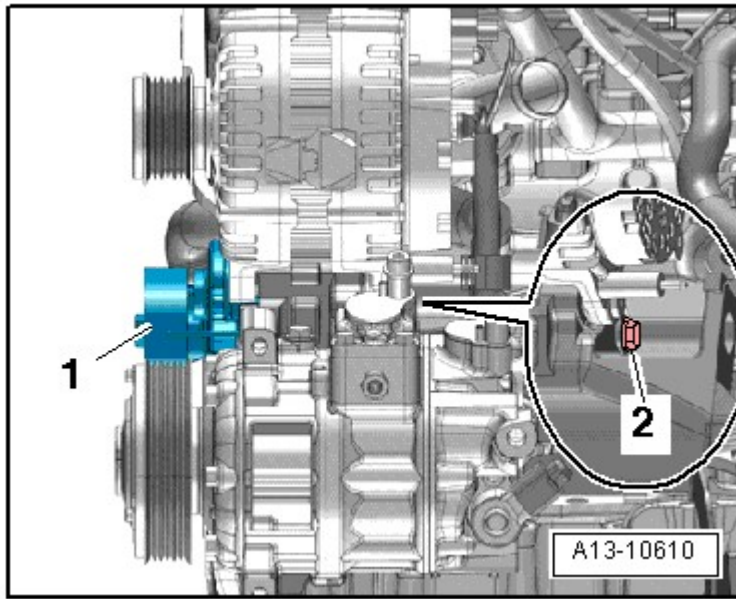


Fig. 36: Identifying Bolt And Belt Tensioner
Courtesy of AUDI OF AMERICA, LLC

Installing

- Tightening specifications, refer to **RIBBED BELT DRIVE WITH TENSIONER AND A/C COMPRESSOR ASSEMBLY OVERVIEW**.

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

- Install the air guide pipe. Refer to **CHARGE AIR COOLER ASSEMBLY OVERVIEW** .
- Install ribbed belt. Refer to **RIBBED BELT, VEHICLES WITH TENSIONING DAMPER AND A/C COMPRESSOR**.

RIBBED BELT, VEHICLES WITH TENSIONING ROLLER AND A/C COMPRESSOR

Removing

- Remove the noise insulation -1-. Refer to **Removal and Installation** .

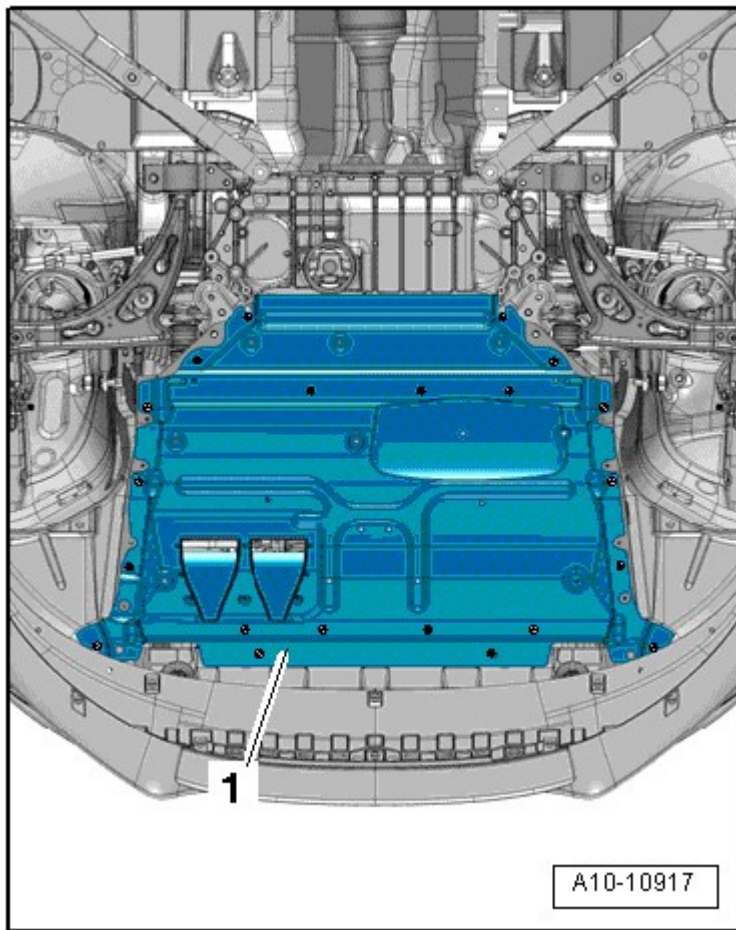


Fig. 37: Noise Insulation

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.

-- Remove the adjusting bolt -arrow- to release the tension on the ribbed belt and remove the tensioning roller.

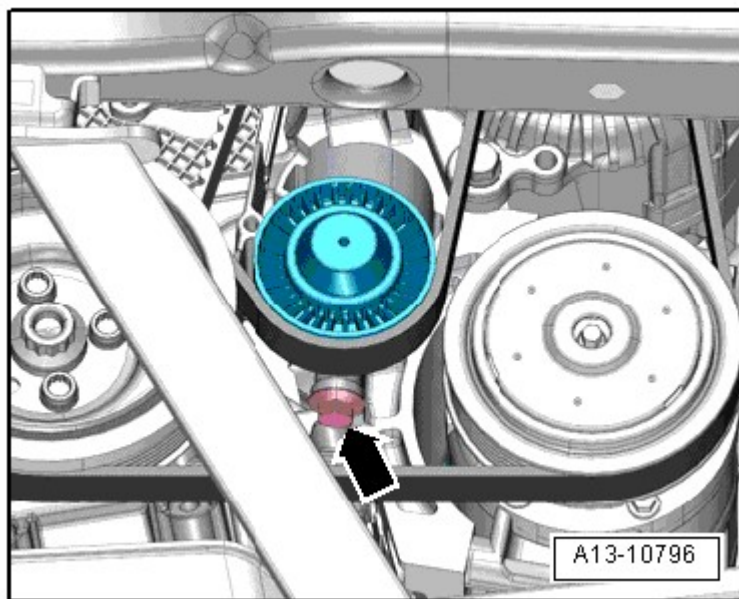


Fig. 38: Identifying Tensioning Roller Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Remove ribbed belt.

Installing

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

NOTE: **Replace the tensioning roller bolt.**

Before installing the ribbed belt, make sure that all ancillaries (generator and A/C compressor) are secured tightly.

-- Mount the ribbed belt on the ribbed belt pulley.

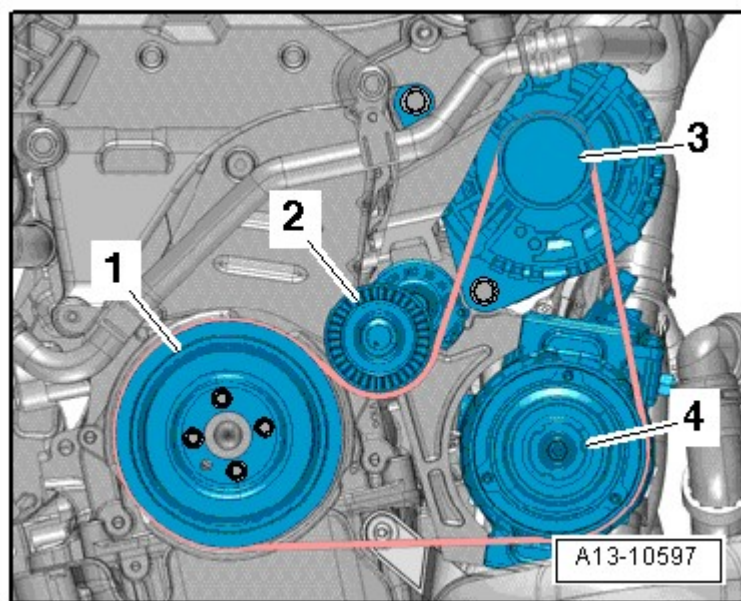


Fig. 39: Identifying Vibration Damper, Belt Tensioner, Generator And A/C Compressor
Courtesy of AUDI OF AMERICA, LLC

1. Vibration damper
2. Tensioning roller
3. Generator
4. A/C Compressor

Apply some adhesive lubricating paste to the guide surfaces on the tensioning roller using a paint brush. For the adhesive lubricating paste, .

-- Install the tensioning roller with the bolt into the guide on the auxiliary component bracket.

-- Tighten the tensioning roller bolt **RIBBED BELT DRIVE WITH TENSIONING ROLLER AND A/C COMPRESSOR ASSEMBLY OVERVIEW.**

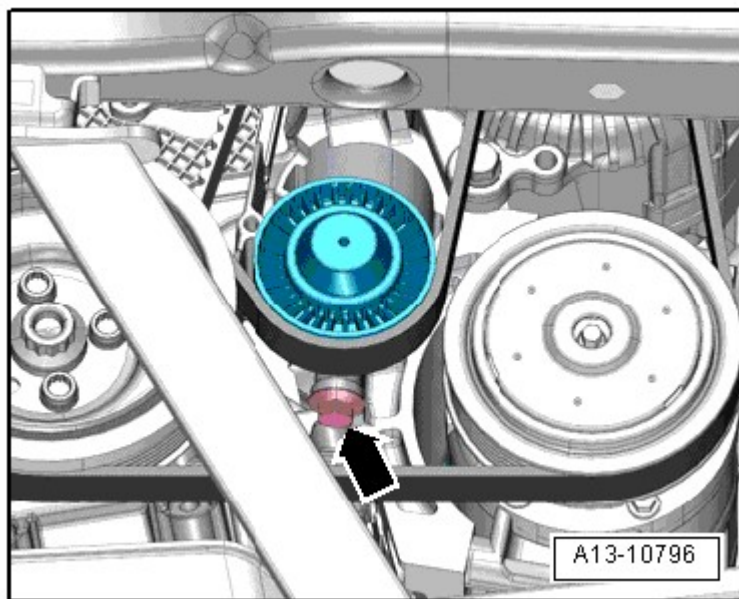


Fig. 40: Identifying Tensioning Roller Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Make sure the end of the tensioning roller bolt protrudes over the running surface on the tensioning roller by dimension -a-.

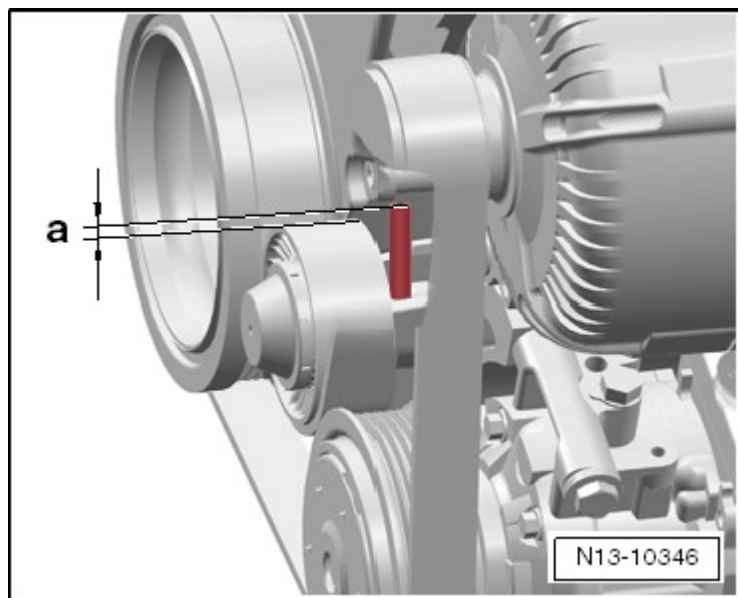


Fig. 41: Identifying Dimension -a-: End Of Tensioning Roller Bolt Over Running Surface Of Tensioning Roller
Courtesy of AUDI OF AMERICA, LLC

- Dimension -a- = approximately 2.5 mm.
- This assures that the bolt was tightened all the way in.

-- Start the engine and check the belt routing.

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

RIBBED BELT, VEHICLES WITHOUT A/C COMPRESSOR

NOTE: Depending on the date of manufacture, the ribbed belt tensioning damper was deleted on vehicles without A/C.

Special tools and workshop equipment required

- Repair Set, Ribbed Belt with Assembly Tool,

Procedure

NOTE: The repair set, ribbed belt with assembly tool contains the assembly tool T10367 and an illustrated instruction manual.

-- Remove the right front wheel.

-- Remove the noise insulation -1-. Refer to **Removal and Installation** .

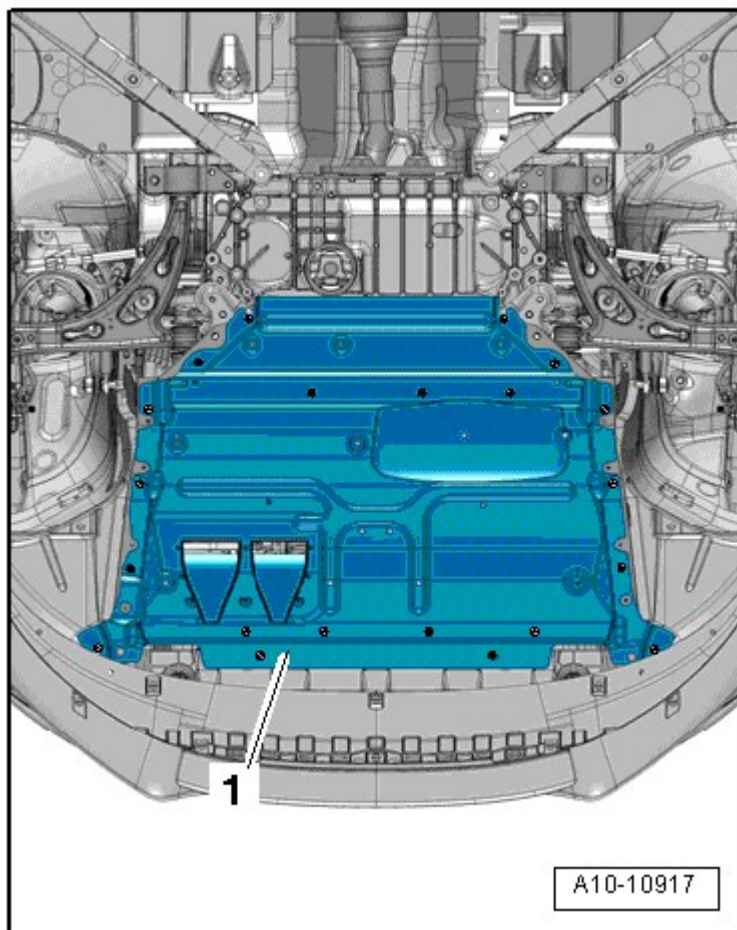


Fig. 42: Noise Insulation

Courtesy of AUDI OF AMERICA, LLC

-- Remove the front section of the right front wheel housing liner. Refer to **Removal and Installation** .

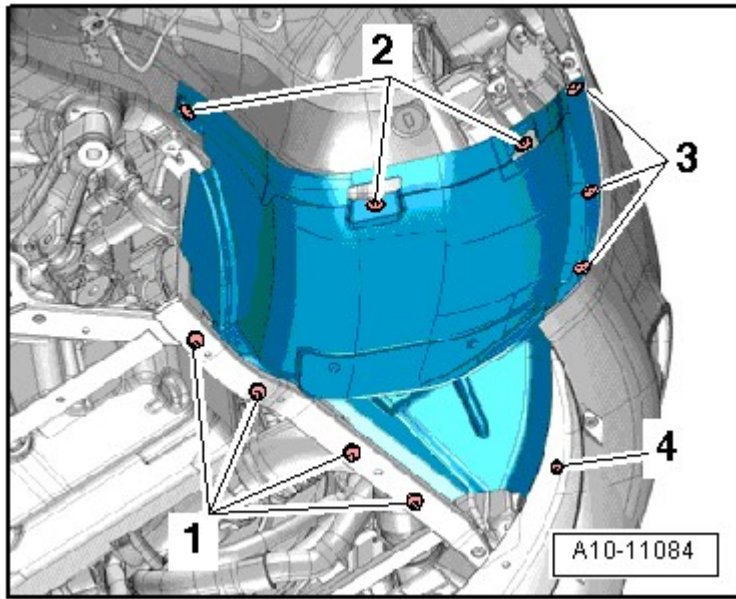


Fig. 43: Front Section Of The Right Front Wheel Housing Liner
 Courtesy of AUDI OF AMERICA, LLC

-- Refer to the illustrated instruction manual for additional procedures.

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

- Install the front section of the front wheel housing liner. Refer to **Removal and Installation** .
- Install the noise insulation. Refer to **Removal and Installation** .
- Install the front wheel. Refer to **REMOVAL AND INSTALLATION** .

VIBRATION DAMPER

Removing

-- Ribbed belt, removing, refer to:

- **RIBBED BELT, VEHICLES WITH TENSIONING DAMPER AND A/C COMPRESSOR**
- **RIBBED BELT, VEHICLES WITH TENSIONING ROLLER AND A/C COMPRESSOR**
- **RIBBED BELT, VEHICLES WITHOUT A/C COMPRESSOR**

-- Counterhold the crankshaft toothed belt gear bolt with a open-end wrench and loosen the vibration damper bolt.

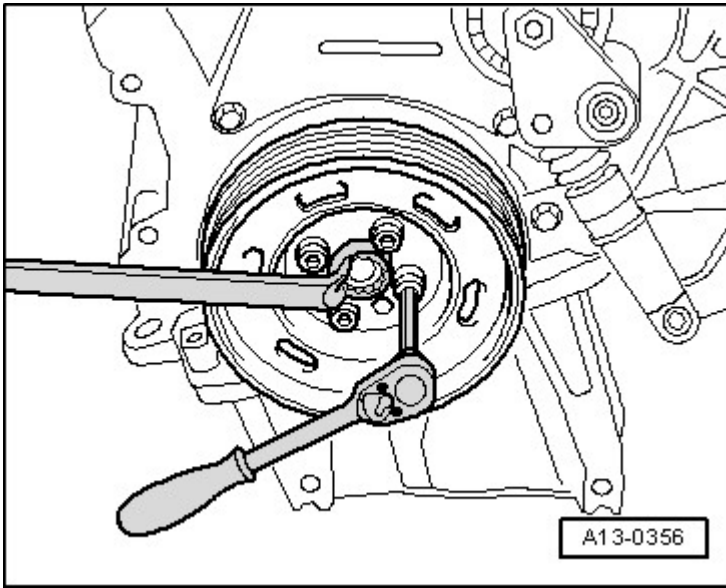


Fig. 44: Identifying Removal/Installation Vibration Damper/Belt Pulley
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts and remove the vibration damper.

Installing

- Tightening specifications, refer to **RIBBED BELT DRIVE WITH TENSIONER AND A/C COMPRESSOR ASSEMBLY OVERVIEW.**
- Tightening specifications, refer to **RIBBED BELT DRIVE WITH TENSIONING ROLLER AND A/C COMPRESSOR ASSEMBLY OVERVIEW.**
- Tightening specifications, refer to **RIBBED BELT DRIVE WITHOUT A/C COMPRESSOR ASSEMBLY OVERVIEW.**

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

NOTE: Replace the vibration damper bolts.

- Installed position: the hole in the vibration damper crankshaft -arrow- must be positioned over the protrusion on the crankshaft toothed belt gear.

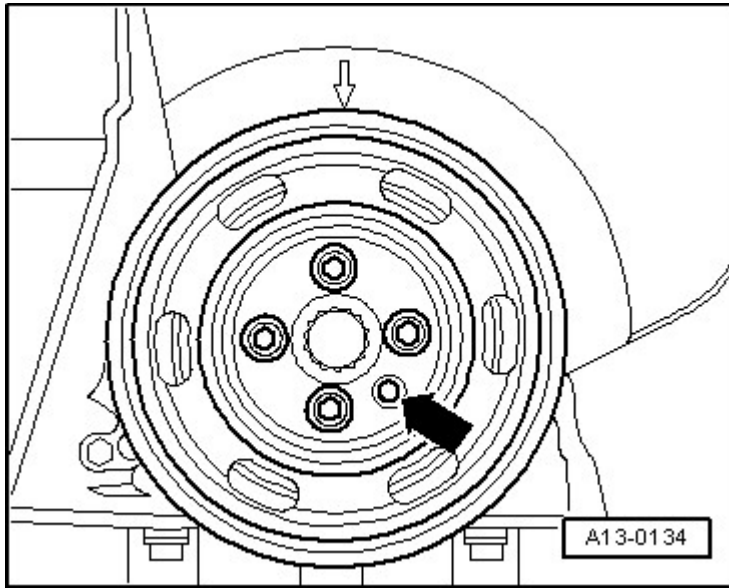


Fig. 45: Installing Crankshaft Belt Pulley With Original Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Install the ribbed belt. Refer to:

- **RIBBED BELT, VEHICLES WITH TENSIONING DAMPER AND A/C COMPRESSOR**
- **RIBBED BELT, VEHICLES WITH TENSIONING ROLLER AND A/C COMPRESSOR**
- **RIBBED BELT, VEHICLES WITHOUT A/C COMPRESSOR**

ACCESSORY ASSEMBLY BRACKET

Special tools and workshop equipment required

- Engine Support Bridge 10 - 222 A
- Pry Lever - Rmv Outside Mirror 80 - 200
- Lifting Eyebolt 3368
- Engine Support Supplement Set T40093
- Nut taken from the Engine Support Bracket T40150
- M10 collar nut or M10 nut with washer

Removing

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

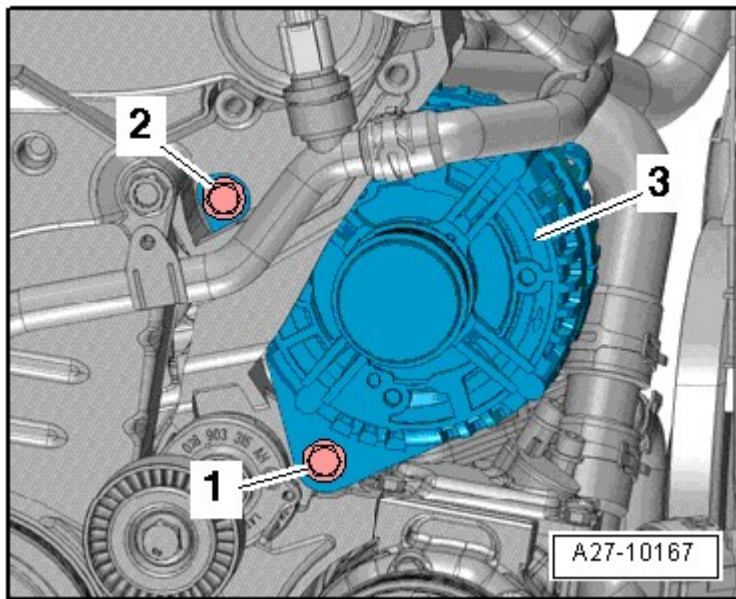


Fig. 46: Identifying Generator & Bolts
Courtesy of AUDI OF AMERICA, LLC

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

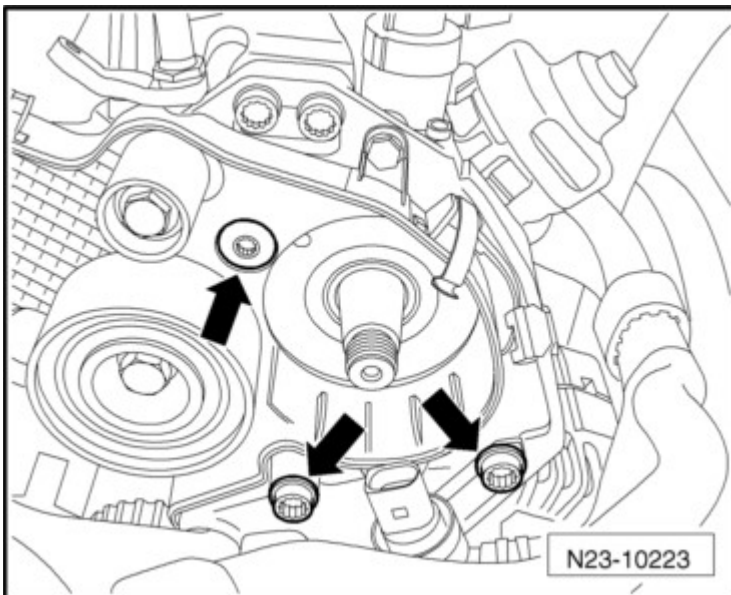


Fig. 47: Identifying High Pressure Fuel Pump Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Mount the 10 - 222 A with the adapters and spindles on the fender bolting edge as illustrated.

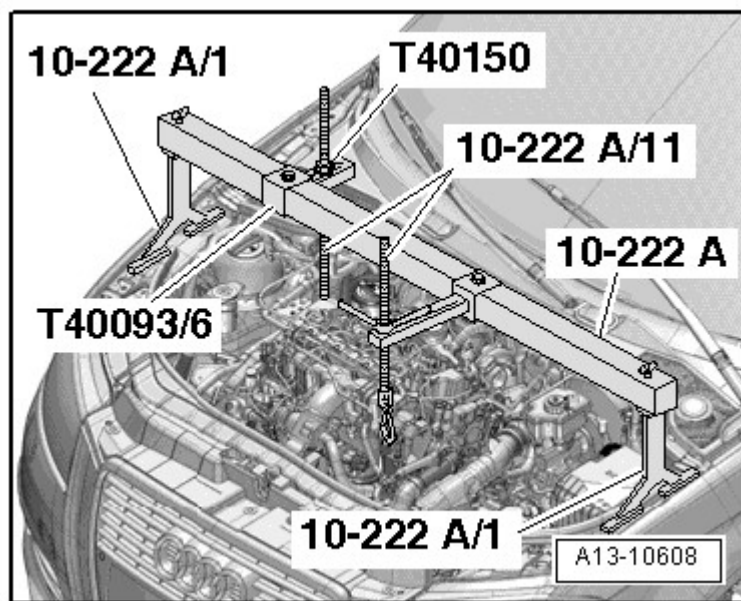


Fig. 48: Mounting 10 - 222 A With Adapters
 Courtesy of AUDI OF AMERICA, LLC

-- Attach the left spindle carabiner hook to the engine lifting eye.

WARNING: Risk of accident if the threaded connection is loose.

- Tightening the collar nut (or the nut and washer) -arrow- at least 6 turns will make sure the 3368 is secure.

-- Secure the 3368 to the engine support with a M10 collar nut or a M10 nut and washer as illustrated.

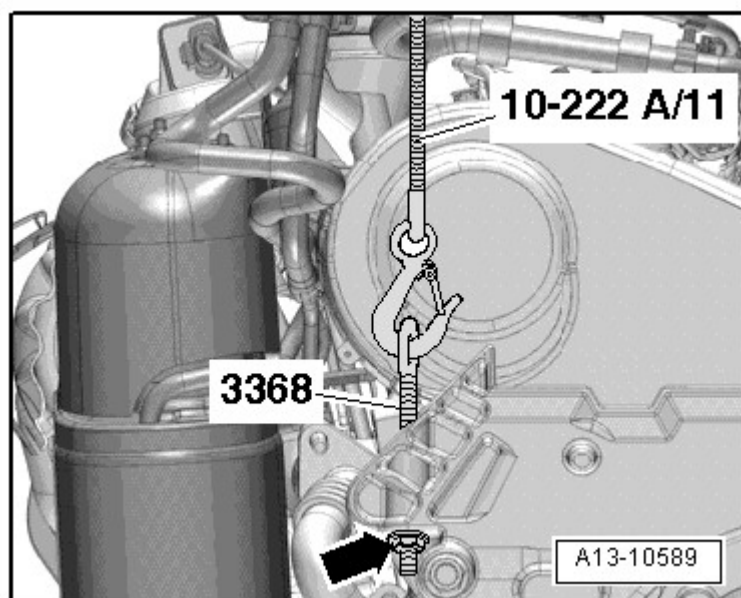


Fig. 49: Securing 3368 To Engine Support With A M10 Collar Nut Or A M10 Nut And Washer
Courtesy of AUDI OF AMERICA, LLC

- Attach the right spindle 10 - 222 A /11 with the nut from the T40150 to the 3368.
- Uniformly pre-load engine using both spindles but do not lift it.
- Remove bolts -arrows-.

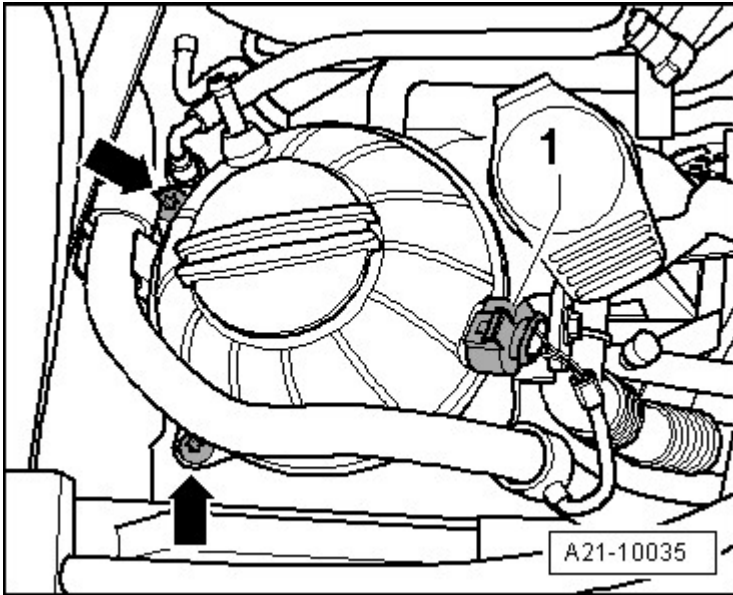


Fig. 50: Coolant Expansion Tank And Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the engine coolant level warning switch -F66- connector and move the coolant reservoir to the side.
- Remove the bolts -1- and -2- and the connecting brace.

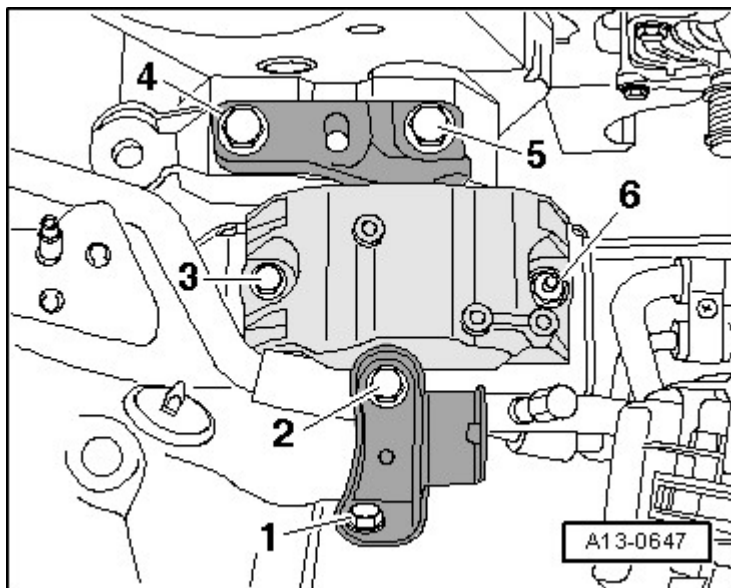


Fig. 51: Identifying Bolts -1- And -2- And Connecting Brace
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -3 through 6- and the engine mount.

-- Remove the bolt -3- on the engine support.

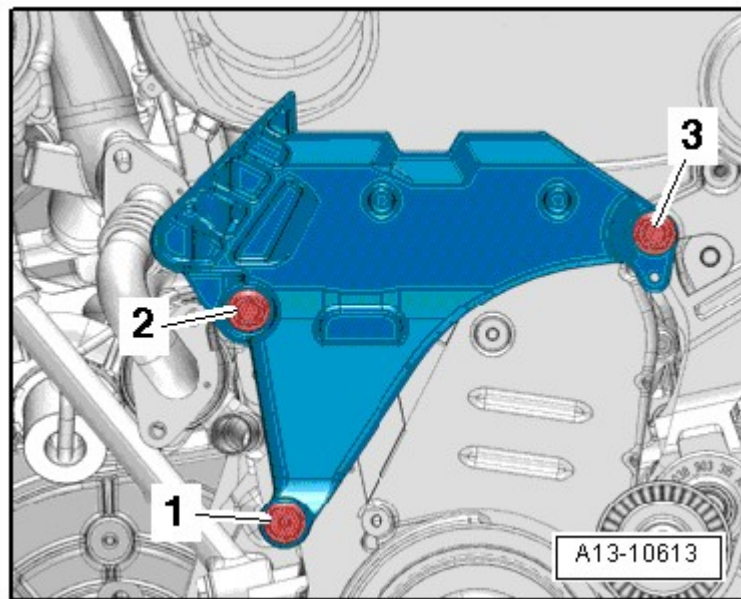


Fig. 52: Identifying Engine Support & Bolts
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1 and 2-.

-- Remove bolt -arrow-.

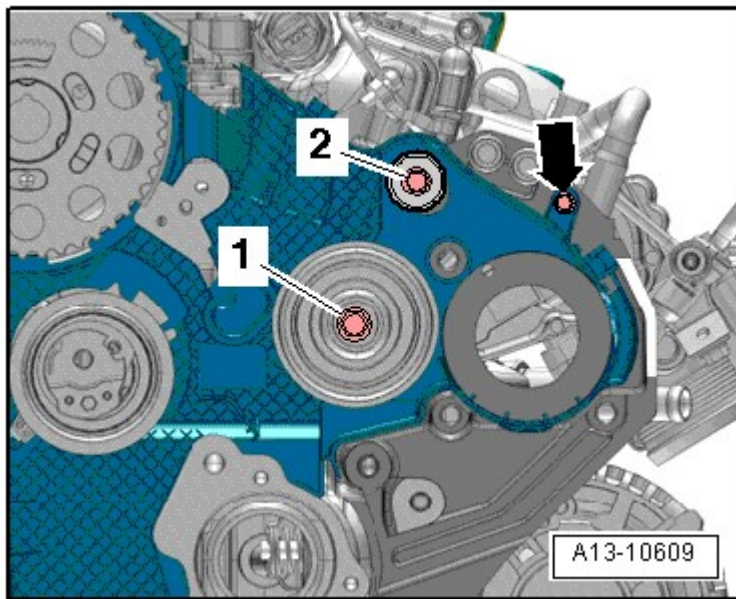


Fig. 53: Identifying Idler Roller Bolts -1 And 2-
Courtesy of AUDI OF AMERICA, LLC

- Remove the bolts -1- and -2- and remove the toothed belt idler rollers.
- Remove bolts -1 to 6- and remove accessory assembly bracket.

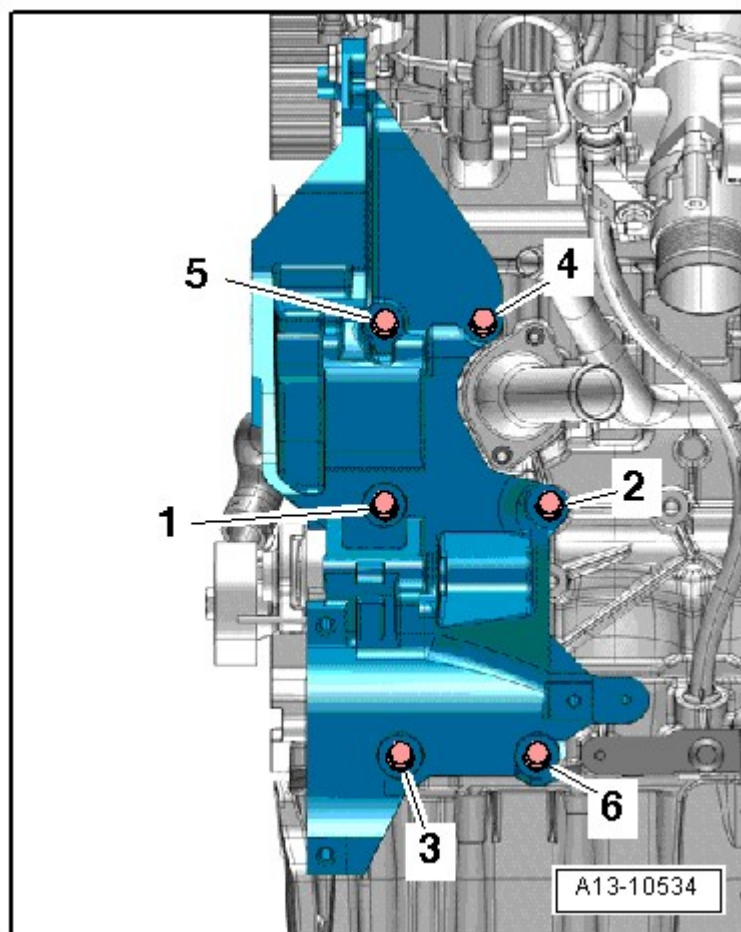


Fig. 54: Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

Installing

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

NOTE: Replace the auxiliary component bracket bolts.

-- If an alignment bushing is missing on the right side between the auxiliary component bracket and the cylinder block, install one.

-- Tighten accessory assembly bracket bolts **RIBBED BELT DRIVE WITH TENSIONER AND A/C COMPRESSOR ASSEMBLY OVERVIEW**.

-- Install the engine support and engine mount. Refer to **SUBFRAME ASSEMBLY OVERVIEW** .

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

-- Install toothed belt (adjust timing) **TOOTHED BELT** .

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

CRANKSHAFT SHAFT SEAL, BELT PULLEY SIDE, REPLACING

Special tools and workshop equipment required

- Seal Remover 3203
- Counter Support 3415
- Assembly Tool T10053

Procedure

-- Toothed belt, removing **TOOTHED BELT** .

-- Using the 3415, loosen the crankshaft toothed belt gear bolt.

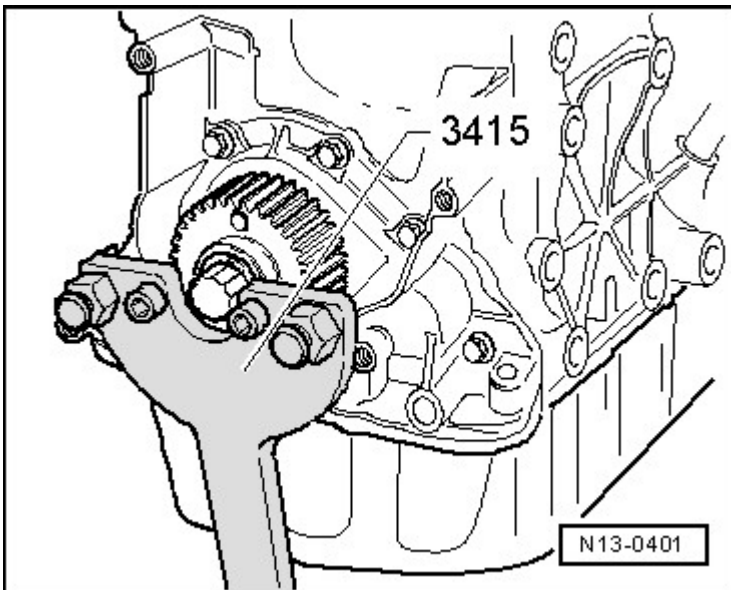


Fig. 55: Counter-Holding Crankshaft Toothed Belt Sprocket With 3415
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt and remove the crankshaft toothed belt gear.

-- Make sure the inside of the 3203 is flush with the outer part and then secure the knurled bolt.

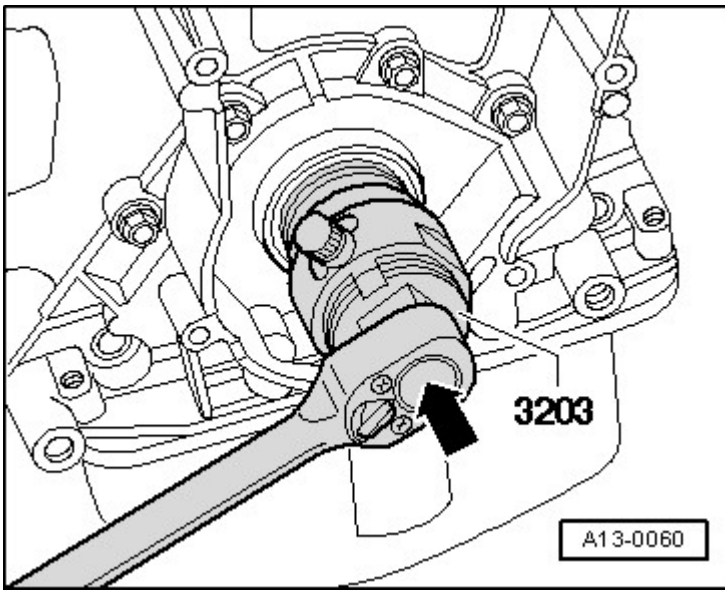


Fig. 56: Exerting Firm Pressure To Oil Seal Extractor 3203 Into Oil Seal
Courtesy of AUDI OF AMERICA, LLC

- Lubricate the seal remover threaded head, position it, and then install it into the shaft seal as far as possible using strong force.
- Loosen the knurled screw and turn the inner portion against the crankshaft until the seal is pulled out.
- Secure the seal remover in a vise at the flat spots and remove the seal using pliers.
- Clean the shaft seal running and sealing surfaces.
- Remove oil residue on crankshaft pins using a clean cloth.

NOTE: **Do not oil the sealing lip and the outer edge of seal before installing.**

- Position guide sleeve T10053/1 on crankshaft pin.

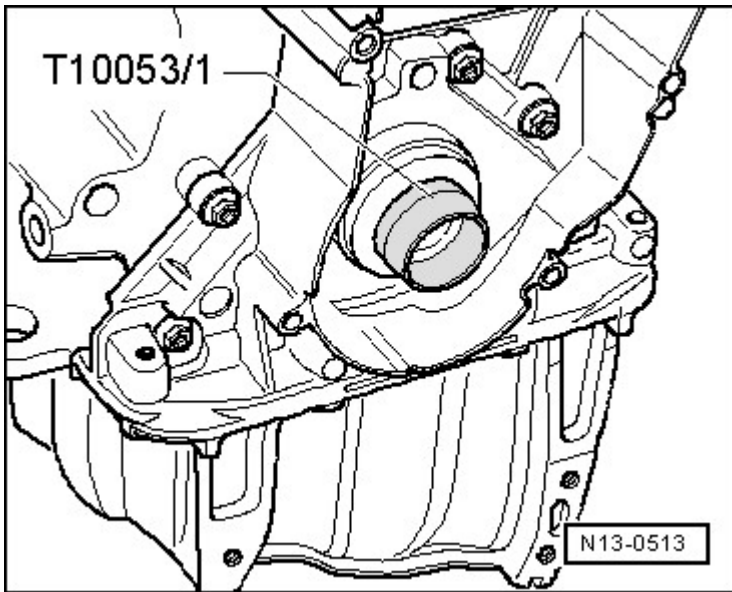


Fig. 57: Identifying Guide Sleeve From Assembly Tool T10053 & Crankshaft Journal
Courtesy of AUDI OF AMERICA, LLC

- Slide the shaft seal over the guide sleeve onto the crankshaft pins.
- Install the seal and toothed belt crankshaft sprocket bolt and pressure sleeve from the T10053 flush.

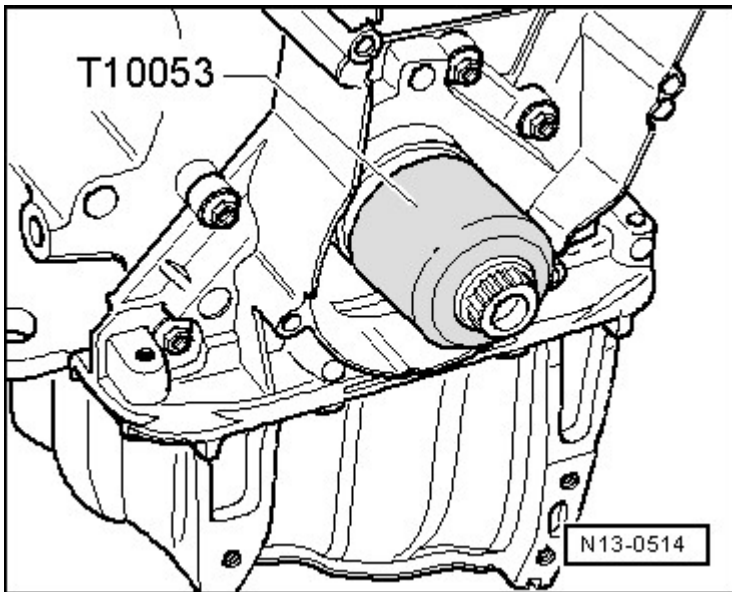


Fig. 58: Identifying Press Sleeve T10053
Courtesy of AUDI OF AMERICA, LLC

- Install the crankshaft toothed belt gear. Refer to **TOOTHED BELT ASSEMBLY OVERVIEW** .
- Install toothed belt (adjust timing) **TOOTHED BELT** .

SEALING FLANGE, BELT PULLEY SIDE**Special tools and workshop equipment required**

- Counter Support 3415
- Hand drill with plastic brush attachment
- Protective eyewear
- Sealant,

Removing

- Toothed belt, removing. Refer to **TOOTHED BELT** .
- Using the 3415, loosen the crankshaft toothed belt gear bolt.

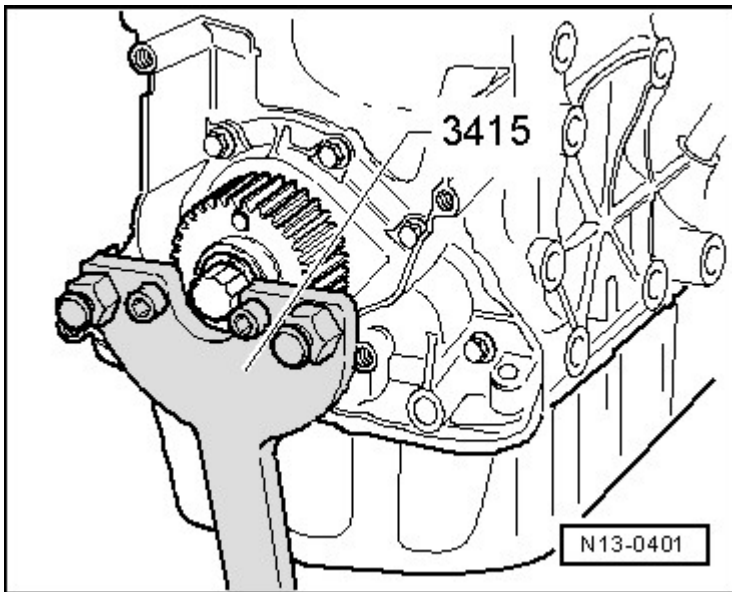


Fig. 59: Counter-Holding Crankshaft Toothed Belt Sprocket With 3415
Courtesy of AUDI OF AMERICA, LLC

- Remove the bolt and remove the crankshaft toothed belt gear.
- Remove the -1 through 10- and carefully loosen the sealing flange from the bonding.

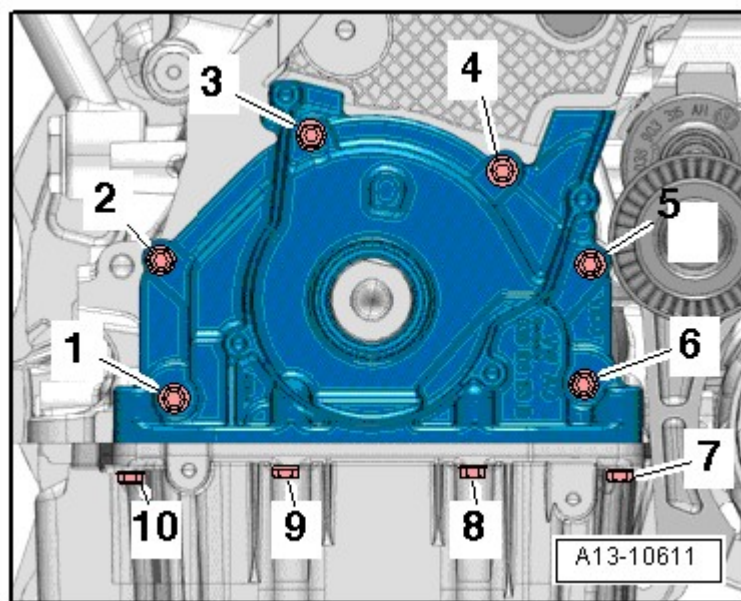


Fig. 60: Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

-- Remove the shaft seal with the sealing flange removed.

Installing

- Tightening specifications, refer to **SEALING FLANGE, RIBBED BELT SIDE ASSEMBLY OVERVIEW**.

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

CAUTION: Risk of contaminating lubrication system with sealant residue.

- Lay clean cloth over open part of oil pan.

-- Carefully remove sealant residue on cylinder block and oil pan.

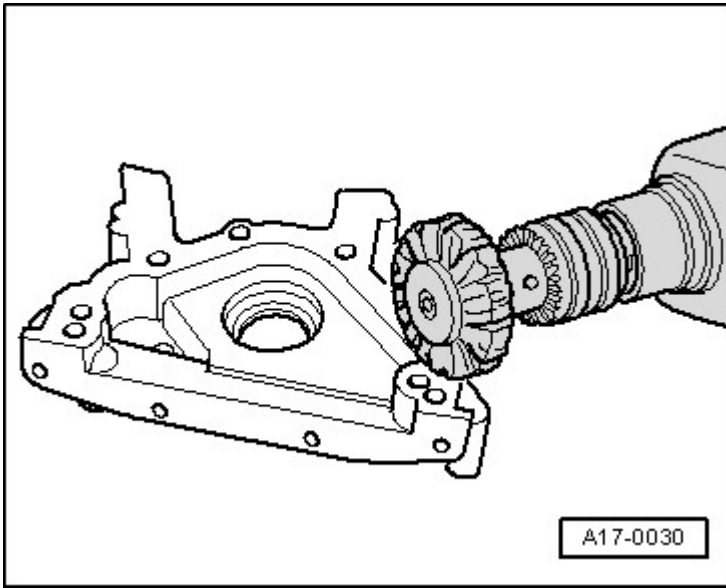


Fig. 61: Identifying Rotating Plastic Brush
Courtesy of AUDI OF AMERICA, LLC

WARNING: Risk of eye injury.

- **Wear safety glasses.**

- Remove sealant residue on sealant flange, for example with a rotating plastic brush.
- Clean the sealing surfaces; they must be free of oil and grease.
- Install alignment pins in the cylinder block for the sealing flange if they are missing.

NOTE: Note the expiration date of the sealing compound.

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

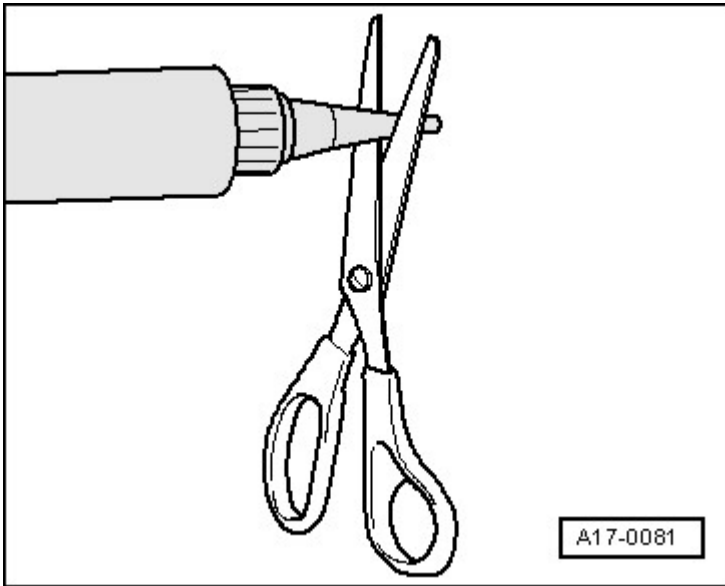


Fig. 62: Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 3 Mm)
Courtesy of AUDI OF AMERICA, LLC

-- Apply a thin bead of sealant -arrows- on edge between cylinder block and oil pan.

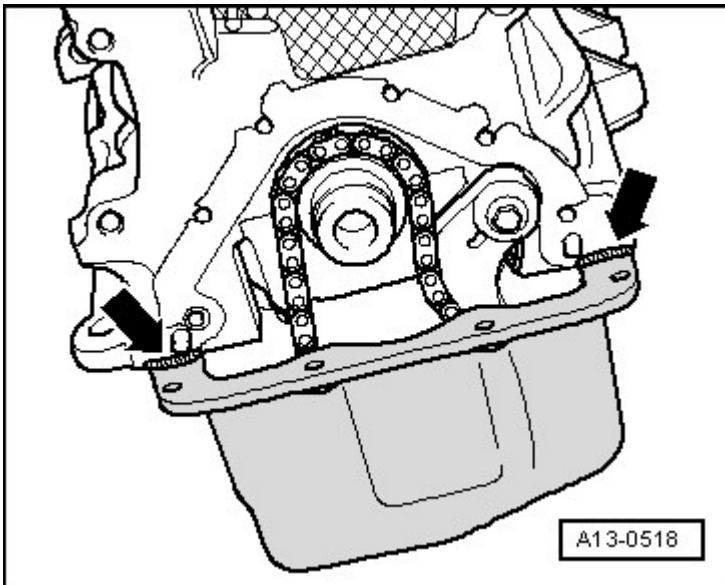


Fig. 63: Applying Thin Bead Of Sealant To Edge Between Cylinder Block And Oil Pan
Courtesy of AUDI OF AMERICA, LLC

CAUTION: The lubrication system could be plugged with excess sealant.

- Do not apply sealant bead thicker than indicated.

-- Apply sealant bead -arrow- to clean sealing flange sealing surface as shown in illustration.

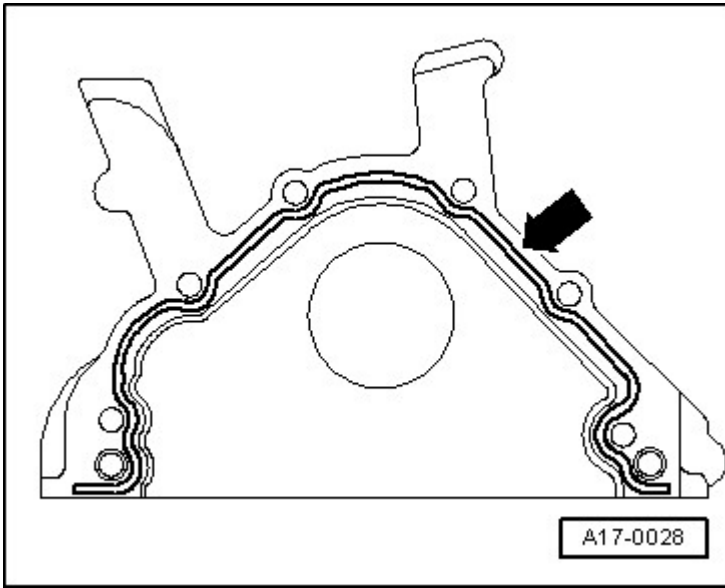


Fig. 64: Applying Silicone Sealant Bead To Clean Sealing Surface Of Sealing Flange
Courtesy of AUDI OF AMERICA, LLC

- Sealant bead thickness: 2 to 3 mm.

-- Lightly coat lower sealing surface -shaded- on sealing flange with sealant.

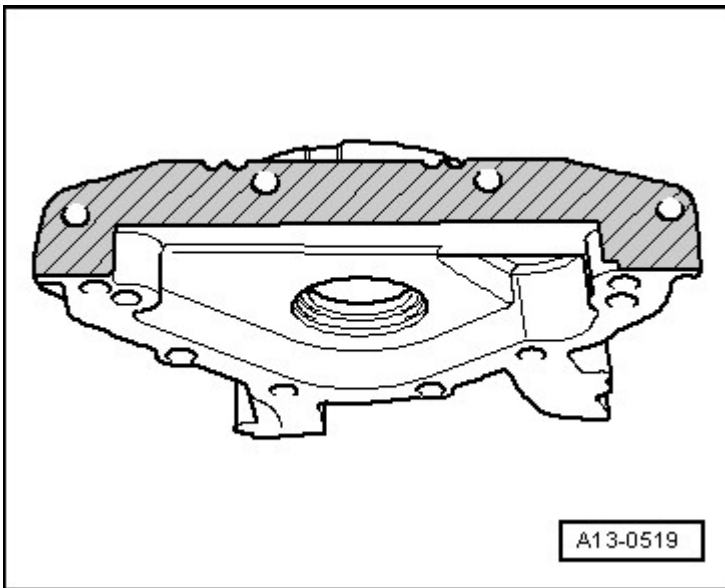


Fig. 65: Lightly Coating Lower Sealing Surface Of Sealing Flange With Sealant
Courtesy of AUDI OF AMERICA, LLC

NOTE: The sealing flange must be installed within 5 minutes after applying the sealant.

-- Carefully push the sealing flange onto the pins on the cylinder block.

-- Tighten sealing flange bolts **SEALING FLANGE, RIBBED BELT SIDE ASSEMBLY OVERVIEW**.

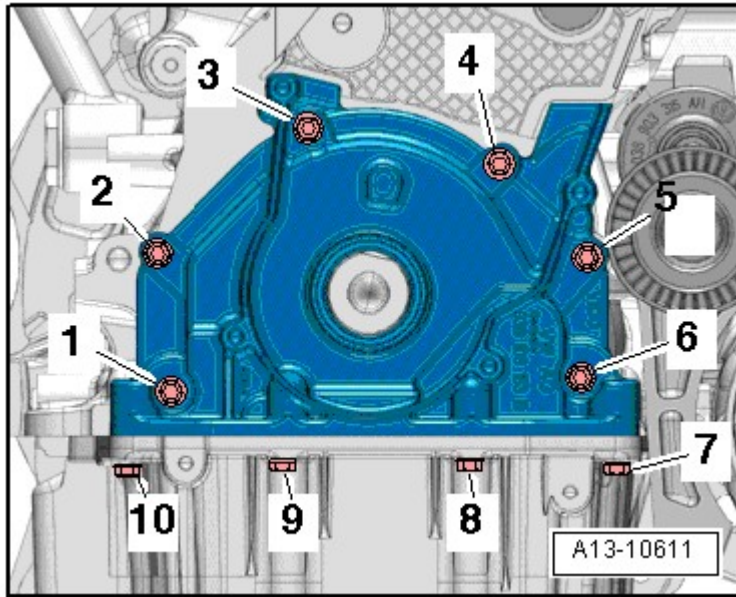


Fig. 66: Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

-- Install the pulley-side crankshaft shaft seal. Refer to **CRANKSHAFT SHAFT SEAL, BELT PULLEY SIDE, REPLACING**.

DUAL MASS FLYWHEEL

Special tools and workshop equipment required

- Flywheel Retainer 3067

Removing

- Transmission removed.

CAUTION: Risk of destroying dual mass flywheel.

- Remove bolts -B- by hand, not with and air-powered or impact wrench.
- When removing bolts, ensure bolt head does not come in contact with dual mass flywheel.
- Rotate dual mass flywheel -A- so bolts -B- are centered to holes - arrows-.

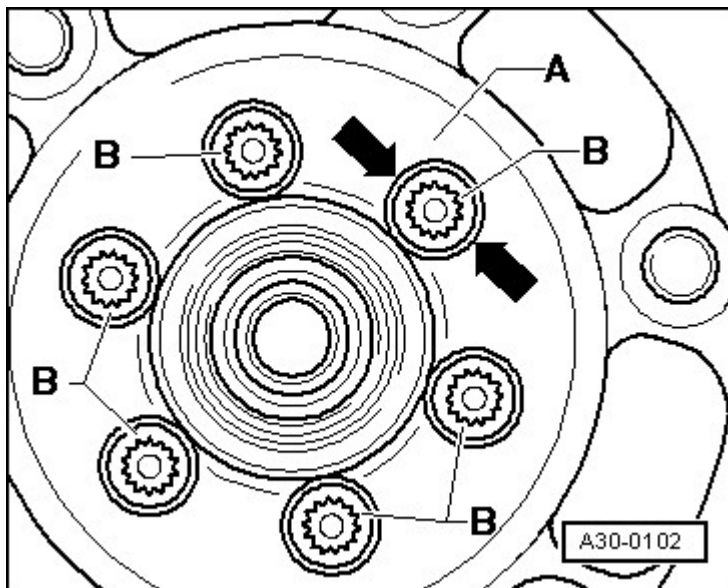


Fig. 67: Identifying Dual-Mass Flywheel & Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Place the 3067 into the hole on the cylinder block -B-, then remove the dual mass flywheel bolts.

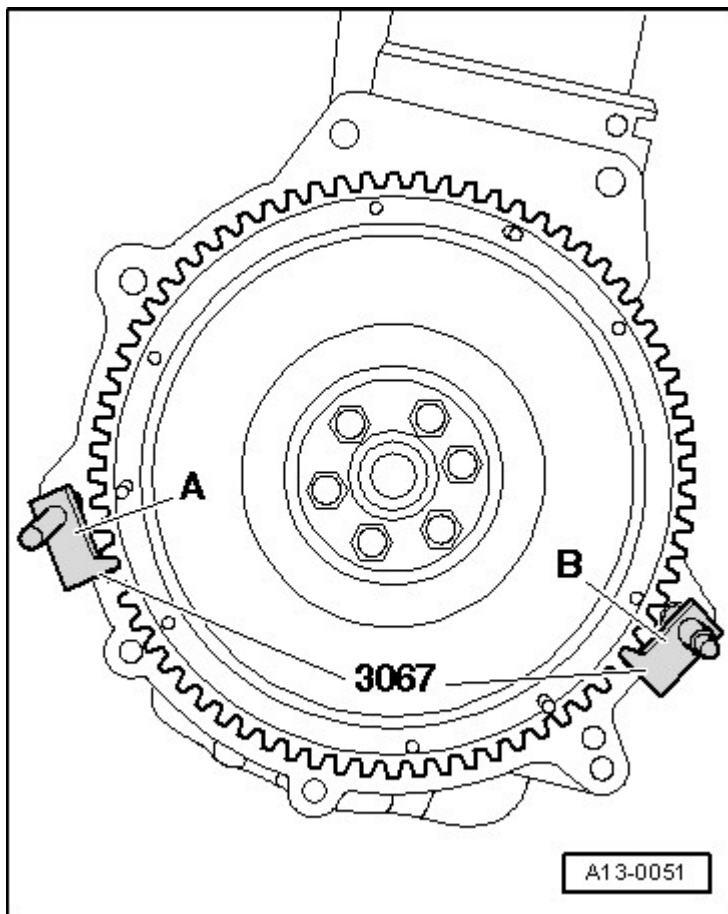


Fig. 68: Identifying Retainer -3067- Inserted In Hole On Cylinder Block
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts and the dual mass flywheel.

Installing

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

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

NOTE: Replace the dual mass flywheel bolts.

-- Place the 3067 into the hole on the cylinder block -A-.

TRANSMISSION SIDE SEALING FLANGE

Special tools and workshop equipment required

- SW 24 socket V.A.G 1332/11

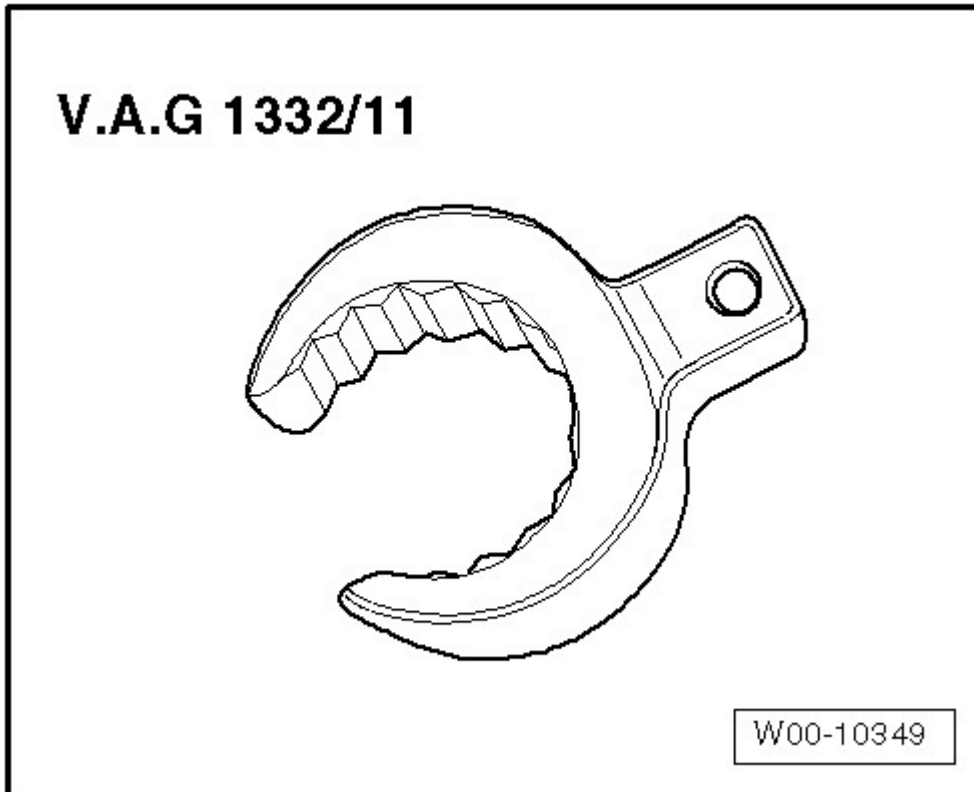


Fig. 69: Identifying Tool 24 V.A.G 1332/11

Courtesy of AUDI OF AMERICA, LLC

- Assembly tool T10134

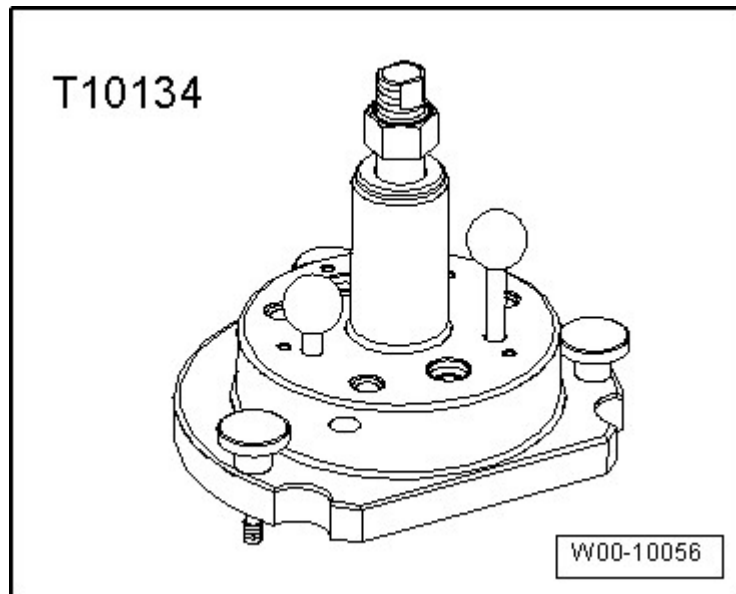


Fig. 70: Assembly Tool T10134

Courtesy of AUDI OF AMERICA, LLC

- Depth gauge VAS 6082

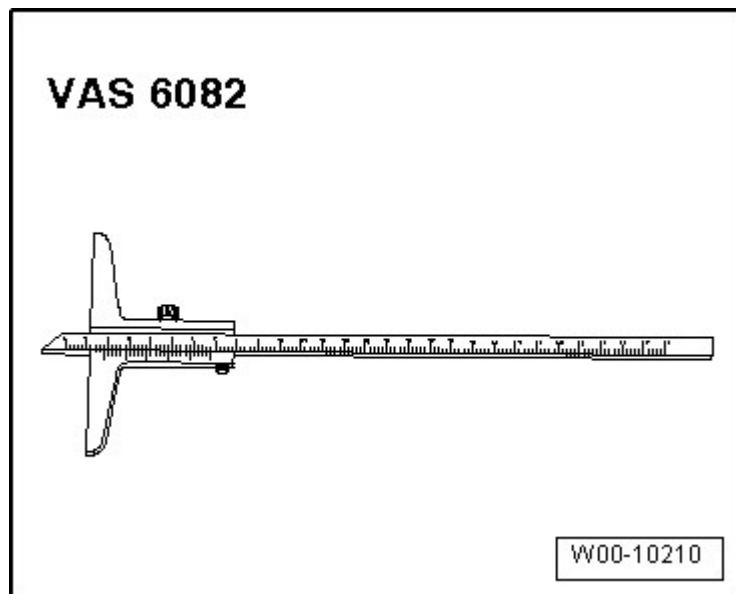


Fig. 71: Identifying Depth Gauge VAS 6082

Courtesy of AUDI OF AMERICA, LLC

- M6 x 35 bolt (quantity 3)
- M7 x 35 (quantity 2)

Sealing Flange with Sensor Wheel, Removing

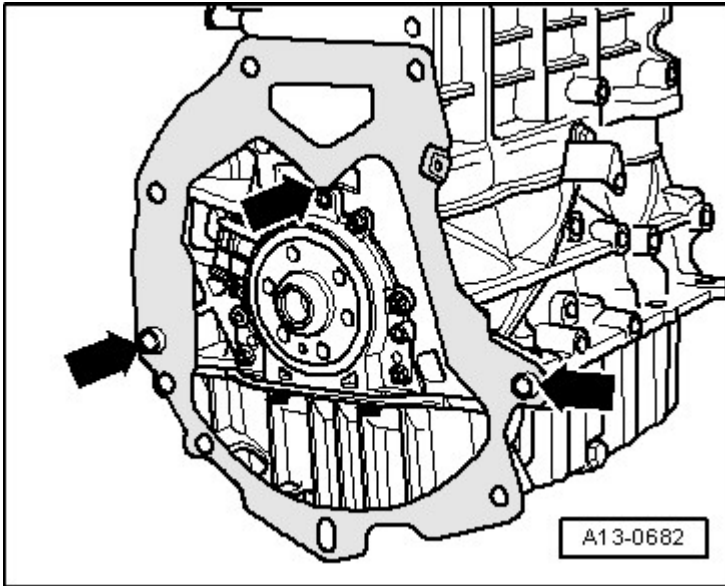


Fig. 72: Identifying Intermediate Plate Is Hooked In At Sealing Flange And Is Pushed Onto Alignment Sleeves

Courtesy of AUDI OF AMERICA, LLC

- Transmission removed.

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

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

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

-- Turn the crankshaft at the toothed belt gear bolt until the crankshaft is at "TDC" as illustrated.

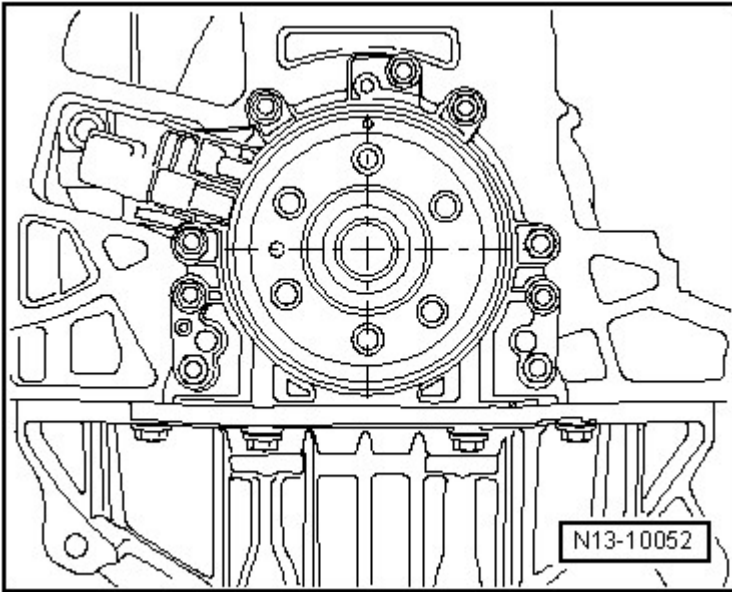


Fig. 73: Identifying Crankshaft Rotated To Top Dead Center (TDC) For Cylinder 1
Courtesy of AUDI OF AMERICA, LLC

- Remove the oil pan. Refer to **OIL PAN** .
- Remove the engine speed sensor -G28- -1-. Refer to **REMOVAL AND INSTALLATION** .

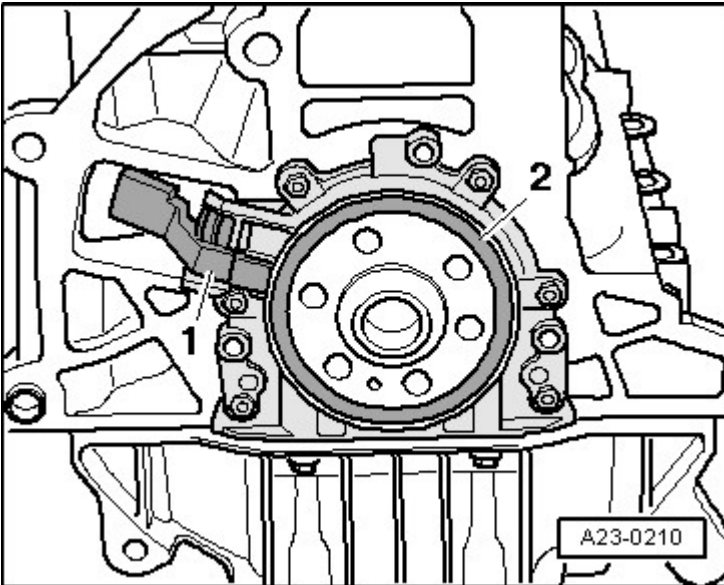


Fig. 74: Component Location Engine Speed (RPM) Sensor G28
Courtesy of AUDI OF AMERICA, LLC

- Remove the sealing flange bolts -1 through 6-.

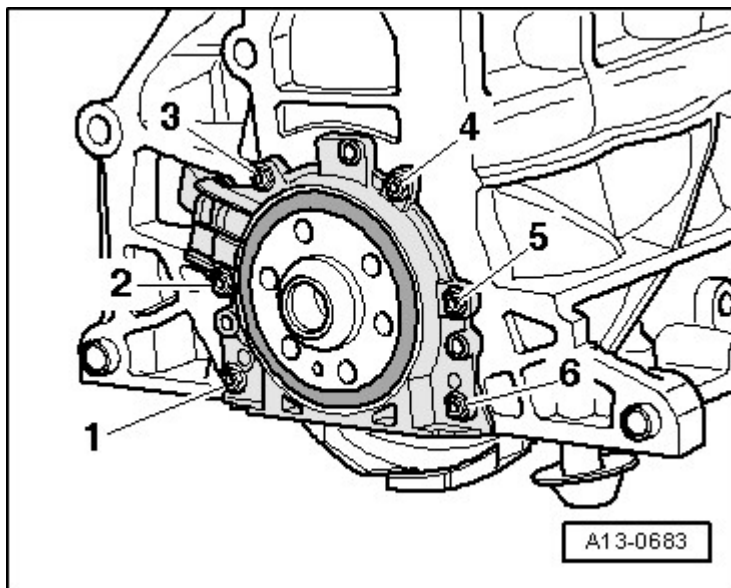


Fig. 75: Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -7 and 8-.

NOTE: The sealing flange and the sensor wheel are removed from the crankshaft together.

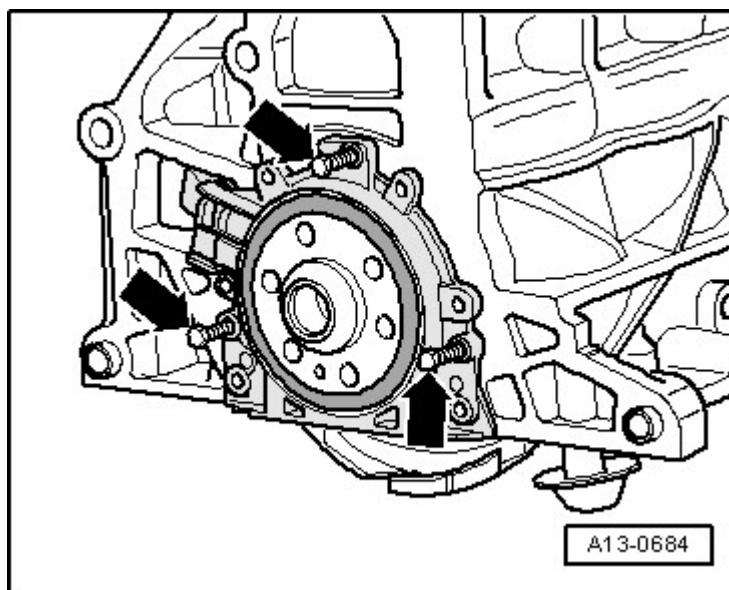


Fig. 76: Alternately Turn Each Of The Three M6 X 35 Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Alternately turn each of the three M6 x 35 bolts -arrows- $\frac{1}{2}$ turn maximum into the sealing flange.

-- Remove the sealing flange and sensor wheel.

Sealing Flange with Sensor Wheel, Pressing In

NOTE: Sealing flange with PTFE-seal is equipped with a sealing lip support ring. This support ring serves the same function of an assembly sleeve and must not be removed before installation.

The sealing flange and sensor wheel must not be separated or rotated after being removed from the replacement part packaging.

The sensor wheel retains the installation position via being located on the locating pin of the assembly tool T10134.

The sealing flange and seal are one unit and may only be replaced together with the sensor wheel.

The assembly tool T10134 retains the installation position to the crankshaft via a guide pin, which is guided into the bore of the crankshaft.

Installing the assembly tool T10134

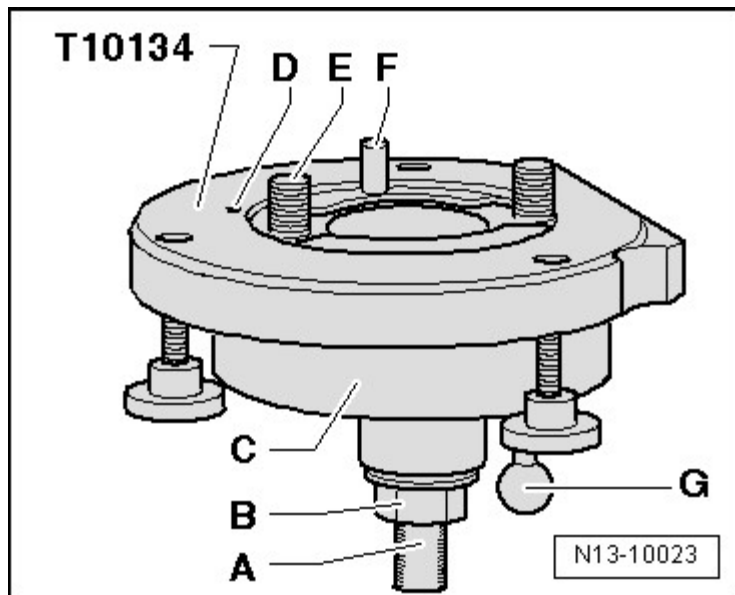


Fig. 77: Identifying Assembly Tool T10134
Courtesy of AUDI OF AMERICA, LLC

A - Tension surface

B - Nut

C - Assembly bell

D - Locating pin

E - Socket head hex bolt

F - Guide pin for diesel engines (black handle)

G - Guide pin for gasoline engines (red handle)

A - Sealing flange with sensor wheel on the assembly tool T10134

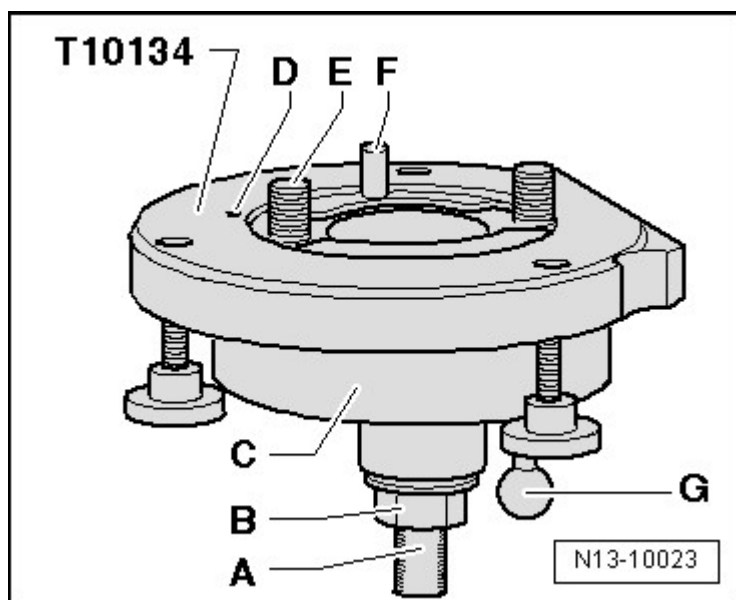


Fig. 78: Identifying Assembly Tool T10134
Courtesy of AUDI OF AMERICA, LLC

-- Install the hex nut on the threaded spindle -B- just up to the tension surface -A-.

-- Mount the assembly tool T10134 in a vice by the tension surface -A- on the threaded spindle.

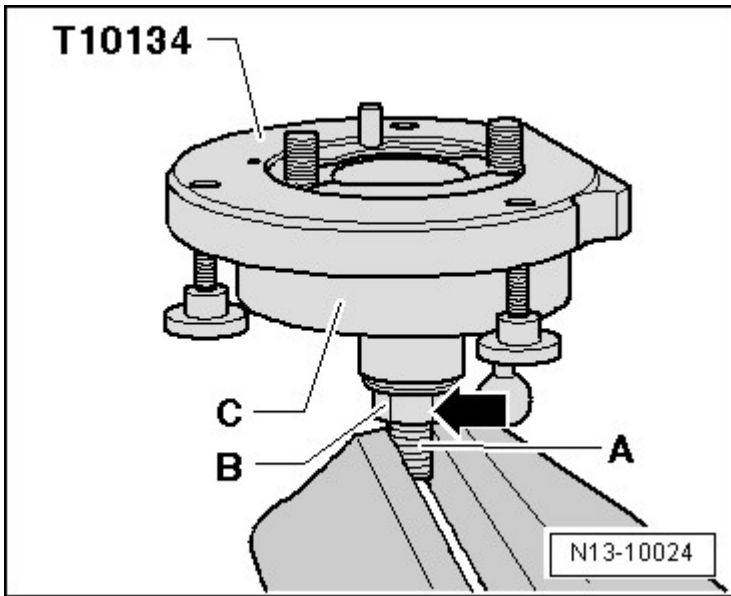


Fig. 79: Identifying Assembly Tool T10134 Tensioned In Vise On Tension Surface Of Threaded Spindle
Courtesy of AUDI OF AMERICA, LLC

-- Push the assembly bell -C- downwards until it touches the hex nut -B- -arrow-.

- Inner part of the assembly tool and assembly bell must be on the same level.

-- Remove the circlip -arrow- from the new sealing flange.

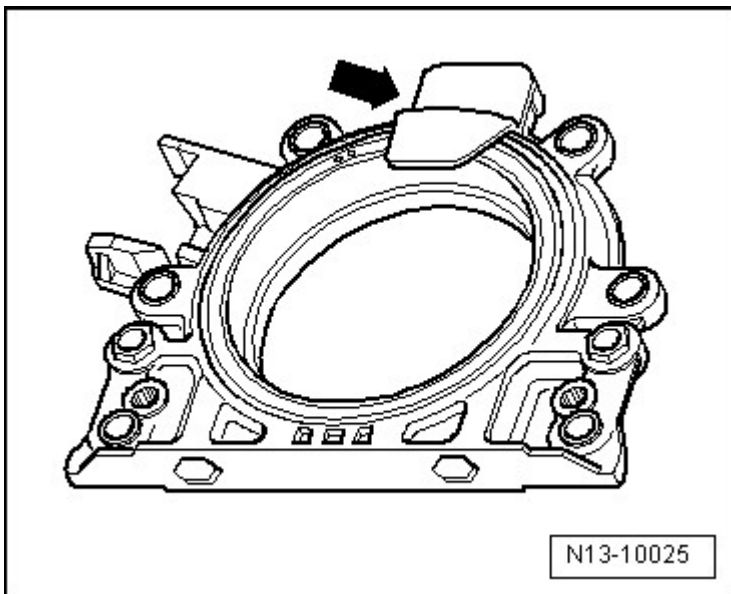


Fig. 80: Identifying Securing Clip From New Sealing Flange
Courtesy of AUDI OF AMERICA, LLC

NOTE: The sensor wheel must not be removed from or rotated in the sealing flange.

- The locating pin -A- on the sensor wheel -C- must align with the marking -B- on the sealing flange.

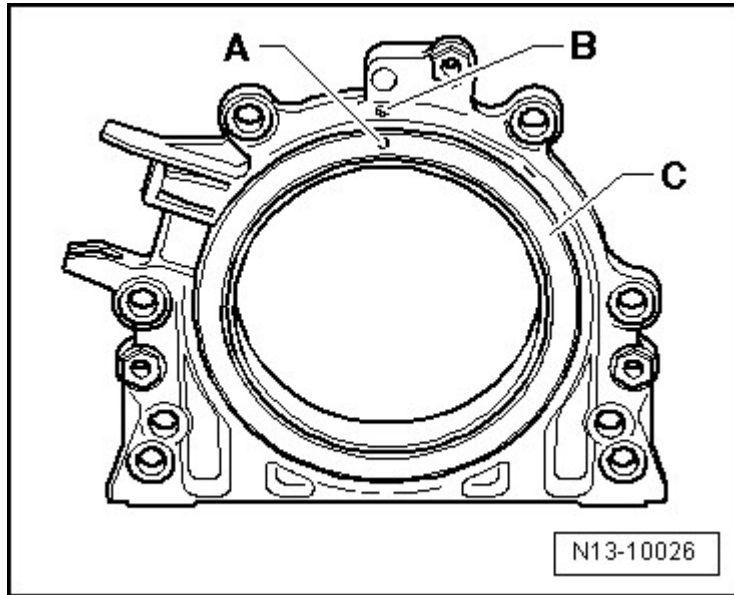


Fig. 81: Identifying Locating Pin On Sensor Wheel Aligns With Marking On Sealing Flange
 Courtesy of AUDI OF AMERICA, LLC

- Place the sealing flange on a clean even surface with the front side facing up.
- Push the sealing lip support ring -A- downward -arrows- until it touches the flat even surface.

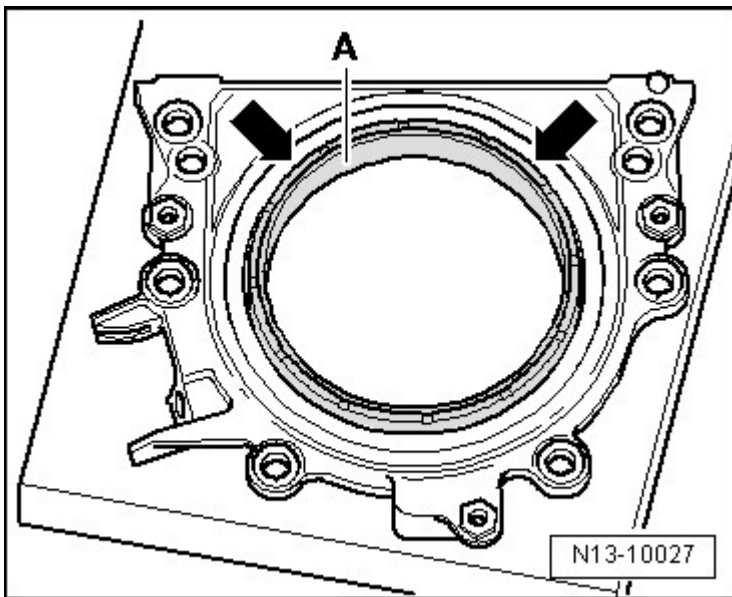


Fig. 82: Identifying Sealing Lip Support Ring Pressed Until It Rests On Level Surface
 Courtesy of AUDI OF AMERICA, LLC

- The upper edge of the sensor wheel and the front edge of the sealing flange must align -arrows-.

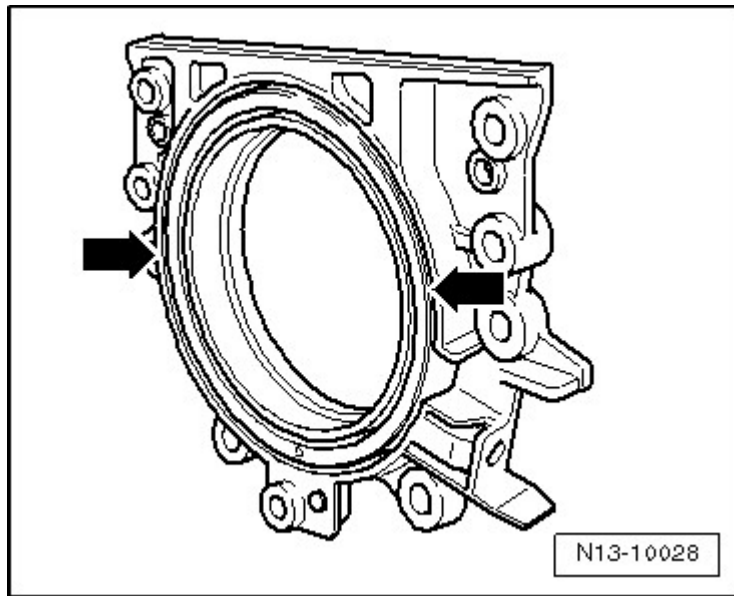


Fig. 83: Identifying Upper Edge Of Sensor Wheel And Front Edge Of Sealing Flange Align
 Courtesy of AUDI OF AMERICA, LLC

-- Mount the sealing flange with the front side on the assembly tool T10134 so that the securing pin -B- fits into the hole -A- in the sensor wheel.

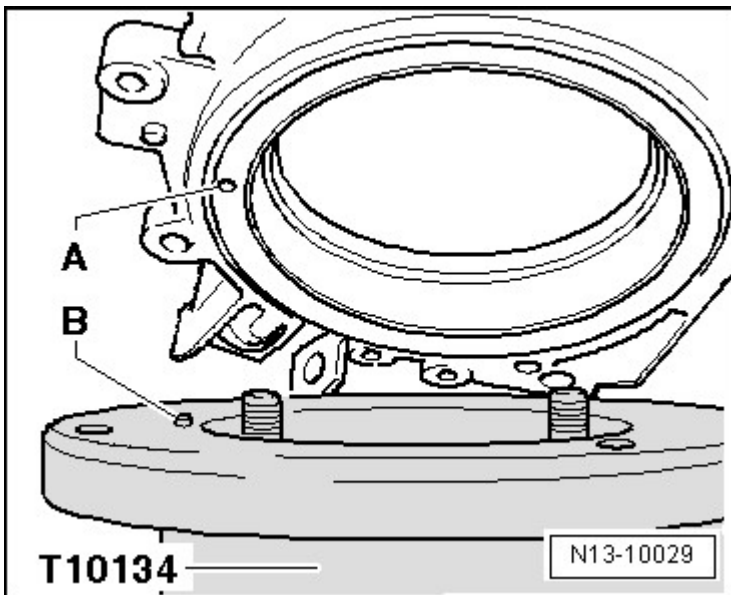


Fig. 84: Identifying Front Side Of Sealing Flange Placed Onto Assembly Tool T10134 To Position Locating Pin In Bore Of Sensor Wheel
 Courtesy of AUDI OF AMERICA, LLC

- The sealing flange must lie flat on the assembly tool.

-- Press the sealing flange and the sealing lip support ring -B- onto the surface of the assembly tool T10134 while tightening the 3 knurled bolts -A- so that the securing pin cannot slip out of the hole in the sensor wheel.

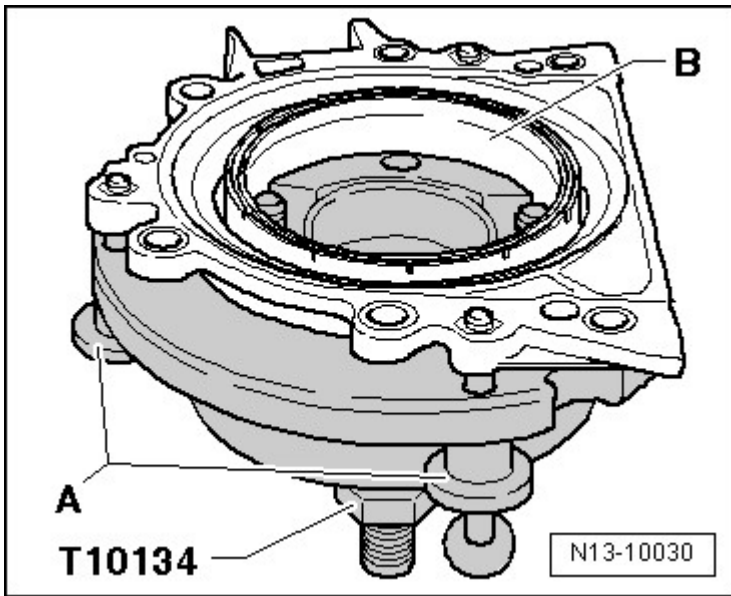


Fig. 85: Identifying Sealing Flange And Sealing Lip Support Ring Pressed On Assembly Tool T10134
 Courtesy of AUDI OF AMERICA, LLC

- The sensor wheel must remain secured in the assembly tool while installing the sealing flange.

B - Installing Assembly Tool T10134 with Sealing Flange on Crankshaft Flange:

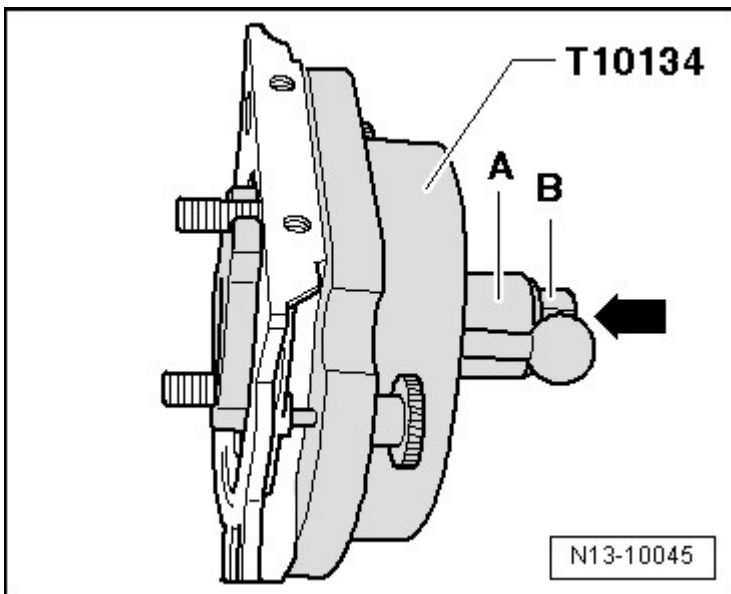


Fig. 86: Identifying Threaded Spindle Pressed Of Assembly Tool T10134 Until Nut Rests On Assembly Bell
 Courtesy of AUDI OF AMERICA, LLC

- The crankshaft flange must be free of oil and grease.
- Engine at "TDC".

- Install the nut -B- all the way to the end of the threaded spindle.
- Press the threaded spindle on assembly tool T10134 in -direction of arrow- until the nut -B- touches the assembly bell -A-.
- Align the flat side of the assembly bell with the oil pan side sealing surface of the cylinder block.

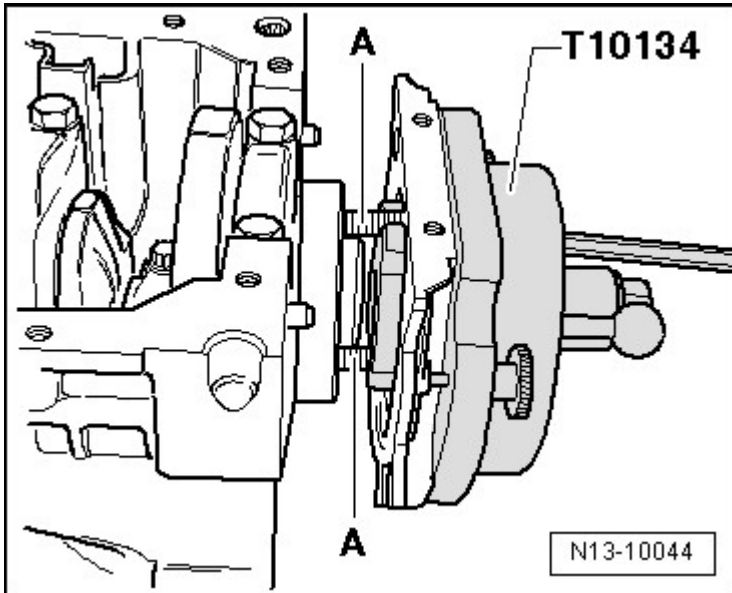


Fig. 87: Identifying Assembly Tool T10134 Secured Onto Crankshaft Flange Using Socket Head Hex Bolts

Courtesy of AUDI OF AMERICA, LLC

- Install the hex socket head bolts -A- in the crankshaft flange approximately 5 thread turns and attach the assembly tool T10134 to the crankshaft flange.
- Install two M7 x 35 bolts -A- into the cylinder block to guide the sealing flange.

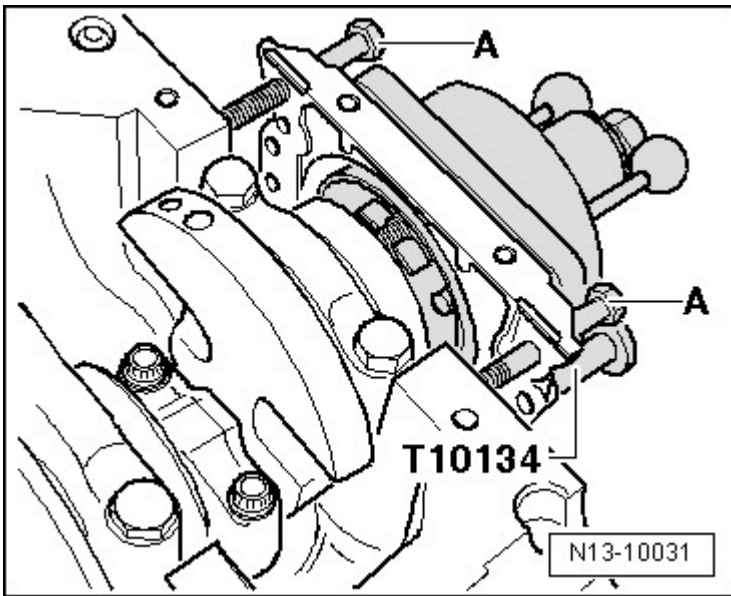


Fig. 88: Identifying Bolts Screwed Into Cylinder Block To Guide Sealing Flange
Courtesy of AUDI OF AMERICA, LLC

C - Bolting Assembly Tool T10134 to Crankshaft Flange

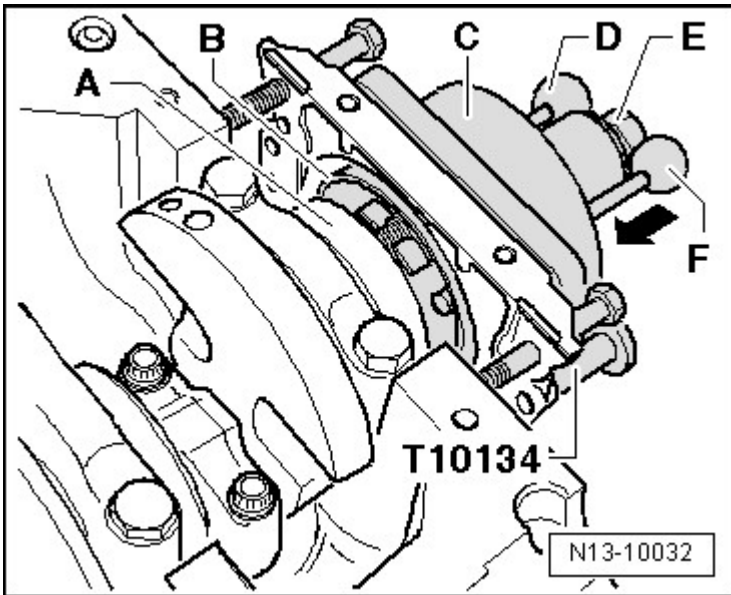


Fig. 89: Identifying Assembly Bell Pushed Until Sealing Lip Support Ring Rests On Crankshaft Flange
Courtesy of AUDI OF AMERICA, LLC

-- Press the assembly bell -C- in -direction of arrow- by hand until the sealing lip support ring -B- touches the crankshaft flange -A-.

CAUTION: Risk of interchanging.

- Do not insert the guide pin for gasoline engines (red handle) -F- into

the crankshaft threaded bore.

-- Install the guide bolts for diesel engines (black handle) -D- into the hole in the crankshaft. The sensor wheel will be in its final installed position.

-- Tighten both assembly tool hex socket head bolts by hand.

-- Install the nut -E- as far as possible on the threaded spindle by hand until it touches the assembly bell -C-.

D - Installing the Sensor Wheel on the Crankshaft Flange with the Assembly Tool T10134:

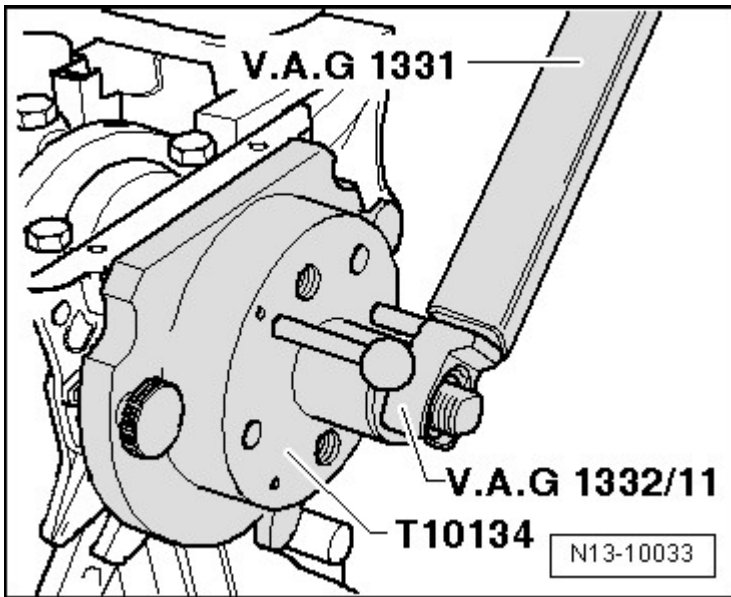


Fig. 90: Identifying Sensor Wheel Pressed With Assembly Tool T10134 Onto Crankshaft Flange
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the assembly tool T10134 nut to 35 Nm.

- After tightening the nut to 35 Nm, a minimal air gap must still be present between the cylinder block and sealing flange.

E - Checking the sensor wheel installed position on the crankshaft:

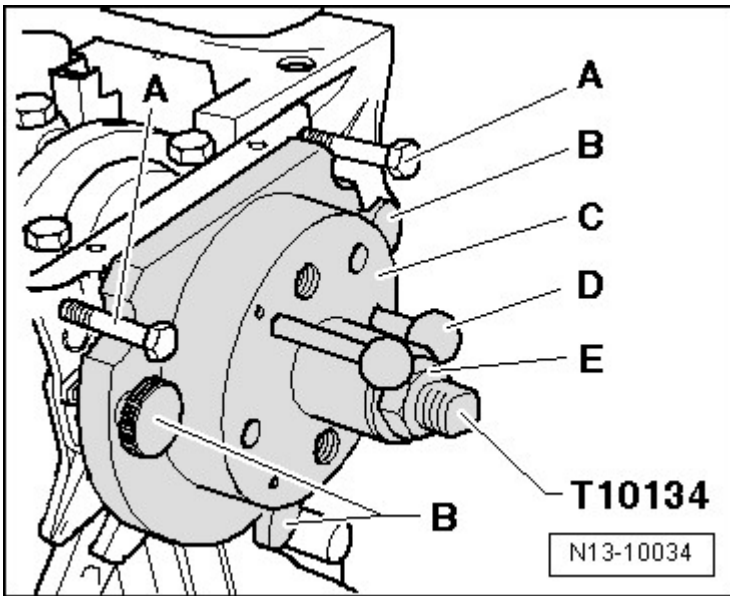


Fig. 91: Checking Installed Position Of Sensor Wheel On Crankshaft
 Courtesy of AUDI OF AMERICA, LLC

- Install the nut -E- all the way to the end of the threaded spindle.
- Remove the bolts -A- from the cylinder block.
- Remove the knurled bolts -B- from the sealing flange.
- Remove the hex socket head bolts.
- Remove the hex socket head bolts from the crankshaft flange and remove the assembly tool T10134 from the crankshaft flange.
- Remove the assembly tool T10134.
- Remove the sealing lip support ring.
- Attach the depth gauge VAS 6082 to the crankshaft flange.

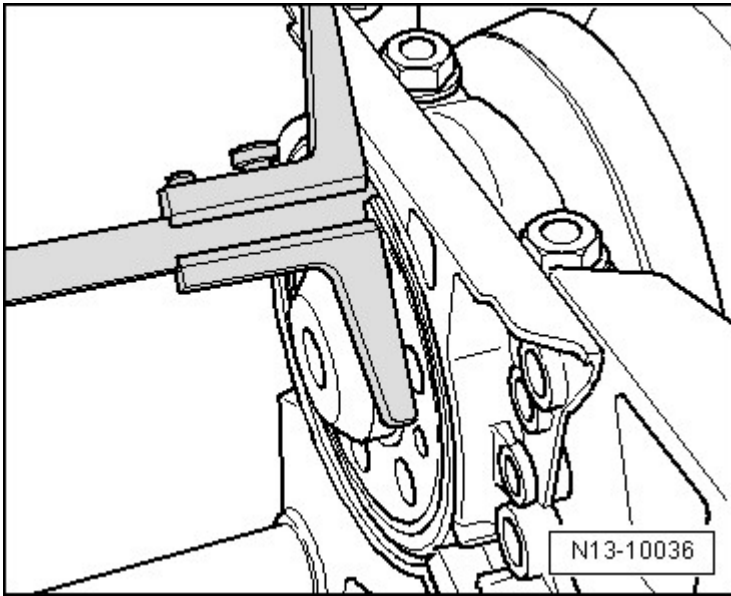


Fig. 92: Identifying Caliper Gauge Set Onto Crankshaft Flange
 Courtesy of AUDI OF AMERICA, LLC

-- Measure the space between the crankshaft flange -A- and the sensor wheel -B-.

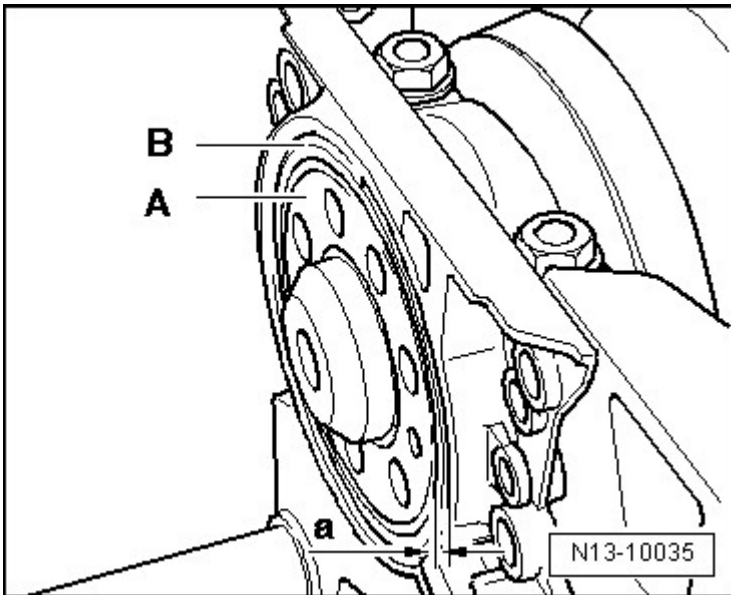


Fig. 93: Identifying Installed Position Of Sensor Wheel On Crankshaft Is Exact
 Courtesy of AUDI OF AMERICA, LLC

- Specified value: -a- = 0.5 mm

-- If dimension -a- is too small, press the sensor wheel further **TRANSMISSION SIDE SEALING FLANGE**.

-- When the specified value is reached, assemble the rest **TRANSMISSION SIDE SEALING FLANGE**.

F - Pressing the sensor wheel further:

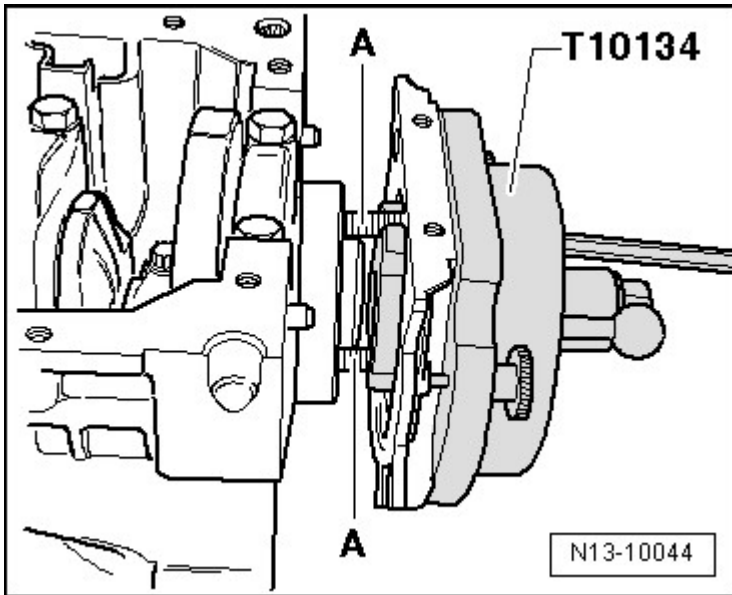


Fig. 94: Identifying Assembly Tool T10134 Secured Onto Crankshaft Flange Using Socket Head Hex Bolts

Courtesy of AUDI OF AMERICA, LLC

- Tighten the hex socket head bolts -A- by hand and secure the assembly tool T10134 to the crankshaft flange.
- Press the assembly tool onto the sealing flange by hand.
- Install the nut -E- as far as possible on the threaded spindle by hand until it touches the assembly bell -C-.

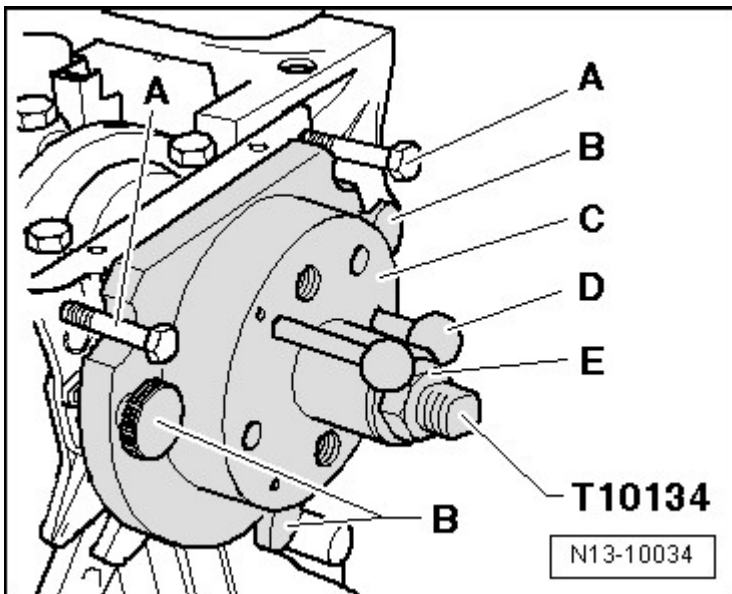


Fig. 95: Checking Installed Position Of Sensor Wheel On Crankshaft

Courtesy of AUDI OF AMERICA, LLC

-- Tighten the assembly tool T10134 nut to 40 Nm.

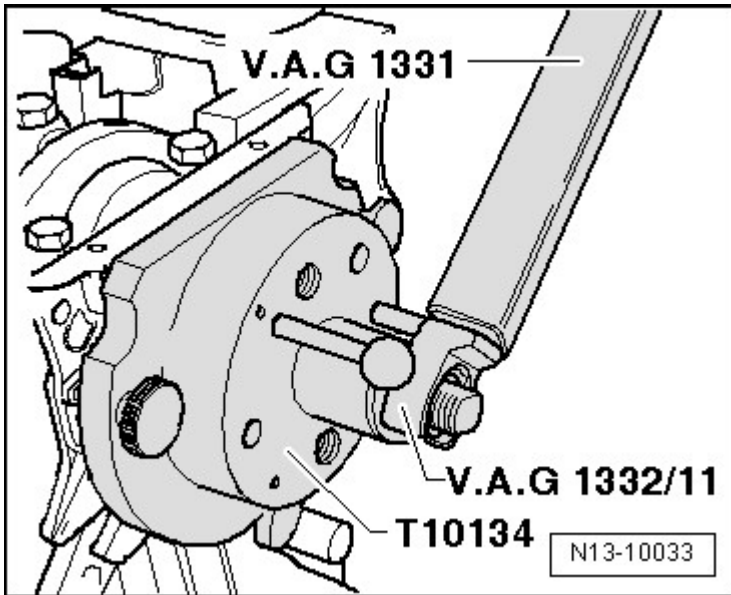


Fig. 96: Identifying Sensor Wheel Pressed With Assembly Tool T10134 Onto Crankshaft Flange
 Courtesy of AUDI OF AMERICA, LLC

-- Check the sensor wheel installed position on the crankshaft TRANSMISSION SIDE SEALING FLANGE.

-- If dimension "a" is still too small, tighten the nut on the assembly tool T10134 to 45 Nm.

-- Check the sensor wheel installed position on the crankshaft TRANSMISSION SIDE SEALING FLANGE.

Assembling:

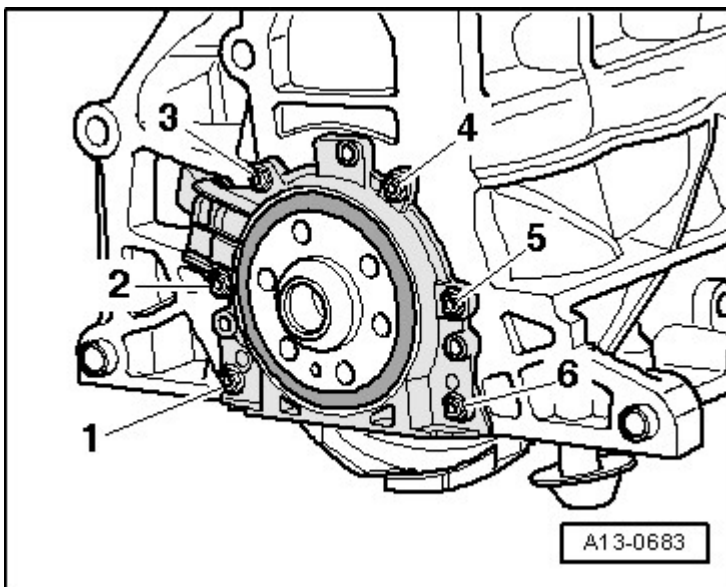


Fig. 97: Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

-- Tighten sealing flange bolts **DUAL MASS FLYWHEEL AND SEALING FLANGE, TRANSMISSION SIDE ASSEMBLY OVERVIEW.**

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

-- Install the engine speed sensor -G28- -1-. Refer to **REMOVAL AND INSTALLATION** .

-- Install oil pan **OIL PAN** .

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

NEEDLE BEARING ON CRANKSHAFT

Special tools and workshop equipment required

- Drift VW 207 C or Centering Mandrel 3176
- Depth Gauge VAS 6082
- Kukko 21/1 internal puller
- Kukko 22/1 counter-support

Pulling Out

- Transmission removed.

-- Remove needle bearing with Kukko 21/1 internal puller and Kukko 22/1 counter-support.

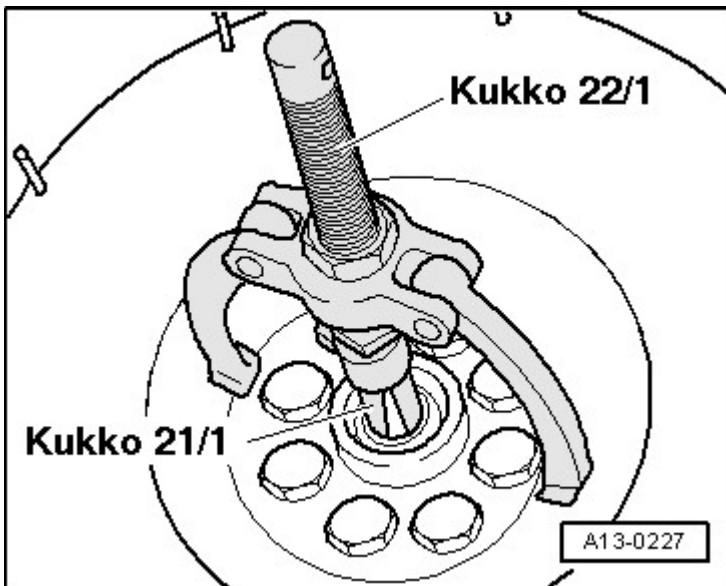


Fig. 98: Pulling Out Pilot Needle Bearing Using Kukko 21/1 And Kukko 22/1
Courtesy of AUDI OF AMERICA, LLC

Driving In

-- Install the needle bearing using a VW 207 C or a 3176.

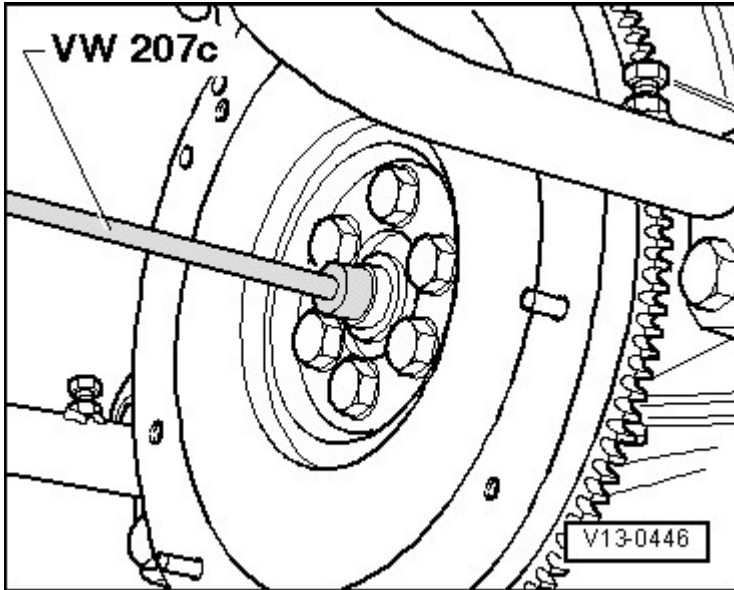


Fig. 99: Driving In Needle Bearing Using Drift VW 207 C
Courtesy of AUDI OF AMERICA, LLC

- Installed position: the lettered side is legible.
- Installation depth: -a- = approximately 3 mm.

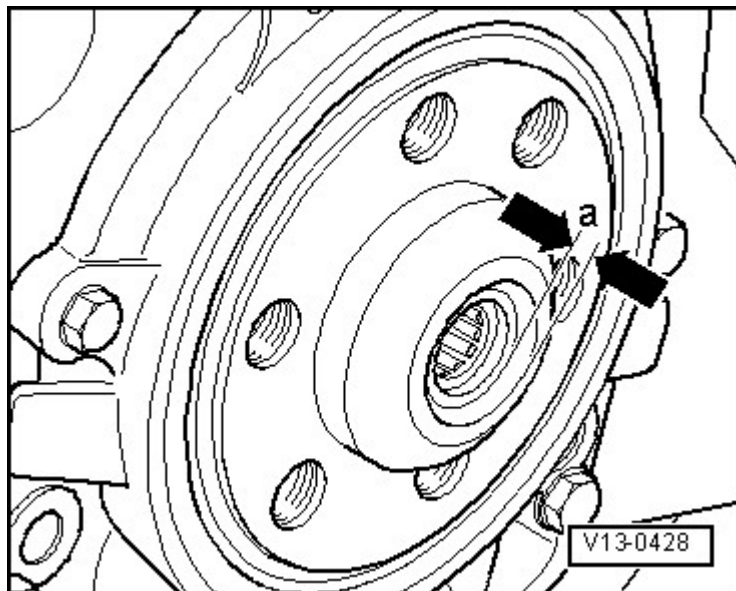


Fig. 100: Identifying Installation Depth Dimension
Courtesy of AUDI OF AMERICA, LLC

SPUR GEAR, REMOVING FROM CRANKSHAFT AND INSTALLING**Special tools and workshop equipment required**

- Oil Seal Driver 10 - 203
- Puller T10392
- Hotplate (commercially available)
- Digital Thermometer VAS 6519
- Protective gloves

Procedure

- Balance Shaft Module, Removing. Refer to **BALANCE SHAFT MODULE, REMOVING** .
- Remove the belt pulley side sealing flange. Refer to **SEALING FLANGE, BELT PULLEY SIDE**.
- Install the thrust piece T10392/1 into the crankshaft stub

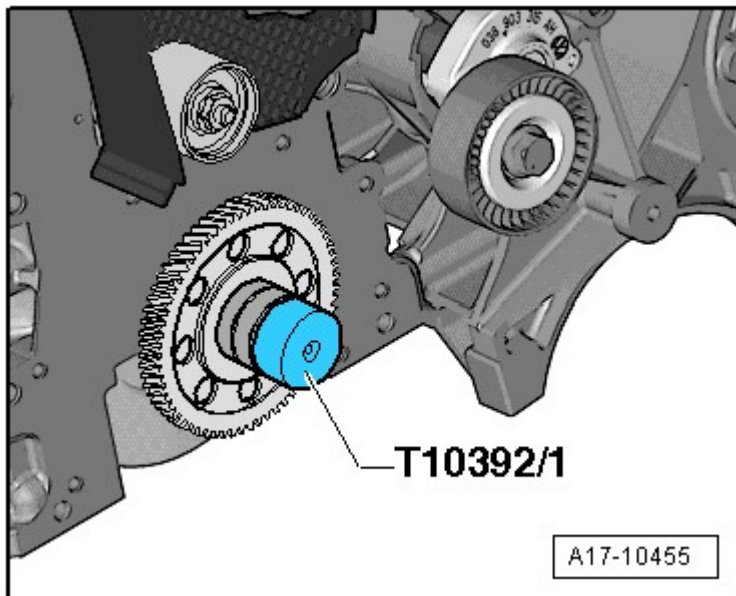


Fig. 101: Identifying Thrust Piece T10392/1
Courtesy of AUDI OF AMERICA, LLC

- Install the T10392 into the hole in the spur gear, turn it to the right -arrow- and install the securing pins -A-.

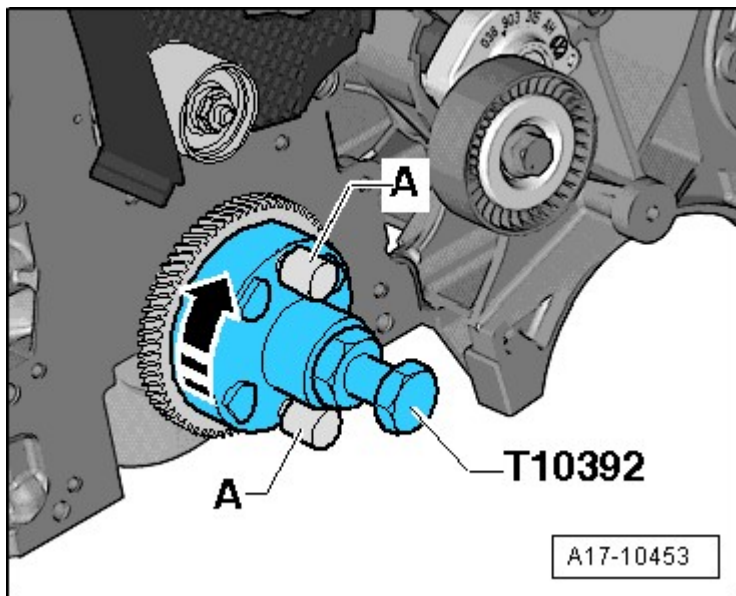


Fig. 102: Identifying Puller T10392

Courtesy of AUDI OF AMERICA, LLC

-- Counterhold the crankshaft with an open end wrench -A-. Remove the spur gear by installing the spindle with the open end wrench -B-.

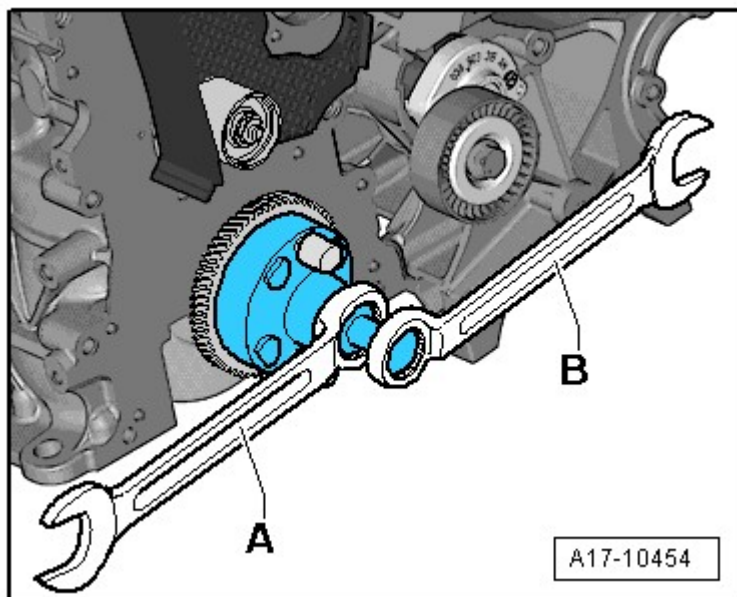


Fig. 103: View Of Counter-Holding Crankshaft

Courtesy of AUDI OF AMERICA, LLC

-- Clean the crankshaft stub.

NOTE: Check the temperature of the new spur gear with the thermometer VAS 6519 when heating it.

When the temperature reaches 200 °C (392 °F), there are about four seconds to position the spur gear on the crankshaft.

A higher temperature increases the amount of time available for positioning (220 °C (428 °F) = approximately six seconds).

Make sure the crankshaft stub is clean.

CAUTION: Danger of causing damage if the temperature is too high.

- **Temperature must not exceed 240 °C (464 °F) otherwise the spur gear may discolor or warp.**

-- Lay the entire surface of the new spur gear on a commercially available hot plate and heat it to at least 200 °C (392 °F) (maximum 240 °C (464 °F)).

- Lettered side faces up.

-- Set the VAS 6519 to measuring range 2.

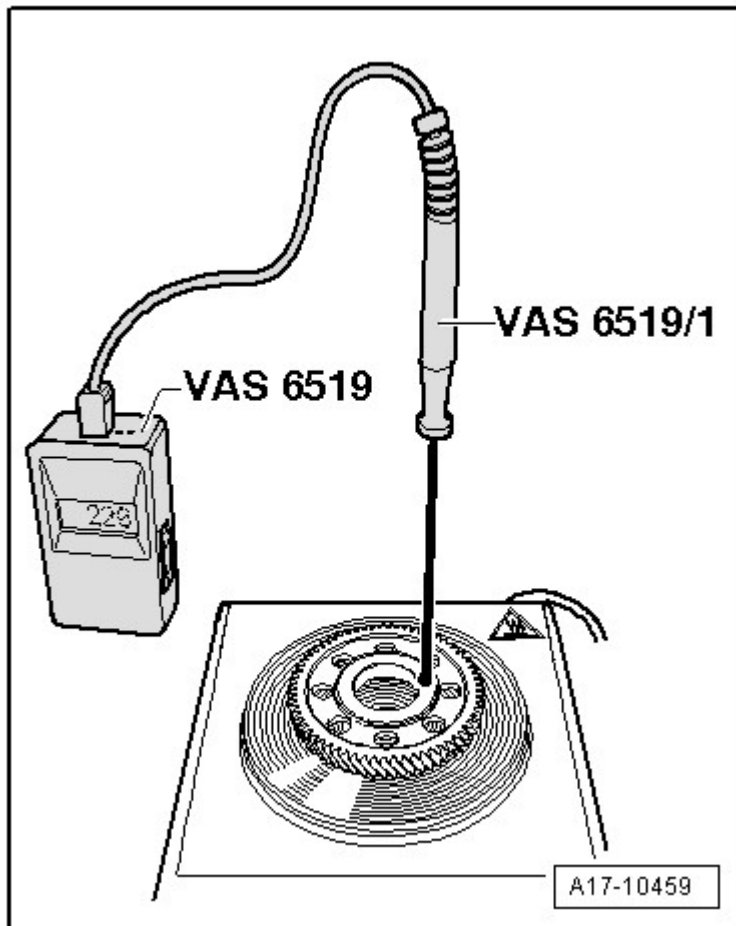


Fig. 104: Mounting Temperature Sensor 6519/1 On Spur Gear
Courtesy of AUDI OF AMERICA, LLC

-- Mount the temperature sensor 6519/1 on the spur gear as illustrated and read the temperature on the digital thermometer.

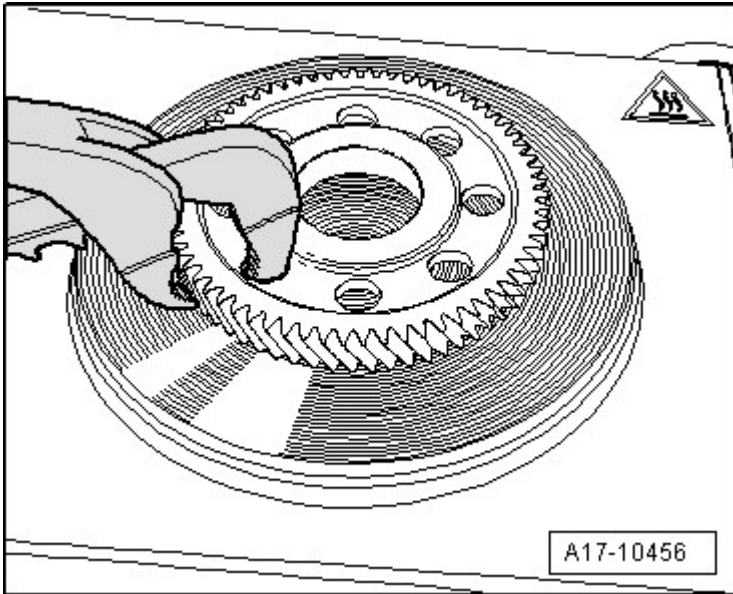


Fig. 105: Removing Spur Gear From Plate With Pliers
Courtesy of AUDI OF AMERICA, LLC

WARNING: There is a risk of burns.

- Wear suitable protective gloves during the rest of the procedure.

-- After the temperature is reached, remove the spur gear from pliers as illustrated.

-- Quickly slide the spur gear by onto the crankshaft pins as far as the stop. Use the oil seal driver 10 - 203 for assistance and do not tilt the gear.

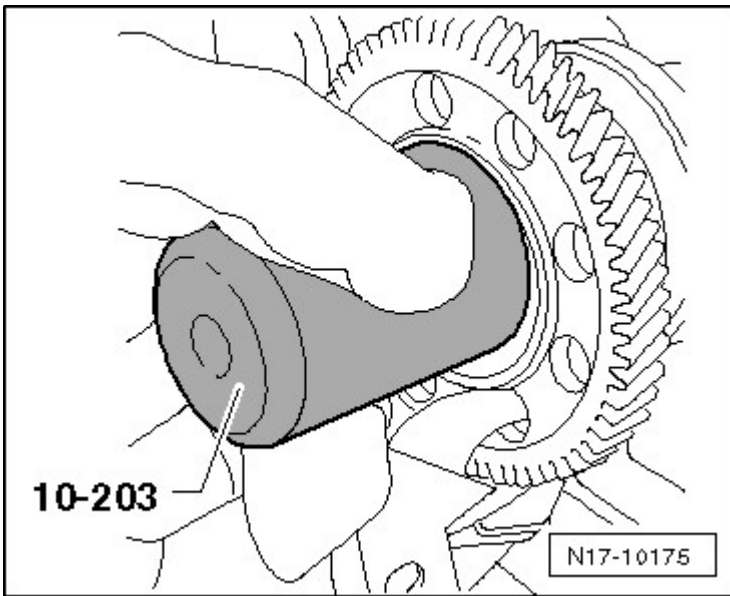


Fig. 106: View Of Oil Seal Driver 10-203
Courtesy of AUDI OF AMERICA, LLC

NOTE: **Make sure the splines on the spur gear are not damaged.**

-- Let the spur gear cool down a few minutes and then install the balance shaft assembly.

-- **USED BALANCE SHAFT MODULE, INSTALLING** .

-- **NEW BALANCE SHAFT ASSEMBLY, INSTALLING** .

SPECIAL TOOLS

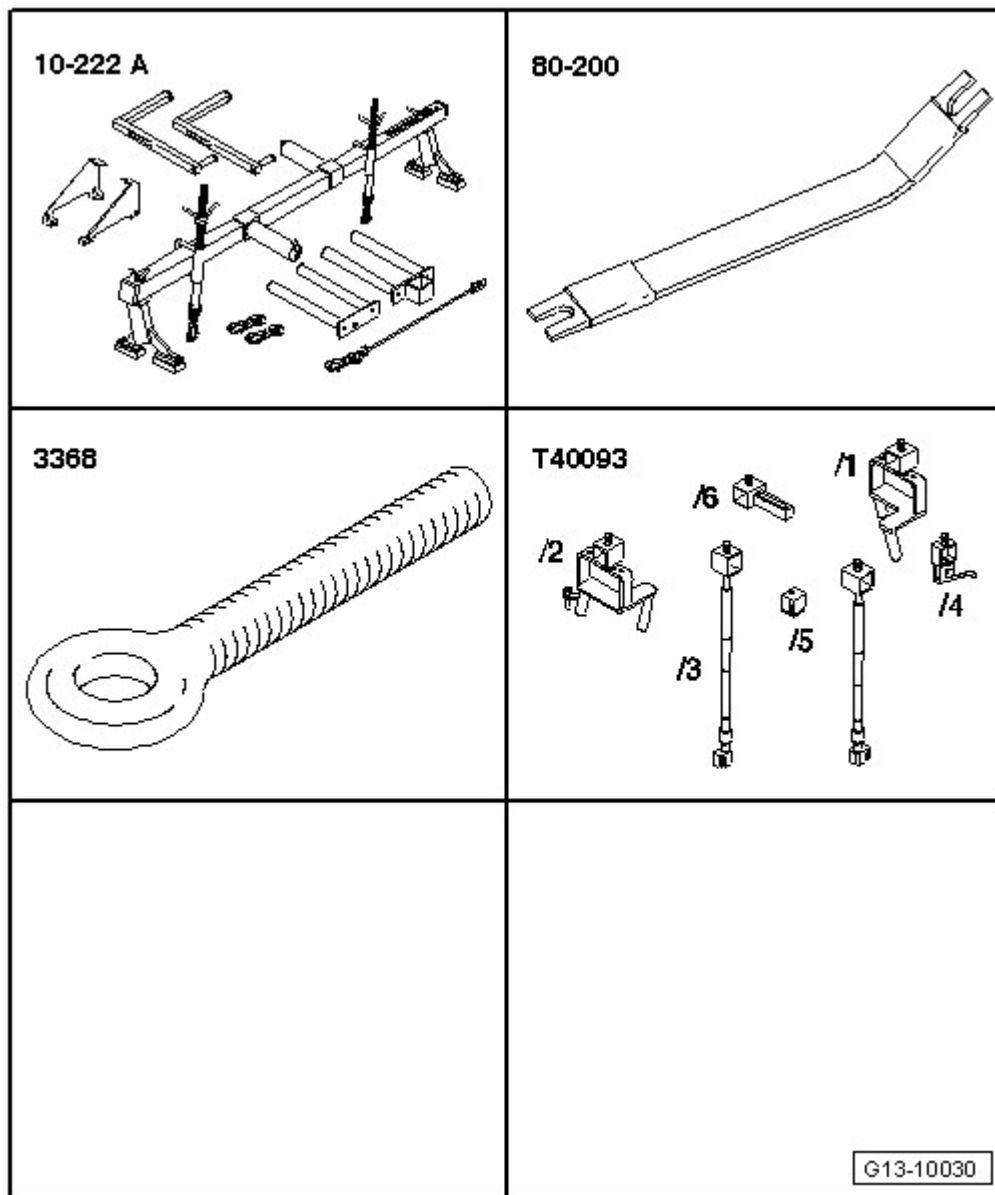


Fig. 107: Special Tools And Workshop Equipment Required
 Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Engine Support Bridge 10 - 222 A
- Pry Lever - Rmv Outside Mirror 80 - 200
- Lifting Eyebolt 3368
- Engine Support Supplement Set T40093
- Nut taken from the Engine Support Bracket T40150

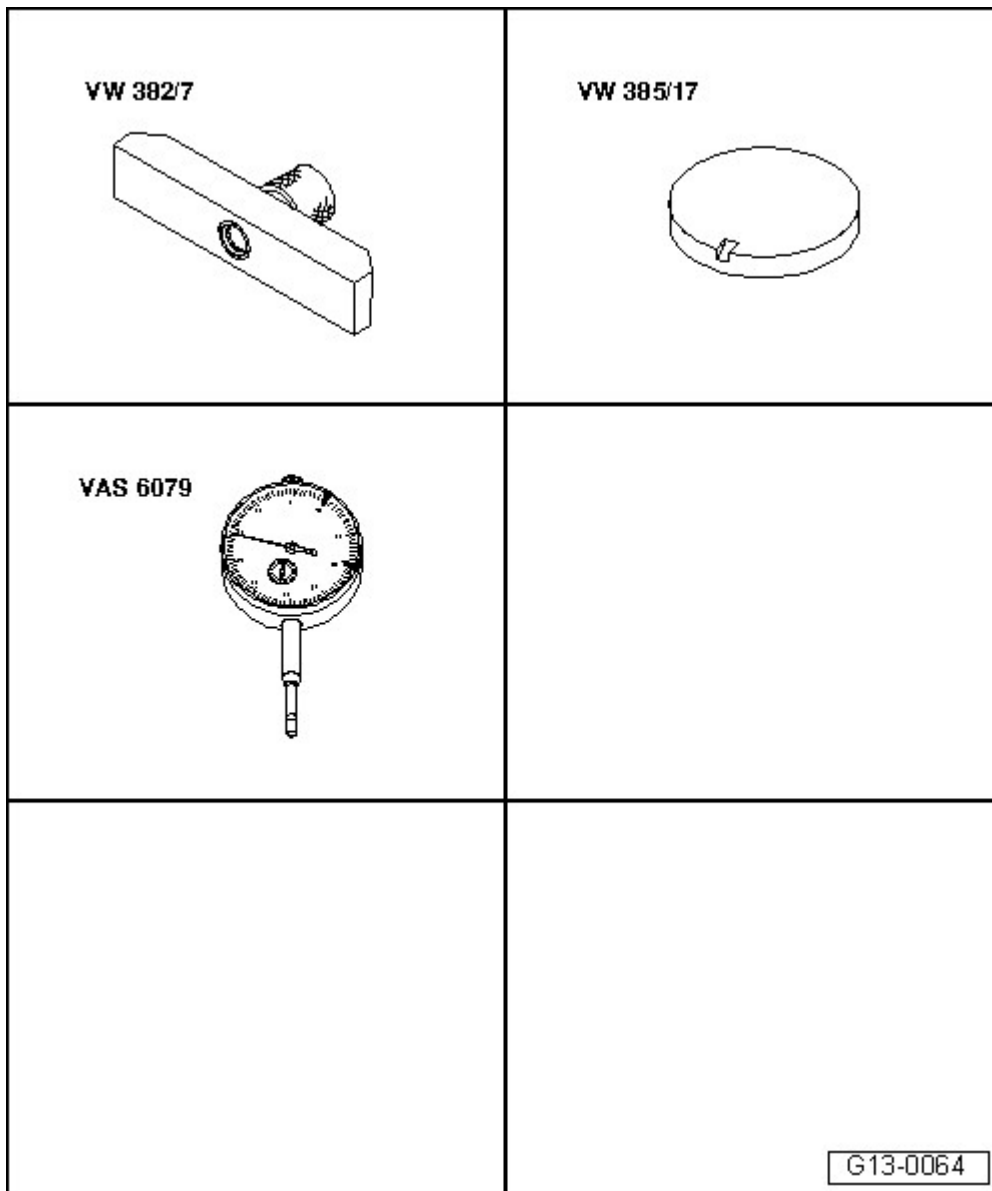


Fig. 108: VW 382/7, VW 385/17 And VAS 6079

Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Measuring Bar VW 382/7 from the Special Socket and Measuring Tools VW 382
- Magnetic Plate 50 mm Dia. VW 385/17 from Universal Measuring Tool VW 385
- Dial Gauge VAS 6079

Special tools and workshop equipment required

- Dial Gauge Holder VW 387

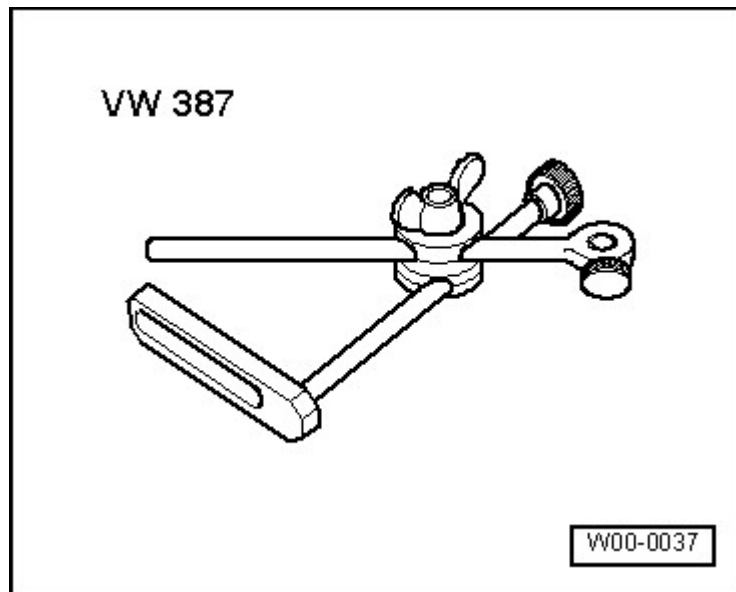


Fig. 109: Dial Gauge Holder VW 387
Courtesy of AUDI OF AMERICA, LLC

- Locking Pin T10060 A

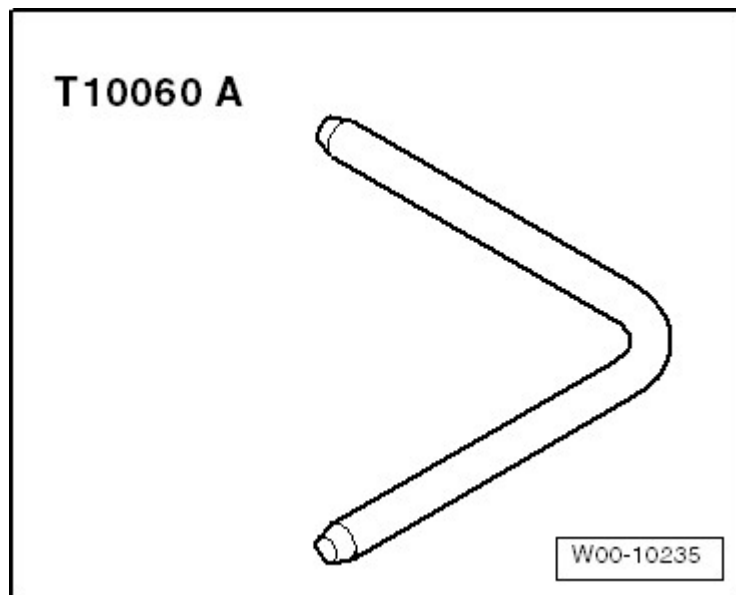


Fig. 110: Identifying Locking Pin T10060 A
Courtesy of AUDI OF AMERICA, LLC

- Seal Remover 3203

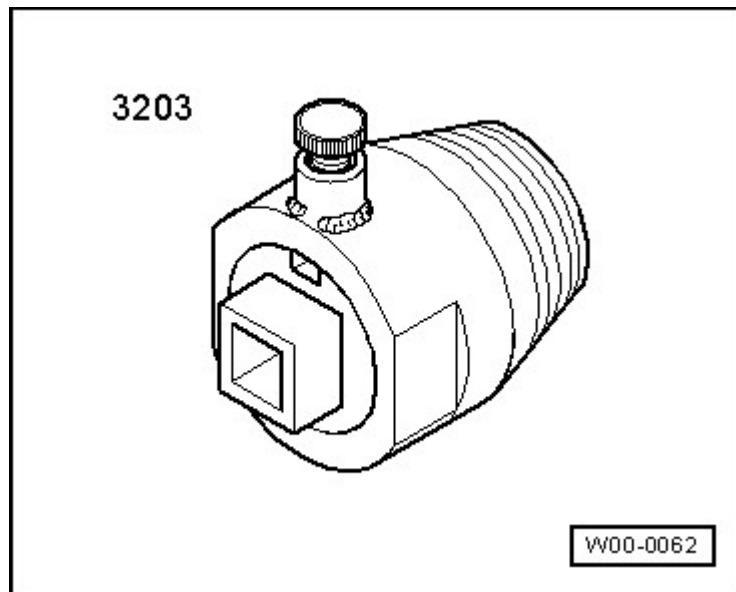


Fig. 111: Seal Remover 3203
Courtesy of AUDI OF AMERICA, LLC

- Counter Support 3415

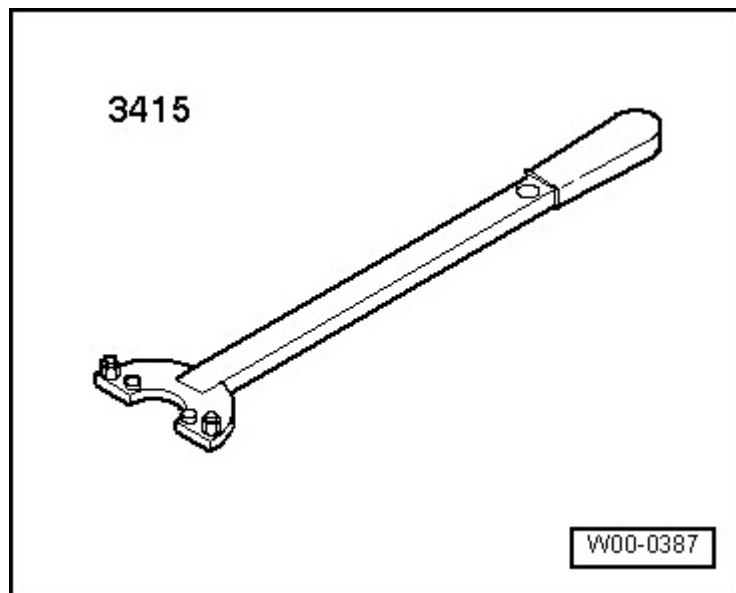


Fig. 112: Counter Support 3415
Courtesy of AUDI OF AMERICA, LLC

- Assembly Tool T10053

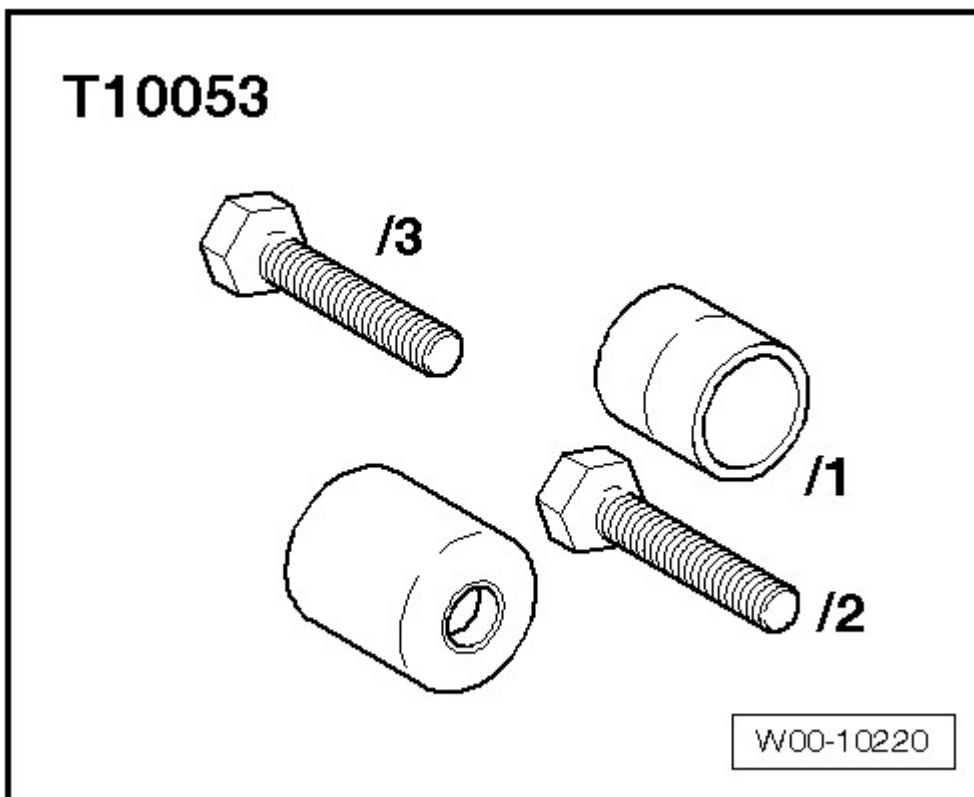


Fig. 113: Assembly Tool T10053
Courtesy of AUDI OF AMERICA, LLC

- Flywheel Retainer 3067

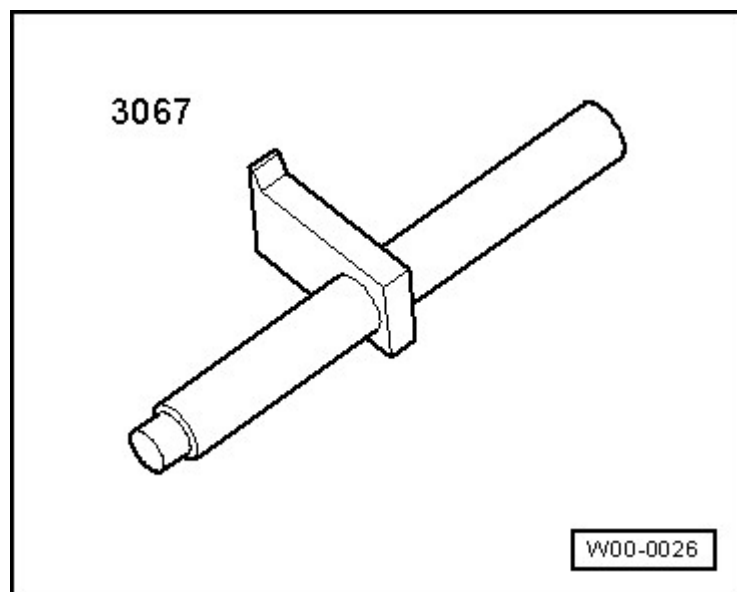


Fig. 114: 3067 Counter-Hold Tool
Courtesy of AUDI OF AMERICA, LLC

- Drift VW 207 C or Centering Mandrel 3176

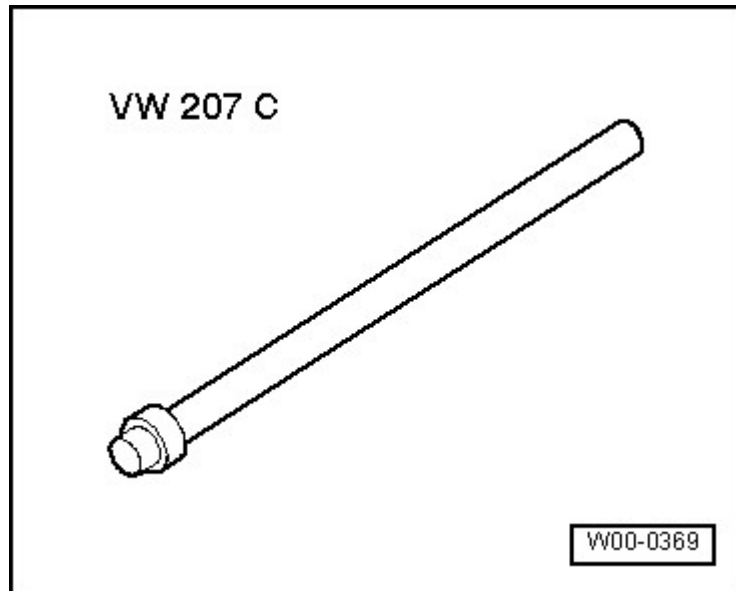


Fig. 115: Drift VW 207 C Or Centering Mandrel 3176
Courtesy of AUDI OF AMERICA, LLC

- -1- Kukko 21/1 internal puller

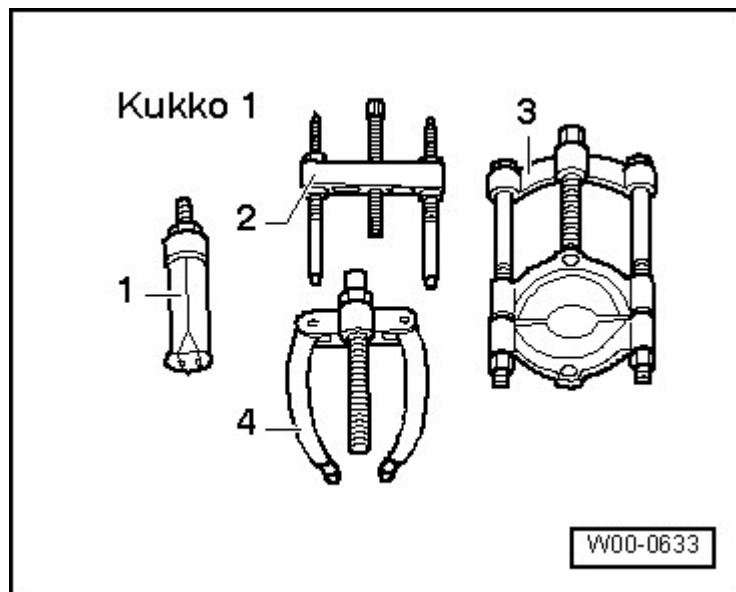


Fig. 116: Identifying Kukko Tools
Courtesy of AUDI OF AMERICA, LLC

- -4- Kukko 22/1 counter-support
- Depth Gauge VAS 6082

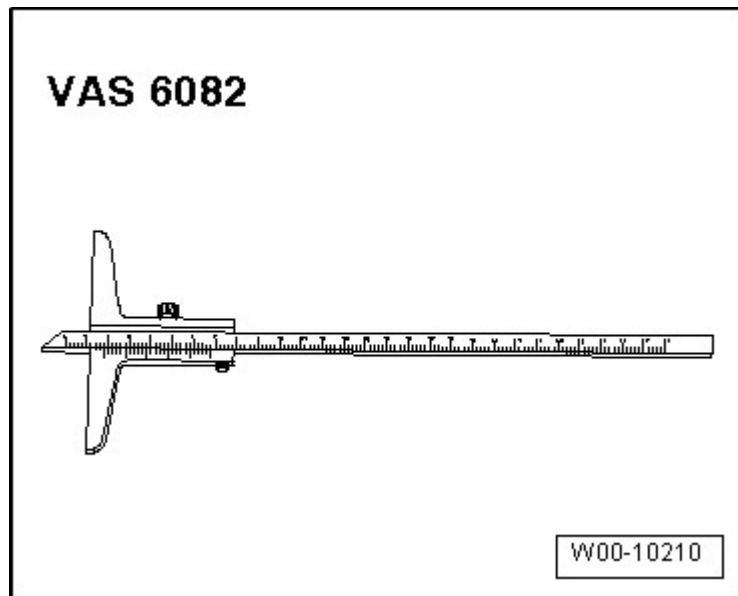


Fig. 117: Identifying Depth Gauge VAS 6082
Courtesy of AUDI OF AMERICA, LLC

- Oil Seal Driver 10 - 203

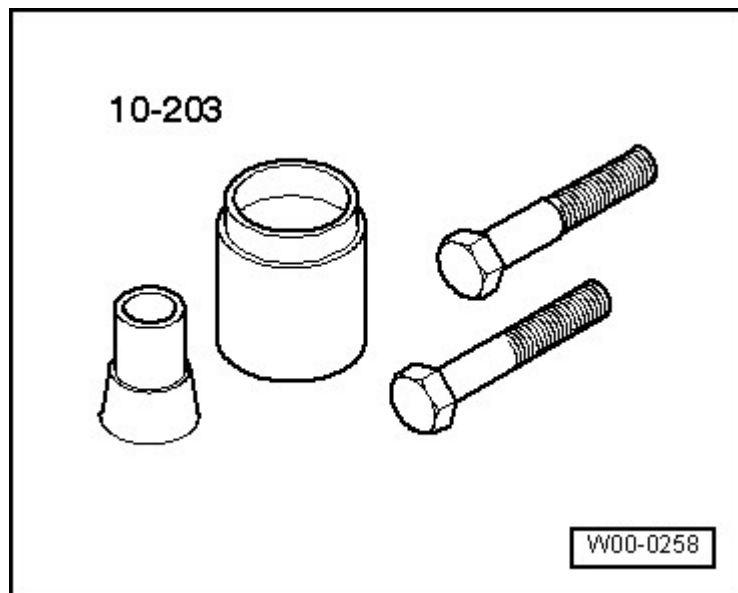


Fig. 118: Oil Seal Driver 10-203
Courtesy of AUDI OF AMERICA, LLC

- Puller T10392

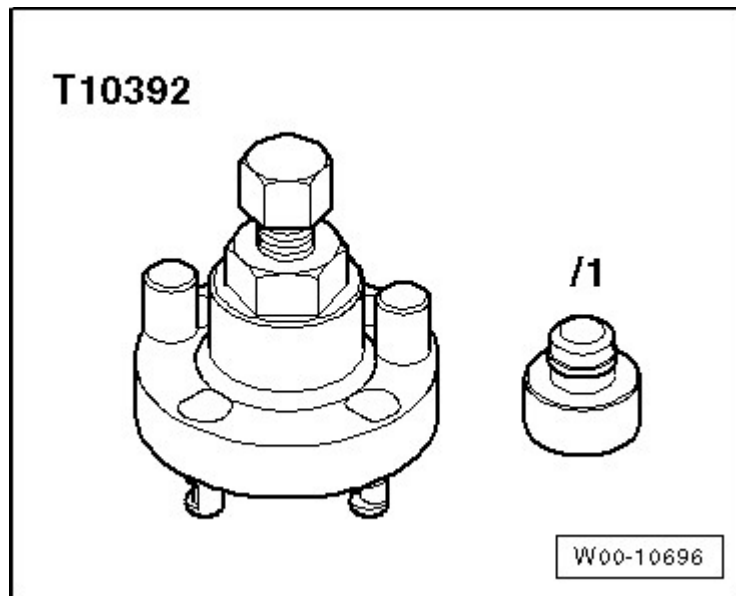


Fig. 119: Puller T10392

Courtesy of AUDI OF AMERICA, LLC

- Hotplate (commercially available)

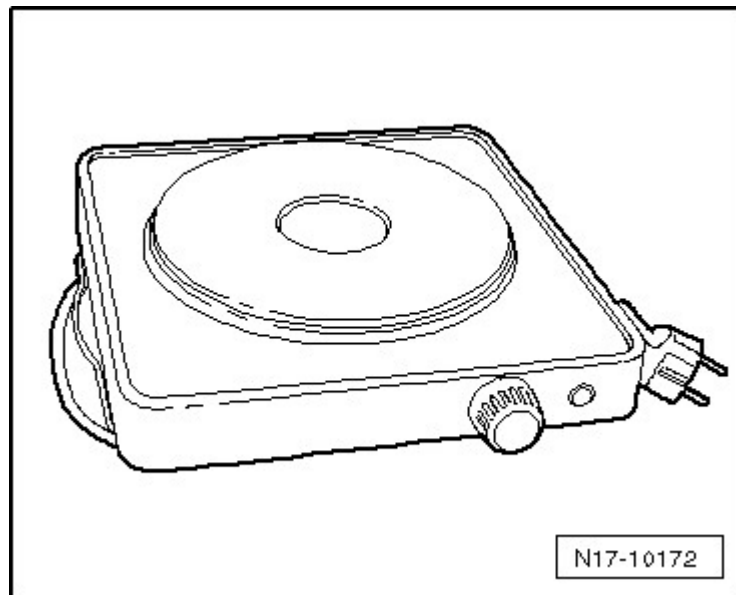


Fig. 120: Hotplate (Commercially Available)

Courtesy of AUDI OF AMERICA, LLC

ENGINE

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

15 CYLINDER HEAD, VALVETRAIN

DESCRIPTION AND OPERATION

TOOTHED BELT ASSEMBLY OVERVIEW

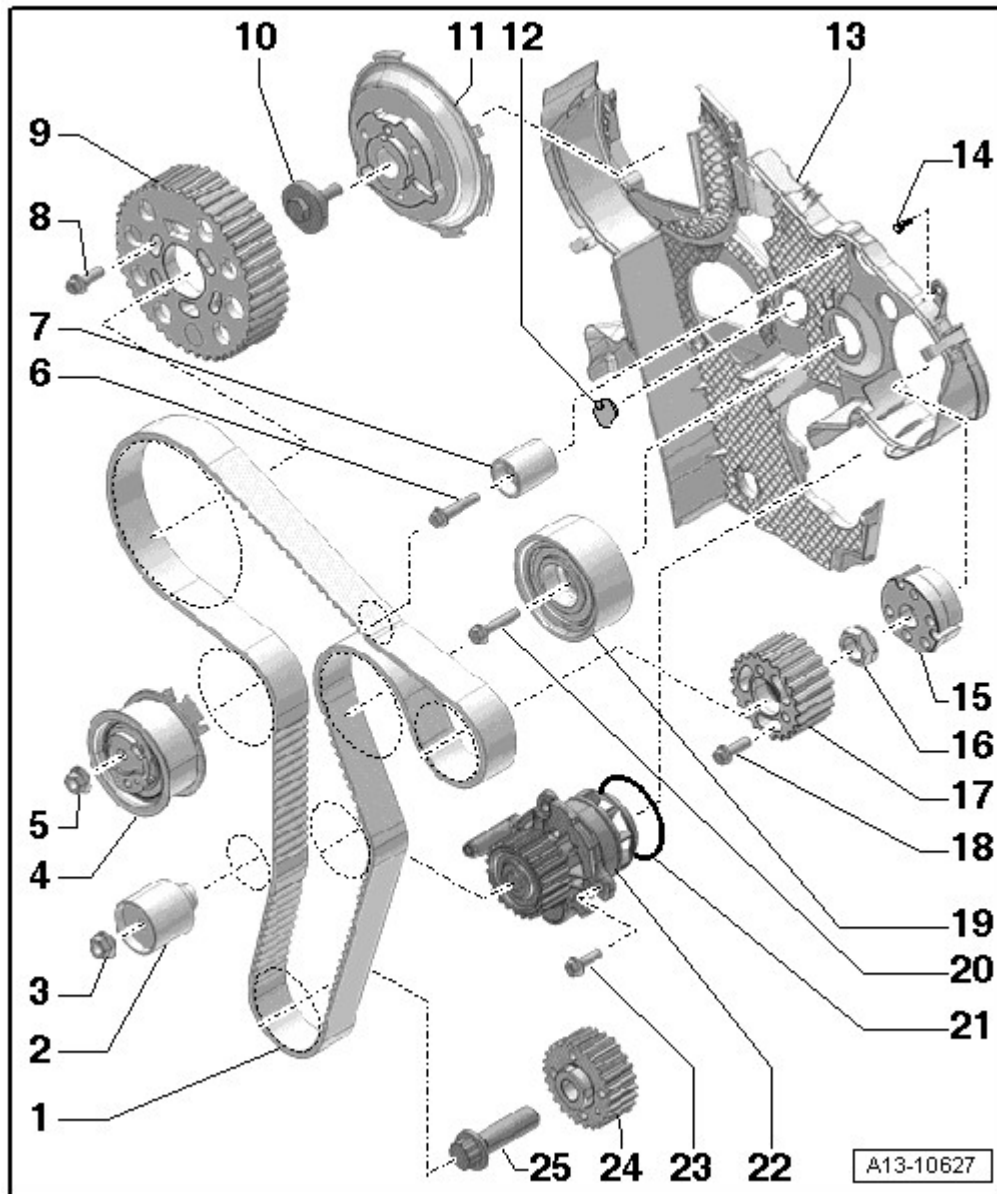


Fig. 1: Toothed Belt Assembly Overview
Courtesy of AUDI OF AMERICA, LLC

1. Toothed Belt
 - Before removing, mark direction of rotation using chalk or felt-tip marker
 - Check for wear
 - Removing, refer to **TOOTHED BELT**
 - Installing (adjusting valve timing) **TOOTHED BELT**
2. Idler Roller
3. Nut
 - 20 Nm
4. Tensioning Roller
5. Nut
 - 20 Nm plus an additional 45° turn
6. Bolt
 - 20 Nm
7. Idler Roller
8. Bolt
 - 25 Nm
9. Camshaft Toothed Belt Gear
10. Bolt
 - 100 Nm
 - Loosen and tighten with counterholder T10051
11. Camshaft Stub
 - Removing and installing, refer to **CAMSHAFTS**
12. Plugs
13. Rear Toothed Belt Guard
14. Bolt
 - 9 Nm
15. High Pressure Pump Stub
 - Removing and installing. Refer to **Removal and Installation**
16. Nut
 - Tightening specifications, refer to **SPECIFICATIONS**
17. Toothed Belt Gear for the High Pressure Pump
18. Bolt
 - Tightening specifications, refer to **SPECIFICATIONS**
19. Idler Roller
20. Bolt
 - Replace
 - 50 Nm plus an additional 90° turn
21. O-ring

- Replace
22. Coolant Pump
- Removing and installing, refer to **COOLANT PUMP**
23. Bolt
- Tightening specifications -1- **COOLANT PUMP AND COOLANT THERMOSTAT ASSEMBLY OVERVIEW**
24. Crank Shafts - Toothed Belt Gear
- There must be no oil on the contact surface between the toothed belt sprocket and crankshaft
 - Only possible to install in one position
25. Bolt
- Replace
 - 120 Nm plus an additional 90° turn
 - Loosen and tighten with counterholder 3415
 - Do not oil the thread and the collar

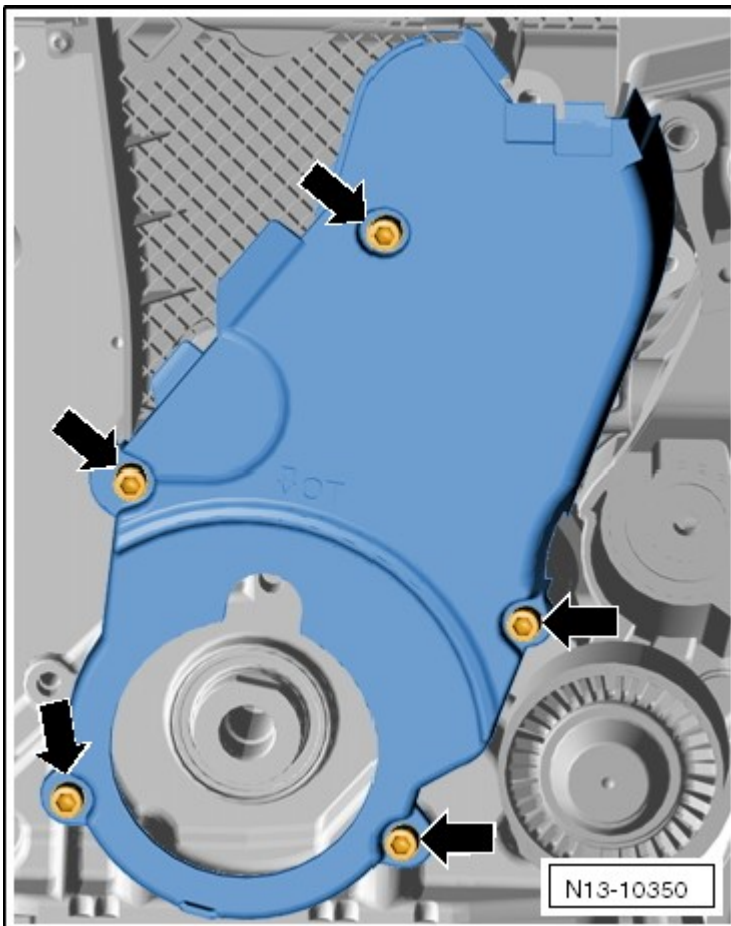


Fig. 2: Identifying Lower Toothed Belt Guard And Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Tighten bolts -arrows- to 9 Nm.

CYLINDER HEAD COVER ASSEMBLY OVERVIEW

NOTE: The Audi A3 with a 2.0L 4V TDI CR engine only has steel glow plugs.

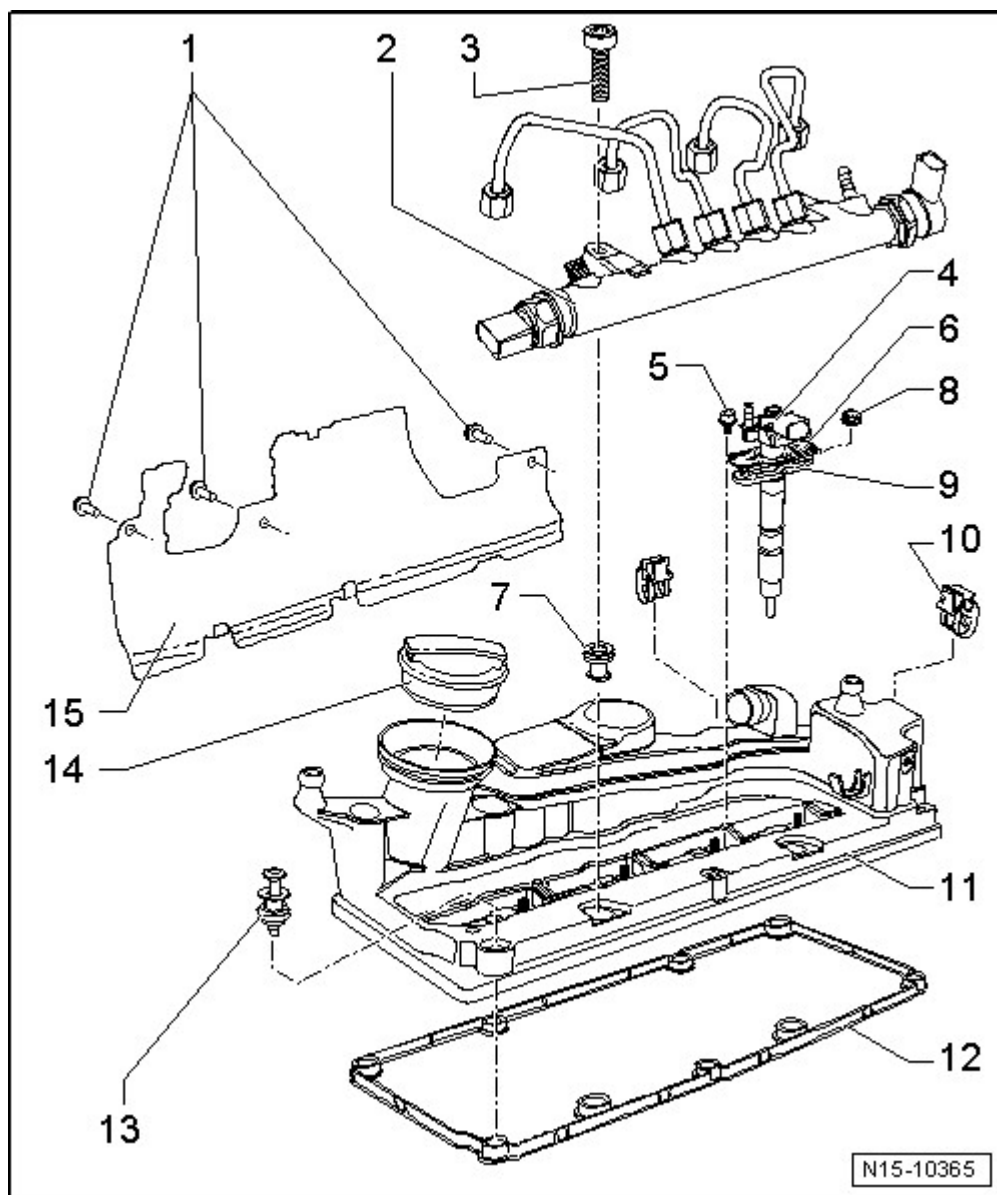


Fig. 3: Identifying Cylinder Head Cover Overview
Courtesy of AUDI OF AMERICA, LLC

1. Bolts
 - 5 Nm
2. Fuel Rail
 - Note rules of cleanliness, refer to **CLEAN WORKING CONDITIONS**

- Do not change the angles of the high pressure lines
 - High pressure lines, installing, refer to **Removal and Installation**
3. Bolt
 - Tightening specifications, refer to **SPECIFICATIONS**
 4. Injector
 - Note rules of cleanliness, refer to **CLEAN WORKING CONDITIONS**
 - Removing and installing, refer to **Removal and Installation**
 5. Bolt
 - Tightening specifications, refer to **SPECIFICATIONS**
 6. Injection Unit Cover
 7. High Pressure Reservoir Connector
 - Replace if damaged or leaking
 8. Nut
 - Tightening specifications, refer to **SPECIFICATIONS**
 9. Tensioning Bracket
 10. Wiring Router
 11. Cylinder Head Cover
 - Removing and installing, refer to **CYLINDER HEAD COVER**
 12. Gasket
 - Replace if damaged or leaking
 13. Bolt
 - Replace if seal is damaged
 - Tightening specification and sequence **Fig. 4**
 14. Cap
 15. Heat Shield

Cylinder Head Cover, Tightening Specifications and Sequence

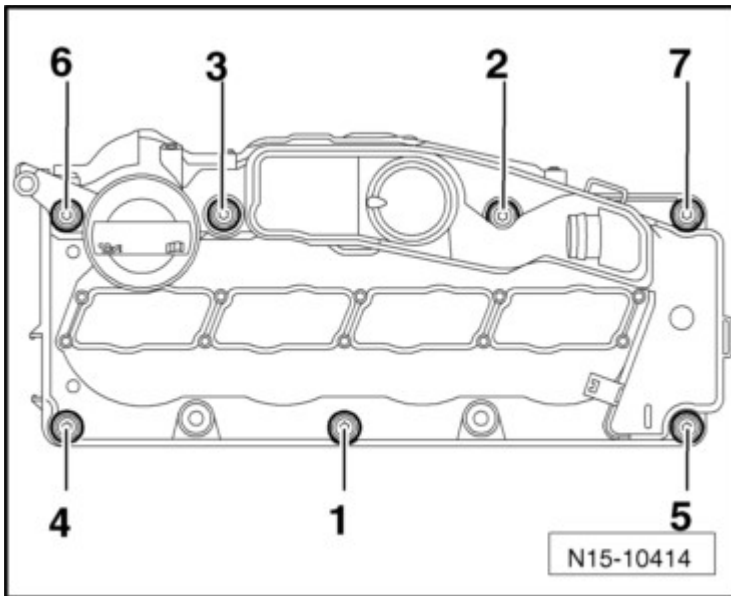


Fig. 4: Identifying Head Cover Bolts -1 Through 7- Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the cylinder head cover bolts to 9 Nm in sequence -1 to 7-.

CYLINDER HEAD ASSEMBLY OVERVIEW

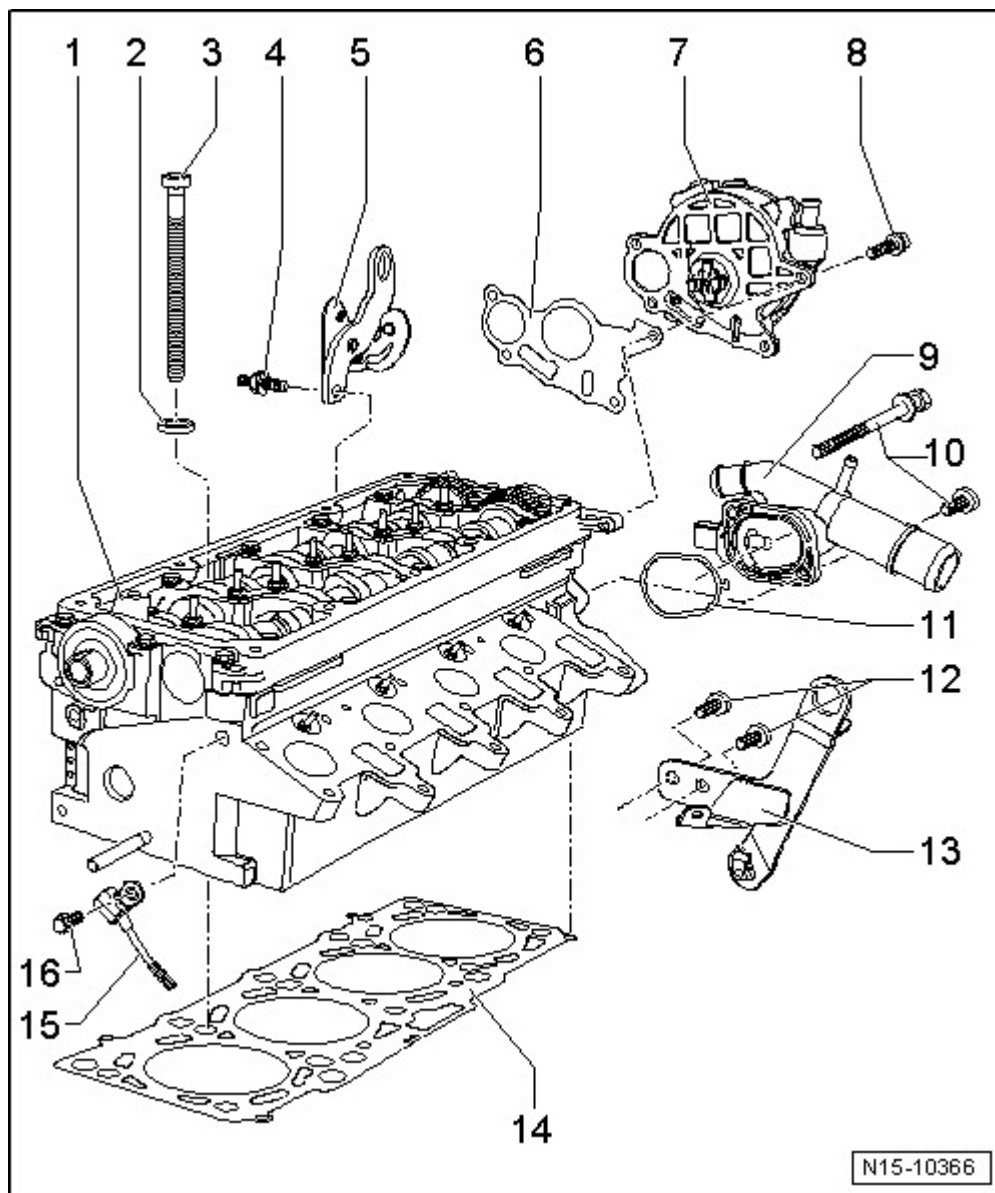


Fig. 5: Identifying Cylinder Head Overview

Courtesy of AUDI OF AMERICA, LLC

1. Cylinder Head

- Removing and installing, refer to **CYLINDER HEAD**
- Only set the removed cylinder head down on a foam pad. Otherwise the glow plugs can be damaged.
- Check for distortion **Fig. 6**
- Must not be reworked
- After replacing, change coolant and engine oil

2. Washer

3. Bolt

- Replace
 - Loosening sequence **Fig. 90**
 - Tightening specification and sequence **Fig. 8**
4. Bolt
 - 20 Nm
 5. Engine Lifting Eye
 6. Gasket
 - Replace
 7. Vacuum Pump
 - Removing and installing, refer to **[For engine(s) CBRA, BPY, CCTA, CBFA] Removal and Installation**
 8. Bolt
 - Tightening specifications, refer to **[For engine(s) CBRA, BPY, CCTA, CBFA] Removal and Installation**
 9. Connecting Piece
 10. Bolts
 - Tightening specifications -19- **COOLANT PIPES, COOLANT TEMPERATURE SENSORS AND COOLANT PUMP ASSEMBLY OVERVIEW**
 11. Gasket
 - Replace
 12. Bolts
 - 20 Nm
 13. Engine Lifting Eye
 14. Cylinder Head Gasket
 - Replacing, refer to **CYLINDER HEAD.**
 - Cylinder head gasket identification **Fig. 7**
 - after replacing, change coolant and engine oil
 15. Camshaft Position Sensor -G40-
 - For camshaft position
 16. Bolt
 - Insert with locking compound; Locking compound
 - 10 Nm

Checking Cylinder Head for Distortion

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

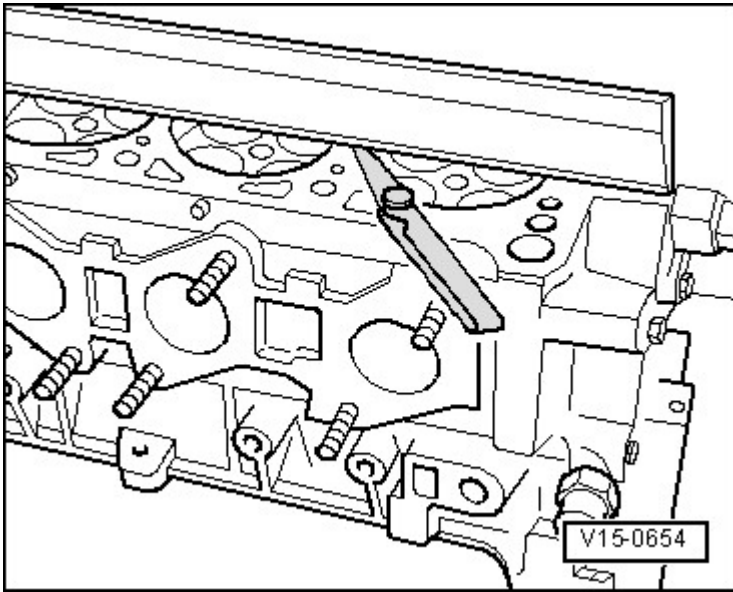


Fig. 6: Checking Cylinder Head For Distortion
Courtesy of AUDI OF AMERICA, LLC

- Maximum permissible warpage: 0.1 mm.

NOTE: It is not permitted to re-work the cylinder heads on TDI engines

Cylinder Head Gasket Identification

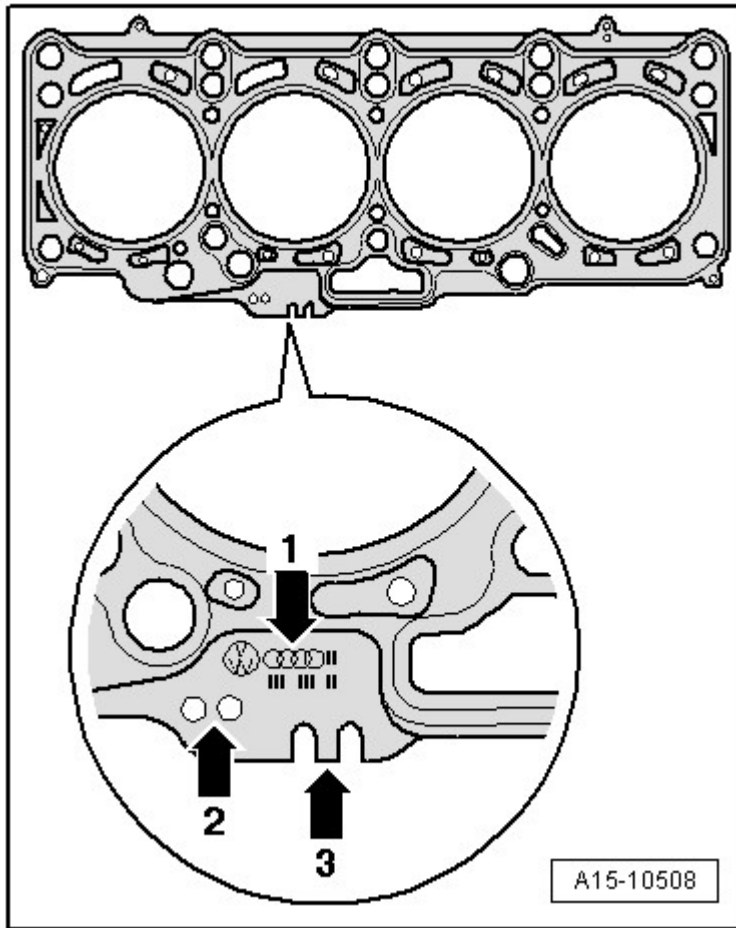


Fig. 7: Identifying Cylinder Head Gasket Identification
 Courtesy of AUDI OF AMERICA, LLC

1. Part number:
2. Holes
3. ignore.

NOTE: Depending on piston projection, varying cylinder head gasket thicknesses can be installed. Refer to PISTON PROJECTION, MEASURING AT TDC . If replacing the cylinder head gasket, make sure the new cylinder head gasket with the same identification.

Cylinder Head, Tightening Specifications and Sequence

- Replace the cylinder head bolts.
- Tighten bolts in 4 stages in -1 to 10- sequence as follows:

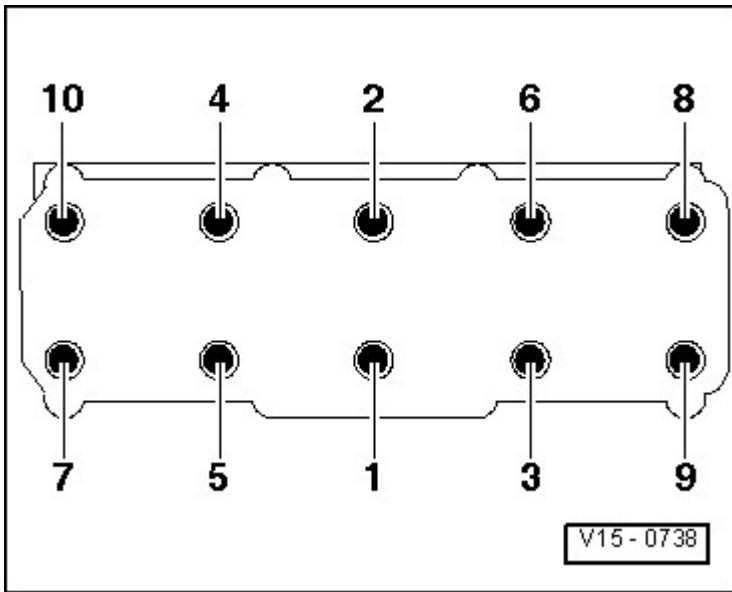


Fig. 8: Cylinder Head Bolt Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten to 30 Nm.-- Tighten to 50 Nm.-- Tighten an additional 90°.-- Tighten an additional 90°.

VALVETRAIN ASSEMBLY OVERVIEW

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

- The motor must not be started for about 30 minutes after installing camshafts because the hydraulic equalization elements must seat themselves.
- To ensure valves do not strike pistons when starting, carefully rotate the crankshaft at least 2 turns.

NOTE: Cylinder heads with cracks between the valve seats can continue to be used without reducing service life, as long as the tears have a width of maximum 0.5 mm.

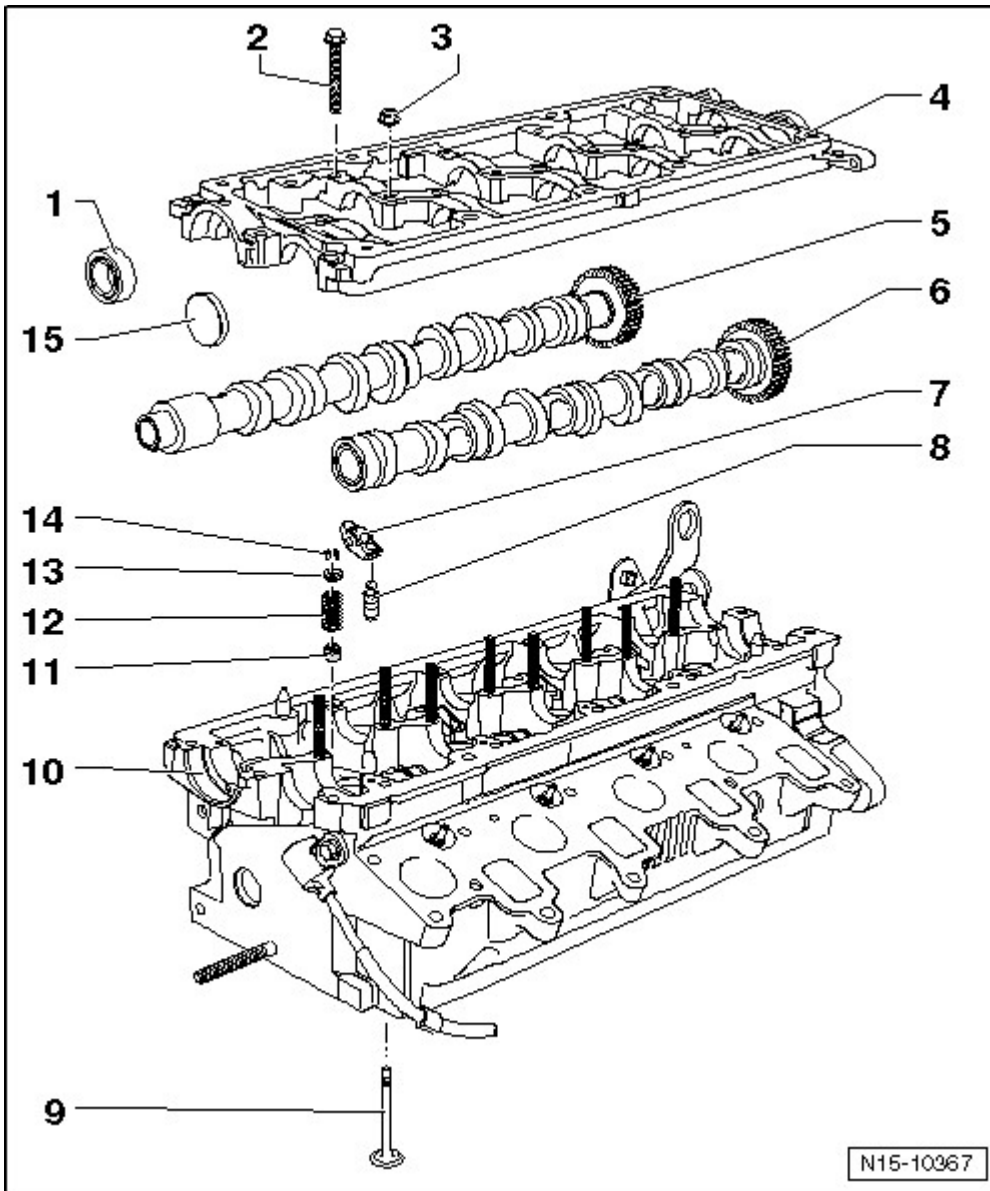


Fig. 9: Identifying Valvetrain Component Overview

Courtesy of AUDI OF AMERICA, LLC

1. Shaft Seal
 - Replacing, refer to **CAMSHAFT SEAL**.
2. Bolt
 - Loosening sequence **Fig. 107**
 - Tightening specification and sequence **VALVETRAIN ASSEMBLY OVERVIEW**
3. Nut
 - Loosening sequence **Fig. 107**
 - Tightening specification and sequence **Fig. 10**
4. Bearing Bracket

- With integrated camshaft bearings
 - Removing and installing, refer to **CAMSHAFTS**
5. Exhaust Camshaft
 - Removing and installing, refer to **CAMSHAFTS**
 - Measuring axial play **CAMSHAFT, MEASURING AXIAL PLAY**
 - Radial clearance, measuring **CAMSHAFT, MEASURING RADIAL PLAY**
 6. Intake Camshaft
 - Removing and installing, refer to **CAMSHAFTS**
 - Measuring axial play **CAMSHAFT, MEASURING AXIAL PLAY**
 - Radial clearance, measuring **CAMSHAFT, MEASURING RADIAL PLAY**
 7. Roller Rocker Lever
 - Removing and installing, refer to **CAMSHAFTS**
 - Mark the installed position for installation later
 - Check roller for easy movement
 - Lubricate the running surfaces before installing
 8. Hydraulic Adjusting Elements
 - With a locking clip
 - Mark the installed position for installation later
 - Lubricate the running surfaces before installing
 9. Valve
 - Do not rework, only grinding is permitted
 - Mark the installed position for installation later
 - checking **VALVES, CHECKING**
 - Valve dimensions **VALVE DIMENSIONS**
 - Check valve guides **VALVE GUIDES, CHECKING**
 10. Cylinder Head
 11. Valve Stem Seal
 - Replacing: cylinder head installed, refer to **VALVE STEM SEALS, CYLINDER HEAD INSTALLED**, cylinder head removed, refer to **VALVE STEM SEALS WITH CYLINDER HEAD REMOVED**
 12. Valve Spring
 13. Valve Spring Plate
 14. Valve Retainers
 15. Cap
 - Replace
 - Removing: with the guide frame installed, pierce through one side of the cover with an awl and pry it out.
 - Installing: install without sealing compound and thrust piece

- Depth 1 to 2 mm

Guide Frame Tightening Specifications and Sequence

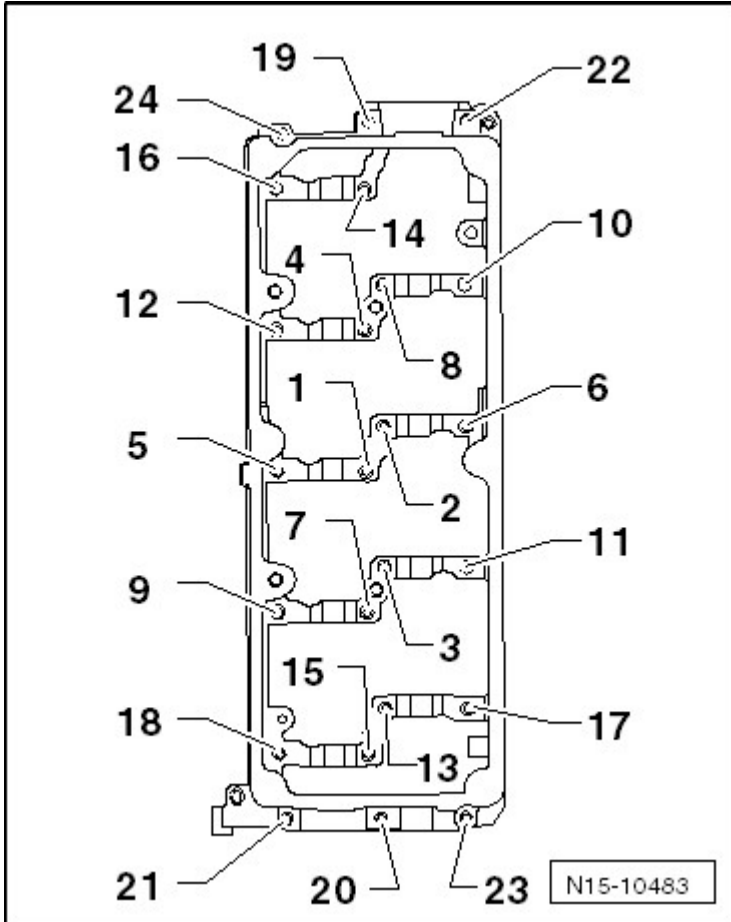


Fig. 10: Identifying Bearing Frame Bolts/Nuts Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten guide frame bolts and nut in 2 stages in -1 to 24- sequence as follows:

-- Insert bolts evenly by hand all the way.

- The guide frame must be in contact with the entire contact surface of the cylinder head.

-- Tighten to 10 Nm.

VALVE SEATS, REFACING

NOTE: The valve seat may not refaced due to a close tolerances.

SPECIFICATIONS

VALVE DIMENSIONS

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

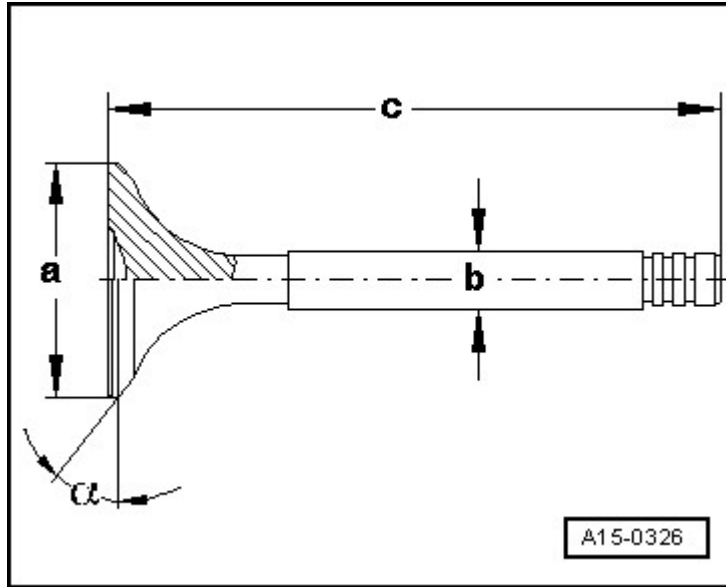


Fig. 11: Identifying Valve Dimensions
Courtesy of AUDI OF AMERICA, LLC

Dimension		Intake Valve	Exhaust Valve
Diameter a	mm	28.10	26.00
Diameter b	mm	5.975	5.965
c	mm	99.30	99.10
a	Angle°	45	45

FASTENER TIGHTENING SPECIFICATIONS

Component	Bolt Size	Nm
Camshaft Stub		100
Camshaft Position Sensor		10
Camshaft Toothed Belt Gear		25
Coolant Pump		15
Crankshafts - Toothed Belt Gear		120 + 90° ¹
Engine Lifting Eye		20
Heat Shield		5
Idler Roller, Nut and Bolt ²		20
Idler Roller ³		50 + 90° ¹

Rear Toothed Belt Guard		9
Tensioning Roller		20 + 45°
¹ Always replace ² For bolt tightening clarification, refer to <u>TOOTHED BELT ASSEMBLY OVERVIEW</u> and see items -3 and 6- ³ For bolt tightening clarification, refer to <u>TOOTHED BELT ASSEMBLY OVERVIEW</u> and see items -20-		

Lower Toothed Belt Guard and in the Center - Tightening Specification

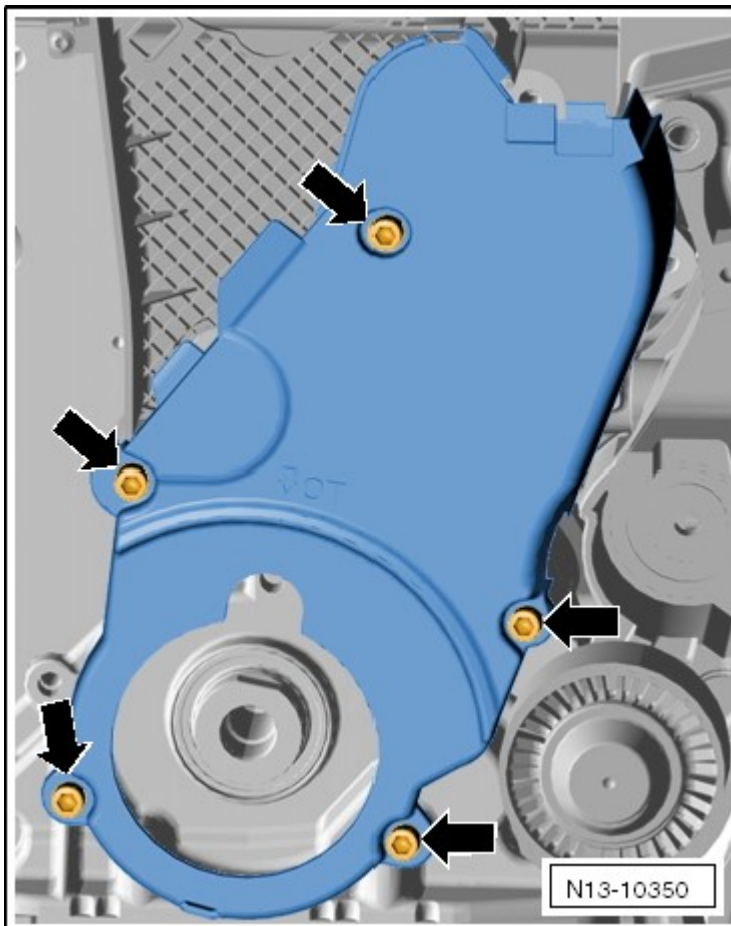


Fig. 12: Identifying Lower Toothed Belt Guard And Bolts -Arrows-
 Courtesy of AUDI OF AMERICA, LLC

-- Tighten bolts -arrows- to 9 Nm.

Cylinder Head Cover, Tightening Specifications and Sequence

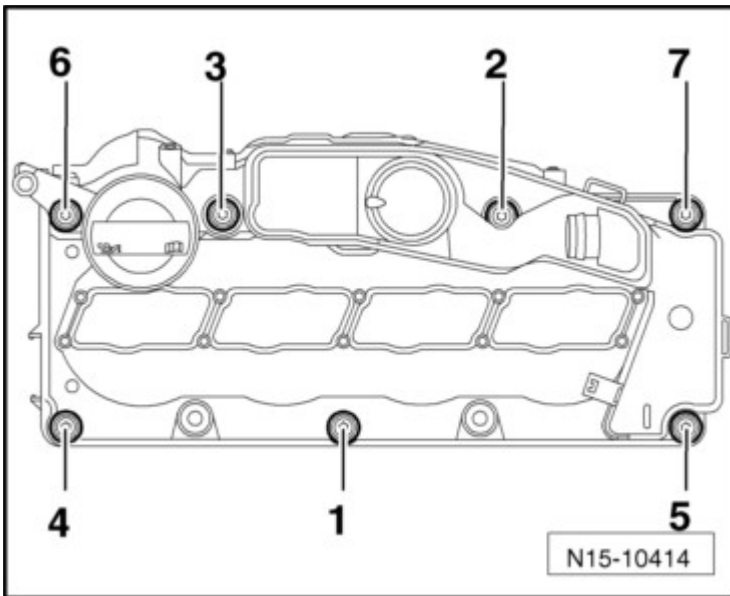


Fig. 13: Identifying Head Cover Bolts -1 Through 7- Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the cylinder head cover bolts to 9 Nm in sequence -1 to 7-.

Cylinder Head, Tightening Specifications and Sequence

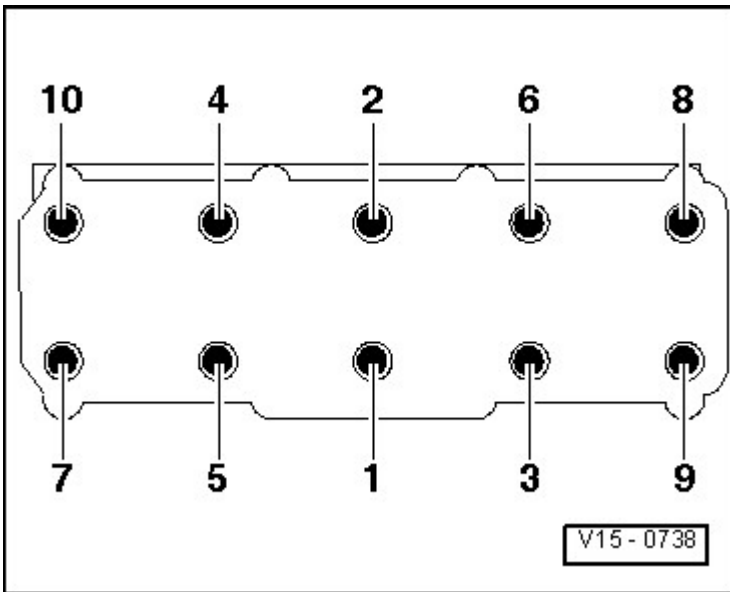


Fig. 14: Cylinder Head Bolt Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Replace the cylinder head bolts.-- Tighten bolts in 4 stages in -1 to 10- sequence as follows:-- Tighten to 30 Nm.-- Tighten to 50 Nm.-- Tighten an additional 90°.-- Tighten an additional 90°.

Guide Frame Tightening Specifications and Sequence

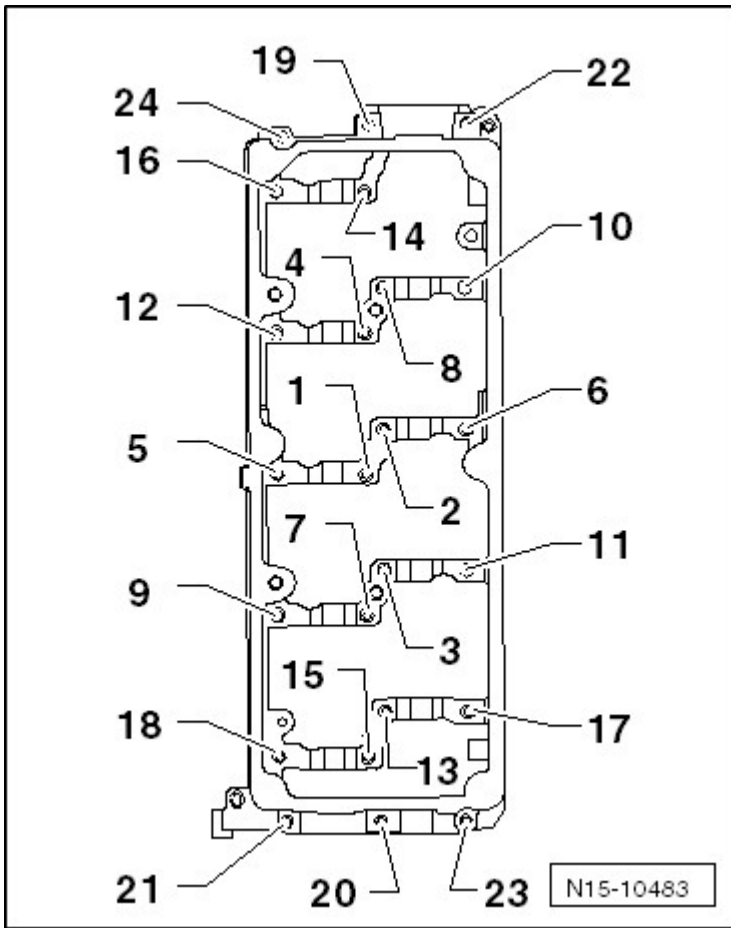


Fig. 15: Identifying Bearing Frame Bolts/Nuts Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten guide frame bolts and nut in 2 stages in -1 to 24- sequence as follows:

-- Insert bolts evenly by hand all the way.

- The guide frame must be in contact with the entire contact surface of the cylinder head.

-- Tighten to 10 Nm.

DIAGNOSIS AND TESTING

COMPRESSION, CHECKING

In guided fault finding select OBD-capable systems

CAMSHAFT, MEASURING AXIAL PLAY

Special tools and workshop equipment required

- Dial Gauge Holder VW 387

- Dial Gauge VAS 6079

Procedure

- Remove the guide frame. Refer to **CAMSHAFTS**.
- Secure the VAS 6079 on the guide frame with the VW 387 as illustrated.

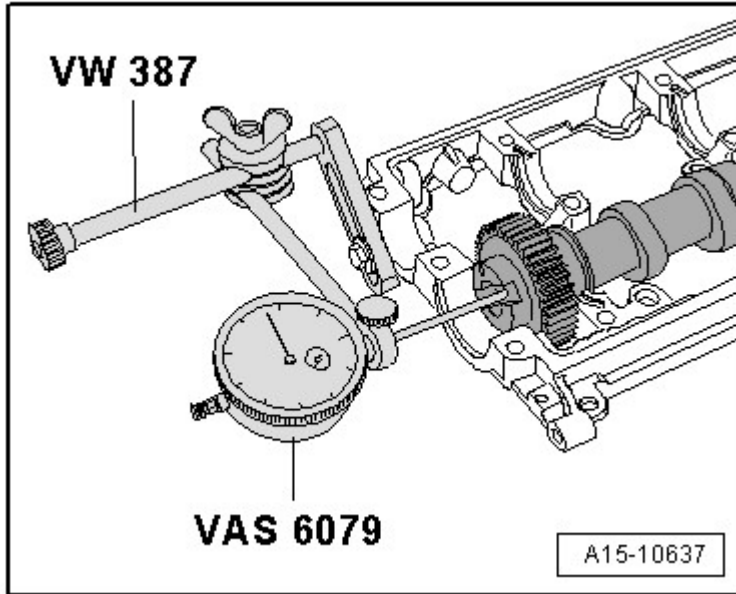


Fig. 16: Securing VAS 6079 On Guide Frame With VW 387
Courtesy of AUDI OF AMERICA, LLC

- Press camshaft against dial gauge by hand.
- Set dial gauge to 0.
- Press camshaft off dial gauge and read the value:

Intake and exhaust camshaft axial play:

- Specified value: 0.048 to 0.118 mm
- Wear limit 0.17 mm.

CAMSHAFT, MEASURING RADIAL PLAY**Special tools and workshop equipment required**

- Plastigage

Procedure

- Removing cam follower. Refer to **CAMSHAFTS**.
- Clean the bearing and the bearing journals.
- Place Plastigage over entire width of bearing journal or into bearing.
 - Plastigage must rest in center of bearing.
- Position the guide frame and tighten to: 10 Nm without rotating camshaft. **Fig. 10**
- Install the guide frame.
- Compare width of Plastigage with calibrated scale.
 - Radial play: 0.035 to 0.085 mm.

HYDRAULIC ADJUSTING ELEMENTS, CHECKING

NOTE: **The hydraulic adjusting elements cannot be repaired.**

Irregular valve noises are normal while starting the engine.

Procedure

- Start the engine and let it run until the coolant fan switches on once.
- Increase engine speed for about 2 minutes to approximately 2500 RPM, perform road test if necessary.

NOTE: **If irregular valve noises disappear but return during short drives, oil check valve must be replaced. Installed location of the oil check valve inside the oil filter bracket -3- OIL FILTER BRACKET AND OIL COOLER ASSEMBLY OVERVIEW => Oil Filter Bracket .**

- If the hydraulic adjusting elements are still loud, determined which one is faulty as follows.
- Remove cylinder head cover. Refer to **CYLINDER HEAD COVER**.
- Turn the crankshaft by the toothed belt gear bolt until the cam lobes on that adjuster that must be checked are at the top.
- To determine the play between cam lobes and roller rocker lever, press lever down -arrow-.

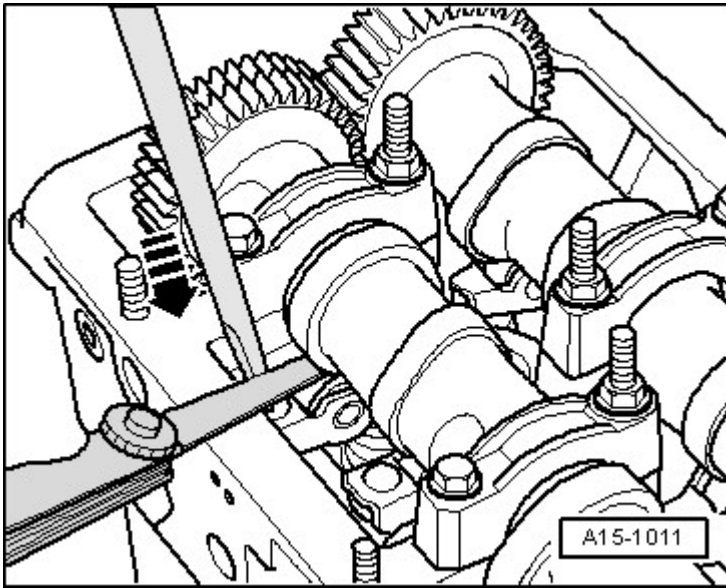


Fig. 17: Identifying Play Between Cams With Screwdriver -Arrow- And 0.20 mm Feeler Gauge
Courtesy of AUDI OF AMERICA, LLC

-- If a 0.20 mm feeler gauge can slide between the cam lobes and roller rocker lever, replace the hydraulic adjusting element. Refer to **CAMSHAFTS**.

Final procedures

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

VALVE GUIDES, CHECKING

Special tools and workshop equipment required

- Dial Gauge Holder VW 387
- Dial Gauge VAS 6079

Procedure

NOTE: If valve is replaced during repair, use new valve for measurement.

Due to different stem diameters, only use an intake valve in the intake guide and an exhaust valve in the exhaust guide.

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

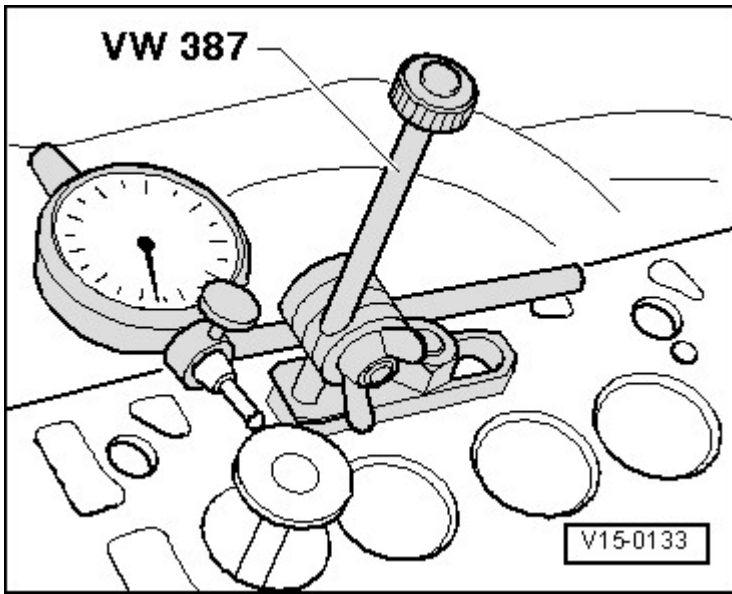


Fig. 18: Determining Valve Rock (Wear limit)

Courtesy of AUDI OF AMERICA, LLC

-- Place valve in valve guide.

- The end of the valve stem must be flush with the guide.

-- Determine tip clearance.

- Wear limit: 1.0 mm.

-- If wear limit is exceeded, measure using new valves.

-- If wear limit is still exceeded, replace cylinder head.

NOTE: The valve guides cannot be replaced.

VALVES, CHECKING

-- Check valves at stem and seating surface for traces of wear.

-- If there are clear traces of wear, replace valve.

REMOVAL AND INSTALLATION

TOOTHED BELT

Special tools and workshop equipment required

- Diesel Injection Pump Locking Pin 3359 (quantity: 2)

- Crankshaft Stop T10050
- Counter-Holder Tool T10172
- Special Wrench, Long Reach T10264
- Locking Tool T10265
- Socket Insert XZN 10 T10385

Removing

-- Remove the engine cover -arrows-.

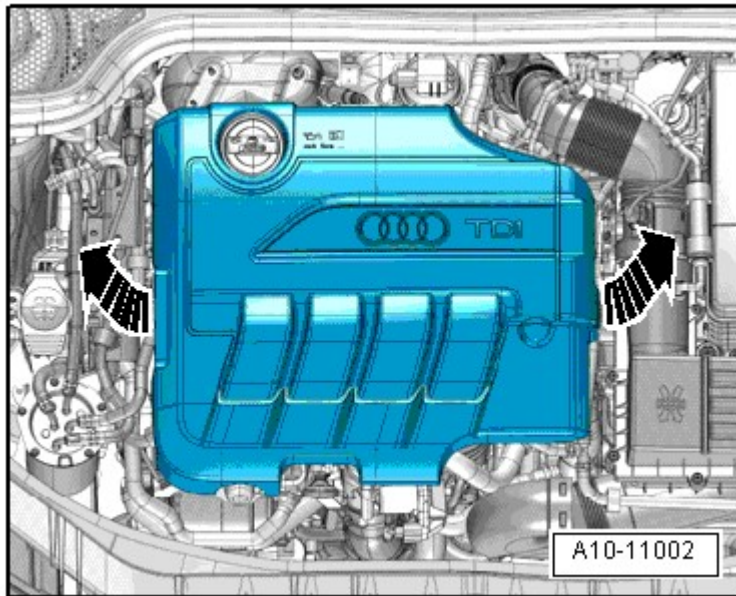


Fig. 19: Identifying Engine Cover Removal
Courtesy of AUDI OF AMERICA, LLC

-- Remove the right front wheel.

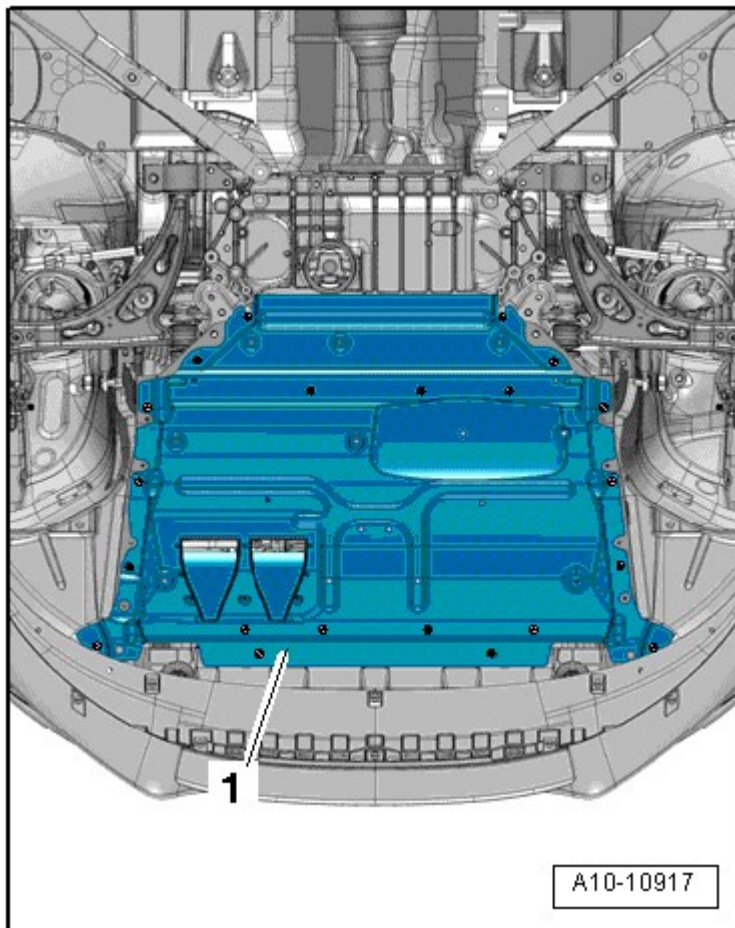


Fig. 20: Identifying Noise Insulation

Courtesy of AUDI OF AMERICA, LLC

- Remove the noise insulation -1-. Refer to **Removal and Installation** .
- A3 Cabrio: Remove the noise insulation frame -arrow-. Refer to **Removal and Installation** .

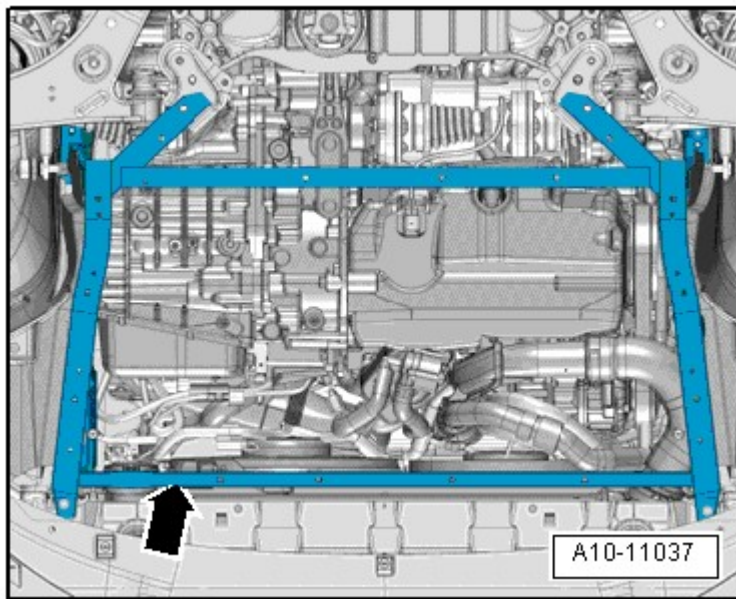


Fig. 21: Identifying Noise Insulation Frame
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connector -2- on exhaust pressure sensor 1 -G450-.

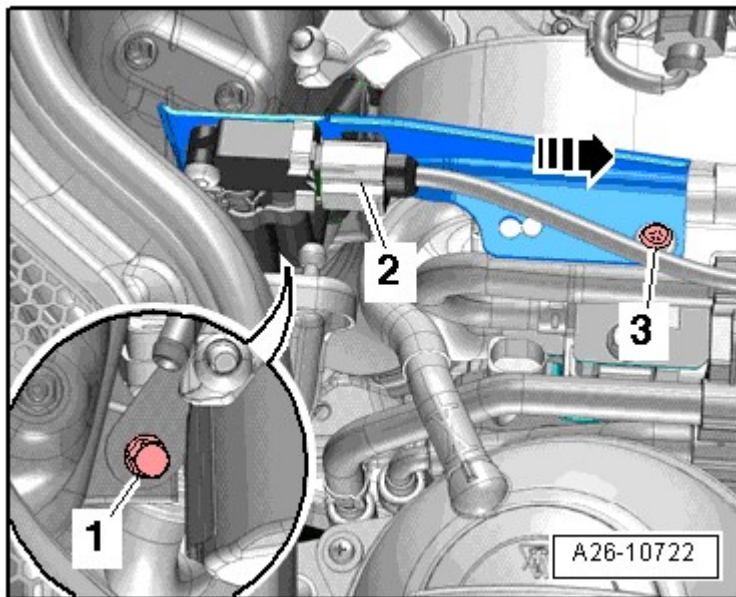


Fig. 22: Disconnecting Connector -2- On Exhaust Pressure Sensor 1 -G450
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1-.

-- Remove bolt -1-.

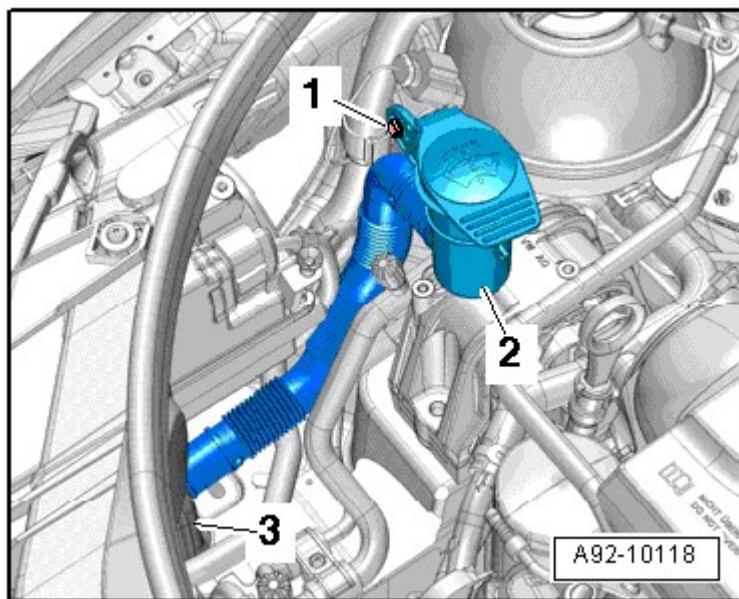


Fig. 23: Identifying Windshield Wiper Fluid Reservoir Filler Tube And Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Move the filler tube and windshield wiper fluid reservoir filler tube -2- to the side.

NOTE: Ignore -3-.

The installation location is shown with the fuel filter removed.

-- Disengage the fuel hose -2- from the bracket.

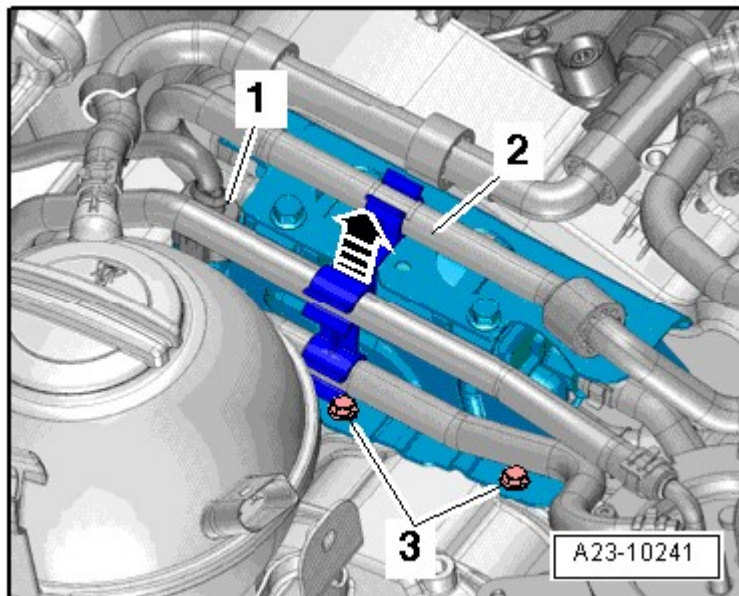


Fig. 24: Disengaging Fuel Hose

Courtesy of AUDI OF AMERICA, LLC

- Removed the bracket for the fuel lines -arrow- and move it to the side.
- Disconnect the connector -1- on the auxiliary fuel pump -V393-.
- Remove the bolts -3- then remove the bracket and the auxiliary fuel pump and move them to the side.
- Loosen bolt -1-.

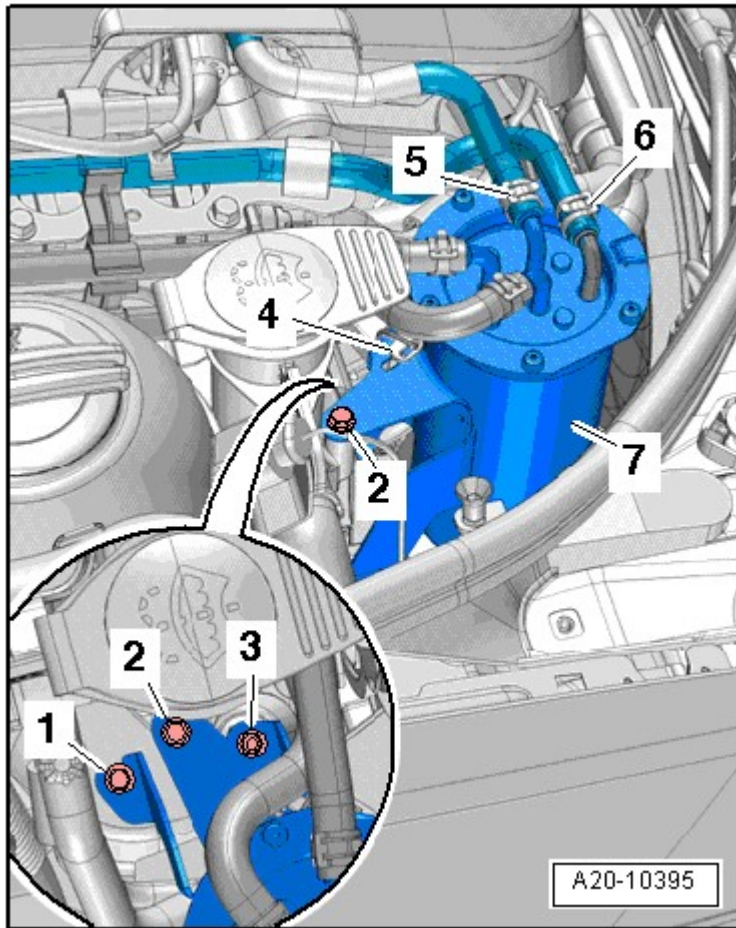


Fig. 25: Identifying Fuel Filter, Bracket And Bolts

Courtesy of AUDI OF AMERICA, LLC

- Remove bolts -2- and nut -3-.
- Remove the hose bracket -4- from the fuel filter and then move the fuel filter -7- to the side with the fuel hoses -5- and -6- still connected.
- Disconnect electrical connector -1- on engine coolant temperature sensor on radiator -G83-.

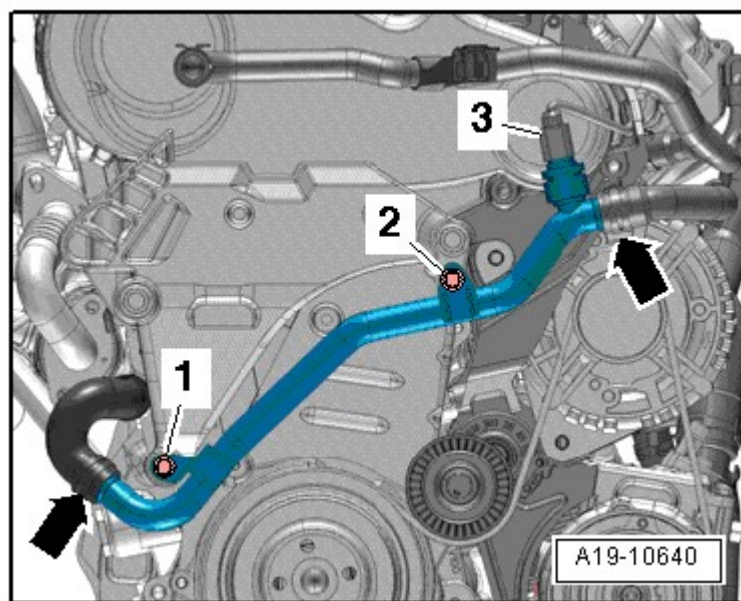


Fig. 26: Identifying Hose Clamps -Arrows
 Courtesy of AUDI OF AMERICA, LLC

- Remove nut -1- and bolt -2-.
- Move the right coolant pipe to the side with the coolants hoses still connected -arrows-.
- Open the clamps -arrows- and remove the upper toothed belt guard.

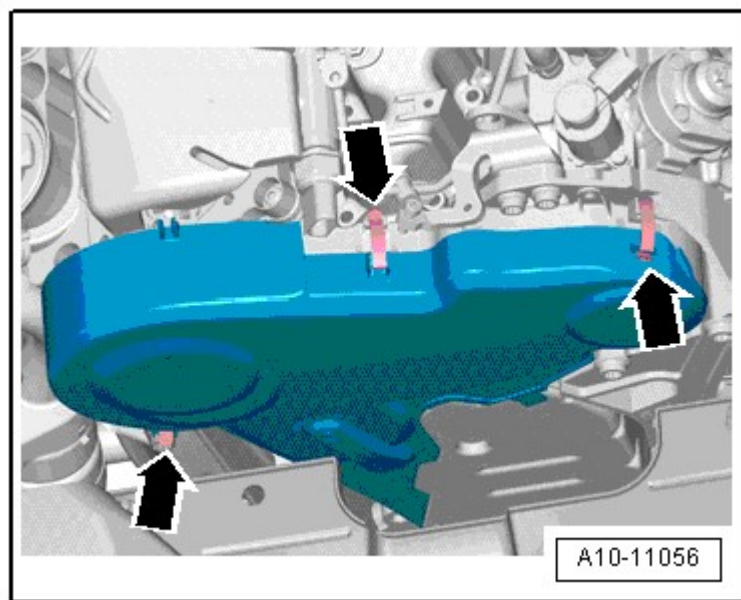


Fig. 27: Removing Upper Toothed Belt Guard
 Courtesy of AUDI OF AMERICA, LLC

- Remove the front section of the right front wheel housing liner. Refer to **Removal and Installation** .

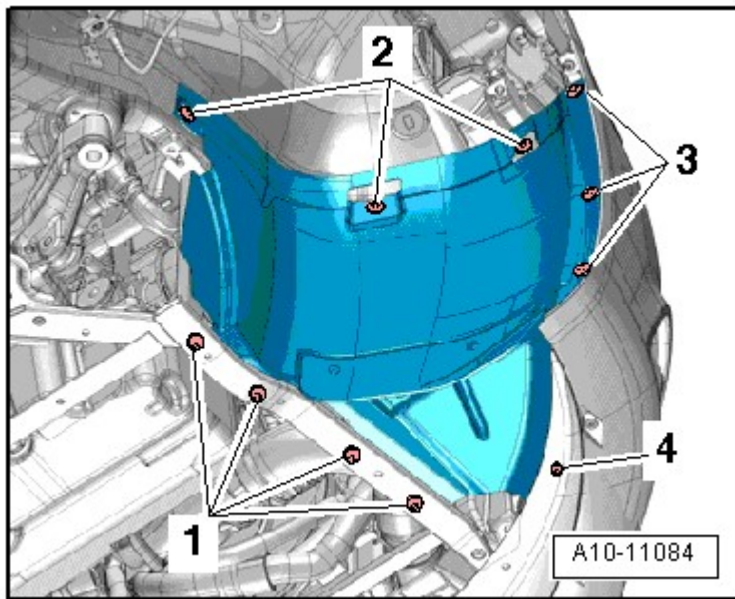


Fig. 28: Identifying Front Section Of Right Front Wheel Housing Liner
Courtesy of AUDI OF AMERICA, LLC

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

NOTE: **The ribbed belt tensioning damper is not secured.**

-- Remove bolts -arrows-.

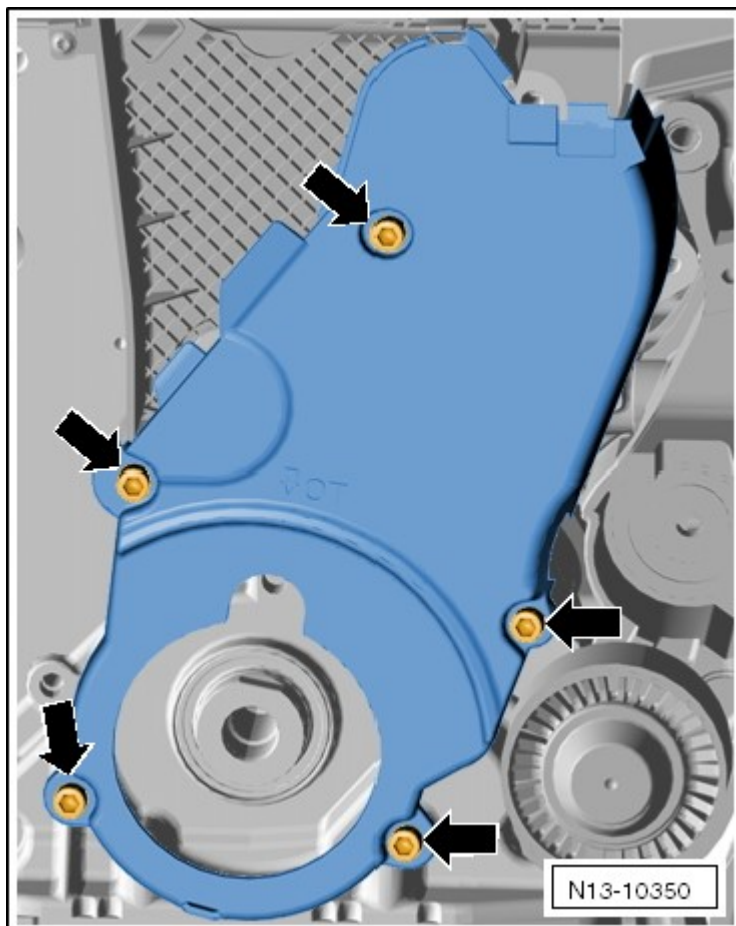


Fig. 29: Identifying Lower Toothed Belt Guard And Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the lower and center toothed belt guard.

CAUTION: Components could be destroyed by the toothed belt jump off.

- Only rotate the crankshaft in the direction of engine rotation.

-- Turn the crankshaft at the toothed belt gear bolt until the camshaft toothed belt gear is at TDC.

- The toothed segment -arrow- must point upward.

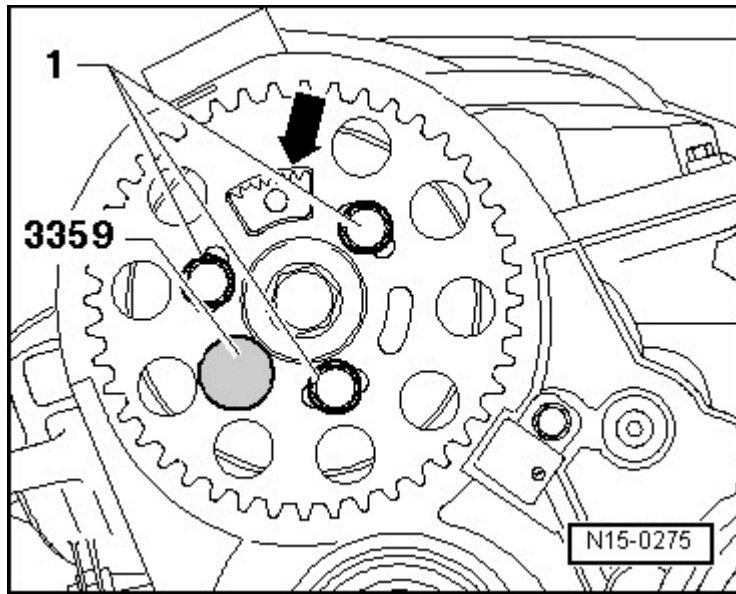


Fig. 30: Identifying Camshaft Pulley Bolts And Toothed Segment -Arrow- Must Point Upward
Courtesy of AUDI OF AMERICA, LLC

-- Secure the camshaft hub with the 3359.

NOTE: The camshaft toothed belt gear is shown in the illustration without the toothed belt.

Ignore -1-.

-- Secure the crankshaft toothed belt gear using the T10050.

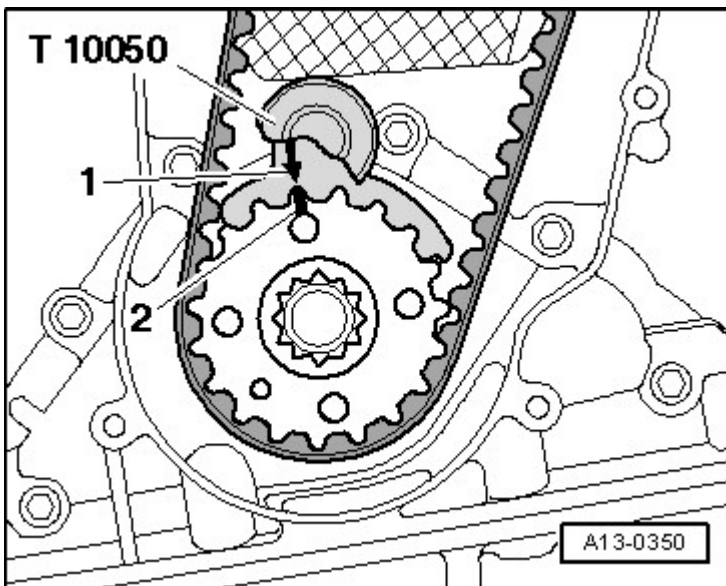


Fig. 31: Identifying Crankshaft Toothed Belt Pulley And Crankshaft Stop T10050
Courtesy of AUDI OF AMERICA, LLC

- The markings on the toothed belt gear -2- and on the crankshaft stop -1- must align -arrow-. The tab of the crankshaft stop must engage in the bore of the sealing flange.

NOTE: **The crankshaft stop can be pushed onto the toothed belt gear only from the front side of the splines.**

-- Loosen the bolts -1- for the camshaft toothed belt gear approximately 90°.

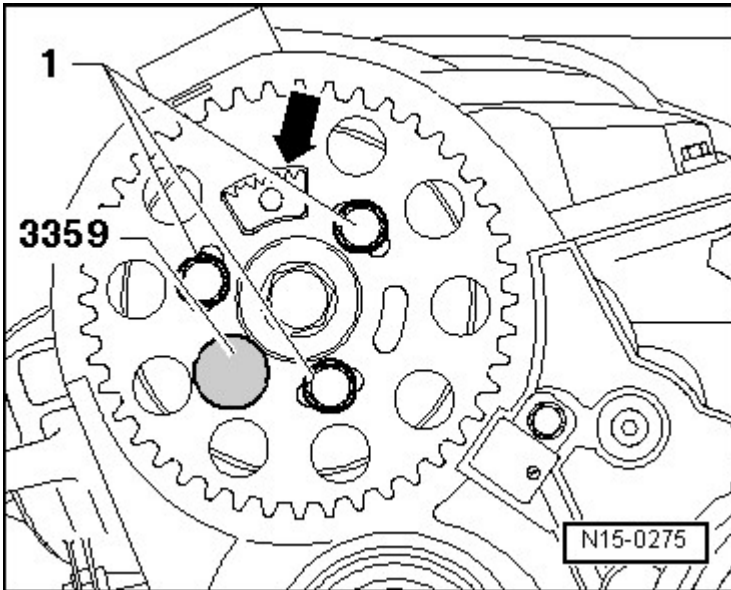


Fig. 32: Identifying Camshaft Pulley Bolts And Toothed Segment -Arrow- Must Point Upward
Courtesy of AUDI OF AMERICA, LLC

NOTE: **Disregard -arrow-.**

-- Remove bolt -1- for coolant pipe.

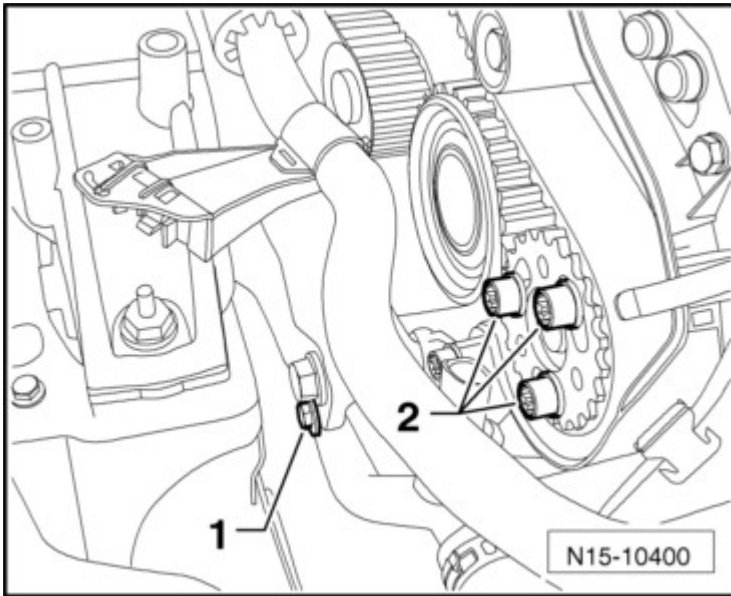


Fig. 33: Identifying Coolant Pipe Bolt -1- And High Pressure Fuel Pump Toothed Belt Gear -2-
 Courtesy of AUDI OF AMERICA, LLC

- Loosen the bolts -2- for the high pressure pump toothed belt gear approximately 90° using the T10385.
- Loosen the nut -1- for the tensioning roller.

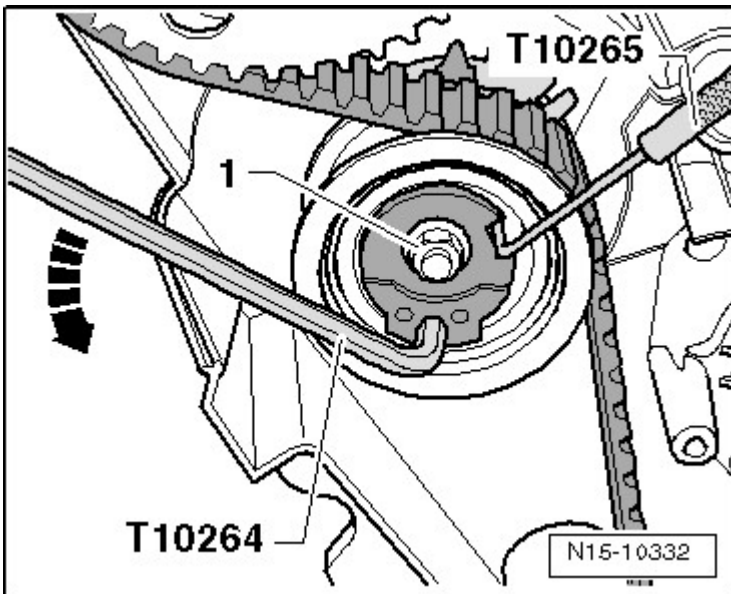


Fig. 34: Identifying Long Reach T10264 And Locking Tool T10265
 Courtesy of AUDI OF AMERICA, LLC

- Turn the tensioning roller eccentric pulley counter-clockwise using the T10264 -arrow- until the roller can be secured with the T10265.
- Then turn the tensioning roller eccentric pulley clockwise all the way using the T10264 -arrow- and tighten

the nut -1- hand-tight.

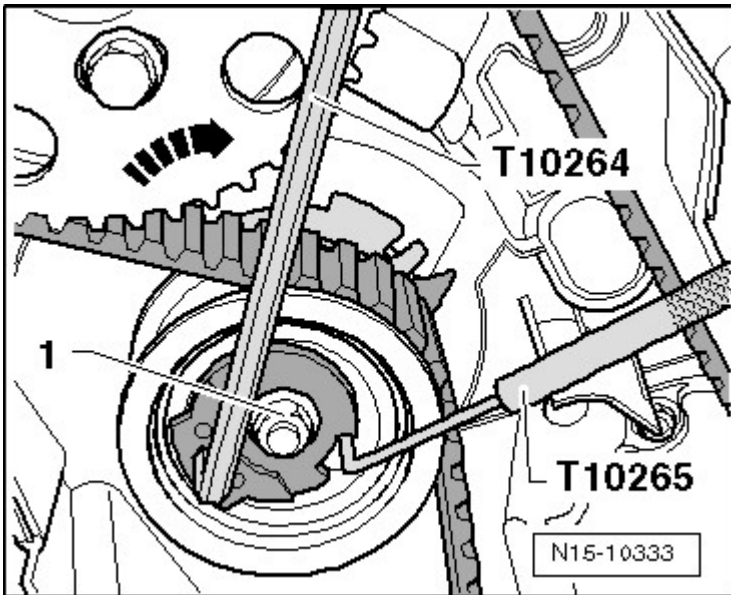


Fig. 35: Identifying Long Reach T10264 And Locking Tool T10265

Courtesy of AUDI OF AMERICA, LLC

CAUTION: A used toothed belt could be destroyed if the running direction is reversed.

- Before removing the ribbed belt, mark the running direction with chalk or a felt-tip pen for installation later.

-- Remove the toothed belt from the idler roller and then from the remaining toothed belt gears.

Installing (Adjusting valve timing)

- Tightening specifications, refer to **TOOTHED BELT ASSEMBLY OVERVIEW**.

NOTE: The engine must be cold when adjusting the toothed belt.

CAUTION: Risk of damaging valves and piston crowns.

- If camshafts are being rotated, crankshaft may not rest with any piston at TDC.

Requirements

- The tensioning roller is secured by the T10265 and fastened to the right stop by the nut.

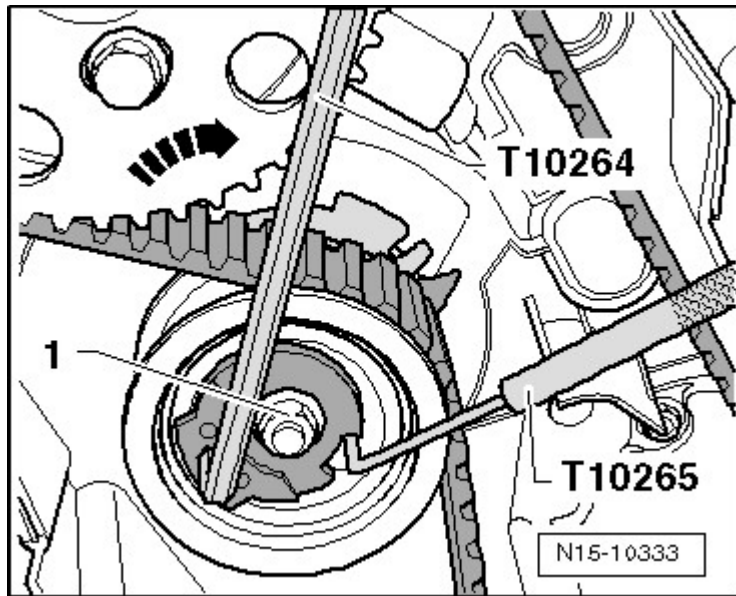


Fig. 36: Identifying Long Reach T10264 And Locking Tool T10265
Courtesy of AUDI OF AMERICA, LLC

- Secure the camshaft hub with the 3359.

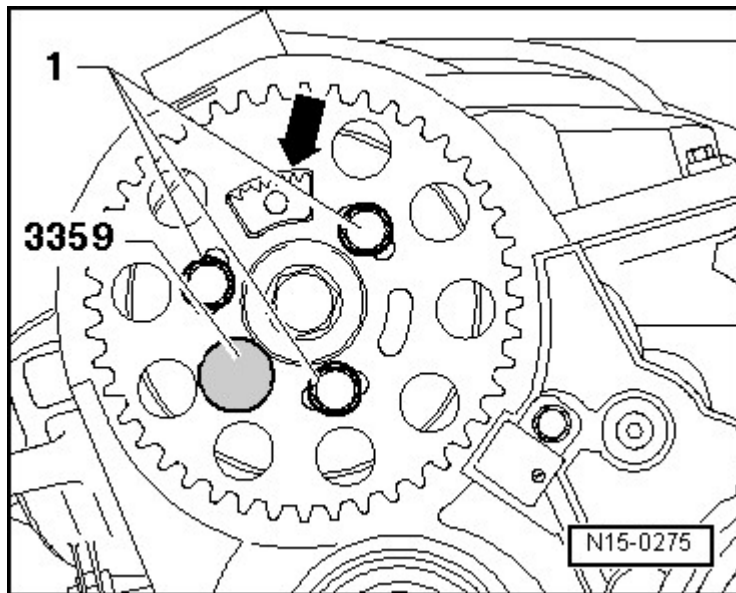


Fig. 37: Identifying Camshaft Pulley Bolts And Toothed Segment -Arrow- Must Point Upward
Courtesy of AUDI OF AMERICA, LLC

- The bolts -1- are installed loose.
- It must still be possible to rotate the camshaft toothed belt gear and it must not tip.

NOTE: Disregard -arrow-.

- Secure crankshaft using the T10050.

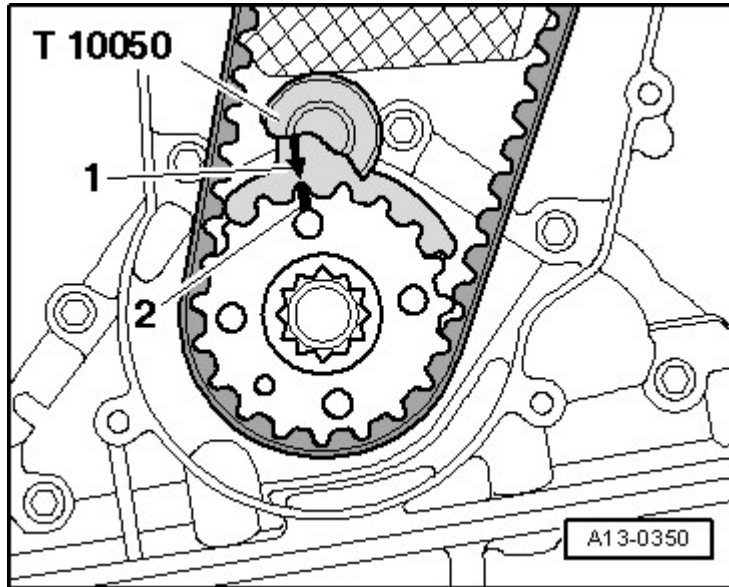


Fig. 38: Identifying Crankshaft Toothed Belt Pulley And Crankshaft Stop T10050
 Courtesy of AUDI OF AMERICA, LLC

- Secure the hub on the high pressure pump with the 3359.

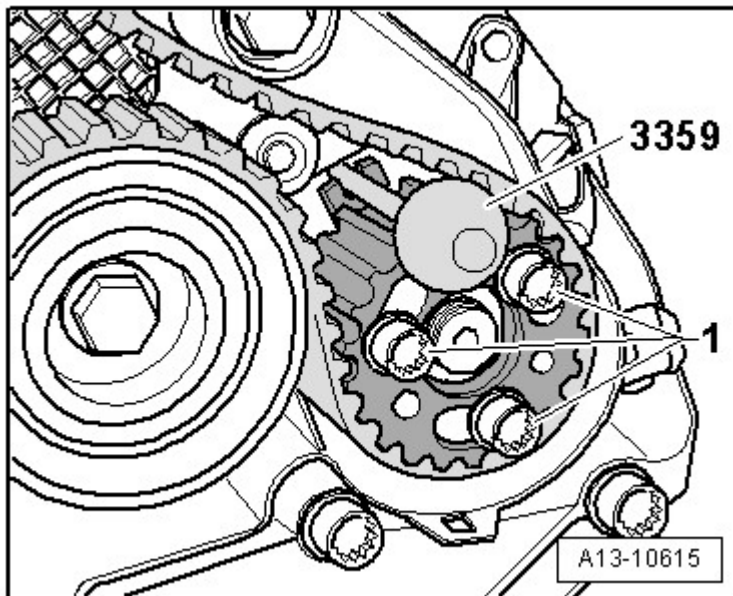


Fig. 39: Securing High Pressure Pump Hub
 Courtesy of AUDI OF AMERICA, LLC

- The bolts -1- are installed loose.
- It must still be possible to rotate the high pressure pump toothed belt gear and it must not tip.

NOTE: If necessary, turn the hub on the high pressure pump by the bolt heads -1- with a screwdriver until it is possible to secure the hub with a locking pin.

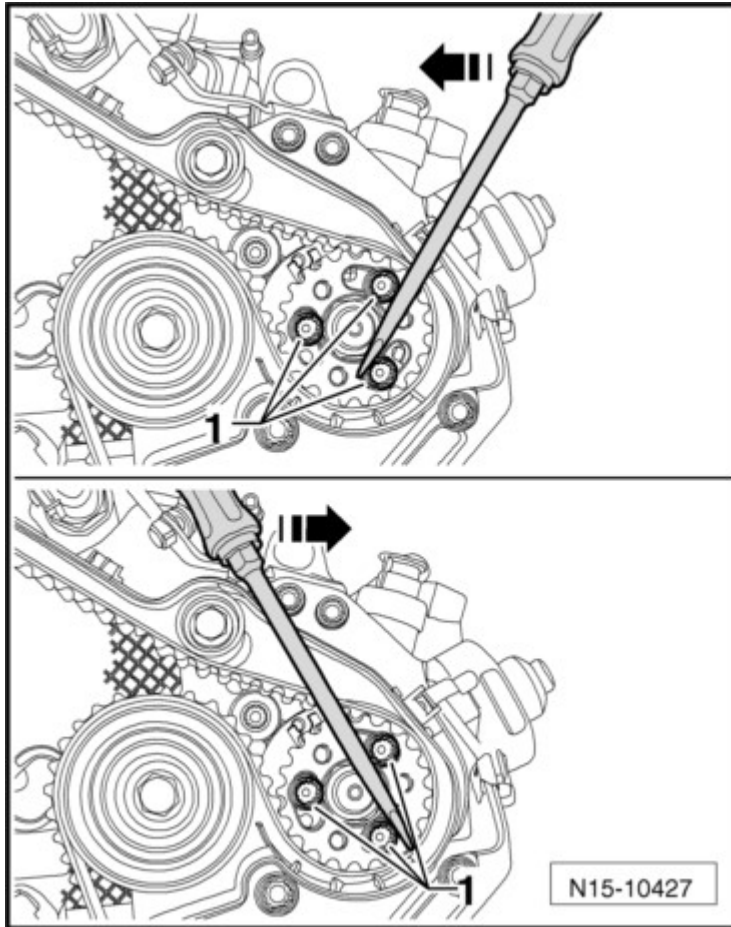


Fig. 40: Identifying Screwdriver Secured At Bolt Heads -1-
Courtesy of AUDI OF AMERICA, LLC

-- Turn the camshaft toothed belt gear and the high pressure pump toothed belt gear all the way clockwise by the oblong holes.

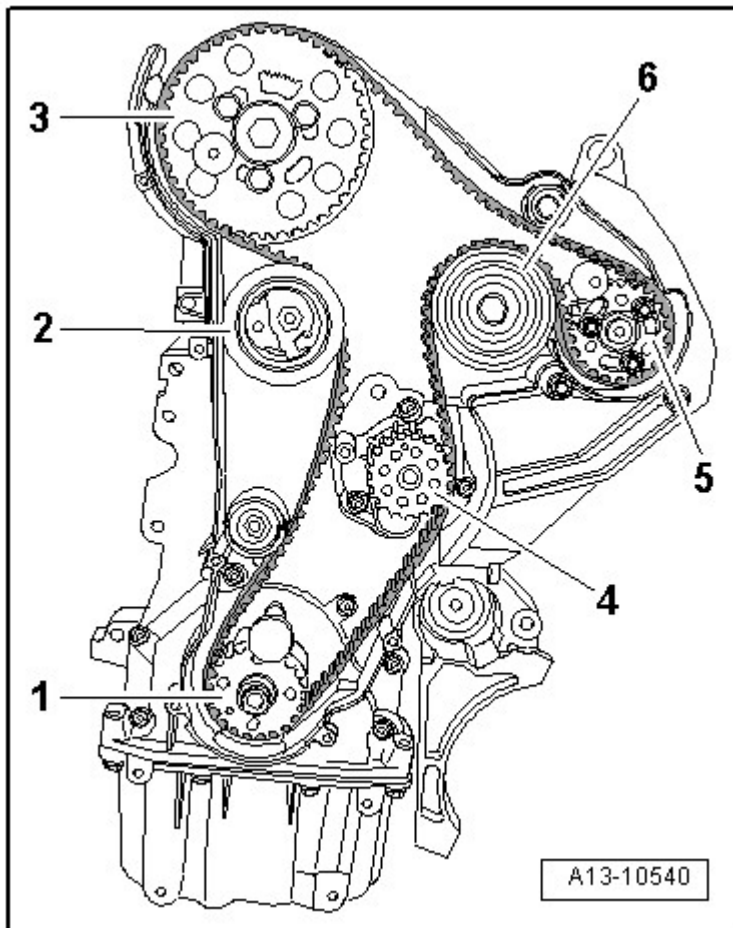


Fig. 41: Identifying Toothed Belt Mounting Sequence
 Courtesy of AUDI OF AMERICA, LLC

-- Mount the toothed belt in the following sequence:

1. Crank shafts - toothed belt gear
2. Tensioning roller
3. Camshaft toothed belt gear
4. Coolant pump toothed belt gear
5. Toothed belt gear for the high pressure pump
6. Idler roller

-- Loosen nut -1- on the tensioning roller and remove the T10265.

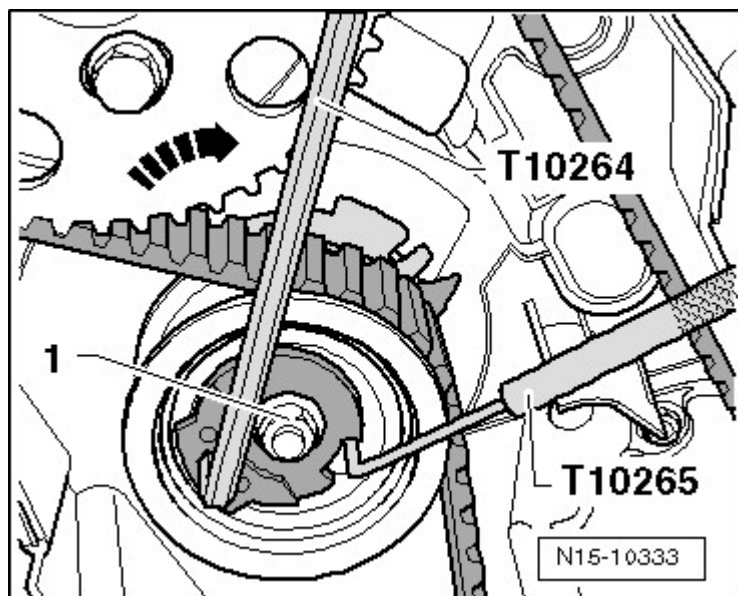


Fig. 42: Identifying Long Reach T10264 And Locking Tool T10265
 Courtesy of AUDI OF AMERICA, LLC

NOTE: Disregard -arrow-.

NOTE: Make sure the tensioning roller is properly positioned in the rear toothed belt guard -arrow-.

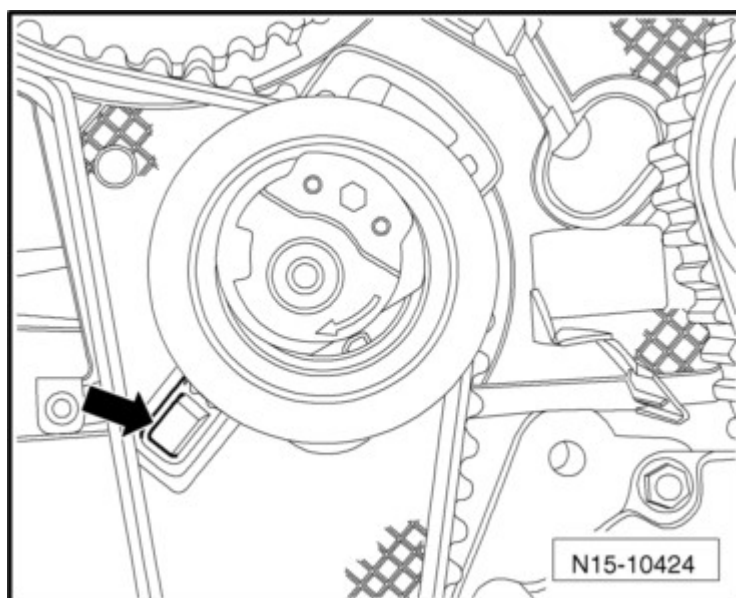


Fig. 43: Identifying Tensioner Positioned In Rear Toothed Belt Guard -Arrow-
 Courtesy of AUDI OF AMERICA, LLC

-- Mount the T10172 on the camshaft toothed belt gear as illustrated.

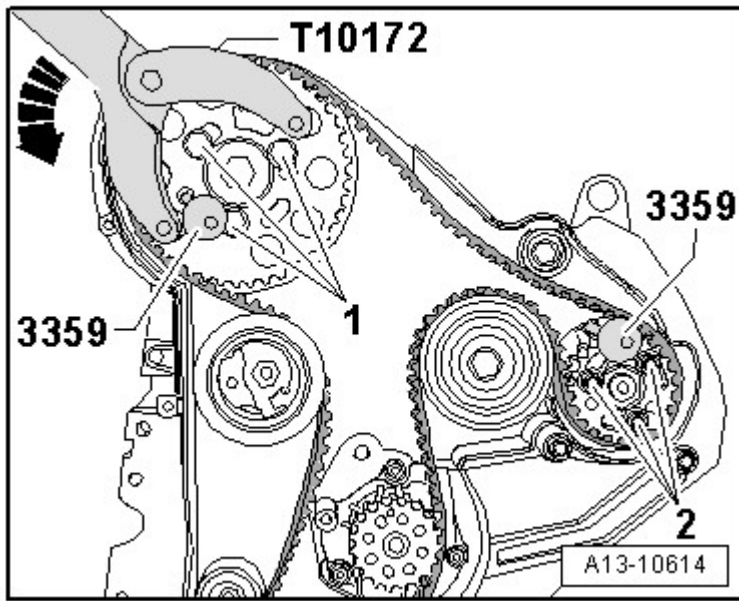


Fig. 44: Mounting T10172 On Camshaft Toothed Belt Gear
Courtesy of AUDI OF AMERICA, LLC

-- Press the counterhold tool counter-clockwise -arrow- and hold it at pre-load.

-- Tighten the bolts -1- for the camshaft toothed belt gear and the bolts -2- for the high pressure pump toothed belt gear in this position.

- Tightening specification: 20 Nm.

-- Carefully turn the tensioning roller eccentric pulley clockwise -arrow- with the T10264 until the indicator is located centrally in the gap of the base plate -2-.

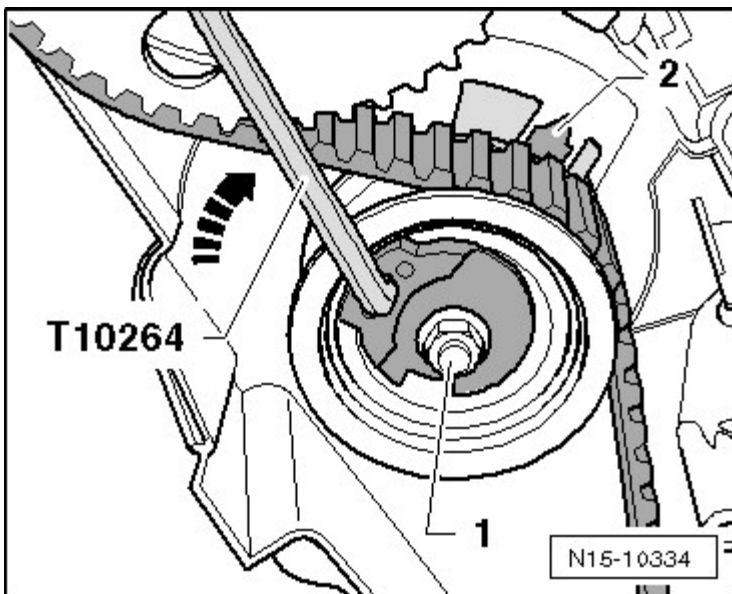


Fig. 45: Identifying Long Reach T10264 And Nut -1-
Courtesy of AUDI OF AMERICA, LLC

- The nut -1- must not turn with it.

-- Hold the tensioning roller in this position and tighten the nut.

-- Remove the 3359 and the T10050.

Check the Valve Timing

CAUTION: Components could be destroyed by the toothed belt jump off.

- Only rotate the crankshaft in the direction of engine rotation.

-- Turn the crankshaft by the toothed belt pulley bolt 2 turns in the direction of engine rotation until the crankshaft is once again just before TDC.

-- Mount the T10050 on the crankshaft toothed belt gear.

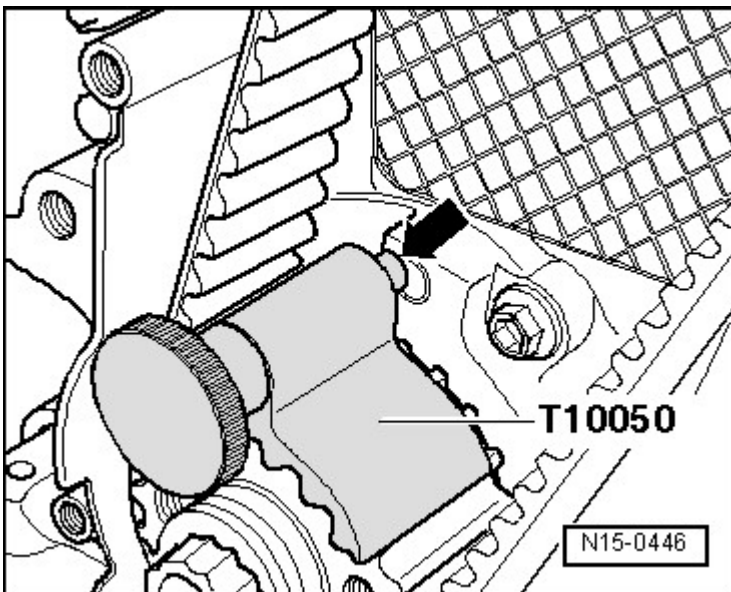


Fig. 46: Identifying Crankshaft Stop T10050
Courtesy of AUDI OF AMERICA, LLC

-- Turn the crankshaft in direction of engine rotation, until the tip -arrow- on the crankshaft stop fits into the sealing flange.

- It must be possible to secure the camshaft hub with the 3359.

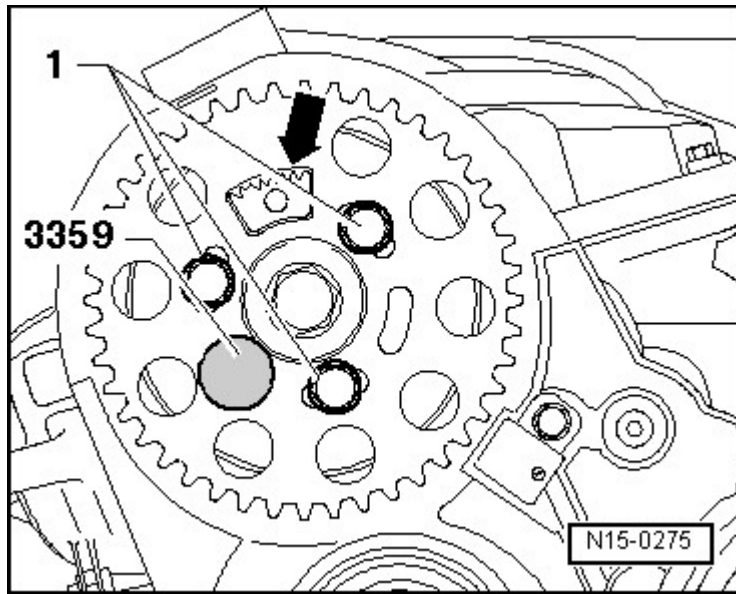


Fig. 47: Identifying Camshaft Pulley Bolts And Toothed Segment -Arrow- Must Point Upward
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1- and -arrow-.

- It is very difficult to find the locking point on the high pressure pump hub. A small deviation -arrow- does not affect engine operation.

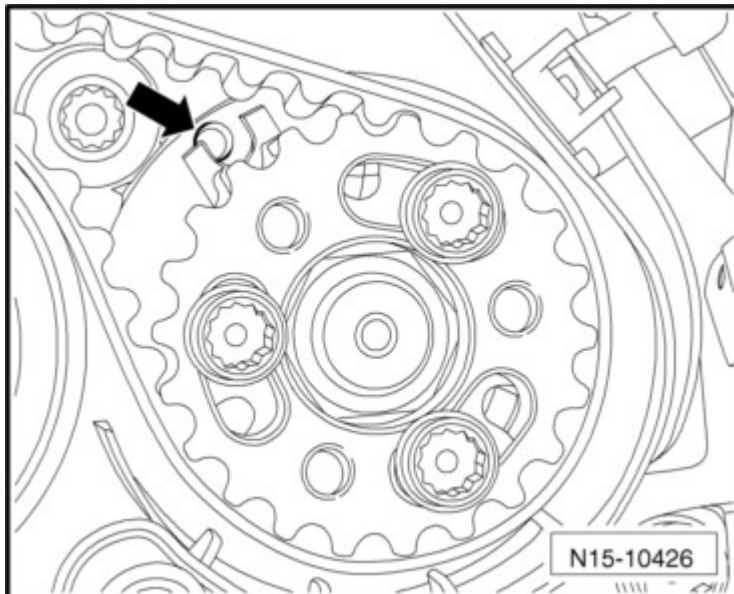


Fig. 48: Identifying Small Deviation -Arrow- On High Pressure Fuel Pump Hub
Courtesy of AUDI OF AMERICA, LLC

- The pointer on the tensioning roller -2- must be in the middle between the tabs -1- and -3- on the plate.

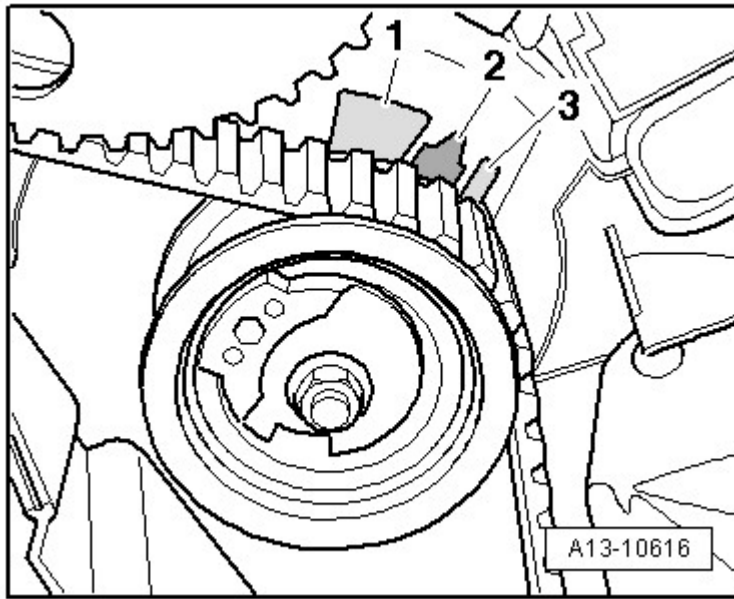


Fig. 49: Identifying Tensioning Roller Pointer & Tabs
Courtesy of AUDI OF AMERICA, LLC

NOTE: Permissible lateral offset: maximum 5 mm.

- If the conditions are not met, correct the valve timing **TOOTHED BELT**.
- If the conditions are met, then continue with the correct valve timing **TOOTHED BELT**.

Correcting the Valve Timing

- If it is not possible to secure the camshaft hub, pull back the T10050 until the hole opens.
- Turn the crankshaft opposite the direction of engine rotation just past TDC.
- Slowing turn the crankshaft in the direction of engine rotation until the camshaft hub is secured.
- Loosen the bolts on the camshaft toothed belt gear.

A - The tip of the T10050 is just left of the hole:

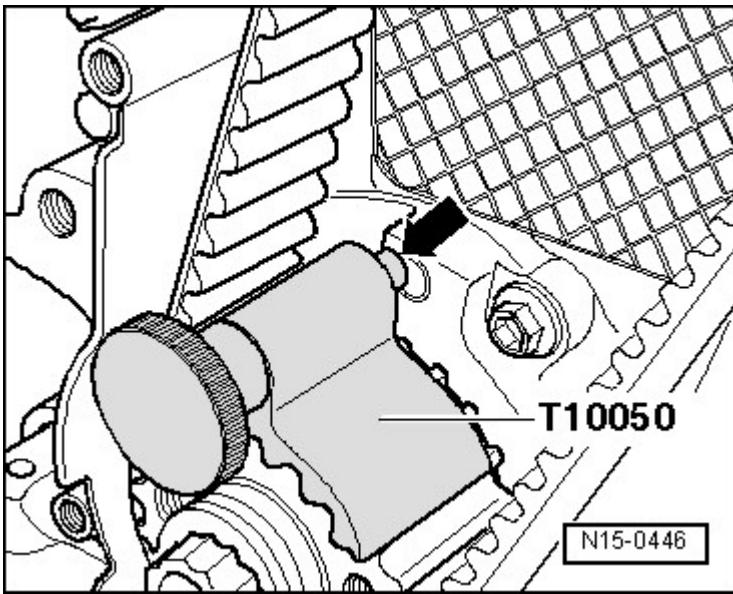


Fig. 50: Identifying Crankshaft Stop T10050

Courtesy of AUDI OF AMERICA, LLC

-- Turn the crankshaft in direction of engine rotation, until the tip -arrow- on the crankshaft stop fits into the sealing flange.

-- Tighten the camshaft toothed belt gear to 20 Nm.

B - The tip of the T10050 is just right of the hole:

-- Turn the crankshaft just a little opposite the direction of engine rotation.

-- Turn the crankshaft again in direction of engine rotation, until the tip on the crankshaft stop fits into the sealing flange.

-- Tighten the camshaft toothed belt gear to 20 Nm.

Continue if the Valve Timing is Correct

-- Remove the 3359 and the T10050.

-- Turn the crankshaft by the toothed belt pulley bolt 2 turns in the direction of engine rotation until the crankshaft is once again just before TDC.

-- Check the valve timing once again **Check the Valve Timing**.

-- If it is now possible to secure the camshaft hub then tighten the camshaft toothed belt gear bolts -1- all the way -8- **Fig. 1**.

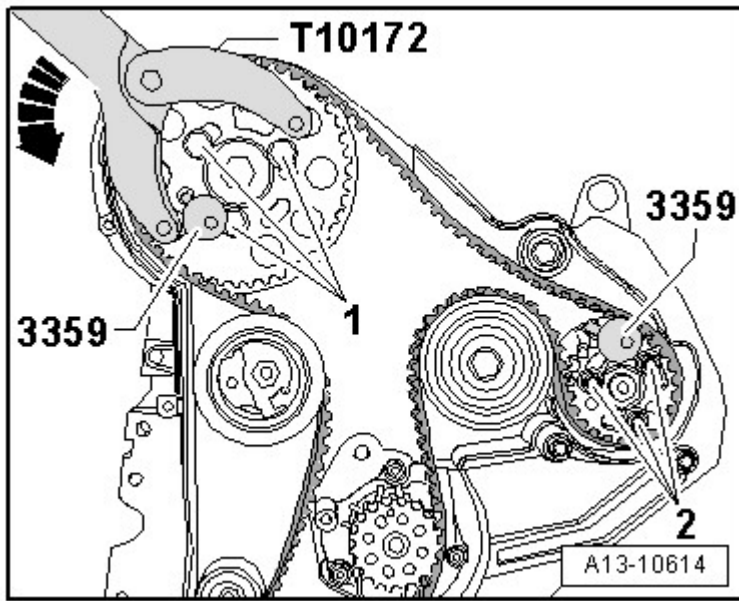


Fig. 51: Mounting T10172 On Camshaft Toothed Belt Gear
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts for the high pressure pump toothed belt -2- all the way. Refer to **Removal and Installation** .

-- Check the valve timing once again **Check the Valve Timing**.

Assembling

- Tightening specifications, refer to **TOOTHED BELT ASSEMBLY OVERVIEW**.
- Tightening specifications, refer to **Fig. 2**

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

NOTE: Replace the seals

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

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

-- Install the front section of the front wheel housing liner. Refer to **Removal and Installation** .

-- Install right coolant pipe. Refer to **RIGHT COOLANT PIPE** .

-- Install the fuel filter. Refer to **REMOVAL AND INSTALLATION** .

-- Install the auxiliary fuel pump -V393-. Refer to **REMOVAL AND INSTALLATION** .

- Install the windshield wiper fluid reservoir filler tube. Refer to **REMOVAL AND INSTALLATION** .
- Install the noise insulation. Refer to **Removal and Installation** .

CYLINDER HEAD COVER**Removing**

- Remove the engine cover -arrows-.

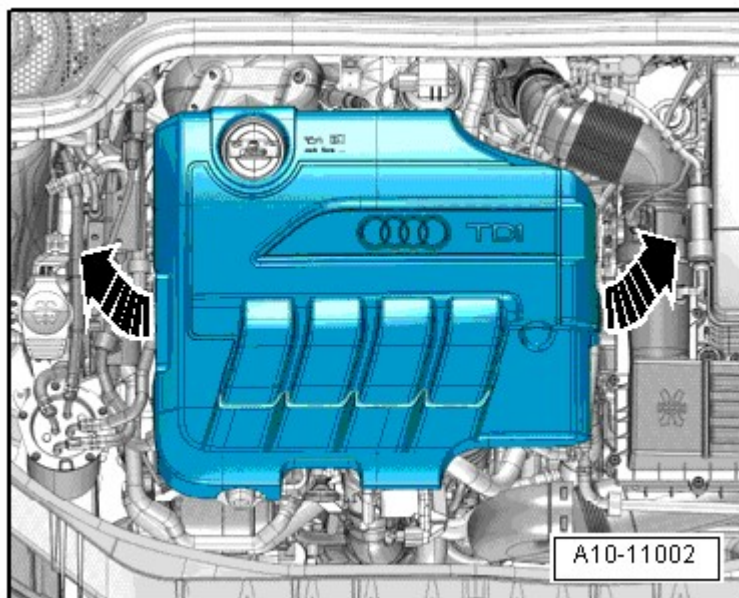


Fig. 52: Identifying Engine Cover Removal
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the connector -2- on exhaust pressure sensor 1 -G450-.

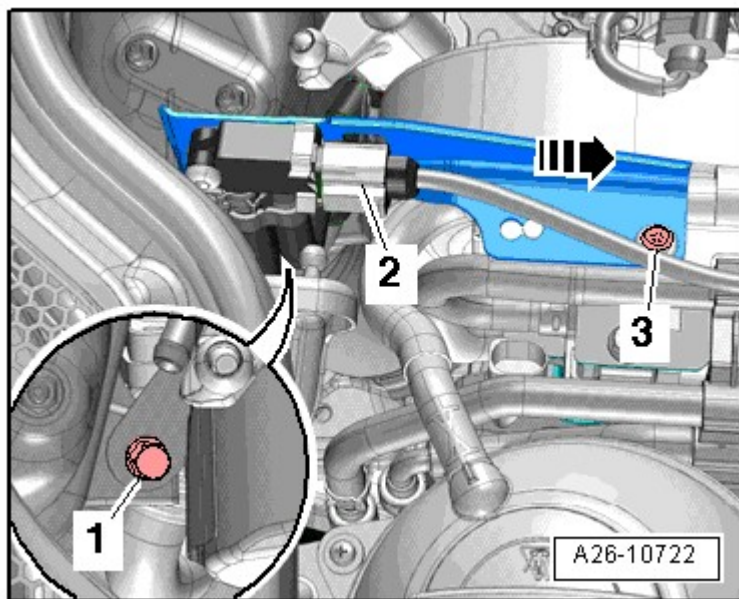


Fig. 53: Disconnecting Connector -2- On Exhaust Pressure Sensor 1 -G450
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1-.

-- Open the clamps -arrows- and move the upper toothed belt guard to the right.

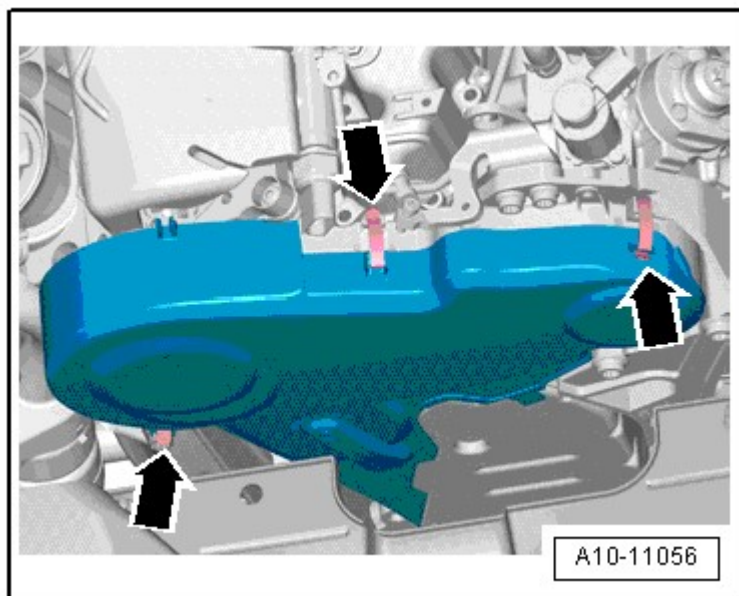


Fig. 54: Removing Upper Toothed Belt Guard
Courtesy of AUDI OF AMERICA, LLC

-- Remove the injectors. Refer to **Removal and Installation** .

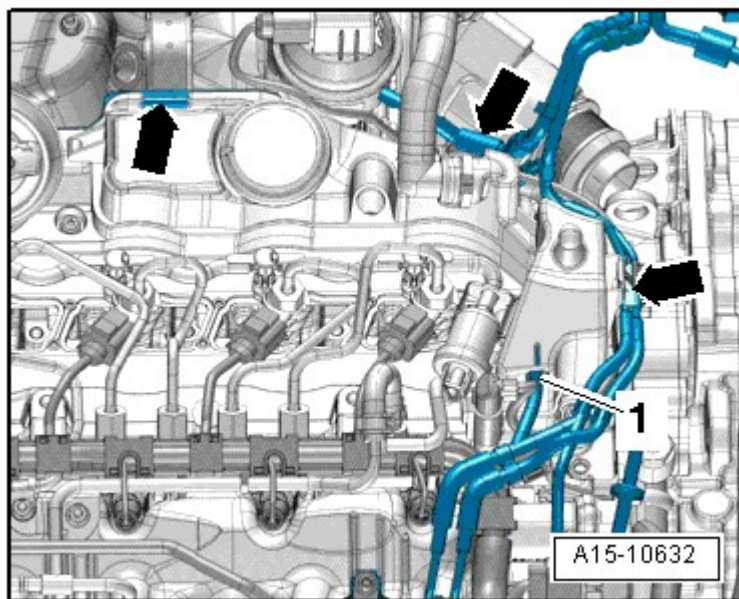


Fig. 55: Removing Vacuum Hose

Courtesy of AUDI OF AMERICA, LLC

-- Remove the vacuum hose -1- from the cylinder head cover.

-- Free up the electrical wires and the remaining vacuum hoses -arrows-.

-- Press the release buttons and remove the crankshaft housing ventilation hose -1- from the cylinder head cover.

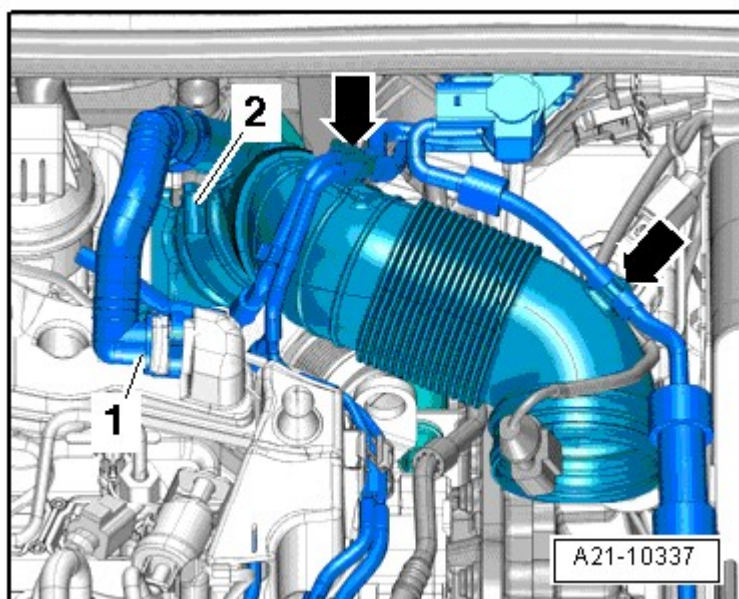


Fig. 56: Identifying Air Guide Pipe

Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -2- and -arrows-.

-- Remove the bolts -arrows- and remove the high pressure reservoir from the cylinder head cover.

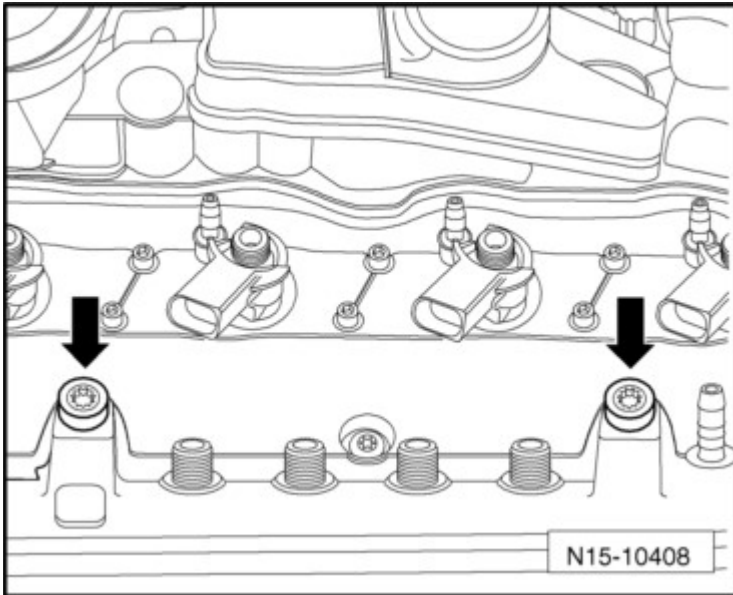


Fig. 57: Identifying Bolts -Arrows- And Fuel Rail

Courtesy of AUDI OF AMERICA, LLC

-- Loosen cylinder head cover bolts in -7 to 1- sequence.

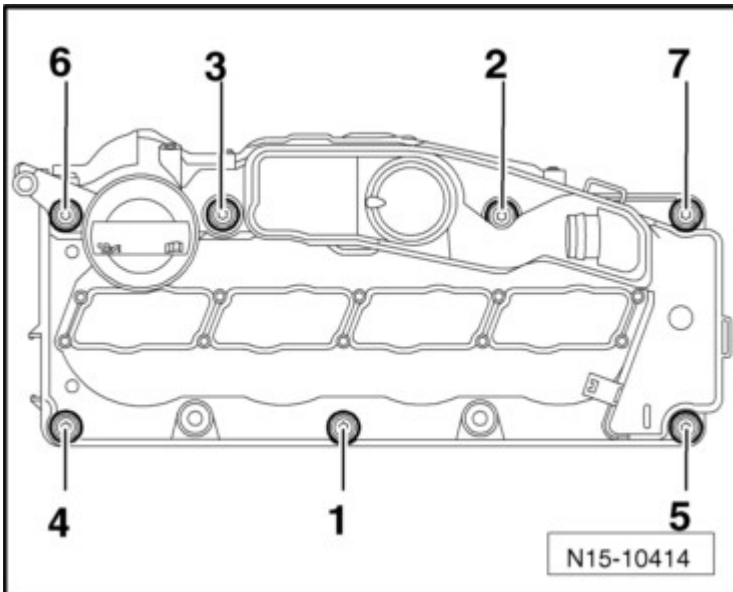


Fig. 58: Identifying Head Cover Bolts -1 Through 7- Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

-- Remove bolts and remove cylinder head cover.

Installing

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

NOTE: **Replace the cylinder head cover gasket and the cylinder head cover bolts if they are damaged or if there are leaks.**

- Tighten cylinder head cover bolts **Fig. 4**.
- Make sure the cylinder head cover is correctly attached to the toothed belt guard.

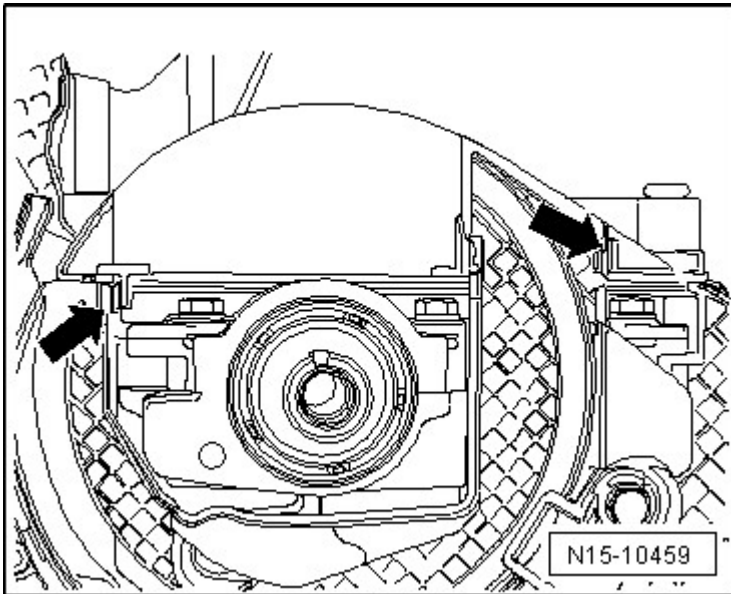


Fig. 59: Identifying Toothed Belt Guard Clips
Courtesy of AUDI OF AMERICA, LLC

NOTE: **The installation location is shown with the camshaft sprocket removed.**

- Push the toothed belt guard near the clips -arrows- against the cylinder head cover with a screwdriver until it audibly engages.
- Check the clearance between the hub and the toothed belt guard.
- Install the high pressure reservoir and the fuel injection units. Refer to **Removal and Installation** .

CYLINDER HEAD**Special tools and workshop equipment required**

- Pry Lever - Rmv Outside Mirror 80 - 200
- Engine Sling 2024 A
- Diesel Injection Pump Locking Pin 3359

- Shop Crane VAS 6100
- Camshaft Gear Counter-Holder T10051
- Puller T10052
- Socket Insert XZN 10 T10385

Removing

- Drain coolant. Refer to **COOLING SYSTEM, DRAINING AND FILLING** .
- Remove fan shroud. Refer to **FAN SHROUD** .
- Remove the air filter housing. Refer to **Removal and Installation** .

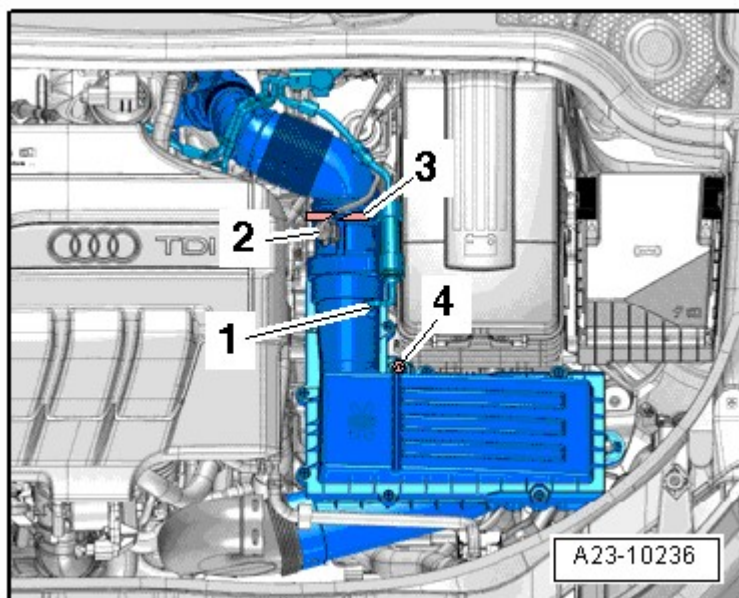


Fig. 60: Removing Air Filter Housing
Courtesy of AUDI OF AMERICA, LLC

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

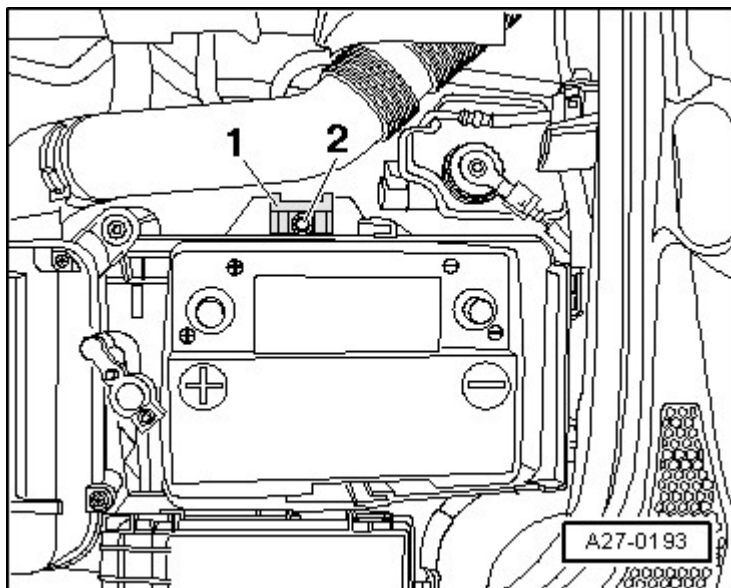


Fig. 61: Identifying Screws And Securing Bracket For Battery
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and remove the battery tray -1-.

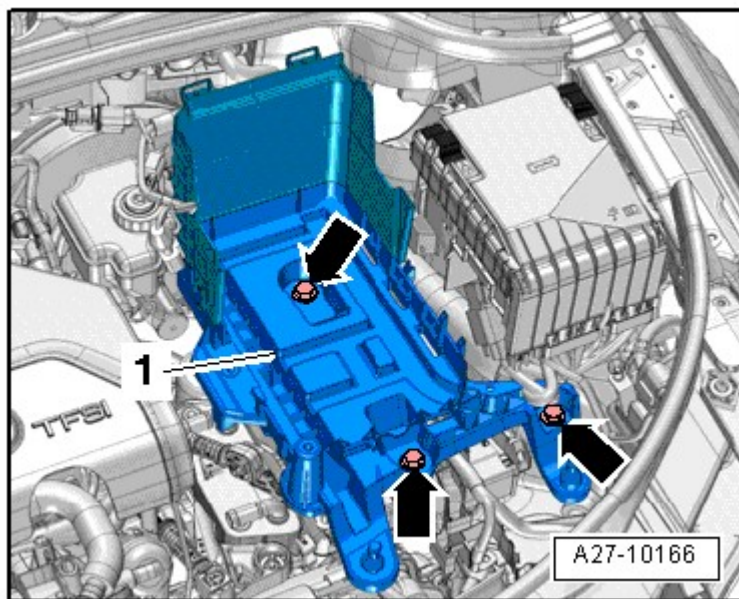


Fig. 62: Identifying Battery Tray And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the hose clamp -2-, lift the retaining clamp -1- and remove the air guide hose.

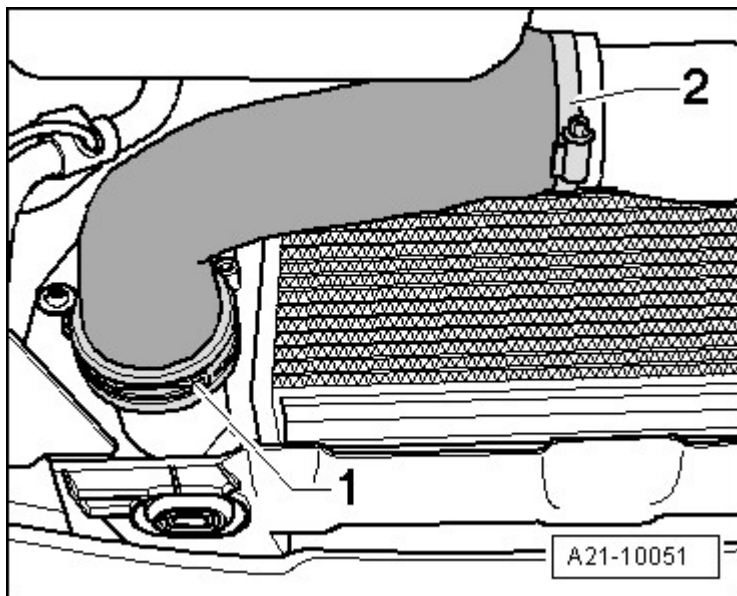


Fig. 63: Identifying Air Guide Hose And Clamps
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the hose clamp -2-, lift the retaining clamp -1- and remove the air guide hose.

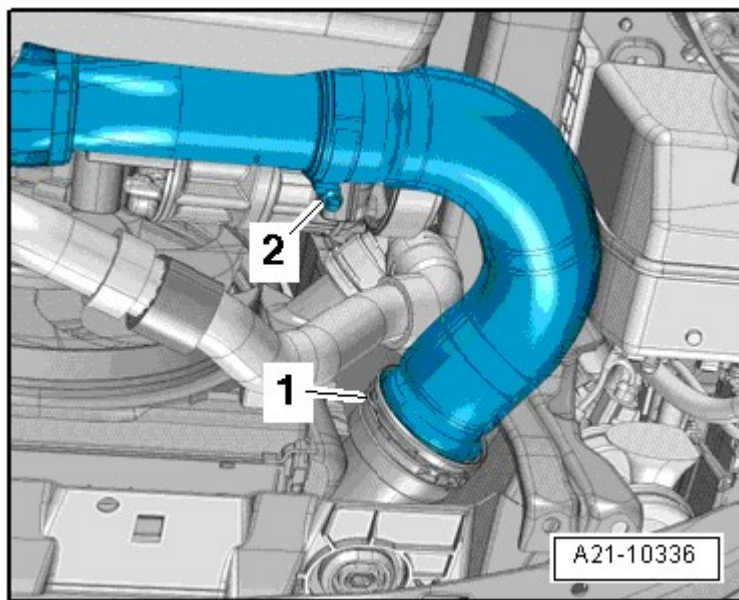


Fig. 64: Identifying Air Guide Hose And Clamps
Courtesy of AUDI OF AMERICA, LLC

-- Remove bolts -1- and -3-.

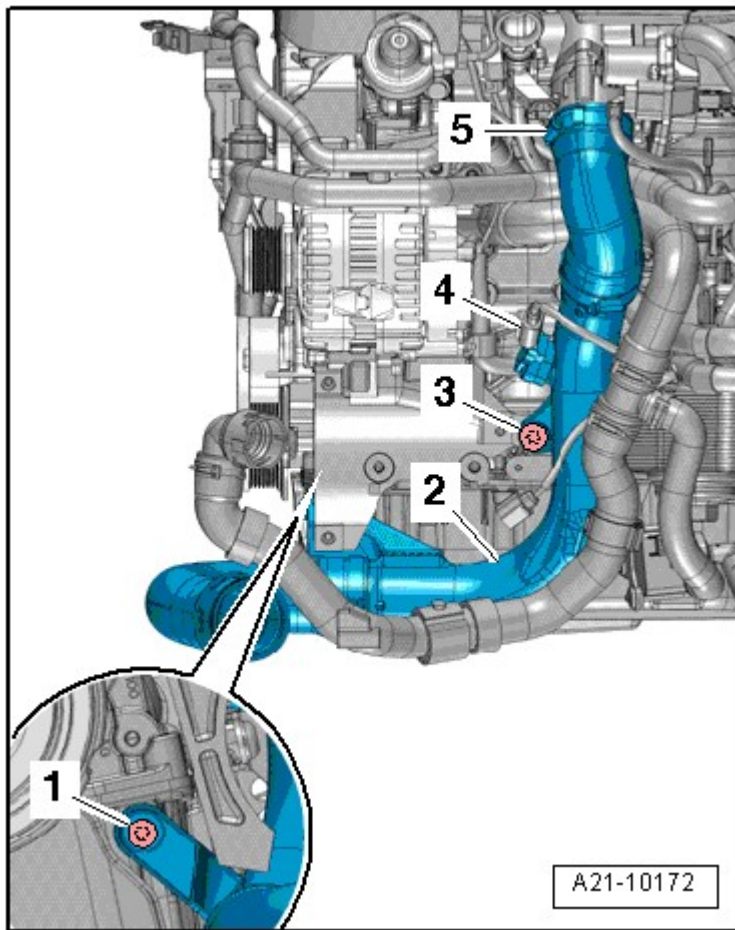


Fig. 65: Identifying Bolts -1- And -3- For Removal

Courtesy of AUDI OF AMERICA, LLC

-- Open the clamp -5- on the intake flap motor -V157- or on the throttle valve control module -J338- and then remove the air guide pipe -2-.

NOTE: Ignore -4-.

-- Remove nuts -2- and bolts -3- and remove the EGR pipe.

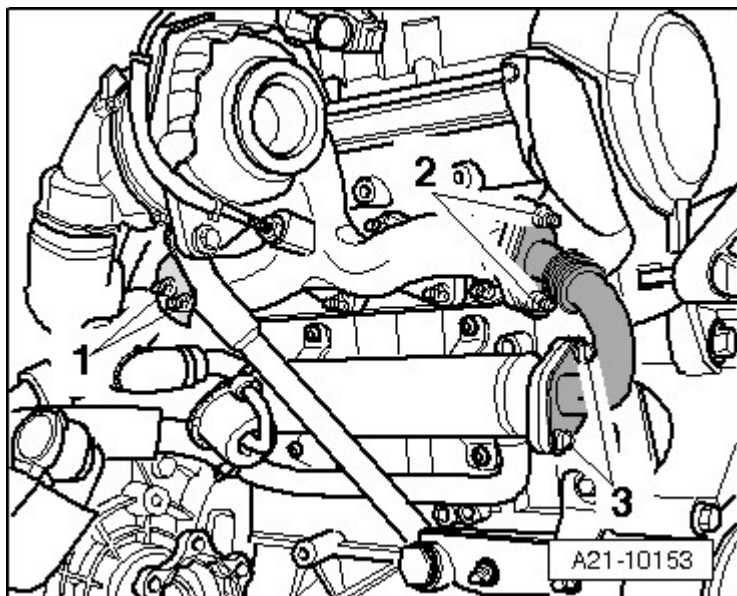


Fig. 66: Locating EGR Pipe Nuts & Bolts
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1-.

-- Remove the bolts -arrows- and remove the right drive axle heat shield.

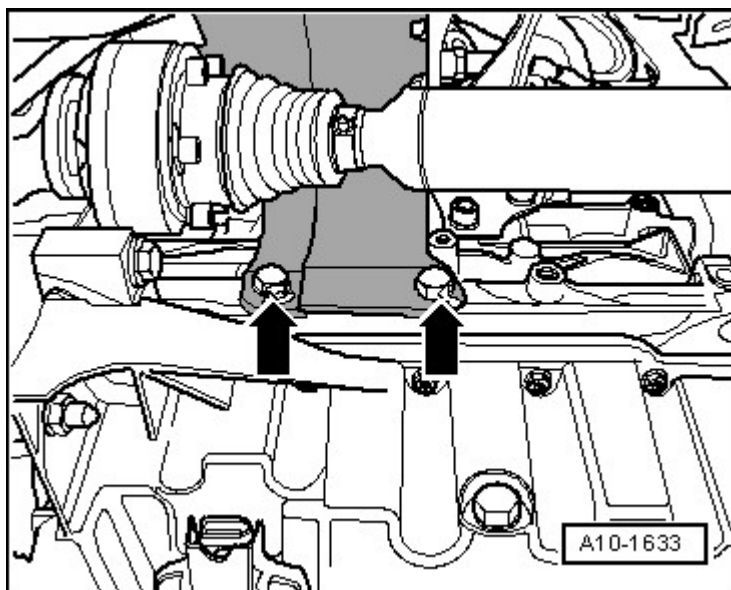


Fig. 67: Identifying Protective Cap For Drive Axle On Engine
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -1 and 2- and the banjo bolt -3-.

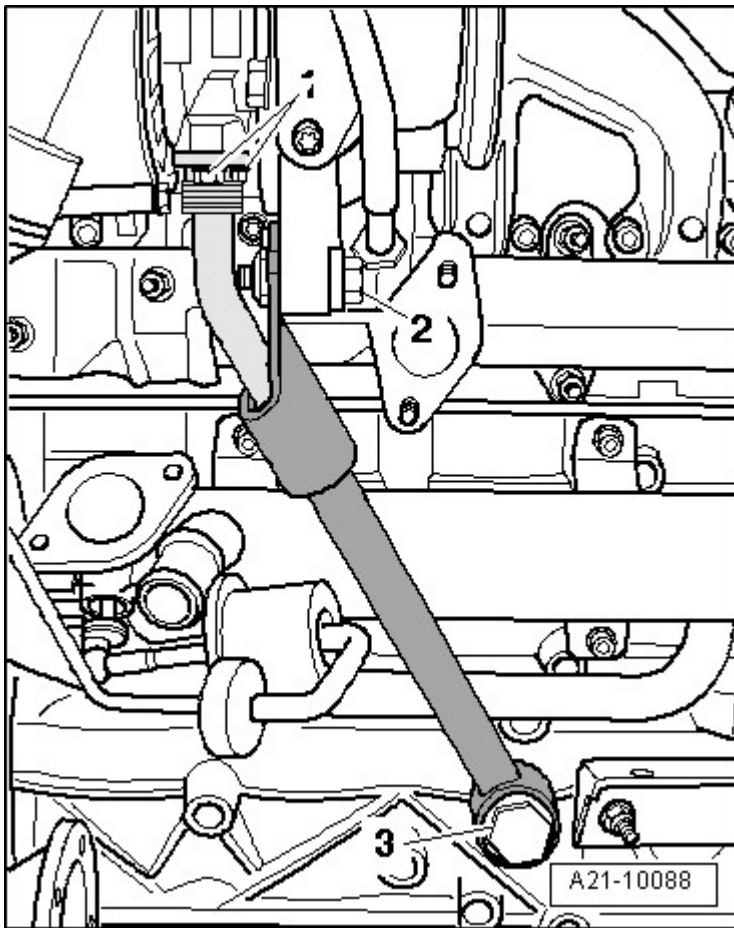


Fig. 68: Locating Banjo Bolt

Courtesy of AUDI OF AMERICA, LLC

- Remove the turbocharger support and the oil return pipe.
- Remove the nuts -2-.

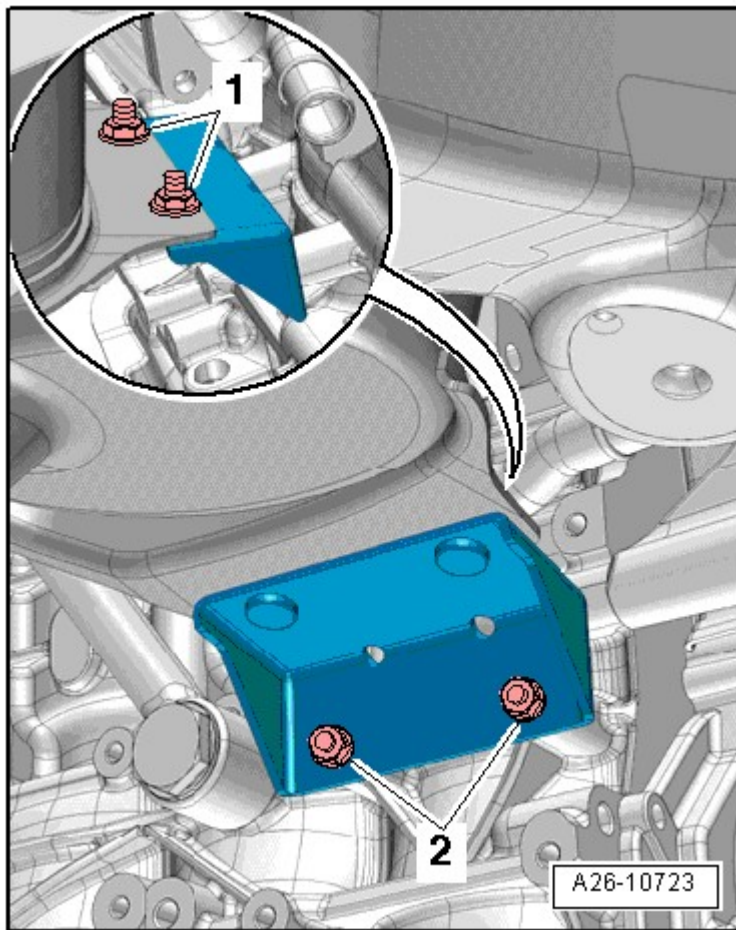


Fig. 69: Identifying Particulate Filter Mount And Nuts
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1-.

-- Press the release buttons and remove the crankshaft housing ventilation hose -1- from the cylinder head cover.

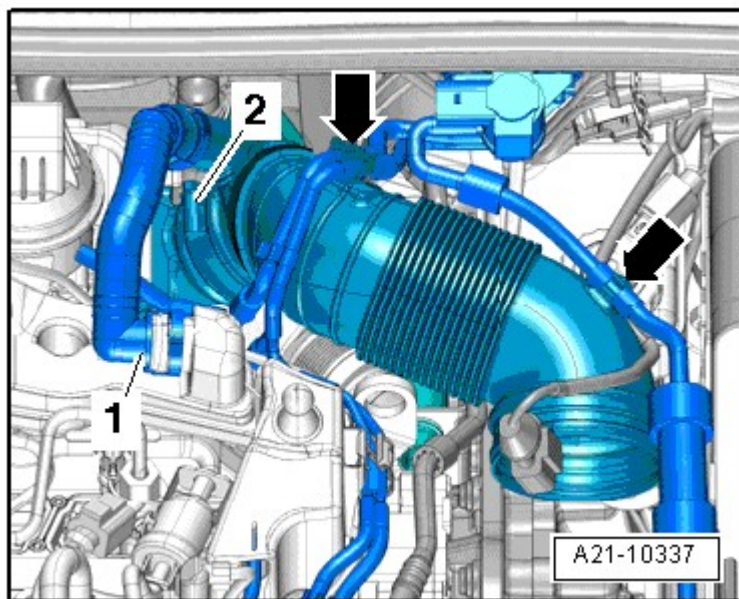


Fig. 70: Identifying Air Guide Pipe

Courtesy of AUDI OF AMERICA, LLC

- Free up the vacuum hoses -arrows- on the air guide pipe.
- Loosen the hose clamp -2- and remove the air guide pipe.
- Disconnect the connector -1- on the charge pressure actuator position sensor -G581-.

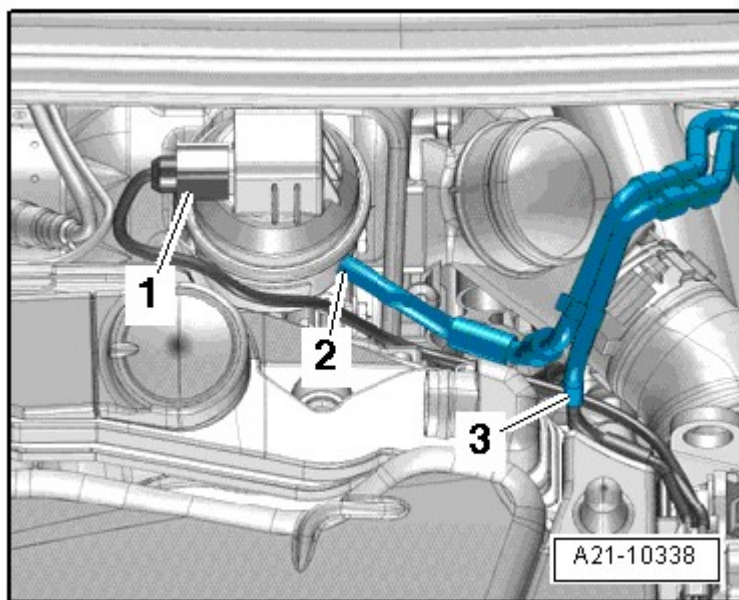


Fig. 71: Identifying Turbocharger Vacuum Diaphragm

Courtesy of AUDI OF AMERICA, LLC

- Remove the vacuum hose -2- from the turbocharger vacuum diaphragm.

-- Disconnect the vacuum hose -3-.

-- Remove exhaust gas temperature sensor 1 -G235-. Refer to **EXHAUST TEMPERATURE CONTROL ASSEMBLY OVERVIEW** .

-- Loosen the bolt -2- and remove the clamp.

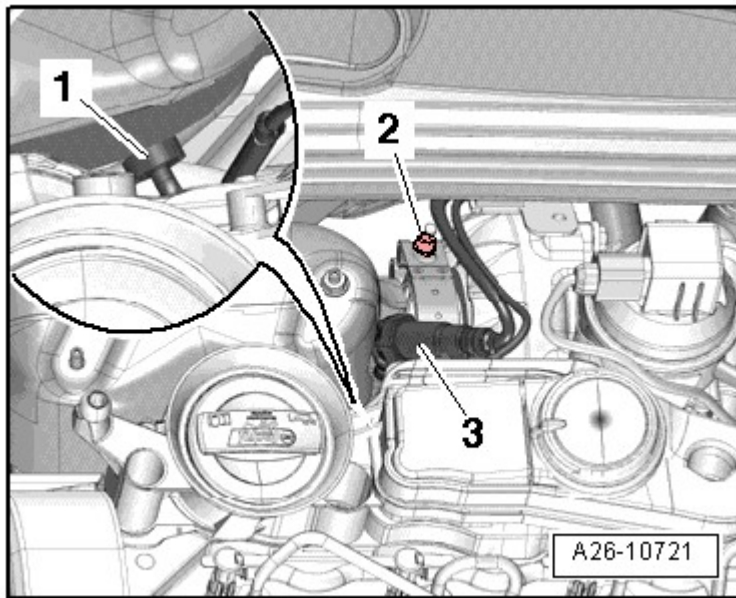


Fig. 72: Identifying Clamp And Bolt
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1 and 3-.

-- Free up the wires on the turbocharger.

-- Disconnect the connector -2- and the exhaust pressure sensor.

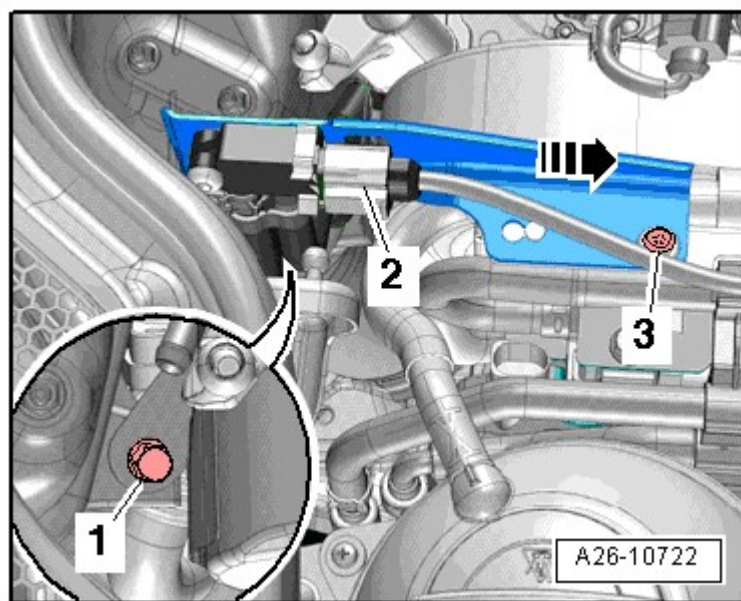


Fig. 73: Disconnecting Connector -2- On Exhaust Pressure Sensor 1 -G450
 Courtesy of AUDI OF AMERICA, LLC

- Remove the bolt -3- and pull exhaust pressure sensor 1 -G450- of its mount -arrow-.
- Remove the bolt -1- at the top of the particulate filter mount and secure the particulate filter to the rear.

NOTE: The installed position may differ depending on the date of manufacture.

- Disconnect the connectors -1- on the EGR vacuum regulator solenoid valve -N18- and -3- on the intake flap motor -V157- or throttle valve control module -J338-.

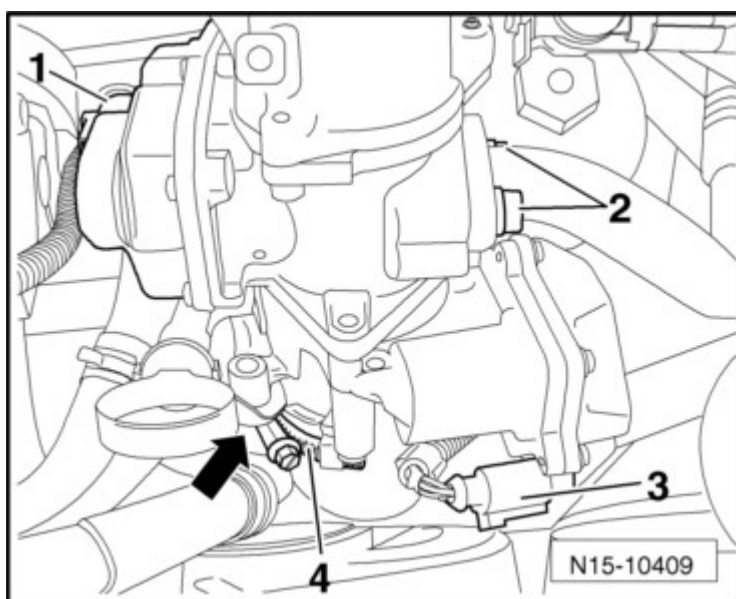


Fig. 74: Identifying Connectors

Courtesy of AUDI OF AMERICA, LLC

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

-- Remove the bolts -2- on the EGR pipe.

NOTE: Ignore -4-.

-- Remove the wiring harness from the bracket -arrow-.

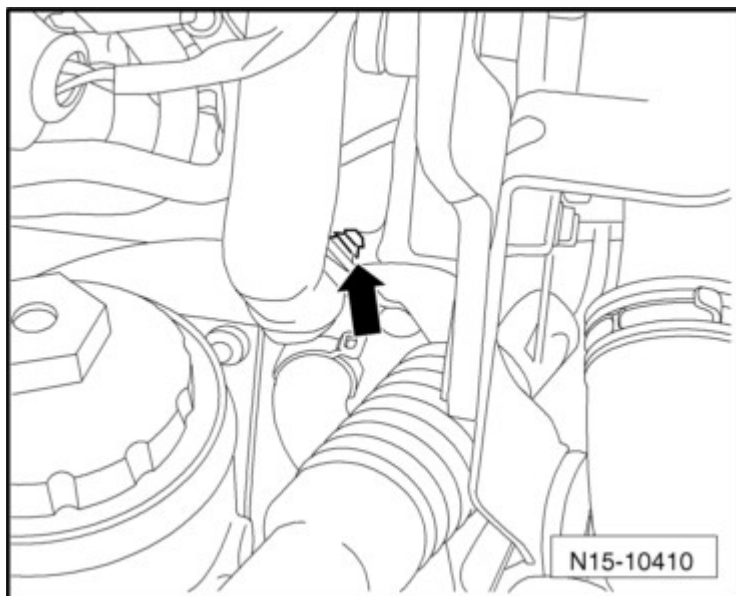


Fig. 75: Identifying Engine Control Module (ECM) Wiring Guide -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the hose clamps -arrows- and remove the coolant hoses from the transmission fluid cooler.

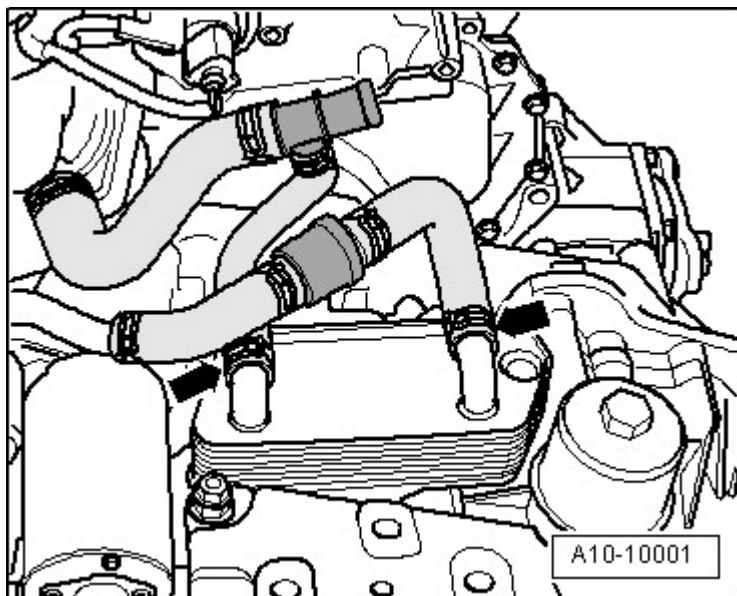


Fig. 76: Identifying Hose Clamps

Courtesy of AUDI OF AMERICA, LLC

-- Free up the wiring harness -arrows- and the connector -1- on the bracket.

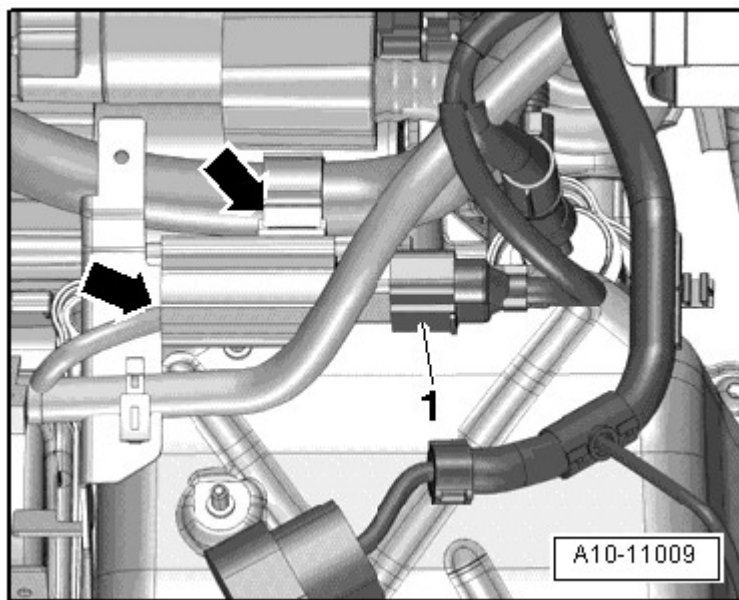


Fig. 77: Identifying Wiring Harnesses And Connector On Hot Side Charge Air Pipe

Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -2 and 5- and -arrows-.

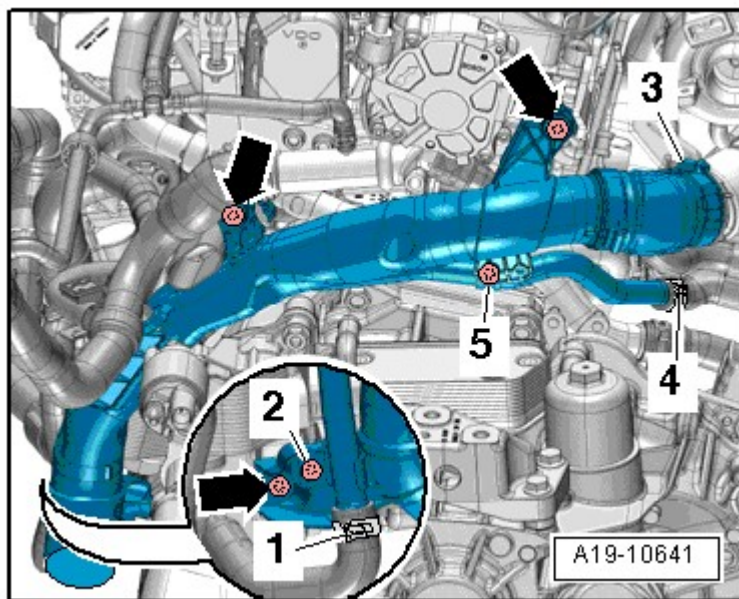


Fig. 78: Identifying Left Air Guide Pipe
Courtesy of AUDI OF AMERICA, LLC

-- Free up the electrical wires and the hoses on the left air guide pipe using the 80 - 200.

-- Loosen the hose clamp -3- and remove the left air guide pipe.

NOTE: Ignore -1 and 4-.

-- Remove the vacuum hose -1- from the vacuum pump.

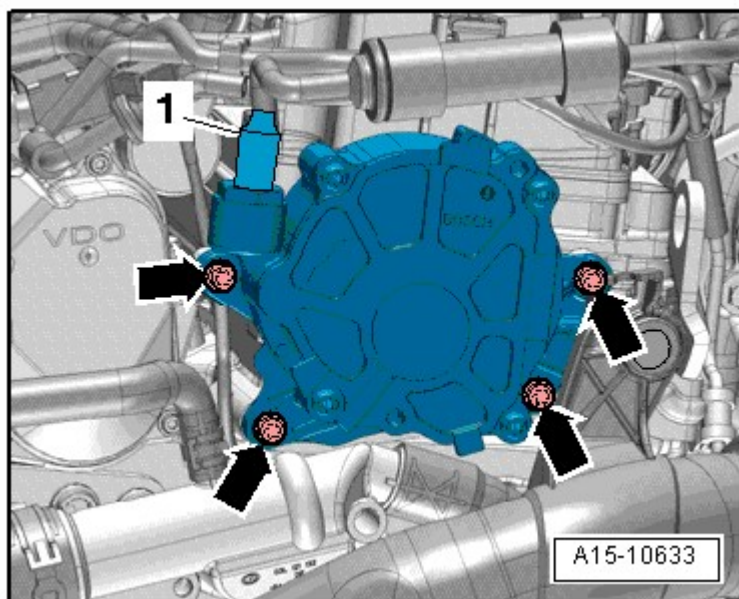


Fig. 79: Locating Vacuum Hose & Pump Bolts

Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -arrows-.

-- Disconnect the electrical connector -2- on the engine coolant temperature sensor -G62-.

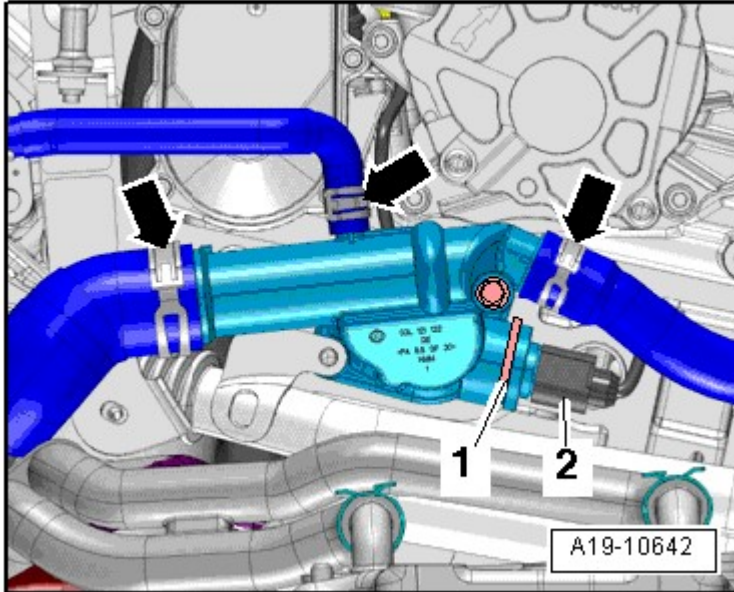


Fig. 80: Identifying Engine Coolant Temperature Sensor -G62- -2- Connector And Hose Clamps
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the hose clamps -arrows- and remove the coolant hoses from the connections.

NOTE: Ignore -1-.

CAUTION: Danger of cracking the coupling.

- Do not bend coupling inside the EGR pipe.

-- Remove the nuts -1- and bolts -2- and remove the EGR pipe.

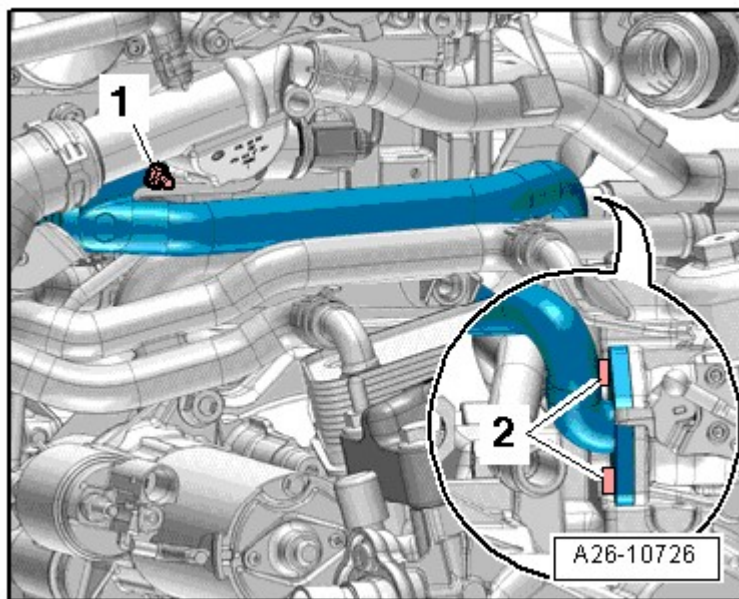


Fig. 81: Identifying EGR Pipe Nuts And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the union nut by counterholding it with an open-end wrench -3- and remove the oil supply line from the oil filter bracket connection.

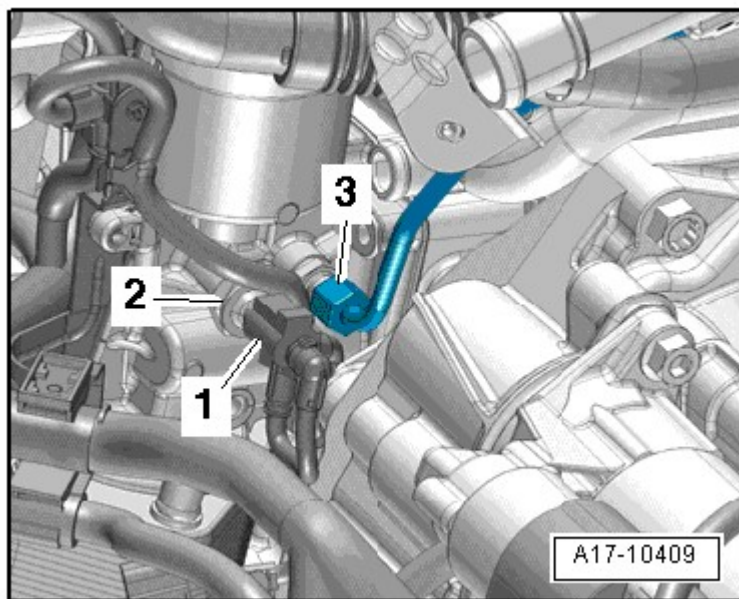


Fig. 82: View Of Oil Pressure Switch Connector
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1 and 2-.

-- Remove the nut -2- on the vacuum line clamp.

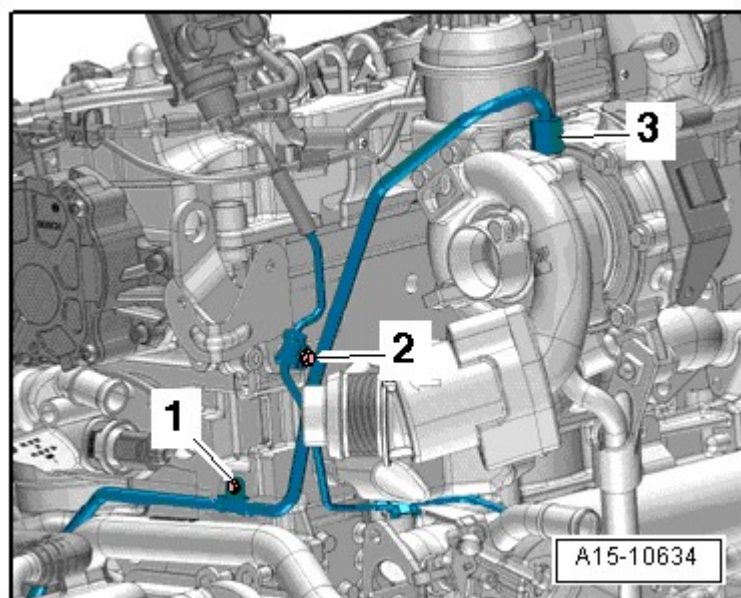


Fig. 83: Identifying Vacuum Line Clamp And Nut
Courtesy of AUDI OF AMERICA, LLC

-- Remove bolt -1-.

-- Loosen the union nut by counterholding it with an open-end wrench -3- and remove the oil supply line from the turbocharger connection.

-- Remove the bolt -arrow- from the rear toothed belt guard.

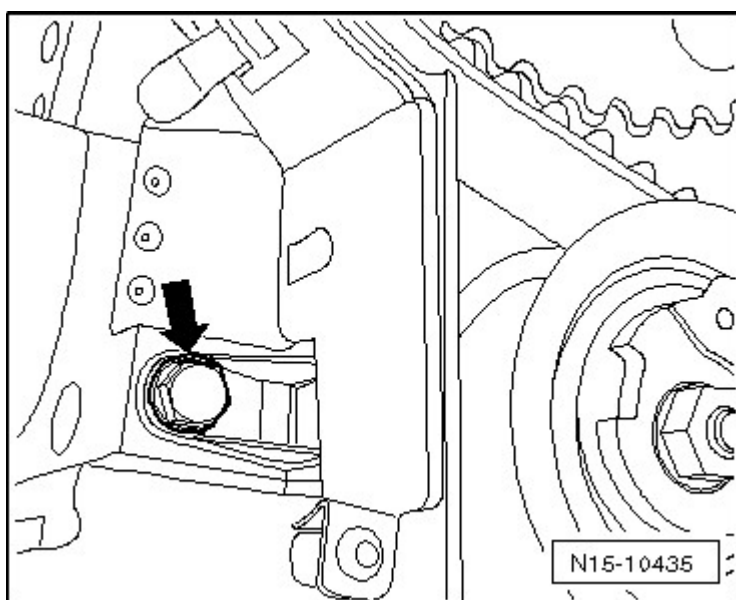


Fig. 84: Identifying Rear Toothed Belt Guard Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Remove the toothed belt from the camshaft toothed belt gear. Refer to **TOOTHED BELT**.

-- Remove the nuts -1-.

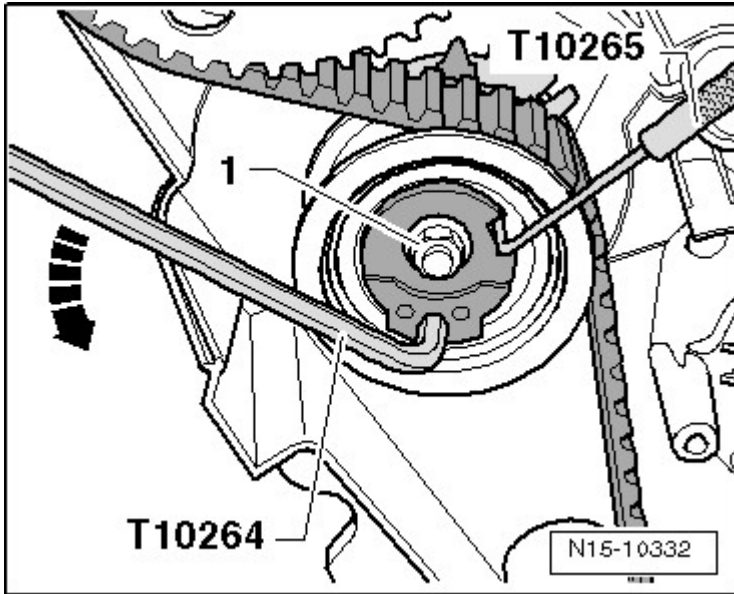


Fig. 85: Identifying Long Reach T10264 And Locking Tool T10265
Courtesy of AUDI OF AMERICA, LLC

NOTE: Disregard -arrow-.

-- Disconnect the electrical connector -arrow- on the camshaft position sensor -G40-.

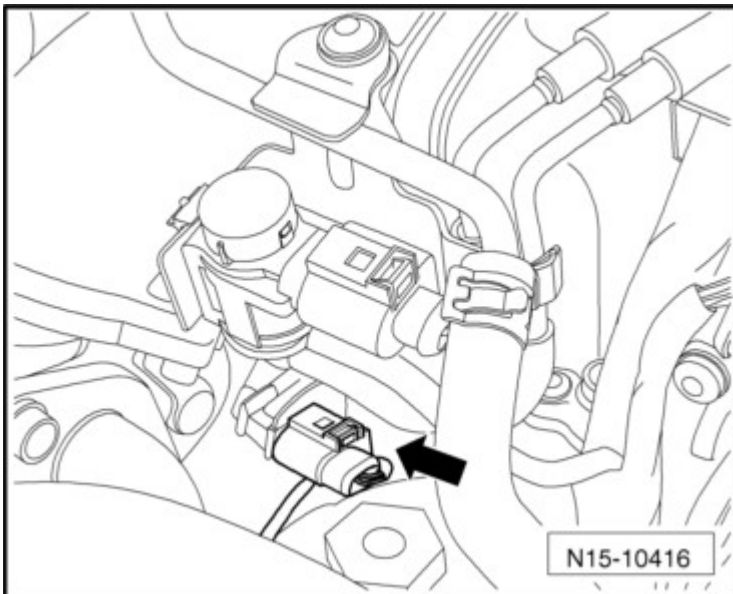


Fig. 86: Identifying Camshaft Position Sensor -G40- Connector -Arrow-
Courtesy of AUDI OF AMERICA, LLC

- Remove cylinder head cover. Refer to **CYLINDER HEAD COVER**.
- Disconnect the connectors on the glow plugs. Refer to **REMOVAL AND INSTALLATION** .
- Remove the bolts -1- and remove the camshaft toothed belt gear.

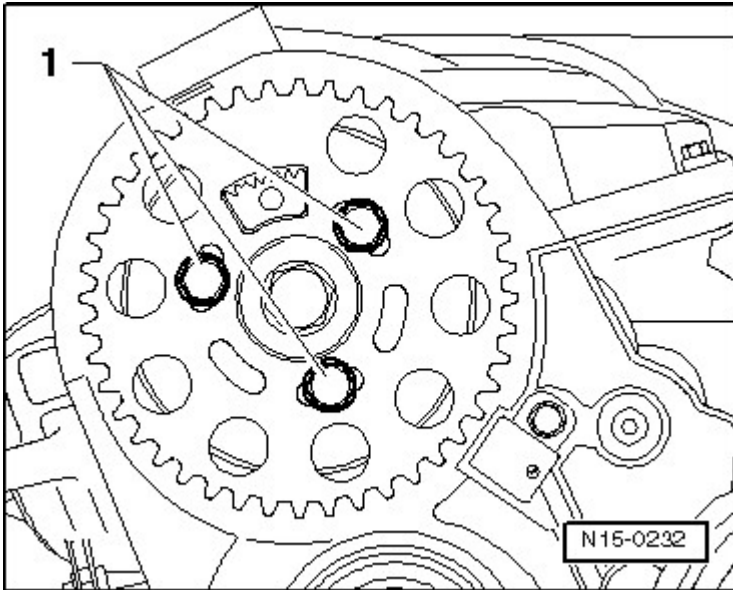


Fig. 87: Identifying Camshaft Pulley Securing Bolts
Courtesy of AUDI OF AMERICA, LLC

- Remove the bolt -1- for the camshaft hub while counterholding it with the T10051.

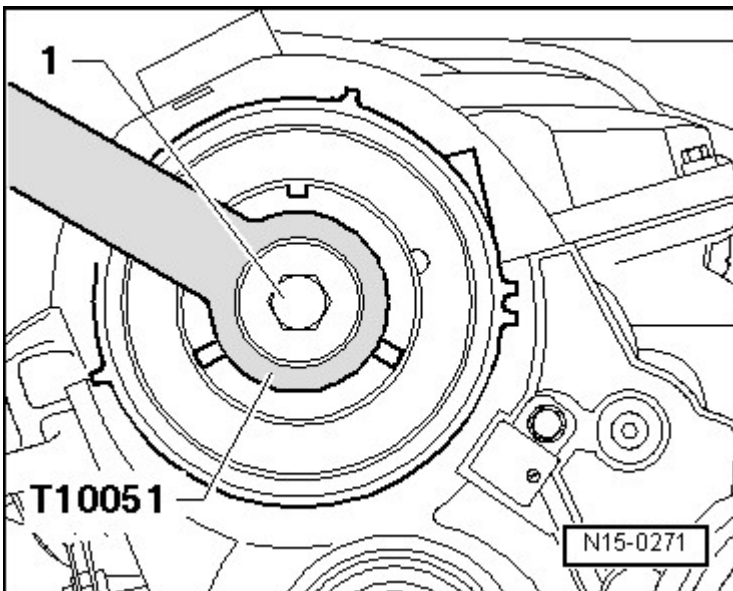


Fig. 88: Identifying Camshaft Gear Counter-Hold T10051
Courtesy of AUDI OF AMERICA, LLC

- Remove the bolt approximately 2 turns.
- Mount the T10052 on the camshaft hub and install the bolts -1- in the hub.

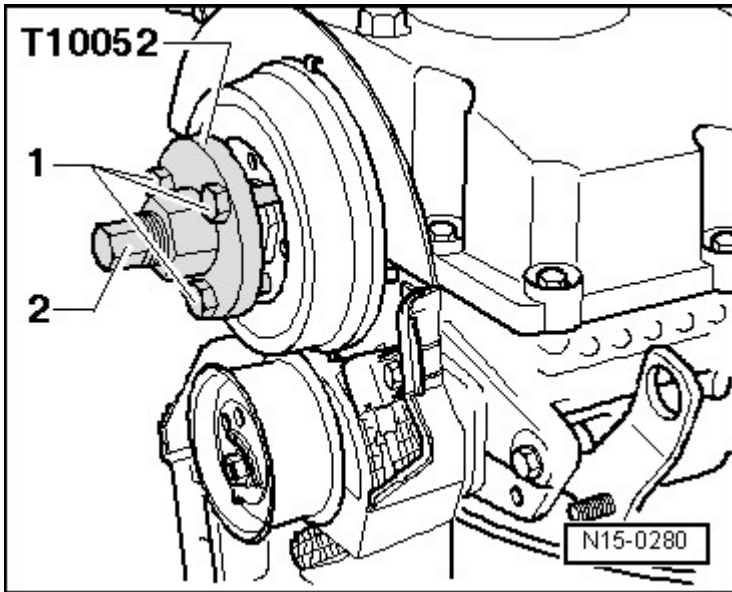


Fig. 89: Identifying Puller T10052
Courtesy of AUDI OF AMERICA, LLC

- To remove the camshaft hub, install the bolt -2- and counterhold it on the hex (30 mm) on the puller.
- Remove the hub from the camshaft cone.
- Loosen the cylinder head bolts in the sequence -1 through 10-.

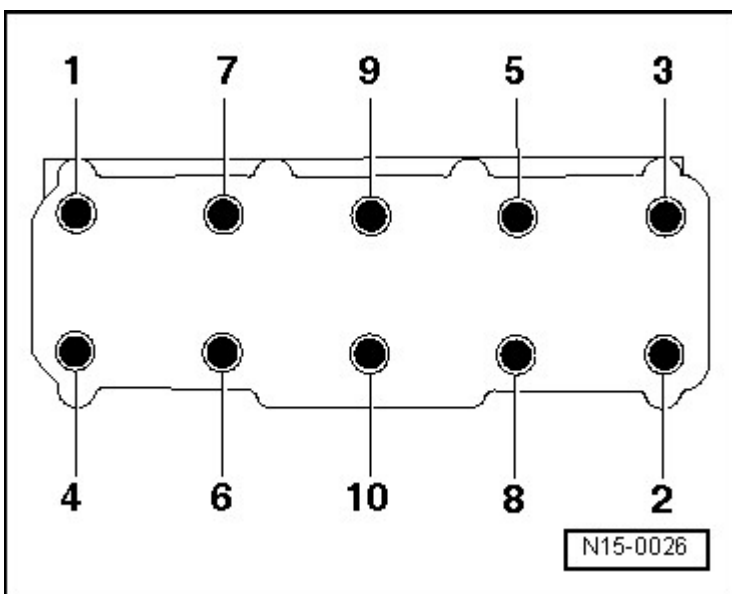


Fig. 90: Cylinder Head Bolts Loosening Sequence

Courtesy of AUDI OF AMERICA, LLC

-- Attach the 2024 A to the cylinder head.

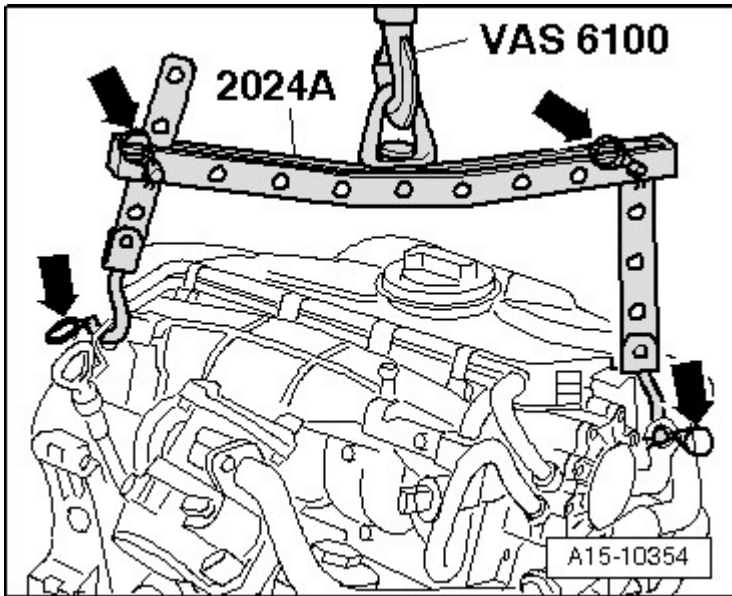


Fig. 91: Attaching 2024 A To Cylinder Head

Courtesy of AUDI OF AMERICA, LLC

WARNING: Loose engine support bridge components could cause an accident.

- Lifting hooks and alignment pins on lifting tackle must be secured with securing pins -arrows-.

-- Slightly lift the cylinder head using the VAS 6100.

-- Move the cylinder head from the rear toothed belt guard toward the left and remove the tensioning roller at the same time.

-- Be careful not to damage the turbocharger oil return line.

-- Lay the cylinder head down being careful not to bend the oil return line. Place a piece of wood under the exhaust manifold if necessary.

CAUTION: Danger of damaging the glow plugs when removing the cylinder head.

- Do not lay the removed cylinder head on the sealing surface with the glow plugs installed otherwise the glow plugs will protrude slightly past the sealing surface

NOTE: The Audi A3 with a 2.0L 4V TDI CR engine only has steel glow plugs.

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.

- No oil or coolant must be in the cylinder head bolt blind holes in the cylinder block.

Risk of leaks in cylinder head seal.

- Carefully remove sealant residue from cylinder head and cylinder block. Make sure that no long scrapes or scratches result.
- Carefully remove all grinding and sanding residue.
- Only unpack new cylinder head gasket immediately prior to installation.
- 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 the crankshaft at least 2 turns.

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

Replace self-locking nuts, sealing rings, seals and O-rings.

It is not permitted to re-work the cylinder heads on TDI engines

When installing a replacement cylinder head, oil the contact surfaces between roller cam followers and cam lubricating surface.

The hose connections as well as the air guide pipes and hoses must be free of oil and grease before installing.

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

In order to be able to securely mount the air guide hoses on their connectors, spray the bolts on the previously used clamps with a rust remover.

When replacing the cylinder head or cylinder head seal, all of the coolant and engine oil must be replaced.

-- Before positioning the cylinder head, remove the T10050 and rotate the crankshaft back opposite the direction of engine rotation until all of the pistons are nearly even under TDC.

-- Install alignment bushings for centering the cylinder block and cylinder head if they are missing.

-- Note the marking on the cylinder head gasket:

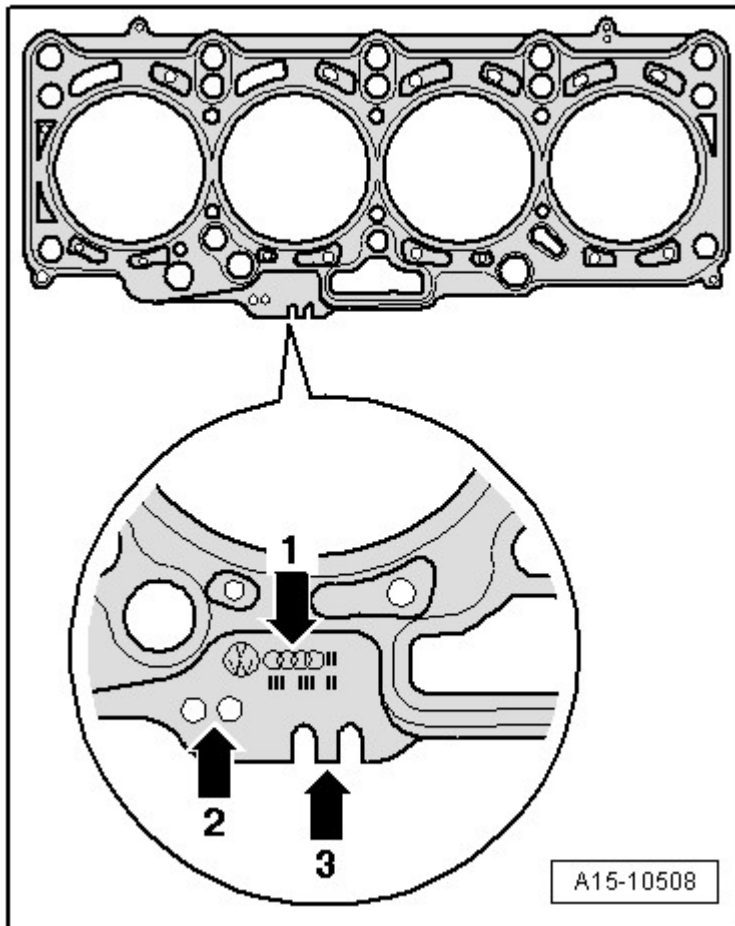


Fig. 92: Identifying Cylinder Head Gasket Identification
Courtesy of AUDI OF AMERICA, LLC

1. Part number:

2. Holes
3. ignore.

NOTE: If the cylinder head gasket or the cylinder head were replaced, select a new cylinder head gasket with the same number of holes as the old gasket.

If parts of the crank drive were replaced, then the new cylinder head gasket must be determined by measuring the piston projection in TDC. Refer to **PISTON PROJECTION, MEASURING AT TDC** .

-- Install the cylinder head gasket on the alignment bushings -arrows- in the cylinder block.

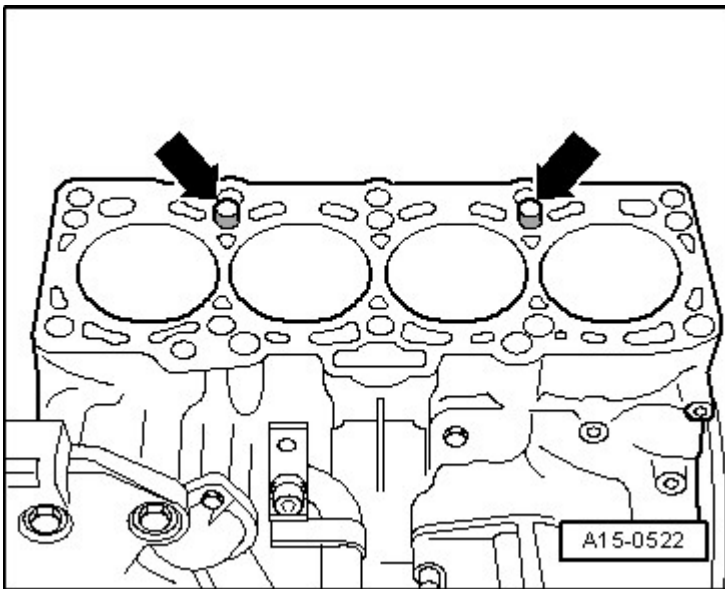


Fig. 93: Identifying Alignment Bushings -Arrows- In Cylinder Block
Courtesy of AUDI OF AMERICA, LLC

- Cylinder head gasket installation position: open marking or part number toward cylinder head.

-- Attach the 2024 A to the cylinder head and VAS 6100.

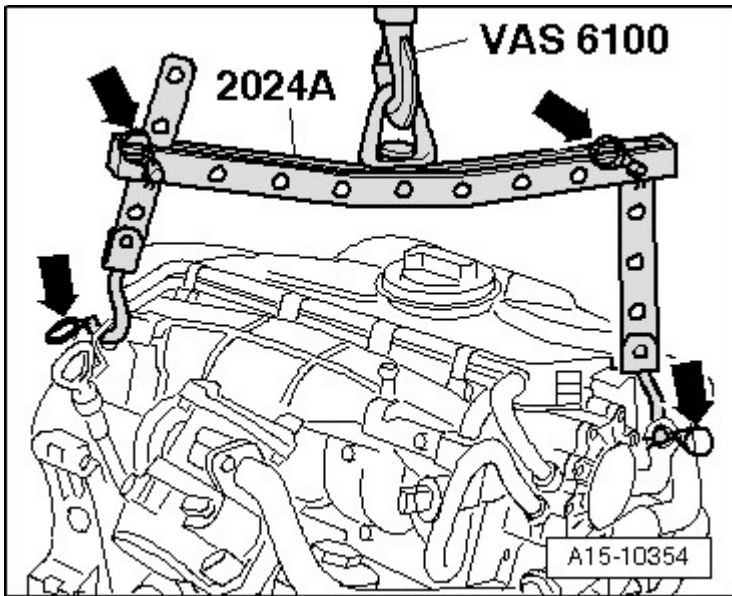


Fig. 94: Attaching 2024 A To Cylinder Head And VAS 6100
 Courtesy of AUDI OF AMERICA, LLC

WARNING: Loose engine support bridge components could cause an accident.

- Lifting hooks and alignment pins on lifting tackle must be secured with securing pins -arrows-.

-- Move the cylinder head with the stud bolt for the toothed belt tensioning roller into the hole in the rear toothed belt guard and mount the tensioning roller at the same time.

NOTE: Pay attention to the camshaft position sensor -G40- wire.

- Set cylinder head in place.
- Install the cylinder bolts all the way in by hand.
- Tighten the cylinder head bolts **Fig. 7**.

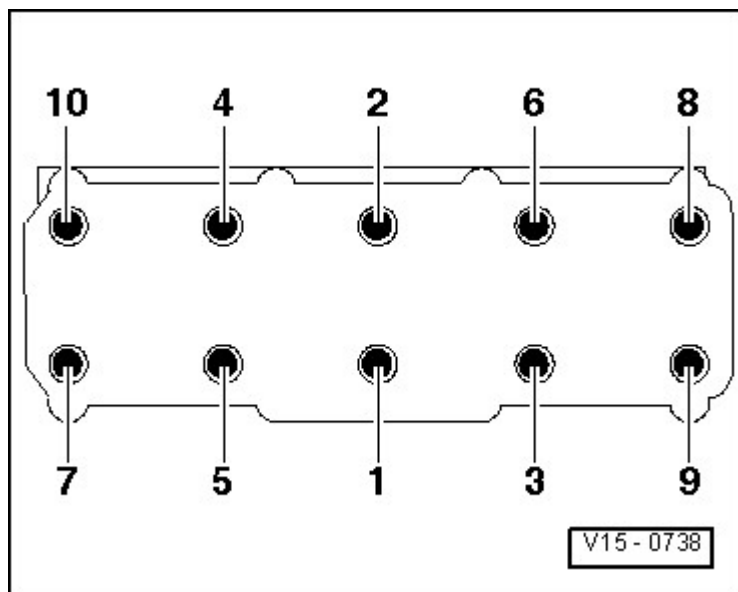


Fig. 95: Cylinder Head Bolt Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

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

-- Install the rear toothed belt guard, the hub and the camshaft toothed belt sprocket. Refer to **TOOTHED BELT ASSEMBLY OVERVIEW**.

-- Secure the camshaft hub with the 3359.

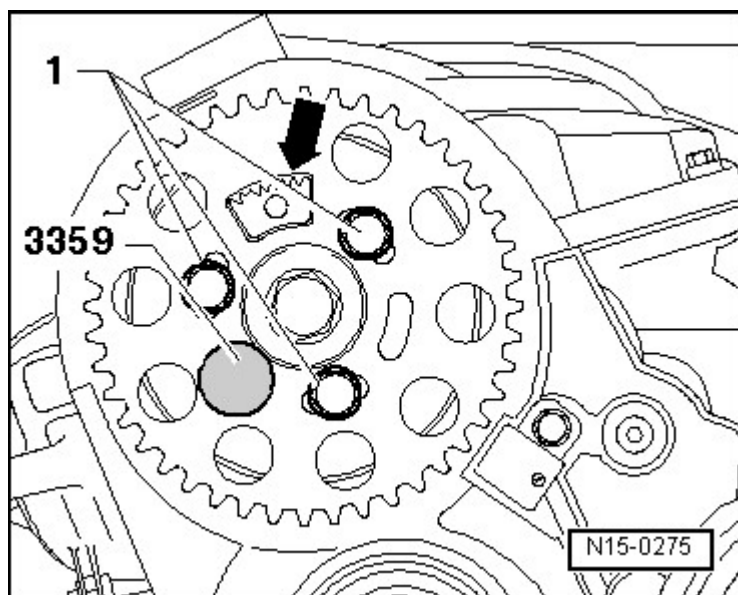


Fig. 96: Identifying Camshaft Pulley Bolts And Toothed Segment -Arrow- Must Point Upward

Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1- and -arrow-.

-- Secure the high pressure pump hub with the 3359.

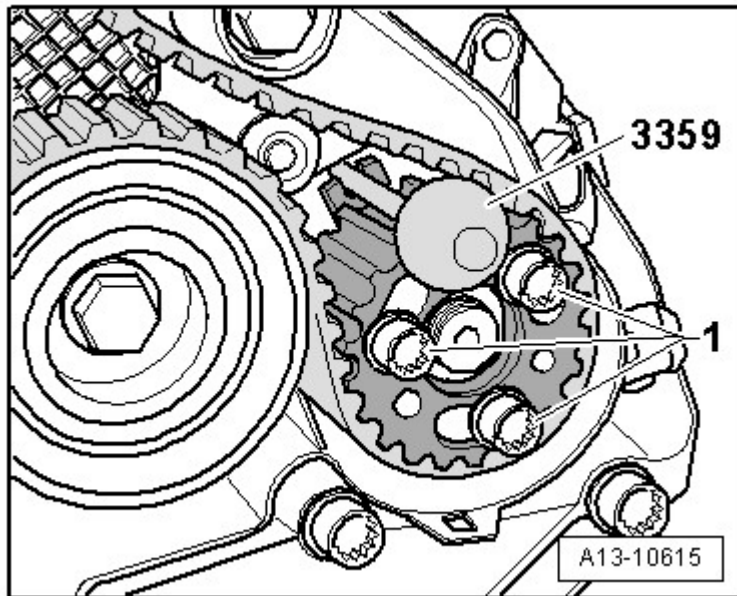


Fig. 97: Securing High Pressure Pump Hub
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1-.

-- Turn the crankshaft in direction of engine rotation, until the tip -arrow- on the T10050 fits into the sealing flange.

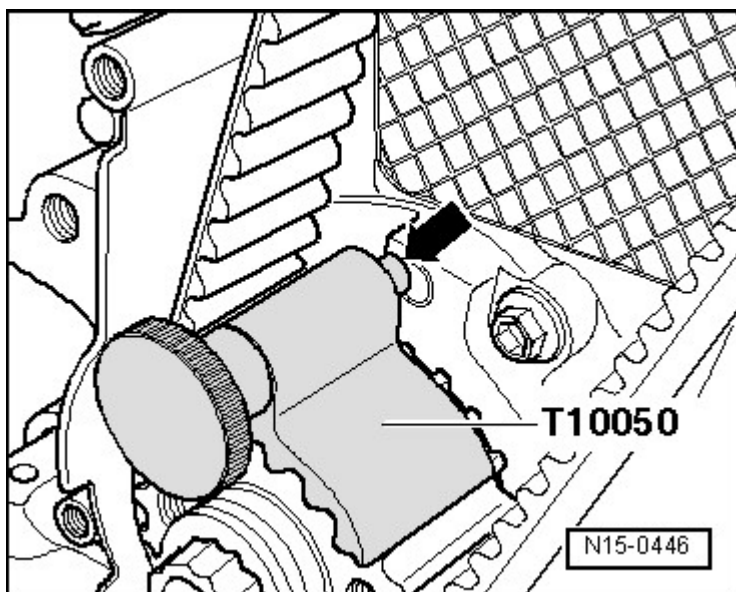


Fig. 98: Identifying Crankshaft Stop T10050

Courtesy of AUDI OF AMERICA, LLC

-- Install toothed belt (adjust timing) **TOOTHED BELT**.

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

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

-- Install the oil supply line. Refer to -6- **OIL FILTER BRACKET AND OIL COOLER ASSEMBLY OVERVIEW => Oil Supply Line** .

-- Install the exhaust gas recirculation pipes. Refer to **EGR WITH EGR COOLING SYSTEM ASSEMBLY OVERVIEW** .

-- Install the left air guide pipe. Refer to **CHARGE AIR COOLER ASSEMBLY OVERVIEW** .

-- Install oil dipstick guide tube **OIL FILTER BRACKET AND OIL COOLER ASSEMBLY OVERVIEW => Oil Dipstick Guide Tube - Tightening Specifications** .

-- Install the particulate filter. Refer to **PARTICULATE FILTER** .

-- Install the exhaust gas temperature sensor 1 -G235-. Refer to **EXHAUST TEMPERATURE CONTROL ASSEMBLY OVERVIEW** .

-- Install the battery tray and the battery. Refer to **REMOVAL AND INSTALLATION** .

-- Install air filter housing. Refer to **Removal and Installation** .

-- Install the turbocharger support. Refer to **TURBOCHARGER ASSEMBLY OVERVIEW** .

-- Install the air guide hose with the connector coupling **CHARGE AIR COOLER ASSEMBLY OVERVIEW => Install the Air Guide Hoses with the Coupling** .

-- Install fan shroud. Refer to **FAN SHROUD** .

-- Change engine oil. Refer to **03 MAINTENANCE, DIAGNOSIS** .

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

CAMSHAFT SEAL**Special tools and workshop equipment required**

- Oil Seal Driver 10 - 203
- Seal Extractor 3240
- M12 x 1.5 x 75

Procedure

- Remove the camshaft sprocket and hub. Refer to **CAMSHAFTS**.
- Insert the thrust piece 3240/1 into the camshaft.

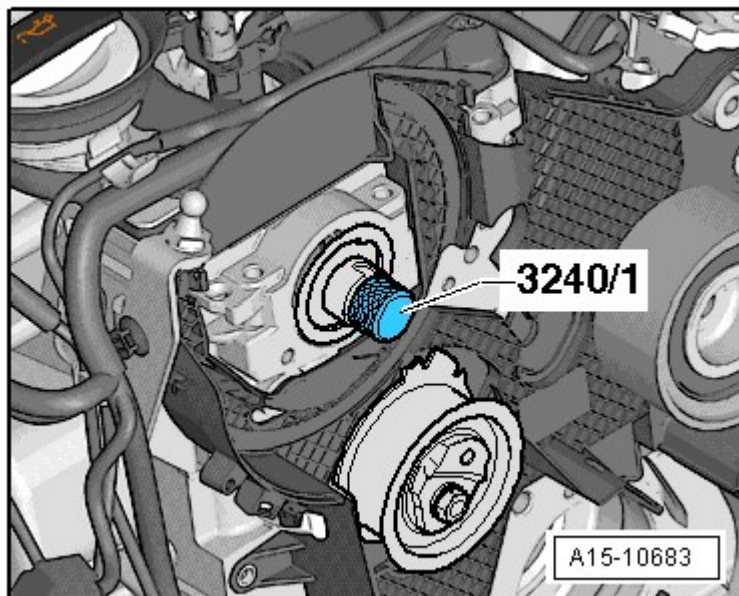


Fig. 99: Identifying Thrust Piece 3240/1 Inserted In Camshaft
Courtesy of AUDI OF AMERICA, LLC

- Loosen the inner section of the 3240 two turns (approximately 3 mm) from the outer section and secure it with the knurled bolt.

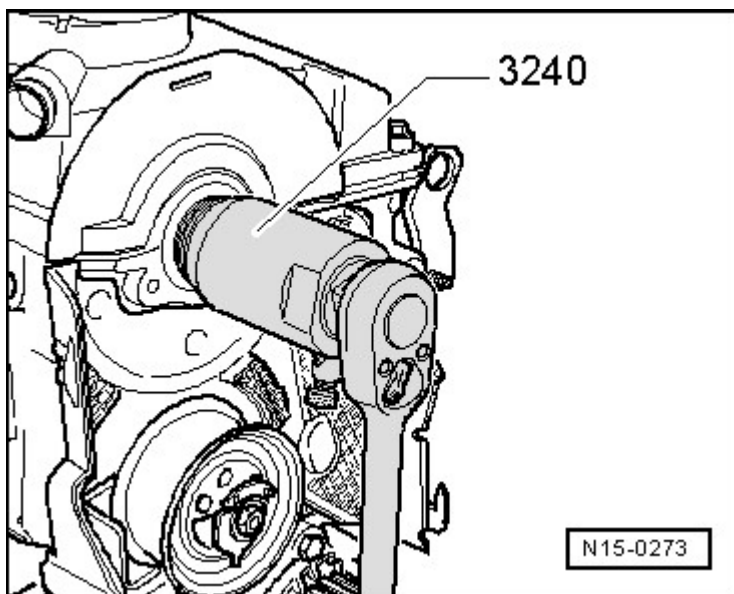


Fig. 100: Identifying Special Tool - 3240

Courtesy of AUDI OF AMERICA, LLC

- Lubricate the seal remover threaded head, position it, and then install it into the shaft seal as far as possible using strong force.
- Loosen the knurled bolt and rotate the inner section against the camshaft until the shaft seal is removed.
- Secure the seal remover in a vise at the flat spots and remove the seal using pliers.
- Clean running and sealing surface.

NOTE: **The sealing lip of the sealing ring may not be additionally oiled or greased.**

- Mount the guide sleeve from the 10 - 203 on the camshaft as illustrated.

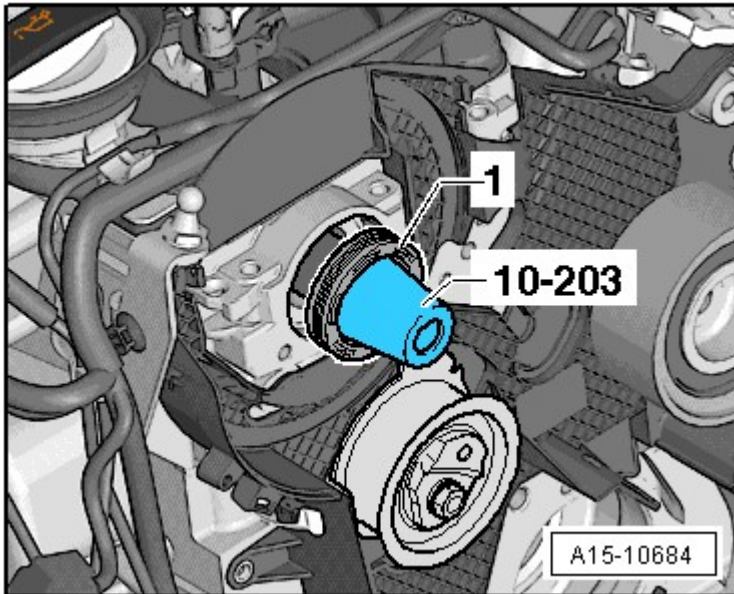


Fig. 101: Identifying Seal -1- Pressed In To Stop Using Seal Driver 10-203

Courtesy of AUDI OF AMERICA, LLC

- Carefully slide the shaft seal -1- over the guide sleeve and onto the camshaft.
- Install the seal using the thrust piece from the 10 - 203 and install the M12 x 1.5 x 75 bolt all the way.

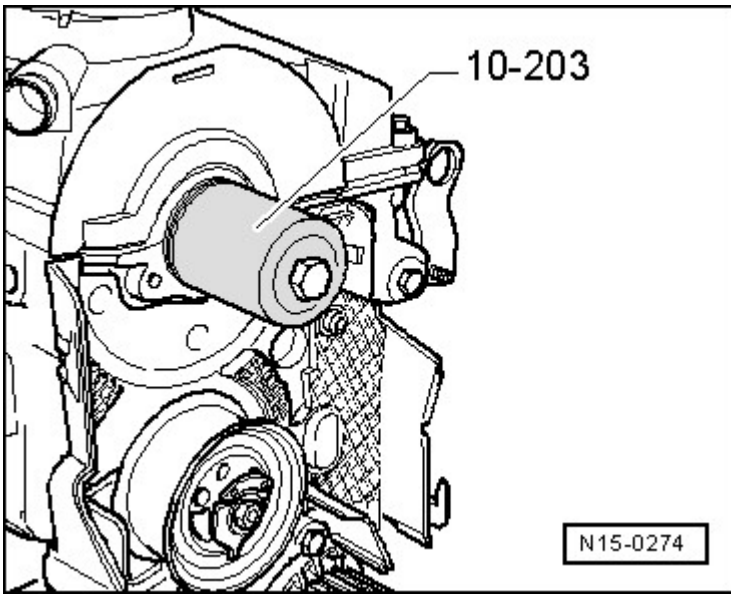


Fig. 102: Identifying Oil Seal Driver 10-203 Thrust Piece And Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Install the camshaft sprocket and the hub. Refer to **CAMSHAFTS**.

-- Install toothed belt (adjust timing) TOOTHED BELT.

CAMSHAFTS

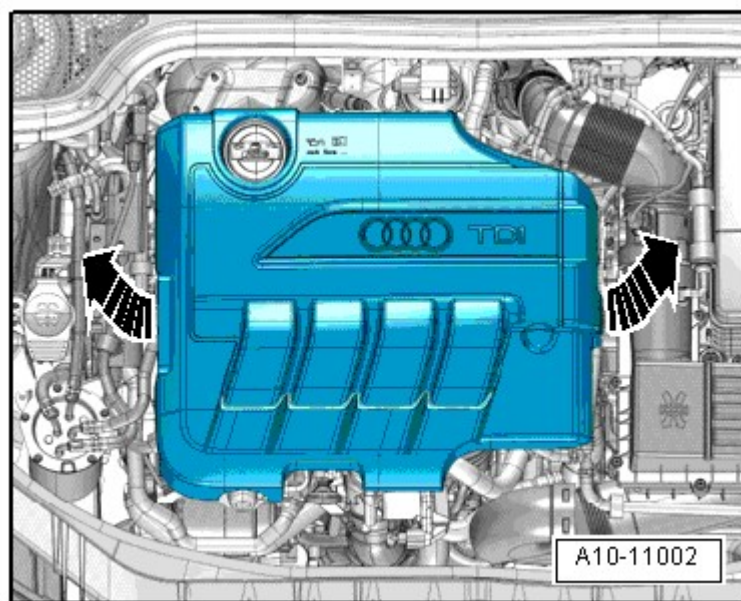
Special tools and workshop equipment required

- Camshaft Gear Counter-Holder T10051
- Puller T10052
- Camshaft Insertion Tool T40094
- Camshaft Insertion Tool T40095
- Tensioning Tool T40096/1
- Hand drill with plastic brush attachment
- Protective eyewear
- Sealant

Removing

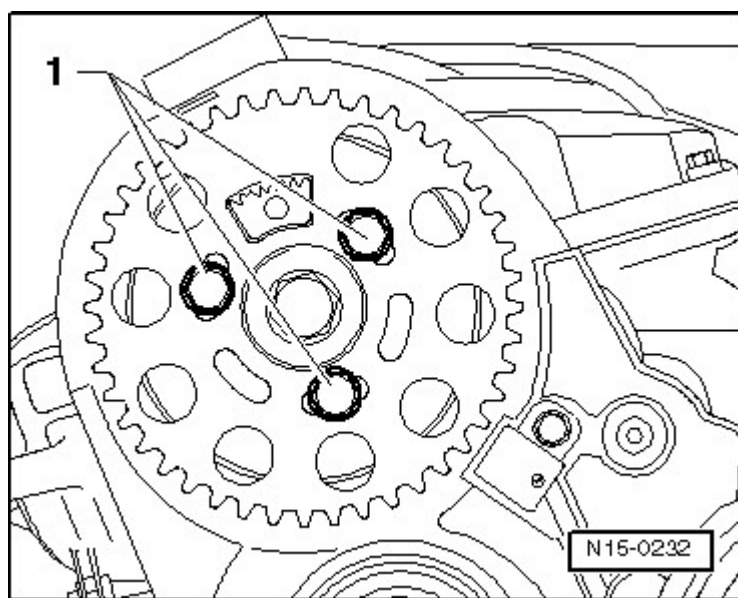
- Cylinder head installed.

-- Remove the engine cover -arrows-.

**Fig. 103: Identifying Engine Cover Removal**

Courtesy of AUDI OF AMERICA, LLC

- Remove the toothed belt from the camshaft toothed belt gear and the high pressure pump toothed belt gear. Refer to **TOOTHED BELT**.
- Remove cylinder head cover. Refer to **CYLINDER HEAD COVER**.
- Remove bolts -1- and remove the camshaft toothed belt gear.

**Fig. 104: Identifying Camshaft Pulley Securing Bolts**

Courtesy of AUDI OF AMERICA, LLC

-- Remove bolt -1- for the camshaft hub while counterholding it with the T10051.

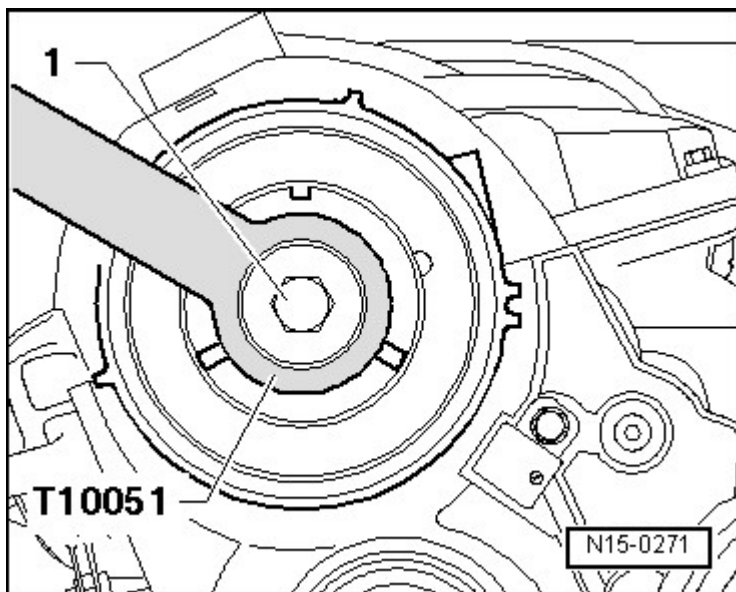


Fig. 105: Identifying Camshaft Gear Counter-Hold T10051
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt approximately 2 turns.

-- Mount the T10052 on the camshaft hub and install the bolts -1- in the hub.

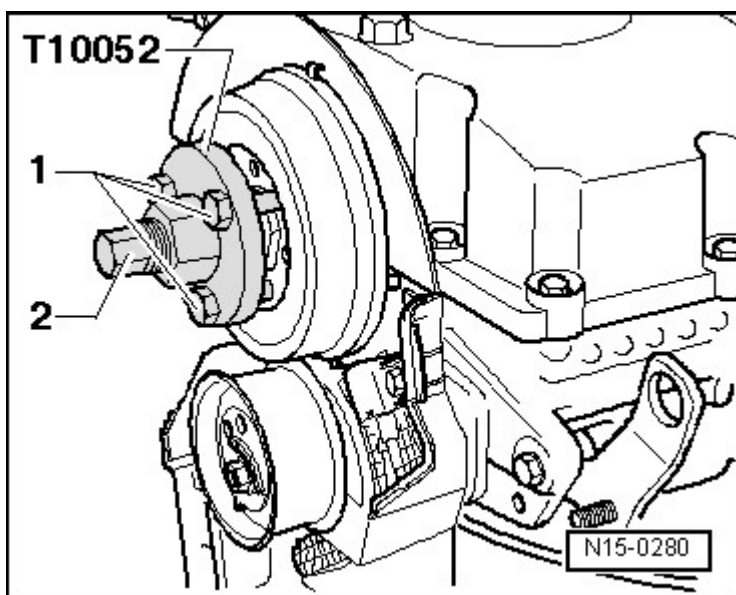


Fig. 106: Identifying Puller T10052
Courtesy of AUDI OF AMERICA, LLC

-- To remove the camshaft hub, install the bolt -2- and counterhold it on the hex (30 mm) on the puller.

- Remove the hub from the camshaft cone.
- Remove vacuum pump. Refer to **[For engine(s) CBRA, BPY, CCTA, CBFA] Removal and Installation** .
- Loosen the guide frame bolts and nuts in the sequence -24 to 1-.

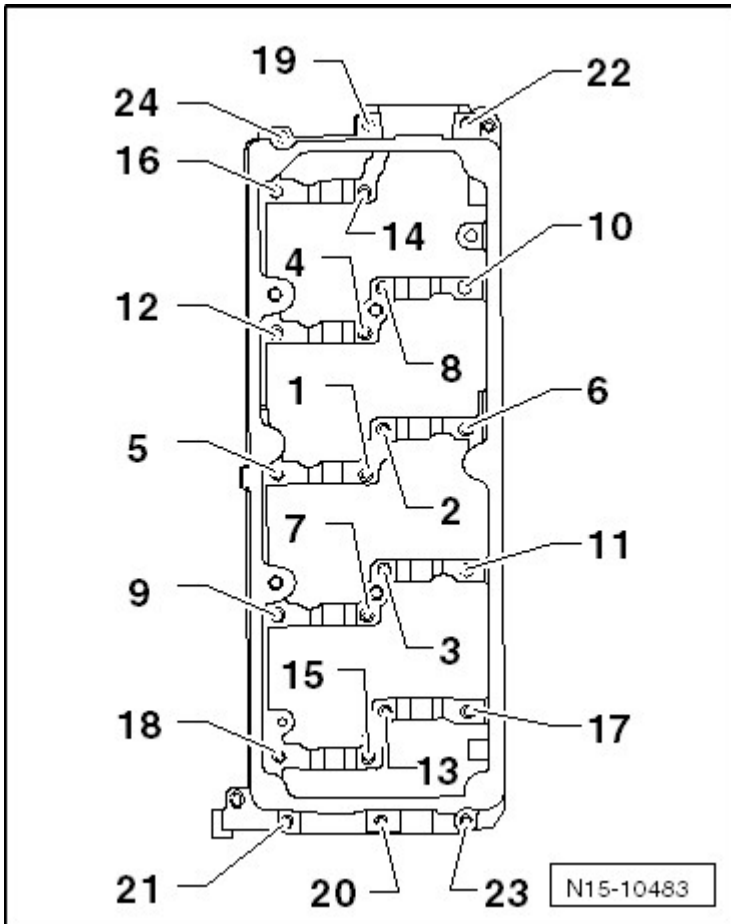


Fig. 107: Identifying Bearing Frame Bolts/Nuts Tightening Sequence
 Courtesy of AUDI OF AMERICA, LLC

- Remove the bolts and carefully loosen the frame from the bonding.
- Mark the camshafts so they can be installed later and remove them.

Installing

- Tightening specifications, refer to **VALVETRAIN ASSEMBLY OVERVIEW**.

CAUTION: Danger of destroying the axial bearing in the bearing bracket.

- The camshafts must be installed only with the T40094 as follows.

CAUTION: Risk of contaminating lubricating system and bearing.

- Cover open parts of engine.

WARNING: Risk of eye injury.

- Wear safety glasses.

-- Using a rotating plastic brush, remove any remaining sealant from the cylinder head and guide frame.

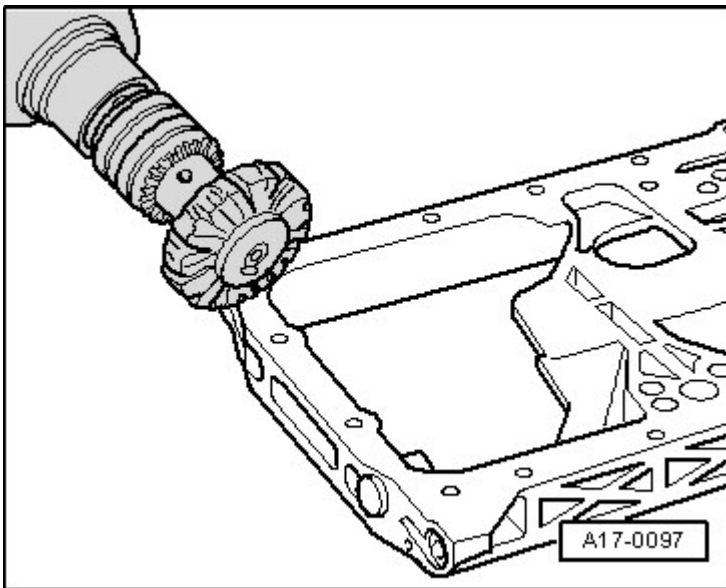


Fig. 108: Identifying Rotating Plastic Brush, Removing Any Remaining Sealant From Cylinder Head And Guide Frame

Courtesy of AUDI OF AMERICA, LLC

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

-- Oil running surfaces of both camshafts.

Set up the T40094 as follows:

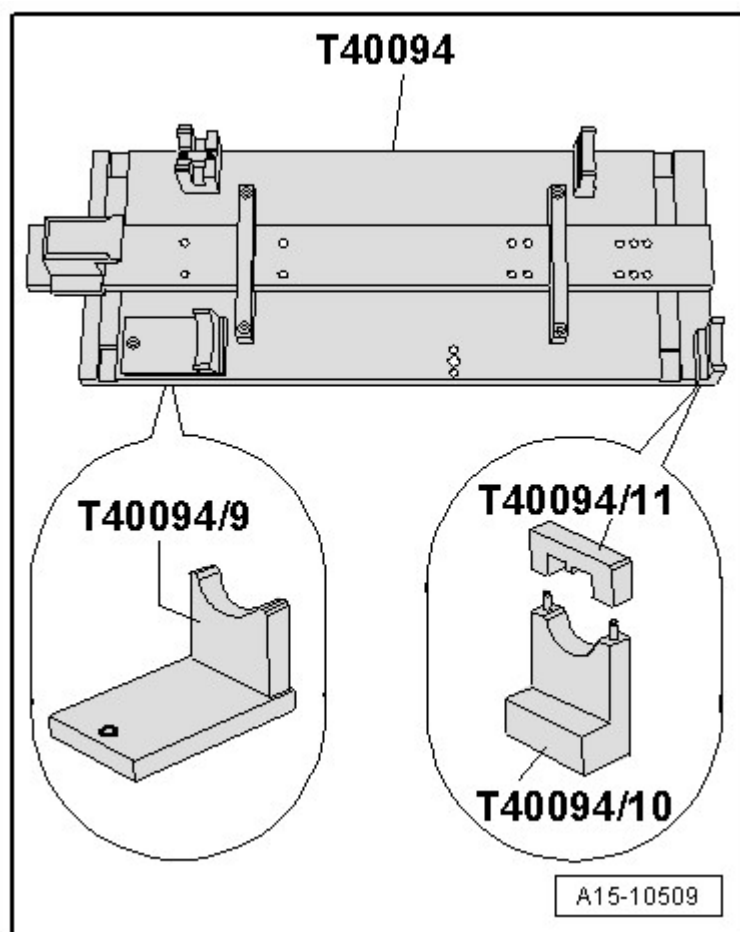


Fig. 109: Identifying Base Plate Secured With Special Tools
 Courtesy of AUDI OF AMERICA, LLC

-- Secure the T40094/9 and T40094/10 (with T40094/11) to the base plate as illustrated. Remove the attached brackets if necessary.

-- Mount the bracket T40094/1 on position -F- and bracket T40094/2 on position -A-.

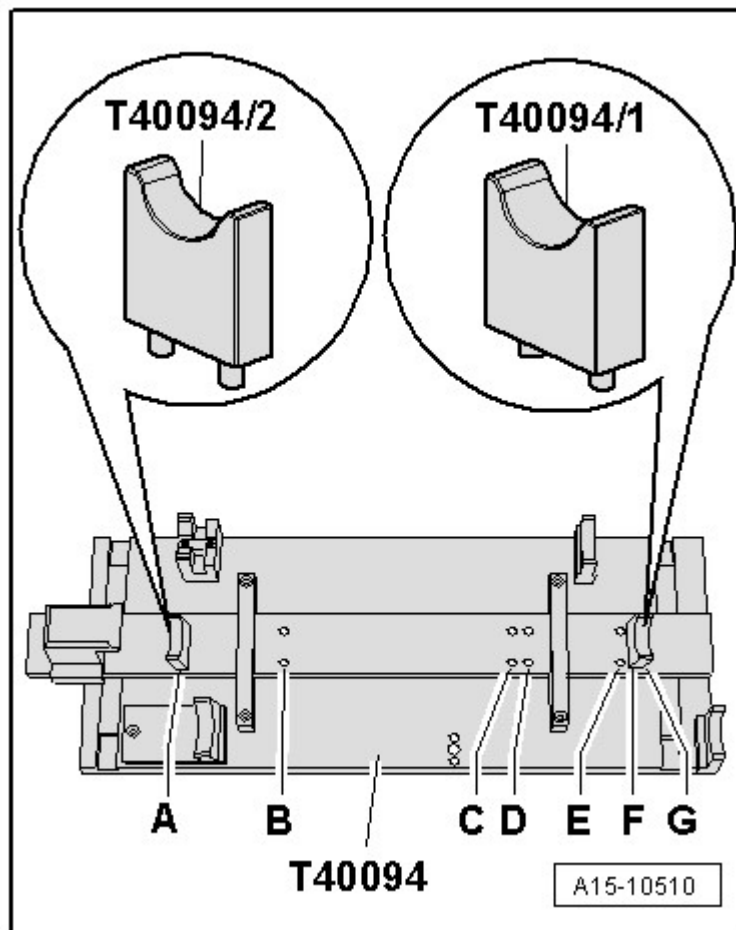


Fig. 110: Identifying Mounting Brackets On Base Plate Position
 Courtesy of AUDI OF AMERICA, LLC

-- Install the intake camshaft into the T40094/1 and T40094/2.

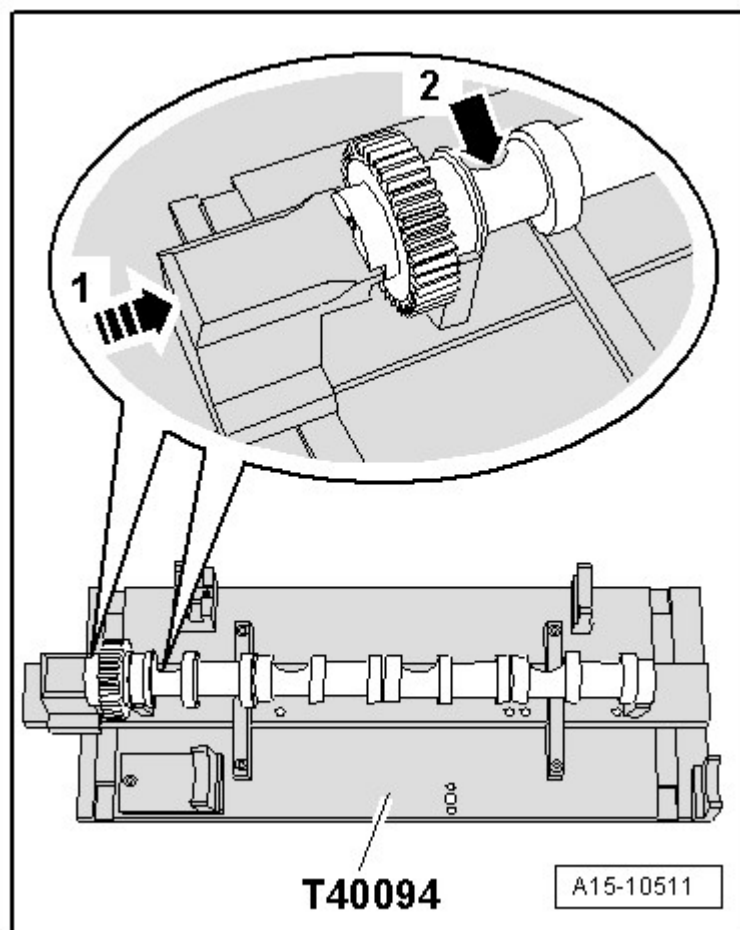


Fig. 111: Installing Intake Camshaft Into T40094/1 And T40094/2
 Courtesy of AUDI OF AMERICA, LLC

- Turn the intake camshaft so that it can be locked with the straight-edge in the TDC position -arrow-.
 - The recess -arrow 2- for the cylinder head bolt must face outward.
- Install the exhaust camshaft into the T40094/9 and T40094/10.
- Secure the exhaust camshaft with the T40094/11.

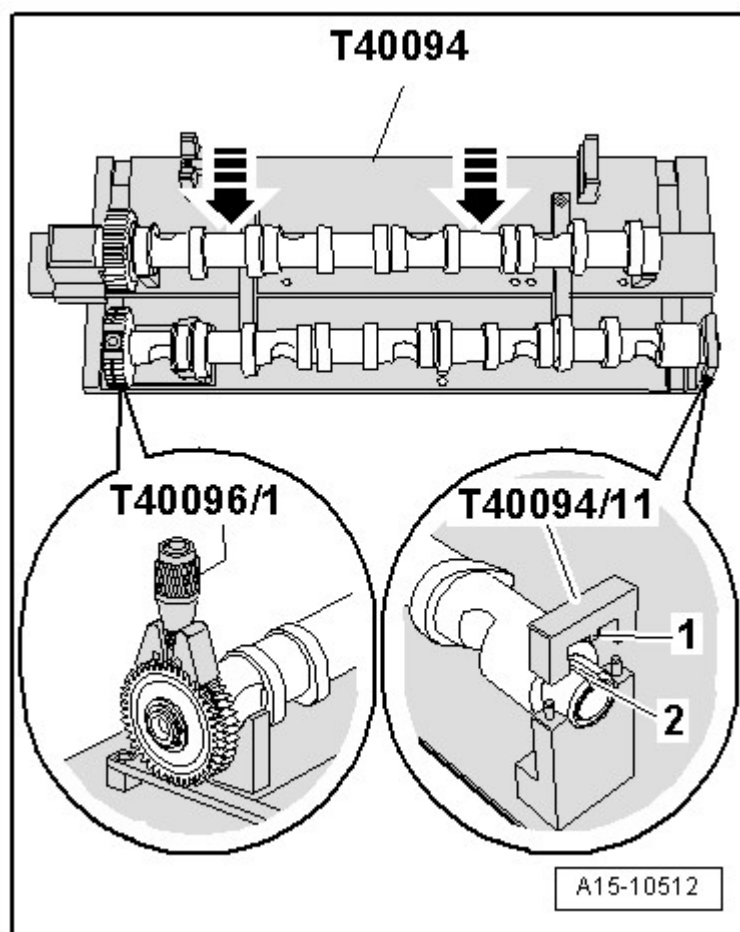


Fig. 112: Identifying Exhaust Camshaft Installed And Secured Positions
 Courtesy of AUDI OF AMERICA, LLC

- The tab -1- in the cover must fit in the groove -2- in the camshaft.

-- Mount the tensioning tool T40096/1 on the teeth of the exhaust camshaft so that one arm of the clamping device engages in one sprocket half.

- The wider arm must engage into the wider half of the sprocket.

-- Tension the tensioning tool with the thumb wheel until the tooth faces align.

-- Slide the intake camshaft toward the exhaust camshaft until the splines mesh -arrows-.

-- Mount the frame on the camshafts.

- All the camshaft bearings must lie on the camshafts.

-- Mount the T40095 and secure the camshafts inside the frame as illustrated.

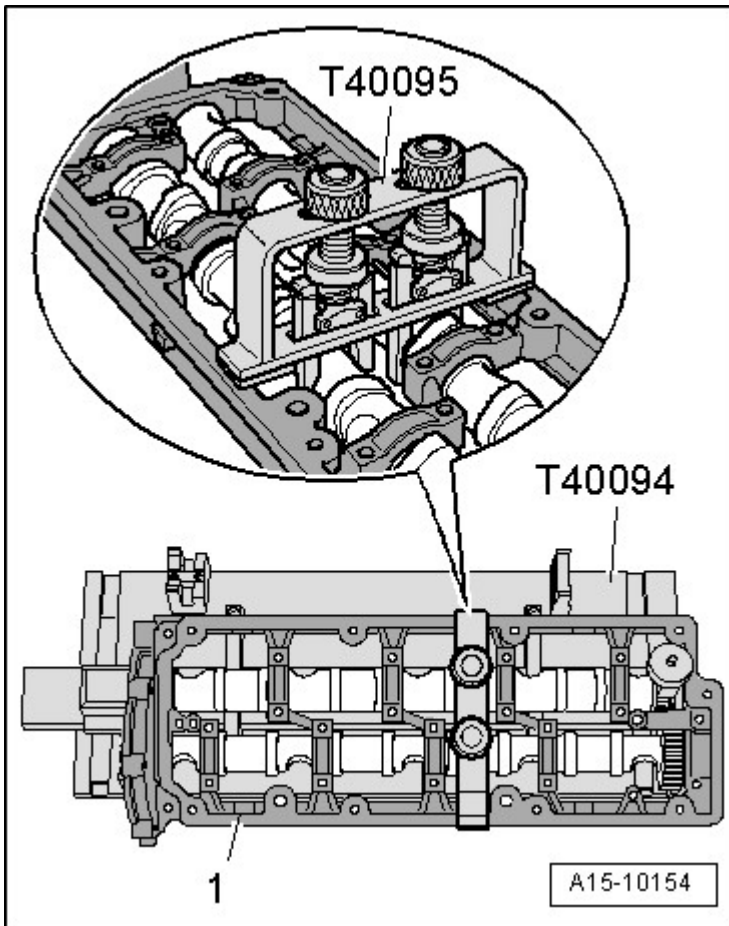


Fig. 113: Securing Camshafts Inside Frame
Courtesy of AUDI OF AMERICA, LLC

-- Remove the T40094/11.

NOTE: **Note the expiration date of the sealing compound.**

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

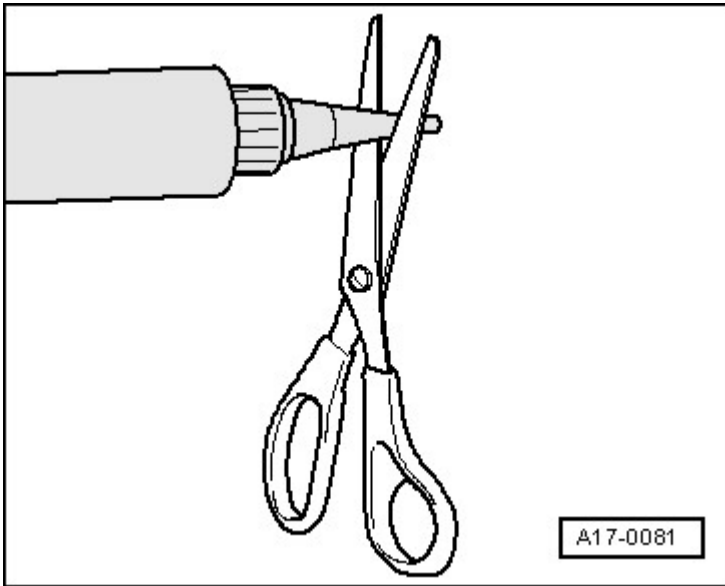


Fig. 114: Cutting Tube Nozzle At Front Marking (Nozzle Diameter Approx. 3 Mm)

Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of contaminating camshaft bearing with excess sealant.

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

-- Apply a bead of sealant on the clean sealing surfaces on the cylinder head as illustrated.

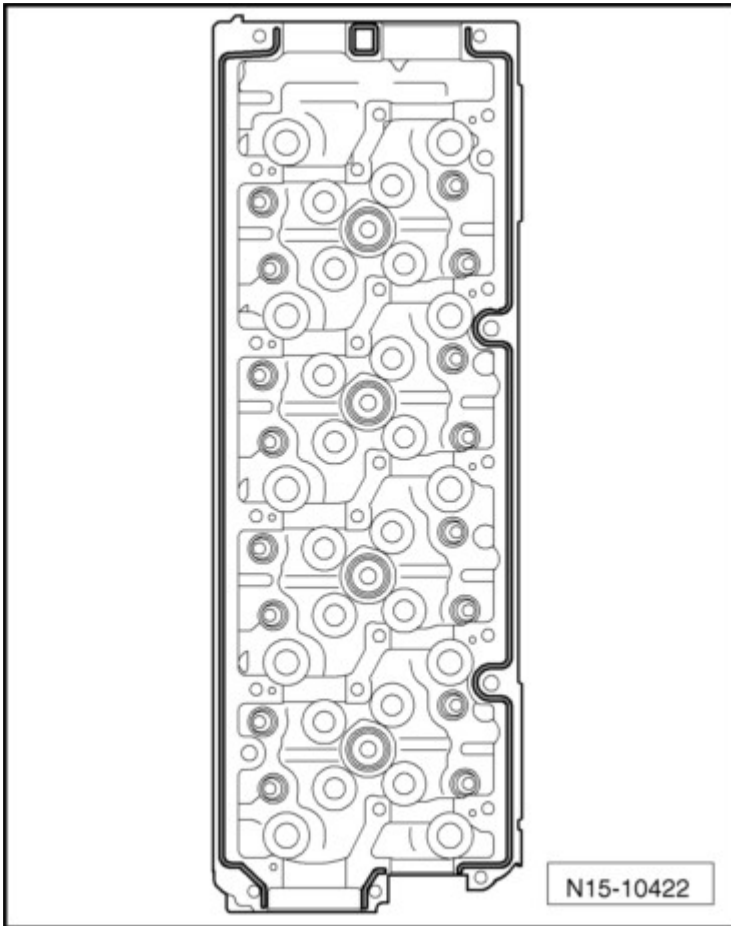


Fig. 115: Identifying Silicone Adhesive Sealant Pattern
Courtesy of AUDI OF AMERICA, LLC

- Sealant bead thickness: 2 to 3 mm.

NOTE: **Placing the guide frame in place and tightening it should occur without interruption, since the sealant begins to harden immediately.**

After installing the guide frame, let the sealant harden for approximately 30 minutes.

-- Remove the camshafts together with the frame, the T40095 and the tensioning tool T40096/1 from the T40094 and carefully install the cylinder head.

-- Install the bolts and nuts for the frame in the following sequence -1 through 24- by hand.

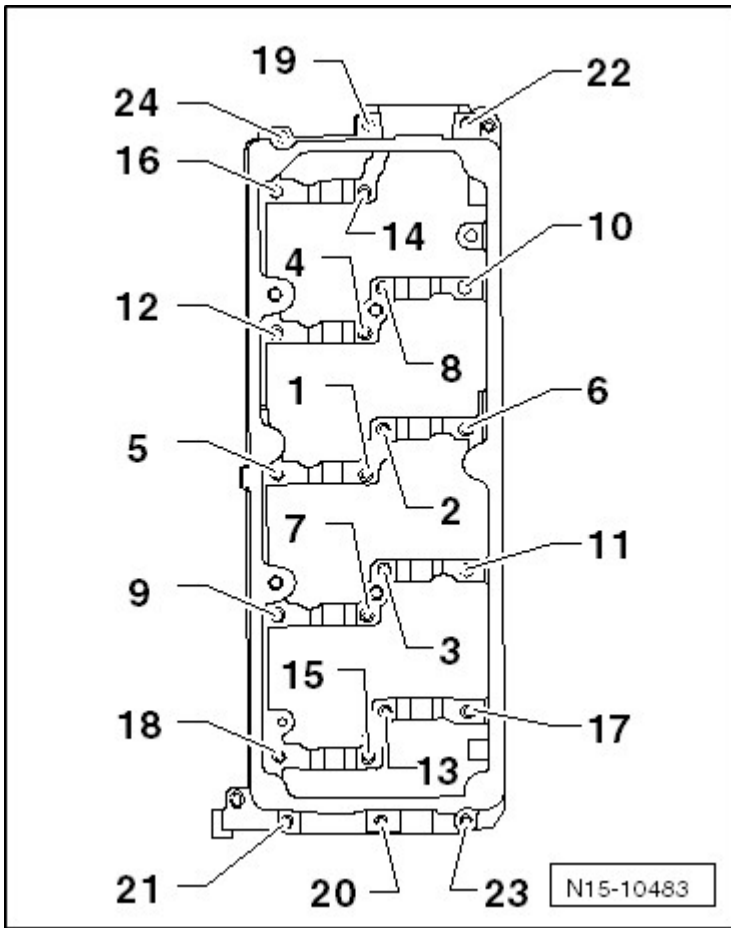


Fig. 116: Identifying Bearing Frame Bolts/Nuts Tightening Sequence
 Courtesy of AUDI OF AMERICA, LLC

- The guide frame must be in contact with the entire contact surface of the cylinder head.

-- Tighten the bolts and nuts **Fig. 10**.

-- Remove the T40095 and the T40096/1.

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

-- Install the camshaft seal. Refer to **CAMSHAFT SEAL**.

-- Install the new cover -15- 15 on the cylinder head 1 to 2 mm deep with a suitable thrust piece.

-- Install the vacuum pump. Refer to **[For engine(s) CBRA, BPY, CCTA, CBFA] Removal and Installation** .

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

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

- **The motor must not be started for about 30 minutes after installing camshafts because the hydraulic equalization elements must seat themselves.**
- **To ensure valves do not strike pistons when starting, carefully rotate the crankshaft at least 2 turns.**

VALVE STEM SEALS, CYLINDER HEAD INSTALLED**Special tools and workshop equipment required**

- Valve Seal Removal Tool 3364
- Valve Stem Seal Driver 3365
- Valve Retainer Disassembly and Assembly Device VAS 5161 with Guide Plate VAS 5161/23 and Sleeve VAS 5161/23-1
- M6 nut without a collar, quantity: 2

Procedure

-- Remove all the glow plugs. Refer to **REMOVAL AND INSTALLATION** .

-- 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.

-- Move piston for respective cylinder to bottom dead center (BDC) position.

-- Position VAS 5161/23 on cylinder head.

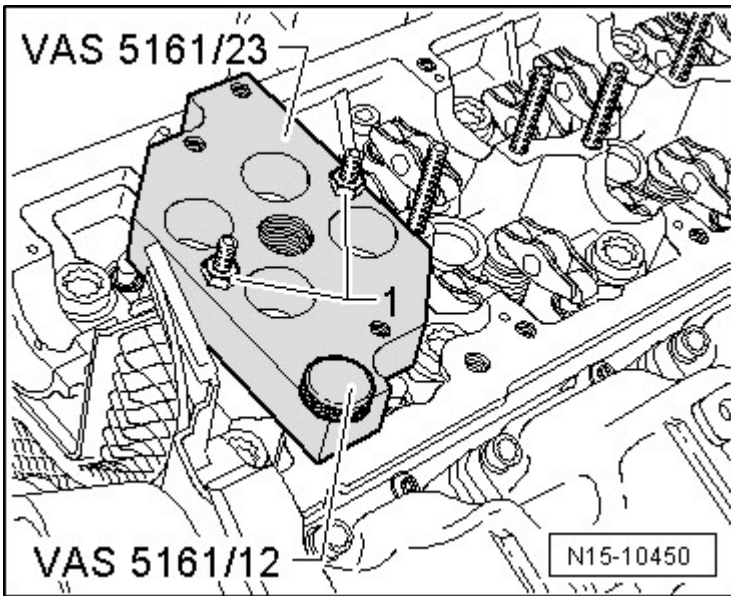


Fig. 117: Identifying Guide Plate VAS 5161/23 Secured Using Knurled Screw VAS 5161/12
 Courtesy of AUDI OF AMERICA, LLC

-- Secure the guide plate on the intake manifold side with the VAS 5161/12 and on the stud bolts with 2 M6 nut with a collar -1- by hand.

-- Install the sealing bolt VAS 5161/10 into the guide plate.

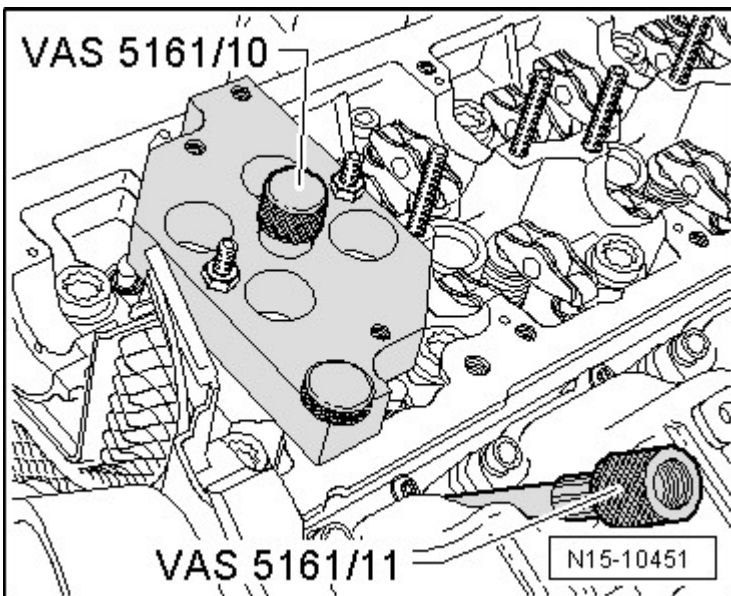


Fig. 118: Identifying Compression Stud VAS 5161/10 Installed In Guide Plate VAS 5161/23
 Courtesy of AUDI OF AMERICA, LLC

-- Install the adapter VAS 5161/11 by hand into the glow plug thread.

-- Insert the drift VAS 5161/3 in the guide plate and loosen the stuck valve retainers with a plastic mallet.

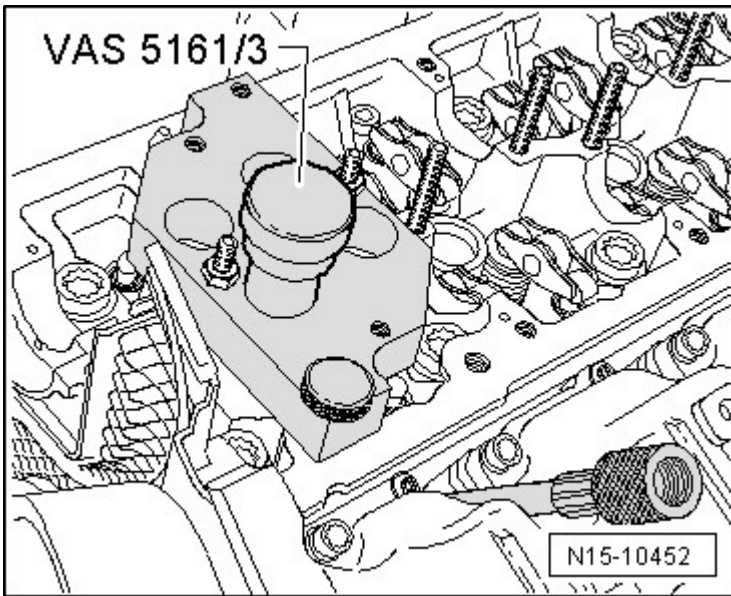


Fig. 119: Identifying Punch VAS 5161/3 Installed In Guide Plate VAS 5161/23
Courtesy of AUDI OF AMERICA, LLC

-- Install engaging device VAS 5161/6 with installation fork VAS 5161/5 in guide plate.

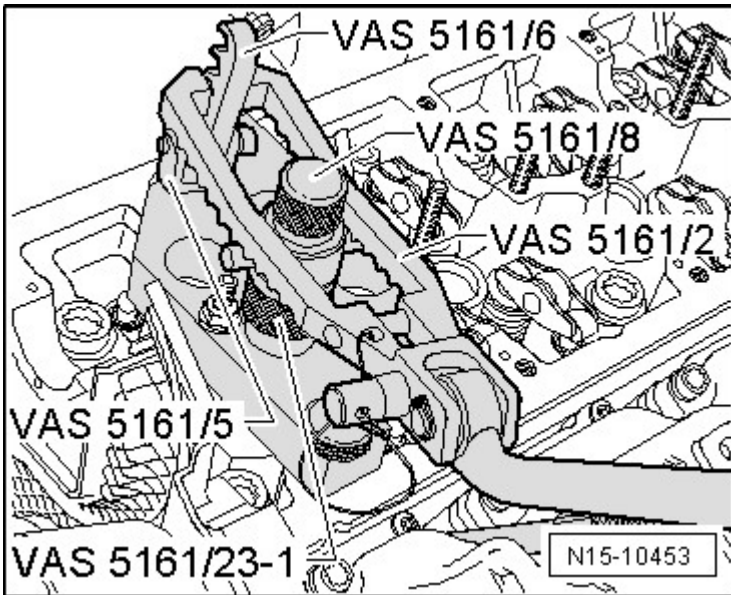


Fig. 120: Identifying Assembly Cartridges VAS 5161/2, Valve Insertion Device VAS 5161/8 And Guide Plate VAS 5161/23
Courtesy of AUDI OF AMERICA, LLC

-- Install the sleeve VAS 5161/23-1 on the installation cartridge VAS 5161/8.

-- Connect the adapter to the compressed air using a commercially available intermediate piece and give steady pressure.

- Minimum pressure: 6 bar

- Engage pressure fork VAS 5161/2 on engaging device and press installation cartridge down.
- At the same time, rotate installation cartridge knurled screw right until points engage in valve retainers.
- Move the knurled wheel left and right slightly. This presses the valve retainers apart and captures them in the installation cartridge.
- Release pressure fork.
- Remove the installation cartridge with the knurled spacer ring.
- Remove valve spring with valve spring plate.
- Remove the valve stem seal with the 3364.

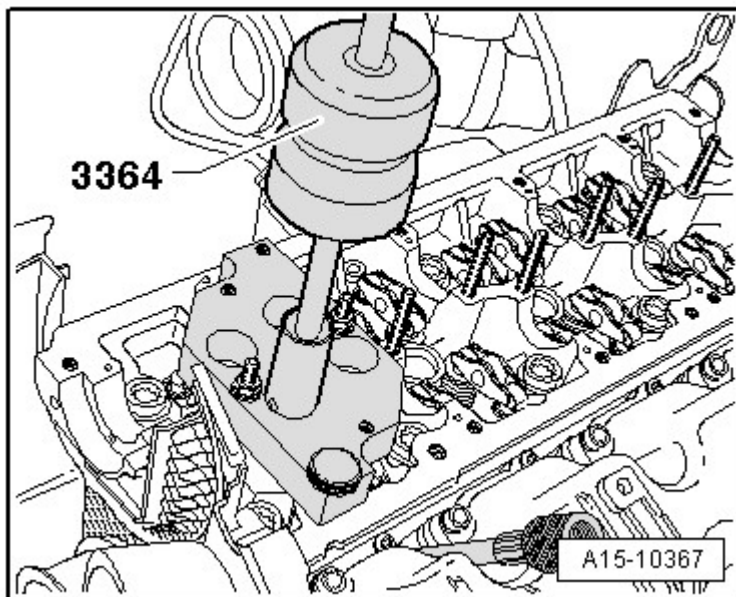


Fig. 121: Identifying 3364

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.

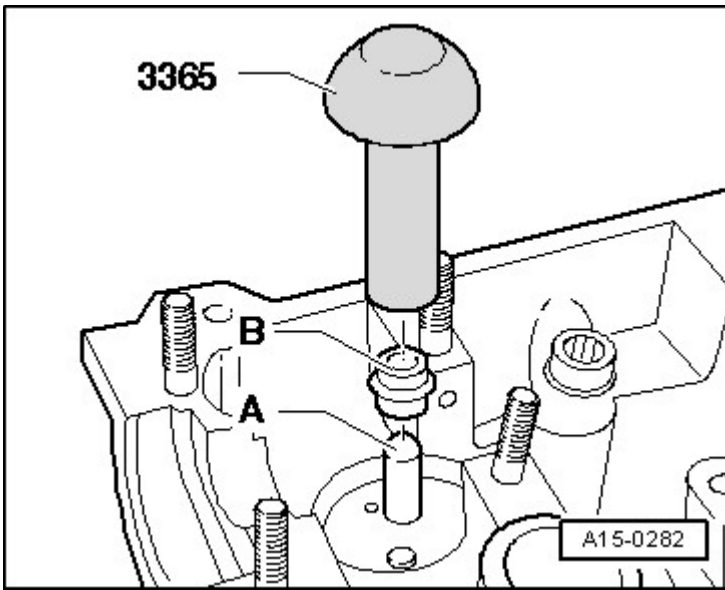


Fig. 122: Identifying Plastic Sleeve, New Valve Stem Oil Seals & Valve Stem Seal Driver 3365
 Courtesy of AUDI OF AMERICA, LLC

- 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.

When the valve retainers were removed from the installation cartridge, they must be inserted in the VAS 5161/18 next.

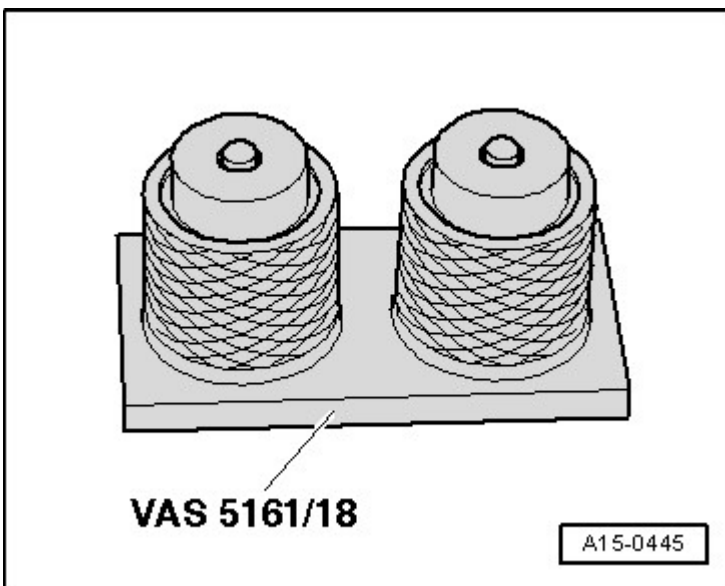


Fig. 123: Identifying Installation Cartridge VAS 5161/8
Courtesy of AUDI OF AMERICA, LLC

- The large diameter of the valve retainers point upward.

-- Insert valve spring and valve spring plate.

-- Press the installation cartridge onto the insertion device for the valve retainers from above and take up valve retainers.

-- Insert installation cartridge in guide plate VAS 5161/23.

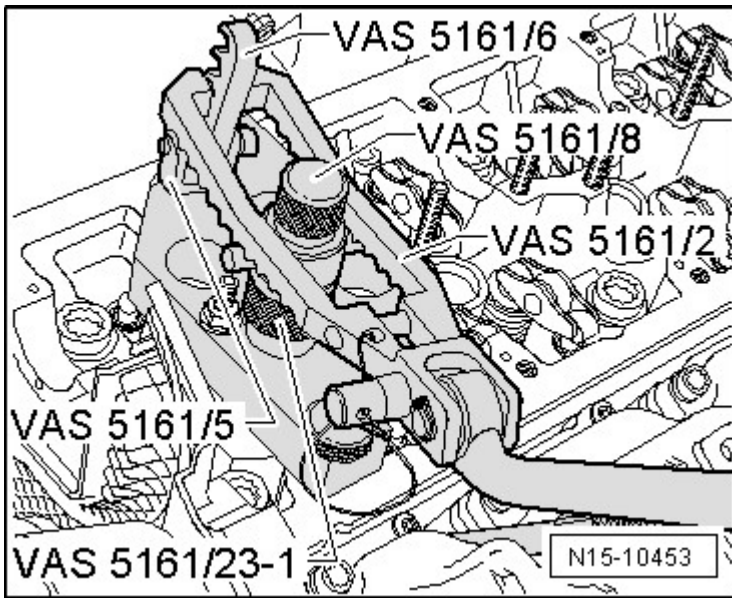


Fig. 124: Identifying Assembly Cartridges VAS 5161/2, Valve Insertion Device VAS 5161/8 And Guide Plate VAS 5161/23
Courtesy of AUDI OF AMERICA, LLC

-- Press the pressure fork down and pull the knurled screw up while turning left and right. This inserts the valve retainers.

-- Release the pressure fork with the knurled screw still raised.

-- Repeat the procedure on each valve.

Assembling

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

-- Make sure all the roller rocker levers lie on the ends of the valve stems correctly and are clipped onto the respective hydraulic adjusting elements.

-- Install camshafts. Refer to **CAMSHAFTS**.

-- Install the glow plugs. Refer to **REMOVAL AND INSTALLATION** .

VALVE STEM SEALS WITH CYLINDER HEAD 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 with Guide Plate VAS 5161/23 and Sleeve VAS 5161/23-1
- Engine and Transmission Holder VAS 6095
- Cylinder Head Tensioning Device VAS 6419
- M6 nut without a collar, quantity: 2

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.

-- Tension the cylinder head on the cylinder head tensioning device, as illustrated.

-- Connect the cylinder head tensioning device to the compressed air.

-- Slide the air cushion with the lever -arrow- under the combustion chamber onto the valve stem seal that will be removed.

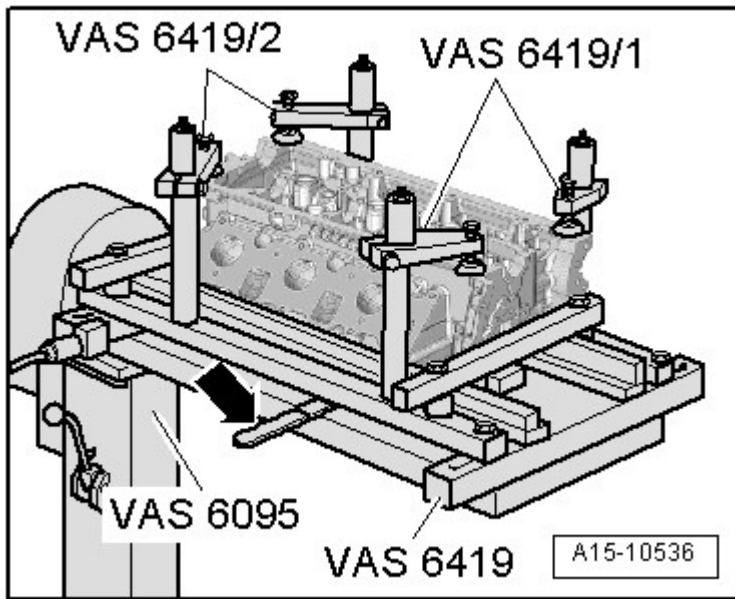


Fig. 125: Sliding Air Cushion With Lever Under Combustion Chamber
 Courtesy of AUDI OF AMERICA, LLC

- Let enough compressed air flow into the air cushion until it contacts the valve plate.
- Position guide plate VAS 5161/23 on cylinder head.

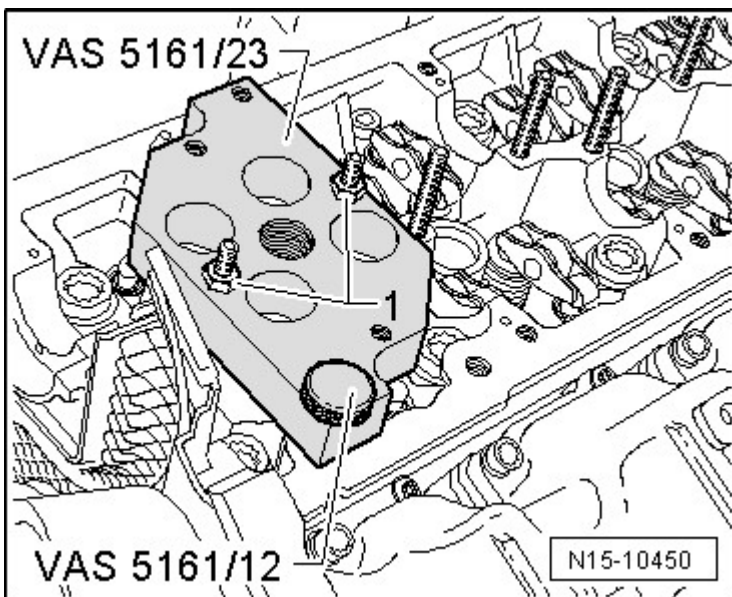


Fig. 126: Identifying Guide Plate VAS 5161/23 Secured Using Knurled Screw VAS 5161/12
 Courtesy of AUDI OF AMERICA, LLC

- Secure the guide plate on the intake manifold side with the knurled bolt VAS 5161/12 and on the stud bolts with 2 M6 nut with a collar -1- by hand.

-- Insert the drift VAS 5161/3 in the guide plate and loosen the stuck valve retainers with a plastic mallet.

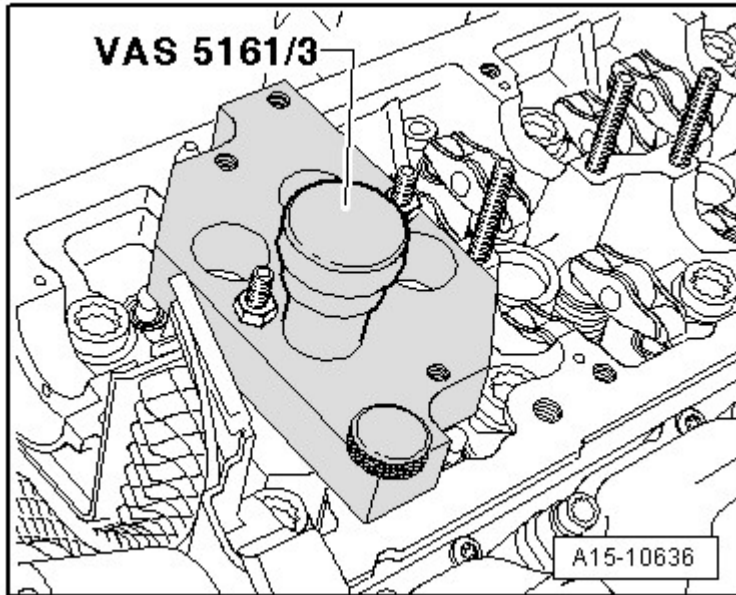


Fig. 127: Identifying VAS 5161/3

Courtesy of AUDI OF AMERICA, LLC

-- Install engaging device VAS 5161/6 with installation fork VAS 5161/5 in guide plate.

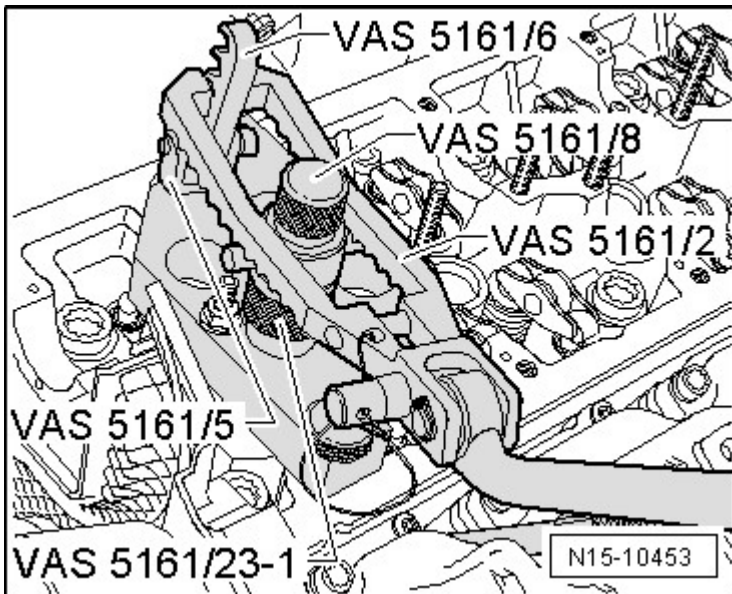


Fig. 128: Identifying Assembly Cartridges VAS 5161/2, Valve Insertion Device VAS 5161/8 And Guide Plate VAS 5161/23

Courtesy of AUDI OF AMERICA, LLC

-- Install the sleeve VAS 5161/23-1 on the installation cartridge VAS 5161/8.

- Engage pressure fork VAS 5161/2 on engaging device and press installation cartridge down.
- At the same time, rotate installation cartridge knurled screw right until points engage in valve retainers.
- Move the knurled wheel left and right slightly. This presses the valve retainers apart and captures them in the installation cartridge.
- Release pressure fork.
- Remove the installation cartridge with the knurled spacer ring.
- Remove valve spring with valve spring plate.
- Remove the valve stem seal with the 3364.

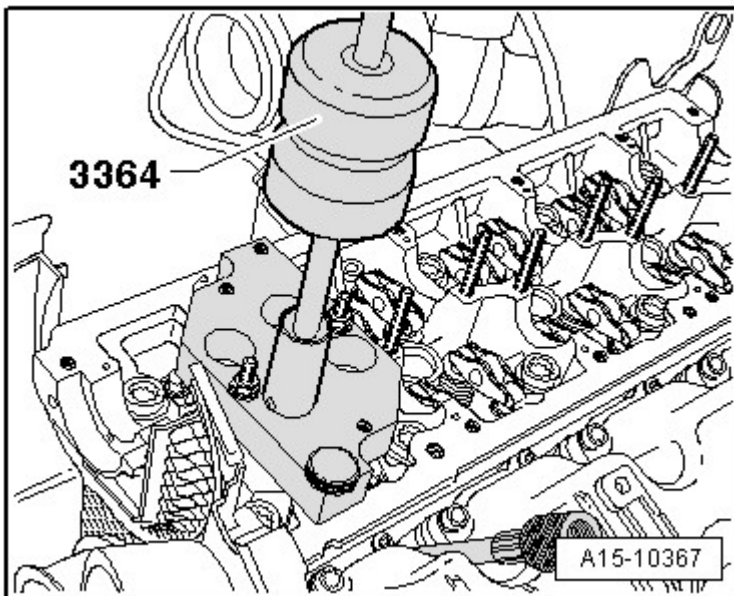


Fig. 129: Identifying 3364

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.

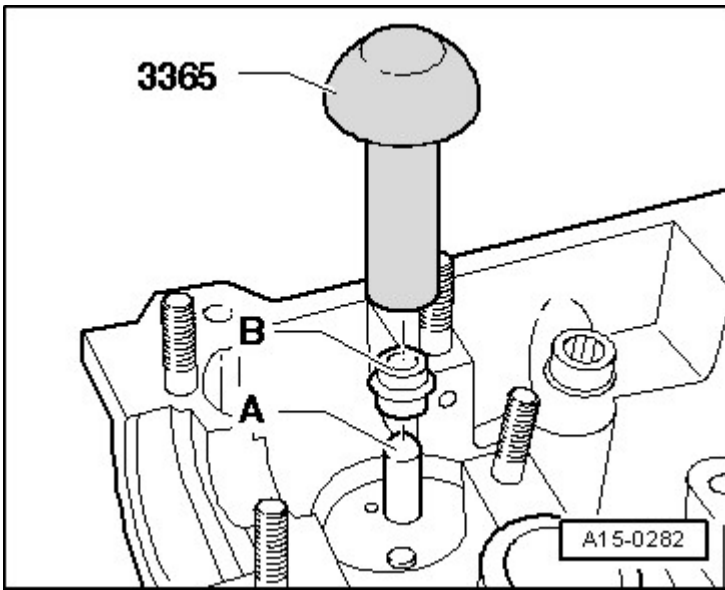


Fig. 130: Identifying Plastic Sleeve, New Valve Stem Oil Seals & Valve Stem Seal Driver 3365
 Courtesy of AUDI OF AMERICA, LLC

- 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.

When the valve retainers were removed from the installation cartridge, they must be inserted in the valve retainer inserting tool next VAS 5161/18.

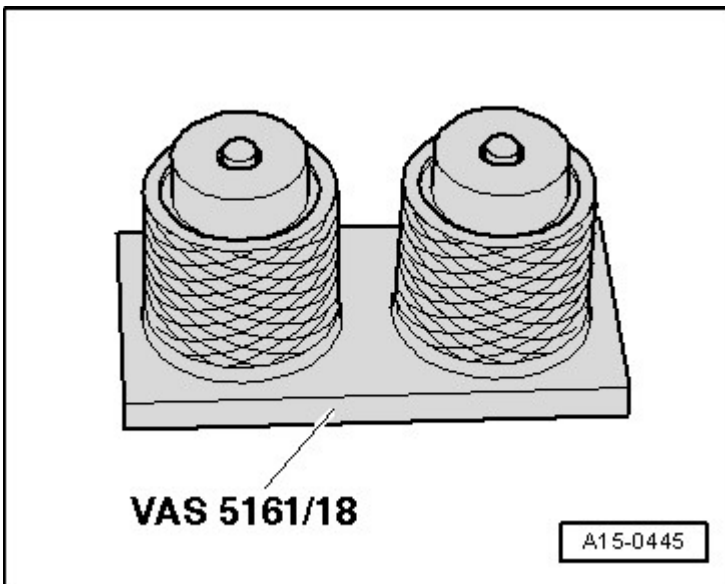


Fig. 131: Identifying Installation Cartridge VAS 5161/8
Courtesy of AUDI OF AMERICA, LLC

- The large diameter of the valve retainers point upward.

-- Insert valve spring and valve spring plate.

-- Press the installation cartridge onto the insertion device for the valve retainers from above and take up valve retainers.

-- Insert installation cartridge in guide plate VAS 5161/23.

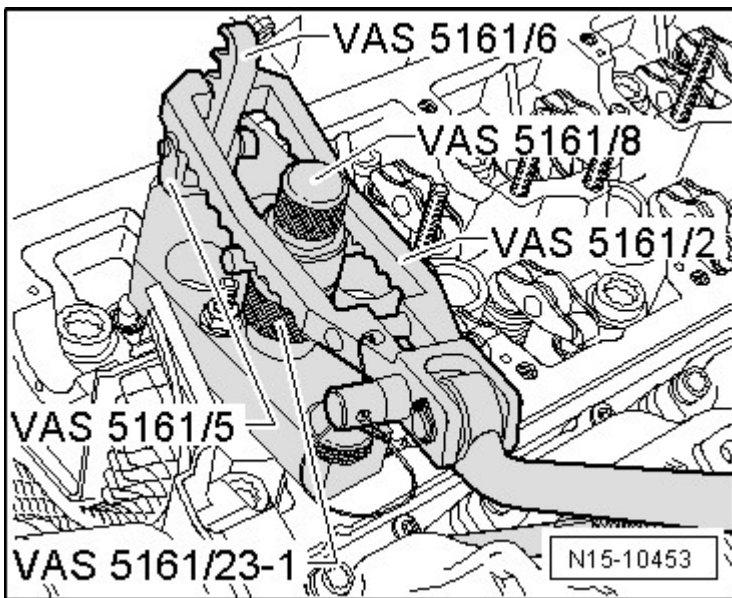


Fig. 132: Identifying Assembly Cartridges VAS 5161/2, Valve Insertion Device VAS 5161/8 And Guide Plate VAS 5161/23
Courtesy of AUDI OF AMERICA, LLC

-- Press the pressure fork down and pull the knurled screw up while turning left and right. This inserts the valve retainers.

-- Release the pressure fork with the knurled screw still raised.

-- Repeat the procedure on each valve.

Assembling

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

-- Make sure all the roller rocker levers lie on the ends of the valve stems correctly and are clipped onto the respective hydraulic adjusting elements.

-- Install camshafts. Refer to **CAMSHAFTS**.

SPECIAL TOOLS

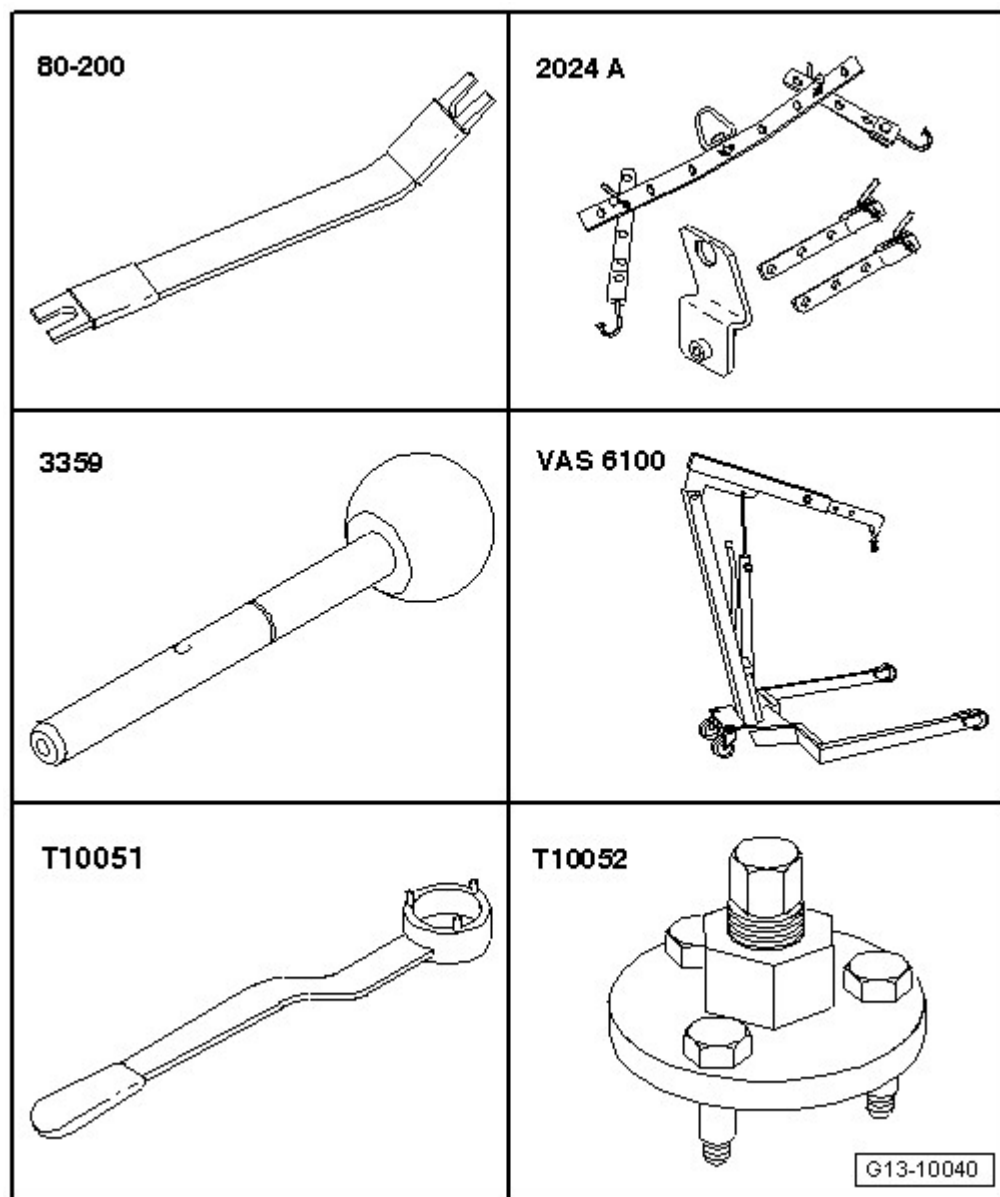


Fig. 133: Special Tools And Workshop Equipment (1 Of 4)
 Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Pry Lever - Rmv Outside Mirror 80 - 200
- Engine Sling 2024 A
- Diesel Injection Pump Locking Pin 3359
- Shop Crane VAS 6100
- Camshaft Gear Counter-Holder T10051

- Puller T10052

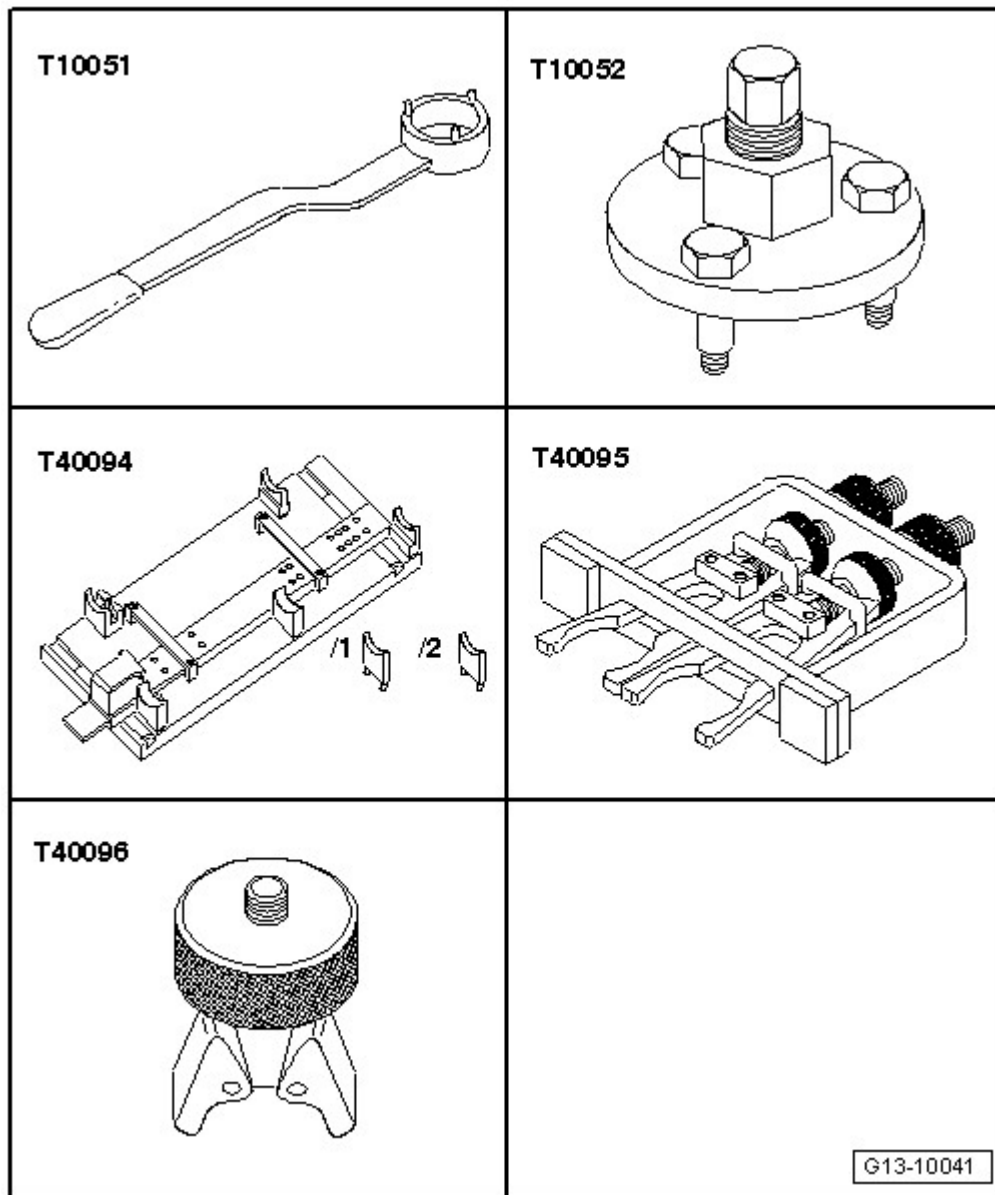


Fig. 134: Special Tools And Workshop Equipment (2 Of 4)
 Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Camshaft Gear Counter-Holder T10051
- Puller T10052
- Camshaft Insertion Tool T40094
- Camshaft Insertion Tool T40095
- Tensioning Tool T40096/1

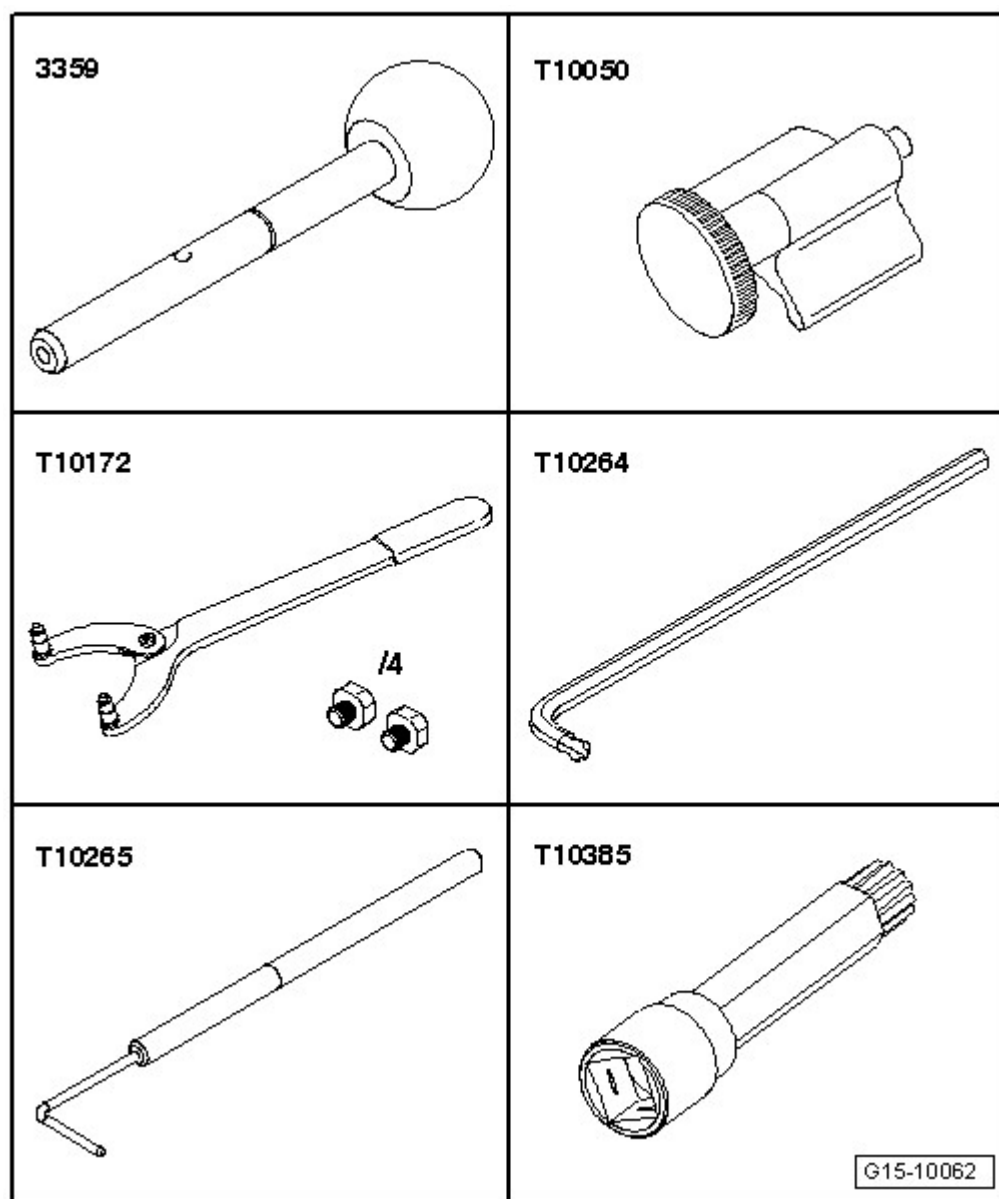


Fig. 135: Special Tools And Workshop Equipment (3 Of 4)

Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Diesel Injection Pump Locking Pin 3359 (quantity: 2)
- Crankshaft Stop T10050
- Counter-Holder Tool T10172
- Special Wrench, Long Reach T10264
- Locking Tool T10265
- Socket Insert XZN 10 T10385

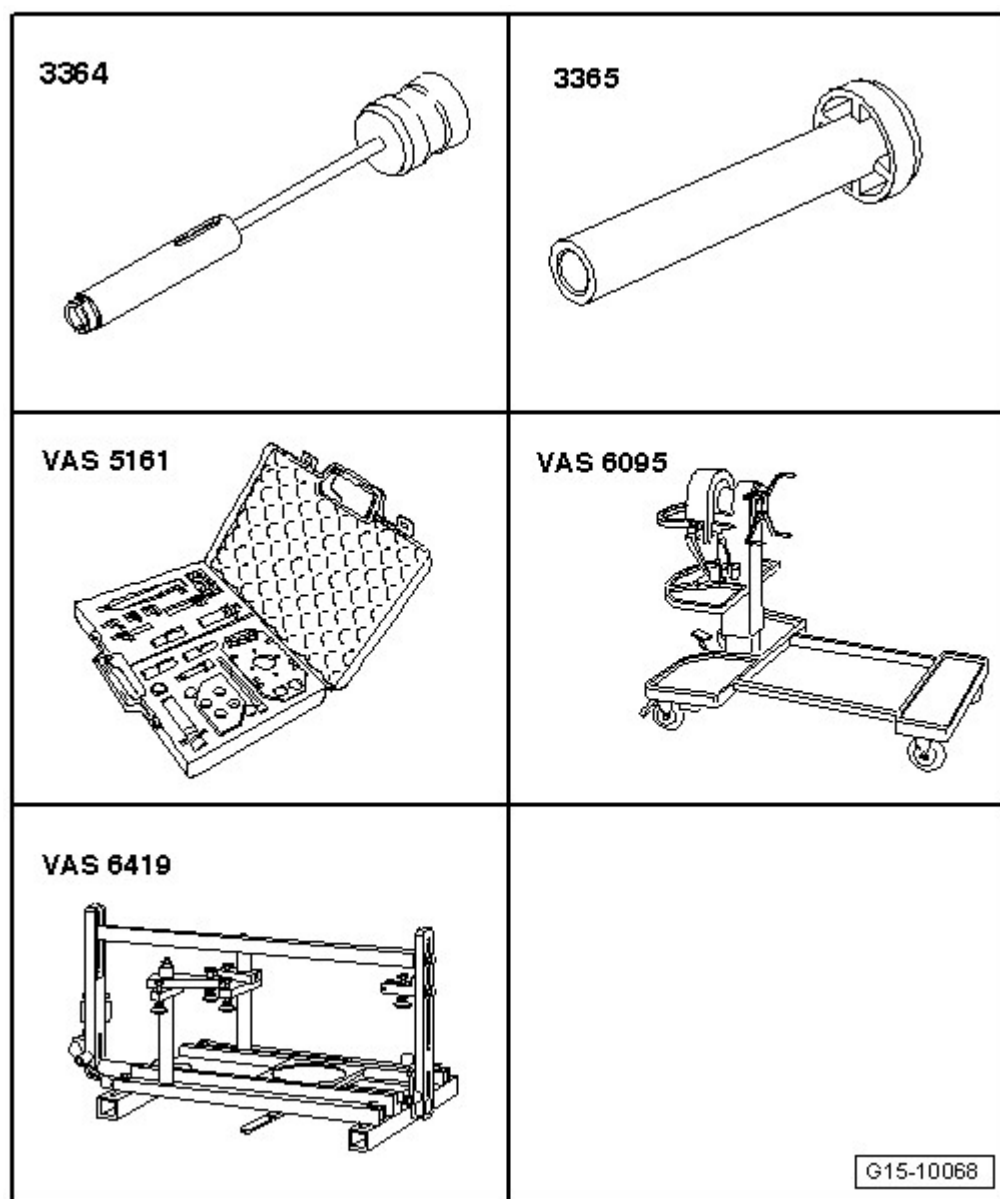


Fig. 136: Special Tools And Workshop Equipment (4 Of 4)

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 with Guide Plate VAS 5161/23 and Sleeve VAS 5161/23-1
- Engine and Transmission Holder VAS 6095
- Cylinder Head Tensioning Device VAS 6419

Special tools and workshop equipment required

- Dial Gauge Holder VW 387

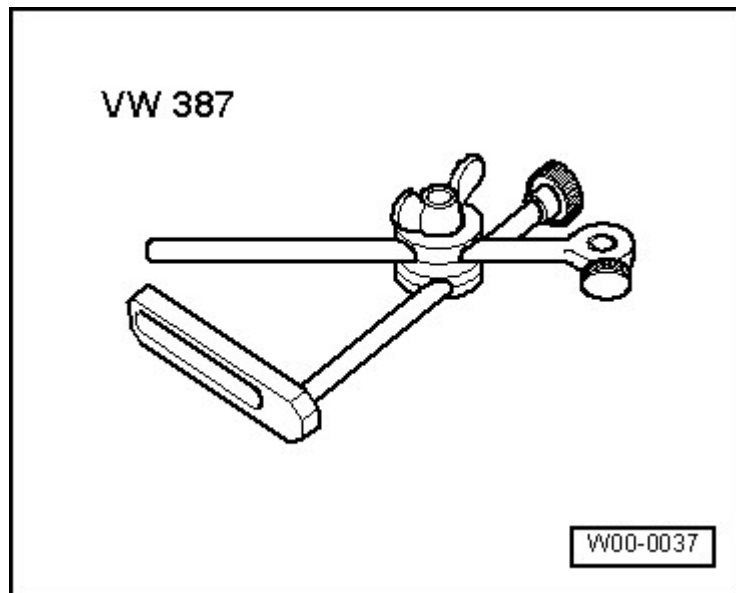


Fig. 137: Dial Gauge Holder VW 387
Courtesy of AUDI OF AMERICA, LLC

- Dial Gauge VAS 6079

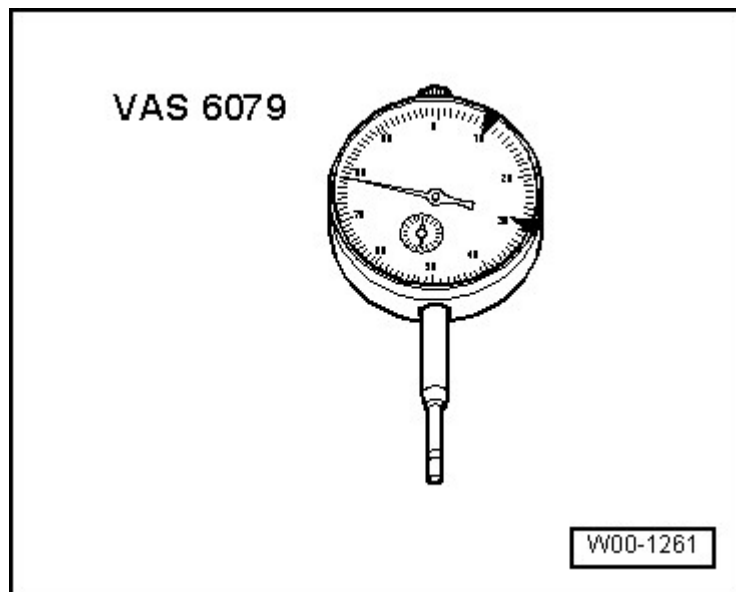


Fig. 138: Dial Gauge VAS 6079
Courtesy of AUDI OF AMERICA, LLC

- Socket Insert XZN 10 T10385

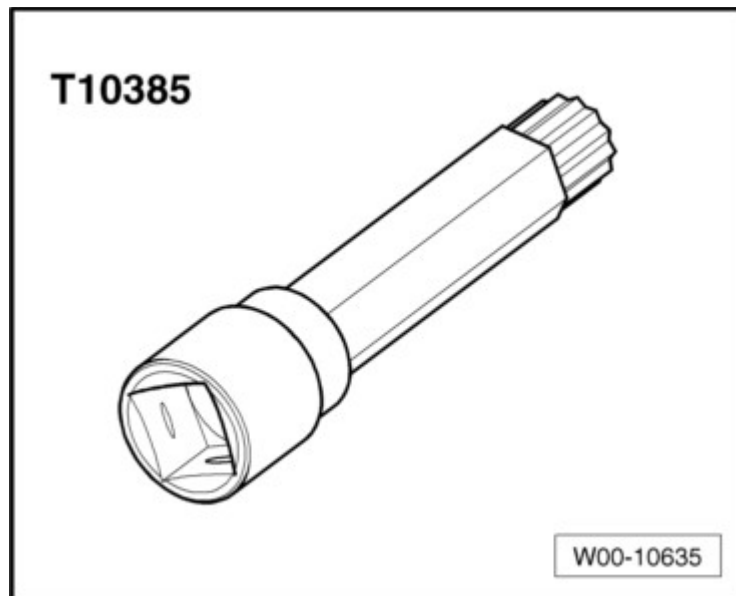


Fig. 139: Socket Insert XZN 10 T10385
Courtesy of AUDI OF AMERICA, LLC

- Oil Seal Driver 10 - 203

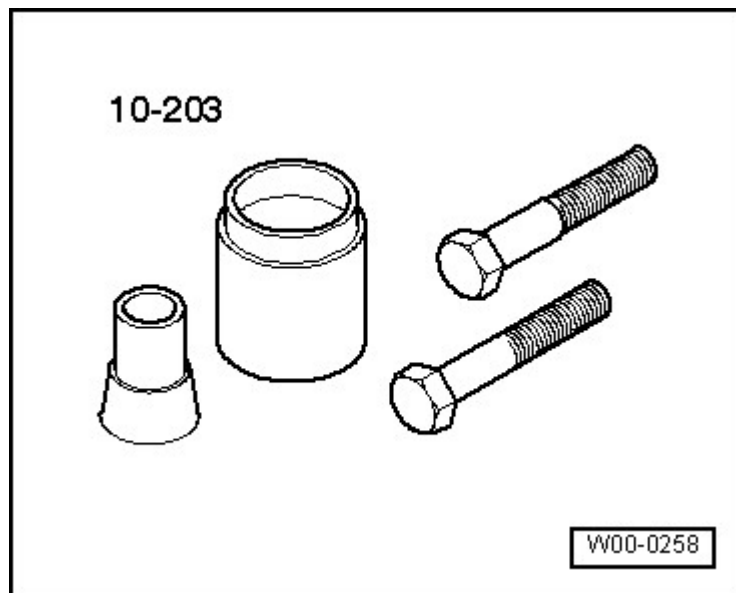


Fig. 140: Oil Seal Driver 10-203
Courtesy of AUDI OF AMERICA, LLC

- Seal Extractor 3240

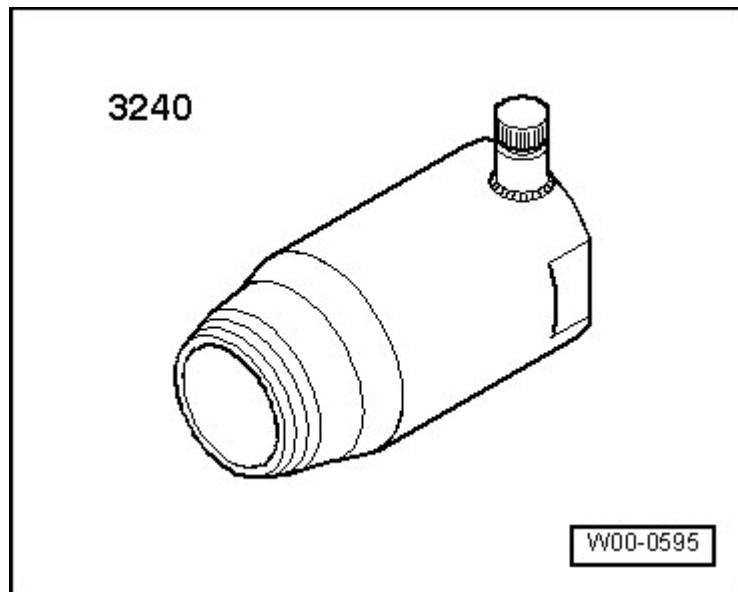


Fig. 141: Seal Remover 3240

Courtesy of AUDI OF AMERICA, LLC

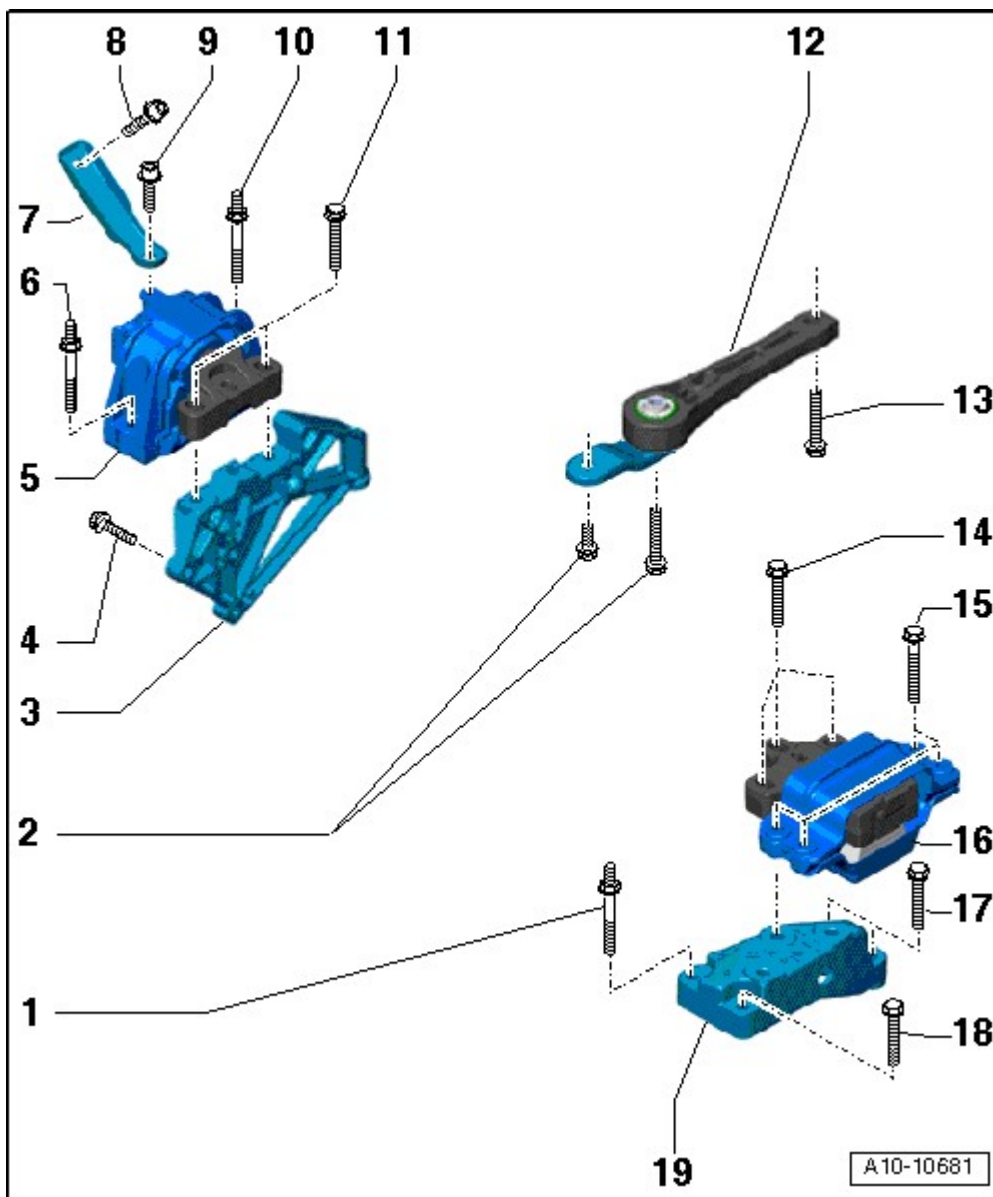
ENGINE**2.0 Liter - Engine Assembly - Engine Code(s): CBEA****10 ENGINE ASSEMBLY****DESCRIPTION AND OPERATION****SUBFRAME ASSEMBLY OVERVIEW**

Fig. 1: Subframe Assembly Overview
 Courtesy of AUDI OF AMERICA, LLC

1. Bolt

- Transmission support to transmission
 - **Tightening specifications** , refer to **DESCRIPTION AND OPERATION**
2. Bolts
 - Pendulum supports to transmission
 - **Tightening specifications** , refer to **DESCRIPTION AND OPERATION**
 3. Engine Support
 - Illustration does not correspond to version in vehicle
 4. Bolt
 - Replace
 - Engine support to engine
 - Tightening specification and sequence **SUBFRAME ASSEMBLY OVERVIEW**
 5. Engine Mount
 - With support arm
 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 Supports
 13. Bolt
 - Pendulum supports to subframe
 - **Tightening specifications** , refer to **DESCRIPTION AND OPERATION**

14. Bolt

- Transmission mount to transmission support
- **Tightening specifications** , refer to **DESCRIPTION AND OPERATION**

15. Bolt

- Transmission mount to body
- **Tightening specifications** , refer to **DESCRIPTION AND OPERATION**

16. Transmission Mount

- With support arm

17. Bolt

- Transmission support to transmission
- **Tightening specifications** , refer to **DESCRIPTION AND OPERATION**

18. Bolt

- Transmission support to transmission
- **Tightening specifications** , refer to **DESCRIPTION AND OPERATION**

19. Transmission Support

Engine Support - Tightening Specification and Sequence

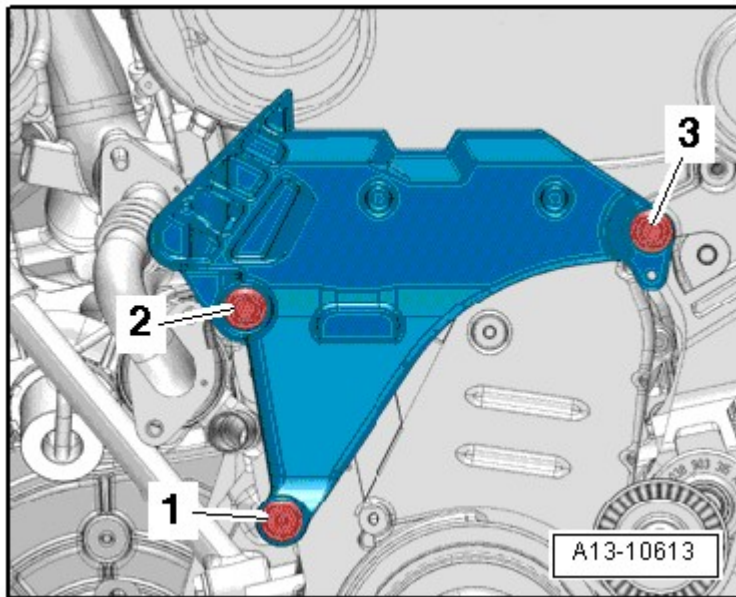


Fig. 2: Identifying Engine Support Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Replace the engine support bolts.-- Tighten the bolts -1 through 3- in 3 stages as follows:-- Tighten to 7 Nm.-- Tighten to 40 Nm.-- Tighten an additional 180°.

SUBFRAME MOUNT, ADJUSTING

Special tools and workshop equipment required

- Engine Support Bridge 10 - 222 A
- Pry Lever - Rmv Outside Mirror 80 - 200

Procedure

- **Tightening specifications** , refer to SUBFRAME ASSEMBLY OVERVIEW.

-- Remove the engine cover -arrows-.

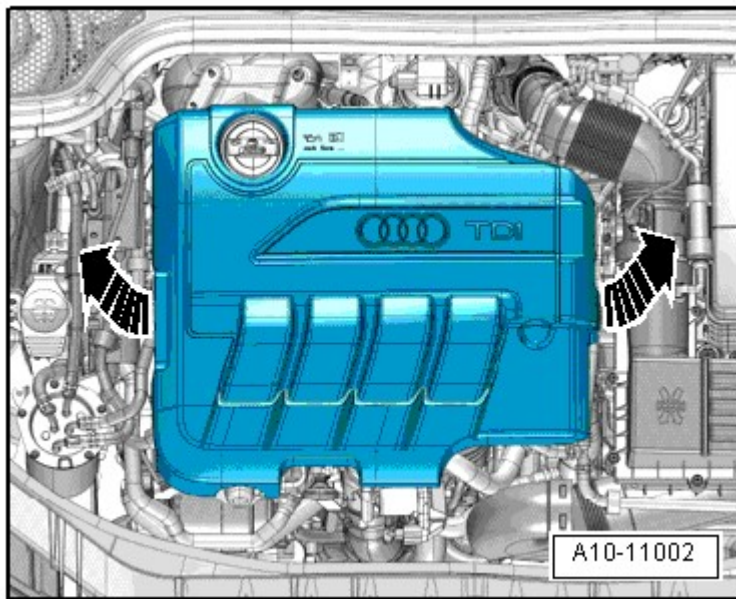


Fig. 3: Identifying Engine Cover
Courtesy of AUDI OF AMERICA, LLC

-- Remove bolt -1-.

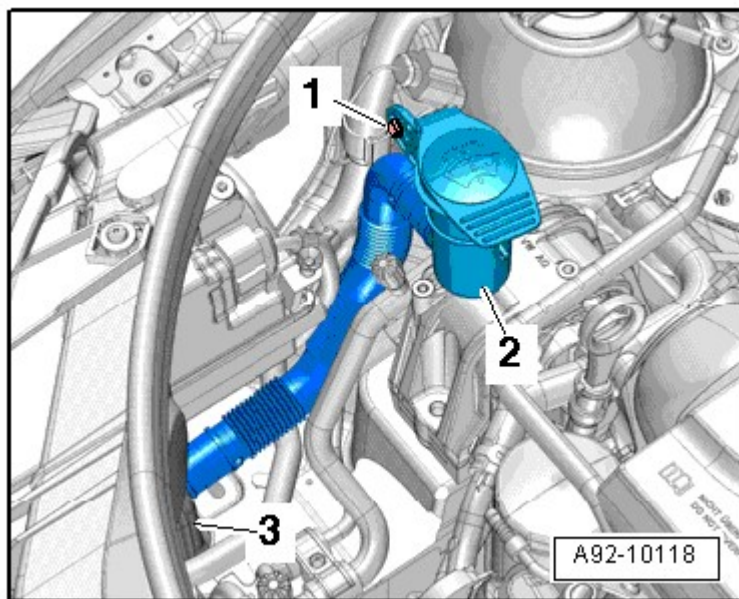


Fig. 4: Identifying Windshield Wiper Fluid Reservoir Filler Tube -2- And Bolt
 Courtesy of AUDI OF AMERICA, LLC

-- Move the filler tube and windshield wiper fluid reservoir filler tube -2- to the side.

NOTE: Ignore -3-.

The installation location is shown with the fuel filter removed.

-- Disengage the fuel hose -2- from the bracket.

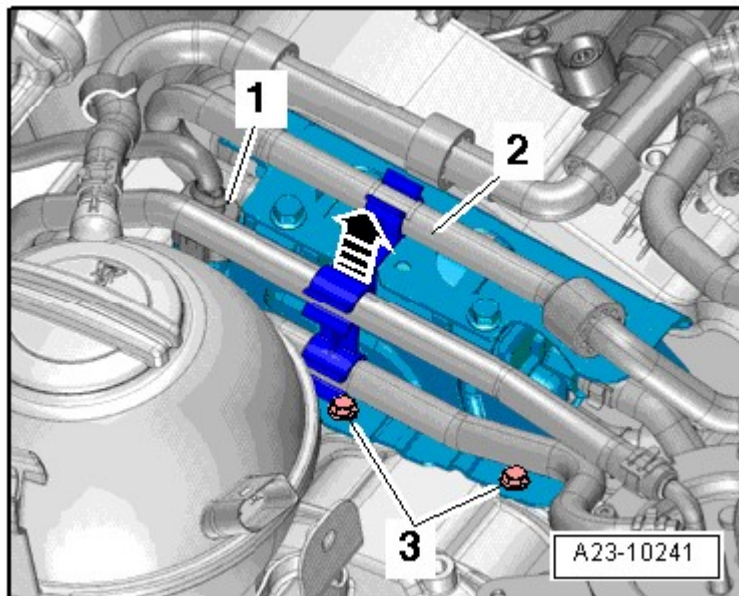


Fig. 5: Identifying Fuel Hose & Lines

Courtesy of AUDI OF AMERICA, LLC

- Removed the bracket for the fuel lines -arrow- and move it to the side.
- Disconnect the connector -1- on the auxiliary fuel pump -V393-.
- Remove the bolts -3- then remove the bracket and the auxiliary fuel pump and move them to the side.
- Loosen the bolt -1-.

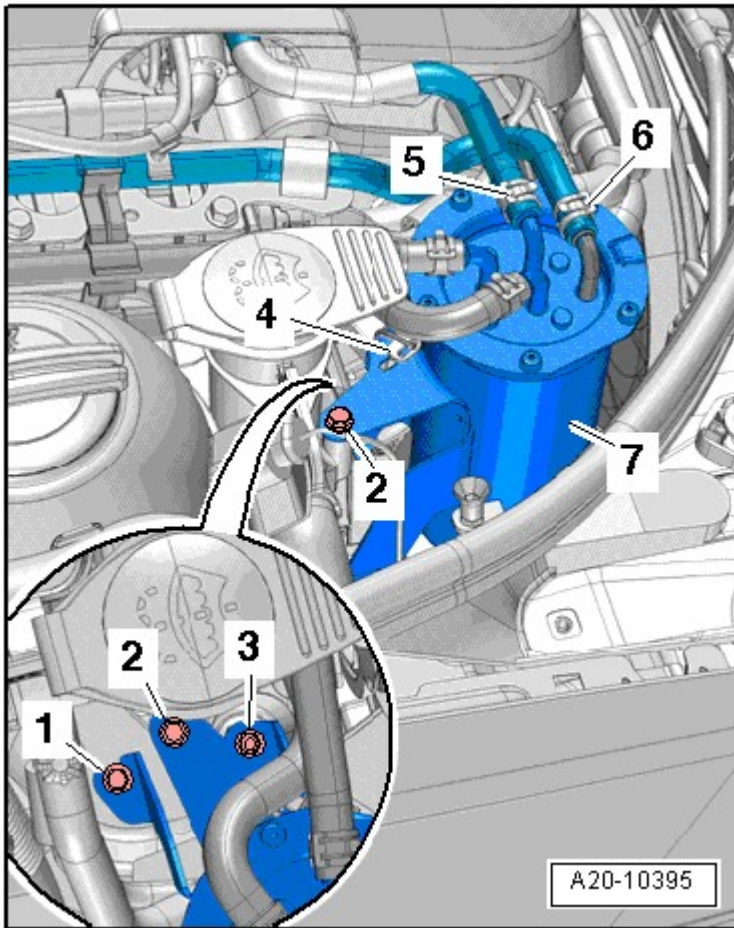


Fig. 6: Identifying Bracket And Auxiliary Fuel Pump And Bolts
Courtesy of AUDI OF AMERICA, LLC

- Remove the bolts -2- and nut -3-.
- Remove the hose bracket -4- from the fuel filter and then move the fuel filter -7- to the side with the fuel hoses -5- and -6- still connected.
- Remove the cover for the air guide; disengage the side clips -arrows- to do so.

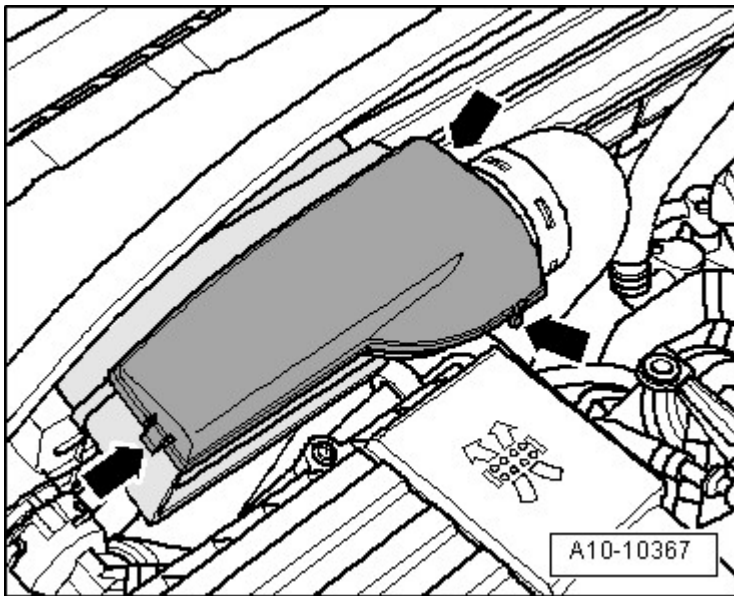


Fig. 7: Identifying Air Duct Cover Slide Clips
Courtesy of AUDI OF AMERICA, LLC

-- Release the left and right spring clips -arrow A- and disconnect the lower air guide -2-.

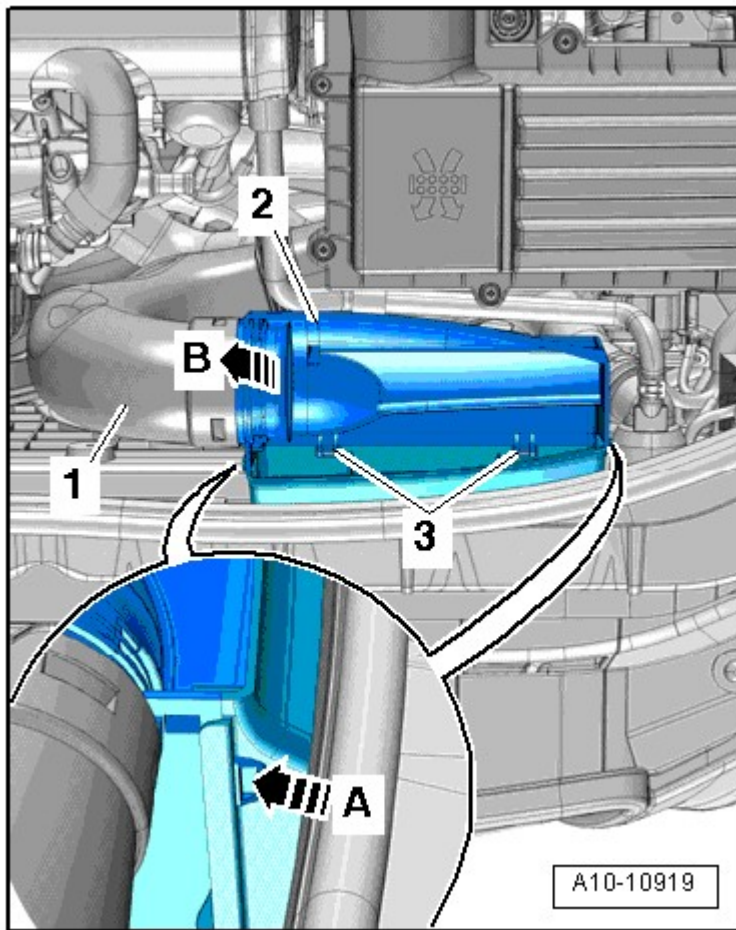


Fig. 8: Unclipping Lower Air Guide By Releasing Left And Right Retainers -Arrow A-.
Courtesy of AUDI OF AMERICA, LLC

- Move the lower air guide slightly to the rear and disengage the lower air guide -3-.
- Disengage the air guide pipe -1- from the lower air guide -arrow B-.
- Disconnect electrical connector -2- on mass air flow sensor -G70-.

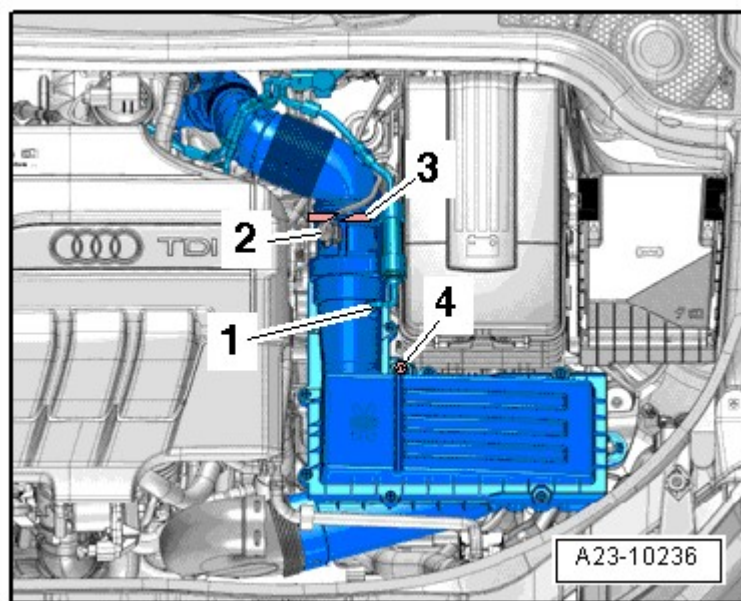


Fig. 9: Removing Air Filter Housing

Courtesy of AUDI OF AMERICA, LLC

- Disconnect the hose -1-.
- Remove the coolant hose by loosening the hose clamp -3-.
- Remove the bolt -4- and the air filter housing.
- Remove the battery. Refer to **REMOVAL AND INSTALLATION** .

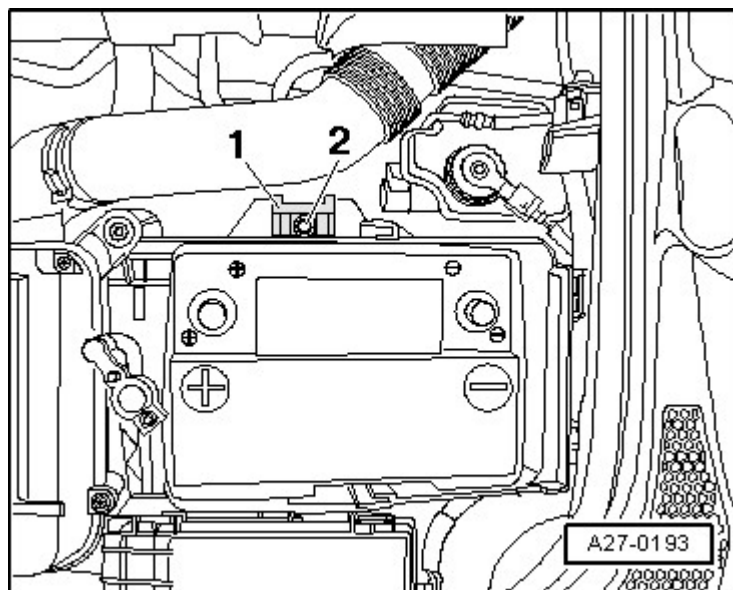


Fig. 10: Identifying Screws And Securing Bracket For Battery

Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and remove the battery tray -1-.

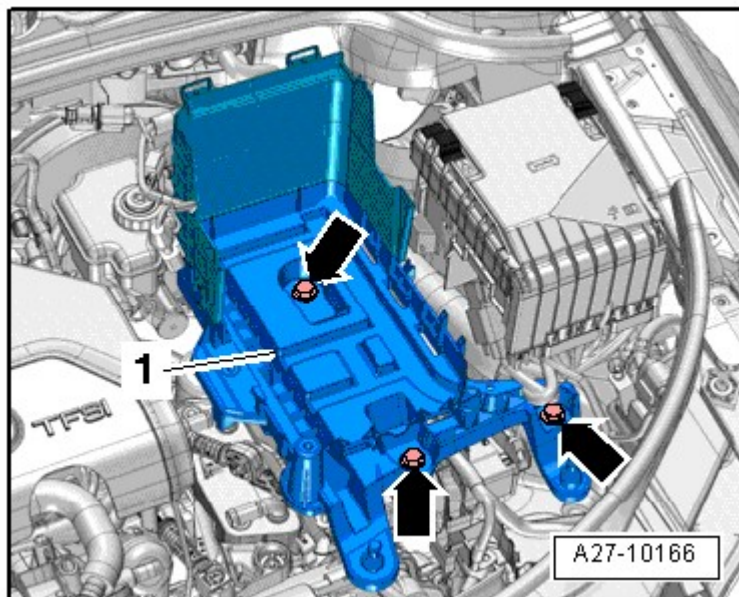


Fig. 11: Identifying Battery Tray And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the sealing piece with the 80 - 200.

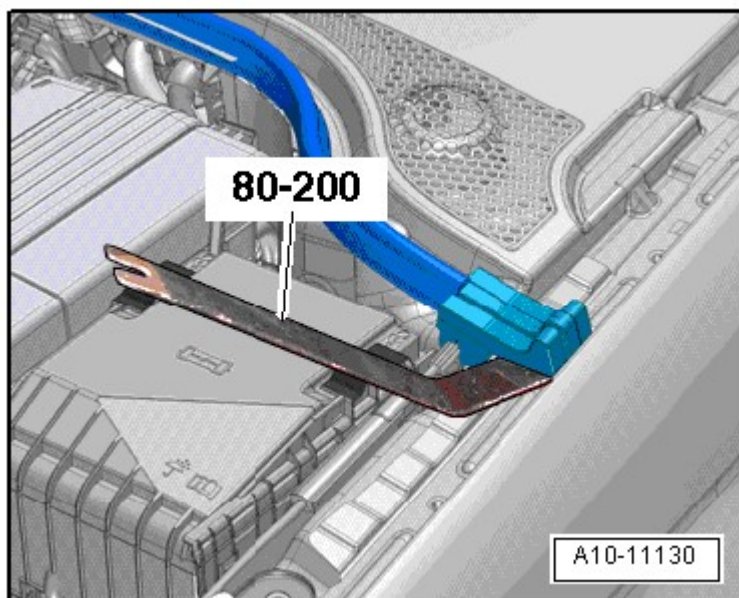


Fig. 12: Identifying Seal Clip Removal With 80 - 200
Courtesy of AUDI OF AMERICA, LLC

-- Mount the 10 - 222 A and the adapters 10 - 222 A /3 on the fender bolting edge.

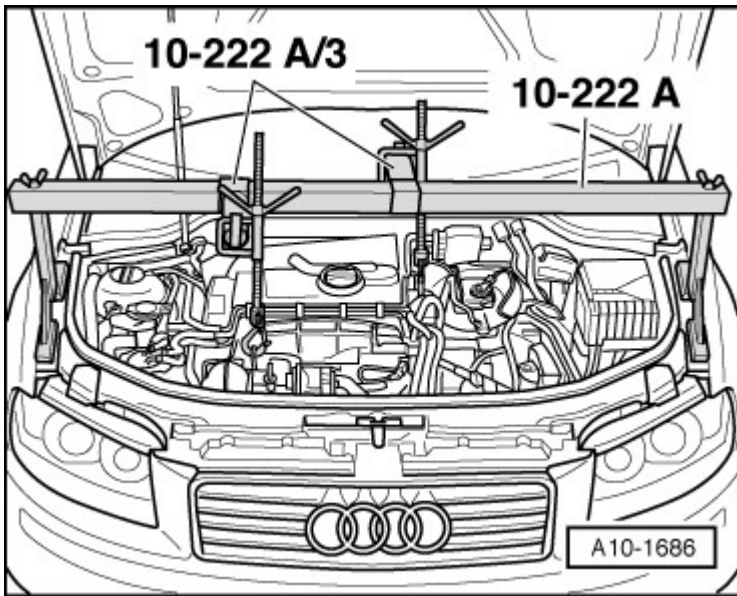


Fig. 13: Identifying Engine Support Bridge 10-222 A With Adapters 10-222 A /3
Courtesy of AUDI OF AMERICA, LLC

- Attach the spindle carabiner hooks to the engine lifting eyes.
- Pretension the engine/transmission subassembly with both spindles, but do not lift it.
- Remove the bolts -arrows- for the subframe mount one after the other on the engine side (if this was not already done when the engine was installed).

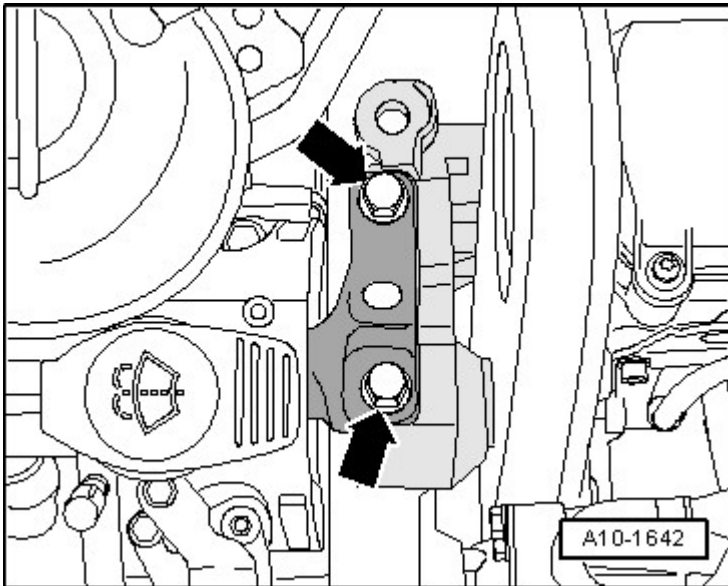


Fig. 14: Identifying Engine Mountings Bolts
Courtesy of AUDI OF AMERICA, LLC

- Install the bolts loosely.

-- Remove the bolts -arrows- for the subframe mount one after the other on the transmission side (if this was not already done when the engine was installed).

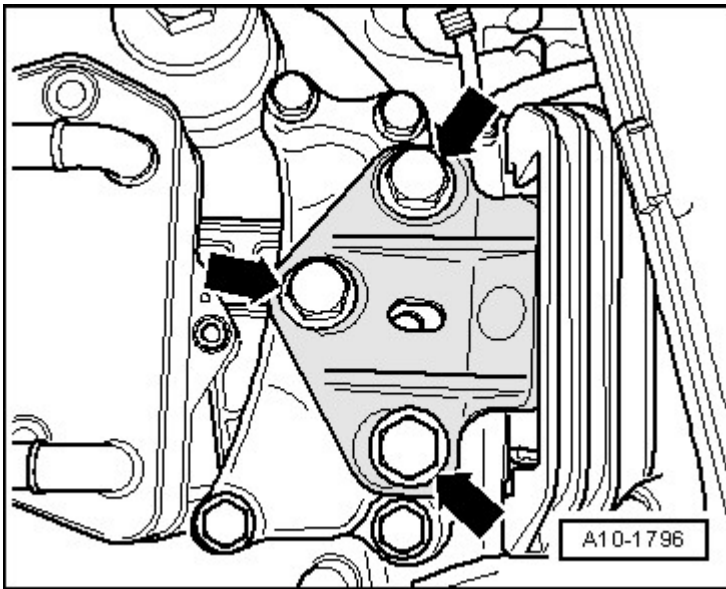


Fig. 15: Identifying Engine Mount To Engine Mount Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Install the bolts loosely.

-- Position the engine/transmission subassembly as far as possible between the engine mount and the and the support arm -1- using the pry lever until the following dimensions are reached:

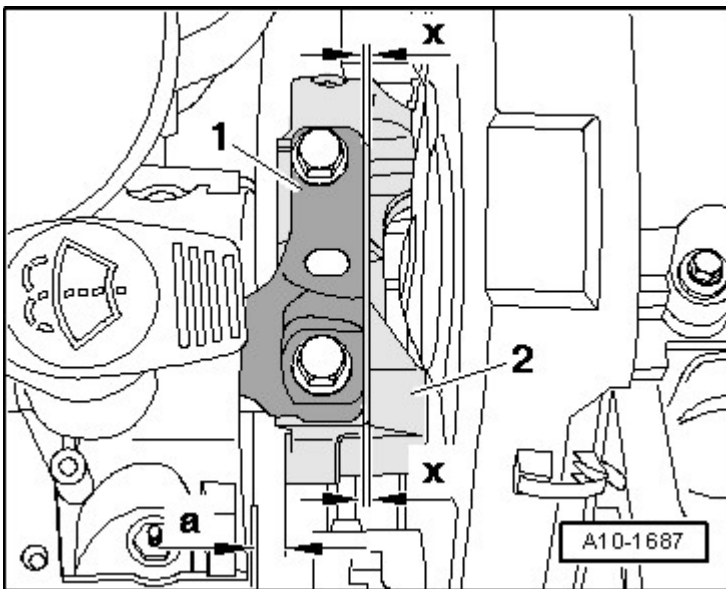


Fig. 16: Checking Subframe Mount, Adjustment
Courtesy of AUDI OF AMERICA, LLC

- The clearance between the engine support -2- and the right longitudinal member must be -a- = 13.5 mm.
- The casting edge on the engine support -2- must be parallel to the support arm -1- (dimension -x- on both side is the same).

NOTE: Distance -a- = 13.5 mm can also be checked with corresponding round stock.

-- Tighten subframe mount bolts on the engine side.

-- The edges on the support arm -2- and transmission mount -1- are parallel on the transmission side.

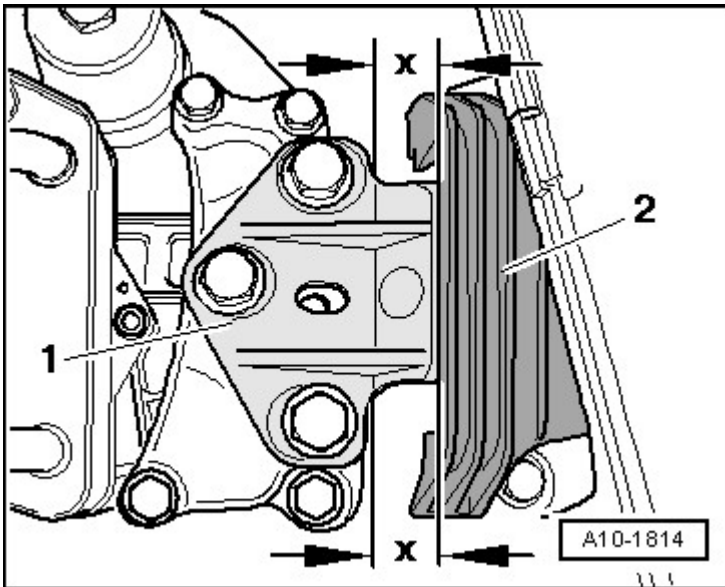


Fig. 17: Ensuring Edges On Support Arm And Transmission Mount Are Parallel
 Courtesy of AUDI OF AMERICA, LLC

- Dimension -x- same size on both sides of bracket.

-- Tighten subframe mount bolts on the transmission side.

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

- Install the battery tray and the battery. Refer to **REMOVAL AND INSTALLATION** .
- Install air filter housing. Refer to **Removal and Installation** .
- Install the auxiliary fuel pump and the fuel filter. Refer to **REMOVAL AND INSTALLATION** .
- Install the windshield wiper fluid reservoir filler tube. Refer to **REMOVAL AND INSTALLATION** .

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Components	Bolt Size	Nm
Bolts and Nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65
Bracket ^{2, 3}		
Bracket to Engine Mount		20 + 90°
Bracket to Body		20 + 90°
Engine Support ^{1, 2}		
Engine Mount to Body		40 + 90°
Engine Mount to Body		40 + 90°
Engine Mount to Engine Support		60 + 90°
¹ For bolt tightening clarification, refer to <u>SUBFRAME ASSEMBLY OVERVIEW</u> and see items -6, 10 and 11- ² Always replace ³ For bolt tightening clarification, refer to <u>SUBFRAME ASSEMBLY OVERVIEW</u> and see items -8 and 9-		

Engine Support - Tightening Specification and Sequence

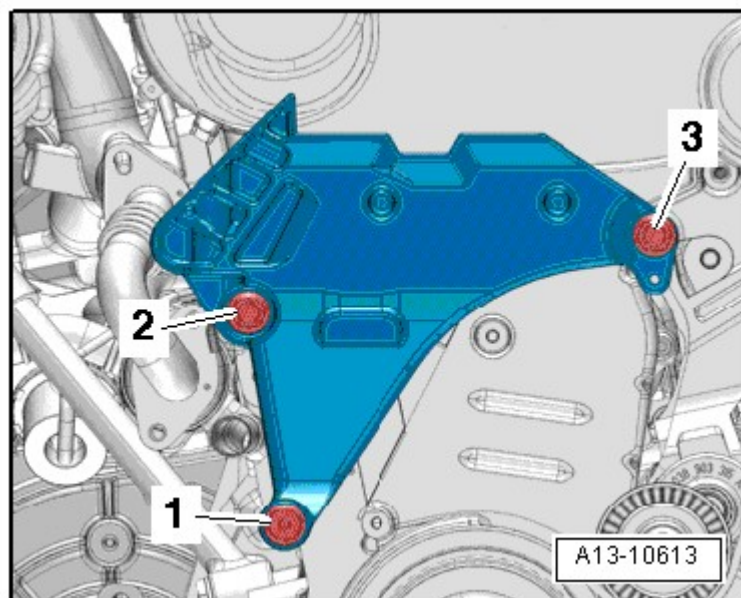


Fig. 18: Identifying Engine Support Bolts

Courtesy of AUDI OF AMERICA, LLC

-- Replace the engine support bolts.-- Tighten the bolts -1 through 3- in 3 stages as follows:-- Tighten to 7 Nm.-- Tighten to 40 Nm.-- Tighten an additional 180°.

Mounting, S-Tronic transmission to engine

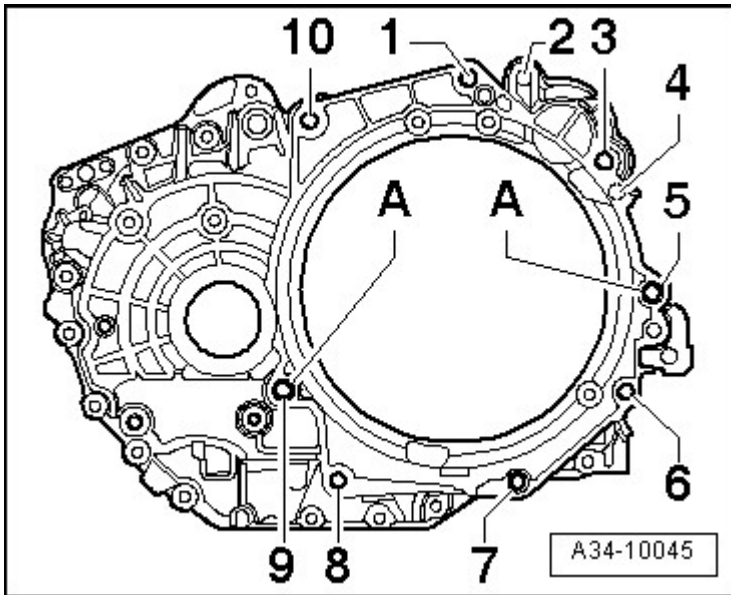


Fig. 19: Direct Shift Automatic Transmission To Engine Mounting Bolts

Courtesy of AUDI OF AMERICA, LLC

Item	Bolt	Nm
1, 3, 10	M12x55	80
5	M12x65	80
6, 7, 8	M10x50	40
9	M12x70	80
2, 4	Starter, securing. Refer to <u>REMOVAL AND INSTALLATION</u>	
A	Alignment sleeves for centering	

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

- The engine/transmission subassembly is attached to the engine bracket T10012.

DIAGNOSIS AND TESTING

SUBFRAME MOUNT, CHECKING ADJUSTMENT

Procedure

-- Remove the engine cover -arrows--.

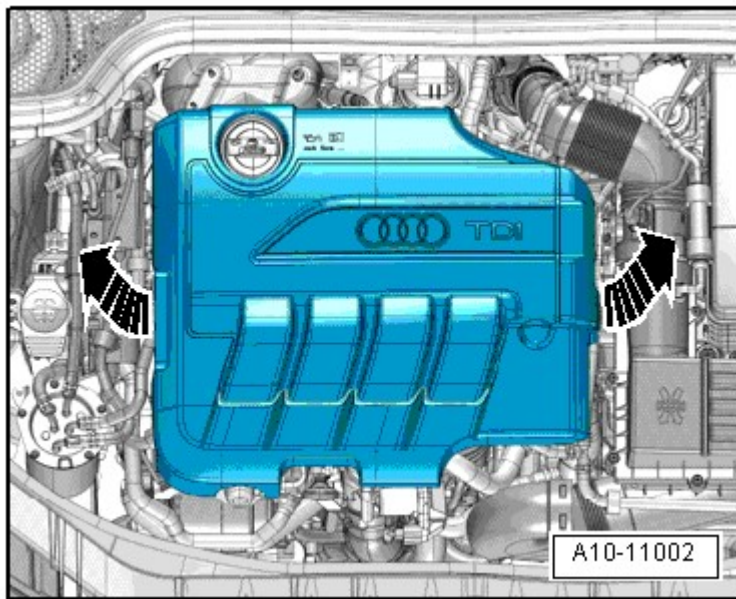


Fig. 20: Identifying Engine Cover
Courtesy of AUDI OF AMERICA, LLC

-- Remove bolt -1-.

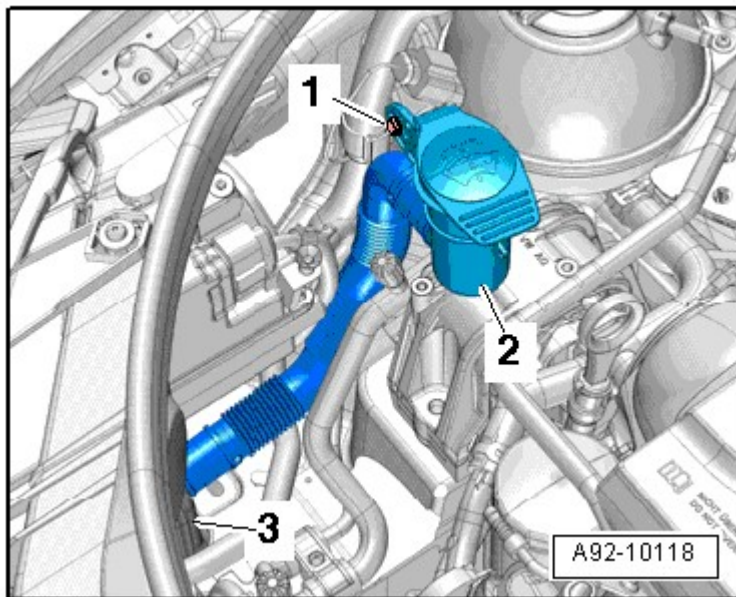


Fig. 21: Identifying Windshield Wiper Fluid Reservoir Filler Tube -2- And Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Move the filler tube and windshield wiper fluid reservoir filler tube -2- to the side.

NOTE: Ignore -3-.

The installation location is shown with the fuel filter removed.

-- Disengage the fuel hose -2- from the bracket.

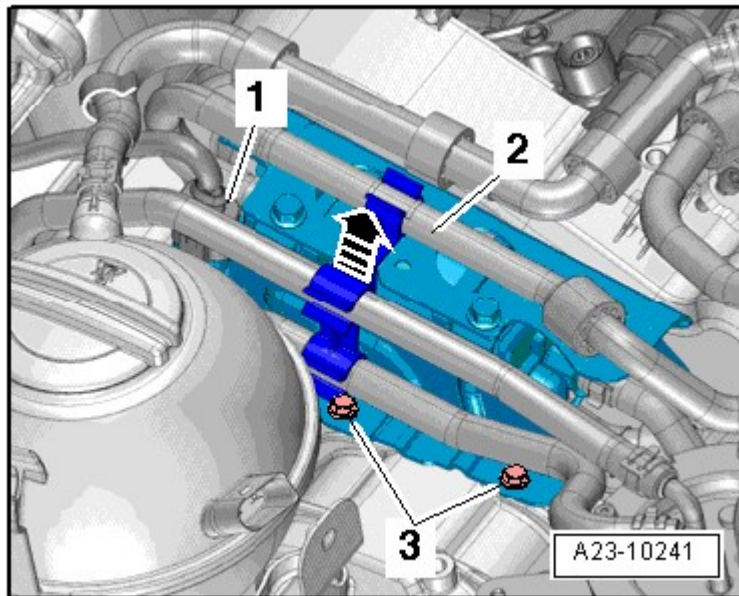


Fig. 22: Identifying Fuel Hose & Lines
Courtesy of AUDI OF AMERICA, LLC

-- Removed the bracket for the fuel lines -arrow- and move it to the side.

-- Disconnect the connector -1- on the auxiliary fuel pump -V393-.

-- Remove the bolts -3- then remove the bracket and the auxiliary fuel pump and move them to the side.

-- Loosen the bolt -1-.

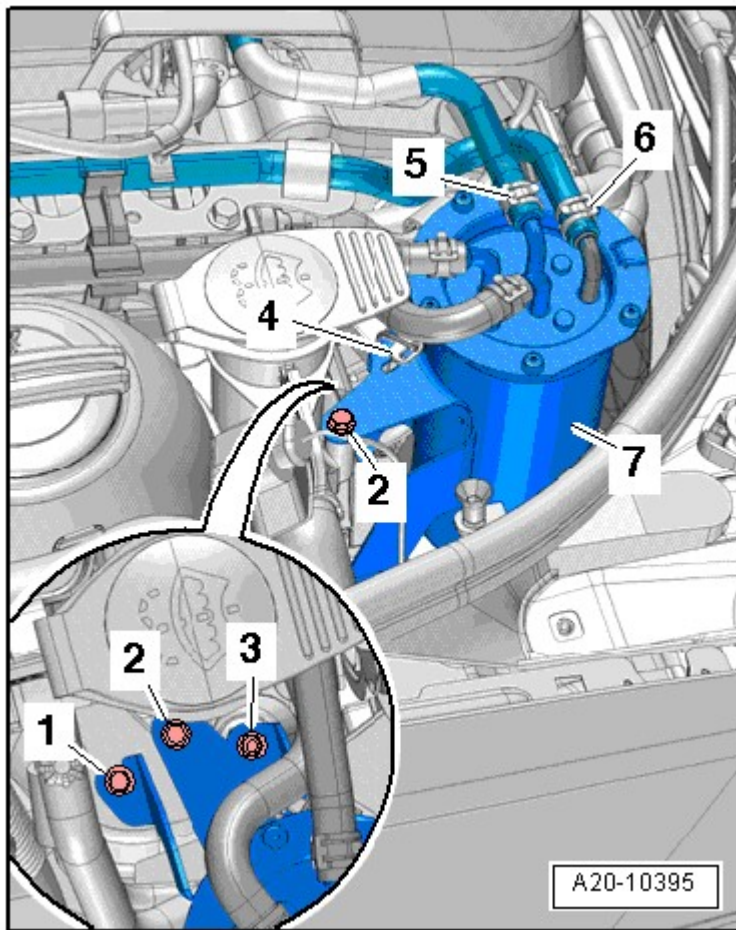


Fig. 23: Identifying Bracket And Auxiliary Fuel Pump And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -2- and nut -3-.

-- Remove the hose bracket -4- from the fuel filter and then move the fuel filter -7- to the side with the fuel hoses -5- and -6- still connected.

The following dimensions must be attained:

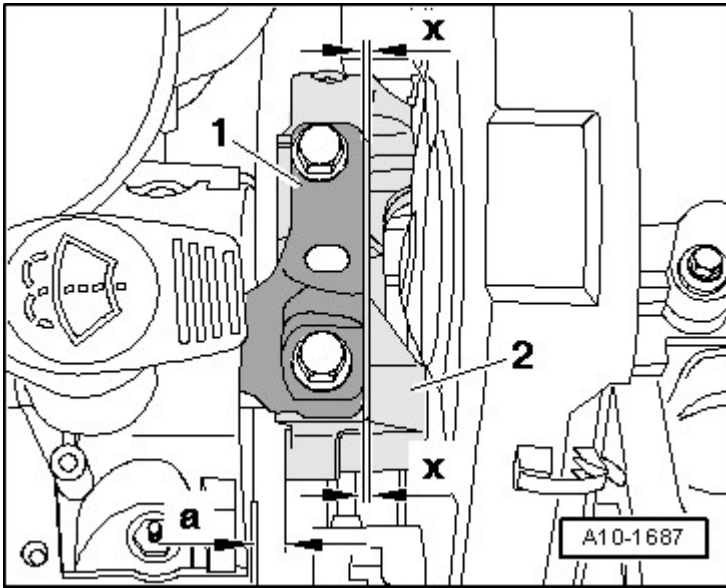


Fig. 24: Checking Subframe Mount, Adjustment

Courtesy of AUDI OF AMERICA, LLC

- The clearance between the engine support -2- and the right longitudinal member must be -a- = 13.5 mm.
- The casting edge on the engine support -2- must be parallel to the support arm -1- (dimension -x- = dimension -x-).

NOTE: Distance -a- = 13.5 mm can also be checked with corresponding round stock.

-- Adjust the subframe if distance measured is too small or too large. Refer to **SUBFRAME MOUNT, ADJUSTING**.

Assembling

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

-- Install the auxiliary fuel pump and the fuel filter. Refer to **REMOVAL AND INSTALLATION** .

-- Install the filler tube and the windshield wiper fluid reservoir filler tube. Refer to **REMOVAL AND INSTALLATION** .

REMOVAL AND INSTALLATION

ENGINE, REMOVING

Special tools and workshop equipment required

- Pry Lever - Rmv Outside Mirror 80 - 200
- Engine/Transmission Jack V.A.G 1383 A
- Step Ladder VAS 5085

- Drip Tray VAS 6208
- Hose Clip Pliers VAS 6362
- Bracket 2024 A /1, part of the Engine Sling 2024 A
- Locking Pin T10060 A
- Engine/Trans. Support T10012
- Protective eyewear
- Protective gloves

Procedure

NOTE: The engine is removed downward together with the transmission.

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

During installation, the heat shield boots must be installed at the same location.

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.

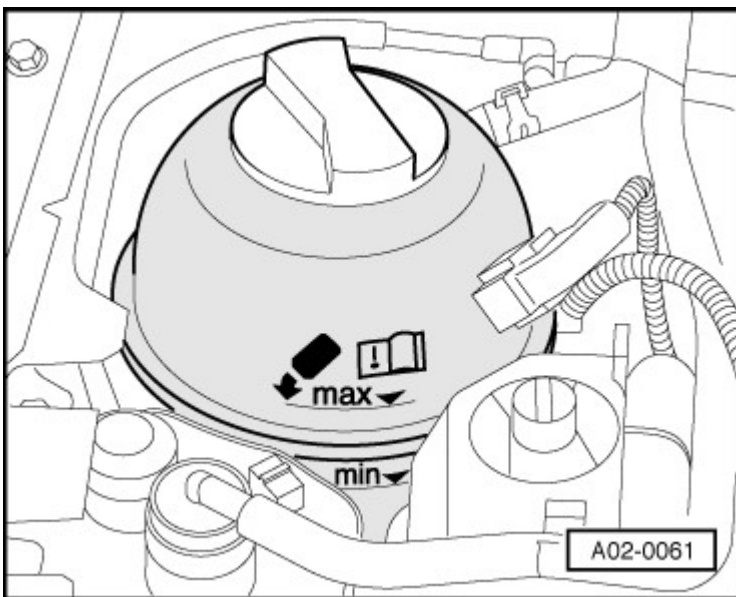


Fig. 25: Coolant Level Markings
Courtesy of AUDI OF AMERICA, LLC

-- Remove the engine cover -arrows-.

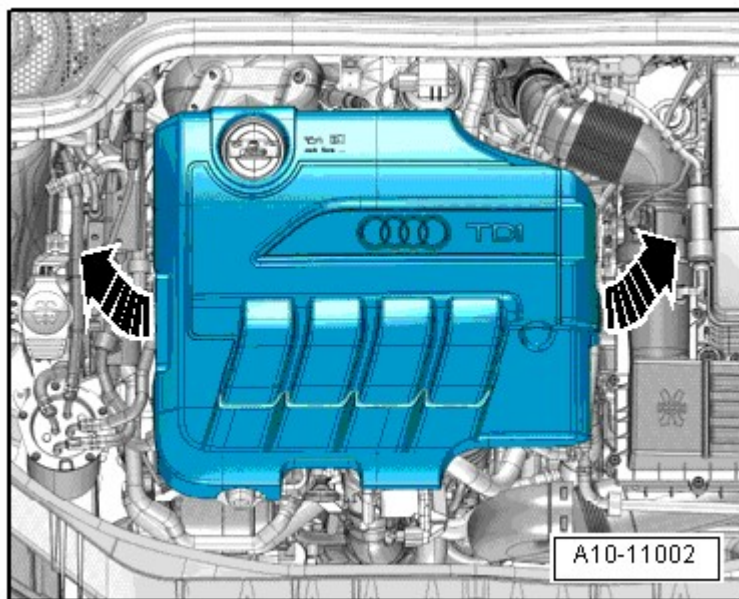


Fig. 26: Identifying Engine Cover

Courtesy of AUDI OF AMERICA, LLC

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

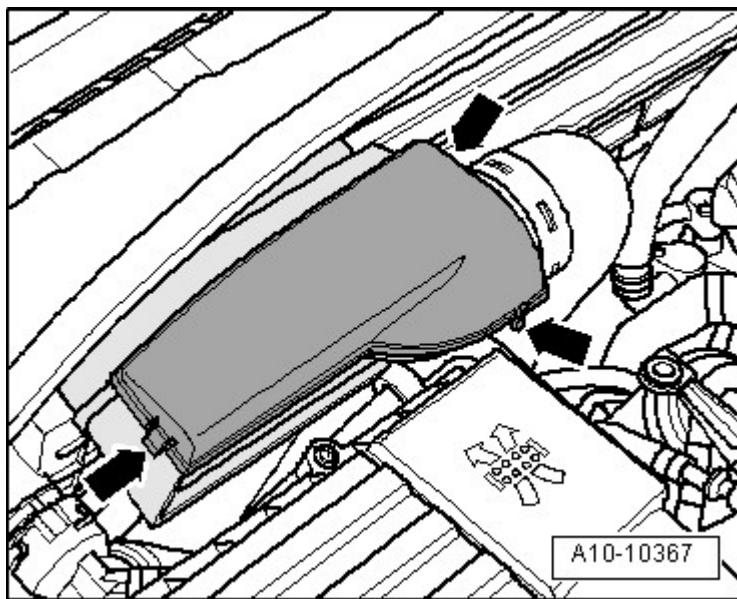


Fig. 27: Identifying Air Duct Cover Slide Clips

Courtesy of AUDI OF AMERICA, LLC

-- Release the left and right spring clips -arrow A- and disconnect the lower air guide -2-.

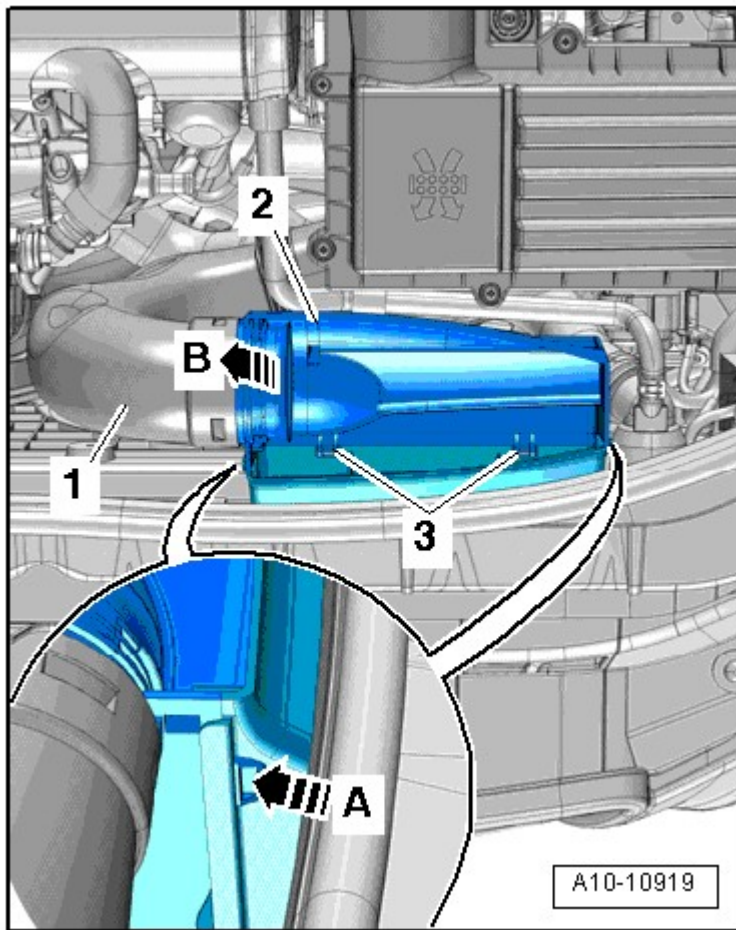


Fig. 28: Unclipping Lower Air Guide By Releasing Left And Right Retainers -Arrow A-.
Courtesy of AUDI OF AMERICA, LLC

- Move the lower air guide slightly to the rear and disengage the lower air guide -3-.
- Disengage the air guide pipe -1- from the lower air guide -arrow B-.
- Disconnect electrical connector -2- on mass air flow sensor -G70-.

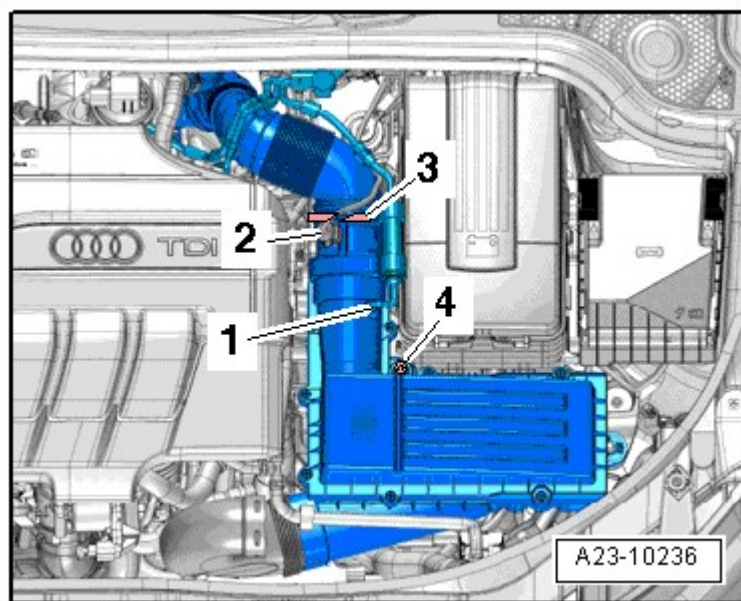


Fig. 29: Removing Air Filter Housing
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the hose -1-.
- Remove the coolant hose by loosening the hose clamp -3-.
- Remove the bolt -4- and air filter housing.
- Remove the bolts -arrows- and the air guide from the lock carrier.

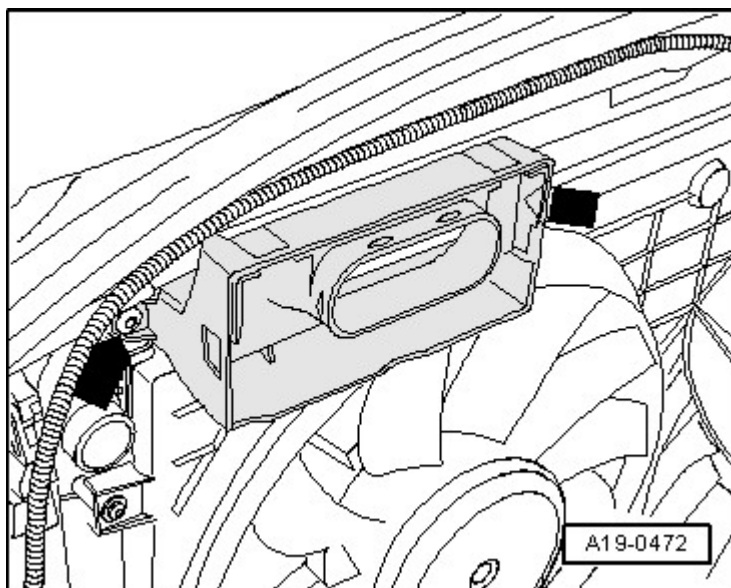


Fig. 30: Identifying Air Guide Screws -Arrows- And Air Guide
Courtesy of AUDI OF AMERICA, LLC

-- Remove the screws -upper arrows- on the fan shroud.

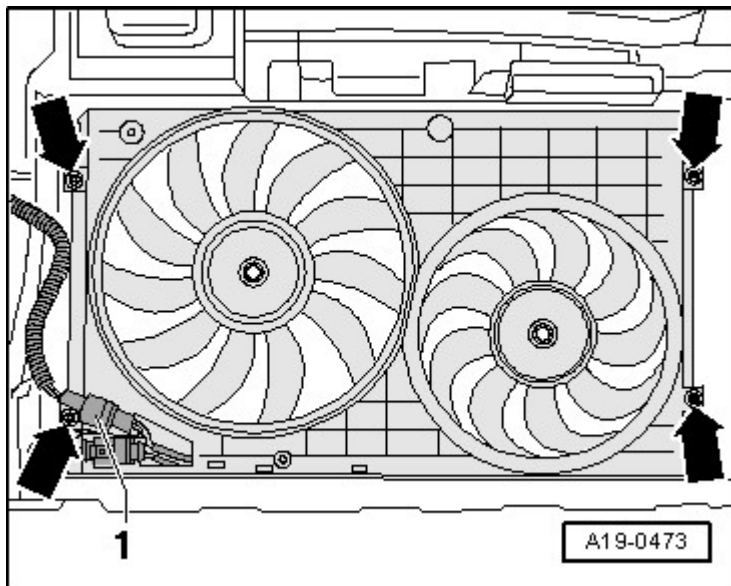


Fig. 31: Identifying Coolant Fan Control Module J293 And Screws
Courtesy of AUDI OF AMERICA, LLC

NOTE: The screws -lower arrows- will be removed later.

Ignore -1-.

-- Remove both front wheels.

-- Remove the noise insulation -1-. Refer to **Removal and Installation** .

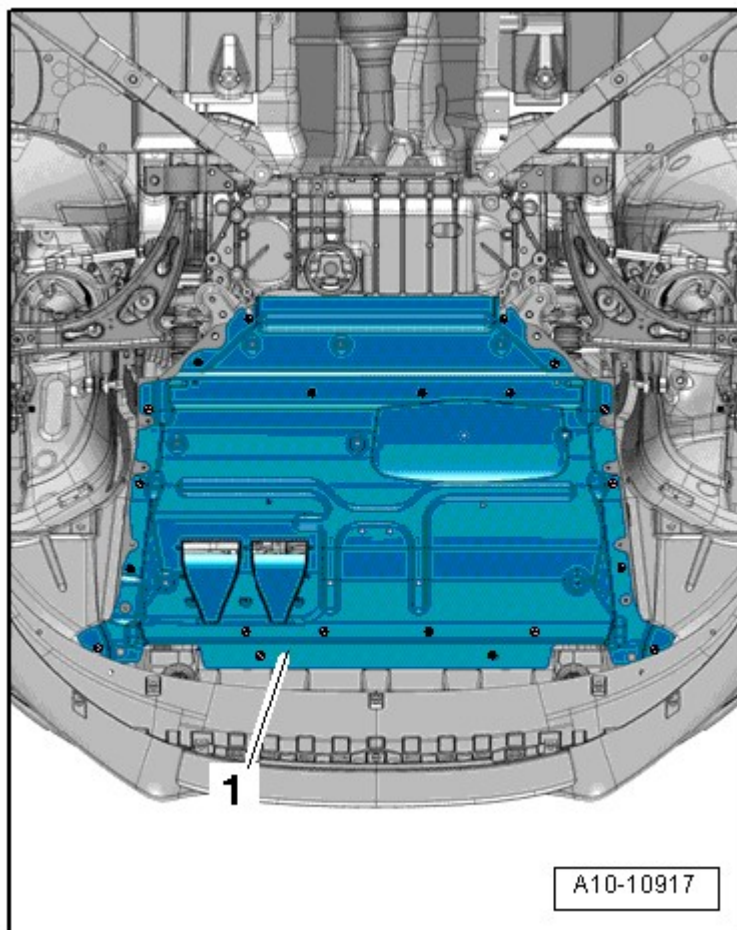


Fig. 32: Identifying Noise Insulation

Courtesy of AUDI OF AMERICA, LLC

-- Cabrio: Remove the noise insulation frame -arrow-. Refer to **Removal and Installation** .

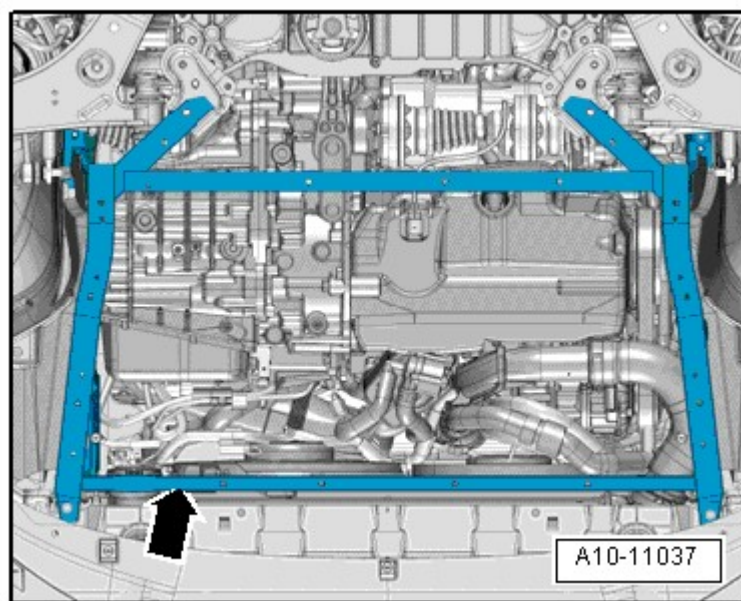


Fig. 33: Identifying Noise Insulation Frame
Courtesy of AUDI OF AMERICA, LLC

-- Remove the front section of the left and right front wheel housing liners. Refer to **Removal and Installation** .

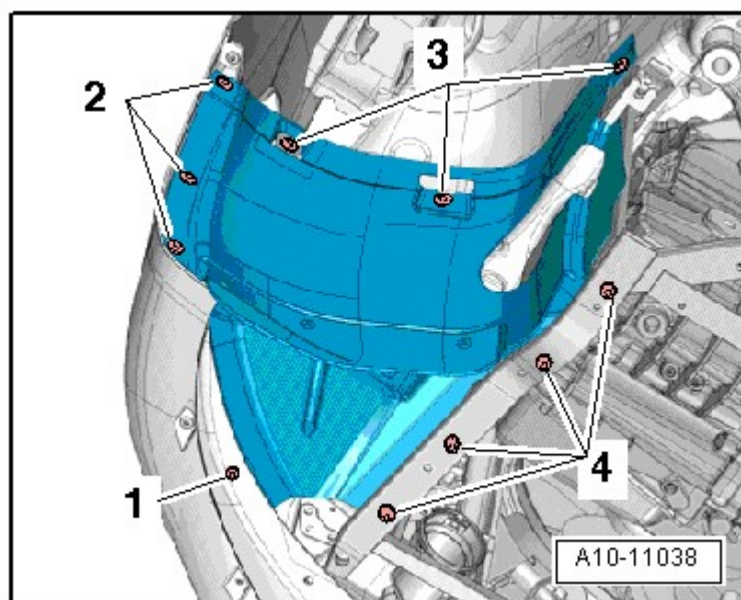


Fig. 34: Identifying Front Section Of Left Front Wheel Housing Liner
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the hose clamp -2-, lift the retaining clamp -1- and remove the air guide hose.

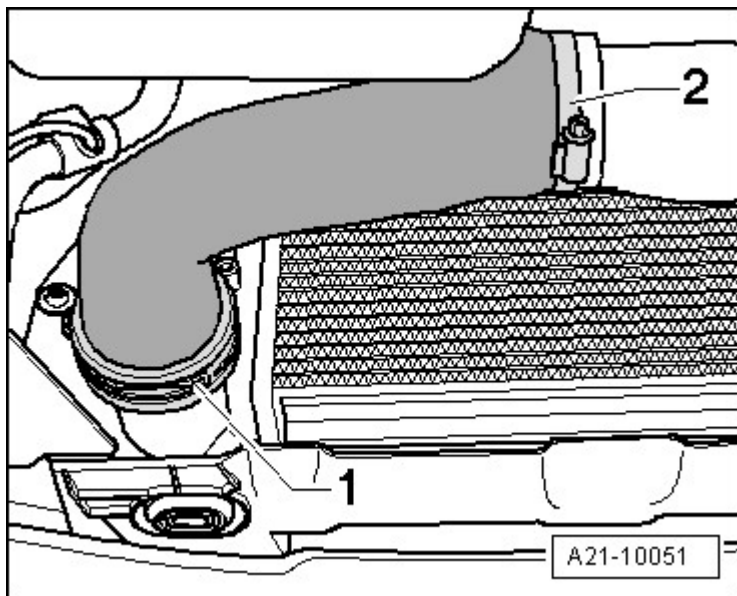


Fig. 35: Identifying Air Cooler Air Duct And Clamps
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the hose clamp -2-, lift the retaining clamp -1- and remove the air guide hose.

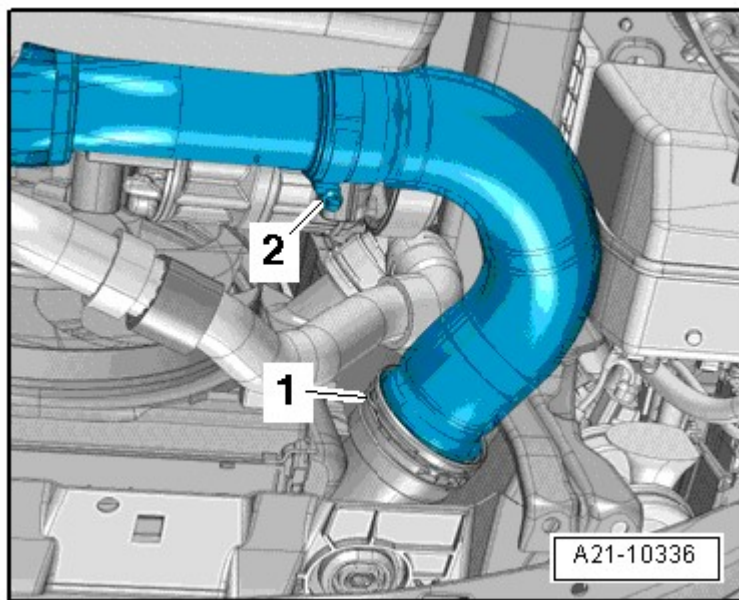


Fig. 36: Identifying Clamp -2- And Circlip -1-
Courtesy of AUDI OF AMERICA, LLC

-- Seal the open lines and connections with clean plugs from the engine bung set VAS 6122.

-- Disconnect the connector -1-.

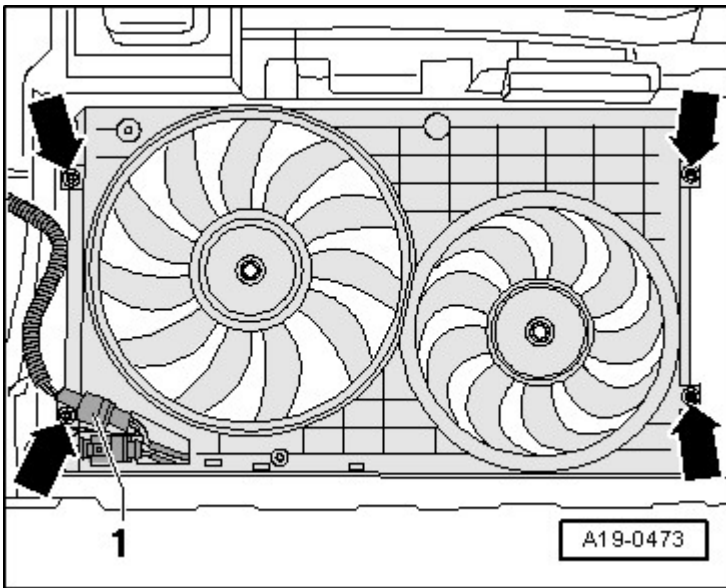


Fig. 37: Identifying Coolant Fan Control Module J293 And Screws
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -lower arrows- and remove the fan shroud downward.

NOTE: Collect escaping coolant in a clean container for disposal or reuse.

-- Place VAS 6208 under engine.

-- Lift the clamp to remove the right lower coolant hose -arrow- and let the coolant drain.

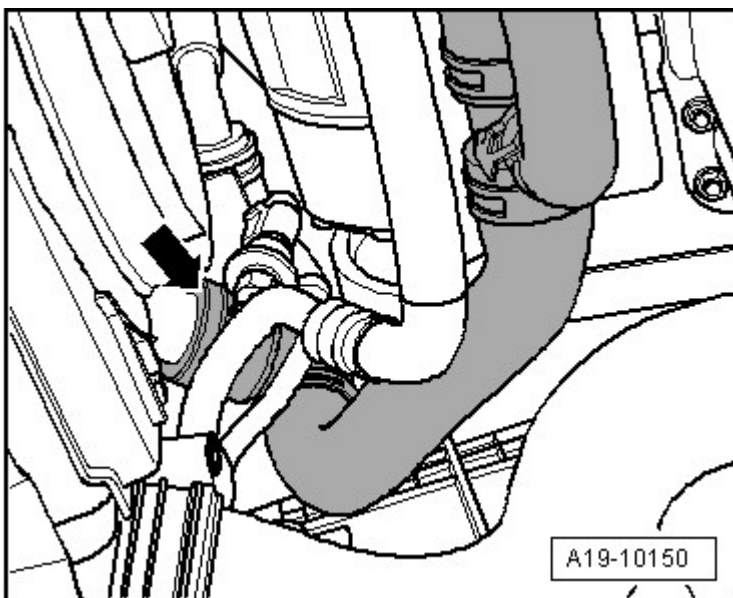


Fig. 38: Identifying Coolant Hose Quick Acting Coupling
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the hose clamp -arrow-, drain the coolant and remove the lower coolant hose for the EGR cooler pump -V400-.

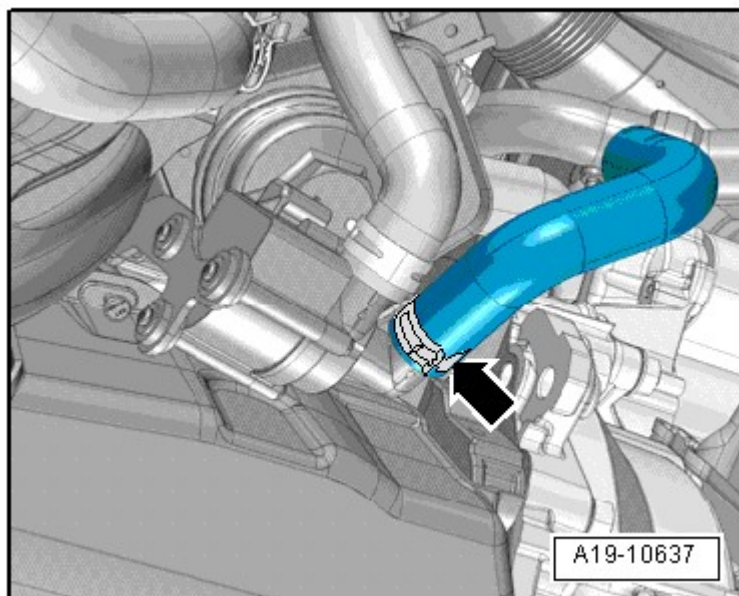


Fig. 39: Identifying Hose Clamp

Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -lower arrows- on the back of the radiator.

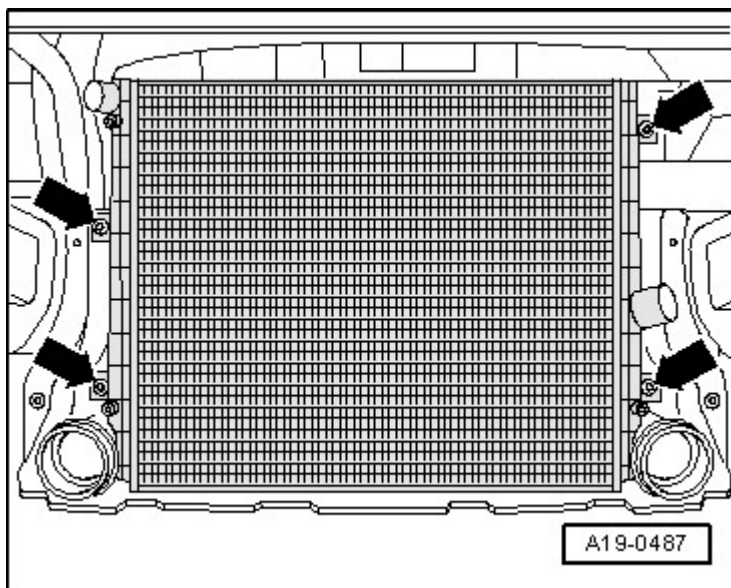


Fig. 40: Identifying Radiator Bolts

Courtesy of AUDI OF AMERICA, LLC

NOTE: The bolts -upper arrows- will be removed later.

-- Loosen the hose clamp -arrow-, drain any remaining coolant and remove the additional coolant hose from the engine oil cooler.

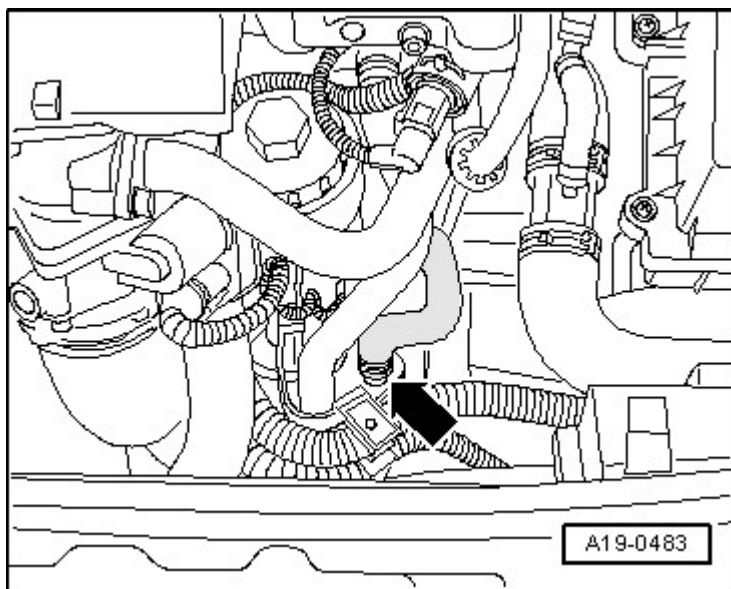


Fig. 41: Identifying Hose Clamp

Courtesy of AUDI OF AMERICA, LLC

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

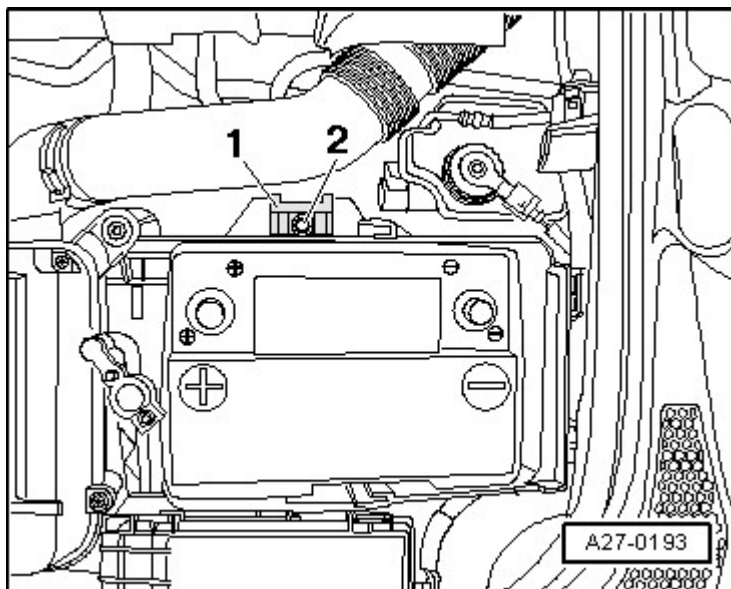


Fig. 42: Identifying Screws And Securing Bracket For Battery

Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and remove the battery tray -1-.

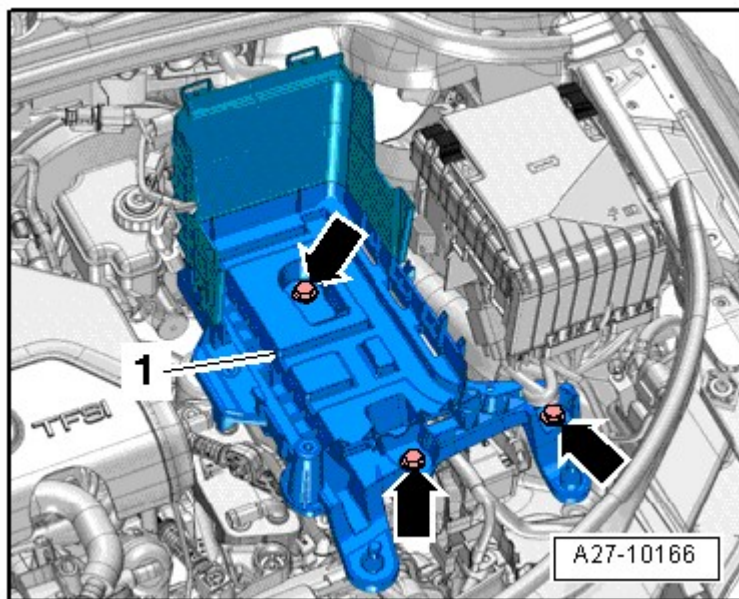


Fig. 43: Identifying Battery Tray And Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Press the release buttons and remove the crankshaft housing ventilation hose -1- from the cylinder head cover.

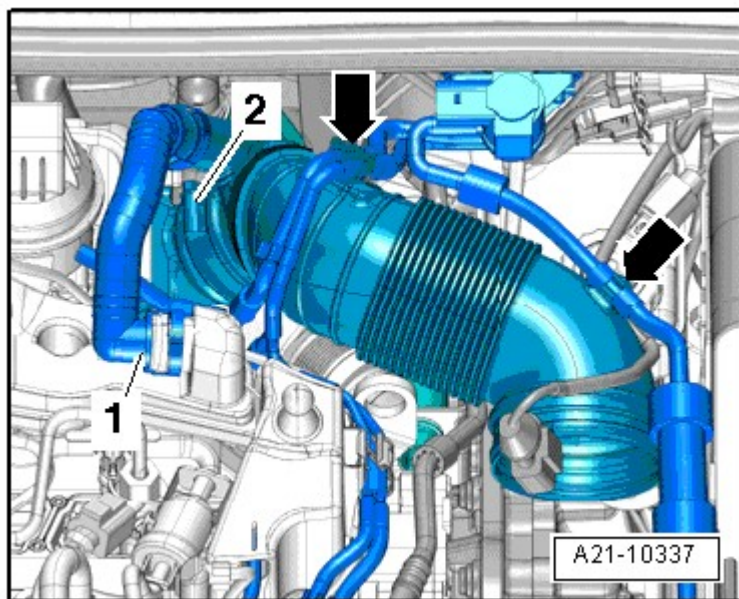


Fig. 44: Identifying Air Guide Pipe
Courtesy of AUDI OF AMERICA, LLC

-- Free up the vacuum hoses -arrows- on the air guide pipe.

-- Loosen the hose clamp -2- and remove the air guide pipe.

-- Remove the vacuum hose -2- from the turbocharger vacuum diaphragm.

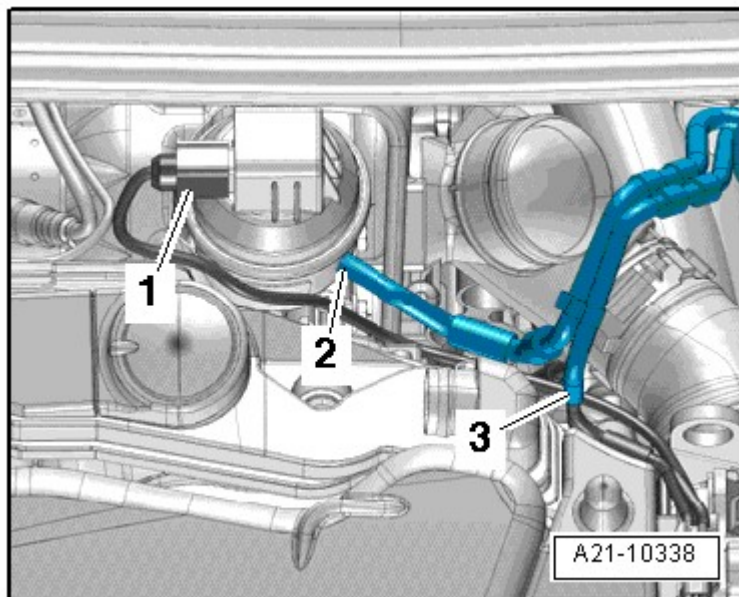


Fig. 45: Identifying Turbocharger Vacuum Diaphragm

Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the vacuum hose -3-.

NOTE: Ignore -1-.

-- Disconnect the vacuum hose -arrow- from the brake booster.

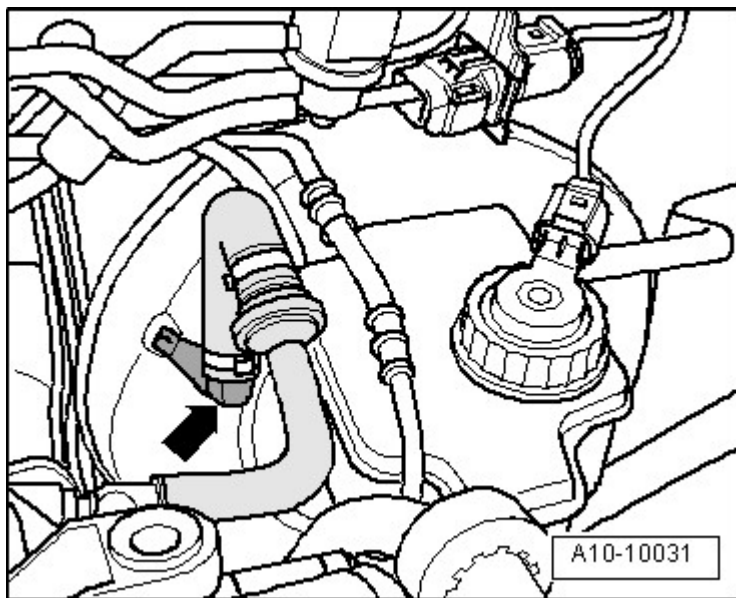


Fig. 46: Identifying Vacuum Hose

Courtesy of AUDI OF AMERICA, LLC

NOTE: Lay a cloth under the heat exchanger to catch escaping coolant.

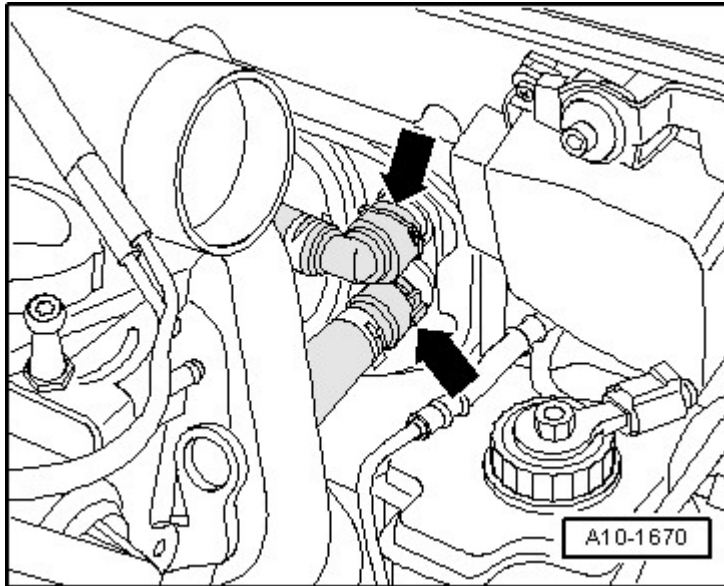


Fig. 47: Disconnecting Coolant Hoses To Heater Core At Bulkhead
Courtesy of AUDI OF AMERICA, LLC

- Lift the clamps -arrows- and remove the heat exchanger.
- Disconnect the connectors -3- from the bracket.

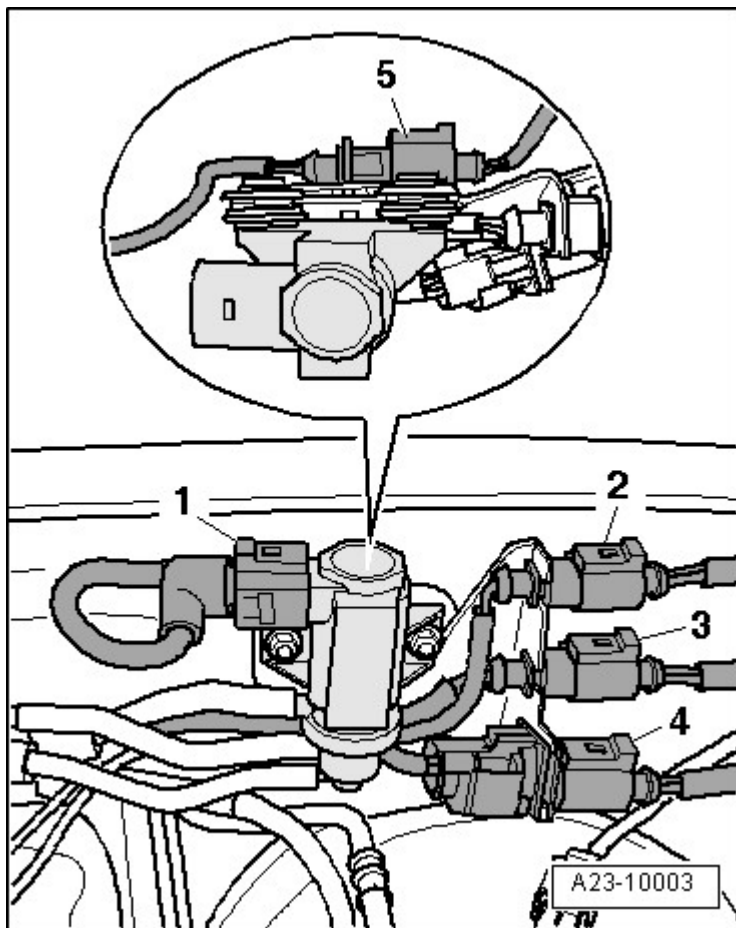


Fig. 48: Installed Locations and Connectors
 Courtesy of AUDI OF AMERICA, LLC

-- Free up the wires -2-3-4-5-.

NOTE: Ignore -1-.

-- Remove the clamp -2-.

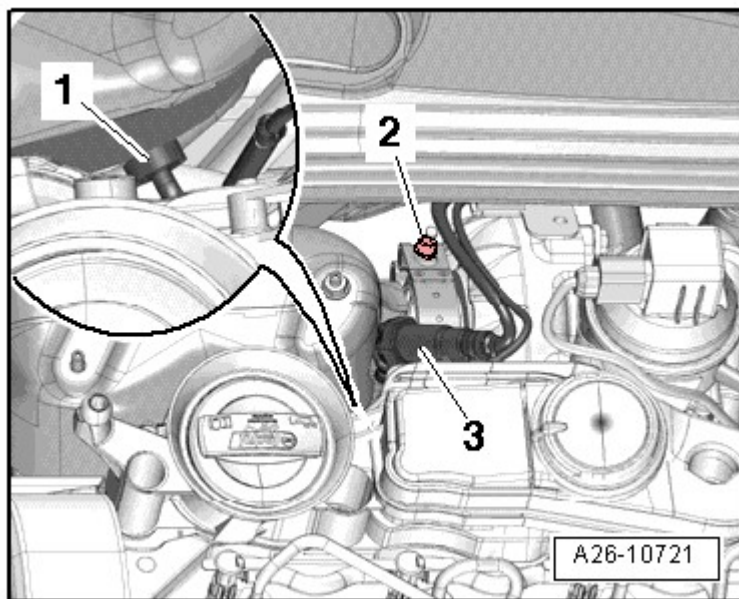


Fig. 49: Identifying Exhaust Gas Temperature Sensor 2 -1-.
 Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1 and 3-.

-- Disconnect the connector -2- on exhaust pressure sensor 1 -G450-.

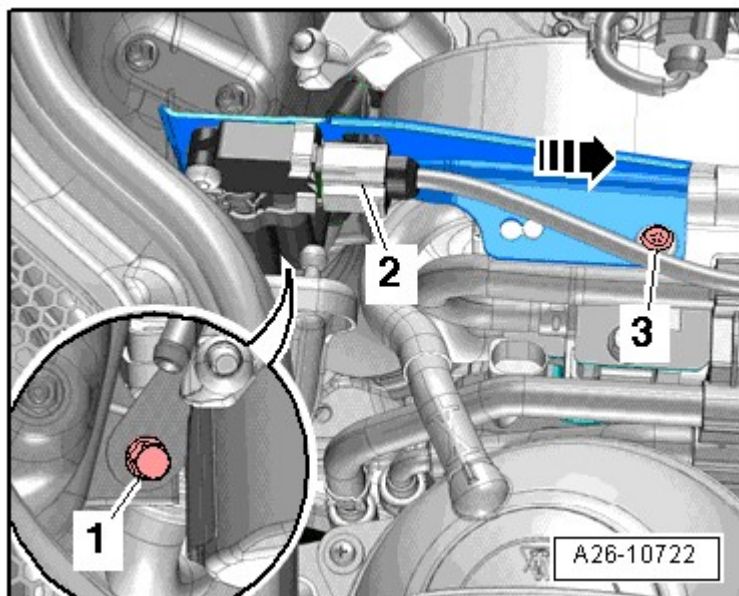


Fig. 50: Identifying Pressure Sensor And Connector
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -3- and pull exhaust pressure sensor 1 of its mount -arrow-.

-- Remove the bolt -1- at the top of the particulate filter mount.

NOTE: The installed position may differ depending on the date of manufacture.

-- Remove the differential pressure sensor -3- from the cylinder head cover.

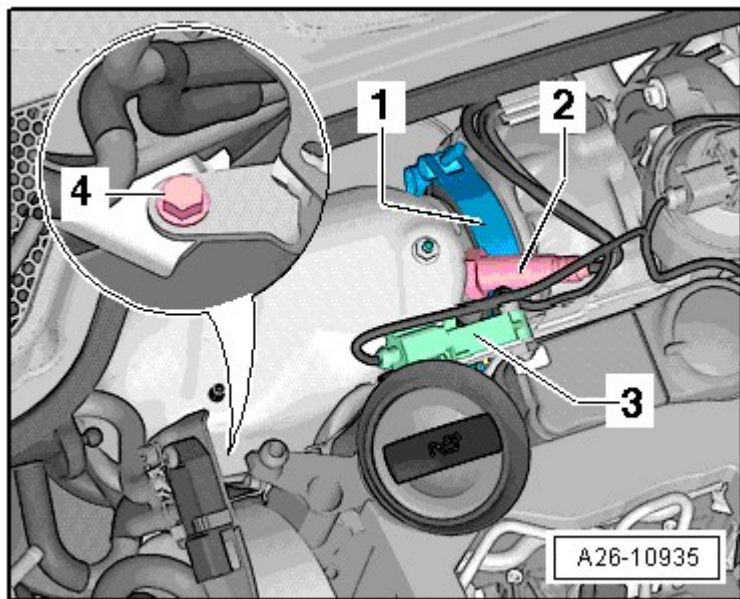


Fig. 51: Exhaust Pressure Sensor 1 -G450- -3-
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connector -4- on the fuel temperature sensor -G81-.

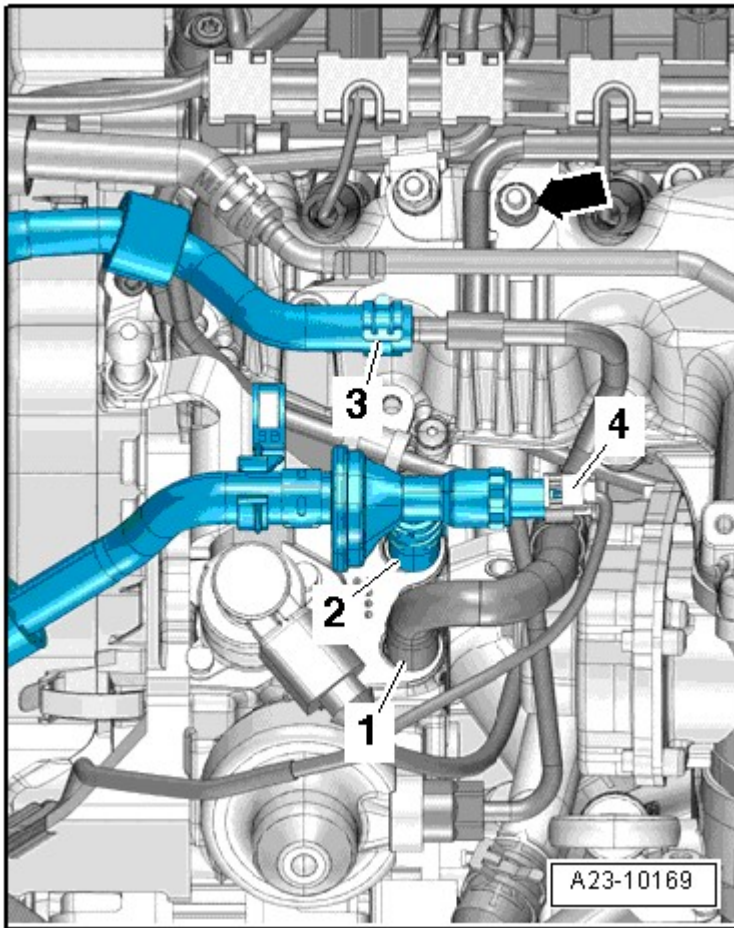


Fig. 52: Locating Fuel Temperature Sensor

Courtesy of AUDI OF AMERICA, LLC

WARNING: Very hot fuel can burn your skin.

- The temperature of the fuel lines and may reach 100 °C (212 °F) after stopping the engine. Let the fuel cool down before opening any line connections otherwise there is a danger of scalding.
- Wear protective gloves.
- Wear safety glasses.

-- Loosen the hose clamps -2- and -3- and remove the fuel supply and return hoses.

-- Seal the open lines and connections with clean plugs from the engine bung set VAS 6122.

NOTE: Ignore -1- and -arrow-.

-- Remove the coolant hose; do to so, loosen the hose clamp -1-.

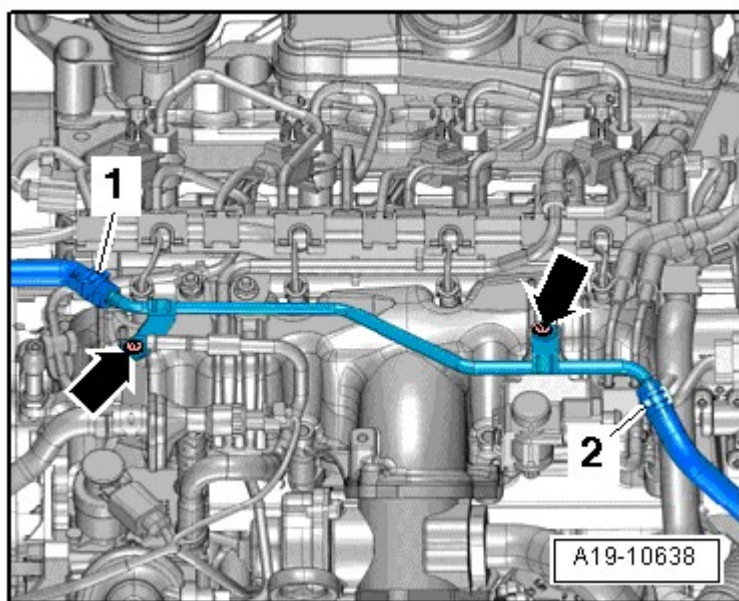


Fig. 53: Identifying Coolant Hose

Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -2- and -arrows-.

-- Remove bolt -1-.

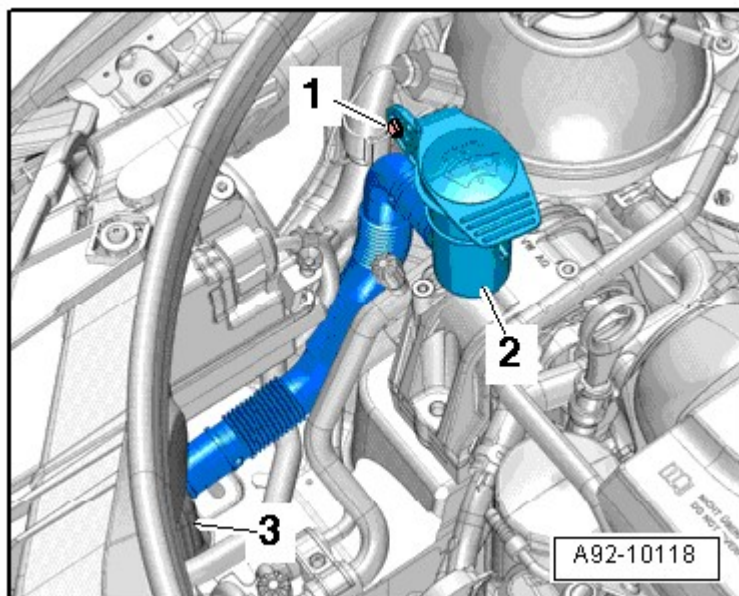


Fig. 54: Identifying Windshield Wiper Fluid Reservoir Filler Tube -2- And Bolt

Courtesy of AUDI OF AMERICA, LLC

-- Move the filler tube and windshield wiper fluid reservoir filler tube -2- to the side.

NOTE: Ignore -3-.

The installation location is shown with the fuel filter removed.

-- Disengage the fuel hose -2- from the bracket.

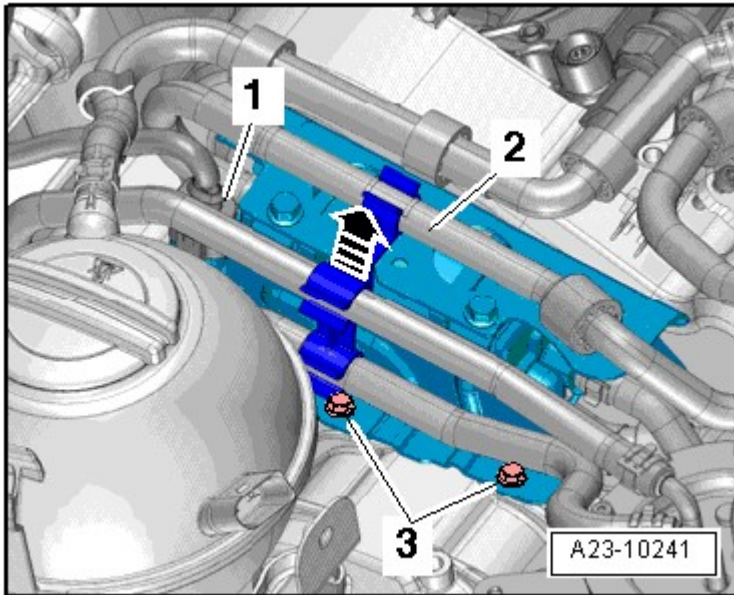


Fig. 55: Identifying Fuel Hose & Lines
Courtesy of AUDI OF AMERICA, LLC

-- Removed the bracket for the fuel lines -arrow- and move it to the side.

-- Disconnect the connector -1- on the auxiliary fuel pump -V393-.

-- Remove the bolts -3- then remove the bracket and the auxiliary fuel pump and move them to the side.

-- Loosen the hose clamp -1-, free up the coolant hose and remove the coolant hose from the coolant reservoir.

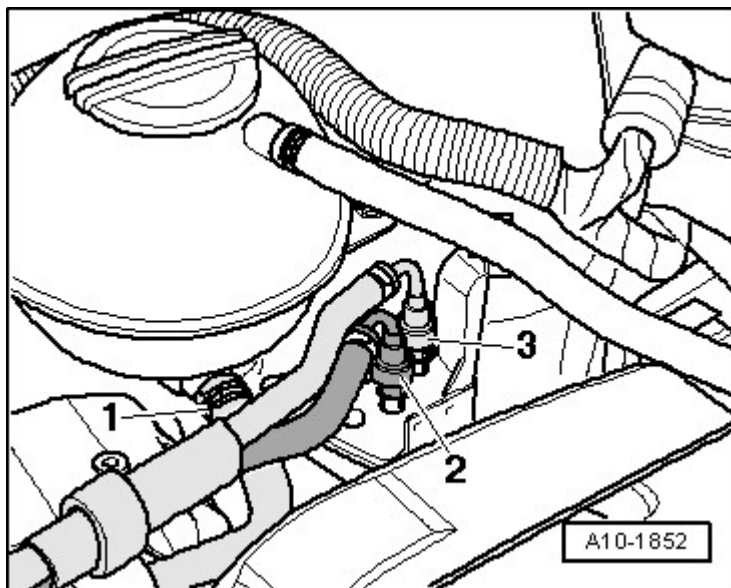


Fig. 56: Identifying Fuel Supply Line, Fuel Return Line & Coolant Hose
 Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -2 and 3-.

-- Lift the clamp -arrow- and remove the left upper coolant hose from the radiator.

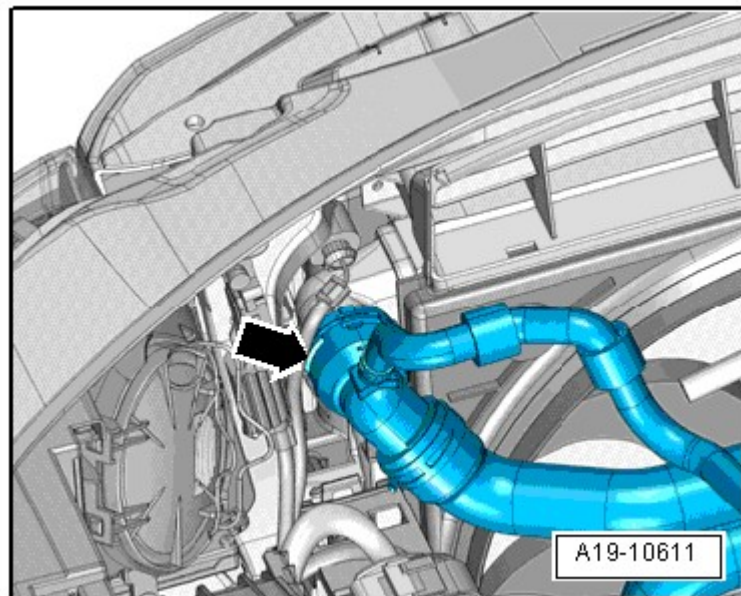


Fig. 57: Identifying Left Upper Coolant Hose Clamp
 Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connector -A- on the high pressure sensor -G65- -B-.

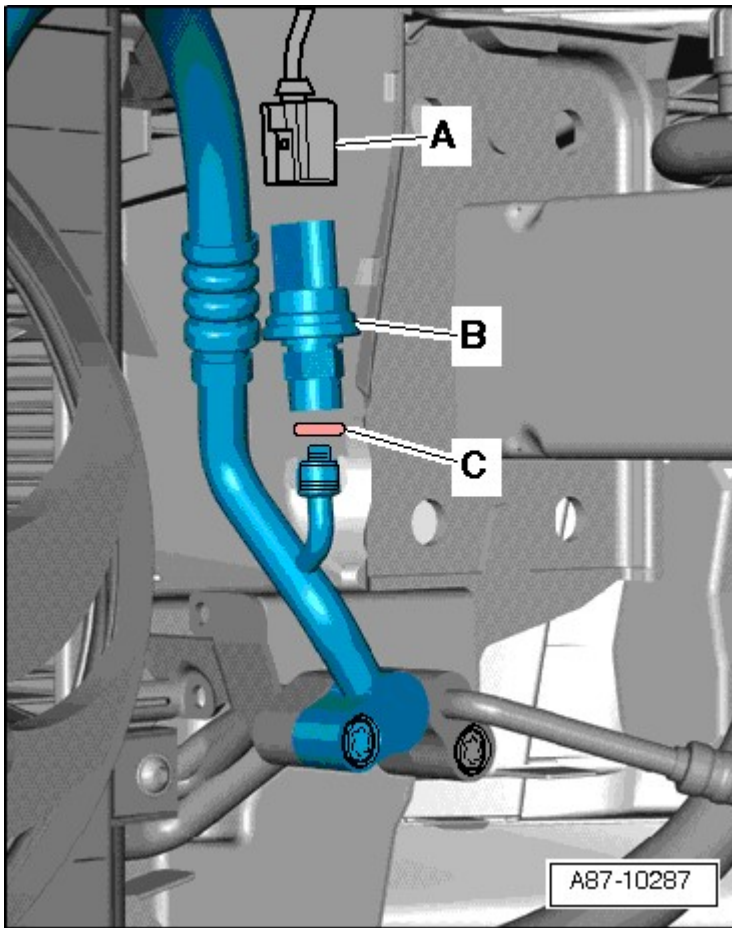


Fig. 58: Disconnecting Connector -A- On High Pressure Sensor -G65- -B-
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -C-.

-- Remove the bolts -upper arrows- on the back of the radiator and then remove the radiator.

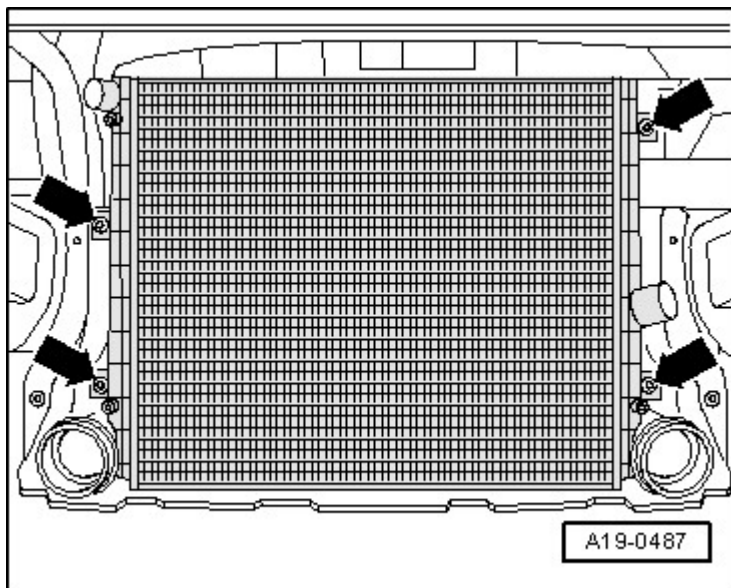


Fig. 59: Identifying Radiator Bolts

Courtesy of AUDI OF AMERICA, LLC

-- Remove the windshield wiper arms. Refer to **REMOVAL AND INSTALLATION** .

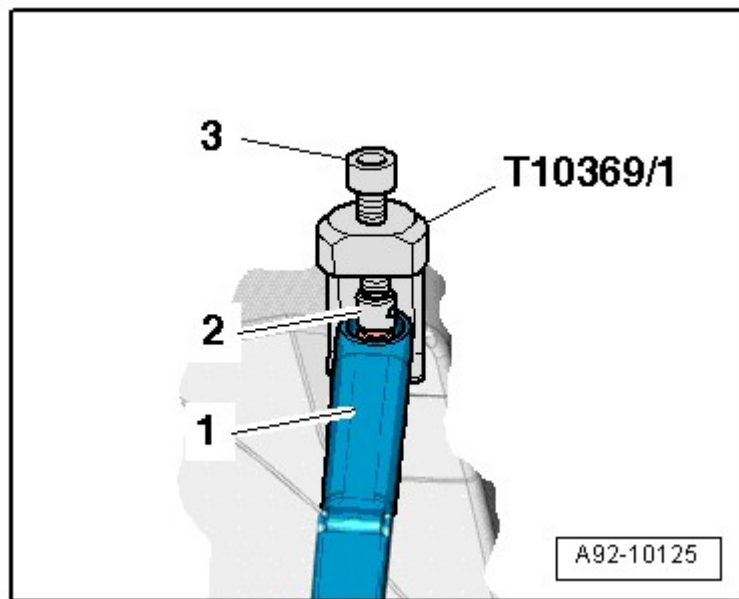
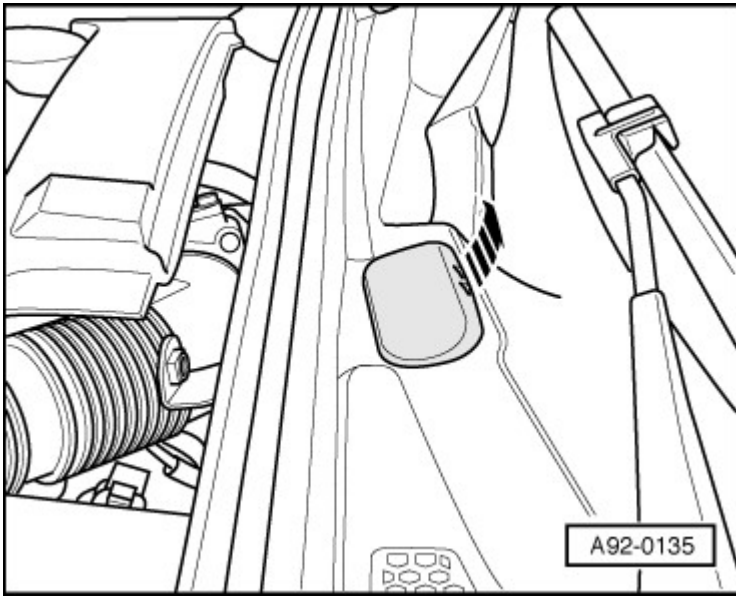


Fig. 60: Removing Windshield Wiper Arm With Puller T10369/1

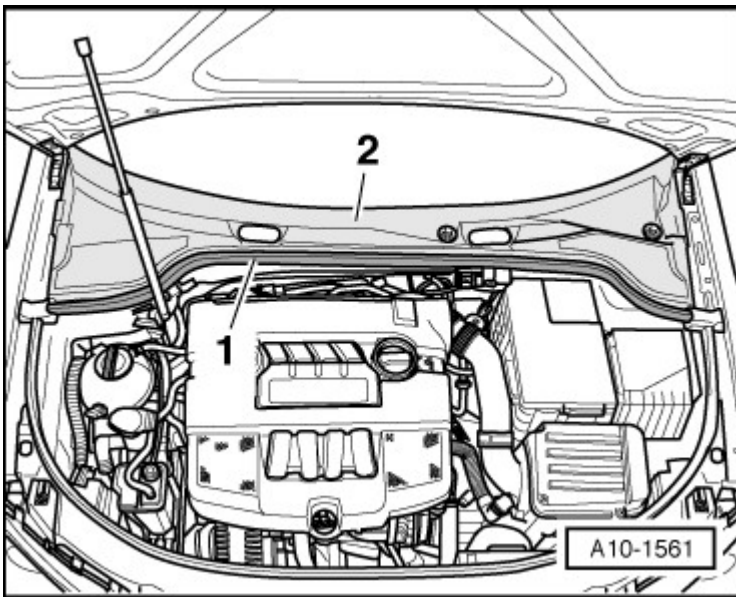
Courtesy of AUDI OF AMERICA, LLC

-- Unclip the spray nozzles -arrow-.

**Fig. 61: 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. 62: Identifying Plenum Chamber Cover And Rubber Seal**

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 the plenum chamber cover.

NOTE: Use the 80 - 200 for removing the spiral clips in the following procedure.

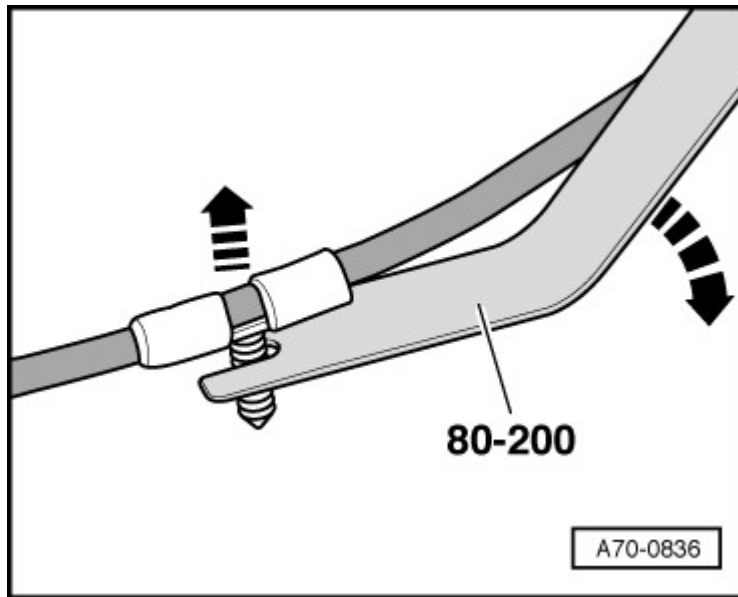


Fig. 63: Free Electrical Wiring Up To Generator Using 80-200
Courtesy of AUDI OF AMERICA, LLC

-- Free up the rear engine wiring harness on the plenum chamber bulkhead.

-- Remove the bolts -arrows- and remove the plenum chamber bulkhead.

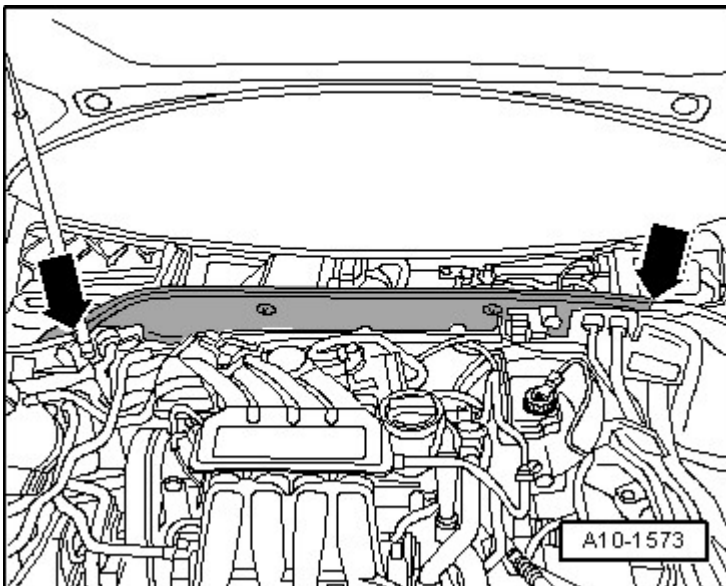


Fig. 64: Identifying Plenum Chamber Bulkhead And Bolts
Courtesy of AUDI OF AMERICA, LLC

- Remove engine control module ECM. Refer to **Removal and Installation** .
- Disconnect the engine wiring harness electrical connector -1-.

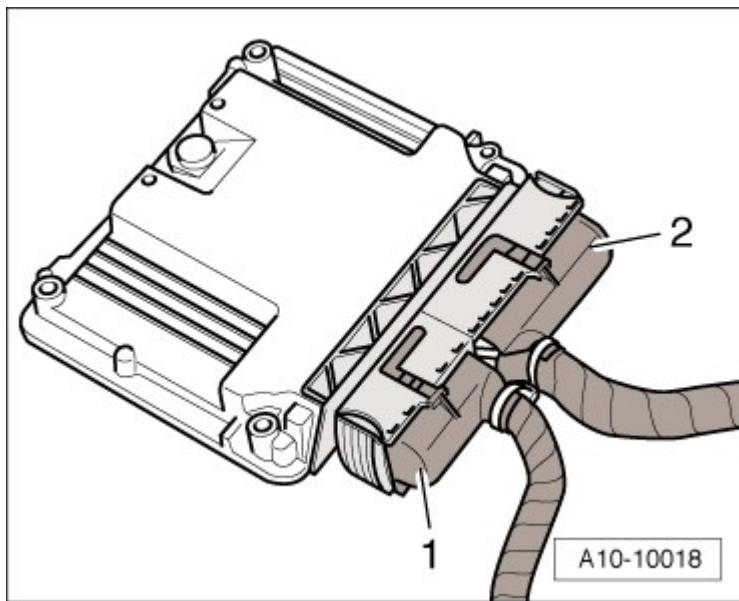


Fig. 65: Identifying ECM And Engine Wiring Harness Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -2-.

- Release pass-through -arrow- for engine wiring harness and pull off upward.

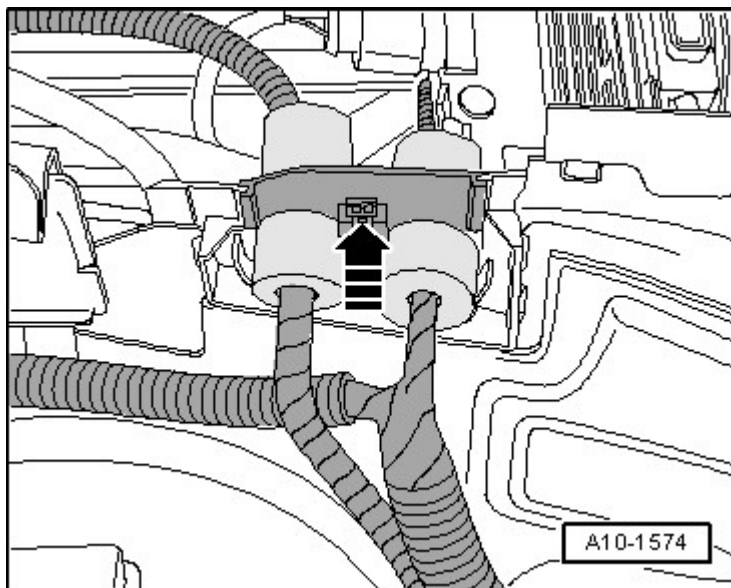


Fig. 66: Release Pass-Through -Arrow- For Engine Wiring Harness
Courtesy of AUDI OF AMERICA, LLC

-- Open wiring router bracket -arrows-.

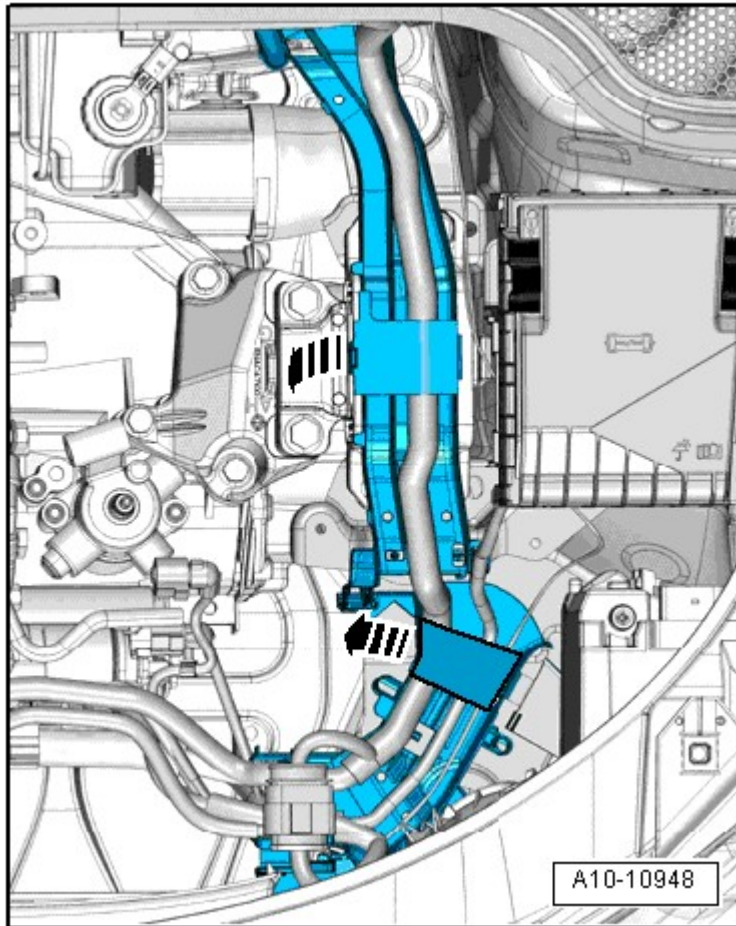


Fig. 67: Opening Wiring Router Bracket
Courtesy of AUDI OF AMERICA, LLC

-- Push the wheel housing liner slightly to the side, release the retainers on the back side -arrows- and remove the connector -1- with the bracket.

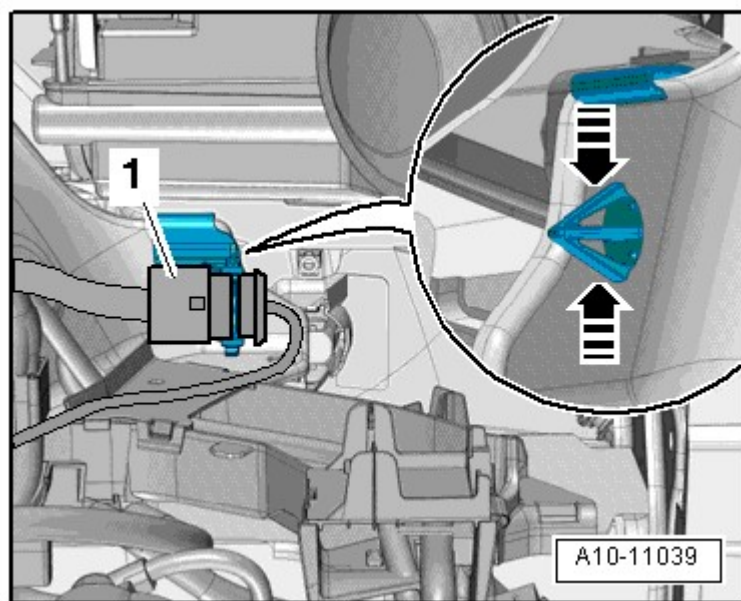


Fig. 68: Identifying Wiring Router Connector
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the connector from the bracket.
- Disconnect the connectors -1- and free them up.

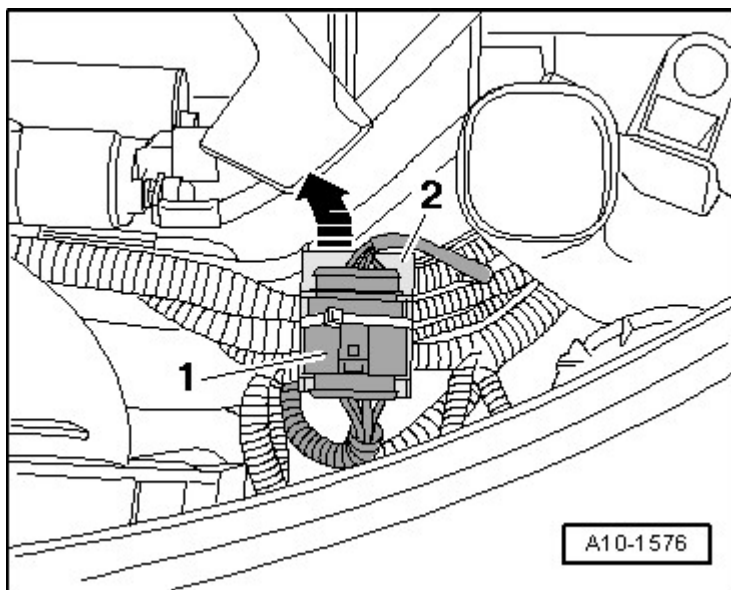


Fig. 69: Identifying Electrical Connector -1- And Wiring Guide Bracket -2-
Courtesy of AUDI OF AMERICA, LLC

- Open the underlying wiring guide bracket -2-.
- Take the ECM wiring harness out of the wiring router and lay it on the engine.

-- Disconnect the electrical connector -arrow- on the lower left longitudinal member.

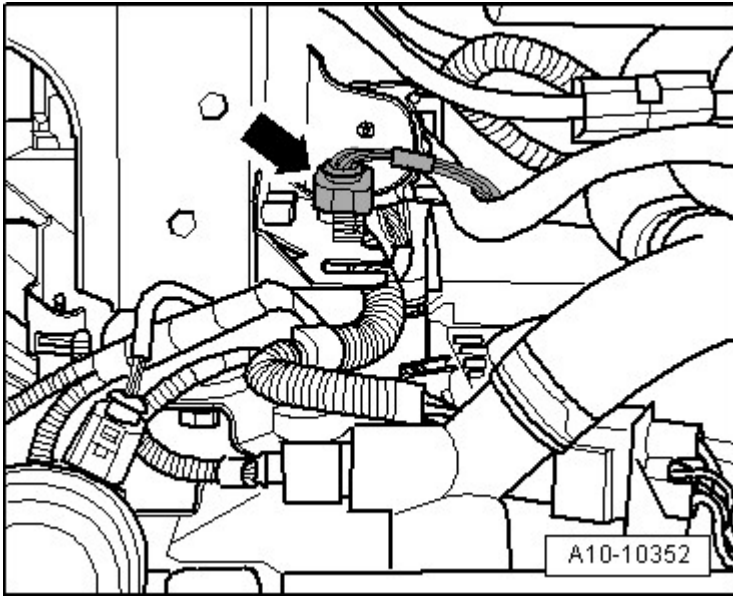


Fig. 70: Identifying Lower Left Longitudinal Member Electrical Connector

Courtesy of AUDI OF AMERICA, LLC

NOTE: The illustration shows the installation location from below.

-- Remove E-box cover by slide both latches in direction of -arrow-.

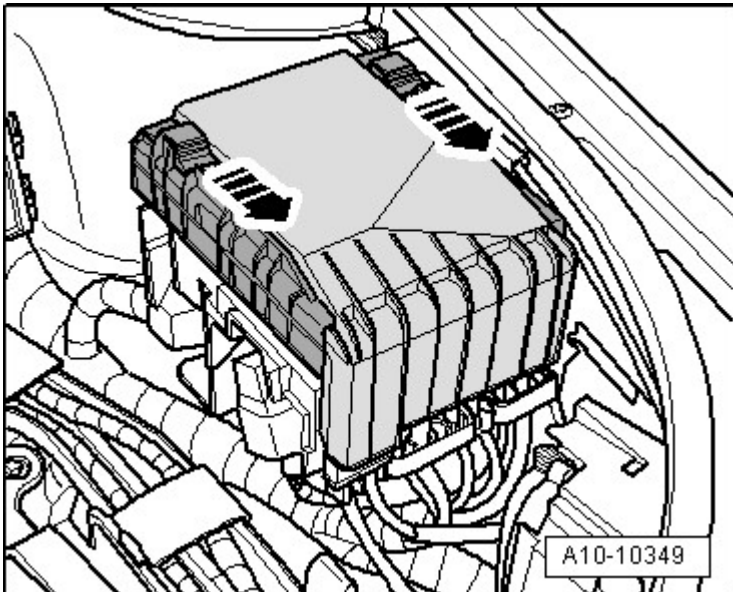


Fig. 71: Identifying E-Box Cover And Latches

Courtesy of AUDI OF AMERICA, LLC

-- Remove the nut -arrow- and then remove and free up the terminal 30 wire from the engine compartment E-box.

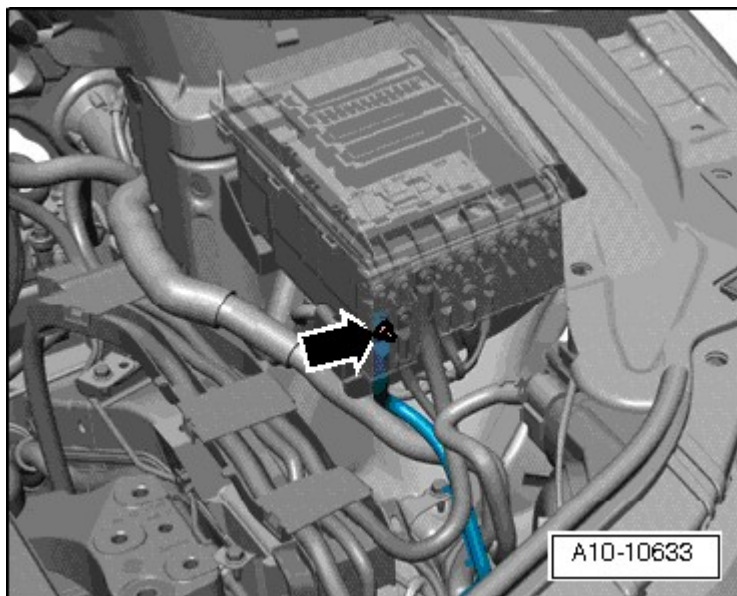


Fig. 72: Locating Engine Compartment E-Box Nut
Courtesy of AUDI OF AMERICA, LLC

Manual Transmission

-- Disconnect the connector -1-.

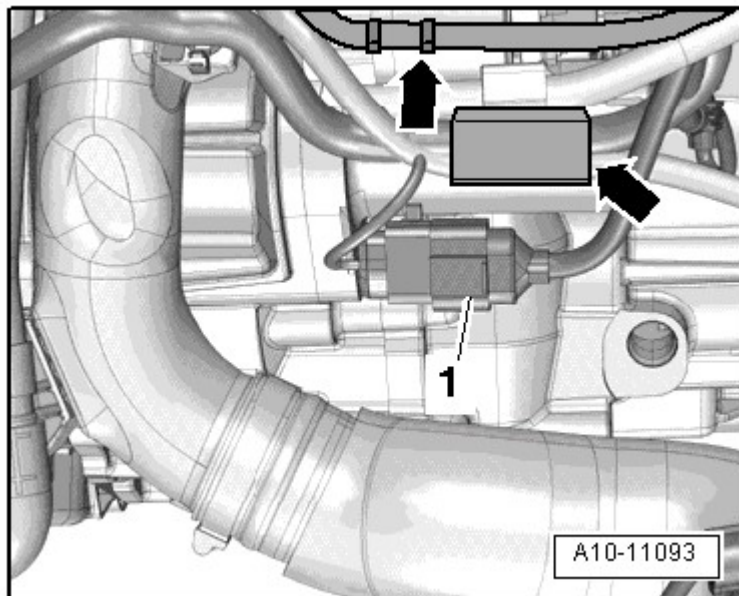


Fig. 73: Identifying Engine Compartment E-Box Connector
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -arrows-.

-- Cut off cable ties -arrow- for protective boot -3-.

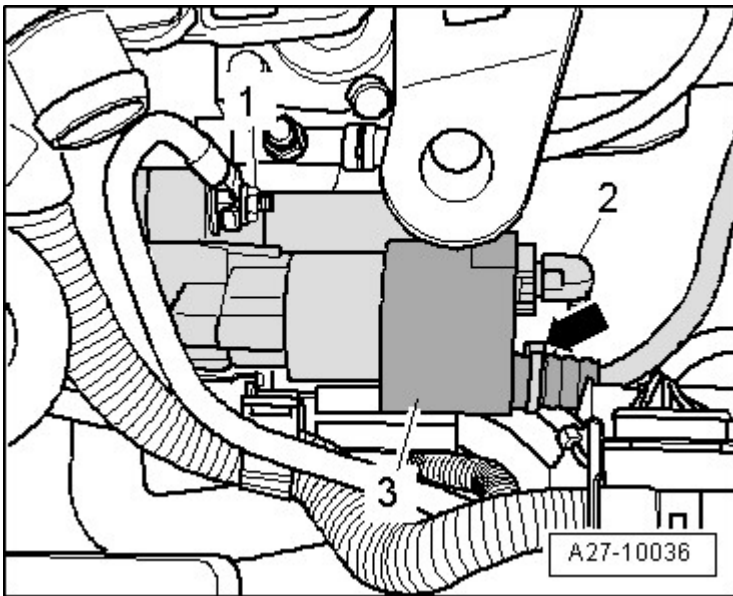


Fig. 74: Identifying Ground (GND) Cable, Electrical Connector, Cable Tie & Protective Boot
 Courtesy of AUDI OF AMERICA, LLC

- Disconnect the connector -2-.
- Fold back protective boot and remove B+ wire from starter solenoid.
- Remove the ground wire nut -1-.
- Remove upper starter bolt.
- Remove the shift cable lock washer -3- from the transmission shift lever -1- and then remove the cable from the ball -arrow-.

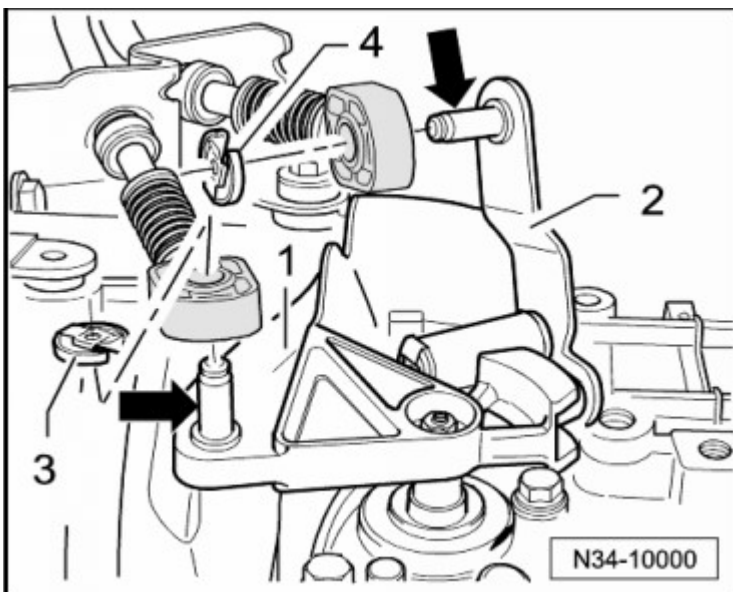


Fig. 75: Identifying Shift Cable Lock Washer To Transmission Shift Lever, Cable And Pins
Courtesy of AUDI OF AMERICA, LLC

Metal Shift Relay Lever

-- Remove the selector cable lock washer -4- from the shift relay lever -2- and then remove the cable from the ball -arrow-.

Plastic Shift Relay Lever

- The cable retainer must be disconnected from the selector lever cable prior to removal to prevent damaging the cable.

-- Pull the safety mechanism all the way to the front -arrow 1- and then lock it to the left -arrow 2-.

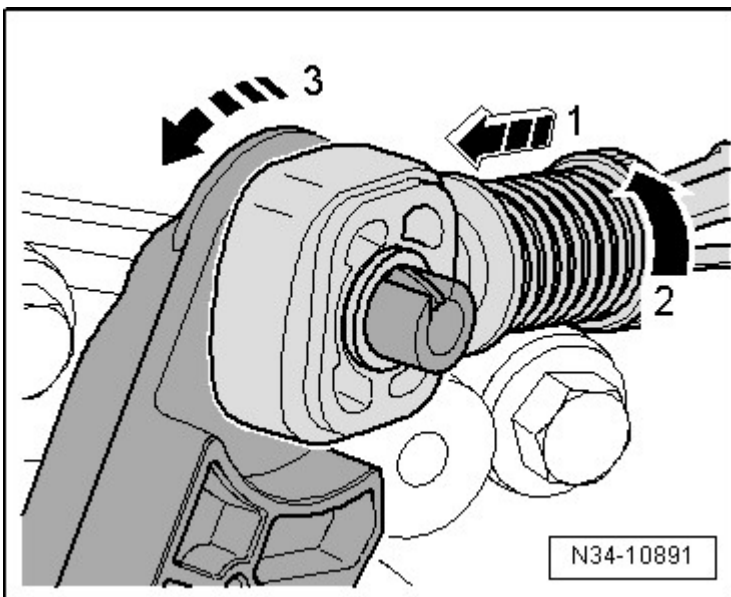


Fig. 76: Disconnecting Cable Retainer From Selector Cable
Courtesy of AUDI OF AMERICA, LLC

-- Push the selector relay lever forward -arrow 3-.

Continuation for Vehicles with a Manual Transmission

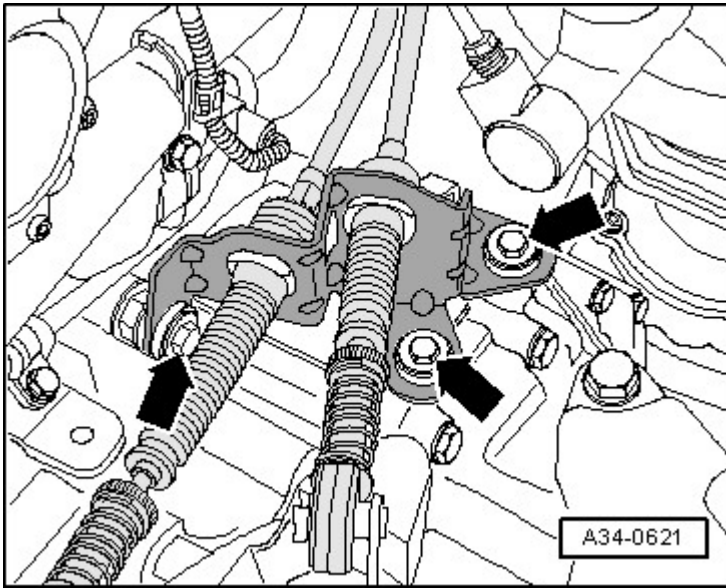


Fig. 77: Identifying Cable Mounting Bracket From Transmission
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the cable mounting bracket from the transmission -arrows- and move it to the side with the cables.

-- Vehicles with a plastic hose between the clutch master cylinder and the clutch slave cylinder: clamp off the supply hose on the brake fluid reservoir with 3094.

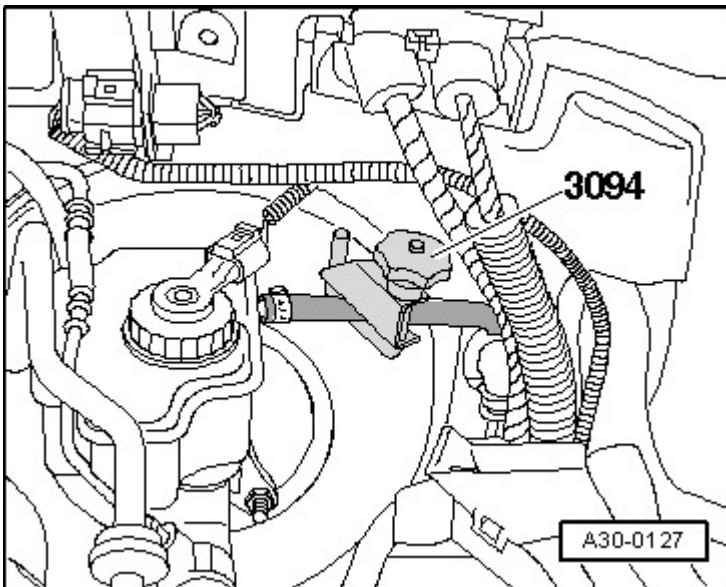


Fig. 78: Identifying Hose Clamps 3094, Clamp Supply Hose And Master Cylinder
 Courtesy of AUDI OF AMERICA, LLC

-- Vehicles with a hose/line assembly between the clutch master cylinder and the clutch slave cylinder: clamp off the hose -A- on the hose/line assembly with 3094.

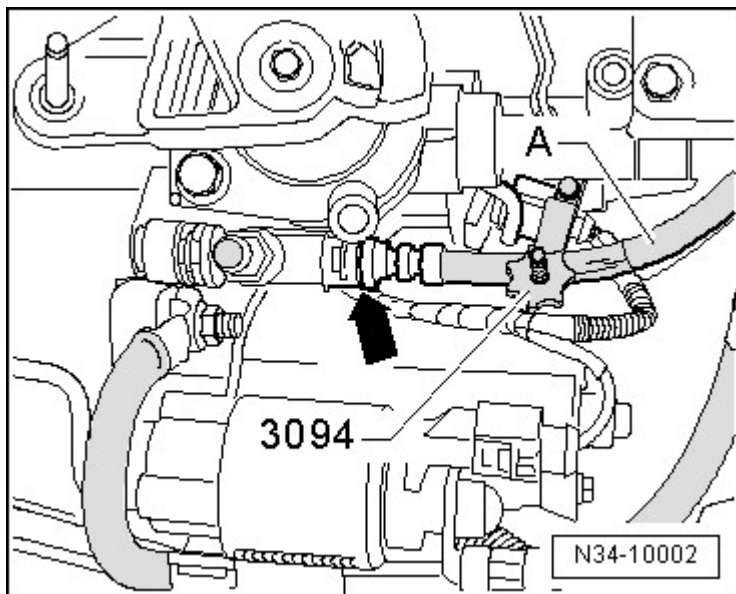


Fig. 79: Clamping Off Hose/Line Assembly Hose To Slave Cylinder With Hose Clamps
Courtesy of AUDI OF AMERICA, LLC

NOTE: Disregard -arrow-.

NOTE: Make sure no brake fluid gets onto the starter or on the transmission. If this happens, clean it off thoroughly.

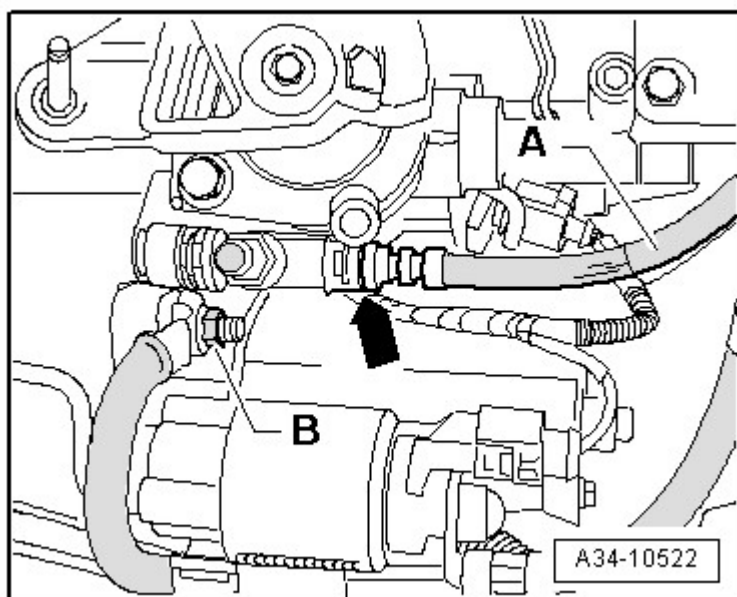


Fig. 80: Identifying Hose/Line Assembly -A-, Ground (GND) Cable -B-
Courtesy of AUDI OF AMERICA, LLC

-- Pull the clamp -arrow- all the way until it stops.

-- Remove the plastic hose or the hose/line assembly -A- from the bleeder/clutch slave cylinder.

NOTE: Ignore -B-.

-- Seal the open lines and connections with clean plugs from the engine bung set VAS 6122.

Vehicles with Dual Clutch Transmission

-- Cut off cable ties -arrow- for protective boot -1-.

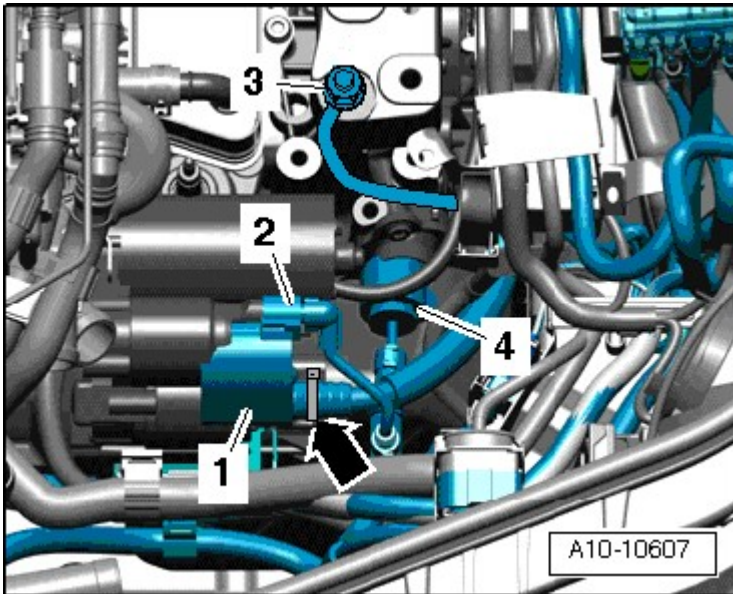


Fig. 81: Identifying Control Module Connectors
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connector -2-.

-- Fold back protective boot and remove B+ wire from starter solenoid.

-- Remove the nut -3- and remove the ground wire.

CAUTION: Risk of destroying control module (Mechatronic) with static discharge.

- **Do not touch contacts in transmission connector with hands.**

-- To discharge static electricity, touch vehicle ground with hand (without gloves).

-- Disconnect electrical connector -4- by turning twist lock counterclockwise.

-- Disconnect the connector -1-.

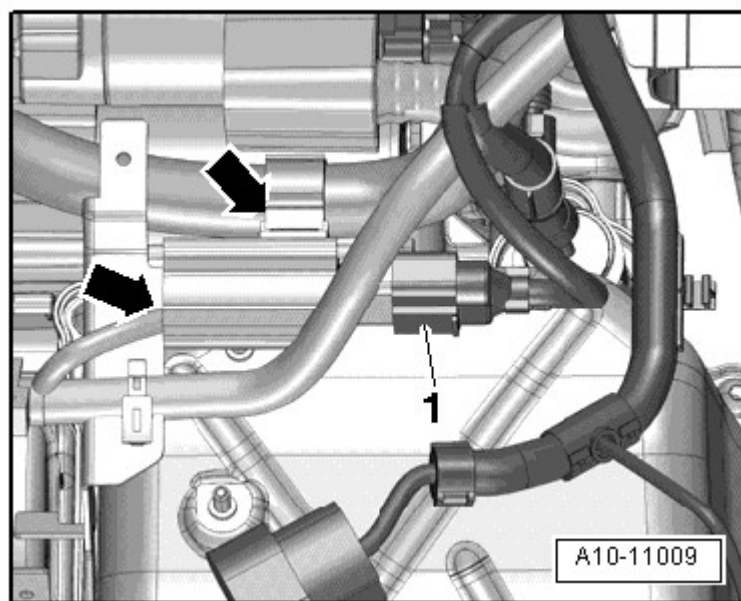


Fig. 82: Identifying Wiring Harnesses And Connector On Hot Side Charge Air Pipe
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -arrows-.

All Vehicles

-- Remove the subframe bolts -arrows- on the engine side 2 turns.

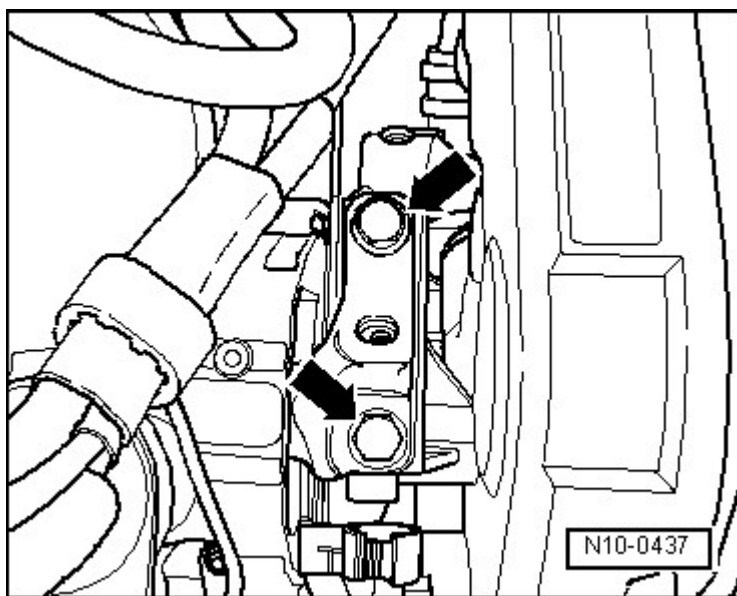


Fig. 83: Identifying Mounting Bolts Of Subframe Mount/Engine Bracket
Courtesy of AUDI OF AMERICA, LLC

-- Remove the subframe bolts -arrows- on the transmission side 2 turns.

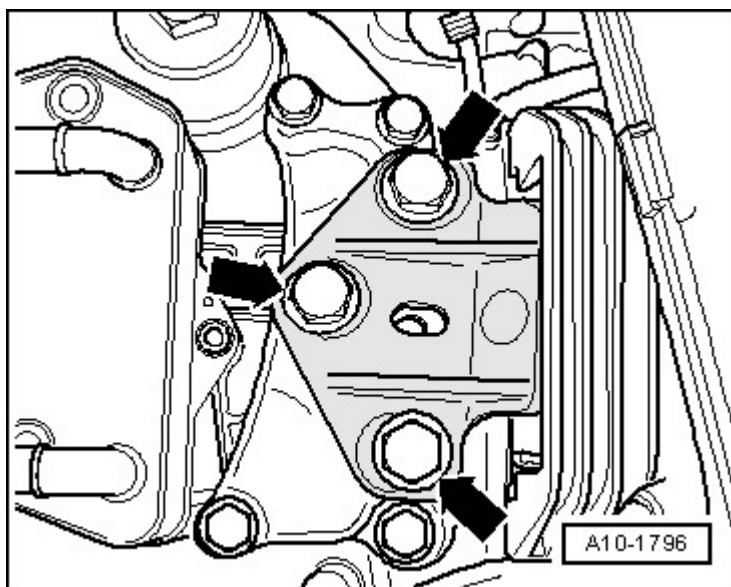


Fig. 84: Identifying Engine Mount To Engine Mount Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

Vehicles with Air Conditioning

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.

-- Pivot the tensioner clockwise -arrow- to release the tension on the ribbed belt.

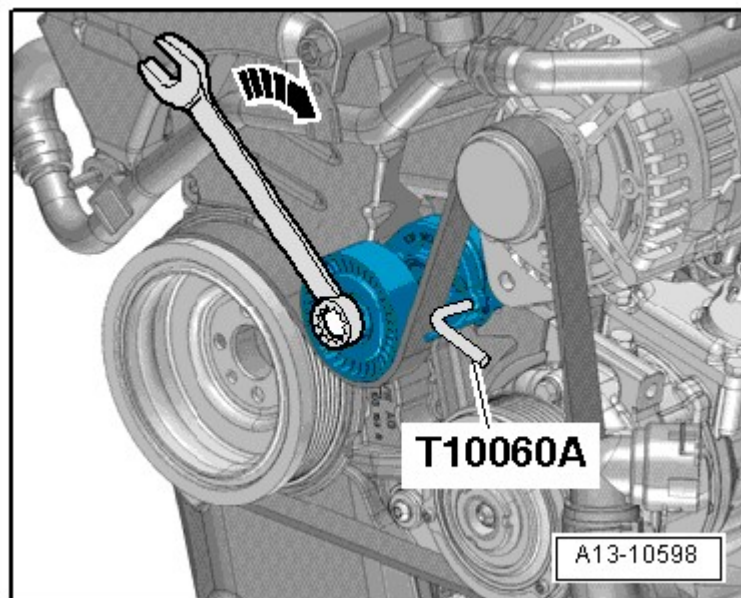


Fig. 85: Pivoting Tensioner Clockwise And Securing Tensioning Element With T10060 A

Courtesy of AUDI OF AMERICA, LLC

- Secure the tensioning element with T10060 A.
- Remove ribbed belt.
- Disconnect the connector -2- on the A/C compressor regulator valve -N280-.

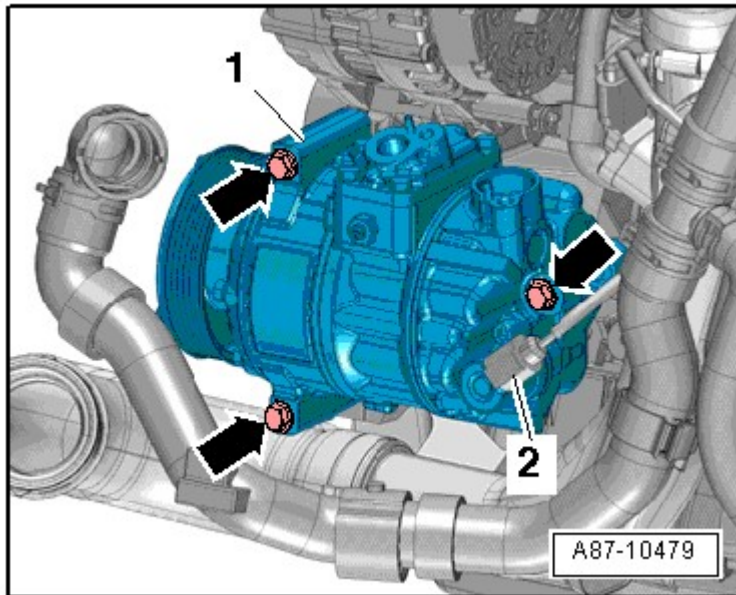


Fig. 86: Identifying A/C Compressor Bolts

Courtesy of AUDI OF AMERICA, LLC

CAUTION: There is a risk of damaging the condenser, the A/C compressor and the refrigerant lines and hoses.

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

-- Remove the bolts -arrows-. Then remove the A/C compressor -1- with the refrigerant pipes still connected and tie them up.

All Vehicles:

-- Disconnect electrical connector -1- on oil level thermal sensor -G266-.

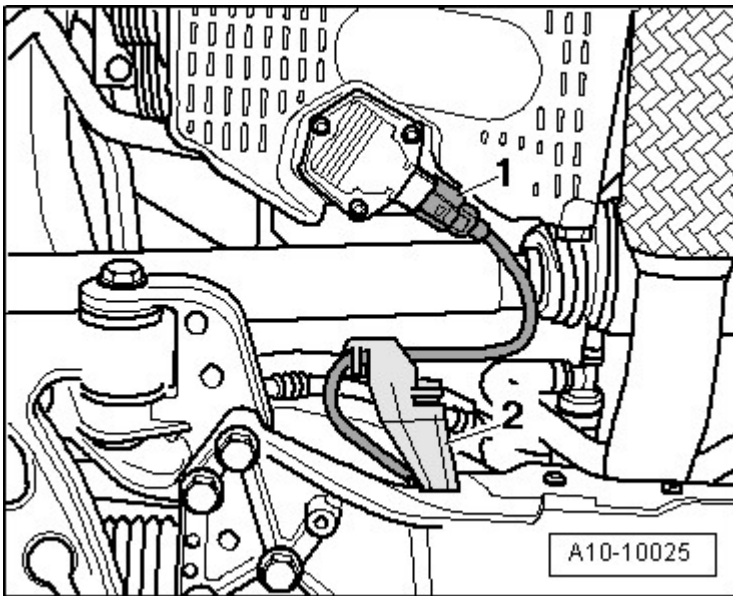


Fig. 87: Identifying Oil Level Thermal Sensor G266 Wire On Subframe
 Courtesy of AUDI OF AMERICA, LLC

-- Unclip bracket -2- for electrical wiring to oil level thermal sensor from subframe.

Vehicles with Front Wheel Drive

-- Remove the bolts -arrows- and remove the right drive axle heat shield.

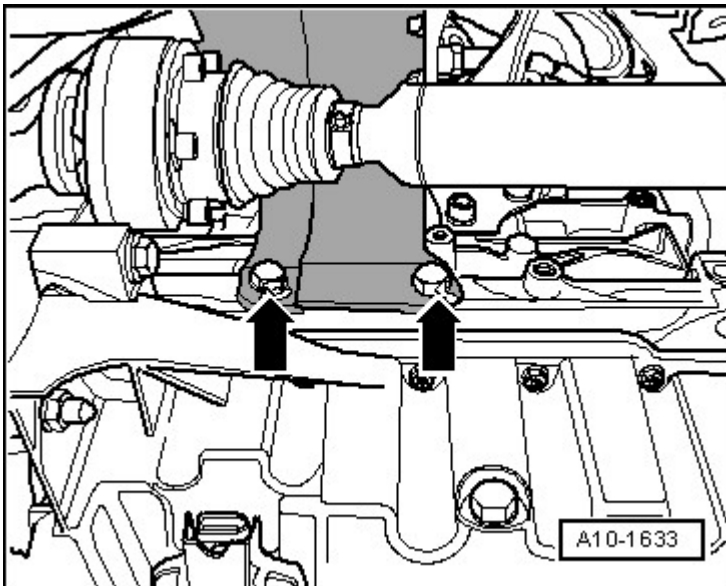


Fig. 88: Identifying Protective Cap For Drive Axle On Engine
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right drive axles from the transmission flange shaft.

- Tie up the left drive axle.
- Remove the left and right coupling rod nuts -arrow- on the stabilizer bar.

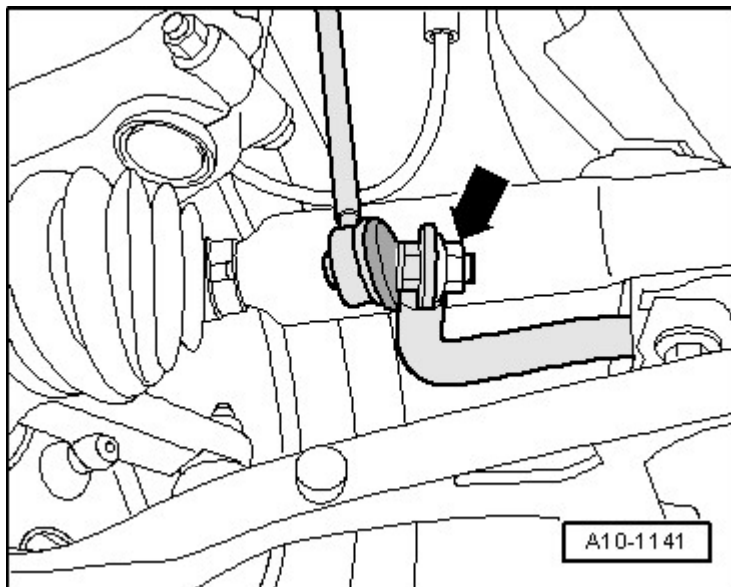


Fig. 89: Identifying Left And Right Coupling Rod Nuts
Courtesy of AUDI OF AMERICA, LLC

Vehicles with All Wheel Drive

- Remove the bolts -arrows- and remove the right drive axle heat shield.

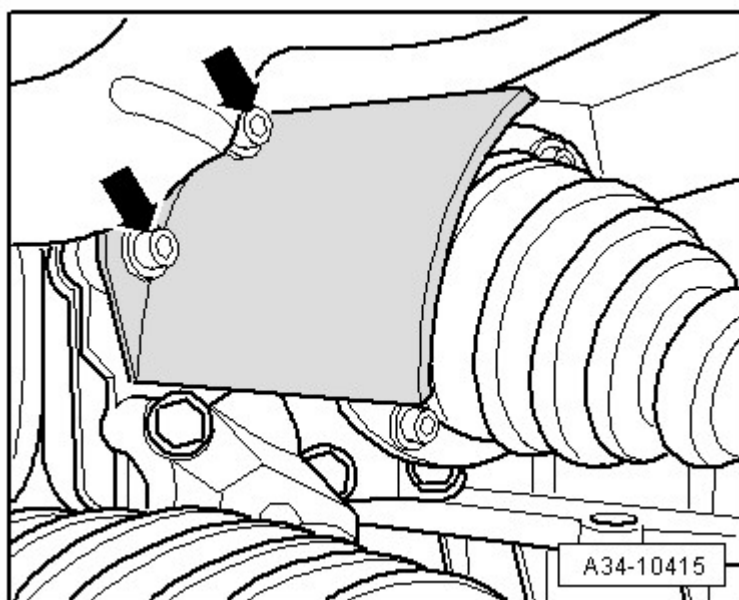


Fig. 90: Identifying Right Drive Axle Heat Shield
Courtesy of AUDI OF AMERICA, LLC

-- Remove the left drive axle from the transmission flange shaft and tie it up.

NOTE: **Make sure the drive axle surface protection is not damaged.**

-- Remove the right drive axle from the bevel box flange shaft.

All Vehicles

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

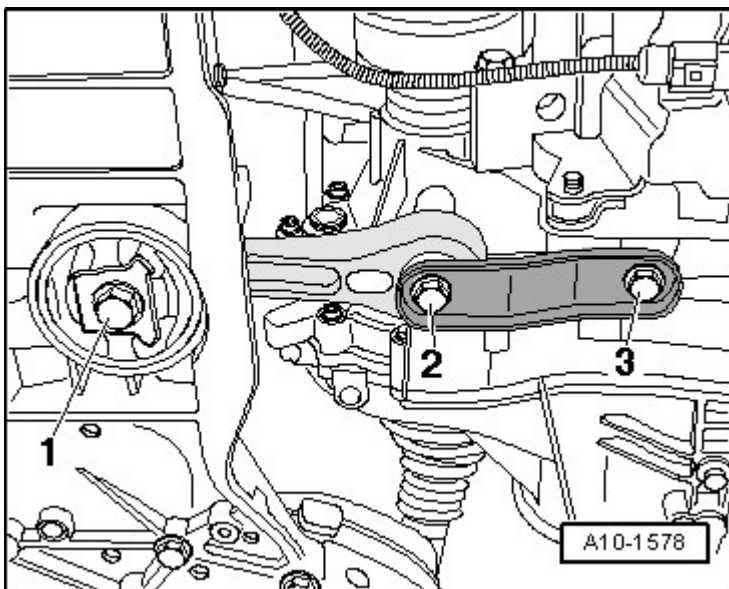


Fig. 91: Identifying Pendulum Support & Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Mark the position of the ball joint nuts -arrows-.

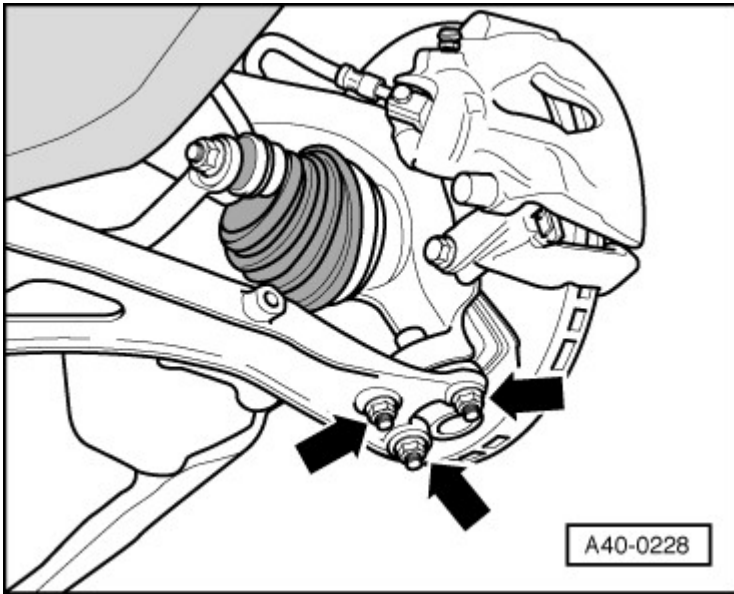


Fig. 92: Identifying Ball Joint Lower Nuts
Courtesy of AUDI OF AMERICA, LLC

- Remove the nuts on the right ball joint.
- Remove the nuts on the left front level control system sensor -G78- bracket, if equipped.
- Disengage the control arm from the transverse link.

Vehicles with Front Wheel Drive

- Tilt the right drive axle forward while pressing the engine/transmission subassembly forward.
- Secure the drive axle to the longitudinal member -arrow-.

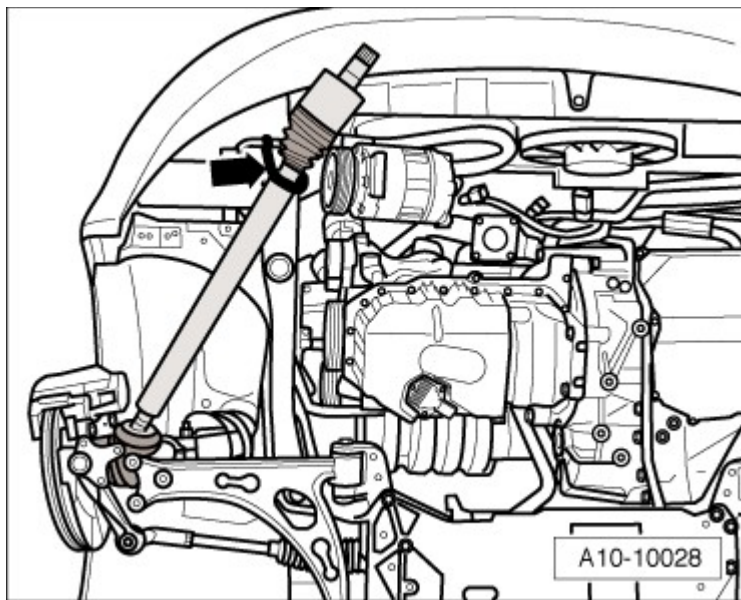


Fig. 93: Identifying Drive Axle Secured To Longitudinal Member
Courtesy of AUDI OF AMERICA, LLC

NOTE: Make sure the drive axle surface protection is not damaged.

Vehicles with All Wheel Drive

-- Tilt the right suspension strut outward and support it with the extension 2024 A /1 as shown in the illustration.

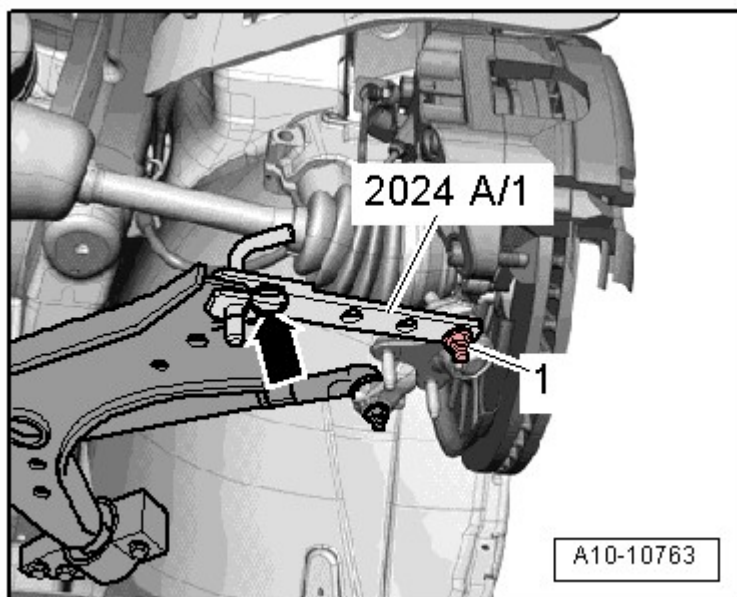


Fig. 94: Tilting Right Suspension Strut Outward And Supporting It With Extension 2024 A /1
Courtesy of AUDI OF AMERICA, LLC

WARNING: Loose support components could cause an accident.

- Secure the securing pin and control arm using the securing pin - arrow- and nut -1-.

NOTE: The installed position of the left front suspension is shown in the illustration.

-- Position of flexible disc and bevel box flange are marked to each other.

-- Remove driveshaft flexible disc from bevel box -arrows- while counterholding on triangle flange with lever.

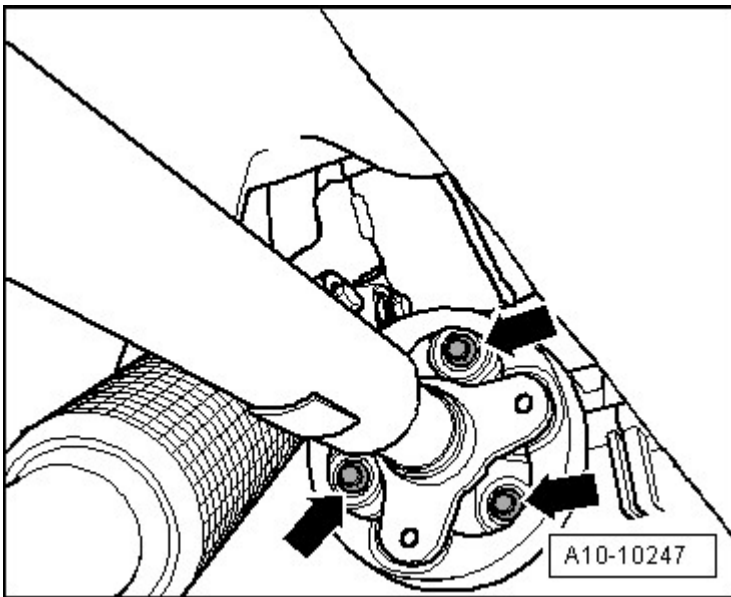


Fig. 95: Identifying Driveshaft Flexible Disc
Courtesy of AUDI OF AMERICA, LLC

-- Press the engine/transmission subassembly slightly forward and remove the driveshaft from the bevel box.

CAUTION: Risk of damaging sealing ring -arrow- in driveshaft flange.

- Press driveshaft horizontally as far back and to right side of vehicle as possible.

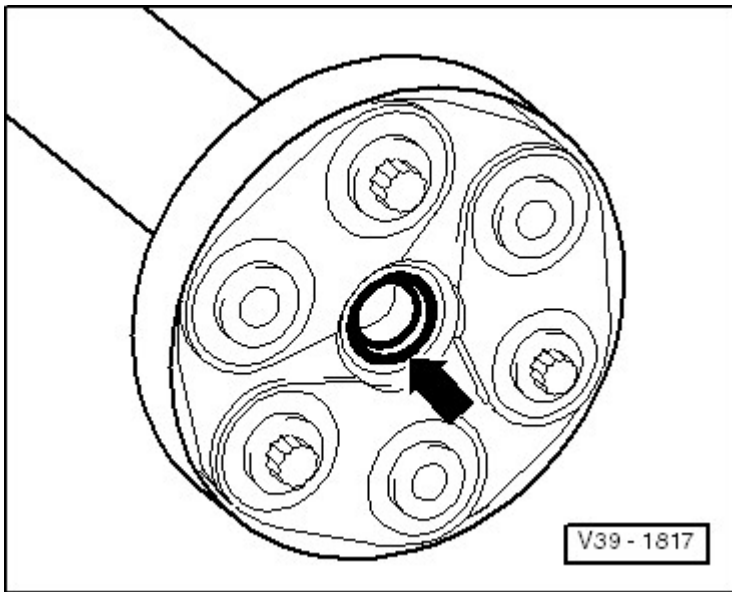


Fig. 96: Identifying Sealing Ring In Driveshaft Flange
Courtesy of AUDI OF AMERICA, LLC

NOTE: If seal is damaged, driveshaft must be replaced.

-- Remove the nuts -1- and -2- and the particulate filter mount.

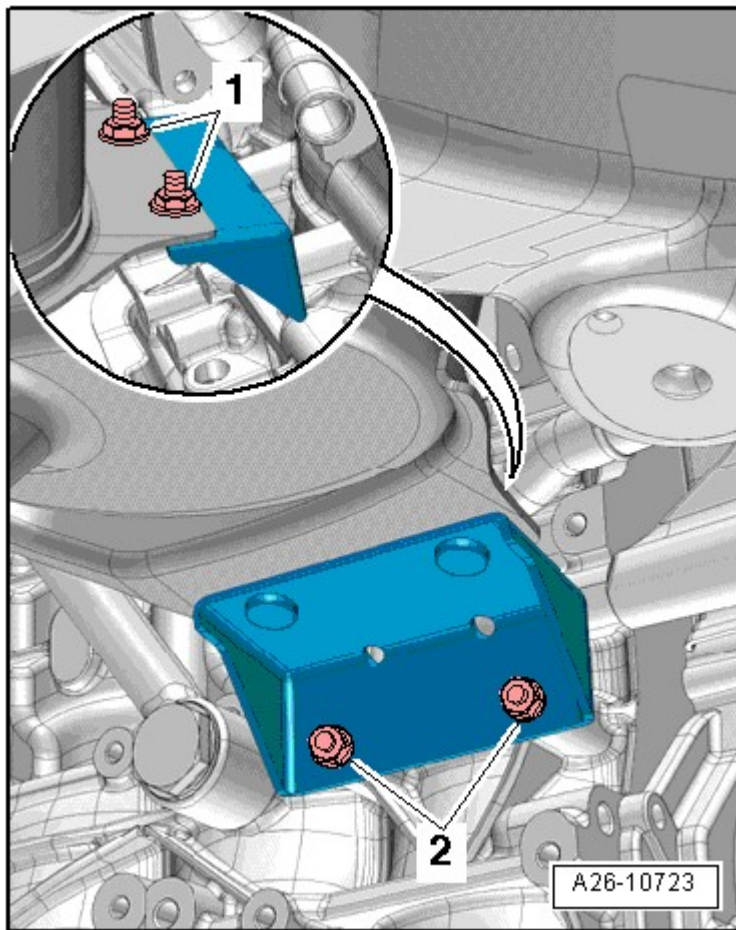


Fig. 97: Identifying Particulate Filter Mount And Nuts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -1- on the cable mounting bracket.

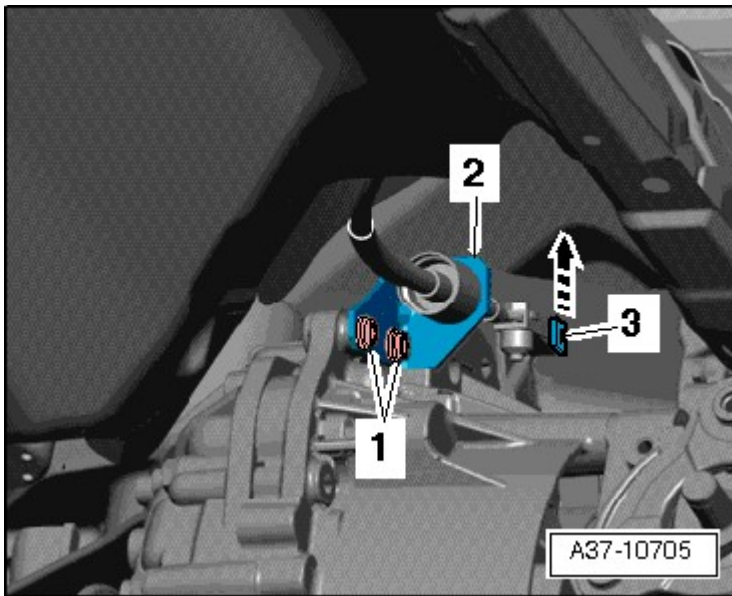


Fig. 98: Identifying Elector Lever Cable Bracket Bolts And Locking Washer
Courtesy of AUDI OF AMERICA, LLC

-- Remove locking washer -3- -arrow- and remove selector lever cable from transmission.

NOTE: Ignore -2-.

-- Remove bolts -arrows-.

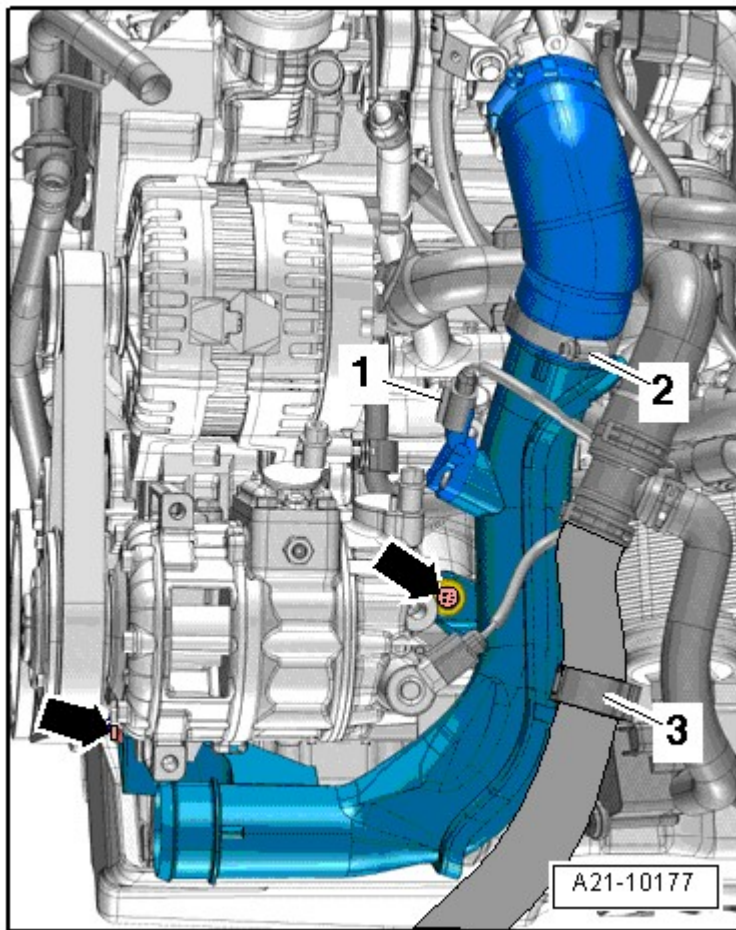


Fig. 99: Identifying Charge Air Pipe Bolts
 Courtesy of AUDI OF AMERICA, LLC

- Free up the coolant hose -3-.
- Loosen the hose clamp -2-.
- Disconnect the connector -1- on the charge air pressure sensor -G31- and then remove the air guide pipe.
- Remove the bolt -arrow- and move the EGR cooler pump -V400- to the side.

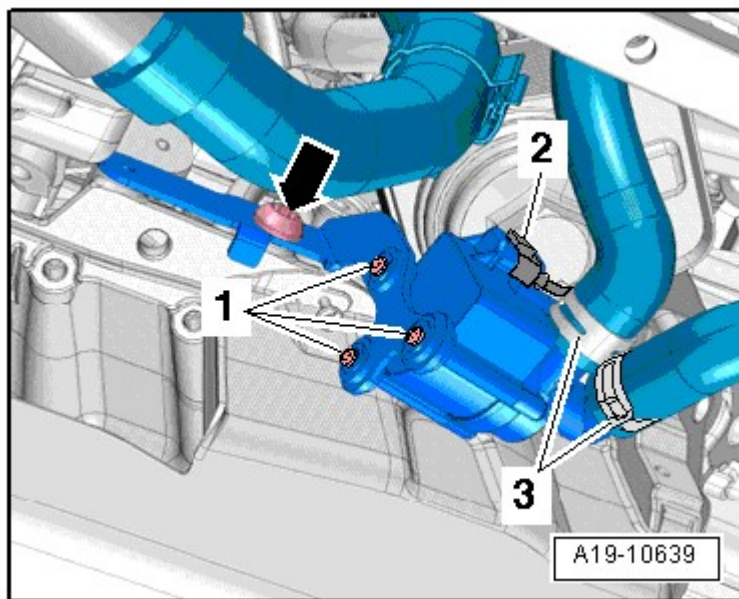


Fig. 100: Identifying Engine Coolant Circulation Pump Bolt
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1, 2 and 3-.

-- Loosen the fasteners -arrows- and remove the oil pan noise insulation -1-.

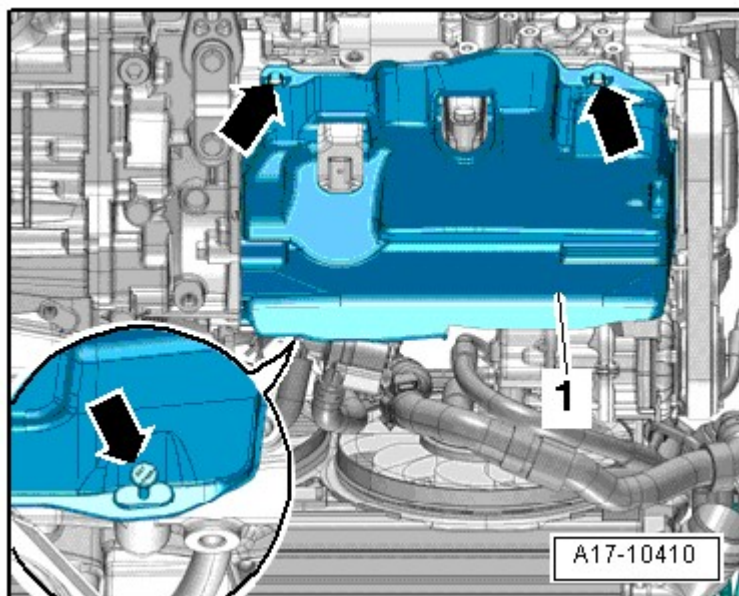


Fig. 101: Identifying Oil Pan Noise Insulation -1-
Courtesy of AUDI OF AMERICA, LLC

-- Attach the T10012 to cylinder block with bolt -1- and nut -2-. Tighten to approximately 20 Nm.

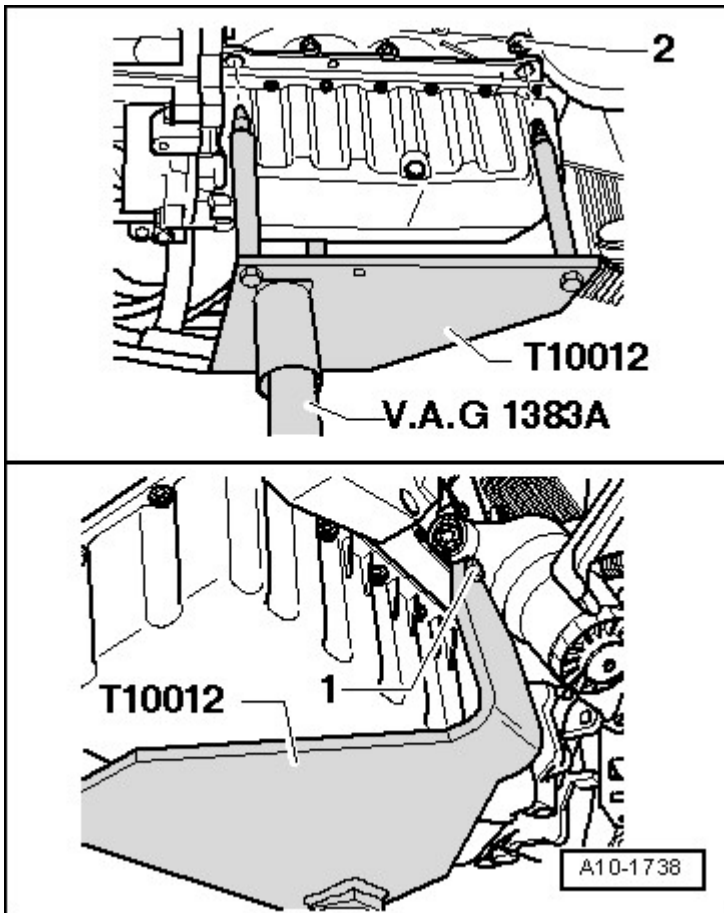


Fig. 102: Attaching Engine Support T10012 On Engine
Courtesy of AUDI OF AMERICA, LLC

-- Place V.A.G 1383 A on T10012 and raise engine/transmission subassembly slightly.

NOTE: Use VAS 5085 to remove bolts for assembly mounting.

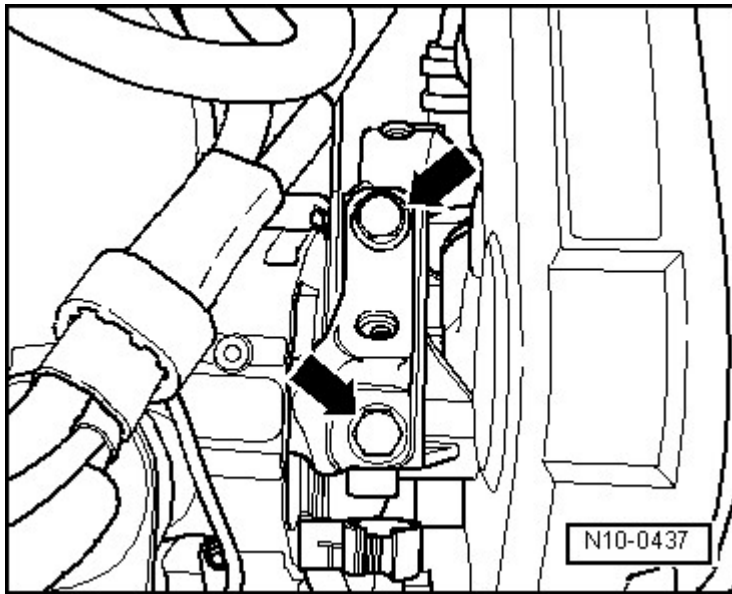


Fig. 103: Identifying Mounting Bolts Of Subframe Mount/Engine Bracket
Courtesy of AUDI OF AMERICA, LLC

- Remove the subframe bolts -arrows- on the engine side.
- Remove the subframe bolts -arrows- on the transmission side completely.

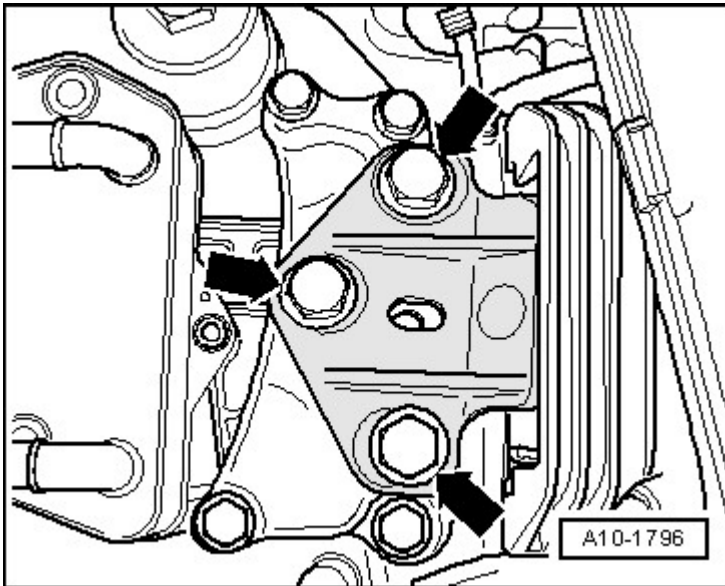


Fig. 104: Identifying Engine Mount To Engine Mount Bracket Bolts
Courtesy of AUDI OF AMERICA, LLC

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

While lowering, carefully guide engine/transmission assembly in order to

prevent damages.

Make sure there is enough clearance for the A/C compressor and for the left drive axle.

-- Lower the engine/transmission subassembly a little.

-- Move the engine/transmission subassembly forward and lower it a little more.

ENGINE AND S-TRONIC TRANSMISSION, SEPARATING

Special tools and workshop equipment required

- Special Hook 10 - 222 A /20
- Bracket 2024 A /1, part of the Engine Sling 2024 A
- Shop Crane VAS 6100

Procedure

- Engine/transmission assembly removed and mounted on engine/transmission support T10012.

-- Loosen the hose clamps -arrows- and remove the coolant hoses from the transmission fluid cooler.

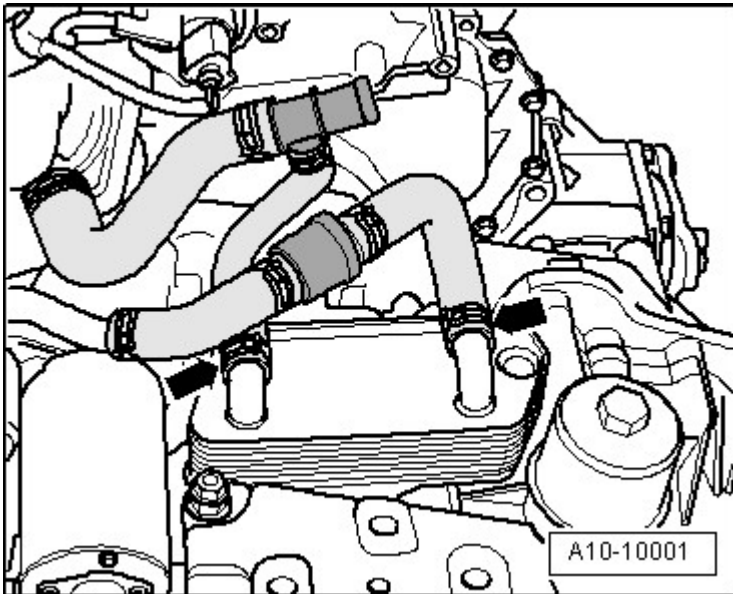


Fig. 105: Identifying Transmission Oil Cooler Coolant Hoses And Clamps
Courtesy of AUDI OF AMERICA, LLC

-- Attach the 2024 A hooks to the transmission lifting eyes and secure it with the securing pin -arrow-.

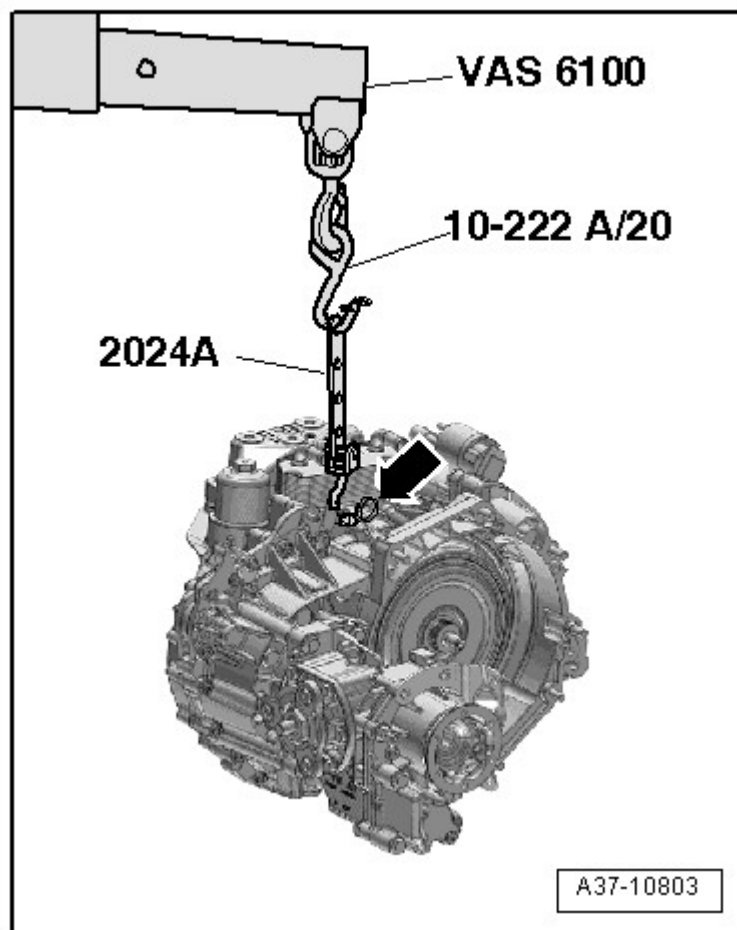


Fig. 106: Installing 2024 A To Transmission
Courtesy of AUDI OF AMERICA, LLC

- Attach the VAS 6100 with the 10 - 222 A /20 to the lifting tackle.
- Free up the wiring harness -arrows- and the connector -1- on the bracket.

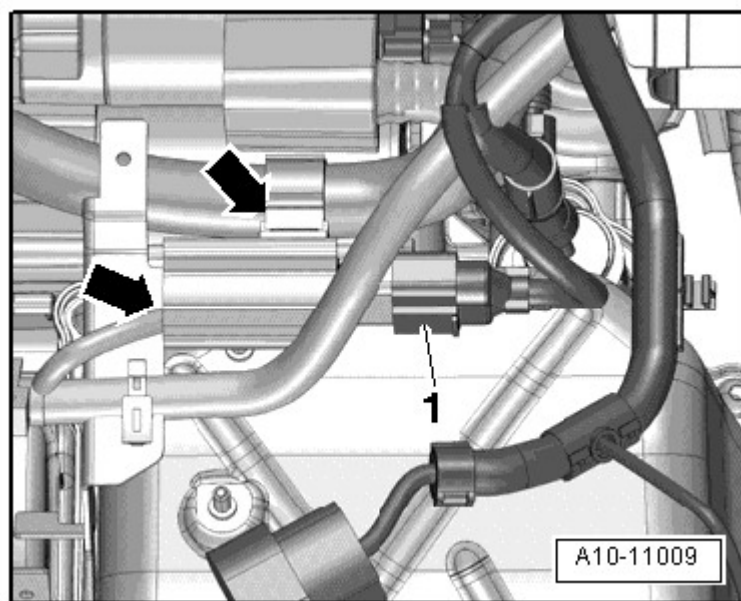


Fig. 107: Identifying Wiring Harnesses And Connector On Hot Side Charge Air Pipe
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -1- and -2- and then remove the starter from the transmission.

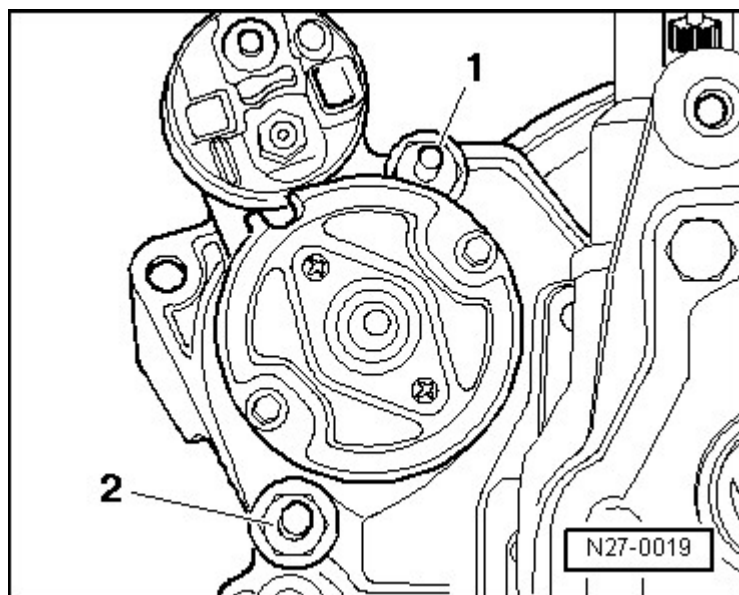


Fig. 108: Identifying Starter Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -1, 3, 5, 6, 7, 8, 9 and 10- that connect the transmission to the engine.

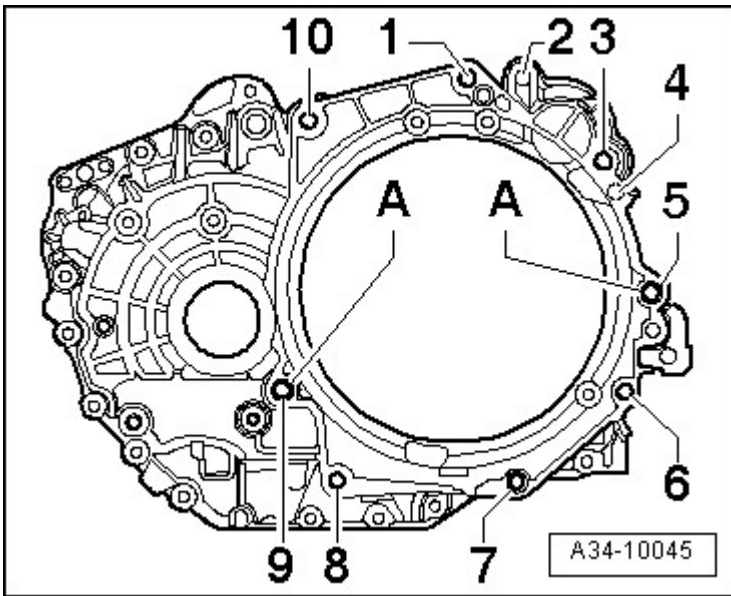


Fig. 109: Identifying Direct Shift Automatic Transmission To Engine Mounting Bolts
 Courtesy of AUDI OF AMERICA, LLC

NOTE: The bolt -3- is accessible only after the starter is removed.

Ignore -2 and 4- and -A-.

-- Remove transmission from engine.

ENGINE, SECURING TO ENGINE AND TRANSMISSION HOLDER

Special tools and workshop equipment required

- Holding Fixture VW 540
- Lifting Tackle 3033
- Engine and Transmission Holder VAS 6095
- Shop Crane VAS 6100

Procedure

- Transmission separated from engine.

-- Engage 3033 on engine and on VAS 6100 as shown in illustration.

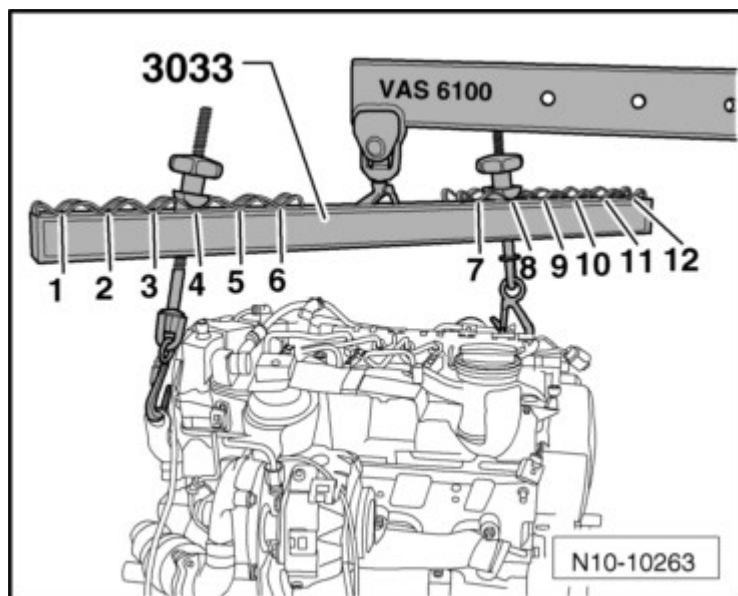


Fig. 110: Identifying Lifting Tackle 3033/ Shop Crane VAS 6100
Courtesy of AUDI OF AMERICA, LLC

-- Raise the engine from the VAS 6100 using the T10012.

-- Secure the engine with the VW 540 to the VAS 6095.

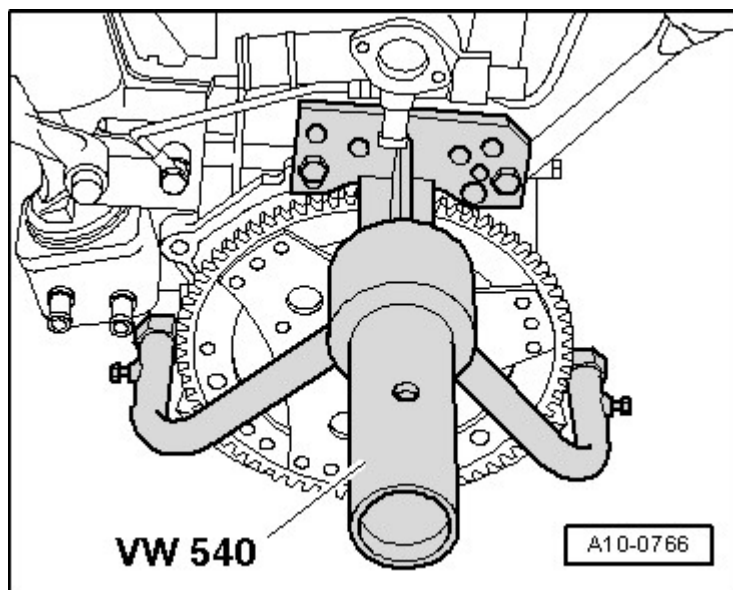


Fig. 111: Identifying Engine Transmission Bracket VW 540
Courtesy of AUDI OF AMERICA, LLC

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 tightening specifications $\pm 15\%$.

Tightening specifications, refer to SUBFRAME ASSEMBLY OVERVIEW.

Additional tightening specifications

Component		Nm
Bolts and nuts	M6	10
	M7	15
	M8	20
	M10	40
	M12	65
Exceptions:		
Driveshaft heat shield to the cylinder block		35
Front underbody crossmember to the body		23

Mounting, S-tronic transmission to engine

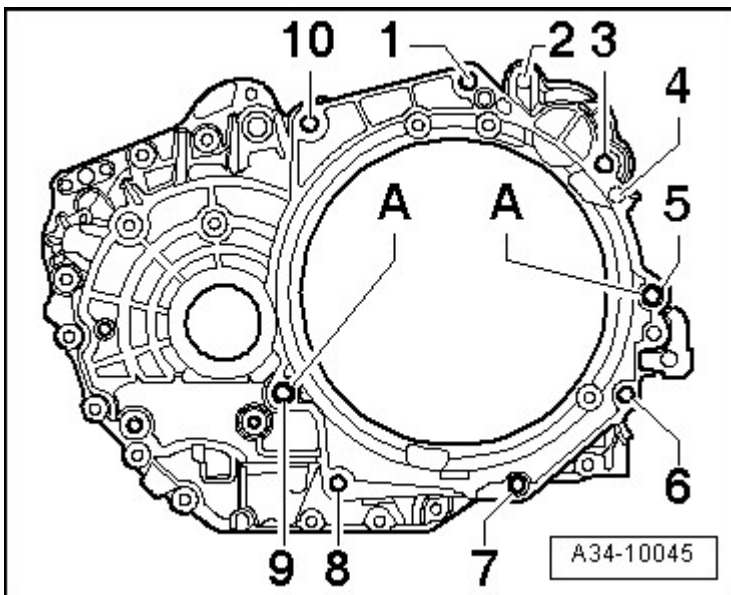


Fig. 112: Identifying Direct Shift Automatic Transmission To Engine Mounting Bolts

Courtesy of AUDI OF AMERICA, LLC

2012 Audi A3 2.0 TDI

ENGINE 2.0 Liter - Engine Assembly - Engine Code(s): CBEA

Item	Bolt	Nm
1, 3, 10	M12x55	80
5	M12x65	80
6, 7, 8	M10x50	40
9	M12x70	80
2, 4	Starter, securing. Refer to <u>REMOVAL AND INSTALLATION</u>	
A	Alignment sleeves for centering	

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

- The engine/transmission subassembly is attached to the engine bracket T10012.

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

Replace self-locking nuts and bolts as well as sealing rings, seals and O-rings.

The hose connections as well as the air guide pipes and hoses must be free of oil and grease before installing.

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

In order to be able to securely mount the air guide hoses on their connectors, spray the bolts on the previously used clamps with a rust remover.

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

-- Make sure the intermediate plate is engaged on the sealing flange and slide onto the guide sleeves -arrows-.

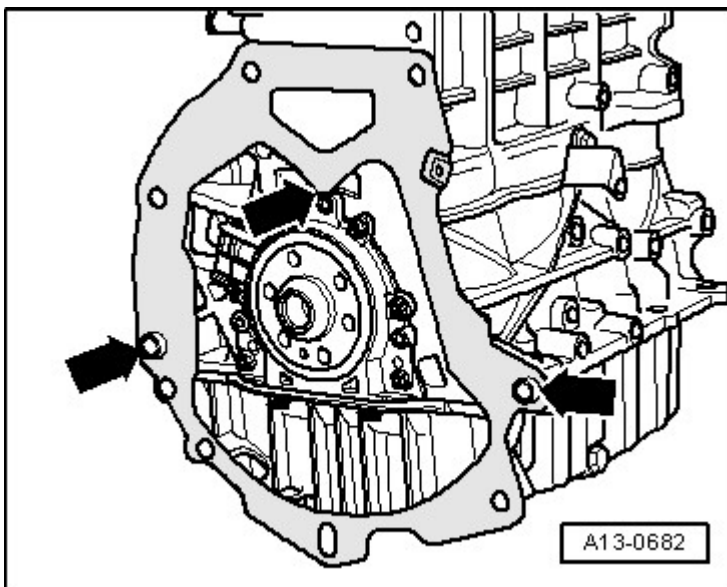


Fig. 113: Identifying Intermediate Plate Is Hooked In At Sealing Flange And Is Pushed Onto Alignment

Sleeves

Courtesy of AUDI OF AMERICA, LLC

-- If the alignment sleeves -A- for centering the engine and transmission are missing inside the cylinder block, then install the sleeves.

-- If a needle bearing is installed in crankshaft, remove needle bearing. Refer to **NEEDLE BEARING ON CRANKSHAFT**.

-- Lightly lubricate transmission input shaft splines with clutch disc connection lubricating grease.

-- Check clutch drive plate centering.

-- If the alignment sleeves -A- for centering the engine and transmission are missing inside the cylinder block, then install the sleeves.

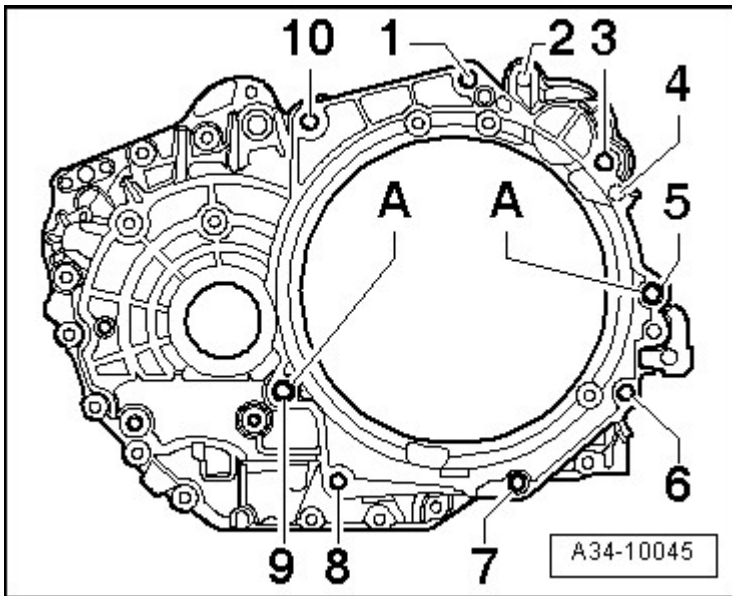


Fig. 114: Identifying Direct Shift Automatic Transmission To Engine Mounting Bolts

Courtesy of AUDI OF AMERICA, LLC

-- If no needle bearing is installed in crankshaft, install needle bearing. Refer to **NEEDLE BEARING ON CRANKSHAFT**.

-- Tighten the transmission to the engine.

-- Guide the engine/transmission subassembly into the body.

-- Install the bolts -arrows- for the subframe mount on the engine side first by hand all the way.

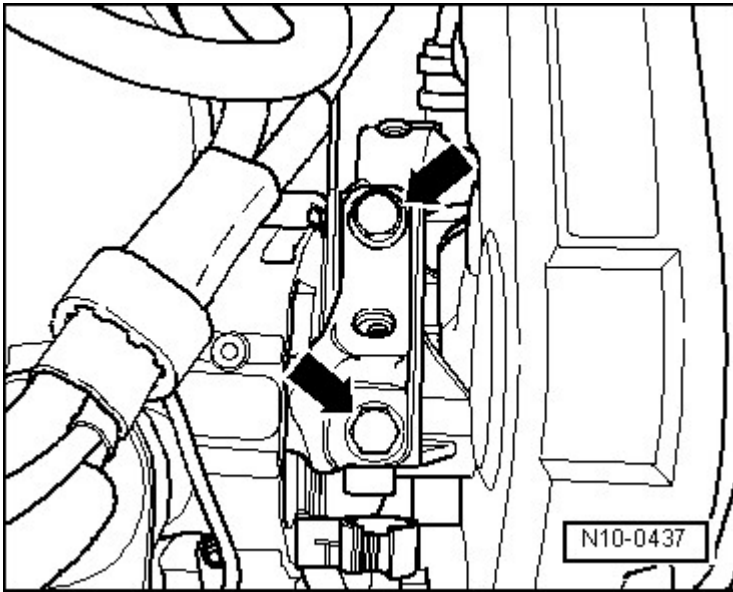


Fig. 115: Identifying Mounting Bolts Of Subframe Mount/Engine Bracket
 Courtesy of AUDI OF AMERICA, LLC

-- Install the bolts -arrows- for the subframe mount on the transmission side first by hand all the way.

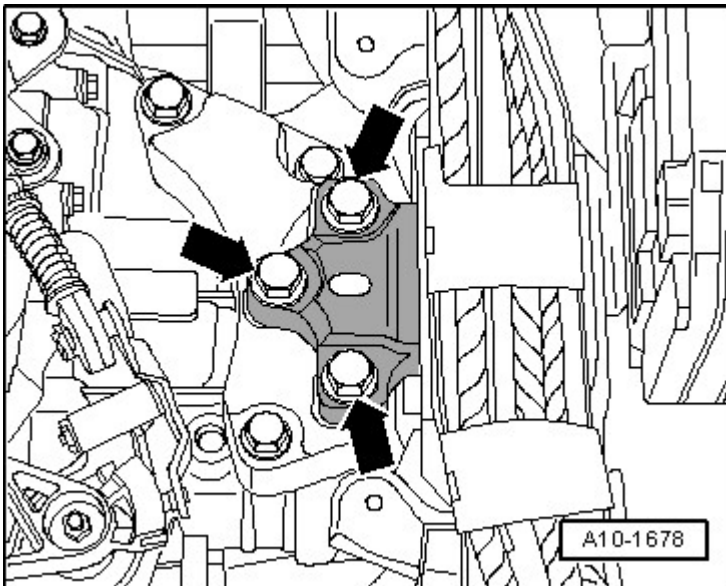


Fig. 116: Identifying Bolts To Assembly Mounting On Transmission
 Courtesy of AUDI OF AMERICA, LLC

NOTE: The bolts are first tightened to final torque after the subframe mount has been adjusted. Refer to SUBFRAME MOUNT, ADJUSTING.

-- Remove engine bracket T10012 from engine.

-- Install the starter. Refer to STARTER - ENGINE CODE(S): CBEA .

-- Install the EGR cooler pump -V400-. Refer to **COOLANT PIPES, COOLANT TEMPERATURE SENSORS AND COOLANT PUMP ASSEMBLY OVERVIEW** .

-- Install the air guide pipe. Refer to **CHARGE AIR COOLER ASSEMBLY OVERVIEW** .

-- Install and adjust the selector lever cable. Refer to **REMOVAL AND INSTALLATION** .

-- Install the particulate filter. Refer to **PARTICULATE FILTER** .

-- Install the drive axles, the transverse links and the coupling rods. Refer to **Removal and Installation** .

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

-- Install the ribbed belt. Refer to:

- **RIBBED BELT, VEHICLES WITH TENSIONING DAMPER AND A/C COMPRESSOR**
- **RIBBED BELT, VEHICLES WITH TENSIONING ROLLER AND A/C COMPRESSOR**
- **RIBBED BELT, VEHICLES WITHOUT A/C COMPRESSOR**

-- Install the front section of the wheel housing liner. Refer to **Removal and Installation** .

-- Install the front wheels. Refer to **REMOVAL AND INSTALLATION** .

-- Install Engine Control Module (ECM). Refer to **Removal and Installation** .

-- Install the radiator. Refer to **RADIATOR** .

-- Connect the coolant hoses to the heat exchanger **RADIATOR AND COOLANT FAN ASSEMBLY OVERVIEW** .

-- Install the auxiliary fuel pump -V393-. Refer to **AUXILIARY FUEL PUMP** .

-- Install exhaust pressure sensor 1 -G450-. Refer to **Removal and Installation** .

-- Install the filler tube and the windshield wiper fluid reservoir filler tube. Refer to **REMOVAL AND INSTALLATION** .

-- Install the air guide hose with the connector coupling **CHARGE AIR COOLER ASSEMBLY OVERVIEW** .

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

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

-- Install the battery tray and the battery. Refer to **REMOVAL AND INSTALLATION** .

-- Install and adjust the windshield wiper arms. Refer to **REMOVAL AND INSTALLATION** .

-- Install air filter housing. 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!

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

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

Dirty coolant may not be used again.

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

SPECIAL TOOLS

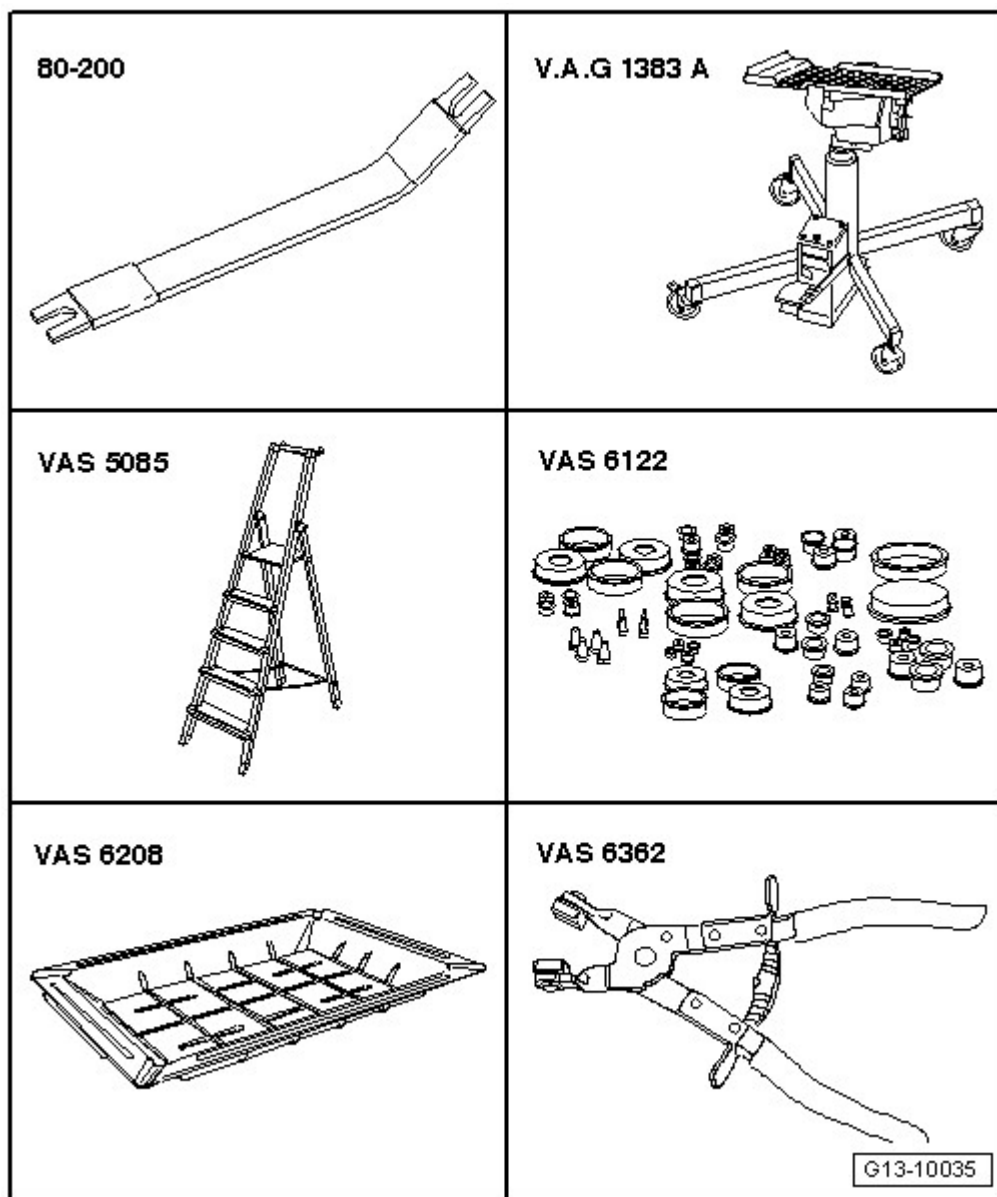


Fig. 117: Special Tools And Workshop Equipment (1 Of 2)

Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Pry Lever - Rmv Outside Mirror 80 - 200
- Engine/Transmission Jack V.A.G 1383 A
- Step Ladder VAS 5085
- Drip Tray VAS 6208
- Hose Clip Pliers VAS 6362

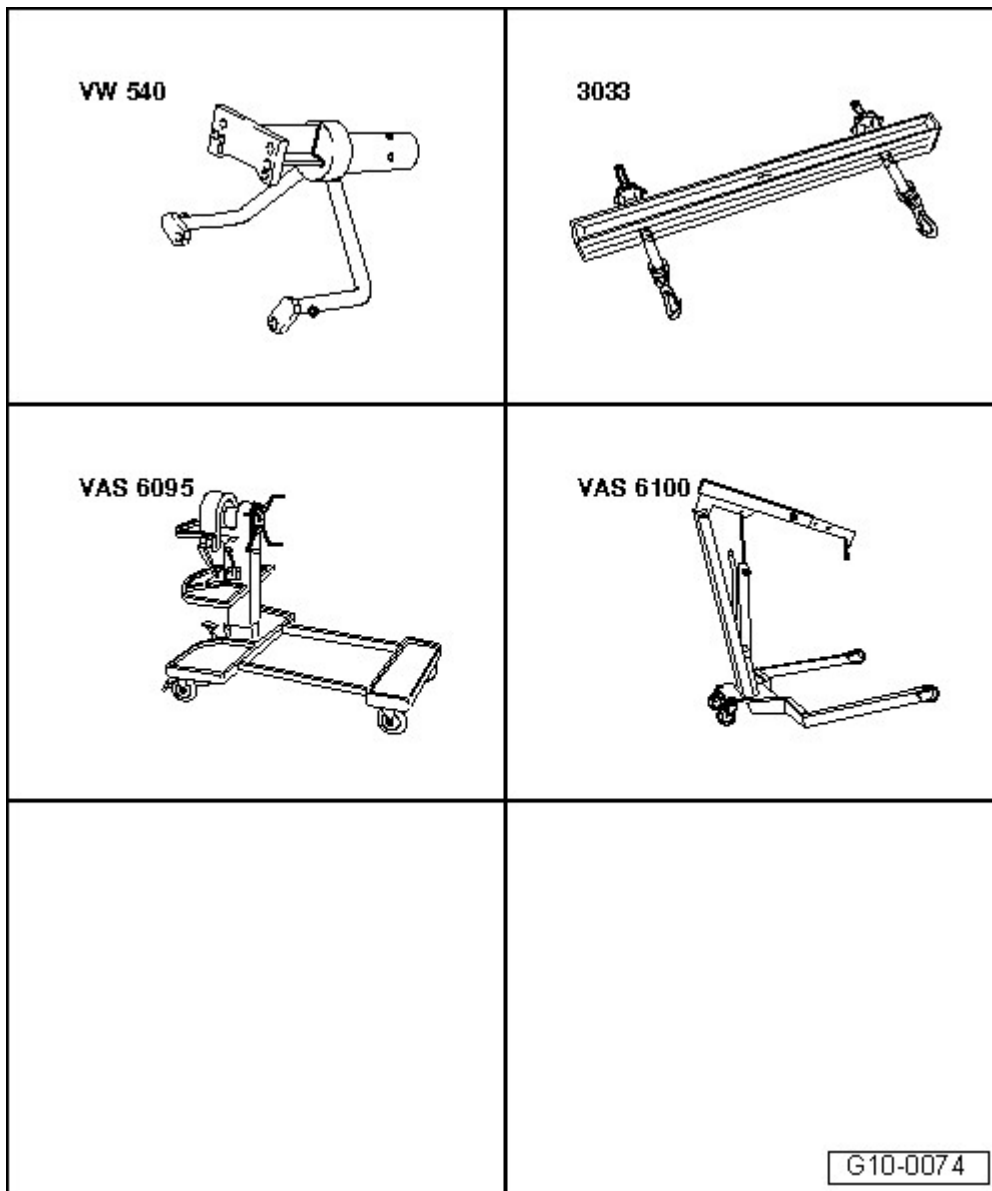


Fig. 118: Special Tools And Workshop Equipment (2 Of 2)

Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Holding Fixture VW 540
- Lifting Tackle 3033
- Engine and Transmission Holder VAS 6095
- Shop Crane VAS 6100

Special tools and workshop equipment required

- Engine Support Bridge 10 - 222 A

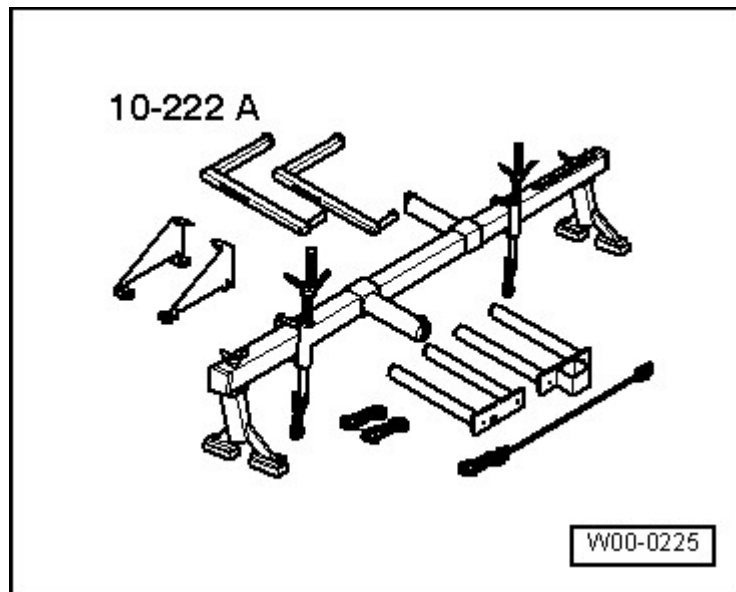


Fig. 119: Identifying Engine Support Bridge 10 - 222 A
Courtesy of AUDI OF AMERICA, LLC

- Bracket 2024 A /1, part of the Engine Sling 2024 A

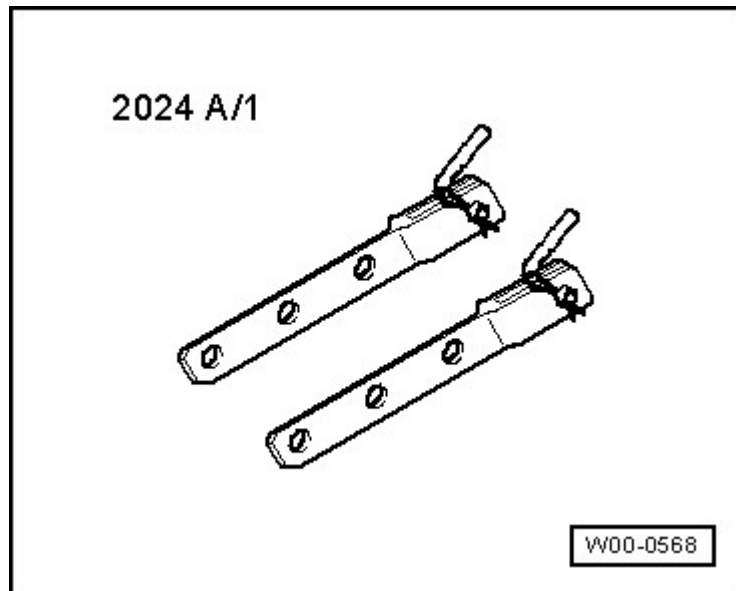


Fig. 120: Identifying Bracket 2024 A /1
Courtesy of AUDI OF AMERICA, LLC

- Locking Pin T10060 A

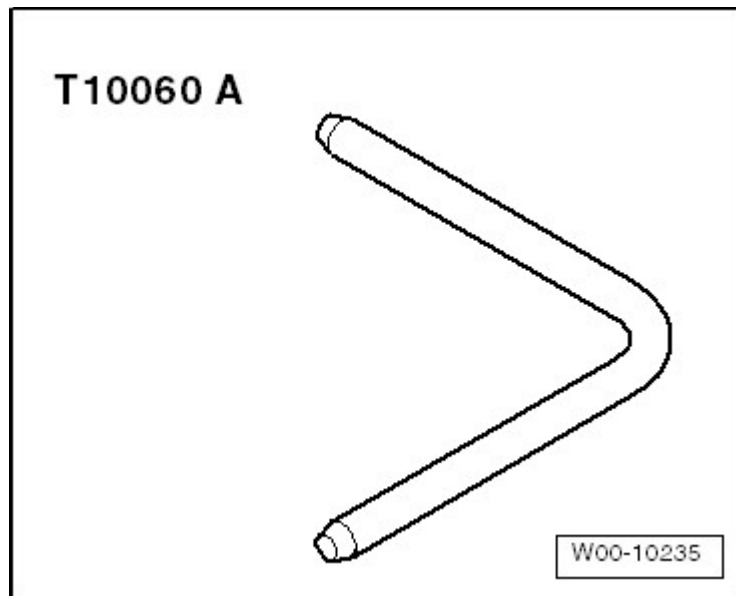


Fig. 121: Identifying Locking Pin T10060 A
Courtesy of AUDI OF AMERICA, LLC

- Engine/Trans. Support T10012

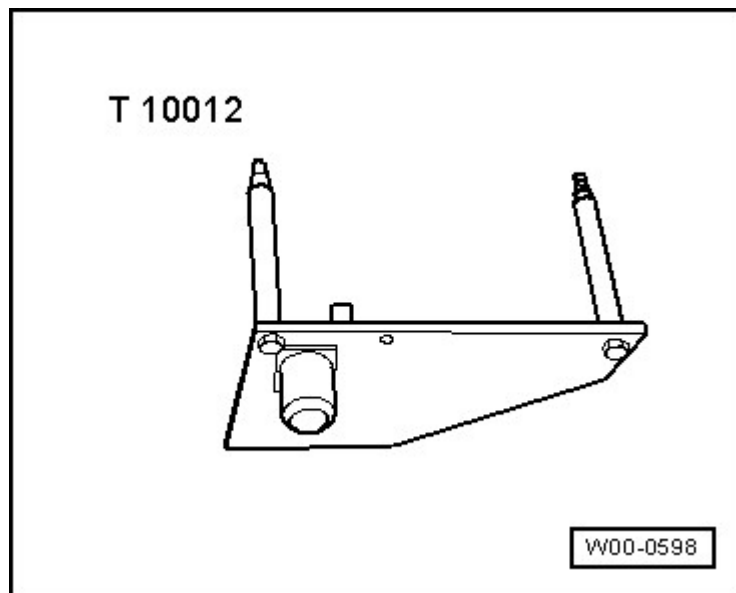


Fig. 122: Identifying Engine/Trans. Support T10012
Courtesy of AUDI OF AMERICA, LLC

- Special Hook 10 - 222 A /20

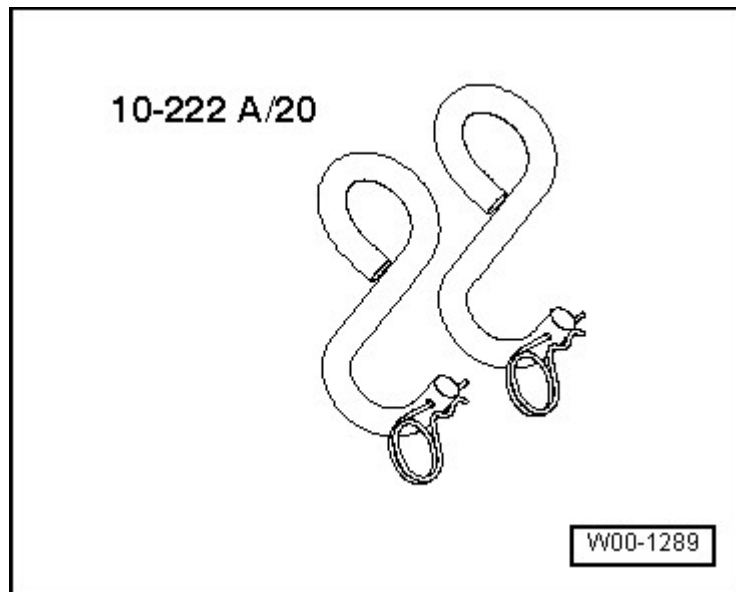


Fig. 123: Identifying Adapter 10 - 222 A/820
Courtesy of AUDI OF AMERICA, LLC

- Bracket 2024 A /1, part of the Engine Sling 2024 A

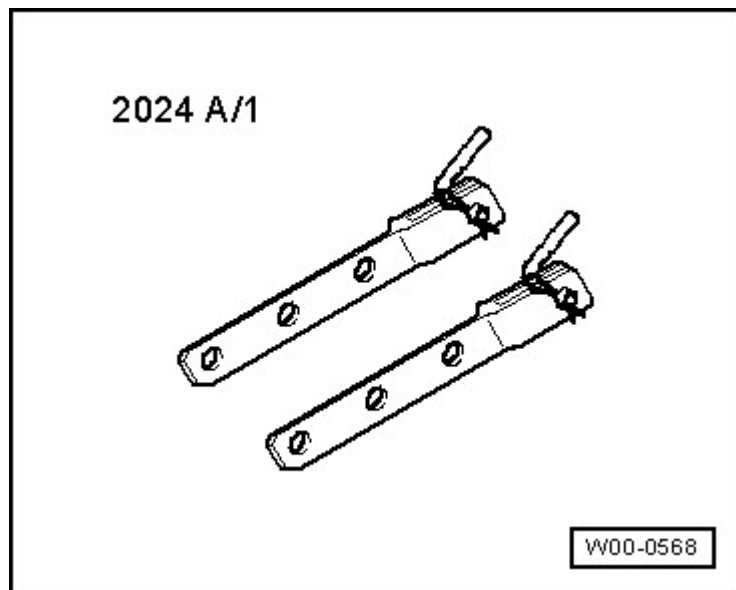


Fig. 124: Identifying Bracket 2024 A /1
Courtesy of AUDI OF AMERICA, LLC

- Shop Crane VAS 6100

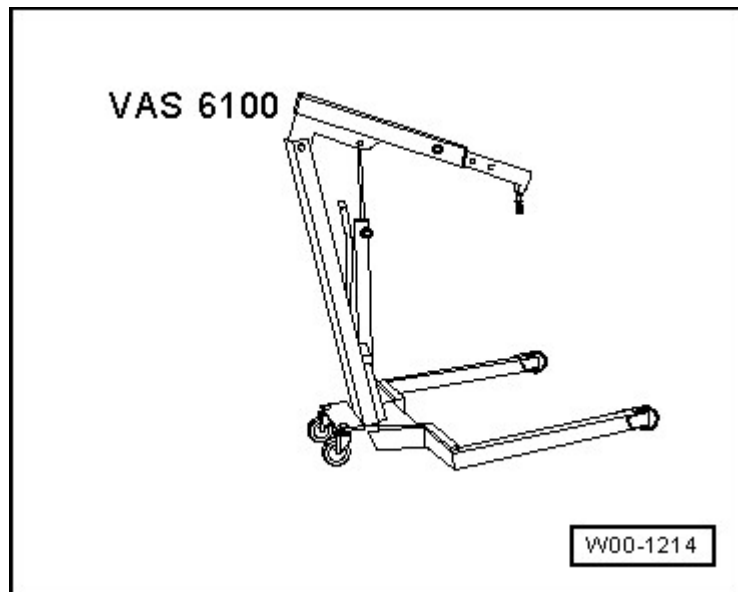


Fig. 125: Identifying Shop Crane VAS 6100
Courtesy of AUDI OF AMERICA, LLC

ENGINE**2.0 Liter - General, Technical Data - Engine Mechanical - Engine Code(s): CBEA****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 pressure.

- Place clean rags around the connection before opening the system. Then release pressure by carefully loosening the connection.
- Wear protective gloves.
- Wear safety glasses.

Very hot fuel can burn your skin.

- The temperature of the fuel lines and may reach 100 °C (212 °F) after stopping the engine. Let the fuel cool down before opening any line connections otherwise there is a danger of scalding.
- Wear protective gloves.
- Wear safety glasses.

To prevent personal injury and damage to the injection and pre-glow system, observe the following:

- The ignition must be switched off before connecting or disconnecting injection and pre-glow system wiring or tester cables.
- Only clean engine with ignition switched off.

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

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

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

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.

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 a 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 to 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 the 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 parts that have been removed on a clean surface and cover them. Use 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.).
- When the system is open: do not work with compressed air. Do not move vehicle unless absolutely necessary.
- Protect disconnected electrical connectors from dirt and moisture and only connect if dry.

ENGINE NUMBER

- The engine number (engine code and serial number) -arrow- is located at the front on the engine/transmission joint.

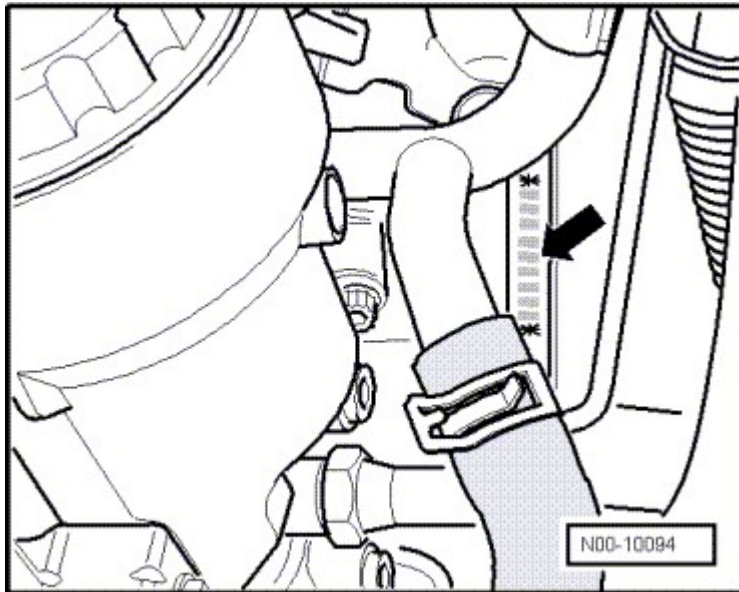


Fig. 1: Identifying Engine Number Location

Courtesy of AUDI OF AMERICA, LLC

- In addition, a sticker with engine codes and serial number is affixed to the toothed belt guard.
- Engine codes beginning with C are four-digit.
- The first 3 digits of the engine code stand for displacement and the mechanical structure of the engine. They are stamped in the cylinder block, including the serial number.
- The fourth digit describes the engine output and torque and depends on the engine control module.

NOTE: **The 4-digit engine code is on the type plate, vehicle data label and engine control module.**

Locations of the type plate and vehicle data label. Refer to 03 MAINTENANCE.

DIAGNOSIS .**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.

NOTE: If there is mechanical damage to the turbocharger, refer to **TURBOCHARGER** .

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.

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 not replace the radiator, condenser or turbocharger because of impressions like that.

LINES, ROUTING AND SECURING

To prevent mistakes and ensure the original installation location is kept, mark the hydraulic lines, vacuum lines or electrical lines before removing them. If necessary, draw sketches or take pictures.

SPECIFICATIONS**ENGINE DATA**

Code letters		CBEA
Displacement	liter	1.968
Output	kW at RPM	103/4200
Torque	Nm at RPM	320/1750 to 2500
Bore	diameter mm	81.0
Stroke	mm	95.5
Compression ratio		16.5

2012 Audi A3 2.0 TDI

ENGINE 2.0 Liter - General, Technical Data - Engine Mechanical - Engine Code(s): CBEA

CZ	at least	51
Ignition sequence		1-3-4-2
Exhaust gas recirculation		yes
Exhaust temperature control		yes
Turbocharger		Turbocharger
Glow plugs		Steel glow plugs
Charge air cooler		yes
		Heated oxygen sensor (HO2S) 1
Oxygen sensor regulation		
Particulate filter		yes
Valve per cylinder		4

NOTE: The Audi A3 with a 2.0L 4V TDI CR engine only has steel glow plugs.

DIAGNOSIS AND TESTING

FUEL SYSTEM, PERFORMING LEAK TEST

- Let engine run a few minutes at average RPM.
- Switch off ignition.
- Check entire fuel supply system for leaks.
- If there are leaks in spite of correct tightening specifications, the corresponding component must be replaced.
- Afterwards, perform the test drive, fully depressing the accelerator pedal at least once.
- Then, check the high pressure areas for leaks again.

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 stored in the DTC memory, check the vacuum lines for the named component, but also check all the vacuum lines.

-- If using the hand vacuum pump VAS 6213 and does not produce any vacuum or if the vacuum 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

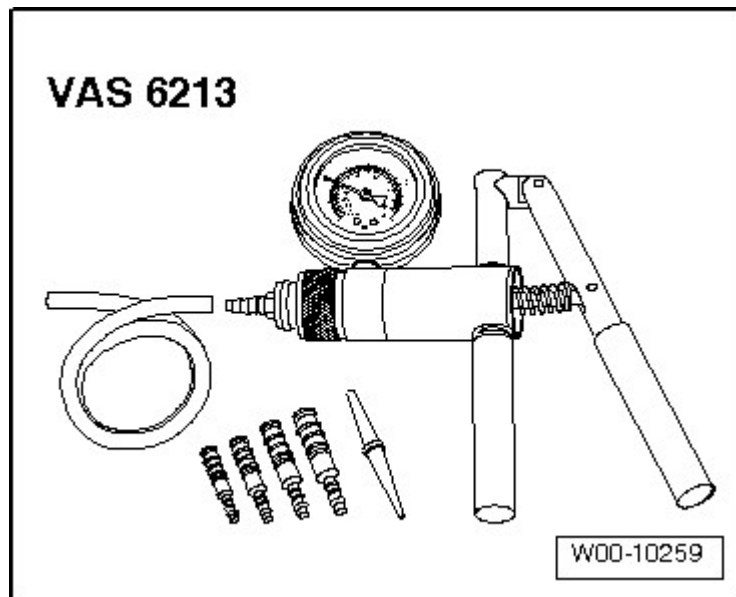


Fig. 2: Identifying Hand Vacuum Pump VAS 6213
Courtesy of AUDI OF AMERICA, LLC