

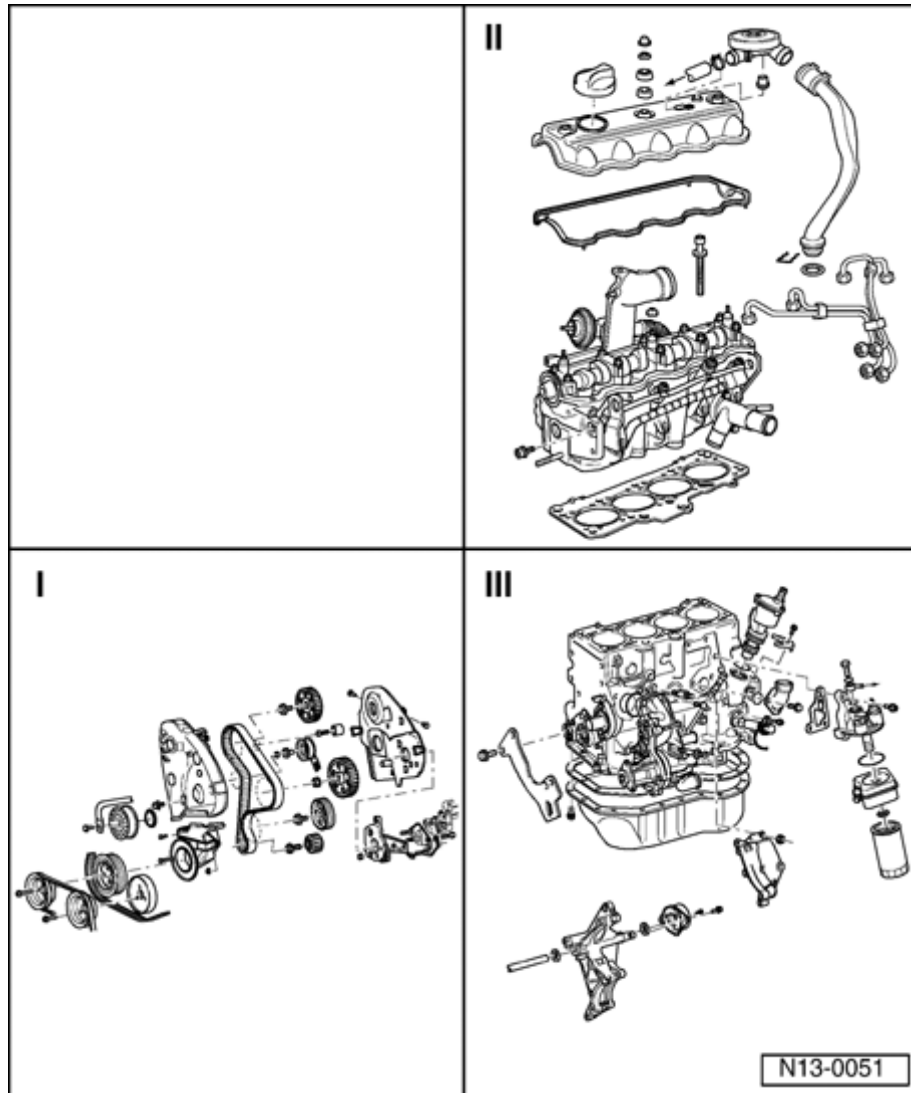
Engine, disassembling and assembling

WARNING!

- ◆ *Do not re-use fasteners that are worn or deformed in normal use.*
- ◆ *Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow recommendations in this manual—replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.*

CAUTION!

- ◆ *If metal shavings or quantities of small metal particles are found in the engine oil, from crankshaft and connecting rod bearing wear, thoroughly clean the oil passages to help prevent further damage.*
- ◆ *The oil cooler cannot be sufficiently cleaned, and must be replaced.*



Section I

⇒ [Page 13-3](#)

Section II

⇒ [Page 13-7](#)

Section III

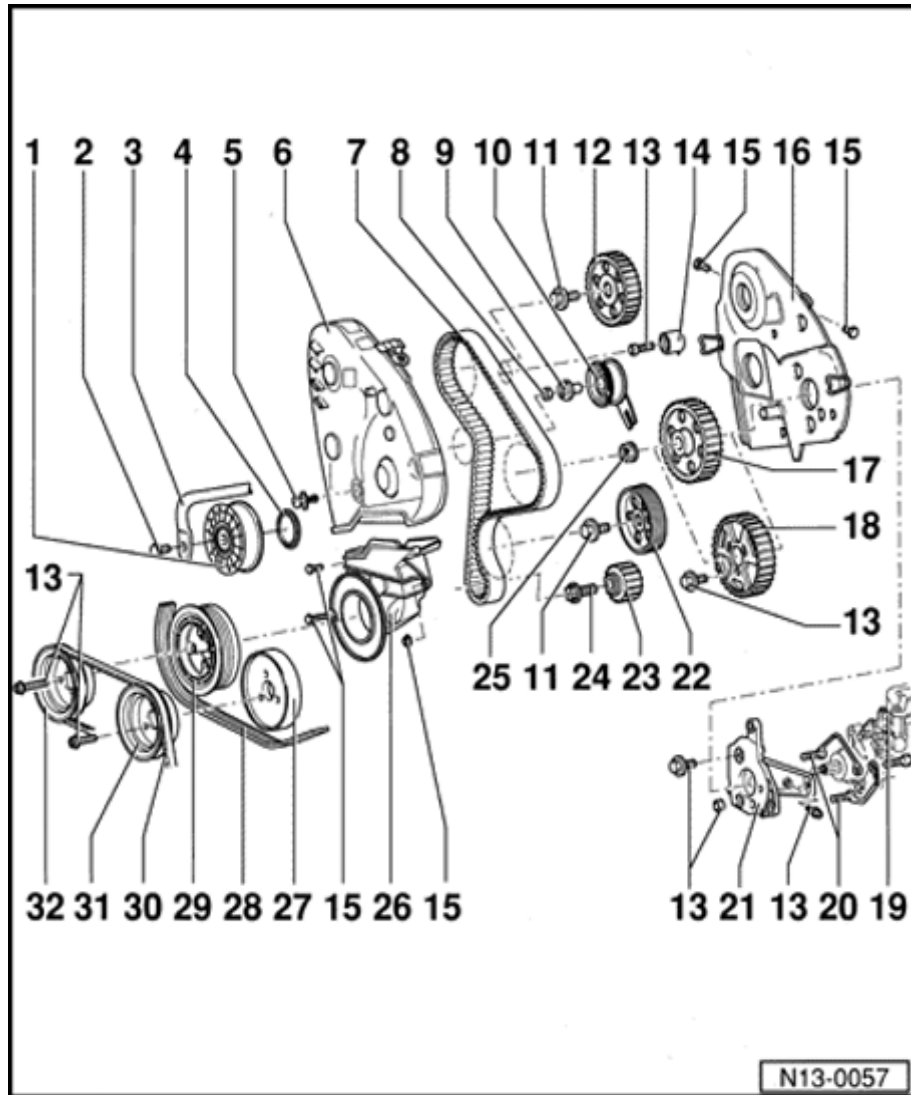
⇒ [Page 13-10](#)

Notes:

- ◆ *Faulty fuel injectors can cause severe engine knock and resulting bearing damage.*
- ◆ *To check for faulty fuel injectors, run the engine at idle and loosen one injector line fitting at a time. If the knocking stops after loosening a line, the corresponding fuel injector to that line is malfunctioning.*

Servicing fuel injectors:

- ◆ *Engine code AAZ ⇒ [Repair Manual, 1.9 Liter 4-Cyl. 2V Eco-Diesel Fuel Injection & Glow Plug, Engine Code\(s\): AAZ, Repair Group 23](#) .*
- ◆ *Engine codes 1Z, AHU ⇒ [Repair Manual, 1.9 Liter 4-Cyl. 2V TDI Fuel Injection & Glow Plug, Engine Code\(s\): 1Z, AHU, Repair Group 23](#) .*



Section I

1 - Tensioning roller

2 - 20 Nm (15 ft lb)

3 - Tensioning lever

4 - Dust cap

5 - Expansion clip

6 - Toothed belt guard, upper

7 - Toothed belt

- ◆ Mark running direction before removing
- ◆ Inspect for wear
- ◆ Do not bend or kink
- ◆ Removing and installing ⇒ [Page 13-18](#)

8 - Nut

Manual tensioning roller:

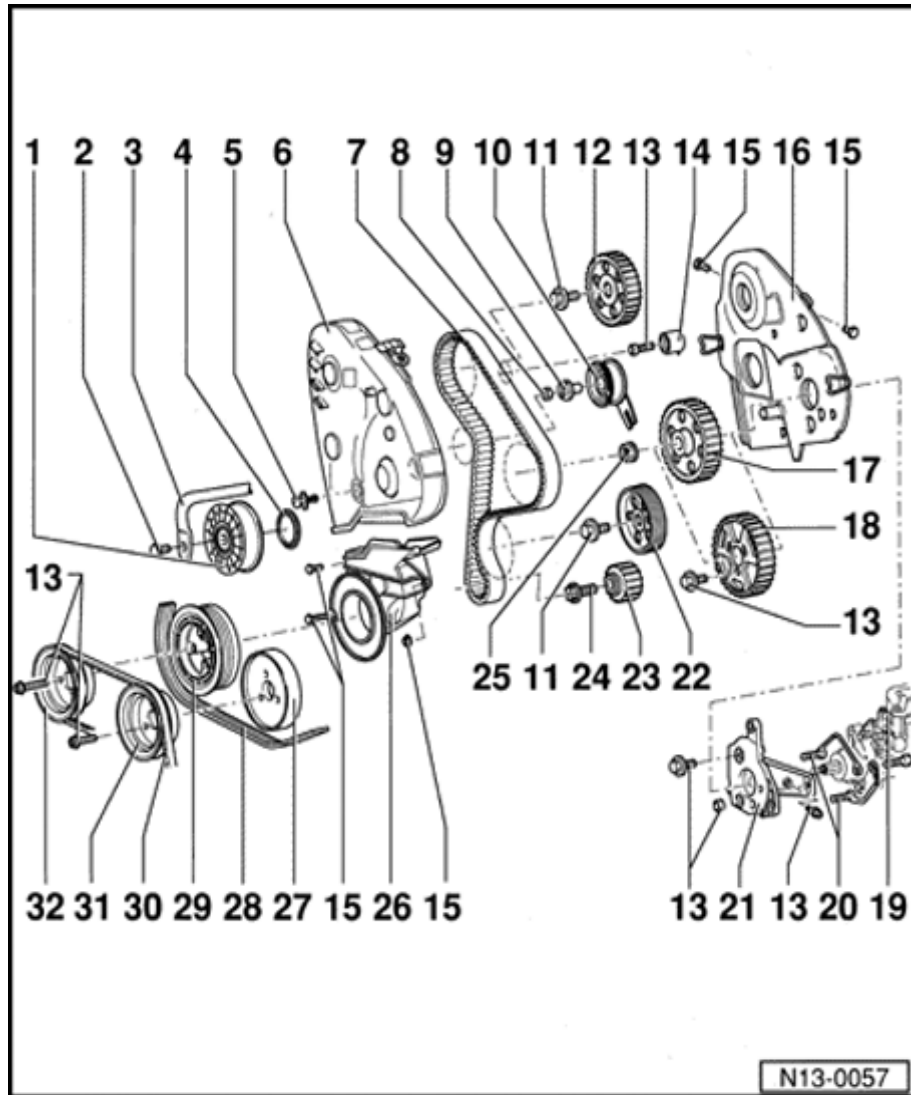
- ◆ 45 Nm (33 ft lb)

Semi-automatic tensioning roller:

- ◆ 20 Nm (15 ft lb)
- ◆ First requires basic setting ⇒ [Page 13-26](#)

9 - Cam

- ◆ For tensioning roller - 10 -



10 - Tensioning roller

- ◆ Semi-automatic tension roller (engine codes 1Z, AHU) shown
- ◆ Tensioning requires basic setting ⇒ [Page 13-26](#)

11 - 45 Nm (33 ft lb)

12 - Camshaft sprocket

- ◆ Loosen from tapered end of camshaft by tapping with hammer on punch inserted through hole in rear drive belt guard

13 - 25 Nm (18 ft lb)

14 - Idler pulley

- ◆ For engine codes 1Z, AHU

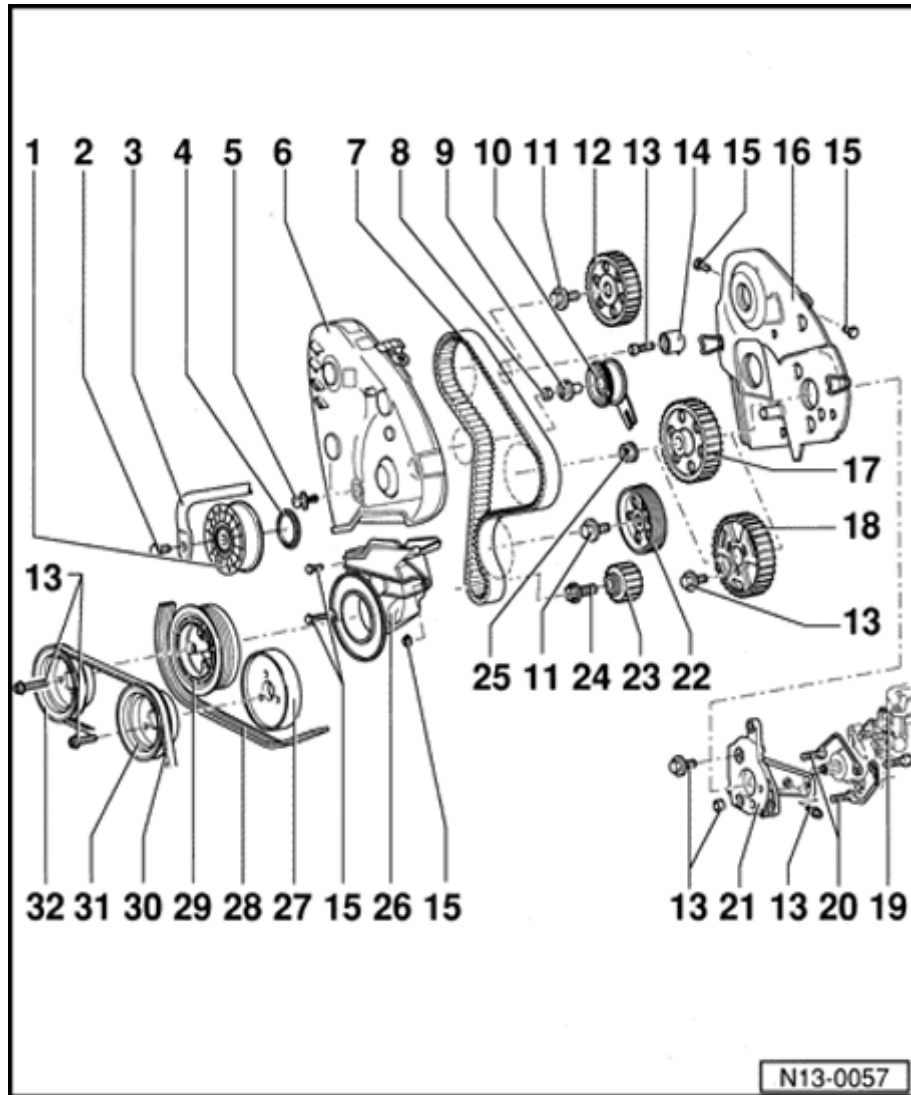
15 - 10 Nm (7 ft lb)

16 - Toothed belt guard, rear

17 - Injection pump sprocket

- ◆ Removing ⇒ [Page 13-30](#)

18 - Not applicable



19 - Injection pump

Removing and installing:

- ◆ Engine code AAZ ⇒ [Repair Manual, 1.9 Liter 4-Cyl. 2V Eco-Diesel Fuel Injection & Glow Plug, Engine Code\(s\): AAZ, Repair Group 23](#)
- ◆ Engine codes 1Z, AHU ⇒ [Repair Manual, 1.9 Liter 4-Cyl. 2V TDI Fuel Injection & Glow Plug, Engine Code\(s\): 1Z, AHU, Repair Group 23](#).

20 - Bracket

- ◆ Engine codes 1Z, AHU

21 - Console

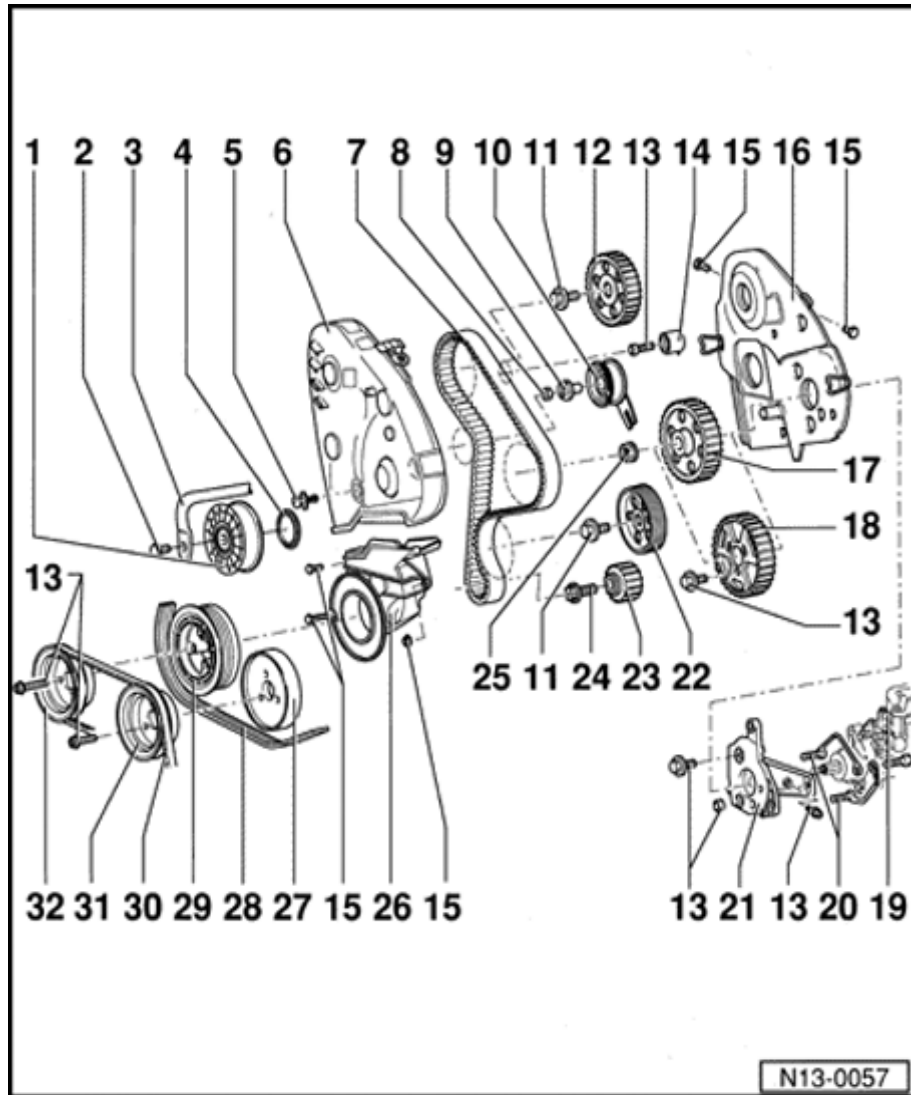
22 - Intermediate shaft sprocket

23 - Crankshaft sprocket

- ◆ For toothed belt

24 - 90 Nm (66 ft lb) + 1/4-turn (90°)

- ◆ Always replace
- ◆ Loosen and tighten using 3099 spur belt spreading tool
- ◆ Lubricate thread and collar
- ◆ Additional 1/4-turn can be performed in more than 1 increment, if necessary



25 - Nut

Engine code AAZ

- ◆ 45 Nm (33 ft lb)

Engine codes 1Z, AHU

- ◆ 55 Nm (41 ft lb)

26 - Toothed belt guard, lower

27 - Belt pulley

- ◆ For engine coolant pump
- ◆ Ribbed belt version

28 - Ribbed belt

- ◆ Mark running direction before removing
- ◆ Removing and installing ⇒ [Page 13-14](#)

29 - Belt-pulley/vibration damper

- ◆ Can only be installed in one position

30 - V-belt

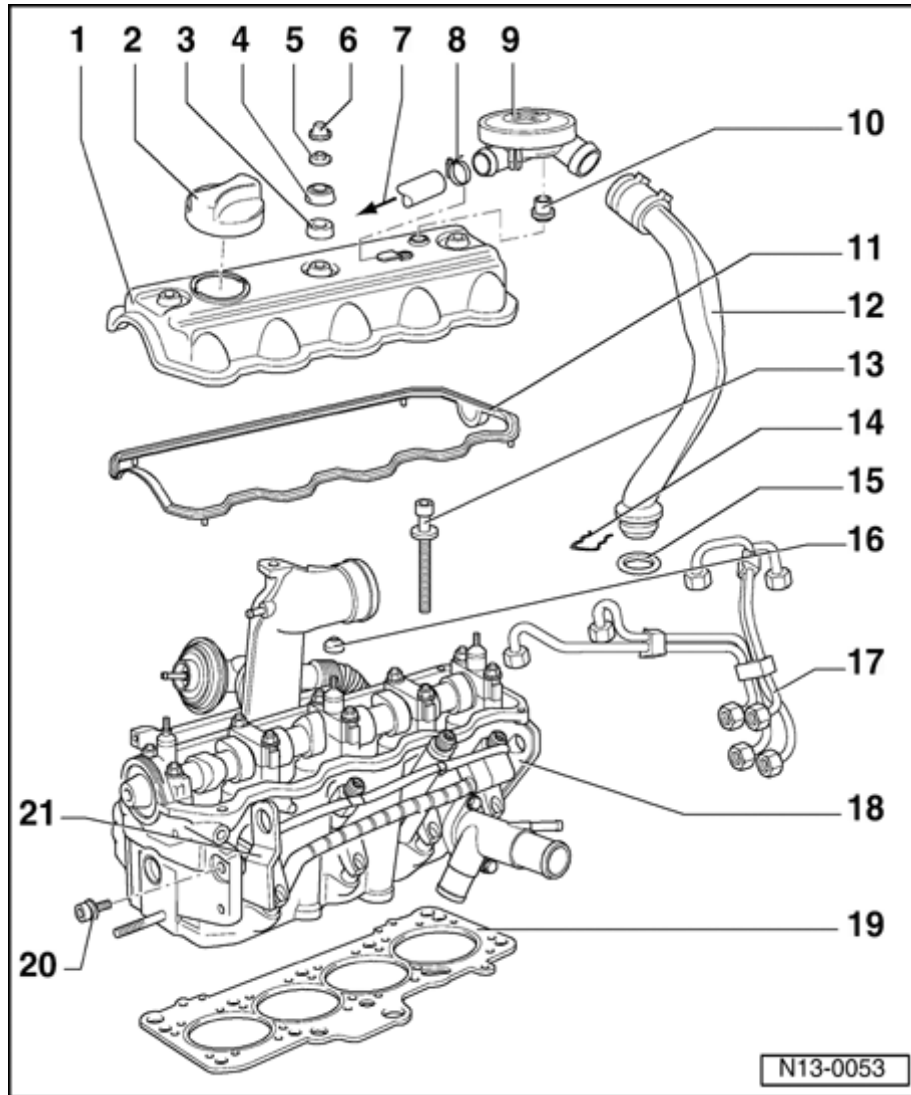
- ◆ Adjusting Repair Manual, Suspension, Wheel, Brakes, Steering, Repair Group 48

31 - Pulley

- ◆ For engine coolant pump

◆ V-belt version shown

32 - Pulley



Section II

1 - Trim cover

◆ TDI only

2 - Cylinder head cover

3 - Cap

◆ Replace seal if damaged

4 - Upper sealing washer

5 - Cup washer

6 - 10 Nm (7 ft lb)

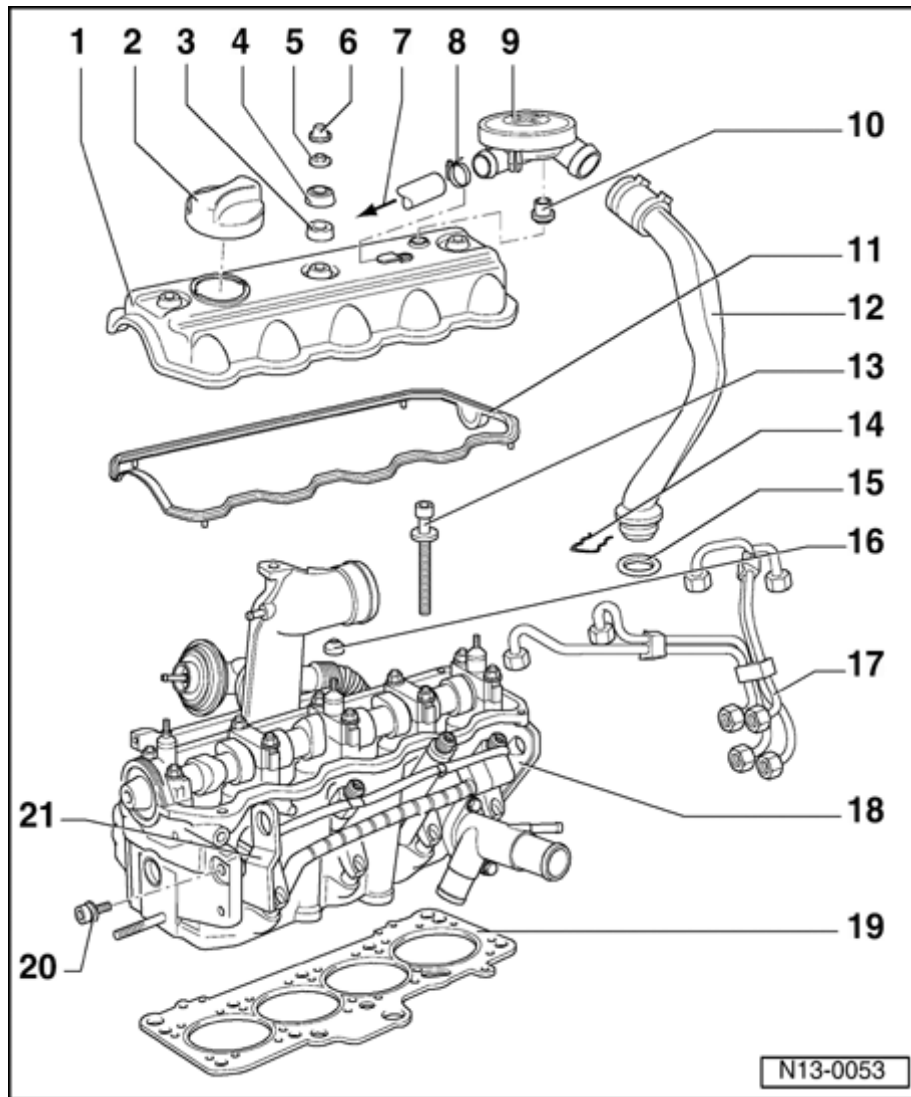
7 - Cap

8 - To intake air duct

9 - Retaining clip

10 - Positive Crankcase Ventilation (PCV) valve

◆ For crankcase ventilation



11 - Gasket

- ◆ Replace if damaged

12 - Cylinder head cover gasket

- ◆ Replace if damaged

13 - Crankcase breather

14 - Cylinder head bolt

- ◆ Note sequence when loosening and tightening ⇒ [Page 15-9](#)

15 - Mounting clip

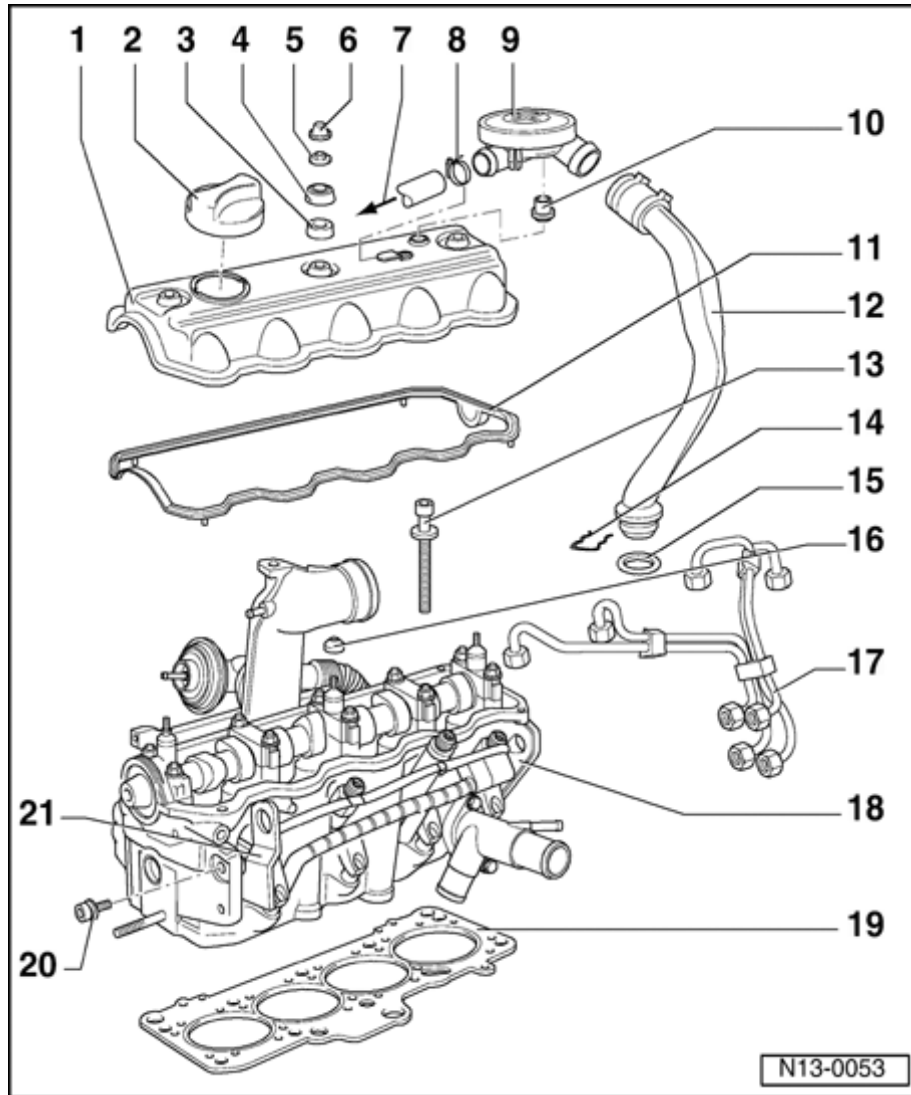
16 - O-ring

- ◆ Always replace

17 - Cone seal, lower

18 - Fuel injector lines

- ◆ Tighten to 25 Nm (18 ft lb)
- ◆ Remove using 3035 injector line wrench
- ◆ Always remove fuel line cluster as a single assembly
- ◆ Do not bend or alter shape



19 - Cylinder head

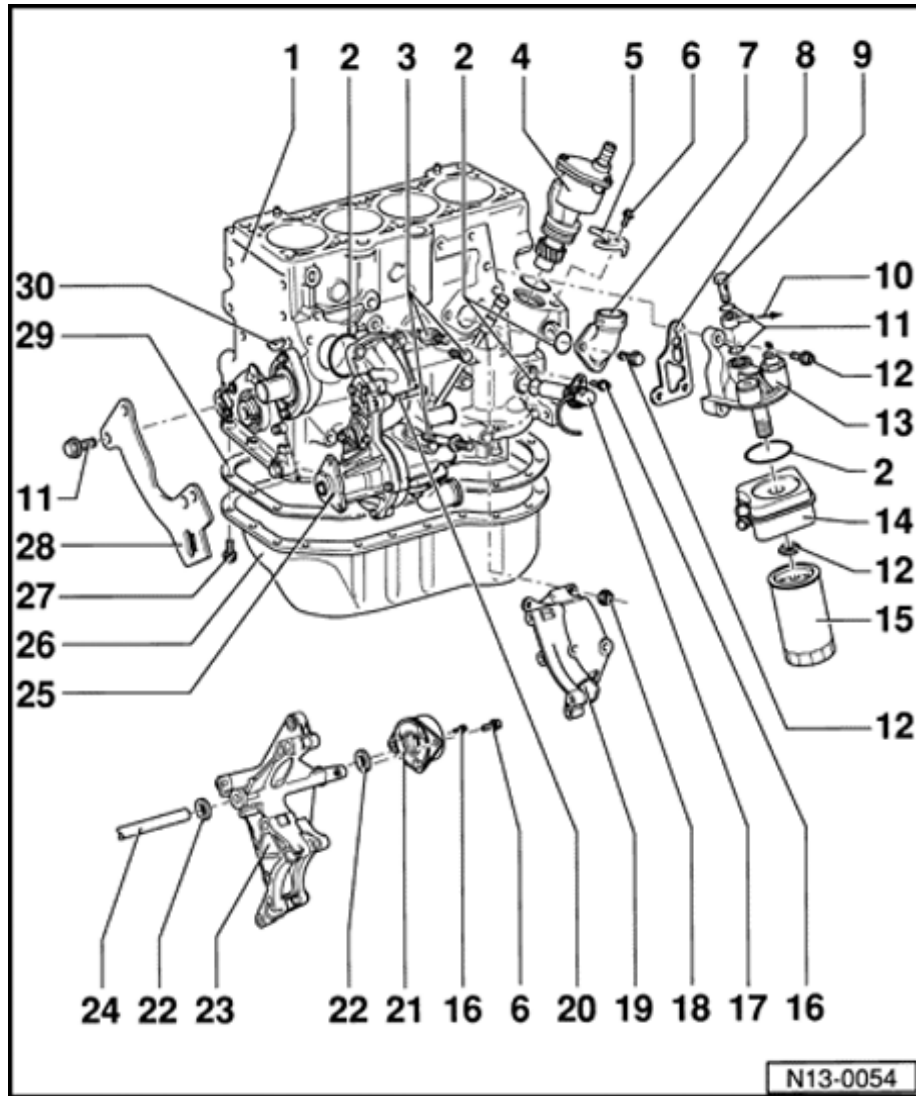
- ◆ Removing & installing ⇒ [Page 15-3](#)
- ◆ If replaced, also completely replace engine coolant

20 - Cylinder head gasket

- ◆ Always replace
- ◆ Note marking ⇒ [Page 13-50](#)
- ◆ If replaced, also completely replace engine coolant

21 - 20 Nm (15 ft lb)

22 - Lifting eye



Section III

1 - Cylinder block

- ◆ Removing and installing sealing flange and flywheel/drive plate ⇒ [Page 13-31](#)
- ◆ Removing and installing crankshaft ⇒ [Page 13-37](#)
- ◆ Disassembling and assembling pistons and connecting rods ⇒ [Page 13-42](#)

2 - O-ring

- ◆ Replace if damaged

3 - 20 Nm (15 ft lb) + 1/4-turn (90°)

- ◆ Always replace

4 - Vacuum pump

5 - Yoke clamp

6 - 20 Nm (15 ft lb)

7 - Flange connection

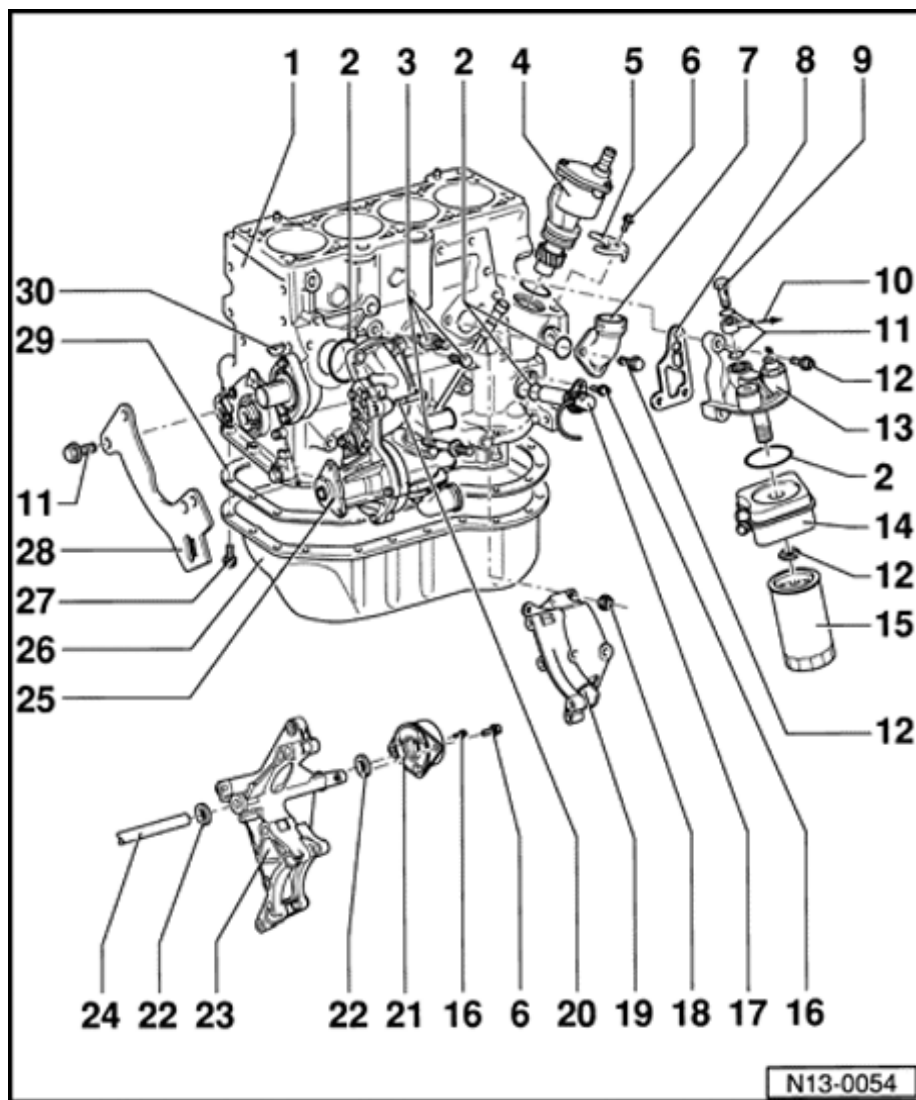
- ◆ For crankcase breather

8 - Gasket

- ◆ Always replace

9 - Banjo bolt

◆ 25 Nm (18 ft lb)



10 - To turbocharger

11 - Sealing ring

◆ Always replace

12 - 25 Nm (18 ft lb)

13 - Oil filter bracket

14 - Oil cooler

◆ Coat contact area to flange, outside seal, with AMV 188 100 02

◆ Check for adequate clearance to adjacent components

◆ See CAUTION! ⇒ [Page 13-1](#)

15 - Oil filter

◆ Use strap wrench to loosen

◆ Tighten by hand

◆ Note instructions on filter when installing

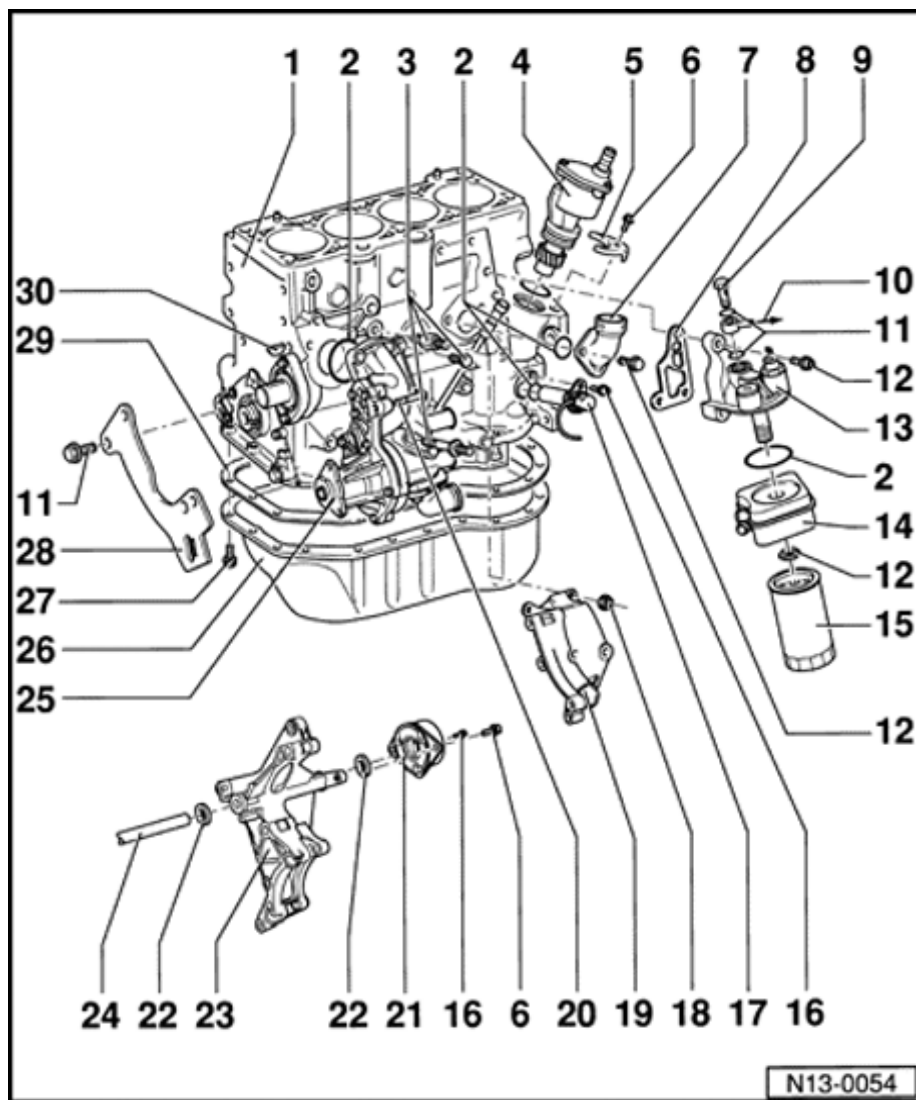
16 - 10 Nm (7 ft lb)

17 - Engine speed (RPM) sensor

18 - 30 Nm (22 ft lb)

19 - Bracket

◆ For ribbed belt without tensioner



20 - Hammer-head bolt

21 - Tensioning element

22 - Sealing ring

- ◆ Replace if damaged

23 - Bracket

- ◆ For ribbed belt with tensioner

24 - Tensioning lever

25 - Engine coolant pump

- ◆ Disassembling and assembling ⇒ [Page 19-8](#)

26 - Oil pan

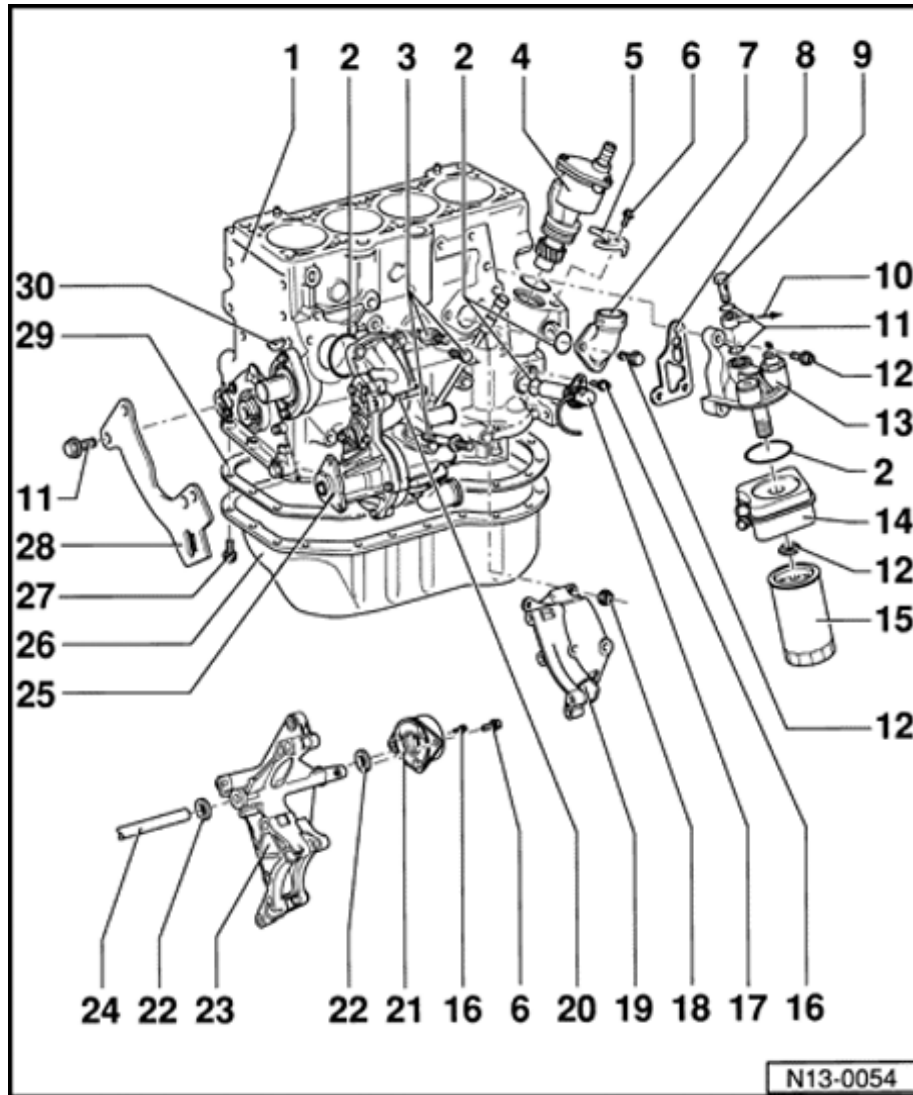
- ◆ Clean sealing surface before installing

27 - 20 Nm (15 ft lb)

- ◆ Remove and install both rear bolts on transmission end using 3185 swivel wrench

28 - Bracket

- ◆ For power steering pump



29 - Oil pan gasket

- ◆ Always replace
- ◆ Engine code AAZ with baffle plate: replace if seal is damaged
- ◆ Before installing gasket, coat oil pan flange/cylinder block flange with "D2"

30 - Woodruff key

- ◆ Check for tight fit



Ribbed belt, removing and installing

Belt drive without tensioner

Belt drive with tensioner ⇒ [Page 13-16](#)

Special tools, testers and auxiliary items

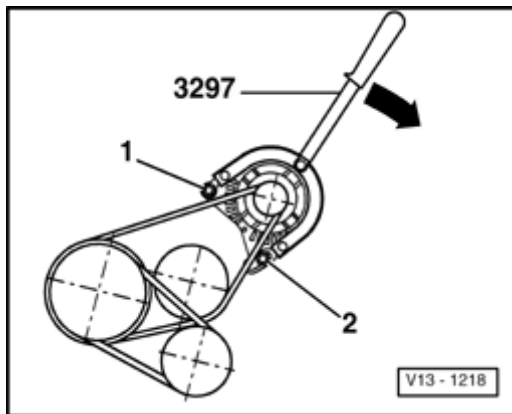
- ◆ 3297 lever

Note:

Before removing the ribbed belt, mark the running direction. When installing the belt, make sure it is correctly seated in the pulley.

Removing

- Loosen generator mounting bolts -1- and -2- at least one turn.
 - Press down on generator using 3297 lever and remove ribbed belt from generator pulley.
 - Remove power steering pump V-belt.
- ⇒ *Repair Manual, Suspension, Wheel, Brakes, Steering, Repair Group 48*
- Remove ribbed belt.



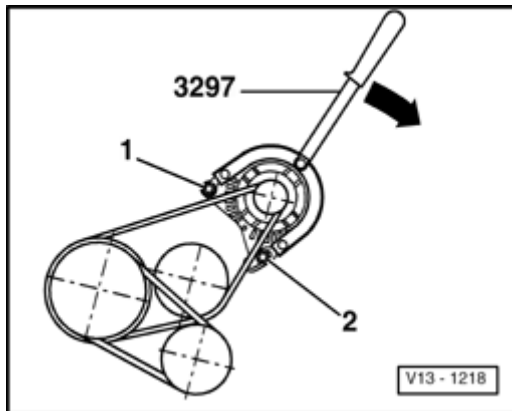


Installing

- Place ribbed belt on crankshaft pulley/vibration damper and coolant pump pulley.
- Install power steering pump V-belt.

⇒ *Repair Manual, Suspension, Wheel, Brakes, Steering, Repair Group 48*

- Push generator down onto stop at least 3 times using 3297 lever, to make sure that it moves freely.



A

- Push down on generator using 3297 and install ribbed belt.

Note:

If the engine has not yet been installed, continue with this sequence AFTER the engine has been installed.

- Idle engine for at least 10 seconds with generator loose.

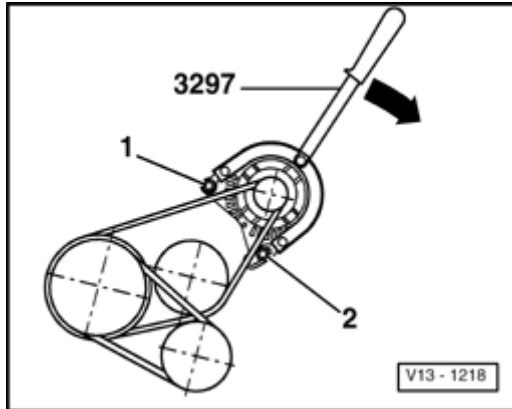
Note:

When tightening the generator bolts, observe tightening sequence, do not use generator for support and do not touch the ribbed belt.

- Tighten mounting bolt -2- to 25 Nm (18 ft lb).

A

- Tighten mounting bolt -1- to 25 Nm (18 ft lb).





Belt drive with tensioner

Special tools, testers and auxiliary items

3299 ribbed belt install. tool.

Removing

A

- Lift tensioning roller using tool 3299 and remove ribbed belt from generator pulley.
- Remove power steering pump V-belt.

⇒ *Repair Manual, Suspension, Wheel, Brakes, Steering, Repair Group 48*

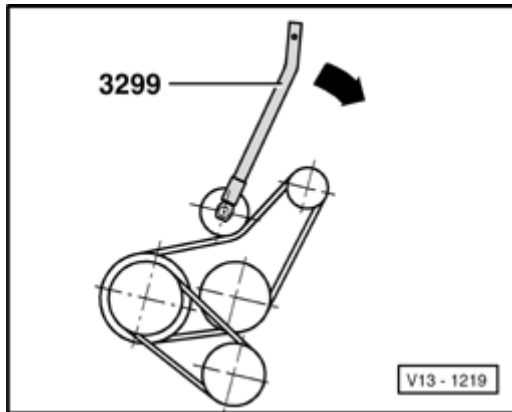
- Remove ribbed belt.

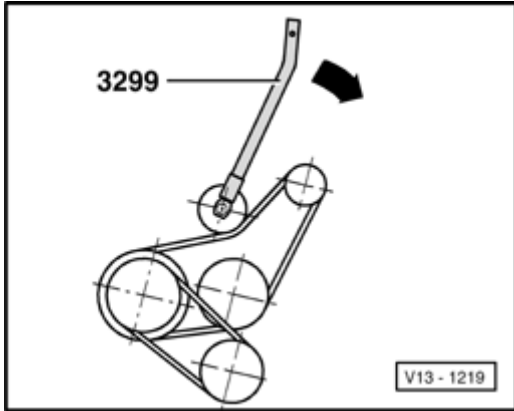
Installing

- Place ribbed belt on crankshaft pulley/vibration damper.
- Install power steering pump V-belt.

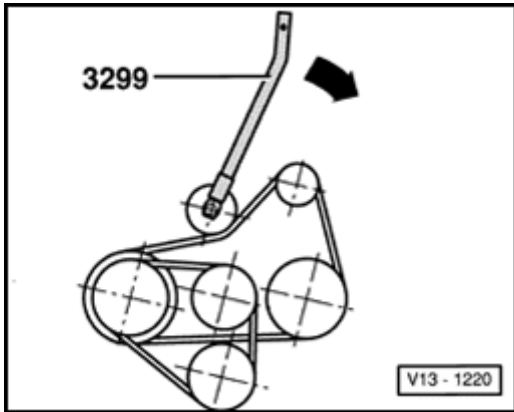
⇒ *Repair Manual, Suspension, Wheel, Brakes, Steering, Repair Group 48*

- Lift tensioning roller using tool 3299 and install ribbed belt.





A Without A/C compressor



A With A/C compressor



Toothed belt, removing and installing (engine code AAZ 09.94 ➤)

Special tools, testers and auxiliary items

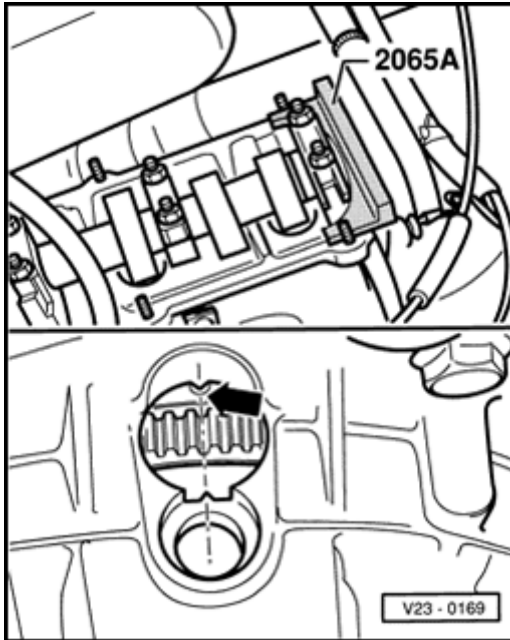
- ◆ 3297 lever (for ribbed belt without tensioning roller)
- ◆ 3299 ribbed belt install. tool (for ribbed belt with tensioning roller)
- ◆ 2065A setting bar
- ◆ 2064 lock pin
- ◆ Pin wrench (e.g. Matra V159)
- ◆ VAG1331 torque wrench, 5 to 50 Nm range
- ◆ VW210 gauge belt tensioner (for engines without semi-automatic tensioning roller)

Removing

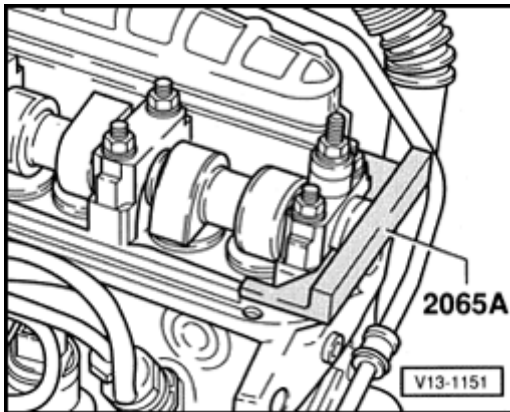
- Removing ribbed belt.

⇒ [Page 13-14](#)

- If installed, remove ribbed belt tensioning roller.
- Remove upper toothed belt guard and cylinder head cover.



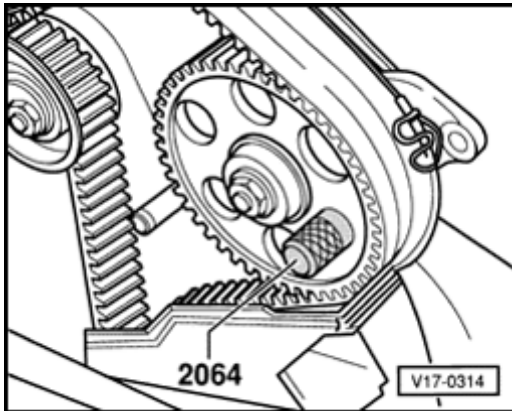
- A
- Turn crankshaft to TDC for number 1 cylinder (arrow).
 - Lock camshaft using 2065A setting bar.



- A
- Center 2065A setting bar by turning camshaft so that one side of setting bar contacts cylinder head.
 - Measure gap between other end of setting bar and cylinder head using feeler gauge.
 - Divide that measurement in half and place feeler gauge corresponding to half measurement between setting bar and cylinder head.



- Turn camshaft until setting bar contacts feeler gauge, then place 2nd feeler gauge (of same 1/2 measurement) on opposite side between setting bar and cylinder head.



A

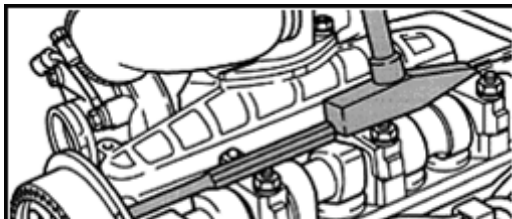
- Lock injection pump sprocket using pin.
- Loosen tensioner.
- Remove vibration damper and belt pulley.
- Remove lower toothed belt guard.
- Mark toothed belt running direction.

Engines with semi-automatic tensioning roller

- Remove idler pulley.
- Remove toothed belt.

Installing

- Make sure TDC mark on flywheel and reference mark are aligned.

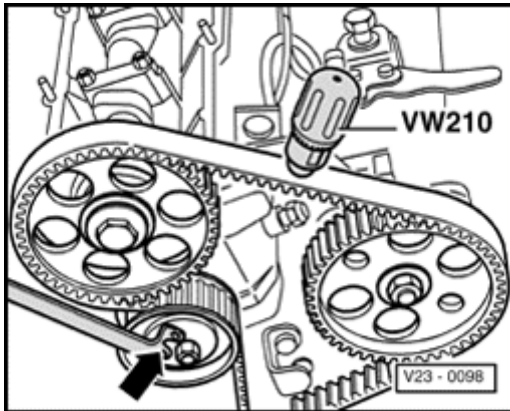


A

- Loosen camshaft sprocket mounting bolt 1/2 turn. Release camshaft sprocket from camshaft taper by very carefully tapping with hammer on soft drift inserted through hole of rear toothed belt guard or by GENTLY hitting sprocket squarely on sprocket teeth using synthetic face hammer.



Engines without semi-automatic tensioning roller



A

- Install toothed belt (note running direction) and remove pin from fuel injection pump sprocket.
- Tension toothed belt by turning tensioner to right (arrow) using pin wrench, e.g. Matra V159.

Scale value: 12 to 13; measured between camshaft sprocket and diesel injection pump sprocket

- Tighten lock nut on tensioner.

Tightening torque: 45 Nm (33 ft lb)

- Tighten camshaft sprocket mounting bolt.

Tightening torque: 45 Nm (33 ft lb)

- Remove setting bar.

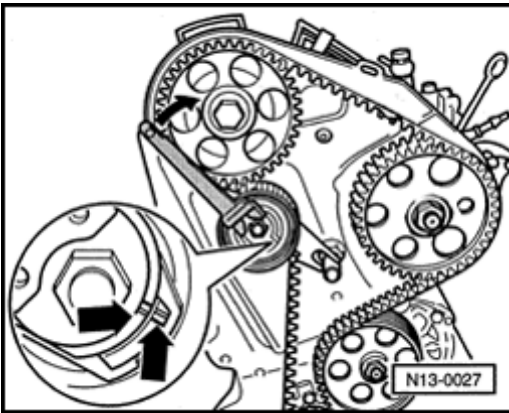
- Turn crankshaft two rotations in engine running direction and check toothed belt tension again.



Engines with semi-automatic tensioning roller

- Install toothed belt (note running direction) and remove pin from fuel injection pump sprocket.
- Install idler pulley and tighten.

Tightening torque: 25 Nm (18 ft lb)



A

- Turn tensioning roller to right using pin wrench (e.g. Matra V159) until notch aligns with raised portion (arrows).
 - Tighten lock nut on tensioning roller.
- Tightening torque: 20 Nm (15 ft lb)
- Check again to make sure TDC mark on flywheel and reference mark are aligned.
 - Tighten camshaft sprocket mounting bolt.
- Tightening torque: 45 Nm (33 ft lb)
- Remove setting bar.



All engines

- Install toothed belt guard, vibration damper, belt pulley, and cylinder head cover.

- Install ribbed belt ⇒ [Page 13-14](#) .

- Check fuel delivery (via adjusting screw)
⇒ [Repair Manual, 1.9 Liter 4-Cyl. 2V Eco-Diesel Fuel Injection & Glow Plug, Engine Code\(s\): AAZ, Repair Group 23](#)

- Check fuel delivery (via adjusting screw)
⇒ [Repair Manual, 1.9](#)

Liter 4-Cyl. 2V TDI Fuel
Injection & Glow Plug,
Engine Code(s): 1Z,
AHU, Repair Group 23



Toothed belt, removing and installing (engine codes AAZ ➤ 10.94, 1Z, AHU)

Special tools

- ◆ 2065A setting bar
- ◆ 3359 locating pin (engine code AAZ)
- ◆ 2064 lock pin (engine codes 1Z, AHU)
- ◆ Matra V159 pin wrench or equivalent; e.g. Hazet 2587, US4493

Removing

- Remove ribbed belt ⇒ [Page 13-14](#) .
- Remove ribbed belt tensioning roller (if installed).
- Remove upper toothed belt guard and valve cover.
- Set crankshaft to TDC for cylinder 1 and lock camshaft using 2065A setting bar.



A

Center the 2065A setting bar as follows:

- Turn locked camshaft, with setting bar in place, until one end of setting bar touches cylinder head.
- Measure gap at other end of setting bar using feeler gauge.

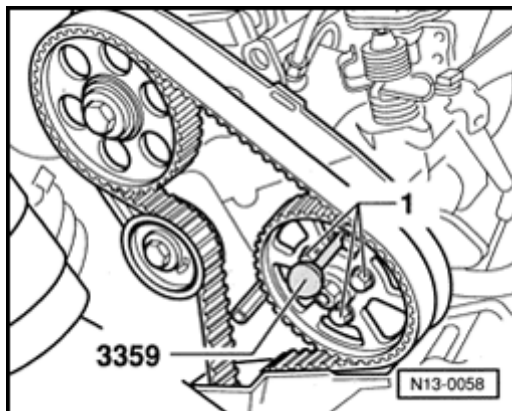


- Select feeler gauge that is one half of measured gap, and temporarily install between setting bar and cylinder head.

Notes:

- ◆ *Illustration shows engine code AAZ (3 mounting bolts)*
- ◆ *Engine codes 1Z, AHU uses a center mounting bolt.*

- Turn camshaft so that setting bar is resting against feeler gauge then insert second feeler gauge of same thickness at other end between setting bar and cylinder head.



A

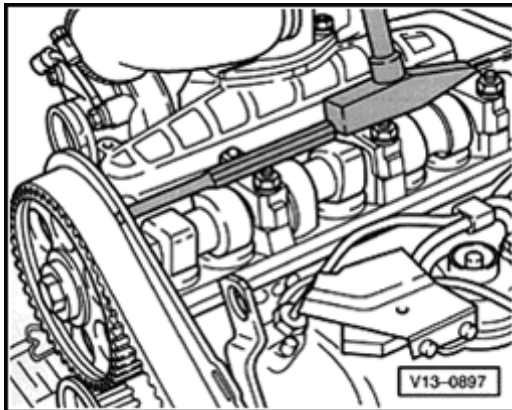
- Lock injection pump sprocket using lock pin.
 - ◆ Engine code AAZ: 3359 rig pin
 - ◆ Engine codes 1Z, AHU: 2064 lock pin
- Loosen injection pump sprocket mounting bolts -1- (AAZ) or center bolt (1Z, AHU).
- Loosen tensioner roller.
- Remove vibration damper and belt pulley.

- Remove lower toothed belt guard.
- Clearly identify toothed belt running direction using felt marker.
- Remove toothed belt.



Installing belt and adjusting tension (basic setting)

- Make sure that TDC marks on flywheel and references align.
- Loosen camshaft sprocket mounting bolt(s) 1/2-turn.

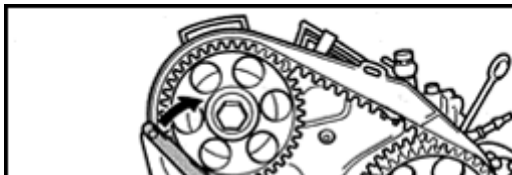


A

- Loosen from tapered end of camshaft by very carefully tapping with hammer on soft drift inserted through hole of rear toothed belt guard or by GENTLY hitting sprocket squarely on sprocket teeth using synthetic face hammer.
 - Place belt onto toothed belt sprocket/crankshaft, intermediate shaft sprocket, injection pump sprocket and tension roller.
- Note running direction of belt.
- Place camshaft sprocket together with toothed belt and tighten mounting bolts. Camshaft sprocket can still be turned.

Note:

Illustration shows engine code 1Z ; engine code AAZ is similar.



A

- Turn tensioner roller to right using Matra V159 pin wrench (or equivalent) until notch and lifting arrow are across from one another.
- Tighten tensioner roller clamp nut.

Tightening torque: 20 Nm (15 ft lb)



- Make sure that TDC marks on flywheel and reference are still in alignment.
- Tighten camshaft sprocket mounting bolt.

Tightening torque: 45 Nm (33 ft lb)

- Tighten injection pump sprocket mounting bolt(s).

Tightening torque: 25 Nm (18 ft lb)

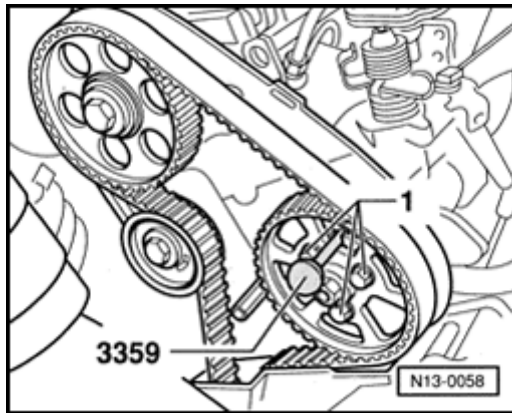
- Remove setting bar.
- Remove pin.
- Turn crankshaft twice in direction of rotation and place again at TDC for cylinder 1.

Engine codes 1Z, AHU



A

- Make sure injection pump sprocket can be locked using 2064 lock pin.



Engine code AAZ

A

- Check whether injection pump sprocket can be locked using 3359 rig pin.

All engines

If injection pump sprocket cannot be locked:

- Loosen injection pump sprocket mounting bolt(s).
- Turn injection pump until locating pin fits.
- Tighten injection pump sprocket mounting bolt(s).

Tightening torque: 25 Nm (18 ft lb)

- Remove locating pin.
- Install belt guard, vibration damper, pulley and valve cover.
- Install ribbed belt ⇒ [Page 13-14](#) .



Semi-automatic toothed belt tensioning roller, checking

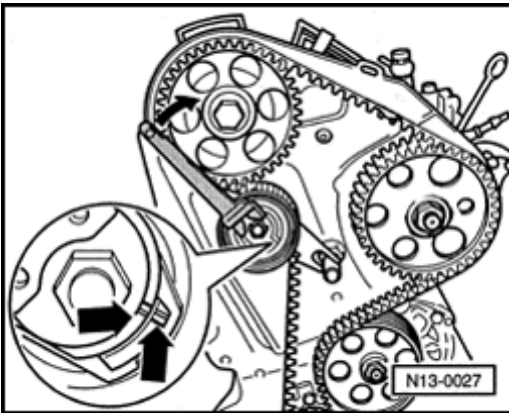
Test conditions

- Toothed belt installed and tensioned

Test sequence

A

- Tension toothed belt using firm thumb pressure.
- Notched and raised portion (arrows) must move apart.
- Release thumb pressure on toothed belt.
- The tensioning roller must move back to its initial position. (Notched and raised portions align again)





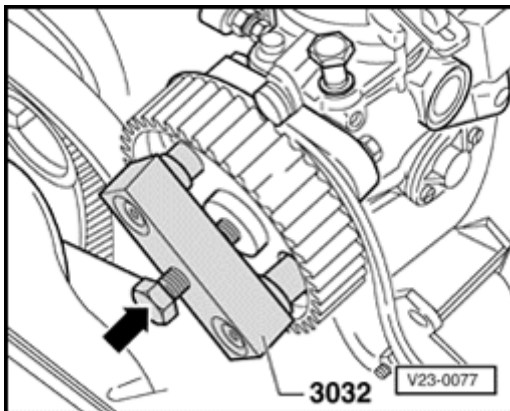
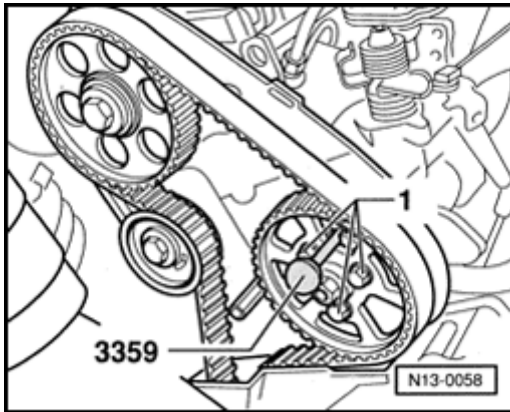
Injection pump sprocket, removing

Engine code AAZ

- A**
- Remove 3 injection pump sprocket mounting bolts -1- (with belt loosened).

Engine codes 1Z, AHU

- Remove injection pump sprocket mounting nut.



- A**
- Loosen puller arms and raise up.
 - Locate puller arms through holes in injection pump sprocket and tighten.
 - Using puller, place injection pump sprocket under tension.
 - Release injection pump sprocket from injection pump taper by tapping on puller spindle (arrow). Hold onto sprocket to prevent it from dropping.