

ENGINE

4.2 Liter - Crankshaft, Cylinder Block - Engine Code(s): CAUA (Coupe)

13 CRANKSHAFT, CYLINDER BLOCK

DESCRIPTION AND OPERATION

CRANKSHAFT OVERVIEW

NOTE:

- For assembly work, secure the engine on the engine/transmission holder VAS 6095. Refer to ENGINE, SECURING TO ENGINE AND TRANSMISSION HOLDER .
- Lubricate all bearings and running surfaces.

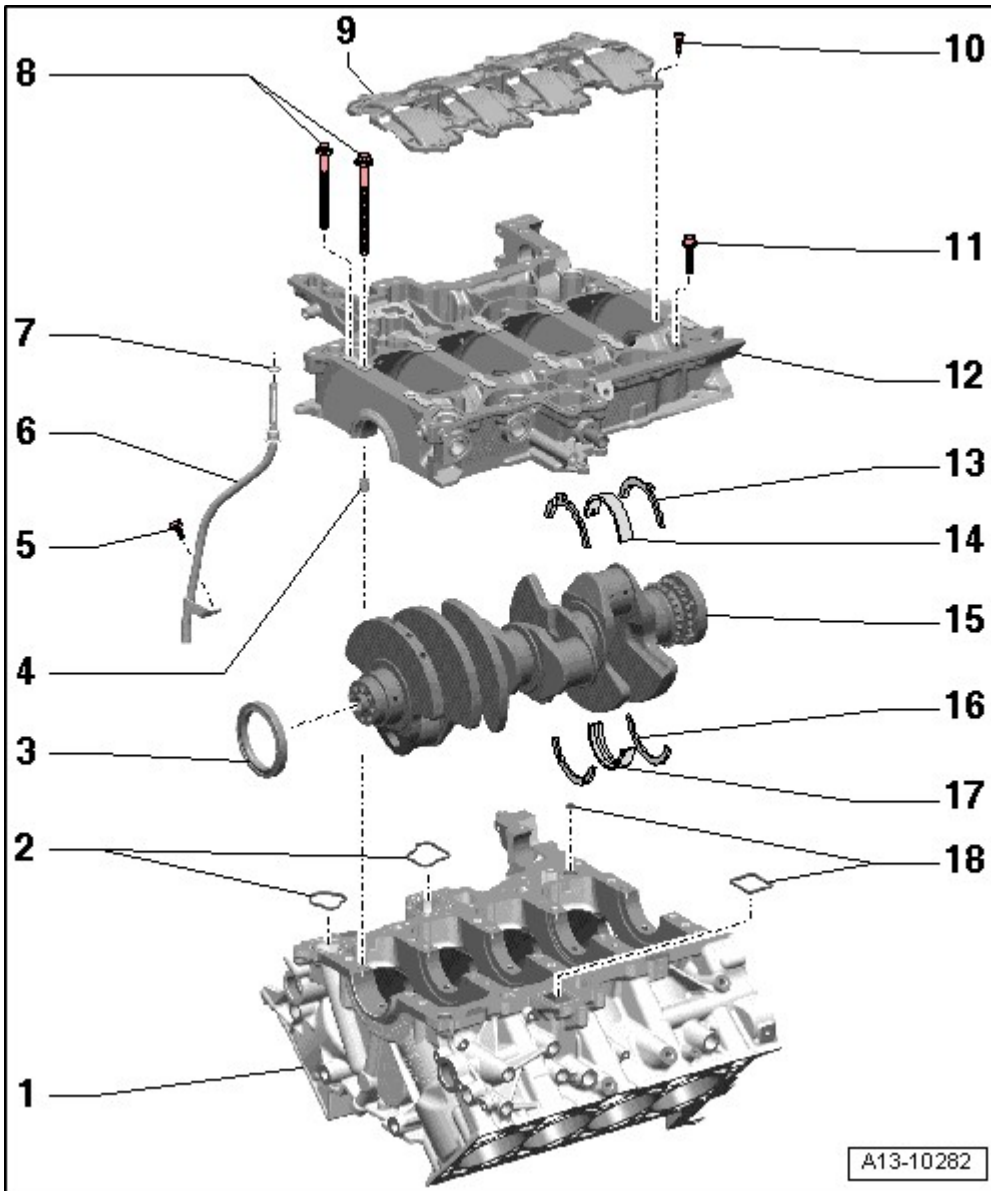


Fig. 1: Crankshaft Assembly Overview
Courtesy of AUDI OF AMERICA, LLC

1. Cylinder Block
 - Paired to -12-
 - Sealant applied on cylinder block (for guide frame), refer to **Fig. 3**
2. Seals
 - Replace
3. Crankshaft Shaft Seal, Belt Pulley Side
 - Removing and installing, refer to **CRANKSHAFT SHAFT SEAL, BELT PULLEY SIDE, REPLACING**
4. Alignment Bushing

- Quantity: 2
 - Insert into guide frame
 - Installed position, refer to **Fig. 4**
5. Bolt
- 9 Nm
6. Guide Tube for Oil Dipstick
7. O-ring
- Replace
8. Bolts
- For guide frame
 - Replace
 - Various screw sizes
 - Tightening specification and sequence, refer to **Fig. 5**
9. Baffle Plate
10. Bolt
- Tightening specification and sequence, refer to **Fig. 2**
11. Bolt
- For guide frame to cylinder block sealing surfaces
 - Different bolt lengths
 - Tightening sequence, refer to **Fig. 5**
12. Guide Frame
- Paired to -1-
 - Sealant applied on cylinder block (for guide frame), refer to **Fig. 3**
13. Thrust Washer
- Only at the 4th crankshaft bearing
 - Installed position: lubricating grooves face outward
 - Note locating point in guide frame
14. Bearing Shell
- For guide frame without lubricating groove
 - Always replace if removed
 - Insert new bearing shells for guide frame with proper color marking: New crankshafts, refer to **MAIN BEARING SHELLS, NEW CRANKSHAFT, ALLOCATING**, used and reworked, refer to crankshafts **MAIN BEARING SHELLS, USED AND REWORKED CRANKSHAFTS, ALLOCATING**
15. Crankshaft
- Measuring axial play, refer to **CRANKSHAFT AXIAL PLAY, MEASURING**
 - Radial clearance, measuring, refer to **CRANKSHAFT, MEASURING RADIAL PLAY**
 - Crankshaft dimensions, refer to **CRANKSHAFT DIMENSIONS**

16. Thrust Washer

- Only at the 4th crankshaft bearing
- Installed position: lubricating grooves face outward

17. Bearing shell

- For cylinder block with oil groove
- Always replace if removed
- Insert new bearing shells for cylinder block with proper color marking: New crankshafts, refer to **MAIN BEARING SHELLS, NEW CRANKSHAFT, ALLOCATING**, used and reworked crankshafts, refer to **MAIN BEARING SHELLS, USED AND REWORKED CRANKSHAFTS, ALLOCATING**

18. Seals

- Replace

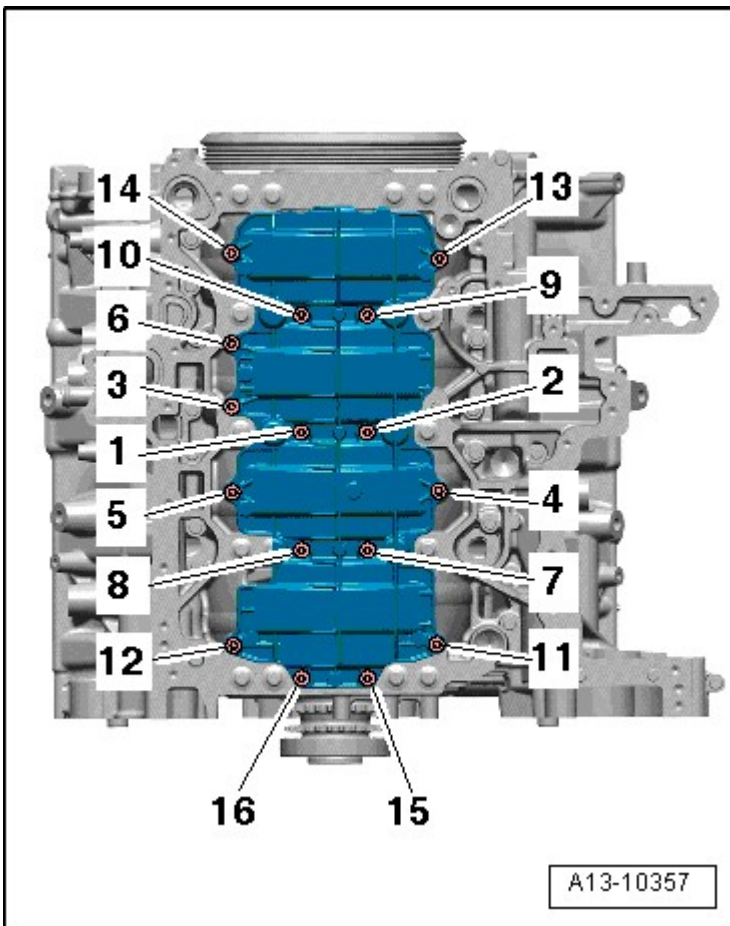


Fig. 2: Baffle Plate Bolts Tightening Sequence
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-- Tighten baffle plate bolts to 9 Nm in sequence -1 to 16--.

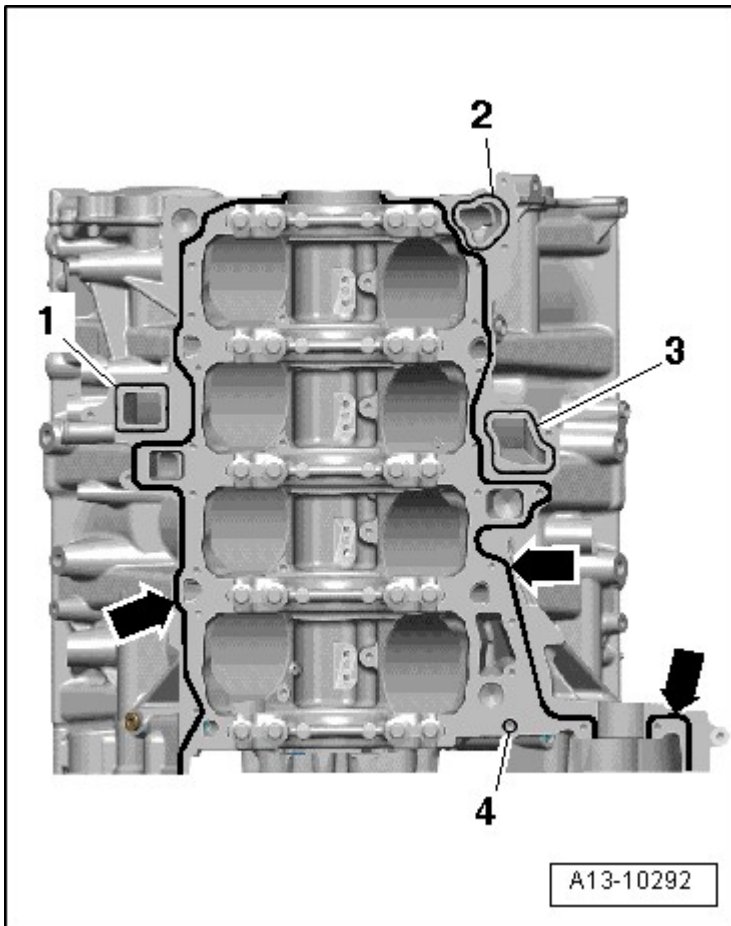


Fig. 3: Identifying Sealant Applied On Cylinder Block (For Guide Frame)
Courtesy of AUDI OF AMERICA, LLC

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

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

- Do not apply sealant bead thicker than indicated.

-- Apply sealant beads -arrows- to the clean sealing surfaces as shown in the illustration.

- Thickness of sealant beads: 2.0 mm.

-- Position seals -1 through 4-.

NOTE: The guide frame must be installed within 5 minutes after applying the sealant.

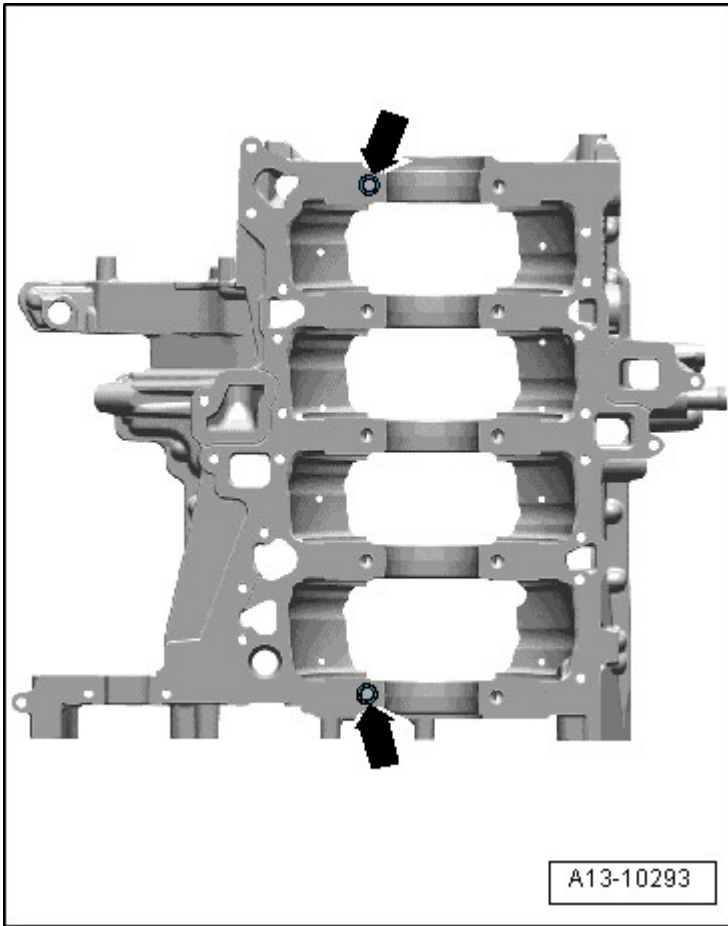


Fig. 4: Installation Position Of Alignment Bushings
Courtesy of AUDI OF AMERICA, LLC

-- If there are no alignment bushings -arrows- at the locations marked in the guide frame, insert them.

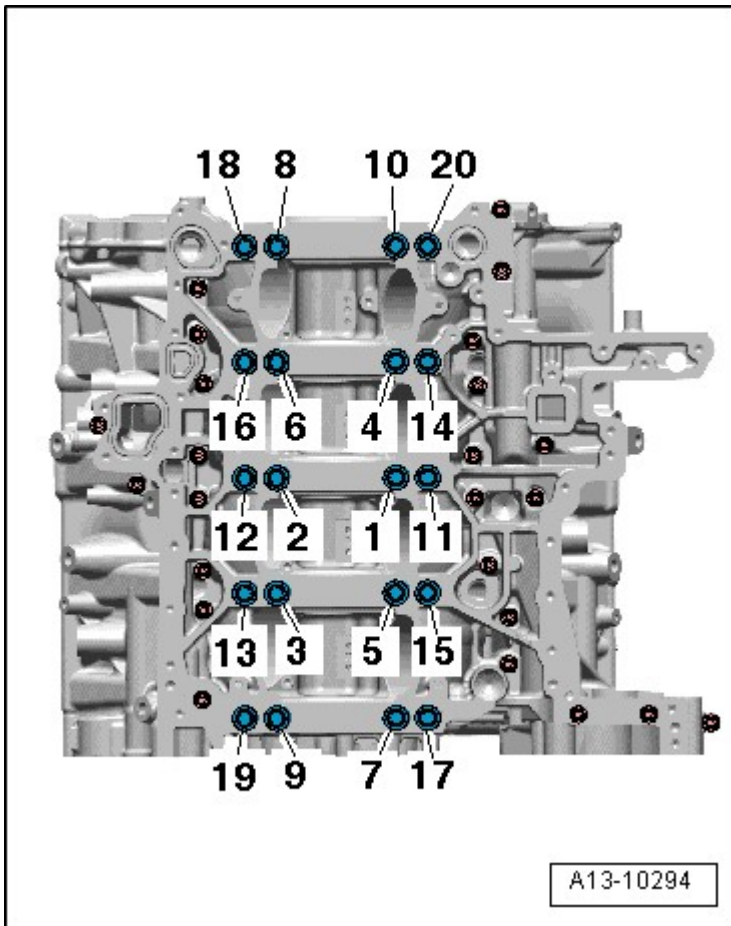


Fig. 5: Guide Frame Bolts Tightening Sequence
 Courtesy of AUDI OF AMERICA, LLC

NOTE: Replace bolts that are tightened to the specification.

-- Tighten the bolts in 5 steps in the sequence shown:

Stage	Bolts	Tightening Specification/Additional Turn
1.	-1 through 10-	30 Nm
2.	-11 through 20-	20 Nm
3.	-1 through 10-	50 Nm
4.	-11 through 20-	30 Nm
5.	-1 through 20-	Tighten 90° further

-- Tighten the guide frame to cylinder block sealing surface bolts, -highlighted in dark-, in a diagonal sequence to 9 Nm.

DRIVE PLATE OVERVIEW

NOTE: For assembly work, secure the engine on the engine and transmission holder

VAS 6095. Refer to ENGINE, SECURING TO ENGINE AND TRANSMISSION HOLDER.

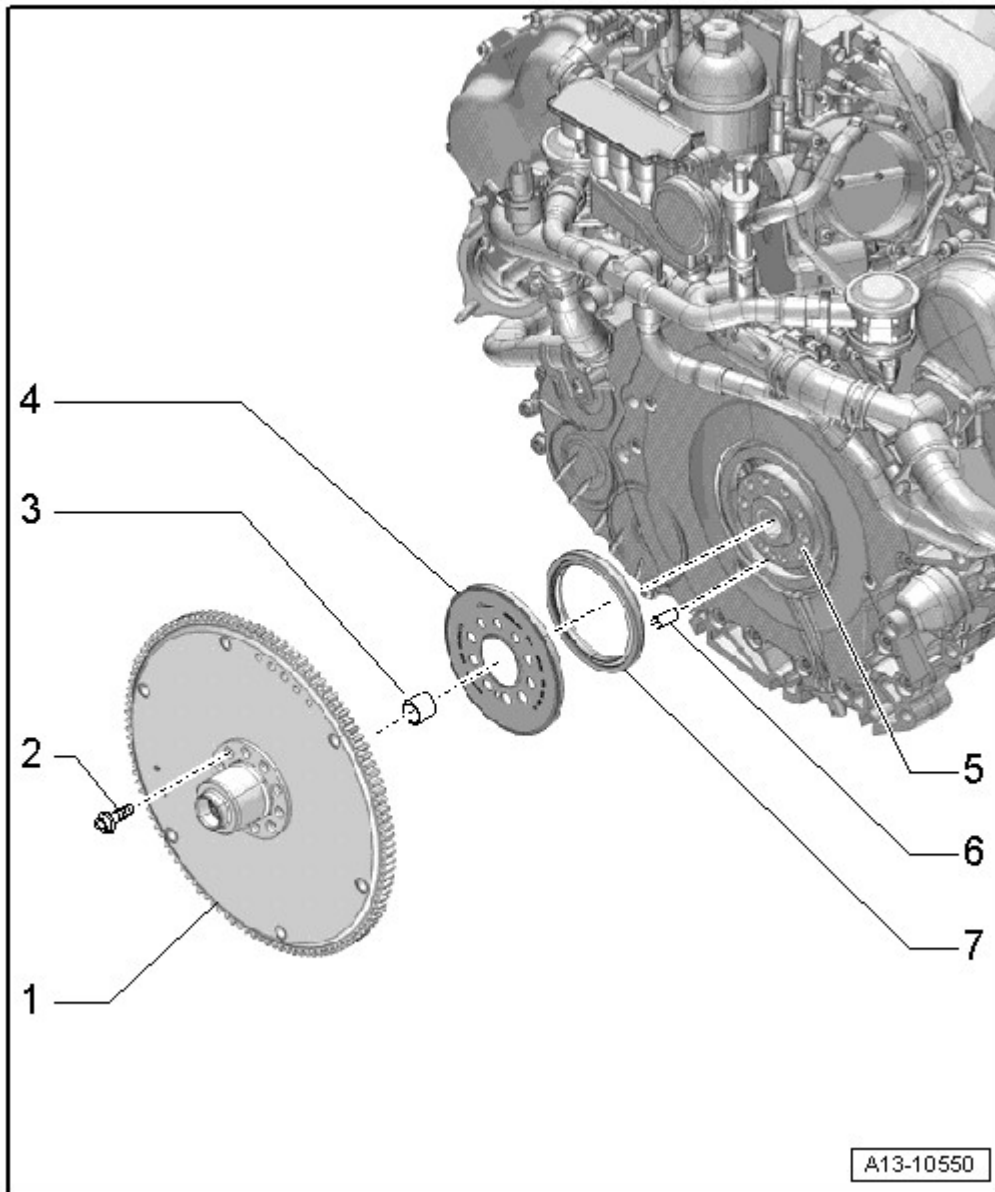


Fig. 6: Drive Plate Overview

Courtesy of AUDI OF AMERICA, LLC

1. Drive Plate
 - With the bearing flange
 - Check the running surfaces on the bearing flange and the clutch module holes for cracks and signs of wear.
 - Removing and installing, refer to **DRIVE PLATE**
2. Bolt

- 60 Nm plus an additional 90° turn
 - Replace
3. Needle Bearing
 - Only for vehicles with manual transmissions
 - Installed position: Closed side faces the engine
 - Removing and installing, refer to **NEEDLE BEARING AT DRIVE PLATE, MANUAL TRANSMISSION**
 4. Sensor Wheel
 - For the Engine Speed (RPM) sensor -G28-
 5. Crankshaft
 6. Alignment Bushing
 7. Crankshaft Shaft Seal, Transmission Side
 - Removing and installing, refer to **CRANKSHAFT SEAL, TRANSMISSION SIDE**

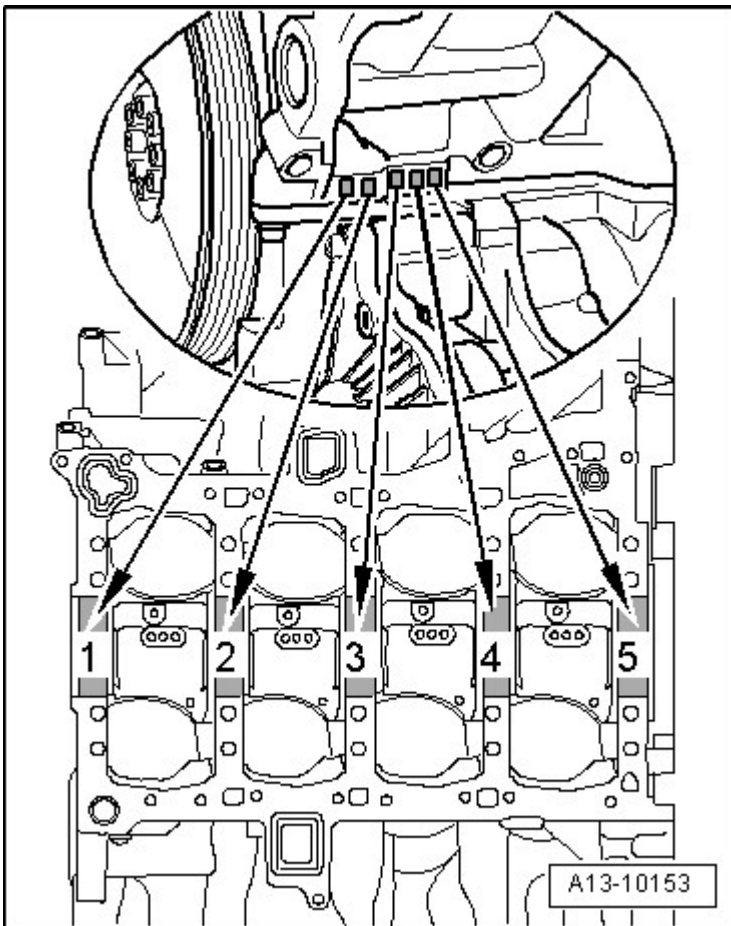
MAIN BEARING SHELLS, NEW CRANKSHAFT, ALLOCATING

Fig. 7: Allocation Of Crankshaft Bearing Shells For Cylinder Block
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- Bearing shells with the correct thickness are allocated to the cylinder block in the factory. Colored dots on sides of bearing shells serve for identifying bearing shell thickness.
- Allocation of bearing shells to cylinder block is marked by one letter each at front left on cylinder block (can be read from outside) as shown in the illustration.

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

NOTE: In addition, the letters are also stamped on the guide frame.

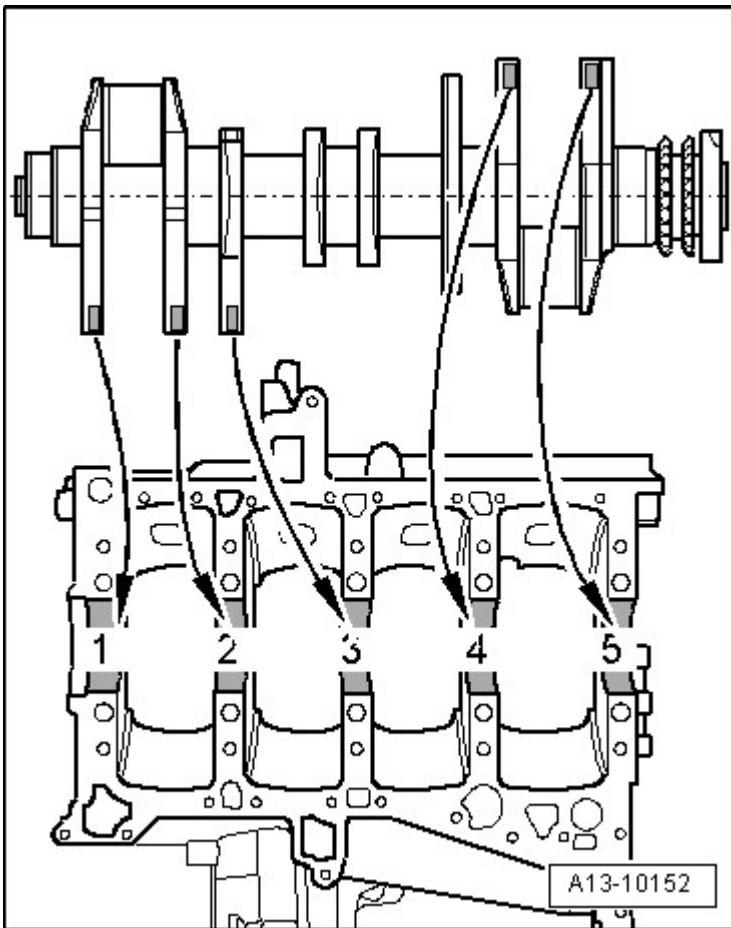


Fig. 8: Allocation Of Crankshaft Bearing Shells For Guide Frame - Crankshaft Manufactured By Alfin
Courtesy of AUDI OF AMERICA, LLC

- Bearing shells with the correct thickness are allocated to the guide frame in the factory. Colored dots on the sides of the bearing shells serve for identifying bearing shell thickness.
- Allocation of bearing shells to guide frame is marked by one colored dot each on crankshaft counterweight as shown in the illustration.

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Colored Dot on Crankshaft	Color of Bearing
Red	Red
Yellow	Yellow
Blue	Blue

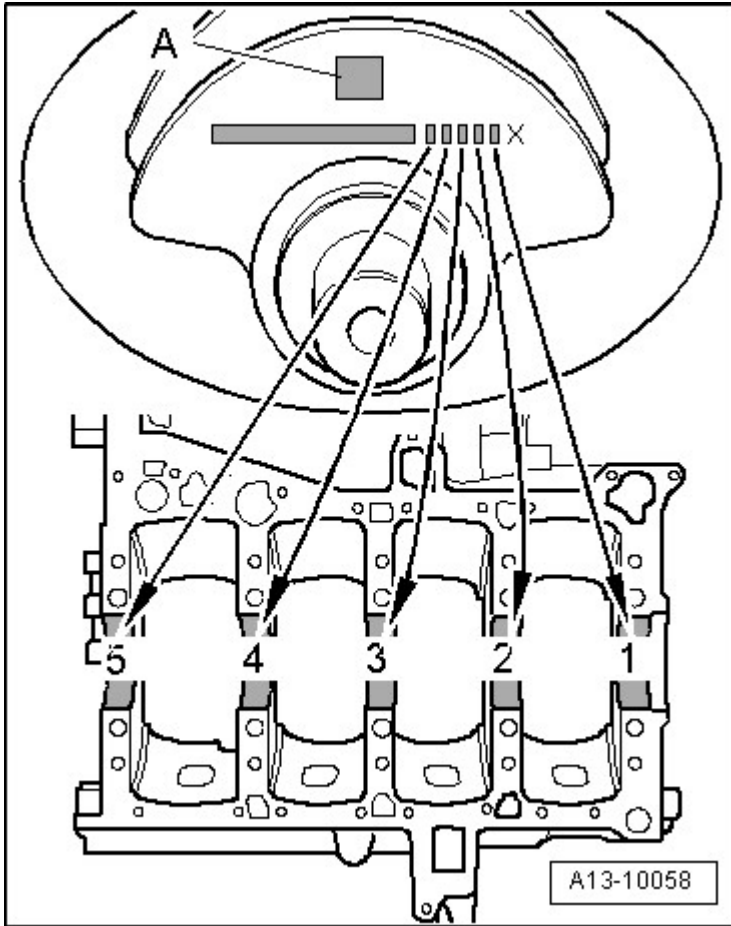


Fig. 9: Allocation Of Crankshaft Bearing Shells For Guide Frame - Crankshaft Manufactured By Weber
Courtesy of AUDI OF AMERICA, LLC

- Bearing shells with the correct thickness are allocated to the guide frame in the factory. Colored dots on the sides of the bearing shells serve for identifying bearing shell thickness.
- The allocation of bearing shells to guide frame is identified by a letter on the front crankshaft counterweight, as shown in the illustration. The "X" marks the end of the letter sequence and is near the bearing 1 color identification on the belt pulley side.

NOTE: Ignore -A-.

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

B

=

Blue

MAIN BEARING SHELLS, USED AND REWORKED CRANKSHAFTS, ALLOCATING

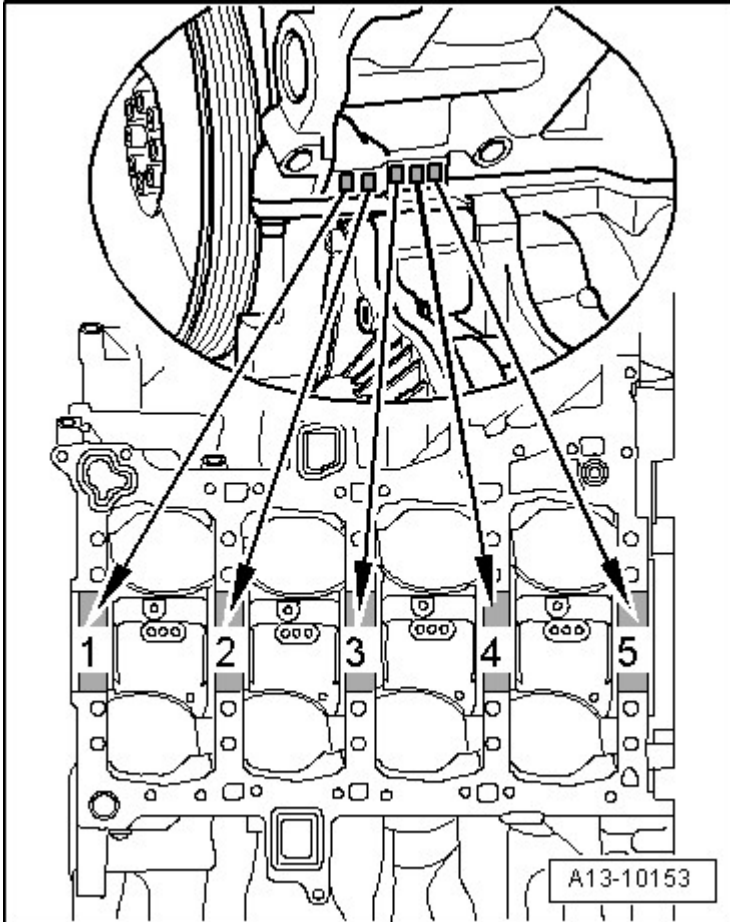


Fig. 10: Allocation Of Crankshaft Bearing Shells For Cylinder Block
 Courtesy of AUDI OF AMERICA, LLC

- Bearing shells are allocated to cylinder block corresponding to color markings stamped into cylinder block.
- With used and reworked crankshafts, the main crankshaft journals must be measured to allocate the appropriate bearing shells.
- Crankshaft dimensions, refer to **CRANKSHAFT DIMENSIONS**.
- Thicker over-sized bearing shells are available for a reworked crankshaft. These have the same color markings as the original-size bearing shells.

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

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Allocation of Crankshaft Bearing Shells for Guide Frame

- With used and reworked crankshafts, the main crankshaft journals must be measured to allocate the appropriate bearing shells.
- Any other markings on the crankshaft are invalid when reworking a crankshaft.
- Allocate bearing shells to the diameter of the main crankshaft pivot pins using the following table

Crankshaft Journal Diameter Dimensions in mm	Color Identification of Bearing Shells for Guide Frame		
	Red	Yellow	Blue
Basic dimension 65.000	64.978 to 64.972	64.972 to 64.965	64.965 to 64.958
Repair stage 64.750 ¹⁾	64.728 to 64.722	64.722 to 64.715	64.715 to 64.708
• ¹⁾ The same color marking applies to the thicker over-sized bearing for reworked crankshafts as for a new crankshaft despite the greater bearing thickness.			

PISTONS AND CONNECTING ROD OVERVIEW

NOTE:

- Lubricate all bearings and running surfaces.
- Oil injector jet for piston cooling, refer to **Fig. 15**.

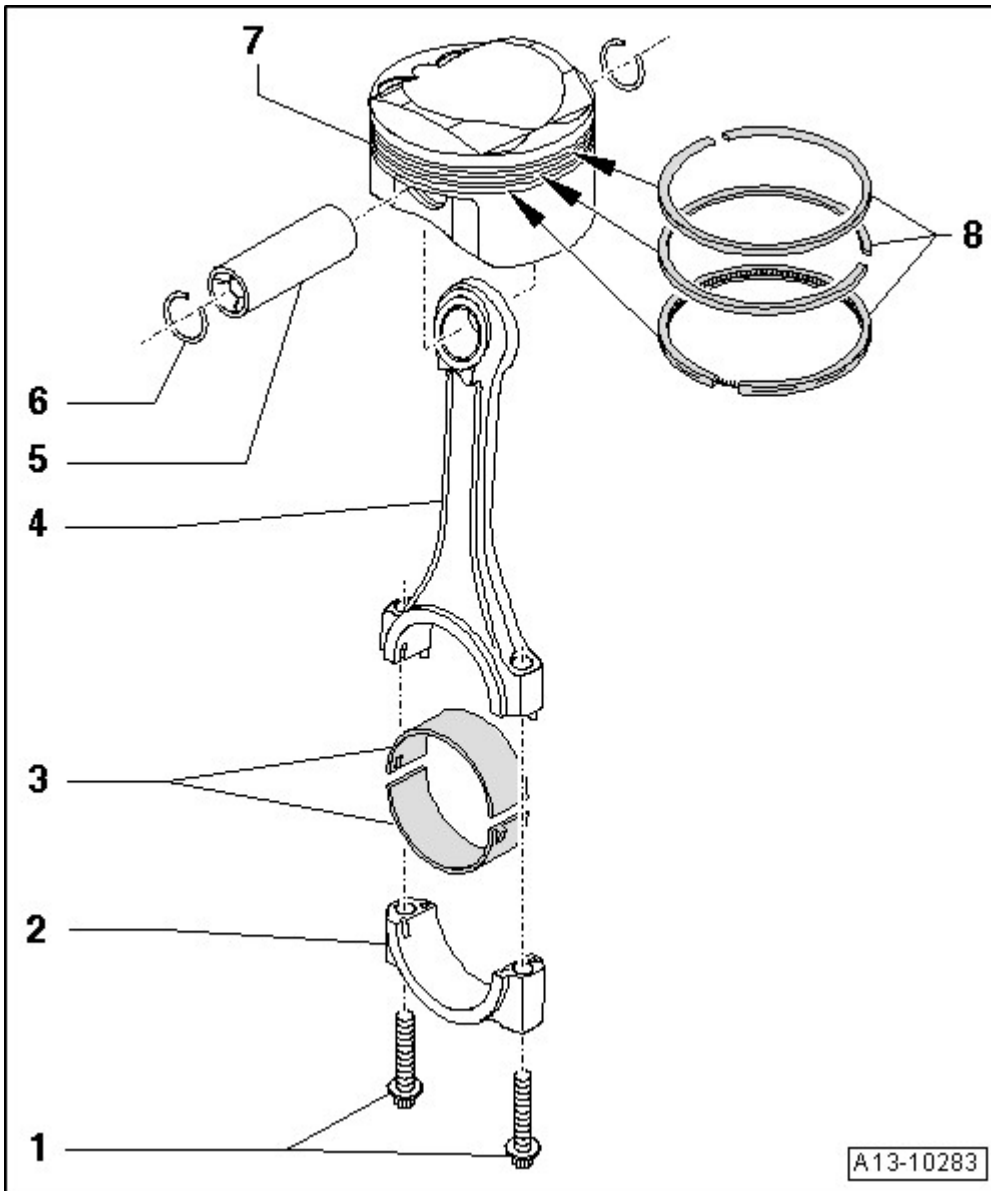


Fig. 11: Identifying Piston And Connecting Rod, Assembly Overview

Courtesy of AUDI OF AMERICA, LLC

1. Bolts
 - 60 Nm +90°
 - Replace
 - Lubricate the threads and contact surface
2. Connecting Rod Bearing Cap
 - Mark for installation later
 - Mark affiliation to cylinder with paint, refer to **Fig. 13**
 - Installation position of connecting rod pairs, refer to **Fig. 14**
3. Bearing Shells

- Check that retaining tabs are secured
- Always replace if removed
- Over-sized bearings are available for reworked crankshaft connecting rod journals,

4. Connecting Rod

- Only replace as a set
- Mark affiliation to cylinder with paint, refer to **Fig. 13**
- Installation position of connecting rod pairs, refer to **Fig. 14**
- Axial play for each new connecting rod pair: 0.20 to 0.27 mm
- Axial play wear limit: 0.30 mm
- Radial clearance, measuring, refer to **CONNECTING ROD RADIAL CLEARANCE, MEASURING**

5. Piston Pin

- Removing and installing, refer to **PISTON**

6. Locking Ring

- Replace
- Quantity: 2

7. Piston

- Removing and installing, refer to **PISTON**
- Piston and cylinder bore, checking, refer to **PISTON AND CYLINDER BORE, CHECKING**
- Installed position, refer to **Fig. 12**

8. Piston Rings

- Gap, measuring, refer to **Fig. 24**
- Measuring side clearance, refer to **Fig. 25**
- Use piston ring pliers (commercially available) for removing and installing
- Installed position: The "TOP" marking or side with writing faces the piston crown.
- Offset gaps by 120°.

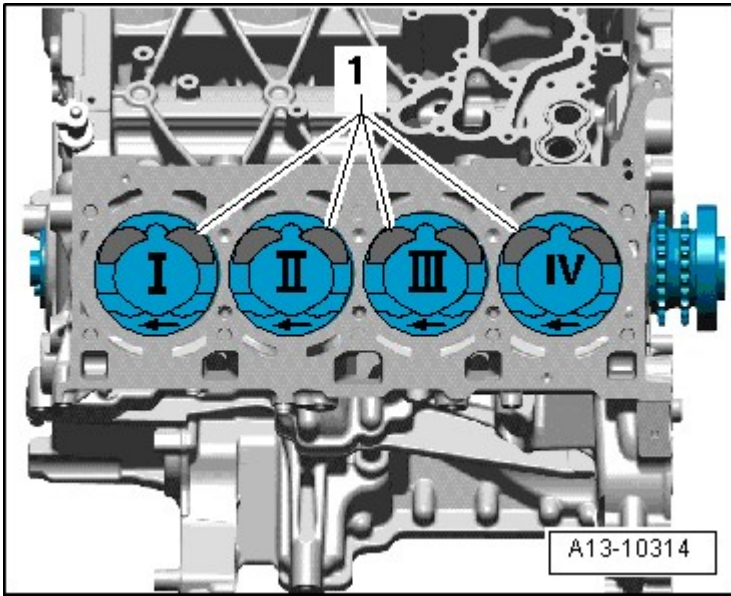


Fig. 12: Piston Installation Position

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.

Installed position:

- The arrows on the piston heads point to the belt pulley side.
- Large valve recesses -1- point toward center of engine.

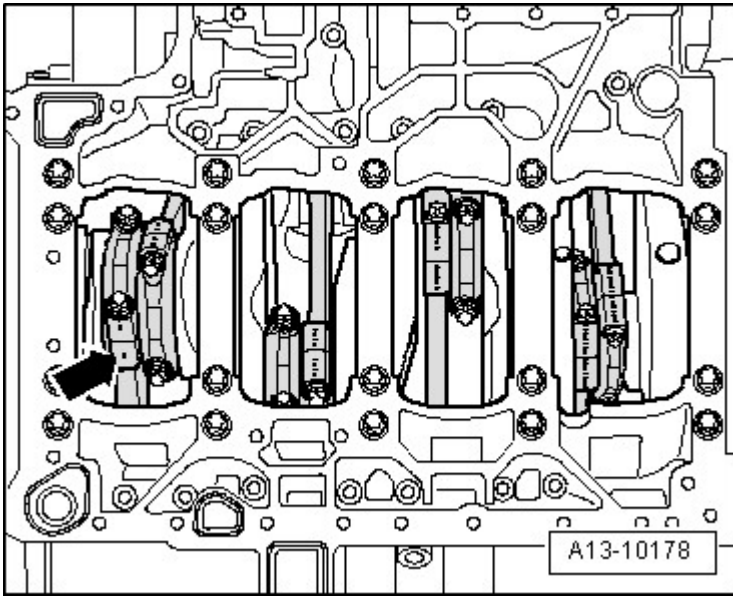


Fig. 13: Identifying Mark Connecting Rod
Courtesy of AUDI OF AMERICA, LLC

NOTE: Only replace the connecting rods as a set.

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

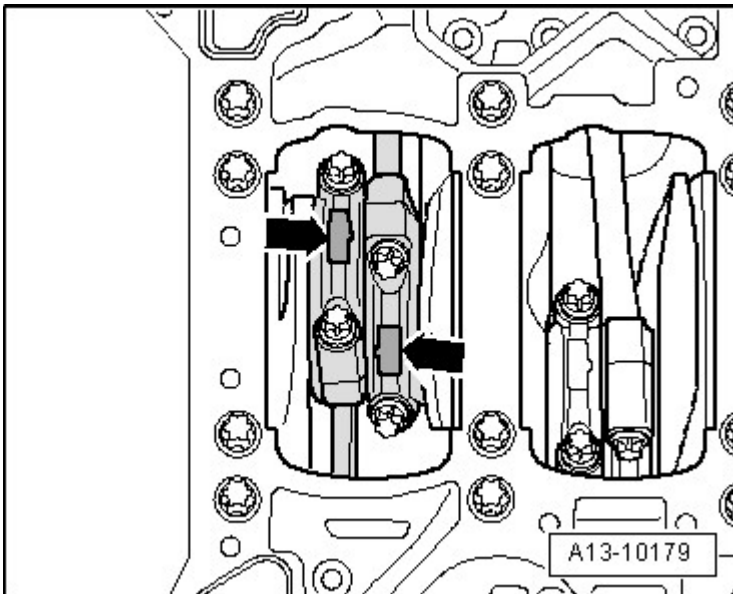


Fig. 14: Connecting Rod, Installed Location
Courtesy of AUDI OF AMERICA, LLC

- The molded tabs -arrows- on the beveled surfaces of connecting rod pairs "1 and 2", "3 and 4", "5 and 6" and "7 and 8" must face each other.

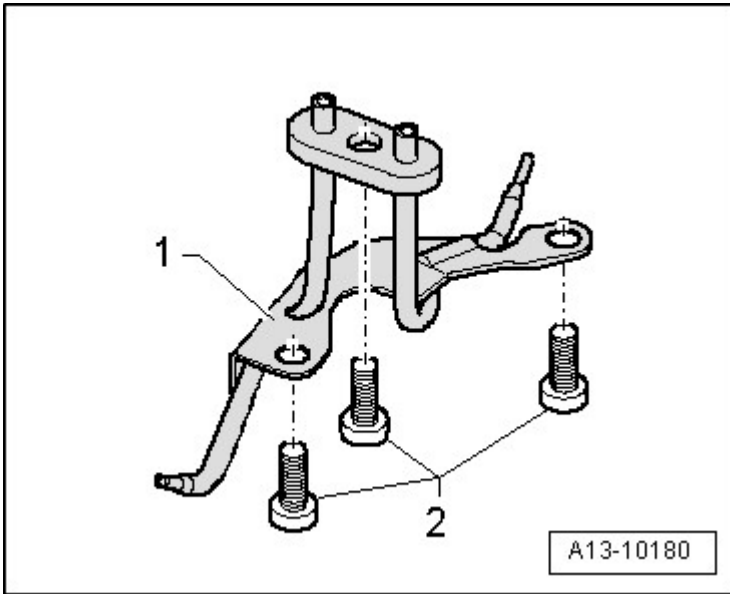


Fig. 15: Identifying Oil Spray Jet For Piston Cooling
Courtesy of AUDI OF AMERICA, LLC

1. Oil spray jet
2. Insert bolts with locking compound and tighten to 9 Nm;

NOTE:

- Do not bend the piston spray nozzles.
- Bend piston spray nozzles must be replaced.

RIBBED BELT DRIVE OVERVIEW

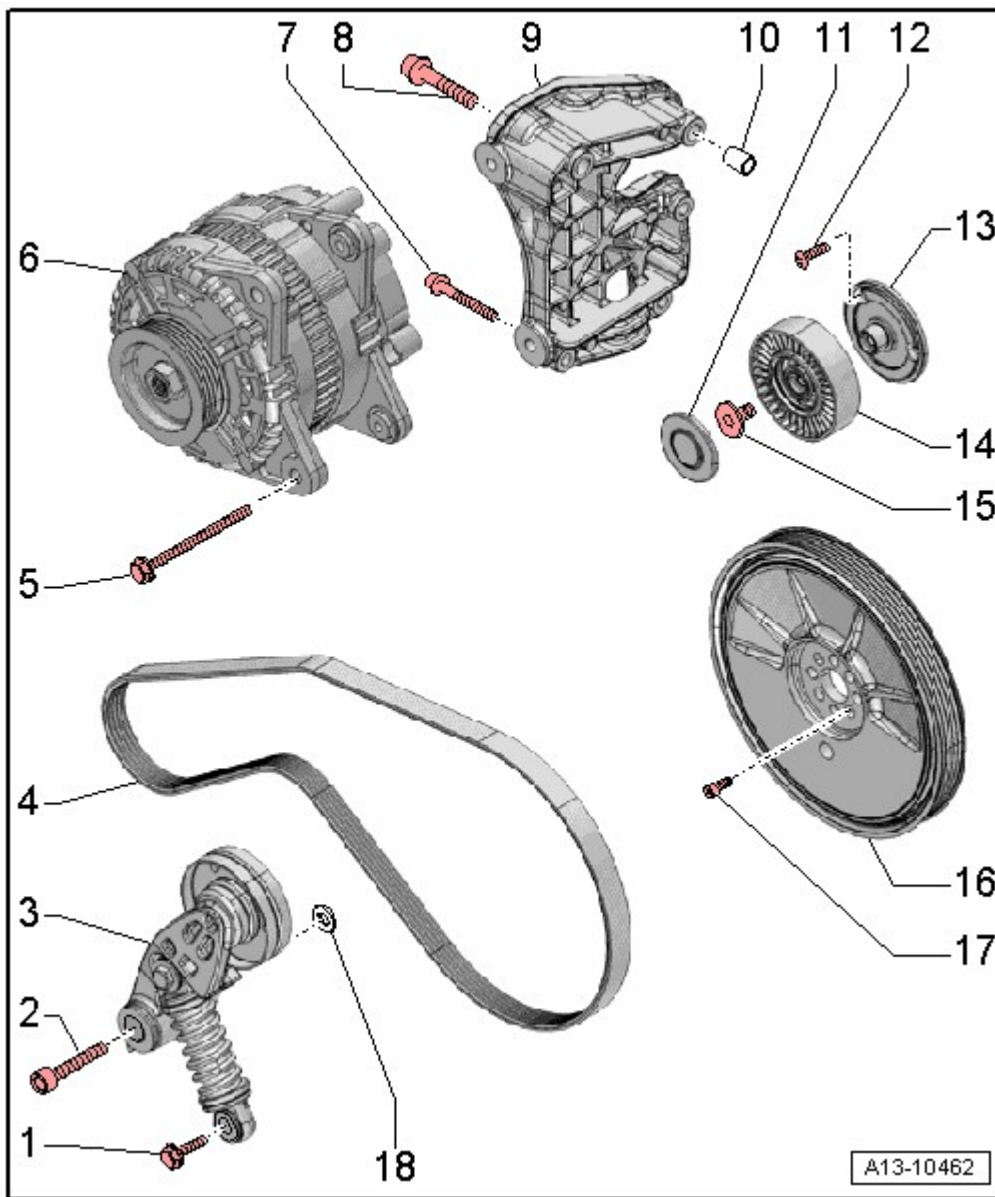


Fig. 16: Ribbed Belt Drive Overview

Courtesy of AUDI OF AMERICA, LLC

1. Bolt
 - 22 Nm
2. Bolt
 - 55 Nm
3. Ribbed Belt Tensioning Damper
 - Removing and installing, refer to **RIBBED BELT TENSIONER**
4. 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
5. Bolt
 - 22 Nm
 6. Generator
 - Removing and installing, refer to **REMOVAL AND INSTALLATION**
 7. Bolt
 - For the correct tightening specification, refer to **BATTERY, STARTER, GENERATOR, CRUISE CONTROL**
 8. Bolt
 - 46 Nm
 9. Generator Bracket
 10. Alignment Bushing
 - For generator bracket
 - Quantity: 2
 11. Idler Roller Cover
 12. Bolt
 - 9 Nm
 13. Bracket
 - For the idler roller
 14. Idler Roller for Ribbed Belt
 15. Bolt
 - 22 Nm
 16. Vibration Damper
 - With ribbed belt pulley
 - Removing and installing, refer to **VIBRATION DAMPER**
 17. Bolt
 - Replace
 - Clean the threaded holes with a thread tap.
 - Insert with locking compound;
 - Tightening specification and sequence, refer to **Fig. 17**
 18. Thrust Washer

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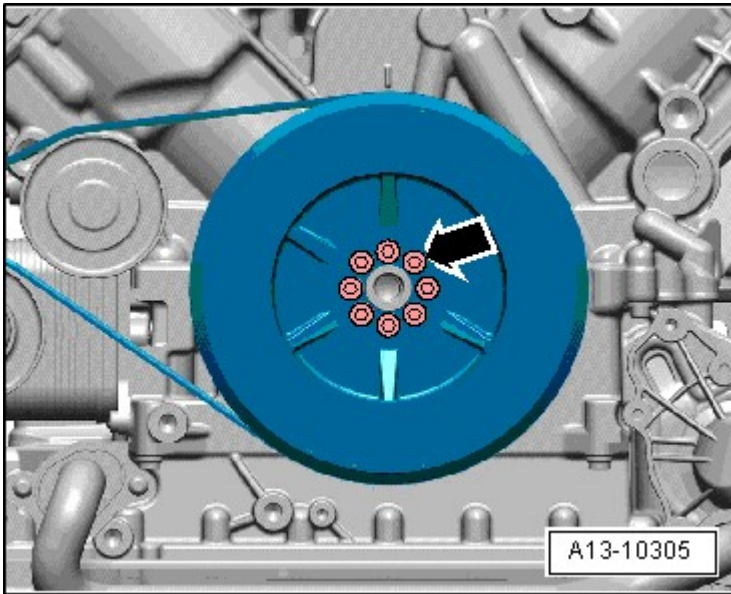


Fig. 17: Identifying Mounting Bolts On Vibration Damper
Courtesy of AUDI OF AMERICA, LLC

NOTE:

- Replace bolts that are tightened to the specification.
- Clean the threaded holes with a thread tap.
- Install the bolts with locking compound;

-- Tighten bolts in 3 stages as follows:

Stage	Bolts	Tightening Specification/Additional Turn
1.	-arrow-	15 Nm in a diagonal sequence
2.	-arrow-	22 Nm in a diagonal sequence
3.	-arrow-	In a diagonal sequence, turn an additional 90°

SPECIFICATIONS

CRANKSHAFT DIMENSIONS

Honing Dimension	Crankshaft Bearing Journal Diameter mm		Connecting Rod Journal Diameter mm	
Basic dimension	65.000	- 0.022 - 0.042	54.000	- 0.022 - 0.042
Repair stage	64.750	- 0.022 - 0.042	53.750	- 0.022 - 0.042

FASTENER TIGHTENING SPECIFICATIONS

Components	Fastener Size	Nm
Bracket for the Idler Roller	-	9
	-	60 + 90°

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Connecting Rod Bearing Cap ^{1, 4}		
Drive Plate ¹	-	60 + 90°
Generator	-	22
Generator Bracket ³	-	46
Guide Tube for Oil Dipstick	-	9
Idler Roller for Ribbed Belt	-	22
Oil Spray Jet ⁵	-	9
Ribbed Belt Tensioning Damper ²		
	-	22
	-	55
• ¹ Replace • ² For bolt tightening clarification, refer to <u>RIBBED BELT DRIVE OVERVIEW</u> and see items -1 and 2- • ³ For bolt tightening clarification, refer to <u>RIBBED BELT DRIVE OVERVIEW</u> and see items -7 and 8- • ⁴ Lubricate the threads and contact surface • ⁵ Insert bolts with locking compound		

VIBRATION DAMPER, TIGHTENING SPECIFICATION AND SEQUENCE

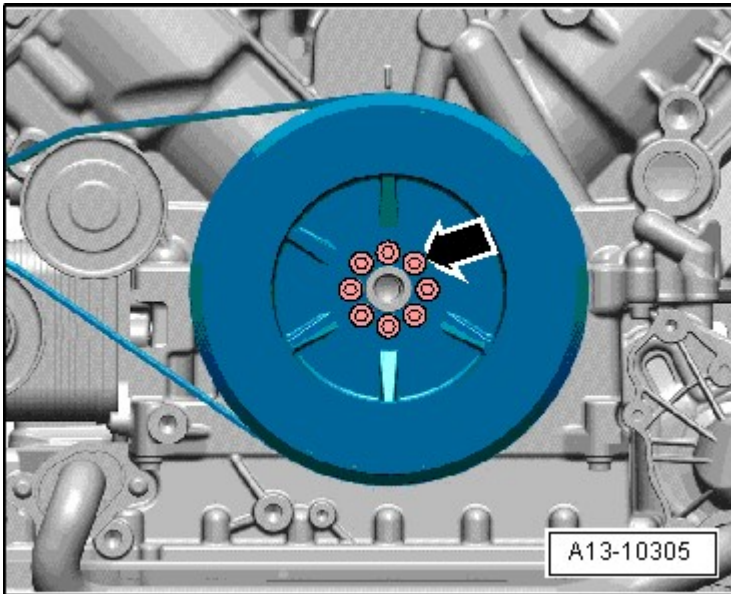


Fig. 18: Identifying Mounting Bolts On Vibration Damper
Courtesy of AUDI OF AMERICA, LLC

NOTE:

- Replace bolts that are tightened to the specification.
- Clean the threaded holes with a thread tap.

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- Install the bolts with locking compound;

-- Tighten bolts in 3 stages as follows:

Stage	Bolts	Tightening Specification/Additional Turn
1.	-arrow-	15 Nm in a diagonal sequence
2.	-arrow-	22 Nm in a diagonal sequence
3.	-arrow-	In a diagonal sequence, turn an additional 90°

BAFFLE PLATE - TIGHTENING SPECIFICATIONS AND SEQUENCE

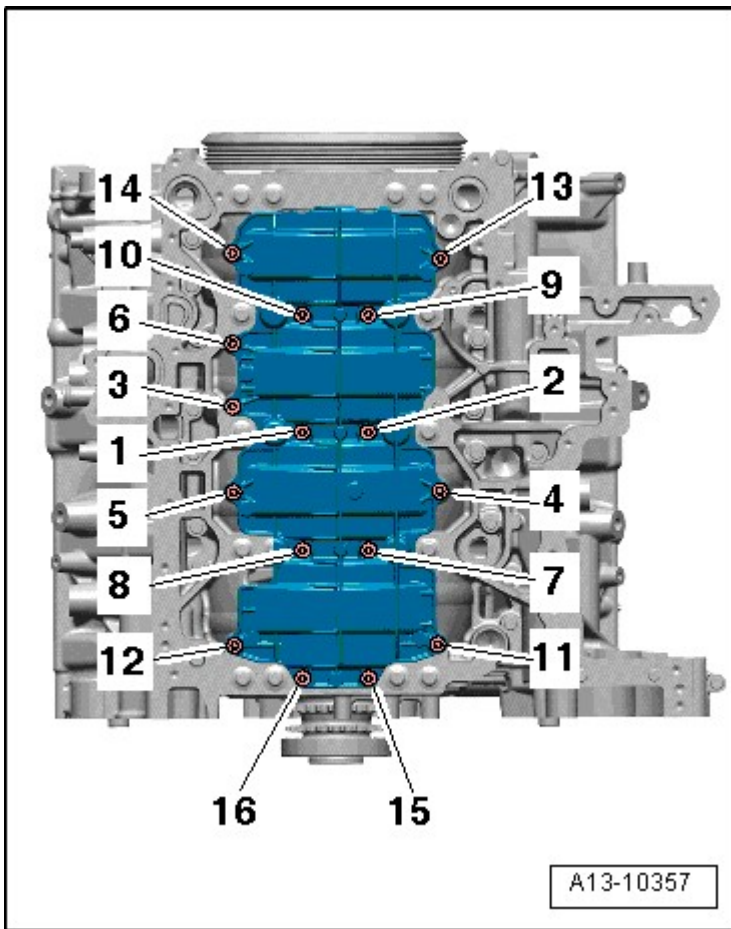


Fig. 19: Baffle Plate Bolts Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

-- Tighten baffle plate bolts to 9 Nm in -1 to 16- sequence.

GUIDE FRAME TIGHTENING SPECIFICATIONS AND SEQUENCE

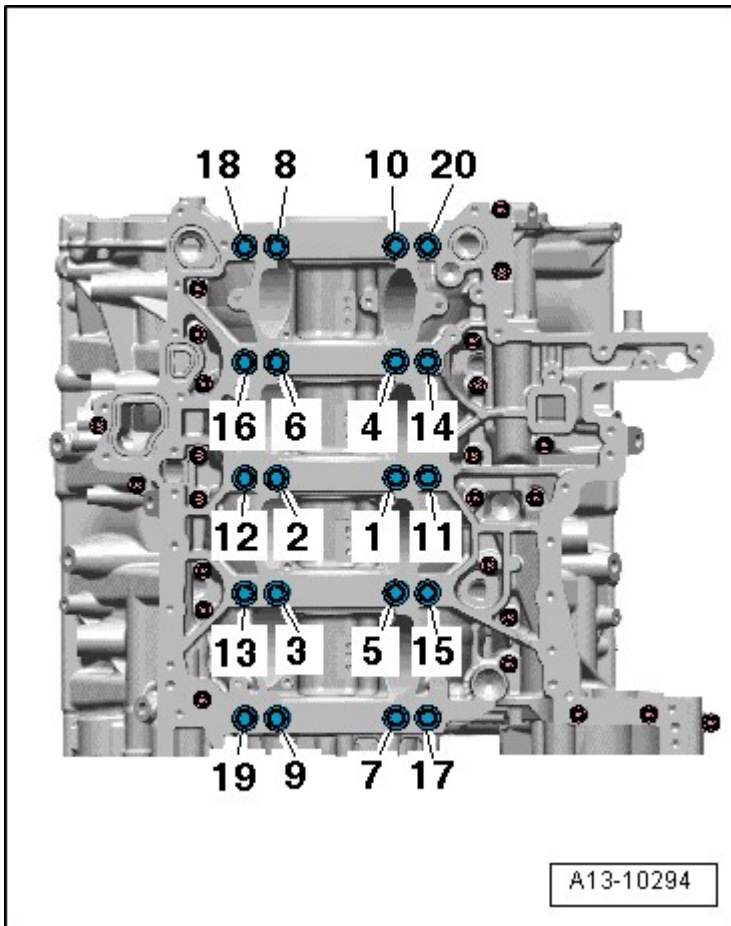


Fig. 20: Guide Frame Bolts Tightening Sequence
 Courtesy of AUDI OF AMERICA, LLC

NOTE: Replace bolts that are tightened to the specification.

-- Tighten the bolts in 5 steps in the sequence shown:

Stage	Bolts	Tightening Specification/Additional Turn
1.	-1 through 10-	30 Nm
2.	-11 through 20-	20 Nm
3.	-1 through 10-	50 Nm
4.	-11 through 20-	30 Nm
5.	-1 through 20-	Tighten 90° further

-- Tighten the guide frame to cylinder block sealing surface bolts, -highlighted in dark-, in a diagonal sequence to 9 Nm.

DIAGNOSIS AND TESTING

CONNECTING ROD RADIAL CLEARANCE, MEASURING

Special tools and workshop equipment required

- Plastigage

PROCEDURE

- Remove connecting rod bearing cap.
- Clean the bearing cap and journal.
- Place the Plastigage over the entire width of the bearing journal or into the bearing shells.
- Install the connecting rod bearing cap and tighten it to 60 Nm without any additional turns. Do not turn crankshaft.
- Reinstall connecting rod cover.
- Compare width of Plastigage with calibrated scale.

Radial clearance:

- New: 0.020 to 0.069 mm.
- Wear limit: 0.120 mm.

- Replace connecting rod bolts.

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

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

PROCEDURE

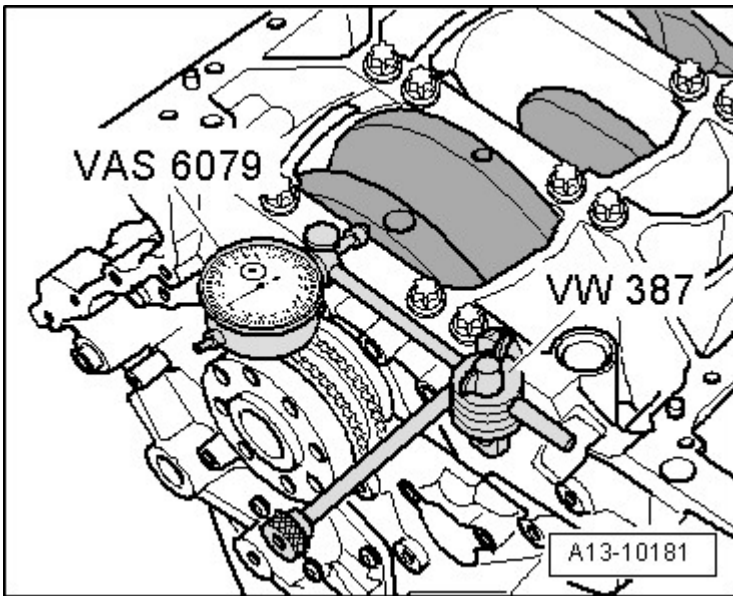


Fig. 21: Identifying Special Tools - Dial Indicator VAS 6079 With Dial Gauge Holder VW 387
Courtesy of AUDI OF AMERICA, LLC

- Install the VAS 6079 with the VW 387 on the cylinder block as shown in the illustration.
- 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: 0.090 to 0.251 mm.

CRANKSHAFT, MEASURING RADIAL PLAY

Special tools and workshop equipment required

- Plastigage

PROCEDURE

- 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 guide frame and tighten it to 30 Nm without tightening it further; do not turn the crankshaft.
- Install the guide frame.

-- Compare width of Plastigage with calibrated scale.

Radial clearance:

- New: 0.017 to 0.044 mm.
- Wear limit: 0.08 mm.

PISTON AND CYLINDER BORE, CHECKING

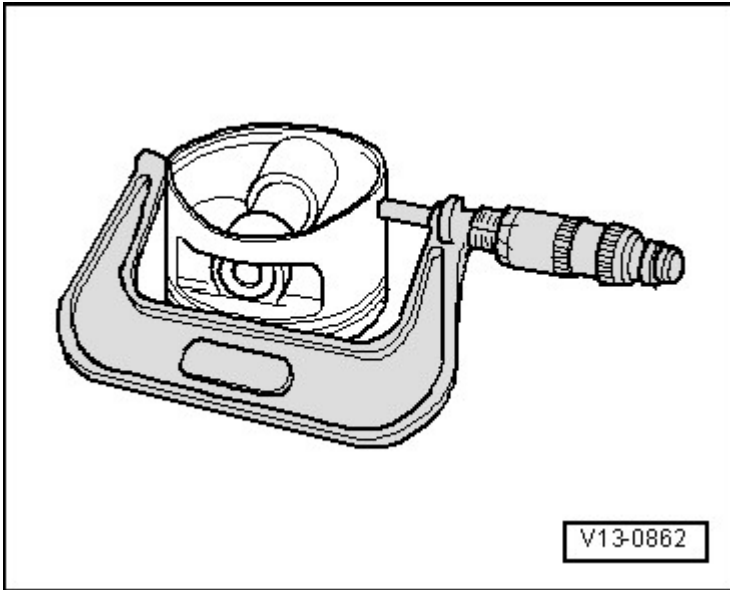


Fig. 22: Checking Piston

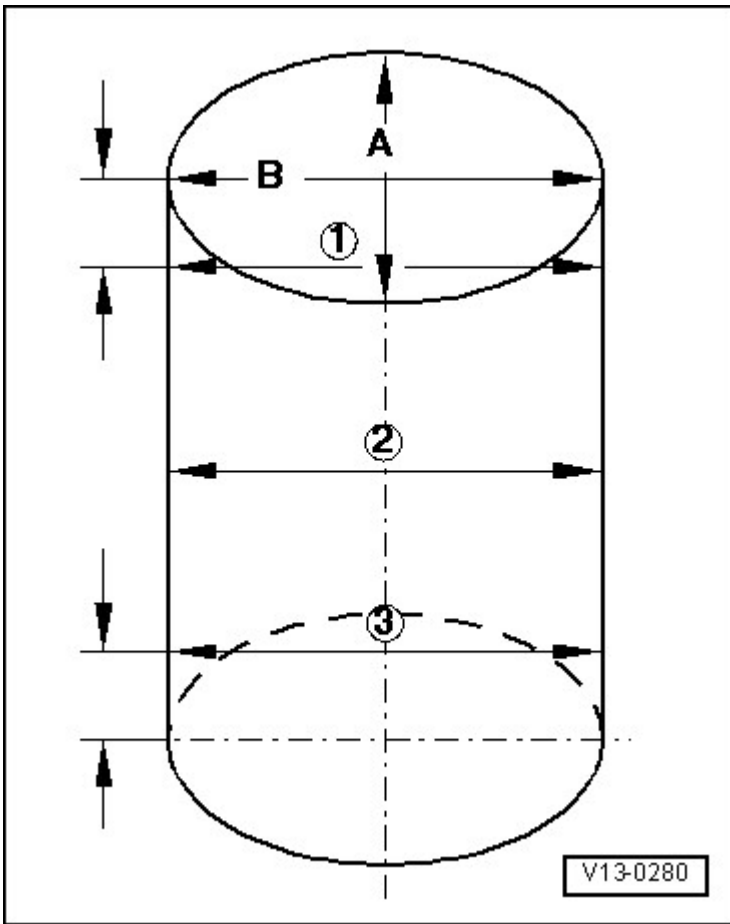
Courtesy of AUDI OF AMERICA, LLC

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

- Maximum deviation from nominal dimension: 0.03 mm.

Matching pistons are allocated to the different manufacturing stages of the cylinder block.

Piston Diameter mm	
Manufacturing stage I nominal size	84.490 ¹⁾
Manufacturing stage II nominal size	84.590 ¹⁾
• ¹⁾ Measurement with coating (thickness = 0.01 mm). The coating wears off.	

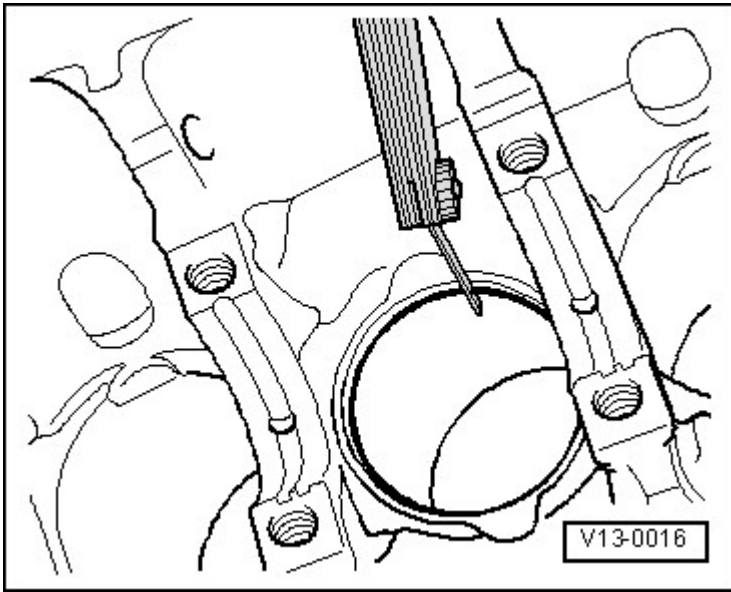
**Fig. 23: Checking Cylinder Bores**

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-- 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.

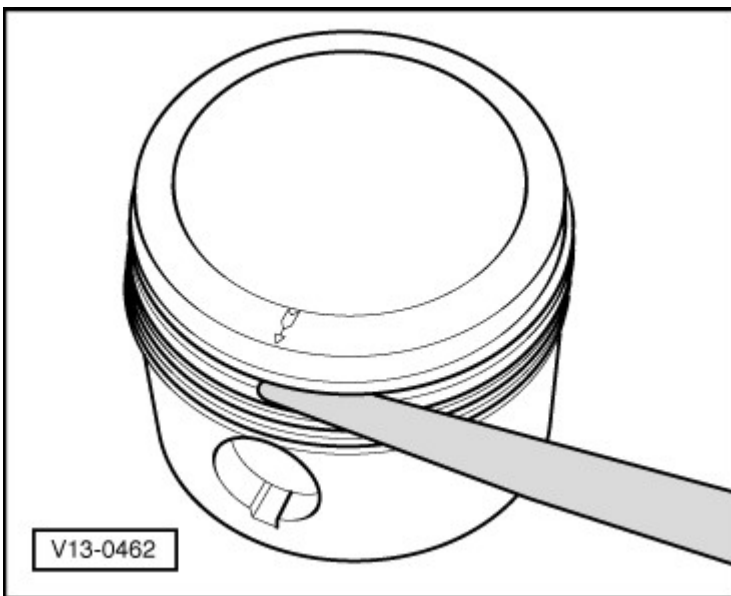
Cylinder Bore Diameter mm	
Manufacturing stage I nominal size	84.510 ± 0.005
Manufacturing stage II nominal size	84.610 ± 0.005

**Fig. 24: Checking Piston Ring Gap**

Courtesy of AUDI OF AMERICA, LLC

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

Piston Ring	New mm	Wear Limit mm
1st Compression ring	0.20 to 0.35	0.80
2nd Compression ring	0.20 to 0.40	0.80
Oil scraping ring	0.20 to 0.40	0.80

**Fig. 25: Checking Piston Ring Side Clearance**

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-- Clean the piston ring groove before checking.

Piston Ring	New mm	Wear Limit mm
1st Compression ring	0.035 to 0.085	0.200
2nd Compression ring	0.005 to 0.045	0.150
Oil scraping ring	0.010 to 0.050	0.200

REMOVAL AND INSTALLATION

CRANKSHAFT SEAL, TRANSMISSION SIDE

Special tools and workshop equipment required

- Assembly Tool T10122
- Pulling Hook T20143/2

PROCEDURE

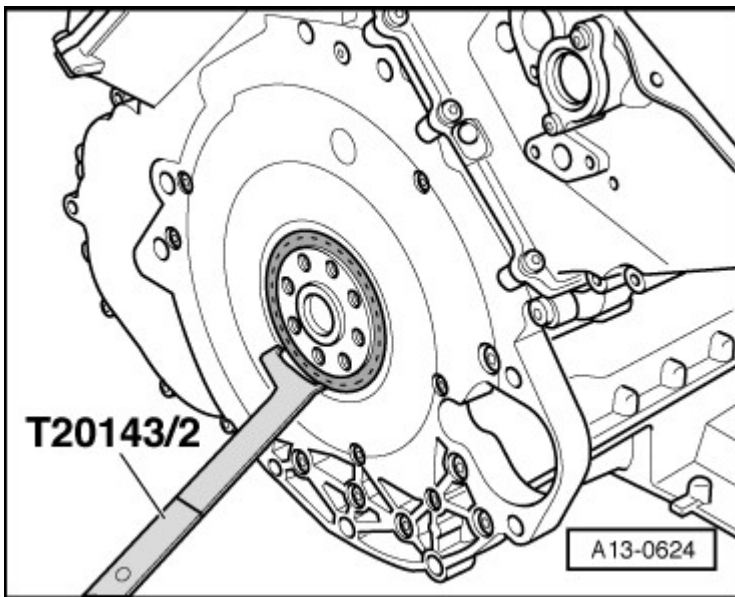


Fig. 26: Prying Out Sealing Ring Using Extractor Lever T20143/2

Courtesy of AUDI OF AMERICA, LLC

- The transmission is removed. Refer to **REMOVAL AND INSTALLATION** or **REMOVAL AND INSTALLATION**.

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

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

-- Clean the 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.

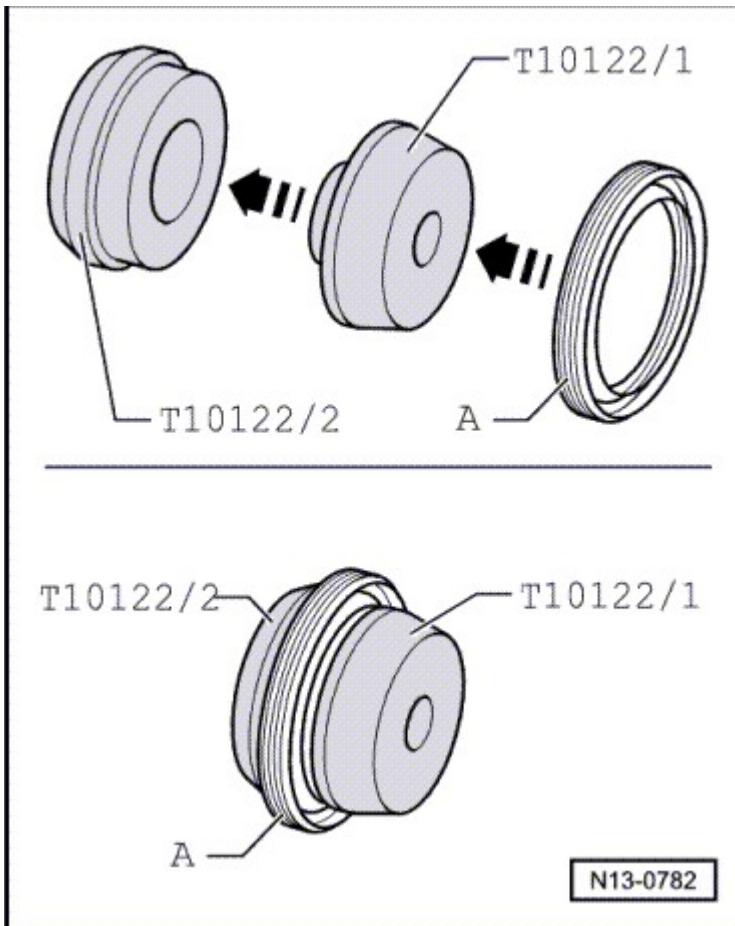


Fig. 27: Identifying Seal, Sleeve T10122/1 And Assembly Tool T10122/2
Courtesy of AUDI OF AMERICA, LLC

-- Remove the assembly device.

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

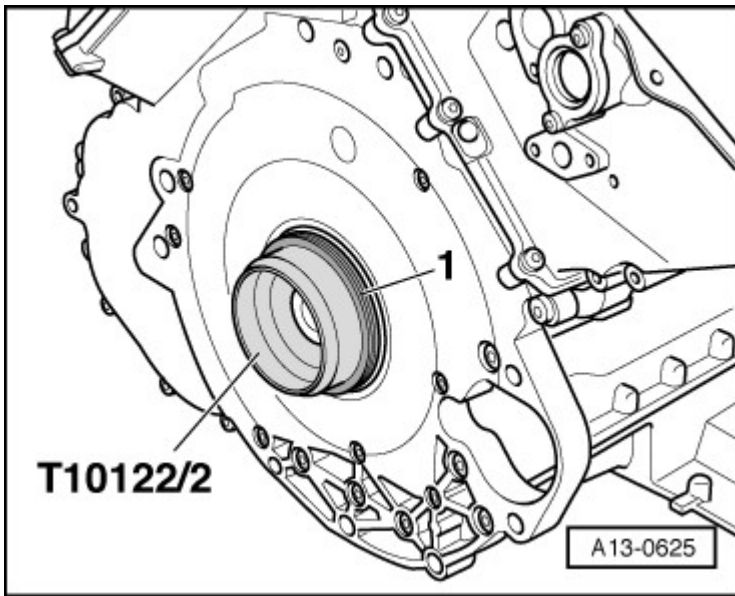


Fig. 28: Identifying Pull Sleeve T10122/2 With Sealing Ring On Crankshaft
Courtesy of AUDI OF AMERICA, LLC

-- Press the shaft seal in evenly all around with the thrust piece T10122/3 until flush.

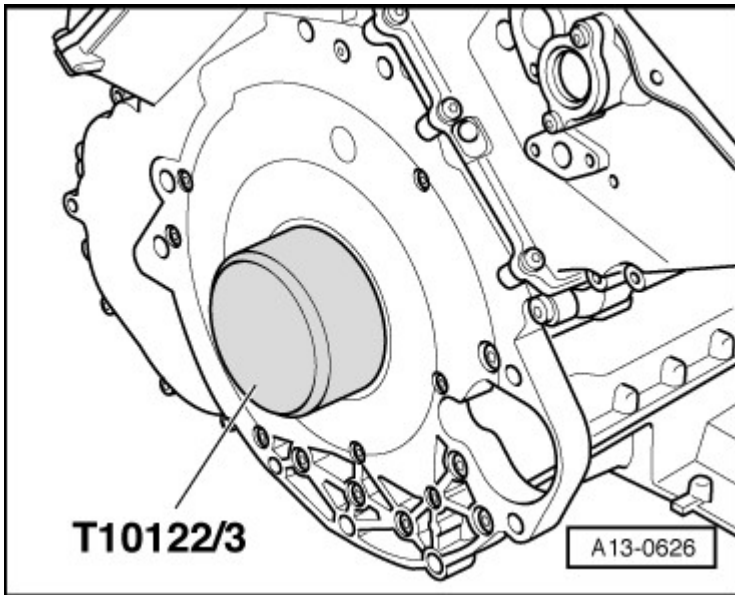


Fig. 29: Pressing In Seal Evenly All Around Until It Reaches Stop Using T10122/3
Courtesy of AUDI OF AMERICA, LLC

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

CRANKSHAFT SHAFT SEAL, BELT PULLEY SIDE, REPLACING

Special tools and workshop equipment required

- Oil Seal Extractor T40019
- Assembling Device T40048
- M8 x 55 mm bolt, quantity: 2

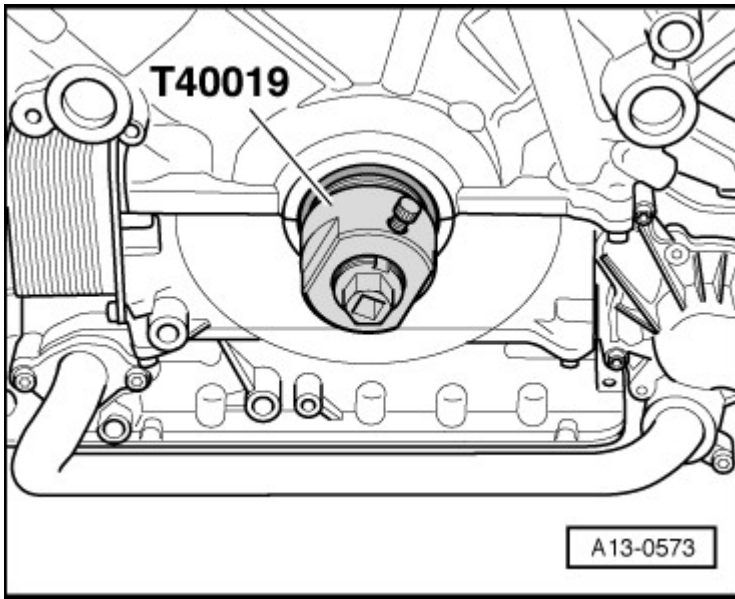
PROCEDURE

Fig. 30: Identifying Oil Seal Extractor T40019
Courtesy of AUDI OF AMERICA, LLC

- Remove vibration damper. Refer to **VIBRATION DAMPER**.
- Position the inner part of the T40019 flush with outer part and secure it with the knurled screw.
- Lubricate the seal remover threaded head, position it, and then install it into the shaft seal as far as possible using strong force.
- Loosen the knurled screw and turn the inner portion against the crankshaft until the seal is pulled out.
- Secure the seal remover in a vise at the flat spots and remove the seal using pliers.
- Clean the 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.

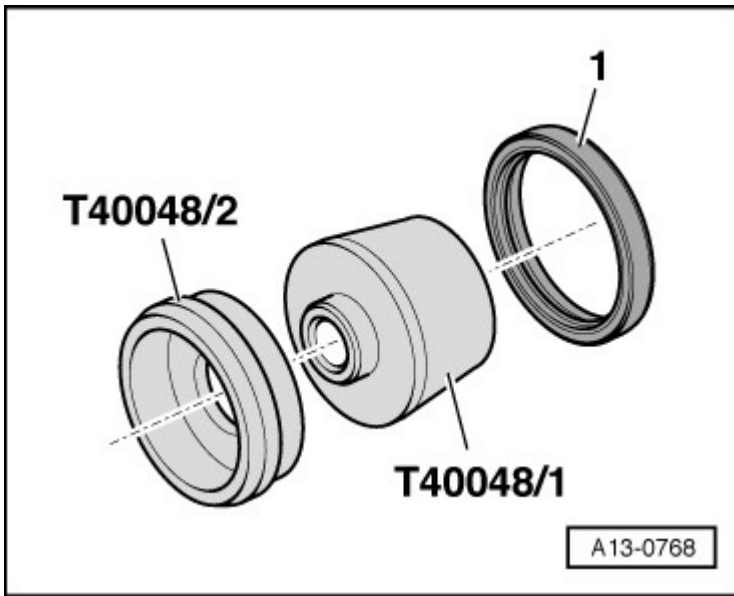


Fig. 31: Inserting Assembly Device T40048/1 Onto Pull Sleeve T40048/2 And Slide Seal Onto Pull Sleeve
Courtesy of AUDI OF AMERICA, LLC

-- Remove the assembly device.

-- Place the T40048/2 on the crankshaft and slide the shaft seal -1- into the sealing surface on the cylinder block.

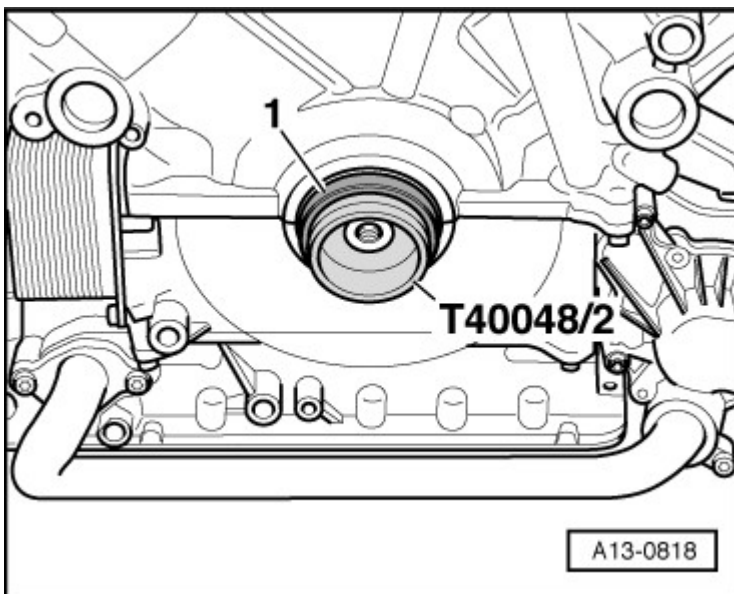


Fig. 32: Placing Pull Sleeve T40048/2 On Crankshaft And Sliding Seal Into Sealing Surface On Engine
Courtesy of AUDI OF AMERICA, LLC

NOTE: Leave the pull sleeve for pressing onto the crankshaft.

-- Position the pull sleeve T40048/3 on the crankshaft with 2 M8 x 55 mm bolts -arrows-.

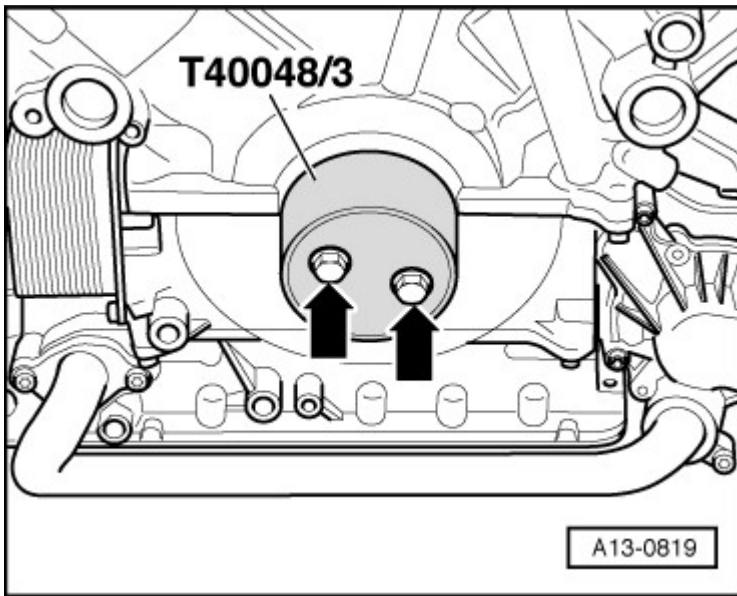


Fig. 33: Positioning Pressure Sleeve T40048/3 With Bolts On Crankshaft
Courtesy of AUDI OF AMERICA, LLC

-- 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.

Install in reverse order of removal paying attention to the following:

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

DRIVE PLATE

Special tools and workshop equipment required

- Counter Hold Tool 10 - 201

REMOVING

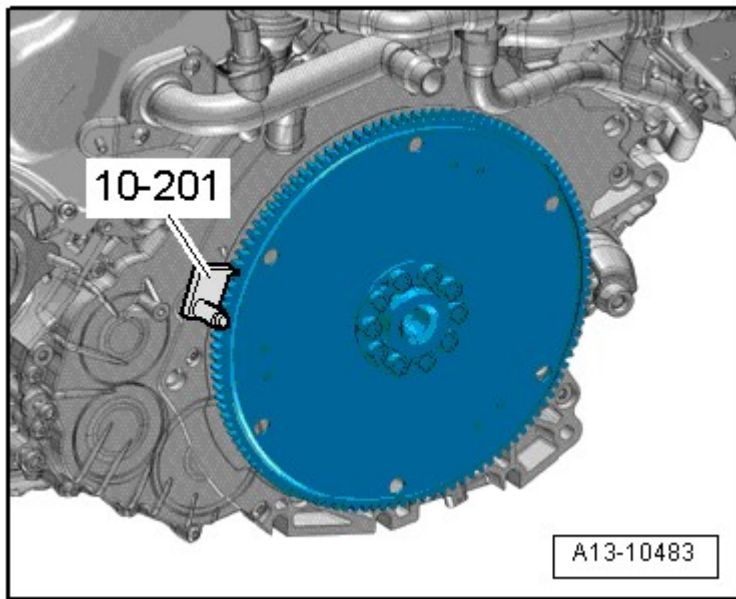


Fig. 34: Identifying Drive Plate & Counter Hold Tool 10 - 201
Courtesy of AUDI OF AMERICA, LLC

- The transmission is removed. Refer to **REMOVAL AND INSTALLATION** or **REMOVAL AND INSTALLATION**.

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

CAUTION: The outer surface of the bearing flange at the drive plate could be damaged.

- Use a multipoint socket wrench with a shaft at least 40 mm long to loosen and tighten the drive plate bolts.

-- Remove the bolts and remove the drive plate.

INSTALLING

Install in reverse order, paying attention to the following:

- Tightening specification, refer to **DRIVE PLATE OVERVIEW**.

NOTE:

- Replace bolts that are tightened to the specification.
- Vehicles with a manual transmission: There is a needed bearing in the drive plate. Check if the needle bearing is inserted before installing. Needle bearing, removing from and installing on drive plate. Refer to **NEEDLE BEARING AT DRIVE PLATE, MANUAL TRANSMISSION**.

-- Pay attention to the alignment bushing when installing the drive plate.

-- Reposition the 10 - 201 to tighten the bolts.

NEEDLE BEARING AT DRIVE PLATE, MANUAL TRANSMISSION

Special tools and workshop equipment required

- Tube 31.5 mm Dia. VW 418 A
- Tube 28 mm Dia. 100 mm VW 421
- Sleeve 40 - 103

PROCEDURE

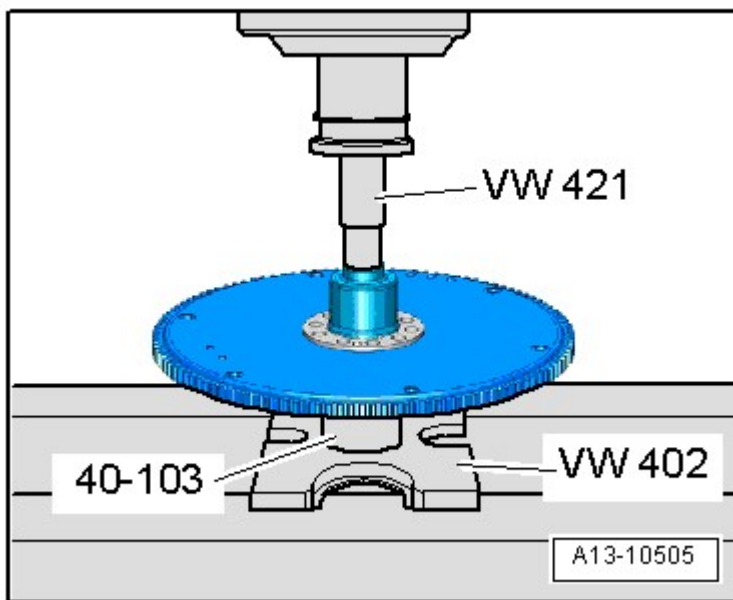


Fig. 35: Identifying Drive Plate, Removal
Courtesy of AUDI OF AMERICA, LLC

- The transmission is removed. Refer to **REMOVAL AND INSTALLATION** .

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

-- Place the 40 - 103 under the drive plate to remove and install.

-- Press the bearing sleeve out using the VW 421 and shop press.

- The smaller diameter of the VW 421 faces the drive plate.

-- Carefully press the needle bearing in as far as the stop using the VW 418 A and shop press.

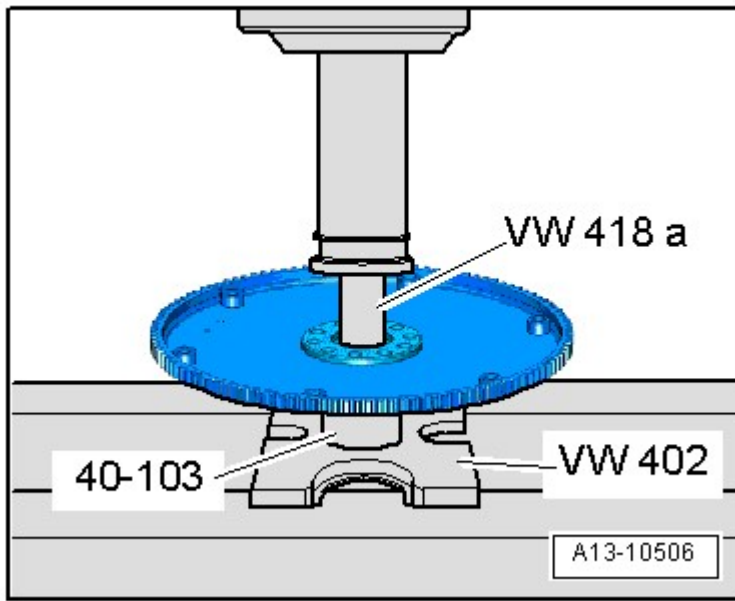


Fig. 36: Identifying Drive Plate, Removal
Courtesy of AUDI OF AMERICA, LLC

- Installed position: the closed side of the needle bearing faces the engine.

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

PISTON

Special tools and workshop equipment required

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

REMOVING

- Engine secured to the VAS 6095. Refer to **ENGINE, SECURING TO ENGINE AND TRANSMISSION HOLDER**

-- Remove the cylinder head:

- **LEFT CYLINDER HEAD, REMOVING**
- **RIGHT CYLINDER HEAD, REMOVING**

-- Remove the upper oil pan. Refer to **UPPER OIL PAN** .

-- Mark the installed position of the connecting rod bearing cap for the cylinder for installing later. Refer to **Fig. 13**.

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

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

- Remove the locking ring from the eye of the piston bolt.
- Remove the piston pin using VW 222 A.

INSTALLING

Install in reverse order, paying attention to the following:

- Tightening specification, refer to **PISTONS AND CONNECTING ROD OVERVIEW**.

NOTE: Replace bolts that are tightened to the specification.

- Coat the contact surfaces on the bearing shells with oil.
- Install the piston and piston ring compressor.

Installed position:

- Piston, refer to **Fig. 12**.
 - Connecting rod, refer to **Fig. 14**.
- Install the connecting rod bearing cap according to the marking.
 - Install the upper oil pan. Refer to **UPPER OIL PAN** .
 - Installing cylinder head. Refer to **CYLINDER HEAD, INSTALLING** .

RIBBED BELT

REMOVING

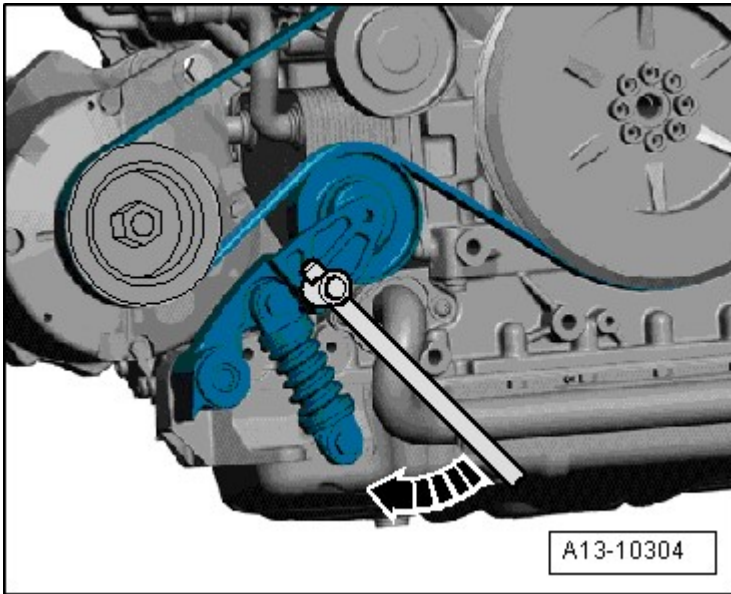


Fig. 37: Releasing Ribbed Belt Tension
Courtesy of AUDI OF AMERICA, LLC

-- Remove the fan shroud. Refer to **FAN SHROUD** .

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

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

-- Pivot tensioning device in direction of -arrow- to relieve tension on ribbed belt.

-- Remove ribbed belt and release tensioning device.

INSTALLING

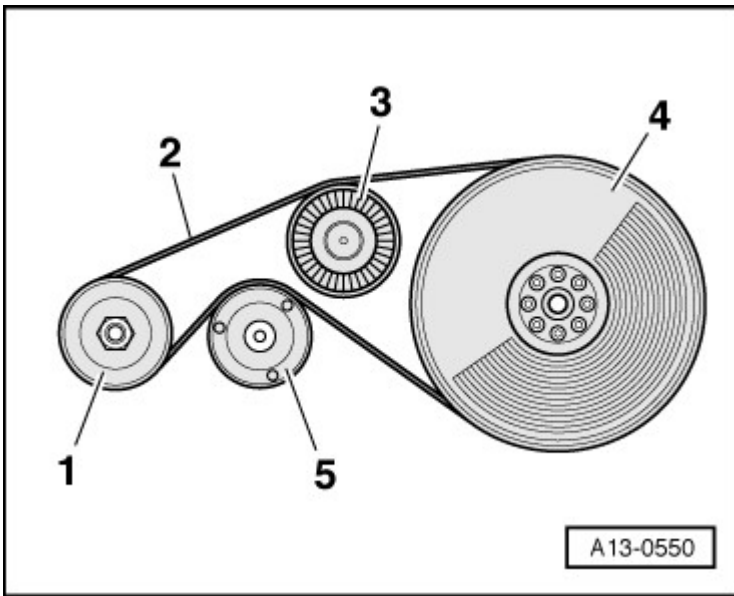


Fig. 38: Placing Ribbed Belt Over Belt Pulley In Sequence
Courtesy of AUDI OF AMERICA, LLC

Install in reverse order, paying attention to the following:

-- Route the ribbed belt -2- in the specified sequence over the ribbed belt pulley.

1 - Generator

3 - Idler roller

4 - Vibration damper

5 - Tensioning roller

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

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

-- Start the engine and check the belt routing.

RIBBED BELT TENSIONER

REMOVING

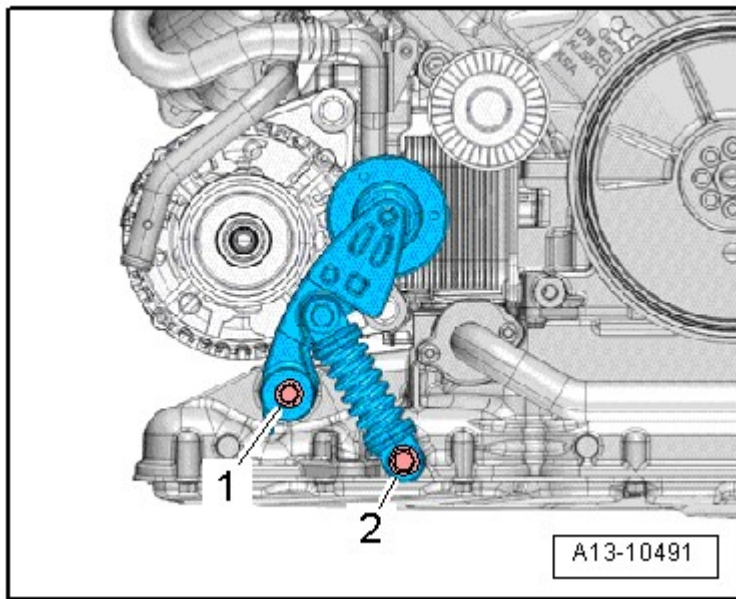


Fig. 39: Identifying Screws -1- And -2-
Courtesy of AUDI OF AMERICA, LLC

- Remove ribbed belt. Refer to **RIBBED BELT**.
- Remove the bolts -1 and 2-.
- Remove the ribbed belt tensioner from the upper oil pan.

INSTALLING

Install in reverse order, paying attention to the following:

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

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

VIBRATION DAMPER

REMOVING

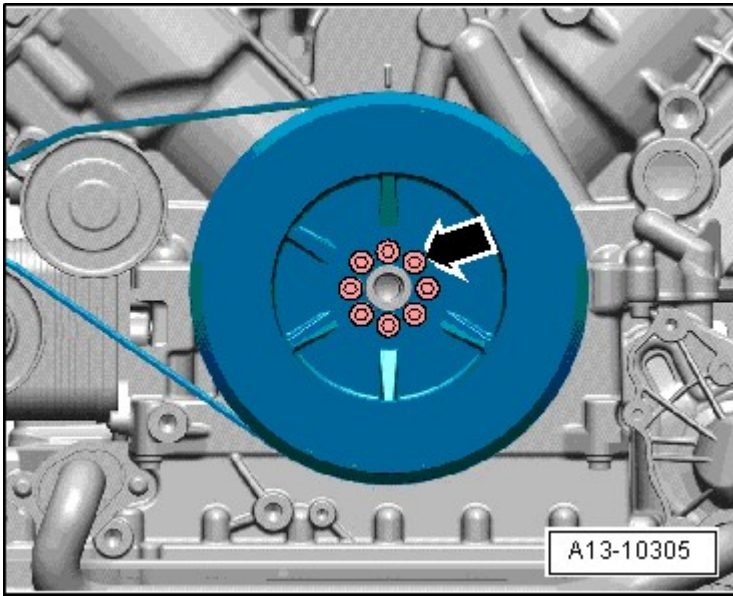


Fig. 40: Identifying Mounting Bolts On Vibration Damper
Courtesy of AUDI OF AMERICA, LLC

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

-- Loosen the vibration damper bolts -arrow- a few turns by counter-holding the open-end wrench on the generator ribbed belt pulley nut.

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

-- Remove the bolts -arrow- and the vibration damper.

INSTALLING

Install in reverse order, paying attention to the following:

- Tightening specification, refer to **Fig. 17**.

NOTE:

- Replace bolts that are tightened to the specification.
- Clean the threaded holes with a thread tap.
- Install the bolts with locking compound;

- The vibration damper can only be installed in one position. Refer to **Fig. 17**.

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

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

SPECIAL TOOLS

Special tools and workshop equipment required

- Counter Hold Tool 10 - 201

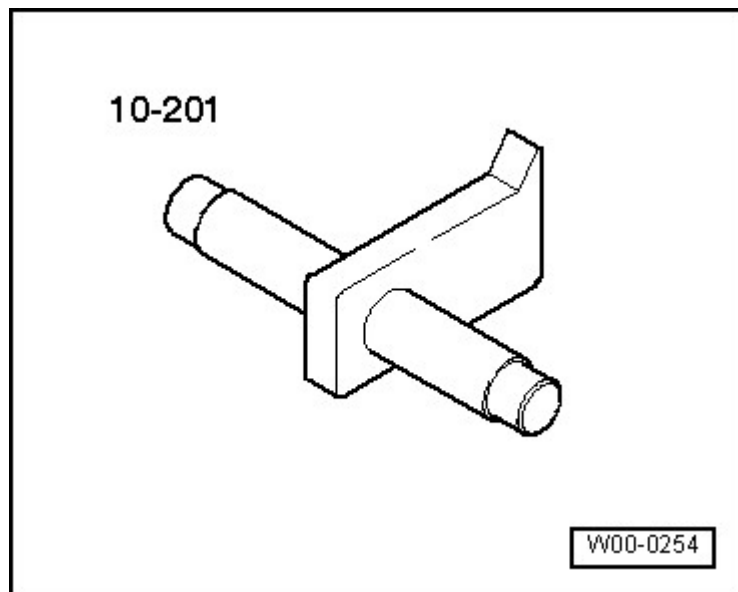


Fig. 41: Identifying Counter-Holder Tool 10 - 201
Courtesy of AUDI OF AMERICA, LLC

- Sleeve 40 - 103

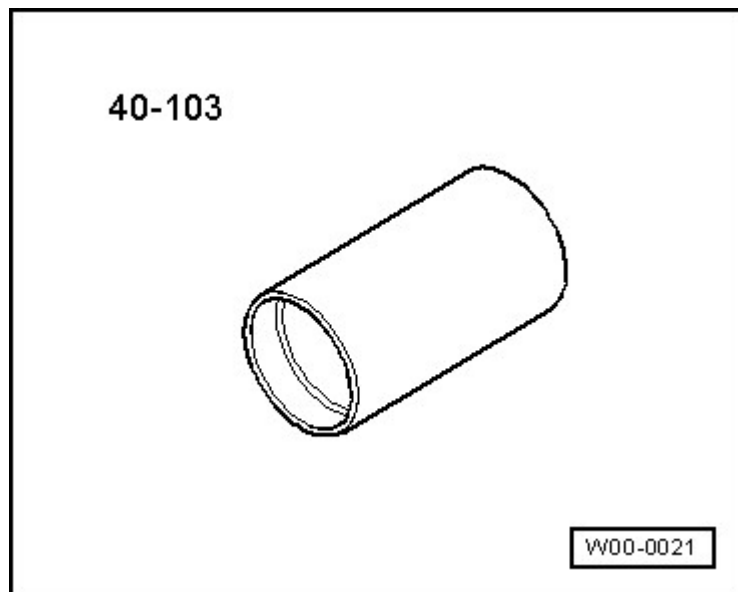


Fig. 42: Identifying Sleeve 40 - 103
Courtesy of AUDI OF AMERICA, LLC

- Assembly Tool T10122

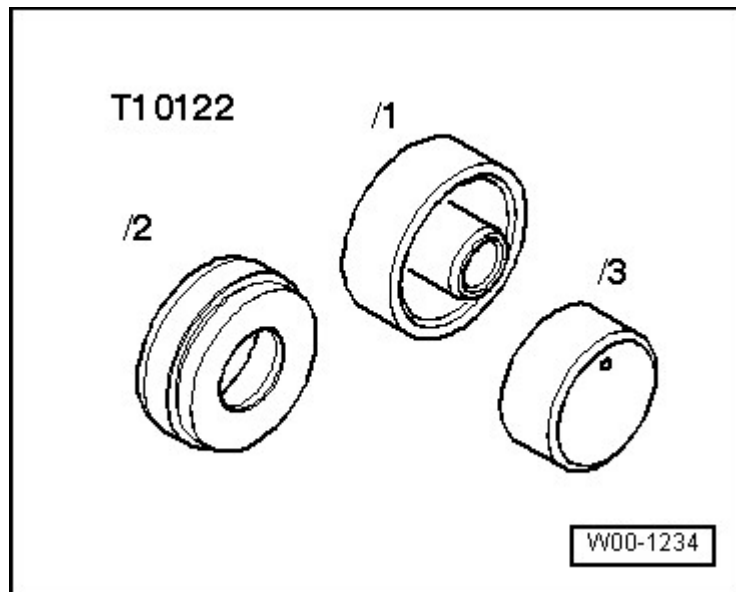


Fig. 43: Identifying Assembly Tool T10122
Courtesy of AUDI OF AMERICA, LLC

- Pulling Hook T20143/2

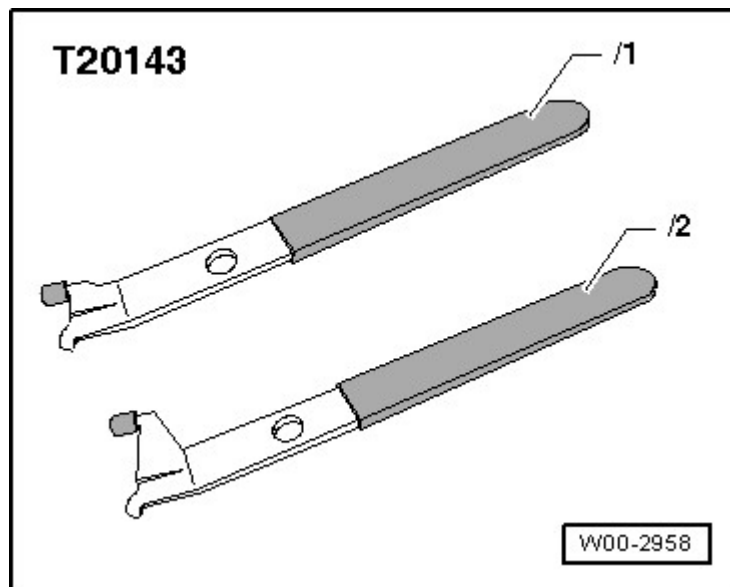


Fig. 44: Identifying Extractor Hook T20143
Courtesy of AUDI OF AMERICA, LLC

- Oil Seal Extractor T40019

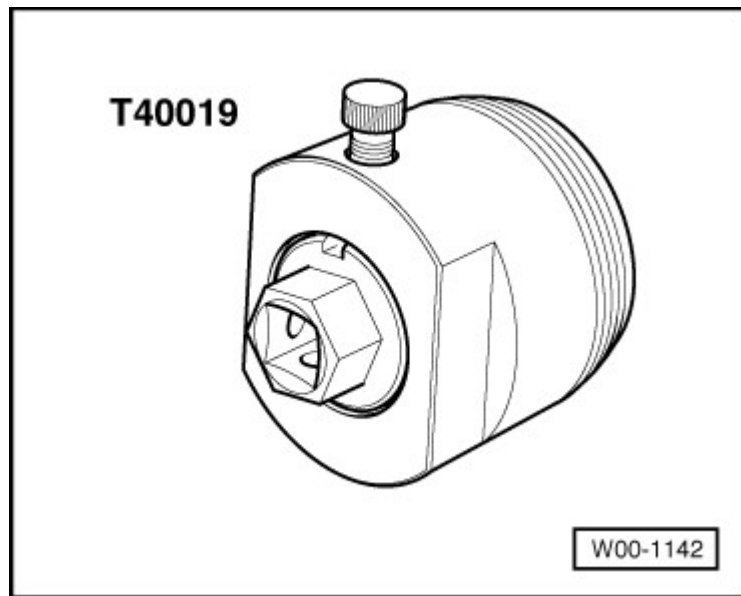


Fig. 45: Identifying Oil Seal Extractor T40019
Courtesy of AUDI OF AMERICA, LLC

- Assembling Device T40048

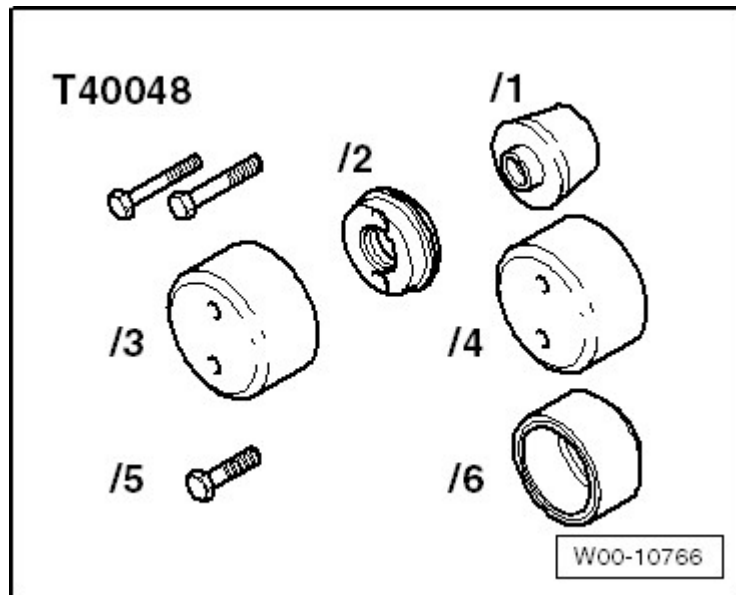


Fig. 46: Identifying Assembling Device T40048
Courtesy of AUDI OF AMERICA, LLC

- Dial Gauge 0-10 mm VAS 6079

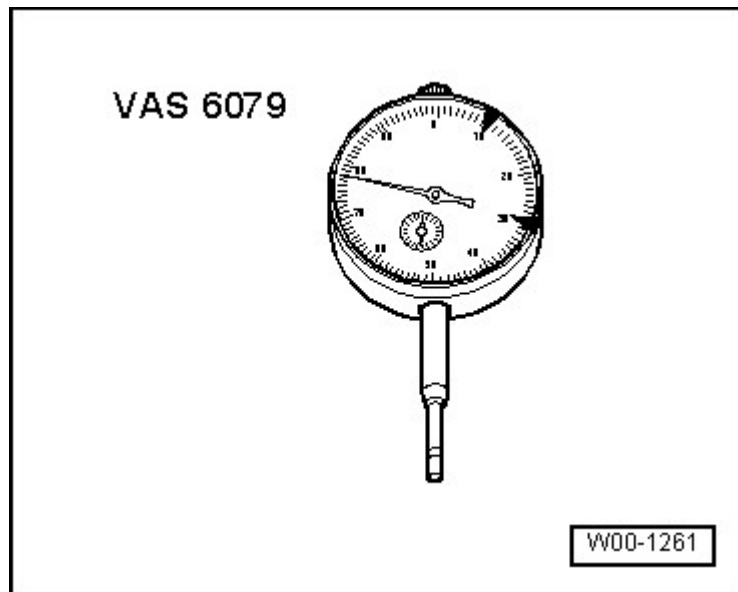


Fig. 47: Identifying Dial Gauge 0-10 mm VAS 6079
Courtesy of AUDI OF AMERICA, LLC

- Dial Gauge Holder VW 387

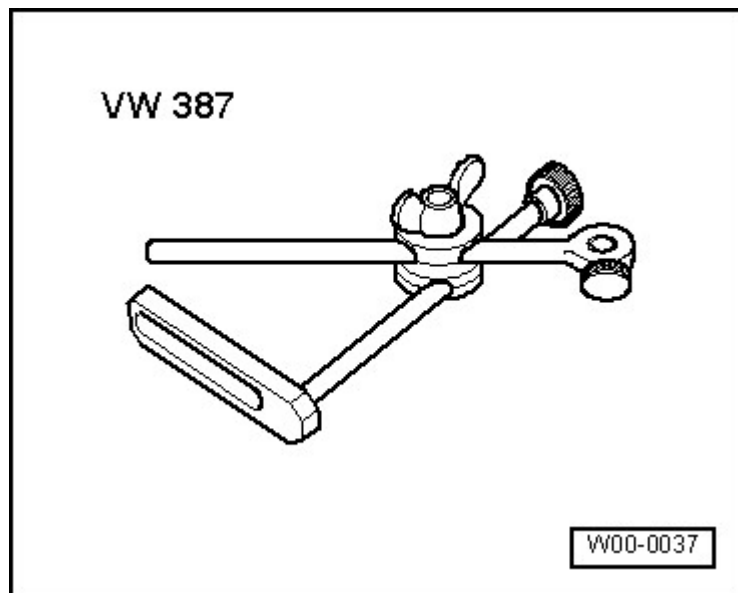


Fig. 48: Identifying Dial Gauge Holder VW 387
Courtesy of AUDI OF AMERICA, LLC

- Tube 31.5 mm Dia. VW 418 A

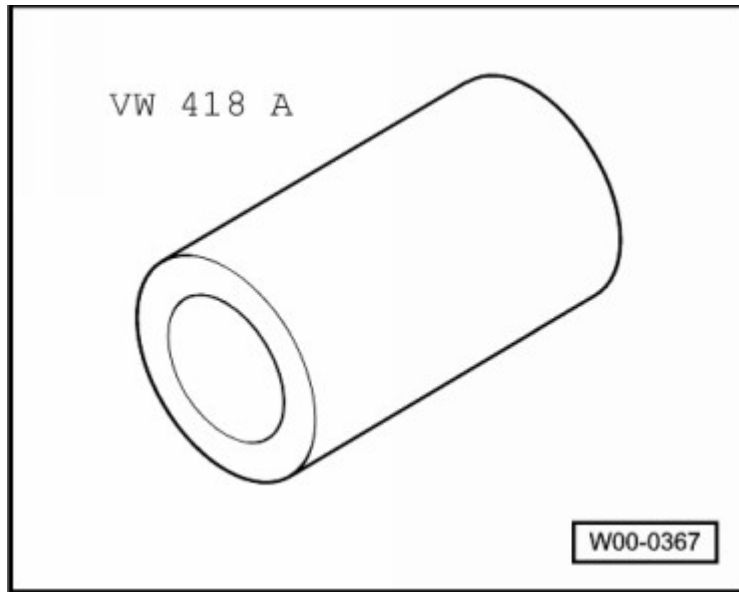


Fig. 49: Identifying Sleeve VW 418 A
Courtesy of AUDI OF AMERICA, LLC

- Tube 28 mm Dia. 100 mm VW 421

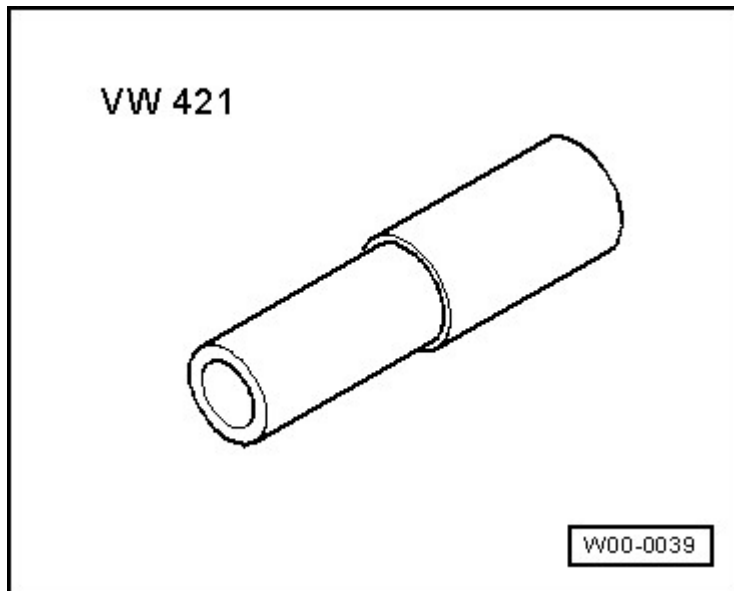


Fig. 50: Identifying Tube 28 mm Dia. 100 mm VW 421
Courtesy of AUDI OF AMERICA, LLC

- Pilot Drift VW 222 A

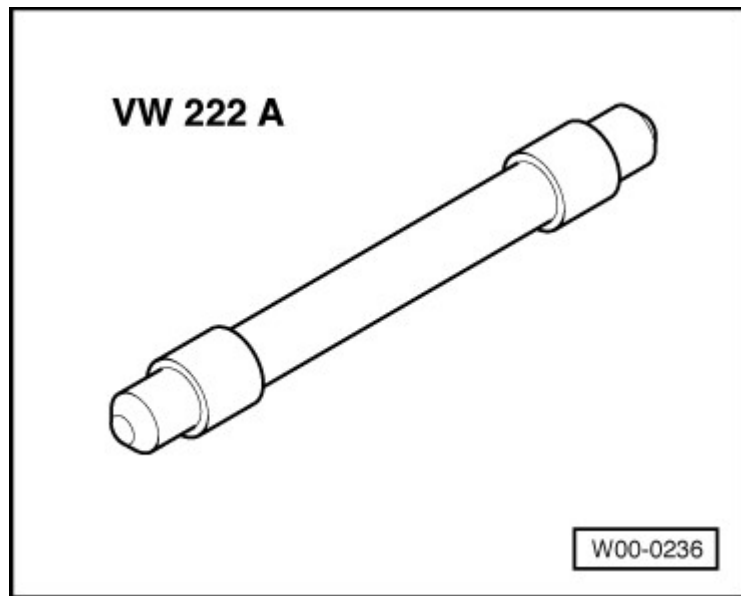


Fig. 51: Identifying Drift VW 222 A
Courtesy of AUDI OF AMERICA, LLC

- Not illustrated:
- Engine and Transmission Holder VAS 6095

4.2 Liter - Cylinder Head, Valvetrain - Engine Code(s): CAUA (Coupe)

LEFT CAMSHAFT TIMING CHAIN

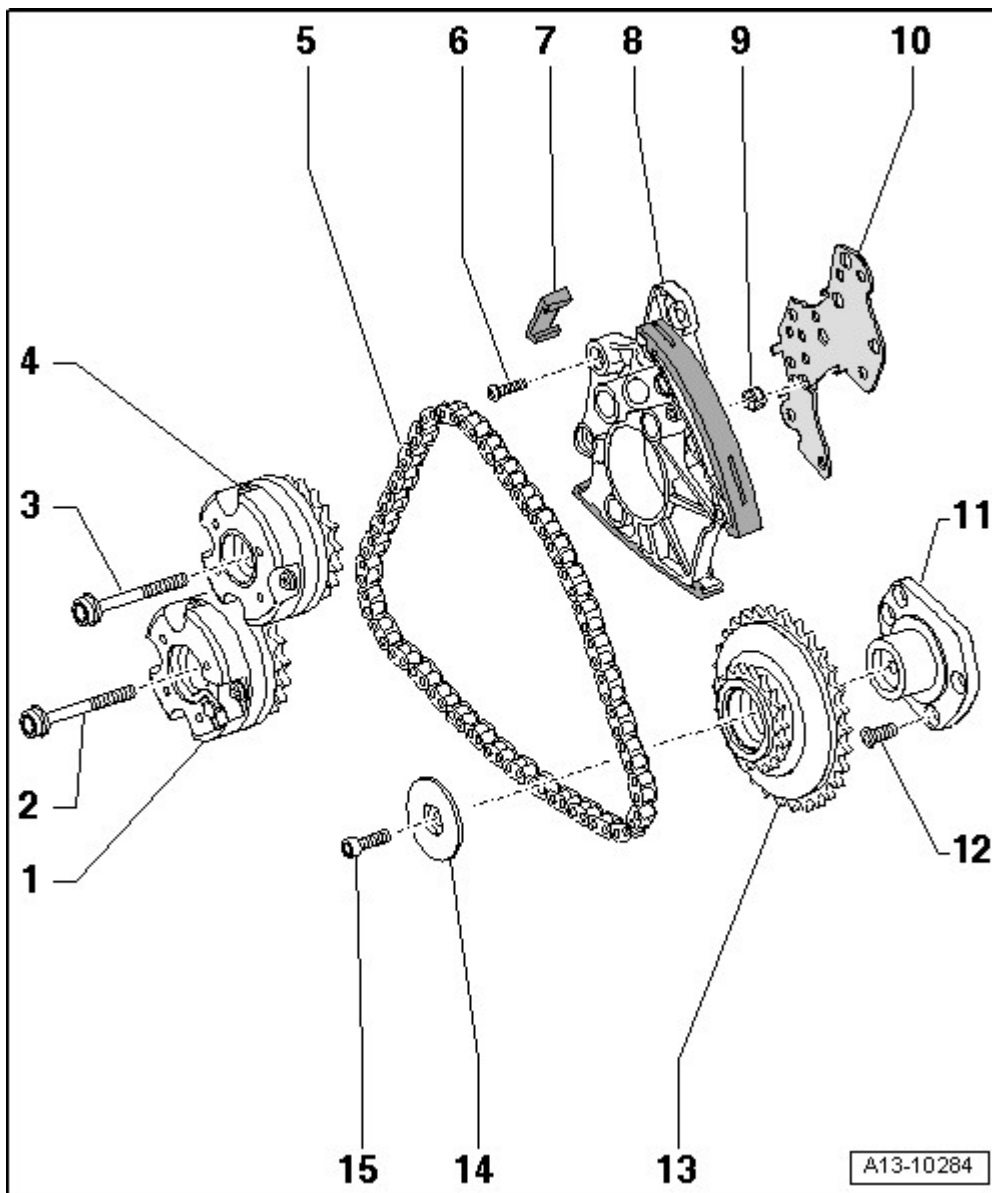


Fig. 1: Left Camshaft Timing Chain Overview
Courtesy of AUDI OF AMERICA, LLC

1. Camshaft Adjuster for Exhaust Camshaft
 - Identification "Exhaust"
 - Removing and installing, refer to **CAMSHAFT TIMING CHAINS**
2. Bolt
 - 80 Nm plus an additional 90° turn
 - Replace
3. Bolt
 - Replace
 - 80 Nm plus an additional 90° turn
4. Camshaft Adjuster for Intake Camshaft
 - Identification "Intake"
 - Removing and installing, refer to **CAMSHAFT TIMING CHAINS**
5. Left Camshaft Timing Chain
 - Remove from camshafts, refer to **CAMSHAFT TIMING CHAINS**
 - Before removing, mark the direction of rotation with paint
 - Removing and installing, refer to **CAMSHAFT TIMING CHAINS**
6. Bolt
 - 5 Nm plus an additional 90° turn
 - Replace
7. Gliding Piece
8. Left Camshaft Timing Chain Tensioner
 - Removing and installing, refer to **CAMSHAFT TIMING CHAINS**
9. Oil Strainer
 - Set into the chain tensioner
 - Observe locating tabs on circumference
10. Gasket
 - Replace
 - Clipped onto the chain tensioner
11. Mounting Bracket for Drive Sprocket
12. Bolt
 - Tightening specification, refer to item 10
13. Left Camshaft Timing Chain Drive Sprocket
14. Thrust Washer for Drive Sprocket
15. Bolt
 - Tightening specification, refer to item 3

RIGHT CAMSHAFT TIMING CHAIN

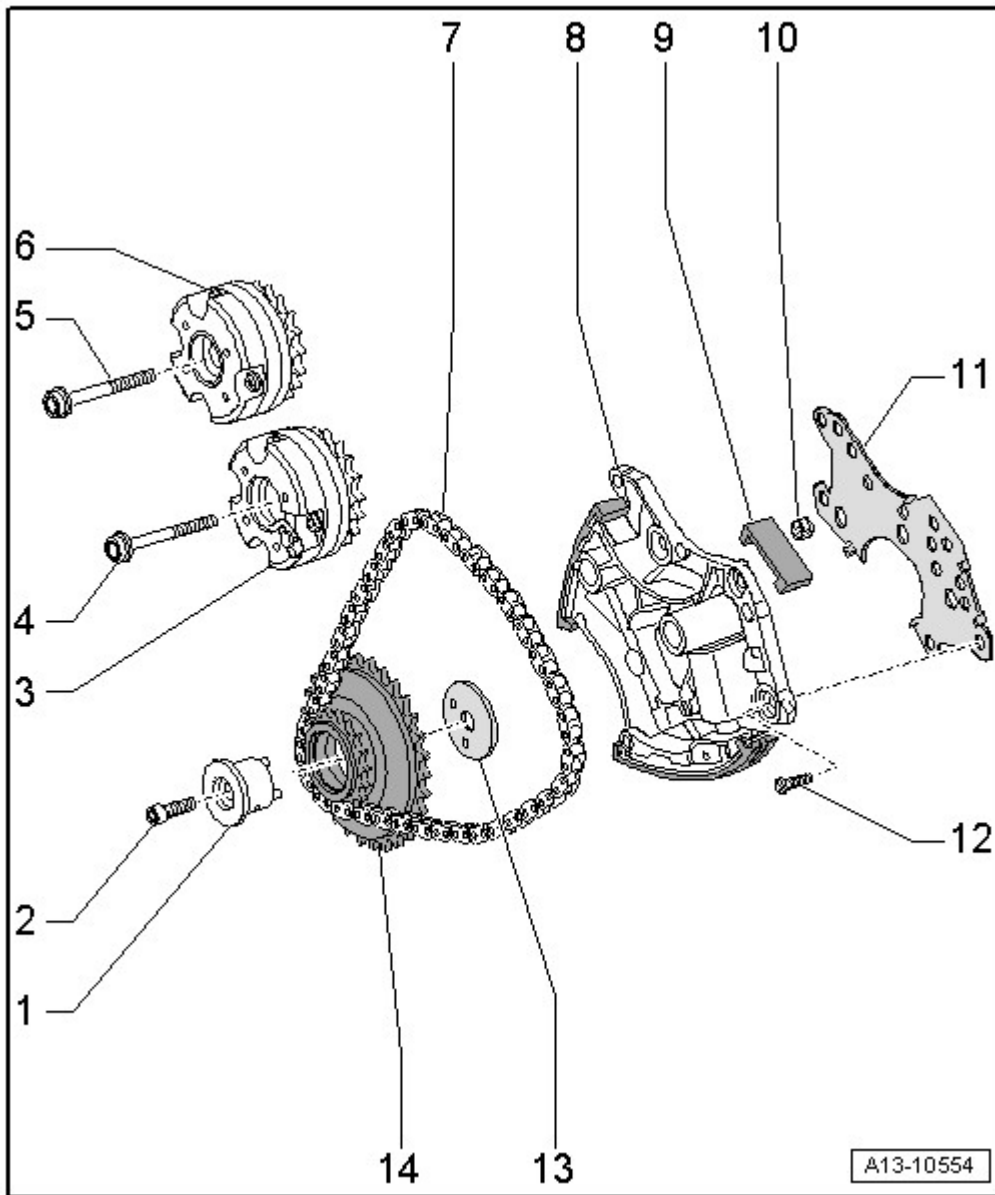


Fig. 2: Right Camshaft Timing Chain Overview

Courtesy of AUDI OF AMERICA, LLC

1. Pivot Pin for Drive Sprocket
 - For the right camshaft timing chain
 - Asymmetrical version
 - Installed position **Fig. 3**
2. Bolt
 - Tightening specification, refer to item 15
3. Camshaft Adjuster for Exhaust Camshaft
 - Identification "Exhaust"
 - Removing and installing, refer to **CAMSHAFT TIMING CHAINS**

4. Bolt
 - 80 Nm plus an additional 90° turn
 - Replace
5. Bolt
 - 80 Nm plus an additional 90° turn
 - Replace
6. Camshaft Adjuster for Intake Camshaft
 - Identification "Intake"
 - Removing and installing, refer to **CAMSHAFT TIMING CHAINS**
7. Right Camshaft Timing Chain
 - remove from camshafts **CAMSHAFT TIMING CHAINS**
 - Before removing, mark the direction of rotation with paint
 - Removing and installing, refer to **CAMSHAFT TIMING CHAINS**
8. Right Camshaft Timing Chain Tensioner
 - Removing and installing, refer to **CAMSHAFT TIMING CHAINS**
9. Gliding Piece
10. Oil Strainer
 - Set into the chain tensioner
 - Installed position: Observe locating tabs on circumference
11. Gasket
 - Replace
 - Clipped onto the chain tensioner
12. Bolt
 - 5 Nm plus an additional 90° turn
 - Replace
13. Thrust Washer for Drive Sprocket
14. Right Camshaft Timing Chain Drive Sprocket

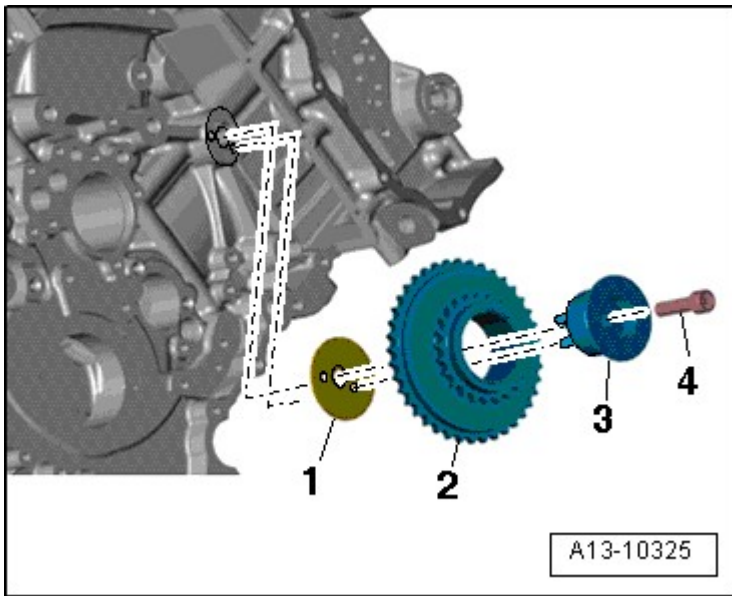


Fig. 3: Locating Camshaft Timing Chain Drive Sprocket Mounting Pins
Courtesy of AUDI OF AMERICA, LLC

- The alignment bushings in the right camshaft timing chain drive sprocket mounting pins -3- must engage in the holes in the thrust washer -1- and cylinder block.

2 - Right camshaft timing chain drive sprocket

4 - Bolt

CYLINDER HEAD OVERVIEW

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



1. Cylinder Head Gasket

- Replacing, refer to **LEFT CYLINDER HEAD, REMOVING** or **RIGHT CYLINDER HEAD, REMOVING**
- Installing, refer to **CYLINDER HEAD, INSTALLING**
- Installed position: Parts number to cylinder head
- After replacing, change coolant and engine oil

2. Cylinder Head

- Removing, refer to **LEFT CYLINDER HEAD, REMOVING**, **RIGHT CYLINDER HEAD, REMOVING**

- Installing, refer to **CYLINDER HEAD, INSTALLING**
 - Check for distortion, refer to **Fig. 8**
 - Reworking dimension, refer to **Fig. 9**
 - After replacing, change coolant and engine oil
3. Cylinder Head Cover Gasket
 - Replace if damaged or leaking
 4. Cylinder Head Cover
 - Removing and installing, refer to **LEFT CYLINDER HEAD COVER, RIGHT CYLINDER HEAD COVER**
 5. Gasket
 - For cap
 - Replace if damaged or leaking
 6. Cover
 7. Ignition Coil
 - Remove with ignition coil puller T40039
 8. Bolt
 - Replace if the seal is damaged
 - Tightening specifications and sequence, refer to **Fig. 5, Fig. 6**
 9. Camshaft Adjustment Valve 2 -N208-
 10. Bolt
 - 2.4 Nm
 11. O-ring
 - Replace
 12. Seal
 - Replace
 13. Drain Plug
 - 35 Nm
 14. Bolt
 - 2.4 Nm
 15. Exhaust Camshaft Adjustment Valve 2 -N319-
 16. O-ring
 - Replace
 17. Bolt
 - Replace
 - Loosening sequence **LEFT CYLINDER HEAD, REMOVING**
 - Tightening specification and sequence, refer to **Fig. 7**

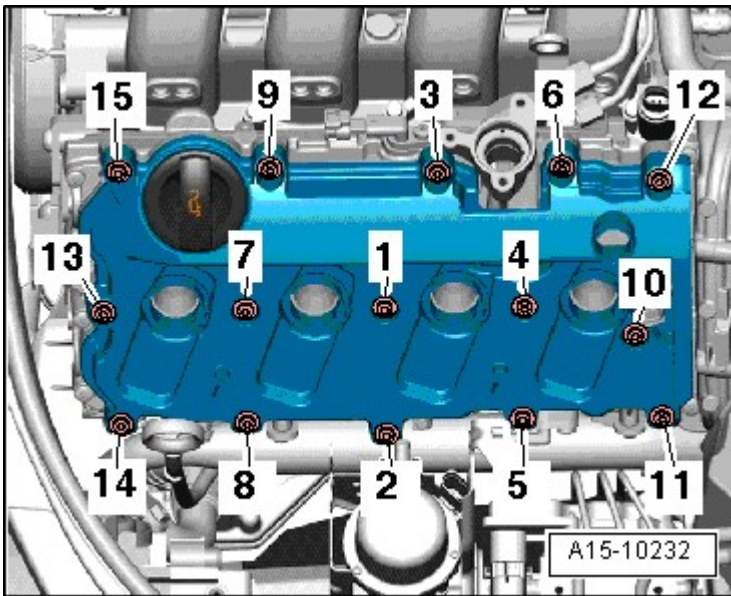


Fig. 5: Identifying Left Cylinder Head Cover Bolts Removal Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the left cylinder head cover bolts to 9 Nm in sequence -1 to 15-.

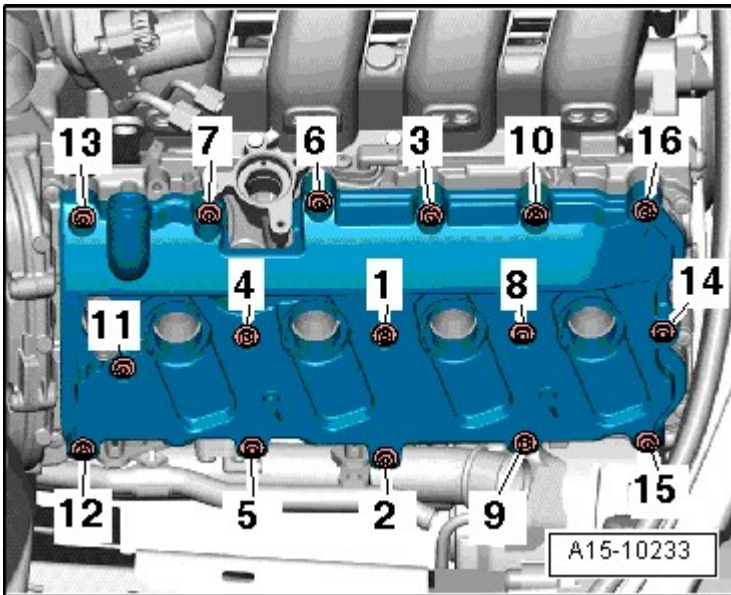


Fig. 6: Identifying Right Cylinder Head Cover Bolts Removal Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the right cylinder head cover bolts to 9 Nm in sequence -1 to 16-.

2009 Audi S5 Quattro

ENGINE 4.2 Liter - Cylinder Head, Valvetrain - Engine Code(s): CAUA (Coupe)

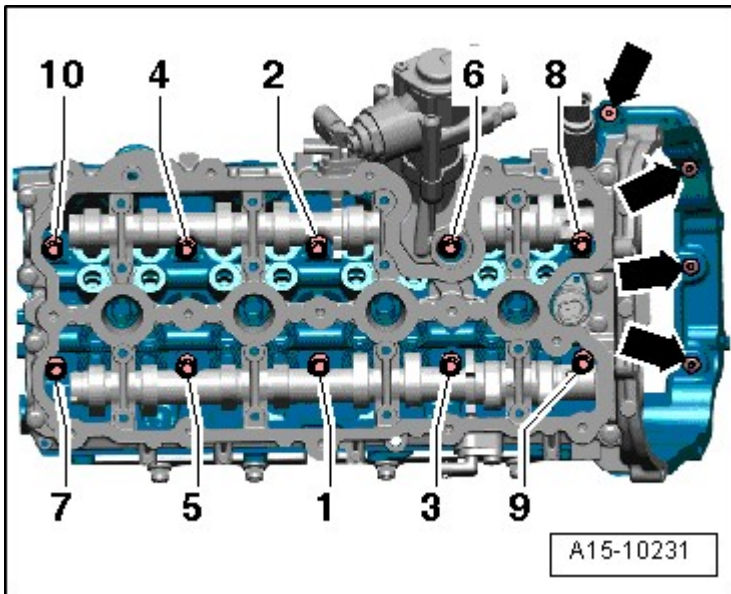


Fig. 7: Identifying Cylinder Head Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

NOTE: Replace bolts that are tightened to the specification.

-- Tighten the bolts in 7 steps in the sequence shown:

Stage	Bolts	Tightening Specification/Additional Turn
1.	-1 through 10-	Install all the way in by hand.
2.	-1 through 10-	30 Nm
3.	-1 through 10-	60 Nm
4.	-1 through 10-	Tighten 90° further
5.	-1 through 10-	Tighten 90° further
6.	-Arrows-	Install using locking fluid, 8 Nm
7.	-Arrows-	Tighten 90° further

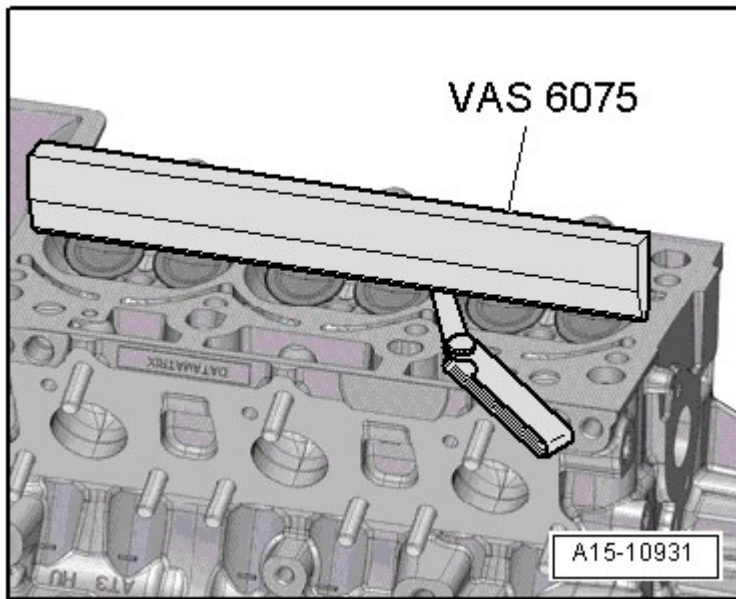


Fig. 8: Checking Cylinder Head Distortion
Courtesy of AUDI OF AMERICA, LLC

-- Check the cylinder head on several locations for distortion using a straight edge 500 mm VAS 6075 and a feeler gauge.

- Maximum permissible distortion: 0.1 mm.

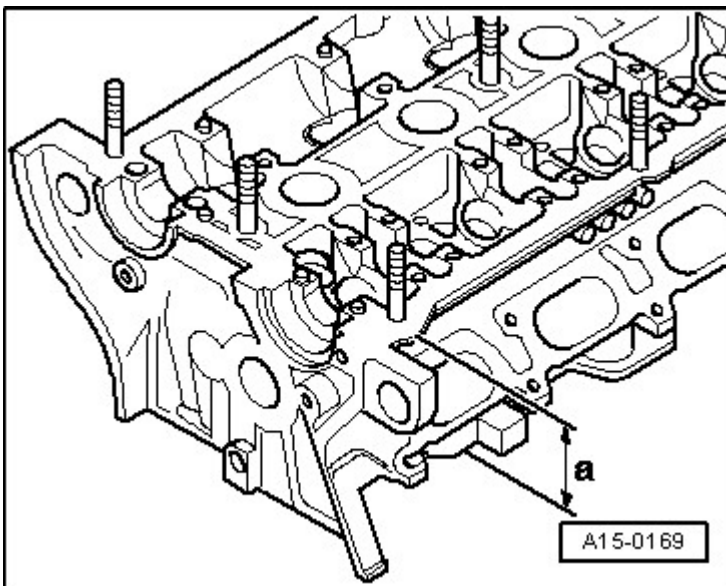


Fig. 9: Identifying Cylinder Head Refacing Dimension
Courtesy of AUDI OF AMERICA, LLC

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

- Minimum dimension -a- = 139.5 mm.

POWER TAKE-OFF OVERVIEW

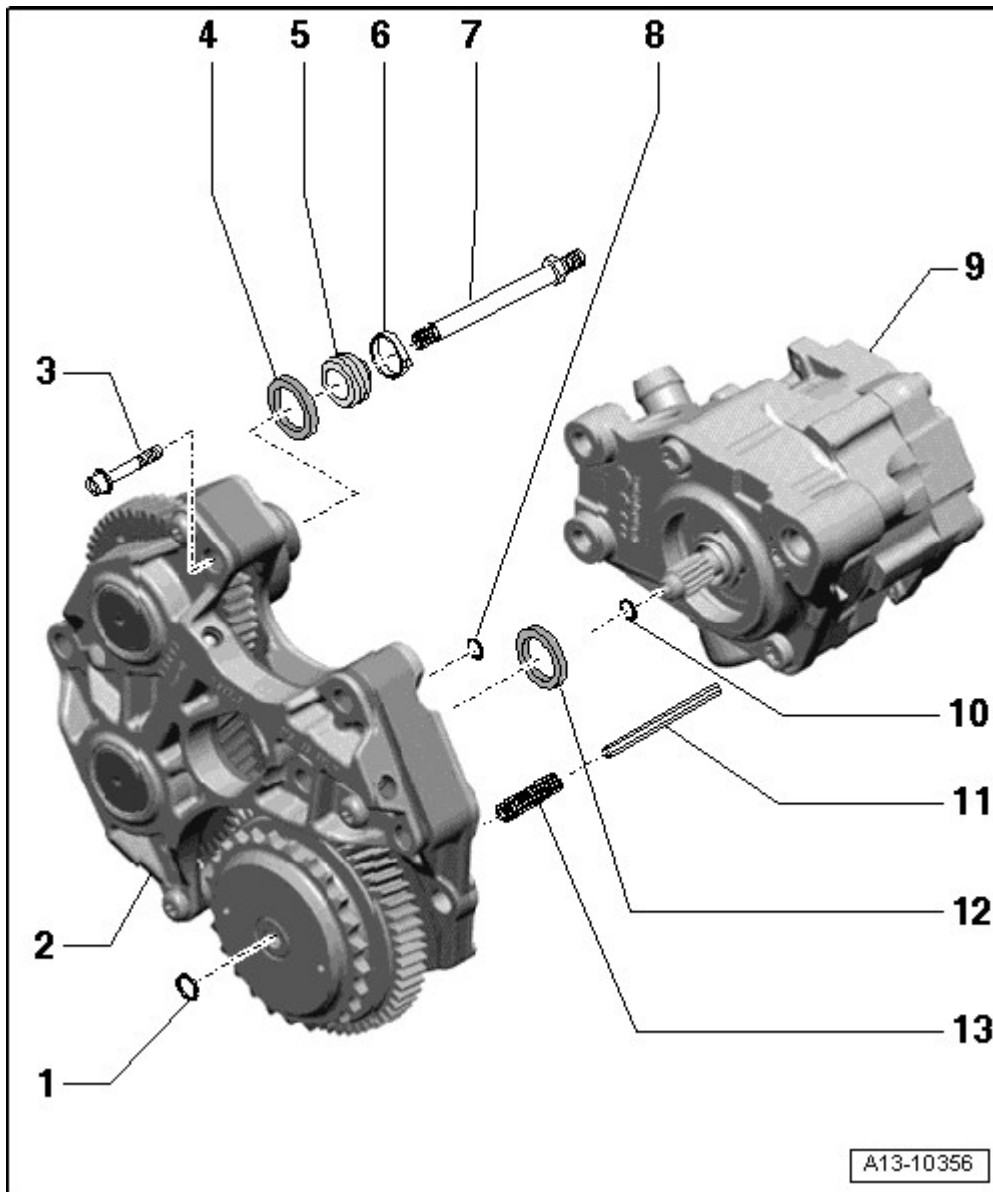


Fig. 10: Power Take-Off Overview

Courtesy of AUDI OF AMERICA, LLC

1. Locking Ring
2. Spur Gear Unit
 - Do not disassemble
 - Removing and installing, refer to **SPUR GEAR UNIT**
 - With semi-circular seal in the power steering pump motor
 - Semi-circular seal installation location, refer to **Fig. 11**
3. Bolt

- Tightening specification and sequence, refer to **Fig. 12**
- 4. Air Conditioning (A/C) Compressor Driveshaft Seal
 - Removing and installing, refer to **A/C COMPRESSOR DRIVE SHAFT SEAL, REPLACING**
- 5. Dust Seal Cap for A/C Compressor Drive
- 6. Clamp
- 7. Driveshaft for A/C Compressor
 - 60 Nm
- 8. O-ring
 - Replace
- 9. Power Steering Pump
- 10. O-ring
 - Replace
- 11. Oil Pump Input Shaft
- 12. Shaft Seal for the Power Steering Pump Drive
 - Removing and installing, refer to **POWER STEERING PUMP DRIVE SEAL**
- 13. Pressure Spring

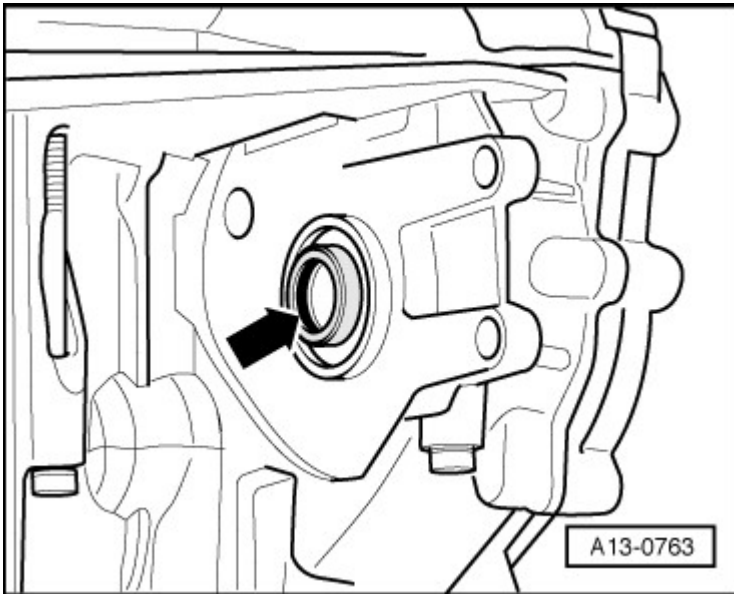


Fig. 11: Checking Power Steering Pump Input Shaft O-Ring
Courtesy of AUDI OF AMERICA, LLC

- In the power steering pump drive -arrow-.

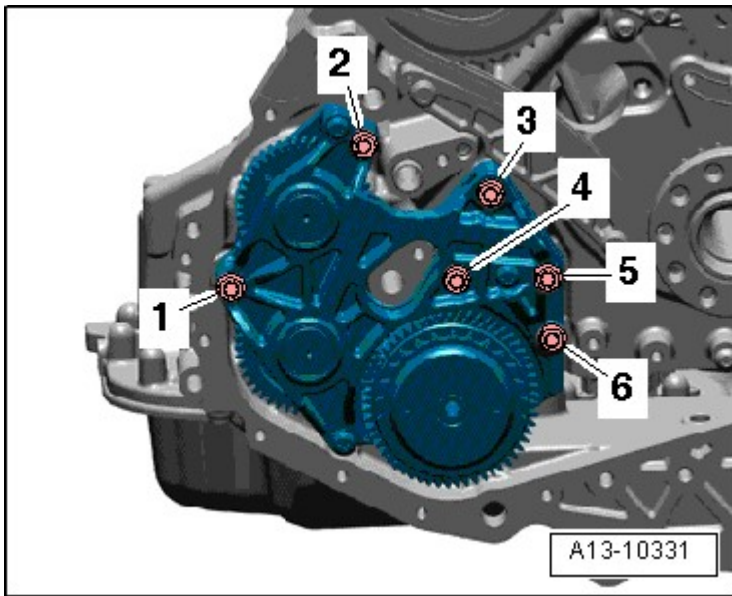


Fig. 12: Identifying Spur Gear Unit Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts -1 to 6- in diagonal sequence to 22 Nm.

POWER TAKE-OFF DRIVE CHAIN OVERVIEW

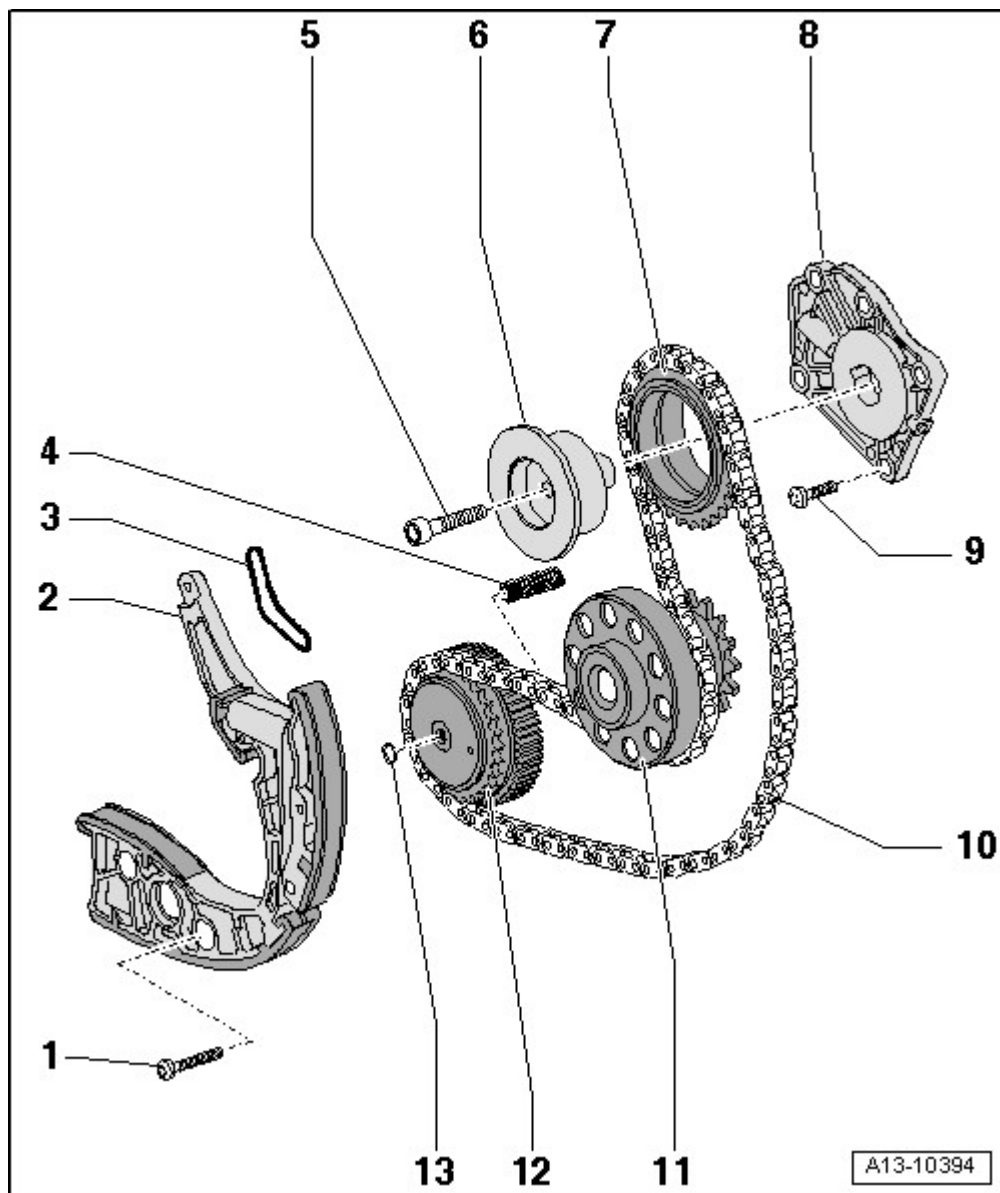


Fig. 13: Identifying Power Take-Off Drive Chain, Assembly Overview
 Courtesy of AUDI OF AMERICA, LLC

1. Bolt
 - 9 Nm
2. Chain Tensioner
 - With glide track
3. Gasket
 - Replace
4. Pressure Spring
5. Bolt
 - 42 Nm

6. Pivot Pin for Idler Sprocket
7. Idler Sprocket for Chain for Power Take-Off
8. Idler Sprocket Mounting Bracket
9. Bolt
 - 9 Nm
10. Power Take-Off Drive Chain
 - Removing and installing, refer to **POWER TAKE-OFF DRIVE CHAIN**
11. Crankshaft
12. Power Take-Off Drive Chain Sprocket
13. Locking Ring

TIMING CHAIN COVERS OVERVIEW

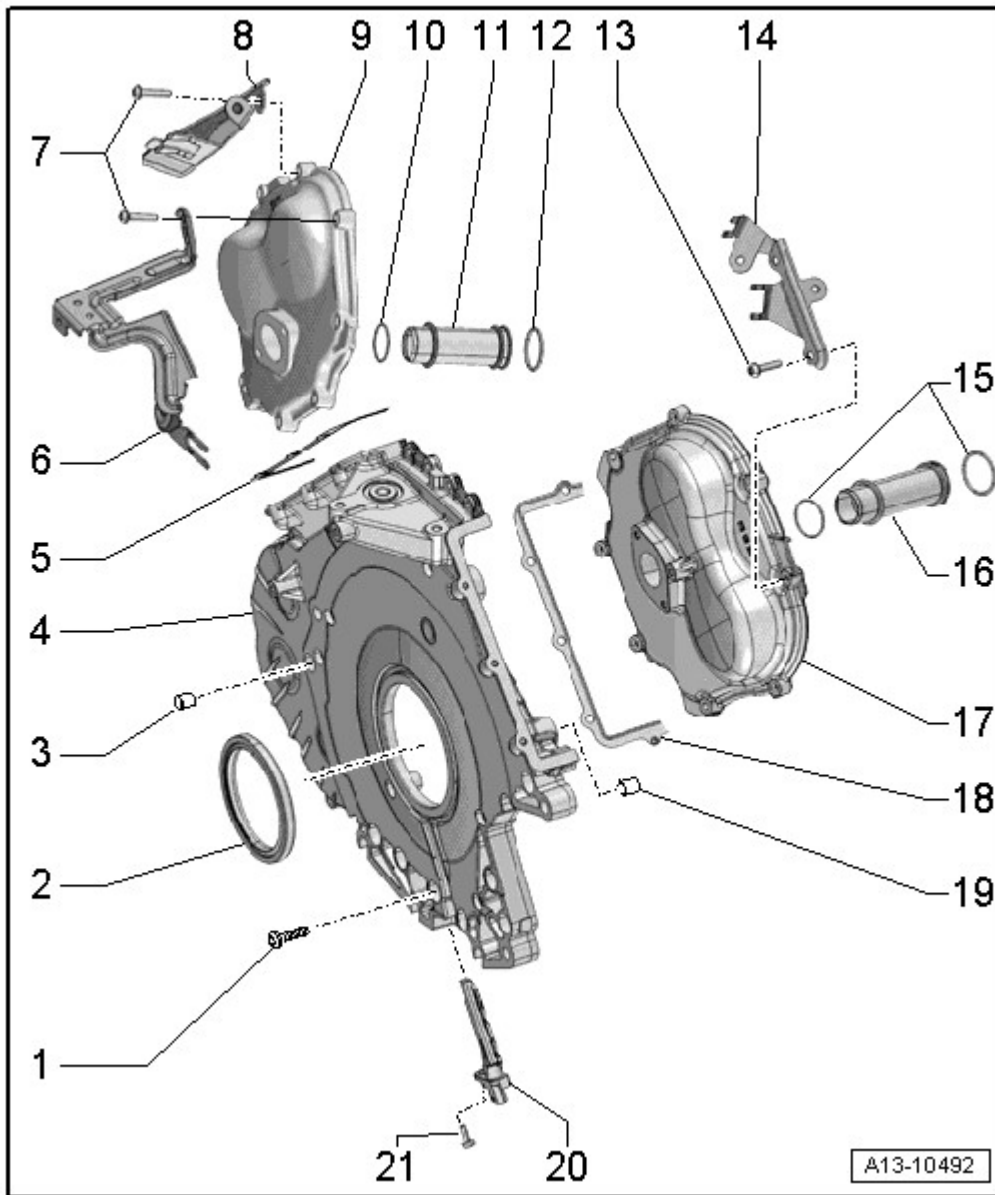


Fig. 14: Timing Chain Covers Overview

Courtesy of AUDI OF AMERICA, LLC

1. Bolt
 - Tightening specification and sequence, refer to **Fig. 17**
2. Crankshaft Shaft Seal, Transmission Side
 - Removing and installing, refer to **CRANKSHAFT SEAL, TRANSMISSION SIDE**
3. Alignment Bushing
 - Quantity: 2
4. Lower Timing Chain Cover
 - Removing and installing, refer to **LOWER TIMING CHAIN COVER**
5. Left Cylinder Head Gasket

6. Bracket
 - For the electrical wiring harness
7. Bolts
 - Tightening specification and sequence, refer to **Fig. 15**
8. Bracket
 - For the left oxygen sensors electrical connectors
9. Left timing Chain Cover
 - Removing and installing, refer to **LEFT TIMING CHAIN COVER**
10. O-ring
 - Replace
11. Left Coolant Intermediate Pipe
 - Remove using a drift
12. O-ring
 - Replace
13. Bolt
 - Tightening specification and sequence, refer to **Fig. 16**
14. Bracket
 - For the right oxygen sensors electrical connectors
15. O-ring
 - Replace
16. Right Coolant Intermediate Pipe
 - Remove using a drift
17. Right Timing Chain Cover
 - Removing and installing, refer to **RIGHT TIMING CHAIN COVER**
18. Right Cylinder Head Gasket
19. Alignment Bushing
 - Quantity: 2
20. Engine Speed (RPM) Sensor -G28-
 - Removing and installing, refer to **REMOVAL AND INSTALLATION**
21. Bolt
 - Tightening specification, refer to **SPECIFICATIONS**

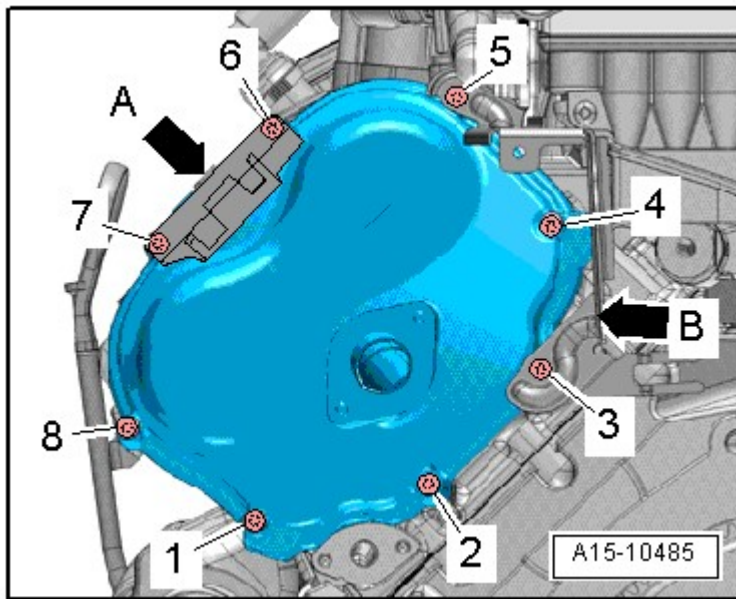


Fig. 15: Identifying Left Timing Chain Cover Tightening Sequence
 Courtesy of AUDI OF AMERICA, LLC

-- Tighten left timing chain cover bolts to 9 Nm in sequence. -1 to 8-

NOTE: The brackets -arrows A, B- are connected with the left timing chain cover.

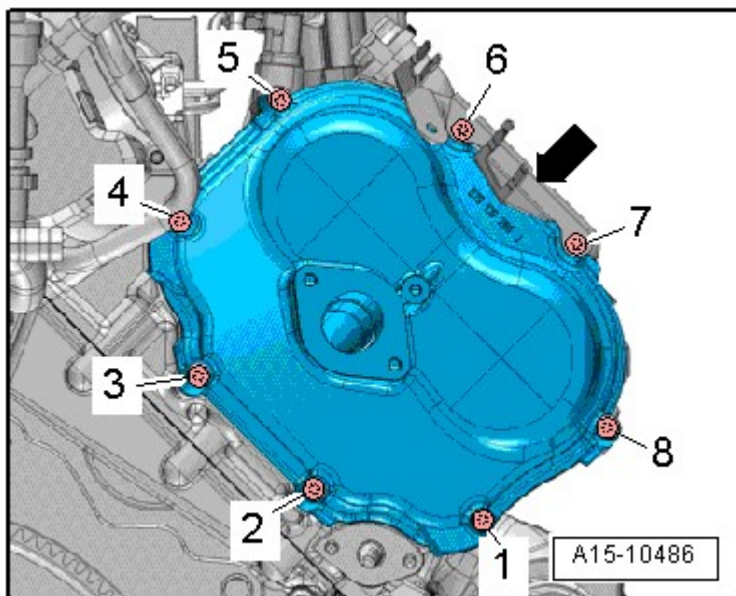


Fig. 16: Identifying Right Timing Chain Cover Tightening Sequence
 Courtesy of AUDI OF AMERICA, LLC

-- Tighten right timing chain cover bolts to 9 Nm in sequence -1 to 8-.

NOTE: The bracket -arrow- is connect with the right timing chain cover.

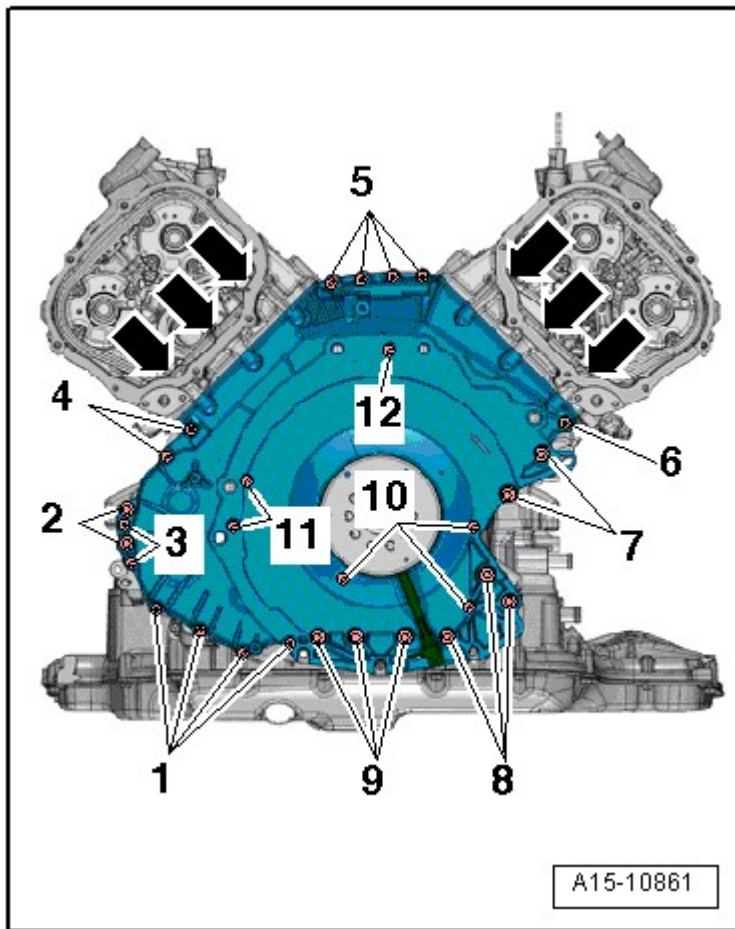


Fig. 17: Identifying Lower Timing Chain Cover Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

NOTE: Replace bolts that are tightened to the specification.

-- Tighten bolts in 6 stages as follows:

Stage	Bolts	Tightening Specification/Additional Turn
1.	-Arrows-	Install using locking fluid, 5 Nm
2.	-1 through 12-	8 Nm in a diagonal sequence
3.	-Arrows-	8 Nm
4.	-2, 7, 8, 9-	22 Nm in a diagonal sequence
5.	-1, 3, 4, 5, 6, 10, 11, 12-	in a diagonal sequence, turn an additional 90°
6.	-Arrows-	Tighten 90° further

TIMING MECHANISM DRIVE CHAIN OVERVIEW

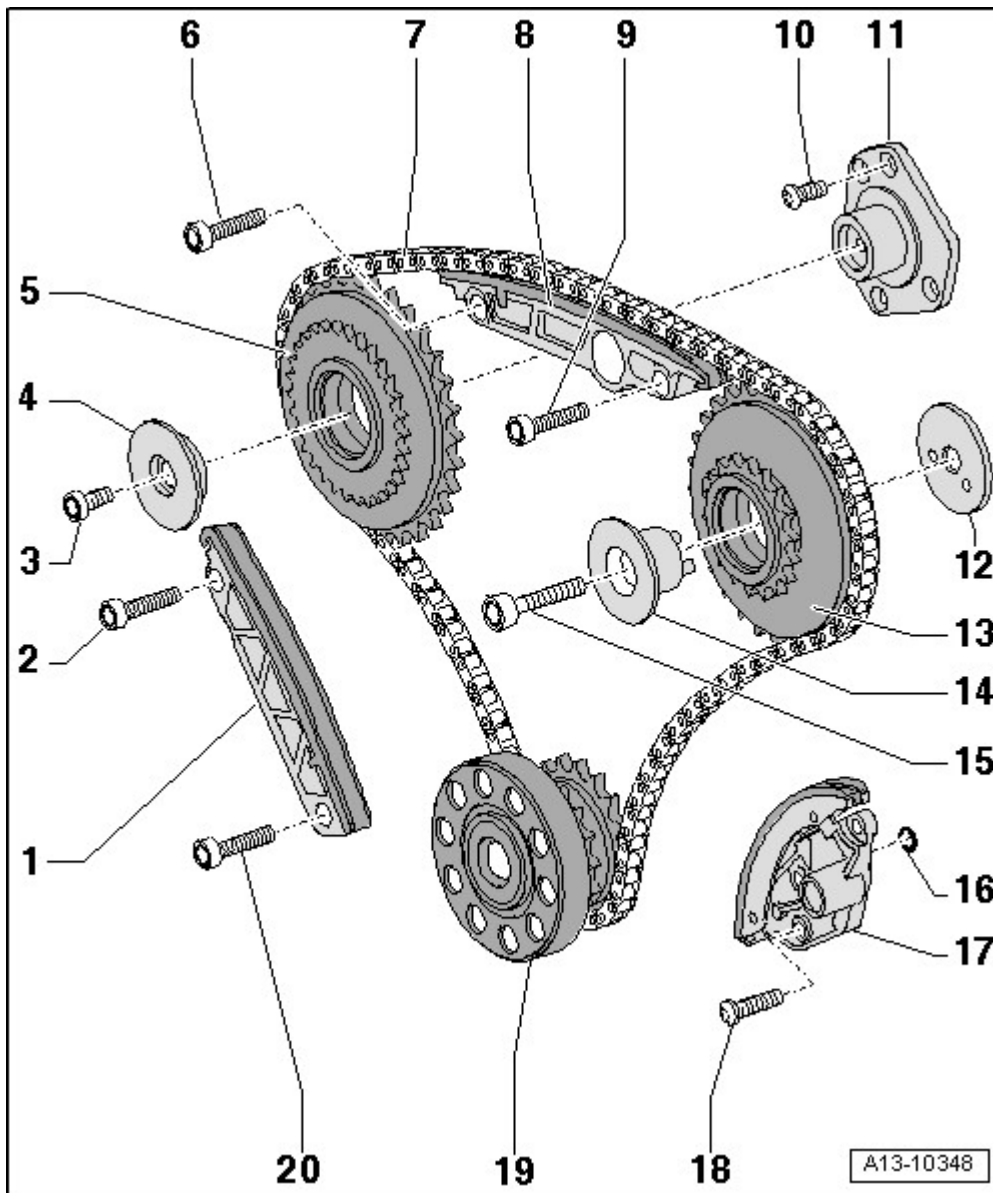


Fig. 18: Timing Mechanism Drive Chain Overview

Courtesy of AUDI OF AMERICA, LLC

1. Guide Rail
2. Bolt
 - 10 Nm plus an additional 90° turn
 - Replace
3. Bolt
 - 22 Nm
4. Thrust Washer for Drive Sprocket
5. Drive Sprocket for Left Timing Chain
6. Bolt

- 10 Nm plus an additional 90° turn
 - Replace
7. Power Take-Off Drive Chain
 - Removing and installing, refer to **TIMING MECHANISM DRIVE CHAIN**
 8. Guide Rail
 9. Bolt
 - 10 Nm plus an additional 90° turn
 - Replace
 10. Bolt
 - 9 Nm
 11. Pivot Pin for Drive Sprocket
 - For the right camshaft timing chain
 - Asymmetrical version
 - Installed position, refer to **Fig. 19**
 12. Thrust Washer
 13. Drive Sprocket for Right Timing Chain
 14. Pivot Pin for Drive Sprocket
 15. Bolt
 - 42 Nm
 16. O-ring
 - Replace
 17. Chain Tensioner
 18. Bolt
 - 5 Nm plus an additional 90° turn
 - Replace
 19. Crankshaft
 20. Bolt
 - 10 Nm plus an additional 90° turn
 - Replace

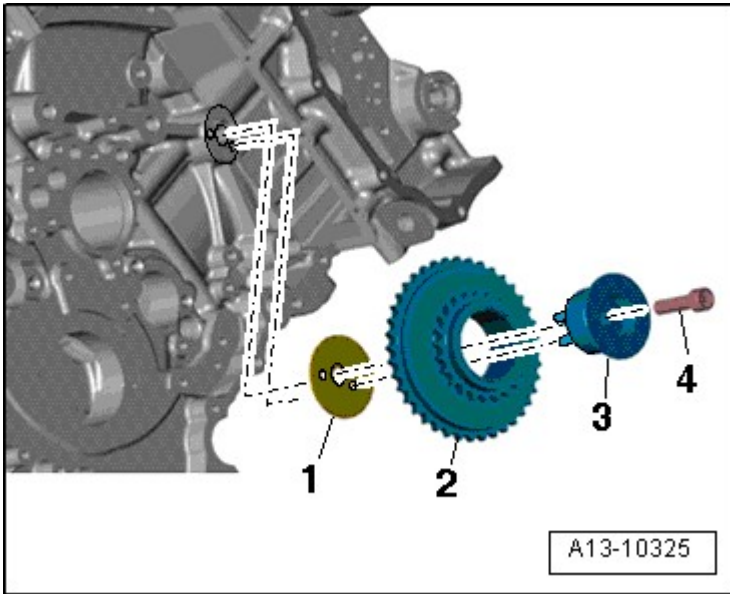


Fig. 19: Locating Camshaft Timing Chain Drive Sprocket Mounting Pins
 Courtesy of AUDI OF AMERICA, LLC

- The alignment bushings in the right camshaft timing chain drive sprocket mounting pins -3- must engage in the holes in the thrust washer -1- and cylinder block.

2 - Right camshaft timing chain drive sprocket

4 - Bolt

VALVETRAIN OVERVIEW

CAUTION: Risk of damaging valves and piston heads after working on the valve train.

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

NOTE: Cylinder heads with cracks between valve seats or between valve seat and spark plug thread can still be used without loss of service life if the cracks are minute (max. 0.3 mm width) or only the first four threads of a spark plug thread are cracked.

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

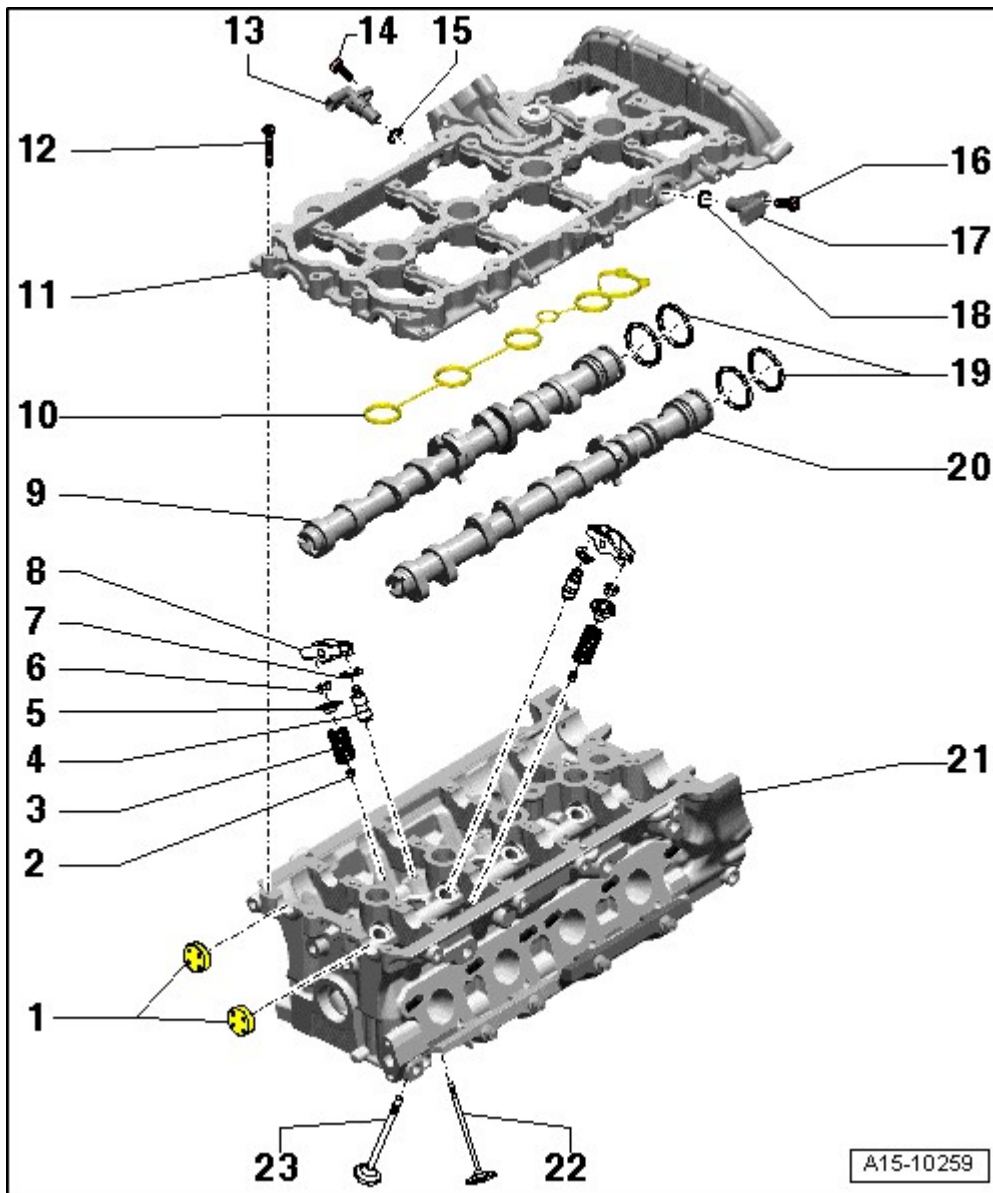


Fig. 20: Valvetrain Overview

Courtesy of AUDI OF AMERICA, LLC

1. Sealing Plug
2. Valve Stem Seal
 - Replace, refer to **VALVE STEM SEALS WITH CYLINDER HEAD INSTALLED, REPLACING, VALVE STEM SEALS WITH CYLINDER HEAR REMOVED, REPLACING**
3. Valve Spring
 - Installed position, refer to **Fig. 22**
4. Hydraulic Adjusting Elements
 - Clipped into roller rocker lever -8-

- Checking, refer to **HYDRAULIC ADJUSTING ELEMENTS, CHECKING**
 - Mark the installation position with paint for reinstallation
 - Lubricate the running surfaces before installing
5. Valve Spring Plate
 6. Valve Retainers
 7. Clip
 - Not available individually
 - Make sure it is secure
 8. Roller Rocker Lever
 - Mark the installation position with paint for reinstallation
 - Check roller for easy movement
 - Lubricate the running surfaces before installing
 - Clip to the hydraulic adjusting element -4- with the clip -7-
 9. Intake Camshaft
 - Removing and installing, refer to **CAMSHAFTS**
 - Measuring axial play, refer to **CAMSHAFT, MEASURING AXIAL CLEARANCE**
 - Radial clearance, measuring, refer to **CAMSHAFT, MEASURING RADIAL CLEARANCE**
 - Maximum run out: 0.04 mm
 10. Gasket
 - Replace
 11. Guide Frame
 - With integrated camshaft bearings
 - Removing and installing, refer to **CAMSHAFTS**
 12. Bolt
 - Replace
 - Tightening specification and sequence, refer to **Fig. 21**
 13. Camshaft Position (CMP) Sensor 2 -G163-
 14. Bolt
 - Tightening specification, refer to **SPECIFICATIONS**
 15. O-ring
 - Replace
 16. Bolt
 - Tightening specification, refer to **SPECIFICATIONS**
 17. Camshaft Position (CMP) Sensor 4 -G301-
 18. O-ring
 - Replace
 19. Compression Ring
 - For camshaft adjuster

20. Exhaust Camshaft

- Removing and installing, refer to **CAMSHAFTS**
- Measuring axial play, refer to **CAMSHAFT, MEASURING AXIAL CLEARANCE**
- Radial clearance, measuring; refer to **CAMSHAFT, MEASURING RADIAL CLEARANCE**
- Maximum run out: 0.04 mm

21. Cylinder Head

- Valve guides, checking, refer to **VALVE GUIDES, CHECKING**

22. Intake Valve

- Do not rework, only lapping is permitted
- Mark the installed position for installation later
- For the correct valve dimensions, refer to **VALVE DIMENSIONS**
- Valve guides, checking, refer to **VALVE GUIDES, CHECKING**

23. Exhaust Valve

- Do not rework, only lapping is permitted
- Mark the installed position for installation later
- For the correct valve dimensions, refer to **VALVE DIMENSIONS**
- Valve guides, checking, refer to **VALVE GUIDES, CHECKING**

2009 Audi S5 Quattro

ENGINE 4.2 Liter - Cylinder Head, Valvetrain - Engine Code(s): CAUA (Coupe)

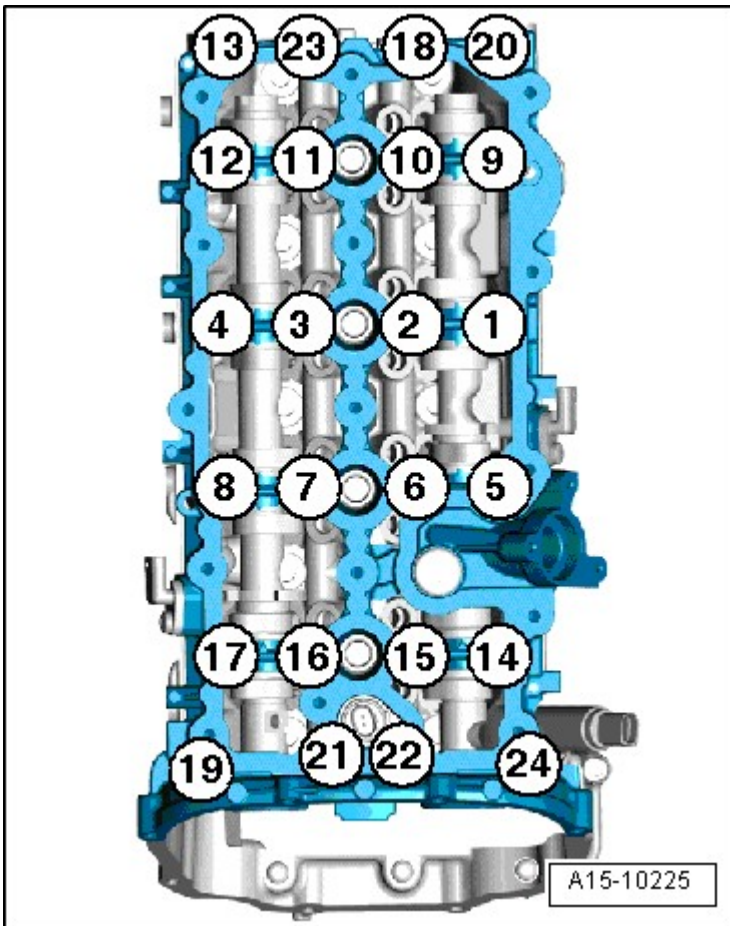


Fig. 21: Identifying Camshaft Guide Frame Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

NOTE: Replace bolts that are tightened to the specification.

-- Tighten the bolts in 3 steps in the sequence shown:

Stage	Bolts	Tightening Specification/Additional Turn
1.	-1 to 24-	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 to 24-	8 Nm
3.	-1 to 24-	Tighten 90° further

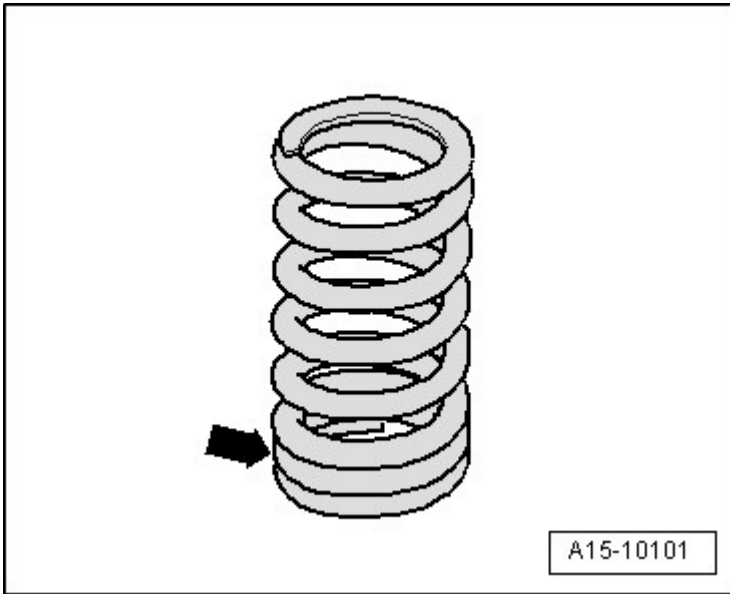


Fig. 22: Identifying Tight Spring Coils
Courtesy of AUDI OF AMERICA, LLC

- The tight spring coils -arrow- face toward the cylinder head.

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Components	Fastener Size	Nm
Camshaft Adjuster for Exhaust Camshaft ¹	-	80 + 90°
Camshaft Adjuster for Intake Camshaft ¹	-	80 + 90°
Camshaft Adjustment Valve 2	-	2.4
Chain Tensioner ¹	-	5 + 90°
Chain Tensioner with glide track	-	9
Drain Plug	-	35
Driveshaft for A/C Compressor	-	60
Exhaust Camshaft Adjustment Valve 2	-	2.4
Guide Rail ²		
1	-	10 + 90°
	-	22
Guide Rail ³	-	10 + 90°
Idler Sprocket Mounting Bracket	-	9
Left Camshaft Timing Chain Tensioner ¹	-	5 + 90°
Pivot Pin for Drive Sprocket for Left Timing Chain	-	9
Pivot Pin for Drive sprocket for right timing chain	-	42

2009 Audi S5 Quattro

ENGINE 4.2 Liter - Cylinder Head, Valvetrain - Engine Code(s): CAUA (Coupe)

Pivot Pin for Idler Sprocket	-	42
Right Camshaft Timing Chain Tensioner ¹	-	5 + 90°
¹ Replace ² For bolt tightening clarification, refer to <u>TIMING MECHANISM DRIVE CHAIN OVERVIEW</u> and items -1, 2 and 3- ³ For bolt tightening clarification, refer to <u>TIMING MECHANISM DRIVE CHAIN OVERVIEW</u> and items -6, 8 and 9-		

LEFT CYLINDER HEAD COVER, TIGHTENING SPECIFICATIONS AND SEQUENCE

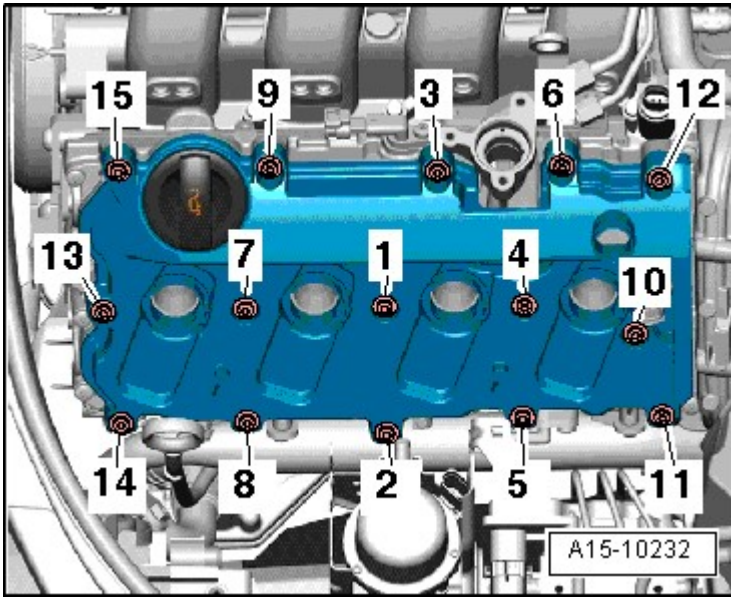


Fig. 23: Identifying Left Cylinder Head Cover Bolts Removal Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the left cylinder head cover bolts to 9 Nm in sequence -1 to 15-.

RIGHT CYLINDER HEAD COVER, TIGHTENING SPECIFICATIONS AND SEQUENCE

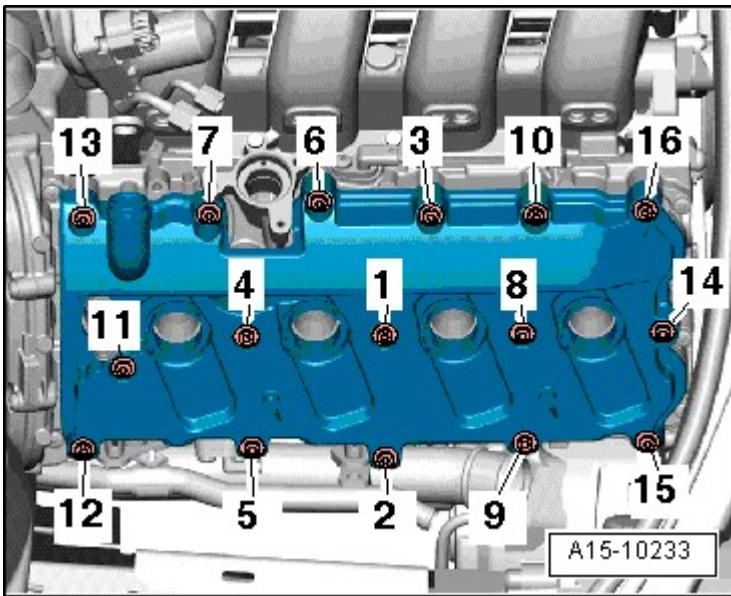


Fig. 24: Identifying Right Cylinder Head Cover Bolts Removal Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the right cylinder head cover bolts to 9 Nm in sequence -1 to 16-.

CYLINDER HEAD, TIGHTENING SPECIFICATIONS AND SEQUENCE

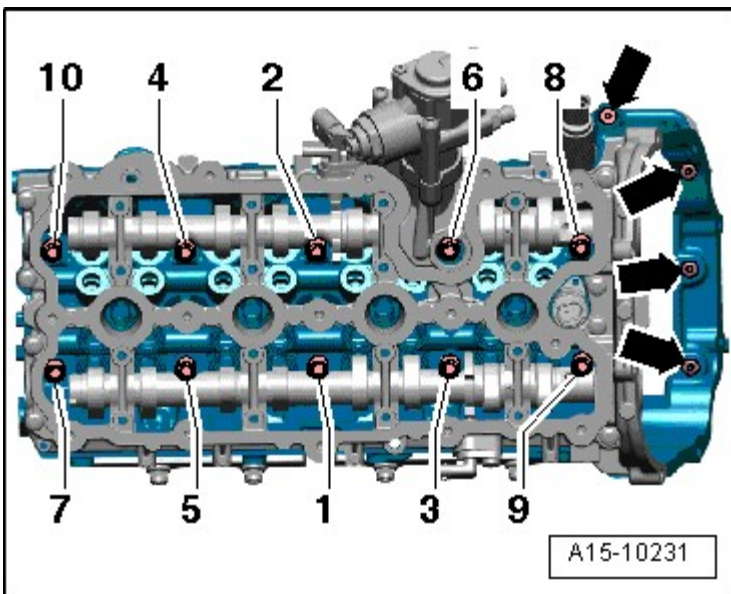


Fig. 25: Identifying Cylinder Head Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

NOTE: Replace bolts that are tightened to the specification.

-- Tighten the bolts in 7 steps in the sequence shown:

2009 Audi S5 Quattro

ENGINE 4.2 Liter - Cylinder Head, Valvetrain - Engine Code(s): CAUA (Coupe)

Stage	Bolts	Tightening Specification/Additional Turn
1.	-1 through 10-	Install all the way in by hand.
2.	-1 through 10-	30 Nm
3.	-1 through 10-	60 Nm
4.	-1 through 10-	Tighten 90° further
5.	-1 through 10-	Tighten 90° further
6.	-Arrows-	Install using locking fluid, 8 Nm
7.	-Arrows-	Tighten 90° further

SPUR GEAR UNIT, TIGHTENING SPECIFICATIONS AND SEQUENCE

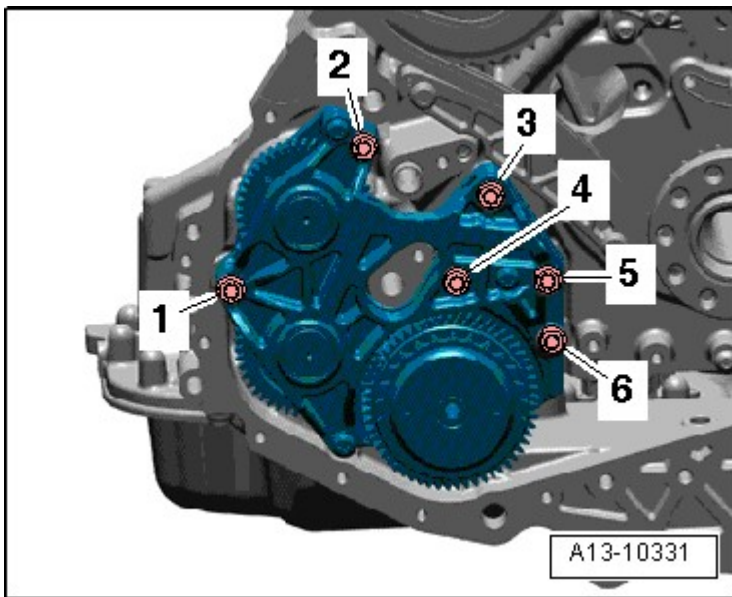


Fig. 26: Identifying Spur Gear Unit Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the bolts -1 to 6- in diagonal sequence to 22 Nm.

LEFT TIMING CHAIN COVER, TIGHTENING SPECIFICATIONS AND SEQUENCE

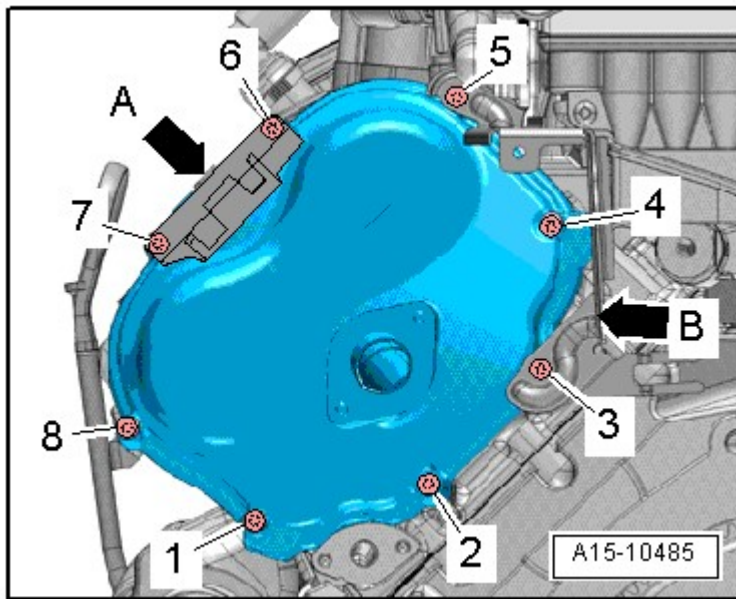


Fig. 27: Identifying Left Timing Chain Cover Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten left timing chain cover bolts to 9 Nm in -1 to 8- sequence.

NOTE: The brackets -arrows A, B- are connected with the left timing chain cover.

RIGHT TIMING CHAIN COVER, TIGHTENING SPECIFICATIONS AND SEQUENCE

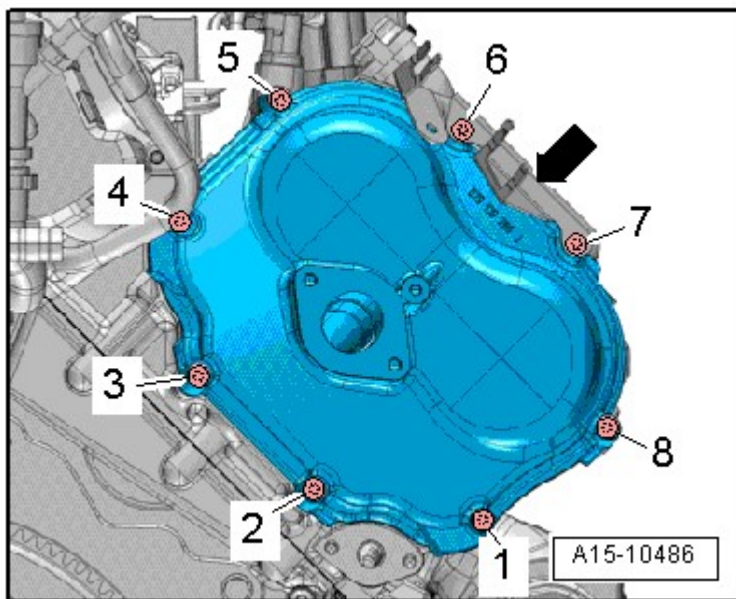


Fig. 28: Identifying Right Timing Chain Cover Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Tighten right timing chain cover bolts to 9 Nm in -1 to 8- sequence.

NOTE: The bracket -arrow- is connect with the right timing chain cover.

LOWER TIMING CHAIN COVER, TIGHTENING SPECIFICATIONS AND SEQUENCE

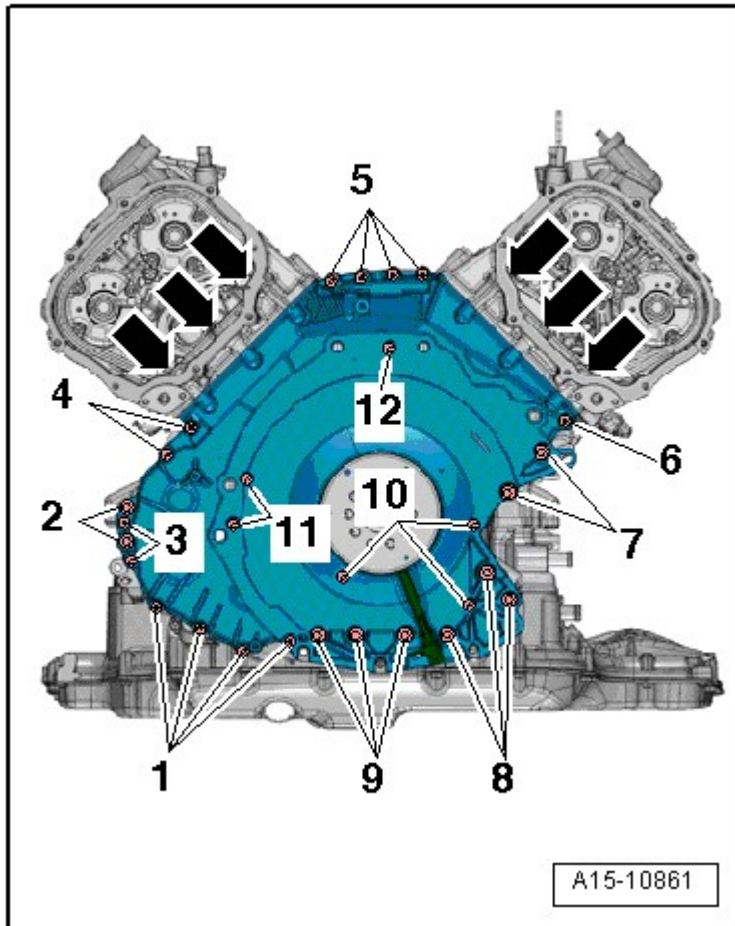


Fig. 29: Identifying Lower Timing Chain Cover Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

NOTE: Replace bolts that are tightened to the specification.

-- Tighten bolts in 6 stages as follows:

Stage	Bolts	Tightening Specification/Additional Turn
1.	-Arrows-	Install using locking fluid, 5 Nm
2.	-1 through 12-	8 Nm in a diagonal sequence
3.	-Arrows-	8 Nm
4.	-2, 7, 8, 9-	22 Nm in a diagonal sequence
5.	-1, 3, 4, 5, 6, 10, 11, 12-	in a diagonal sequence, turn an additional 90°

6. -Arrows- Tighten 90° further

CAMSHAFT GUIDE FRAME, TIGHTENING SPECIFICATIONS AND SEQUENCE

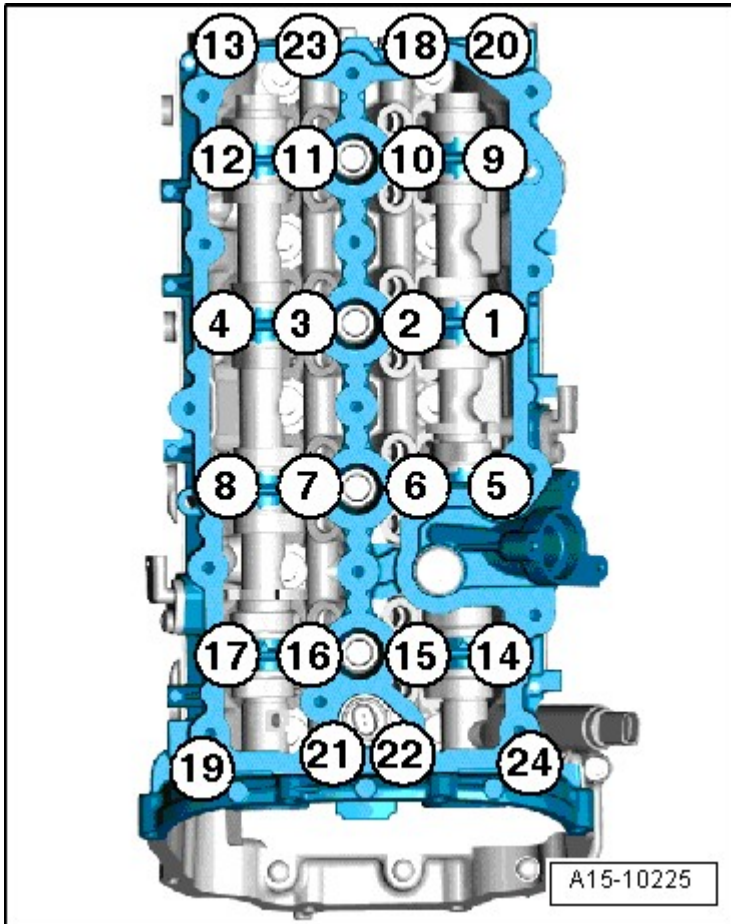


Fig. 30: Identifying Camshaft Guide Frame Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

NOTE: Replace bolts that are tightened to the specification.

-- Tighten the bolts in 3 steps in the sequence shown:

Stage	Bolts	Tightening Specification/Additional Turn
1.	-1 to 24-	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 to 24-	8 Nm
3.	-1 to 24-	Tighten 90° further

VALVE DIMENSIONS

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

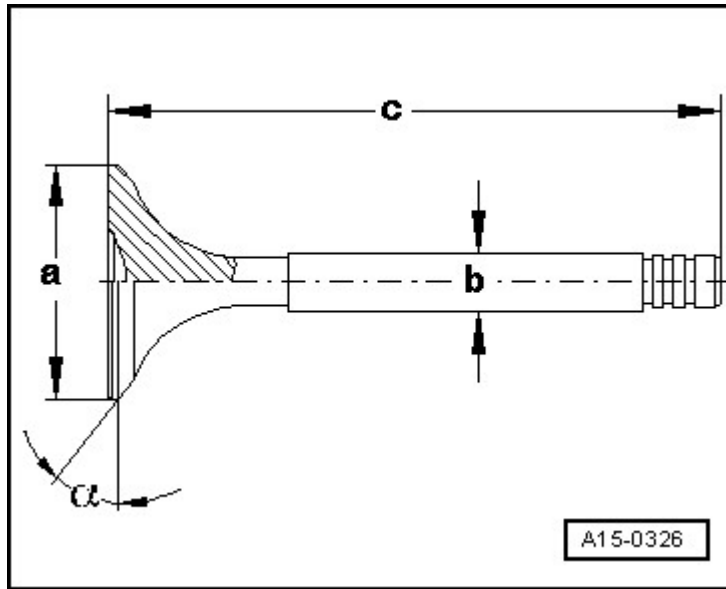


Fig. 31: Identifying Valve Dimensions
Courtesy of AUDI OF AMERICA, LLC

Dimension		Intake Valve	Exhaust Valve
Diameter a	mm	33.85 ± 0.10	28.0 ± 0.1
Diameter b	mm	5.98 ± 0.01	5.96 ± 0.01
c	mm	103.97 ± 0.20	101.9 ± 0.2
a	Angle°	45	45

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

- Cut the 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.

DIAGNOSIS AND TESTING

CAMSHAFT, MEASURING AXIAL CLEARANCE

SPECIAL TOOLS AND WORKSHOP EQUIPMENT REQUIRED

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

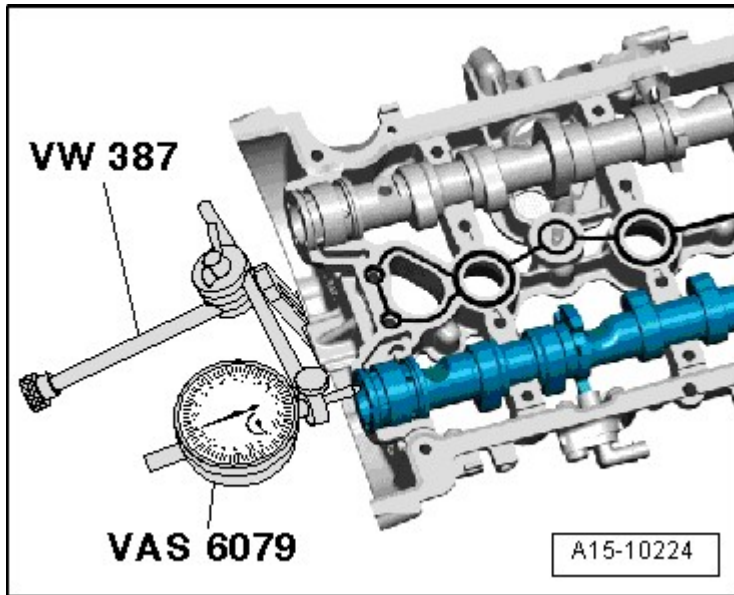
PROCEDURE

Fig. 32: Securing Dial Gauge Holder VW 387 To Dial Gauge VAS 6079 On Cylinder Head
Courtesy of AUDI OF AMERICA, LLC

- Measure with the guide frame removed.
- Secure the VW 387 with the VAS 6079 on the cylinder head as shown in the illustration.
- Determine the axial play.
 - Axial clearance: 0.100 to 0.191 mm.

CAMSHAFT, MEASURING RADIAL CLEARANCE**SPECIAL TOOLS AND WORKSHOP EQUIPMENT REQUIRED**

- Plastigage

PROCEDURE

- Remove the camshafts. Refer to **CAMSHAFTS**.
- Mark the assignment of the roller rocker lever for installation later.
- Remove the roller rocker lever and place it on a clean surface.

-- 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.

-- Install the camshafts, mount the bearing bracket and tighten to 8 Nm without an additional turn, do not turn the camshafts while doing this. Refer to **Fig. 21**.

-- Remove the bearing bracket and camshafts.

-- Compare width of Plastigage with calibrated scale.

Radial clearance:

- For 24 mm diameter bearings: 0.024 to 0.066 mm
- For 36 mm diameter bearings: 0.032 to 0.078 mm

COMPRESSION, CHECKING**Special tools and workshop equipment required**

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

PROCEDURE

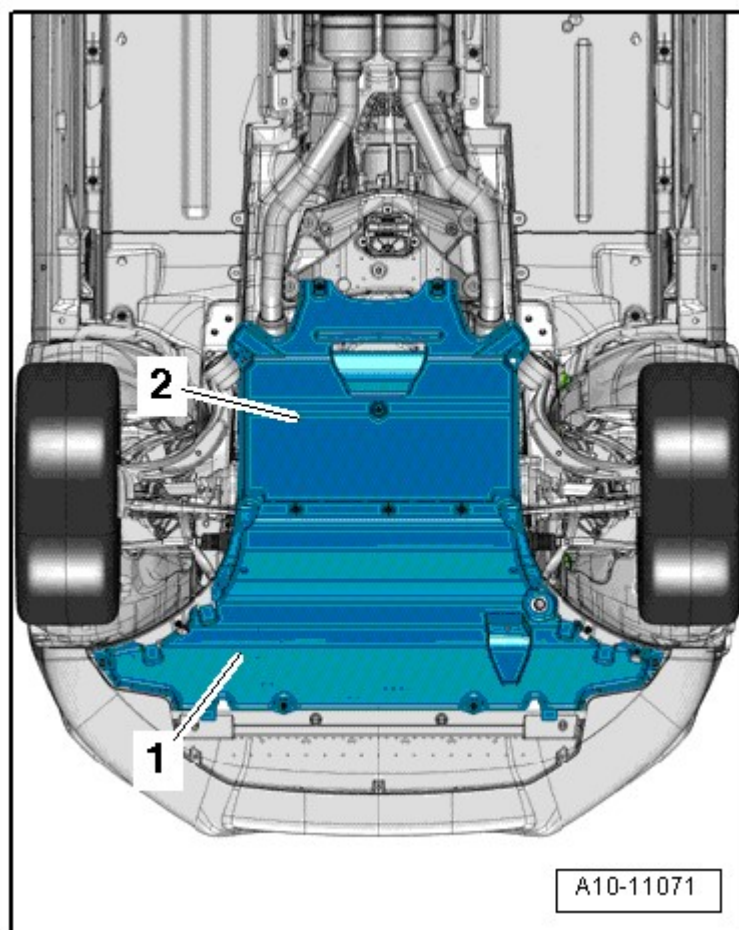


Fig. 33: Identifying Automatic Transmission Fluid Oil Pan
Courtesy of AUDI OF AMERICA, LLC

- Engine oil temperature at least 30 °C (86 °F).
- Battery voltage at least 12.5 V.

-- Remove the rear noise insulation -2-. Refer to **Description and Operation** in Underbody Trim.

-- Disconnect the electrical connector -2- on the Engine Speed (RPM) sensor -G28-.

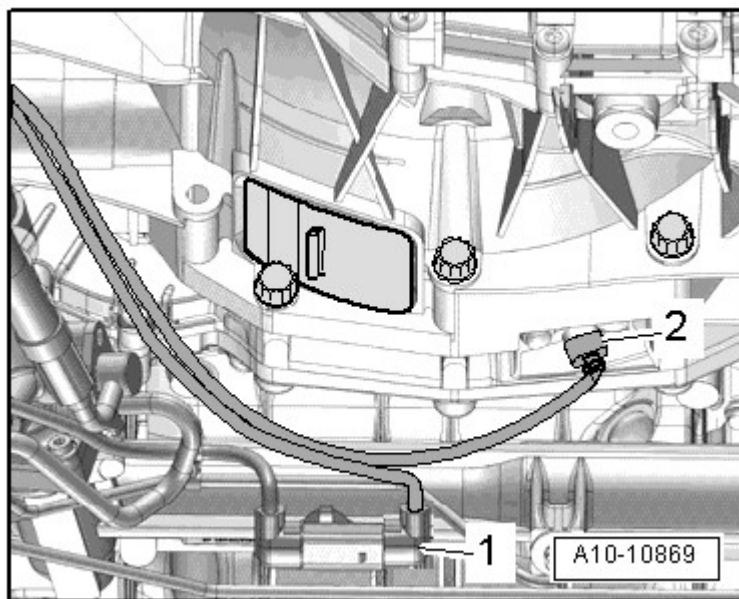


Fig. 34: Disconnecting Engine Speed (RPM) Sensor Connector
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1-.

-- Remove the air duct -arrows-.

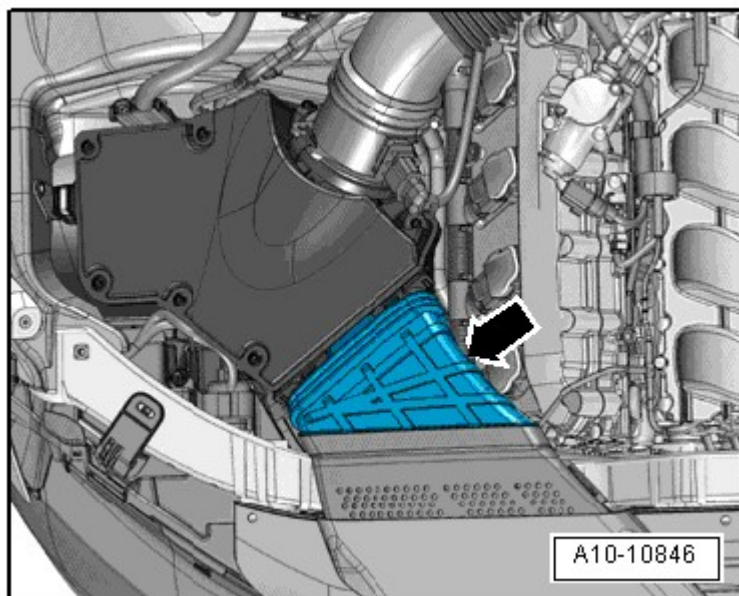


Fig. 35: Identifying Air Duct
Courtesy of AUDI OF AMERICA, LLC

-- Free up the fuel line and the line to the EVAP canister on the air guide pipe.

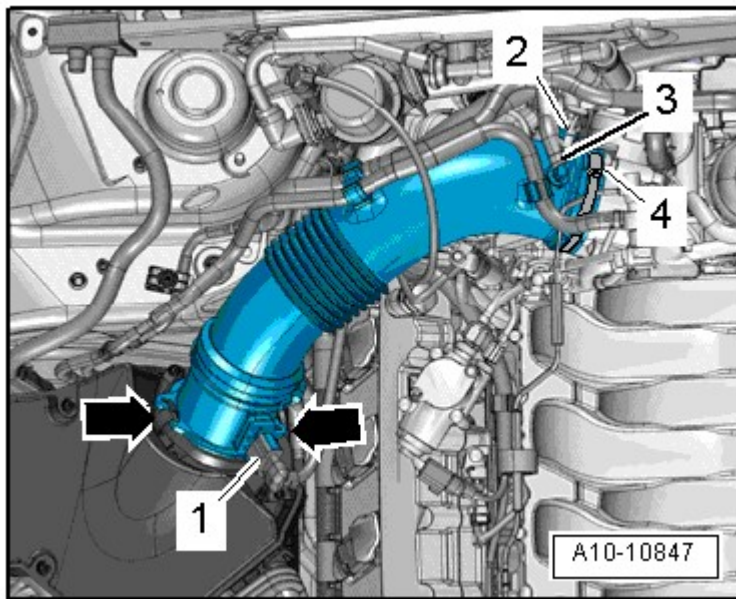


Fig. 36: Disconnecting Mass Airflow (MAF) Sensor Connector
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the connector -1- from the Mass Airflow (MAF) sensor -G70-.
- Disconnect the vacuum line -3- from the air guide pipe.

CAUTION: Risk of violating emissions legislation.

- **Do not open hose connection -2- !**

- Lay aside air guide pipe with connected crankcase ventilation hose -2- by loosening hose clamp -4- and opening clips -arrows-.
- Disconnect the vacuum line -1-.

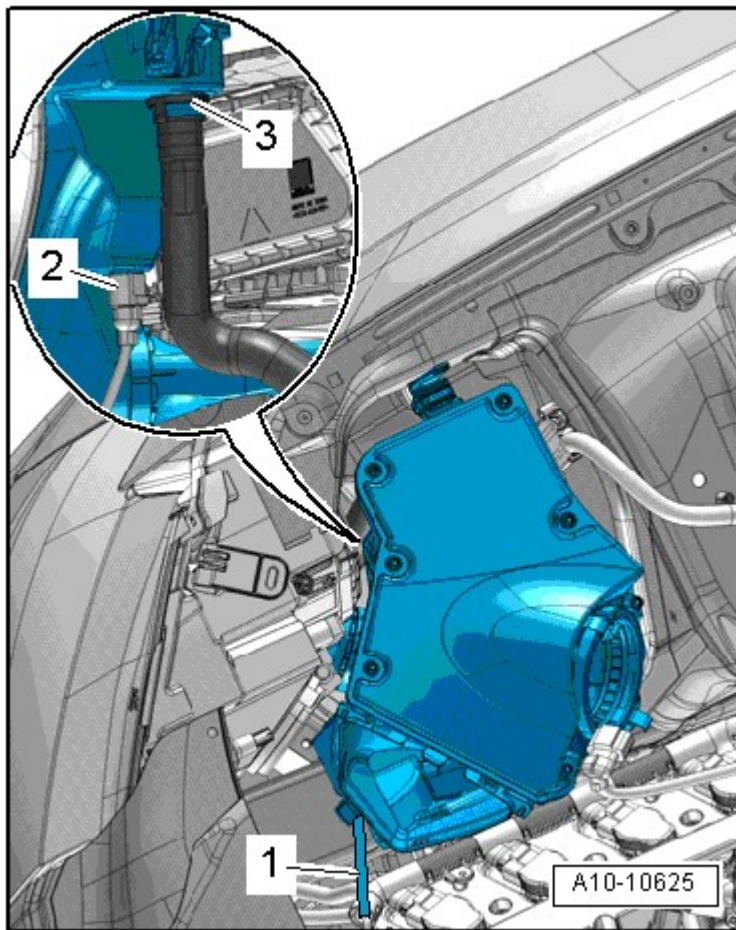


Fig. 37: Identifying Secondary Air System Components
 Courtesy of AUDI OF AMERICA, LLC

- Remove the air filter housing and disconnect the electrical connector -2- on the rear side at the intake air switch-over valve -N335-.
- Remove hose -3- from the secondary air system.
- Disconnect the coolant hose -3- from the coolant overflow reservoir.

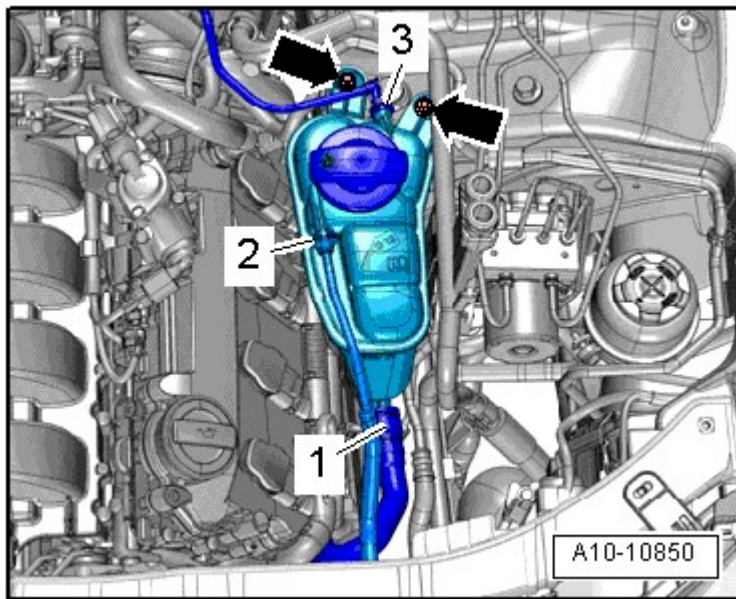


Fig. 38: Identifying Coolant Reservoir Components
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows-.

-- Disconnect the electrical connector on the engine coolant lever warning switch -F66- and move the coolant overflow reservoir with the coolant hoses -1 and 2- still connected to the side.

-- Pull the oil dipstick -1- out of the guide tube.

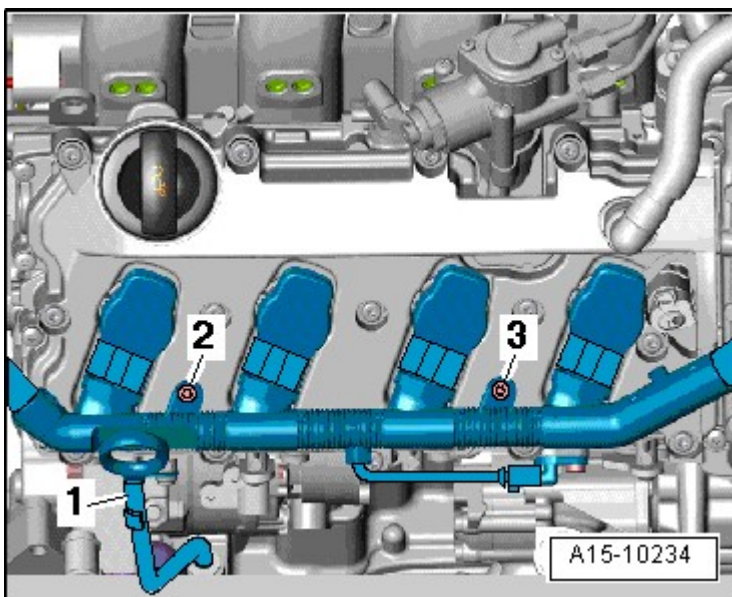


Fig. 39: Identifying Oil Dipstick, Bolts & Ignition Coils Electrical Harness Connectors
Courtesy of AUDI OF AMERICA, LLC

- Remove the bolts -2 and 3-.
- Disconnect the electrical connectors on the ignition coils.
- Press the electrical wiring harness to the side.
- Remove the bolts -1 and 2-.

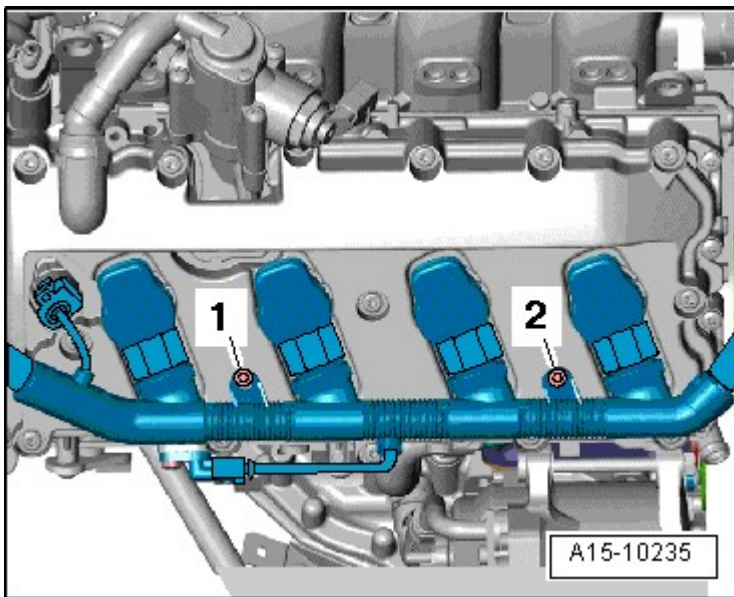


Fig. 40: Identifying Ignition Coil Harness Bolts
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the electrical connectors on the ignition coils.
- Press the electrical wiring harness to the side.
- Remove all the ignition coils with the T40039.

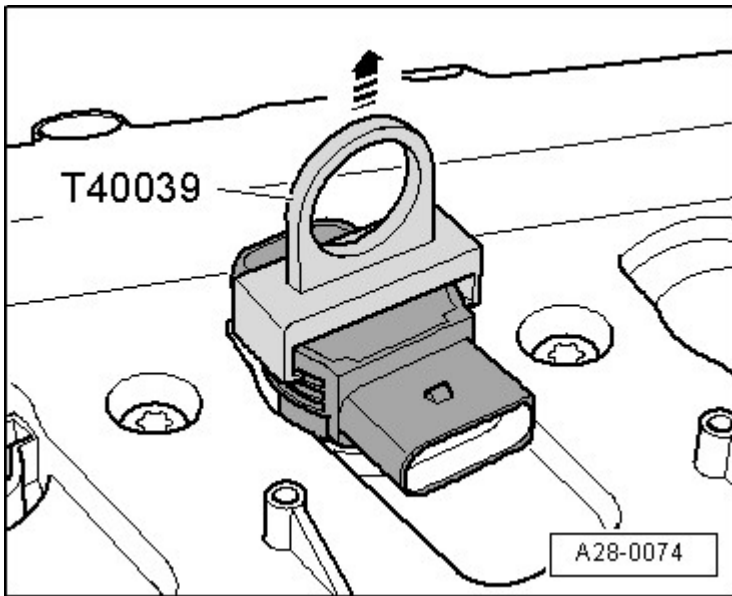


Fig. 41: Removing Ignition Coils With Ignition Coil Puller T40039
 Courtesy of AUDI OF AMERICA, LLC

- Remove the spark plugs using the 3122 B.
- Check compression pressure using the V.A.G 1763.

NOTE: Using tester, refer to operating instructions.

- Have a second technician press the accelerator pedal down all the way while operating the starter until the pressure increase is no longer displayed on the tester.
- Repeat the procedure on each cylinder.

Compression Pressure	Bar Pressure
New	10.0 to 14.0
Wear limit	9.0
Maximum difference between cylinders	3.0

Assemble in reverse order of disassembling. Note the following:

- Install spark plugs.
- Install the rear noise insulation. Refer to **DESCRIPTION AND OPERATION** in Underbody Trim.

There will be faults stored in the engine control module (ECM) Diagnostic Trouble Code (DTC) memory because the connectors were disconnected.

- **Generate readiness code in Guided Functions** using the vehicle diagnostic tester.

HYDRAULIC ADJUSTING ELEMENTS, CHECKING**Special tools and workshop equipment required**

- Adapter T40257 for vehicles with an automatic transmission
- Socket T40263 for vehicles with an automatic transmission
- Feeler gauge

NOTE:

- **The hydraulic adjusting elements cannot be repaired.**
- **Irregular valve noises are normal while starting the engine.**

PROCEDURE

-- Start the engine and let it run until the coolant fan switches on once.

-- Increase engine speed for about 2 minutes to approximately 2500 RPM, perform road test if necessary.

NOTE:

If irregular valve noises disappear but return during short drives, oil check valve must be replaced. Oil check valve location, refer to OIL CHECK VALVE AND SPRAY NOZZLE VALVE OVERVIEW .

-- 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, RIGHT CYLINDER HEAD COVER.

-- Rotate the crankshaft until the lobes on the adjusting element to be checked face upward:

Vehicles with a Manual Transmission:

-- Move the vehicle forward with 4th gear engaged and the ignition switched off.

Vehicles with Automatic Transmission:

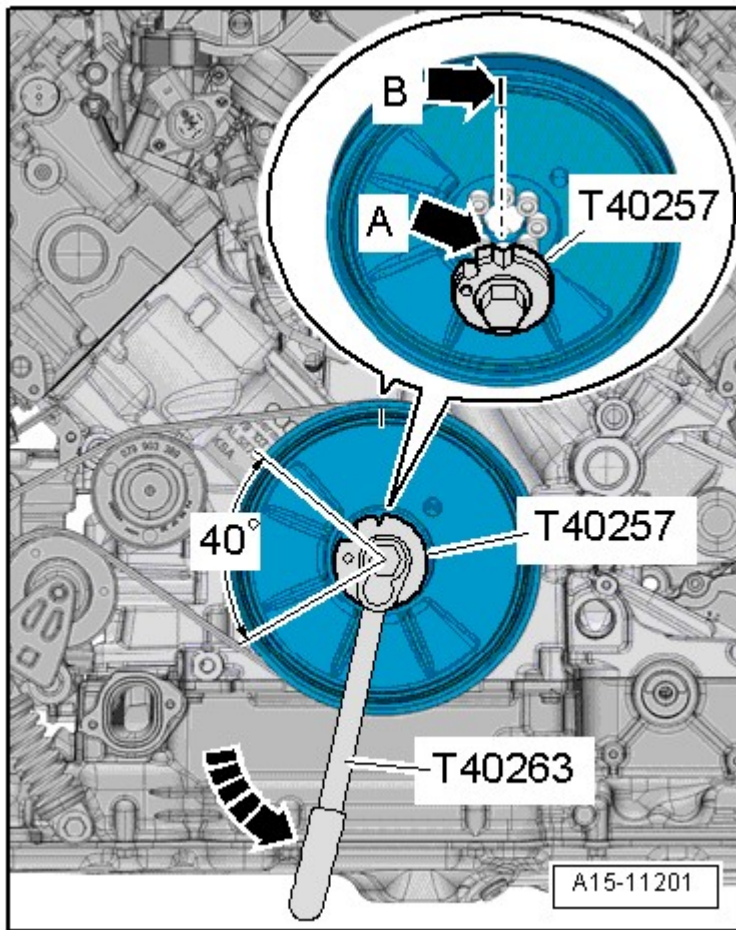


Fig. 42: Identifying Notch On T40257

Courtesy of AUDI OF AMERICA, LLC

-- Attach the T40257 to the T40263.

-- Attach the adapter to the bolts on the vibration damper.

- The notch -arrow A- on the T40257 must face the color dash -arrow B- on the vibration damper.

NOTE: Ignore the semi-round countersink on the T40257.

All Vehicles:

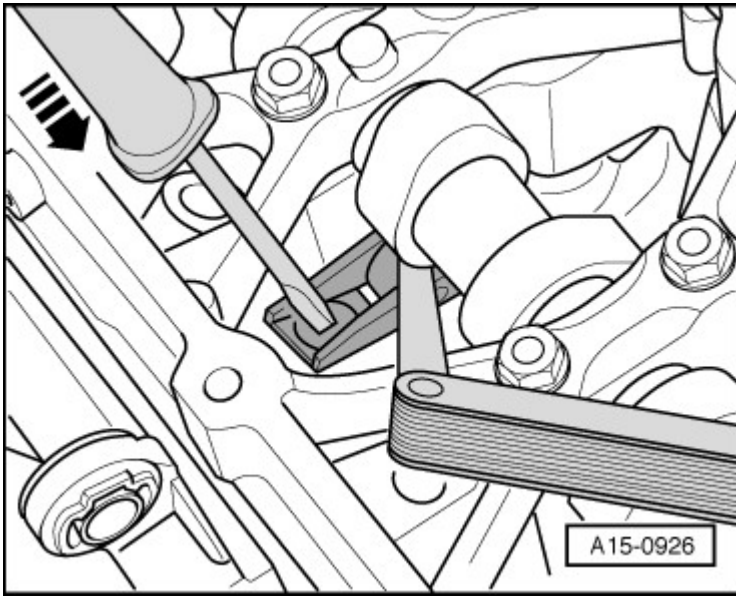


Fig. 43: Checking Play Between Cam Lobes & Roller Rocker Lever
Courtesy of AUDI OF AMERICA, LLC

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

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

Final Procedures

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

VALVES, CHECKING

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

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

VALVE GUIDES, CHECKING

Special tools and workshop equipment required

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

PROCEDURE

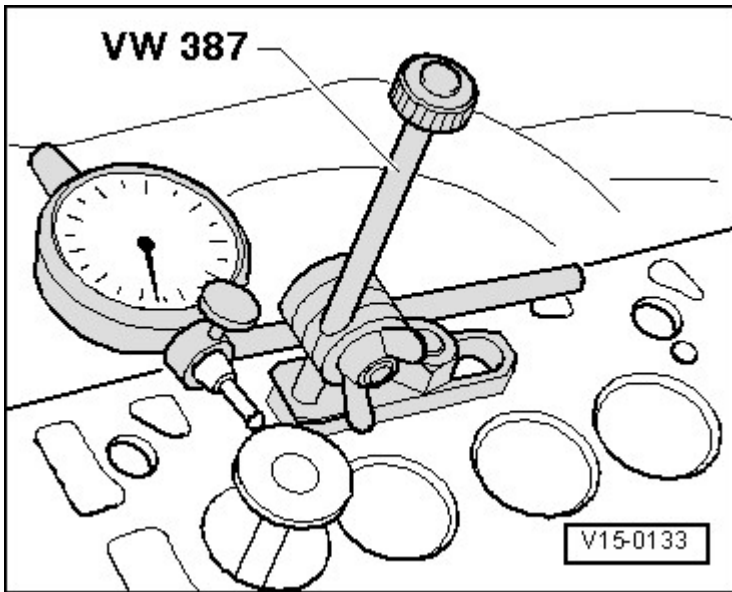


Fig. 44: Determining Valve Rock (Wear Limit)

Courtesy of AUDI OF AMERICA, LLC

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.

-- Determine tip clearance.

- Wear limit: 0.8 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.

REMOVAL AND INSTALLATION

A/C COMPRESSOR DRIVE SHAFT SEAL, REPLACING

Special tools and workshop equipment required

- Thrust Piece T40192
- Seal Puller T40195

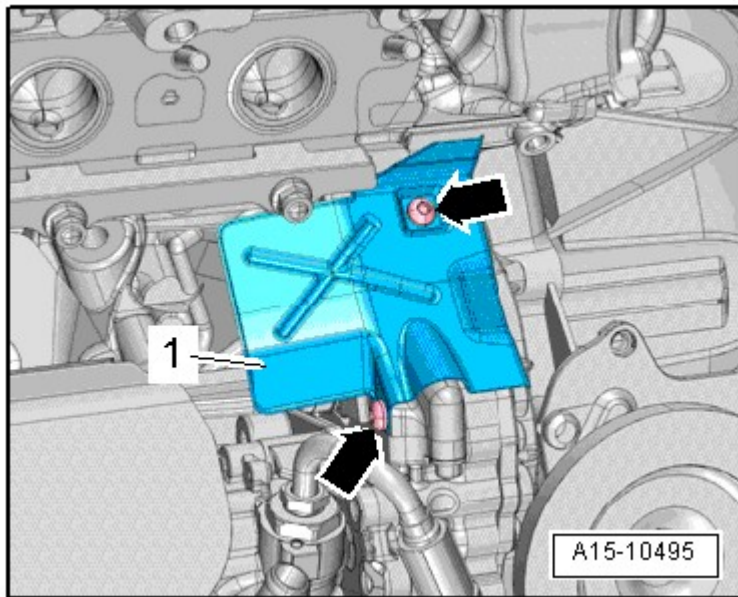
PROCEDURE

Fig. 45: Identifying Heat Shield Components
Courtesy of AUDI OF AMERICA, LLC

- Remove air conditioner compressor. Refer to **REMOVAL AND INSTALLATION** .
- Remove the bolts -arrows- and the heat shield -1-.
- Remove the hose clamp on the dust cap -arrow-.

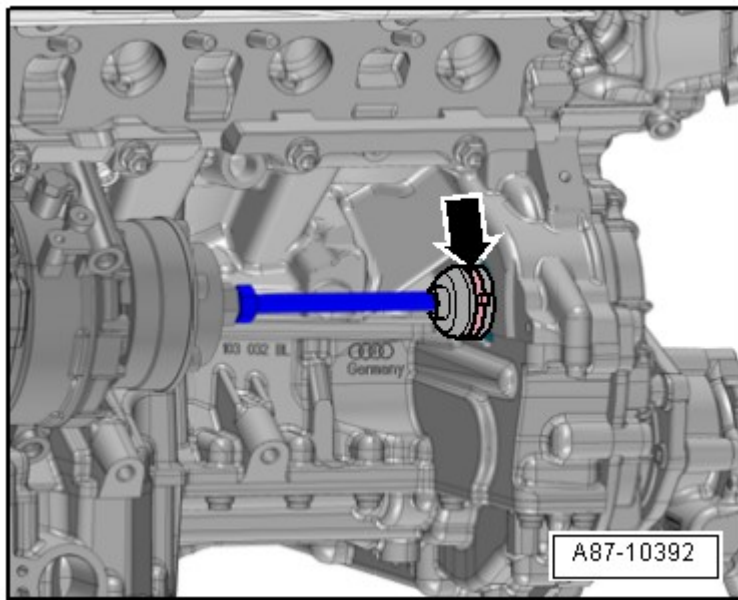


Fig. 46: Identifying Dust Cap Hose Clamp
Courtesy of AUDI OF AMERICA, LLC

- Remove the dust cap and Air conditioning (A/C) compressor driveshaft from the end of the spur gear shaft for the A/C compressor drive.
- Rotate the spindle on the T40195 all the way back.

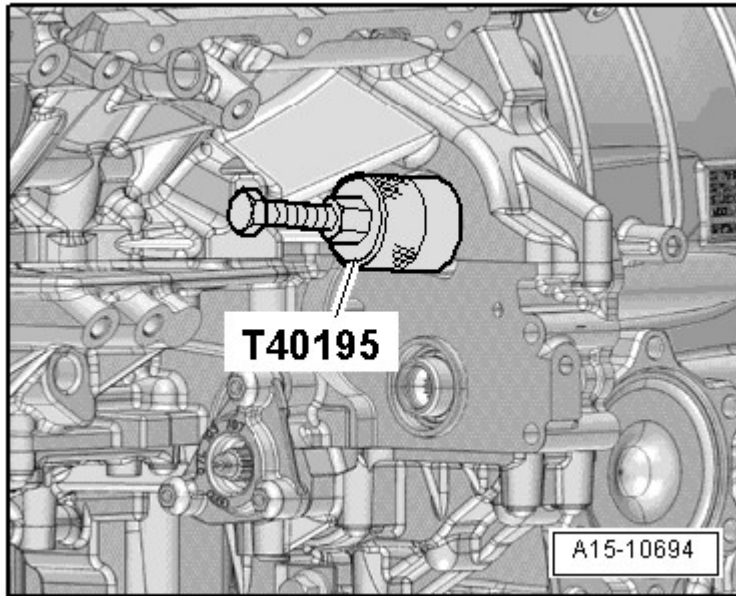


Fig. 47: Identifying Special Tool -- T40195
Courtesy of AUDI OF AMERICA, LLC

- Lubricate the seal remover threaded head, position it, and then install it into the shaft seal as far as possible using strong force.
- Rotate the inner section of the seal puller against the spur gear unit until the shaft seal is removed.

NOTE: **If the shaft seal breaks, position the seal puller a second time and remove the rest of the seal.**

- Clamp the seal puller in a vise at the hex bolt and remove the shaft seal with pliers.
- Clean the running and sealing surface.
- Drive in the A/C compressor driveshaft seal with the T40192.

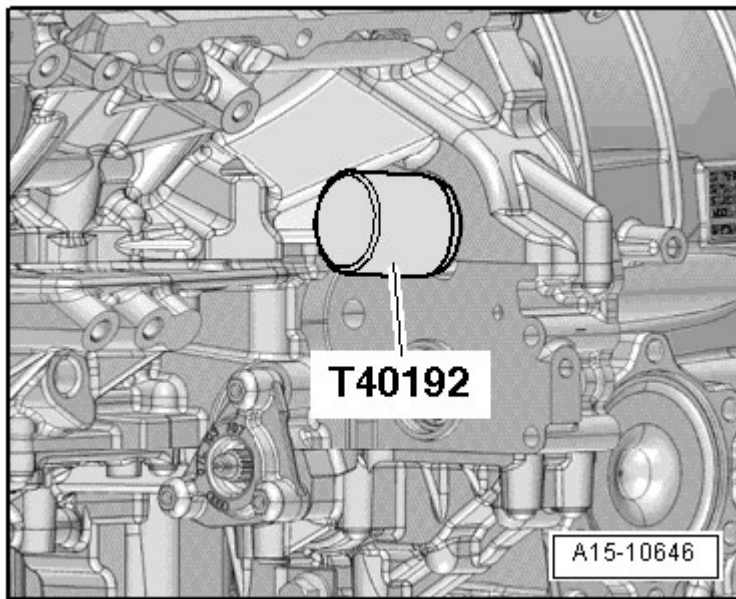


Fig. 48: Identifying Special Tool -- T40192
Courtesy of AUDI OF AMERICA, LLC

NOTE: Use a hose clamp appropriate for the model,

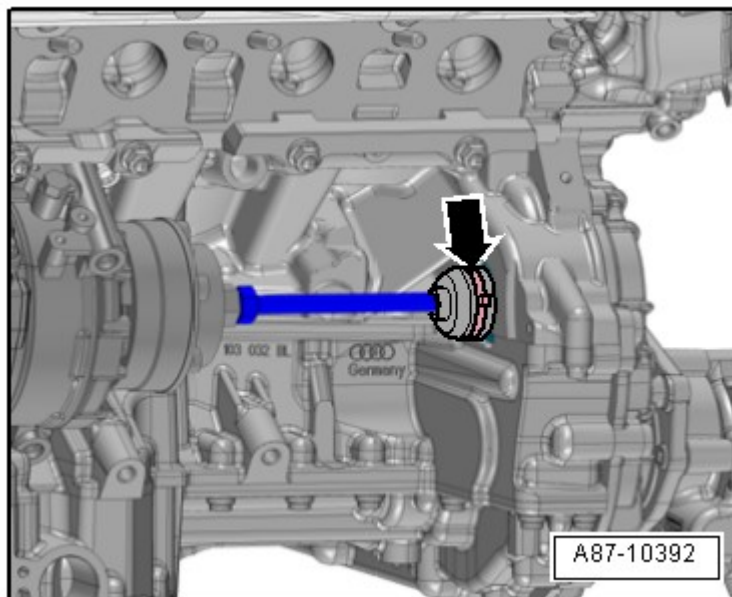


Fig. 49: Identifying Dust Cap Hose Clamp
Courtesy of AUDI OF AMERICA, LLC

-- Slide the dust cap -arrow- with pre-installed hose clamp on the end of the spur gear shaft for the A/C compressor drive.

-- Install A/C compressor. Refer to **REMOVAL AND INSTALLATION** .

CAMSHAFTS**Special tools and workshop equipment required**

- Multipoint Socket T10035
- Tool Set T10133
- Locating Pins T40116
- Adapter T40257
- Wrench T40263
- Crankshaft Holder 3242
- Camshaft Clamp T40070
- Counterhold Tool Touareg V10 T10172
- Hand drill with plastic brush attachment
- Protective goggles
- Sealant,

REMOVING

NOTE: Here, removal and installation at left cylinder head is depicted in the following description.

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

-- Disconnect the connectors:

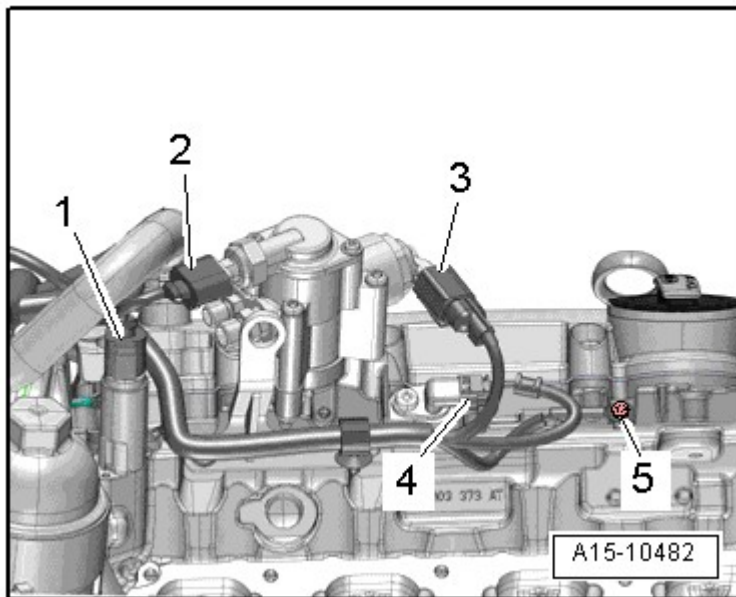


Fig. 50: Identifying Connectors

Courtesy of AUDI OF AMERICA, LLC

1. On camshaft adjustment valve 2 -N208-
2. On fuel pressure sensor -G247- *
3. On the left high pressure pump
4. On Camshaft Position (CMP) sensor 2 -G163-

-- Remove the bolt -5- and free up the wiring harness.

-- Remove the high pressure pump. Refer to **REMOVAL AND INSTALLATION** .

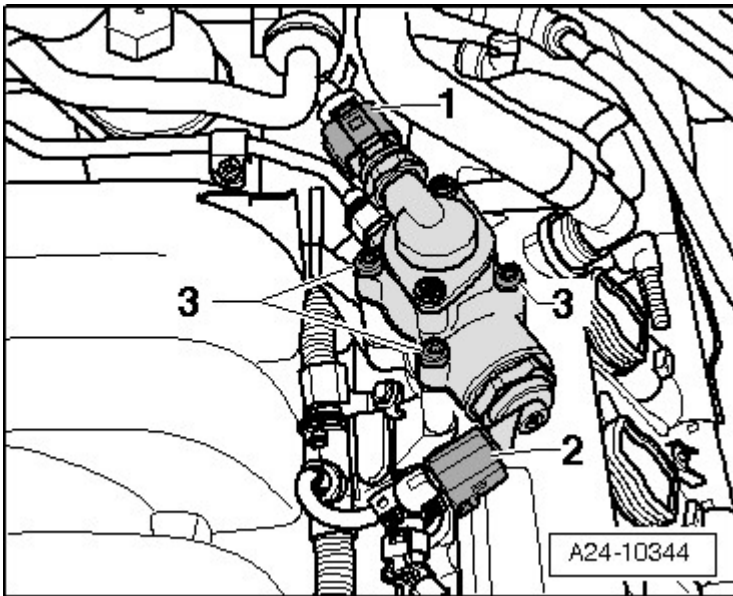


Fig. 51: Identifying Fuel Metering Valve Components
Courtesy of AUDI OF AMERICA, LLC

-- Remove the 3242.

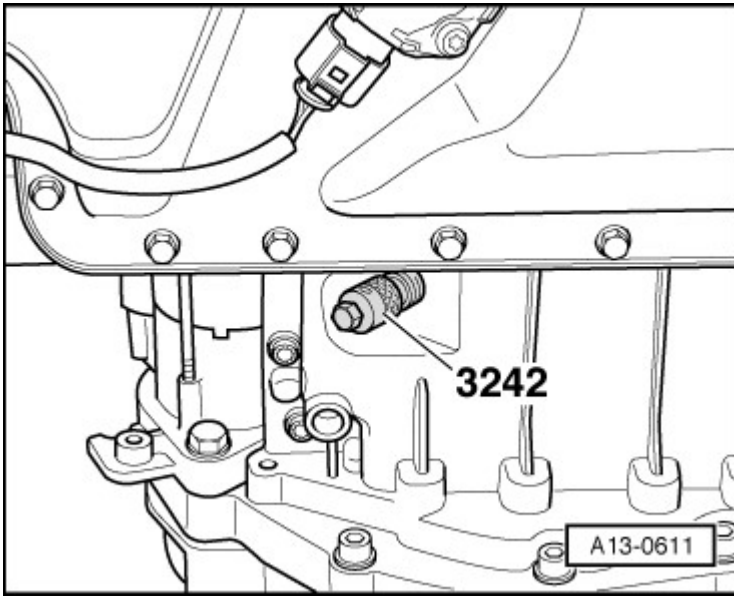


Fig. 52: Identifying Special Tool -- Crankshaft Holder 3242
Courtesy of AUDI OF AMERICA, LLC

-- Attach the T40257 to the T40263.

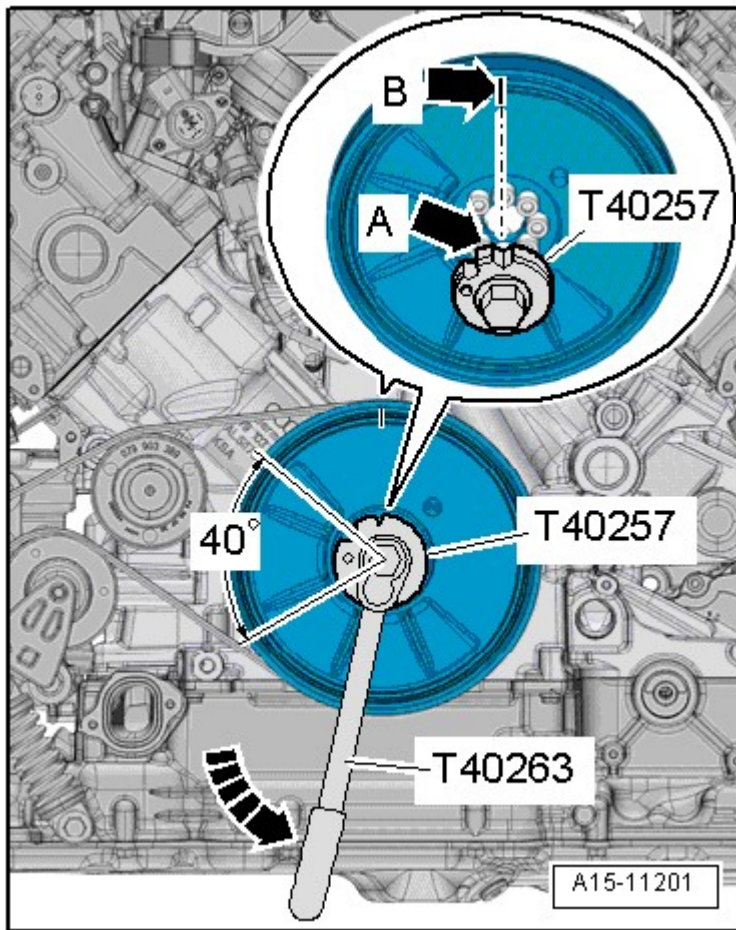


Fig. 53: Identifying Notch On T40257

Courtesy of AUDI OF AMERICA, LLC

-- Attach the adapter to the bolts on the vibration damper.

- The notch -arrow A- on the T40257 must face the color dash -arrow B- on the vibration damper.

NOTE: Ignore the semi-round countersink on the T40257.

CAUTION: Risk of damaging valves and piston crowns.

- In the course of the following steps, the crankshaft must not stand with any piston at "TDC".

-- Turn the crankshaft using the T10172 with the T10172/7 opposite the direction of engine rotation 40° out of "TDC" -arrow-.

-- Remove the T40070 -arrows-.

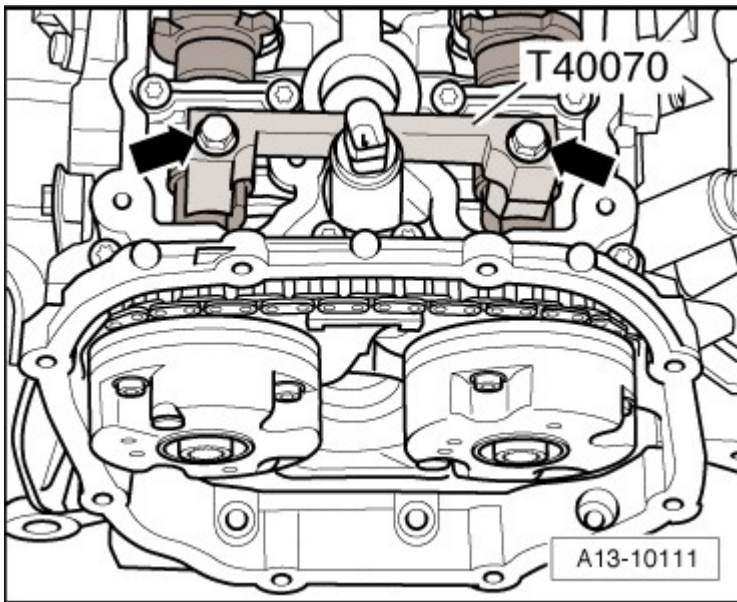


Fig. 54: Mounting Camshaft Locating Tool T40070 To Both Cylinder Heads And Tightening Bolts
 Courtesy of AUDI OF AMERICA, LLC

-- Loosen and then remove the guide frame bolts in the following sequence: -24 through 1-.

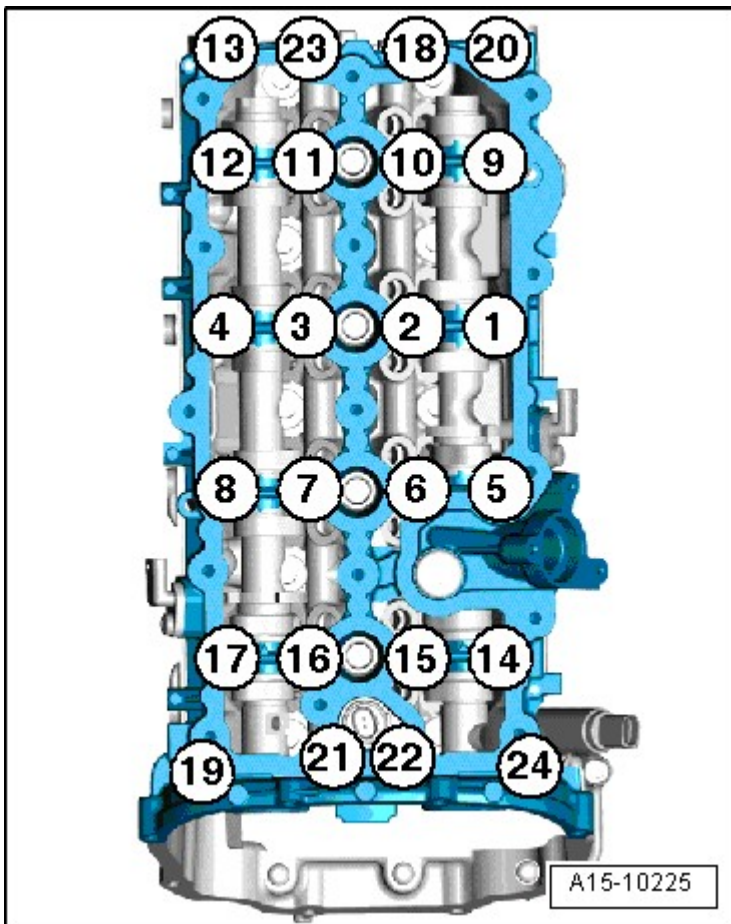


Fig. 55: Identifying Camshaft Guide Frame Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

NOTE: **Proceed in the same way with right guide frame.**

- Loosen and remove the guide frame carefully from the adhesive.
- Mark the camshafts so they can be installed later and remove them.

INSTALLING

- Tightening specification, refer to **Fig. 21**.

NOTE:

- **Replace seals and sealing rings.**
- **Replace bolts that are tightened to the specification.**

CAUTION: Risk of contaminating lubricating system and bearing.

- **Cover open parts of engine.**

WARNING: Danger of eye injury.

- **Wear protective goggles.**

- Using a rotating plastic brush, remove any remaining sealant from the cylinder head and guide frame.
- Clean sealing surfaces, must be free of oil and grease.
- Oil running surfaces of both camshafts.
- Place the camshafts in the cylinder head, being careful of their position so the guide frame can be laid on top without tension.

LEFT CYLINDER HEAD:

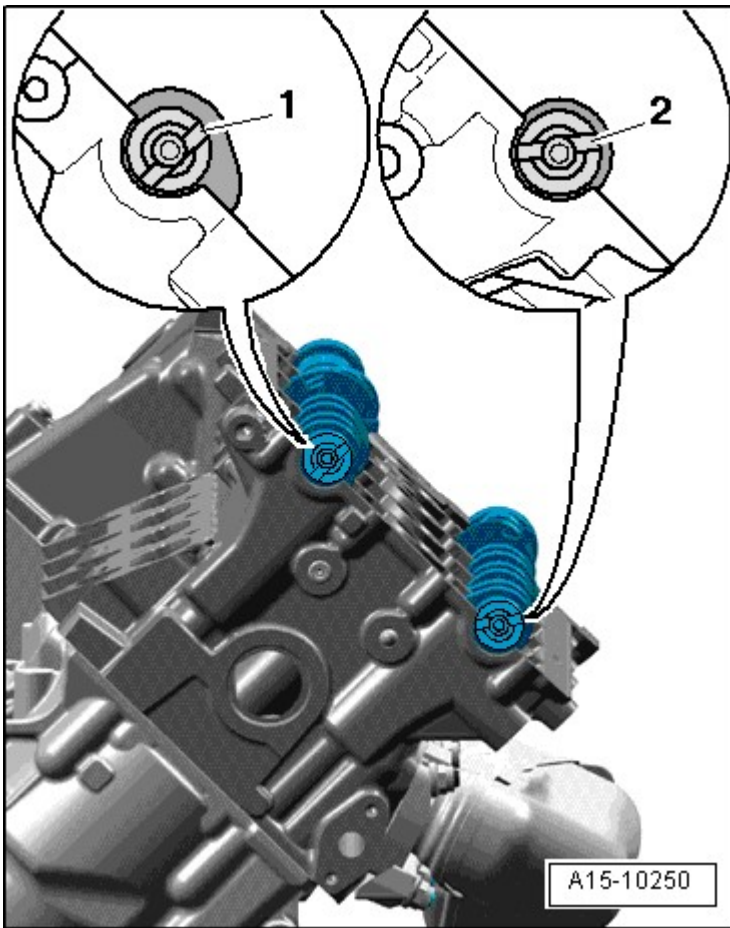


Fig. 56: Identifying Intake Camshaft & Exhaust Camshaft (Left Cylinder Head)
Courtesy of AUDI OF AMERICA, LLC

1. Intake camshaft
 2. Exhaust camshaft
- Groove on the end of the shaft must lie as shown in illustration.

RIGHT CYLINDER HEAD:

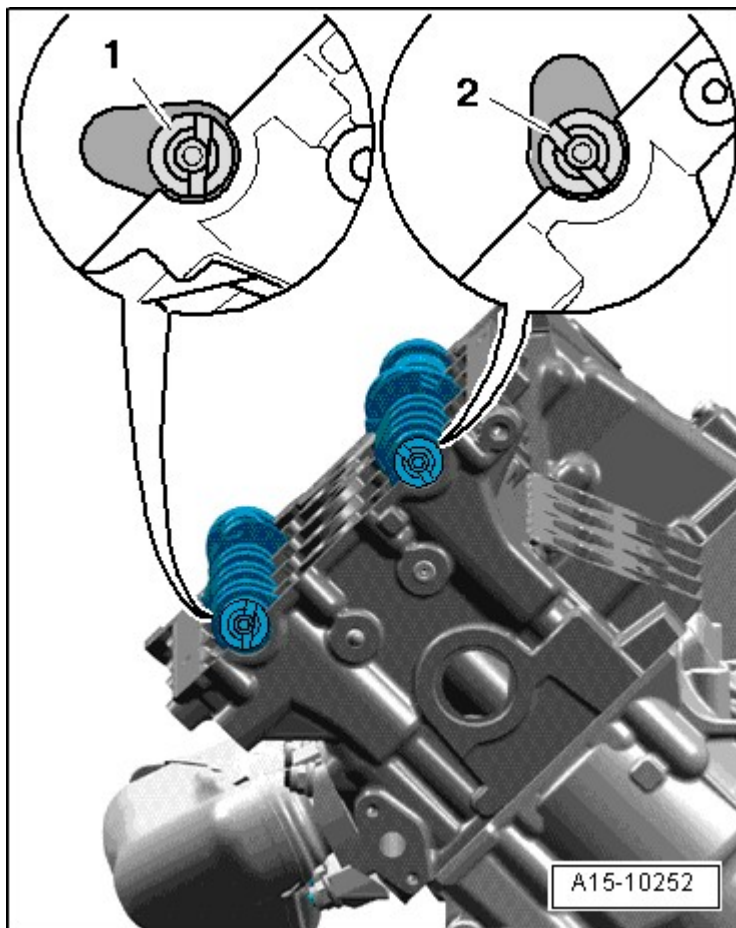


Fig. 57: Identifying Intake Camshaft & Exhaust Camshaft (Right Cylinder Head)
Courtesy of AUDI OF AMERICA, LLC

1. Exhaust camshaft
 2. Intake camshaft
- Groove on the end of the shaft must lie as shown in illustration.

CONTINUED FOR BOTH SIDES:

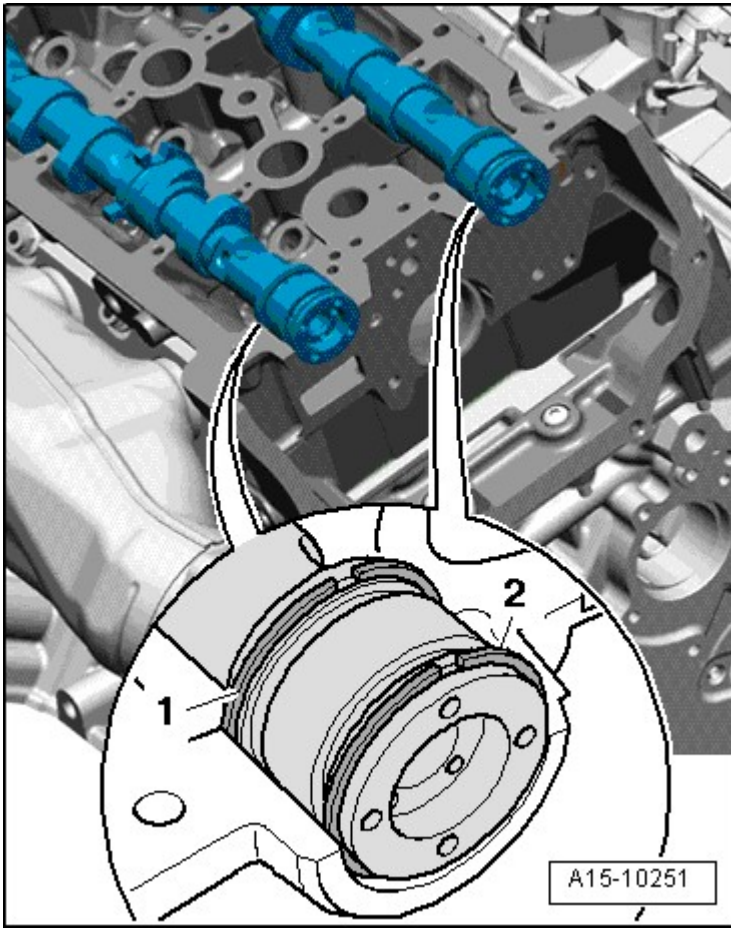


Fig. 58: Identifying Compression Ring End Position
Courtesy of AUDI OF AMERICA, LLC

-- Check the location of the compressor ring ends.

- The compression ring ends -1 and 2- must face upward or downward, and must never face sideways.

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

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

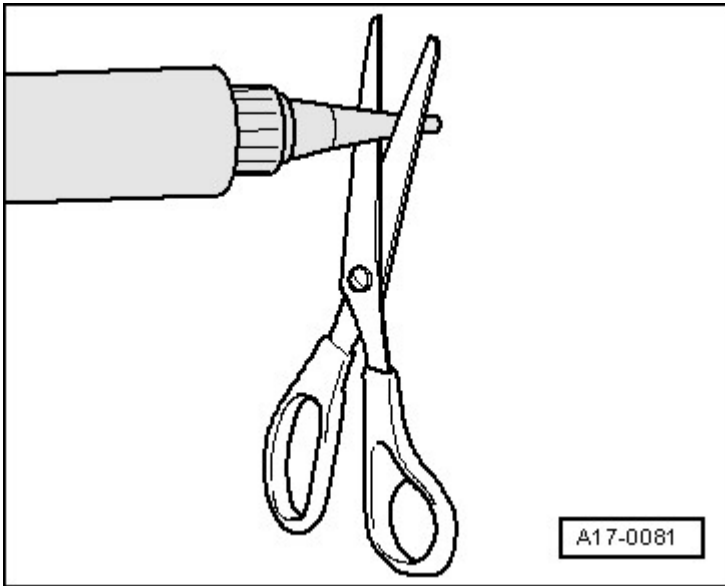


Fig. 59: Cutting Tube Nozzle

Courtesy of AUDI OF AMERICA, LLC

-- Lay the seal -2- in the groove on the guide frame.

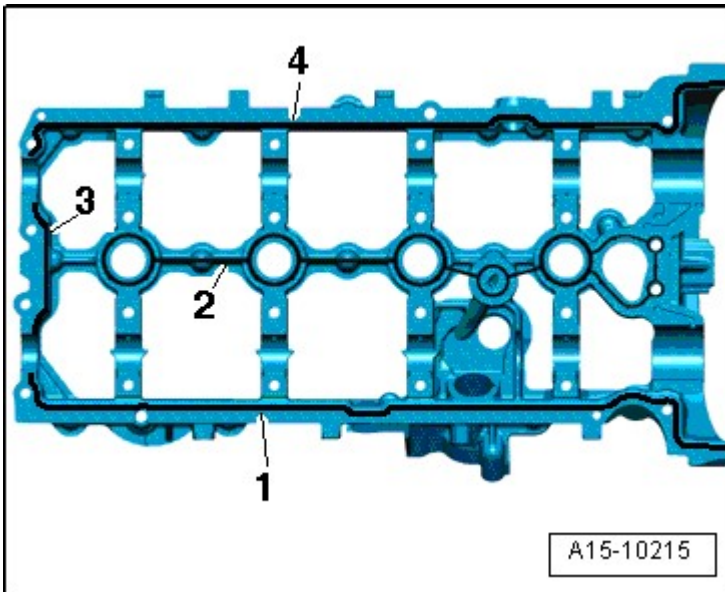


Fig. 60: Identifying Seal Beads

Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of contaminating camshaft bearing with excess sealant.

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

-- Apply sealant beads -1, 3 and 4- to the clean guide frame sealing surfaces as shown in the illustration.

- Thickness of sealant beads: 2.5 mm.

NOTE: The guide frame must be installed within 5 minutes after applying the sealant.

-- Place the guide frame on the cylinder head.

NOTE: Ensure camshafts can be inserted in guide frame axial bearing without force.

-- Insert the T40116 in the guide frame and cylinder head.

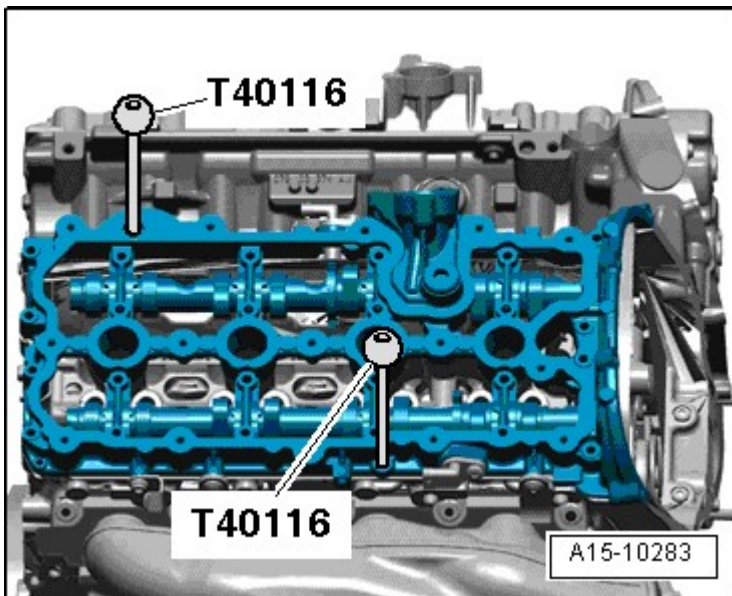


Fig. 61: Identifying Guide Frame Securing Pins T40116
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the guide frame bolts. Refer to **Fig. 21**.

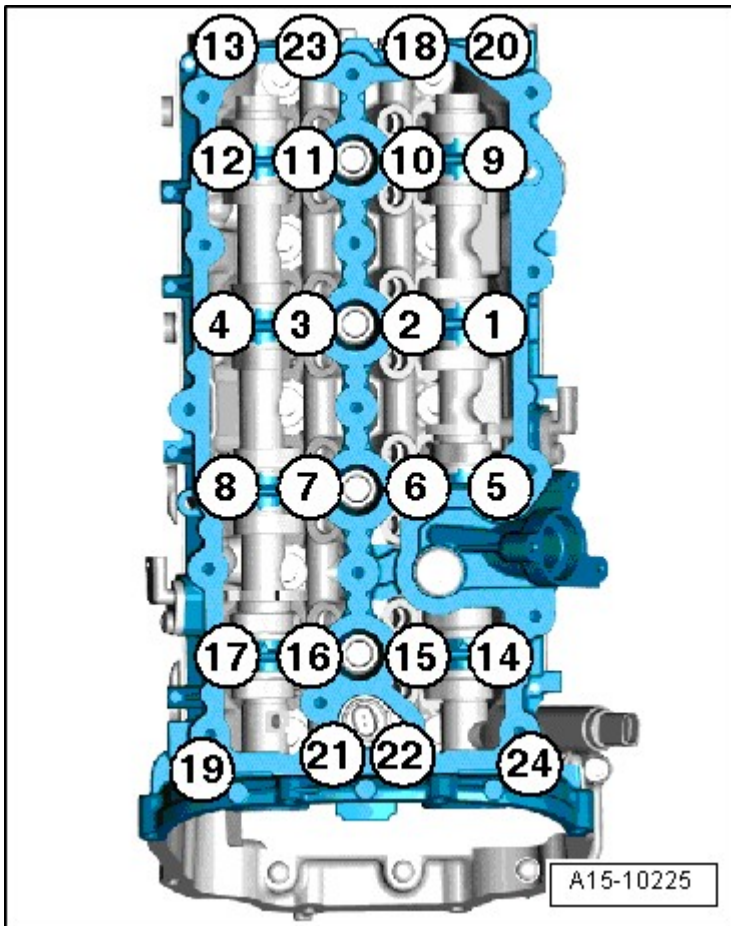


Fig. 62: Identifying Camshaft Guide Frame Tightening Sequence
 Courtesy of AUDI OF AMERICA, LLC

NOTE: The sealant must harden for approximately 30 minutes after installing the guide frame.

-- Drive in the sealing plugs -arrows- until they are flush.

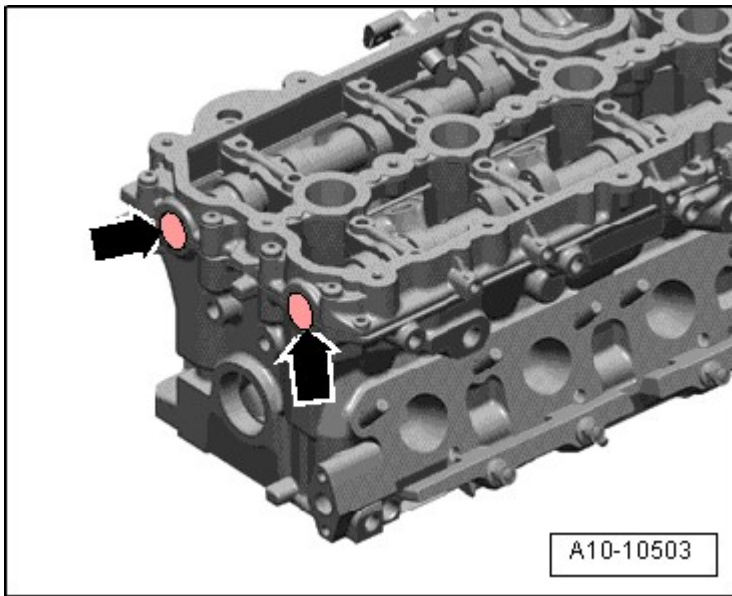


Fig. 63: Identifying Sealing Plugs
Courtesy of AUDI OF AMERICA, LLC

-- Remove the T40116 with the impact puller T10133/3.

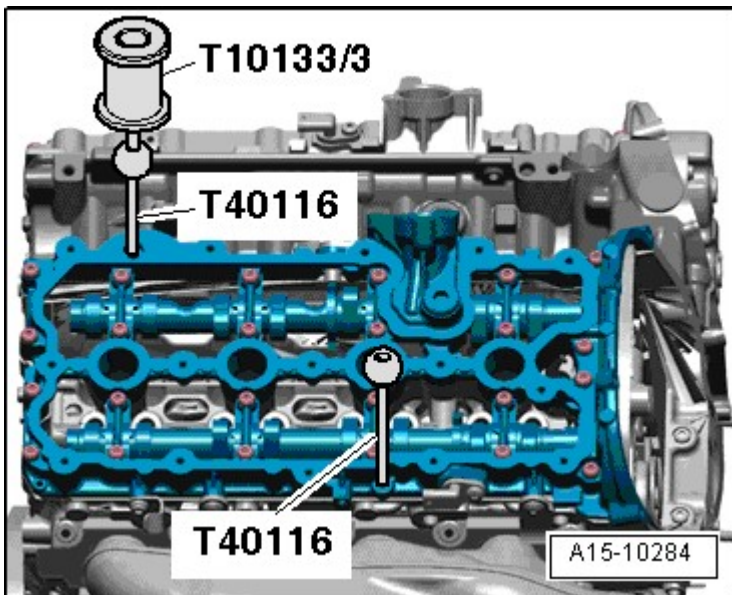


Fig. 64: Identifying Guide Frame Securing Pins T40116 With Impact Puller T10133/3
Courtesy of AUDI OF AMERICA, LLC

-- Rotate intake camshaft to "TDC" and tighten camshaft adjuster screw -2- on camshaft with a socket SW 24 - 1- inserted between.

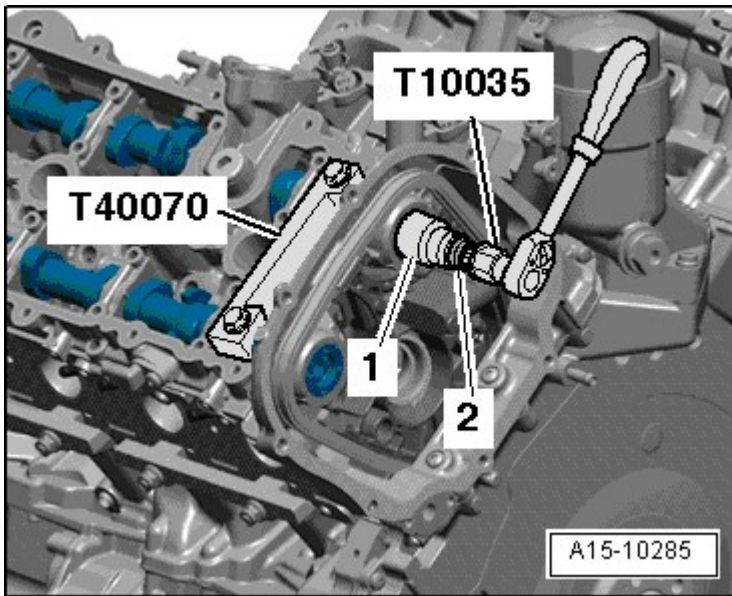


Fig. 65: Identifying Intake Camshaft TDC
Courtesy of AUDI OF AMERICA, LLC

NOTE: When tightening the bolt, use pliers to counterhold the socket.

-- Position a lever or ratchet with the T10035 on the bolt and turn the camshaft until the threaded hole for the T40070 faces up.

-- Then install the T40070 loosely on the intake camshaft.

- The T40070 is correctly positioned when the holes for the cylinder head bolts remain free.

-- Change the camshaft adjuster bolt -2- and the 24 mm socket -1- to the exhaust camshaft.

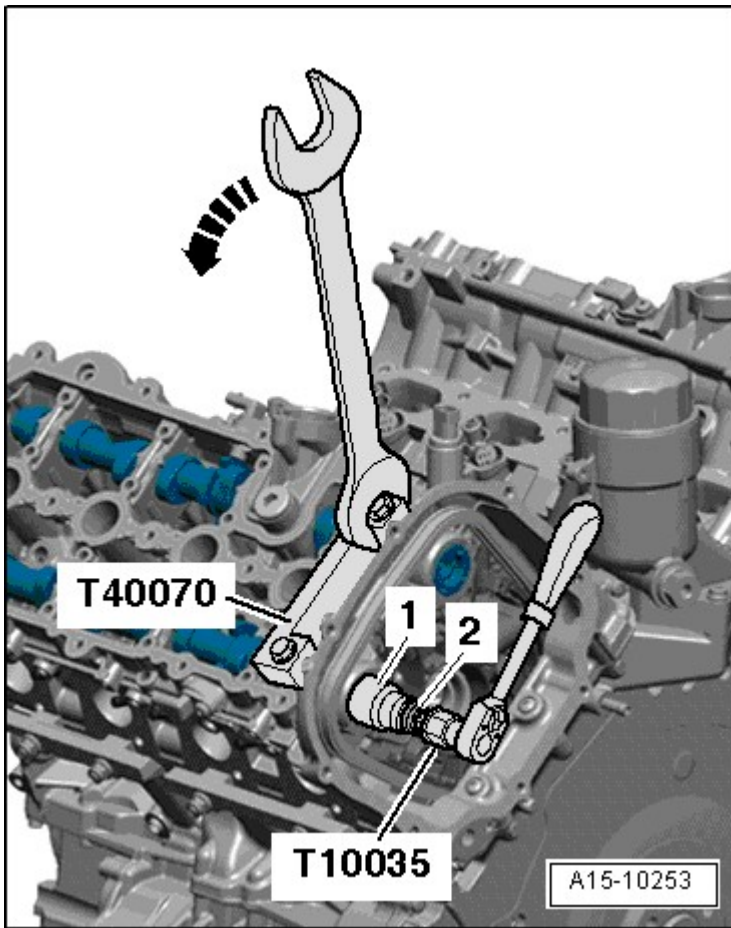


Fig. 66: Adapting Camshaft Adjuster Screw And Socket 24 To Exhaust Camshaft
Courtesy of AUDI OF AMERICA, LLC

- Turn the exhaust camshaft until the threaded hole for the T40070 faces up.
- At the same time, position a 24 mm open end wrench on the T40070 and turn the T40070 against the exhaust camshaft -arrow-.
- Install the T40070 on the exhaust camshaft by hand to prevent damage to the threads (a second technician is needed).
- Tighten the T40070 to 25 Nm -arrows-.

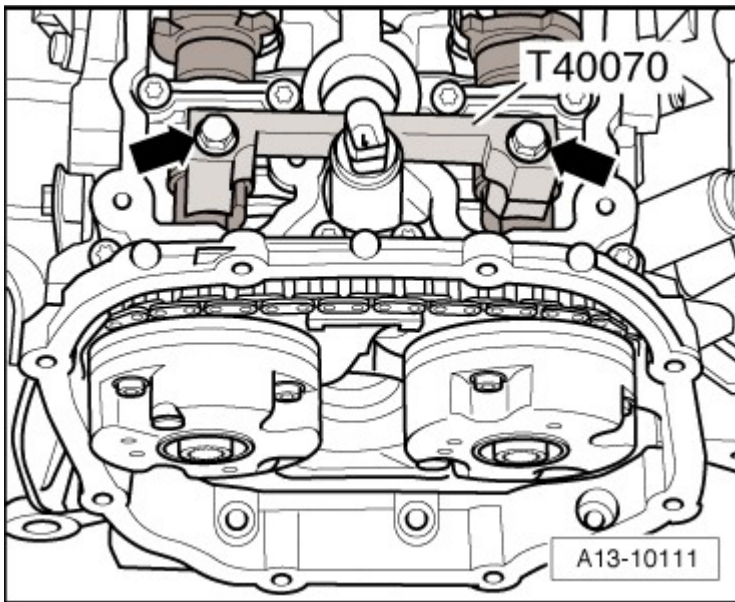


Fig. 67: Mounting Camshaft Locating Tool T40070 To Both Cylinder Heads And Tightening Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Turn the crankshaft to "TDC" in direction of engine rotation -arrow-.

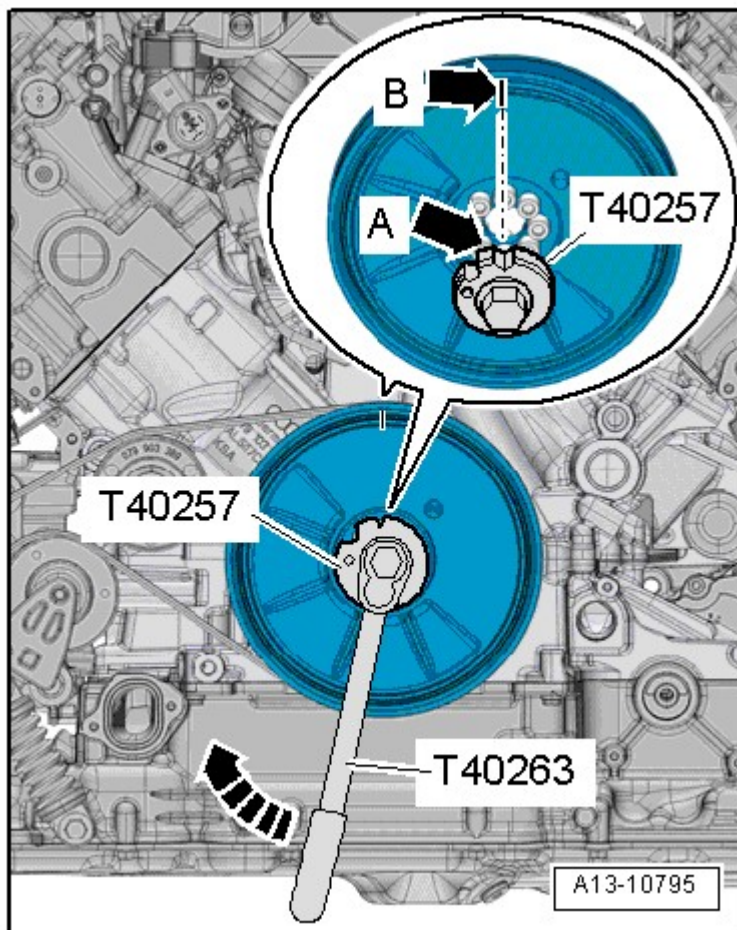


Fig. 68: Turning Crankshaft 180 Degrees In Direction Of Engine Rotation
Courtesy of AUDI OF AMERICA, LLC

-- 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.

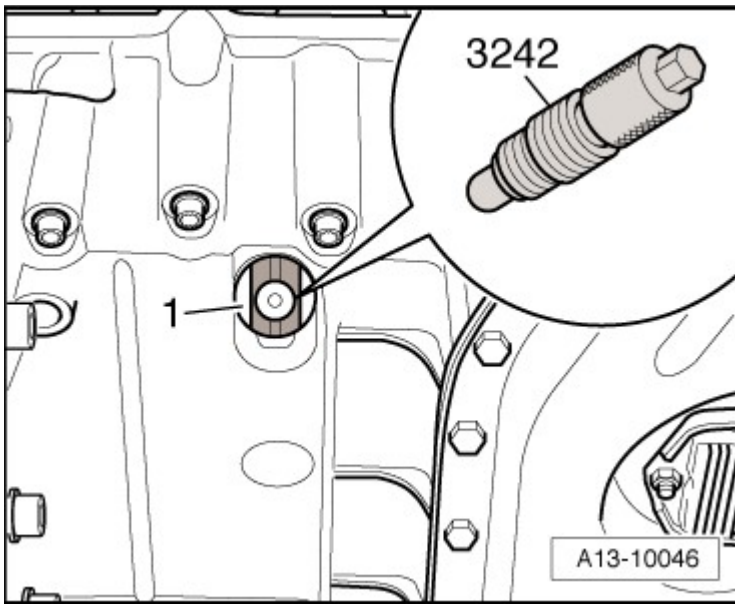


Fig. 69: Identifying Crankshaft Holder 3242
Courtesy of AUDI OF AMERICA, LLC

Install in reverse order of removal paying attention to the following:

- Install the high pressure pump. Refer to **REMOVAL AND INSTALLATION** .
- Position the camshaft timing chain on the camshafts **CAMSHAFT TIMING CHAINS**.

CAUTION: Risk of damaging valves and piston heads after working on the valve train.

- 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.

CAMSHAFT TIMING CHAINS

REMOVING

- The transmission is removed. Refer to **REMOVAL AND INSTALLATION** or **REMOVAL AND INSTALLATION** .
- Remove timing chain lower cover. Refer to **LOWER TIMING CHAIN COVER**.
- Remove the camshaft timing chains from the camshafts. Refer to **CAMSHAFT TIMING CHAINS**.

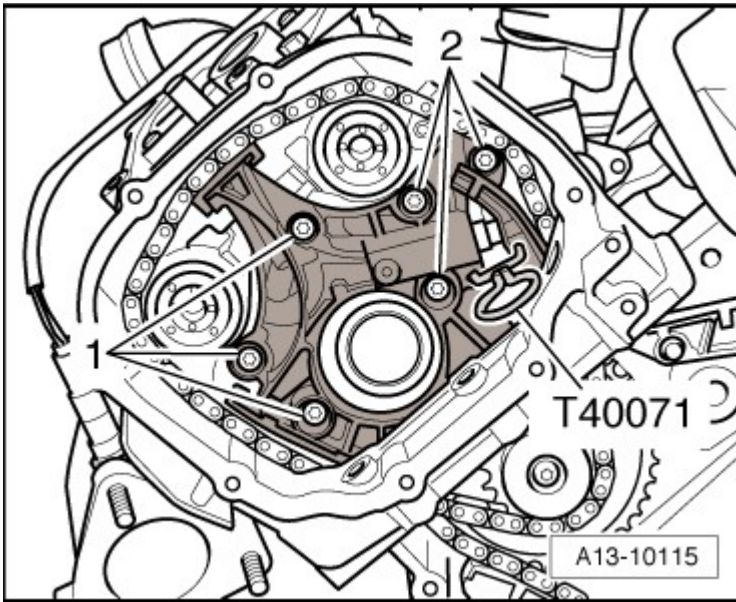


Fig. 70: Identifying Bolts For Left Chain Tensioner And Left Camshaft Timing Chain
Courtesy of AUDI OF AMERICA, LLC

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 bolts -1 and 2- and remove the left chain tension and left camshaft timing chain.

-- Remove bolts -1 and 2- and remove the right chain tension and right camshaft timing chain.

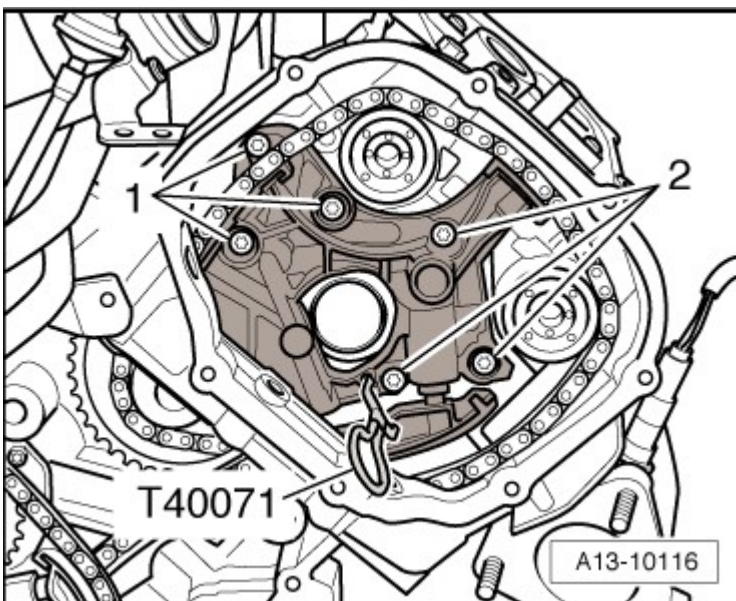


Fig. 71: Identifying Bolts For Right Chain Tensioner And Right Camshaft Timing Chain
Courtesy of AUDI OF AMERICA, LLC

INSTALLING

- Tightening specification, refer to **CAMSHAFT TIMING CHAINS OVERVIEW**.

NOTE: If the tensioning element was removed from the chain tensioner, then the installation position must be noted: Hole in housing floor faces toward chain tensioner, piston faces toward tensioning rail.

Replace bolts that are tightened to the specification.

Replace the seals

CAUTION: Risk of damaging valves and piston crowns.

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

-- Press the guide rails for the left or right camshaft timing chain tensioner in -arrow- as far as the stop and secure the chain tensioner with a T40071.

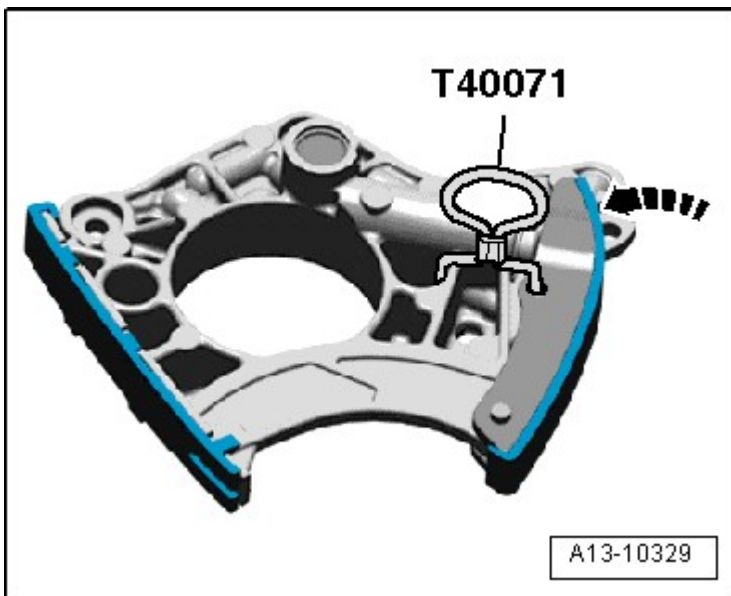


Fig. 72: Pressing Left/Right Camshaft Timing Chain Guide Rail Inward And Securing Chain Tensioner With Locking Pin T40071
Courtesy of AUDI OF AMERICA, LLC

-- Clean the oil strainer -2- in both chain tensioners if necessary.

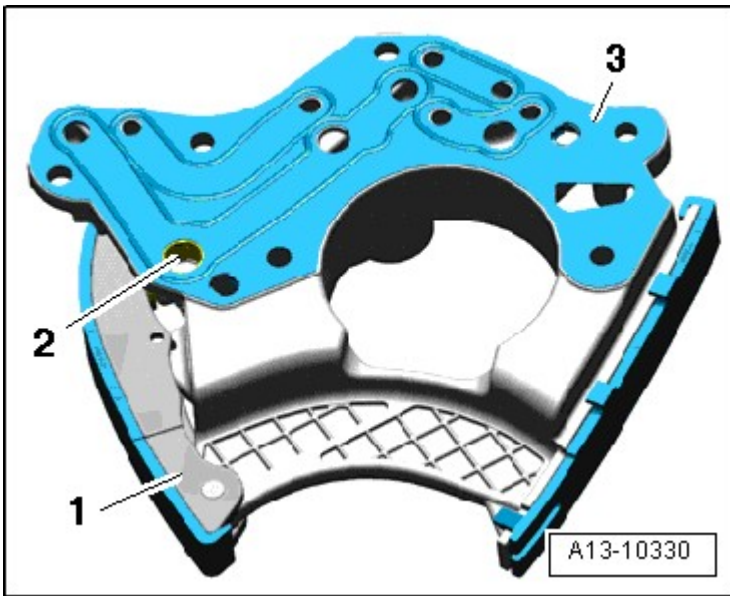


Fig. 73: Identifying Chain Tensioner Oil Screen, Gasket & Chain Tensioner
Courtesy of AUDI OF AMERICA, LLC

-- Position a new seal -3- on the rear of the chain tensioner -1-.

-- Insert the chain tensioner on the left cylinder head and position the camshaft timing chain according to the markings made during removal, as shown in the illustration.

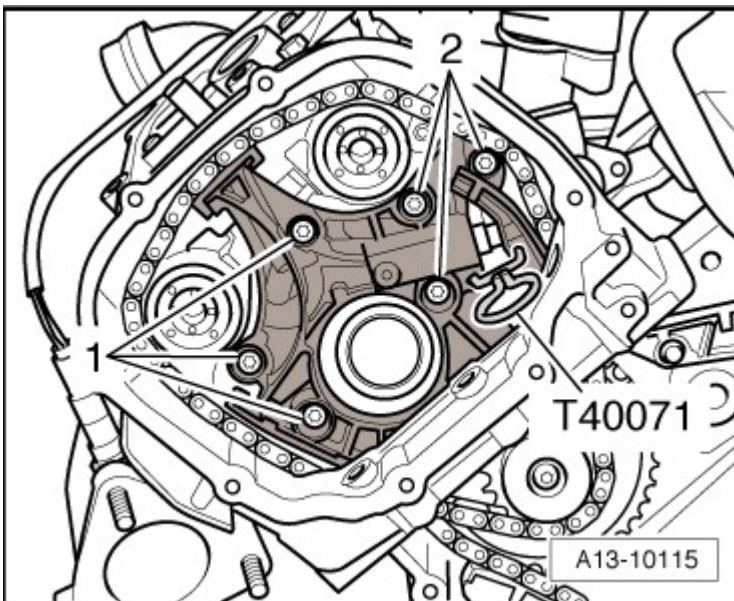


Fig. 74: Identifying Bolts For Left Chain Tensioner And Left Camshaft Timing Chain
Courtesy of AUDI OF AMERICA, LLC

-- Fasten bolts -1 and 2-.

-- Insert the chain tensioner on the right cylinder head and position the camshaft timing chain according to the

markings made during removal, as shown in the illustration.

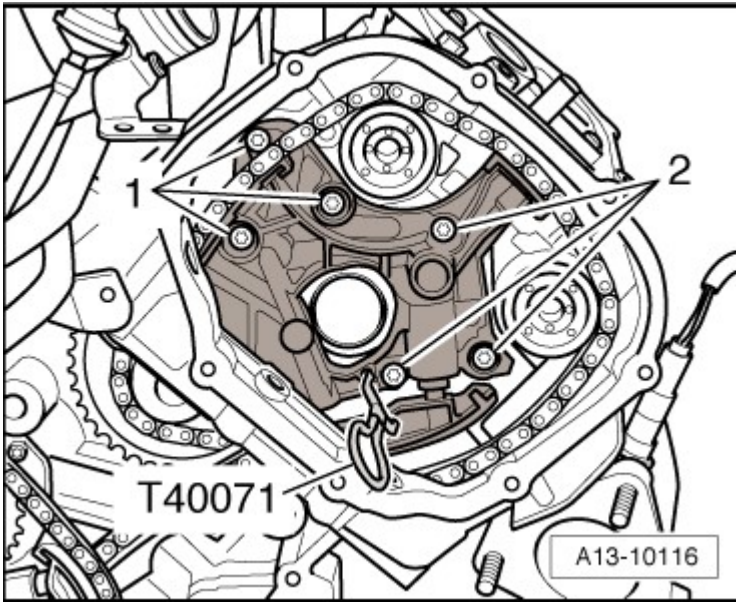


Fig. 75: Identifying Bolts For Right Chain Tensioner And Right Camshaft Timing Chain
Courtesy of AUDI OF AMERICA, LLC

-- Fasten bolts -1 and 2--.

Install in reverse order of removal paying attention to the following:

-- Position the camshaft timing chain on the camshafts **INSTALLING**.

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

CAMSHAFT TIMING CHAINS

Special tools and workshop equipment required

- Crankshaft Holder 3242
- Torque Wrench 40-200 Nm V.A.G 1332
- Open Ring Spanner Insert, AF 24 mm V.A.G 1332/9
- Camshaft Clamp T40070, quantity: 2
- Locking Pin T40071, quantity: 2
- Key T40079
- Adapter T40257
- Wrench T40263

REMOVING

NOTE: The camshaft timing chains stay on the engine in the following description.

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

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

-- Attach the T40257 to the T40263.

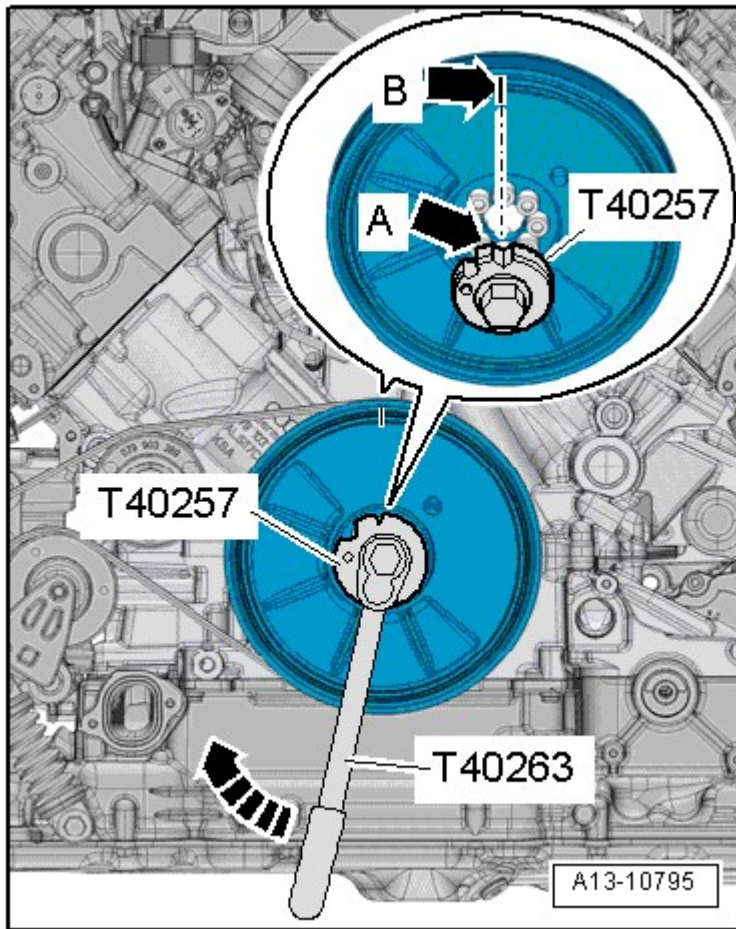


Fig. 76: Turning Crankshaft 180 Degrees In Direction Of Engine Rotation -Arrow
Courtesy of AUDI OF AMERICA, LLC

-- Mount the adapter over the bolts on the vibration damper and turn the crankshaft in direction of engine rotation -arrow- to "TDC".

- The threaded holes -arrows- in the camshafts must face upward.

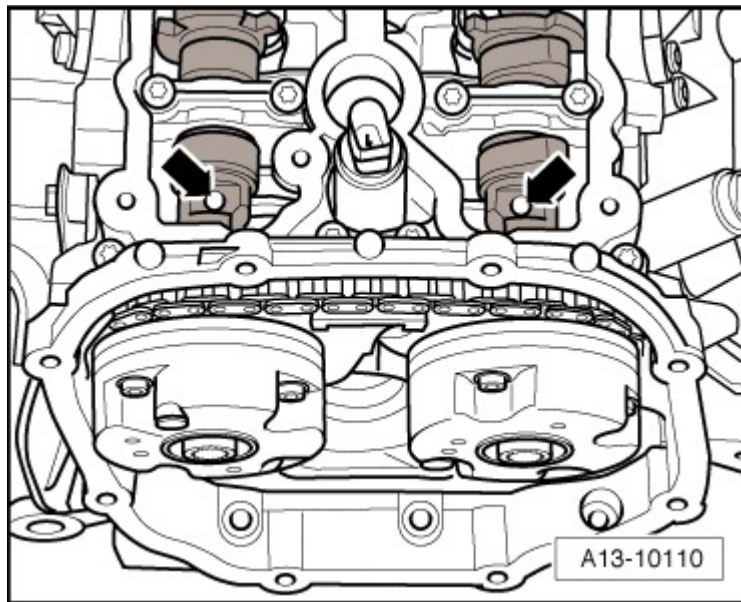


Fig. 77: Identifying Threaded Holes In Camshafts Must Face Upward
Courtesy of AUDI OF AMERICA, LLC

-- T40070 mounted on both cylinder heads and tightened to 25 Nm -arrows-.

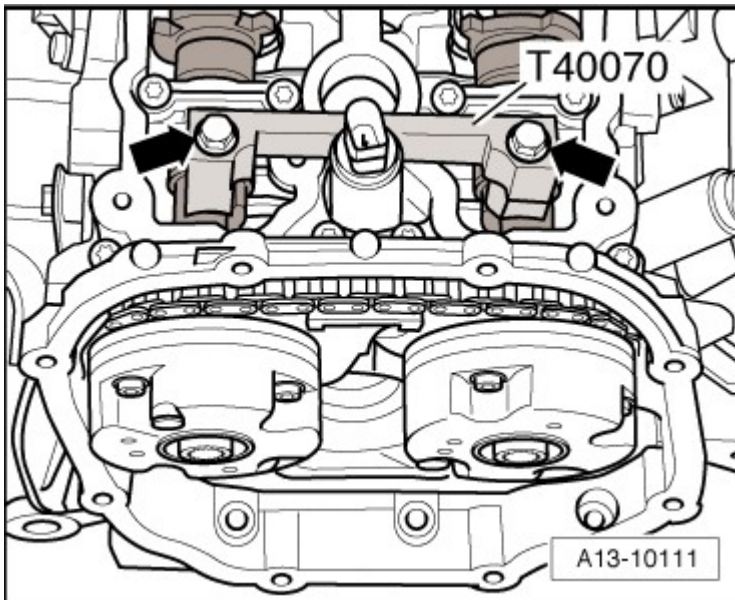


Fig. 78: Mounting Camshaft Locating Tool T40070 To Both Cylinder Heads And Tightening Bolts
Courtesy of AUDI OF AMERICA, LLC

- The T40070 is correctly positioned when the holes for the cylinder head bolts remain free.

-- Remove the drain plug -arrow- from the upper section of the oil pan by using a long hex socket wrench with ball head.

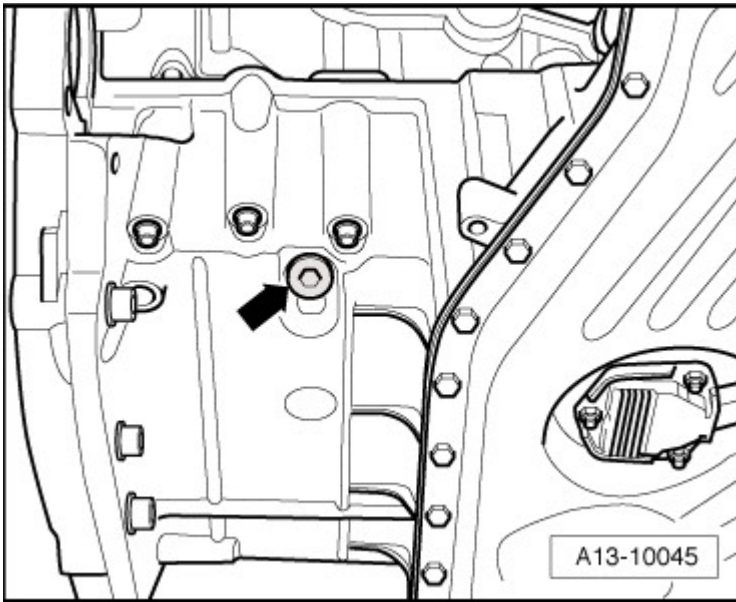


Fig. 79: Identifying Locking Bolt Of Upper Part Of Oil Pan
Courtesy of AUDI OF AMERICA, LLC

-- 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.

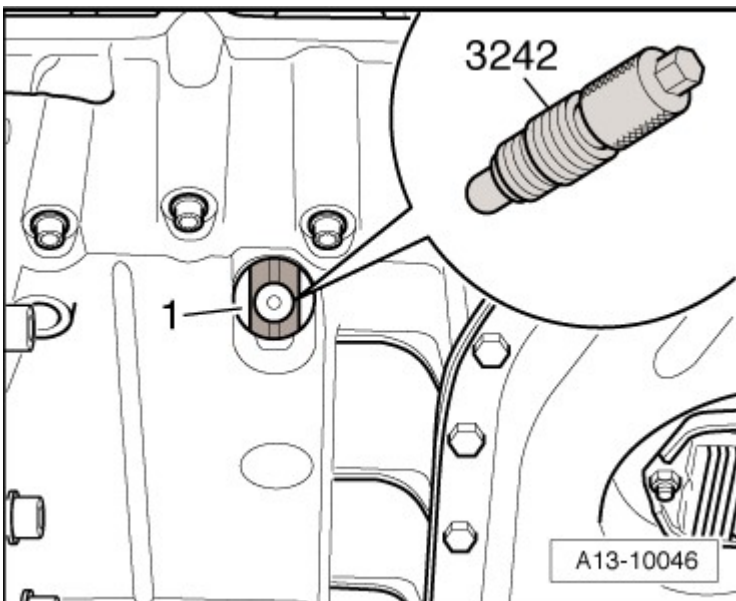


Fig. 80: Identifying Crankshaft Holder 3242 In Bore
Courtesy of AUDI OF AMERICA, LLC

-- Press the left camshaft timing chain tensioner guide rails in as far as the stop using a screwdriver -1- and secure the chain tensioner with a T40071.

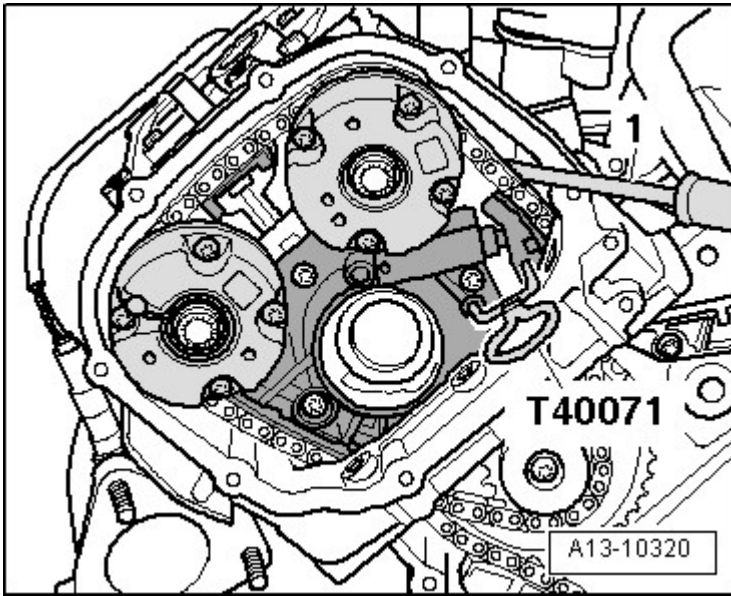


Fig. 81: Pressing Left Camshaft Timing Chain Tensioner Glide Track Inward With Screwdriver As Far As Stop And Securing Chain Tensioner With Locking Pin T40071

Courtesy of AUDI OF AMERICA, LLC

NOTE: The toothed belt tensioner is lubricated with oil and should only be compressed slowly by applying constant pressure.

-- Press the right camshaft timing chain tensioner guide rails in as far as the stop using a screwdriver -1- and secure the chain tensioner with a T40071.

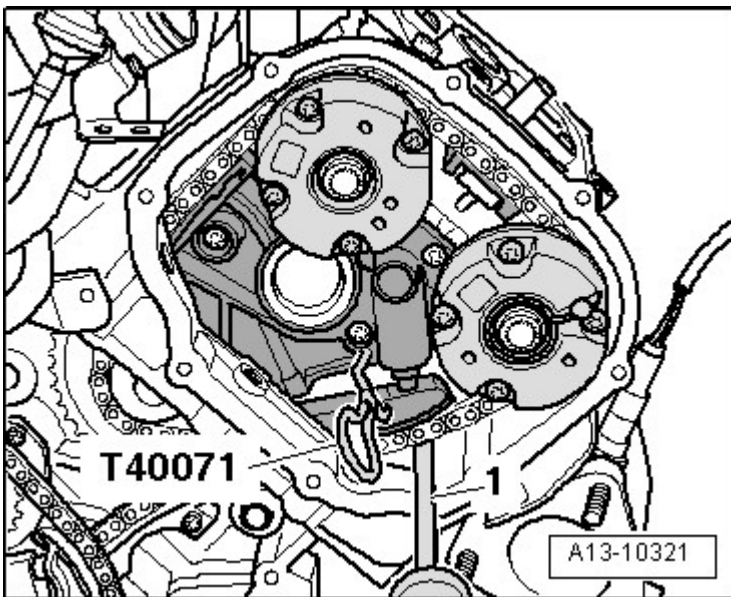


Fig. 82: Pressing Right Camshaft Timing Chain Tensioner Glide Track Inward With Screwdriver As Far As Stop And Securing Chain Tensioner With Locking Pin T40071

Courtesy of AUDI OF AMERICA, LLC

NOTE: The toothed belt tensioner is lubricated with oil and should only be compressed slowly by applying constant pressure.

-- Mark the installation position of the camshaft adjuster with paint for installation later.

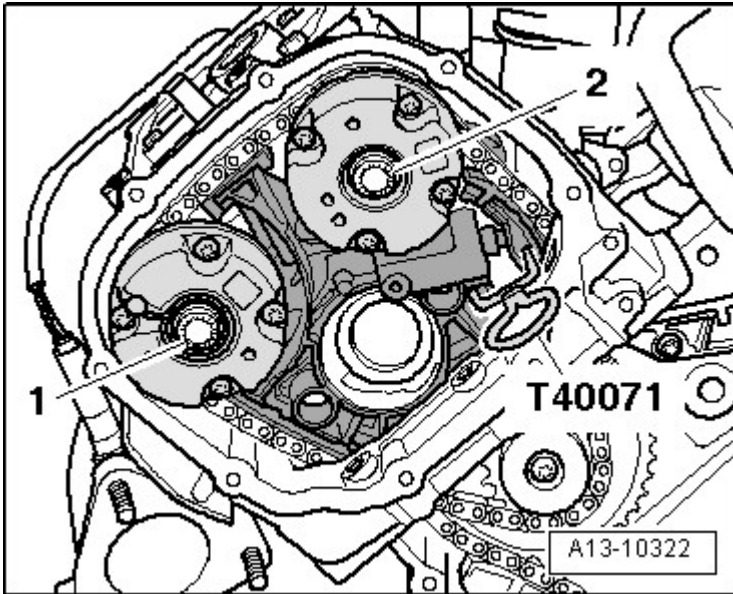


Fig. 83: Identifying Bolts On Left Cylinder Head And Removing Both Camshaft Adjusters
Courtesy of AUDI OF AMERICA, LLC

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 bolts -1 and 2- on the left cylinder head and remove both camshaft adjusters.

-- Mark the installation position of the camshaft adjuster with paint for installation later.

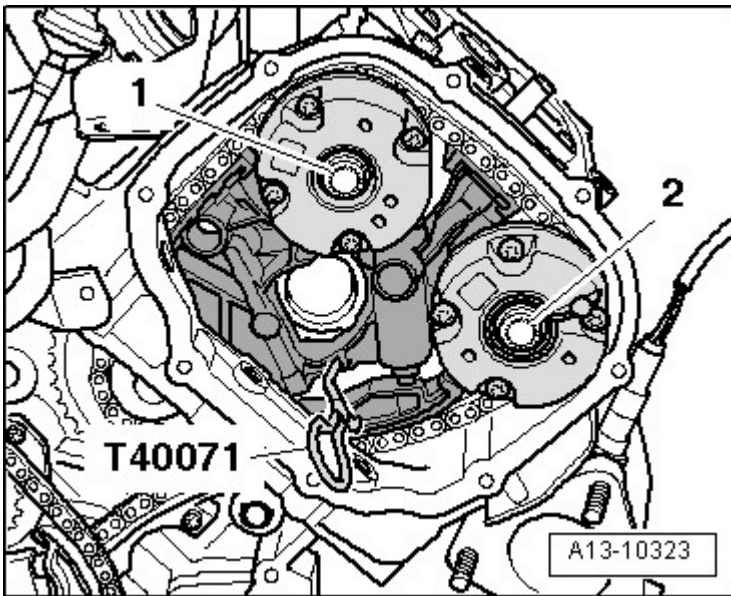


Fig. 84: Identifying Bolts On Right Cylinder Head And Removing Both Camshaft Adjusters
Courtesy of AUDI OF AMERICA, LLC

-- Remove bolts -1 and 2- on the right cylinder head and remove both camshaft adjusters.

INSTALLING

- For the correct tightening specifications, refer to **CAMSHAFT TIMING CHAINS OVERVIEW**.

NOTE:

- Replace bolts that are tightened to the specification.
- Replace the locking bolt seal for the "TDC" marking.

CAUTION: Risk of damaging valves and piston crowns.

- If the camshafts are rotated, crankshaft may not rest with any piston at "TDC".
- Drive chain for timing mechanism installed. Refer to **TIMING MECHANISM DRIVE CHAIN**.
- Secure crankshaft -1- in "TDC" position using 3242.

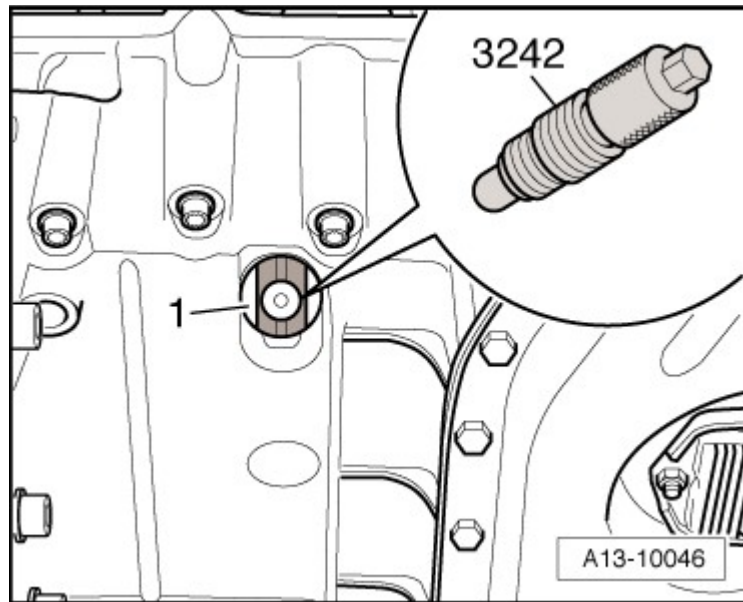


Fig. 85: Identifying Crankshaft Holder 3242 In Bore
Courtesy of AUDI OF AMERICA, LLC

- T40070 mounted on both cylinder heads and tightened to 25 Nm -arrows-.

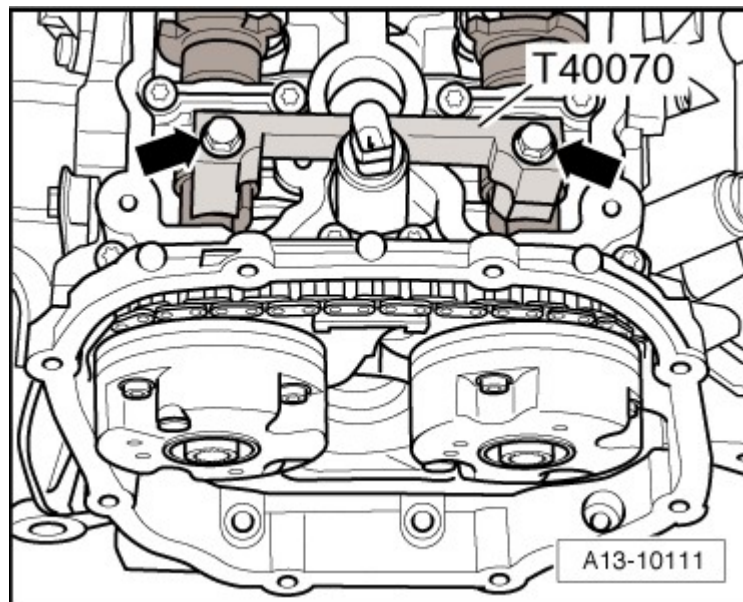


Fig. 86: Mounting Camshaft Locating Tool T40070 To Both Cylinder Heads And Tightening Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Install the camshaft adjuster on the left cylinder head according to the markings applied during removal.

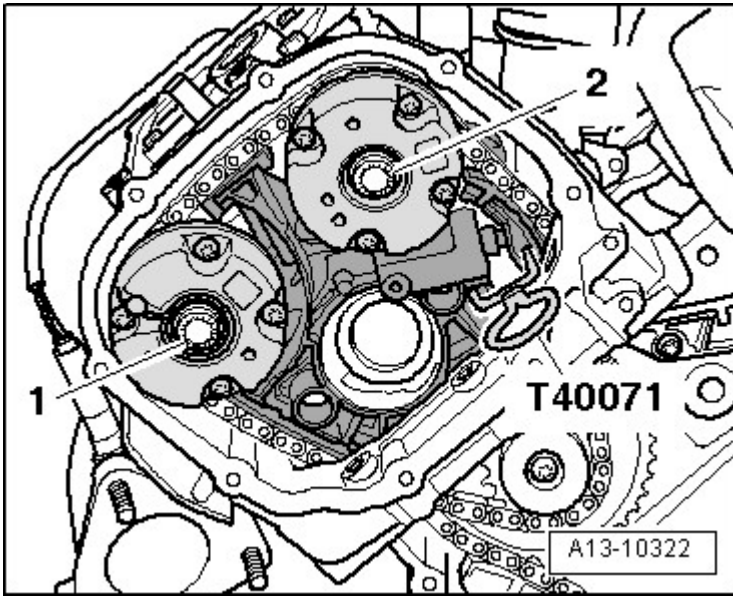


Fig. 87: Identifying Bolts On Left Cylinder Head And Removing Both Camshaft Adjusters
Courtesy of AUDI OF AMERICA, LLC

-- Position the camshaft timing chain on the drive sprocket and the camshaft adjuster and loosely install bolts -1 and 2--.

- Both camshaft adjusters must be able to still be rotated on camshaft and must not tip.

-- Remove the T40071.

-- Install the camshaft adjuster on the right cylinder head according to the markings applied during removal.

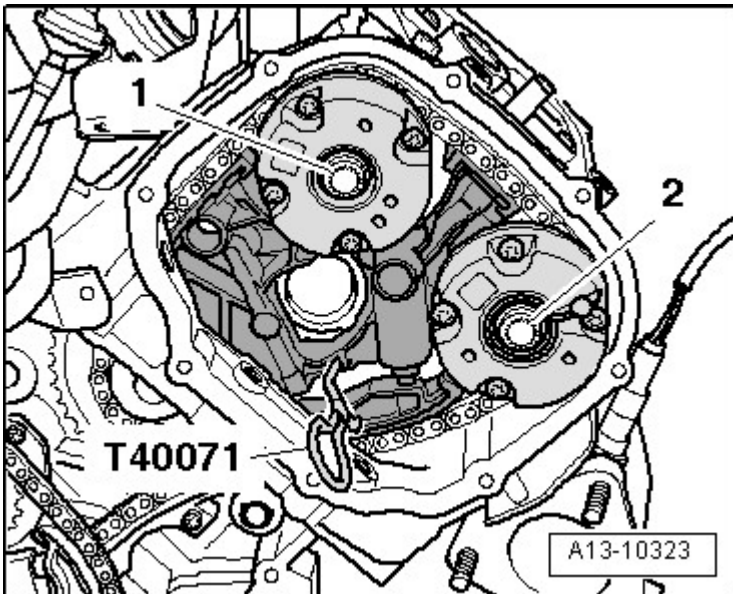


Fig. 88: Identifying Bolts On Right Cylinder Head And Removing Both Camshaft Adjusters
Courtesy of AUDI OF AMERICA, LLC

-- Position the camshaft timing chain on the drive sprocket and the camshaft adjuster and loosely install bolts -1 and 2-.

- Both camshaft adjusters must be able to still be rotated on camshaft and must not tip.

-- Remove the T40071.

-- Place the T40079 on the intake camshaft adjuster on the left cylinder head.

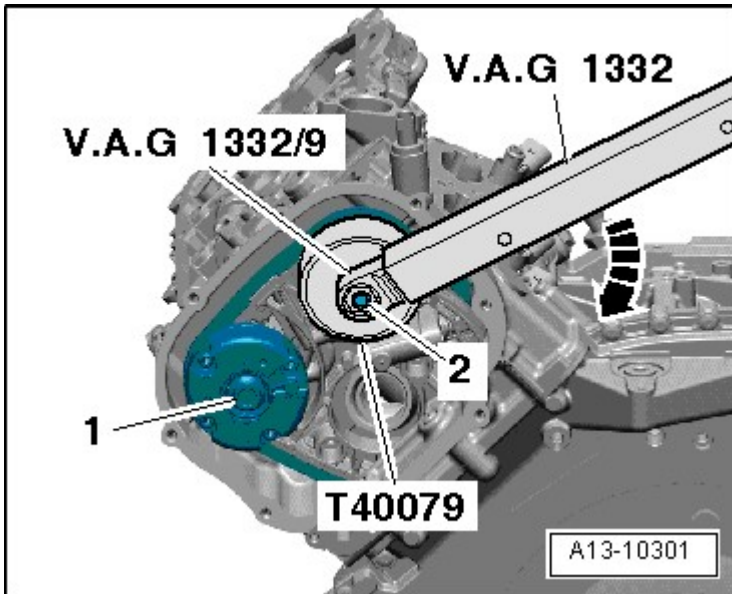


Fig. 89: Positioning Adapter T40079 On Intake Camshaft Adjuster At Left Cylinder Head
Courtesy of AUDI OF AMERICA, LLC

-- Place the V.A.G 1332 with V.A.G 1332/9 on the T40079.

-- Have a second technician tension the camshaft adjuster in the direction of the -arrow- to 40 Nm.

-- Tighten the bolts as follows while the camshaft adjuster is still held under tension.

Stage	Bolt	Tightening Specifications
1.	-1-	to the exhaust camshaft 60 Nm
1.	-2-	to the intake camshaft 60 Nm

-- Position the T40079 on the exhaust camshaft adjuster on the right cylinder head.

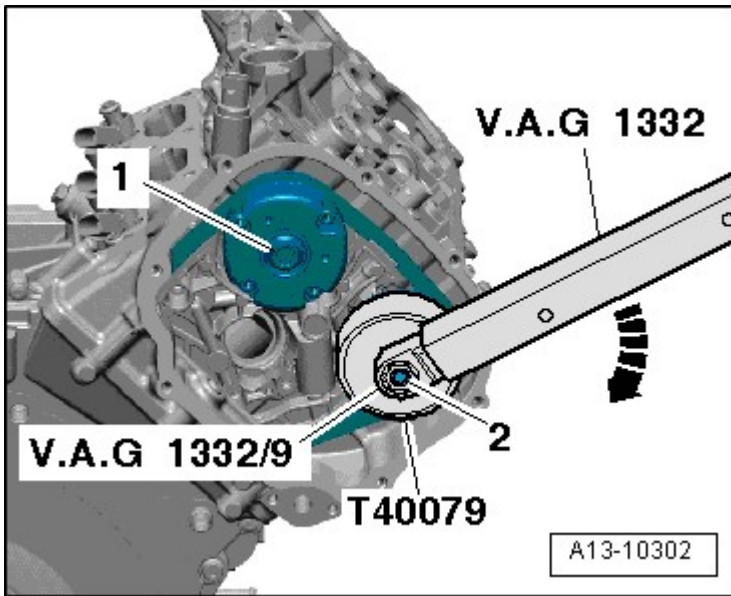


Fig. 90: Positioning Adapter T40079 On Exhaust Camshaft Adjuster At Right Cylinder Head
 Courtesy of AUDI OF AMERICA, LLC

- Place the V.A.G 1332 with V.A.G 1332/9 on the T40079.
- Have a second technician tension the camshaft adjuster in the direction of the -arrow- to 40 Nm.
- Tighten the bolts as follows while the camshaft adjuster is still held under tension.

Stage	Bolt	Tightening Specifications
1.	-1-	to the intake camshaft 60 Nm
1.	-2-	to the exhaust camshaft 60 Nm

- Remove the T40079.
- Remove the T40070 on both cylinder heads -arrows-.

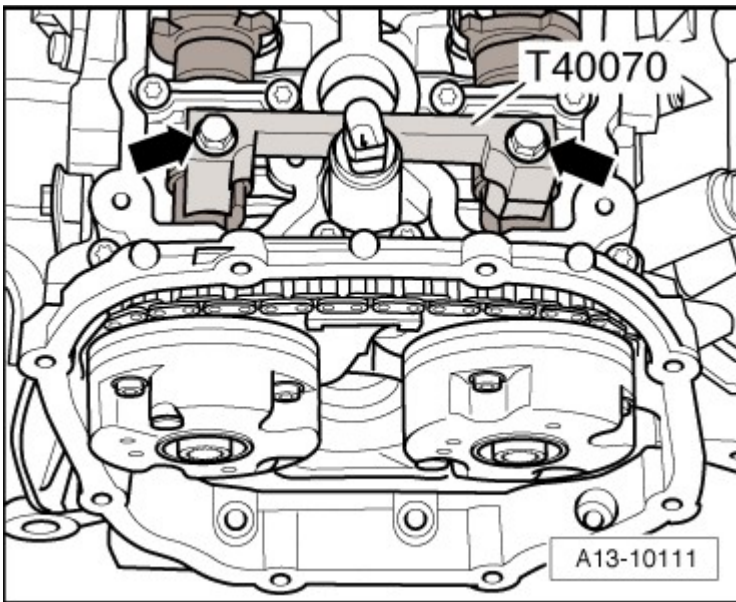


Fig. 91: Mounting Camshaft Locating Tool T40070 To Both Cylinder Heads And Tightening Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Tighten the camshaft adjuster bolts on the left cylinder head as follows:

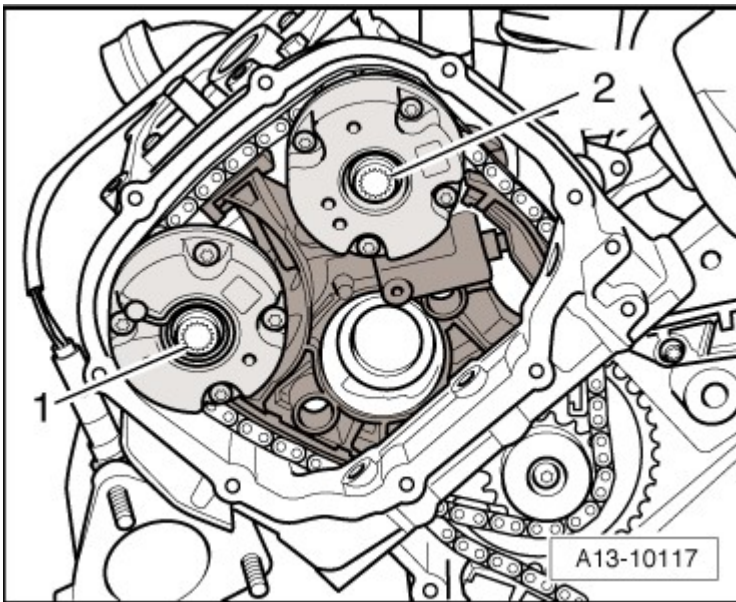


Fig. 92: Identifying Camshaft Adjuster Screws On Left Cylinder Head, Removal/Installation
Courtesy of AUDI OF AMERICA, LLC

Stage	Bolt	Tightening Specifications
2.	-1-	to the exhaust camshaft final tightening specification
2.	-2-	to the intake camshaft final tightening specification

-- Tighten the camshaft adjuster bolts on the right cylinder head as follows:

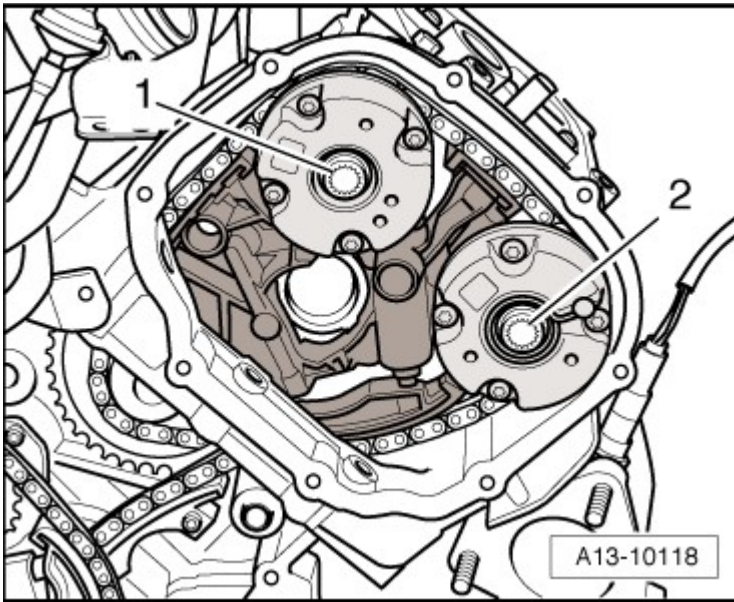


Fig. 93: Identifying Bolts For Camshaft Adjuster Using Multipoint Socket T10035
Courtesy of AUDI OF AMERICA, LLC

Stage	Bolt	Tightening Specifications
2.	-1-	to the intake camshaft final tightening specification
2.	-2-	to the exhaust camshaft final tightening specification

-- Remove the 3242.

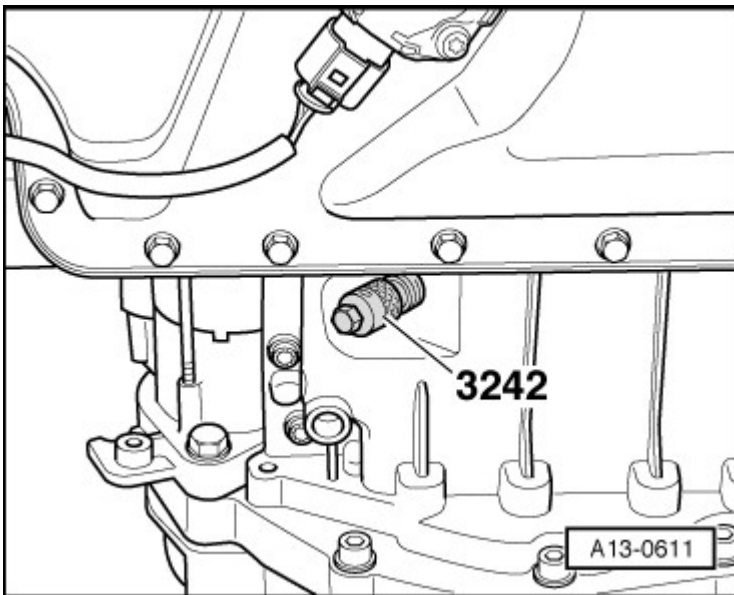


Fig. 94: Identifying Crankshaft Holder 3242 Into Hole, Removal/Installation
Courtesy of AUDI OF AMERICA, LLC

-- Turn the crankshaft 2 turn in direction of engine rotation -arrow- until the crankshaft is at "TDC" again.

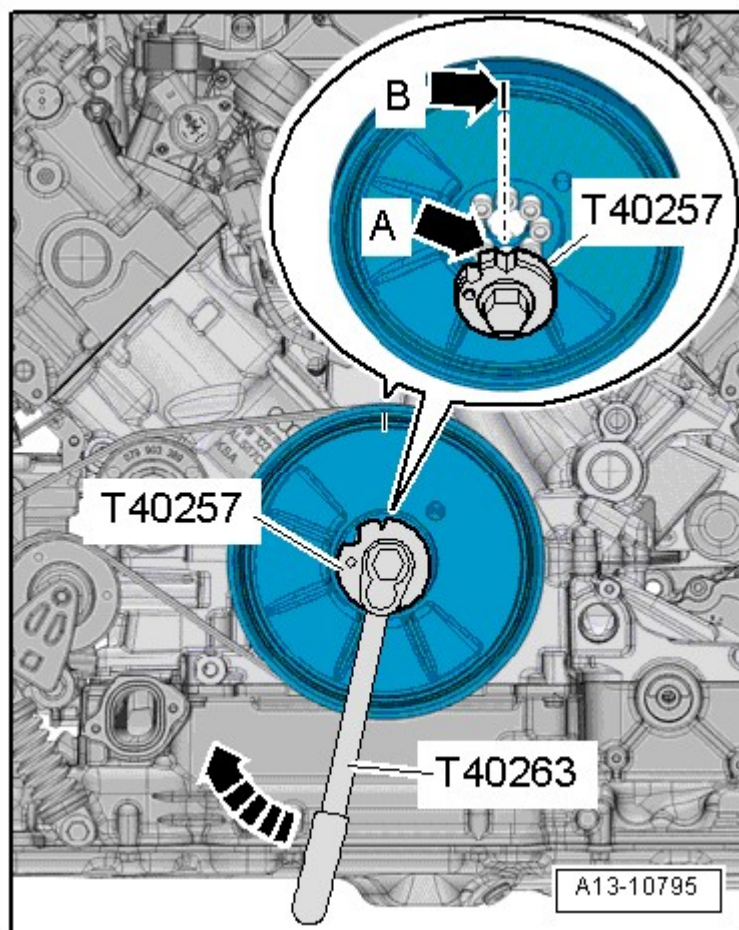


Fig. 95: Turning Crankshaft 180 Degrees In Direction Of Engine Rotation -Arrow
Courtesy of AUDI OF AMERICA, LLC

NOTE: If it is accidentally rotated beyond "TDC", rotate it back approximately 30° and set it to "TDC" again.

- The threaded holes -arrows- in the camshafts must face upward.

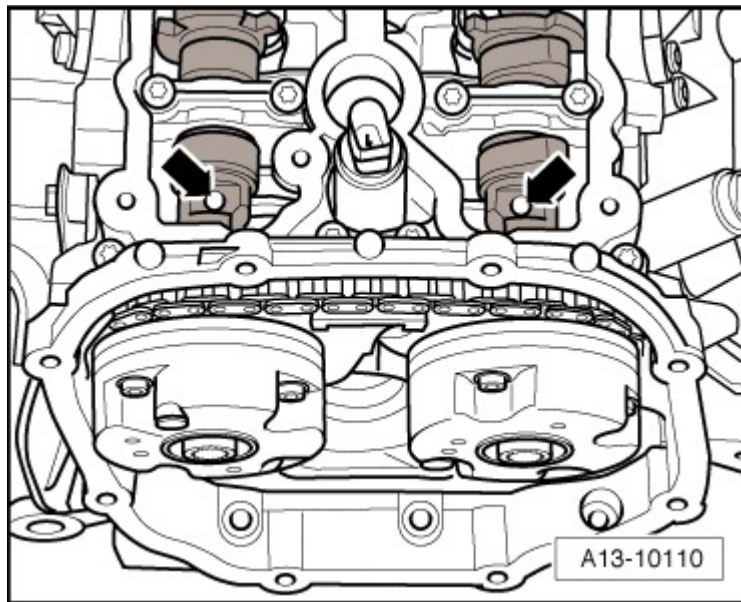


Fig. 96: Identifying Threaded Holes In Camshafts Must Face Upward
Courtesy of AUDI OF AMERICA, LLC

-- T40070 mounted on both cylinder heads and tightened to 25 Nm -arrows-.

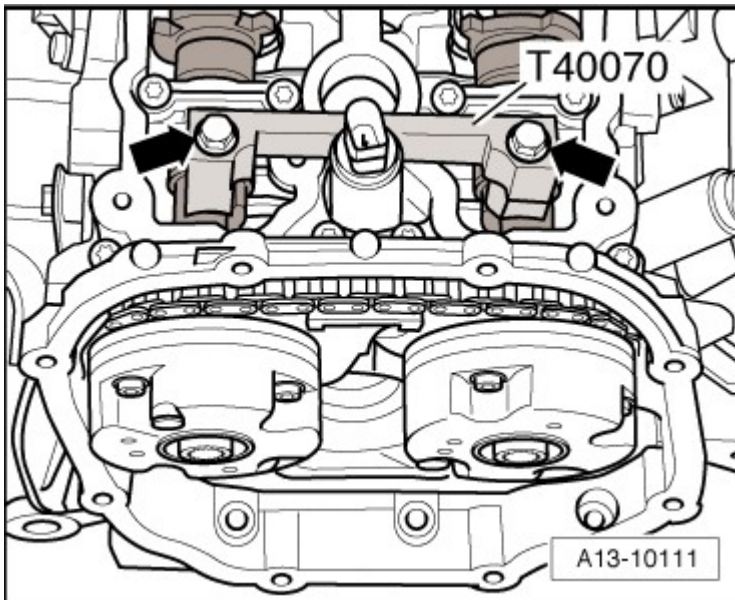


Fig. 97: Mounting Camshaft Locating Tool T40070 To Both Cylinder Heads And Tightening Bolts
Courtesy of AUDI OF AMERICA, LLC

- The T40070 is correctly positioned when the holes for the cylinder head bolts remain free.

-- Install the 3242 in the hole and tighten to 20 Nm.

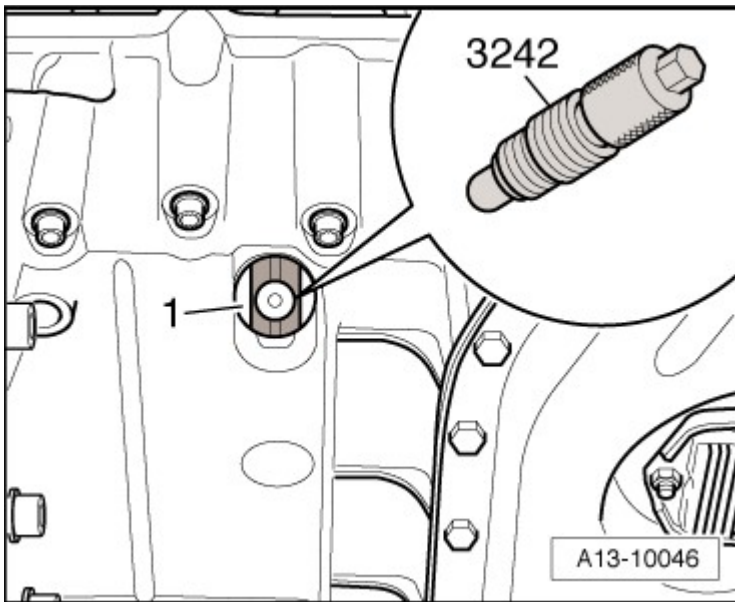


Fig. 98: Identifying Crankshaft Holder 3242 In Bore
Courtesy of AUDI OF AMERICA, LLC

- The 3242 must engage in the locating hole of the crankshaft -1-, otherwise repeat the adjustment.

-- Remove the camshaft locating pins on both cylinder heads.

-- Remove the 3242.

-- Install the sealing plug -arrow- for the "TDC" marking in the upper oil pan. Refer to **UPPER OIL PAN OVERVIEW** .

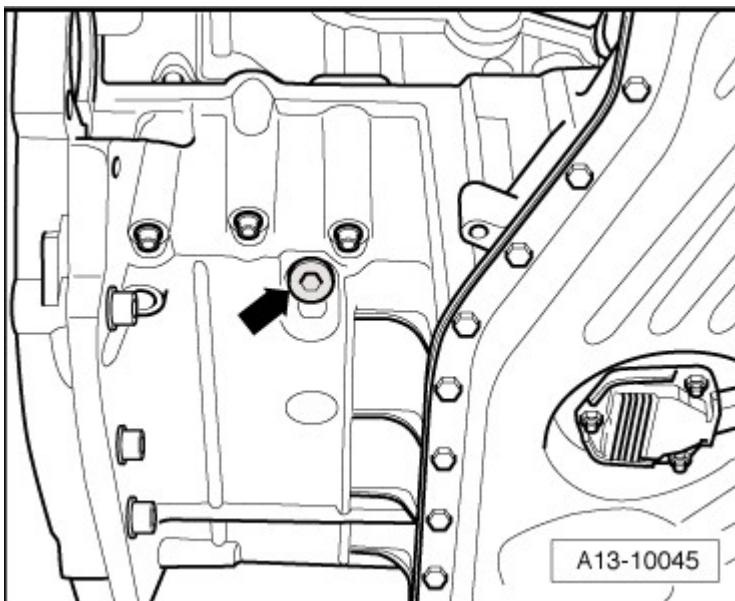


Fig. 99: Identifying Locking Bolt Of Upper Part Of Oil Pan
Courtesy of AUDI OF AMERICA, LLC

Install in reverse order of removal paying attention to the following:

-- Install the timing chain covers. Refer to **LEFT TIMING CHAIN COVER**, **RIGHT TIMING CHAIN COVER**.

-- Install the cylinder head covers. Refer to **LEFT CYLINDER HEAD COVER**, **RIGHT CYLINDER HEAD COVER**.

CYLINDER HEAD, INSTALLING

Special tools and workshop equipment required

- Crankshaft Holder 3242
- Camshaft Clamp T40070
- Locking Pin T40071

PROCEDURE

Tightening specifications:

- **CYLINDER HEAD OVERVIEW**
- **Fig. 7**

CAUTION: The sealing surfaces could be damaged.

- Carefully remove sealant residue from the 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 the 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 the valve train.

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

NOTE:

- Replace bolts that are tightened to the specification.
- Replace self-locking nuts, sealing rings, seals and O-rings.
- If a replacement cylinder is installed, the contact surfaces between the hydraulic adjusting elements, roller rocker levers and cam running surfaces must be lubricated before installing the cylinder head cover.
- Secure all hose connections with hose clamps appropriate for the model.
- It is necessary to replace all the coolant and engine oil whenever the cylinder head or the cylinder head gasket are replaced.

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

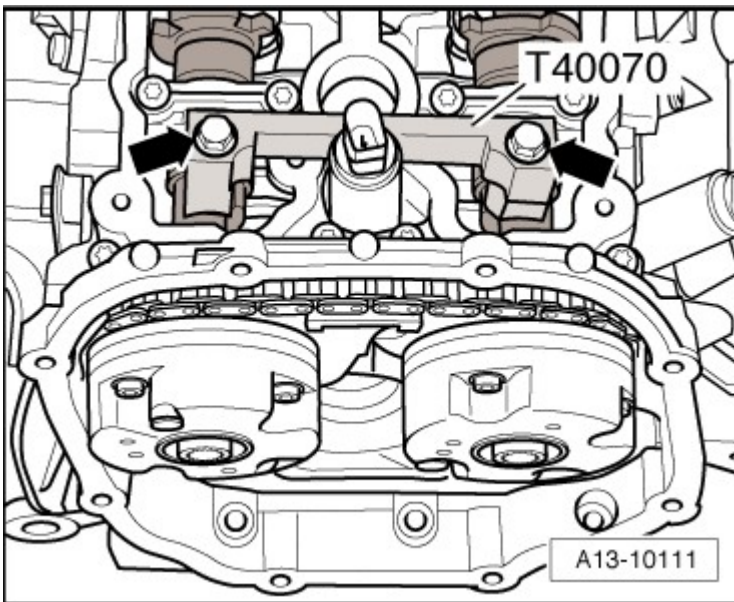


Fig. 100: Mounting Camshaft Locating Tool T40070 To Both Cylinder Heads And Tightening Bolts
Courtesy of AUDI OF AMERICA, LLC

- T40070 mounted on both cylinder heads and tightened to 25 Nm -arrows-.
- 3242 connected.

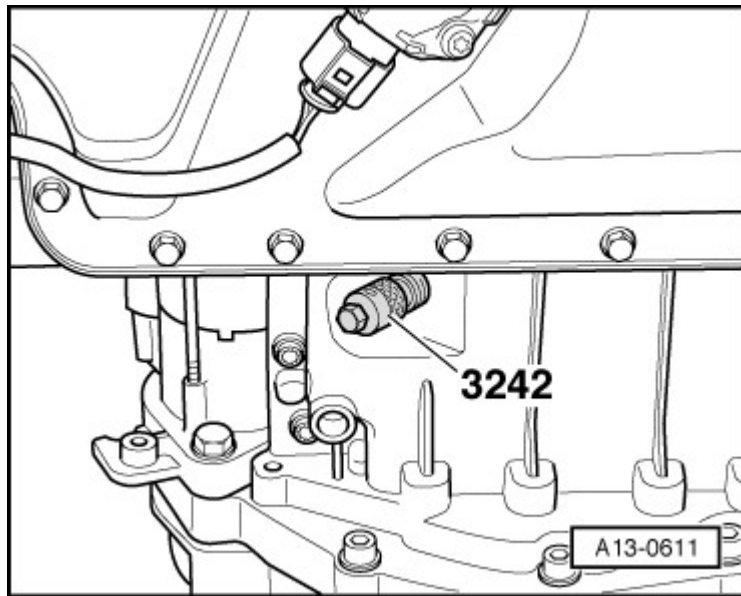


Fig. 101: Removing/Installing Crankshaft Holder 3242 Into Hole
Courtesy of AUDI OF AMERICA, LLC

NOTE: The following illustrations show the left cylinder head instead.

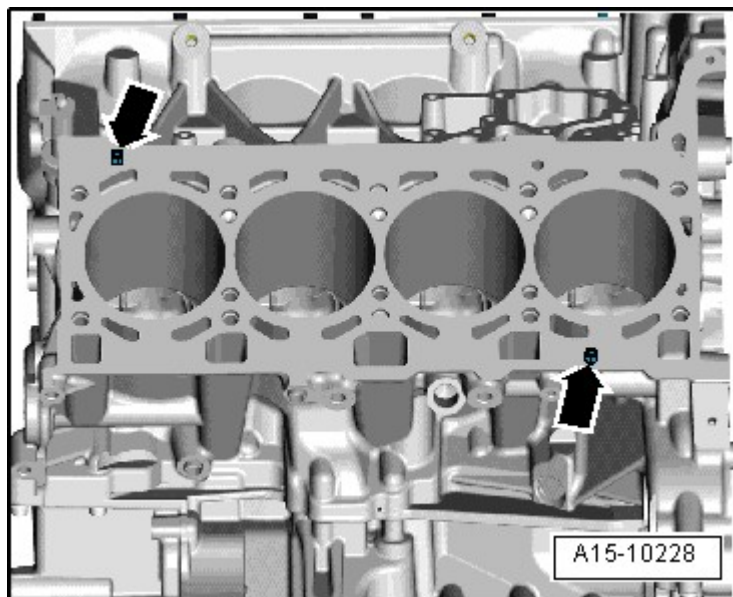


Fig. 102: Identifying Alignment Bushings In Cylinder Block
Courtesy of AUDI OF AMERICA, LLC

-- Set cylinder head gasket in place.

- Pay close attention to alignment bushings in cylinder block -arrows-.
- Cylinder head seal installation position: Identification "oben" (top) or the cylinder head part number.

-- Set cylinder head in place.

-- Tighten the cylinder head bolts. Refer to **Fig. 7**.

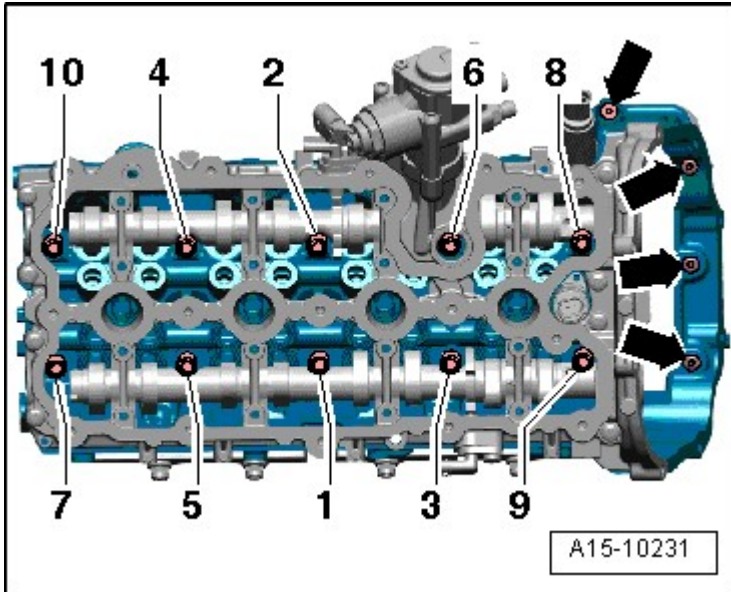


Fig. 103: Identifying Cylinder Head Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

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

-- Tighten the locking bolt -arrow-.

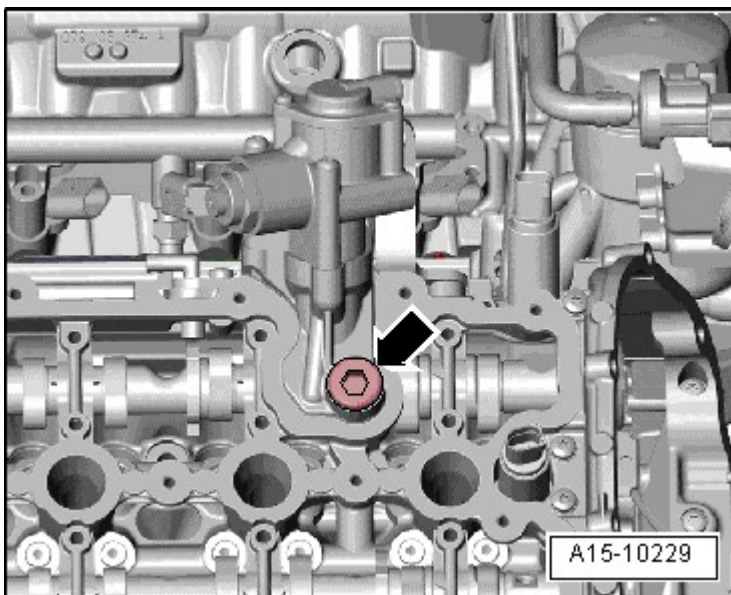


Fig. 104: Identifying Locking Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Check if the guide rail for the camshaft timing chain tensioner is secured with the T40071.

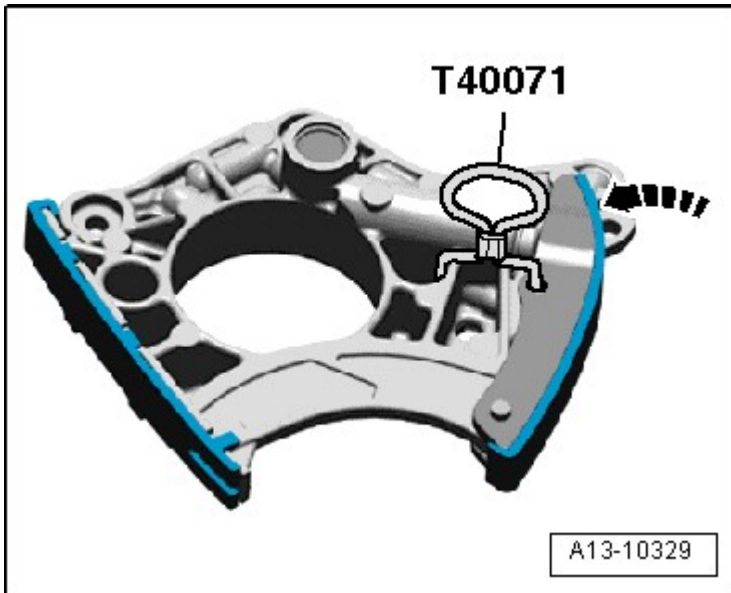


Fig. 105: Pressing Left/Right Camshaft Timing Chain Guide Rail Inward And Securing Chain Tensioner With Locking Pin T40071

Courtesy of AUDI OF AMERICA, LLC

NOTE:

- If the tensioning element was removed from the chain tensioner, then the installation position must be noted: Hole in housing floor faces toward chain tensioner, piston faces toward tensioning rail.
- Ignore -arrow-.

-- Clean the chain tensioner oil strainer -2-.

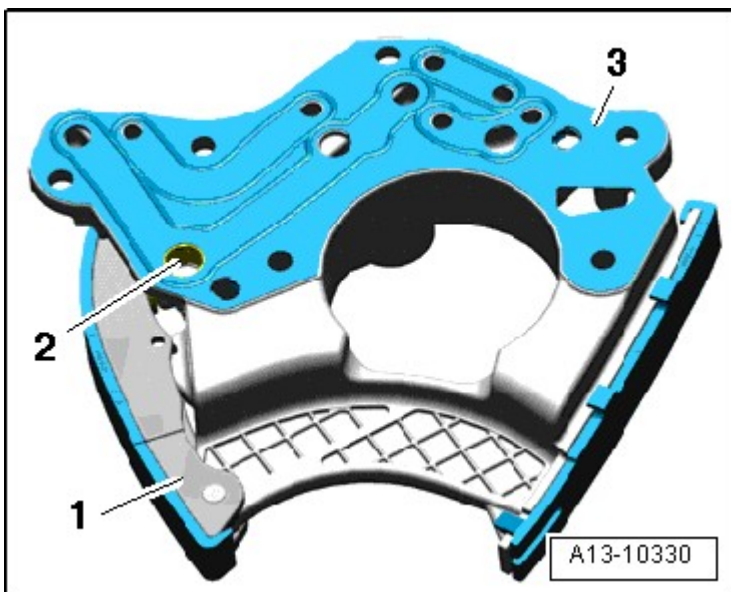


Fig. 106: Identifying Chain Tensioner Oil Screen, Gasket & Chain Tensioner
Courtesy of AUDI OF AMERICA, LLC

- Position a new seal -3- on the rear of the chain tensioner -1-.
- Insert the chain tensioner and position the camshaft timing chain as shown in the illustration.

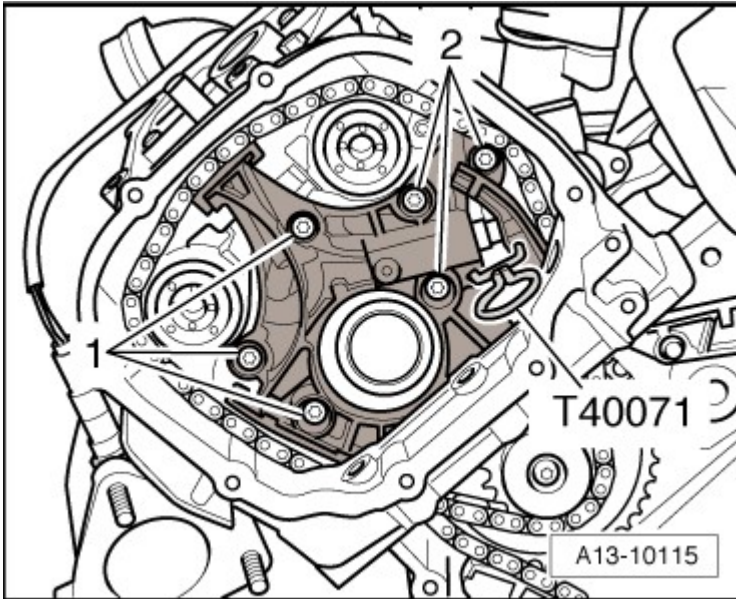


Fig. 107: Identifying Bolts For Left Chain Tensioner And Left Camshaft Timing Chain
Courtesy of AUDI OF AMERICA, LLC

- Fasten bolts -1 and 2-.

Install in reverse order of removal paying attention to the following:

- Install the cylinder head cover. Refer to **LEFT CYLINDER HEAD COVER, RIGHT CYLINDER HEAD COVER**.
- Install the high pressure lines and the intake manifold. Refer to **REMOVAL AND INSTALLATION** .
- Position the camshaft timing chain on the camshafts **CAMSHAFT TIMING CHAINS => Installing**.
- Install the timing chain covers. Refer to **LEFT TIMING CHAIN COVER, RIGHT TIMING CHAIN COVER**.
- Change engine oil.
- Replace coolant **FILLING** .

LEFT CYLINDER HEAD, REMOVING

Special tools and workshop equipment required

- Commercially available XZN M12 socket, minimum 140 mm

PROCEDURE

- Remove the left timing chain cover. Refer to **LEFT TIMING CHAIN COVER**.
- Remove the left camshaft timing chain from the camshafts. Refer to **CAMSHAFT TIMING CHAINS**.
- Remove the intake manifold. Refer to **REMOVAL AND INSTALLATION**.

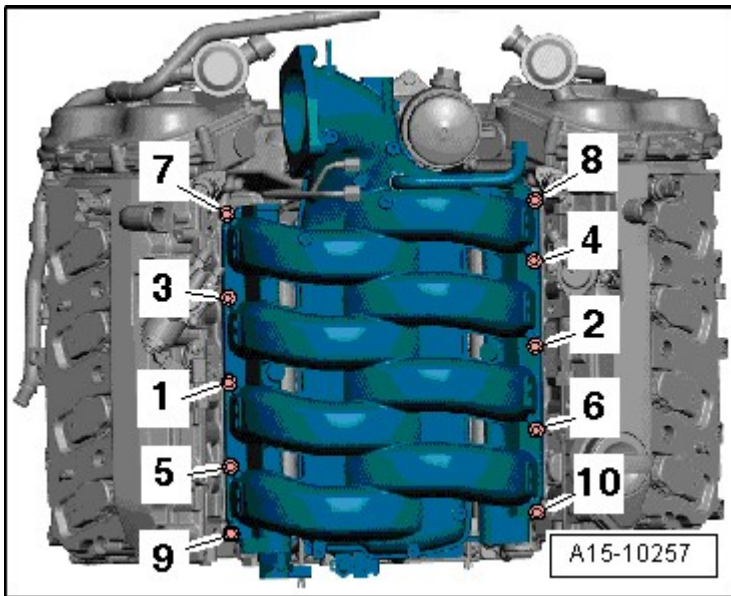


Fig. 108: Identifying Intake Manifold Bolts Removal/Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

- Remove the left cylinder head cover. Refer to **LEFT CYLINDER HEAD COVER**
- Disconnect the connectors:

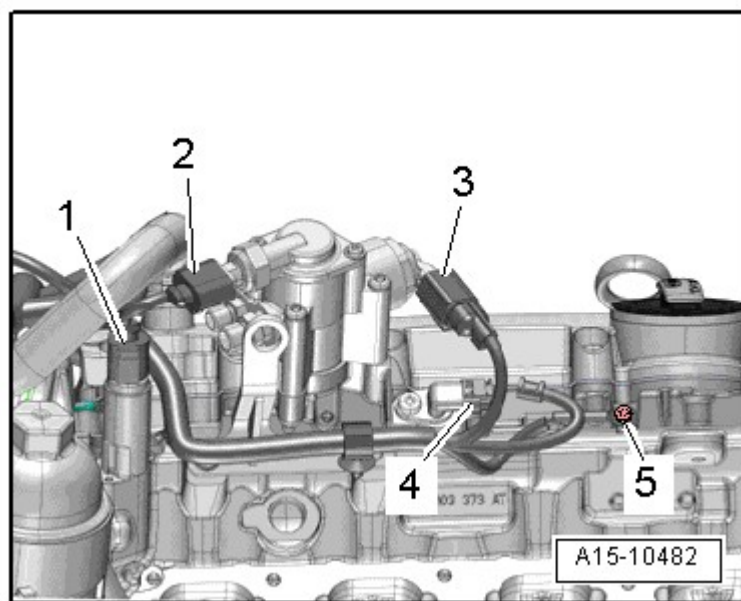


Fig. 109: Identifying Connectors

Courtesy of AUDI OF AMERICA, LLC

1. On camshaft adjustment valve 2 -N208-
2. On fuel pressure sensor -G247- *
3. On the left high pressure pump
4. On Camshaft Position (CMP) sensor 2 -G163-

-- Remove the bolt -5- and move the electrical wiring harness to the side.

-- Remove the bolts -1 and 2- and remove the left chain tensioner.

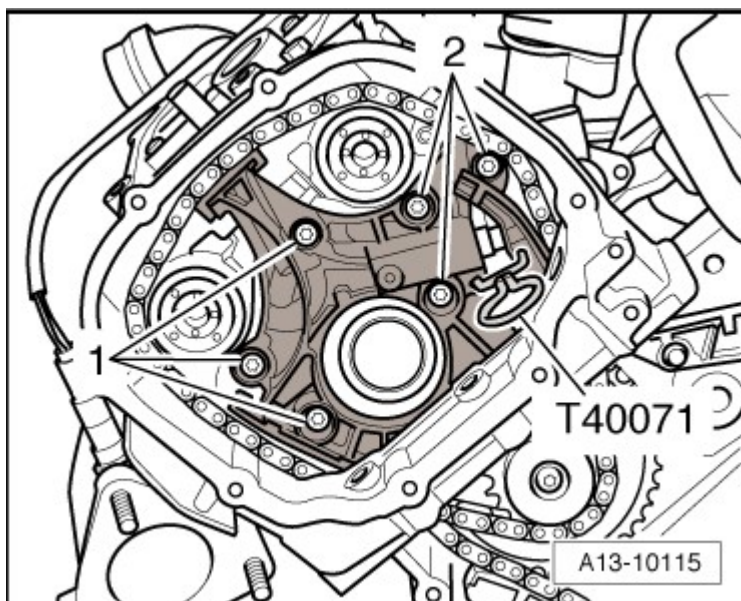


Fig. 110: Identifying Bolts For Left Chain Tensioner And Left Camshaft Timing Chain
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect electrical connectors -arrows- on the fuel injectors.

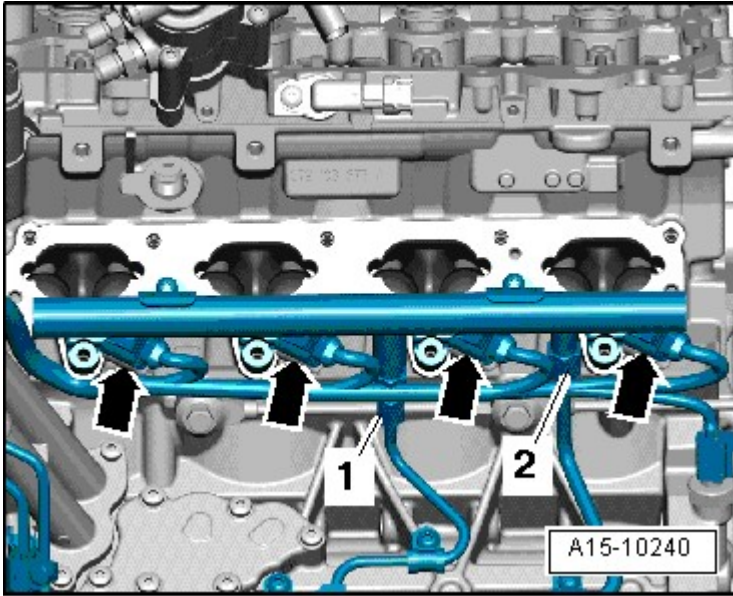


Fig. 111: Disconnecting Electrical Connectors At Fuel Injectors & Removing High Pressure Lines From Connector On Fuel Rail
Courtesy of AUDI OF AMERICA, LLC

-- Remove the high pressure line -2- from the connection on the fuel rail.

-- Remove high pressure line -1- from the connector on the fuel rail by counter holding at the hex head with an open end wrench and loosening union nut.

NOTE: **Do not change the bent shape of the high pressure lines.**

-- Remove the locking bolt -arrow-.

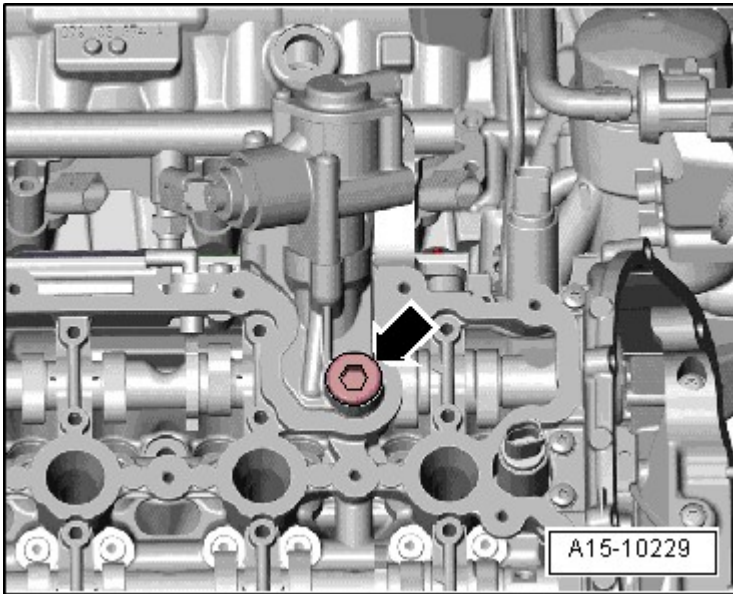


Fig. 112: Identifying Locking Bolt

Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows-.

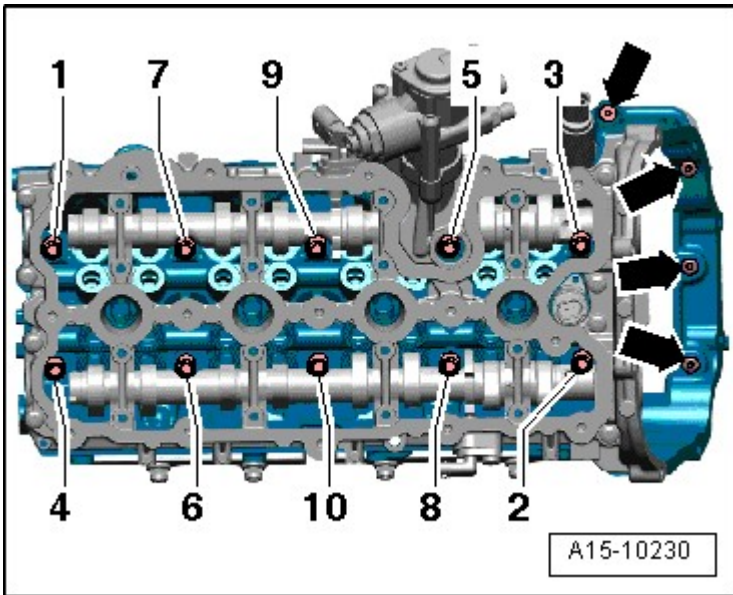


Fig. 113: Cylinder Head Bolts Loosening Sequence

Courtesy of AUDI OF AMERICA, LLC

-- Loosen the cylinder head bolts in the following sequence -1 through 10-.

-- Remove the bolts and the cylinder head carefully.

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

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

- Ignition Coil Puller T40039

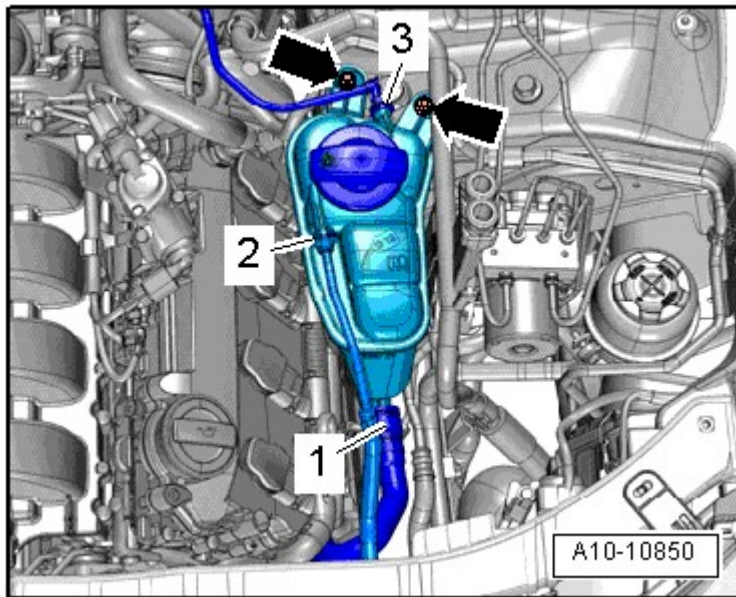
REMOVING

Fig. 114: Identifying Coolant Reservoir Components

Courtesy of AUDI OF AMERICA, LLC

- Disconnect the coolant hose -3- from the coolant overflow reservoir.
- Remove the bolts -arrows-.
- Disconnect the electrical connector on the engine coolant lever warning switch -F66- and move the coolant overflow reservoir with the coolant hoses -1 and 2- still connected to the side.
- Pull the oil dipstick -10- out of the guide tube.

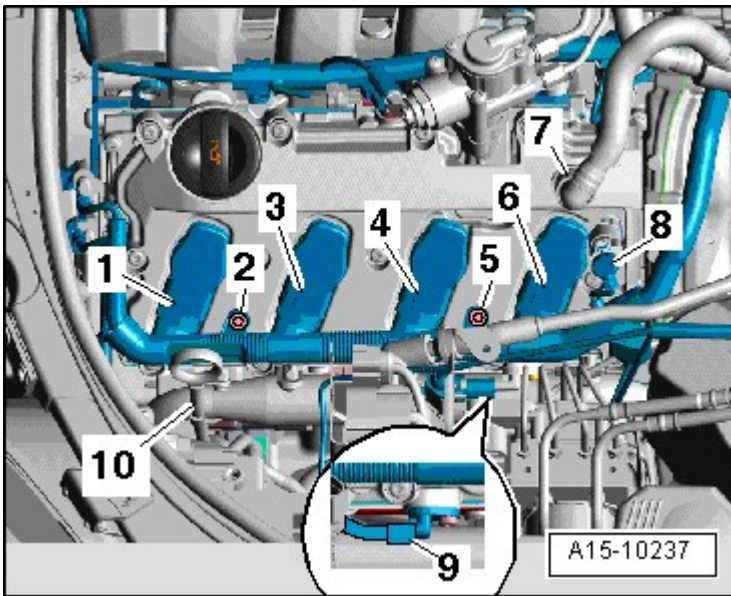


Fig. 115: Identifying Oil Dipstick, Bolts, Electrical Connectors, And Ventilation Hose
Courtesy of AUDI OF AMERICA, LLC

- Remove the bolts -2 and 5-.
- Disconnect the connectors -1, 3, 4, 6, 8 and 9- and free up the wiring harness.
- Remove the crankcase ventilation hose -7- by pressing the release buttons.
- Remove the ignition coils using the T40039.

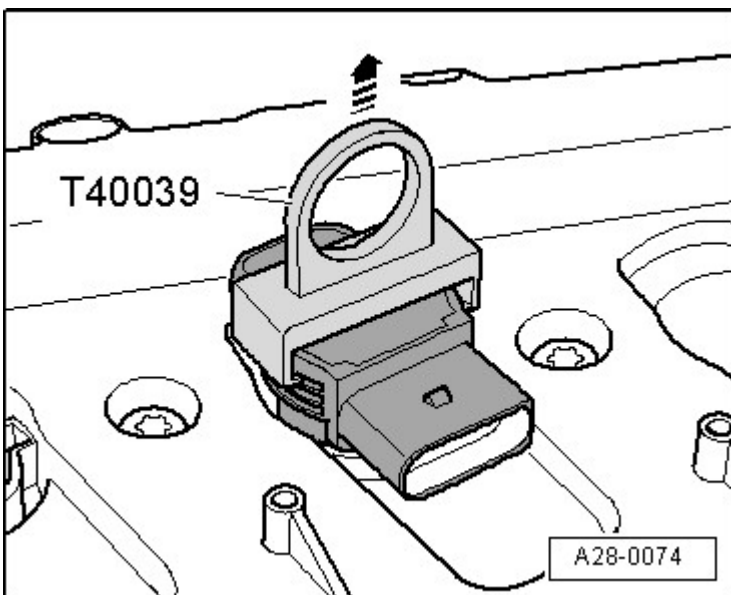


Fig. 116: Removing Ignition Coils With Ignition Coil Puller T40039
Courtesy of AUDI OF AMERICA, LLC

-- Remove the left cylinder head bolts in sequence -15 to 1-.

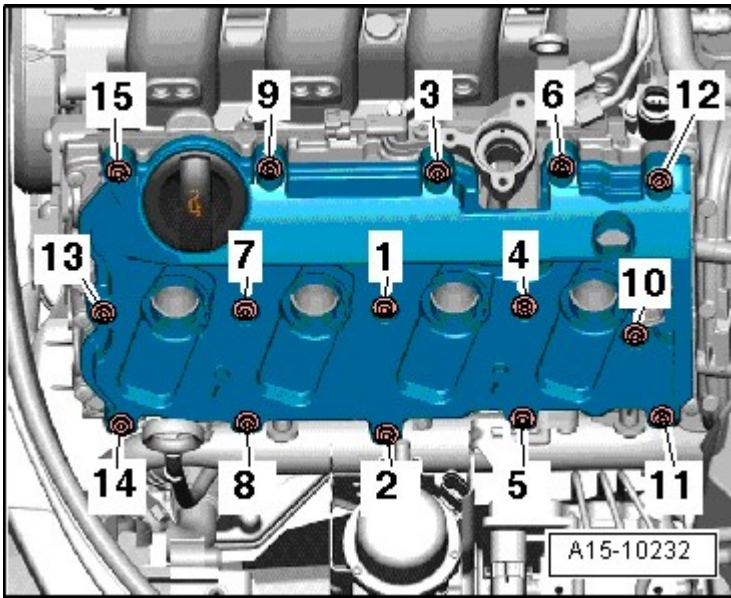


Fig. 117: Identifying Left Cylinder Head Cover Bolts Removal Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts and remove the left cylinder head cover.

INSTALLING

Install in reverse order, paying attention to the following:

- Tightening specification, refer to **Fig. 5**.

NOTE:

- Replace the cylinder head seal if it is damaged.
- Replace the cylinder head cover bolts when replacing the damaged seal.
- Secure all hose connections with hose clamps of the same type as those equipped by the factory,

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

-- Tighten the left cylinder head cover bolts. Refer to **Fig. 5**.

LEFT TIMING CHAIN COVER

Special tools and workshop equipment required

- Hand drill with plastic brush attachment
- Protective goggles
- Sealant,

REMOVING

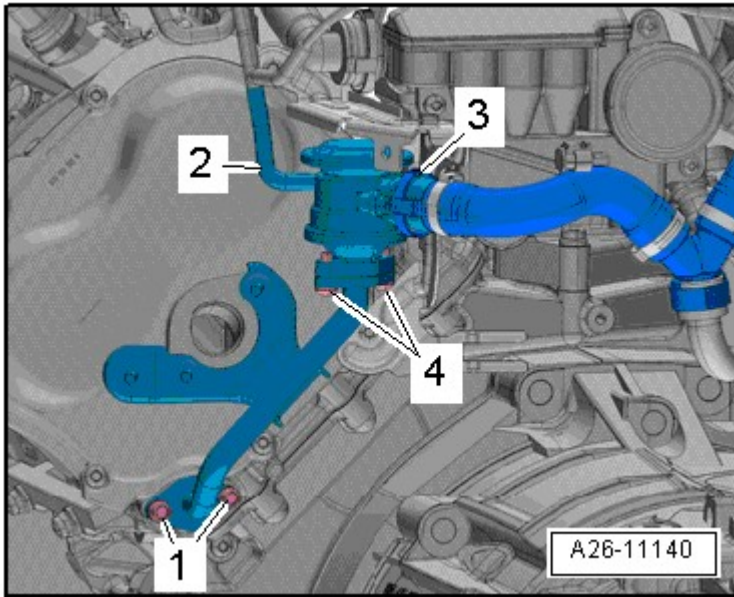


Fig. 118: Identifying Vacuum Hose -2-, Secondary Air Hose -3- & Bolts -4-
 Courtesy of AUDI OF AMERICA, LLC

- Remove the upper left coolant pipe. Refer to UPPER LEFT COOLANT PIPE .
- Remove the rear coolant pipe. Refer to REAR COOLANT PIPE .
- Remove the vacuum hose -2- (if equipped) from the Secondary Air Injection (AIR) combination valve.
- Remove the secondary air hose -3- by pressing the release buttons.
- Remove the bolts -1- and remove the AIR combi-valve.

NOTE: Ignore -4-.

- Loosen and remove the bolts in the following sequence: -8 through 1- and then remove the bracket -arrow A- for the heated oxygen sensor connectors.

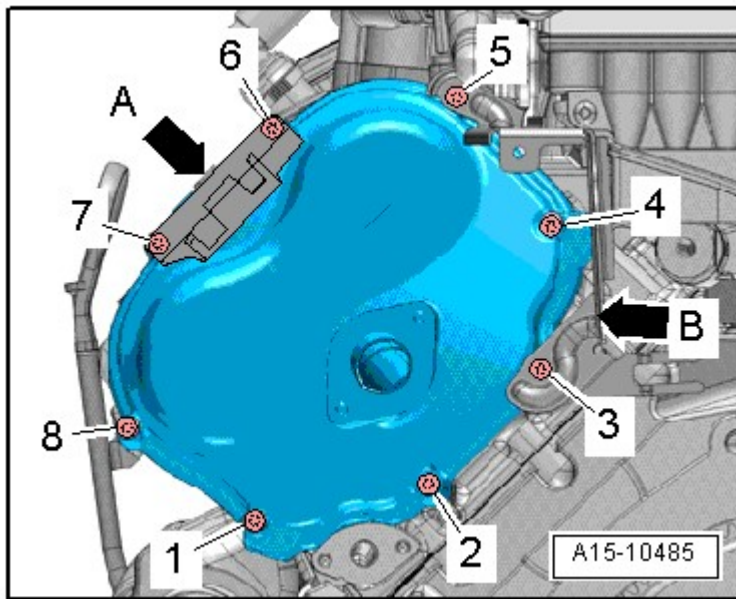


Fig. 119: Identifying Left Timing Chain Cover Tightening Sequence
 Courtesy of AUDI OF AMERICA, LLC

-- Push the wiring harness bracket -arrow B- to the side and carefully remove the left timing chain guard.

INSTALLING

- Tightening specification, refer to **Fig. 15**.

NOTE: Replace the O-rings.

-- Remove the 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.

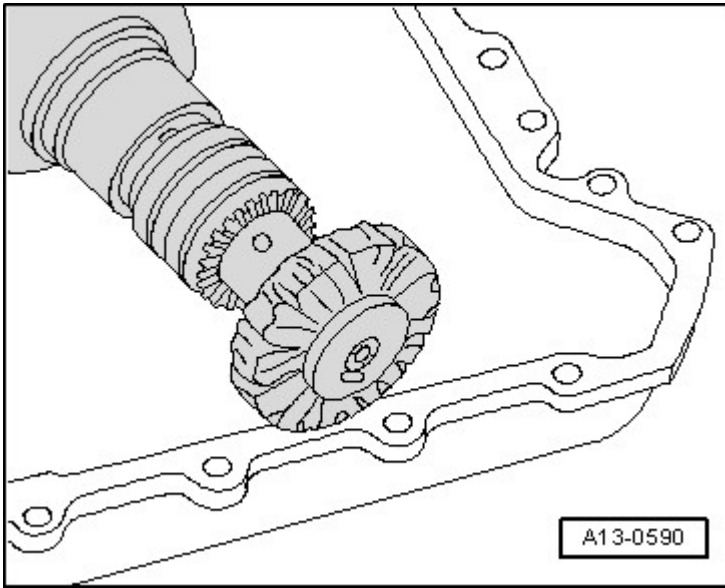


Fig. 120: Identifying Rotating Plastic Brush

Courtesy of AUDI OF AMERICA, LLC

WARNING: Danger of eye injury.

- **Wear protective goggles.**

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

-- Clean sealing surfaces, 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 2 mm).

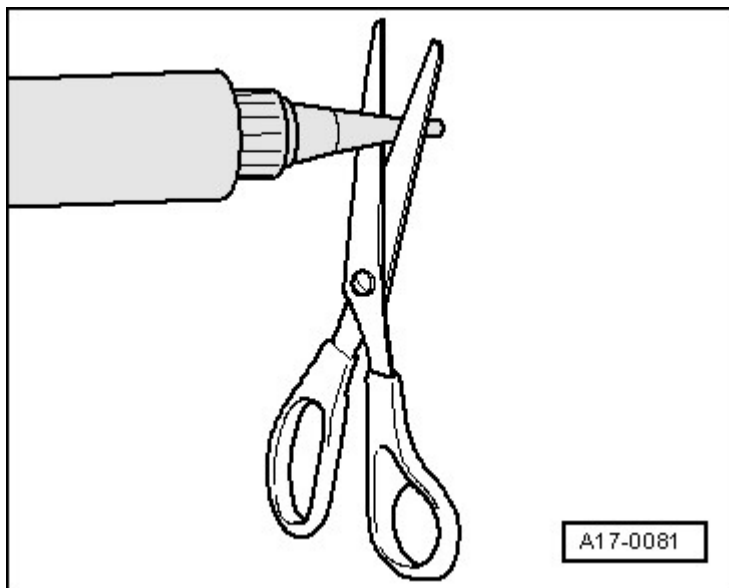


Fig. 121: Cutting Tube Nozzle

Courtesy of AUDI OF AMERICA, LLC

-- Drive the left coolant intermediate pipe -2- out of the left timing chain cover with a drift.

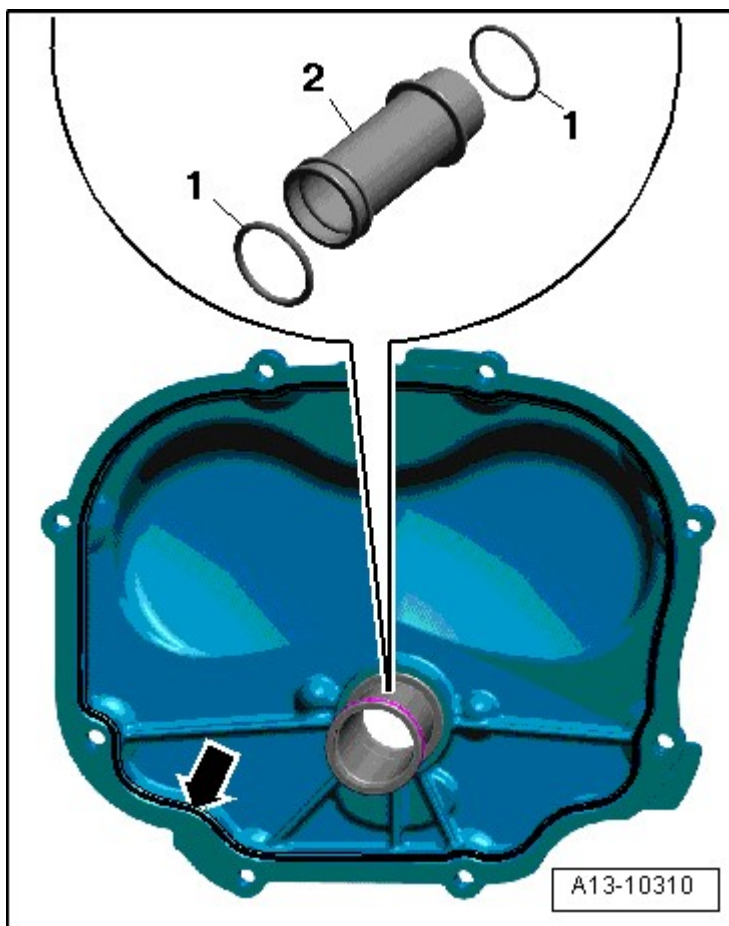


Fig. 122: Driving Left Coolant Intermediate Pipe Out Of Left Timing Chain Cover With Suitable Drift
Courtesy of AUDI OF AMERICA, LLC

- Insert O-rings -1- on the coolant intermediate pipe -2-.
- Insert the coolant intermediate pipe into the left timing chain cover.

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

- Do not apply sealant bead thicker than indicated.

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

- Thickness of sealant bead: 2.5 mm.

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

- Install the left timing chain cover with both brackets -arrows A and B- and tighten the bolts. Refer to **Fig. 15**.

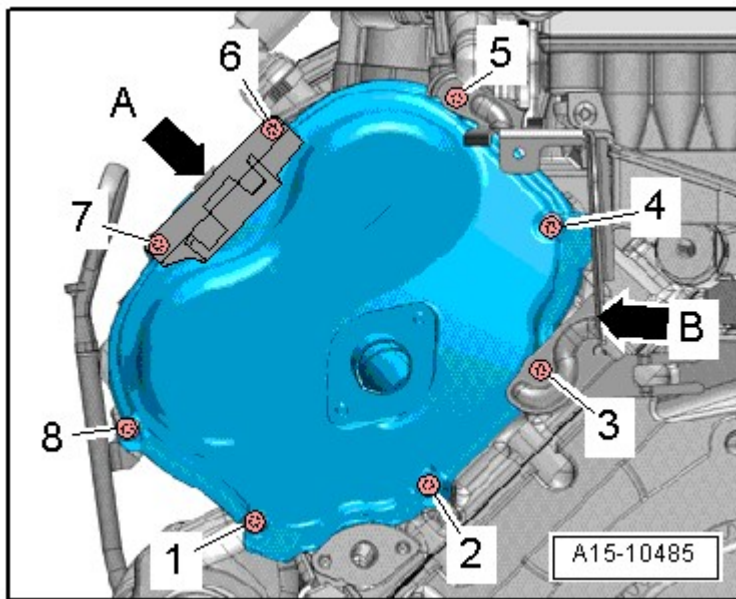


Fig. 123: Identifying Left Timing Chain Cover Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

Install in reverse order of removal paying attention to the following:

- Install the left AIR combination valve. Refer to **LEFT SECONDARY AIR INJECTION (AIR) COMBINATION VALVE**.

-- Install the rear coolant pipes. Refer to **REAR COOLANT PIPE** .

-- Installing the upper left coolant pipe. Refer to **UPPER LEFT COOLANT PIPE** .

LOWER TIMING CHAIN COVER

Special tools and workshop equipment required

- Oil Collecting and Extracting Device V.A.G 1782
- Hand drill with plastic brush attachment
- Protective goggles
- Sealant,

REMOVING

- The transmission is removed. Refer to **REMOVAL AND INSTALLATION** or **REMOVAL AND INSTALLATION** .
- Place the V.A.G 1782 under the engine and drain the engine oil.
- Remove the drive plate. Refer to **DRIVE PLATE** .
- Remove the timing chain covers. Refer to **LEFT TIMING CHAIN COVER**, **RIGHT TIMING CHAIN COVER**.
- Remove intake manifold. Refer to **REMOVAL AND INSTALLATION** .

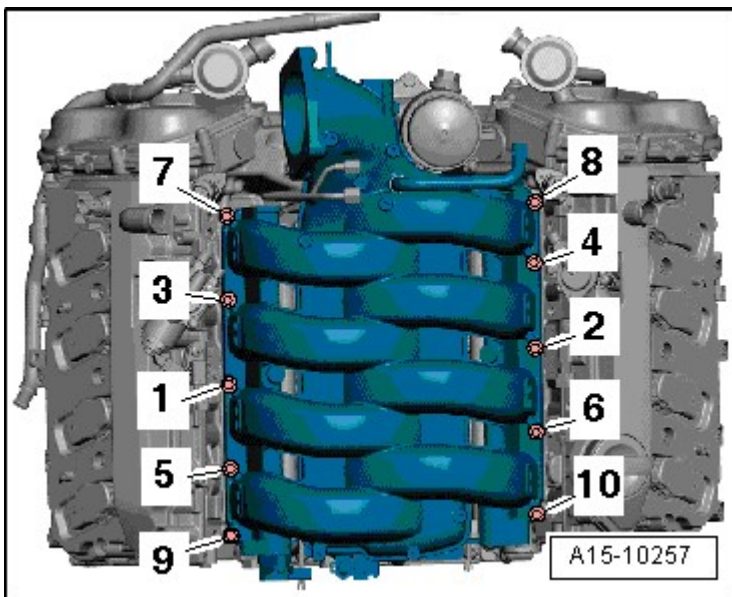


Fig. 124: Identifying Intake Manifold Bolts Removal/Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

- Remove the oil filter housing. Refer to **OIL FILTER HOUSING** .
- Remove the bolts -1 and 2- and move the lower left coolant pipe to the side.

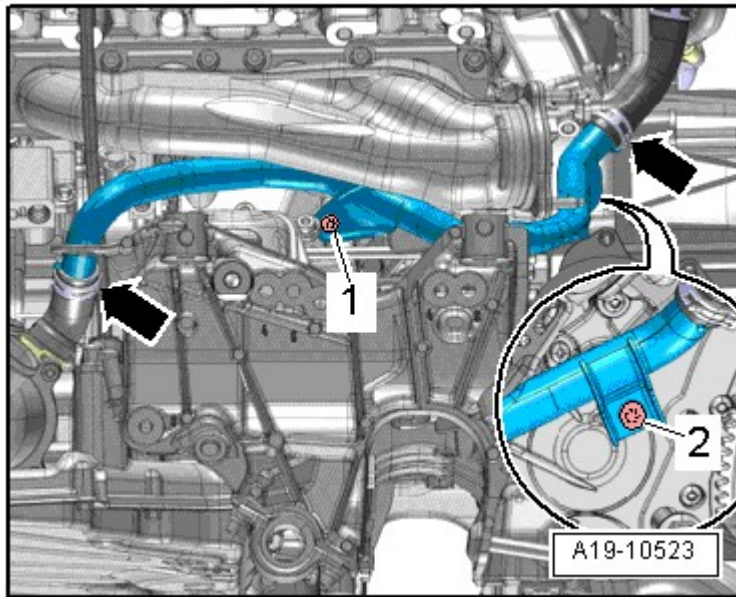


Fig. 125: Identifying Bolts -1 & 2- & Move Lower Left Coolant Pipe To Side
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -arrows-.

- Remove the bolts -arrows-.

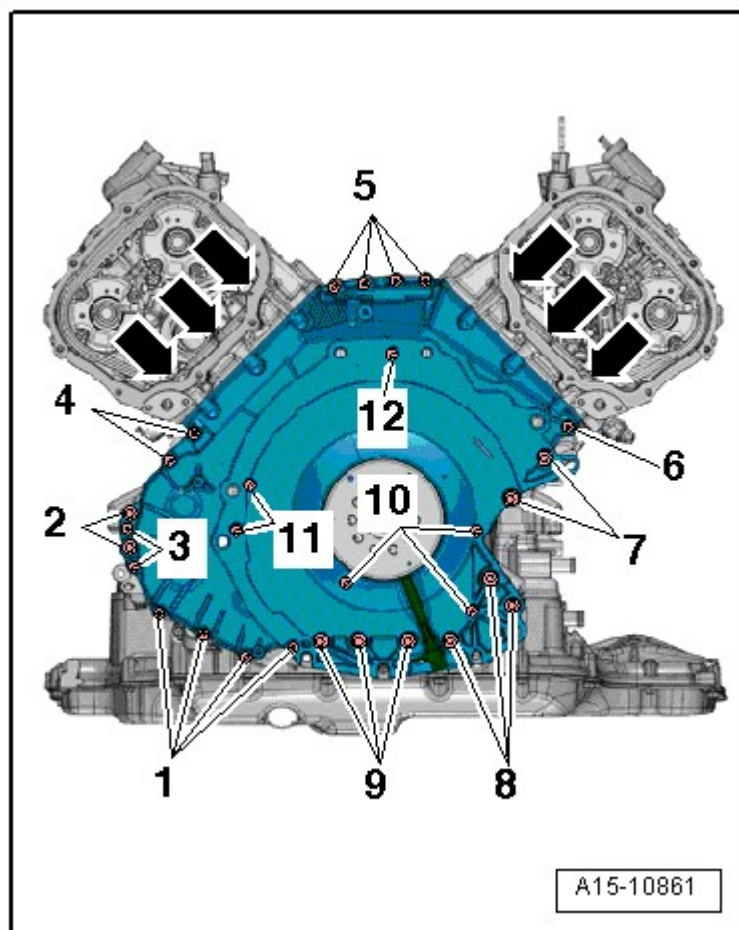


Fig. 126: Identifying Lower Timing Chain Cover Tightening Sequence
 Courtesy of AUDI OF AMERICA, LLC

- Remove the bolts in the following sequence: -12 to 1-.
- Carefully separate the timing chain guard lower section from the bond.
- Press the transmission side of the crankshaft shaft seal out of the lower timing chain cover.

INSTALLING

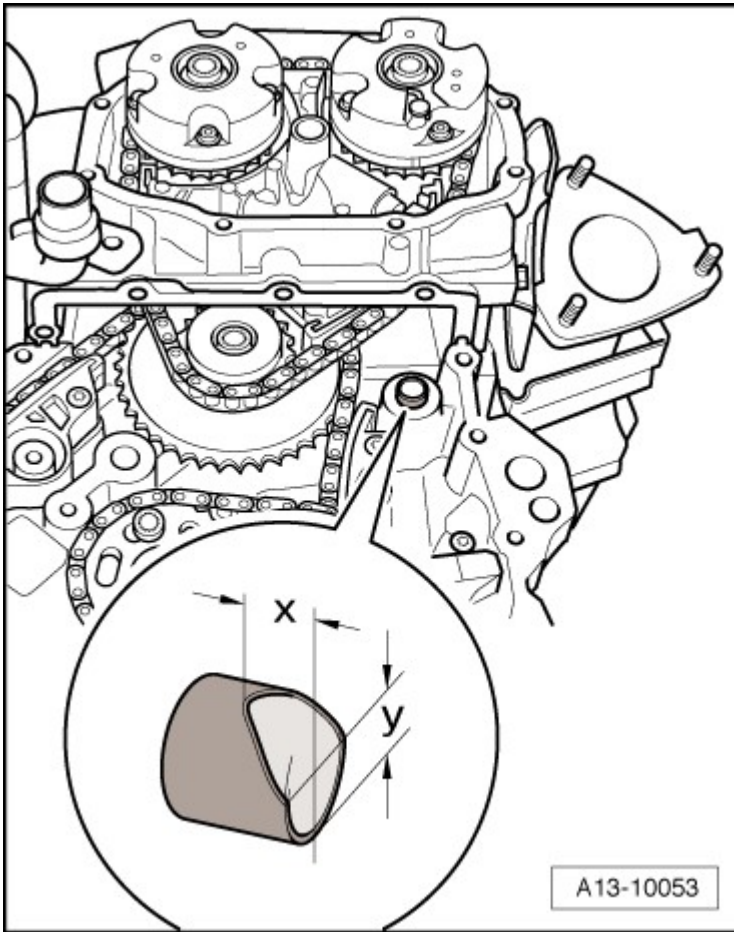


Fig. 127: Chamfer Alignment Bushing With File
Courtesy of AUDI OF AMERICA, LLC

- For the correct tightening specifications, refer to **Fig. 17**.

NOTE: Replace the M6 bolts.

- Remove the right upper alignment bushing from the cylinder block.
- Grind the alignment bushing down at an angle as shown in the illustration.
 - Dimension -x- = 6.5 mm.
 - Dimension -y- = 8 mm.

- Insert the alignment bushing in the cylinder block so the angled side faces up.

NOTE: Because of the chamfer, the lower timing chain cover can be positioned more easily when the cylinder head is installed.

CAUTION: Risk of contaminating lubricating system.

- Cover open parts of the engine.

WARNING: Danger of eye injury.

- Wear protective goggles.

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

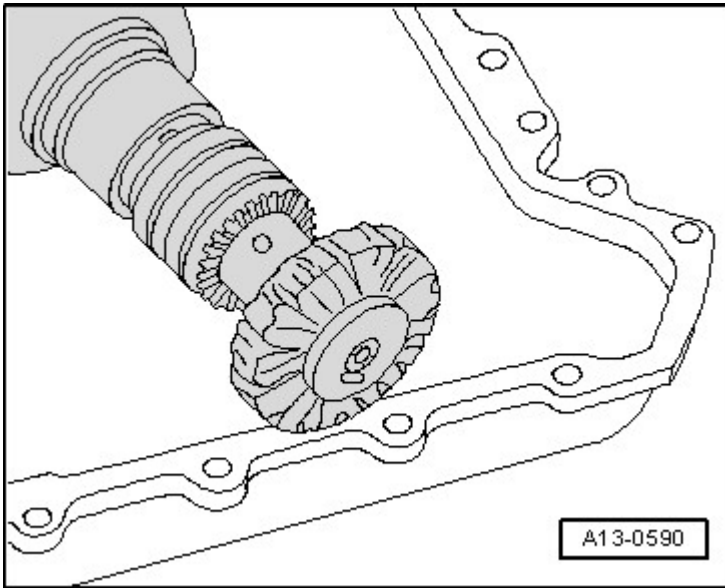


Fig. 128: Identifying Rotating Plastic Brush

Courtesy of AUDI OF AMERICA, LLC

- Clean sealing surfaces, must be free of oil and grease.
- Clean the threaded holes in the cylinder block for connecting the engine and transmission using a thread tap before installing the transmission.
- Clean old sealant out of the holes -arrow- in the cylinder head seals.

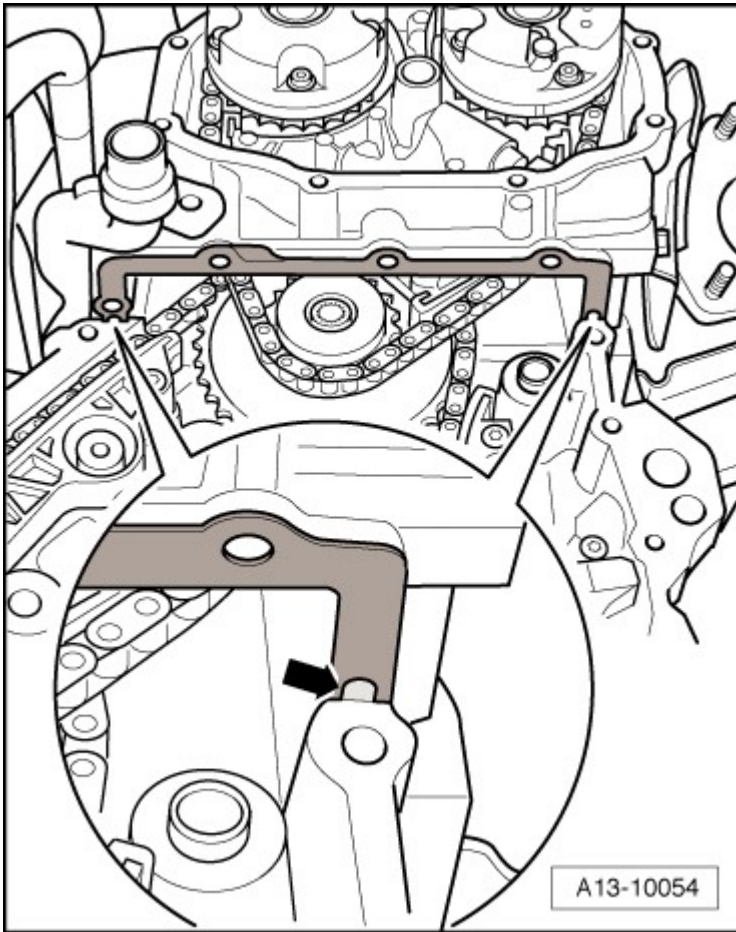


Fig. 129: Cleaning Old Sealant From Holes In Cylinder Head Gaskets
Courtesy of AUDI OF AMERICA, LLC

NOTE: With cylinder head installed, holes in cylinder head seal are only half visible.

CAUTION: The cylinder head seal could be damaged.

- Only bend ends of cylinder head seals slightly, do not kink.

NOTE: A kinked cylinder head seal must be replaced.

-- Bend the end of the cylinder head seals down slightly -arrows- until the upper sealing surface of the seals and the cylinder head can be cleaned.

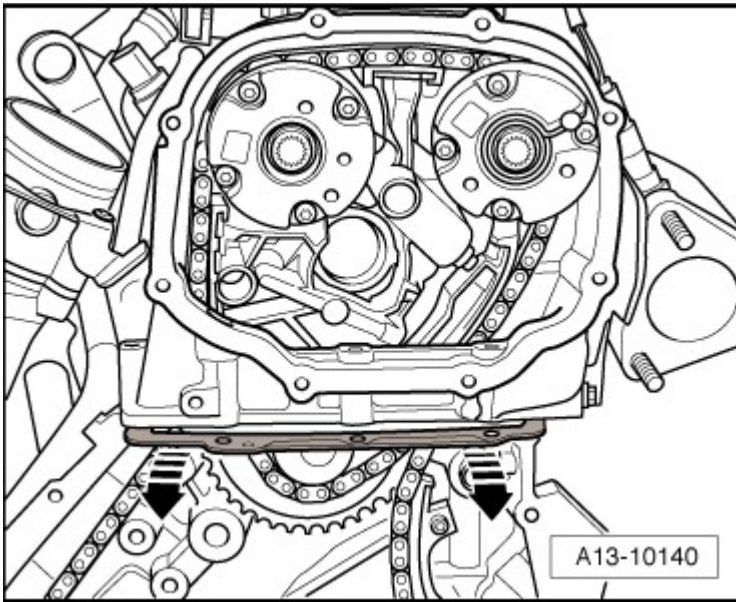


Fig. 130: Bending Ends Of Cylinder Head Gaskets Very Slightly Downward
Courtesy of AUDI OF AMERICA, LLC

-- Clean the top and bottom of the cylinder head seals so they are 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 2 mm).

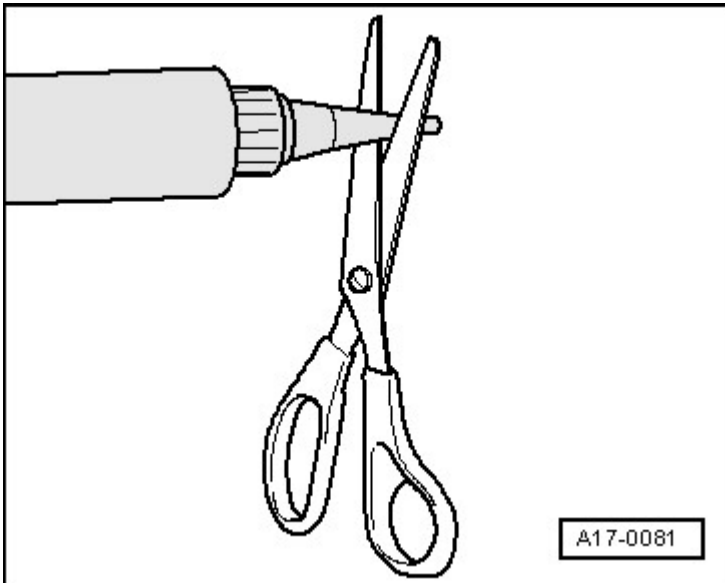


Fig. 131: Cutting Tube Nozzle
Courtesy of AUDI OF AMERICA, LLC

-- Lightly coat the top and bottom cylinder head seal sealing surfaces with lubricant by bending the seals down slightly again -arrows-.

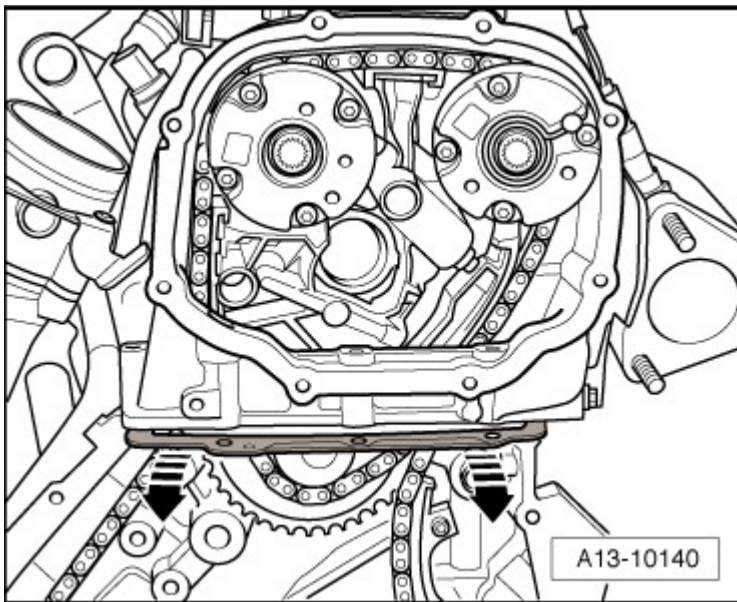


Fig. 132: Bending Ends Of Cylinder Head Gaskets Very Slightly Downward
Courtesy of AUDI OF AMERICA, LLC

- Use a flat object such as a feeler gauge to coat the surface between the cylinder head and seal.
- Fill the cleaned cylinder head seal holes -arrow- with sealant.

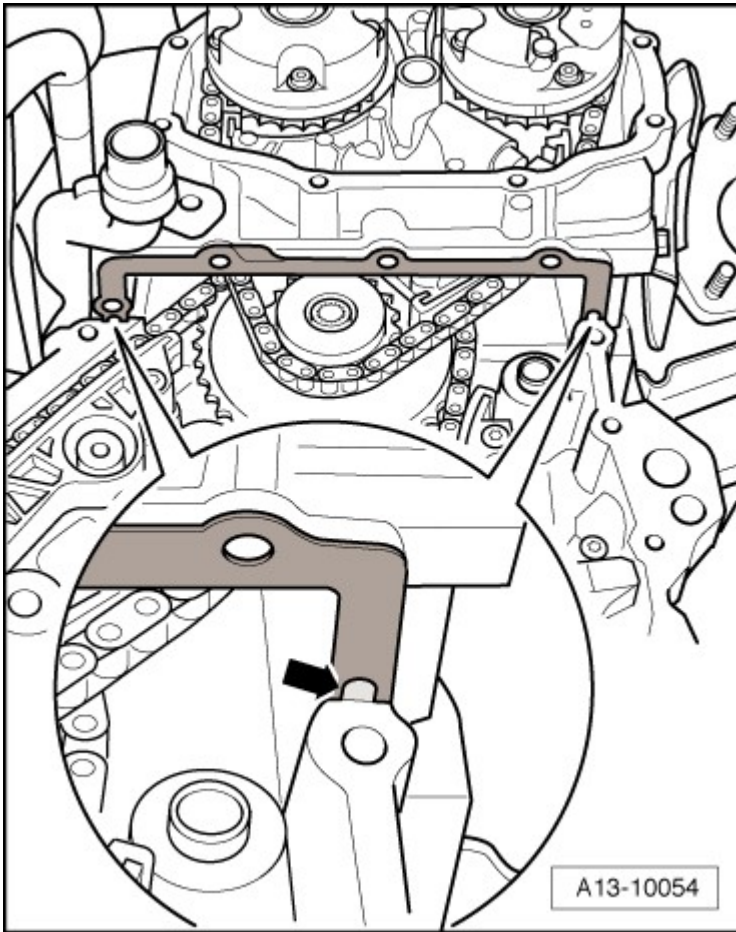


Fig. 133: Cleaning Old Sealant From Holes In Cylinder Head Gaskets
Courtesy of AUDI OF AMERICA, LLC

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

- Do not apply sealant bead thicker than indicated.

-- Apply sealant beads -1 through 9- on the clean lower timing chain cover sealing surfaces as shown in the illustration.

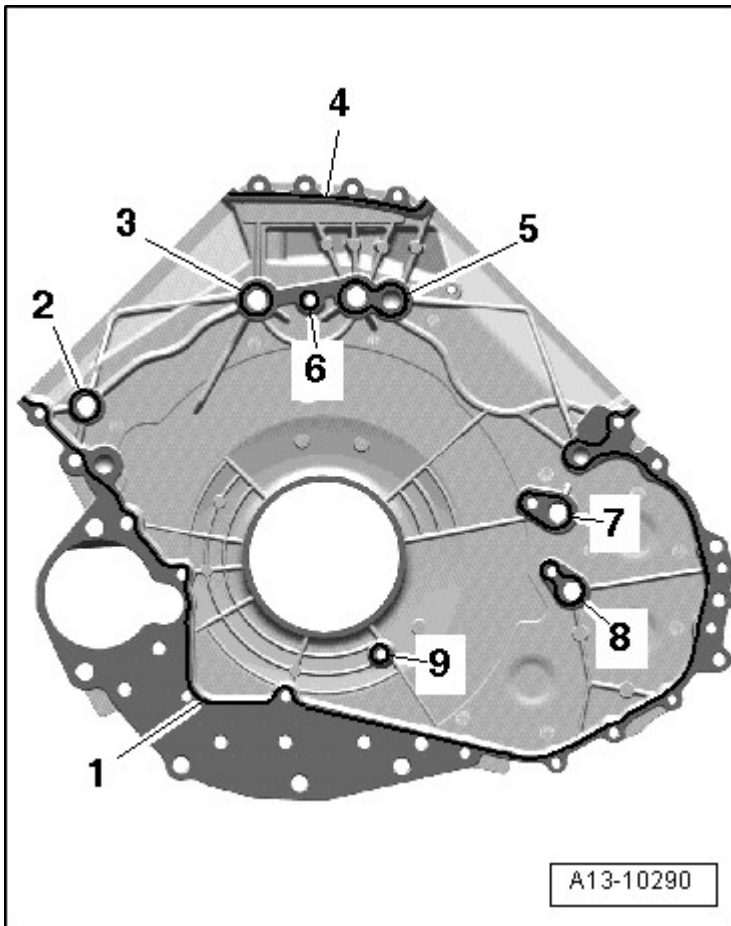


Fig. 134: Applying Sealant Beads On Clean Sealing Surfaces Of Lower Timing Chain Cover
Courtesy of AUDI OF AMERICA, LLC

- Thickness of sealant beads: 2.5 mm.

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

-- Position the lower timing chain cover, guiding it diagonally from below to the sealing surface on the cylinder block and cylinder head.

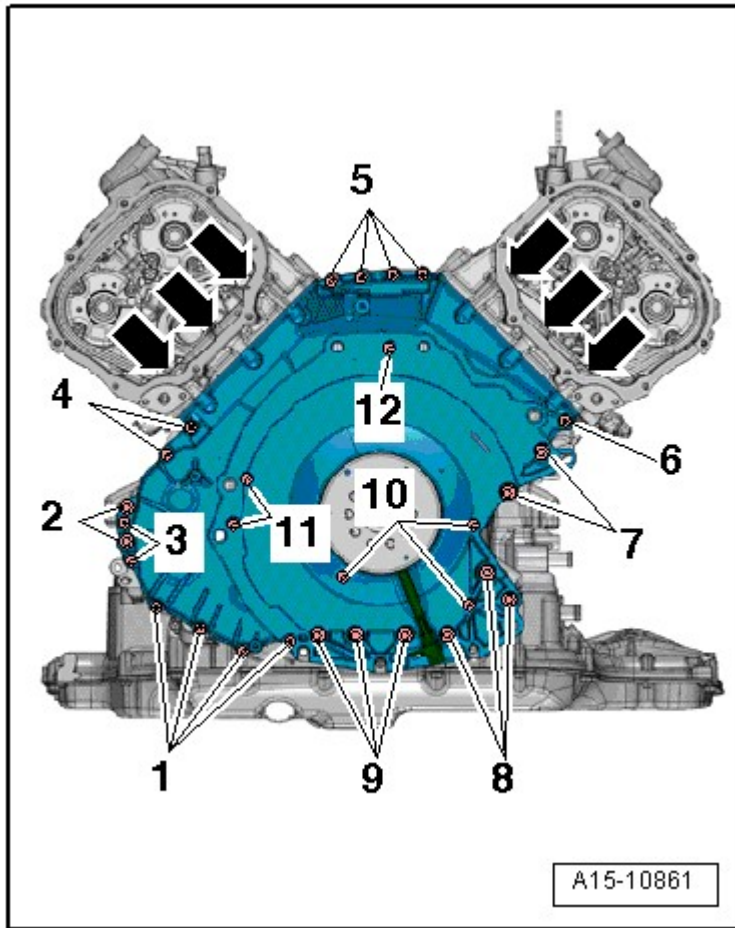


Fig. 135: Identifying Lower Timing Chain Cover Tightening Sequence
 Courtesy of AUDI OF AMERICA, LLC

-- When positioning, ensure the cylinder head seals are not damaged.

-- Tighten the bolts. Refer to **Fig. 17**.

Install in reverse order of removal paying attention to the following:

-- Install the transmission-side crankshaft shaft seal. Refer to **CRANKSHAFT SEAL, TRANSMISSION SIDE** .

-- Installing the lower left coolant pipe. Refer to **LOWER LEFT COOLANT PIPE** .

-- Install the oil filter housing. Refer to **OIL FILTER HOUSING** .

-- Install intake manifold. Refer to **REMOVAL AND INSTALLATION** .

-- Install the timing chain covers. Refer to **LEFT TIMING CHAIN COVER, RIGHT TIMING CHAIN COVER**.

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

POWER STEERING PUMP DRIVE SEAL

Special tools and workshop equipment required

- Thrust Piece T40193
- Seal Puller T40195

PROCEDURE

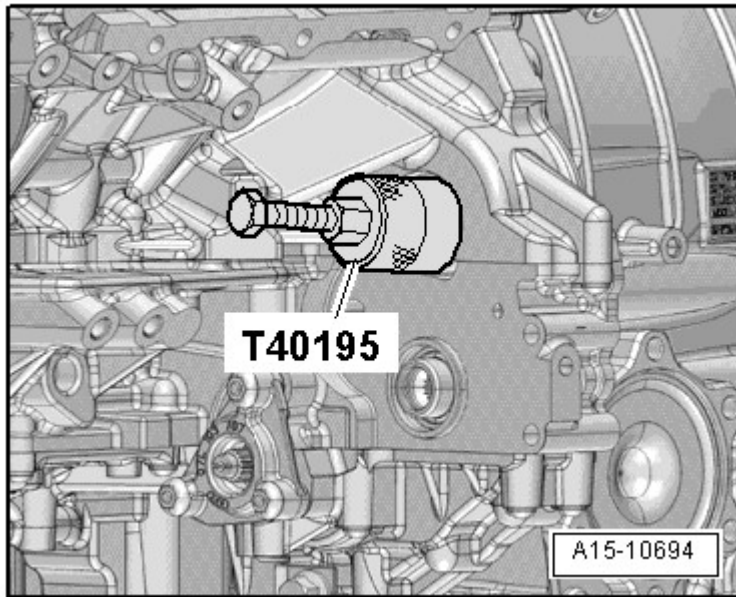


Fig. 136: Rotating Spindle On T40195 Back
Courtesy of AUDI OF AMERICA, LLC

-- Remove the power steering pump. Refer to **Removal and Installation** .

-- Rotate the spindle on the T40195 all the way back.

-- Lubricate the seal remover threaded head, position it, and then install it into the shaft seal as far as possible using strong force.

-- Rotate the inner section of the seal puller against the spur gear unit until the shaft seal is removed.

NOTE: **If the shaft seal breaks, position the seal puller a second time and remove the rest of the seal.**

-- Clamp the seal puller in a vise at the hex bolt and remove the shaft seal with pliers.

-- Clean the running and sealing surface.

-- Install the power steering pump drive seal in as far as it will go using the T40193.

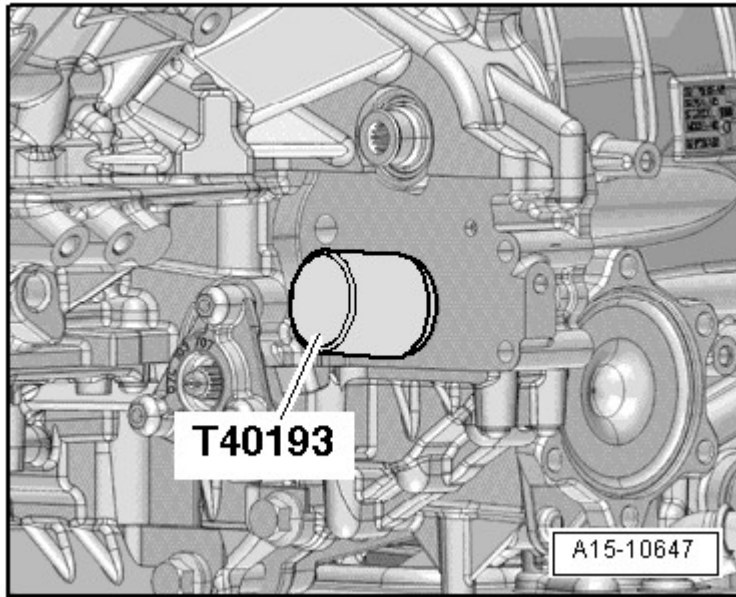


Fig. 137: Driving Power Steering Pump Drive Shaft Seal In As Far As Stop Using T40193
Courtesy of AUDI OF AMERICA, LLC

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

-- Install the power steering pump. Refer to **Removal and Installation** .

POWER TAKE-OFF DRIVE CHAIN

Special tools and workshop equipment required

- Locking Pin T40071

REMOVING

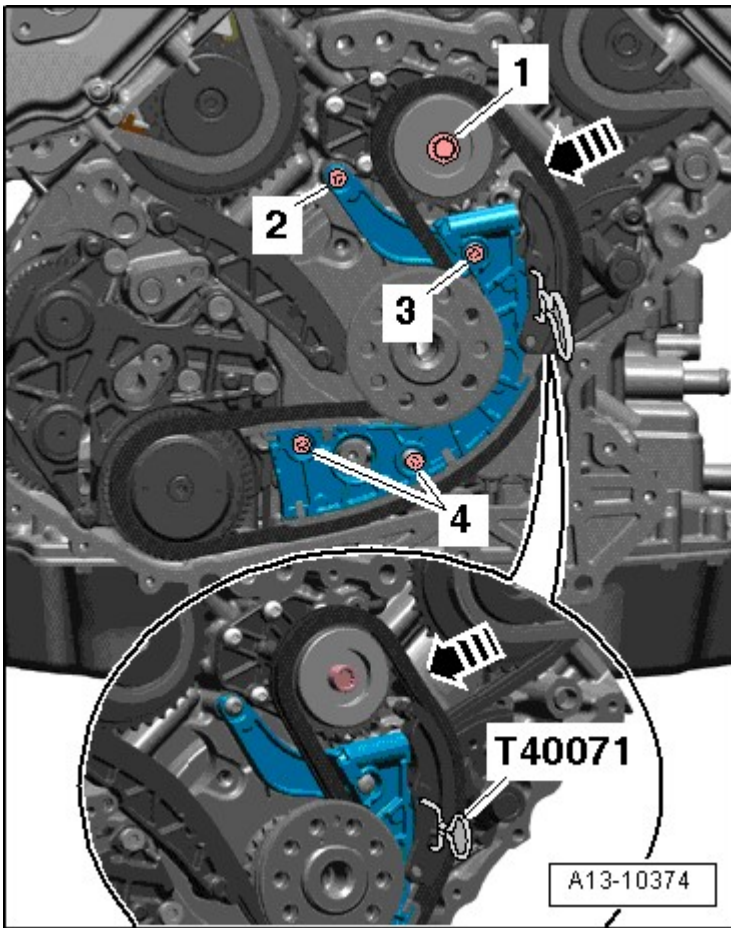


Fig. 138: Pressing Tensioning Rail And Securing Chain Tensioner With Locking Pin T40071
 Courtesy of AUDI OF AMERICA, LLC

- The transmission is removed. Refer to REMOVAL AND INSTALLATION or REMOVAL AND INSTALLATION.

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

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.

-- Press the tensioning rail in the direction of the -arrow- and secure it with a T40071.

-- Remove the bolt -1- and remove the idler sprocket.

NOTE: Pay attention to the compression spring when removing, refer to item 4.

-- Remove the bolts -2, 3 and 4- and the chain tensioner.

-- Remove the power take-off drive chain.

INSTALLING

Install in reverse order, paying attention to the following:

- For the correct tightening specifications, refer to **POWER TAKE-OFF DRIVE CHAIN OVERVIEW**.

NOTE:

- **Replace the gasket.**
- **Secure all hose connections with hose clamps of the same type as those equipped by the factory,**

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

RIGHT CYLINDER HEAD, REMOVING

Special tools and workshop equipment required

- Commercially available XZN M12 socket, minimum 140 mm

PROCEDURE

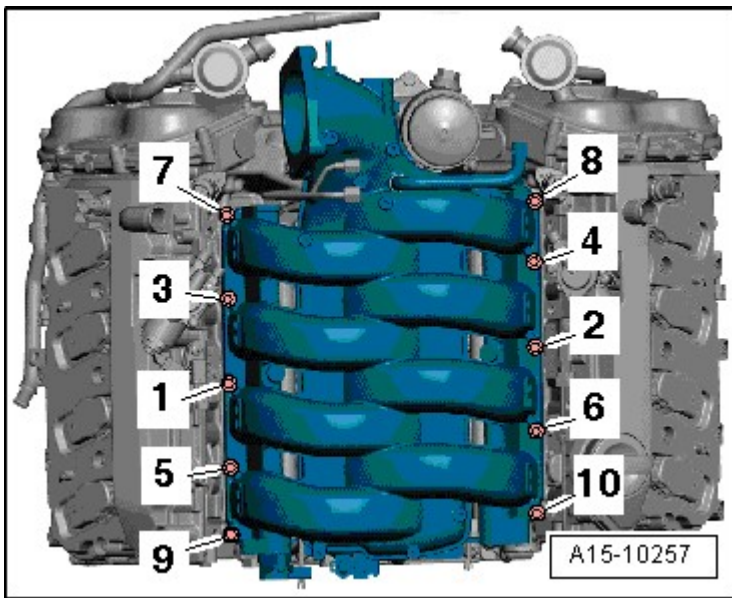


Fig. 139: Identifying Intake Manifold Bolts Removal/Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Remove the right timing chain cover. Refer to **RIGHT TIMING CHAIN COVER**.

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

-- Remove intake manifold. Refer to **REMOVAL AND INSTALLATION** .

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

-- Disconnect the connectors:

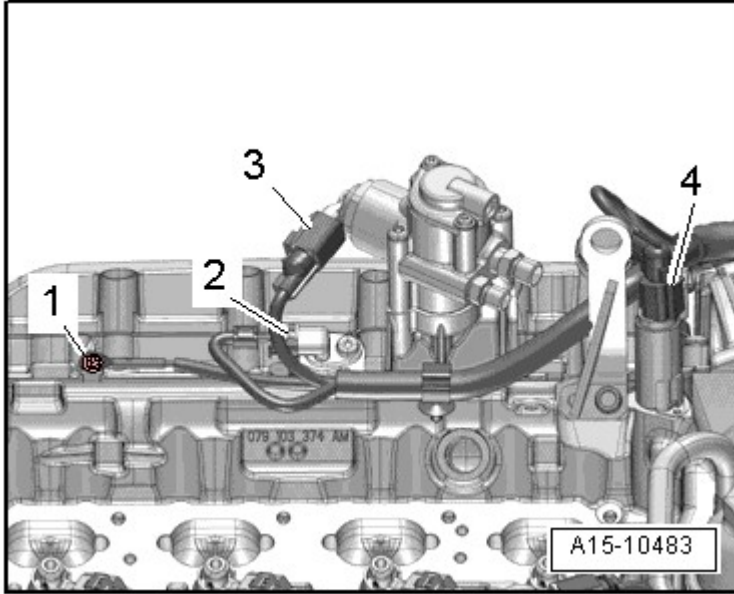


Fig. 140: Identifying Connectors

Courtesy of AUDI OF AMERICA, LLC

2 - On Camshaft Position (CMP) sensor 4 -G301-

3 - On the right high pressure pump

4 - On camshaft adjustment valve 1 -N205-

-- Remove the bolt -1-, free up the wiring harness and move it to the side.

-- Remove the bolts -1 and 2- and the right chain tensioner.

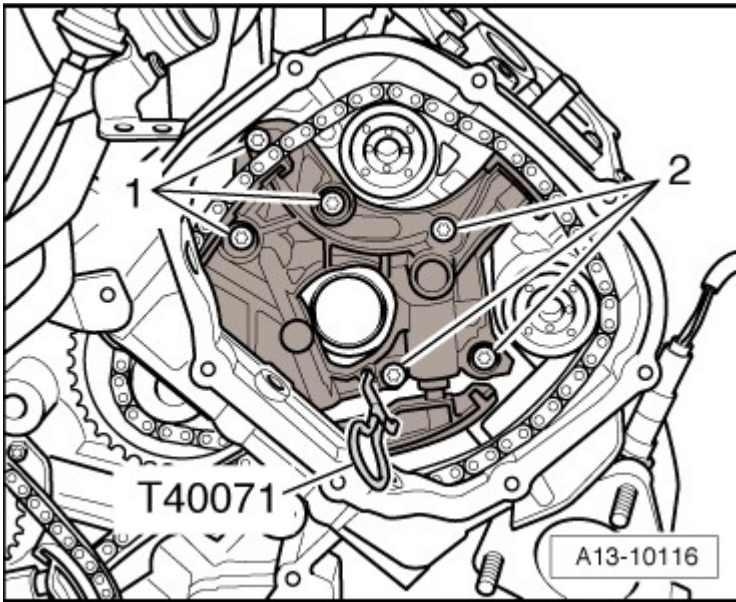


Fig. 141: Identifying Bolts For Right Chain Tensioner And Right Camshaft Timing Chain
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect electrical connectors -arrows- on fuel injectors.

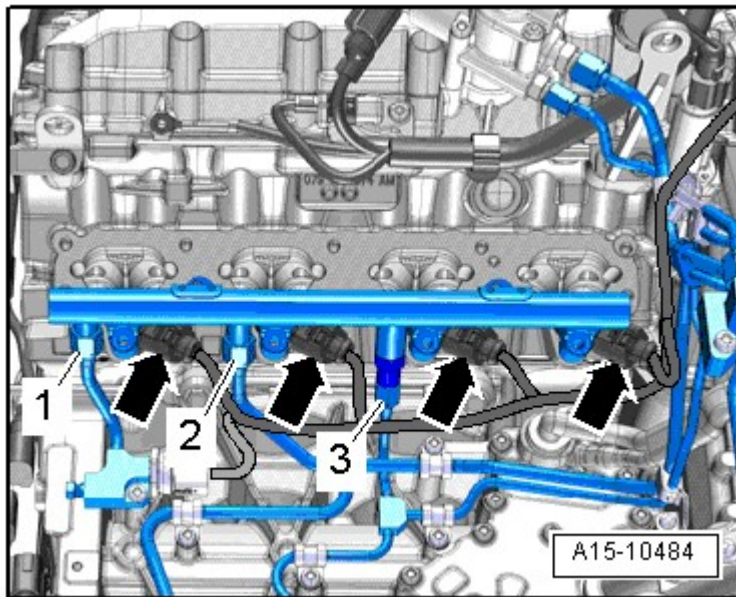


Fig. 142: Identifying Electrical Connectors -Arrows- On Fuel Injectors
Courtesy of AUDI OF AMERICA, LLC

-- Remove the high pressure lines -1 and 2- from the connection on the fuel rail.

-- Remove high pressure line -3- from connector on fuel rail by counterholding at the hex head with an open end wrench and loosening the union nut.

NOTE: Do not change the bent shape of the high pressure lines.

NOTE: The following illustrations show the left cylinder head instead.

-- Remove the locking bolt -arrow-.

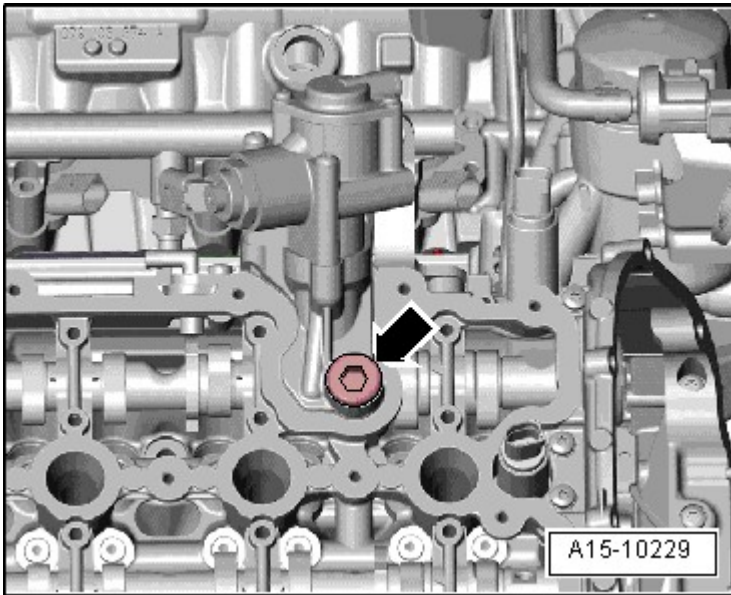


Fig. 143: Identifying Locking Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows-.

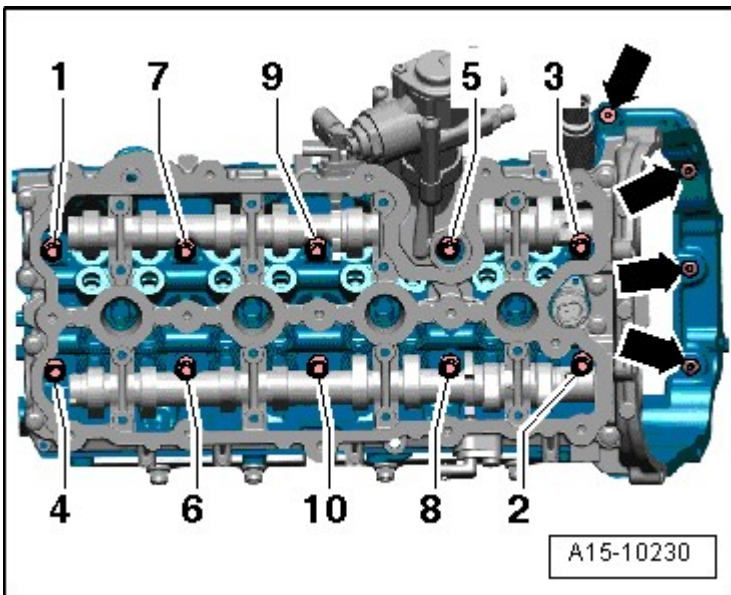


Fig. 144: Cylinder Head Bolts Loosening Sequence
Courtesy of AUDI OF AMERICA, LLC

- Loosen the cylinder head bolts in -1 to 10- sequence
- Remove the bolts and the cylinder head carefully.
- Lay the cylinder head on a soft surface, such as foam.

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

- Ignition Coil Puller T40039

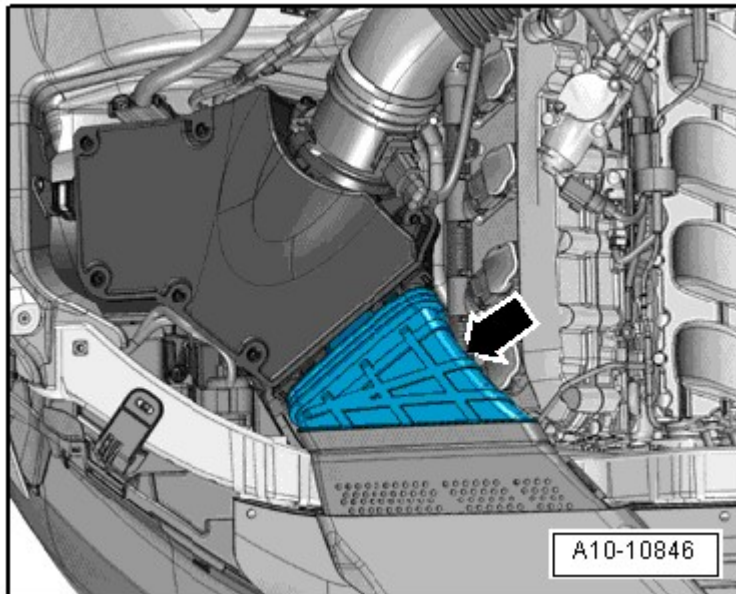
REMOVING

Fig. 145: Identifying Air Duct
Courtesy of AUDI OF AMERICA, LLC

- Remove the air duct -arrows-.
- Free up the fuel line and the line to the EVAP canister on the air guide pipe.

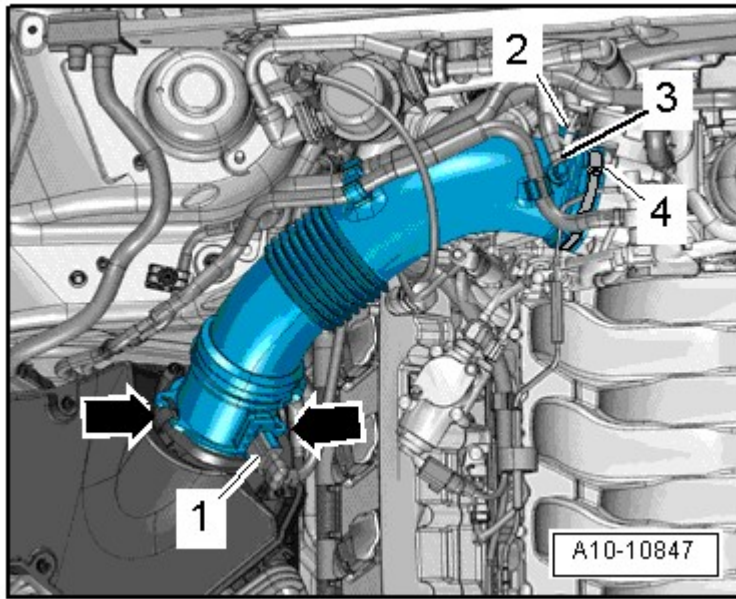


Fig. 146: Disconnecting Connector On Mass Airflow (MAF) Sensor
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the connector -1- from the Mass Airflow (MAF) sensor -G70-.
- Disconnect the vacuum line -3- from the air guide pipe.

CAUTION: Risk of violating emissions legislation.

- **Do not open hose connection -2- !**

- Lay aside the air guide pipe with connected crankcase ventilation hose -2- by loosening hose clamp -4- and opening clips -arrows-.
- Disconnect the vacuum line -1-.

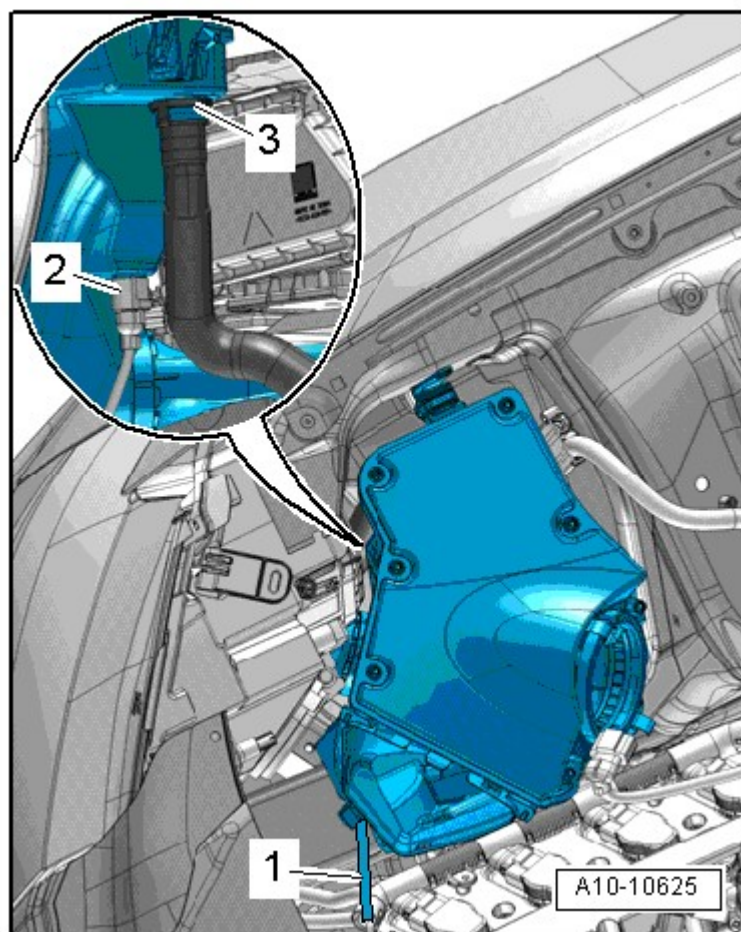


Fig. 147: Identifying Secondary Air System Components
Courtesy of AUDI OF AMERICA, LLC

- Remove the air filter housing and disconnect the electrical connector -2- on the rear side at the intake air switch-over valve -N335-.
- Remove hose -3- from the secondary air system.
- Remove the bolts -3 and 6- on the cylinder head cover.

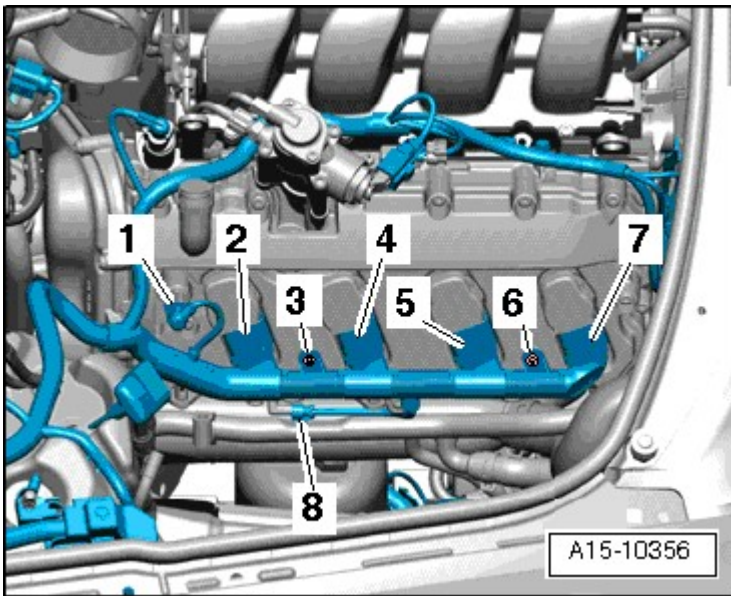


Fig. 148: Removing Bolts On Right Cylinder Head & Disconnecting Electrical Connectors
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the electrical connectors -1, 2, 4, 5, 7, 8-.
- Remove the ignition coils using the T40039.

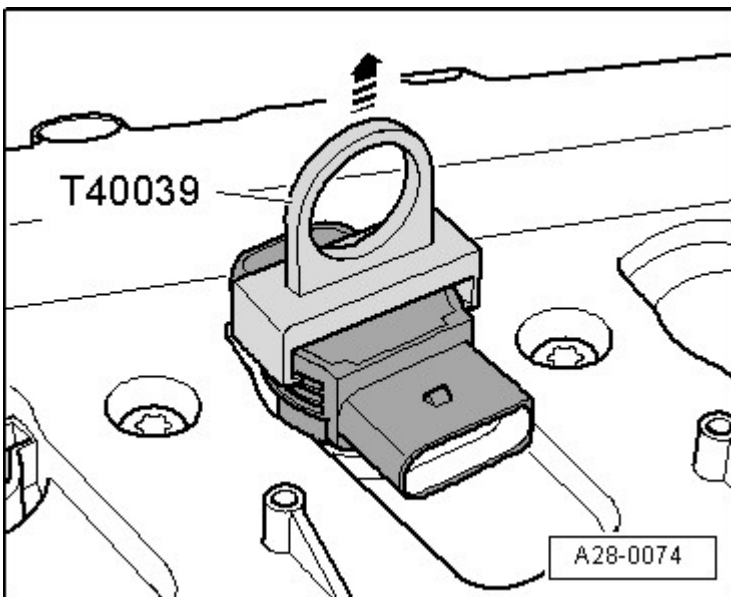


Fig. 149: Removing Ignition Coils With Ignition Coil Puller T40039
Courtesy of AUDI OF AMERICA, LLC

- Remove the right cylinder head bolts in the sequence -16 to 1-.

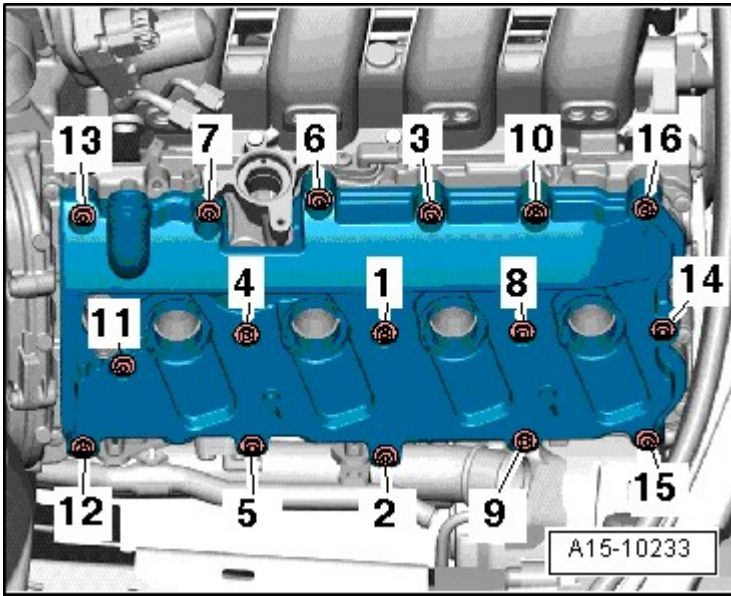


Fig. 150: Identifying Right Cylinder Head Cover Bolts Removal Sequence
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts and remove the right cylinder head cover.

INSTALLING

Install in reverse order, paying attention to the following:

- Tightening specification, refer to **Fig. 6**.

NOTE:

- Replace the cylinder head seal if it is damaged.
- Replace the cylinder head cover bolts when replacing the damaged seal.
- Secure all hose connections with hose clamps of the same type as those equipped by the factory,

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

-- Tighten the right cylinder head cover bolts. Refer to **Fig. 6**.

RIGHT TIMING CHAIN COVER

SPECIAL TOOLS AND WORKSHOP EQUIPMENT REQUIRED

- Jointed Socket, 12 mm T40220 for engines through engine serial number CAU 005 521
- Hand drill with plastic brush attachment
- Protective goggles
- Sealant,

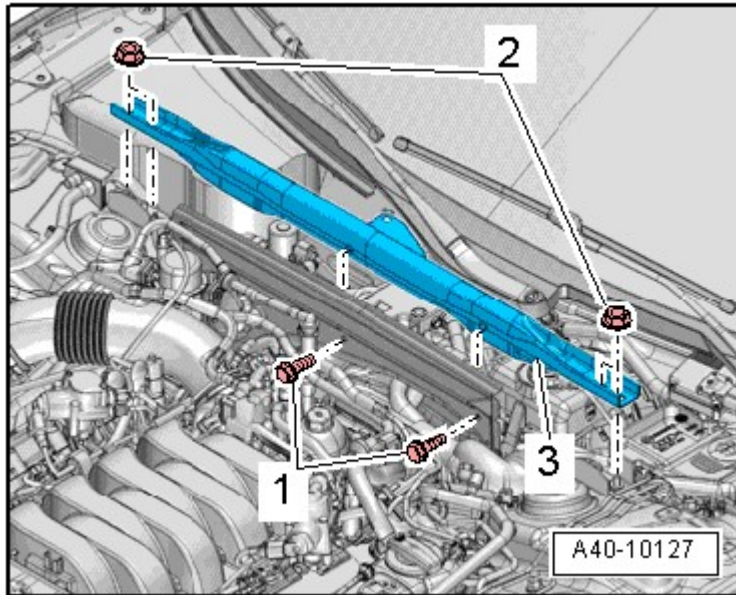
REMOVING

Fig. 151: Identifying Bolts, Nuts And Tower Brace
Courtesy of AUDI OF AMERICA, LLC

- Drain the coolant. Refer to **COOLANT, DRAINING AND FILLING** .
- Remove the right front muffler. Refer to **FRONT MUFFLER** .
- Remove the strut tower brace. Refer to **Removal and Installation** .
- Remove the plenum chamber bulkhead. Refer to **Removal and Installation** .
- Remove the Heated Oxygen Sensor (HO2S) -G39- -1-. Refer to **REMOVAL AND INSTALLATION** .

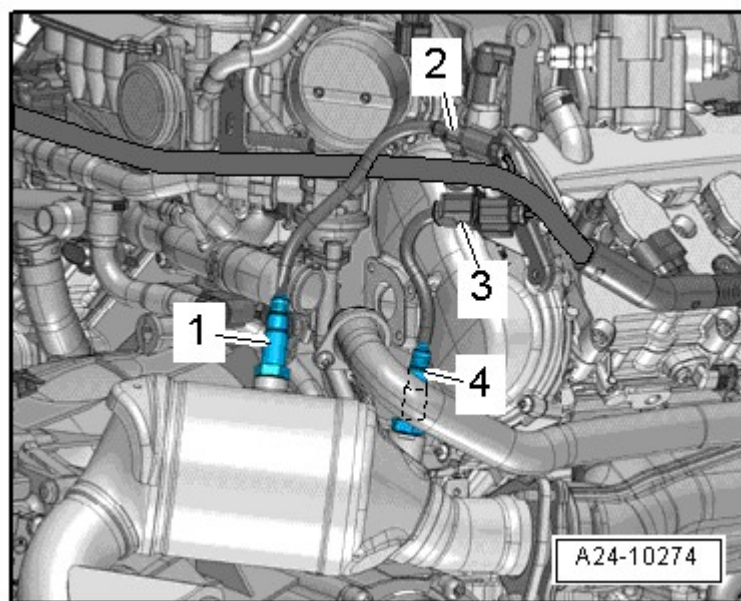


Fig. 152: Oxygen Sensor (O2S) Behind Three Way Catalytic Converter (TWC) -G130-, Removing
 Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connector from the bracket:

2 - For Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) -G130-

NOTE:

- Ignore -3 and 4-.
- The installation location is shown with the engine removed.

-- Remove the nuts -arrows- using T40220.

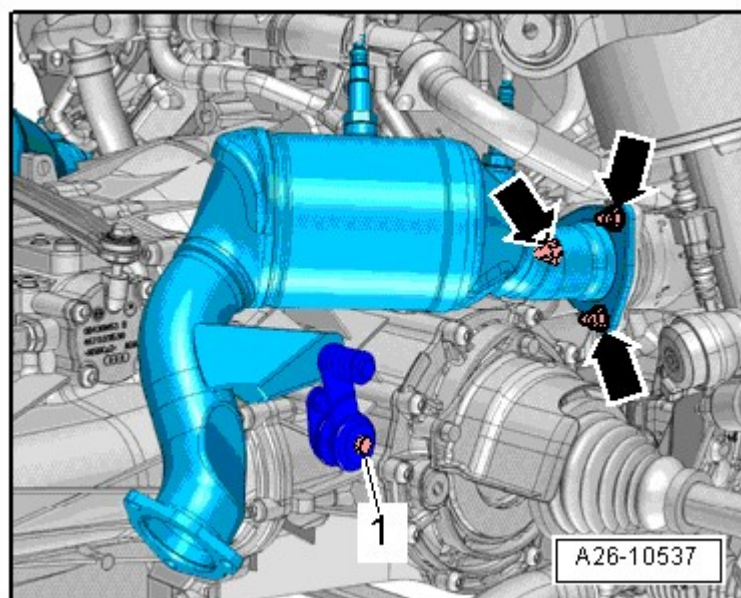


Fig. 153: Identifying Nuts And Bolt, Removal

Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -1-, remove the right catalytic converter and lay it to the side.

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

-- Free up the fuel line and the line to the Evaporative Emission (EVAP) canister on the air guide pipe.

-- Disconnect the connector -1- from the Mass Airflow (MAF) sensor -G70-.

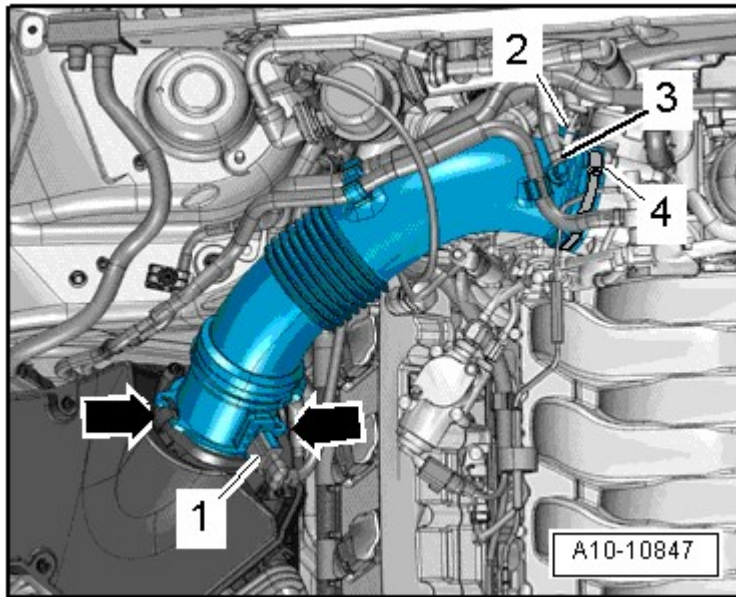


Fig. 154: Disconnecting Connector On Mass Airflow (MAF) Sensor

Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the vacuum line -3- from the air guide pipe.

CAUTION: Risk of violating emissions legislation.

- Do not open hose connection -2- !

-- Lay aside air guide pipe with connected crankcase ventilation hose -2- by loosening hose clamp -4- and opening clips -arrows-.

-- Disconnect the vacuum line -1-.

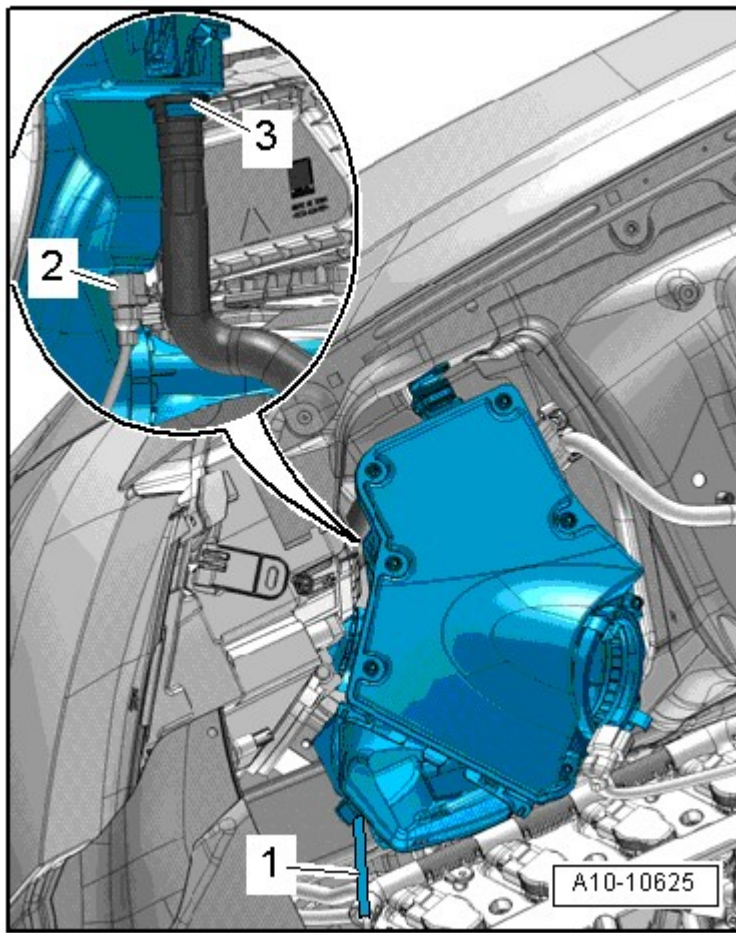


Fig. 155: Identifying Secondary Air System Components
 Courtesy of AUDI OF AMERICA, LLC

- Remove the air filter housing and disconnect the electrical connector -2- on the rear side at the intake air switch-over valve -N335-.
- Remove hose -3- from the secondary air system.
- Disconnect the coolant hose by lifting the retaining clamps -2- and loosening the hose clamp -1- on the coolant tube.

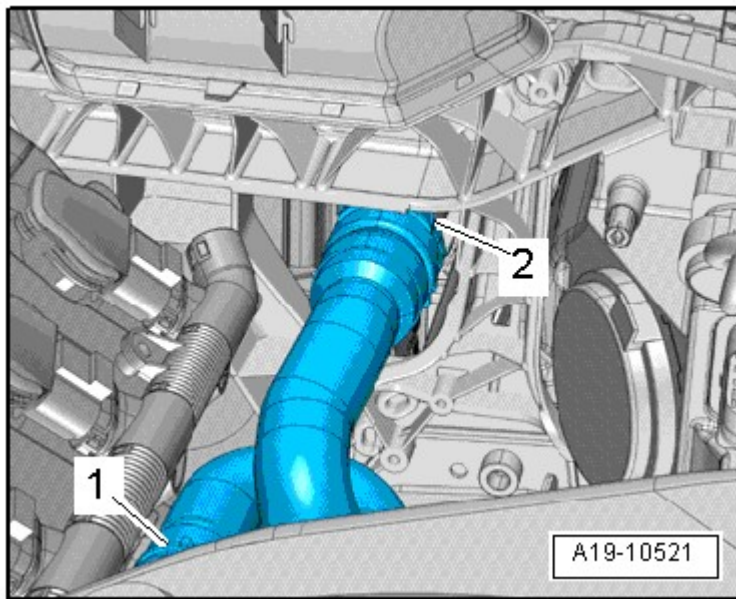


Fig. 156: Identifying Coolant Hose From Radiator And Right Coolant Pipe, Removal
Courtesy of AUDI OF AMERICA, LLC

-- Remove the nuts -arrows- and move the vacuum pump -1- with the lines connected to the side.

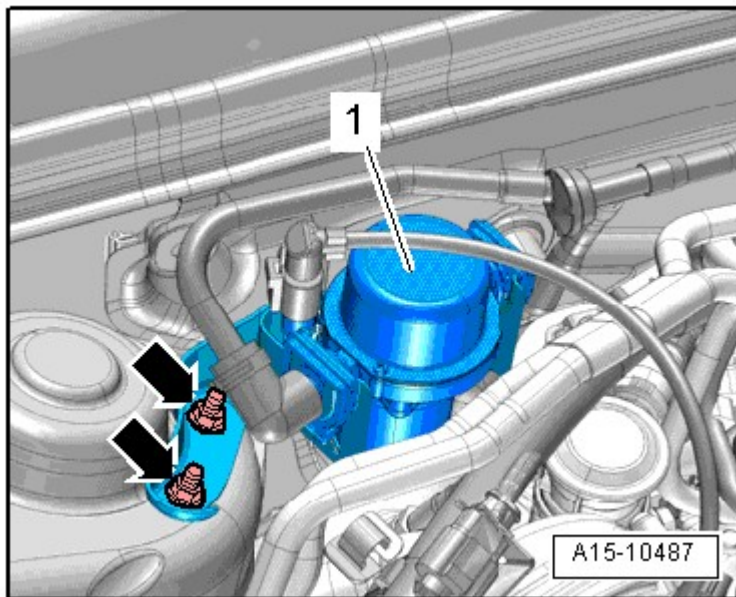


Fig. 157: Identifying Nuts -Arrows- & Move Vacuum Pump -1- With Lines Connected To Side
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -1 and 2- and the coolant hose -arrow-.

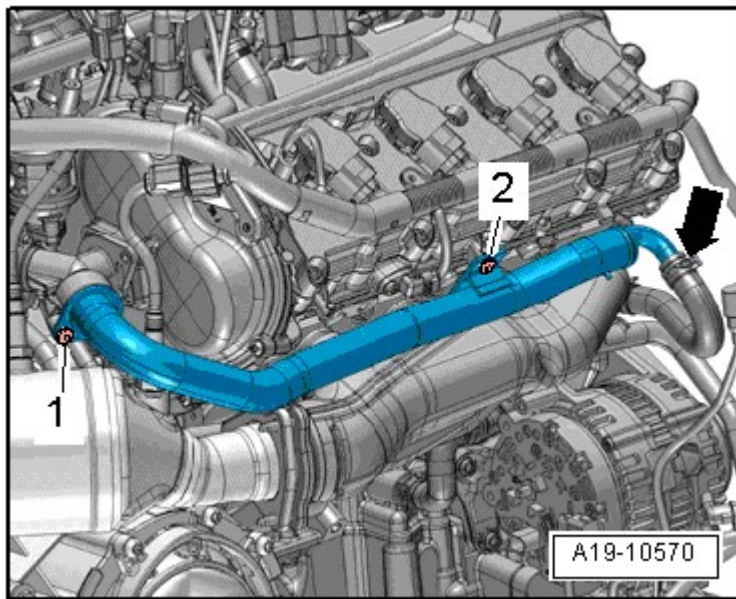


Fig. 158: Identifying Bolts And Coolant Hose, Removal
Courtesy of AUDI OF AMERICA, LLC

- Remove the right coolant pipe from the coolant connections and lay it aside.
- Remove the bolts -1 and 2- and loosen the hose clamp -arrow-.

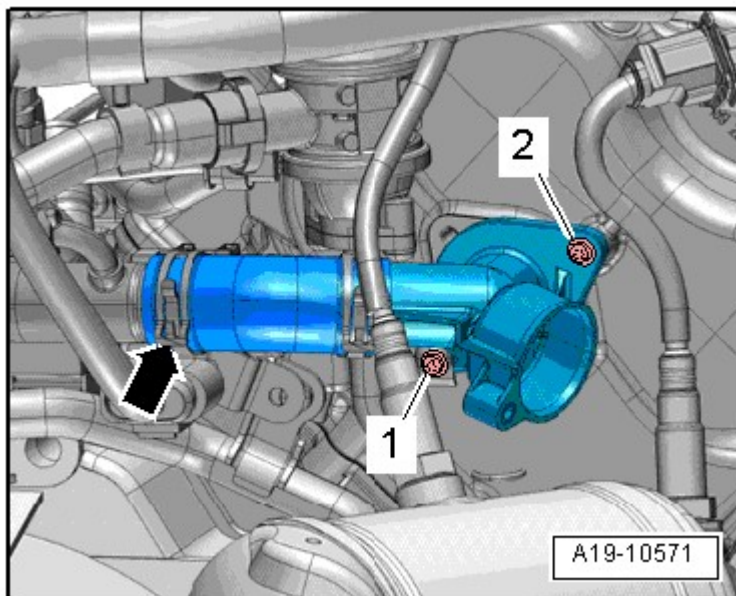


Fig. 159: Identifying Bolts And Coolant Connection, Removal
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the coolant connection pieces leading to the right side.
- Remove the vacuum hose -5- (if equipped) from the Secondary Air Injection (AIR) combination valve.

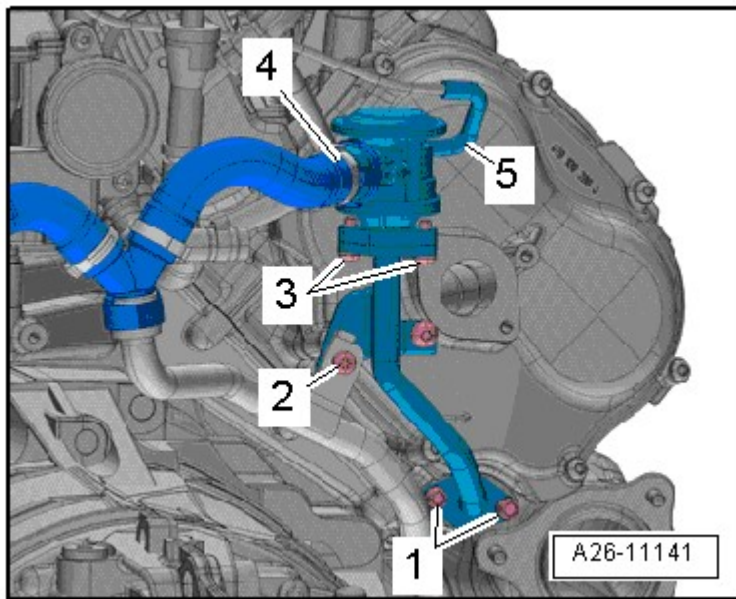


Fig. 160: Identifying Right Secondary Air Injection (Air) Combination Valve
Courtesy of AUDI OF AMERICA, LLC

-- Remove the secondary air hose -4- by pressing the release buttons.

-- Remove the bolts -1 and 2- and the AIR combination valve.

NOTE: Ignore -3-.

-- Remove the bolts in the following sequence: -8 to 1-.

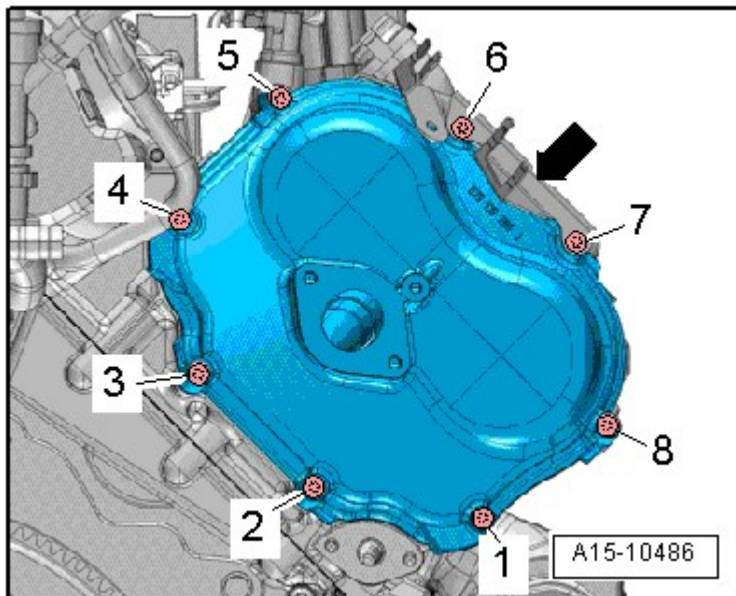


Fig. 161: Identifying Right Timing Chain Cover Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

-- Carefully remove the right timing chain guard from the bond and the bracket -arrow- for the heated oxygen sensor connectors.

INSTALLING

- For the correct tightening specifications, refer to **Fig. 16**.

NOTE: **Replace the O-rings.**

-- Remove the 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 the engine.

WARNING: Danger of eye injury.

- Wear protective goggles.

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

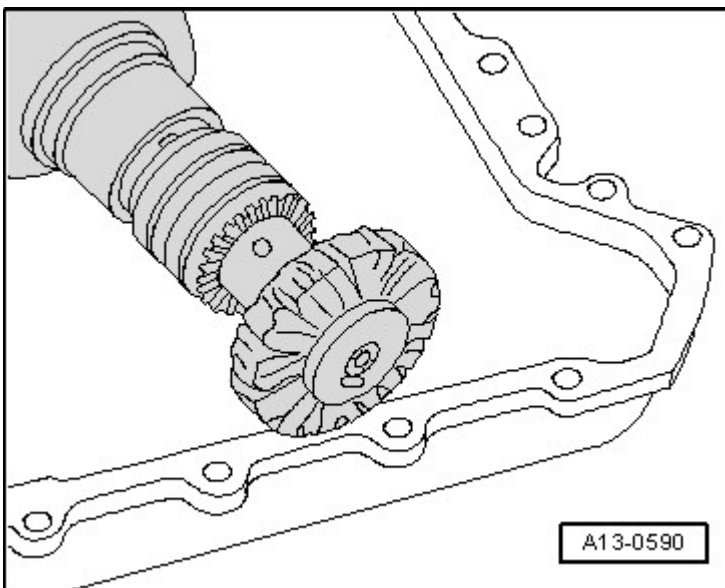


Fig. 162: Identifying Rotating Plastic Brush
Courtesy of AUDI OF AMERICA, LLC

-- Clean sealing surfaces, 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 2 mm).

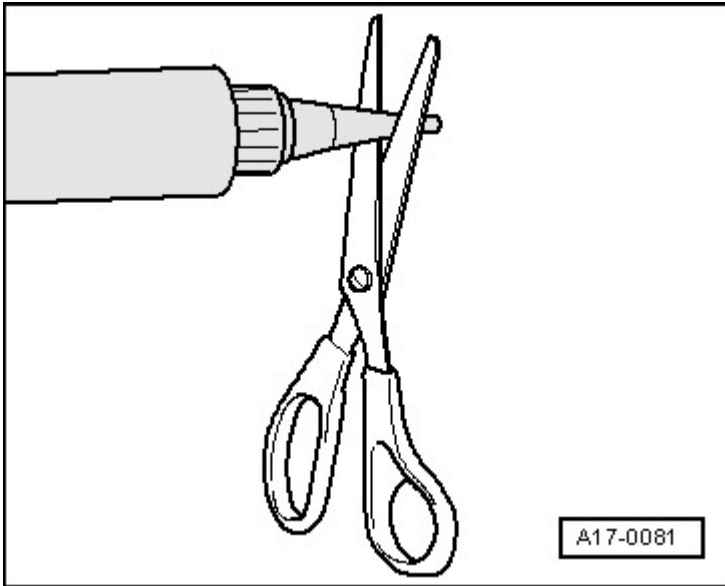


Fig. 163: Cutting Tube Nozzle

Courtesy of AUDI OF AMERICA, LLC

-- Drive the right coolant intermediate pipe -2- out of the right timing chain cover with a drift.

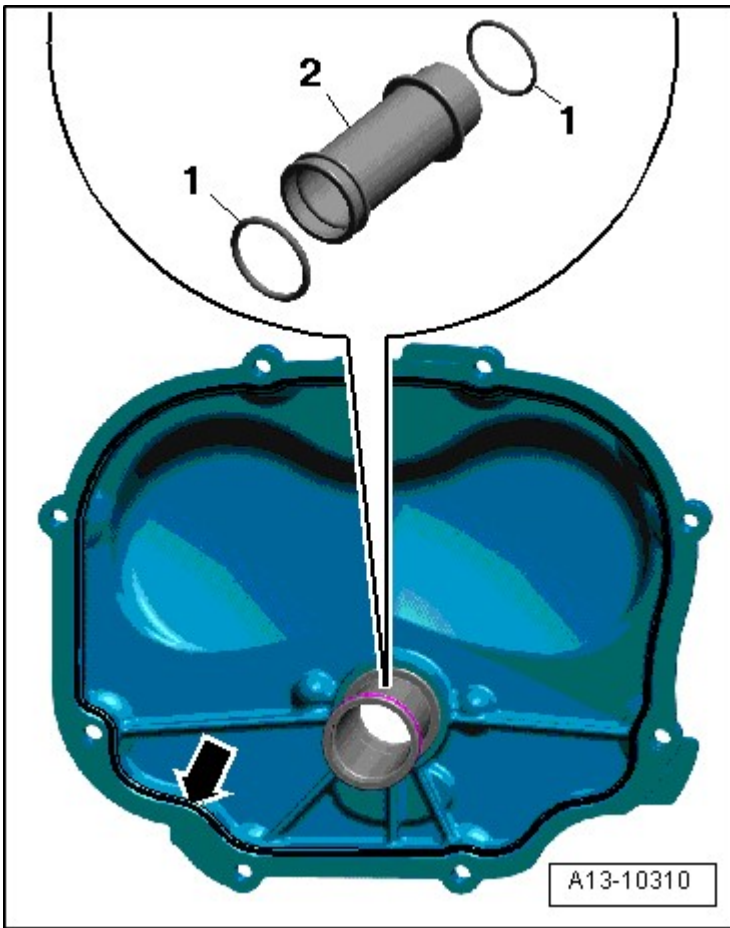


Fig. 164: Driving Left Coolant Intermediate Pipe Out Of Left Timing Chain Cover With Suitable Drift
Courtesy of AUDI OF AMERICA, LLC

- Insert O-rings -1- on the coolant intermediate pipe -2-.
- Insert the coolant intermediate pipe into the right timing chain cover.

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

- Do not apply sealant bead thicker than indicated.

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

- Thickness of sealant bead: 2.5 mm.

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

-- Install the right timing chain cover with the bracket -arrow- and tighten the bolts. Refer to **Fig. 16**.

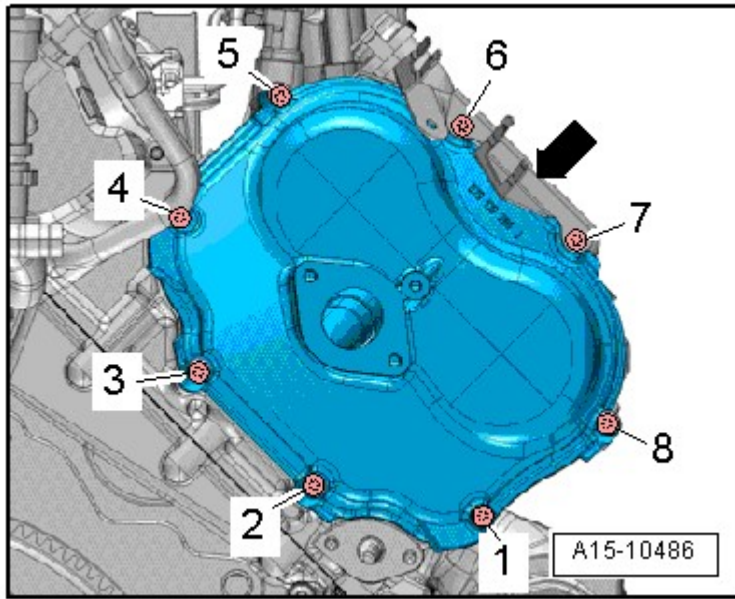


Fig. 165: Identifying Right Timing Chain Cover Tightening Sequence
 Courtesy of AUDI OF AMERICA, LLC

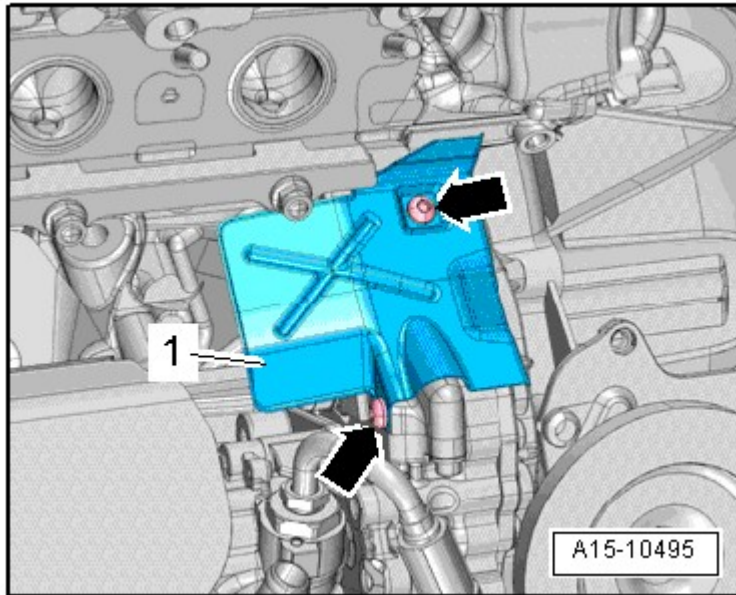
Install in reverse order of removal paying attention to the following:

- Install the right Secondary Air Injection (AIR) combination valve. Refer to **RIGHT SECONDARY AIR INJECTION (AIR) COMBINATION VALVE** .
- Installing the coolant connecting pieces. Refer to **COOLANT CONNECTIONS** .
- Install right coolant pipe. Refer to **RIGHT COOLANT PIPE** .
- Install the right catalytic converter. Refer to **RIGHT CATALYTIC CONVERTER, WITH MANUAL TRANSMISSION** , **RIGHT CATALYTIC CONVERTER, WITH AUTOMATIC TRANSMISSION** .
- Install the right front muffler. Refer to **FRONT MUFFLER** .
- Install the Heated Oxygen Sensor (HO2S) -G39-. Refer to **REMOVAL AND INSTALLATION** .
- Install the plenum chamber bulkhead. Refer to **REMOVAL AND INSTALLATION** .
- Install the tower brace. Refer to **REMOVAL AND INSTALLATION** .
- Install the vacuum pump. Refer to **REMOVAL AND INSTALLATION** .

SPUR GEAR UNIT

Special tools and workshop equipment required

- Sealant,

REMOVING**Fig. 166: Identifying Heat Shield Components**

Courtesy of AUDI OF AMERICA, LLC

- The transmission is removed. Refer to **REMOVAL AND INSTALLATION** or **REMOVAL AND INSTALLATION**.

-- Remove the left exhaust manifold. Refer to **LEFT EXHAUST MANIFOLD**.

-- Remove the bolts -arrows- and the heat shield -1-.

-- Remove the hose clamp on the Air Conditioning (A/C) compressor drive dust cap -arrow-.

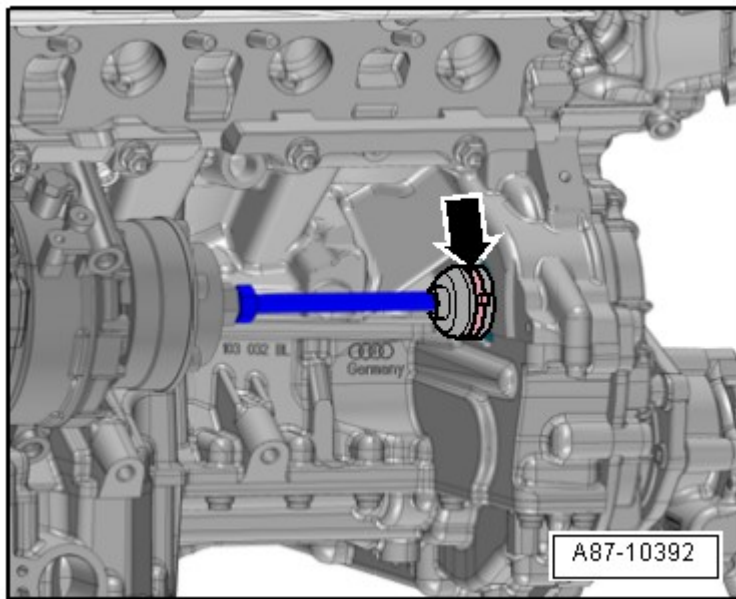


Fig. 167: Identifying Dust Cap Hose Clamp
Courtesy of AUDI OF AMERICA, LLC

- Remove timing chain lower cover. Refer to **LOWER TIMING CHAIN COVER**.
- Disconnect the power steering pump from the guide frame.
- Remove the power take-off drive chain. Refer to **POWER TAKE-OFF DRIVE CHAIN**.
- Loosen and remove the bolts -1 through 6- in a diagonal sequence.

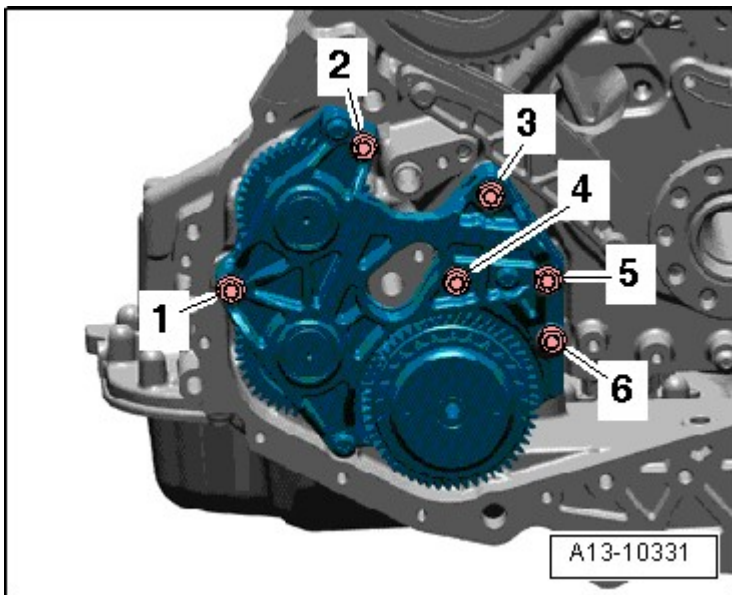


Fig. 168: Identifying Spur Gear Unit Tightening Sequence
Courtesy of AUDI OF AMERICA, LLC

-- First loosen the spur gear unit from the bonding and then remove it.

THROUGH VIN CAU 003 685:

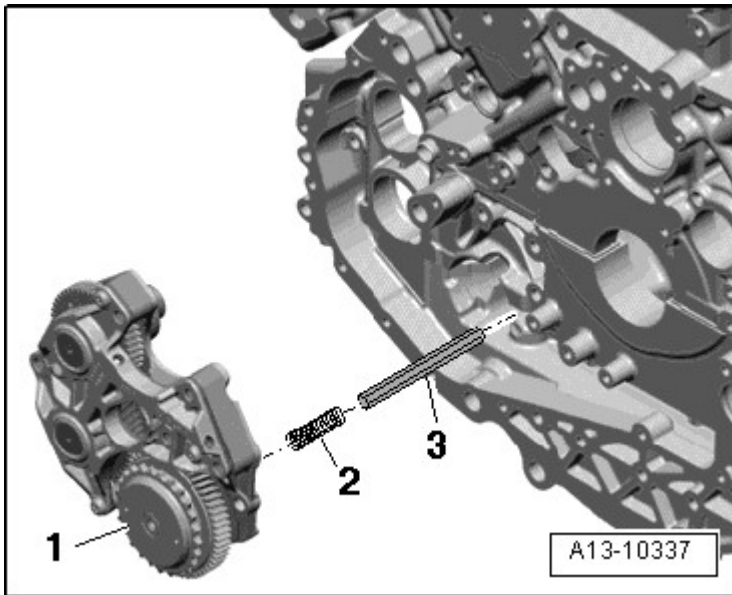


Fig. 169: Identifying Compress Spring -2- For Input Shaft -3- In Spur Gear Unit -1-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the compression spring -2- between the spur gear unit -1- and oil pump input shaft -3-.

CONTINUED FOR ALL ENGINES:

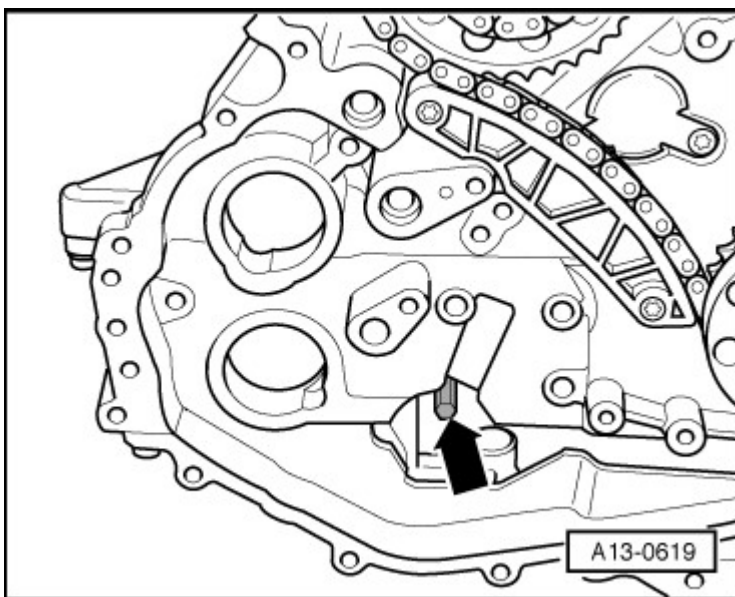


Fig. 170: Identifying Drive Shaft For Oil Pump
Courtesy of AUDI OF AMERICA, LLC

-- Remove the oil pump input shaft -arrow-.

INSTALLING

- Tightening specification, refer to **Fig. 12**.

NOTE: **Replace the O-ring.**

-- Replace the shaft seals, refer to items 12, 4 and the semi-round ring in the power steering pump drive, if damaged. Refer to **Fig. 11**.

-- Remove the sealant residue on the spur gear unit and on the cylinder block.

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

-- Insert the oil pump input shaft -arrow- in the guide on the oil pump.

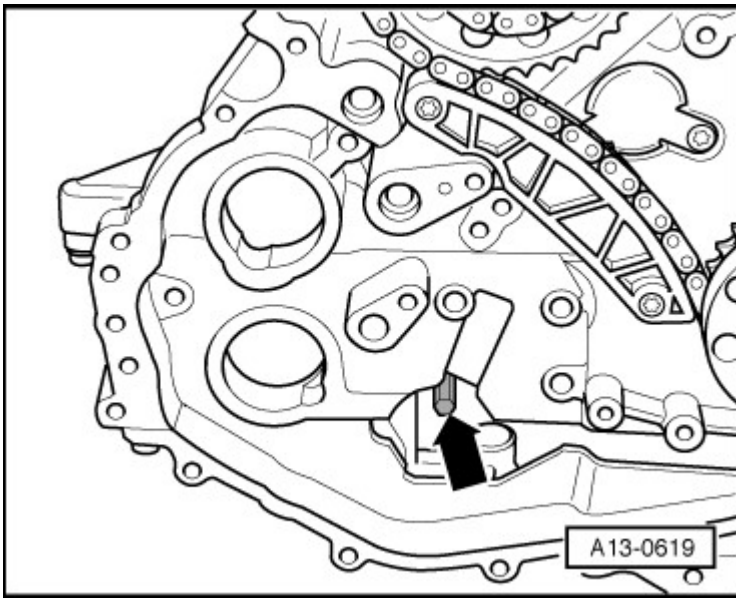


Fig. 171: Identifying Drive Shaft For Oil Pump

Courtesy of AUDI OF AMERICA, LLC

NOTE: To guarantee that the driveshaft engages correctly in the oil pump, insert the driveshaft into the oil pump separately, do not install together with the front bearing cap.

NOTE: Note the expiration date of the sealing compound.

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

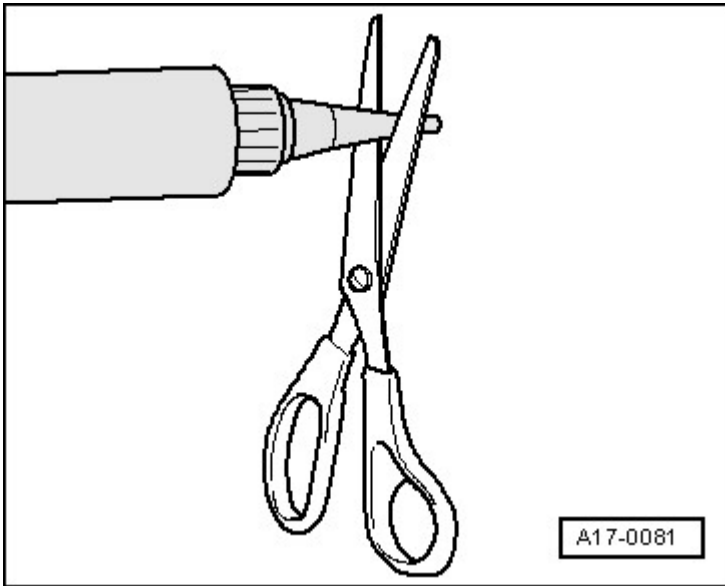


Fig. 172: Cutting Tube Nozzle

Courtesy of AUDI OF AMERICA, LLC

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

- Do not apply sealant beads thicker than indicated.

-- Apply sealant beads -arrows- to the clean sealing surfaces of the spur gear unit as shown in the illustration.

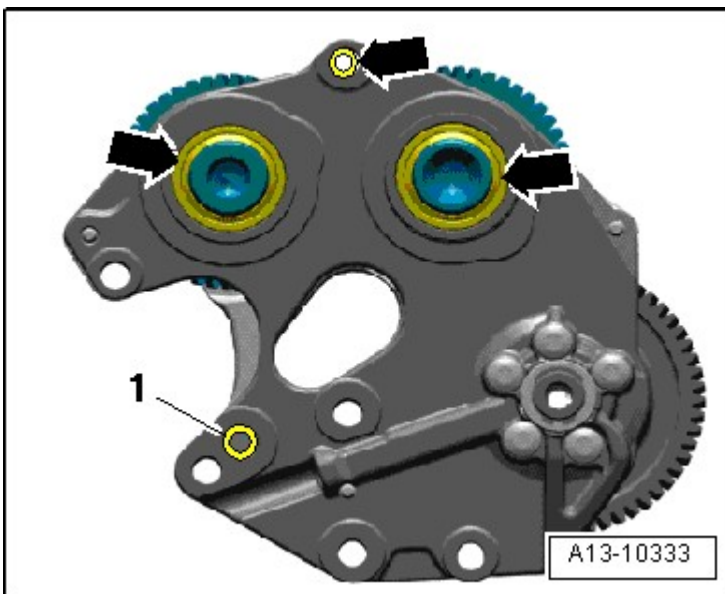


Fig. 173: Applying Sealant Beads To Clean Sealing Surfaces Of Spur Gear Unit

Courtesy of AUDI OF AMERICA, LLC

- Thickness of sealant beads: 2.0 mm.

-- Install a new O-ring -1- and secure it with some grease.

NOTE: Install the spur gear unit within five minutes of applying the sealant.

THROUGH VIN CAU 003 685:

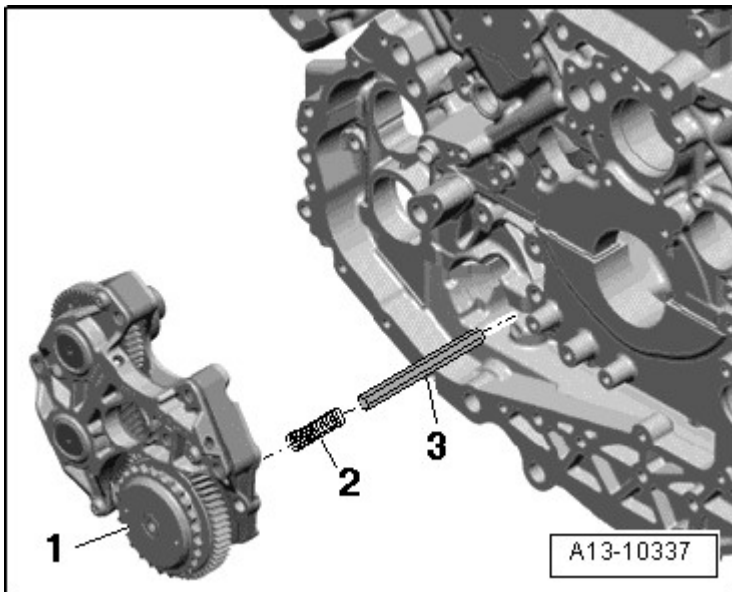


Fig. 174: Identifying Compression Spring -2- For Input Shaft -3- In Spur Gear Unit -1-
Courtesy of AUDI OF AMERICA, LLC

-- Insert the compression spring -2- for the input shaft -3- in the spur gear unit -1-.

CONTINUED FOR ALL ENGINES:

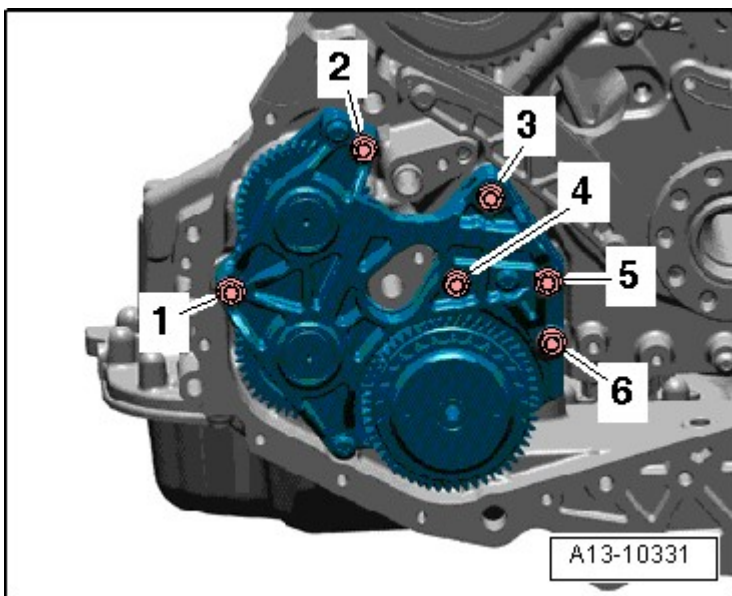


Fig. 175: Identifying Spur Gear Unit Tightening Sequence

Courtesy of AUDI OF AMERICA, LLC

- Position the spur gear unit and tighten the bolts. Refer to **Fig. 12**.
- Install the power take-off drive chain. Refer to **POWER TAKE-OFF DRIVE CHAIN**.
- Install the power steering pump with the new O-ring on the power steering pump drive spur gear.
- Slide the dust cap -arrow- with pre-installed hose clamp on the end of the spur gear shaft for the A/C compressor drive.

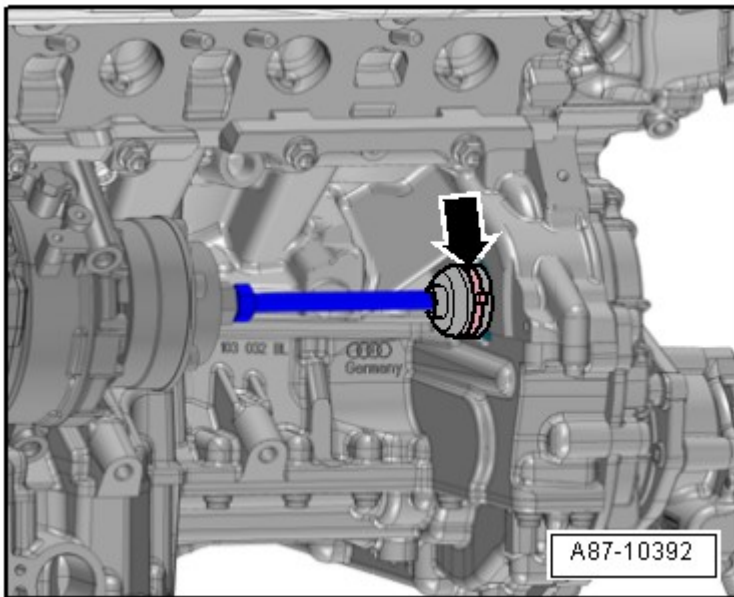


Fig. 176: Identifying Dust Cap Hose Clamp
Courtesy of AUDI OF AMERICA, LLC

Install in reverse order of removal paying attention to the following:

- Install timing chain lower cover. Refer to **LOWER TIMING CHAIN COVER**.
- Install the left exhaust manifold. Refer to **LEFT EXHAUST MANIFOLD** .

TIMING MECHANISM DRIVE CHAIN**Special tools and workshop equipment required**

- Locking Pin T40071

REMOVING

- The transmission is removed. Refer to **REMOVAL AND INSTALLATION** or **REMOVAL AND INSTALLATION** .

- Remove timing chain lower cover. Refer to **LOWER TIMING CHAIN COVER**.
- Remove the camshaft timing chains from the camshafts. Refer to **CAMSHAFT TIMING CHAINS**.
- Remove the power take-off drive chain. Refer to **POWER TAKE-OFF DRIVE CHAIN**.
- Press the drive chain tensioner guide rail in the direction of the -arrow- and secure the chain tensioner with a T40071.

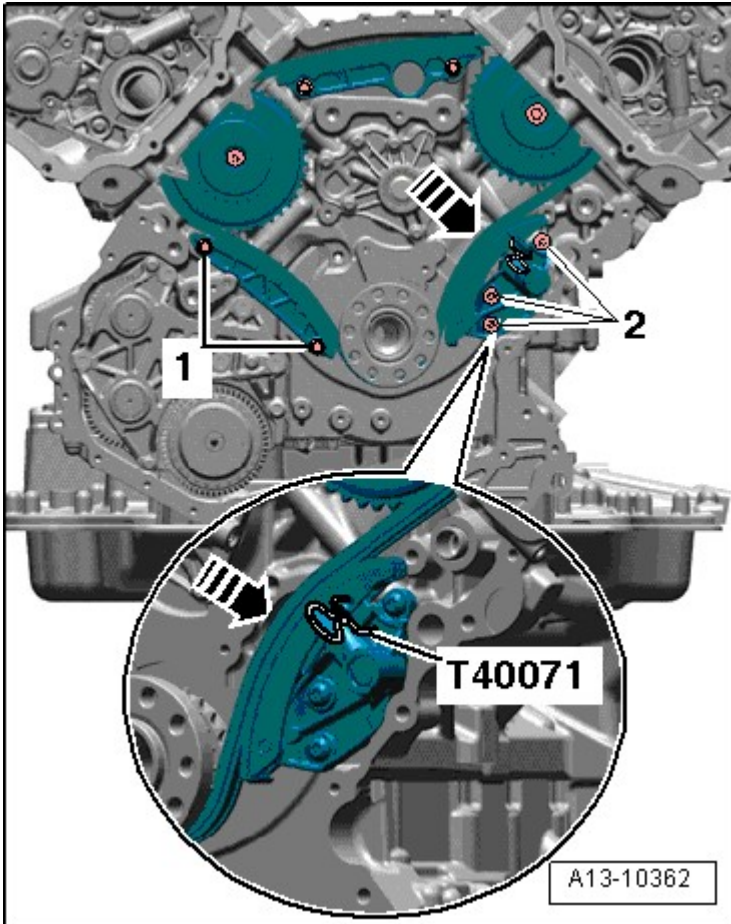


Fig. 177: Identifying Bolts And Chain Tensioner
Courtesy of AUDI OF AMERICA, LLC

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 the chain tensioner.

-- Remove the timing mechanism drive chain.

INSTALLING

Install in reverse order, paying attention to the following:

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

NOTE: Replace bolts that are tightened to the specification.

-- Position the timing mechanism drive chain according to the markings made on the drive chain sprockets during removal.

-- Install the guide rail and tighten the bolts -1-.

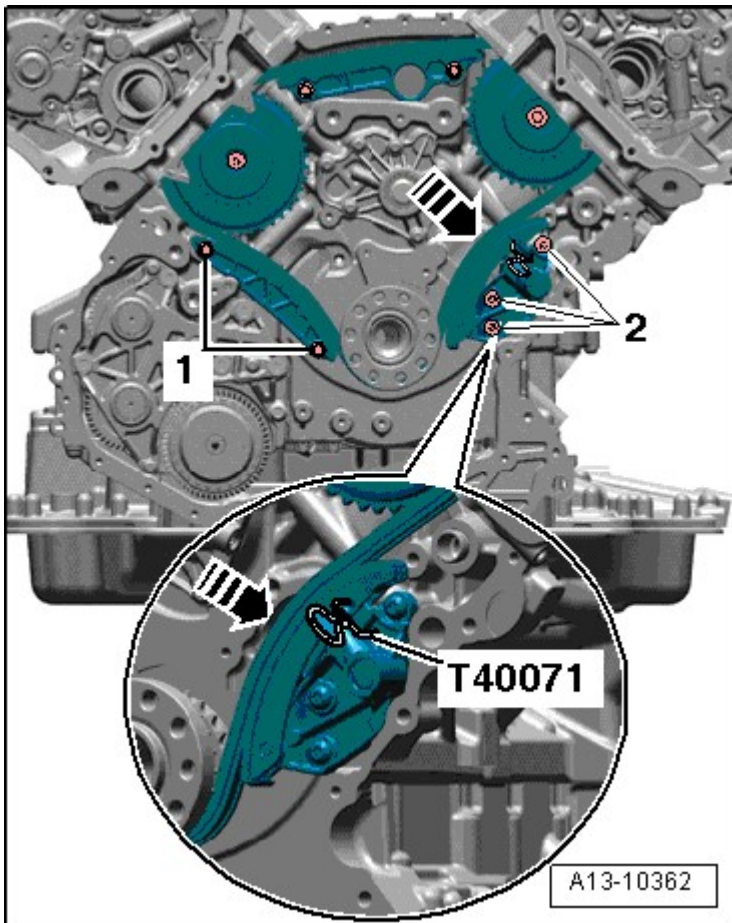


Fig. 178: Identifying Bolts And Chain Tensioner
Courtesy of AUDI OF AMERICA, LLC

-- Install the chain tensioner and tighten the bolts -2-.

- Press the drive chain tensioner guide rail in direction of -arrow- and pull T40071 out of the chain tensioner.
- Install the power take-off drive chain. Refer to **POWER TAKE-OFF DRIVE CHAIN**.
- Position the camshaft timing chain on the camshafts **CAMSHAFT TIMING CHAINS => Installing**.
- Install timing chain lower cover. Refer to **LOWER TIMING CHAIN COVER**.

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

- Spark Plug Removal Tool 3122 B
- Valve Seal Removal Tool 3364
- Valve Stem Seal Driver 3365
- Valve Cotters Asm/Dis-Asm Device VAS 5161 with Guide Plate for FSI Engine VAS 5161/19B
- Adapter T40012

REMOVING

- Remove the camshafts. Refer to **CAMSHAFTS**.
- Mark the allocation of the roller rocker lever and the hydraulic adjusting elements so they can be installed again.
- If necessary, remove the roller rocker levers with the hydraulic adjusting elements and place them on a clean surface.
- Remove the spark plugs using the 3122 B.
- Move piston for respective cylinder to "Bottom Dead Center (BDC) position".
- Position the drift VAS 5161/3 on the valve spring plate and loosen the stuck valve retainers with a plastic mallet.

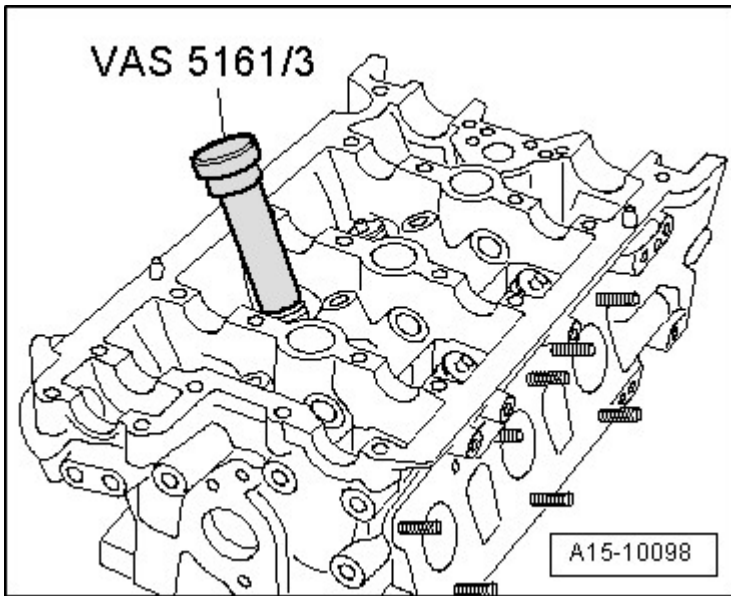


Fig. 179: Placing Drift VAS 5161/3 On Valve Spring Plate And Loosening Stuck Valve Keepers Using Plastic Hammer

Courtesy of AUDI OF AMERICA, LLC

-- Mount the VAS 5161/19B on the cylinder head.

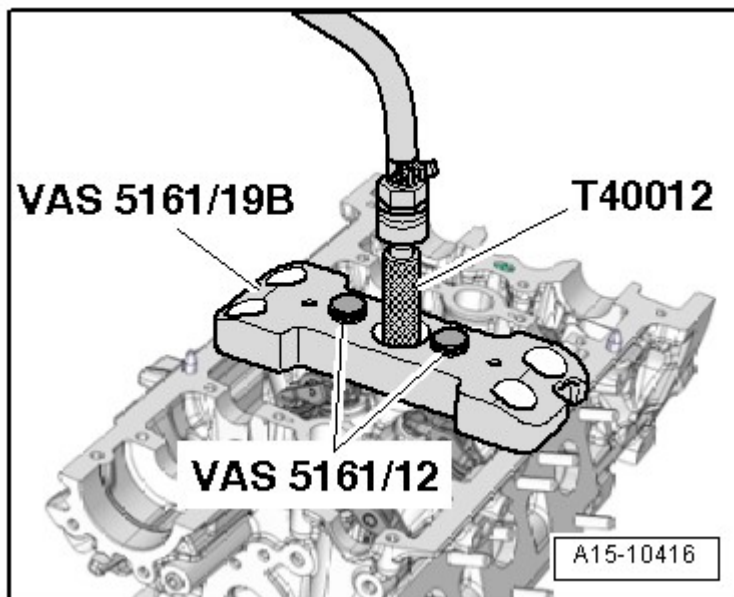


Fig. 180: Identifying Guide Plate For FSI Engine VAS 5161/19B

Courtesy of AUDI OF AMERICA, LLC

-- Secure the guide plate with the knurled screws VAS 5161/12.

-- Install T40012 with sealing ring in respective spark plug thread and hand tighten.

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

- Minimum pressure: 6 bar positive pressure.

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

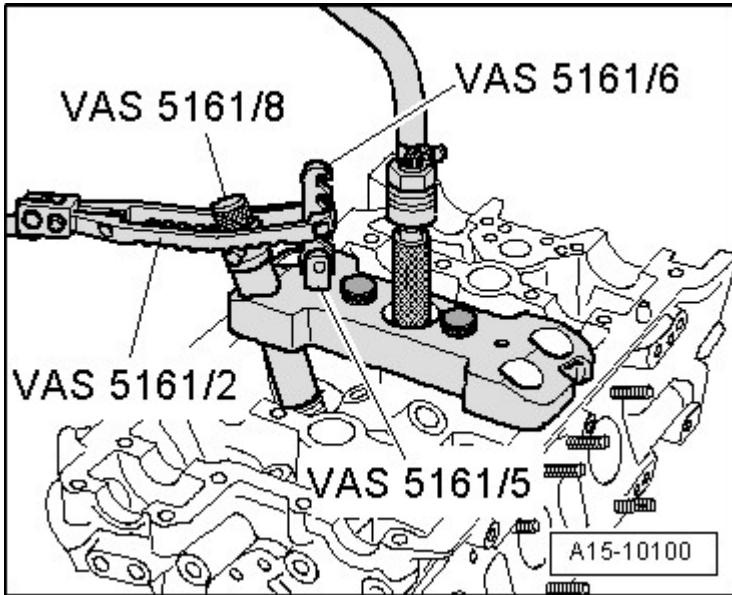


Fig. 181: Identifying Engaging Device VAS 5161/6 With Installation Fork VAS 5161/5 Installed Into Guide Plate

Courtesy of AUDI OF AMERICA, LLC

-- Slide installation cartridge VAS 5161/8 in guide plate.

-- 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 installation cartridge.

-- Unfasten guide plate and turn it aside.

- Pressurized air hose remains connected.

-- Remove the valve spring and the valve spring plate.

-- Remove the valve stem seal with the 3364.

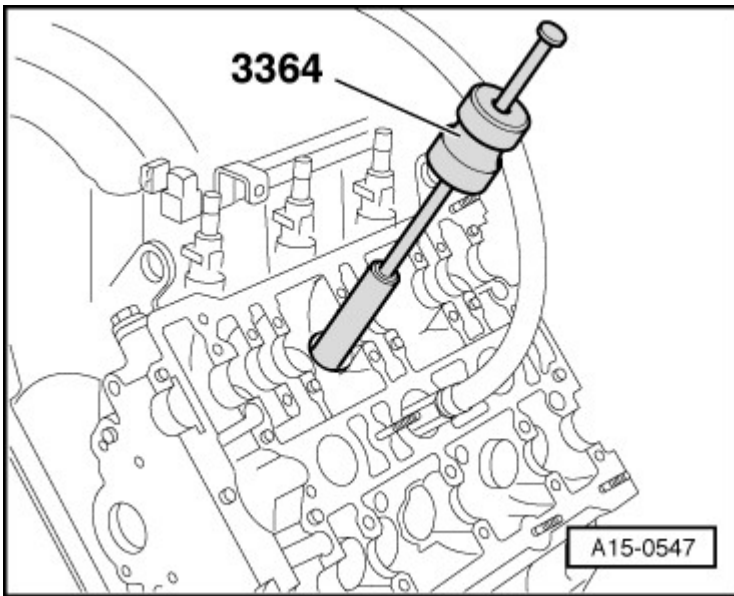


Fig. 182: Identifying 3364

Courtesy of AUDI OF AMERICA, LLC

If the 3364 cannot be used on some valve stem seals due to restricted clearance, proceed as follows:

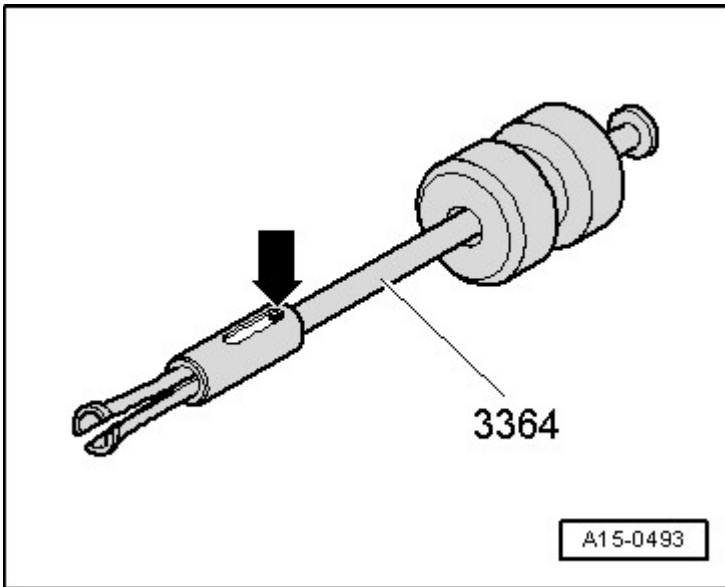


Fig. 183: Driving Out Roll Pin -Arrow-

Courtesy of AUDI OF AMERICA, LLC

-- Drive out the roll pin -arrow- on the puller with a drift and remove the impact puller attachment.

-- Position the lower part of the 3364 on the valve stem seal.

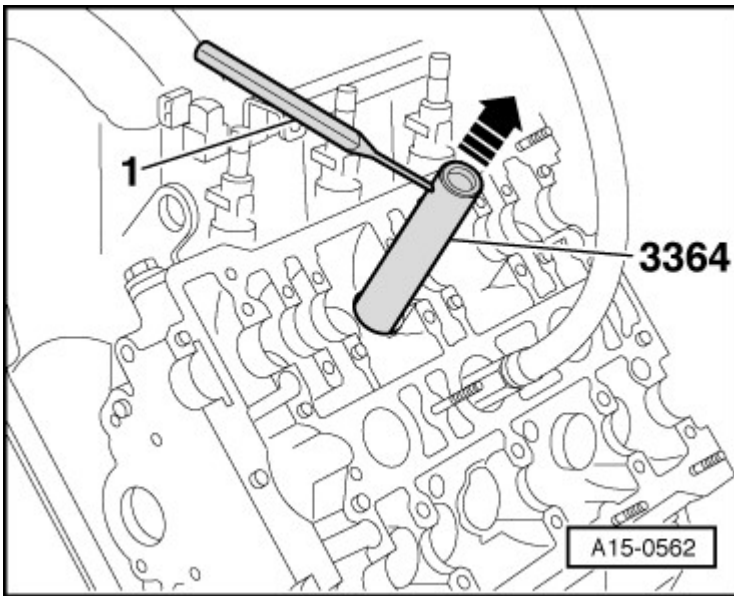


Fig. 184: Positioning Lower Part Of 3364 Valve Stem Removal Tool At Valve Stem Oil Seal
Courtesy of AUDI OF AMERICA, LLC

- Secure the puller with a drift or cotter pin drive -1- as shown in the illustration.
- Position the valve lever on the puller and remove the valve stem seal -arrow-.

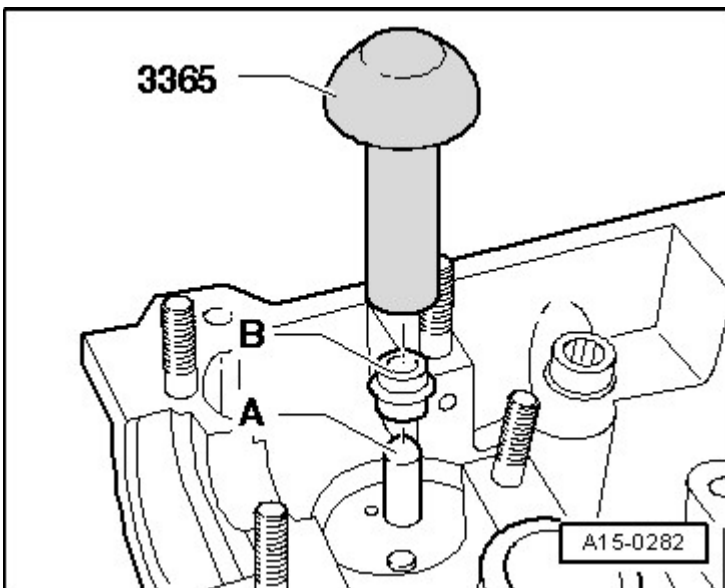


Fig. 185: Identifying Plastic Sleeve, New Valve Stem Oil Seals & Valve Stem Seal Driver 3365
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of damage when installing valve stem seals.

- Place plastic sleeve -A- that is attached to valve stem seals -B- on valve stem.

- Lightly oil valve stem seal.
- Slide valve shaft seal onto plastic sleeve.
- Carefully press valve stem seal onto valve guide using the 3365.
- Remove plastic sleeve again.

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

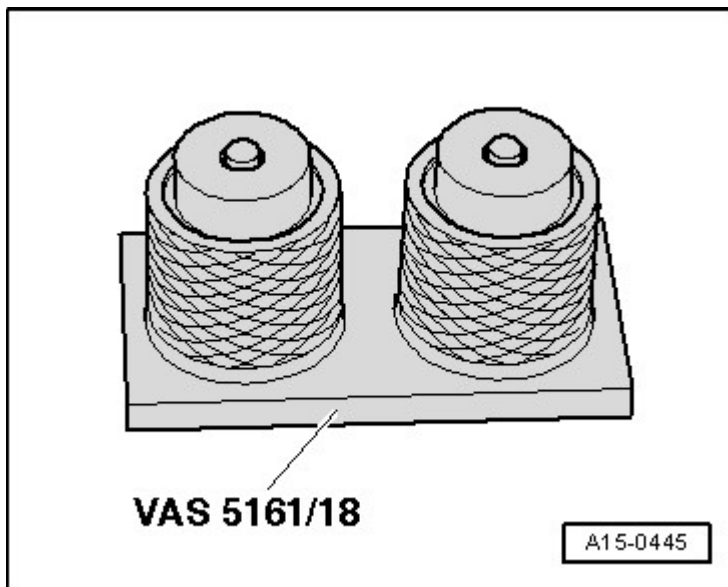


Fig. 186: Identifying Installation Cartridge VAS 5161/8
Courtesy of AUDI OF AMERICA, LLC

- Valve keepers large diameter facing up.
- Press installation cartridge from above onto the insertion device and capture keepers.
 - Insert valve spring and valve spring plate.

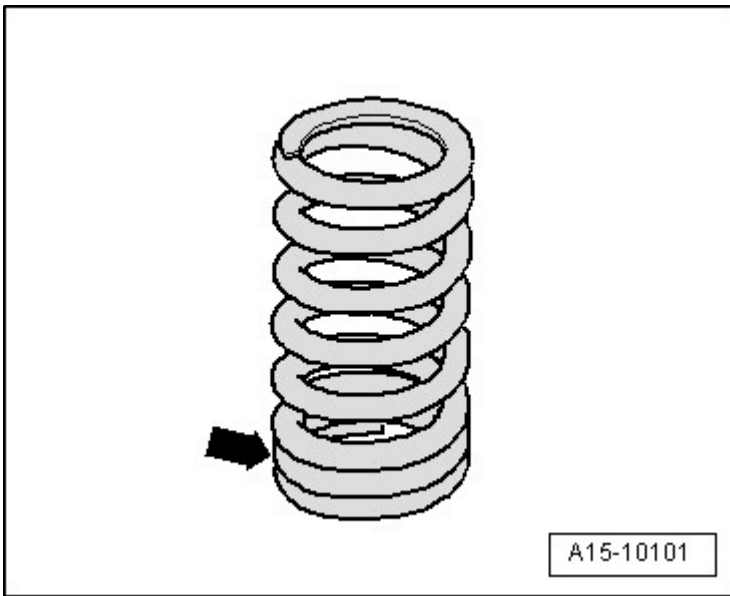


Fig. 187: Identifying Tight Spring Coils
Courtesy of AUDI OF AMERICA, LLC

- Installed position: the tight spring coils -arrow- face toward the cylinder head.

-- Mount the VAS 5161/19B on the cylinder head.

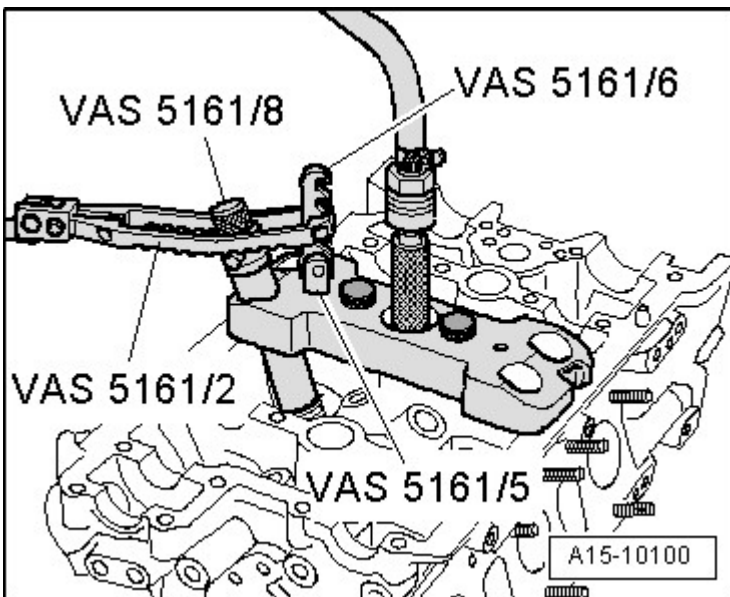


Fig. 188: Identifying Engaging Device VAS 5161/6 With Installation Fork VAS 5161/5 Installed Into Guide Plate
Courtesy of AUDI OF AMERICA, LLC

-- Insert installation cartridge in guide plate.

-- 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

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

-- Install the spark plugs.

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

VALVE STEM SEALS WITH CYLINDER HEAD REMOVED, REPLACING

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 Guide Plate for FSI Engine VAS 5161/19B
- Engine and Transmission Holder VAS 6095
- Cylinder Head Tensioning Device VAS 6419

PROCEDURE

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

-- Mark the allocation of the roller rocker lever and the hydraulic adjusting elements so they can be installed again.

-- If necessary, remove the roller rocker levers with the hydraulic adjusting elements and place them on a clean surface.

-- Mount the VAS 6419 into the VAS 6095.

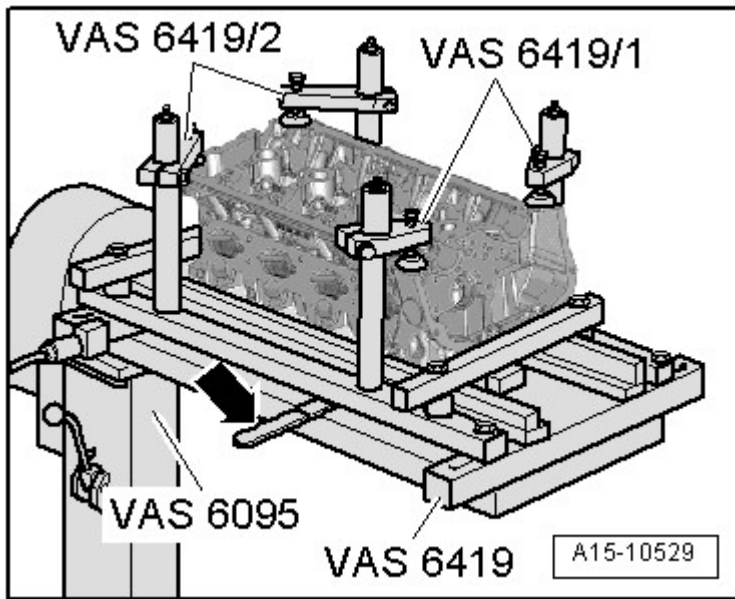


Fig. 189: Identifying Cylinder Head Tensioning Device VAS 6419
 Courtesy of AUDI OF AMERICA, LLC

- 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.
- Let enough compressed air flow into the air cushion until it contacts the valve plate.
- Position the drift VAS 5161/3 on the valve spring plate and loosen the stuck valve retainers with a plastic mallet.

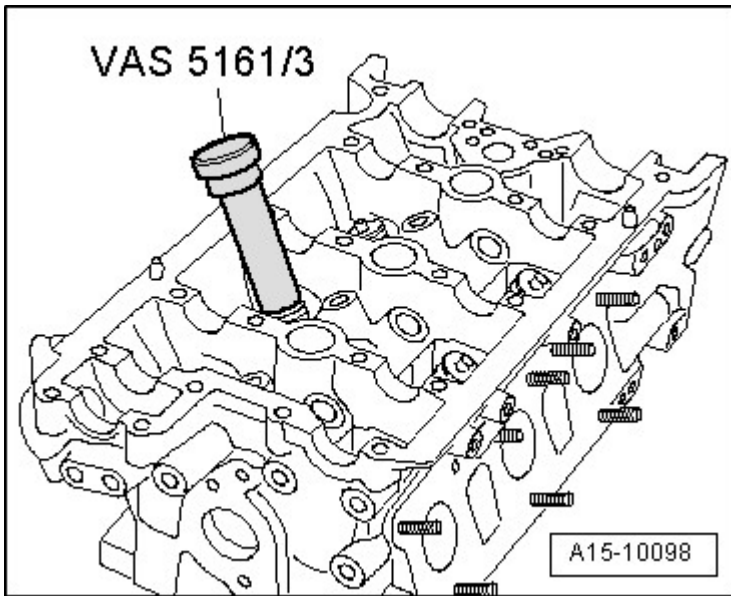


Fig. 190: Placing Drift VAS 5161/3 On Valve Spring Plate And Loosening Stuck Valve Keepers Using Plastic Hammer

Courtesy of AUDI OF AMERICA, LLC

-- Mount the VAS 5161/19B on the cylinder head.

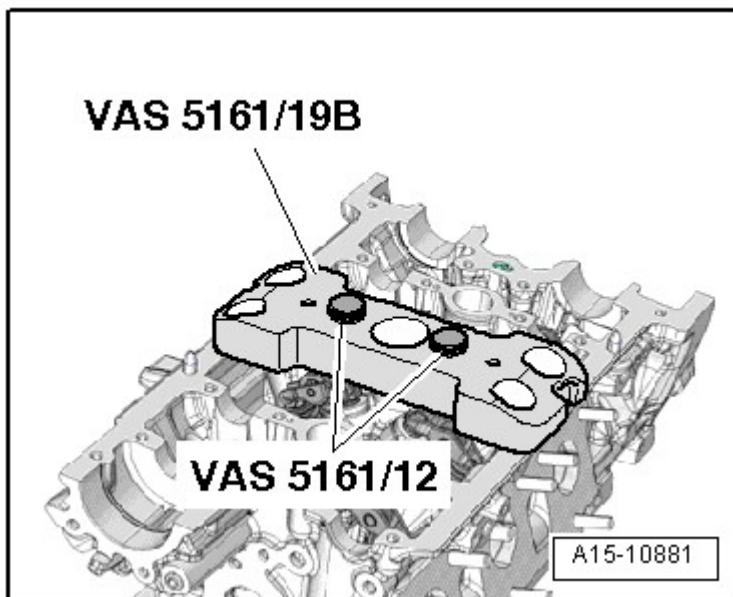


Fig. 191: Identifying Pressure Fork VAS 5161/12

Courtesy of AUDI OF AMERICA, LLC

-- Secure the guide plate with the knurled screws VAS 5161/12.

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

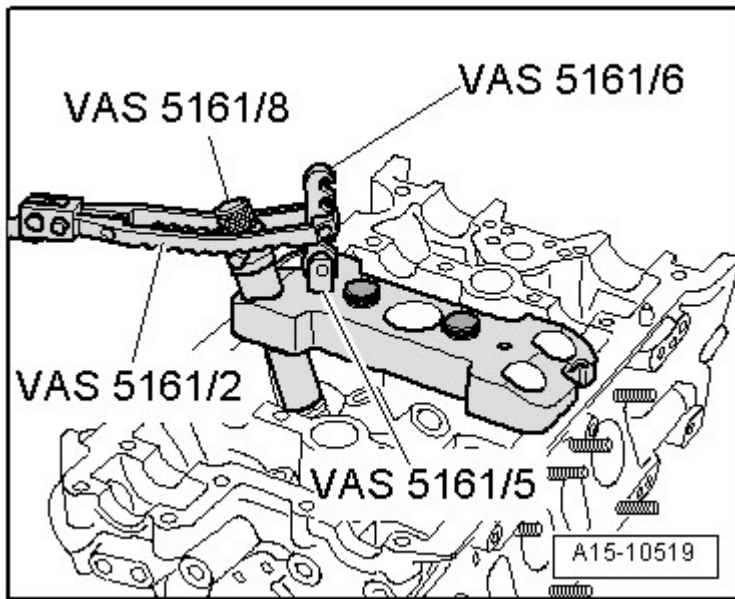


Fig. 192: Identifying Engaging Device VAS 5161/6, Installation Fork VAS 5161/5 And Guide Plate, Removal/Installation

Courtesy of AUDI OF AMERICA, LLC

- Slide installation cartridge VAS 5161/8 in guide plate.
- 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 back and forth slightly. This presses the valve retainers apart and captures them in the installation cartridge.
- Release the pressure fork.
- Remove installation cartridge.
- Unfasten guide plate and turn it aside.
- Remove the valve spring and the valve spring plate.
- Remove the valve stem seal with the 3364.

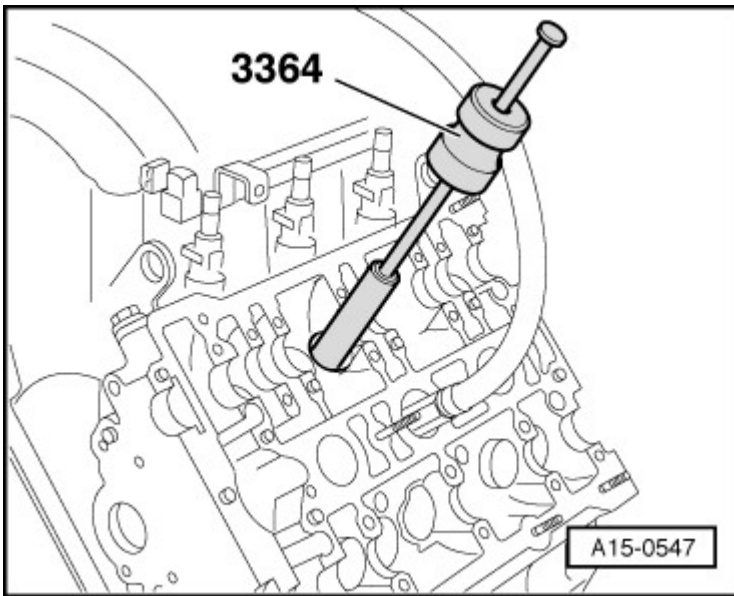


Fig. 193: Identifying 3364

Courtesy of AUDI OF AMERICA, LLC

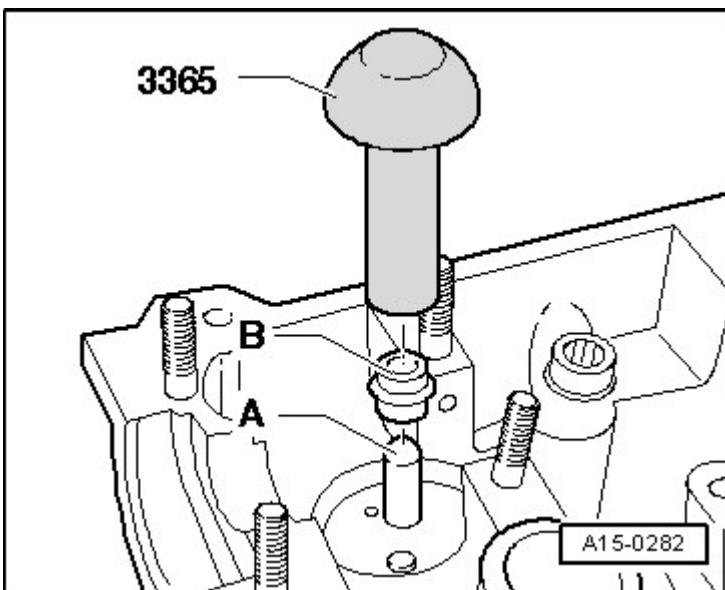


Fig. 194: Identifying Plastic Sleeve, New Valve Stem Oil Seals & Valve Stem Seal Driver 3365

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.

-- Lightly oil valve stem seal.

-- Slide valve shaft seal onto plastic sleeve.

-- Carefully press valve stem seal onto valve guide using the 3365.

-- Remove plastic sleeve again.

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

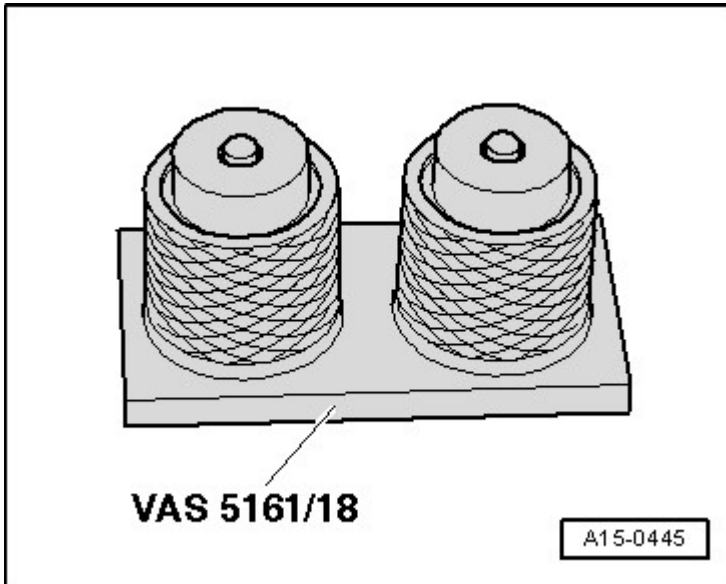


Fig. 195: Identifying Installation Cartridge VAS 5161/8
Courtesy of AUDI OF AMERICA, LLC

- The large diameter of the valve retainers point upward.

-- Press installation cartridge from above onto the insertion device and capture keepers.

-- Insert valve spring and valve spring plate.

- The tight spring coils -arrow- face toward cylinder head.

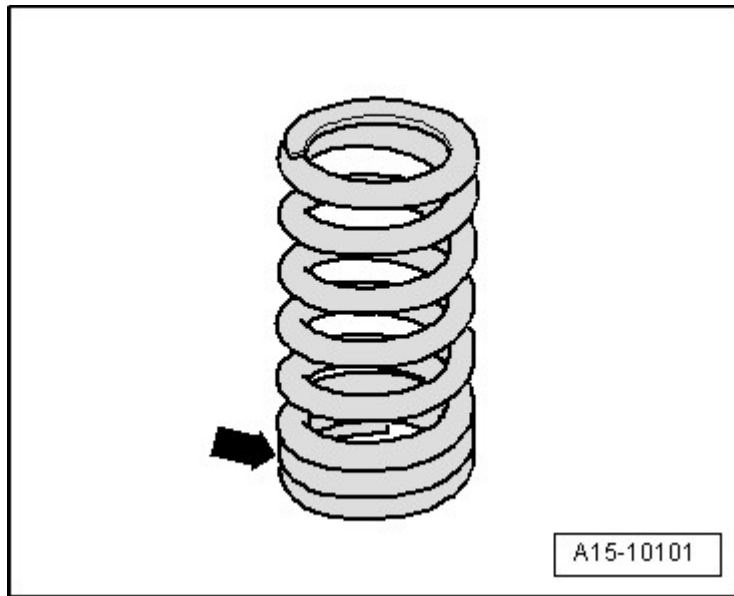


Fig. 196: Identifying Tight Spring Coils
Courtesy of AUDI OF AMERICA, LLC

-- Mount the VAS 5161/19B on the cylinder head.

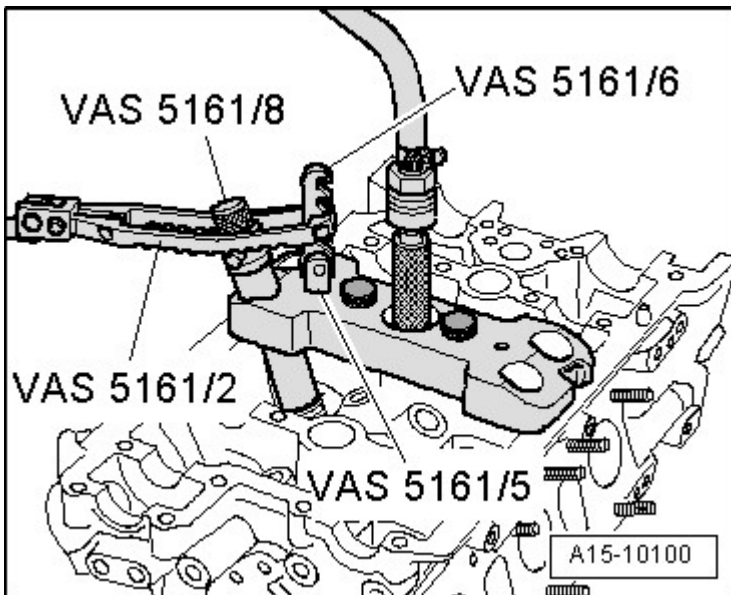


Fig. 197: Identifying Engaging Device VAS 5161/6 With Installation Fork VAS 5161/5 Installed Into Guide Plate
Courtesy of AUDI OF AMERICA, LLC

-- Insert installation cartridge in guide plate.

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

2009 Audi S5 Quattro

ENGINE 4.2 Liter - Cylinder Head, Valvetrain - Engine Code(s): CAUA (Coupe)

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

-- Repeat the procedure on each valve.

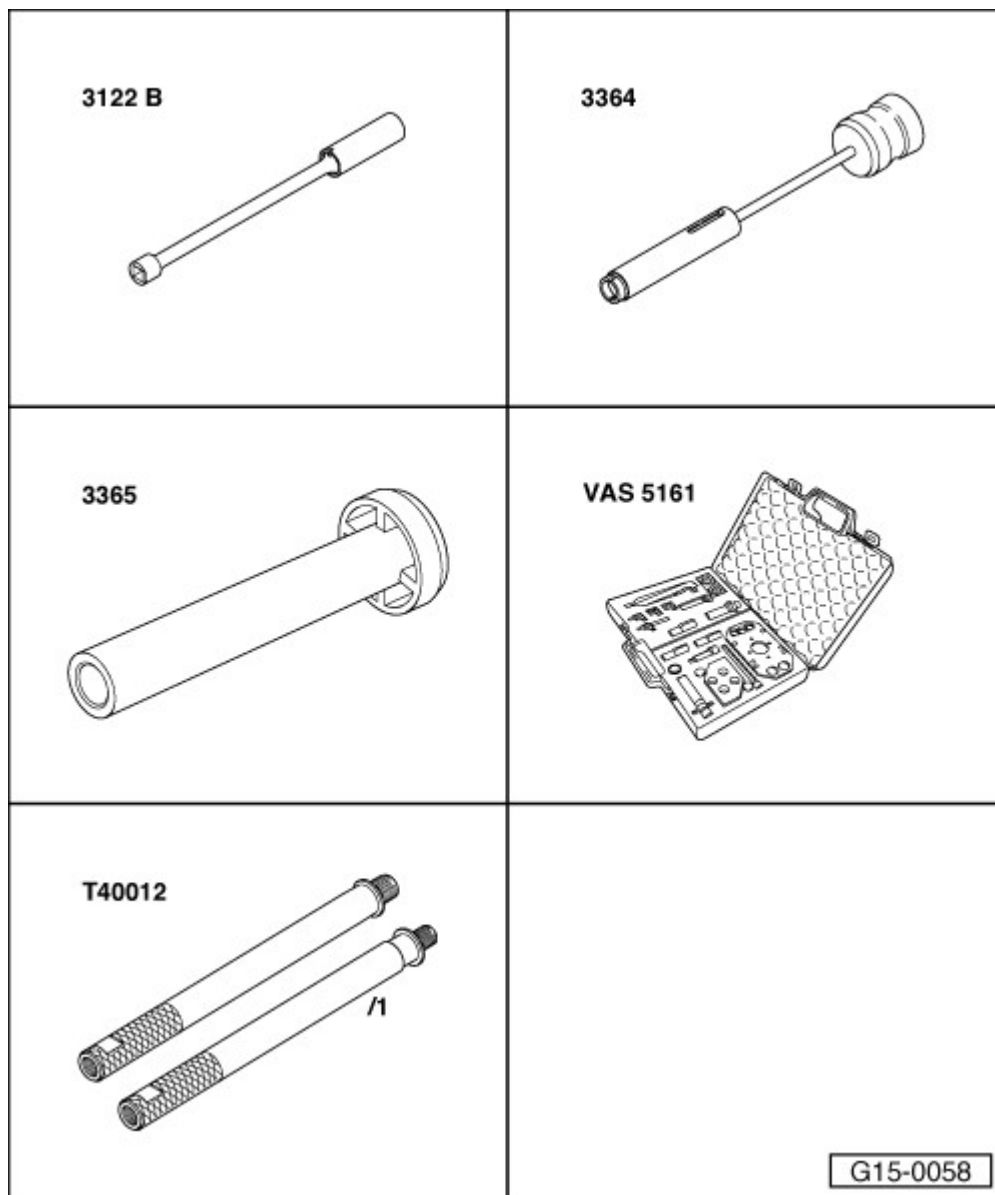
ASSEMBLING

Assemble in reverse order of disassembling. Note the following:

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

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

SPECIAL TOOLS

**Fig. 198: Identifying Special Tools**

Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Spark Plug Removal Tool 3122 B
- Valve Seal Removal Tool 3364
- Valve Stem Seal Driver 3365
- Valve Cotters Asm/Dis-Asm Device VAS 5161 with Guide Plate for FSI Engine VAS 5161/19B
- Adapter T40012

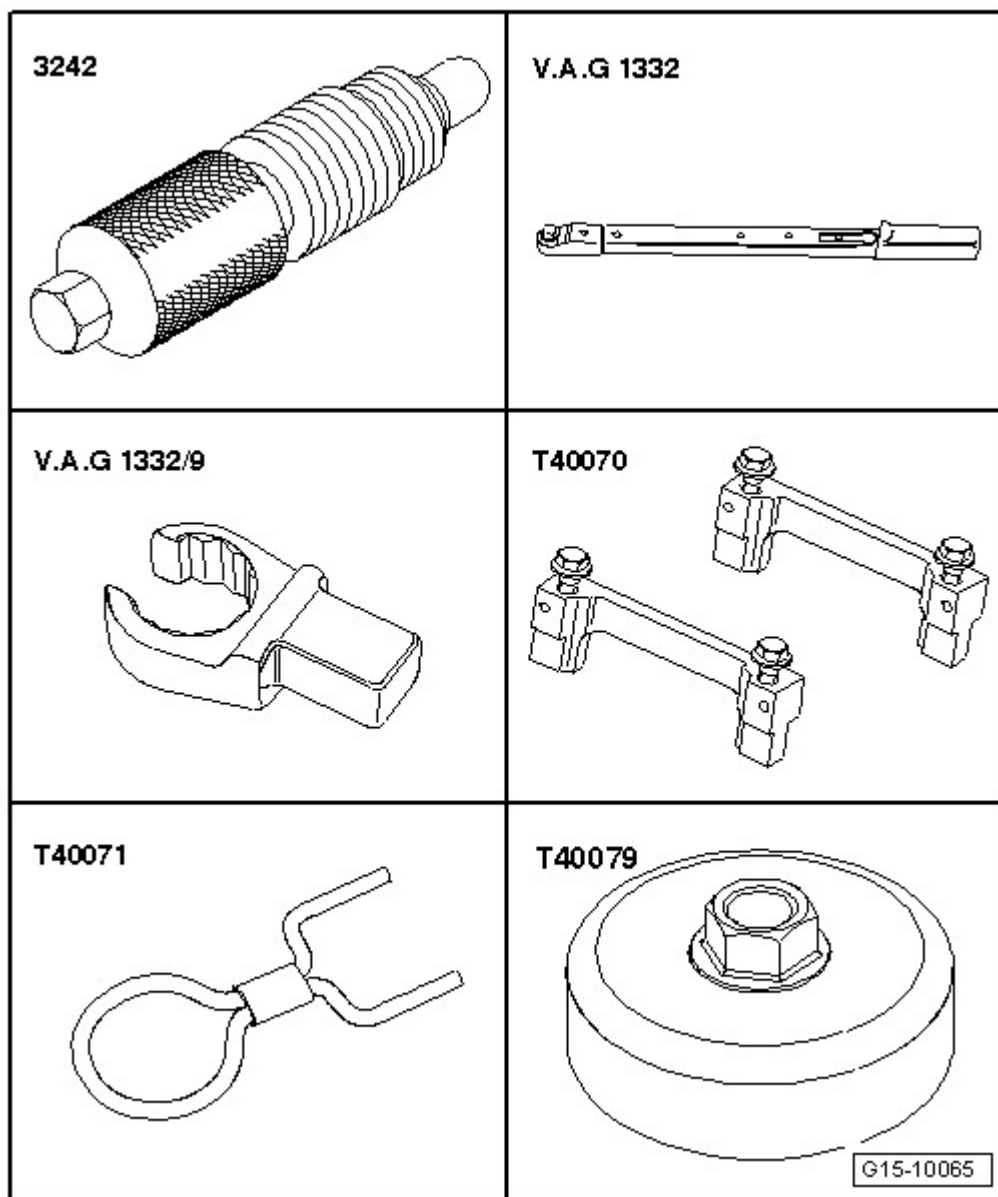


Fig. 199: Identifying Special Tools

Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Crankshaft Holder 3242
- Torque Wrench 40-200 Nm V.A.G 1332
- Open Ring Spanner Insert, AF 24 mm V.A.G 1332/9
- Camshaft Clamp T40070, quantity: 2
- Locking Pin T40071, quantity: 2
- Key T40079

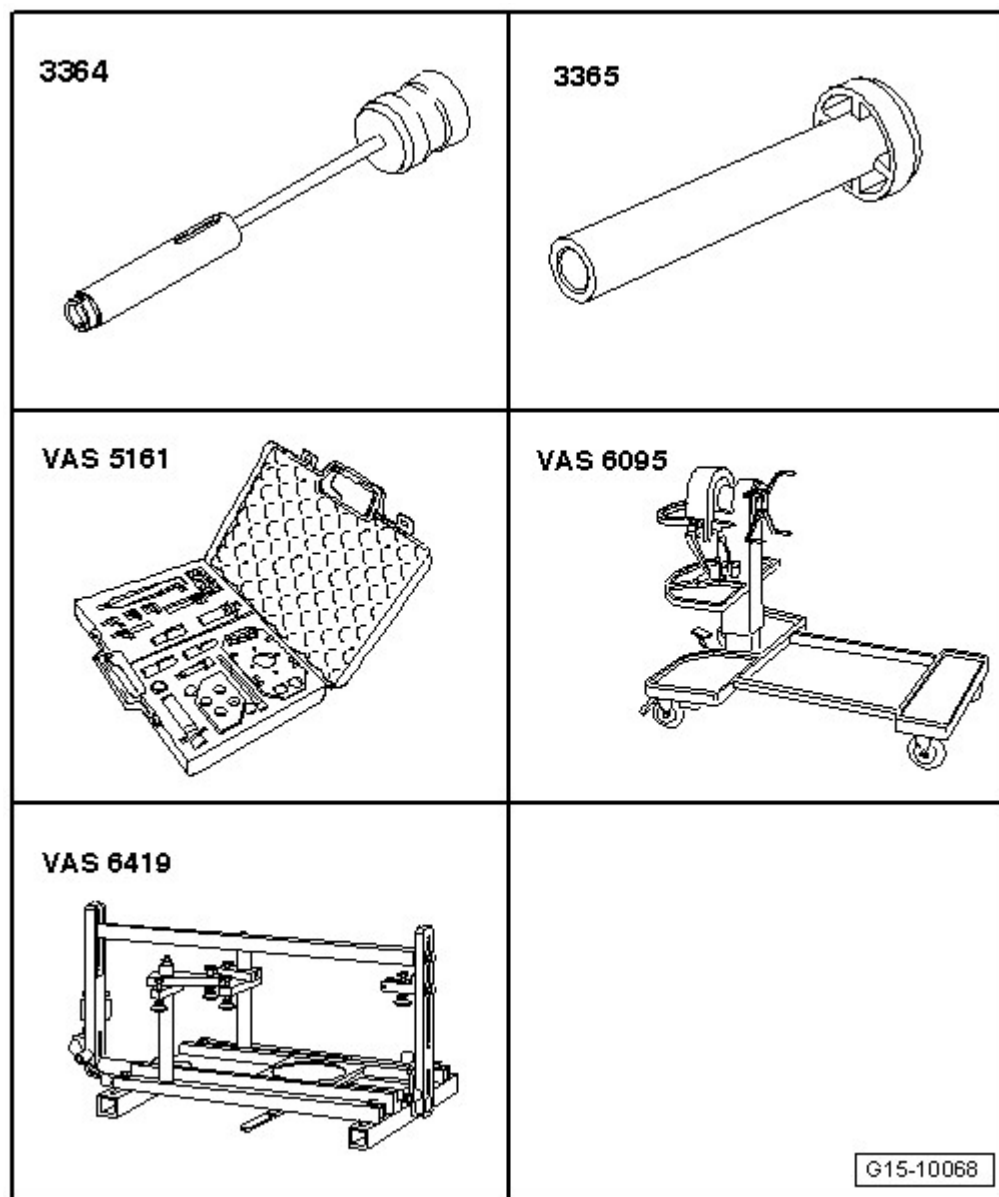


Fig. 200: Identifying Special Tools -- Valve Stem Seals With Cylinder Head Removal
 Courtesy of AUDI OF AMERICA, LLC

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 Guide Plate for FSI Engine VAS 5161/19B
- Engine and Transmission Holder VAS 6095
- Cylinder Head Tensioning Device VAS 6419

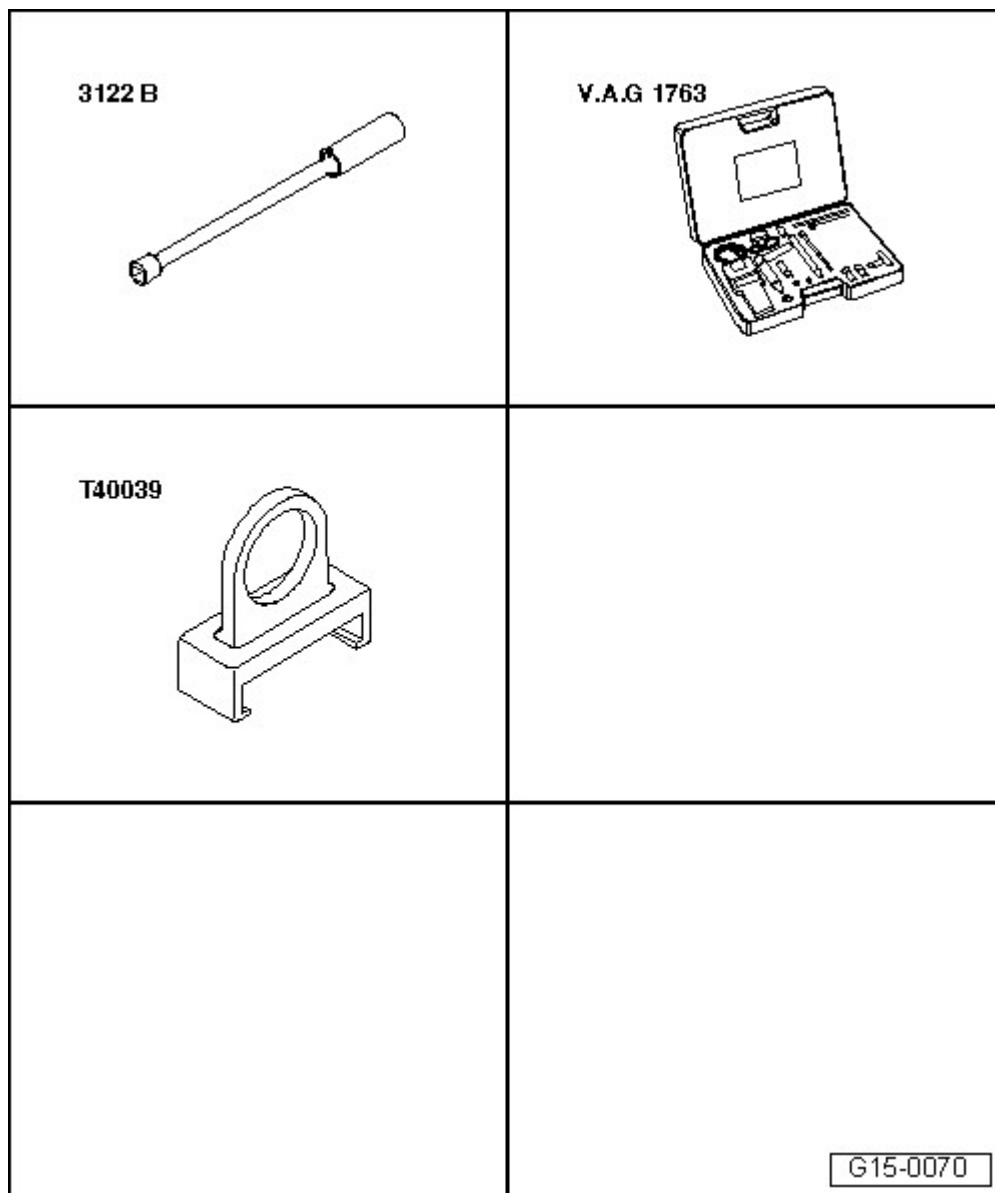


Fig. 201: Identifying Special Tools - Pressures, Checking
 Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

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

Special tools and workshop equipment required

- Multipoint Socket T10035

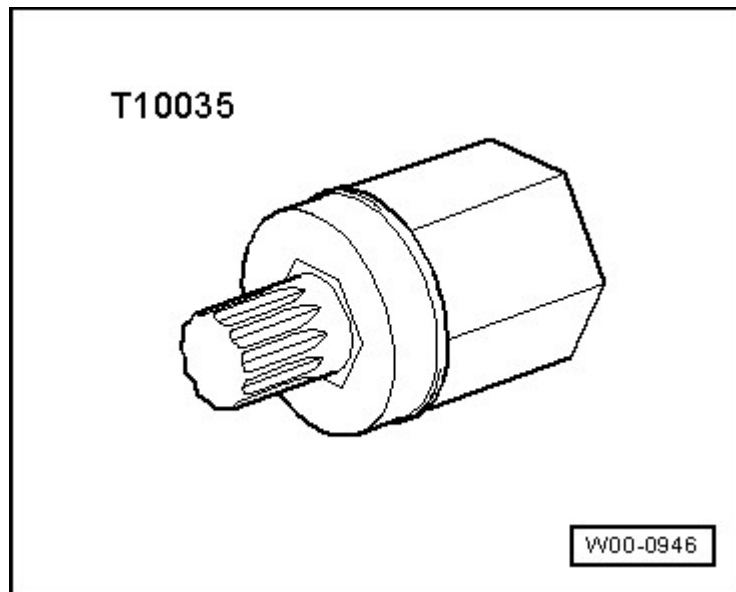


Fig. 202: Identifying Multipoint Socket T10035
Courtesy of AUDI OF AMERICA, LLC

- Locking Pin T40071

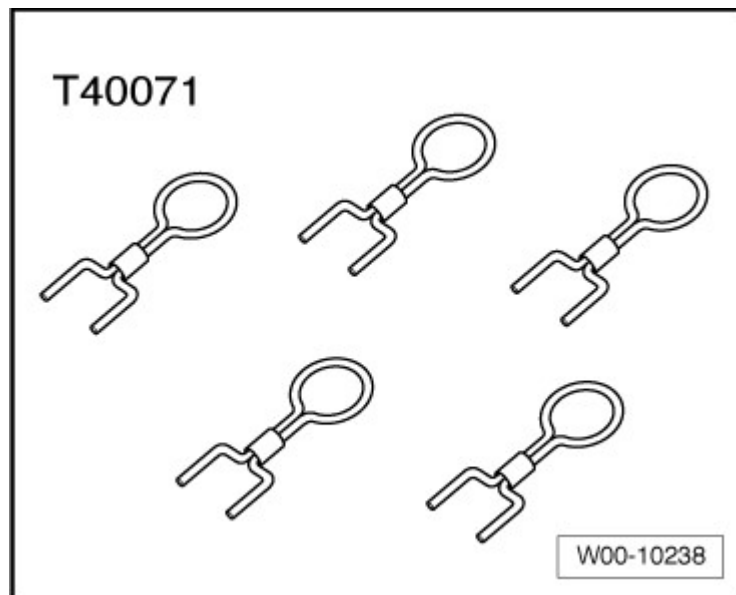


Fig. 203: Identifying Securing Pin T40071
Courtesy of AUDI OF AMERICA, LLC

- Locating Pins T40116

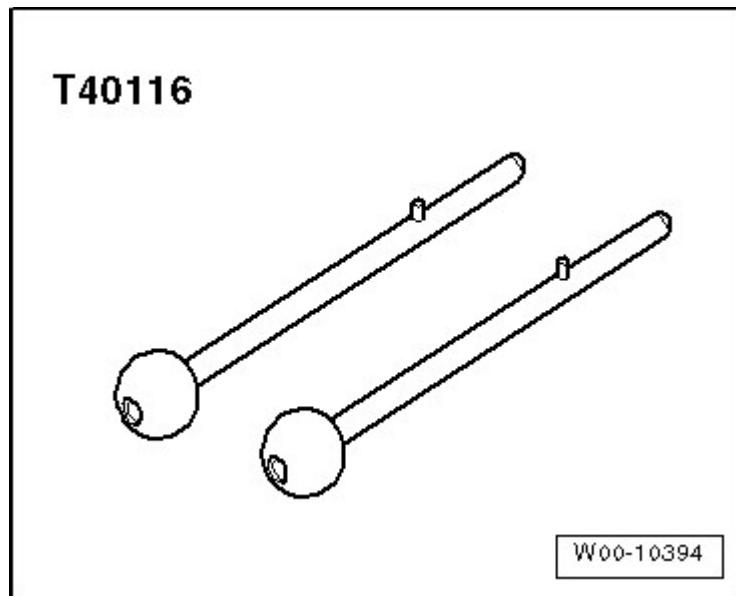


Fig. 204: Identifying Locating Pins T40116
Courtesy of AUDI OF AMERICA, LLC

- Tool Set T10133

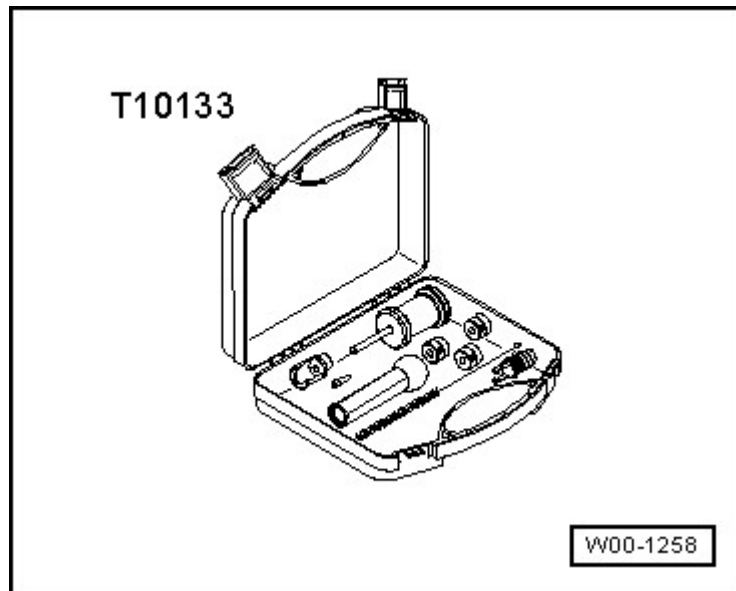


Fig. 205: Identifying Tool Set T10133
Courtesy of AUDI OF AMERICA, LLC

- Thrust Piece T40192

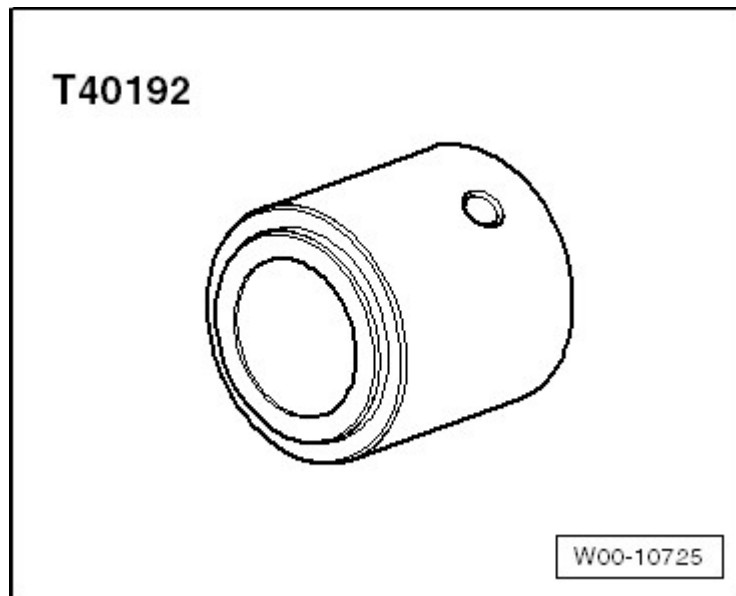


Fig. 206: Identifying Thrust Piece T40192
Courtesy of AUDI OF AMERICA, LLC

- Thrust Piece T40193

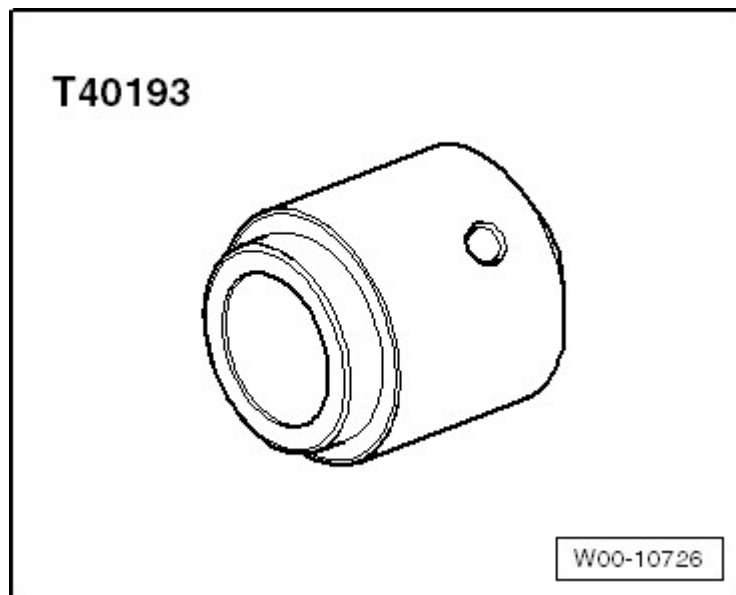


Fig. 207: Identifying Thrust Piece T40193
Courtesy of AUDI OF AMERICA, LLC

- Seal Puller T40195

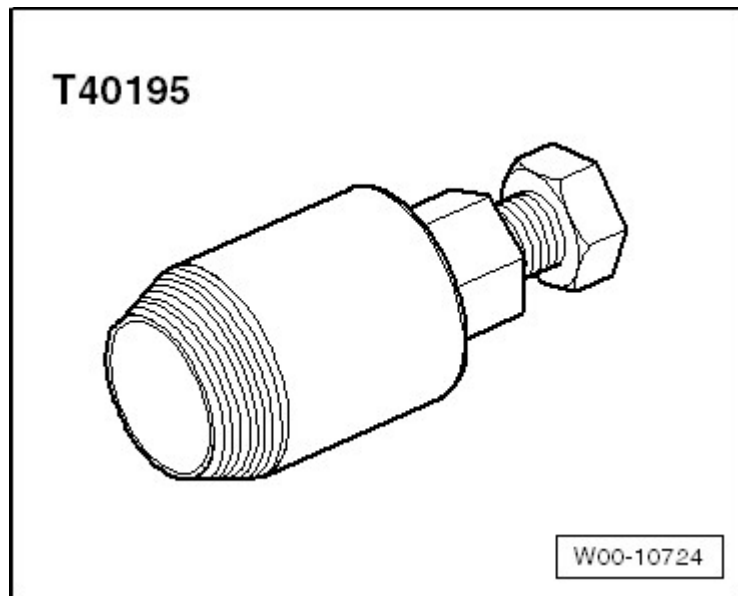


Fig. 208: Identifying Seal Puller T40195
Courtesy of AUDI OF AMERICA, LLC

- Oil Collecting and Extracting Device V.A.G 1782

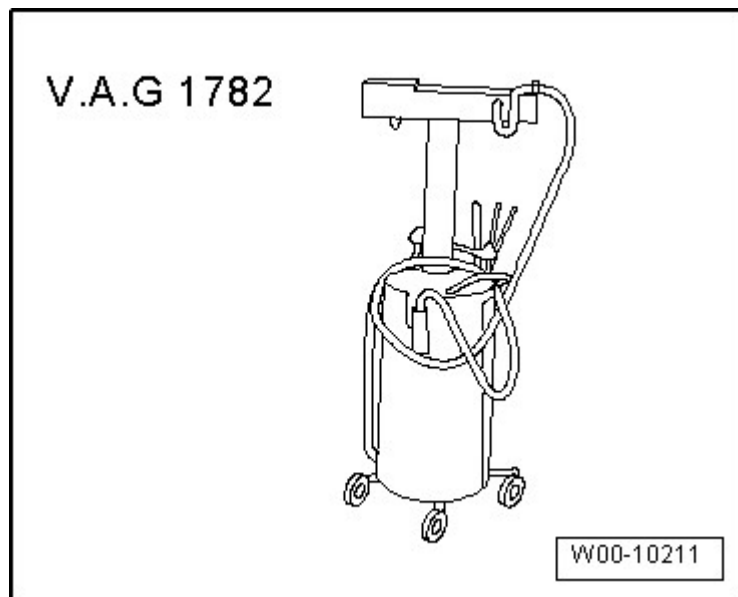


Fig. 209: Identifying Oil Collecting & Extracting Device V.A.G 1782
Courtesy of AUDI OF AMERICA, LLC

- Dial Gauge 0-10 mm VAS 6079

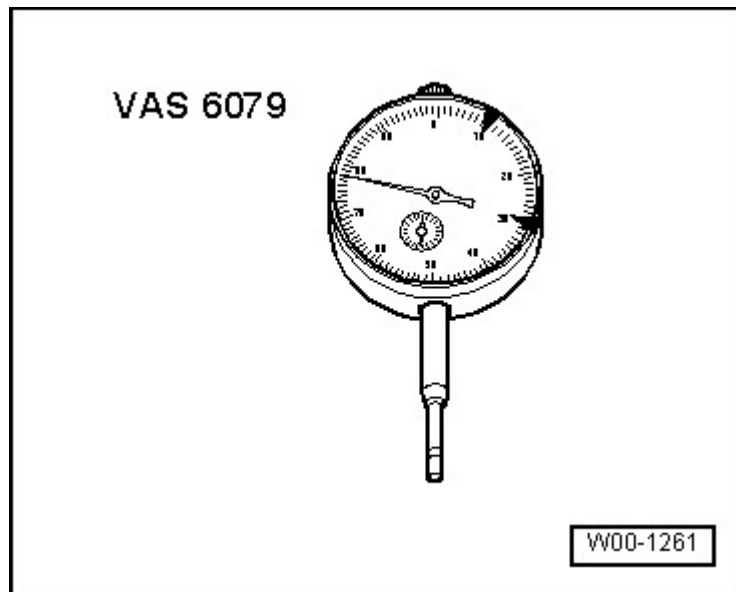


Fig. 210: Identifying Dial Gauge 0-10 mm VAS 6079
Courtesy of AUDI OF AMERICA, LLC

- Dial Gauge Holder VW 387

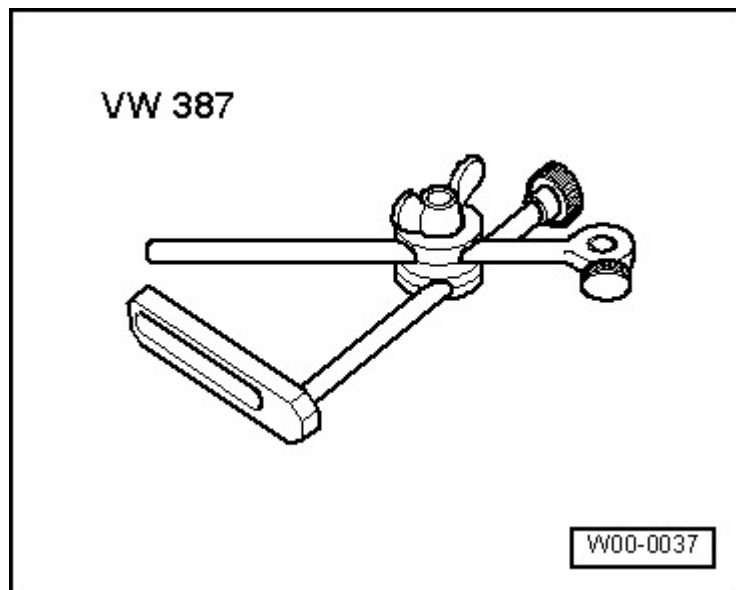


Fig. 211: Identifying Dial Gauge Holder VW 387
Courtesy of AUDI OF AMERICA, LLC

- Not illustrated:
- Crankshaft Holder 3242
- Camshaft Clamp T40070
- Counterhold Tool Touareg V10 T10172
- Jointed Socket, 12 mm T40220

2009 Audi S5 Quattro

ENGINE 4.2 Liter - Cylinder Head, Valvetrain - Engine Code(s): CAUA (Coupe)

- Adapter T40257
- Socket T40263

ENGINE

4.2 Liter - Engine Assembly - Engine Code(s): CAUA (Coupe)

10 ENGINE ASSEMBLY

DESCRIPTION AND OPERATION

SUBFRAME MOUNT OVERVIEW

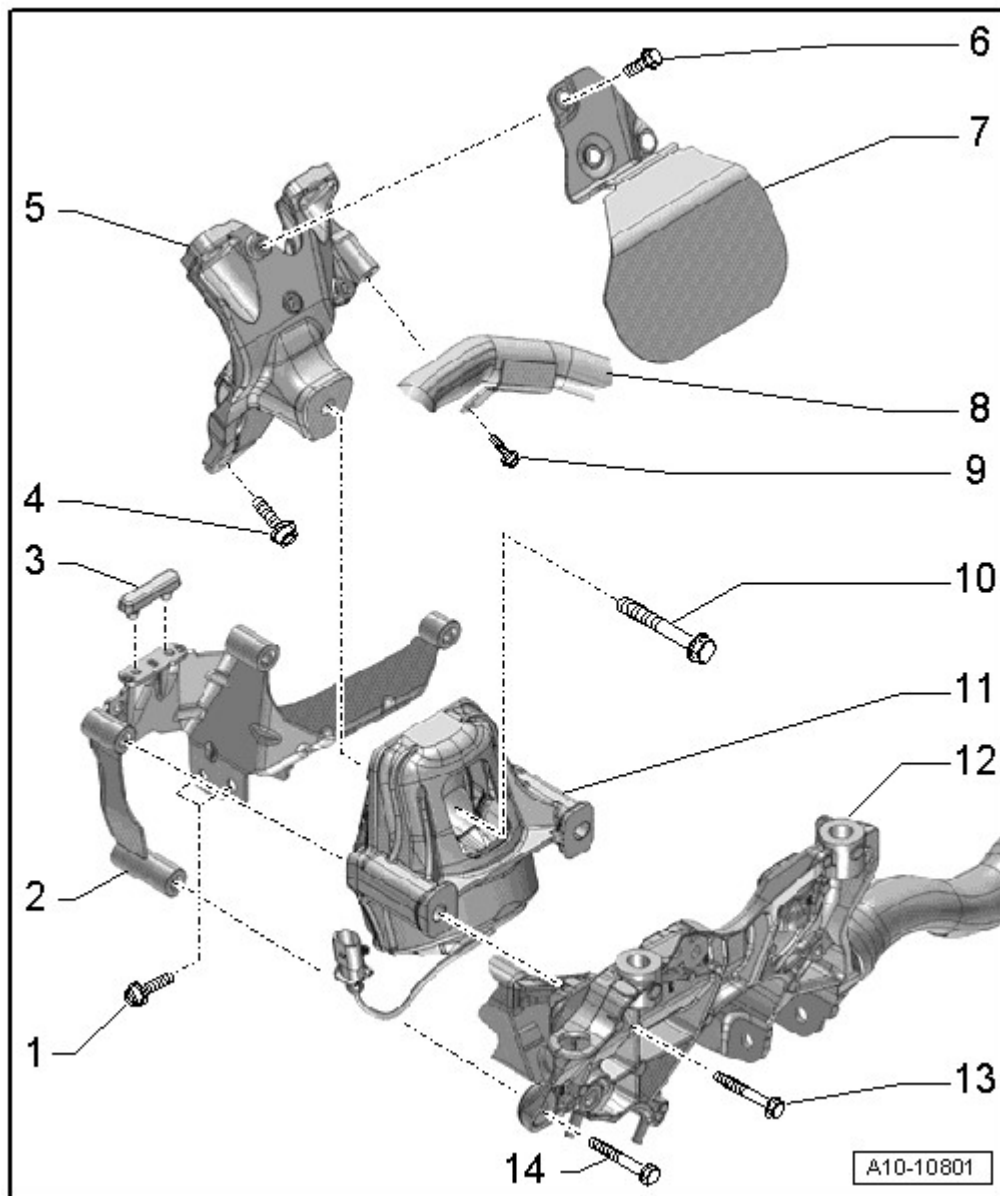


Fig. 1: Subframe Mount Overview

Courtesy of AUDI OF AMERICA, LLC

2009 Audi S5 Quattro

ENGINE 4.2 Liter - Engine Assembly - Engine Code(s): CAUA (Coupe)

1. Bolt
 - 20 Nm
2. Retaining Plate
 - For the engine mount
 - If the engine mount is faulty, replace the retaining plate
 - Check the retaining plate on the opposite side; replace if necessary
3. Rubber Stop
 - Not available individually
4. Bolt
 - 40 Nm
5. Engine Support
6. Bolt
 - 10 Nm
7. Heat Shield
8. Lower Left Coolant Pipe
9. Bolt
 - Tightening specification item 26 **COOLANT PIPES OVERVIEW**
10. Bolt
 - Replace
 - 90 Nm plus an additional 90° turn
11. Engine Mount
 - With the electro-hydraulic engine mount solenoid valve
 - Left electrohydraulic engine mount solenoid valve -N144- or right electro-hydraulic engine mount solenoid valve -N145-
 - Removing and installing, refer to **LEFT ENGINE MOUNT**, **RIGHT ENGINE MOUNT**
 - Replace in pairs
12. Subframe
13. Bolt
 - 55 Nm
14. Bolt
 - 55 Nm

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Components	Fastener Size	Nm
Engine Mount ¹	-	90 + 90°
Engine Support	-	40

2009 Audi S5 Quattro

ENGINE 4.2 Liter - Engine Assembly - Engine Code(s): CAUA (Coupe)

Heat Shield	-	10
Retaining Plate	-	20
Subframe	-	55
Bolts and Nuts		
	M6	9
	M7	15
	M8	20
	M10	40
	M12	65
Exceptions:		
Ground Pins to the Strut Tower	-	9
¹ Replace		

ENGINE TO AUTOMATIC TRANSMISSION 0B6

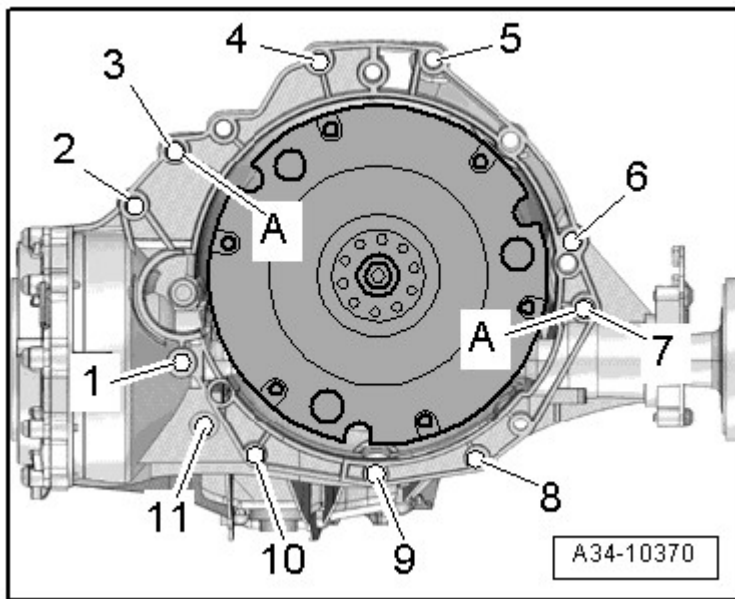


Fig. 2: Checking If Alignment Sleeves -A- For Centering Engine/Transmission Are In Cylinder Block
 Courtesy of AUDI OF AMERICA, LLC

Item	Bolt	Nm
1	M10 x 50 ¹⁾	65
2 ... 6	M12x100 ²⁾³⁾	30 + 90°
7	M12x175 ²⁾³⁾	30 + 90°
8, 11	M10x60 ²⁾³⁾	15 + 90°
9	M10x75 ²⁾³⁾	15 + 90°
10	M10x95 ²⁾³⁾	15 + 90°

2009 Audi S5 Quattro

ENGINE 4.2 Liter - Engine Assembly - Engine Code(s): CAUA (Coupe)

A

Alignment sleeves for centering

- 1) Bolt class 10.9, the steel bolt may be used again unlimited number of times.
- 2) Through VIN 8T-9A-007999: replace the aluminum bolts.
- 3) From VIN 8T-9A-008000: the aluminum bolts may be used twice **ENGINE, INSTALLING.**

ENGINE TO MANUAL TRANSMISSION

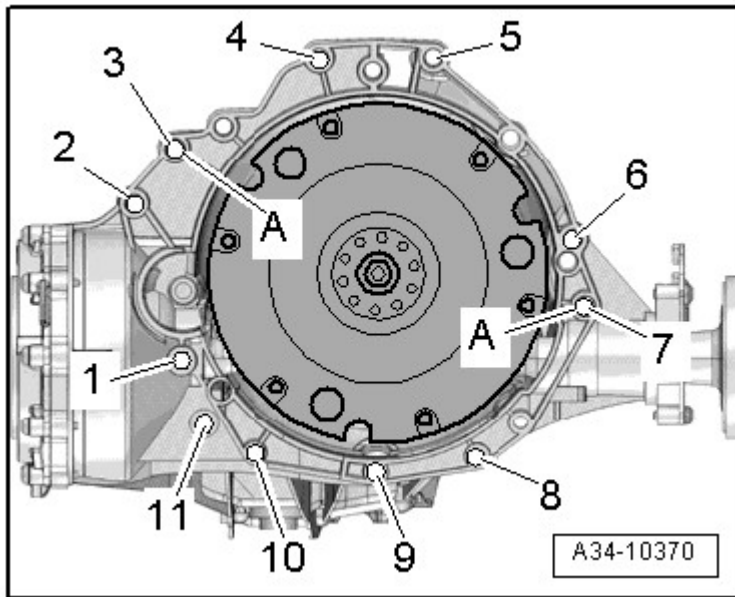


Fig. 3: Checking If Alignment Sleeves -A- For Centering Engine/Transmission Are In Cylinder Block
Courtesy of AUDI OF AMERICA, LLC

Item	Bolt	Nm
1 ¹⁾	M10 x 50 ²⁾	65
2 ³⁾ to 6	M12x100 ⁴⁾⁵⁾	30 + 90°
7	M12x125 ⁴⁾⁵⁾	30 + 90°
8, 11	M10x60 ⁴⁾⁵⁾	15 + 90°
9, 10	M10x95 ⁴⁾⁵⁾	15 + 90°
A	Alignment sleeves for centering	
• ¹⁾ Also secures the starter • ²⁾ Bolt strength rating 10.9. There is no limit to the number of times steel bolts may be used. • ³⁾ Also secures the starter. • ⁴⁾ Through VIN 8T-9A-007999: replace the aluminum bolts. • ⁵⁾ From VIN 8T-9A-008000: the aluminum bolts may be used twice <u>ENGINE, INSTALLING</u> <u>From VIN 8T-9A-008000: the aluminum bolts -2 through 11- may be used twice..</u>		

REMOVAL AND INSTALLATION**AUTOMATIC TRANSMISSION****ENGINE, REMOVING**

NOTE: With lock carrier installed, engine is removed downward together with the transmission and the subframe.

Collect escaping coolant in a clean container for disposal or reuse.

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

Special tools and workshop equipment required

- Pry Lever - Rmv Outside Mirror 80 - 200
- 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, Audi A8 VAS 6131/11, Supplementary Set, Audi Q7 VAS 6131/13 and qty. 3 Tapered Mounting Pin VAS 6131/10-2
- Drip Tray For VAS 6100 VAS 6208
- Hose Clip Pliers VAS 6340
- Hose Clip Pliers VAS 6362

Procedure

WARNING: Risk of vehicle tipping over with engine removed.

- Secure vehicle. Luggage compartment must be empty for this.

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

- Reduce the fuel pressure down to residual pressure before opening high pressure area of the fuel injection system.

-- Reduce fuel pressure in high pressure area. Refer to General Information .

NOTE: Release the electrical parking brake before disconnecting battery so the driveshaft can be rotated to remove it.

Place the selector lever in the "N" position and release the electromechanical parking brake before disconnecting the battery so that the driveshaft can still move freely.

-- Position the front wheels so they are straight.

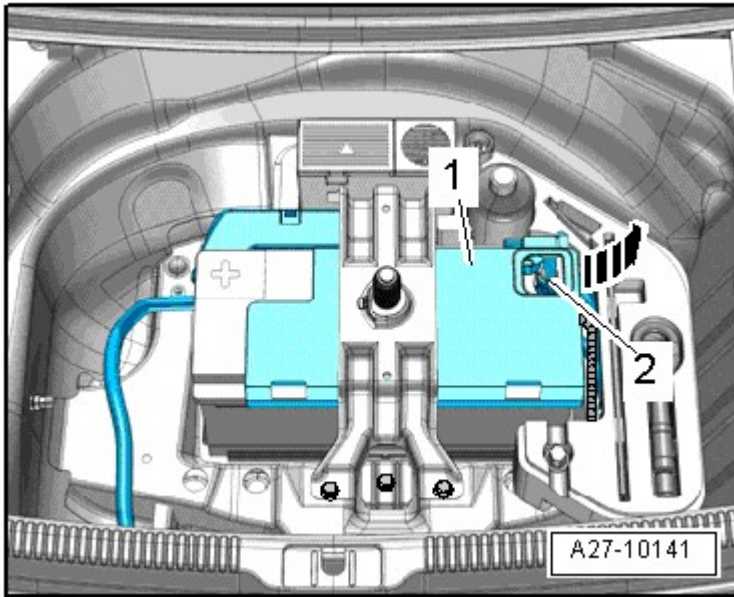


Fig. 4: Identifying Battery

Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of destroying electrical components.

- **Observe measures for disconnecting battery.**

-- Turn off the ignition and remove the key.

-- Disconnect the Ground (GND) cable -2- from the battery pole. Refer to **Removal and Installation** .

-- Empty coolant circuit. Refer to **Description and Operation** .

-- Extract the power steering oil from the reservoir with the V.A.G 1782.

-- Remove the engine cover -arrows-.

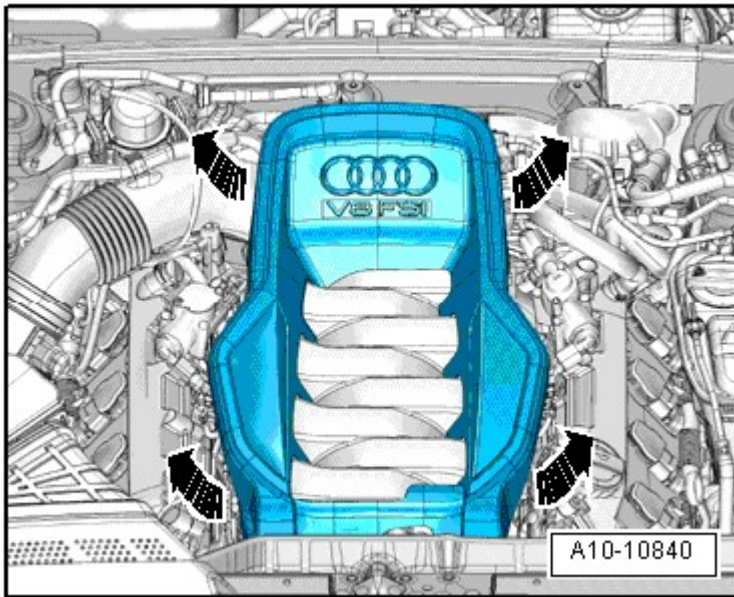


Fig. 5: Identifying Engine Cover
Courtesy of AUDI OF AMERICA, LLC

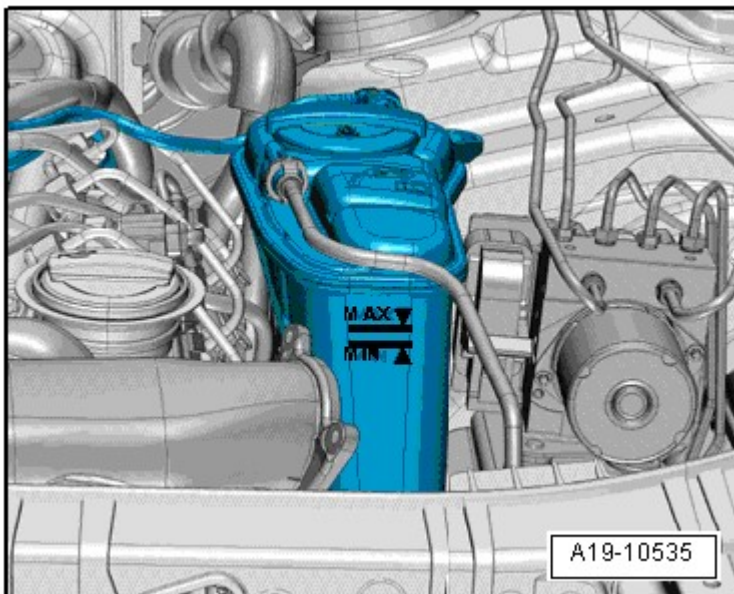


Fig. 6: Identifying Coolant Reservoir Marking
Courtesy of AUDI OF AMERICA, LLC

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

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

- Remove the left and right front wheels. Refer to **Removal and Installation** .
- Remove left and right front wheel housing liners. Refer to **Removal and Installation** .
- Remove the noise insulation -1 and 2-. Refer to **Description and Operation** .

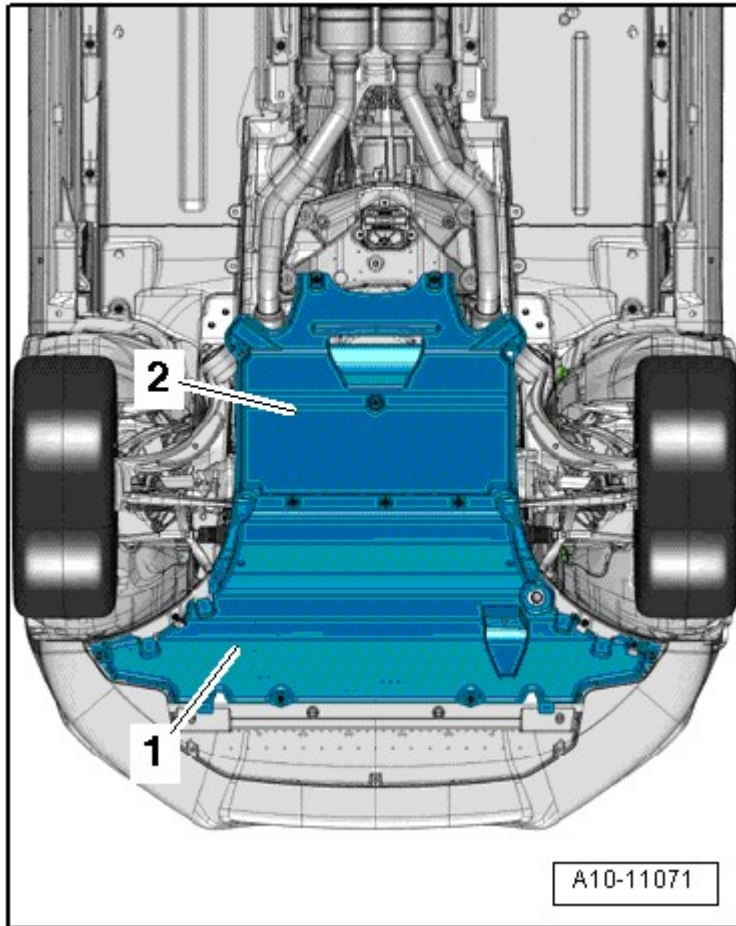


Fig. 7: Identifying Noise Insulation -1 & 2-
Courtesy of AUDI OF AMERICA, LLC

- Place VAS 6208 under engine.
- Remove the drain plug -arrow- on the front coolant hose and drain the coolant.

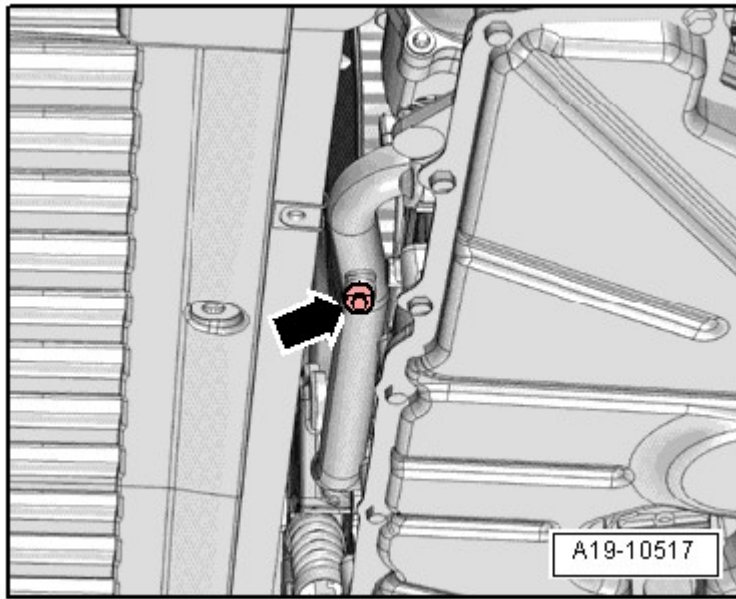


Fig. 8: Identifying Drain Plug -Arrow- On Front Coolant Hose
Courtesy of AUDI OF AMERICA, LLC

-- Remove the drain plug -arrow- on the map controlled engine cooling thermostat -F265- and drain the coolant.

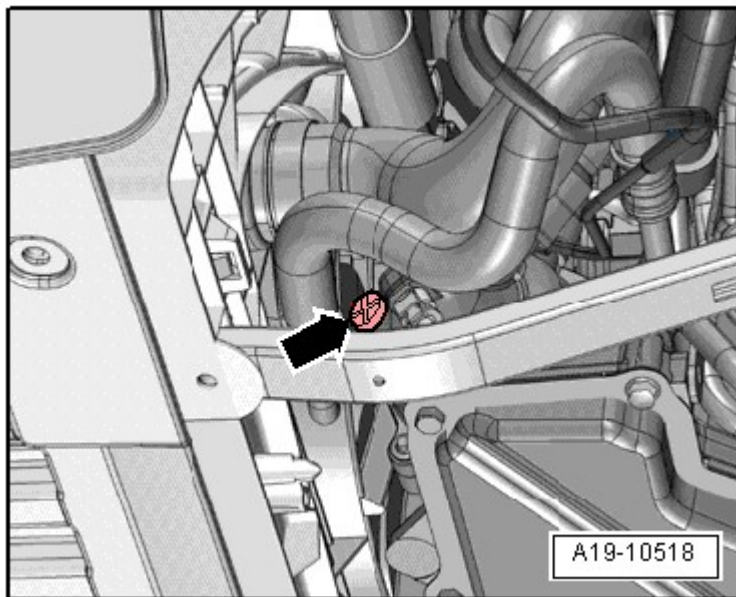


Fig. 9: Identifying Drain Plug -Arrow- On Map Controlled Engine Cooling Thermostat -F265-
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the coolant hose from the radiator, to do this, lift the retaining clip -2-.

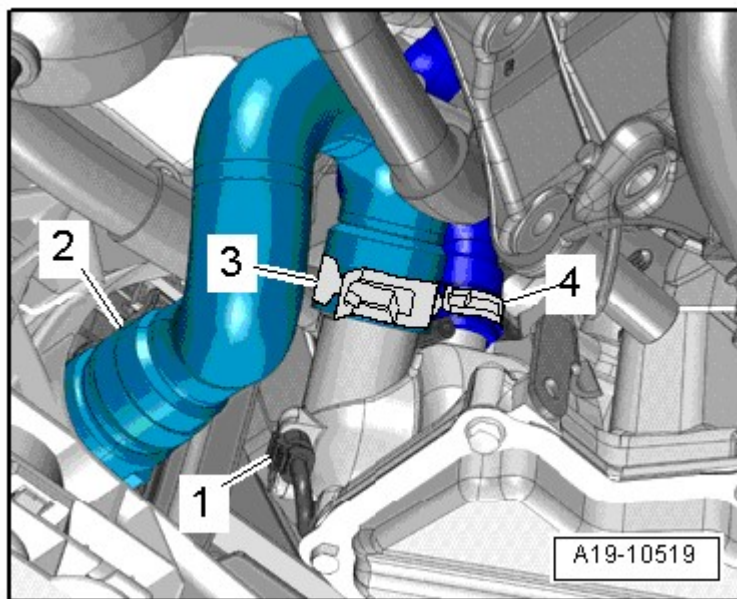


Fig. 10: Identifying Coolant Hose And Spring Clip
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1, 3 and 4-

-- Disconnect the vacuum hose -1- and free up the hydraulic hose -arrow- on the bracket.

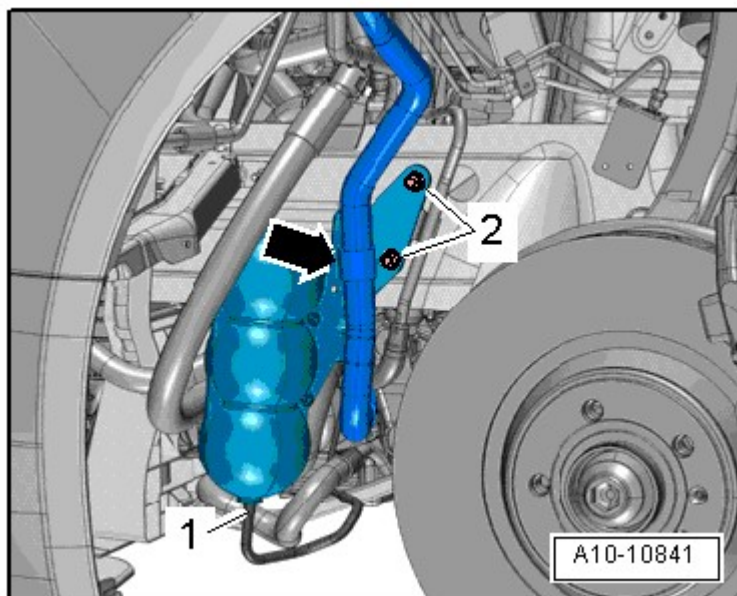


Fig. 11: Disconnecting Vacuum Hose & Lay Hydraulic Oil Hose To Side
Courtesy of AUDI OF AMERICA, LLC

-- Remove the nuts -2- and vacuum reservoir.

-- Place the V.A.G 1782 under the disconnection point.

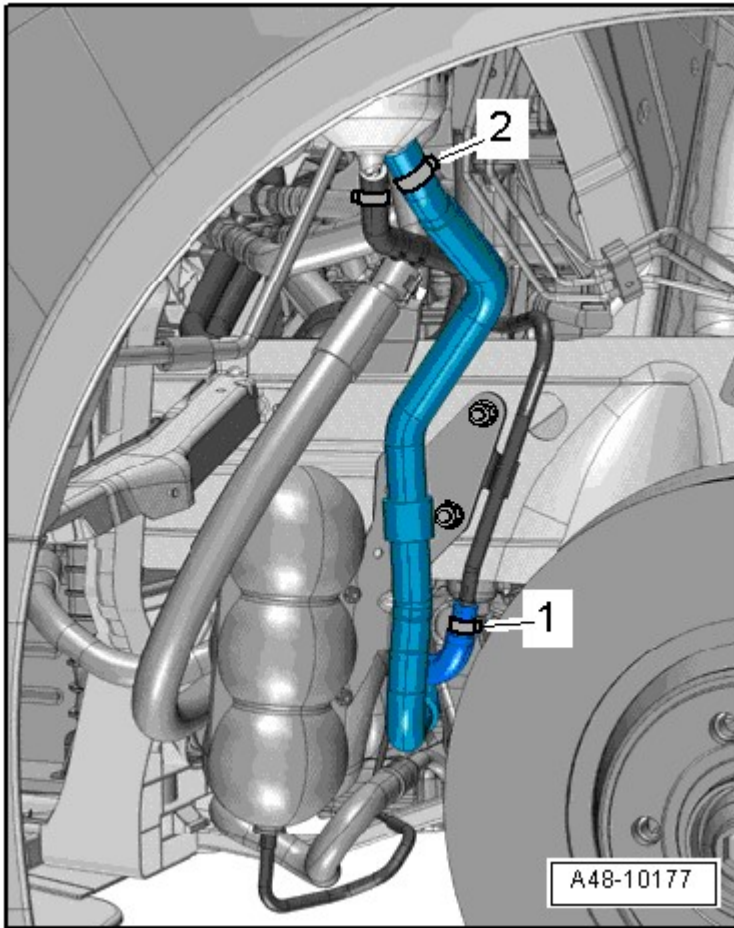


Fig. 12: Identifying Power Steering Hydraulic Oil Feed Line -2- & Return Line -1-
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the power steering hydraulic oil feed line -2- and return line -1-.

-- Seal any open lines and connections with a clean plug from the engine plug set VAS 6122.

NOTE: Observe the rules of cleanliness for working on automatic transmissions. Refer to General Information .

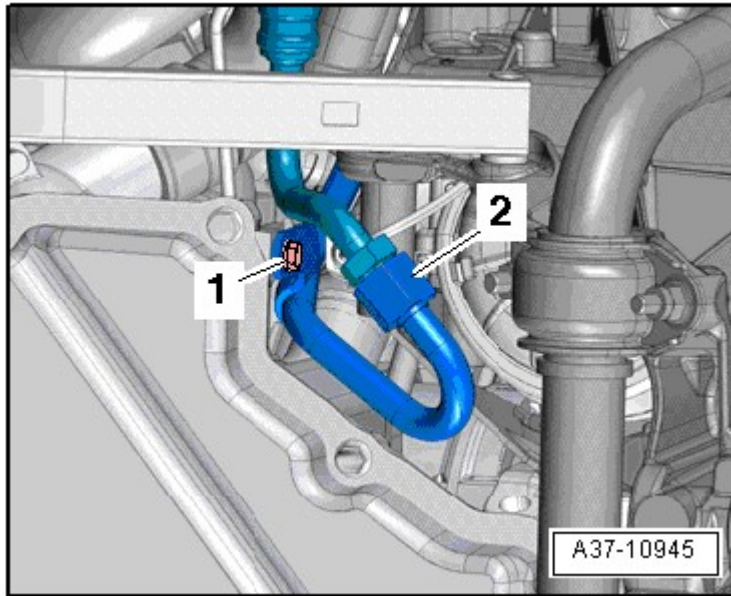


Fig. 13: Disconnecting ATF Line -2-
Courtesy of AUDI OF AMERICA, LLC

- Place the V.A.G 1782 under the disconnection point.
- Disconnect the ATF line -2-.
- Seal any open lines and connections with a clean plug from the VAS 6122.

NOTE: Ignore -1-.

CAUTION: Risk of damaging refrigerant lines and hoses.

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

- Remove the bolts -1 and 2-.

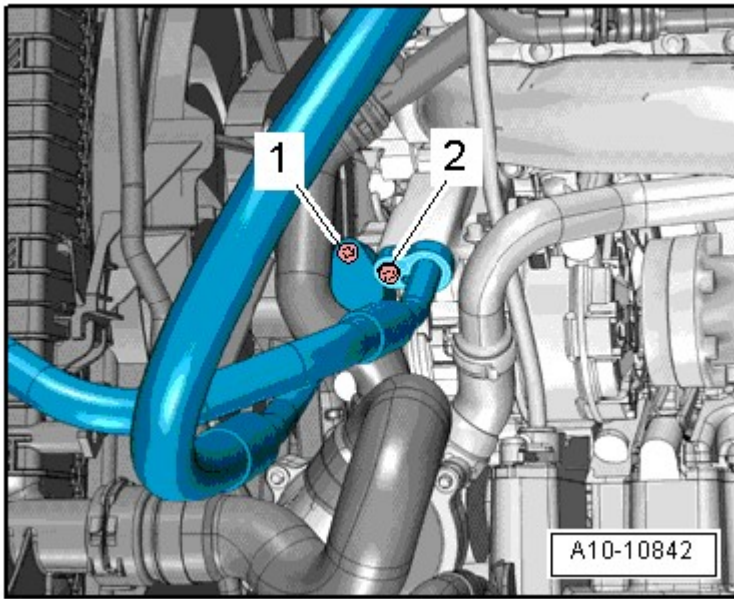


Fig. 14: Identifying Bolts & Refrigerant Lines To A/C Compressor
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the refrigerant lines from the compressor.
- Seal any open lines and connections with a clean plug from the VAS 6122.
- Remove the nut -arrow- on the right longitudinal member and free up the ground wires.

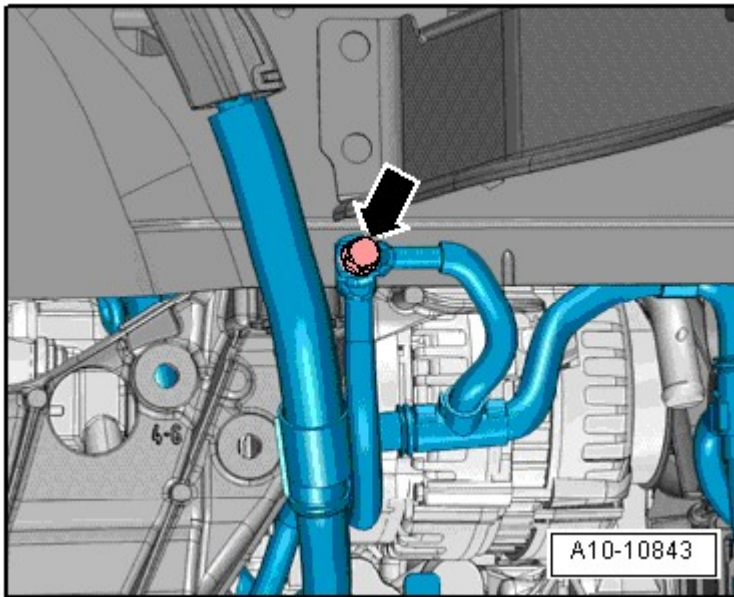
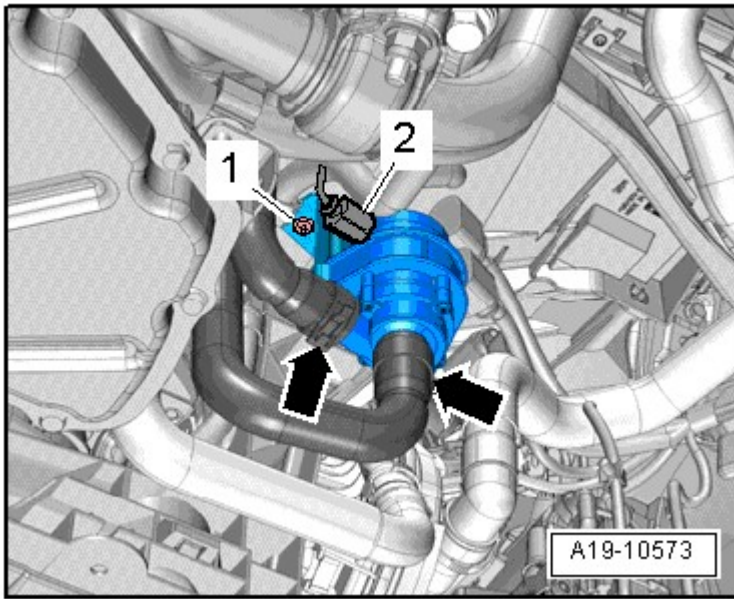


Fig. 15: Disconnecting Ground Wires -Arrow- From Right Longitudinal Member
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the connector -2-.



**Fig. 16: Removing/Installing Coolant Hoses From After-Run Coolant Pump -V51- -Arrows-
Courtesy of AUDI OF AMERICA, LLC**

-- Place VAS 6208 under engine.

-- Remove the coolant hoses from the after-run coolant pump -V51- -arrows-.

NOTE: Ignore -1-.

-- Disconnect the connector -3- on the secondary air injection (AIR) pump motor -Via-.

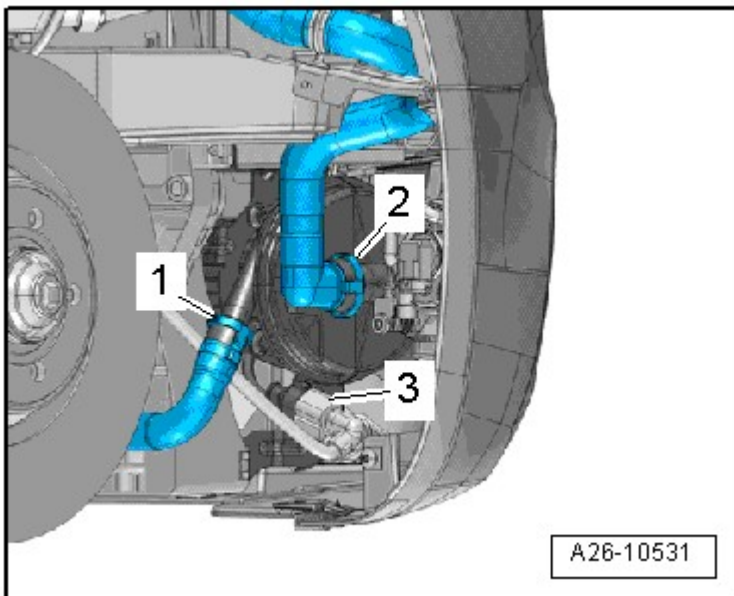


Fig. 17: Component Location Of Secondary Air Injection (AIR) Pump Motor -V101-

Courtesy of AUDI OF AMERICA, LLC

-- Remove the AIR hose -1- and free it up.

NOTE: Ignore -2-.

-- Disconnect the radiator fan electrical connectors -1 and 2-, to do this, push the clamp to the rear -arrow- and push the release down.

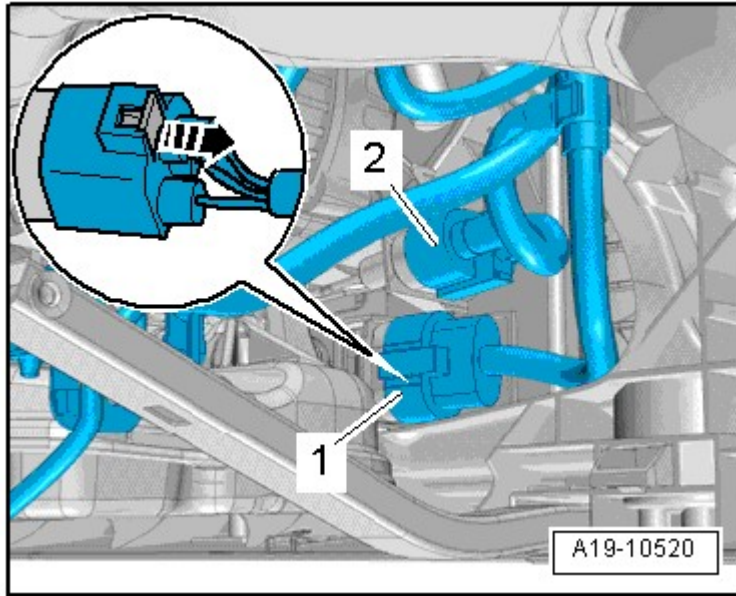


Fig. 18: Identifying Coolant Fan Electrical Connectors -1 And 2-
Courtesy of AUDI OF AMERICA, LLC

-- Free up the wiring harness.

-- Remove the left and right bolts -1- and nuts -3- and the lock carrier braces -2-.

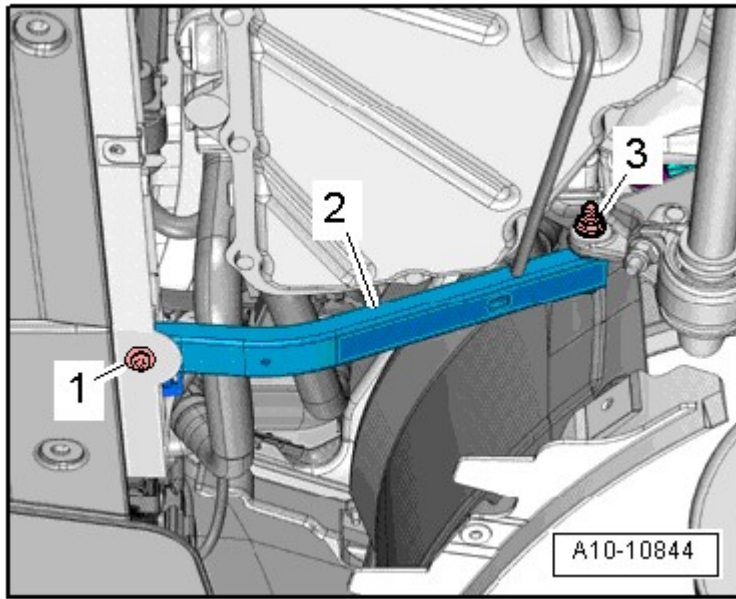


Fig. 19: Identifying Carrier Left Brace Components
Courtesy of AUDI OF AMERICA, LLC

WARNING: Risk of injury from fuel.

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

CAUTION: Follow the guidelines for cleanliness when working on the fuel supply system. Refer to **CLEAN WORKING CONDITIONS** .

-- Disconnect the fuel line -arrow-.

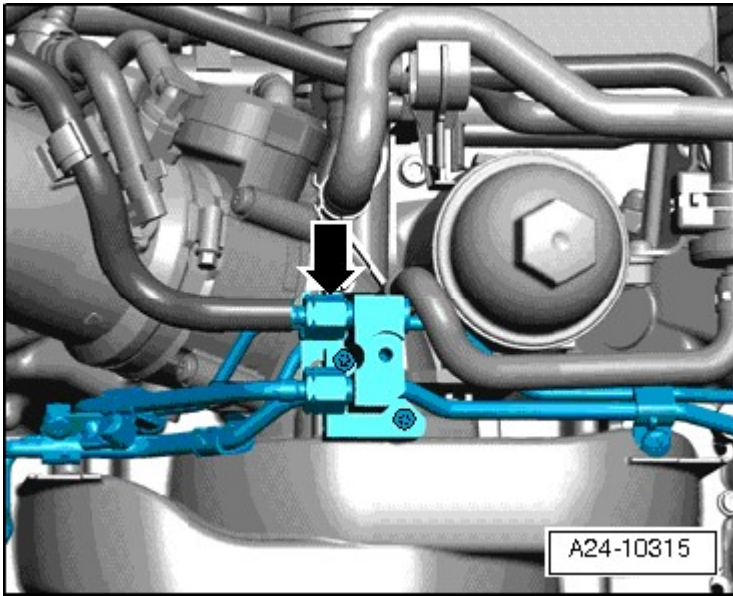


Fig. 20: Disconnecting Fuel Line

Courtesy of AUDI OF AMERICA, LLC

-- Free up the fuel line and the line to the Evaporative Emission (EVAP) canister on the air guide pipe.

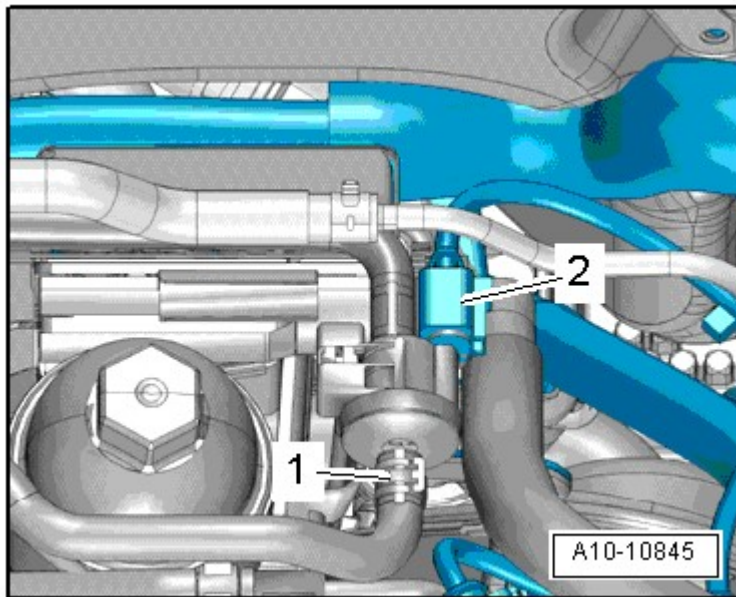


Fig. 21: Disconnecting Electrical Connector -2- On EVAP Canister Purge Regulator Valve 1 -N80- & Disconnect Vacuum Hose -1-

Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the electrical connector -2- on EVAP canister purge regulator valve 1 -N80- and disconnect the vacuum hose -1-.

-- Remove the EVAP canister purge regulator valve 1 from the bracket and lay aside with hose and fuel line

connected.

-- Disconnect the vacuum hose leading to the leak detection pump -V144- -arrow-.

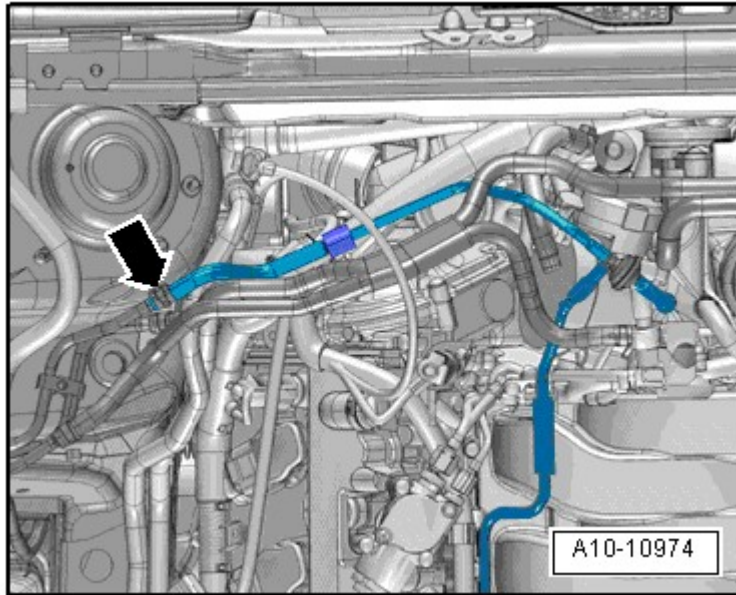


Fig. 22: Disconnecting Vacuum Hose Leading To Leak Detection Pump -V144- -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the air duct -arrows-.

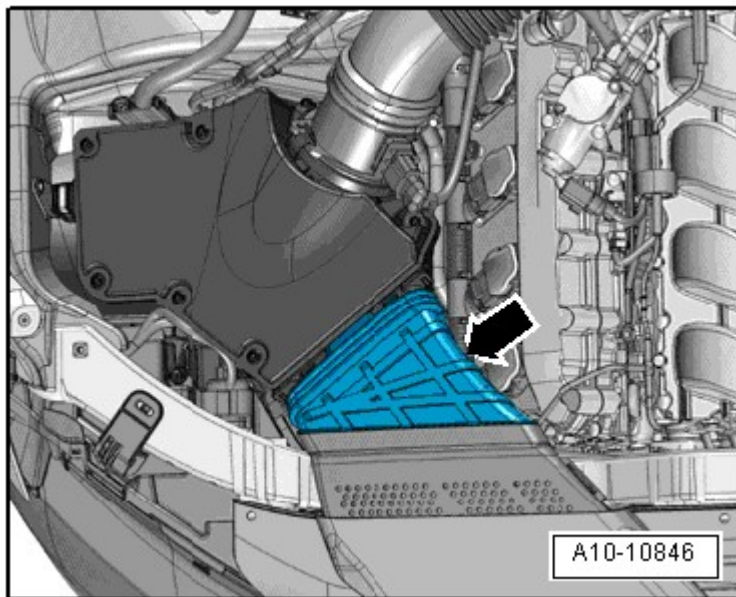


Fig. 23: Identifying Air Duct
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connector -1- from the Mass Airflow (MAF) sensor -G70-.

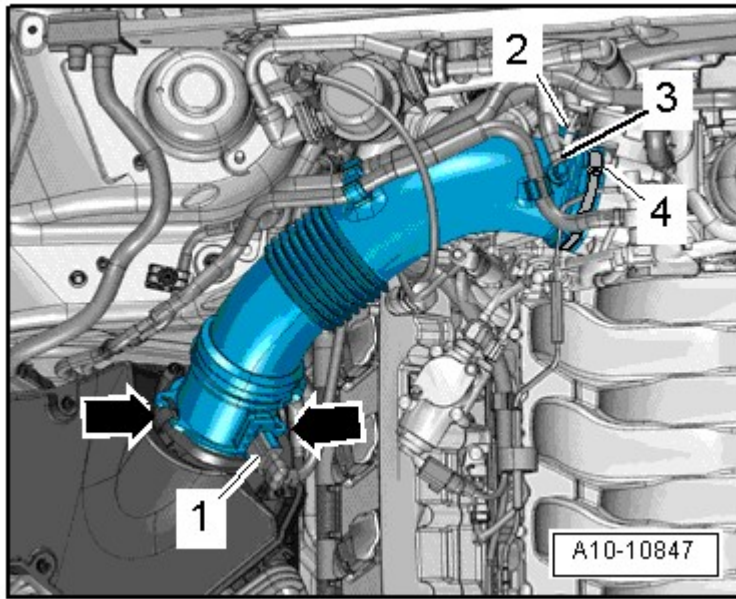


Fig. 24: Disconnecting Connector On Mass Airflow (MAF) Sensor
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the vacuum line -3- from the air guide pipe.

CAUTION: Risk of violating emissions legislation.

- **Do not open the hose connection -2- !**

-- Lay aside air guide pipe with connected crankcase ventilation hose -2- by loosening hose clamp -4- and opening clips -arrows-.

-- Disconnect the vacuum line -1-.

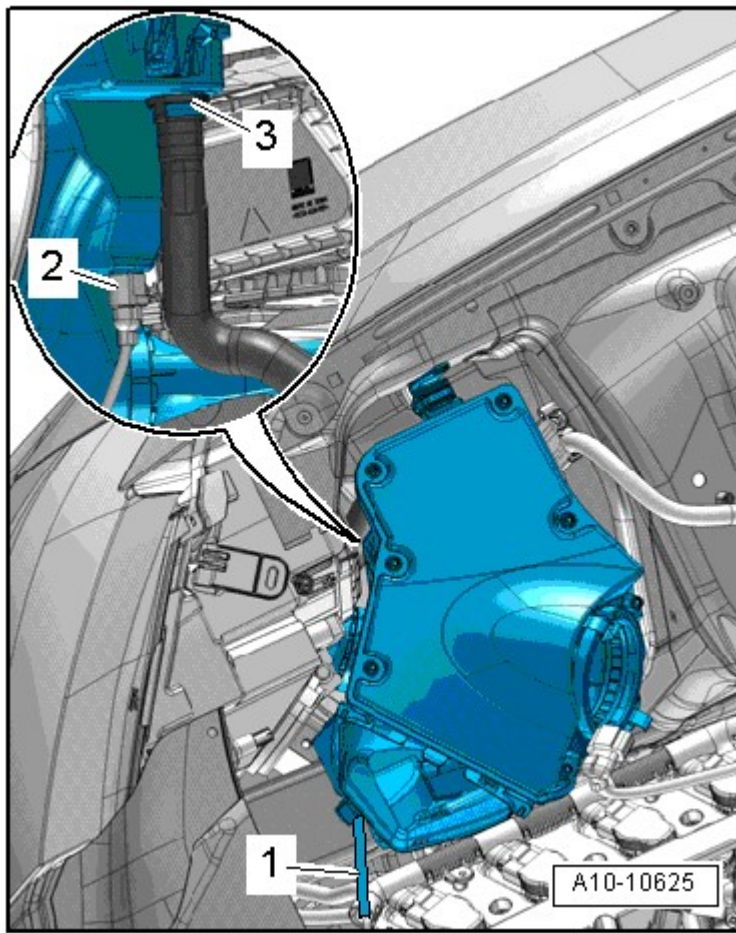


Fig. 25: Intake Air Switch-Over Valve -N335- -2-
Courtesy of AUDI OF AMERICA, LLC

- Remove the air filter housing and disconnect the electrical connector -2- on the rear side at the intake air switch-over valve -N335-.
- Remove hose -3- from the secondary air system.
- Disconnect the coolant hose by lifting the retaining clamps -2- and loosening the hose clamp -1- on the coolant tube.

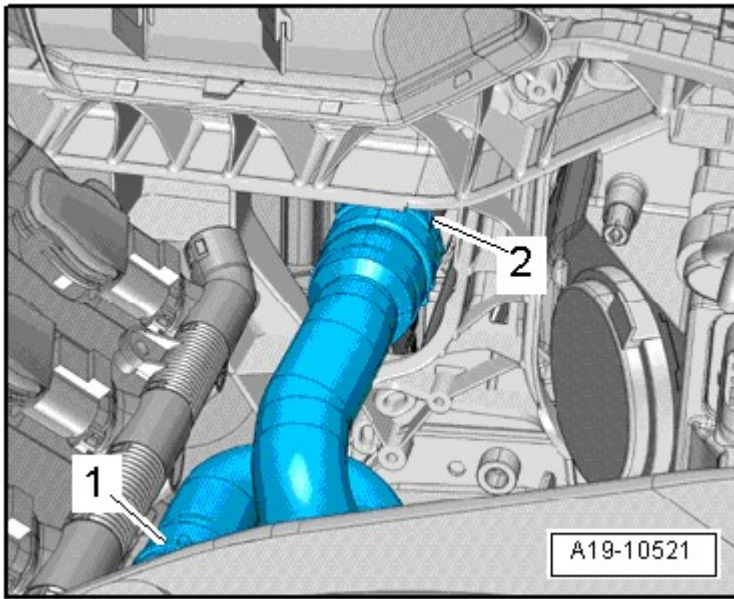


Fig. 26: Identifying Coolant Hose From Radiator And Right Coolant Pipe, Removal
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect electrical connector -1- for the brake system vacuum pump -V192- and free up the electrical wiring.

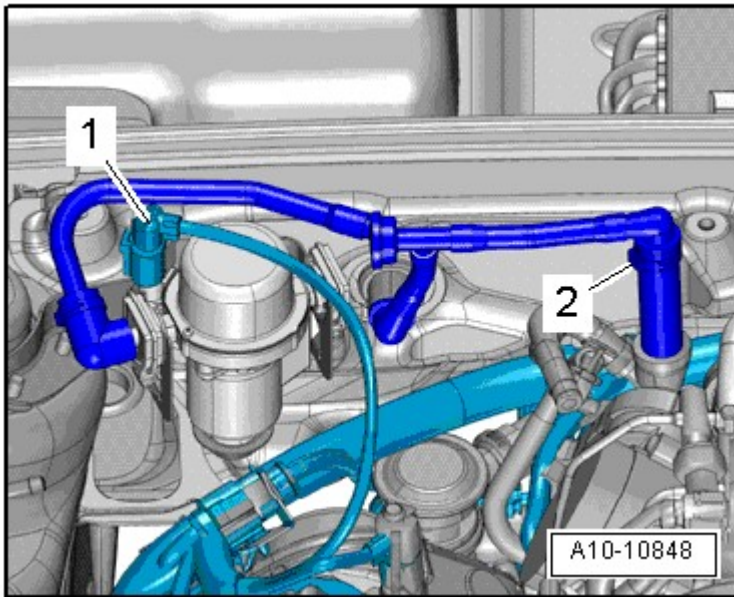


Fig. 27: Identifying Electrical Connector -1- & Vacuum Hose -2-
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the vacuum hose -2-.

-- Remove the coolant hoses -1 and 3- from the coolant overflow reservoir.

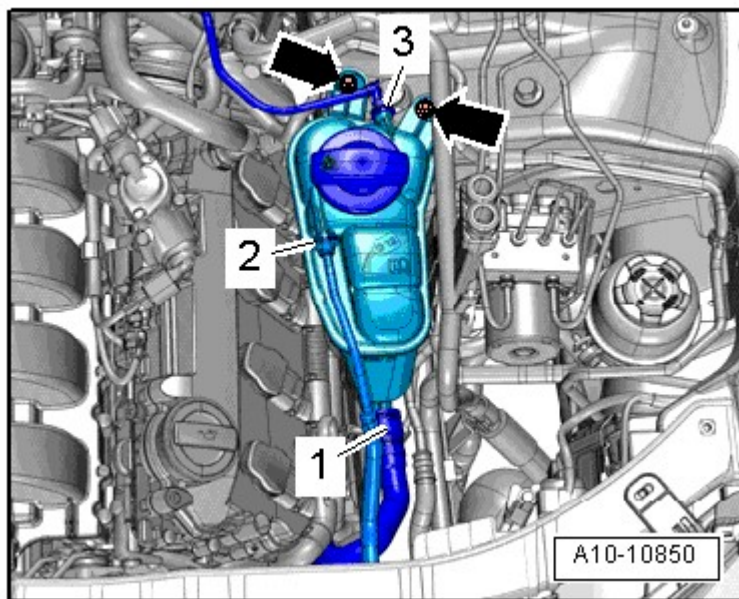


Fig. 28: Identifying Coolant Hose And Coolant Reservoir
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -2 and arrows-.

NOTE: Catch any leaking ATF with a cloth.

-- Disconnect the ATF line -arrow-.

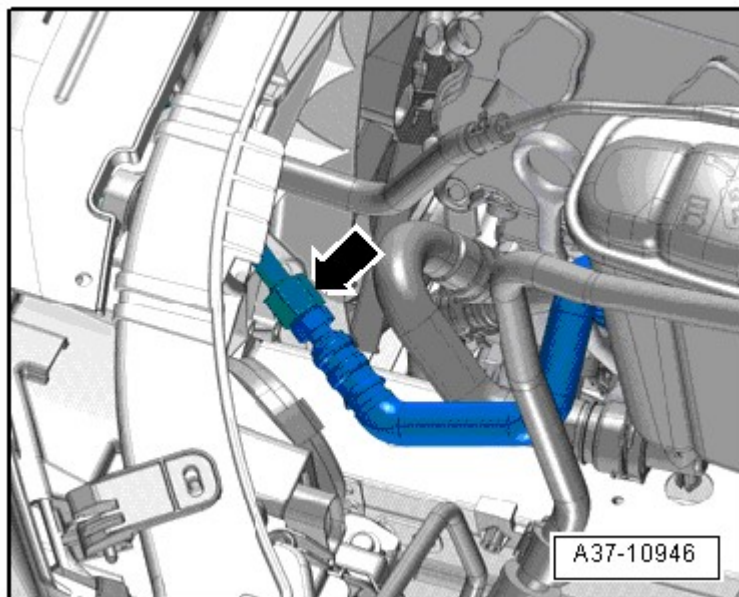


Fig. 29: Identifying ATF Line -Arrow-
Courtesy of AUDI OF AMERICA, LLC

- Seal any open lines and connections with a clean plug from the VAS 6122.
- Remove the seal -arrow-.

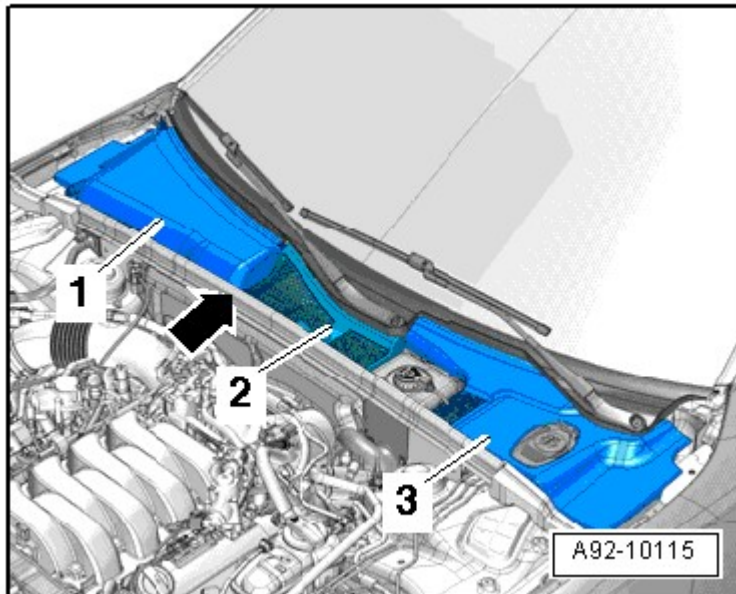


Fig. 30: Identifying Alarm Horn, Removal
Courtesy of AUDI OF AMERICA, LLC

- Remove the plenum chamber cover. Refer to **Removal and Installation** .
- Release the retainer -arrow A- and open the cover -arrow B-.

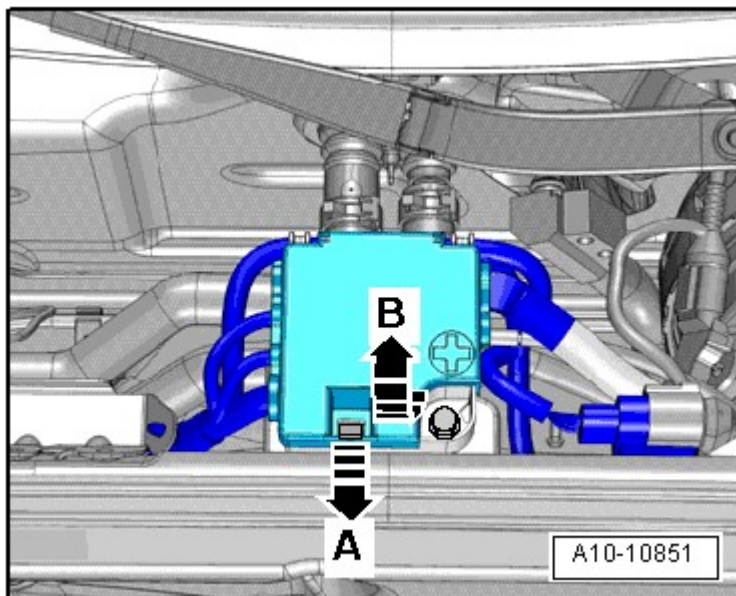


Fig. 31: Opening Terminal Box Cover
Courtesy of AUDI OF AMERICA, LLC

-- Remove the nuts -1 and 2- for the electrical wires.

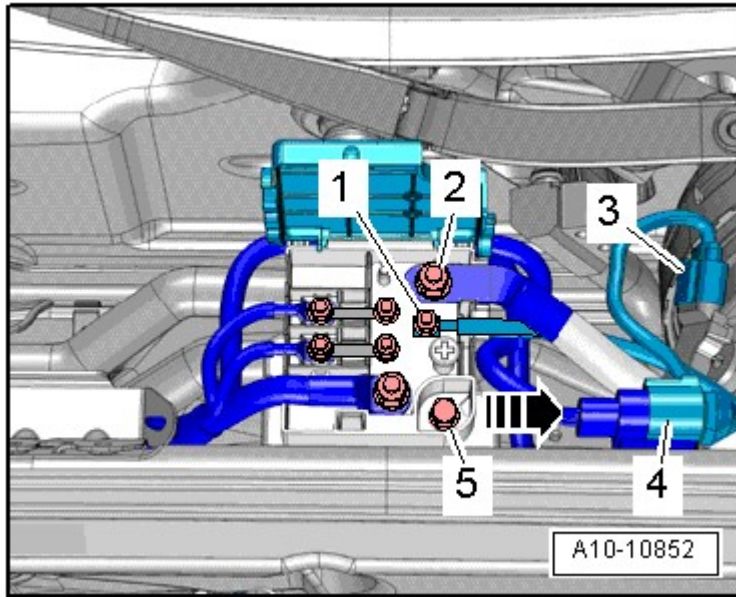


Fig. 32: Identifying Nuts, Bolts & Connectors

Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connectors -3 and 4-.

-- Remove the bolt -5- and the terminal 30 wire junction 2 -TV22- from the tower brace -arrow-.

-- Release the retainers from the wheel housing side using a 5.5 mm open end wrench -1- and remove the wiring bushing -2- upward.

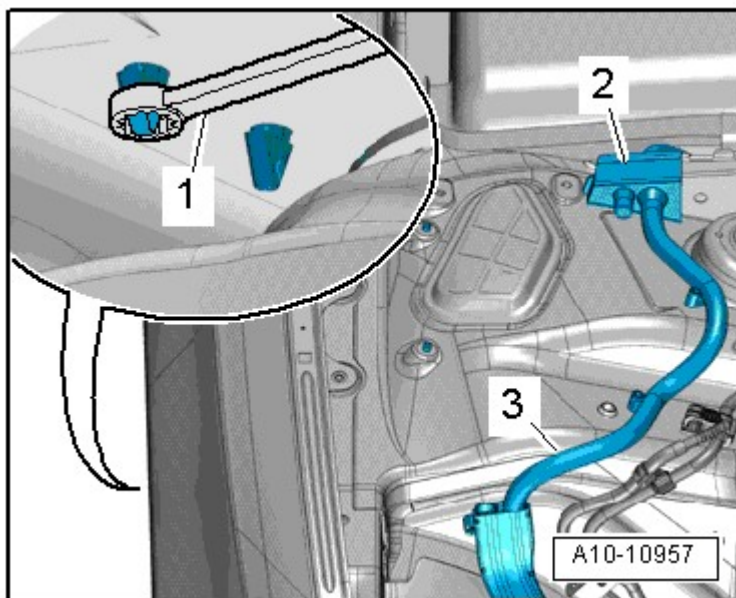


Fig. 33: Releasing Retainers From Wheel Housing Side Using A 5.5 Mm Open End Wrench

Courtesy of AUDI OF AMERICA, LLC

-- Free up the wiring harness -3- to the generator and starter using the 80 - 200.

-- Free up the wiring duct by releasing the retainer -arrow B- and pulling the duct forward -arrow A-.

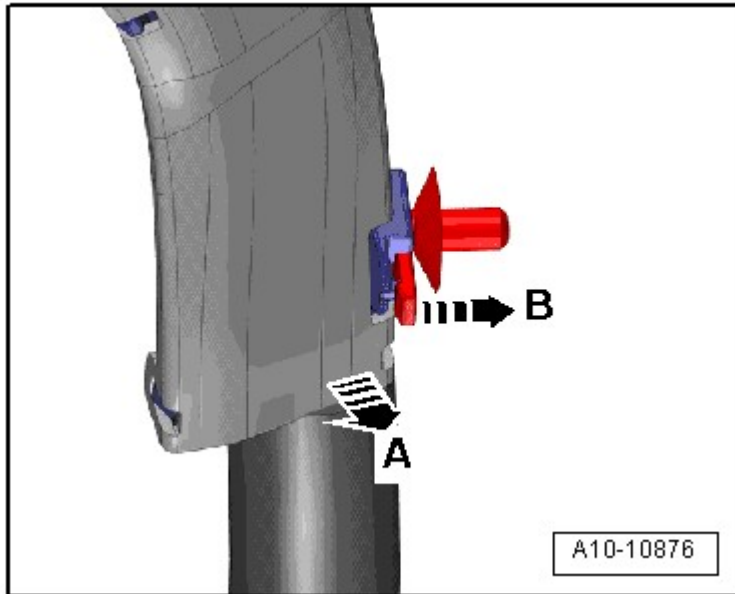


Fig. 34: Freeing Up Wiring Duct By Releasing Retainer
Courtesy of AUDI OF AMERICA, LLC

-- Remove the nut -1- and tilt the washer fluid filler neck upward -arrow A-.

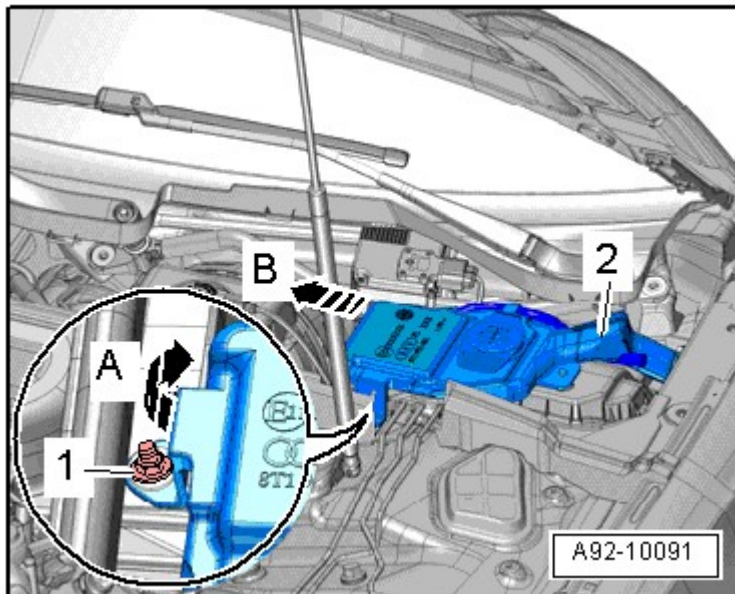


Fig. 35: Identifying Filler Neck With Filler Tube From Washer Fluid Reservoir And Opening In Body
Courtesy of AUDI OF AMERICA, LLC

-- Remove the filler neck -2- with the filler tube from the washer fluid reservoir and the opening in the body - arrow B-.

-- Remove the bolts -1- and nuts -2- and the tower brace -3-. The procedure for doing this depends on the version.

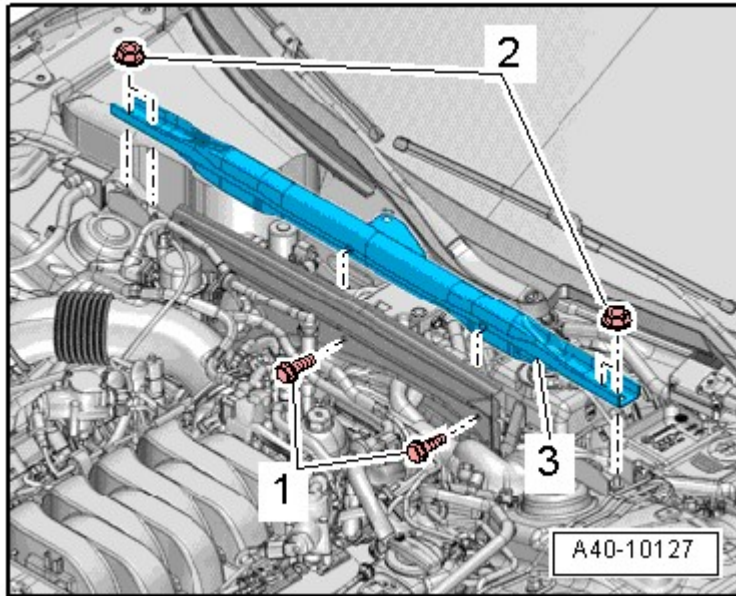


Fig. 36: Identifying Bolts, Nuts And Tower Brace
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and the engine compartment E-box cover.

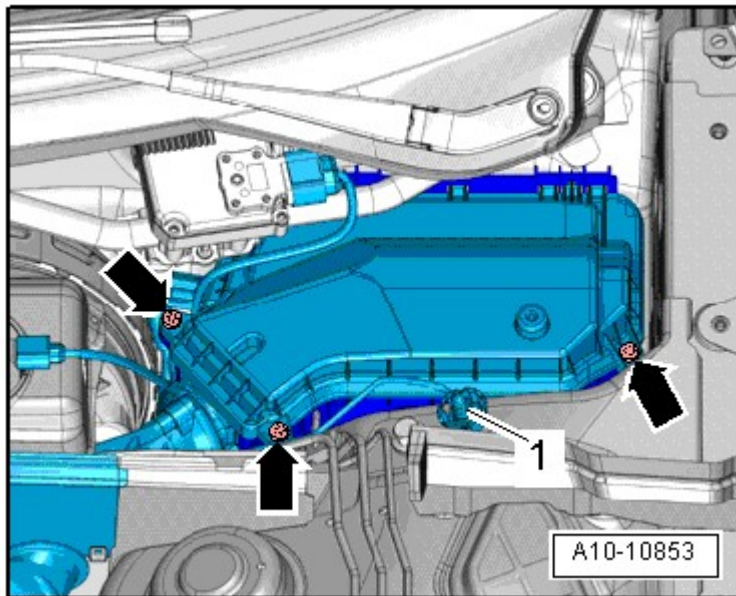


Fig. 37: Identifying E-Box Bolts & Cover
Courtesy of AUDI OF AMERICA, LLC

- Remove the nut -1- and free up the wire.
- Release the retainers -A arrows- and remove the engine control module -arrow B-.

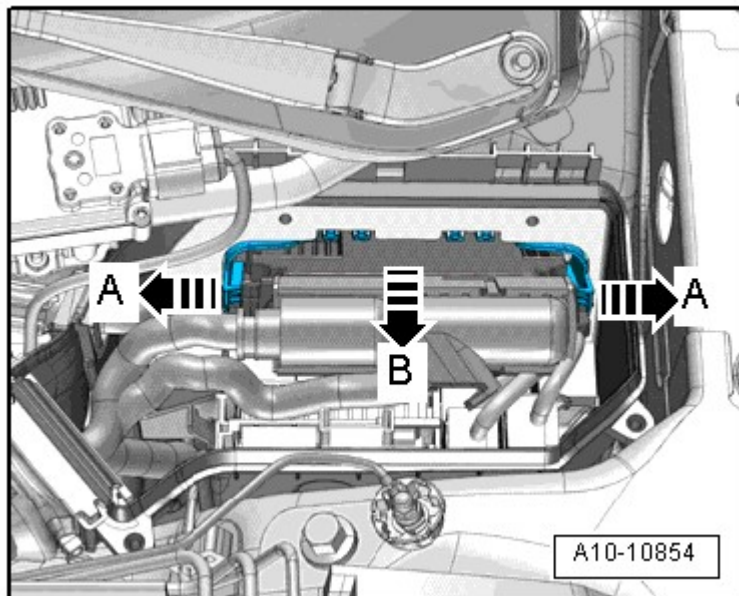


Fig. 38: Engine Control Module (ECM)
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the connector -2- if applicable.

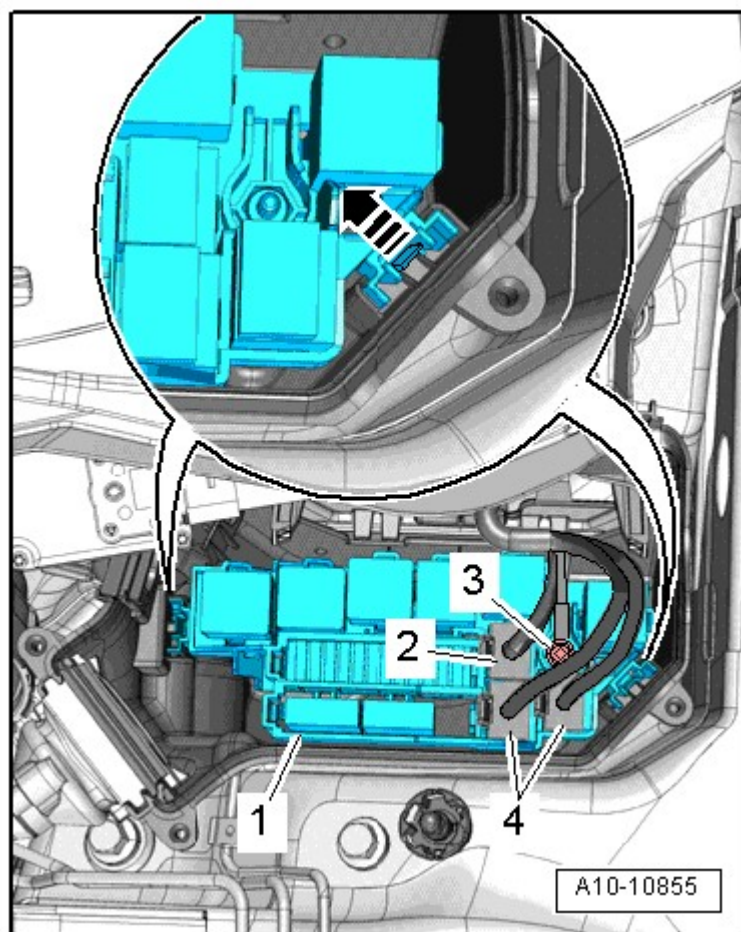


Fig. 39: Disconnecting Electrical Connectors

Courtesy of AUDI OF AMERICA, LLC

- Disconnect the electrical connectors -4- and remove the nut -3- for the electrical wire.
- Release the retainers -arrow- and remove the relay carrier with the fuse holder -1-.
- Disengage the engine wiring harness at the engine compartment E-box and free it up.
- Open the retainers -arrows A- and remove the harness opening -2- -arrow B-.

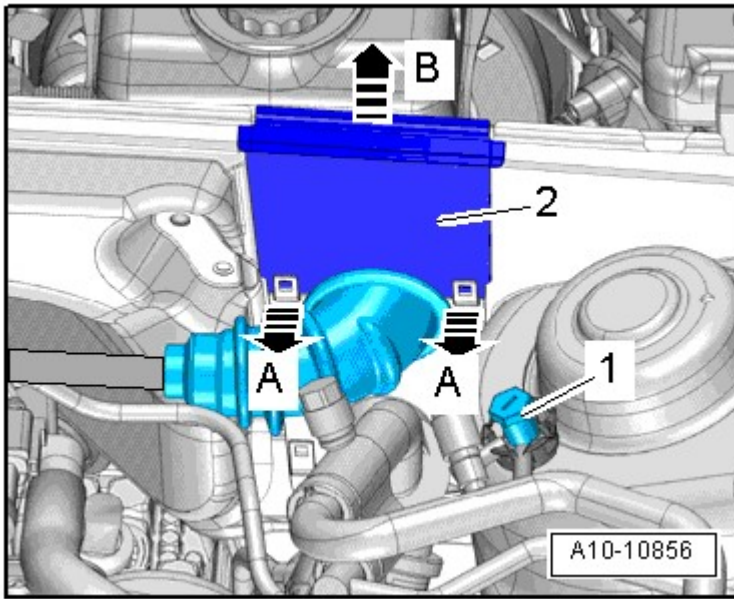


Fig. 40: Disengaging Catches -Arrows A- And Remove Upper Part Of Line Pass-Through -2- Upward - Arrow B-

Courtesy of AUDI OF AMERICA, LLC

- Remove the ground pin -1- and free up the ground wire.
- Lay the wiring harness on the engine and secure the engine control module so that it cannot fall.
- Mark and remove the coolant hoses -1 and 2- for re-installing.

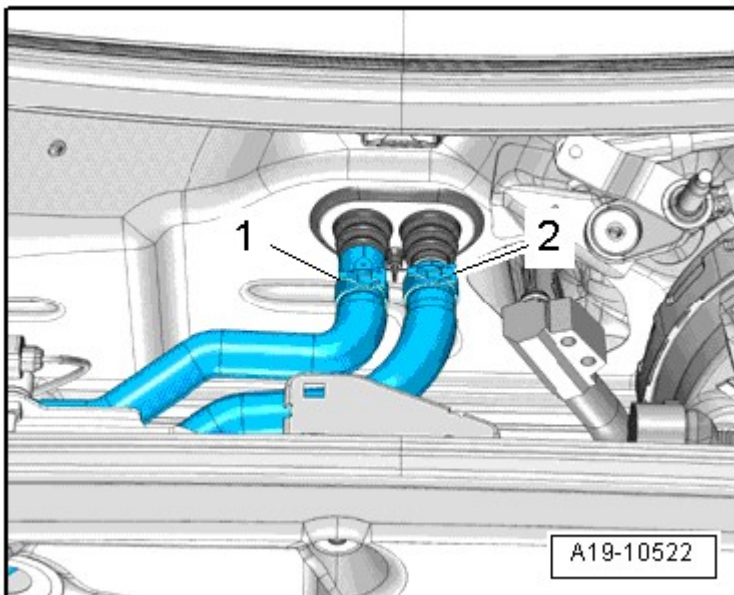


Fig. 41: Identifying Clamp -2- And Remove Coolant Hose

Courtesy of AUDI OF AMERICA, LLC

- Press the coolant hoses with hose guide in the engine compartment.
- Disconnect the electrical connectors -arrow- at the left and right on the front speed sensors.

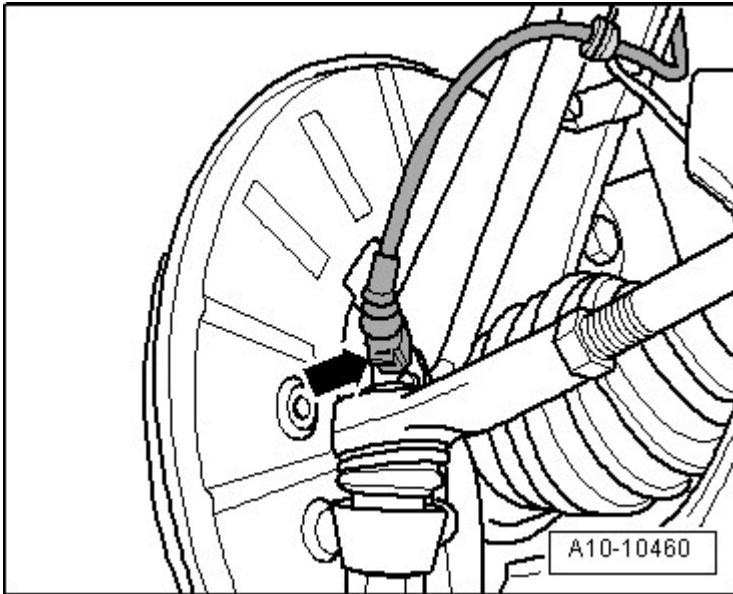


Fig. 42: Identifying Speed Sensor Connector
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the connector -1- headlamp beam control sensor 1 -G233- electrical sensor -arrow- and free up electrical wiring.

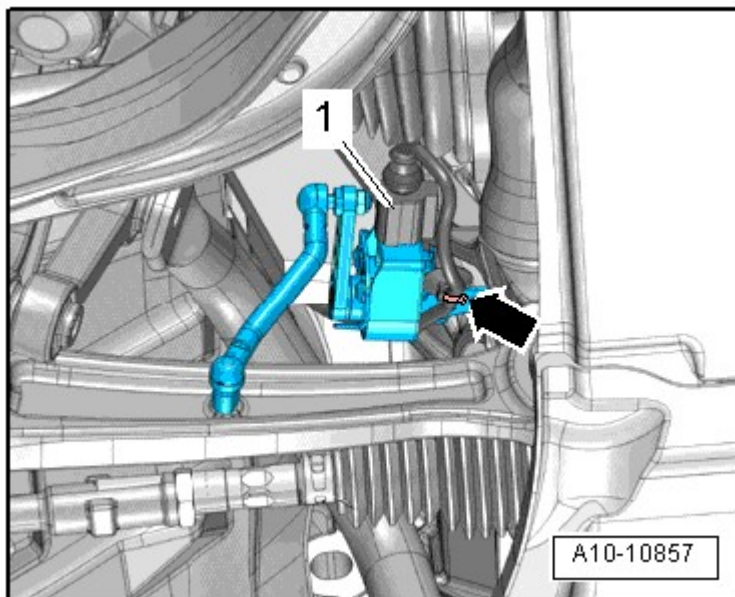


Fig. 43: Disconnecting Electrical Connector On Left Front Level Control System Sensor
Courtesy of AUDI OF AMERICA, LLC

-- Free up the electrical connector -2- on the bracket by pulling the retainer back -arrow A- and turning the connector approximately 90° in the direction of -arrow B-.

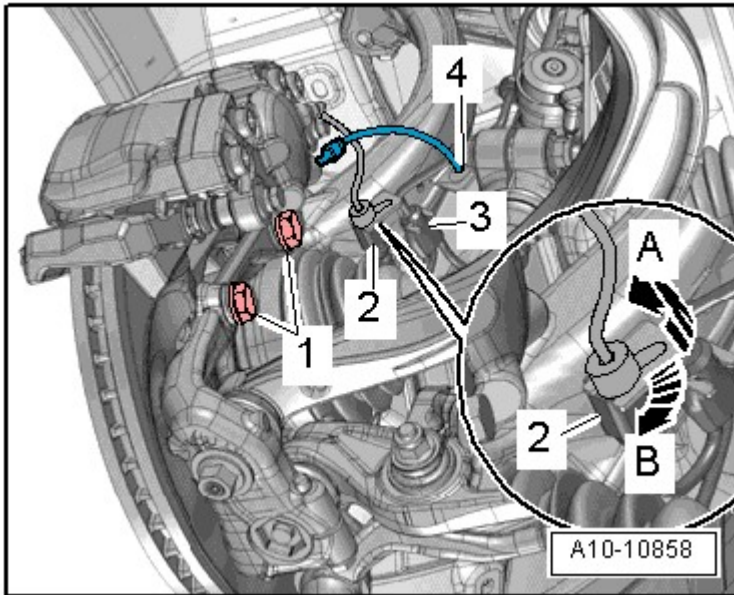


Fig. 44: Freeing Up Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

-- Free up the electrical wiring -3- and brake line -4- on the bracket.

-- Remove the bolts -1- and secure the brake caliper, with the brake line still connected, inside the wheel housing using wire.

CAUTION: Risk of damaging brake pistons.

- Do not operate the brake pedal with brake caliper removed.

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

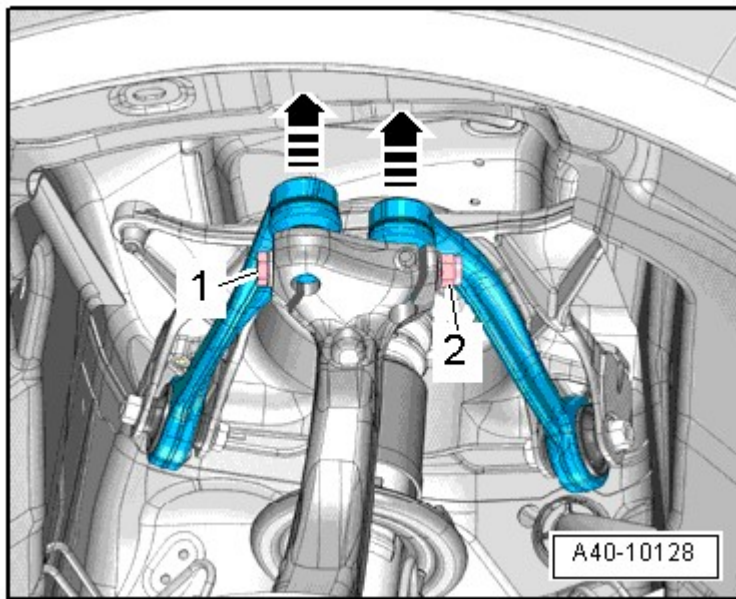


Fig. 45: Identifying Nut And Bolt
Courtesy of AUDI OF AMERICA, LLC

- Remove the upper control arm upward from the wheel bearing housing -arrows-.
- Repeat the procedure on the other side of the vehicle.
- Remove the left and right stabilizer bar bolt -1-.

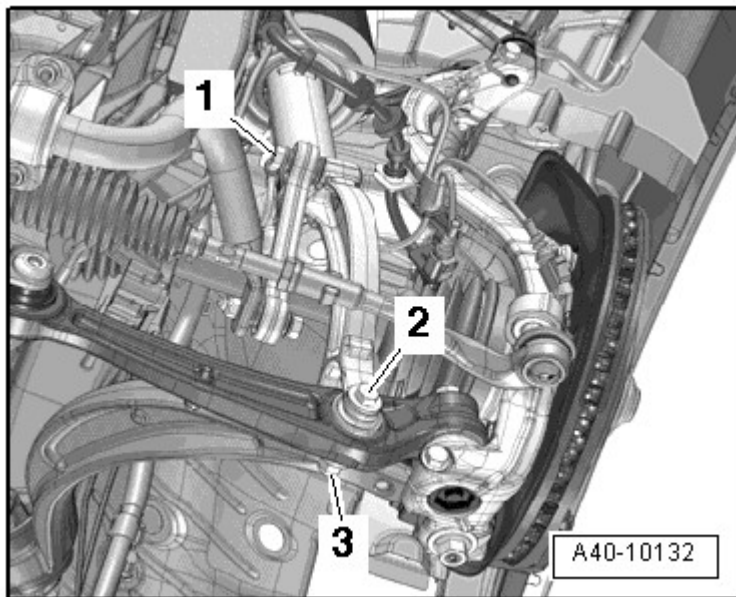


Fig. 46: Identifying Left And Right Stabilizer Bar Bolt
Courtesy of AUDI OF AMERICA, LLC

- Remove the left and right nuts -3-.

NOTE: The bolt -2- will be removed later.

CAUTION: The suspension components could be damaged.

- Do not rest the vehicle on its wheels if the subframe mount, the steering gear or the subframe crossbrace are not installed correctly.
- Do not support the vehicle on the subframe or the subframe crossbrace (for example by a floor jack or similar device).

-- Remove the subframe crossbrace. Refer to Removal and Installation .

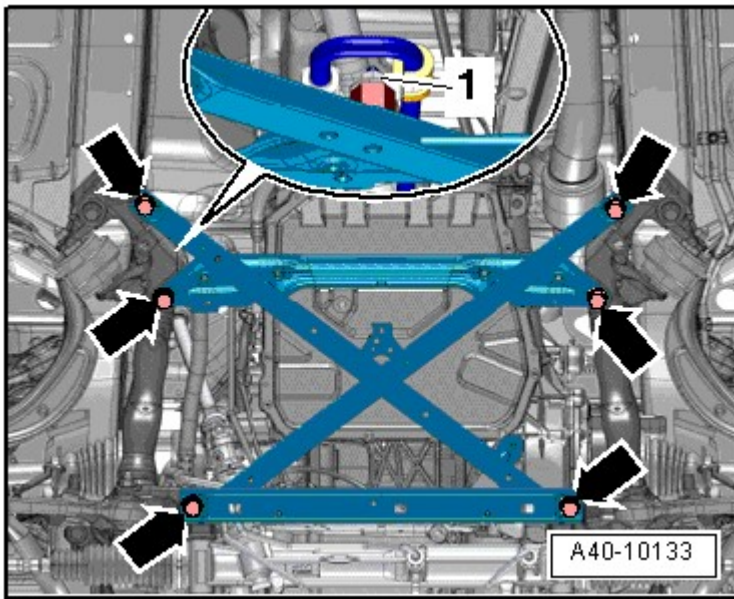


Fig. 47: Locating Power Steering Hydraulic Line
Courtesy of AUDI OF AMERICA, LLC

-- Remove the steering intermediate shaft from the steering gear push them upward. Refer to Removal and Installation .

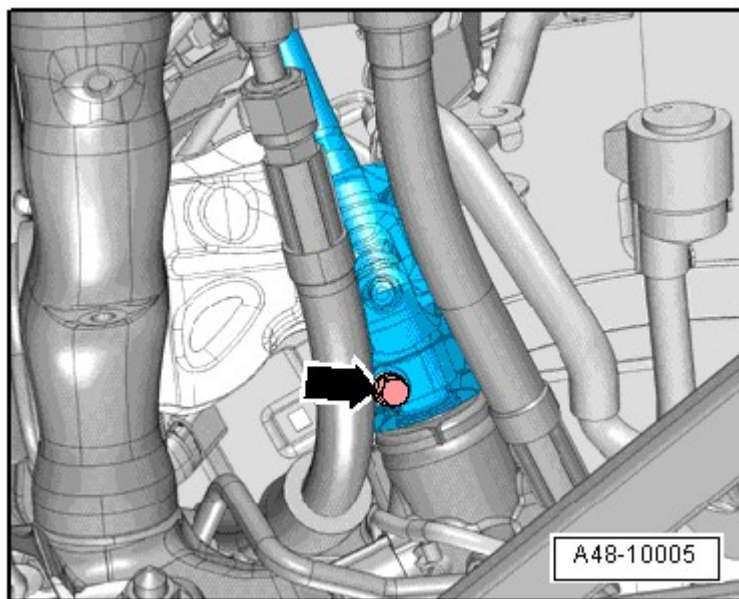


Fig. 48: Locating Universal Joint Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and the front crossmember, if applicable.

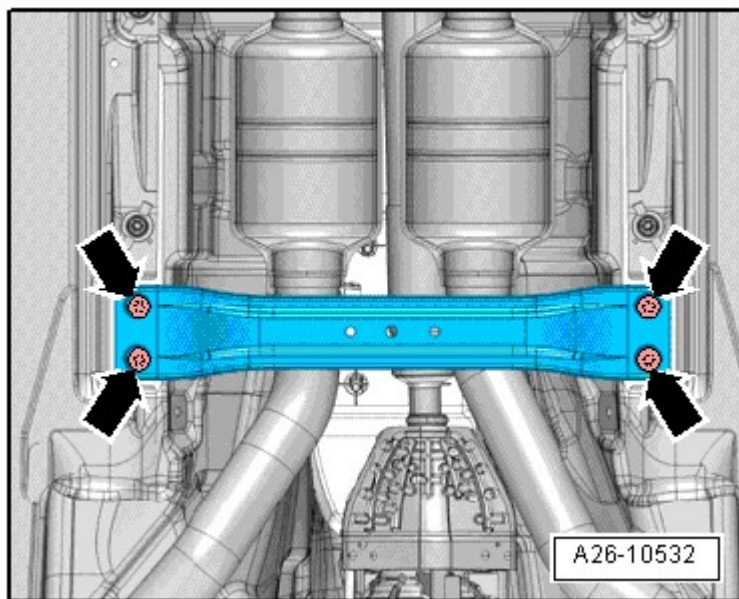


Fig. 49: Identifying Bolts And Front Crossmember
Courtesy of AUDI OF AMERICA, LLC

-- Remove the left front muffler nuts -arrows-.

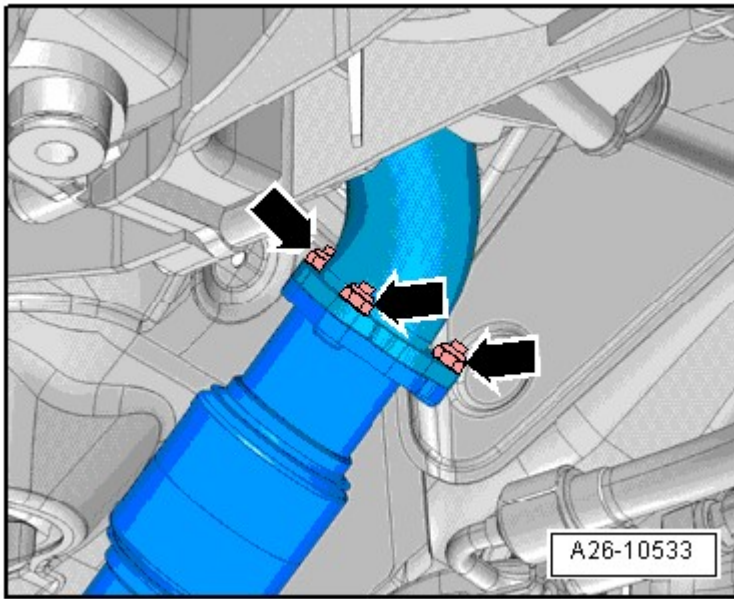


Fig. 50: Identifying Left Front Muffler Nuts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the right front muffler nuts -arrows-.

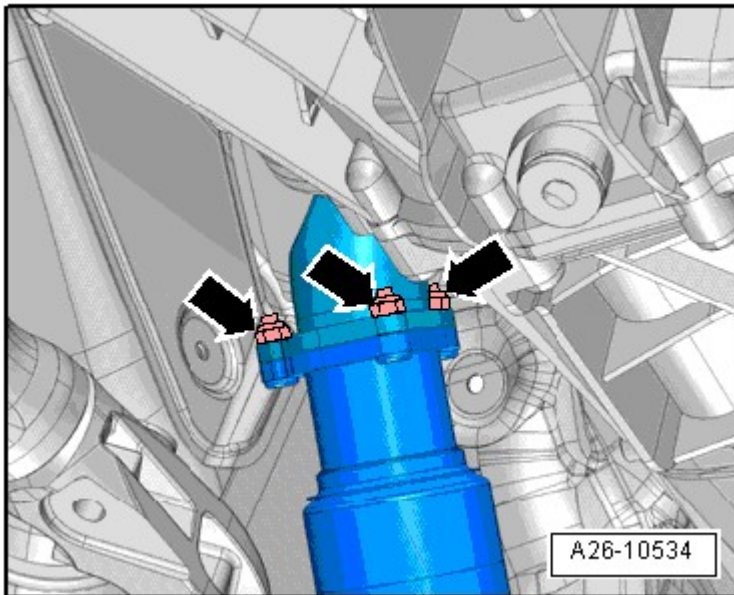


Fig. 51: Identifying Right Front Muffler Nuts
Courtesy of AUDI OF AMERICA, LLC

CAUTION: The decoupling elements in the front muffler could be damaged.

- Do not bend decoupling elements in front muffler by more than 10°.

-- Loosen the clamping sleeves -1 and 2-, slide them back and remove the left and right front mufflers.

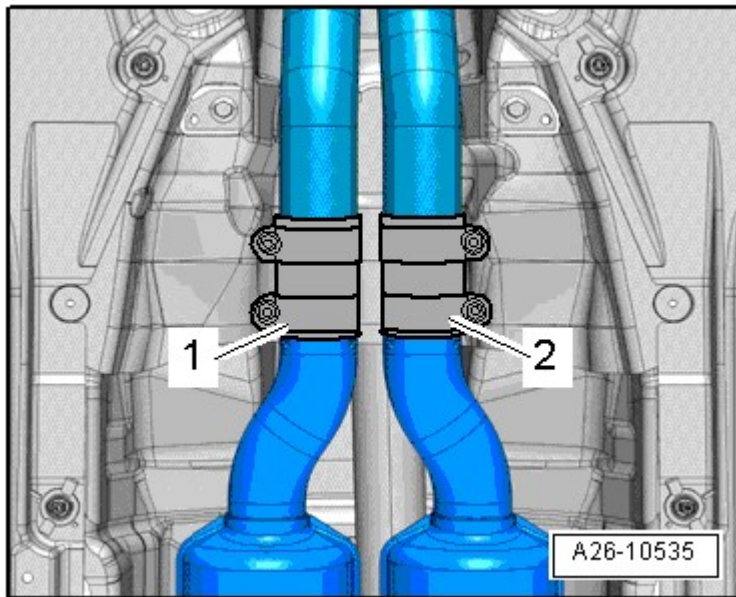


Fig. 52: Identifying Bolts Vehicles With Dual Exhaust System
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and the driveshaft heat shield -1-.

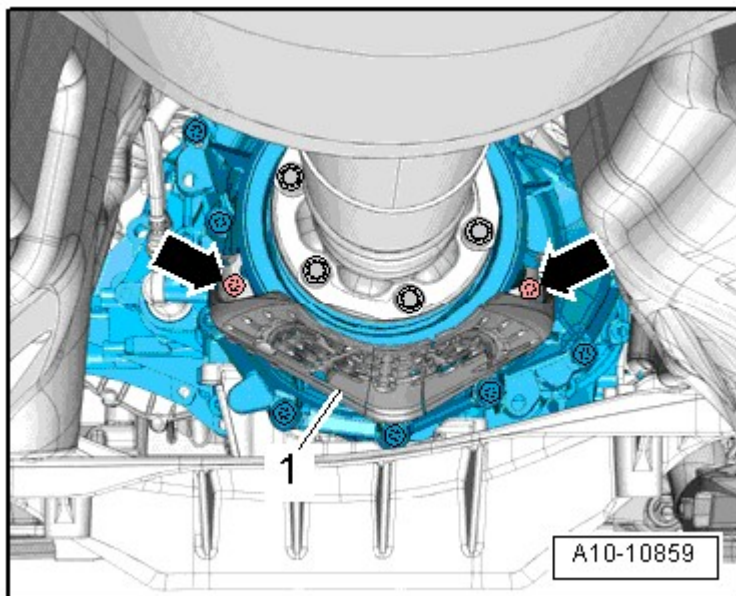


Fig. 53: Driveshaft Heat Shield - Tightening Specification
Courtesy of AUDI OF AMERICA, LLC

-- Remove the driveshaft from the transmission. Refer to **Removal and Installation** .

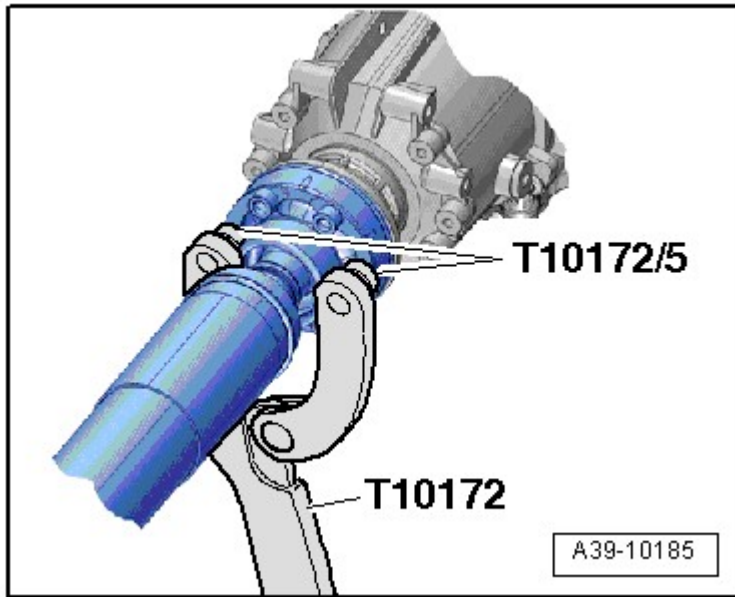


Fig. 54: Counterholding Driveshaft Using T10172 And T10172/5
Courtesy of AUDI OF AMERICA, LLC

- Slide the driveshaft toward the rear final drive; the CV joints can move axially.
- Secure the driveshaft to the side.
- Remove the ball socket -1- on the selector lever cable from the selector shaft lever using the 80 - 200.

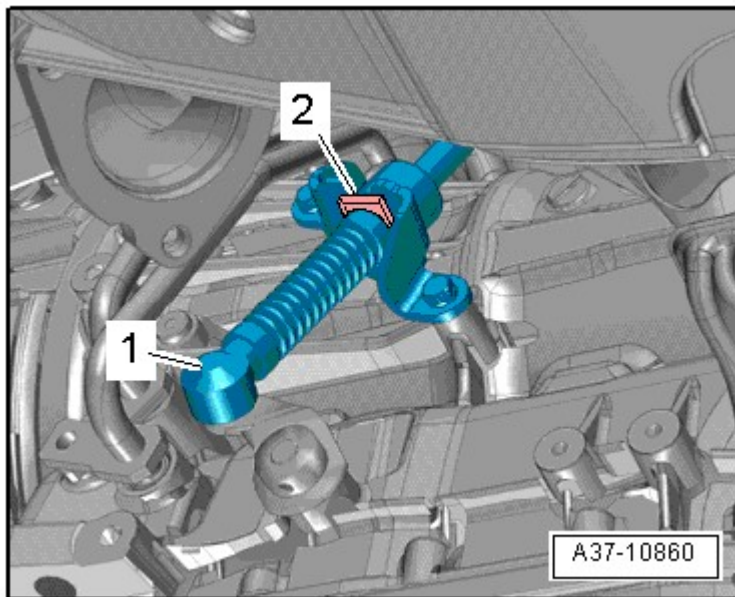


Fig. 55: Identifying Selector Lever Cable
Courtesy of AUDI OF AMERICA, LLC

- Press the securing clips -2- off and remove the selector lever cable from the transmission.

2009 Audi S5 Quattro

ENGINE 4.2 Liter - Engine Assembly - Engine Code(s): CAUA (Coupe)

NOTE: Do not bend or kink the selector lever cable.

Prepare Scissor Lift Platform:

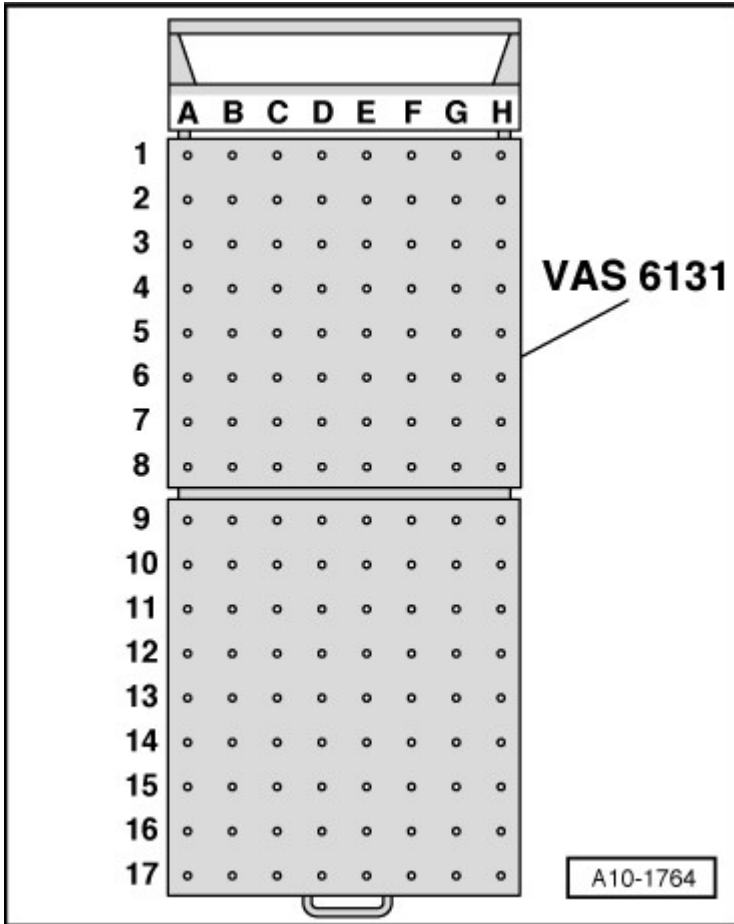


Fig. 56: Identifying Scissor Lift Platform VAS 6131
Courtesy of AUDI OF AMERICA, LLC

-- Equip the VAS 6131 A with the VAS 6131/10 and VAS 6131/13 as follows:

Platform Coordinates	Parts from VAS 6131/10 and VAS 6131/13			
B4	/13-4	/10-4	/10-5	/13-1
G4	/13-4	/10-4	/10-5	/13-1
B6	/10-1	/10-2	/10-5	/10-11
G6	/10-1	/10-2	/10-5	/10-11
A8+C8	/13-6			/13-2
F8+H8	/13-6			/13-2
C14	/10-1	/10-4	/10-5	/10-7
F14	/10-1	/10-4	/10-5	/11-1

-- Next secure mounting elements to scissor lift table by hand.

-- Position the VAS 6131 A horizontally.

- Note the bubble level (sight glass) on support platform.

-- Move the VAS 6131 A under the engine/transmission subassembly.

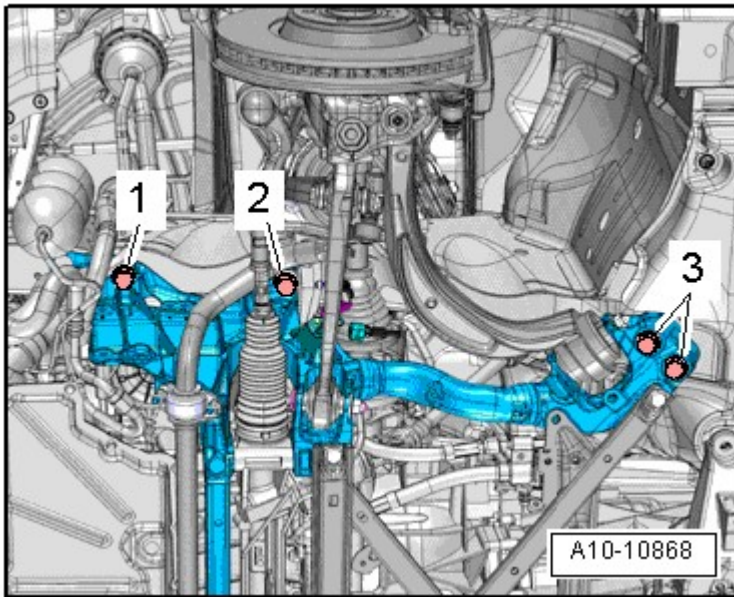


Fig. 57: Identifying Subframe Bolts (Tighten To Specifications)

Courtesy of AUDI OF AMERICA, LLC

WARNING: The subframe could cause an accident if it is not secured.

- Do not loosen the subframe bolts -2 and 3-.

-- Remove the left and right subframe bolts -1-.

-- Attach the mounting elements from the VAS 6131/10 and VAS 6131/13 at the left and right front of the subframe as shown in the illustration.

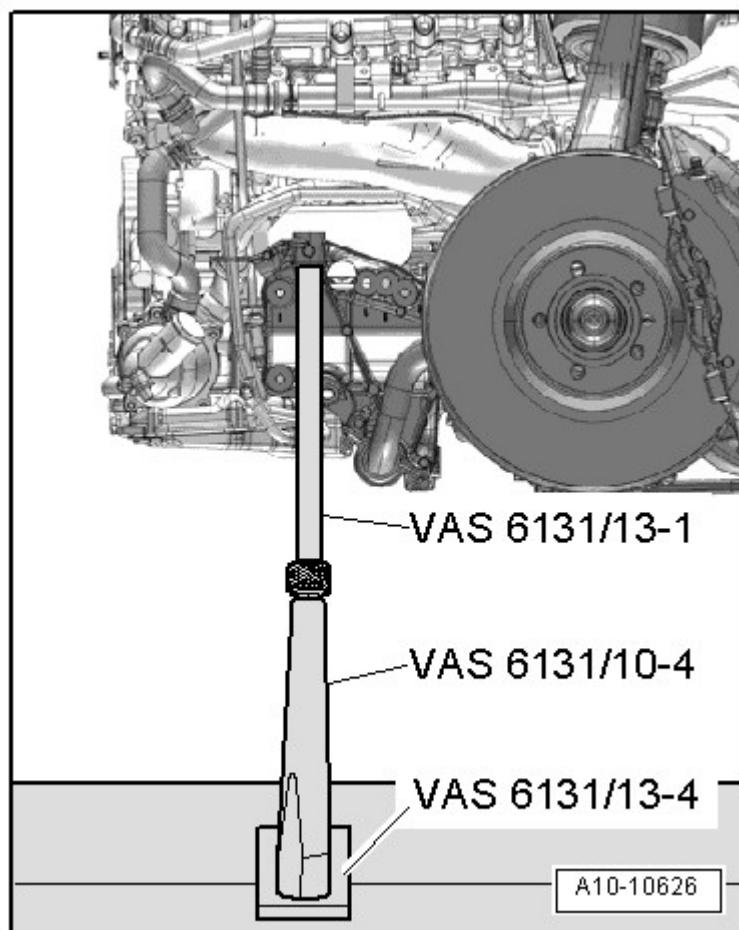


Fig. 58: Attaching At Left And Right Front Of Subframe
Courtesy of AUDI OF AMERICA, LLC

-- Ensure threaded spindles are completely installed.

-- Attach the mounting elements from the VAS 6131/10 at the left and right rear on the subframe crossbrace front connecting points as shown in the illustration.

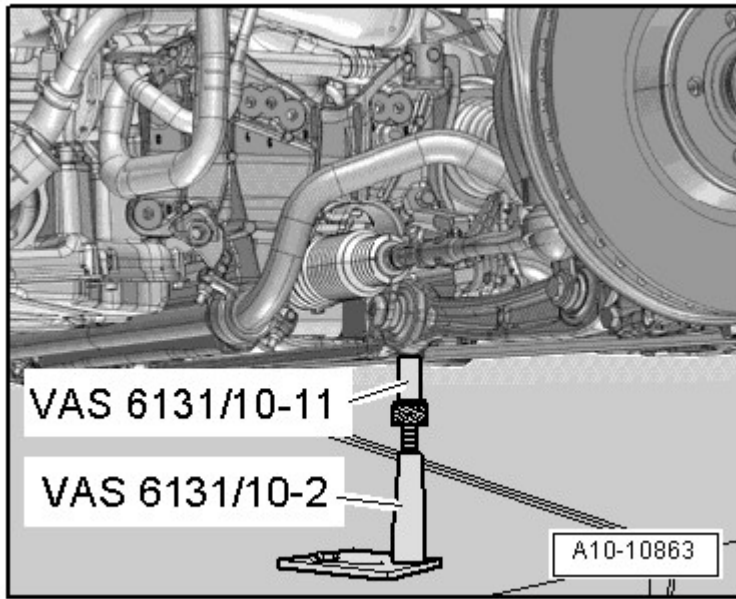


Fig. 59: Attaching At Left And Right Rear Of Subframe
 Courtesy of AUDI OF AMERICA, LLC

-- Attach mounting elements from the VAS 6131/13 at the lower left and right of the wheel bearing housing as shown in the illustration.

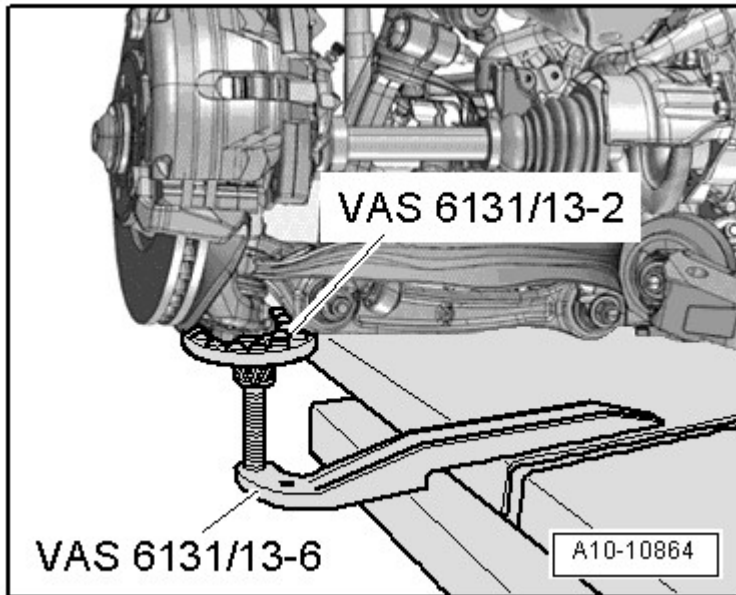


Fig. 60: Attaching At Lower Left And Right Of Wheel Bearing Housing
 Courtesy of AUDI OF AMERICA, LLC

-- Attach the mounting elements from the VAS 6131/10 and VAS 6131/11 at the left and right rear of the tunnel crossmember as shown in the illustration.

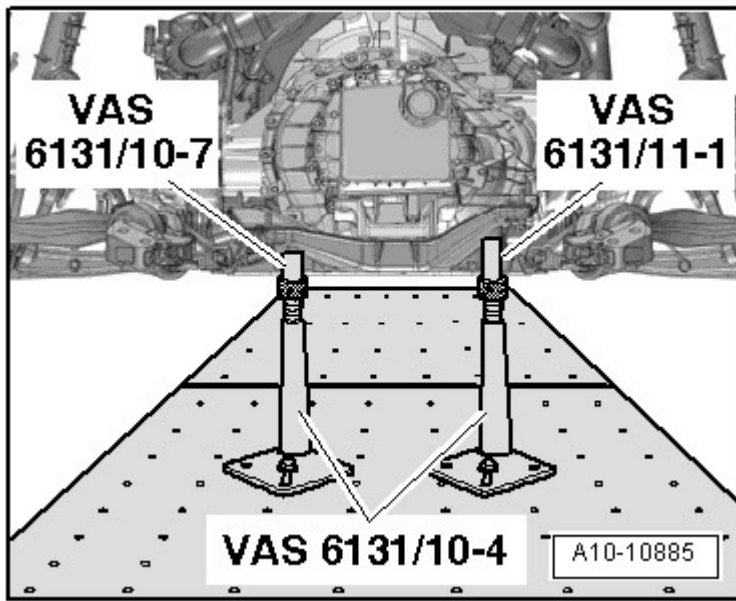


Fig. 61: Attaching VAS 6131/10 And VAS 6131/11 At Left And Right Rear Of Tunnel Crossmember
 Courtesy of AUDI OF AMERICA, LLC

- Rotate the mounting element spindles upward until all the mounting pins come into contact with the mounting points.
- Attach mounting element base plates to VAS 6131 A and tighten to 20 Nm.
- Mark the location of the subframe and engine carrier to the longitudinal members using a felt-tip pen.

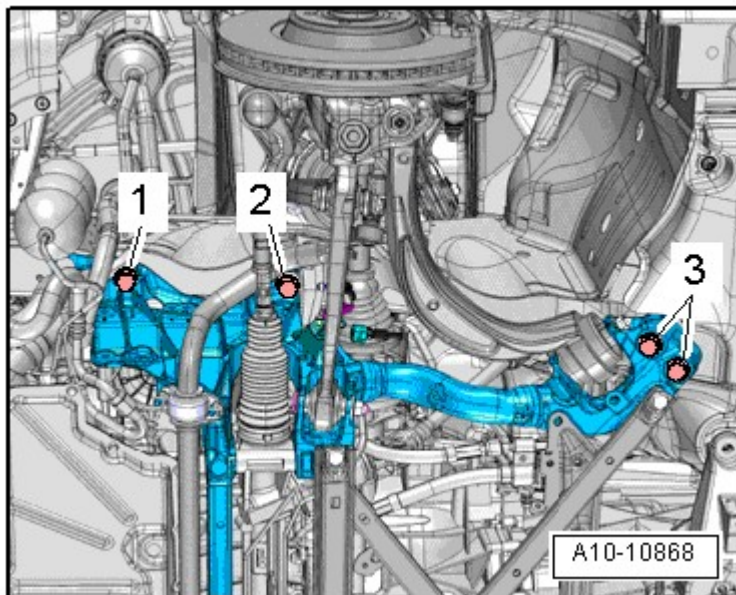


Fig. 62: Identifying Subframe Bolts (Tighten To Specifications)
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right subframe bolts -2 and 3- in a diagonal sequence in stages.

NOTE: Ignore -1-.

-- Remove the bolts -arrows- on the tunnel crossmember.

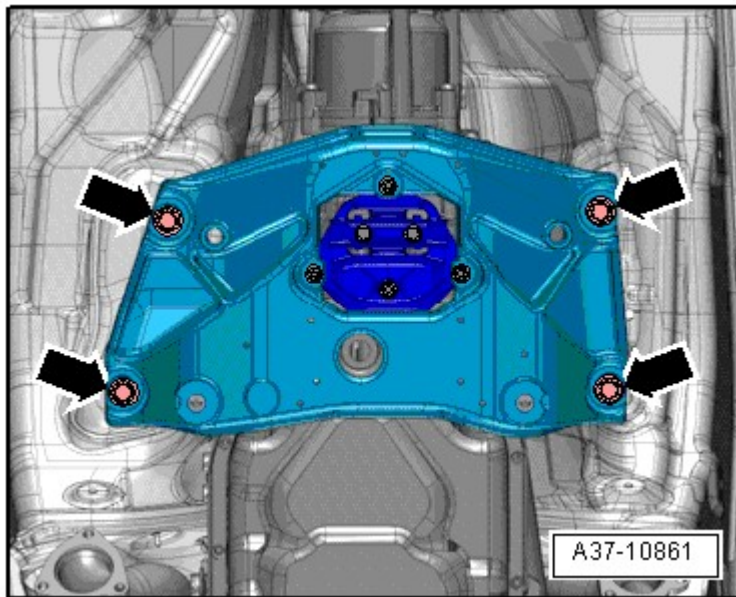


Fig. 63: Identifying Tunnel Crossmember
Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right bolts -2-.

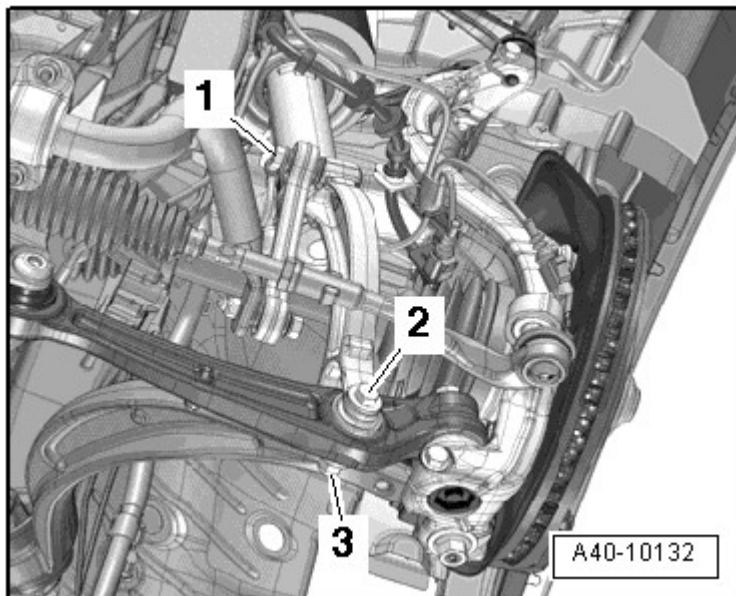


Fig. 64: Identifying Left And Right Stabilizer Bar Bolt

Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1 and 3-.

CAUTION: Risk of damaging hose and wiring connections as well as the engine compartment.

- Make sure all the hoses and lines between the engine, transmission, subframe and body have been disconnected.
- Carefully guide the engine-transmission assembly with subframe out of the engine compartment while lowering.

-- Lower the engine/transmission subassembly using the VAS 6131 A.

-- Remove the VAS 6131 A with the engine/transmission subassembly under the vehicle.

ENGINE AND AUTOMATIC TRANSMISSION, SEPARATING

Special tools and workshop equipment required

- Scissor-Type Assembly Platform VAS 6131 A
- Support Set VAS 6131/10, Supplementary Set VAS 6131/13-7 and Transmission Support VAS 6131/14
- Engine Bung Set VAS 6122
- Socket T40058
- Adapter T40257
- Wrench T40263
- M10 x 65 bolt

Procedure

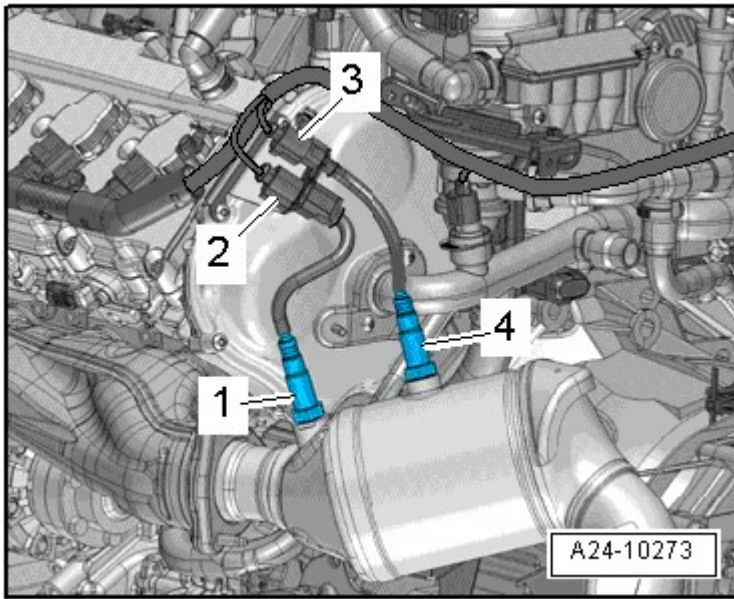


Fig. 65: Identifying Oxygen Sensor Electrical Connectors
Courtesy of AUDI OF AMERICA, LLC

- Engine/transmission assembly removed and placed on the VAS 6131 A.

-- Remove electrical connectors from the bracket and disconnect:

2 - For Heated Oxygen Sensor (HO2S) 2 -G108-

3 - For Oxygen Sensor (O2S) 2 after catalytic converter -G131-

NOTE: Ignore -1 and 4-.

-- Remove the nuts -arrows- and the bolt -1- and the left catalytic converter.

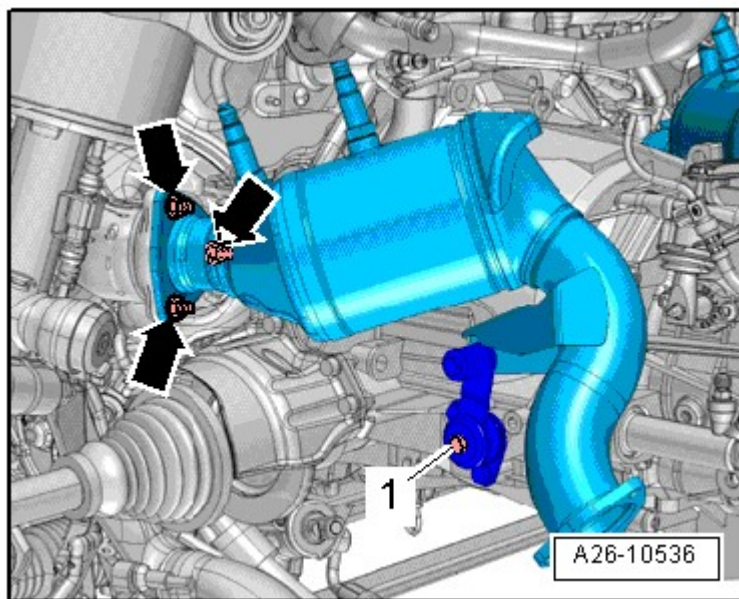


Fig. 66: Identifying Left Catalytic Converter, Nuts & Bolt
 Courtesy of AUDI OF AMERICA, LLC

NOTE: Catch any leaking ATF with a cloth.

-- Remove the bolts -1, 2, 4, 5 and 6- and the nut -3-.

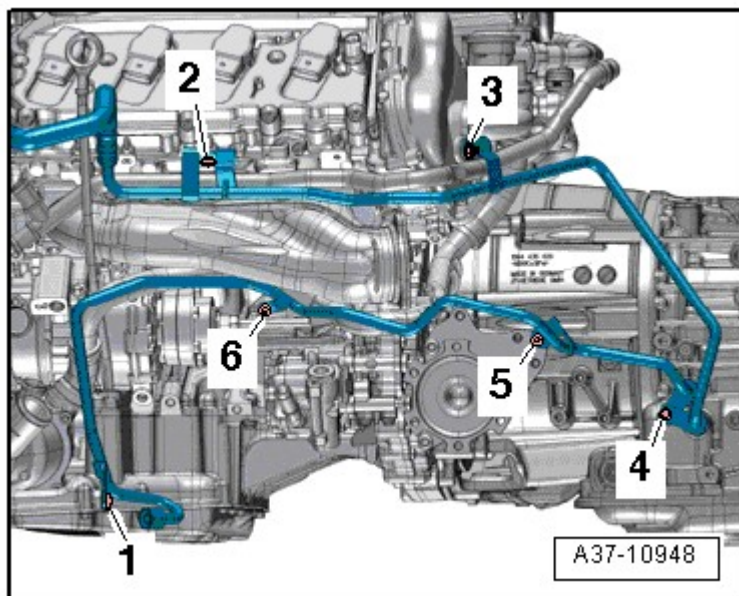


Fig. 67: Identifying Bolts
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the ATF line.

- Seal any open lines and connections with a clean plug from the VAS 6122.
- Remove electrical connectors from bracket and disconnect:

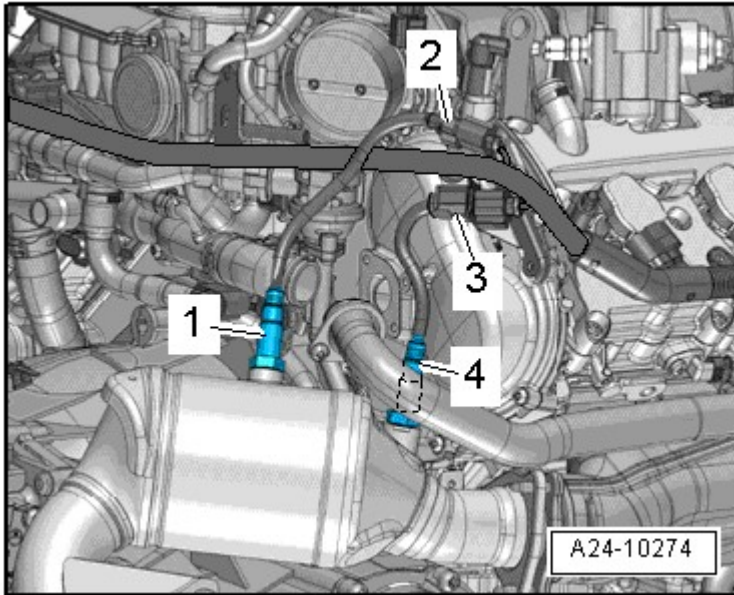


Fig. 68: Identifying Oxygen Sensor Electrical Connectors
Courtesy of AUDI OF AMERICA, LLC

- 2 - For Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) -G130-
- 3 - For Heated Oxygen Sensor (HO2S) -G39-

NOTE: Ignore -1 and 4-.

- Remove the nuts -arrows- and the bolt -1- and the right catalytic converter.

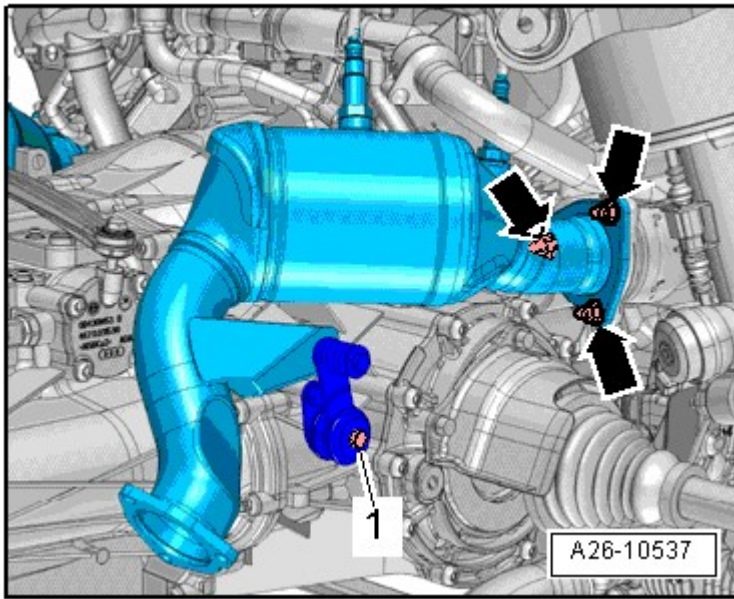


Fig. 69: Identifying Nuts And Bolt, Removal
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the electrical connectors -1- leading to the steering gear -2- on the Engine Speed (RPM) sensor - G28- and free up the electrical wires.

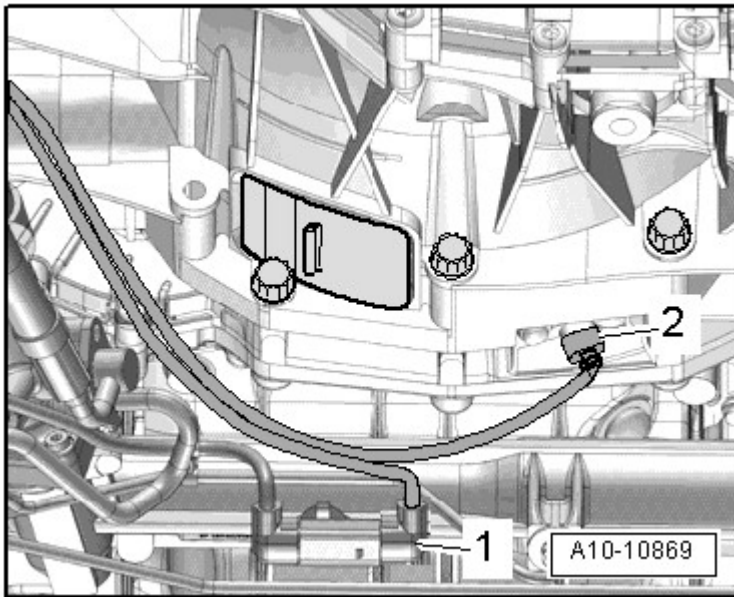


Fig. 70: Disconnecting Connector From Servotronic Solenoid Valve
Courtesy of AUDI OF AMERICA, LLC

CAUTION: There is a risk of destroying the transmission control module (Mechatronic) with static discharge.

- **Do not touch contacts in the transmission connector with hands.**

- To discharge static electricity, touch the transmission housing (without wearing gloves).
- Disconnect the connector on the transmission by rotating screw connections counter-clockwise -arrow-.

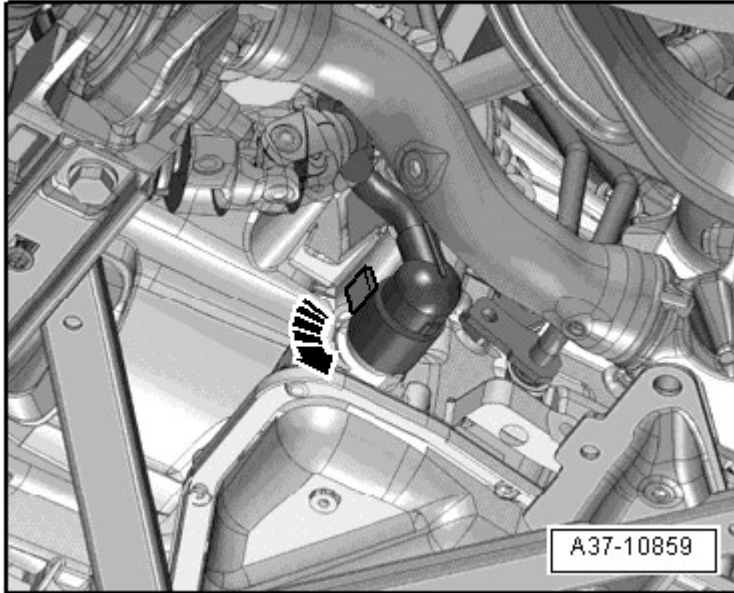


Fig. 71: Identifying Transmission Connector
Courtesy of AUDI OF AMERICA, LLC

- Free up the wiring harness on the transmission.
- Remove the left and right drive axles from the transmission flange shafts.
- Remove the lower cover -1- from the transmission -arrow-.

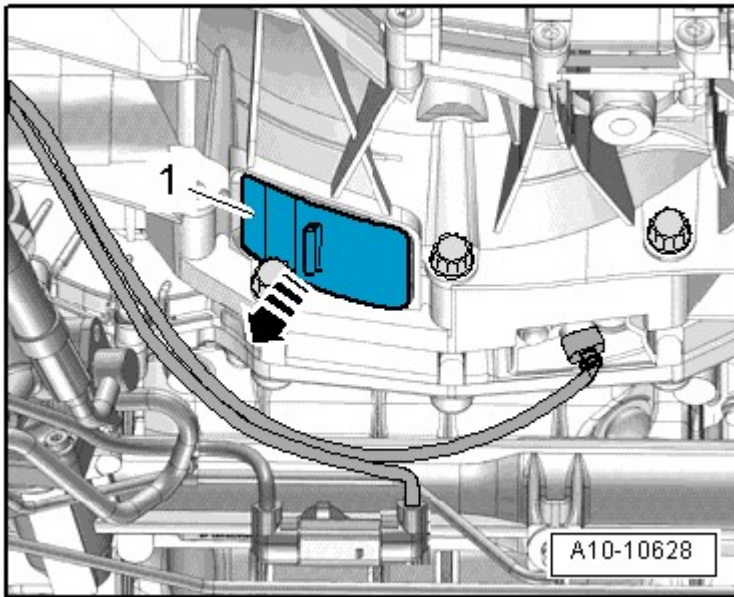


Fig. 72: Identifying Transmission Lower Cover
Courtesy of AUDI OF AMERICA, LLC

-- Insert the T40058 guide pins as follows:

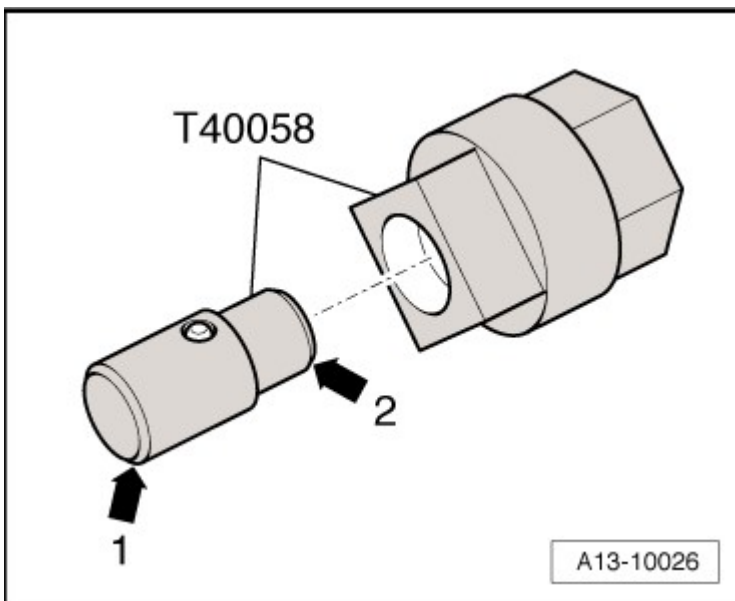


Fig. 73: Identifying Guide Pin And Adapter T40058
Courtesy of AUDI OF AMERICA, LLC

- The large diameter -arrow 1- faces the engine.
- The small diameter -arrow 2- faces the adapter.

-- Attach the T40257 to the T40263.

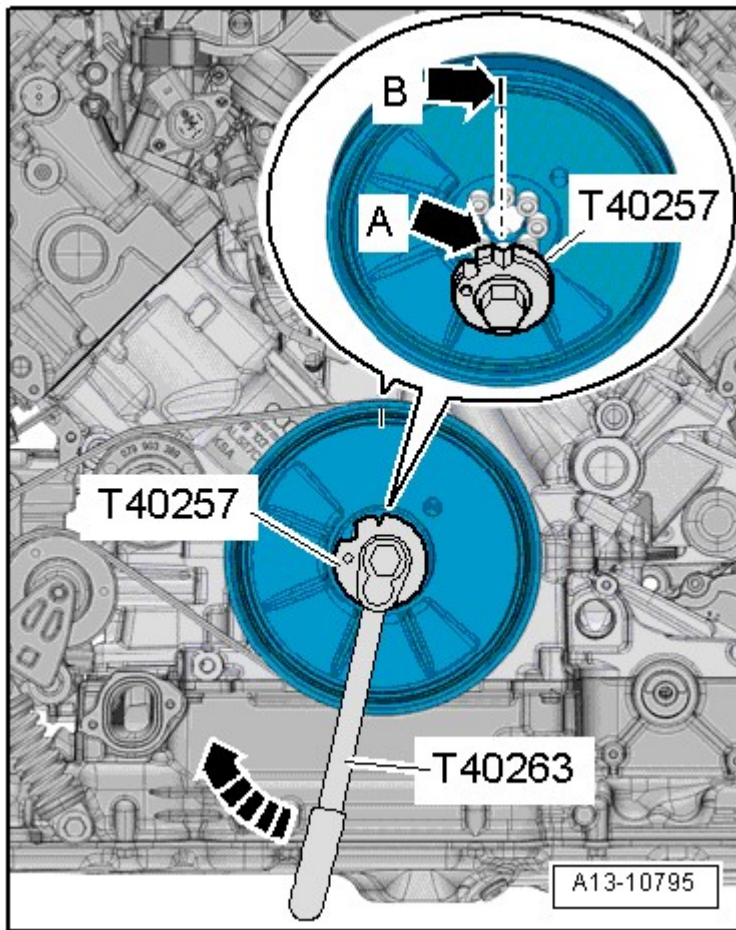


Fig. 74: Identifying Notch -Arrow A- On T40257 Must Face Color Dash -Arrow B- On Vibration Damper
 Courtesy of AUDI OF AMERICA, LLC

-- Attach the adapter to the bolts on the vibration damper.

- The notch -arrow A- on the T40257 must face the color dash -arrow B- on the vibration damper.

NOTE: Ignore the semi-round countersink on the T40257.

When mounting, turn the crankshaft only in the direction of engine rotation - arrow-.

-- Remove the six torque converter bolts -arrow- while turning the crankshaft 60° further in the direction of engine rotation.

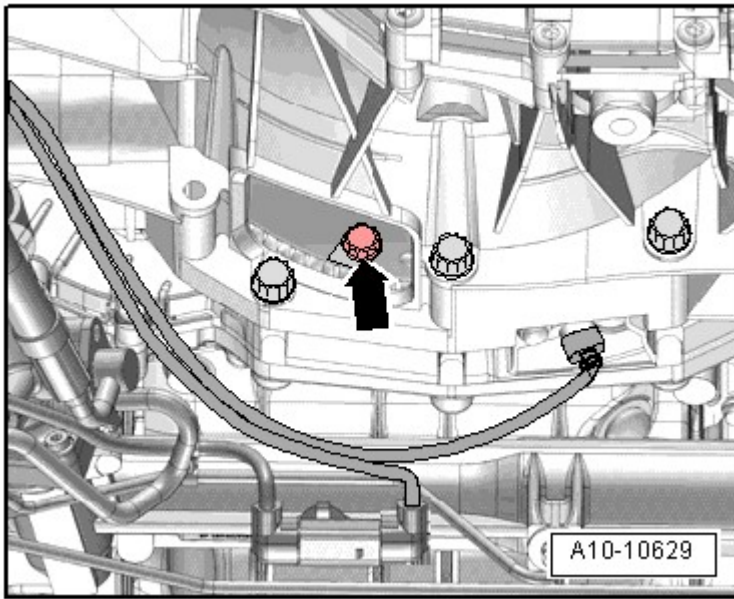


Fig. 75: Identifying Clutch Module First Bolt Installation Location
Courtesy of AUDI OF AMERICA, LLC

-- Equip the VAS 6131 A with the VAS 6131/10, VAS 6131/13-7 and VAS 6131/14 as follows:

2009 Audi S5 Quattro

ENGINE 4.2 Liter - Engine Assembly - Engine Code(s): CAUA (Coupe)

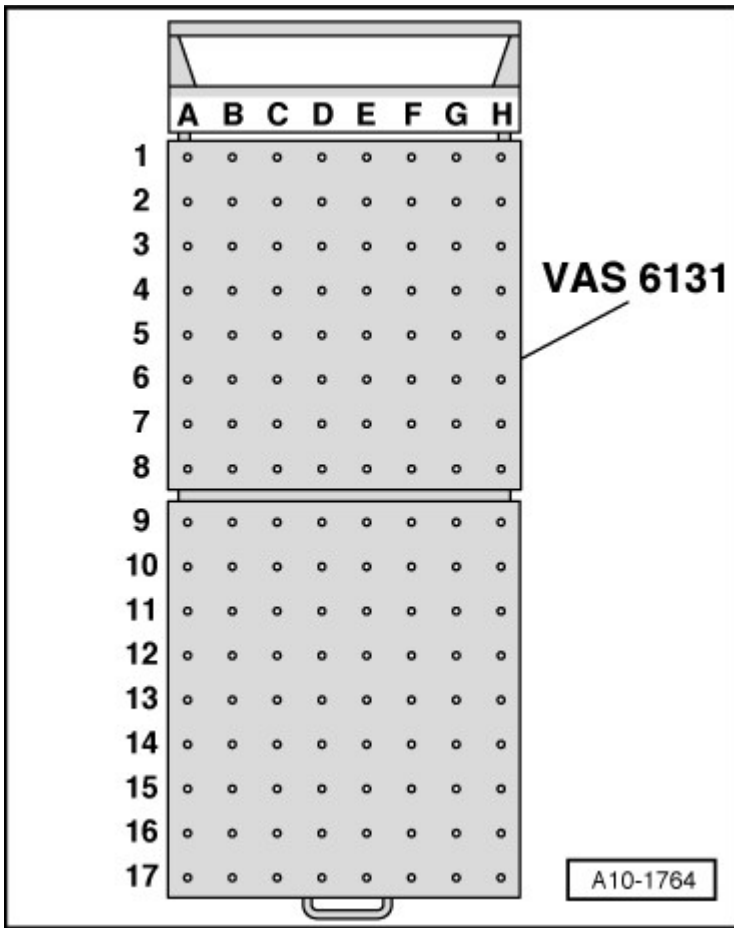


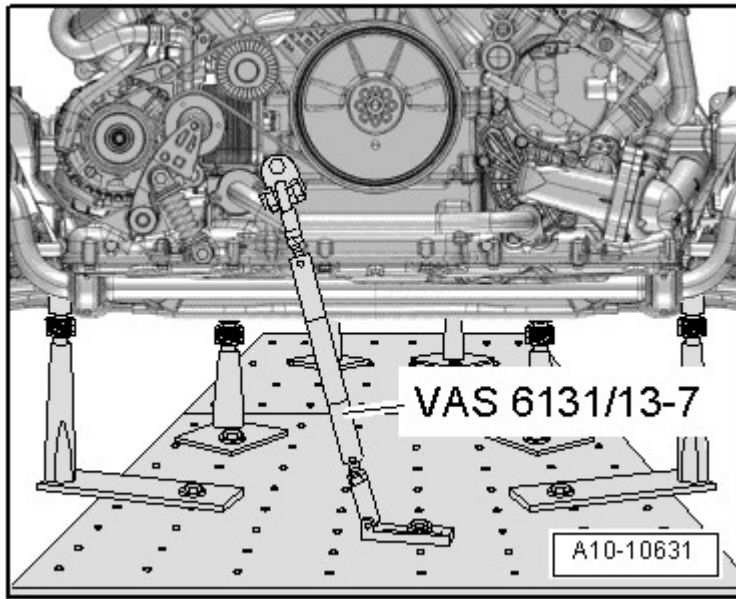
Fig. 76: Identifying Scissor Lift Platform VAS 6131

Courtesy of AUDI OF AMERICA, LLC

NOTE: The other attachments remain unchanged.

Platform Coordinates	Parts from the VAS 6131/10, VAS 6131/13-7 and VAS 6131/14			
D	/13-7			
B10	/10-1	/10-2	/10-5	/14
G10	/10-1	/10-2	/10-5	

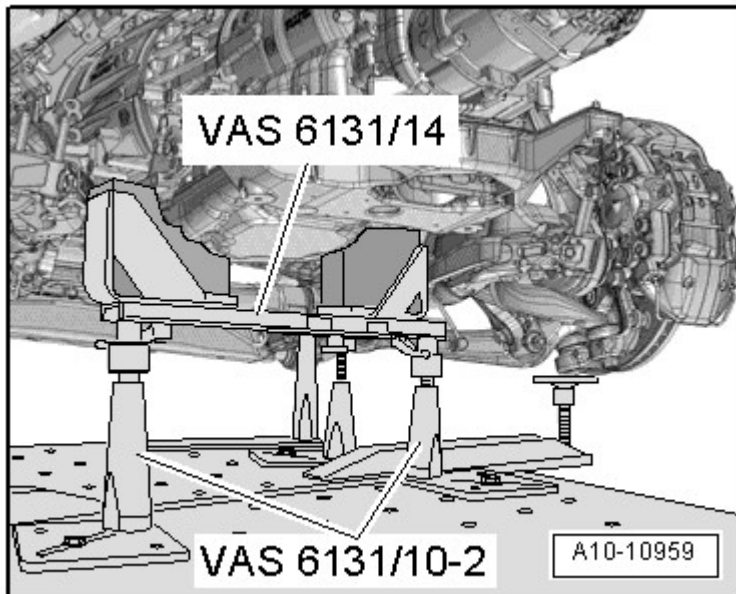
-- Connect the right front VAS 6131/13-7 to the engine using the MD bolt in threaded hole as shown in the illustration.

**Fig. 77: Identifying VAS 6131/13-7**

Courtesy of AUDI OF AMERICA, LLC

-- Install the VAS 6131/13-7 on the scissor lift table and tighten it to 20 Nm.

-- Attach the mounting elements from the VAS 6131/10 and VAS 6131/14 at the front of the transmission as shown in the illustration.

**Fig. 78: Attaching Mounting Elements From VAS 6131/10 & Transmission Support**

Courtesy of AUDI OF AMERICA, LLC

-- Rotate the left and right spindles up until the VAS 6131/14 rests firmly against the transmission.

-- Attach mounting element base plates to VAS 6131 A and tighten to 20 Nm.

-- Remove the starter bolts -1 and 2-.

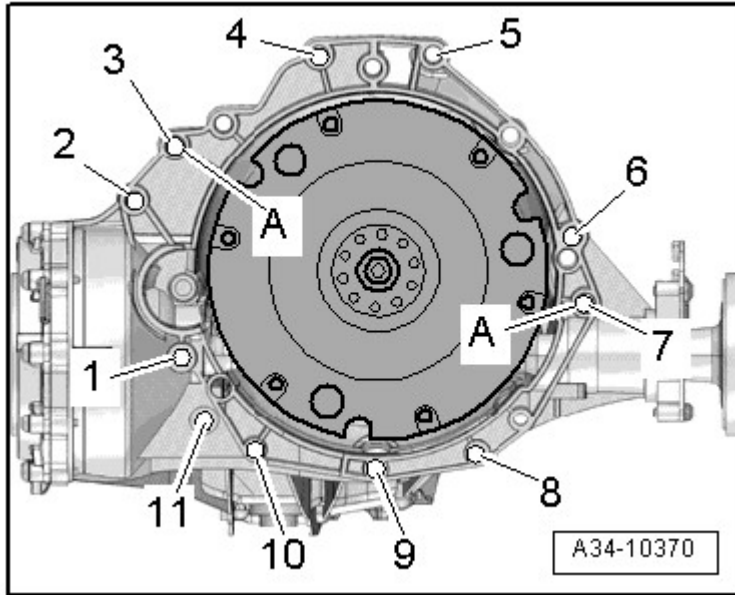


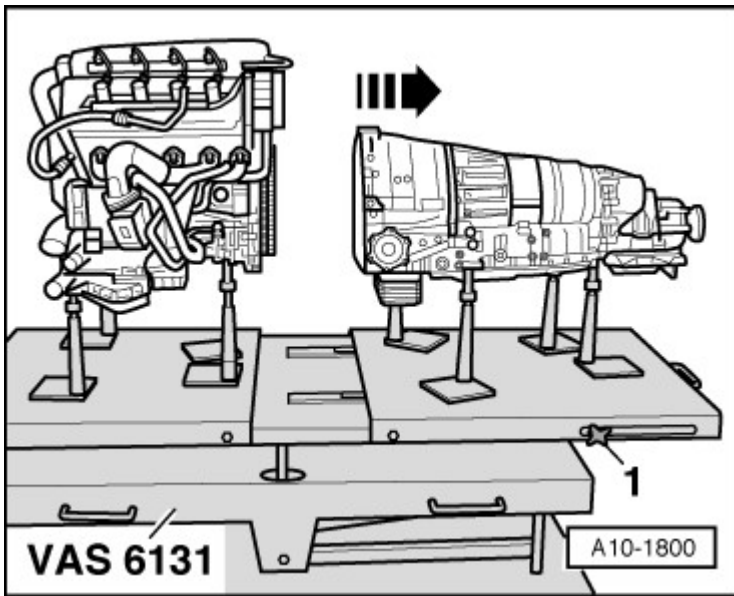
Fig. 79: Checking If Alignment Sleeves -A- For Centering Engine/Transmission Are In Cylinder Block
 Courtesy of AUDI OF AMERICA, LLC

-- Press the starter off the transmission and leave it in the installation position.

-- Remove the remaining bolts -3 through 11- that attach the engine to the transmission.

NOTE: Ignore -A-.

-- Loosen clamping bolts -1- on sides of the VAS 6131 A and pull rear table plate with transmission toward the rear -arrow-.



**Fig. 80: Loosening Bolts -1- On Sides Of VAS 6131 A And Pull Rear Table Plate With Transmission Toward Rear -Arrow-
Courtesy of AUDI OF AMERICA, LLC**

ENGINE, INSTALLING

Special tools and workshop equipment required

- Scissor-Type Assembly Platform VAS 6131 A
- Ring Spanner Insert AF 16 V.A.G 1332/14
- Transportation Lock T40170
- Adapter T40257
- Wrench T40263

Tightening specifications

NOTE: The tightening specifications apply only to lightly greased, oiled, phosphated or blackened nuts and bolts.

Additional lubricant such as engine or transmission oil may be used, but do not use graphite lubricant.

Do not use any parts that have had the lubrication removed.

Tightening specification tolerance +/- 15%.

Component	Nm
Bolts and Nuts	M6 9
	M7 15

2009 Audi S5 Quattro

ENGINE 4.2 Liter - Engine Assembly - Engine Code(s): CAUA (Coupe)

	M8	20
	M10	40
	M12	65
Exceptions:		
Ground pins to the strut tower		9

Subframe mount, refer to **SUBFRAME MOUNT OVERVIEW**.

Engine to Automatic Transmission 0B6

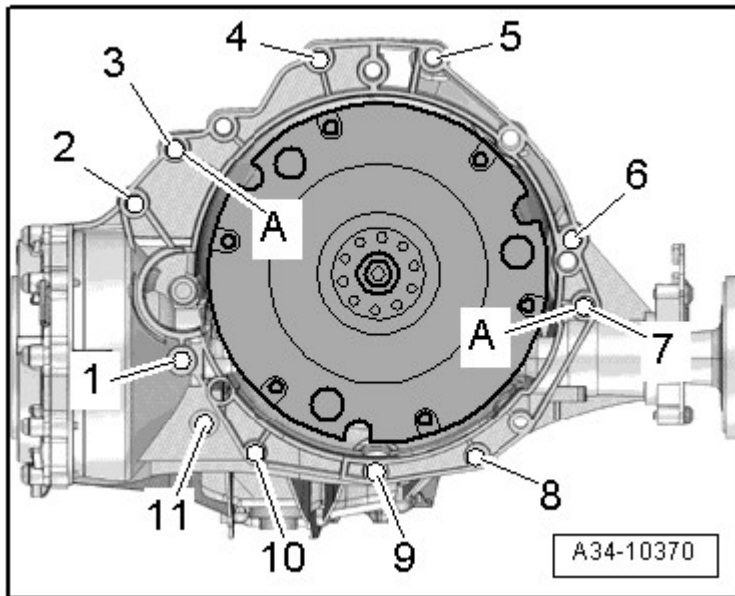


Fig. 81: Checking If Alignment Sleeves -A- For Centering Engine/Transmission Are In Cylinder Block
Courtesy of AUDI OF AMERICA, LLC

Item	Bolt	Nm
1	M10 x 50 ¹⁾	65
2 ... 6	M12x100 ²⁾³⁾	30 + 90°
7	M12x175 ²⁾³⁾	30 + 90°
8, 11	M10x60 ²⁾³⁾	15 + 90°
9	M10x75 ²⁾³⁾	15 + 90°
10	M10x95 ²⁾³⁾	15 + 90°
A	Alignment sleeves for centering	
• ¹⁾ Bolt class 10.9, the steel bolt may be used again unlimited number of times. • ²⁾ Through VIN 8T-9A-007999: replace the aluminum bolts. • ³⁾ From VIN 8T-9A-008000: the aluminum bolts may be used twice <u>ENGINE, INSTALLING => From VIN 8T-9A-008000: the aluminum bolts -2 through 11- may be used twice..</u>		

(1) To prevent damaging the bolts when marking them, do not clamp them in a vise. Insert the bolt using a 14 mm socket with a $\frac{1}{2}$ drive, which is inserted in to the vise, as illustrated.

- From VIN 8T-9A-008000: the aluminum bolts -2 through 11- may be used twice. Therefore, the bolts must be marked with two notches "X" made by a chisel after they have be used the first time -arrow-.

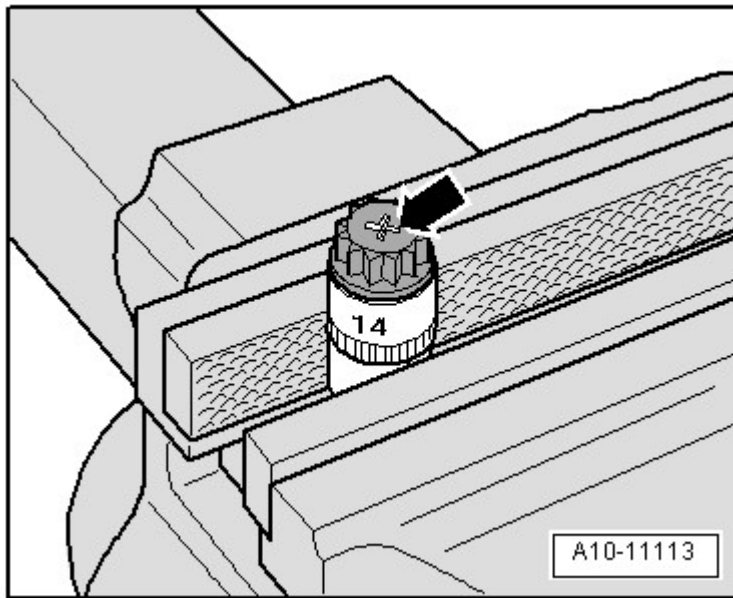


Fig. 82: Identifying Bolts Marked With An "X" May Not Be Used Again
Courtesy of AUDI OF AMERICA, LLC

- Bolts marked with an "X" may not be used again.

Procedure

NOTE: Replace the bolts which are being tightened with an additional turn.

Replace self-locking nuts and bolts and seals, gaskets and O-rings.

The hose connections and charge air system hoses must be free of oil and grease before installing.

Secure all hose connections with hose clamps of the same type as those equipped by the factory.

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

When installing, bring all cable ties back to same positions.

-- Install Secondary Air Injection (AIR) pipe. Refer to **SECONDARY AIR INJECTION SYSTEM**

WITHOUT VACUUM CONTROL OVERVIEW .

-- Clean the threaded holes in the cylinder block for connecting the engine and transmission using a thread tap before installing the transmission.

-- Before installing a replacement engine, make sure the semi-circular ring -arrow- is inserted in the power steering pump driveshaft.

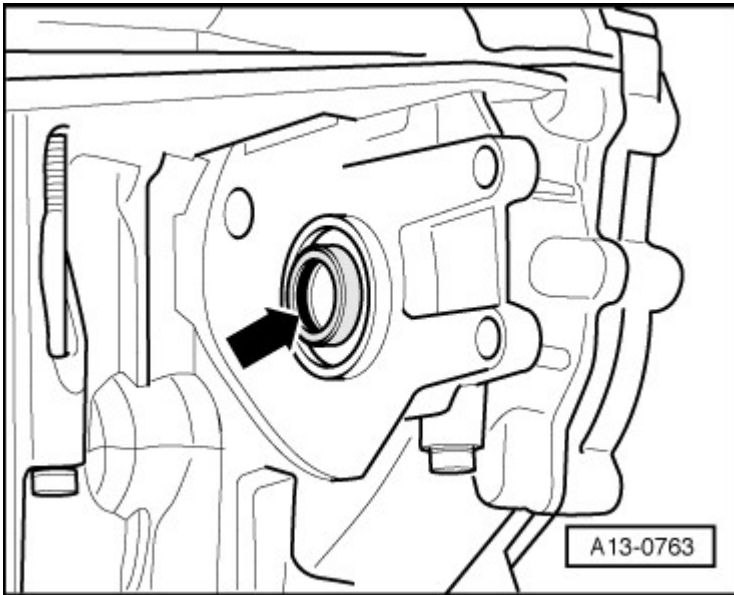


Fig. 83: Checking Whether O-Ring Is Inserted In Power Steering Pump Input Shaft
Courtesy of AUDI OF AMERICA, LLC

-- The following preparations must be made before connecting the engine and transmission:

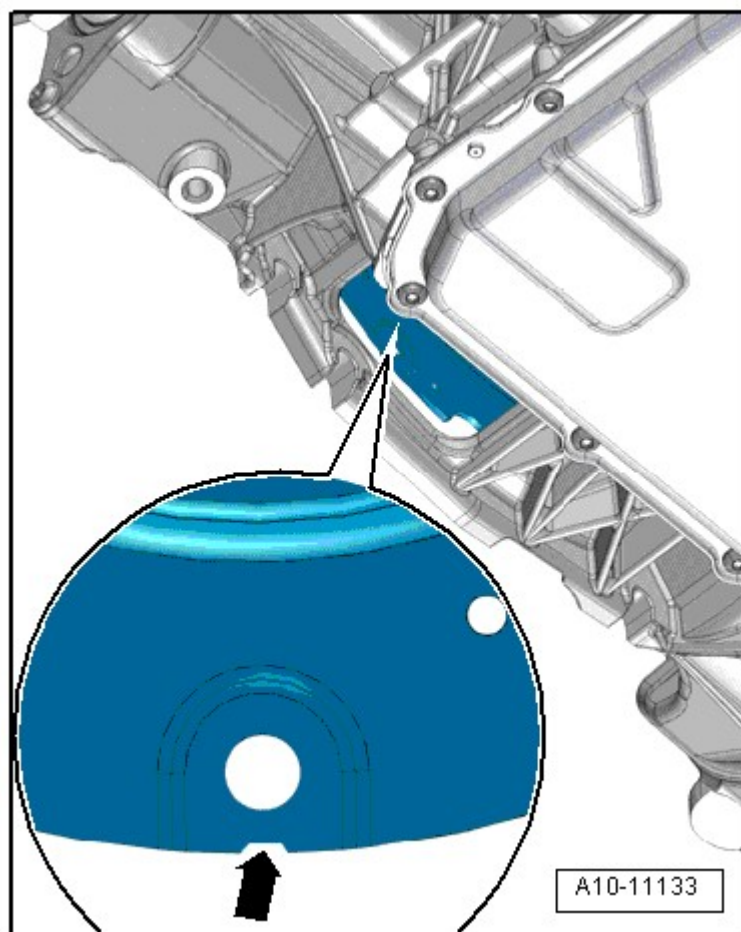


Fig. 84: Locating Hole Next To Notch
Courtesy of AUDI OF AMERICA, LLC

-- Turn the torque converter so that the hole next to the notch -arrow- is visible in the lower cut-out in the transmission housing as illustrated.

NOTE: **There is only 1 notch on the circumference; rotate the torque converter as needed.**

-- Insert the T40170 in the transmission housing from below and secure it on the flange shaft -1-.

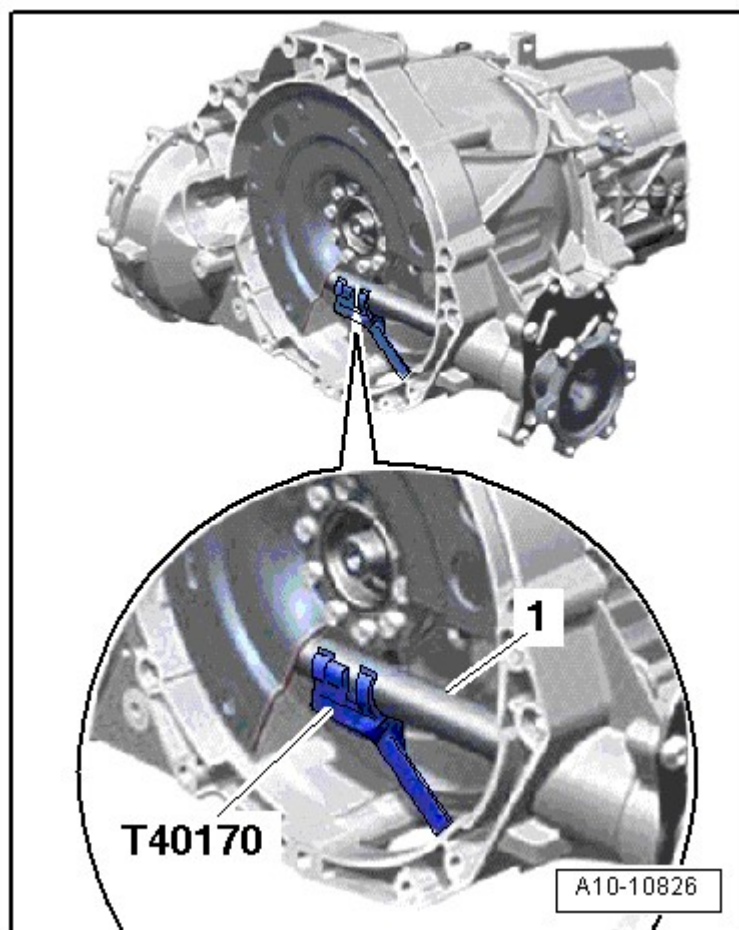


Fig. 85: Identifying Transportation Lock T40170

Courtesy of AUDI OF AMERICA, LLC

- When joining the engine and subframe, hold the ATF lines in their installation position.
- Install the engine supports and engine mount. Refer to **SUBFRAME MOUNT OVERVIEW**.
- Check if the alignment sleeves -A- for centering the engine/transmission are in the cylinder block and insert them if they are not.

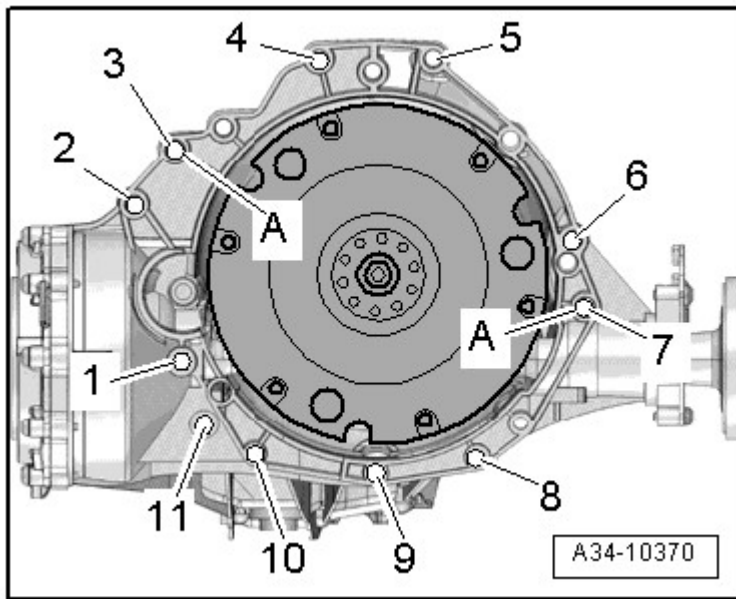


Fig. 86: Checking If Alignment Sleeves -A- For Centering Engine/Transmission Are In Cylinder Block
 Courtesy of AUDI OF AMERICA, LLC

- Inspect the aluminum bolts used to connect the engine to the transmission to see if they can be used again and mark them, if necessary **ENGINE, INSTALLING.**
- Position the transmission on the engine. Be careful of the starter.
- Tighten bolts -1 to 11-.
- Remove the T40170.

NOTE: The following step is necessary to make sure the torque converter rests on the drive plate evenly and is not tilted.

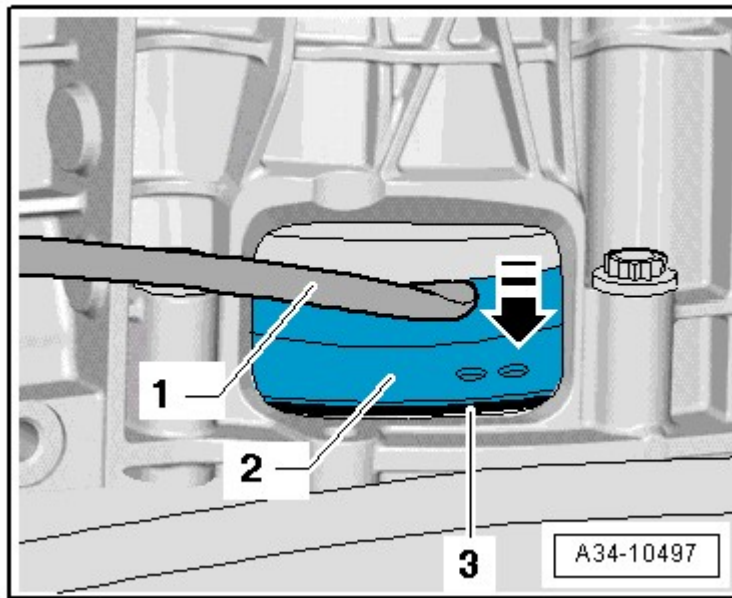


Fig. 87: Pressing Torque Converter
Courtesy of AUDI OF AMERICA, LLC

-- Press the torque converter -2- against the drive plate -3- slightly in the direction of the -arrow- using an assembly lever -1-.

-- Install the first bolt -arrow- and tighten by hand (2 Nm).

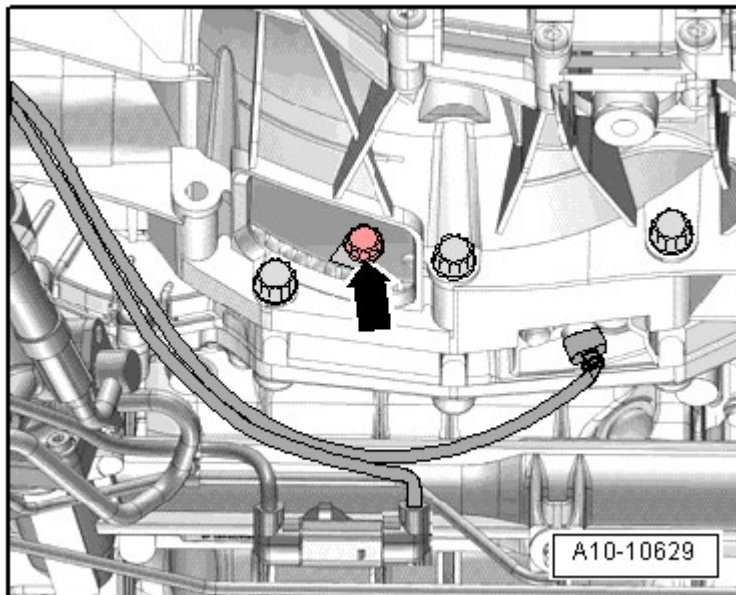


Fig. 88: Identifying Clutch Module First Bolt Installation Location
Courtesy of AUDI OF AMERICA, LLC

-- Attach the T40257 to the T40263.

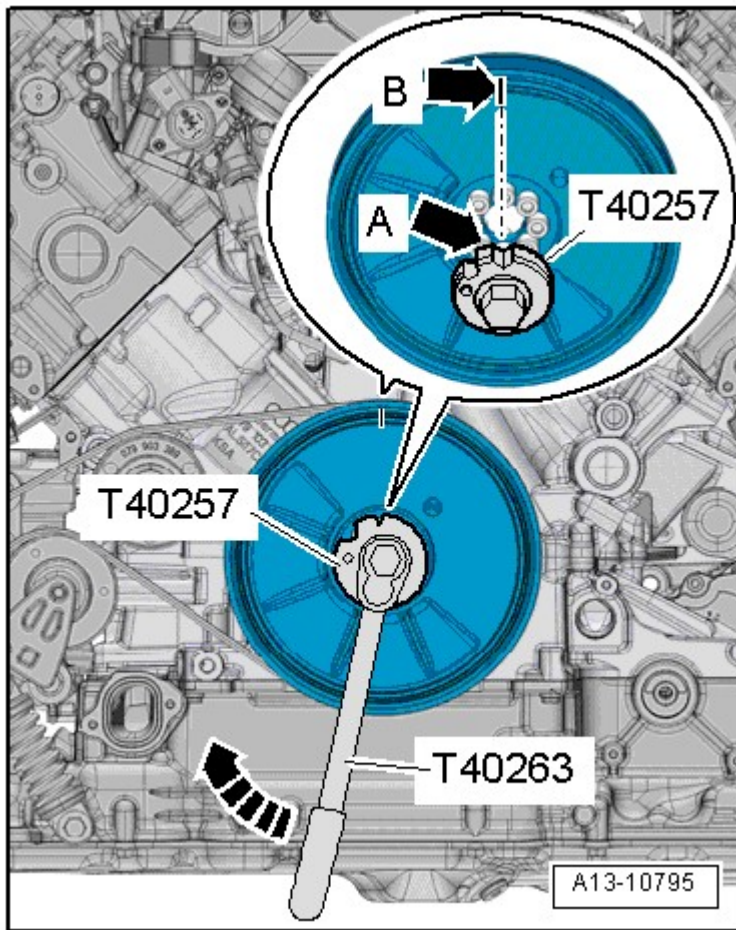


Fig. 89: Turning Crankshaft 180° In Direction Of Engine Rotation -Arrow
 Courtesy of AUDI OF AMERICA, LLC

- Attach the adapter to the bolts on the vibration damper.
- Turn the crankshaft 180° in the direction of engine rotation -arrow-.
- Tighten the bolts that are accessible in this position to the tightening specifications. Refer to **Removal and Installation** .
- Turn the crankshaft 60° further and tighten the remaining 5 bolts to the tightening specification. Refer to **Specifications** .
- Install the power steering hydraulic lines. Refer to **Removal and Installation** .
- Install the left and right drive axles on the transmission flange shafts. Refer to **Removal and Installation** .
- Installing the lower left coolant pipe. Refer to **LOWER LEFT COOLANT PIPE** .
- Install selector lever cable. Refer to **Removal and Installation** .

- Install the ATF lines. Refer to **Removal and Installation** .
- Install the catalytic converter. Refer to **MUFFLER OVERVIEW** .
- Raise the engine/transmission assembly using the VAS 6131 A.
- Align the subframe and the tunnel crossmember using the marks made on the longitudinal members during removal.
- Tighten the subframe bolts only to the tightening specifications, do not tighten them further (tighten the bolts only after axle alignment). Refer to **Removal and Installation** .

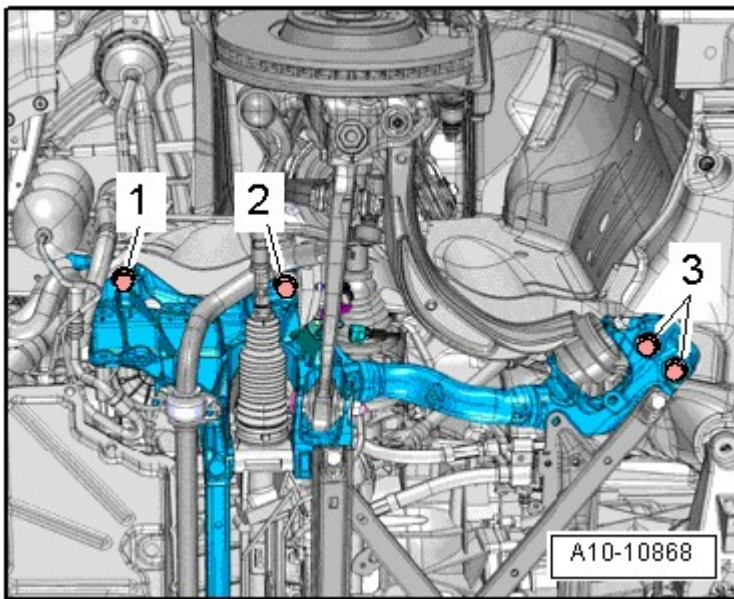


Fig. 90: Identifying Subframe Bolts (Tighten To Specifications)
Courtesy of AUDI OF AMERICA, LLC

WARNING: Risk of accident due to loose connections.

- If the bolts in the subframe are not tightened to final torque, vehicle must not be driven.

- Tighten the tunnel crossmember bolts -arrow-. Refer to **Description and Operation** .

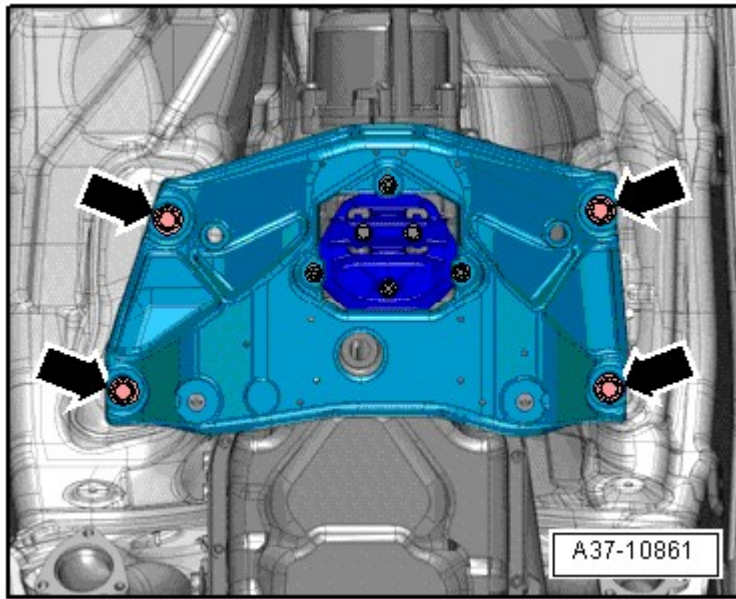


Fig. 91: Identifying Tunnel Crossmember
 Courtesy of AUDI OF AMERICA, LLC

Install in reverse order of removal paying attention to the following:

- Attach the steering intermediate shaft to the steering gear. Refer to **Removal and Installation** .
- Install the driveshaft. Refer to **Removal and Installation** .
- Install the front muffler. Refer to **FRONT MUFFLER** .
- Install exhaust system free of stress. Refer to **EXHAUST SYSTEM, INSTALLING** .
- Install the front crossmember. Refer to **Description and Operation** .
- Install the subframe crossbrace, upper control arm and stabilizer bar and tighten the suspension strut on the control arm. Refer to **Removal and Installation** .
- Install the brake caliper. Refer to **Removal and Installation** .
- Install the engine control module. Refer to **Removal and Installation** .
- Electrical connectors and wiring routing. Refer to appropriate SYSTEM WIRING DIAGRAM.
- Install the electrical wires, terminal 30 wire junction 2 -TV22- and the engine compartment E-box cover. Refer to **Removal and Installation** .
- Install the tower brace. Refer to **Removal and Installation** .
- Install the windshield wiper fluid reservoir filler tube. Refer to **Removal and Installation** .

-- Install refrigerant lines. Refer to **Removal and Installation** .

-- Be sure to follow the procedure for connecting the battery afterwards. Refer to **Removal and Installation** .

CAUTION: There is a risk of destroying control modules with excess voltage.

- **Do not use a charger as a starting aid.**

-- Install and adjust the windshield wiper arms. Refer to **Removal and Installation** .

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

-- Install the lock carrier braces. Refer to **Removal and Installation** .

-- 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 coolant system **COOLANT, 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.

-- Fill the refrigerant circuit. Refer to **General Information** .

-- Align the subframe. Refer to **Removal and Installation** .

-- Install the wheel housing liners. Refer to **Removal and Installation** .

-- Install the front wheels. Refer to **Removal and Installation** .

-- Perform axle alignment. Refer to **General Information** .

WARNING: Risk of accident due to loose connections.

- **Tighten the subframe bolts to the specification after performing axle alignment.**

-- Fill transmission with ATF. Refer to **General Information** .

-- Install the noise insulation. Refer to **Description and Operation** .

MANUAL TRANSMISSION

ENGINE, REMOVING

NOTE: With lock carrier installed, engine is removed downward together with the transmission and the subframe.

Collect escaping coolant in a clean container for disposal or reuse.

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

Special tools and workshop equipment required

- Pry Lever - Rmv Outside Mirror 80 - 200
- 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 6131/10as well as Supplementary Set, Audi A8 VAS 6131/11, Supplementary Set, Audi Q7 VAS 6131/13 and qty. 3 Tapered Mounting Pin VAS 6131/10-2
- Drip Tray For VAS 6100 VAS 6208
- Hose Clip Pliers VAS 6340
- Hose Clip Pliers VAS 6362
- Puller for Gear Shaft Linkage T40160

Procedure

WARNING: Risk of vehicle tipping over with engine removed.

- **Secure vehicle. Luggage compartment must be empty for this.**

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

- **Reduce the fuel pressure down to residual pressure before opening the high pressure area of the fuel injection system.**

-- Reduce the fuel pressure in high pressure area. Refer to **General Information** .

NOTE: Release the electrical parking brake before disconnecting the battery so the driveshaft can be rotated to remove it.

-- Position the front wheels so they are straight.

CAUTION: Risk of destroying electrical components.

- **Observe measures for disconnecting battery.**

-- Turn off the ignition and remove the key.

-- Disconnect the Ground (GND) cable -2- from the battery post. Refer to **Removal and Installation** .

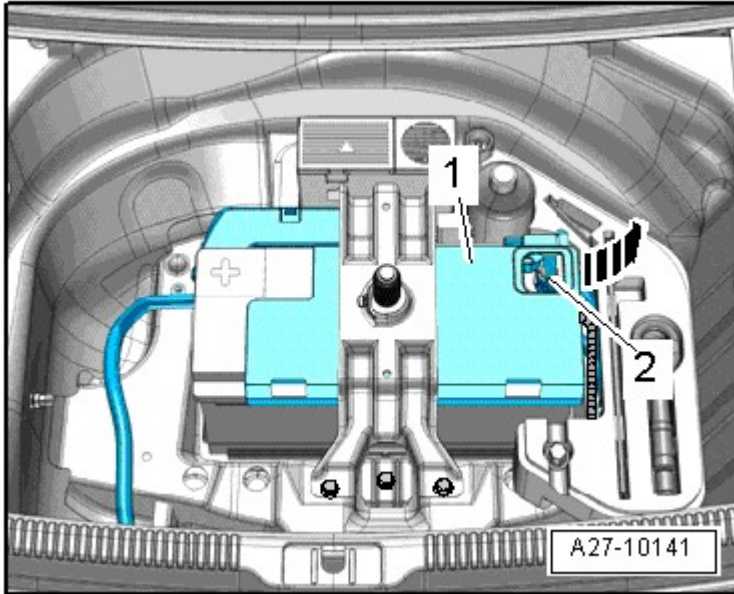


Fig. 92: Identifying Battery

Courtesy of AUDI OF AMERICA, LLC

-- Empty the coolant circuit. Refer to **Description and Operation** .

-- Extract the power steering oil from the reservoir with the V.A.G 1782.

-- Remove the engine cover -arrows-.

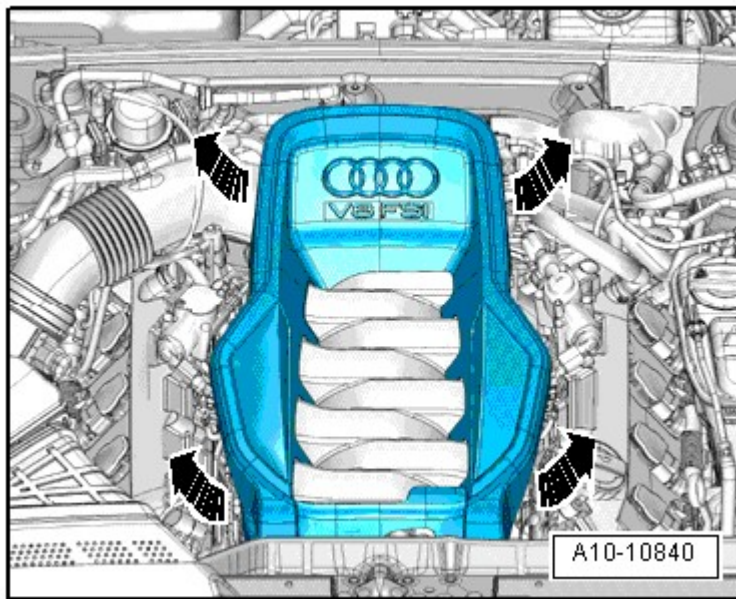


Fig. 93: Identifying Engine Cover
Courtesy of AUDI OF AMERICA, LLC

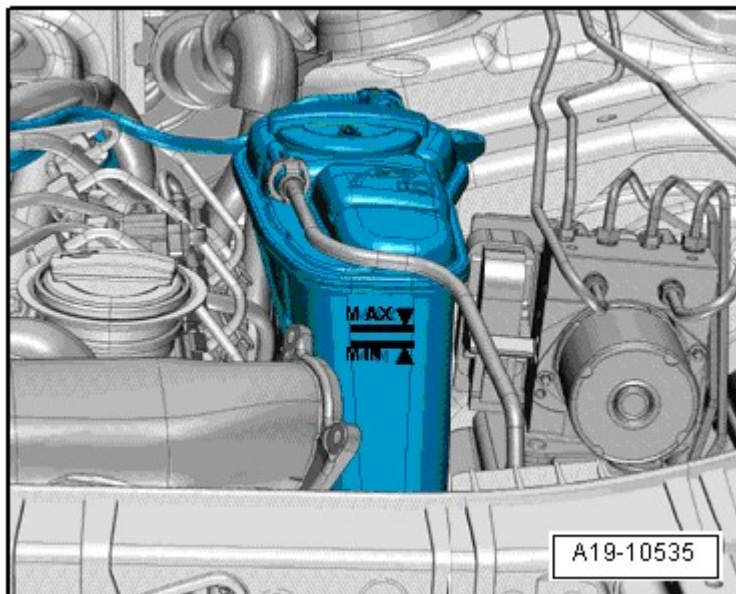


Fig. 94: Identifying Coolant Reservoir Marking
Courtesy of AUDI OF AMERICA, LLC

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

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

- Remove the left and right front wheels. Refer to **Removal and Installation** .
- Remove left and right front wheel housing liners. Refer to **Removal and Installation** .
- Remove the noise insulation -1 and 2-. Refer to **Description and Operation** .

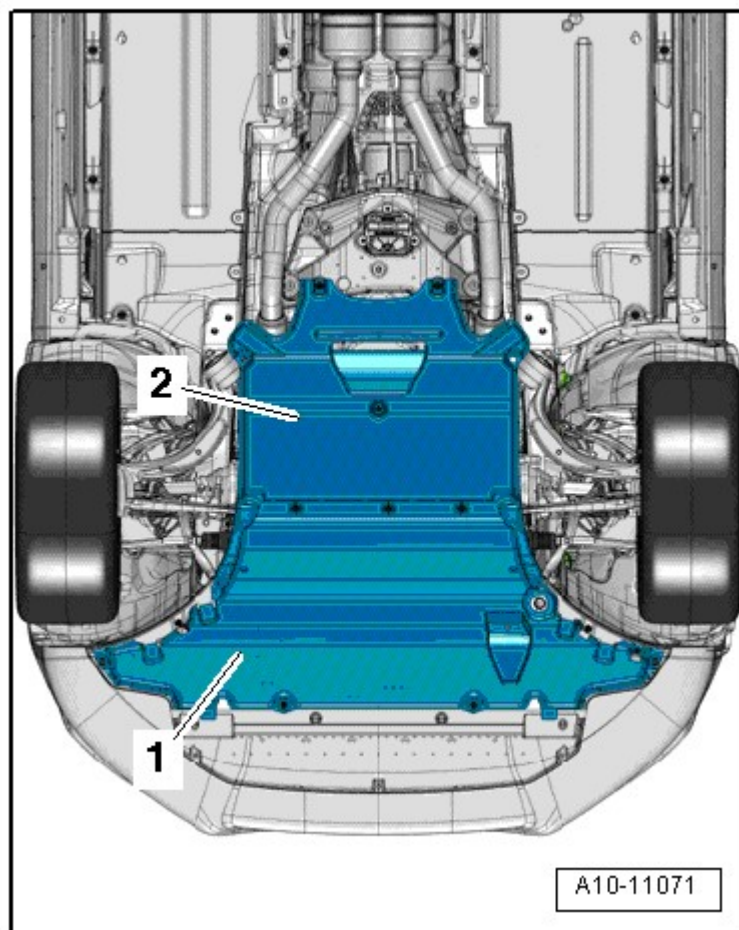


Fig. 95: Identifying Noise Insulation -1 & 2-
Courtesy of AUDI OF AMERICA, LLC

- Place the VAS 6208 under the engine.

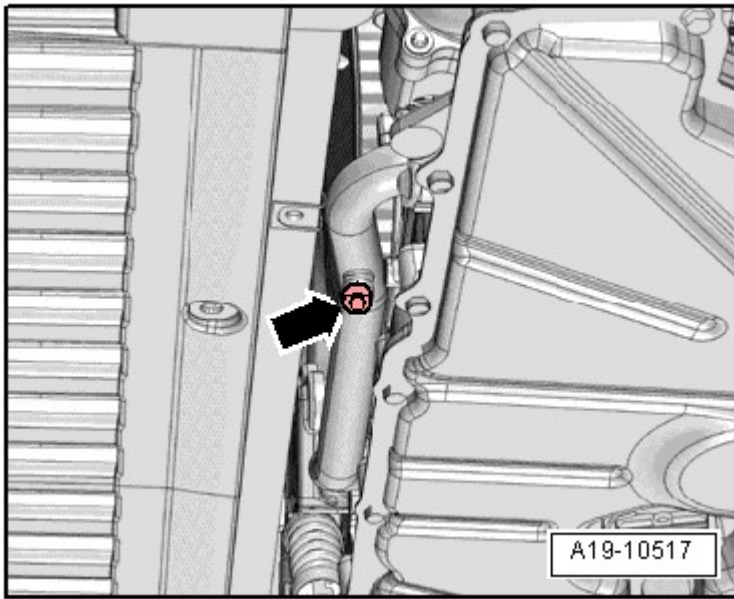


Fig. 96: Identifying Drain Plug -Arrow- On Front Coolant Hose
Courtesy of AUDI OF AMERICA, LLC

- Remove the drain plug -arrow- on the front coolant hose and drain the coolant.
- Remove the drain plug -arrow- on the map controlled engine cooling thermostat -F265- and drain the coolant.

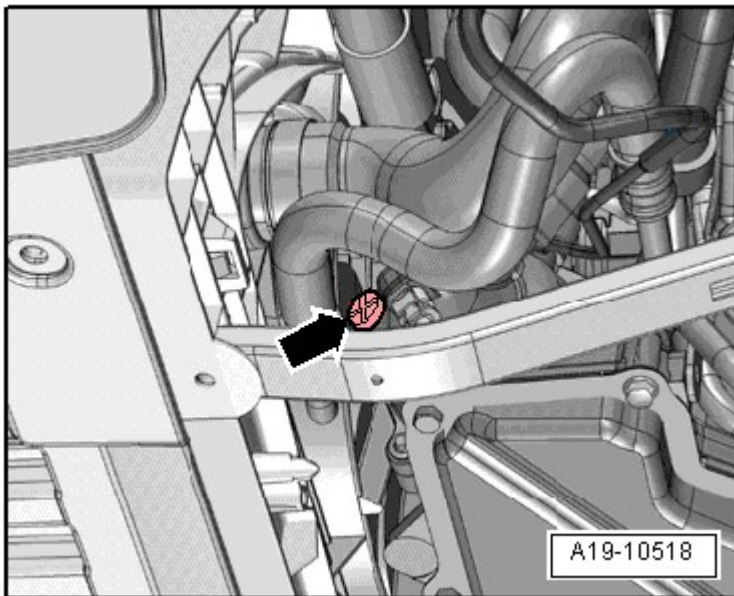


Fig. 97: Identifying Drain Plug -Arrow- On Map Controlled Engine Cooling Thermostat -F265-
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the coolant hose from the radiator, to do this, lift the retaining clip -2-.

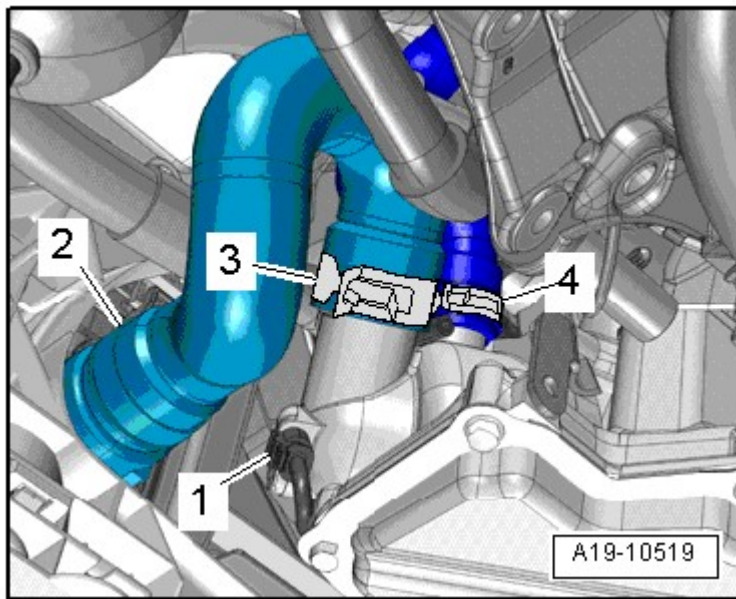


Fig. 98: Identifying Coolant Hose And Spring Clip
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1, 3 and 4-

-- Disconnect the vacuum hose -1- and free up the hydraulic hose -arrow- on the bracket.

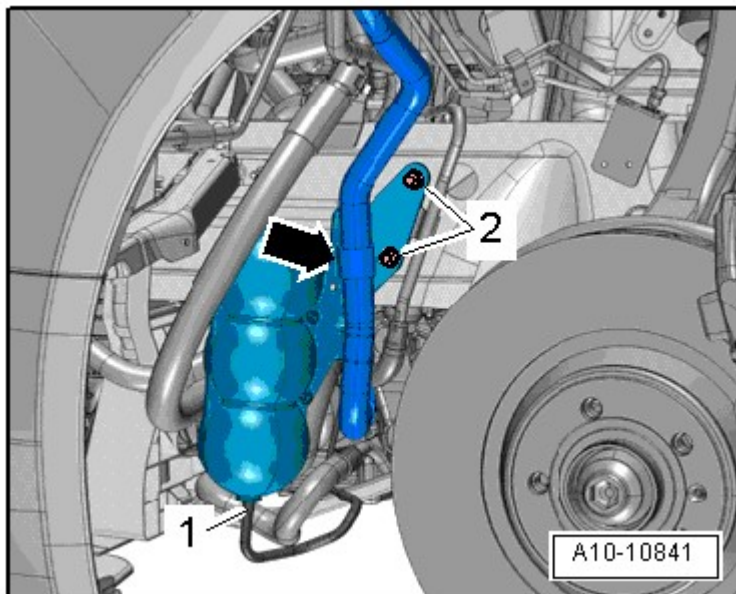


Fig. 99: Disconnecting Vacuum Hose And Lay Hydraulic Oil Hose To Side
Courtesy of AUDI OF AMERICA, LLC

-- Remove the nuts -2- and vacuum reservoir.

-- Place the V.A.G 1782 under the disconnection point.

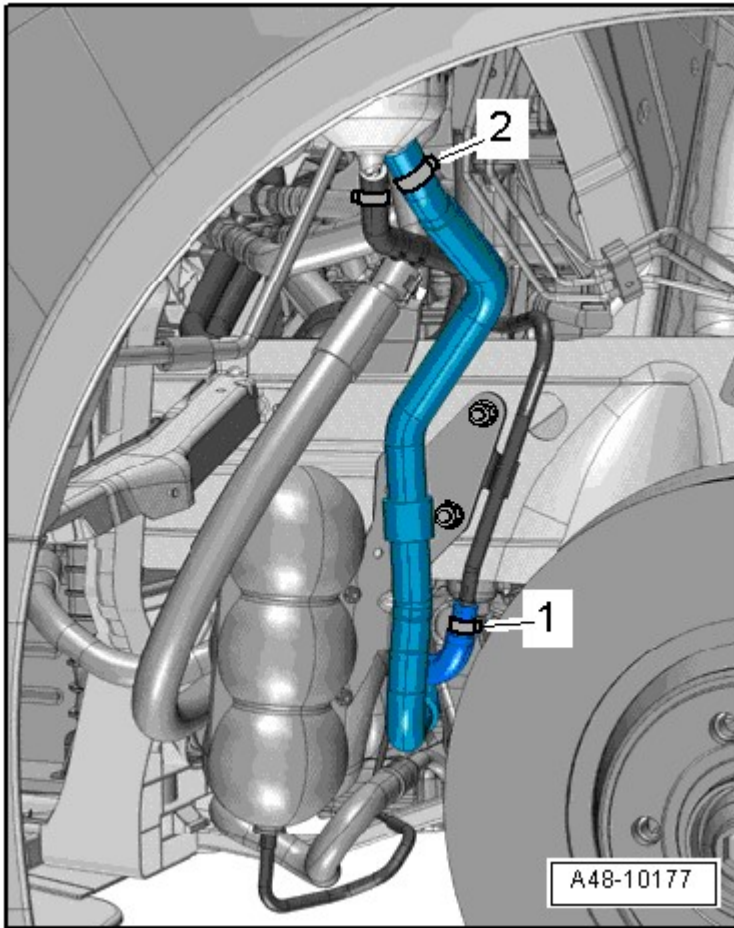


Fig. 100: Identifying Power Steering Hydraulic Oil Feed Line -2- & Return Line -1-
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the power steering hydraulic oil feed line -2- and return line -1-.

-- Seal any open lines and connections with a clean plug from the VAS 6122.

CAUTION: Risk of damaging refrigerant lines and hoses.

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

-- Remove the bolts -1 and 2-.

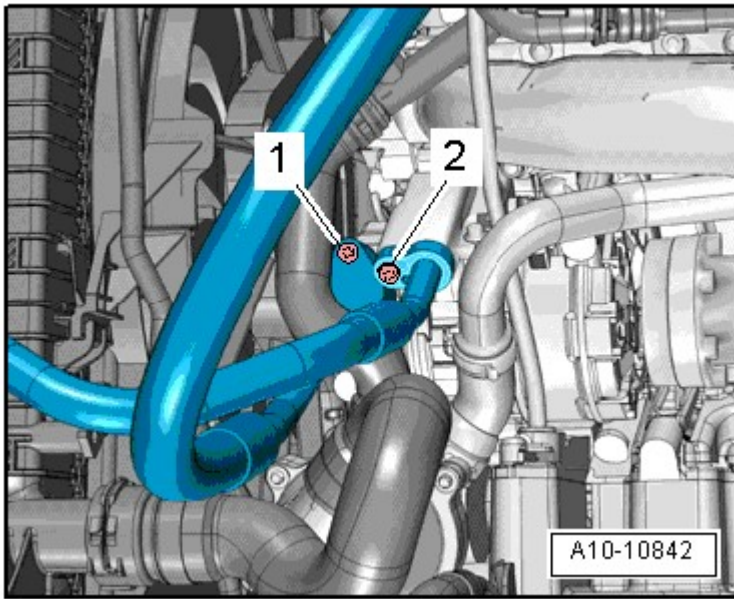


Fig. 101: Identifying Bolts & Refrigerant Lines To A/C Compressor
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the refrigerant lines from the compressor.
- Seal any open lines and connections with a clean plug from the VAS 6122.
- Remove the nut -arrow- on the right longitudinal member and free up the Ground (GND) wires.

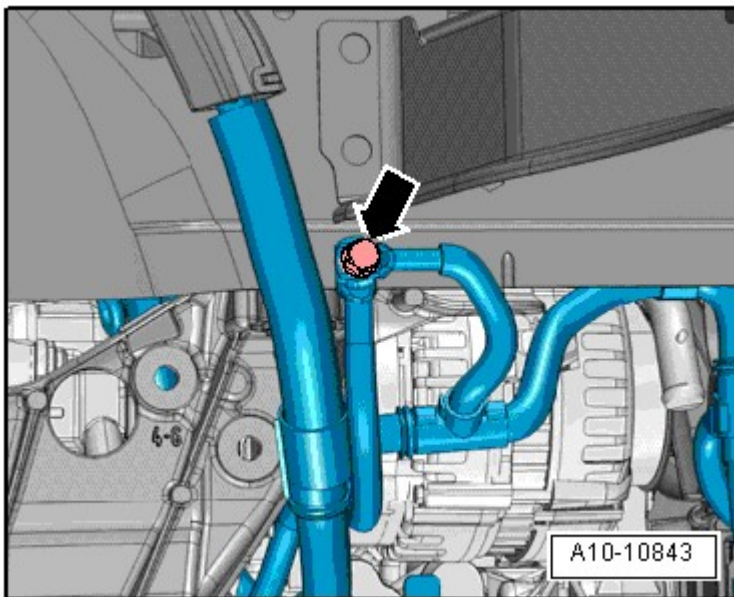
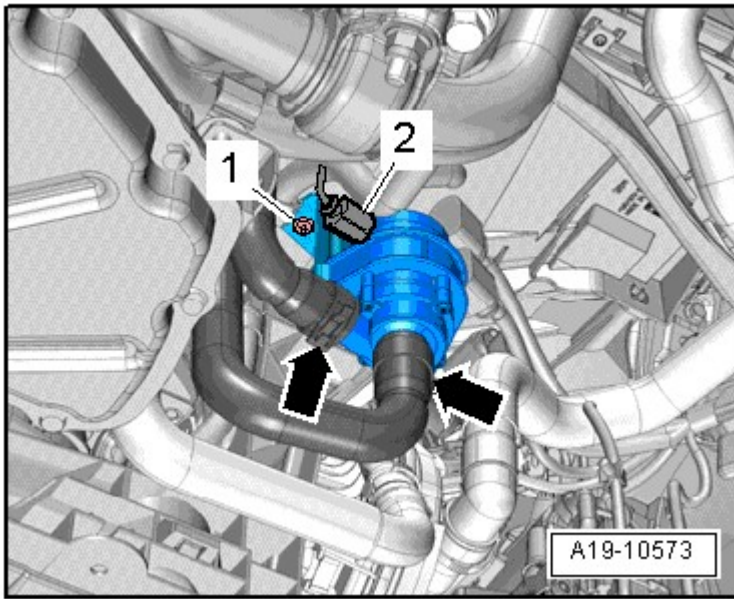


Fig. 102: Disconnecting Ground Wires -Arrow- From Right Longitudinal Member
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the connector -2-.



**Fig. 103: Removing/Installing Coolant Hoses From After-Run Coolant Pump -V51- -Arrows-
Courtesy of AUDI OF AMERICA, LLC**

-- Place VAS 6208 under the engine.

-- Remove the coolant hoses from the after-run coolant pump -V51- -arrows-.

NOTE: Ignore -1-.

-- Disconnect the connector -3- on the Secondary Air Injection (IAT) pump motor -Via-.

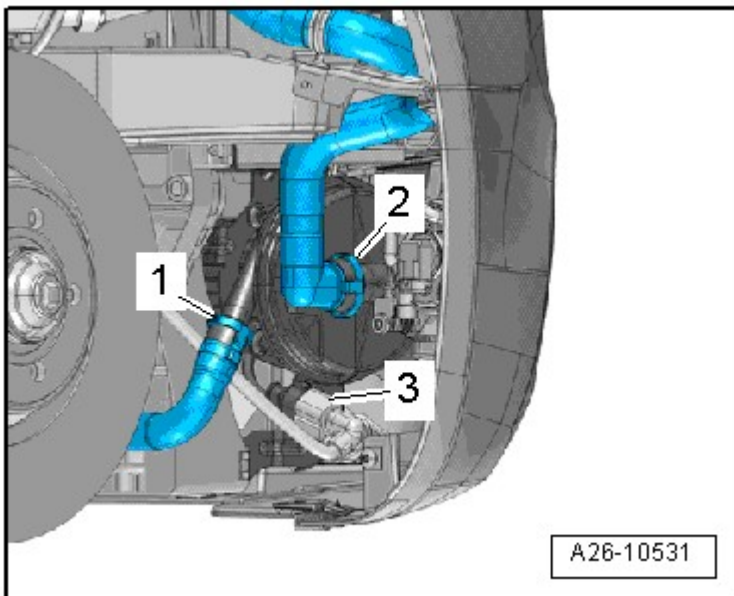


Fig. 104: Component Location Of Secondary Air Injection (AIR) Pump Motor -V101-

Courtesy of AUDI OF AMERICA, LLC

-- Remove the secondary air injection hose -1- and free it up.

NOTE: Ignore -2-.

-- Disconnect the radiator fan electrical connectors -1 and 2-, to do this, push the clamp to the rear -arrow- and push the release down.

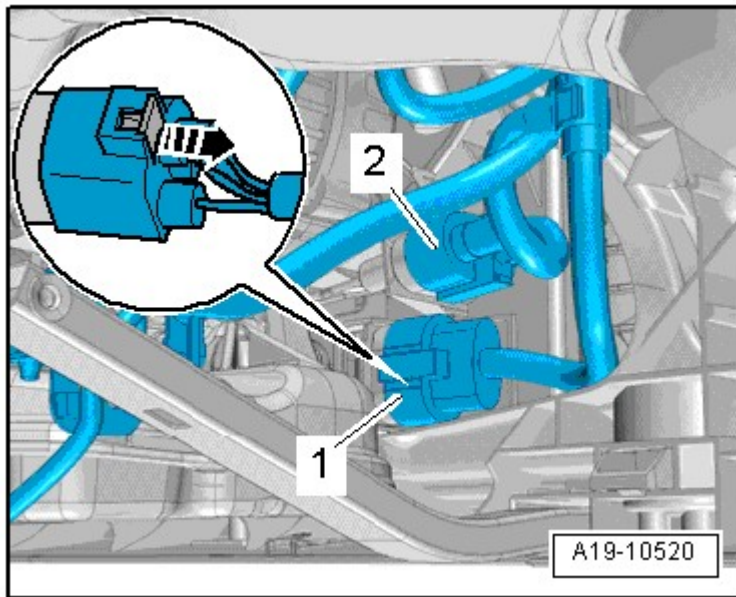


Fig. 105: Identifying Coolant Fan Electrical Connectors -1 And 2-
Courtesy of AUDI OF AMERICA, LLC

-- Free up the wiring harness.

-- Remove the left and right bolts -1- and nuts -3- and the lock carrier braces -2-.

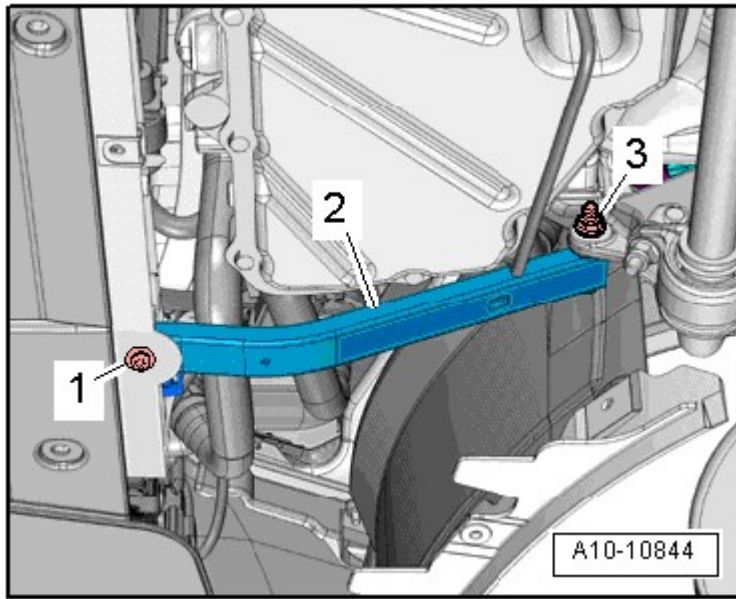


Fig. 106: Identifying Carrier Left Brace Components
Courtesy of AUDI OF AMERICA, LLC

WARNING: Risk of injury from fuel.

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

CAUTION: Follow the guidelines for cleanliness when working on the fuel supply system. Refer to CLEAN WORKING CONDITIONS .

-- Disconnect the fuel line -arrow-.

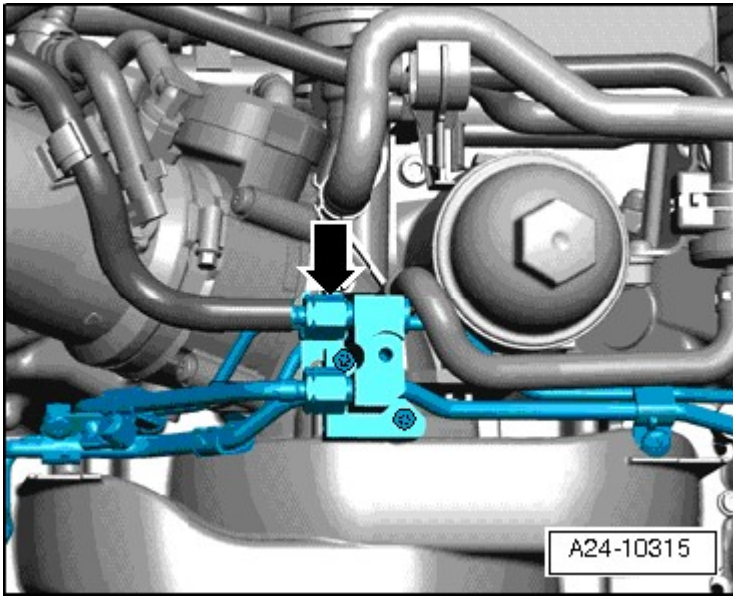


Fig. 107: Disconnecting Fuel Line
Courtesy of AUDI OF AMERICA, LLC

-- Free up the fuel line and the line to the EVAP canister on the air guide pipe.

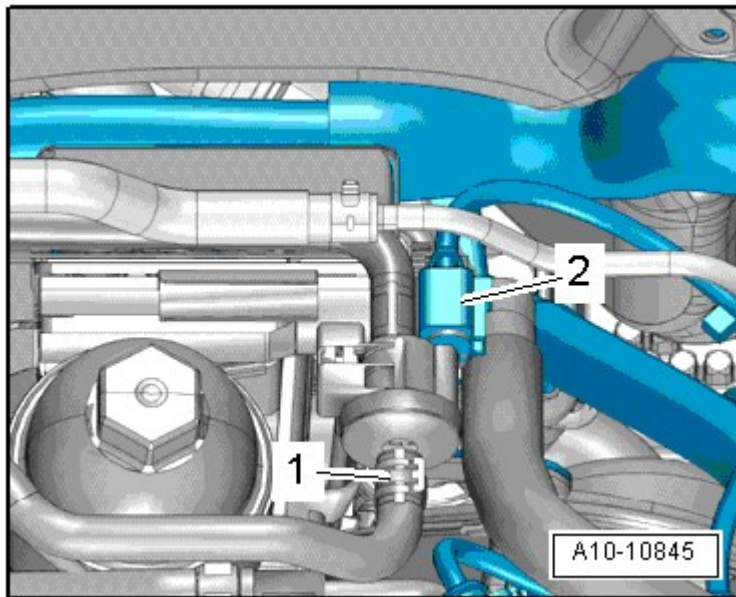


Fig. 108: Disconnecting Electrical Connector -2- On EVAP Canister Purge Regulator Valve 1 -N80- & Disconnect Vacuum Hose -1-
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the electrical connector -2- on the Evaporative Emission (EVAP) canister purge regulator valve 1 -N80- and disconnect the vacuum hose -1-.

-- Remove the EVAP canister purge regulator valve 1 from the bracket and lay aside with hose and fuel line

connected.

-- Disconnect the vacuum hose leading to the leak detection pump -V144- -arrow-.

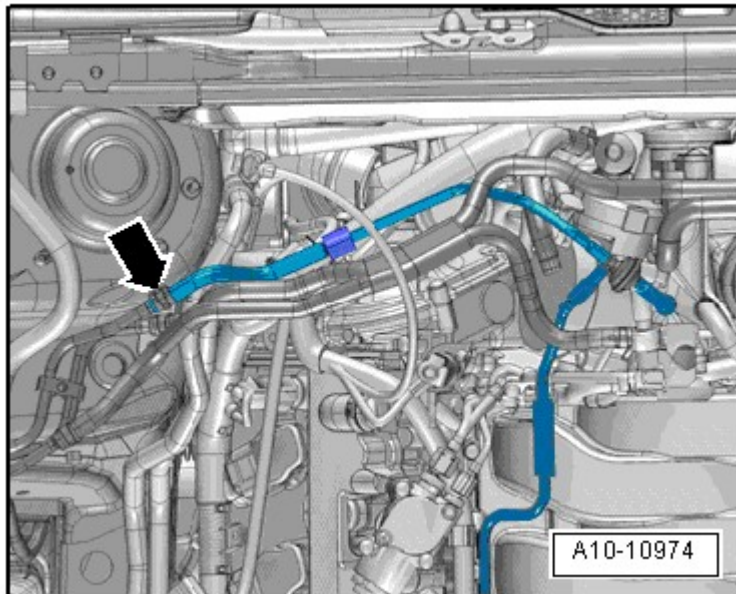


Fig. 109: Disconnecting Vacuum Hose Leading To Leak Detection Pump -V144- -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the air duct -arrows-.

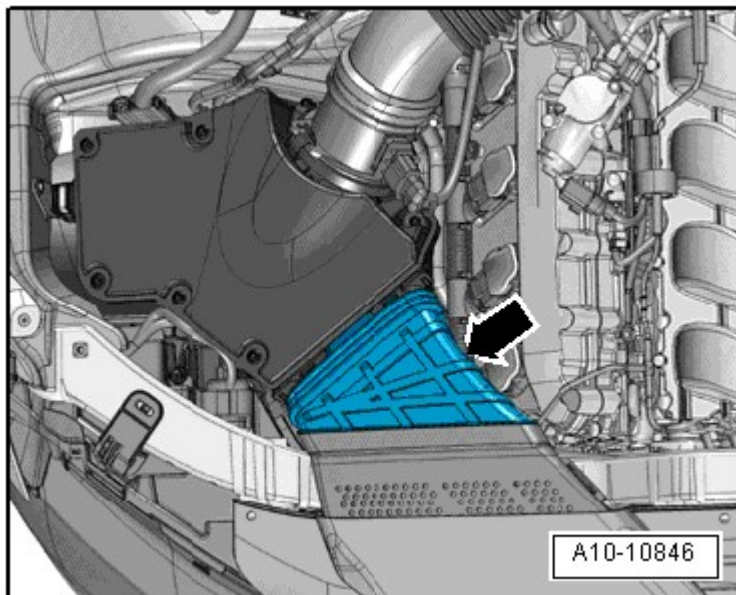


Fig. 110: Identifying Air Duct
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connector -1- from the Mass Airflow (MAF) sensor -G70-.

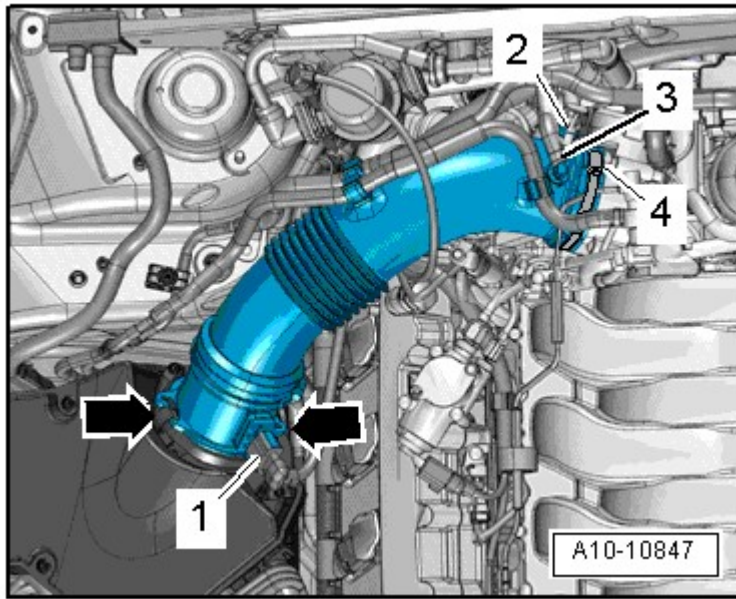


Fig. 111: Disconnecting Connector On Mass Airflow (MAF) Sensor
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the vacuum line -3- from the air guide pipe.

CAUTION: Risk of violating emissions legislation.

- **Do not open hose connection -2- !**

-- Lay aside air guide pipe with connected crankcase ventilation hose -2- by loosening hose clamp -4- and opening clips -arrows-.

-- Disconnect the vacuum line -1-.

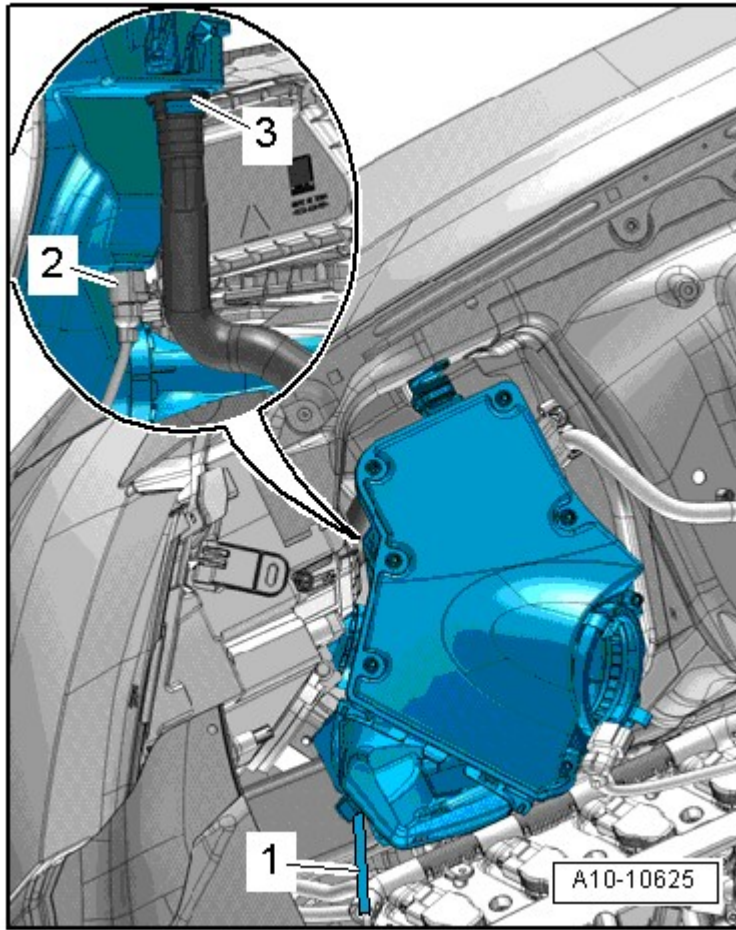


Fig. 112: Intake Air Switch-Over Valve -N335- -2-
Courtesy of AUDI OF AMERICA, LLC

- Remove the air filter housing and disconnect the electrical connector -2- on the rear side at the intake air switch-over valve -N335-.
- Remove hose -3- from the secondary air system.
- Disconnect the coolant hose by lifting the retaining clamps -2- and loosening the hose clamp -1- on the coolant tube.

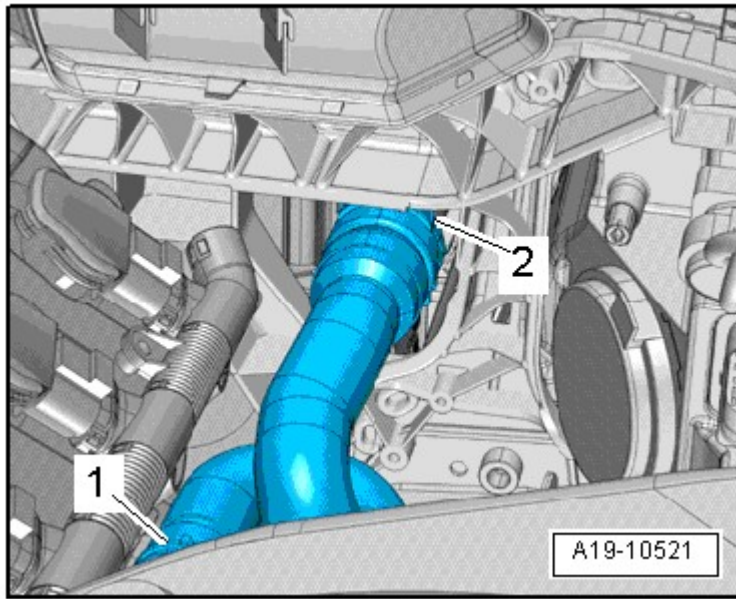


Fig. 113: Identifying Coolant Hose From Radiator And Right Coolant Pipe, Removal
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect electrical connector -1- for the brake system vacuum pump -V192- and free up electrical wiring.

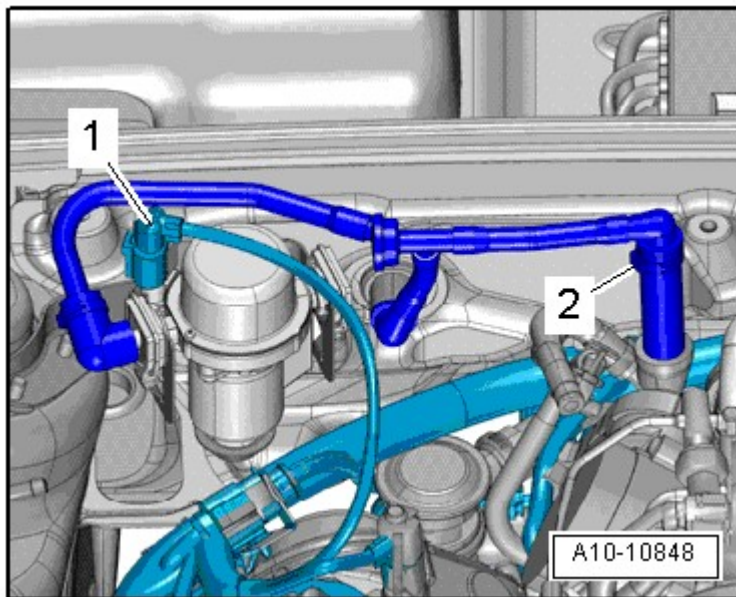


Fig. 114: Identifying Electrical Connector -1- & Vacuum Hose -2-
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the vacuum hose -2-.

-- Remove the coolant hoses -1 and 3- from the coolant overflow reservoir.

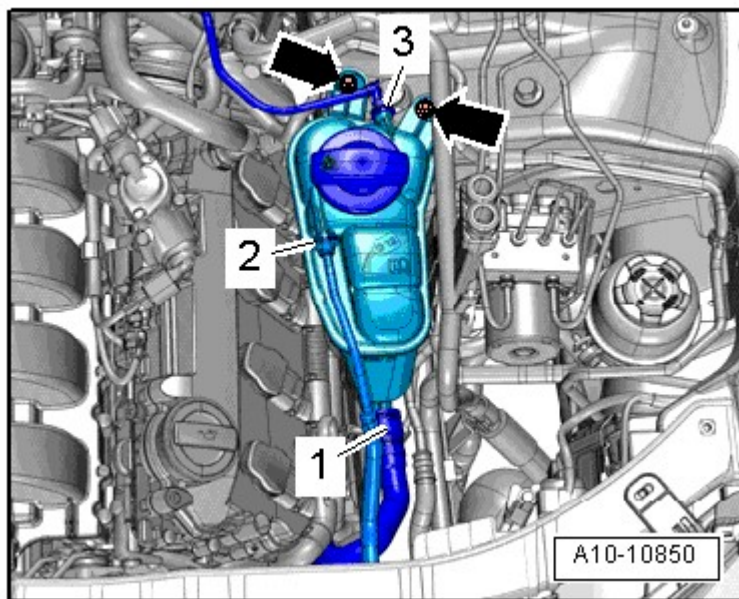


Fig. 115: Identifying Coolant Hose And Coolant Reservoir
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -2 and arrows-.

-- Remove the seal -arrow-.

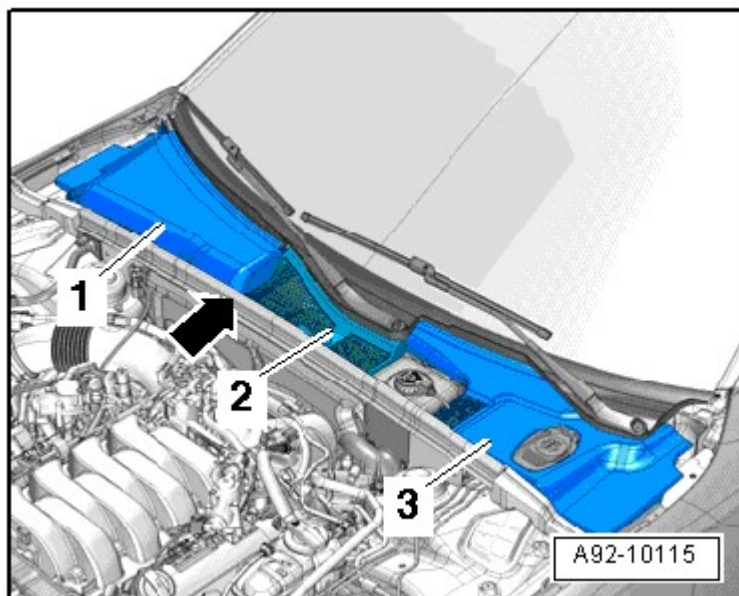


Fig. 116: Identifying Alarm Horn, Removal
Courtesy of AUDI OF AMERICA, LLC

-- Remove the plenum chamber cover. Refer to **Removal and Installation** .

-- Release the retainer -arrow A- and open the cover -arrow B-.

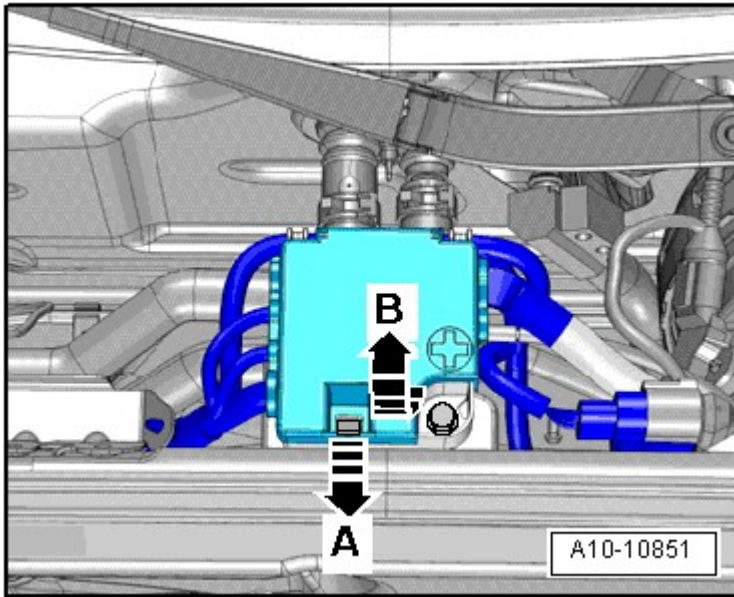


Fig. 117: Opening Terminal Box Cover
Courtesy of AUDI OF AMERICA, LLC

-- Remove the nuts -1 and 2- for the electrical wires.

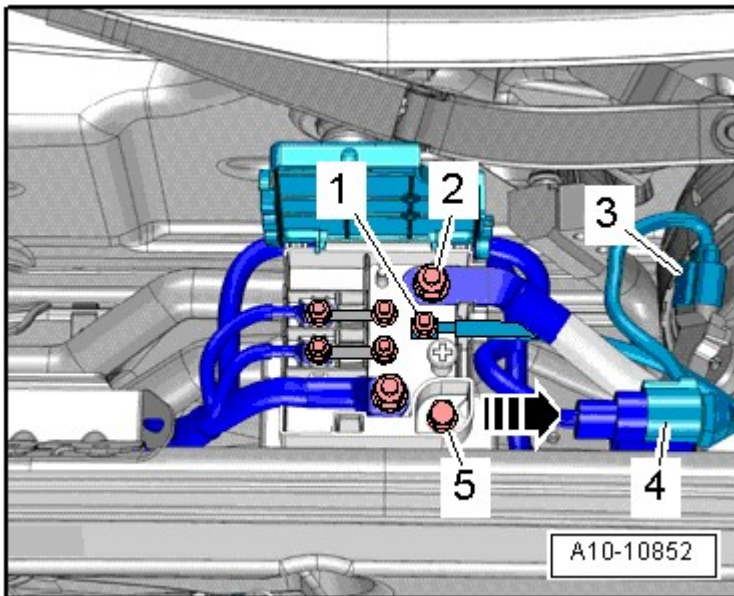


Fig. 118: Identifying Nuts, Bolts & Connectors
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connectors -3 and 4-.

-- Remove the bolt -5- and the terminal 30 wire junction 2 -TV22- from the tower brace -arrow-.

-- Release the retainers from the wheel housing side using a 5.5 mm open end wrench -1- and remove the wiring bushing -2- upward.

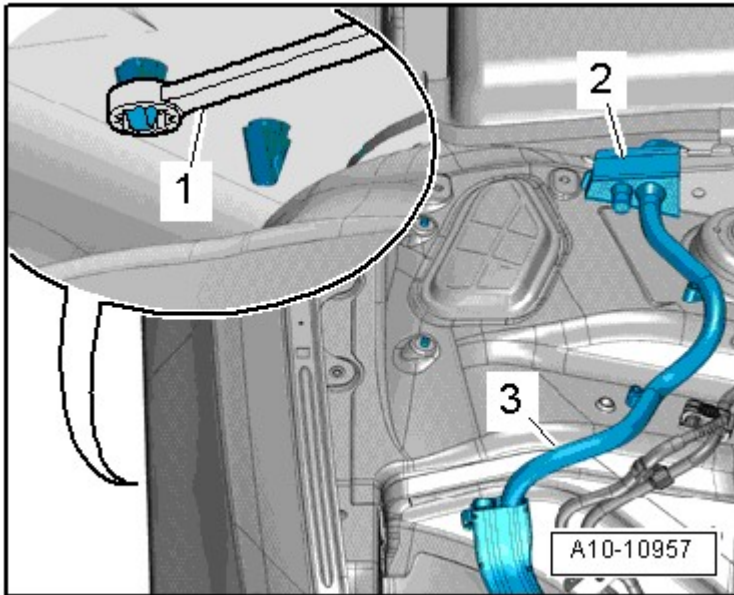


Fig. 119: Releasing Retainers From Wheel Housing Side Using A 5.5 Mm Open End Wrench
 Courtesy of AUDI OF AMERICA, LLC

-- Free up the wiring harness -3- to the generator and starter using the 80 - 200.

-- Free up the wiring duct by releasing the retainer -arrow B- and pulling the duct forward -arrow A-.

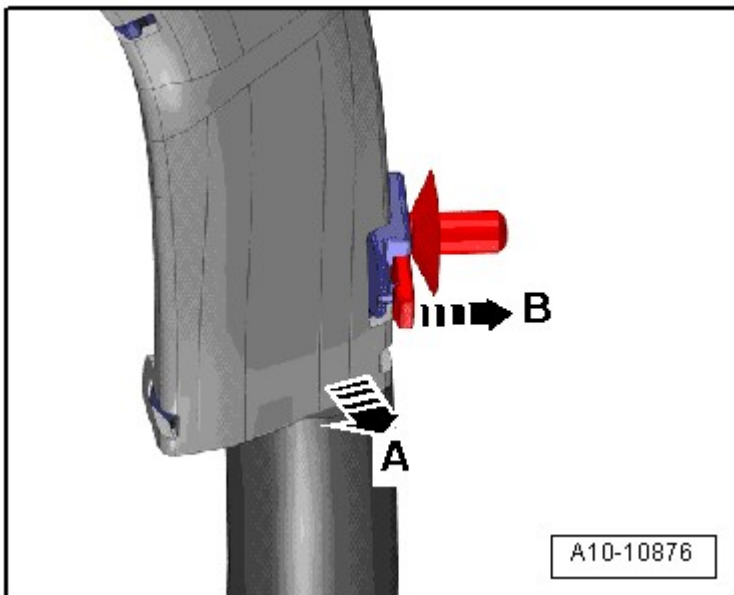


Fig. 120: Freeing Up Wiring Duct By Releasing Retainer
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the nut -1- and tilt the washer fluid filler neck upward -arrow A-.

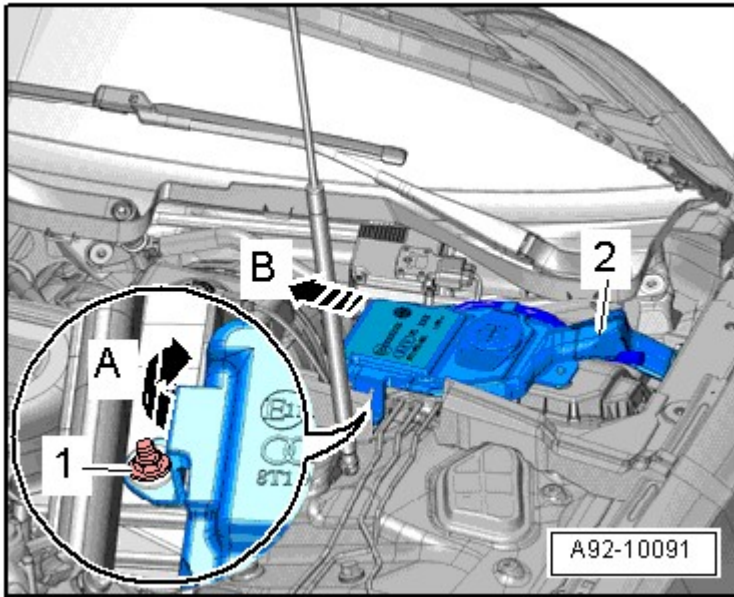


Fig. 121: Identifying Filler Neck With Filler Tube From Washer Fluid Reservoir And Opening In Body
Courtesy of AUDI OF AMERICA, LLC

-- Remove the filler neck -2- with the filler tube from the washer fluid reservoir and the opening in the body -arrow B-.

-- Remove the bolts -1- and nuts -2- and the tower brace -3-. The procedure for doing this depends on the version.

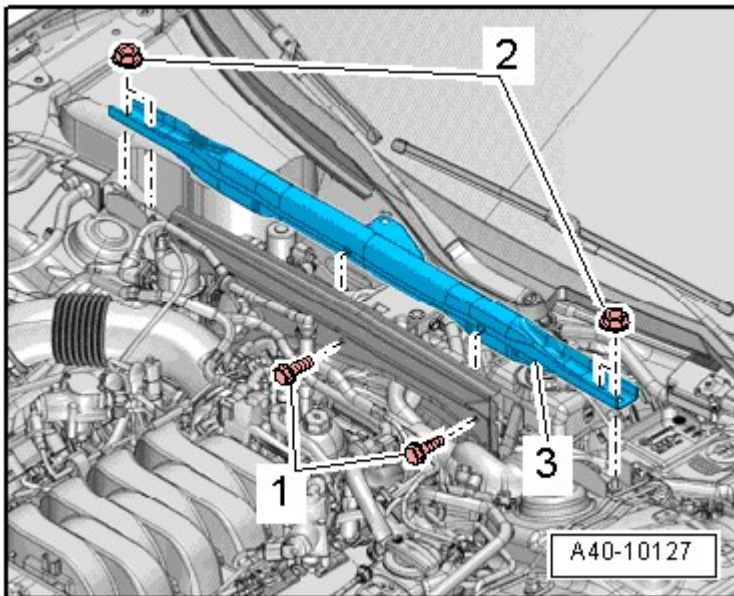


Fig. 122: Identifying Bolts, Nuts And Tower Brace
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and the engine compartment E-box cover.

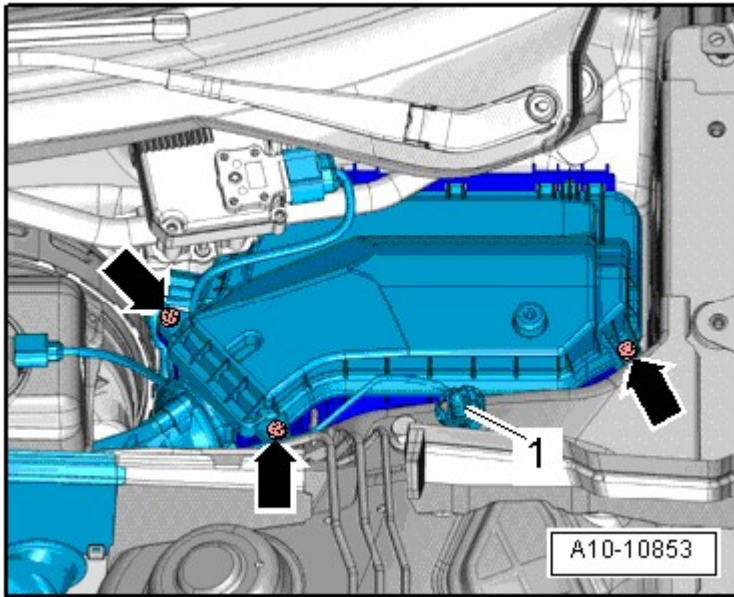


Fig. 123: Identifying E-Box Bolts & Cover
Courtesy of AUDI OF AMERICA, LLC

-- Remove the nut -1- and free up the wire.

-- Release the retainers -A arrows- and remove the engine control module -arrow B-.

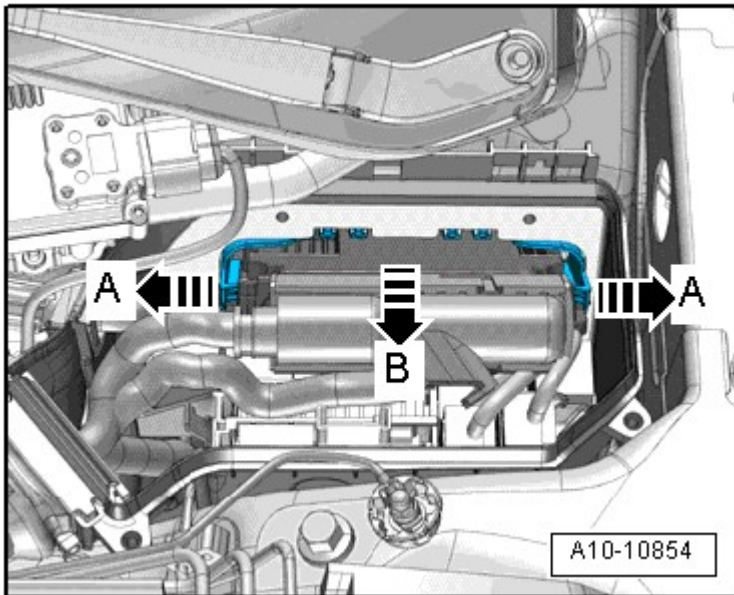


Fig. 124: Engine Control Module (ECM)
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connector -2- if applicable.

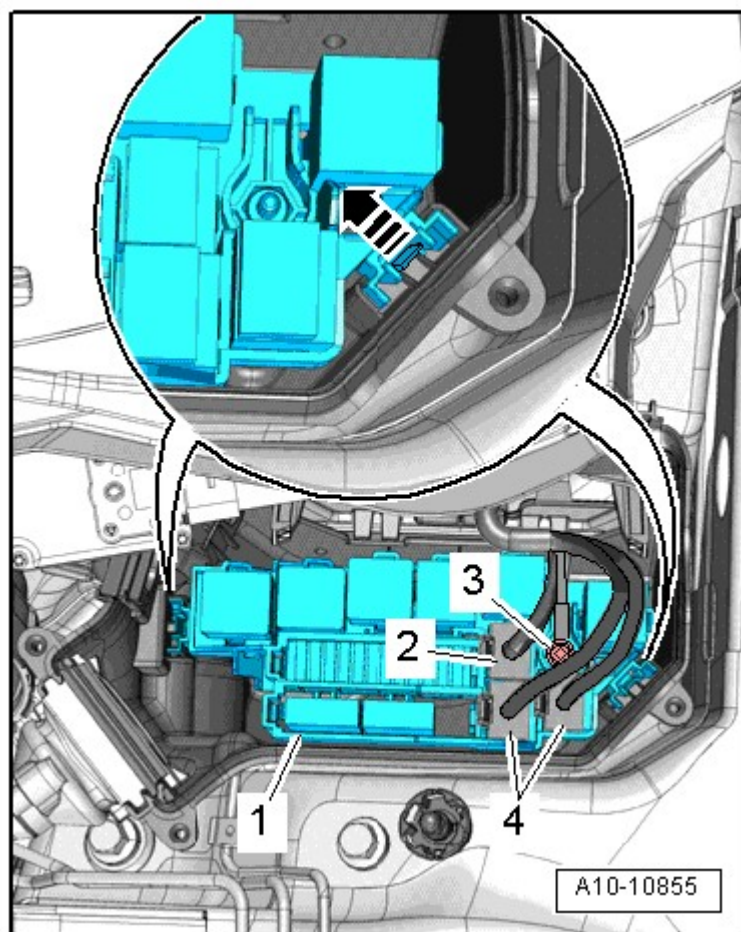


Fig. 125: Disconnecting Electrical Connectors

Courtesy of AUDI OF AMERICA, LLC

- Disconnect the electrical connectors -4- and remove the nut -3- for the electrical wire.
- Release the retainers -arrow- and remove the relay carrier with the fuse holder -1-.
- Disengage the engine wiring harness at the engine compartment E-box and free it up.
- Open the retainers -arrows A- and remove the harness opening -2- -arrow B-.

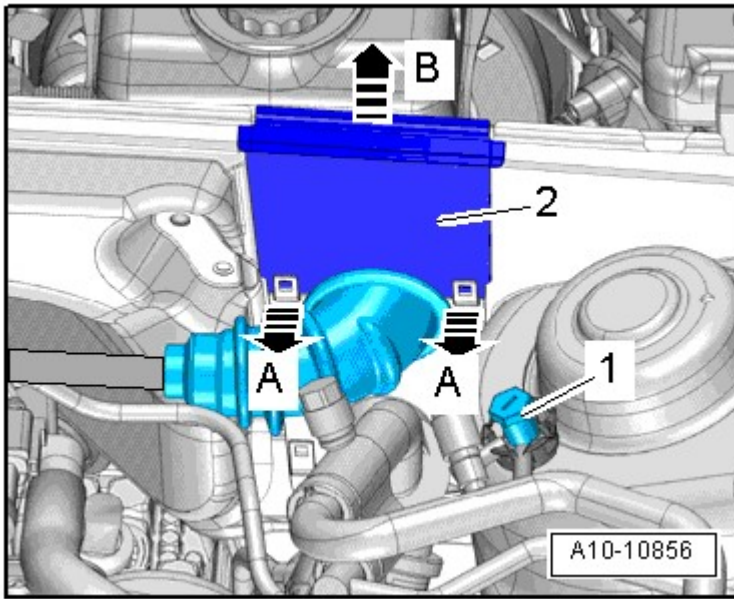


Fig. 126: Disengaging Catches -Arrows A- And Remove Upper Part Of Line Pass-Through -2- Upward - Arrow B-
 Courtesy of AUDI OF AMERICA, LLC

- Remove the ground pin -1- and free up the ground wire.
- Lay the wiring harness on the engine and secure the Engine Control Module (ECM) so that it cannot fall.
- Mark and remove the coolant hoses -1 and 2- for re-installing.

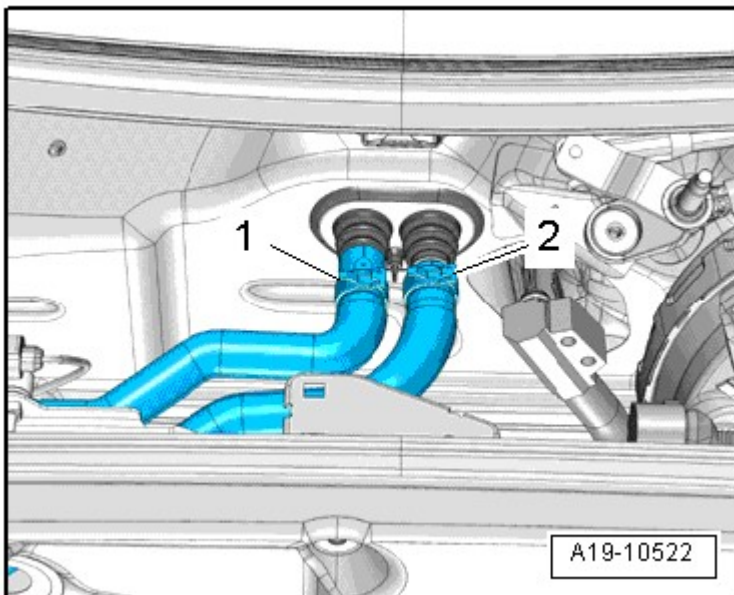


Fig. 127: Identifying Clamp -2- And Remove Coolant Hose
 Courtesy of AUDI OF AMERICA, LLC

- Press the coolant hoses with hose guide in the engine compartment.
- Disconnect the electrical connectors -arrow- at the left and right on the front speed sensors.

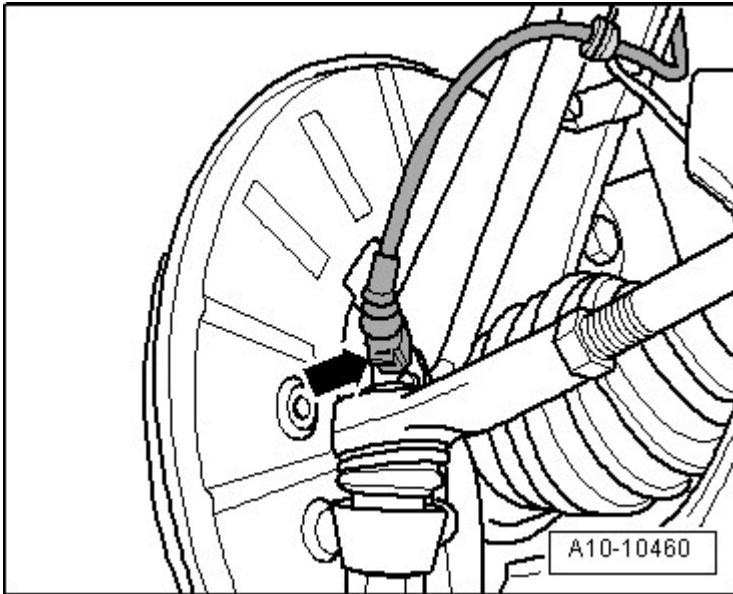


Fig. 128: Identifying Speed Sensor Connector
Courtesy of AUDI OF AMERICA, LLC

- Disconnect the connector -1- headlamp range control sensor 1 -G233- electrical sensor -arrow- and free up electrical wiring.

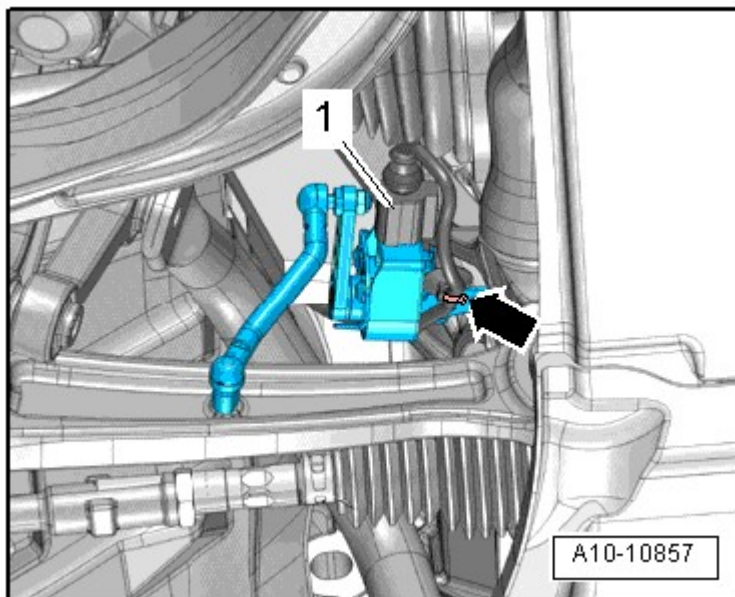


Fig. 129: Disconnecting Electrical Connector On Left Front Level Control System Sensor
Courtesy of AUDI OF AMERICA, LLC

-- Free up the electrical connector -2- on the bracket by pulling the retainer back -arrow A- and turning the connector approximately 90° in the direction of -arrow B-.

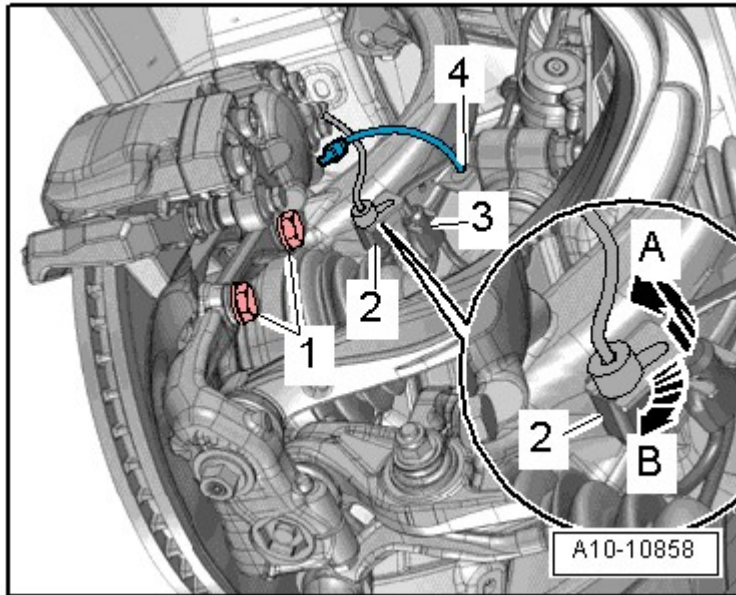


Fig. 130: Freeing Up Electrical Connector
Courtesy of AUDI OF AMERICA, LLC

-- Free up the electrical wiring -3- and brake line -4- on the bracket.

-- Remove the bolts -1- and secure the brake caliper, with the brake line still connected, inside the wheel housing using wire.

CAUTION: Risk of damaging brake pistons.

- Do not operate brake pedal with brake caliper removed.

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

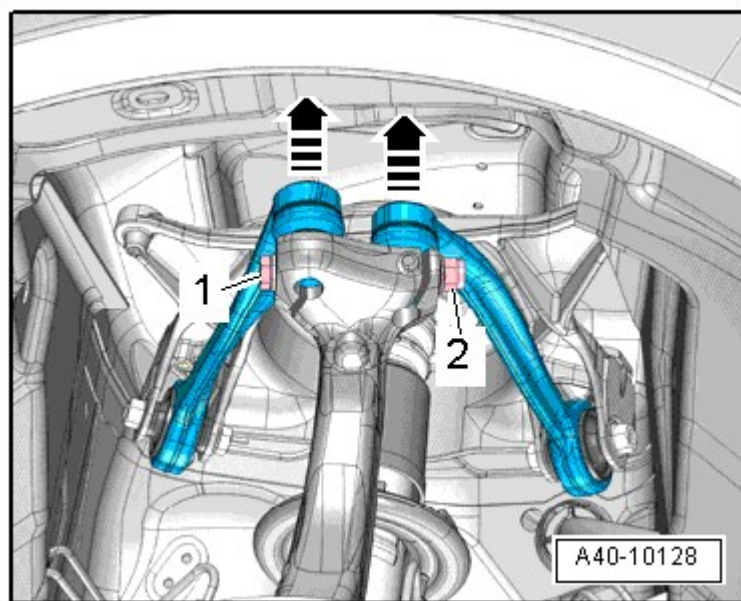


Fig. 131: Identifying Nut And Bolt

Courtesy of AUDI OF AMERICA, LLC

-- Remove the upper control arm upward from the wheel bearing housing -arrows-.

-- Repeat the procedure on the other side of the vehicle.

Vehicles through VIN 8T-8A-011200:

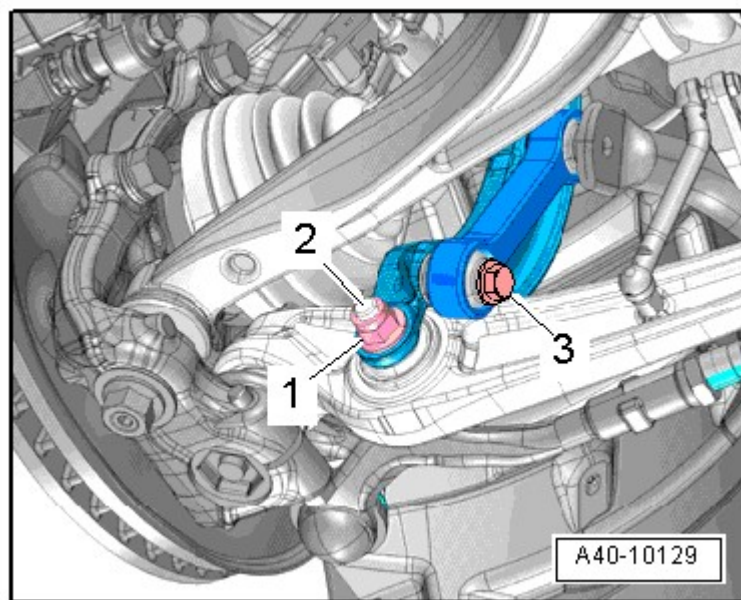


Fig. 132: Identifying Left And Right Bolts

Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right stabilizer bar bolt -3-.

-- Remove the left and right nuts -1-.

NOTE: The bolts -2- will be removed later.

Vehicles from VIN 8T-8A-011201:

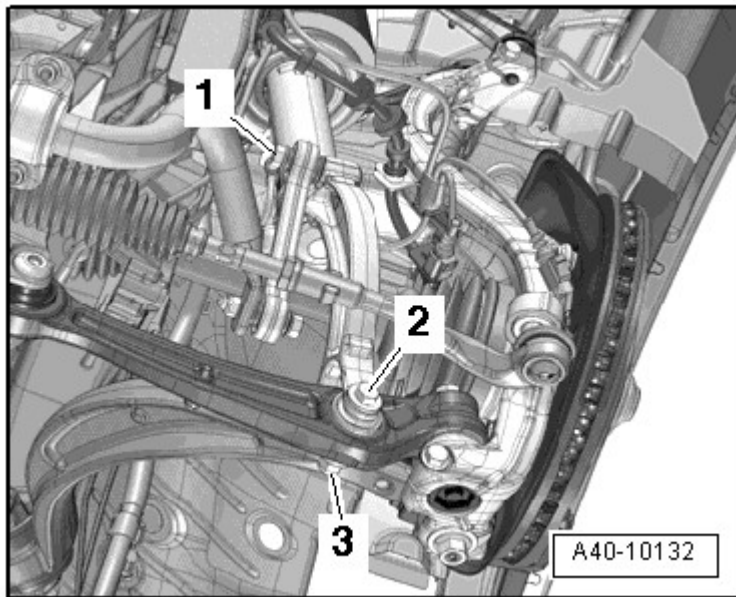


Fig. 133: Identifying Left And Right Stabilizer Bar Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right stabilizer bar bolt -1-.

-- Remove the left and right nuts -3-.

NOTE: The bolts -2- will be removed later.

All Vehicles:

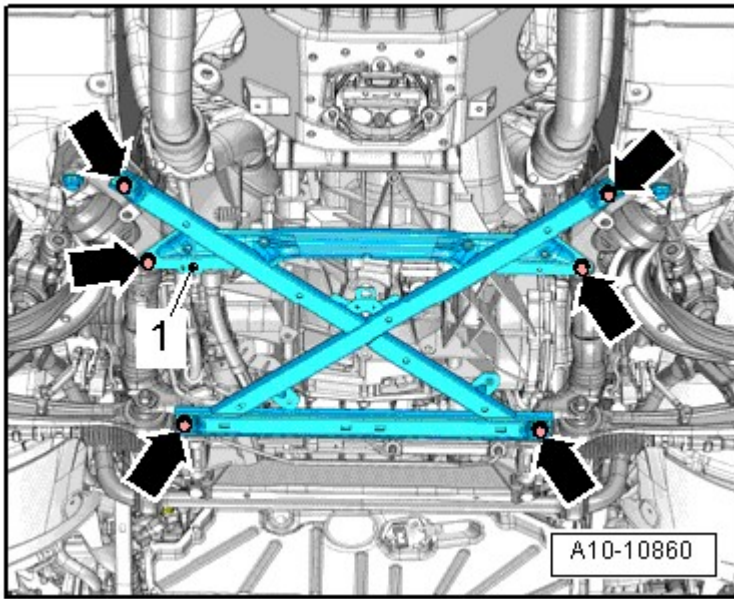


Fig. 134: Identifying Subframe Crossbrace
Courtesy of AUDI OF AMERICA, LLC

CAUTION: The suspension components could be damaged.

- Do not rest the vehicle on its wheels if the subframe mount, the steering gear or the subframe crossbrace are not installed correctly.

-- Remove the subframe crossbrace. Refer to **Removal and Installation** .

-- Remove the bolts -arrows- and the crossmember.

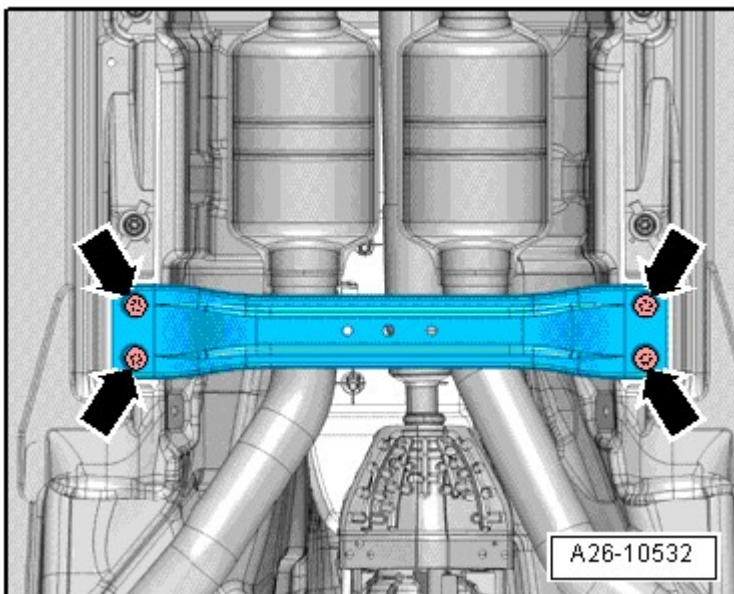


Fig. 135: Identifying Bolts And Front Crossmember

Courtesy of AUDI OF AMERICA, LLC

-- Remove the left front muffler nuts -arrows-.

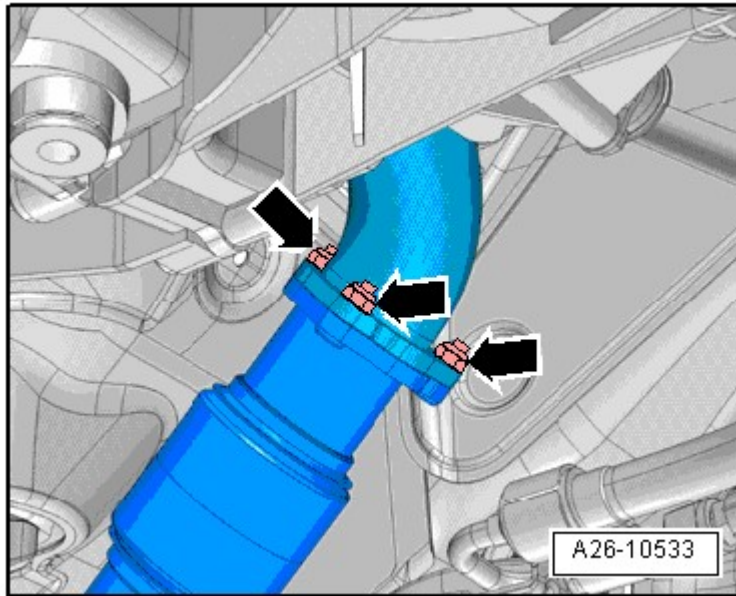


Fig. 136: Identifying Left Front Muffler Nuts

Courtesy of AUDI OF AMERICA, LLC

-- Remove the right front muffler nuts -arrows-.

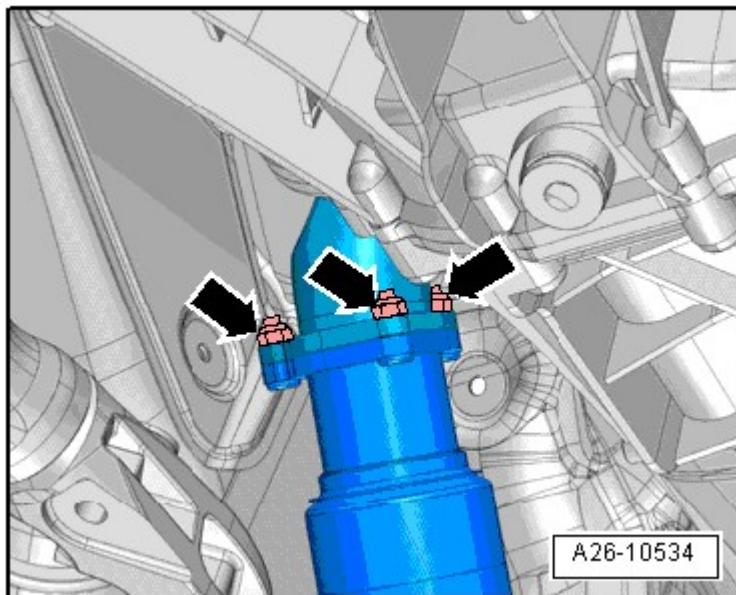


Fig. 137: Identifying Right Front Muffler Nuts

Courtesy of AUDI OF AMERICA, LLC

CAUTION: The decoupling elements in the front muffler could be damaged.

- Do not bend decoupling elements in front muffler more than 10°.

-- Loosen the clamping sleeves -1 and 2-, slide them back and remove the left and right front mufflers.

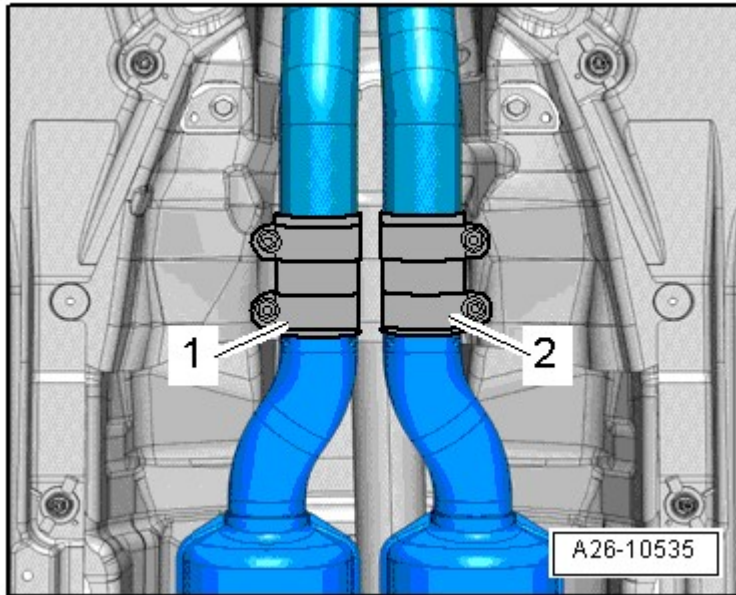


Fig. 138: Identifying Bolts Vehicles With Dual Exhaust System
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolts -arrows- and the driveshaft heat shield -1-.

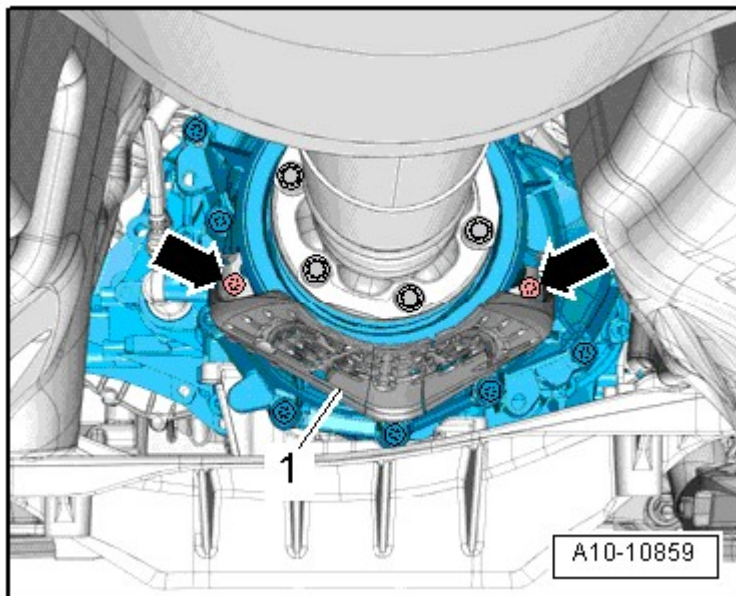


Fig. 139: Driveshaft Heat Shield - Tightening Specification

Courtesy of AUDI OF AMERICA, LLC

-- Remove the driveshaft from the transmission. Refer to **Removal and Installation** .

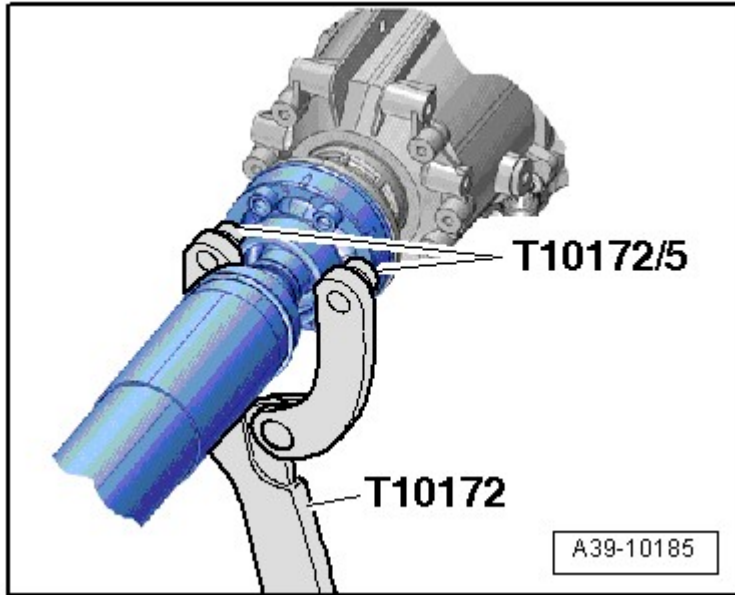


Fig. 140: Counterholding Driveshaft Using T10172 And T10172/5
Courtesy of AUDI OF AMERICA, LLC

-- Slide the driveshaft toward the rear final drive; the CV joints can move axially.

-- Secure the driveshaft to the side.

-- Remove the steering intermediate shaft from the steering gear push them upward. Refer to **Removal and Installation** .

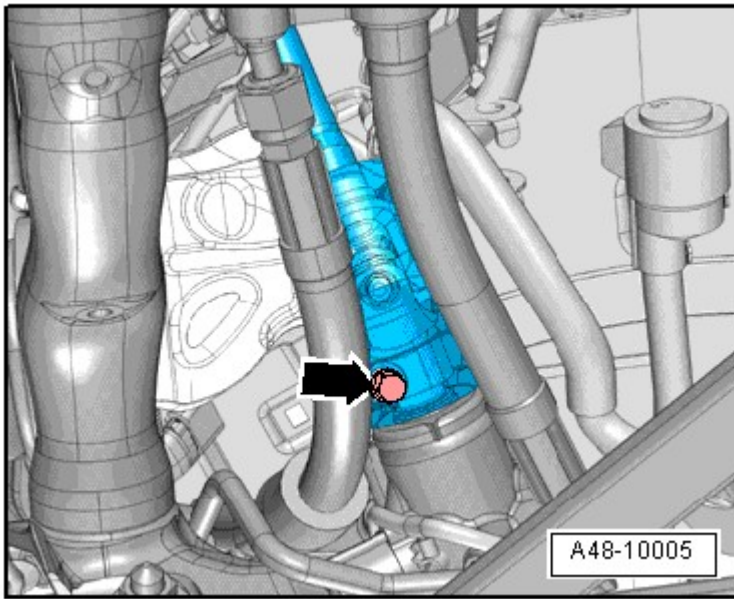


Fig. 141: Locating Universal Joint Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -2- and secure the clutch slave cylinder sideways in the engine compartment.

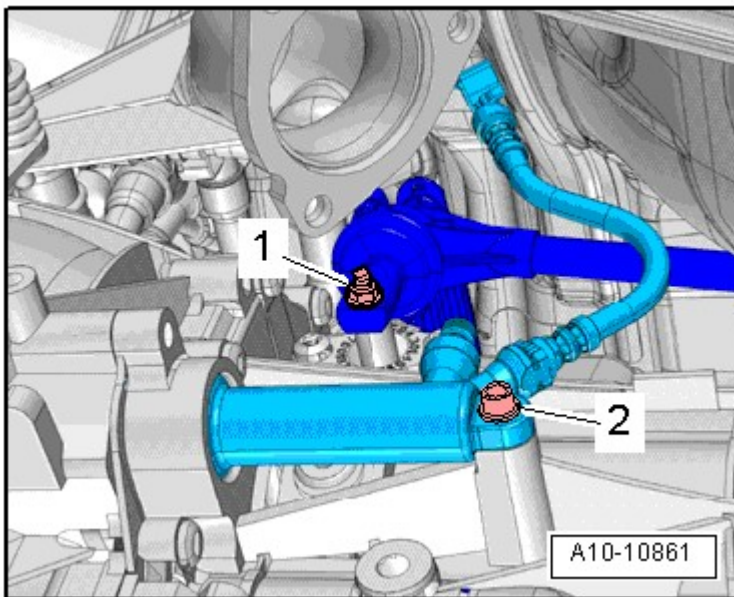


Fig. 142: Identifying Bolt And Clutch Slave Cylinder Secured Sideways In Engine Compartment
Courtesy of AUDI OF AMERICA, LLC

CAUTION: Risk of damaging clutch slave cylinder.

- Do not operate the clutch pedal anymore after slave cylinder has been removed.

-- Remove the selector rod nut -1-.

-- Position the T40160 and remove the selector rod -1-.

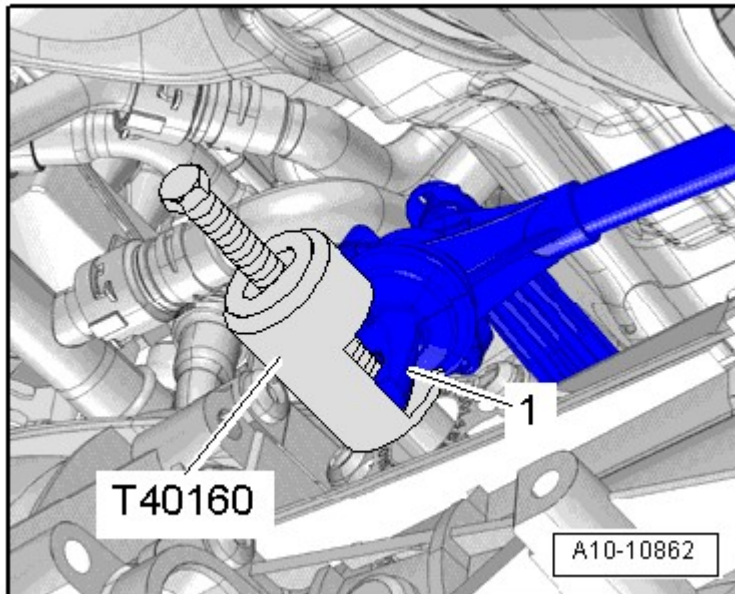


Fig. 143: Positioning Puller T40160 And Remove Selector Rod
Courtesy of AUDI OF AMERICA, LLC

Prepare Scissor Lift Platform:

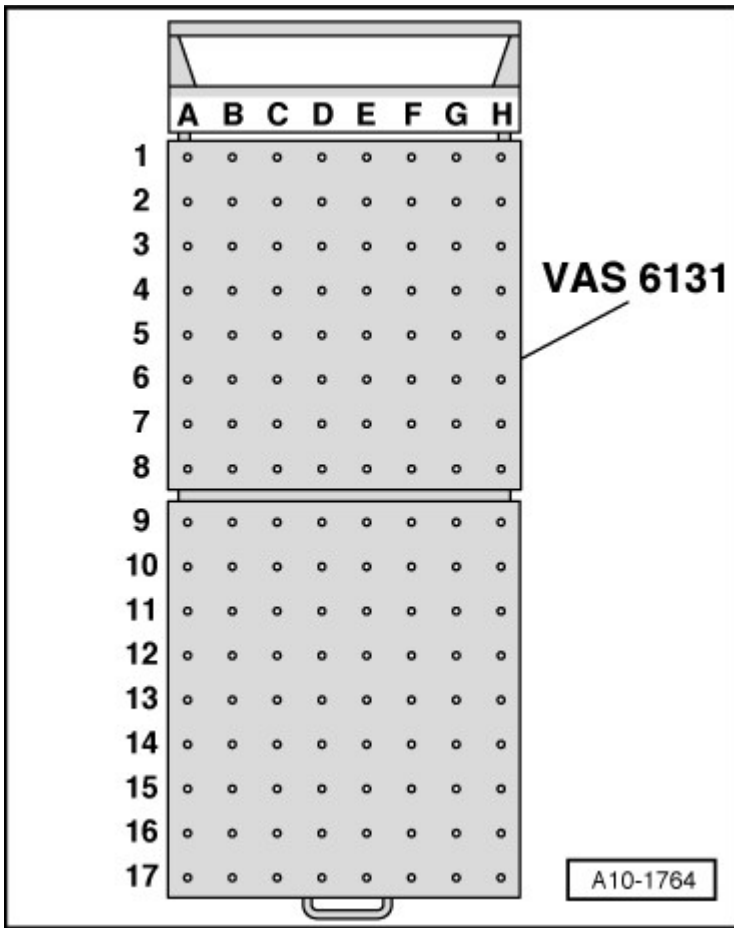


Fig. 144: Identifying Scissor Lift Platform VAS 6131
Courtesy of AUDI OF AMERICA, LLC

-- Equip the VAS 6131 A with the VAS 6131/10 and VAS 6131/13 as follows:

Platform Coordinates	Parts from VAS 6131/10 and VAS 6131/13			
B4	/13-4	/10-4	/10-5	/13-1
G4	/13-4	/10-4	/10-5	/13-1
B6	/10-1	/10-2	/10-5	/10-11
G6	/10-1	/10-2	/10-5	/10-11
A8+C8	/13-6			/13-2
F8+H8	/13-6			/13-2
C14	/10-1	/10-3	/10-5	/10-13
F14	/10-1	/10-3	/10-5	/10-10

-- Next secure mounting elements to scissor lift table by hand.

-- Position the VAS 6131 A horizontally.

- Note bubble level (sight glass) on support platform.

-- Move the VAS 6131 A under the engine/transmission subassembly.

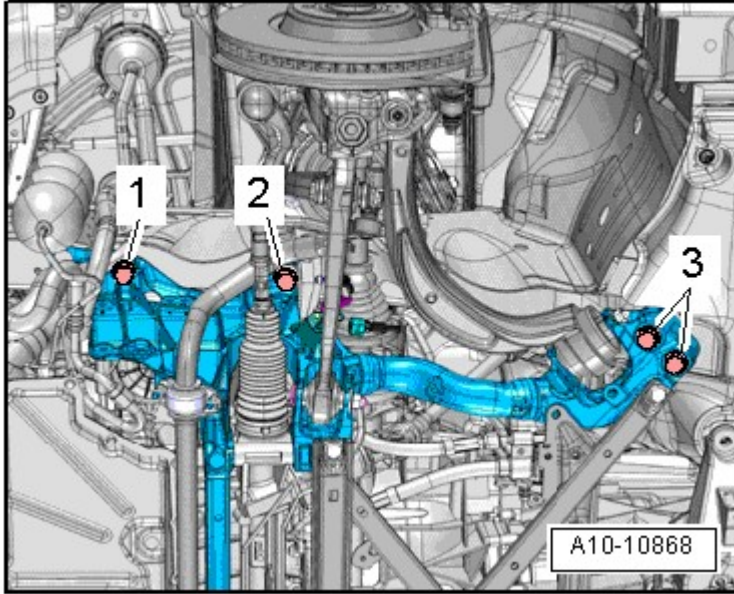


Fig. 145: Identifying Subframe Bolts (Tighten To Specifications)

Courtesy of AUDI OF AMERICA, LLC

WARNING: The subframe could cause an accident if it is not secured.

- Do not loosen the subframe bolts -2 and 3-.

-- Remove the left and right subframe bolts -1-.

-- Attach the mounting elements from the VAS 6131/10 and VAS 6131/13 at the left and right front of the subframe as shown in the illustration.

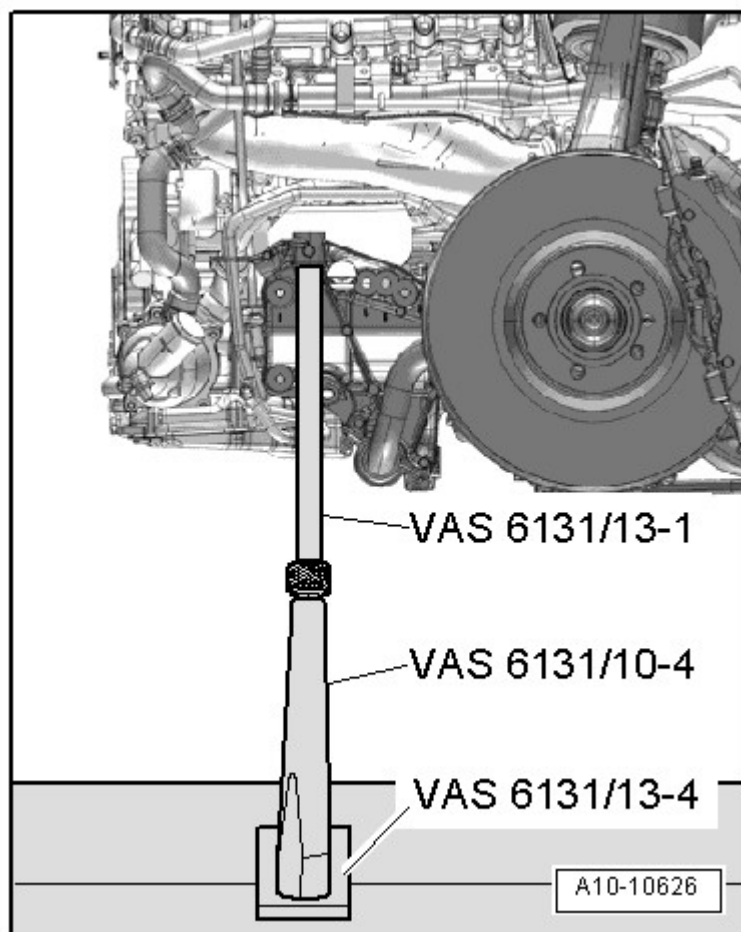


Fig. 146: Attaching At Left And Right Front Of Subframe
Courtesy of AUDI OF AMERICA, LLC

-- Ensure threaded spindles are completely installed.

-- Attach the mounting elements from the VAS 6131/10 at the left and right rear on the subframe crossbrace front connecting points as shown in the illustration.

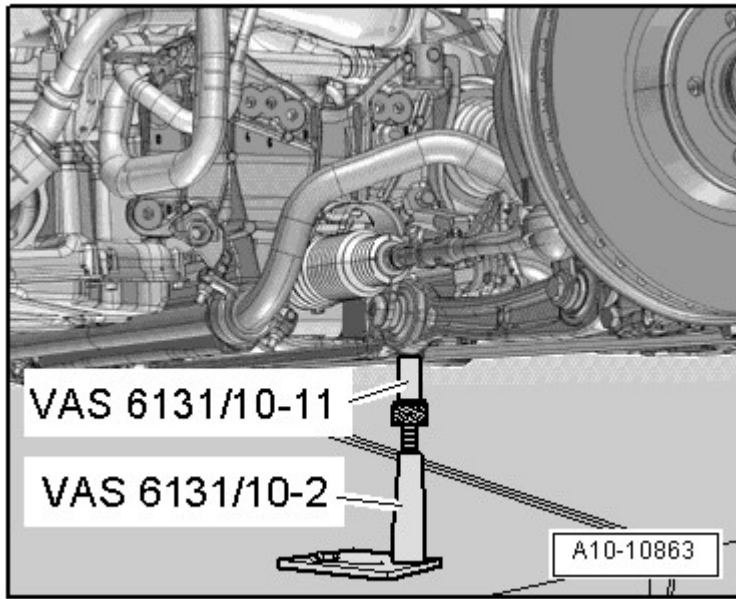


Fig. 147: Attaching At Left And Right Rear Of Subframe
 Courtesy of AUDI OF AMERICA, LLC

-- Attach mounting elements from the VAS 6131/13 at the lower left and right of the wheel bearing housing as shown in the illustration.

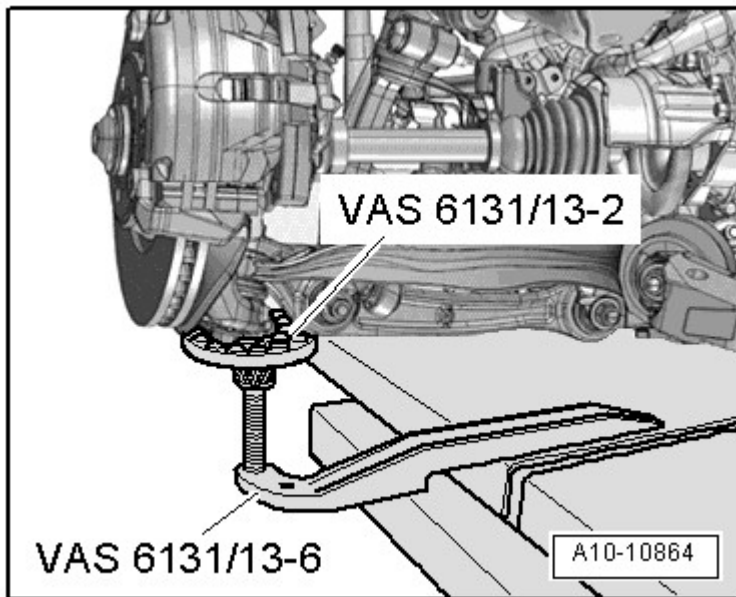


Fig. 148: Attaching At Lower Left And Right Of Wheel Bearing Housing
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the noise insulation retaining clips from the crossmember.

-- Attach the mounting elements from the VAS 6131/10 at the left and right rear of the crossmember as shown in the illustration.

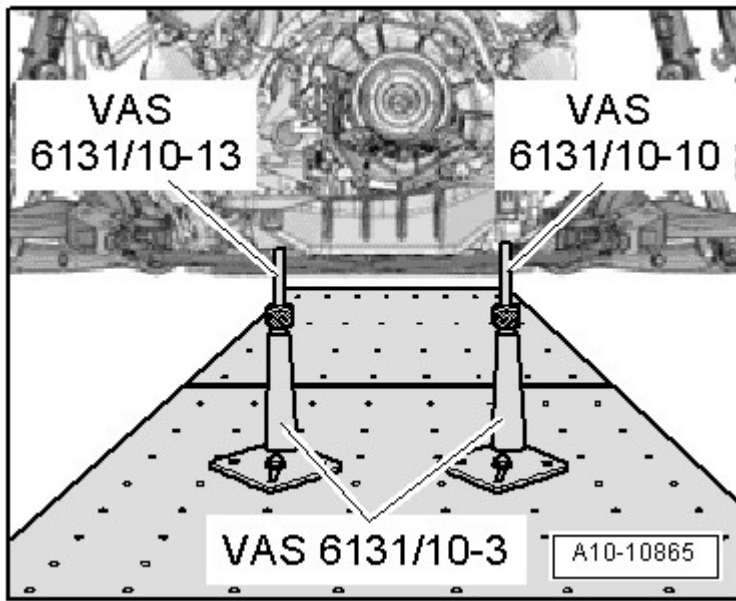


Fig. 149: Attaching Mounting Elements From VAS 6131/10 At Left And Right Rear Of Crossmember
 Courtesy of AUDI OF AMERICA, LLC

- Rotate the mounting element spindles upward until all the mounting pins come into contact with the mounting points.
- Attach mounting element base plates to the VAS 6131 A and tighten to 20 Nm.
- Mark the location of the subframe and engine carrier to the longitudinal members using a felt-tip pen.

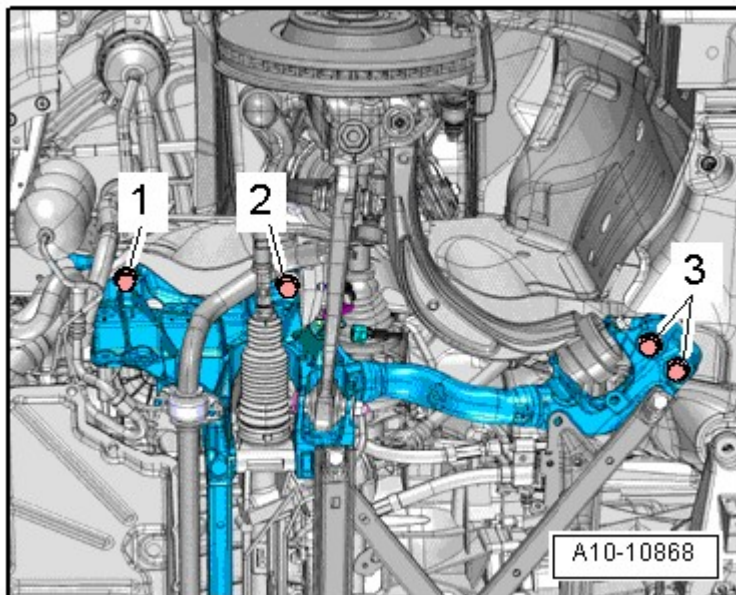


Fig. 150: Identifying Subframe Bolts (Tighten To Specifications)
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right subframe bolts -2 and 3- in a diagonal sequence in stages.

NOTE: Ignore -1-.

-- Remove the bolts -arrows- and remove the tunnel crossmember.

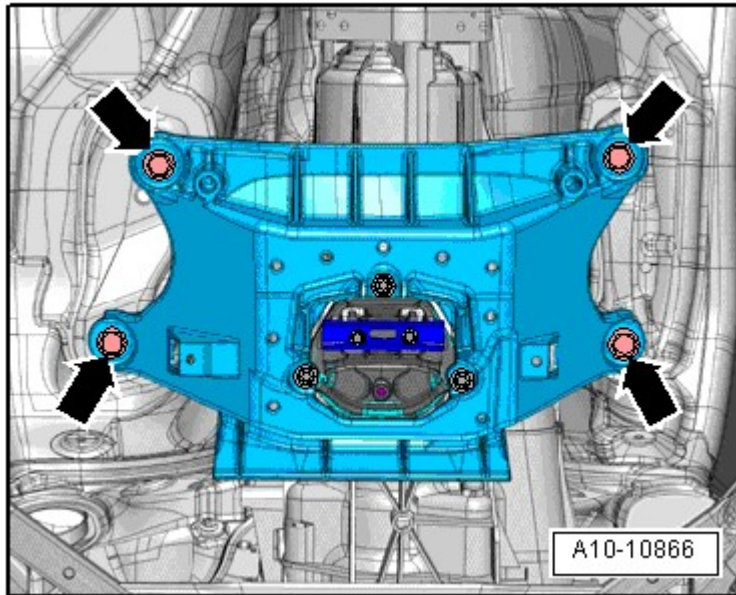


Fig. 151: Identifying Bolts & Tunnel Crossmember
Courtesy of AUDI OF AMERICA, LLC

Vehicles through VIN 8T-8A-011200:

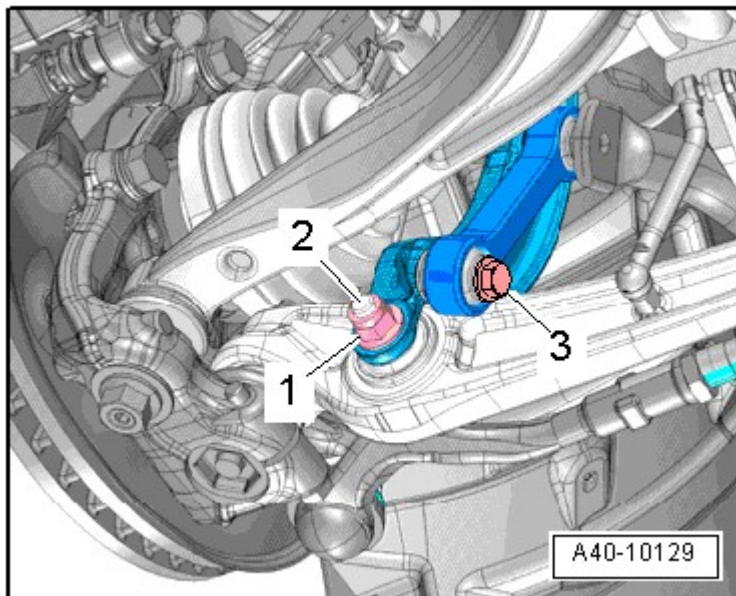


Fig. 152: Identifying Left And Right Bolts

Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right bolts -2-.

Vehicles from VIN 8T-8A-011201:

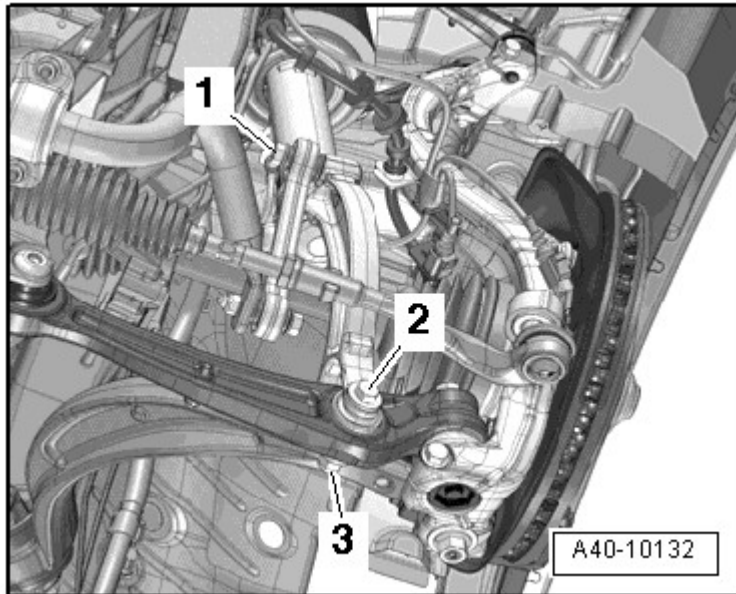


Fig. 153: Identifying Left And Right Stabilizer Bar Bolt

Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right bolts -2-.

All Vehicles:

CAUTION: Risk of damaging hose and wiring connections as well as the engine compartment.

- Make sure all the hoses and lines between the engine, transmission, subframe and body have been disconnected.
- Carefully guide the engine-transmission assembly with subframe out of the engine compartment while lowering.

-- Next lower engine/transmission subassembly with VAS 6131 A only by dimension -a-.

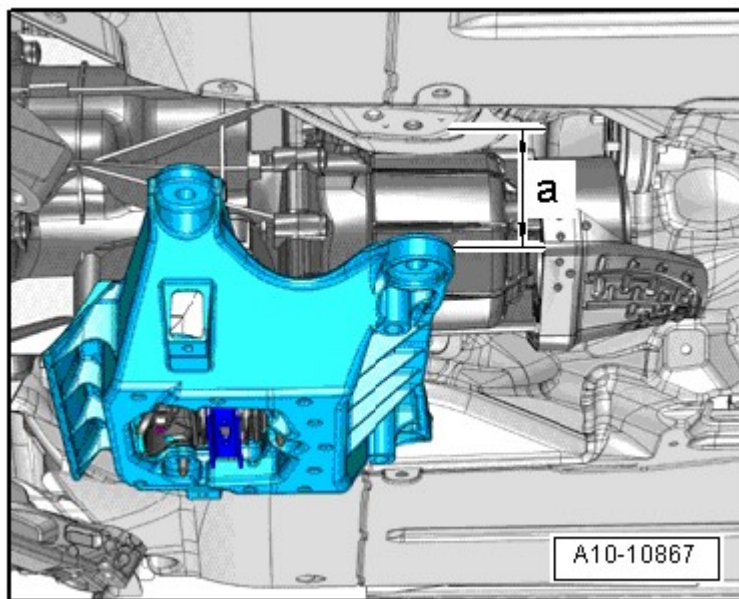


Fig. 154: Lowering Transmission
Courtesy of AUDI OF AMERICA, LLC

- Dimension -a- = 100 mm maximum.

-- Remove the bolts -1 and 3- -3- for the selector rod and push rod.

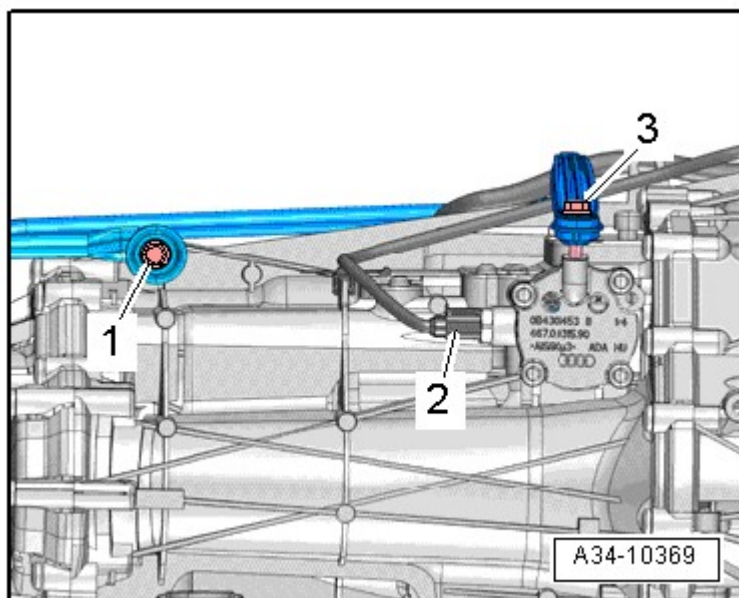


Fig. 155: Attaching Bolts And For Selector Rod And Push Rod
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -2-.

-- Lower the engine/transmission subassembly more.

-- Remove the VAS 6131 A with the engine/transmission subassembly under the vehicle.

ENGINE AND MANUAL TRANSMISSION, SEPARATING

Special tools and workshop equipment required

- Scissor-Type Assembly Platform VAS 6131 A
- Support Set VAS 6131/10, Supplementary Set VAS 6131/13-7 and Transmission Support VAS 6131/14
- Adapter T40257
- Wrench T40263
- Jointed Socket, 12 mm T40220 for engines through engine serial number CAU 005 521
- M10 x 65 bolt

Procedure

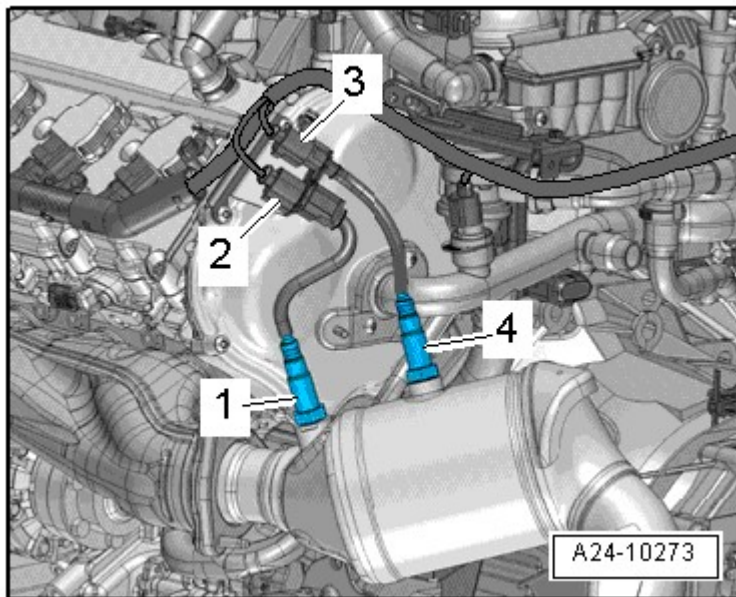


Fig. 156: Identifying Oxygen Sensor Electrical Connectors
Courtesy of AUDI OF AMERICA, LLC

- Engine/transmission assembly removed and placed on the VAS 6131 A.

-- Remove the electrical connectors from bracket and disconnect:

2 - For Heated Oxygen Sensor (HO2S) 2 -G108-

3 - For Oxygen Sensor (O2S) 2 after catalytic converter -G131-

NOTE: Ignore -1 and 4-.

-- Remove the nuts -arrows- using the T40220.

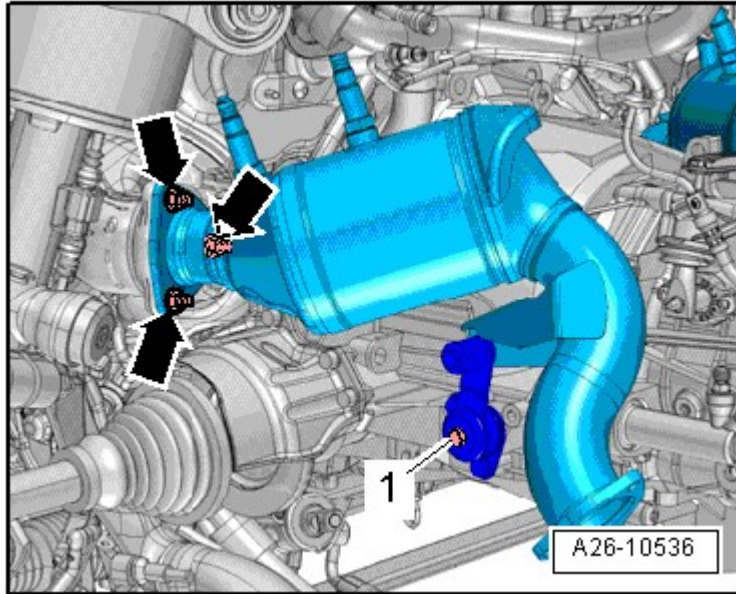


Fig. 157: Identifying Left Catalytic Converter, Nuts & Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -1- and the left catalytic converter.

-- Remove electrical connectors from bracket and disconnect:

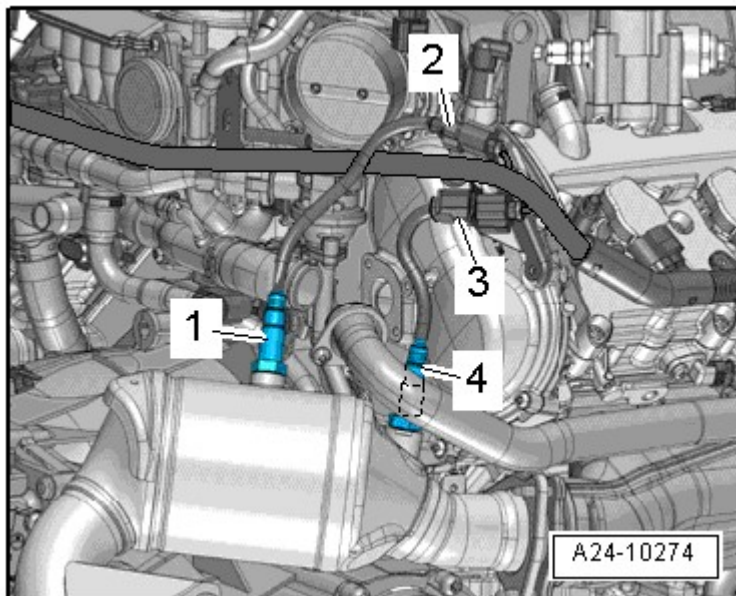


Fig. 158: Identifying Oxygen Sensor Electrical Connectors

Courtesy of AUDI OF AMERICA, LLC

2 - For Oxygen Sensor (O2S) after Three Way Catalytic Converter (TWC) -G130-

3 - For Heated Oxygen Sensor (HO2S) -G39-

NOTE: Ignore -1 and 4-.

-- Remove the nuts -arrows- using the T40220.

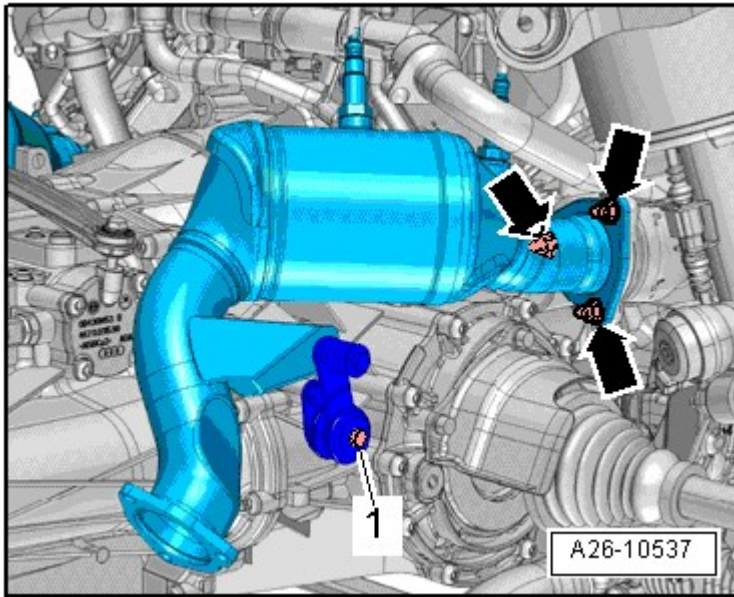


Fig. 159: Identifying Nuts And Bolt, Removal

Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -1- and the right catalytic converter.

-- Disconnect the electrical connectors -1- leading to the steering gear -2- and on the Engine Speed (RPM) sensor -G28- and free up the electrical wires.

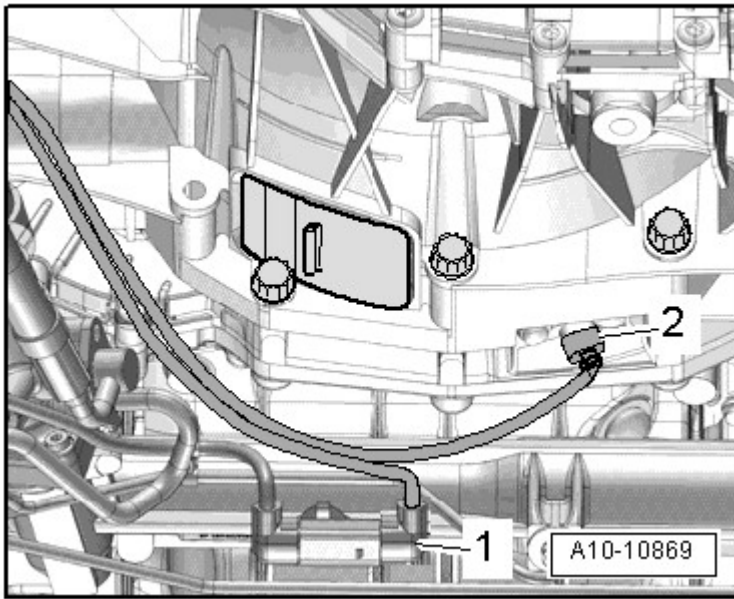


Fig. 160: Disconnecting Connector From Servotronic Solenoid Valve
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect electrical connector -2- on the back-up lamp switch -F4-.

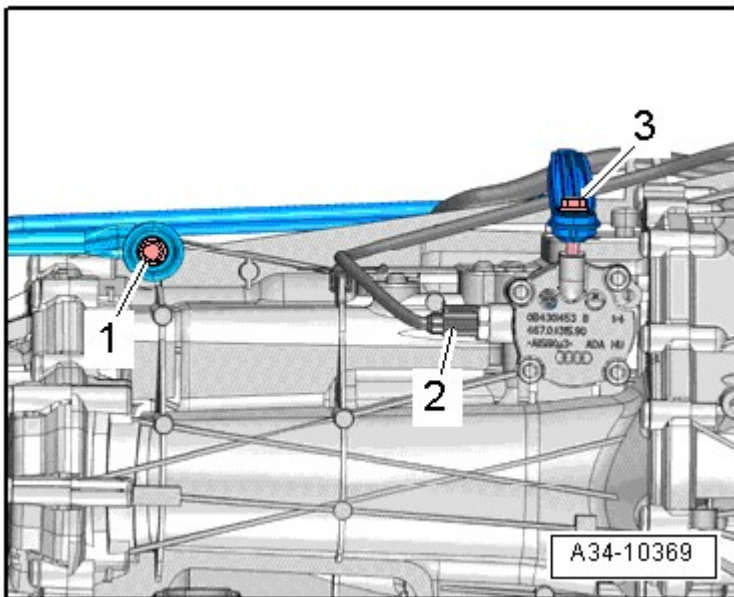


Fig. 161: Attaching Bolts And For Selector Rod And Push Rod
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -1 and 3-.

-- Remove the left and right drive axles from the transmission flange shafts.

-- Remove the lower cover -1- from the transmission -arrow-.

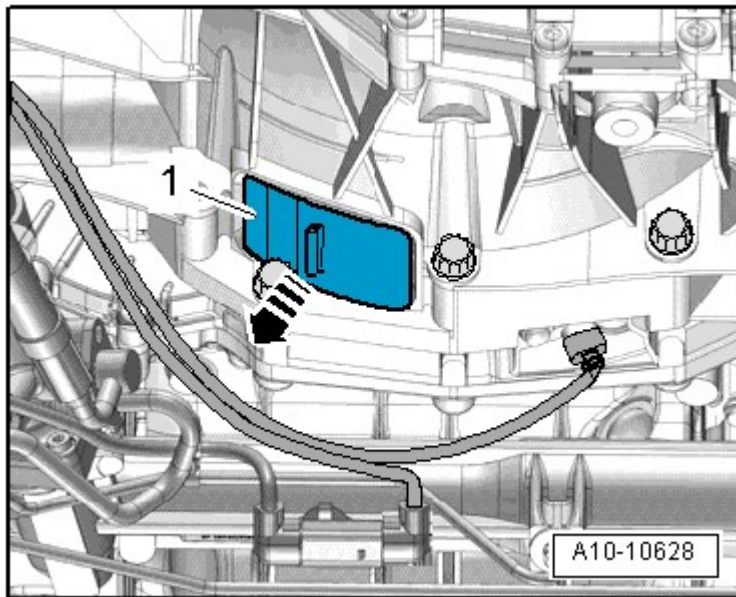


Fig. 162: Identifying Transmission Lower Cover
Courtesy of AUDI OF AMERICA, LLC

-- Attach the T40257 to the T40263.

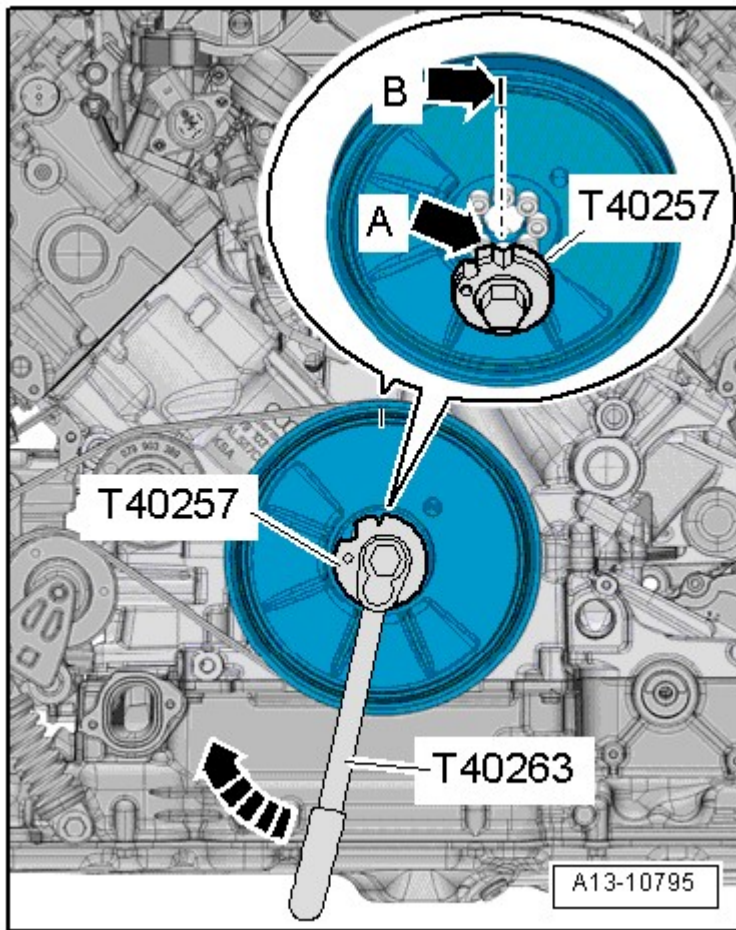


Fig. 163: Identifying Notch -Arrow A- On T40257 Must Face Color Dash -Arrow B- On Vibration Damper

Courtesy of AUDI OF AMERICA, LLC

-- Attach the adapter to the bolts on the vibration damper.

- The notch -arrow A- on the T40257 must face the color dash -arrow B- on the vibration damper.

NOTE: Ignore the semi-round countersink on the adapter.

When mounting, turn the crankshaft only in the direction of engine rotation - arrow-.

-- Remove the 6 drive plate bolts -arrow- while turning the crankshaft 60° further in the direction of engine rotation.

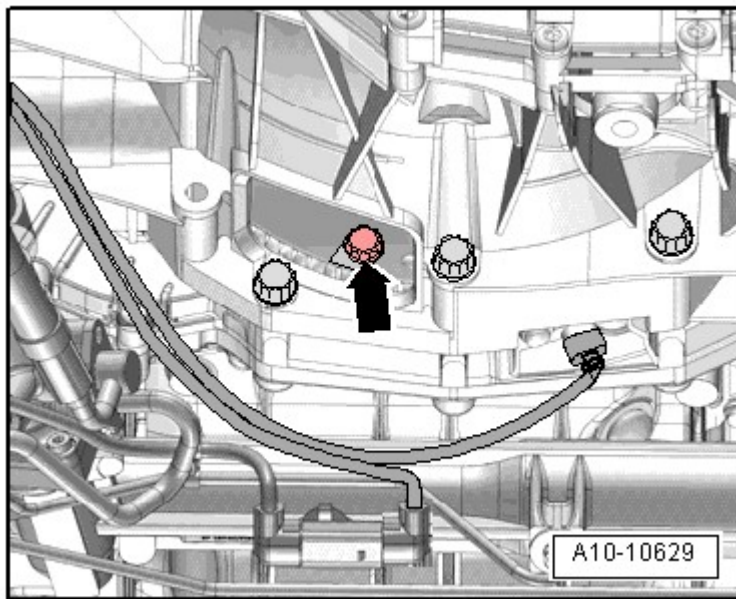


Fig. 164: Identifying Clutch Module First Bolt Installation Location
Courtesy of AUDI OF AMERICA, LLC

-- Equip the VAS 6131 A with the VAS 6131/10, VAS 6131/13-7 and VAS 6131/14 as follows:

2009 Audi S5 Quattro

ENGINE 4.2 Liter - Engine Assembly - Engine Code(s): CAUA (Coupe)

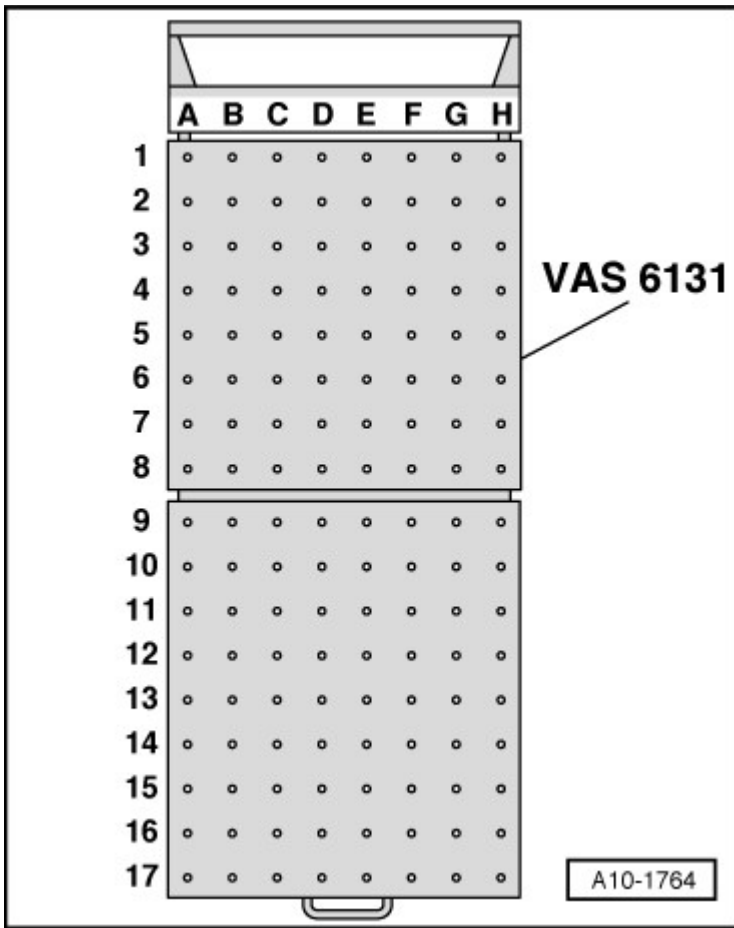


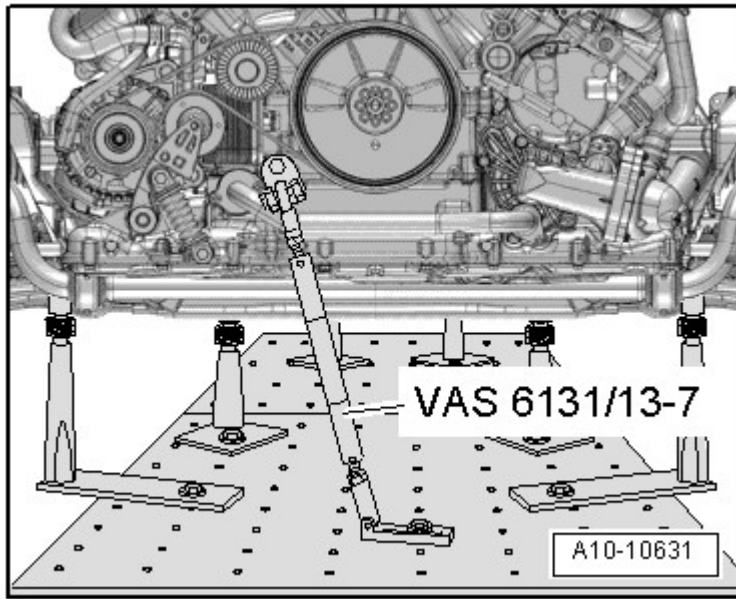
Fig. 165: Identifying Scissor Lift Platform VAS 6131

Courtesy of AUDI OF AMERICA, LLC

NOTE: The other attachments remain unchanged.

Platform Coordinates	Parts from the VAS 6131/10, VAS 6131/13-7 and VAS 6131/14			
D	/13-7			
B10	/10-1	/10-2	/10-5	/14
G10	/10-1	/10-2	/10-5	

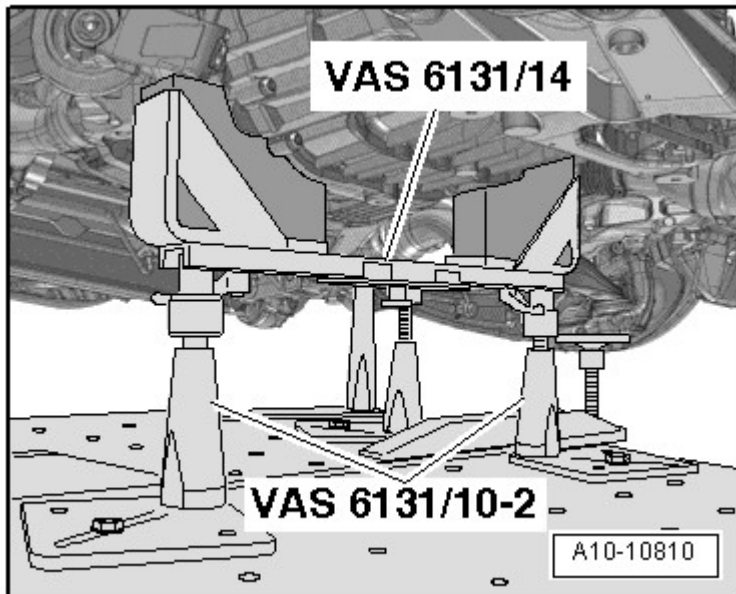
-- Connect the right front VAS 6131/13-7 to the engine using the MD bolt in threaded hole as shown in the illustration.

**Fig. 166: Identifying VAS 6131/13-7**

Courtesy of AUDI OF AMERICA, LLC

-- Install the VAS 6131/13-7 on the scissor lift table and tighten it to 20 Nm.

-- Attach the mounting elements from the VAS 6131/10 and VAS 6131/14 at the front of the transmission as shown in the illustration.

**Fig. 167: Attaching Mounting Elements From Support Set For Audi VAS 6131/10**

Courtesy of AUDI OF AMERICA, LLC

-- Rotate the left and right spindles up until the VAS 6131/14 rests firmly against the transmission.

- Attach mounting element base plates to the VAS 6131 A and tighten to 20 Nm.
- Remove the starter bolts -1 and 2-.

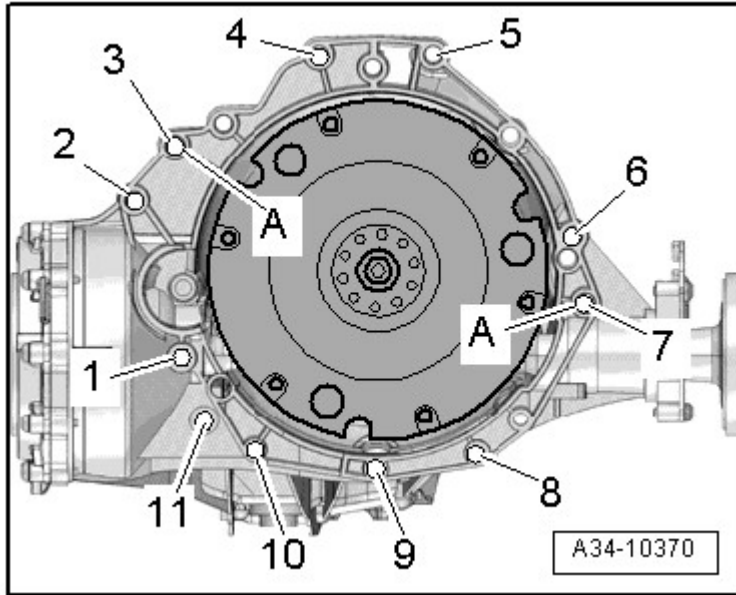
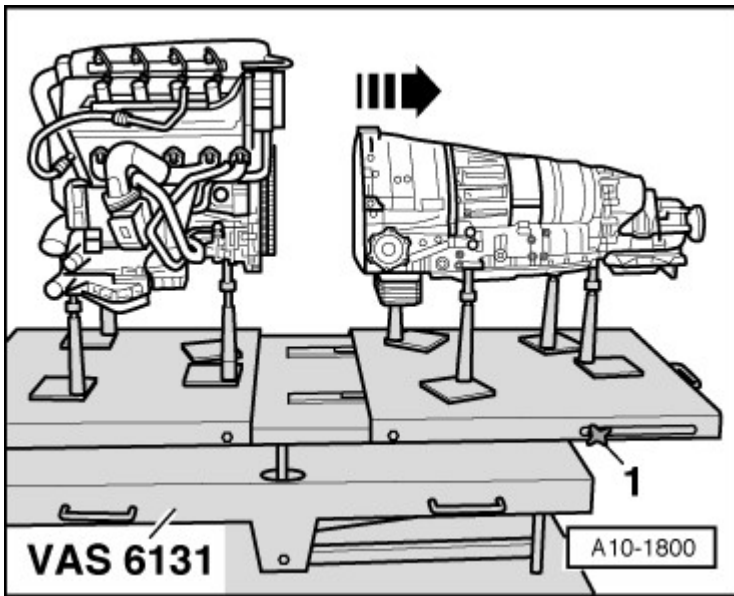


Fig. 168: Checking If Alignment Sleeves -A- For Centering Engine/Transmission Are In Cylinder Block
Courtesy of AUDI OF AMERICA, LLC

- Press the starter off the transmission and leave it in the installation position.
- Remove the remaining bolts -3 through 11- that attach the engine to the transmission.

NOTE: Ignore -A-.

- Loosen clamping bolts -1- on the sides of VAS 6131 A and pull the rear table plate with transmission toward the rear -arrow-.



**Fig. 169: Loosening Bolts -1- On Sides Of VAS 6131 A And Pull Rear Table Plate With Transmission Toward Rear -Arrow-
Courtesy of AUDI OF AMERICA, LLC**

ENGINE, INSTALLING

Special tools and workshop equipment required

- Scissor-Type Assembly Platform VAS 6131 A
- Ring Spanner Insert AF 16 V.A.G 1332/14
- Assembly Aid T40169
- Transportation Lock T40170
- Adapter T40257
- Wrench T40263

Tightening specifications

NOTE: The tightening specifications apply only to lightly greased, oiled, phosphated or blackened nuts and bolts.

Additional lubricant such as engine or transmission oil may be used, but do not use graphite lubricant.

Do not use any parts that have had the lubrication removed.

Tightening specification tolerance +/- 15 %.

Component	Nm
	M6 9

2009 Audi S5 Quattro

ENGINE 4.2 Liter - Engine Assembly - Engine Code(s): CAUA (Coupe)

Bolts and Nuts	M7	15
	M8	20
	M10	40
	M12	65
Exceptions:		
Ground pins to the strut tower		9

Subframe mount, refer to **SUBFRAME MOUNT OVERVIEW**.

Engine to Manual Transmission

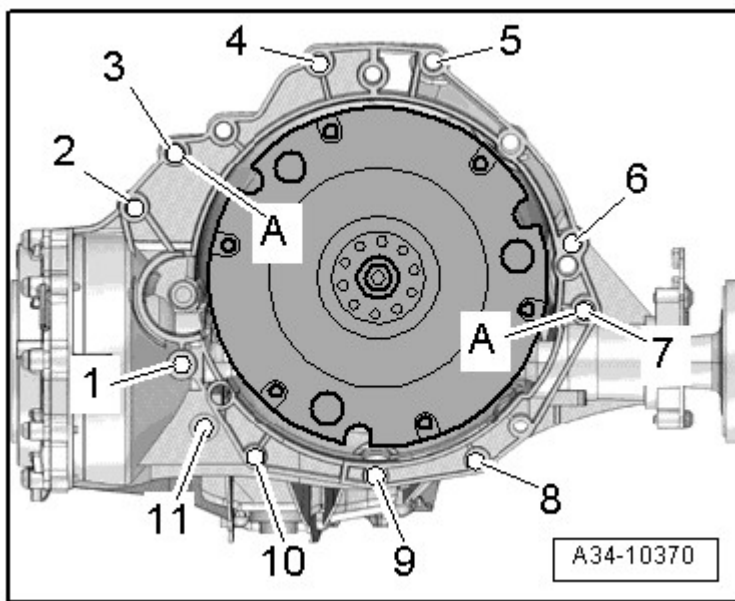


Fig. 170: Checking If Alignment Sleeves -A- For Centering Engine/Transmission Are In Cylinder Block
Courtesy of AUDI OF AMERICA, LLC

Item	Bolt	Nm
1 ¹⁾	M10 x 50 ²⁾	65
2 ³⁾ to 6	M12x100 ⁴⁾⁵⁾	30 + 90°
7	M12x125 ⁴⁾⁵⁾	30 + 90°
8, 11	M10x60 ⁴⁾⁵⁾	15 + 90°
9, 10	M10x95 ⁴⁾⁵⁾	15 + 90°
A	Alignment sleeves for centering	

- ¹⁾ Also secures the starter
- ²⁾ Bolt strength rating 10.9. There is no limit to the number of times steel bolts may be used.
- ³⁾ Also secures the starter.
- ⁴⁾ Through VIN 8T-9A-007999: replace the aluminum bolts.

- 5) From VIN 8T-9A-008000: the aluminum bolts may be used twice **ENGINE, INSTALLING => From VIN 8T-9A-008000: the aluminum bolts -2 through 11- may be used twice.**

(1) To prevent damaging the bolts when marking them, do not clamp them in a vise. Insert the bolt using a 14 mm socket with a $\frac{1}{2}$ drive, which is inserted in to the vise, as illustrated.

- From VIN 8T-9A-008000: the aluminum bolts -2 through 11- may be used twice. Therefore, the bolts must be marked with two notches "X" made by a chisel after they have be used the first time -arrow-.

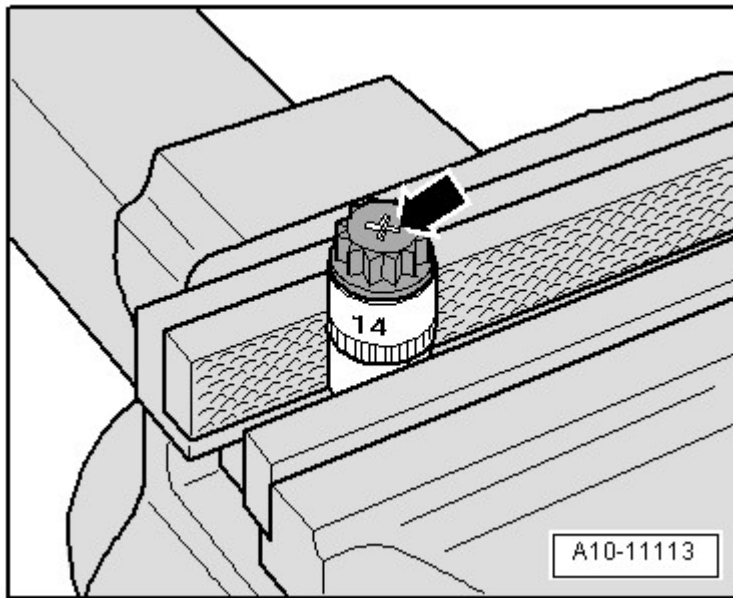


Fig. 171: Identifying Bolts Marked With An "X" May Not Be Used Again
Courtesy of AUDI OF AMERICA, LLC

- Bolts marked with an "X" may not be used again.

Procedure

NOTE: Replace bolts that are tightened to the specification.

Replace self-locking nuts and bolts and seals, gaskets and O-rings.

There is a needle bearing in the drive plate. Check if the needle bearing is inserted before installing. Needle bearing, removing from and installing on drive plate. Refer to **NEEDLE BEARING AT DRIVE PLATE, MANUAL TRANSMISSION** .

Secure all hose connections with hose clamps of the same type as those equipped by the factory.

When installing, bring all cable ties back to same positions.

-- Clean the threaded holes in the cylinder block for connecting the engine and transmission using a thread tap before installing the transmission.

-- Before installing a replacement engine, make sure the semi-circular ring -arrow- is inserted in the power steering pump driveshaft.

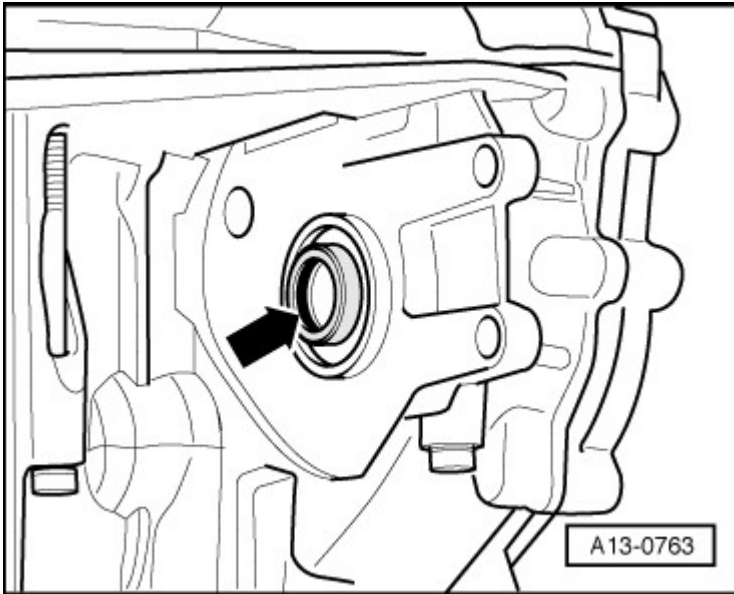


Fig. 172: Checking Whether O-Ring Is Inserted In Power Steering Pump Input Shaft
Courtesy of AUDI OF AMERICA, LLC

-- Install the engine supports and engine mount. Refer to **SUBFRAME MOUNT OVERVIEW**.

-- Installing the lower left coolant pipe. Refer to **LOWER LEFT COOLANT PIPE** .

-- The following preparations must be made before connecting the engine and transmission:

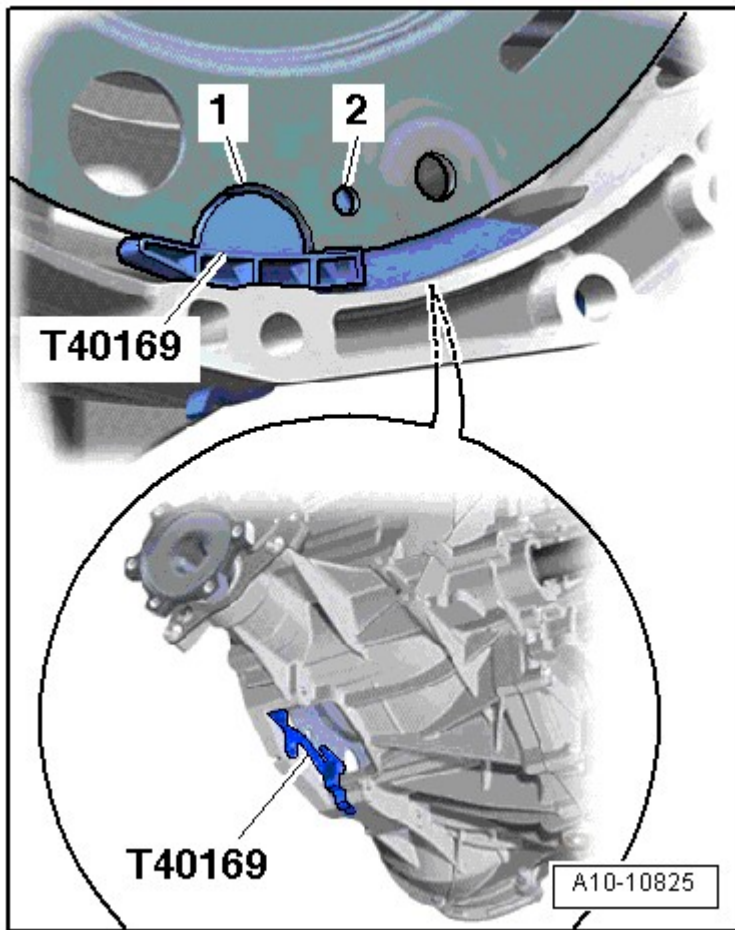


Fig. 173: Inserting Assembly Aid T40169 Into Transmission Housing
 Courtesy of AUDI OF AMERICA, LLC

-- Insert the T40169 into the transmission housing and clutch module from underneath as illustrated.

- The assembly aid must engage in the semicircular opening -1- and in the inspection hole -2-.

NOTE: **The inspection hole is only in one location on the circumference so rotate the clutch module as needed.**

-- Install the assembly aid bolt into the hole on the transmission housing.

-- Insert the T40170 in the transmission housing from below and secure it on the flange shaft -1-.

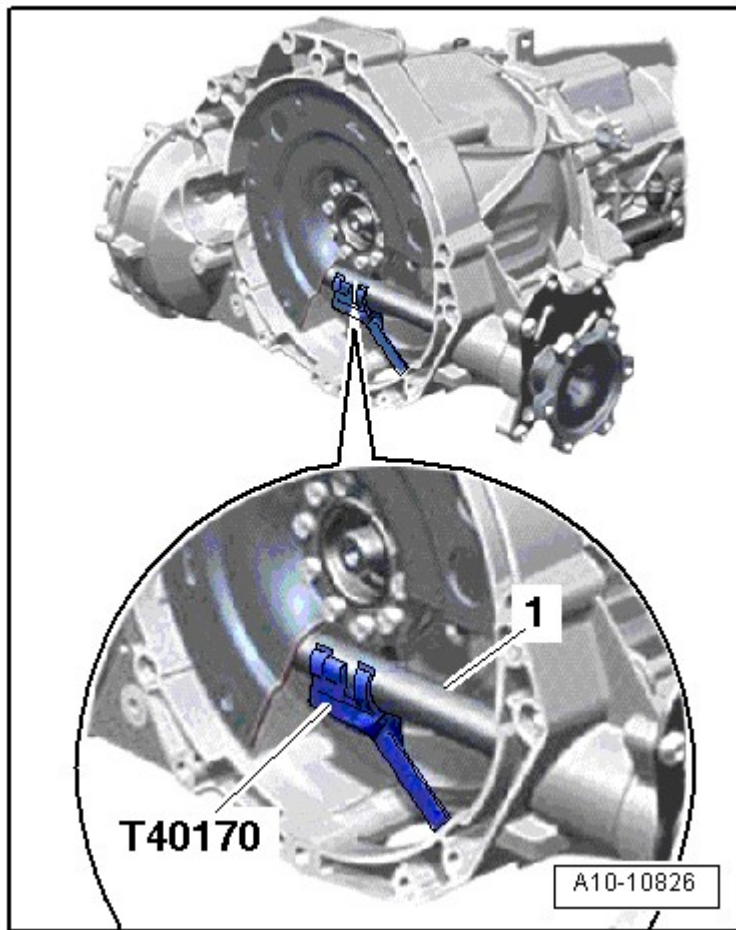


Fig. 174: Identifying Transportation Lock T40170

Courtesy of AUDI OF AMERICA, LLC

-- Check if the alignment sleeves -A- for centering the engine/transmission are in the cylinder block and insert them if they are not.

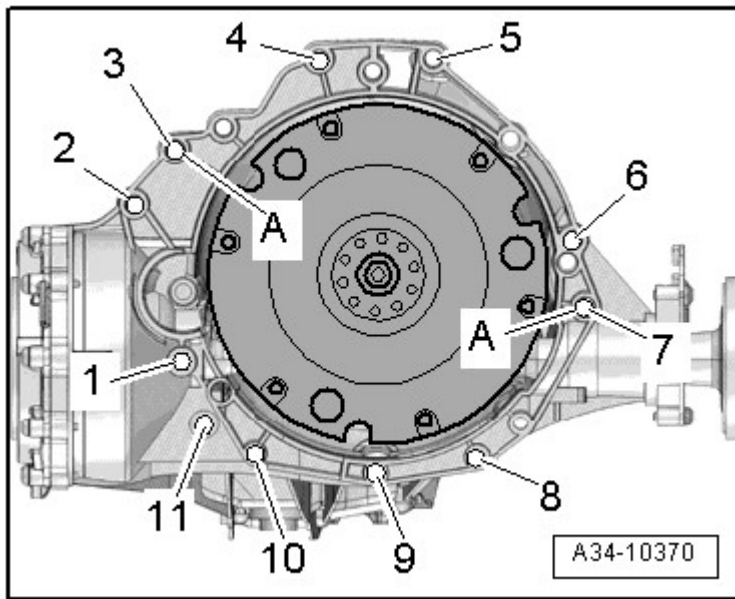


Fig. 175: Checking If Alignment Sleeves -A- For Centering Engine/Transmission Are In Cylinder Block
 Courtesy of AUDI OF AMERICA, LLC

- Inspect the aluminum bolts used to connect the engine to the transmission to see if they can be used again and mark them, if necessary **ENGINE, INSTALLING**.
- Position the transmission on the engine and tighten the bolts -1 through 11-.
- Remove the T40170 and T40169.
- Tighten the drive axles on the transmission flange shafts. Refer to **Specifications** .
- Install the wheel housing liners. Refer to **Removal and Installation** .
- Install the front wheels. Refer to **Removal and Installation** .

NOTE: The following procedure is necessary to assure that the clutch module contacts the drive plate evenly and does not get bent.

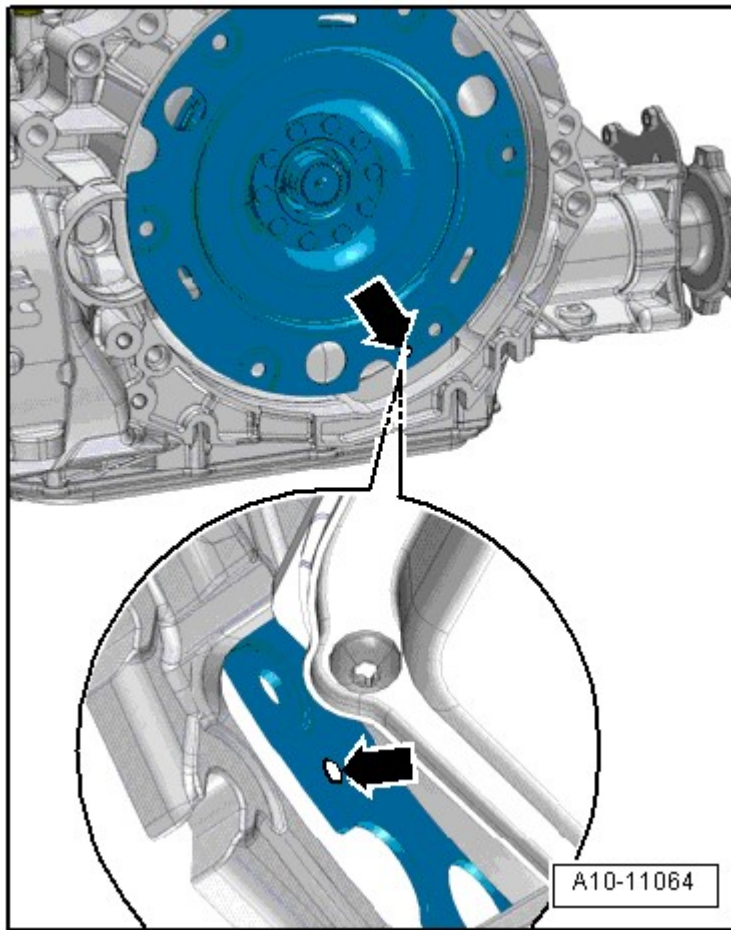


Fig. 176: Locating Transmission Housing Check Hole
Courtesy of AUDI OF AMERICA, LLC

-- Engage a gear and turn the front wheels in direction of travel until the clutch module is rotated one complete turn (360°).

- The inspection hole -arrow- must be visible through the opening in the transmission housing.

-- Secure the clutch module to the drive plate as follows:

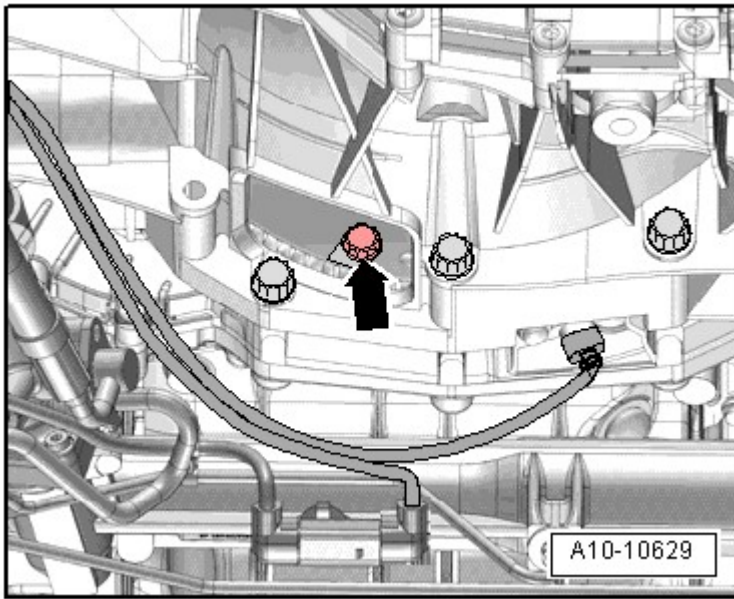


Fig. 177: Identifying Clutch Module First Bolt Installation Location
 Courtesy of AUDI OF AMERICA, LLC

NOTE: Use the V.A.G 1332/14 to tighten.

- Install the first bolt -arrow- and tighten by hand (2 Nm).
- Turn the front wheels in direction of travel until the clutch module is rotated one half turn (180°).
- Tighten the bolts that are accessible in this position to the tightening specification. Refer to **Description and Operation** .
- Turn the front wheels in direction of travel until the clutch module is rotated $\frac{1}{6}$ turn (60°) and tighten the remaining 5 bolts to the tightening specification. Refer to **Description and Operation** .
- Install the power steering hydraulic lines. Refer to **Removal and Installation** .
- Install Secondary Air Injection (AIR) pipe **SECONDARY AIR INJECTION SYSTEM WITHOUT VACUUM CONTROL OVERVIEW**
- Install the catalytic converter. Refer to **MUFFLER OVERVIEW** .
- Next, raise engine/transmission assembly high enough using VAS 6131 A until dimension -a- is reached between tunnel crossmember and body.

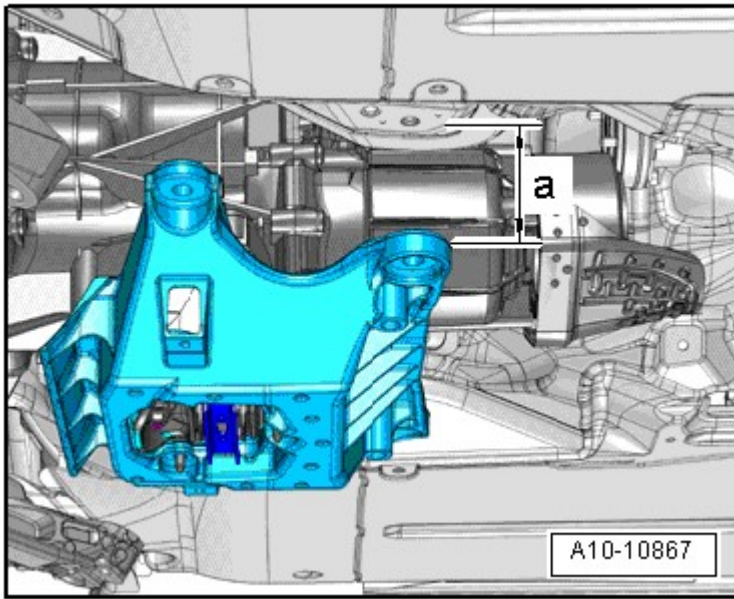


Fig. 178: Raising Transmission

Courtesy of AUDI OF AMERICA, LLC

- -a- = minimum 100 mm

-- Install the shift rod and pivot rod. Refer to **Description and Operation** .

-- Continue raising the engine/transmission subassembly using the VAS 6131 A.

-- Align the subframe and tunnel crossmember using the marks made on the longitudinal members during removal.

-- Tighten the subframe bolts only to the tightening specifications, do not tighten them further (tighten the bolts only after axle alignment). Refer to **Removal and Installation** .

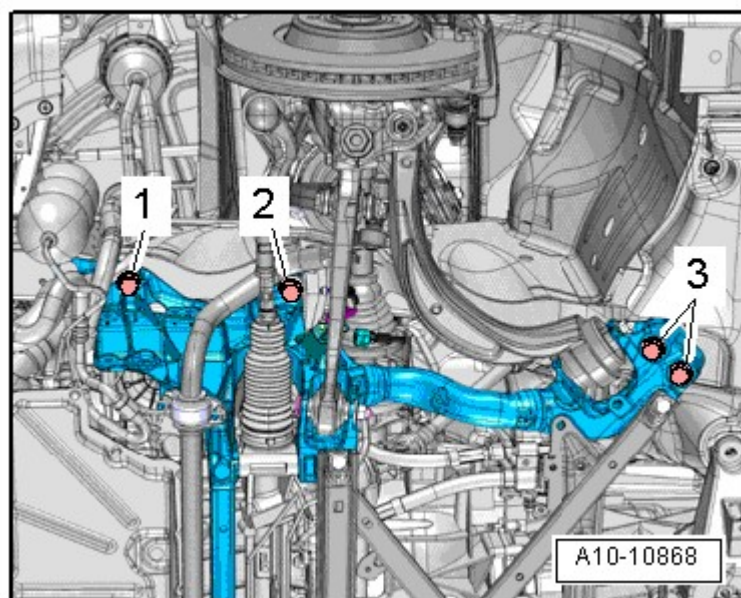


Fig. 179: Identifying Subframe Bolts (Tighten To Specifications)

Courtesy of AUDI OF AMERICA, LLC

WARNING: Risk of accident due to loose connections.

- If the bolts in the subframe are not tightened to final torque, vehicle must not be driven.

-- Tighten the tunnel crossmember bolts -arrow-. Refer to Description and Operation .

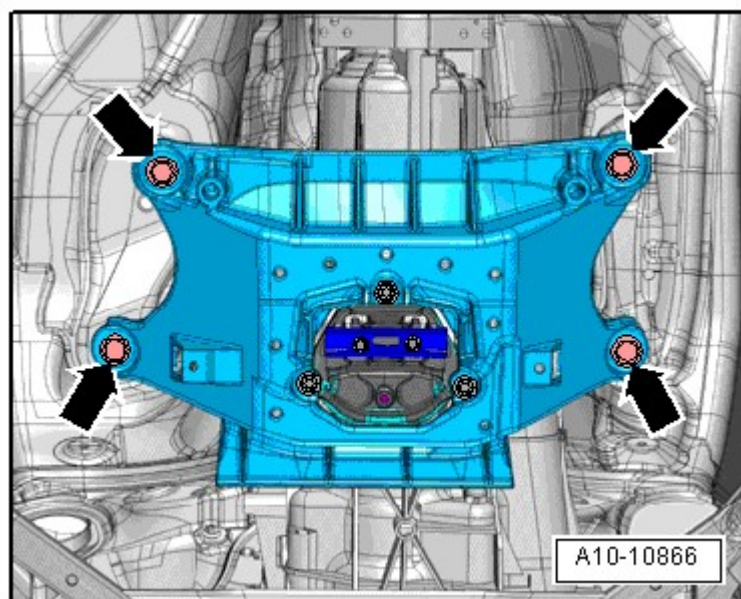


Fig. 180: Identifying Bolts & Tunnel Crossmember

Courtesy of AUDI OF AMERICA, LLC

Install in reverse order of removal paying attention to the following:

- Install the clutch slave cylinder. Refer to **Removal and Installation** .
- Attach the steering intermediate shaft to the steering gear. Refer to **Removal and Installation** .
- Install the driveshaft. Refer to **Final Drive, Differential** .
- Install the front muffler. Refer to **FRONT MUFFLER** .
- Install exhaust system free of stress. Refer to **EXHAUST SYSTEM, INSTALLING** .
- Install the front crossmember. Refer to **Description and Operation** .
- Install the subframe crossbrace, upper control arm and stabilizer bar and tighten the suspension strut on the control arm. Refer to **Removal and Installation** .
- Install the brake caliper. Refer to **Removal and Installation** .
- Install the Engine Control Module (ECM). Refer to **Removal and Installation** .
- Electrical connectors and wiring routing. Refer to appropriate SYSTEM WIRING DIAGRAM.
- Install the electrical wires, terminal 30 wire junction 2 -TV22- and the engine compartment E-box cover. Refer to **Removal and Installation** .
- Install the tower brace. Refer to **Removal and Installation** .
- Install the windshield wiper fluid reservoir filler tube. Refer to **Removal and Installation** .
- Install the refrigerant lines. Refer to **Removal and Installation** .
- Be sure to follow the procedure for connecting the battery and afterwards. Refer to **Removal and Installation** .

CAUTION: There is a risk of destroying control modules with excess voltage.

- **Do not use a charger as a starting aid.**

- Install and adjust the windshield wiper arms. Refer to **Removal and Installation** .
- Install the air filter housing. Refer to **Removal and Installation** .
- Install the lock carrier braces. Refer to **Removal and Installation** .
- Fill with engine oil and check oil level.

-- Before starting the engine for the first time, check the fluid level in the power steering reservoir. Refer to **General Information** .

NOTE: **The power steering pump must not run dry.**

-- Fill the coolant system **COOLANT, 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.

-- Fill the refrigerant circuit. Refer to **General Information** .

-- Align the subframe. Refer to **Removal and Installation** .

-- Perform axle alignment. Refer to **General Information** .

WARNING: Risk of accident due to loose connections.

- **Tighten the subframe bolts to the specification after performing axle alignment.**

-- Install the noise insulation. Refer to **Description and Operation** .

ENGINE, SECURING TO ENGINE AND TRANSMISSION HOLDER

Special tools and workshop equipment required

- Lifting Tackle 3033
- Engine and Transmission Holder VAS 6095 with Universal Mounting VAS 6095/1 and Bracket for V8 Engine VAS 6095/1-6A
- Shop Crane -Load Cap=700-1200kg VAS 6100
- Lift Arm Ext./Workshop Hoist VAS 6101
- Supplementary Set VAS 6131/13-7

Procedure

- The engine/transmission subassembly is removed. Refer to **ENGINE, REMOVING**; the engine and transmission are separated, refer to **ENGINE AND AUTOMATIC TRANSMISSION, SEPARATING**.
- Engine secured using the VAS 6131/13-7.

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

-- Disconnect the power steering hydraulic pipe -arrow-.

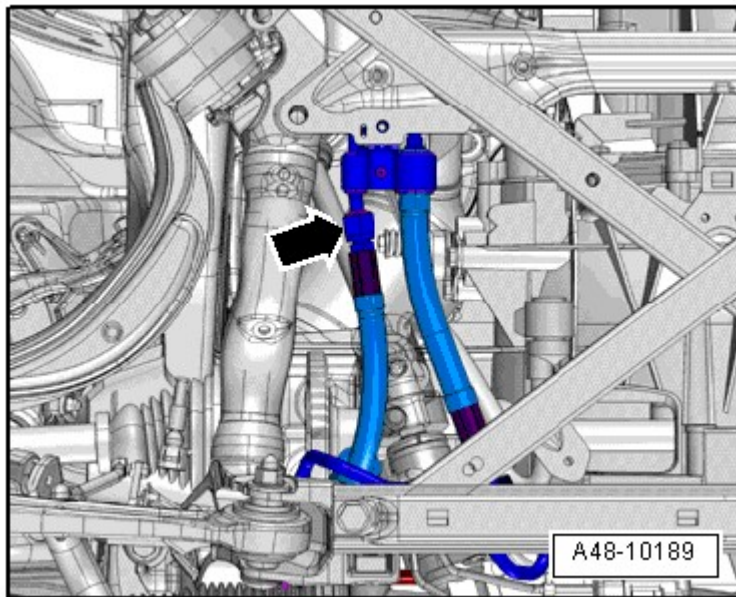


Fig. 181: Identifying Power Steering Hydraulic Pipe -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Free up the electrical wire on the left lower coolant pipe.

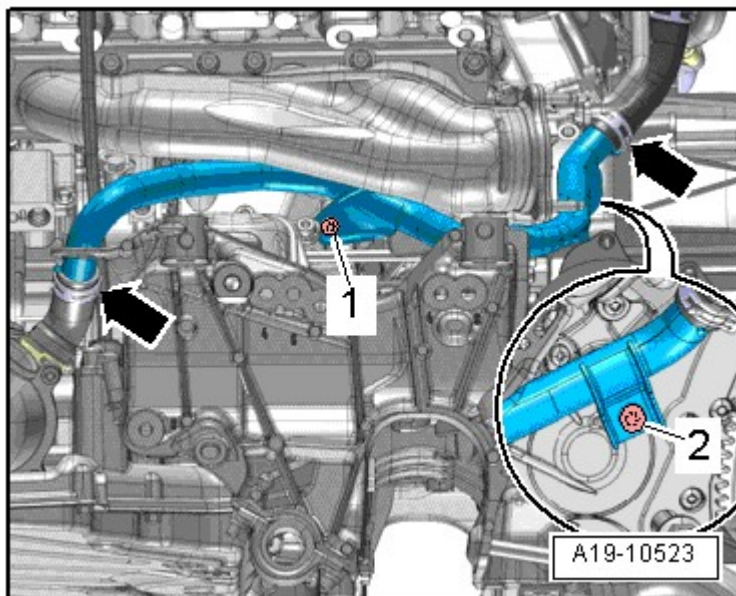


Fig. 182: Disconnecting Upper Coolant Hose From Engine
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -2- and lower left coolant pipe from the coolant hoses -arrows-.

NOTE: Ignore -1-.

-- Engage the 3033 on the engine lifting eyes and on the shop crane as shown in the illustration.

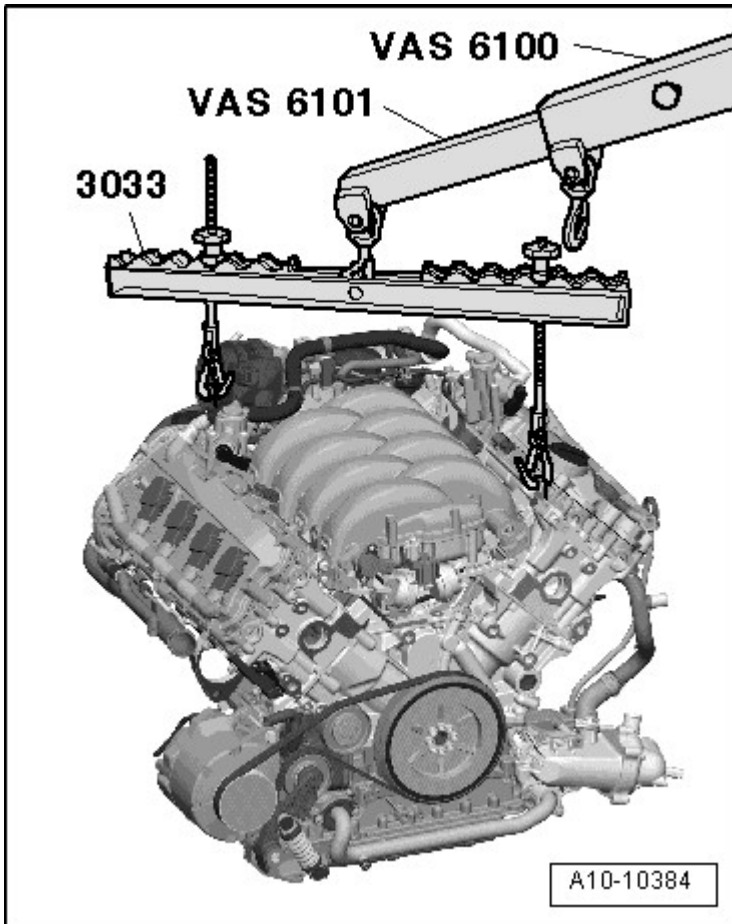


Fig. 183: Engaging Lifting Tackle 3033 On Engine Lifting Eyes And On Shop Crane VAS 6100 With Lift Arm Ext./Workshop Hoist VAS 6101

Courtesy of AUDI OF AMERICA, LLC

-- Tension the engine slightly with the shop crane, but do not raise.

-- Disconnect the electrical connector -3- on the left electrohydraulic engine mount solenoid valve -N144-.

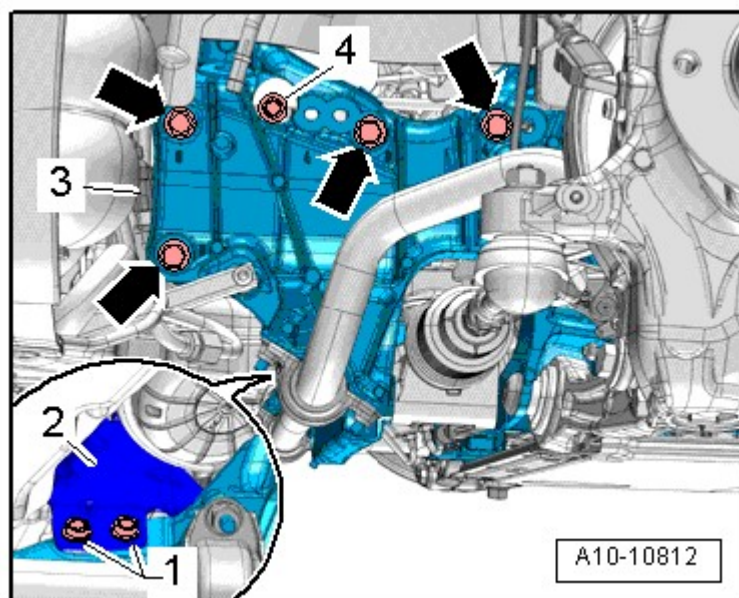


Fig. 184: Identifying Bolt For Left Engine Mount
Courtesy of AUDI OF AMERICA, LLC

-- Remove the left engine mount bolt -4-.

NOTE: Ignore -1 and 2- and -arrow-.

-- Disconnect the electrical connector -2- on the right electronhydraulic engine mount solenoid valve -N145-.

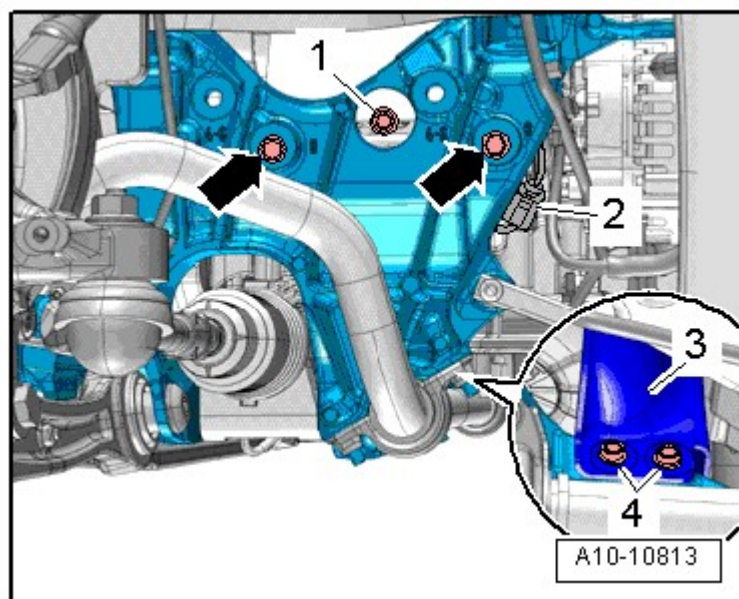


Fig. 185: Identifying Engine Mount Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Remove the right engine mount bolt -1-.

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

-- Remove the VAS 6131/13-7 from the engine.

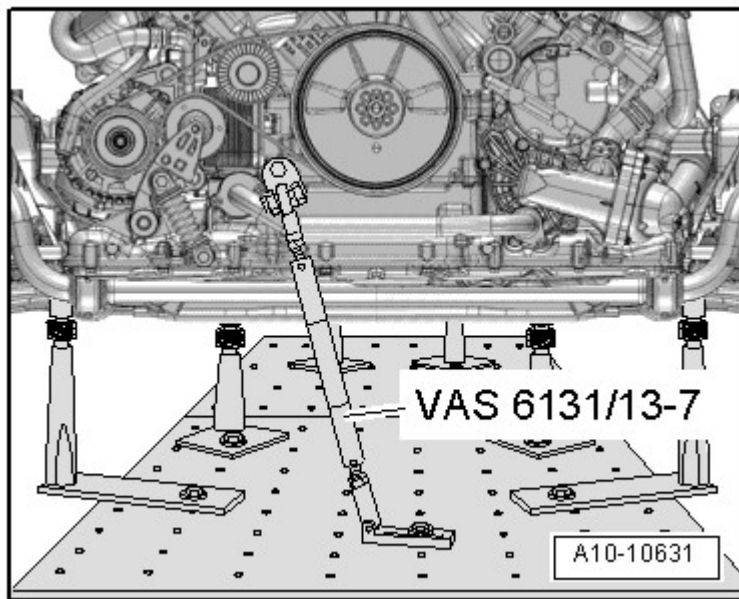


Fig. 186: Identifying VAS 6131/13-7
Courtesy of AUDI OF AMERICA, LLC

-- Raise the engine from the engine carrier.

-- Remove the bolts -arrows- and the left engine support.

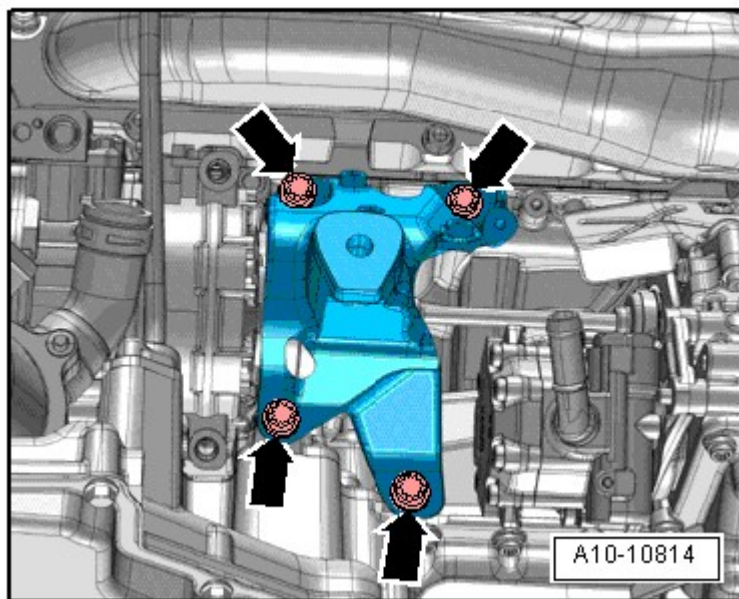


Fig. 187: Identifying Bolts And Left Engine Support
Courtesy of AUDI OF AMERICA, LLC

-- Remove bolt -arrow-.

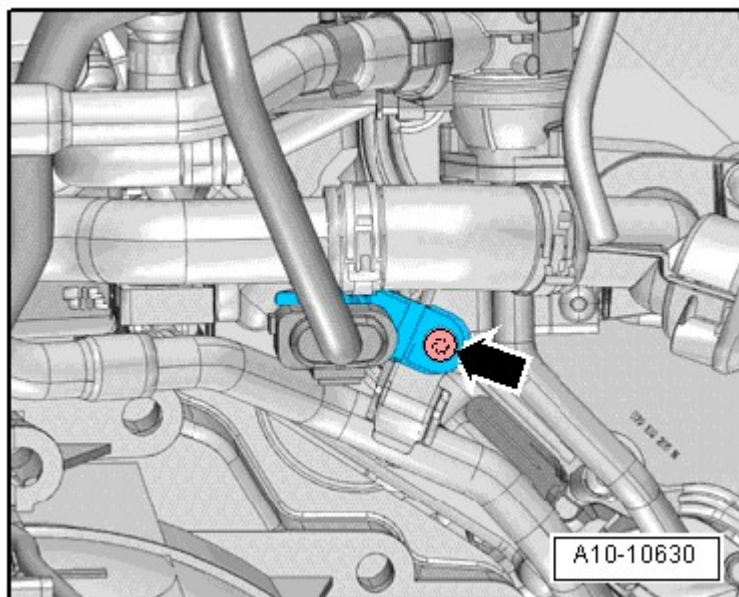


Fig. 188: Identifying Bolts -Arrow-
Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -2- and slightly press the secondary air tube downward.

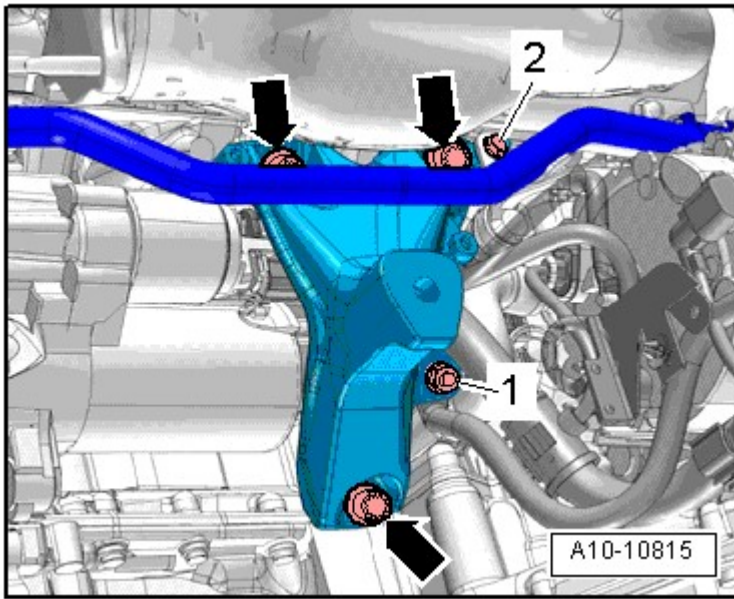


Fig. 189: Removing Bolt -2- And Lay Secondary Air Pipe Aside
Courtesy of AUDI OF AMERICA, LLC

- Remove the nut -1- and free up the ground wire at the engine support.
- Remove the bolts -arrows- and the right engine support.
- Secure the starter on the engine.
- Secure the engine to the VAS 6095 using VAS 6095/1 and the VAS 6095/1-6A to 40 Nm as illustrated.

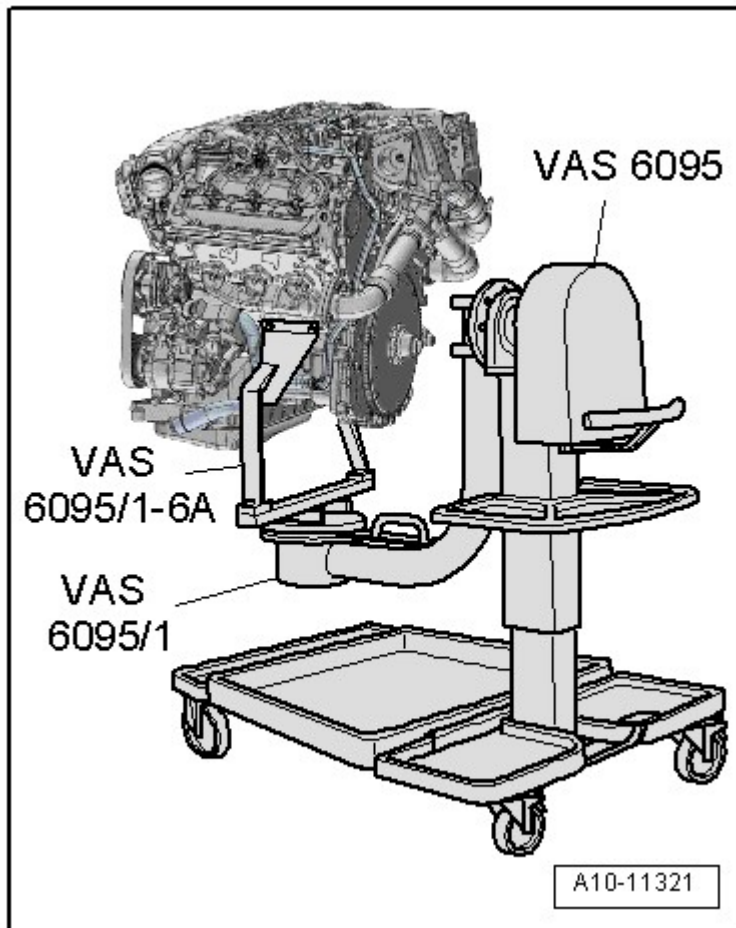


Fig. 190: Securing Engine To VAS 6095 Using VAS 6095/1 And VAS 6095/1-6A
Courtesy of AUDI OF AMERICA, LLC

LEFT ENGINE MOUNT

NOTE: To avoid repeat repairs, do the following if the engine mount is faulty:

Replace the faulty engine mount and its retaining plate.

Likewise replace the engine mount on the opposite side, check the retaining plate and replace it if necessary.

Special tools and workshop equipment required

- Engine support bridge 10 - 222 A
- Spindle 10 - 222 A /11
- Engine/transmission jack V.A.G 1383 A
- Engine Support Supplement Set T40093

REMOVING

-- Position the front wheels so they are straight.

CAUTION: Risk of destroying electrical components.

- **Observe measures for disconnecting the battery.**

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

-- Remove the engine cover -arrows-.

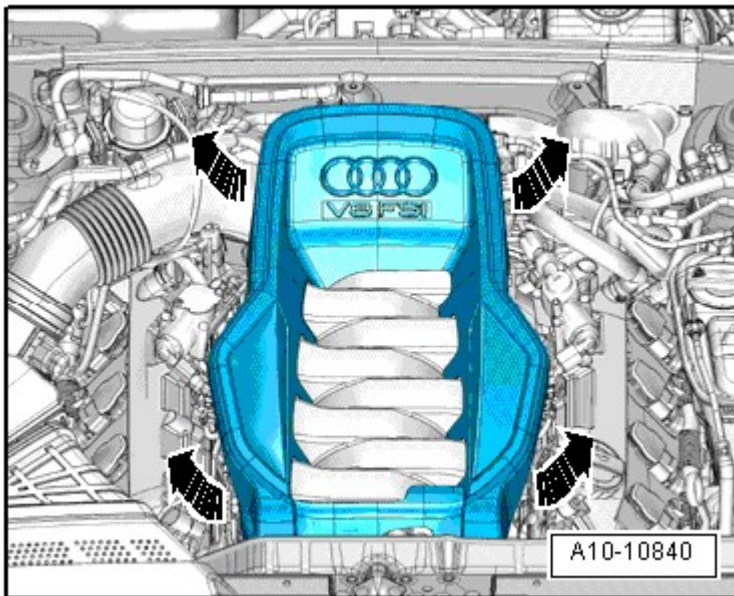


Fig. 191: Identifying Engine Cover
Courtesy of AUDI OF AMERICA, LLC

-- Install the 10 - 222 A with adapters T40093/6 on the left and right strut towers, as shown in the illustration.

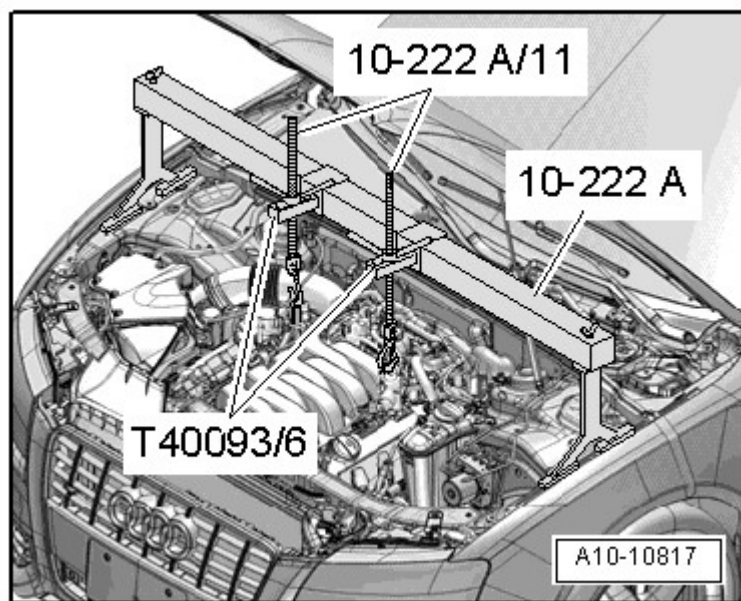


Fig. 192: Installing 10- 222 A With Adapters T40093/6 On Left And Right Suspension Strut Domes
Courtesy of AUDI OF AMERICA, LLC

- Engage the 10 - 222 A /11 to the rear engine lifting eyes.
- Lightly tension the engine with spindles.
- Remove the noise insulation -1 and 2-. Refer to **Description and Operation** .

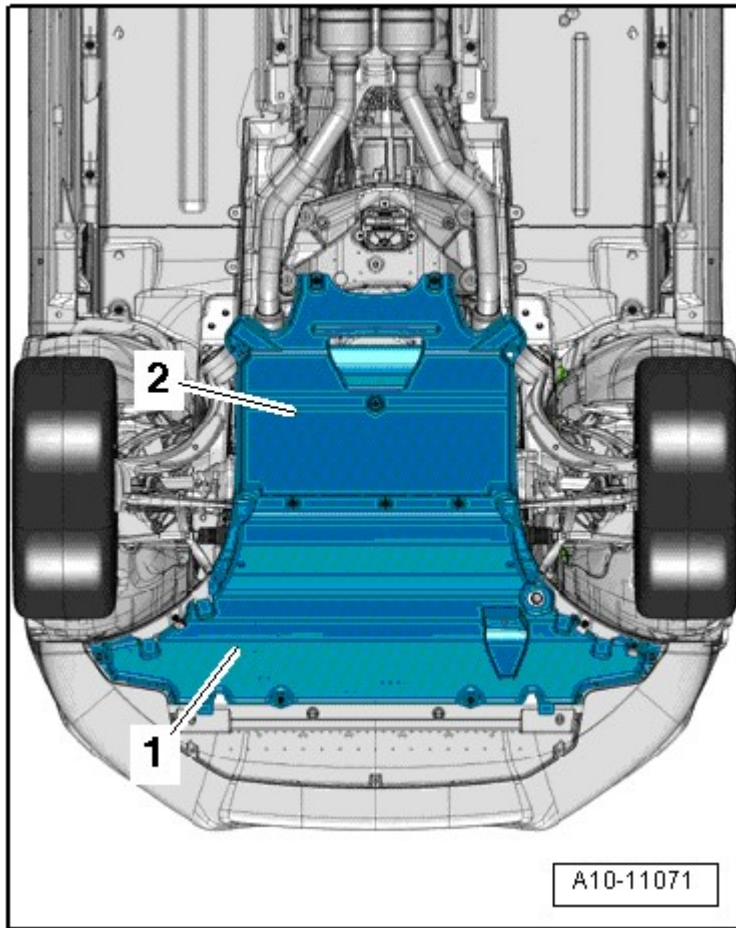


Fig. 193: Identifying Noise Insulation -1 & 2-
Courtesy of AUDI OF AMERICA, LLC

- Remove the left and right front wheels. Refer to **Removal and Installation** .
- Remove left and right front wheel housing liners. Refer to **Removal and Installation** .
- Remove the left and right drive axles from the transmission flange shafts.
- Remove the nut -arrow- on the right longitudinal member and free up the ground wires.

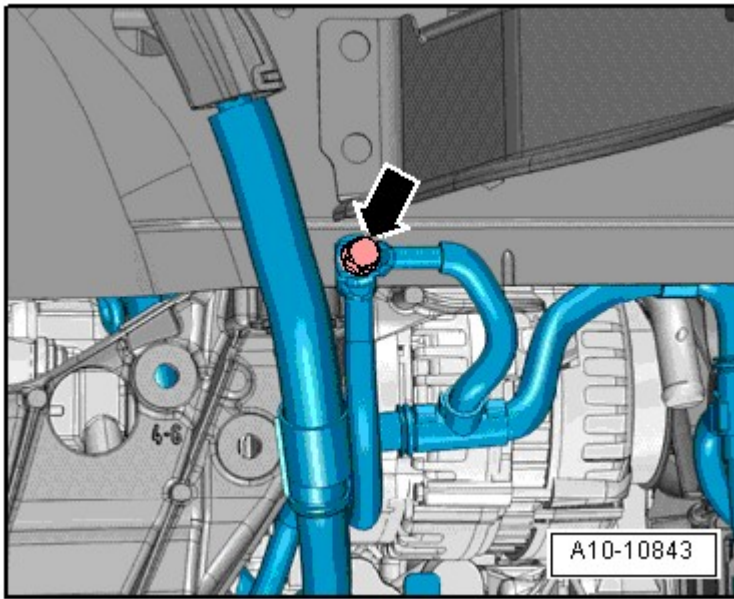


Fig. 194: Disconnecting Ground Wires -Arrow- From Right Longitudinal Member
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right bolts -1- as well as the nuts -3- and remove the lock carrier support -2-.

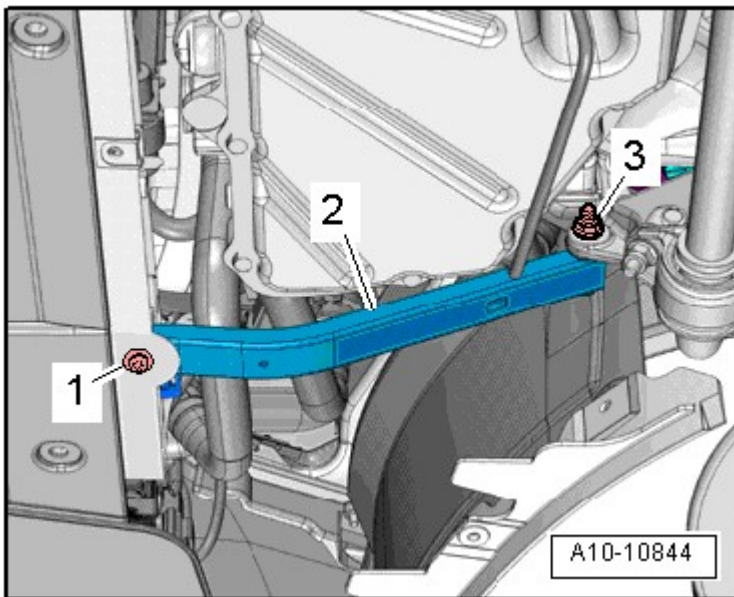


Fig. 195: Identifying Carrier Left Brace Components
 Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the connector -1- headlamp range control sensor 1 -G233- electrical sensor -arrow- and free up electrical wiring.

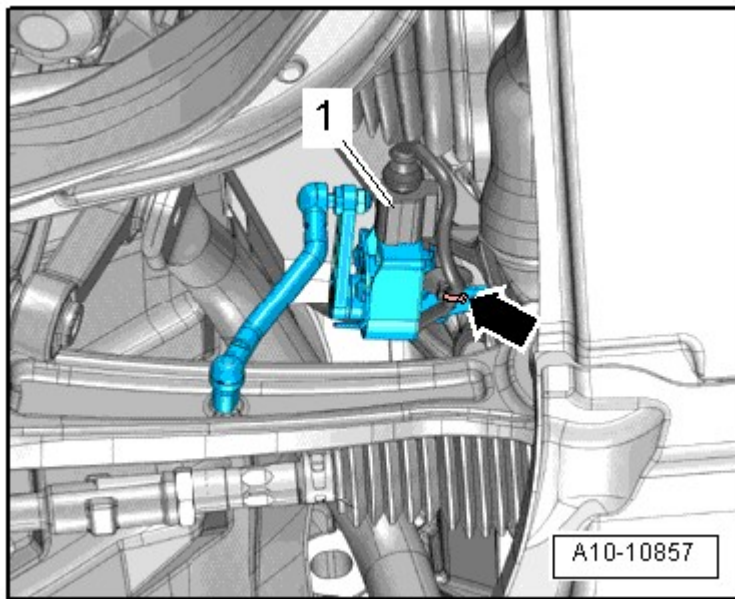


Fig. 196: Disconnecting Electrical Connector On Left Front Level Control System Sensor
Courtesy of AUDI OF AMERICA, LLC

Vehicles through VIN 8T-8A011200:

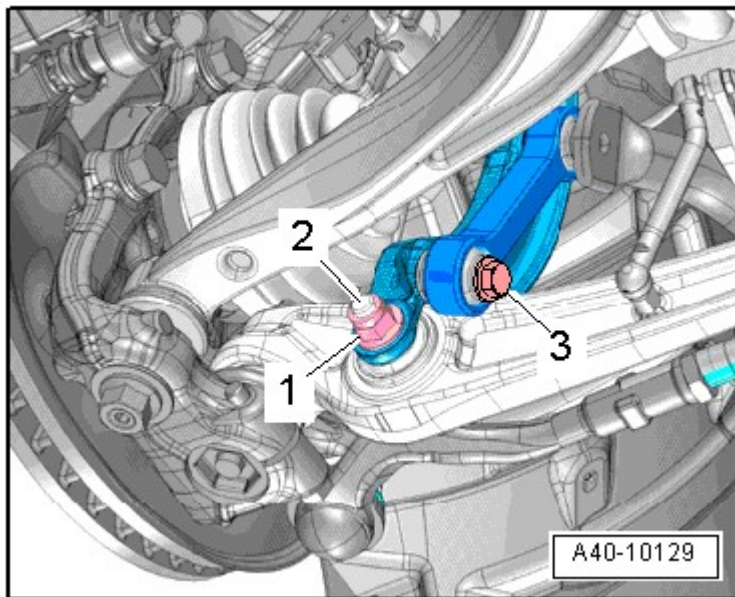


Fig. 197: Identifying Left And Right Bolts
Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right stabilizer bar bolt -3-.

NOTE: Ignore -1 and 2-.

Vehicles from VIN 8T-8A011201:

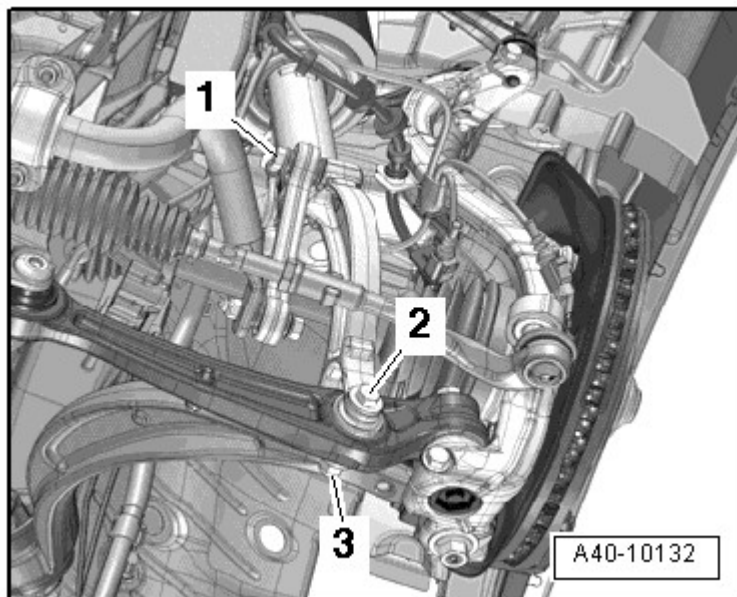


Fig. 198: Identifying Left And Right Stabilizer Bar Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right stabilizer bar bolt -1-.

NOTE: Ignore -2 and 3-.

Vehicles with a manual transmission:

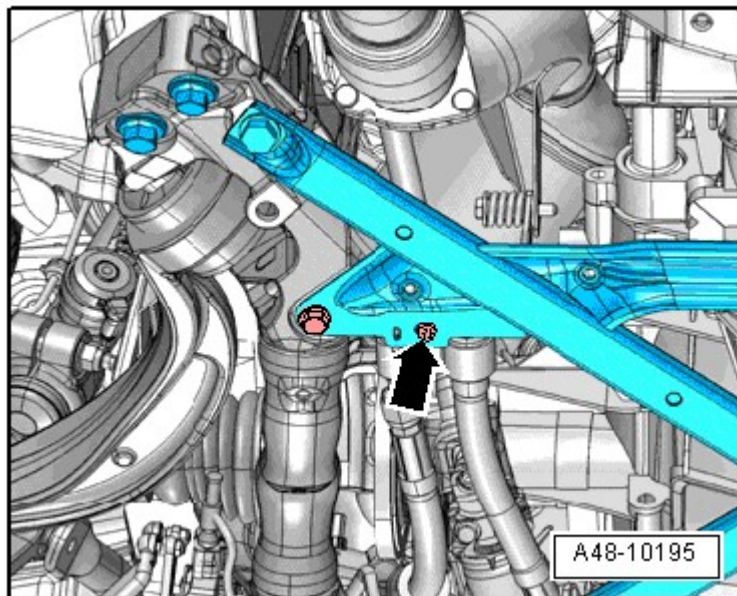


Fig. 199: Identifying Bolt For Power Steering Hydraulic Oil Pressure Line

Courtesy of AUDI OF AMERICA, LLC

-- Remove the bolt -arrow- from the power steering hydraulic line.

Vehicles with automatic transmission:

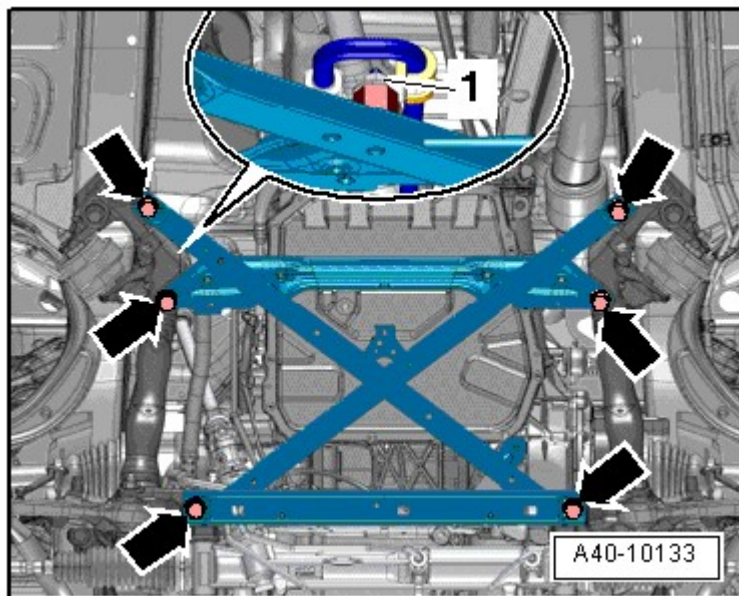


Fig. 200: Locating Power Steering Hydraulic Line

Courtesy of AUDI OF AMERICA, LLC

-- Remove the nut -1- from the power steering hydraulic line.

NOTE: Ignore -arrows-.

All Vehicles:

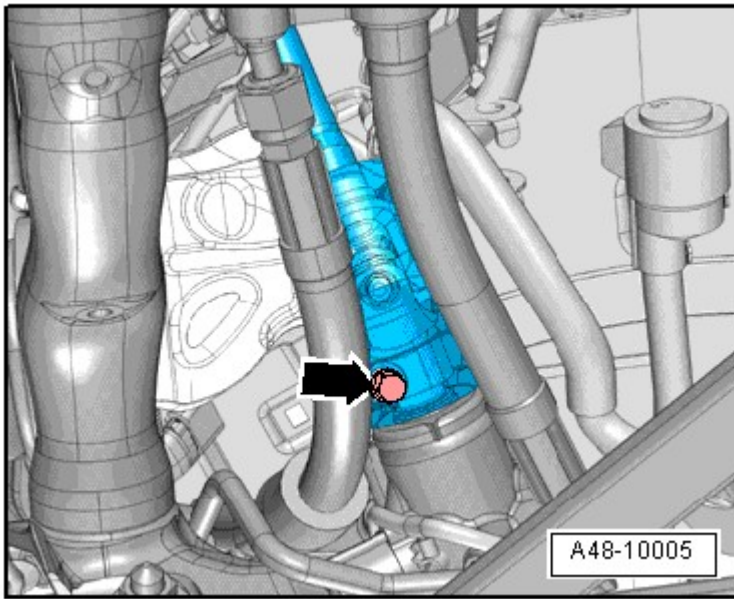


Fig. 201: Locating Universal Joint Bolt
Courtesy of AUDI OF AMERICA, LLC

- Remove the steering intermediate shaft from the steering gear, push them upward. Refer to **Removal and Installation** .
- Disconnect the vacuum hose -1- and free up the power steering hydraulic hose -arrow- on the bracket.

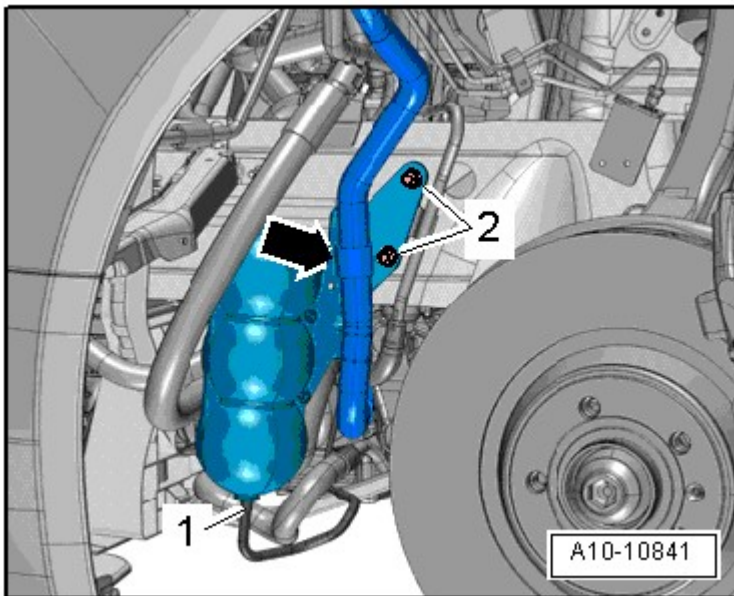


Fig. 202: Disconnecting Vacuum Hose And Lay Hydraulic Oil Hose To Side
Courtesy of AUDI OF AMERICA, LLC

- Remove the nuts -2- and vacuum reservoir.

-- Disconnect and free up the connector -1- from the steering gear.

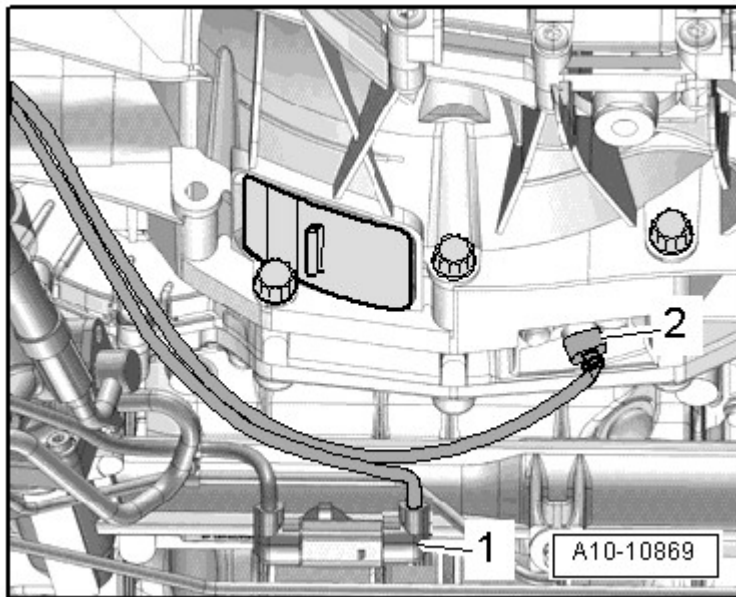


Fig. 203: Disconnecting Connector From Servotronic Solenoid Valve
Courtesy of AUDI OF AMERICA, LLC

NOTE: Ignore -2-.

-- Free up the power steering hydraulic fluid hose on the left side of the subframe.

-- Free up the wires on the right side of the subframe.

-- Disconnect the electrical connector -3- on the left electrohydraulic engine mount solenoid valve -N144-.

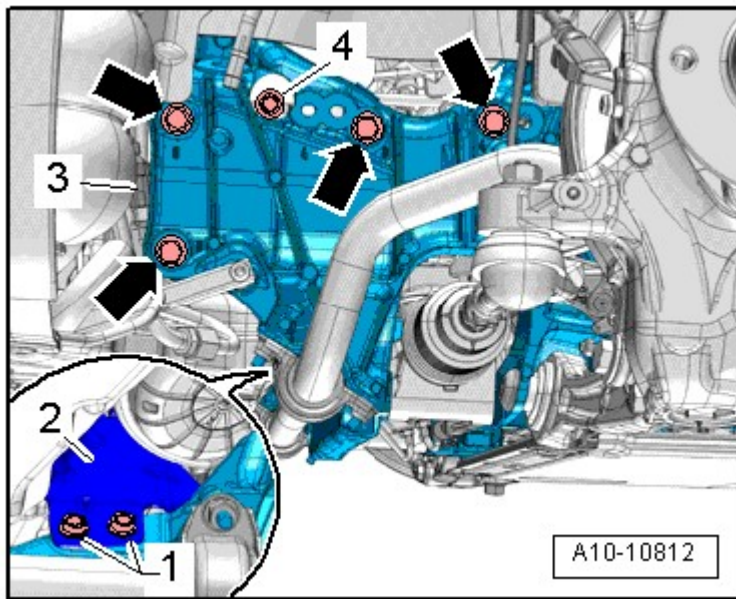


Fig. 204: Identifying Bolt For Left Engine Mount
 Courtesy of AUDI OF AMERICA, LLC

-- Remove bolts -1, 4- and -arrows-, the retaining plate -2- for the left engine mount remains in the installation position.

-- Disconnect the electrical connector -2- on the right electronhydraulic engine mount solenoid valve -N145-.

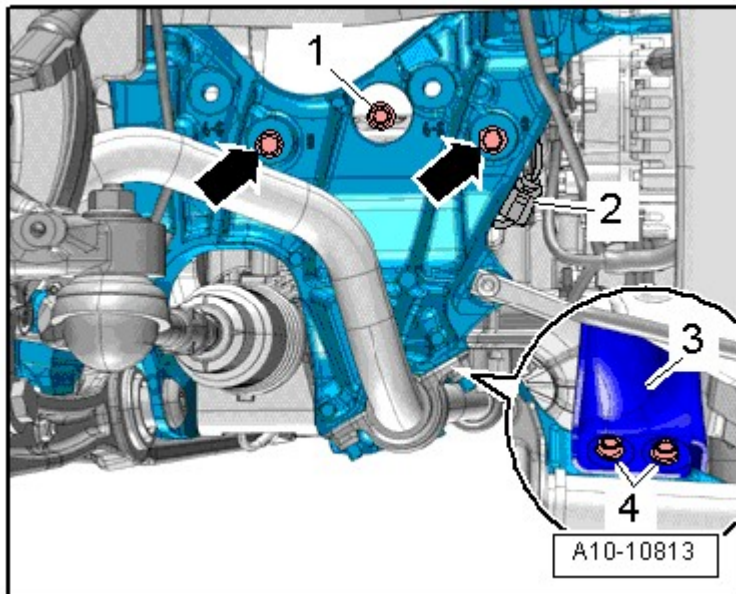


Fig. 205: Identifying Engine Mount Bolt
 Courtesy of AUDI OF AMERICA, LLC

-- Remove the right engine mount bolt -1-.

NOTE: Ignore -3, 4 and arrow-.

-- Support the subframes using the V.A.G 1383 A as shown in the illustration.

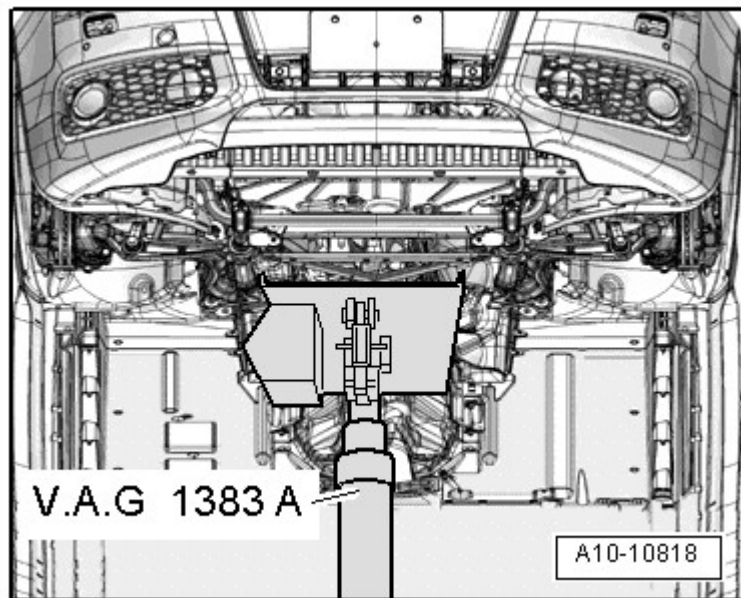


Fig. 206: Supporting Subframe Using V.A.G 1383

Courtesy of AUDI OF AMERICA, LLC

-- Mark the location of the subframe to the longitudinal members using a felt-tip pen.

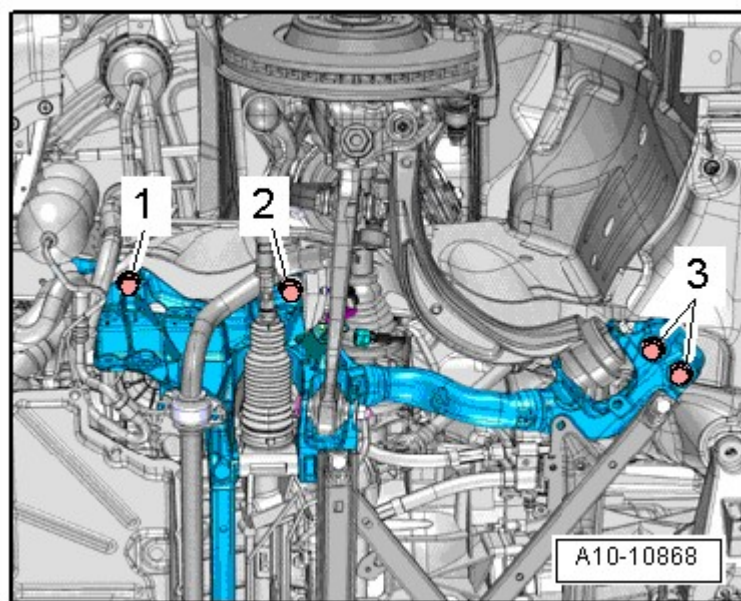


Fig. 207: Identifying Subframe Bolts (Tighten To Specifications)

Courtesy of AUDI OF AMERICA, LLC

-- Remove the left and right subframe bolts -1, 2 and 3- in a diagonal sequence.

CAUTION: The suspension components could be damaged.

- **Do not rest the vehicle on its wheels if the subframe mount, the steering gear or the subframe crossbrace are not installed correctly.**

-- Lower the subframe using the V.A.G 1383 A just enough so that the left engine mount can be removed, while at the same time paying attention to the clearance for the left hydraulic hoses and the right electrical cables.

-- Remove the left engine mount.

INSTALLING

Install in reverse order, paying attention to the following:

- For the correct tightening specifications, refer to **SUBFRAME MOUNT OVERVIEW**.

NOTE: Replace bolts that are tightened to the specification.

When installing, bring all cable ties back to the same positions.

-- Align the subframe and using the marks made on longitudinal members during removal.

-- Tighten the subframe bolts only to the tightening specifications, do not tighten them further (tighten the bolts only after axle alignment). Refer to **Removal and Installation** .

WARNING: Risk of accident due to loose connections.

- **If the bolts in the subframe are not tightened to final torque, vehicle must not be driven.**

-- Install the stabilizer, connect the suspension strut to the control arm. Refer to **Removal and Installation** .

-- Install the wires. Refer to **Removal and Installation** .

-- Be sure to follow the procedure for connecting the battery afterwards. Refer to **Removal and Installation** .

-- Attach the steering intermediate shaft to the steering gear. Refer to **Removal and Installation** .

-- Install the power steering hydraulic line. Refer to **Removal and Installation** .

-- Install the lock carrier braces. Refer to **Removal and Installation** .

-- Install the left and right drive axles on the transmission flange shafts. Refer to **Removal and Installation** .

- Install the wheel housing liners. Refer to **Removal and Installation** .
- Install the front wheels. Refer to **Wheels, Tires, Wheel Alignment** .
- Perform axle alignment. Refer to **General Information** .

WARNING: Risk of accident due to loose connections.

- **Tighten the subframe bolts to the specification after performing axle alignment.**

- Install the noise insulation. Refer to **Description and Operation** in Underbody Trim.

RIGHT ENGINE MOUNT

NOTE: To avoid repeat repairs, do the following if the engine mount is faulty:

Replace the faulty engine mount and its retaining plate.

Likewise replace the engine mount on the opposite side, check the retaining plate and replace it if necessary.

Special tools and workshop equipment required

- Engine Support Bridge 10 - 222 A
- Spindle 10 - 222 A /11
- Engine Support Supplement Set T40093

REMOVING

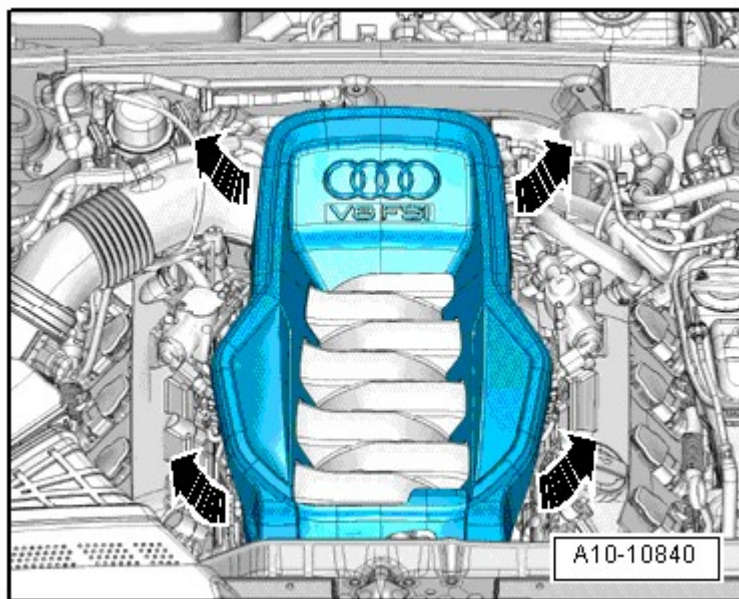


Fig. 208: Identifying Engine Cover

Courtesy of AUDI OF AMERICA, LLC

NOTE: The engine mounts must be replaced in pairs.

-- Remove the engine cover -arrows-.

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

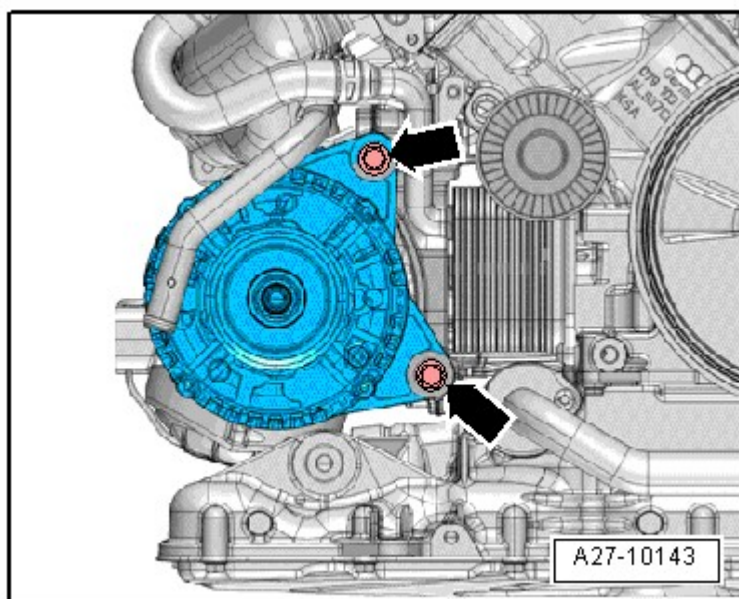


Fig. 209: Identifying Generator Bolts -Arrows-

Courtesy of AUDI OF AMERICA, LLC

-- Install the 10 - 222 A with adapter T40093/6 on the left and right strut towers, as shown in the illustration.

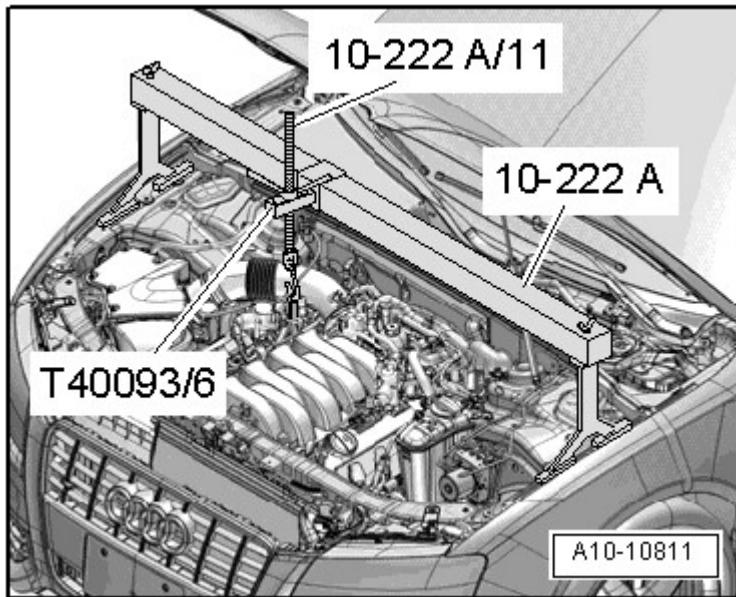


Fig. 210: Installing 10 - 222 A With T40093/6 On Left And Right Strut Towers
Courtesy of AUDI OF AMERICA, LLC

-- Engage the 10 - 222 A /11 on the right rear engine lifting eye.

-- Lightly pretension the engine using the spindle.

-- Remove the nut -arrow- on the right longitudinal member and free up the ground wires.

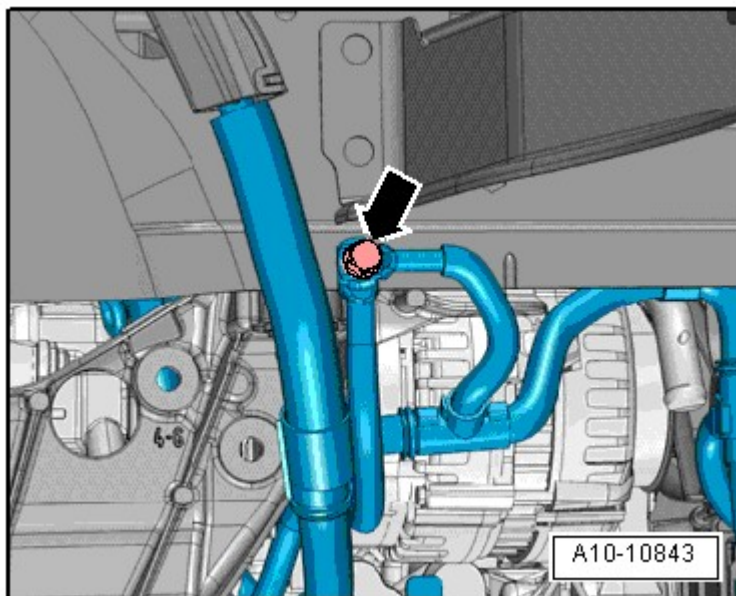


Fig. 211: Disconnecting Ground Wires -Arrow- From Right Longitudinal Member
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect and free up the connector -2- from the oil level thermal sensor -G266-.

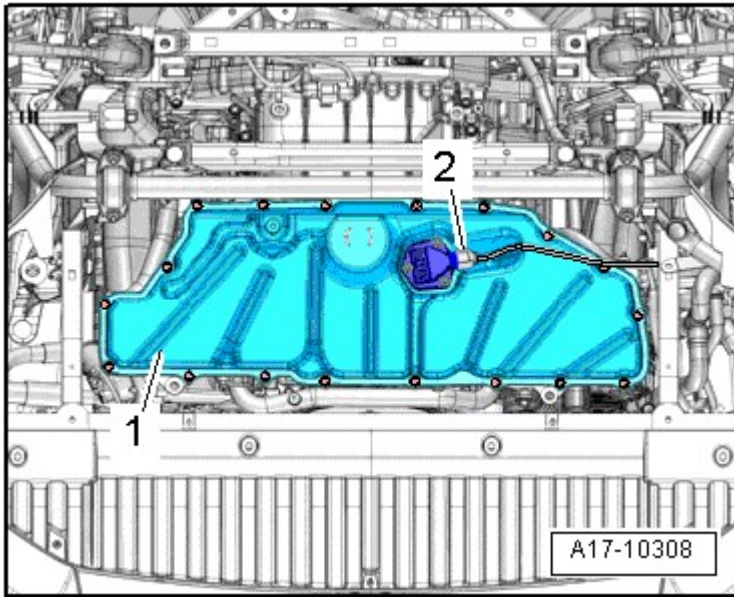


Fig. 212: Disconnecting And Free Up Connector -2- From Oil Level Thermal Sensor -G266-
Courtesy of AUDI OF AMERICA, LLC

-- Disconnect the electrical connector -2- on the right electronhydraulic engine mount solenoid valve -N145- and free up.

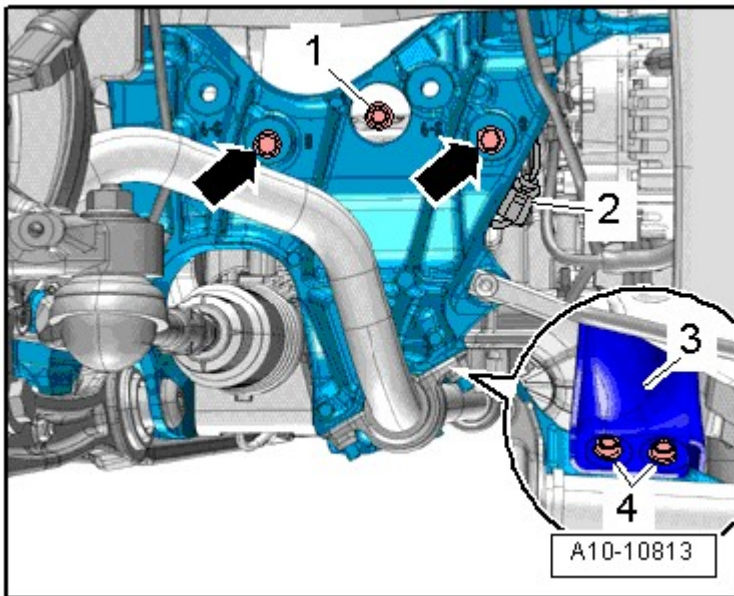


Fig. 213: Identifying Engine Mount Bolt
Courtesy of AUDI OF AMERICA, LLC

-- Remove the right engine support retaining plate bolts -1, 4 and arrows-.

- Free up the electrical wiring harness located on the right engine mount retaining plate -3-.
- Move the engine mount retaining plate to the side.
- Raise the engine by dimension -a- using the 10 - 222 A /11.

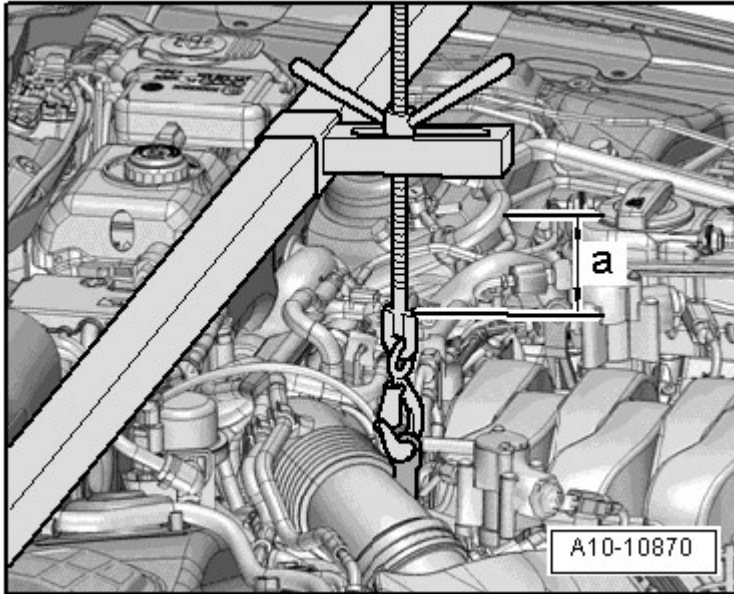


Fig. 214: Raising Engine By Dimension Using Spindle 10 - 222 A /11
Courtesy of AUDI OF AMERICA, LLC

- Dimension -a- = approximately 20 mm.

- Remove the right engine mount.

INSTALLING

Install in reverse order, paying attention to the following:

- For the correct tightening specifications, refer to **SUBFRAME MOUNT OVERVIEW**.

NOTE: Replace bolts that are tightened to the specification.

When installing, bring all cable ties back to the same positions.

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

SPECIAL TOOLS

2009 Audi S5 Quattro

ENGINE 4.2 Liter - Engine Assembly - Engine Code(s): CAUA (Coupe)

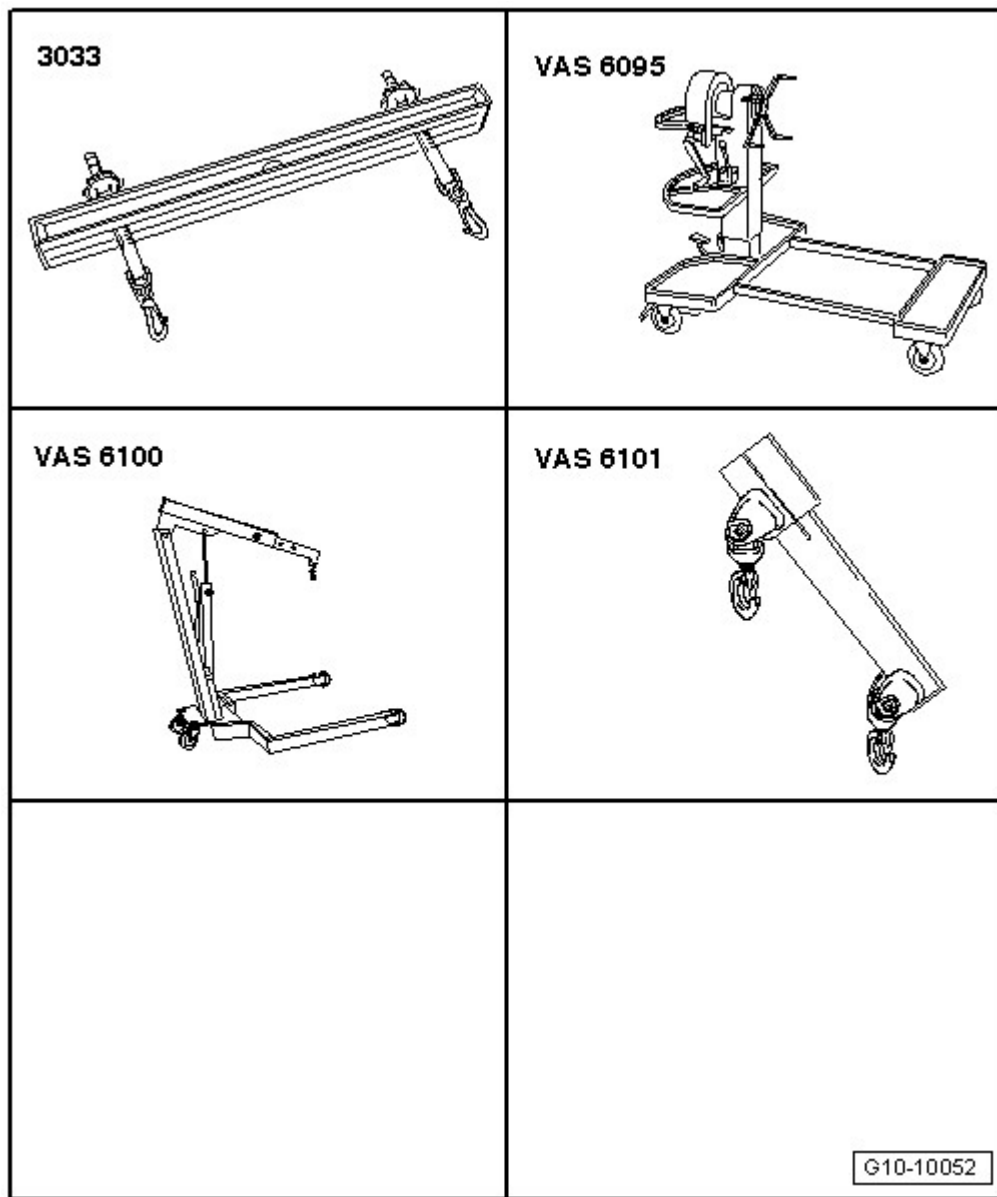


Fig. 215: Identifying Special Tools -- Engine, Securing To Assembly Stand
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Lifting Tackle 3033
- Engine and Transmission Holder VAS 6095 with Universal Mounting VAS 6095/1 and Bracket for V8 Engine VAS 6095/1-6A
- Shop Crane -Load Cap=700-1200kg VAS 6100
- Lift Arm Ext./Workshop Hoist VAS 6101

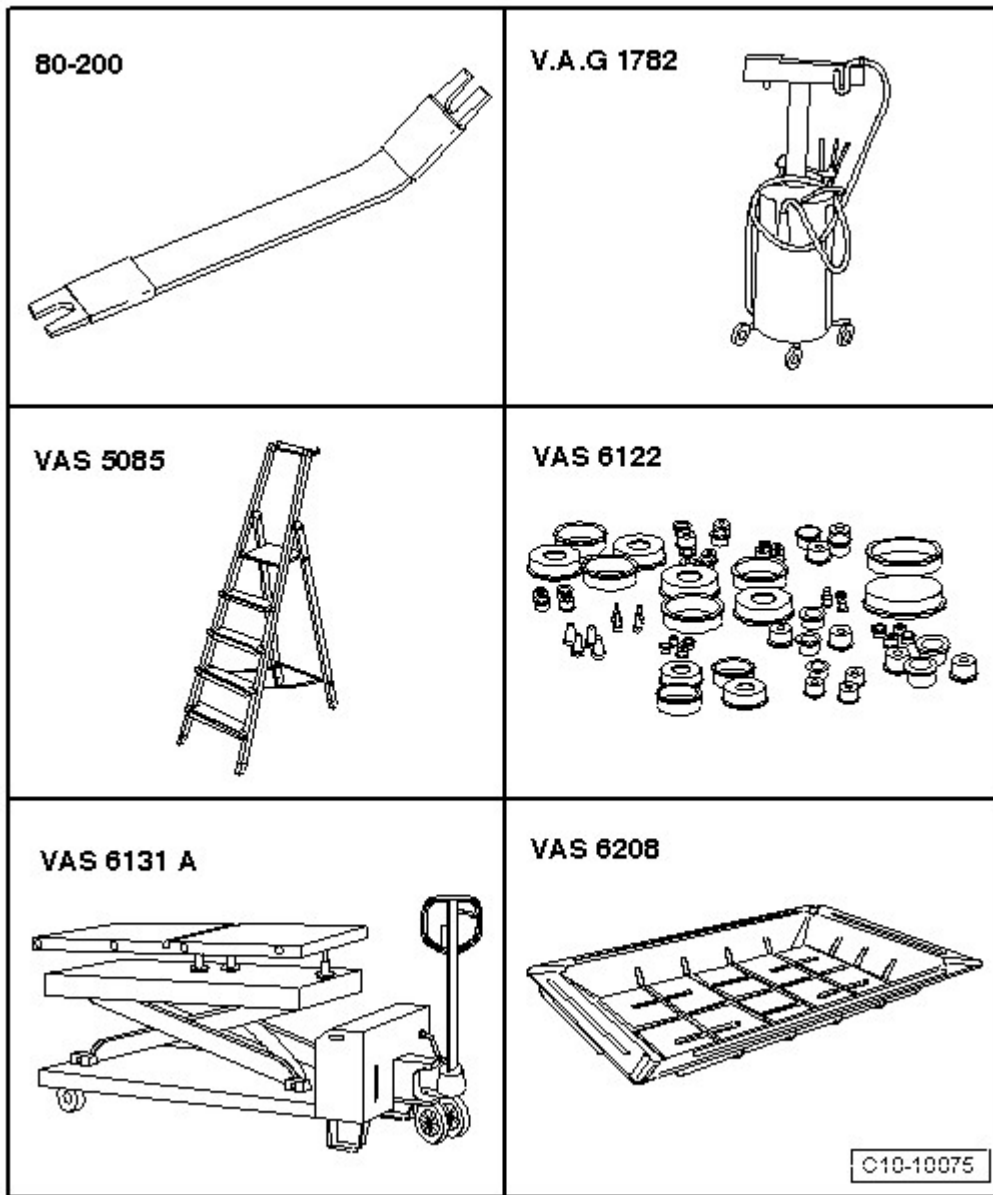


Fig. 216: Identifying Special Tools -- Engine, Removing
 Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Pry Lever - Rmv Outside Mirror 80 - 200
- 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 6131/10as well as Supplementary Set, Audi A8 VAS 6131/11, Supplementary Set, Audi Q7 VAS 6131/13 and qty. 3 Tapered Mounting Pin VAS 6131/10-2

- Drip Tray For VAS 6100 VAS 6208

Engine support bridge 10 - 222 A

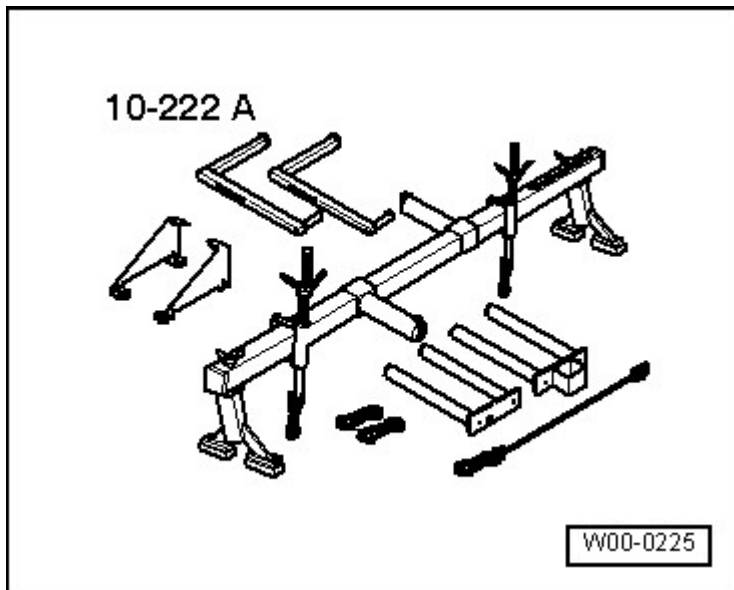


Fig. 217: Engine Support Bridge 10 - 222 A
Courtesy of AUDI OF AMERICA, LLC

Engine Support Supplement Set T40093

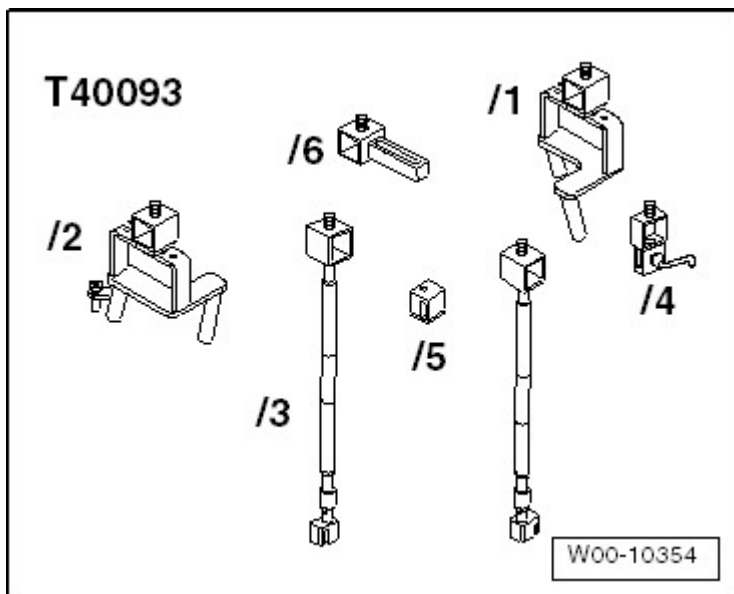


Fig. 218: Engine Support Supplement Set T40093
Courtesy of AUDI OF AMERICA, LLC

Puller for Gear Shaft Linkage T40160

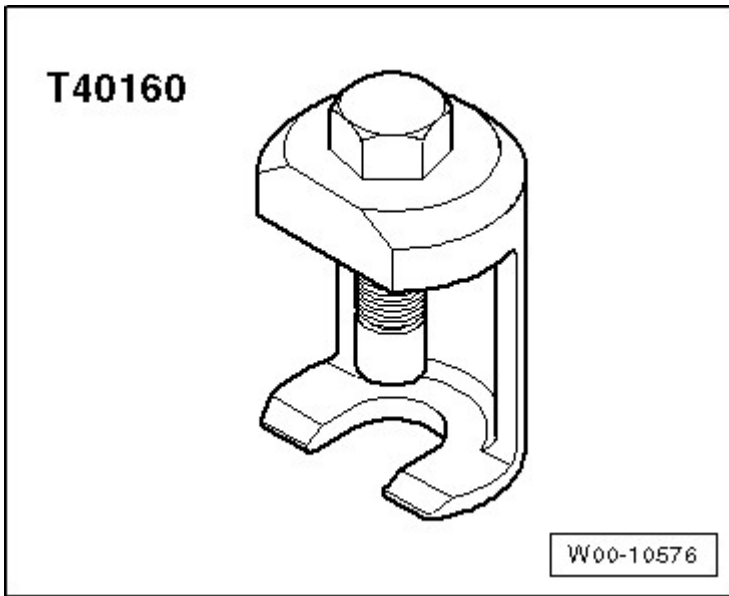


Fig. 219: Identifying Puller T40160
Courtesy of AUDI OF AMERICA, LLC

Assembly Aid T40169

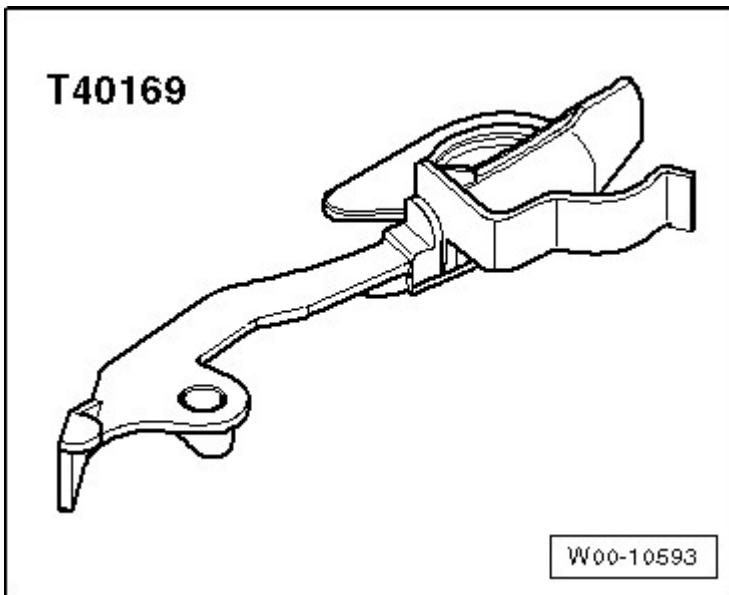


Fig. 220: Assembly Aid T40169
Courtesy of AUDI OF AMERICA, LLC

Transportation Lock T40170

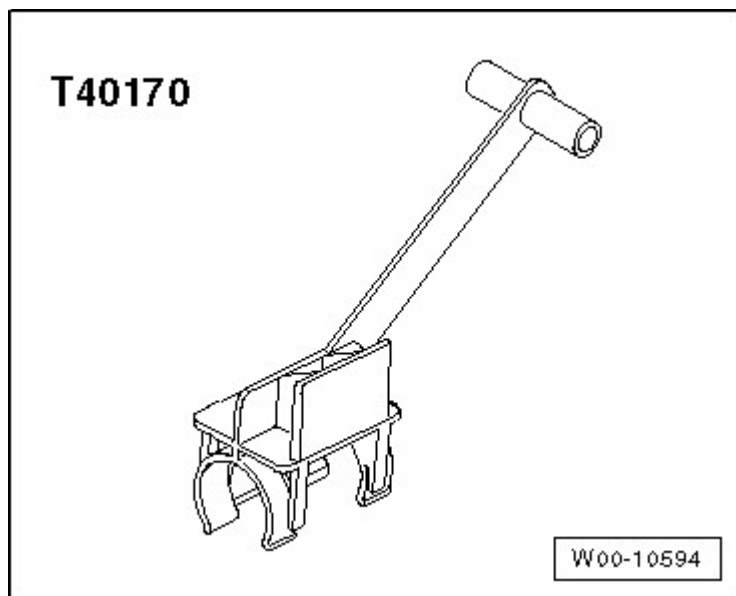


Fig. 221: Identifying Transportation Lock T40170
Courtesy of AUDI OF AMERICA, LLC

Ring Spanner Insert AF 16 V.A.G 1332/14

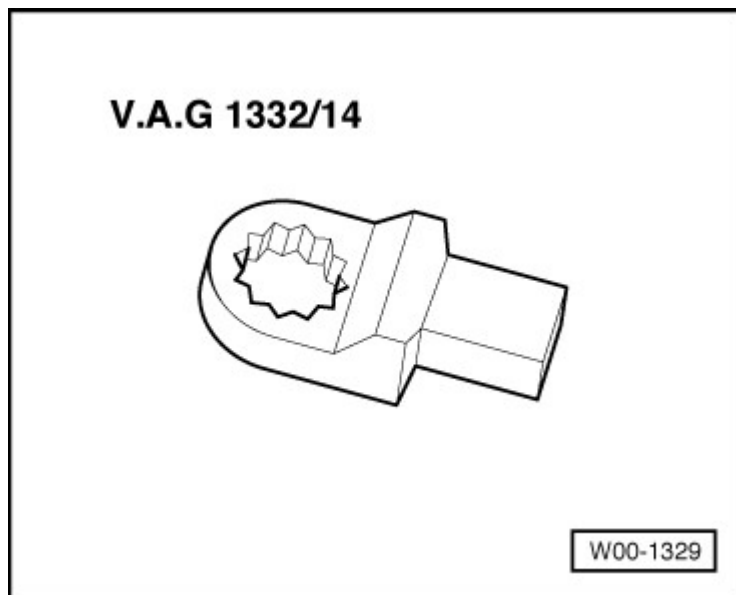


Fig. 222: Identifying Ring Spanner Insert AF 16 V.A.G 1332/14
Courtesy of AUDI OF AMERICA, LLC

Engine/transmission jack V.A.G 1383 A

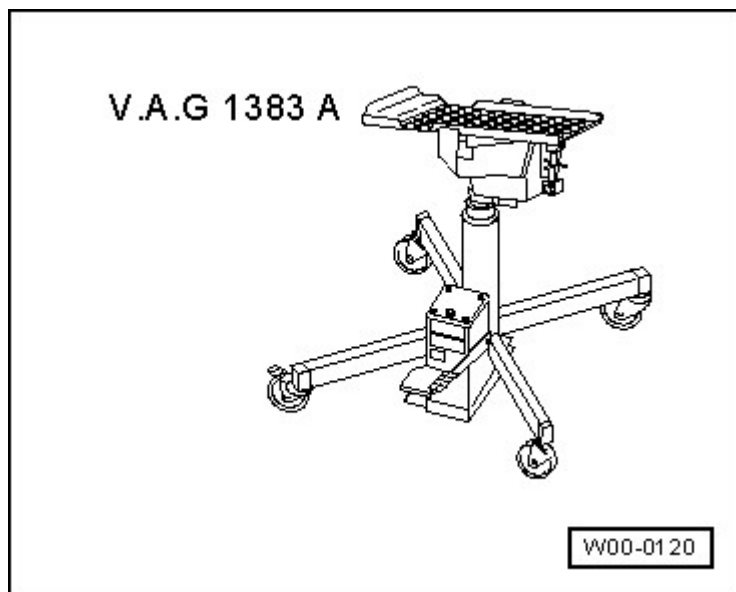


Fig. 223: Engine & Transmission Jack VAG 1383 A
Courtesy of AUDI OF AMERICA, LLC

Special tools and workshop equipment required

- Hose Clip Pliers VAS 6340

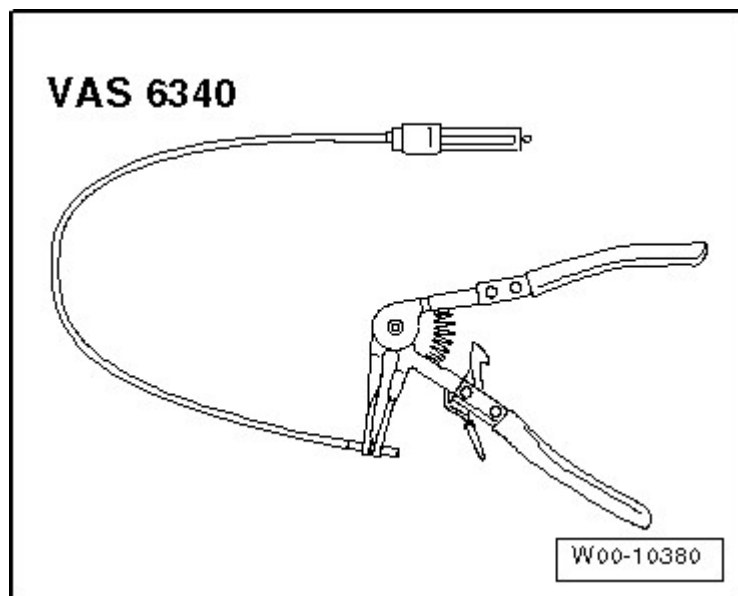


Fig. 224: Hose Clamp Pliers VAS 6340
Courtesy of AUDI OF AMERICA, LLC

- Hose Clip Pliers VAS 6362

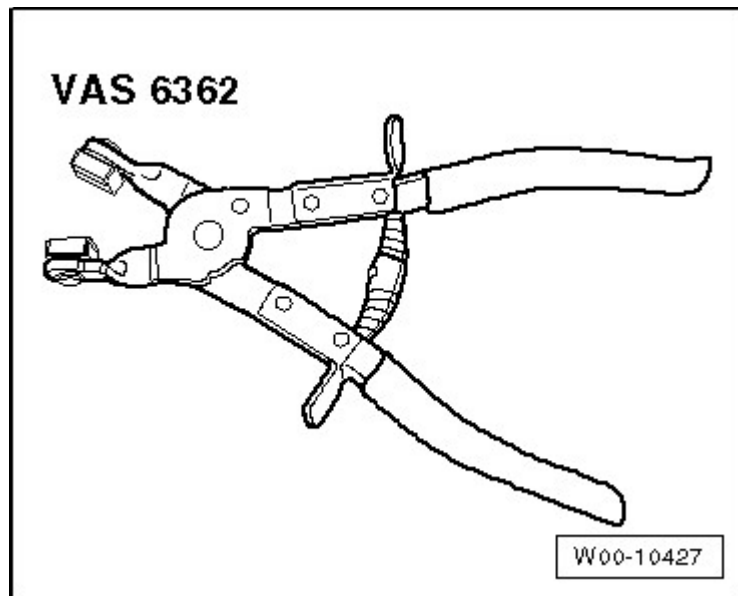


Fig. 225: Clamp Pliers VAS 6362
Courtesy of AUDI OF AMERICA, LLC

- Not illustrated:
- Spindle 10 - 222 A /11
- Socket T40058
- Jointed Socket, 12 mm T40220 for engines through engine serial number CAU 005 521
- Adapter T40257
- Wrench T40263
- Support Set VAS 6131/10, Supplementary Set VAS 6131/13-7 and Transmission Support VAS 6131/14

ENGINE**4.2 Liter - General, Technical Data - Engine Mechanical - Engine Code(s): CAUA (Coupe) (As of 01.2011)****00 GENERAL, TECHNICAL DATA****GENERAL INFORMATION****CLEAN WORKING CONDITIONS**

Even a little contamination can lead to faults. When working on the fuel supply and fuel injection system, observe the following guidelines for a clean working environment:

- Before loosening, connections and surrounding areas must be cleaned thoroughly with engine or brake cleaner, and then cleaned area must be dried completely.
- Plug open lines and connections immediately with appropriate protective caps.
- Place removed parts 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: Remove the replacement parts from their packaging just prior to installing them. Do not use parts that have been stored outside of their original packaging (for example in tool boxes etc.).
- When the system is open: Do not work with compressed air. Do not move vehicle unless absolutely necessary.
- Protect the disconnected connectors from dirt and moisture and only connect when they are dry.

CONTACT CORROSION

Contact corrosion can occur if non-approved fasteners are used such as bolts, nuts, washers, etc.

For this reason, only connecting elements with a special surface coating are installed.

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

If you are not sure about the suitability of parts, install new parts.

NOTE: We recommend original parts only. They are tested and compatible with aluminum.

It is recommended to use Audi accessories.

Damage resulting from contact corrosion is not covered by the warranty.

COOLERS AND CONDENSERS, INSTALLING

The radiator and condenser may have small indentations on the fins even when installed correctly. It is not damage. Radiators or condensers should not be replaced because of slight impressions like these.

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.

ENGINE NUMBER

NOTE: The engine number is only visible if the front engine cover is removed.

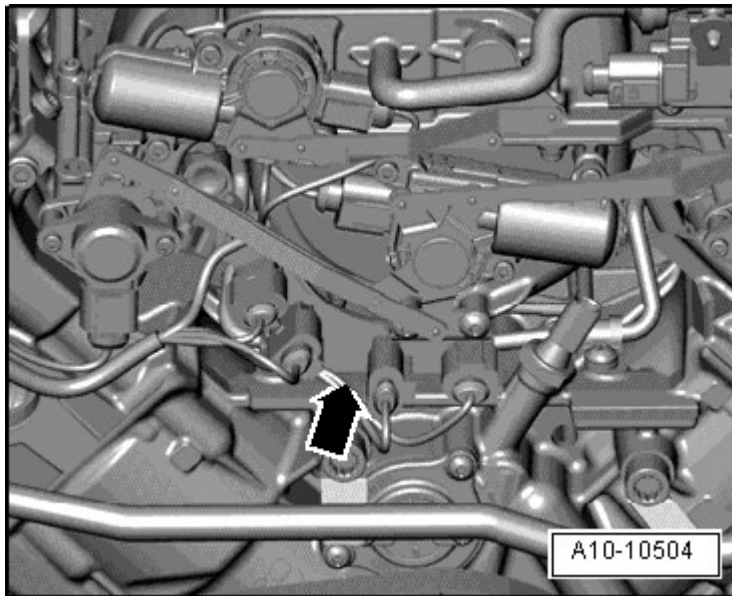


Fig. 1: Identifying Engine Number Stamped On Engine Block
Courtesy of AUDI OF AMERICA, LLC

- Engine number ("engine code" and "serial number") is located at front on cylinder block at top -arrow-.
- Engine codes beginning with "C" are four-digit.
- The first 3 digits of the engine code stand for displacement and the mechanical structure of the engine. They are stamped in the cylinder block, including the serial number.
- The fourth digit describes the engine output and torque and depends on the engine control module.

NOTE: The 4-digit engine code is on the type plate, vehicle data label and engine control module.

Locations of the type plate and vehicle data label.

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.

SAFETY PRECAUTIONS**BEFORE OPENING HIGH PRESSURE FUEL INJECTION SYSTEM****WARNING:**

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

COOLING SYSTEM

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.

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

- The cap must engage noticeably when sealing.

EXHAUST SYSTEM

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.

FUEL SYSTEM

Note the following when working on the fuel system:

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

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

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

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

- Turn off the ignition before disconnecting and connecting the wiring for the injection and ignition system. This includes tester cables as well.
- Only clean engine with ignition switched off.
- If the connectors were disconnected and the engine was started, then malfunctions have been stored in the engine control module DTC memory: **Generate readiness code in Guided Functions** using the vehicle diagnostic tester.

CAUTION: Risk of destroying electronic components when disconnecting the battery.

- Observe measures for disconnecting battery.
- Only disconnect the battery with ignition switched off.

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

SUBFRAME

Note the following when working on the subframe:

CAUTION: The suspension components could be damaged.

- Do not rest the vehicle on its wheels if the subframe mount, the steering gear or the subframe crossbrace are not installed correctly.
- Do not support the vehicle on the subframe or the subframe crossbrace, for example, by a floor jack or similar device.

TEST DRIVES WITH THE USE OF TEST AND MEASURING DEVICES

If testing equipment must be used during a road test, observe the following:

WARNING: Distraction and testing equipment that is not secured properly can cause accidents.

The passenger airbag could pose a risk if it deploys in a collision.

2009 Audi S5 Quattro

ENGINE 4.2 Liter - General, Technical Data - Engine Mechanical - Engine Code(s): CAUA (Coupe) (As of 01.2011)

- Operating testing equipment while driving causes it to shift position.
- There is an increased risk of injury due to unsecured testing equipment.
- Always secure testing equipment on the rear seat using a strap and have a second person in the rear seat operate it.

SPECIFICATIONS

ENGINE DATA

Identification codes	CAUA
Displacement	liter
Output	kW at RPM
Torque	Nm at RPM
Bore	diameter mm
Stroke	mm
Compression ratio	
RON	at least
Fuel injection and ignition system	
Ignition sequence	
Turbocharger	
Oxygen sensor regulation	
Variable valve timing	
Variable intake manifold	
Secondary Air Injection (AIR) System	
Valve per cylinder	
• ¹⁾ Super unleaded RON 95 is permissible, although with reduced power.	

DIAGNOSIS AND TESTING

FUEL SYSTEM, CHECKING FOR LEAKS

- Let the engine run a few minutes at a moderate speed.
- Turn off the ignition.
- Check the entire fuel system for leaks.
- If there are leaks in spite of correct tightening specifications, the corresponding component must be replaced.
- Then perform a road test and depress the accelerator pedal all the way at least one time.

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

VACUUM SYSTEM, CHECKING

Special tools and workshop equipment required

- Hand Vacuum Pump VAS 6213

Procedure

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

- Cracks
- Damage caused by animals
- Crimps
- Leaks

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

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

-- If using the 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

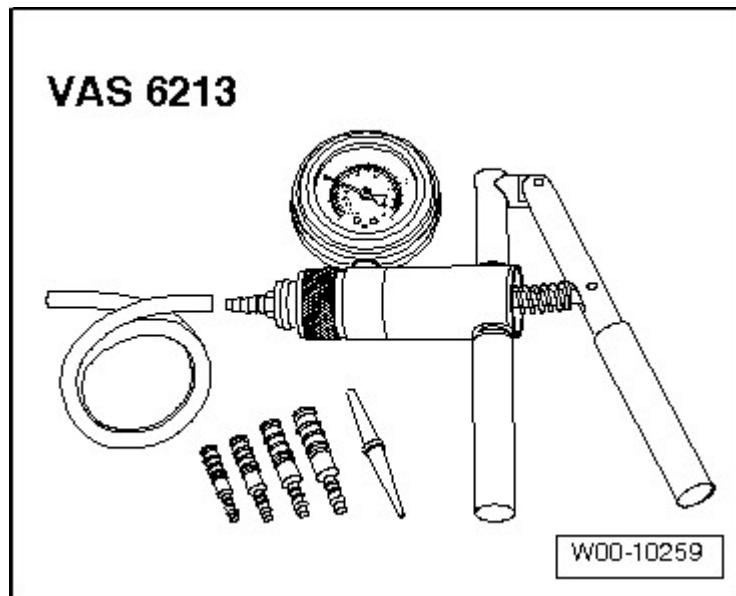


Fig. 2: Hand Vacuum Pump VAS 6213
Courtesy of AUDI OF AMERICA, LLC