

## Lubrication system components, removing and installing

### **WARNING!**

- ◆ *Do not re-use any 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 again. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.*

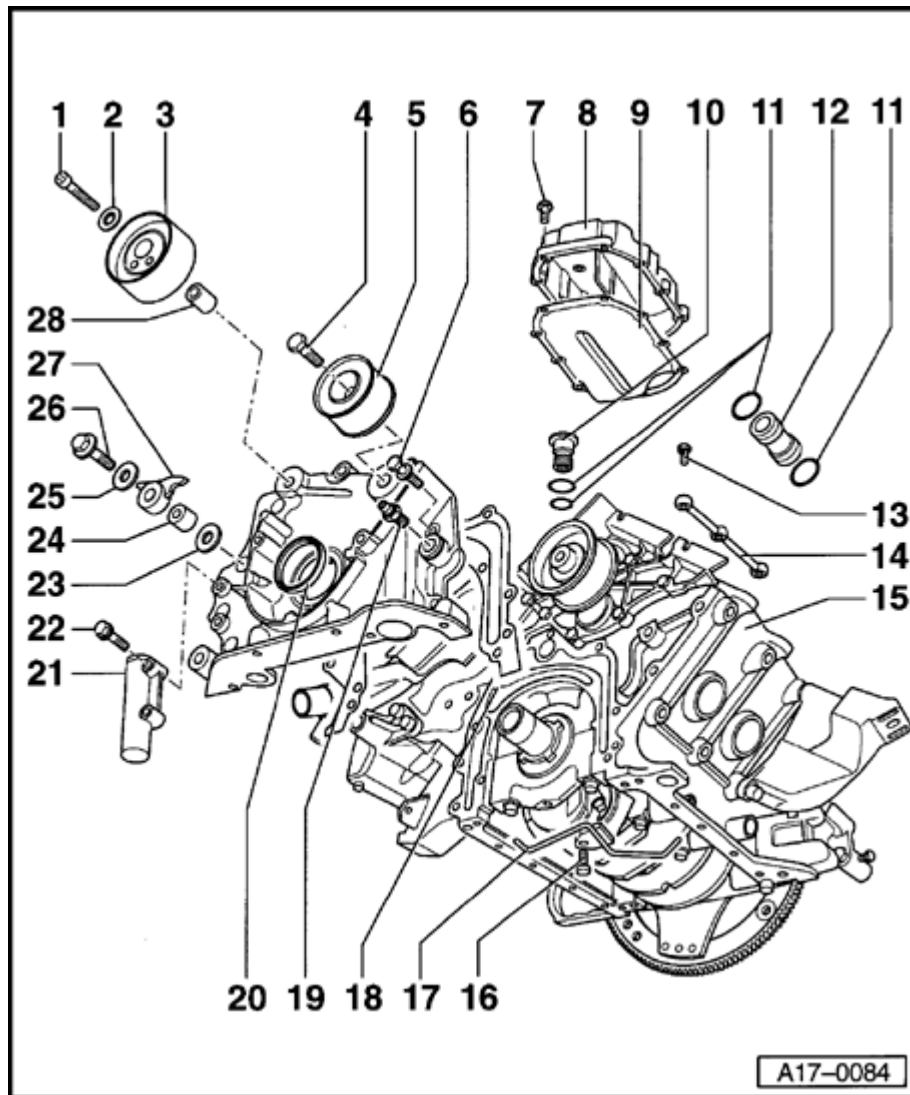
### **CAUTION!**

- ◆ *If large quantities of metal particles or other deposits (caused, i.e. by partial seizure of the crankshaft or connecting rod bearings) are found in engine oil, thoroughly clean oil passages and replace oil cooler to prevent damage from re-occurring.*
- ◆ *Do not overfill with oil past the MAX mark on the oil dipstick. Damage to the Three Way Catalytic Converter (TWC) could result.*

**Checking oil level** ⇒ [page 17-32](#) .

**Notes:**

- ◆ *Always replace seals and gaskets.*
- ◆ *Viscosity classes and oil specifications* ⇒ [page 17-31](#) .
- ◆ *Checking oil pressure* ⇒ [page 17-30](#) .



## Oil pump, cylinder block breather and oil spray jets, removing and installing

Oil pan (upper part) and oil pan (lower part), removing and installing ⇒ [page 17-10](#) .

### 1 - Bolt

◆ 20 Nm (15 ft lb)

### 2 - Washer

### 3 - Tensioner roller

◆ For toothed belt

### 4 - Bolt

◆ 45 Nm (33 ft lb)

### 5 - Bolt

◆ 10 Nm (7 ft lb)

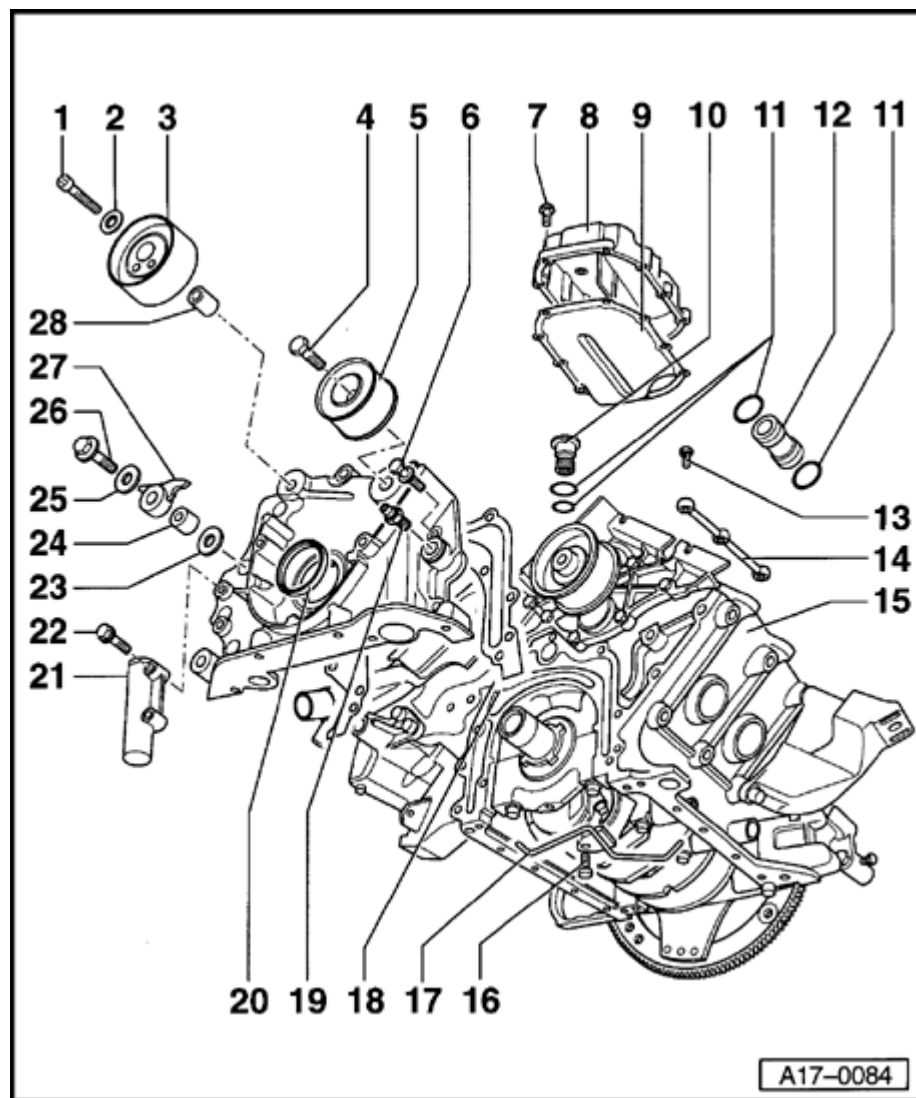
◆ For toothed belt

### 6 - Bolt

◆ 10 Nm (7 ft lb)

### 7 - Bolt

◆ 10 Nm (7 ft lb)



**8 - Breather housing**

**9 - Gasket/breather plate**

◆ Always replace

**10 - Oil check valve**

◆ 25 Nm (18 ft lb)

**11 - Oil seal**

**12 - Connector**

**13 - Bolt**

◆ 15 Nm (11 ft lb)

**14 - 15 Nm**

◆ For oil spray jets for piston cooling

**15 - Cylinder block**

**16 - Bolt**

◆ 10 Nm (7 ft lb)

◆ Use locking fluid D 000 600 A2 when installing

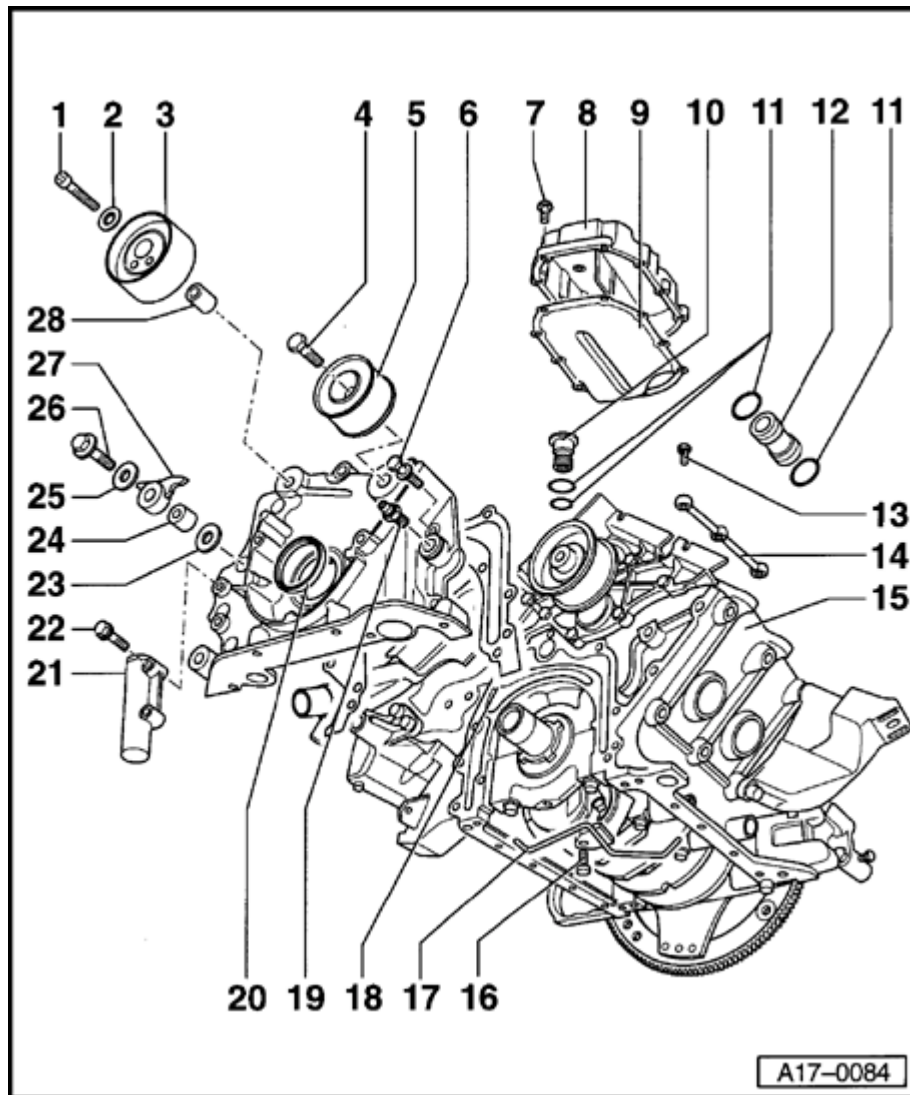
**17 - Oil spray jet**

◆ For piston cooling

**18 - Gasket**

◆ Metal gasket

◆ Always replace

**19 - Engine oil temperature sensor -G8-**

- ◆ 10 Nm (7 ft lb)
- ◆ For oil temperature gauge
- ◆ White
- ◆ If seal is leaking, replace seal

**20 - Oil seal**

- ◆ Replacing ⇒ [page 15-14](#)

**21 - Tensioner**

- ◆ Compress and secure before removing ⇒ [page 13-12](#)

**22 - 10 Nm**

- ◆ Use locking fluid D 000 600 A2 when installing

**23 - Washer****24 - Bearing bushing**

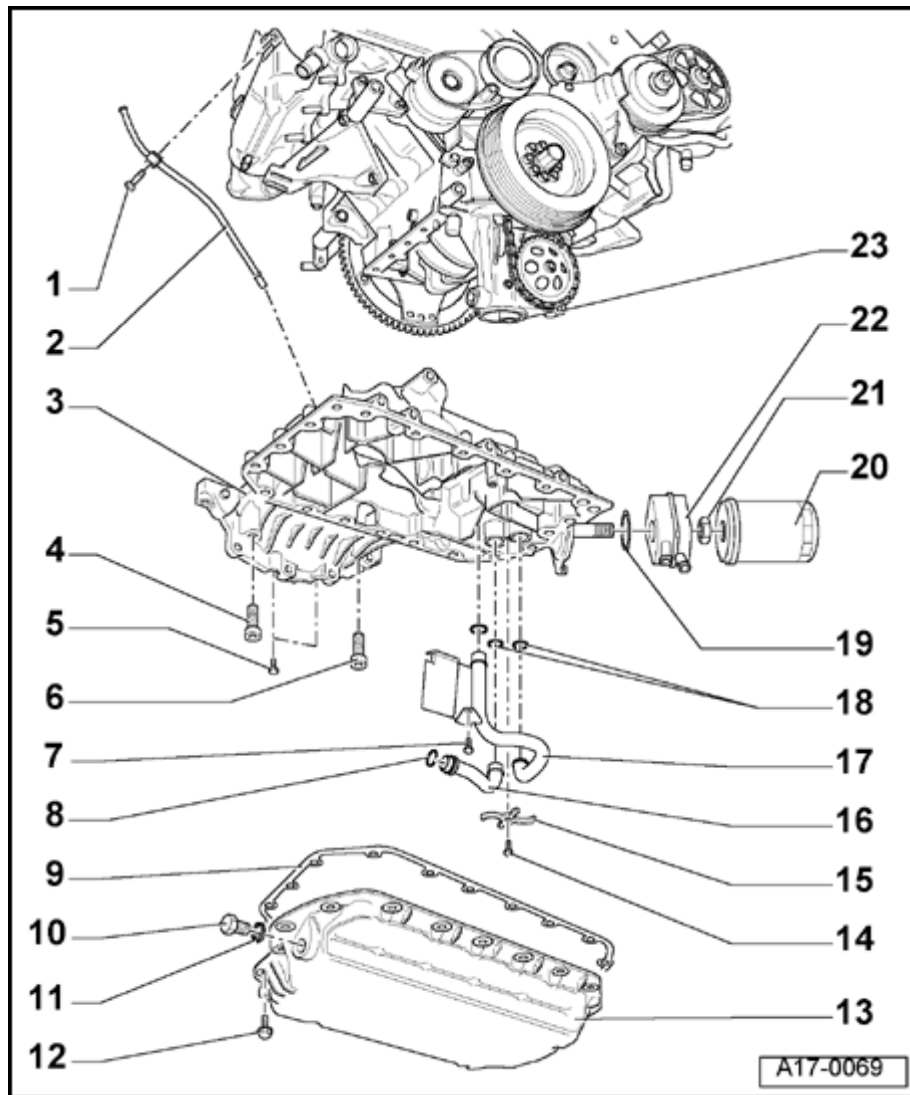
- ◆ For tensioner lever

**25 - Washer****26 - Bolt**

- ◆ 25 Nm (18 ft lb)

**27 - Tensioning lever****28 - Bearing bushing**

◆ For tensioner roller



## Oil pump, oil pan, oil filter, oil cooler, removing and installing

### 1 - Bolt for dipstick tube

- ◆ 25 Nm (18 ft lb)

### 2 - Dipstick tube

- ◆ Replace O-ring

### 3 - Oil pan (upper part)

- ◆ No gasket is installed between engine block and oil pan (upper part)
- ◆ Only use silicon sealant D 454 300 A2

### 4 - Bolt

- ◆ M8
- ◆ 20 Nm (15 ft lb)

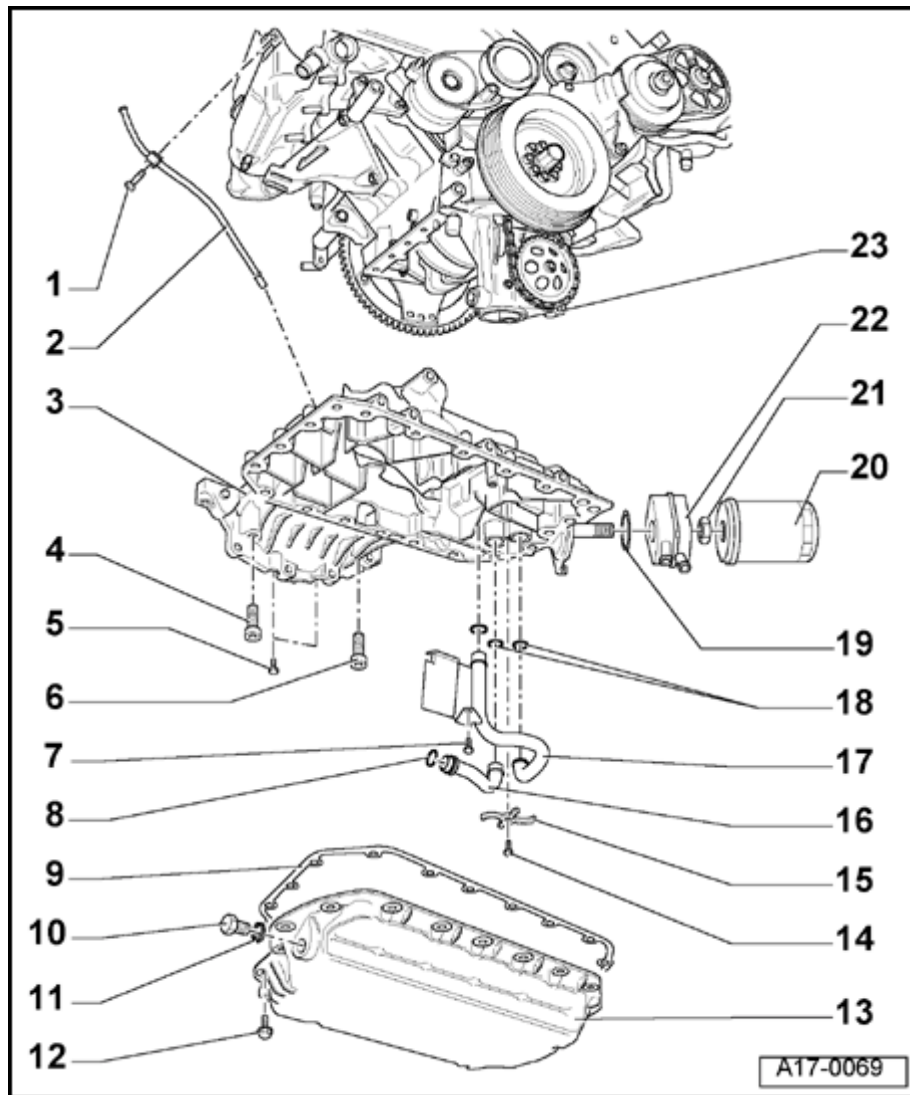
### 5 - Bolt

- ◆ M6
- ◆ 15 Nm (11 ft lb)

### 6 - Bolt

- ◆ M8
- ◆ 20 Nm (15 ft lb)
- ◆ Bolt is next to coolant drain plug



**7 - Bolt**

- ◆ M6
- ◆ 10 Nm (7 ft lb)

**8 - O-ring**

- ◆ Always replace

**9 - Gasket for oil pan (lower part)**

- ◆ Sealing surfaces clean and dry

**10 - Oil drain plug**

- ◆ 30 Nm (22 ft lb)

**11 - Gasket for oil drain plug**

- ◆ Always replace

**12 - Bolt**

- ◆ M6
- ◆ 10 Nm (7 ft lb)

**13 - Oil pan (lower part)****14 - Bolt**

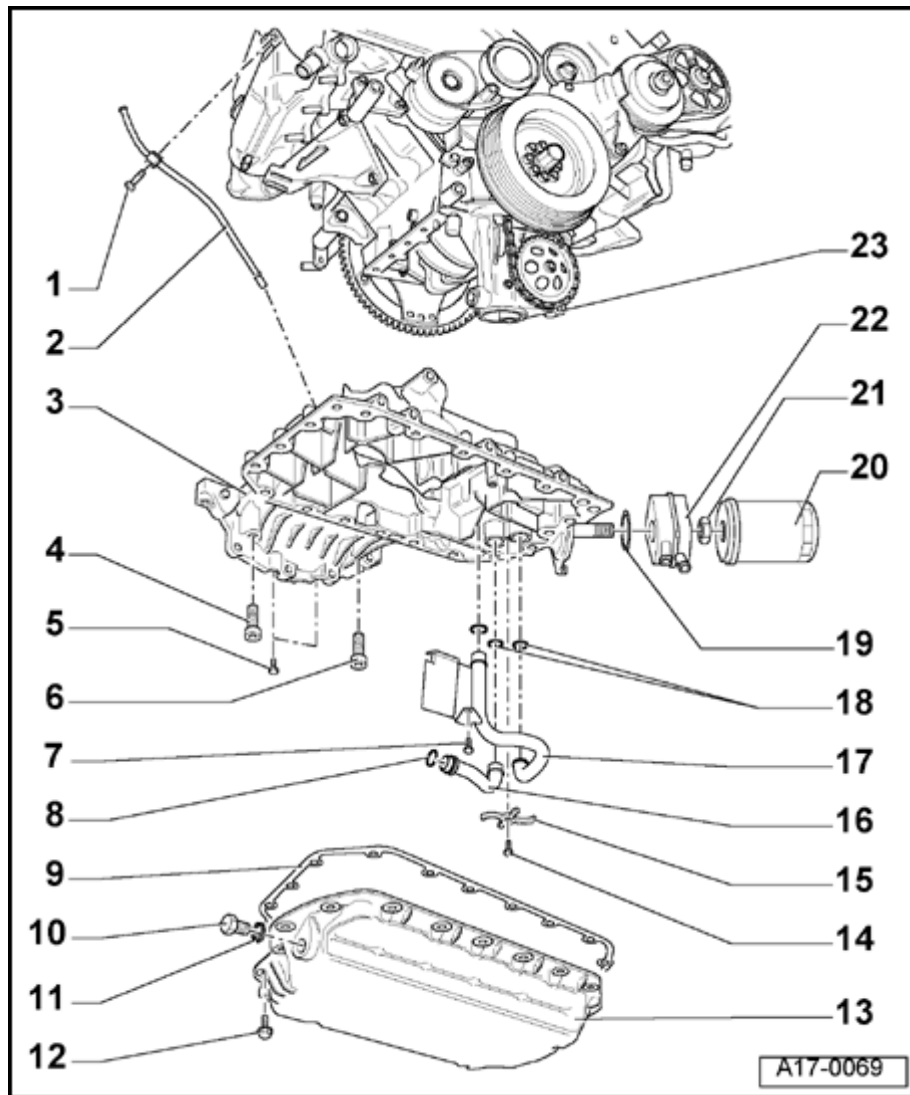
- ◆ M6
- ◆ 10 Nm (7 ft lb)

**15 - Bracket for oil lines****16 - Oil supply line**

- ◆ From pump to oil filter

### **17 - Oil supply line**

- ◆ From oil filter to engine oil circulation

**18 - O-ring**

- ◆ Always replace

**19 - O-ring**

- ◆ Always replace

**20 - Oil filter****21 - Hex nut**

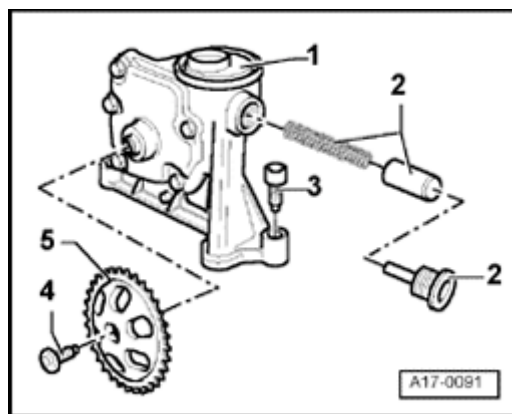
- ◆ 30 Nm (22 ft lb)
- ◆ Threaded pipe for oil cooler and oil filter installed in oil pan (upper part) and tightened to 20 Nm (15 ft lb)

**22 - Oil cooler**

- ◆ When installing, make sure O-ring is seated correctly

**23 - Oil pump**

- ◆ Disassembling and assembling ⇒ [Fig. 1](#)
- ◆ Driven by chain from crankshaft
- ◆ Tightening torque (chain sprocket to oil pump): 25 Nm (18 ft lb)
- ◆ Tightening torque (oil pump to engine block): 25 Nm (18 ft lb)



A

**Fig. 1 Removing and installing oil pump**

1 - Oil pump

Cannot be disassembled (oil pressure release valve is integrated with oil pump)

2 - Pressure regulation valve

Tightening torque: 40 Nm (30 ft lb)

3 - Tightening torque: 20 Nm (15 ft lb)

4 - Tightening torque: 25 Nm (18 ft lb)

5 - Chain sprocket

When installing, make sure shaft fits chain sprocket

## Oil check valve, replacing

### Note:

*If irregular valve noise occurs repeatedly during short periods of driving and disappears after extended periods of driving, the oil check valves must be replaced.*

- Remove intake manifold.

Tightening torque: 10 Nm (7 ft lb)

- Remove cover under intake manifold.

Tightening torque: 10 Nm (7 ft lb)

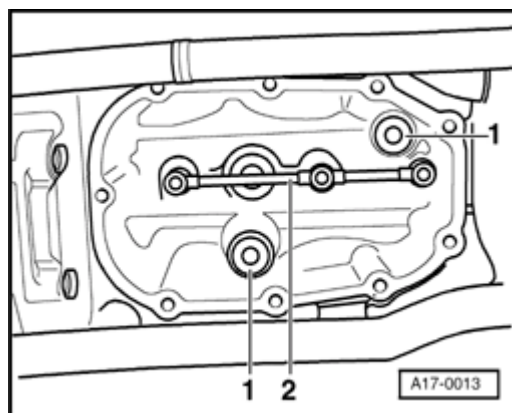
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- Replace oil check valves -1-.

Tightening torque: 25 Nm (18 ft lb)

### Note:

*The opening also contains distribution line -2- for supplying jets for piston cooling.*



## Oil pan (upper part) and oil pan (lower part), removing and installing

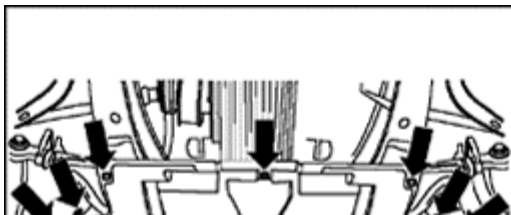
### Special tools and equipment

- ◆ Drill with plastic brush attachment
- ◆ Sealant D 454 300 A2
- ◆ Torque wrench 10 Nm - 45 Nm
- Switch ignition off and disconnect battery Ground (GND) strap.

### **CAUTION!**

***Before disconnecting the battery, determine the correct coding for the anti-theft radio.***

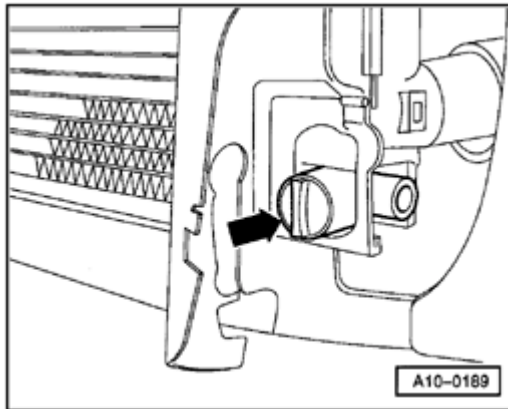
- Withdraw dipstick.
- Unbolt dipstick tube at right-front of cylinder head, pull up and remove.
- Remove noise insulation panel (arrows).



- Lock carrier in service position ⇒ [page 13-1](#)

- Open engine coolant expansion tank cap.

- Place VAG1306 drip tray beneath engine.



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- Turn radiator drain plug counterclockwise (arrow). If needed, attach tube to connection flange.



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- Open coolant pump bearing housing drain plug as well (arrow).

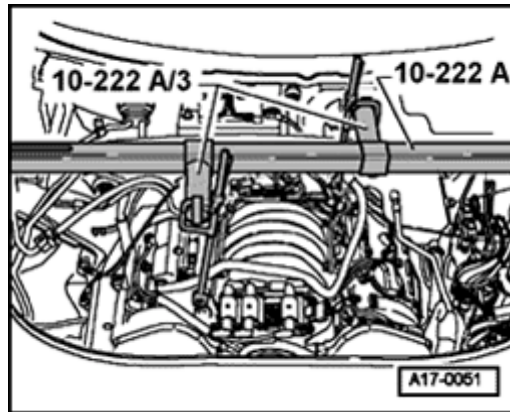
- Drain engine coolant.

- Drain engine oil.

Collect engine oil in appropriate receptacle.

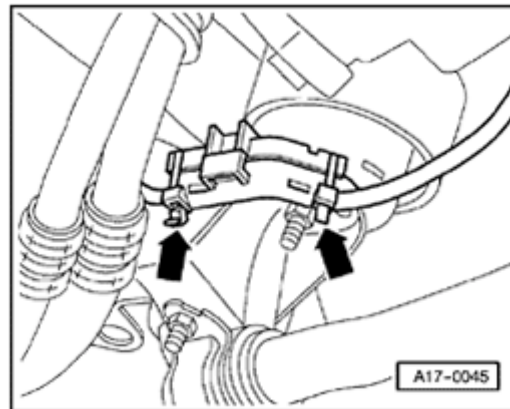
#### **Vehicles with automatic transmission**

- Unbolt oil cooler line bracket from right-side of oil pan.



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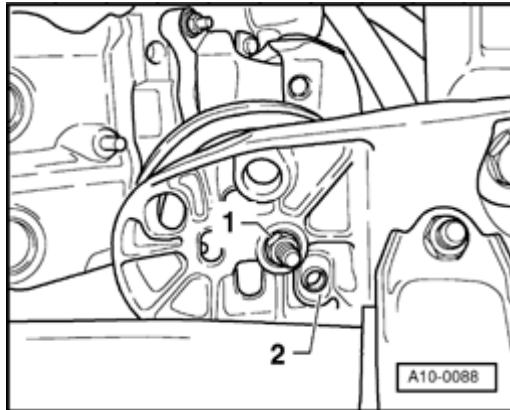
- Set 10-222A engine support bridge together with 10-222A/3 engine support adapter on fender mounting edges.
- Attach 2024A engine sling to mounting eyes at front and rear of engine.
- Using 10-222A engine support bridge spindle, lift up engine as far as possible.



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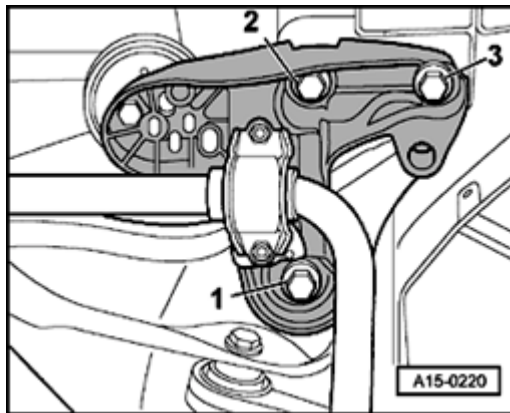
- Cut tie wraps (arrows), open bracket for starter wiring and remove wiring.
- Remove torque support at front of engine.
- Unbolt coolant line at front of engine from oil pan.
- Disconnect harness connector from oil pressure switch on left-side of oil pan.
- Disconnect coolant lines from oil cooler underneath oil filter.





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- Remove left and right nuts from lower engine mount -1-.
- Mark installation positions for threaded assembly -1- and guide sleeves -2- on left and right lower engine mounts.



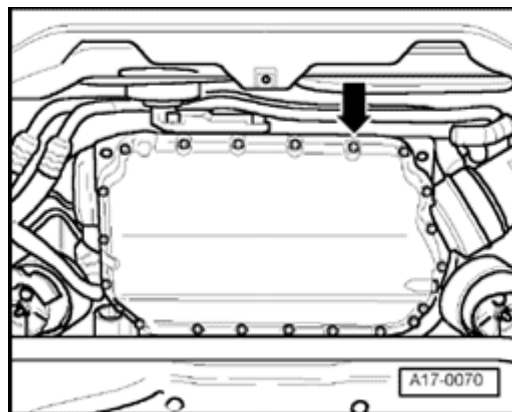
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- First remove front bolts -2- and -3- from left and right-sides of subframe. Then remove bolts -1-.
- Swing stabilizer down.
- Remove starter.

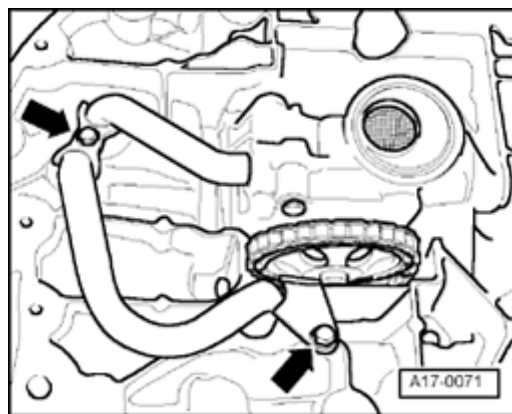
**Note:**

*Only loosen or lower subframe at front to avoid changing wheel alignment.*

17-14

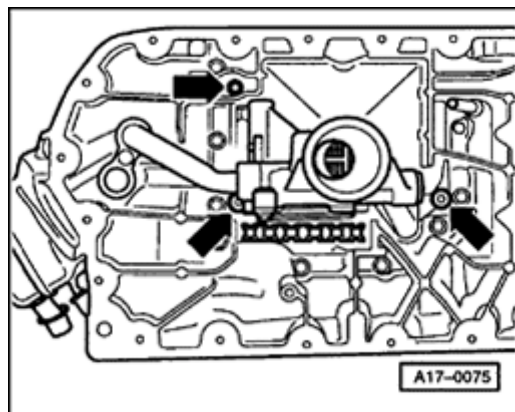


- A**
- Remove oil pan (lower part) and oil pan (upper part).



- A**
- Unbolt both oil supply lines. Pull longer of two lines down and off oil pan (upper part).

17-15



A

- Unbolt oil pump from engine to allow removal of shorter oil supply line (do not remove oil pump).
- Remove bolts between oil pan (upper part) and transmission.
- Unbolt oil pan (upper part) from engine.

**Note:**

*Two M6 and two M8 bolts are installed vertically in rear of oil pan (upper part) in front of connection between engine and transmission.*

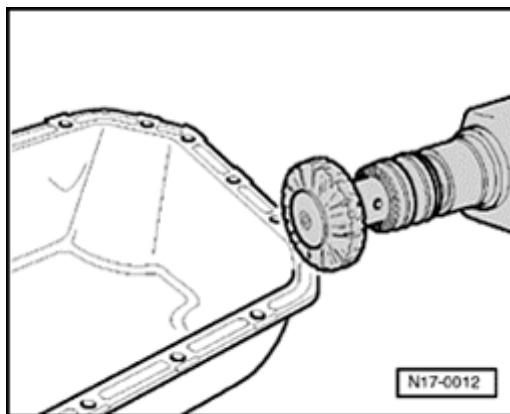
## Installing

Installation is the reverse of removal, noting the following:

- Clean sealing surfaces so they are completely free of any oil or grease.

### **WARNING!**

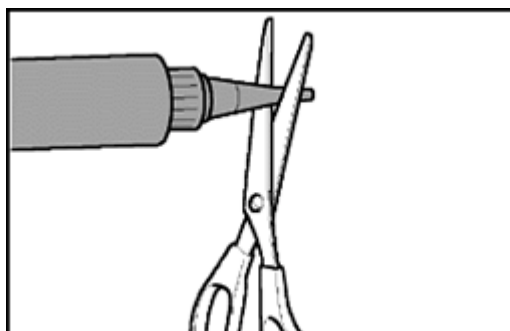
**Wear protective glasses.**



- A** - Using rotating plastic brush, remove any remaining sealant from oil pan.

### **Note:**

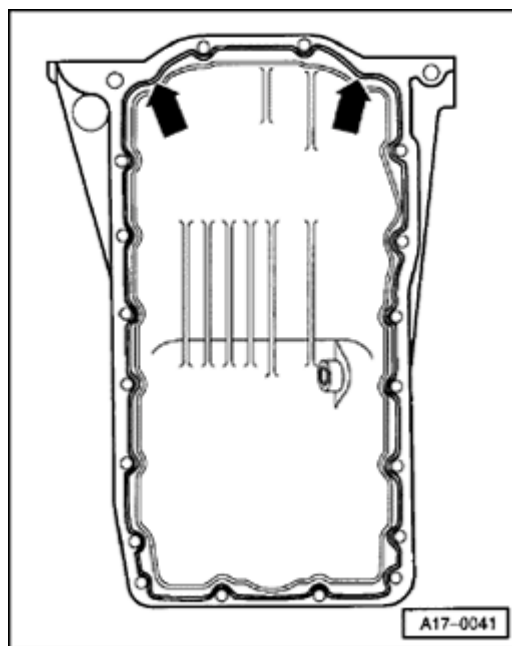
*After applying silicon sealant D 454 300 2, oil pan must be installed within 5 minutes.*



- A** - Cut tube jet at front marking (jet diameter approx. 3 mm).  
Thickness of sealant: 2-3 mm (0.04-0.12 in.)

### **Note:**

*Sealant must not be thicker than 3 mm, otherwise excess sealant may get into the oil pan and clog the oil intake strainer.*



A

- Apply silicon sealant to clean sealing surface as shown in illustration. (The illustration shows placement of sealant on cylinder block.)

**Note:**

*Be especially careful when applying sealant to rear oil seal carrier (arrows in illustration A17-0041).*

- Immediately install oil pan and tighten all bolts between oil pan and engine block to 5 Nm (44 in. lb).
- Tighten bolts between oil pan and transmission to 45 Nm (33 ft lb).
- Tighten bolts between oil pan and engine block in 2 stages in diagonal sequence.  
Finally sequence tightening torque: 15 Nm (11 ft lb)
- Tighten M10 bolts between oil pan and cylinder block to 45 Nm (33 ft lb).
- Clean both sealing surfaces on oil pan (lower part) so they are free of oil and grease.

**Note:**

*Do not use glue or sealant.*

- Install new gasket on oil pan (lower part) and attach to oil pan (upper part) with two bolts diagonal to each other.
- Tighten all bolts hand tight.

- Starting in center and moving toward outside, tighten bolts to 10 Nm (7 ft lb).
- Install new seal on oil drain plug and tighten to 30 Nm (22 ft lb).

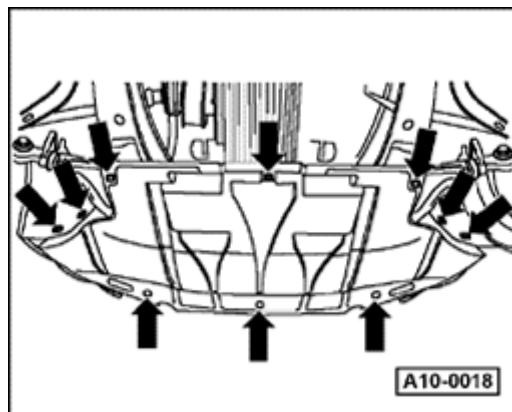
**Notes:**

- ◆ *When installing oil pan on removed engine, make sure oil pan is aligned with cylinder block on flywheel side.*
- ◆ *After installing oil pan, allow sealant to dry for approx. 30 minutes. Only after allowing sealant to dry may engine oil be added.*
- Install subframe.

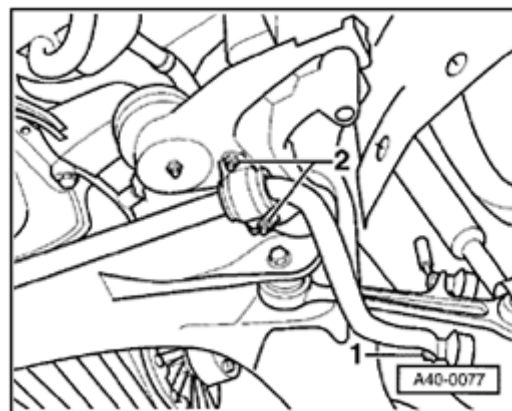
⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40](#)

- Install lock carrier.

## Oil pump, removing and installing



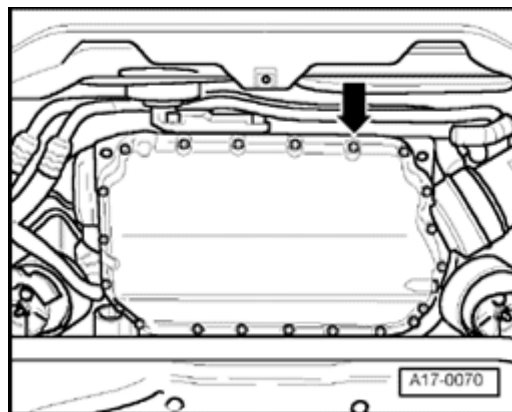
- A**
- Remove noise insulation panel (arrows).
  - Drain engine oil.
  - Collect engine oil in appropriate receptacle.



- A**
- Unbolt both stabilizer mounting brackets -2- from subframe.
  - Lower stabilizer not more than 10 cm (3.94 in.) and secure using wire.

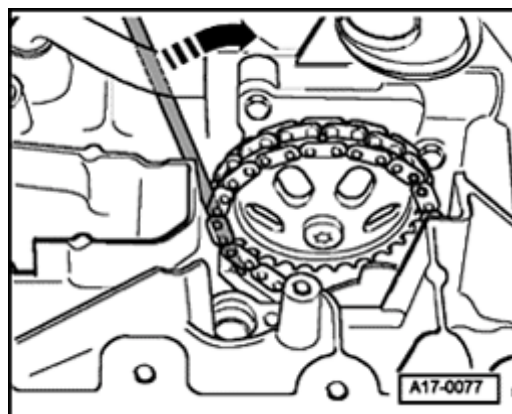
### Vehicles with automatic transmission

- Unbolt oil cooler line bracket from right-side of oil pan.



- A**
- Remove oil pan (lower part) ⇒ [page 17-10](#) .

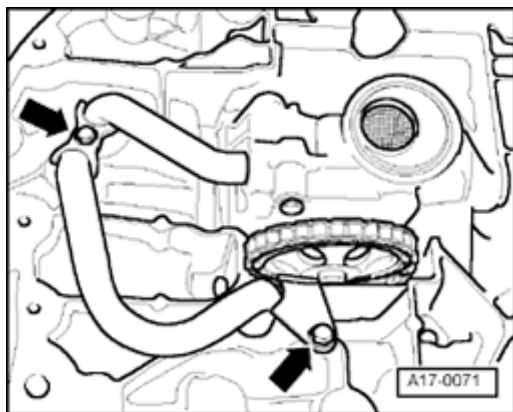
### Checking chain tensioner



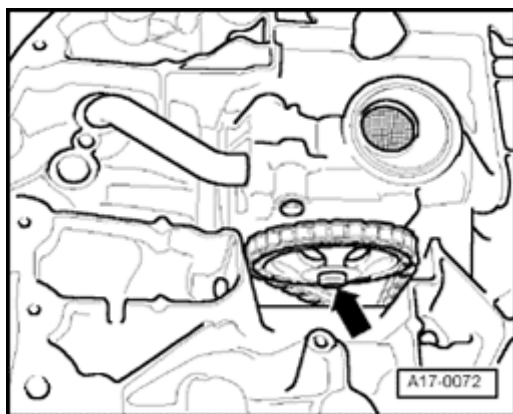
- A**
- Insert screwdriver between chain and chain tensioner and lift against chain tensioner.  
If no spring tension is evident and chain is not under tension, chain tensioner is damaged and must be replaced.
  - Before replacing chain tensioner, remove front oil seal carrier ⇒ [page 17-26](#) .



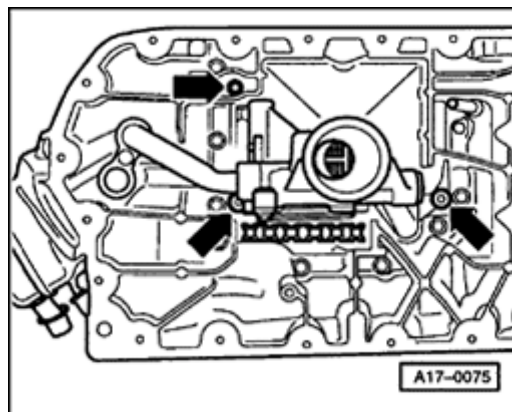
17-21



- A
- Unbolt bracket for oil supply lines (arrows) and pull front oil supply line (longer line) down and remove.



- A
- Using Torx<sup>®</sup> T45, unbolt chain sprocket from oil pump and pull off oil pump.



A

- Remove oil pump together with shorter oil supply line.

### Installing

Installation is the reverse of removal, noting the following:

- Before installing oil pump, install short oil supply line together with O-rings into pump and into oil pan (upper part).
- Clean both sealing surfaces on oil pan (lower part) so they are free of oil and grease.

### Note:

*Do not use glue or sealant.*

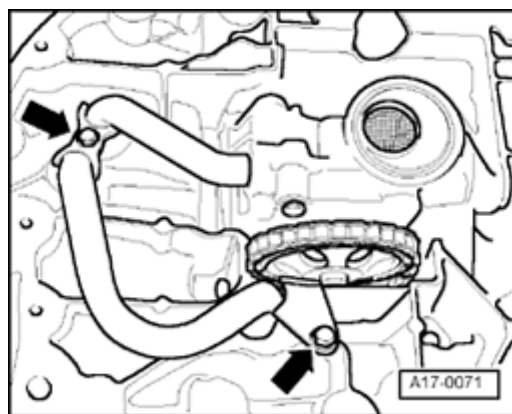
- Install new gasket on oil pan (lower part) and attach to oil pan (upper part) with two bolts diagonal to each other.
- Tighten all bolts hand tight.
- Starting in the center and moving toward the outside, tighten bolts to 10 Nm (7 ft lb).
- Install new seal on oil drain plug and tighten to 30 Nm (22 ft lb).

**Tightening torques**

<b>Component</b>		<b>Tightening torque</b>
Oil pan to cylinder block	M6	10 Nm (7 ft lb)
	M8	20 Nm (15 ft lb)
Oil pan (lower part) to oil pan (upper part)	M6	10 Nm (7 ft lb)
Oil pan to transmission	M8	25 Nm (18 ft lb)
	M10	45 Nm (33 ft lb)
Coolant line to oil pan		10 Nm (7 ft lb)
Oil drain plug in oil pan (lower part)		30 Nm (22 ft lb)

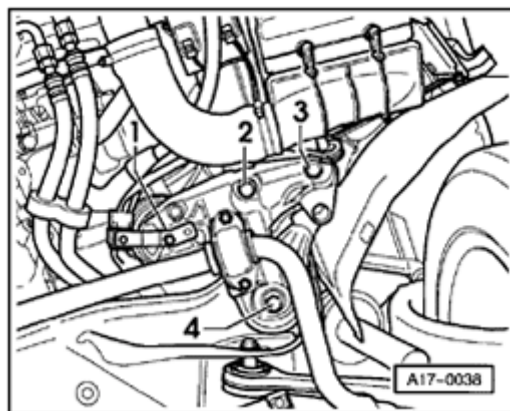
<b>Component</b>		<b>Tightening torque</b>
Dipstick tube to cylinder head	M6	10 Nm (7 ft lb)
	M8	25 Nm (18 ft lb)
Oil pump to engine block		25 Nm (18 ft lb)
Oil supply line for oil pump		10 Nm (7 ft lb)

to oil pan (upper part)		
Oil seal carrier, front	M6	10 Nm (7 ft lb)



A

Component		Tightening torque
Collar screw	M8	30 Nm (22 ft lb)
Stabilizer bracket to subframe 1)		25 Nm (18 ft lb)
Coolant drain plug to engine		20 Nm (15 ft lb)
Torque support stop to bracket on engine		25 Nm (18 ft lb)
Engine mount to subframe		25 Nm (18 ft lb)
Torque support to front side of oil pan		25 Nm (18 ft lb)
Engine mount to engine support		25 Nm (18 ft lb)
Chain sprocket to oil pump		25 Nm (18 ft lb)
1) Replace all self-locking nuts after removal.		

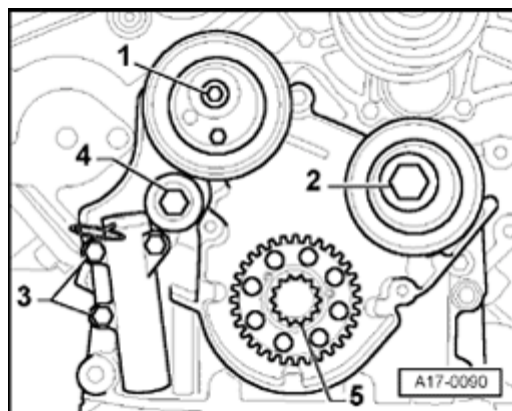
**A Other tightening torques**

Component	Tightening torque
Nut for engine mount -1-	25 Nm (18 ft lb)
Bolts -2- and -3-	60 Nm (44 ft lb)
Combination bolt -4- 2)	110 Nm (81 ft lb) + 90°
2) Replace combination bolt -4- after removing.	

## Front oil seal carrier and oil pump chain, removing and installing

### Removing

- Remove ribbed belt ⇒ [page 13-8](#) .
- Remove toothed belt ⇒ [page 13-12](#) .
- Remove oil pan (upper part) and oil pan (lower part) ⇒ [page 17-10](#) .



A

- Before removing front oil seal carrier, remove following components:

1 - Toothed belt tensioner roller

Tightening torque: 20 Nm (15 ft lb)

2 - Idler roller

Tightening torque: 45 Nm (33 ft lb)

3 - Toothed belt tensioner

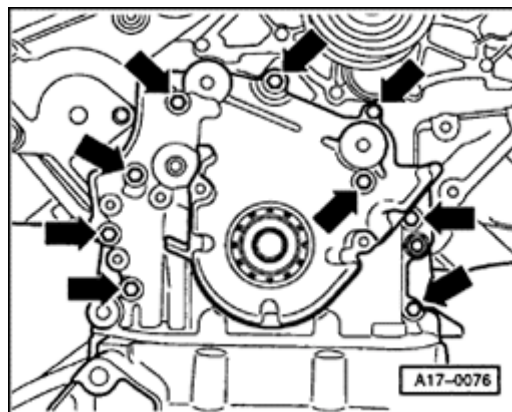
Tightening torque: 20 Nm (15 ft lb)

4 - Toothed belt tensioner lever

Tightening torque: 20 Nm (15 ft lb)

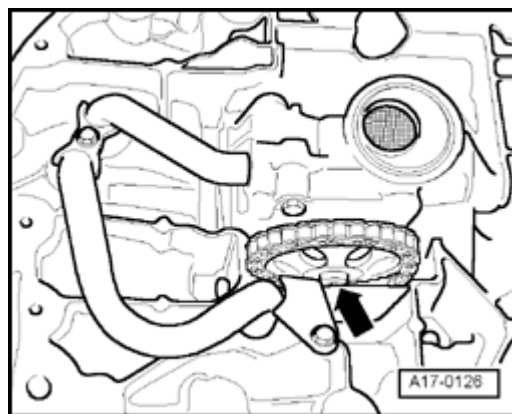
5 - Crankshaft center bolt and toothed belt sprocket

17-27



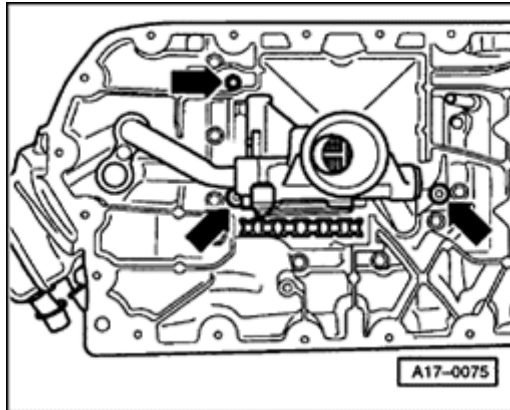
- A**
- Remove front oil seal carrier and remove gasket from front oil seal carrier (M6 bolts: 10 Nm, 7 ft lb) (Collar screw M8: 30 Nm 22 ft lb).

### Replacing oil pump drive chain



- A**
- Using Torx<sup>®</sup> T45, unbolt chain sprocket from oil pump and pull off oil pump.





A

- Remove oil pump together with shorter oil supply line.
- Remove oil pump chain sprocket and remove drive chain from crankshaft ⇒ [page 17-26](#) .

### Installing

Installation is the reverse of removal, noting the following:

- Remove any remaining sealant from front oil seal carrier and if necessary, from cylinder block.
- Clean sealing surfaces so they are completely free of any oil or grease.

### Note:

*Install gasket for front oil seal carrier dry.*

- Tighten bolts for oil seal carrier.

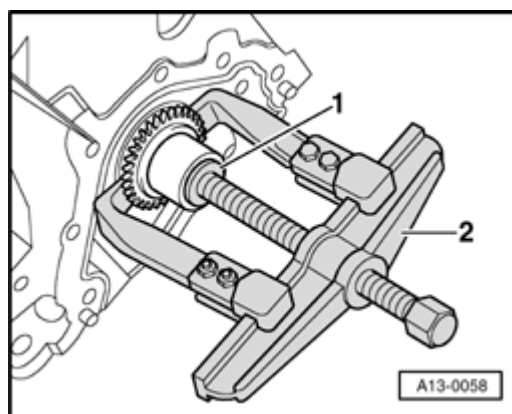
Tightening torque: M6 - 10 Nm (7 ft lb), M8 - 20 Nm (15 ft lb)

Oil pan (upper part) and oil pan (lower part), removing ⇒ [page 17-10](#) .

## Oil pump chain sprocket on crankshaft, removing and installing

### Removing

Front sealing flange and oil pump chain,  
removing and installing ⇒ [page 17-26](#) .



- A - Using puller -2-, remove crankshaft chain sprocket, while protecting crankshaft end with appropriate washer -1-.

### Installing

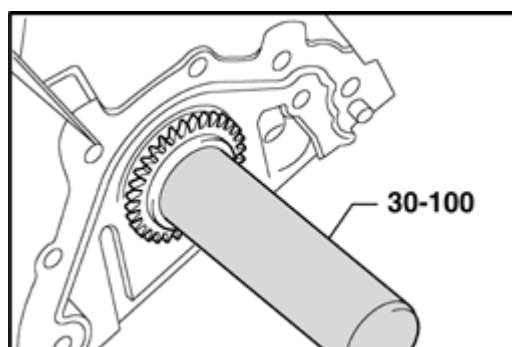
- Warm chain sprocket in 220 ° C (428 ° F) oven for approx. 15 minutes.

### **WARNING!**

**Wear protective gloves.**

### **Note:**

*Installation position: wider collar of chain sprocket points toward engine.*



- A - Using pliers, install chain sprocket on crankshaft end and slide onto crankshaft to stop using 30-100 press tube. If necessary, carefully tap with plastic hammer.