ENGINE

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

13 CRANKSHAFT, CYLINDER BLOCK

GENERAL INFORMATION

CRANKSHAFT BEARING SHELL, ALLOCATING

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

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

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

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

Cylinder Block

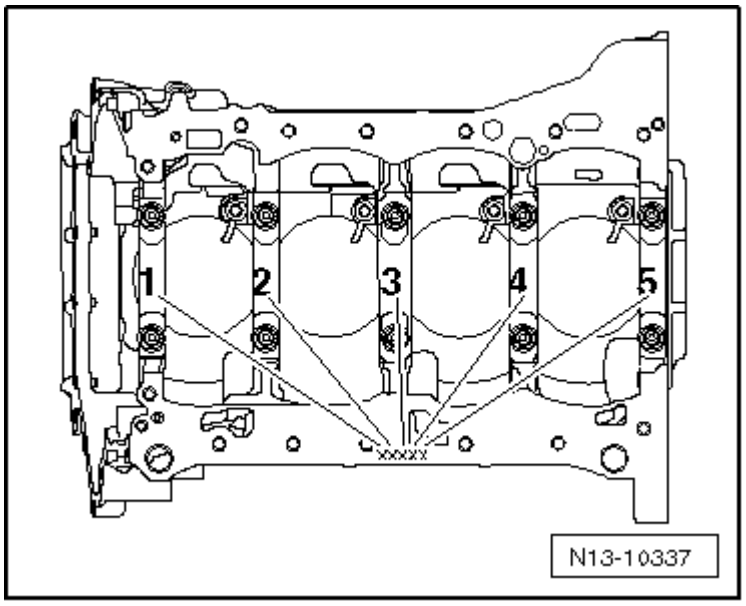

Fig. 1: Locating Cylinder Block Identification On Top (Transmission Side) Of Cylinder Block
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

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

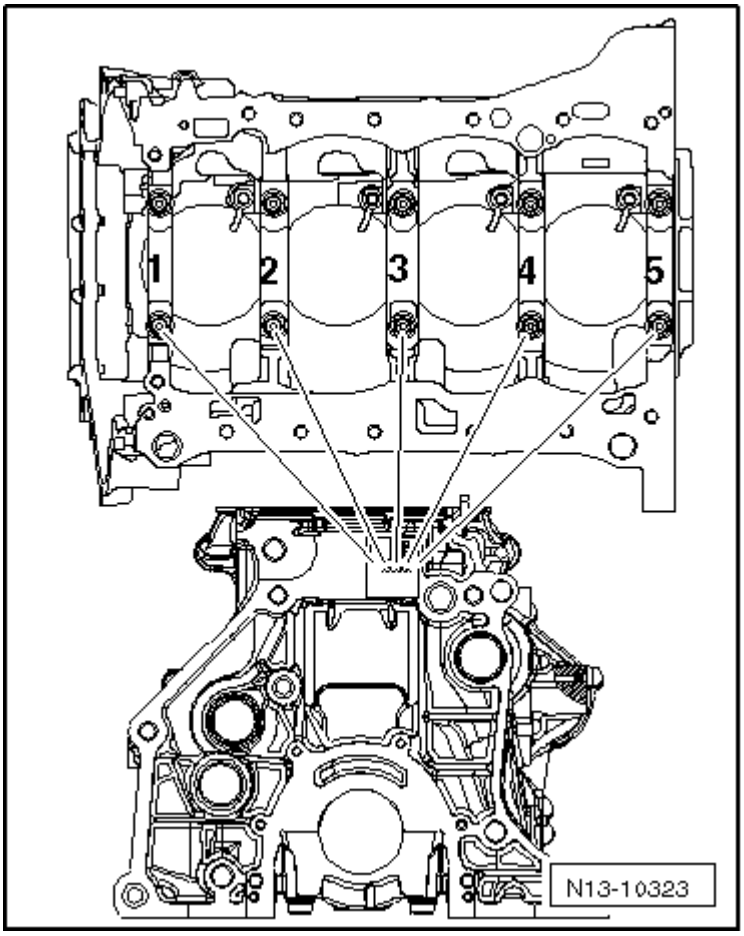

Fig. 2: Locating Identification On Cylinder Block
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

Crankshaft

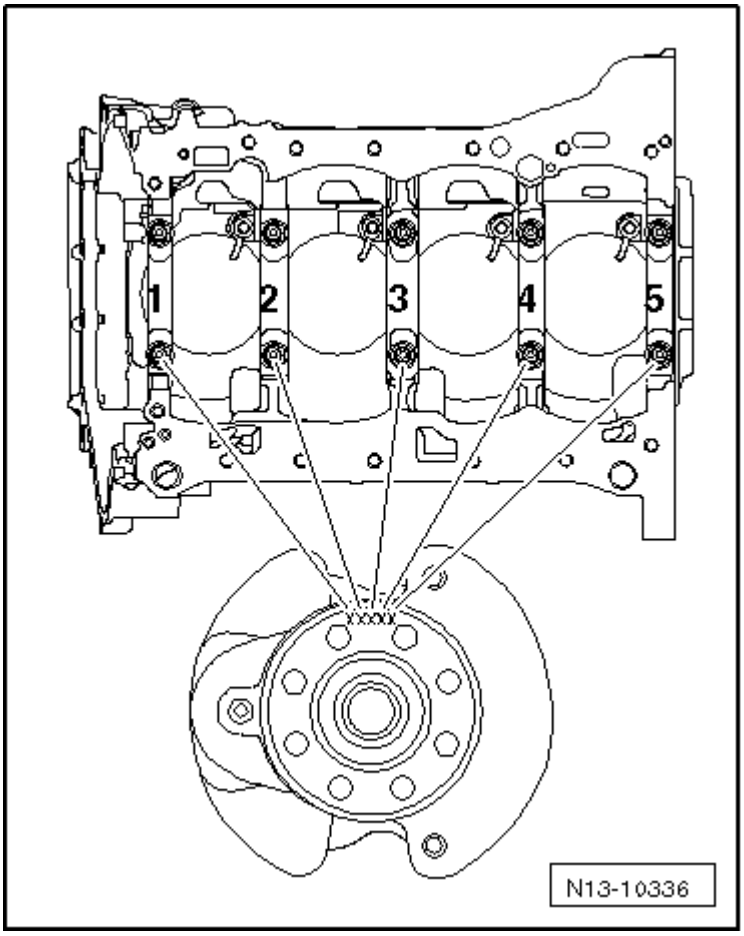

Fig. 3: Locating Identification On Crankshaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

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

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

NEW CONNECTING ROD, SEPARATING

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

-- Mark which cylinder the connecting rod belongs to.

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

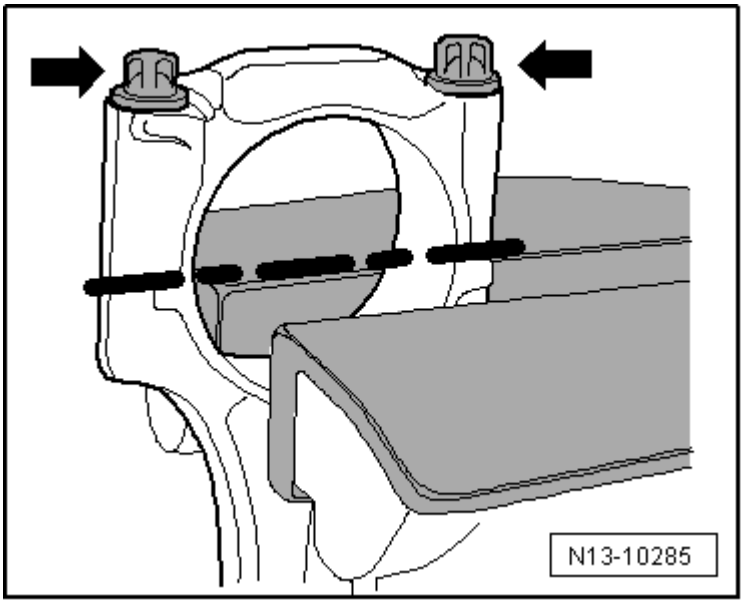

Fig. 4: Identifying Connecting Rod Clamped In Vise Equipped With Aluminum Protective Pads
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

Clamp the connecting rod below the dotted line.

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

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

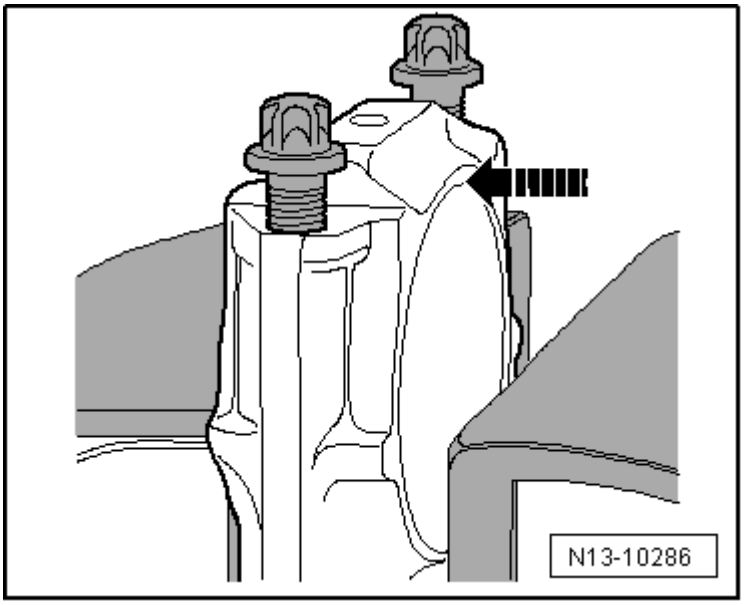

Fig. 5: Identifying Connecting Rod Bearing Cap
Courtesy of VOLKSWAGEN UNITED STATES, INC.

DESCRIPTION AND OPERATION

RIBBED BELT OVERVIEW

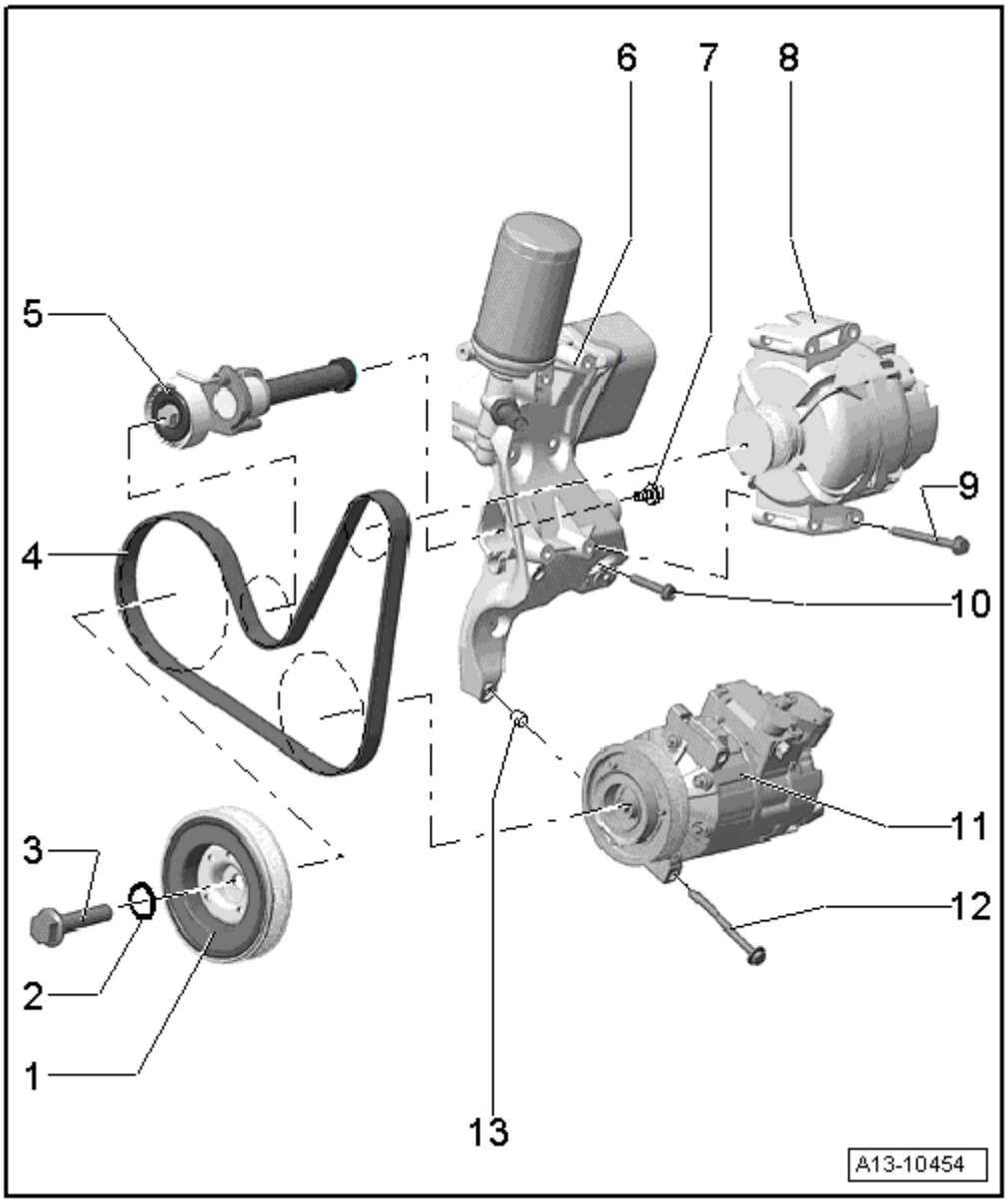

Fig. 6: Identifying Ribbed Belt Drive Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1. **Vibration Damper**
   - With the pulley for the ribbed belt.
   - Removing and installing, refer to **VIBRATION DAMPER**.
2. **O-ring**
   - Always replace.
3. **Bolt**

- 150 Nm + an additional 90° (1/4) turn.
- Always replace.
- Use the counter hold tool -T10355- to loosen and tighten.

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

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

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

   - Removing and installing, refer to **RIBBED BELT**.
   - When installing, make sure it is seated correctly on the pulleys.
5. **Belt Tensioner**
   - To release tension on the ribbed belt, rotate using a box end wrench.
   - Secure using locking pin -T10060 A-.
   - Belt tensioner installed position. Refer to **Fig. 7**.
   - Removing and installing, refer to one of the following:
     - GTI and Eos, refer to **RIBBED BELT TENSIONER**.
6. **Accessory Bracket**
   - With the oil pressure switch -F1-, oil filter and oil cooler.
   - Removing and installing, refer to **ACCESSORY BRACKET**.
   - Oil cooler removing and installing, refer to **OIL COOLER** .
7. **Bolt**
   - 10 Nm
8. **Generator**
   - Removing and installing, refer to **Removal and Installation** .
9. **Bolt**
   - 23 Nm
10. **Bolt**
    - Tightening sequence, refer to **Fig. 8**.
11. **Air Conditioning (A/C) Compressor**
    - Do not remove or disconnect the refrigerant lines.
    - Removing and installing, refer to **Removal and Installation** .
12. **Bolt**
    - 25 Nm
13. **Alignment Sleeve**

- For the A/C compressor.

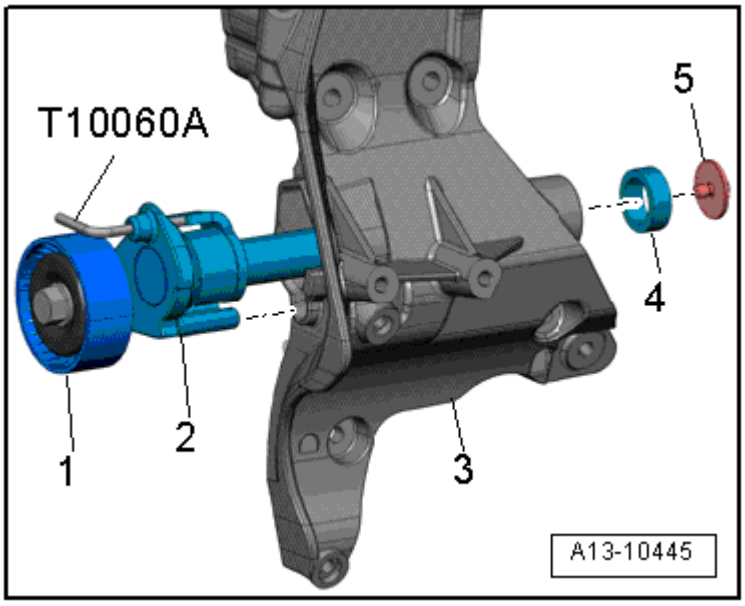

Fig. 7: Identifying Tensioning Device For Ribbed Belt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1. **Belt tensioner**
2. **Support**
3. **Accessory bracket**
4. **Centering sleeve**
5. **Bolt**

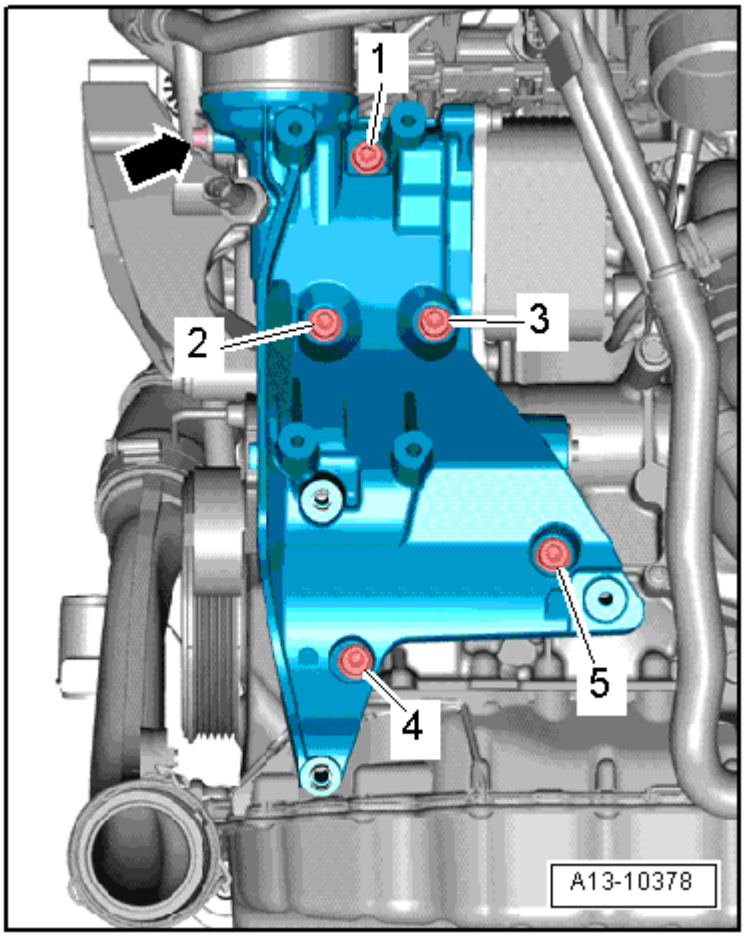

Fig. 8: Identifying Accessory Assembly Bracket Tightening Sequence
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Position the accessory bracket and install the bolt -4- first, then install the bolts -1, 2, 3 and 5-.

-- Tighten the bolts in 3 passes in sequence -1 through 5- as follows:

-- Tighten the bolts by hand. -- Tighten the bolts to 20 Nm. -- Tighten the bolts an additional 90° (1/4) turn.

SEALING FLANGE AND DUAL MASS FLYWHEEL/DRIVE PLATE OVERVIEW

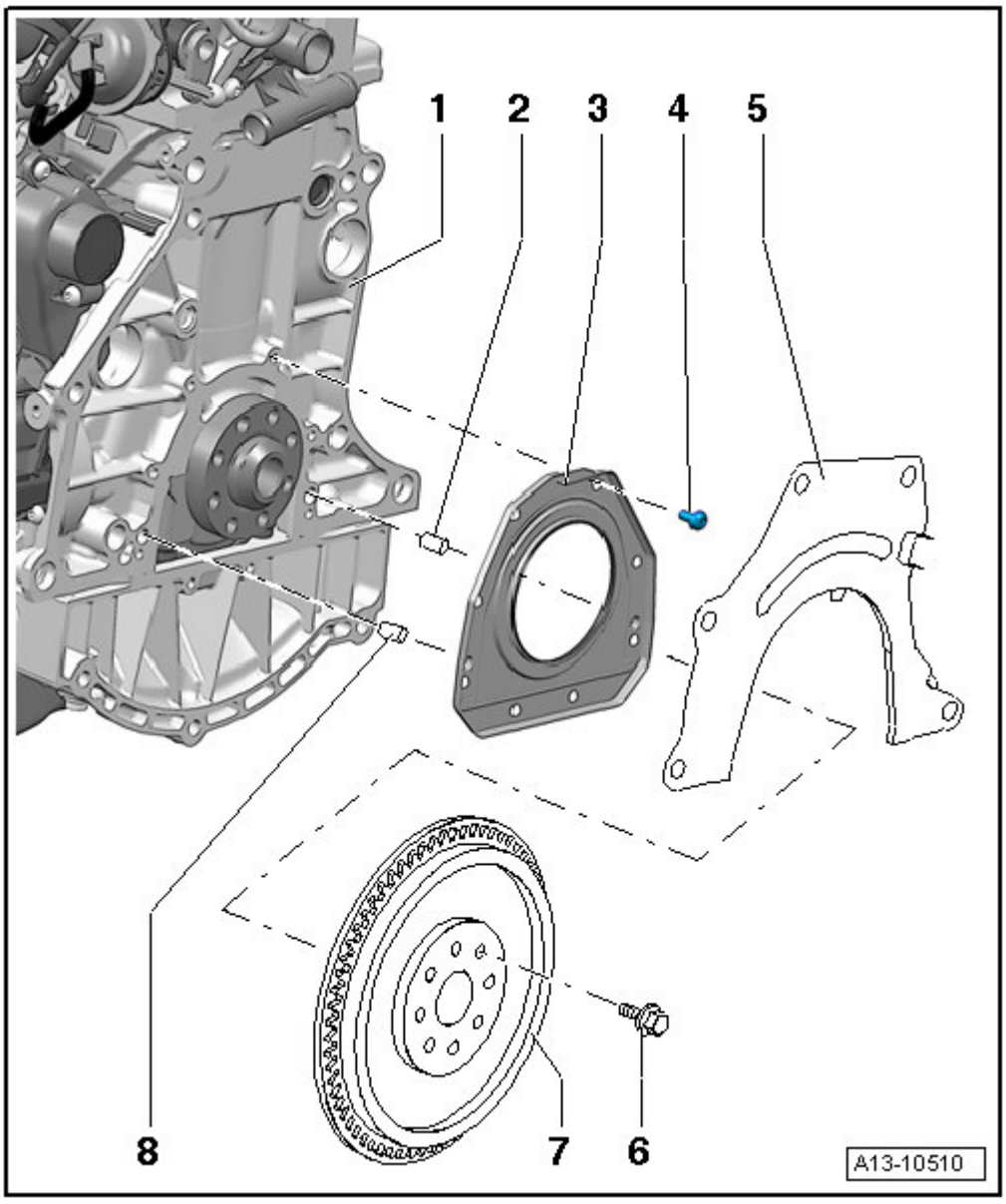

Fig. 9: Identifying Sealing Flange And Dual Mass Flywheel Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1. **Cylinder Block**
   - Crankshaft overview, refer to **CRANKSHAFT OVERVIEW**.
   - Piston and connecting rod overview, refer to **PISTONS AND CONNECTING ROD OVERVIEW**.
2. **Alignment Pin**
   - Not installed.
3. **Sealing Flange, Transmission Side**
   - With the seal.
   - Only replaced as a complete unit.

- Removing and installing, refer to **SEALING FLANGE, TRANSMISSION SIDE**.

4. **Bolt**
   - Tightening sequence, refer to **Fig. 10**.
5. **Intermediate Plate**
   - Must be located on the alignment sleeves.
   - Do not damage or bend when doing assembly work.
   - Is hooked in at the sealing flange, refer to **Fig. 11**.
6. **Bolt**
   - 60 Nm + an additional 90° (1/4) turn.
   - Always replace.
   - For the dual mass flywheel/drive plate.
7. **Dual Mass Flywheel/Drive Plate**
   - Dual mass flywheel removing and installing. Refer to **DUAL MASS FLYWHEEL**.
   - Drive plate removing and installing. Refer to **DRIVE PLATE**.
   - Drive plate installed position: the flange faces the engine.
   - Only possible to install in one position - Bores are offset.
8. **Alignment Pin**
   - Not installed.

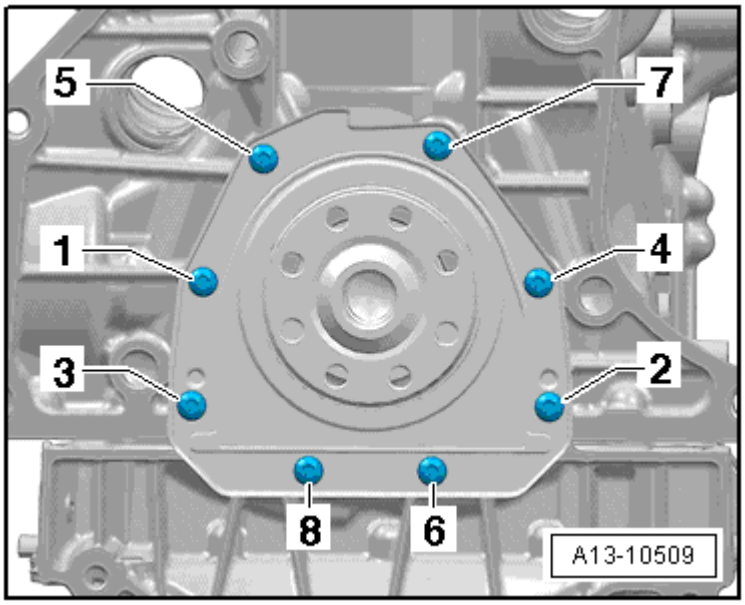

Fig. 10: Identifying Sealing Flange Tightening Sequence
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

-- 1. Install the bolts and tighten them by hand.

-- 2. Tighten the bolts to 9 Nm.

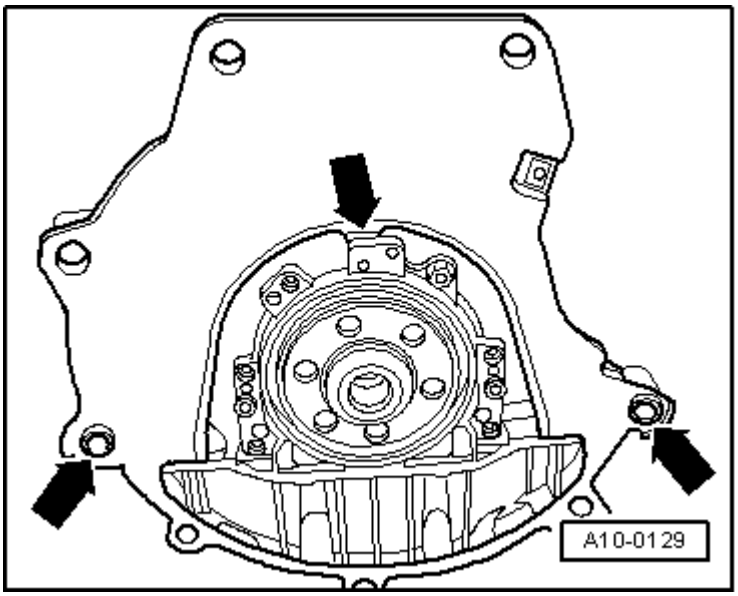

Fig. 11: Identifying Intermediate Plate Alignment Bushings
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

CRANKSHAFT OVERVIEW

NOTE: Secure the engine to the assembly stand using the engine and transmission holder -VAS 6095- when performing repair work. Refer to ENGINE, SECURING TO Engine and Transmission Holder VAS 6095 .

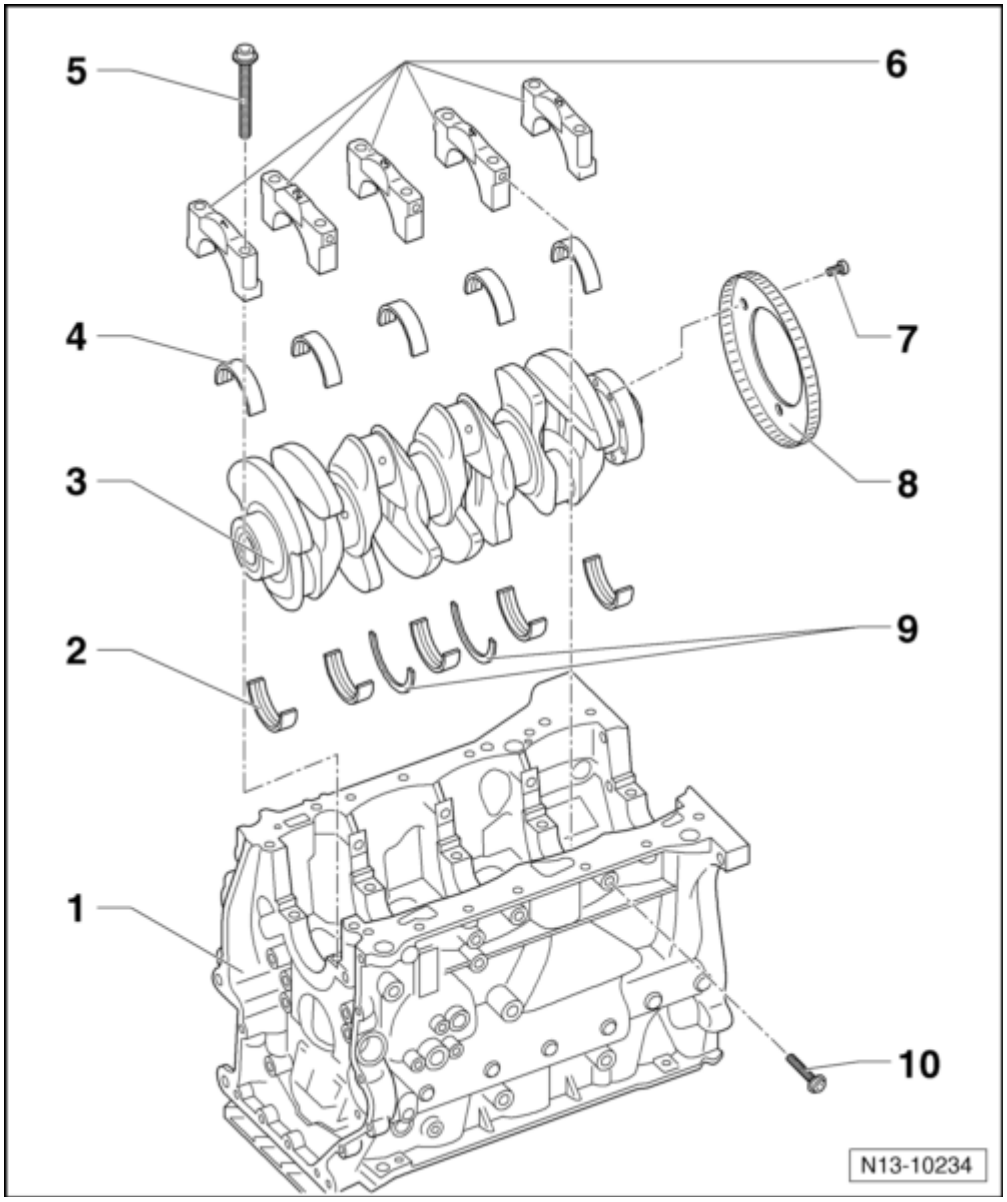

Fig. 12: Identifying Assembly Overview: Crankshaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1. **Cylinder Block**
   - If the cylinder block is being replaced, then the bearing shells must be allocated again. Refer to **CRANKSHAFT BEARING SHELL, ALLOCATING**.
2. **Bearing Shell, for the Cylinder Block**
   - With a lubricating groove.
   - Do not interchange used bearing shells (mark them).
   - Crankshaft bearing shell, allocating. Refer to **CRANKSHAFT BEARING SHELL, ALLOCATING**.
3. **Crankshaft**

- After removal, place it in such a way it does not rest on the sensor wheel -item 8- and damage it
- If the crankshaft is being replaced, then the bearing shells must be allocated to the bearing cap. Refer to **CRANKSHAFT BEARING SHELL, ALLOCATING**.
- Axial clearance measuring, refer to **CRANKSHAFT AXIAL PLAY, MEASURING**.
- Radial clearance measuring, refer to **CRANKSHAFT RADIAL PLAY, MEASURING**.
- Do not rotate the crankshaft when measuring the radial play.
- Crankshaft dimensions, refer to **CRANKSHAFT DIMENSIONS**.
- Removing and installing, refer to **SENSOR WHEEL**.

4. **Bearing Shell**
   - Without a lubricating groove.
   - Do not interchange used bearing shells (mark them).
   - Crankshaft bearing shell, allocating. Refer to **CRANKSHAFT BEARING SHELL, ALLOCATING**.
5. **Bolt**
   - Always replace.
   - Observe the tightening sequence, refer to **Fig. 13**.
6. **Bearing Cap**
   - Bearing cap 1: Belt pulley side.
   - Retaining tabs on the bearing shells and cylinder block/bearing caps must align above one another.
7. **Screw**
   - 10 Nm + an additional 90° (1/4) turn.
   - Always replace.
   - Replace the sensor wheel every time the bolts are loosened. Refer to **SENSOR WHEEL**.
8. **Sensor Wheel**
   - For the engine speed sensor -G28-.
   - Only possible to install in one position - Bores are offset.
   - Replace the sensor wheel every time the bolts -item 7- are loosened.
   - Removing and installing, refer to **SENSOR WHEEL**.
9. **Thrust washers**
   - For bearing 3.
10. **Bolt**
    - Always replace.
    - Observe the tightening sequence, refer to **Fig. 13**.

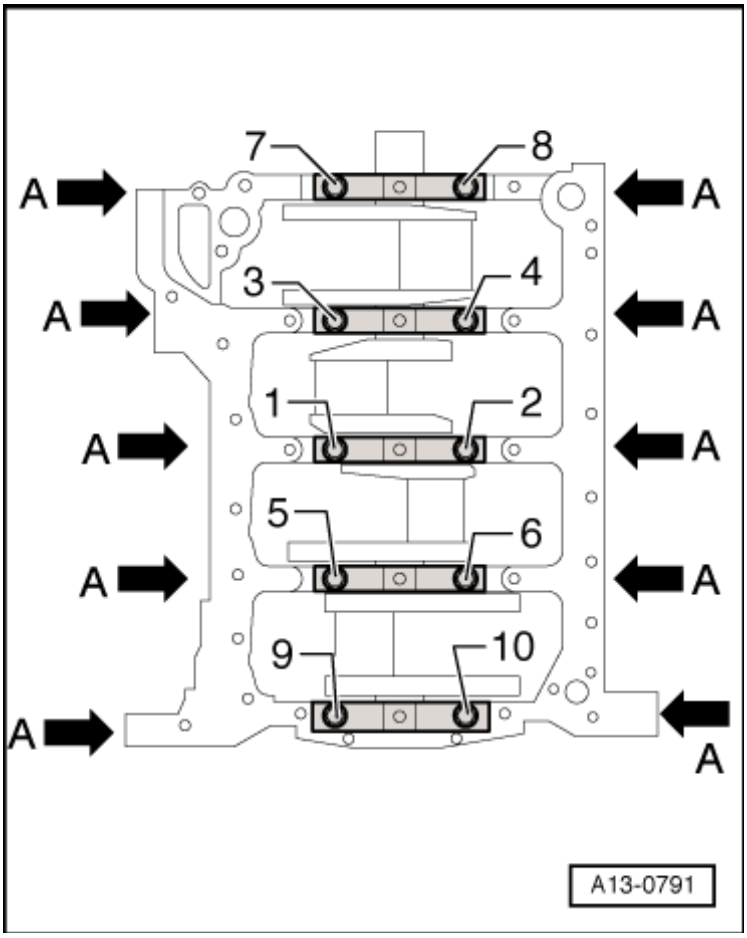

Fig. 13: Identifying Crankshaft Bearing Cap, Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Tighten the crankshaft bearing cap bolts in sequence -1 through 5- :

1. Tighten the bolts -1 through 10- and the -arrows- by hand.
2. Tighten the bolts -1 through 10- to 65 Nm.
3. Tighten the bolts -1 through 10- an additional 90° (1/4) turn using a ratchet.
4. Tighten the bolts -arrows- to 20 Nm.
5. Tighten the bolts -arrows- an additional 90° (1/4) turn using a ratchet.

PISTONS AND CONNECTING ROD OVERVIEW

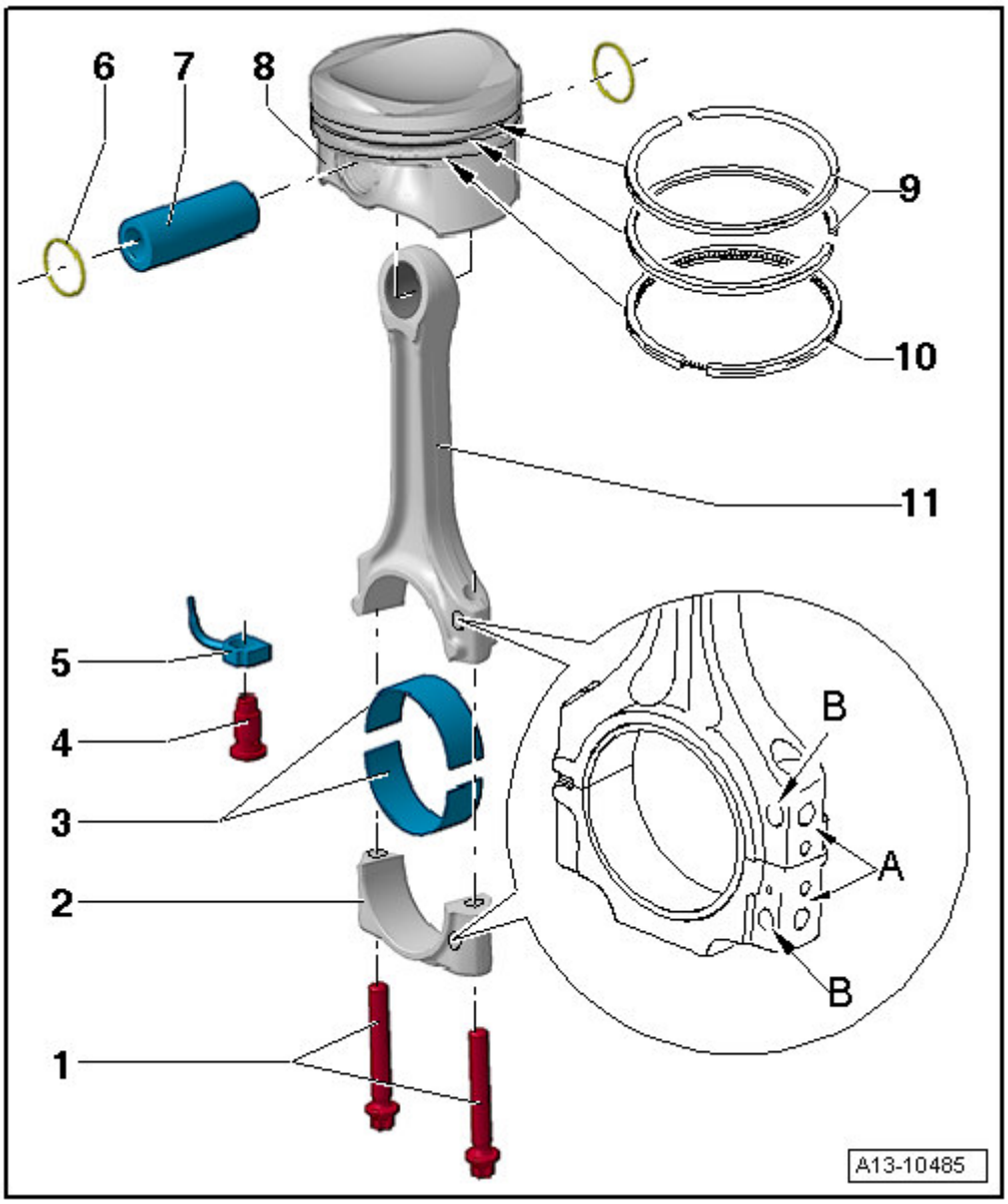

Fig. 14: Identifying Assembly Overview: Pistons And Connecting Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1. **Connecting Rod Bolt**
   - M8 bolt: 30 Nm + an additional 90° (1/4) turn.
   - M9 bolt: 45 Nm + an additional 90° (1/4) turn.
   - Always replace.
   - Lubricate the threads and contact surface.
   - Use an old bolt to measure the radial play.
   - Do not tighten the additional 90° (1/4) turn further when measuring the radial play.
2. **Connecting Rod Bearing Cap**
   - Note the installed position.

- Due to the separation procedure (cracking) for the connecting rod, the cap only fits in one position and only on the correct connecting rod.
- Mark the affiliation to the cylinder -A-.
- Installed position: Marks -B- point to the belt pulley side.

3. **Bearing Shells**
   - Installed location, refer to **Fig. 19**.
   - Do not interchange used bearing shells (mark them).
   - Axial play:

     New: 0.10 to 0.35 mm

     Wear limit: 0.40 mm.

   - Measure the radial clearance using Plastigage R :

     New: 0.02 to 0.06 mm

     Wear limit: 0.09 mm

   - Do not rotate the crankshaft when checking the radial clearance.
4. **Pressure Relief Valve**
   - 27 Nm
   - Opening pressure 1.6 to 1.9 bar.
5. **Oil Spray Jet**
   - For piston cooling.
6. **Circlip**
7. **Piston Pin**
   - If the piston is difficult to move, heat it to 60 °C (140 °F).
   - Remove and install using the pilot drift -VW 222 A-.
8. **Piston**
   - Checking, refer to **PISTON, CHECKING**.
   - Mark the installed position and cylinder allocation.
   - The arrow on the piston face points toward the belt pulley side.
   - Install using a piston ring compressor.
   - Piston and cylinder dimensions. Refer to **PISTON AND CYLINDER DIMENSIONS**.
   - Cylinder bore checking. Refer to **CYLINDER BORE, CHECKING**.
9. **Compression Rings**
   - Offset gaps by 120°.
   - Use piston ring pliers for removing and installing.
   - "TOP" mark must face up toward piston crown.

- Checking ring gap. Refer to **Fig. 15**.
- Checking piston ring groove clearance. Refer to **Fig. 16**.

10. **Oil Scraping Ring**
    - 2 piece
    - Install the upper steel ring so the gap is offset by 120° to the neighboring compression ring.
    - Offset all oil scraping ring component gaps to each other.
    - Checking ring gap. Refer to **Fig. 15**.
    - The side clearance cannot be measured.
11. **Connecting Rod**
    - Only replace as a set.
    - Mark the affiliation to the cylinder -A-.
    - Installed position: Marks -B- point to the belt pulley side.

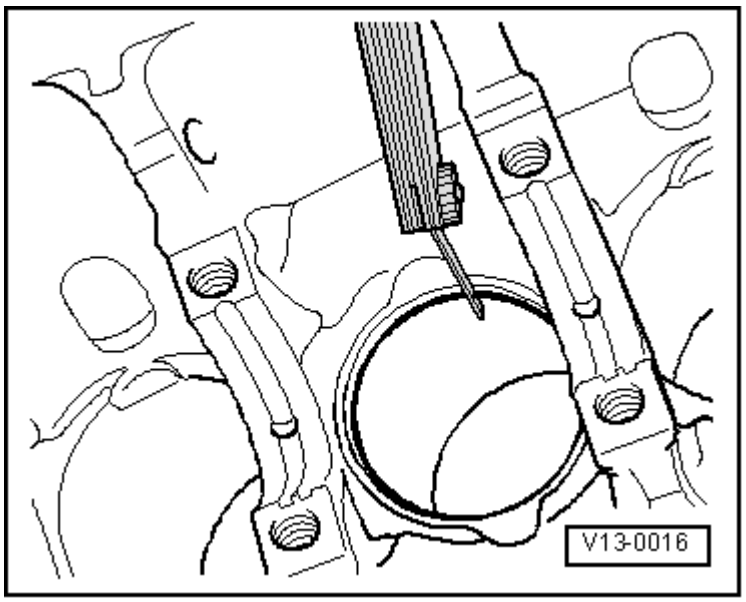

Fig. 15: Identifying Piston Ring Gap
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

Piston Ring Dimensions in mm	New	Wear limit
Compression ring	0.20... 0.40	0.8
Oil scraping ring	0.25... 0.50	0.8

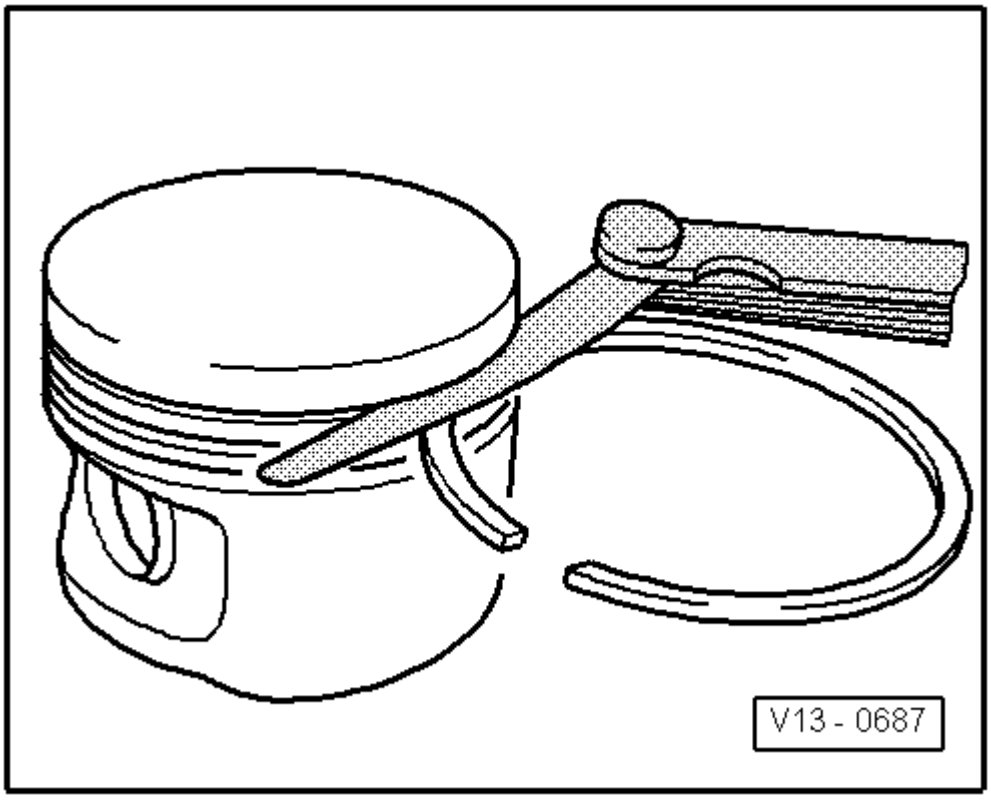

Fig. 16: Identifying Piston Ring Gap
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Clean the ring grooves of the piston before checking.

Piston Ring Dimensions in mm	New	Wear limit
1. Compression ring	0.06... 0.09	0.20
2. Compression ring	0.03... 0.06	0.15
Oil scraping rings	cannot be measured	

PISTON, CHECKING

Special tools and workshop equipment required

- Micrometer 75-100 mm -VAS 6071-

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

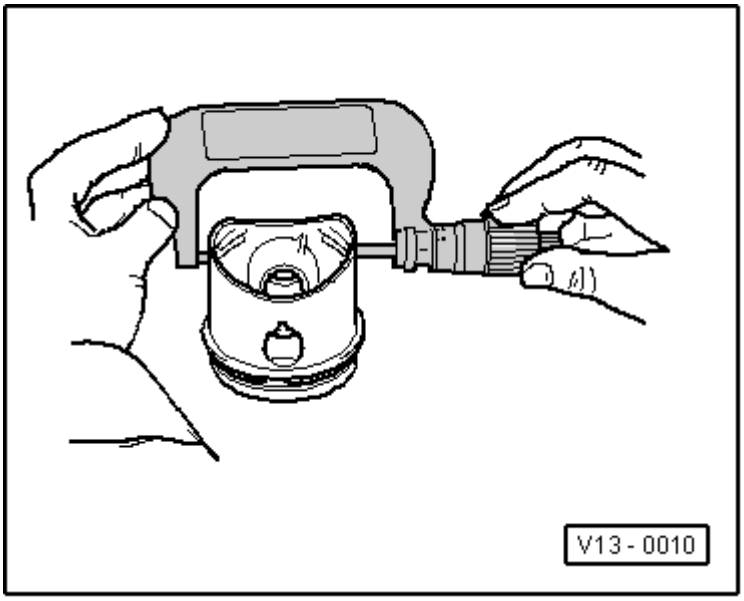

Fig. 17: Identifying Checking Piston
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Deviation from nominal dimension: Max. 0.04 mm

CYLINDER BORE, CHECKING

Special tools and workshop equipment required

- Cylinder Gauge -VAS 6078-

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

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

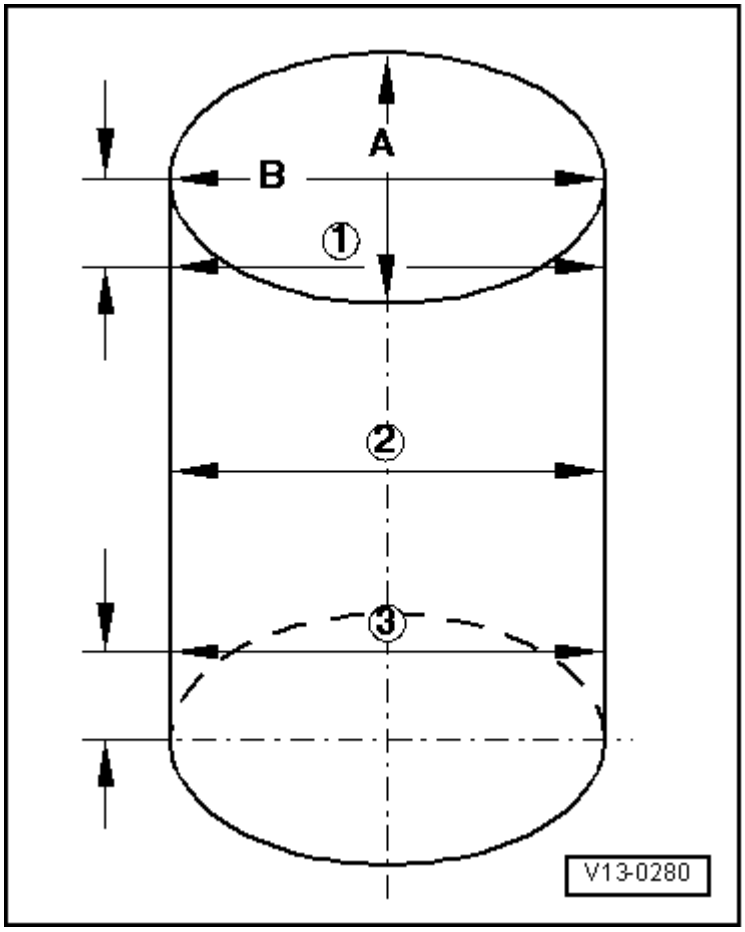

Fig. 18: Identifying Measurements
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Deviation from nominal dimension: Max. 0.08 mm

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

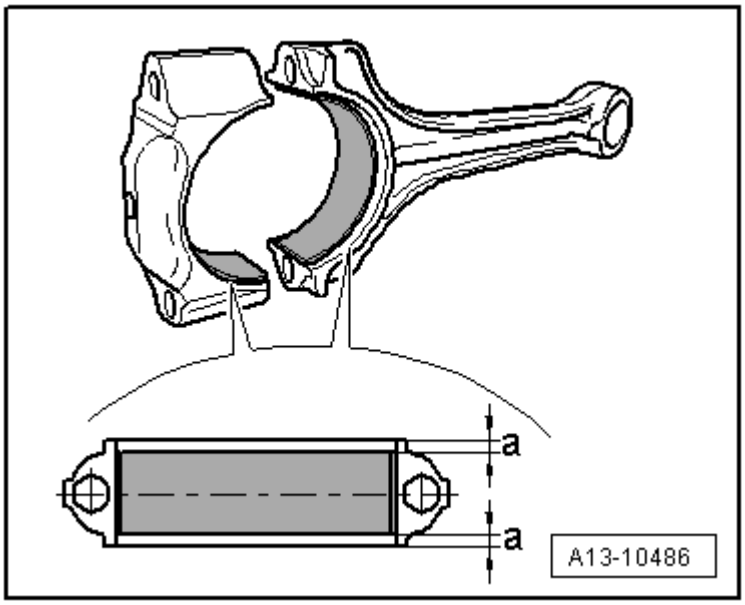

Fig. 19: Identifying Installed Position Of Bearing Shell
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Place the bearing shell centrally into the connecting rod and connecting rod bearing cap.

Dimension -a- must be the same on the left and right sides.

SPECIFICATIONS

CRANKSHAFT DIMENSIONS

(Dimensions are in mm)

Reconditioning Dimension (1)	Crankshaft Bearing Pin Diameter	Connecting Rod Bearing Pin Diameter
Basic dimension	58.00	47.80
(1) The preparation of worn crankshafts is not provided.		

PISTON AND CYLINDER DIMENSIONS

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

		Piston Diameter	Cylinder Bore Diameter
Basic dimension	mm	82.465(1)	82.51

(1) Dimensions are without graphite coating (0.02 mm thick). The graphite coating wears off.

FASTENER TIGHTENING SPECIFICATIONS

Component	Fastener Size	Nm
Air Conditioning Compressor to Accessory Bracket Bolt	-	25
Connecting Rod Bearing Cap to Connecting Rod Bolt (1)		
	M8	30 + 90°
	M9	45 + 90°
Dual Mass Flywheel/Drive Plate to Crankshaft Bolt (1)	-	60 + 90°
Generator to Accessory Bracket Bolt	-	23
Pressure Relief Valve	-	27
Ribbed Belt Tensioner to Accessory Bracket Bolt	-	10
Sensor Wheel to Crankshaft Screw (1)	-	10 + 90°
Vibration Damper to Crankshaft Bolt (1)	-	150 + 90°
(1) Always replace		

Accessory Bracket Bolt Tightening Sequence and Specification

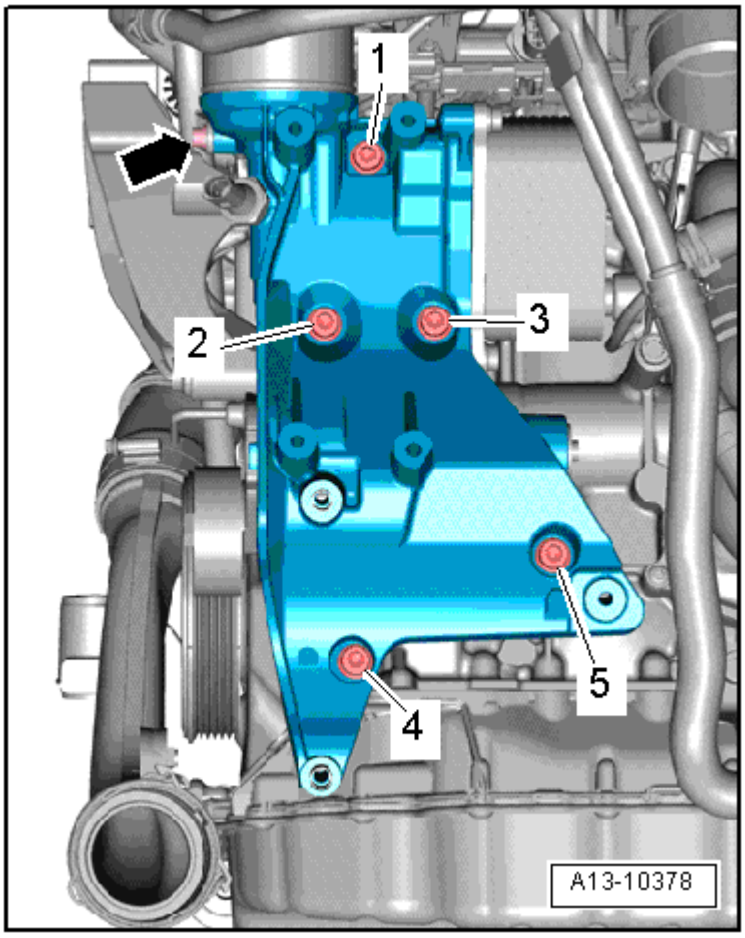

Fig. 20: Identifying Accessory Assembly Bracket Tightening Sequence
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Tighten the bolts in 3 passes in sequence -1 through 5- as follows:

-- 1st pass, tighten the bolts by hand.

-- 2nd pass, tighten the bolts to 20 Nm.

-- 3rd pass, tighten the bolts an additional 90° (1/4) turn.

Sealing Flange Bolt Tightening Sequence and Specification

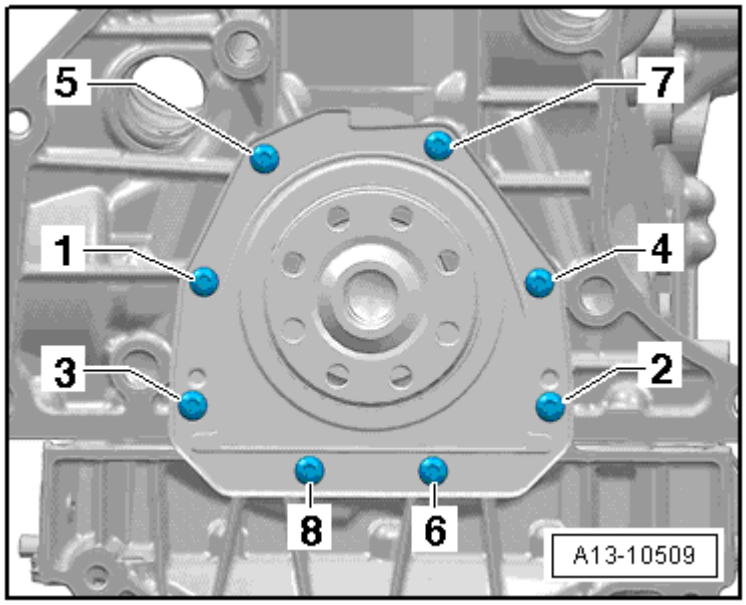

Fig. 21: Identifying Sealing Flange Tightening Sequence
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Tighten the bolts in sequence -1 through 8- as follows:

-- 1. Tighten the bolts by hand.

-- 2. Tighten the bolts to 9 Nm.

Crankshaft Bearing Cap Bolt Tightening Sequence and Specification

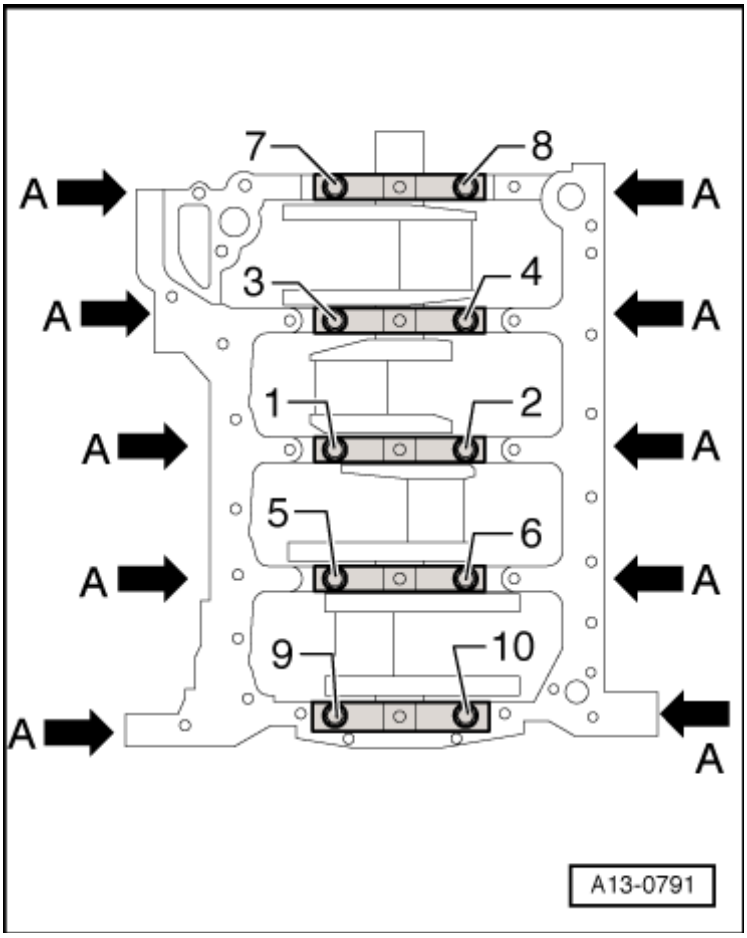

Fig. 22: Identifying Crankshaft Bearing Cap, Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Tighten the crankshaft bearing cap bolts -1 through 10- and -arrows- in sequence as follows:

1. Tighten the bolts -1 through 10- and - arrows- by hand.
2. Tighten the bolts -1 through 10- to 65 Nm.
3. Tighten the bolts -1 through 10- an additional 90° (1/4) turn using a ratchet.
4. Tighten the bolts -arrows- to 20 Nm.
5. Tighten the bolts -arrows- an additional 90° (1/4) turn using a ratchet.

DIAGNOSIS AND TESTING

CRANKSHAFT AXIAL PLAY, MEASURING

Special tools and workshop equipment required

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

Procedure

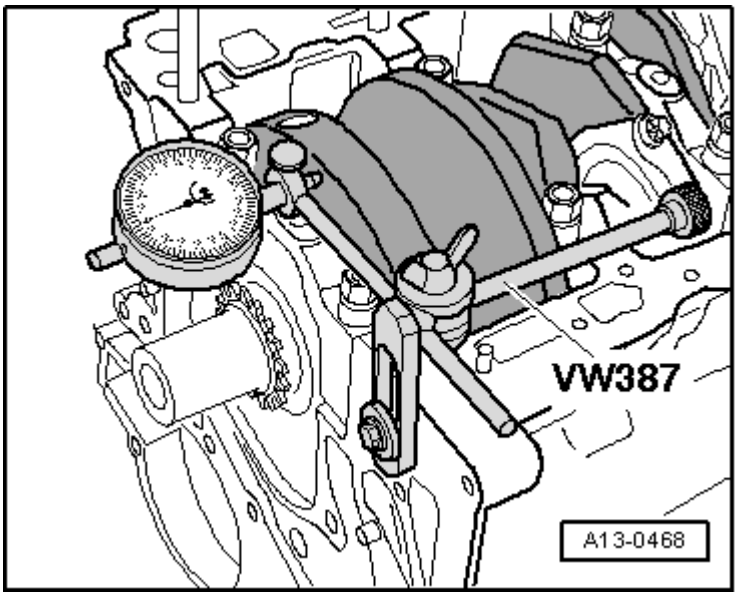

Fig. 23: Identifying Dial Indicator Attached Together With VW387 Dial Gauge Holder To Cylinder Block
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Install the dial gauge 0-10 mm -VAS 6079- together with the dial gauge holder -VW 387- to the cylinder block and set the indicator against the crankshaft counterweight.

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

-- Press the crankshaft off the gauge and read the value.

Axial Clearance

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

CRANKSHAFT RADIAL PLAY, MEASURING

Special tools and workshop equipment required

- Plastigage R

Procedure

NOTE: Do not interchange used bearing shells.

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

-- Remove the main bearing cap and clean the bearing cap and journal.

-- Place the Plastigage R over the entire width of the journal or into the bearing shell.

- The Plastigage R must rest in the center of the bearing shell.

-- Position the main bearing cap and tighten the bolts to 60 Nm. Do not rotate the crankshaft when doing so.

-- Remove the main bearing cap again.

-- Compare the width of the Plastigage R with the measuring scale.

Radial Clearance

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

REMOVAL AND INSTALLATION

RIBBED BELT

Removing

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

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

-- Remove the noise insulation. Refer to **Description and Operation** .

-- Remove the right charge air hose -arrows-.

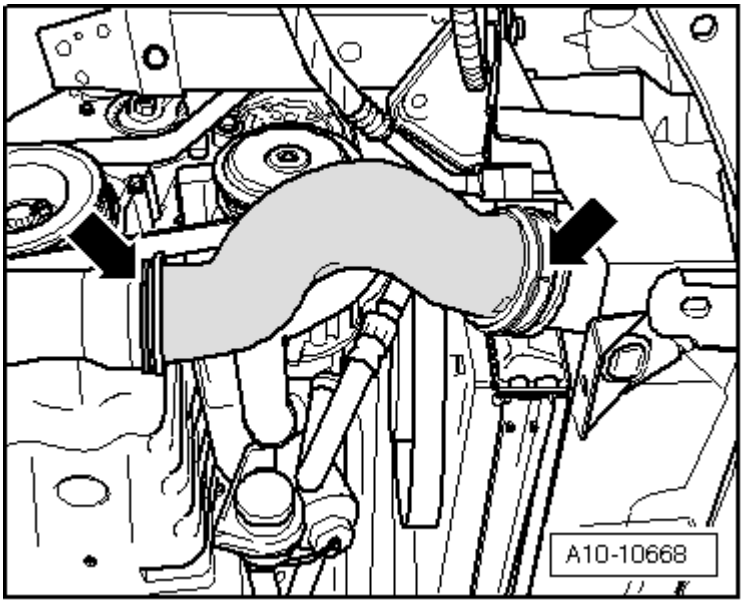

Fig. 24: Identifying Right Charge Air Guide Hose
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- To release the tension on the ribbed belt, rotate the tensioner in the -direction of the arrow- from underneath.

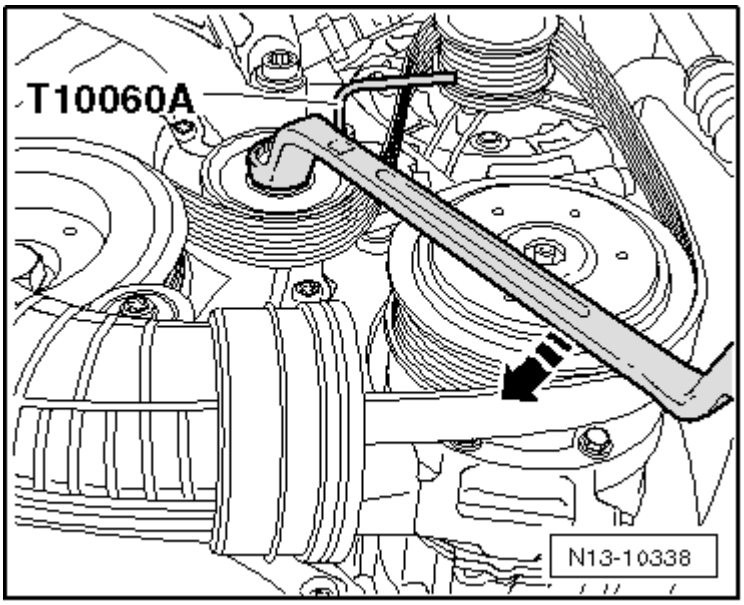

Fig. 25: Identifying Wrench And Locking Pin -T10060 A-
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Secure the tensioner using the locking pin -T10060 A-.

-- Remove the ribbed belt.

Installing

Install in reverse order of removal. Note the following:

NOTE: Before installing the ribbed belt, the generator and Air Conditioning (A/C) compressor must be securely installed.

-- First, mount the ribbed belt on the vibration damper, then on the A/C compressor and generator.

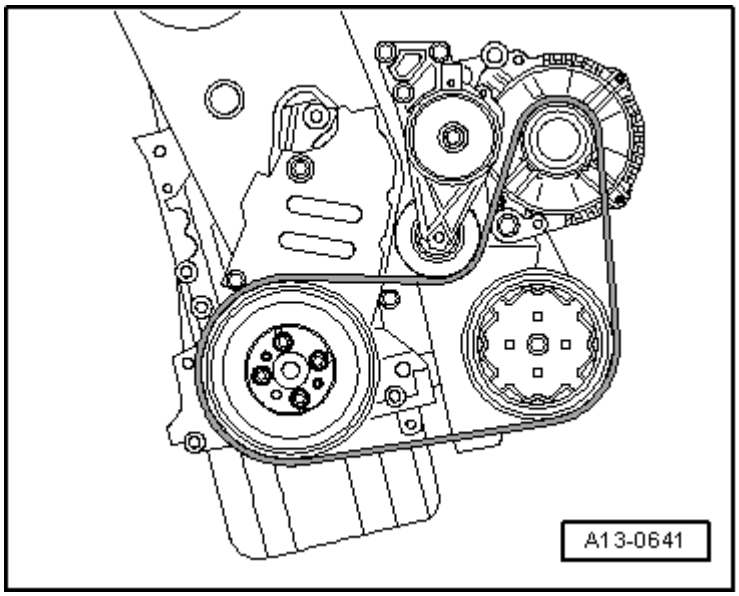

Fig. 26: Identifying Ribbed Belt Routing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Rotate the tensioner using a box end wrench and remove the locking pin -T10060 A-.

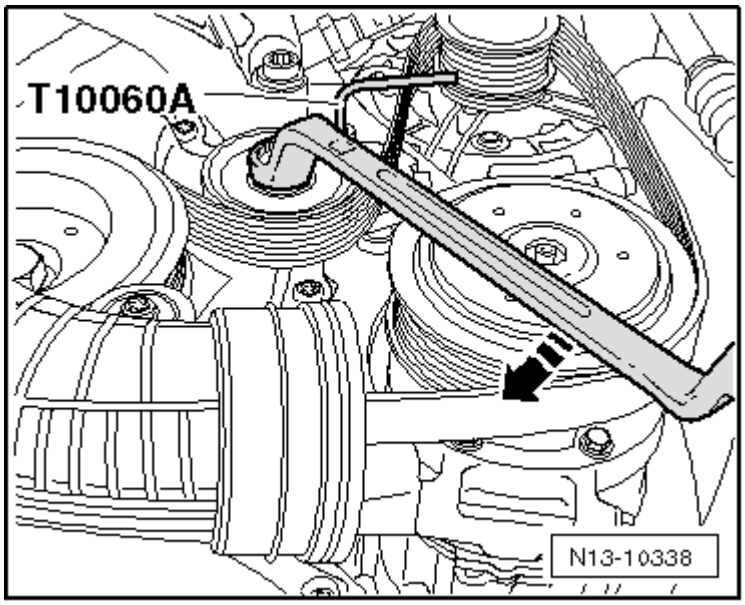

Fig. 27: Identifying Wrench And Locking Pin -T10060 A-
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Release the tensioner.

-- Check whether the ribbed belt is routed correctly.

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

RIBBED BELT TENSIONER

Special tools and workshop equipment required

- Engine Support Bridge 10-222 A
- Bracket with Spindle and Hook 10-222 A/10
- Shackle 10-222 A/12
- Adapter 10-222 A/13 (GTI only)
- Locking Pin -T10060 A-
- Torque Wrench (5-50 Nm) -V.A.G 1331-
- Bracket for Engine 10-222 A/1 (Eos only)

Removing

-- Remove the noise insulation. Refer to **Description and Operation** .

-- Remove the front part of the right wheel housing liner or loosen the one piece wheel housing liner. Refer to **Removal and Installation** .

-- First, remove the bolt -1-, then the bolts -2 and 3- and then remove the pendulum support.

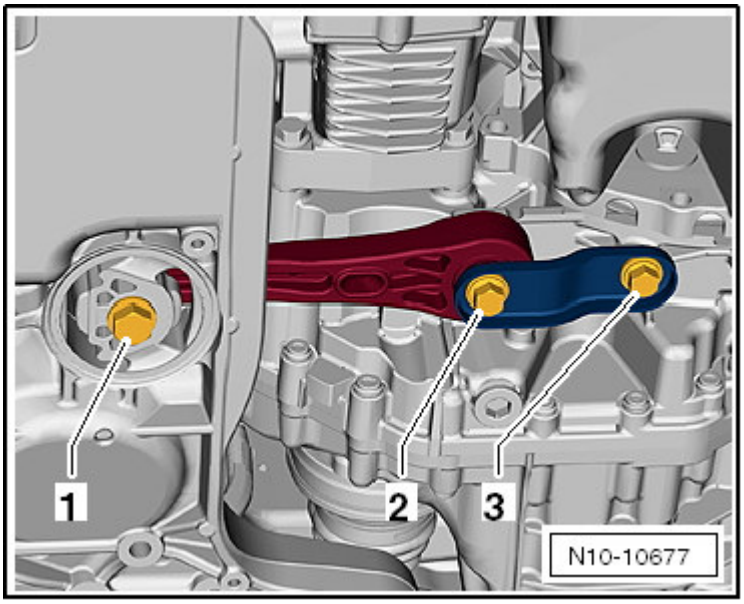

Fig. 28: Identifying Support Bracket, Pendulum And Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Remove the after-run coolant pump bracket bolt -2-.

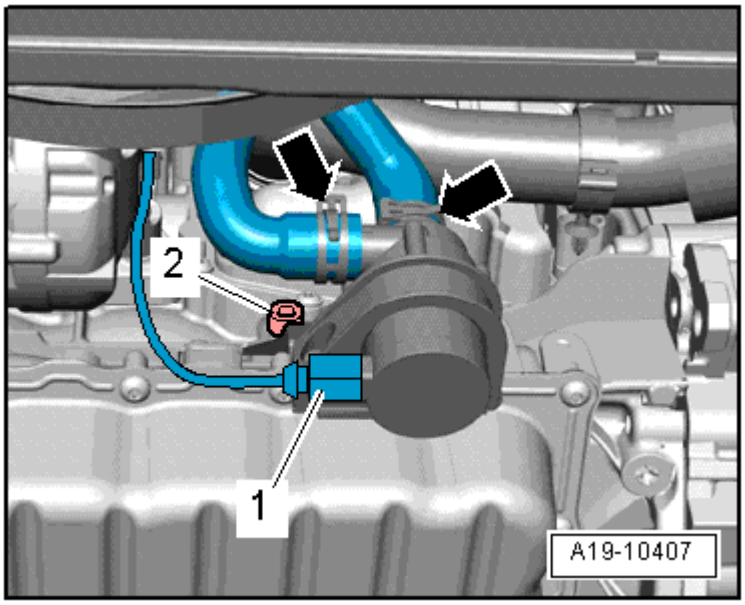

Fig. 29: Identifying After-Run Coolant Pump V51 Bracket Bolt -2-
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Install the engine support bridge 10-222 A using the following special tools:

GTI

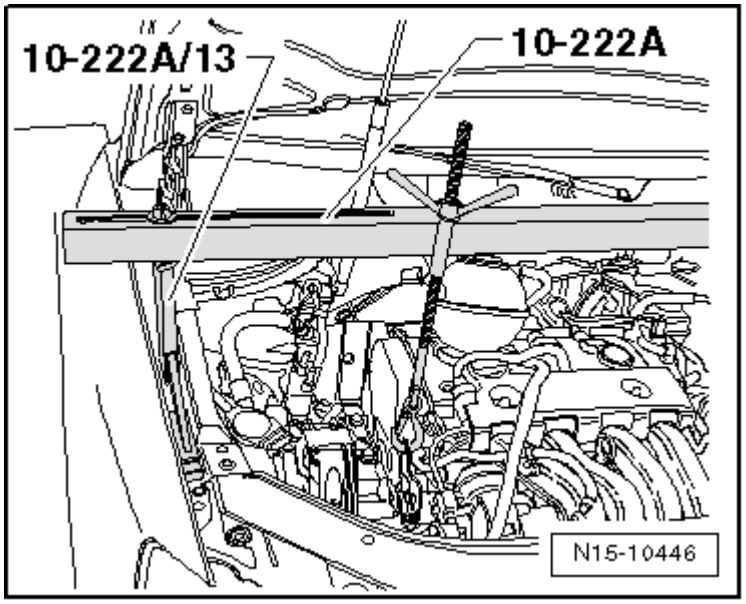

Fig. 30: Identifying Engine Support Bridge -10-222 A- And Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Adapter 10-222 A/13

- Bracket with spindle and hook 10-222 A/10

Eos

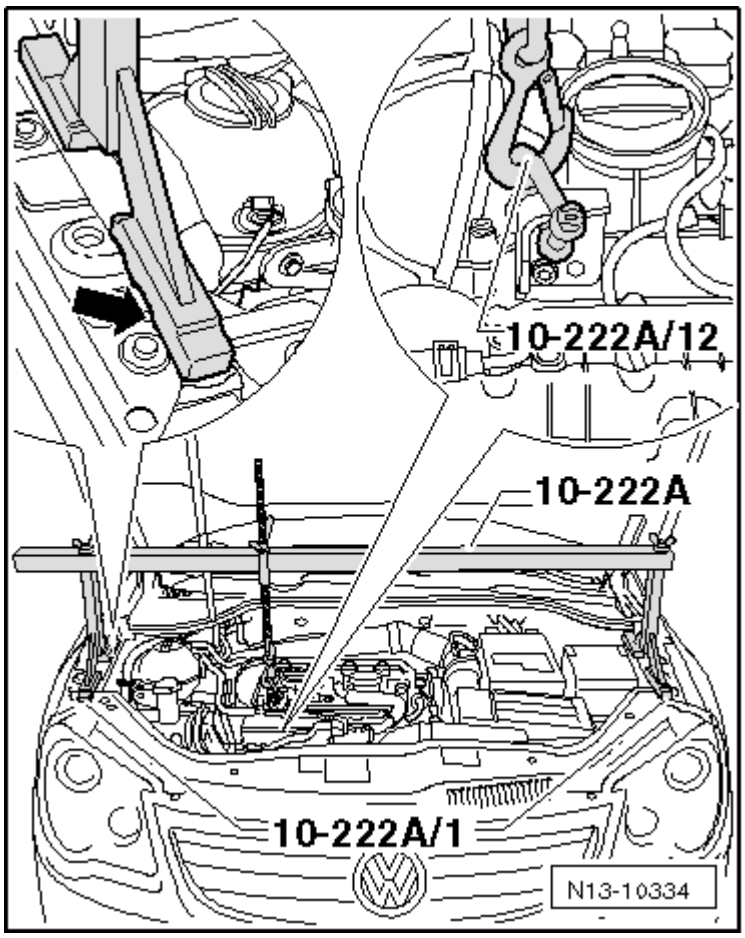

Fig. 31: Identifying Engine Support Bridge -10-222 A- And Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bracket for engine 10-222 A/1
- Bracket with spindle and hook 10-222 A/10
- Shackle 10-222 A/12

NOTE: Do not place the bracket for engine 10-222 A/1 on the fender panels. The panels will be damaged.

The shackle 10-222 A/12 is needed to make sure the engine is lifted in the installed position and not tipped.

Continuation for all Vehicles

-- Support the engine with the spindle.

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

-- Remove the engine mount to engine mount bracket bolts -arrows-.

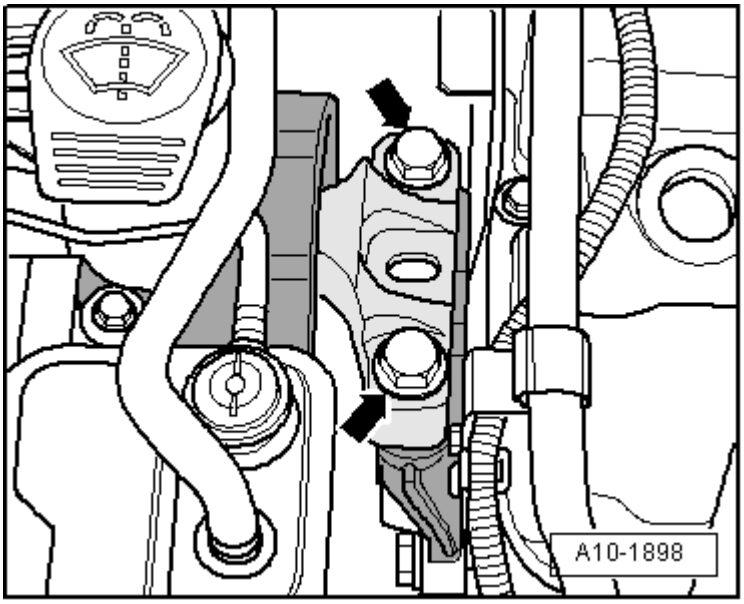

Fig. 32: Identifying Engine Mount To Engine Mount Bracket Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Lower the engine approximately 55 mm.

-- Free up the wiring harness -arrow-.

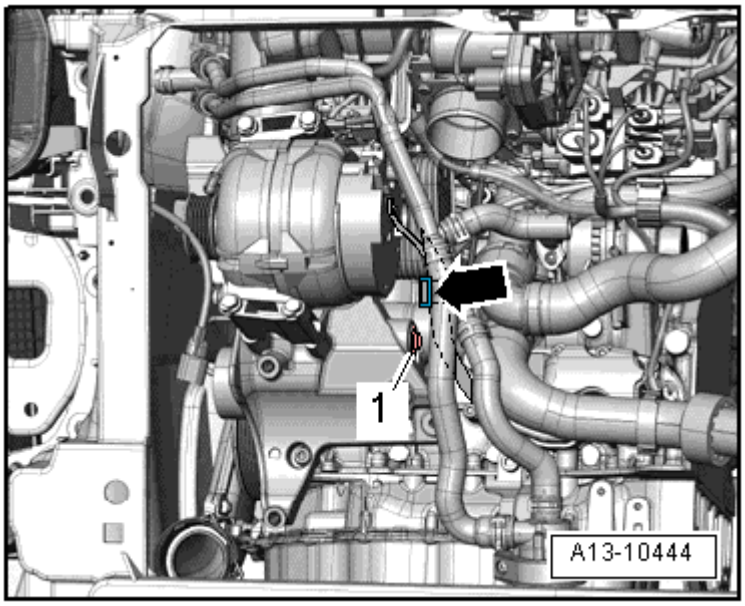

Fig. 33: Identifying Ribbed Belt Tensioner Bolt And Locating Electrical Wiring Harness
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

Installing

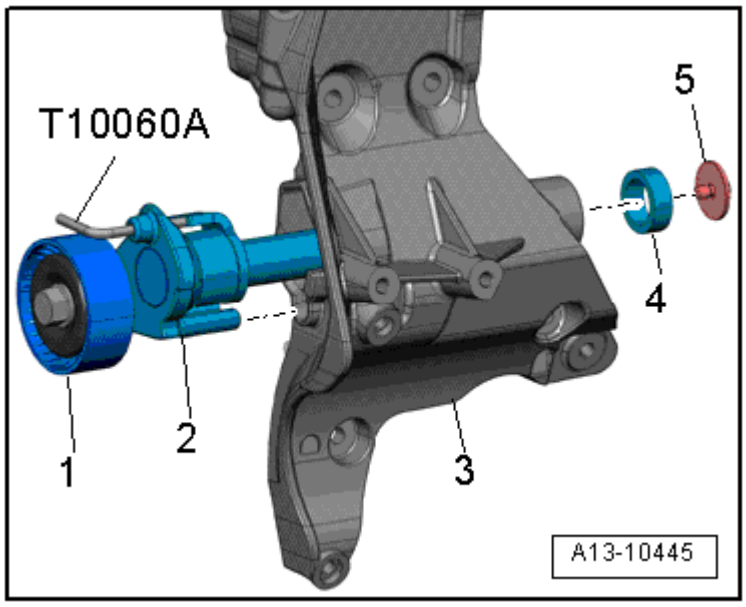

Fig. 34: Identifying Tensioning Device For Ribbed Belt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

Install in reverse order of removal. Note the following:

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

- Note the support -2- installed position: insert the support in the hole on the accessory bracket.
- Note the centering sleeve -4-.

-- Adjust the engine mount. Refer to **ENGINE AND TRANSMISSION MOUNT, ADJUSTING** .

ACCESSORY BRACKET

Removing

-- Drain the coolant. Refer to **DRAINING AND FILLING** .

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

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

-- Disconnect the connector -1- from the A/C compressor regulator valve -N280-.

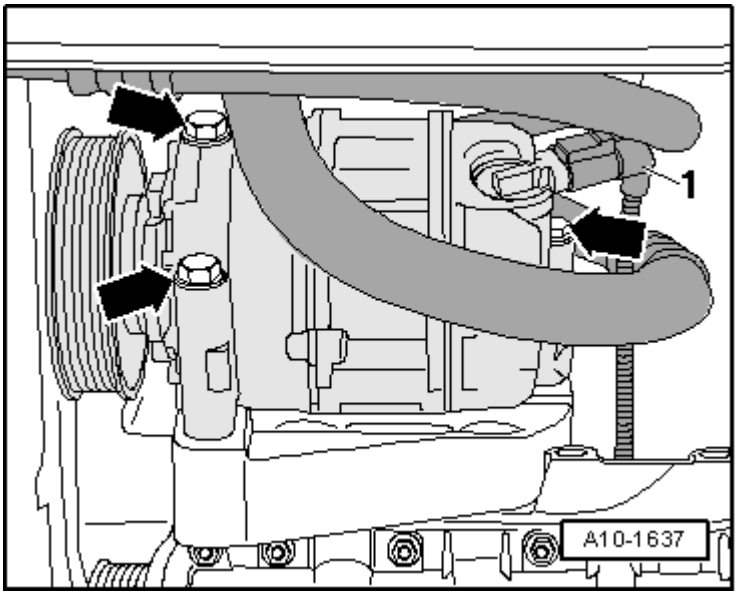

Fig. 35: Identifying A/C Compressor Bolts And Solenoid Clutch Electrical Connector
Courtesy of VOLKSWAGEN UNITED STATES, INC.

WARNING: Refrigerant can cause serious personal injury.

- **Do not open the Air Conditioning (A/C) refrigerant circuit.**

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

CAUTION: Risk of damaging refrigerant lines and hoses.

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

-- Secure the A/C compressor with the refrigerant lines attached to the longitudinal member.

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

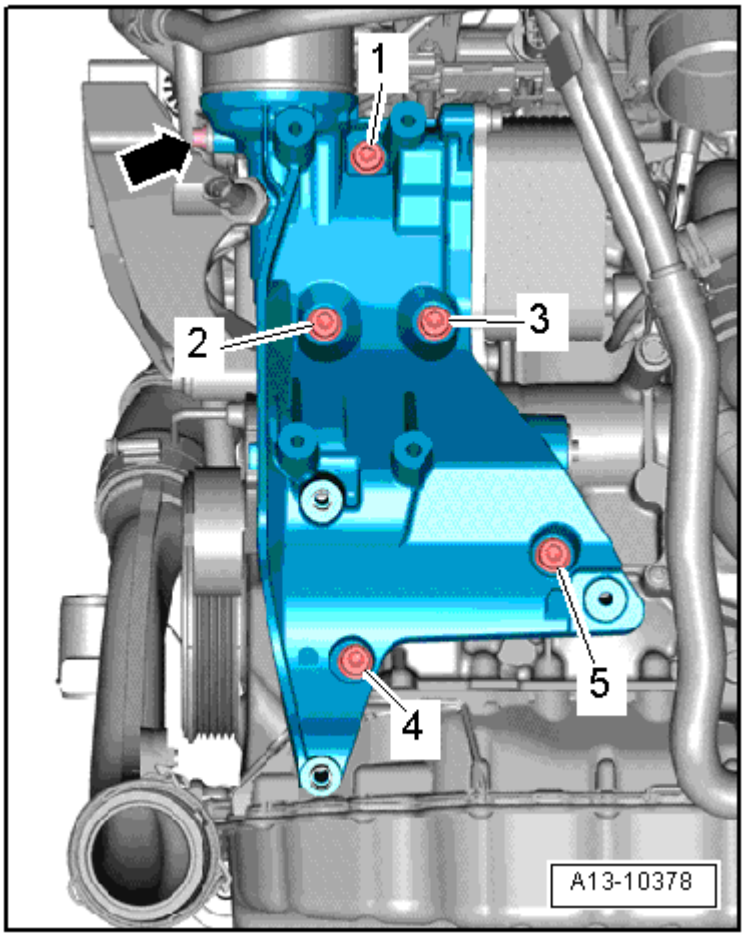

Fig. 36: Identifying Accessory Assembly Bracket Tightening Sequence
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Remove the bolts -1 through 5- and remove the accessory bracket from the coolant pump housing.

Installing

NOTE: Replace the bolts which have been tightened to a torque angle.

Replace the O-rings and seals.

-- Lubricate the O-rings -4- with coolant.

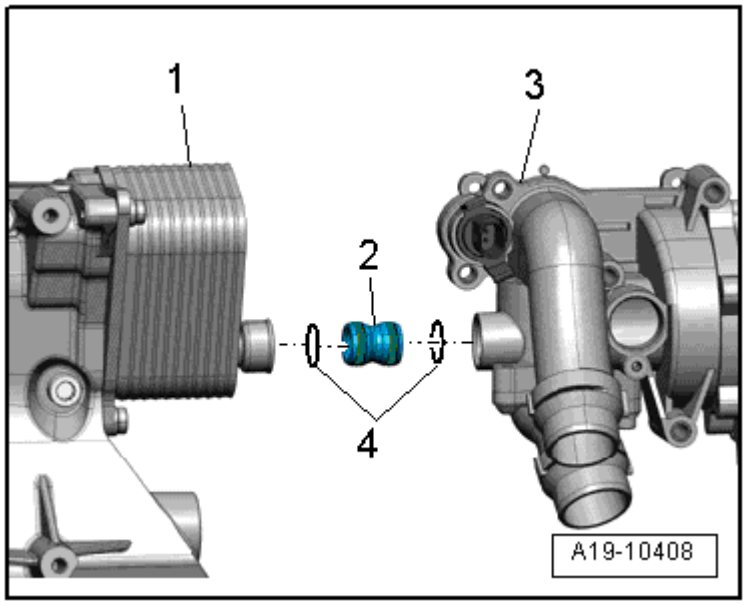

Fig. 37: Identifying Accessory Assembly Bracket, Coolant Pump Housing, Connection And O-Rings
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

-- Slide the accessory bracket -1- onto the connection -2-.

-- Position the accessory bracket and install the bolt -4- first, then the bolts -1, 2, 3 and 5-.

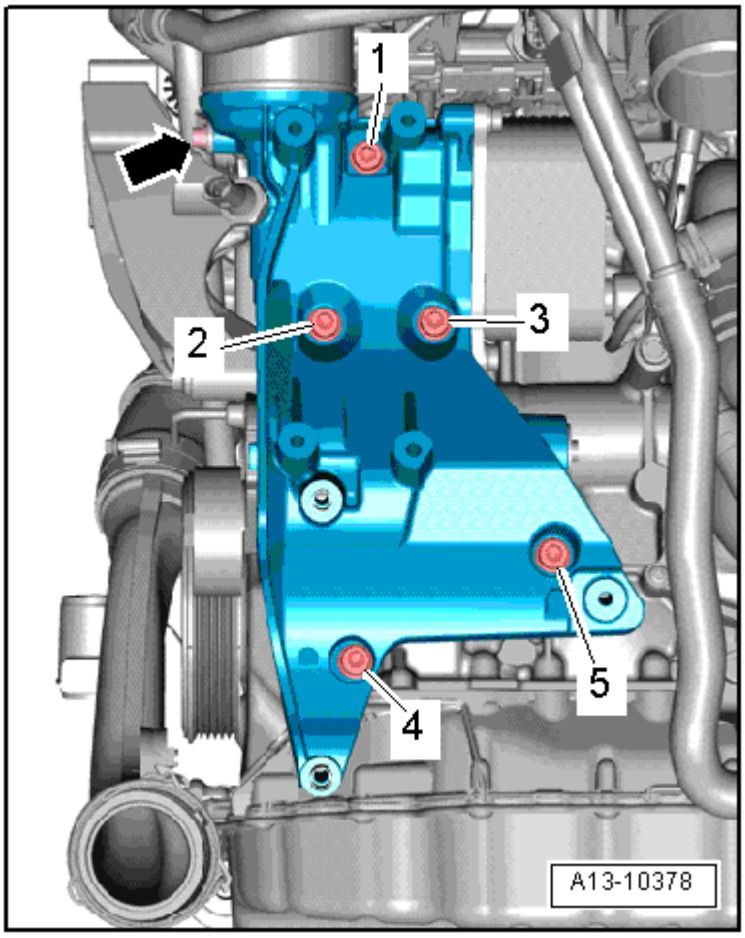

Fig. 38: Identifying Accessory Assembly Bracket Tightening Sequence
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Tighten the bolts in 3 passes in sequence -1 through 5- as follows:

-- Tighten the bolts by hand. -- Tighten the bolts to 20 Nm. -- Tighten the bolts an additional 90° (1/4) turn.

The rest of the installation is basically a reverse of the removal procedure, when doing this, note the following:

- Tightening specifications, refer to **RIBBED BELT OVERVIEW**.
- Install the A/C compressor. Refer to **Removal and Installation** .
- Install the generator. Refer to **Removal and Installation** .

VIBRATION DAMPER

Special tools and workshop equipment required

- Locking Pin -T10060 A-
- Counter Hold Tool -T10355-

Removing

-- Remove the noise insulation. Refer to **Description and Operation** .

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

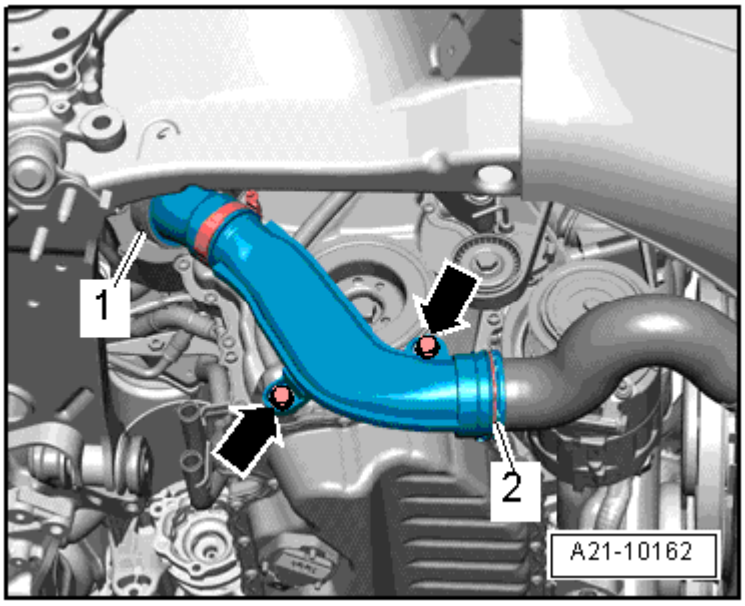

Fig. 39: Identifying Air Guide Pipe And Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Remove the bolts -arrows-.

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

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

-- Rotate the vibration damper to the Top Dead Center (TDC) position -arrow- using the counter hold tool -T10355-.

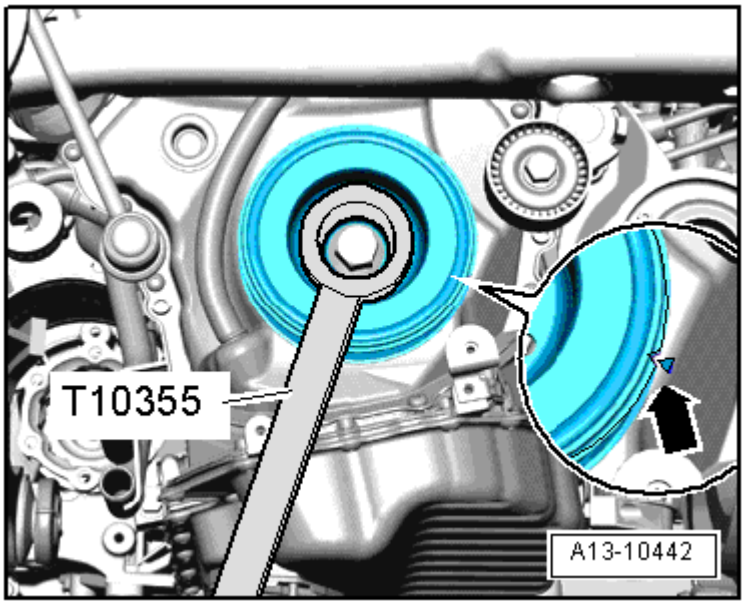

Fig. 40: Identifying Vibration Damper Rotated Into "OT" Position Using Counter Hold Tool T10355
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

-- Remove the vibration damper bolt using the counter hold tool -T10355-.

CAUTION: The engine could be destroyed.

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

-- Remove the vibration damper.

-- If the vibration damper is not immediately reinstalled, install the bolt and the sleeve -T10368-.

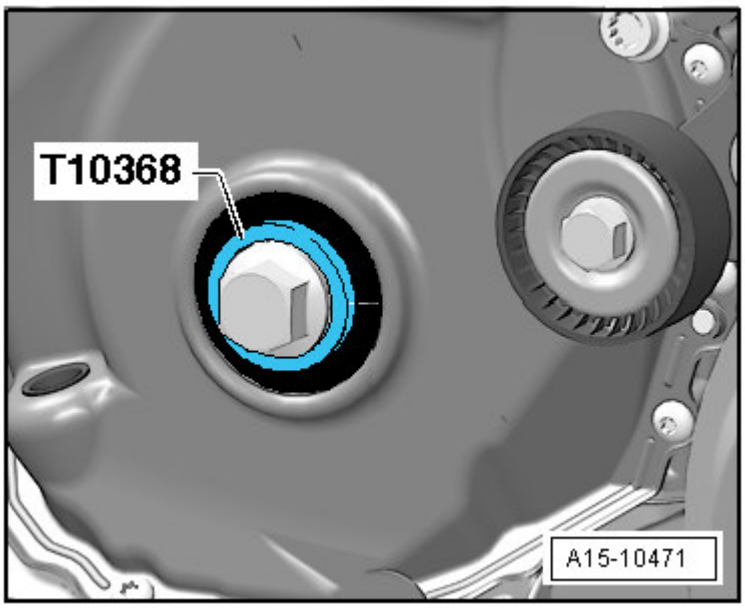

Fig. 41: Identifying Vibration Damper Bolt And Thrust Piece T10368
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installing

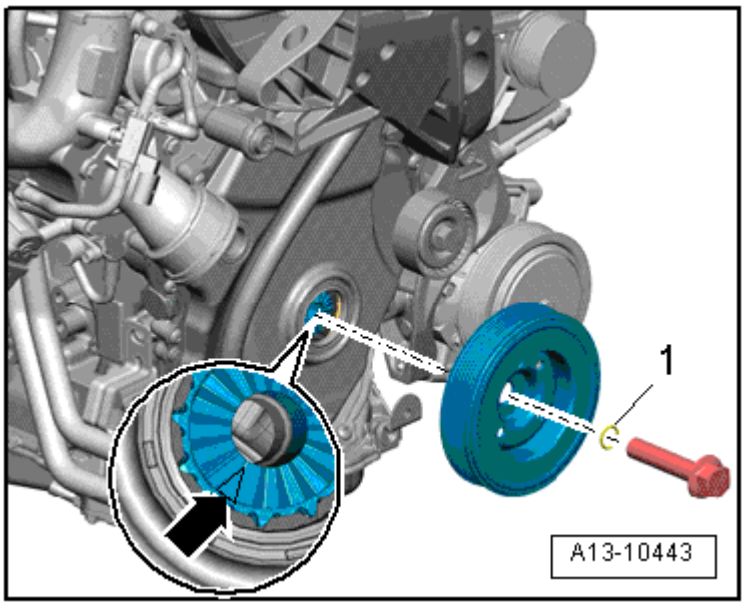

Fig. 42: Identifying O-Ring And Tooth Contour
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

Install in reverse order of removal. Note the following:

NOTE: Replace the vibration damper bolt.

Replace the O-ring -1-.

-- Lubricate the sealing lip with engine oil.

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

DUAL MASS FLYWHEEL

Special tools and workshop equipment required

- Flywheel Retainer -3067-

Removing

-- Remove the transmission. Refer to one of the following:

- **[For transmission(s) 02E] Removal and Installation** .
- **[For transmission(s) 02Q] Removal and Installation** .

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

-- Rotate the dual mass flywheel -A- so that the bolts -B- are centered with the holes -arrows-.

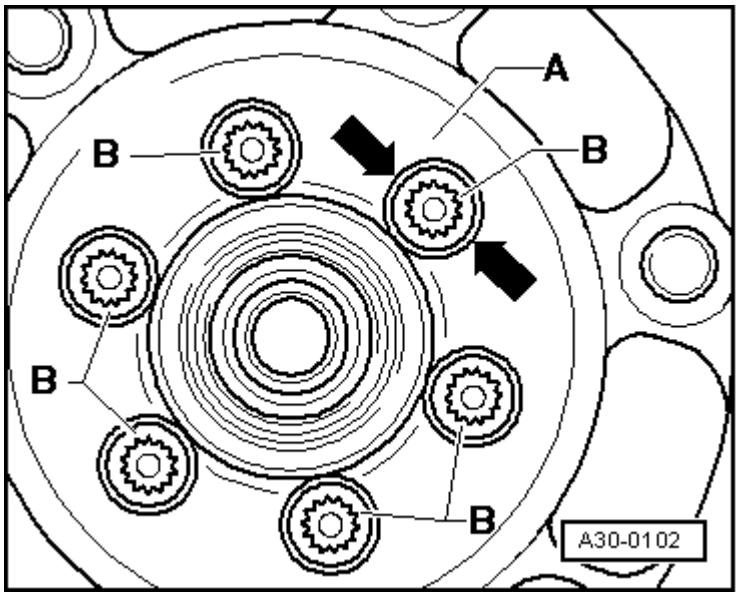

Fig. 43: Identifying Dual-Mass Flywheel & Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

-- Install the flywheel retainer -3067- to the hole in the cylinder block -B-.

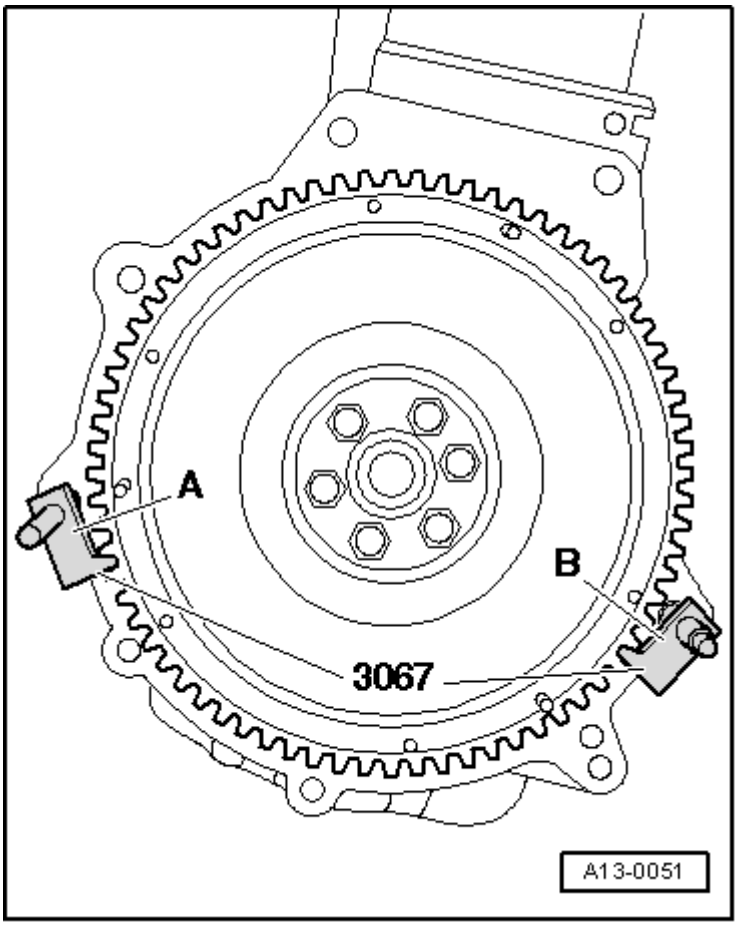

Fig. 44: Identifying Retainer -3067- Inserted In Hole On Cylinder Block
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Remove the dual mass flywheel.

Installing

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

- Tightening specification, see -item 6- in the **SEALING FLANGE AND DUAL MASS FLYWHEEL/DRIVE PLATE OVERVIEW**.

-- Install using new bolts.

-- Install the flywheel retainer -3067- to the hole in the cylinder block -A-.

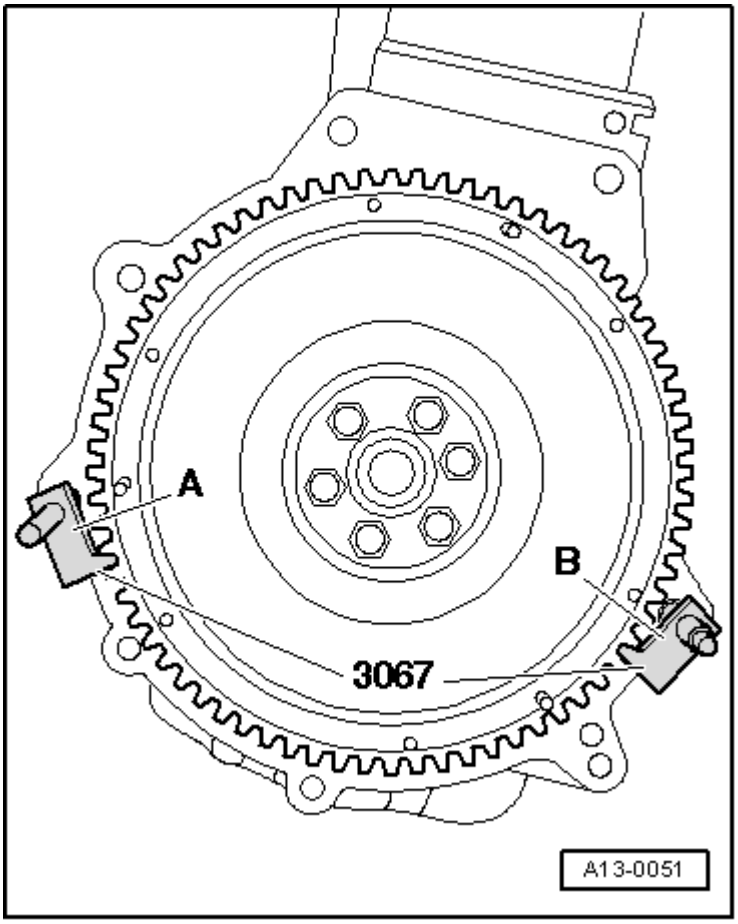

Fig. 45: Identifying Retainer -3067- Inserted In Hole On Cylinder Block
Courtesy of VOLKSWAGEN UNITED STATES, INC.

DRIVE PLATE

Special tools and workshop equipment required

- Flywheel Lock Adapter -VW 558-
- Depth Gauge
- M8 x 40 Bolt and M8 Nut

-- Remove the transmission. .

Preparing the Flywheel Lock Adapter -VW 558-

-- Install a M8 x 40 bolt -A- with a M8 nut to the flywheel lock adapter -VW 558-.

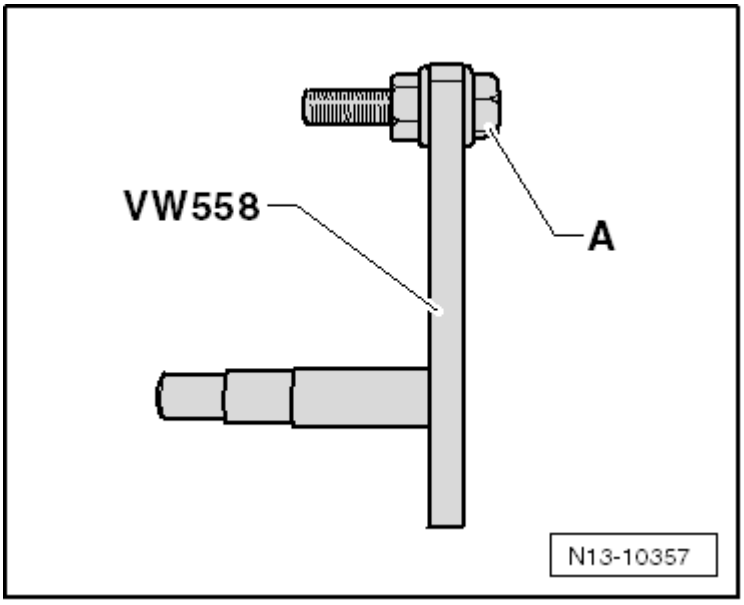

Fig. 46: Identifying Flywheel Lock Adapter -VW 558- And Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Loosening and Tightening

-- Install the flywheel lock adapter -VW 558- to the cylinder block and drive plate as illustrated.

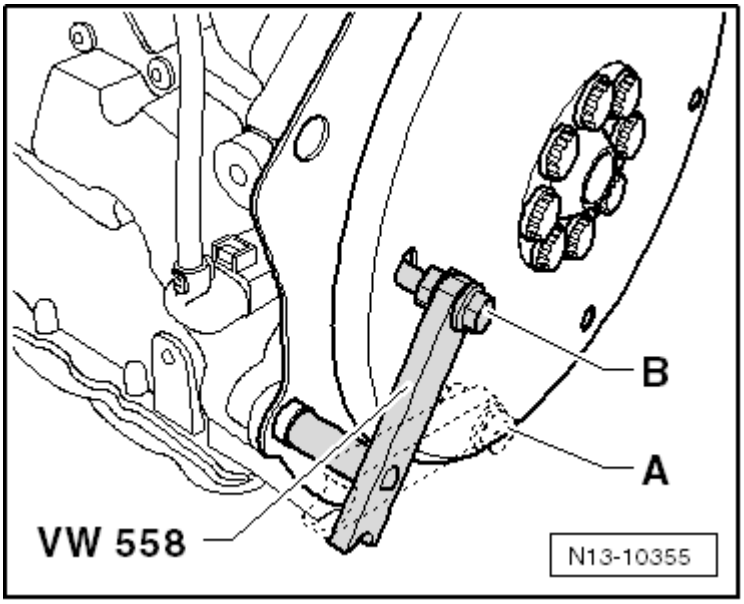

Fig. 47: Identifying Flywheel Lock Adapter -VW 558- Installed To Cylinder Block And Drive Plate
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installed location of the flywheel lock adapter -VW 558-: -A- to loosen, -B- to tighten.

Installing

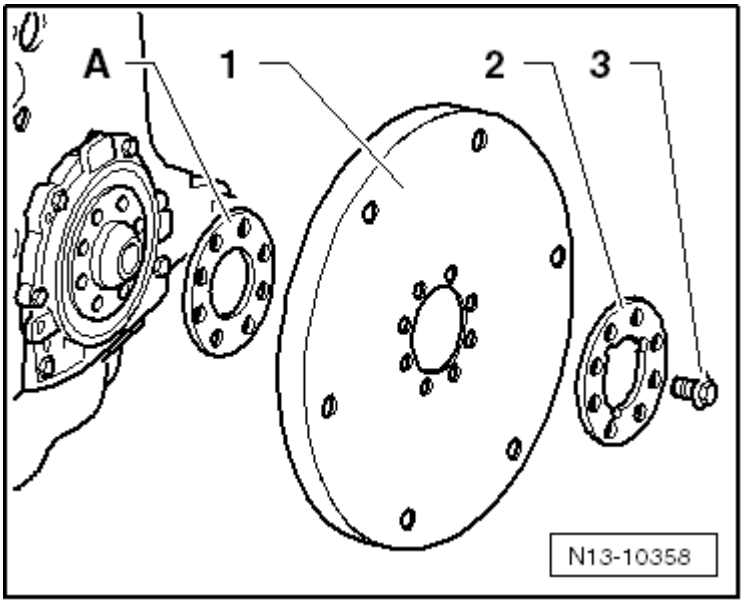

Fig. 48: Identifying Shim -A- And Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- First, position the drive plate without the shim -A-.

-- Install the used bolts -3- and tighten them to 30 Nm.

-- Calculate the dimension between the drive plate and cylinder block in three locations.

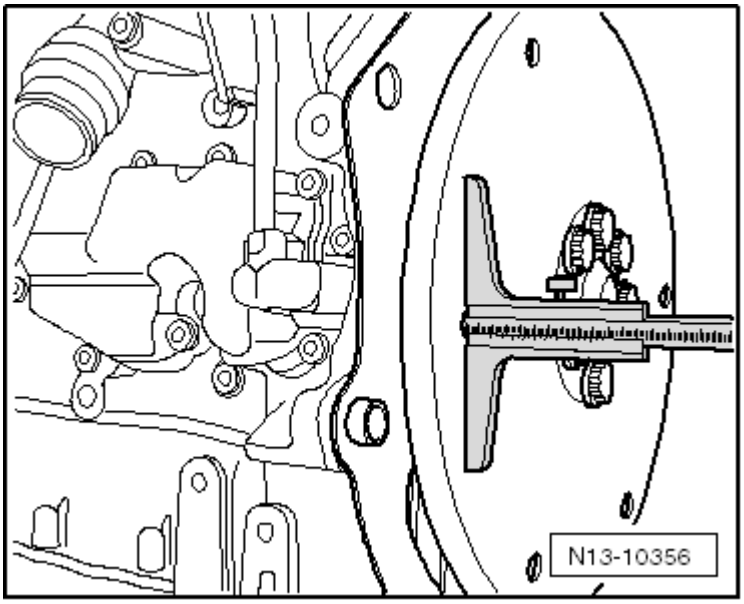

Fig. 49: Identifying Dimension Between Drive Plate And Cylinder Block
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: This is measured through the hole in the drive plate to the machined surface of the cylinder block. When measuring on the intermediate plate, take the

thickness of the plate into consideration.

- Specified value measured without the intermediate plate: 19.5 to 21.1 mm
- Specified value measured with the intermediate plate: 18.8 to 20.4 mm

If the specified value is reached, replace all the bolts and tighten them.

If the specified value is not obtained:

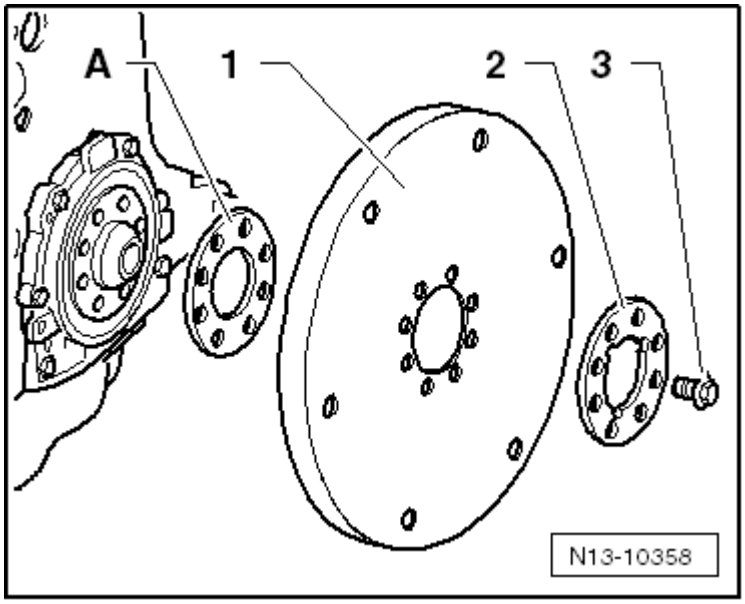

Fig. 50: Identifying Shim -A- And Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Remove the drive plate again and use the shim -A-. Tighten the bolts -3- again to 30 Nm.

-- Repeat the measurement. If the specified value is reached, replace all bolts and tighten them.

- Tightening specification, see -item 6- in the **SEALING FLANGE AND DUAL MASS FLYWHEEL/DRIVE PLATE OVERVIEW**.

SEALING FLANGE, TRANSMISSION SIDE

Special tools and workshop equipment required

- Guide Sleeve -T20097-
- Hand Drill with Plastic Brush Attachment
- Protective Eyewear
- Silicone Sealant -D 174 003 A2-

Requirements

- The transmission is removed.
- The dual mass flywheel is removed or the drive plate is removed. Refer to **DUAL MASS FLYWHEEL** or **DRIVE PLATE**.

Removing

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

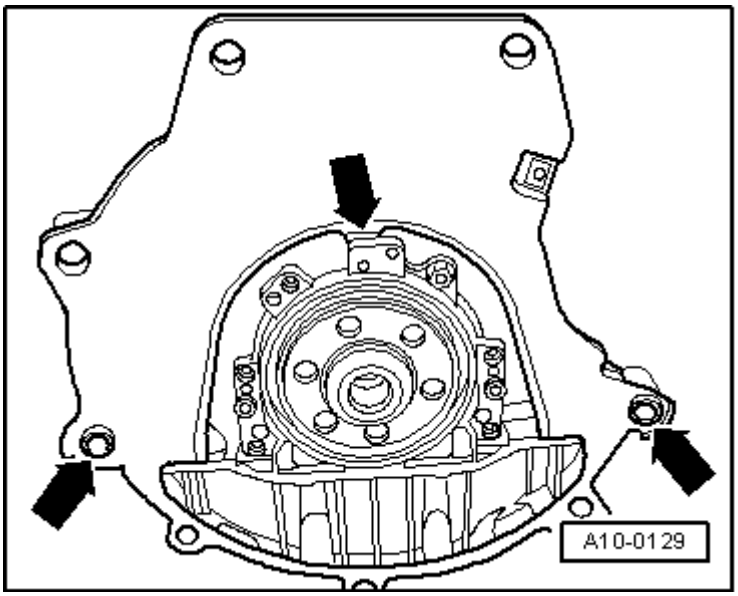

Fig. 51: Identifying Intermediate Plate Alignment Bushings
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Remove the bolts -1 through 8-

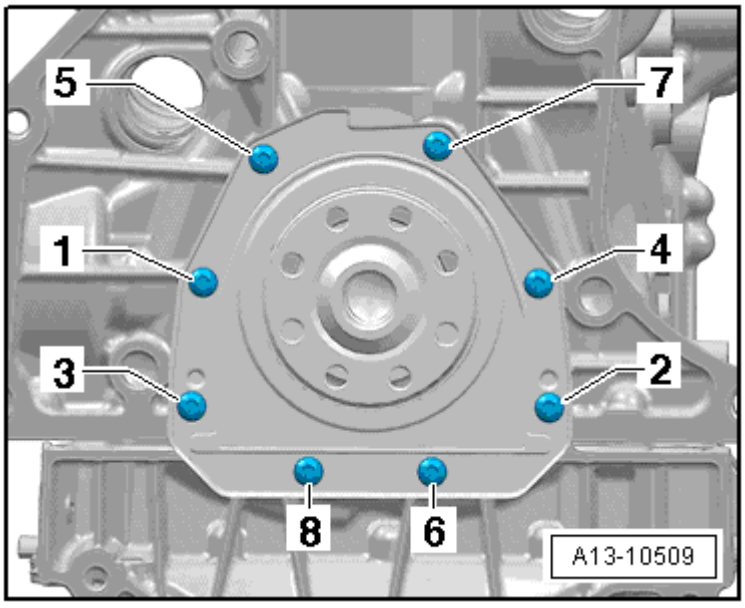

Fig. 52: Identifying Sealing Flange Tightening Sequence
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Remove the sealing flange.

Installing

NOTE: Note the expiration date of the silicone sealant.

The sealing flange must be installed within 5 minutes after application of the silicone sealant.

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

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

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

WARNING: Wear safety glasses.

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

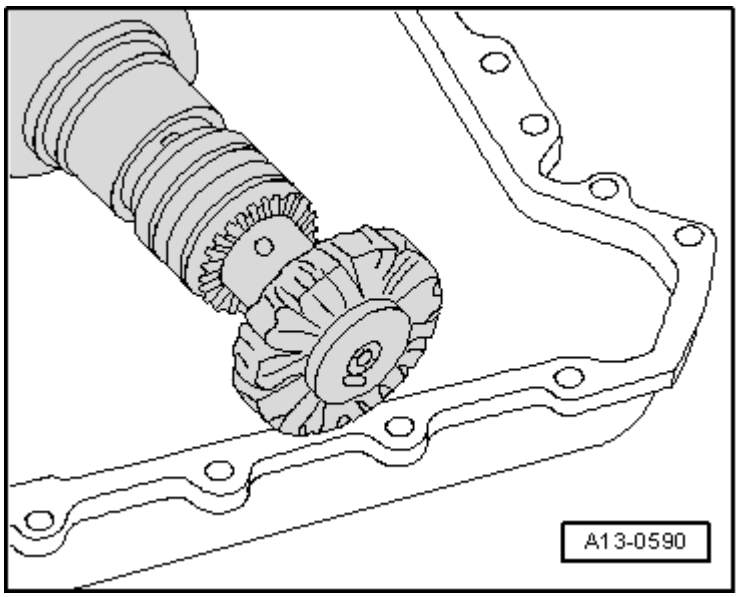

Fig. 53: Identifying Rotating Plastic Brush To Remove Sealant Residue From Sealing Flange, Cylinder Block And Upper Part Of Oil Pan
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

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

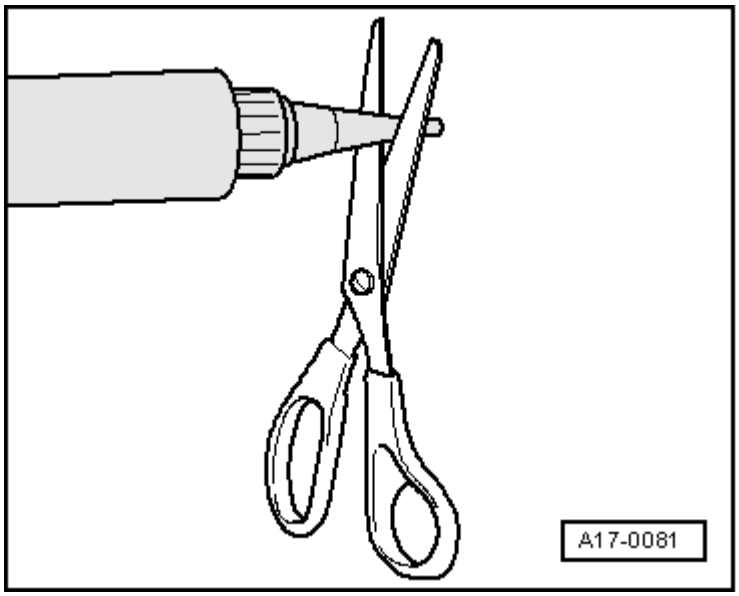

Fig. 54: Identifying Scissors To Cut Tube Nozzle At Front Marking (Nozzle Diameter Approx. 3 Mm)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Apply the silicone sealant to the clean sealing surface on the sealing flange as illustrated.

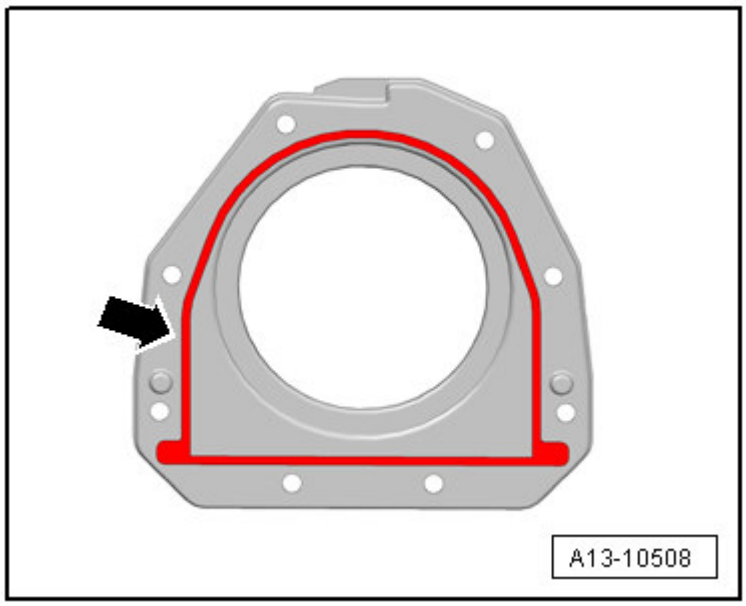

Fig. 55: Identifying Silicone Sealant Applied On Cover Sealing Surface
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Thickness of sealant bead: 2 to 3 mm

-- Position the guide sleeve -T20097- on the crankshaft.

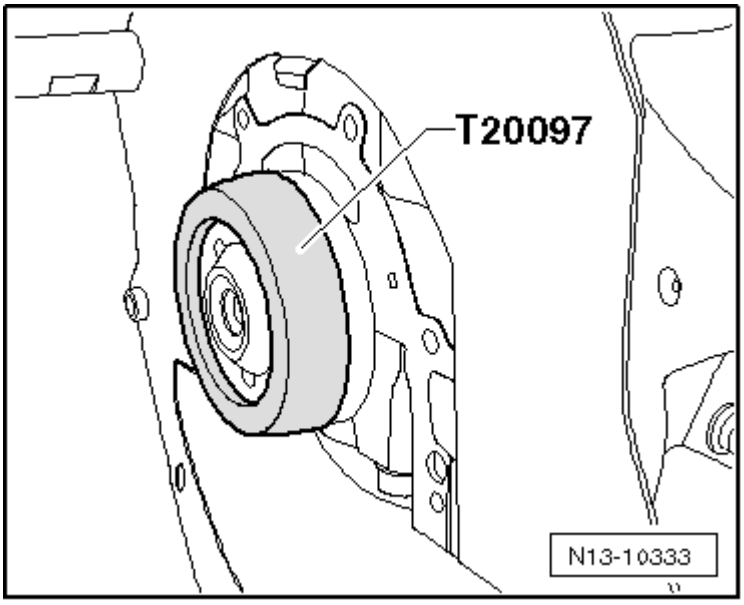

Fig. 56: Identifying Guide Sleeve On Crankshaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Slide the sealing flange onto the crankshaft using the guide sleeve -T20097-.

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

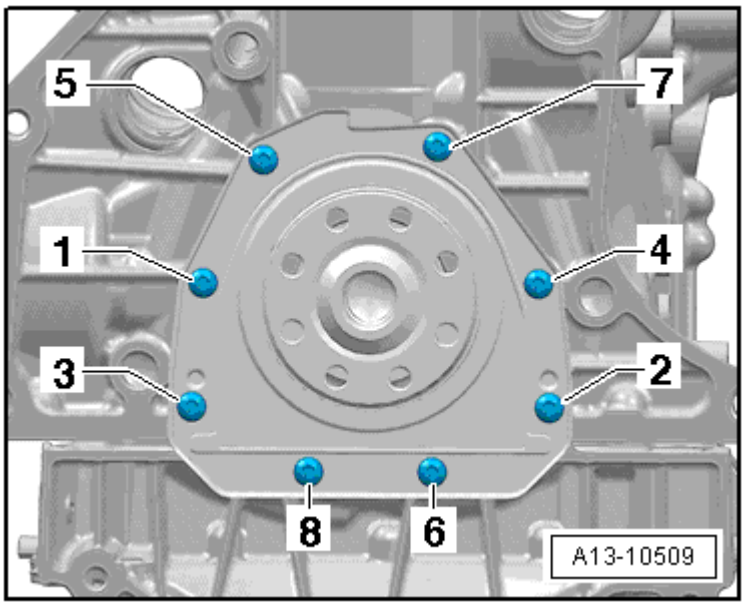

Fig. 57: Identifying Sealing Flange Tightening Sequence
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- 1. Install the bolts and tighten them by hand.

-- 2. Tighten the bolts to 9 Nm.

The rest of the installation is performed in the reverse order of removal.

SENSOR WHEEL

-- Remove the engine.

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

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

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

-- Remove the connecting rod bearing caps.

-- Remove the crankshaft bearing caps.

-- Remove the crankshaft with the sensor wheel.

-- Always replace the sensor wheel -2- any time the screws are loosened -1-.

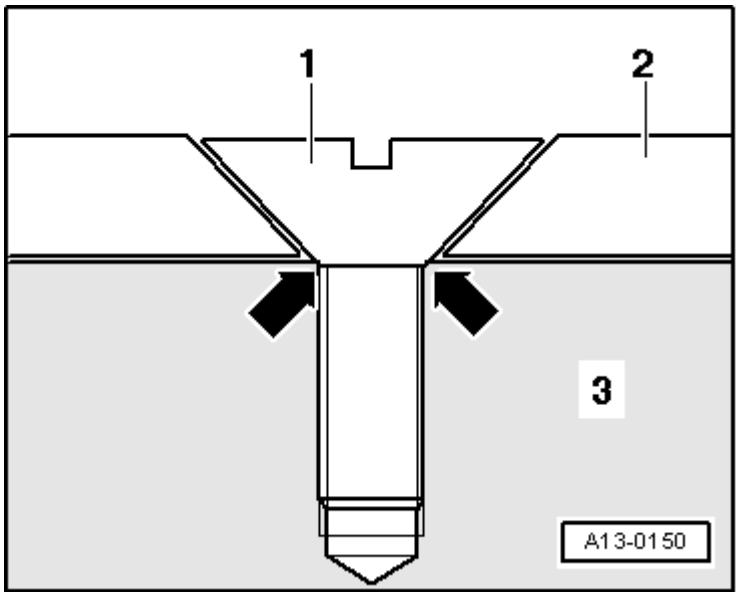

Fig. 58: Identifying Attachment Points, Countersunk Screws, Crankshaft & Sensor Wheel
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: After tightening for the second time, the points where the head of the screw make contact with the sensor wheel become so deformed that the screw heads at the crankshaft -3- -arrows- and the sensor wheel lies >>loosely<< under the screws.

The sensor wheel can only be installed in one position. The holes are offset.

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

CRANKSHAFT NEEDLE BEARINGS

Special tools and workshop equipment required

- Counter Support, for example, Kukko Support 22/1
- Internal Puller, for example, Kukko Extractor 14.5-18.5 mm 21/2
- Drift -VW 207 C-

Removing

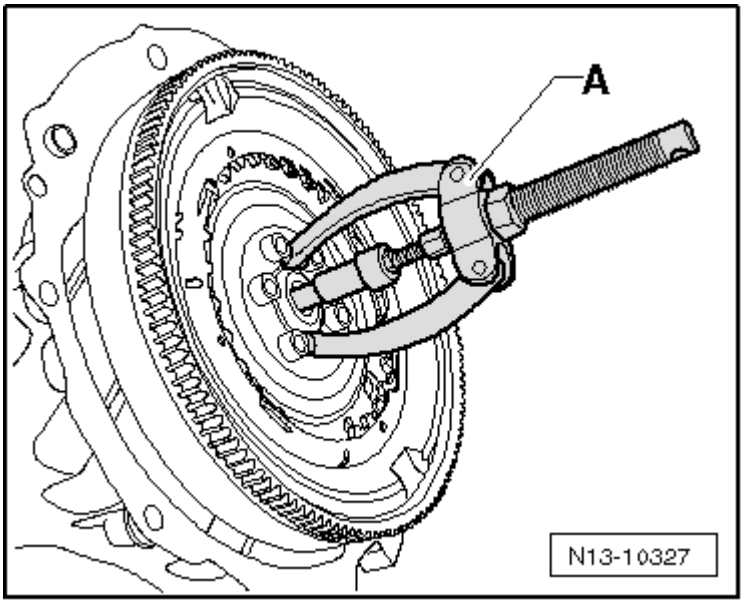

Fig. 59: Identifying Kukko Support 22/1 -A-
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Using a standard puller, for example, Kukko extractor 14.5-18.5 mm 21/2 and a counter support, for example, Kukko support 22/1 -A-, remove the needle bearings.

Installing

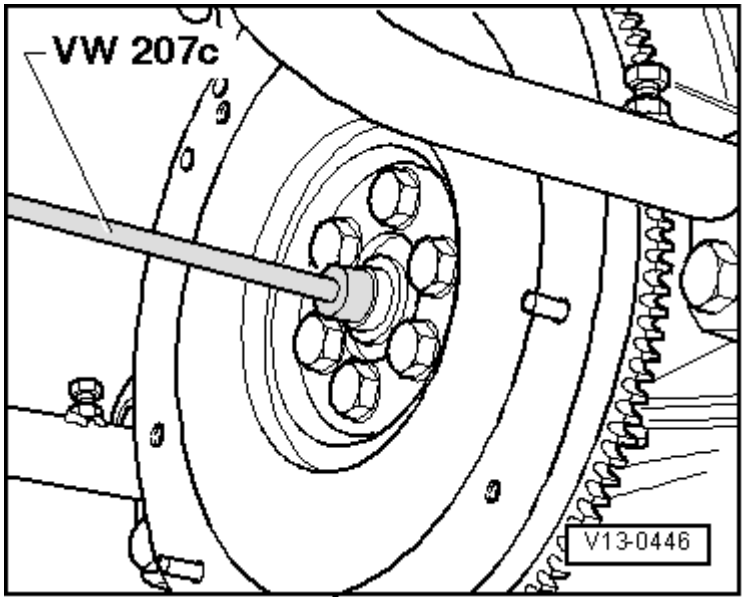

Fig. 60: Identifying Drift -VW 207 C- To Drive In Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Drive in the needle bearings using the drift -VW 207 C-.

Installed depth dimension is 2 mm -a-

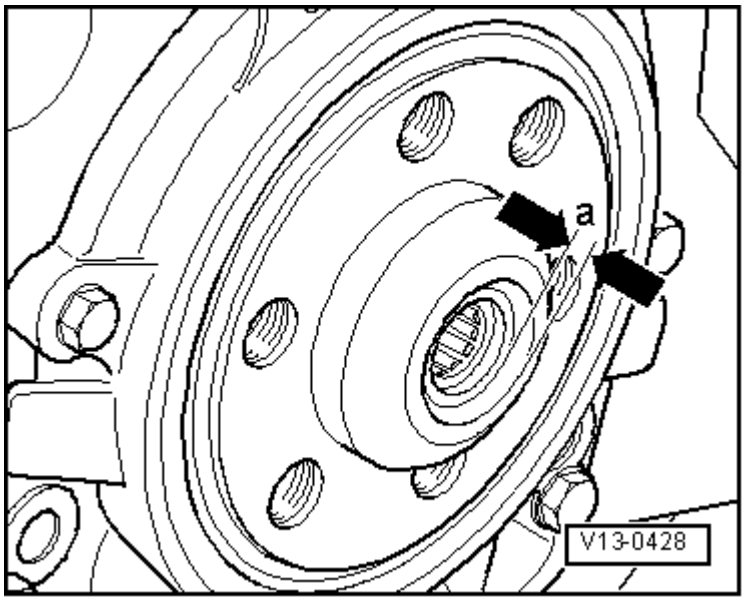

Fig. 61: Identifying Installation Depth Dimension
Courtesy of VOLKSWAGEN UNITED STATES, INC.

SPECIAL TOOLS

Special tools and workshop equipment required

- Guide Sleeve -T20097-
- Micrometer 75-100 mm -VAS 6071-
- Cylinder Gauge -VAS 6078-
- Dial Gauge Holder -VW 387-

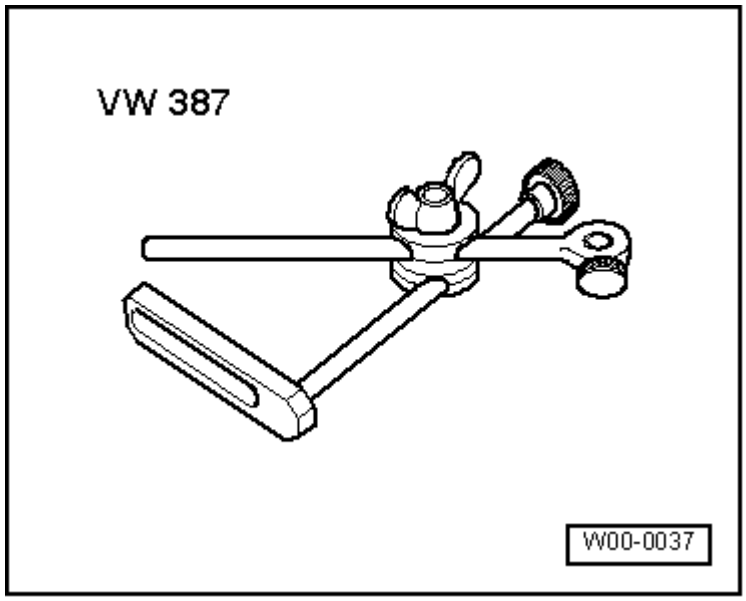

Fig. 62: Identifying Dial Gauge Holder VW 387
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Dial Gauge 0-10 mm -VAS 6079-

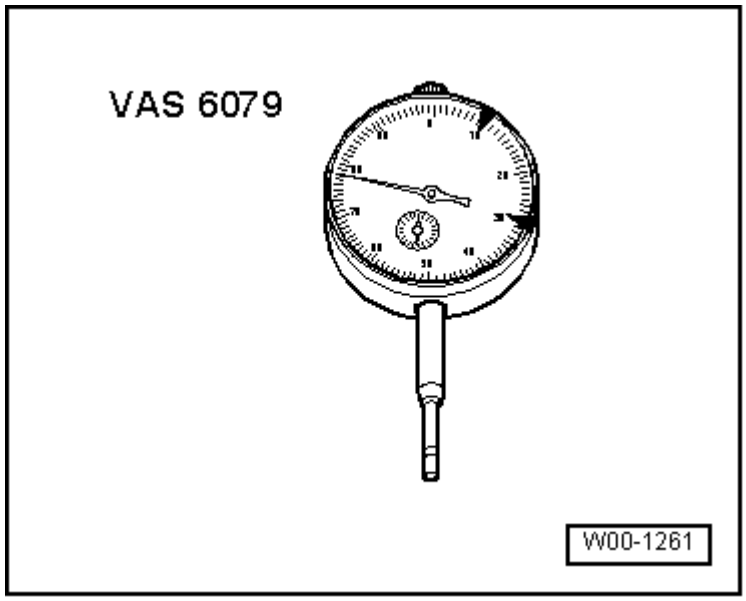

Fig. 63: Identifying Dial Gauge VAS 6079
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bracket for Engine 10-222 A/1 (Eos only)

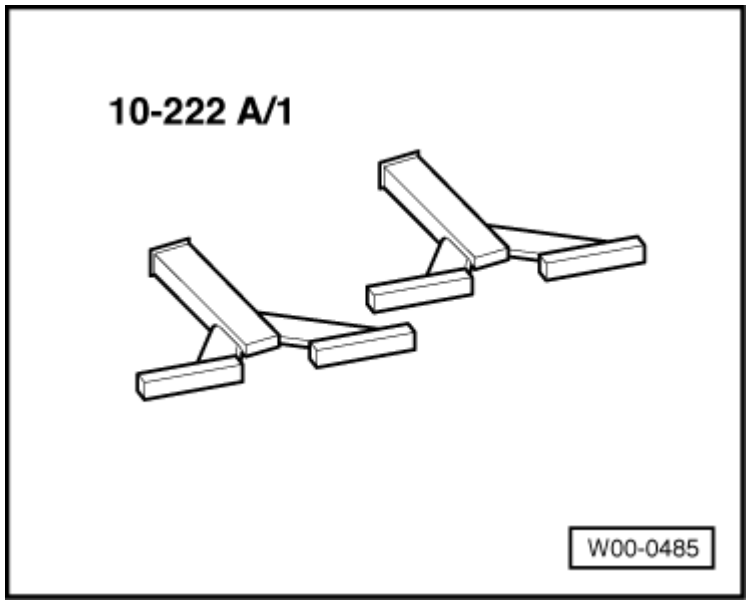

Fig. 64: Identifying Bracket for Engine 10-222 A/1 (Eos only)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Counter Hold Tool -T10355-

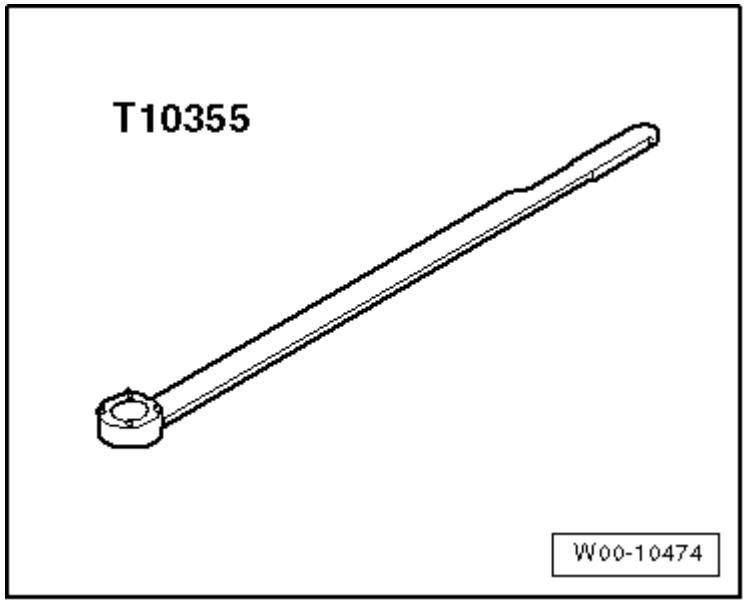

Fig. 65: Identifying Counter Hold Tool -T10355-
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Flywheel Retainer -3067-

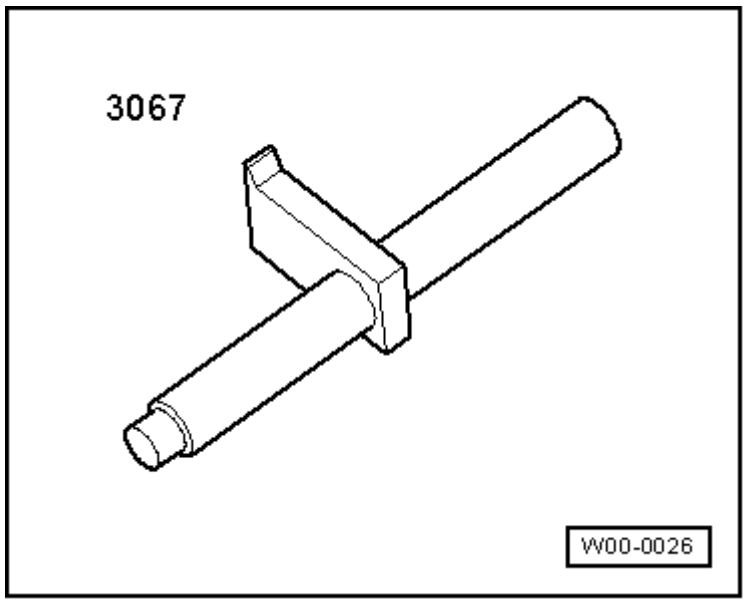

Fig. 66: Identifying 3067 Counter-Hold Tool
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Flywheel Lock Adapter -VW 558-

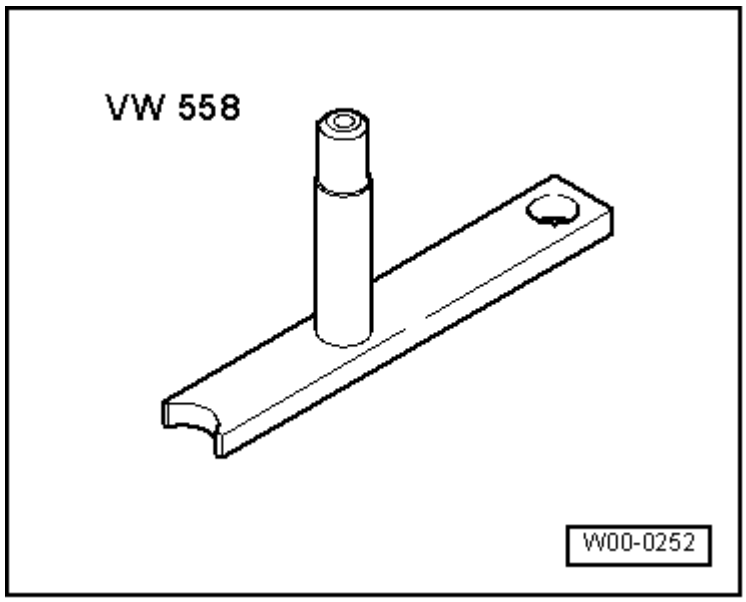

Fig. 67: Identifying Counterhold VW 558
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Kukko Support 22/1

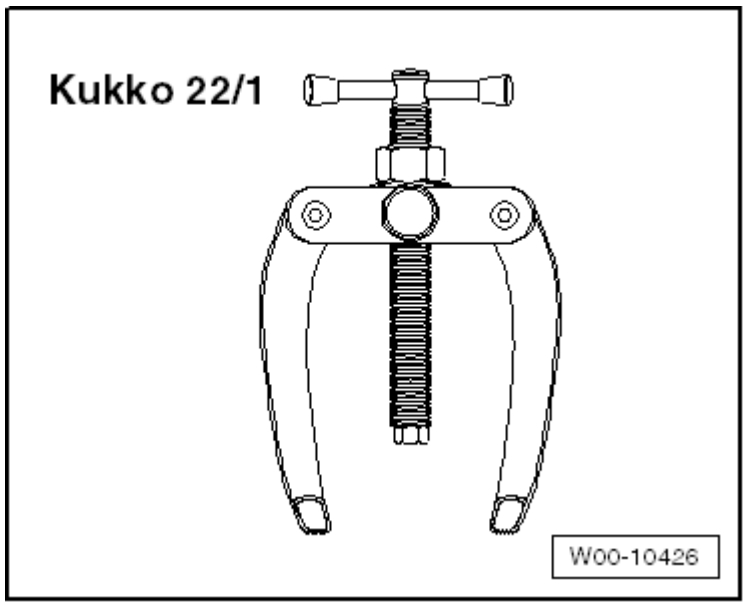

Fig. 68: Identifying Kukko Support 22/1
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Kukko Extractor 14.5-18.5 mm 21/2

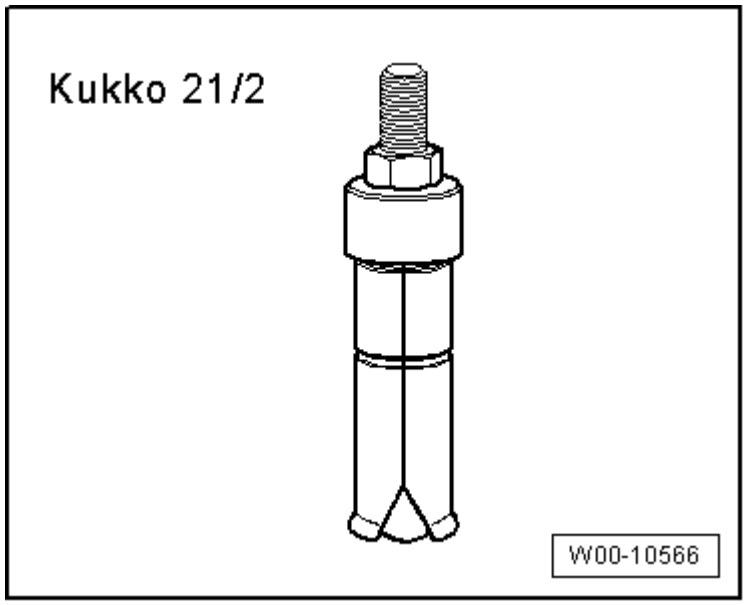

Fig. 69: Identifying Kukko Extractor 14.5-18.5 mm 21/2
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drift -VW 207 C-

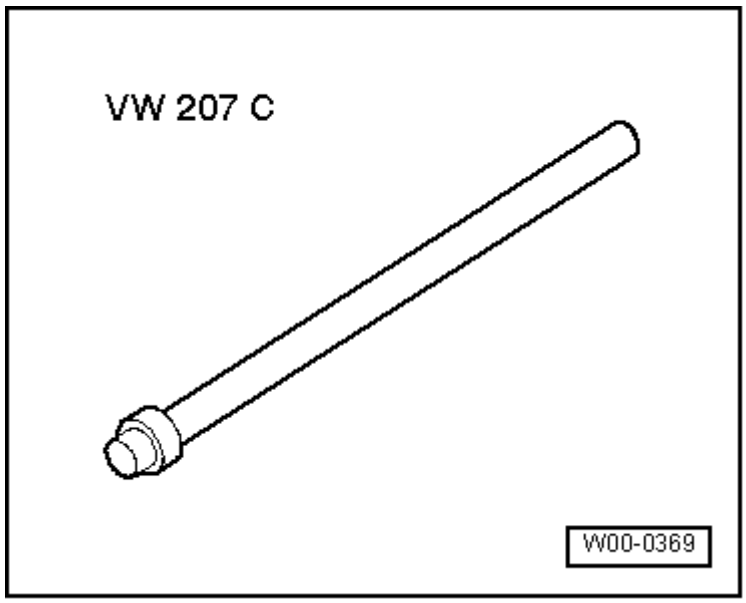

Fig. 70: Identifying Drift -VW 207 C-
Courtesy of VOLKSWAGEN UNITED STATES, INC.

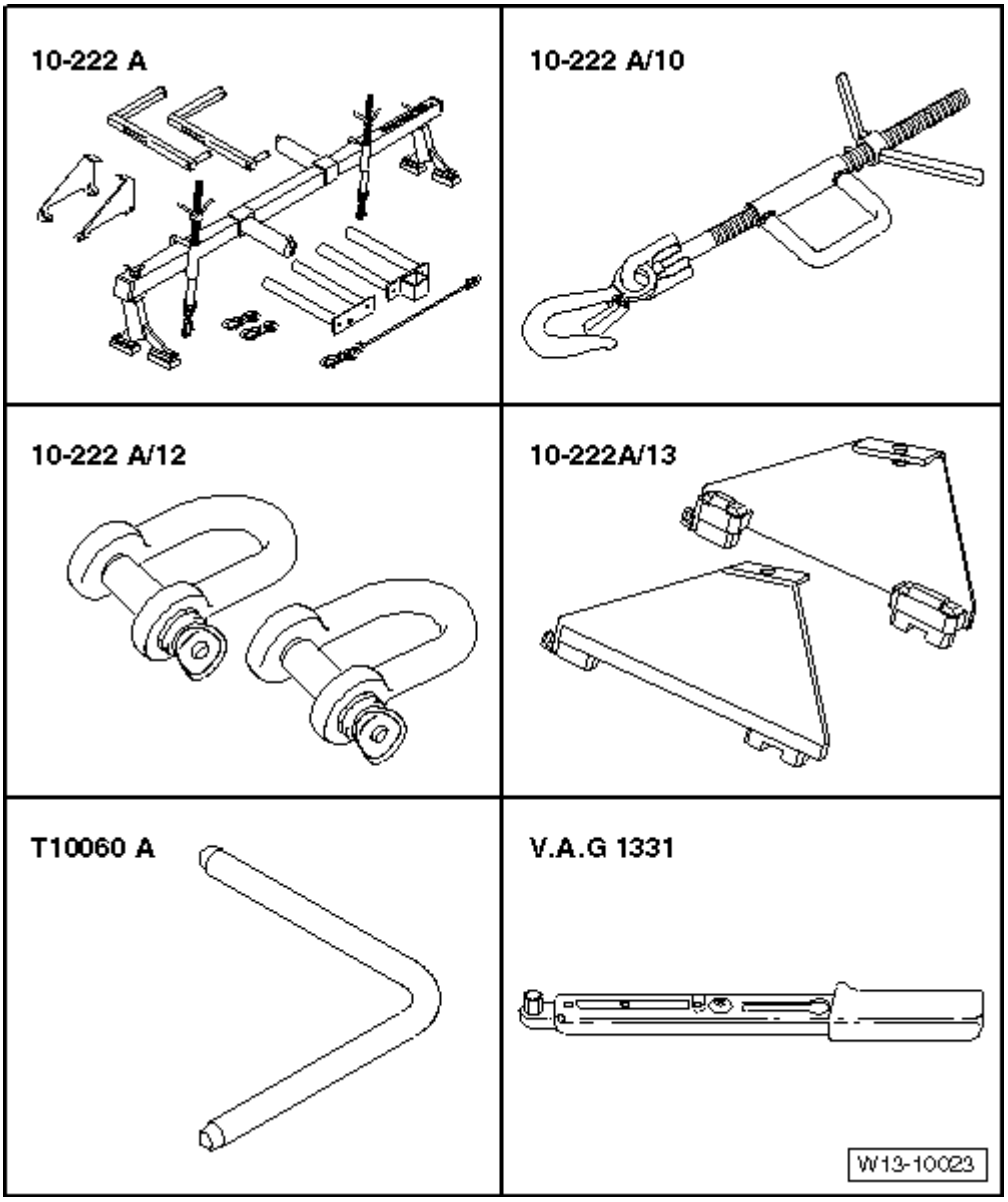

Fig. 71: Identifying Engine Support Bridge And Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and workshop equipment required

- Engine Support Bridge 10-222 A
- Bracket with Spindle and Hook 10-222 A/10
- Shackle 10-222 A/12
- Adapter 10-222 A/13 (GTI only)
- Locking Pin -T10060 A-
- Torque Wrench (5-50 Nm) -V.A.G 1331-

