

ENGINE**3.6 Liter - Crankshaft, Cylinder Block - Engine Code(s): BLV & CNNA****13 CRANKSHAFT, CYLINDER BLOCK****GENERAL INFORMATION****CRANKSHAFT BEARING SHELL, ALLOCATING**

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

If the cylinder block or crankshaft are being replaced, then the bearing shells must be allocated.

The bearing shell for the cylinder block (upper bearing shell) is always marked in yellow.

Using the letters on the cylinder block and crankshaft, determine the correct color identification for the bearing shell in the bearing cap (lower bearing shell).

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

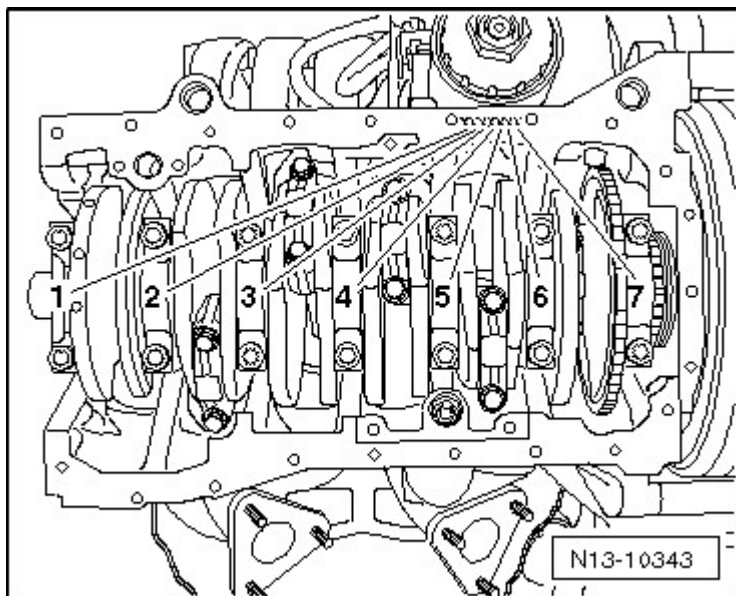
Cylinder Block Identification

Fig. 1: Identifying Cylinder Block Identification
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

The letters are located on the oil pan sealing surface.

Crankshaft Identification

2010 Volkswagen CC VR6 Sport

ENGINE 3.6 Liter - Crankshaft, Cylinder Block - Engine Code(s): BLV & CNNA

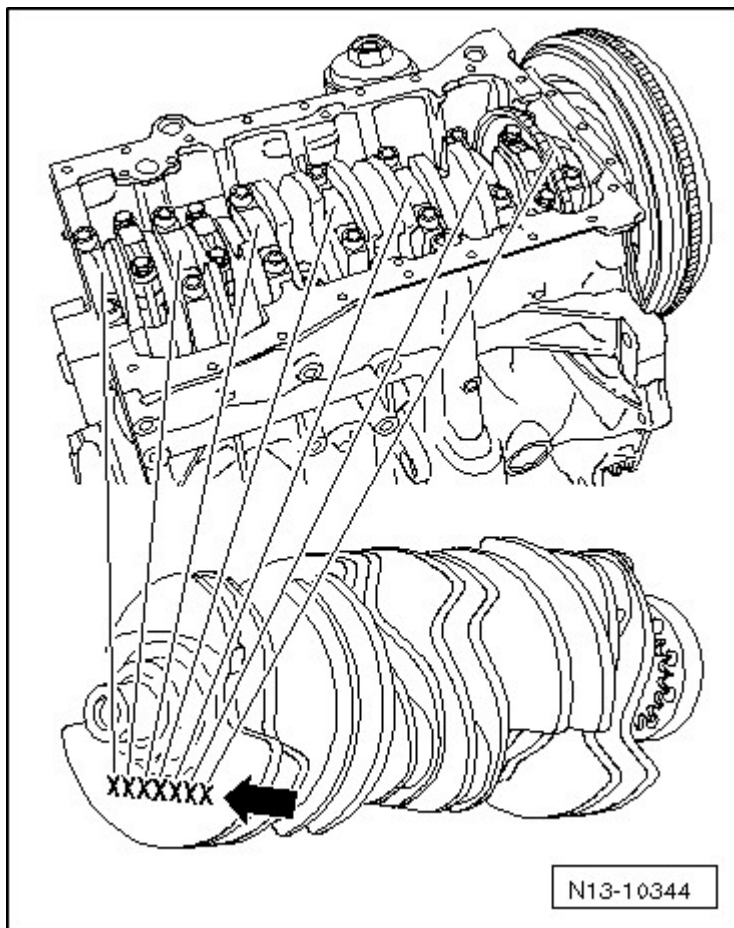


Fig. 2: Identifying Crankshaft Identification

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

The letters are located on the outer crankshaft counterweight for cylinder 1.

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

Letter on the Cylinder Block	Letter on the Crankshaft Counterweight	Bearing Shell Color Identification for the Bearing Cap	Bearing Shell Color Identification for the Cylinder Block
A, B, C, D, E	R	Red	Yellow
A, B, C, D, E	G	Red	Yellow
A, B, C, D, E	B	Yellow	Yellow
A, B, C, D, E	V	Blue	Yellow
G, H, I	R	Red	Yellow
G, H, I	G	Red	Yellow
G, H, I	B	Yellow	Yellow
G, H, I	V	Blue	Yellow
K, L, M	R	Red	Yellow
K, L, M	G	Yellow	Yellow

2010 Volkswagen CC VR6 Sport

ENGINE 3.6 Liter - Crankshaft, Cylinder Block - Engine Code(s): BLV & CNNA

K, L, M	B	Blue	Yellow
K, L, M	V	Purple	Yellow

Example:

Bearing Cap	1	2	3	4	5	6	7
Letters on the Cylinder Block	G	H	H	H	G	E	G
Letters on the Crankshaft Counterweight	G	B	B	V	B	B	G
Bearing Shell Color Identification for the Bearing Cap	Red	Yellow	yellow	Blue	Yellow	Yellow	Red

DESCRIPTION AND OPERATION

Engine Code BLV

Engine Code CNNA

All

RIBBED DRIVE BELT OVERVIEW

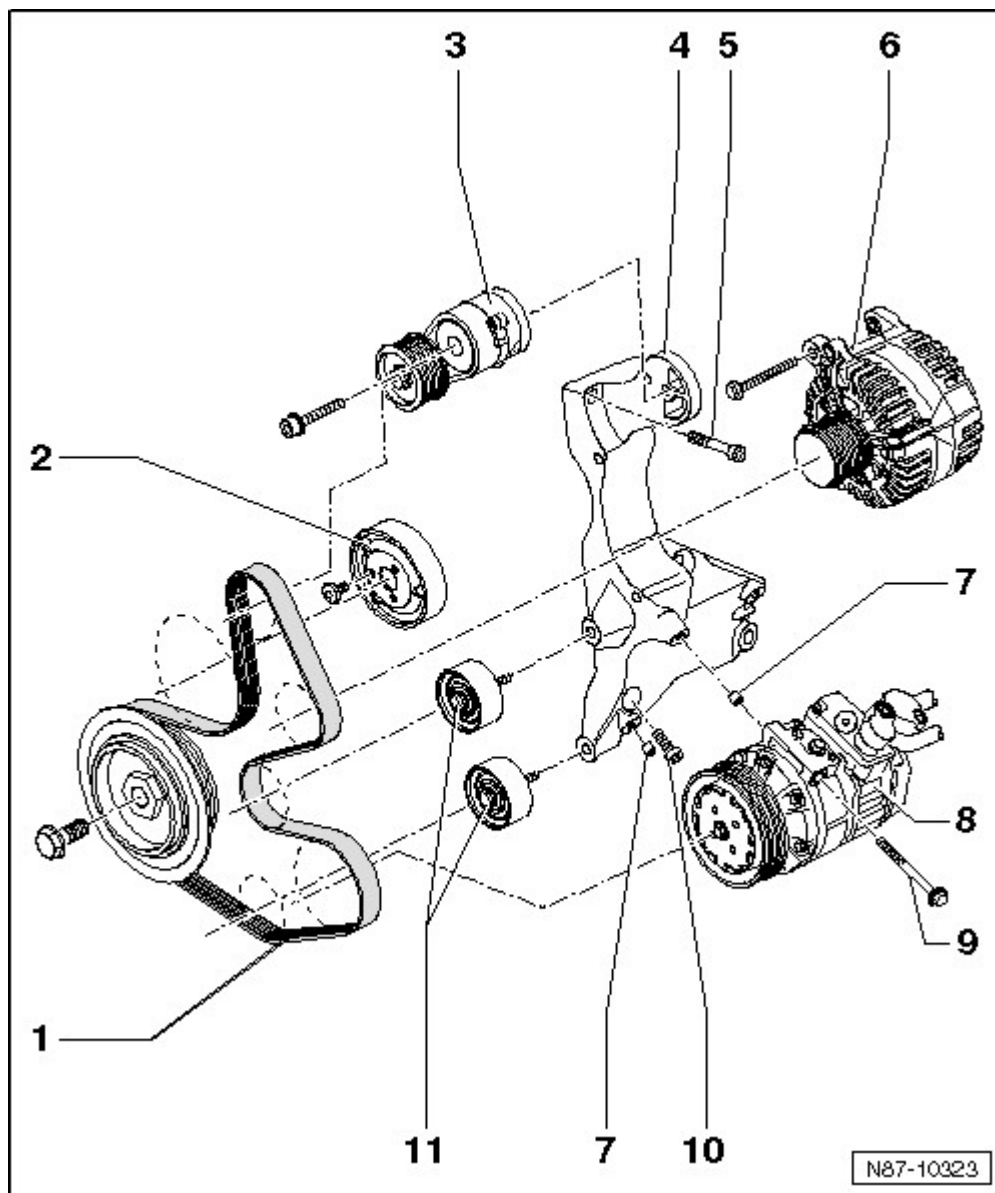


Fig. 3: Identifying A/C Compressor Sub-Assembly

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

1. Ribbed Belt

- **Removing and installing** , refer to **RIBBED BELT**.

2. Coolant Pump Pulley

3. Belt Tensioner

4. Accessory Bracket

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

5. Bolt

- **23 Nm**
- Used to align the accessory bracket.

6. Generator

- **Removing and installing** , refer to **Removal and Installation** .

7. Alignment Sleeve

- Quantity: 2
- Make sure that the seating between the accessory bracket and the A/C compressor is correct.

8. Air Conditioning (A/C) Compressor

- **Removing and installing** , refer to **Removal and Installation** .

9. Bolt

- **23 Nm**
- M8 x 100
- Quantity: 3

10. Bolt

- **23 Nm**
- Used to align the accessory bracket.

ENGINE OVERVIEWS

NOTE: The engine is to be secured to the engine and transmission holder VAS 6095 when performing assembly work.

If large quantities of metal particles or abraded material are detected during engine repairs, it may mean the crankshaft or rod bearings are damaged. To prevent further damage, perform the following steps after the repair:

Clean the oil passages.

Replace the oil check valve.

Replace the oil spray jets.

Replace the engine oil cooler.

Replace the oil filter element.

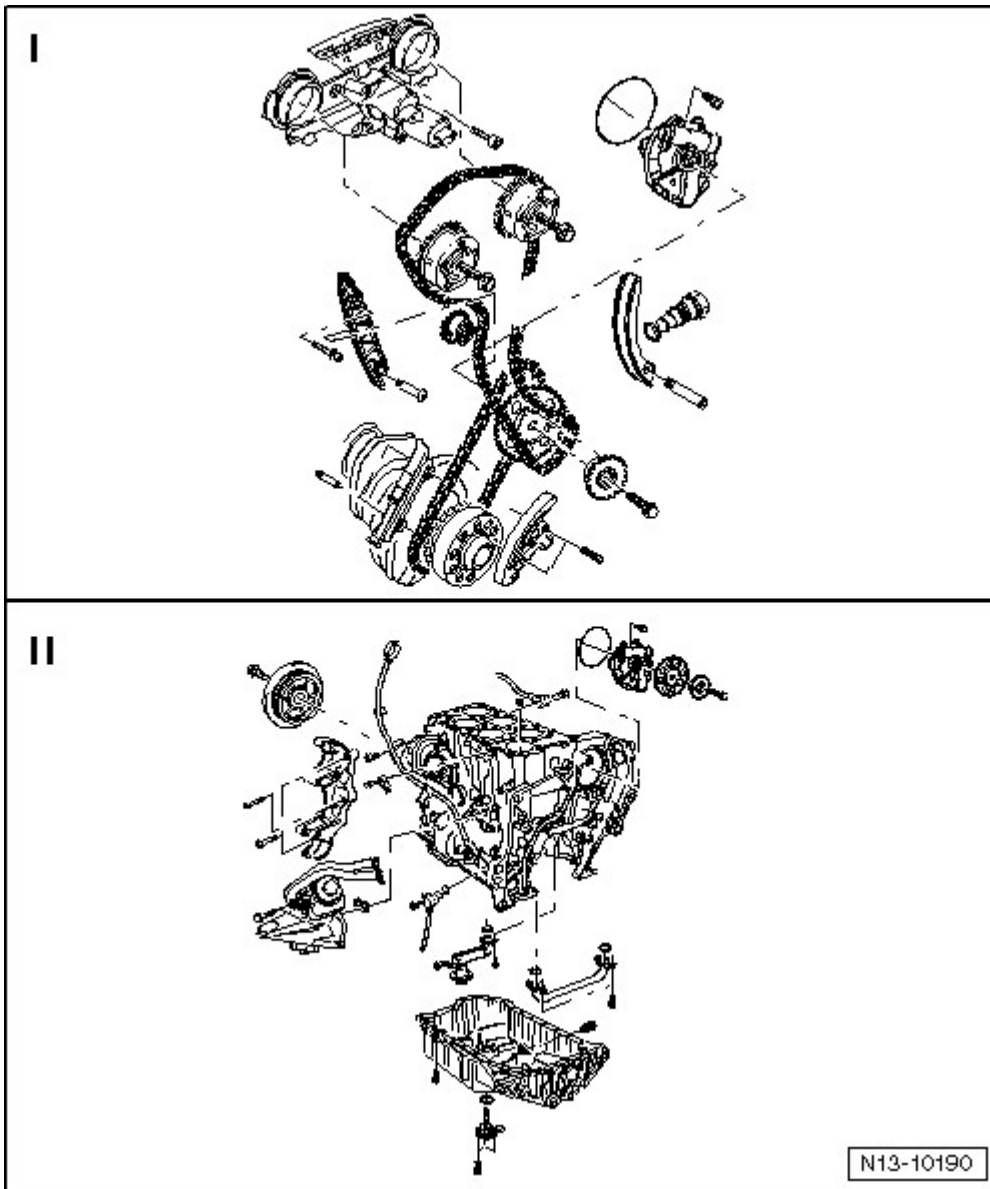


Fig. 4: Identifying Engine, Disassembling And Assembling Overview
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

1. I - **CHAIN DRIVE**
2. II - **CYLINDER BLOCK AND ATTACHMENTS**

CHAIN DRIVE

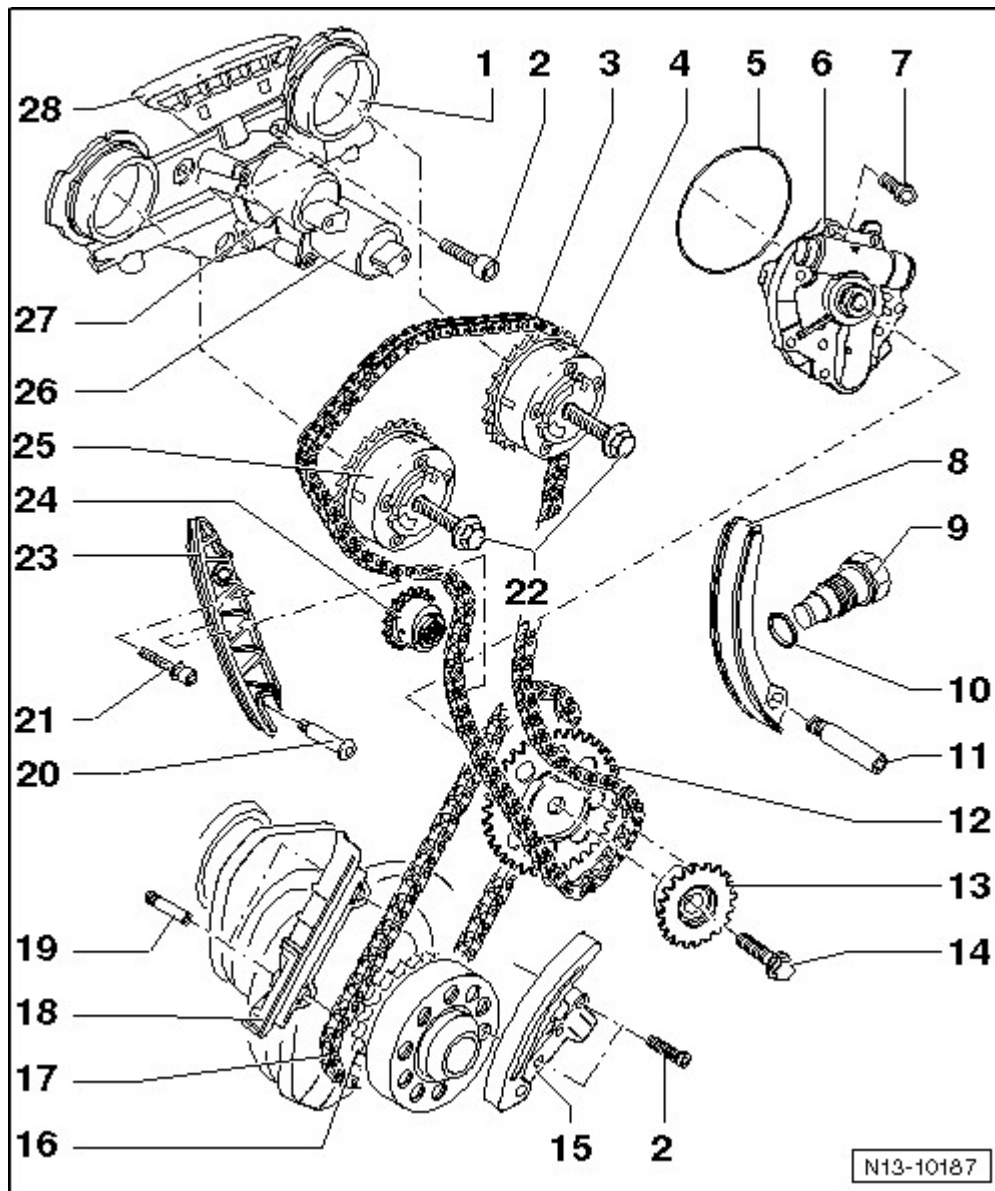


Fig. 5: Identifying Engine, Disassembling And Assembling Part I

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

1. Control Housing

- Oil the contact surface of the seals before installing.
- **Removing and installing** , refer to **CAMSHAFTS** .
- Camshaft adjustment valve removing and installing, refer to **CAMSHAFT ADJUSTMENT VALVES** .
- Check the control housing strainer for contamination before installation. Refer to **Fig. 7**.

2. Bolt

- **8 Nm + 90° (1/4) additional turn.**
- Install using liquid locking fluid D 000 600 A2

3. Timing Chain
 - For the camshafts.
 - Mark the direction of rotation before removing (installed position). Refer to **Fig. 6**.
 - **Installing** , refer to **CAMSHAFT AND OIL PUMP TIMING CHAINS** .
4. Exhaust Camshaft Adjuster
 - Identification: 32A
 - **Installing** , refer to **CAMSHAFT AND OIL PUMP TIMING CHAINS** .
5. Seal
 - Always replace.
6. Oil Pump
 - **Removing and installing** , refer to **OIL PUMP** .
7. Bolt
 - **8 Nm**
 - Always replace.
8. Tensioning Rail
 - For the camshaft timing chain -item 3-.
9. Chain Tensioner
 - **50 Nm**
 - For the camshaft timing chain -item 3-.
 - Only rotate the engine with the chain tensioner installed.
10. Seal
 - Replace if damaged or leaking.
11. Pin
 - **10 Nm**
 - For the tensioning rail -item 8-.
12. Chain Sprocket
 - For the oil pump timing chain -item 17-.
 - **Installing** , refer to **CAMSHAFT AND OIL PUMP TIMING CHAINS** .
13. Chain Sprocket
 - For the camshaft timing chain -item 3-.
 - **Installing** , refer to **CAMSHAFT AND OIL PUMP TIMING CHAINS** .
14. Bolt
 - **60 Nm + 90° (1/4) additional turn.**
 - Always replace.
 - Only use bolts with a strength category of 10.9.
15. Chain Tensioner with Tensioning Rail
 - For the oil pump timing chain -item 17-.
 - Before installation, release the locking device in the chain tensioner using a small screwdriver and

press the tensioning rail against the chain tensioner.

- Only rotate the engine with the chain tensioner installed.

16. Drive Sprocket

- Integral part of the crankshaft.
- The milled tooth aligned with the crankshaft main bearing cap joint = Top Dead Center (TDC) for cylinder 1. Refer to **CAMSHAFT AND OIL PUMP TIMING CHAINS** .

17. Timing Chain

- For the oil pump.
- Mark the direction of rotation before removing (installed position). Refer to **Fig. 6**.
- **Installing** , refer to **CAMSHAFT AND OIL PUMP TIMING CHAINS** .

18. Guide Rail

- For the oil pump timing chain -item 17-.
- Remove and install together with the timing chains. Refer to **CAMSHAFT AND OIL PUMP TIMING CHAINS** .

19. Pin, without Collar

- **10 Nm**
- For the guide rail -item 18-.

20. Pin

- **10 Nm**

21. Bolt

- **23 Nm**

22. Bolt

- **60 Nm + 90° (1/4) additional turn.**
- Always replace.
- The sensor wheel contact surface on the bolt head must be dry when installing.
- When removing and installing, counter hold the camshaft using a 27 mm open end wrench. Refer to **CAMSHAFTS** .

23. Guide Rail

- For the camshaft timing chain -item 3-.

24. Drive Sprocket

- For the high pressure pump.

25. Intake Camshaft Adjuster

- Identification: 24E
- **Installing** , refer to **CAMSHAFT AND OIL PUMP TIMING CHAINS** .

26. Exhaust Camshaft Adjustment Valve 1 -N318-

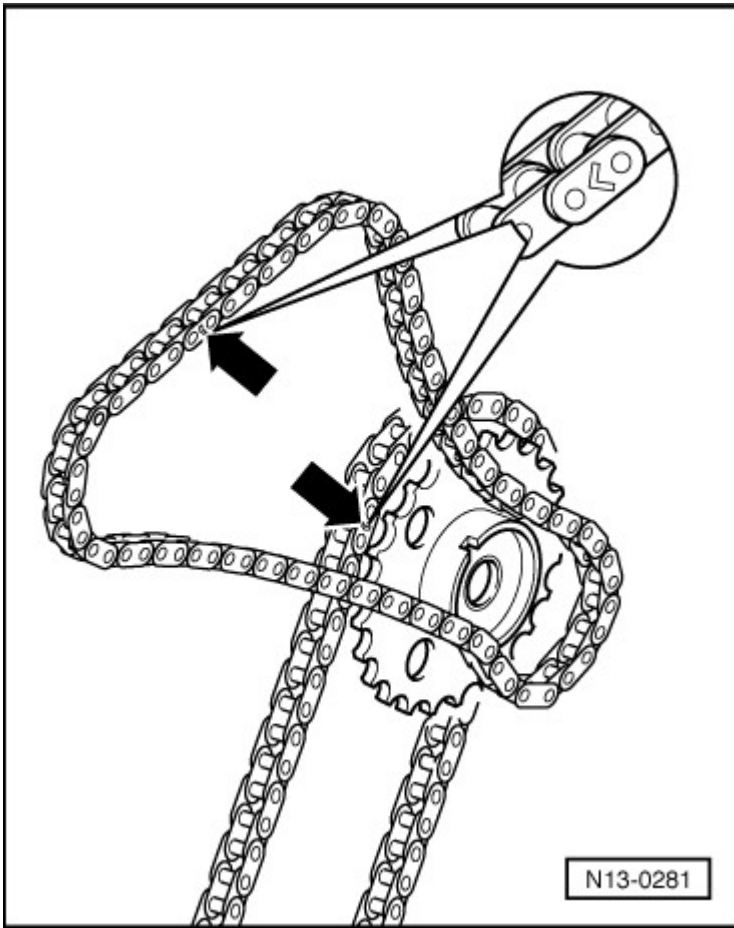
- For the exhaust camshaft.
- Mark the connector belonging to the component before disconnecting.
- **Removing and installing** , refer to **CAMSHAFT ADJUSTMENT VALVES** .

27. Camshaft Adjustment Valve 1 -N205-

- For the intake camshaft.
- Mark the connector belonging to the component before disconnecting.
- **Removing and installing** , refer to **CAMSHAFT ADJUSTMENT VALVES** .

28. Guide Rail

- For the camshaft timing chain -item 3-.
- Clipped into the control housing.

**Fig. 6: Identifying Marks On Roller Chains**

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Mark the timing chains before removing (for example, with a paint arrow pointing in the direction of rotation).

NOTE: **Do not mark the chain using a center punch or similar means!**

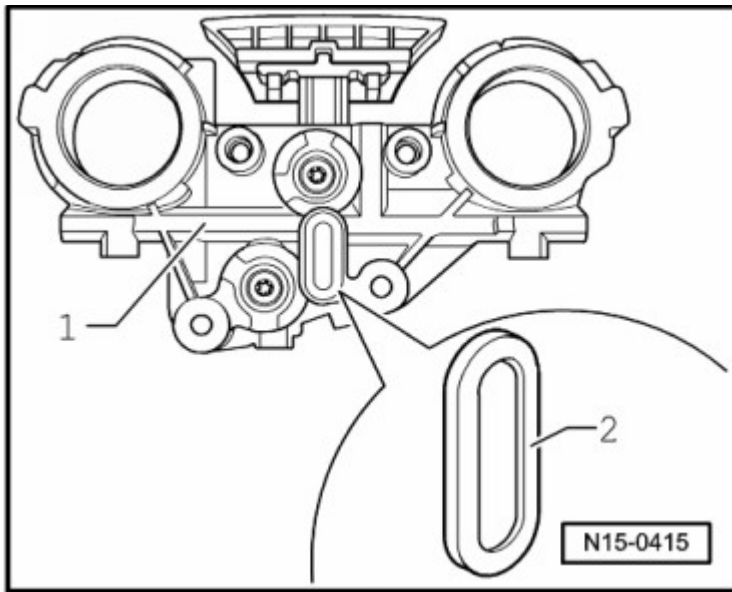


Fig. 7: Identifying Backside Of Control Housing & Screen
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

CYLINDER BLOCK AND ATTACHMENTS

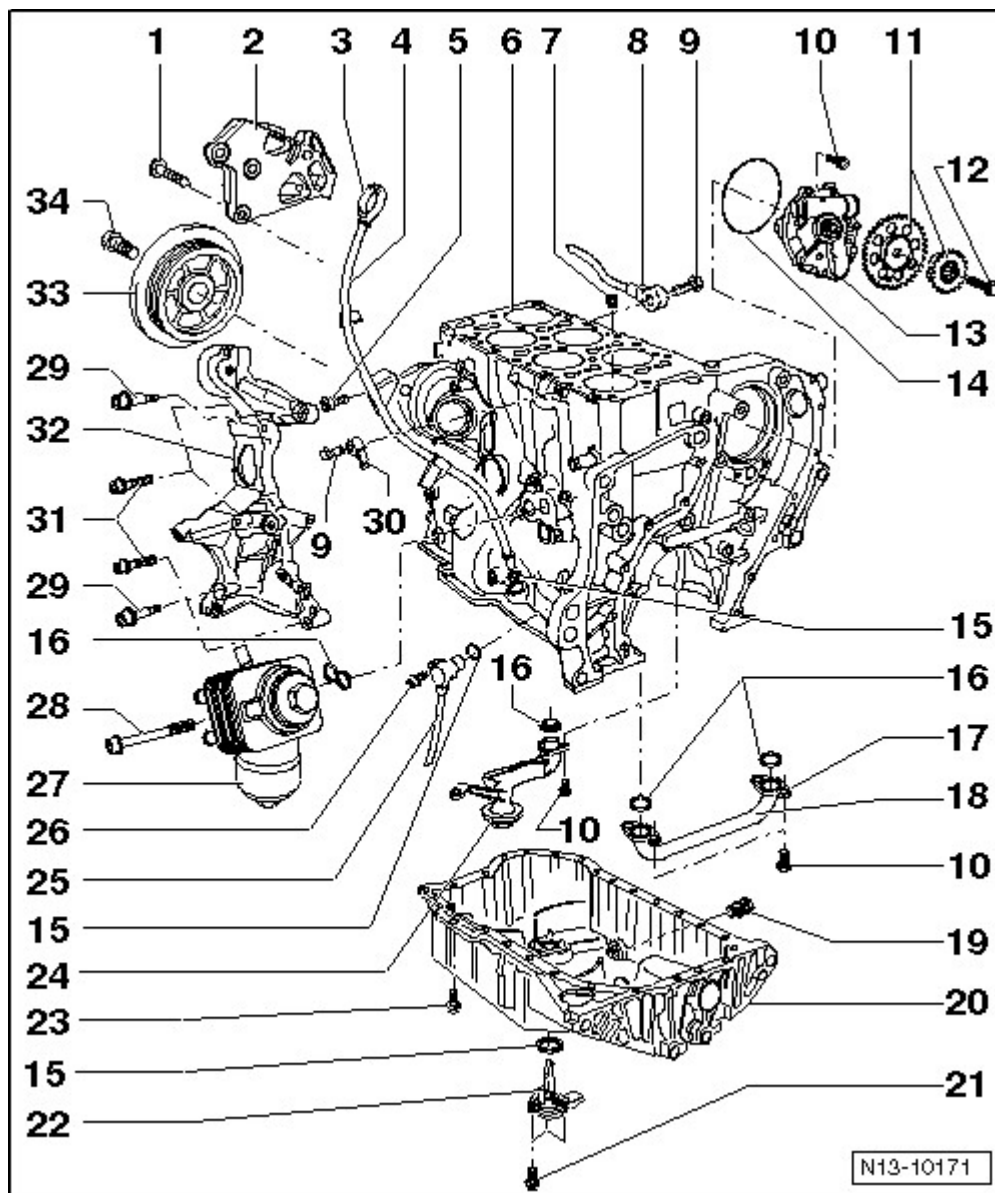


Fig. 8: Identifying Cylinder Block And Attachments
 Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

1. Bolt
 - 50 Nm + 90° (1/4) additional turn.
 - Always replace.
2. Engine Mount Bracket
3. Oil Dipstick
 - The oil level must not be above the Max. mark!
 - Marks, refer to **ENGINE OIL**.
4. Oil Dipstick Guide Tube
 - For the oil dipstick.

- Secured by a bolt to intake manifold.
5. Bolt
 - **6 Nm**
 - To the intake manifold.
 6. Cylinder Block
 - Sealing flange and drive plate overview. Refer to **SEALING FLANGE AND DRIVE PLATE OVERVIEW**.
 - Crankshaft overview. Refer to **CRANKSHAFT OVERVIEW**.
 - Piston and connecting rod overview. Refer to **PISTON AND CONNECTING ROD OVERVIEW**.
 7. Oil Check Valve
 - Not installed.
 8. Knock Sensor 1 -G61-
 - Installed location: between cylinders 1 and 3.
 9. Bolt
 - **20 Nm**
 - The tightening specification affects the function of the knock sensor.
 10. Bolt
 - **8 Nm**
 - Always replace.
 11. Chain Sprocket
 - Installing, refer to **CAMSHAFT AND OIL PUMP TIMING CHAINS** .
 12. Bolt
 - **60 Nm + 90° (1/4) additional turn.**
 - Always replace.
 - Only use bolts with a strength category of 10.9.
 13. Oil Pump
 - **Removing and installing** , refer to **OIL PUMP** .
 14. Seal
 - Always replace.
 - Coat with oil before installing.
 15. O-ring
 - Always replace.
 16. Gasket
 - Always replace.
 17. Flange
 - Pay attention to the installed position.
 18. Oil Pipe

19. Oil Drain Plug
 - **30 Nm**
 - Always replace.
 - With a permanent seal.
20. Oil Pan
 - **Removing and installing** , refer to **OIL PAN** .
21. Bolt
 - **10 Nm**
22. Oil Level Thermal Sensor -G266-
23. Bolt
 - **11 Nm**
24. Suction Pipe
 - For the oil pump.
25. Engine Speed Sensor -G28-
26. Bolt
 - **10 Nm**
27. Oil Filter Housing
 - Overview, refer to one **OIL FILTER HOUSING OVERVIEW**
 - Coolant hose connection diagram. Refer to **COOLANT HOSE CONNECTION DIAGRAM** .
28. Bolt
 - **23 Nm**
29. Bolt
 - **23 Nm**
 - For aligning the accessory bracket.
30. Knock Sensor 2 -G66-
 - Installed location: between cylinders 4 and 6.
31. Bolt
 - **23 Nm**
32. Accessory Bracket
 - For the generator and Air Conditioning (A/C) compressor.
 - **Removing and installing** , refer to **ACCESSORY BRACKET**.
33. Vibration Damper
 - **Removing and installing** , refer to **VIBRATION DAMPER**.
 - **Removing and installing** the ribbed belt. Refer to **RIBBED BELT**.
34. Bolt
 - **Removal and installation** , refer to **VIBRATION DAMPER**.

RIBBED DRIVE BELT OVERVIEW

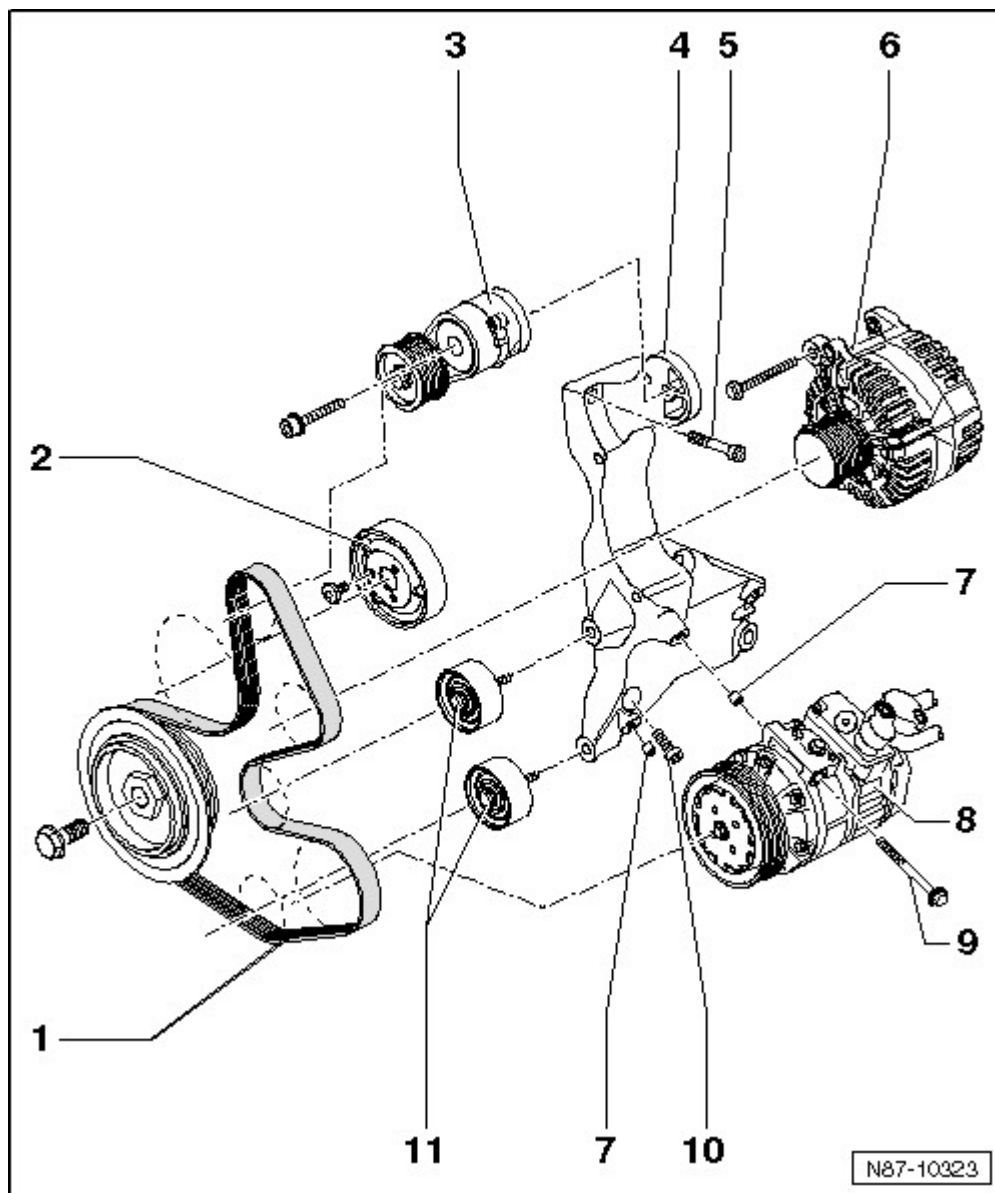


Fig. 9: Identifying A/C Compressor Sub-Assembly

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

1. Ribbed Belt

- **Removing and installing** , refer to **RIBBED BELT**.

2. Coolant Pump Pulley

3. Belt Tensioner

4. Accessory Bracket

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

5. Bolt

- **23 Nm**
- Used for aligning the accessory bracket.

6. Generator

- **Removing and installing** , refer to **Removal and Installation** .

7. Alignment Sleeves

- Quantity: 2
- Make sure that the seating between the accessory bracket and the A/C compressor is correct.

8. Air Conditioning (A/C) Compressor

- **Removing and installing** , refer to **REMOVAL AND INSTALLATION** .

9. Bolt

- **23 Nm**
- M8 x 100
- Quantity: 3

10. Bolt

- **23 Nm**
- Used for aligning the accessory bracket.

ENGINE OVERVIEW

NOTE: The engine is to be secured to the engine and transmission holder VAS 6095 when performing assembly work.

If large quantities of metal particles or abraded material are detected during engine repairs, it may mean the crankshaft or rod bearings are damaged. To prevent further damage, perform the following steps after the repair:

Clean the oil passages.

Replace the oil check valve.

Replace the oil spray jets.

Replace the engine oil cooler.

Replace the oil filter element.

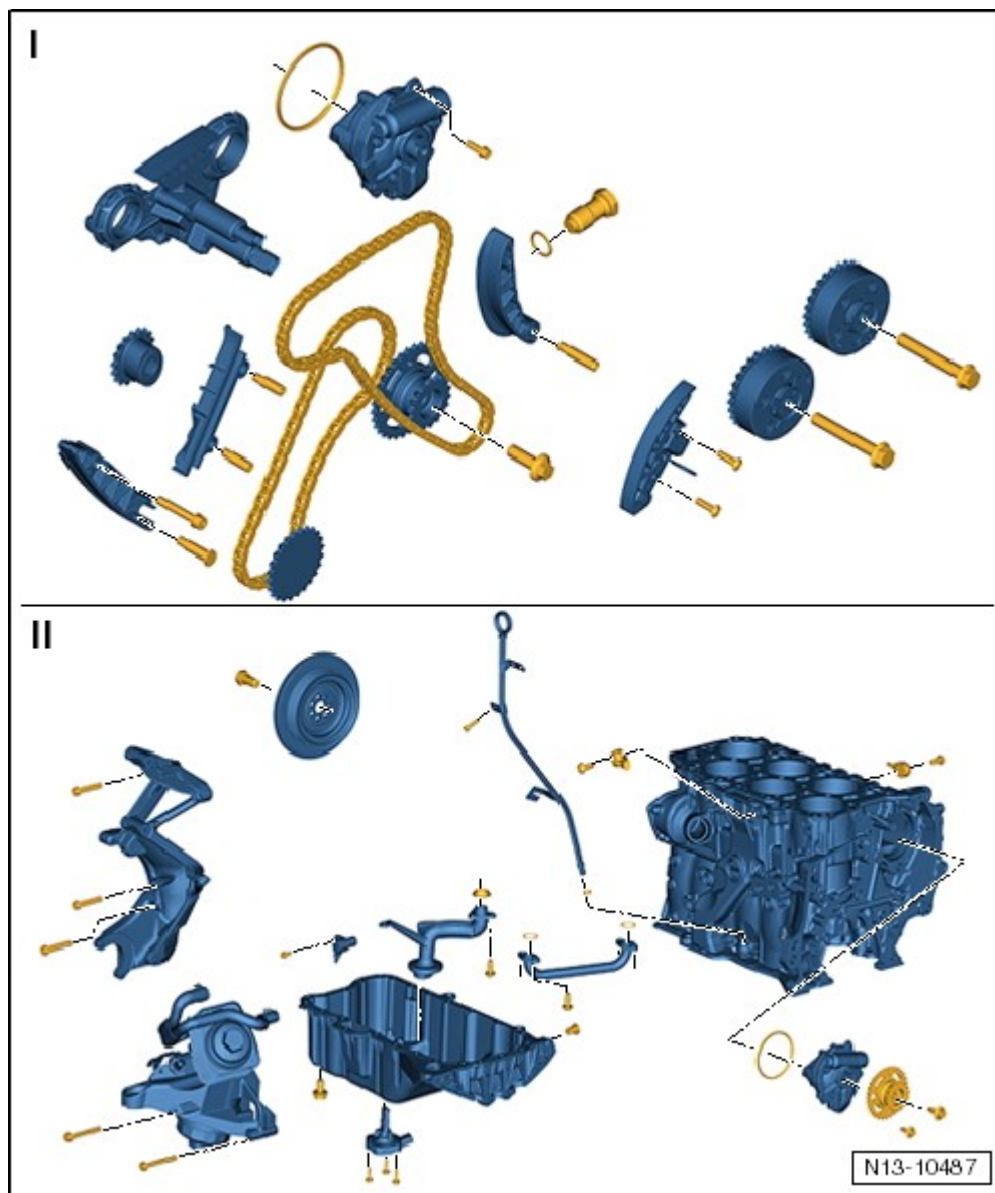


Fig. 10: Identifying Engine Overview

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

1. I - CHAIN DRIVE
2. II - CYLINDER BLOCK AND ATTACHMENTS

CHAIN DRIVE

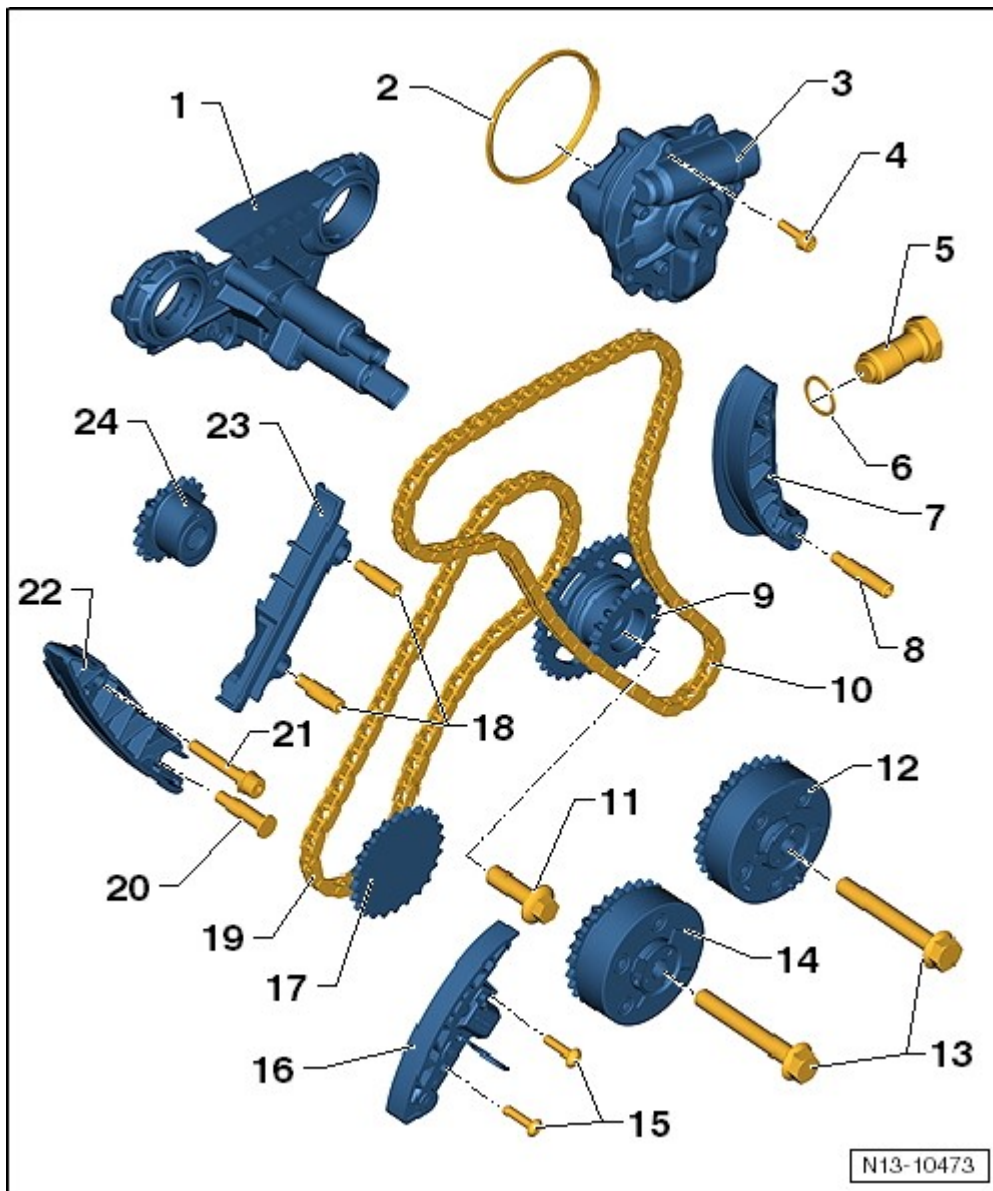


Fig. 11: Identifying Timing Chains And Adjusters

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

1. Control Housing

- Oil the contact surface of the seals before installing.
- **Removing and installing** , refer to CAMSHAFTS .
- Assembly overview, refer to CONTROL HOUSING OVERVIEW .
- Check the control housing strainer for contamination before installation. Refer to CONTROL HOUSING OVERVIEW .

2. Seal

- Always replace.

3. Oil Pump

- **Removing and installing** , refer to **OIL PUMP** .
4. Bolt
 - **8 Nm**
 - Install using liquid locking fluid D 000 600 A2.
 5. Chain Tensioner
 - **50 Nm**
 - For the camshaft timing chain -item 10-.
 - Only rotate the engine with the chain tensioner installed.
 6. Seal
 - Replace if damaged or leaking.
 7. Tensioning Rail
 - For the camshaft timing chain -item 10-.
 8. Pin
 - **10 Nm**
 - For the tensioning rail -item 7-.
 9. Chain Sprocket
 - For the timing chains.
 10. Timing Chain
 - For the camshafts.
 - Mark the direction of rotation before removing (installed position). Refer to **Fig. 12**.
 - **Removing and installing** , refer to **CAMSHAFT TIMING CHAIN** .
 11. Bolt
 - **60 Nm + 90° (1/4) additional turn.**
 - Always replace.
 12. Exhaust Camshaft Adjuster
 - Identification: 32A
 - **Removing and installing** , refer to **CAMSHAFT ADJUSTER WITH TIMING CHAIN, INSTALLING** .
 13. Bolt
 - **60 Nm + 90° (1/4) additional turn.**
 - Always replace.
 - The contact surface of the sensor wheel at the bolt head must be dry when installing.
 - When removing and installing, counter-hold the camshaft using a 27 mm open end wrench. Refer to **CAMSHAFTS** .
 14. Intake Camshaft Adjuster
 - Identification: 24E
 - **Removing and installing** , refer to **CAMSHAFT ADJUSTER WITH TIMING CHAIN, INSTALLING** .

15. Bolt
 - **10 Nm**
16. Chain Tensioner with Tensioning Rail
 - For the oil pump timing chain -item 19-.
 - Only rotate the engine with the chain tensioner installed.
17. Drive Sprocket
 - Integral part of the crankshaft.
 - The milled tooth aligned with the crankshaft main bearing cap joint = Top Dead Center (TDC) for cylinder 1, install the oil pump timing chain. Refer to **CAMSHAFT AND OIL PUMP TIMING CHAINS**.
18. Pin without Collar
 - **10 Nm**
 - For the guide rail -item 23-.
19. Timing Chain
 - For the oil pump.
 - Mark the direction of rotation before removing (installed position). Refer to **Fig. 12**.
 - **Installing**, refer to **OIL PUMP**.
20. Pin
 - **10 Nm**
 - For the guide rail.
21. Bolt
 - **23 Nm**
22. Guide Rail
 - For the camshaft timing chain -item 10-.
23. Guide Rail
 - For the oil pump timing chain -item 19-.
 - Together with the camshaft timing chain, removing and installing. Install the oil pump timing chain. Refer to **OIL PUMP**.
24. Drive Sprocket
 - For the high pressure pump.
 - With needle bearings.
 - Oil the needle bearing before installing.

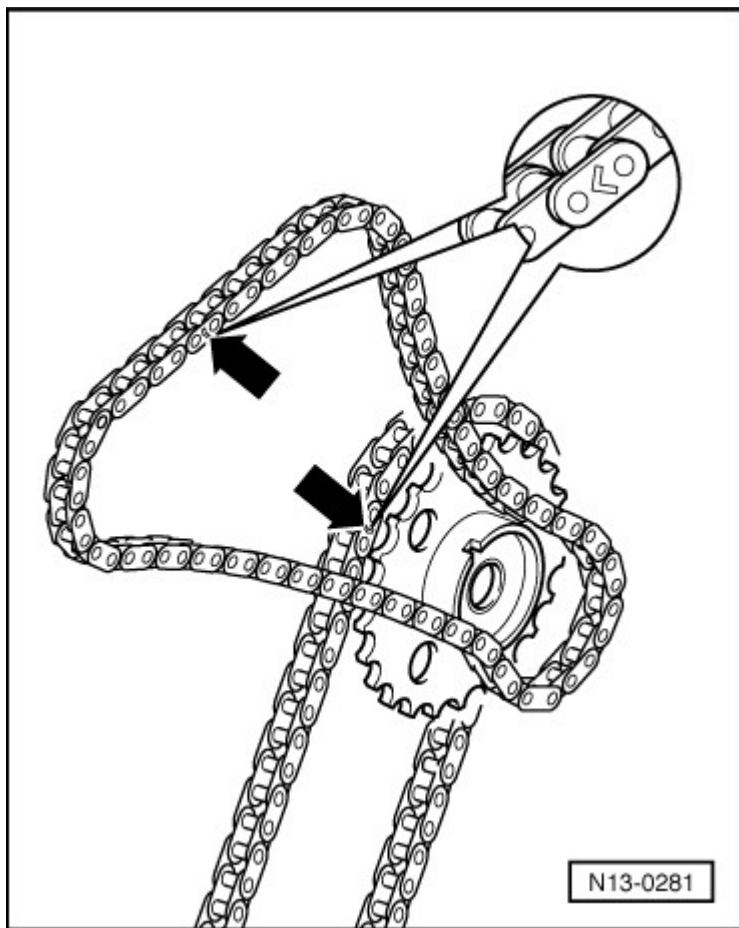


Fig. 12: Identifying Marks On Roller Chains

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Mark the timing chains before removing (for example, with a paint arrow, pointing in the direction of rotation).

NOTE: **Do not mark the chain using a center punch or similar means!**

CYLINDER BLOCK AND ATTACHMENTS

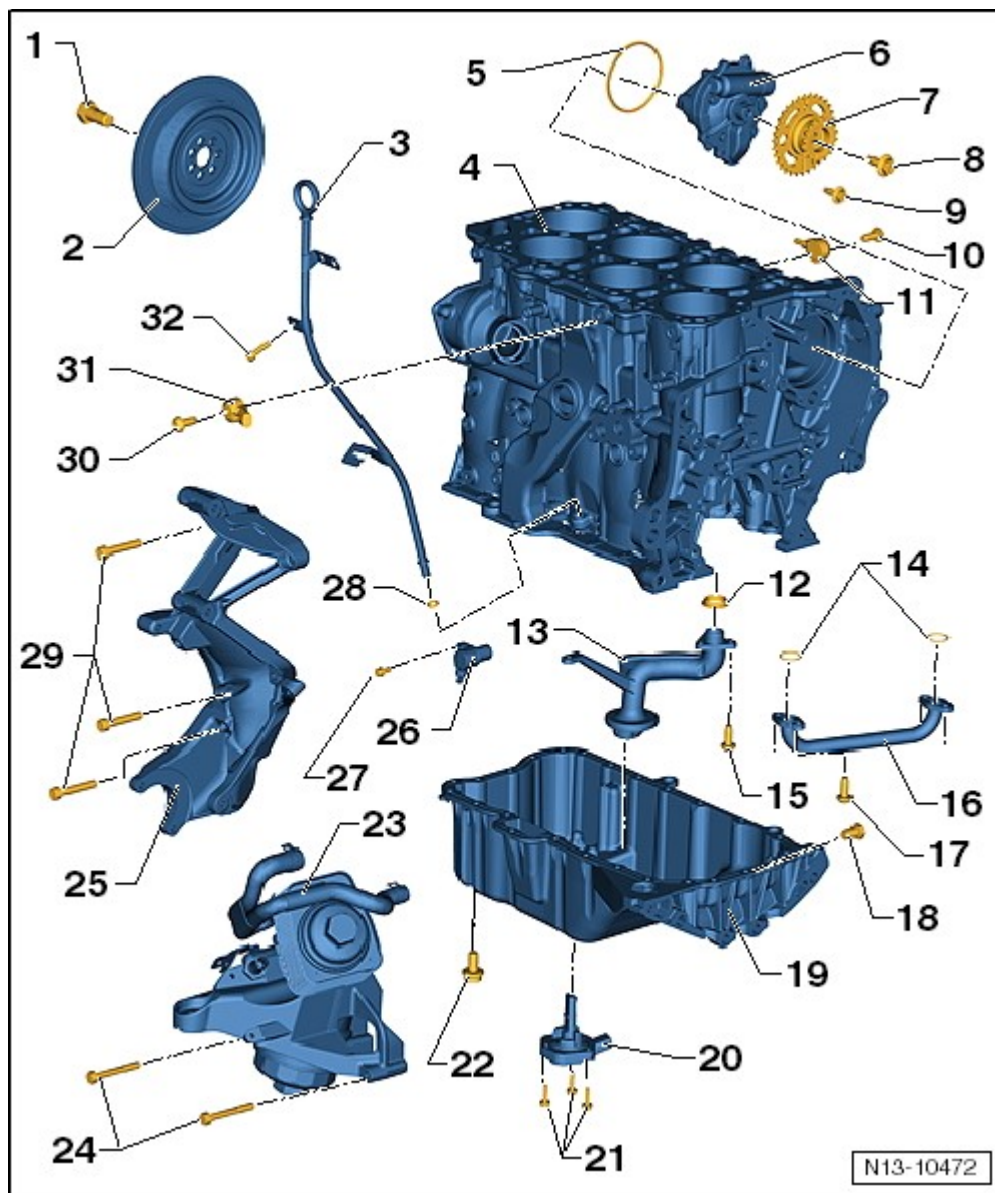


Fig. 13: Identifying Cylinder Block And Attaching Components

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

1. Bolt
 - 60 Nm + 180° (1/2) additional turn.
 - Quantity: 7
2. Vibration Damper
 - **Removing and installing** , refer to **VIBRATION DAMPER**.
 - **Removing and installing** the ribbed belt. Refer to **RIBBED BELT**.
3. Oil Dipstick Guide Tube
 - For the oil dipstick.
 - Secured by a bolt to the intake manifold.

4. Cylinder Block
 - Sealing flange and drive plate overview. Refer to **SEALING FLANGE AND DRIVE PLATE OVERVIEW**
 - Piston and connecting rod overview. Refer to **PISTON AND CONNECTING ROD OVERVIEW**.
5. Seal
 - Always replace.
 - Coat with oil before installing.
6. Oil Pump
 - **Removing and installing** , refer to **OIL PUMP** .
7. Chain Sprocket
8. Bolt
 - **60 Nm + 90° (1/4) additional turn.**
 - Always replace.
9. Bolt
 - **8 Nm**
 - Install using liquid locking fluid D 000 600 A2.
10. Bolt
 - **20 Nm**
 - The tightening specification affects the function of the knock sensor.
11. Knock Sensor 1 -G61-
 - Installed location: between cylinders 1 and 3, below the exhaust manifold.
12. Gasket
 - Always replace.
13. Suction Pipe
 - For the oil pump.
14. O-rings
 - Always replace.
15. Bolt
 - **8 Nm**
 - Install using liquid locking fluid D 000 600 A2.
16. Oil Pipe
17. Bolt
 - **8 Nm**
 - Install using liquid locking fluid D 000 600 A2.
18. Oil Drain Plug
 - **30 Nm**
 - Always replace.

- With a permanent seal.
19. Oil Pan
 - **Removing and installing** , refer to **OIL PAN** .
 20. Oil Level Thermal Sensor -G266-
 21. Bolt
 - **12 Nm**
 22. Bolt
 - **10 Nm**
 23. Oil Filter Housing
 - Overview, refer to **OIL FILTER HOUSING OVERVIEW** .
 24. Bolt
 - **23 Nm**
 25. Accessory Bracket
 - For the generator and Air Conditioning (A/C) compressor.
 - **Removing and installing** , refer to **ACCESSORY BRACKET** .
 26. Engine Speed Sensor -G28-
 27. Bolt
 - **10 Nm**
 28. O-ring
 - Always replace.
 29. Bolt
 - **23 Nm**
 30. Bolt
 - **20 Nm**
 - The tightening specification affects the function of the knock sensor.
 31. Knock Sensor 2 -G66-
 - Installed location: between cylinders 4 and 6.
 32. Bolt
 - **6 Nm**
 - To the intake manifold.

SEALING FLANGE AND DRIVE PLATE OVERVIEW

NOTE: **Secure the engine to engine and transmission holder VAS 6095 when working on it.**

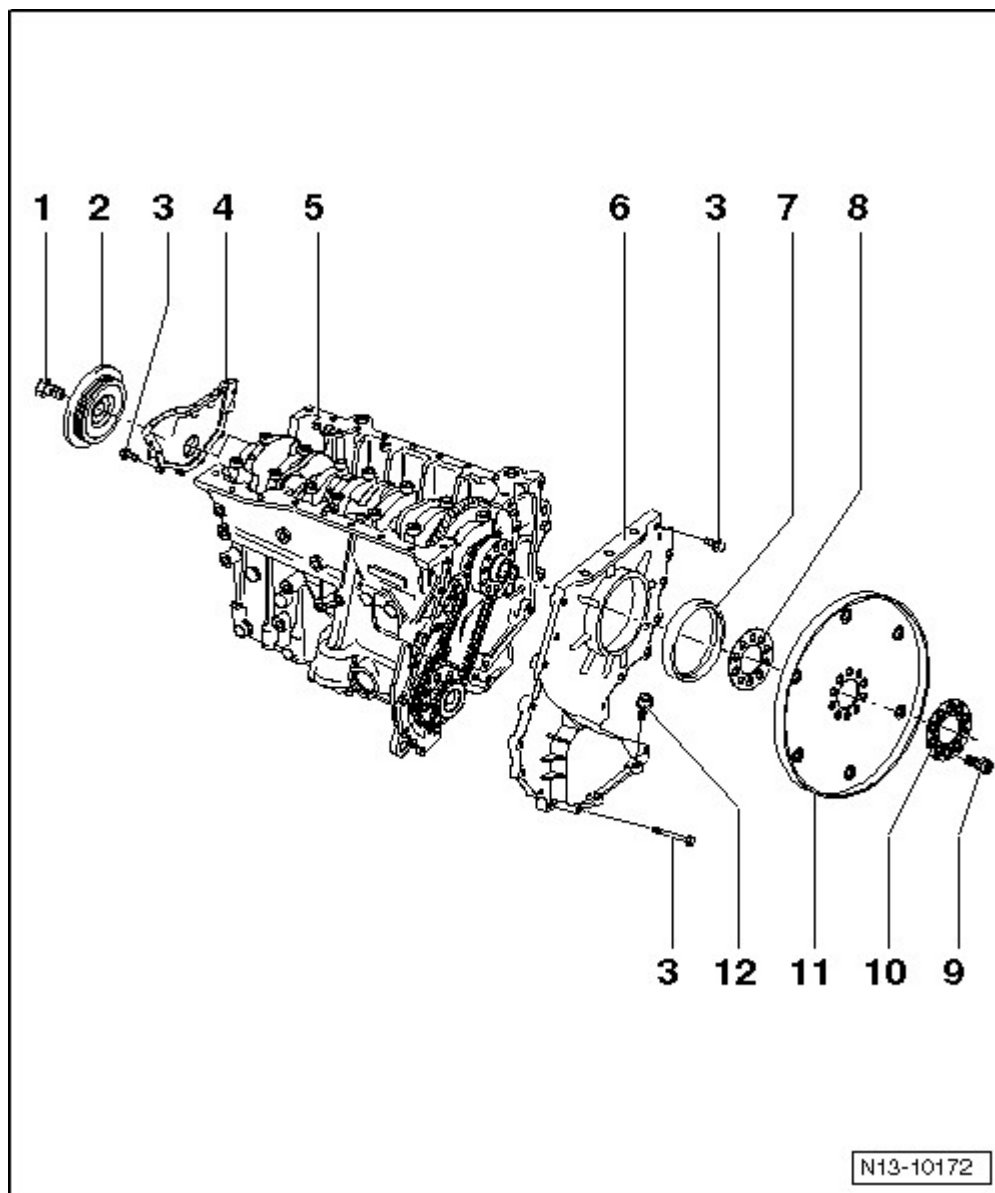


Fig. 14: Identifying Sealing Flange And Drive Plate, Assembly Overview
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

1. Bolt

- **Removing and installing** , refer to one of the following:

Engine code BLV, refer to **VIBRATION DAMPER**.

Engine code CNNA, refer to **VIBRATION DAMPER**.

2. Vibration Damper

- **Removing and installing** , refer to one of the following:

Engine code BLV, refer to **VIBRATION DAMPER**.

Engine code CNNA, refer to **VIBRATION DAMPER**.

3. Bolt

- **10 Nm**

4. Sealing Flange

- **Removing and installing** , refer to one of the following:

Engine code BLV, refer to **CRANKSHAFT SEALING FLANGE, VIBRATION DAMPER SIDE**

Engine code CNNA, refer to **CRANKSHAFT SEALING FLANGE, VIBRATION DAMPER SIDE**

- Coat the sealing surfaces with silicone adhesive sealant D 176 501 A1.

5. Cylinder Block

- Crankshaft overview. Refer to **CRANKSHAFT OVERVIEW**.
- Piston and connecting rod overview. Refer to **PISTON AND CONNECTING ROD OVERVIEW**.

6. Sealing Flange

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

7. Seal

- Remove using the pulling hook T20143/2.
- Polytetrafluoroethylene (PTFE) version of the seal.
- Do not lubricate or grease the sealing lip on the seal.
- Wipe off any oil on the crankshaft journal with a clean cloth before installing.
- **Installing** , refer to **CRANKSHAFT SEAL, TRANSMISSION SIDE**.

8. Shim

9. Bolt

- **60 Nm + 90° (1/4) additional turn.**
- Always replace.
- To loosen or tighten, use the counter hold tool T10044 (with 5 mm spacers), or the counter-holder tool T10069.

10. Washer

11. Drive Plate

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

12. Bolt

- **23 Nm**

COVER AND SEALING FLANGE OVERVIEW

Mechanical vacuum pump overview. Refer to **MECHANICAL VACUUM PUMP OVERVIEW** .

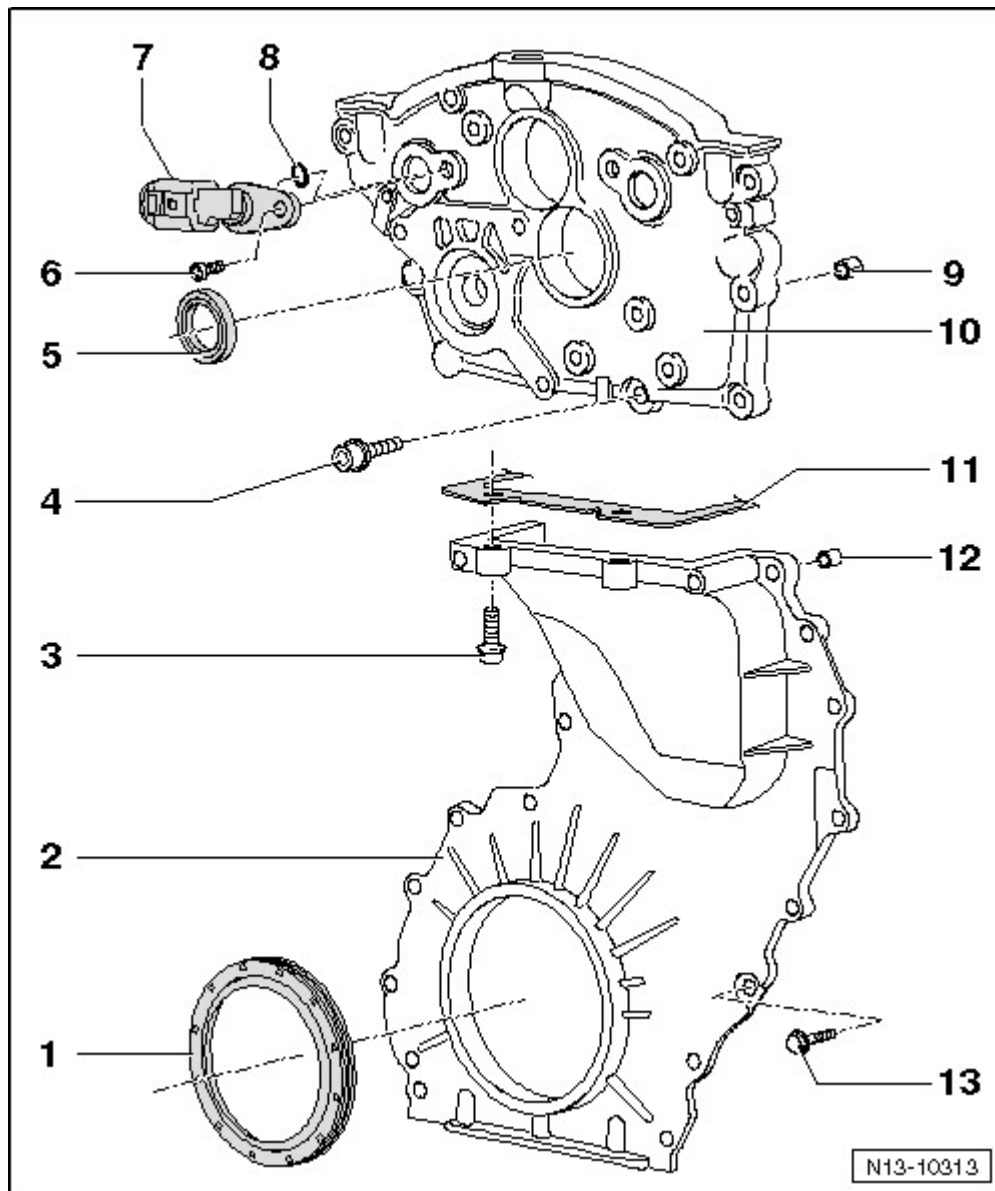


Fig. 15: Identifying Timing Chain Cover And Sealing Flange Overview
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

1. Seal
 - For the crankshaft.
 - **Removing and installing** , refer to **CRANKSHAFT SEAL, TRANSMISSION SIDE.**
2. Sealing Flange
 - Transmission side.
 - **Removing and installing** , refer to **SEALING FLANGE, TRANSMISSION SIDE.**
3. Bolt
 - **23 Nm**
4. Bolt

- **8 Nm**
 - Tighten in a diagonal sequence and in steps.
5. Seal
- Quantity: 2
 - For the camshaft adjustment valve 1 -N205- and the exhaust camshaft adjustment valve 1 -N318-.
 - Replace if leaking or damaged.
 - **Removing and installing** , refer to **COVER SEAL, INSTALLING** .
6. Bolt
- **8 Nm**
7. Camshaft Position Sensor
- Camshaft position sensor -G40- and camshaft position sensor 2 -G163-.
8. O-ring
- Always replace.
 - Quantity: 2
9. Alignment Pins
- Quantity: 2
10. Cover
11. Cylinder Head Gasket
- Clean the holes and fill with sealant.
12. Alignment Pins
13. Bolt
- **10 Nm**

CRANKSHAFT OVERVIEW

NOTE: Before removing the crankshaft, prepare for appropriate storage, so that the sensor wheel -item 6- does not make contact or become damaged.

The engine is to be secured to the engine and transmission holder VAS 6095 when performing assembly work.

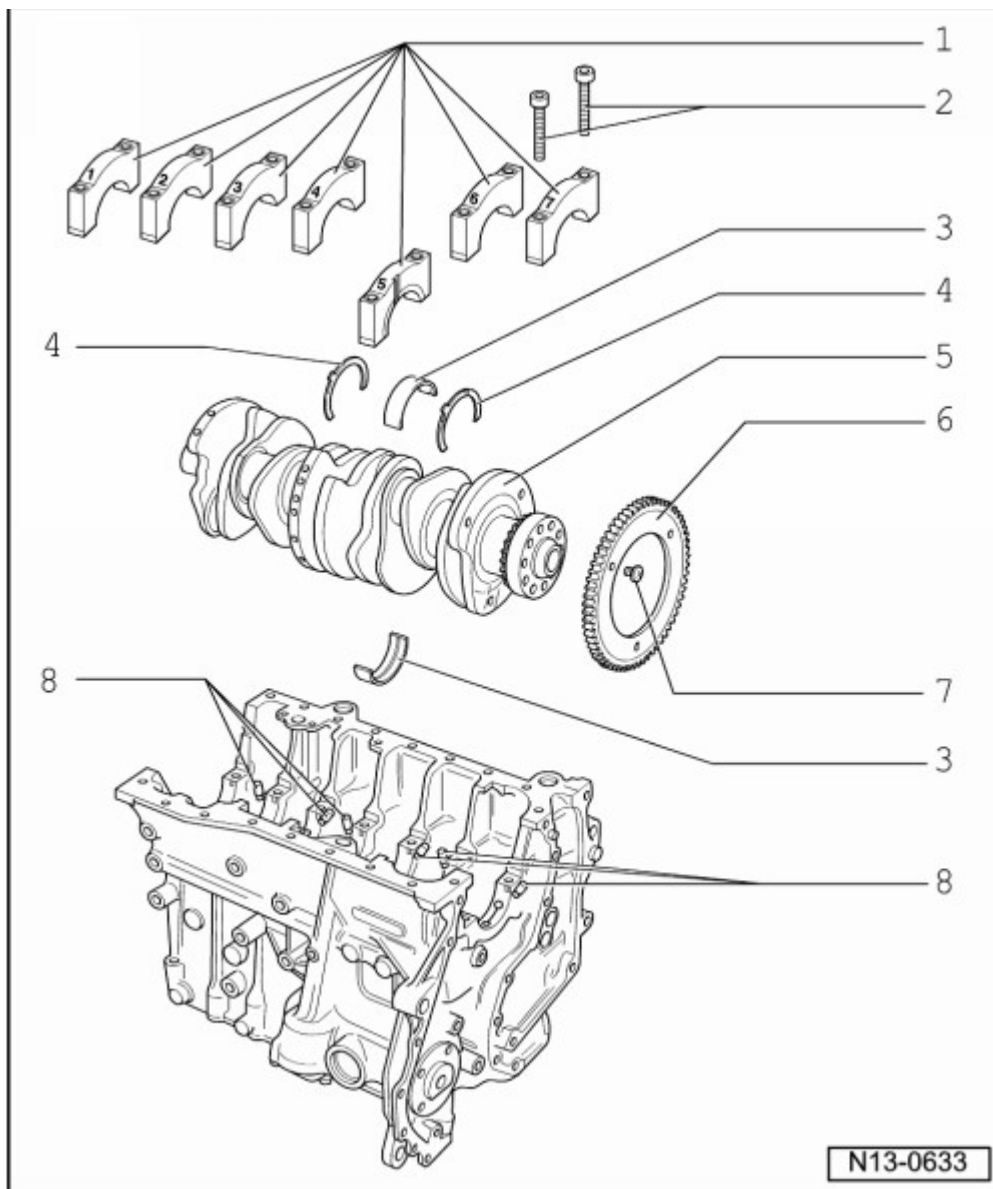


Fig. 16: Identifying Crankshaft, Assembly Overview
 Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

1. Bearing Cap

- Bearing cap 1: Vibration damper side.
- Bearing cap 5, with notches for the thrust washers.
- Retaining tabs on the bearing shells and the cylinder block/bearing caps must align above one another.

2. Bolt

- **30 Nm + 180° (1/2) additional turn.**
- Always replace.
- Two additional 90° turns is permitted.

3. Bearing Shell, 1 through 7

- For bearing caps without a oil groove.
- For the cylinder block with a oil groove.
- Do not interchange used bearing shells (mark them).
- Crankshaft bearing shell allocating. Refer to **CRANKSHAFT BEARING SHELL, ALLOCATING.**

4. Thrust Washer

- For bearing cap 5.
- Observe the locating point.

5. Crankshaft

- If replacing the crankshaft, allocate the crankshaft bearing shells. Refer to **CRANKSHAFT BEARING SHELL, ALLOCATING.**
- Before removing, observe the note at the top.
- Axial play:

New: 0.07 to 0, 23 mm

Wear limit: 0.30 mm

- Check the radial clearance using Plastigage®:

0.02 to 0.06 mm

Wear limit: 0.10 mm

- Do not rotate the crankshaft when measuring the radial play.
- Crankshaft dimensions:

Crankshaft bearing: 59.958 to 59.978 mm

Connecting rod bearing: 53.958 to 53.978 mm

- It is not permissible to rework the crankshaft.

6. Sensor Wheel

- For the engine speed sensor -G28-.
- Always replace.
- Installing, refer to **CRANKSHAFT SENSOR WHEEL, INSTALLING.**

7. Screw

- **10 Nm + 90° (1/4) additional turn.**
- Always replace.

8. Oil Spray Jet

- For crankshaft bearings 2 through 7.

- For piston cooling.
- Opening pressure:

2.0 bar

- **Removing and installing** , refer to **OIL SPRAY JET** .
- See the note in the engine overviews, refer to one of the following:

Engine code BLV, refer to **ENGINE OVERVIEWS**.

Engine code CNNA, refer to **ENGINE OVERVIEWS**.

PISTON AND CONNECTING ROD OVERVIEW

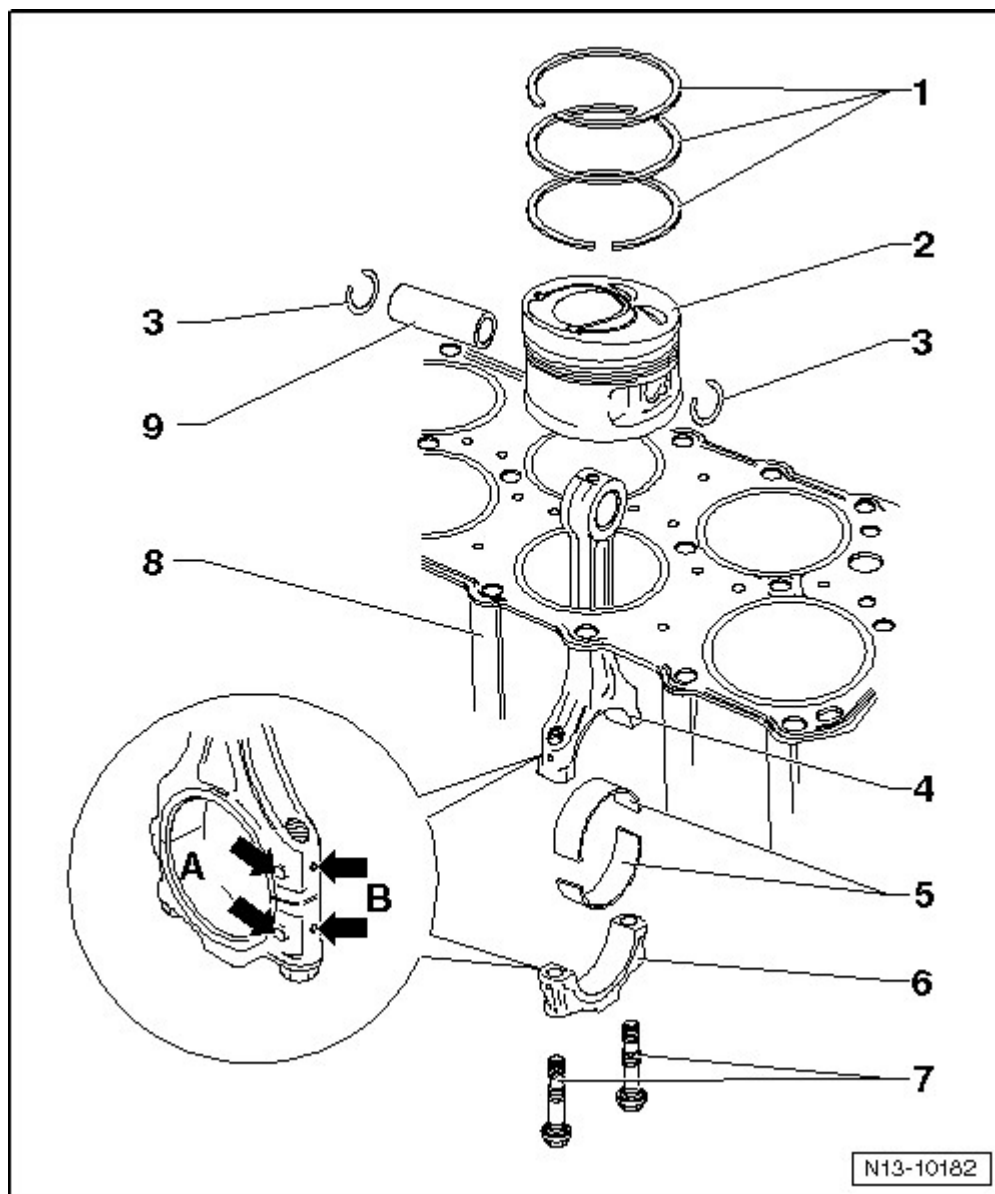


Fig. 17: Identifying Piston And Connecting Rod Assembly Overview
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

1. Piston Rings

- Offset gaps by 120°.
- Use piston ring pliers for removal and installation.
- "TOP" faces toward the piston crown.
- Checking the ring gap. Refer to **PISTON RING GAP, CHECKING.**
- Checking the piston ring groove clearance. Refer to **PISTON RING GROOVE CLEARANCE, CHECKING.**

2. Piston

- Checking, refer to **PISTON, CHECKING.**
- Mark the installed location to the connecting rod and to the cylinder to which it belongs.
- The 2 deep valve recesses in the piston head point toward the center of the cylinder block.
- **Removing and installing** , refer to **PISTON.**

3. Locking Ring

- Make sure it is secure.

4. Connecting Rod

- Only replace as a set.
- Mark which cylinder to which it belongs -B-.
- Installed position: Marks -A- must align.

5. Bearing Shell

- Pay attention to the installed position.
- Do not interchange used bearing shells (mark them).
- The bearing shell retaining tabs must be firmly seated in the notches.
- Axial clearance:

New: 0.05 to 0.31 mm

Wear limit: 0.40 mm

- Measure the radial clearance using Plastigage®:

New: 0.02 to 0.07 mm

Wear limit: 0.10 mm

- Do not rotate the crankshaft when measuring radial play.

6. Connecting Rod Bearing Cap

- Mark which cylinder to which it belongs -B-.
- Installed position: Marks -A- must align.

2010 Volkswagen CC VR6 Sport

ENGINE 3.6 Liter - Crankshaft, Cylinder Block - Engine Code(s): BLV & CNNA

7. Bolt

- **40 Nm + 90° (1/4) additional turn.**
- Always replace.
- Lubricate the threads and contact surface.
- Only tighten to 40 Nm to measure the radial play, do not tighten the additional torque angle.

8. Cylinder Block

- Checking the cylinder bore. Refer to **CYLINDER BORE, CHECKING**.
- Crankshaft overview. Refer to **CRANKSHAFT OVERVIEW**.
- For the correct piston and cylinder dimensions, refer to **PISTON AND CYLINDER DIMENSIONS**.

9. Piston Pin

- If difficult to move, heat the piston to 60 °C (140 °F).
- Remove and install using the pilot drift VW 222 A.

SPECIFICATIONS

PISTON AND CYLINDER DIMENSIONS

	Piston Diameter	Cylinder Bore Diameter
Basic dimension mm	88.945	89.010

FASTENER TIGHTENING SPECIFICATIONS

Component	Fastener Size	Nm
Air Conditioning Compressor to Accessory Bracket Bolt	M8 x 100	23
Camshaft Adjuster to Camshaft Bolt ⁽¹⁾	-	60 + 90°
Camshaft Position Sensor to Cover Bolt	-	8
Chain Tensioner to Cylinder Block	-	50
Chain Tensioner with Tensioning Rail to Cylinder Block Bolt ⁽²⁾	-	8 + 90°
Connecting Rod Bearing Cap to Connecting Rod Bolt ⁽¹⁾	-	30 + 90°
Control Housing to Cylinder Head Bolt ⁽²⁾	-	8 + 90°
Cover to Cylinder Head Bolt ⁽⁵⁾	-	8
Crankshaft Bearing Cap to Cylinder Block Bolt	-	30 + 180°
Crankshaft Sensor Wheel to Crankshaft Screw ⁽¹⁾	-	10 + 90°
Drive Plate to Crankshaft Bolt ⁽¹⁾	-	60 + 90°
Engine Mount Bracket to Cylinder Block Bolt ⁽¹⁾	-	50 + 90°
Engine Speed Sensor to Cylinder Block Bolt	-	10

2010 Volkswagen CC VR6 Sport

ENGINE 3.6 Liter - Crankshaft, Cylinder Block - Engine Code(s): BLV & CNNA

Guide Rail to Cylinder Head Pin	-	10
Guide Rail to Cylinder Block Bolt	-	23
Guide Rail to Cylinder Block Pin	-	10
Knock Sensor to Cylinder Block Bolt ⁽⁴⁾	-	20
Oil Dipstick Guide Tube to Intake Manifold Bolt	-	6
Oil Drain Plug to Oil Pan ⁽¹⁾	-	30
Oil Filter Housing to Cylinder Block Bolt	-	23
Oil Level Thermal Sensor to Oil Pan Bolt	-	10
Oil Pan to Cylinder Block Bolt	-	11
Oil Pipe to Cylinder Block Bolt ⁽¹⁾	-	8
Oil Pump to Cylinder Block Bolt ⁽¹⁾	-	8
Sealing Flange to Cover Bolt	-	23
Sealing Flange to Cylinder Block Bolt	-	10
Sprocket to Oil Pump Bolt ⁽³⁾	-	60 + 90°
Suction Pipe to Cylinder Block Bolt ⁽¹⁾	-	8
Tensioning Rail to Cylinder Block Pivot Pin	-	10
Vibration Damper to Crankshaft Bolt ⁽¹⁾	-	100 + 180°

(1) Always replace

(2) Install the bolts using liquid locking fluid D 000 600 A2

(3) Only use bolts with a strength category of 10.9

(4) The tightening specification affects the function of the knock sensor

(5) Tighten in a diagonal sequence and in steps

Accessory Bracket Bolt Tightening Sequence and Specification

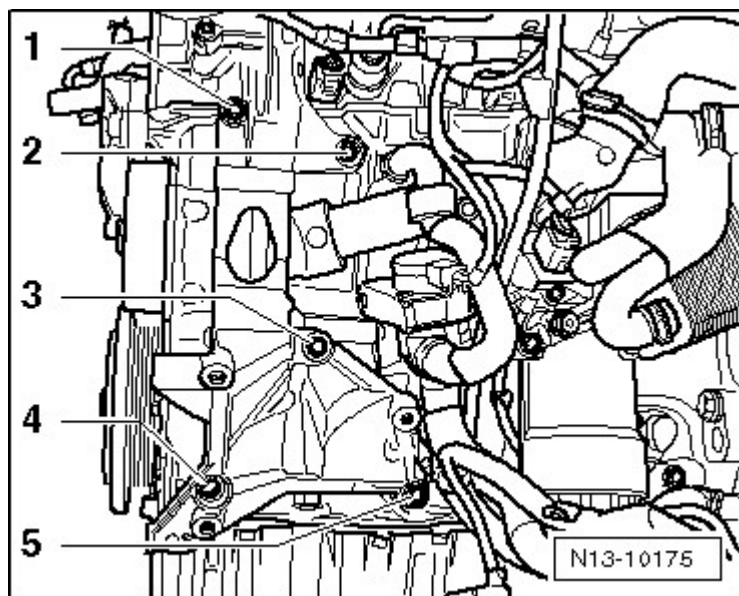


Fig. 18: Identifying Bracket On Cylinder Block, Removal/Installation
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Install and tighten the bolts -2 and 4- hand tight.
- Install and tighten the bolts -1, 3 and 5- hand tight.
- Tighten all the bolts in a diagonal sequence to 23 Nm.

DIAGNOSIS AND TESTING

PISTON, RINGS AND CYLINDER BORE, CHECKING

PISTON RING GAP, CHECKING

Special tools and workshop equipment required

- Feeler Gauge

Test Sequence

- 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.

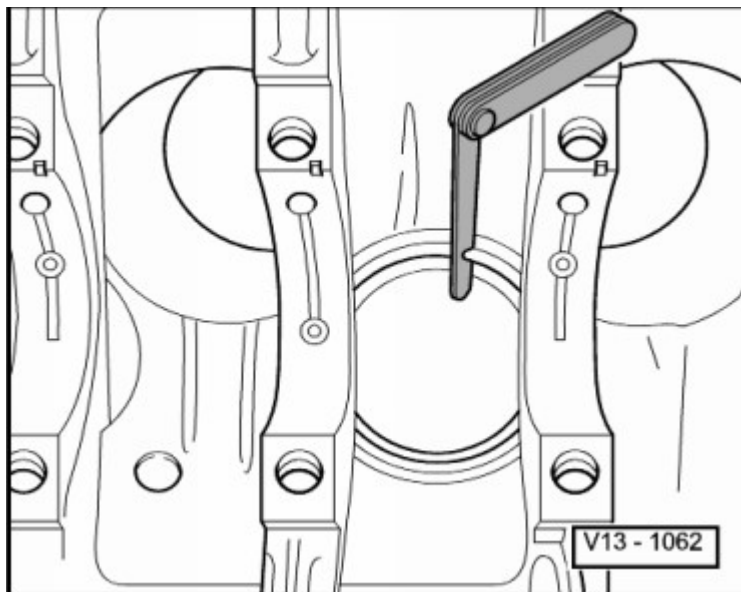


Fig. 19: Checking Piston Ring Gap

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

Piston Ring		Gap	
		New	Wear limit
Compression ring	mm	0.30 ••• 0.45	1.0
Stepped compression ring	mm	0.30 ••• 0.50	1.0
Oil scraping ring	mm	0.20 ••• 0.90	1.2

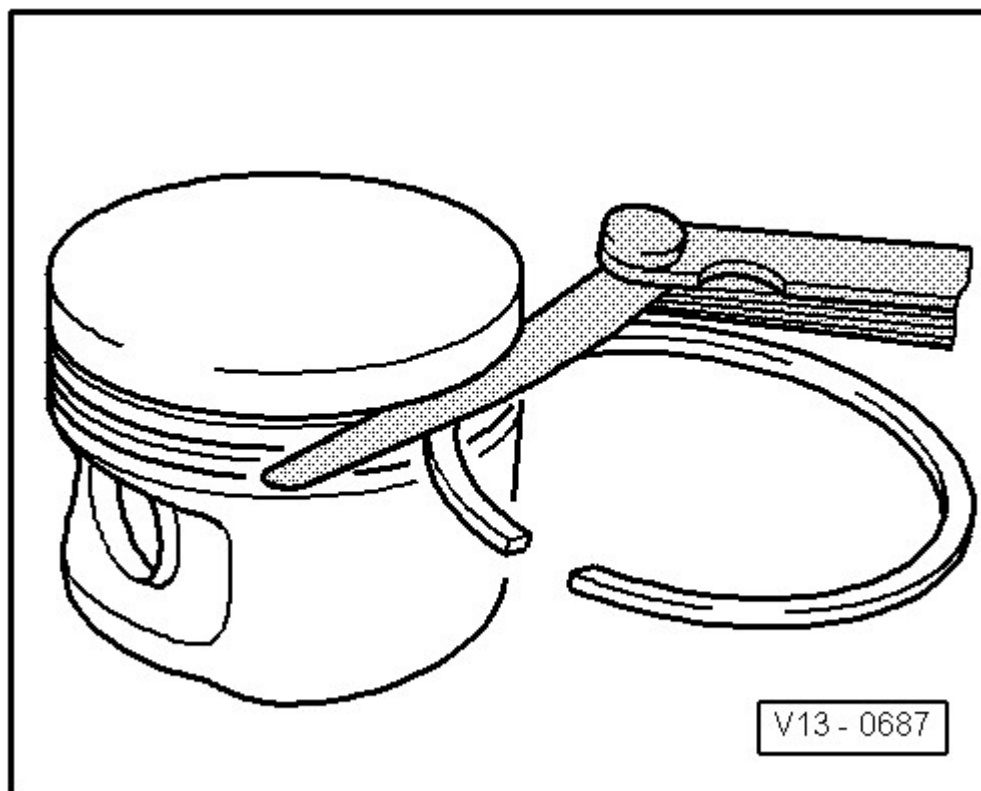
PISTON RING GROOVE CLEARANCE, CHECKING

Special tools and workshop equipment required

- Feeler Gauge

Test Sequence

Clean the ring groove before checking.

**Fig. 20: Checking Piston Ring Gap**

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

Piston Ring		Ring to Groove Clearance	
		New	Wear limit
Compression ring	mm	0.04 ••• 0.06	0.12
Stepped compression ring	mm	0.03 ••• 0.06	0.15
Oil scraping ring	mm	0.02 ••• 0.06	0.15

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

- Micrometer 75-100 mm VAS 6071

Test Sequence

-- Take the measurement approximately 15 mm from the lower edge of the piston skirt and offset 90° to the piston axis.

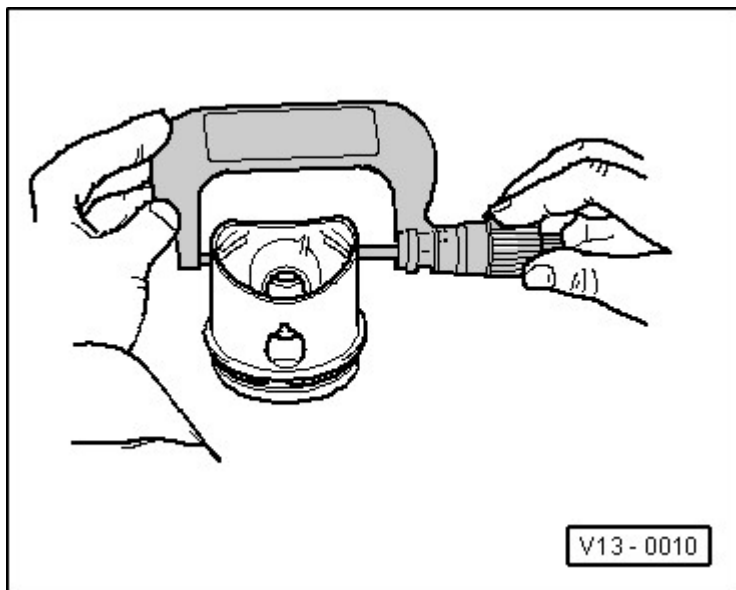


Fig. 21: Checking Piston

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

Deviation from nominal dimension: Max. 0.06 mm

CYLINDER BORE, CHECKING

Special tools and workshop equipment required

- Cylinder Gauge VAS 6078

Test Sequence

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

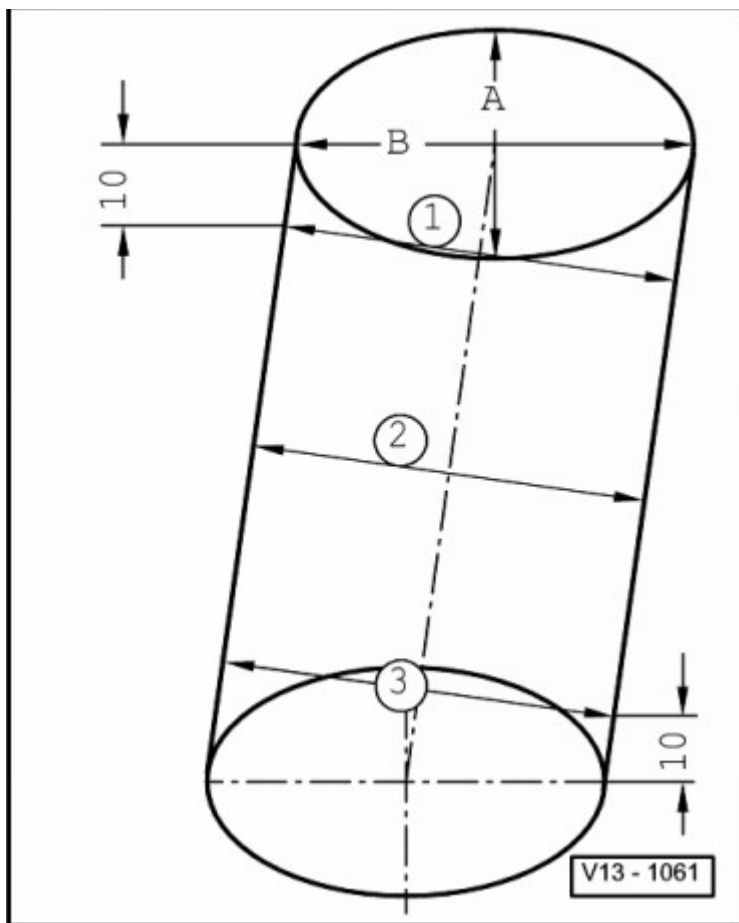


Fig. 22: Checking Cylinder Bore

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Deviations from nominal dimension: 0.08 mm.

NOTE: Measurement of the cylinder bore must not be performed when the cylinder block is installed on the engine and transmission holder VAS 6095 or the holding fixture VW 540, false measurements are possible.

REMOVAL AND INSTALLATION

Engine Code BLV

Engine Code CNNA

All

RIBBED BELT, ENGINE CODE BLV

Special tools and workshop equipment required

- Connecting Pin T10027

Removing

- Remove the engine cover.
- Remove the noise insulation. Refer to **Description and Operation** .
- Mark the running direction of the ribbed belt before removing.
- Install a box end wrench -1- onto the belt tensioner bolt and rotate in the -direction of the arrow- far enough until the connecting pin T10027 can be inserted into the tensioner.

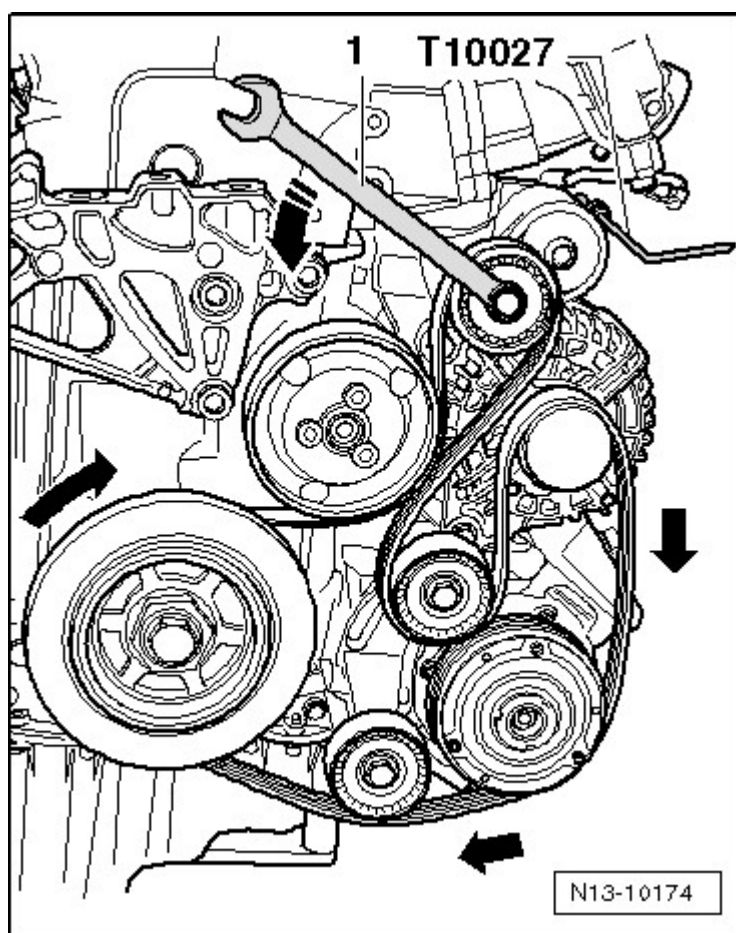


Fig. 23: Identifying Ribbed Belt Routing
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Remove the ribbed belt.

Installing

NOTE: Before installing the ribbed belt, make sure that all ancillaries (generator and Air

Conditioning (A/C) compressor) are secured tightly.

Check the idler pulleys for ease of movement

The ribbed belt must not be kinked.

Note the previously marked belt rotation direction and be sure that it is seated correctly on the pulleys.

-- Install the ribbed belt as illustrated.

-- Then, rotate the tensioner slightly in the -direction of the arrow- using a box end wrench -1-. This releases the tension on the connecting pin T10027 in the tensioner and it can be pulled out.

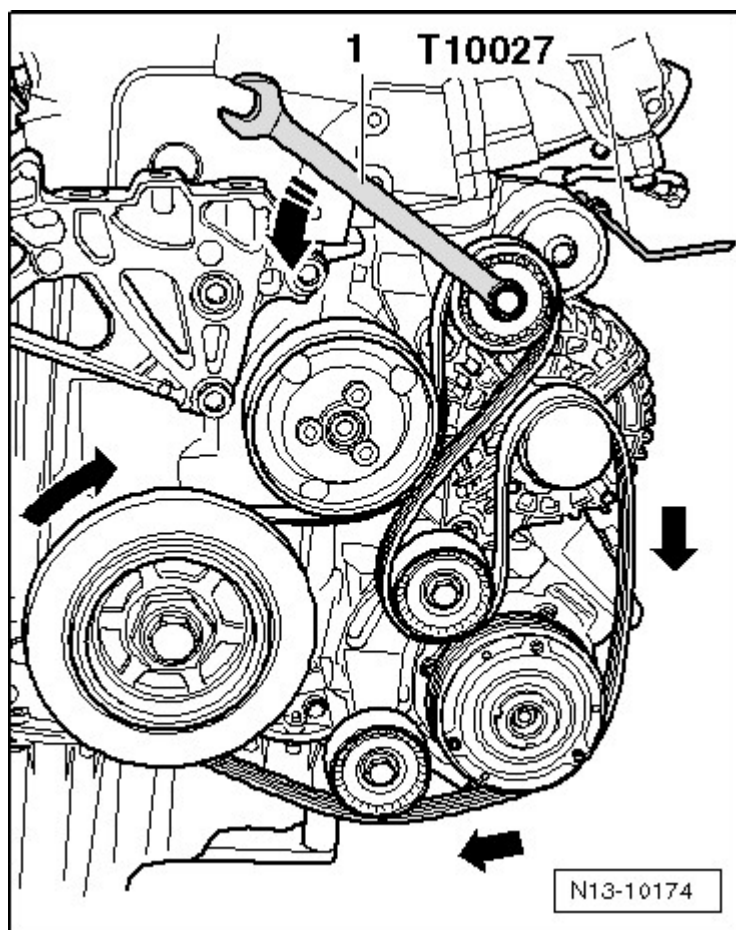


Fig. 24: Identifying Ribbed Belt Routing
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

After installing the ribbed belt, start the engine and make sure the ribbed belt is running correctly.

ACCESSORY BRACKET, ENGINE CODE BLV

Removing

- Remove the ribbed belt. Refer to **RIBBED BELT**.
- Remove the generator. Refer to **Removal and Installation** .
- Remove the Air Conditioning (A/C) compressor. Refer to **Removal and Installation** .
- Remove the accessory bracket bolts and bracket.

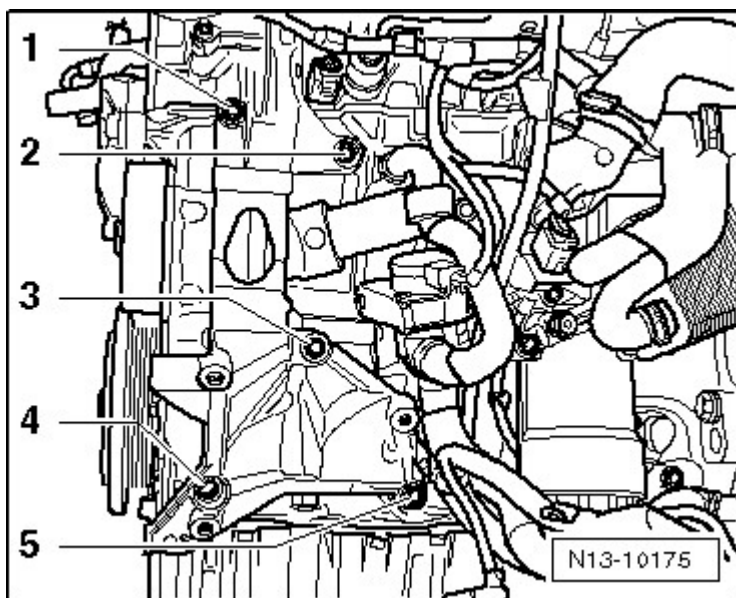
Installing

Fig. 25: Identifying Bracket On Cylinder Block, Removal/Installation
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Position the accessory bracket to the cylinder block.
- First, install the bolts -2 and 4- hand tight.
- Then, install the bolts -1, 3 and 5- hand tight.
- Now, tighten all the bolts to 23 Nm in a diagonal sequence.

Further installation is in the reverse order of removal.

VIBRATION DAMPER, ENGINE CODE BLV**Special tools and workshop equipment required**

- Counter-Holder Tool T10069

- Two Arm Puller T10040
- Puller Legs with Thrust Piece T10040/2A+/3

NOTE: The two arm puller T10040 is only necessary for tight fitting vibration dampers.

Removing

- Remove the ribbed belt. Refer to **RIBBED BELT**.
- Secure the vibration damper using the counter-holder tool T10069.
- Loosen the vibration damper bolt and unscrew it approximately 10 mm.
- Remove the vibration damper from the crankshaft hub. If the vibration damper cannot be removed, use the two arm puller T10040 and puller legs T10040/2A and T10040/3.

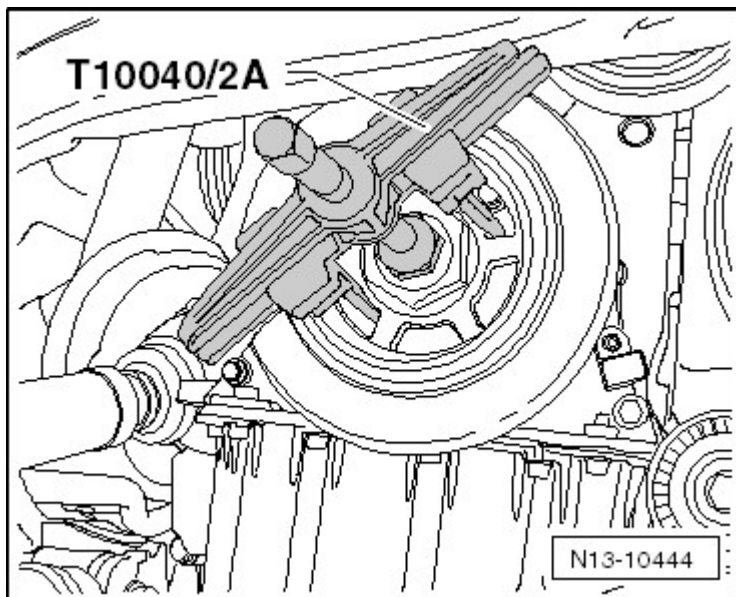


Fig. 26: Identifying Vibration Damper With Two Arm Puller, Removal/Installation
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

Installing

CAUTION: Check the rubber connection between the inner ring and the outer ring of the vibration damper for cracks and flaking. If rubber connection damage is identified, the vibration damper must be replaced.

- Clean the threads in the crankshaft using an M18 x 1.5 thread tap.
- Replace the vibration damper bolts.

-- Position the vibration damper and tighten the bolt using the torque wrench V.A.G 1601 and the counter-holder tool T10069.

Tightening specification: 100 Nm + 180° (1/2) additional turn.

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

CRANKSHAFT SEALING FLANGE, VIBRATION DAMPER SIDE, ENGINE CODE BLV

Special tools and workshop equipment required

- Counter-Holder Tool T10069
- Assembly Tool T10215
- Torque Wrench (40-200 Nm) V.A.G 1332
- Torque Wrench V.A.G 1601
- Silicone Adhesive Sealant D 176 501 A1

Removing

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

-- Remove the vibration damper. To do so, secure the vibration damper using the counter-holder tool T10069. Refer to **VIBRATION DAMPER**.

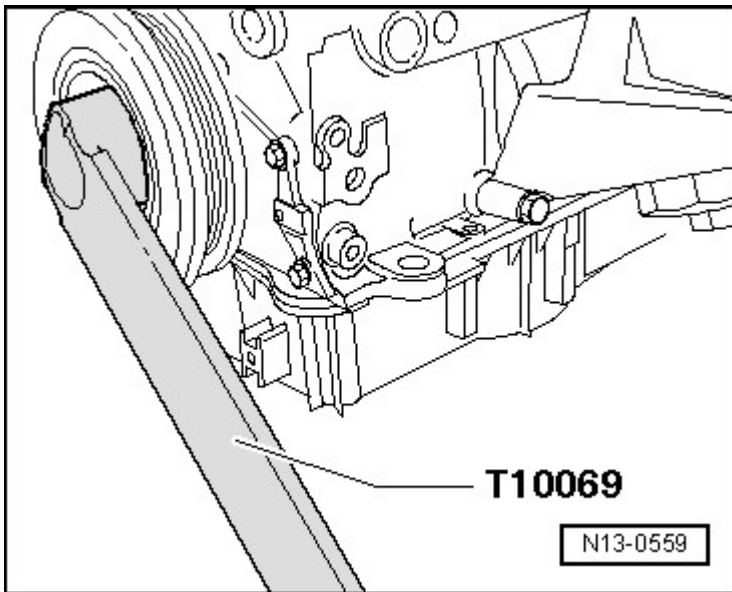


Fig. 27: Identifying Counter-Holder T10069 To Hold Vibration Damper
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

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

-- Remove the sealing flange bolts and sealing flange.

-- Remove any sealant residue on the sealing surfaces.

Installing

-- Before installing, remove any remaining oil from the crankshaft journal with a clean cloth.

-- Cut the tube nozzle at the front mark (nozzle diameter: approximately 3 mm).

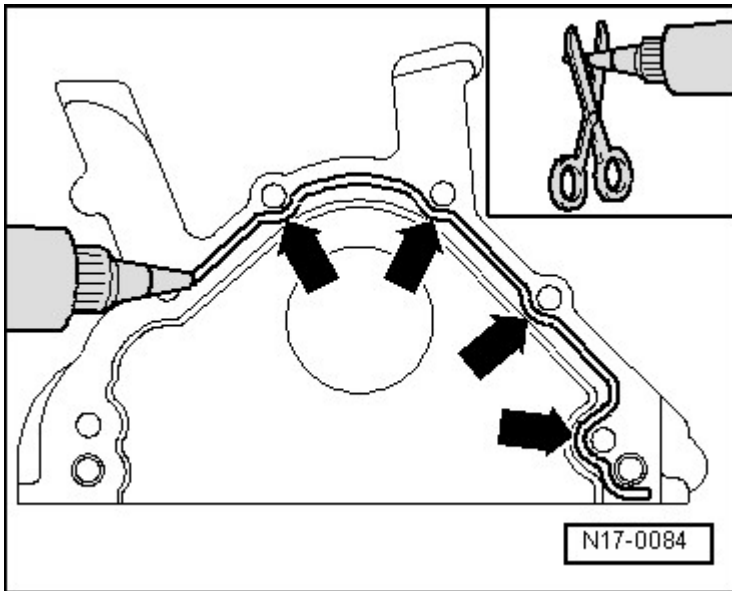


Fig. 28: Applying Silicone Sealing Compound

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Apply a bead of silicone adhesive sealant D 176 501 A1 approximately 2 to 3 mm thick, as shown -arrows- onto the clean sealing flange sealing surface.

NOTE: Cover the seal with a clean cloth before applying the sealant bead.

The sealant bead must not be thicker than 2 to 3 mm or the excess sealant could get into the oil pan and clog the suction pipe strainer.

Note the expiration date of the sealant.

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

-- Insert the guide sleeve T10215/1 -1- onto the crankshaft journal -3-.

-- Now, slide the sealing flange with seal -2- carefully over the guide sleeve.

-- Secure the sealing flange to the cylinder block. **Tightening specification: 10 Nm**

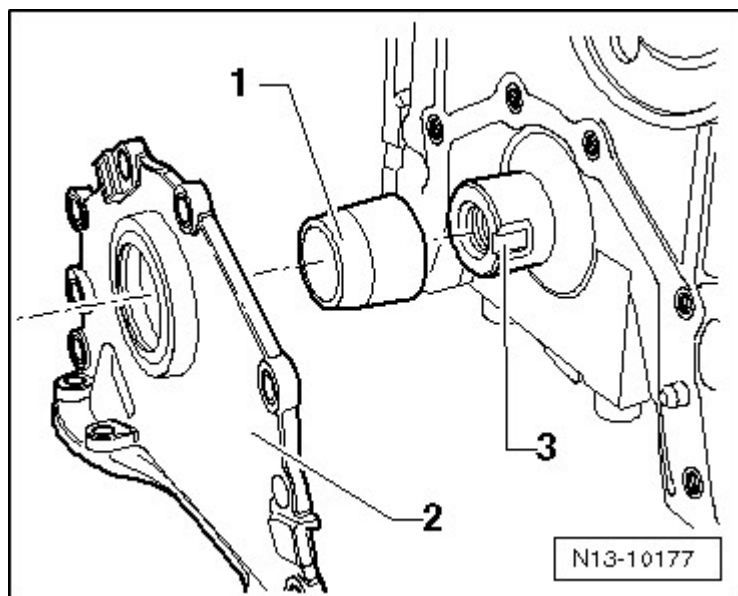


Fig. 29: Identifying Guide Sleeve T10215/1, Crankshaft Pin & Sealing Ring
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Install the oil pan. Refer to **OIL PAN** .
- Install the vibration damper. Refer to **VIBRATION DAMPER**.
- Install the ribbed belt. Refer to **RIBBED BELT**.

RIBBED BELT, ENGINE CODE CNNA

Special tools and workshop equipment required

- Connecting Pin T10027

Removing

- Remove the engine cover.
- Remove the noise insulation. Refer to **Description and Operation** .
- Identify the rotation direction for the ribbed belt before removing.
- Instal a box end wrench -1- onto the belt tensioner bolt and rotate in the -direction of the arrow- far enough until the connecting pin T10027 can be inserted into the tensioner.

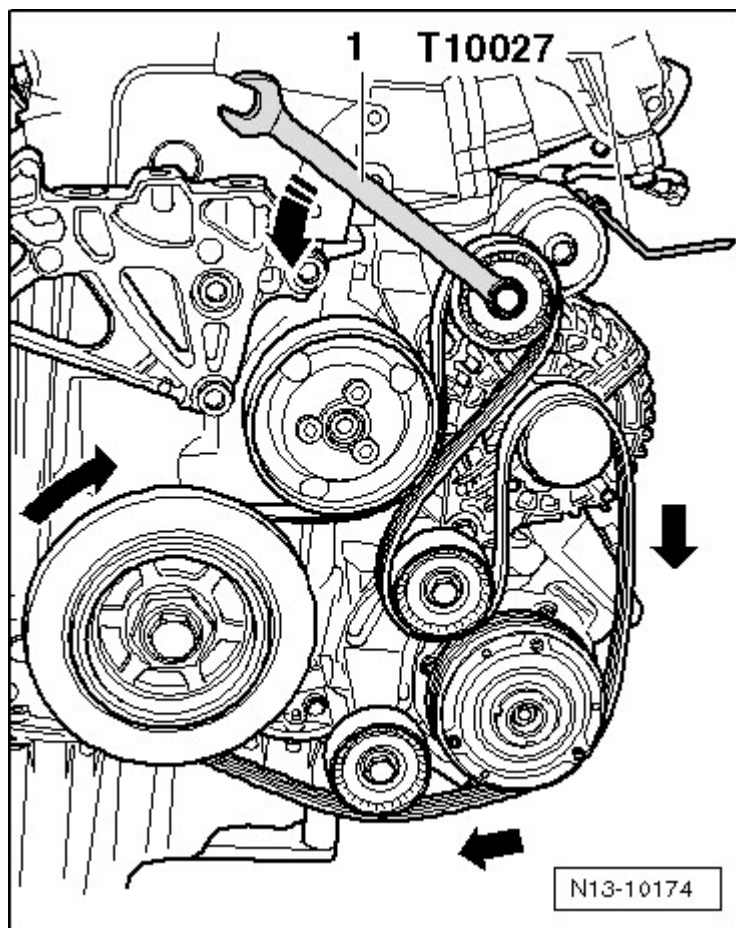


Fig. 30: Identifying Ribbed Belt Routing
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Remove the ribbed belt.

Installing

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

Check the idler pulleys for ease of movement

The ribbed belt must not be kinked.

Note the previously marked belt rotation direction and be sure that it is seated correctly on the pulleys.

-- Install the ribbed belt as illustrated.

-- Then, rotate the tensioner slightly in the -direction of the arrow- using a box end wrench -1-. This releases the tension on the connecting pin T10027 in the tensioner and it can be removed.

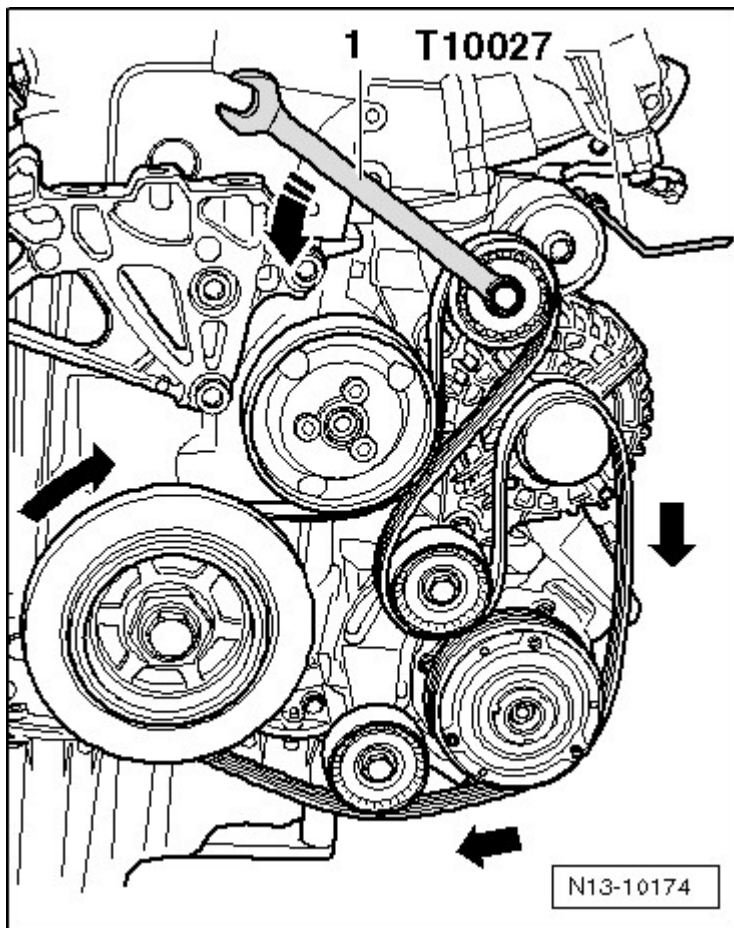


Fig. 31: Identifying Ribbed Belt Routing
 Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

After installing the ribbed belt, start the engine and make sure the ribbed belt is running correctly.

ACCESSORY BRACKET, ENGINE CODE CNNA

Removing

- Remove the ribbed belt. Refer to **RIBBED BELT**.
- Remove the generator. Refer to **Removal and Installation** .
- Remove the Air Conditioning (A/C) compressor. Refer to **REMOVAL AND INSTALLATION** .
- Remove the accessory bracket bolts and bracket.

Installing

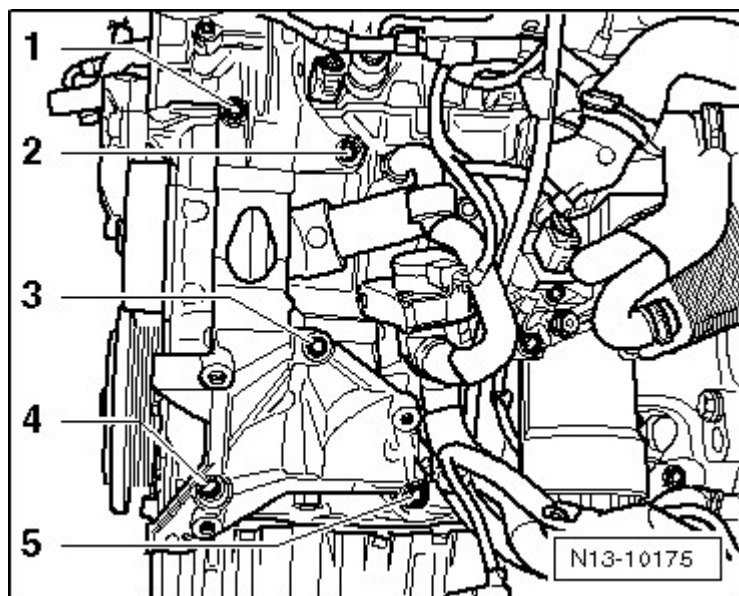


Fig. 32: Identifying Bracket On Cylinder Block, Removal/Installation
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Position the accessory bracket to the cylinder block.
- First, install the bolts -2 and 4- hand tight.
- Then, install the bolts -1, 3 and 5- hand tight.
- Now, tighten all the bolts to 23 Nm in a diagonal sequence.

Further installation is in the reverse order of removal.

VIBRATION DAMPER, ENGINE CODE CNNA

Special tools and workshop equipment required

- Counterhold Tool T10172

Removing

- Remove the ribbed belt. Refer to **RIBBED BELT**.
- Secure the vibration damper using the counterhold tool T10172.

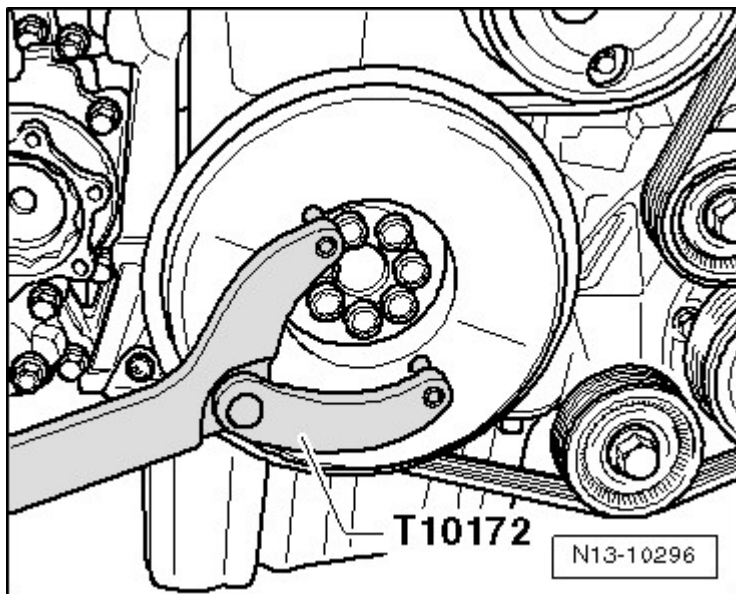


Fig. 33: Loosening and Tightening the Vibration Damper Bolts
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Loosen the bolts and remove the vibration damper from the crankshaft.

Installing

CAUTION: Check the rubber connection between the inner ring and the outer ring of the vibration damper for cracks and flaking. If rubber connection damage is identified, the vibration damper must be replaced.

-- Replace the vibration damper bolts.

-- Position the vibration damper and tighten the new bolts hand tight.

-- Secure the vibration damper using the counterhold tool T10172.

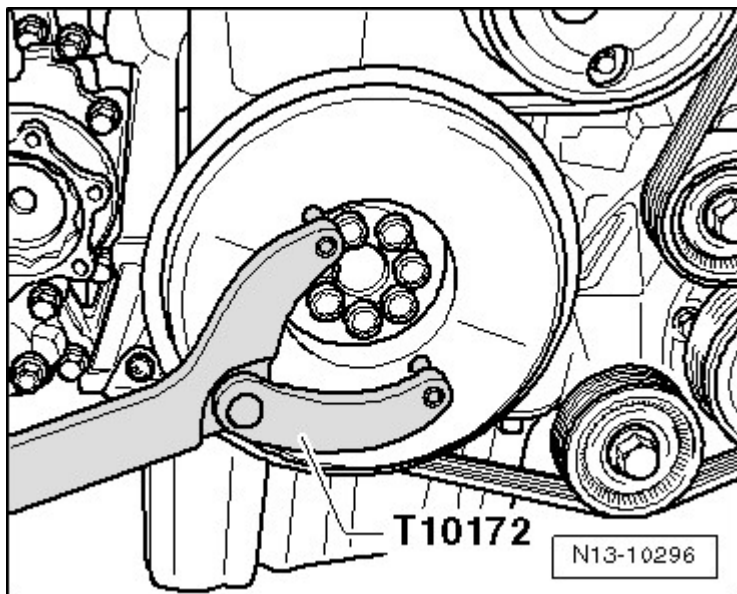


Fig. 34: Loosening and Tightening the Vibration Damper Bolts
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Tighten the bolts to 60 Nm + 180° (1/2) additional turn.

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

CRANKSHAFT SEALING FLANGE, VIBRATION DAMPER SIDE, ENGINE CODE CNNA

Special tools and workshop equipment required

- Torque Wrench (5-50 Nm) V.A.G 1331
- Torque Wrench (40-200 Nm) V.A.G 1332
- Counterhold Tool T10172
- Silicone Adhesive Sealant D 176 501 A1

Removing

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

-- Remove the vibration damper. To do so, secure the vibration damper using the counterhold tool T10172. Refer to **VIBRATION DAMPER**.

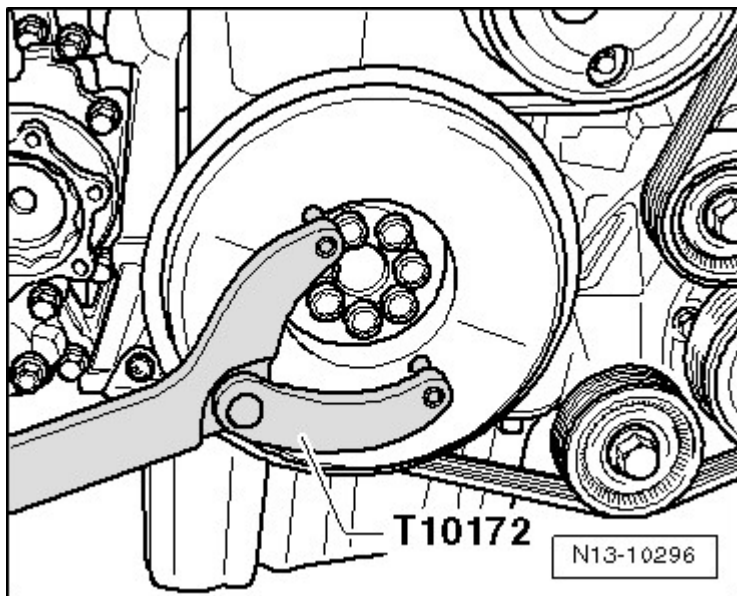


Fig. 35: Loosening and Tightening the Vibration Damper Bolts
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Remove the oil pan. Refer to **OIL PAN** .
- Remove the sealing flange bolts and flange.
- Remove any sealant residue from the sealing surfaces.

Installing

NOTE: **The supplied guide sleeve may be removed before installing.**

- Before installing, remove any remaining oil from the crankshaft journal with a clean cloth.
- Cut the sealant tube nozzle at the front mark (nozzle diameter: approximately 3 mm).

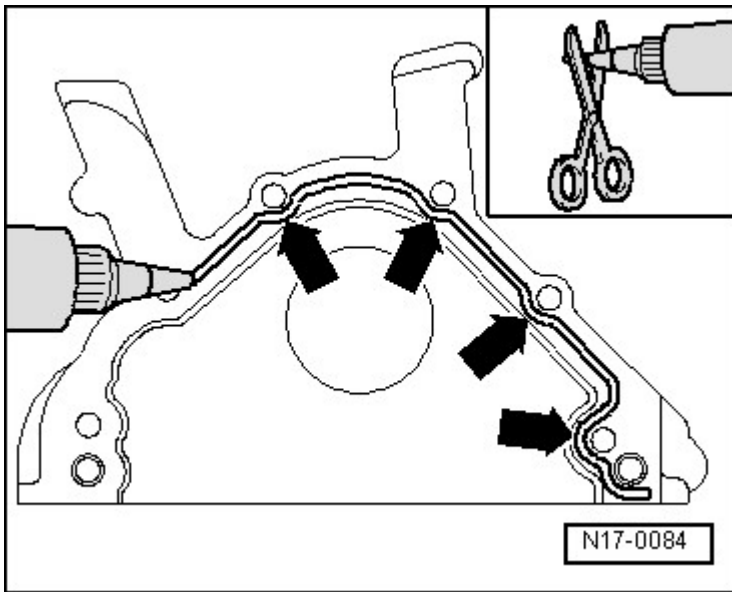


Fig. 36: Applying Silicone Sealing Compound

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Apply a bead of silicone adhesive sealant D 176 501 A1 approximately 2 to 3 mm thick as shown -arrows- onto the clean sealing flange sealing surface.

NOTE: **Cover the seal with a clean cloth before applying the sealant.**

The sealant bead must not be thicker than 2 to 3 mm or the excess sealant could get into the oil pan and clog the suction pipe strainer.

Note the expiration date of the sealant.

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

-- Install the sealing flange -1- and the seal guide sleeve -2- onto the crankshaft journal.

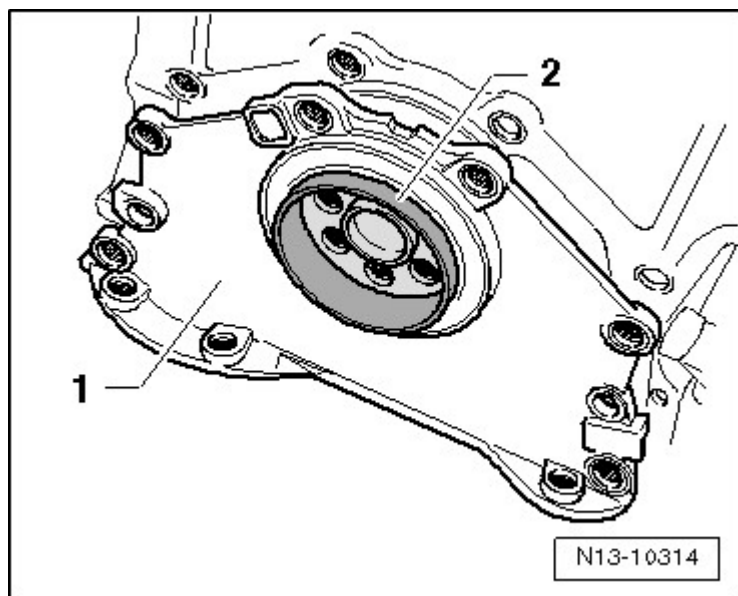


Fig. 37: Identifying Sealing Flange & Seal Guide Sleeve
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Carefully slide the sealing flange and seal over the guide sleeve.
- Secure the sealing flange to the cylinder block. Tightening specification: 10 Nm
- Install the oil pan. Refer to **OIL PAN**.

NOTE: **The vibration damper bolts must be replaced.**

- Install the vibration damper. Refer to **VIBRATION DAMPER**.
- Install the ribbed belt. Refer to **RIBBED BELT**.

CRANKSHAFT SEAL, TRANSMISSION SIDE

Special tools and workshop equipment required

- Assembly Tool T10122
- Pulling Hook T20143

Removing

- Place the pulling hook T20143/2 behind the sealing lip on the seal as illustrated.

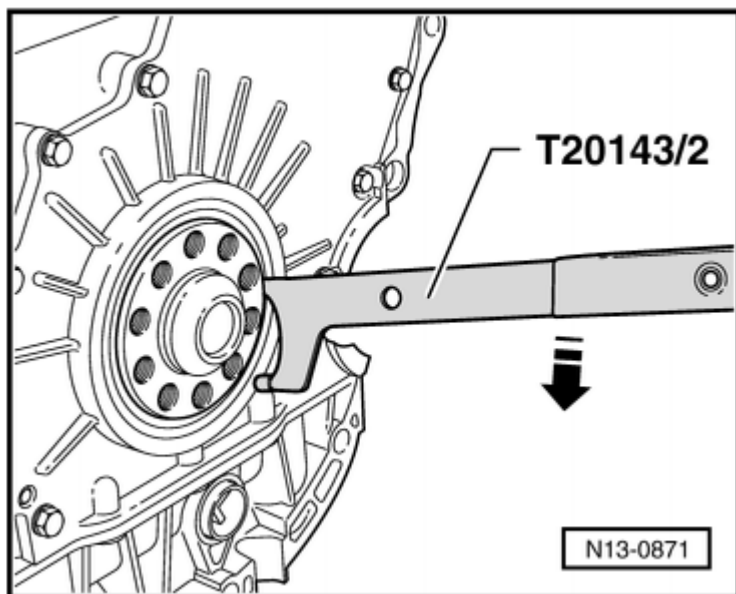


Fig. 38: Identifying Removal Hook T20143/2 Placed Behind Sealing Lip Of Oil Seal
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Support the pulling hook T20143/2 on the sealing flange and pry out the seal in the -direction of the arrow-.

Installing

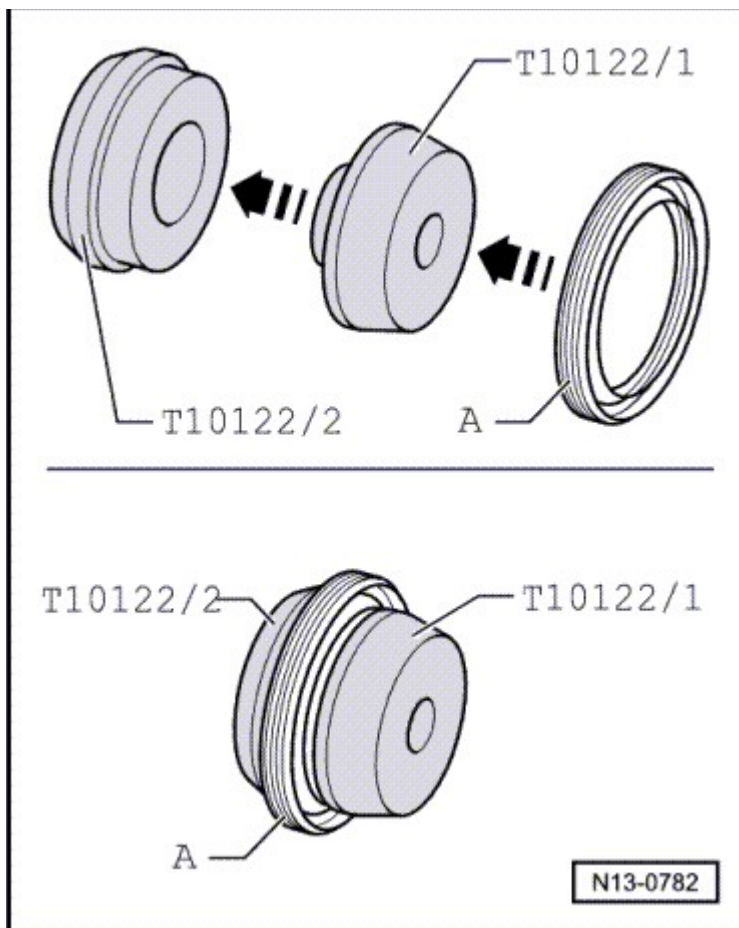


Fig. 39: Identifying Seal, Sleeve T10122/1 And Assembly Tool T10122/2
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Pull the seal -A- over the sleeve T10122/1 onto the sleeve T10122/2.
- Separate both sleeves.
- Then, place the sleeve T10122/2 with a dry seal, onto the crankshaft journal.
- Now, drive the seal into the sealing flange until seated using the assembly tool T10122/3.

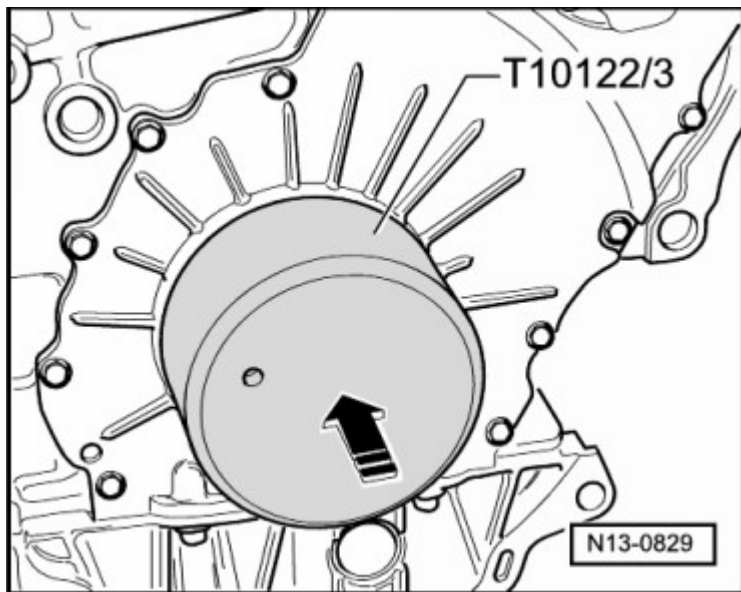


Fig. 40: Driving Seal Into Sealing Flange Until Stop Using Thrust Piece T10122/3
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

SEALING FLANGE, TRANSMISSION SIDE

Special tools and workshop equipment required

- Hand Drill with Plastic Brush Attachment
- Protective Eyewear
- Silicone Adhesive Sealant D 176 501 A1

Removing

- Remove the drive plate. Refer to **DRIVE PLATE**.
- Remove the oil pan. Refer to **OIL PAN** .
- Remove the sealing flange bolts -1 and 2-.

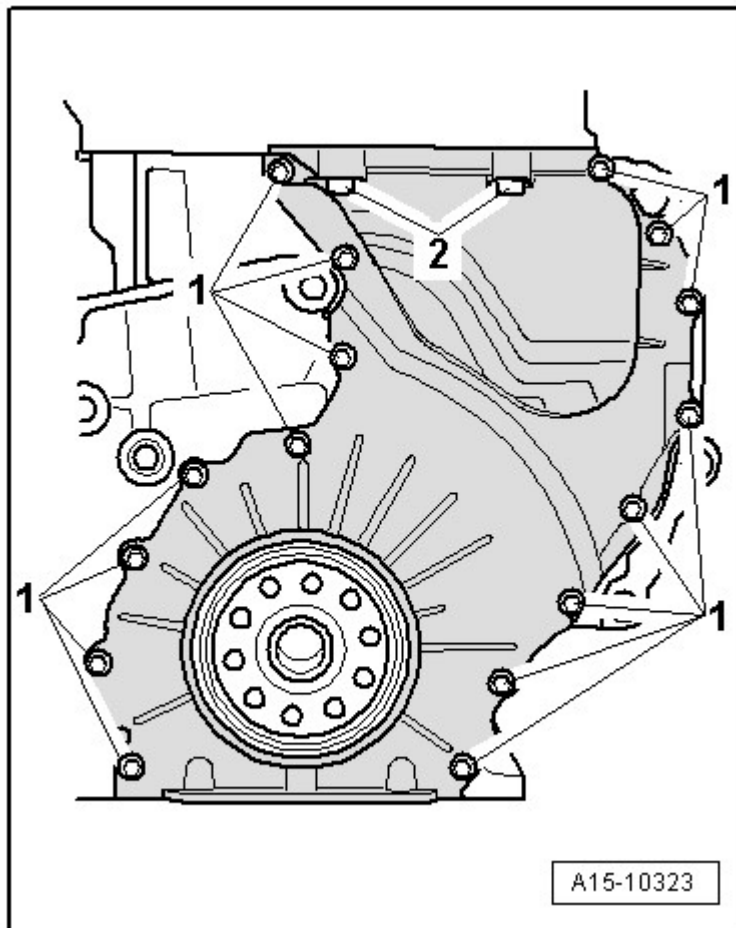


Fig. 41: Identifying Sealing Flange Bolts

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

CAUTION: The cylinder head gasket could be damaged. The cylinder head gasket can kink if it is bent too much. A kinked cylinder head gasket must be replaced.

-- Remove the sealing flange bolts and flange from the cylinder block horizontally.

-- Press the seal out of the sealing flange.

Installing

- For the correct tightening specifications, refer to **COVER AND SEALING FLANGE OVERVIEW**.

CAUTION: Risk of contaminating the lubrication system with sealant residue. Carefully cover the exposed parts of the engine in order to prevent any sealant residue from falling in.

-- Using a rotating plastic brush, remove any remaining sealant from the sealing flange and cylinder block

sealing surfaces. Wear protective eyewear.

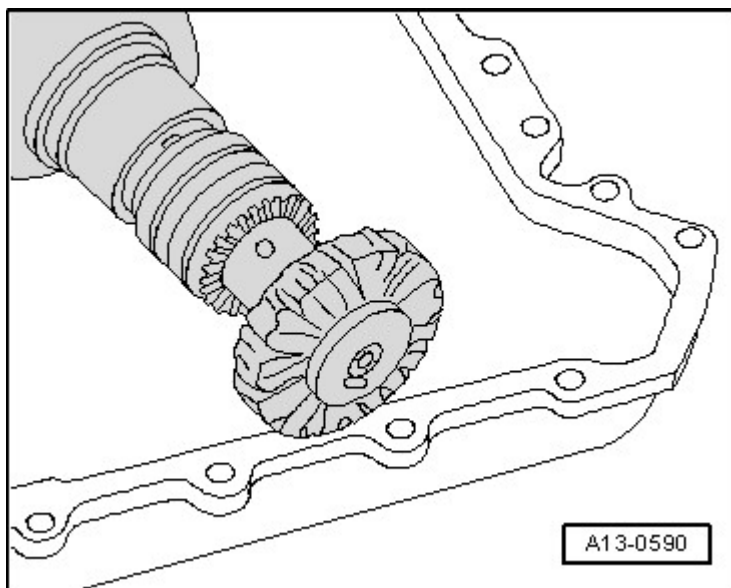


Fig. 42: Identifying Rotating Plastic Brush To Remove Sealant Residue From Sealing Flange, Cylinder Block And Upper Part Of Oil Pan

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Clean the sealing surfaces, they must be free of oil and grease.
- Clean the holes -arrow- in the cylinder head gasket of old sealant.

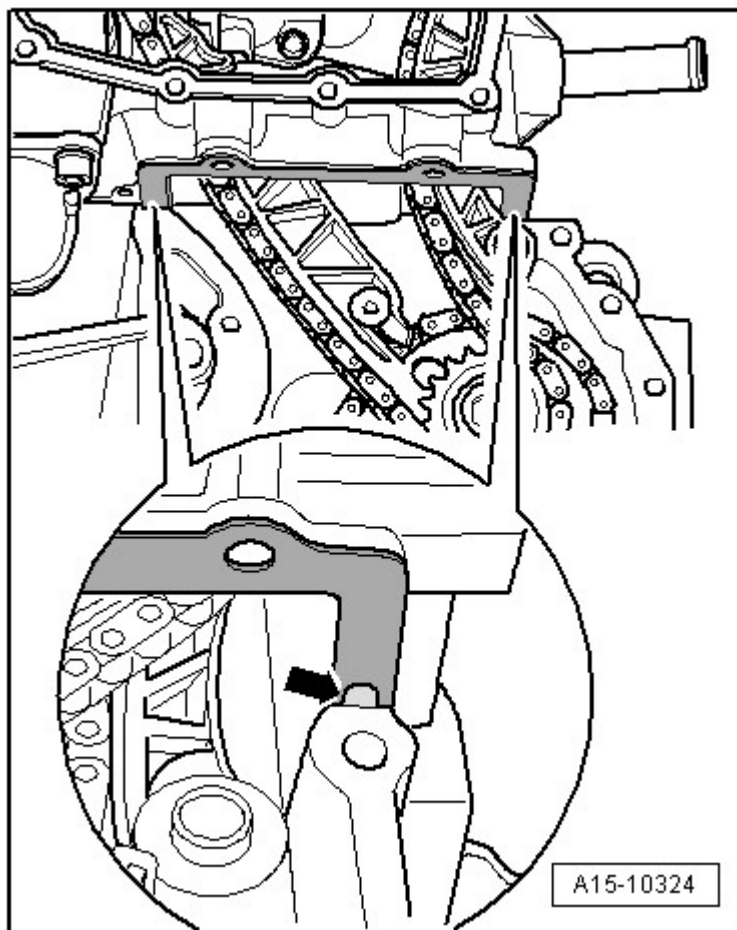


Fig. 43: Cleaning Holes -Arrow- In Cylinder Head Gasket Of Old Sealant
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

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

CAUTION: The cylinder head gasket could be damaged. The cylinder head gasket can kink if it is bent too much. A kinked cylinder head gasket must be replaced.

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

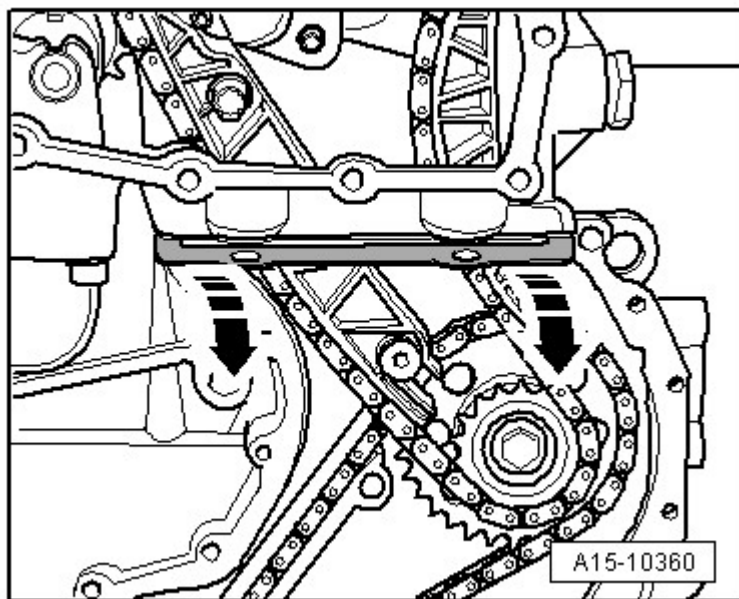


Fig. 44: Bending End Of Cylinder Head Gasket Down Slightly
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Clean the top and bottom of the cylinder head gasket, it must be free of oil and grease.
- Cut the sealant tube nozzle at the front mark (nozzle diameter: approximately 2 mm).

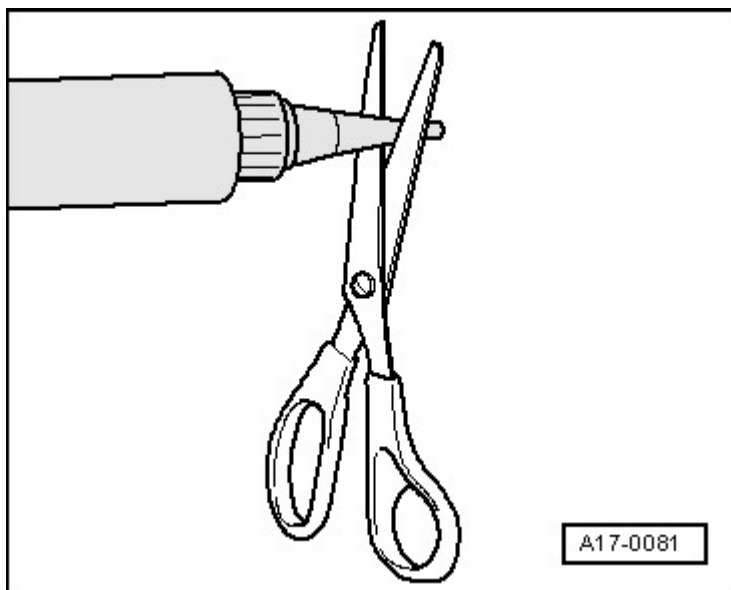


Fig. 45: Cutting Tube Nozzle At Front Marking (Nozzle Diameter Approx. 2 mm)
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Lightly coat the top and bottom of the cylinder head gasket with lubricant by bending the gasket down slightly again -arrows-.

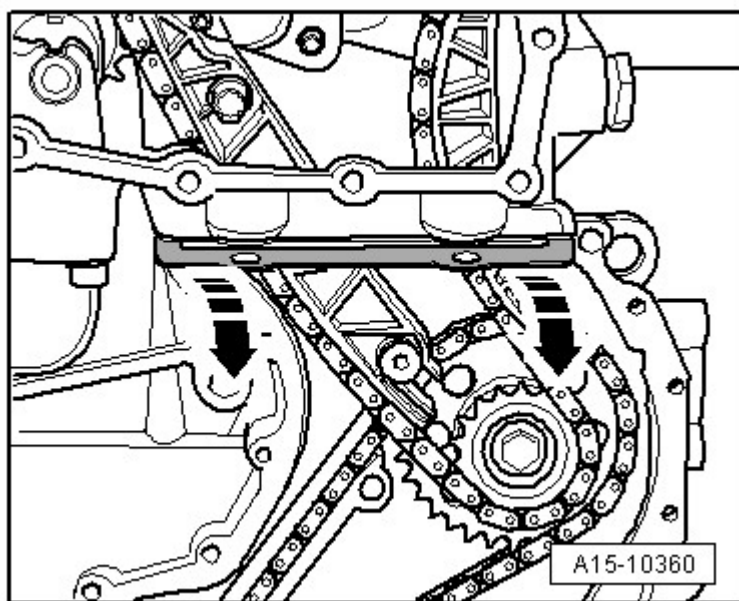


Fig. 46: Bending End Of Cylinder Head Gasket Down Slightly
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- To coat the surface between the cylinder head and gasket, use a flat object, for example, a feeler gauge.

-- Place a thin sealant bead -arrows- from below, in both corners between the cylinder head gasket and cylinder block so that the cylinder head gasket holes are filled.

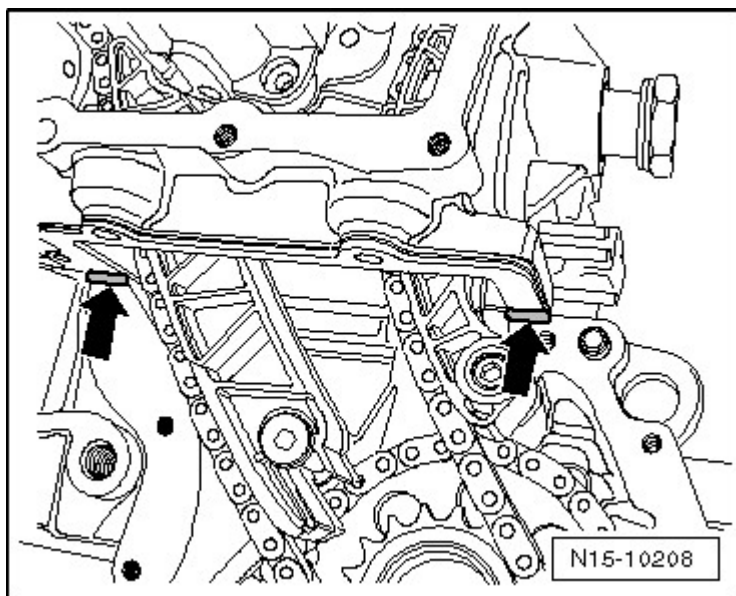


Fig. 47: Identifying Sealant Locations For Corners Of Cylinder Block/Cylinder Head
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Make sure the sealing flange alignment sleeves are installed in the cylinder block.

-- Apply silicone adhesive sealant D 176 501 A1 onto the sealing flange as shown.

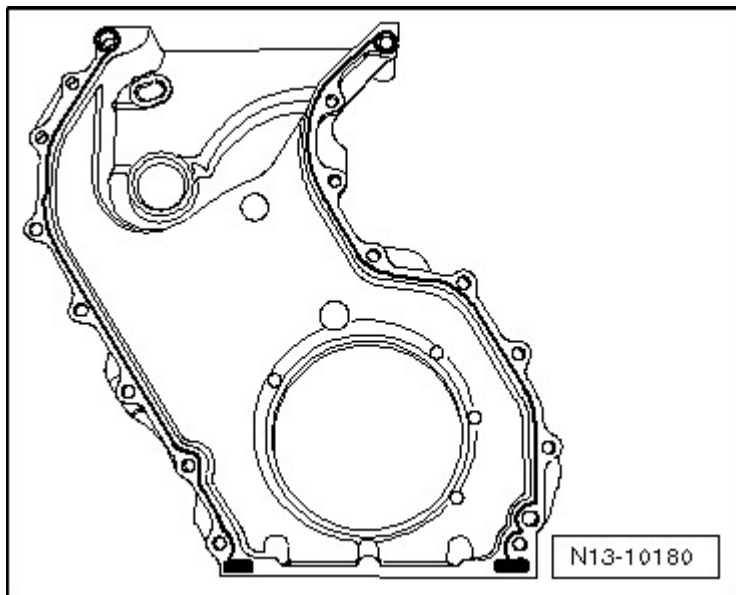


Fig. 48: Applying Sealant On Clean Sealing Surfaces Of Sealing Flange
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

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

-- Tighten the sealing flange bolts in 3 stages as follows:

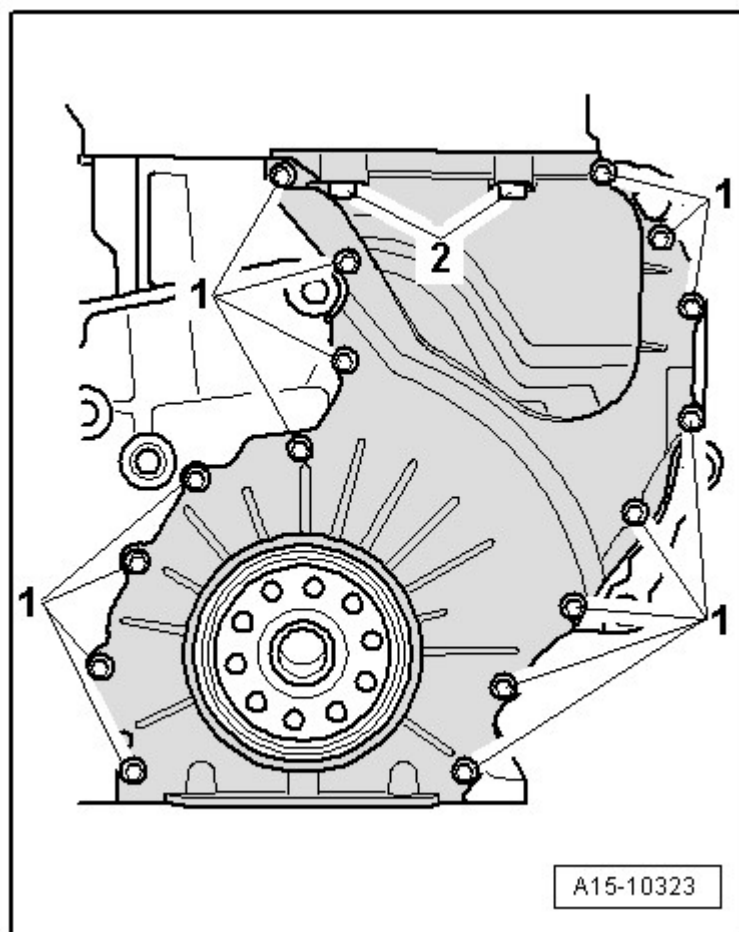


Fig. 49: Identifying Sealing Flange Bolts

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

A - Tighten the bolts -1- to **5 Nm** .

B - Tighten the bolts -2- to **23 Nm** .

C - Tighten the bolts -1- to **10 Nm** .

Further installation is in the reverse order of removal paying attention to the following:

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

-- Install the oil pan. Refer to **OIL PAN** .

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

DRIVE PLATE

Special tools and workshop equipment required

- Counter-Holder Tool T10069
- Torque Wrench (40-200 Nm) V.A.G 1332

Removing

-- Remove the transmission. Refer to **TRANSMISSION [FOR TRANSMISSION(S): 09M]** or refer to **TRANSMISSION [FOR TRANSMISSION(S): 09MA]** .

-- Remove the drive plate. To do so, secure the vibration damper using the counter-holder tool T10069 or the counterhold tool T10172. Refer to one of the following:

Engine code BLV (counter-holder tool T10069), refer to **VIBRATION DAMPER**.

Engine code CNNA (counterhold tool T10172), refer to **VIBRATION DAMPER**.

-- Loosen the drive plate bolts in a diagonal sequence and remove them.

-- Remove the drive plate.

Installing

-- Install the drive plate onto the crankshaft.

-- Install at least 3 old bolts and tighten them to **30 Nm** .

-- Measure dimension -a- via 3 holes for the torque converter via an assisting ruler and a depth measurement tool and calculate the mean value.

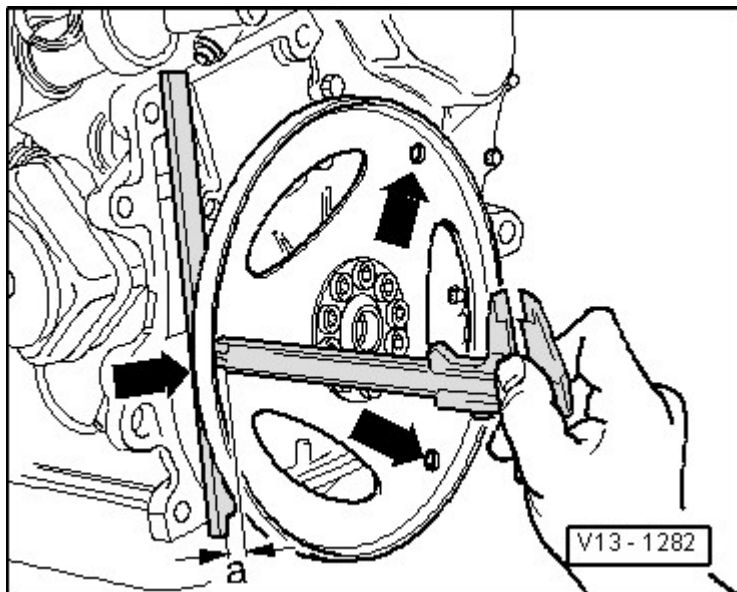


Fig. 50: Checking Dimension Through 3 Holes For Securing Torque Converter Using A Straight Edge And Depth Gauge And Calculate Average

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Compare the average (measured distance + thickness of straight edge) with the specification. Specified value: 15.7 to 17.3 mm

If the specified value is not reached:

-- Remove the drive plate and install an appropriate shim -1-.

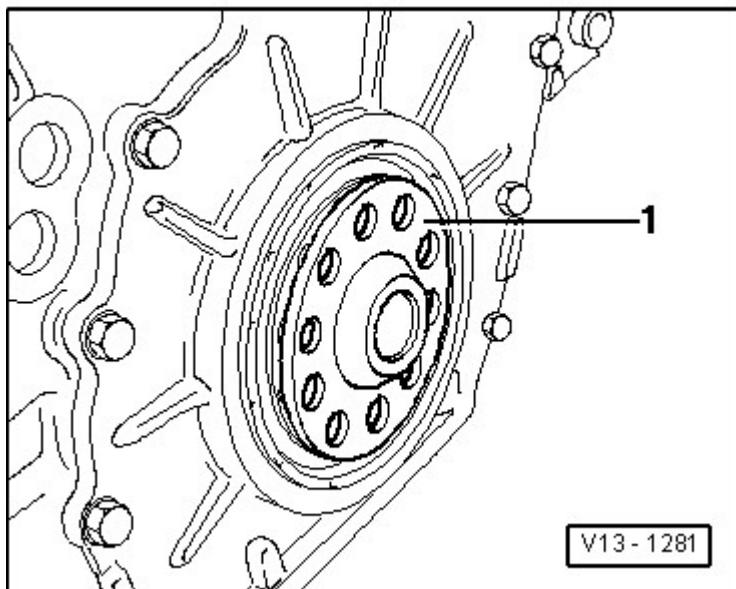


Fig. 51: Identifying Appropriate Shim

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

NOTE: Only one shim of the appropriate thickness may be used.

If the specified value is obtained:

-- Install new bolts and tighten by hand.

-- Then, tighten the bolts to **60 Nm + 90° (1/4) additional turn** .

-- Install the transmission. Refer to **TRANSMISSION [FOR TRANSMISSION(S): 09M]** or refer to **TRANSMISSION [FOR TRANSMISSION(S): 09MA]** .

CRANKSHAFT SENSOR WHEEL, INSTALLING

Special tools and workshop equipment required

- Torque Wrench (5-50 Nm) V.A.G 1331
- Locking fluid D 154 100 A1

Procedure

Make sure the crankshaft to sensor wheel contact surface is free of oil and grease.

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

Installation of the sensor wheel is only possible in one position, the bore holes are shifted.

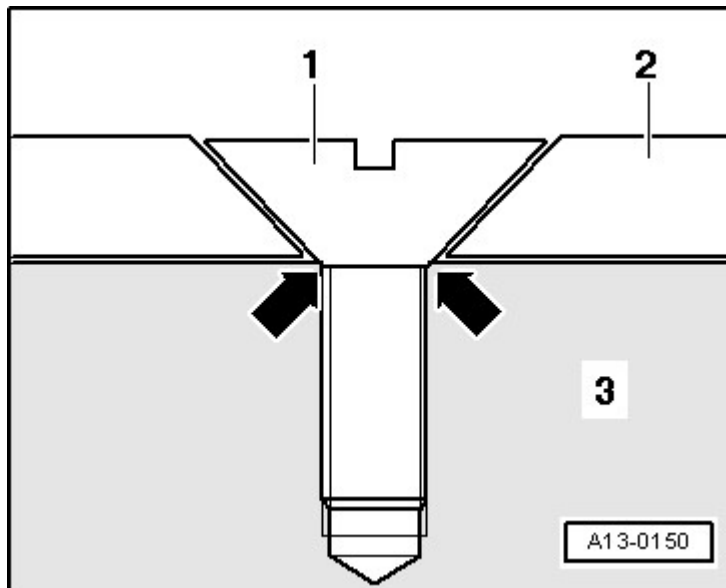


Fig. 52: Identifying Attachment Points, Countersunk Screws, Crankshaft & Sensor Wheel

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Apply a thin coat of liquid locking fluid D 154 100 A1 to the contact surfaces of the crankshaft and sensor wheel for additional security.

-- When installing, make sure that mark >>VR6<< -arrow- aligns with the individual threaded hole on the crankshaft.

-- Tighten the new screws lightly by hand.

-- Then, tighten the new screw -1- to **10 Nm + 90° (1/4) additional turn** .

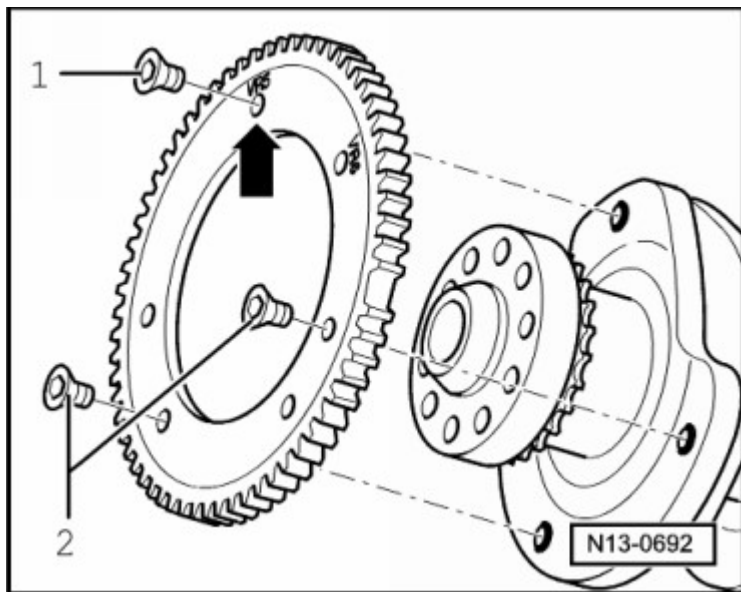


Fig. 53: Identifying VR6 And Bolts

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Then, tighten the new screws -2- to **10 Nm + 90° (1/4) additional turn** .

PISTON

Special tools and workshop equipment required

- Funnel for Piston Installation T10333

Removing

-- Remove the cylinder head. Refer to **CYLINDER HEAD** .

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

-- Remove the connecting rod bearing cap bolts and cap and push the piston upward and out.

Installing

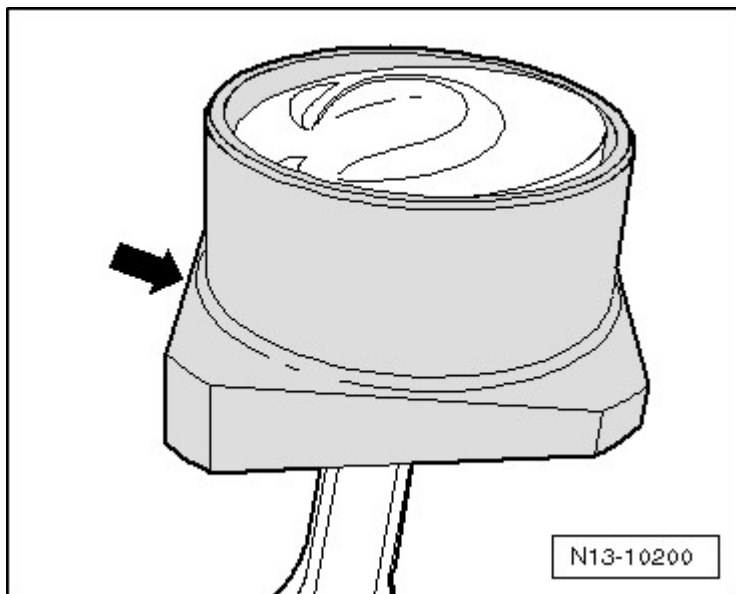


Fig. 54: Identifying Piston Installation Tool

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

NOTE: The funnel for piston installation T10333 with a piston inserted, is placed on the cylinder block so that the high, straight side -arrow- of the tool faces toward the center of the cylinder block.

-- Before installing the pistons, remove the alignment sleeves -arrow- from the bores.

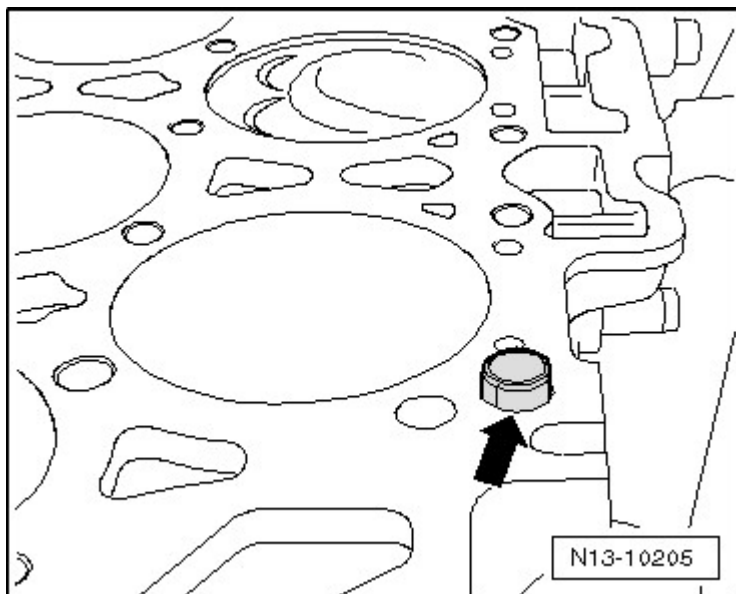
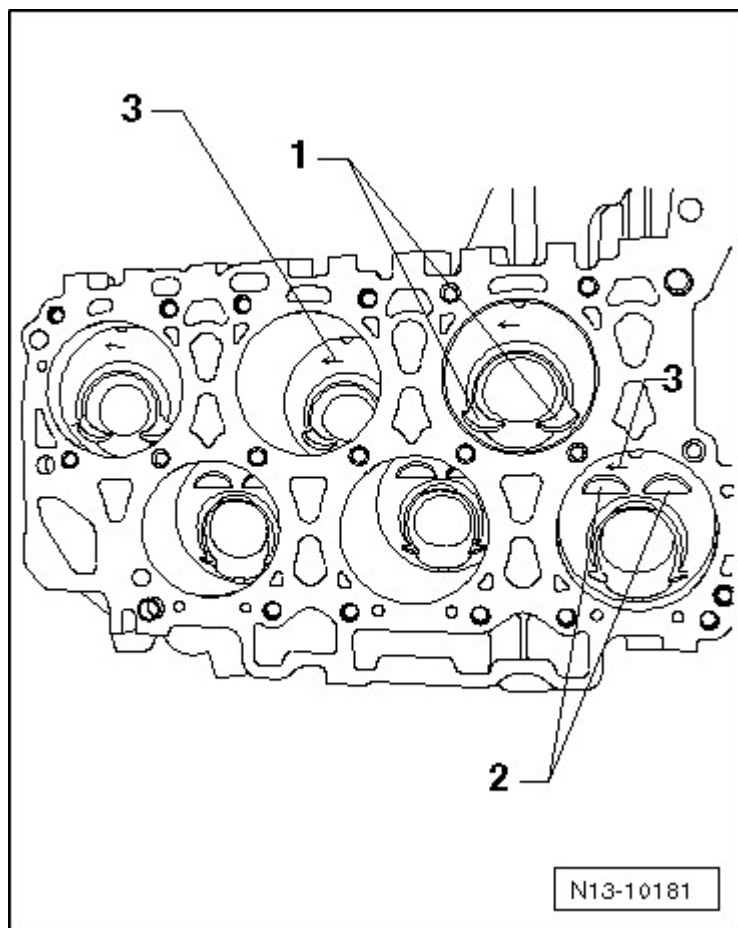


Fig. 55: Identifying Alignment Bushing

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Pistons for cylinders 1, 3 and 5 must be installed so that the deep valve recesses -1- point toward the center of the cylinder block and the arrows -3- point toward the vibration damper.

**Fig. 56: Identifying Pistons Cylinders Positions**

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Pistons for cylinders 2, 4 and 6 must be installed so that the deep valve recesses -2- point toward the center of the cylinder block and the arrows -3- point toward the vibration damper.

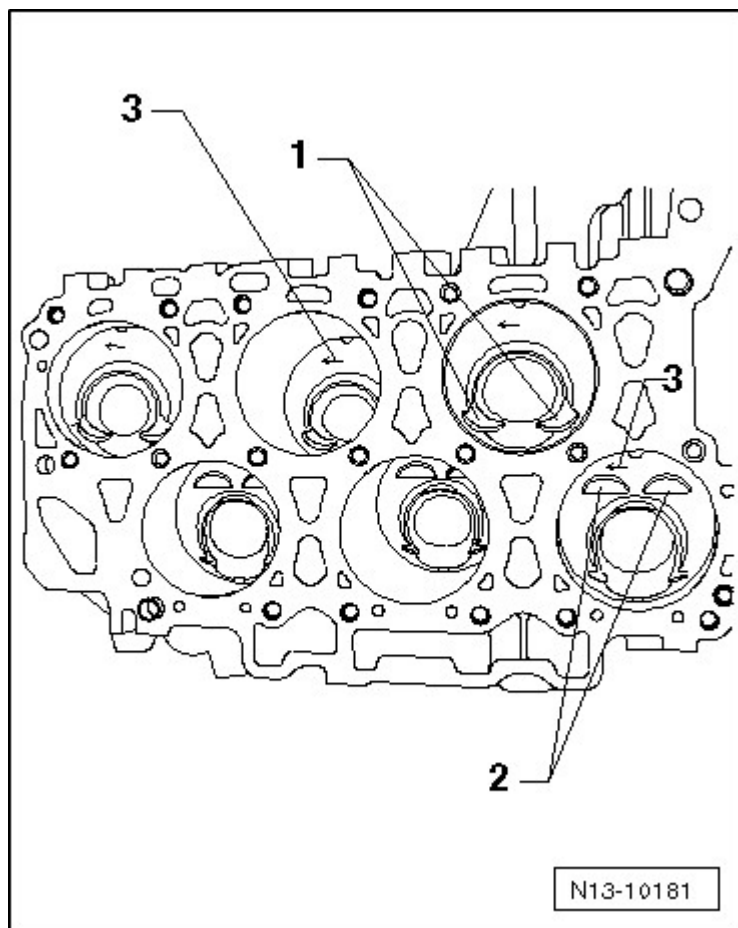


Fig. 57: Identifying Pistons Cylinders Positions

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Slide the piston into the funnel for piston installation T10333 from the top. The side of the piston -arrow- must extend approximately 15 mm past the lower edge of the installation tool.

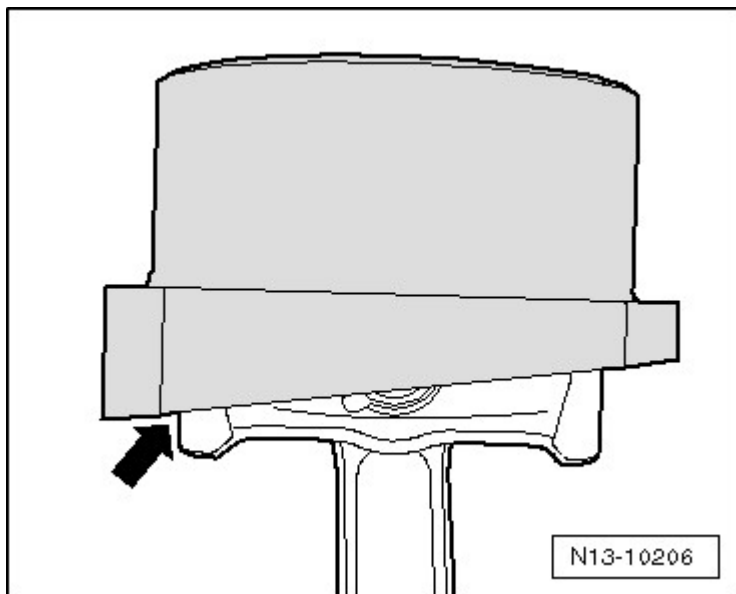


Fig. 58: Sliding Correct Piston For Each Cylinder From Above Into Piston Installation Tool
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Now, place the piston with tool into the appropriate cylinder bore. The high side of the piston installation tool -arrow- must face toward the center of the cylinder block.

-- Place the tool securely onto the cylinder block and slide the piston completely into the cylinder bore.

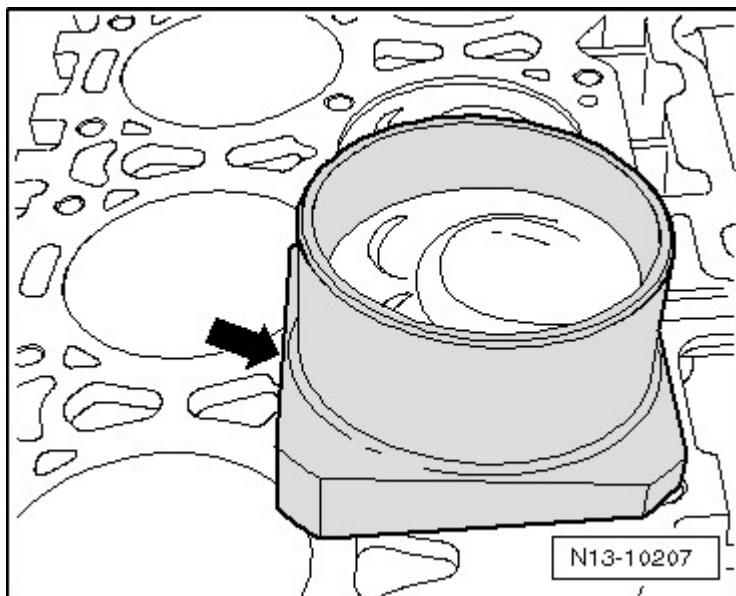


Fig. 59: Placing Funnel Securely On Cylinder Block And Slide Piston Completely Into Cylinder Bore
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- After the pistons have been installed, reinstall the alignment sleeves -arrow- back into their bores.

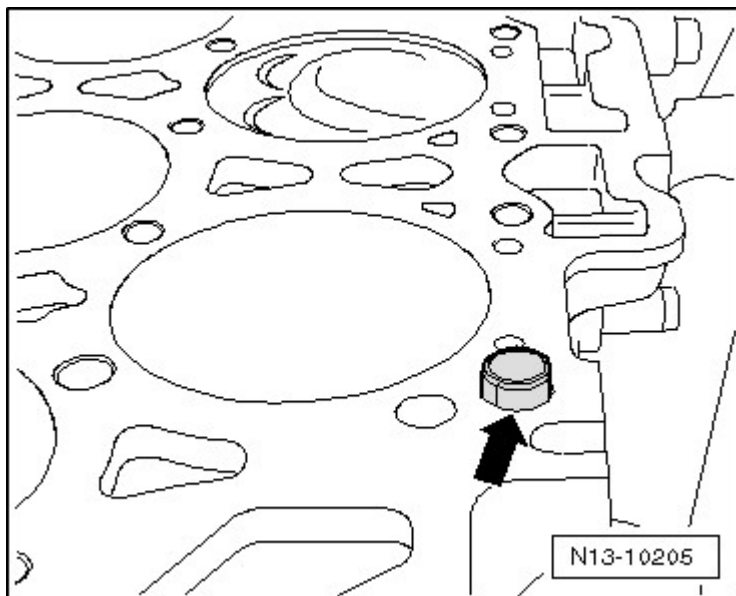


Fig. 60: Identifying Alignment Bushing

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

-- Further installation is in the reverse order of removal.

SPECIAL TOOLS - ENGINE CODE(S): BLV

Special tools and workshop equipment required

- Micrometer 75-100 mm VAS 6071
- Cylinder Gauge VAS 6078
- Puller Legs with Thrust Piece T10040/2A+/3
- Connecting Pin T10027

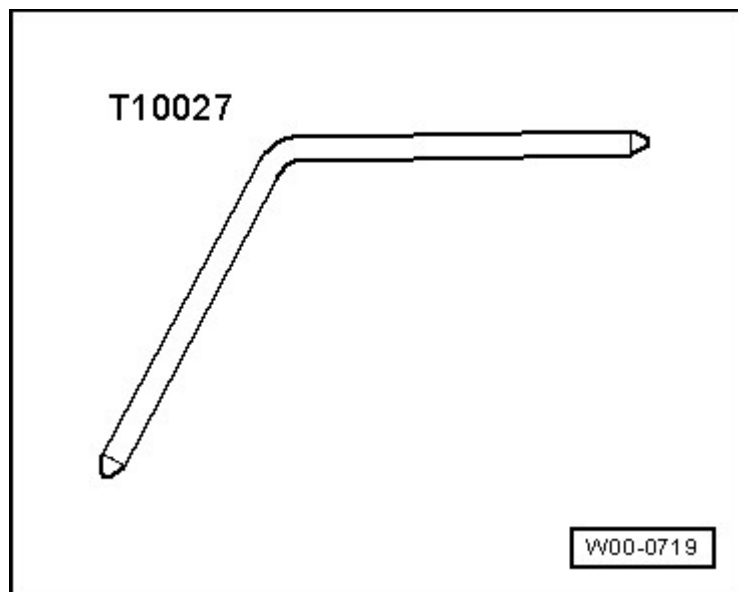


Fig. 61: Identifying Connecting Pin T10027

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Two Arm Puller T10040

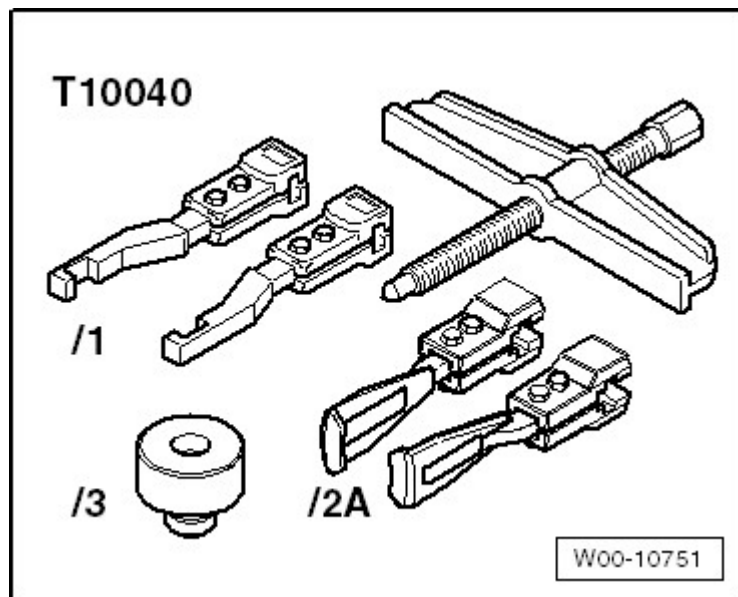


Fig. 62: Identifying Two Arm Puller

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Assembly Tool T10122

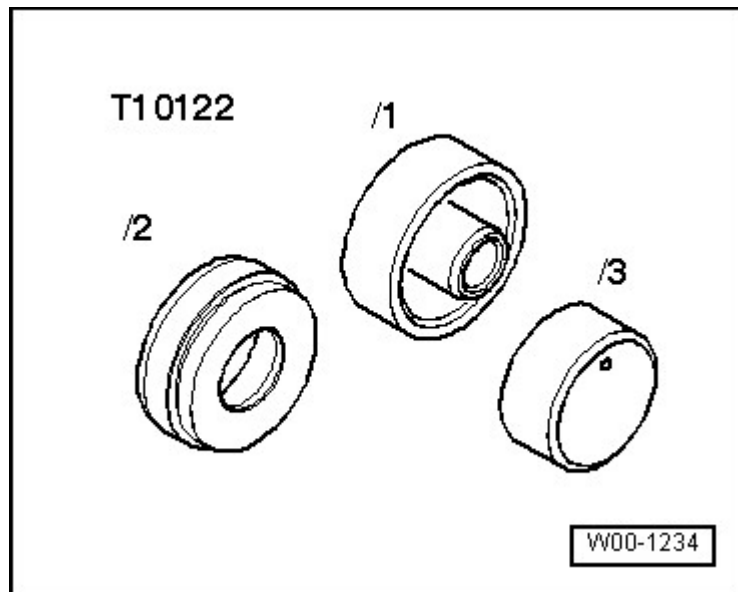


Fig. 63: Identifying Installation Tool T10122

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Pulling Hook T20143

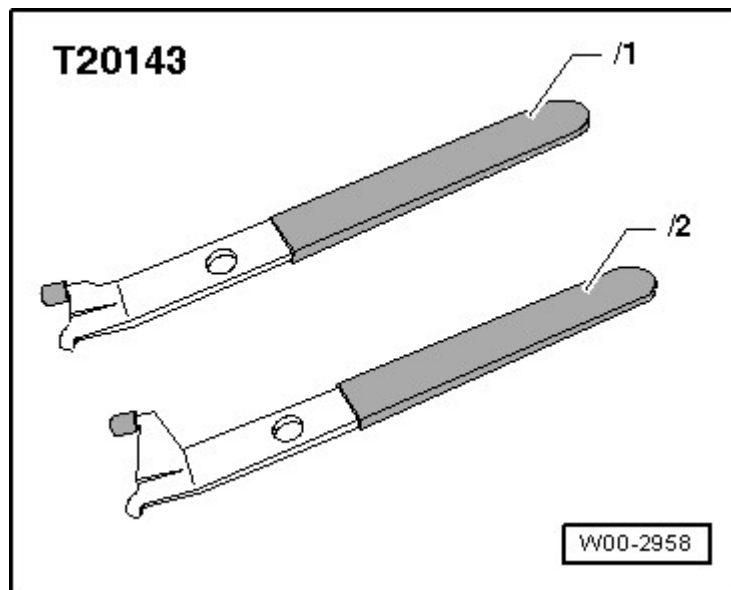


Fig. 64: Identifying Extractor Hook T20143

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Torque Wrench (5-50 Nm) V.A.G 1331

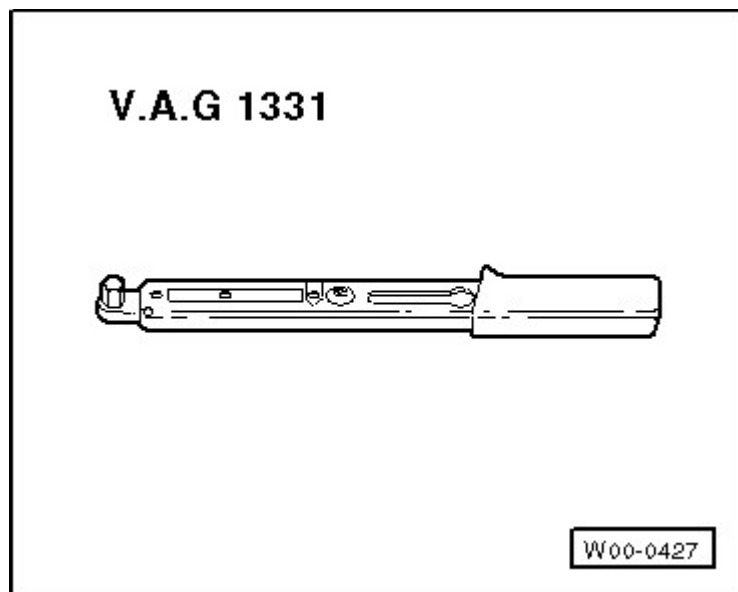


Fig. 65: Identifying Torque Wrench (5 To 50 Nm) V.A.G 1331
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Funnel for Piston Installation T10333

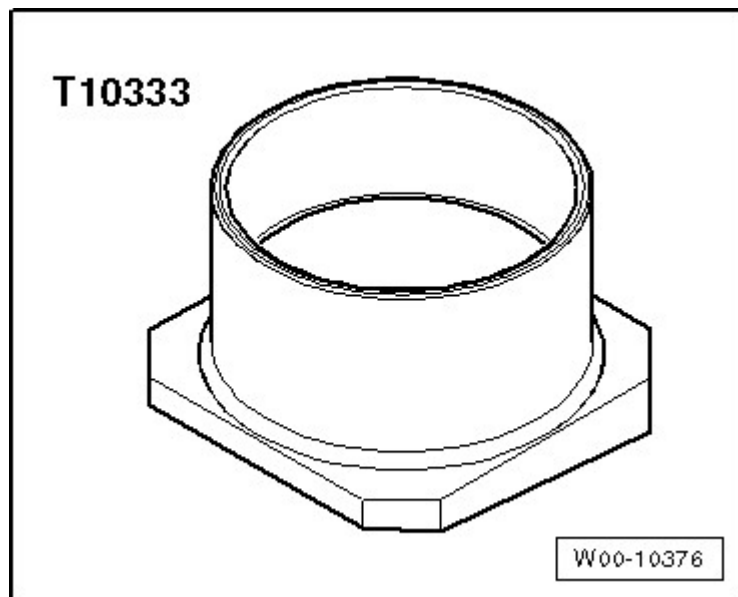


Fig. 66: Identifying Funnel T10333
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

2010 Volkswagen CC VR6 Sport

ENGINE 3.6 Liter - Crankshaft, Cylinder Block - Engine Code(s): BLV & CNNA

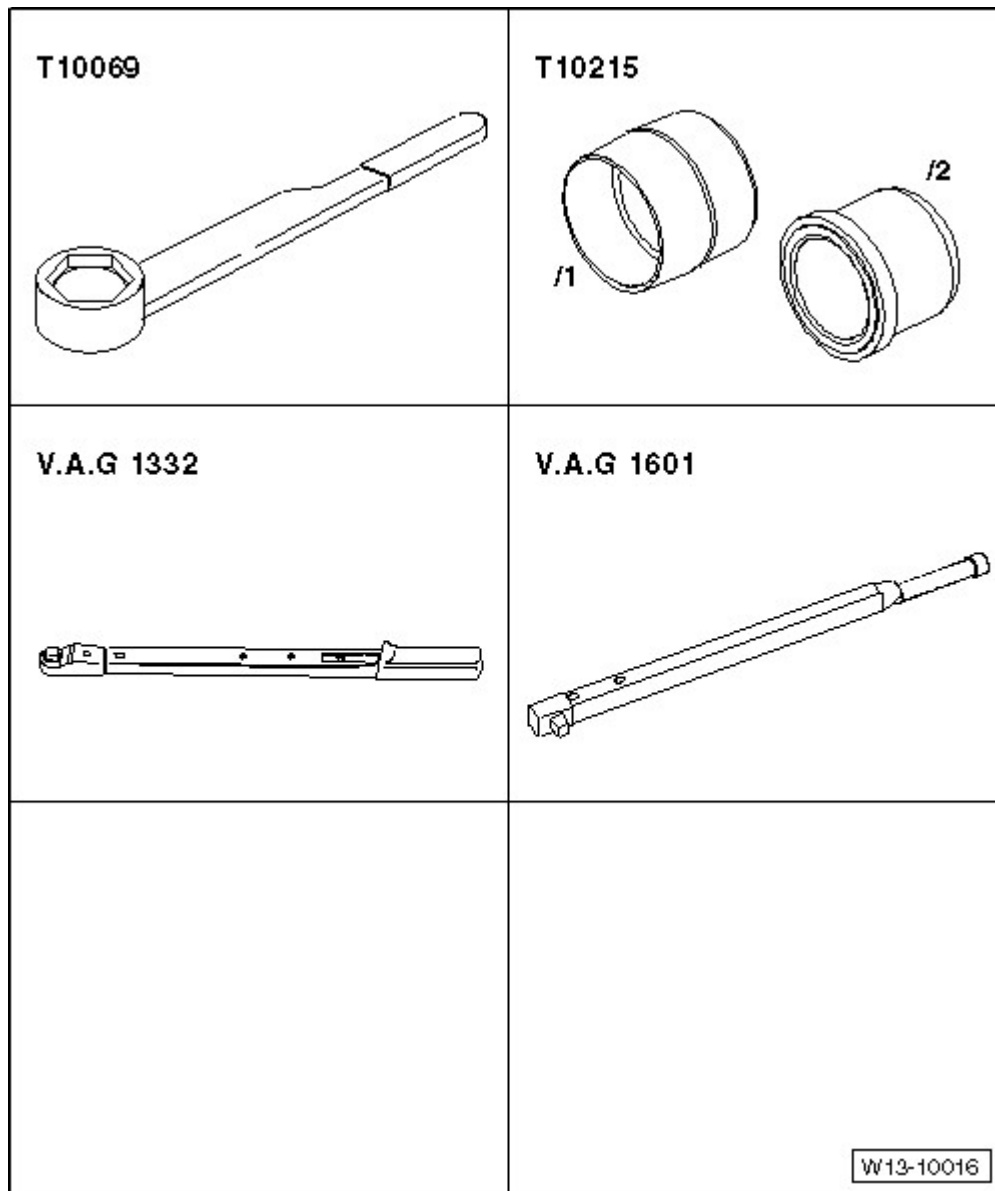


Fig. 67: Identifying Special Tools - Sealing Flange For Crankshaft (Harmonic Balancer Side), Replacing
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

Special tools and workshop equipment required

- Counter-Holder Tool T10069
- Assembly Tool T10215
- Torque Wrench (40-200 Nm) V.A.G 1332
- Torque Wrench V.A.G 1601

SPECIAL TOOLS - ENGINE CODE(S): CNNA

Special tools and workshop equipment required

- Micrometer 75-100 mm VAS 6071
- Cylinder Gauge VAS 6078
- Connecting Pin T10027

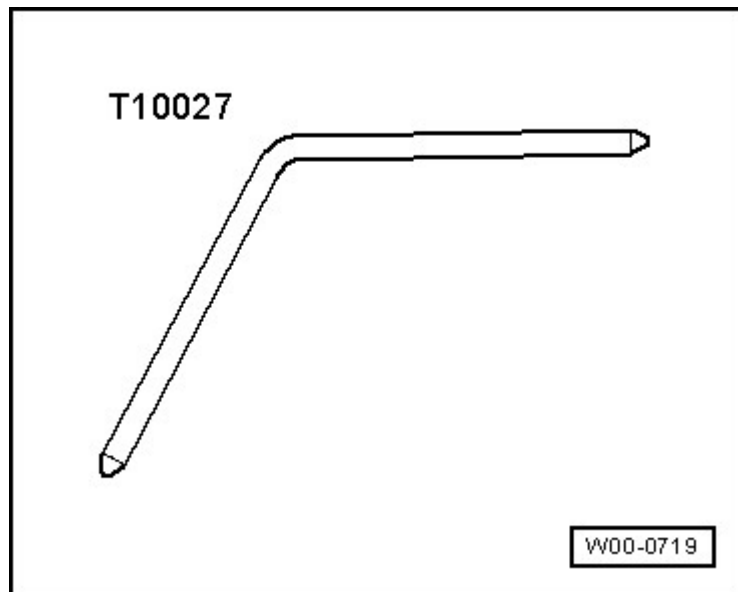


Fig. 68: Identifying Connecting Pin T10027

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Counterhold Tool T10172

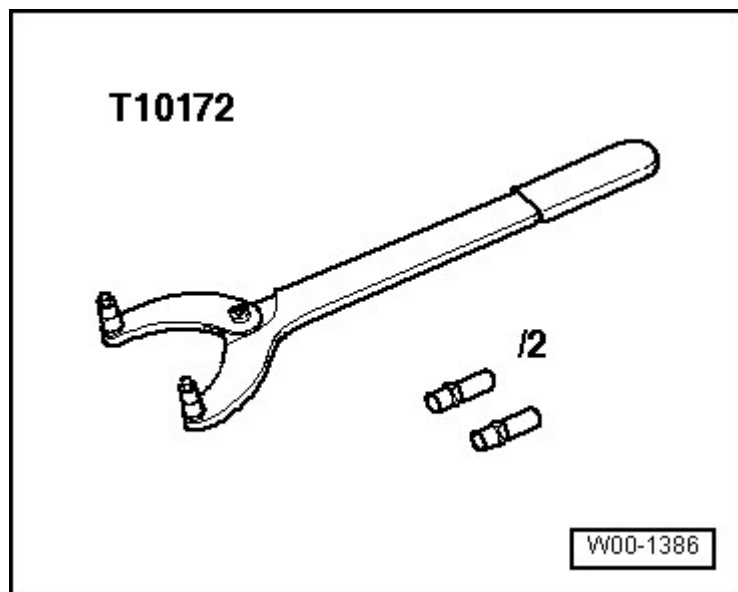


Fig. 69: Identifying Counter-Holder Tool T10172

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Torque Wrench (5-50 Nm) V.A.G 1331

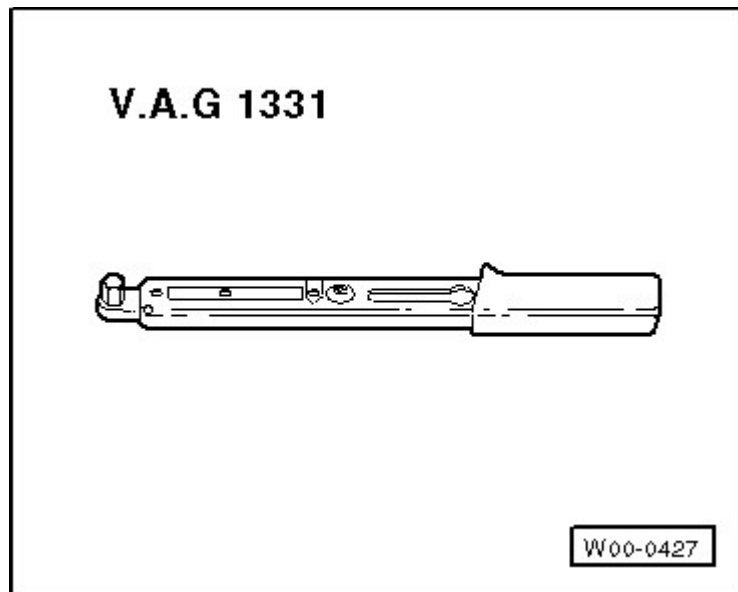


Fig. 70: Identifying Torque Wrench (5 To 50 Nm) V.A.G 1331
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Torque Wrench (40-200 Nm) V.A.G 1332

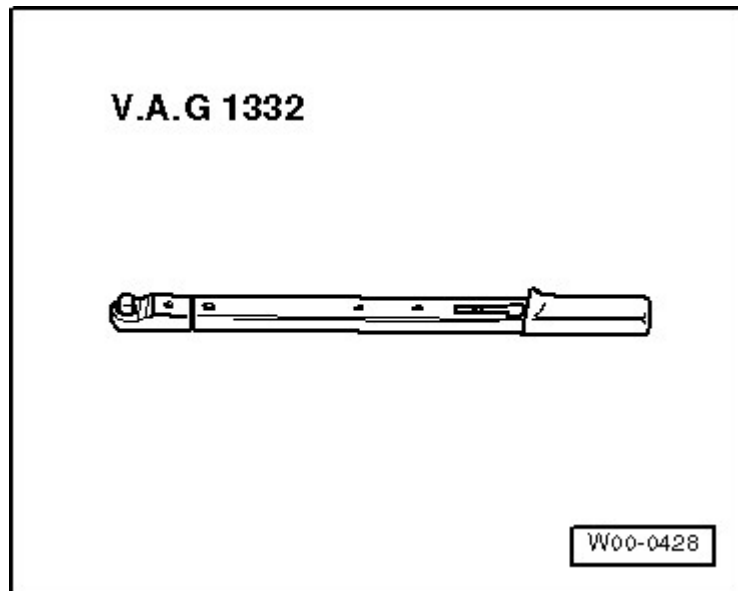


Fig. 71: Identifying Torque Wrench 40-200 Nm V.A.G. 1332
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Assembly Tool T10122

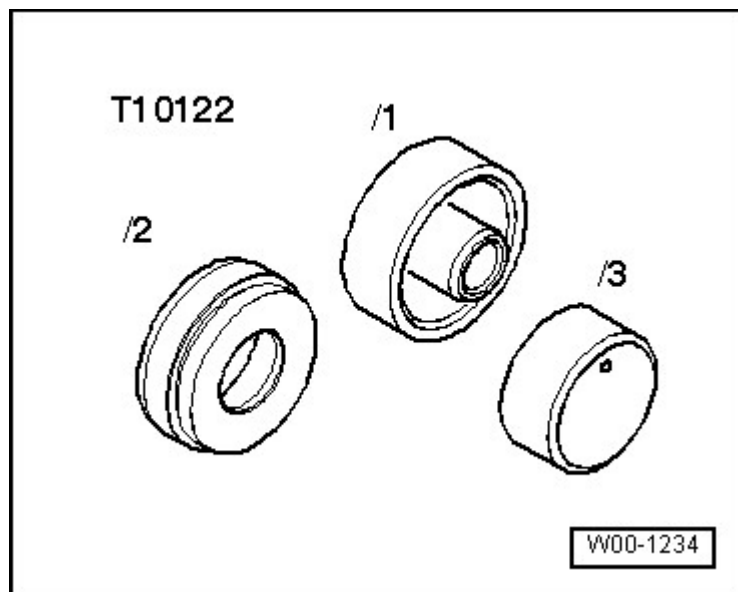


Fig. 72: Identifying Installation Tool T10122

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Pulling Hook T20143

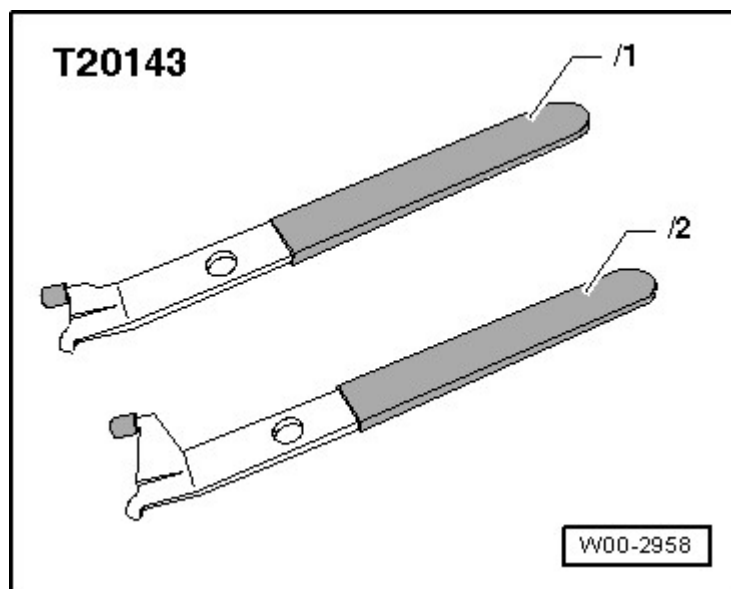


Fig. 73: Identifying Extractor Hook T20143

Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Counter-Holder Tool T10069

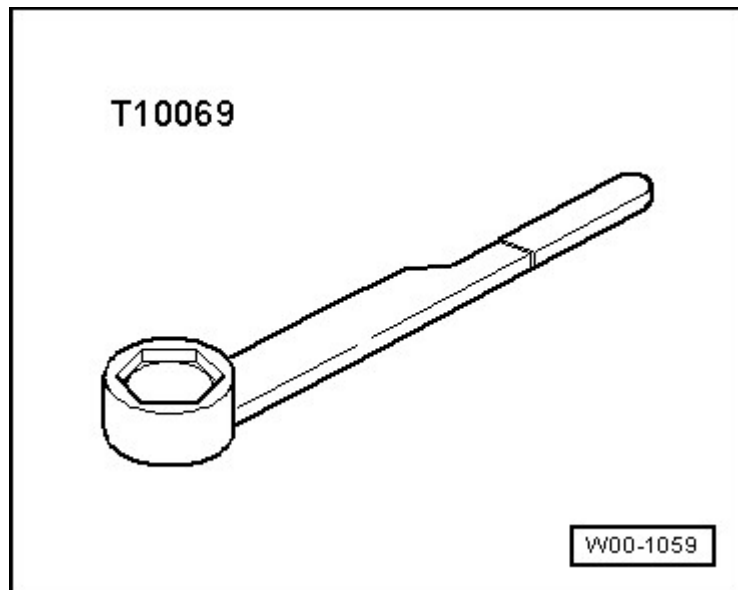


Fig. 74: Identifying Counter-Holder Tool T10069
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

- Funnel for Piston Installation T10333

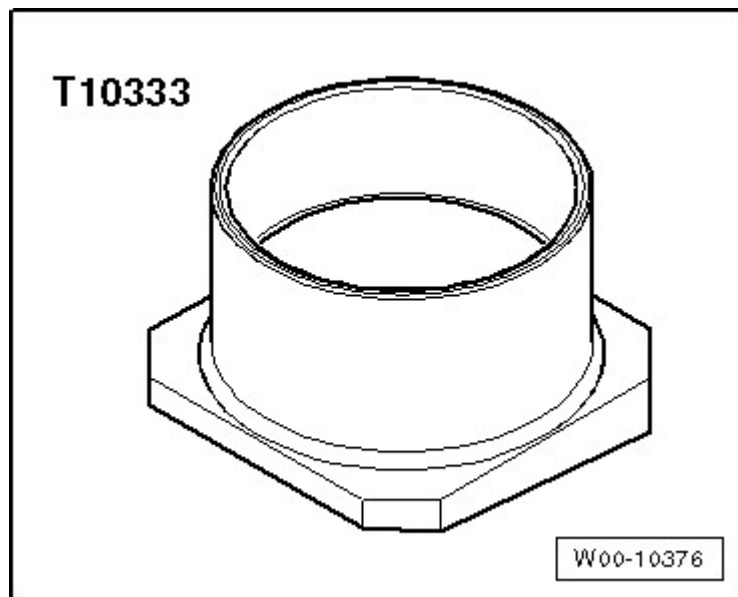


Fig. 75: Identifying Funnel T10333
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.