

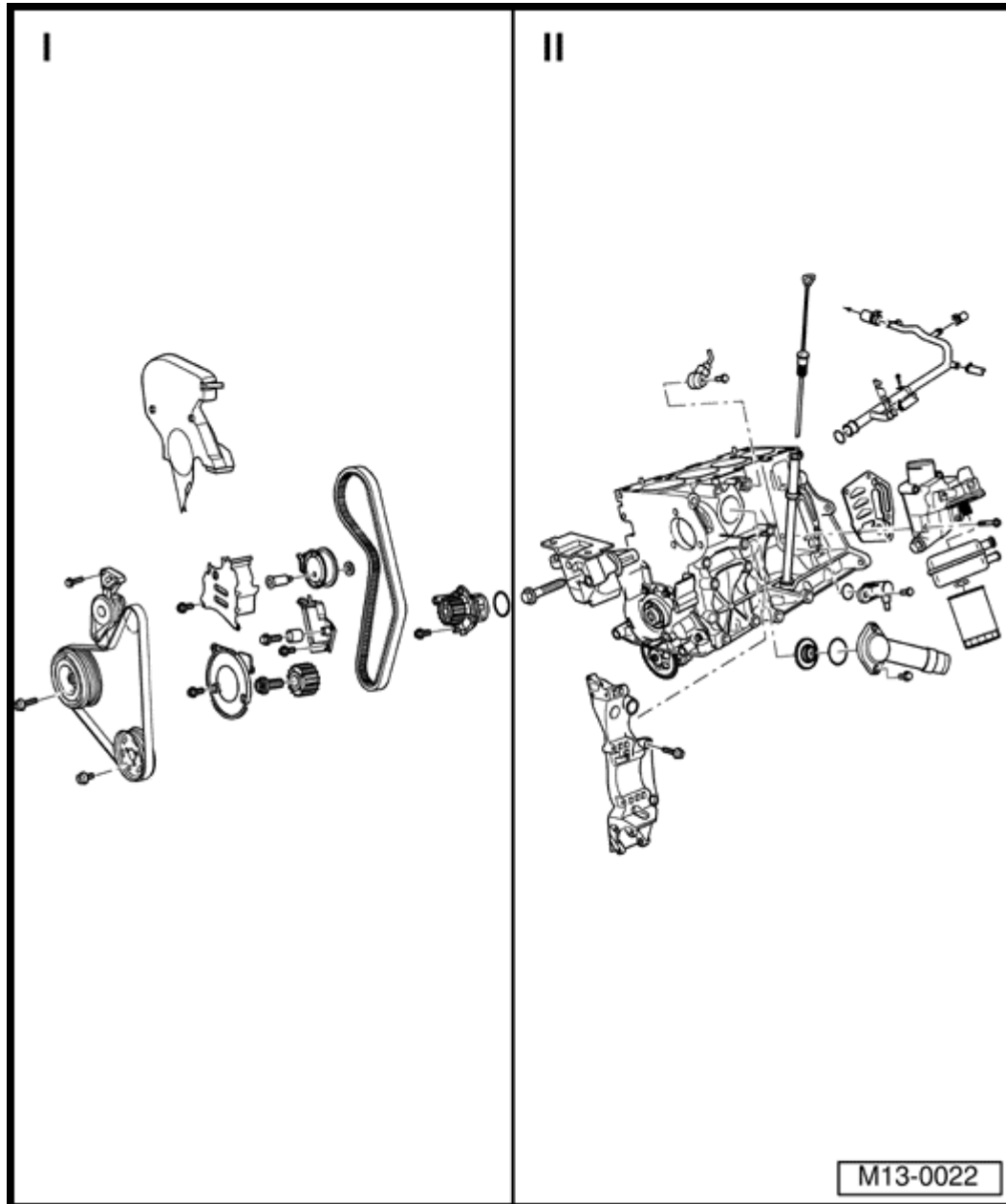
Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

13 Engine-Crankshaft, Cylinder block (Page GR-13)

- **Engine, disassembling and assembling**
- Ribbed belt, removing and installing
- Toothed belts, removing, installing and tensioning
- **Sealing flanges and flywheel/drive plate, removing and installing**
- Crankshaft oil seal, belt pulley end, replacing
- Drive plate, removing and installing
- Front sealing flange, removing and installing
- **Crankshaft, removing and installing**
- Crankshaft dimensions
- **Pistons and connecting rods, disassembling and assembling**
- Piston and cylinder dimensions

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Engine, removing and installing (Page 13-1)



Notes:

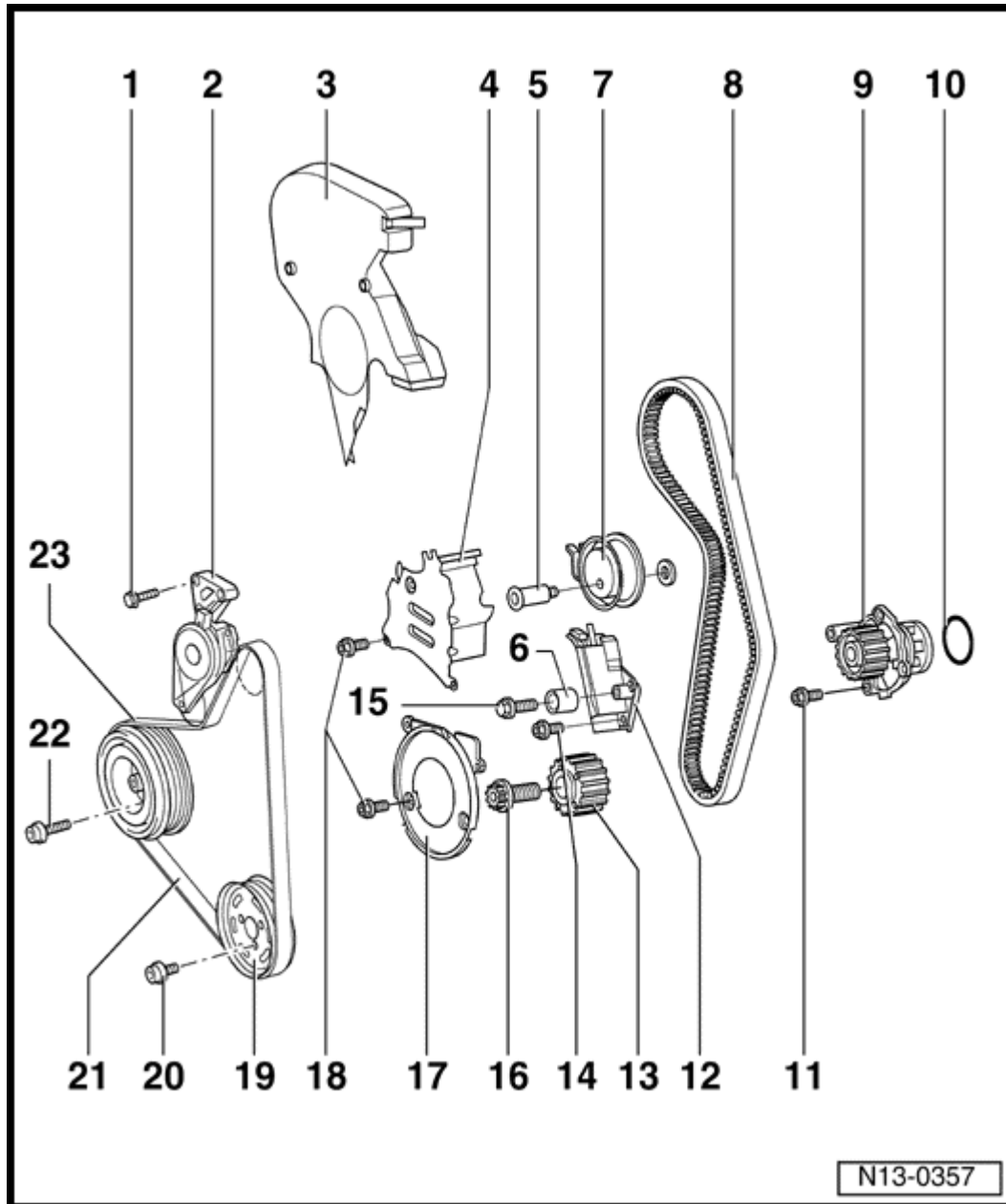
To prevent consequential damage when repairing an engine, if metal shavings or large quantities of small metal particles (caused, for example, by partial seizure of crankshaft and connecting rod bearings) are found in the engine oil, apart from thoroughly cleaning the oil passages, it is necessary to replace the oil cooler.

I ⇒ [Page 13-2](#)

II ⇒ [Page 13-5](#)

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Engine, disassembling and assembling (Page 13-2)

Part I



1 - 25 Nm

2 - Tensioning device for ribbed belt

♦ Turn with open - end spanner to loosen ribbed belt ⇒ [Page 13-8](#)

3 - Toothed belt guard - upper part

4 - Toothed belt guard - center section

5 - 27 Nm

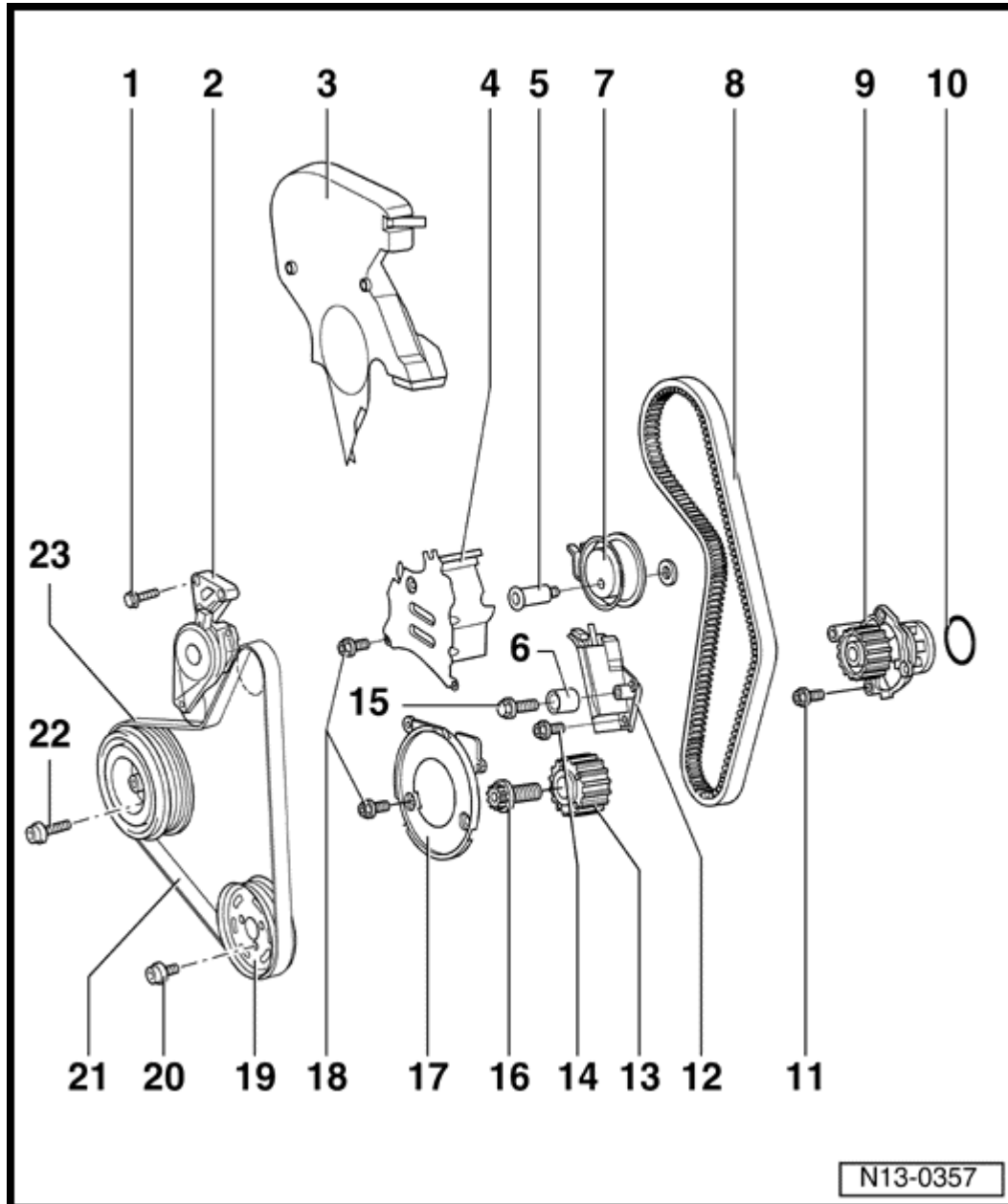
6 - Idler wheel

7 - Tensioning roller

8 - Toothed belt

- ◆ Mark direction of travel before removing
- ◆ Check for wear
- ◆ Do not kink
- ◆ Removing, installing and tensioning ⇒ [Page 13-11](#)

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Engine, disassembling and assembling (Page 13-3)



9 - Coolant pump

- ◆ Removing and installing ⇒ [Page 19-21](#)

10 - O - Ring

- ◆ Replace if damaged

11 - 15 Nm

12 - Tensioner for toothed belt

13 - Crankshaft toothed belt sprocket

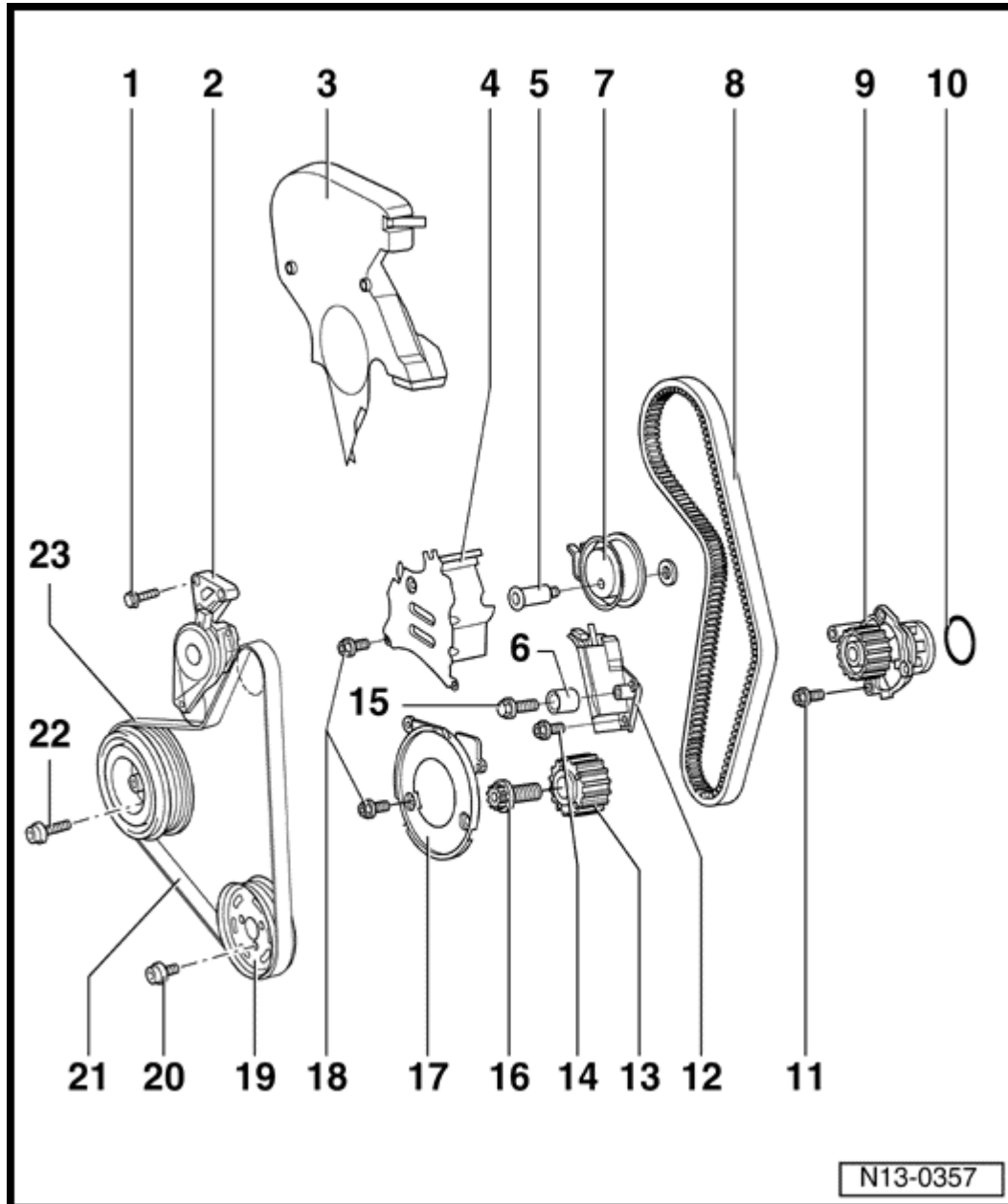
14 - 15 Nm

15 - 20 Nm

16 - 90 Nm + 1/4 turn (90 °) further

- ◆ Replace
- ◆ Counter - hold with 3099 to loosen and tighten
- ◆ When bolting on, place two washers between toothed belt pulley and counter - hold

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Engine, disassembling and assembling (Page 13-4)



17 - Toothed belt guard - lower part

18 - 10 Nm

19 - Pulley

- ◆ For power assisted steering pump

20 - 25 Nm

21 - Ribbed belt

- ◆ Mark direction of rotation before removing
- ◆ Removing and installing ⇒ [Page 13-8](#)

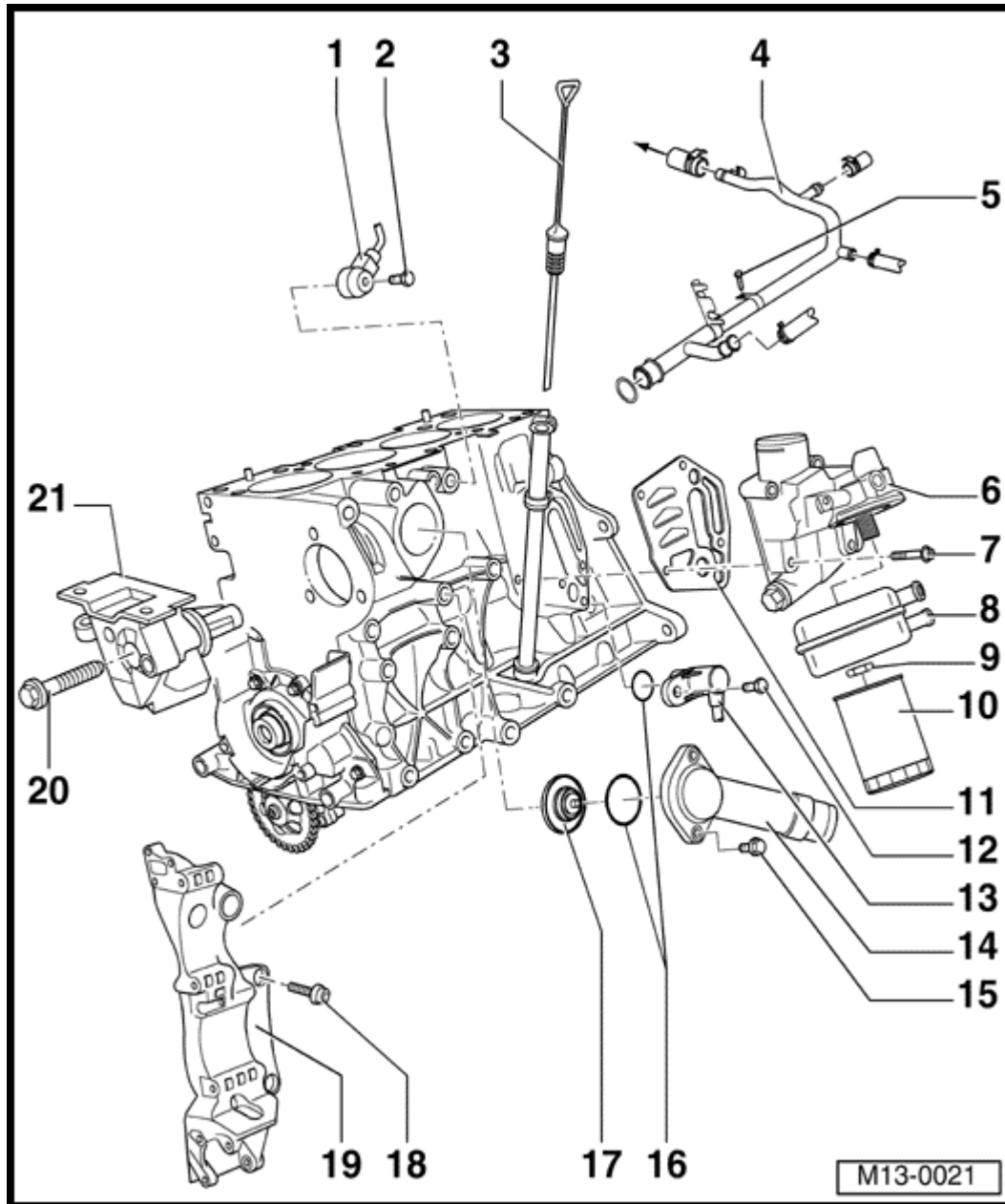
22 - 25 Nm

23 - Belt pulley/vibration damper

- ◆ Can only be installed in one position (holes are offset)
- ◆ Note position when installing toothed belt ⇒ [Page 13-11](#)

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Engine, disassembling and assembling (Page 13-5)

Part II



1 - Knock sensor 1 (G61)

- ◆ Checking:

⇒ [Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01](#)

2 - 20 Nm

- ◆ Tightening torque influences function of knock sensor

3 - Dipstick

- ◆ Oil level must not be above the max. mark!

4 - Coolant pipe

5 - 20 Nm

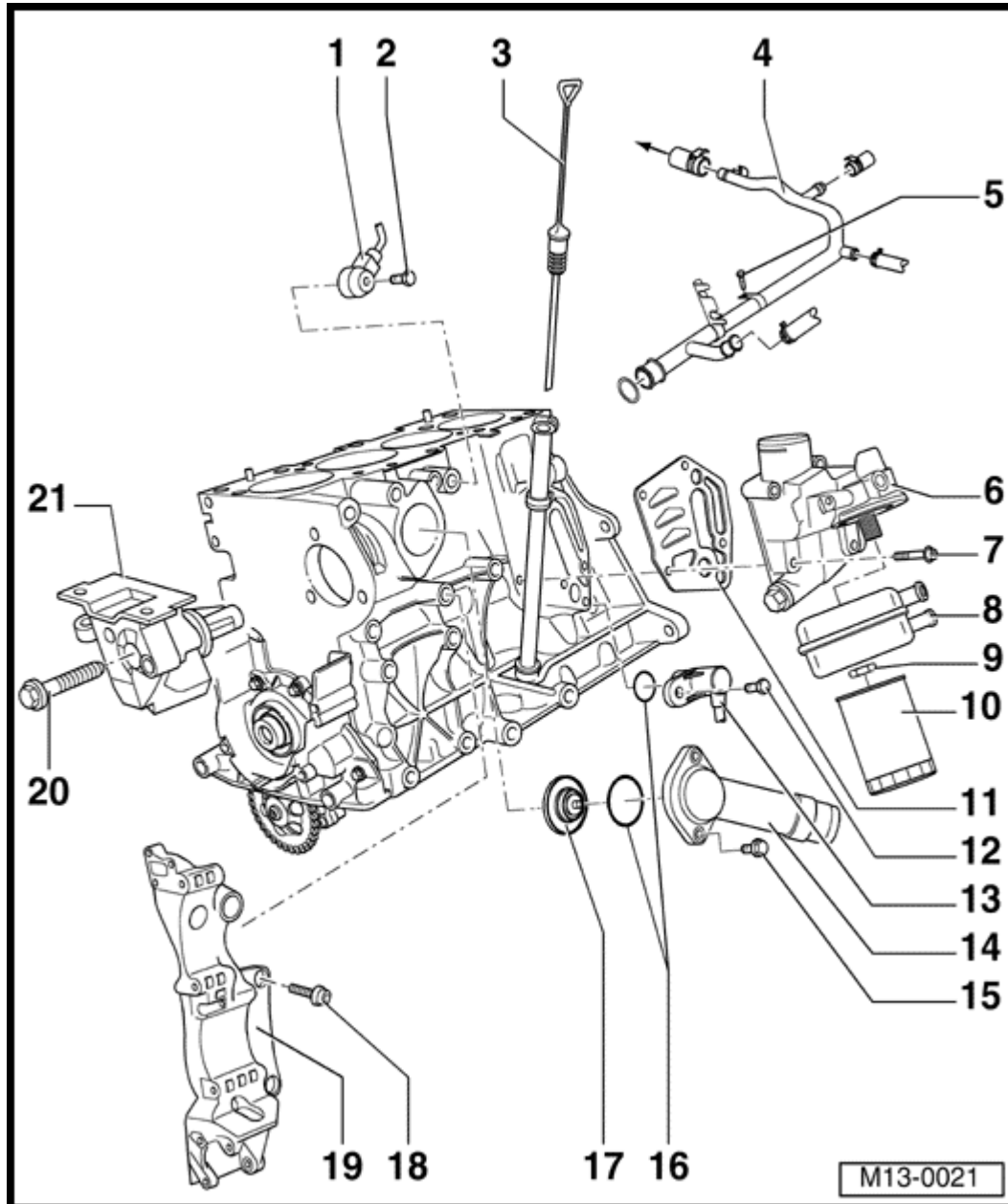
6 - Oil filter bracket

♦ Disassembling and assembling ⇒ [Page 17-6](#)

7 - 15 Nm + 1/4 turn (90°) further

♦ Replace

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Engine, disassembling and assembling (Page 13-6)



8 - Oil cooler

- ◆ Coat contact area to flange, outside the seal, with AMV 188 100 02
- ◆ Ensure clearance to adjacent components
- ◆ Note ⇒ [Page 13-1](#)

9 - 25 Nm

10 - Oil filter

- ◆ Loosen with strap wrench
- ◆ Tighten by hand
- ◆ Note instructions on filter when installing

11 - Gasket

- ◆ Replace

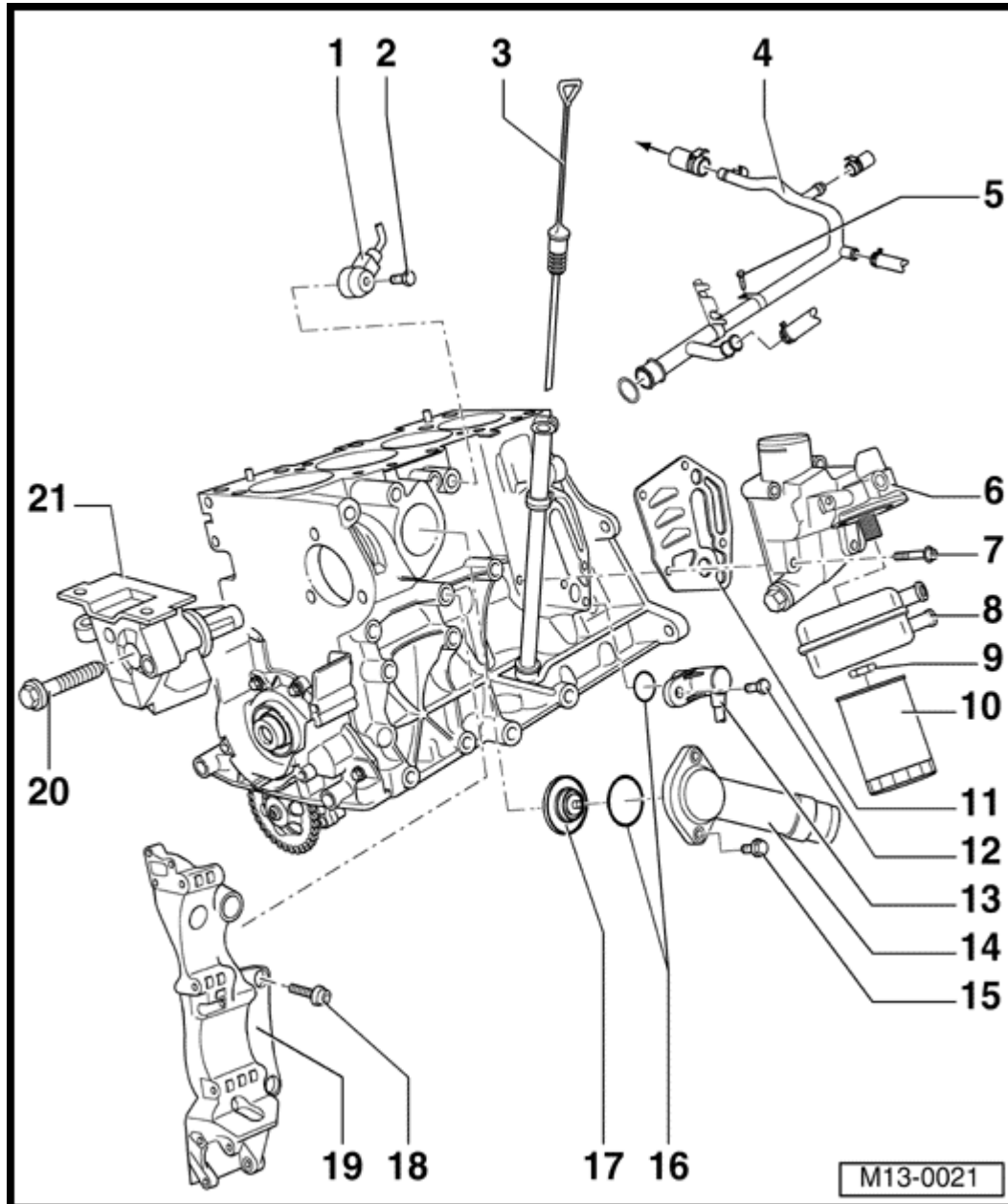
12 - 10 Nm

13 - Engine speed sender

- ◆ Checking:

⇒ [Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01](#)

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Engine, disassembling and assembling (Page 13-7)



14 - Connection

15 - 15 Nm

16 - O - Ring

- ◆ Replace

17 - Coolant thermostat

- ◆ Checking: heat - up thermostat in water
- ◆ Opening commences approx. 86 ° C
- ◆ Opening lift min. 7 mm

18 - 45 Nm

19 - Compact bracket

- ◆ For ribbed belt tensioning roller, alternator, P.A.S. power steering pump and air conditioner compressor

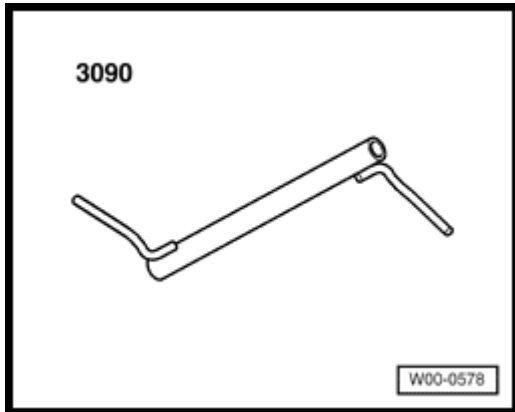
20 - 45 Nm

21 - Right engine bracket

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Engine, disassembling and assembling (Page 13-8)

Ribbed belt, removing and installing

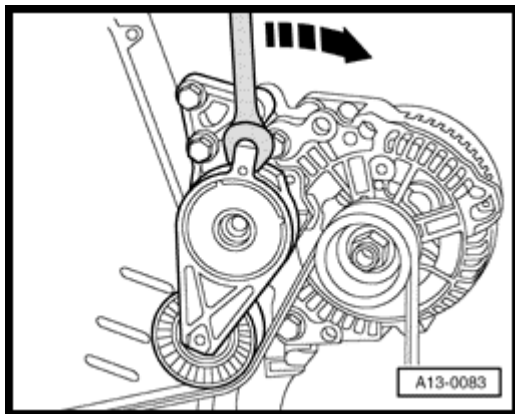
Special tools and equipment



- ◆ 3090 Conrod support

Removing ribbed belt

- Mark direction of rotation of ribbed belt.

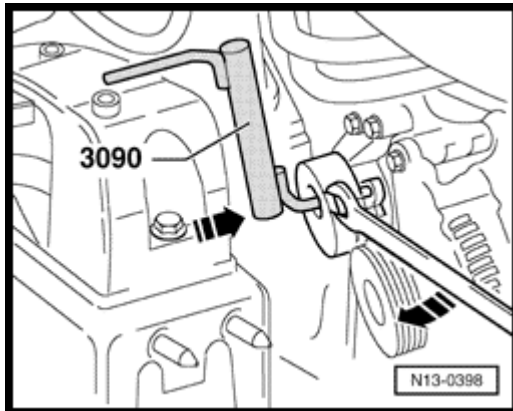


- To loosen ribbed belt turn tensioning element in direction of arrow.

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Engine, disassembling and assembling (Page 13-9)



- Lock tensioning device with pin 3204.
- Remove or fit ribbed belt.

Notes:

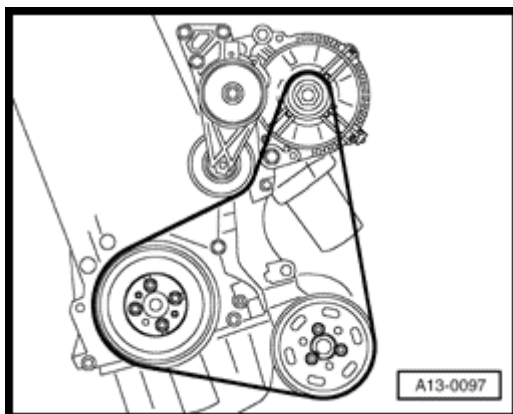
When installing ribbed belts ensure the belt seats correctly in the belt pulley.

- Remove insulation tray.

⇒ [Repair Manual, Body-Exterior, Repair Group 50](#)

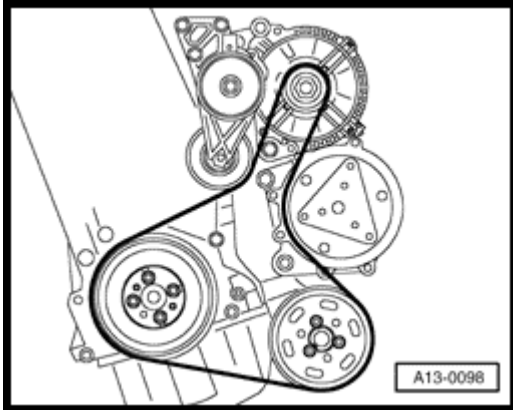
- Remove or fit the ribbed belt.
- Start engine and check belt running.

Ribbed belt routing



Belt drive without air conditioner compressor

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Engine, disassembling and assembling (Page 13-10)

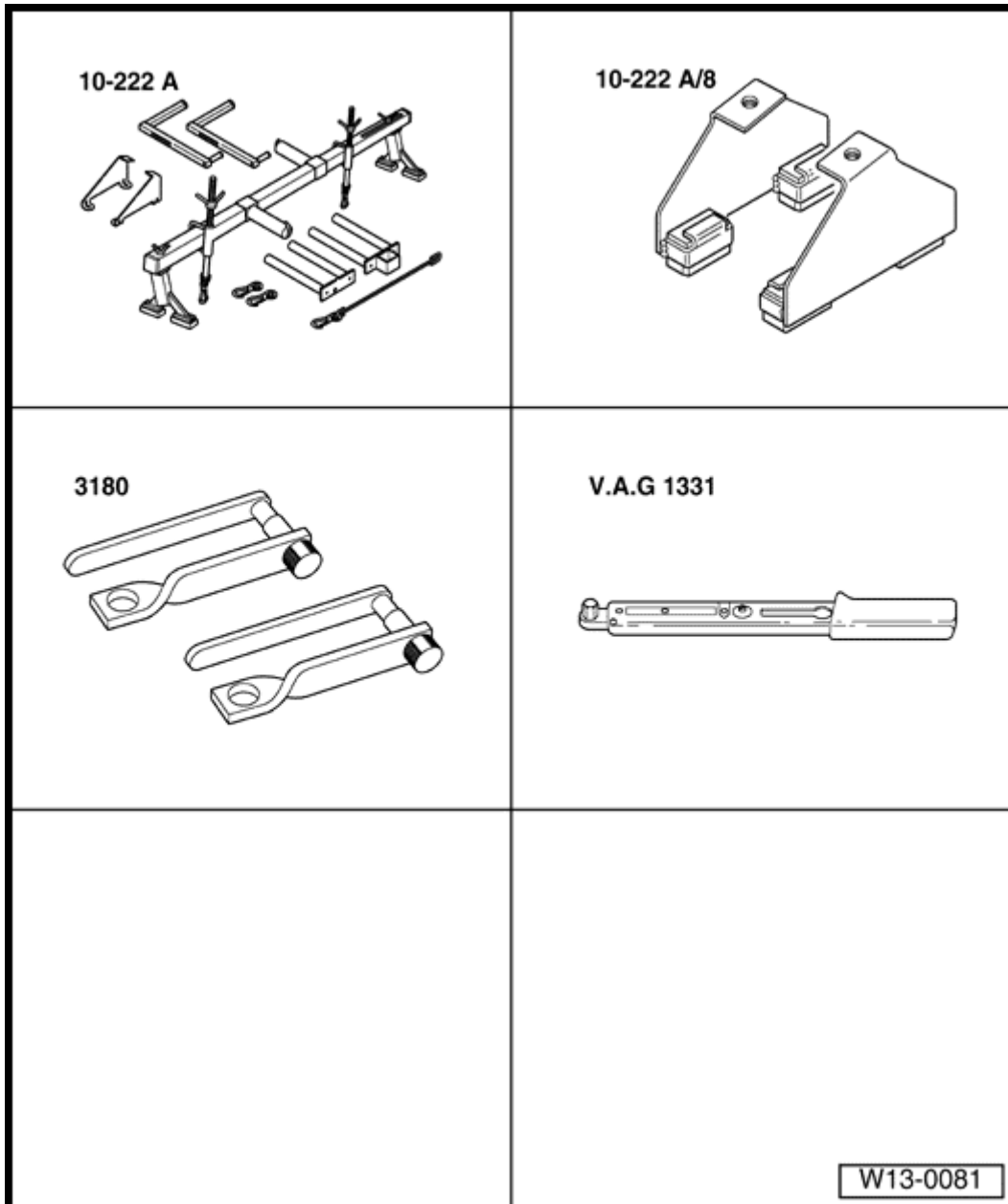


Belt drive with air conditioner compressor

Notes:

Engines with an air conditioner compressor are fitted with a double ribbed belt.

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Engine, disassembling and assembling (Page 13-11)



Toothed belts, removing, installing and tensioning

Special tools and equipment

- ◆ 10 - 222A Engine support bracket with legs 10 - 222A/1
- ◆ 10 - 222 A/8 Adapter
- ◆ 3180 Retainer (for engine code AGU)
- ◆ V.A.G 1331 Torque wrench (5-50 Nm)

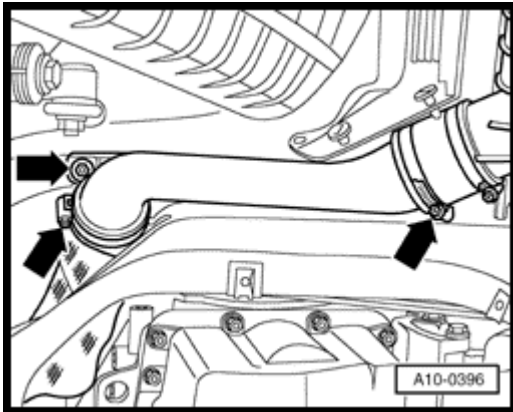
Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Engine, disassembling and assembling (Page 13-12)

Removing

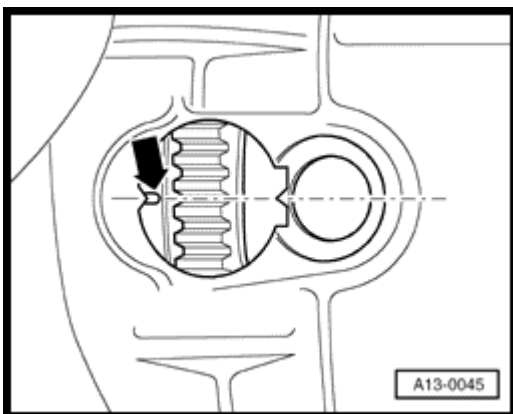
- Remove engine cover.
 - Remove right - hand insulation tray.
- ⇒ [Repair Manual, Body-Exterior, Repair Group 50](#)



A

- Remove air duct to charge air cooler at bottom right of long member.
- Remove ribbed belt ⇒ [Page 13-8](#) .
- Remove tensioning element for ribbed belt.

Engine installed:



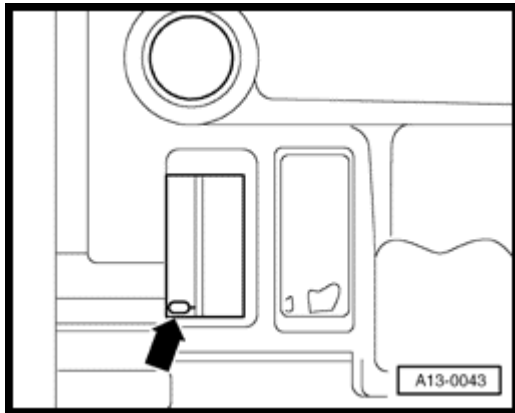
A

- Turn crankshaft to TDC No.1 cylinder (vehicles with manual gearbox).

Volkswagen New Beetle

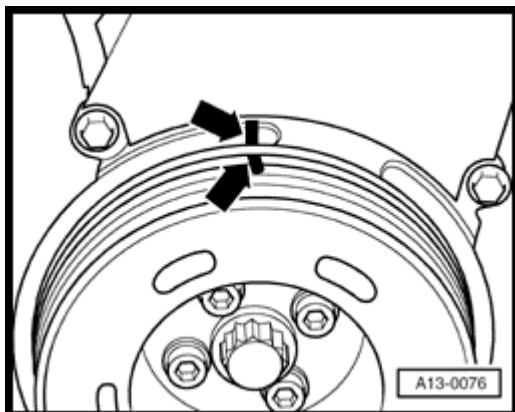
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Engine, disassembling and assembling (Page 13-13)



A

- Turn crankshaft to TDC No.1 cylinder (vehicles with automatic gearbox).
- With engine removed:



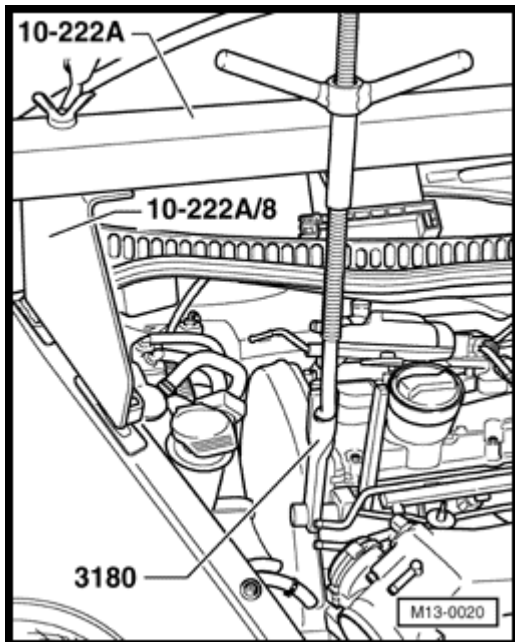
A

- Turn vibration damper to TDC No. 1 cylinder - arrows - .
- Remove coolant expansion tank and place to side.
- Pull off vacuum pipes at activated charcoal filter and at throttle valve housing.
- Remove toothed belt guard (upper part).

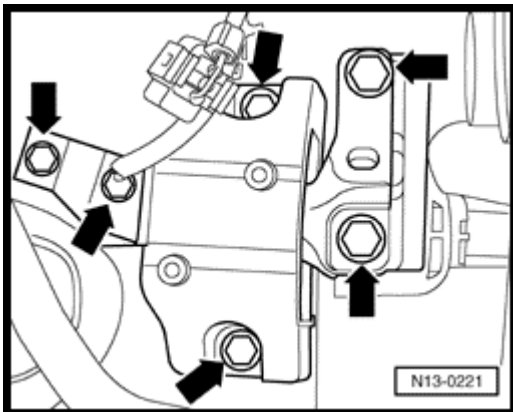
Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Engine, disassembling and assembling (Page 13-14)

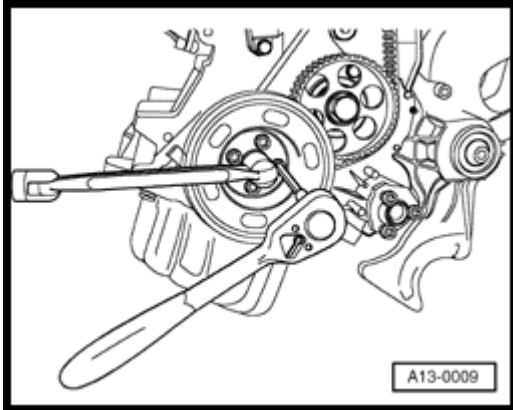


- Fit engine support bracket 10 - 222A with legs 10 - 222A/1.
- Locate bracket 3180 in lifting eye on cylinder head and take-up weight of engine.



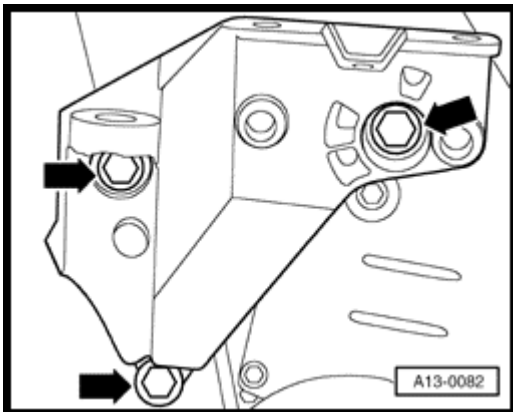
- Remove securing bolts from assembly mounting/engine mounting, assembly mounting/body and assembly mounting/body mounting - arrows - and remove assembly mounting complete.

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Engine, disassembling and assembling (Page 13-15)



A

- Remove vibration damper/belt pulley.
- Remove lower and center toothed belt guard.



A

- Remove engine bracket from cylinder block.

Notes:

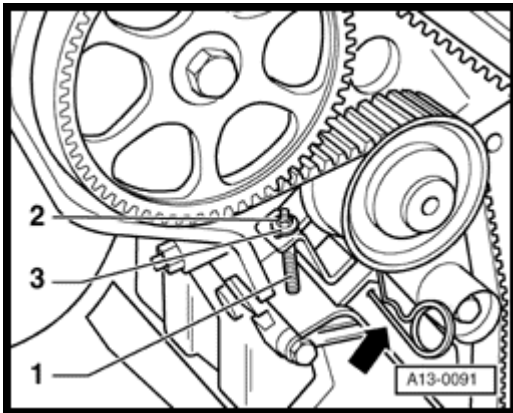
When loosening the front engine mounting bolt the engine must be raised slightly with the support bracket.

- Mark direction of travel of toothed belt.

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Engine, disassembling and assembling (Page 13-16)



A

- Screw threaded stud M5x55 - 1 - into toothed belt tensioner. Fit hexagon nut - 2 - with large washer - 3 - onto threaded stud - 1 - .
- Align pressure piston using pointed pliers or wire before tensioning (hole in pressure piston must align with hole in housing).
- Tension piston of tensioning device just sufficient so that the piston can be locked with a pin (e.g. from the lifting tackle MP 9 - 201) - arrow - .
- Remove toothed belt.
- Turn crankshaft back slightly.

Installing

Notes:

When turning the camshaft the crankshaft must not be at TDC (danger of damage valves/piston crown).

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Engine, disassembling and assembling (Page 13-17)

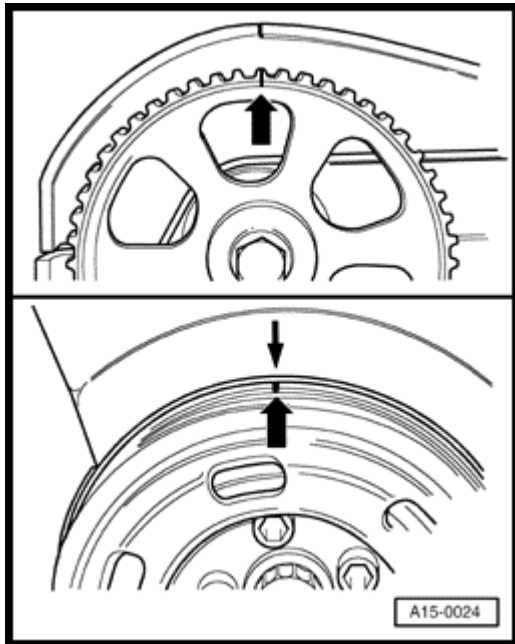
A - Toothed belt completely removed

If toothed belt has only been removed from camshaft ⇒ [Page 13-18](#) .

Conditions

- The pistons must not be positioned at TDC

Work sequence



A

- Bring mark on camshaft in line with the mark on cylinder head cover.
- Place toothed belt on crankshaft sprocket (observe DOR).
- Fit engine mounting to cylinder block.
- Tightening torque: 45 Nm

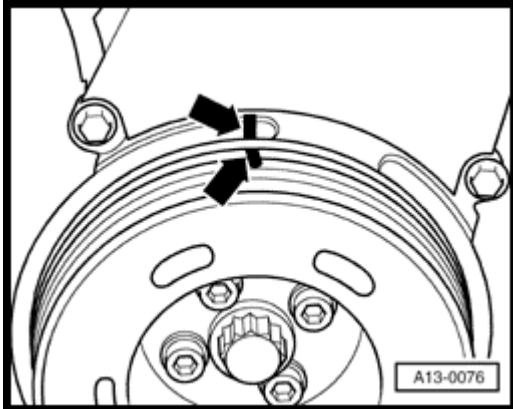
Notes:

Before installing engine mounting, insert bolts into mounting.

- Install toothed belt guard lower part.

Volkswagen New Beetle 1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical Engine, disassembling and assembling (Page 13-18)

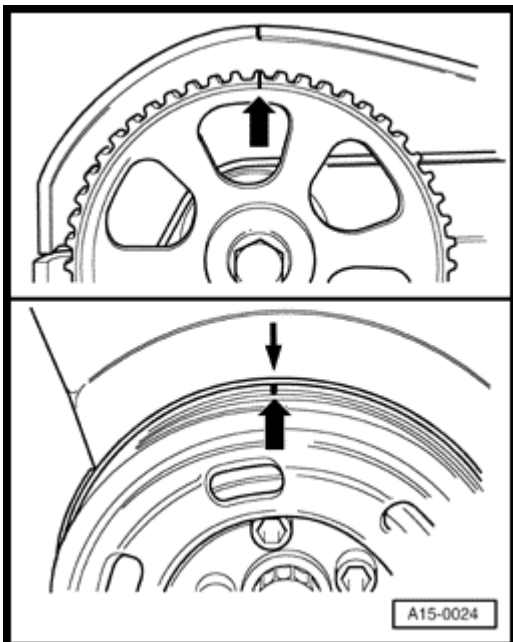
- Secure vibration damper/belt pulley with one bolt (note fixing arrangement).



A

- Turn crankshaft to TDC No. 1 cylinder.
- Place toothed belt on coolant pump, tensioning pulley and camshaft pulley.
- Tighten toothed belt ⇒ [Page 13-19](#) .

B - Toothed belt only taken off camshaft sprocket



A

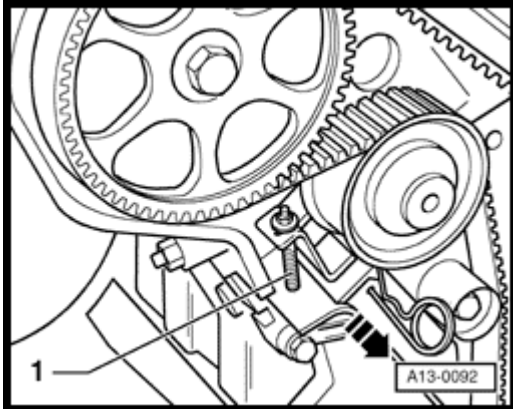
- Bring mark on camshaft in line with the mark on cylinder head cover.
- Turn crankshaft to TDC No. 1 cylinder.
- Place toothed belt on camshaft wheel.
- Tighten toothed belt ⇒ [Page 13-19](#)

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Engine, disassembling and assembling (Page 13-19)

Tensioning toothed belt



A

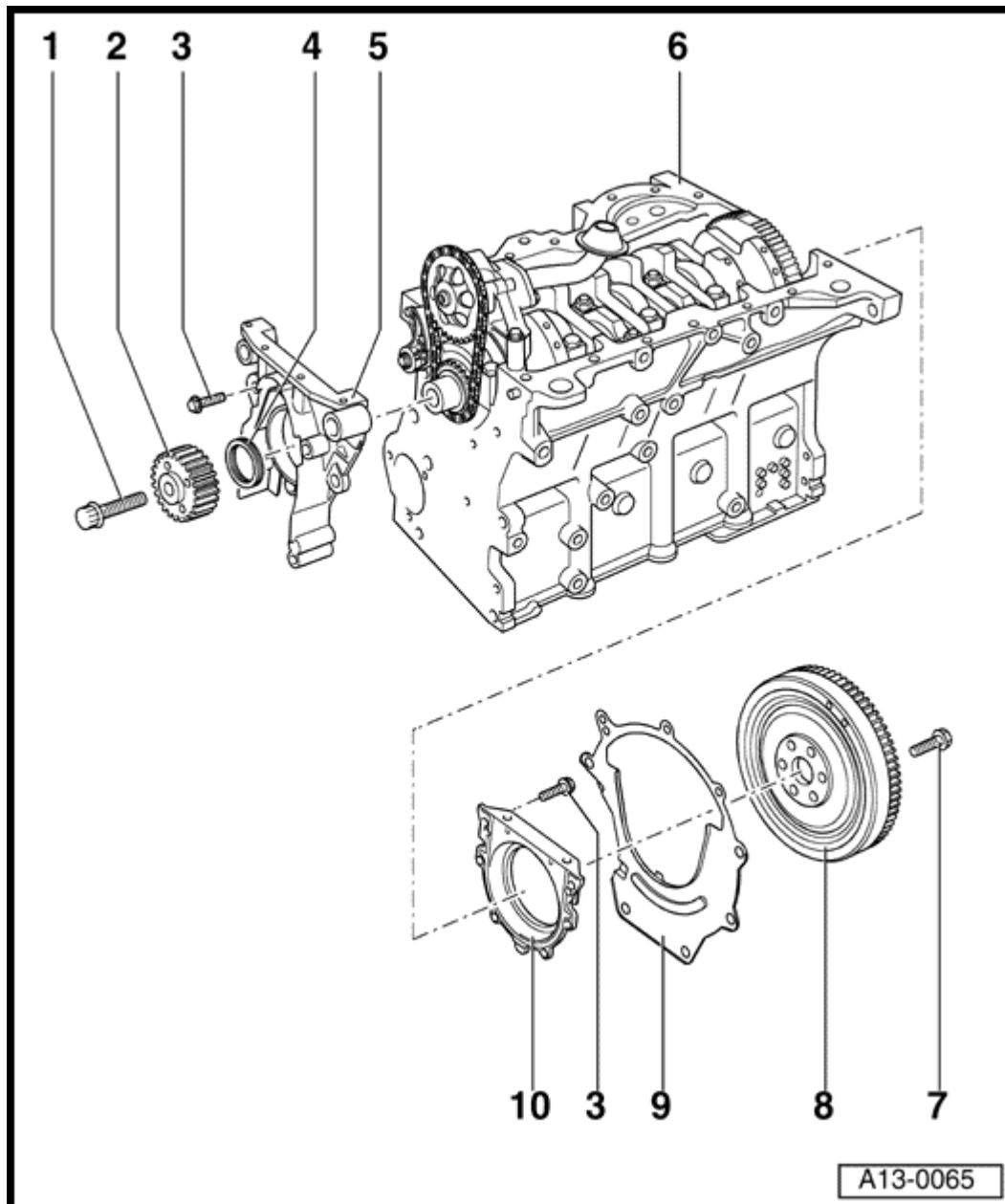
- Tension toothed belt, to do this pull out securing pin - arrow - and remove threaded stud - 1 - .
 - Turn crankshaft two full turns and check whether camshaft and crankshaft marks align with their reference points.
 - Install vibration damper/belt pulley
 - Tightening torque: 25 Nm
 - Install center and upper toothed belt guard.
 - Install aggregate mount and engine mount.
 - Install ribbed belt tensioner.
 - Tightening torque: 25 Nm
 - Install ribbed belt ⇒ [Page 13-8](#) .
 - Install air duct to charge air cooler at bottom right of long member.
 - Remove right - hand insulation tray
- ⇒ [Repair Manual, Body-Exterior, Repair Group 50](#)

3 - 15 Nm

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Sealing flanges and flywheel/drive plate, removing and installing (Page 13-21)



4 - Oil seal

- ◆ Replacing ⇒ [Page 13-23](#)

5 - Sealing flange

- ◆ Must be located on dowel sleeves
- ◆ Removing and installing ⇒ [Page 13-27](#)

6 - Cylinder block

- ◆ Removing and installing crankshaft ⇒ [Page 13-34](#)
- ◆ Disassembling and assembling pistons and connecting rods ⇒ [Page 13-39](#)

7 - 60 Nm + 1/4 turn (90°) further

- ◆ Replacing

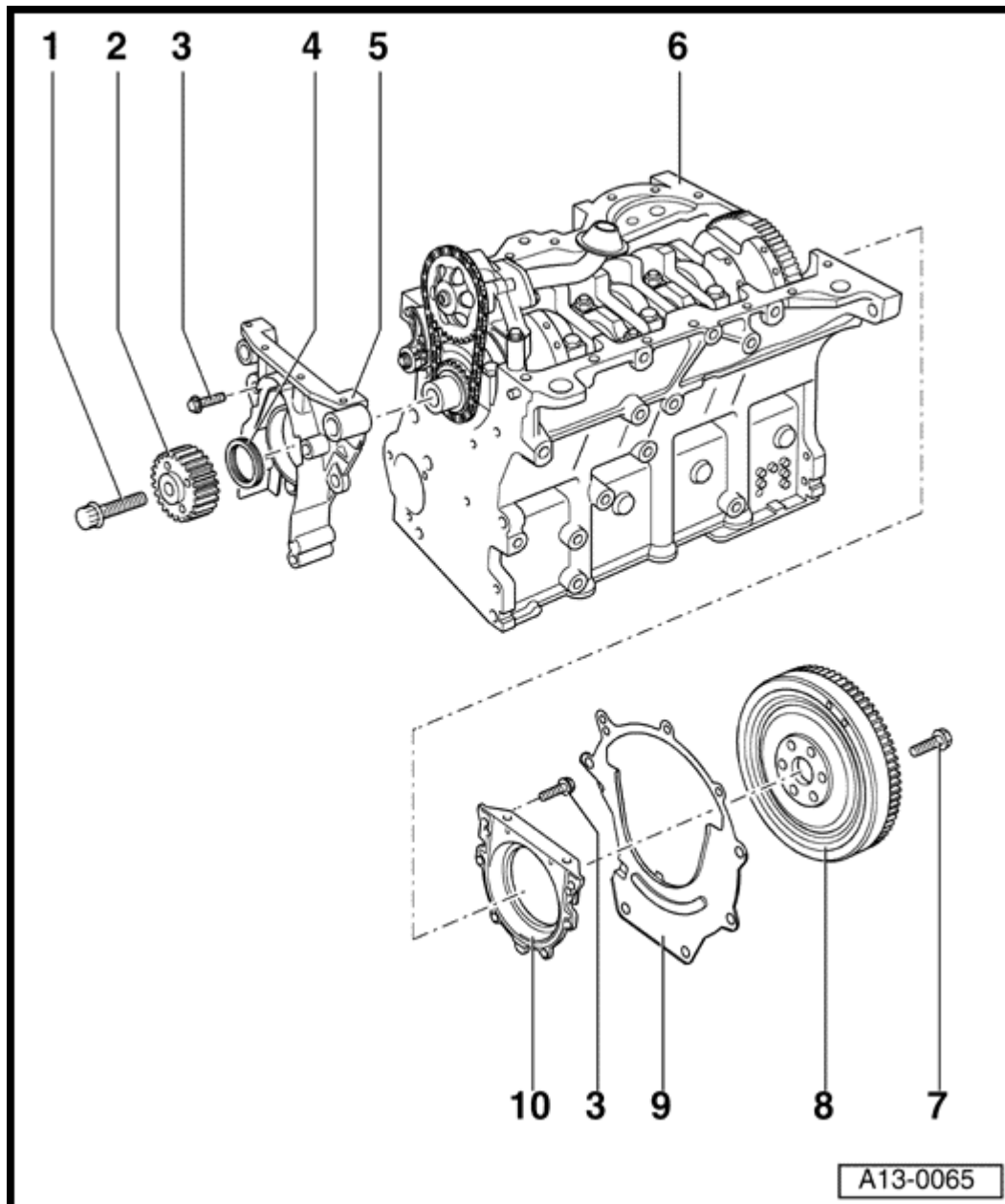
8 - Flywheel/drive plate

- ◆ To remove and install flywheel counter - hold with 3067
- ◆ Removing and installing drive plate ⇒ [Page 13-31](#)

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Sealing flanges and flywheel/drive plate, removing and installing (Page 13-22)



9 - Intermediate plate

- ◆ Must be located on dowel sleeves
- ◆ Do not damage/bend when assembling

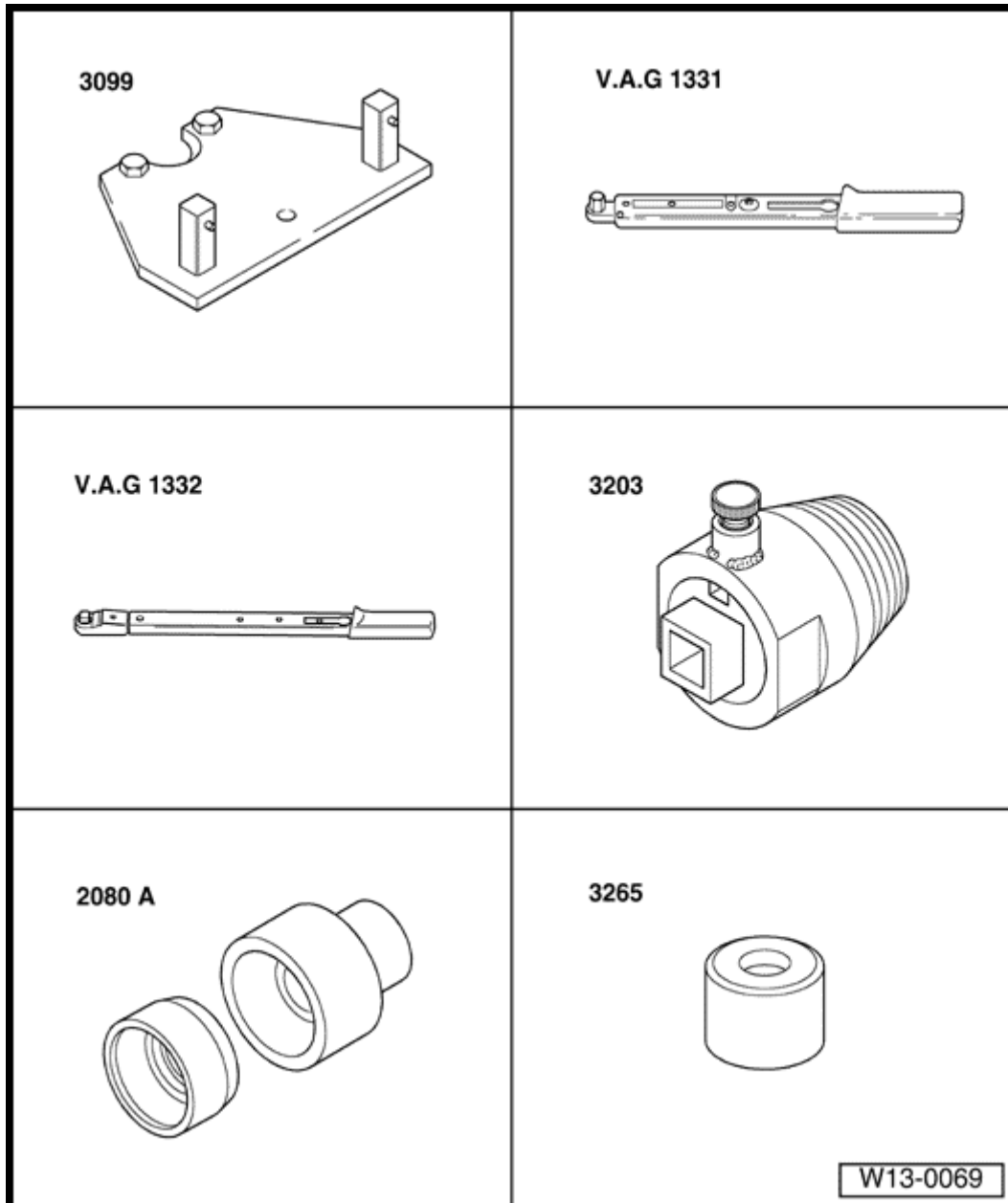
10 - Sealing flange with oil seal

- ◆ Only replace complete
- ◆ Lightly oil sealing lip of oil seal
- ◆ Remove sump to be able to remove and install ⇒ [Page 17-10](#)
- ◆ Install new sealing flange with fitting sleeve (before installing do not pull sealing sleeve out of oil seal)

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Sealing flanges and flywheel/drive plate, removing and installing (Page 13-23)



Crankshaft oil seal, belt pulley end, replacing

Special tools and equipment

- ◆ 3099 Counter - hold tool
- ◆ V.A.G 1331 Torque wrench (5-50 Nm)
- ◆ V.A.G 1332 Torque wrench (40-200 Nm)
- ◆ 3203 Oil seal extractor
- ◆ 2080 A Fitting sleeve
- ◆ 3265 Fitting sleeve

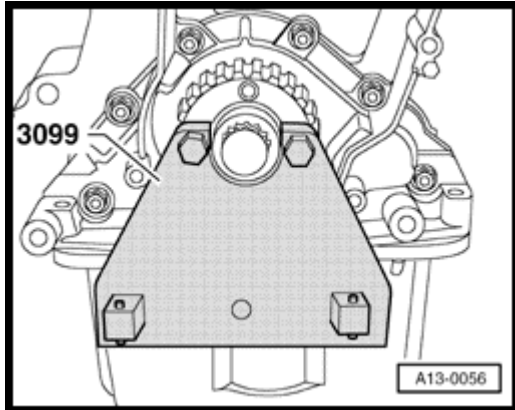
Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Sealing flanges and flywheel/drive plate, removing and installing (Page 13-24)

Removing

- Remove ribbed belt and tensioning element ⇒ [Page 13-8](#) .
- Remove toothed belt ⇒ [Page 13-11](#) .

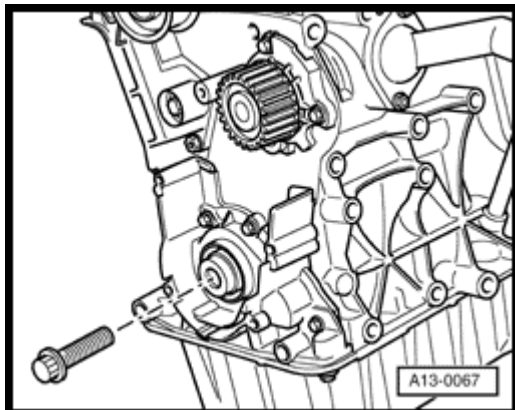


A

- Remove crankshaft toothed belt sprocket. To do this counter - hold sprocket with 3099.

Notes:

When bolting on counter - hold place two washers between toothed belt pulley and counter - hold.



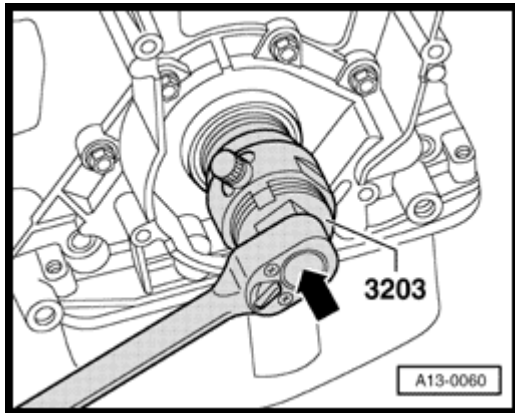
A

- To guide seal extractor, screw center bolt into crankshaft onto stop by hand.
- Unscrew inner part of the oil seal extractor 3203 two turns (approx. 3 mm) out of the outer part and lock with knurled screw.

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Sealing flanges and flywheel/drive plate, removing and installing (Page 13-25)

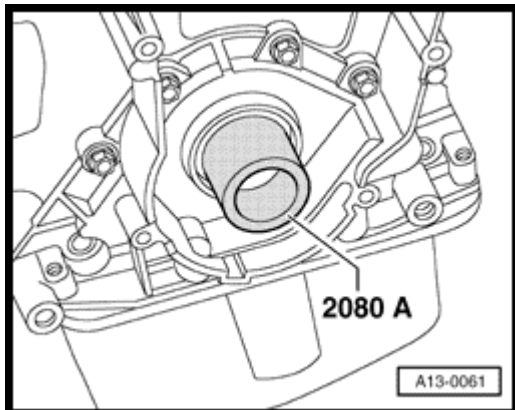


A

- Lubricate threaded head of oil seal extractor 3203, place it in position and exerting firm pressure screw it as far as possible into oil seal.
- Loosen knurled screw and turn inner part against crankshaft until the oil seal is pulled out.

Installing

- Lightly oil sealing lip of oil seal.



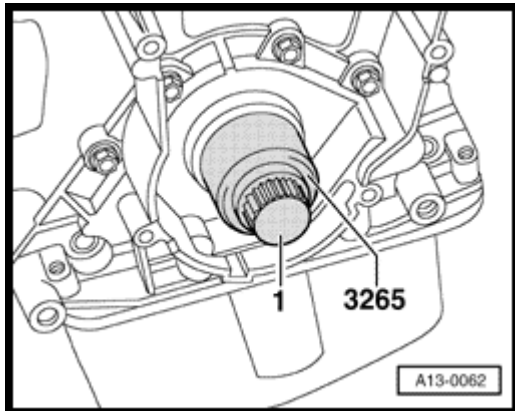
A

- Fit guide sleeve from 2080 A onto crankshaft journal.
- Slide oil seal over guide sleeve.

Volkswagen New Beetle

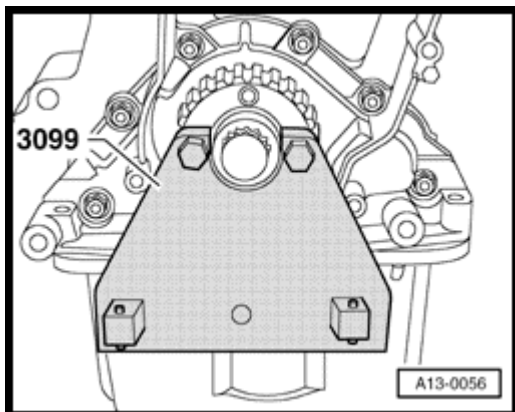
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Sealing flanges and flywheel/drive plate, removing and installing (Page 13-26)



A

- Press in seal with press sleeve from 3265. To do this use old central bolt for crankshaft toothed belt sprocket.
- Press sleeve in onto stop.



A

- Remove crankshaft toothed belt sprocket. To do this counter - hold sprocket with 3099.
- Tighten new central bolt to 90 Nm + 1/4 turn (90 °) further.

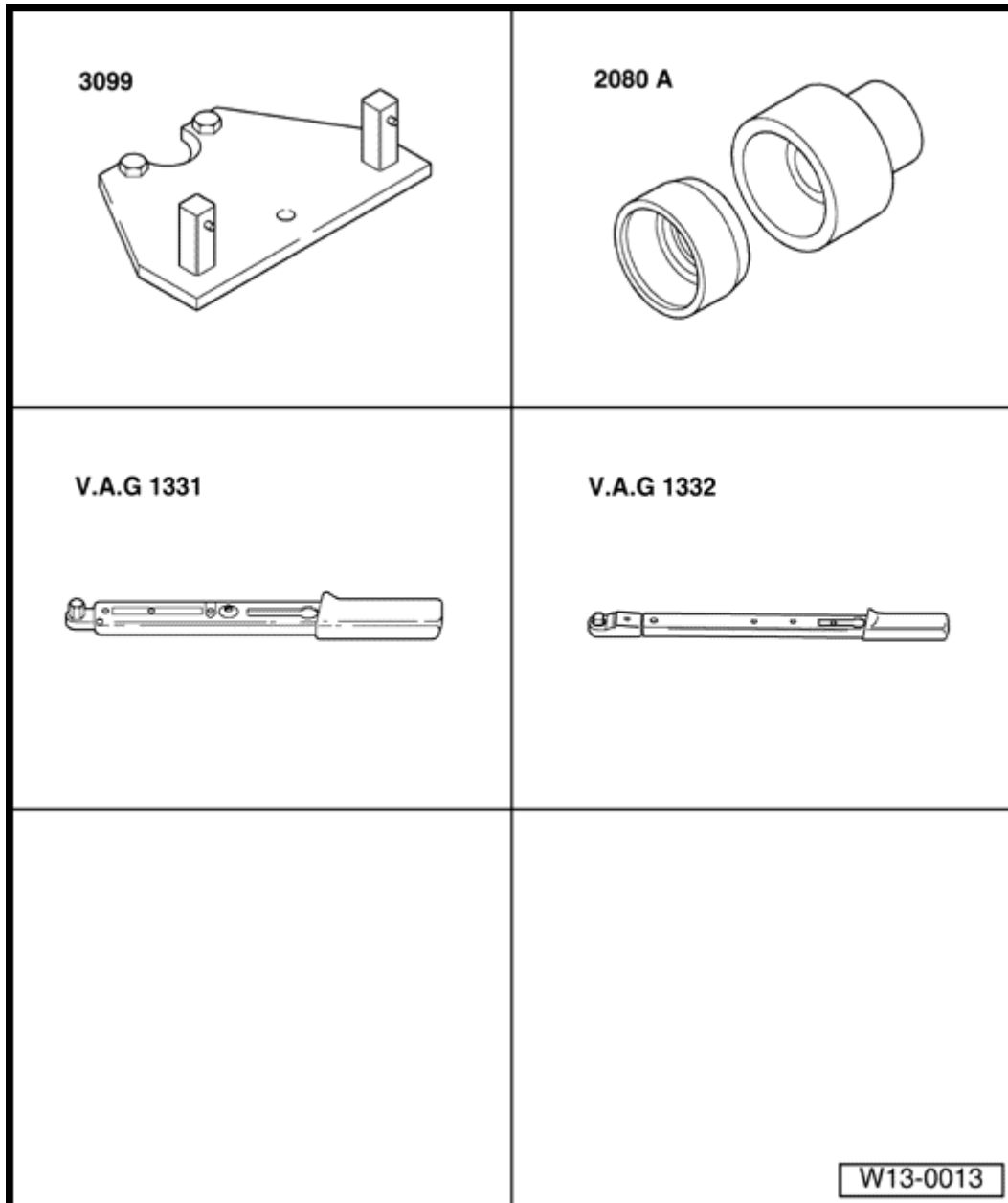
Notes:

- ♦ *When bolting on, place two washers between toothed belt pulley and counter - hold.*
- ♦ *Thread and shoulder must be free of oil and grease.*
- Install toothed belt and adjust valve timing ⇒ [Page 13-11](#)
- Install ribbed belt and tensioning element ⇒ [Page 13-8](#) .

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Sealing flanges and flywheel/drive plate, removing and installing (Page 13-27)



Front sealing flange, removing and installing

Special tools and equipment

- ◆ 3099 Counter - hold tool
- ◆ 2080 A Fitting sleeve
- ◆ V.A.G 1331 Torque wrench (5-50 Nm)
- ◆ V.A.G 1332 Torque wrench (40-200 Nm)
- ◆ D 176 404 A2 Silicone sealant
- ◆ Hand drilling machine with plastic brush insert
- ◆ Flat scraper

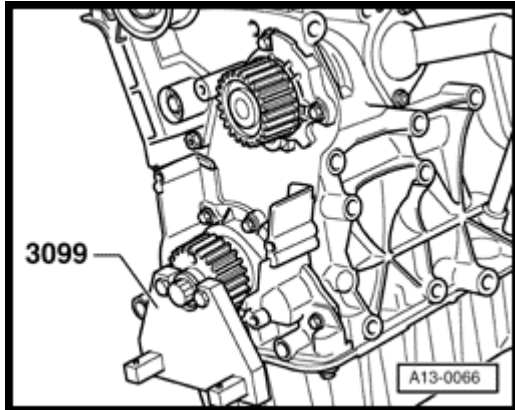
Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Sealing flanges and flywheel/drive plate, removing and installing (Page 13-28)

Removing

- Remove ribbed belt and tensioning element ⇒ [Page 13-8](#) .
- Remove toothed belt ⇒ [Page 13-11](#) .



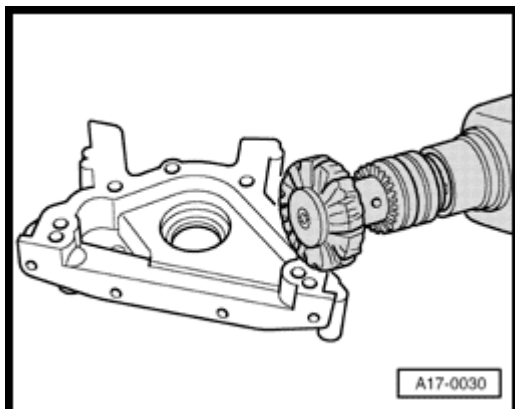
A

- Remove crankshaft toothed belt sprocket. To do this counter - hold sprocket with 3099.

Notes:

When bolting on, place two washers between toothed belt pulley and counter - hold.

- Remove sump ⇒ [Page 17-10](#) .
- Unbolt front sealing flange.
- Take off sealing flange, release using light blows with a rubber headed hammer if necessary.
- Remove sealant residue on cylinder block with a flat scraper.



A

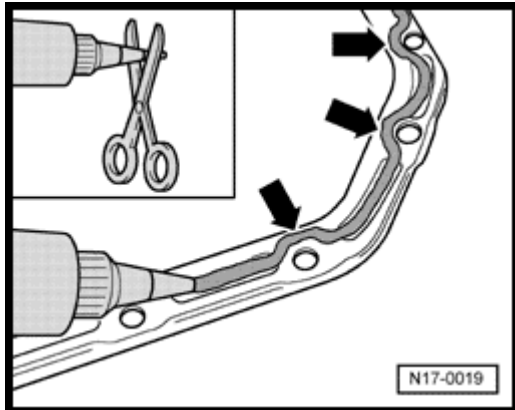
- Remove sealant remains on sealing flange with a rotating plastic brush (wear protective goggles).
- Clean sealing surface, must be free of oil and grease.

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Sealing flanges and flywheel/drive plate, removing and installing (Page 13-29)

Installing

Notes:

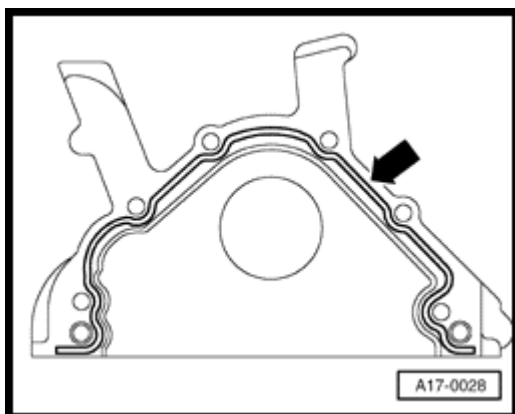
- ♦ Note the "use by" date of the sealant.
- ♦ The sealing flange must be installed within 5 minutes of applying the silicone sealant.



- Cut - off tube nozzle at forward marking (nozzle approx. 3 mm \varnothing).
- Apply silicone sealing compound to clean sump sealing surface as shown.
- Thickness of sealant bead - arrows - : 2 - 3 mm

Notes:

The sealing compound bead must not be thicker, otherwise excessive sealing compound will enter the sump and may block the oil suction pipe strainer.



- Apply silicone sealant bead as shown to the clean sealing surface of the sealing flange.
- Fit sealing flange immediately and lightly tighten all bolts.

Notes:

Use guide sleeve from 2080A to fit sealing flange with the oil seal already installed.

Volkswagen New Beetle

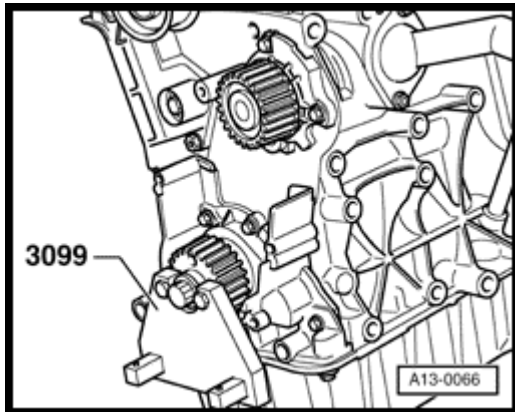
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Sealing flanges and flywheel/drive plate, removing and installing (Page 13-30)

- Tighten sealing flange securing bolts using alternate sequence.
- Tightening torque: 15 Nm
- Install sump ⇒ [Page 17-10](#) .

Notes:

After installing, the sealant must be allowed to dry for approx. 30 minutes before engine oil is filled.



A

- Remove crankshaft toothed belt sprocket. To do this counter - hold sprocket with 3099.
- Tighten new central bolt to 90 Nm + 1/4 turn (90 °) further.
- Install compact bracket including tightening element for ribbed V - belt ⇒ [Page 13-7](#) , item 19.

Notes:

- ◆ *When bolting on, place two washers between toothed belt pulley and counter - hold.*
- ◆ *Thread and shoulder must be free of oil and grease.*
- Install toothed belt and adjust valve timing ⇒ [Page 13-11](#)
- Installing ribbed belt and tensioning element ⇒ [Page 13-8](#) .

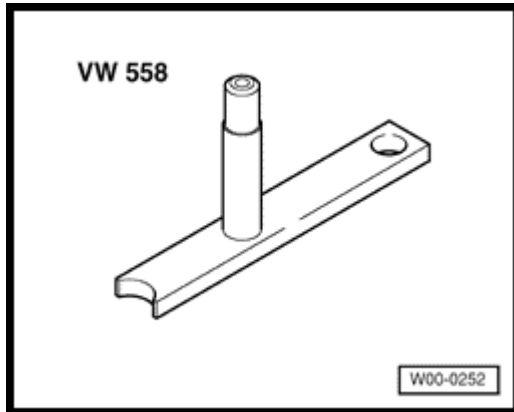
Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Sealing flanges and flywheel/drive plate, removing and installing (Page 13-31)

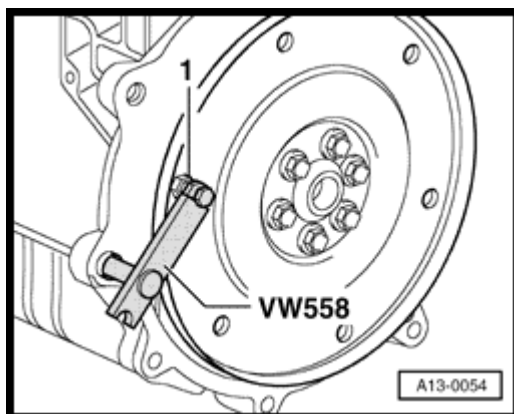
Drive plate, removing and installing

Special tools and equipment



- ◆ VW 558 Retainer
- ◆ Hexagon bolt M8x45 and two M10 hexagon nuts
- ◆ Depth gauge

Loosening and tightening drive plate



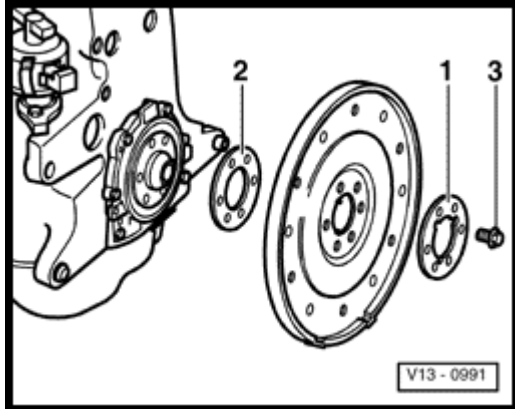
- Secure counter - hold tool VW 558 to the drive plate with a hexagon bolt M8x45. Place two M10 hexagon nuts - 1 - between counter - hold tool and drive plate.
- Loosen drive plate bolts.

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

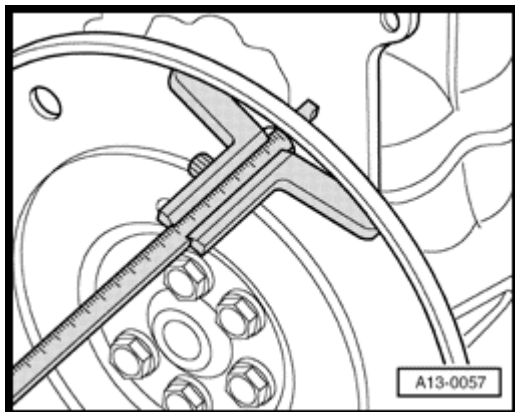
Sealing flanges and flywheel/drive plate, removing and installing (Page 13-32)

Installing drive plate



▲

- Locate drive plate and packing plate with recesses - 1 - .
- Fit new bolts - 3 - and tighten to 30 Nm.



▲

- Check dimension - a - at three points and calculate average.
- Specification: 19.5-21.1 mm

Notes:

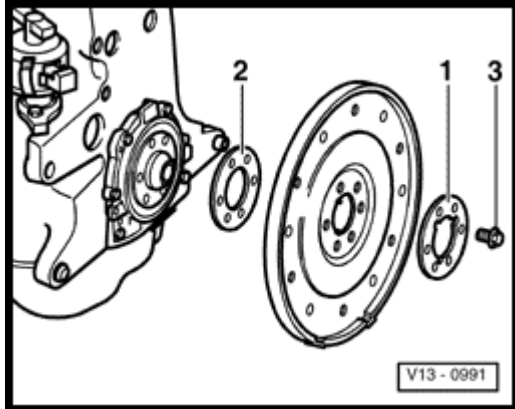
Measured through hole in drive plate to milled surface of cylinder block.

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Sealing flanges and flywheel/drive plate, removing and installing (Page 13-33)

If the specification is not attained:



A

- Remove drive plate again and fit shim - 2 - . Tighten bolts again to 30 Nm.
- Tighten bolts to 60 Nm and turn 90° (1/4 turn) further (turning further can be done in several stages).

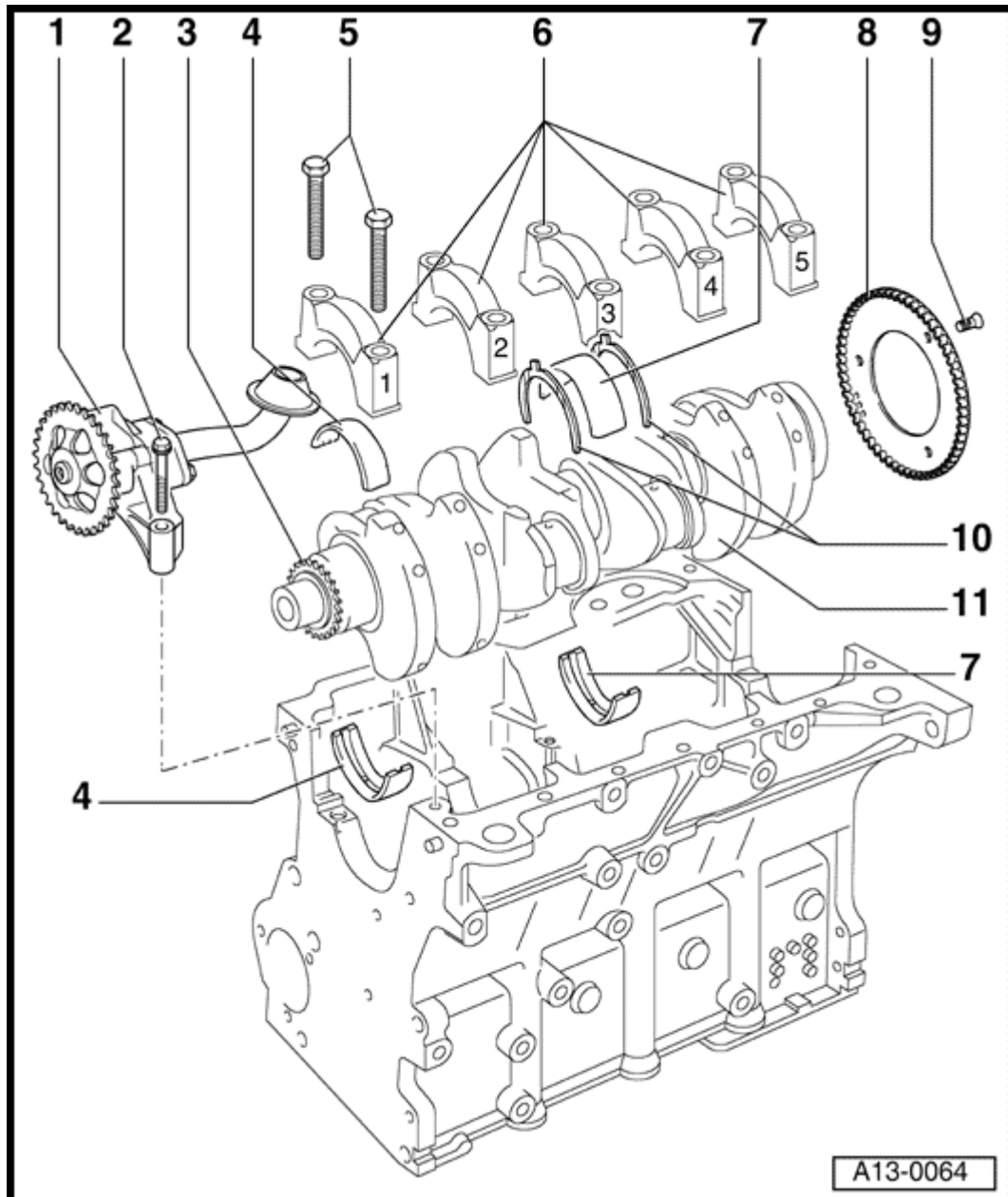
Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Sealing flanges and flywheel/drive plate, removing and installing (Page 13-34)

Notes:

- ◆ Before removing the crankshaft, prepare a suitable surface so that the sender wheel (item 8) is not making contact with anything and is not damaged.
- ◆ When stripping and assembling the engine it should be secured to the engine frame with engine and gearbox bracket VW 540 and supplementary set VW 540/1B.



1 - Oil pump

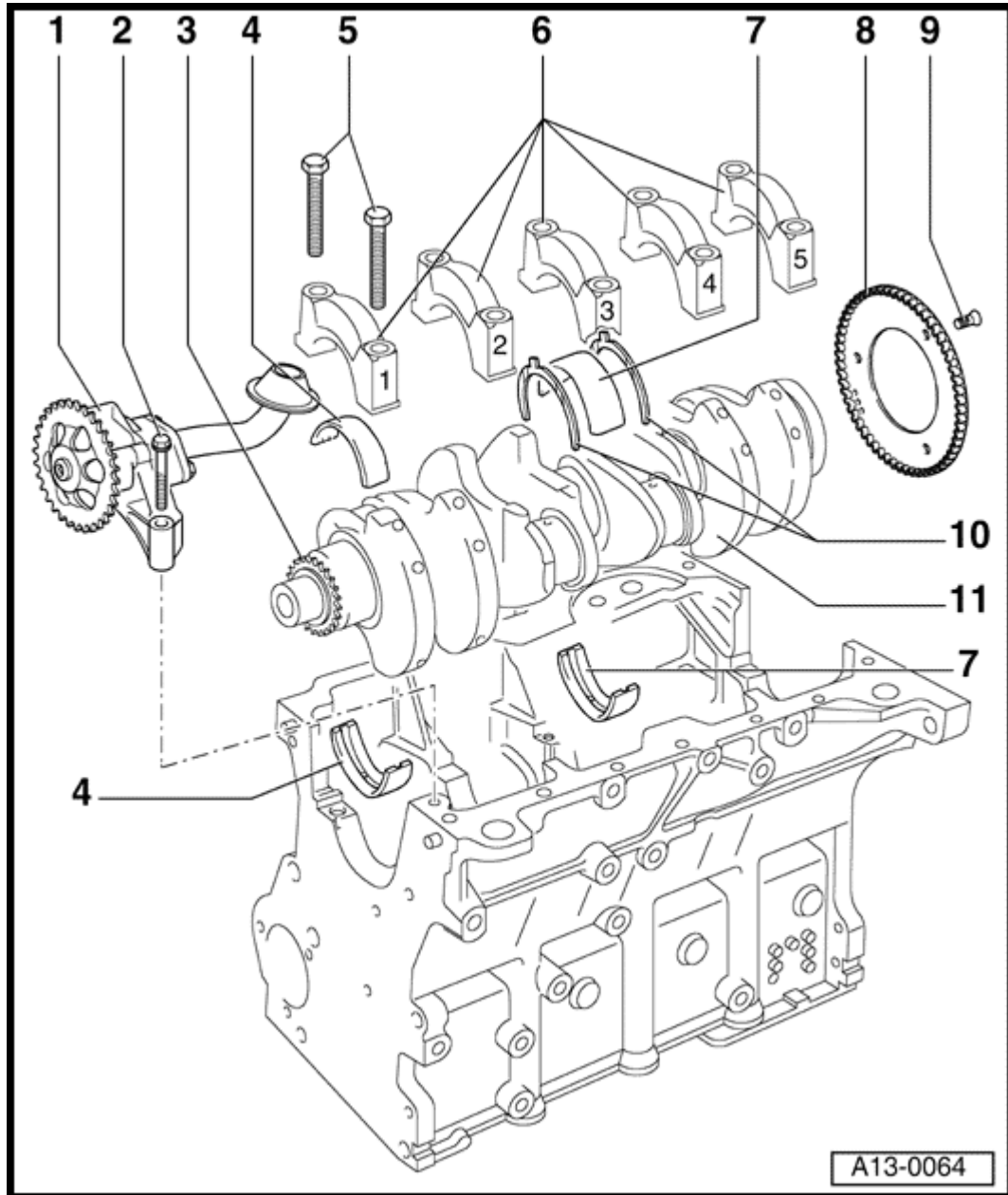
- ◆ Removing and installing ⇒ [Page 17-1](#)

2 - 15 Nm

3 - Chain sprocket

◆ For oil pump drive

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Crankshaft, removing and installing (Page 13-35)



4 - Bearing caps 1, 2, 4 and 5

- ◆ For bearing cap without oil groove
- ◆ For cylinder block with oil groove
- ◆ Do not interchange used bearing shells (mark)

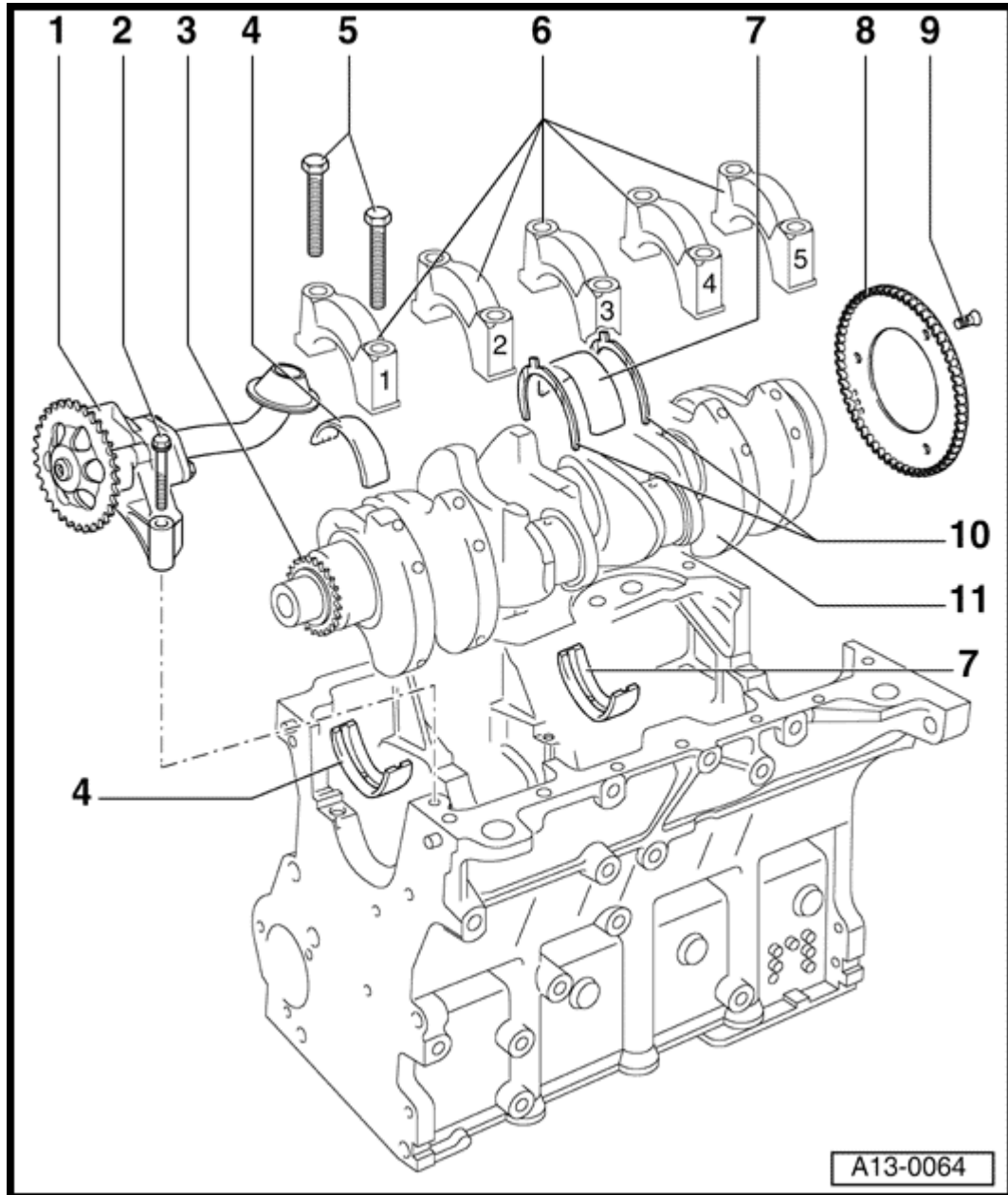
5 - 65 Nm + 90° (1/4 turn) further

- ◆ Replacing
- ◆ Threaded along complete length (screw)
- ◆ Tighten to 65 Nm when measuring radial clearance

6 - Bearing cap

- ◆ Bearing cap 1: pulley end
- ◆ Bearing cap 3 with recesses for thrust washers
- ◆ Bearing shell retaining lugs (cylinder block/bearing cap) must be on the same side

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Crankshaft, removing and installing (Page 13-36)



7 - Bearing shell 3

- ◆ For bearing cap without oil groove
- ◆ For cylinder block with oil groove
- ◆ Do not interchange used bearing shells (mark)

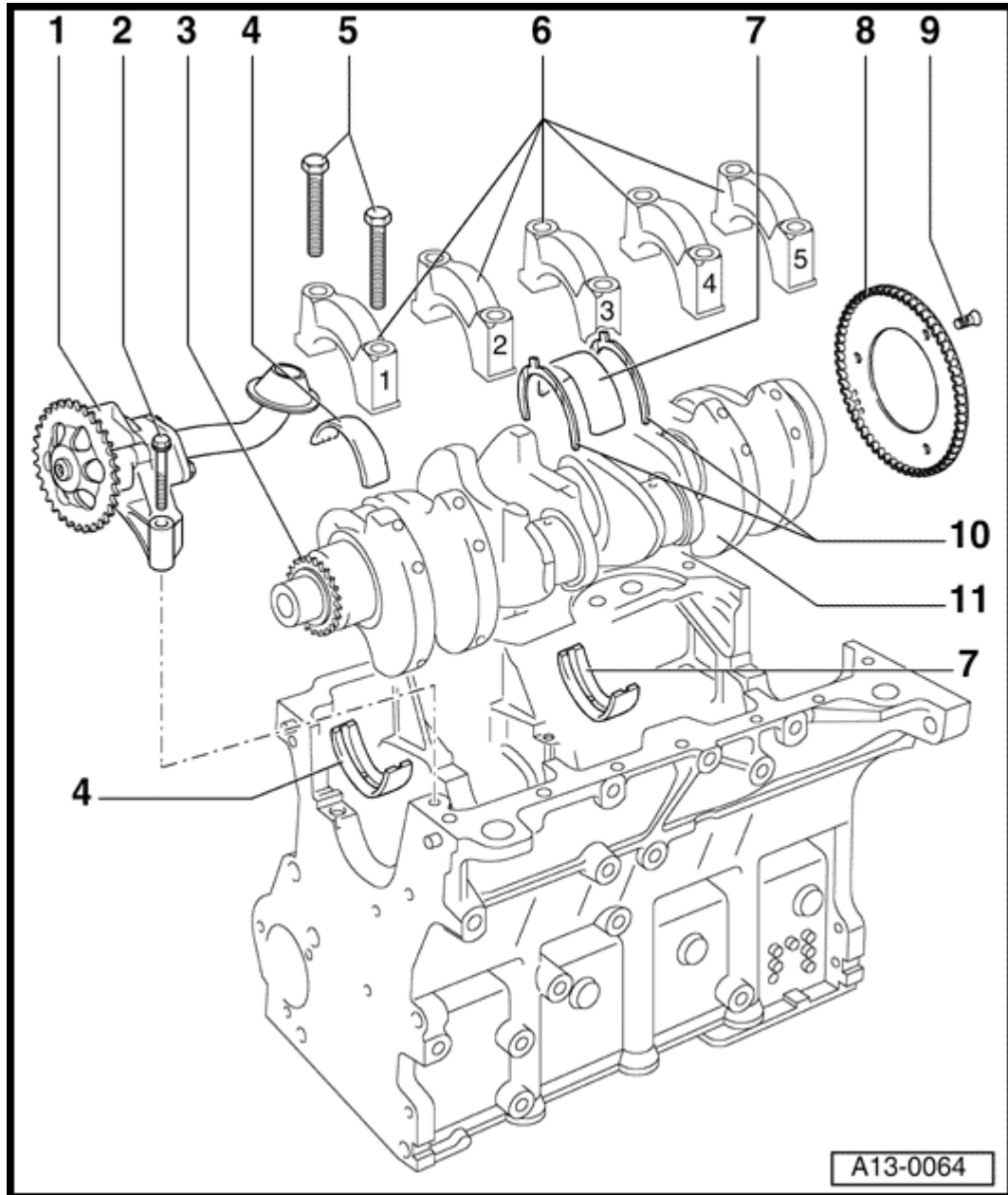
8 - Sender wheel

- ◆ Replace
- ◆ For engine speed sender (G28)
- ◆ Can only be installed in one position (holes are offset)

9 - 10 Nm + 1/4 turn (90°) further

◆ Replace

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Crankshaft, removing and installing (Page 13-37)



10 - Thrust washer

- ◆ For bearing 3 bearing cap
- ◆ Note fixing arrangement

11 - Crankshaft

Axial clearance:

- ◆ New: 0.07-0.23 mm
- ◆ Wear limit: 0.30 mm

Checking radial clearance with Plastigage:

- ◆ New: 0.01-0.04 mm

- ◆ Wear limit: 0.15 mm
- ◆ Do not rotate the crankshaft when checking the radial clearance
- ◆ Crankshaft dimensions ⇒ [Page 13-38](#)

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Crankshaft, removing and installing (Page 13-38)

Crankshaft dimensions

(in mm)

Honing dimension	Main journal -\varnothing	Connectingrod journal-\varnothing
Basic dimension	-0.022 54.00 -0.042	-0.022 47.80 -0.042
1st undersize	-0.022 53.75 -0.042	-0.022 47.55 -0.042
2nd undersize	-0.022 53.50 -0.042	-0.022 47.30 -0.042
3rd undersize	-0.022 53.25 -0.042	-0.022 47.05 -0.042

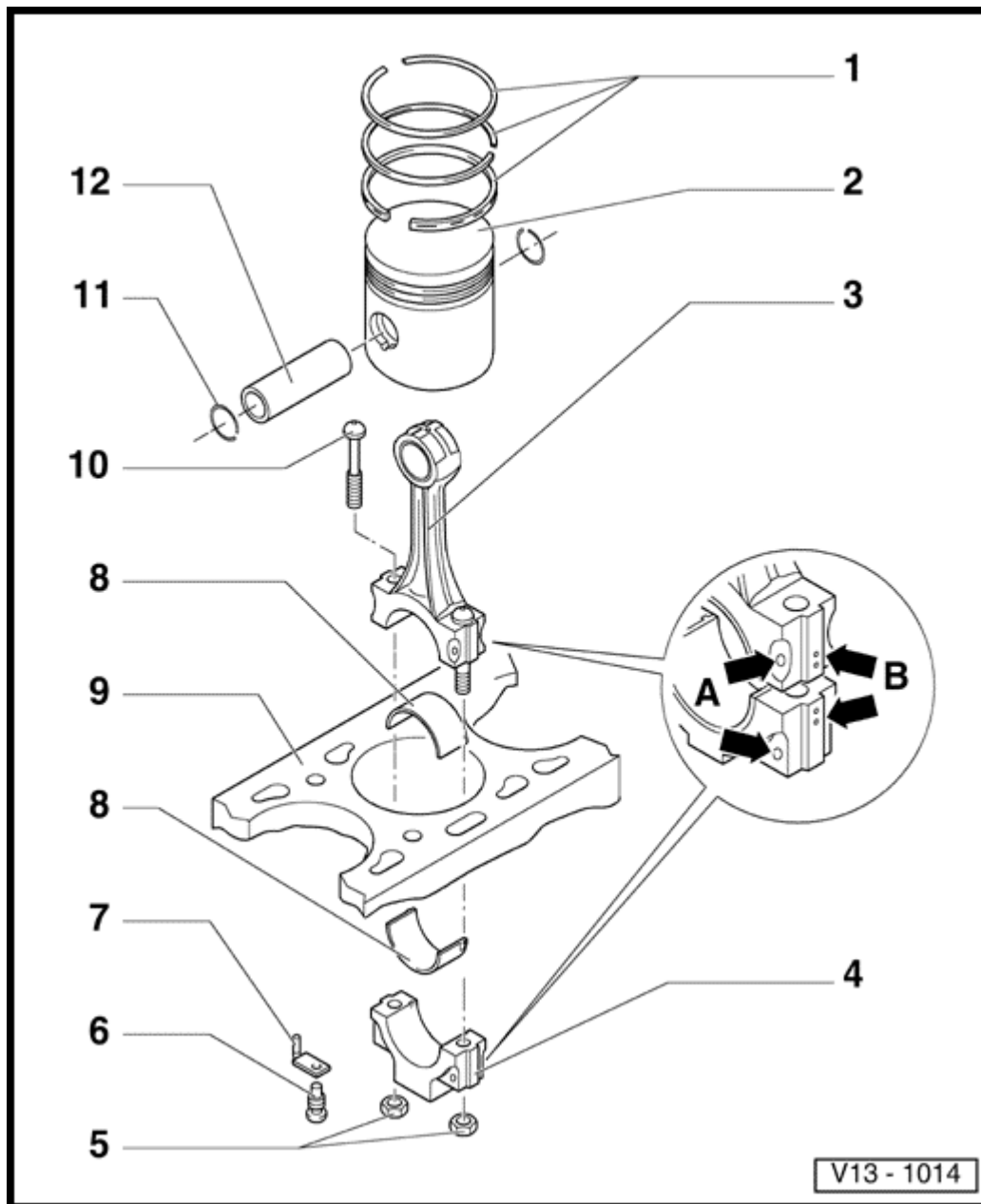
Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Crankshaft, removing and installing (Page 13-39)

Notes:

Secure engine to engine bracket VW 540 on assembly stand when disassembling/assembling engine.



1 - Piston ring

- ◆ Offset gaps by 1205
- ◆ Remove and install with piston ring pliers
- ◆ "TOP" faces toward piston crown
- ◆ Checking ring gap ⇒ [Fig. 1](#)
- ◆ Checking ring to groove clearance ⇒ [Fig. 2](#)

- ◆ 2 or 3 part oil scraper ring, mixed installations permissible

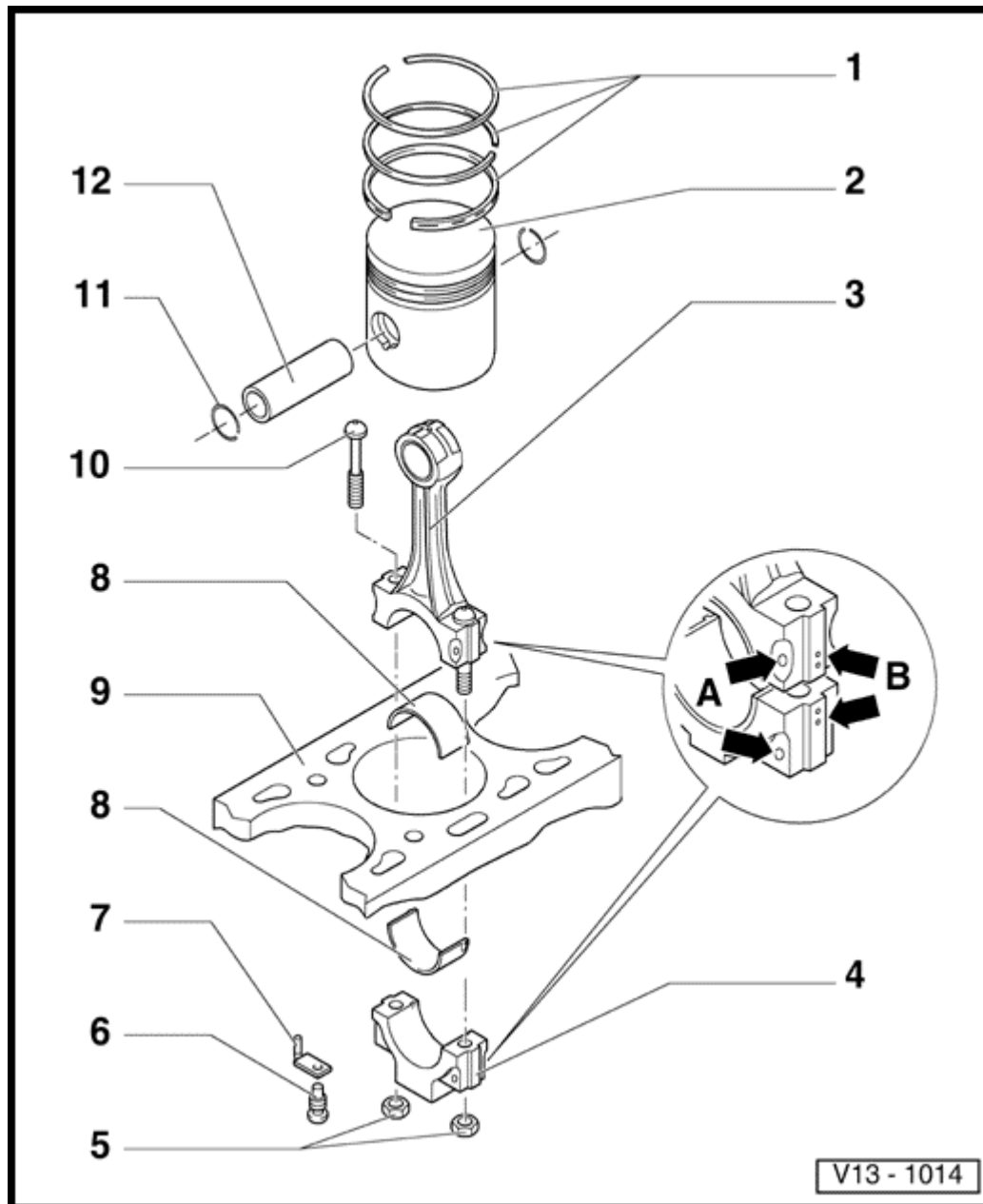
2 - Piston

- ◆ Checking ⇒ [Fig. 3](#)
- ◆ Mark installation position and cylinder number
- ◆ Arrow on piston crown points to pulley end
- ◆ Install using piston ring clamp

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Pistons and connecting rods, disassembling and assembling (Page 13-40)



3 - Connecting rod

- ◆ Only replace as a set
- ◆ Mark cylinder number - B -
- ◆ Installation position: Marking - A - faces toward pulley end

4 - Connecting rod bearing cap

- ◆ Note installation position

5 - 30 Nm + 1/4 turn (90°) further

- ◆ Replace
- ◆

Oil threads and contact surface

- ◆ To measure radial clearance tighten to 30 Nm but not further

6 - Pressure relief valve, 27 Nm

- ◆ Opening pressure: 2.5-3.2 bar

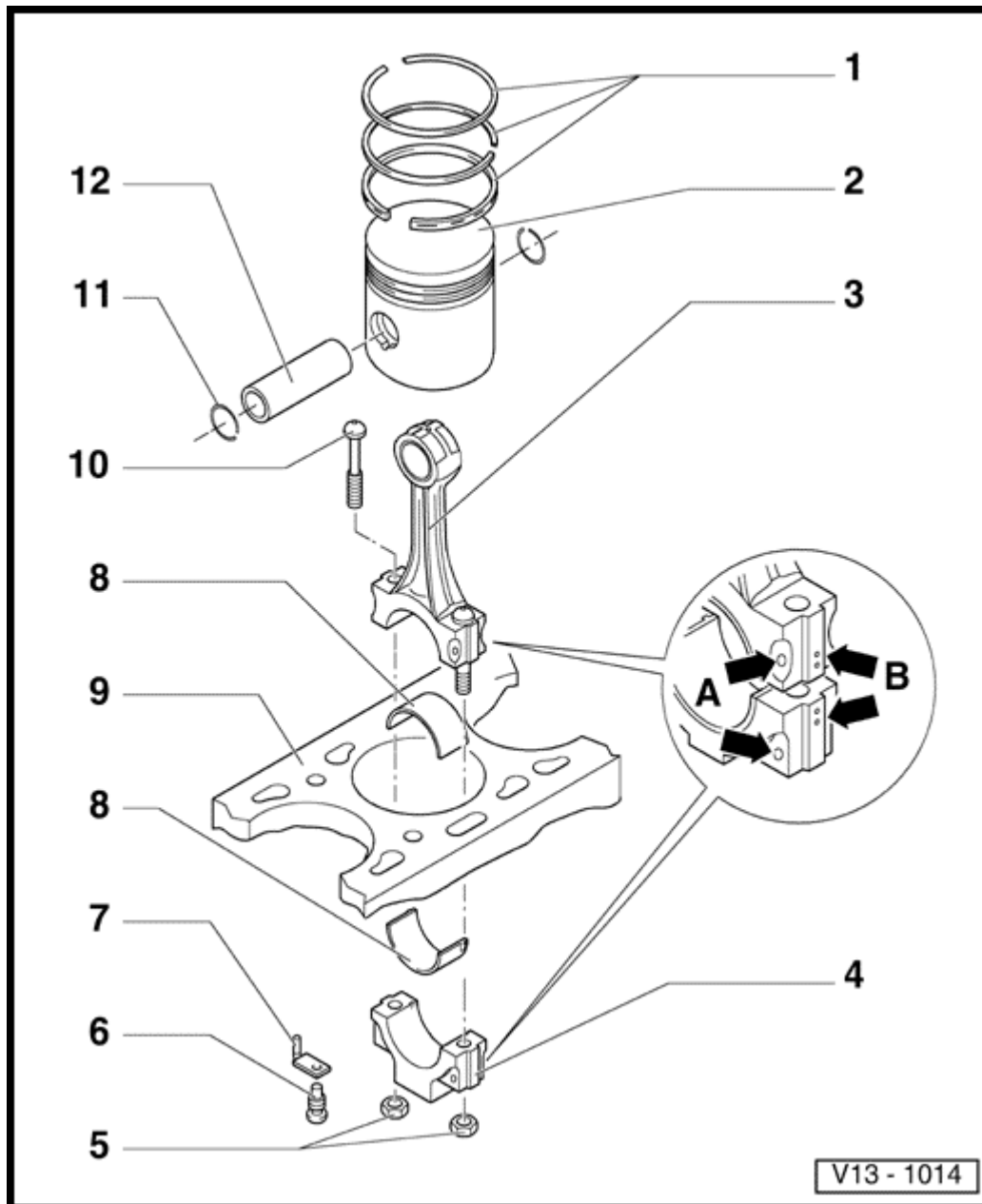
7 - Oil spray jet

- ◆ For piston cooling

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Pistons and connecting rods, disassembling and assembling (Page 13-41)



8 - Bearing shell

- ◆ Note installation position
- ◆ Do not interchange used bearing shells
- ◆ Ensure retaining lugs fit tightly in recesses
- ◆ Axial clearance New: 0.10-0.31 mm Wear limit: 0.40 mm

Check radial clearance with Plastigage:

- ◆ New: 0.01-0.05 mm
- ◆ Wear limit: 0.12 mm
- ◆

Do not rotate crankshaft when checking radial clearance

9 - Cylinder block

- ◆ Checking cylinder bores ⇒ [Fig. 4](#)
- ◆ Piston and cylinder dimensions ⇒ [Page 13-46](#)

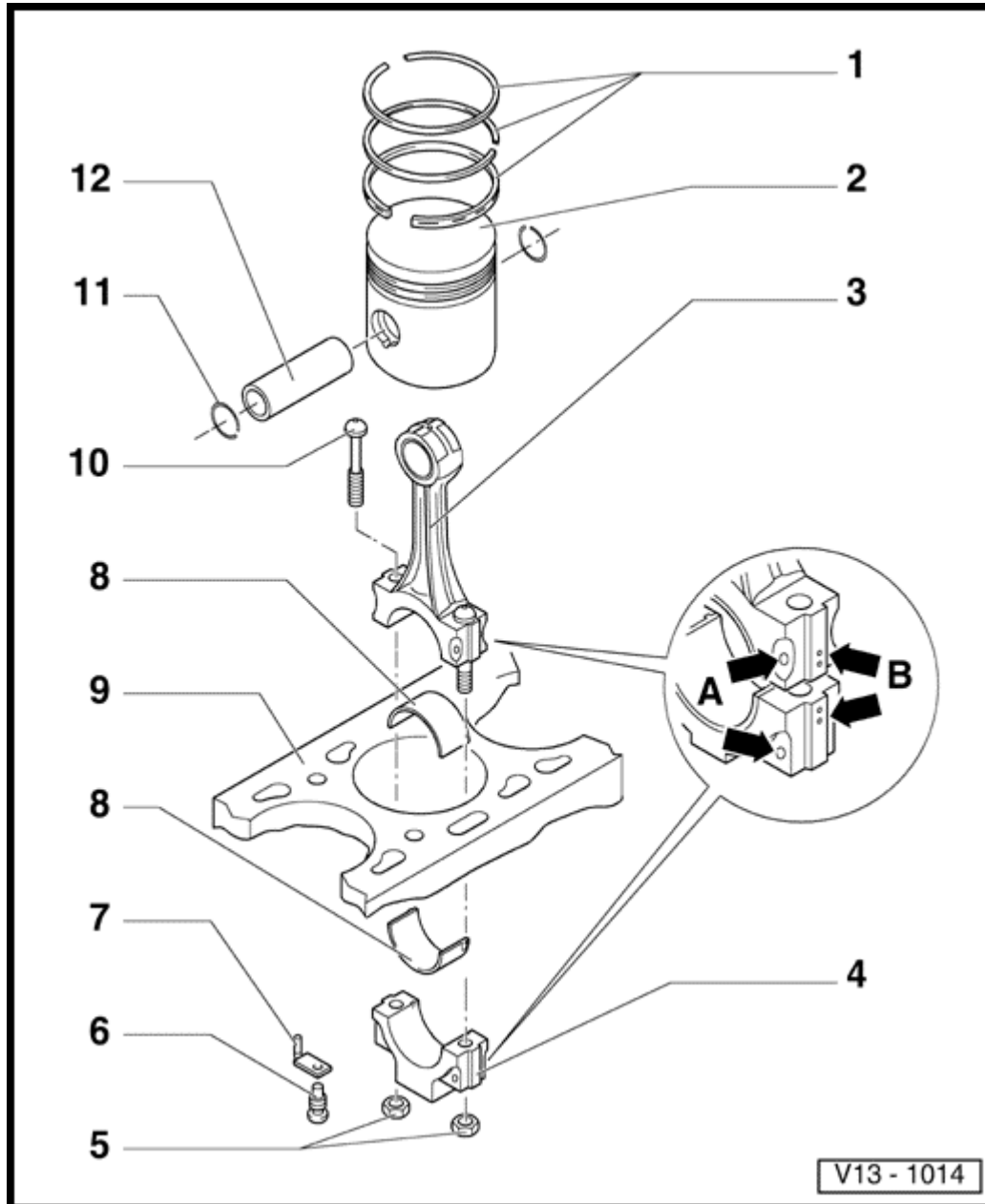
10 - Connecting rod bolt

- ◆ Replace

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Pistons and connecting rods, disassembling and assembling (Page 13-42)

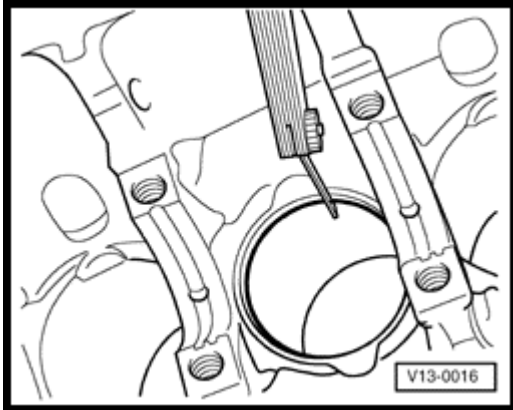


11 - Circlip

12 - Piston pin

- ◆ If difficult to remove, heat piston to 60° C
- ◆ Remove and install with VW 222a

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Pistons and connecting rods, disassembling and assembling (Page 13-43)



A

Fig. 1 Checking piston ring gap

Special tools and equipment

- ♦ Feeler gauges
- Push ring squarely from above down to approx. 15 mm from bottom end of cylinder.

Piston ring		Gap	
		New	Wear limit
Compression rings	mm	0.15-0.40	0.8
Oil scraper ring	mm	0.25-0.50	1.0

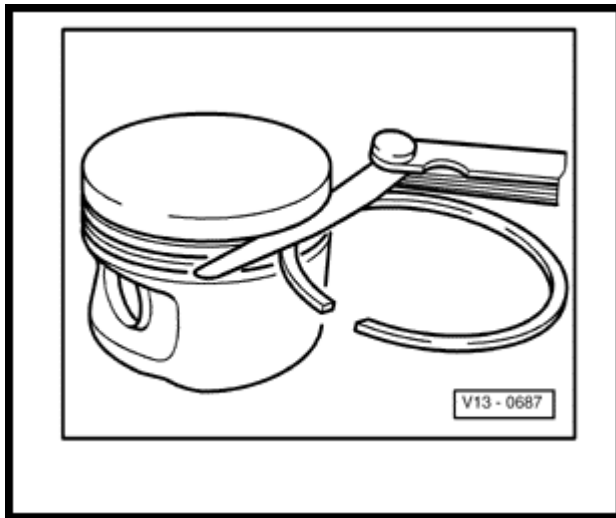


Fig. 2 Checking ring to groove clearance

Special tools and equipment

- ◆ Feeler gauges
- Clean groove before check.

Piston ring	Clearance		
		New	Wear limit
Compression rings	mm	0.02-0.07	0.12
Oil scraper ring	mm	0.02-0.06	0.12

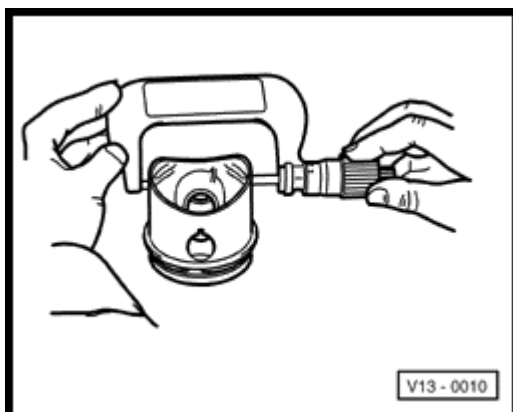


Fig. 3 Checking piston

Special tools and equipment

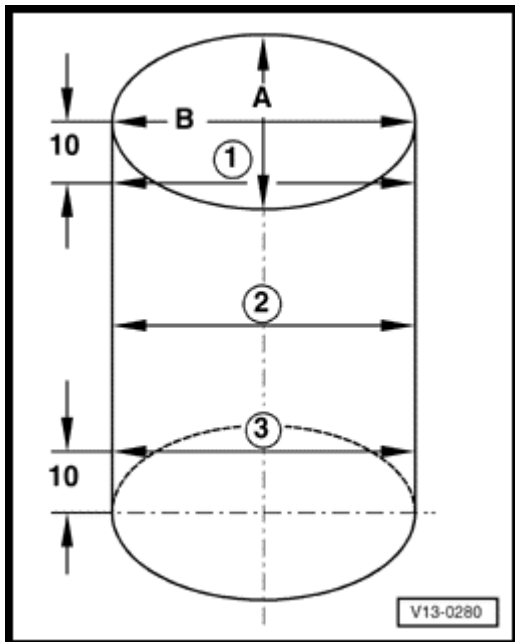
- ◆ Micrometer 75-100 mm

- Measure pistons approx. 10 mm from the lower edge of skirt, at 90° to the piston pin axis.
- Deviation from nominal dimension max.: 0.04 mm

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Pistons and connecting rods, disassembling and assembling (Page 13-45)



A

Fig. 4 Checking cylinder bores

Special tools and equipment

- ◆ Internal dial gauge 50-100 mm
- ◆ Measure bores at 3 locations in both directions - A - across the engine and - B - in line with crankshaft.
- ◆ Deviation from nominal dimension max.: 0.10 mm

Notes:

Measuring the cylinder bores must not be done when the cylinder block is mounted on a repair stand with adapter bracket VW 540, as incorrect measurements would then be possible.

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Pistons and connecting rods, disassembling and assembling (Page 13-46)

Piston and cylinder dimensions

Honing dimension		Piston- \varnothing	Cylinder bore- \varnothing
Basic dimen.	mm	80.965 ¹⁾	81.01
1st oversize	mm	81.465 ¹⁾	81.51

¹⁾ Dimension without graphite coating (thickness 0.02 mm). The graphite coating wears away.