

ENGINE

3.0 Liter - Crankshaft, Cylinder Block - Engine Code(s): CATA

13 CRANKSHAFT, CYLINDER BLOCK

DESCRIPTION AND OPERATION

RIBBED BELT DRIVE OVERVIEW

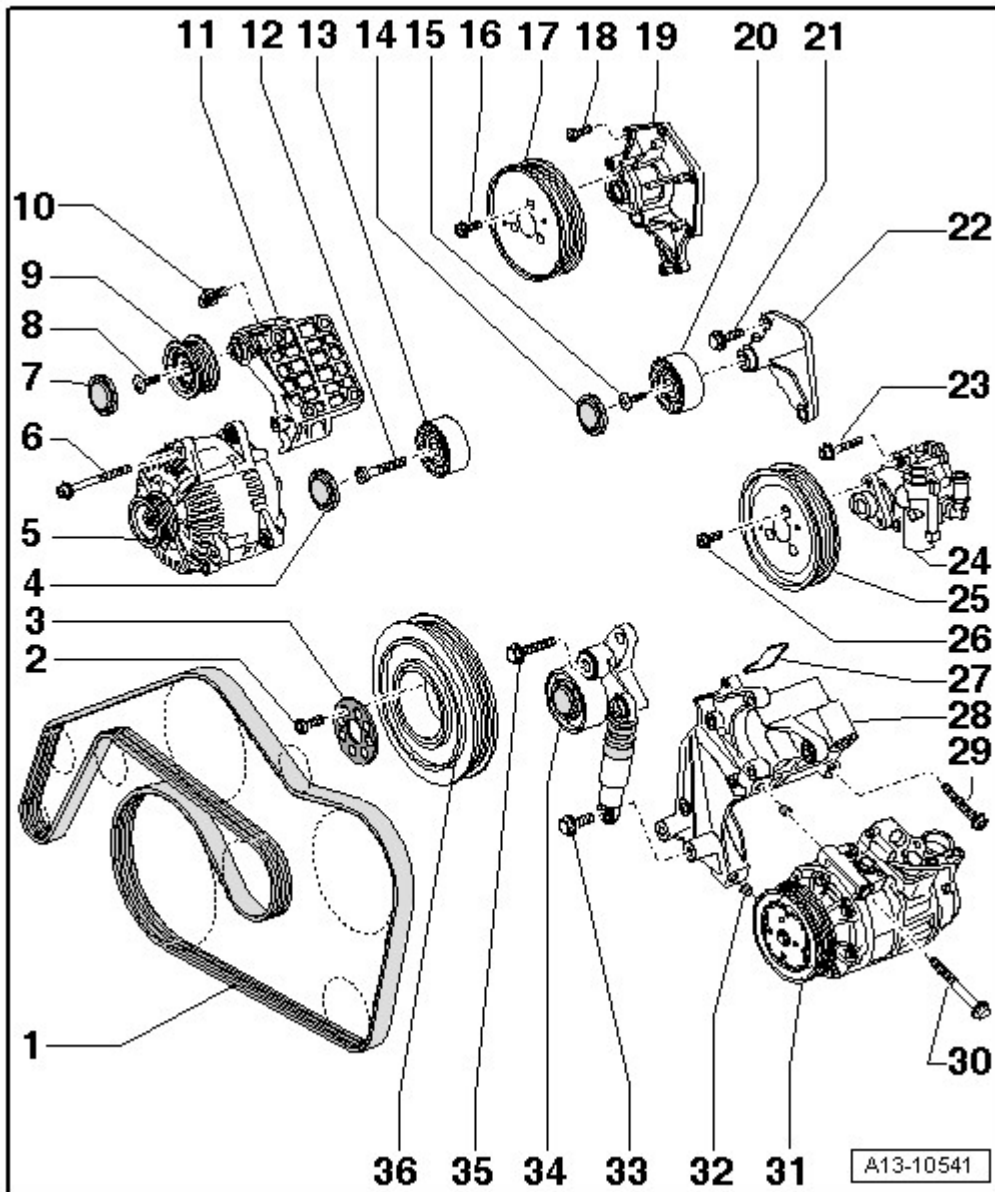


Fig. 1: Identifying Ribbed Belt Drive Overview
 Courtesy of AUDI OF AMERICA, LLC

1. Ribbed Belt

- Check for wear
- Before removing, mark the direction of rotation using chalk or a felt-tip pen.
- Removing and installing, refer to **RIBBED BELT**
- Do not kink
- When installing, make sure it is seated correctly on the ribbed belt pulleys

2. Bolt

- Replace
- 20 Nm plus an additional 90° turn

3. Shim

- Replace

4. Idler Roller Cover**5. Generator**

- Removing and installing, refer to **GENERATOR, AIR COOLED**

6. Bolt

- For the correct tightening specification, refer to **FASTENER TIGHTENING SPECIFICATIONS**

7. Idler Roller Cover**8. Bolt**

- 23 Nm

9. Idler Roller for Ribbed Belt

- On the generator bracket
- Pay attention to the installed position

10. Bolt

- 40 Nm

11. Generator and Idler Roller Bracket**12. Bolt**

- 23 Nm

13. Right Idler Roller for Ribbed Belt

- Pay attention to the installed position

14. Left Idler Roller Cover**15. Bolt**

- 23 Nm

16. Bolt

- Tightening specifications, refer to "Bolt" under **COOLANT PUMP AND COOLANT THERMOSTAT OVERVIEW**

17. Ribbed Belt Pulley for Coolant Pump

- Removing and installing, refer to **COOLANT PUMP**

18. **Bolt**
 - Tightening specification and sequence, refer to **Fig. 2**
19. **Coolant Pump**
 - Removing and installing, refer to **COOLANT PUMP**
20. **Left Idler Roller for Ribbed Belt**
 - Removing and installing, refer to **LEFT RIBBED BELT IDLER ROLLER**
 - Pay attention to the installed position
21. **Bolt**
 - 23 Nm
22. **Idler Roller Holder**
23. **Bolt**
 - Tightening specifications, refer to **FASTENER TIGHTENING SPECIFICATIONS**
24. **Power Steering Pump**
 - Removing and installing, refer to **Removal and Installation**
25. **Power Steering Pump Ribbed Belt Pulley**
 - Removing and installing, refer to **Removal and Installation**
26. **Bolt**
 - Tightening specifications, refer to **FASTENER TIGHTENING SPECIFICATIONS**
27. **Gasket**
 - Replace
28. **Bracket for Assemblies**
 - Removing and installing, refer to **LEFT COOLANT PIPE**
29. **Bolt**
 - 40 Nm
30. **Bolt**
 - Tightening specifications, refer to **FASTENER TIGHTENING SPECIFICATIONS**
31. **A/C Compressor**
 - Do not remove or disconnect refrigerant lines
 - Removing and installing, refer to **Removal and Installation**
 - Be careful of the alignment sleeves -item 32- when installing
32. **Alignment Bushing**
 - 2 pieces
 - Make sure the accessory assembly bracket fits correctly
33. **Bolt**
 - 23 Nm
34. **Ribbed Belt Tensioning Damper**
 - Removing and installing, refer to **RIBBED BELT TENSIONER**
35. **Bolt**

- Replace
- 50 Nm plus an additional 90° turn

36. Vibration Damper with Ribbed Belt Pulley

- Removing and installing, refer to **VIBRATION DAMPER WITH RIBBED BELT PULLEY**,

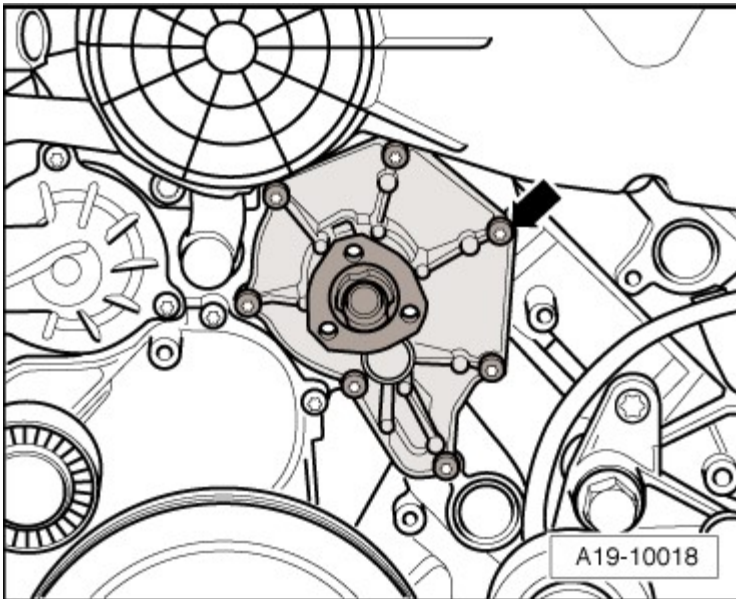


Fig. 2: Identifying Coolant Pump Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

SEAL AND SEALING FLANGE, PULLEY SIDE OVERVIEW

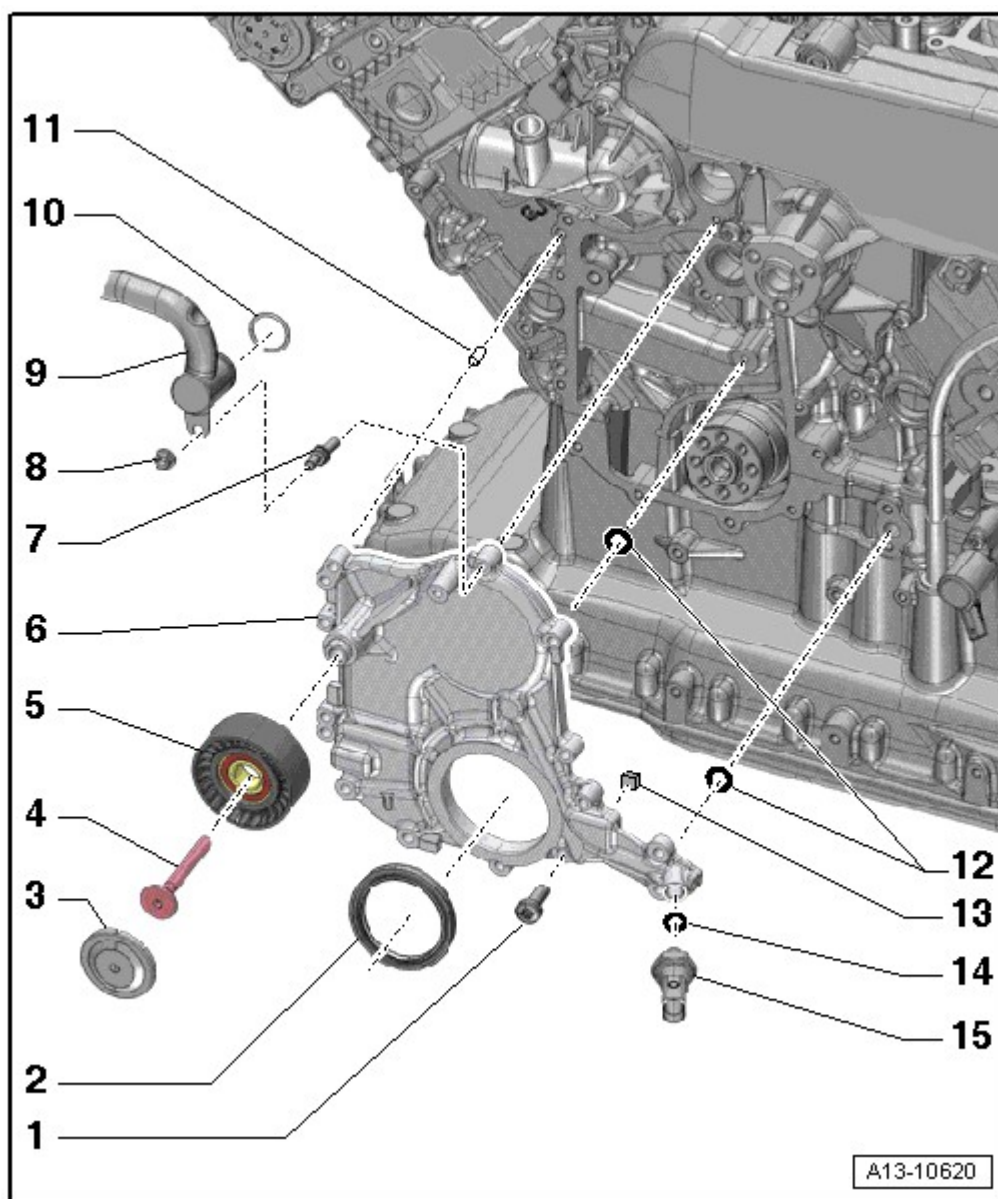


Fig. 3: Identifying Seal And Sealing Flange, Pulley Side Overview

Courtesy of AUDI OF AMERICA, LLC

1. Bolt

- Tightening specification and sequence, refer to **Fig. 4**

2. Crankshaft Shaft Seal, Belt Pulley Side

- Removing and installing, refer to **CRANKSHAFT SHAFT SEAL, BELT PULLEY SIDE, REPLACING**

3. Right Idler Roller Cover

4. Bolt

- Tightening specifications, refer to item 12

5. Right Idler Roller for Ribbed Belt

- Pay attention to the installed position
- 6. **Sealing Flange (belt pulley side)**
 - Removing and installing, refer to **SEALING FLANGE, BELT PULLEY SIDE**
- 7. **Double Bolt**
 - 9 Nm
- 8. **Nut**
 - Tightening specifications, refer to "Nut" under **COOLANT PIPES OVERVIEW**
- 9. **Upper Coolant Pipe**
 - Removing and installing, refer to **UPPER COOLANT PIPE**
- 10. **O-ring**
 - Replace
- 11. **Alignment Pins**
 - 2 pieces
- 12. **O-rings**
 - Replace
- 13. **Sealing Piece**
 - 2 pieces
 - Replace
- 14. **Seal**
 - Replace
- 15. **Oil Pressure Switch -F22-**
 - Removing and installing, refer to **Oil Pressure Switch -F22-**
 - Tightening specifications, refer to "Oil Pressure Switch -F22-" under **UPPER OIL PAN OVERVIEW**

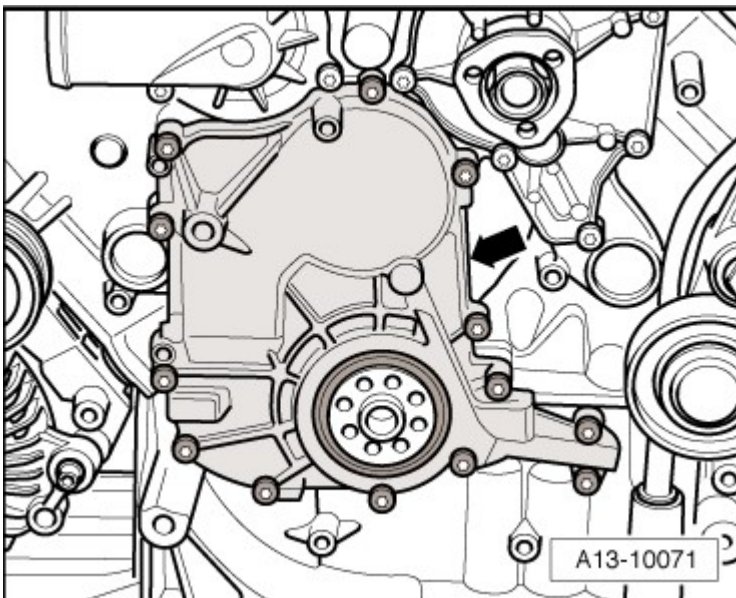


Fig. 4: Identifying Sealing Flange -Arrow- Bolts -- Tighten Diagonally
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the pulley side sealing flange bolts -arrow- in a diagonal sequence and in steps to 9 Nm.

DRIVE PLATE OVERVIEW

Vehicles Built through 05.10

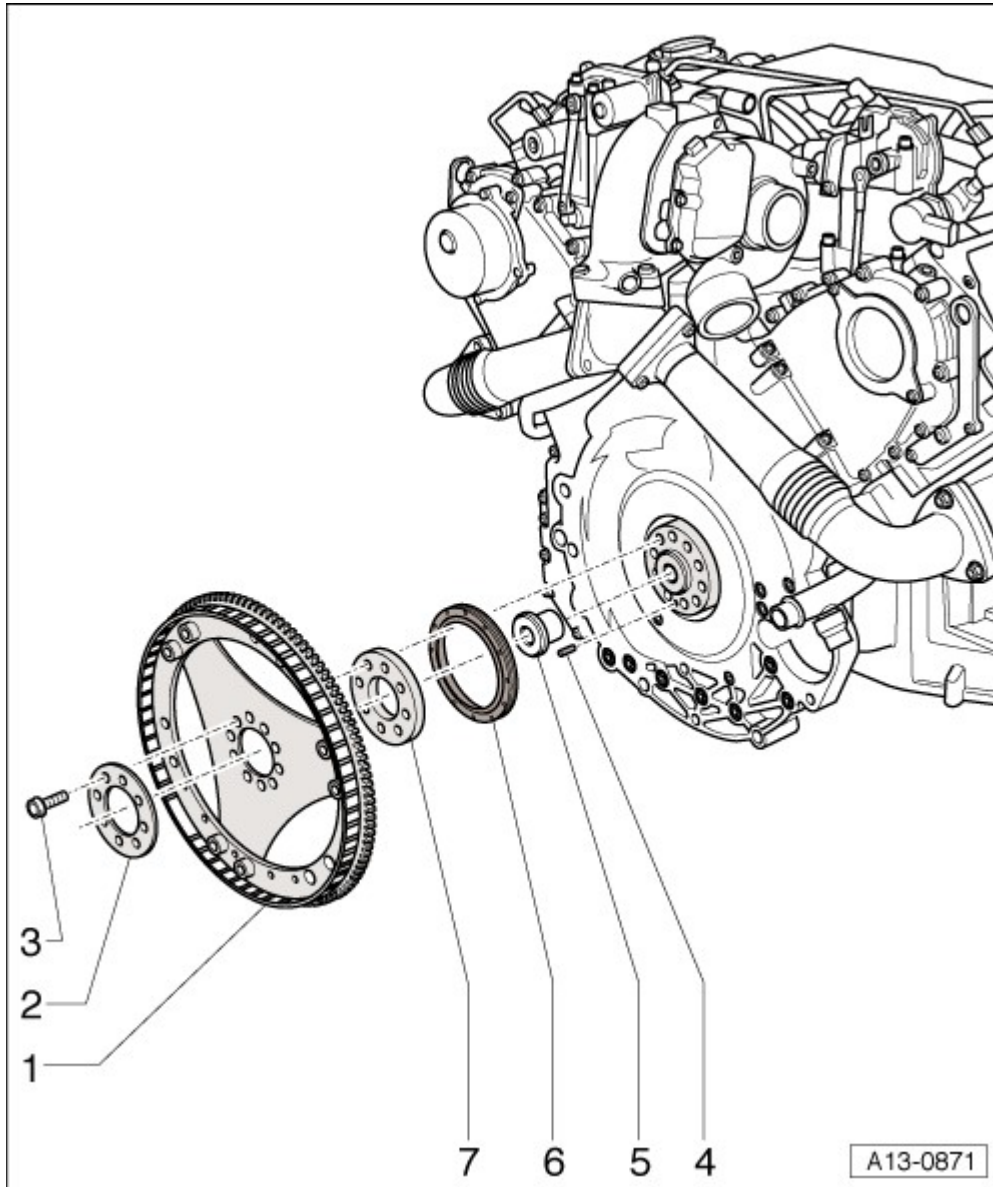


Fig. 5: Identifying Drive Plate Overview
Courtesy of AUDI OF AMERICA, LLC

1. Drive Plate

- Removing and installing, refer to **DRIVE PLATE**

2. Washer

- Thickness 3.4 mm

3. Bolt

- Replace
- 30 Nm plus an additional 90° turn

4. Alignment Bushing**5. Centering Bushing for Torque Converter**

- Install in the crankshaft

6. Crankshaft Shaft Seal, Transmission Side

- Removing and installing, refer to **CRANKSHAFT SEAL, TRANSMISSION SIDE.**

7. Shim

- Thickness 0.06 in

Vehicles Built from 06.10

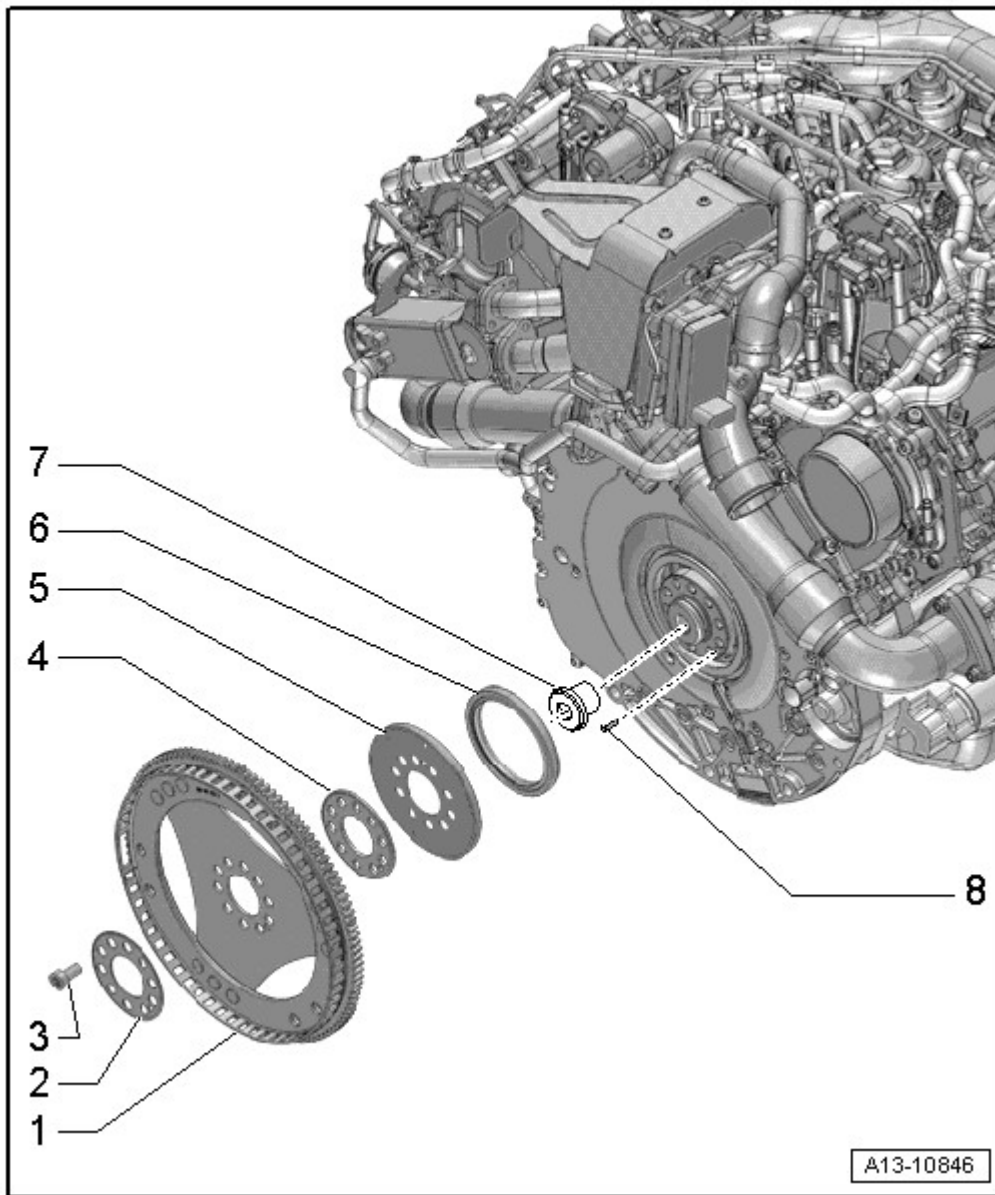


Fig. 6: Identifying Drive Plate Overview
Courtesy of AUDI OF AMERICA, LLC

1. **Drive Plate**
 - Removing and installing, refer to **DRIVE PLATE**
2. **Washer**
3. **Bolt**
 - Replace
 - 30 Nm plus an additional 90° turn
4. **Washer**
5. **Sensor Wheel**
 - For the engine speed (RPM) sensor -G28-

6. Crankshaft Shaft Seal, Transmission Side

- Removing and installing, refer to **CRANKSHAFT SEAL, TRANSMISSION SIDE**

7. Centering Bushing for Torque Converter

- Install in the crankshaft

8. Alignment Bushing

CRANKSHAFT OVERVIEW

NOTE: For assembly work, secure the engine on the engine and transmission holder **VAS 6095 ENGINE, SECURING TO ENGINE AND TRANSMISSION HOLDER** .

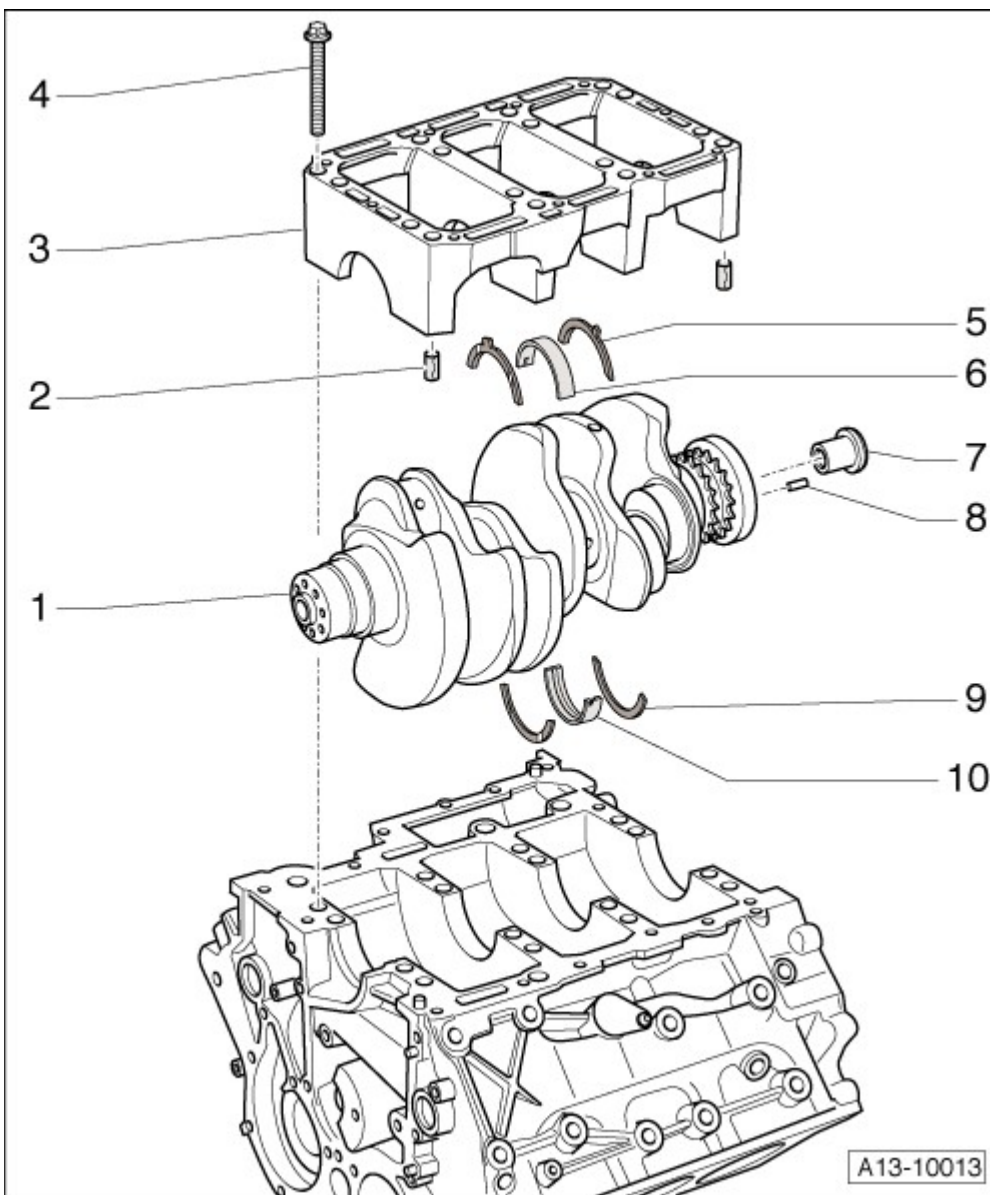


Fig. 7: Identifying Crankshaft Overview
Courtesy of AUDI OF AMERICA, LLC

1. 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**

2. Alignment Bushing

- 2 pieces
- Insert in cylinder block

3. Guide Frame

- Installing, refer to **Fig. 8**

4. Bolt

- Replace
- Tightening specification and sequence, refer to **Fig. 8**

5. Thrust Washer

- Only at 3rd crankshaft bearing
- Installation position: lubricating grooves face outward
- Observe locating point

6. Bearing Shell

- For guide frame
- Mark used bearing shells for reinstallation but not on the running surface
- Replace the bearing shells worn down to the base layer
- Insert new bearing shells for guide frame with proper color marking, refer to **Fig. 10**

7. Centering Bushing for Torque Converter

- Install in the crankshaft

8. Fitting Pin

- Make sure the crankshaft fits correctly

9. Thrust Washer

- Only at 3rd crankshaft bearing
- Installation position: lubricating grooves face outward
- Observe locating point

10. Bearing Shell

- For cylinder block with oil groove
- Mark used bearing shells for reinstallation but not on the running surface
- Replace the bearing shells worn down to the base layer
- Insert new bearing shells for cylinder block with proper color marking, refer to **Fig. 9**

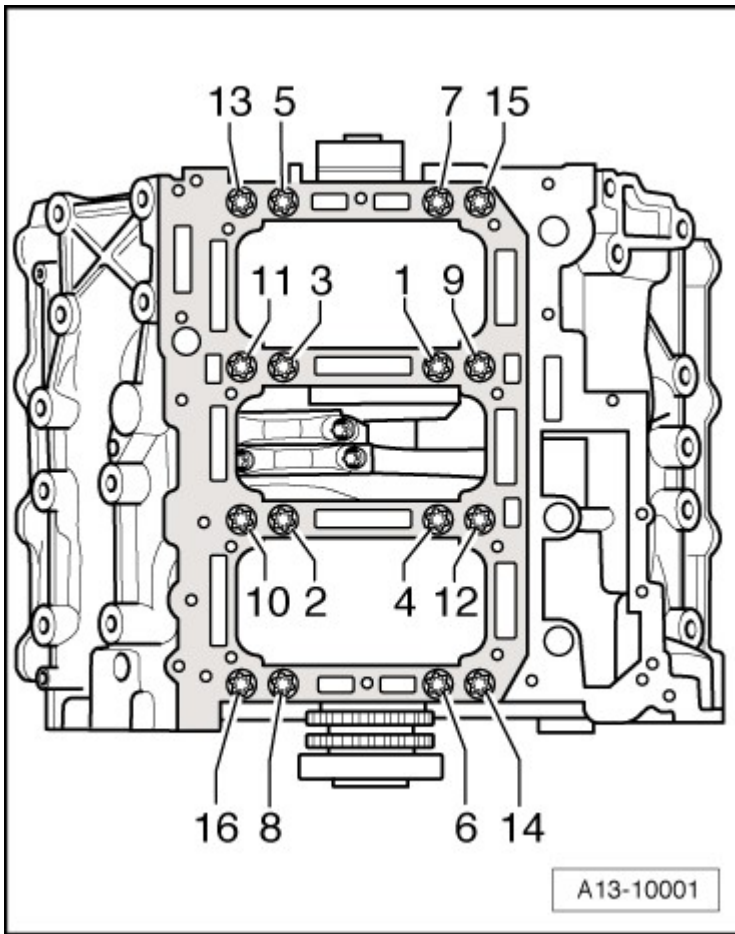


Fig. 8: Guide Frame, Bolt Installation Sequence

Courtesy of AUDI OF AMERICA, LLC

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

-- Install both dowel sleeves into the cylinder block.

-- Tighten the bolts in 3 steps according to the tightening sequence:

Step	Bolts	Tightening Torque/Additional Angle of Rotation
1.	-1 through 16-	30 Nm
2.	-1 through 16-	50 Nm
3.	-1 through 16-	Tighten an additional 90°.

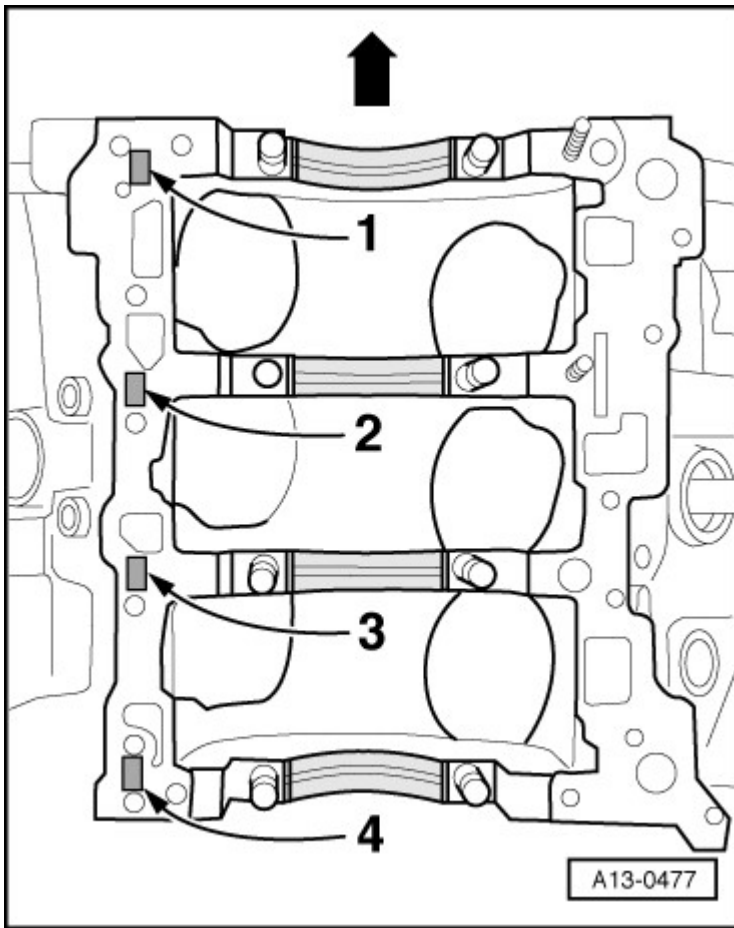


Fig. 9: Identifying Application Of Crankshaft Bearing Shells For Cylinder Block
 Courtesy of AUDI OF AMERICA, LLC

Bearing shells with the correct thickness are allocated to the cylinder block in the factory. Colored dots on bearing shells serve for identifying bearing shell thickness.

NOTE: -Arrow- points to belt pulley side.

Allocation of bearing shells to cylinder block is identified with a letter by each bearing.

Letter on Cylinder Block	Color of Bearing
R =	Red
G =	Yellow
B =	Blue

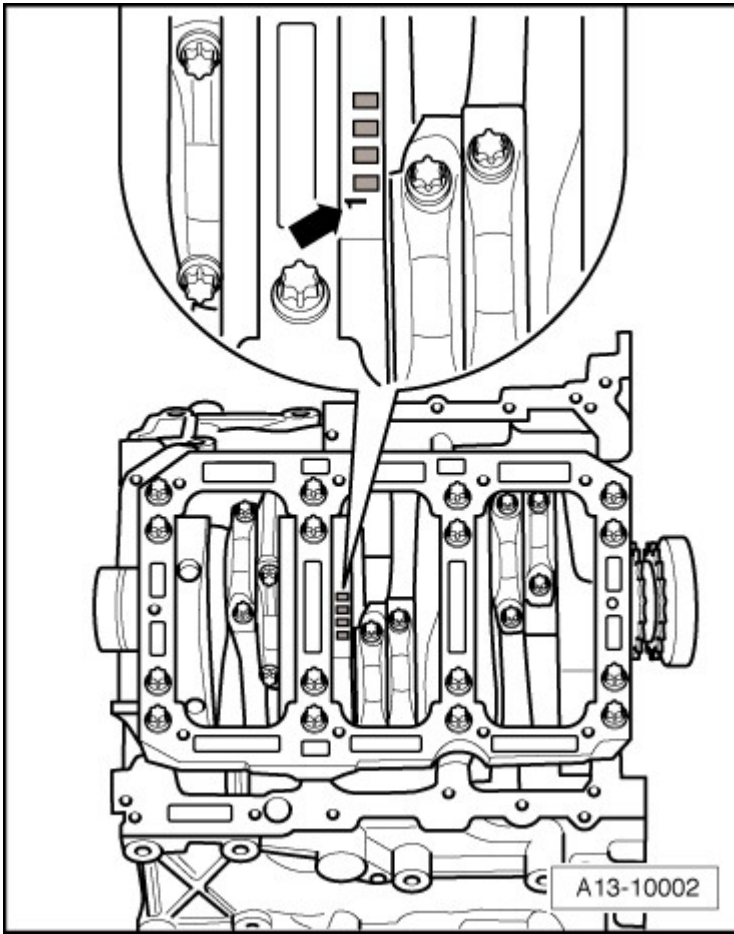


Fig. 10: Identifying Allocation Of Crankshaft Bearing Shells For Guide Frame
 Courtesy of AUDI OF AMERICA, LLC

- Bearing shells with correct thickness are allocated to bearing cap at the factory. Colored dots on bearing shells serve for identifying bearing shell thickness.
- Allocation of bearing shells to crankshaft is identified with sequence of letters on crankshaft side. The prefix "1" -arrow- indicates color code for bearing 1.

Letter on Crankshaft	Color of Bearing
R=	Red
G=	Yellow
B=	Blue

PISTONS AND CONNECTING ROD OVERVIEW

NOTE: Oil injector jet for piston cooling, refer to Fig. 12.

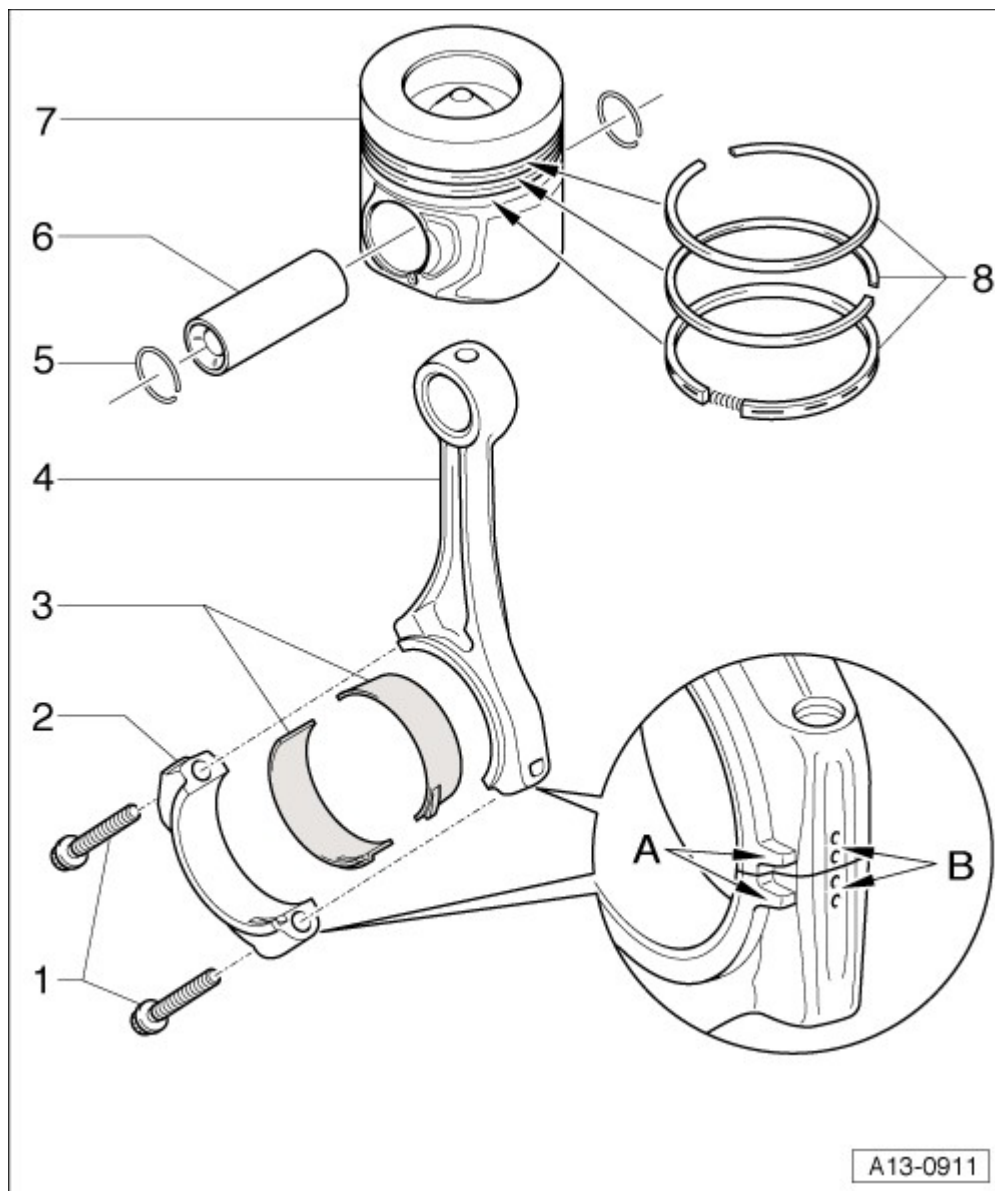


Fig. 11: Identifying Pistons And Connecting Rod Overview

Courtesy of AUDI OF AMERICA, LLC

1. Bolts

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

2. Connecting Rod Bearing Cap

- Mark for installation later
- Mark allocation to cylinder with paint -B-, refer to **Fig. 18**
- Installation position: Note the casting marks -A-

3. Bearing Shells

- Pay attention to the installed position
- Mark used bearing shells for reinstallation but not on the running surface
- Replace the bearing shells worn down to the base layer

4. Connecting Rod

- Only replace as a set
- Mark allocation to cylinder with paint -B-, refer to **Fig. 18**
- Installation position: Note the casting marks -A- and **Fig. 19**
- Axial play for each new connecting rod pair: 0.20 to 0.44 mm
- Radial clearance, measuring, refer to **CONNECTING ROD, MEASURING RADIAL CLEARANCE**

5. Circlip

- Replace

6. Piston Pin

- Heat piston to 60 °C 140 °F) if it is difficult to move.
- Removing and installing using a pilot drift VW 222 A

7. Piston

- Mark the installation position and cylinder allocation, refer to **Fig. 17**
- Replace the piston if there are cracks on the piston head or piston shaft
- Checking, refer to **Fig. 15**
- Install with piston ring compressor
- For the correct piston and cylinder dimensions, refer to **PISTON AND CYLINDER DIMENSIONS**
- Measuring cylinder bore, refer to **Fig. 16**
- Measure the piston projection at "TDC", refer to **PISTON PROJECTION, MEASURING AT TDC**

8. Piston Rings

- Offset gaps by 120°
- Use piston ring pliers for removing and installing
- Mark "TOP" must face toward piston head
- Gap, measuring, refer to **Fig. 13**
- Measuring side clearance, refer to **Fig. 14**

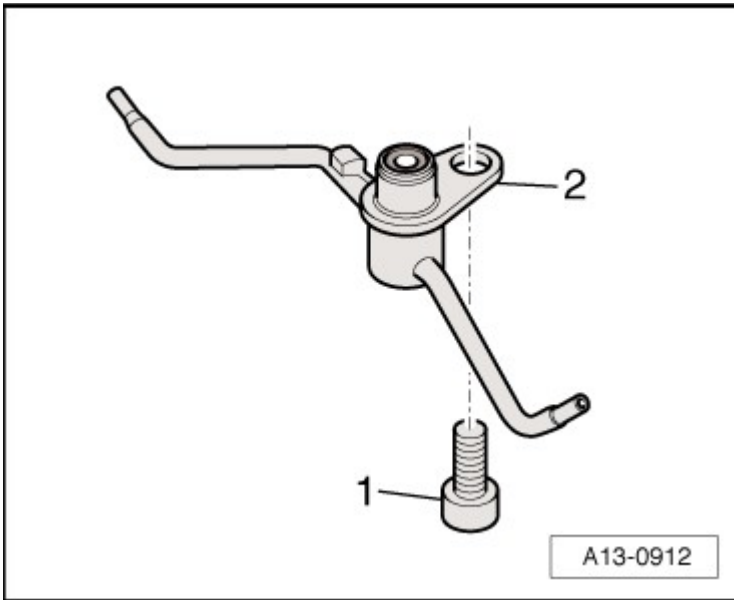


Fig. 12: Identifying Oil Spray Jet For Piston Cooling
Courtesy of AUDI OF AMERICA, LLC

1. Bolt - 9 Nm
2. Oil spray jet for cooling the piston and spray jet valve

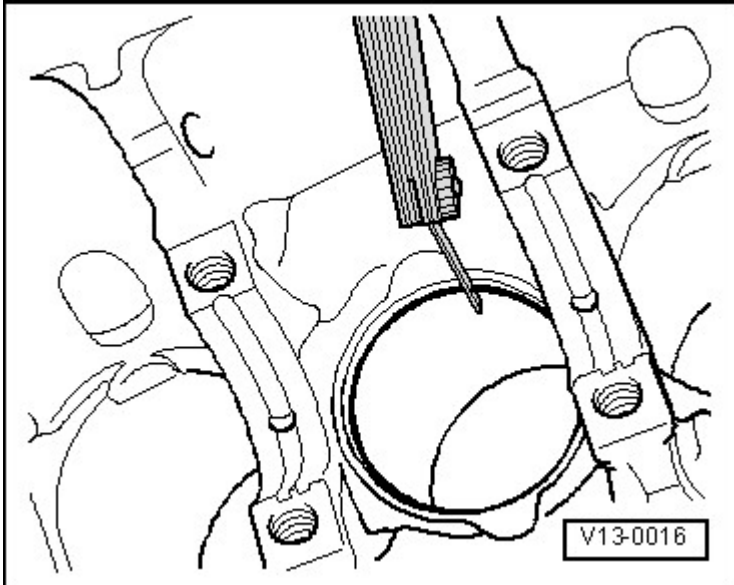


Fig. 13: Checking Piston Ring Gap
Courtesy of AUDI OF AMERICA, LLC

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

Piston Ring	New mm	Wear Limit mm
1st Compression ring	0.25 to 0.38	0.80
2nd Compression ring	0.70 to 0.90	1.30
Oil scraping ring	Maximum 0.40	0.70

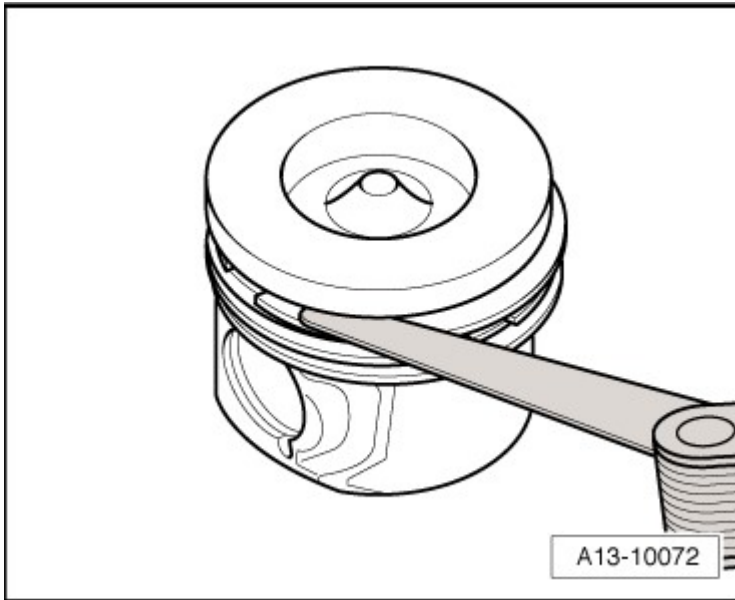


Fig. 14: Piston Ring Groove Clearance, Checking
 Courtesy of AUDI OF AMERICA, LLC

-- Clean the piston ring groove before checking.

Piston Ring	New mm	Wear Limit mm
1st Compression ring	0.120 to 0.160	0.175
2nd Compression ring	0.020 to 0.090	0.115
Oil scraping ring	0.020 to 0.090	0.115

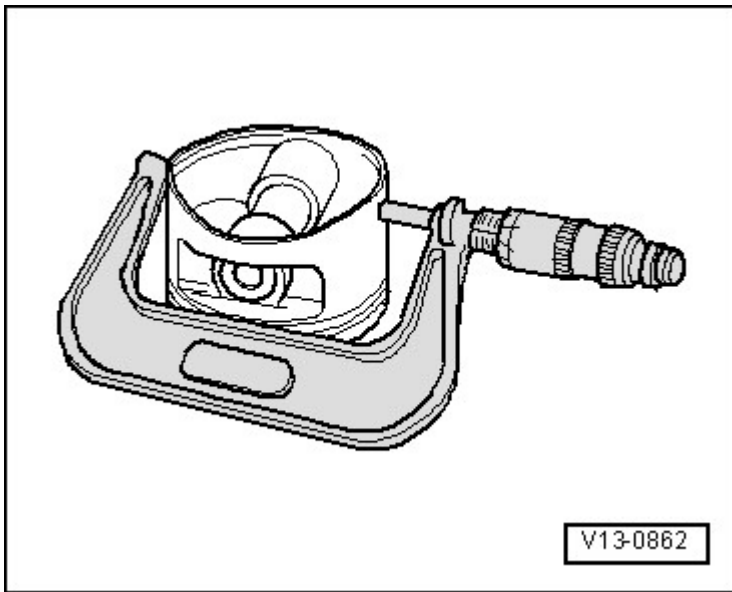


Fig. 15: Checking Piston

Courtesy of AUDI OF AMERICA, LLC

-- Measure approximately 0.39 in from the lower edge at a 90° angle to the piston pin axis using a 75 to 100 mm external micrometer.

- Maximum deviation from nominal dimension: 0.05 mm.

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

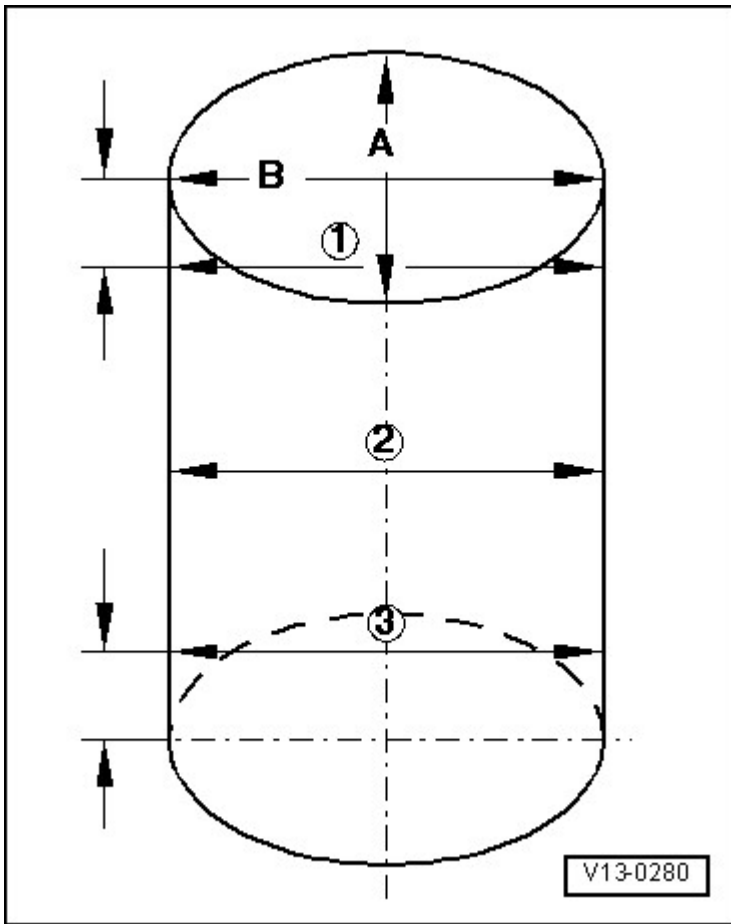


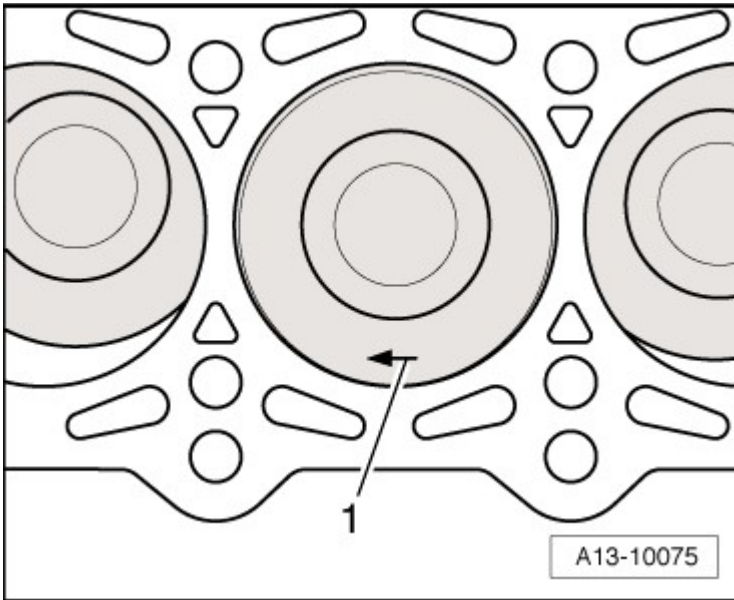
Fig. 16: Identifying Cylinder Bore Dimensions

Courtesy of AUDI OF AMERICA, LLC

-- Measure in a diagonal sequence at 3 positions transversely -A- and longitudinally -B- using a cylinder gauge VAS 6078 or inside micrometer set 18-100 mm US1033/S.

- Maximum deviation from nominal dimension: 0.08 mm.

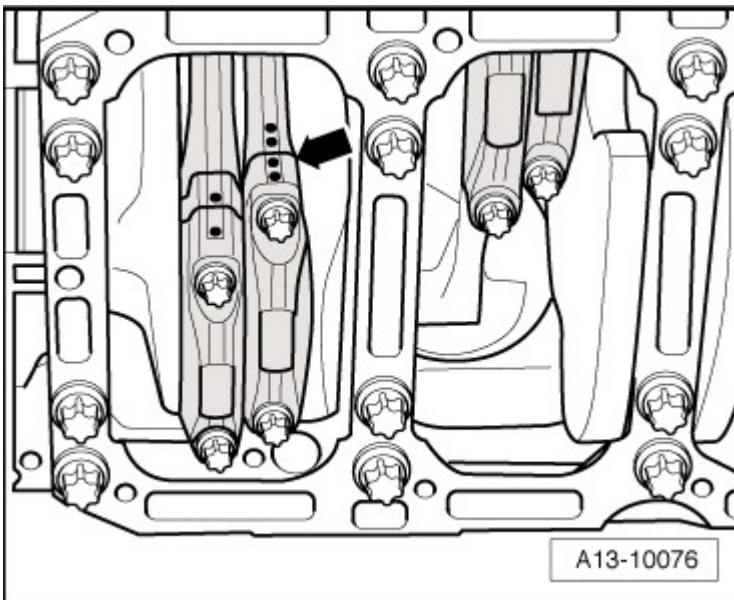
Nominal dimension, refer to **PISTON AND CYLINDER DIMENSIONS**.

**Fig. 17: Piston, Installed Position**

Courtesy of AUDI OF AMERICA, LLC

CAUTION: The coating on the piston crown could be destroyed.

- Mark the allocation to the cylinder on the piston crown with paint to install used pistons. Do not mark the piston crown with a punch, notch or similar object.
- Installation position: The arrow -1- on the piston crown faces the belt pulley side.

**Fig. 18: Connecting Rod, Marking**

Courtesy of AUDI OF AMERICA, LLC

-- Mark the connecting rod and connector rod bearing caps to each other and to the cylinder -arrow- with paint for installation.

NOTE: Only replace the connecting rods as a set.

Do not interchange the connecting rod bearing.

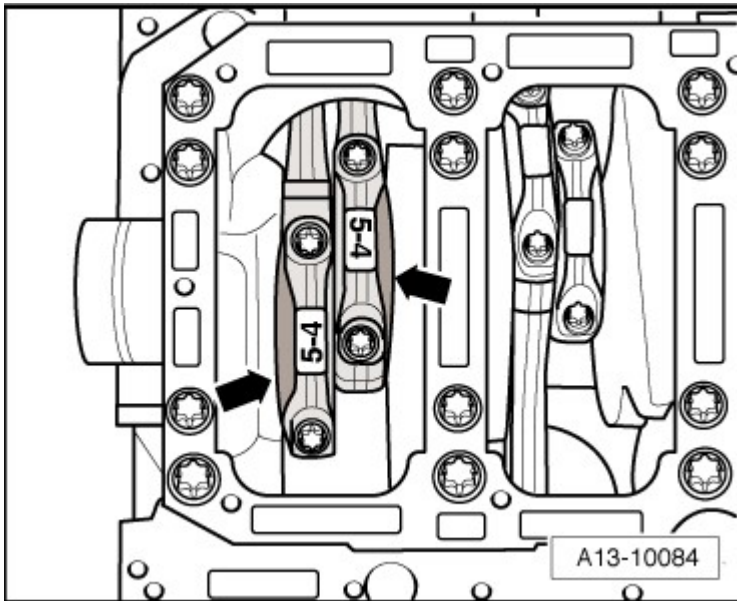


Fig. 19: Connecting Rod, Installed Position

Courtesy of AUDI OF AMERICA, LLC

- Installation position: The larger thrust flange on the connecting rod -arrows- faces the adjacent crankshaft bearing.

NOTE: The front connecting rod pair is shown in the illustration.

SPECIFICATIONS

CRANKSHAFT DIMENSIONS

Honing Dimension	Crankshaft Bearing Pin Diameter mm	Crankshaft Connecting Rod Journal Diameter mm
Basic dimension	65.00 - 0.022 - 0.042	60.00 - 0.022 - 0.042

PISTON AND CYLINDER DIMENSIONS

Honing Dimension	Piston Diameter mm	Cylinder Bore Diameter mm
Basic dimension	82.939 to 82.951 ⁽¹⁾	83.006 to 83.014
Repair stage	82.979 to 82.991 ⁽¹⁾	83.046 to 83.054

2009 Audi Q7 3.0 TDI

ENGINE 3.0 Liter - Crankshaft, Cylinder Block - Engine Code(s): CATA

(1) Measurement without coating (thickness = 0.02 mm). The coating wears off.

FASTENER TIGHTENING SPECIFICATIONS

Component	Bolt Size	Nm
Bracket for A/C Compressor	-	40
Connecting Rod Bearing Cap ⁽¹⁾ , ⁽³⁾	-	30 + 90°
Drive Plate ⁽¹⁾	-	30 + 90°
Generator and Idler Roller Bracket	-	40
Idler Roller for Ribbed Belt	-	23
Idler Roller Holder	-	23
Left Idler Roller for Ribbed Belt	-	23
Oil Spray Jet for Piston Cooling	-	9
Right Idler Roller for Ribbed Belt	-	23
Shim for Vibration Damper ⁽¹⁾	-	20 + 90°
Ribbed Belt Tensioning Damper ⁽²⁾		
-	-	23
-	-	50 + 90° ⁽¹⁾
Upper Coolant Pipe, Double Bolt, Nut	-	9
(1) Always replace (2) For bolt tightening clarification, refer to <u>RIBBED BELT DRIVE OVERVIEW</u> and see items -33 and 35- (3) Lubricate the threads and contact surface		

Ribbed Belt Pulley Side Sealing Flange - Tightening Specifications and Sequence

-- Tighten the pulley side sealing flange bolts -arrow- in a diagonal sequence and in steps to 9 Nm.

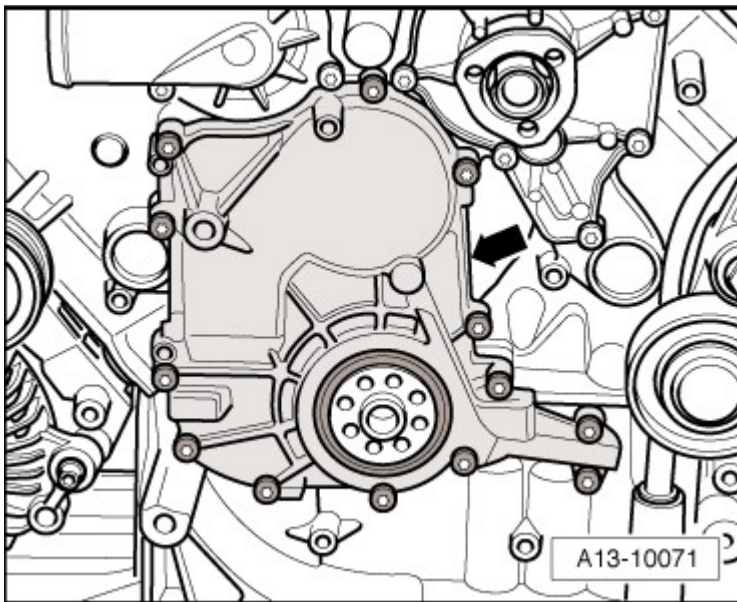


Fig. 20: Identifying Sealing Flange -Arrow- Bolts -- Tighten Diagonally
 Courtesy of AUDI OF AMERICA, LLC

Guide Frame Tightening Specifications and Sequence

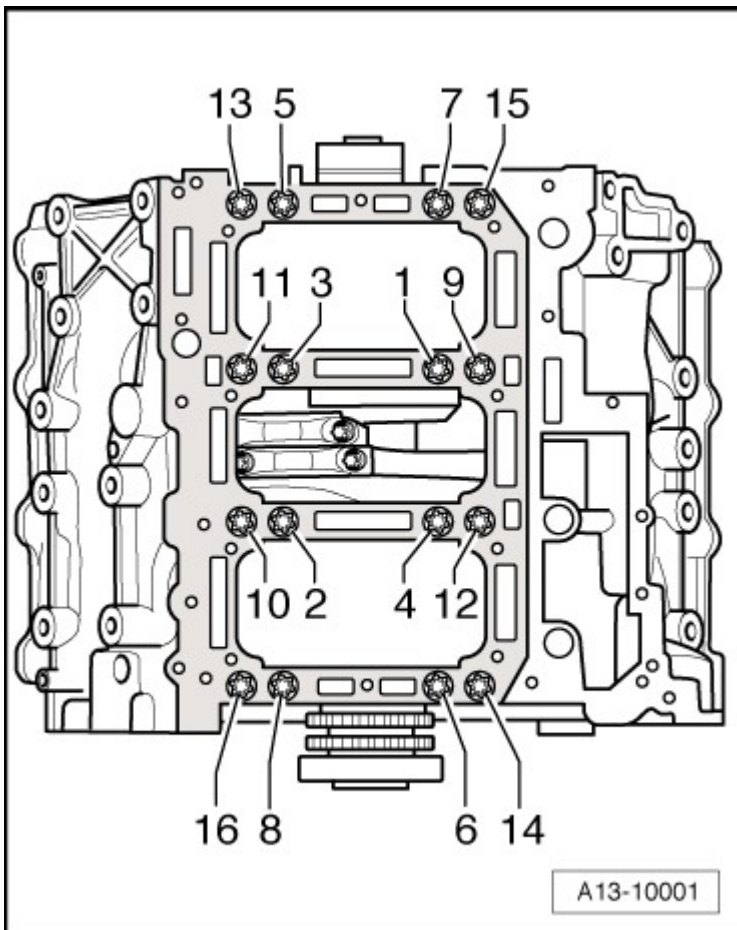


Fig. 21: Guide Frame, Bolt Installation Sequence

Courtesy of AUDI OF AMERICA, LLC

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

-- Install both dowel sleeves into the cylinder block.

-- Tighten the bolts in 3 steps according to the tightening sequence:

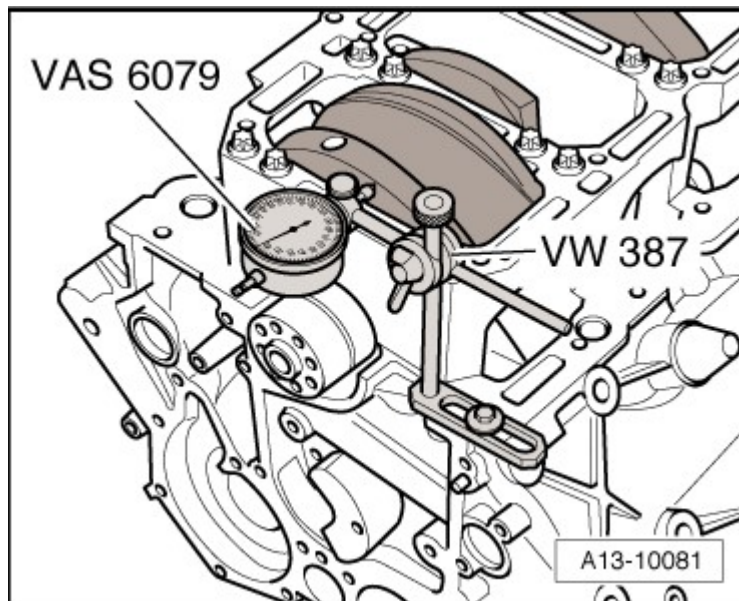
Step	Bolts	Tightening Torque/Additional Angle of Rotation
1.	-1 through 16-	30 Nm
2.	-1 through 16-	50 Nm
3.	-1 through 16-	Tighten an additional 90°.

DIAGNOSIS AND TESTING**CRANKSHAFT, MEASURING AXIAL PLAY****Special tools and workshop equipment required**

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

Procedure

-- Install the VAS 6079 with the VW 387 on the cylinder block as shown in the illustration.

**Fig. 22: Attaching Dial Indicator VAS 6079 Together With Dial Gauge Holder VW 387 To Cylinder Block**

Courtesy of AUDI OF AMERICA, LLC

- Place the dial gauge against the crankshaft counterweight.
- Press the crankshaft against the dial gauge by hand and set the gauge to "0".
- Press the crankshaft off the dial gauge and read the measurement.

Axial clearance:

- New: 0.090 to 0.215 mm
- Wear limit: 0.280 mm

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

- Plastigage

Procedure

NOTE: Marked the used bearing for installation later, but not on the running surface.

Replace bearing shells worn down to the base layer.

- Remove the guide frame 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.
- Position the bearing bracket and tighten it to 30 Nm; do not turn the crankshaft.
- Install the guide frame.
- Compare width of Plastigage with calibrated scale.

Radial clearance:

- New: 0.018 to 0.045 mm
- Wear limit: 0.100 mm.

PISTON PROJECTION, MEASURING AT TDC

NOTE: Check the piston projection at "TDC" whenever installing a new piston or new part of the engine. Depending on the piston projection, install the

corresponding cylinder head gasket according to the following table.

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

The cylinder head gasket must be determined for each cylinder bank removed.

Special tools and workshop equipment required

- Measuring Bar VW 382/7 from Special Socket and Measuring Tools VW 382
- Magnetic Plate 50 mm Dia. VW 385/17 from Universal Measuring Tool VW 385
- Dial Gauge 0-10 mm VAS 6079

Procedure

-- Attach the VAS 6079 with measuring bar VW 382/7 and the VW 385/17 to the cylinder block.

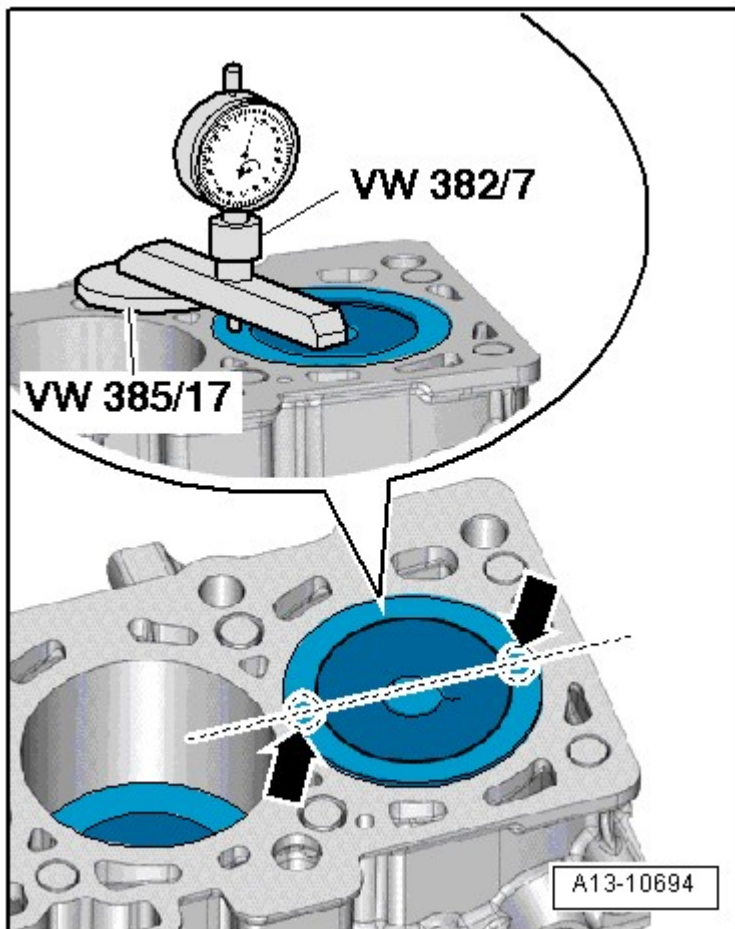


Fig. 23: Identifying Measuring Bar VW 382/7 And VW 385/17 On Cylinder Block
 Courtesy of AUDI OF AMERICA, LLC

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

Piston Projection Above the Upper Edge of the Cylinder Block (mm)	Identification Holes
0.39 to 0.49	1
0.49 to 0.54	2
0.54 to 0.65	3

Cylinder Head Seal Identification

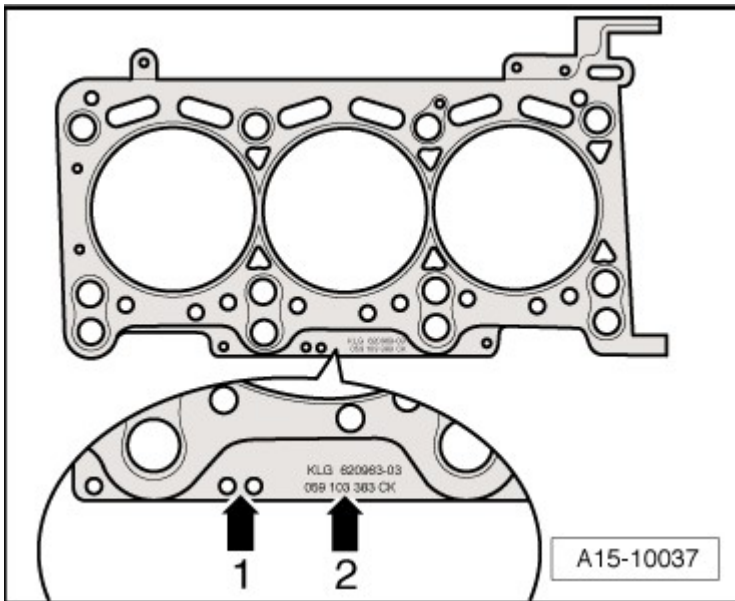


Fig. 24: Cylinder Head Gasket Identification
Courtesy of AUDI OF AMERICA, LLC

1. Holes
2. Part number:

NOTE: The cylinder head gaskets for the left and right cylinder head cannot be interchanged because they each have a different shape.

CONNECTING ROD, MEASURING RADIAL CLEARANCE

Special tools and workshop equipment required

- Plastigage

Procedure

NOTE: Marked the used bearing for installation later, but not on the running surface.

Replace bearing shells worn down to the base layer.

- 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; do not turn the crankshaft.
- Reinstall connecting rod cover.
- Compare width of Plastigage with calibrated scale.

Radial clearance:

- New: 0.015 to 0.062 mm
- Wear limit: 0.12 mm

- Replace connecting rod bolts.

REMOVAL AND INSTALLATION**RIBBED BELT****Special tools and workshop equipment required**

- Torx® Socket T60 T40087

Removing

- On a vehicle with air suspension, activate vehicle lift mode. Refer to **General Information** .
- Carefully pull the engine cover -arrows- off the 4 bolts one after the other.

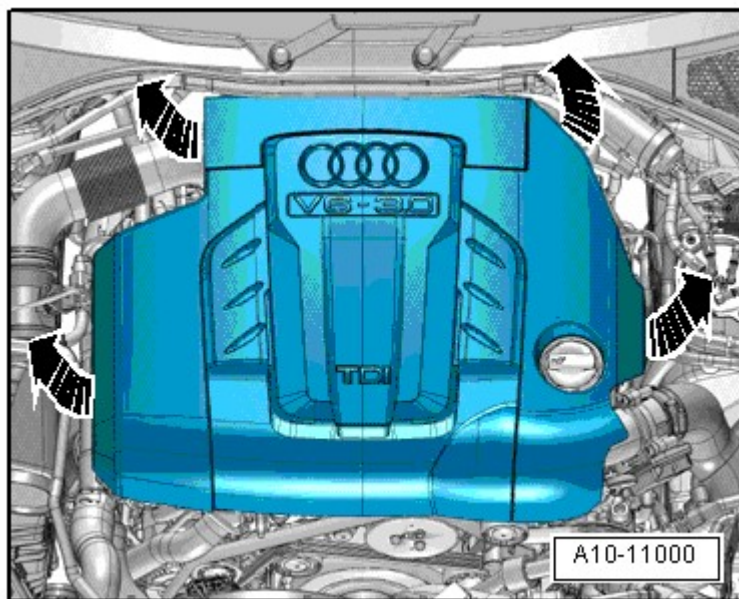


Fig. 25: Identifying Engine Cover -Arrows-
Courtesy of AUDI OF AMERICA, LLC

Vehicles Built through 05.10:

-- Loosen the hose clamp -arrow-, remove the air duct hose and move it to the side.

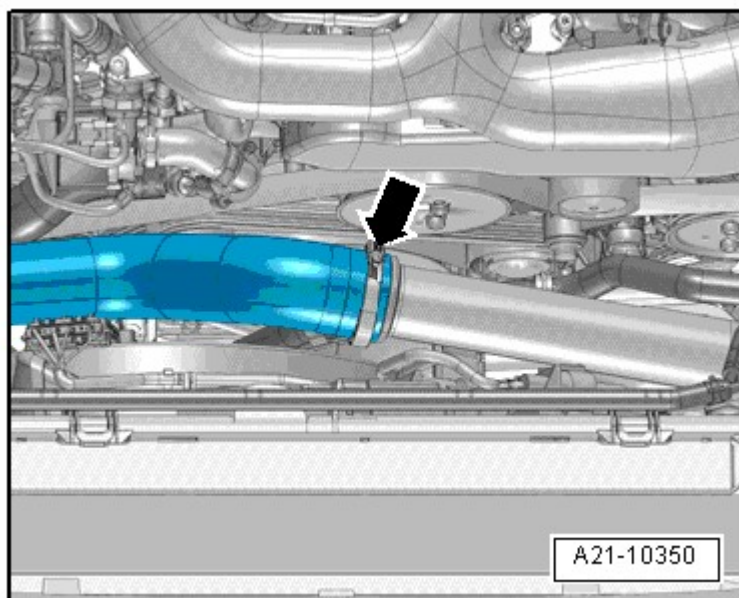


Fig. 26: Identifying Hose Clamp -Arrow- And Air Duct Hose
Courtesy of AUDI OF AMERICA, LLC

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

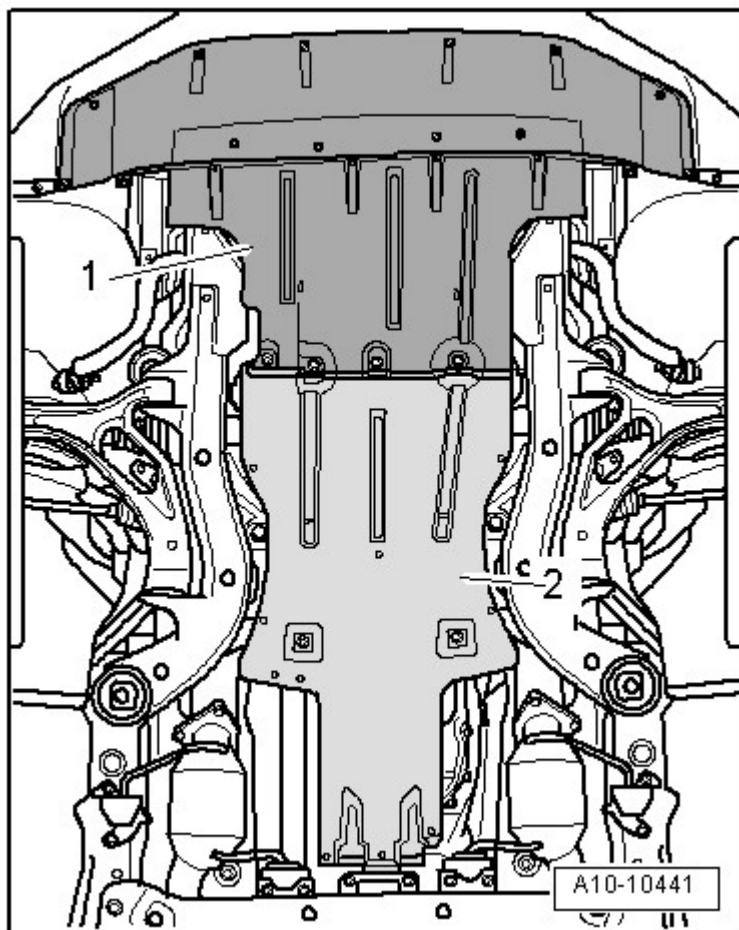


Fig. 27: Identifying Front/Rear Noise Insulation
Courtesy of AUDI OF AMERICA, LLC

All vehicles:

-- Disconnect electrical connectors -2- and -3-.

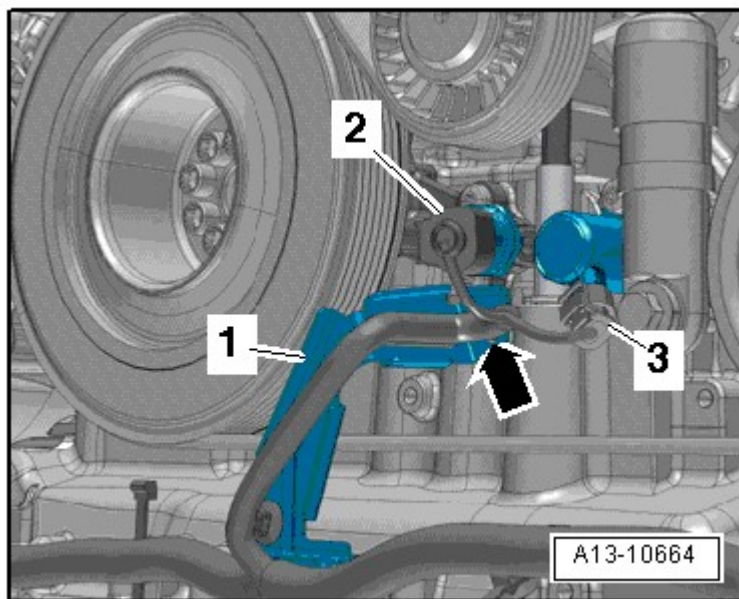


Fig. 28: Identifying Bracket & Connectors
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bracket -1- and move it to the side along with the wiring harness.

NOTE: Ignore -arrow-.

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.

-- Turn the tensioning element clockwise using the T40087 -arrow- to release the tension on the ribbed belt.

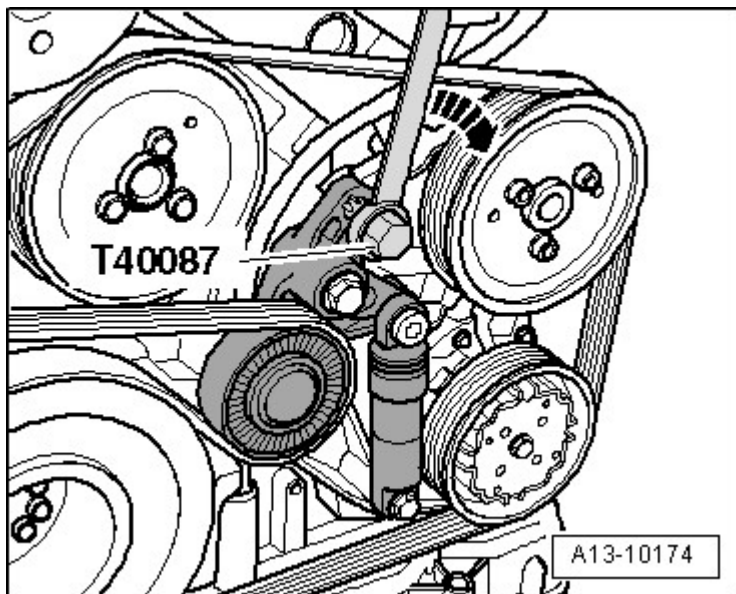


Fig. 29: Turning Tensioning Element Clockwise Using T40087 -Arrow- To Release Tension On Ribbed Belt

Courtesy of AUDI OF AMERICA, LLC

-- Remove the ribbed belt and release the tension on the tensioning element.

Installing

Install in reverse order of removal. Note the following:

NOTE: 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.

-- Mount the ribbed belt over the pulley.

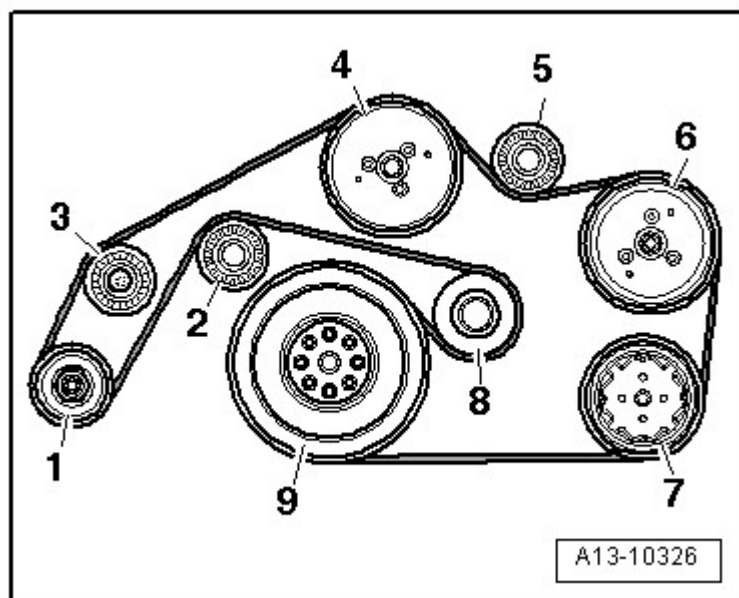


Fig. 30: Identifying Ribbed Belt Components With An Additional Idler Pulley
Courtesy of AUDI OF AMERICA, LLC

1. Generator
2. Idler roller
3. Idler roller
4. Coolant pump
5. Idler roller
6. Power steering pump
7. A/C compressor
8. Ribbed belt tensioning damper
9. Vibration damper

NOTE: When installing the ribbed belt, make sure it is seated correctly on the pulleys.

-- Install the wiring harness bracket. Refer to UPPER OIL PAN OVERVIEW .

-- Install the air duct hose and screw-type clamps. Refer to Fig. 31.

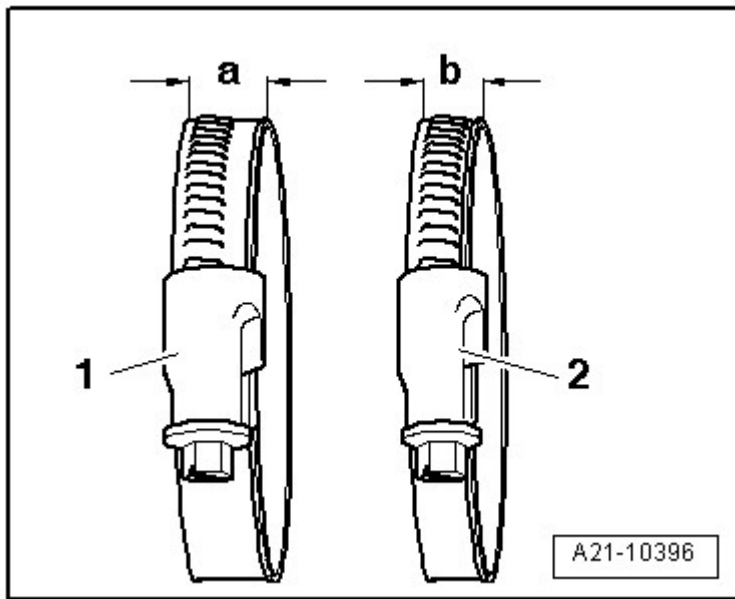


Fig. 31: Clamp Tightening Specifications
Courtesy of AUDI OF AMERICA, LLC

- Start the engine and check the belt routing.
- Install the noise insulation. Refer to **Removal and Installation** .
- On a vehicle with air suspension, deactivate vehicle lift mode. Refer to **General Information** .

RIBBED BELT TENSIONER

Removing

- Remove the ribbed belt from the tensioning element. Refer to **RIBBED BELT**.
- Remove the bolt -1- and -2- and then remove the ribbed belt tensioning element.

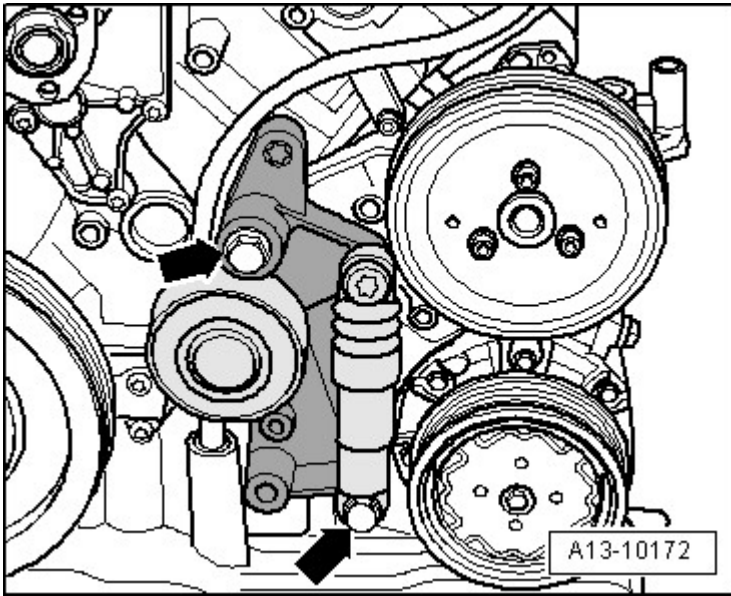


Fig. 32: Identifying Bolt -1 And 2- To Ribbed Belt Tensioning Element
 Courtesy of AUDI OF AMERICA, LLC

Installing

Install in reverse order of removal. Note the following:

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

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

LEFT RIBBED BELT IDLER ROLLER

Removing

-- Remove the ribbed belt from the tensioning element. Refer to **RIBBED BELT**.

-- Tilt the toothed belt guard forward -arrows- and disengage the pins on the underside of the guard.

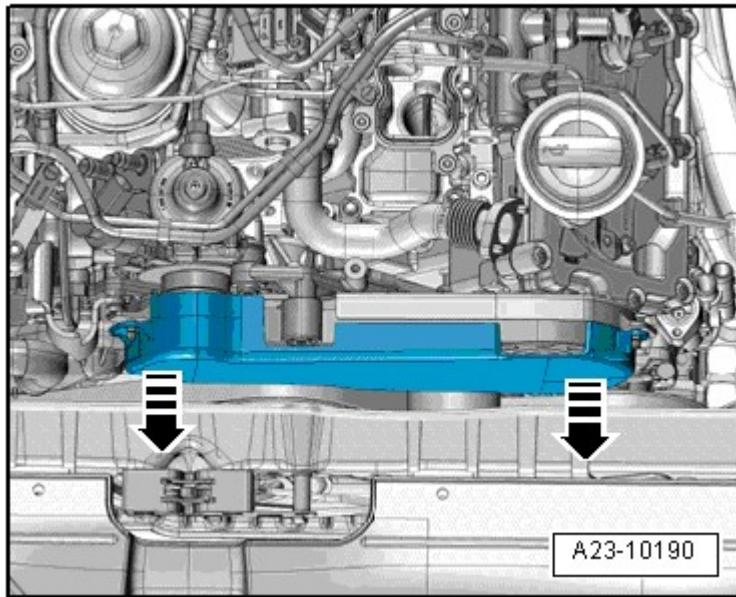


Fig. 33: Identifying Toothed Belt Guard
Courtesy of AUDI OF AMERICA, LLC

NOTE: The toothed belt guard is shown with the intake manifold upper section removed.

-- Remove the bolts -arrows- and the ribbed belt idler roller.

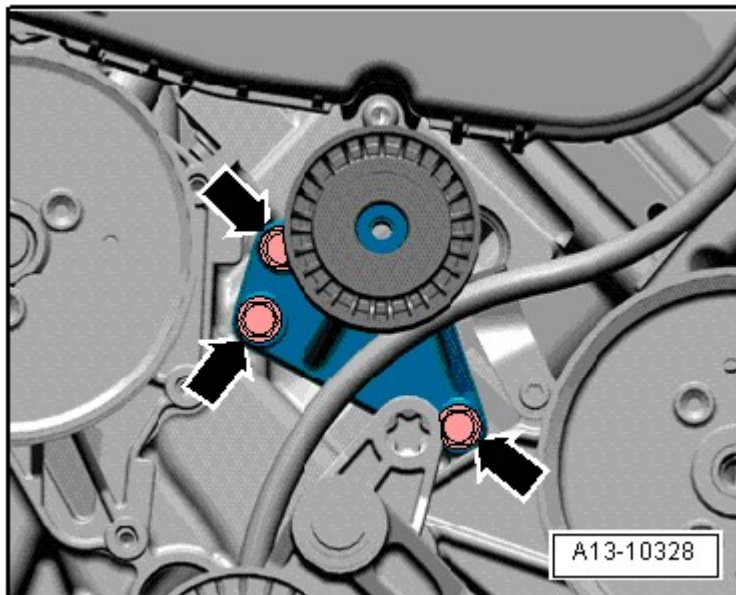


Fig. 34: Identifying Bolts -Arrows- And Ribbed Belt Idler Roller
Courtesy of AUDI OF AMERICA, LLC

Installing

Install in reverse order of removal. Note the following:

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

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

VIBRATION DAMPER WITH RIBBED BELT PULLEY,

Removing

-- On a vehicle with air suspension, activate vehicle lift mode. Refer to **General Information** .

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

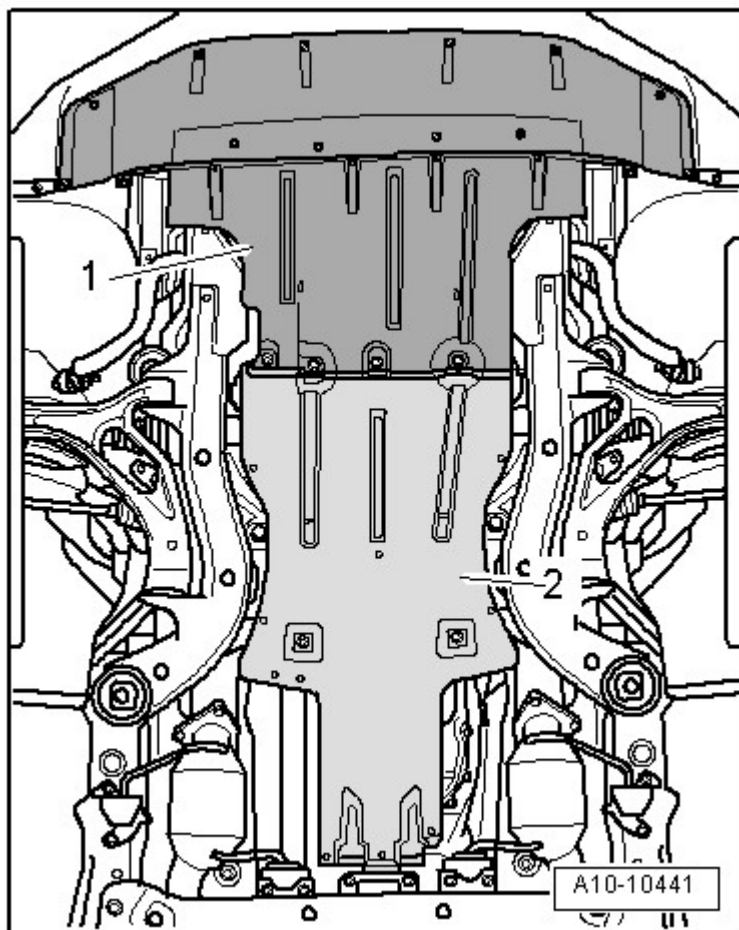


Fig. 35: Identifying Front/Rear Noise Insulation

Courtesy of AUDI OF AMERICA, LLC

-- Counterhold the generator ribbed belt pulley nut with an open end wrench and loosen the bolts -1-.

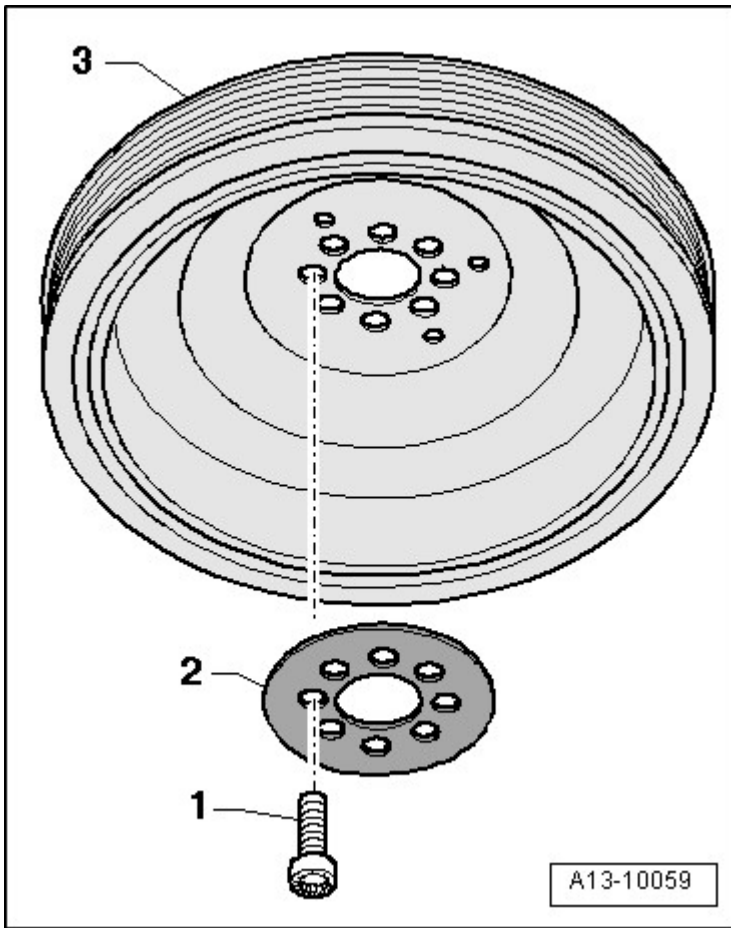


Fig. 36: Vibration Damper Connection

Courtesy of AUDI OF AMERICA, LLC

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

-- Remove the bolts and then remove the shim -2- and the vibration damper -3- together with the ribbed belt pulley.

Installing

Install in reverse order of removal. Note the following:

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

NOTE: Replace the vibration damper bolts -1- and shim -2-.

Counterhold the generator ribbed belt pulley nut with an open end wrench and with the ribbed belt mounted when tightening the vibration damper bolts.

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

ACCESSORY ASSEMBLY BRACKET

Accessory assembly bracket, removing and installing, refer to **LEFT COOLANT PIPE** .

CRANKSHAFT SHAFT SEAL, BELT PULLEY SIDE, REPLACING**Special tools and workshop equipment required**

- Oil Seal Extractor T40019
- Assembly Device T40048 with Assembly Adapter T40048/4
- M8x55 mm bolt, quantity: 2

Removing

-- Remove the vibration damper with the ribbed belt pulley. Refer to **VIBRATION DAMPER WITH RIBBED BELT PULLEY,**

-- Position the inner part of the T40019 flush with inner part and secure it with the knurled screw.

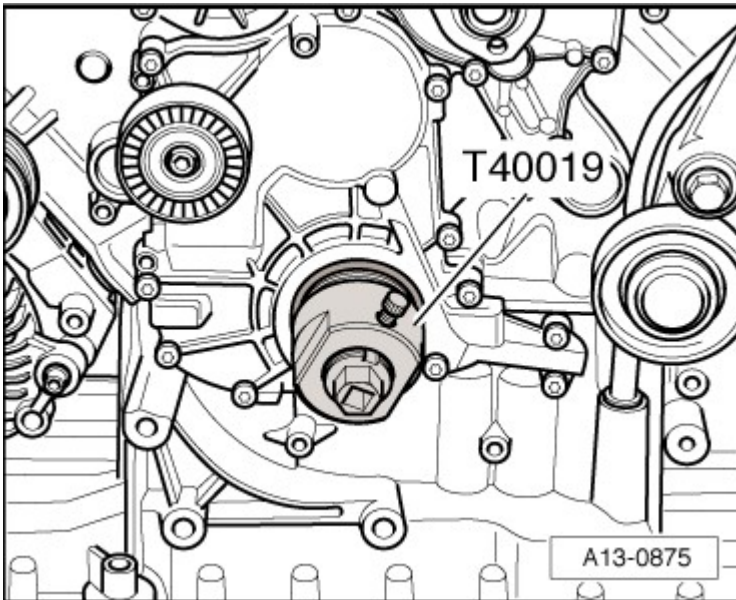


Fig. 37: Installing Inner Part Of Oil Seal Extractor T40019
Courtesy of AUDI OF AMERICA, LLC

-- 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 running and sealing surface.

-- Place the assembly device T40048/1 on the pull sleeve T40048/2 and slide the shaft seal -1- onto the pull sleeve.

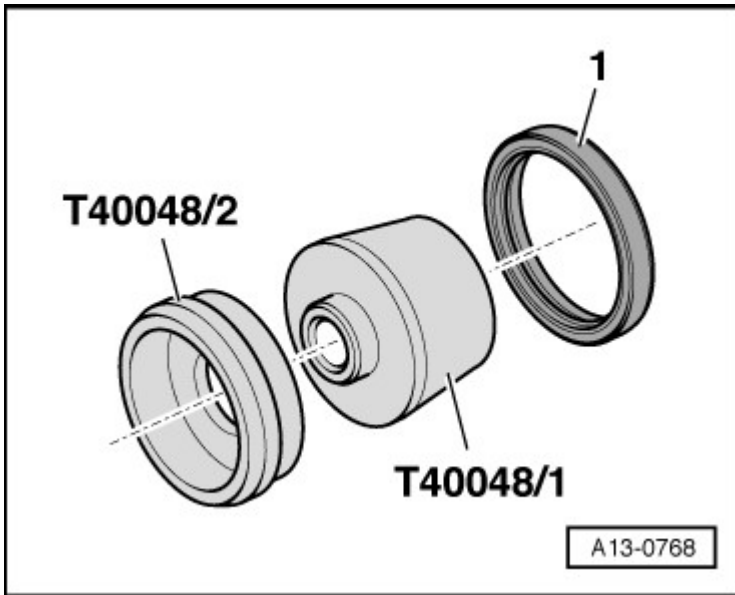


Fig. 38: Inserting Assembly Device T40048/1 Onto Pull Sleeve T40048/2 And Slide Seal Onto Pull Sleeve
Courtesy of AUDI OF AMERICA, LLC

-- Remove the assembly device.

-- Mount the T40048/2 to the crankshaft and push the seal -1- into the pulley side sealing flange.

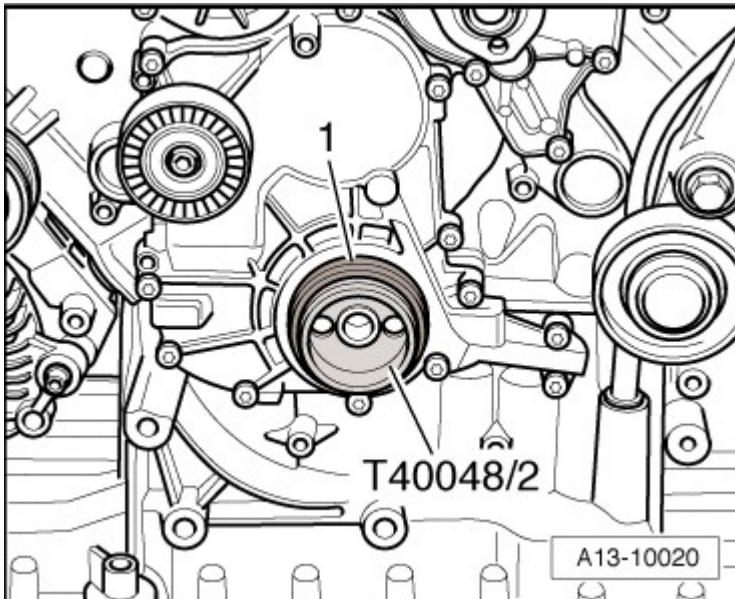
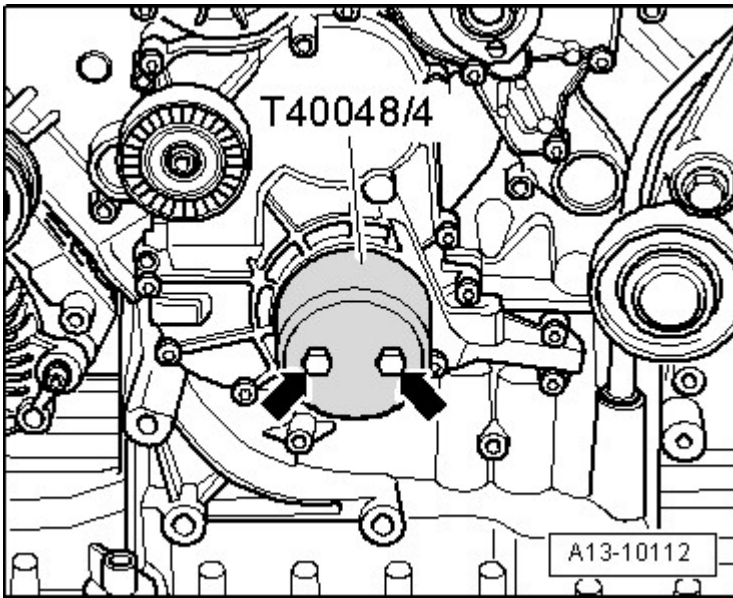


Fig. 39: Placing Pull Sleeve T40048/2 On Crankshaft And Slide Seal -1- Into Sealing Surface On Engine
Courtesy of AUDI OF AMERICA, LLC

NOTE: Leave the pull sleeve T40048/2 for pressing onto the crankshaft.

-- Mount the T40048/4 (depth 5 mm) to the crankshaft with M8 x 55 mm bolts -arrows-.



**Fig. 40: Positioning Assembly Adapter T40048/4 On Crankshaft With 2 - M8 x 55 mm Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC**

-- Install bolts by hand.

-- Tighten the bolts $1 \frac{1}{2}$ turn each, alternating from side to side in order to press the shaft seal all the way in.

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

-- Install the vibration damper with ribbed belt pulley. Refer to **VIBRATION DAMPER WITH RIBBED BELT PULLEY.**

SEALING FLANGE, BELT PULLEY SIDE

Special tools and workshop equipment required

- Spanner Wrench 3212
- Hand drill with plastic brush attachment
- Protective eyewear
- Sealant

Removing

-- Remove the coolant thermostat and connection. Refer to **CONNECTING PIECE WITH COOLANT THERMOSTAT** .

-- Remove the vibration damper with the ribbed belt pulley. Refer to **VIBRATION DAMPER WITH**

RIBBED BELT PULLEY.

-- Remove the bolt -1-.

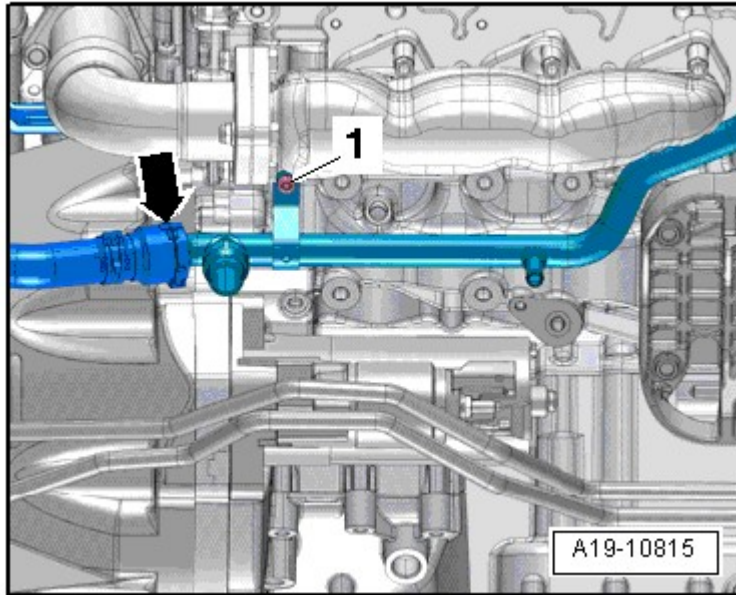


Fig. 41: Identifying Bolt -1- And Coolant Hose -Arrow-
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -arrow-.

-- Tilt the toothed belt guard forward -arrows- and disengage the pins on the underside of the guard.

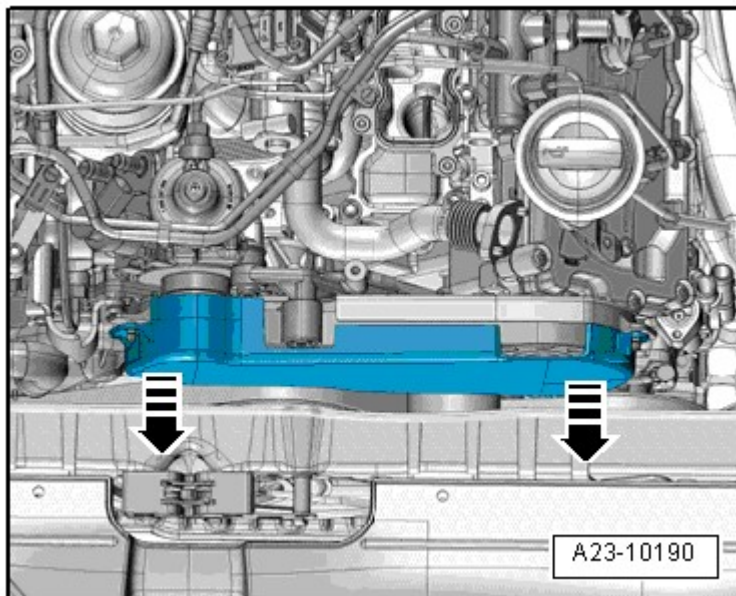


Fig. 42: Identifying Toothed Belt Guard

Courtesy of AUDI OF AMERICA, LLC

NOTE: The toothed belt guard is shown with the intake manifold upper section removed.

-- Remove the bolts -arrows- for the coolant pump ribbed belt pulley using a 3212 to counterhold.

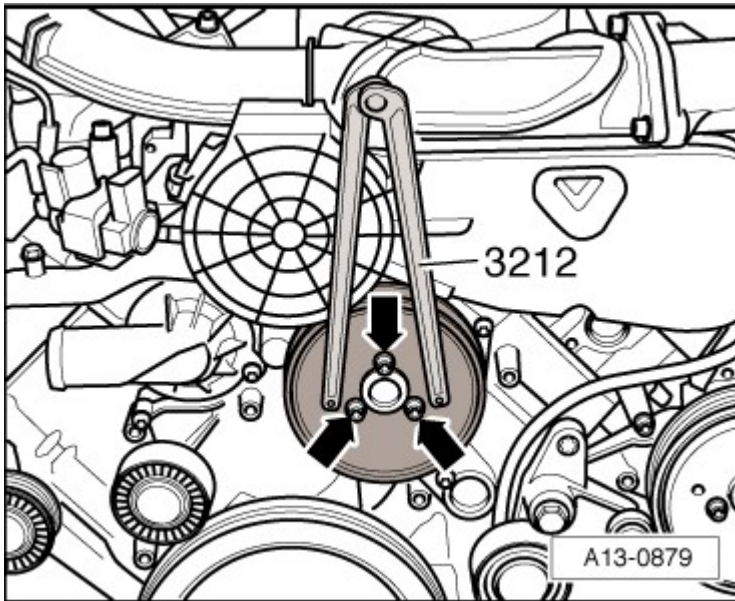


Fig. 43: Identifying Spanner Wrench 3212 And Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -1- and nut -2-.

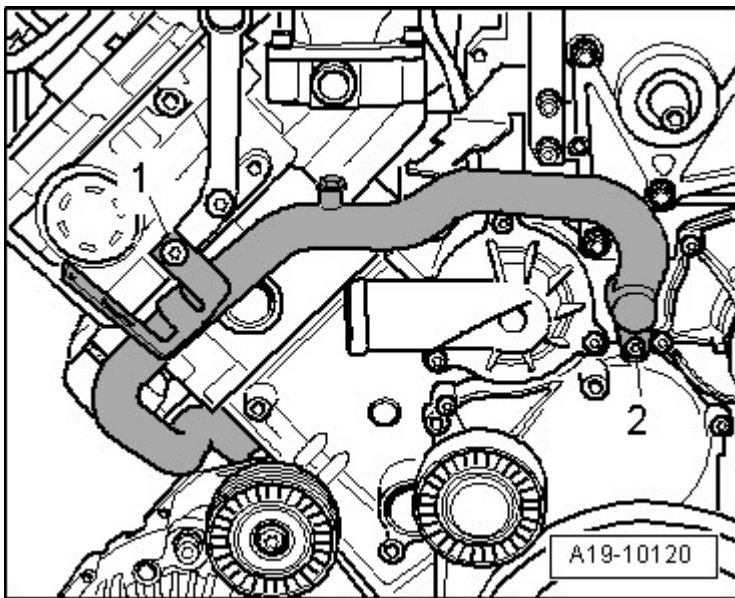


Fig. 44: Identifying Bolt -1- And Nut -2-

Courtesy of AUDI OF AMERICA, LLC

- Remove the right coolant pipe from the cylinder block and move it to the side.
- Pry the cover off the ribbed belt idler roller.

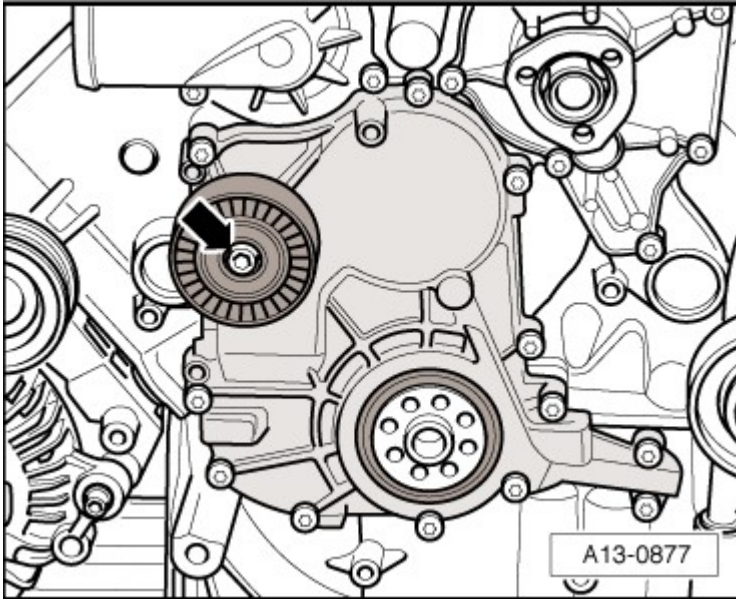


Fig. 45: Identifying Bolt -Arrow- And Idler Pulley
Courtesy of AUDI OF AMERICA, LLC

- Remove the bolt -arrow- and remove the idler roller from the pulley side sealing flange.
- Remove the bolts.

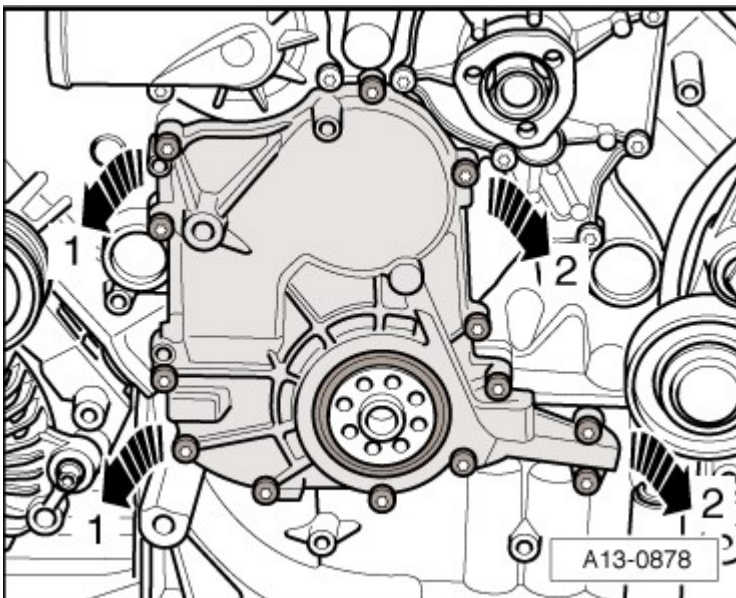


Fig. 46: Identifying Removal Of Front Sealing Flange Sequence -- At Right -Arrows 1- Then At Left -

Arrows 2-**Courtesy of AUDI OF AMERICA, LLC**

-- First remove the right pulley side sealing flange -arrows 1- and then the left one -arrows 2-.

-- Remove the crankshaft seal on the removed sealing flange.

Installing

- Tightening specifications, refer to **RIBBED BELT DRIVE OVERVIEW, SEAL AND SEALING FLANGE, PULLEY SIDE OVERVIEW.**

NOTE: **Replace the crankshaft seals, O-rings and sealing rings.**

-- Remove any old sealant from the grooves on the sealing flange as well as from the sealing surfaces.

CAUTION: Risk of contaminating lubricating system.

- **Cover open parts of the engine.**

WARNING: Risk of eye injury.

- **Wear protective eyewear.**

-- Remove sealant residue on the sealing flange and the cylinder block and the upper section of the oil pan, for example using a rotating plastic brush.

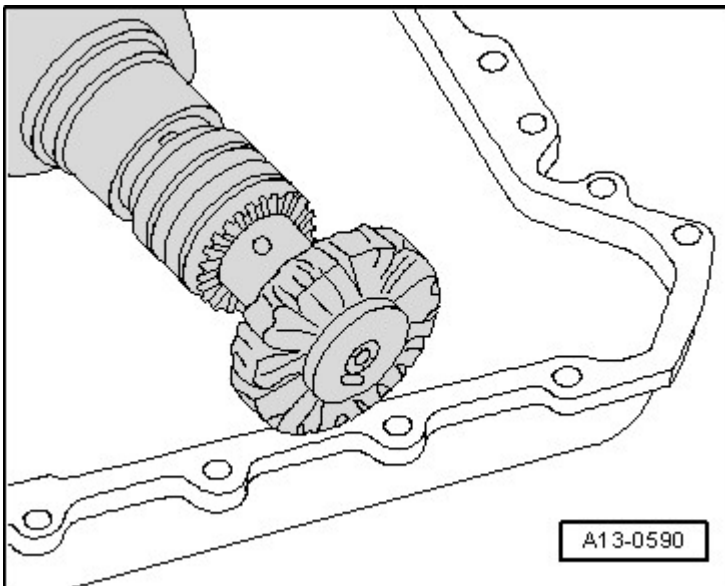


Fig. 47: Identifying Rotating Plastic Brush To Remove Sealant Residue From Sealing Flange, Cylinder Block And Upper Part Of Oil Pan

Courtesy of AUDI OF AMERICA, LLC

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

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

-- Cut the tube nozzle at the front marking (nozzle diameter approximately 1.5 mm).

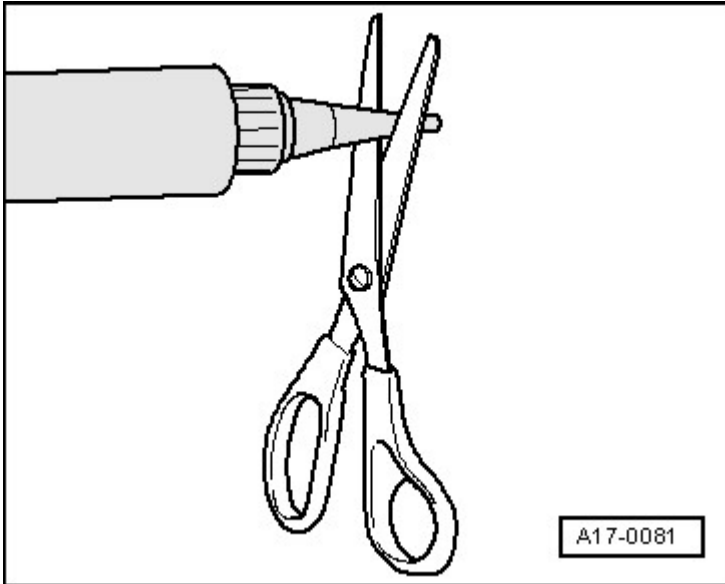


Fig. 48: Identifying Scissors To Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 1.5 mm)
Courtesy of AUDI OF AMERICA, LLC

-- Install the seals -2- and -4- and O-rings -1- and -3-.

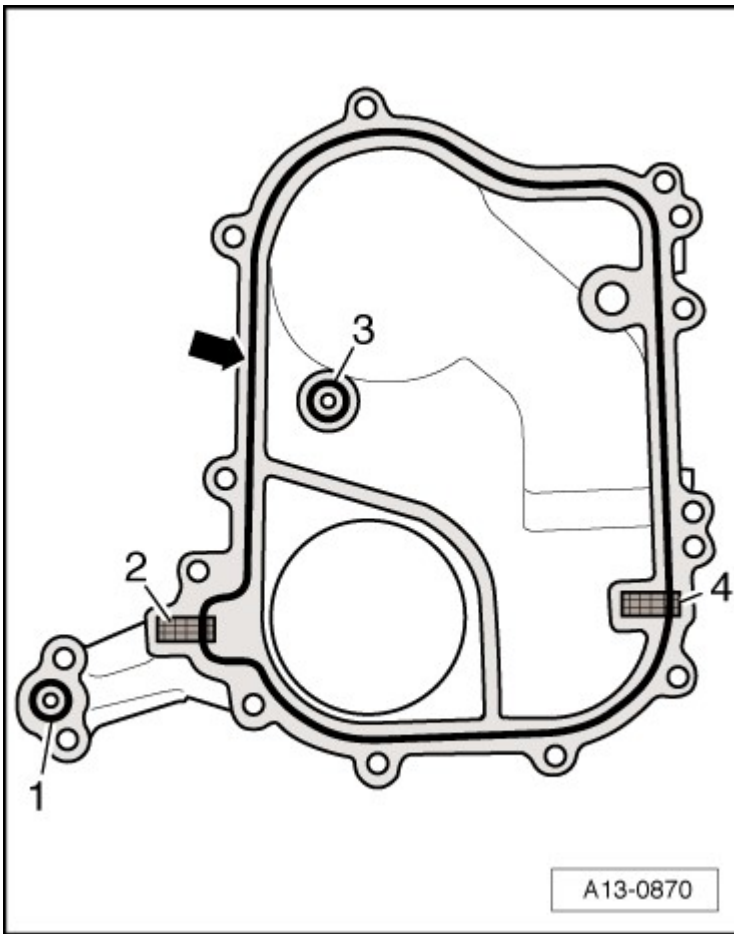


Fig. 49: Identifying Seals -2 & 4-, O-rings -1 & 3- And Sealant Bead
Courtesy of AUDI OF AMERICA, LLC

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

- Do not apply sealant bead thicker than specified.

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

- The sealant bead must be 1.5 to 2.0 mm above the sealing surface.

NOTE: The ribbed belt side sealing flange must be installed within 5 minutes of applying the sealant.

-- Tighten pulley side sealing flange bolts. Refer to **Fig. 4**.

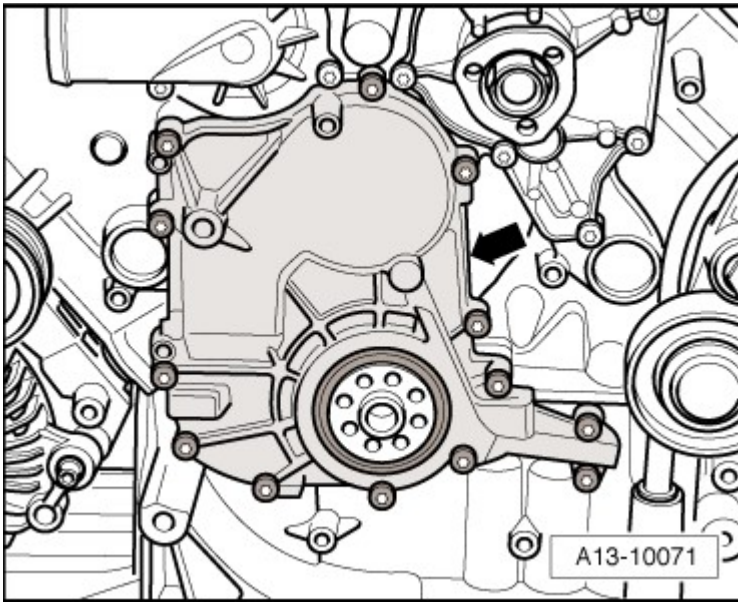


Fig. 50: Identifying Sealing Flange -Arrow- Bolts -- Tighten Diagonally
 Courtesy of AUDI OF AMERICA, LLC

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

- Install the pulley-side crankshaft shaft seal. Refer to **CRANKSHAFT SHAFT SEAL, BELT PULLEY SIDE, REPLACING**.
- Install right coolant pipe. Refer to **COOLANT PIPES OVERVIEW**.
- Install the coolant pump ribbed belt pulley. Refer to **COOLANT PUMP AND COOLANT THERMOSTAT OVERVIEW**.
- Install the vibration damper with ribbed belt pulley. Refer to **VIBRATION DAMPER WITH RIBBED BELT PULLEY**.
- Install the coolant thermostat and connection. Refer to **CONNECTING PIECE WITH COOLANT THERMOSTAT**.

DRIVE PLATE

Special tools and workshop equipment required

- Counter Hold Tool 10-201

Removing

- Transmission removed.
- Insert the 10-201 to loosen the bolts.

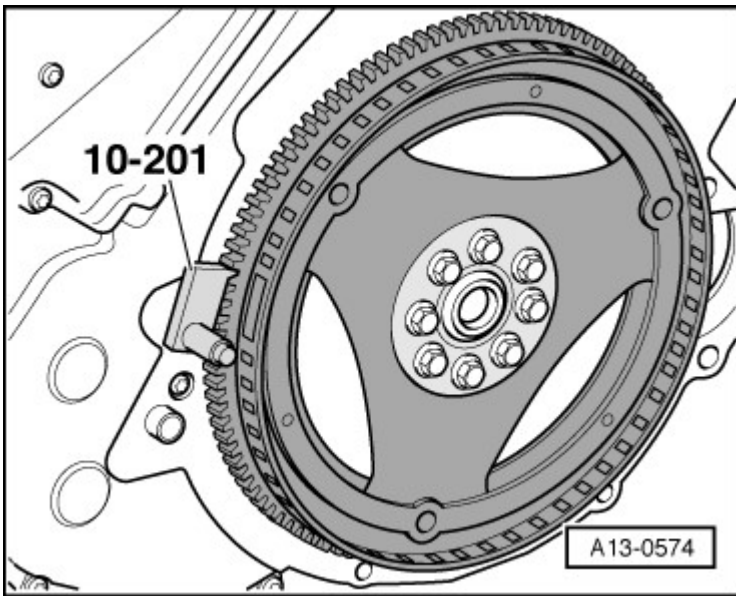


Fig. 51: Inserting Counter Hold Tool 10-201 To Loosen Bolts
Courtesy of AUDI OF AMERICA, LLC

- Remove the bolts and then remove the washer, the drive plate and the shim behind them.
- Vehicles built from 06.10: Install the sensor wheel for the engine speed (RPM) sensor -G28-.

Installing

Install in reverse order of removal. Note the following:

- Tightening specifications, refer to **DRIVE PLATE OVERVIEW**

NOTE: Replace the drive plate bolts.

- Vehicles built through 05.10: Place the 1.5 mm shim on the crankshaft.
- Be careful of the alignment bushings when installing the other parts.
- Position the 10-201 to tighten the bolts.

CRANKSHAFT SEAL, TRANSMISSION SIDE

Special tools and workshop equipment required

- Assembly Tool T10122
- Pulling Hook T20143

Procedure

- Transmission removed.

-- Remove the drive plate. Refer to **DRIVE PLATE**.

-- Pry the shaft seal out with the T20143/2.

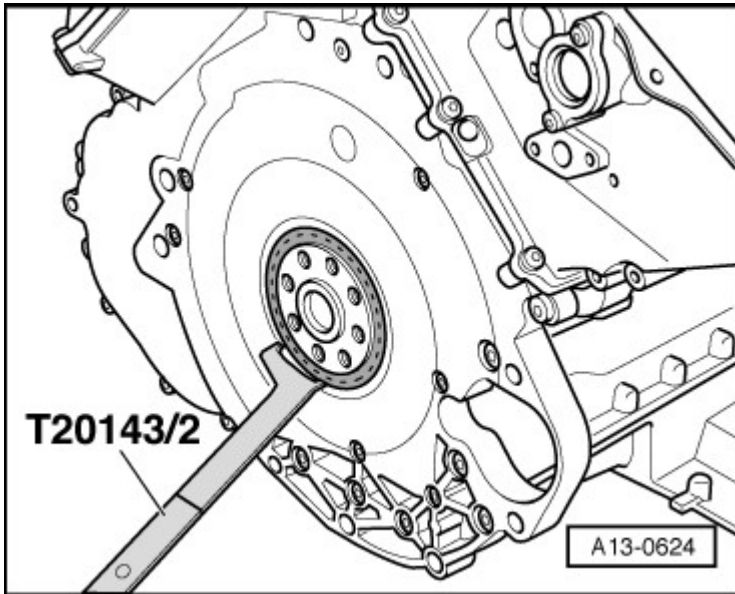


Fig. 52: Prying Out Sealing Ring Using Extractor Lever T20143/2
Courtesy of AUDI OF AMERICA, LLC

-- Drill a 8 mm -arrow 2- hole in the guide sleeve T10122/2 for the alignment sleeve; use the hole in the washer as a template -arrow 1-.

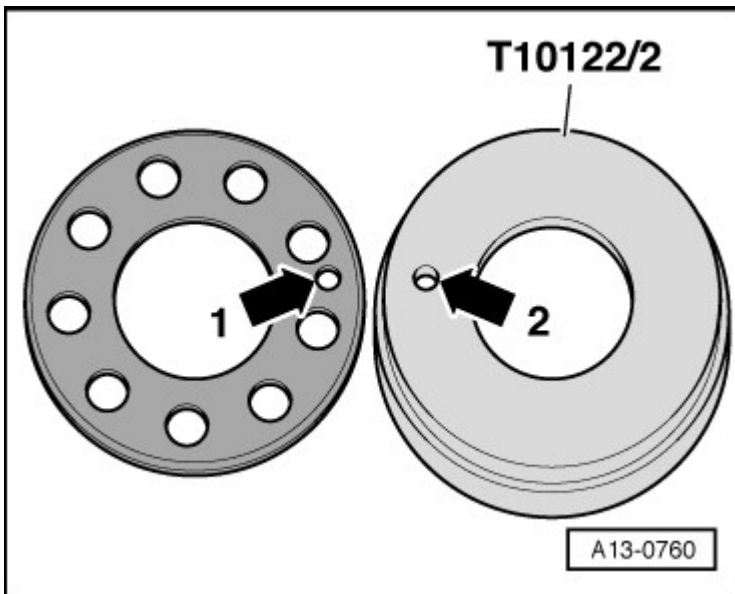


Fig. 53: Identifying 8 mm Drill Hole -Arrow 2- In Guide Sleeve T10122/2 For Alignment Sleeve
Courtesy of AUDI OF AMERICA, LLC

-- Clean running and sealing surface.

-- Place the assembly device T10122/1 on the pull sleeve T10122/2 and slide the shaft seal -A- onto the pull sleeve.

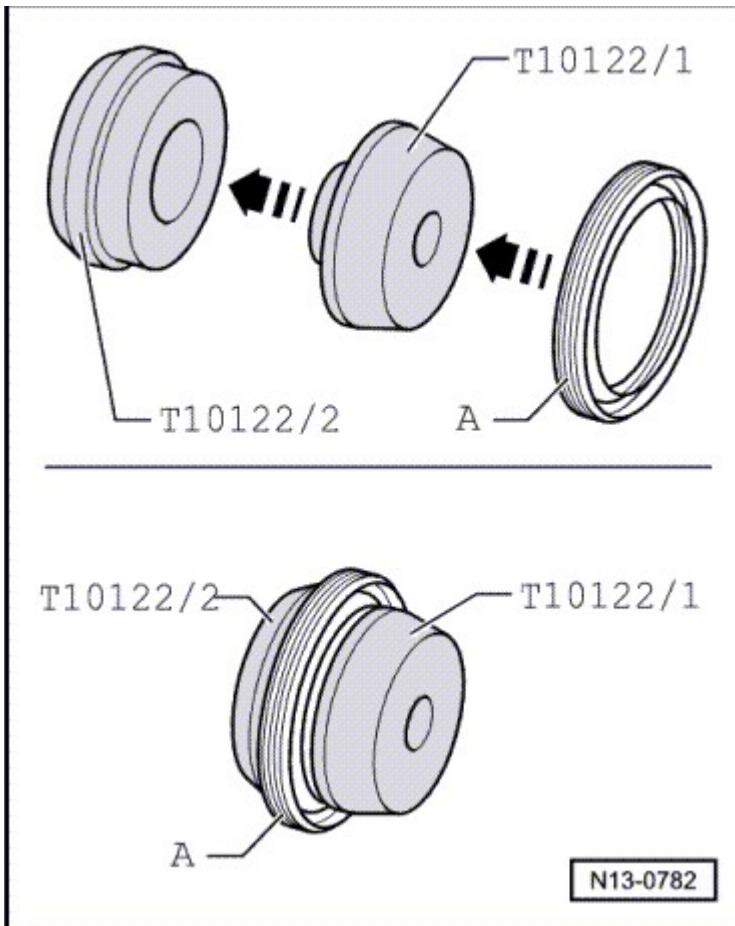


Fig. 54: Identifying Seal, Sleeve T10122/1 And Assembly Tool T10122/2
Courtesy of AUDI OF AMERICA, LLC

-- Remove the assembly device.

-- Position the T10122/2 with shaft seal -1- on the crankshaft.

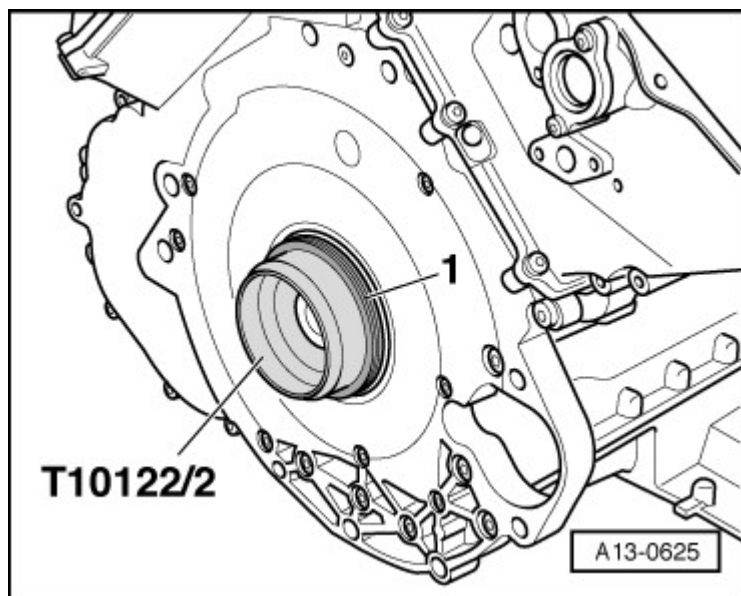


Fig. 55: Installing Pull Sleeve T10122/2 With Sealing Ring Onto Crankshaft
 Courtesy of AUDI OF AMERICA, LLC

-- Press the shaft seal in, evenly and flush, using the pressure sleeve T10122/3.

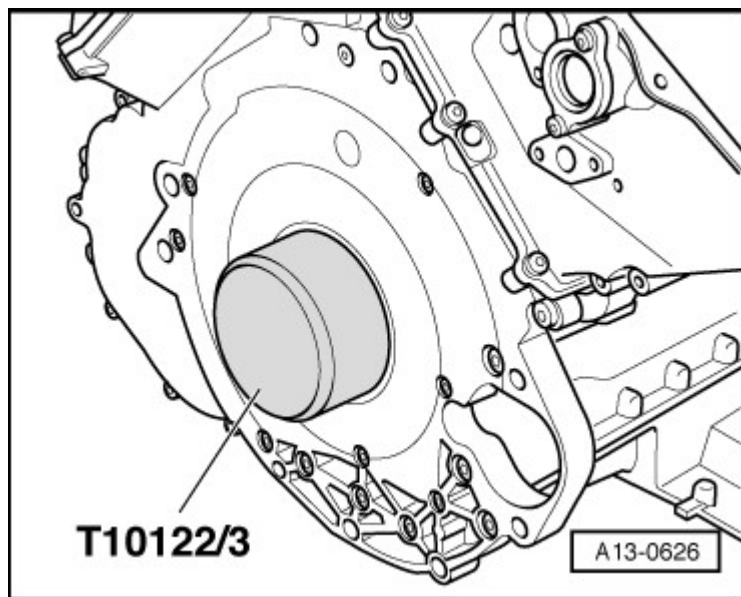


Fig. 56: Pressing In Seal Evenly All Around Until It Reaches Stop Using T10122/3
 Courtesy of AUDI OF AMERICA, LLC

-- Installing drive plate. Refer to **DRIVE PLATE**.

SPECIAL TOOLS

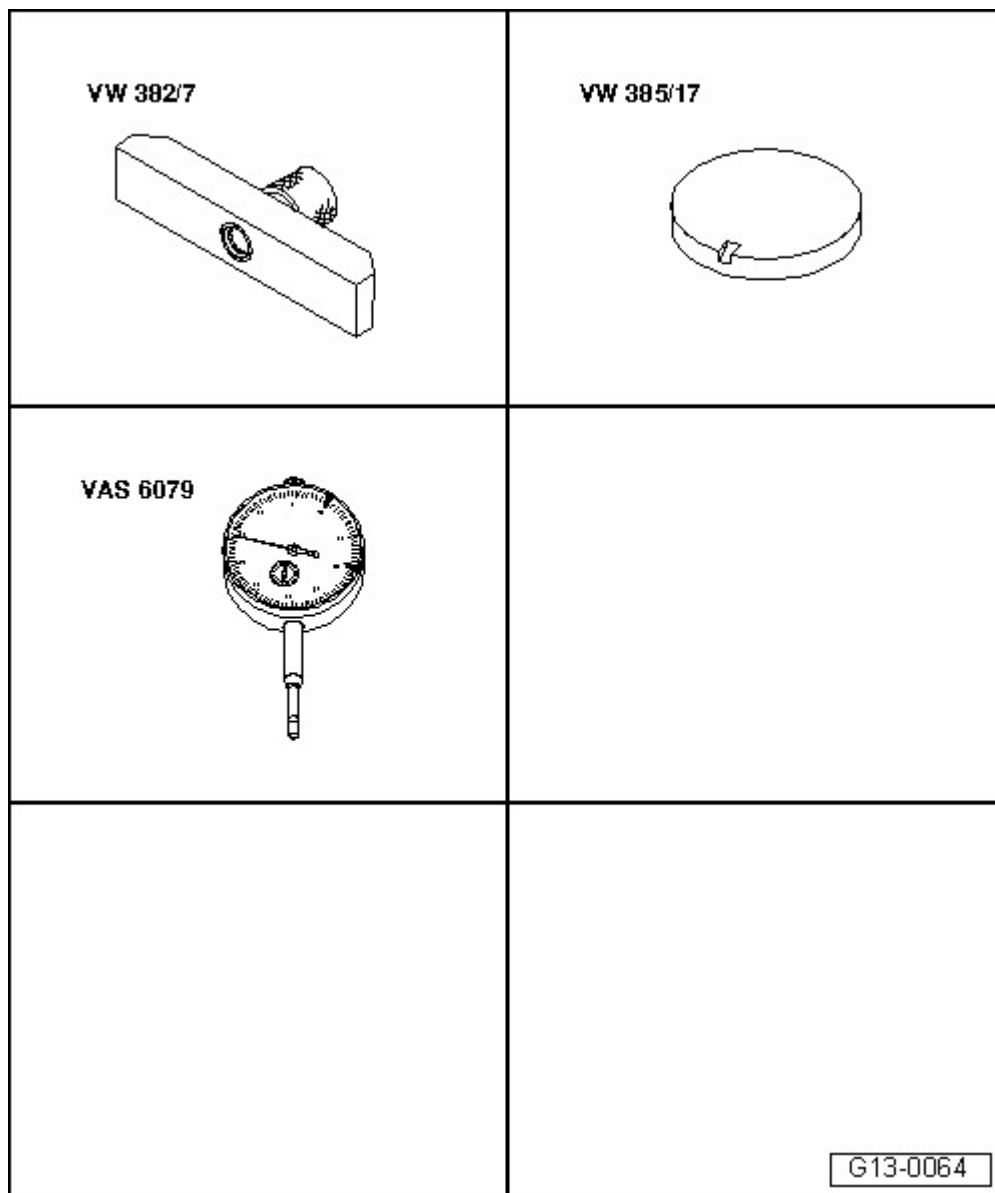


Fig. 57: Identifying VW 382/7, VW 385/17 And VAS 6079

Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Measuring Bar VW 382/7 from Special Socket and Measuring Tools VW 382
- Magnetic Plate 50 mm Dia. VW 385/17 from Universal Measuring Tool VW 385
- Dial Gauge 0-10 mm VAS 6079
- Dial Gauge Holder VW 387

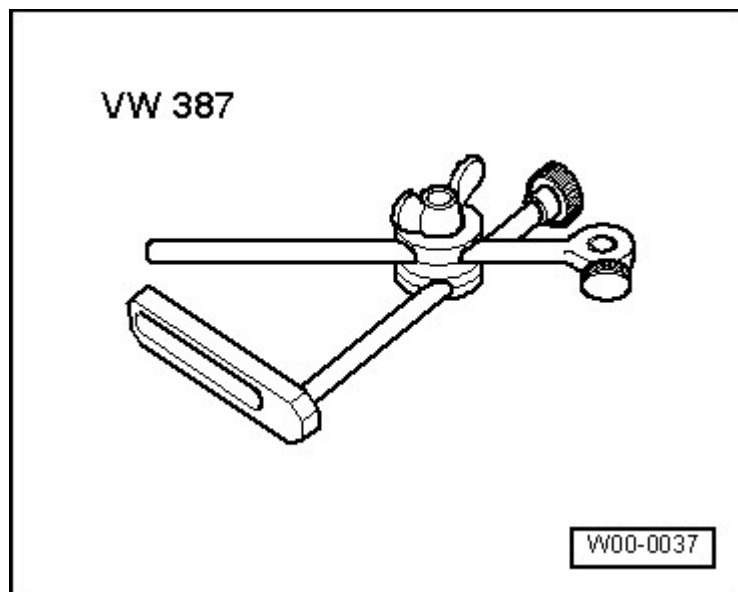


Fig. 58: Identifying Dial Gauge Holder VW 387
Courtesy of AUDI OF AMERICA, LLC

- Torx® Socket T60 T40087

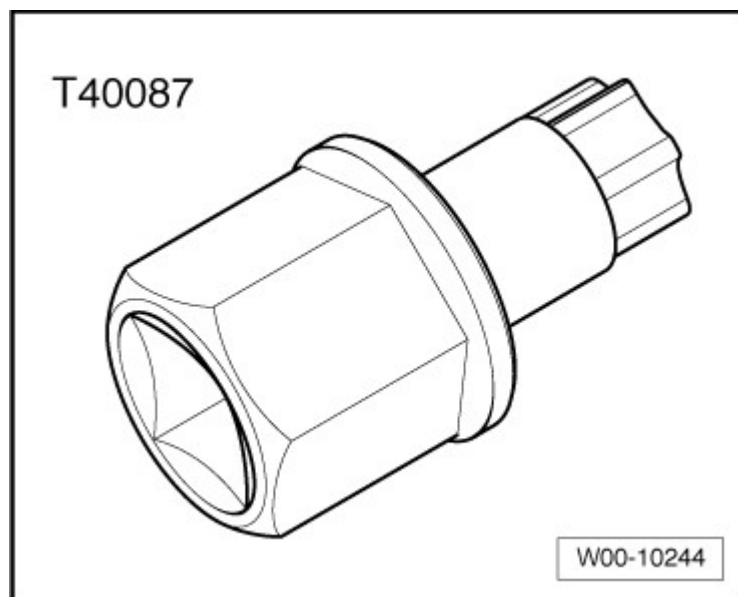


Fig. 59: Identifying TORX® Socket T60 T40087
Courtesy of AUDI OF AMERICA, LLC

- Oil Seal Extractor T40019

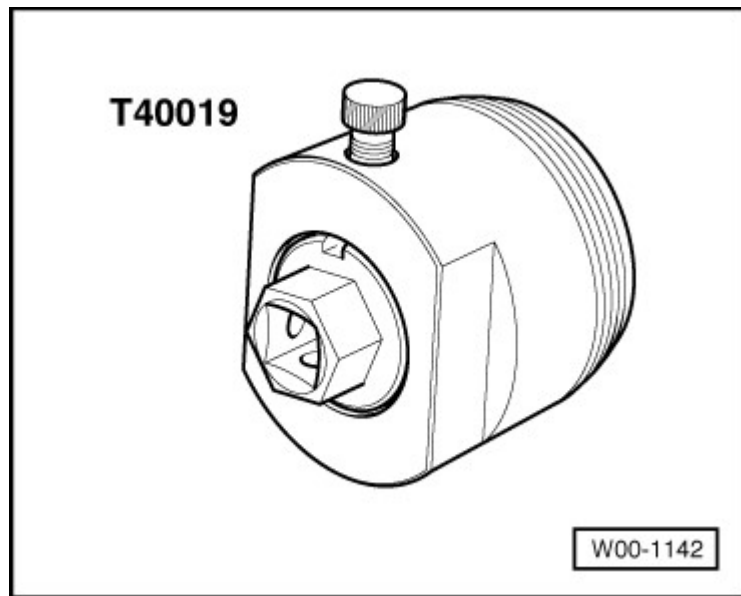


Fig. 60: Identifying Oil Seal Extractor T40019
Courtesy of AUDI OF AMERICA, LLC

- Assembly Device T40048 with Assembly Adapter T40048/4

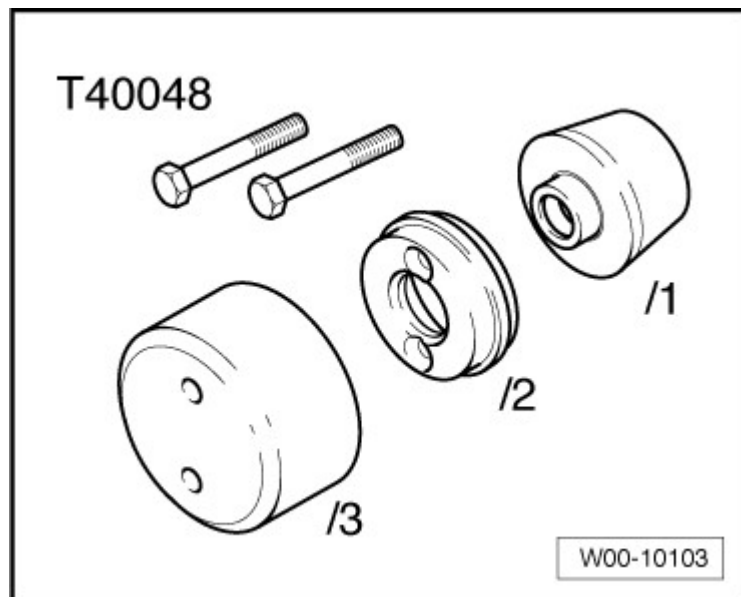


Fig. 61: Identifying Assembly Tool T40048
Courtesy of AUDI OF AMERICA, LLC

- Spanner Wrench 3212

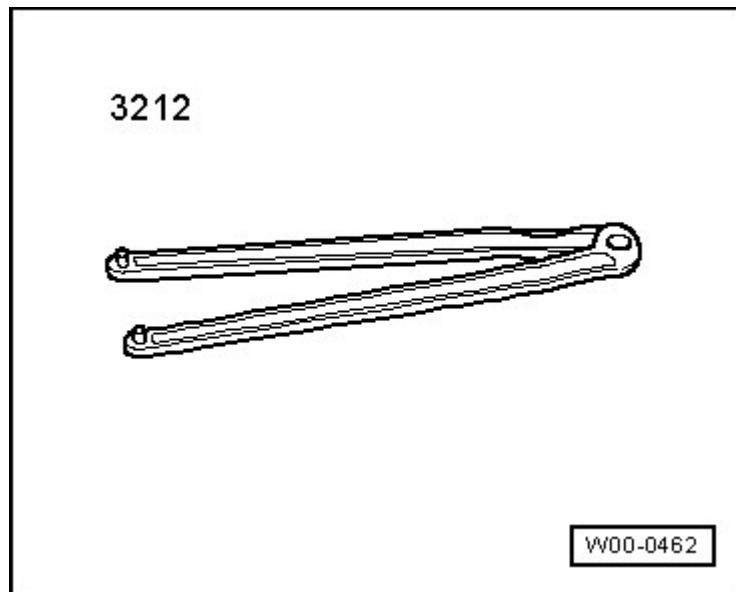


Fig. 62: Identifying Special Tool - Spanner Wrench 3212
Courtesy of AUDI OF AMERICA, LLC

- Counter Hold Tool 10-201

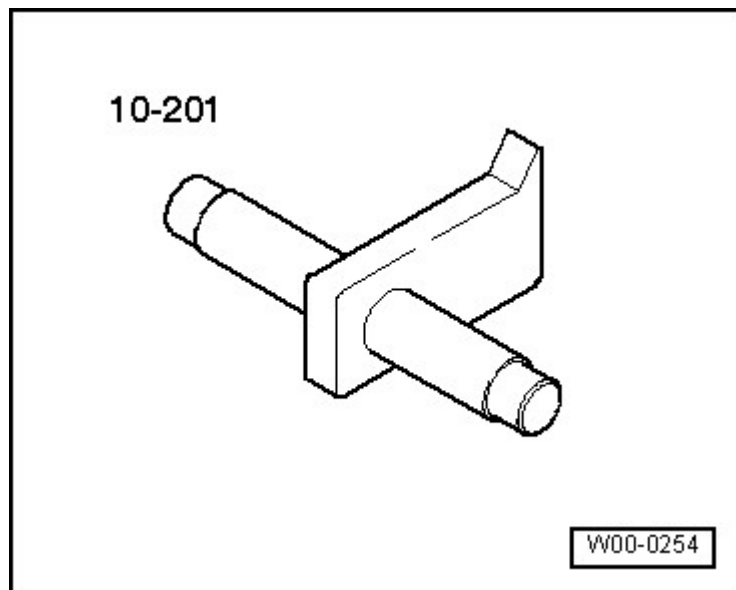


Fig. 63: Identifying Counter-Holder Tool 10-201
Courtesy of AUDI OF AMERICA, LLC

- Assembly Tool T10122

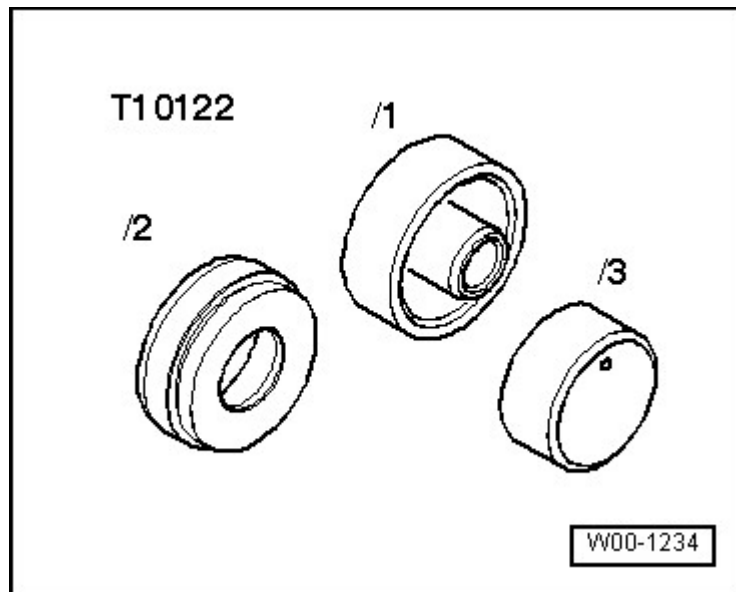


Fig. 64: Identifying Installation Tool T10122
Courtesy of AUDI OF AMERICA, LLC

- Pulling Hook T20143

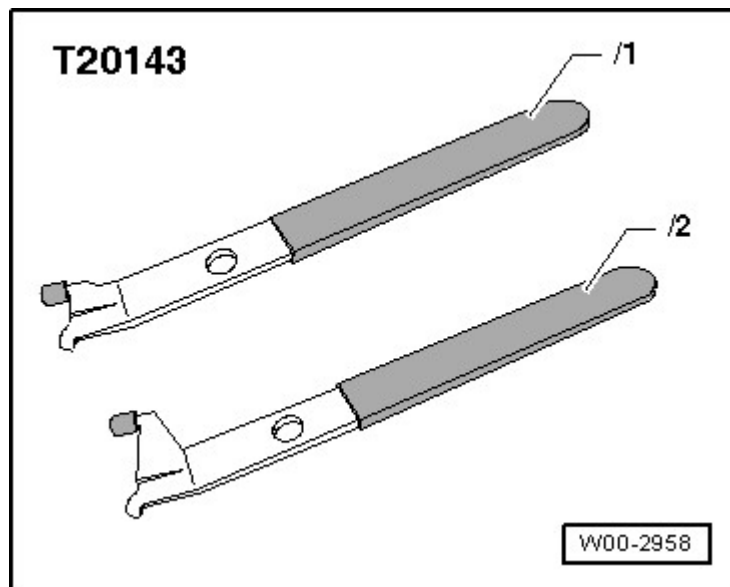


Fig. 65: Identifying Extractor Hook T20143
Courtesy of AUDI OF AMERICA, LLC

ENGINE**3.0 Liter - Cylinder Head, Valvetrain - Engine Code(s): CATA****15 CYLINDER HEAD, VALVETRAIN****DESCRIPTION AND OPERATION****CYLINDER HEAD COVER OVERVIEW**

NOTE: The cylinder head cover for cylinder bank 2 (left) is shown in the illustration.

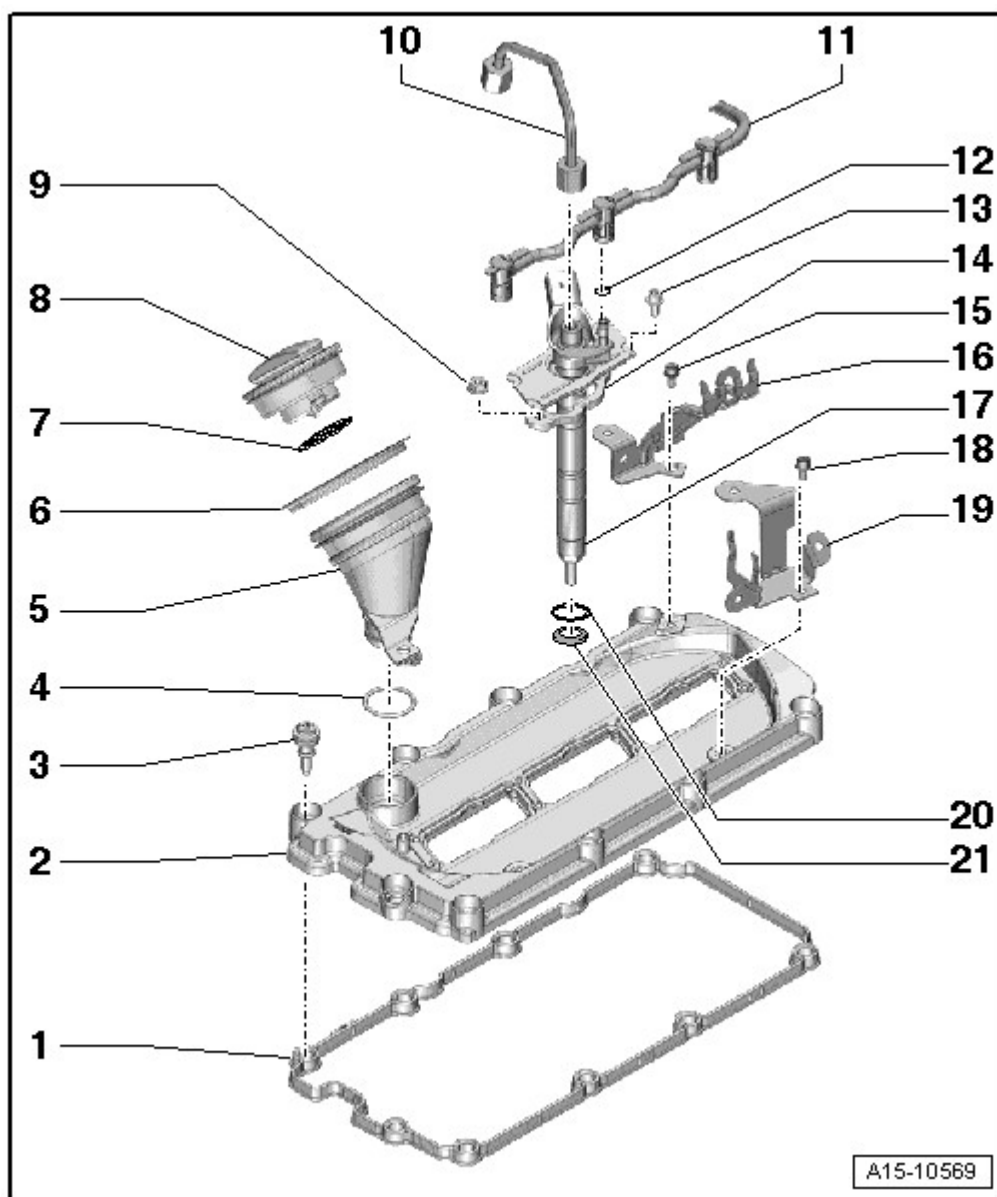


Fig. 1: Identifying Cylinder Head Cover Overview

Courtesy of AUDI OF AMERICA, LLC

1. Cylinder Head Cover Gasket
 - Replace if damaged or leaking
2. Cylinder Head Cover
 - Removing and installing, refer to **LEFT CYLINDER HEAD COVER** and **RIGHT CYLINDER HEAD COVER**
3. Bolt
 - With gasket
 - Replace if the seal is damaged or leaking
 - Tightening specification and sequence, refer to **Fig. 2**
4. O-ring
 - Replace
5. Oil Filler Neck
 - To remove, lift the tab, turn the oil filler neck to the left and remove it.
6. Seal
7. Seal
 - Replace if damaged or leaking
8. Cap
9. Nut
 - Tightening specifications, refer to **Description and Operation**
10. High-Pressure Line
 - Note rules of cleanliness, refer to **CLEAN WORKING CONDITIONS**
 - Mark the order of the injectors
 - Do not change bent shape
 - Installing, refer to **Description and Operation**
11. Fuel Return Line
 - Note rules of cleanliness, refer to **CLEAN WORKING CONDITIONS**
12. O-ring
 - Replace
13. Bolt
 - Tightening specifications, refer to **Description and Operation**
14. Tensioning Bracket
15. Screw
 - 5 Nm
16. Bracket
 - For the electrical connectors
17. Injector

- Note rules of cleanliness, refer to **CLEAN WORKING CONDITIONS**
- Removing and installing, refer to **Removal and Installation**

18. Bolt

- 5 Nm

19. Bracket

- For the electrical wiring harness

20. O-ring

- Replace

21. Copper Sealing Ring

- Replace

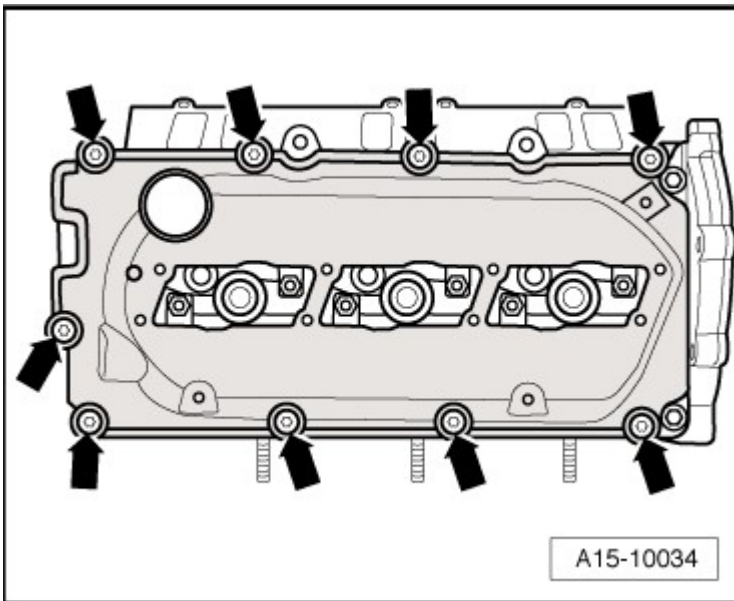


Fig. 2: Identifying Cylinder Head Cover, Tightening Specifications and Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the cylinder head cover bolts -arrows- in a diagonal sequence in stages to 9 Nm.

CYLINDER HEAD OVERVIEW

NOTE: The illustration shows the cylinder bank 2 cylinder head (left).

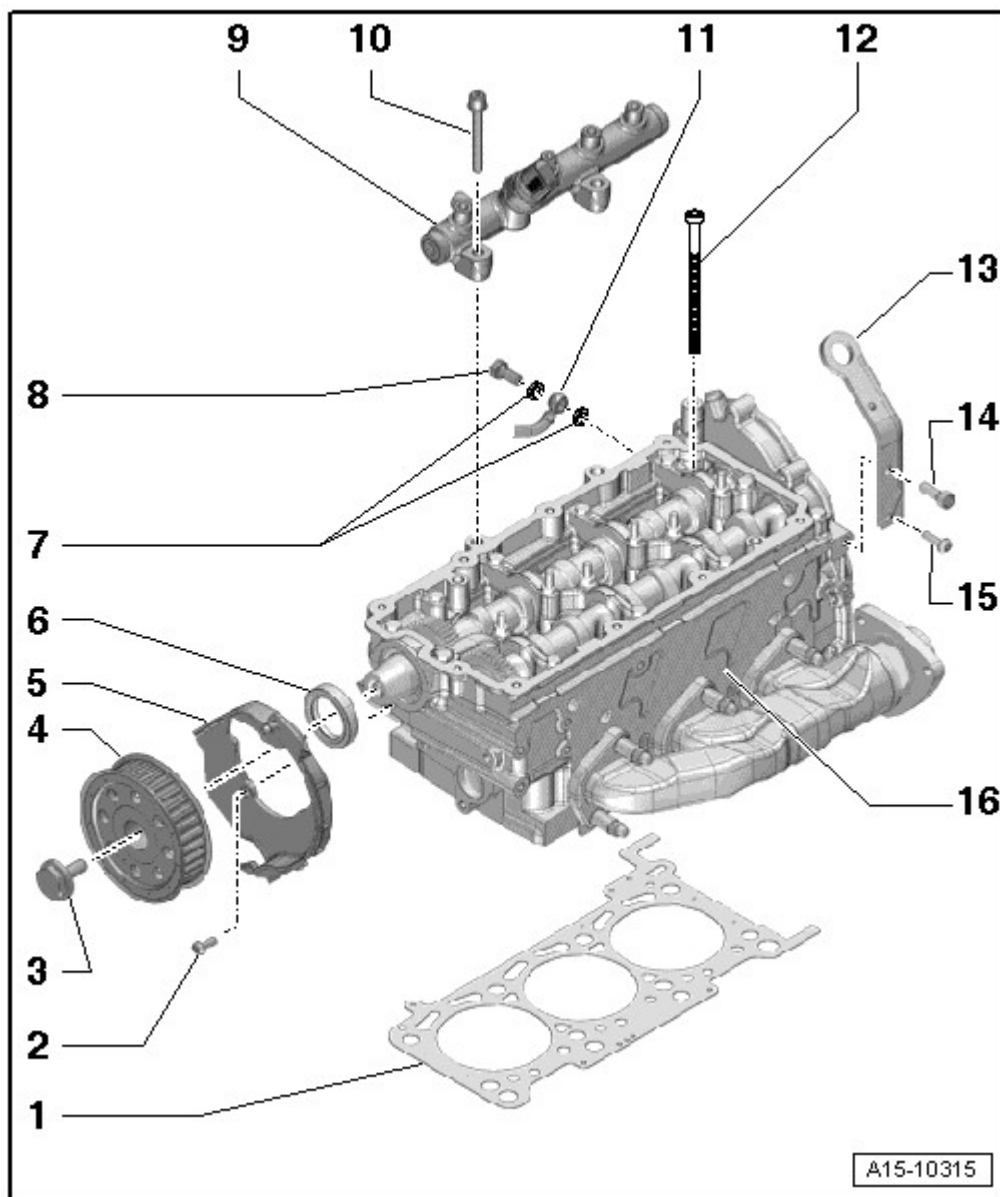


Fig. 3: Identifying Cylinder Head Overview

Courtesy of AUDI OF AMERICA, LLC

1. Cylinder Head Gasket

- Removing and installing, refer to **CYLINDER HEAD**
- Identification, refer to **Fig. 5**
- Installation position: Parts number to cylinder head
- After replacing, change coolant and engine oil

2. Bolt

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

3. Bolt

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

4. High Pressure Pump Toothed Belt Drive Sprocket
 - Removing and installing, refer to **Removal and Installation**
5. Rear Toothed Belt Guard
6. Camshaft Seal
 - Removing and installing, refer to **CAMSHAFT SEAL**
7. Seals
 - Replace
8. Banjo Bolt
 - Tightening specifications, refer to "Banjo Bolt" in numbered list under **COOLANT PIPES OVERVIEW**
9. Fuel Rail
 - Note rules of cleanliness, refer to **CLEAN WORKING CONDITIONS**
 - Removing and installing, refer to **Removal and Installation**
 - Do not change the angles of the high pressure lines
 - High pressure lines, removing and installing, refer to **Removal and Installation**
10. Bolt
 - Tightening specifications, refer to **Description and Operation**
11. Coolant Pipe
12. Bolt
 - Replace
 - Loosening sequence **LOOSEN THE CYLINDER HEAD BOLTS IN THE FOLLOWING SEQUENCE -1 THROUGH 8-**
 - Tightening specification and sequence, refer to **Fig. 6**
13. Engine Lifting Eye
14. M8 Bolts
 - 23 Nm
15. M6 Bolt
 - 9 Nm
16. Cylinder Head
 - Removing and installing, refer to **CYLINDER HEAD**
 - Do not lay the cylinder head on the sealing surface with the glow plugs installed otherwise the glow plugs will protrude slightly past the sealing surface
 - Check for distortion, refer to **Fig. 4**
 - It is not permitted to re-work the cylinder heads on TDI engines
 - After replacing, change coolant and engine oil

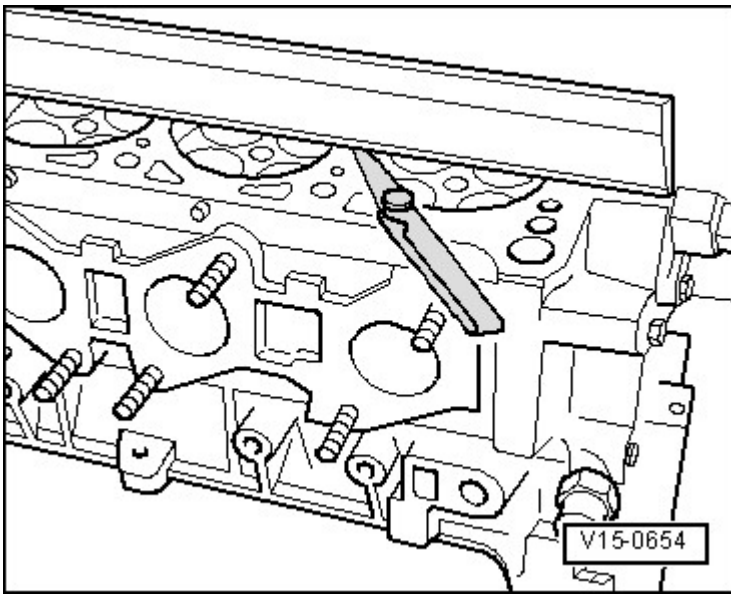


Fig. 4: Checking Cylinder Head For Distortion

Courtesy of AUDI OF AMERICA, LLC

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

- Maximum permissible distortion: 0.1 mm

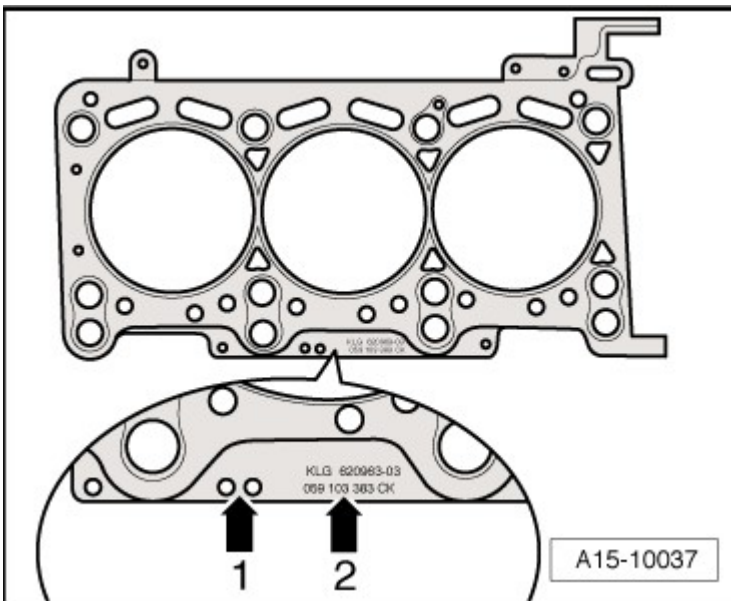


Fig. 5: Identifying Cylinder Head Gasket Identification

Courtesy of AUDI OF AMERICA, LLC

1. Holes
2. Part number:

NOTE: The cylinder head gaskets for the left and right cylinder head cannot be interchanged because they each have a different shape.

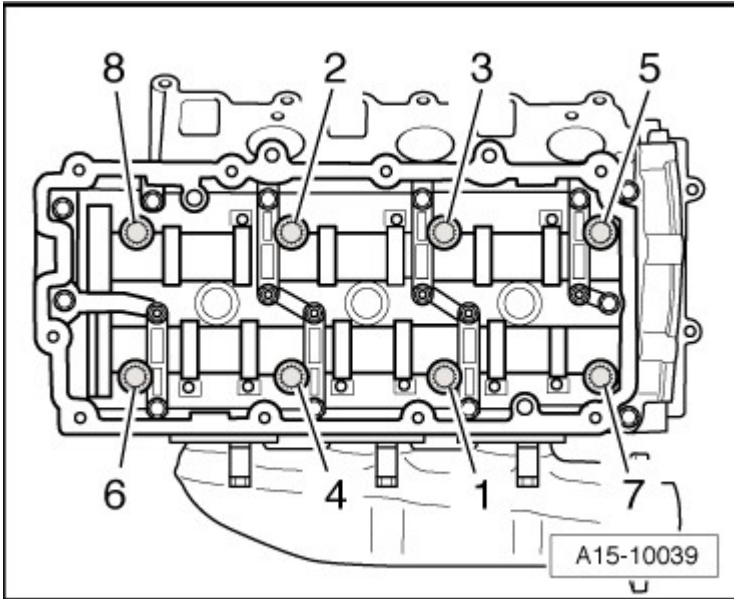


Fig. 6: Identifying Cylinder Head, Tightening Specifications and Sequence
Courtesy of AUDI OF AMERICA, LLC

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

-- Tighten the bolts in 5 steps according to the tightening sequence:

Step	Bolts	Tightening Torque/Additional Angle of Rotation
1.	-1 through 8-	Install all the way in by hand.
2.	-1 through 8-	35 Nm
3.	-1 through 8-	60 Nm
4.	-1 through 8-	Tighten an additional 90°.
5.	-1 through 8-	Tighten an additional 90°.

TIMING CHAIN COVERS OVERVIEW

Vehicles Built through 05.10

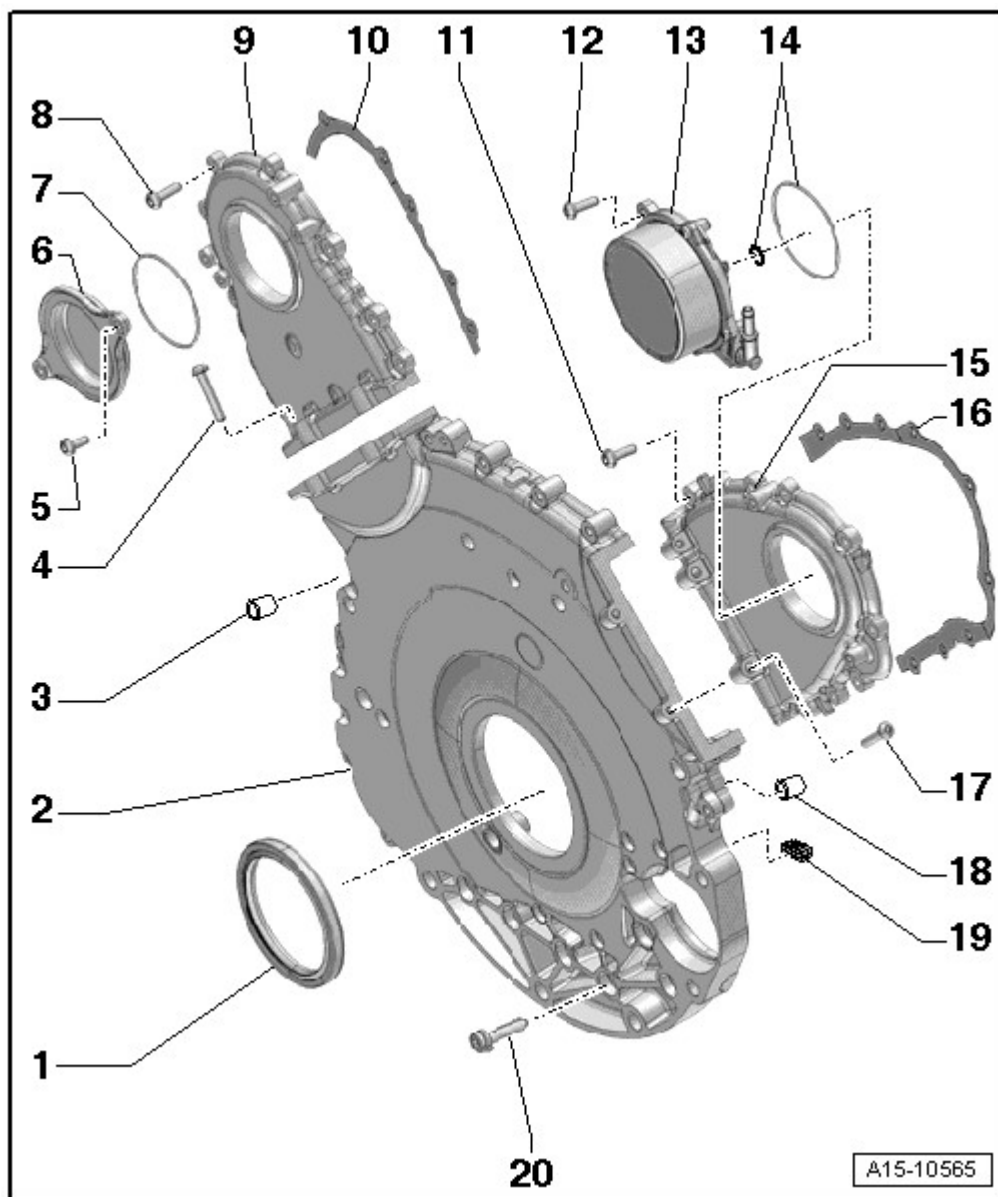


Fig. 7: Identifying Timing Chain Covers Overview (Vehicles Built through 05.10)

Courtesy of AUDI OF AMERICA, LLC

1. Crankshaft Shaft Seal, Transmission Side
 - Removing and installing, refer to **CRANKSHAFT SEAL, TRANSMISSION SIDE**
2. Lower Timing Chain Cover
 - Removing and installing, refer to **LOWER TIMING CHAIN COVER**
3. Alignment Bushing
 - 2 pieces
4. Bolt
 - Replace
 - Tightening specification and sequence, refer to **Fig. 9**

5. Bolt
 - 9 Nm
6. Cap
7. O-ring
 - Replace
8. Bolt
 - Replace
 - Tightening specification and sequence, refer to **Fig. 9**
9. Left Timing Chain Cover
 - Removing and installing, refer to **LEFT TIMING CHAIN COVER**
10. Gasket
 - Replace
11. Bolt
 - Replace
 - Tightening specification and sequence, refer to **Fig. 10**
12. Bolt
 - Tightening specifications, refer to **FASTENER TIGHTENING SPECIFICATIONS**
13. Vacuum Pump
 - Removing and installing, refer to **Removal and Installation**
14. O-rings
 - Replace
15. Right Timing Chain Cover
 - Removing and installing, refer to **RIGHT TIMING CHAIN COVER**
16. Gasket
 - Replace
17. Bolt
 - Replace
 - Tightening specification and sequence **Fig. 10**
18. Alignment Bushing
 - 2 pieces
19. Sealing Piece
 - 2 pieces
20. Bolt
 - Tightening specification and sequence, refer to **Fig. 11**

Vehicles Built from 06.10

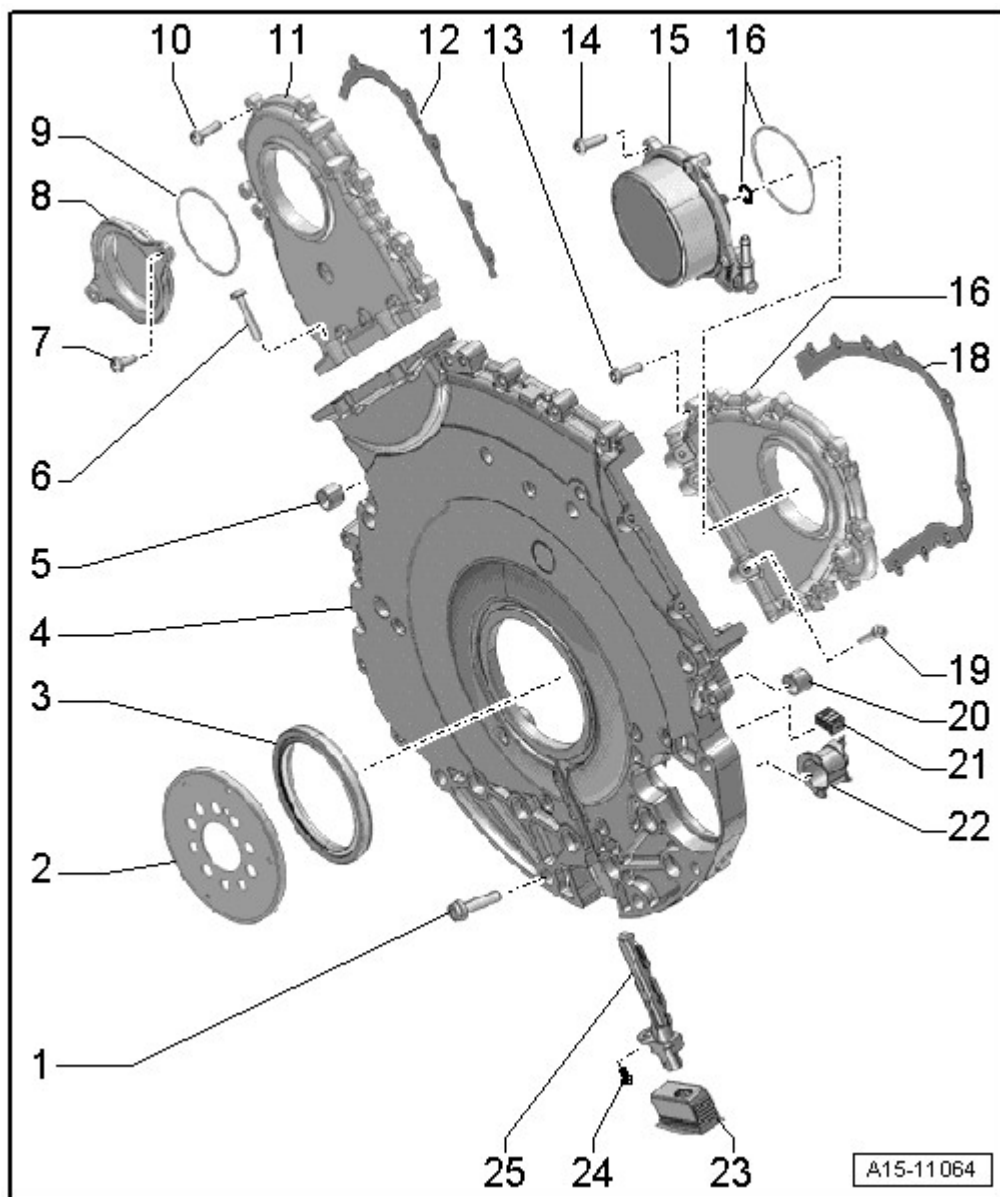


Fig. 8: Identifying Timing Chain Cover Overview (Vehicles Built from 06.10)

Courtesy of AUDI OF AMERICA, LLC

1. Bolt
 - Tightening specification and sequence, refer to **Fig. 11**
2. Sensor Wheel
 - For the engine speed sensor -G28-
3. Crankshaft Shaft Seal, Transmission Side
 - Removing and installing, refer to **CRANKSHAFT SEAL, TRANSMISSION SIDE**
4. Lower Timing Chain Cover
 - Removing and installing, refer to **LOWER TIMING CHAIN COVER**
5. Alignment Bushing

- 2 pieces
- 6. Bolt
 - Replace
 - Tightening specification and sequence, refer to **Fig. 9**
- 7. Bolt
 - 9 Nm
- 8. Cap
- 9. O-ring
 - Replace
- 10. Bolt
 - Replace
 - Tightening specification and sequence, refer to **Fig. 9**
- 11. Left Timing Chain Cover
 - Removing and installing, refer to **LEFT TIMING CHAIN COVER**
- 12. Gasket
 - Replace
- 13. Bolt
 - Replace
 - Tightening specification and sequence, refer to **Fig. 10**
- 14. Bolt
 - Tightening specifications, refer to **FASTENER TIGHTENING SPECIFICATIONS**
- 15. Vacuum Pump
 - Removing and installing, refer to **Removal and Installation**
- 16. O-rings
 - Replace
- 17. Right Timing Chain Cover
 - Removing and installing, refer to **RIGHT TIMING CHAIN COVER**
- 18. Gasket
 - Replace
- 19. Bolt
 - Replace
 - Tightening specification and sequence, refer to **Fig. 10**
- 20. Alignment Bushing
 - 2 pieces
- 21. Sealing piece
 - 2 pieces
- 22. Cover
 - For the starter

23. Cover

- For the engine speed (RPM) sensor -G28-

24. Bolt

- Tightening specifications, refer to **Ignition/Glow Plug System**

25. Engine Speed (RPM) Sensor -G28-

- Removing and installing, refer to **Ignition/Glow Plug System**

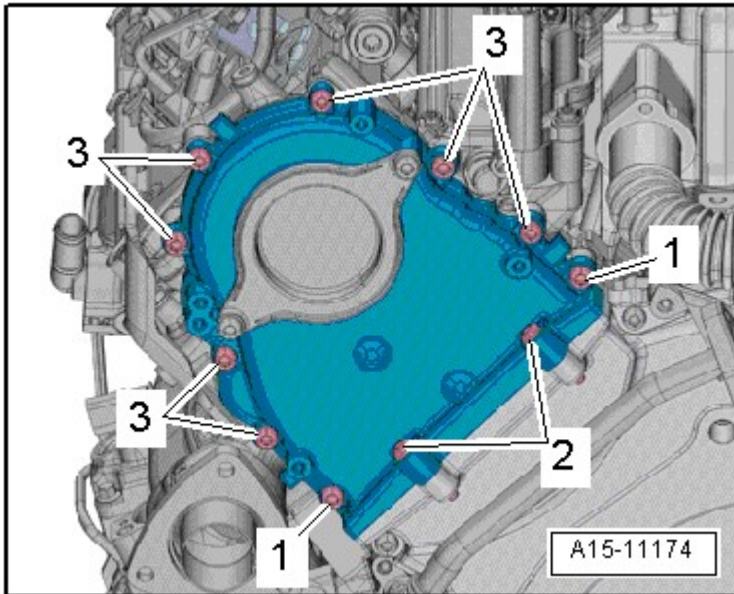


Fig. 9: Identifying Left Timing Chain Cover
 Courtesy of AUDI OF AMERICA, LLC

-- Tighten bolts in 4 stages as follows:

Step	Bolts	Tightening Specification
1.	-1-	3 Nm
2.	-2-	9 Nm
3.	-1-	9 Nm
4.	-3-	9 Nm in a diagonal sequence

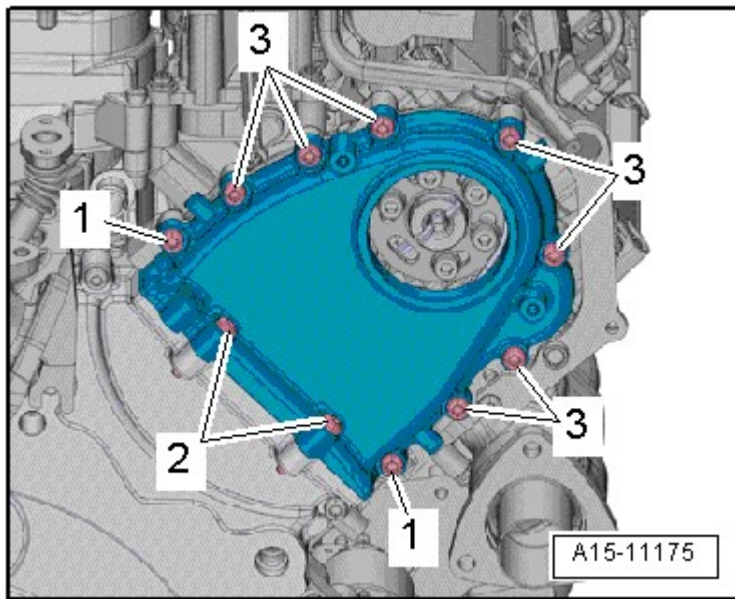


Fig. 10: Identifying Right Timing Chain Cover, Tightening Specifications and Sequence
 Courtesy of AUDI OF AMERICA, LLC

-- Tighten bolts in 4 stages as follows:

Step	Bolts	Tightening Specification
1.	-1-	3 Nm
2.	-2-	9 Nm
3.	-1-	9 Nm
4.	-3-	9 Nm in a diagonal sequence

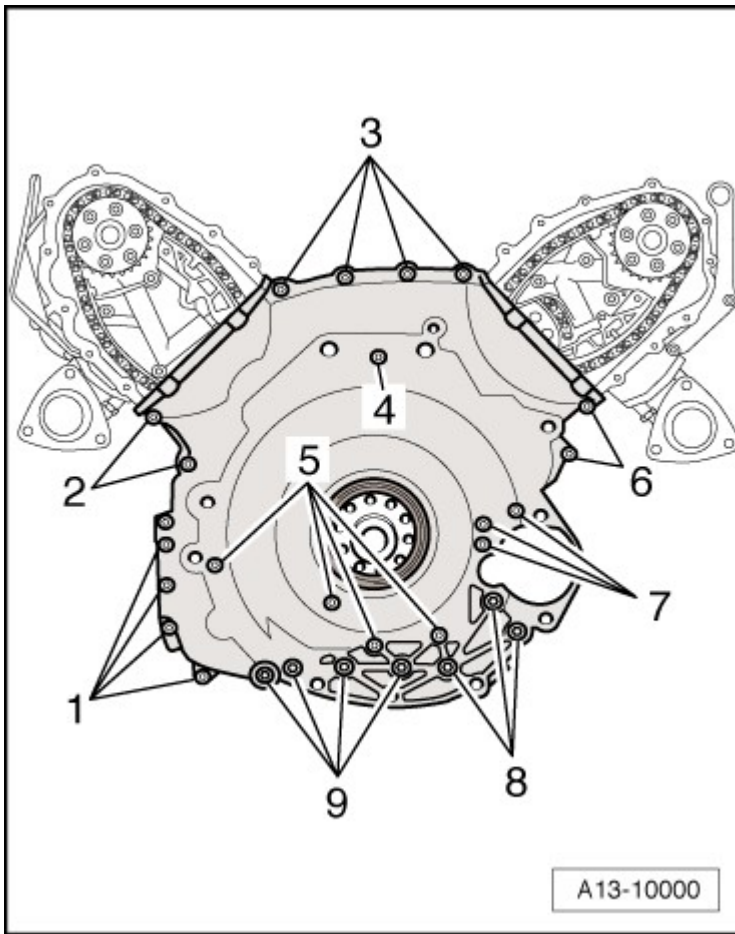


Fig. 11: Identifying Lower Timing Chain Cover Bolt Tightening Sequence and Specification
 Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts in 3 steps according to the tightening sequence:

Step	Bolts	Tightening Specification
1.	-1 through 9-	5 Nm from the inside toward the outside and diagonally
2.	-1 through 7-	9 Nm from the inside toward the outside and diagonally
3.	-8- and -9-	23 Nm

CAMSHAFT TIMING CHAINS OVERVIEW

Left Camshaft Timing Chain

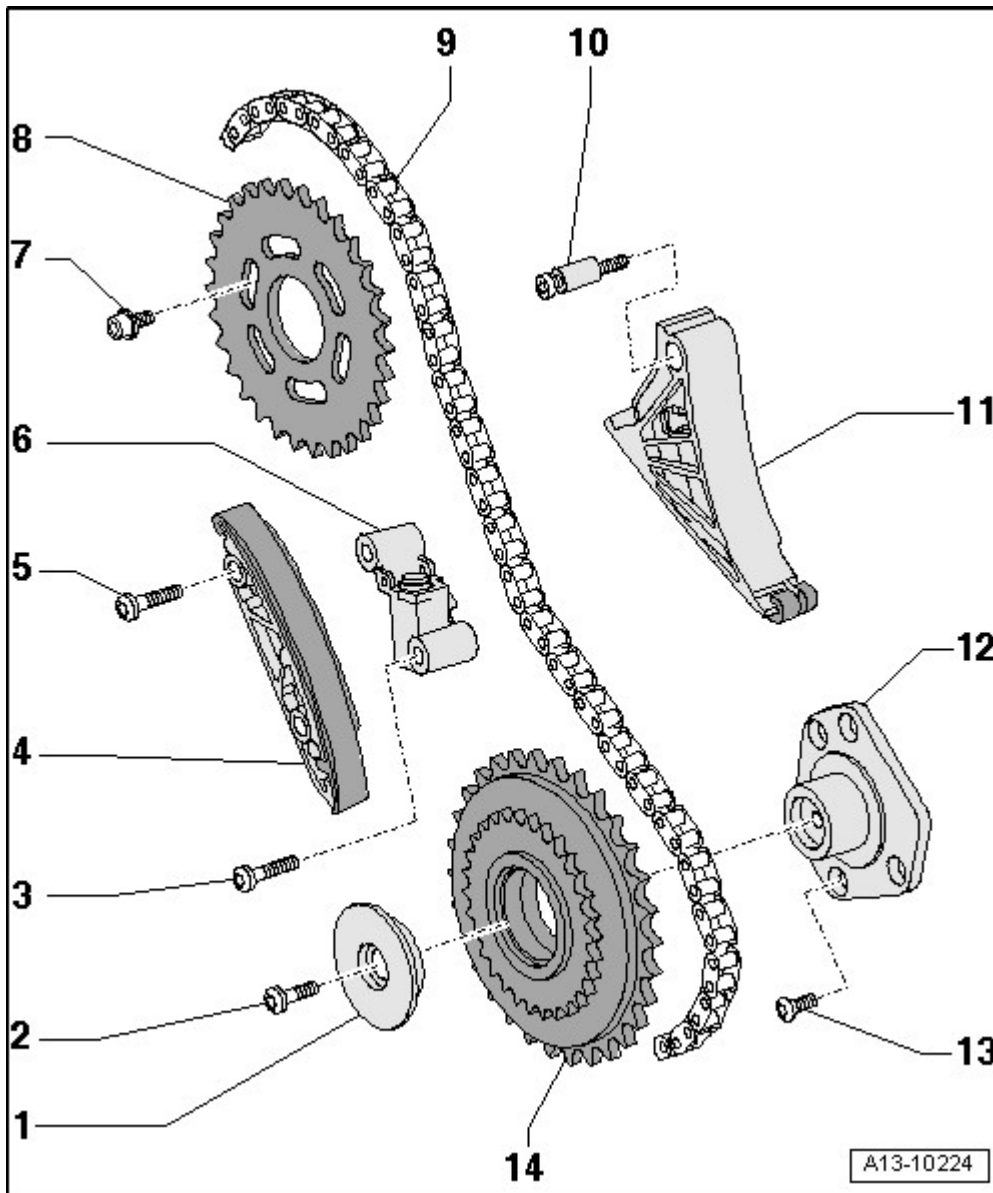


Fig. 12: Identifying Left Camshaft Timing Chain Overview
 Courtesy of AUDI OF AMERICA, LLC

1. Thrust Washer
 - For drive sprocket
2. Bolt
 - Tightening specifications, refer to item 4
3. Bolt
 - Replace
 - 5 Nm plus an additional 90° turn

4. Guide Rail
 - Pay attention to the installed position
5. Bolt
 - Replace
 - 5 Nm plus an additional 90° turn
6. Chain Tensioner
 - For the left camshaft control chain
7. Bolt
 - 23 Nm
8. Camshaft Chain Sprocket
 - For intake camshaft
 - Installation position: The side with lettering faces forward
9. Left Camshaft Timing Chain
 - Remove from camshafts, refer to **CAMSHAFT TIMING CHAINS, REMOVING FROM CAMSHAFTS**
 - Before removing, mark the direction of rotation with paint
 - Removing and installing, refer to **CAMSHAFT TIMING CHAINS**
10. Bolt
 - With sleeve
 - Replace
 - 5 Nm plus an additional 90° turn
11. Tensioning Rail
12. Bracket
 - For drive sprocket
13. Bolt
 - Tightening specifications, refer to item 10
14. Drive Sprocket
 - For the left camshaft control chain

Right Camshaft Timing Chain

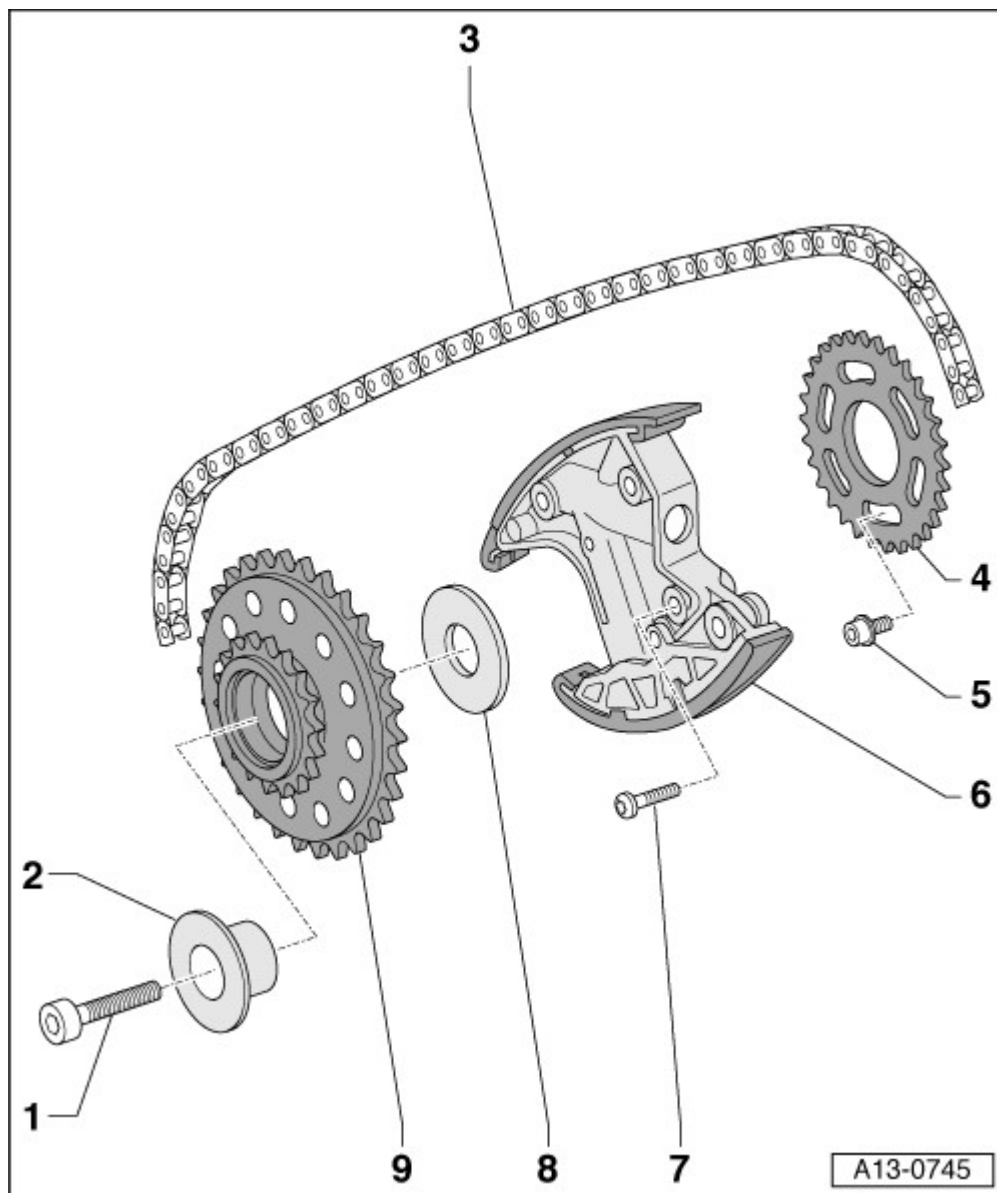


Fig. 13: Identifying Right Camshaft Timing Chain Overview

Courtesy of AUDI OF AMERICA, LLC

1. Bolt
 - Tightening specifications, refer to item 2
2. Mounting Pin
 - For drive sprocket
3. Right Camshaft Timing Chain
 - Remove from camshafts **CAMSHAFT TIMING CHAINS, REMOVING FROM CAMSHAFTS**
 - Before removing, mark the direction of rotation with paint
 - Removing and installing, refer to **CAMSHAFT TIMING CHAINS**

4. Camshaft Chain Sprocket
 - For intake camshaft
 - Installation position: The side with lettering faces forward
5. Bolt
 - 23 Nm
6. Chain Tensioner
 - For the right camshaft timing chain
7. Bolt
 - Replace
 - 5 Nm plus an additional 90° turn
8. Thrust washer
 - For drive sprocket
9. Drive Sprocket
 - For the right camshaft timing chain

TIMING MECHANISM DRIVE CHAIN OVERVIEW

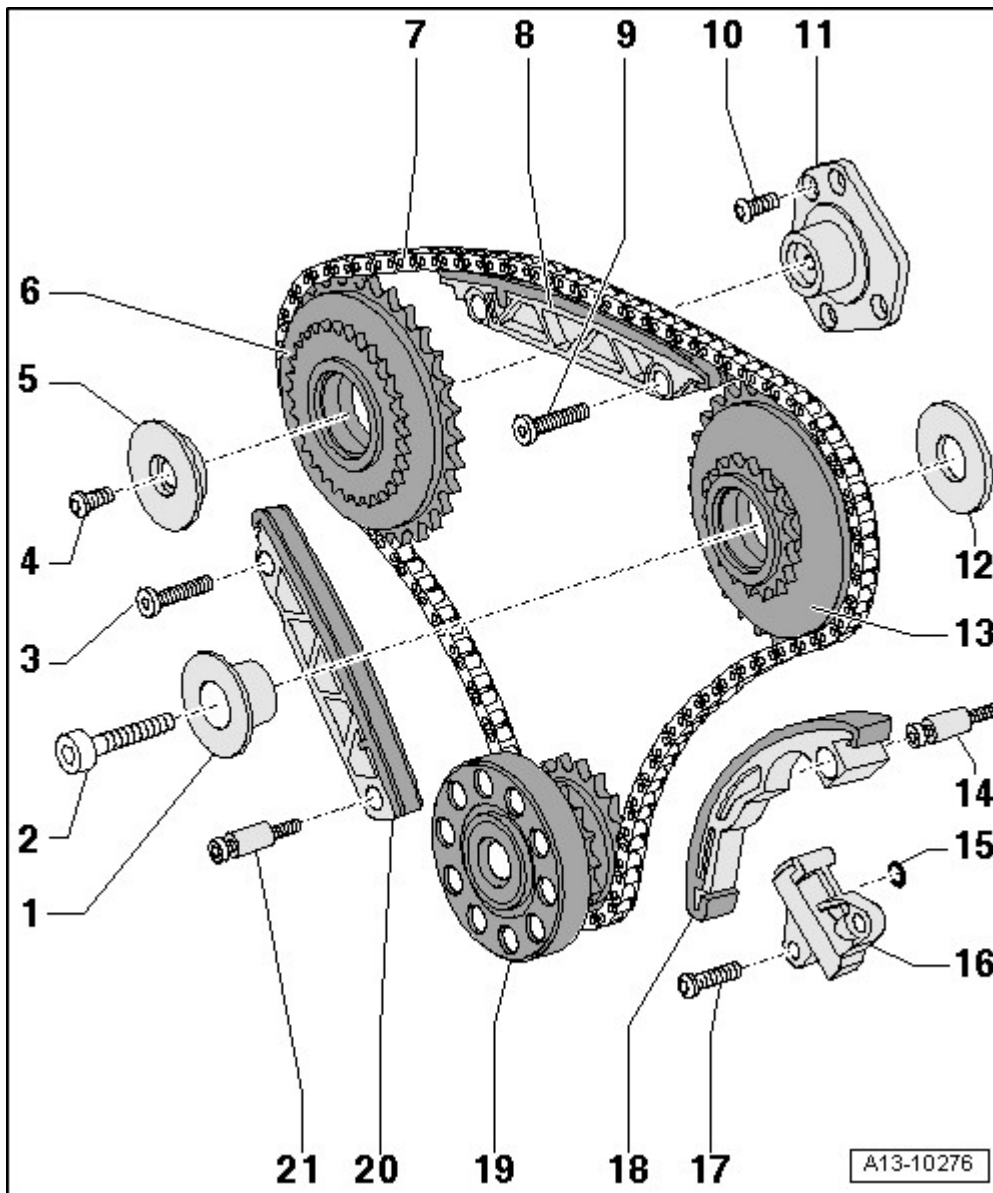


Fig. 14: Identifying Timing Mechanism Drive Chain Overview

Courtesy of AUDI OF AMERICA, LLC

1. Pivot Pin for Drive Sprocket
2. Bolt
 - 45 Nm
3. Bolt
 - Replace
 - 5 Nm plus an additional 90° turn
4. Bolt
 - Replace
 - 5 Nm plus an additional 90° turn

5. Thrust Washer for Drive Sprocket
6. Drive Sprocket for Left Timing Chain
7. Power Take-Off Drive Chain
 - Before removing, mark the direction of rotation with paint
 - Removing and installing, refer to **TIMING MECHANISM DRIVE CHAIN**
8. Guide Rail
 - Pay attention to the installed position
9. Bolt
 - Replace
 - 5 Nm plus an additional 90° turn
10. Bolt
 - Replace
 - 5 Nm plus an additional 90° turn
11. Mounting Bracket for Drive Sprocket
12. Thrust Washer
13. Drive Sprocket for Right Timing Chain
14. Mounting Pin
 - 12 Nm
 - Insert with locking compound; Locking compound .
15. O-ring
 - Replace
16. Chain Tensioner
17. Bolt
 - 12 Nm
18. Tensioning Rail
19. Crankshaft
 - With chain sprockets
20. Guide Rail
21. Mounting Pin
 - 12 Nm
 - Insert with locking compound; Locking compound .

POWER TAKE-OFF DRIVE CHAIN OVERVIEW

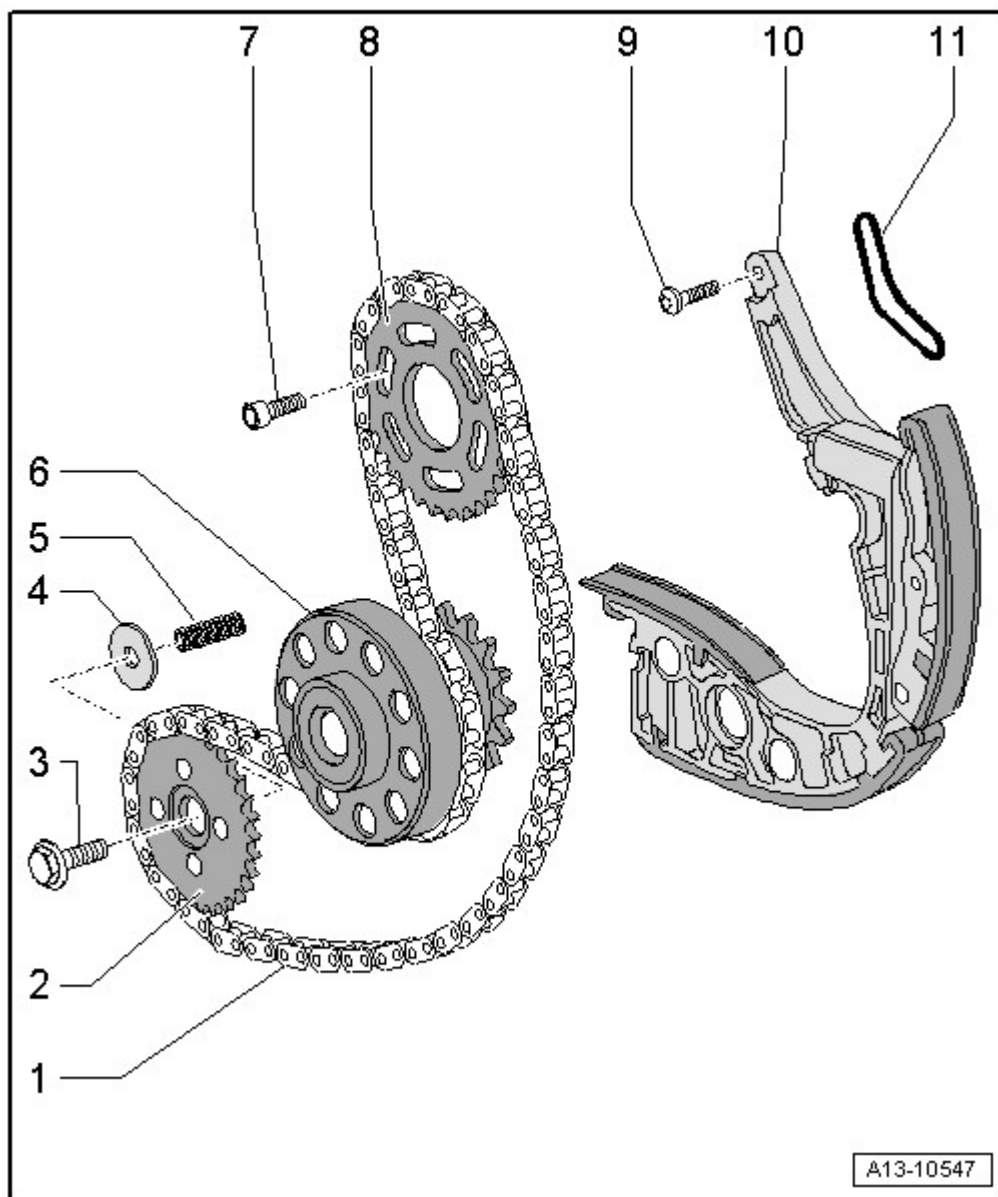


Fig. 15: Identifying Balance Shaft And Oil Pump Chain Overview

Courtesy of AUDI OF AMERICA, LLC

1. Power Take-Off Drive Chain
 - Removing and installing, refer to **POWER TAKE-OFF DRIVE CHAIN**
2. Drive Sprocket for Oil Pump
 - Installation position: The labeled side faces the engine
3. Bolt
 - Tightening specifications, refer to "Bolt" in numbered list under **OIL PUMP AND LOWER OIL PAN OVERVIEW**
4. Thrust Washer
5. Spring

6. Crankshaft
7. Bolt
 - 23 Nm
8. Balance Shaft Chain Sprocket
 - Installation position: The labeled side faces the transmission
9. Bolt
 - 9 Nm
10. Chain Tensioner
 - With glide track
11. Gasket
 - Replace

BALANCE SHAFT OVERVIEW

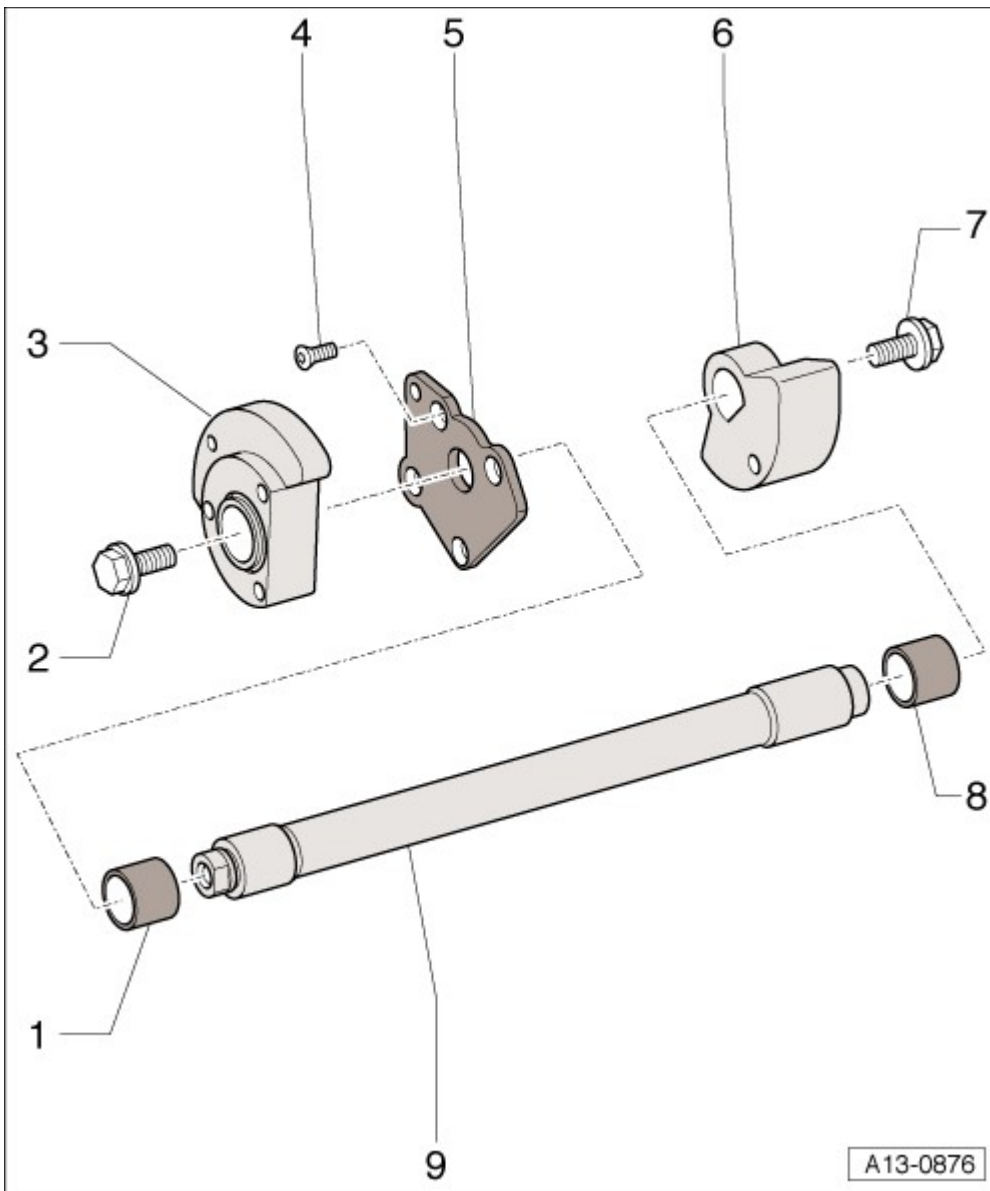


Fig. 16: Identifying Balance Shaft Overview

Courtesy of AUDI OF AMERICA, LLC

1. Friction Bearing
2. Bolt
 - 60 Nm
 - When loosening or tightening, us the diesel injection pump locking pin 3359 as a counterhold tool
3. Balance Shaft Transmission Side
4. Bolt
 - 9 Nm
 - Insert with locking compound; Locking compound .
5. Bearing End Bracket

6. Balance Shaft Belt Pulley Side

7. Bolt

- 60 Nm
- When loosening or tightening, use the diesel injection pump locking pin 3359 as a counterhold tool

8. Friction Bearing

9. Balance Shaft

- Removing and installing, refer to **BALANCE SHAFT**

VALVETRAIN 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 engine at least 2 full revolutions.

NOTE: The illustration shows the cylinder bank 2 cylinder head (left).

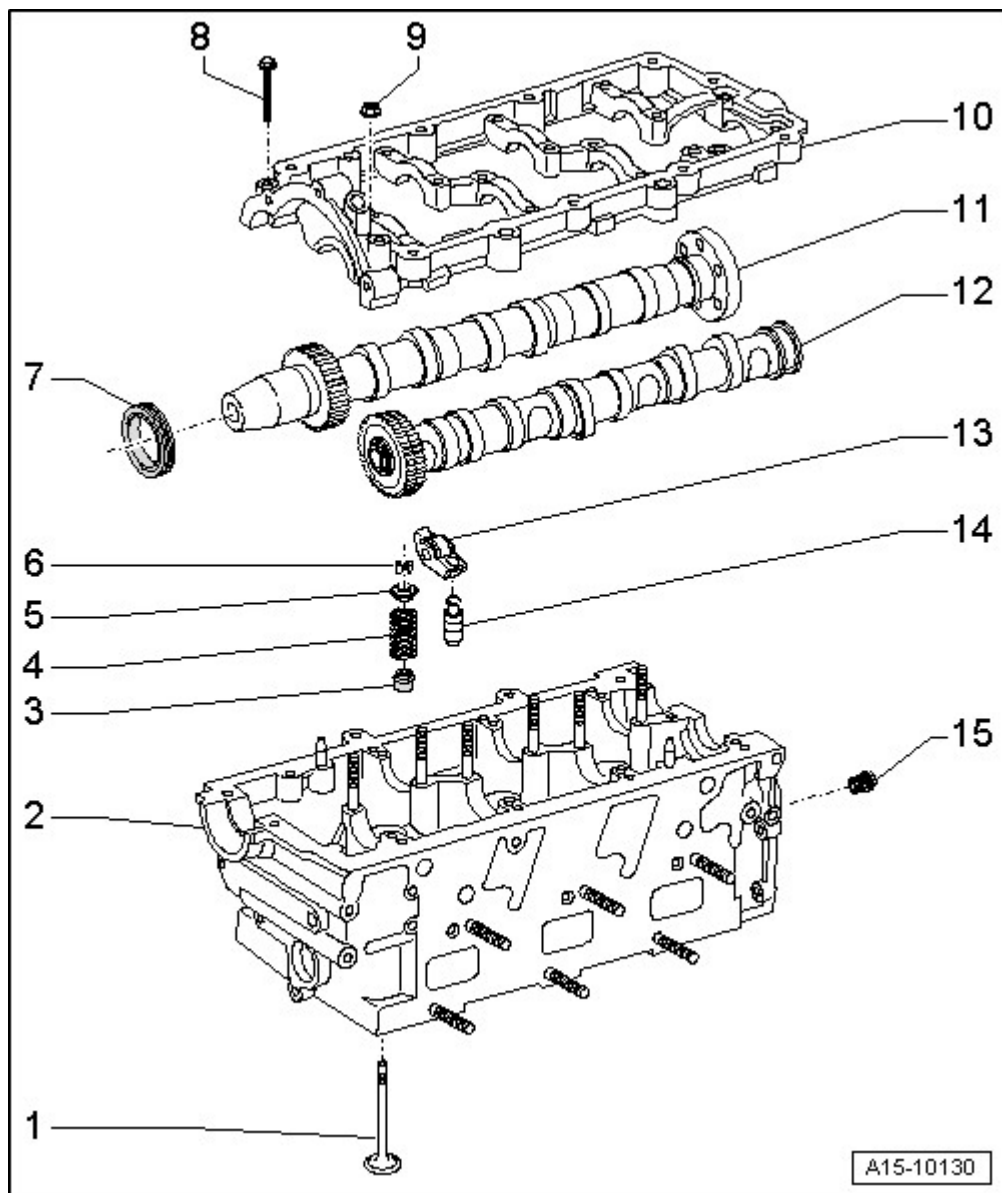


Fig. 17: Identifying Valvetrain Overview

Courtesy of AUDI OF AMERICA, LLC

1. Valve

- Do not reface, only lapping is permitted
- Mark the installed position for installation later
- Checking, refer to **VALVES, CHECKING**
- For the correct valve dimensions, refer to **VALVE DIMENSIONS**

2. Cylinder Head

- Valve guides, checking, refer to **VALVE GUIDES, CHECKING**
- The valve seat may not be reworked due to a close tolerances.

3. Valve Stem Seal

- Replace, refer to **VALVE STEM SEALS, CYLINDER HEAD INSTALLED** and **VALVE STEM SEALS WITH CYLINDER HEAD REMOVED**
- 4. Valve Spring
- 5. Valve Spring Plate
- 6. Valve Retainers
- 7. Camshaft Seal
 - Removing and installing, refer to **CAMSHAFT SEAL**.
- 8. Bolt
 - Tightening specifications and sequence, refer to **Fig. 18**, **Fig. 19**
- 9. Nut
 - Tightening specifications and sequence, refer to **Fig. 18**, **Fig. 19**
- 10. Guide Frame
 - With integrated camshaft bearings
 - Removing and installing, refer to **LEFT CYLINDER HEAD CAMSHAFT** and **RIGHT CYLINDER HEAD CAMSHAFT**
- 11. Intake Camshaft
 - Removing and installing, refer to **LEFT CYLINDER HEAD CAMSHAFT** and **RIGHT CYLINDER HEAD CAMSHAFT**
 - Measuring axial play, refer to **CAMSHAFT, MEASURING AXIAL PLAY**
 - Radial clearance, measuring, refer to **CAMSHAFT, MEASURING RADIAL PLAY**
 - Maximum run out: 0.01 mm
- 12. Exhaust Camshaft
 - Removing and installing, refer to **LEFT CYLINDER HEAD CAMSHAFT** and **RIGHT CYLINDER HEAD CAMSHAFT**
 - Measuring axial play, refer to **CAMSHAFT, MEASURING AXIAL PLAY**
 - Radial clearance, measuring, refer to **CAMSHAFT, MEASURING RADIAL PLAY**
 - Maximum run out: 0.01 mm
- 13. Roller Rocker Lever
 - Removing and installing, refer to **LEFT CYLINDER HEAD CAMSHAFT**, **RIGHT CYLINDER HEAD CAMSHAFT**
 - Mark the installed position for installation later
 - Check roller for easy movement
 - Lubricate the running surfaces before installing
- 14. Hydraulic Adjusting Elements
 - Mark the installed position for installation later
 - Checking, refer to **HYDRAULIC ADJUSTING ELEMENTS, CHECKING**
 - Lubricate the running surfaces before installing
- 15. Pressure Relief Valve 1.0 Bar
 - 25 Nm

- For the lubricating points in the cylinder head

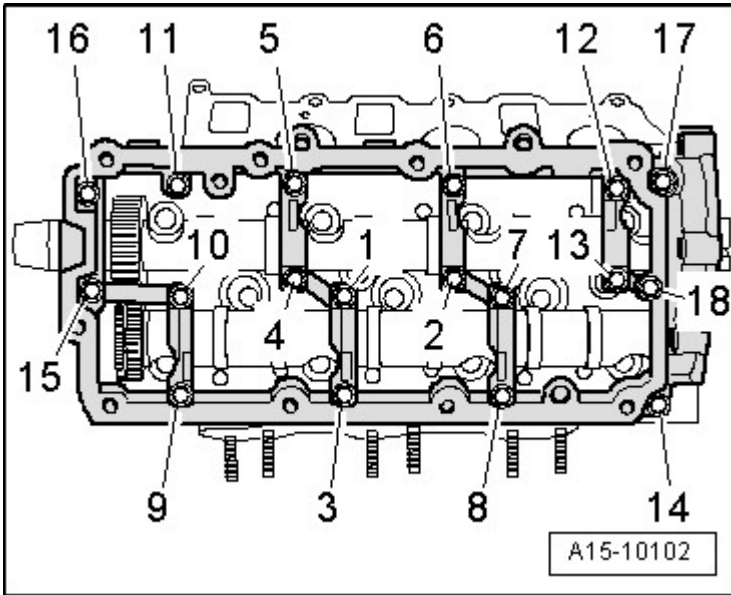


Fig. 18: Identifying Left Cylinder Head Guide Frame, Tightening Specifications and Sequence
 Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts and nuts in 2 steps in the sequence shown:

Step	Bolts/Nuts	Tightening Specification
1.	-1 through 18-	Install all the way in by hand. • The guide frame must be in contact with the entire contact surface of the cylinder head.
2.	-1 through 18-	9 Nm

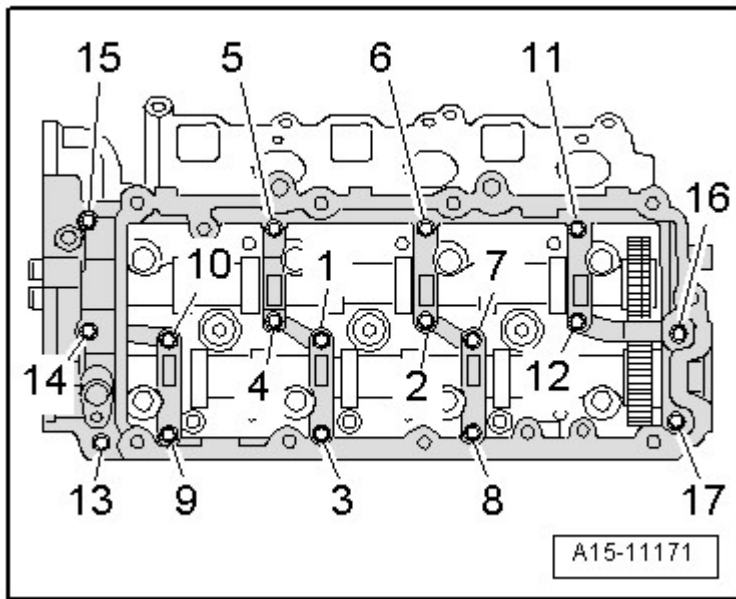


Fig. 19: Identifying Right Cylinder Head Guide Frame, Tightening Specifications and Sequence
 Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts and nuts in 2 steps in the sequence shown:

Step	Bolts/Nuts	Tightening Specification
1.	-1 through 17-	Install all the way in by hand. The guide frame must be in contact with the entire contact surface of the cylinder head.
2.	-1 through 17-	9 Nm

SPECIFICATIONS

VALVE DIMENSIONS

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

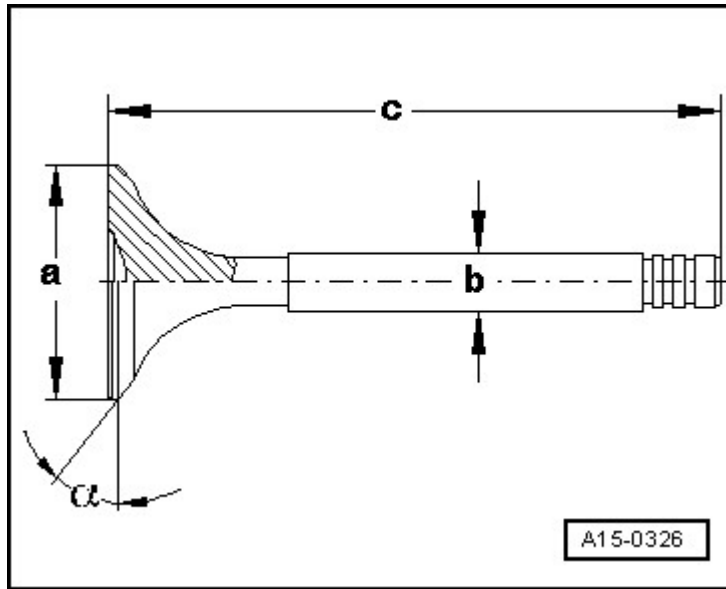


Fig. 20: Identifying Valve Dimensions
Courtesy of AUDI OF AMERICA, LLC

Dimension		Intake Valve	Exhaust Valve
Diameter a	mm	28.60 to 28.80	26.70 to 26.90
Diameter b	mm	5.968 to 5.982	5.958 to 5.972
c	mm	97.25 to 97.45	97.35 to 97.55
a	Angle°	45° 10'	45° 10'

WARNING: Risk of injury if exhaust valves with sodium filling are disposed of improperly.

- Cut exhaust valve with sodium filling into 2 parts with a metal saw between shaft center and valve plate. While doing this, do not come into contact with water.
- Throw at the most 10 such sawed exhaust valves in a bucket filled with water and step back immediately.
- When there is contact with water, a sudden chemical reaction occurs which burns the sodium filling.
- The treated parts may then be discarded through conventional disposal channels.

FASTENER TIGHTENING SPECIFICATIONS

Component	Bolt Size	Nm

2009 Audi Q7 3.0 TDI

ENGINE 3.0 Liter - Cylinder Head, Valvetrain - Engine Code(s): CATA

Balance Shaft Belt Pulley Side	-	60
Balance Shaft Chain Sprocket	-	23
Balance Shaft Transmission Side	-	60
Bearing End Bracket	-	9
Bracket for the Electrical Connectors	-	5
Bracket for the Electrical Wiring Harness	-	5
Cap	-	9
Camshaft Chain Sprocket	-	23
Chain Tensioner for Camshaft Timing Chains ⁽¹⁾	-	5 + 90°
Chain Tensioner ⁽²⁾	-	12
Chain tensioner with Glide Track		9
Drive sprocket for left timing chain ⁽¹⁾	-	5 + 90°
Drive sprocket for right timing chain	-	45
	-	
Engine Lifting Eye ⁽³⁾		
	M6	9
	M8	23
Guide Rail	-	5 + 90° ⁽¹⁾
Mounting Bracket for Drive Sprocket ⁽¹⁾	-	5 + 90°
Mounting Pin ⁽⁴⁾	-	12
Pivot Pin for Drive Sprocket	-	45
Pressure Relief Valve	-	25
Tensioning Rail ⁽¹⁾	-	5 + 90°
Thrust Washer for Drive Sprocket ⁽¹⁾	-	5 + 90°
(1) Always replace (2) For bolt tightening clarification, refer to <u>TIMING MECHANISM DRIVE CHAIN OVERVIEW</u> and see items -16- (3) For bolt tightening clarification, refer to <u>CYLINDER HEAD COVER OVERVIEW</u> and see items -14 and 15- (4) Insert with locking compound		

Left Timing Chain Cover, Tightening Specifications and Sequence

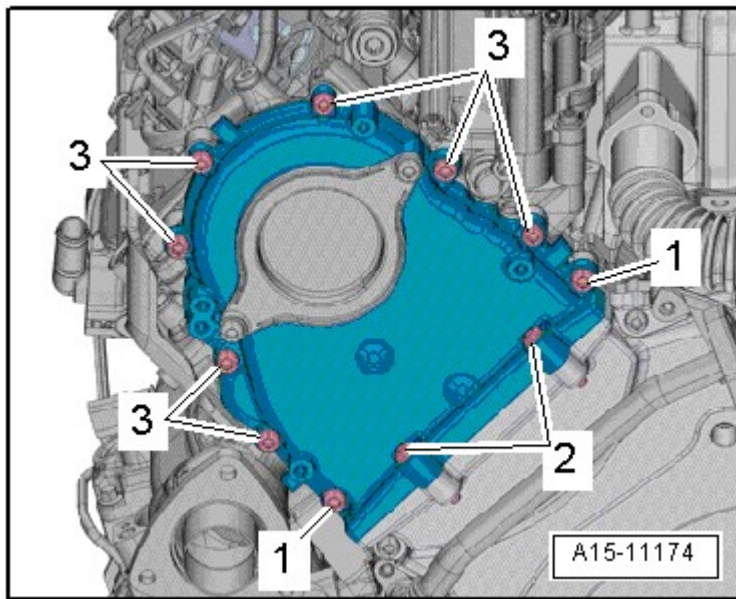


Fig. 21: Identifying Left Timing Chain Cover
 Courtesy of AUDI OF AMERICA, LLC

-- Tighten bolts in 4 stages as follows:

Step	Bolts	Tightening Specification
1.	-1-	3 Nm
2.	-2-	9 Nm
3.	-1-	9 Nm
4.	-3-	9 Nm in a diagonal sequence

Right Timing Chain Cover, Tightening Specifications and Sequence

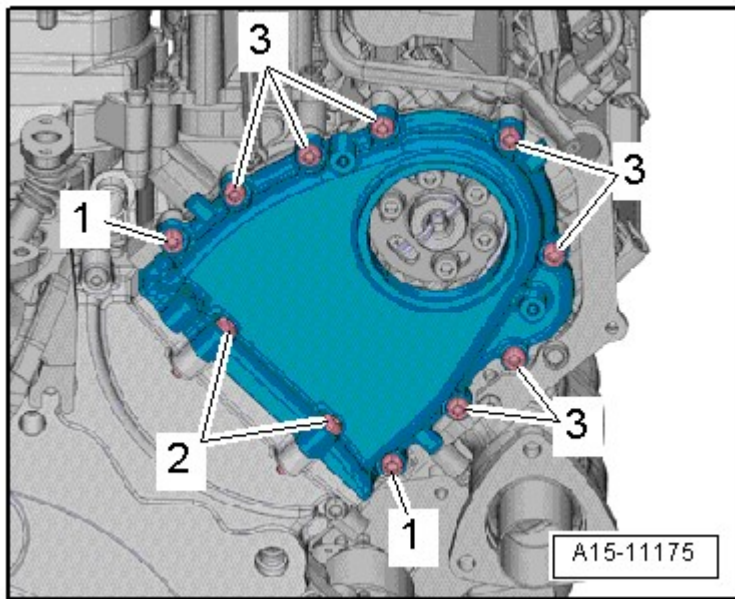


Fig. 22: Identifying Right Timing Chain Cover, Tightening Specifications and Sequence
 Courtesy of AUDI OF AMERICA, LLC

-- Tighten bolts in 4 stages as follows:

Step	Bolts	Tightening Specification
1.	-1-	3 Nm
2.	-2-	9 Nm
3.	-1-	9 Nm
4.	-3-	9 Nm in a diagonal sequence

Lower Timing Chain Cover, Tightening Specifications and Sequence

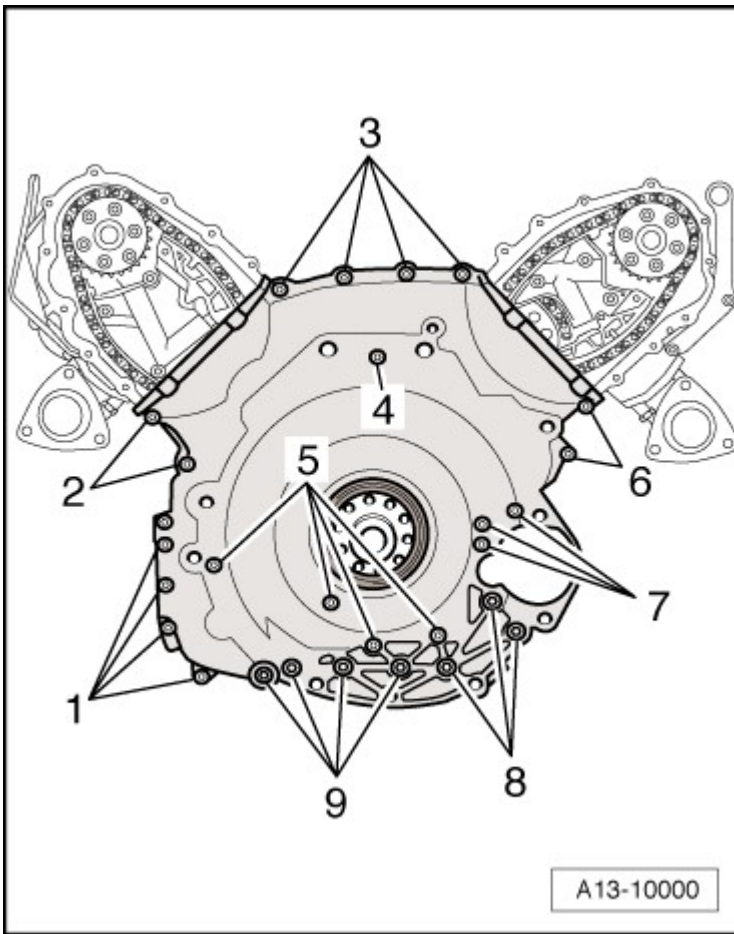


Fig. 23: Identifying Lower Timing Chain Cover Bolt Tightening Sequence and Specification
 Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts in 3 steps according to the tightening sequence:

Step	Bolts	Tightening Specification
1.	-1 through 9-	5 Nm from the inside toward the outside and diagonally
2.	-1 through 7-	9 Nm from the inside toward the outside and diagonally
3.	-8- and -9-	23 Nm

Cylinder Head Cover, Tightening Specifications and Sequence

-- Tighten the cylinder head cover bolts -arrows- in a diagonal sequence in stages to 9 Nm.

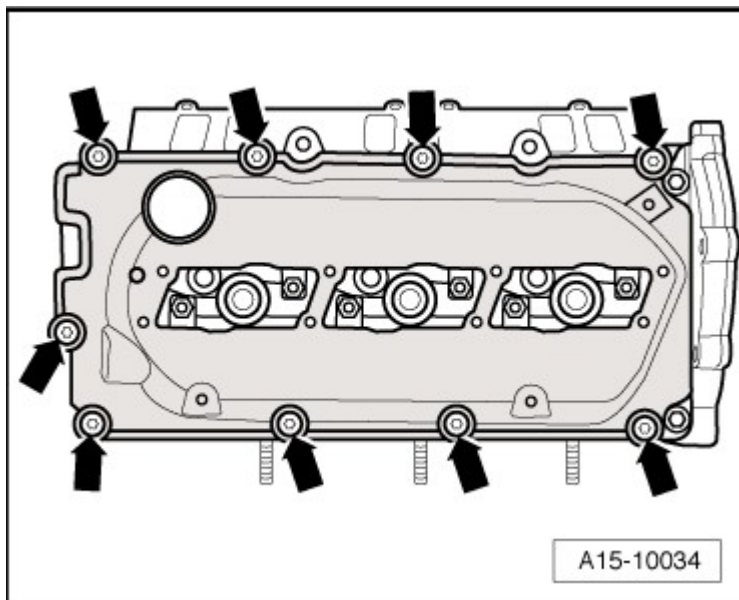


Fig. 24: Identifying Cylinder Head Cover, Tightening Specifications and Sequence
Courtesy of AUDI OF AMERICA, LLC

Cylinder Head, Tightening Specifications and Sequence

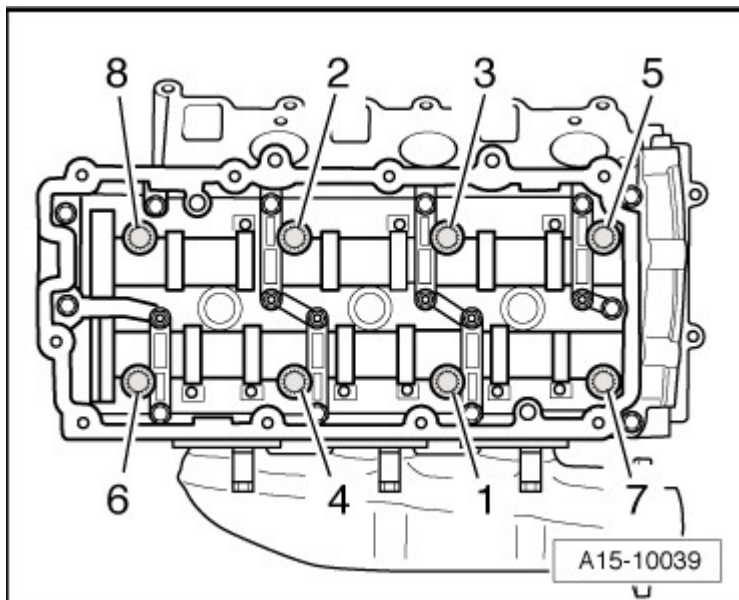


Fig. 25: Identifying Cylinder Head, Tightening Specifications and Sequence
Courtesy of AUDI OF AMERICA, LLC

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

-- Tighten the bolts in 5 steps according to the tightening sequence:

Step	Bolts	Tightening Torque/Additional Angle of Rotation
1.	-1 through 8-	Install all the way in by hand.
2.	-1 through 8-	35 Nm
3.	-1 through 8-	60 Nm
4.	-1 through 8-	Tighten an additional 90°.
5.	-1 through 8-	Tighten an additional 90°.

Left Cylinder Head Guide Frame, Tightening Specifications and Sequence

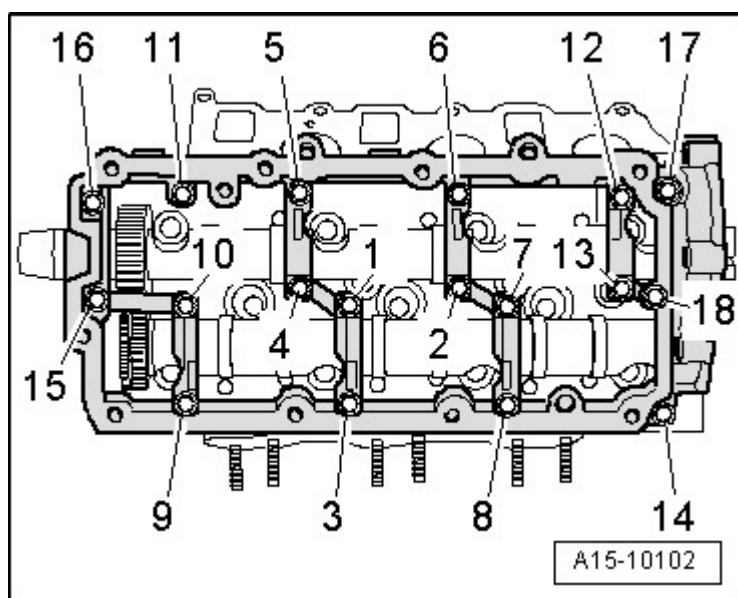


Fig. 26: Identifying Left Cylinder Head Guide Frame, Tightening Specifications and Sequence
 Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts and nuts in 2 steps in the sequence shown:

Step	Bolts/Nuts	Tightening Specification
		Install all the way in by hand. The guide frame must be

2009 Audi Q7 3.0 TDI

ENGINE 3.0 Liter - Cylinder Head, Valvetrain - Engine Code(s): CATA

1.	-1 through 18-	in contact with the entire contact surface of the cylinder head.
2.	-1 through 18-	9 Nm

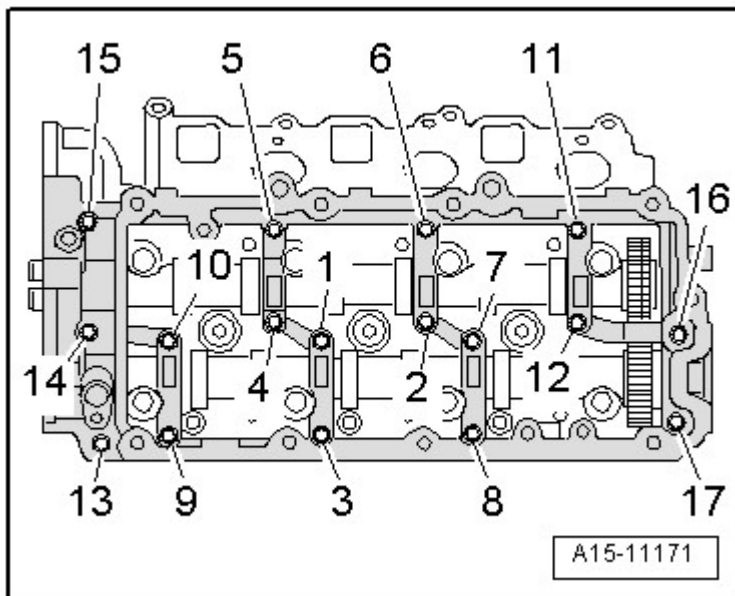
Right Cylinder Head Guide Frame, Tightening Specifications and Sequence

Fig. 27: Identifying Right Cylinder Head Guide Frame, Tightening Specifications and Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts and nuts in 2 steps in the sequence shown:

Step	Bolts/Nuts	Tightening Specification
1.	-1 through 17-	Install all the way in by hand. The guide frame must be in

2009 Audi Q7 3.0 TDI

ENGINE 3.0 Liter - Cylinder Head, Valvetrain - Engine Code(s): CATA

		contact with the entire contact surface of the cylinder head.
2.	-1 through 17-	9 Nm

DIAGNOSIS AND TESTING

COMPRESSION, CHECKING

Special tools and workshop equipment required

- Hinged Socket 3220
- Compression Tester V.A.G 1763 with Adapter V.A.G 1763/8

Procedure

- Engine oil temperature approximately 80 °C (176 °F)
- Battery voltage at least 12.5 V.

-- Carefully pull the engine cover off the 4 bolts one after the other -arrows-.

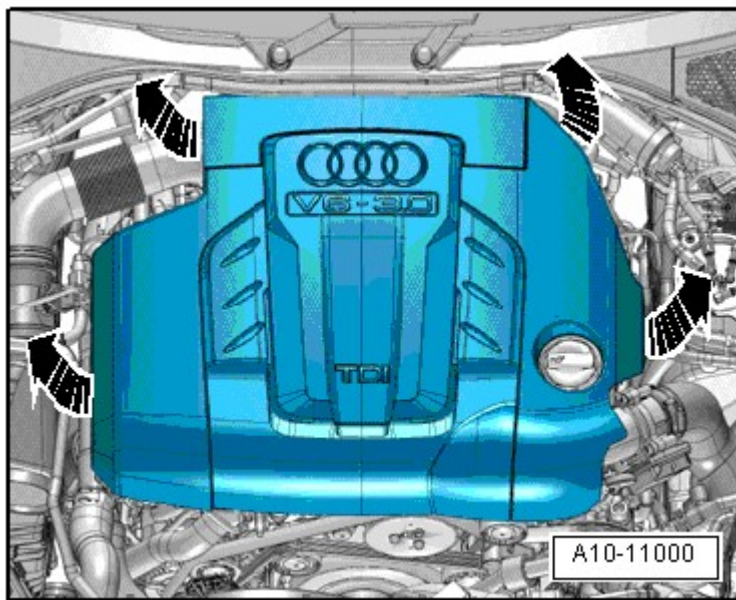


Fig. 28: Identifying Engine Cover -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connector on the fuel pressure regulator valve -N276- -1- on the cylinder bank 1 (right) rail.

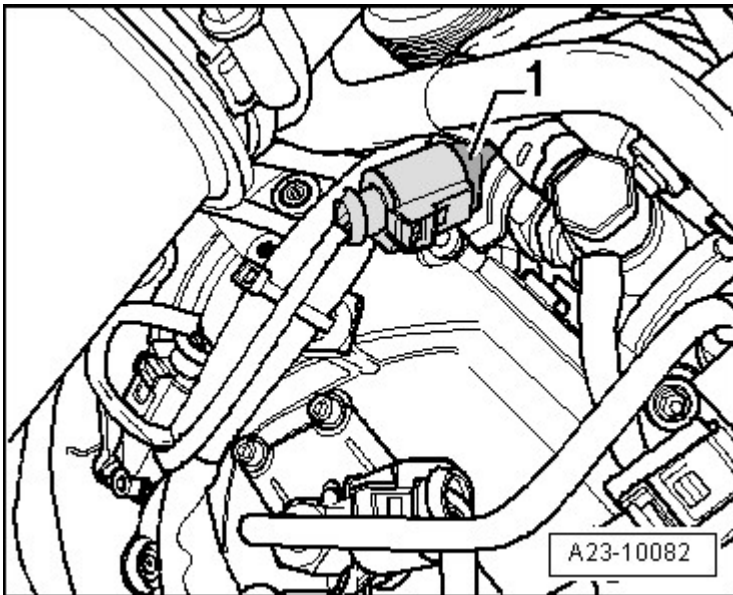


Fig. 29: Identifying Connector From Fuel Pressure Regulator Valve -1-
Courtesy of AUDI OF AMERICA, LLC

-- In order to reduce the fuel pressure in the fuel rail, start the engine briefly.

-- Remove all the glow plugs. Refer to **Removal and Installation** .

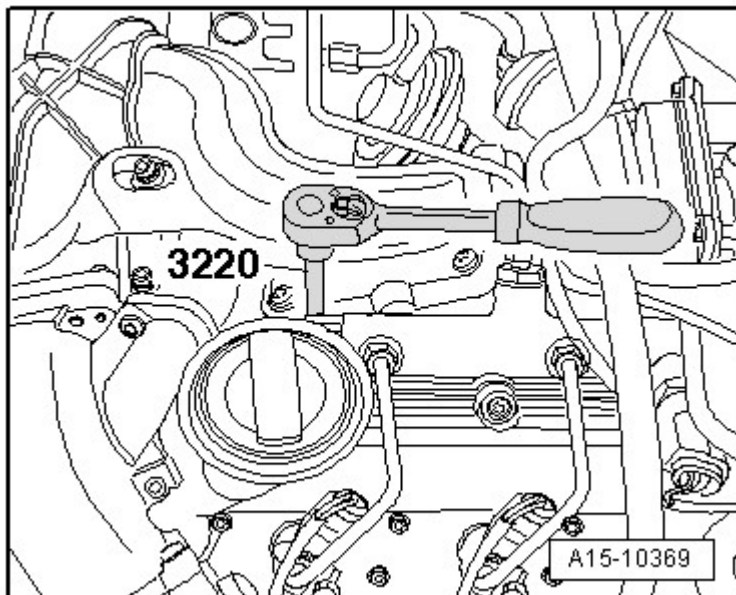


Fig. 30: Identifying Socket 3320 To Remove Glow Plugs
Courtesy of AUDI OF AMERICA, LLC

-- Install the V.A.G 1763/8 in place of the glow plugs and connect the V.A.G 1763.

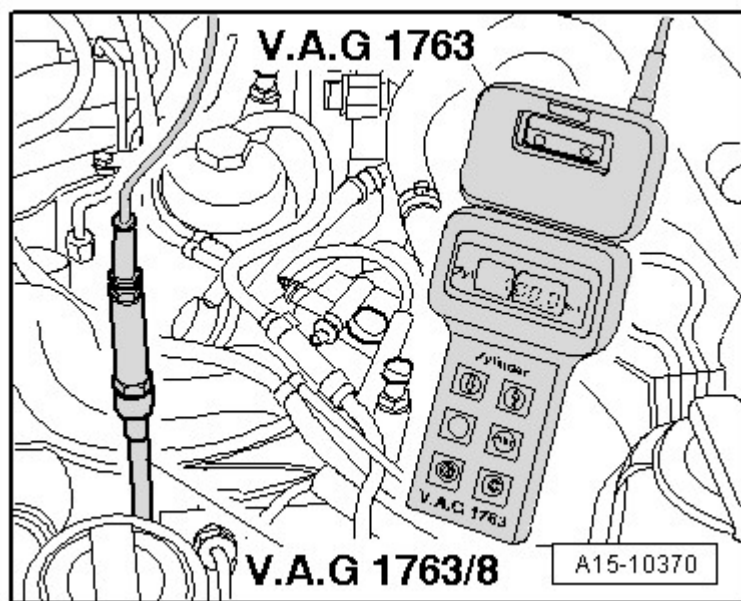


Fig. 31: Identifying Adapter V.A.G 1763/8 And Compression Tester V.A.G 1763
 Courtesy of AUDI OF AMERICA, LLC

NOTE: Using the tester operating instructions.

- Have a second technician operate the starter until the test stops showing an increase in pressure.
- Repeat procedure on each cylinder.

Compression Pressure	Bar Pressure
New	28 to 33
Wear limit	21
Maximum difference between cylinders	5

Assembling

Assemble in reverse order of disassembling. Note the following:

- Install the glow plugs. Refer to **Removal and Installation** .
- If electrical connectors were disconnected and the engine was started, then malfunctions have been stored in the engine control module. "Check the DTC memory" .

CAMSHAFT, MEASURING AXIAL PLAY

Special tools and workshop equipment required

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

Procedure

- Remove the guide frame. Refer to **LEFT CYLINDER HEAD CAMSHAFT**.
- Secure the VAS 6079 on the cylinder head with the VW 387 as illustrated.
- Determine the axial play on the intake camshaft -arrows-.

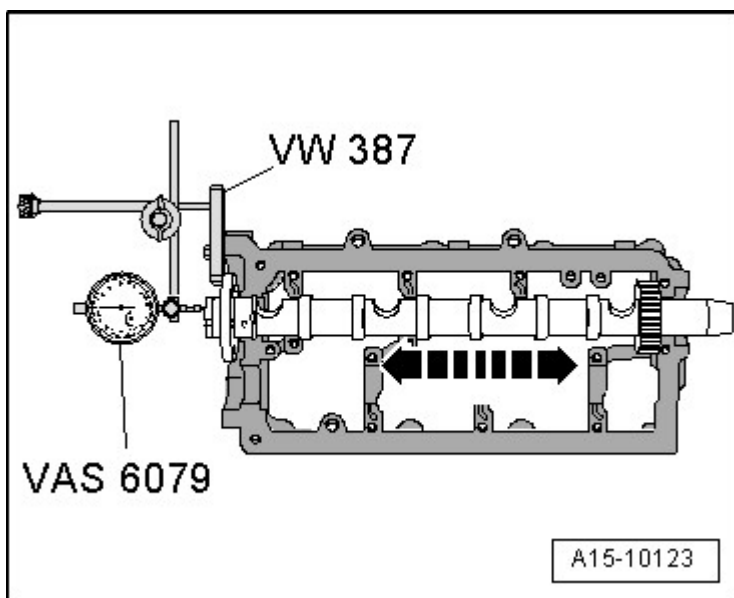


Fig. 32: Identifying Dial Gauge Holder VW387 And Dial Gauge (0-10 mm) VAS 6079, Intake Camshaft Check

Courtesy of AUDI OF AMERICA, LLC

- Specified value: 0.03 to 0.08 mm
- Wear limit 0.12 mm

- Determine the axial play on the exhaust camshaft -arrows-.

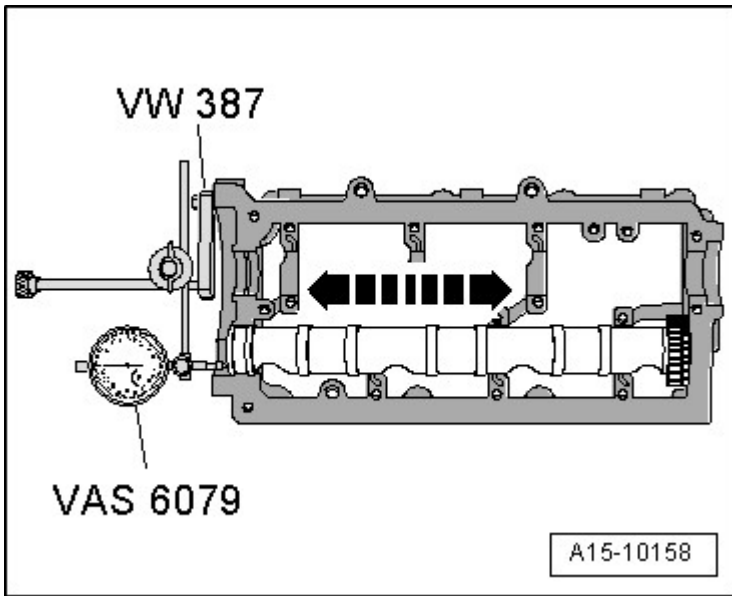


Fig. 33: Identifying Dial Gauge Holder VW387 And Dial Gauge (0-10 mm) VAS 6079, Exhaust Camshaft Check

Courtesy of AUDI OF AMERICA, LLC

- Specified value: 0.03 to 0.08 mm
- Wear limit 0.12 mm

CAMSHAFT, MEASURING RADIAL PLAY

Special tools and workshop equipment required

- Plastigage

Procedure

- Removing cam follower. Refer to **LEFT CYLINDER HEAD CAMSHAFT**.
- 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.
- Re-install the camshafts, mount the bearing bracket and tighten to 10 Nm. Refer to **Fig. 18**, do not turn the camshafts while doing this.
- Remove the bearing bracket and camshafts.
- Compare width of Plastigage with calibrated scale.

Radial clearance:

- New: 0.035 to 0.085 mm
- Wear limit: 0.100 mm

HYDRAULIC ADJUSTING ELEMENTS, CHECKING

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

Irregular valve noises are normal while starting the engine.

Special tools and workshop equipment required

- Socket T40058
- 0.20 mm feeler gauge

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 a road test if necessary.
- If the hydraulic adjusting elements are still loud, determine which one is faulty as follows:
- Remove the cylinder head cover, refer to **LEFT CYLINDER HEAD COVER** and **RIGHT CYLINDER HEAD COVER**.

Vehicles Built through 05.10:

- Loosen the hose clamp -arrow-, remove the air duct hose and move it to the side.

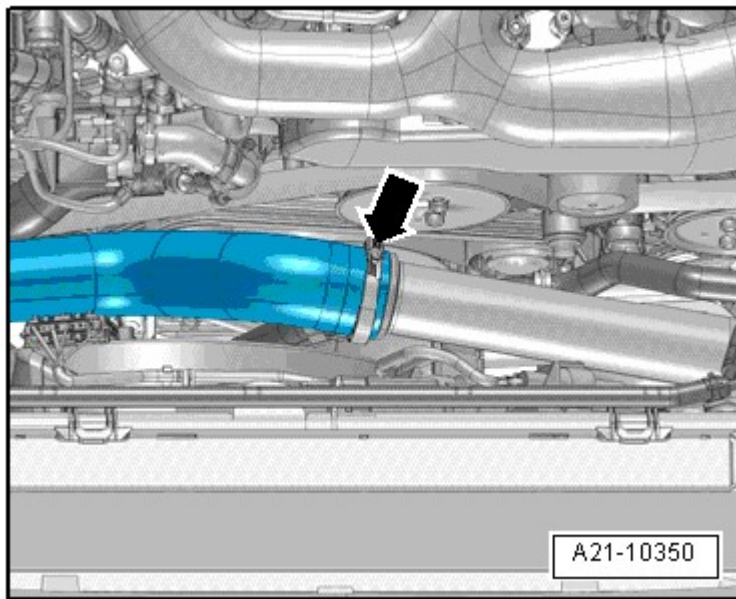


Fig. 34: Identifying Hose Clamp -Arrow- And Air Duct Hose
Courtesy of AUDI OF AMERICA, LLC

All Vehicles:

-- Insert the T40058 guide pins as follows:

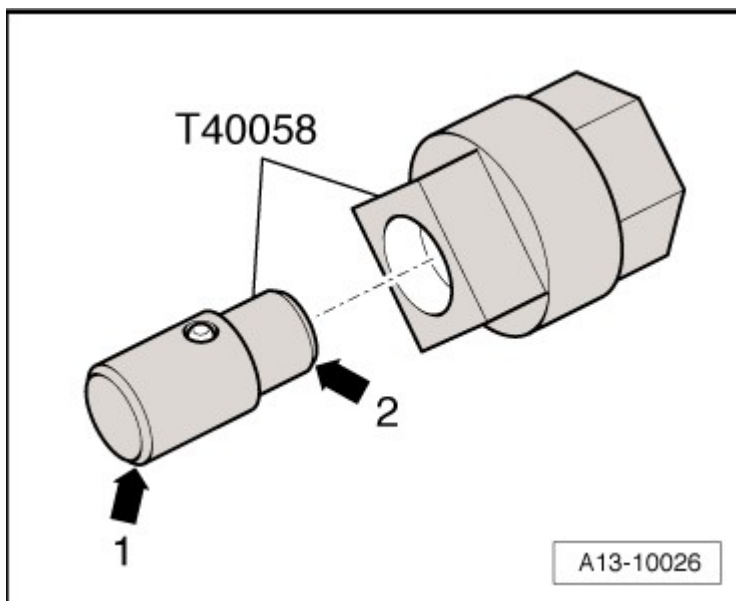


Fig. 35: Identifying Guide Pin And Adapter T40058
Courtesy of AUDI OF AMERICA, LLC

- The large diameter -arrow 1- faces the engine.
- Small diameter -arrow 2- points to adapter.

-- Turn the crankshaft with the T40058 in direction of engine rotation -arrow- until the cam on the balance element which is to be checked faces upward.

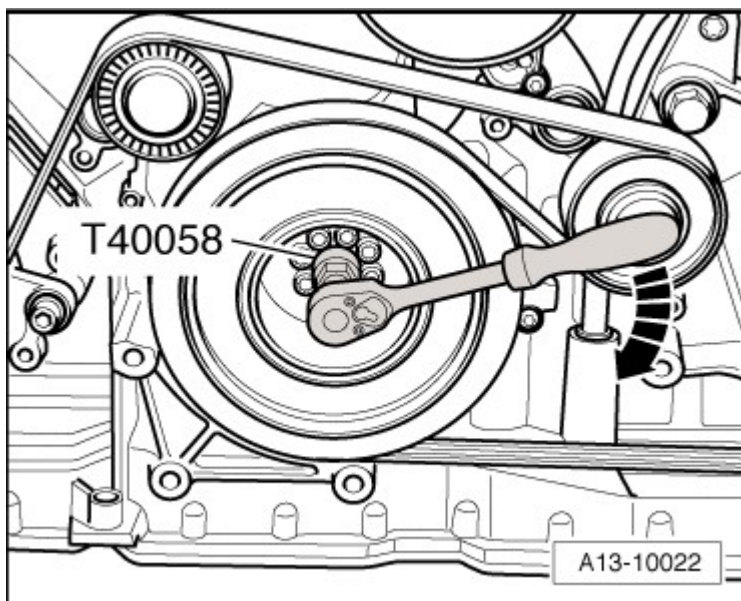


Fig. 36: Identifying Torque Converter Bolts And Adapter T40058
Courtesy of AUDI OF AMERICA, LLC

-- To determine the play between cam lobes and roller rocker lever, press lever down -arrow-.

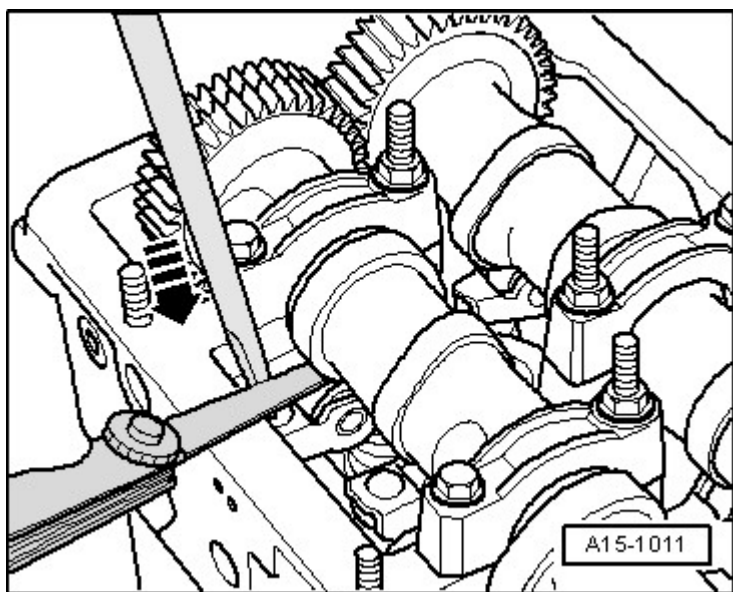


Fig. 37: Identifying Play Between Cams With Screwdriver -Arrow- And 0.20 mm Feeler Gauge
Courtesy of AUDI OF AMERICA, LLC

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

Final Procedures

NOTE: 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 .

-- Install the air duct hose and screw-type clamps. Refer to **Fig. 38**.

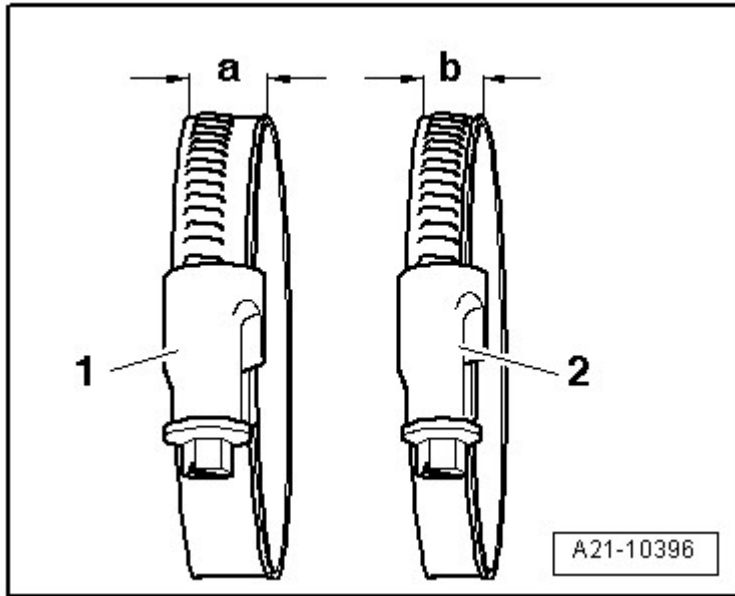


Fig. 38: Identifying Clamp Tightening Specifications
Courtesy of AUDI OF AMERICA, LLC

-- Install the cylinder head cover. Refer to **LEFT CYLINDER HEAD COVER** and **RIGHT CYLINDER HEAD COVER**.

VALVE GUIDES, CHECKING

Special tools and workshop equipment required

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

Procedure

NOTE: If the 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.

-- Place valve in valve guide.

- Valve stem tip must seal with valve guide.

-- Secure the VAS 6079 on the cylinder head with the VW 387 as illustrated.

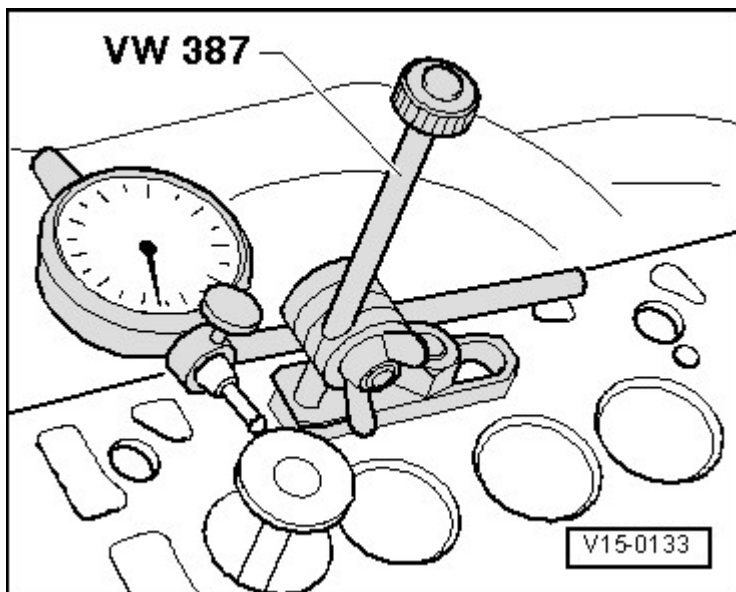


Fig. 39: Determining Valve Rock (Wear limit)
Courtesy of AUDI OF AMERICA, LLC

-- Determine tip clearance.

- Wear limit: 1.0 mm

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

-- Replace the cylinder head if the wear limit is still exceeded.

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

LEFT TIMING CHAIN COVER

Special tools and workshop equipment required

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

Removing

- Remove the left intermediate pipe. Refer to **LEFT INTERMEDIATE PIPE** .
- Remove the exhaust gas recirculation (EGR) cooler switch-over valve 2 -N381- -3-.
- Remove the bolts -arrows-.

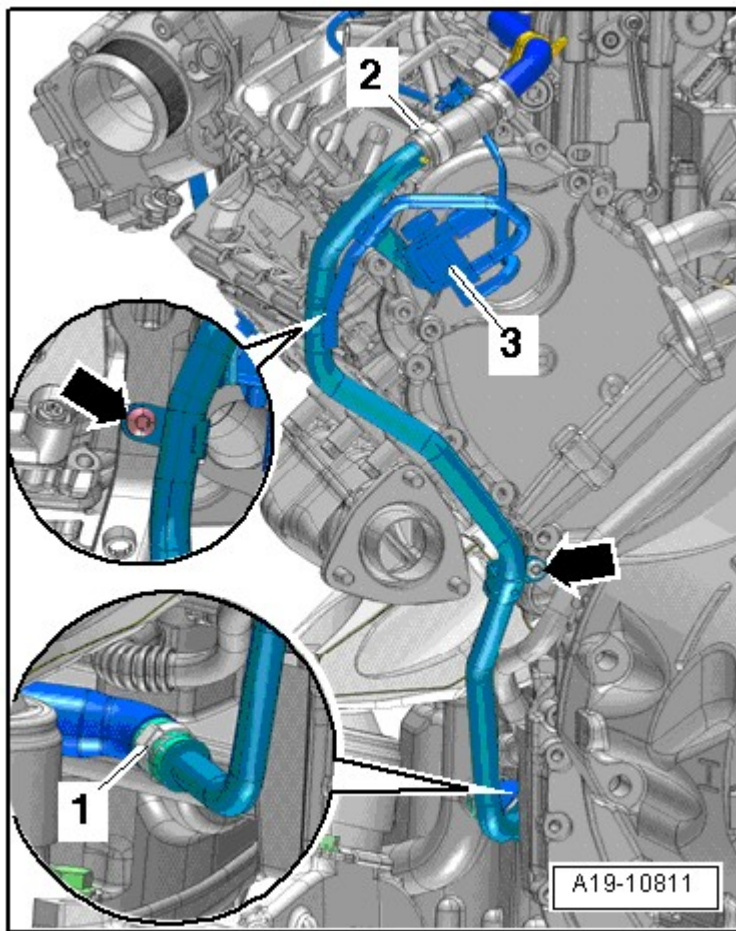


Fig. 40: Identifying Hose Clamps -1 & 2-, EGR Cooler Switch-Over Valve -3- And Bolts -Arrows-
 Courtesy of AUDI OF AMERICA, LLC

- Push the left rear coolant pipe to the side and remove the coolant hose -2-.

NOTE: Ignore -1-.

- Remove the bolts -3- and -4- and remove the exhaust gas recirculation pipes.

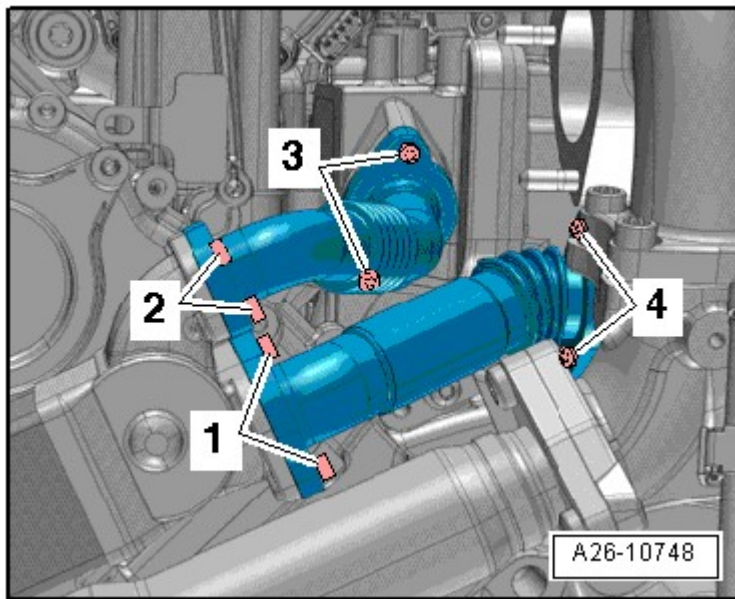


Fig. 41: Identifying Connecting Pipe And Bolts
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1 and 2-.

-- Remove the bolts -1 through 4- and remove the left timing chain cover.

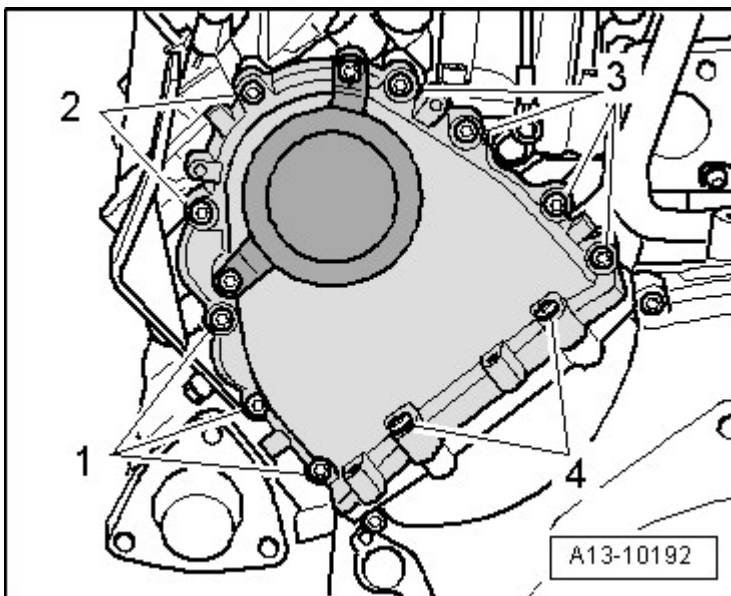


Fig. 42: Identifying Bolts -1 Through 4- And Left Timing Chain Cover
Courtesy of AUDI OF AMERICA, LLC

Installing

- Tightening specifications, refer to **TURBOCHARGER OVERVIEW** and **EXHAUST GAS**

RECIRCULATION OVERVIEW .

NOTE: Replace the bolts for the left timing chain cover.

-- Remove old sealant from the grooves in the timing chain cover as well as from the sealing surfaces.

CAUTION: Risk of contaminating lubricating system.

- Cover open parts of engine.

WARNING: Risk of eye injury.

- Wear protective eyewear.

-- Remove the sealant residue on the cover for the timing chain, cylinder block and cylinder head, for example using a rotating plastic brush.

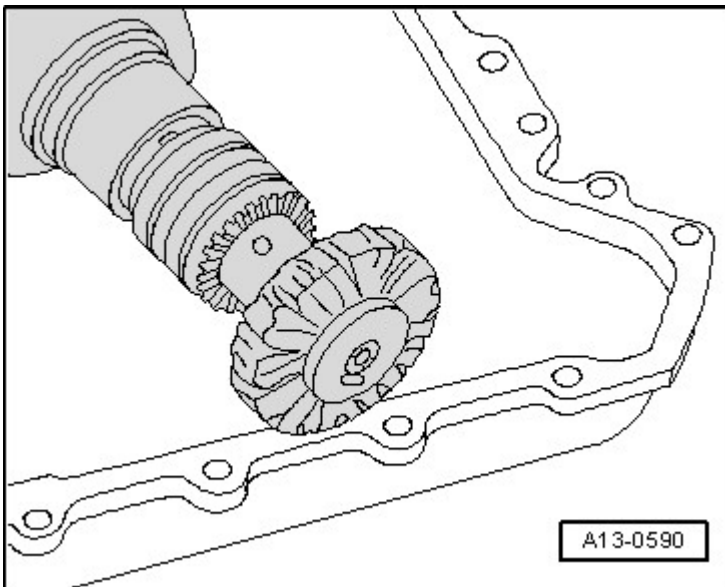


Fig. 43: Identifying Rotating Plastic Brush To Remove Sealant Residue From Sealing Flange, Cylinder Block And Upper Part Of Oil Pan

Courtesy of AUDI OF AMERICA, LLC

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

NOTE: Note the expiration date of the sealing compound.

-- Cut the tube nozzle at the front marking (nozzle diameter approximately 1.5 mm).

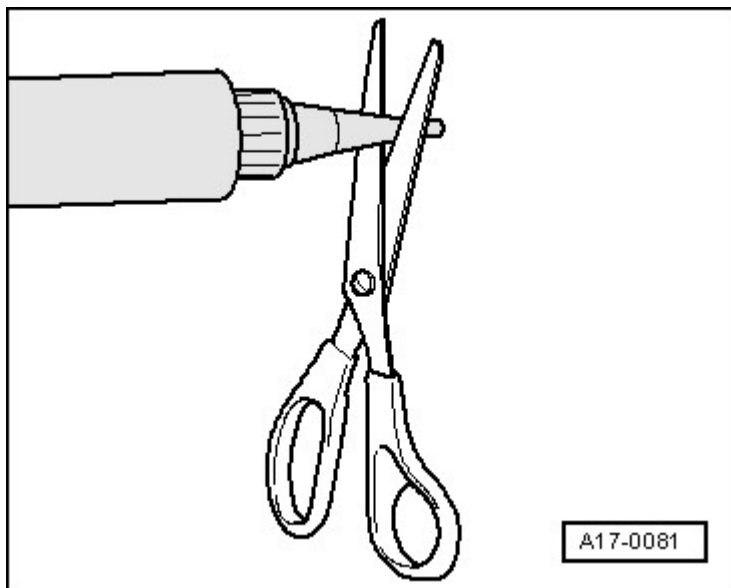


Fig. 44: Identifying Scissors To Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 1.5 mm)
Courtesy of AUDI OF AMERICA, LLC

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

- Do not apply sealant bead thicker than specified.

-- Apply a sealant bead to the clean sealing surface of the left timing chain cover as shown in the illustration.

- The groove -1- of sealing surface must be completely filled with sealant.

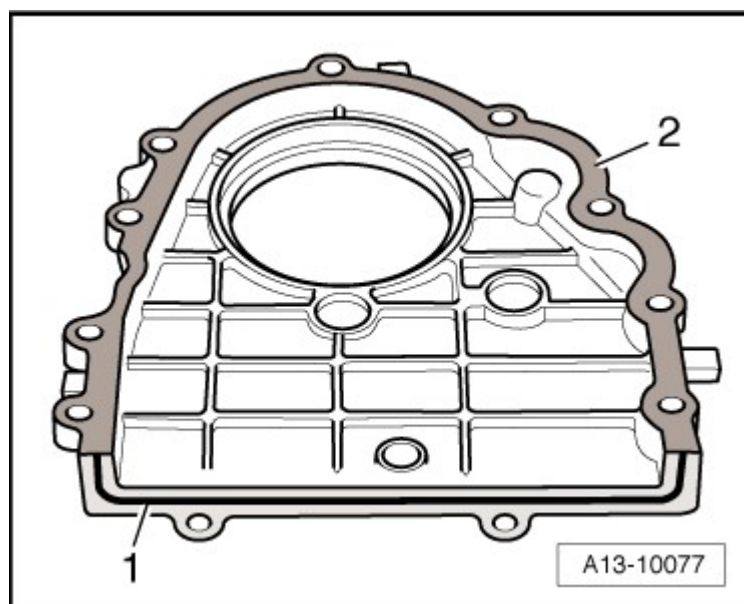


Fig. 45: Identifying Groove -1- Of Sealing Surface
Courtesy of AUDI OF AMERICA, LLC

- The sealant bead must be 1.5 to 2.0 mm above the sealing surface.

-- Install the seal -2-.

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

-- Cut the tube nozzle at the front marking (nozzle diameter approximately 1.5 mm).

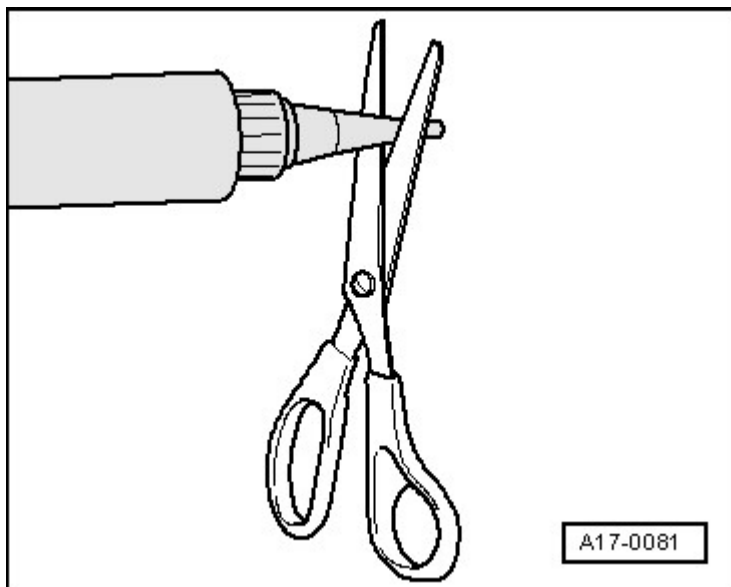


Fig. 46: Identifying Scissors To Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 1.5 mm)
Courtesy of AUDI OF AMERICA, LLC

-- Apply a 3 mm diameter sealant bead to the transitions between the cylinder head and lower timing chain cover -arrows- as illustrated.

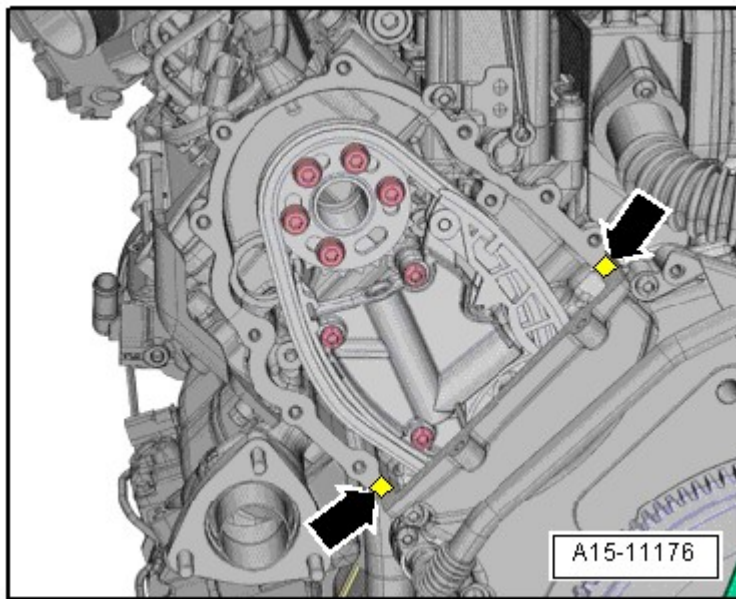


Fig. 47: Identifying Sealant Beads

Courtesy of AUDI OF AMERICA, LLC

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

- Do not apply sealant bead thicker than specified.

NOTE: The timing chain cover must be installed within 5 minutes after applying the sealant

-- Position the left timing chain cover and tighten the bolts. Refer to **Fig. 9**.

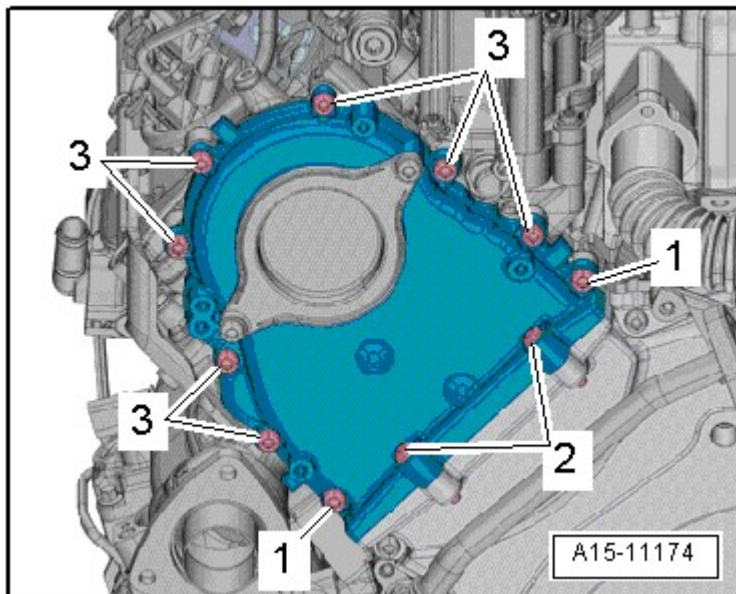


Fig. 48: Identifying Left Timing Chain Cover

Courtesy of AUDI OF AMERICA, LLC

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

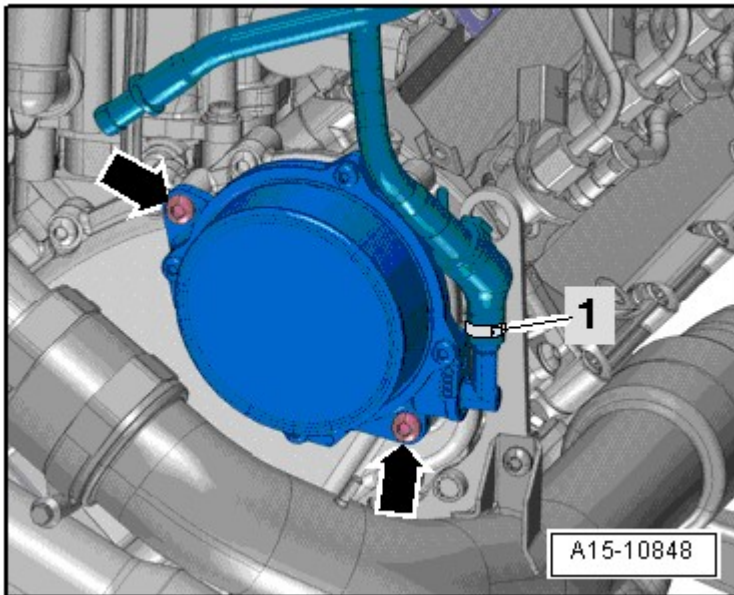
- Install the left rear coolant pipes. Refer to **LEFT REAR COOLANT PIPE** .
- Install the left intermediate pipe. Refer to **LEFT INTERMEDIATE PIPE** .

RIGHT TIMING CHAIN COVER**Special tools and workshop equipment required**

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

Removing

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

**Fig. 49: Identifying Vacuum Pump Bolts**

Courtesy of AUDI OF AMERICA, LLC

- Free up electrical wiring harness -arrows-.

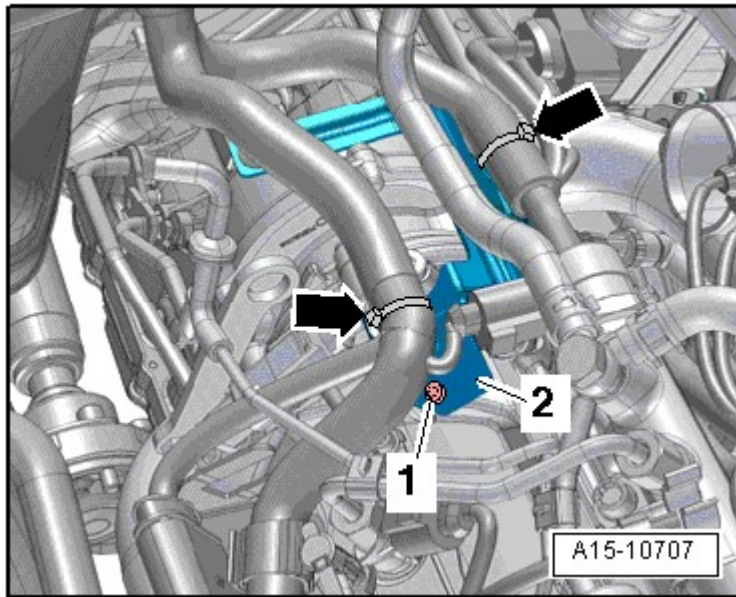


Fig. 50: Identifying Bolt -1-, Bracket -2-, And Wiring Harness
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -1- and the bracket -2-.

-- Remove the bolts -1 through 4- and remove the right timing chain cover.

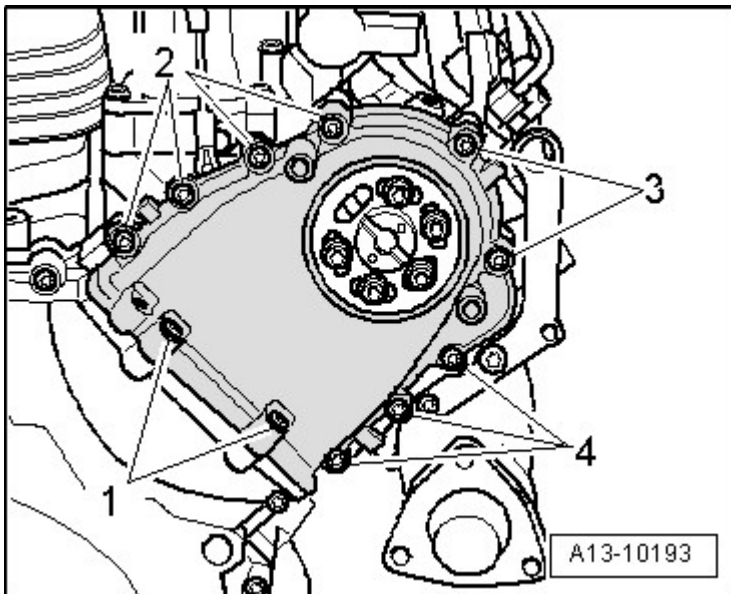


Fig. 51: Identifying Bolts -1 Through 4-
Courtesy of AUDI OF AMERICA, LLC

Installing

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

NOTE: Replace the bolts for the right timing chain cover.

-- Remove old sealant form the grooves in the timing chain cover as well as from the sealing surfaces.

CAUTION: Risk of contaminating lubricating system.

- Cover open parts of engine.

WARNING: Risk of eye injury.

- Wear protective eyewear.

-- Remove the remaining sealant on the left timing chain and cylinder head covers, for example with a rotating plastic brush.

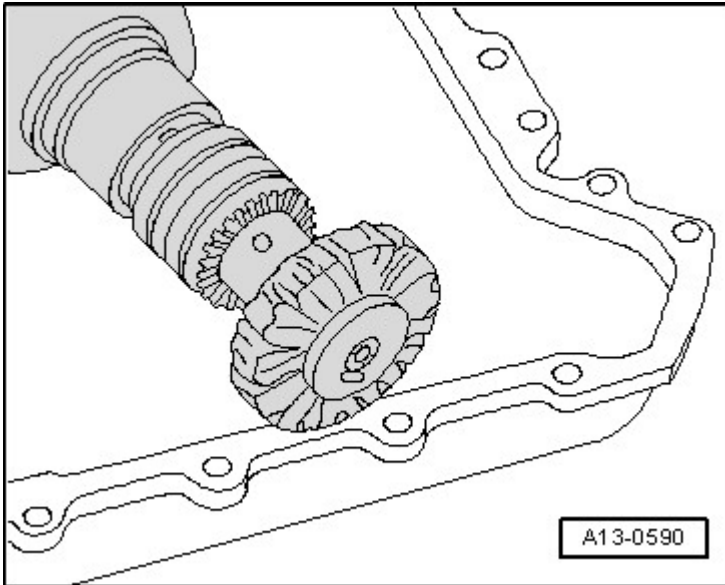


Fig. 52: Identifying Rotating Plastic Brush To Remove Sealant Residue From Sealing Flange, Cylinder Block And Upper Part Of Oil Pan

Courtesy of AUDI OF AMERICA, LLC

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

NOTE: Note the expiration date of the sealing compound.

-- Cut the tube nozzle at the front marking (nozzle diameter approximately 1.5 mm).

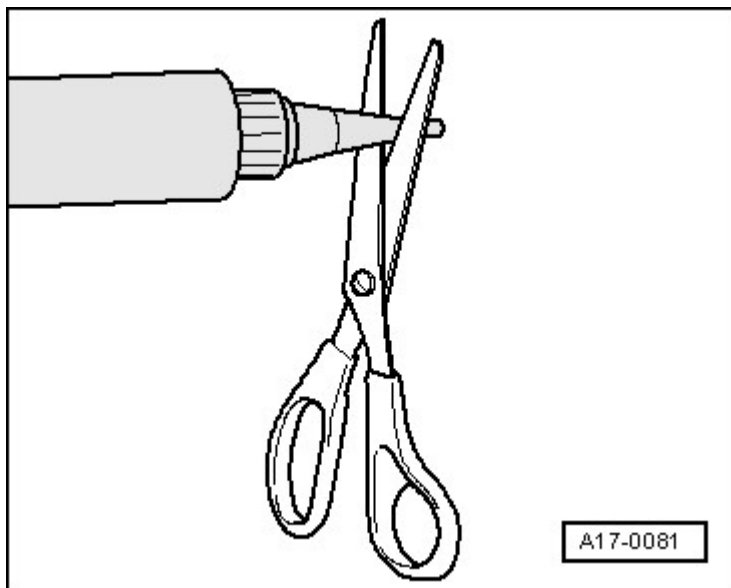


Fig. 53: Identifying Scissors To Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 1.5 mm)
Courtesy of AUDI OF AMERICA, LLC

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

- Do not apply sealant bead thicker than specified.

-- Apply a sealant bead to the clean sealing surface of the right timing chain cover as shown in the illustration.

- The groove -1- of sealing surface must be completely filled with sealant.

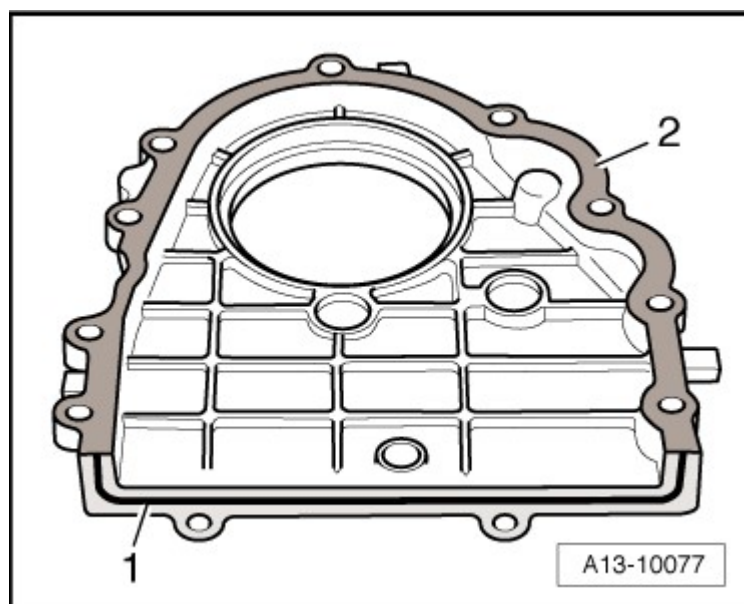


Fig. 54: Identifying Groove -1- Of Sealing Surface
Courtesy of AUDI OF AMERICA, LLC

- The sealant bead must be 1.5 to 2.0 mm above the sealing surface.

-- Install the seal -2-.

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

-- Cut the tube nozzle at the front marking (nozzle diameter approximately 1.5 mm).

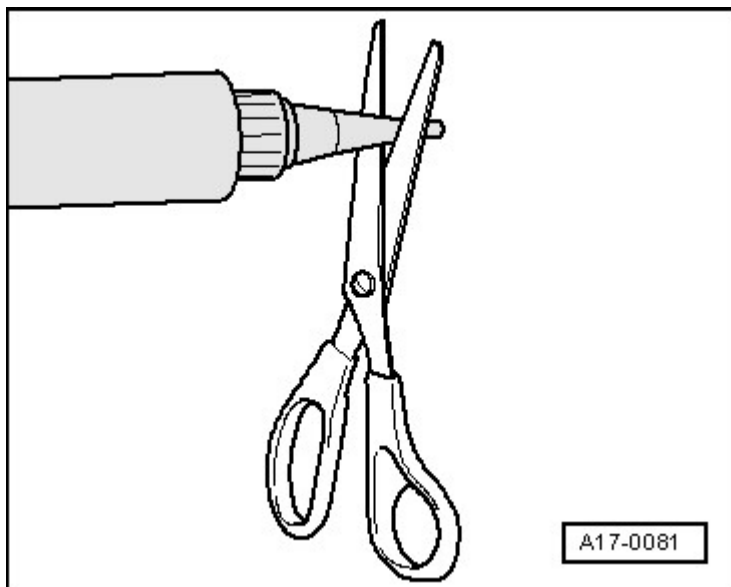


Fig. 55: Identifying Scissors To Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 1.5 mm)
Courtesy of AUDI OF AMERICA, LLC

-- Apply a 3 mm diameter sealant bead to the transitions between the cylinder head and lower timing chain cover -arrows- as illustrated.

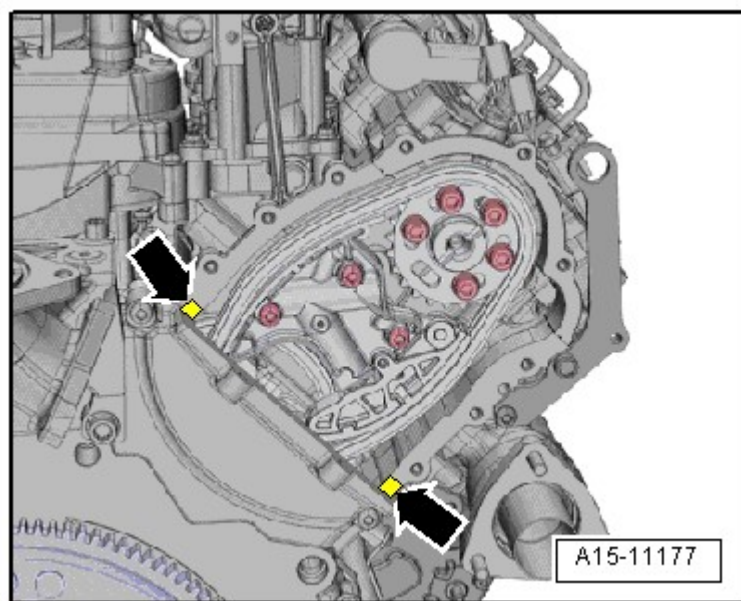


Fig. 56: Locating Sealant Beads

Courtesy of AUDI OF AMERICA, LLC

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

- Do not apply sealant bead thicker than specified.

NOTE: The timing chain cover must be installed within 5 minutes after applying the sealant

-- Position the right timing chain cover and tighten the bolts. Refer to **Fig. 10**.

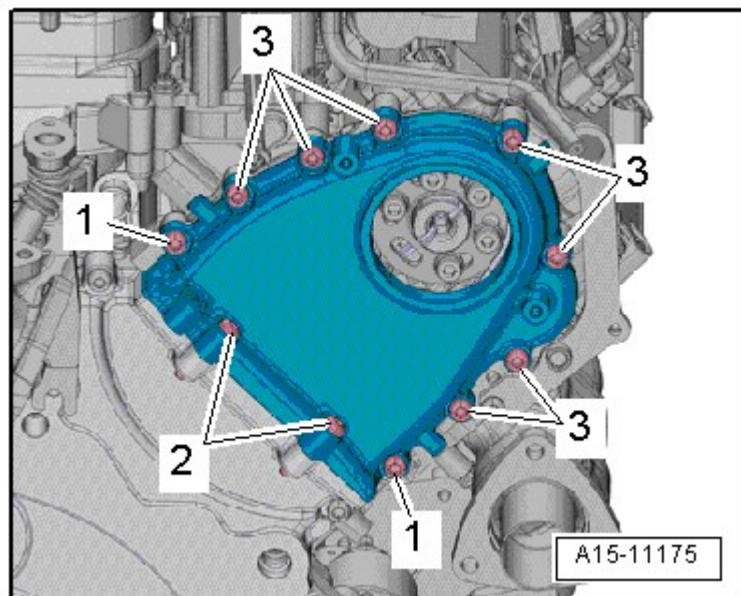


Fig. 57: Identifying Right Timing Chain Cover, Tightening Specifications and Sequence
Courtesy of AUDI OF AMERICA, LLC

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

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

LOWER TIMING CHAIN COVER

Special tools and workshop equipment required

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

Removing

- Transmission removed.
- Engine oil drained. Refer to Maintenance Procedures .

-- Remove the drive plate. Refer to **DRIVE PLATE** .

-- Remove the intermediate pipe and intermediate flange. Refer to **LEFT INTERMEDIATE PIPE** , and **RIGHT INTERMEDIATE PIPE** and **INTERMEDIATE FLANGE** .

-- Remove the timing chain covers. Refer to **LEFT TIMING CHAIN COVER** and **RIGHT TIMING CHAIN COVER**.

-- If equipped, remove the nuts -arrows- and the connector bracket from the left engine support.

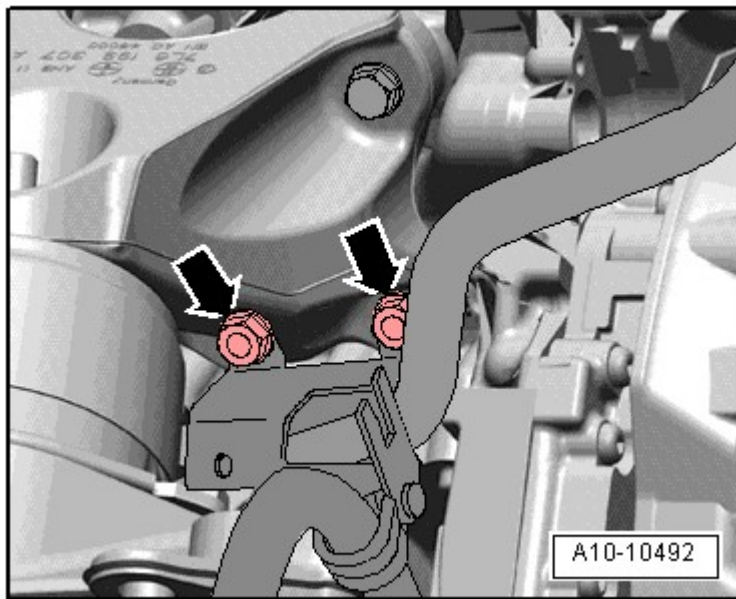


Fig. 58: Identifying Bolts -Arrows- And Connector Bracket From Left Engine Mount Bracket
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and remove the oil return pipe -1- from the cylinder block.

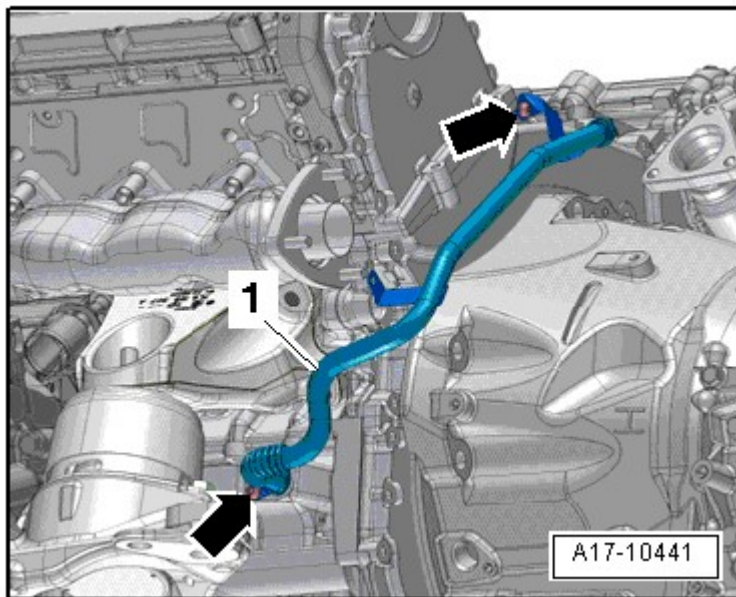


Fig. 59: Identifying Bolts -Arrows- And Remove Oil Return Pipe -1-
 Courtesy of AUDI OF AMERICA, LLC

NOTE: Lay a cloth below to catch the draining engine oil.

-- Remove the bolts -1 through 9- and remove the lower timing chain cover.

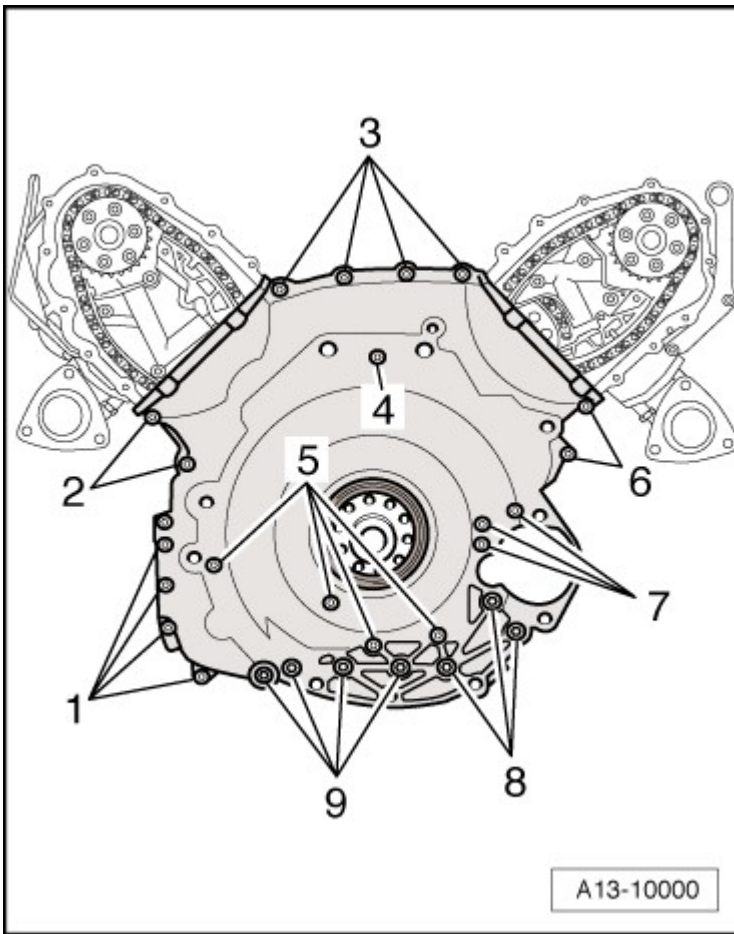


Fig. 60: Identifying Lower Timing Chain Cover Bolt Tightening Sequence and Specification
Courtesy of AUDI OF AMERICA, LLC

-- Press the transmission side of the crankshaft shaft seal out of the lower timing chain cover.

Installing

- Tightening specifications, refer to **SUBFRAME ASSEMBLY OVERVIEW** and **TURBOCHARGER OVERVIEW**.

-- Remove old sealant form the grooves in the timing chain cover as well as from the sealing surfaces.

CAUTION: Risk of contaminating lubricating system.

- Cover open parts of engine.

WARNING: Risk of eye injury.

- Wear protective eyewear.

-- Remove any sealant residue on the lower timing chain cover and cylinder block with a rotating plastic brush.

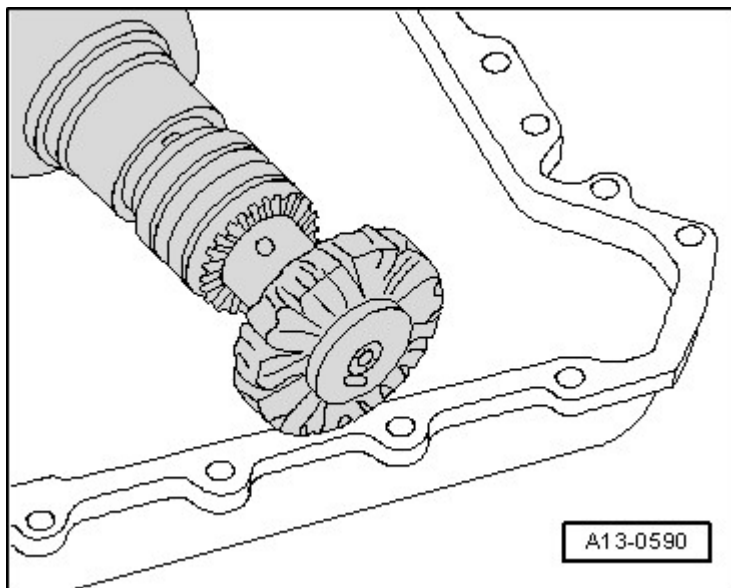


Fig. 61: Identifying Rotating Plastic Brush To Remove Sealant Residue From Sealing Flange, Cylinder Block And Upper Part Of Oil Pan

Courtesy of AUDI OF AMERICA, LLC

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

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

-- Cut the tube nozzle at the front marking (nozzle diameter approximately 1.5 mm).

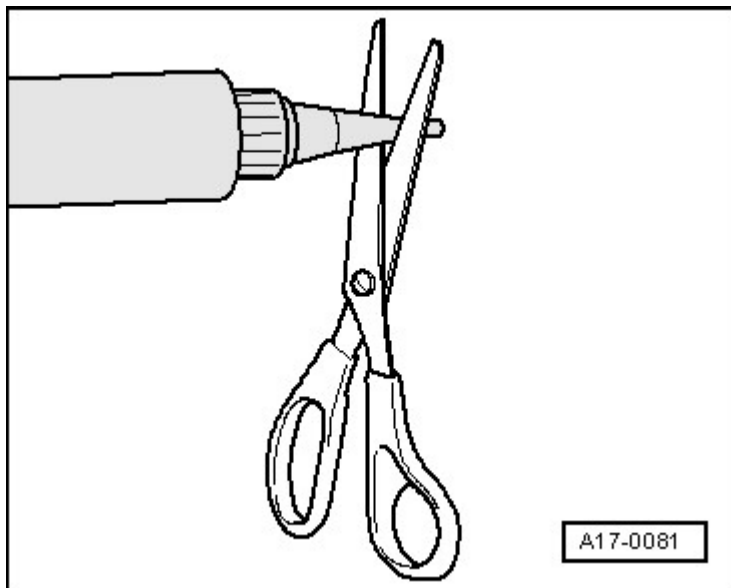


Fig. 62: Identifying Scissors To Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 1.5 mm)

Courtesy of AUDI OF AMERICA, LLC

-- Install the seals -2- and -5-.

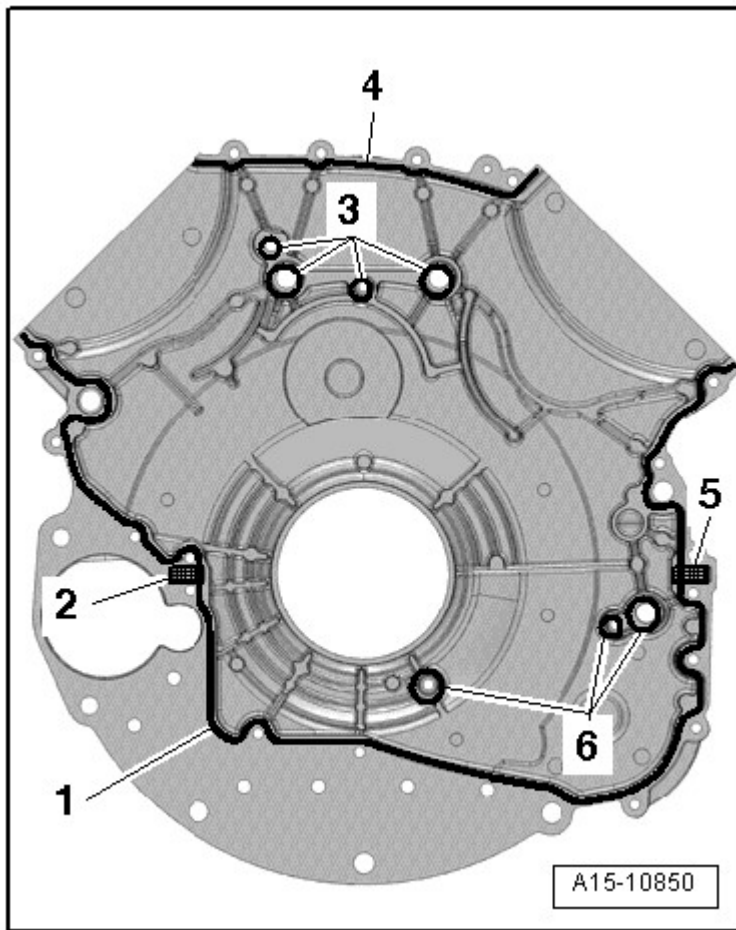


Fig. 63: Identifying Seals -2- And -5-
Courtesy of AUDI OF AMERICA, LLC

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

- Do not apply sealant bead thicker than specified.

-- Apply a bead of sealant -1- and -4- on the clean sealing surfaces on the lower timing chain cover as illustrated.

- Completely fill the grooves on the sealing surfaces with sealant.
- The sealant bead must be 1.5 to 2.0 mm above the sealing surface.
- The bead of sealant around the holes -3- and -6- must be 1.5 to 2.0 mm thick.

NOTE: The timing chains cover must be installed within 5 minutes after applying the sealant

-- Make sure the dowel sleeves are inside the cylinder block; if not, install them.

-- Install the lower timing chain cover and tighten the bolts. Refer to **Fig. 11**.

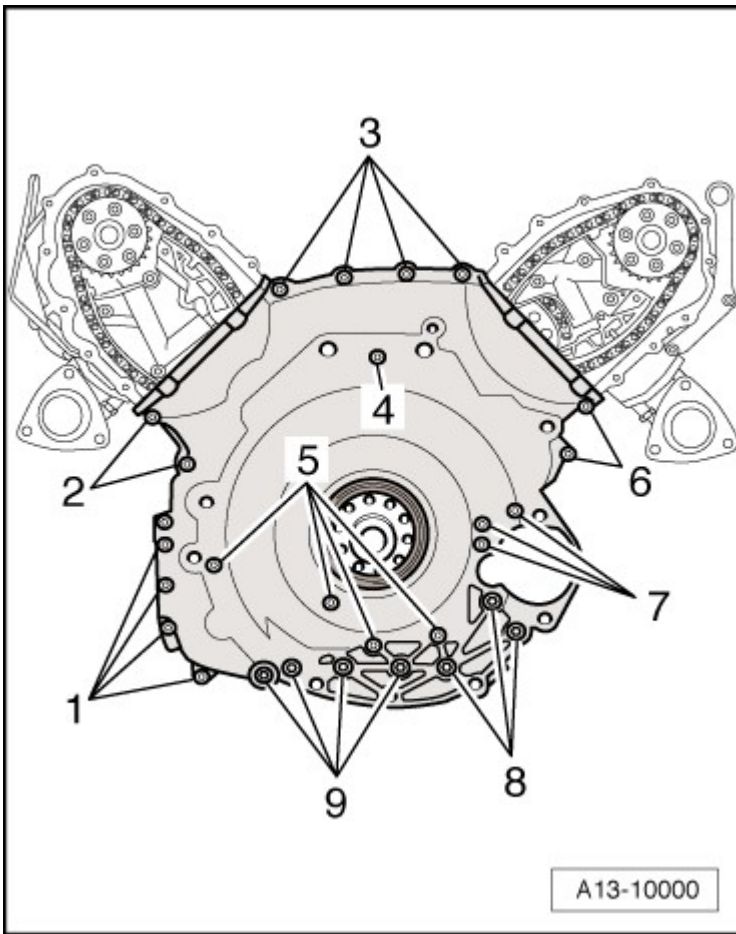


Fig. 64: Identifying Lower Timing Chain Cover Bolt Tightening Sequence and Specification
Courtesy of AUDI OF AMERICA, LLC

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

- Install the lower section of the oil return line. Refer to **TURBOCHARGER OVERVIEW** .
- Install the timing chain covers. Refer to **LEFT TIMING CHAIN COVER** and **RIGHT TIMING CHAIN COVER**.
- Install the intermediate pipe and intermediate flange. Refer to **LEFT INTERMEDIATE PIPE** , and **RIGHT INTERMEDIATE PIPE** and **INTERMEDIATE FLANGE** .
- Installing drive plat. Refer to **DRIVE PLATE** .
- Fill engine oil and check oil level. Refer to Maintenance Procedures .

CAMSHAFT TIMING CHAINS, REMOVING FROM CAMSHAFTS

Special tools and workshop equipment required

- Crankshaft Holder 3242
- Socket T40058
- Adjusting Pin T40060 (quantity: 2)
- Adapter T40061
- Adapter T40062
- Two 3.3 mm drill bits

Removing

- Engine and transmission installed.

NOTE: If working on just one of the cylinder heads, it is not necessary to remove the timing chain cover on the opposite cylinder head.

-- Remove the timing chain cover. Refer to LEFT TIMING CHAIN COVER and RIGHT TIMING CHAIN COVER.

-- Insert the T40058 guide pins as follows:

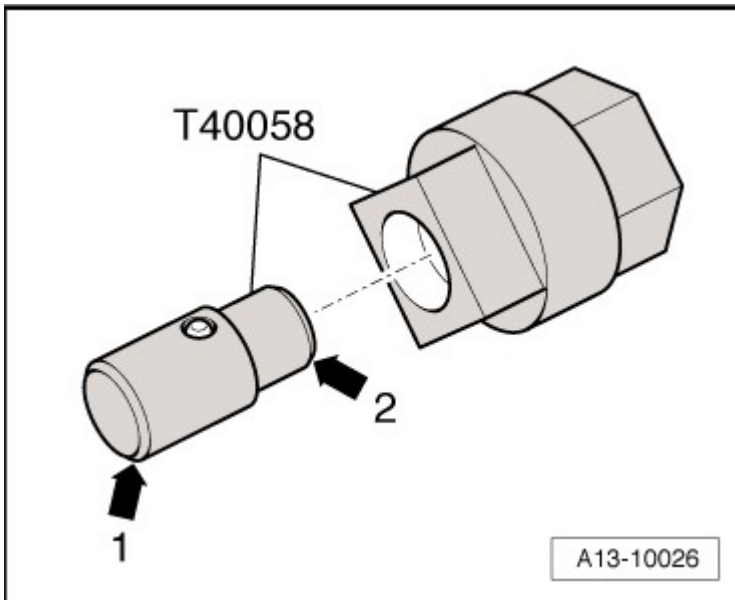


Fig. 65: Identifying Guide Pin And Adapter T40058
Courtesy of AUDI OF AMERICA, LLC

- The large diameter -arrow 1- faces the engine.
- Small diameter -arrow 2- points to adapter.

CAUTION: Components could be destroyed by the camshaft timing chain jumping off.

- Turn crankshaft only in direction of engine rotation -arrow-.

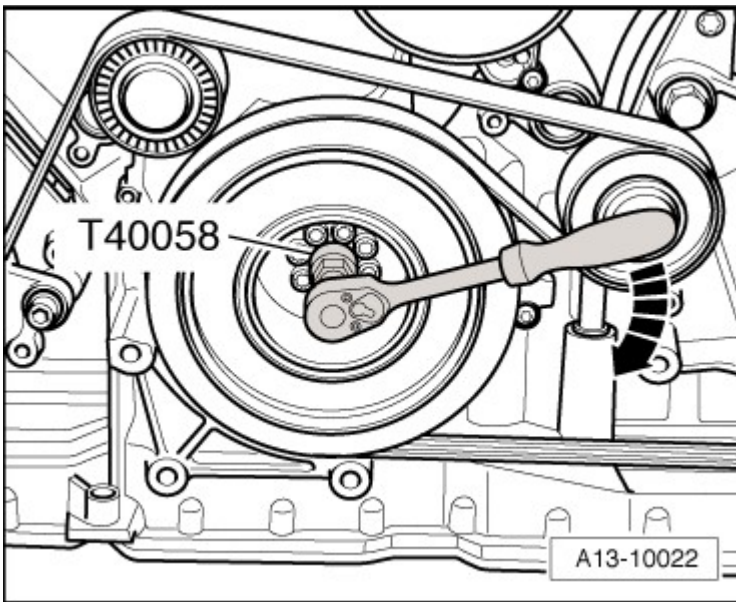


Fig. 66: Identifying Torque Converter Bolts And Adapter T40058
Courtesy of AUDI OF AMERICA, LLC

-- Use the T40058 to rotate the crankshaft to "TDC".

NOTE: The T40060 has a flat part -2- which makes it easier to insert if the camshaft and the cylinder head are slightly offset.

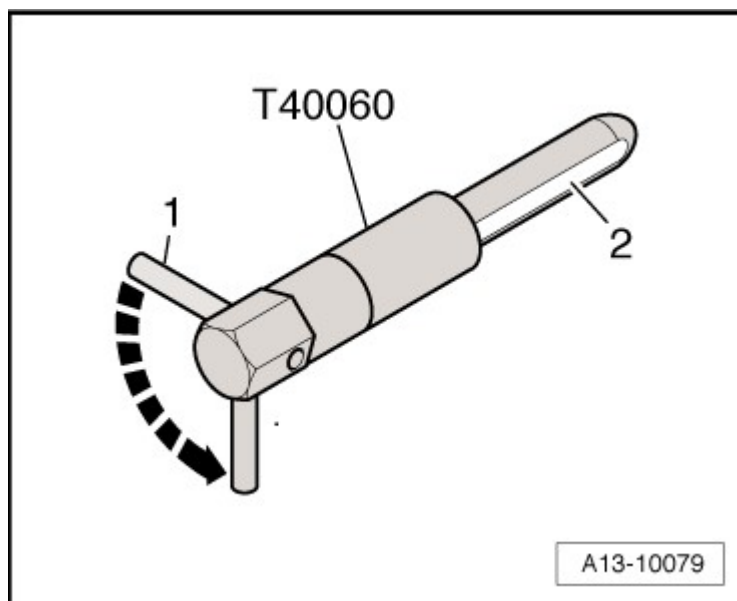


Fig. 67: Identifying Adjustment Pin T40060
Courtesy of AUDI OF AMERICA, LLC

Insert the pin so that the bolt -1- is perpendicular to the camshaft axle.

Move the bolt -1- 90° -arrow- so that it is perpendicular to the camshaft axle and it is possible to attain the correct "TDC" position.

-- Check whether camshafts of both cylinder heads stand in "TDC" position.

- It must be possible to secure the camshafts with the T40060.
- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft on cylinder bank 1 (right).

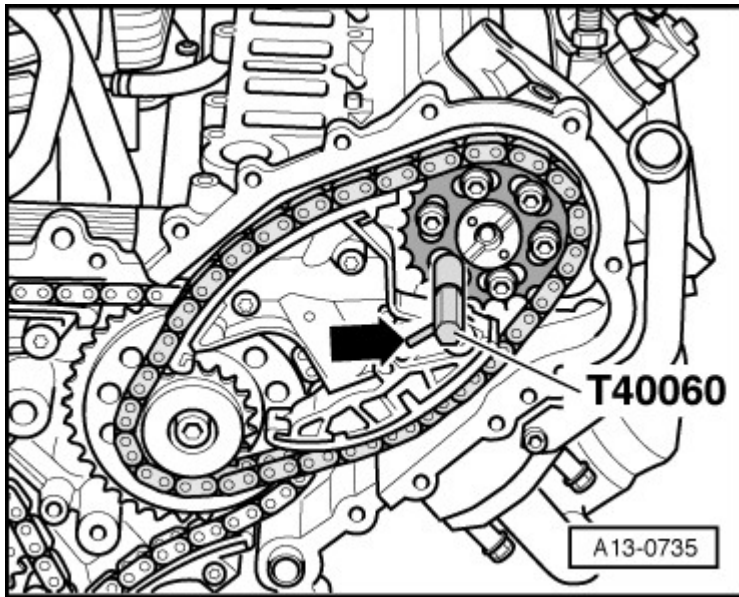


Fig. 68: Identifying TDC Position Of Camshafts
Courtesy of AUDI OF AMERICA, LLC

- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft on cylinder bank 2 (left).

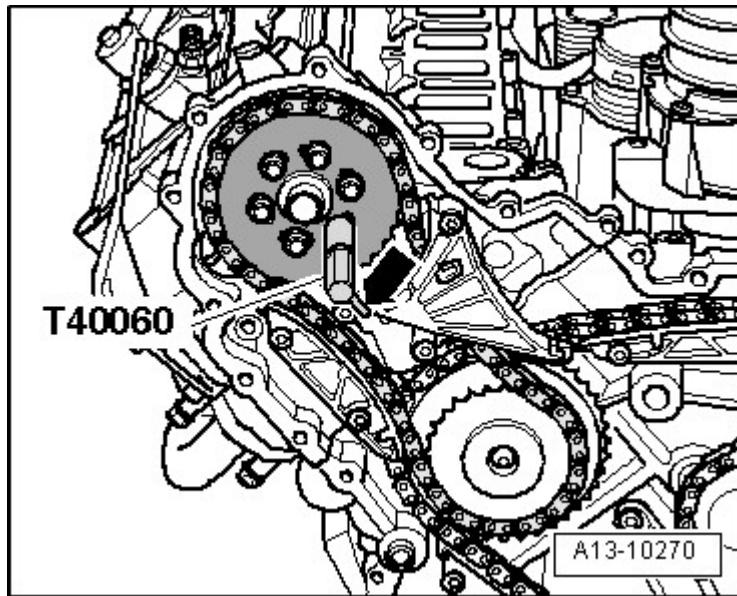


Fig. 69: Identifying Perpendicular Pin -Arrow- On Adjustment Pin T40060
Courtesy of AUDI OF AMERICA, LLC

NOTE: To collect escaping engine oil, place a clean cloth under the upper section of the oil pan.

-- Remove the bolt -arrow- for the "TDC" marking from the upper section of the oil pan by using a long hex socket wrench with a ball head.

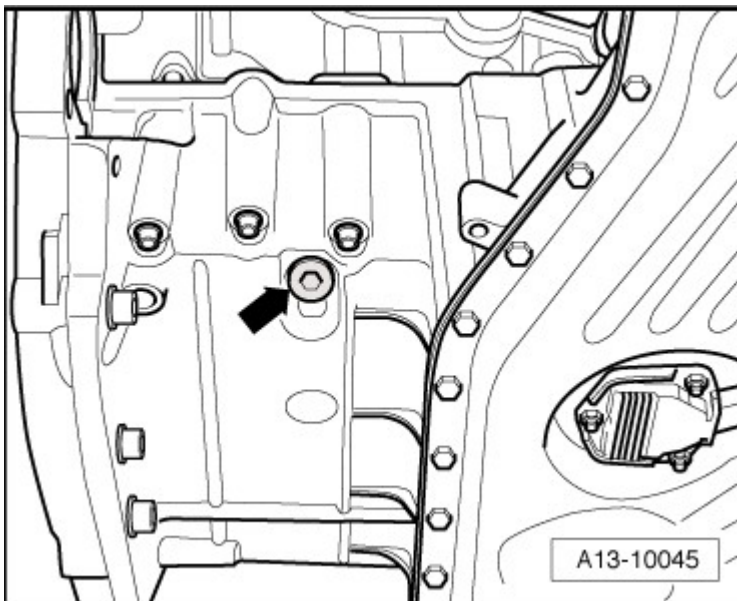


Fig. 70: Identifying Locking Bolt Of Upper Part Of Oil Pan
Courtesy of AUDI OF AMERICA, LLC

-- Install the 3242 in the hole and tighten to 20 Nm. Turn the crankshaft -1- back and slightly to completely

center the bolt, if necessary.

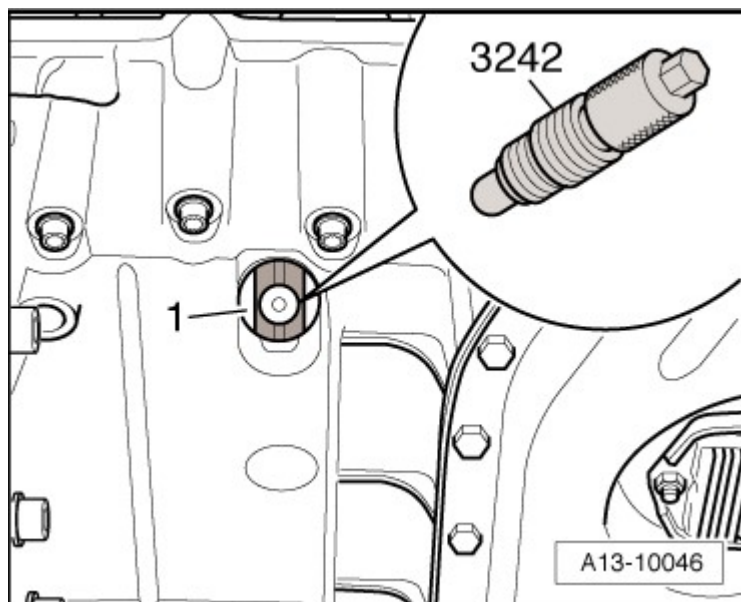


Fig. 71: Identifying Crankshaft Holder 3242 In Bore
Courtesy of AUDI OF AMERICA, LLC

-- To protect against cuts, wrap the point and the cutting edges on a 3.3 mm drill bit with insulating tape.

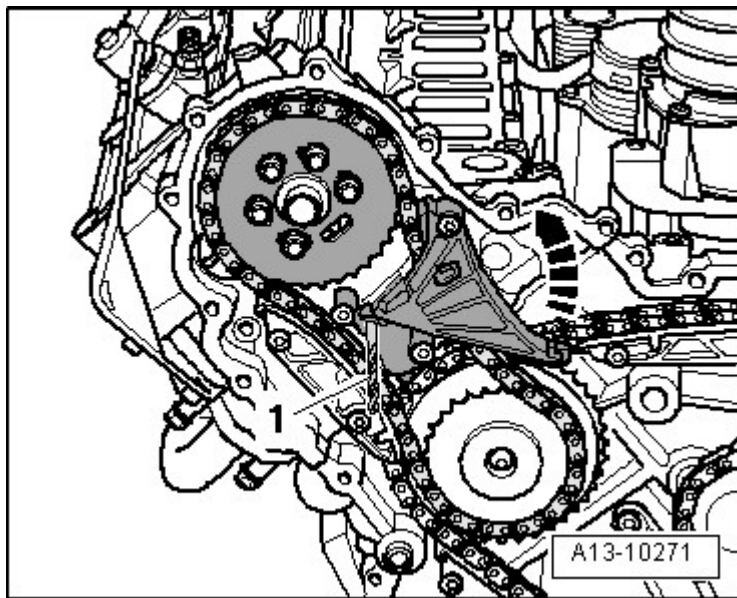


Fig. 72: Identifying Chain Tensioner Secured Using 3.3 Mm Diameter Drill Bit
Courtesy of AUDI OF AMERICA, LLC

-- Push the tensioning track of the chain tensioner for the left camshaft timing chain in direction of -arrow- and secure the chain tensioner with a 3.3 mm drill bit -1-.

CAUTION: The engine could be destroyed.

- To prevent small parts from accidentally entering the engine through the opening in the timing chain compartment, cover the opening with a clean cloth.

-- Remove the bolt -3- and remove the tensioning rail.

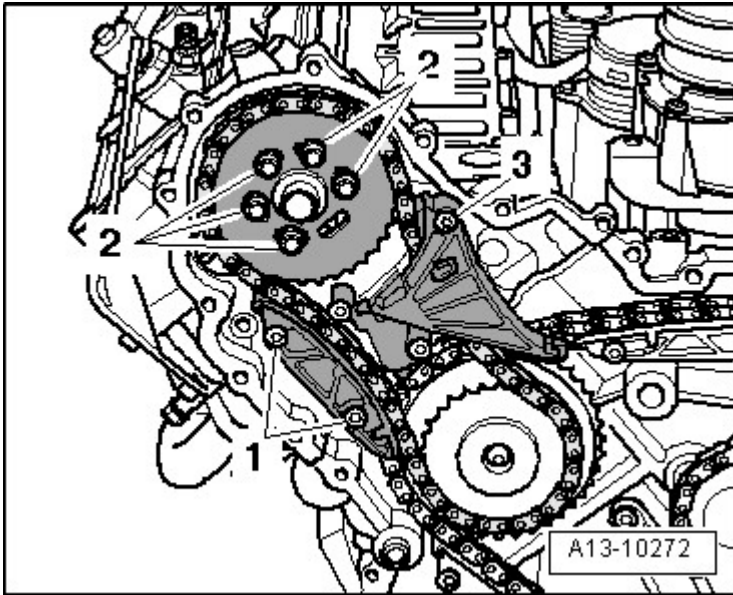


Fig. 73: Identifying Bolts -1- For Guide Rail And Bolts -2- For Camshaft Chain Sprocket
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -1- for the guide rail and bolts -2- for the camshaft chain sprocket.

-- Remove the camshaft chain sprocket and guide rail.

-- To protect against cuts, wrap the point and the cutting edges on a 3.3 mm drill bit with insulating tape.

-- Push the chain tensioner guide rail for the right camshaft timing chain in direction of -arrow- and secure the chain tensioner with a 3.3 mm drill bit -1-.

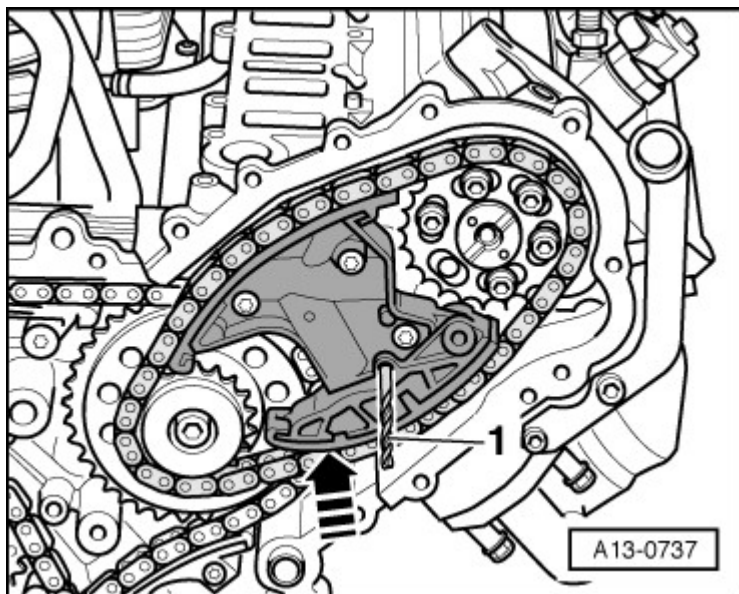


Fig. 74: Identifying 3.3 mm Diameter Drill Bit -1- To Install Chain Tensioner Guide Rail On Right Camshaft Timing Chain

Courtesy of AUDI OF AMERICA, LLC

CAUTION: The engine could be destroyed.

- To prevent small parts from accidentally entering the engine through the opening in the timing chain compartment, cover the opening with a clean cloth.

-- Remove the chain tensioner bolts -1- and camshaft chain sprocket bolts -3- and -2-.

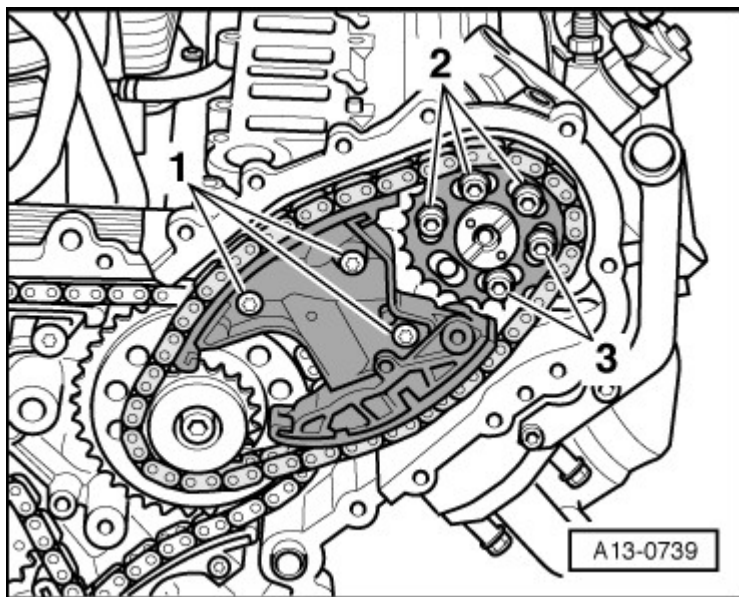


Fig. 75: Identifying Chain Tensioner Guide Rail Installed On Right Camshaft Timing Chain

Courtesy of AUDI OF AMERICA, LLC

-- Remove the camshaft chain sprocket and chain tensioner.

INSTALLING

- For the correct tightening specifications, refer to **CAMSHAFT TIMING CHAINS OVERVIEW**.
- Secure crankshaft -1- in "TDC" position using 3242.

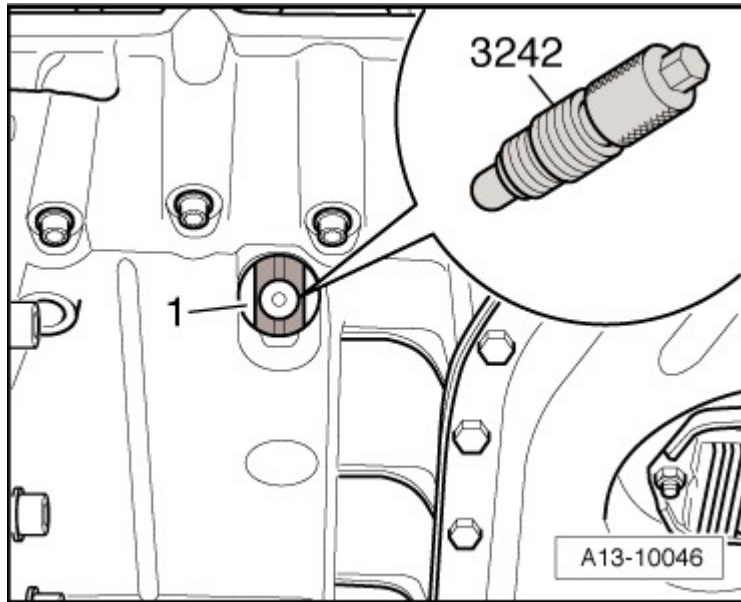


Fig. 76: Identifying Crankshaft Holder 3242 In Bore
Courtesy of AUDI OF AMERICA, LLC

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

CAUTION: Risk of damaging valves and piston crowns.

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

-- Check whether camshafts of both cylinder heads stand in "TDC" position.

- It must be possible to secure the camshafts with the T40060.
- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft on cylinder bank 1 (right).

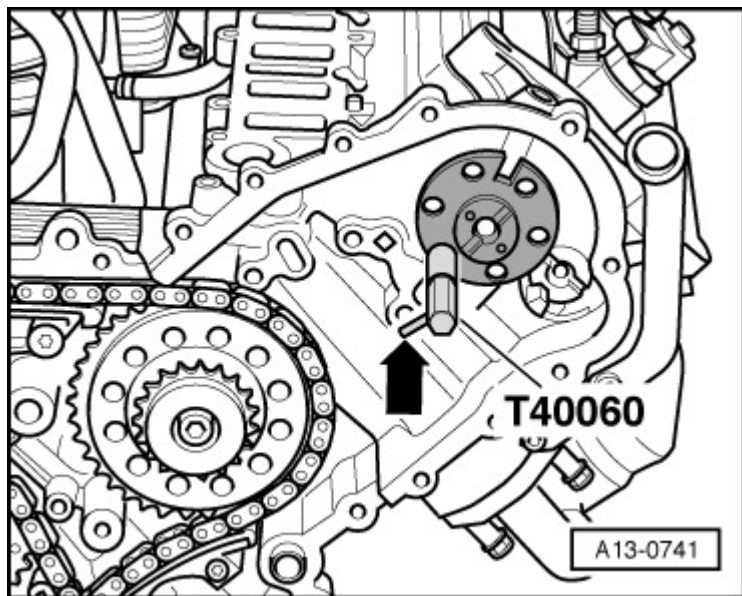


Fig. 77: Identifying Check Of Camshafts For Both Cylinder Heads In TDC Position And Adjustment Pin T40060

Courtesy of AUDI OF AMERICA, LLC

- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft on cylinder bank 2 (left).

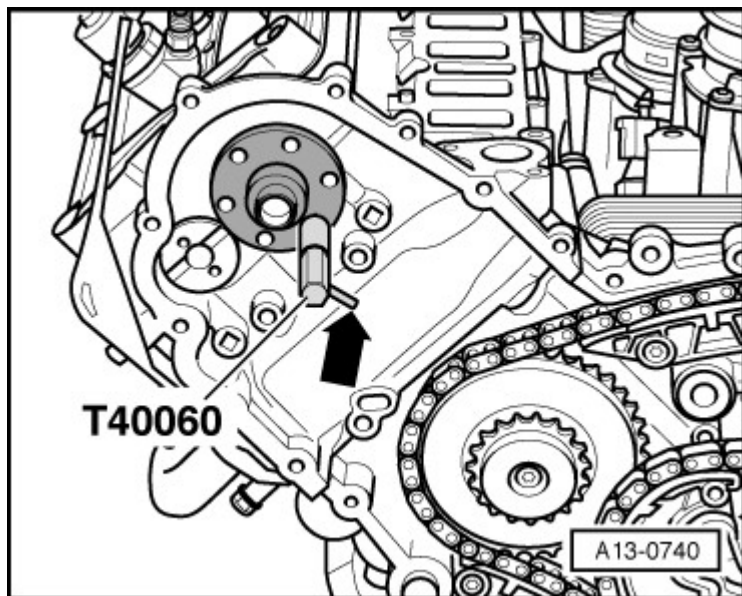


Fig. 78: Identifying Perpendicular Pin -Arrow- On Adjustment Pin T40060

Courtesy of AUDI OF AMERICA, LLC

-- Remove the T40060 from both camshafts.

CAUTION: Risk of damaging valves and piston crowns.

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

NOTE: If the camshafts are not secured, it is possible to correct them slightly with the T40061 by installing the camshaft chain sprocket on the camshaft.

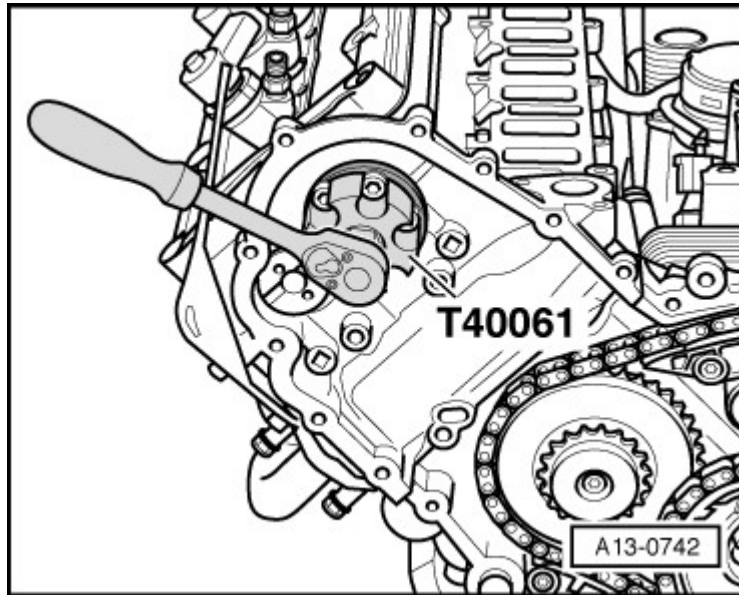


Fig. 79: Identifying Adapter T40061 And Adjustment Pin T40060
Courtesy of AUDI OF AMERICA, LLC

- Install the left camshaft timing chain with the camshaft chain sprocket, the guide rail and the tensioning rail.
 - The slots in the camshaft chain sprocket must be at the middle position in relation to the threaded holes in the camshaft.
- Tighten the bolts -1- and -3- for the guide rail and the tensioning rail.

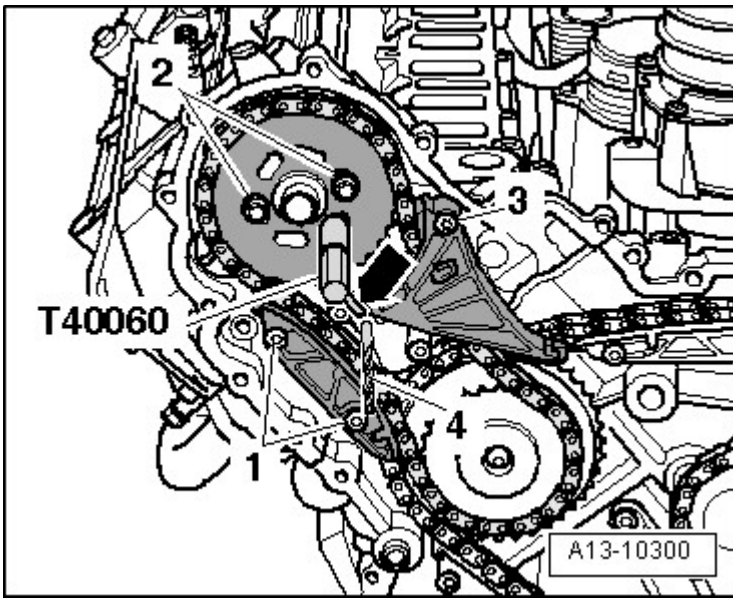


Fig. 80: Identifying Left Camshaft Timing Chain, Camshaft Chain Sprocket, Guide Rail And Tensioning Rail

Courtesy of AUDI OF AMERICA, LLC

-- Install both camshaft chain sprocket bolts -2- loosely.

- It must still be possible to rotate the camshaft chain sprocket on the camshaft and it must not tip.

-- Secure the left camshaft with the T40060.

- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft.

-- Pull the drill bit -4- out of the alignment hole, thereby releasing the chain tensioner.

-- Install the right camshaft timing chain with the chain sprocket and chain tensioner.

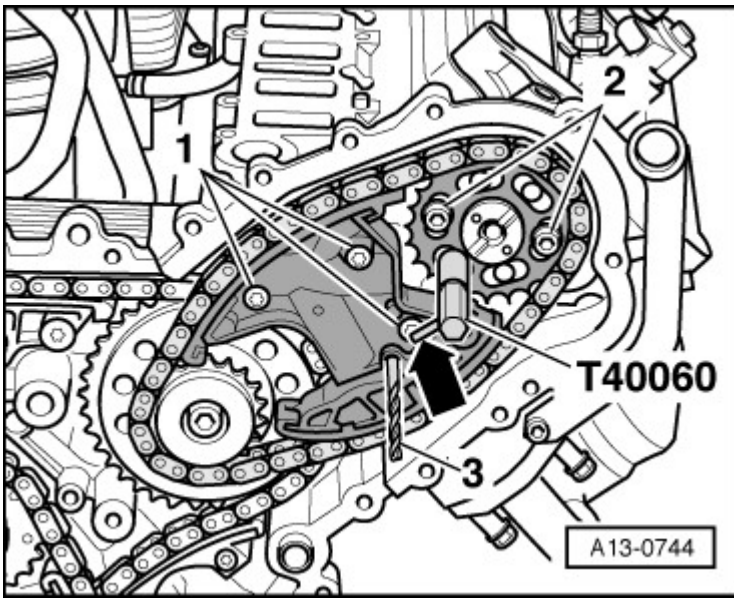


Fig. 81: Identifying Drill Bit -4- And Alignment Hole
 Courtesy of AUDI OF AMERICA, LLC

- The slots in the camshaft chain sprocket must be at the middle position in relation to the threaded holes in the camshaft.

-- Tighten the chain tensioner bolts -1-.

-- Install both camshaft chain sprocket bolts -2- loosely.

- It must still be possible to rotate the camshaft chain sprocket on the camshaft and it must not tip.

-- Secure the right camshaft with the T40060.

- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft.

-- Pull the drill bit -3- out of the alignment hole, thereby releasing the right chain tensioner.

-- Tighten the right camshaft chain sprocket using the T40062 and torque wrench to 20 Nm in direction of -arrow- and hold.

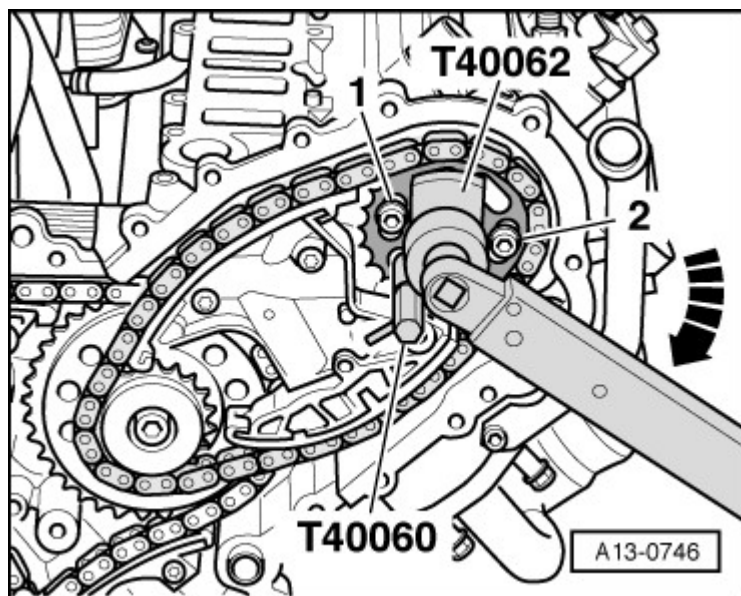


Fig. 82: Identifying Bolts -1 And 2-, Torque Wrench, Adapter T40062 And Adjustment Pin T40060
 Courtesy of AUDI OF AMERICA, LLC

- Fasten bolts -1- and -2-.
- Remove the T40062 and T40060.
- Tighten the remaining bolts for the right camshaft chain sprocket.
- Tighten the left camshaft chain sprocket using the T40062 and torque wrench to 15 Nm in direction of -arrow- and hold.

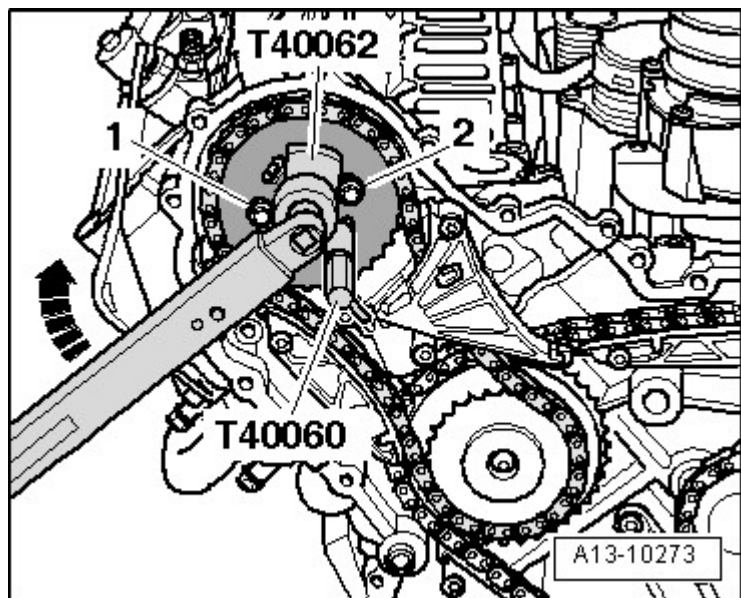


Fig. 83: Identifying Adapter T40062 On Left Camshaft Chain Sprocket
 Courtesy of AUDI OF AMERICA, LLC

- Fasten bolts -1- and -2-.
- Remove the T40062 and T40060.
- Tighten the remaining bolts for the left camshaft chain sprocket.
- Remove the 3242.

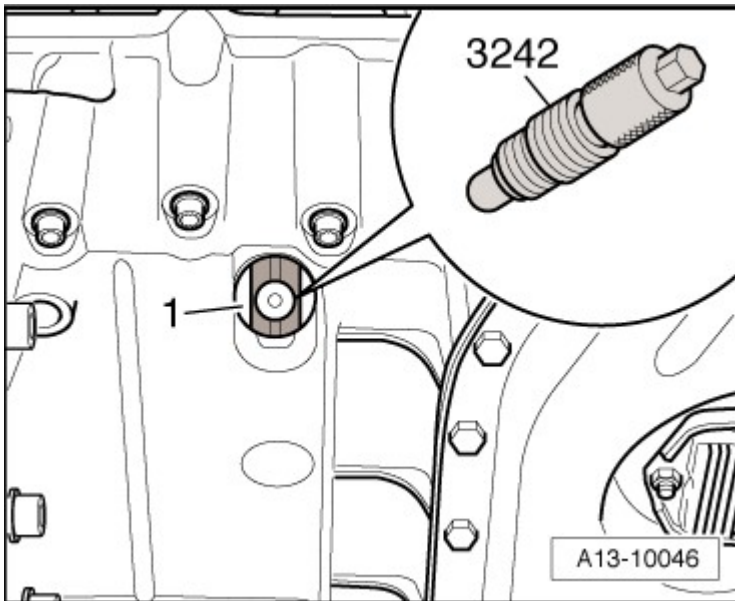


Fig. 84: Identifying Crankshaft Holder 3242 In Bore
Courtesy of AUDI OF AMERICA, LLC

CHECKING THE VALVE TIMING

CAUTION: Components could be destroyed by the camshaft timing chain jumping off.

- Turn crankshaft only in direction of engine rotation -arrow-.

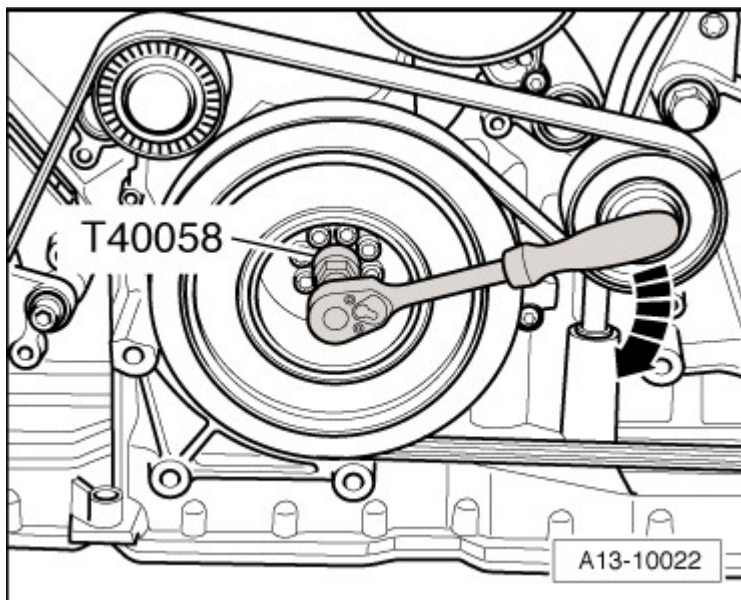


Fig. 85: Identifying Torque Converter Bolts And Adapter T40058
Courtesy of AUDI OF AMERICA, LLC

- Turn the crankshaft two turns until the crankshaft is just in front of "TDC".
- Lock the crankshaft -1- from turning using the 3242 to 20 Nm.

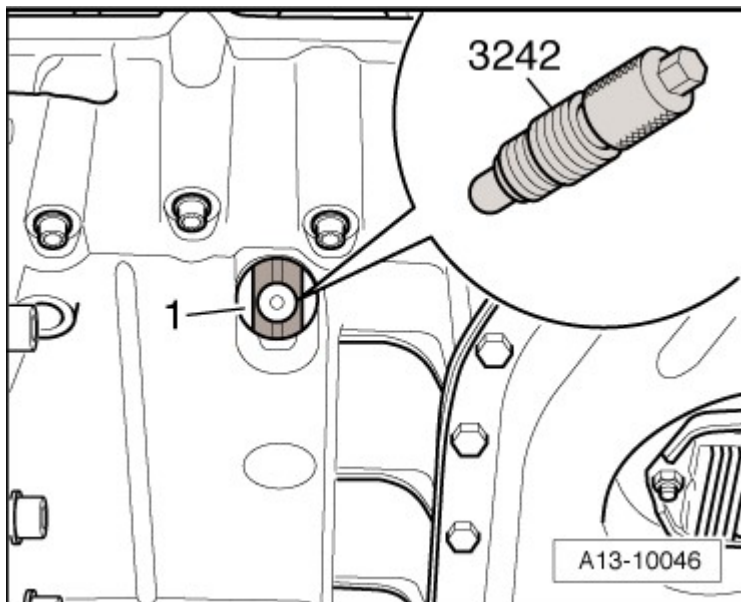


Fig. 86: Identifying Crankshaft Holder 3242 In Bore
Courtesy of AUDI OF AMERICA, LLC

CAUTION: An inaccurate "TDC" setting will cause an inaccurate setting.

- If the crankshaft was turned past "TDC" : Turn the crankshaft again 2

turns until it is just in front of "TDC", then lock it from moving with the 3242.

-- Check whether camshafts of both cylinder heads stand in "TDC" position.

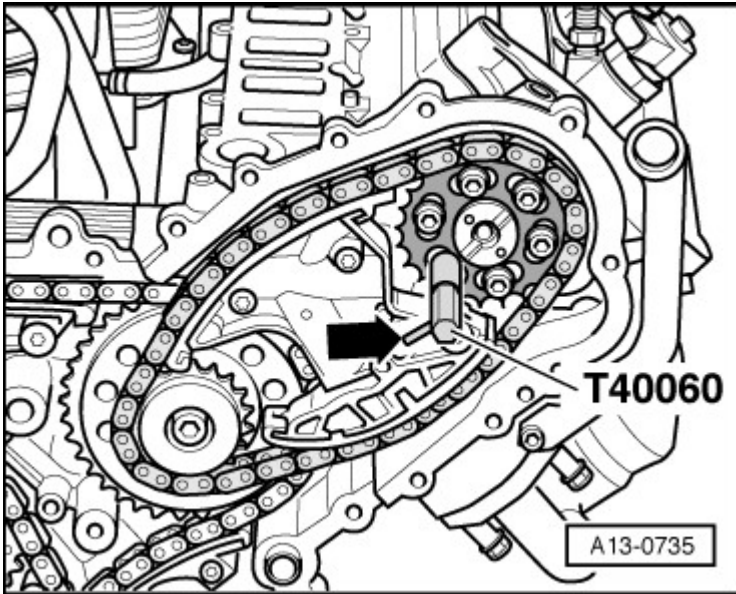


Fig. 87: Identifying TDC Position Of Camshafts
Courtesy of AUDI OF AMERICA, LLC

- It must be possible to secure the camshafts with the T40060.
- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft on cylinder bank 1 (right).
- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft on cylinder bank 2 (left).

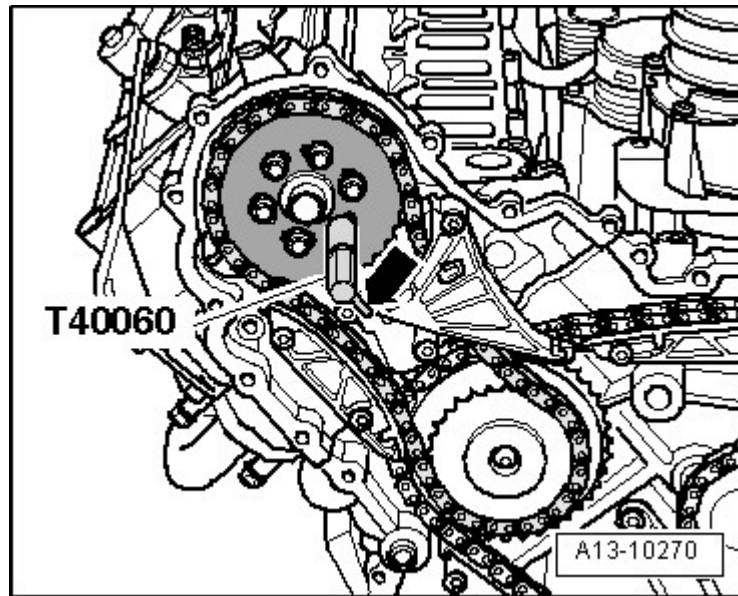


Fig. 88: Identifying Perpendicular Pin -Arrow- On Adjustment Pin T40060
 Courtesy of AUDI OF AMERICA, LLC

CORRECTING THE VALVE TIMING

-- If one of the camshafts does not lock, loosen all the bolts -arrows- for that particular camshaft chain sprocket about 1 turn.

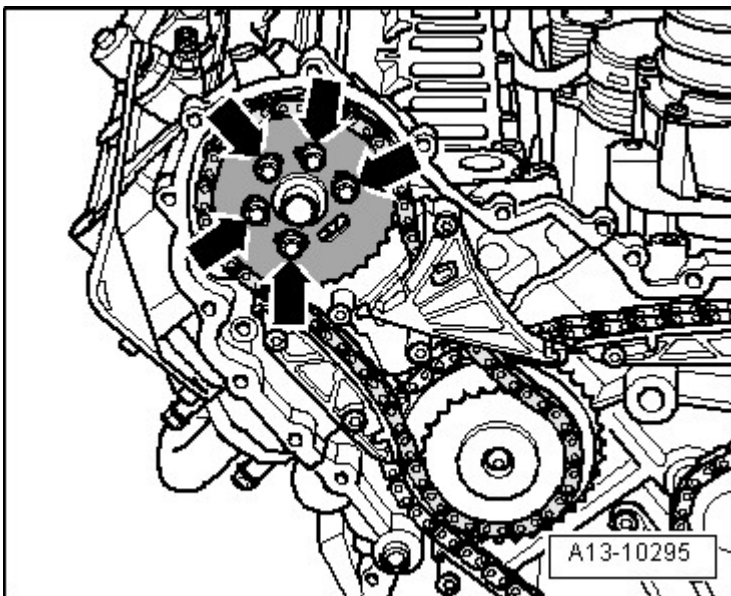


Fig. 89: Identifying Bolts -Arrows-
 Courtesy of AUDI OF AMERICA, LLC

-- Mount the T40061 over the bolt heads.

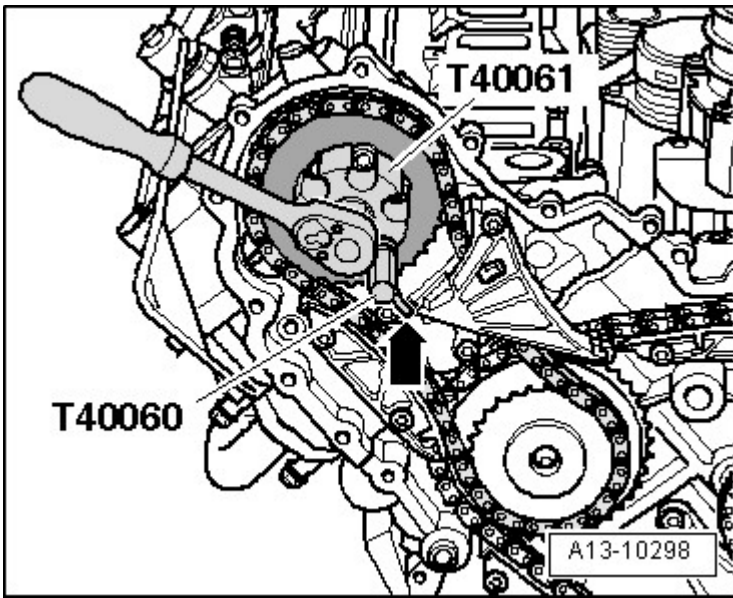


Fig. 90: Identifying Adapter T40061 And Adjustment Pin T40060
 Courtesy of AUDI OF AMERICA, LLC

-- Turn the camshaft by the T40061 just a little back and forth until it is possible to insert the T40060.

- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft.

-- Tighten the bolts for the camshaft chain sprocket with the T40061 and the T40060 still attached to approximately 5 Nm.

-- Remove the T40060 and T40061.

-- Tighten the camshaft chain sprocket bolts to final torque.

-- Repeat the procedure on the other cylinder bank if necessary.

-- Remove the 3242.

-- Check the valve timing once again **CHECKING THE VALVE TIMING**.

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

-- Tighten the bolt for the "TDC" marking in the upper section of the oil pan **UPPER OIL PAN OVERVIEW** .

-- Install the timing chain cover. Refer to **LEFT TIMING CHAIN COVER** and **RIGHT TIMING CHAIN COVER**.

CAMSHAFT TIMING CHAINS

Special tools and workshop equipment required

- Crankshaft Holder 3242
- Key T40049
- Adjusting Pin T40060 (quantity: 2)
- Adapter T40061
- Adapter T40062
- Two 3.3 mm drill bits

Removing

- Transmission removed.

CAUTION: Risk of damaging valves and piston crowns.

- Turn the crankshaft and camshafts only with the chain drive completely installed.

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

-- Attach the T40049 to the back of the crankshaft using two old drive plate bolts -arrows-.

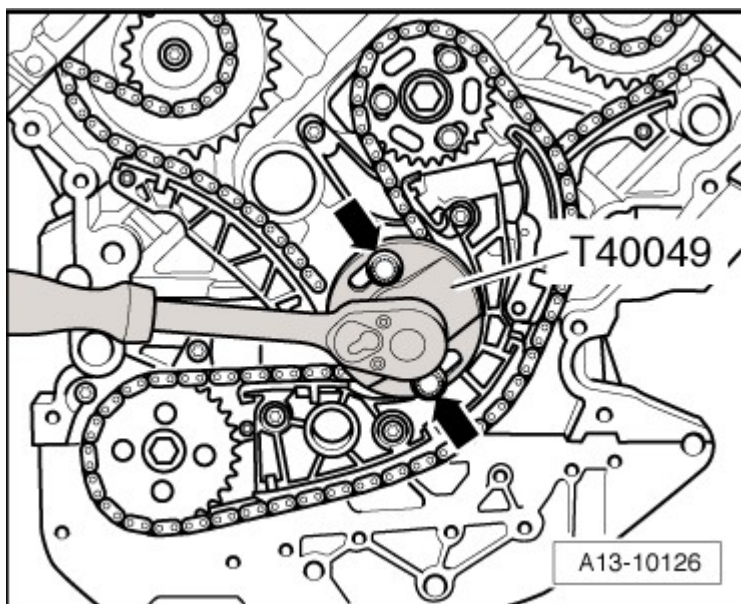


Fig. 91: Identifying Key T40049 At Rear On Crankshaft And 2 Old Bolts For Dual-Mass Flywheel
Courtesy of AUDI OF AMERICA, LLC

NOTE: The T40060 has a flat part -2- which makes it easier to insert if the camshaft and the cylinder head are slightly offset.

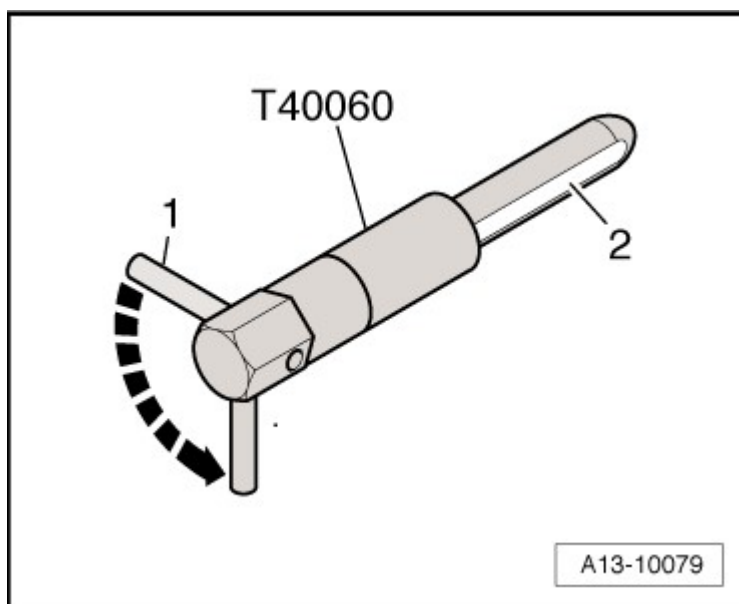


Fig. 92: Identifying Adjustment Pin T40060
Courtesy of AUDI OF AMERICA, LLC

Insert the pin so that the bolt -1- is perpendicular to the camshaft axle.

Move the bolt -1- 90° -arrow- so that it is perpendicular to the camshaft axle and it is possible to attain the correct "TDC" position.

CAUTION: Components could be destroyed by the camshaft timing chain jumping off.

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

-- Use the T40049 to rotate the crankshaft to "TDC" :

-- Check whether camshafts of both cylinder heads stand in "TDC" position.

- It must be possible to secure the camshafts with the T40060.

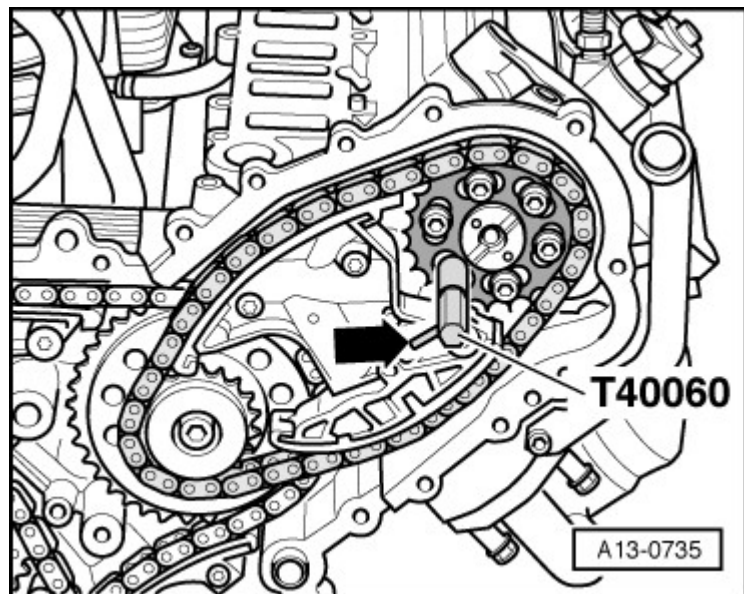


Fig. 93: Identifying TDC Position Of Camshafts

Courtesy of AUDI OF AMERICA, LLC

- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft on cylinder bank 1 (right).
- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft on cylinder bank 2 (left).

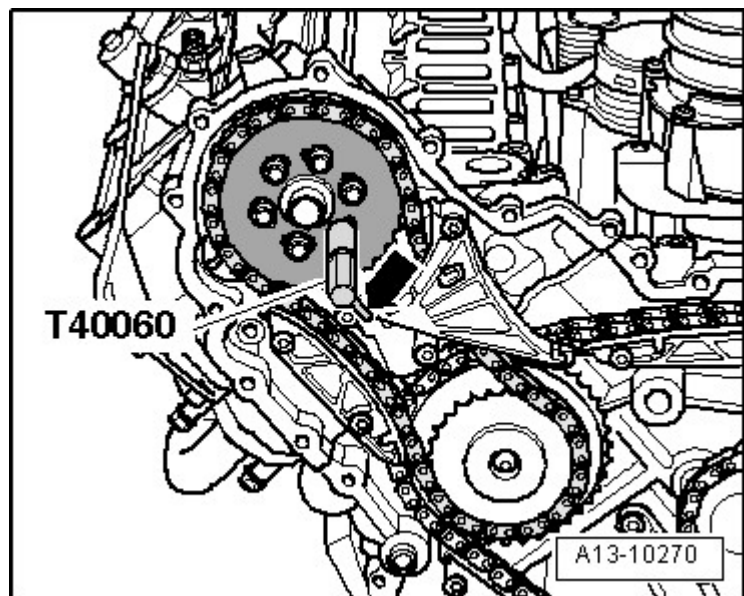


Fig. 94: Identifying Perpendicular Pin -Arrow- On Adjustment Pin T40060

Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -arrow- for the "TDC" marking from the upper section of the oil pan by using a long hex socket wrench with a ball head.

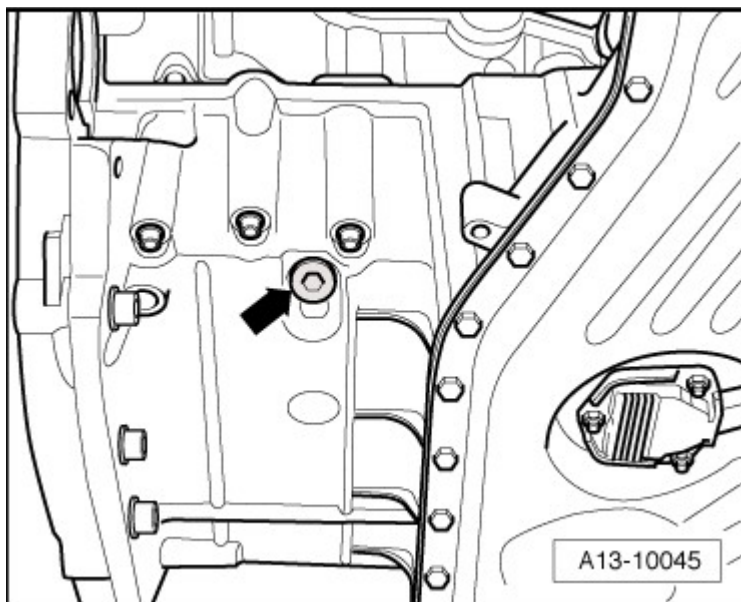


Fig. 95: Identifying Locking Bolt Of Upper Part Of Oil Pan
Courtesy of AUDI OF AMERICA, LLC

-- Install the 3242 in the hole and tighten to 20 Nm. Turn the crankshaft -1- back and slightly to completely center the bolt, if necessary.

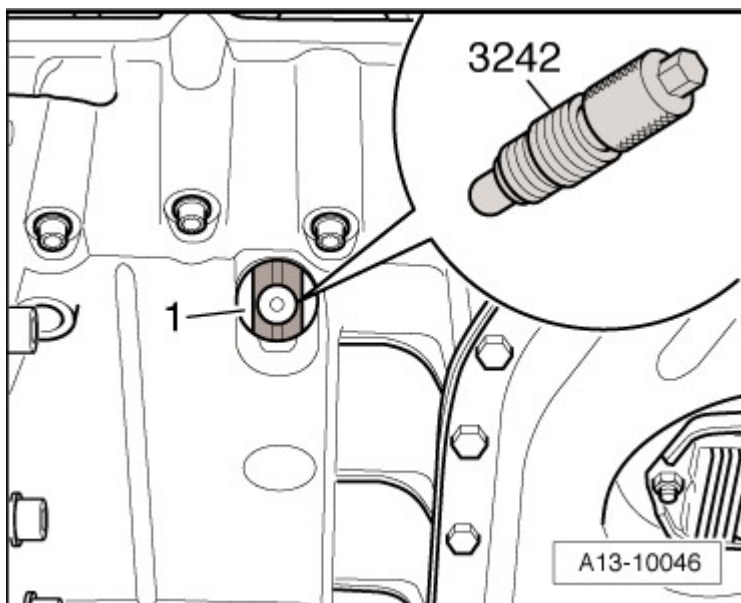


Fig. 96: Identifying Crankshaft Holder 3242 In Bore
Courtesy of AUDI OF AMERICA, LLC

-- To protect against cuts, wrap the point and the cutting edges on a 3.3 mm drill bit with insulating tape.

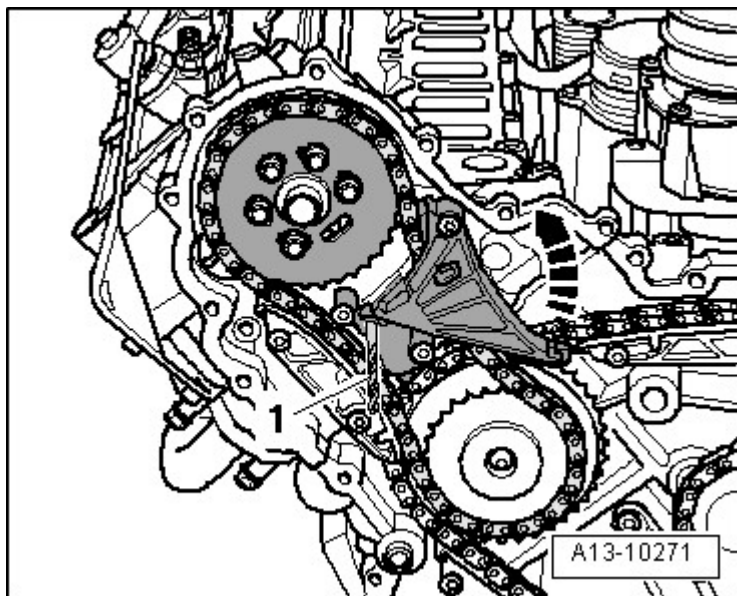


Fig. 97: Identifying Chain Tensioner Secured Using 3.3 Mm Diameter Drill Bit
Courtesy of AUDI OF AMERICA, LLC

-- Push the tensioning track of chain tensioner for the left camshaft timing chain in direction of -arrow- and secure the chain tensioner with a 3.3 mm drill bit -1-.

CAUTION: If the running direction is reversed on a used camshaft timing chain, it could be destroyed.

- Paint arrows to mark the timing chain running direction so it can be installed again.

-- Remove the T40060 from both camshafts.

-- Remove the bolt -3- and remove the tensioning rail.

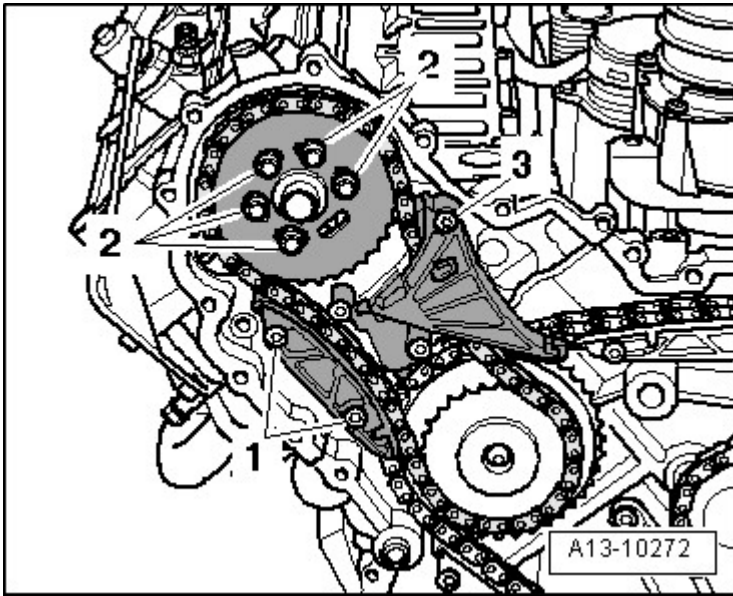


Fig. 98: Identifying Bolts -1- For Guide Rail And Bolts -2- For Camshaft Chain Sprocket
 Courtesy of AUDI OF AMERICA, LLC

- Remove the bolts -1- for the guide rail and bolts -2- for the camshaft chain sprocket.
- Remove the camshaft chain sprocket, guide rail and left camshaft timing chain.
- To protect against cuts, wrap the point and the cutting edges on a 3.3 mm drill bit with insulating tape.
- Push the chain tensioner guide rail for the right camshaft timing chain in direction of -arrow- and secure the chain tensioner with a 3.3 mm drill bit -1-.

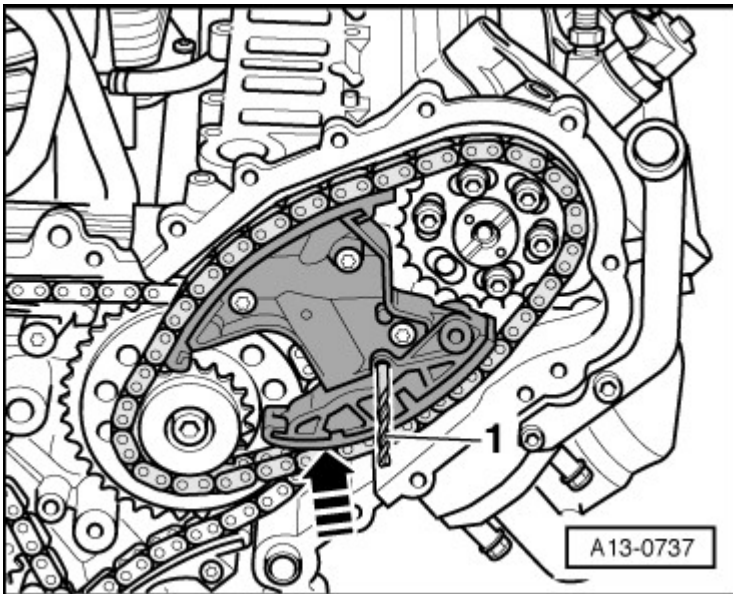


Fig. 99: Identifying 3.3 mm Diameter Drill Bit -1- To Install Chain Tensioner Guide Rail On Right Camshaft Timing Chain

Courtesy of AUDI OF AMERICA, LLC

CAUTION: If the running direction is reversed on a used camshaft timing chain, it could be destroyed.

- Paint arrows to mark the timing chain running direction so it can be installed again.

-- Remove the chain tensioner bolts -1- and camshaft chain sprocket -3- and bolts -2-.

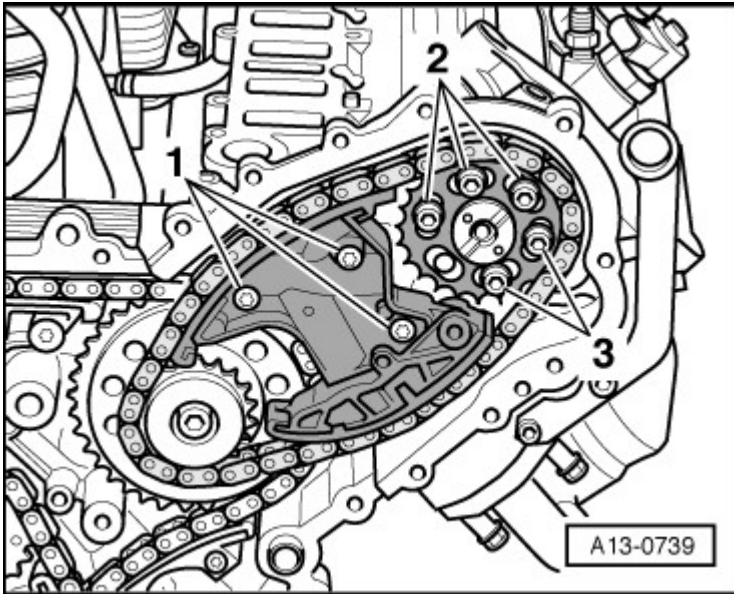


Fig. 100: Identifying Chain Tensioner Guide Rail Installed On Right Camshaft Timing Chain
Courtesy of AUDI OF AMERICA, LLC

-- Remove the camshaft chain sprocket, chain tensioning and right camshaft timing chain.

Installing

- For the correct tightening specifications, refer to **CAMSHAFT TIMING CHAINS OVERVIEW.**
- Secure crankshaft -1- in "TDC" position using 3242.

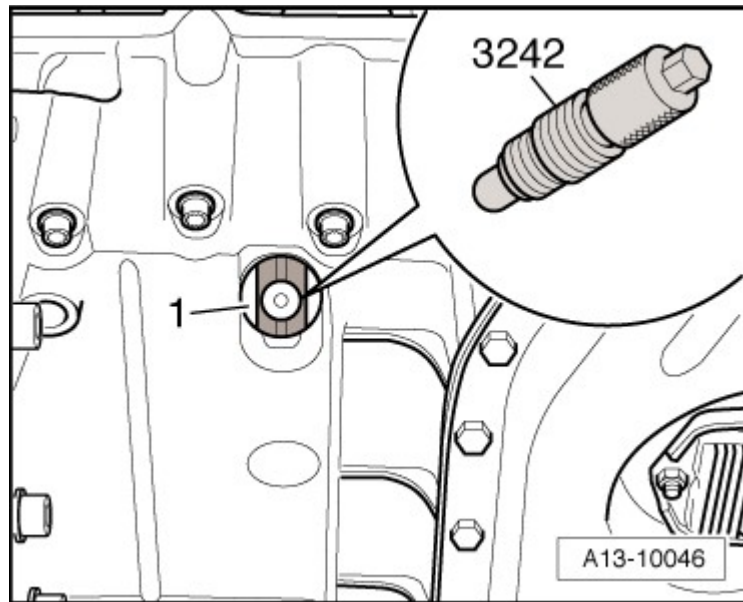


Fig. 101: Identifying Crankshaft Holder 3242 In Bore
Courtesy of AUDI OF AMERICA, LLC

- Drive chain for timing mechanism installed. Refer to **TIMING MECHANISM DRIVE CHAIN**.

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

CAUTION: Risk of damaging valves and piston crowns.

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

-- Check whether camshafts of both cylinder heads stand in "TDC" position.

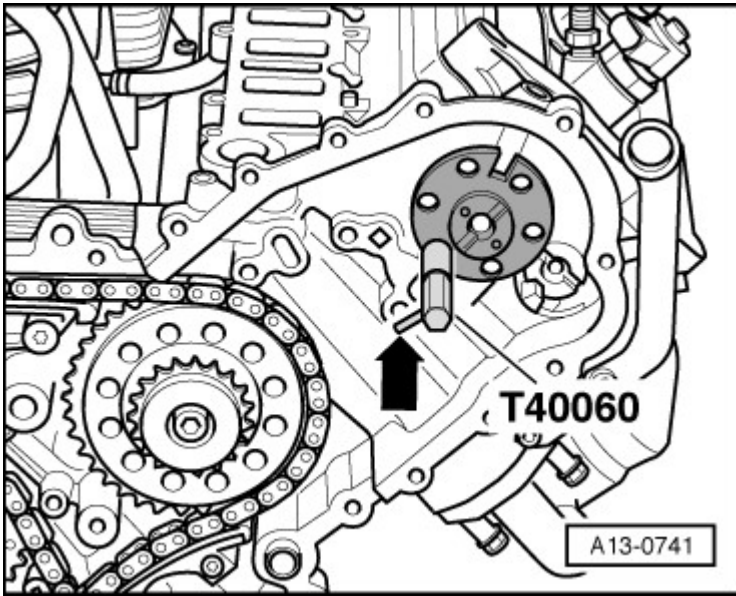


Fig. 102: Identifying Check Of Camshafts For Both Cylinder Heads In TDC Position And Adjustment Pin T40060

Courtesy of AUDI OF AMERICA, LLC

- It must be possible to secure the camshafts with the T40060.
- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft on cylinder bank 1 (right).
- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft on cylinder bank 2 (left).

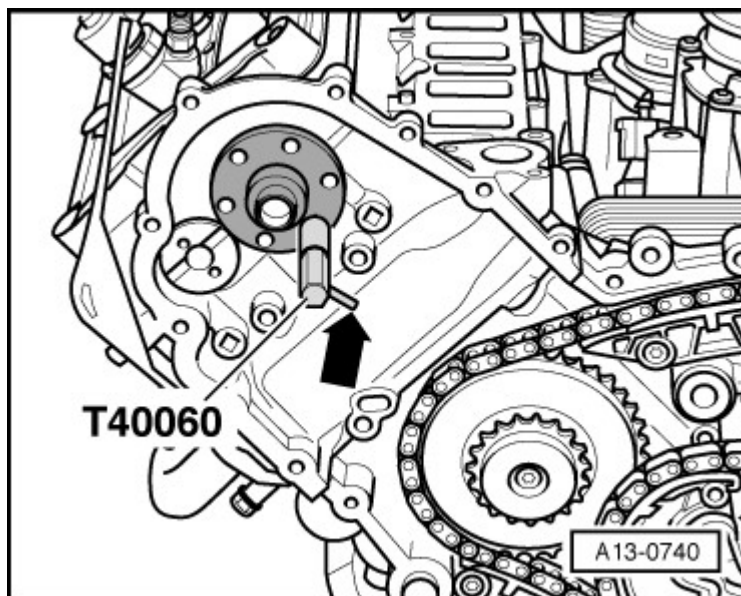


Fig. 103: Identifying Perpendicular Pin -Arrow- On Adjustment Pin T40060

Courtesy of AUDI OF AMERICA, LLC

-- Remove the T40060 from both camshafts.

CAUTION: Risk of damaging valves and piston crowns.

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

NOTE: If the camshafts are not secured, it is possible to correct them slightly with the T40061 by installing the camshaft chain sprocket on the camshaft.

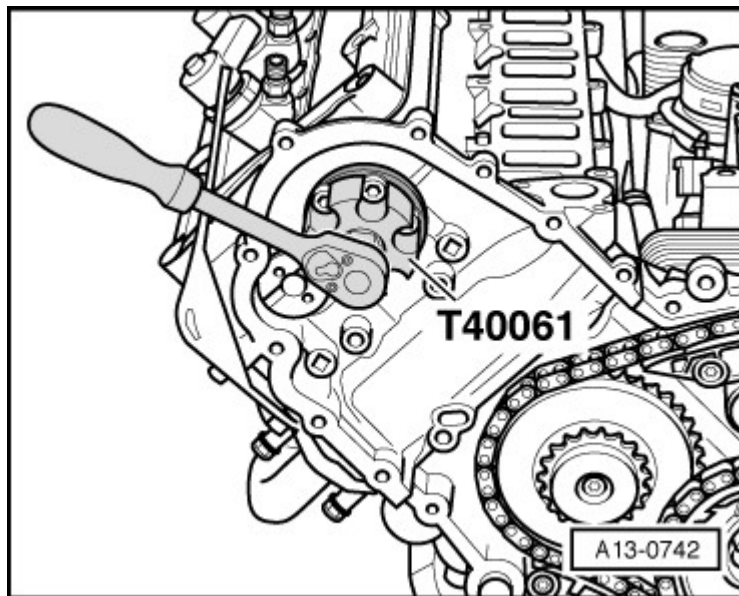


Fig. 104: Identifying Adapter T40061 And Adjustment Pin T40060
Courtesy of AUDI OF AMERICA, LLC

-- Install the left camshaft timing chain with the camshaft chain sprocket, the guide rail and the tensioning rail.

- The slots in the camshaft chain sprocket must be at the middle position in relation to the threaded holes in the camshaft.

-- Tighten the bolts -1- and -3- for the guide rail and the tensioning rail.

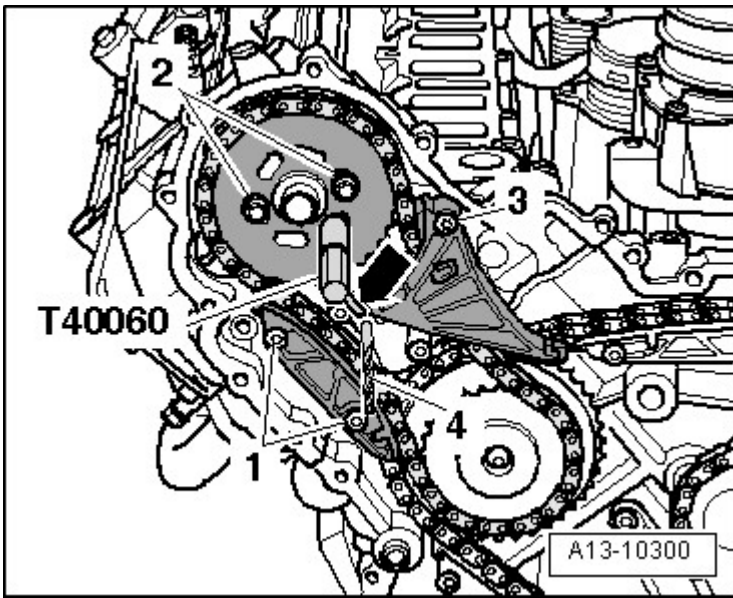


Fig. 105: Identifying Left Camshaft Timing Chain, Camshaft Chain Sprocket, Guide Rail And Tensioning Rail

Courtesy of AUDI OF AMERICA, LLC

-- Install both camshaft chain sprocket bolts -2- loosely.

- It must still be possible to rotate the camshaft chain sprocket on the camshaft and it must not tip.

-- Secure the left camshaft with the T40060.

- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft.

-- Pull the drill -4- out of the alignment hole, thereby releasing the chain tensioner.

-- Install the right camshaft timing chain with the chain sprocket and chain tensioner.

- The slots in the camshaft chain sprocket must be at the middle position in relation to the threaded holes in the camshaft.

-- Tighten the chain tensioner bolts -1-.

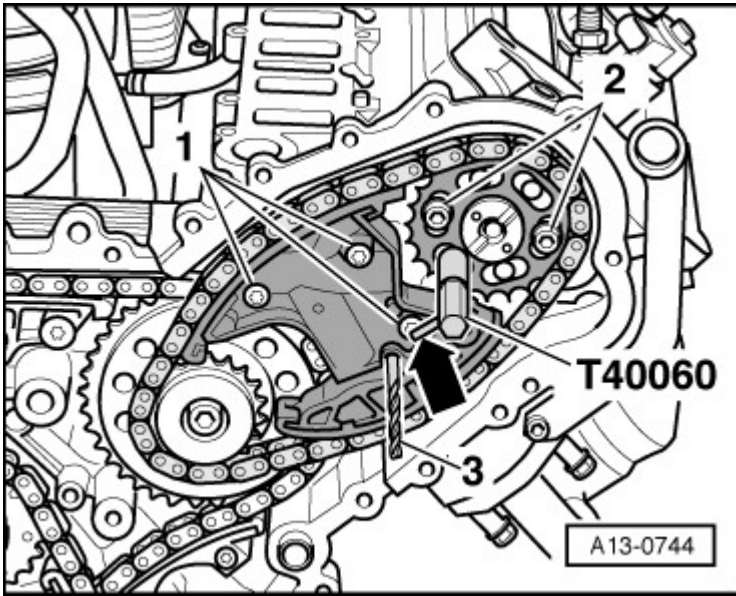


Fig. 106: Identifying Drill Bit -4- And Alignment Hole
 Courtesy of AUDI OF AMERICA, LLC

-- Install both camshaft chain sprocket bolts -2- loosely.

- It must still be possible to rotate the camshaft chain sprocket on the camshaft and it must not tip.

-- Secure the right camshaft with the T40060.

- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft.

-- Pull the drill bit -3- out of the alignment hole, thereby releasing the right chain tensioner.

-- Pre-tighten the right camshaft chain sprocket using the T40062 and torque wrench to 20 Nm in direction of -arrow- and hold.

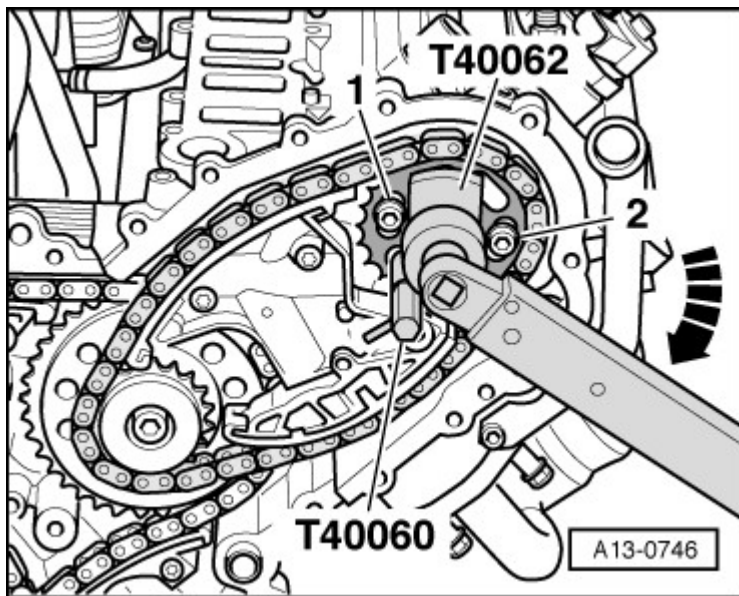


Fig. 107: Identifying Bolts -1 And 2-, Torque Wrench, Adapter T40062 And Adjustment Pin T40060
 Courtesy of AUDI OF AMERICA, LLC

- Fasten bolts -1- and -2-.
- Remove the adapter T40062 and T40060.
- Tighten the remaining bolts for the right camshaft chain sprocket.
- Pre-tighten the left camshaft chain sprocket using the T40062 and torque wrench to 15 Nm in direction of - arrow- and hold.

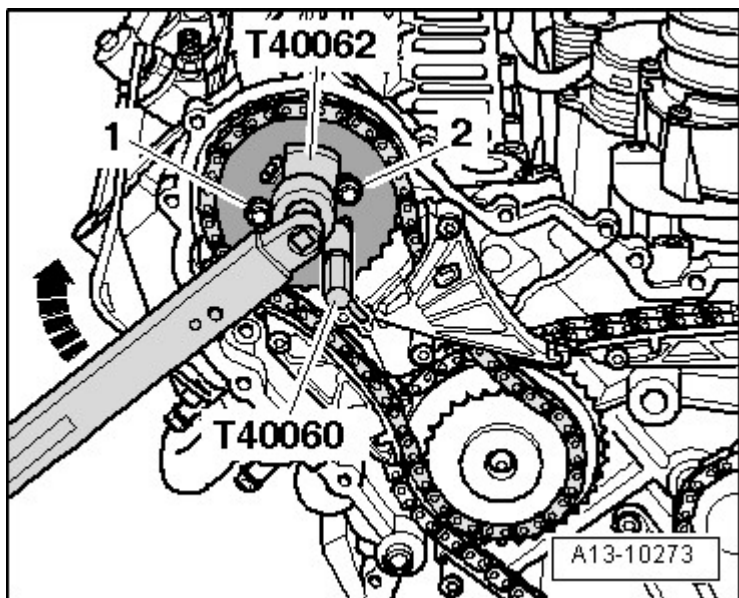


Fig. 108: Identifying Adapter T40062 On Left Camshaft Chain Sprocket
 Courtesy of AUDI OF AMERICA, LLC

- Fasten bolts -1- and -2-.
- Remove the T40062 and T40060.
- Tighten the remaining bolts for the left camshaft chain sprocket.
- Remove the 3242.

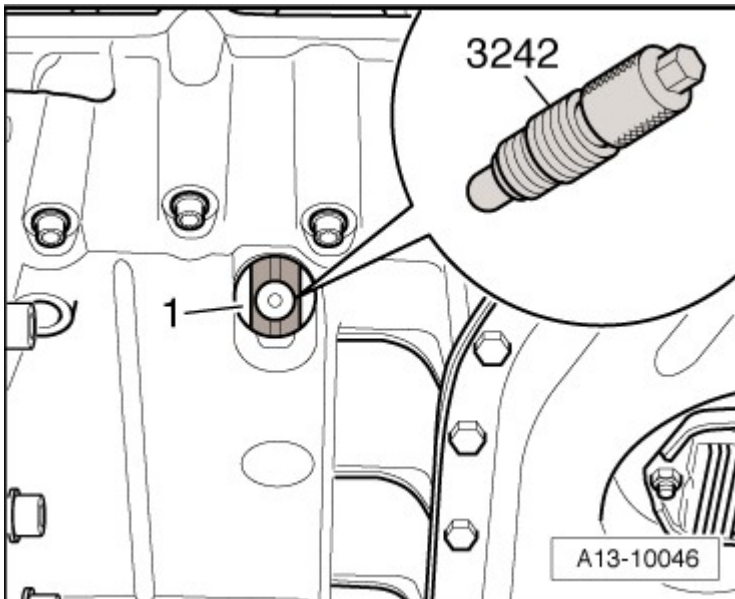


Fig. 109: Identifying Crankshaft Holder 3242 In Bore
Courtesy of AUDI OF AMERICA, LLC

CHECKING THE VALVE TIMING

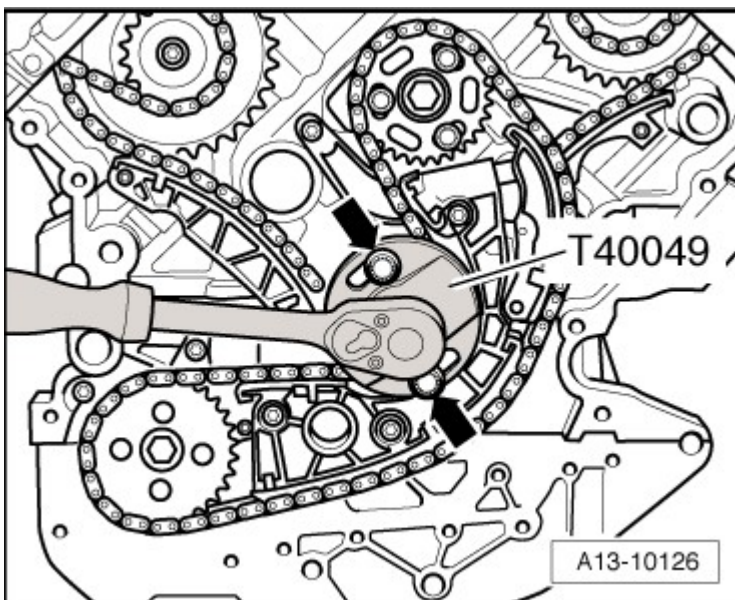


Fig. 110: Identifying Key T40049 At Rear On Crankshaft And 2 Old Bolts For Dual-Mass Flywheel

Courtesy of AUDI OF AMERICA, LLC

CAUTION: Components could be destroyed by the camshaft timing chain jumping off.

- Turn crankshaft only in direction of engine rotation -arrow-.

-- Turn the crankshaft 2 turns using the T40049 until it is just in front of "TDC".

-- Lock the crankshaft -1- from turning using the 3242 to 20 Nm.

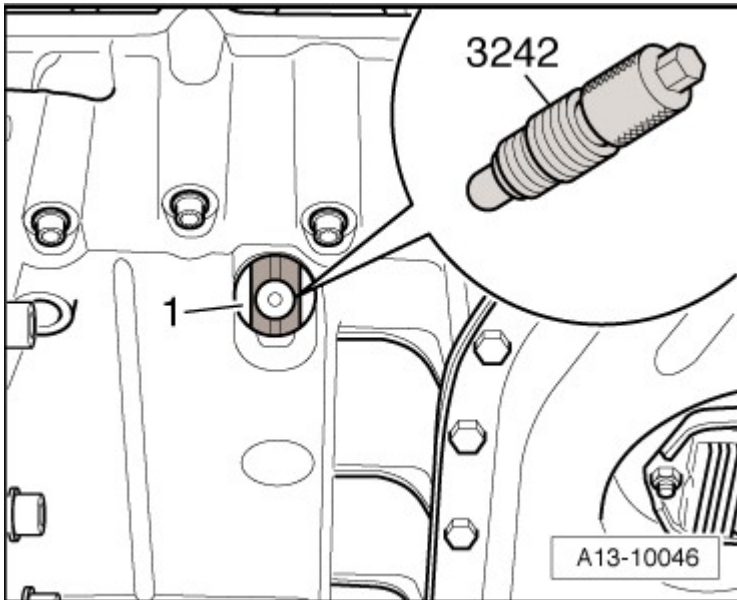


Fig. 111: Identifying Crankshaft Holder 3242 In Bore
Courtesy of AUDI OF AMERICA, LLC

CAUTION: An inaccurate "TDC" setting will cause an inaccurate setting.

- If the crankshaft was turned past "TDC" : Turn the crankshaft again 2 turns until it is just in front of "TDC", then lock it from moving with the 3242.

-- Check whether camshafts of both cylinder heads stand in "TDC" position.

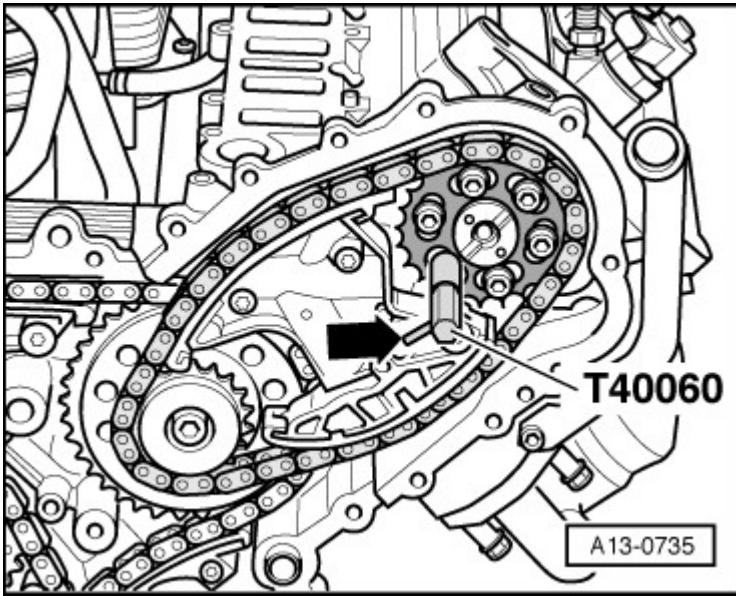


Fig. 112: Identifying TDC Position Of Camshafts

Courtesy of AUDI OF AMERICA, LLC

- It must be possible to secure the camshafts with the T40060.
- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft on cylinder bank 1 (right).
- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft on cylinder bank 2 (left).

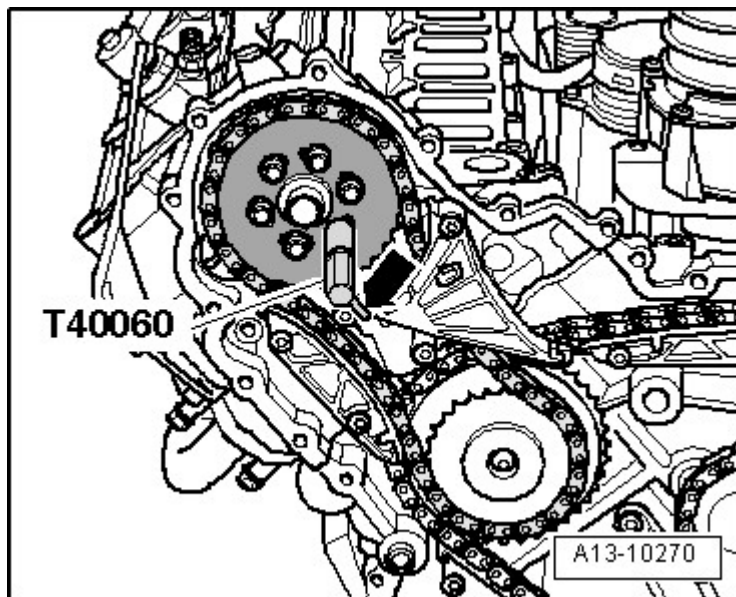


Fig. 113: Identifying Perpendicular Pin -Arrow- On Adjustment Pin T40060

Courtesy of AUDI OF AMERICA, LLC

CORRECTING THE VALVE TIMING

-- If one of the camshafts does not lock, loosen all the bolts -arrows- for that particular camshaft chain sprocket about 1 turn.

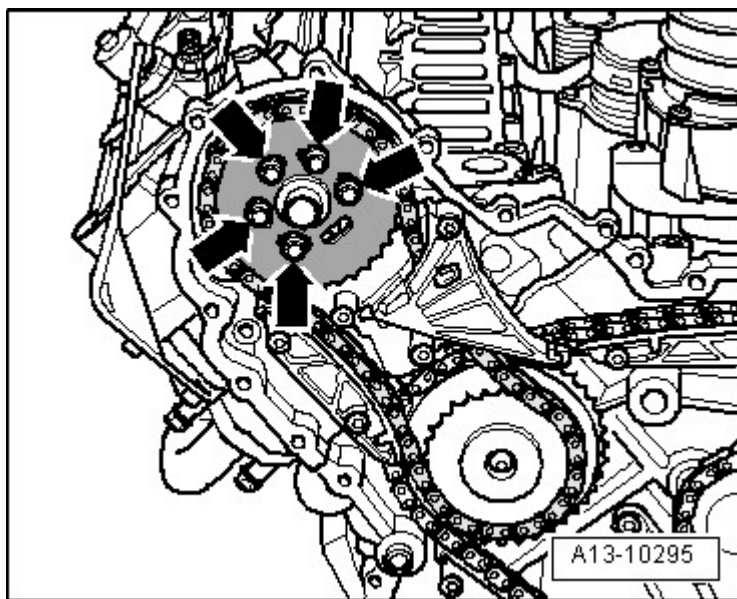


Fig. 114: Identifying Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Mount the T40061 over the bolt heads.

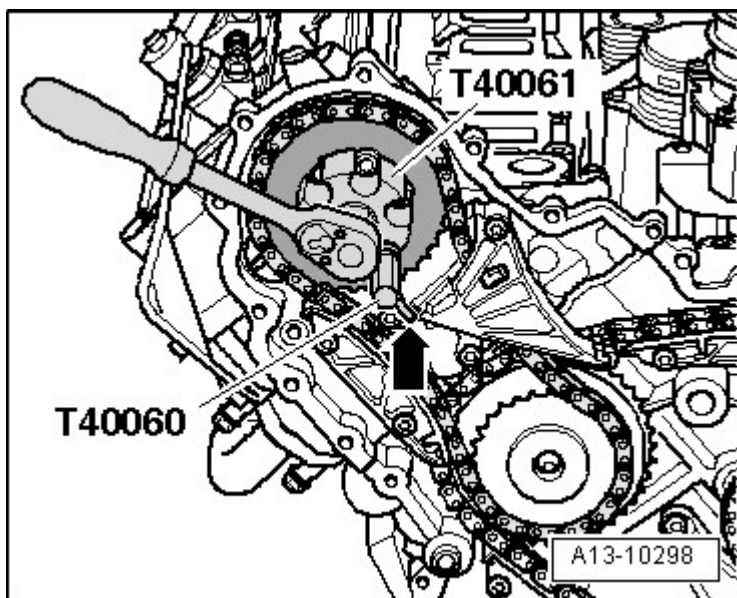


Fig. 115: Identifying Adapter T40061 And Adjustment Pin T40060
Courtesy of AUDI OF AMERICA, LLC

-- Turn the camshaft by the T40061 just a little back and forth until it is possible to insert the T40060.

- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft.

-- Tighten the bolts for the camshaft chain sprocket with the T40061 and the T40060 still attached to approximately 5 Nm.

-- Remove the T40060 and T40061.

-- Tighten the camshaft chain sprocket bolts to final torque.

-- Repeat the procedure on the other cylinder bank if necessary.

-- Remove the 3242.

-- Check the valve timing once again **CHECKING THE VALVE TIMING**.

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

-- Tighten the bolt for the "TDC" marking in the upper section of the oil pan. Refer to **UPPER OIL PAN OVERVIEW** .

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

-- Fill engine oil and check oil level. Refer to Maintenance Procedures .

TIMING MECHANISM DRIVE CHAIN

Special tools and workshop equipment required

- Locking Pin T40071
- 3.3 mm diameter drill bit

Removing

- Transmission removed.

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

-- Remove the power take-off drive chain. Refer to **POWER TAKE-OFF DRIVE CHAIN**.

-- Press the drive chain tensioner rail in the direction of the -arrow- and secure the chain tensioner with a T40071.

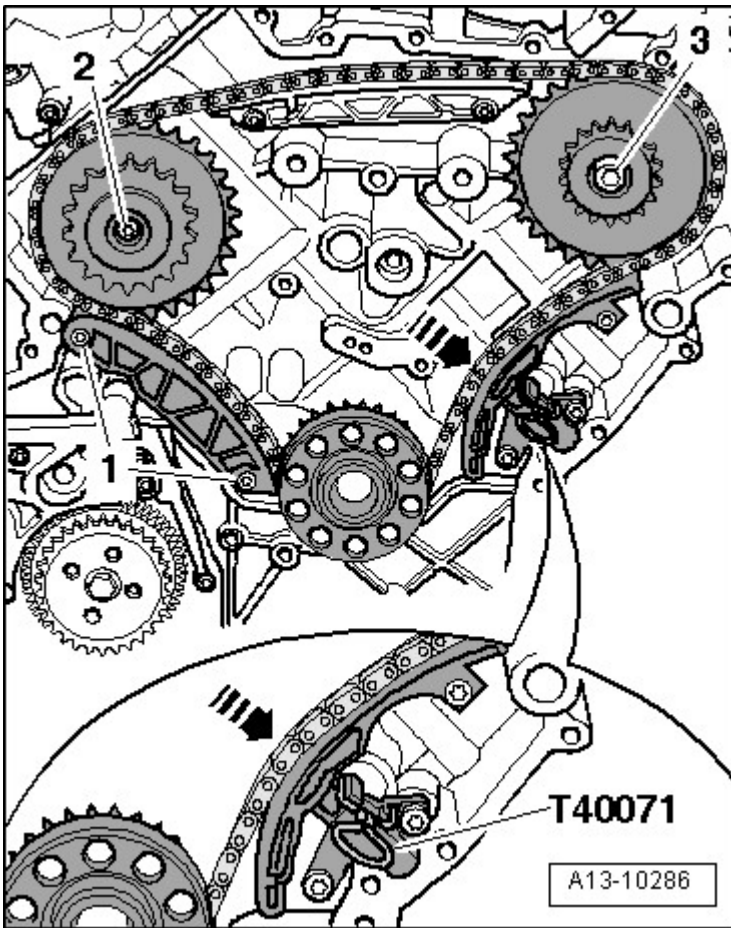


Fig. 116: Pressing And Securing Drive Chain Tensioner Rail Using Locking Pin T40071
 Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of destroying due to reversed running direction on a used drive chain.

- Mark drive chain running direction with arrows using paint for reinstallation.

-- Remove the bolts -1- and the guide rail.

-- Remove the bolts -2- and -3- and remove the chain sprockets and drive chain.

Installing

Install in reverse order of removal. Note the following:

- For the correct tightening specifications, refer to **TIMING MECHANISM DRIVE CHAIN OVERVIEW**.

-- Install the power take-off drive chain, refer to **POWER TAKE-OFF DRIVE CHAIN**.

-- Install the camshaft timing chains, refer to **CAMSHAFT TIMING CHAINS**.

-- Fill engine oil and check oil level. Refer to Maintenance Procedures .

POWER TAKE-OFF DRIVE CHAIN

Special tools and workshop equipment required

- Crankshaft Holder 3242
- Diesel Injection Pump Locking Pin 3359
- Key T40049
- 3.3 mm diameter drill bit

Removing

- Transmission removed.

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

-- Attach the T40049 to the back of the crankshaft using two old drive plate bolts -arrows-.

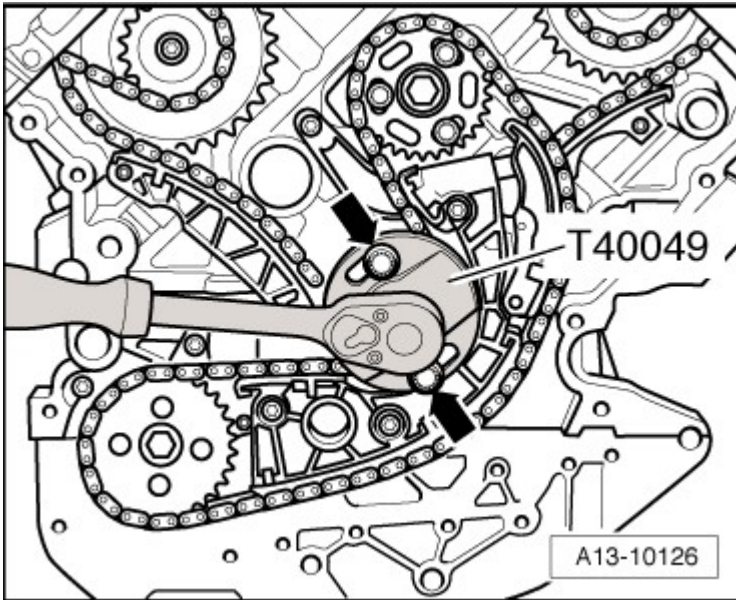


Fig. 117: Identifying Key T40049 At Rear On Crankshaft And 2 Old Bolts For Dual-Mass Flywheel
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -arrow- for the "TDC" marking from the upper section of the oil pan by using a long hex socket wrench with a ball head.

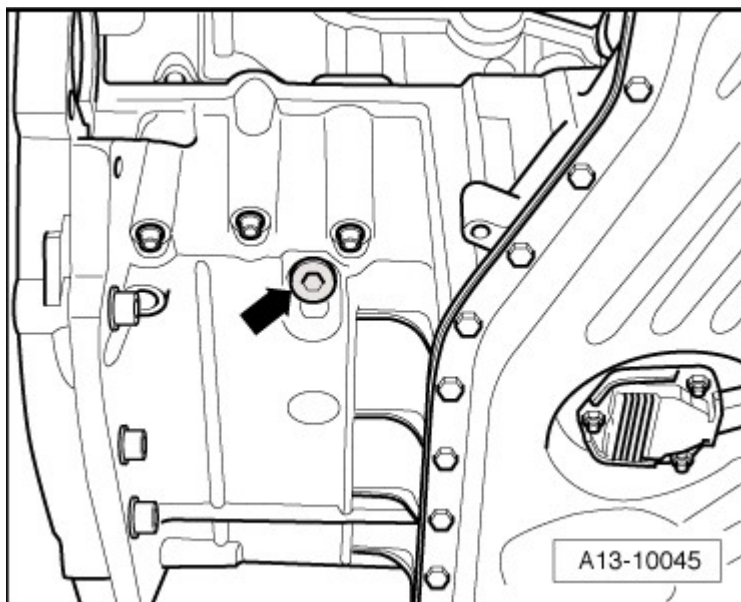


Fig. 118: Identifying Locking Bolt Of Upper Part Of Oil Pan
 Courtesy of AUDI OF AMERICA, LLC

-- Install the 3242 in the hole and tighten to 20 Nm. Turn the crankshaft -1- back and slightly to completely center the bolt, if necessary.

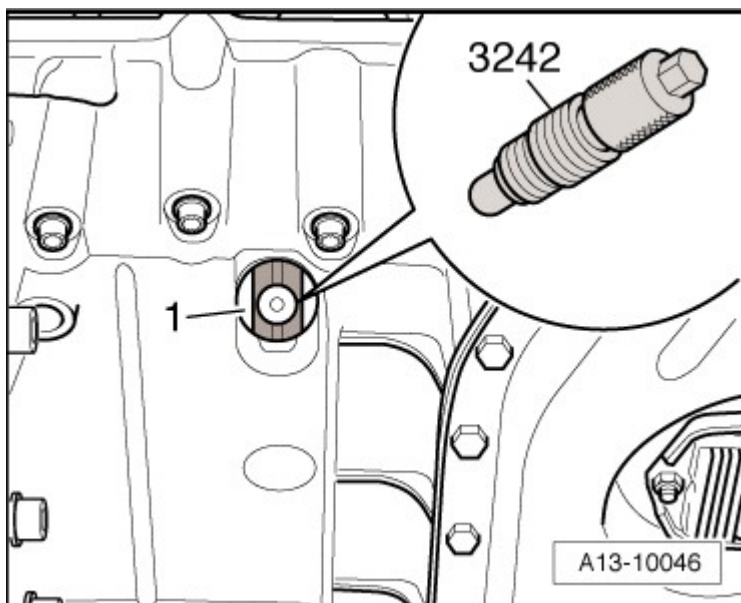


Fig. 119: Identifying Crankshaft Holder 3242 In Bore
 Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of destroying due to reversed running direction on a used drive chain.

- Paint arrows to mark the power take-off drive chain running direction

so it can be installed again.

-- Lock the rear balance shaft on the engine using the 3359 and loosen the bolts -arrows- for balance shaft chain sprocket.

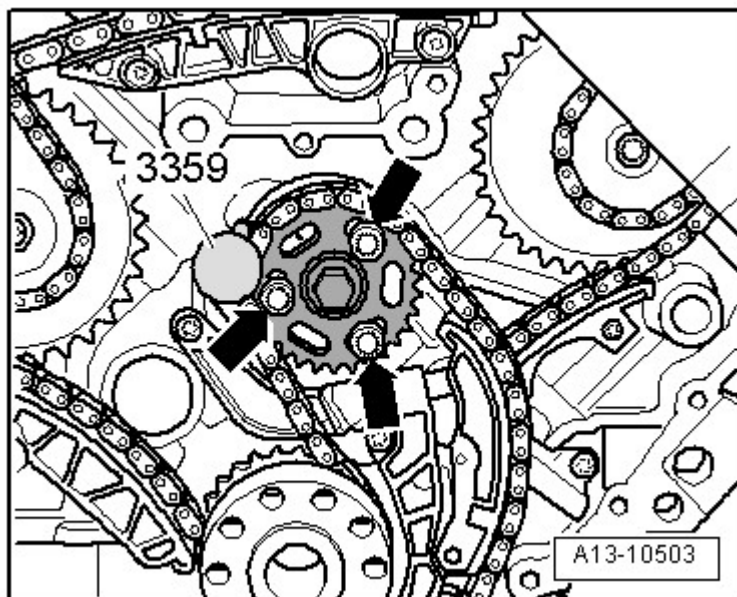


Fig. 120: Identifying Chain Sprocket Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- To protect against cuts, wrap the point and the cutting edges on a 3.3 mm drill bit with insulating tape.

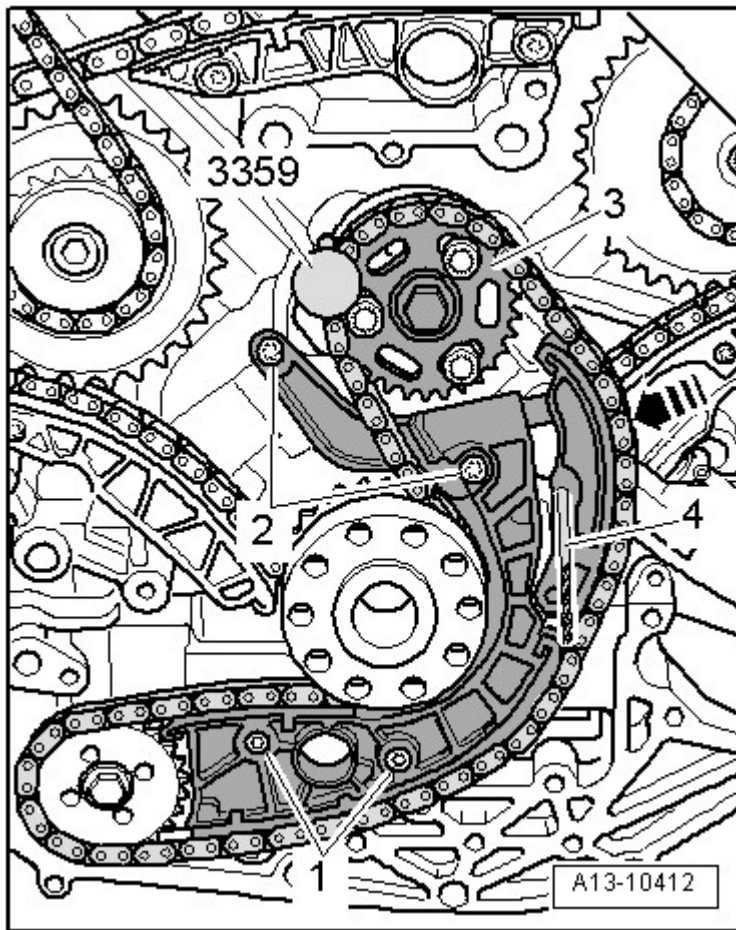


Fig. 121: Identifying Chain Tensioner, Drive Chain, And Balance Shaft -3- Chain Sprocket
 Courtesy of AUDI OF AMERICA, LLC

-- Push the slide rail for the chain tensioner in direction of -arrow- and then lock the chain tensioner using a 3.3 mm drill bit -4-.

-- Remove the bolts -1- and -2- and remove the chain tensioner, chain sprocket -3- for the balance shaft and the chain.

Installing

- For the correct tightening specifications, refer to **POWER TAKE-OFF DRIVE CHAIN OVERVIEW**.
- Secure crankshaft -1- in "TDC" position using 3242.

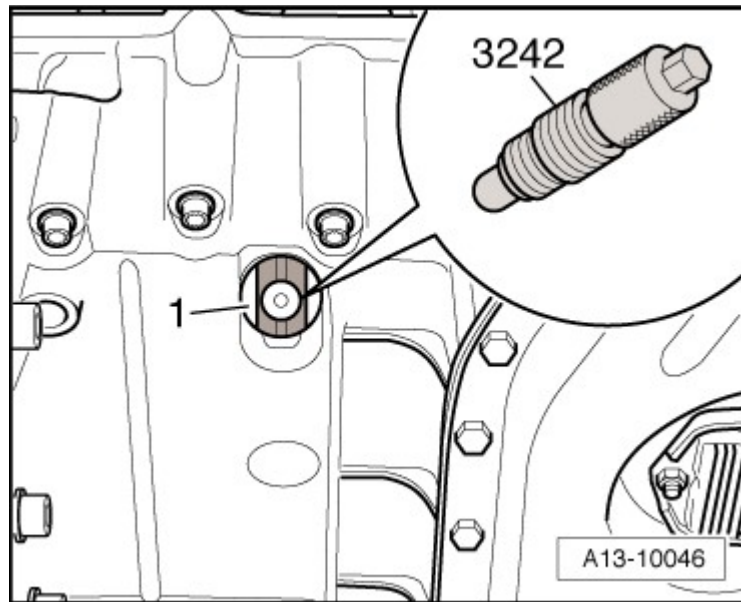


Fig. 122: Identifying Crankshaft Holder 3242 In Bore
 Courtesy of AUDI OF AMERICA, LLC

-- Lock the rear balance shaft -arrow- to the engine with the 3359.

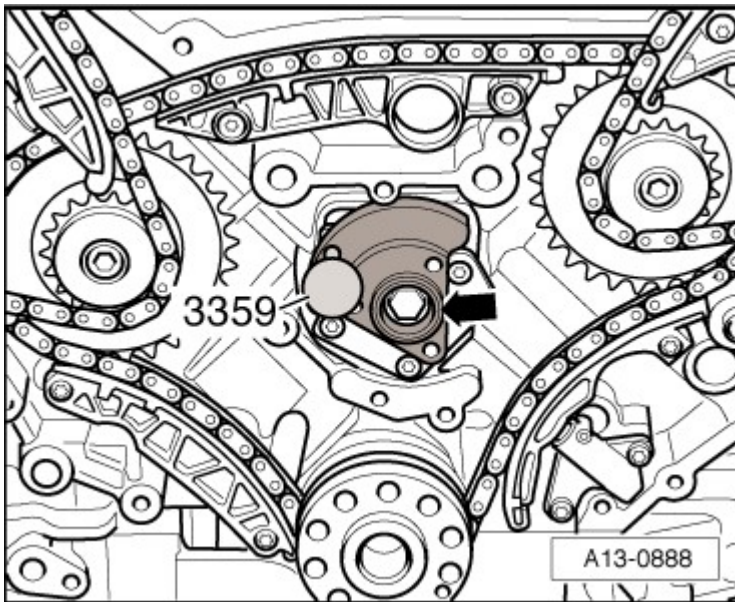


Fig. 123: Identifying Rear Balance Shaft -Arrow- And Diesel Injection Pump Locking Pin 3359
 Courtesy of AUDI OF AMERICA, LLC

-- Install the chain tensioner with the chain and the drive chain and the balance shaft chain sprocket.

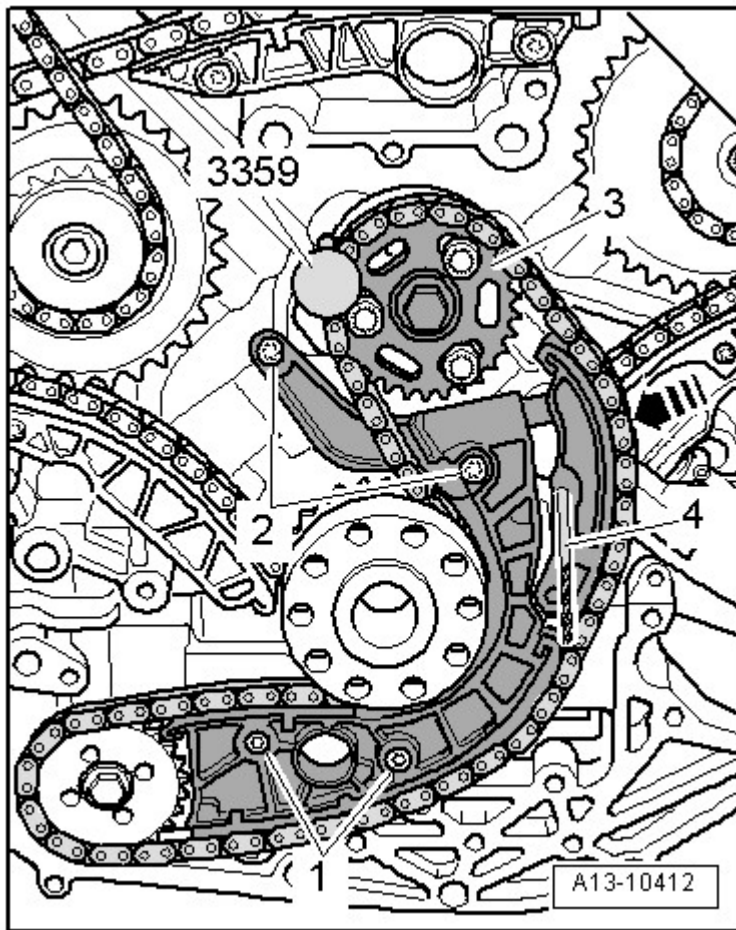


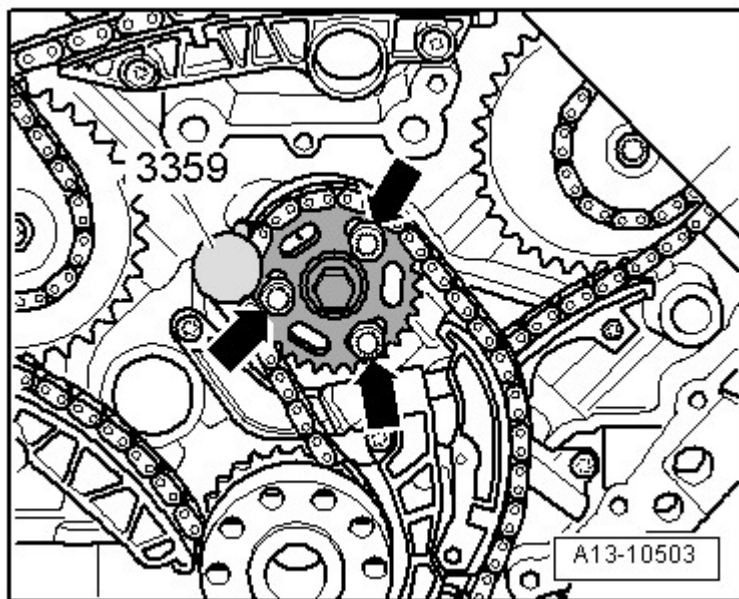
Fig. 124: Identifying Chain Tensioner, Drive Chain, And Balance Shaft -3- Chain Sprocket
 Courtesy of AUDI OF AMERICA, LLC

- The slots in the chain sprocket -3- must be in the center position to the threaded holes in the balance shaft.

-- Tighten the chain tensioner bolts -1- and -2-.

NOTE: Ignore -4- and -arrow-.

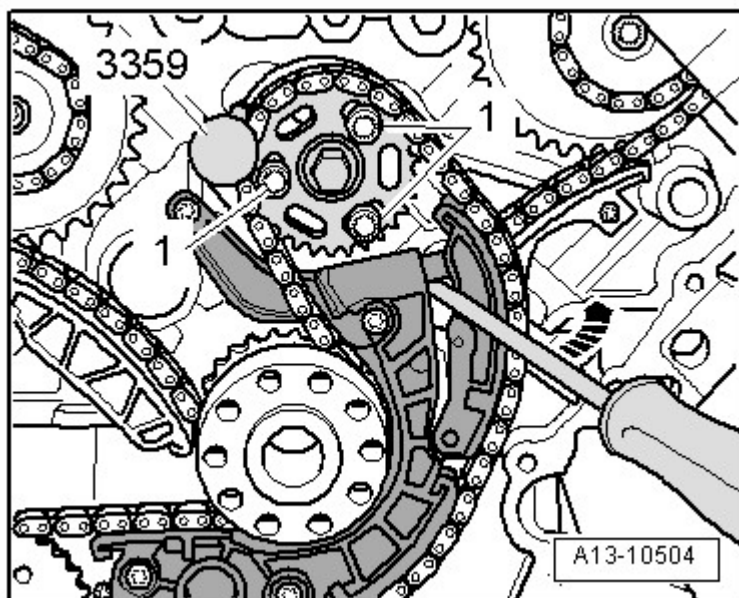
-- Install the chain sprocket bolts -arrows- loosely.



**Fig. 125: Identifying Chain Sprocket Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC**

- It must still be possible to rotate the chain sprocket on the balance shaft and it must not tip.

-- Remove the drill from the alignment hole.



**Fig. 126: Pushing Screwdriver In -Direction Of Arrow-
Courtesy of AUDI OF AMERICA, LLC**

-- Push a screwdriver in direction of -arrow- against the chain tensioner guide rail while tightening the chain sprocket bolts -1-.

-- Remove the 3359.

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

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

-- Fill engine oil and check oil level. Refer to Maintenance Procedures .

BALANCE SHAFT

Special tools and workshop equipment required

- Diesel Injection Pump Locking Pin 3359

Removing

- Transmission removed.

-- Remove the belt pulley side sealing flange. Refer to **SEALING FLANGE, BELT PULLEY SIDE** .

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

-- Remove the power take-off drive chain. Refer to **POWER TAKE-OFF DRIVE CHAIN**.

-- Lock the front balance shaft to the engine with the 3359.

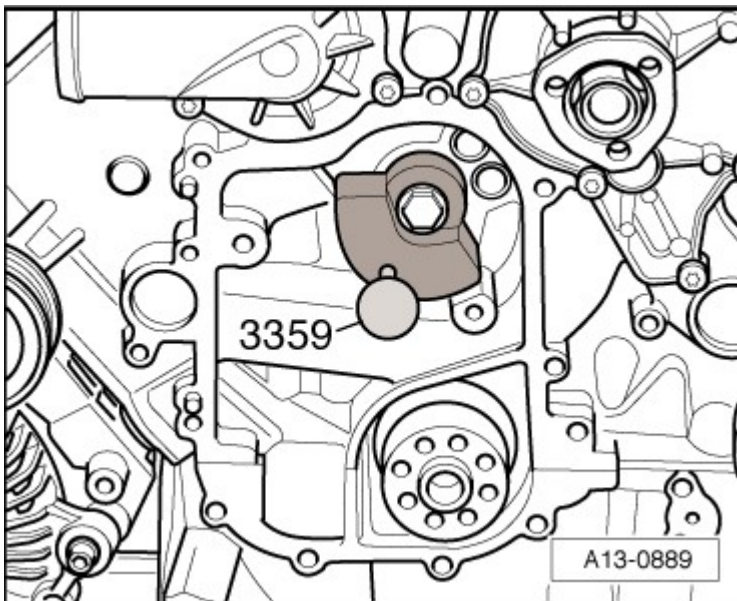


Fig. 127: Securing Balance Shaft Using Diesel Injection Pump Locking Pin 3359
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt and remove the balance weight from the balance shaft.

-- Remove the bolts -arrows- at the back of the motor and remove the chain sprocket from the balance weight.

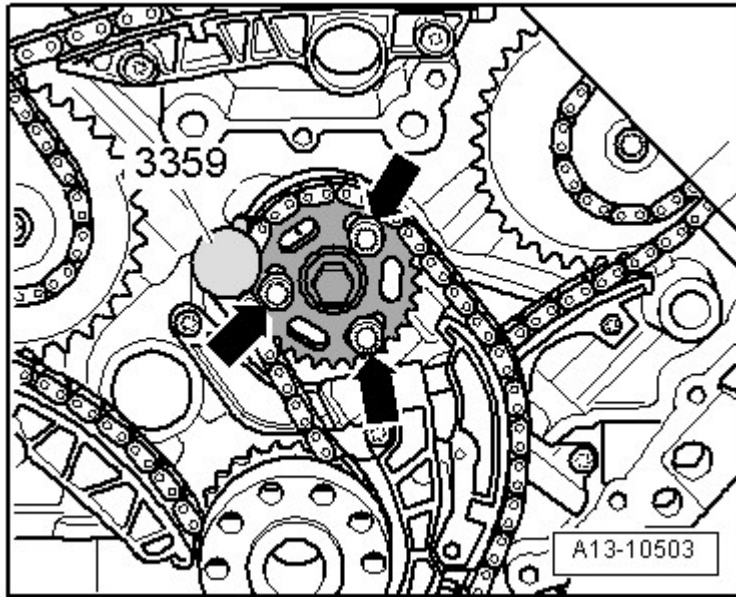


Fig. 128: Identifying Chain Sprocket Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -arrow- at the back of the engine and remove the balance weight from the balance shaft.

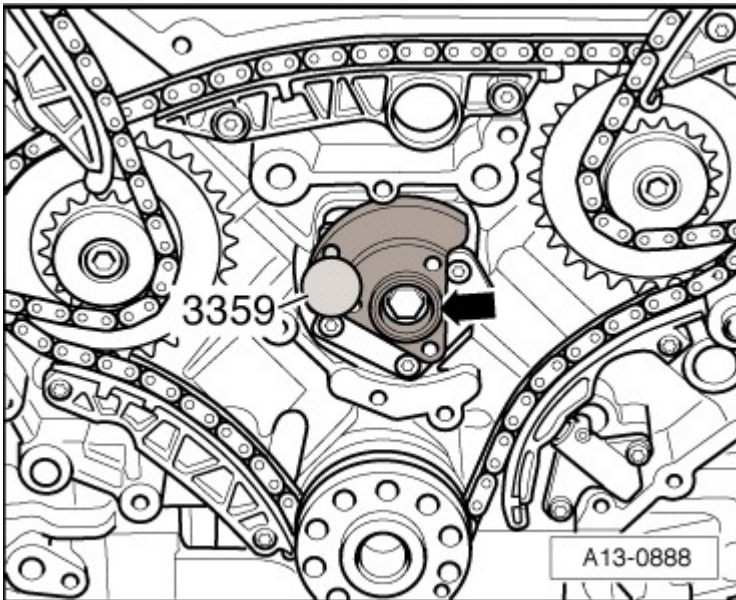


Fig. 129: Identifying Rear Balance Shaft -Arrow- And Diesel Injection Pump Locking Pin 3359
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and remove the balance shaft bearing end bracket.

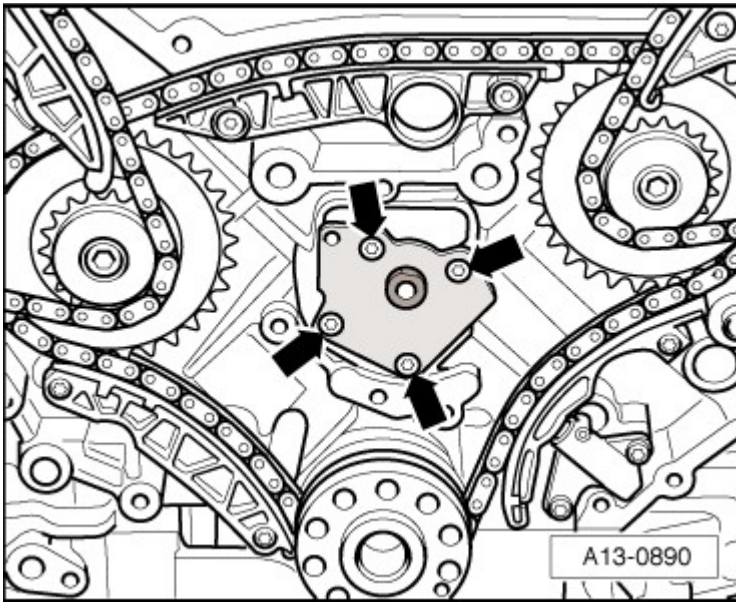


Fig. 130: Identifying Bolts -Arrows- And Balance Shaft Bearing End Bracket
Courtesy of AUDI OF AMERICA, LLC

-- Remove the balance shaft from the cylinder block.

Installing

Install in reverse order of removal. Note the following:

- For the correct tightening specifications, refer to **BALANCE SHAFT OVERVIEW**.
- Secure crankshaft -1- in "TDC" position using 3242.

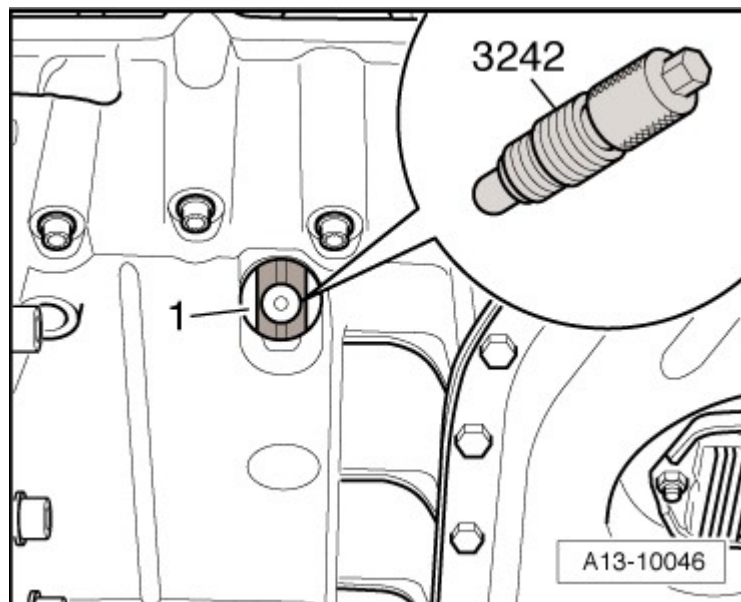


Fig. 131: Identifying Crankshaft Holder 3242 In Bore

Courtesy of AUDI OF AMERICA, LLC

- Install the power take-off drive chain. Refer to **POWER TAKE-OFF DRIVE CHAIN**.
- Install timing chain lower cover. Refer to **LOWER TIMING CHAIN COVER**.
- Install the belt pulley side sealing flange. Refer to **SEALING FLANGE, BELT PULLEY SIDE** .
- Fill engine oil and check oil level. Refer to Maintenance Procedures .

LEFT CYLINDER HEAD COVER

Special tools and workshop equipment required

- Pry Lever - Rmv Outside Mirror 80-200

Removing

- Carefully pull the engine cover -arrows- off the 4 bolts one after the other.

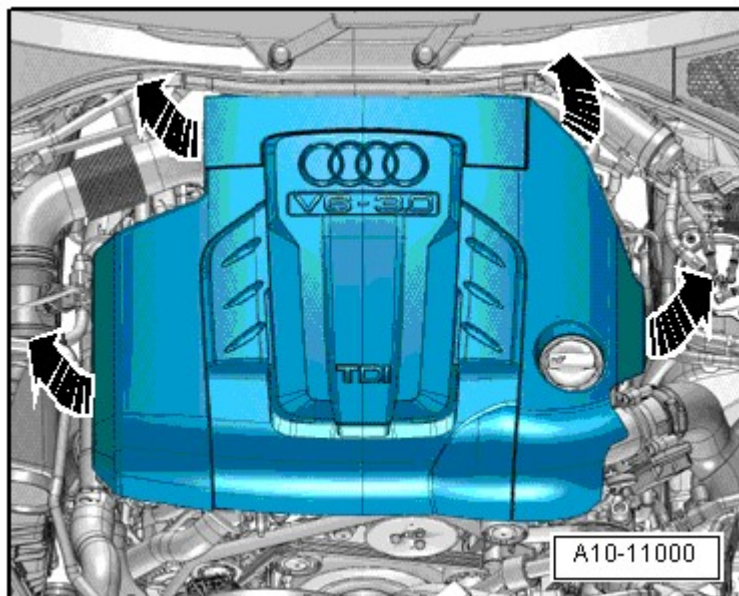


Fig. 132: Identifying Engine Cover -Arrows-
Courtesy of AUDI OF AMERICA, LLC

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

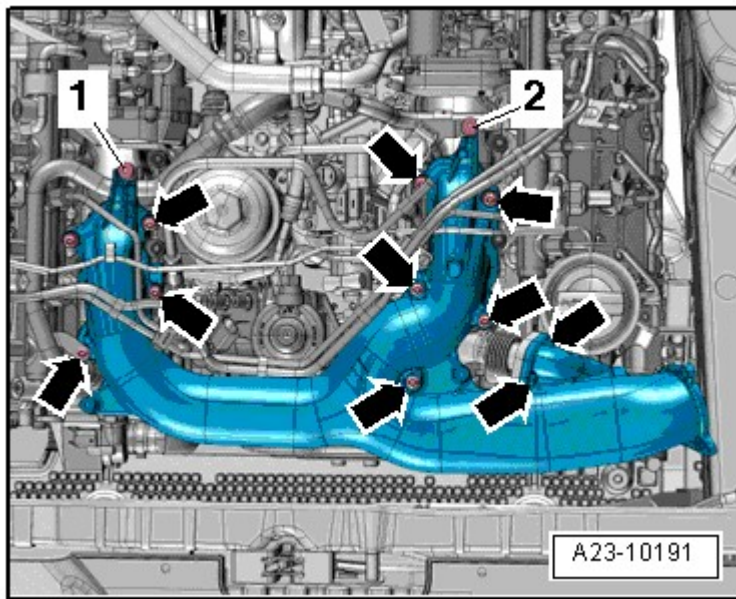


Fig. 133: Identifying Bolts -Arrows-
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the oil filler tube by lifting the strap -1- and turning the tuber counter-clockwise -arrow-.

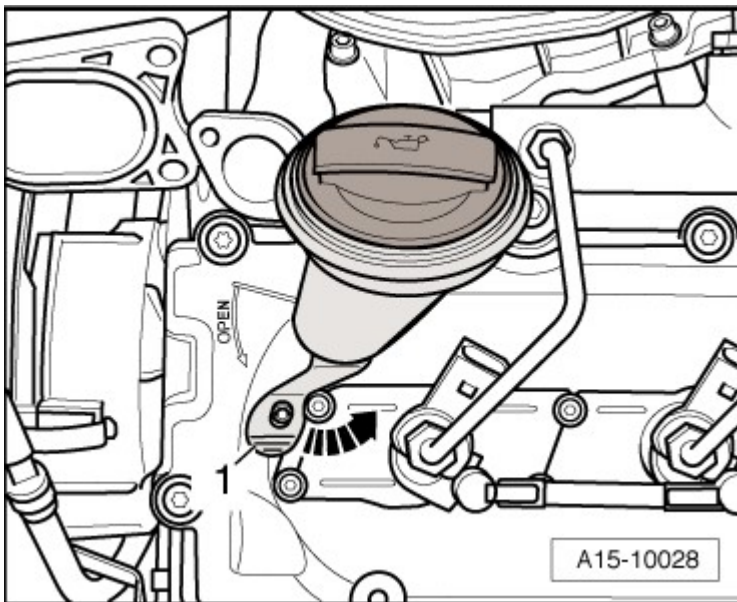


Fig. 134: Identifying Tab -1- And Position To Turn Oil Filler Tube (Counterclockwise -Arrow-)
 Courtesy of AUDI OF AMERICA, LLC

-- Remove electrical connectors from bracket and disconnect.

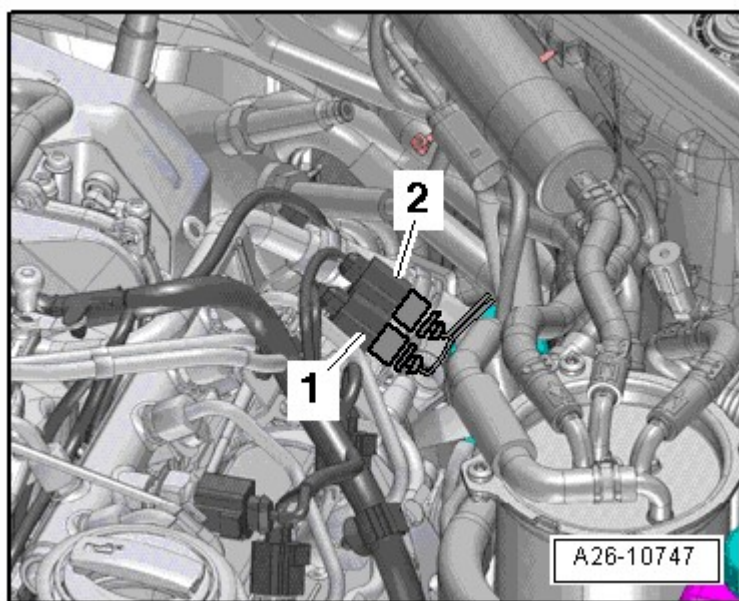


Fig. 135: Identifying Electrical Connectors

Courtesy of AUDI OF AMERICA, LLC

1. For catalyst temperature sensor 1 -G20- (orange) - only engines meeting emissions standard BIN 5
2. For exhaust gas temperature 3 -G495- (brown)

-- Disconnect the glow plug connector for cylinders "4" and "5".

-- Disconnect the electrical connectors -1 through 4-.

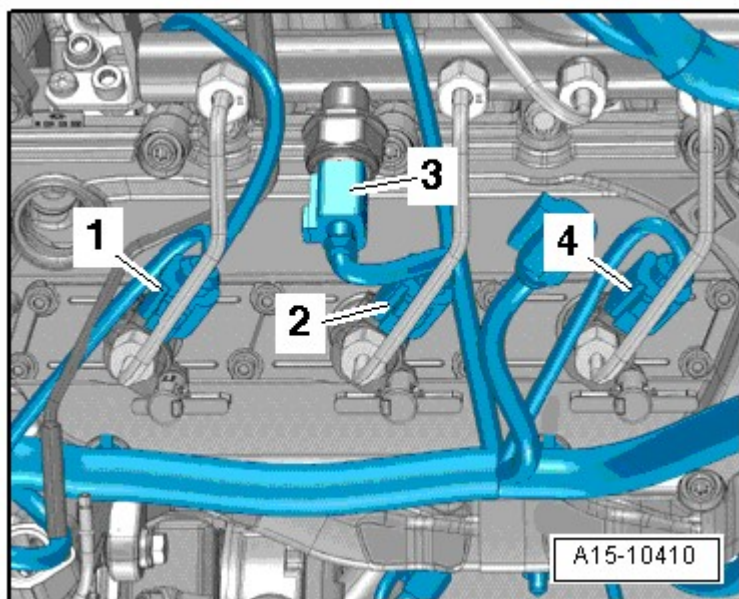


Fig. 136: Identifying Electrical Connectors -1 Through 4-

Courtesy of AUDI OF AMERICA, LLC

-- Free up the wiring harness using the 80 - 200.

Vehicles Built through 05.10:

-- Free up the wiring on the cylinder head.

-- Remove the bolts -arrows- and move the brackets -1- and -2- and wiring harness with the wiring harness to the side.

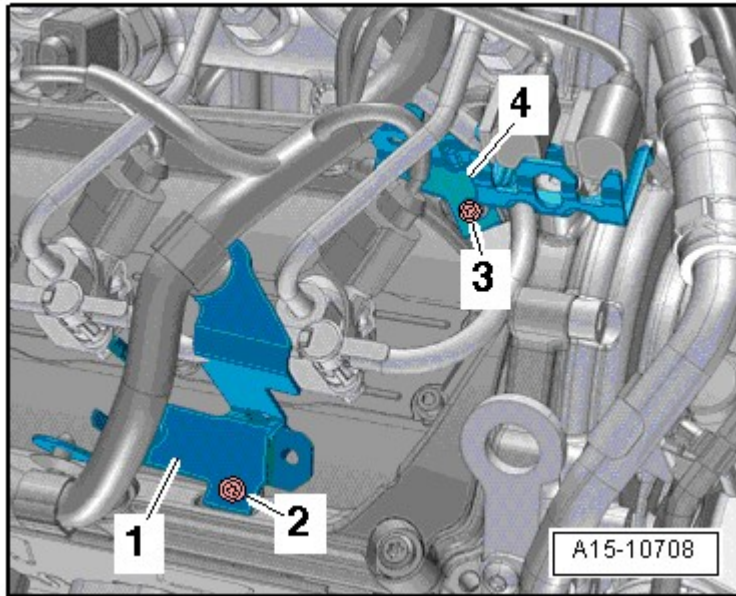


Fig. 137: Identifying Bolts -Arrows- And Brackets -1- And -2-
Courtesy of AUDI OF AMERICA, LLC

Vehicles built from 06.10:

-- Free up the electric wires on the cylinder head.

-- Remove the bolts -arrows- and move the brackets -1- and -2- and wiring harness to the side.

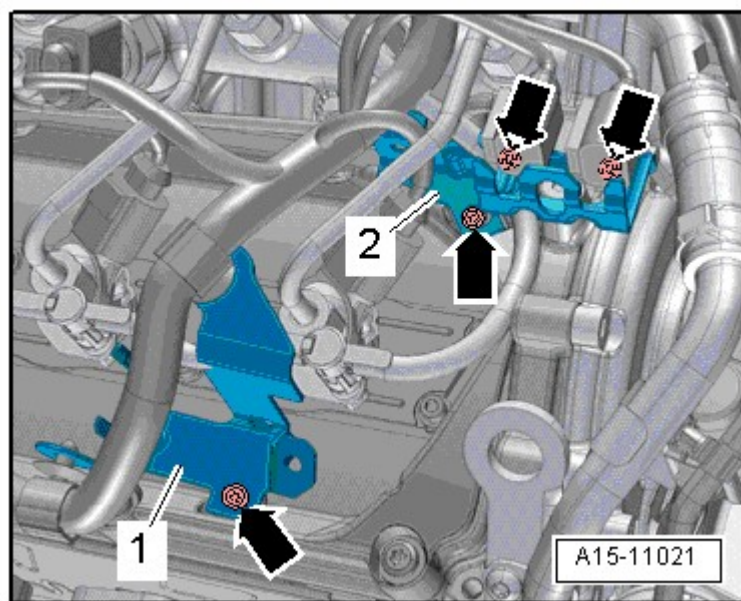


Fig. 138: Identifying Bolts -Arrows-, Brackets -1- And -2-, And Wiring Harness
 Courtesy of AUDI OF AMERICA, LLC

All vehicles:

-- Mark the injector high pressure line for re-installing.

-- Remove the high pressure lines by loosening the union nuts -1 through 6-. Refer to **Description and Operation** .

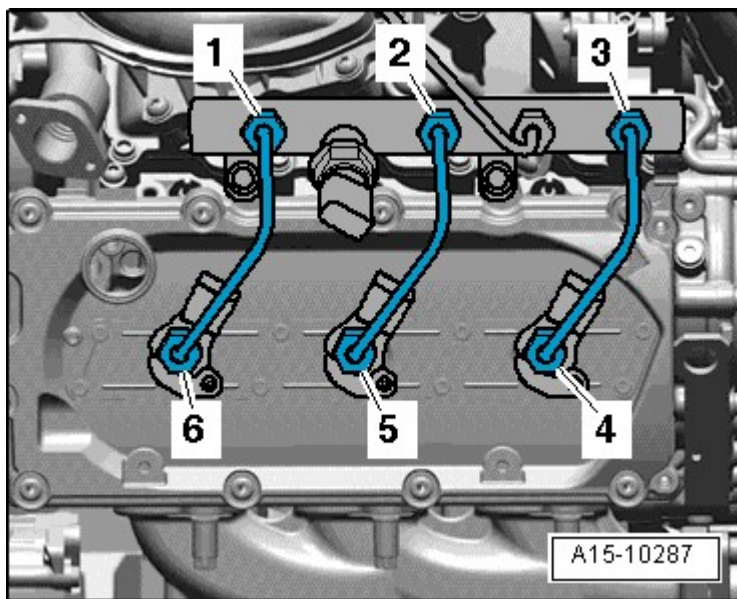


Fig. 139: Identifying High Pressure Line Union Nuts -1 Through 6-
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the injectors. Refer to **Description and Operation** .

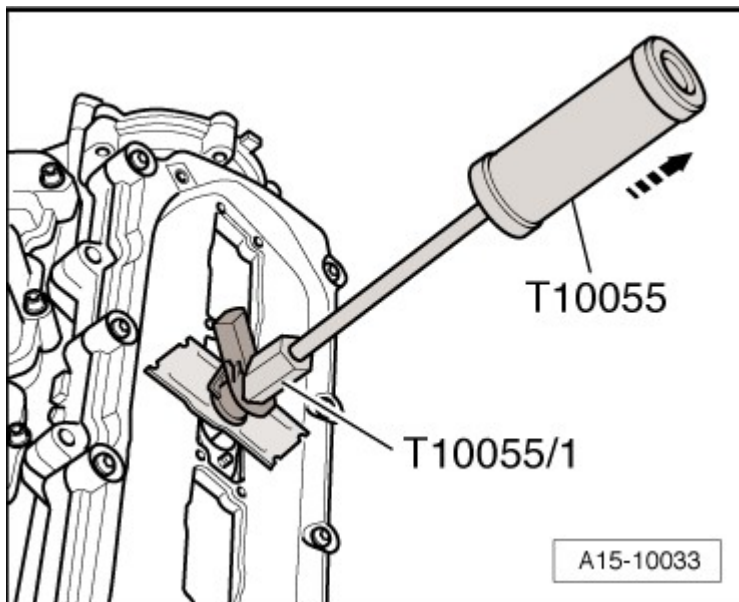


Fig. 140: Identifying Puller T10055 With Adapter T10055/1
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the cylinder head cover bolts -arrows- in a diagonal sequence.

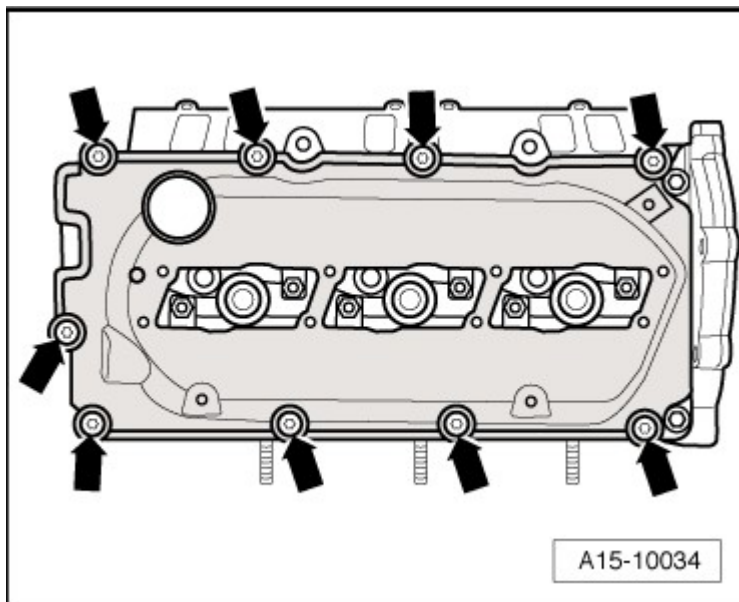


Fig. 141: Identifying Cylinder Head Cover, Tightening Specifications and Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts and the cylinder head cover.

Installing

Install in reverse order of removal. Note the following:

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

NOTE: **Replace O-ring.**

Replace the cylinder head seal if it is damaged.

Replace the cylinder head cover bolts when replacing the damaged seal.

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

-- Tighten cylinder head cover bolts. Refer to **Fig. 2**.

-- Install the injectors, high pressure lines and upper section of the intake manifold. Refer to **Removal and Installation** .

-- Fuel system, performing leak test. Refer to **FUEL SYSTEM, CHECKING FOR LEAKS** .

RIGHT CYLINDER HEAD COVER

Special tools and workshop equipment required

- Pry Lever - Rmv Outside Mirror 80-200

Removing

-- Carefully pull the engine cover -arrows- off the 4 bolts one after the other.

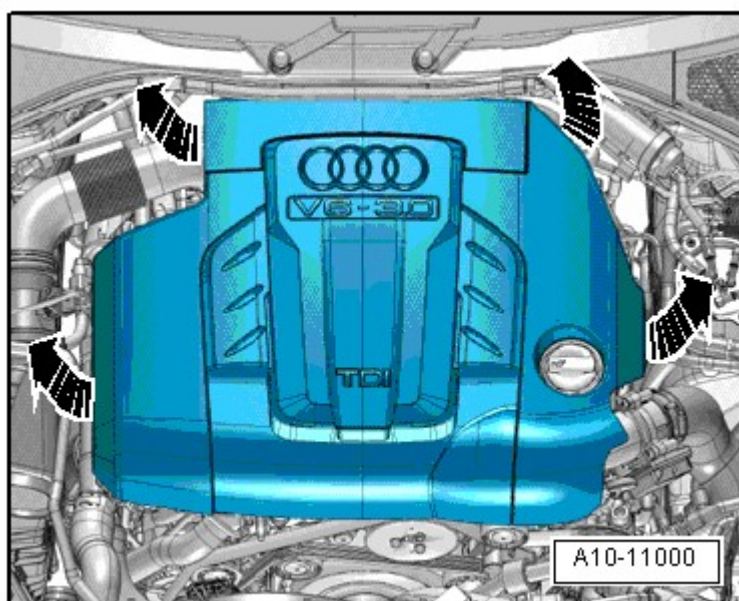


Fig. 142: Identifying Engine Cover -Arrows-

Courtesy of AUDI OF AMERICA, LLC

- Remove air filter insert. Refer to **Removal and Installation** .
- Remove the electrical connector -arrow- from the bracket and disconnect it.

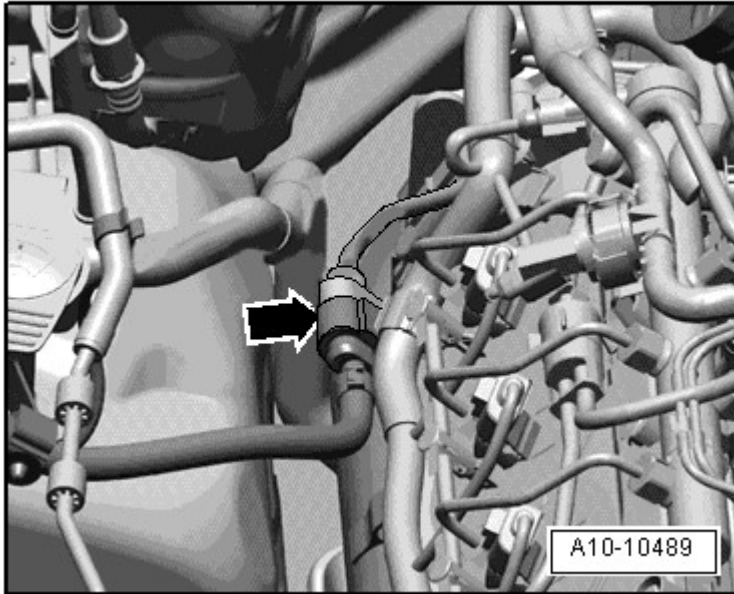


Fig. 143: Identifying Electrical Connector -Arrow-
Courtesy of AUDI OF AMERICA, LLC

- Remove the connector bracket bolt on the cylinder head cover.
- Disconnect cylinder "1" glow plug connector.
- Disconnect the connectors -1 through 7- and free up the wiring harness using the 80 - 200.

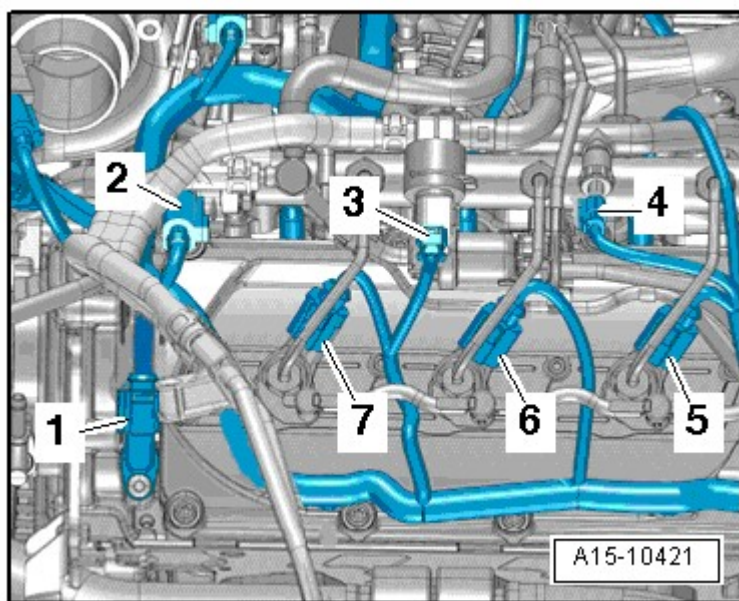


Fig. 144: Identifying Connectors -1 Through 7-
Courtesy of AUDI OF AMERICA, LLC

NOTE: -4- not on vehicles built from 06.10.

-- Free up the wiring harness on the cylinder head cover using the 80 - 200.

-- Remove the bolt -1- and move the bracket -2- and wiring harness to the side.

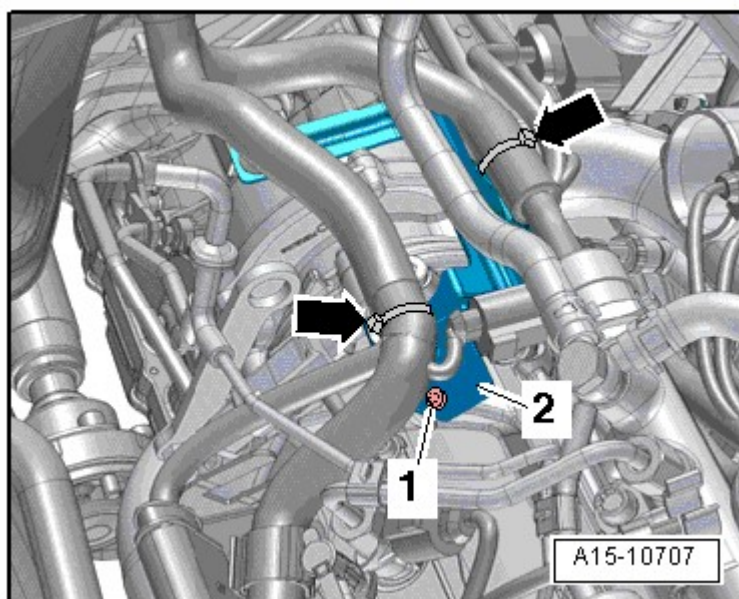


Fig. 145: Identifying Bolt -1-, Bracket -2-, And Wiring Harness
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -arrows-.

-- Mark the injector high pressure line for re-installing.

-- Remove the high pressure lines by loosening the union nuts -1 through 6-. Refer to **Description and Operation** .

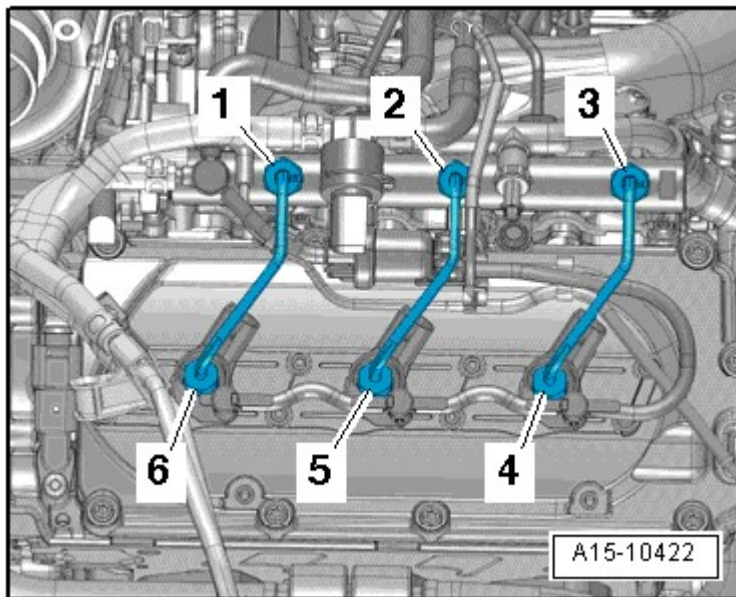


Fig. 146: Identifying High Pressure Lines And Union Nuts -1 Through 6-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the pressure retention valve -arrow- from the bracket with the fuel hoses still connected and move it to the side.

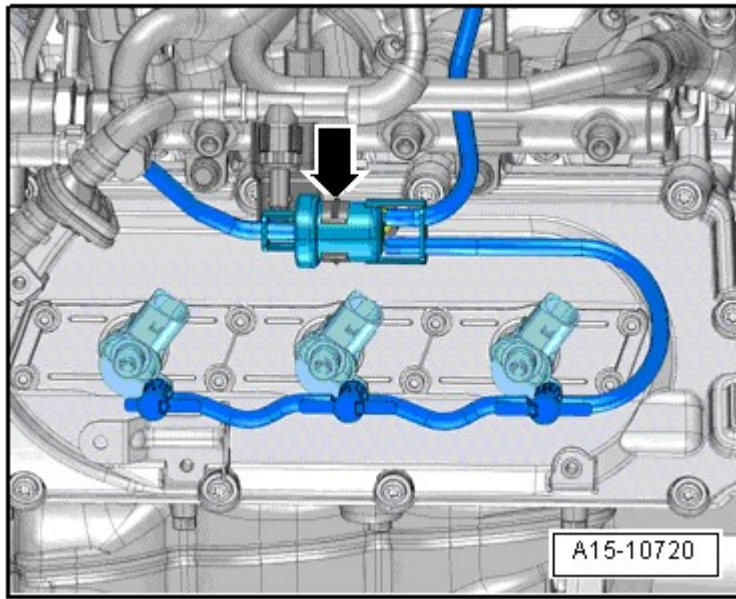


Fig. 147: Identifying Pressure Retention Valve -Arrow- And Bracket With Fuel Hoses
Courtesy of AUDI OF AMERICA, LLC

- Remove the pressure retention valve bracket.
- Remove the injectors. Refer to **Removal and Installation** .

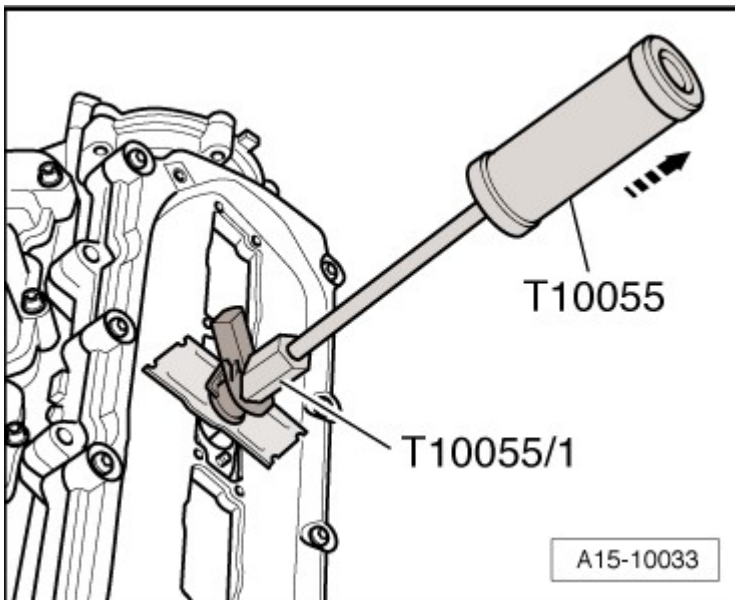


Fig. 148: Identifying Puller T10055 With Adapter T10055/1
Courtesy of AUDI OF AMERICA, LLC

- Loosen the cylinder head cover bolts -arrows- in a diagonal sequence.

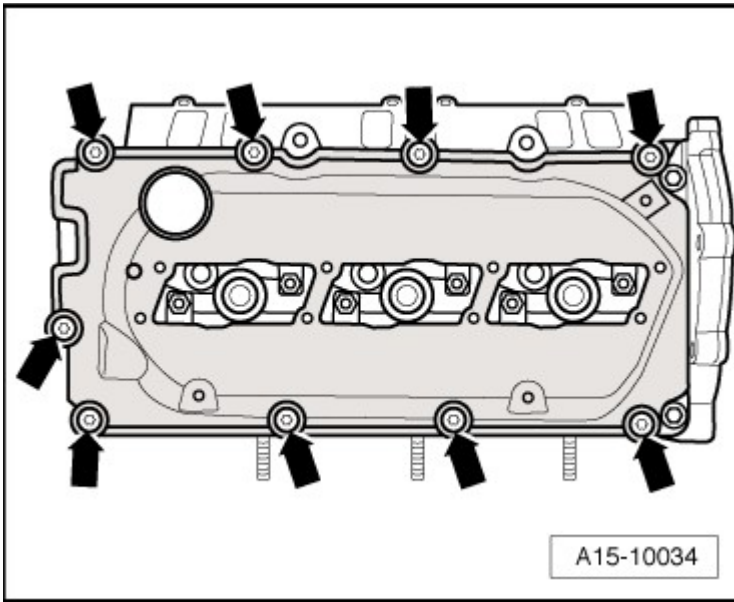


Fig. 149: Identifying Cylinder Head Cover, Tightening Specifications and Sequence
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts and the cylinder head cover.

Installing

Install in reverse order of removal. Note the following:

- Tightening specifications, refer to CYLINDER HEAD COVER OVERVIEW.

NOTE: Replace the cylinder head seal if it is damaged.

Replace the cylinder head cover bolts when replacing the damaged seal.

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 .

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

-- Tighten cylinder head cover bolts. Refer to Fig. 2.

-- Install the injectors, high pressure lines and fuel filter. Refer to Removal and Installation .

-- Fuel system, performing leak test. Refer to FUEL SYSTEM, CHECKING FOR LEAKS .

CYLINDER HEAD

Special tools and workshop equipment required

- Pry Lever - Rmv Outside Mirror 80-200
- Retainer 3036
- Hose Clamps Up to 25 mm Dia. 3094
- Engine Bung Set VAS 6122
- Puller T10320
- Crankshaft Holder 3242
- Adjusting Pin T40060
- Sealant

Removing

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

-- Remove the affected camshaft timing chain from the camshaft. Refer to **CAMSHAFT TIMING CHAINS, REMOVING FROM CAMSHAFTS**.

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

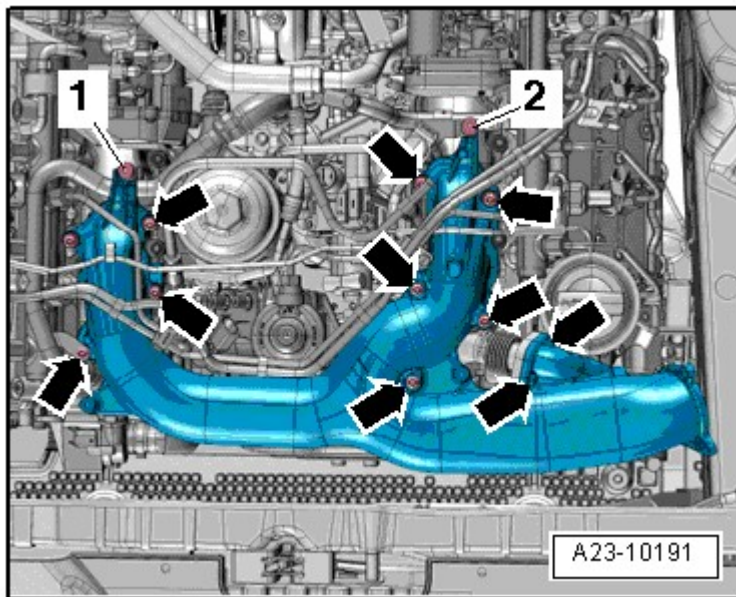


Fig. 150: Identifying Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the respective cylinder head cover. Refer to **LEFT CYLINDER HEAD COVER, RIGHT CYLINDER HEAD COVER**.

Left Cylinder Head:

-- Remove the upper left coolant pipe. Refer to **LEFT UPPER COOLANT PIPE, VEHICLES BUILT THROUGH 05.10** .

-- Remove the high pressure pump toothed belt and the belt tensioning roller. Refer to **Removal and Installation** .

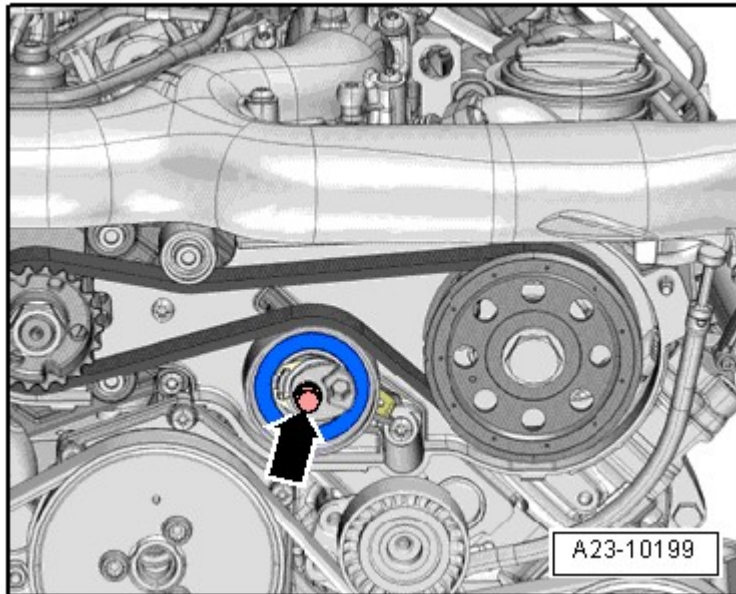


Fig. 151: Identifying Toothed Belt Tensioning Roller And Bolt -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the toothed belt drive sprocket bolt -1- 2 turns using the 3036.

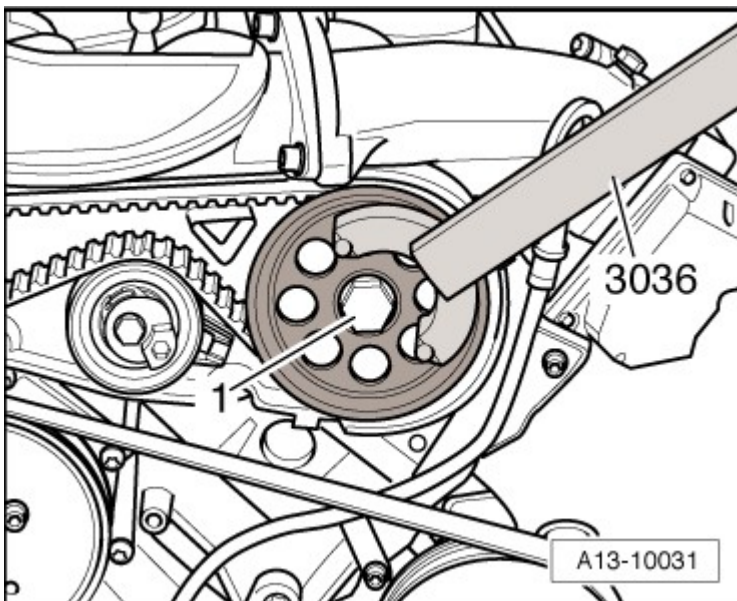


Fig. 152: Identifying Toothed Belt Drive Gear Bolt, Loosening and Tightening
Courtesy of AUDI OF AMERICA, LLC

-- Remove the toothed belt drive sprocket using the T10320.

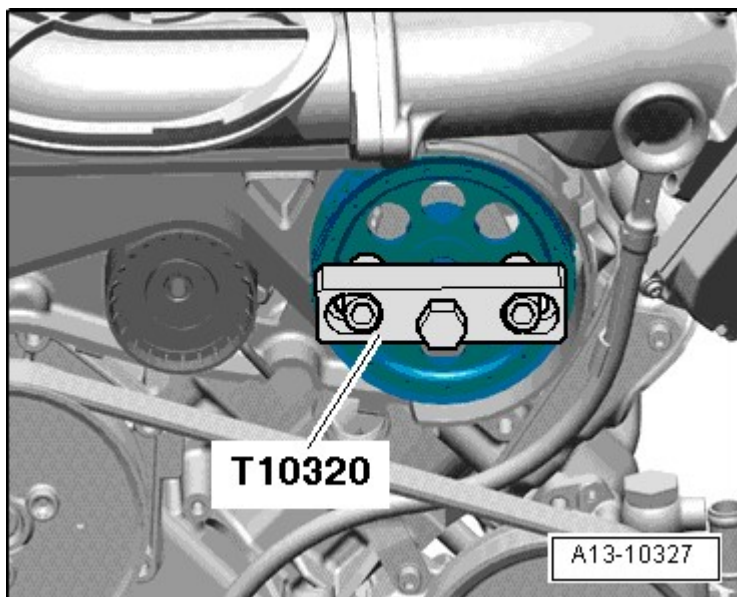


Fig. 153: Identifying Toothed Belt Drive Gear, Removal
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and leave the rear toothed belt guard in its installation position.

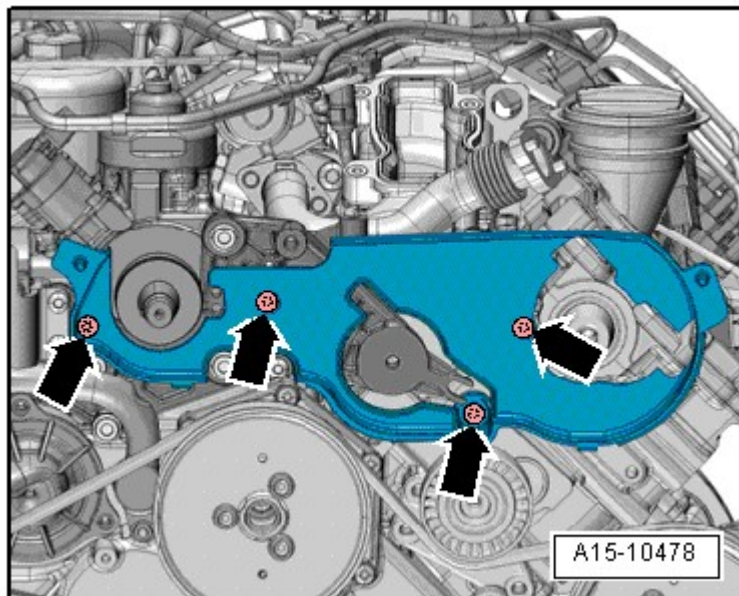


Fig. 154: Identifying Bolts -Arrows- And Rear Toothed Belt Guard
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -2- for the oil dipstick guide tube.

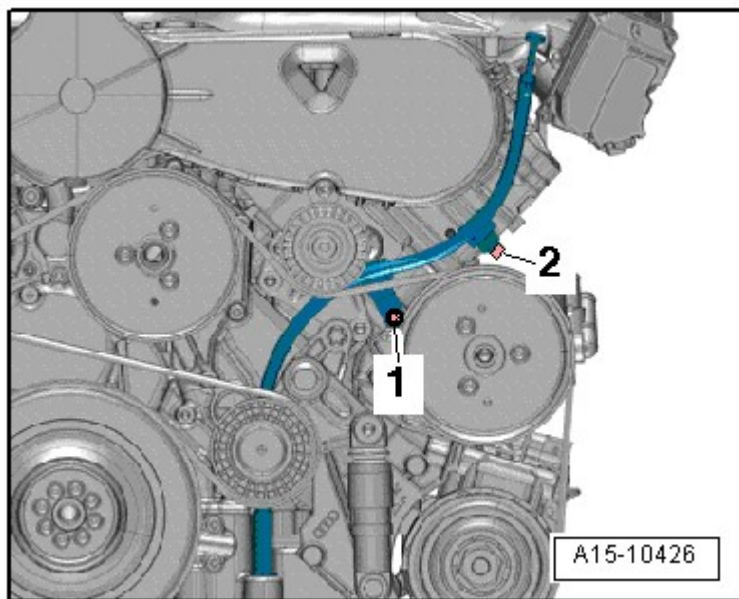


Fig. 155: Identifying Bolt -2- To Oil Dipstick Guide Tube
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1-.

-- Mark the injector high pressure line for re-installing.

-- Remove the union nuts -2- and -3-, free up and remove the high pressure line.

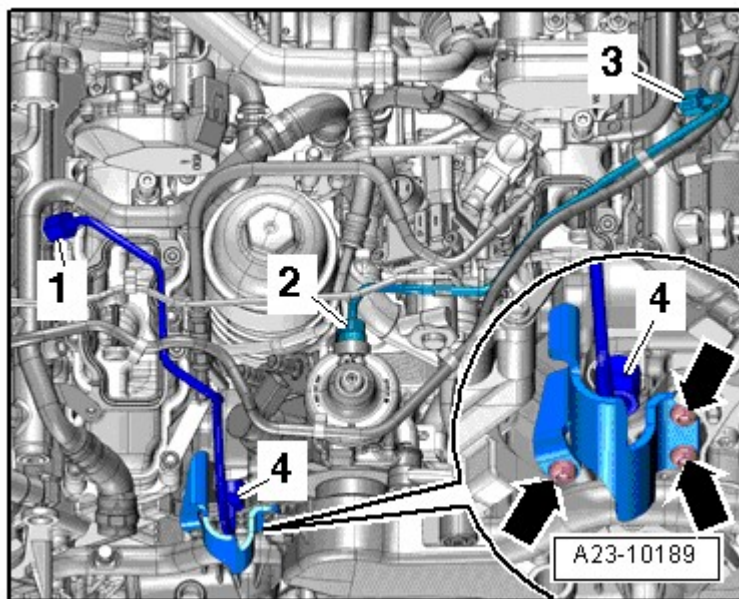


Fig. 156: Identifying Union Fittings -1 Through 4-
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1, 4- and -arrows-.

-- Remove the T-connector from the coolant hose -arrow-.

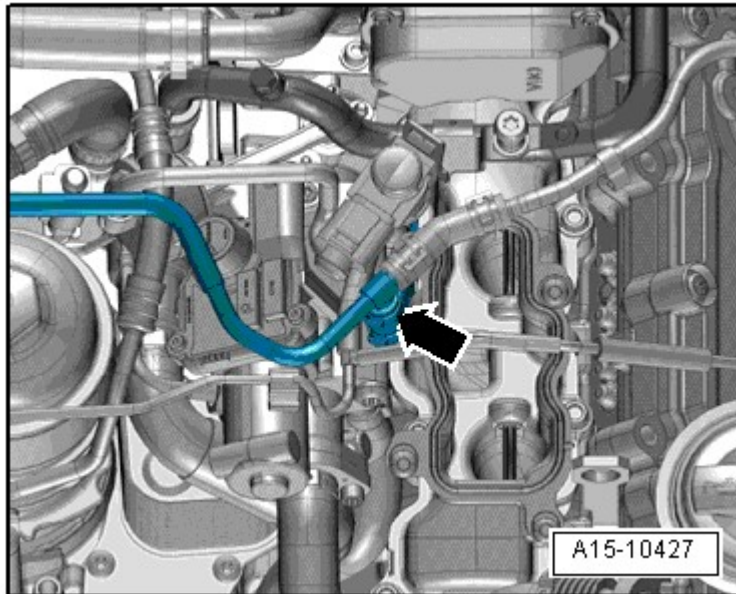


Fig. 157: Identifying T-Connector To Coolant Hose -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connector -1- on the intake flap motor 2 -V275- -4-.

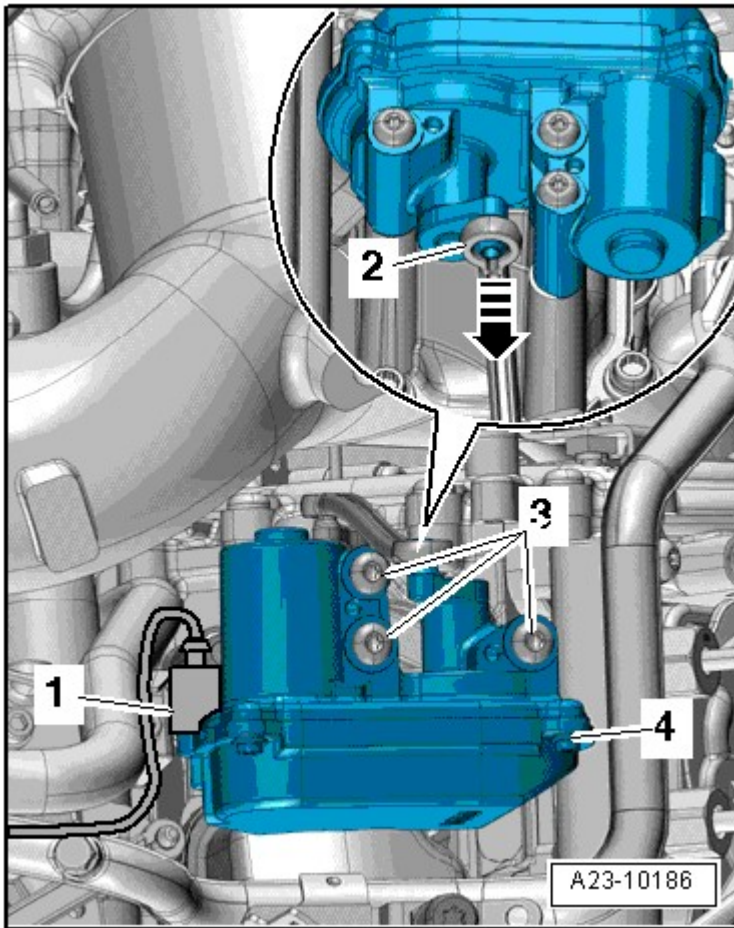


Fig. 158: Identifying Intake Flap Motor 2 -V275- Connecting Rod -Arrow-, Electrical Connector -1-, Bolts -3- And Intake Flap Motor 2 -4-
 Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -2 and 3- and -arrows-.

Vehicles Built from 06.10:

NOTE: Place a cloth underneath to soak up any escaping power steering fluid.

-- Clamp off the power steering pump hydraulic hose -1- with a 3094.

-- Remove the bolts -2- and move the hydraulic line to the rear.

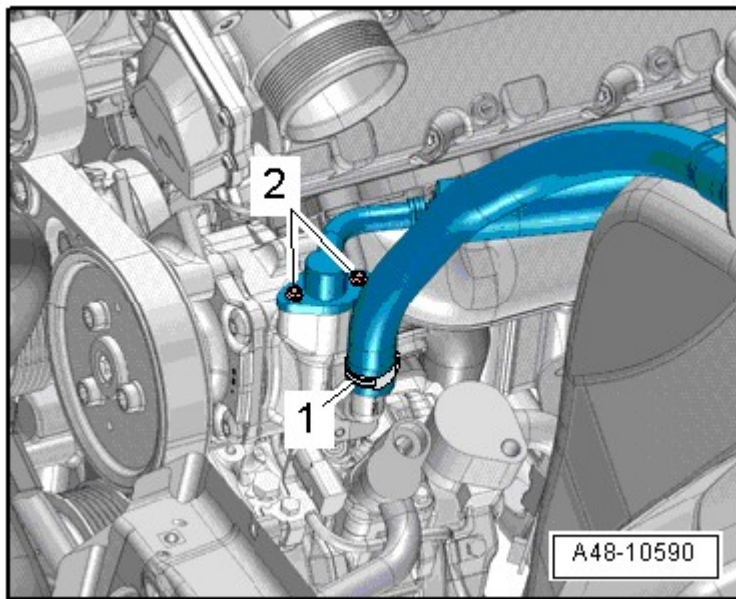


Fig. 159: Identifying Power Steering Pump Hydraulic Hose -1- And Bolts -2-
Courtesy of AUDI OF AMERICA, LLC

-- Seal the open lines and connections with clean plugs from the engine bung set VAS 6122.

All Vehicles:

-- Loosen the clamp -arrow- and remove the exhaust gas recirculation pipe -1-.

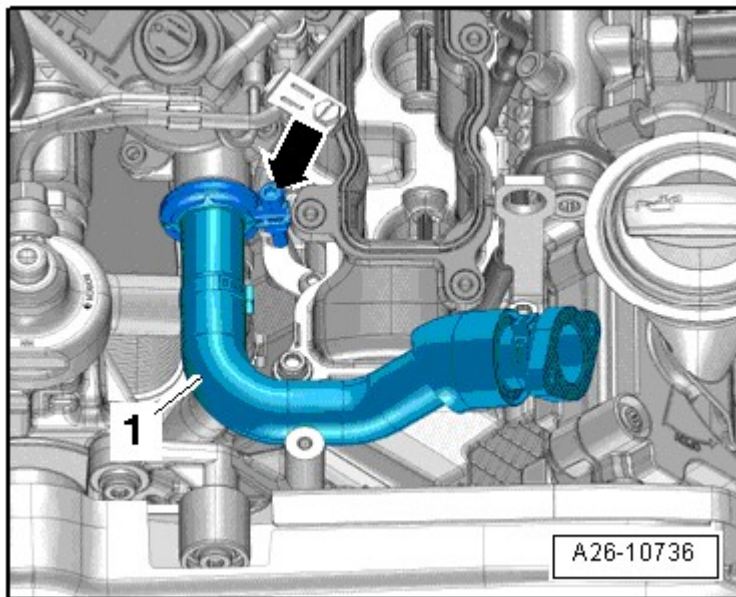


Fig. 160: Identifying Clamp -Arrow- And Connecting Pipe -1-
Courtesy of AUDI OF AMERICA, LLC

Right Cylinder Head:

- Remove the right intermediate pipe. Refer to **RIGHT INTERMEDIATE PIPE** .
- Remove the right upper coolant pipe. Refer to **UPPER RIGHT COOLANT PIPE** .
- Remove the bolts -arrows- and the high pressure line protective plate.

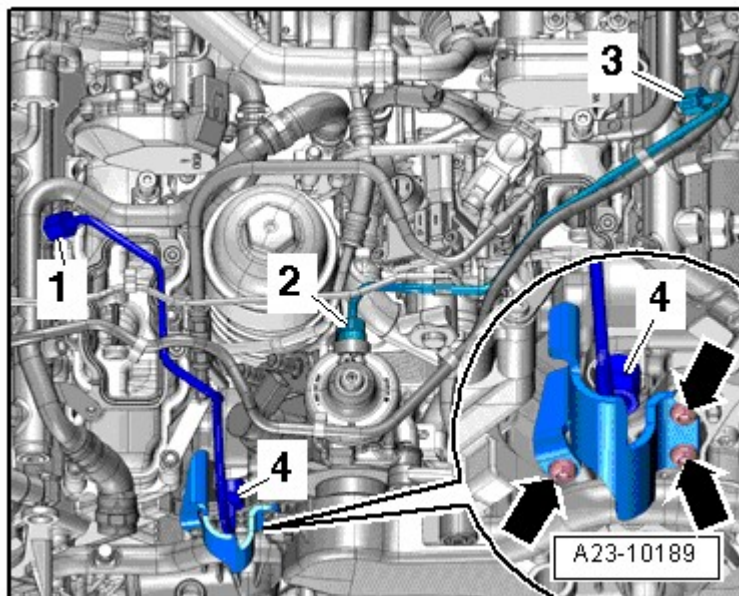
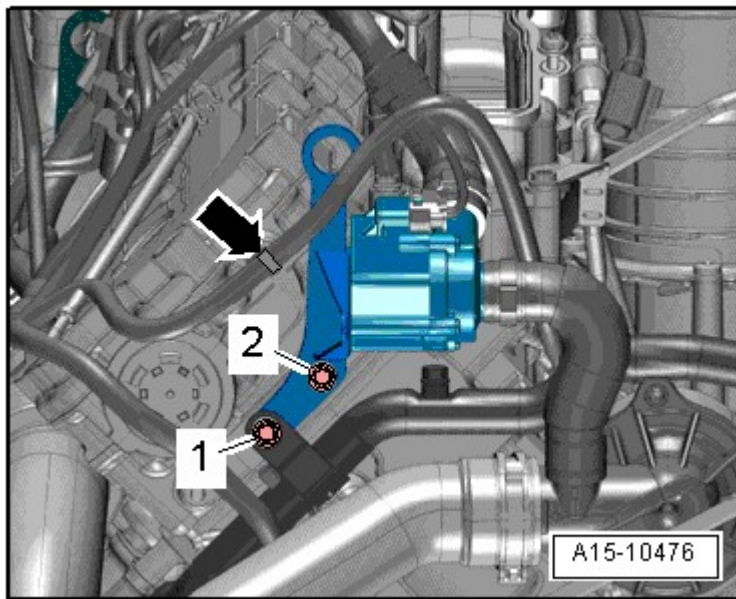


Fig. 161: Identifying Union Fittings -1 Through 4-
 Courtesy of AUDI OF AMERICA, LLC

- Mark the injector high pressure line for re-installing.
- Remove the union nuts -1- and -4-, free up and remove the high pressure line.

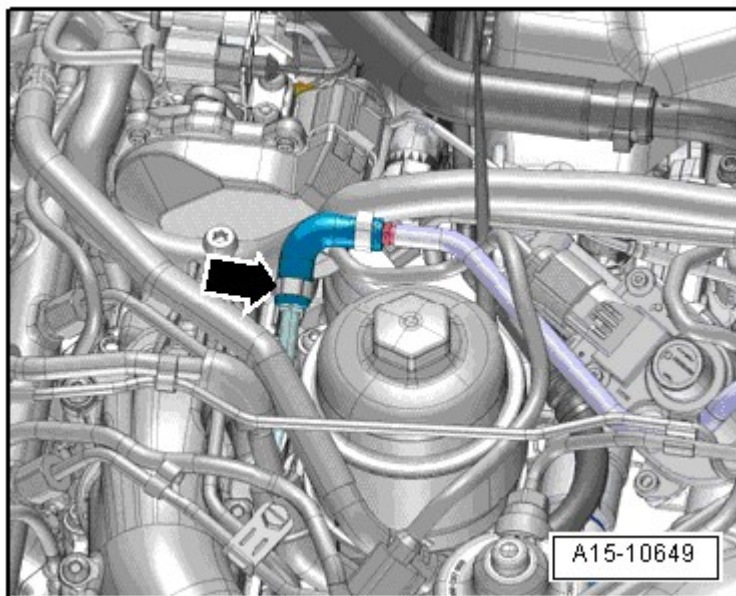
NOTE: Ignore -2 and 3-.

- Remove the engine lifting eyelet bolts -1- and -2-.



**Fig. 162: Identifying Wiring Harness -Arrow-
Courtesy of AUDI OF AMERICA, LLC**

- Free up the wiring harness using 80 - 200 -arrow-.
- Loosen the clamp -arrow- and remove the coolant pipe.



**Fig. 163: Loosening Clamp -Arrow- To Remove Coolant Pipe
Courtesy of AUDI OF AMERICA, LLC**

- Disconnect the glow plug connectors for cylinders "2" and "3".
- Disconnect the connector -1- on the intake flap motor -V157-.

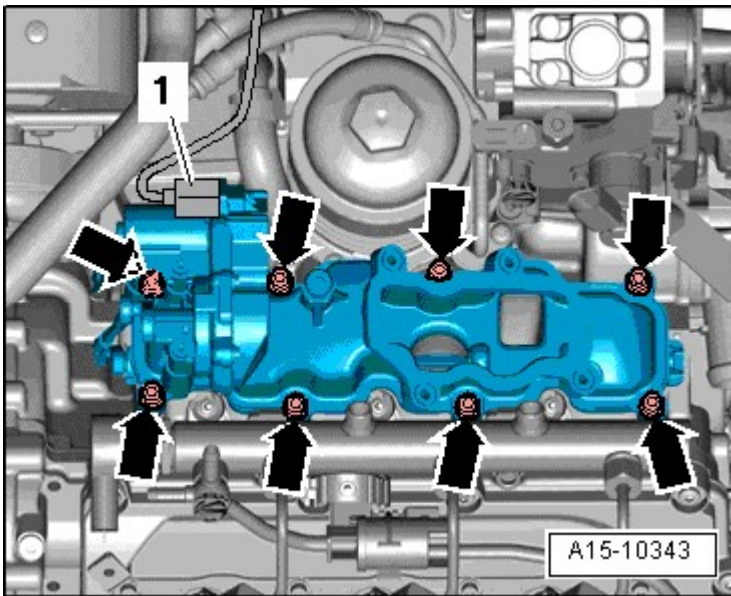


Fig. 164: Identifying Lower Intake Manifold Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -arrows-.

-- Remove the connector -2- (orange) for exhaust gas recirculation (EGR) temperature sensor -G98- from the bracket and disconnect it.

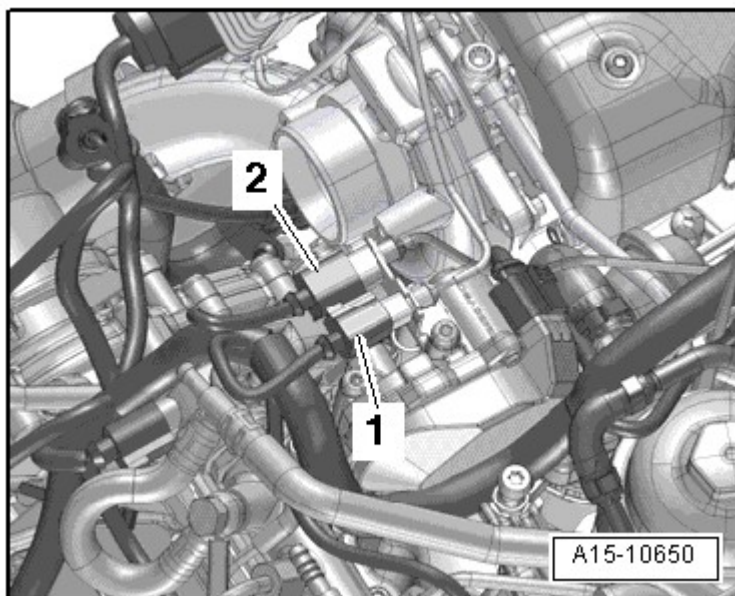


Fig. 165: Identifying Connectors -1 And 2-
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1-.

NOTE: Pay attention to the rules of cleanliness. Refer to CLEAN WORKING CONDITIONS .

-- Remove the bolts -arrows- and then move the fuel rail to the side with the hoses still attached.

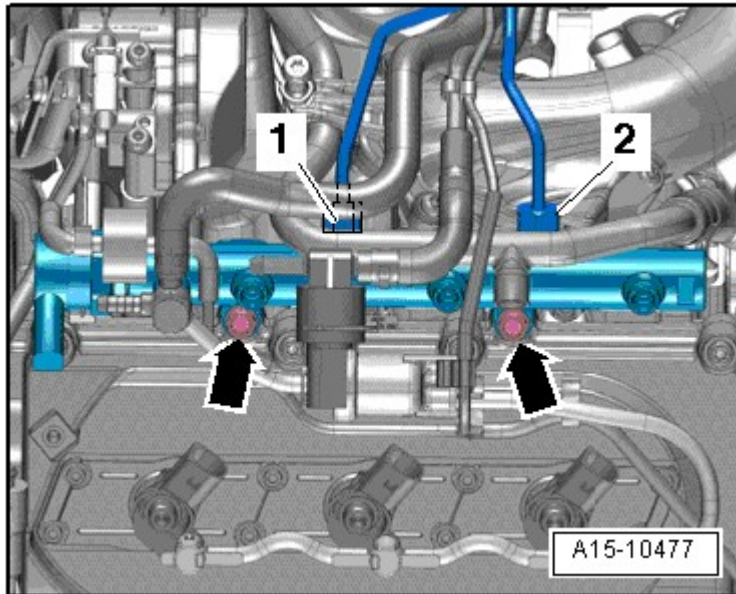


Fig. 166: Identifying Bolts -Arrows- And Fuel Rail
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1 and 2-.

Continued for Both Sides:

LOOSEN THE CYLINDER HEAD BOLTS IN THE FOLLOWING SEQUENCE -1 THROUGH 8-

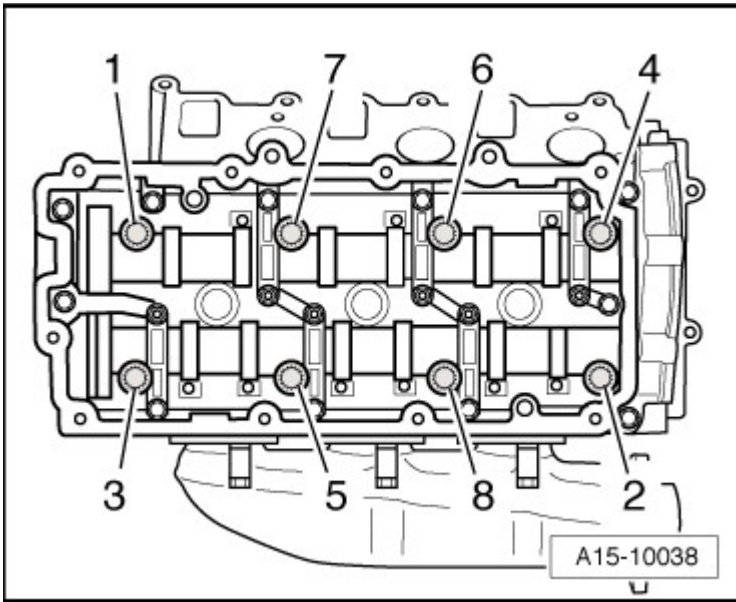


Fig. 167: Identifying Bolt Removal Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts and the cylinder head carefully.

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

INSTALLING

Install in reverse order of removal. Note the following:

- For the correct tightening specifications, refer to CYLINDER HEAD 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 engine at least 2 full revolutions.**

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 with the camshaft installed, coat the contact surfaces between the hydraulic adjusting elements, the roller rocker levers and cam running surfaces with oil.

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 .

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

-- Before positioning the cylinder head, adjust the crankshaft and camshafts to "TDC" :

- The 3242 must be installed in the "TDC" position for the crankshaft -1-.

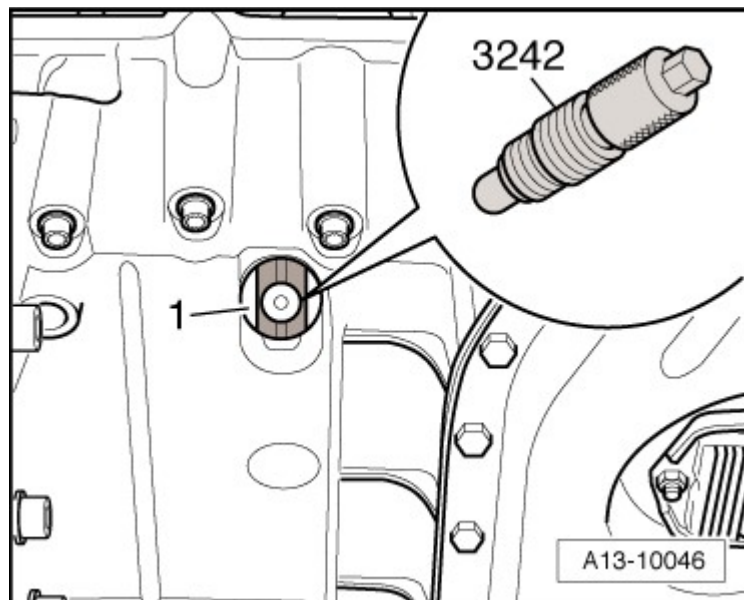


Fig. 168: Identifying Crankshaft Holder 3242 In Bore
 Courtesy of AUDI OF AMERICA, LLC

- The camshafts on both cylinder head must be locked by the T40060.
- The bolt -arrow- in the T40060 must be perpendicular to the center axle of the camshaft.

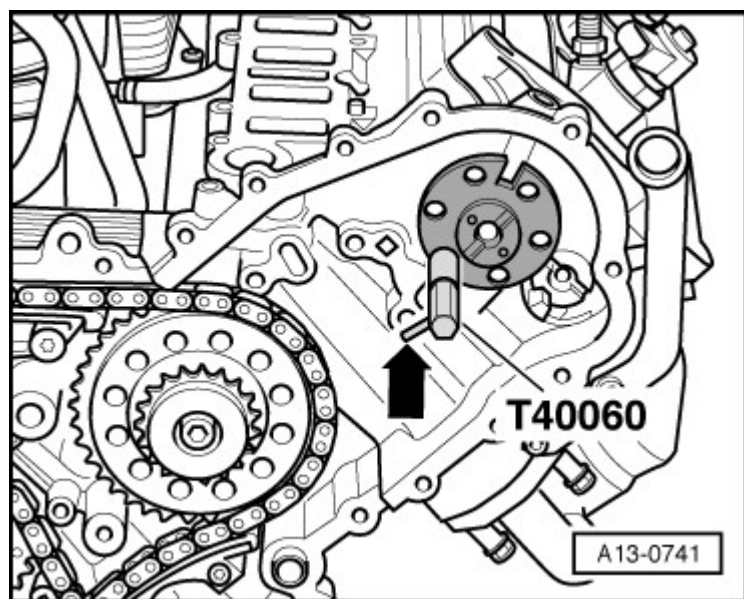


Fig. 169: Identifying Check Of Camshafts For Both Cylinder Heads In TDC Position And Adjustment Pin T40060
 Courtesy of AUDI OF AMERICA, LLC

-- Note the cylinder head gasket identification:

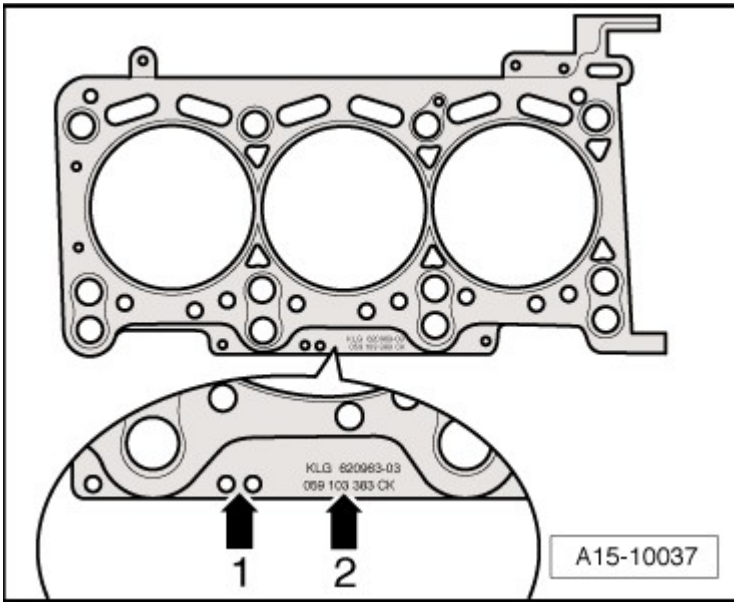


Fig. 170: Identifying Cylinder Head Gasket Identification
 Courtesy of AUDI OF AMERICA, LLC

1. Holes
2. Part number:

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 the crankshaft drive is replaced, measure the piston projection in TDC to determine the new cylinder head. Refer to PISTON PROJECTION, MEASURING AT TDC .

The cylinder head gaskets for the left and right cylinder head cannot be interchanged because they each have a different shape.

-- Clean any oil or grease off the sealing surfaces.

NOTE: Note the expiration date of the sealing compound.

Cut the tube nozzle at the front marking (nozzle diameter approximately 5 mm).

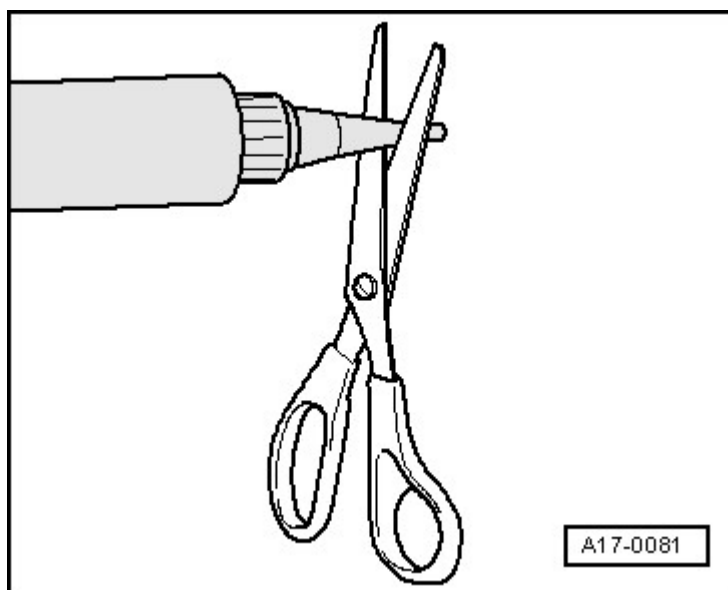


Fig. 171: Identifying Scissors To Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 5 mm)

Courtesy of AUDI OF AMERICA, LLC

Components that have had sealant applied to them must be bolted within 15 minutes.

Left Cylinder Head:

-- Apply a bead of sealant -1- and -2- on the clean sealing surfaces on the cylinder block and the lower timing chain cover as illustrated.

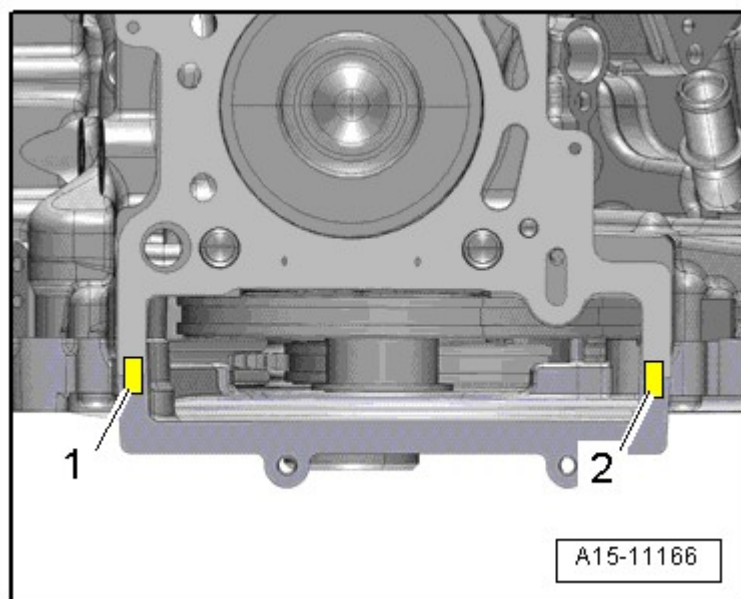


Fig. 172: Identifying Areas -1 And 2- To Apply Bead Of Sealant

Courtesy of AUDI OF AMERICA, LLC

-- Apply the sealant in the amounts specified.

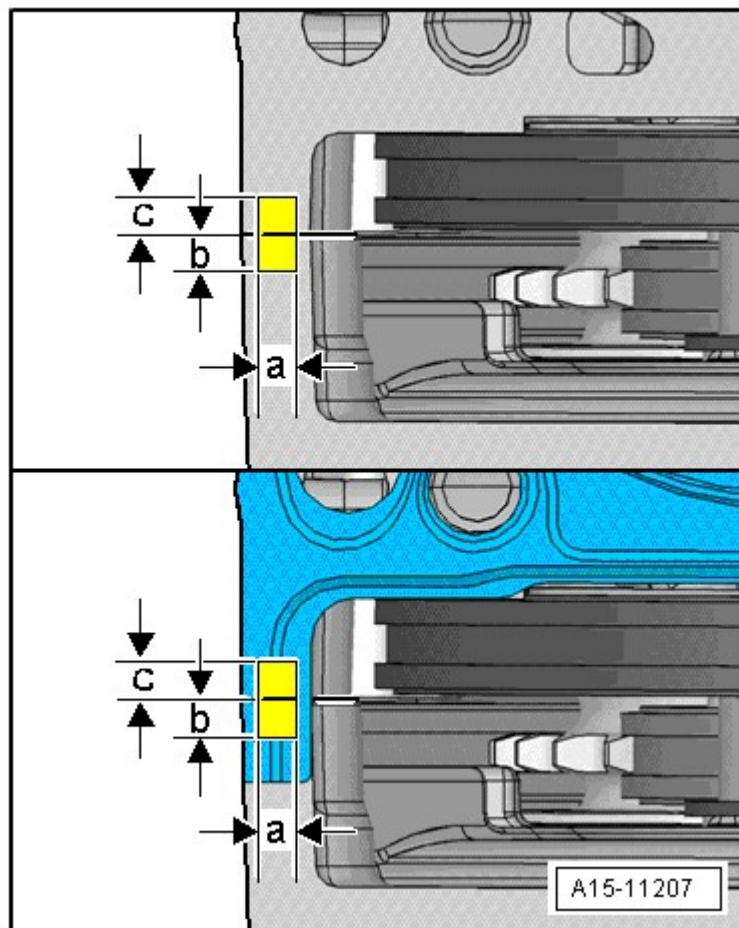


Fig. 173: Identifying Dimensions -a to c-
Courtesy of AUDI OF AMERICA, LLC

- a = 7 mm
- b = 7 mm
- c = 7 mm

-- Set cylinder head gasket in place.

-- Apply sealant beads -1- and -2- to the clean sealing surfaces as illustrated.

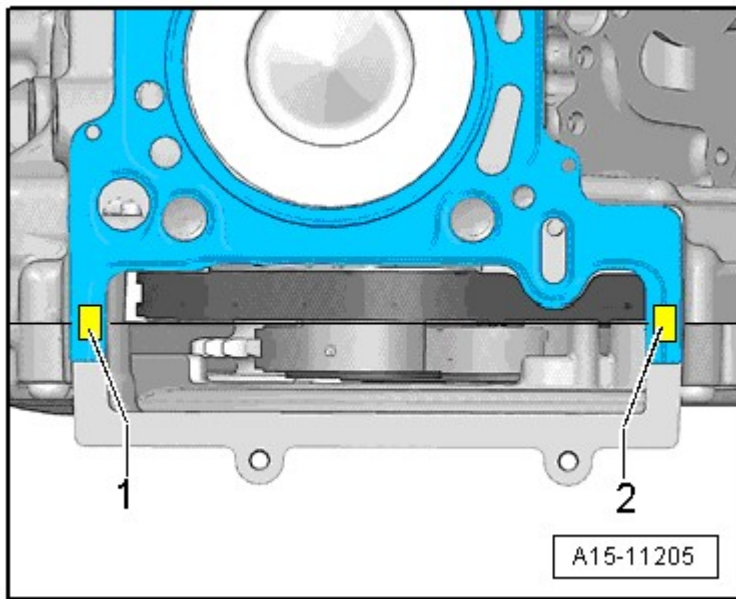


Fig. 174: Identifying Areas -1 And 2- To Apply Bead Of Sealant
Courtesy of AUDI OF AMERICA, LLC

Right Cylinder Head:

-- Apply a bead of sealant -1- and -2- on the clean sealing surfaces on the cylinder block and the lower timing chain cover as illustrated.

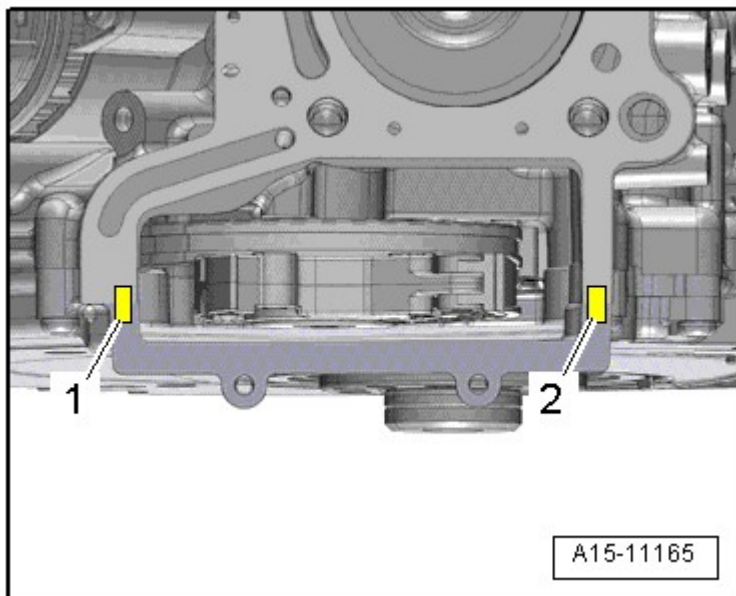


Fig. 175: Identifying Areas -1 And 2- To Apply Bead Of Sealant
Courtesy of AUDI OF AMERICA, LLC

-- Apply the sealant in the amounts specified.

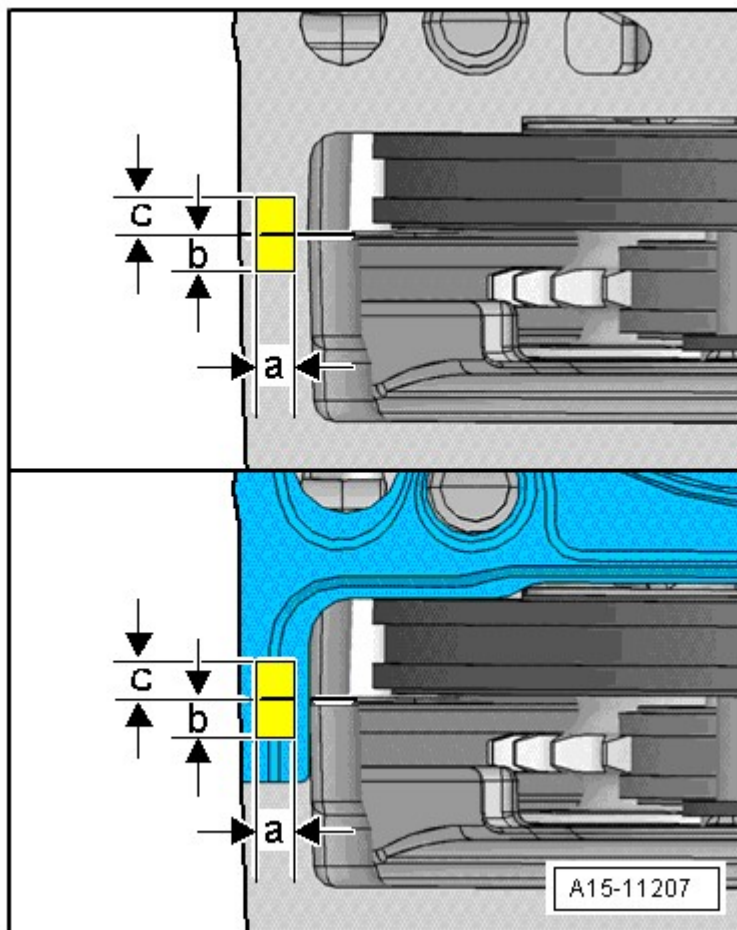


Fig. 176: Identifying Dimensions -A To C-
Courtesy of AUDI OF AMERICA, LLC

- a = 7 mm
- b = 7 mm
- c = 7 mm

-- Set cylinder head gasket in place.

-- Apply sealant beads -1- and -2- to the clean sealing surfaces as illustrated.

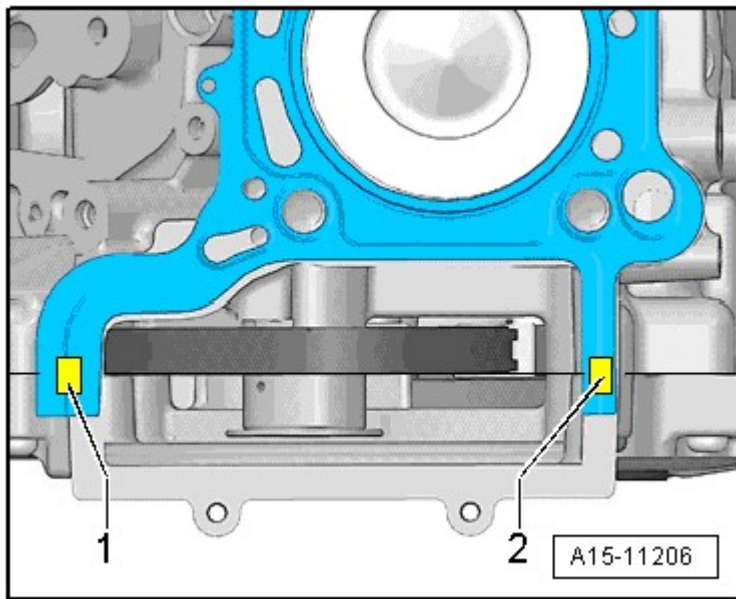


Fig. 177: Identifying Sealant Beads -1 And 2-
Courtesy of AUDI OF AMERICA, LLC

Continued for Both Sides:

- Pay close attention to alignment bushings in cylinder block -arrows-.

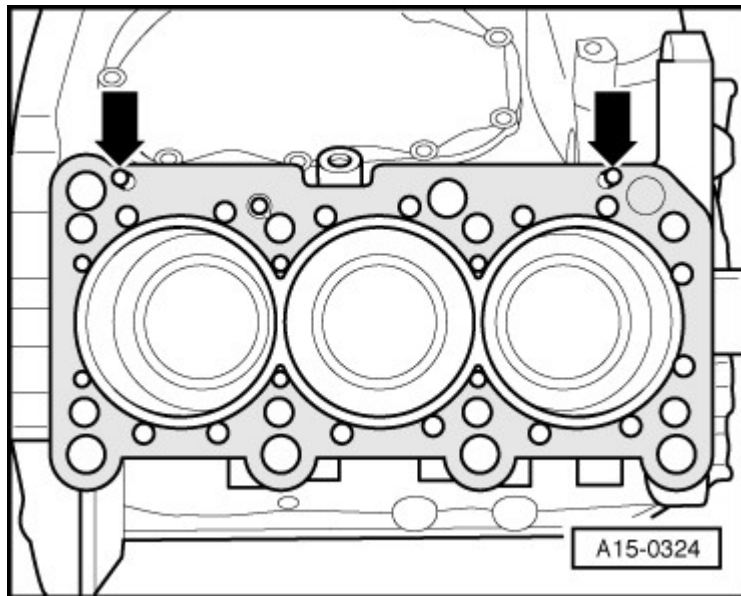


Fig. 178: Identifying Cylinder Head Gasket
Courtesy of AUDI OF AMERICA, LLC

- Pay attention to installation position of the cylinder head gasket, marking "oben" (top) or part number must face toward cylinder head.

- Set cylinder head in place.
- Insert new cylinder head bolts and tighten by hand.
- Tighten the cylinder head bolts. Refer to **Fig. 6**.

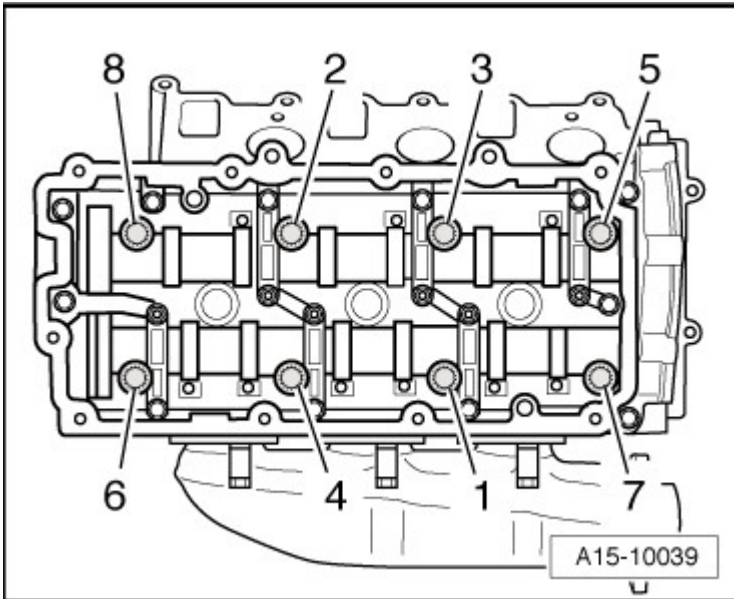


Fig. 179: Identifying Cylinder Head, Tightening Specifications and Sequence
 Courtesy of AUDI OF AMERICA, LLC

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

Left Cylinder Head:

- Install the exhaust gas recirculation pipe. Refer to **EXHAUST GAS RECIRCULATION OVERVIEW** .
- Install oil dipstick guide tube. Refer to **UPPER OIL PAN OVERVIEW** .
- Installing the upper left coolant pipe. Refer to **LEFT UPPER COOLANT PIPE, VEHICLES BUILT THROUGH 05.10** .
- Install the rear toothed belt guard, the toothed belt tensioning roller and the high pressure pump toothed belt. Refer to **Removal and Installation** .
- Install the hydraulic pipe. Refer to **Description and Operation** .

Right Cylinder Head:

- Install the fuel rail. Refer to **Removal and Installation** .
- Install the right upper coolant pipe. Refer to **UPPER RIGHT COOLANT PIPE** .

-- Install the right intermediate pipe. Refer to **RIGHT INTERMEDIATE PIPE** .

Continued for Both Sides:

-- High pressure lines, installing. Refer to **Removal and Installation** .

-- Install the cylinder head cover. Refer to **LEFT CYLINDER HEAD COVER** and **RIGHT CYLINDER HEAD COVER**.

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

-- Install the camshaft timing chains **CHECKING THE VALVE TIMING**.

-- Change engine oil. Refer to Maintenance Procedures .

-- Replace coolant, refer to "Filling" under **COOLING SYSTEM, DRAINING AND FILLING** .

-- Fuel system, performing leak test. Refer to **FUEL SYSTEM, CHECKING FOR LEAKS** .

CAMSHAFT SEAL

Special tools and workshop equipment required

- Seal Puller - General Usage 2085
- Retainer 3036
- M10 x 1.25 x 40 hex bolt from Seal Installer 3241
- Assembly Tool T10053
- Puller T10320

Procedure

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

-- Carefully pull the engine cover -arrows- off the 4 bolts one after the other.

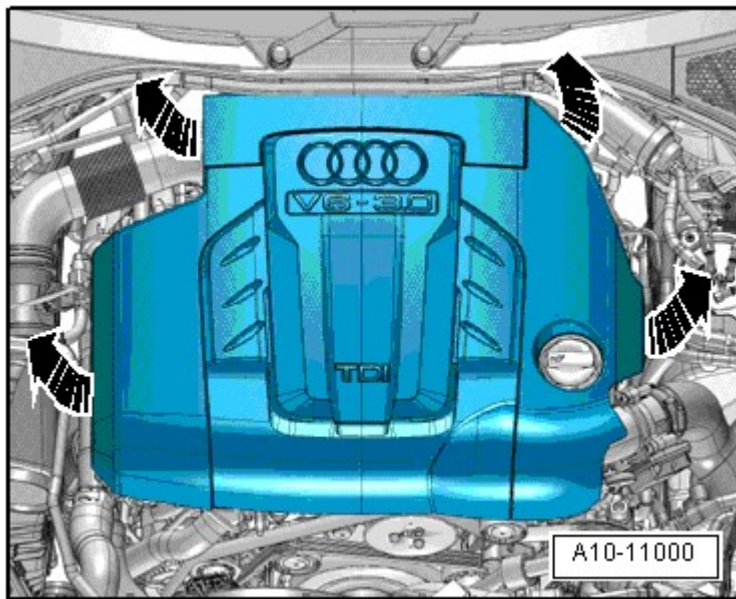


Fig. 180: Identifying Engine Cover -Arrows-
Courtesy of AUDI OF AMERICA, LLC

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

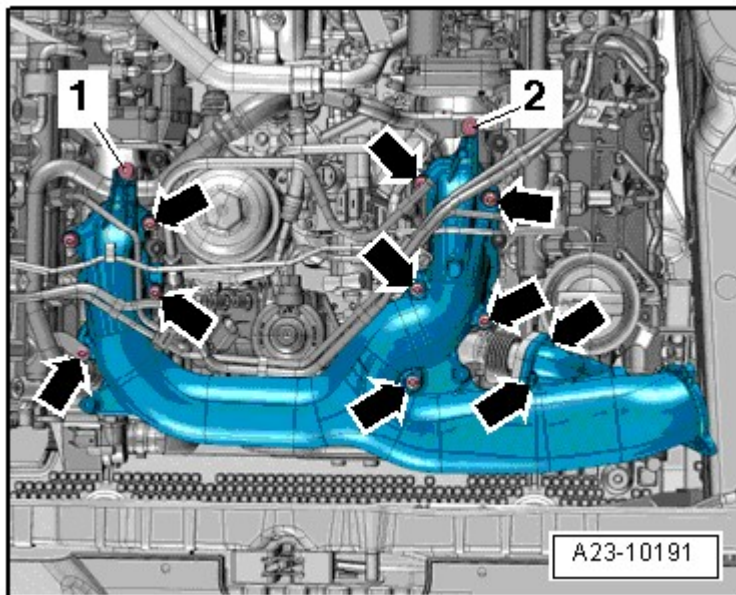


Fig. 181: Identifying Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

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

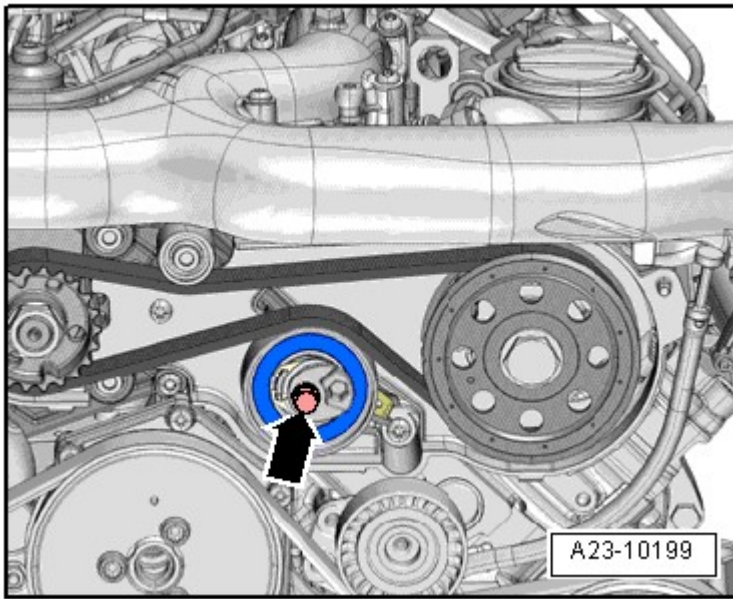


Fig. 182: Identifying Toothed Belt Tensioning Roller And Bolt -Arrow-
 Courtesy of AUDI OF AMERICA, LLC

-- Loosen the toothed belt drive sprocket bolt -1- 2 turns using the 3036.

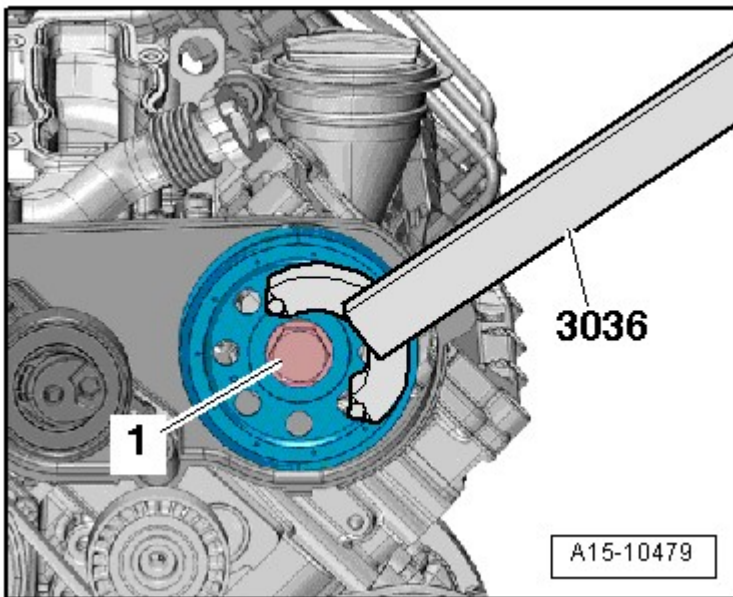


Fig. 183: Identifying Toothed Belt Drive Sprocket Bolt -1- And 3036
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the toothed belt drive sprocket using the T10320.

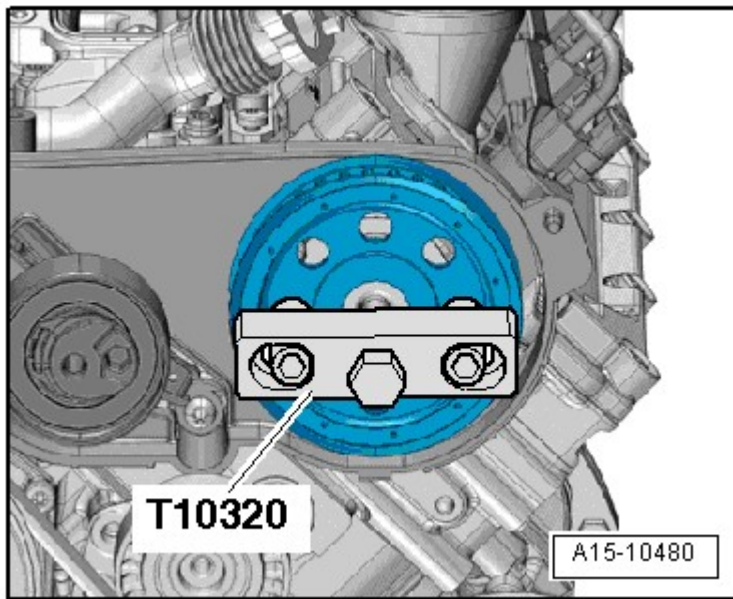


Fig. 184: Identifying Toothed Belt Drive Sprocket Using T10320
Courtesy of AUDI OF AMERICA, LLC

-- Turn the inner part of the 2085 3 turns from the outer part and lock the inner part with the knurled bolt.

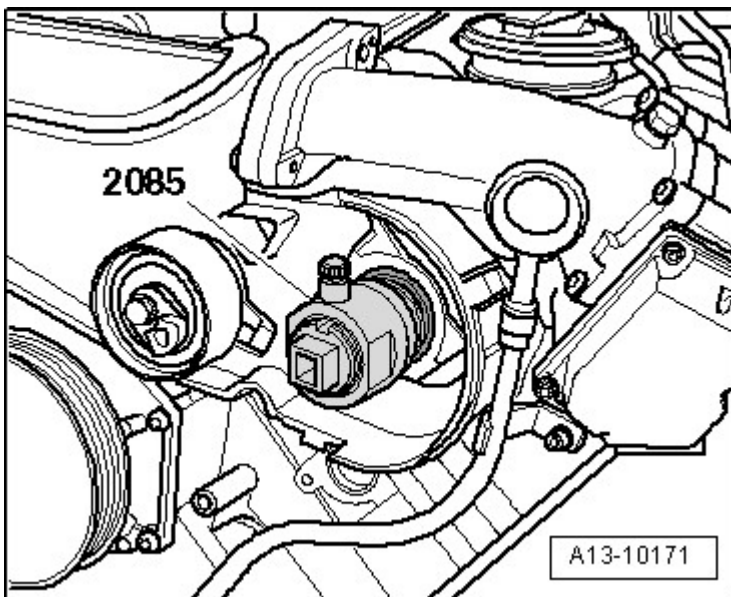


Fig. 185: Identifying Seal Puller 2085
Courtesy of AUDI OF AMERICA, LLC

-- 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.

-- Install the new seal all the way using the pressure sleeve from the T10053 using the hex head bolt M10 x 1.25 x 40 -arrow- from the 3241.

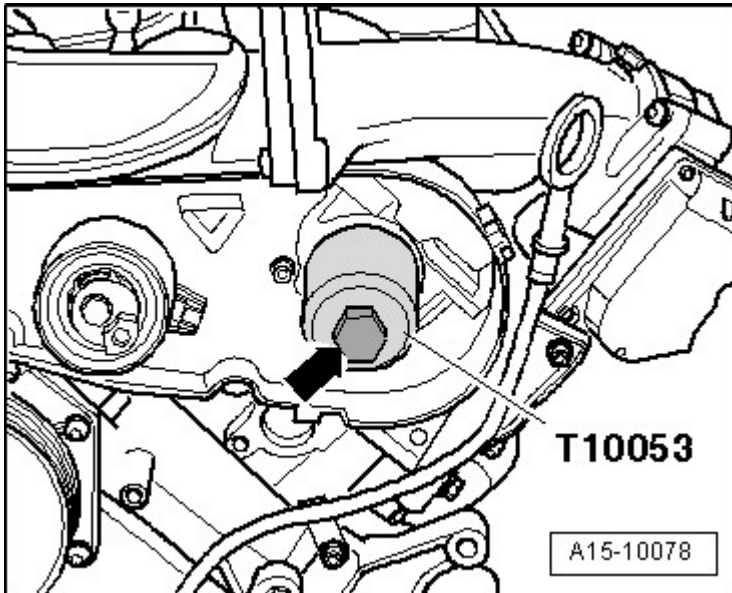


Fig. 186: Identifying Assembly Tool T10053 And M10 x 1.25 x 40 Bolt -Arrow- From Seal Installer 3241
Courtesy of AUDI OF AMERICA, LLC

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

-- Install the high pressure pump toothed belt and the upper section of the intake manifold. Refer to **Removal and Installation** .

LEFT CYLINDER HEAD CAMSHAFT

Special tools and workshop equipment required

- Puller T10320
- Camshaft Fitting Tool T40094
- Camshaft Fitting Tool T40095
- Component of T40096 T40096
- Pry Lever - Rmv Outside Mirror 80-200
- Retainer 3036
- Hand drill with plastic brush attachment
- Protective eyewear
- Sealant

Removing

-- Remove the affected camshaft timing chain from the camshaft. Refer to **CAMSHAFT TIMING CHAINS, REMOVING FROM CAMSHAFTS.**

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

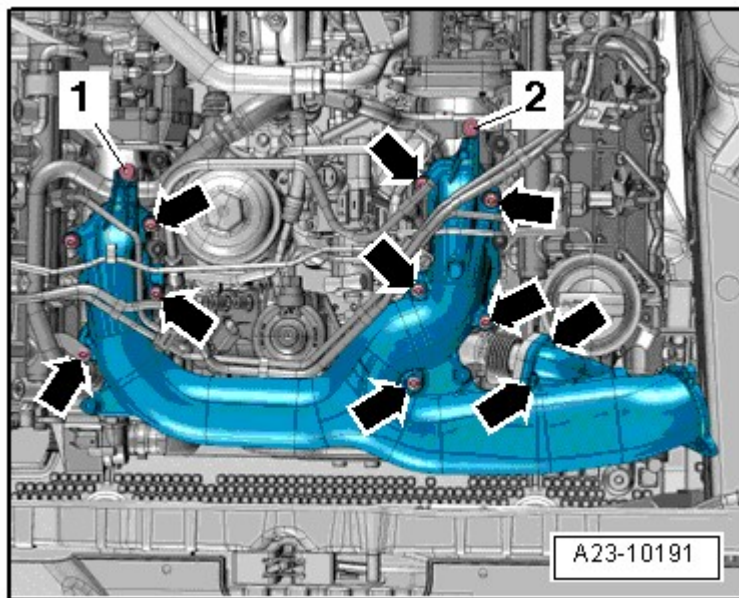


Fig. 187: Identifying Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

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

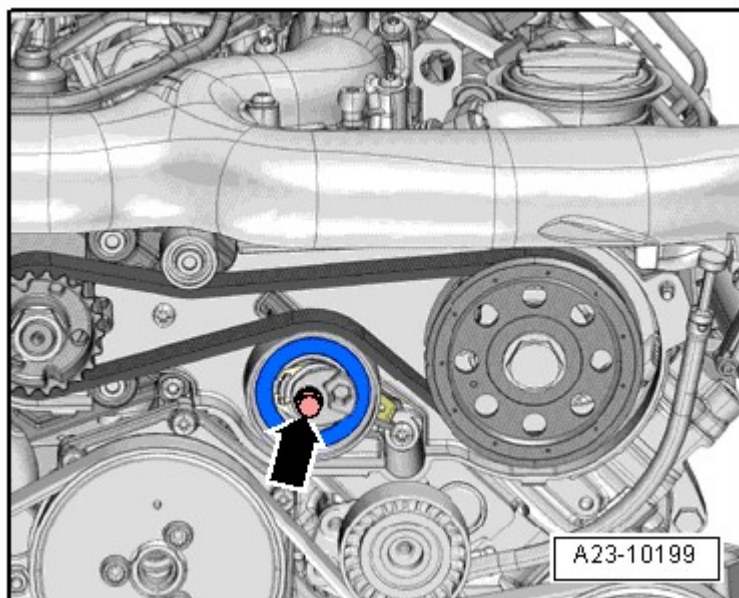


Fig. 188: Identifying Toothed Belt Tensioning Roller And Bolt -Arrow-

Courtesy of AUDI OF AMERICA, LLC

-- Loosen the toothed belt drive sprocket bolt -1- 2 turns using the 3036.

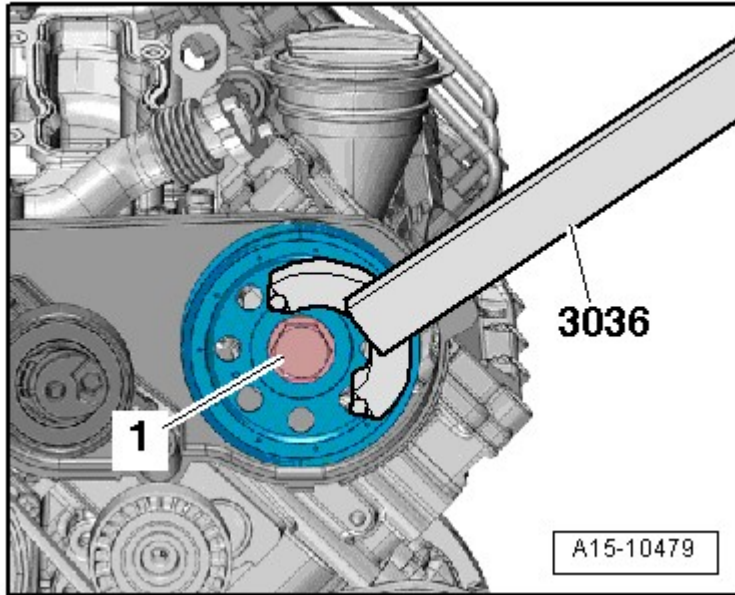


Fig. 189: Identifying Toothed Belt Drive Sprocket Bolt -1- And 3036
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the toothed belt drive sprocket using the T10320.

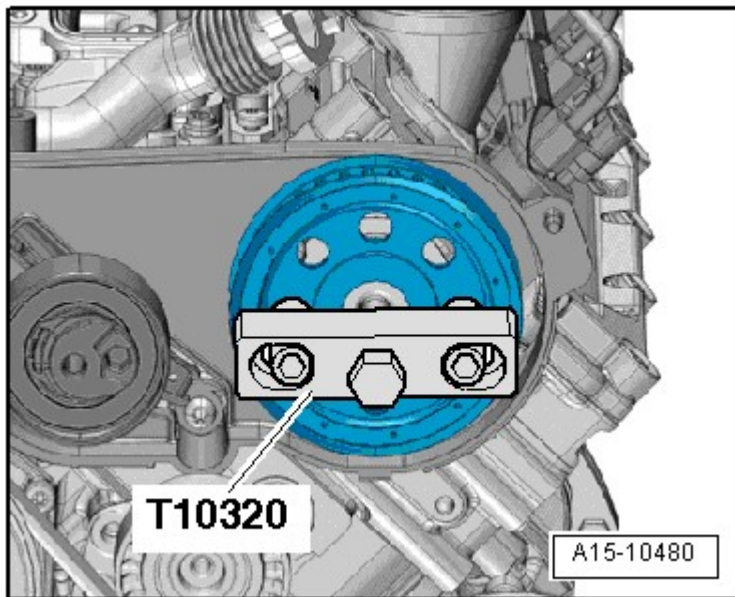


Fig. 190: Identifying Toothed Belt Drive Sprocket Using T10320
 Courtesy of AUDI OF AMERICA, LLC

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

-- Remove the exhaust gas recirculation (EGR) cooler switch-over valve -N345- -1- from the bracket.

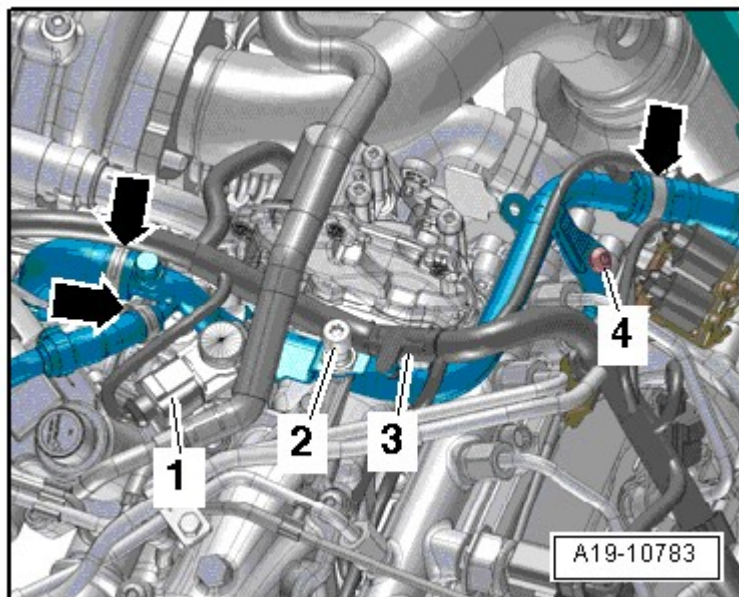


Fig. 191: Identifying EGR Cooler Switch-Over Valve -N345- -1-, Engine Cover Ball Studs -2-, Wiring Harness -3- And Bolt -4-

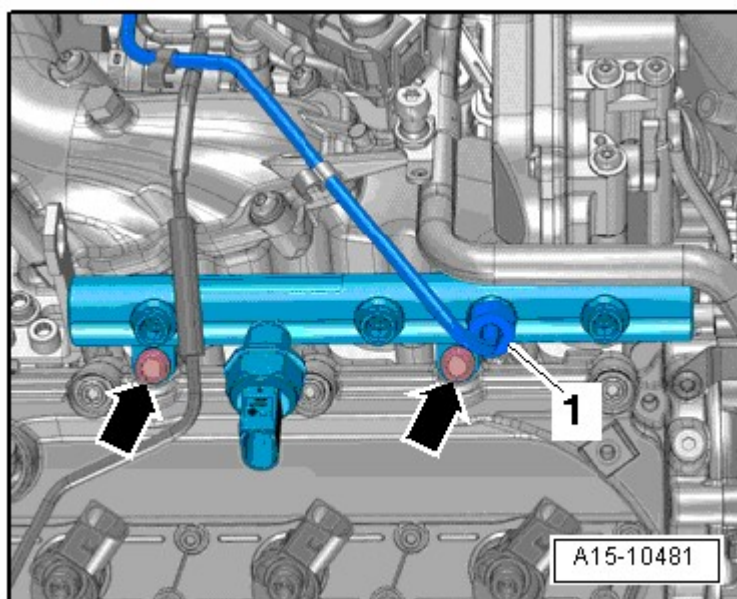
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -4- and the engine cover bolts -2-.

-- Free up the wiring harness -3- on the top of the coolant pipe on the left side.

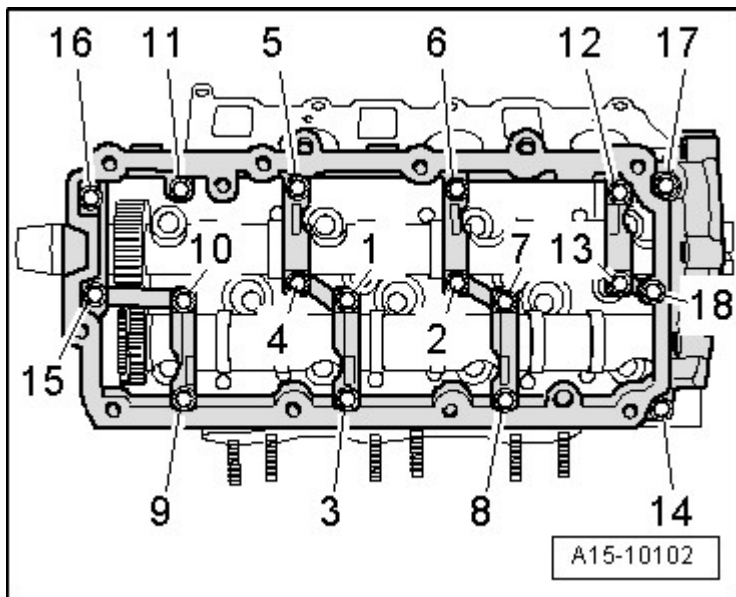
NOTE: Ignore -arrows-.

NOTE: Pay attention to the rules of cleanliness. Refer to **CLEAN WORKING CONDITIONS** .



**Fig. 192: Identifying High Pressure Line Union Nut -1- And Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC**

- Remove the high pressure line union nut -1-.
- Remove the bolts -arrows- and remove the fuel rail from the left cylinder head.
- Loosen the guide frame bolts and nuts in the sequence -18 to 1-.



**Fig. 193: Identifying Left Cylinder Head Guide Frame, Tightening Specifications and Sequence
Courtesy of AUDI OF AMERICA, LLC**

NOTE: Be careful of the roller rocker lever and the adjusters when removing the

camshafts.

-- Carefully remove the bearing bracket and camshafts.

Installing

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

NOTE: Replace the front cover in the cylinder head on the right side.

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

- Install the camshaft as described with the T40094.

Risk of contaminating lubricating system.

- Cover any open parts in the cylinder head.

WARNING: Risk of eye injury.

- Wear protective eyewear.

-- Remove the sealant residue on the cylinder head and guide frame and the upper section of the oil pan, for example using a rotating plastic brush.

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

-- Lubricate the running surfaces of both camshafts.

Set up the T40094 as follows:

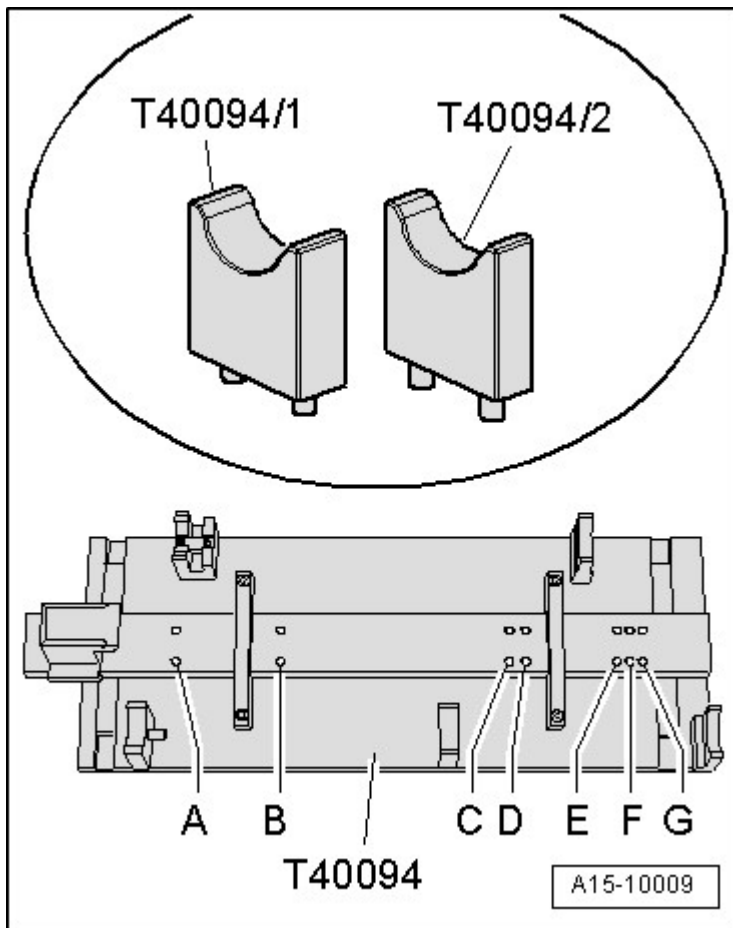


Fig. 194: Identifying Bracket T40094/1 And Bracket T40094/2
 Courtesy of AUDI OF AMERICA, LLC

- Install the T40094/2 in -A-.
- Install the T40094/1 in -D-.
- Install the exhaust camshaft -1- into the T40094/1 and T40094/2.

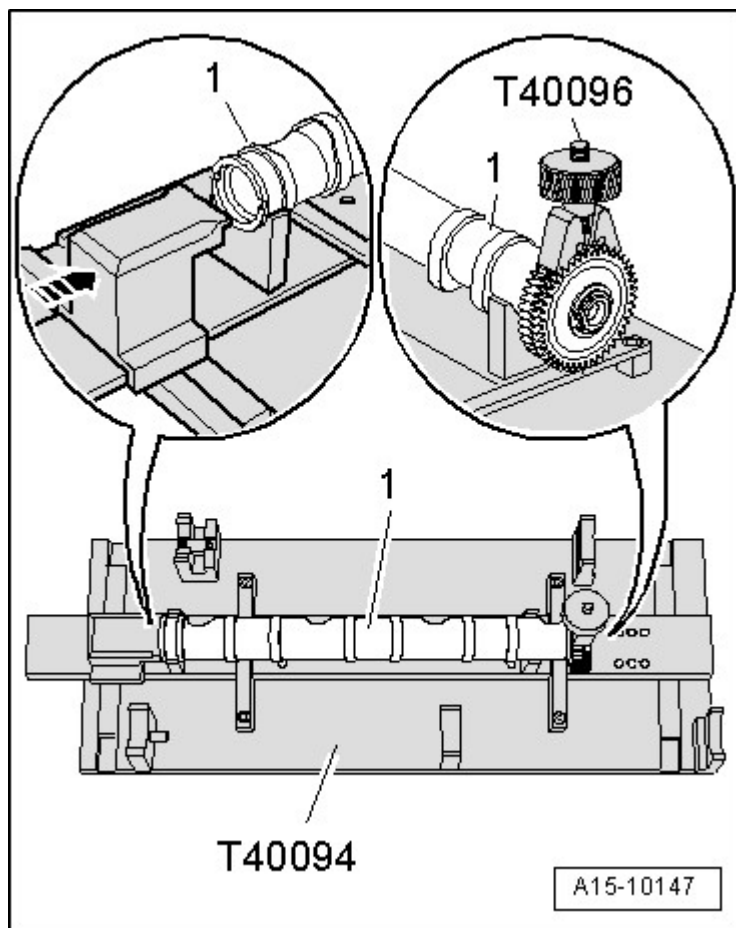


Fig. 195: Identifying Camshaft Insertion Tools T40094 And T40096
 Courtesy of AUDI OF AMERICA, LLC

- Turn the exhaust camshaft so that it can be locked with the straight-edge in the "TDC" position -arrow-.
- Mount the T40096 onto the teeth of the exhaust camshaft so that one arm of the clamping device engages in one sprocket half.
- Tension the clamping device with the thumb wheel until the tooth faces align.
- Place the intake camshaft -2- into the T40094.

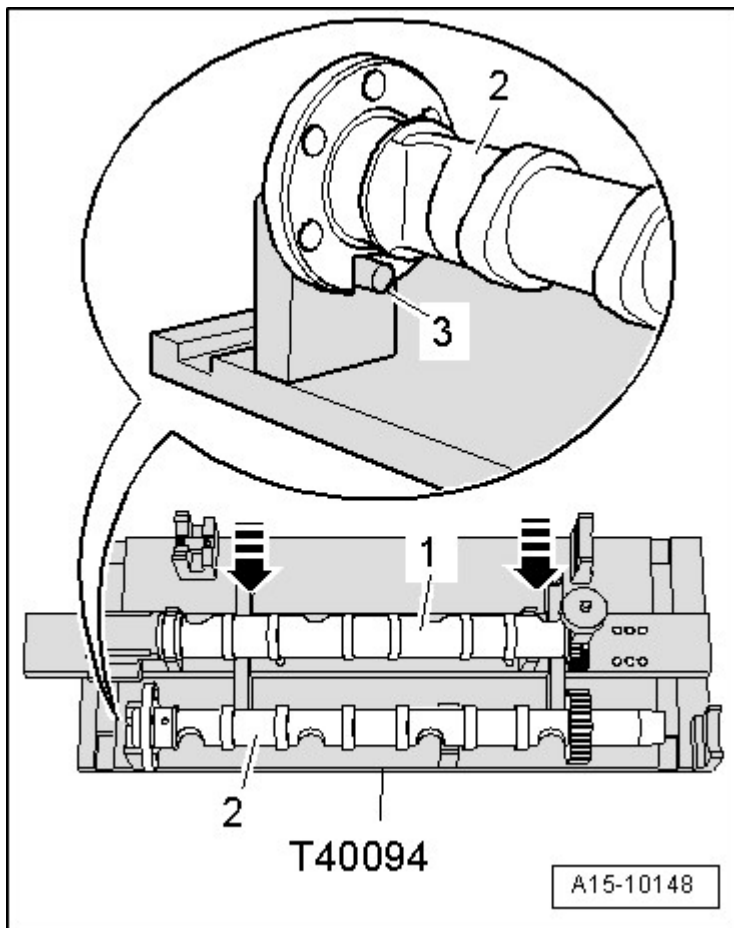


Fig. 196: Identifying Intake Camshaft -2- In Camshaft Insertion Tool T40094
Courtesy of AUDI OF AMERICA, LLC

- The securing pin -3- must engage in the groove on the intake camshaft.
- Push the exhaust camshaft -1- toward the intake camshaft -arrows- until the splines engage.
- Make sure the camshaft is positioned correctly:

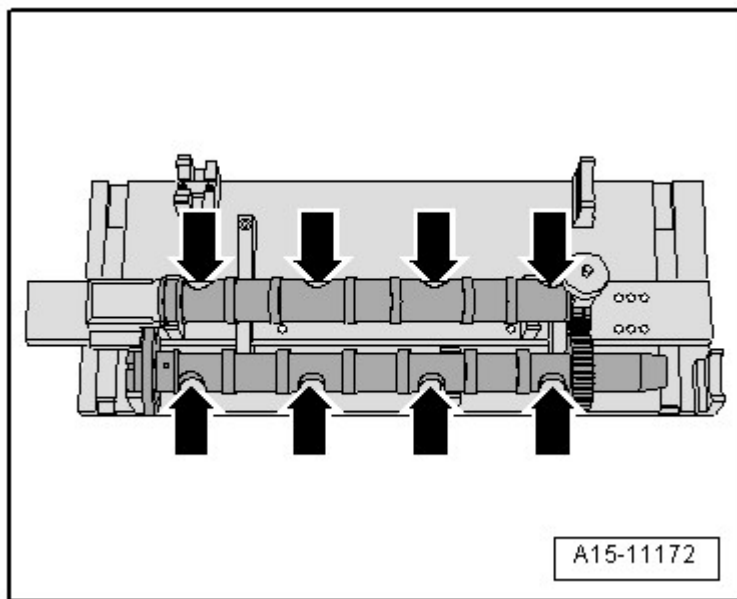


Fig. 197: Locating Camshaft Notches

Courtesy of AUDI OF AMERICA, LLC

- The notches -arrows- on both camshafts must face upward.

-- Place the bearing brackets -1- on both camshafts.

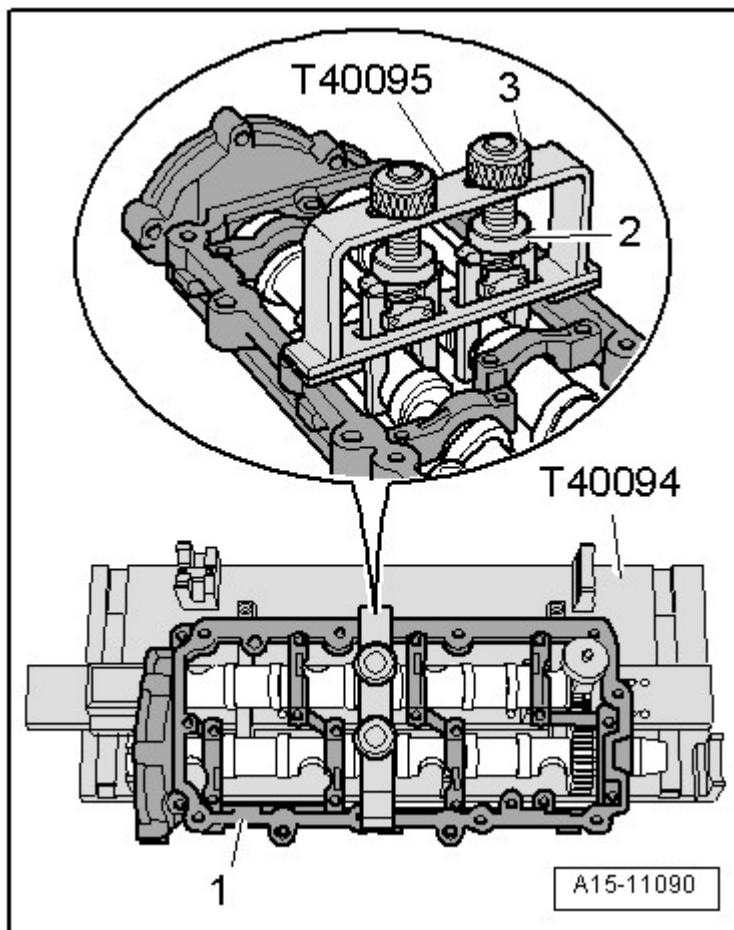


Fig. 198: Placing Bearing Brackets -1- On Both Camshafts
Courtesy of AUDI OF AMERICA, LLC

- All the camshaft bearings must lie on the camshafts.
- Mount the T40095 onto the camshafts by aligning the pliers and tension with the knurled nuts -2-.
- Tension the camshafts by tightening the nuts -3-.
- Make sure the alignment pins -arrows- are in the cylinder head. Insert any missing alignment pins.

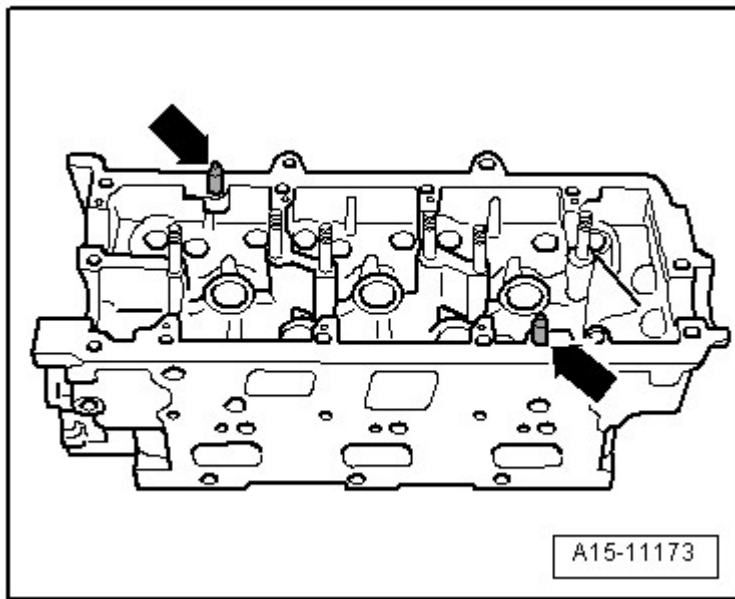


Fig. 199: Locating Cylinder Head Alignment Pins
Courtesy of AUDI OF AMERICA, LLC

NOTE: Note the expiration date of the sealing compound.

-- Cut the tube nozzle at the front marking (nozzle diameter approximately 1.5 mm).

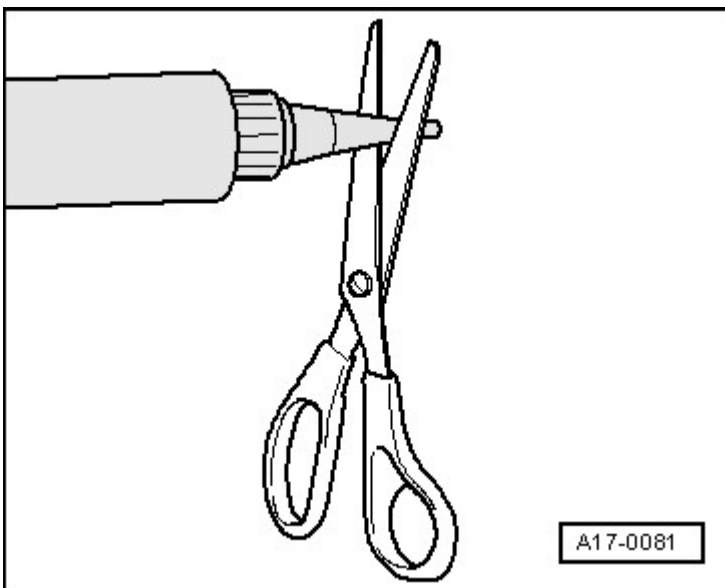


Fig. 200: Identifying Scissors To Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 1.5 mm)
Courtesy of AUDI OF AMERICA, LLC

NOTE: The guide frame is shown without the camshafts.

-- Turn the guide frame around.

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

- Do not apply sealant beads thicker than specified.

-- Apply sealant beads -arrows- to the clean sealing surfaces on the guide frame as shown in the illustration.

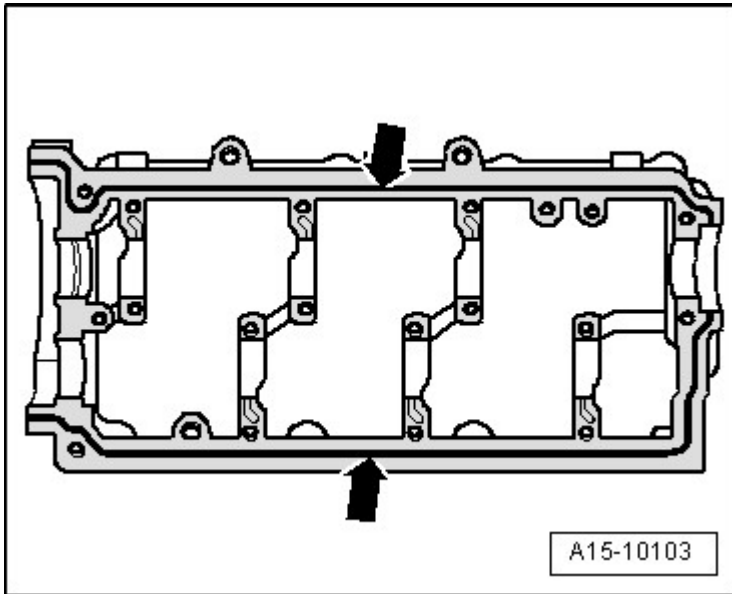


Fig. 201: Identifying Sealant Beads -Arrows- On Clean Sealing Surfaces Of Guide Frame
Courtesy of AUDI OF AMERICA, LLC

- The grooves of sealing surface must be completely filled with sealant.
- The sealant beads must be 1.5 to 2.0 mm above the sealing surface.

NOTE: The guide frame must be installed within 5 minutes after applying the sealant.

CAUTION: The engine could be damaged.

- Make sure all the roller rocker levers are seated correctly on the valve stem ends and the adjusters.

-- Mount the guide frame together with both camshaft and the T40095 to the cylinder head.

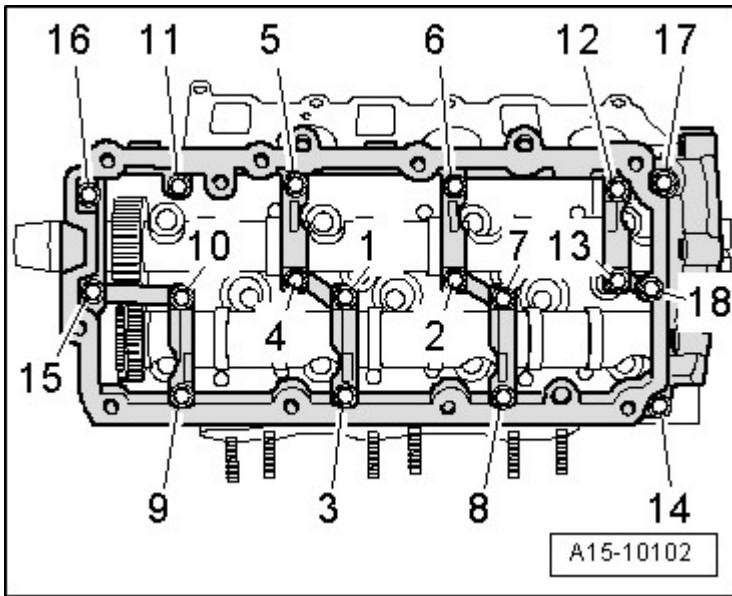


Fig. 202: Identifying Left Cylinder Head Guide Frame, Tightening Specifications and Sequence
 Courtesy of AUDI OF AMERICA, LLC

-- Tighten the guide frame bolts. Refer to **Fig. 18**.

-- Remove the T40095 and T40096.

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

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

-- Install the fuel rail and the high pressure lines. Refer to **Removal and Installation**.

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

-- Camshaft seal, removing and installing. Refer to **CAMSHAFT SEAL**.

-- Install the high pressure pump toothed belt and the upper section of the intake manifold. Refer to **Removal and Installation**.

-- Install the camshaft timing chains **CHECKING THE VALVE TIMING**.

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 engine at least 2 full revolutions.

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

- Puller T10320
- Camshaft Fitting Tool T40094
- Camshaft Fitting Tool T40095
- Component of T40096 T40096
- Pry Lever - Rmv Outside Mirror 80-200
- Retainer 3036
- Hand drill with plastic brush attachment
- Protective eyewear
- Sealant

Removing

-- Remove the affected camshaft timing chain from the camshaft. Refer to **CAMSHAFT TIMING CHAINS, REMOVING FROM CAMSHAFTS.**

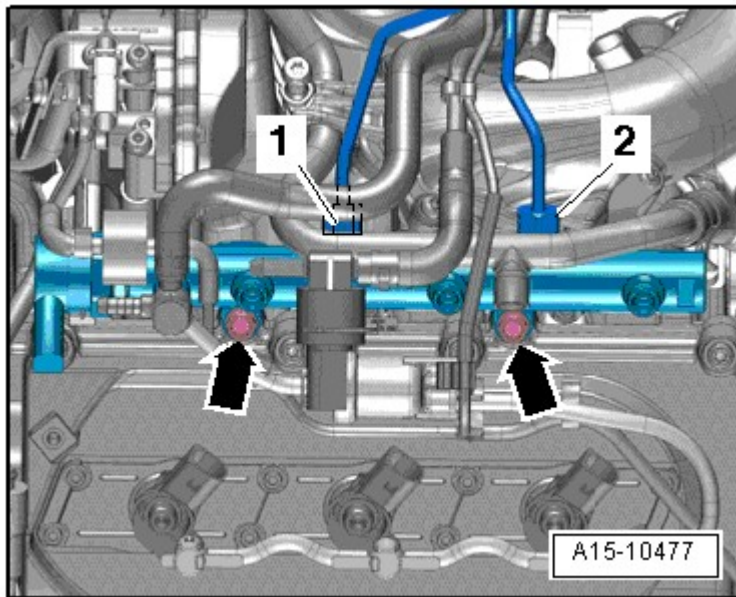


Fig. 203: Identifying Bolts -Arrows- And Fuel Rail
Courtesy of AUDI OF AMERICA, LLC

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

NOTE: Pay attention to the rules of cleanliness. Refer to **CLEAN WORKING CONDITIONS** .

-- Remove the union nuts -1- and -2-.

- Remove the bolts -arrows- and then move the fuel rail to the side with the hoses still attached.
- Free up the wiring harness -arrow- using the 80 - 200.

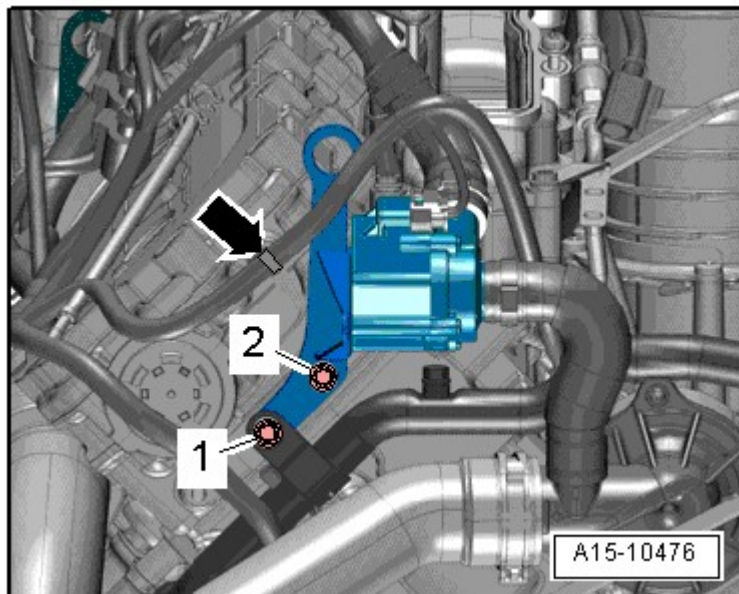


Fig. 204: Identifying Wiring Harness -Arrow-
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1 and 2-.

- Loosen the guide frame bolts and nuts in the sequence -17 to 1-.

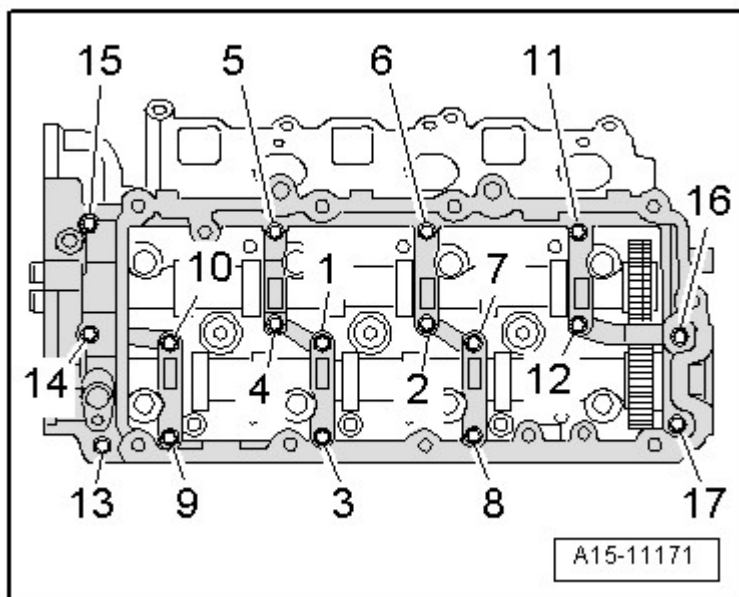


Fig. 205: Identifying Right Cylinder Head Guide Frame, Tightening Specifications and Sequence

Courtesy of AUDI OF AMERICA, LLC

NOTE: Be careful of the roller rocker lever and the adjusters when removing the camshafts.

-- Carefully remove the bearing bracket and camshafts.

Installing

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

NOTE: Replace the front cover in the cylinder head on the right side.

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

- Install the camshaft as described with the T40094.

Risk of contaminating lubricating system.

- Cover any open parts in the cylinder head.

WARNING: Risk of eye injury.

- Wear protective eyewear.

-- Remove the sealant residue on the cylinder head and guide frame and the upper section of the oil pan, for example using a rotating plastic brush.

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

-- Lubricate the running surfaces of both camshafts.

Set up the T40094 as follows:

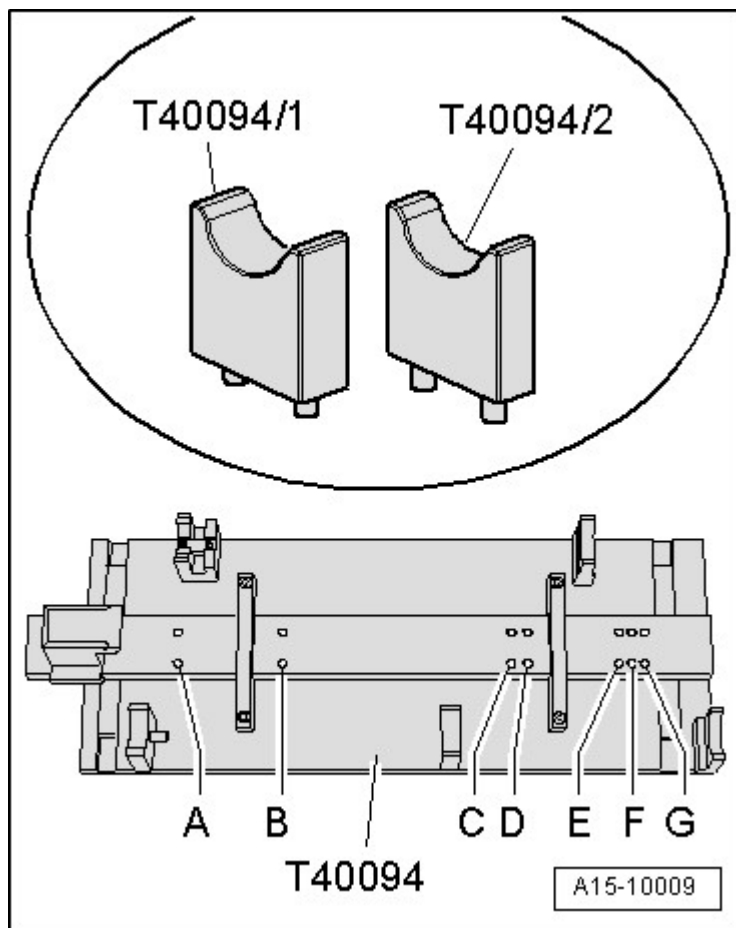


Fig. 206: Identifying Bracket T40094/1 And Bracket T40094/2
 Courtesy of AUDI OF AMERICA, LLC

- Install the T40094/2 in -B-.
- Install the T40094/1 in -C-.
- Install the exhaust camshaft -1- into the T40094/1 and T40094/2.

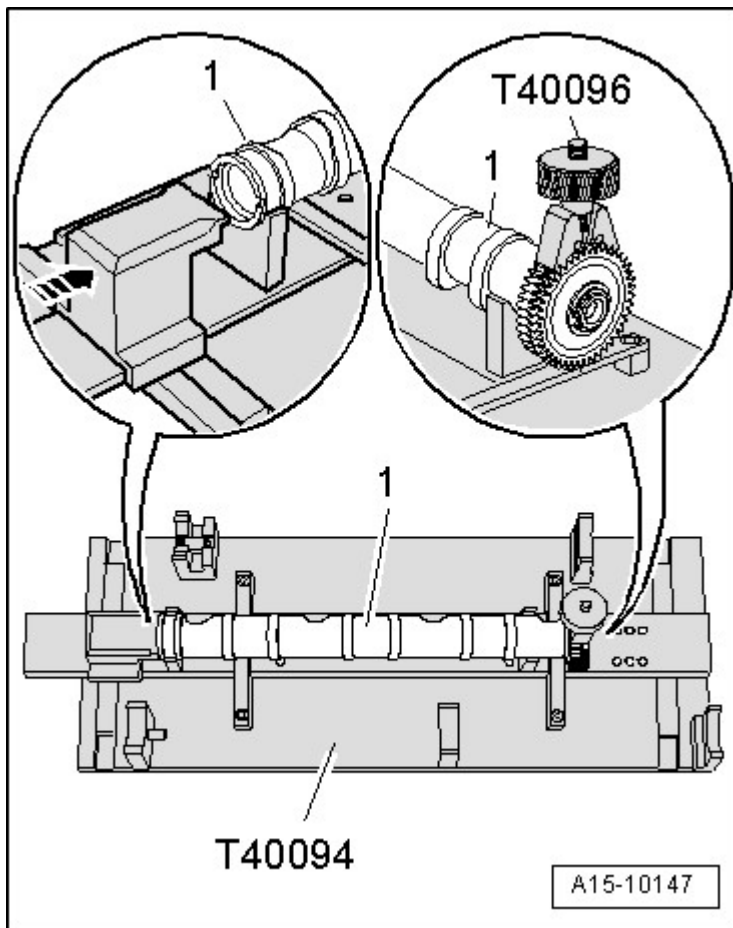


Fig. 207: Identifying Camshaft Insertion Tools T40094 And T40096
Courtesy of AUDI OF AMERICA, LLC

- Turn the exhaust camshaft so that it can be locked with the straight-edge in the "TDC" position -arrow-.
- Place the intake camshaft -2- into the T40094.

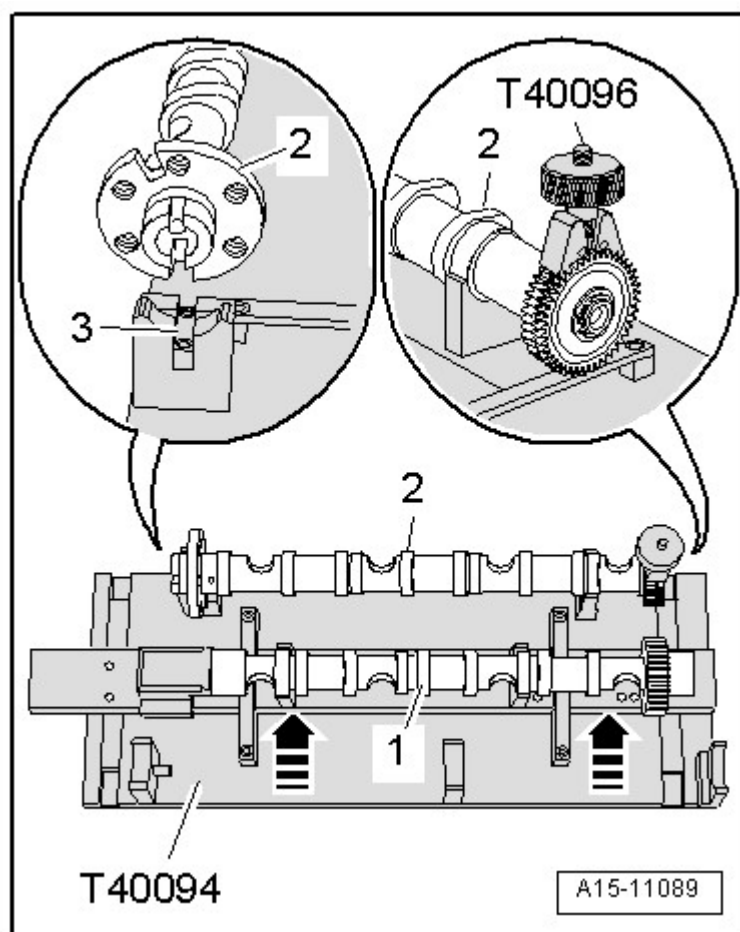


Fig. 208: Placing Intake Camshaft -2- Into T40094

Courtesy of AUDI OF AMERICA, LLC

- The securing pin -3- must engage in the groove on the intake camshaft.
- Mount the T40096 onto the teeth of the intake camshaft so that one arm of the clamping device engages in one sprocket half.
- Tension the clamping device with the thumb wheel until the tooth faces align.
- Push the exhaust camshaft -1- toward the intake camshaft -arrows- until the splines engage.
- Make sure the camshaft is positioned correctly:
- The notches -arrows- on both camshafts must face upward.

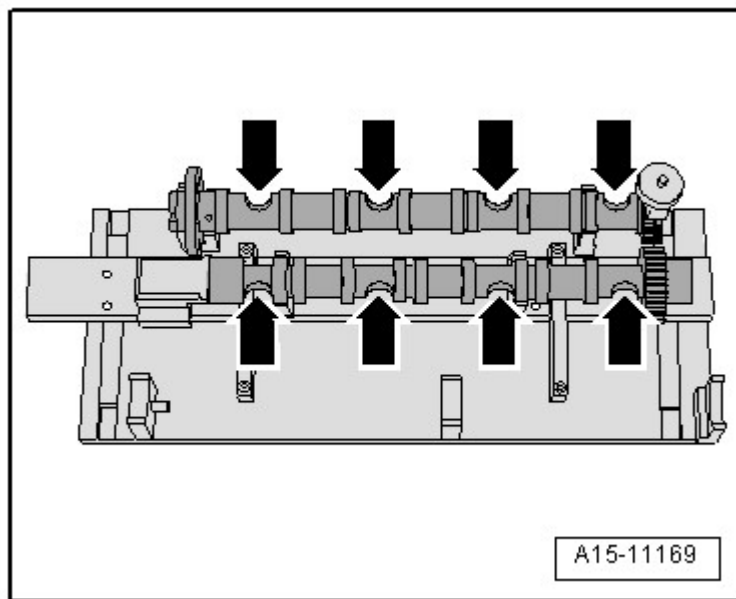


Fig. 209: Identifying Notches -Arrows- On Both Camshafts
Courtesy of AUDI OF AMERICA, LLC

-- Place the bearing brackets -1- on both camshafts.

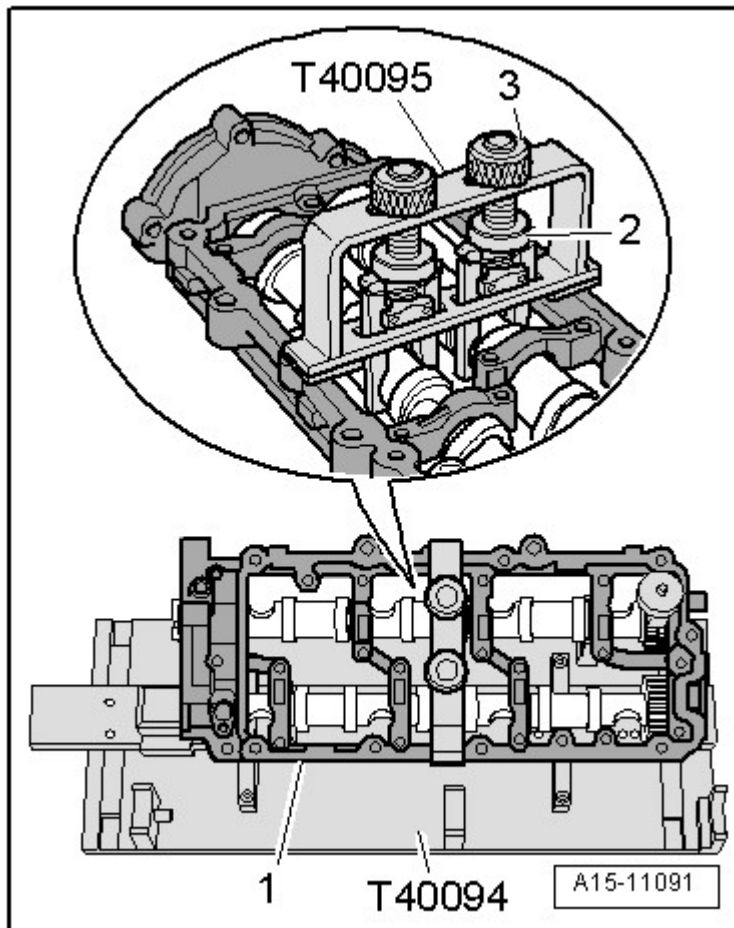


Fig. 210: Placing Bearing Brackets -1- On Both Camshafts And Mounting T40095 Onto Camshafts
Courtesy of AUDI OF AMERICA, LLC

- All the camshaft bearings must lie on the camshafts.
- Mount the T40095 onto the camshafts by aligning the pliers and tension with the knurled nuts -2-.
- Tension the camshafts by tightening the nuts -3-.
- Make sure the alignment pins -arrows- are in the cylinder head. Insert any missing alignment pins.

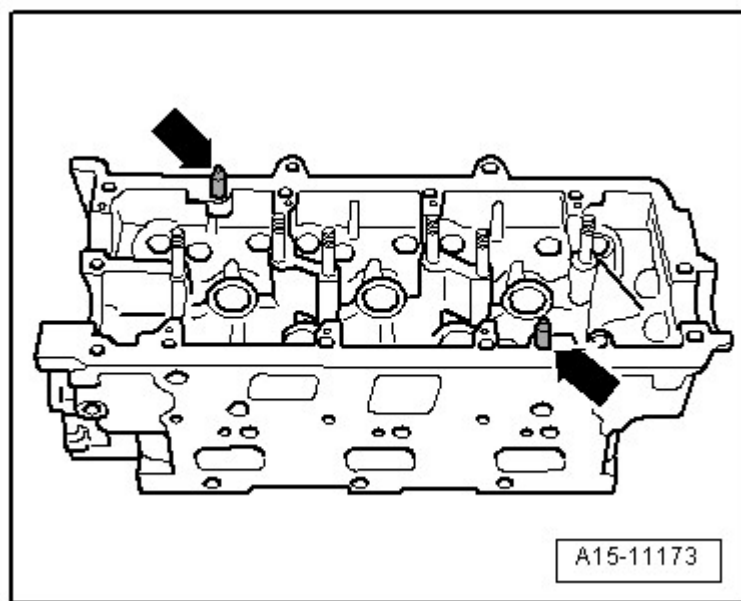


Fig. 211: Locating Cylinder Head Alignment Pins
Courtesy of AUDI OF AMERICA, LLC

NOTE: Note the expiration date of the sealing compound.

-- Cut the tube nozzle at the front marking (nozzle diameter approximately 1.5 mm).

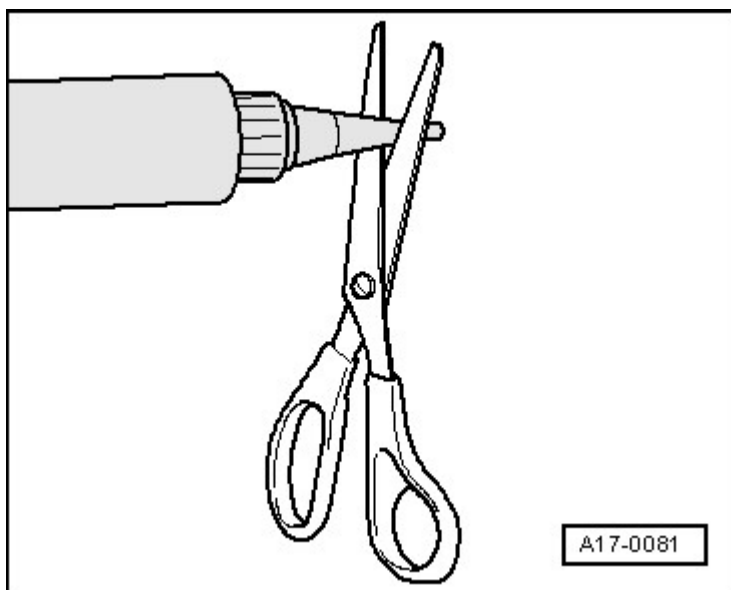


Fig. 212: Identifying Scissors To Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 1.5 mm)
Courtesy of AUDI OF AMERICA, LLC

NOTE: The guide frame is shown without the camshafts.

-- Turn the guide frame around.

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

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

-- Apply sealant beads -arrows- to the clean sealing surfaces on the guide frame as shown in the illustration.

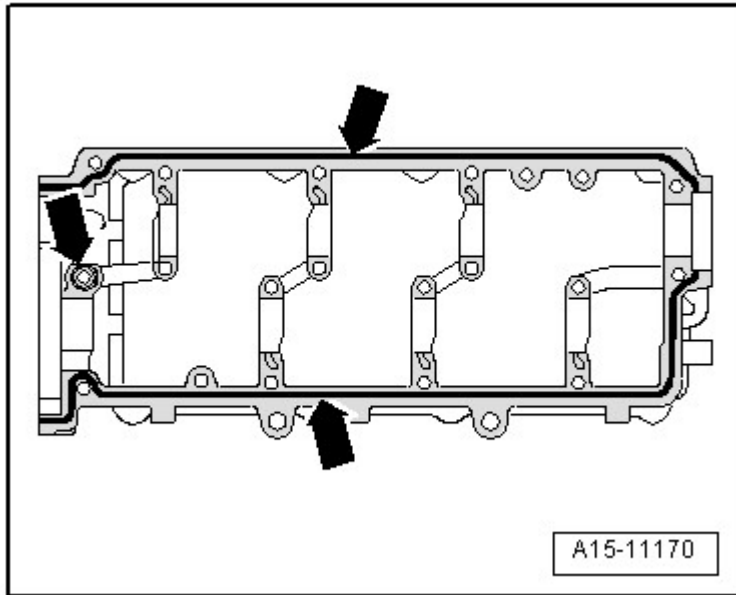


Fig. 213: Identifying Sealant Beads -Arrows- Application Area On Guide Frame
Courtesy of AUDI OF AMERICA, LLC

- The grooves of sealing surface must be completely filled with sealant.
- The sealant beads must be 1.5 to 2.0 mm above the sealing surface.

NOTE: The guide frame must be installed within 5 minutes after applying the sealant.

CAUTION: The engine could be damaged.

- **Make sure all the roller rocker levers are seated correctly on the valve stem ends and the adjusters.**

-- Mount the guide frame together with both camshaft and the T40095 to the cylinder head.

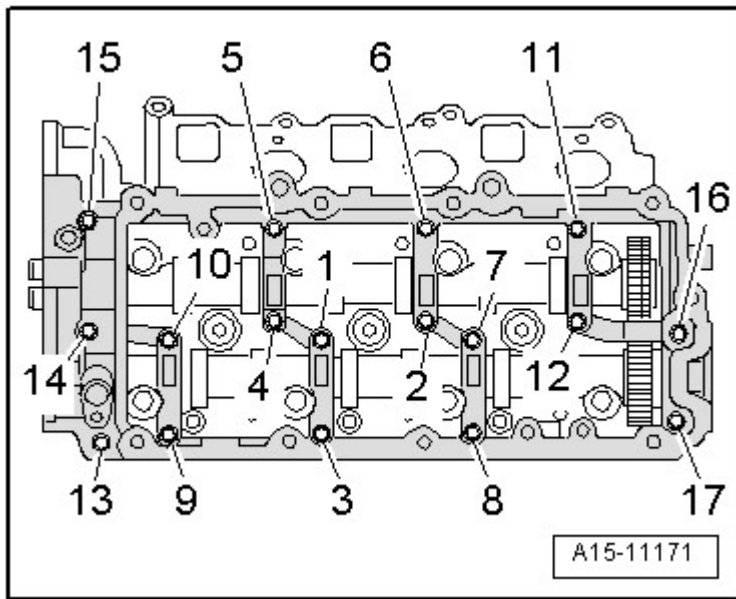


Fig. 214: Identifying Right Cylinder Head Guide Frame, Tightening Specifications and Sequence
 Courtesy of AUDI OF AMERICA, LLC

-- Tighten the guide frame bolts. Refer to **Fig. 19**.

-- Remove the T40095 and T40096.

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

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

-- Install the fuel rail and the high pressure lines. Refer to **Removal and Installation**.

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

-- Install the new cover with a suitable drift so that it is flush.

-- Install the camshaft timing chains **CHECKING THE VALVE TIMING**.

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 engine at least 2 full revolutions.

VALVE STEM SEALS, CYLINDER HEAD INSTALLED

Special tools and workshop equipment required

- Hinged Socket 3220
- Valve Seal Removal Tool 3364
- Valve Stem Seal Driver 3365
- Valve Cotters Asm/Dis-Asm Device VAS 5161 with Knurled Spacer Ring VAS 5161/23-1 and Guide Plate VAS 5161/23

Removing

-- Remove all the glow plugs. Refer to **Removal and Installation** .

-- Camshafts, removing. Refer to **LEFT CYLINDER HEAD CAMSHAFT**, **RIGHT CYLINDER HEAD CAMSHAFT**.

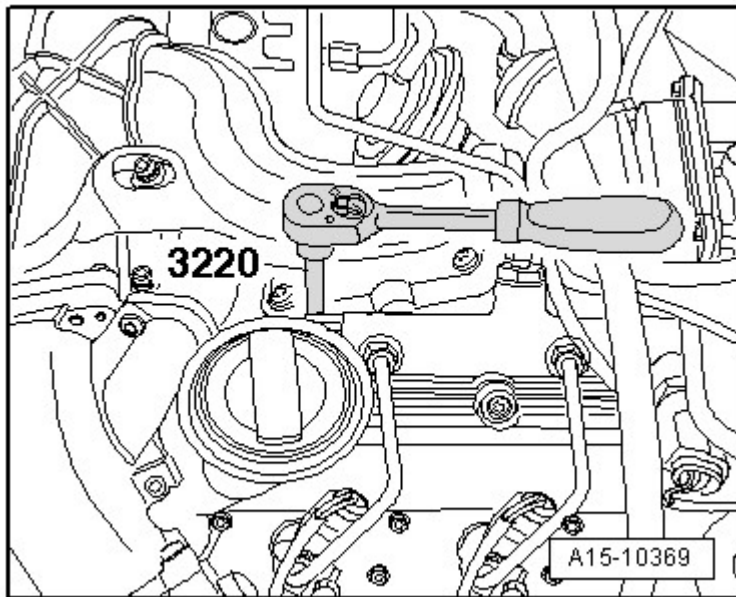


Fig. 215: Identifying Socket 3320 To Remove Glow Plugs
Courtesy of AUDI OF AMERICA, LLC

-- 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 (DC) position".

-- Mount the VAS 5161/23 on cylinder head.

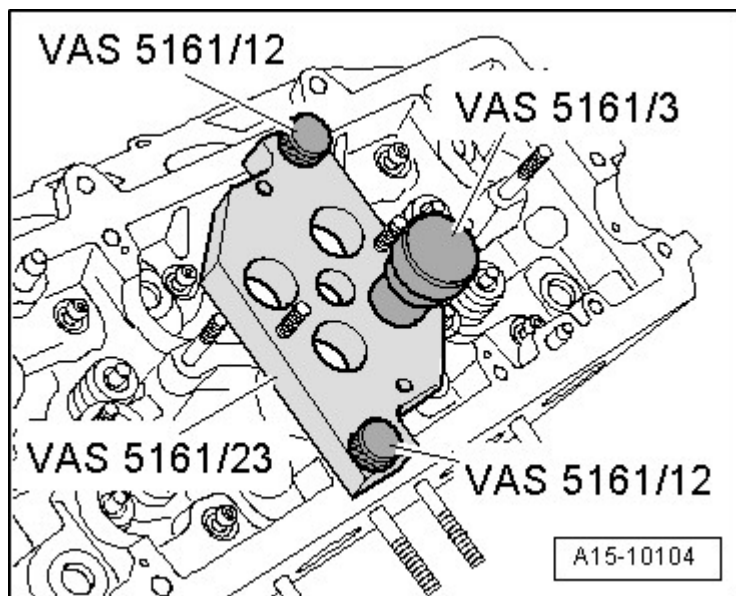


Fig. 216: Identifying Punch VAS 5161/3, Knurled Thumb Screws VAS 5161/12 And Guide Plate For 3.0 Liter TDI Engine VAS 5161/23

Courtesy of AUDI OF AMERICA, LLC

- Secure the guide plate with the knurled screws VAS 5161/12.
- Insert the drift VAS 5161/3 in the guide plate and loosen the stuck valve retainers with a plastic mallet.
- Install the sealing bolt VAS 5161/10 into the guide plate.

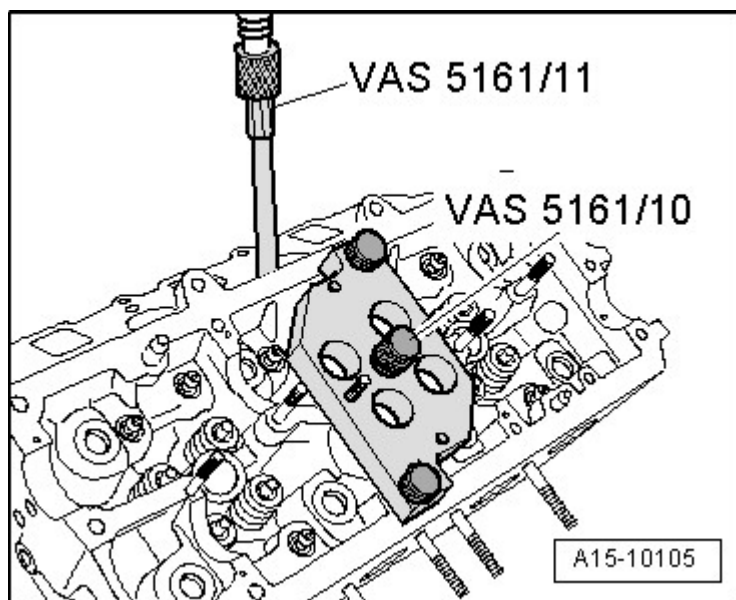


Fig. 217: Identifying Compression Stud VAS 5161/10 And Compressed Air Connection VAS 5161/11

Courtesy of AUDI OF AMERICA, LLC

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

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

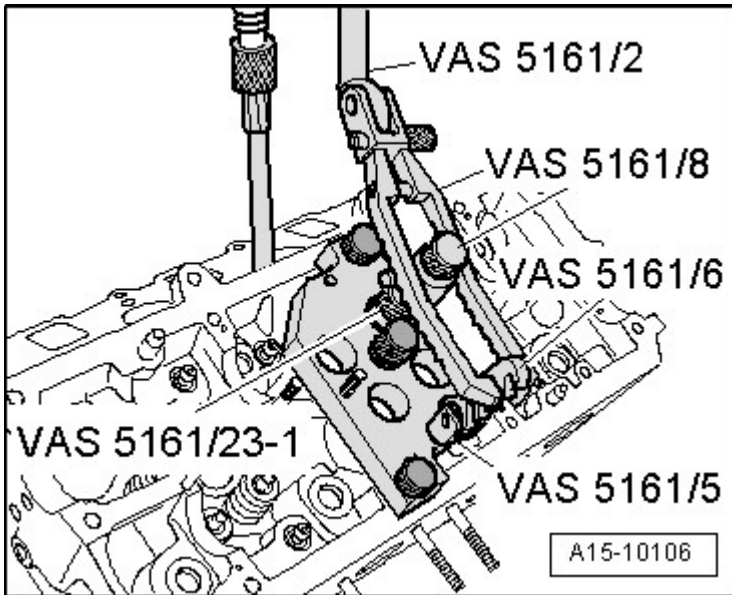


Fig. 218: Identifying Valve Insertion Device VAS 5161/8 Inserted In Guide Plate For 3.0 Liter TDI Engine VAS 5161/23

Courtesy of AUDI OF AMERICA, LLC

- Slide the knurled spacer ring VAS 5161/23-1 onto 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 positive pressure.
- 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 the 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 the pressure fork.
- Remove the installation cartridge with the knurled spacer ring.
- Remove the valve spring and the valve spring plate.
- Remove the valve stem seal with the 3364.

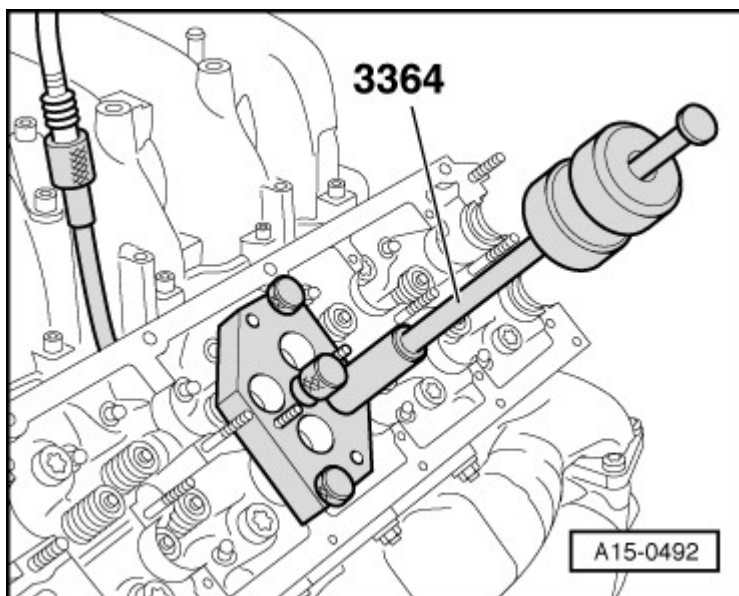


Fig. 219: Identifying Valve Seal Removal Tool 3364
Courtesy of AUDI OF AMERICA, LLC

If puller cannot be used on several valve stem seals due to restricted clearance, proceed as follows:

-- Remove the roll pin -arrow- on the puller with a drift and remove the impact puller attachment.

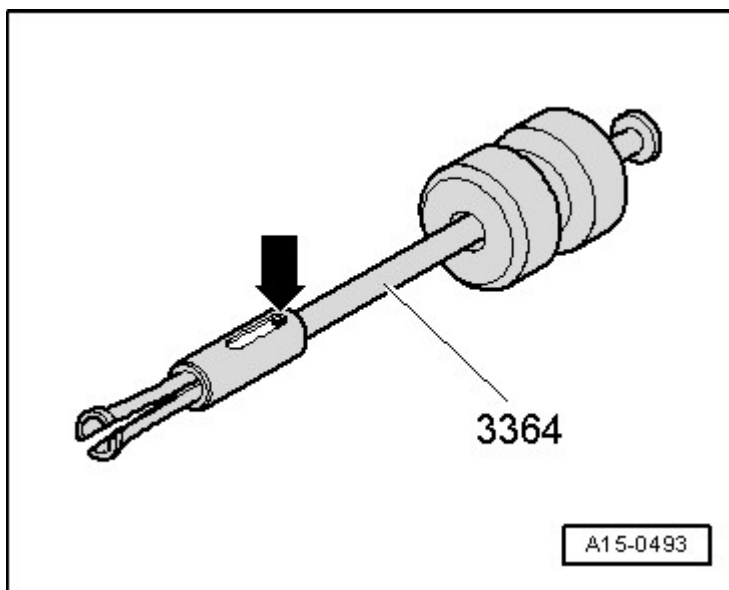


Fig. 220: Identifying Valve Seal Removal Tool 3364
Courtesy of AUDI OF AMERICA, LLC

-- Position the lower part of the 3364 on the valve stem seal.

-- Secure the puller with a drift or cotter drive pin -1- as shown in the illustration.

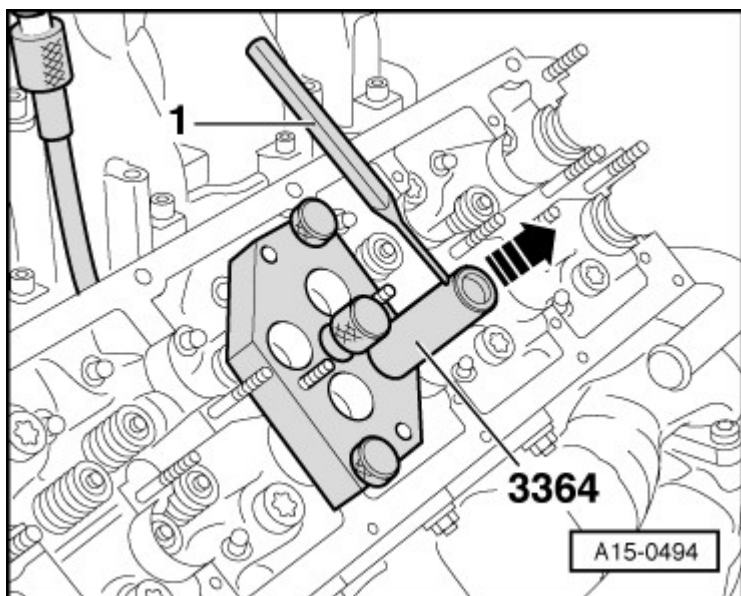


Fig. 221: Identifying Lower Section Of Valve Seal Removal Tool 3364 On Valve Stem Seal
 Courtesy of AUDI OF AMERICA, LLC

-- Position the valve lever on the puller and remove the valve stem seal -arrow-.

CAUTION: Risk of damage when installing valve stem seals.

- Place plastic sleeve -A- that is attached to valve stem seals -B- on valve stem.

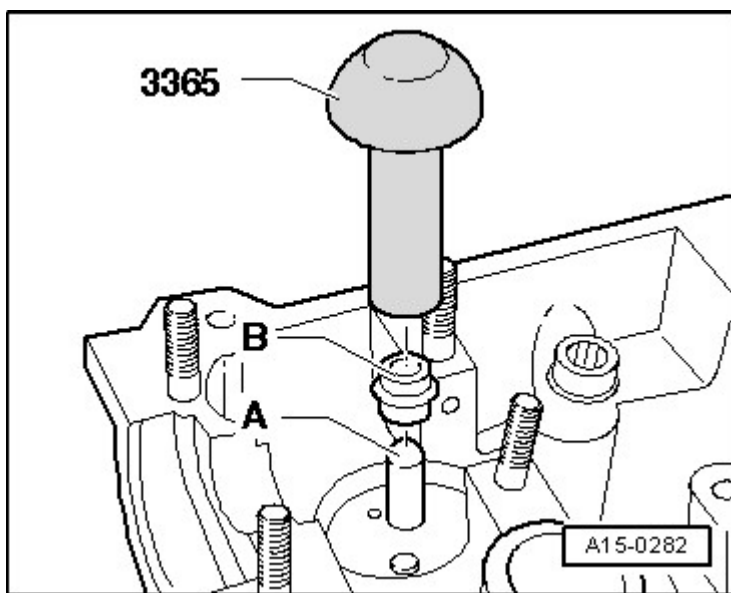


Fig. 222: Identifying Plastic Sleeve, New Valve Stem Oil Seals & Valve Stem Seal Driver 3365
 Courtesy of AUDI OF AMERICA, LLC

-- Lightly oil valve stem seal.

- Slide valve shaft seal onto plastic sleeve.
- Carefully press valve stem seal onto valve guide with the 3365.
- Remove plastic sleeve.

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

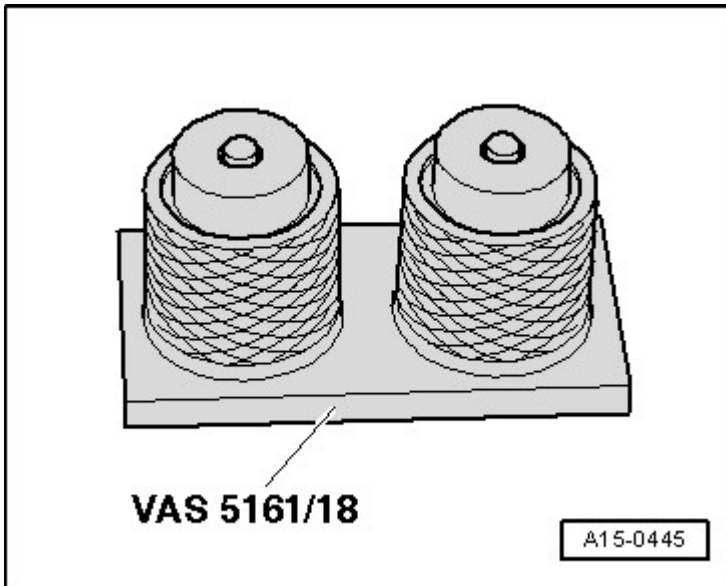


Fig. 223: Identifying Installation Cartridge VAS 5161/8
Courtesy of AUDI OF AMERICA, LLC

- 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 the valve retainers.
 - Insert installation cartridge in the VAS 5161/23.

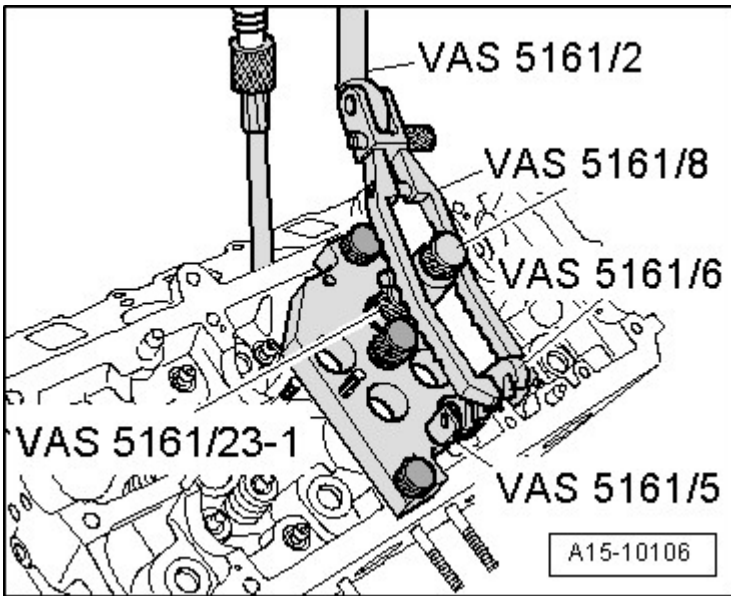


Fig. 224: Identifying Valve Insertion Device VAS 5161/8 Inserted In Guide Plate For 3.0 Liter TDI Engine VAS 5161/23

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

Assemble in reverse order of disassembling. Note the following:

-- Camshafts, installing. Refer to **LEFT CYLINDER HEAD CAMSHAFT** and **RIGHT CYLINDER HEAD CAMSHAFT**.

-- 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 Cotters Asm/Dis-Asm Device VAS 5161 with Knurled Spacer Ring VAS 5161/23-1 and Guide Plate VAS 5161/23
- Engine and Transmission Holder VAS 6095
- Cylinder Head Tensioning Device VAS 6419

Removing

-- Camshafts, removing, refer to **LEFT CYLINDER HEAD CAMSHAFT** and **RIGHT CYLINDER HEAD CAMSHAFT**.

-- 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.

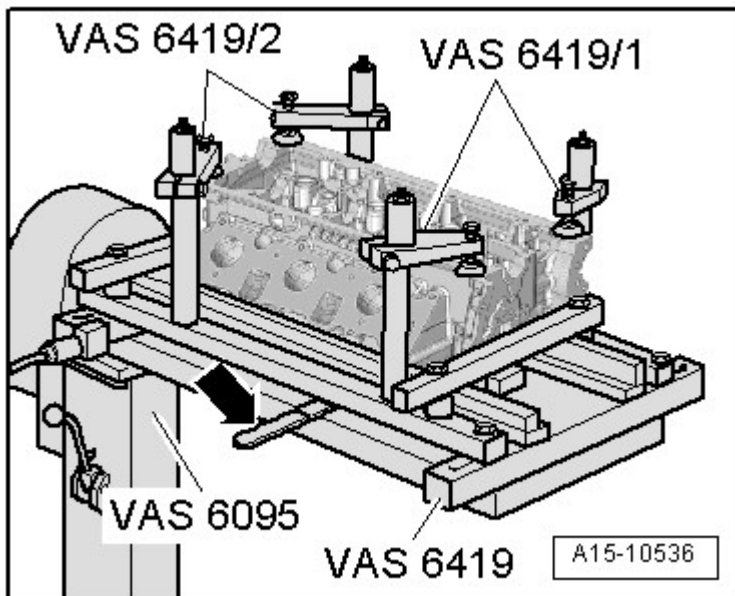


Fig. 225: Sliding Air Cushion With Lever Under Combustion Chamber
Courtesy of AUDI OF AMERICA, LLC

-- Let enough compressed air flow into the air cushion until it contacts the valve plate.

-- Mount the VAS 5161/23 on cylinder head.

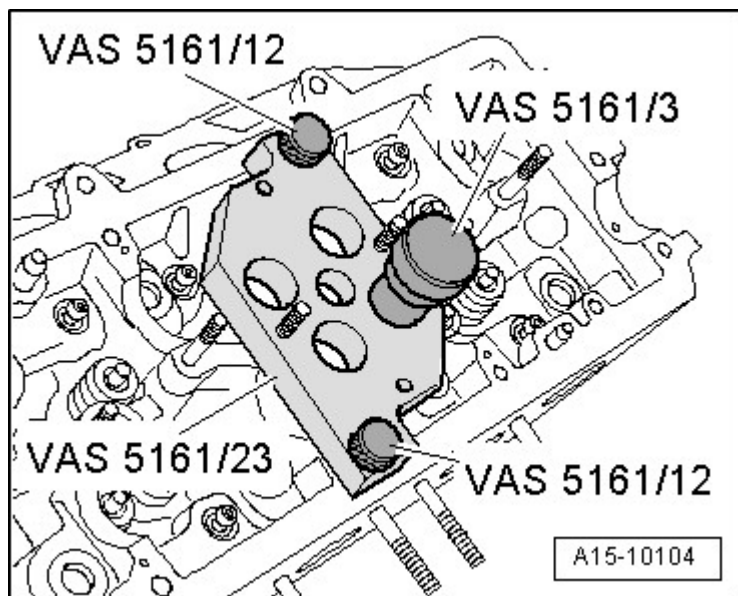


Fig. 226: Identifying Punch VAS 5161/3, Knurled Thumb Screws VAS 5161/12 And Guide Plate For 3.0 Liter TDI Engine VAS 5161/23

Courtesy of AUDI OF AMERICA, LLC

- Secure the guide plate with the knurled screws VAS 5161/12.
- Insert the drift VAS 5161/3 in the guide plate and loosen the stuck valve retainers with a plastic mallet.
- Install engaging device VAS 5161/6 with installation fork VAS 5161/5 in guide plate.

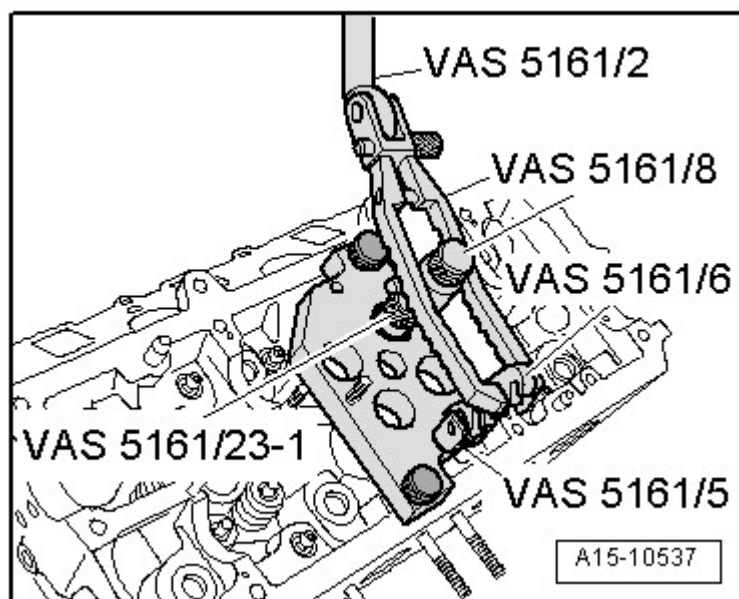


Fig. 227: Identifying Engaging Device VAS 5161/6 With Installation Fork VAS 5161/5 In Guide Plate

Courtesy of AUDI OF AMERICA, LLC

- Slide the knurled spacer ring VAS 5161/23-1 onto 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 the pressure fork.
- Remove the installation cartridge with the knurled spacer ring.
- Remove the valve spring and the valve spring plate.
- Remove the valve stem seal with the 3364.

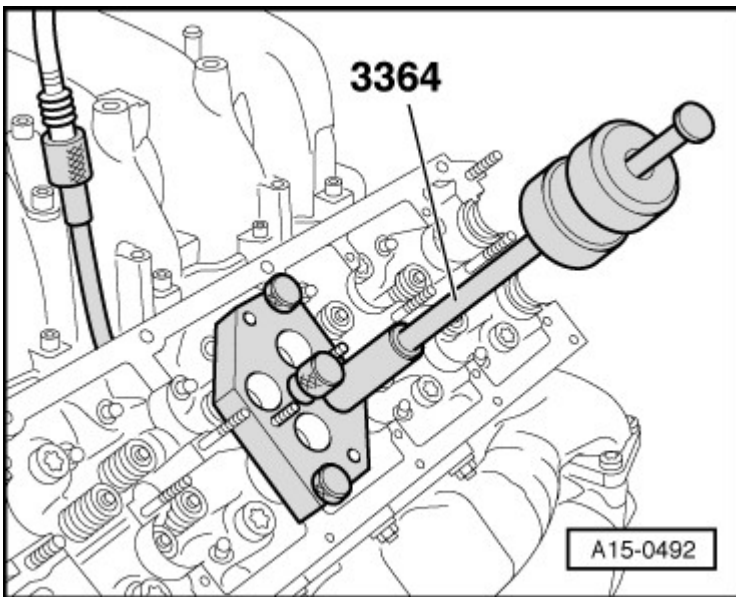


Fig. 228: Identifying Valve Seal Removal Tool 3364
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of damage when installing valve stem seals.

- Place plastic sleeve -A- that is attached to valve stem seals -B- on valve stem.

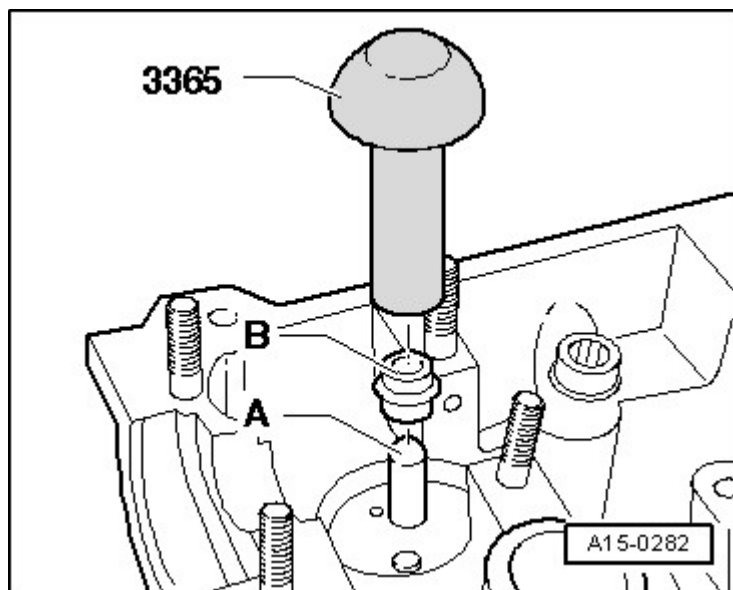


Fig. 229: Identifying Plastic Sleeve, New Valve Stem Oil Seals & Valve Stem Seal Driver 3365
Courtesy of AUDI OF AMERICA, LLC

- Lightly oil valve stem seal.
- Slide valve shaft seal onto plastic sleeve.
- Carefully press valve stem seal onto valve guide with the 3365.
- Remove plastic sleeve.

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

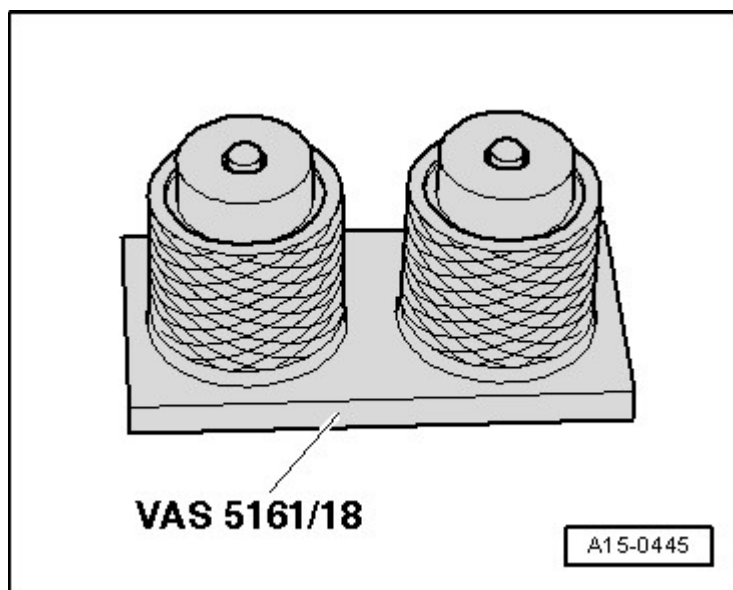


Fig. 230: Identifying Installation Cartridge VAS 5161/8
 Courtesy of AUDI OF AMERICA, LLC

- 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 VAS 5161/23.

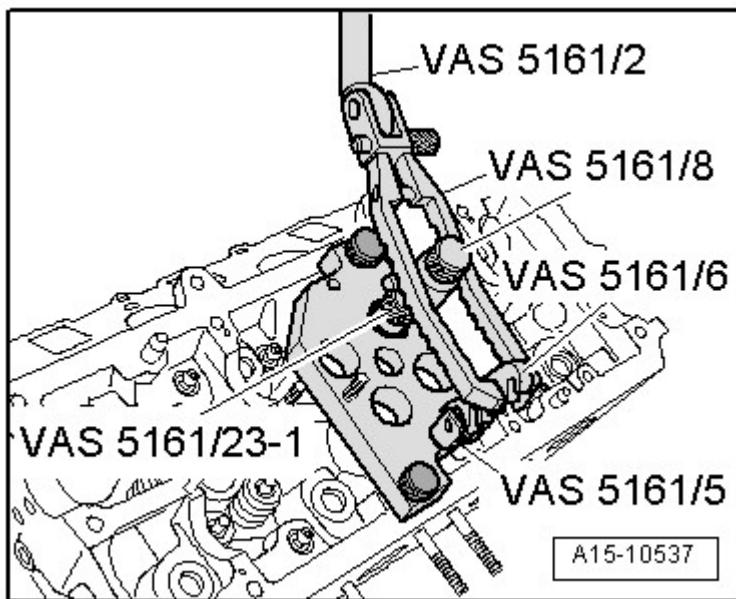


Fig. 231: Identifying Engaging Device VAS 5161/6 With Installation Fork VAS 5161/5 In Guide Plate
 Courtesy of AUDI OF AMERICA, LLC

-- 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

Assemble in reverse order of disassembling. Note the following:

-- Install the camshafts. Refer to **LEFT CYLINDER HEAD CAMSHAFT** and **RIGHT CYLINDER HEAD CAMSHAFT**.

SPECIAL TOOLS

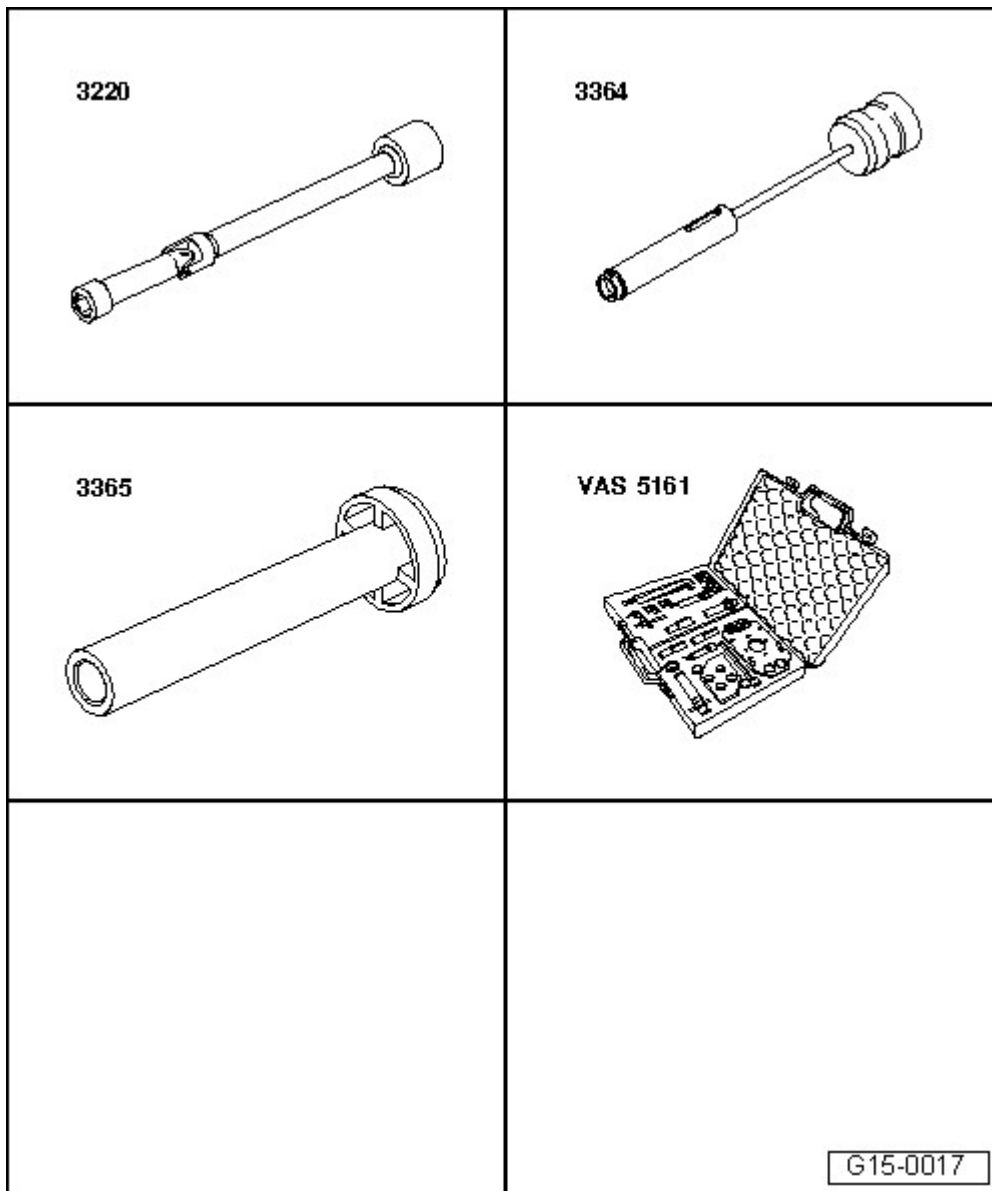


Fig. 232: Identifying 3220, 3364, 3365 And VAS 5161

Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Hinged Socket 3220
- Valve Seal Removal Tool 3364
- Valve Stem Seal Driver 3365
- Valve Cotteners Asm/Dis-Asm Device VAS 5161 with Knurled Spacer Ring VAS 5161/23-1 and Guide Plate VAS 5161/23

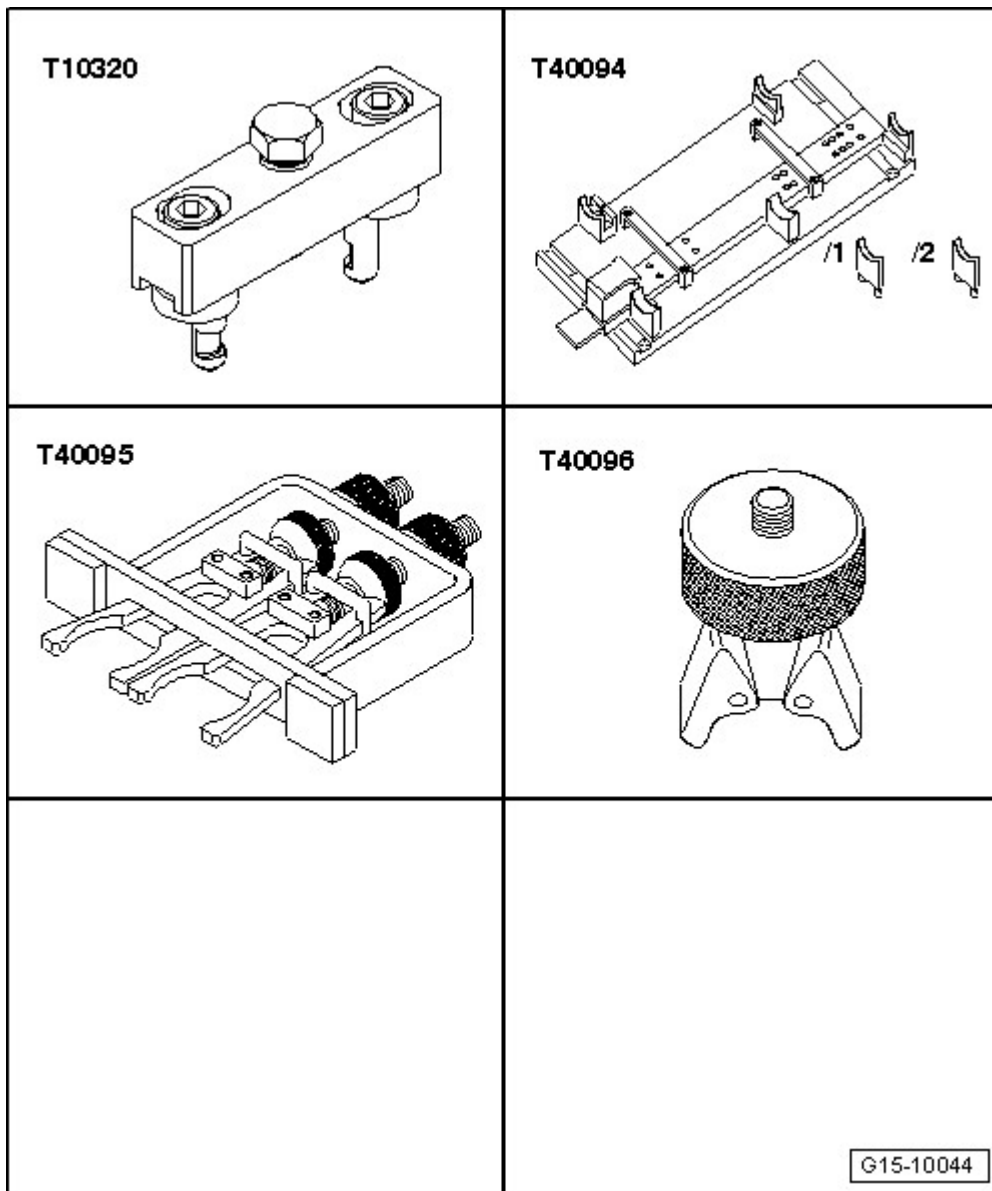


Fig. 233: Identifying Special Tools -- Left/Right Cylinder Head Camshaft
 Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Puller T10320
- Camshaft Fitting Tool T40094
- Camshaft Fitting Tool T40095
- Component of T40096 T40096

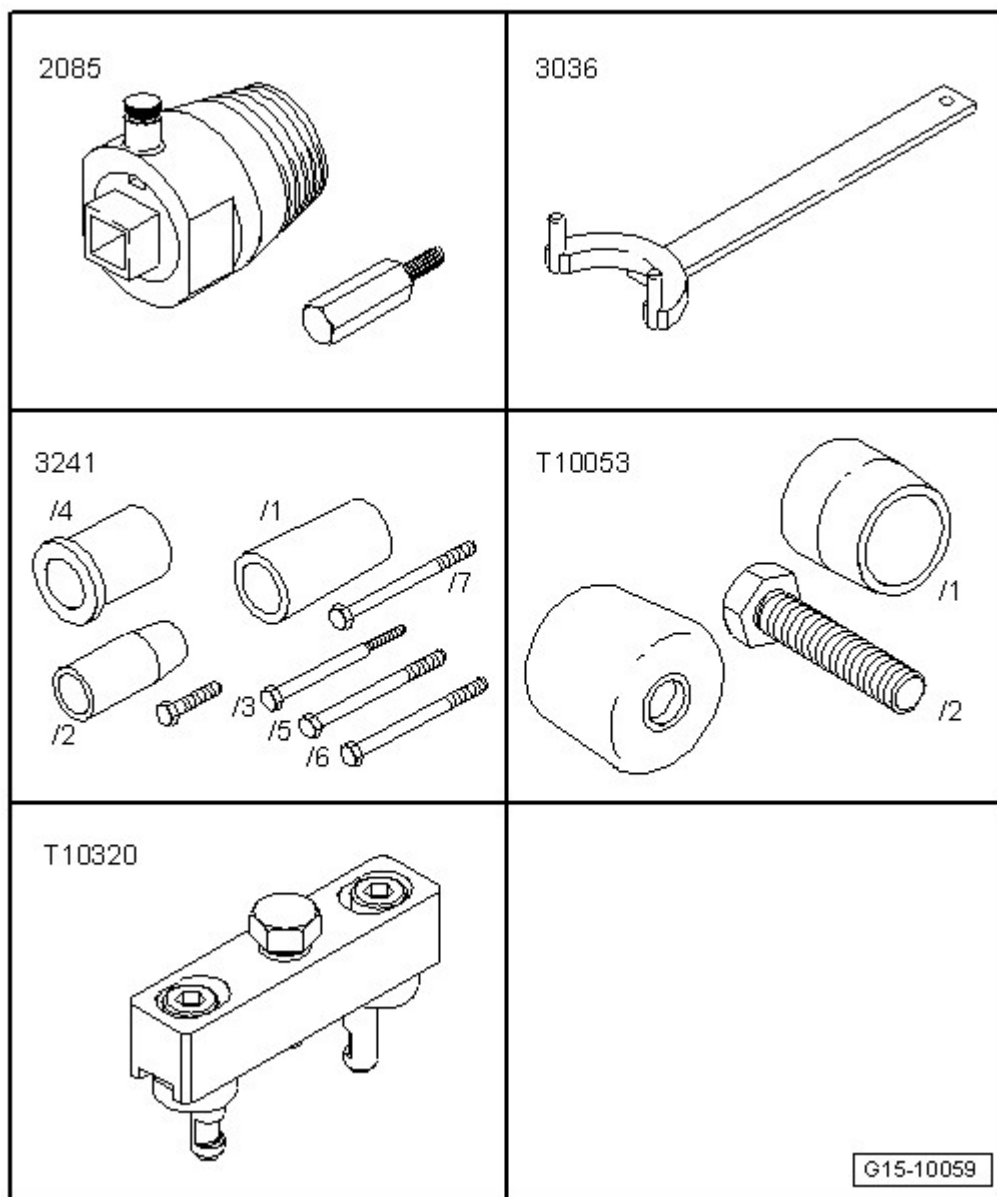


Fig. 234: Identifying Special Tools -- Camshaft Seal
 Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Seal Puller - General Usage 2085
- Retainer 3036
- M10 x 1.25 x 40 hex bolt from Seal Installer 3241
- Assembly Tool T10053
- Puller T10320

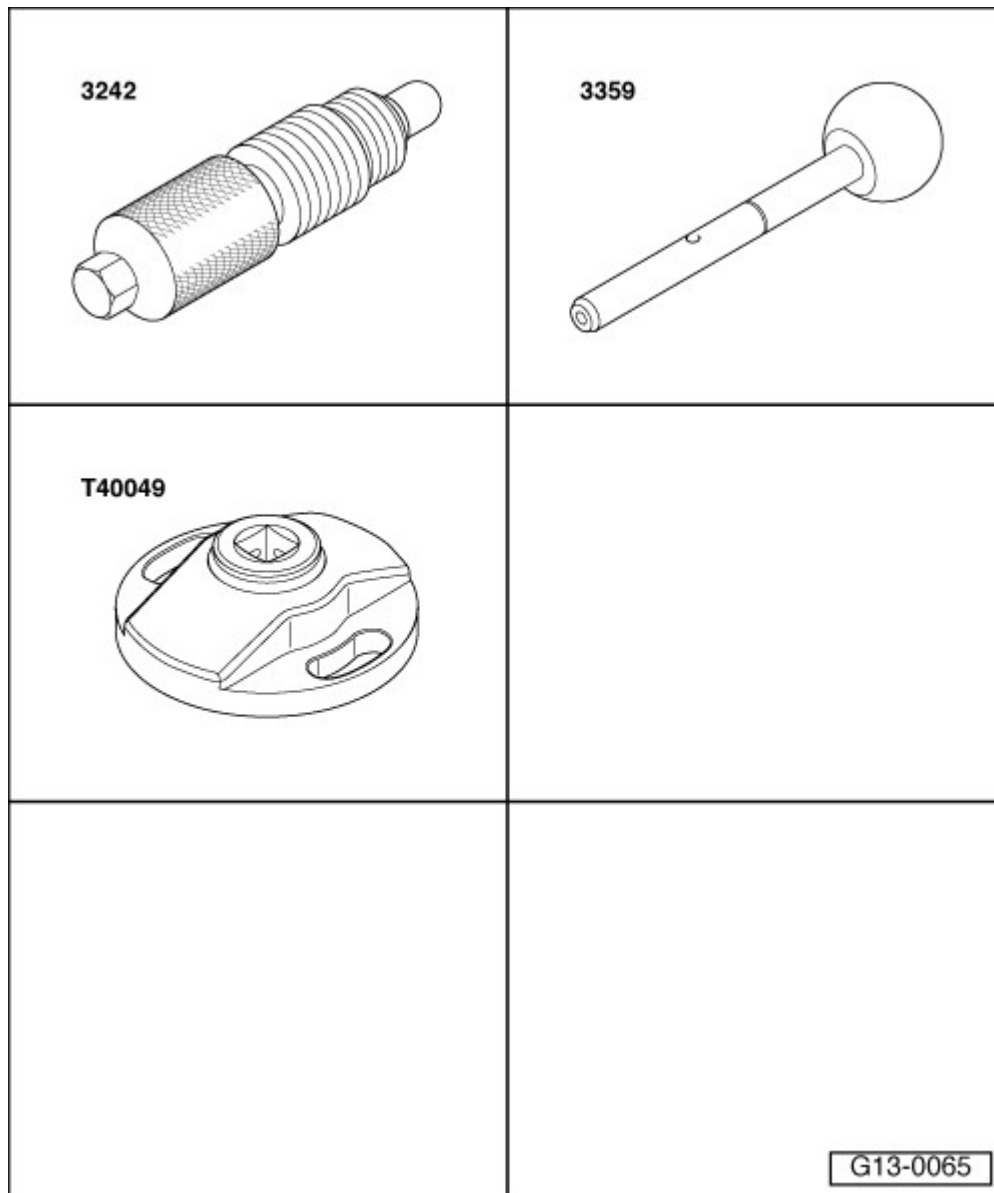


Fig. 235: Identifying Holder 3242, Pin 3359 And Key T40049

Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Crankshaft Holder 3242
- Diesel Injection Pump Locking Pin 3359
- Key T40049
- 3.3 mm diameter drill bit

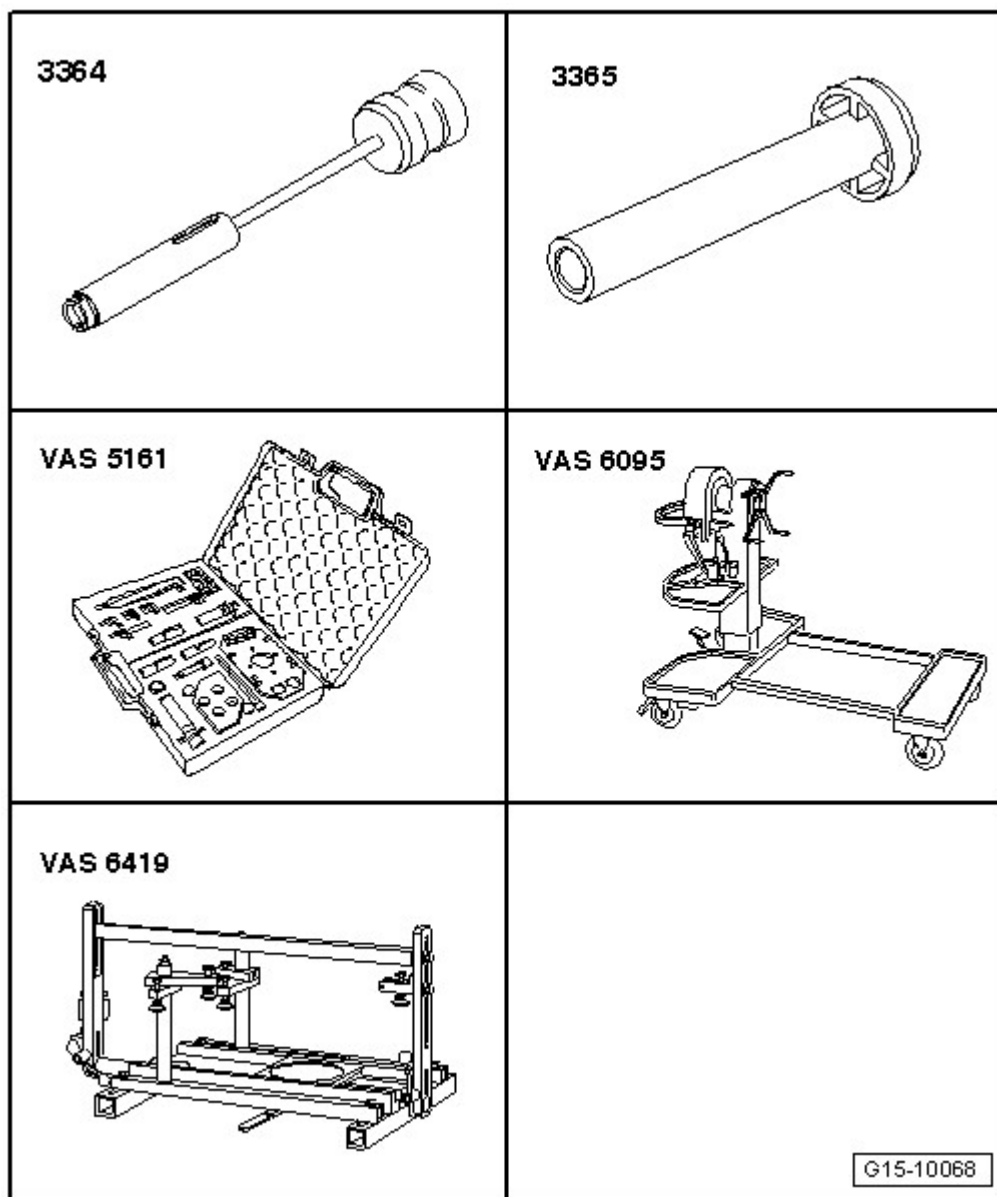


Fig. 236: Identifying Special Tools -- Valve Stem Seals With Cylinder Head Removal
 Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Valve Seal Removal Tool 3364
- Valve Stem Seal Driver 3365
- Valve Cotteners Asm/Dis-Asm Device VAS 5161 with Knurled Spacer Ring VAS 5161/23-1 and Guide Plate VAS 5161/23
- Engine and Transmission Holder VAS 6095
- Cylinder Head Tensioning Device VAS 6419

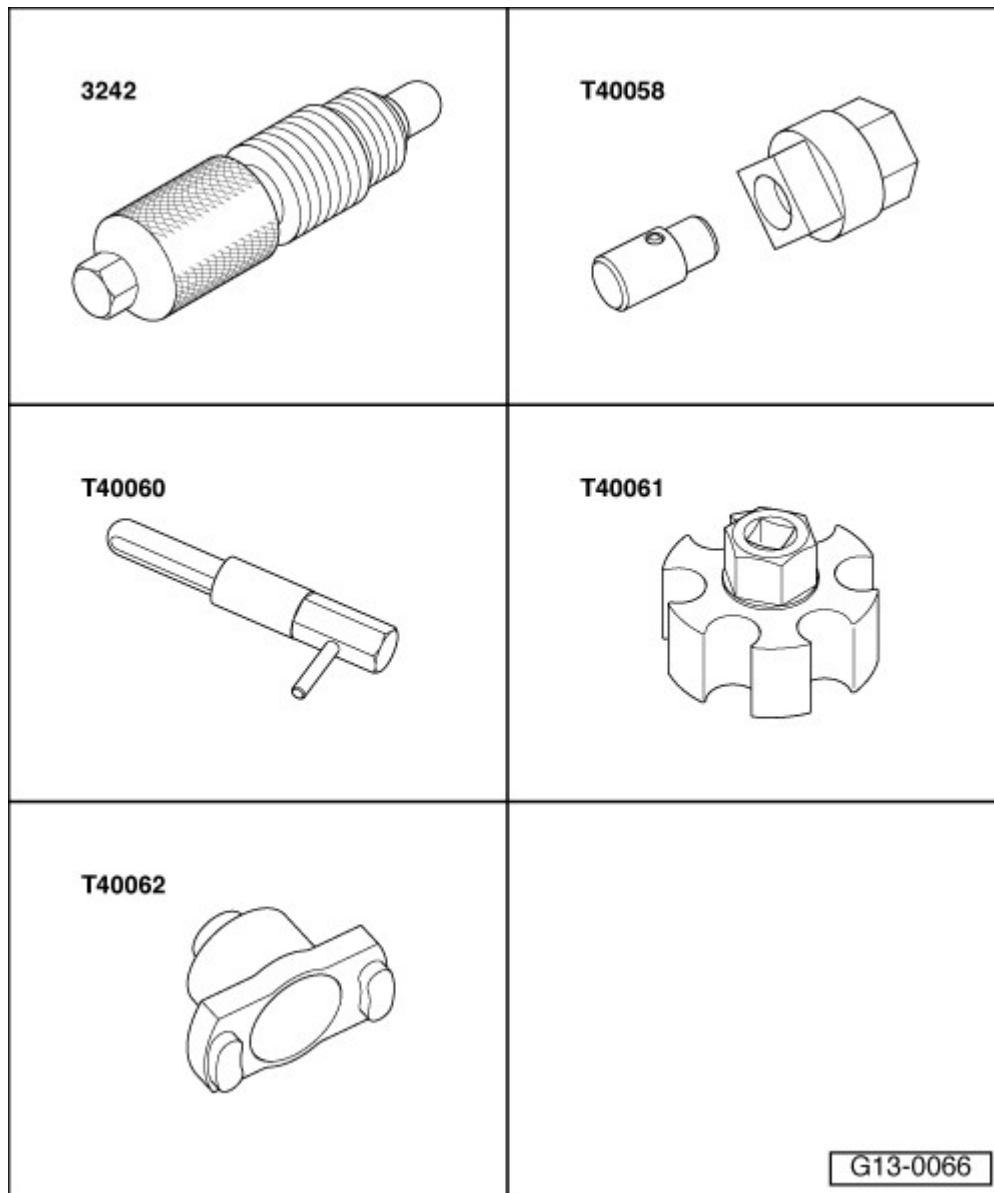


Fig. 237: Identifying Special Tools -- Camshaft Timing Chains

Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Crankshaft Holder 3242
- Socket T40058
- Adjusting Pin T40060 (quantity: 2)
- Adapter T40061
- Adapter T40062
- Hinged Socket 3220

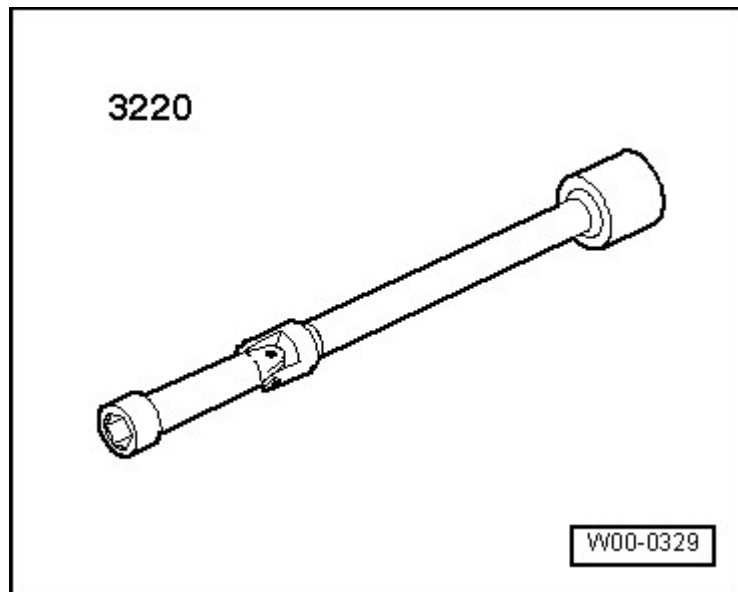


Fig. 238: Identifying Hinged Socket 3220
Courtesy of AUDI OF AMERICA, LLC

- Compression Tester V.A.G 1763 with Adapter V.A.G 1763/8

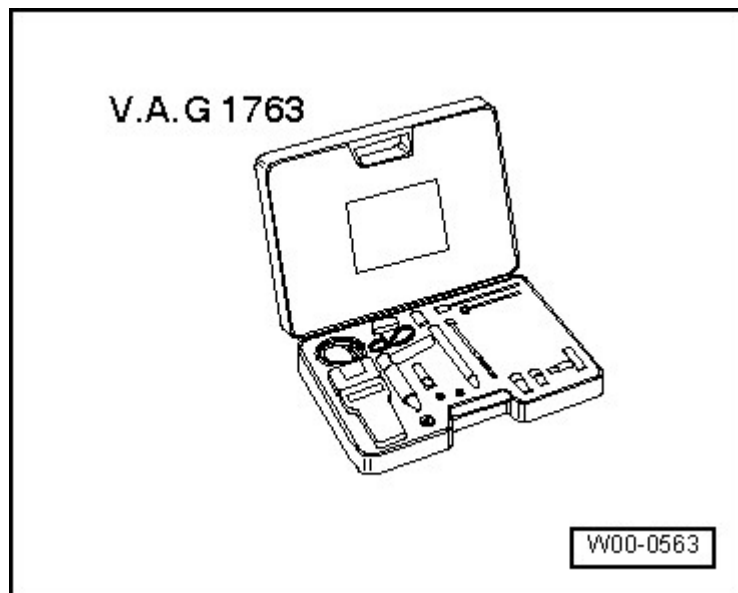


Fig. 239: Identifying Compression Tester V.A.G 1763
Courtesy of AUDI OF AMERICA, LLC

- Dial Gauge Holder VW 387

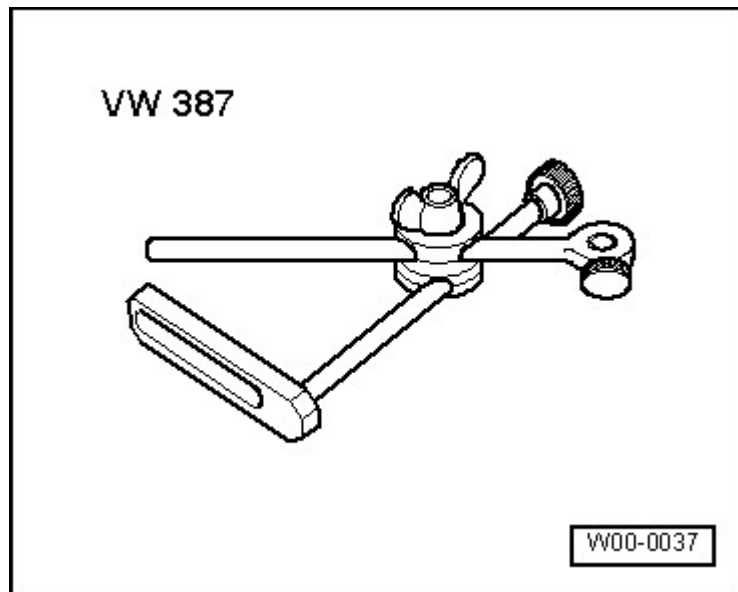


Fig. 240: Identifying Dial Gauge Holder VW 387
Courtesy of AUDI OF AMERICA, LLC

- Dial Gauge 0-10 mm VAS 6079

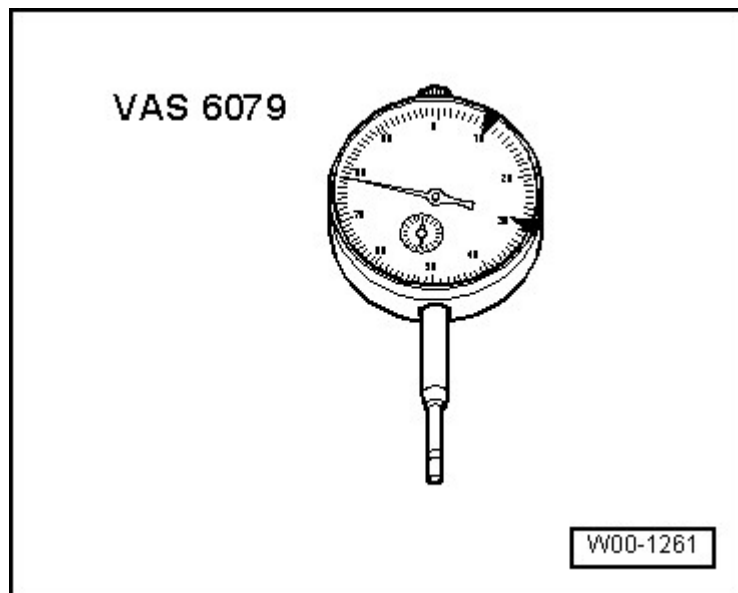


Fig. 241: Identifying Dial Gauge VAS 6079
Courtesy of AUDI OF AMERICA, LLC

- Socket T40058

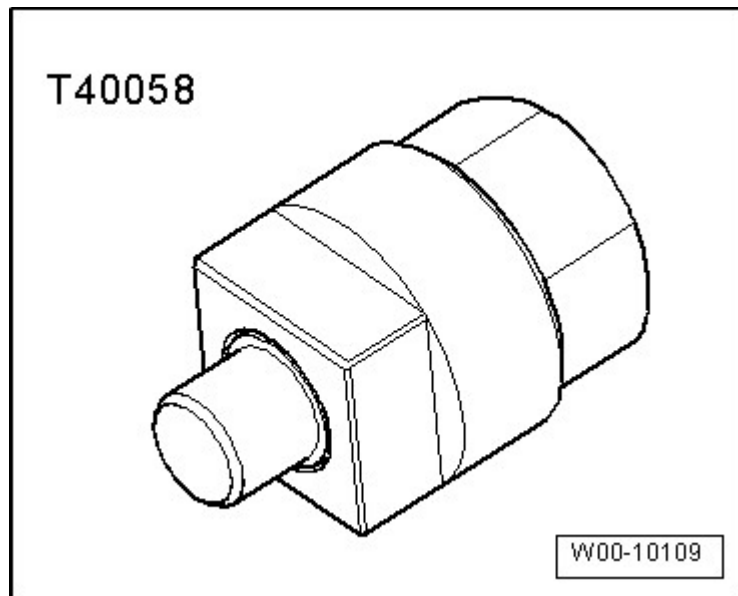


Fig. 242: Identifying Adapter T40058
Courtesy of AUDI OF AMERICA, LLC

- Locking Pin T40071

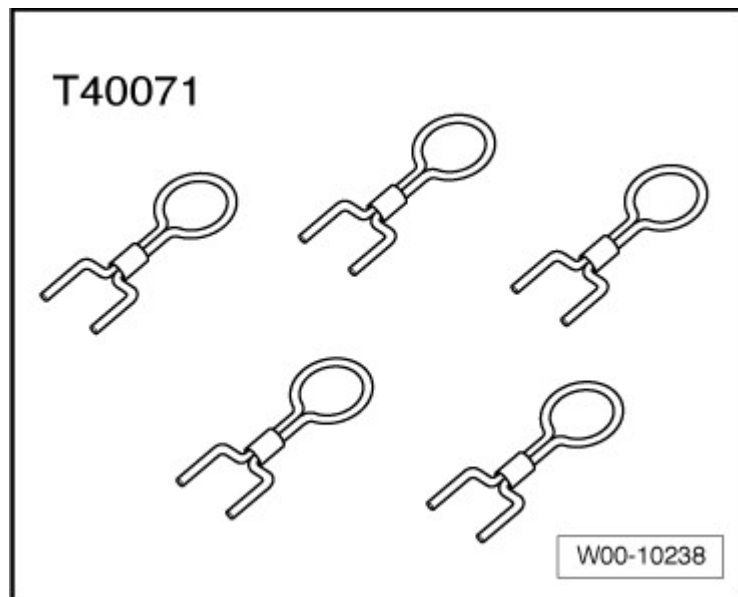


Fig. 243: Identifying Securing Pin T40071
Courtesy of AUDI OF AMERICA, LLC

- Pry Lever - Rmv Outside Mirror 80-200

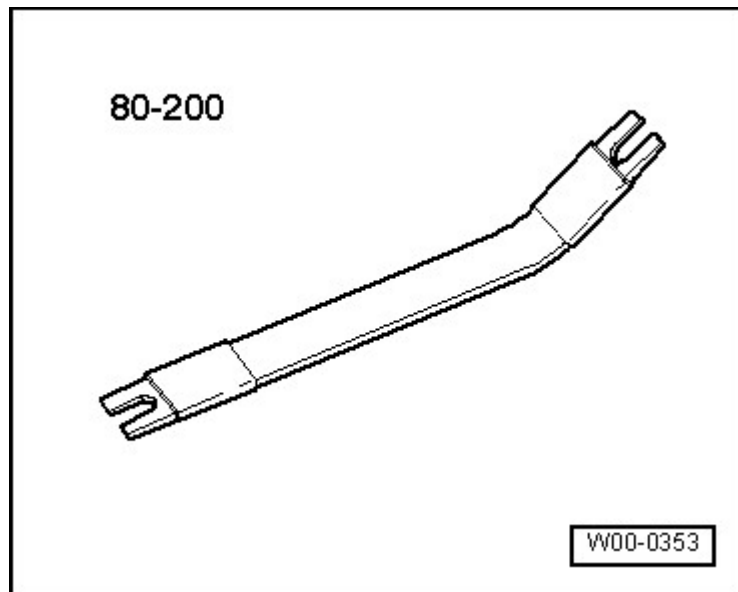


Fig. 244: Identifying Pry Lever 80-200
Courtesy of AUDI OF AMERICA, LLC

- Retainer 3036

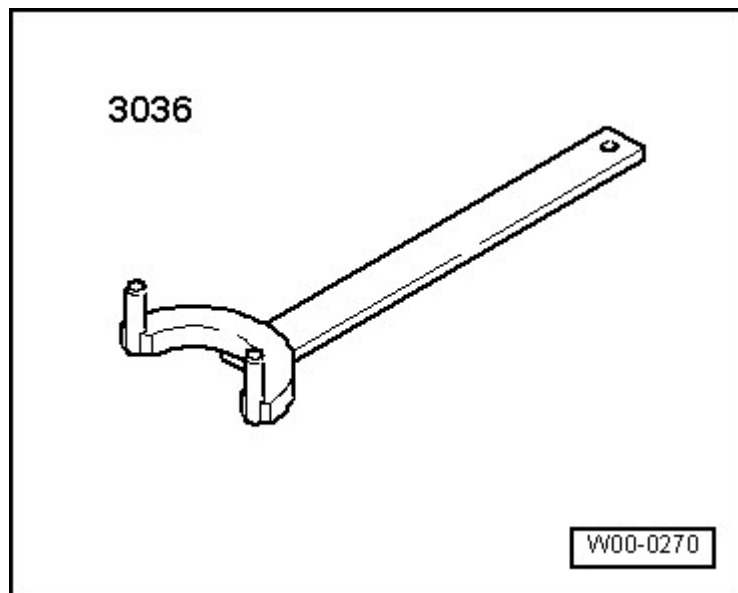


Fig. 245: Identifying Counter-Hold Tool 3036
Courtesy of AUDI OF AMERICA, LLC

- Hose Clamps Up to 25 mm Dia. 3094

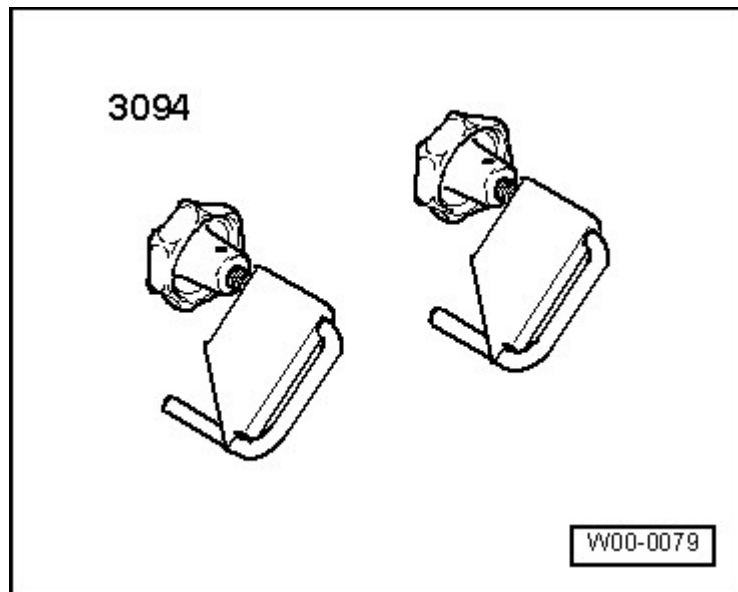


Fig. 246: Identifying Hose Clamps 3094
Courtesy of AUDI OF AMERICA, LLC

- Engine Bung Set VAS 6122

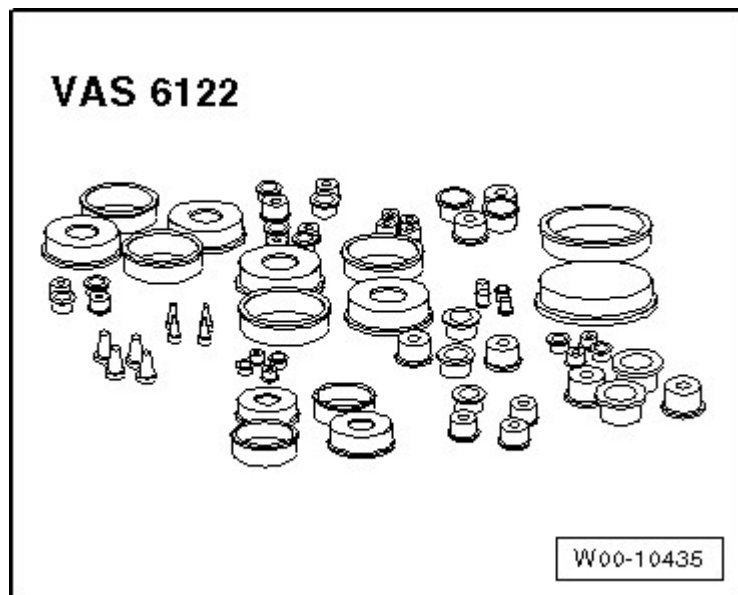


Fig. 247: Identifying Engine Bung Set Plugs VAS 6122
Courtesy of AUDI OF AMERICA, LLC

- Puller T10320

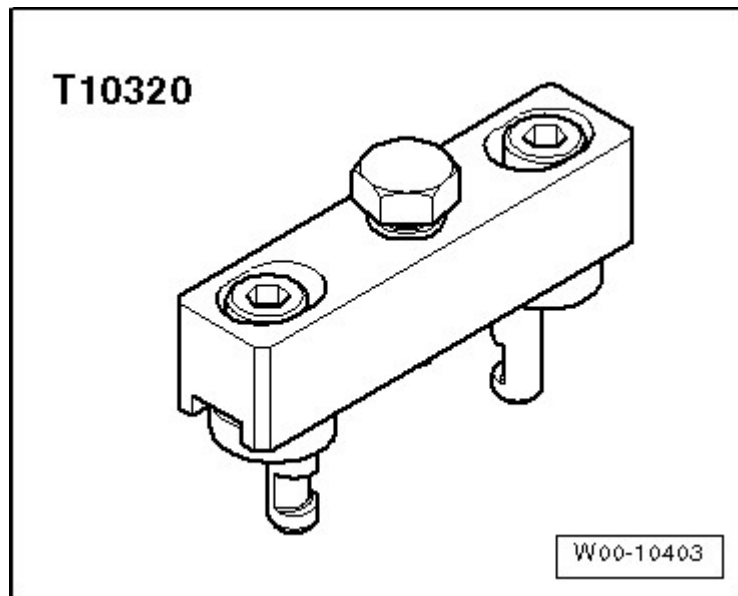


Fig. 248: Identifying Puller T10320
Courtesy of AUDI OF AMERICA, LLC

ENGINE

3.0 Liter - Engine Assembly - Engine Code(s): CATA

10 ENGINE ASSEMBLY

GENERAL INFORMATION

ENGINE, SECURING TO ENGINE AND TRANSMISSION HOLDER

Special tools and workshop equipment required

- Lifting Tackle 3033
- Engine and Transmission Holder VAS 6095 with Bracket for V6 TDI Engine, Audi A8 VAS 6095/1-4
- Shop Crane VAS 6100
- Lift Arm Ext./Workshop Hoist VAS 6101
- Scissor-Type Assembly Platform VAS 6131 A
- Joint Support VAS 6131/13-7
- Engine Bung Set VAS 6122

Procedure

- Engine/transmission assembly removed and separated on VAS 6131 A.
- Engine secured with the VAS 6131/13-7.

NOTE: **Place a cloth underneath to soak up any escaping power steering fluid.**

Vehicles Built through 05.10:

-- Remove the banjo bolt -1- and the bolt for the power steering fluid line -2-.

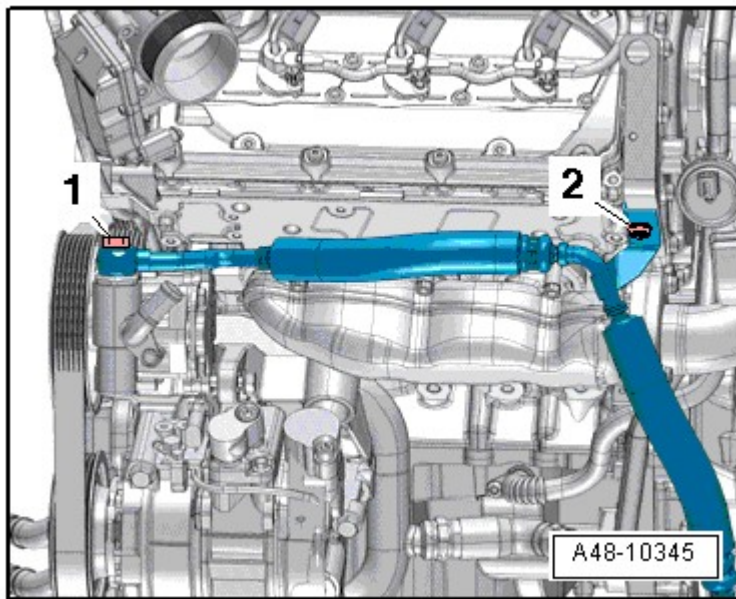


Fig. 1: Banjo Bolt -1- And Bolt -2-
Courtesy of AUDI OF AMERICA, LLC

Vehicles Built from 06.10:

Ignore -1-.

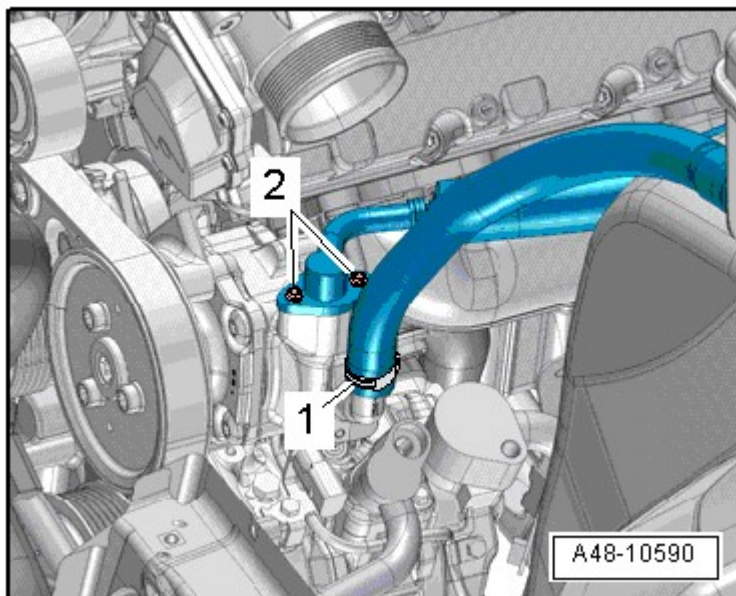


Fig. 2: Power Steering Pump Hydraulic Hose -1-, Bolts -2-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -2- and the hydraulic pipe.

All Vehicles:

- Seal the open lines and connections with clean plugs from the VAS 6122.
- Remove the bolt -arrow- on the A/C compressor wire bracket.

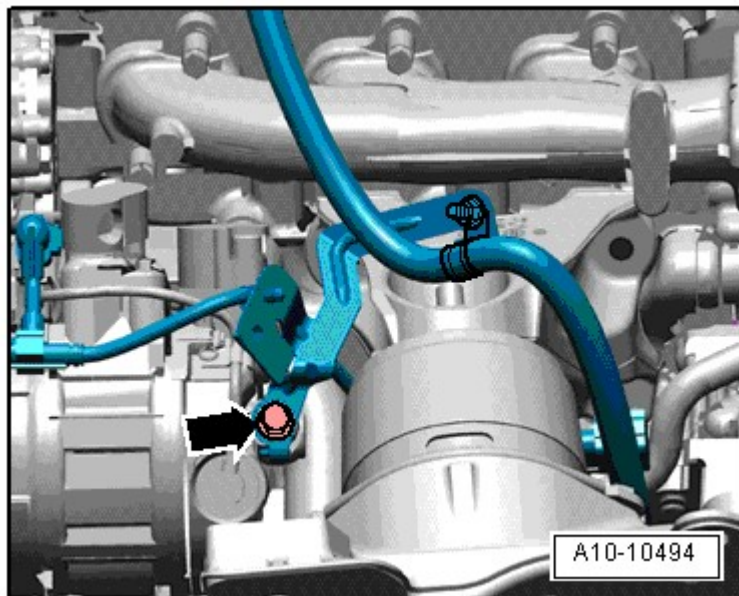


Fig. 3: Identifying Electric Wire Bracket Bolt -Arrow- From Air Conditioning (A/C) Compressor
Courtesy of AUDI OF AMERICA, LLC

- Remove engine bracket left and right bolts -arrows-.

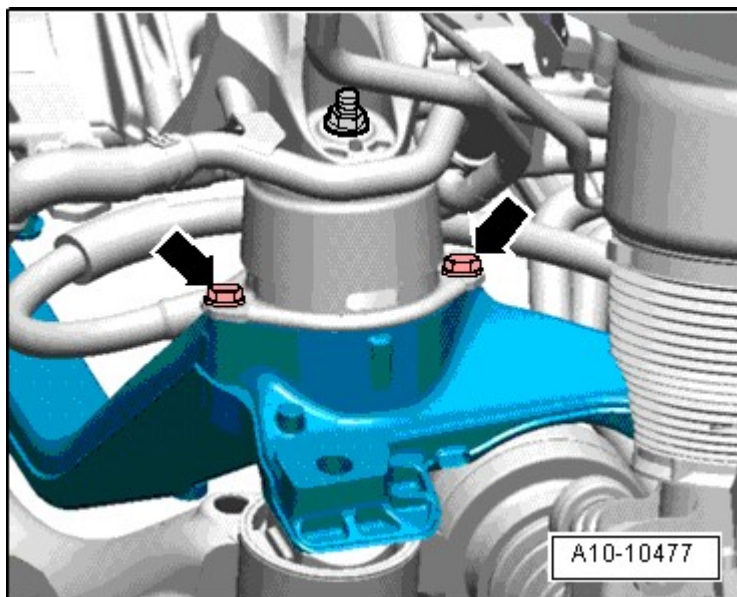


Fig. 4: Identifying Engine Bracket Bolts At Left And Right
Courtesy of AUDI OF AMERICA, LLC

NOTE: Engine carrier remains in installation location.

-- Connect the VAS 6101 to the VAS 6100.

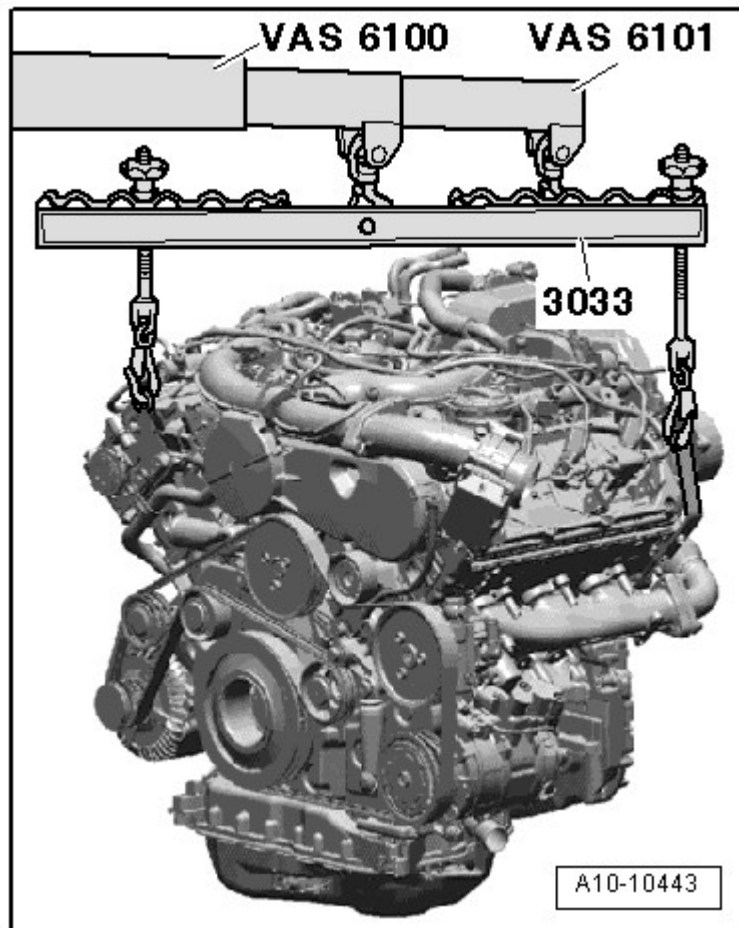


Fig. 5: Identifying Engine Raised On Shop Crane VAS6100 With Extension VAS6101 And Lifting Tackle 3033

Courtesy of AUDI OF AMERICA, LLC

-- Engage the 3033 on the engine lifting eyes and on the shop crane as shown in the illustration.

-- Tension engine slightly with shop crane, do not raise.

-- Remove VAS 6131/13-7 from engine.

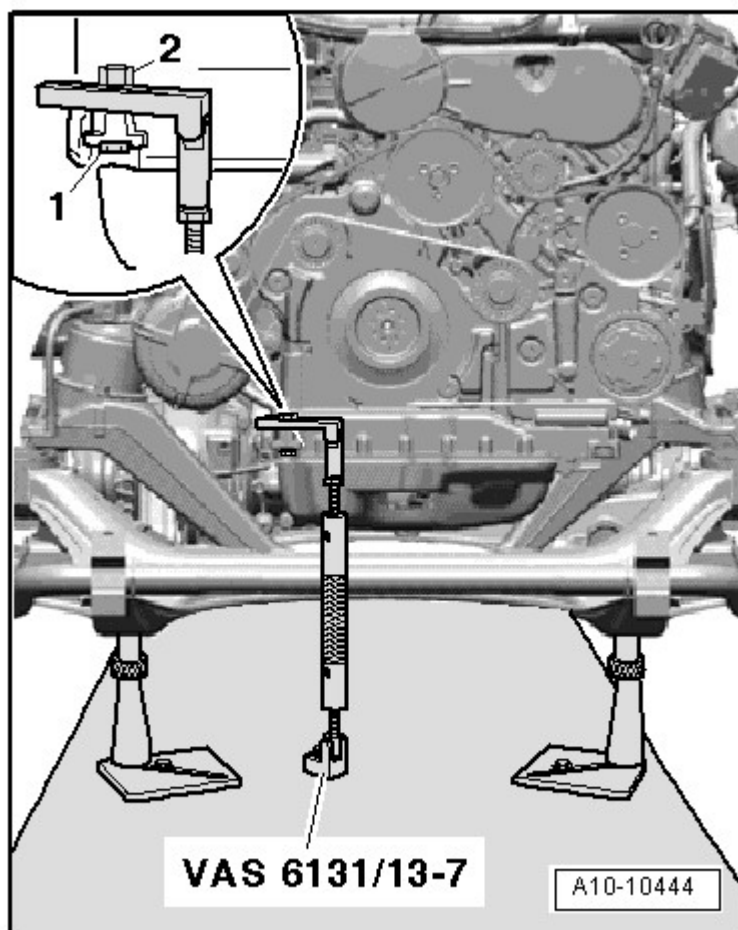


Fig. 6: Identifying VAS 6131/13-7 Removal From Engine
Courtesy of AUDI OF AMERICA, LLC

- Raise engine from engine carrier.
- If equipped, remove the nuts -arrows- and the connector bracket from the left engine support.

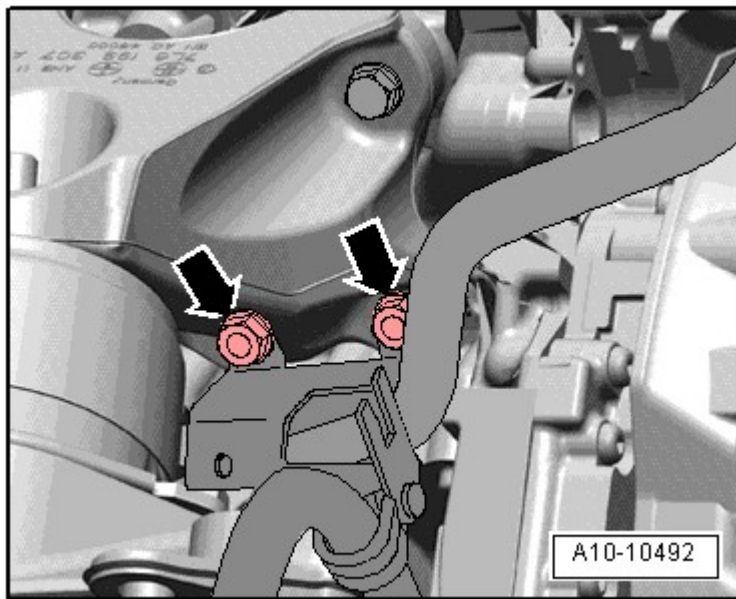


Fig. 7: Identifying Bolts -Arrows- And Connector Bracket From Left Engine Mount Bracket
Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right bolts -1 through 4- and remove the engine support.

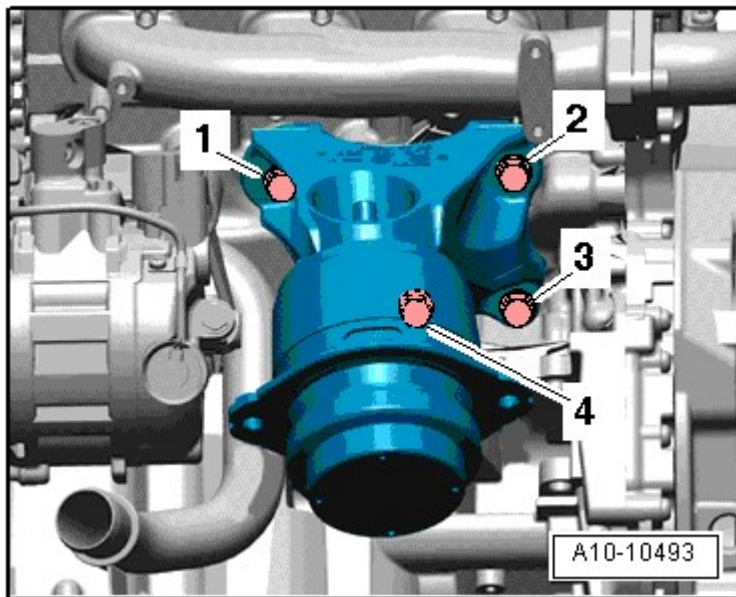


Fig. 8: Identifying Bolts -1 Through 4- For Engine Mount Bracket
Courtesy of AUDI OF AMERICA, LLC

NOTE: The left engine support is shown in the illustration.

-- Secure the engine to the VAS 6095 using the VAS 6095/1-4 and tighten to 40 Nm, as illustrated.

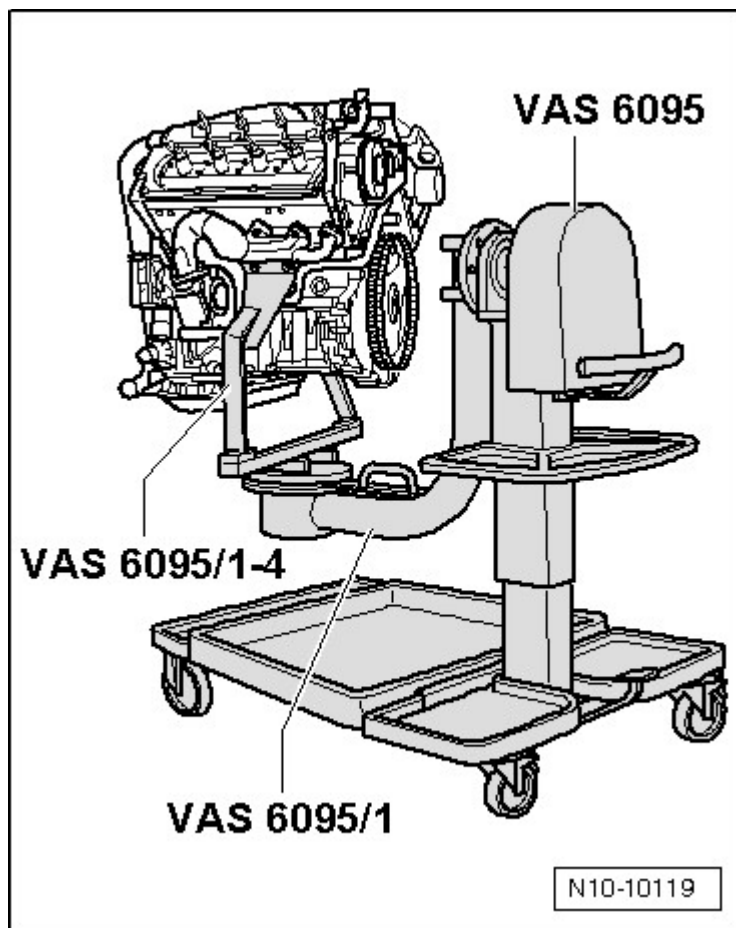


Fig. 9: Universal Mounting VAS 6095/1
Courtesy of AUDI OF AMERICA, LLC

DESCRIPTION AND OPERATION

SUBFRAME ASSEMBLY OVERVIEW

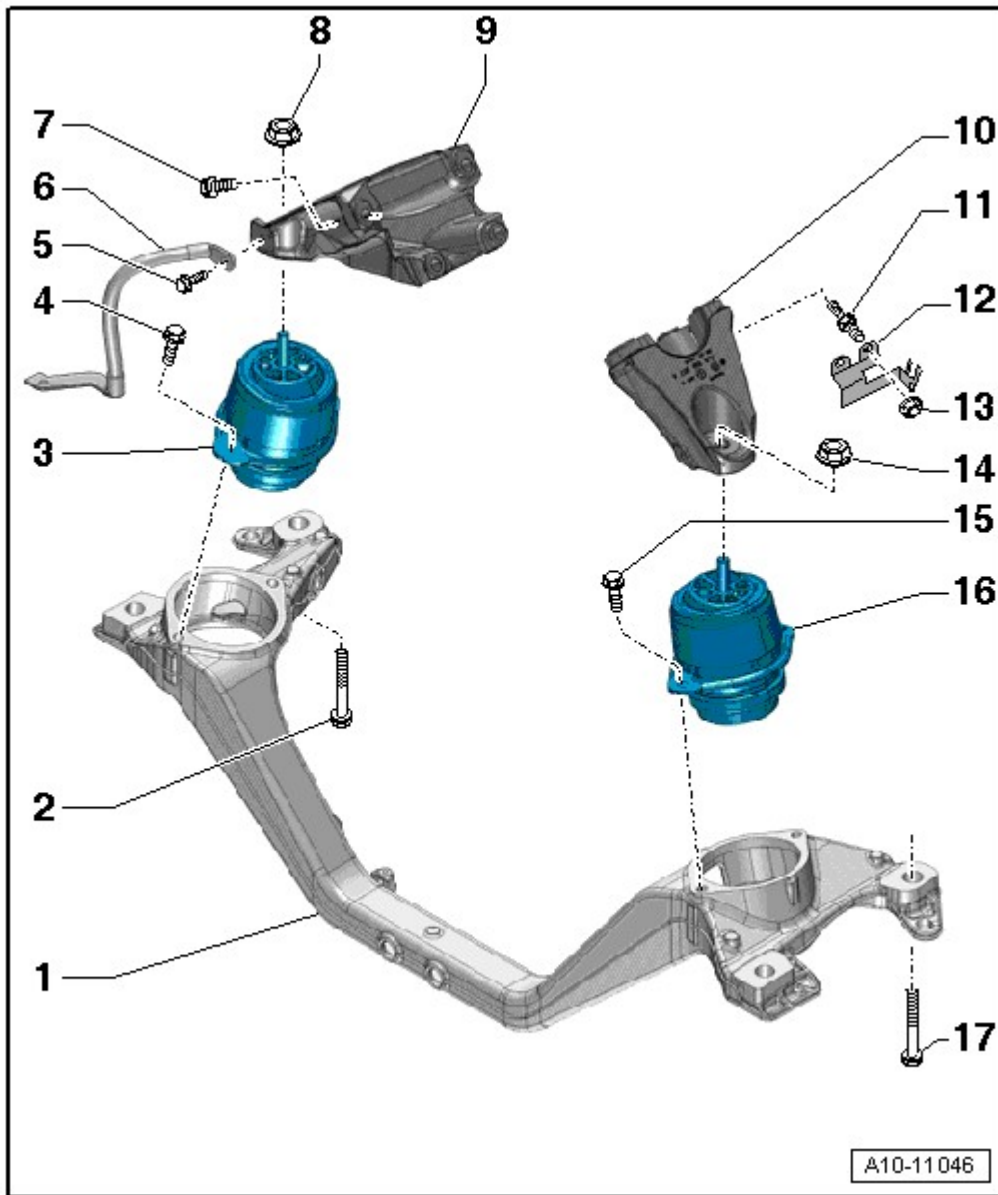


Fig. 10: Engine Mount And Bracket Overview

Courtesy of AUDI OF AMERICA, LLC

1. Engine Carrier
 - Removing and installing, refer to **ENGINE CARRIER**
2. Bolt
 - Replace
 - 120 Nm plus an additional 180° turn
3. Right Engine Mount
 - Removing and installing, refer to **ENGINE MOUNT**
4. Screw
 - 60 Nm

5. Screw
 - 15 Nm
6. Ground (GND) Strap
7. Bolt
 - Replace
 - 50 Nm plus an additional 90° turn
8. Nut
 - 75 Nm
9. Right Engine Support
10. Left Engine Support
11. Double Bolt
 - Replace
 - 50 Nm plus an additional 90° turn
12. Bracket
 - For the electrical connector
13. Nut
 - 23 Nm
14. Nut
 - 75 Nm
15. Bolt
 - 60 Nm
16. Left Engine Mount
 - Removing and installing, refer to **ENGINE MOUNT**
17. Bolt
 - Replace
 - 120 Nm plus an additional 180° turn

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Component	Bolt Size	Nm
Bolts and Nuts		
	M6	9
	M7	15
	M8	20
	M10	40
	M12	65
Bracket for the Electrical Connector		

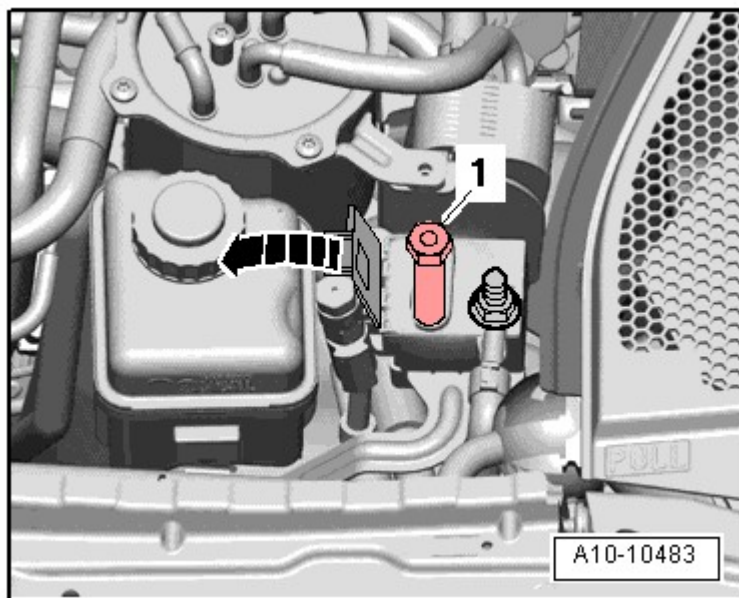
2009 Audi Q7 3.0 TDI

ENGINE 3.0 Liter - Engine Assembly - Engine Code(s): CATA

-Nut	-	23
-Double Bolt ¹	-	50 + 90°
Engine Carrier ¹	-	120 + 180°
Engine Mount, Left	-	60
Engine Mount, Right	-	60
Ground Strap	-	15
Left Engine Support, Nut	-	75
Right Engine Support		
Nut	-	75
Bolt ¹	-	50 + 90°
• ¹ Always replace		

Battery Jump Start Terminal -U6- Pins

-- Tighten the bolt -1- for the battery jump start terminal to 15 Nm.

**Fig. 11: Battery Jump Start Terminal -U6- Pins**

Courtesy of AUDI OF AMERICA, LLC

Ground Connection in the Right of the Plenum Chamber

-- Tighten the nut -2- to 9 Nm.

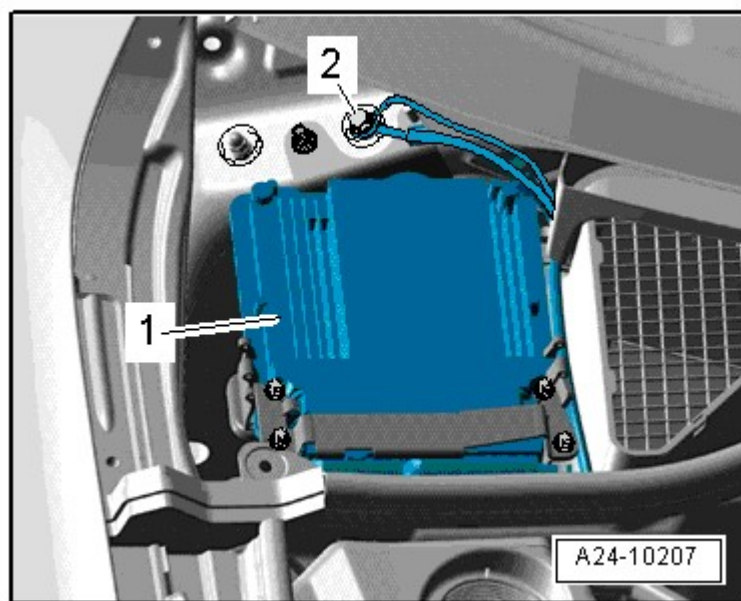


Fig. 12: Location of Engine Control Module (ECM) -J623- -1-
Courtesy of AUDI OF AMERICA, LLC

Ground Connection on the right Longitudinal Member

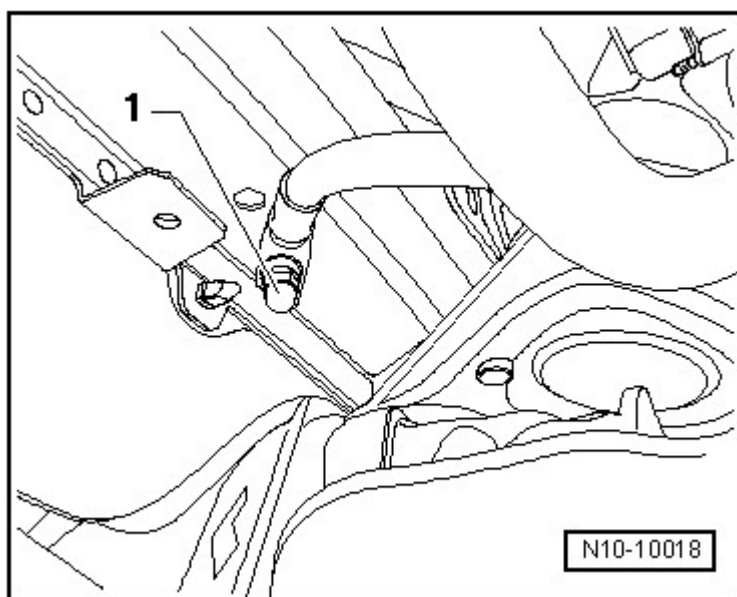


Fig. 13: Identifying Ground (GND) Cable On Longmember
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the nut -1- to 15 Nm.

Engine to Automatic Transmission 09D

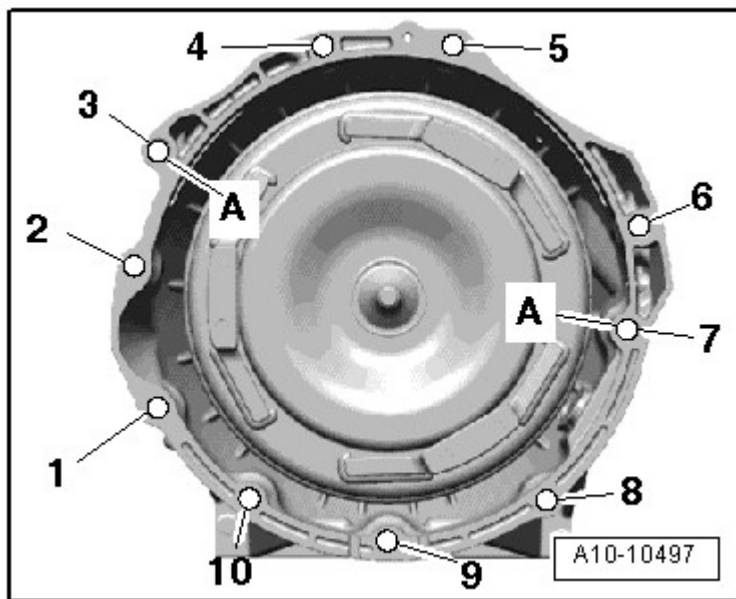


Fig. 14: Bolt Removal Sequence
Courtesy of AUDI OF AMERICA, LLC

Item	Bolt	Nm
1, 2	M10x70	45
3, 4, 5, 7	M12 x 80	80
6	M12x70	80
8, 9, 10	M10x70	45
A	Alignment sleeves for centering	

Engine and 8-Speed Automatic Transmission 0C8

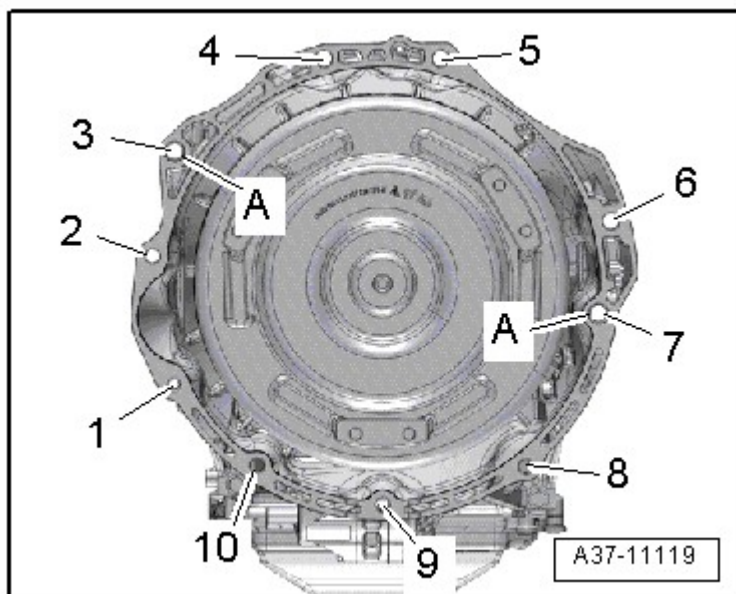


Fig. 15: Identifying Engine/Transmission Connecting Bolts -3 To 10
 Courtesy of AUDI OF AMERICA, LLC

Item	Bolt	Nm
1	M10x70	65
2	M10x90	65
3, 4, 5, 7	M12 x 80	80
6	M12x70	80
8, 9, 10	M10x70	45
A	Alignment sleeves for centering	

REMOVAL AND INSTALLATION

ENGINE THROUGH 05.2010, REMOVING

Special tools and workshop equipment required

- Pry Lever - Rmv Outside Mirror 80 - 200
- Used Oil Collecting and Extracting Device V.A.G 1782
- Step Ladder VAS 5085
- Engine Bung Set VAS 6122
- Scissor-Type Assembly Platform VAS 6131 A with Support Set VAS 6131/10 as well as Supplementary Set VAS 6131/11, VAS 6131/13 and qty. 3 VAS 6131/10-2
- Drip Tray VAS 6208
- Hose Clamps Up to 25 mm Dia. 3094
- Hose Clip Pliers VAS 6362
- Ball Joint Puller T10187

Removing

NOTE: With lock carrier installed, engine is removed downward with transmission and subframe.

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

Collect escaping coolant in a clean container for disposal or reuse.

-- On a vehicle with air suspension, activate vehicle lift mode. Refer to General Information .

NOTE: To rotate the driveshaft freely, move the selector lever into "N".

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

- Complete the steps for disconnecting the battery.
- Pay attention the to waiting period for vehicles with urea injection.

-- Disconnect the ground (GND) cable -4-. Refer to **BATTERY, DISCONNECTING AND CONNECTING**.

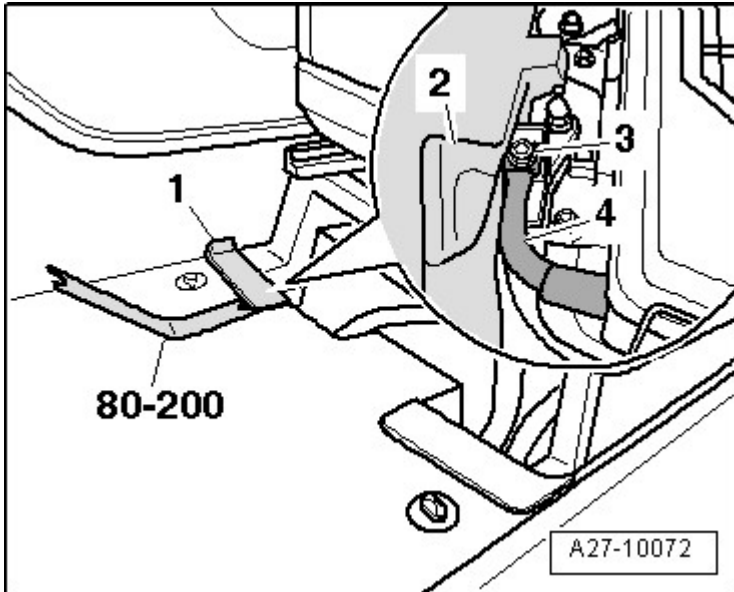


Fig. 16: Pry Cover -1- With 80 - 200 From Floor Covering.
 Courtesy of AUDI OF AMERICA, LLC

-- Empty coolant circuit. Refer to **LEAK DETECTION**.

-- Extract the power steering oil from the reservoir with the V.A.G 1782.

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

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

-- Open the coolant reservoir cap.

-- Remove the left and right front wheels.

-- Remove the noise insulation -1- and -2-. Refer to **Removal and Installation**.

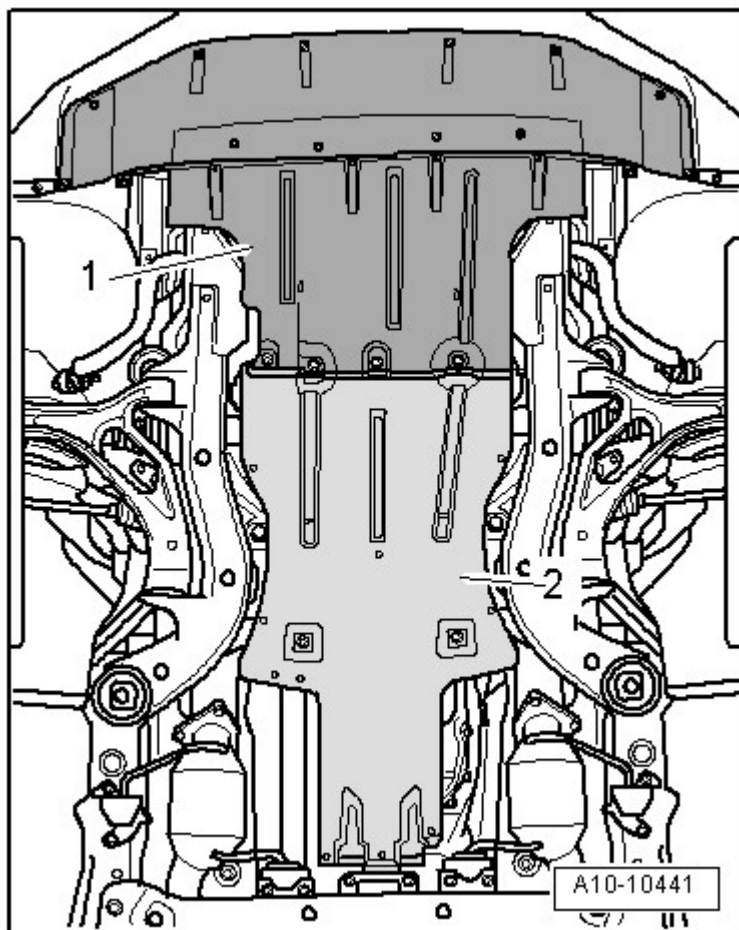


Fig. 17: Identifying Front/Rear Noise Insulation
Courtesy of AUDI OF AMERICA, LLC

-- Remove left and right front wheel housing liners. Refer to **Removal and Installation** .

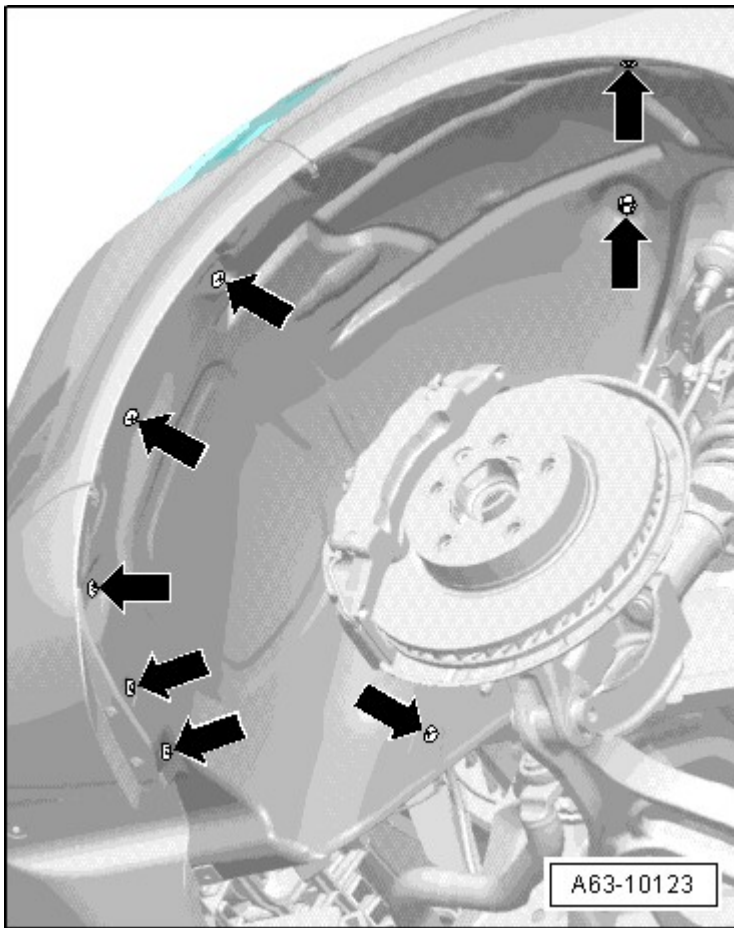


Fig. 18: Remove Left Front Wheel Housing Liner
Courtesy of AUDI OF AMERICA, LLC

-- Place VAS 6208 under engine.

-- Remove the coolant hose from the left coolant pipe by loosening the hose clamp -arrow- and letting the coolant drain out.

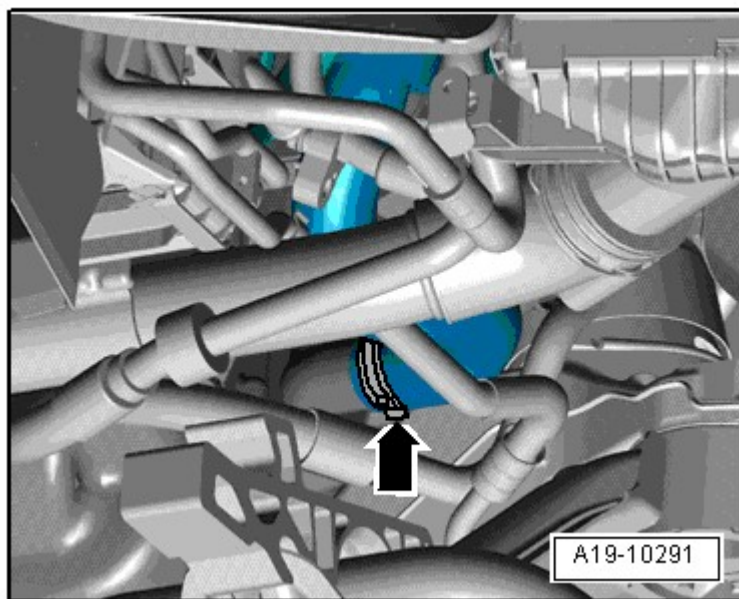


Fig. 19: Identifying Hose Clamp -Arrow
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect electrical connector -2- on engine coolant temperature (ECT) sensor on radiator -G83-.

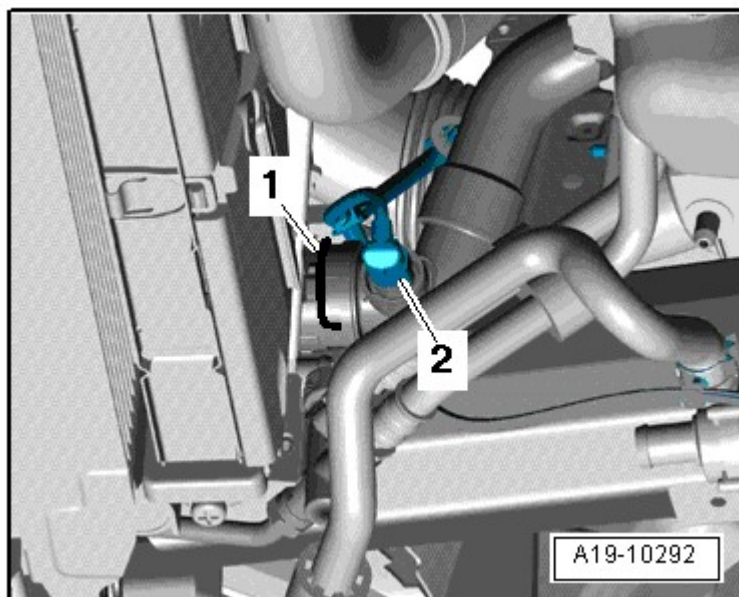


Fig. 20: Engine Coolant Temperature (ECT) Sensor On Radiator Outlet -G83- -2-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the right lower coolant hose from the radiator by lifting the clamp -1- and let the coolant drain out.

-- Loosen the hose clamps, remove the coolant hoses from the heat exchanger -arrows- and let the coolant drain out.

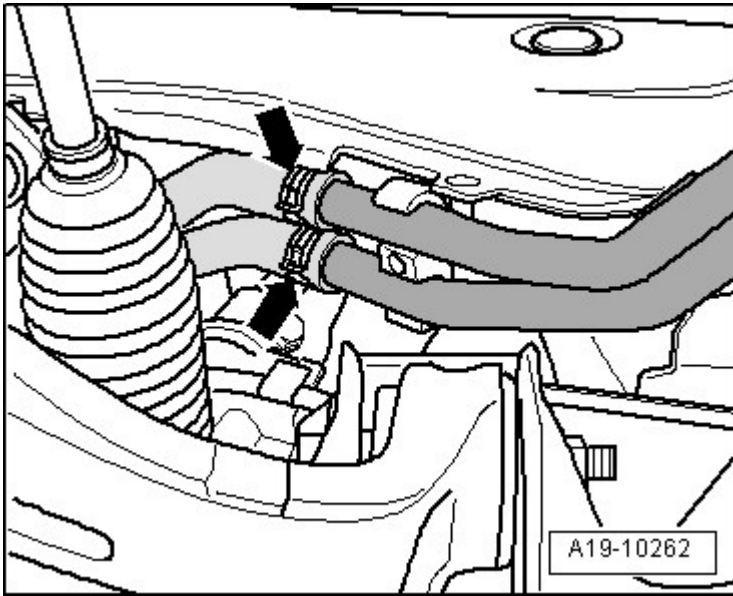


Fig. 21: Identifying Hose Connections To Heater Core
Courtesy of AUDI OF AMERICA, LLC

-- Remove the coolant hose from the right coolant pipe by loosening the hose clamp -arrow- and letting any remaining coolant drain out.

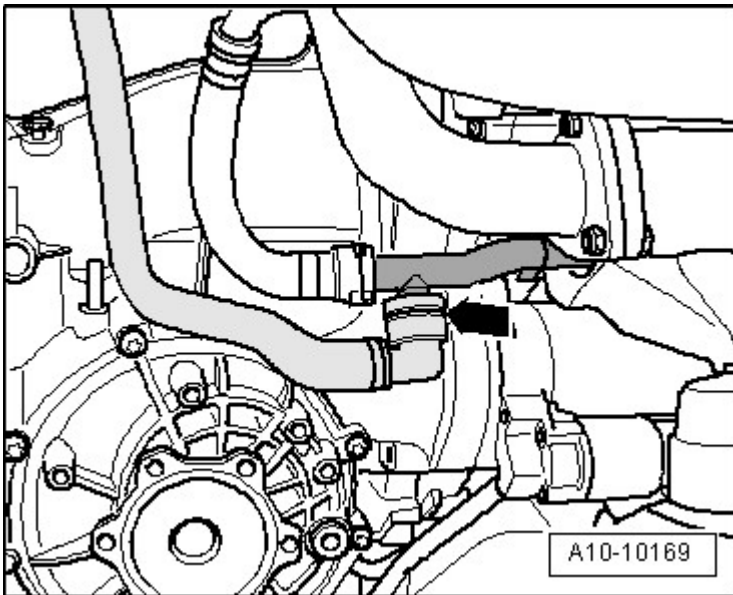


Fig. 22: Identifying Hose Clamp -Arrow
Courtesy of AUDI OF AMERICA, LLC

-- Carefully pull the engine cover off the 4 bolts one after the other -arrows-.

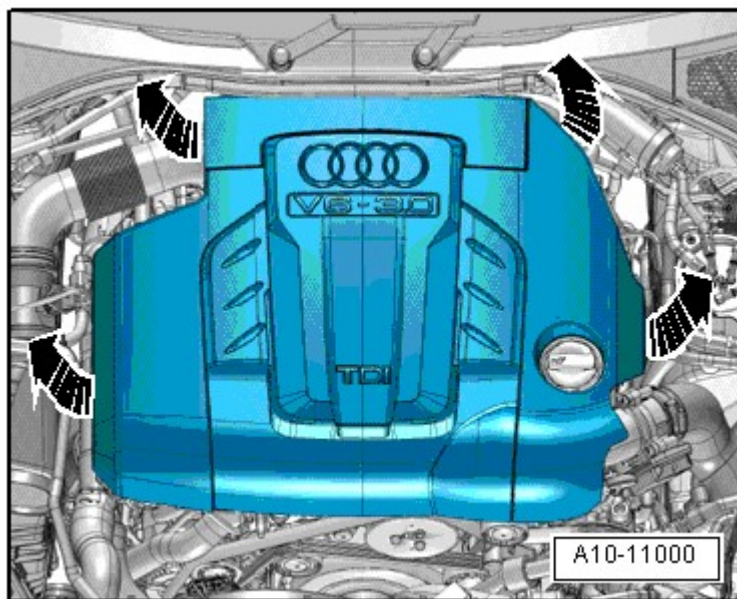


Fig. 23: Identifying Engine Cover -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Pull the cover -arrows- over the radiator, to do this disconnect the lower coolant hose.

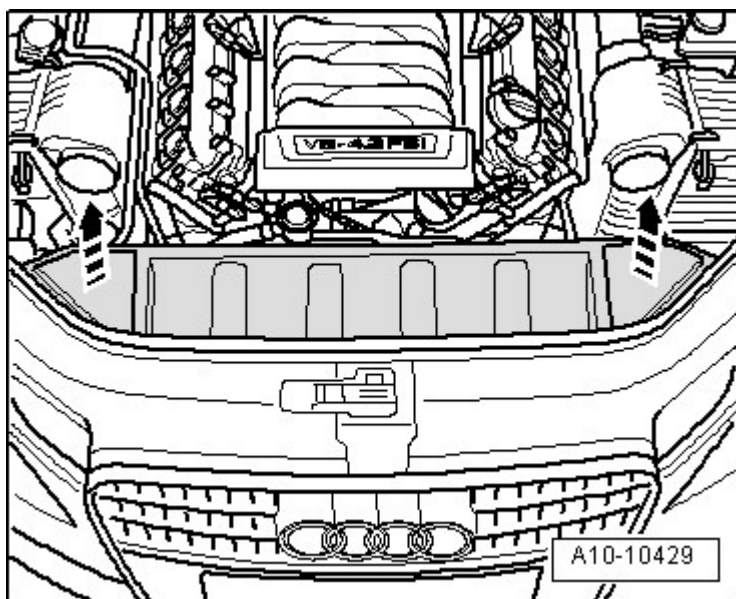


Fig. 24: Cover Over Radiator -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the coolant hose; to do this, loosen the hose clamp -1-.

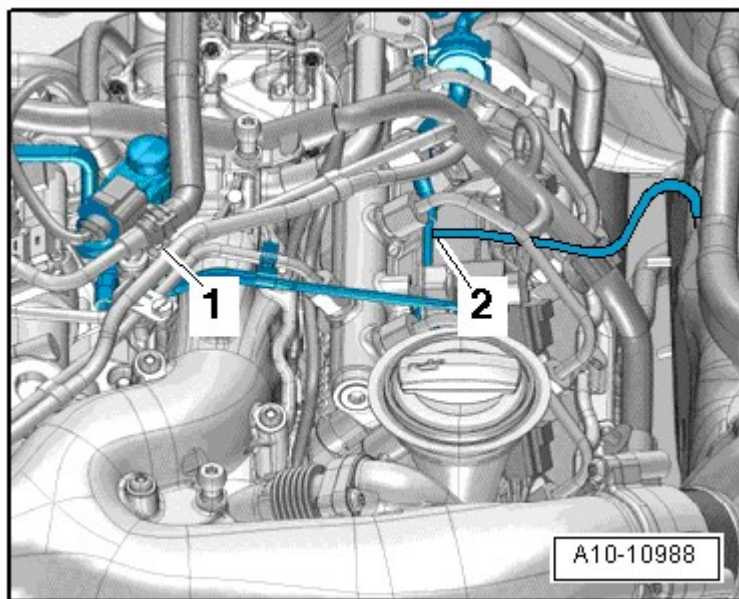


Fig. 25: Removing Coolant Hose; To Do This, Loosen Hose Clamp -1-
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -2-.

WARNING: Very hot fuel can burn your skin.

- In extreme cases, the fuel lines and the fuel itself in vehicles with a common rail engine can be as hot as 100 °C (212 °F) after the engine has been turned off. Let the fuel cool down before opening any line connections otherwise there is a danger of scalding.
- Wear protective gloves.
- Wear safety glasses.

-- Remove the bolts -1- and -2- as well as the nut -4-.

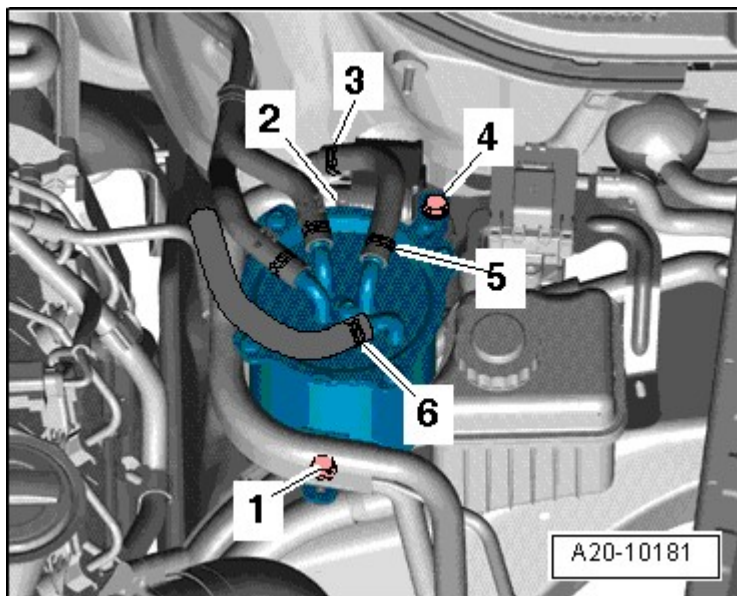


Fig. 26: Identifying Bolts -1 & 2-, Fuel Hose -3 & 5-, Fuel Supply Hose -6- And Nut -4-
 Courtesy of AUDI OF AMERICA, LLC

-- Move the fuel filter to the side, with the fuel hoses still connected -3, 5 and 6-.

-- Remove the bolts -1 through 4- and move the fuel system cooler to the side.

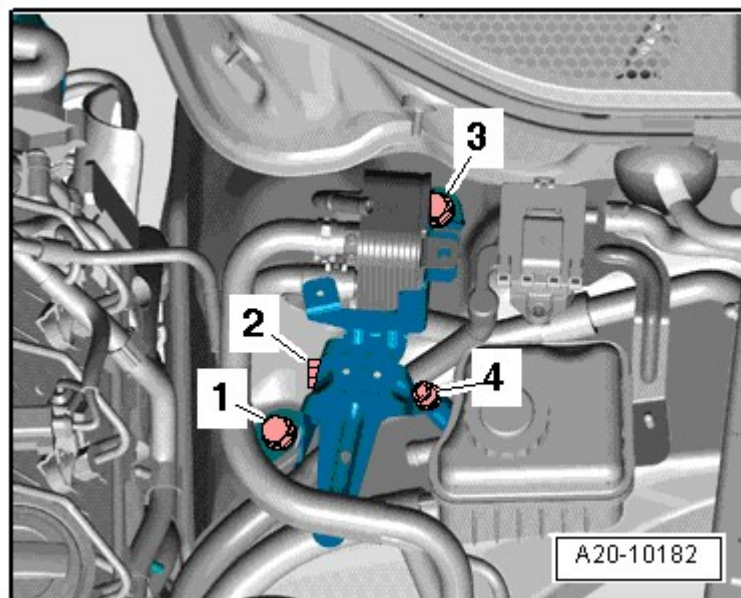


Fig. 27: Identifying Bolts -1 Through 4
 Courtesy of AUDI OF AMERICA, LLC

NOTE: **The fuel filter bracket remains in its installation position.**

-- Open the cover over the terminal 30 wire junction 2 -TV22- -arrow-.

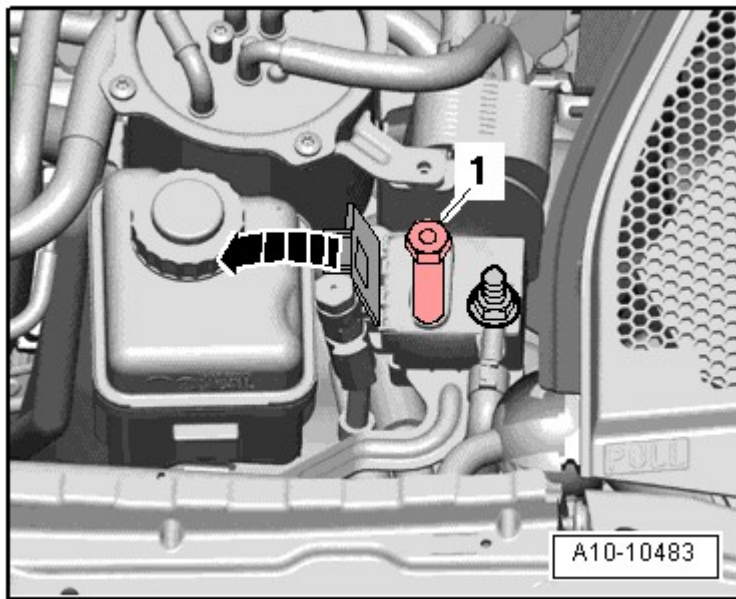


Fig. 28: Battery Jump Start Terminal -U6- Pins
Courtesy of AUDI OF AMERICA, LLC

- Remove the bolt -1- for the battery jump start terminal -U6- and free up the electrical wire.
- Remove the air guide hose by loosening the hose clamps -arrows-.

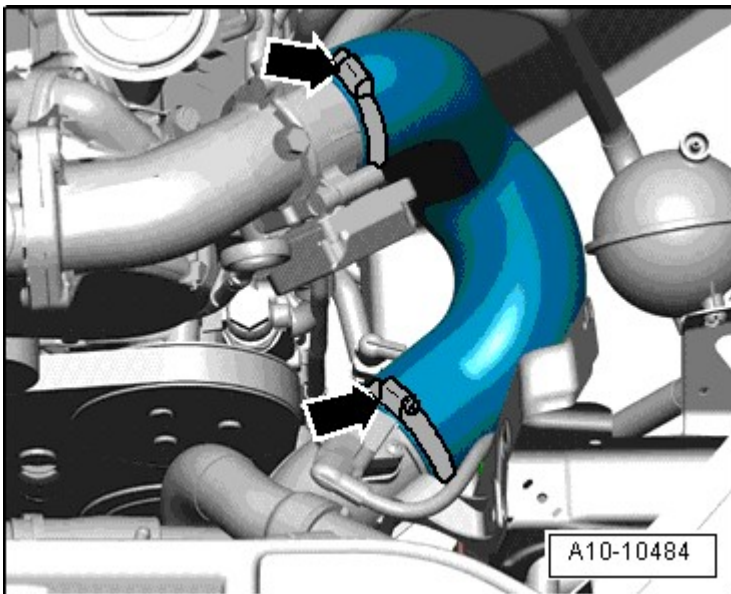


Fig. 29: Loosen Charge Air Hose Clamps -Arrows- And Remove The Hose
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the connector -3-.

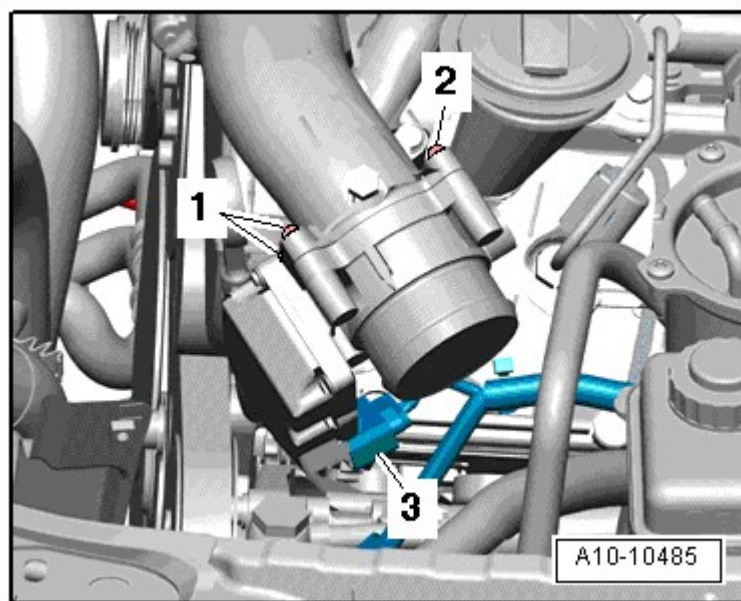


Fig. 30: Identifying Bolts -1 & 2- And Electrical Connector -3-
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -1- and -2-, remove the throttle valve control module -J338- from the intake tube.

NOTE: Place a cloth underneath to soak up any escaping power steering fluid.

-- Disconnect the power steering pump fluid line and the 3094.

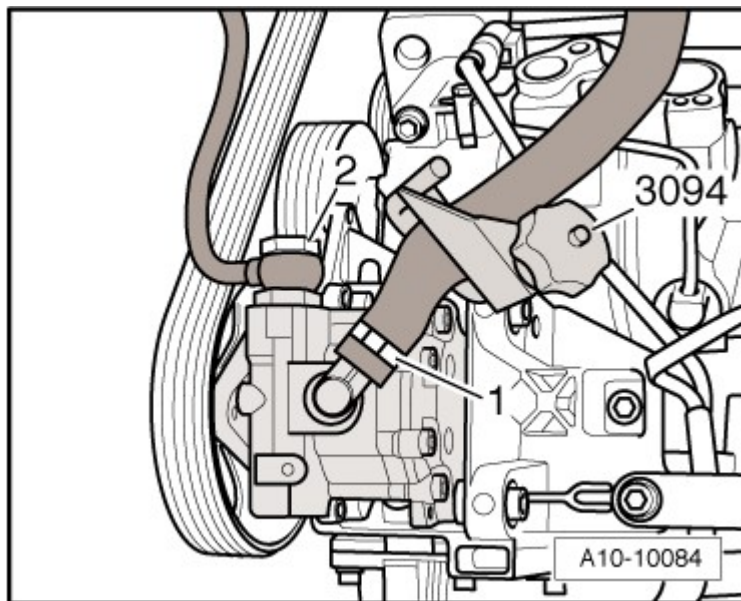


Fig. 31: Identifying Hydraulic Hose, Hydraulic Pressure Line & Hose Clamps 3094
 Courtesy of AUDI OF AMERICA, LLC

-- Loosen the hose clamp -1- and remove the power steering fluid hose.

-- Seal the open lines and connections with clean plugs from the VAS 6122.

NOTE: Ignore -2-.

CAUTION: Risk of damaging refrigerant lines and hoses.

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

-- Remove the clamp bolts -1- and -5-.

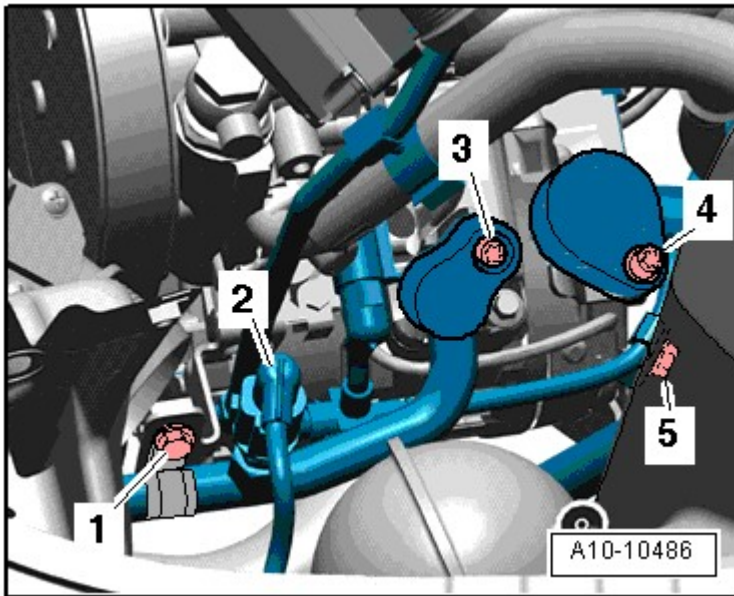


Fig. 32: Identifying Bolts -1 To 5- And Electrical Connector -2-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -3- and -4- and then remove the refrigerant lines from the A/C compressor.

-- Seal the open lines and connections with clean plugs from the VAS 6122.

NOTE: Ignore -2-.

-- Unclip the coolant hose on the air filter housing upper section.

-- Unclip the front final drive vent hose -1- from the air filter housing.

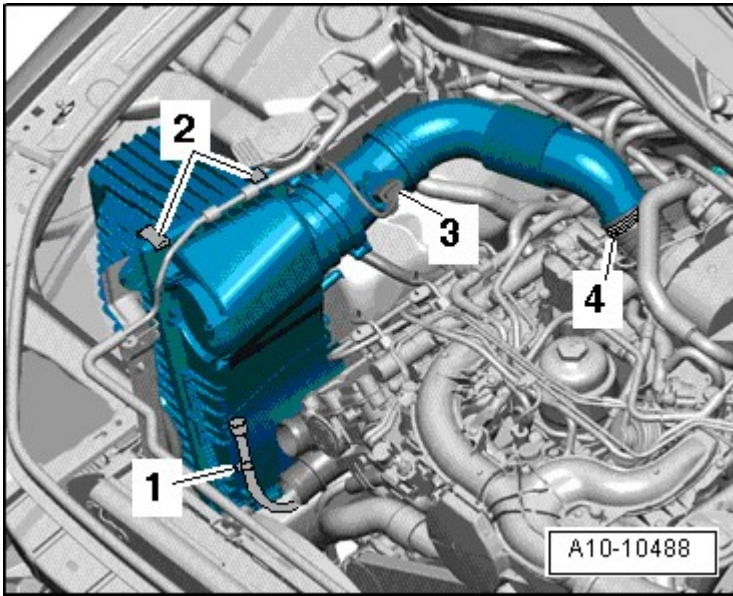


Fig. 33: Connectors And Clips

Courtesy of AUDI OF AMERICA, LLC

- Disconnect the connector -3- from the mass airflow (MAF) sensor -G70-.
- Remove the air duct hose from the turbocharger by loosening the hose clamps -4-.
- Unlock the clips -2-.
- On vehicles with air suspension, push the securing ring -1- forward off the hose coupling, press the release ring -2- downward -arrows- and remove the ventilation hose -3- from the air filter housing upper section.

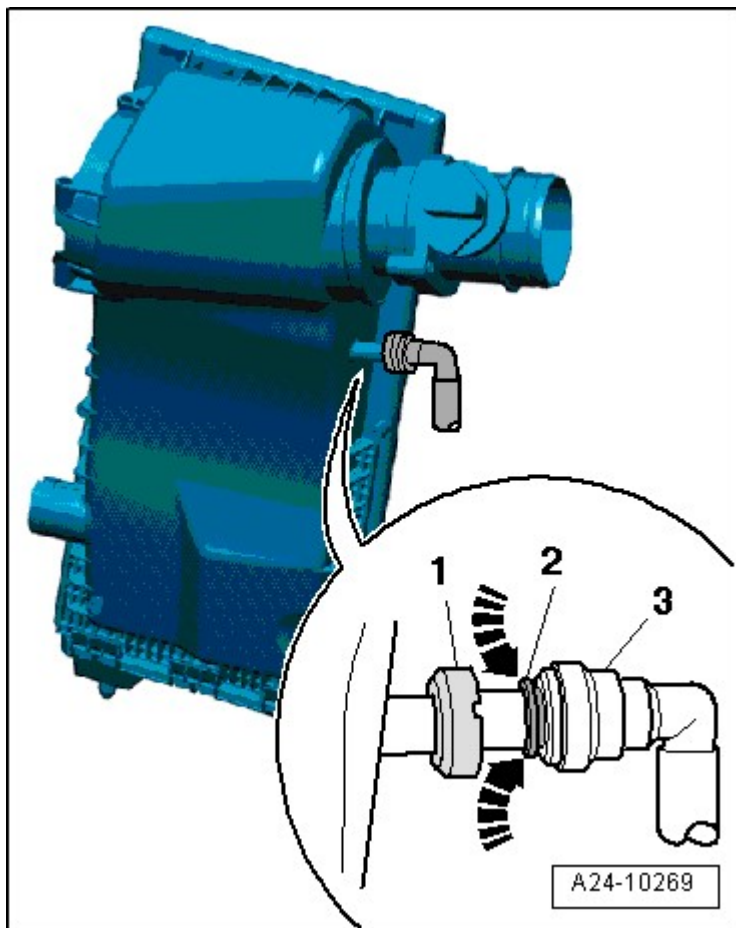


Fig. 34: Circlip, Release Ring And Ventilation Hose
Courtesy of AUDI OF AMERICA, LLC

-- Remove the air filter housing upper section and the air filter.

-- Pry off the air guide -2- from the air filter housing lower section -1- starting on the wheel housing side using the 80 - 200.

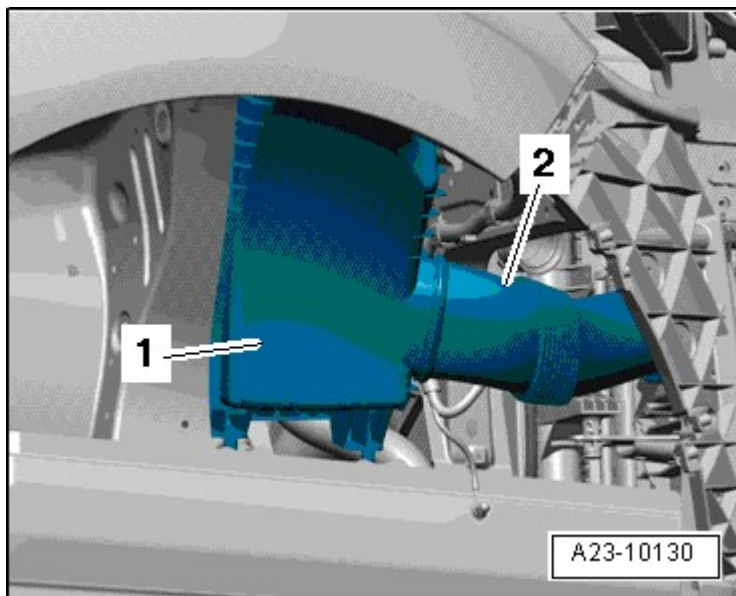


Fig. 35: Identifying Air Filter Housing
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -1- and -2-.

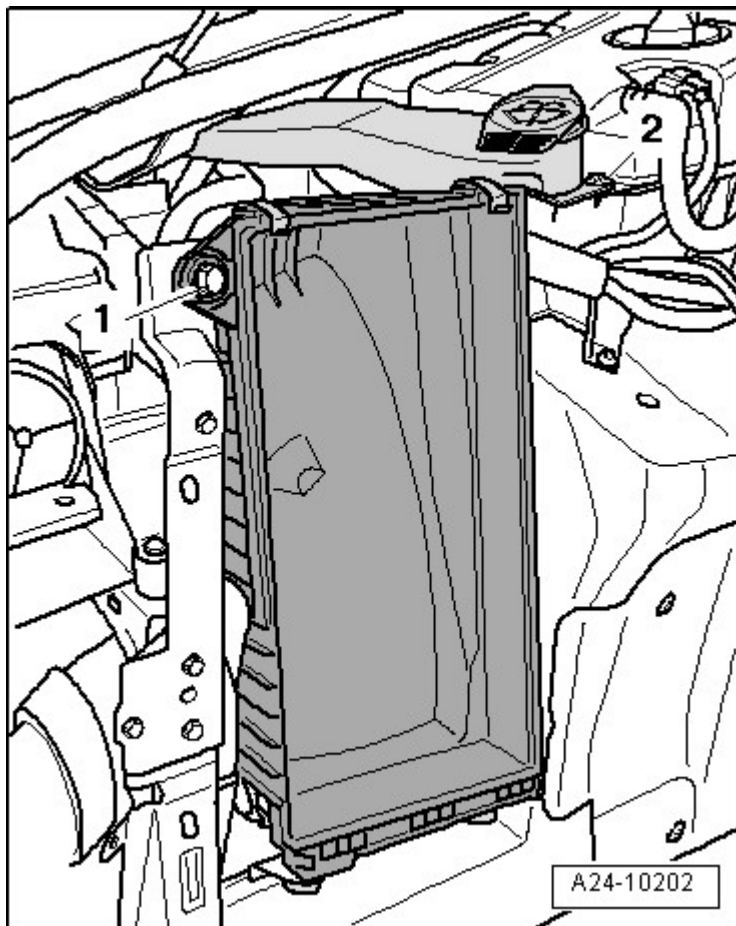
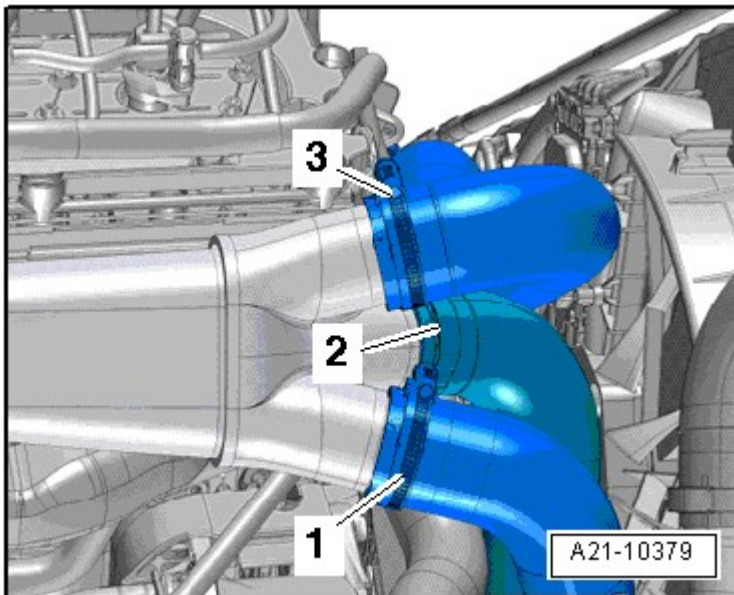


Fig. 36: Identifying Screws

Courtesy of AUDI OF AMERICA, LLC

-- Remove the air filter housing lower section; to do this, slightly push on the windshield washer fluid reservoir to the side.

-- Remove the air duct hoses by loosening the hose clamps -1, 2 and 3-.

**Fig. 37: Clamps -1, 2 And 3-**

Courtesy of AUDI OF AMERICA, LLC

-- Disconnect electrical connector -arrow-.

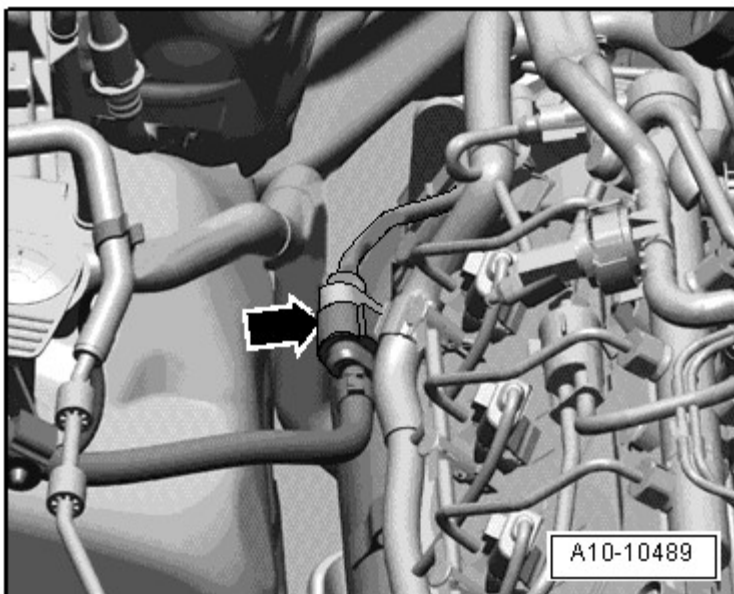


Fig. 38: Connector

Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the vacuum hose -arrow- leading to the brake booster.

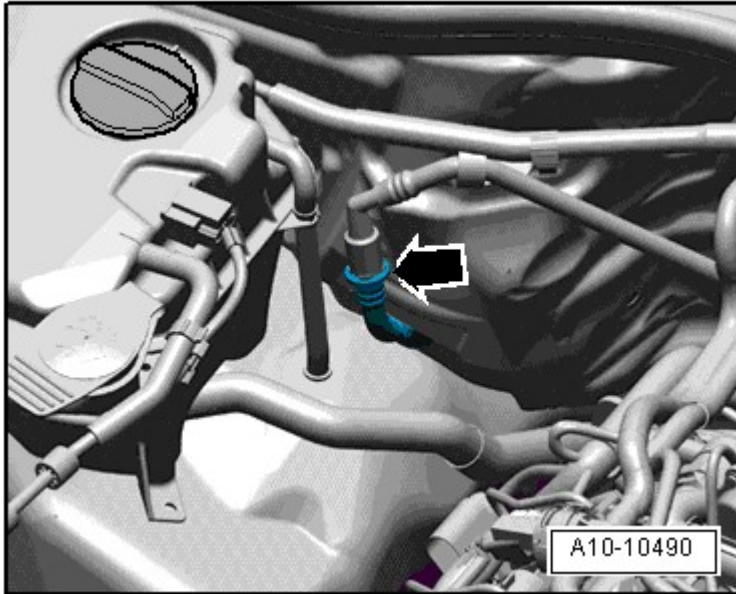


Fig. 39: Identifying Vacuum Hose -Arrow

Courtesy of AUDI OF AMERICA, LLC

WARNING: Very hot fuel can burn your skin.

- In extreme cases, the fuel lines and the fuel itself in vehicles with a common rail engine can be as hot as 100 °C (212 °F) after the engine has been turned off. Let the fuel cool down before opening any line connections otherwise there is a danger of scalding.
- Wear protective gloves.
- Wear safety glasses.

There is a risk of injury because the fuel is under pressure.

- To reduce pressure in fuel system, lay a clean cloth around the connector and carefully loosen connector.

-- Disconnect the fuel supply line -1- and return line -2- on the bulkhead.

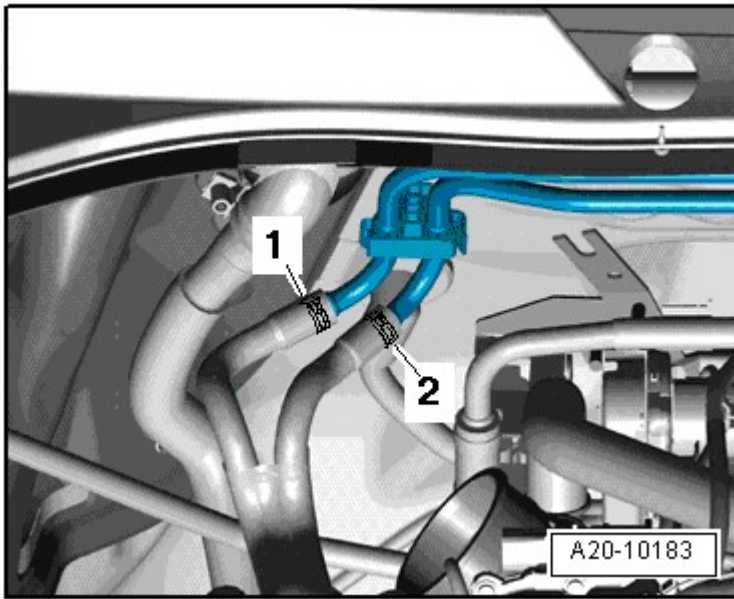


Fig. 40: Identifying Fuel Supply Hose -1-
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the exhaust gas temperature (EGT) sensor 2 -G448- -1- and heated oxygen sensor (HO2S) -G39- -2- connectors.

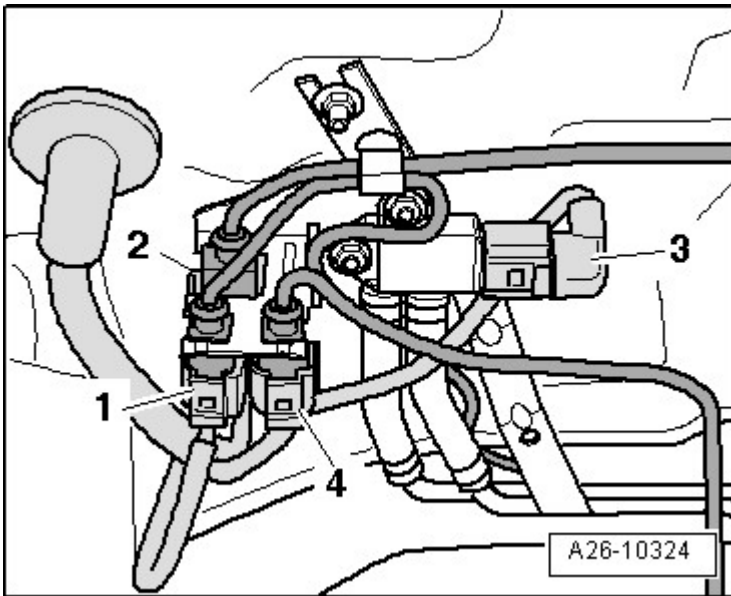


Fig. 41: Component Location On Plenum Chamber Bulkhead
Courtesy of AUDI OF AMERICA, LLC

-- Free up electrical wires.

NOTE: Ignore -3 and 4-.

-- Remove the heated oxygen sensor (HO2S) -5-.

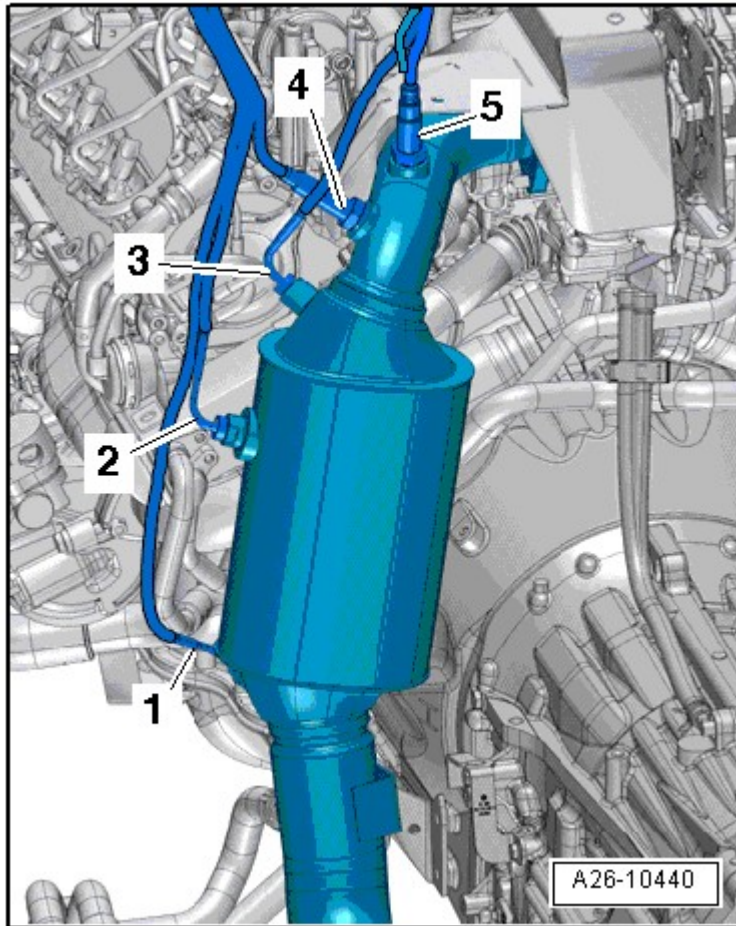


Fig. 42: Installation Location Inside Exhaust System Tract
Courtesy of AUDI OF AMERICA, LLC

-- Remove the NOX sensor -G295- -4- and free up the electrical wire.

-- Secure the NOX sensor to the body.

NOTE: Ignore -1, 2 and 3-.

-- Remove the windshield wiper arms -1- and -3-. Refer to **WINDSHIELD WIPER SYSTEM** .

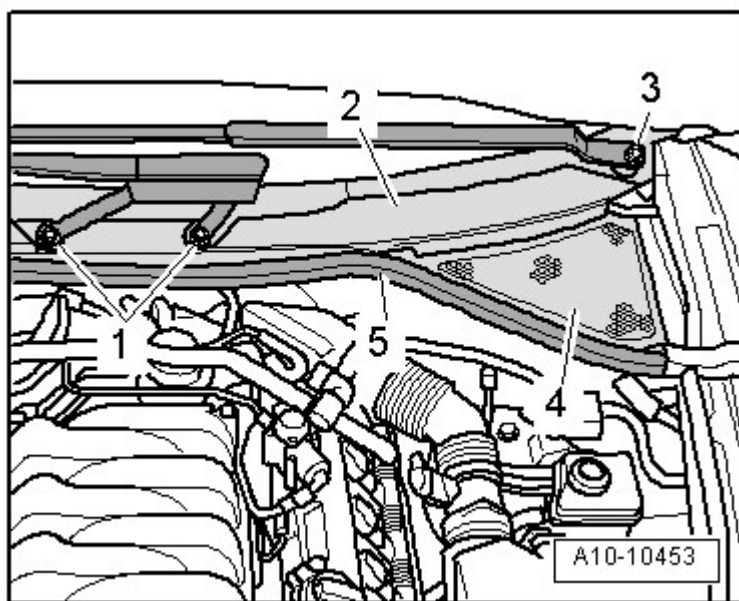


Fig. 43: Windshield Wiper, Driver Side, Remove Nut -3-
Courtesy of AUDI OF AMERICA, LLC

CAUTION: The plenum chamber cover could be damaged.

- Coat the transition area between the windshield and plenum chamber cover 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 gasket -5-.

-- Carefully remove the plenum chamber covers -2- and -4- from the retainers on the windshield.

-- Remove cover for E-box, plenum chamber -arrows-.

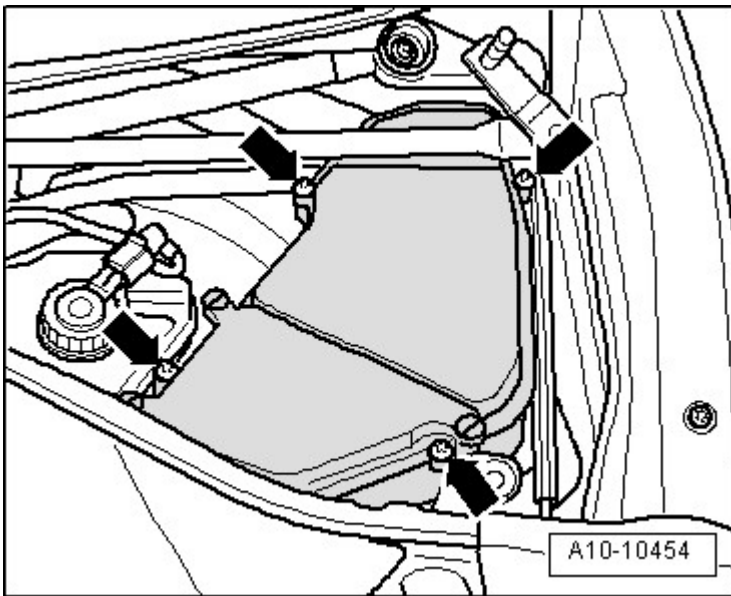


Fig. 44: Identifying Bolts To E-Box Plenum Chamber Cover -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connectors -1, 2 and 3- at E-box plenum chamber coupling station and free up the wiring harness.

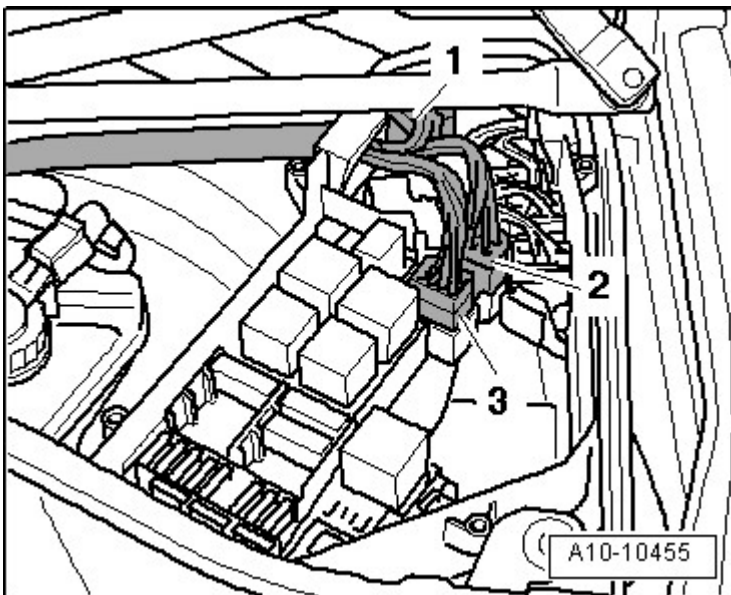


Fig. 45: Identifying Electrical Connectors -1 Through 3-
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect electrical connector -arrow-.

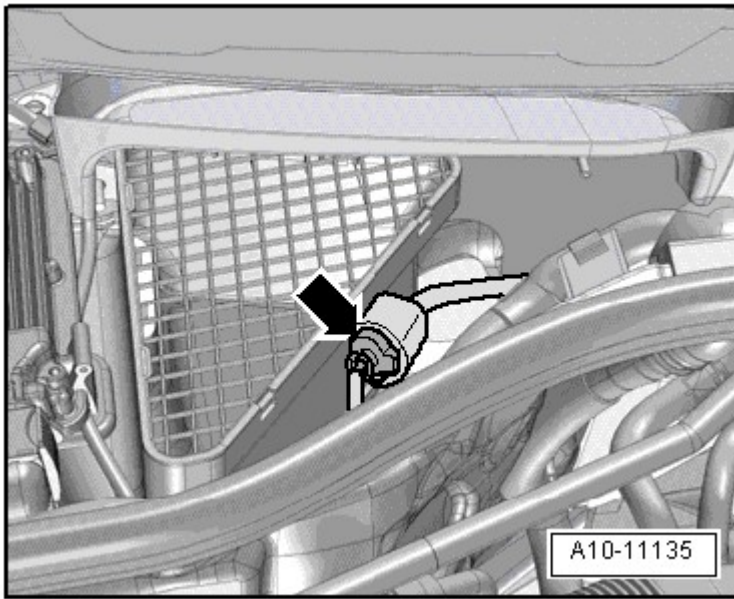


Fig. 46: Identifying Electrical Connector -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the ground (GND) connection nut -2-.

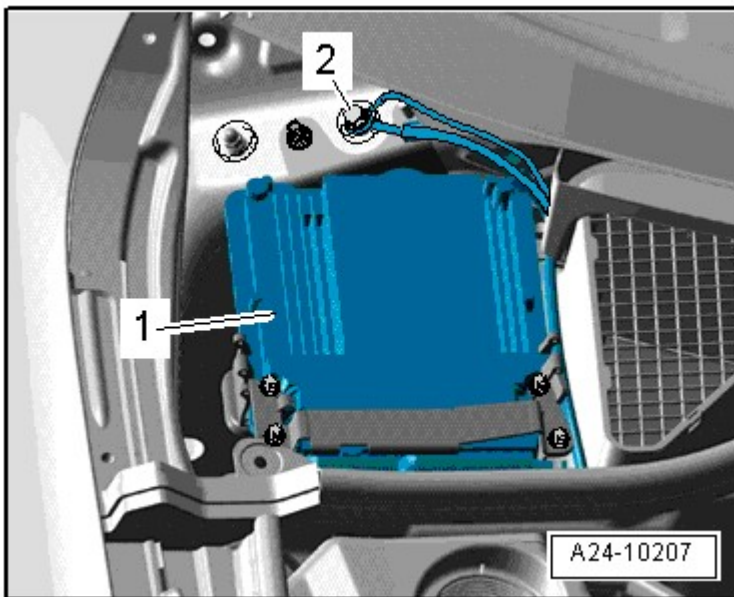


Fig. 47: Location Of Engine Control Module (ECM) -J623- -1-
Courtesy of AUDI OF AMERICA, LLC

-- Remove engine control module (ECM) -1-. Refer to **Removal and Installation** .

-- Free up electrical wiring harness to engine.

-- Loosen upper control arm nut a few turns and pull joint off with the T10187.

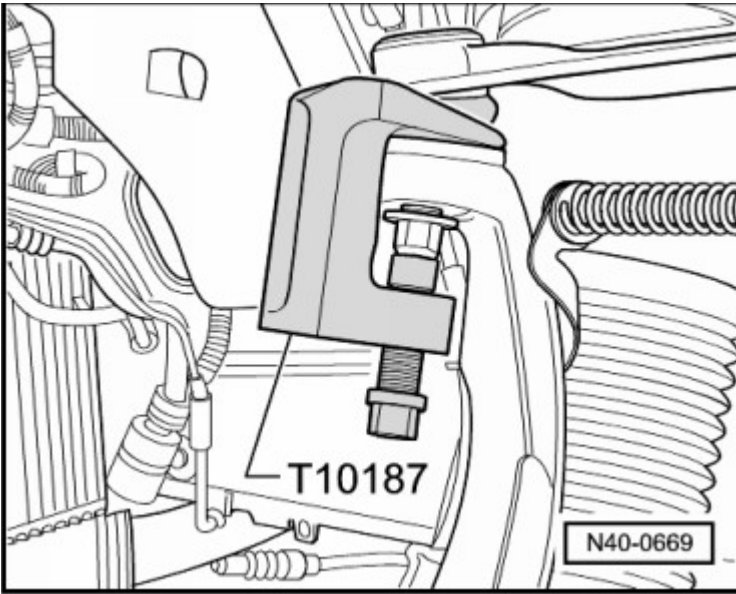


Fig. 48: Pressing Out Upper Control Arm
Courtesy of AUDI OF AMERICA, LLC

- Completely remove upper control arm nut.
- Repeat procedure on opposite side of vehicle.
- Disconnect the electrical connectors -arrow- at the left and right on the front speed sensors.

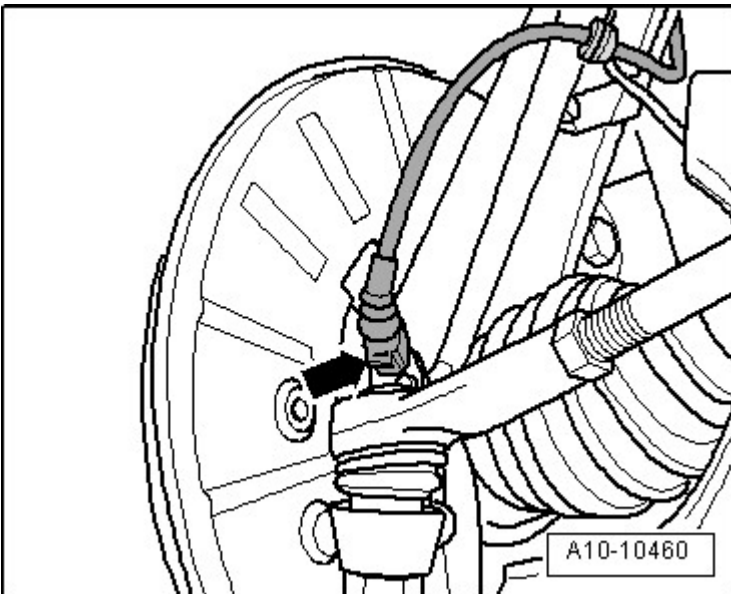


Fig. 49: Identifying Speed Sensor Connector
Courtesy of AUDI OF AMERICA, LLC

- Remove wiring harness bolts -arrows-.

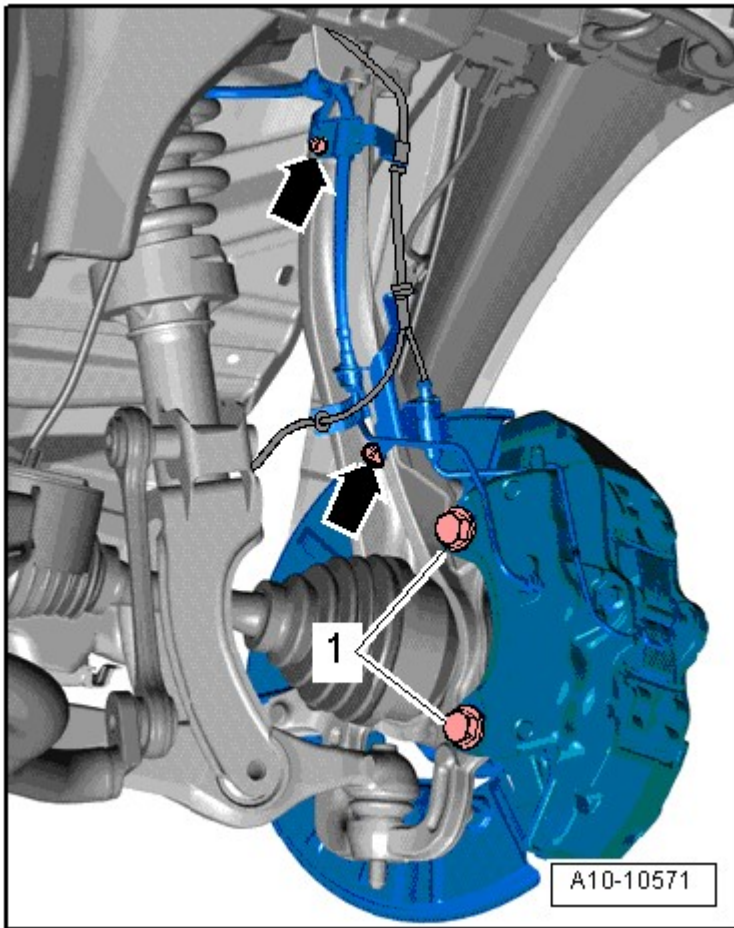


Fig. 50: Identifying Wire Harness Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove brake caliper bolts -1-.

NOTE: **Do not change brake line bent shape.**

-- Engage brake caliper in wheel housing with wire.

CAUTION: Risk of damaging brake pistons.

- **Do not operate brake pedal with brake caliper removed.**

-- Repeat procedure on opposite side of vehicle.

-- Disconnect lower threaded connection -2- at left and right on stabilizer bar.

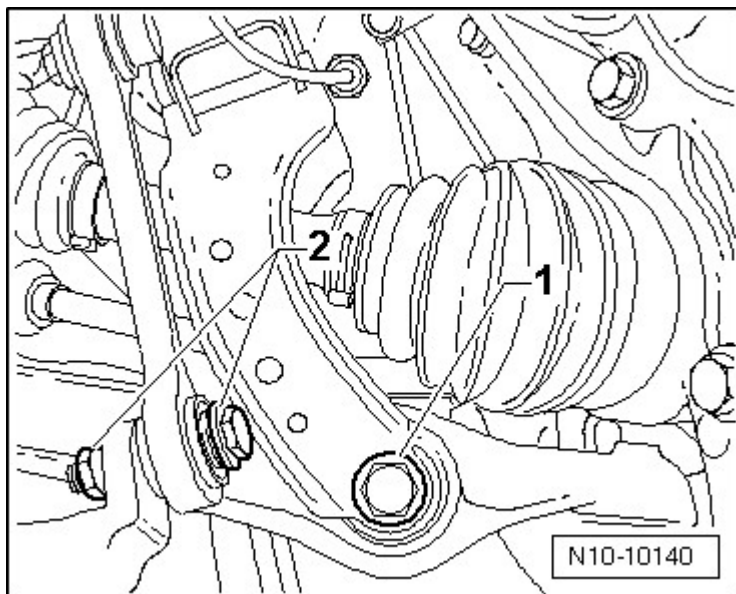


Fig. 51: Identifying Right/Left Lower Bolt On Stabilizer Bar
Courtesy of AUDI OF AMERICA, LLC

-- Remove nuts from bolts -1- at left and right on strut.

NOTE: Bolts -1- are removed later.

-- Disconnect the exhaust system at the clamping sleeve -arrows-.

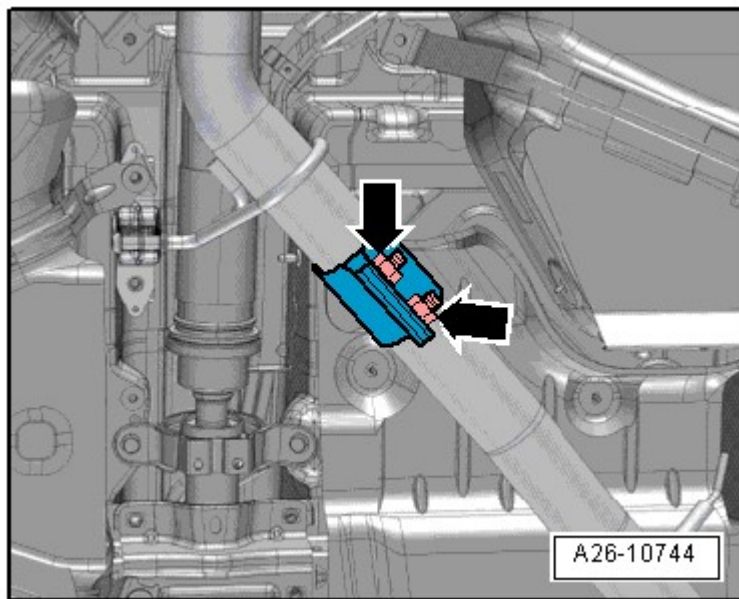


Fig. 52: Disconnect Exhaust System At Clamping Sleeve -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Remove NOX sensor 2 -G687- -3-.

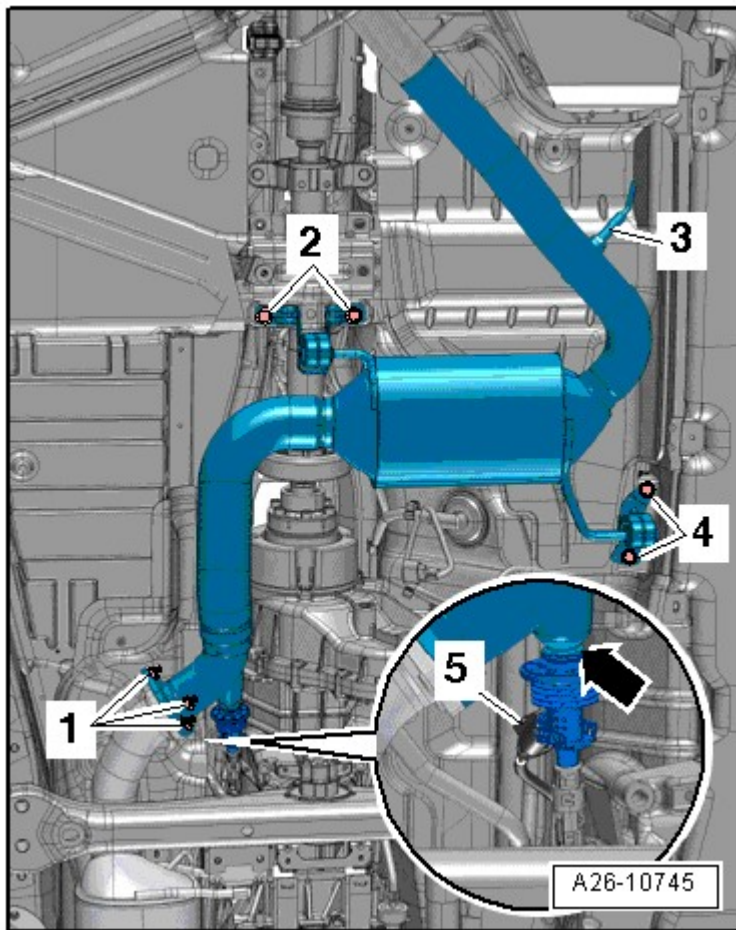


Fig. 53: Disconnect Connector -5-

Courtesy of AUDI OF AMERICA, LLC

- Disconnect the connector -5- and free up the electrical wire.
- Loosen the clamp -arrow- and remove the reducing agent injector -N474-.
- Move the nuts -1- and bolts -2- and -4- and remove the SCR catalytic converter.
- Remove the bolts -arrows- that attach the rear driveshaft to the transfer case. Refer to **REAR FINAL DRIVE** or **REAR FINAL DRIVE** .

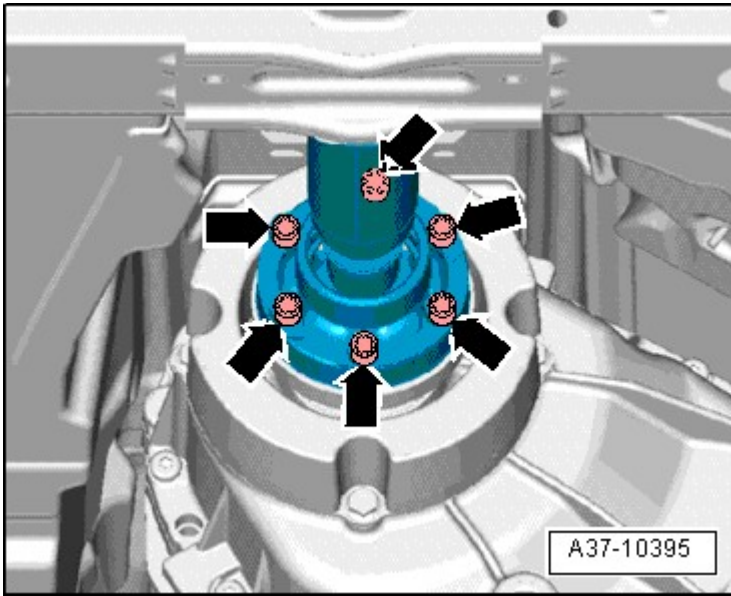


Fig. 54: Identifying Rear Driveshaft Bolts
 Courtesy of AUDI OF AMERICA, LLC

- Slide rear driveshaft toward rear final drive; CV joints can move axially.
- Secure the driveshaft to the side.
- Remove the nuts and bolts -arrows- then remove the noise insulation bracket.

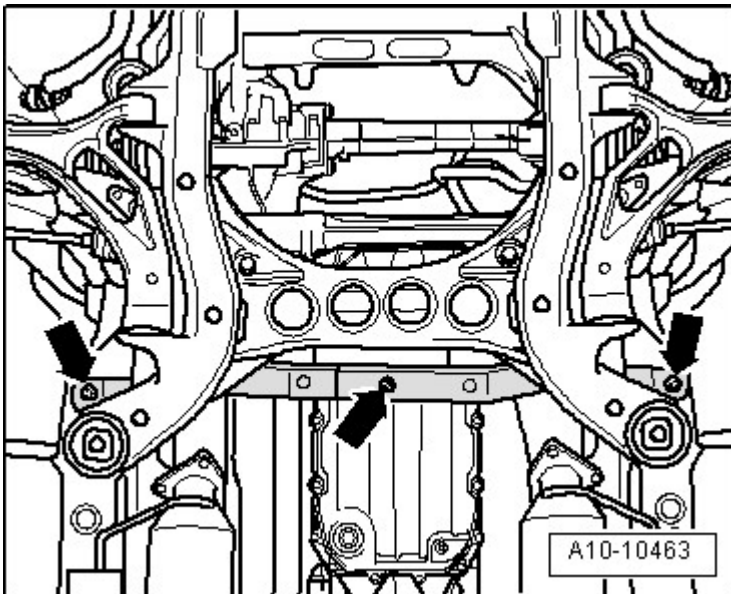


Fig. 55: Identifying Bracket For Noise Insulation
 Courtesy of AUDI OF AMERICA, LLC

- Remove the exhaust system bracket bolts -arrows- on the longitudinal member.

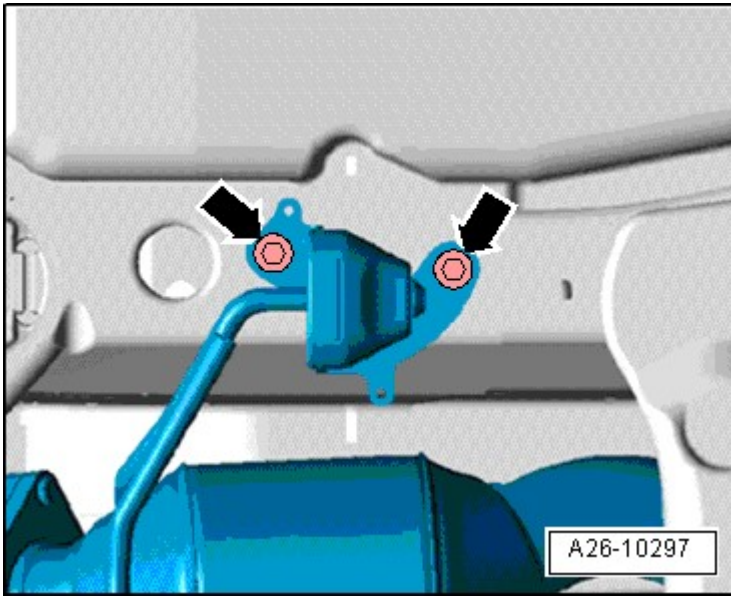


Fig. 56: Identifying Exhaust System Bracket At Left And Right From Longitudinal Members -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the Exhaust gas temperature sensor 4 -G648- -arrow-.

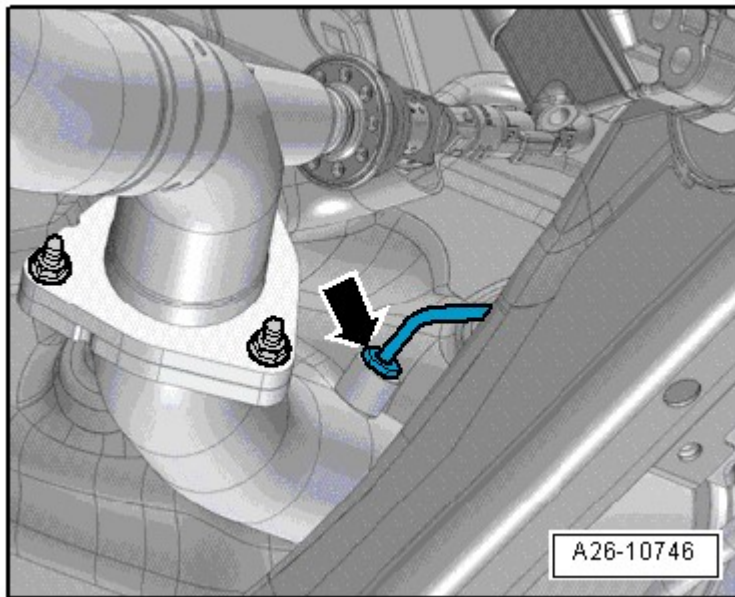


Fig. 57: Identifying Exhaust Gas Temperature Sensor 4 -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the differential pressure sensor -G505- hoses from the pressure lines on the particulate filter; to do this, loosen the hose clamps -arrows-.

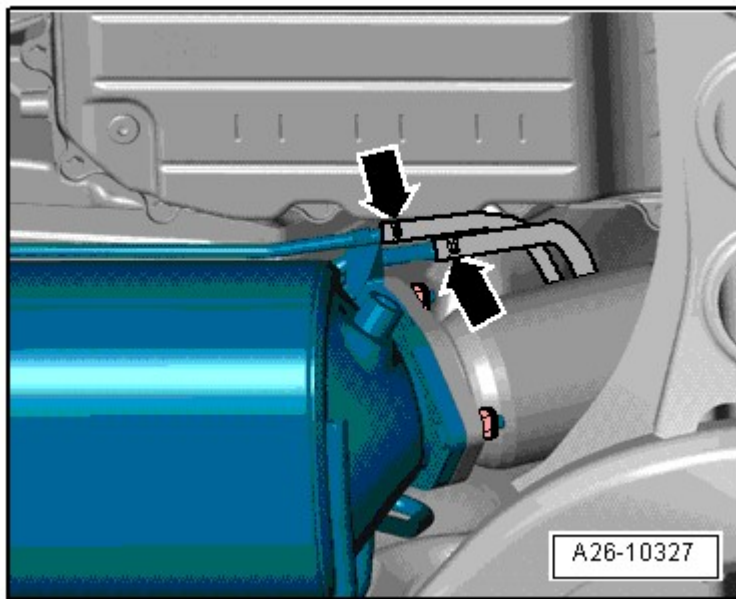


Fig. 58: Disconnect Differential Pressure Sensor Hoses -Arrows
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect electrical connector -arrow- on steering gear.

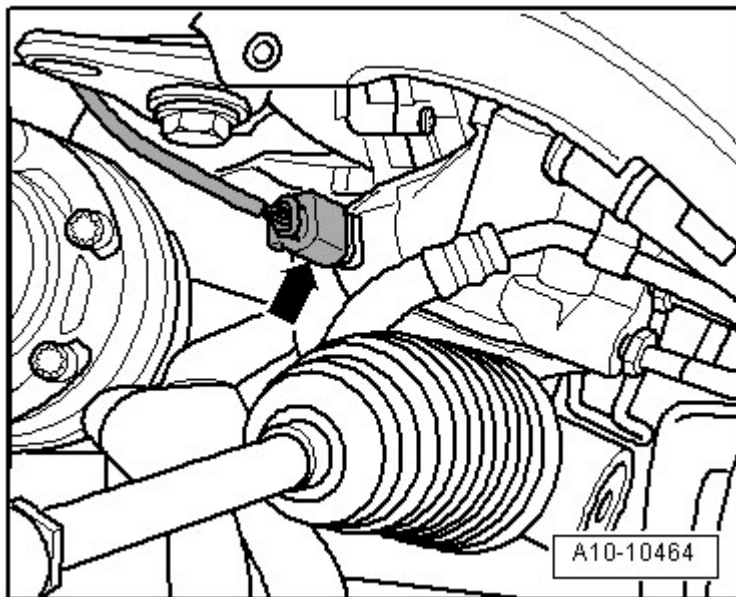


Fig. 59: Identifying Electrical Connector And Heat Shield
Courtesy of AUDI OF AMERICA, LLC

-- Remove the 2 bolts and then remove the steering gear heat shield -A-.

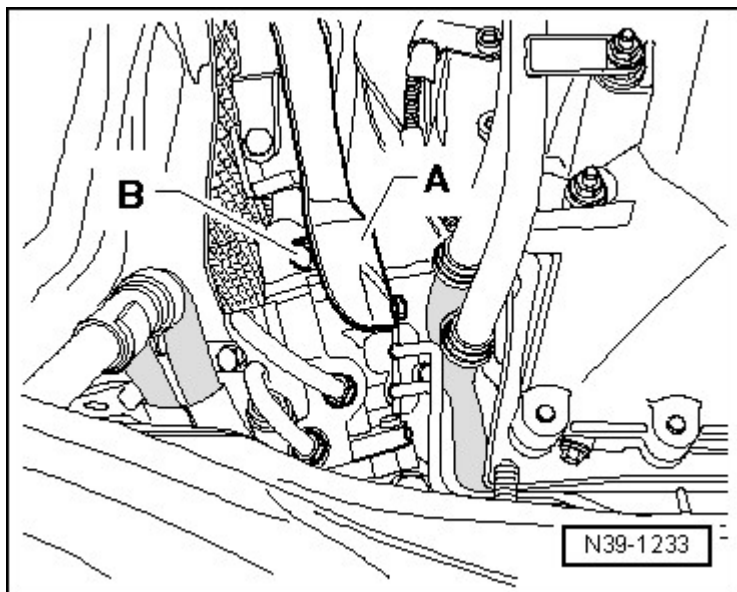


Fig. 60: Identifying Universal Joint Bolt

Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of distorting airbag spiral spring.

- Separate universal joint from steering gear only when front wheels are in straight ahead position.
- Secure steering wheel with adhesive tape to prevent position of steering wheel and steering gear from changing.

-- Remove the universal joint bolt -B-. Refer to Description and Operation .

-- Remove universal joint from steering gear.

-- Place the V.A.G 1782 under the disconnection point.

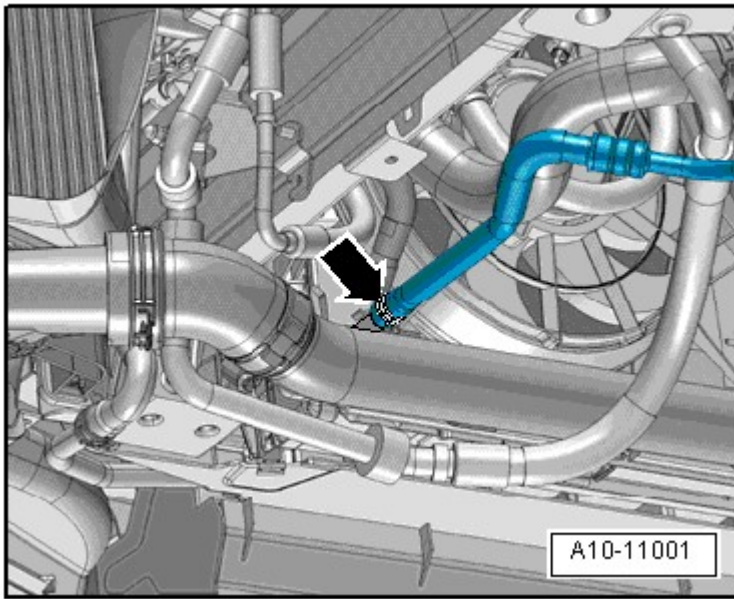


Fig. 61: Identifying Hose Clamp -Arrow
Courtesy of AUDI OF AMERICA, LLC

- Loosen the hose clamp -arrow- and disconnect the left fluid line on the lock carrier leading to the power steering cooler.
- Seal the open lines and connections with clean plugs from the VAS 6122.
- Remove the bolt -arrow-, free up the coolant hose and move the fuel cooler pump -V166- to the side.

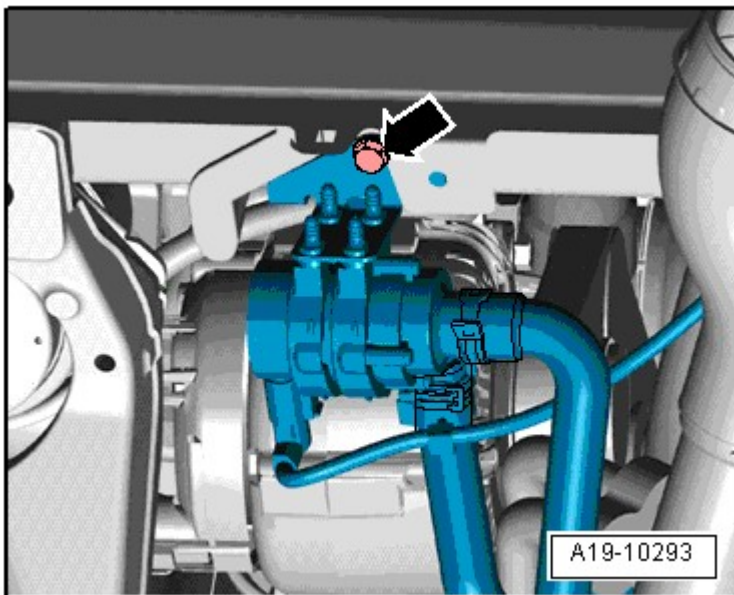


Fig. 62: Vehicles Built through 05.10: Fuel Cooler Pump -V166-, Tightening Specifications
Courtesy of AUDI OF AMERICA, LLC

NOTE: Observe the rules of cleanliness for working on automatic transmissions. Refer to **GENERAL REPAIR INFORMATION** .

-- Remove the bolt -arrow- and disconnect the ATF lines from the ATF thermostat.



Fig. 63: Identifying Lines From Transmission Oil Cooler And Rear Mounting Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Seal the open lines and connections with clean plugs from the VAS 6122.

-- Remove the nut -1- on the right longitudinal member and disconnect the ground (GND) wire from the threaded pin.

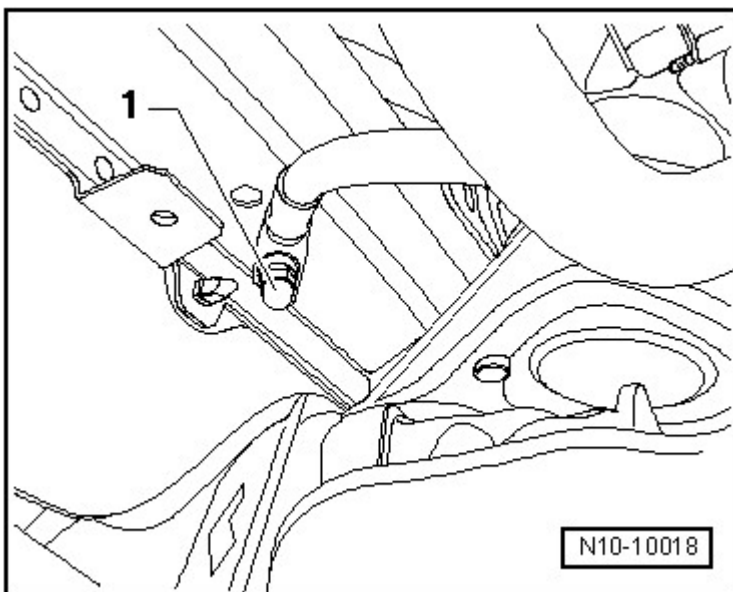


Fig. 64: Identifying Ground (GND) Cable On Longmember

Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the automatic transmission connectors -1, 2 and 3--

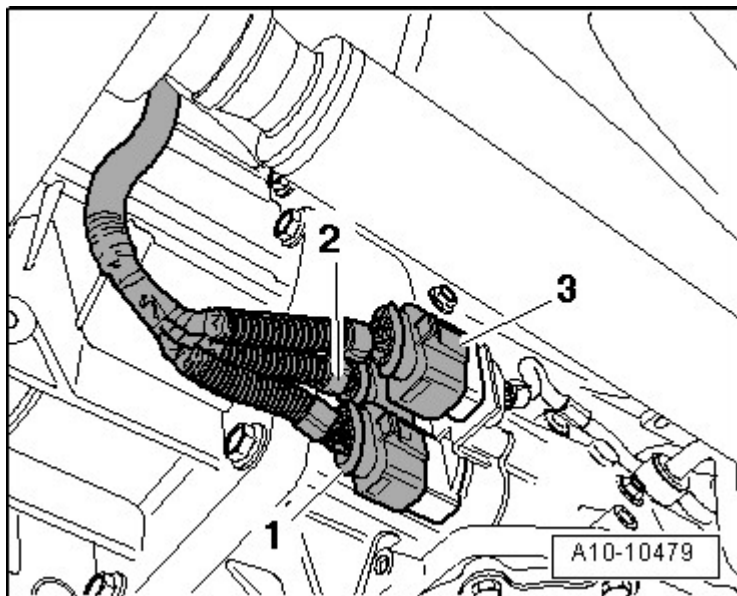


Fig. 65: Connect Connectors -1 Through 3-
Courtesy of AUDI OF AMERICA, LLC

Prepare Scissor Lift Platform:

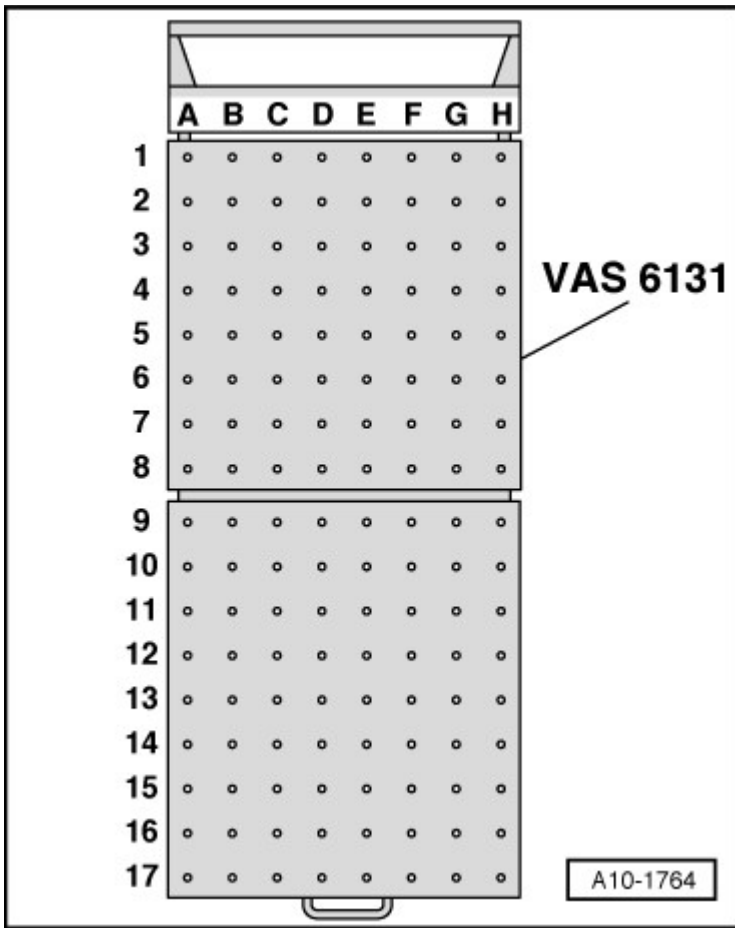


Fig. 66: Identifying Scissor Lift Platform VAS 6131

Courtesy of AUDI OF AMERICA, LLC

-- Equip scissor-type assembly platform VAS 6131 A with support set VAS 6131/10 and supplementary set VAS 6131/11 and VAS 6131/13 as follows:

Platform Coordinates	Parts from Support Set VAS 6131/10, Supplementary Set VAS 6131/11 and VAS 6131/13			
B2	/10-1	/10-2	/10-5	/11-1
G2	/10-1	/10-2	/10-5	/11-1
A4 and C4	/13-5	-	-	/13-2
F4 and H4	/13-6	-	-	/13-2
B5	/13-4	/10-2	/10-5	/13-1
G5	/13-4	/10-2	/10-5	/13-1
C7	/10-1	/10-2	/10-5	/10-8
F7	/10-1	/10-2	/10-5	/10-8
B14	/10-1	/10-3	/10-5	/10-7
G14	/10-1	/10-3	/10-5	/10-7

-- First manually secure the mounting elements to the VAS 6131 A.

-- Position the scissor lift table horizontally.

- Note bubble level (sight glass) on support platform.

-- Guide scissor lift table under the engine/transmission subassembly.

-- Attach mounting elements from VAS 6131/10 and VAS 6131/11 at front of subframe as shown in illustration.

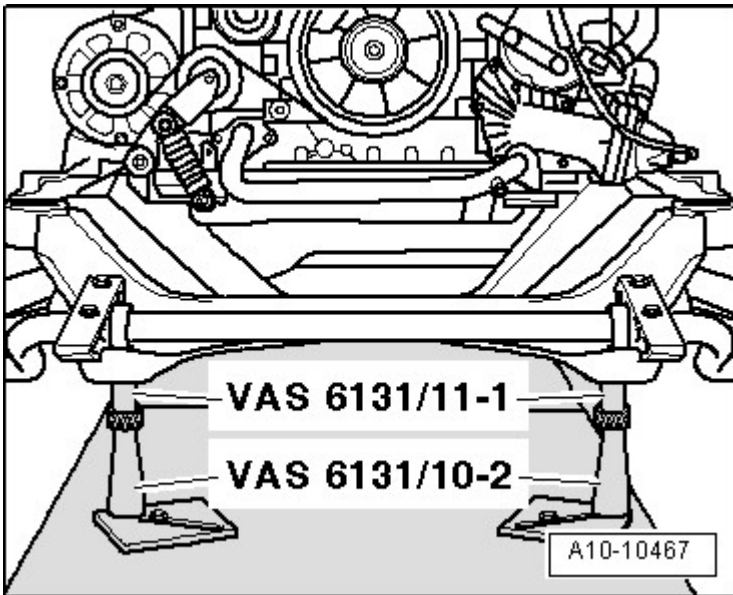


Fig. 67: Attach Mounting Elements From VAS 6131/10 And VAS 6131/11 At Front Of Subframe
Courtesy of AUDI OF AMERICA, LLC

-- Ensure threaded spindles are completely installed.

-- Attach mounting elements from the VAS 6131/10 and VAS 6131/13 at the left and right on the transmission carrier as shown in the illustration.

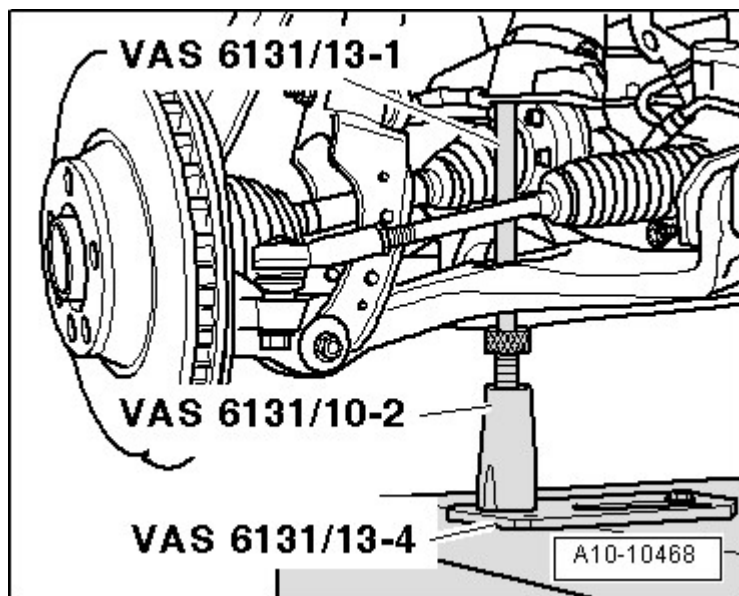


Fig. 68: Attaching Mounting Elements From VAS 6131/10 And VAS 6131/13
 Courtesy of AUDI OF AMERICA, LLC

-- Position mounting elements VAS 6131/13 at the left and right on the suspension struts as shown in the illustration.

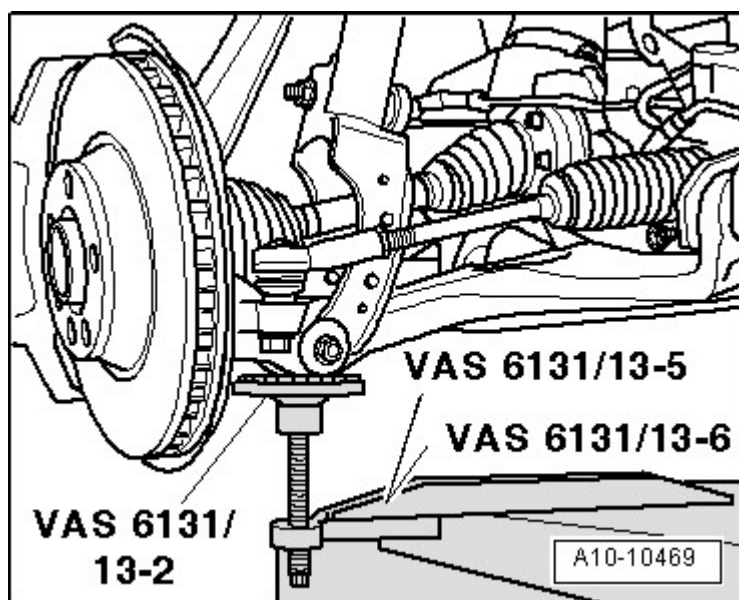


Fig. 69: Position Supporting Elements From VAS 6131/13 On Strut Supports
 Courtesy of AUDI OF AMERICA, LLC

-- Attach mounting elements from VAS 6131/10 at the left and right on the subframe as shown in the illustration.

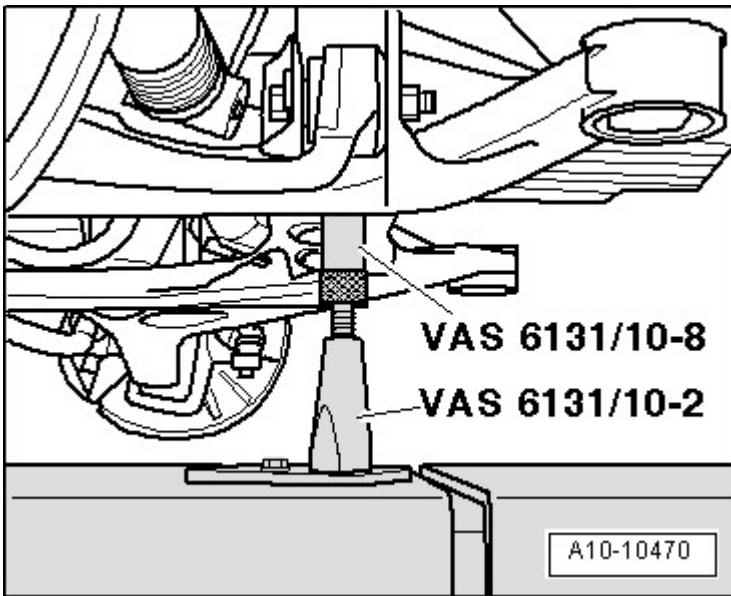


Fig. 70: Attach Mounting Elements From VAS 6131/10 At Rear Of Subframe
 Courtesy of AUDI OF AMERICA, LLC

-- Attach mounting elements from VAS 6131/10 at left and right on transmission carrier as shown in illustration.

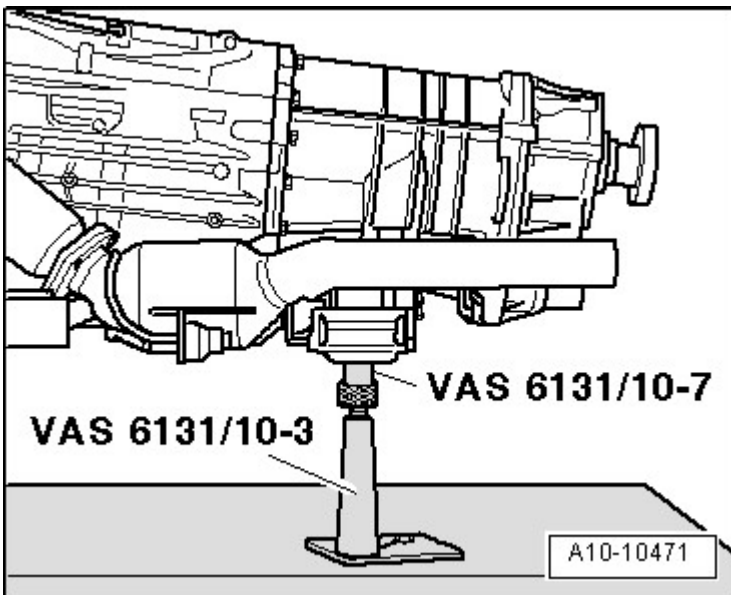


Fig. 71: Attaching Mounting Elements From VAS 6131/10 At Left And Right On Transmission Carrier
 Courtesy of AUDI OF AMERICA, LLC

- Rotate mounting element spindles upward until all mounting pins come in contact with mounting points.
- Attach mounting element base plates to the VAS 6131 A and tighten to 20 Nm.
- Mark position of subframe, engine carrier and transmission carrier to longitudinal members with a felt-tip

pen.

-- Remove the bolts -1 to 4- in a diagonal sequence in steps.

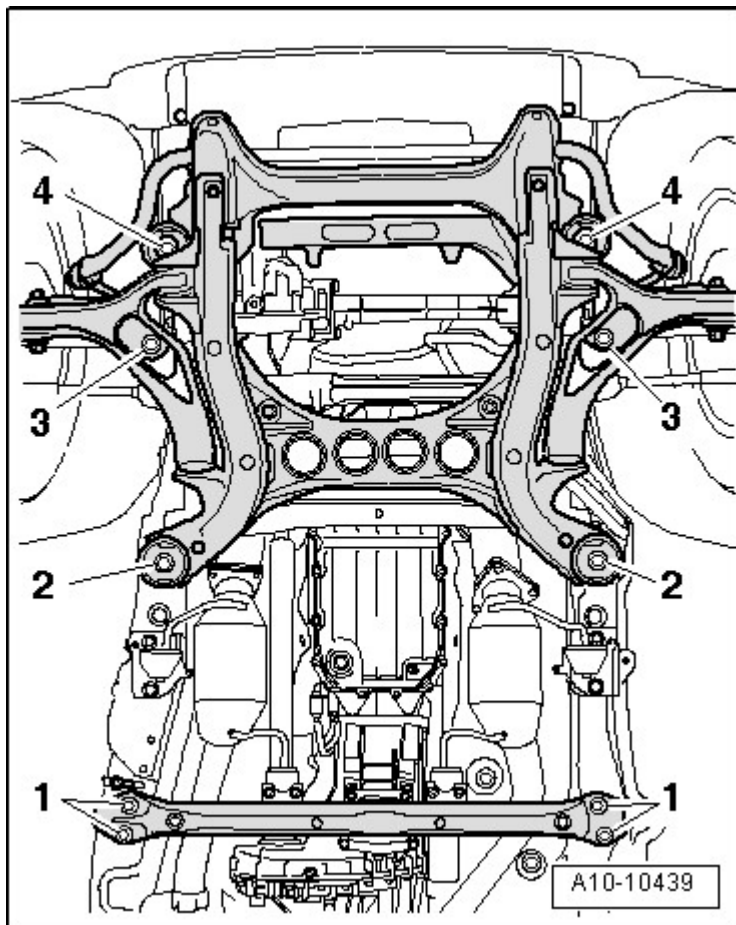


Fig. 72: Identifying Bolts -4- And Engine Carrier Bolts -3-
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of damaging hose and wiring connections as well as engine compartment.

- Make sure all the hoses and lines between the engine, transmission, subframe and body have been disconnected.
- Carefully guide engine-transmission assembly with subframe out of engine compartment while lowering.
- Carefully guide the suspension struts past the longitudinal members.

-- Next lower engine/transmission subassembly with the VAS 6131 A only by dimension -a-.

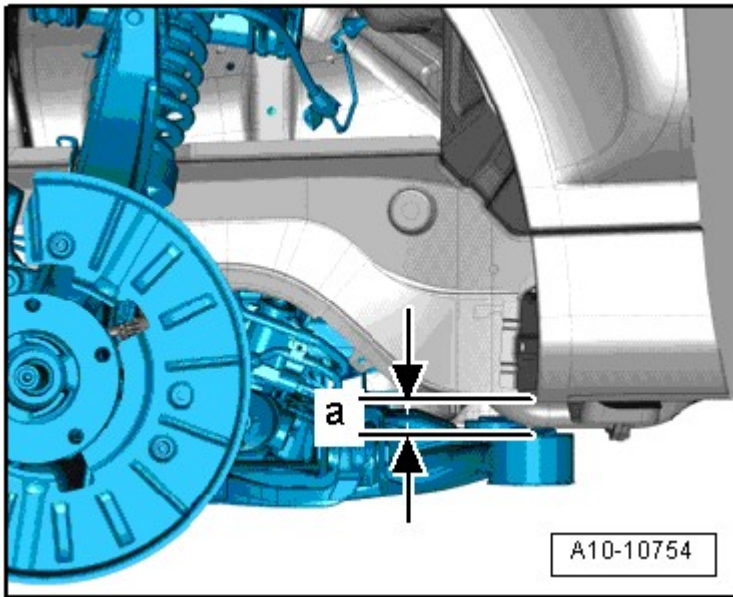


Fig. 73: Identifying Dimension -a- Between Subframe And Body
 Courtesy of AUDI OF AMERICA, LLC

- Dimension -a- = 7.87 in.

-- Remove the bolts -1 through 4- and remove the selector lever cable heat shield.

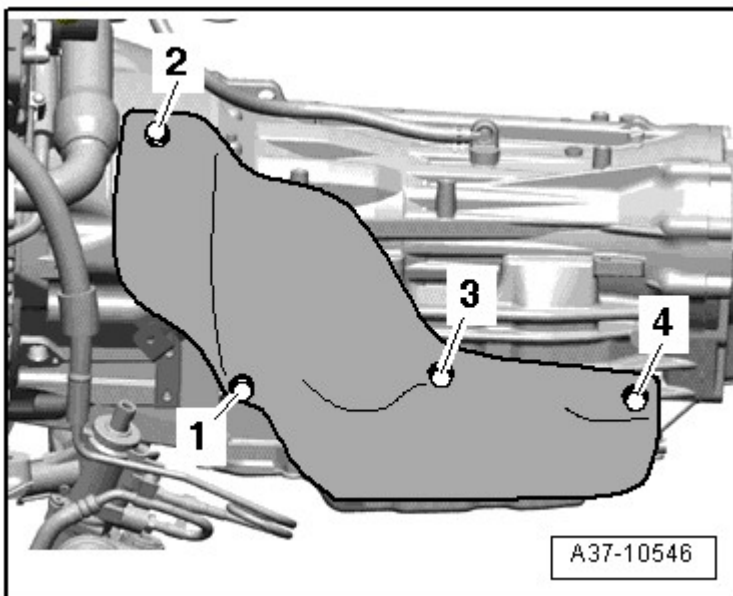


Fig. 74: Selector Lever Cable Heat Shield - Tightening Specification
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the selector lever cable ball head -2- from the transmission shift lever using the 80 - 200.

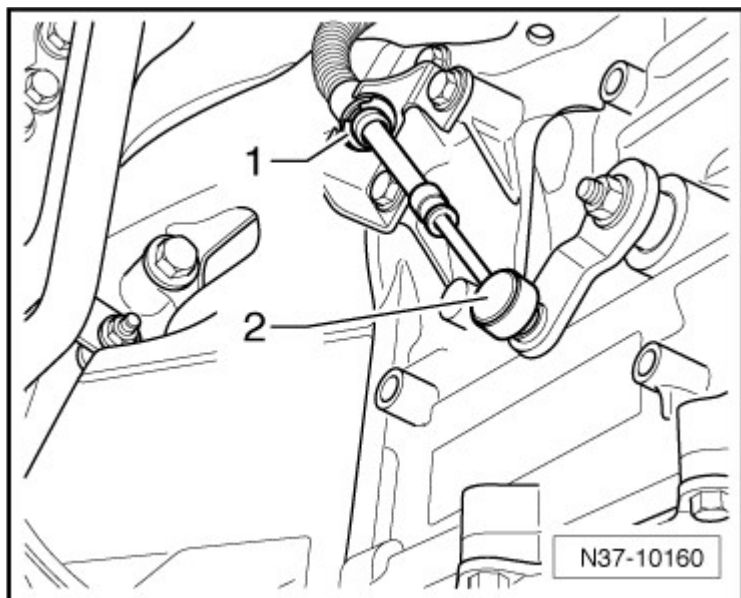


Fig. 75: Identifying Locking Washer & Selector Lever Cable
Courtesy of AUDI OF AMERICA, LLC

-- Remove securing clips -1- and remove selector lever cable from transmission.

NOTE: **Do not bend or kink the selector lever cable.**

-- Lower the engine/transmission subassembly further.

-- Remove the VAS 6131 A with the engine/transmission subassembly under vehicle.

ENGINE AND AUTOMATIC TRANSMISSION 09D, SEPARATING

Special tools and workshop equipment required

- Support Set VAS 6131/10 and Supplementary Set VAS 6131/12 and VAS 6131/13
- Bracket 30 - 211 A
- Socket T40058
- M10 x 45 bolt and nut

Procedure

- Engine/transmission assembly removed and placed on the VAS 6131 A.

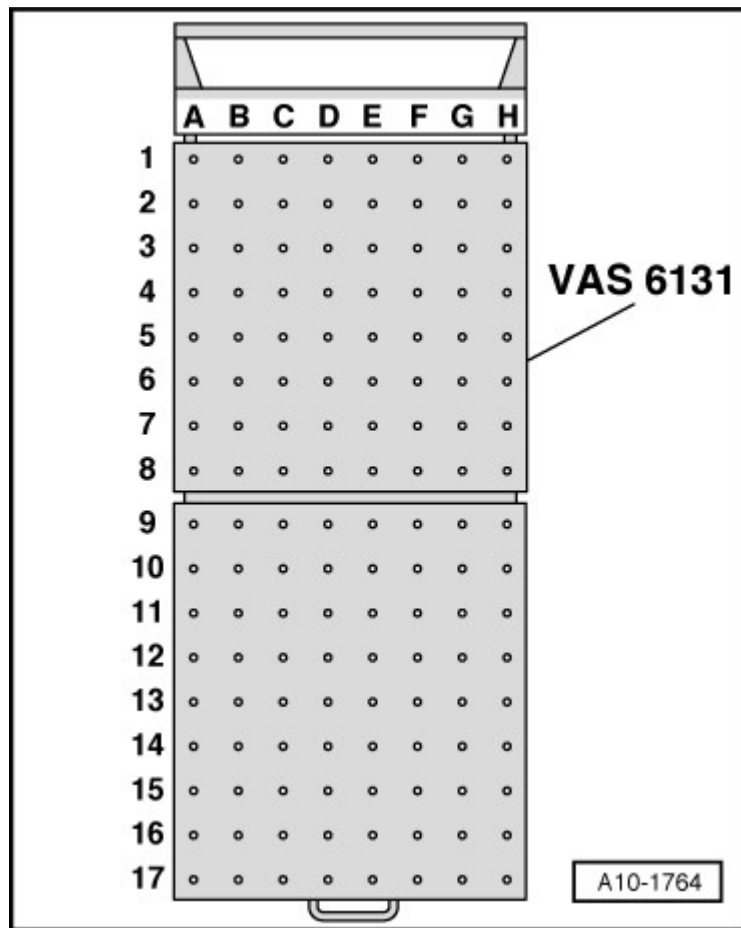


Fig. 76: Identifying Scissor Lift Platform VAS 6131

Courtesy of AUDI OF AMERICA, LLC

-- Equip scissor-type assembly platform VAS 6131 A with support set VAS 6131/10 and supplementary set VAS 6131/12 and VAS 6131/13 as follows:

NOTE: The other attachments remain unchanged.

Platform Coordinates	Parts from Support Set VAS 6131/10, Supplementary Set VAS 6131/12 and VAS 6131/13			
E1	/13-7			
C10	/10-1	/10-4	/10-5	/13-2
E10	/10-1	/10-4	/10-5	/13-2
G10	/10-1	/12-2	/10-5	/13-3

-- Secure the front joint support VAS 6131/13-7 into the threaded holes in the engine with a M10 x 45 bolt -1- and nut -2-.

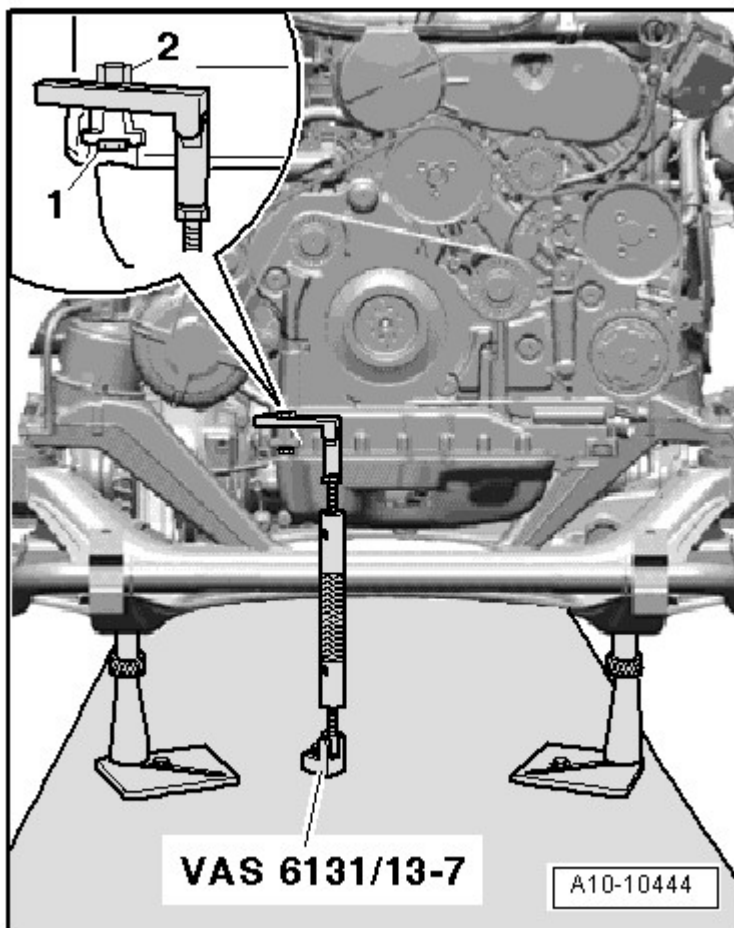


Fig. 77: Identifying VAS 6131/13-7 Securing To Engine
 Courtesy of AUDI OF AMERICA, LLC

- Install the joint support on the VAS 6131 A and tighten it to 20 Nm.
- Attach mounting elements from the VAS 6131/10 and VAS 6131/13 at the front under transmission ATF oil pan as shown in the illustration.

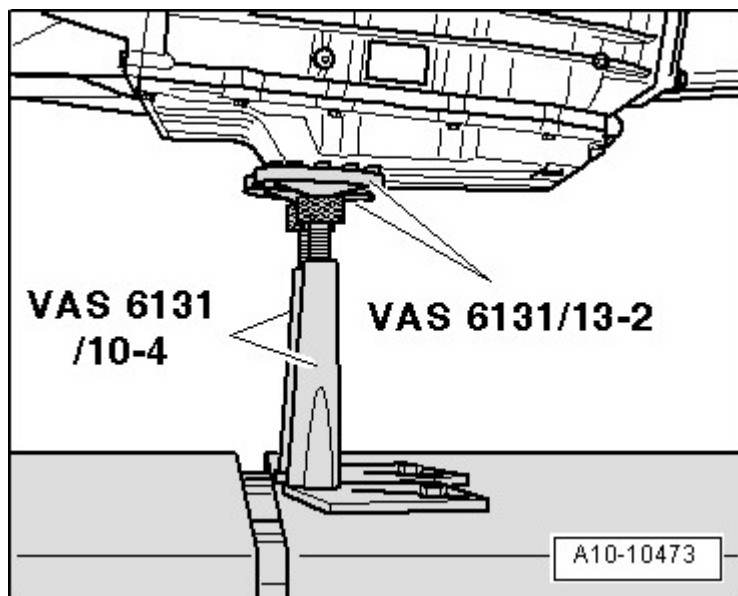


Fig. 78: Identifying Support Elements From VAS6131/10 And VAS6131/13 At Front Under Transmission ATF Oil Pan

Courtesy of AUDI OF AMERICA, LLC

-- Prepare mounting elements from VAS 6131/10, VAS 6131/12 and VAS 6131/13 for supporting the driveshaft as shown in illustration.

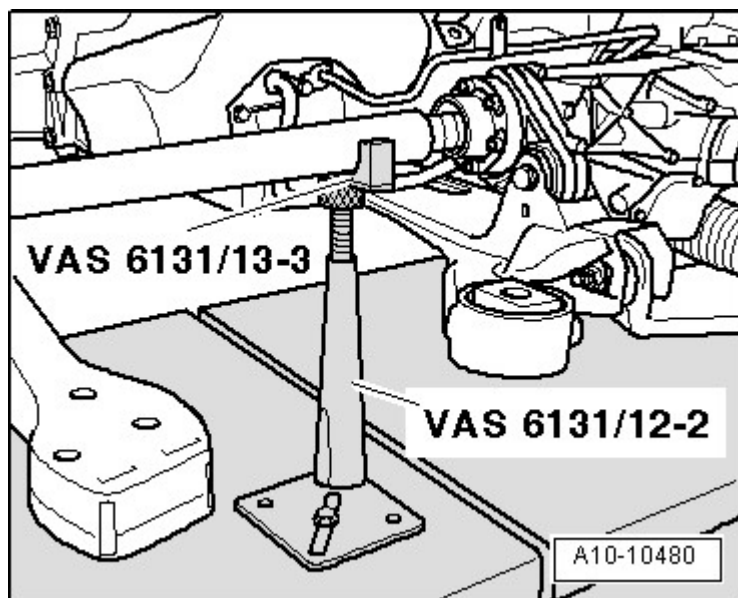


Fig. 79: Identifying Support Elements VAS6131/12 And VAS6131/13 To Support Driveshaft

Courtesy of AUDI OF AMERICA, LLC

-- Remove the particulate filter bracket bolts -arrows-.

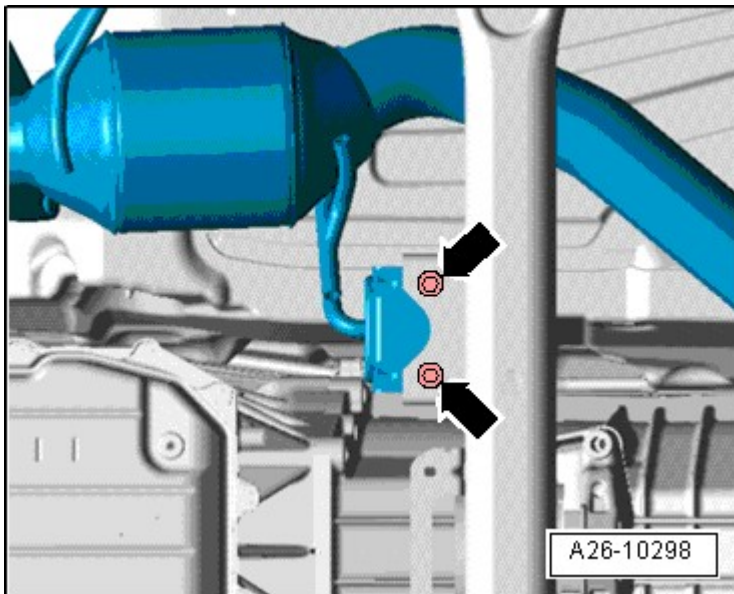


Fig. 80: Identifying Bolts

Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -arrow- on the preliminary catalytic converter strap.

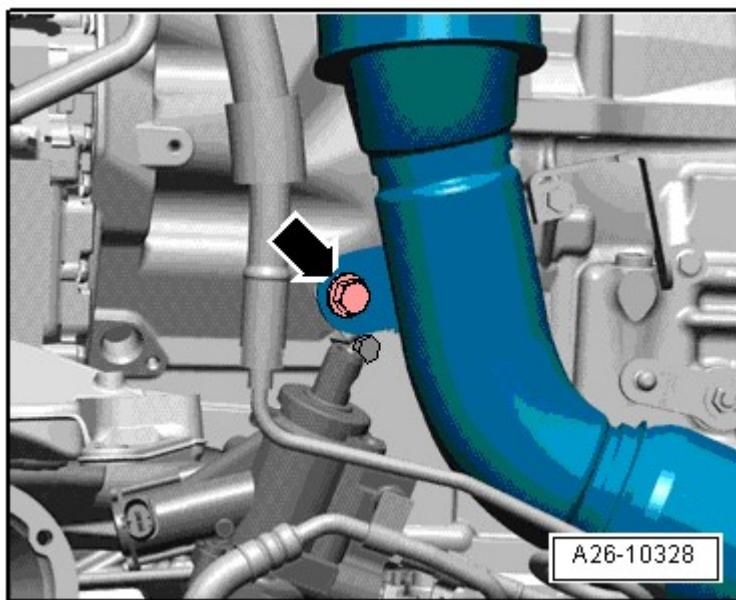


Fig. 81: Identifying Bolt -Arrow- From Exhaust Pipe

Courtesy of AUDI OF AMERICA, LLC

-- Remove electrical connectors from the bracket and disconnect.

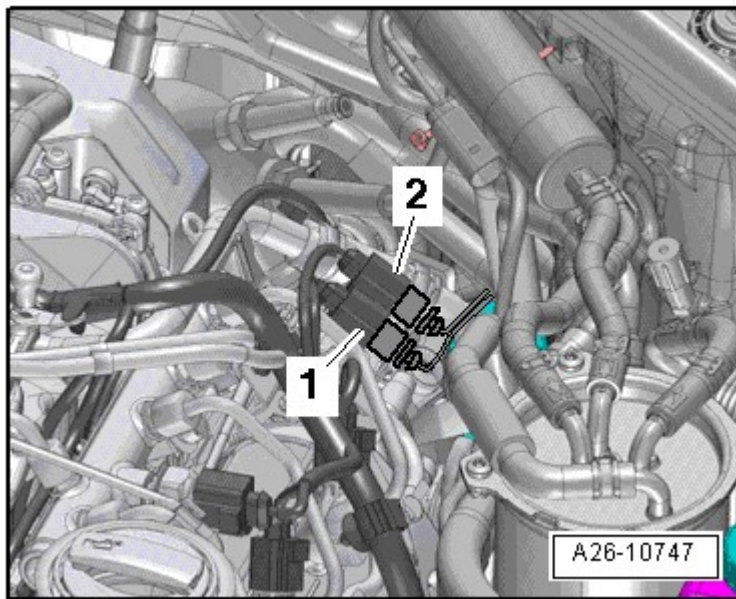


Fig. 82: Electrical Connectors

Courtesy of AUDI OF AMERICA, LLC

1. For catalyst temperature sensor 1 -G20- (orange) - only engines meeting emissions standard BIN 5
2. For exhaust gas temperature 3 -G495- (brown)

-- Free up electrical wires.

-- Remove the bolts -1- and -2- and then remove the heat shield from the turbocharger.

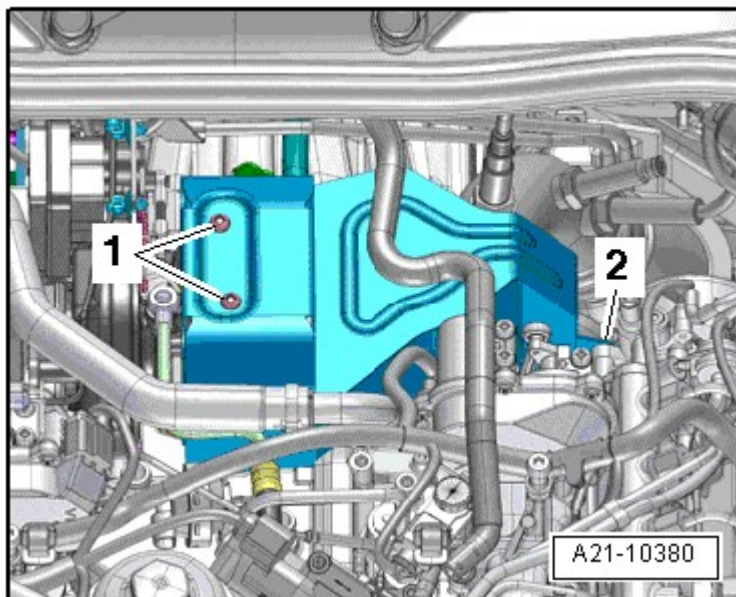


Fig. 83: Identifying Bolts -1 To 2- And Turbocharger Heat Shield

Courtesy of AUDI OF AMERICA, LLC

-- Remove the nuts -arrows- and then remove the preliminary catalytic converter and particulate filter.

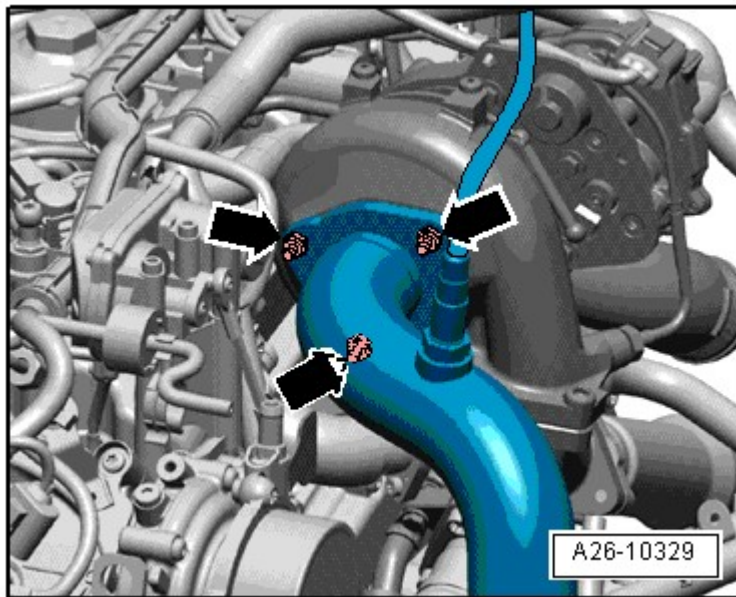


Fig. 84: Identifying Nuts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Free up the coolant hoses -arrow-.

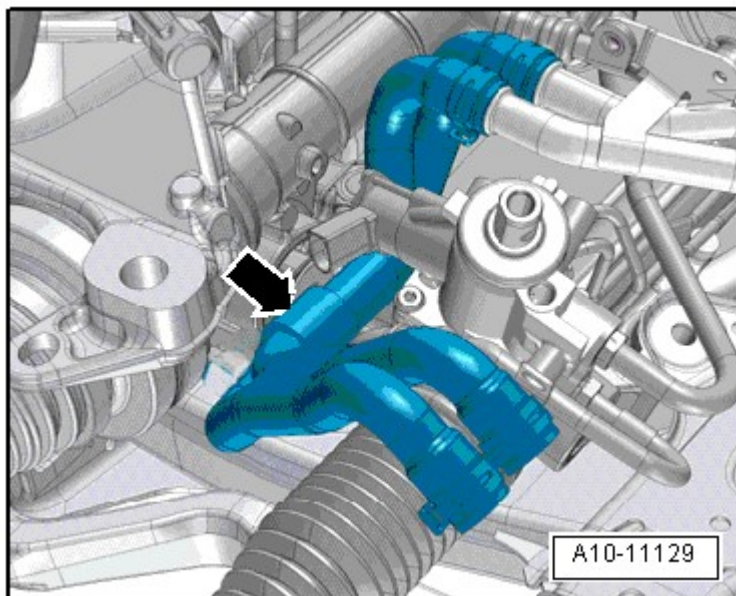


Fig. 85: Identifying Coolant Hoses -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Loosen hose clamp -2- and lift clamp -4- to remove the coolant hoses.

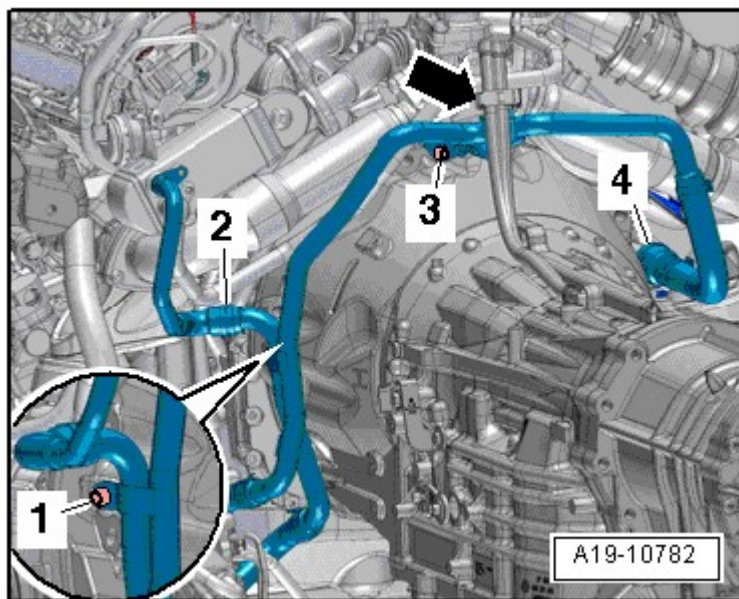


Fig. 86: Identifying Bolts -1 And 3- For Coolant Pipe
Courtesy of AUDI OF AMERICA, LLC

- Free up the transmission vent hose -arrow-.
- Remove the bolts -1- and -3- ; then remove the left coolant pipe on the back of the transmission.
- Disconnect the engine speed (RPM) sensor -G28- -arrow- connector.

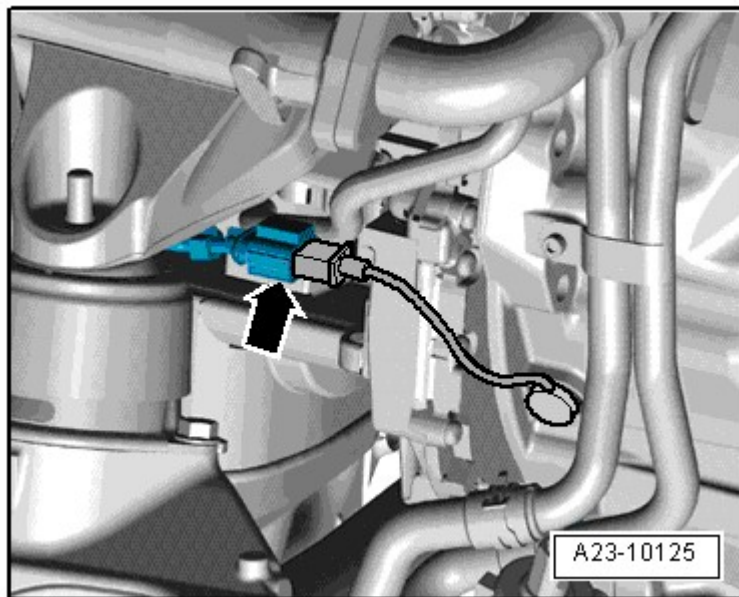


Fig. 87: Identifying Connector -Arrow-
Courtesy of AUDI OF AMERICA, LLC

- Remove the bolts -arrows- that attach the front driveshaft to the transfer case. Refer to **FRONT FINAL**

DRIVE or FRONT DRIVESHAFT .

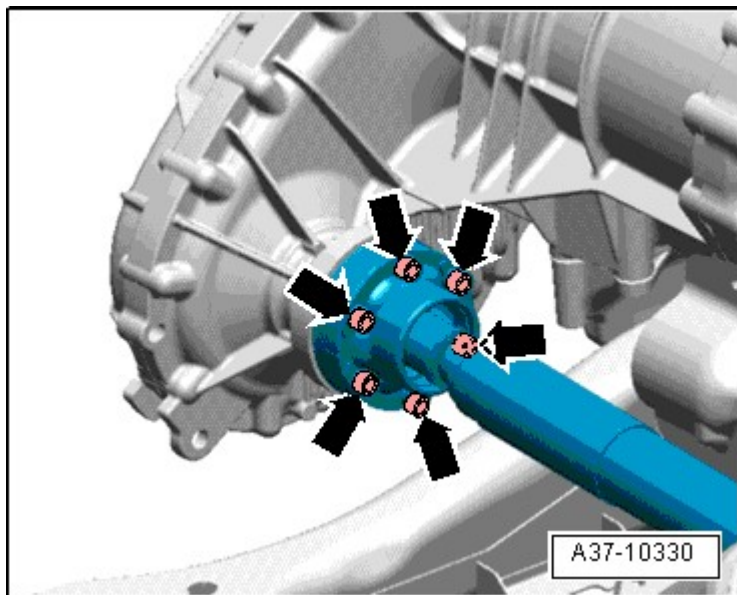


Fig. 88: Identifying Driveshaft Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

NOTE: Place a cloth underneath to soak up any escaping ATF.

Observe the rules of cleanliness for working on automatic transmissions. Refer to GENERAL REPAIR INFORMATION .

-- Remove the bolts -1- and -2- and then remove the ATF lines from the transmission.

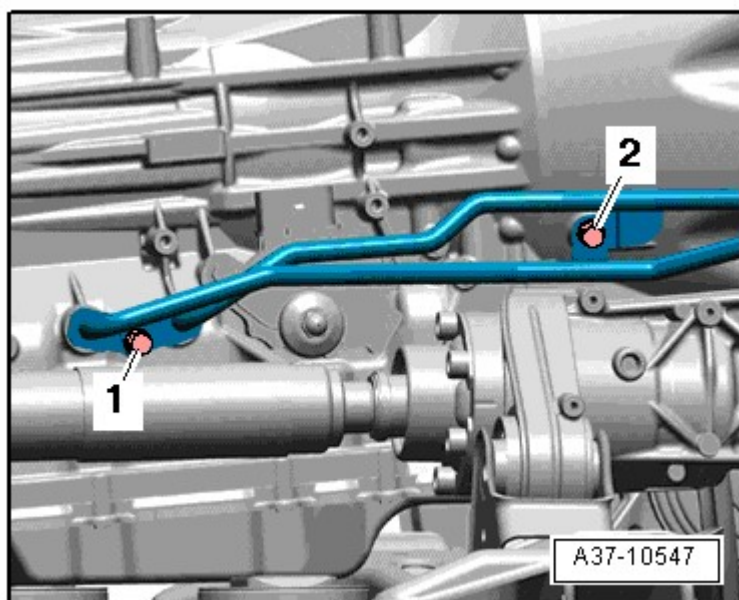


Fig. 89: Identifying ATF Transmission Line Bolt -2-

Courtesy of AUDI OF AMERICA, LLC

-- Remove the generator -1-. Refer to GENERATOR, AIR COOLED .

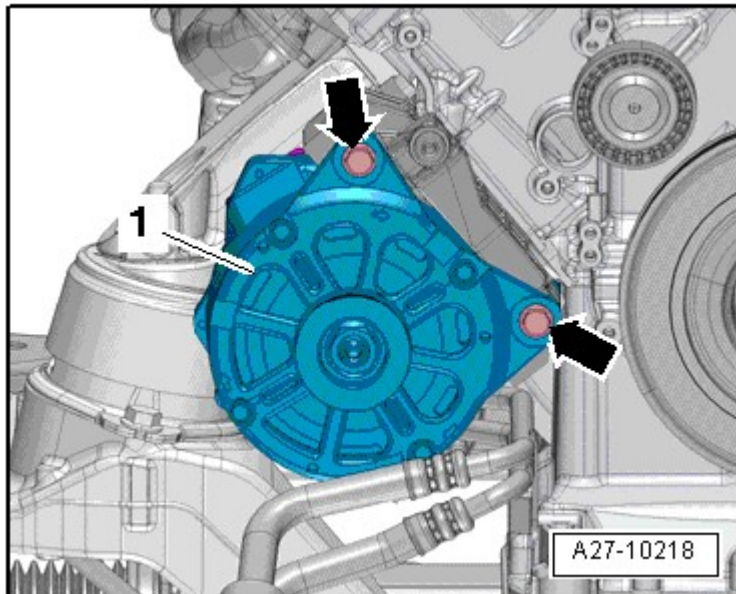


Fig. 90: Identifying Bolts -Arrows- To Generator -1-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the starter. Refer to STARTER [for engine(s) CATA] .

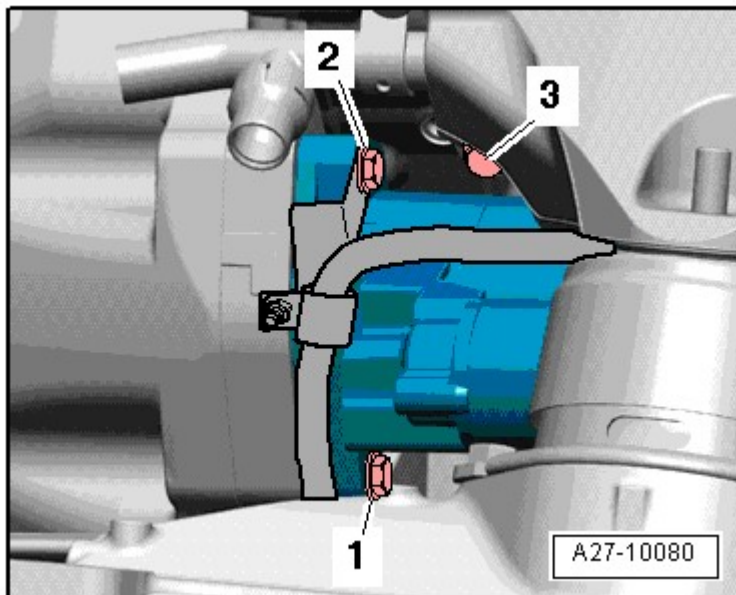


Fig. 91: Identifying Engine Support Screw
Courtesy of AUDI OF AMERICA, LLC

-- Insert the T40058 guide pins as follows:

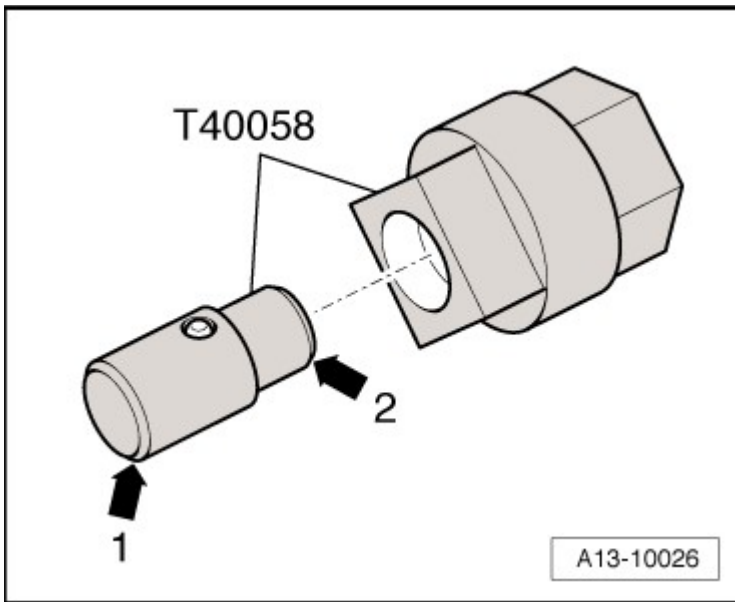


Fig. 92: Identifying Guide Pin And Adapter T40058
Courtesy of AUDI OF AMERICA, LLC

- The large diameter -arrow 1- faces the engine.
- Small diameter -arrow 2- points to adapter.

-- To loosen the torque converter bolts, counterhold the crankshaft using the T40058.

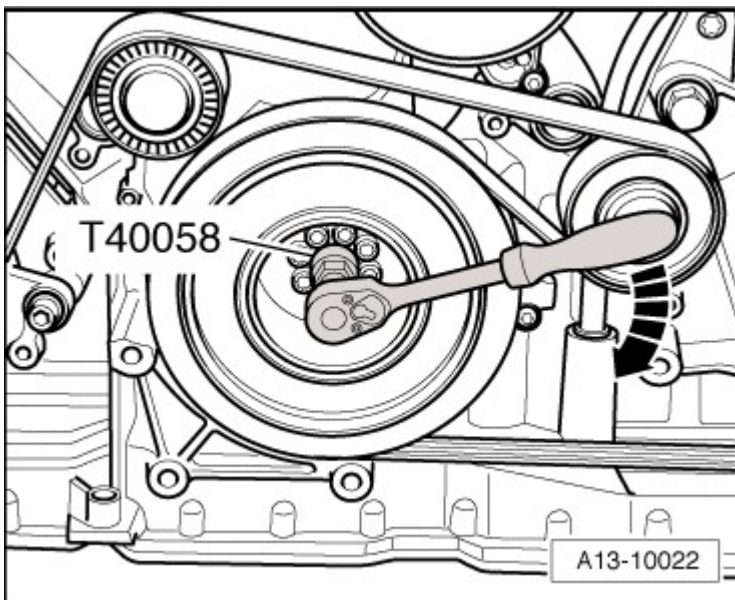


Fig. 93: Identifying Torque Converter Bolts And Adapter T40058
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Components could be destroyed by the camshaft timing chain jumping off.

- Only turn the crankshaft in the direction of engine rotation -arrow-.

-- Remove the cover -arrow-.

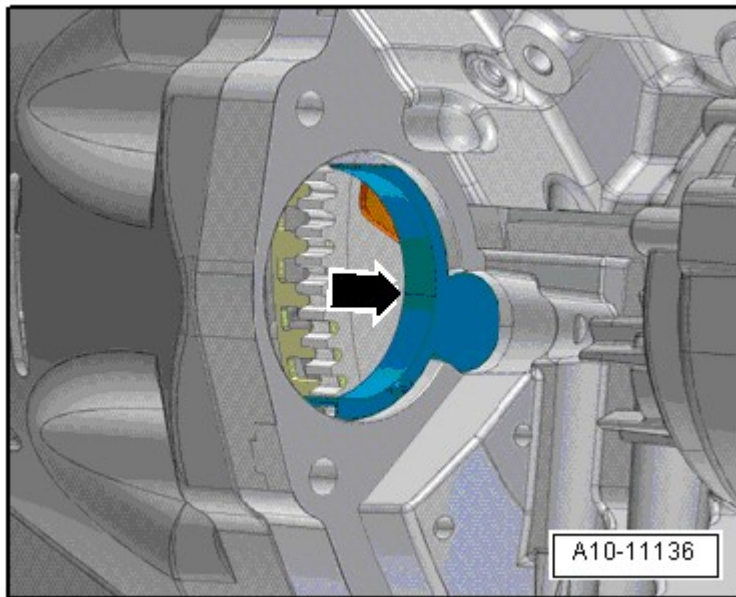


Fig. 94: Identifying Cover -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Turn the crankshaft 120° in the direction of engine rotation and remove the 6 torque converter bolts -arrows- inside the opening of the starter.

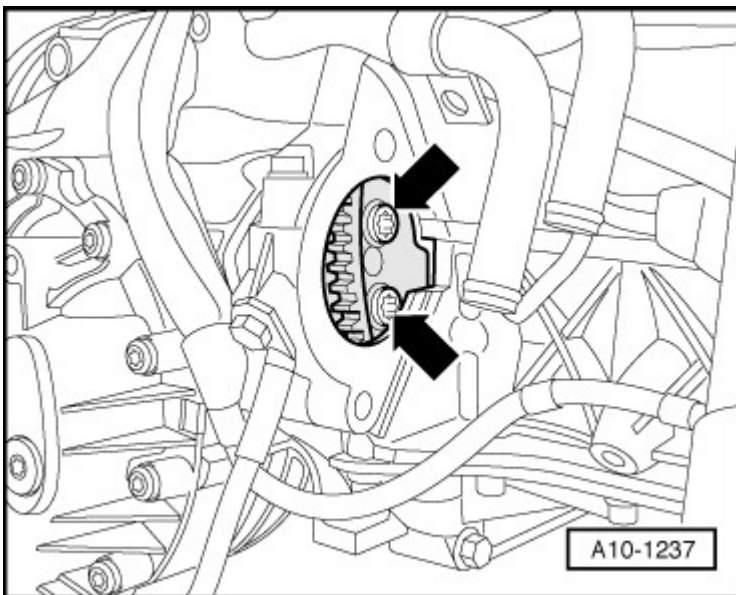


Fig. 95: Identifying Torque Converter Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the transmission/engine bolts -3 through 10-.

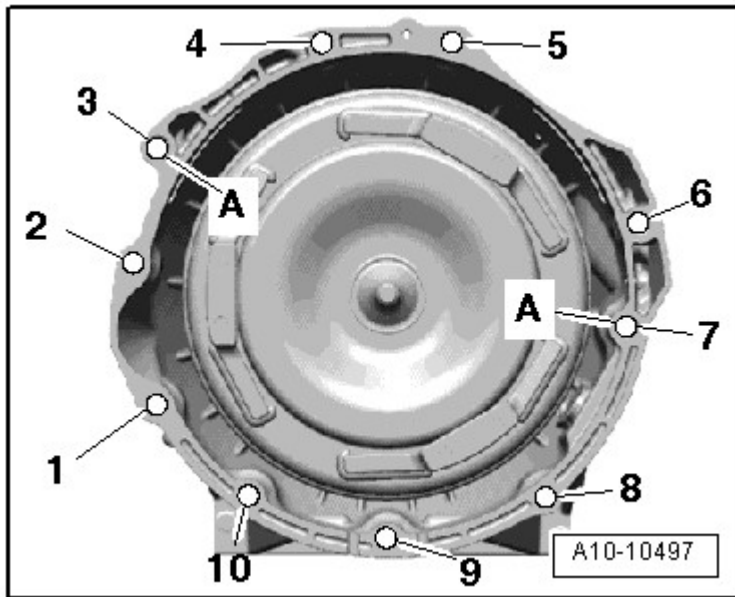


Fig. 96: Bolt Removal Sequence

Courtesy of AUDI OF AMERICA, LLC

-- Remove the plug.

-- Press the transmission off the engine, which also presses the torque converter off the drive plate -arrow-.

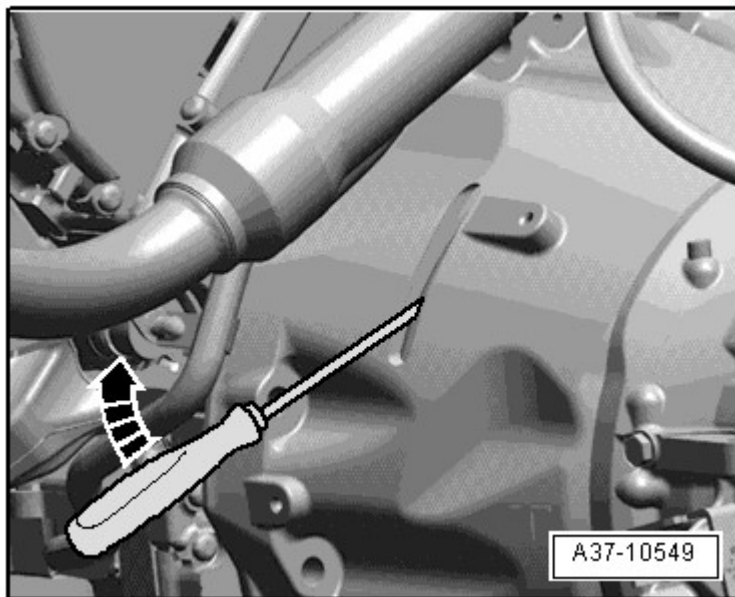


Fig. 97: Prying Torque Converter Off Drive Plate -Arrow-

Courtesy of AUDI OF AMERICA, LLC

-- Loosen the side bolts -1- on the VAS 6131 A and pull the rear table plate and transmission slightly toward the

rear.

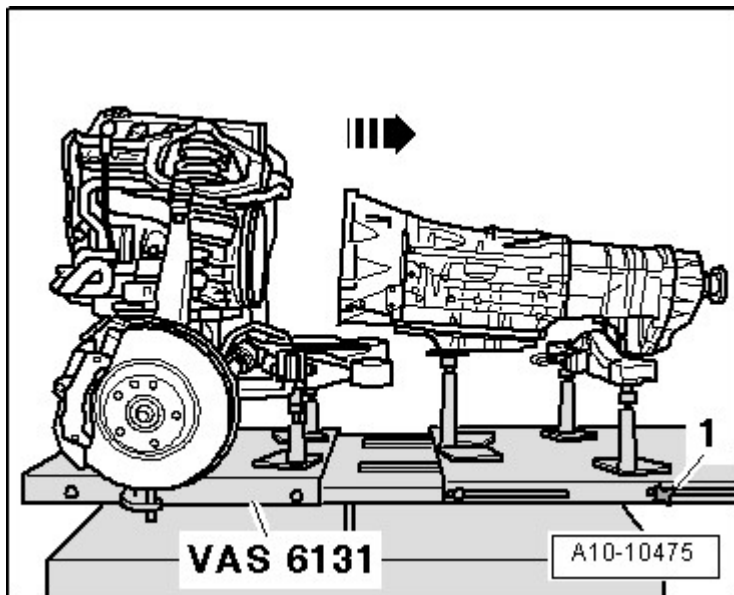


Fig. 98: Identifying Separation Of Engine And Transmission
Courtesy of AUDI OF AMERICA, LLC

-- Secure torque converter in transmission against falling out with the 30 - 211 A.

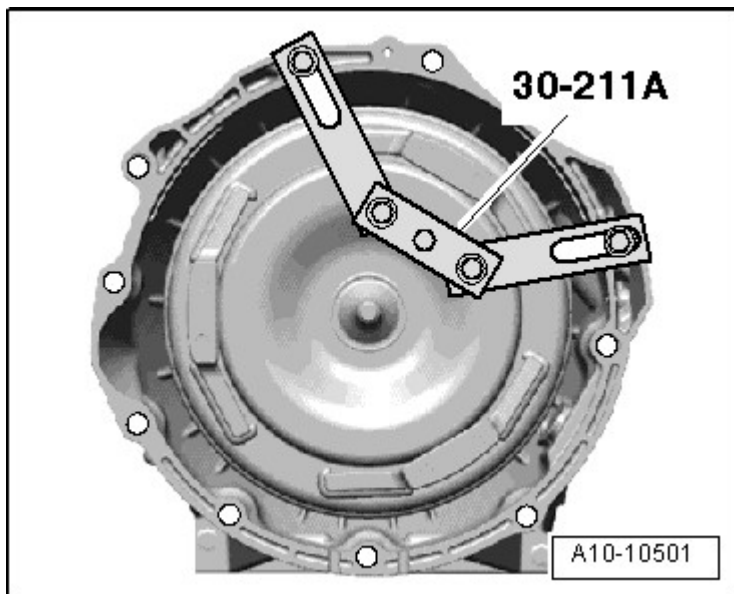


Fig. 99: Identifying Bracket -30-211A- Attached To Secure Torque Converter
Courtesy of AUDI OF AMERICA, LLC

ENGINE FROM 06.2010, REMOVING

Special tools and workshop equipment required

- Pry Lever - Rmv Outside Mirror 80 - 200
- Used Oil Collecting and Extracting Device V.A.G 1782
- Step Ladder VAS 5085
- Engine Bung Set VAS 6122
- Scissor-Type Assembly Platform VAS 6131 A with Support Set VAS 6131/10 as well as Supplementary Set VAS 6131/11, VAS 6131/13 and qty. 3 VAS 6131/10-2
- Drip Tray VAS 6208
- Hose Clamps Up to 25 mm Dia. 3094
- Hose Clip Pliers VAS 6362
- Ball Joint Puller T10187

Removing

NOTE: With lock carrier installed, engine is removed downward with transmission and subframe.

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

Collect escaping coolant in a clean container for disposal or reuse.

-- On a vehicle with air suspension, activate vehicle lift mode. Refer to General Information .

NOTE: To rotate the driveshaft freely, move the selector lever into "N".

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

- Complete the steps for disconnecting the battery.
- Pay attention to the waiting period for vehicles with urea injection.

-- Disconnect the ground (GND) cable -4-. Refer to BATTERY, DISCONNECTING AND CONNECTING .

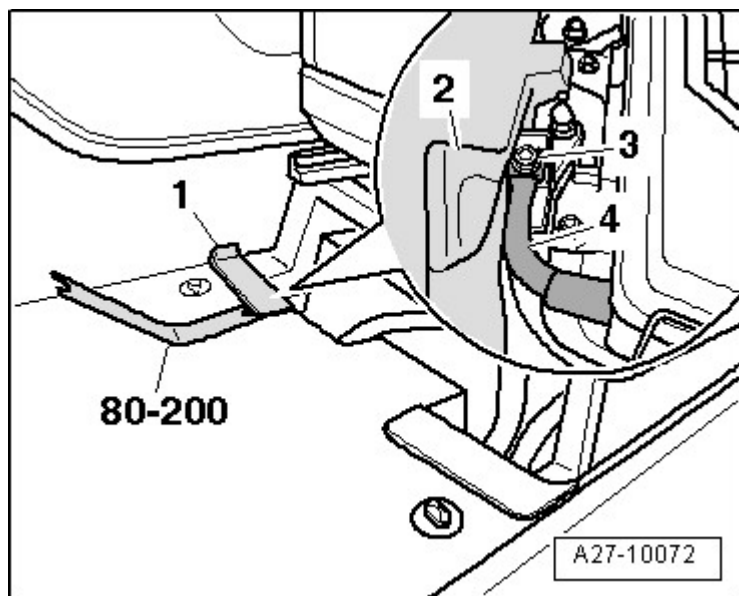


Fig. 100: Pry Cover -1- With 80 - 200 From Floor Covering.
Courtesy of AUDI OF AMERICA, LLC

- Empty coolant circuit. Refer to **LEAK DETECTION** .
- Extract the power steering oil from the reservoir with the V.A.G 1782.

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

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

- Open the coolant reservoir cap.
- Remove the left and right front wheels.
- Remove the noise insulation -1- and -2-. Refer to **Removal and Installation** .

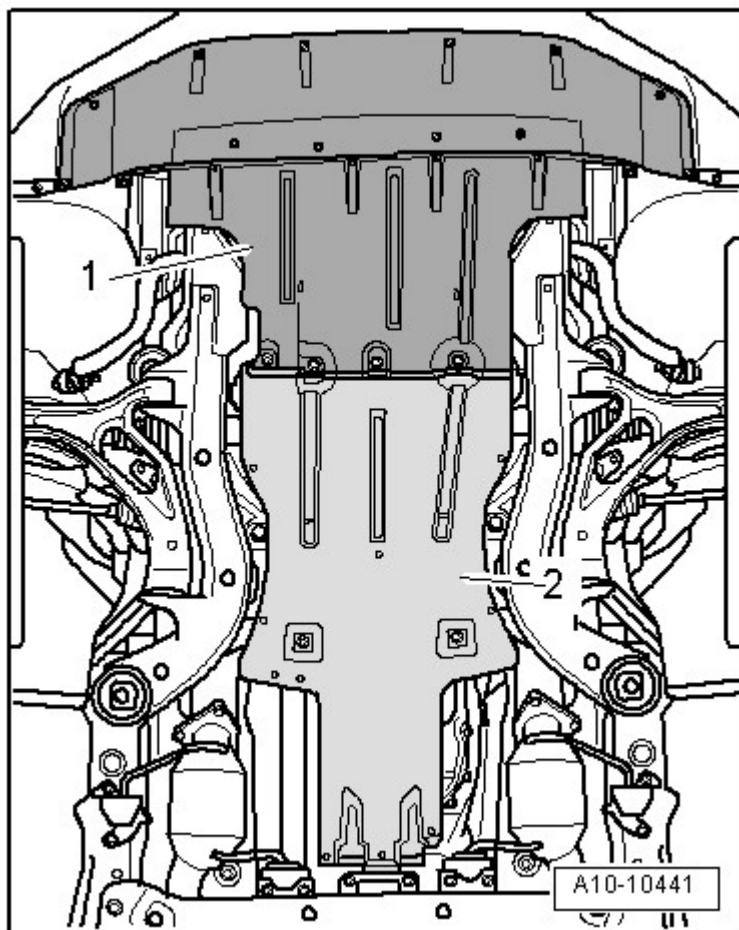


Fig. 101: Identifying Front/Rear Noise Insulation
Courtesy of AUDI OF AMERICA, LLC

-- Remove left and right front wheel housing liners. Refer to **Removal and Installation** .

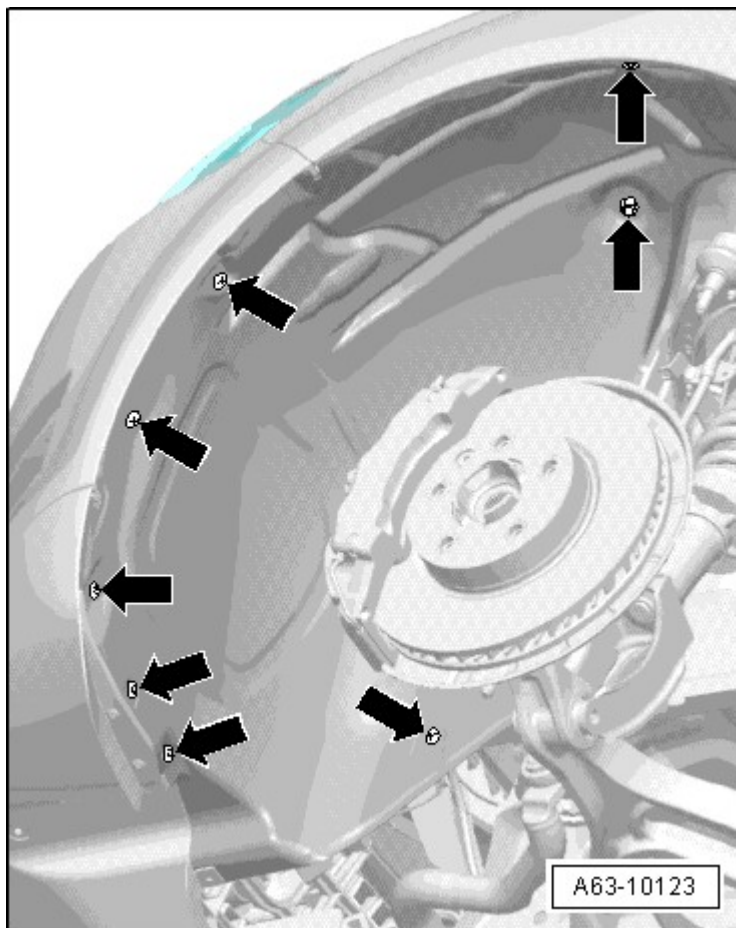


Fig. 102: Remove Left Front Wheel Housing Liner
Courtesy of AUDI OF AMERICA, LLC

-- Place the VAS 6208 under engine.

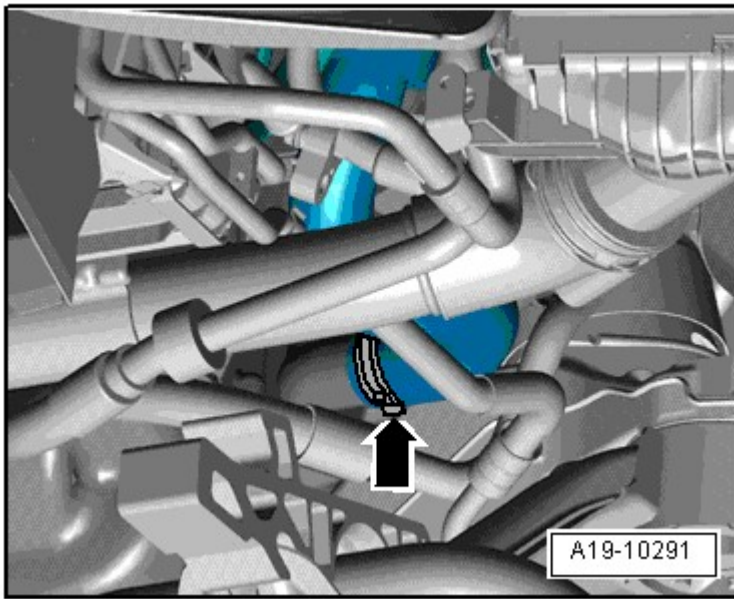


Fig. 103: Identifying Hose Clamp -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the coolant hose from the left coolant pipe by loosening the hose clamp -arrow- and letting the coolant drain out.

-- Disconnect electrical connector -3- on the engine coolant temperature (ECT) sensor on radiator -G83-.

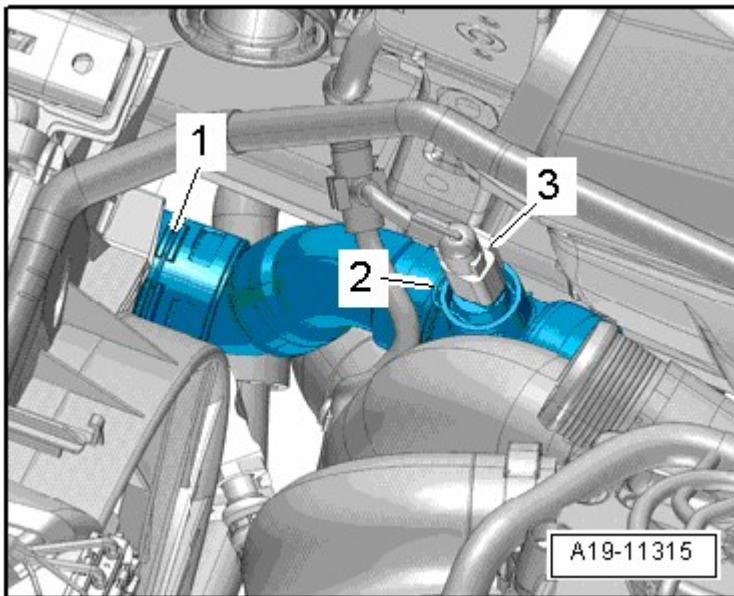


Fig. 104: Identifying Clamp -1- & Electrical Connector -3-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the right lower coolant hose from the radiator by lifting the clamp -1- and let the coolant drain out.

NOTE: Ignore -2-.

-- Loosen the hose clamps, remove the coolant hoses from the heat exchanger -arrows- and let the coolant drain out.

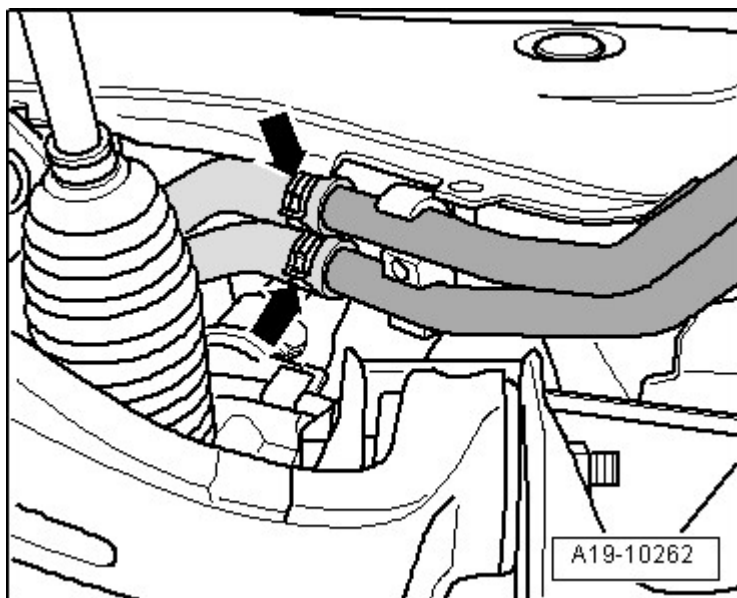


Fig. 105: Identifying Hose Connections To Heater Core
Courtesy of AUDI OF AMERICA, LLC

-- Remove the coolant hose from the right coolant pipe by loosening the hose clamp -arrow- and letting any remaining coolant drain out.

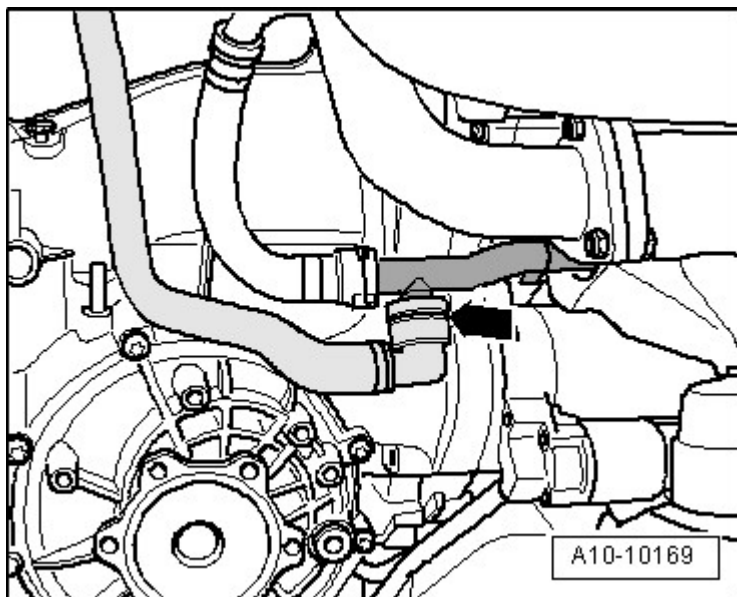


Fig. 106: Identifying Hose Clamp -Arrow
Courtesy of AUDI OF AMERICA, LLC

-- Carefully pull the engine cover -arrows- off the 4 bolts one after the other.

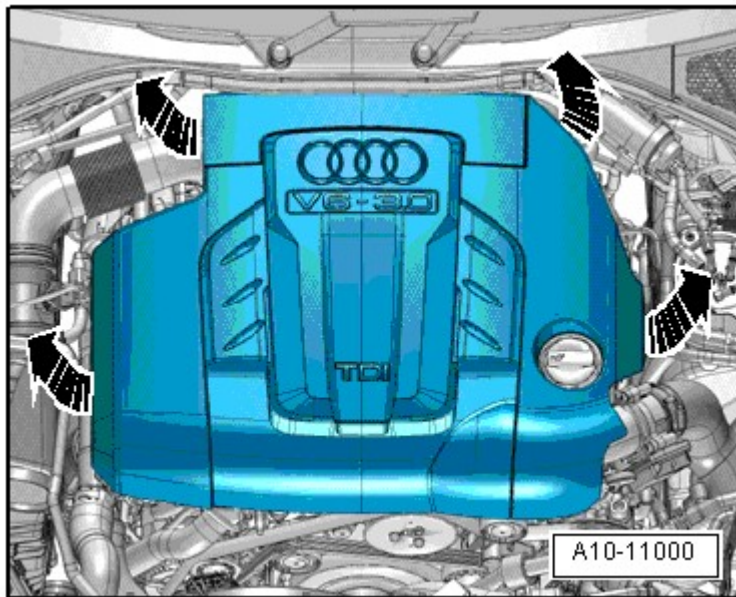


Fig. 107: Identifying Engine Cover -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Pull the cover -arrows- over the radiator, to do this disconnect the lower coolant hose.

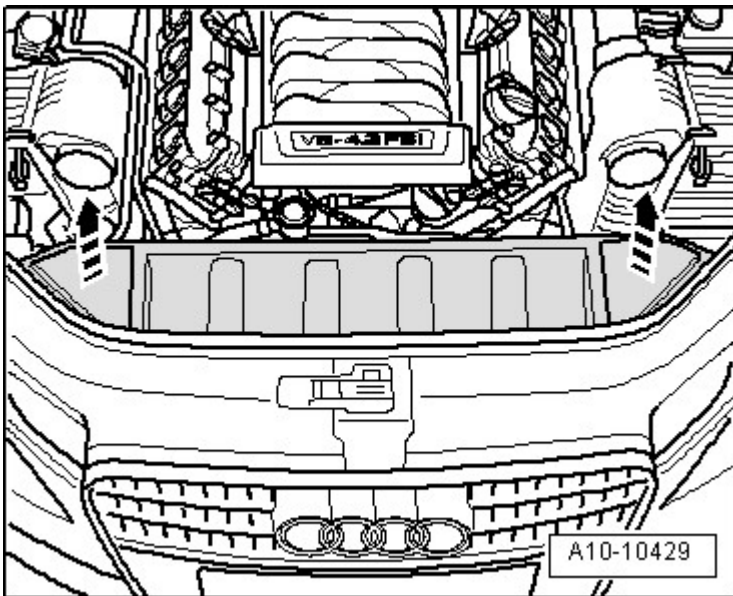


Fig. 108: Cover Over Radiator -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the coolant hose; to do this, loosen the hose clamp -1-.

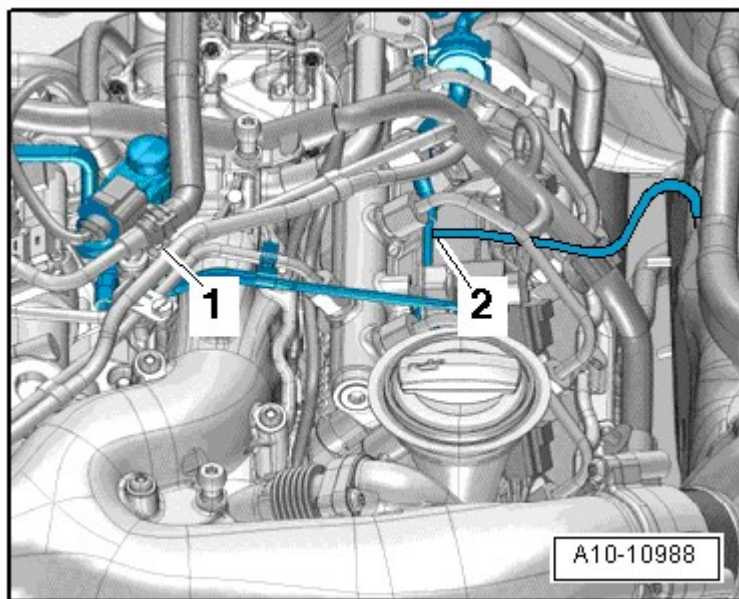


Fig. 109: Removing Coolant Hose; To Do This, Loosen Hose Clamp -1-
 Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -2-.

-- Open the cover over the terminal 30 wire junction 2 -TV22- -arrow-.

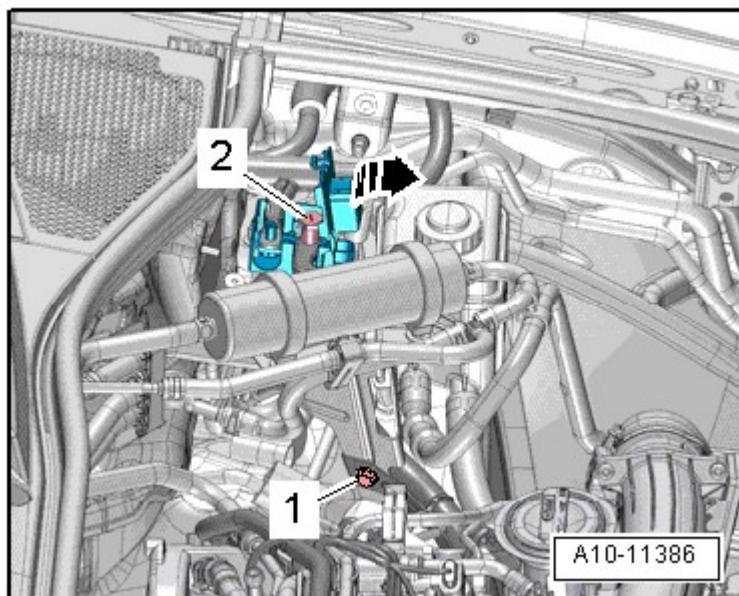


Fig. 110: Opening Cover Over Terminal 30 Wire Junction 2 -Tv22- -Arrow-
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -1-.

- Remove the bolts -2- from the battery jump start terminal -U6- and free up the electric wire.
- Remove the air guide hose by loosening the hose clamps -arrows-.

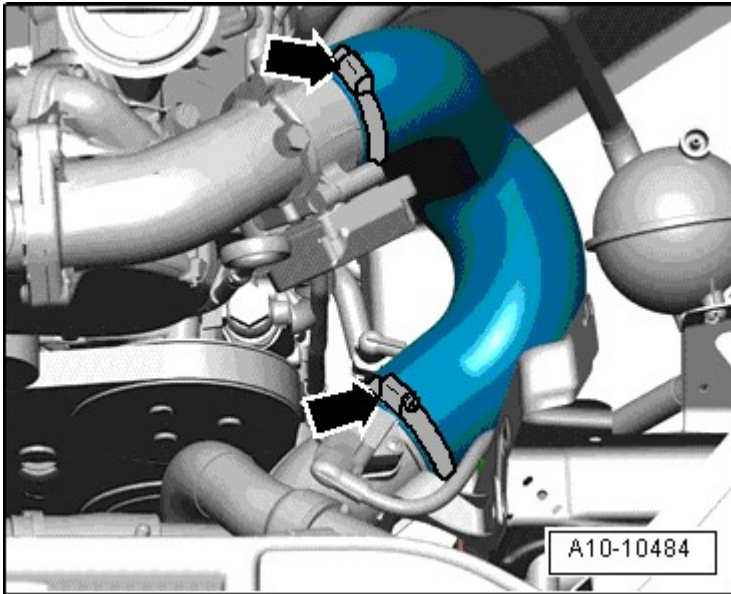


Fig. 111: Loosen Charge Air Hose Clamps -Arrows- And Remove Hose
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the connector -3-.

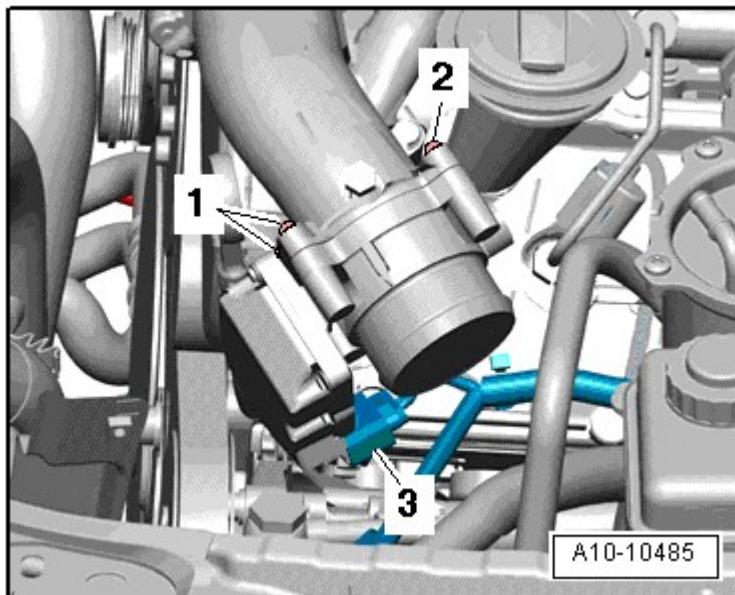


Fig. 112: Identifying Bolts -1 & 2- And Electrical Connector -3-
Courtesy of AUDI OF AMERICA, LLC

- Remove the bolts -1- and -2-, remove the throttle valve control module -J338- from the intake tube.

NOTE: Place a cloth underneath to soak up any escaping power steering fluid.

-- Clamp and remove the power steering pump hydraulic hose -1- with the 3094.

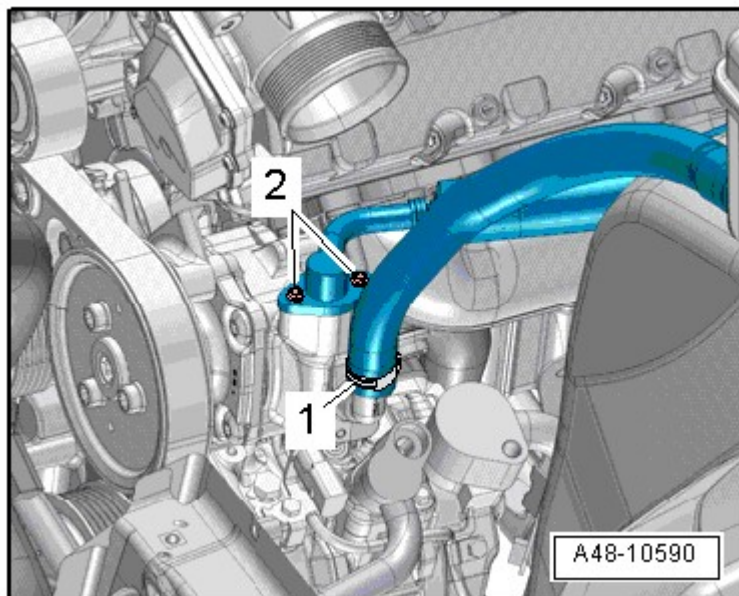


Fig. 113: Power Steering Pump Hydraulic Hose -1-, Bolts -2-
Courtesy of AUDI OF AMERICA, LLC

-- Seal the open lines and connections with clean plugs from the VAS 6122.

NOTE: Ignore -2-.

CAUTION: Risk of damaging refrigerant lines and hoses.

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

-- Remove the clamp bolts -1- and -5-.

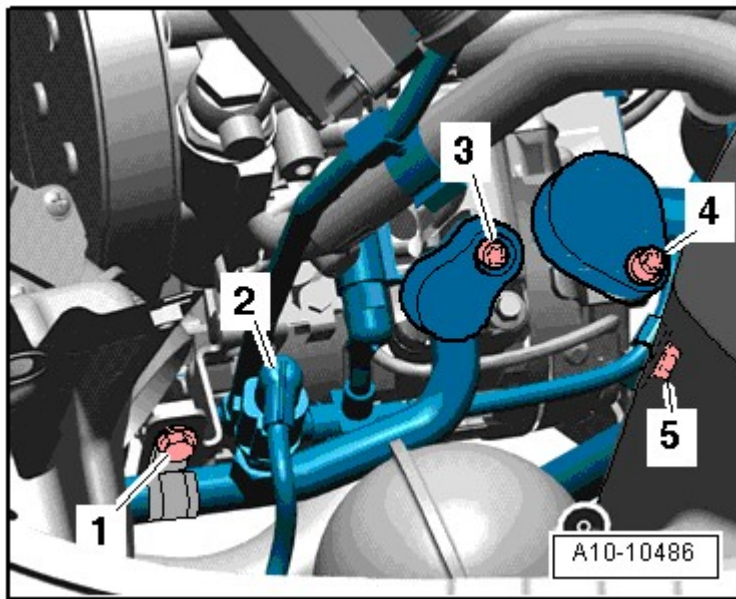


Fig. 114: Identifying Bolts -1 To 5- And Electrical Connector -2-
Courtesy of AUDI OF AMERICA, LLC

- Remove the bolts -3- and -4- and then remove the refrigerant lines from the A/C compressor.
- Seal the open lines and connections with clean plugs from the VAS 6122.

NOTE: Ignore -2-.

- Loosen the hose clamps -2 and 3- and remove the air guide hoses.

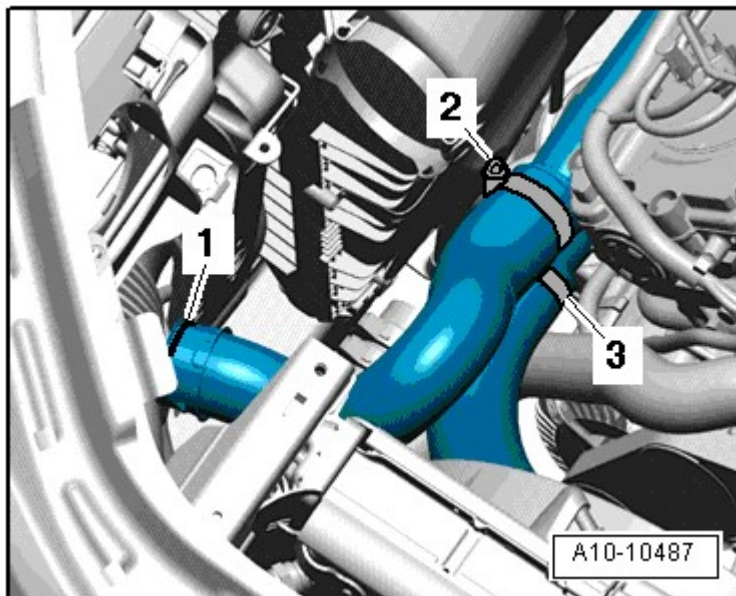


Fig. 115: Identifying Clamps -2 And 3- To Connecting Hoses

Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1-.

-- Remove the air guide pipe; to do this, loosen the hose clamps -arrows-.

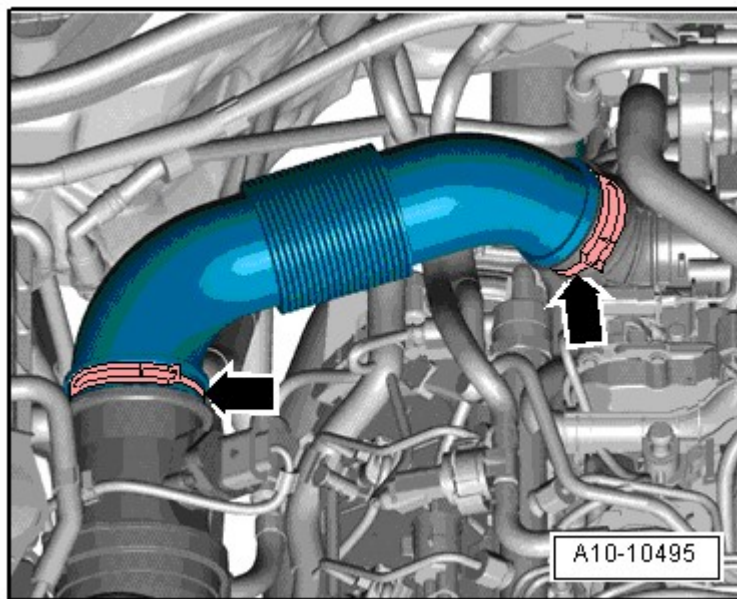


Fig. 116: Locating Spring Clamps

Courtesy of AUDI OF AMERICA, LLC

-- Disconnect electrical connector -arrow-.

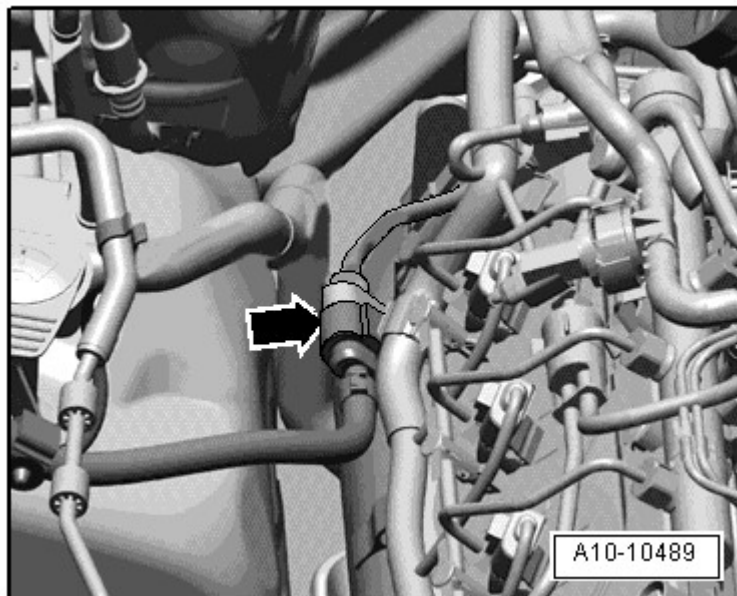


Fig. 117: Connector

Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the vacuum hose -arrow- leading to the brake booster.

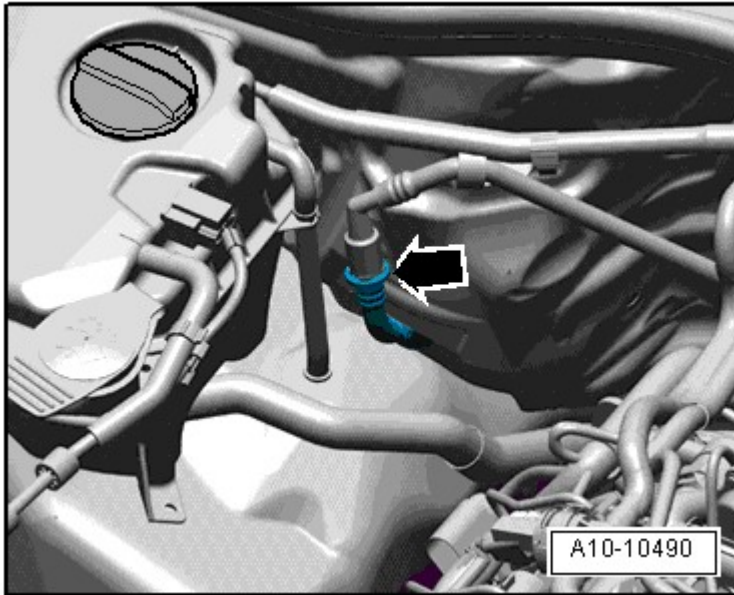


Fig. 118: Identifying Vacuum Hose -Arrow
Courtesy of AUDI OF AMERICA, LLC

WARNING: Very hot fuel can burn your skin.

- In extreme cases, the fuel lines and the fuel itself in vehicles with a common rail engine can be as hot as 100 °C (212 °F) after the engine has been turned off. Let the fuel cool down before opening any line connections otherwise there is a danger of scalding.
- Wear protective gloves.
- Wear safety glasses.

There is a risk of injury because the fuel is under pressure.

- To reduce pressure in fuel system, lay a clean cloth around the connector and carefully loosen connector.

-- Remove the fuel supply -1- and return lines -2 and 3- on the plenum chamber bulkhead.

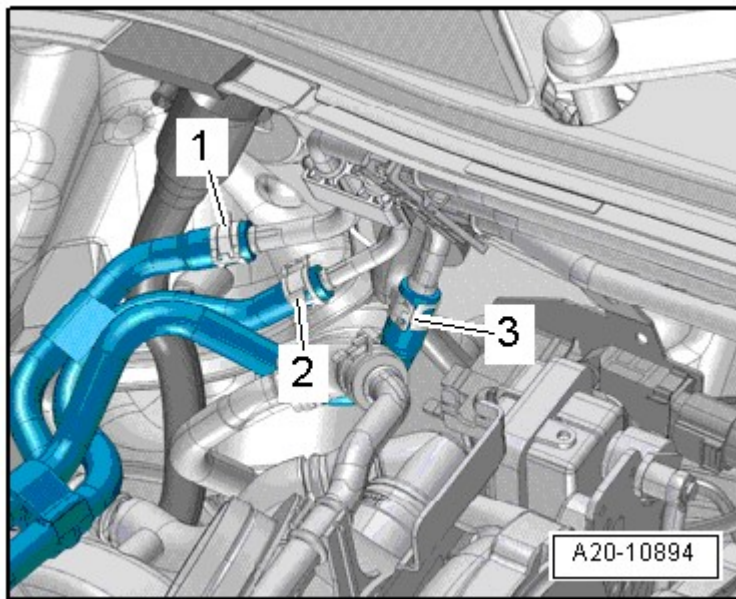


Fig. 119: Identifying Fuel Supply -1- And Return Lines -2 And 3-
 Courtesy of AUDI OF AMERICA, LLC

-- Remove and disconnect the connector -2- for the heated oxygen sensor (HO2S) -G39-.

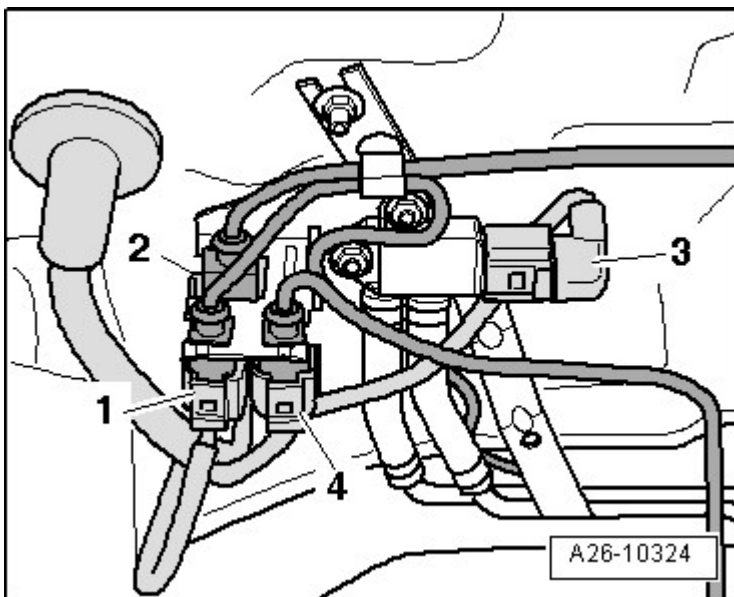


Fig. 120: Component Location On Plenum Chamber Bulkhead
 Courtesy of AUDI OF AMERICA, LLC

-- Free up the electrical wire.

NOTE: Ignore -1, 3 and 4-.

-- Remove the heated oxygen sensor (HO2S) -5-.

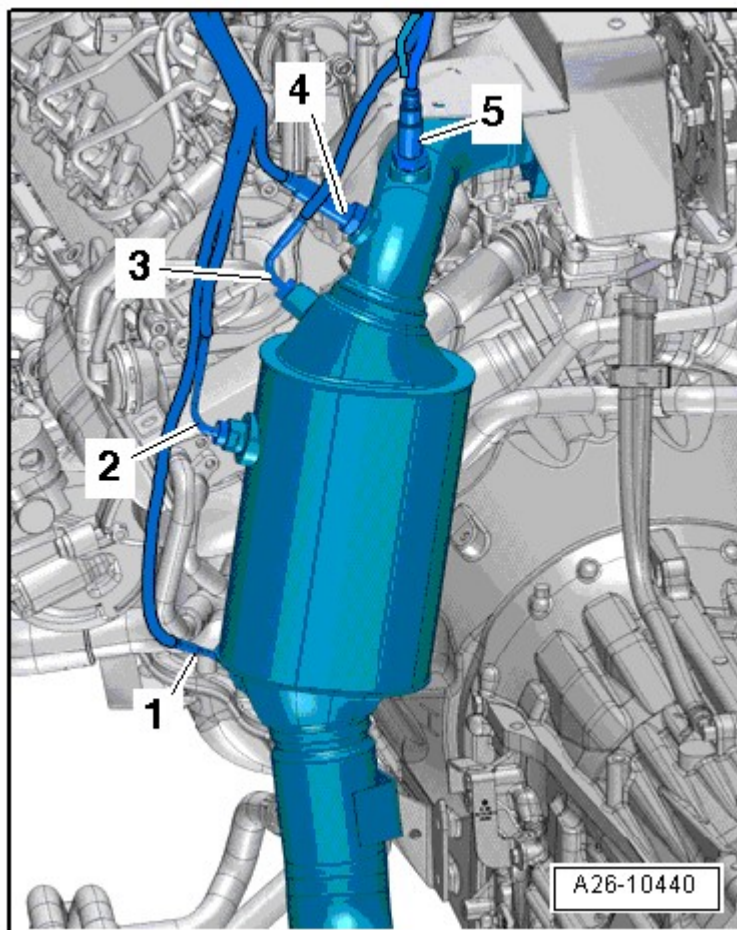


Fig. 121: Installation Location Inside Exhaust System Tract
Courtesy of AUDI OF AMERICA, LLC

-- Remove the NOX sensor -G295- -4- and free up the electrical wire.

-- Secure the NOX sensor to the body.

NOTE: Ignore -1, 2 and 3-.

-- Remove the windshield wiper arms -1- and -3-. Refer to **WINDSHIELD WIPER SYSTEM** .

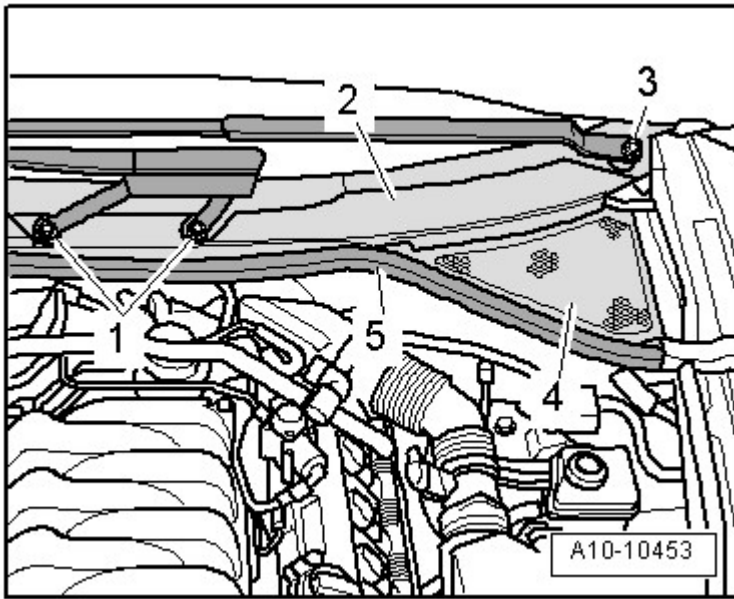


Fig. 122: Windshield Wiper, Driver Side, Remove Nut -3-
Courtesy of AUDI OF AMERICA, LLC

CAUTION: The plenum chamber cover could be damaged.

- Coat the transition area between the windshield and plenum chamber cover 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 gasket -5-.

-- Carefully remove the plenum chamber covers -2- and -4- from the retainers on the windshield.

-- Remove cover for E-box, plenum chamber -arrows-.

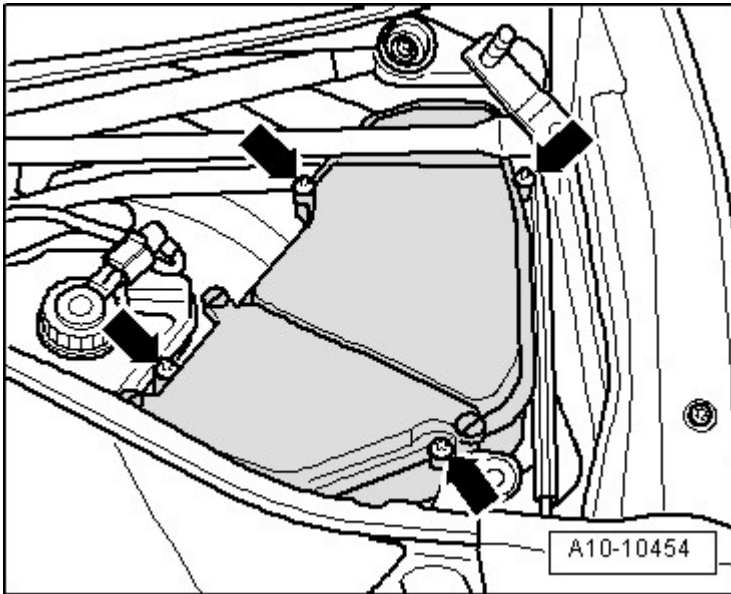


Fig. 123: Identifying Bolts To E-Box Plenum Chamber Cover -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connectors -1, 2 and 3- at E-box plenum chamber coupling station and free up the wiring harness.

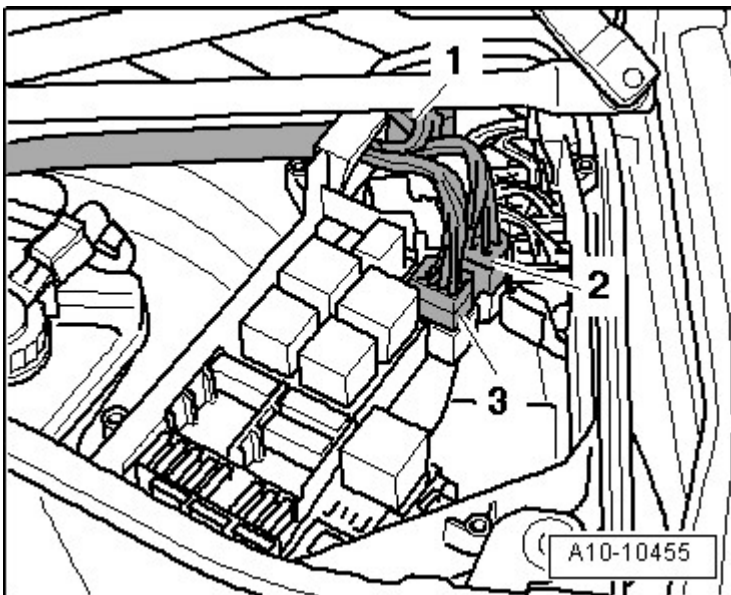


Fig. 124: Identifying Electrical Connectors -1 Through 3-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the ground (GND) connection nut -2-.

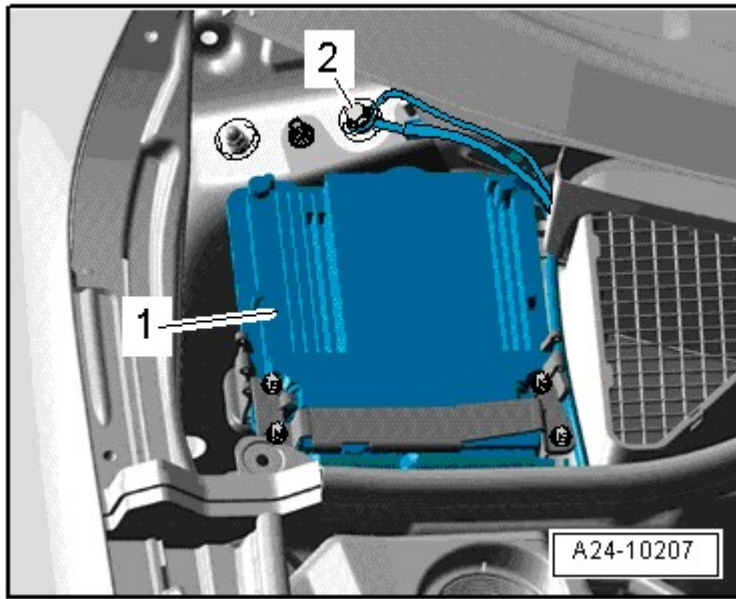


Fig. 125: Location Of Engine Control Module (ECM) -J623- -1-
Courtesy of AUDI OF AMERICA, LLC

- Remove engine control module (ECM) -1-. Refer to **Removal and Installation** .
- Free up electrical wiring harness to engine.
- Loosen upper control arm nut a few turns and pull joint off with the T10187.

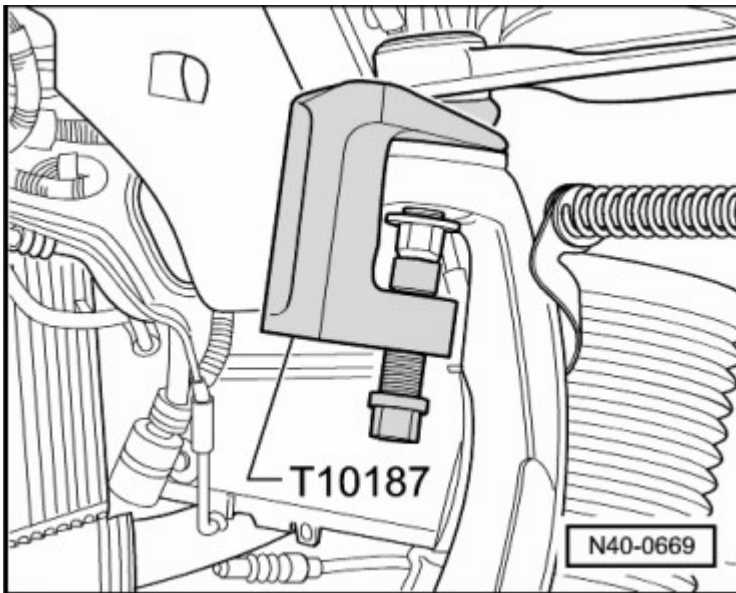


Fig. 126: Pressing Out Upper Control Arm
Courtesy of AUDI OF AMERICA, LLC

- Completely remove upper control arm nut.

-- Repeat procedure on opposite side of vehicle.

-- Disconnect the electrical connectors -arrow- at the left and right on the front speed sensors.

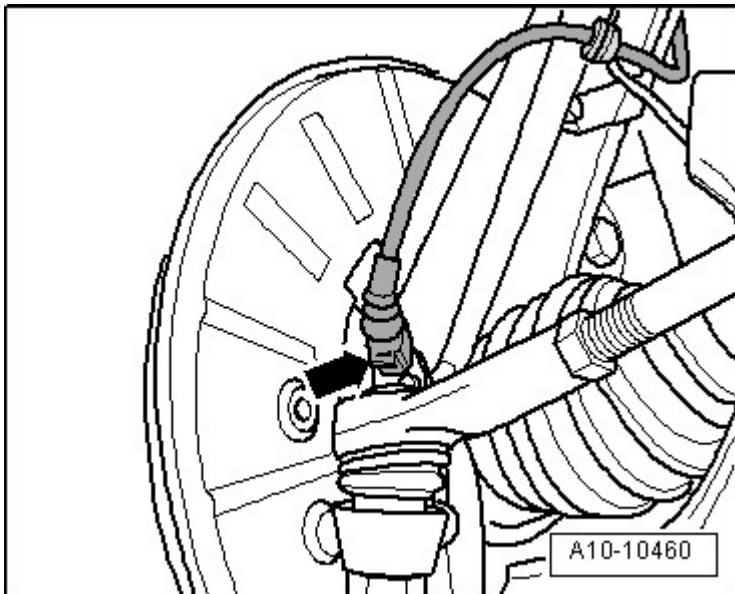


Fig. 127: Identifying Speed Sensor Connector
Courtesy of AUDI OF AMERICA, LLC

-- Remove wiring harness bolts -arrows-.

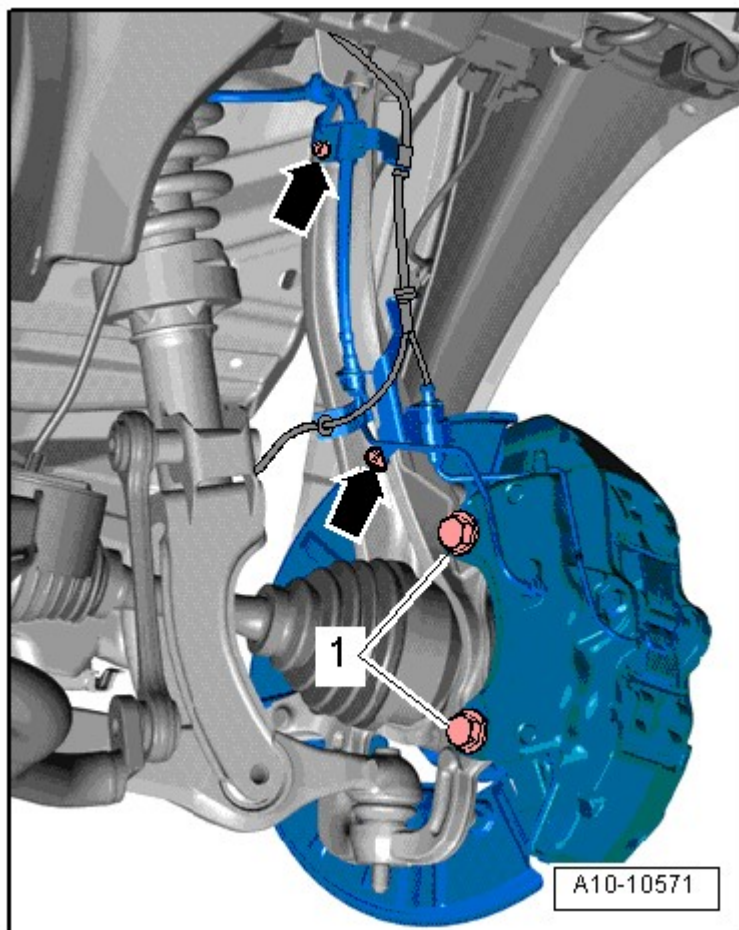


Fig. 128: Identifying Wire Harness Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove brake caliper bolts -1-.

NOTE: Do not change brake line bent shape.

-- Engage brake caliper in wheel housing with wire.

CAUTION: Risk of damaging brake pistons.

- Do not operate brake pedal with brake caliper removed.

-- Repeat procedure on opposite side of vehicle.

-- Disconnect lower threaded connection -2- at left and right on stabilizer bar.

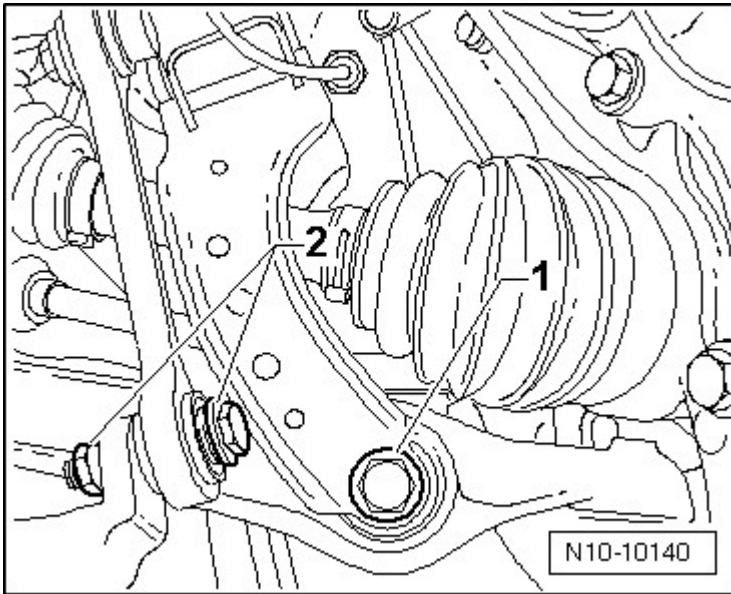


Fig. 129: Identifying Right/Left Lower Bolt On Stabilizer Bar
Courtesy of AUDI OF AMERICA, LLC

-- Remove nuts from bolts -1- at left and right on strut.

NOTE: Bolts -1- are removed later.

-- Disconnect the exhaust system at the clamping sleeve -arrows-.

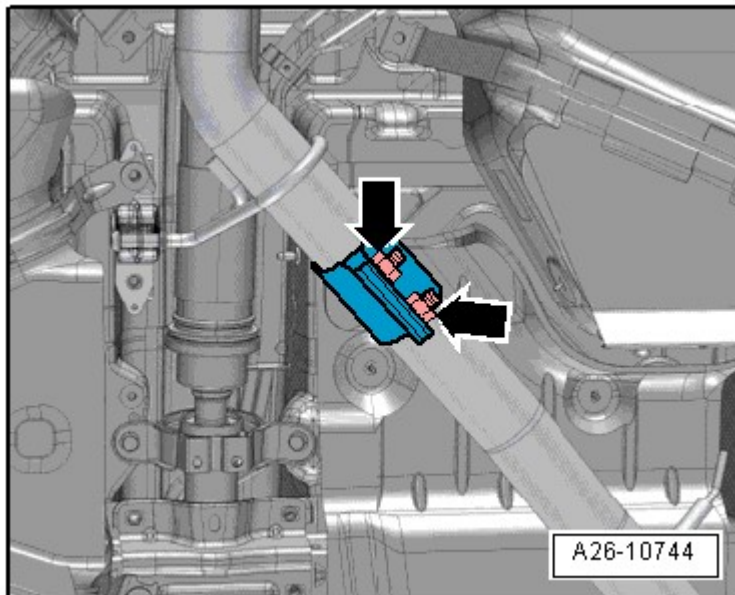


Fig. 130: Disconnect Exhaust System At Clamping Sleeve -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Remove NOx sensor 2 -G687- -3- and free up the wiring harness on the transfer case.

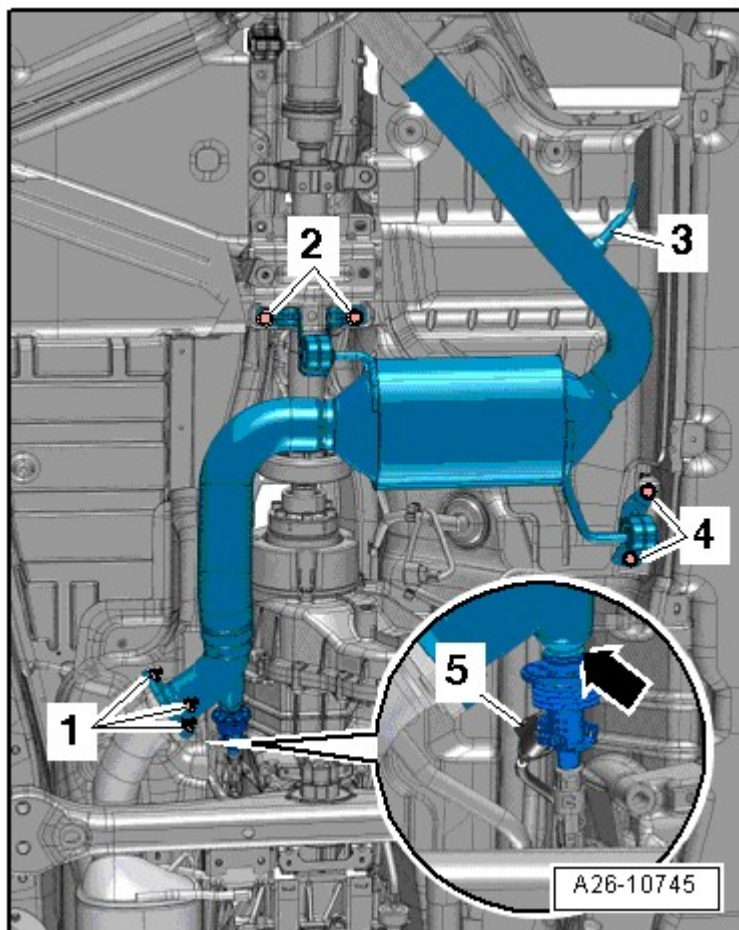


Fig. 131: Disconnect the connector -5-
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the connector -5- and free up the electrical wire.
- Loosen the clamp -arrow- and remove the reducing agent injector -N474-.
- Move the nuts -1- and bolts -2- and -4- and remove the SCR catalytic converter.
- Remove the nuts and bolts -arrows- then remove the noise insulation bracket.

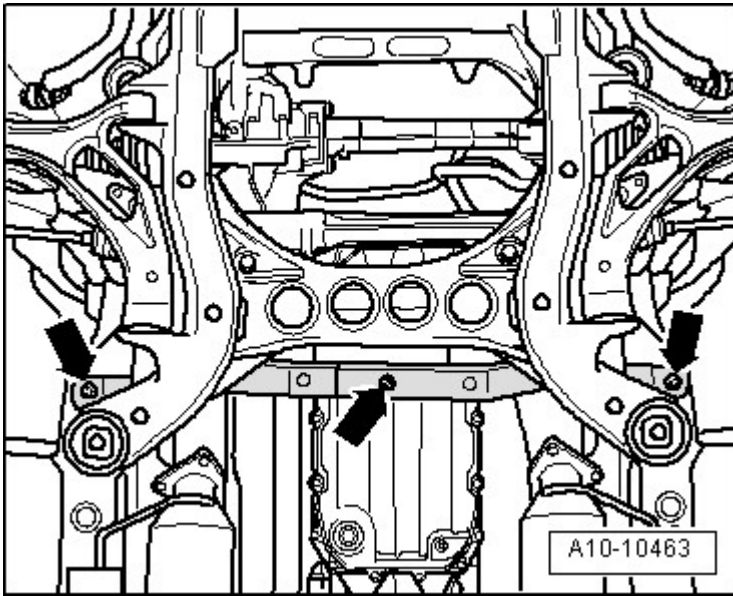


Fig. 132: Identifying Bracket For Noise Insulation
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the exhaust system bracket bolts -arrows- on the longitudinal member.

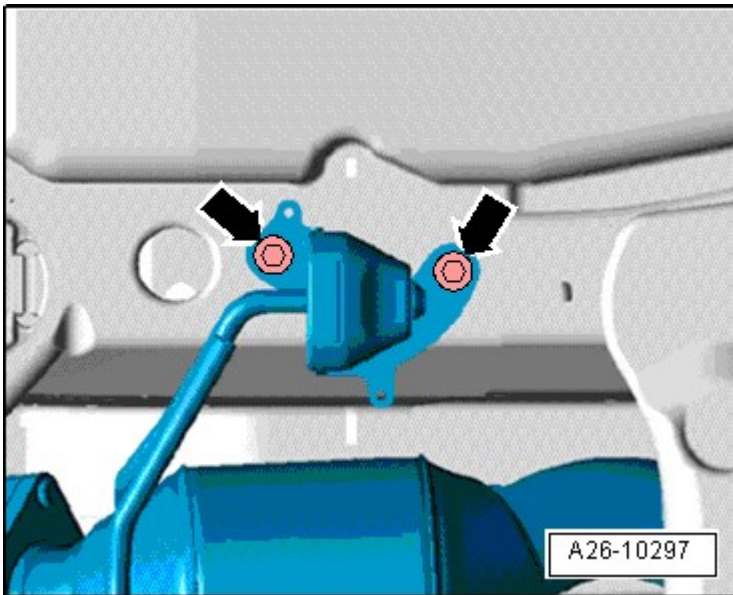


Fig. 133: Identifying Exhaust System Bracket At Left And Right From Longitudinal Members -Arrows-
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the Exhaust gas temperature sensor 4 -G648- -arrow-.

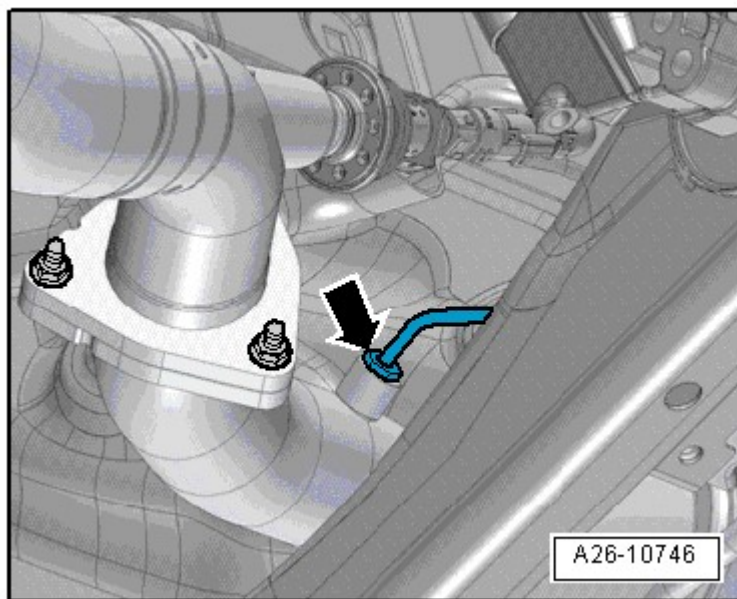


Fig. 134: Identifying Exhaust Gas Temperature Sensor 4 -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the differential pressure sensor -G505- hoses from the pressure lines on the particulate filter; to do this, loosen the hose clamps -arrows-.

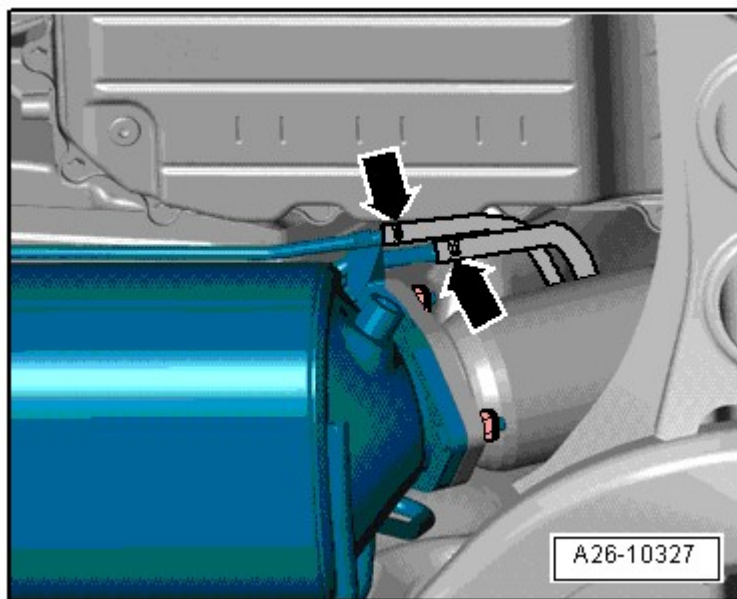


Fig. 135: Disconnect Differential Pressure Sensor Hoses -Arrows
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect electrical connector -arrow- on the steering gear.

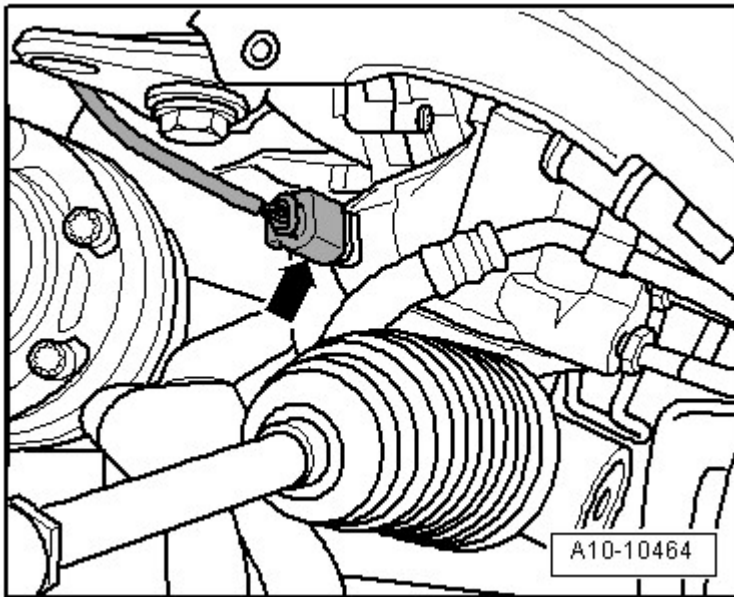


Fig. 136: Identifying Electrical Connector And Heat Shield
Courtesy of AUDI OF AMERICA, LLC

-- Remove the rear driveshaft. Refer to **REAR FINAL DRIVE** or **REAR DRIVESHAFT** .

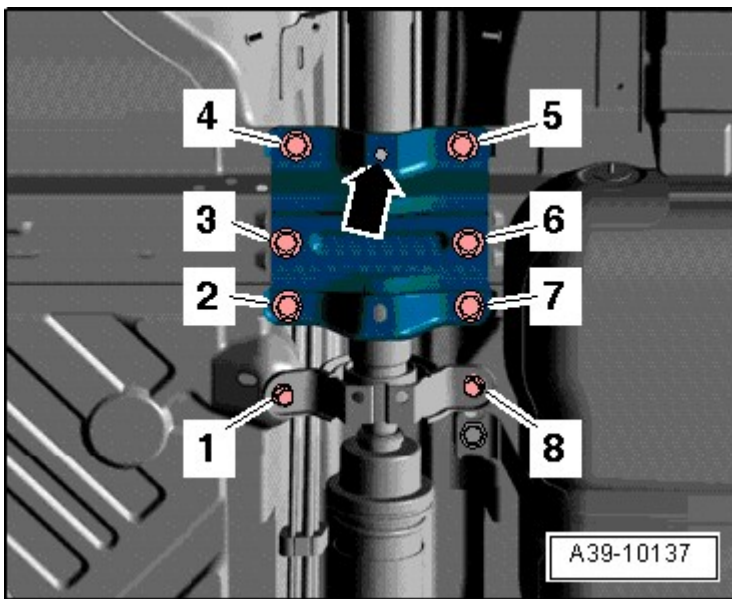
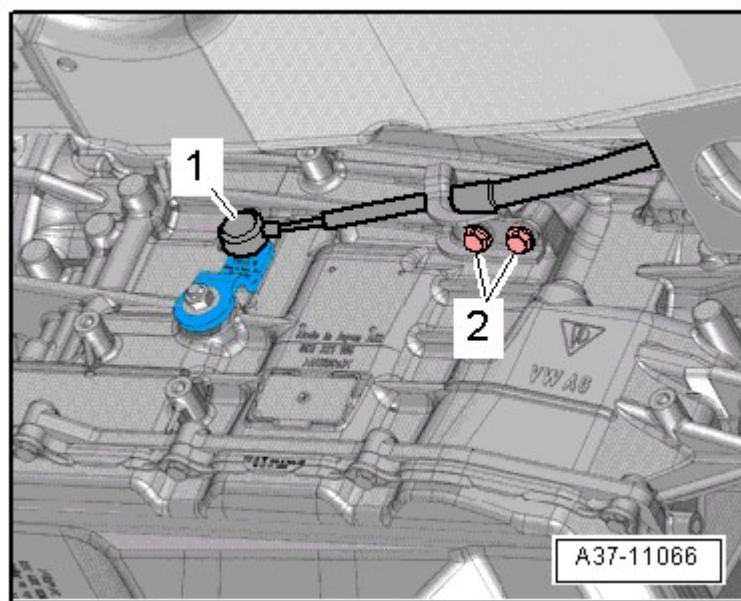


Fig. 137: Installed Position Of Tunnel Support
Courtesy of AUDI OF AMERICA, LLC

-- Remove the selector lever cable ball head -1- from the transmission shift lever using the 80 - 200.

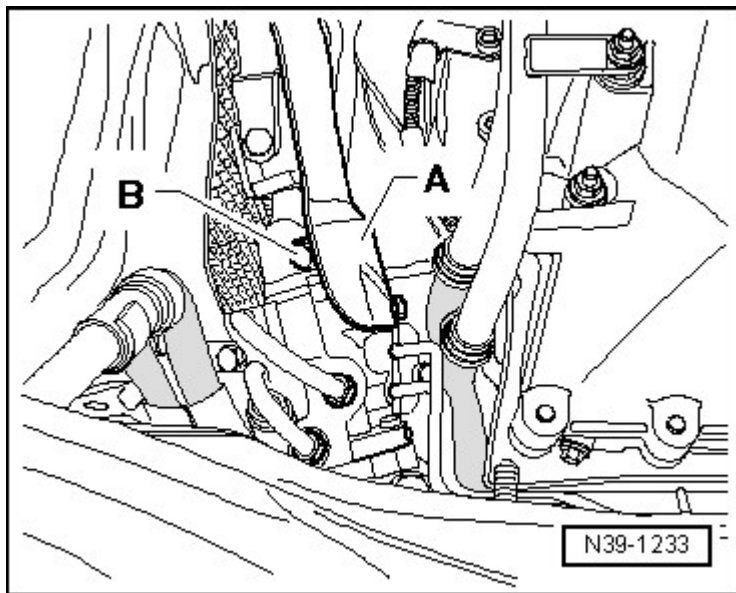


**Fig. 138: Identifying Selector Lever Cable Ball Head -1- And Cable Mounting Bracket Bolt -2-
Courtesy of AUDI OF AMERICA, LLC**

-- Remove the bolt -2- and remove the cable mounting bracket from the transmission.

NOTE: Do not bend or kink selector lever cable.

-- Remove the 2 bolts and then remove the steering gear heat shield -A-.



**Fig. 139: Identifying Universal Joint Bolt
Courtesy of AUDI OF AMERICA, LLC**

CAUTION: Risk of distorting airbag spiral spring.

- Separate universal joint from steering gear only when front wheels are in straight ahead position.
- Secure steering wheel with adhesive tape to prevent position of steering wheel and steering gear from changing.

-- Remove the universal joint bolt -B-. Refer to Description and Operation .

-- Remove universal joint from steering gear.

-- Place the V.A.G 1782 under the disconnection point.

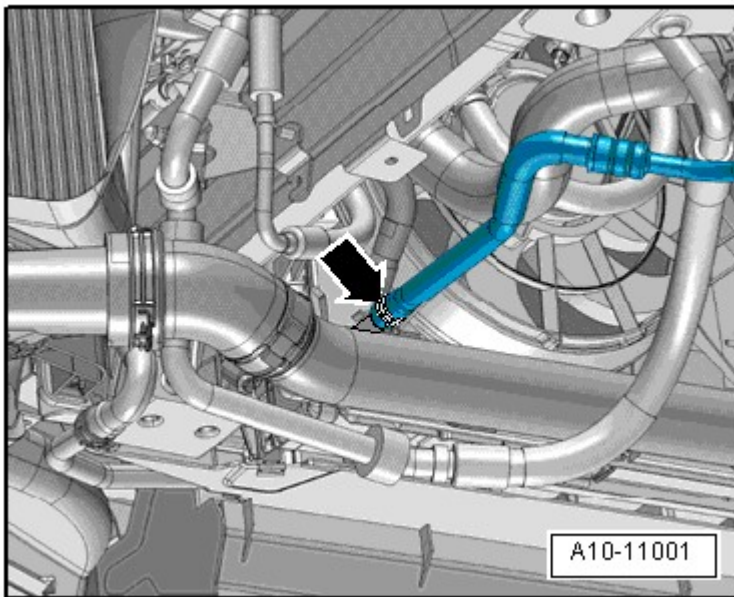


Fig. 140: Identifying Hose Clamp -Arrow
Courtesy of AUDI OF AMERICA, LLC

-- Loosen the hose clamp -arrow- and disconnect the left fluid line on the lock carrier leading to the power steering cooler.

-- Seal the open lines and connections with clean plugs from the VAS 6122.

NOTE: Observe the rules of cleanliness for working on automatic transmissions. Refer to REPAIR INFORMATION .

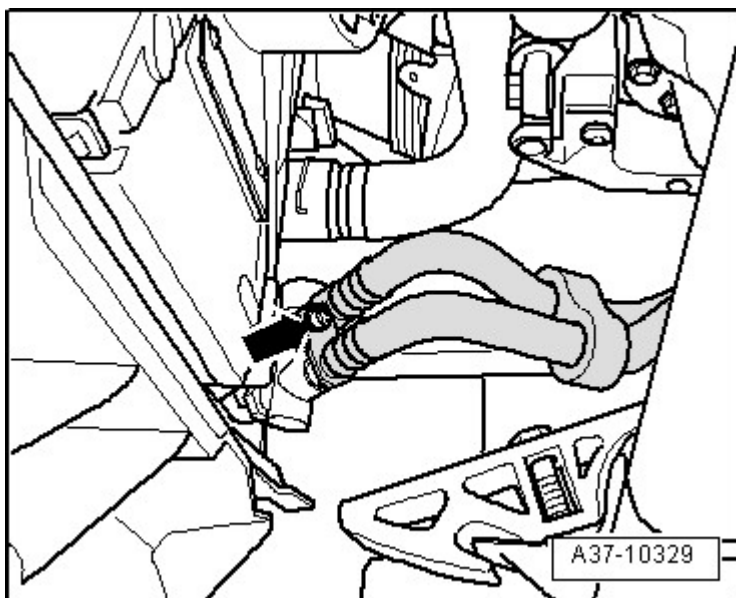


Fig. 141: Identifying Lines From Transmission Oil Cooler And Rear Mounting Bolts
Courtesy of AUDI OF AMERICA, LLC

- Remove the bolt -arrow- and disconnect the ATF lines from the ATF thermostat.
- Seal the open lines and connections with clean plugs from the VAS 6122.
- Remove the nut -1- on the right longitudinal member and disconnect the ground (GND) wire from the threaded pin.

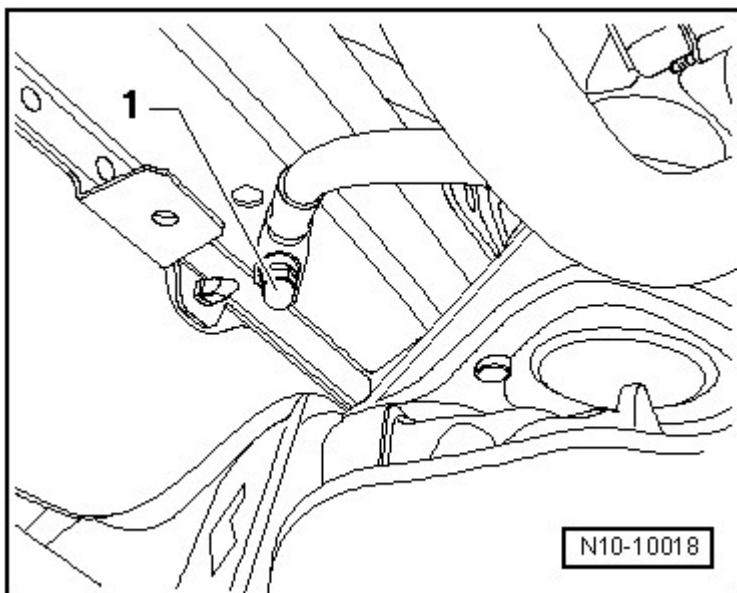


Fig. 142: Identifying Ground (GND) Cable On Longmember
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the automatic transmission connectors -1, 2 and 3--.

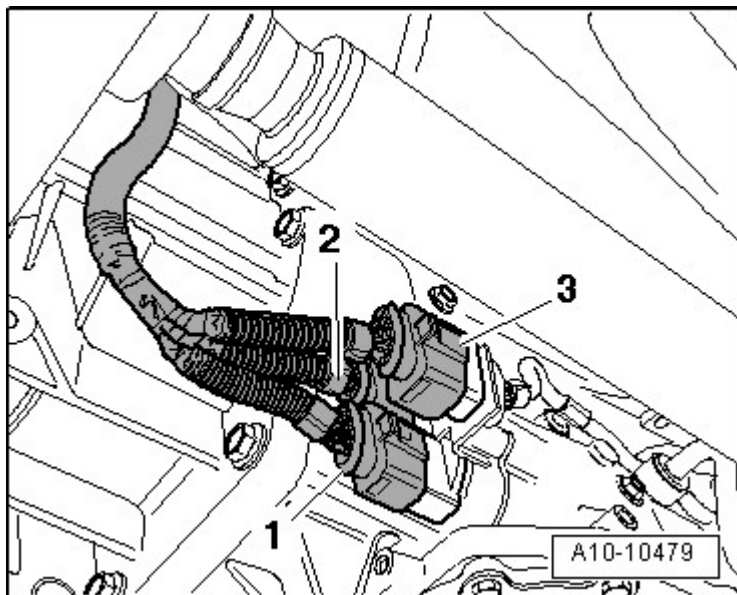


Fig. 143: Connect Connectors -1 Through 3-
Courtesy of AUDI OF AMERICA, LLC

Prepare Scissor Lift Platform:

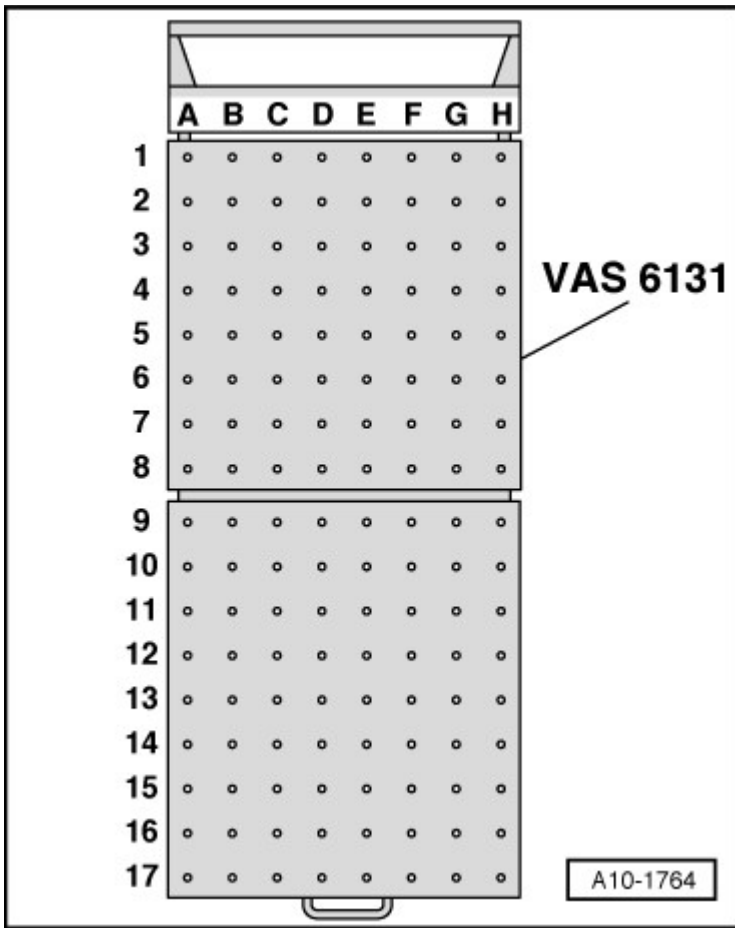


Fig. 144: Identifying Scissor Lift Platform VAS 6131

Courtesy of AUDI OF AMERICA, LLC

-- Equip scissor-type assembly platform VAS 6131 A with support set VAS 6131/10 and supplementary set VAS 6131/11 and VAS 6131/13 as follows:

Platform Coordinates	Parts from Support Set VAS 6131/10, Supplementary Set VAS 6131/11 and VAS 6131/13			
B2	/10-1	/10-2	/10-5	/11-1
G2	/10-1	/10-2	/10-5	/11-1
A4 and C4	/13-5	-	-	/13-2
F4 and H4	/13-6	-	-	/13-2
B5	/13-4	/10-2	/10-5	/13-1
G5	/13-4	/10-2	/10-5	/13-1
C7	/10-1	/10-2	/10-5	/10-8
F7	/10-1	/10-2	/10-5	/10-8
B14	/10-1	/10-3	/10-5	/10-7
G14	/10-1	/10-3	/10-5	/10-7

-- First manually secure the mounting elements to the VAS 6131 A.

-- Position the scissor lift table horizontally.

- Note bubble level (sight glass) on support platform.

-- Guide scissor lift table under the engine/transmission subassembly.

-- Attach mounting elements from VAS 6131/10 and VAS 6131/11 at the front of subframe as shown in illustration.

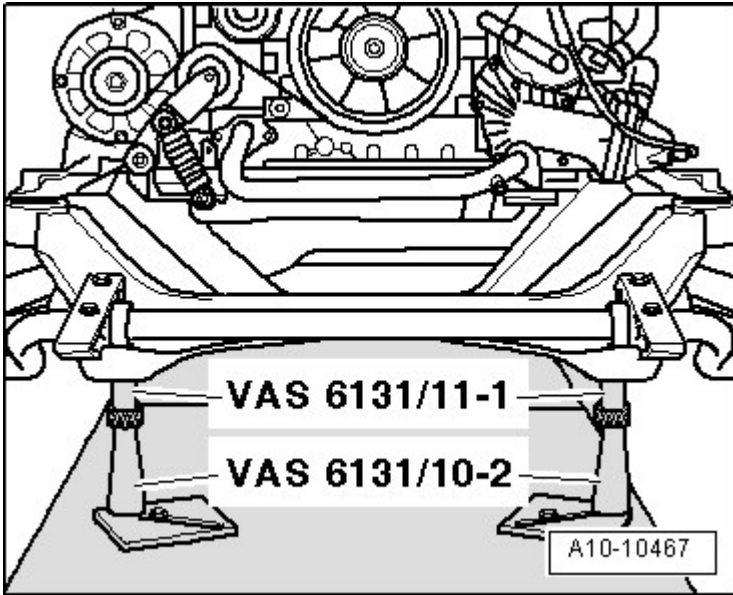


Fig. 145: Attach Mounting Elements From VAS 6131/10 And VAS 6131/11 At Front Of Subframe
Courtesy of AUDI OF AMERICA, LLC

-- Ensure threaded spindles are completely installed.

-- Attach mounting elements from the VAS 6131/10 and VAS 6131/13 at the left and right on the transmission carrier as shown in the illustration.

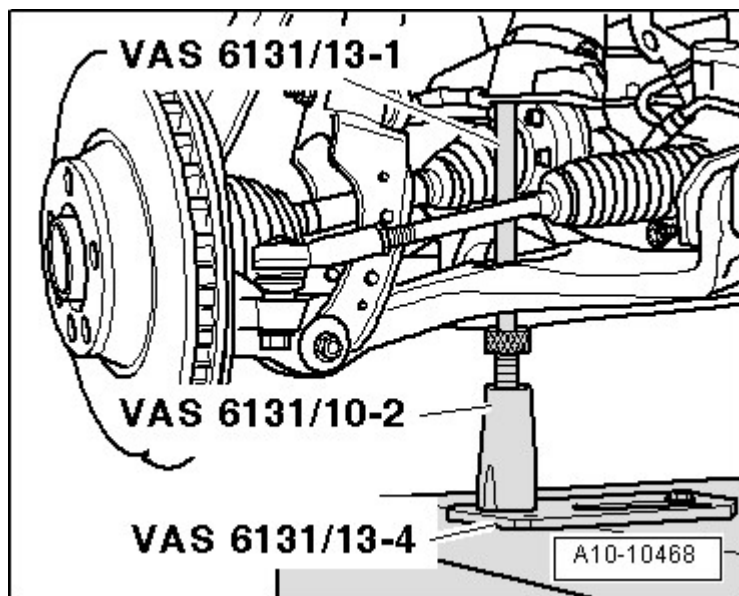


Fig. 146: Attaching Mounting Elements From VAS 6131/10 And VAS 6131/13
 Courtesy of AUDI OF AMERICA, LLC

-- Position mounting elements VAS 6131/13 at the left and right on the suspension struts as shown in the illustration.

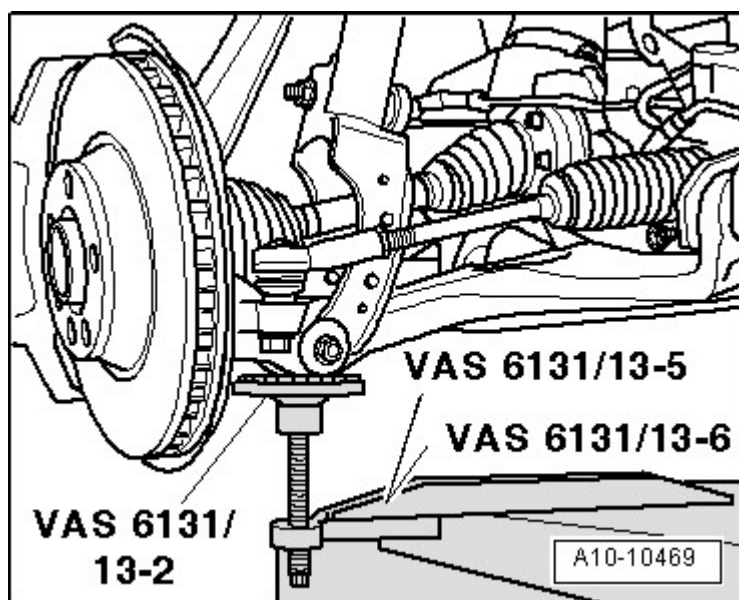


Fig. 147: Position Supporting Elements From VAS 6131/13 On Strut Supports
 Courtesy of AUDI OF AMERICA, LLC

-- Attach mounting elements from VAS 6131/10 at the left and right on the subframe as shown in the illustration.

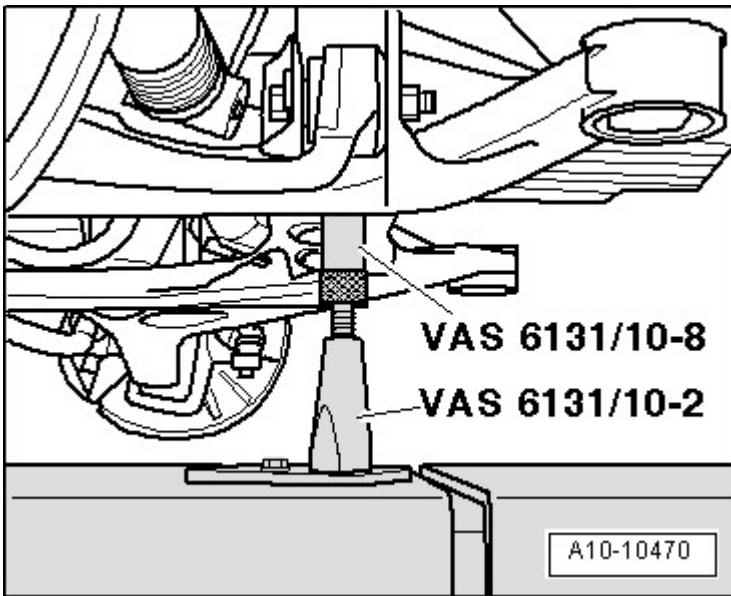


Fig. 148: Attach Mounting Elements From VAS 6131/10 At Rear Of Subframe
 Courtesy of AUDI OF AMERICA, LLC

-- Attach mounting elements from VAS 6131/10 at left and right on transmission carrier as shown in illustration.

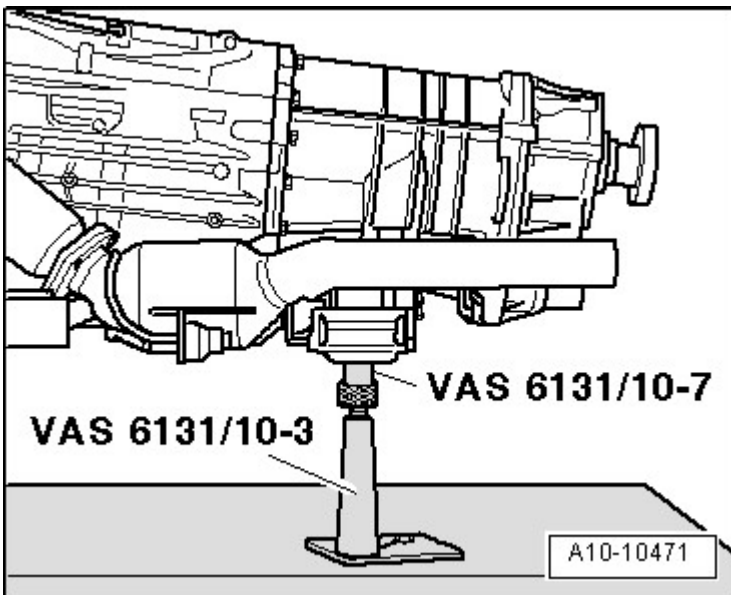


Fig. 149: Attaching Mounting Elements From VAS 6131/10 At Left And Right On Transmission Carrier
 Courtesy of AUDI OF AMERICA, LLC

- Rotate mounting element spindles upward until all mounting pins come in contact with mounting points.
- Attach mounting element base plates to the VAS 6131 A and tighten to 20 Nm.
- Mark position of the subframe, engine carrier and transmission carrier to the longitudinal members with a

felt-tip pen.

-- Remove the bolts -1 to 4- in a diagonal sequence in steps.

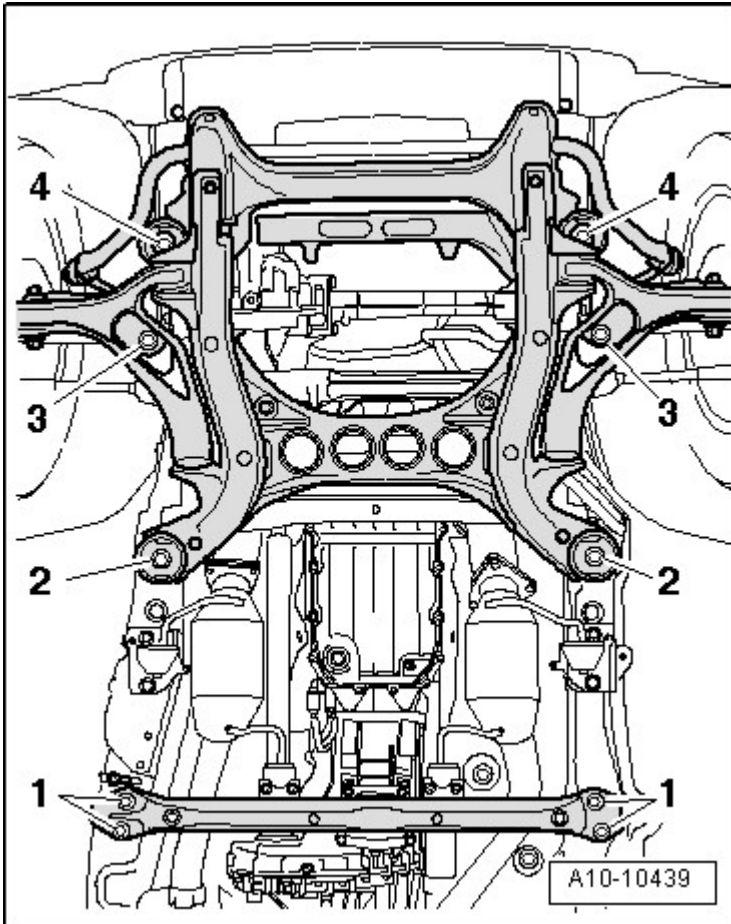


Fig. 150: Identifying Bolts -4- And Engine Carrier Bolts -3-
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of damaging hose and wiring connections as well as engine compartment.

- Make sure all the hoses and lines between the engine, transmission, subframe and body have been disconnected.
- Carefully guide engine-transmission assembly with subframe out of engine compartment while lowering.
- Carefully guide the suspension struts past the longitudinal members.

-- Lower the engine/transmission sub-assembly using the VAS 6131 A.

-- Remove the VAS 6131 A with the engine/transmission subassembly under vehicle.

ENGINE AND AUTOMATIC TRANSMISSION 0C8, SEPARATING

Special tools and workshop equipment required

- Support Set VAS 6131/10, Supplementary Set VAS 6131/12, VAS 6131/13 and Transmission Support VAS 6131/14
- Bracket 30 - 211 A
- Socket T40058
- M10 x 35 bolt and washer
- M10 x 45 bolt and nut

Procedure

- Engine/transmission assembly removed and placed on the VAS 6131 A.

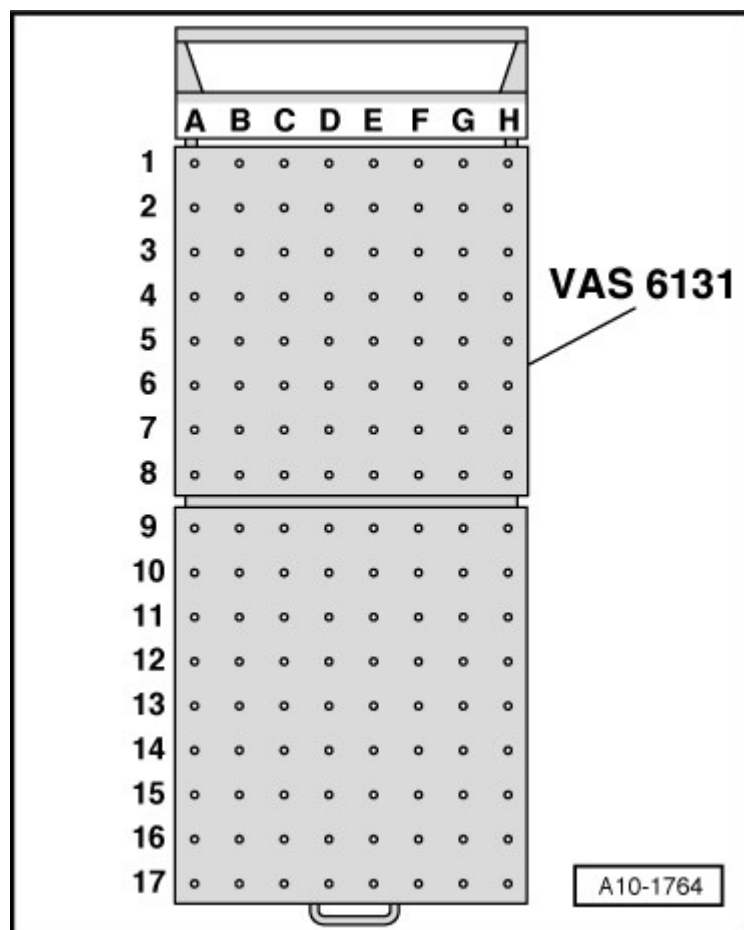


Fig. 151: Identifying Scissor Lift Platform VAS 6131
 Courtesy of AUDI OF AMERICA, LLC

-- Equip the scissor-type assembly platform VAS 6131 A with the support set VAS 6131/10 and support set VAS 6131/12, VAS 6131/13 and transmission support VAS 6131/14 as follows:

NOTE: The other attachments remain unchanged.

Platform Coordinates	Parts from the Support Set VAS 6131/10, and Supplementary Set VAS 6131/12, VAS 6131/13 and Transmission Mount VAS 6131/14			
E1	/13-7			
B10	/10-1	/10-2	/10-5	/14
G10	/10-1	/10-2	/10-5	/14
G10	/10-1	/12-2	/10-5	/13-3

-- Secure the front joint support VAS 6131/13-7 into the threaded holes in the engine with a M10 x 45 bolt -1- and nut -2-.

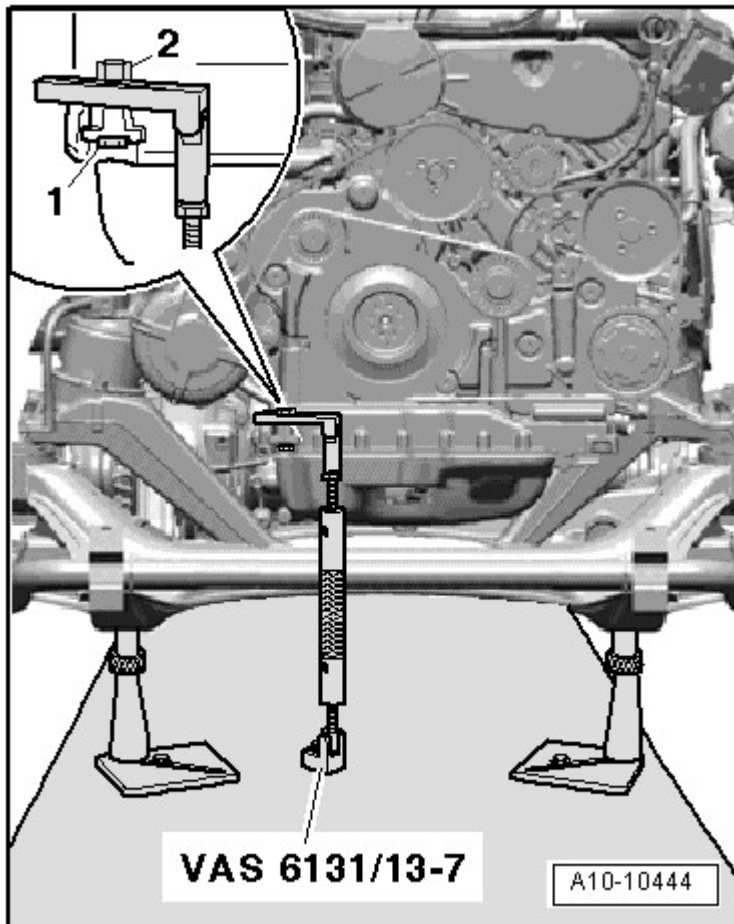


Fig. 152: Identifying VAS 6131/13-7 Secured To Engine
Courtesy of AUDI OF AMERICA, LLC

-- Install the joint support on the VAS 6131 A and tighten it to 20 Nm.

-- Attach the mounting elements from VAS 6131/10, VAS 6131/12, VAS 6131/13 and VAS 6131/14 to the transmission as illustrated.

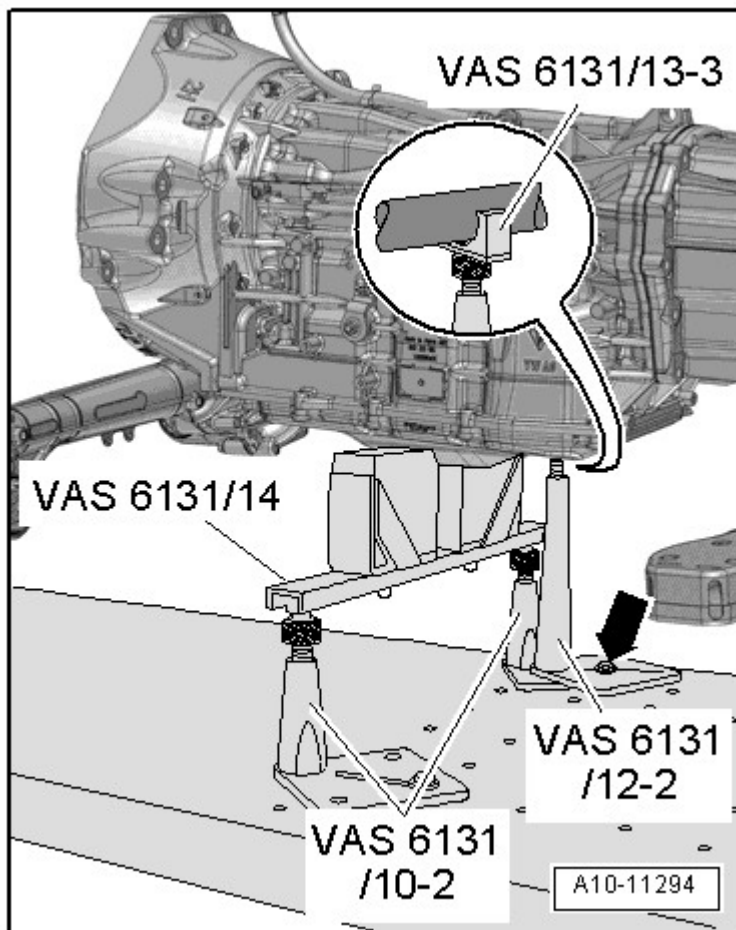


Fig. 153: Attaching Mounting Elements From VAS 6131/10, VAS 6131/12, VAS 6131/13 And VAS 6131/14 To Transmission

Courtesy of AUDI OF AMERICA, LLC

- Prepare the mounting elements from VAS 6131/12 and VAS 6131/13 for supporting the driveshaft as illustrated.
- Secure VAS 6131/12-2 and M10 x 35 bolt -arrow- and washer.
- Remove the particulate filter bracket bolts -arrows-.

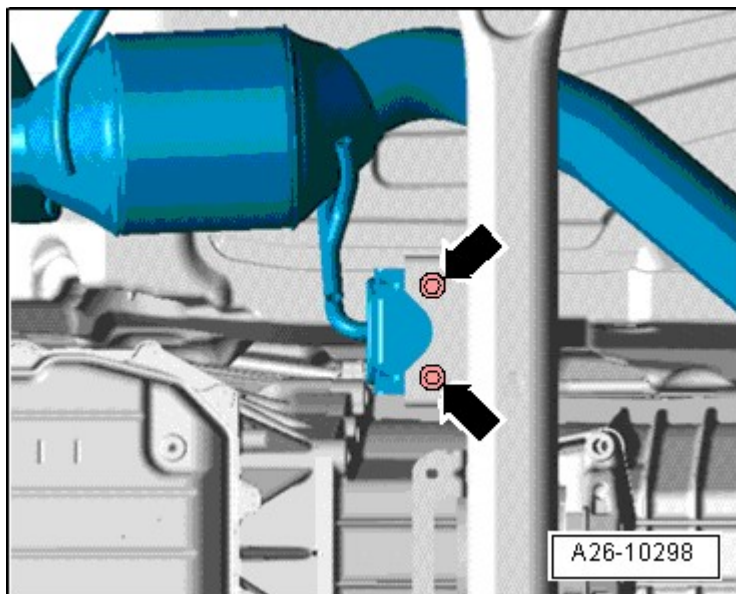


Fig. 154: Identifying Bolts

Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -arrow- on the preliminary catalytic converter strap.

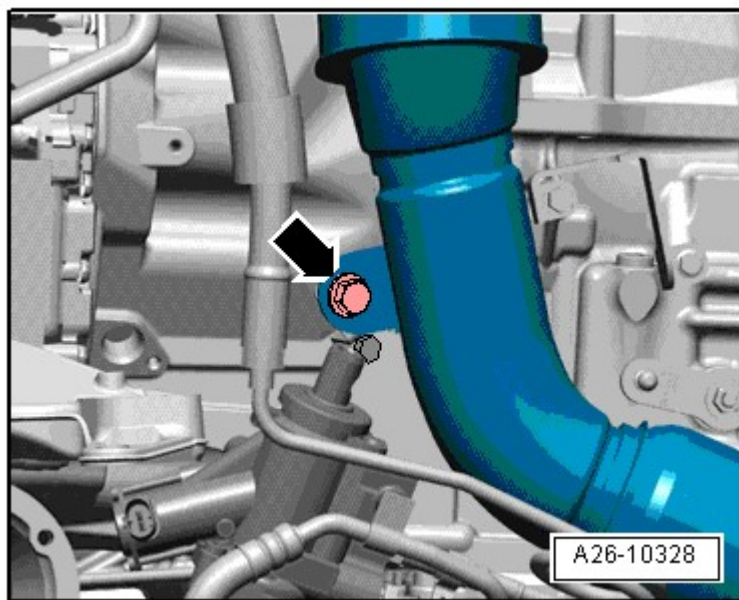


Fig. 155: Identifying Bolt -Arrow- From Exhaust Pipe

Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the -2- exhaust gas temperature sensor 3 -G495- brown connector.

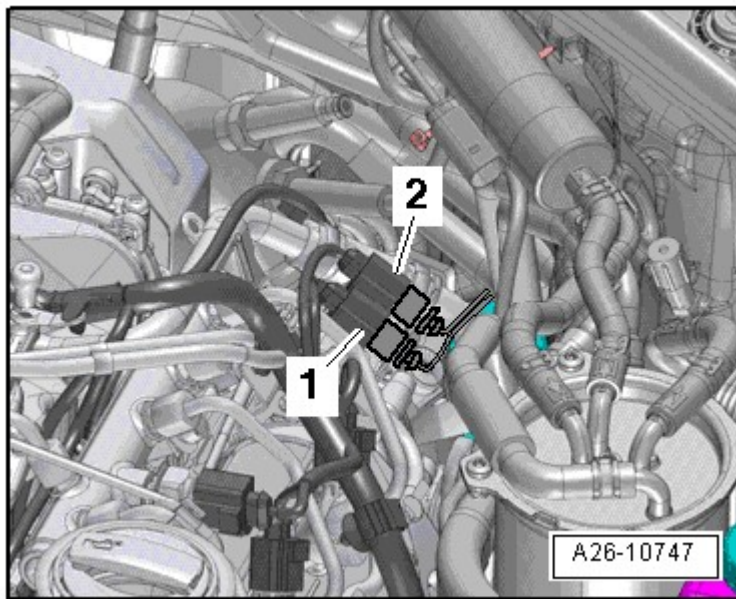


Fig. 156: Electrical Connectors

Courtesy of AUDI OF AMERICA, LLC

-- Free up the electrical wire.

NOTE: Ignore -1-.

-- Remove the bolts -1- and -2- and then remove the heat shield from the turbocharger.

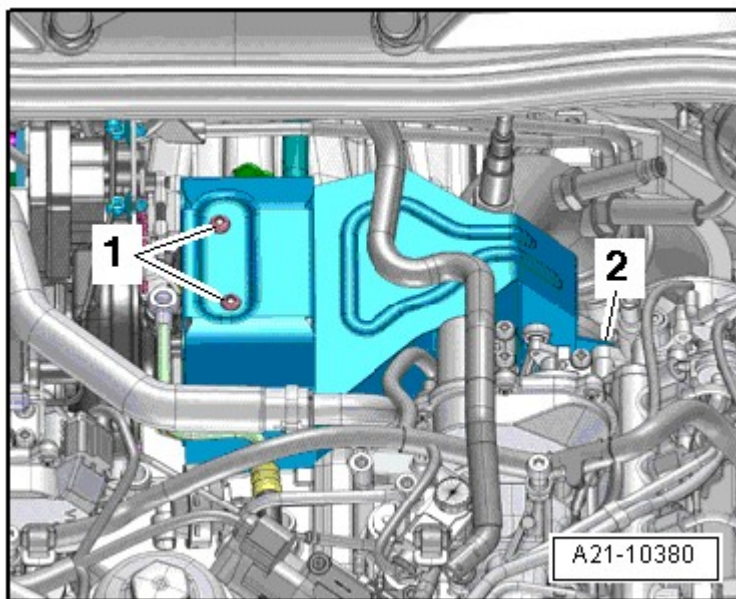


Fig. 157: Identifying Bolts -1 To 2- And Turbocharger Heat Shield

Courtesy of AUDI OF AMERICA, LLC

-- Remove the nuts -arrows- and then remove the preliminary catalytic converter and particulate filter.

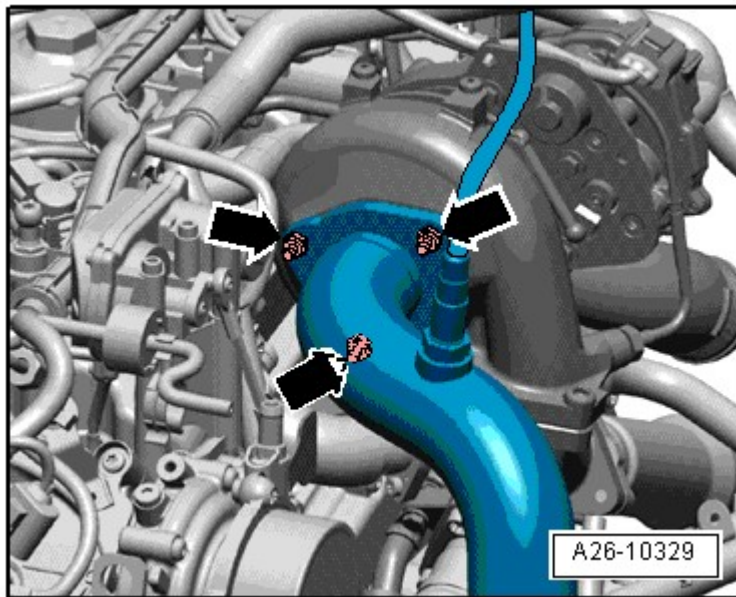


Fig. 158: Identifying Nuts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

-- Free up the coolant hoses -arrow-.

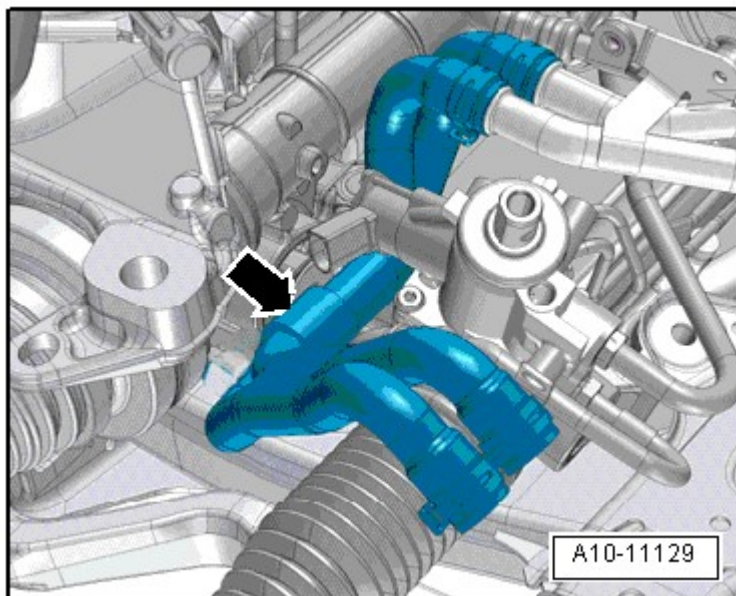


Fig. 159: Identifying Coolant Hoses -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Loosen hose clamp -2- and lift clamp -4- to remove the coolant hoses.

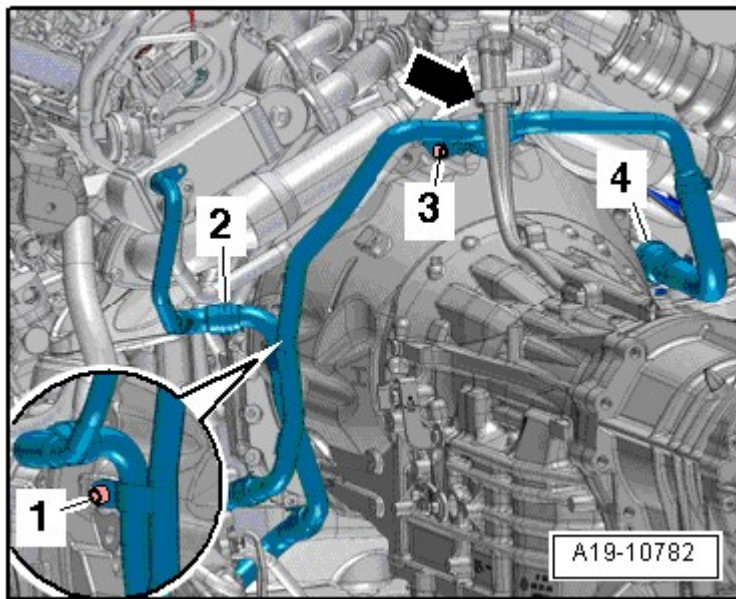


Fig. 160: Identifying Bolts -1 And 3- For Coolant Pipe
Courtesy of AUDI OF AMERICA, LLC

-- Free up the transmission vent hose -arrow-.

-- Remove the bolts -1- and -3- ; then remove the left coolant pipe on the back of the transmission.

-- Remove the bolts -arrows- that attach the front driveshaft to the transfer case. Refer to **FRONT FINAL DRIVE** or **FRONT DRIVESHAFT** .

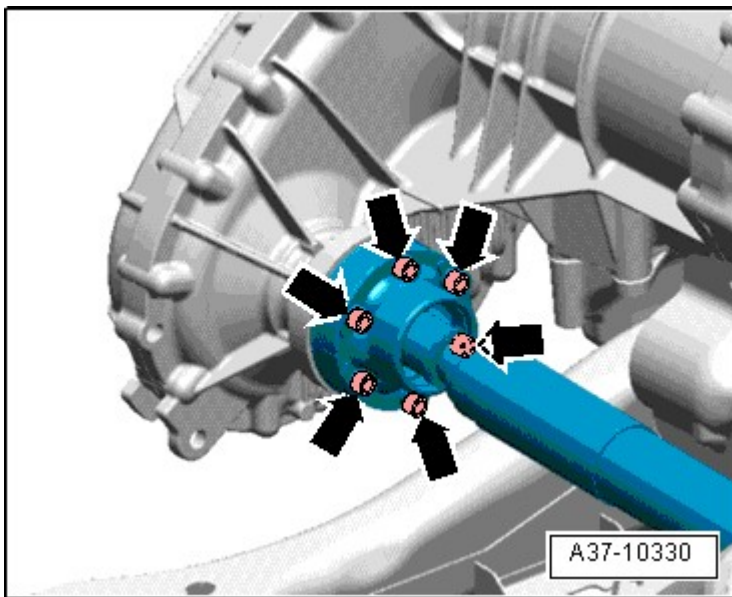


Fig. 161: Identifying Driveshaft Bolts -Arrows-
Courtesy of AUDI OF AMERICA, LLC

NOTE: Place a cloth underneath to soak up any escaping ATF.

Observe the rules of cleanliness for working on automatic transmissions. Refer to REPAIR INFORMATION .

-- Remove the bolts -1- and -2- and then remove the ATF lines from the transmission.

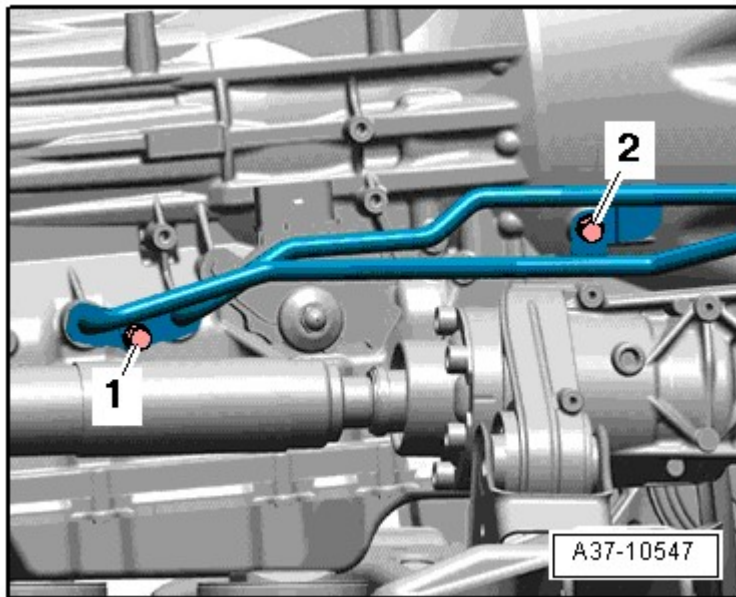


Fig. 162: Identifying ATF Transmission Line Bolt -2-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -arrow- and remove the ATF lines.

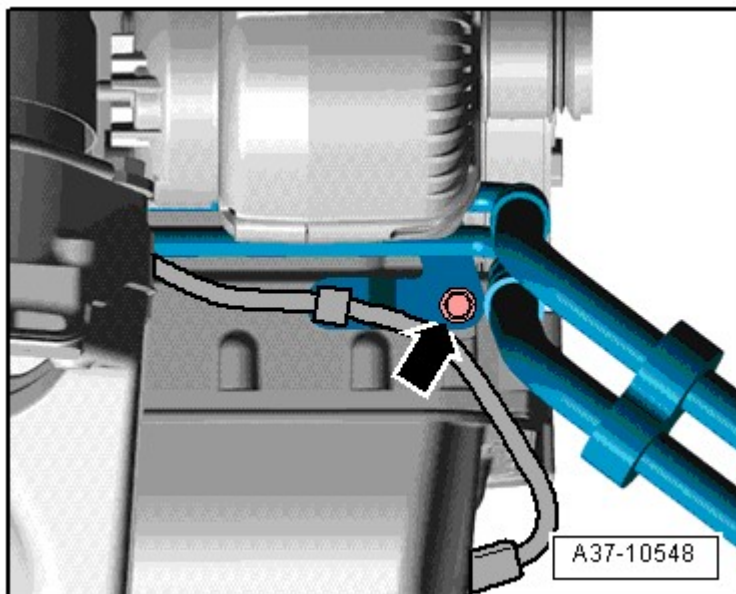


Fig. 163: Identifying ATF Transmission Line Bolt -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the generator -1-. Refer to **GENERATOR, AIR COOLED** .

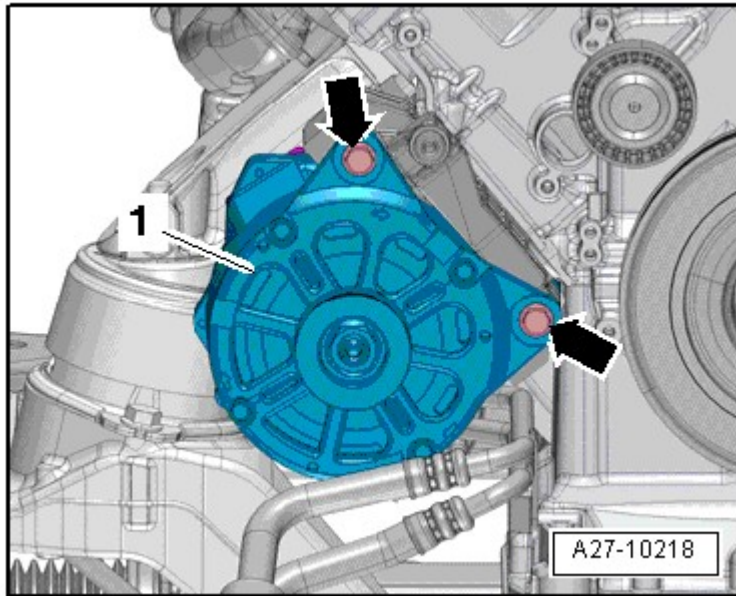


Fig. 164: Identifying Bolts -Arrows- To Generator -1-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the starter. Refer to **STARTER [for engine(s) CATA]** .

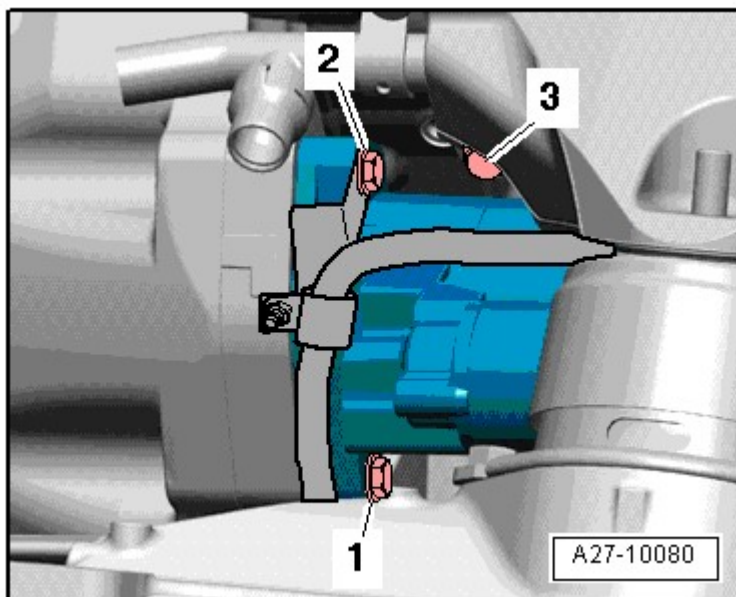


Fig. 165: Identifying Engine Support Screw
Courtesy of AUDI OF AMERICA, LLC

-- Insert the T40058 guide pins as follows:

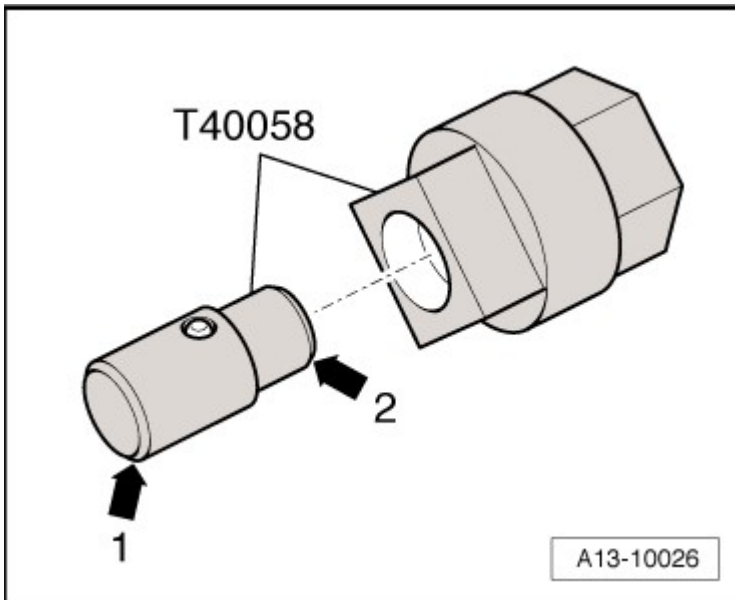


Fig. 166: Identifying Guide Pin And Adapter T40058
Courtesy of AUDI OF AMERICA, LLC

- The large diameter -arrow 1- faces the engine.
- Small diameter -arrow 2- points to adapter.

-- To loosen the torque converter bolts, counterhold the crankshaft using the T40058.

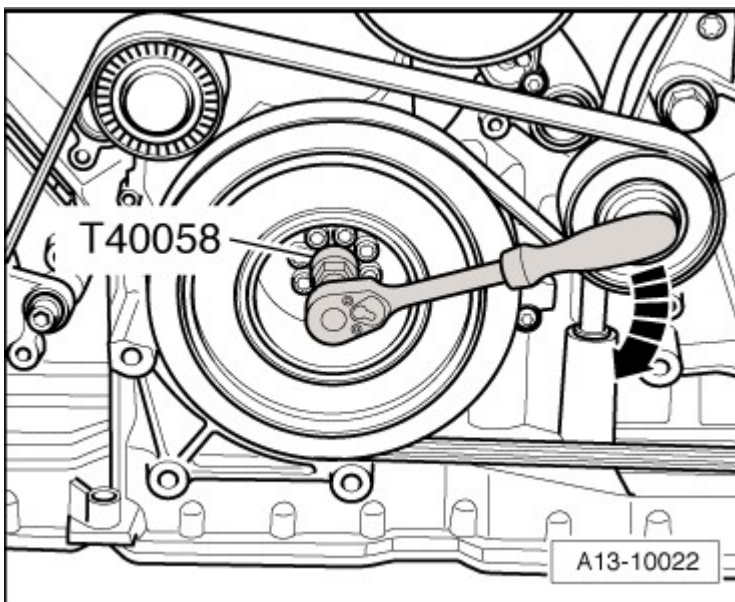


Fig. 167: Identifying Torque Converter Bolts And Adapter T40058
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Components could be destroyed by the camshaft timing chain jumping off.

- Only turn the crankshaft in the direction of engine rotation -arrow-.

-- Remove the cover -arrow-.

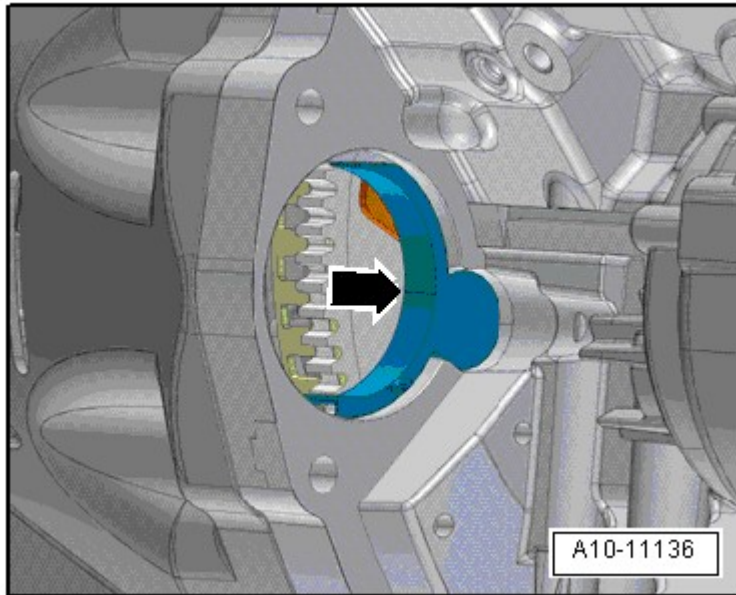


Fig. 168: Identifying Cover -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Turn the crankshaft 120° in the direction of engine rotation and remove the 6 torque converter bolts -arrows- inside the opening of the starter.

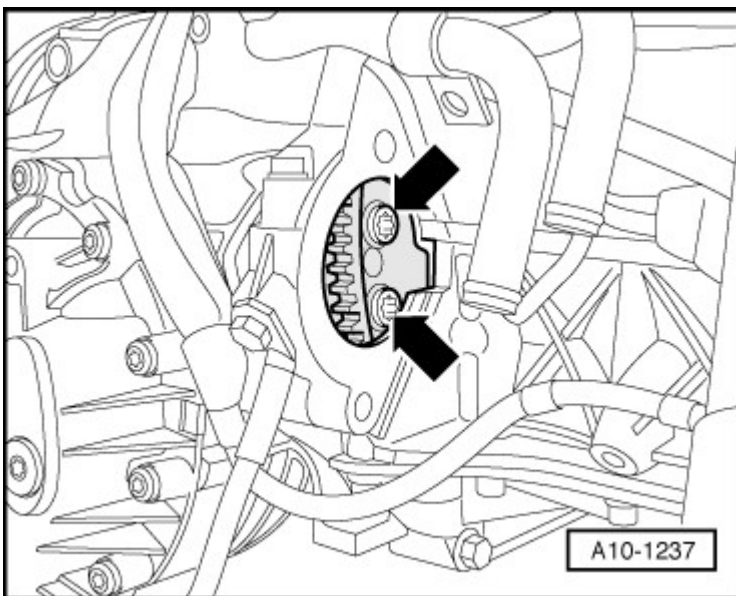


Fig. 169: Identifying Torque Converter Bolts

Courtesy of AUDI OF AMERICA, LLC

-- Remove the transmission/engine bolts -3 through 10--.

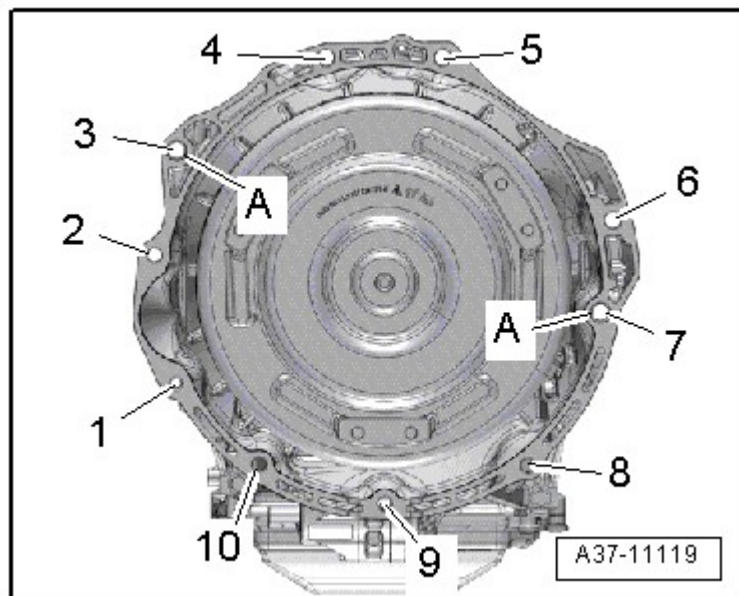


Fig. 170: Identifying Engine/Transmission Connecting Bolts -3 To 10

Courtesy of AUDI OF AMERICA, LLC

-- Loosen the side bolts -1- on the VAS 6131 A and pull the rear table plate and transmission slightly toward the rear.

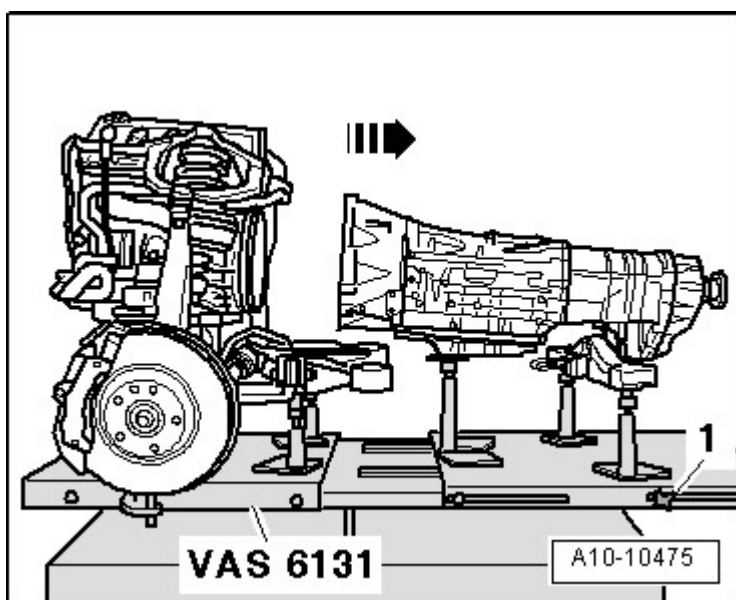


Fig. 171: Identifying Separation Of Engine And Transmission

Courtesy of AUDI OF AMERICA, LLC

- Push the torque converter off the drive plate and through the opening for the starter.
- Secure torque converter in transmission against falling out with the 30 - 211 A.

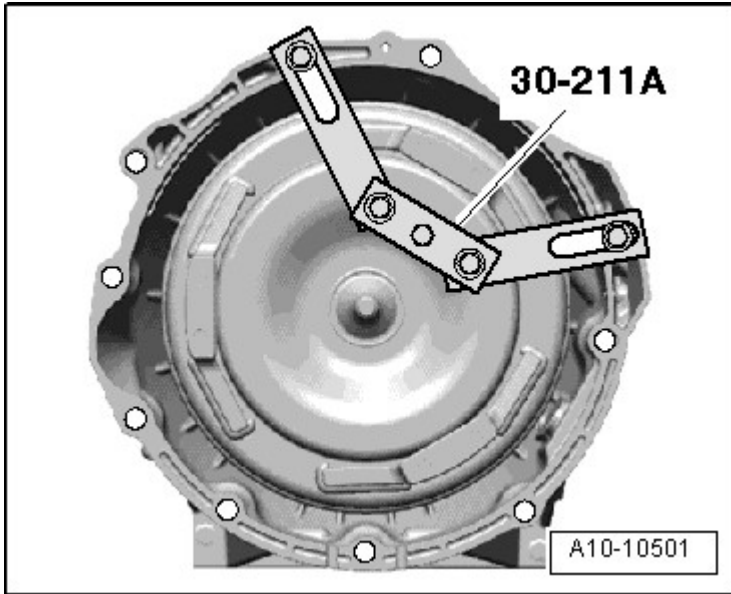


Fig. 172: Identifying Bracket -30-211A- Attached To Secure Torque Converter
 Courtesy of AUDI OF AMERICA, LLC

ENGINE, INSTALLING

Tightening Specifications

NOTE: Tightening specifications only apply to lightly greased, oiled, phosphate or blackened nuts and bolts.

Additional lubricants, such as engine or transmission oil are permissible, although lubricants containing graphite are not.

Do not use any degreased parts.

Tolerance for torque specifications +/- 15%.

Component	Nm	
Bolts and nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65

Battery Jump Start Terminal -U6- Pins

-- Tighten the bolt -1- for the battery jump start terminal to 15 Nm.

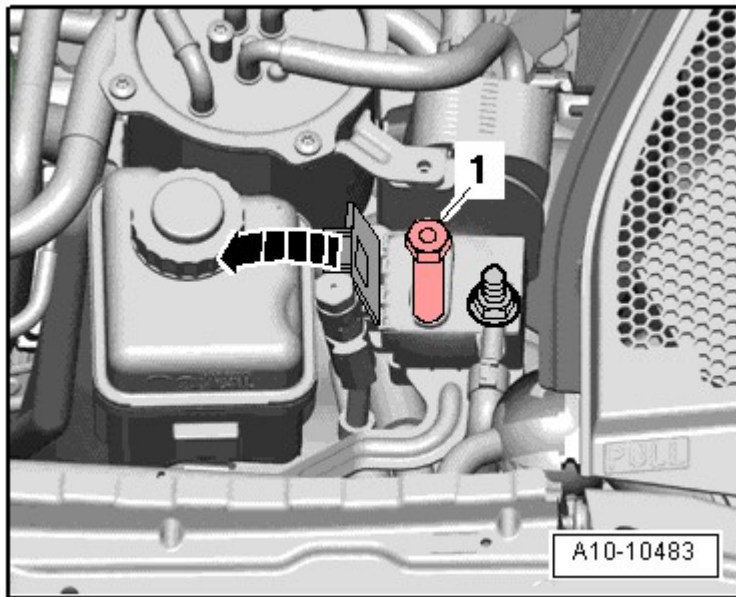


Fig. 173: Battery Jump Start Terminal -U6- Pins
Courtesy of AUDI OF AMERICA, LLC

Ground Connection in the Right of the Plenum Chamber

-- Tighten the nut -2- to 9 Nm.

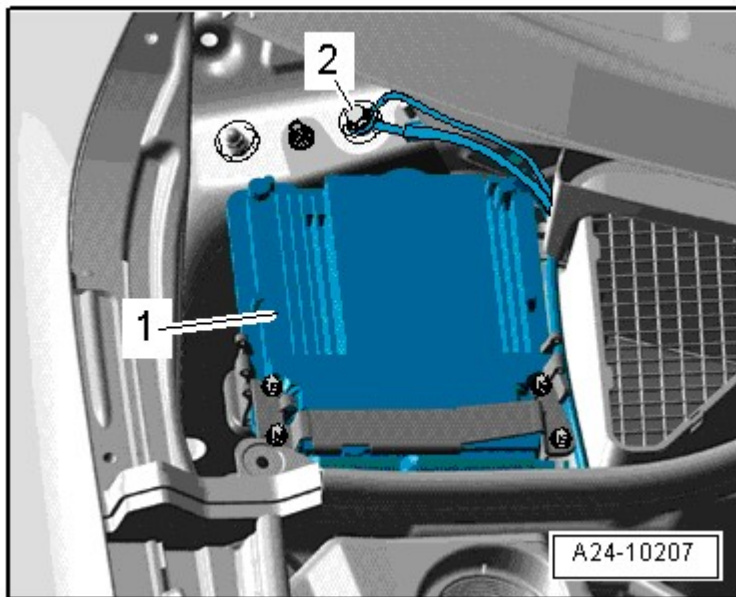


Fig. 174: Location Of Engine Control Module (ECM) -J623- -1-
Courtesy of AUDI OF AMERICA, LLC

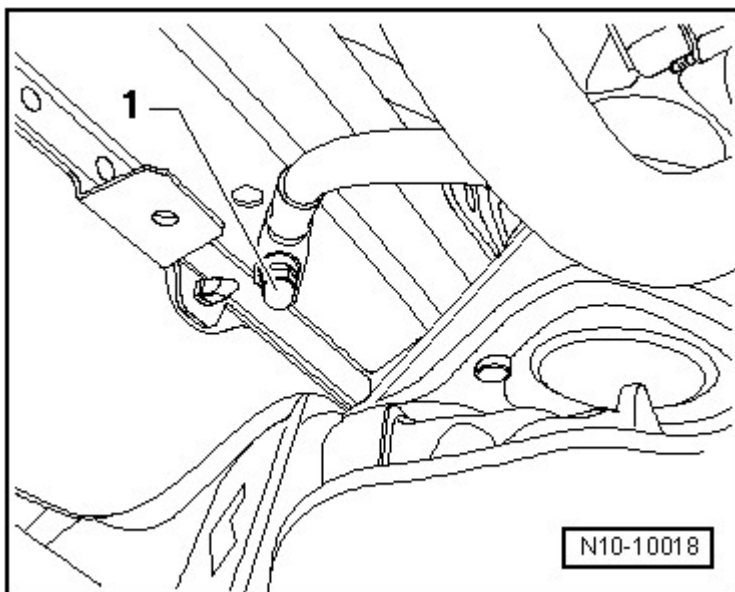


Fig. 175: Identifying Ground (GND) Cable On Longmember
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the nut -1- to 15 Nm.

Engine to Automatic Transmission 09D

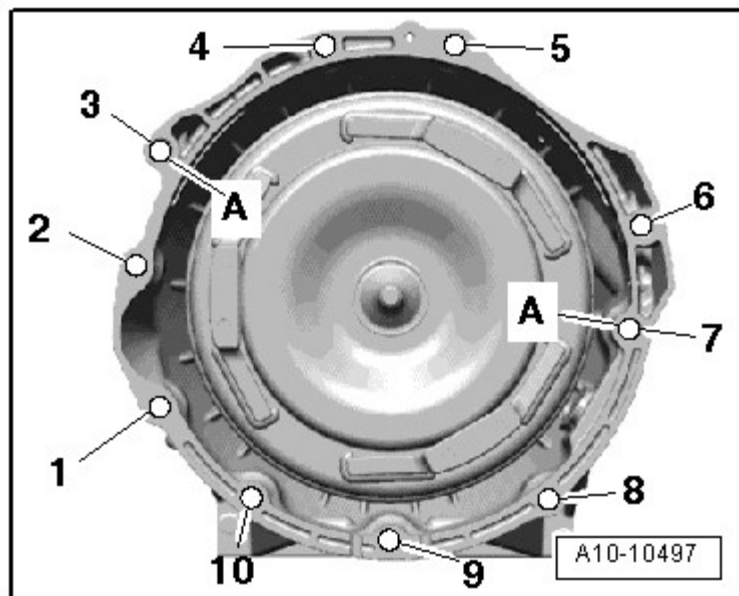


Fig. 176: Bolt Removal Sequence
Courtesy of AUDI OF AMERICA, LLC

Item	Bolt	Nm
1, 2	M10x70	45
3, 4, 5, 7	M12 x 80	80

2009 Audi Q7 3.0 TDI

ENGINE 3.0 Liter - Engine Assembly - Engine Code(s): CATA

6	M12x70	80
8, 9, 10	M10x70	45
A	Alignment sleeves for centering	

Engine and 8-Speed Automatic Transmission 0C8

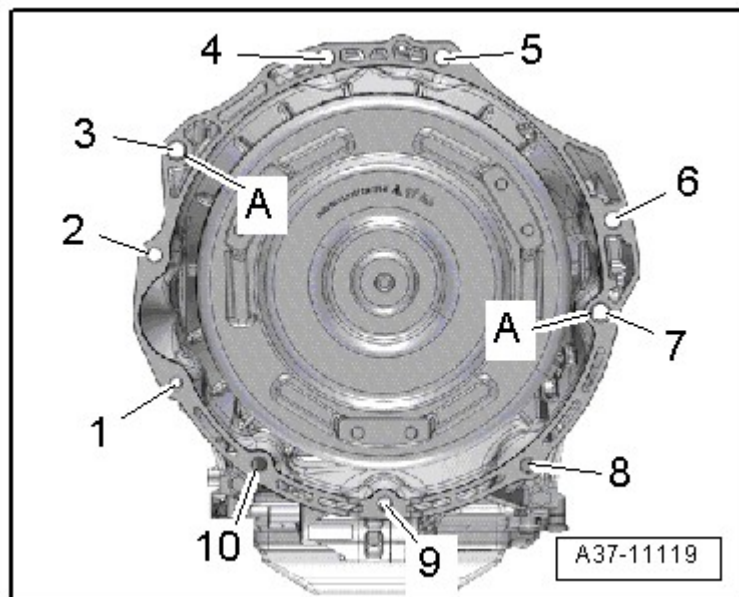


Fig. 177: Identifying Engine/Transmission Connecting Bolts -3 To 10
Courtesy of AUDI OF AMERICA, LLC

Item	Bolt	Nm
1	M10x70	65
2	M10x90	65
3, 4, 5, 7	M12 x 80	80
6	M12x70	80
8, 9, 10	M10x70	45
A	Alignment sleeves for centering	

Installing

Install in reverse order of removal. Note the following:

- NOTE:** **Replace bolts which have been tightened to an additional torque.**
- Replace bolts for securing torque converter to the drive plate with new original bolts,**
- 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,

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

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

-- Make sure the rear centering bushing -arrow- is installed into the crankshaft; install a missing centering bushing.

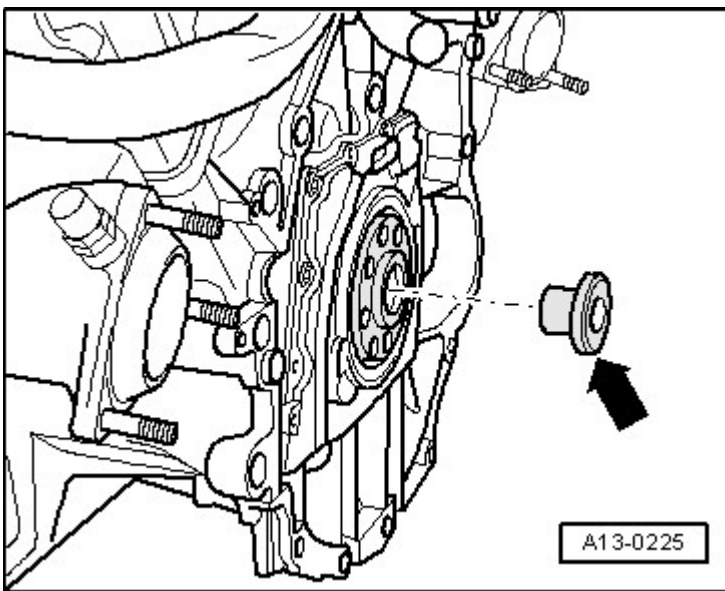


Fig. 178: Torque Converter Centering Bushing
Courtesy of AUDI OF AMERICA, LLC

Vehicles Built through 05.10:

-- Make sure the alignment sleeves -A- for centering the engine and transmission in the cylinder block are present. Insert the alignment sleeves if they are missing.

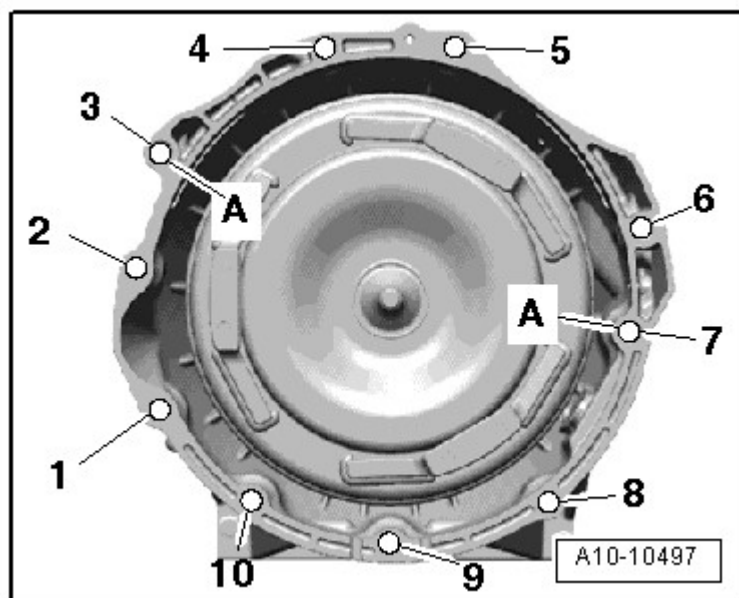


Fig. 179: Bolt Removal Sequence

Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of destroying ATF pump coupling plate by inserting torque converter incorrectly.

- Check torque converter installation dimension.
- When the torque converter is installed correctly, distance -a- between the lower contact surface of threaded holes at torque converter and contact surface of bell housing on the automatic transmission 09D is at least 22 mm.

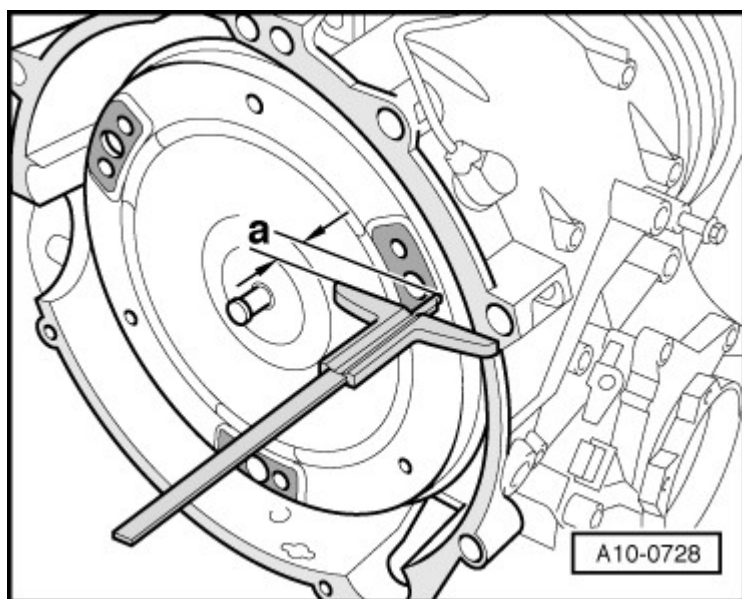


Fig. 180: Measuring Torque Converter

Courtesy of AUDI OF AMERICA, LLC

NOTE: If torque converter is not completely inserted, distance is approximately 10 mm.

-- Before guiding engine and transmission together, rotate torque converter and drive plate so that holes or threaded holes are the same height as opening for removed starter -arrows-.

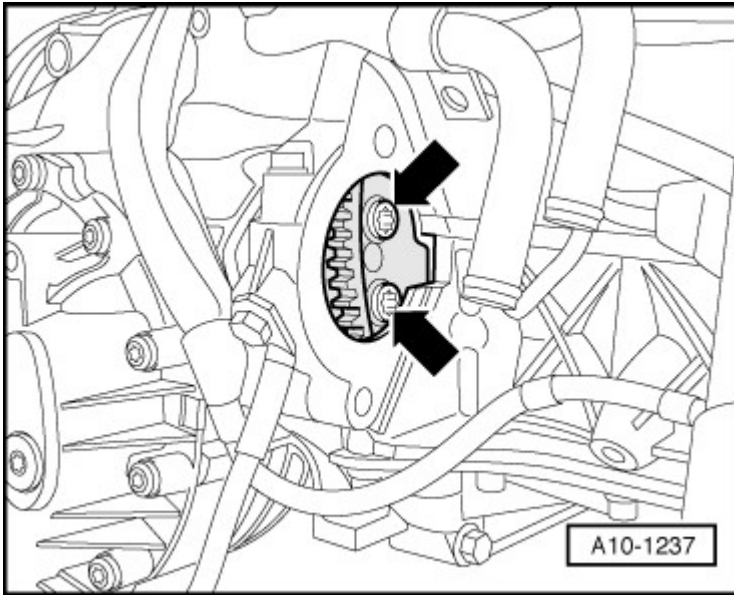


Fig. 181: Identifying Torque Converter Bolts
Courtesy of AUDI OF AMERICA, LLC

Vehicles Built from 06.10:

-- Make sure the alignment sleeves -A- for centering the engine and transmission in the cylinder block are present. Insert the alignment sleeves if they are missing.

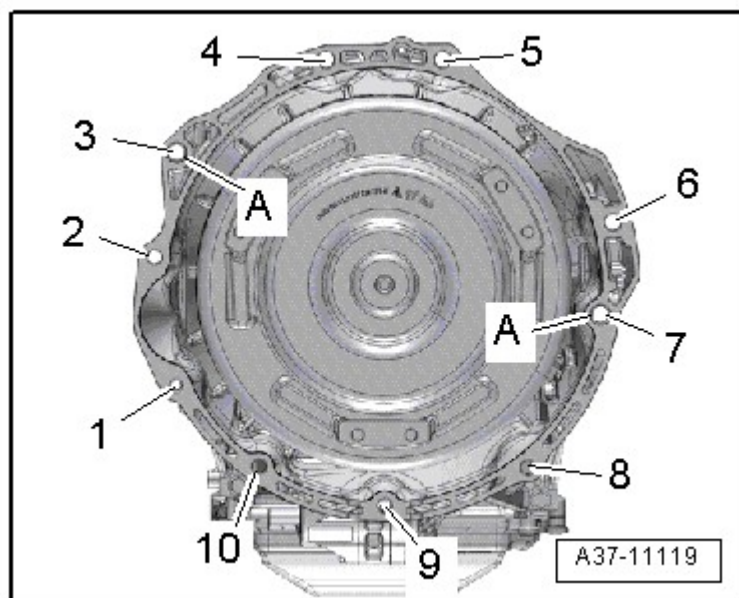


Fig. 182: Identifying Engine/Transmission Connecting Bolts -3 To 10
 Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of destroying ATF pump coupling plate by inserting torque converter incorrectly.

- Check torque converter installation dimension.
- When the torque converter is installed correctly, distance -a- between the lower contact surface of threaded holes at torque converter and contact surface of bell housing on automatic transmission 0C8 is at least 23 mm.

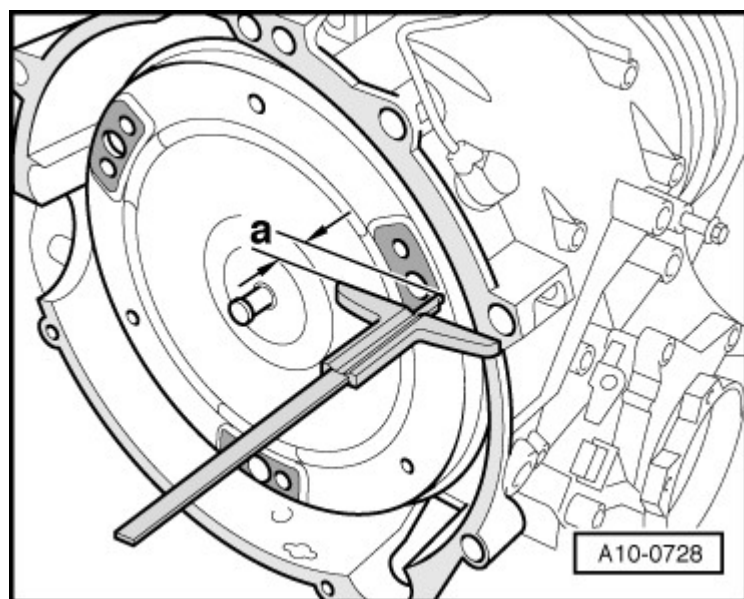


Fig. 183: Measuring Torque Converter

Courtesy of AUDI OF AMERICA, LLC

NOTE: If torque converter is not completely inserted, distance is approximately 0.43 in.

-- Before guiding the engine and transmission together, rotate torque converter and drive plate so that holes or threaded holes are same height as opening for removed starter -arrows-.

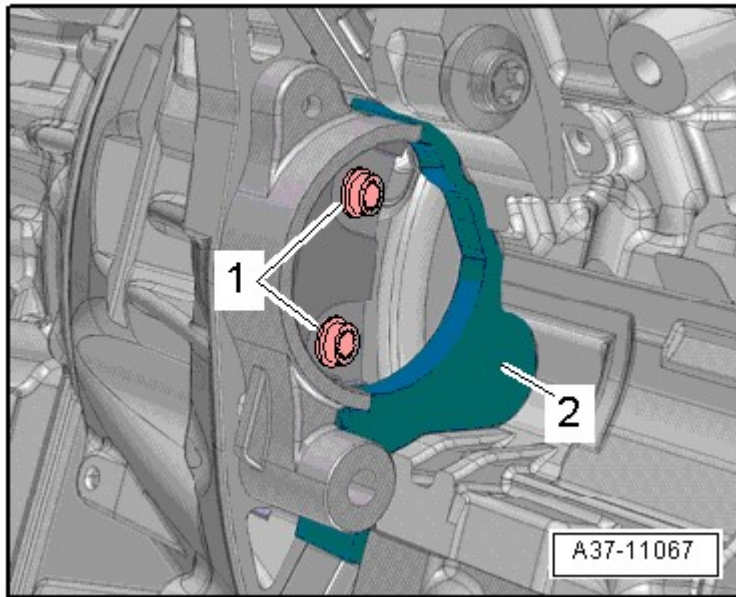


Fig. 184: Identifying Cover -2-
Courtesy of AUDI OF AMERICA, LLC

All Vehicles:

-- Tighten the transmission to the engine.

CAUTION: Risk of destroying transmission due to torque converter inserted incorrectly.

- Keep checking whether the torque converter behind the drive plate can be turned before and during tightening of the bolts at engine/transmission connection.
- If torque converter cannot be rotated, the ATF pump coupling plate and therefore the transmission are destroyed when connections are tightened to final torque.

-- Tighten the torque converter. Refer to TRANSMISSION, INSTALLING Removal and Installation .

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

-- Install the power steering fluid line. Refer to Description and Operation .

- Install Air Conditioner (A/C) compressor. Refer to **Removal and Installation** .
- Install the starter and generator. Refer to **STARTER [for engine(s) CATA]** .
- Install the ribbed belt. Refer to **RIBBED BELT** .
- Install ATF lines. Refer to **ATF PIPES AND ATF COOLER Removal and Installation** .

Vehicles Built through 05.10:

- Tighten the front driveshaft to the transfer case. Refer to **FRONT FINAL DRIVE** or **FRONT DRIVESHAFT** .

Vehicles Built from 06.10:

- Attach the front driveshaft to the transfer case. Refer to **FRONT FINAL DRIVE** or **FRONT DRIVESHAFT** .

All Vehicles:

- Install the left rear coolant pipe to the transmission. Refer to **COOLANT PIPES OVERVIEW** .
- Install the preliminary catalytic converter and particulate filter. Refer to **MUFFLER OVERVIEW** .
- Install the turbocharger heat shield. Refer to **TURBOCHARGER OVERVIEW** .

Vehicles Built through 05.10:

- Slowly guide the engine/transmission subassembly with subframe into body from below using the VAS 6131 A. Be careful not to damage the boots on the drive axle.
- Next, raise engine/transmission subassembly high enough using the VAS 6131 A until dimension -a- is reached between subframe and body.

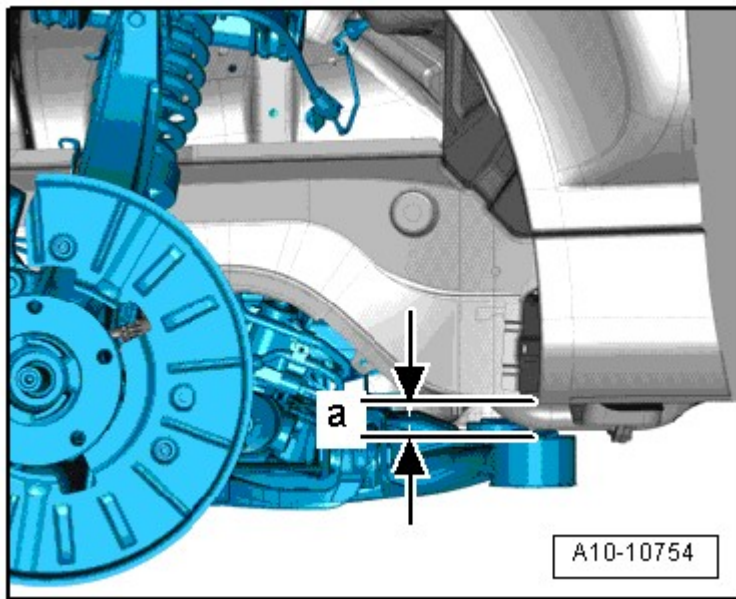


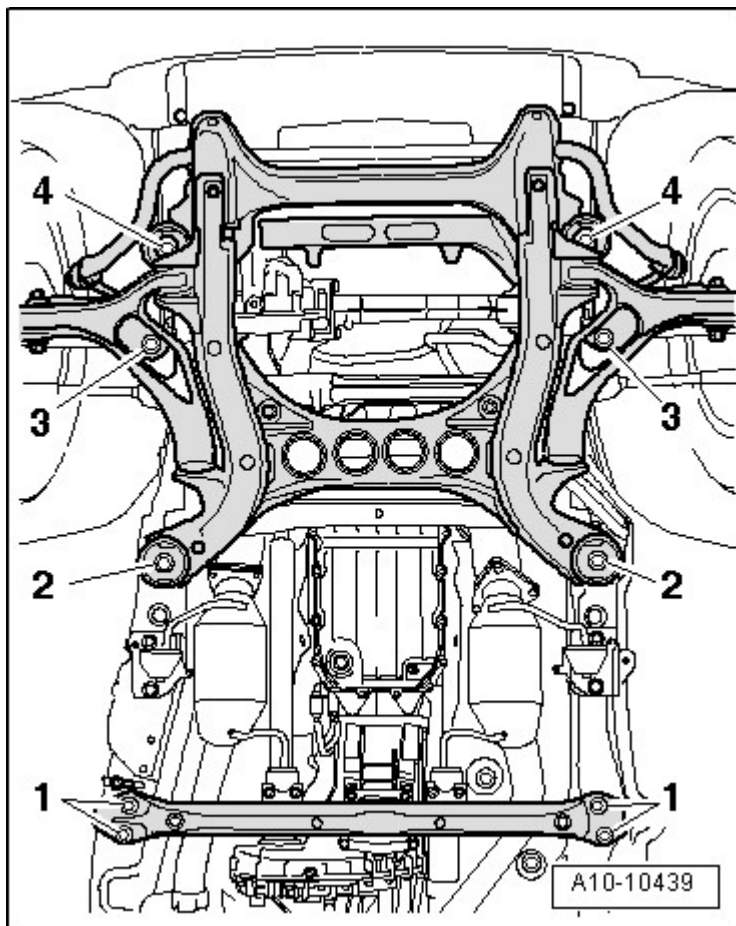
Fig. 185: Identifying Dimension -a- Between Subframe And Body
Courtesy of AUDI OF AMERICA, LLC

- Dimension -a- = 7.87 in.

-- Install the selector lever cable and check the adjustment if necessary. Refer to **SELECTOR LEVER CABLE** .

All Vehicles:

- Continue raising engine/transmission subassembly with subframe using the VAS 6131 A.
- Align subframe, engine carrier and transmission carrier using marks made on longitudinal during removal.



**Fig. 186: Identifying Bolts -4- And Engine Carrier Bolts -3-
Courtesy of AUDI OF AMERICA, LLC**

-- Tighten bolts for subframe, engine carrier and transmission carrier only to specified torque. Refer to **SUBFRAME ASSEMBLY OVERVIEW** and **Description and Operation** ; do not tighten further (tighten bolts only after axle alignment).

WARNING: Risk of accident due to loose connections.

- **Vehicle must not be driven in this condition.**

-- Install universal joint on steering gear. Refer to **Description and Operation** .

Vehicles Built from 06.10:

-- Install the selector lever cable and check the adjustment if necessary. Refer to **SELECTOR LEVER CABLE** .

-- Attach the rear driveshaft to the transfer case. Refer to **REAR FINAL DRIVE** or **REAR DRIVESHAFT** .

Vehicles Built through 05.10:

-- Tighten the rear driveshaft to the transfer case. Refer to **REAR FINAL DRIVE** or **REAR DRIVESHAFT** .

All Vehicles:

-- Install stabilizer bar. Refer to **Removal and Installation** .

-- Install brake caliper. Refer to **Removal and Installation** .

-- Install the suspension struts and control arms. Refer to **Removal and Installation** .

-- Install the selective catalytic reduction (SCR) catalytic converter. Refer to **MUFFLER OVERVIEW** .

-- Install the NOX sensor, heated oxygen sensor (HO2S) -G39-, throttle valve control module -J338-, air filter housing, air filter and engine control module. Refer to **Removal and Installation** .

-- Install the air duct hoses and screw-type clamps. Refer to **Fig. 187**.

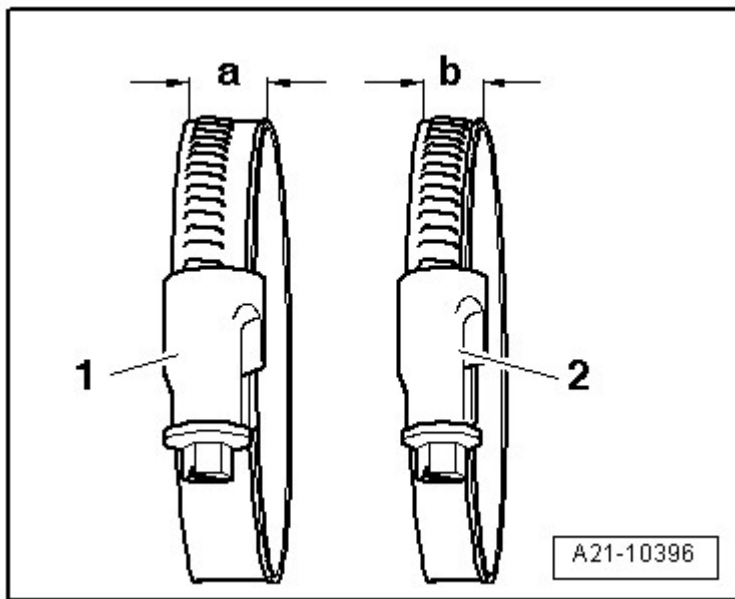


Fig. 187: Clamp Tightening Specifications

Courtesy of AUDI OF AMERICA, LLC

-- Install the fuel filter. Refer to **FUEL FILTER** .

-- Tighten the fuel cooler pump -V166- to the longitudinal member. Refer to **Fig. 188**.

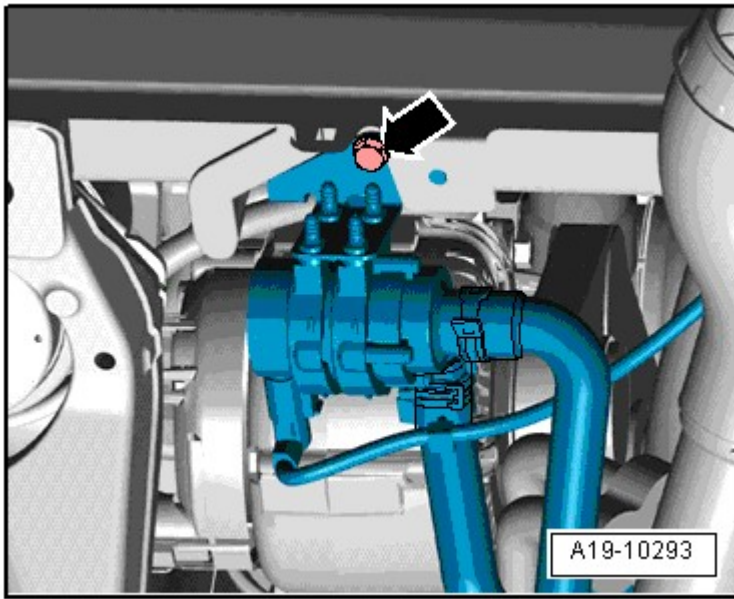


Fig. 188: Vehicles Built through 05.10: Fuel Cooler Pump -V166-, Tightening Specifications
Courtesy of AUDI OF AMERICA, LLC

- Install refrigerant lines. Refer to **Removal and Installation** .
- Electrical connections and routing. Refer to appropriate SYSTEM WIRING DIAGRAM.
- Install the cover for the plenum chamber E-box. Refer to **Removal and Installation** .
- Follow the instructions for connecting the battery. Refer to **BATTERY, DISCONNECTING AND CONNECTING** .

CAUTION: Risk of destroying control modules with excess voltage.

- **Do not use a battery charger for starting assistance!**

- Install and adjust the windshield wiper arms. Refer to **WINDSHIELD WIPER SYSTEM** .
- Fill engine oil and check oil level.
- Before starting engine for the first time, check the fluid level in power steering reservoir. Refer to **General Information** .

NOTE: The power steering pump must not run dry.

- Fill the refrigerant circuit. Refer to **LEAKING OR DAMAGED COMPONENTS EXCEPT A/C COMPRESSOR, ACCUMULATOR OR RECEIVER - CIRCUIT EMPTY OF REFRIGERANT** .
- Connect the coolant hose to the coupling. Refer to **Fig. 189**.

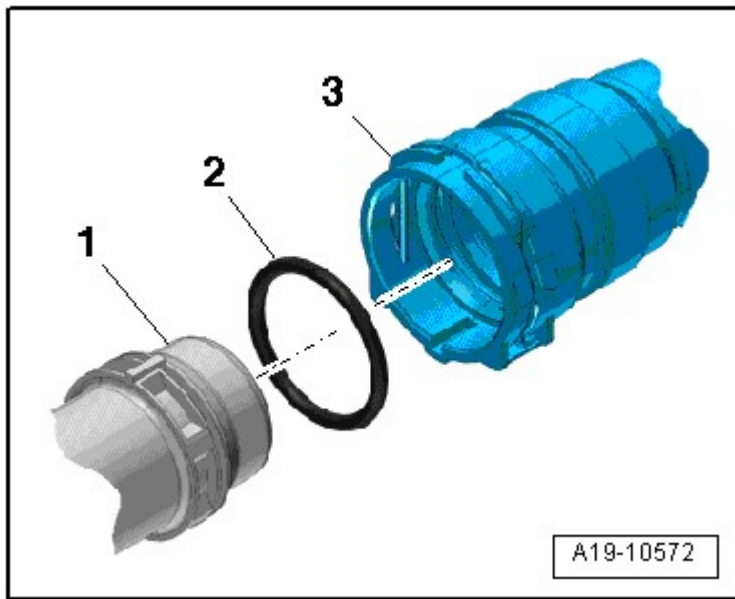


Fig. 189: Connecting Coolant Hose To Coupling
Courtesy of AUDI OF AMERICA, LLC

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

NOTE: Do not use drained coolant in the following situations:

If the cylinder head or cylinder block was replaced.

If the coolant is contaminated.

-- Align subframe and engine carrier. Refer to Removal and Installation .

-- Align and tighten the transmission carrier. Refer to ATF PIPES AND ATF COOLER .

-- Install the wheel housing liners. Refer to Removal and Installation .

-- Install the front wheels. Refer to WHEEL, CHANGING AND MOUNTING

-- Perform axle alignment. Refer to VEHICLE ALIGNMENT OVERVIEW .

WARNING: Risk of accident due to loose connections.

- Tighten subframe bolts to final torque after axle alignment.

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

-- Install exhaust system free of stress. Refer to EXHAUST SYSTEM, INSTALLING .

-- On a vehicle with air suspension, deactivate vehicle lift mode. Refer to **General Information** .

ENGINE MOUNT

Special tools and workshop equipment required

- Engine Support Bridge 10 - 222 A
- Bracket with Spindle and Hook 10 - 222 A /10
- Adapter 10 - 222 A /19
- Engine Sling 2024 A and Bracket 2024 A/1
- Bracket T10014
- Engine Support Basic Set T40091
- Engine Support Supplement Set T40093

Removing

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

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

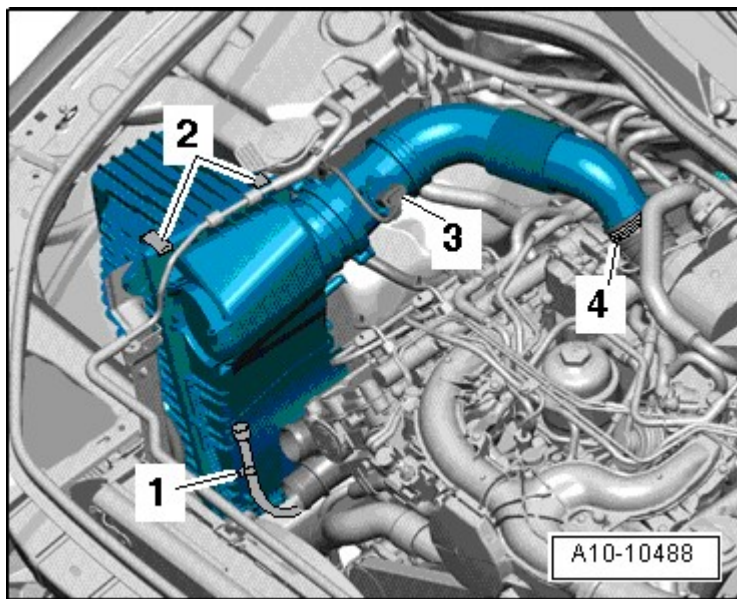


Fig. 190: Connectors And Clips

Courtesy of AUDI OF AMERICA, LLC

-- Remove the air guide hose by loosening the hose clamps -arrows-.

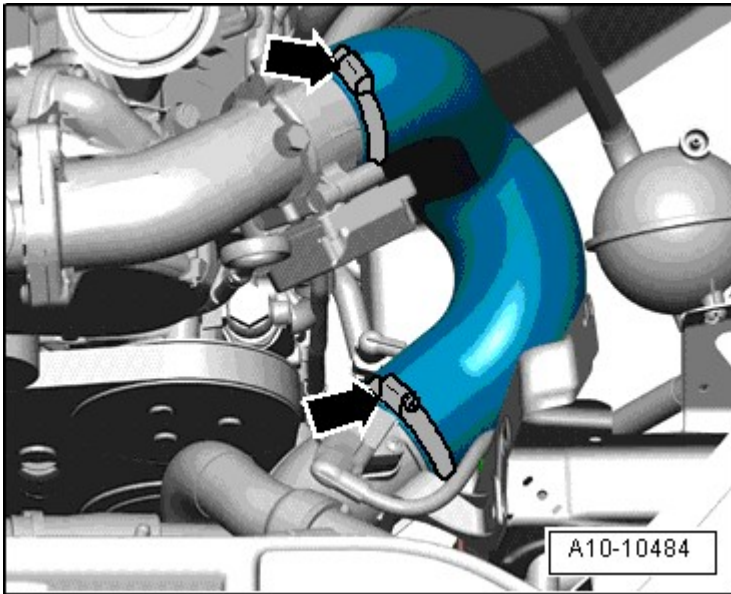


Fig. 191: Loosen Charge Air Hose Clamps -Arrows- And Remove Hose
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right engine mount nuts -arrow-.

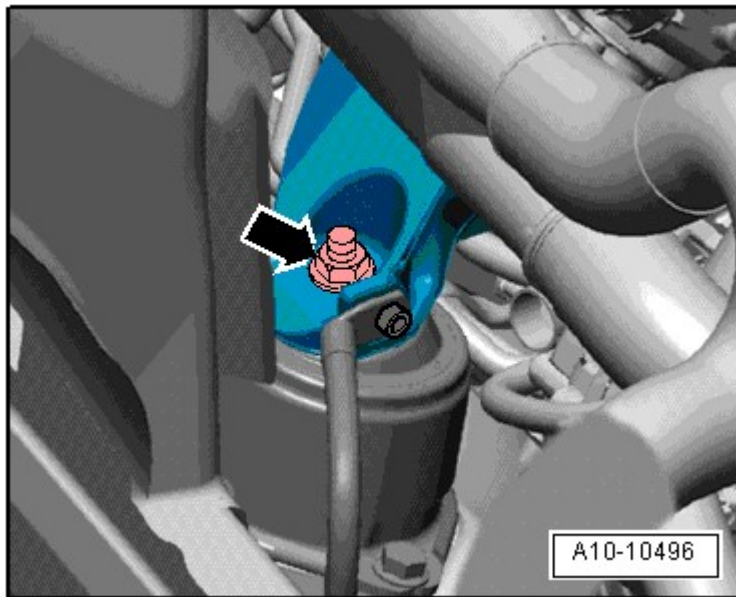


Fig. 192: Identifying Engine Mount Bracket To Engine Mount Nut -Arrow-
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the left front wheel housing liner. Refer to **Removal and Installation** .

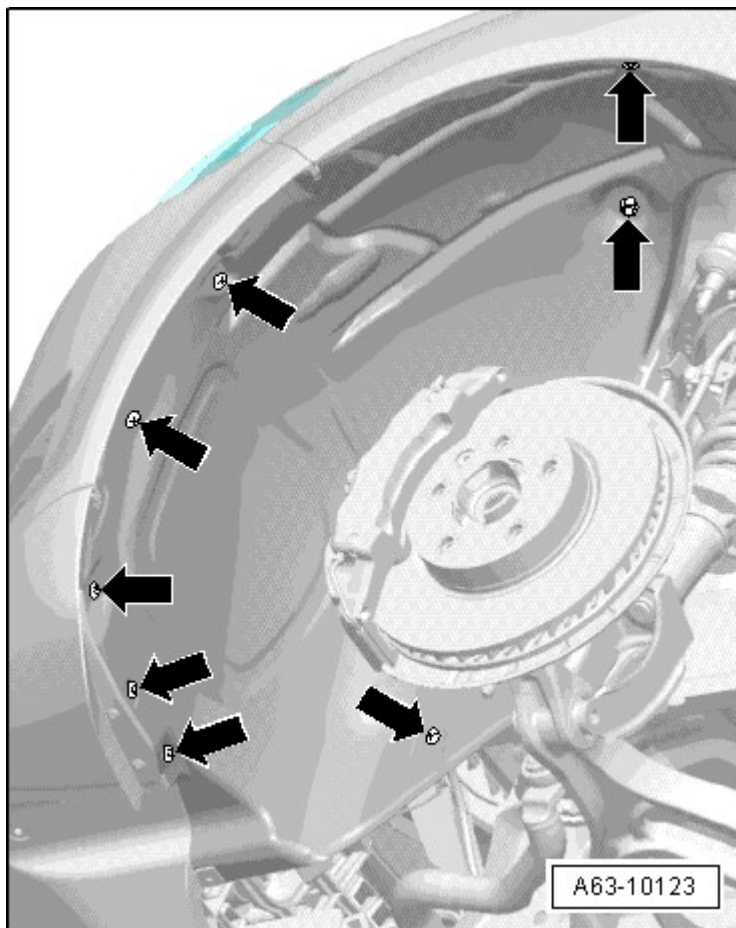


Fig. 193: Remove Left Front Wheel Housing Liner
Courtesy of AUDI OF AMERICA, LLC

-- Remove the nuts and bolts -arrows- on the refrigerant line clamps.

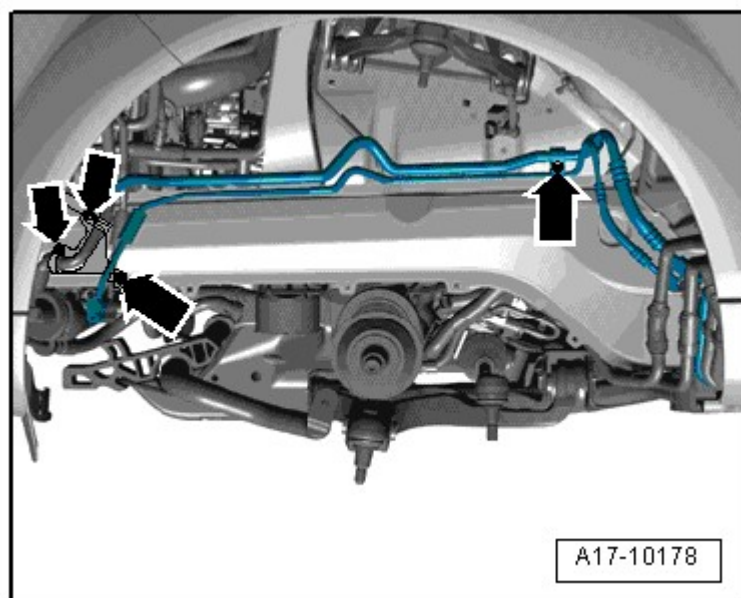


Fig. 194: Identifying Coolant Line Retaining Clamp Nuts And Bolts -Arrows-
 Courtesy of AUDI OF AMERICA, LLC

NOTE: To position the 10 - 222 A /19 on the longitudinal members, move the refrigerant lines slightly to the side.

-- Mount the 10 - 222 A with the engine supports T40091/3 and 2 spindles onto bolted fender edges.

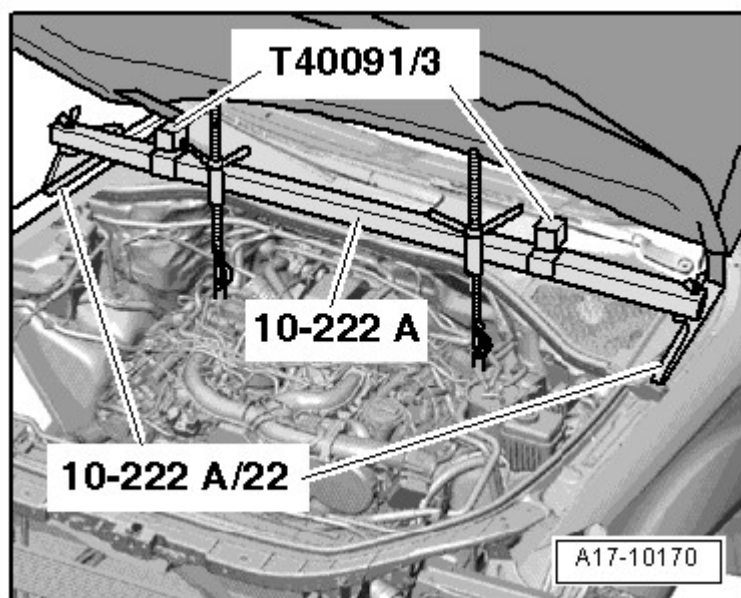


Fig. 195: Identifying Engine Support Bridge 10-222A And Movable Joints T40091/3
 Courtesy of AUDI OF AMERICA, LLC

- The spindles are positioned forward.

-- Attach both spindles to the rear engine lifting eyes.

-- Install the other components of the 10 - 222 A as illustrated; when doing this, place the 10 - 222 A /19 on the notches in the longitudinal members.

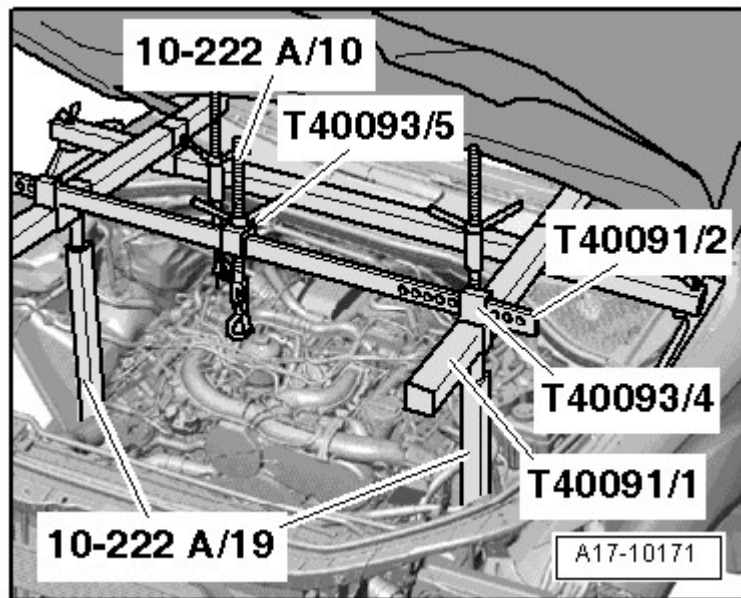


Fig. 196: Identifying Rail With Holes T40091/2, Mounts T40093/5 And Movable Joints T40093/4
 Courtesy of AUDI OF AMERICA, LLC

-- Slide support T40091/2 into both connectors T40093/4 with slide T40093/5.

WARNING: Risk of accident due to loose supporting elements.

- Secure T40091/2 with connector pins and T40093/4.

-- Install the T10014 into the hole in the ribbed belt tensioning element.

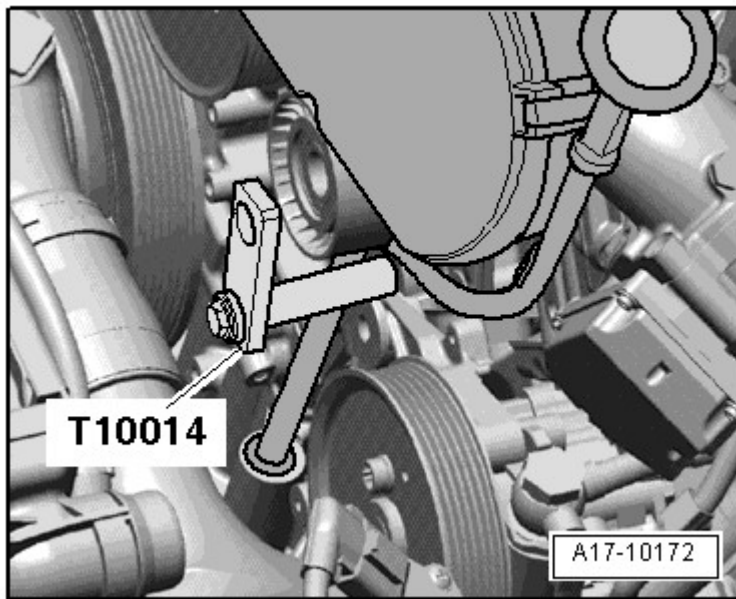


Fig. 197: Identifying Engine Support T10014
Courtesy of AUDI OF AMERICA, LLC

- Remove eyelet for the 2024 A.
- Install the bolt -1- into the center hole in the engine sling and secure it with a cotter pin.

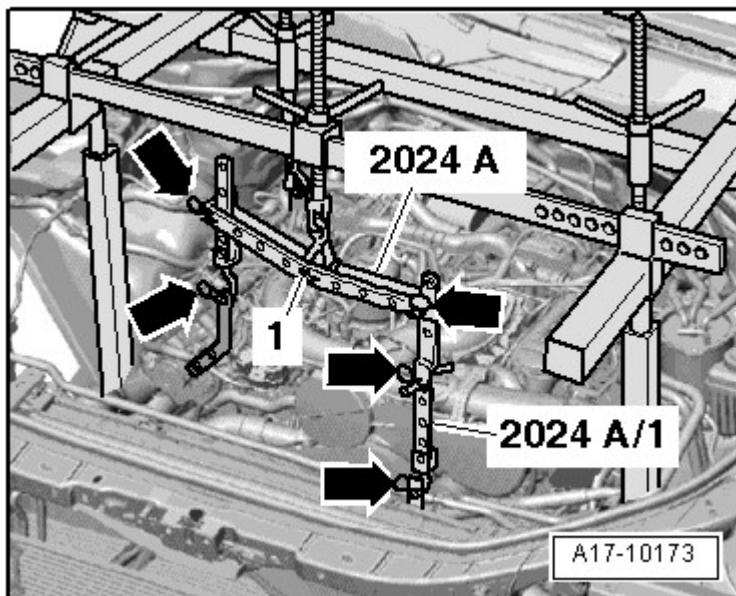


Fig. 198: Identifying Engine Sling 2024A And Bracket 2024A/1
Courtesy of AUDI OF AMERICA, LLC

- Attach the engine sling bolt to the front spindle of the engine support bridge.
- Install the bracket 2024 A/1 to the left side of the engine sling.

-- Attach the 2024 A to the right front engine lifting eye and to the T10014.

WARNING: Risk of accident due to unsecured engine sling.

- **Secure the mounting hooks and pins on the engine support bridge using securing pins -arrows-.**

-- Raise engine until engine supports are above engine bracket threaded pins and evenly tension both spindles to achieve even weight distribution.

-- Remove the left and right bolts -arrows- and remove the engine mount from the engine carrier.

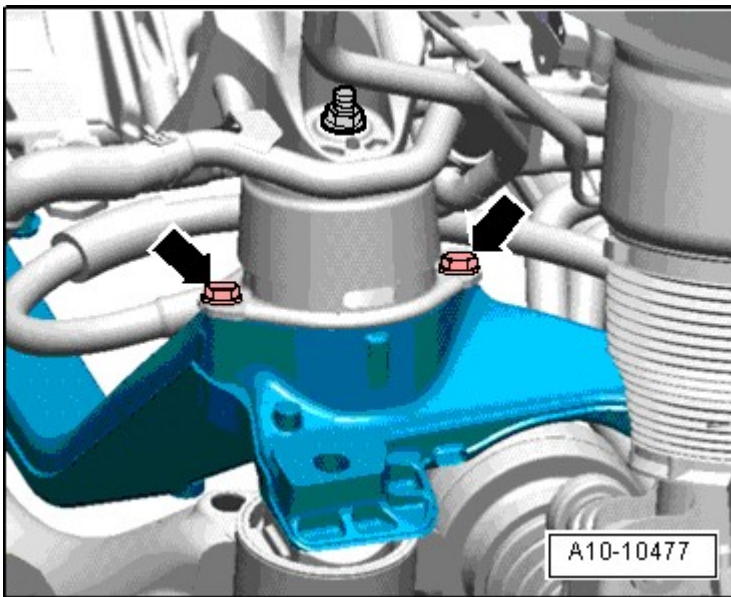


Fig. 199: Identifying Engine Bracket Bolts At Left And Right
Courtesy of AUDI OF AMERICA, LLC

Installing

Install in reverse order of removal. Note the following:

- For the correct tightening specifications, refer to **SUBFRAME ASSEMBLY OVERVIEW**.

NOTE: 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, .

-- Install refrigerant lines. Refer to **Removal and Installation** .

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

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

-- Install the air duct hose and screw-type clamps. Refer to **Fig. 187**.

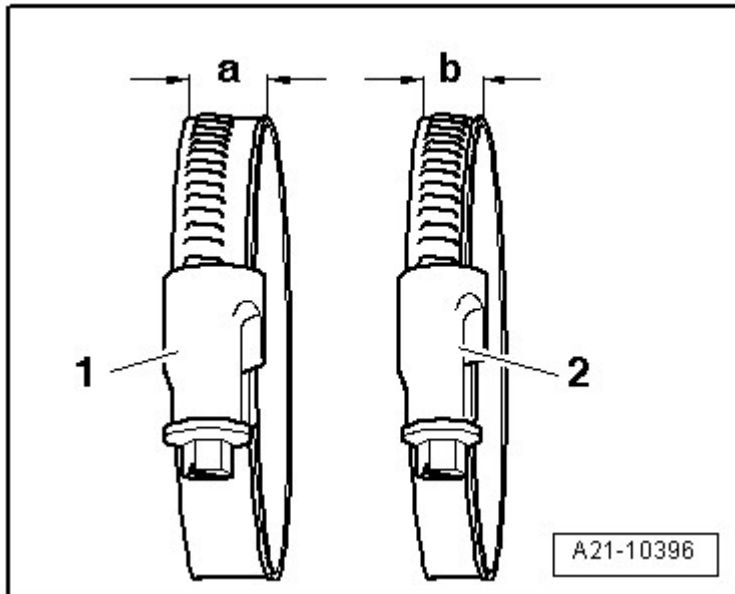


Fig. 200: Clamp Tightening Specifications
Courtesy of AUDI OF AMERICA, LLC

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

ENGINE CARRIER

Removing

-- Remove the left and right engine bracket. Refer to **ENGINE MOUNT**.

-- Remove the 2 bolts and then remove the steering gear heat shield -A-.

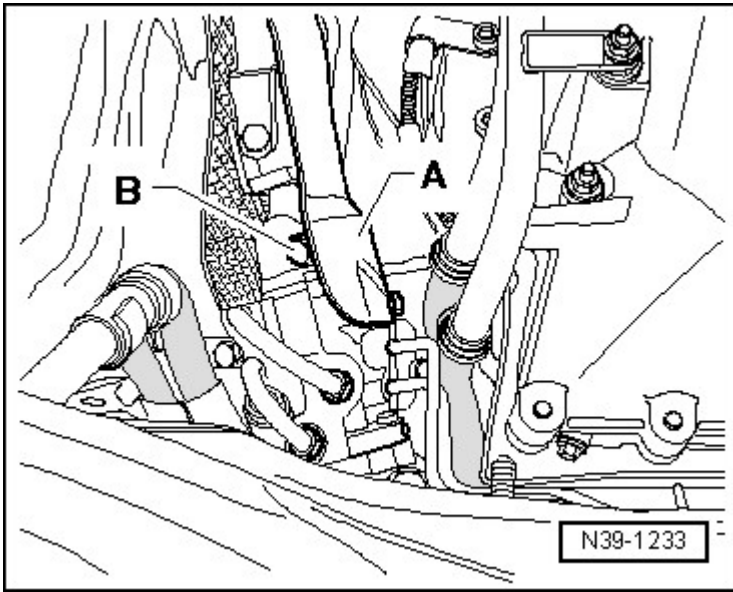


Fig. 201: Identifying Universal Joint Bolt
 Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of distorting airbag spiral spring.

- Separate universal joint from steering gear only when front wheels are in straight ahead position.
- Secure steering wheel with adhesive tape to prevent position of steering wheel and steering gear from changing.

-- Remove the universal joint bolt -B-. Refer to Description and Operation .

-- Remove universal joint from steering gear.

-- Remove the nut -1- on the right longitudinal member and disconnect the ground (GND) wire form the threaded pin.

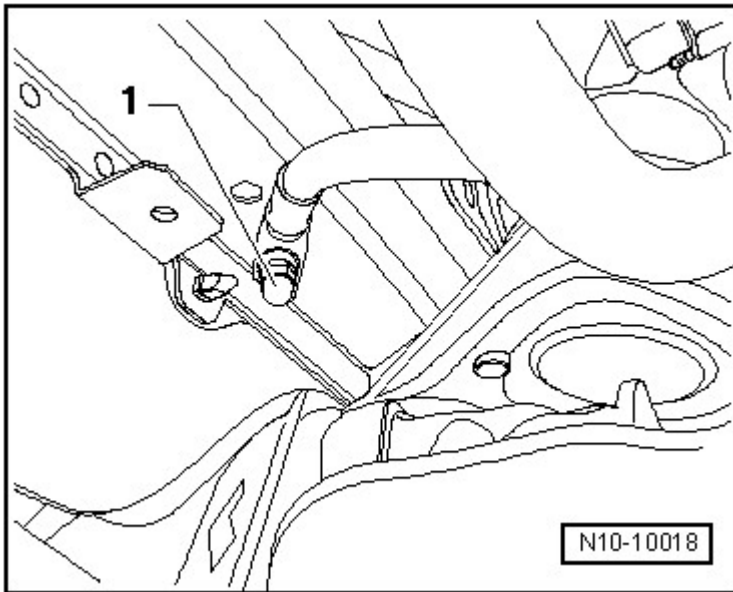


Fig. 202: Identifying Ground (GND) Cable On Longmember
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right coupling rod nuts -arrow- on the stabilizer bar.

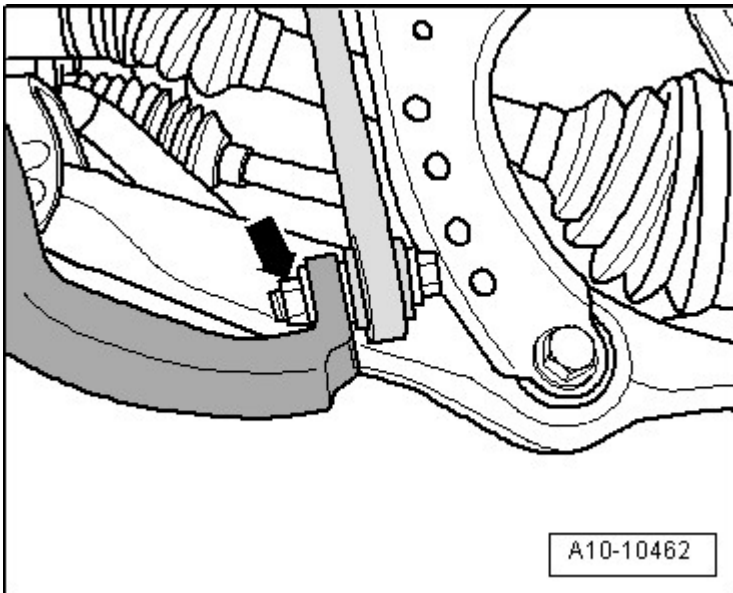


Fig. 203: Identifying Nut -Arrows- Securing Coupling Rod
 Courtesy of AUDI OF AMERICA, LLC

Vehicles Built through 05.10:

-- Remove the bolt -arrow- and move the fuel cooler pump -V166- to the side.

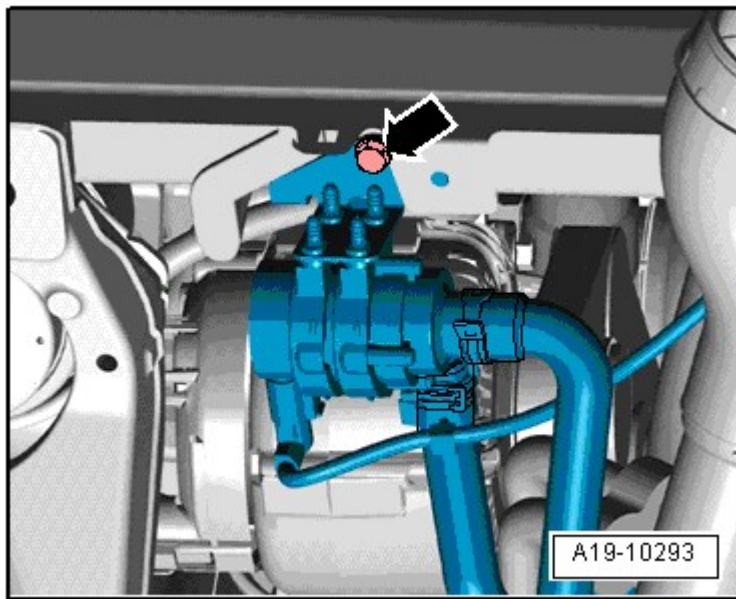


Fig. 204: Vehicles Built through 05.10: Fuel Cooler Pump -V166-, Tightening Specifications
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows-.

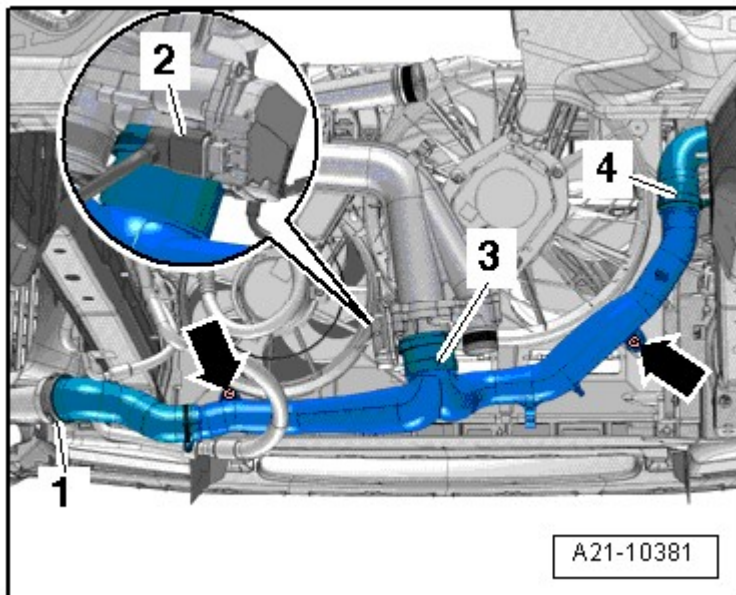


Fig. 205: Coolant Hoses And Clamps
 Courtesy of AUDI OF AMERICA, LLC

-- Lift the clips -1-, loosen the hose clamps -3- and -4- and remove the air duct hoses.

-- Remove the air duct pipe.

NOTE: Ignore -2-.

Vehicles Built from 06.10:

-- Remove the cover -2-.

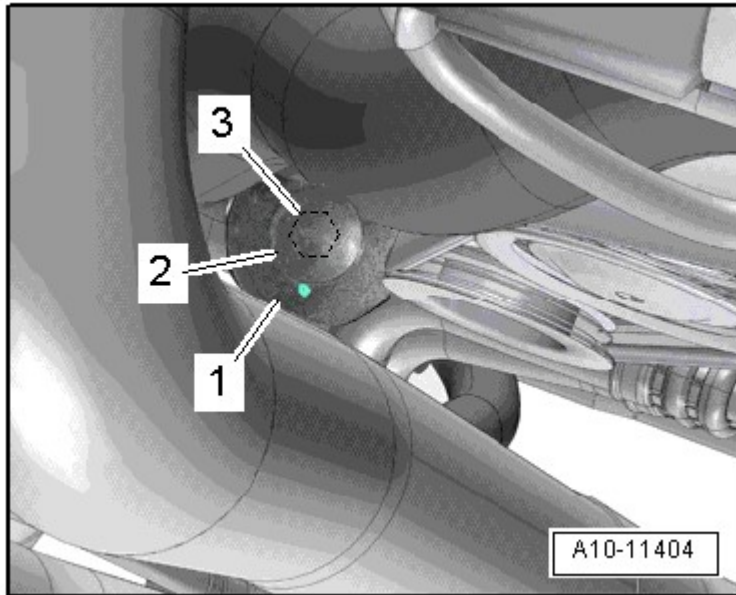


Fig. 206: Identifying Bolt -3- And Balance Weight -1- And Cover -2
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -3- and the balance weight -1-.

All Vehicles:

-- Mark location of subframe and engine carrier to longitudinal members with a felt-tip pen.

WARNING: The subframe could cause an accident if it is not secured.

- The subframe bolts -2- and the transmission carrier bolts -1- must never be loosened.

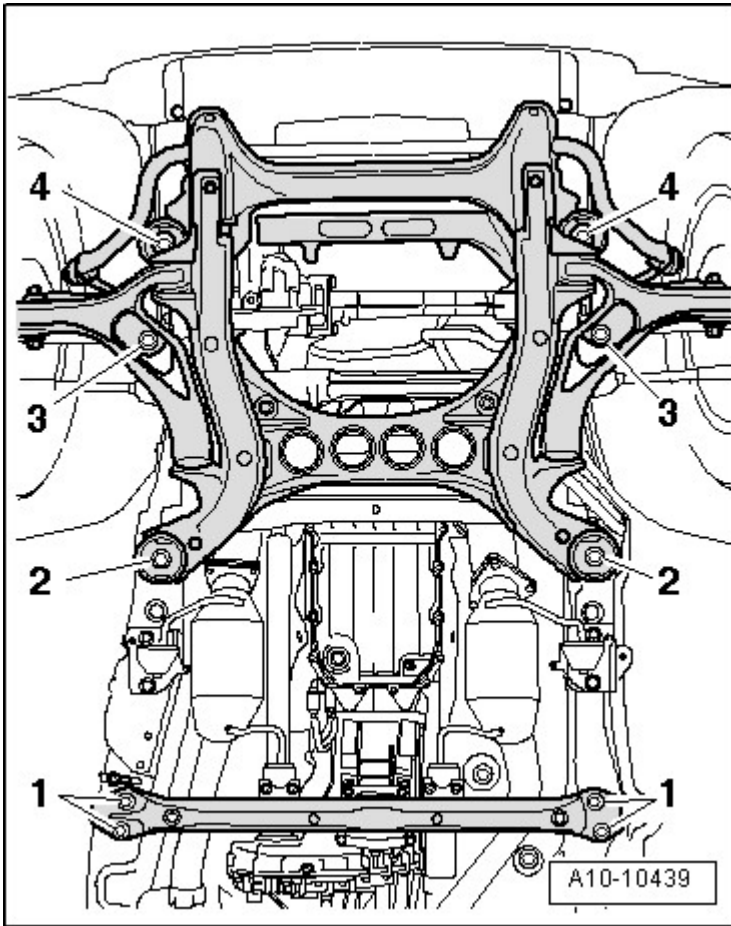


Fig. 207: Identifying Bolts -4- And Engine Carrier Bolts -3-
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -3- and -4- then lower the subframe with the front engine carrier.

-- Remove engine carrier forward.

Installing

Install in reverse order of removal. Note the following:

- Tightening specifications, refer to SUBFRAME ASSEMBLY OVERVIEW, Fig. 175.

NOTE: 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,

-- Install the engine carrier.

-- Install the air guide pipe. Refer to AIR DUCT PIPES AND AIR DUCT HOSES OVERVIEW,

VEHICLES BUILT THROUGH 05.10 .

- Install subframe. Refer to **Removal and Installation** .
- Tighten the fuel cooler pump -V166- to the longitudinal member. Refer to **Fig. 188**.

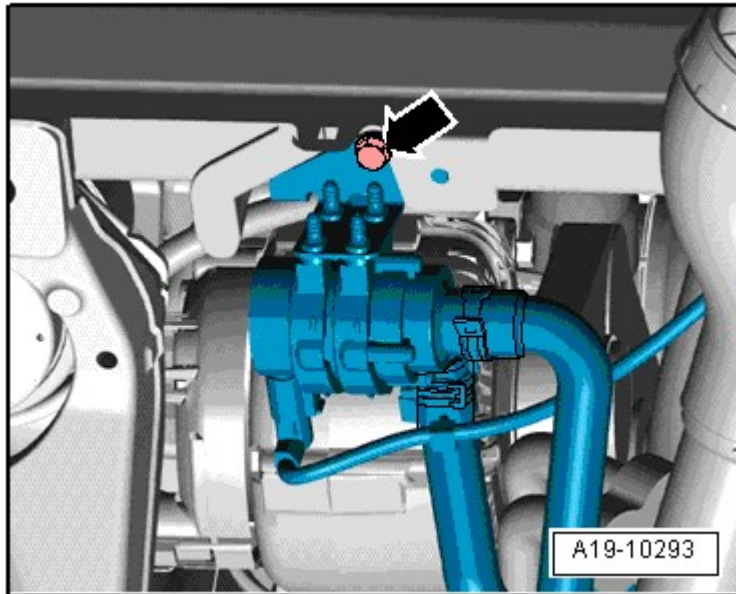


Fig. 208: Vehicles Built through 05.10: Fuel Cooler Pump -V166-, Tightening Specifications
Courtesy of AUDI OF AMERICA, LLC

- Install universal joint on steering gear. Refer to **Description and Operation** .
- Install engine bracket. Refer to **ENGINE MOUNT**.

SPECIAL TOOLS

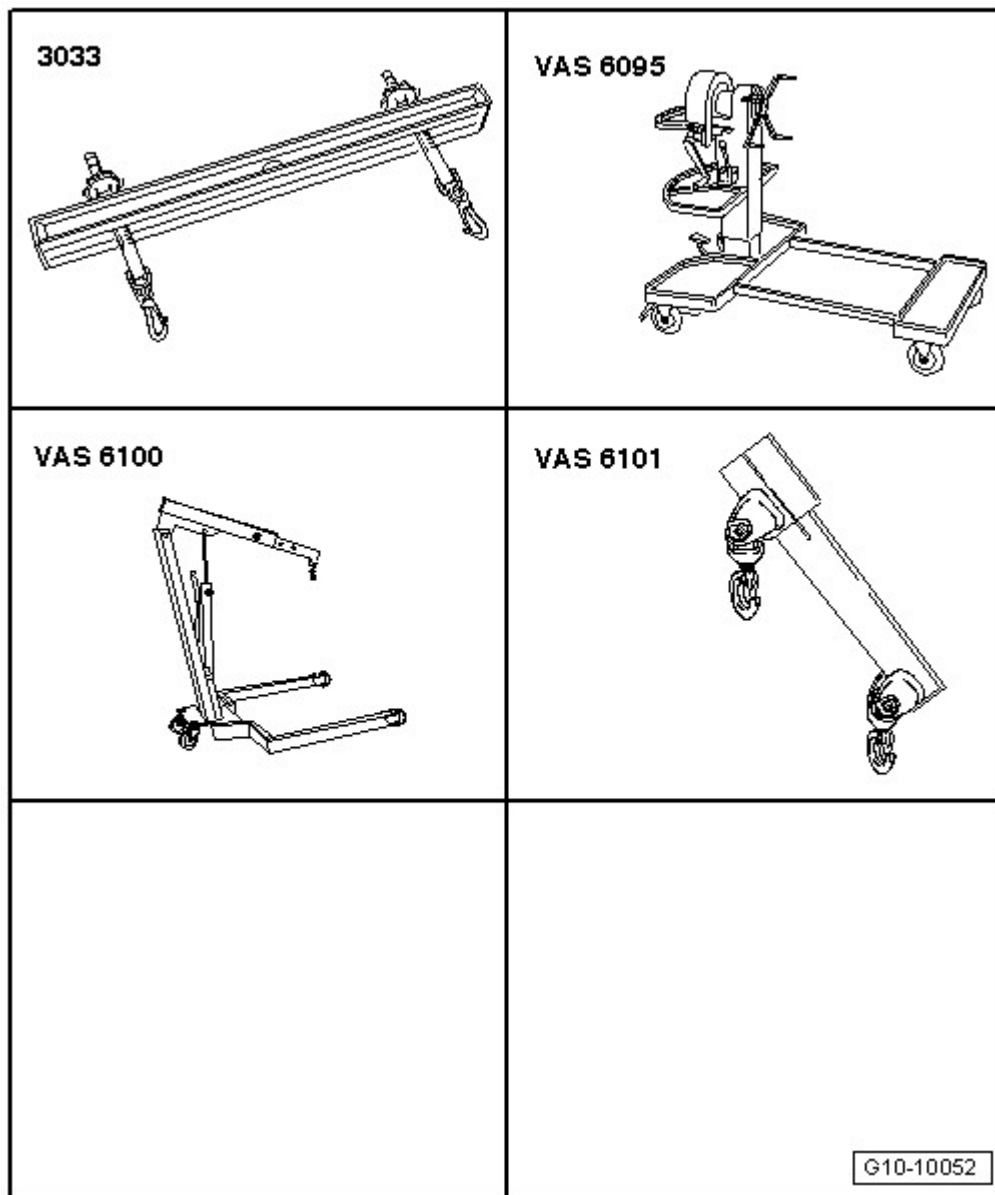


Fig. 209: Identifying Special Tools -- Engine, Securing To Assembly Stand
 Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Lifting Tackle 3033
- Engine and Transmission Holder VAS 6095 with Bracket for V6 TDI Engine, Audi A8 VAS 6095/1-4
- Shop Crane VAS 6100
- Lift Arm Ext./Workshop Hoist VAS 6101

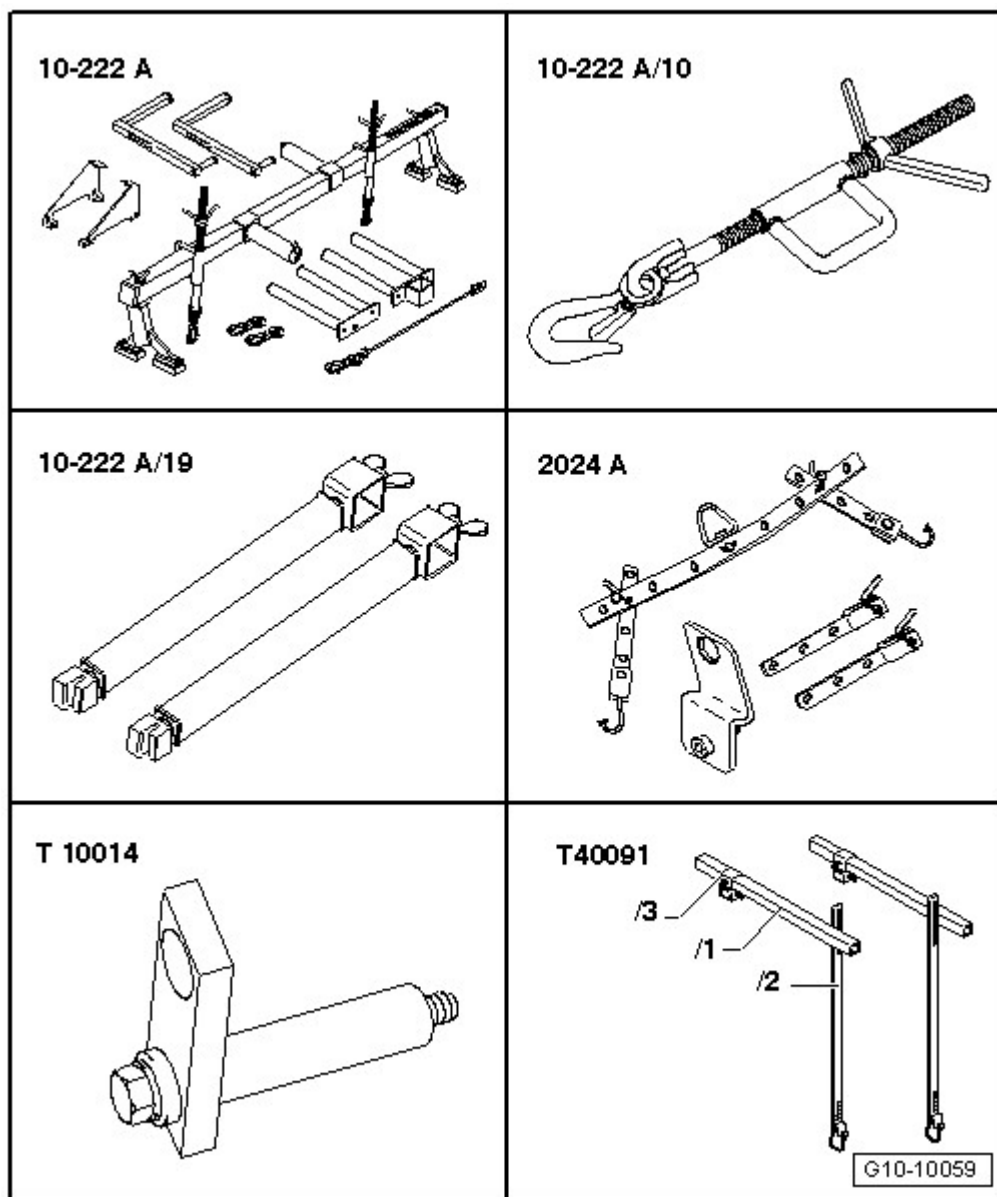


Fig. 210: Identifying Special Tools-Engine
 Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Engine Support Bridge 10 - 222 A
- Bracket with Spindle and Hook 10 - 222 A /10
- Adapter 10 - 222 A /19
- Engine Sling 2024 A and Bracket 2024 A/1
- Bracket T10014
- Engine Support Basic Set T40091

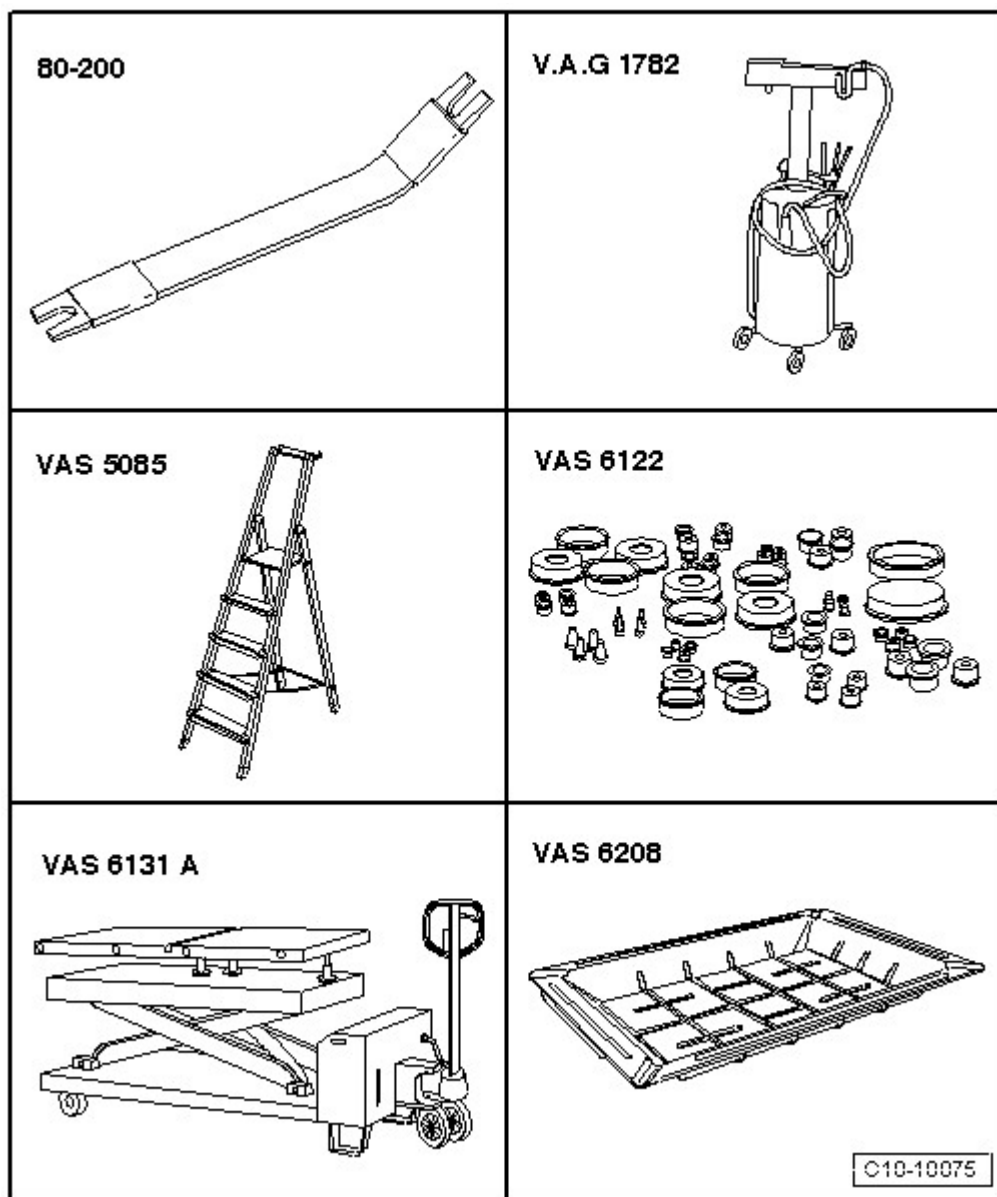


Fig. 211: Identifying Special Tools And Workshop Equipment

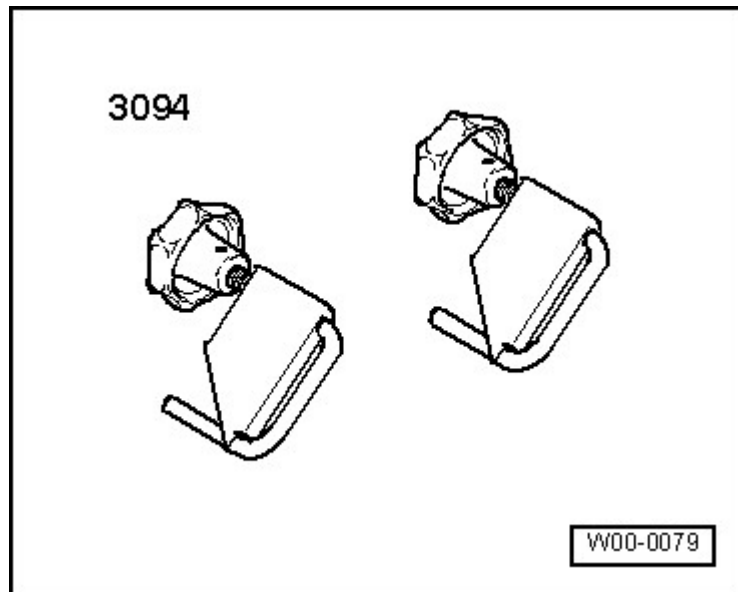
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Pry Lever - Rmv Outside Mirror 80 - 200
- Used Oil Collecting and Extracting Device V.A.G 1782
- Step Ladder VAS 5085
- Engine Bung Set VAS 6122
- Scissor-Type Assembly Platform VAS 6131 A with Support Set VAS 6131/10 as well as Supplementary Set VAS 6131/11, VAS 6131/13 and qty. 3 VAS 6131/10-2
- Drip Tray VAS 6208

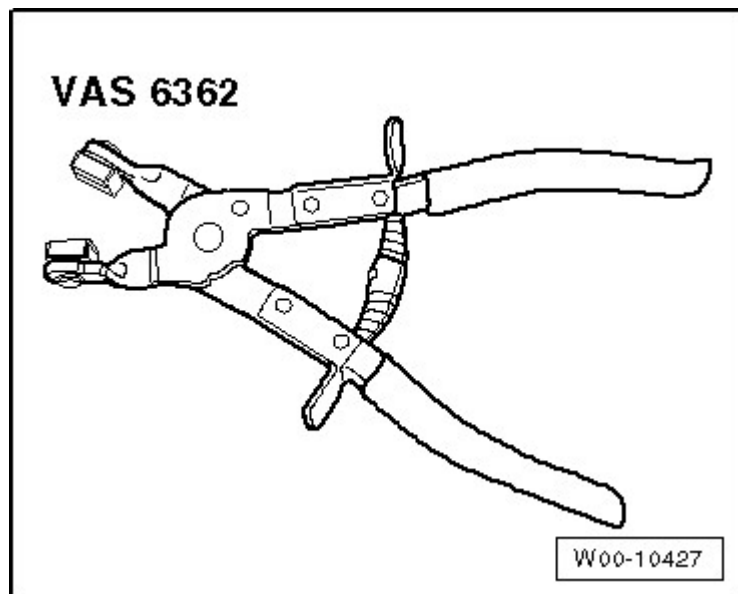
Special tools and workshop equipment required

- Hose Clamps Up to 25 mm Dia. 3094

**Fig. 212: 3094 Hose Clamps**

Courtesy of AUDI OF AMERICA, LLC

- Hose Clip Pliers VAS 6362

**Fig. 213: Clamp Pliers VAS 6362**

Courtesy of AUDI OF AMERICA, LLC

- Ball Joint Puller T10187

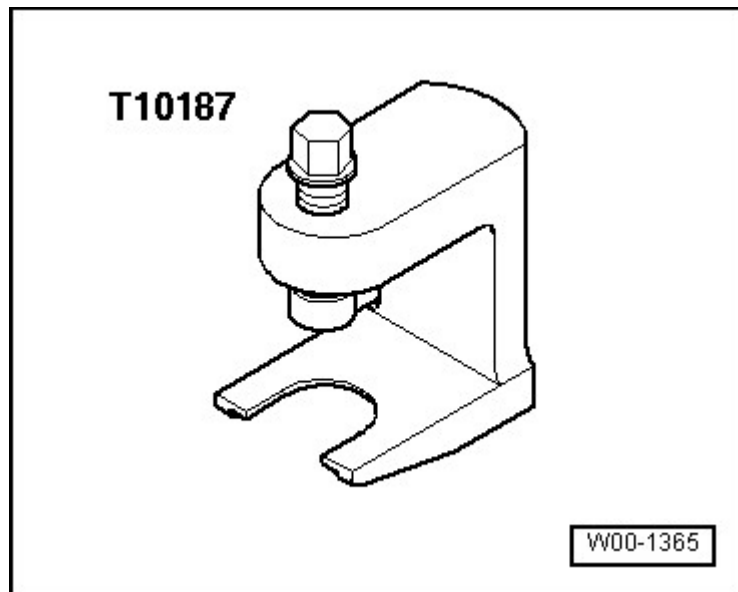


Fig. 214: Ball Joint Puller T10187
Courtesy of AUDI OF AMERICA, LLC

- Bracket 30 - 211 A

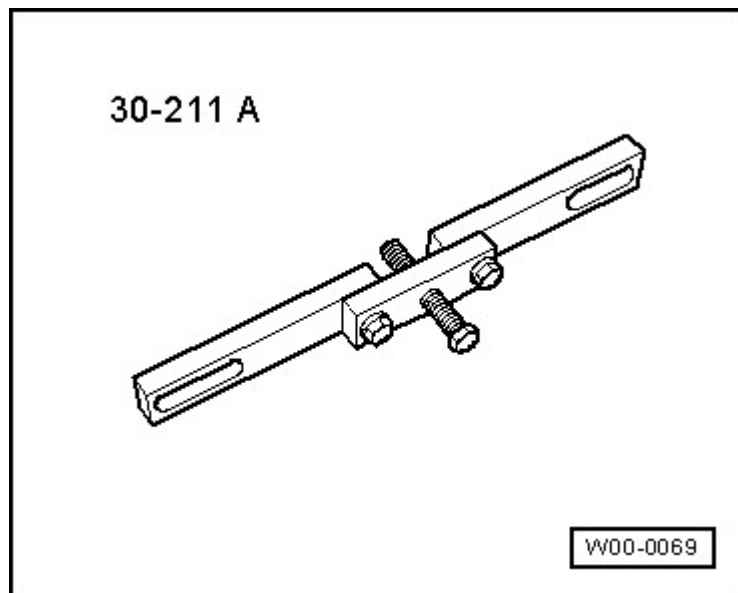


Fig. 215: Bracket 30 - 211 A
Courtesy of AUDI OF AMERICA, LLC

- Socket T40058

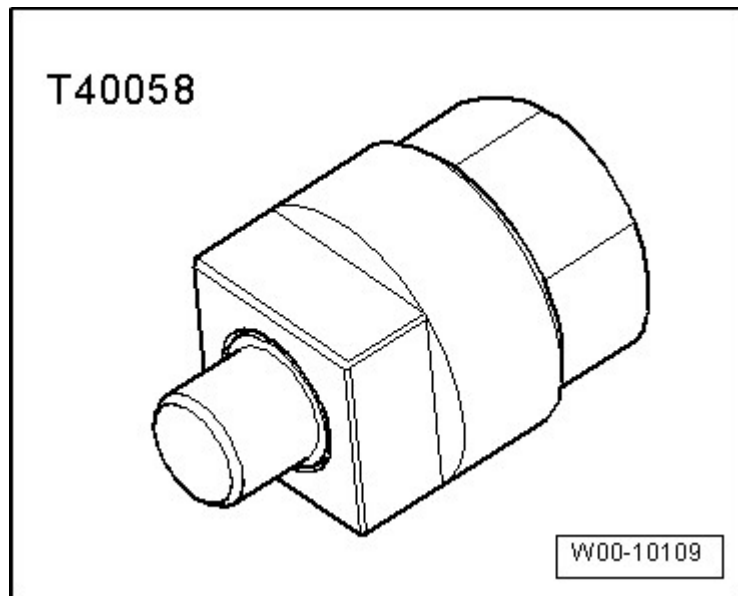


Fig. 216: Adapter T40058
Courtesy of AUDI OF AMERICA, LLC

- Engine Support Supplement Set T40093

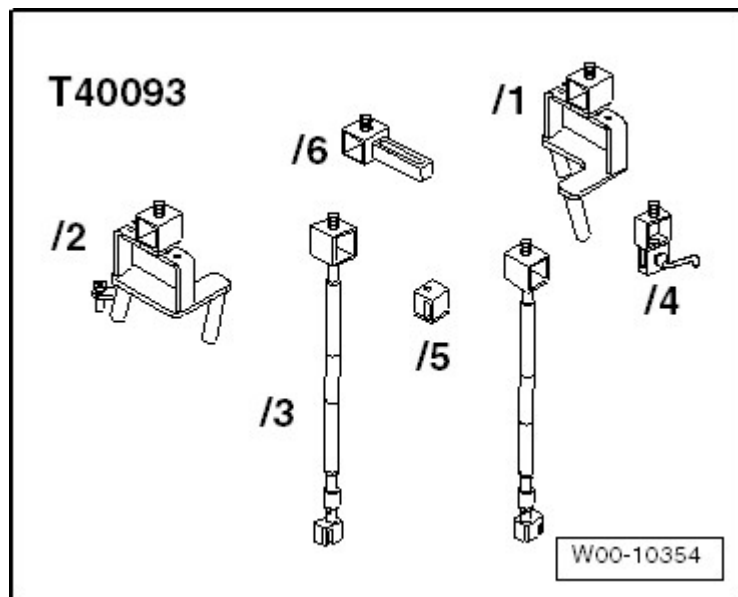


Fig. 217: Engine Support Supplement Set T40093
Courtesy of AUDI OF AMERICA, LLC

- Not illustrated:
- Joint Support VAS 6131/13-7

ENGINE PERFORMANCE

3.0 Liter - Ignition/Glow Plug System - Engine Code(s): CATA

28 IGNITION/GLOW PLUG SYSTEM

DESCRIPTION AND OPERATION

GLOW PLUG, CAMSHAFT POSITION SENSOR, ENGINE SPEED SENSOR OVERVIEW

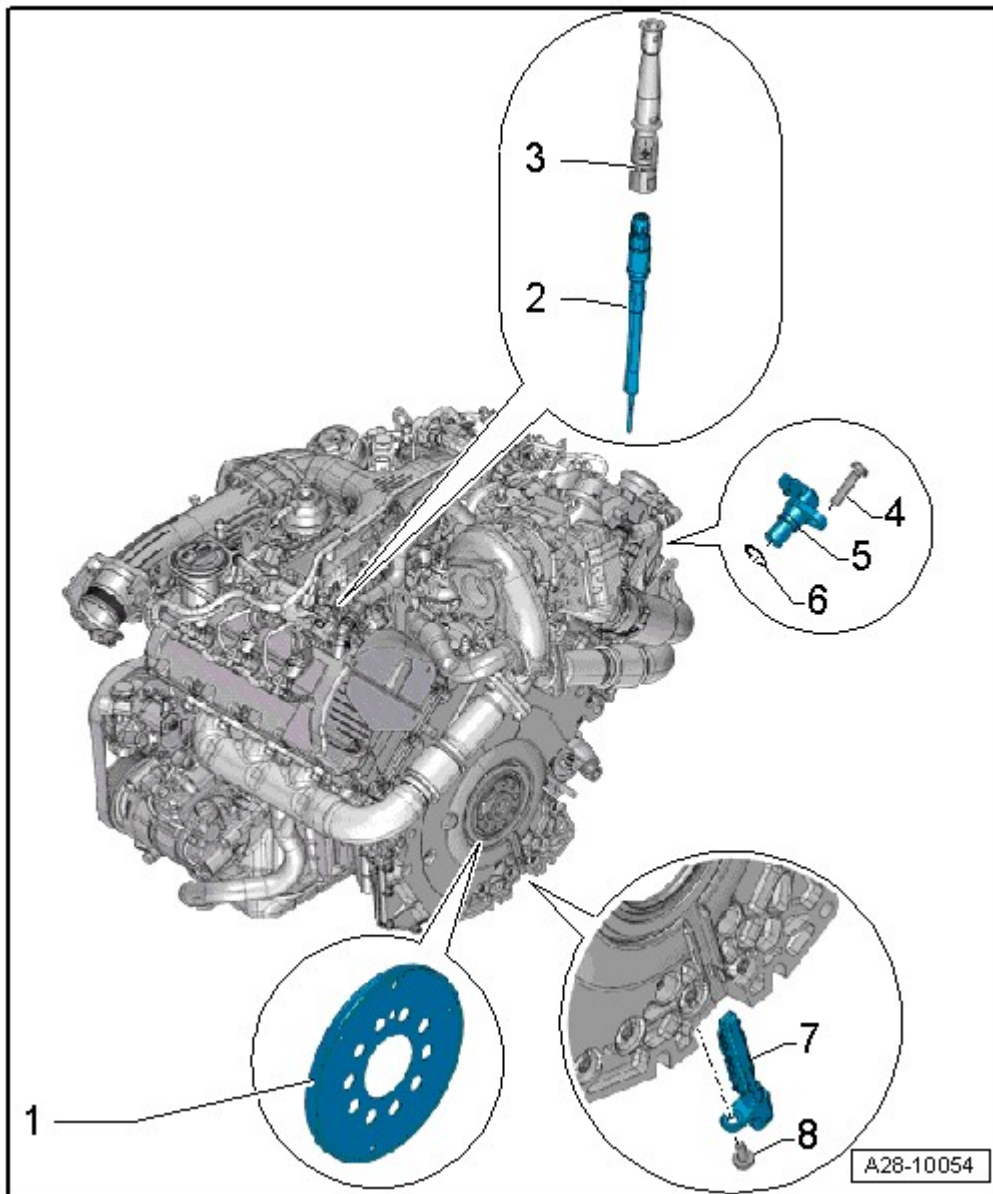


Fig. 1: Glow Plug, Camshaft Position Sensor, Engine Speed Sensor Overview
Courtesy of AUDI OF AMERICA, LLC

1. Sensor Wheel

- For the Engine Speed (RPM) sensor -G28-
- **Removing and installing** , refer to **Description and Operation**

2. Glow Plug

- **12 Nm**

Cylinder bank 1 (right):

- Glow plug 1 -Q10-, Glow plug 2 -Q11-, Glow plug 3 -Q12-

Cylinder bank 2 (left):

- Glow plug 4 -Q13-, Glow plug 5 -Q14-, Glow plug 6 -Q15-
- **Removing and installing** , refer to **GLOW PLUGS**

3. Electrical Harness Connector

4. Bolt

- **9 Nm**

5. Camshaft Position (CMP) Sensor -G40-

- **Removing and installing** , refer to **Camshaft Position Sensor -G40-**

6. O-ring

- Replace

7. Engine Speed (RPM) Sensor -G28-

- **Removing and installing** , refer to **Engine Speed Sensor -G28-**

8. Bolt

- **9 Nm**

SPECIFICATIONS**FASTENER TIGHTENING SPECIFICATIONS**

Components	Fastener Size	Nm
Camshaft Position Sensor	-	9
Engine Speed Sensor	-	9
Glow Plug	-	17

DIAGNOSIS AND TESTING**GLOW PLUG SYSTEM, CHECKING**

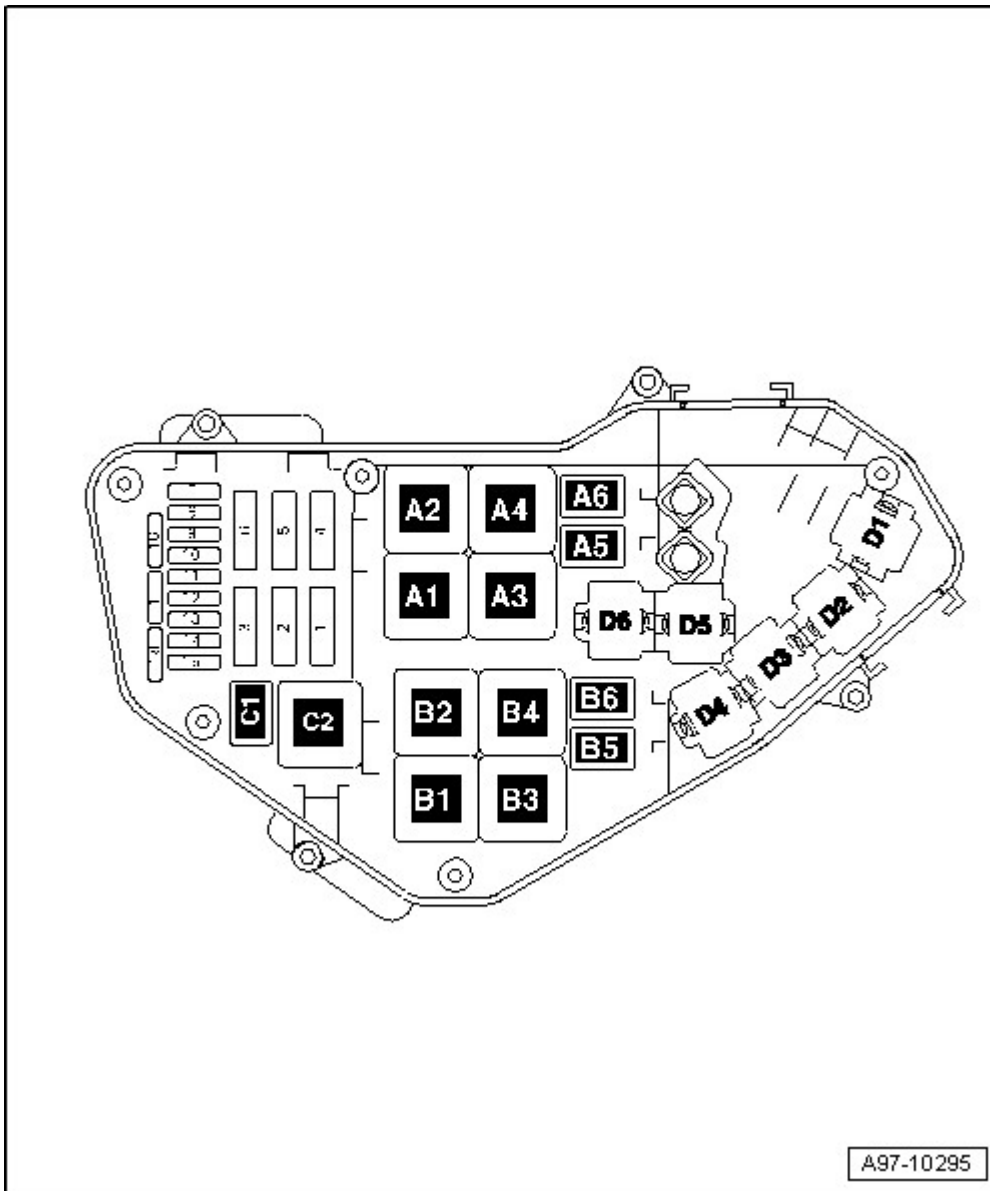


Fig. 2: Fuse And Relay Location In Left E-Box Plenum Chamber
 Courtesy of AUDI OF AMERICA, LLC

A1 - Automatic glow time control module -J179-

S2 - Automatic glow time control module fuse

The pre-glow system is controlled by the automatic glow time control module. The automatic glow time control module is On Board Diagnostic (OBD) capable.

If there is a malfunction in the preglow system, a fault will be stored in the Engine Control Module (ECM) - J623-.

Checking the pre-glow system is explained in Guided Fault Finding.

Electronically controlled glow plugs with a separate glow plug control module was installed in order to reach a quick starting function.

Each glow plug is controlled and diagnosed individually.

NOTE: Wait 60 seconds after each glow plug control module output diagnostic test. The ignition must remain switched on.

If the 60 second waiting period is not observed, (if the ignition switched off and then back on again), the glow plugs could be damaged (by a repeated preglow).

The glow plug control depends on the coolant temperature.

REMOVAL AND INSTALLATION

Camshaft Position Sensor -G40-

Removing

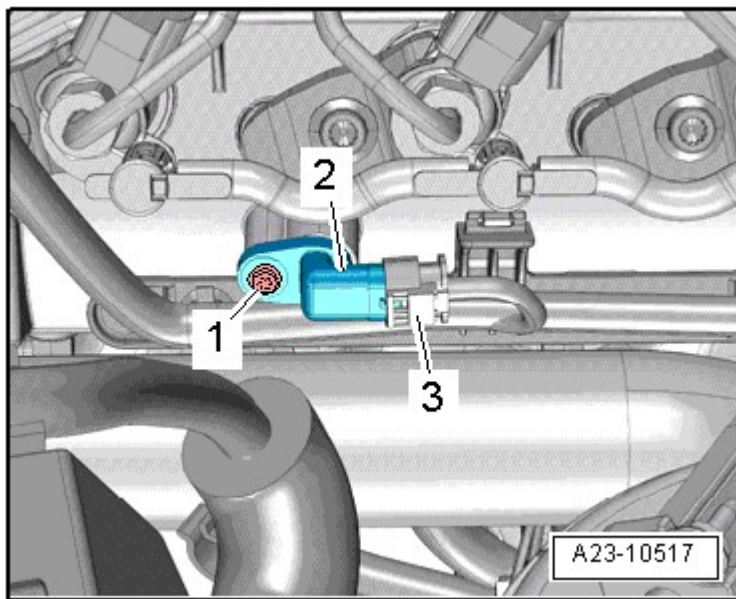


Fig. 3: Identifying Camshaft Position Sensor, Bolt And Connector
Courtesy of AUDI OF AMERICA, LLC

- Remove the engine cover. Refer to **ENGINE COVER** .
- Disconnect the connector -3-.
- Remove the bolt -1-, and remove the Camshaft Position (CMP) sensor -G40- -2-.

Installing

- **Tightening specification** , refer to **GLOW PLUG, CAMSHAFT POSITION SENSOR, ENGINE SPEED SENSOR OVERVIEW.**

Install in reverse order, paying attention to the following:

NOTE: **Replace the O-ring.**

Engine Speed Sensor -G28-

Removing

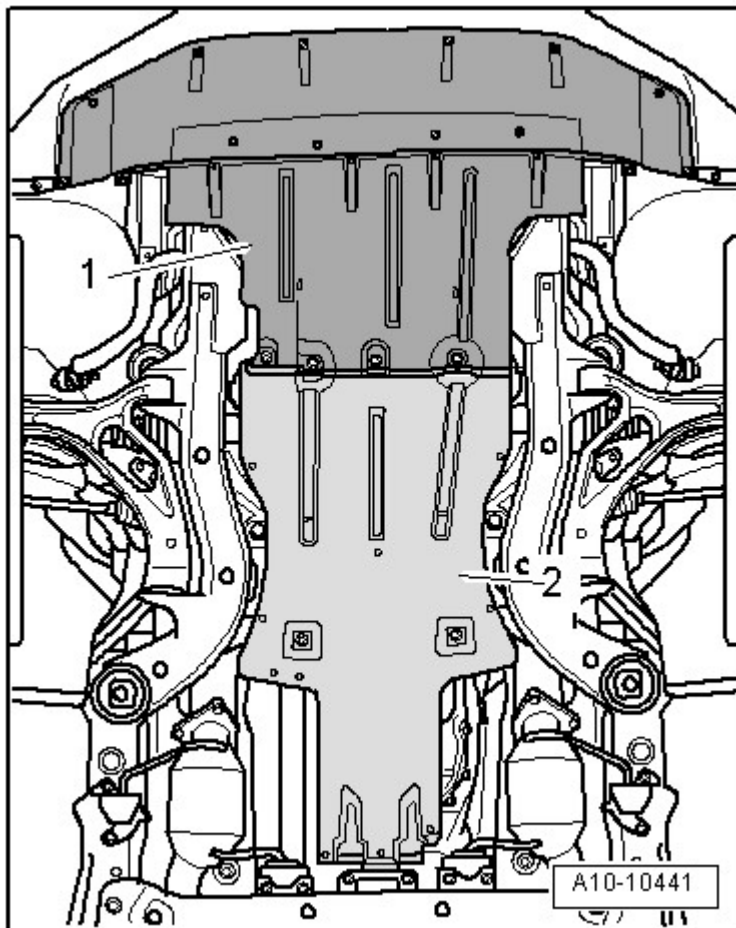


Fig. 4: Identifying Front/Rear Noise Insulation

Courtesy of AUDI OF AMERICA, LLC

-- Loosen the fasteners and remove the rear noise insulation -2-.

-- Disconnect the connector -2-.

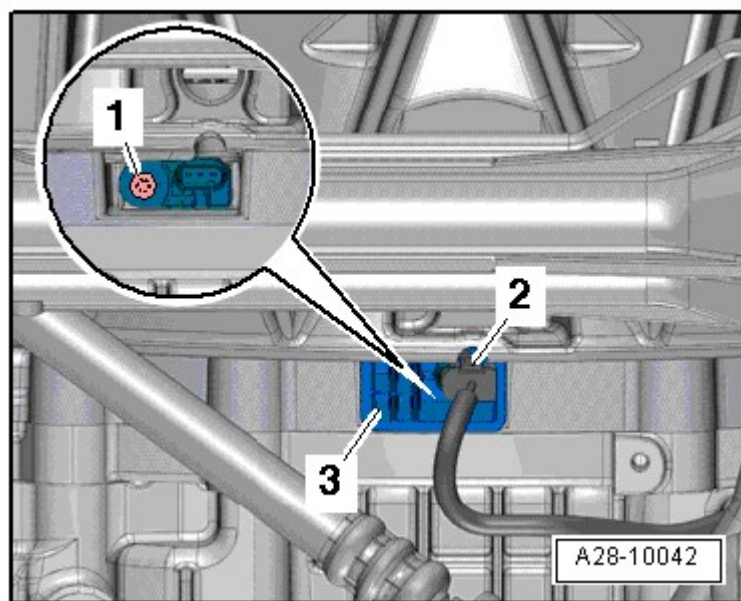


Fig. 5: Identifying Engine Speed Sensor, Bolt And Connector
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -1- and the Engine Speed (RPM) sensor -G28-.

Installing

Install in reverse order, paying attention to the following:

- **Tightening specification** , refer to **GLOW PLUG, CAMSHAFT POSITION SENSOR, ENGINE SPEED SENSOR OVERVIEW.**

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

GLOW PLUGS

Special tools and workshop equipment required

- Hinged Socket 3220 (for glow plugs "1, 3, 4 and 6")
- Socket Insert AF 12 for Glow Plugs 4-cyl. TDI CR VAS 6454 (for glow plugs " cylinders 2 and 5")

Removing

-- Turn off the ignition.

-- Remove engine cover. Refer to **ENGINE COVER** .

NOTE: For cylinders 3 and 6, the intake manifold flap motor must be removed.

In cylinders 2 and 5, a combustion chamber pressure sensor is integrated in the glow plug.

Electrical component list term: glow plug 2 -Q11- with cylinder 2 combustion chamber pressure sensor -G678-.

Electrical component list term: glow plug 5 -Q14- with cylinder 5 combustion chamber pressure sensor -G681-.

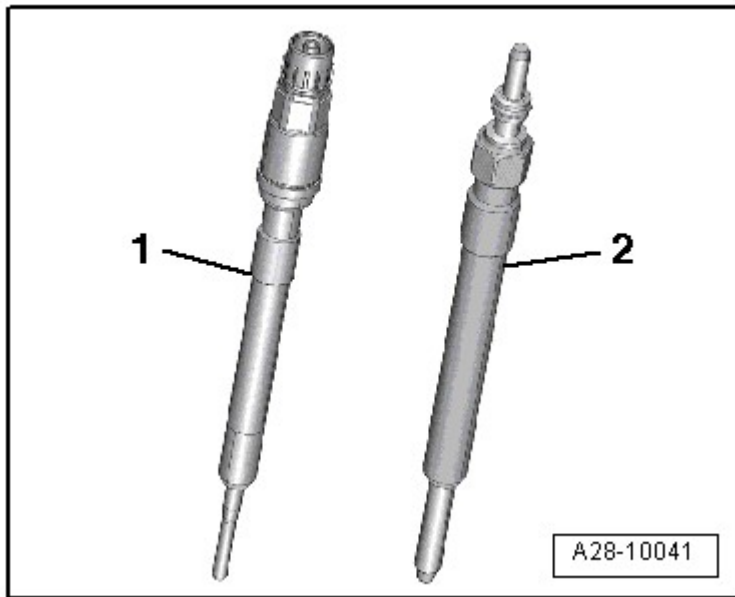


Fig. 6: Identifying Glow Plug Versions
Courtesy of AUDI OF AMERICA, LLC

1 - Glow plug with combustion chamber pressure sensor (only installed in cylinders 2 and 5).

2 - Glow plug without combustion chamber pressure sensor.

-- Disconnect glow plug connectors from glow plugs.

-- Clean the glow plug duct in the cylinder head. Contaminants must not enter the cylinder.

NOTE: **Example for cleaning:**

Extract large contaminants with a vacuum cleaner.

Spray a brake cleaner or a suitable cleaner into the glow plug shaft, let it work and then use compressed air to remove it.

Then clean the glow plug duct with a cloth dampened with oil.

- Use the 3220 to loosen the glow plugs "1, 3, 4 and 6".
- To loosen glow plugs "2 and 5" use the VAS 6454.
- Then carefully remove the glow plug by hand or with a hose without bending it.

Installing

- Carefully install the glow plugs by hand or with a hose without bending it.
- Tighten the glow plugs with 3220 or VAS 6454 to the tightening specification.
 - Glow plug tightening specification: **17 Nm**
- Connect the glow plug connector and make sure it is secure.

Further installation is performed in reverse order.

- Intake manifold flap motor tightening torque - assembly overview, refer to **INTAKE MANIFOLD OVERVIEW** .

SPECIAL TOOLS**Special tools and workshop equipment required**

- Hinged Socket 3220 (for glow plugs "1, 3, 4 and 6")

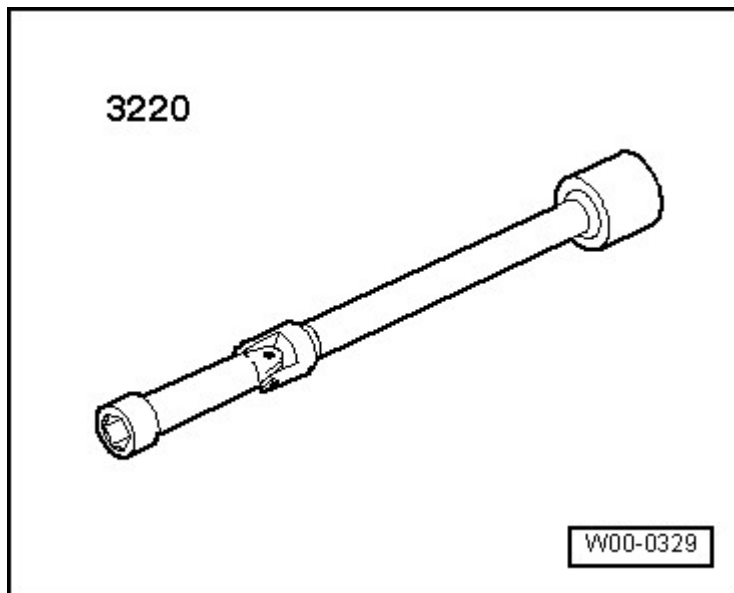


Fig. 7: Identifying Hinged Socket 3220
Courtesy of AUDI OF AMERICA, LLC

- Socket Insert AF 12 for Glow Plugs 4-cyl. TDI CR VAS 6454 (for glow plugs " cylinders 2 and 5")

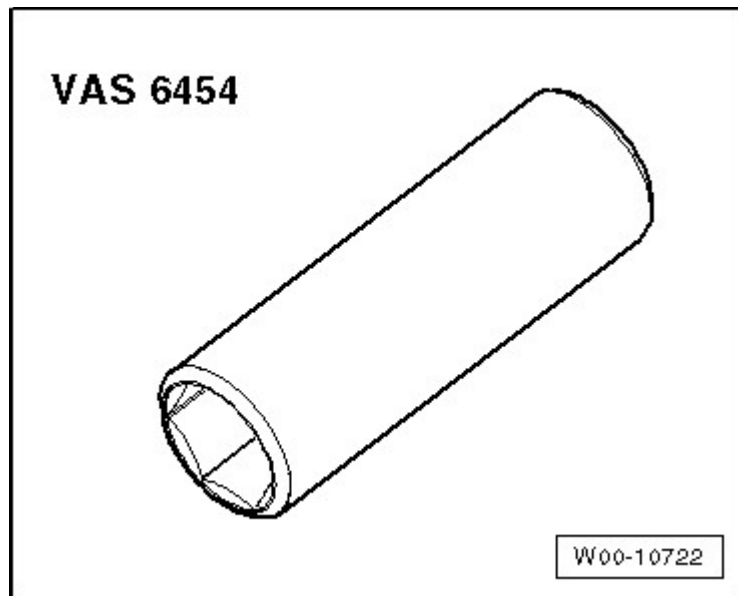


Fig. 8: Identifying Socket Insert VAS 6454
Courtesy of AUDI OF AMERICA, LLC

Edition 6 6 2012

ENGINE**3.0 Liter - General, Technical Data - Engine Mechanical - Engine Code(s): CATA****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 fuel 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 preglow system wiring or tester cables.
- Only clean engine with ignition switched off.
- If electrical connectors were disconnected and the engine was started, then malfunctions have been stored in the engine control module. "Check the DTC memory" in "OBD" => .

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

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

-- Disconnect the battery. Refer to **BATTERY, DISCONNECTING AND CONNECTING** .

Observe the following when working on the reducing agent metering system:

WARNING: The reducing agent can cause skin irritation.

- **Avoid contact with skin and eyes! Wear protective gloves!**
- **If reducing agent should get on your skin, wash it off immediately with soap and water.**
- **If reducing agent gets in your eye, rinse the eye for several minutes with water.**
- **Never inhale or swallow the reducing agent!**
- **Should you swallow any reducing agent, rinse your mouth, drink plenty of water and contact a doctor immediately.**

Note the following when removing or installing any components of the reducing agent metering system:

- The reducing agent active/passive tanks must be empty when working on the reducing agent metering system. Be sure to read the work procedure whenever the reducing agent in the active or passive tank must be emptied. Drain the active tank or the passive tank, if necessary. For information on the active tank, refer to **ADBLUE® ACTIVE TANK, DRAINING** and for the passive tank, refer to **ADBLUE® PASSIVE TANK, DRAINING**.

Note the following when removing and installing the active or passive tank:

- The reducing agent active/passive tank must be empty. Drain the active or passive tank, if necessary. For information on the active tank, refer to **ADBLUE® ACTIVE TANK, DRAINING** and for the passive tank, refer to **ADBLUE® PASSIVE TANK, DRAINING**.

AdBlue®, Automatic Regenerating

- After switching off the ignition, any reducing agent is recirculated from the reducing agent injector - N474- metering line back into the active tank.
- Before working in this area, wait 10 minutes after switching off the ignition so that the recirculation can complete.
- Likewise, wait 10 minutes after switching off the ignition before disconnecting the battery so that the recirculation process can complete. Refer to **BATTERY, DISCONNECTING AND CONNECTING**.

WARNING: Danger due to reducing agent leaking out.

- **To prevent large amounts of reducing agent when opening the metering line, wait for the recirculation process to complete SAFETY PRECAUTIONS.**

Note the following when working on the cooling system:

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

- **The coolant system is under pressure when the engine is warm.**

- **Cover the coolant reservoir cap with a cloth and then open it slowly to release the pressure in the system.**

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

WARNING: Danger of serious personal injury if the engine starts automatically on vehicles with the start/stop system.

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

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

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

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

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

Note the following when working on the exhaust system:

CAUTION: Danger of damaging the decoupling element.

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

CLEAN WORKING CONDITIONS

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

- **Before loosening, connections and surrounding areas must be cleaned thoroughly with engine or brake cleaner, and then cleaned area must be dried completely.**
- **Immediately seal off lines and connections with clean plugs or caps.**

- 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.
- Only install clean components: Only unpack replacement parts immediately prior to installation. Do not use parts that have been stored unpacked (for example in tool boxes etc.).
- When the system is open: Do not work with compressed air. Do not move vehicle unless absolutely necessary.
- Make sure no fuel gets onto the fuel hoses. If necessary, wipe off the fuel hoses immediately. Replace any corroded fuel hoses.
- Protect disconnected electrical connectors from dirt and moisture and only connect if dry.

ADAPTING ADAPTATION VALUE AFTER DRAINING ADBLUE® OR REPLACING COMPONENTS

The adaptation value in the engine control module must be adapted with the vehicle tester when the reducing agent is drained or one of the components listed below is replaced.

- Active tank
- Reducing agent pump
- Reducing agent injector
- Reducing agent line
- Engine Control Module

-- Perform the adaptation using the vehicle tester in "Guided Functions" under "01-Adapting reducing agent tank adaptation values".

ENGINE NUMBER

- The engine number ("engine code" and "serial number") is located on the left side in the front under the high pressure pump toothed belt -arrow-.

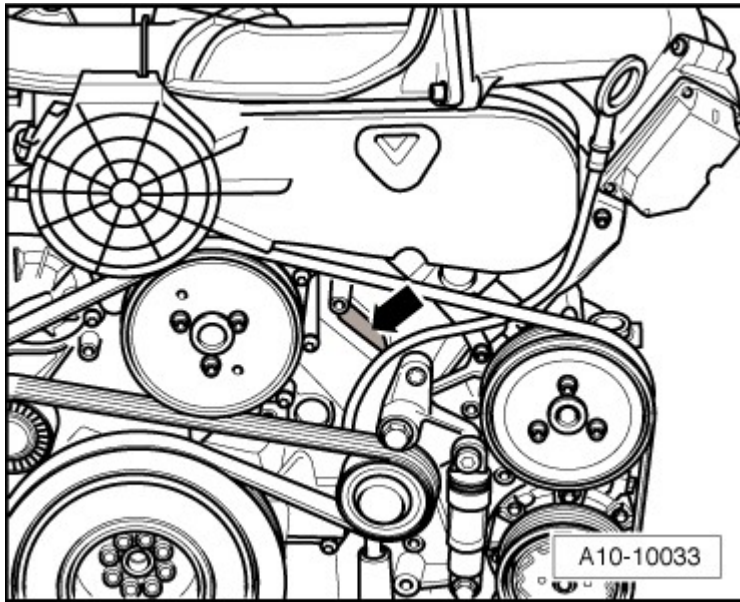


Fig. 1: Identifying Engine Number Plate (Engine Code And Serial Number)
Courtesy of AUDI OF AMERICA, LLC

- In addition, a sticker with "engine code" and "serial number" is affixed to the intake manifold.
- 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 engine number is covered by the ribbed belt idler roller. Remove the ribbed belt idler roller. Refer to **LEFT RIBBED BELT IDLER ROLLER** .

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.

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.
- If mechanical damage to a cylinder bank is found, check the intake and exhaust tract and the combustion chambers in the opposite cylinder bank for foreign objects to prevent further damage.

CONTACT CORROSION

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

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

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

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

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

Audi accessories are recommended.

Damage due to contact corrosion is not covered by warranty.

COOLERS, CONDENSERS AND CHARGE AIR COOLERS

When assembled correctly, the radiator, condenser and turbocharger may have slight impressions on their fins. This is not damage. Do not replace the radiator, condenser or turbocharger because of impressions like that.

LINES, ROUTING AND SECURING

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

SPECIFICATIONS

ENGINE DATA

Code letters		CATA
Displacement	liter	2.967
Output	kW at RPM	176/4000 to 4500
Torque	Nm at RPM	500/1500 to 3000
Bore	diameter mm	83.0
Stroke	mm	91.4
Compression ratio		16.4
CZ	minimum	51
Ignition sequence		1-4-3-6-2-5
Emissions values		BIN 5
Exhaust gas recirculation		yes
Exhaust temperature control		5 sensors
Urea injection		yes
Turbocharger		Turbocharger
Glow plugs		Steel glow

Charge air cooler	plugs yes heated
Oxygen sensor regulation	oxygen sensor (HO2S) 1
NOx control	2 sensors
Oxidation catalytic converter	yes
Particulate filter	yes
Selective Catalytic Reduction (SCR) - catalytic converter	yes
Valve per cylinder	4

DIAGNOSIS AND TESTING

FUEL SYSTEM, CHECKING FOR LEAKS

- Let the engine run a few minutes at a moderate speed.
- Turn off the ignition.
- Check the entire fuel system for leaks.
- If there are leaks in spite of correct tightening specifications, the corresponding component must be replaced.
- Then perform a road test and depress the accelerator pedal all the way at least one time.
- Then check the high pressure area again for leaks.

VACUUM SYSTEM, CHECKING

Special tools and workshop equipment required

- Hand Vacuum Pump VAS 6213

Procedure

- Check all vacuum lines in the vacuum system for:
 - Cracks
 - Damage caused by animals
 - Crimps
 - Leaks and leakage
- Check the vacuum line leading to and from the solenoid valve.
- If there is a fault, check the vacuum lines for the named component, but also all the vacuum lines.

-- If using the VAS 6213 does not produce any 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

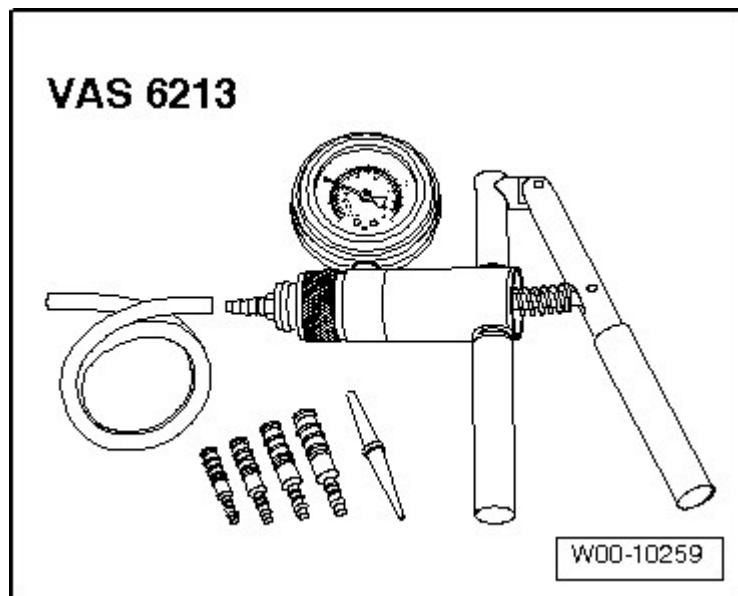


Fig. 2: Hand Vacuum Pump VAS 6213
Courtesy of AUDI OF AMERICA, LLC