

## Engine, disassembling and assembling

### Lock carrier, moving into service position

#### Special tools and equipment

3369 support tool

#### 1 - Bolts

◆ 45 Nm (33 ft lb)

#### 2 - Bolts

◆ 45 Nm (33 ft lb)

#### 3 - Bolts

◆ 10 Nm (7 ft lb)

#### 4 - Bolts

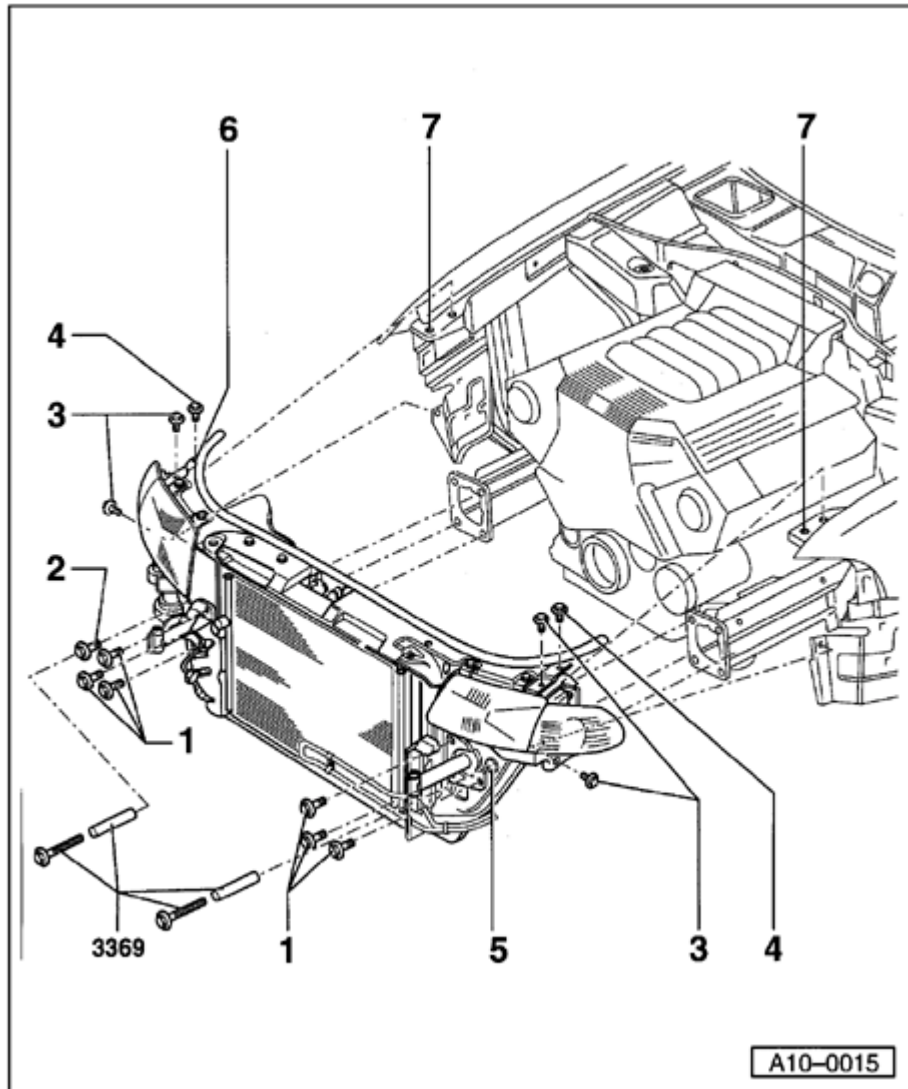
◆ 10 Nm (7 ft lb)

#### 5 - Bore

◆ For 3369 support tool

#### 6 - Lock carrier bore

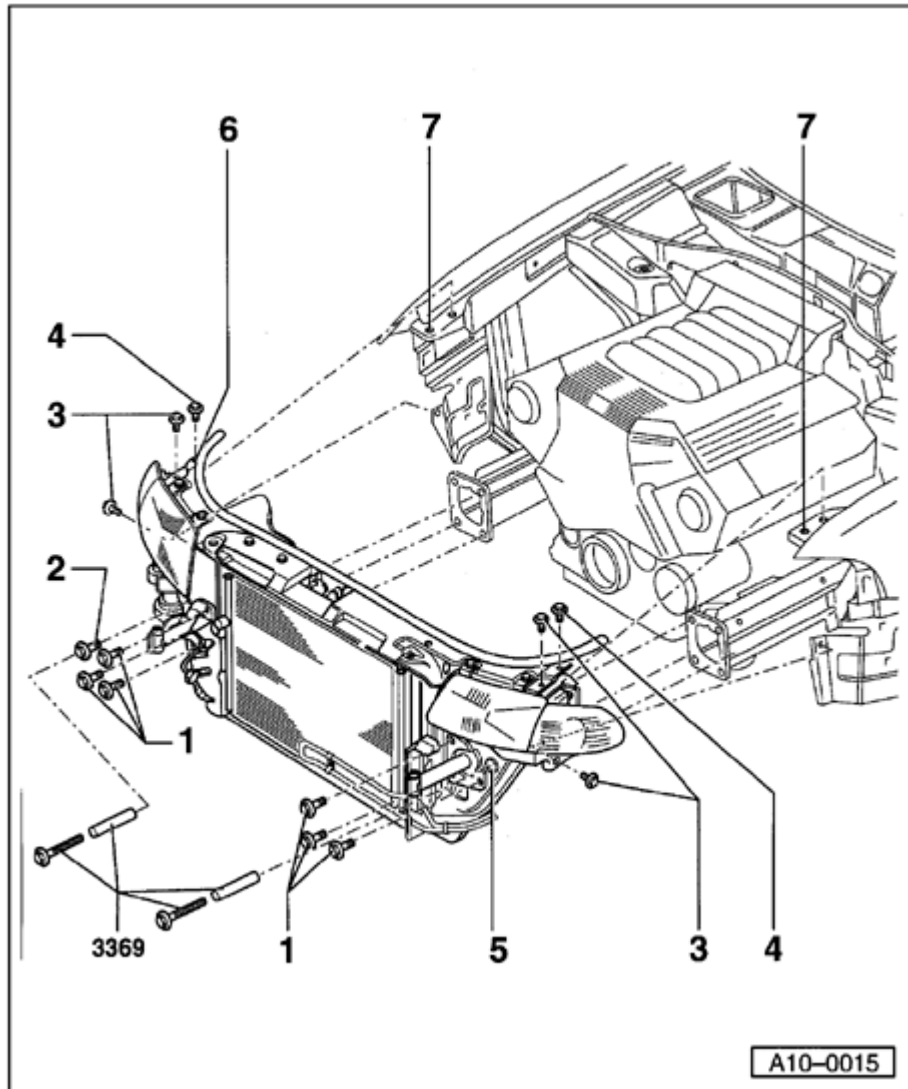
#### 7 - Fender bore



- Remove front bumper.

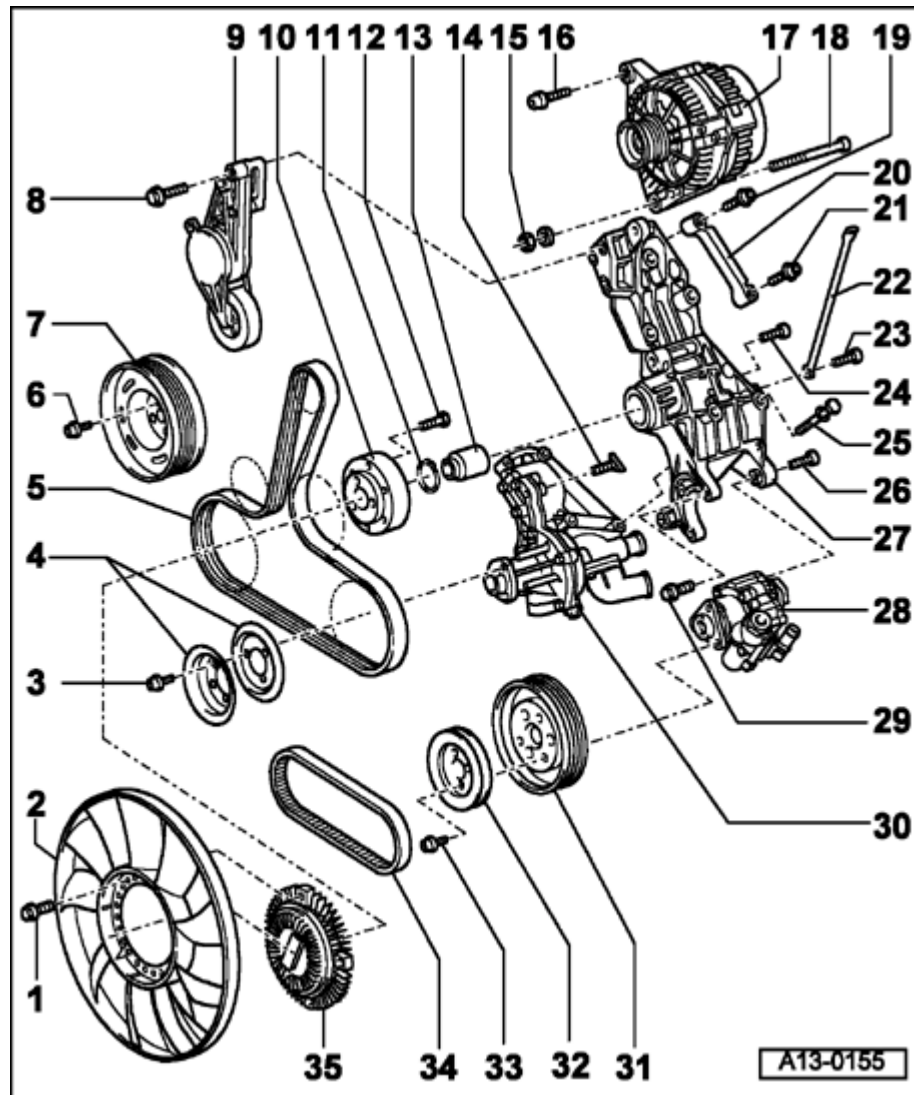
⇒ [Repair Manual, Body Exterior, Repair Group 63](#)

- Remove 3 quick-release screws on front of noise insulation panel.
- Unbolt air guide between lock carrier and air filter at lock carrier.
- If installed, remove retaining clamps for wiring harness on left side of radiator frame.
- Remove bolt -2- and install 3369 support tool.
- Install 3369 support tool into left bore -5-.
- Remove bolts -1- and -3-.
- Remove bolts -4- and pull lock carrier out to stop.
- To secure lock carrier, install appropriate M6 bolts into rear bored holes of lock carrier -6- and fender -7-.



- After installing lock carrier, check wiring for proper routing near coolant fan.
- Install front bumper.

⇒ [Repair Manual, Body Exterior, Repair Group 63](#)



Ribbed belt for power steering pump, generator and viscous fan, and V-belt for coolant pump

**CAUTION!**

*Before removing ribbed belt, note direction of rotation with chalk or felt-tip marker. Reversing the direction of rotation of a used belt can destroy the belt. When installing the ribbed belt, make sure it is seated correctly on the pulley.*

**1 - Fan wheel bolt**

◆ 10 Nm (7 ft lb)

**2 - Fan wheel**

◆ For viscous fan

◆ Removing and installing ⇒ [Page 13-14](#), Fig. ⇒ [1](#)

**3 - Coolant pump pulley bolt**

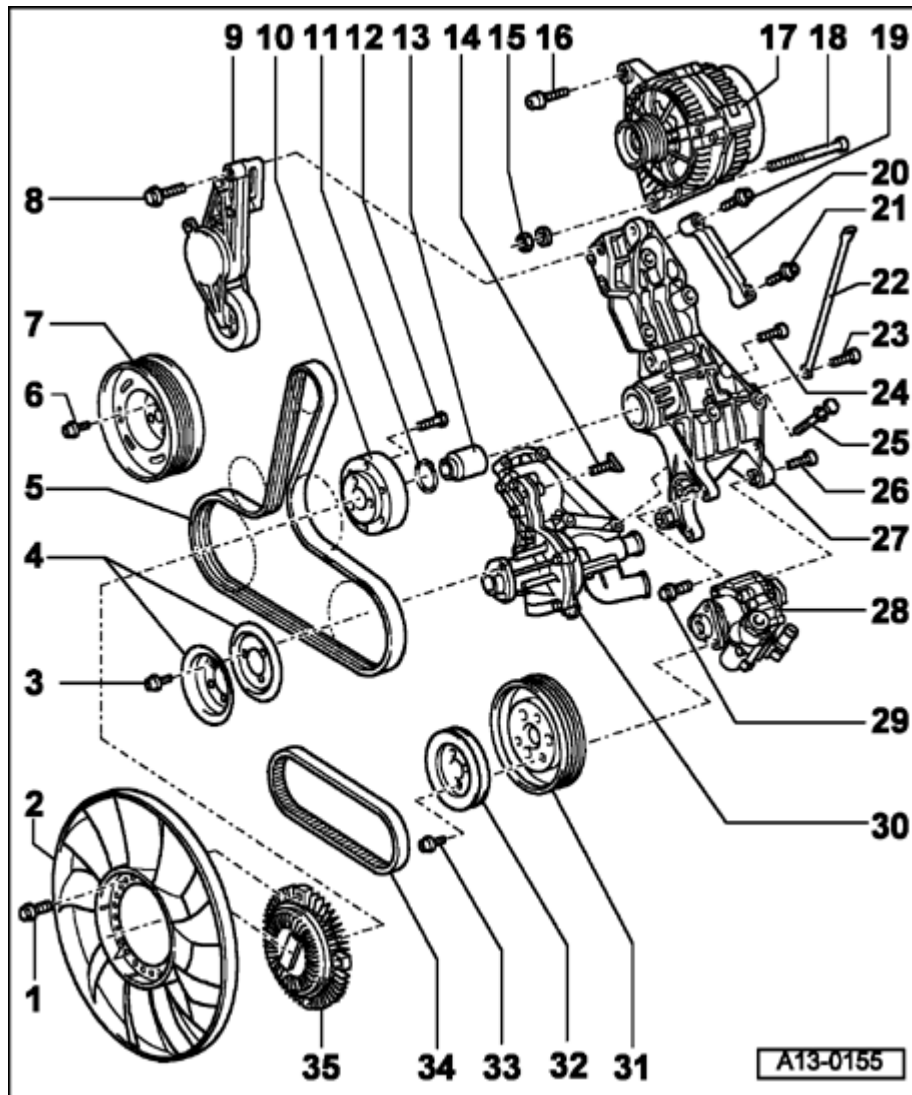
◆ 25 Nm (18 ft lb)

**4 - Belt pulley**

◆ For coolant pump

◆ V-belt design

◆ Installed position: straight side toward coolant pump



### 5 - Ribbed belt

- ◆ Removing and installing ⇒ [Page 13-15](#)
- ◆ Check for wear

### 6 - Special bolt

- ◆ Tighten to 40 Nm (30 ft lb)
- ◆ Only use VW bolts, bolt strength grade 10.9 ⇒ parts catalog

### 7 - Vibration damper

- ◆ With pulley for ribbed belt
- ◆ Installation only possible in one position ⇒ [Page 13-14](#), Fig. ⇒ [2](#)

### 8 - Bolt for ribbed belt tensioner

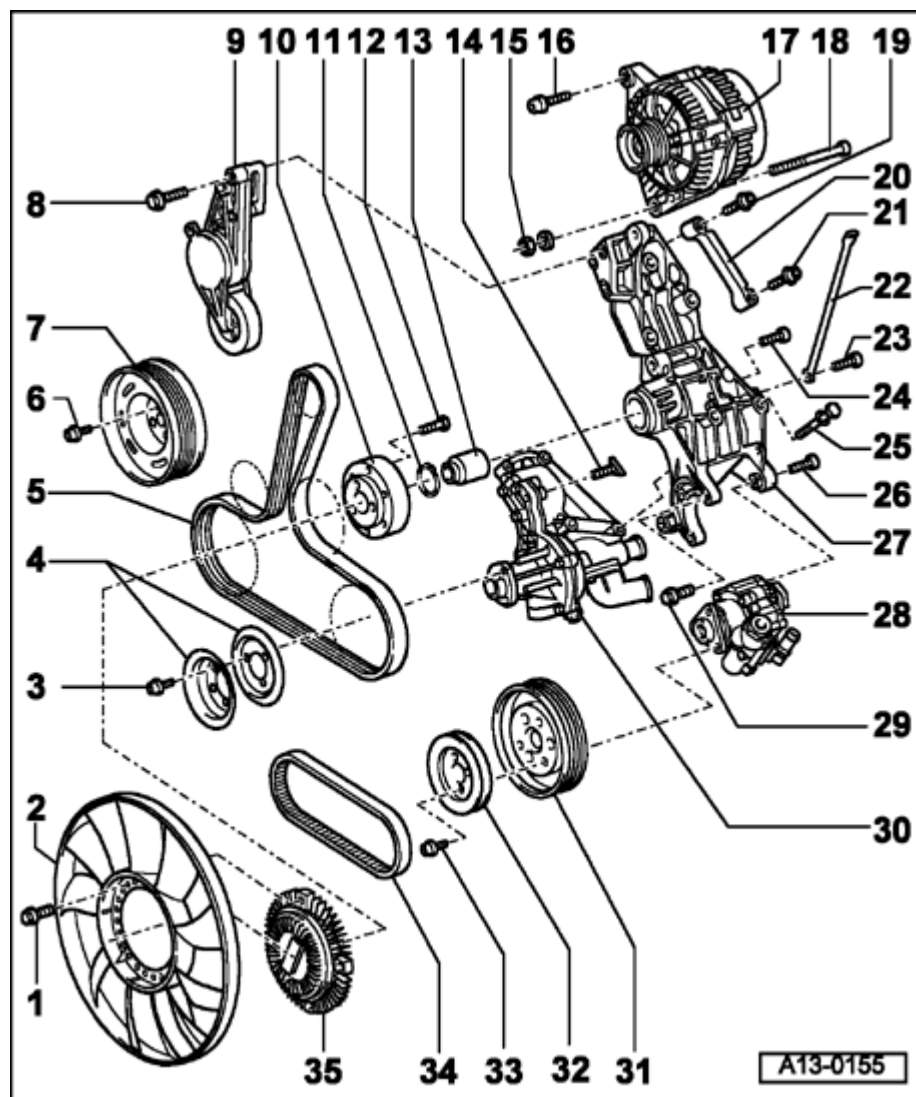
- ◆ 25 Nm (18 ft lb)

### 9 - Ribbed belt tensioner

- ◆ To release tension on the ribbed belt, use open-end wrench ⇒ [Page 13-15](#)
- ◆ Secure with appropriate hex socket or 3204 drift in positioning bore

### 10 - Belt pulley

- ◆ For viscous fan
- ◆ Removing and installing ⇒ [Page 13-14](#), Fig. ⇒ [1](#)



**11 - Circlip**

- ◆ For viscous fan bearing
- ◆ Removing and installing ⇒ [Page 13-20](#)

**12 - Bolt for belt pulley**

- ◆ 10 Nm (7 ft lb)

**13 - Bearing**

- ◆ For viscous fan
- ◆ Removing and installing ⇒ [Page 13-20](#)

**14 - T-head bolt**

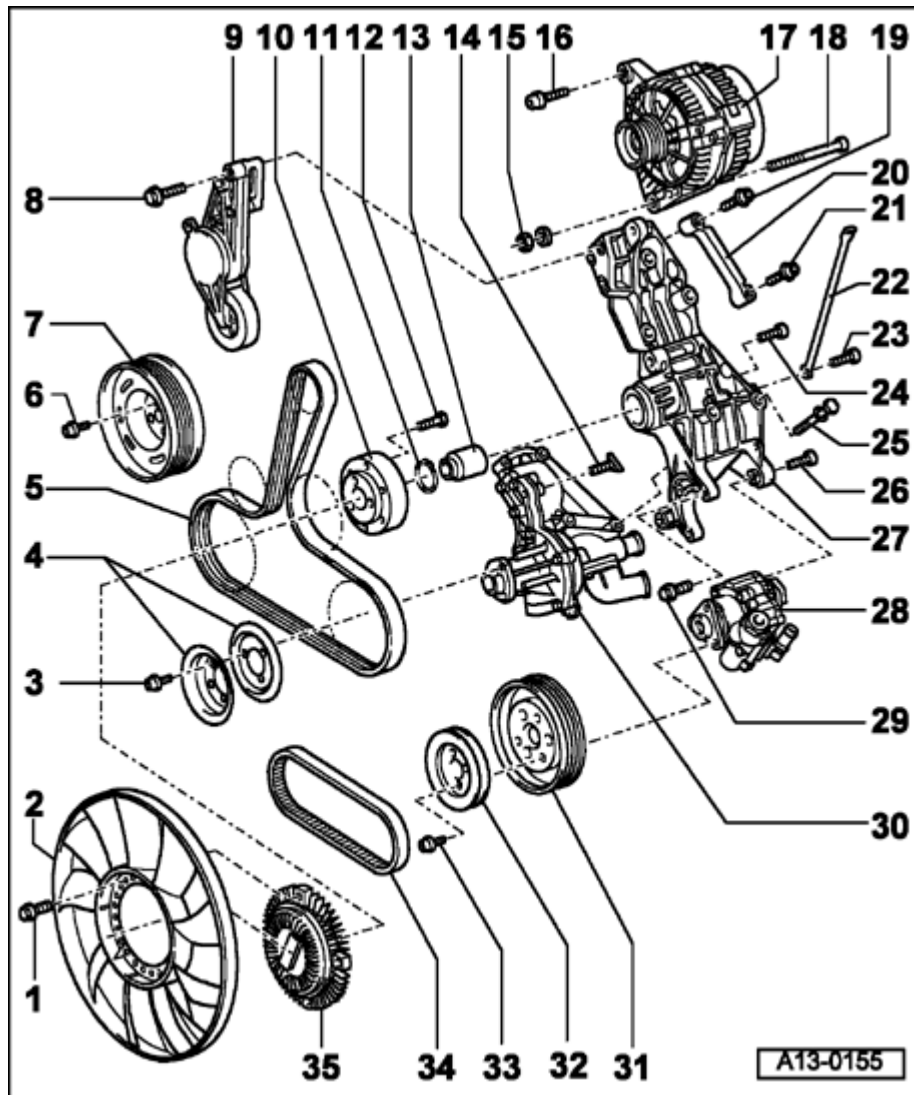
- ◆ Insert before installing bracket for generator, power steering pump and viscous fan

**15 - Nut**

- ◆ 40 Nm (30 Nm)

**16 - Bolt**

- ◆ 25 Nm (18 ft lb)



### 17 - Generator

#### Removing:

- Disconnect battery Ground (GND) strap.
- Loosen ribbed belt and remove from generator ⇒ [Page 13-15](#) .
- Remove air guide at throttle body.
- Remove upper and lower threaded assemblies.
- Swing generator slightly to side and remove lower bolt.
- Remove wiring from generator.
- Remove generator.

#### Note:

*For easier installation of generator into the bracket, push back lower bolt bushing slightly.*

### 18 - Bolt

- ◆ 40 Nm (30 ft lb)

### 19 - Bolt

- ◆ 40 Nm (30 ft lb)

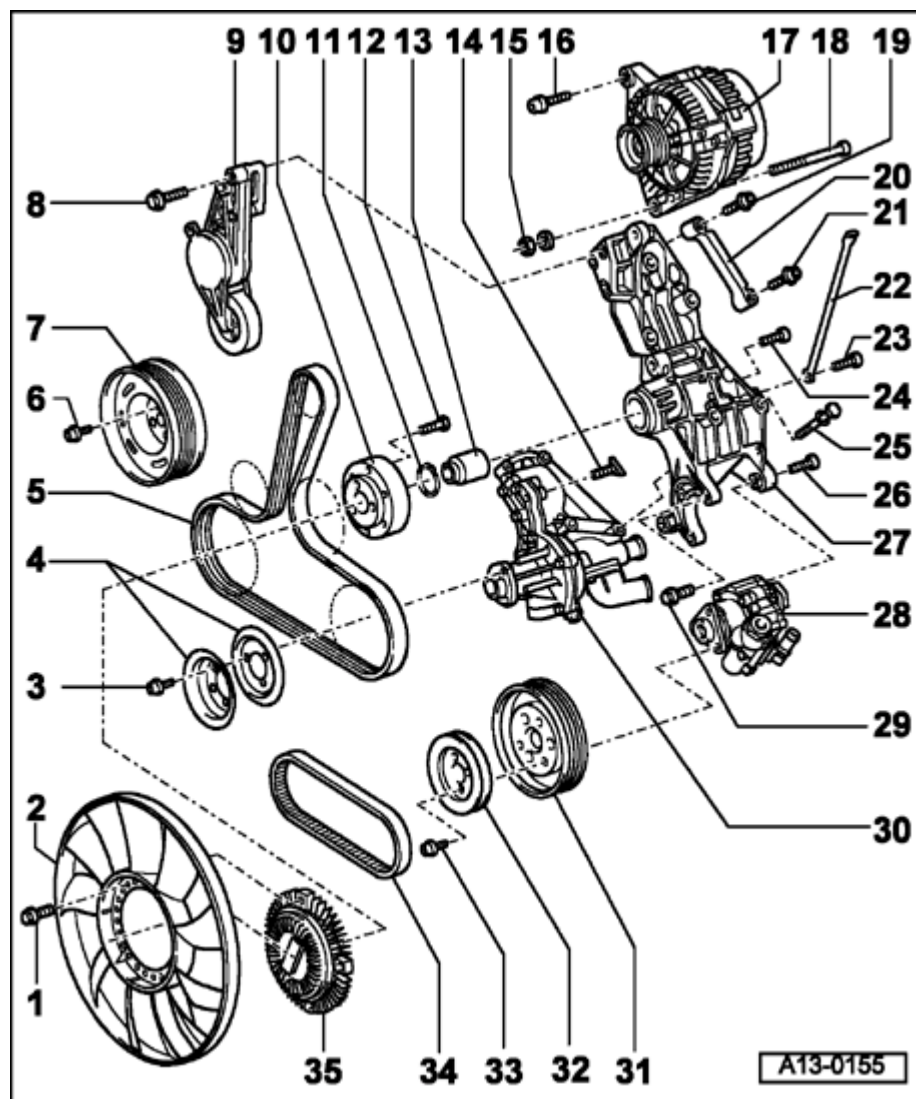
### 20 - Brace

- ◆ To cylinder block

**21 - Bolt**

◆ 25 Nm (18 ft lb)





**22 - Brace**

- ◆ For intake manifold

**23 - Bolt**

- ◆ 20 Nm (15 ft lb)

**24 - Bolt**

- ◆ 40 Nm (30 ft lb)

**25 - Bolt**

- ◆ 25 Nm (18 ft lb)

**26 - Bolt**

- ◆ 25 Nm (18 ft lb)

**27 - Bracket**

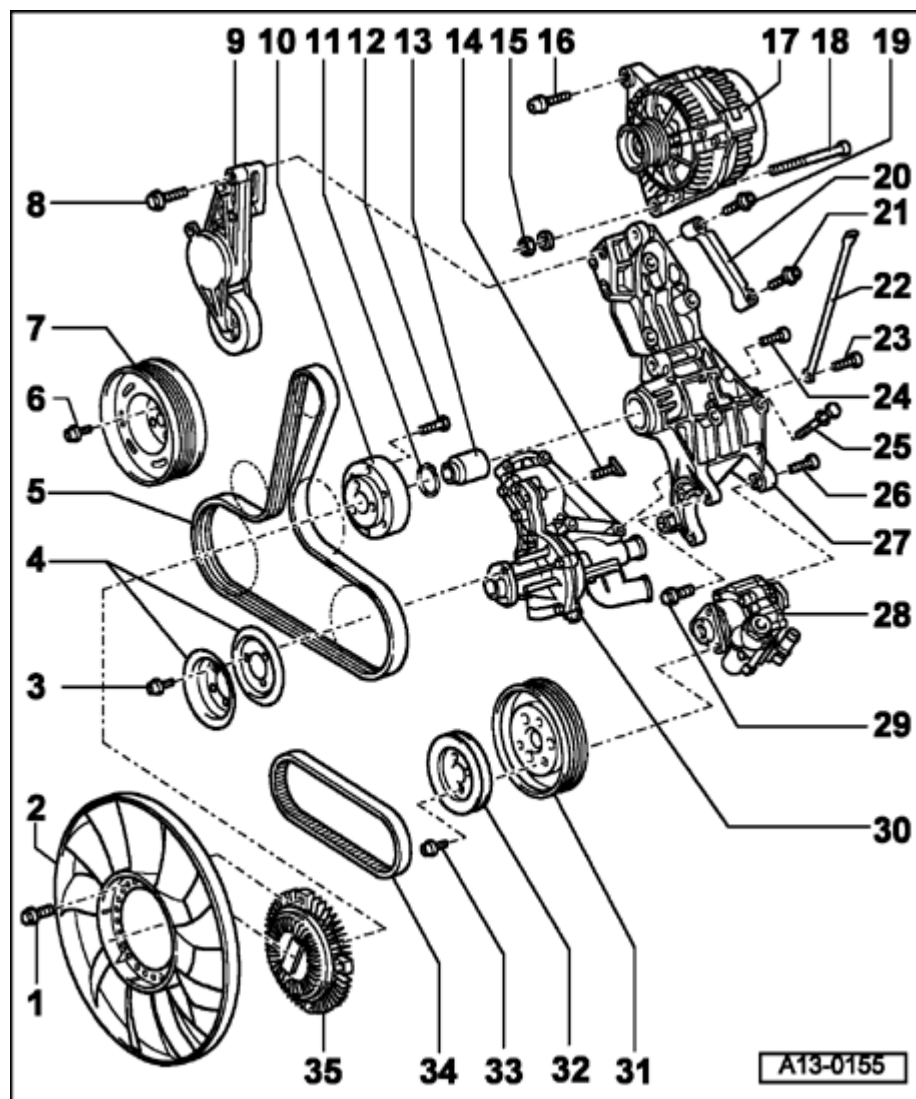
- ◆ For generator, power steering pump and viscous fan
- ◆ Removing and installing ⇒ [Page 13-22](#)
- ◆ Different length bolts
- ◆ Arrangement and tightening sequence ⇒ [Page 19-16](#)

**28 - Power steering pump**

- ◆ Removing and installing ⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 48](#)

**29 - Bolt**

◆ 25 Nm (18 ft lb)



**30 - Coolant pump**

- ◆ With coolant regulator
- ◆ Removing and installing ⇒ [Page 19-13](#)

**31 - Belt pulley**

- ◆ For power steering pump
- ◆ Designed for ribbed belt
- ◆ Install with bulged side facing in driving direction

**32 - Belt pulley**

- ◆ For power steering pump
- ◆ Designed for ribbed belt

**33 - Bolt**

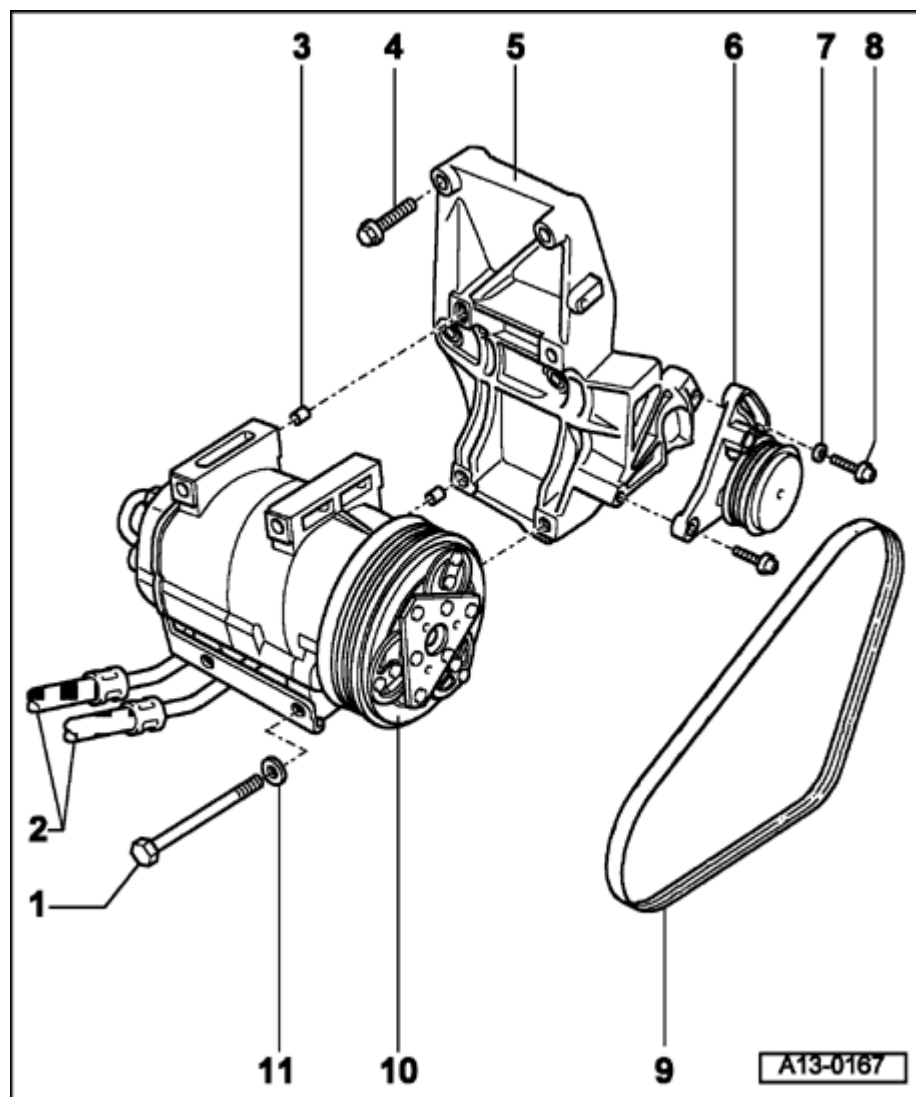
- ◆ 25 Nm (18 ft lb)

**34 - V-belt**

- ◆ For coolant pump
- ◆ Removing and installing ⇒ [Page 13-18](#)

**35 - Viscous clutch**

- ◆ Removing and installing ⇒ [Page 13-14](#) , Fig. ⇒ [1](#)



## Ribbed belt for air conditioning

### **CAUTION!**

- ◆ *The A/C refrigerant circuit must not be opened.*
- ◆ *Before removing ribbed belt, note direction of rotation with chalk or felt-tip marker. Reversing the direction of rotation of a used belt can destroy the belt. When installing the ribbed belt, make sure it is seated correctly on the pulley.*

#### **1 - Bolt**

- ◆ 25 Nm (18 ft lb)

#### **2 - Refrigerant lines**

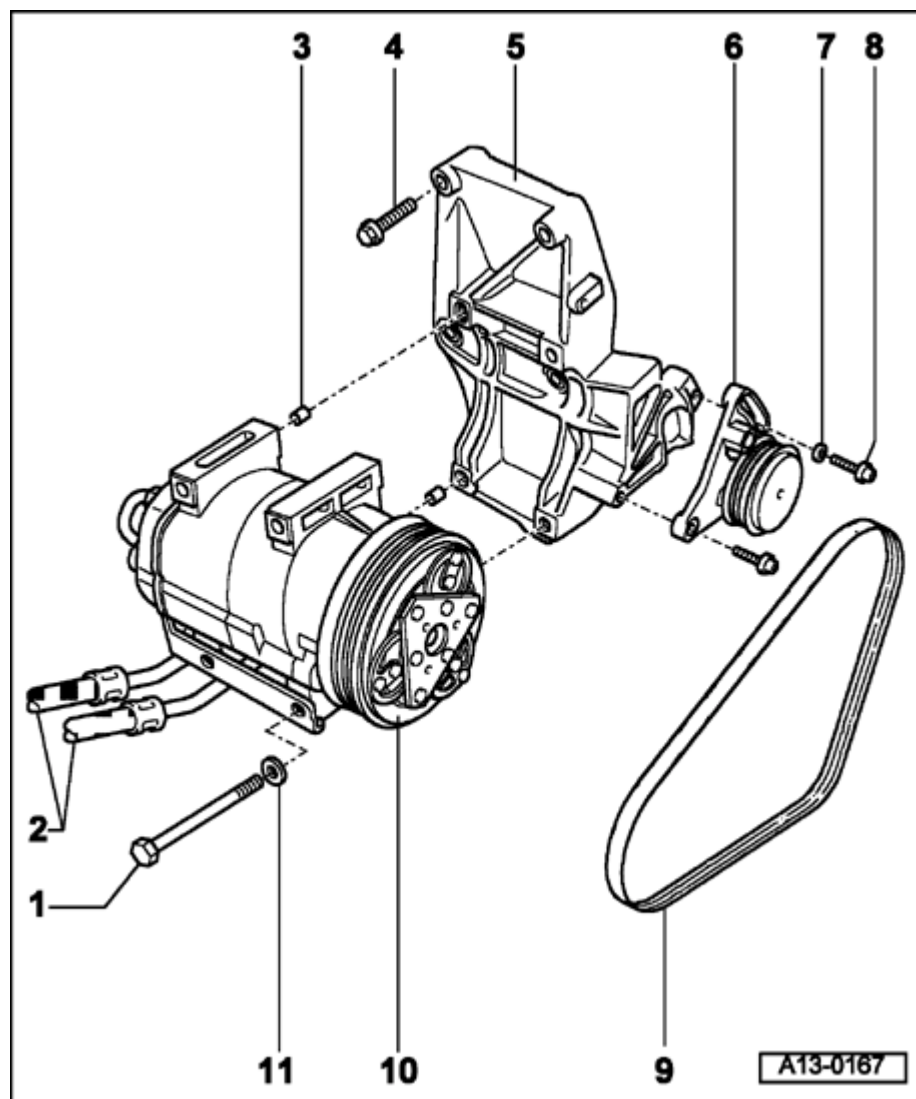
- ◆ Do not unbolt or separate

#### **3 - Bushing**

- ◆ Verify proper seating in bracket

#### **4 - Bolt**

- ◆ For bolt strength grade 8.8, tighten to 25 Nm (18 ft lb) ⇒ parts catalog
- ◆ For bolt strength grade 10.9, tighten to 30 Nm (22 ft lb) ⇒ parts catalog

**5 - Bracket**

- ◆ For A/C compressor

**6 - Ribbed belt tensioner**

- ◆ Removing and installing ⇒ [Page 13-15](#)

**7 - Washer****8 - Bolt**

- ◆ 20 Nm (15 ft lb)

**9 - Ribbed belt**

- ◆ Removing and installing ⇒ [Page 13-15](#)
- ◆ Check for wear

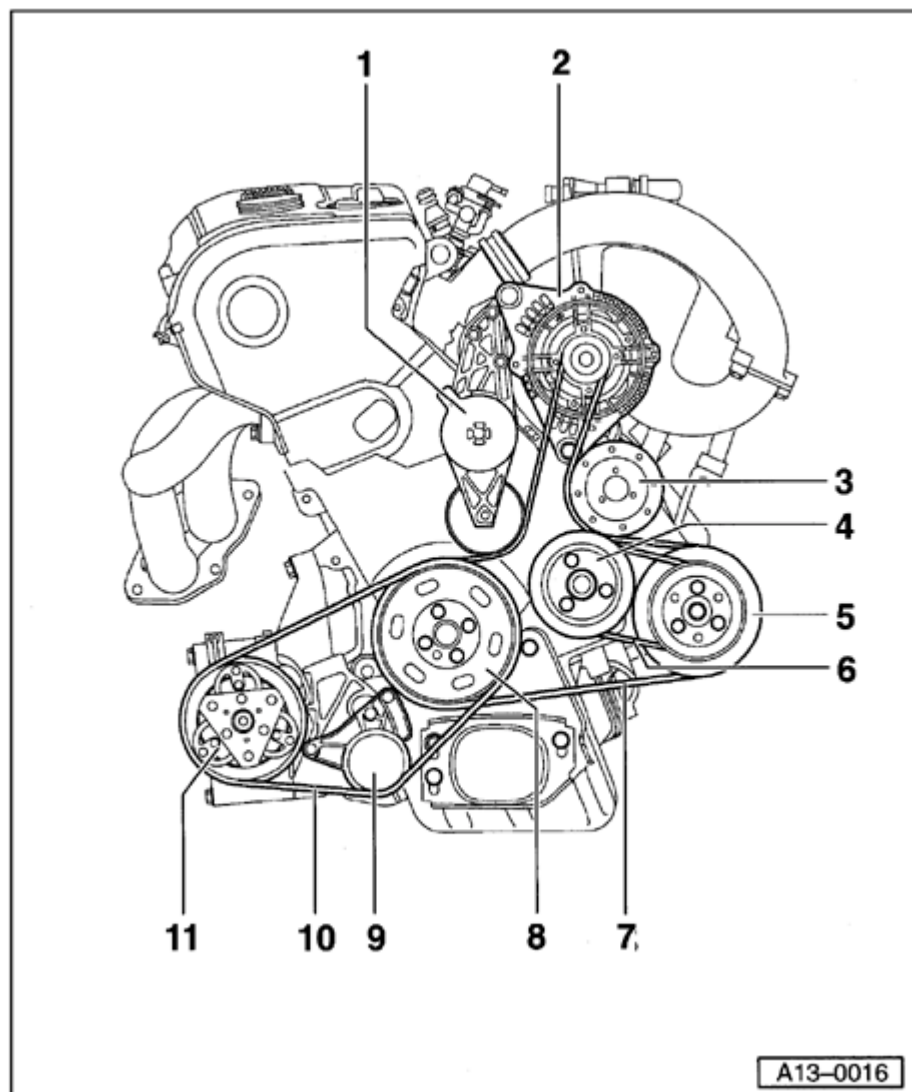
**10 - A/C compressor**

- ◆ After removing, secure A/C compressor to long member (i.e. using wire).

**CAUTION!**

**Do not let A/C compressor hang by refrigerant lines.**

**11 - Washer**



## V-belt and ribbed belt, routing overview

**1 - Ribbed belt tensioner**

**2 - Generator**

**3 - Viscous clutch**

**4 - Coolant pump**

**5 - Power steering pump**

**6 - V-belt**

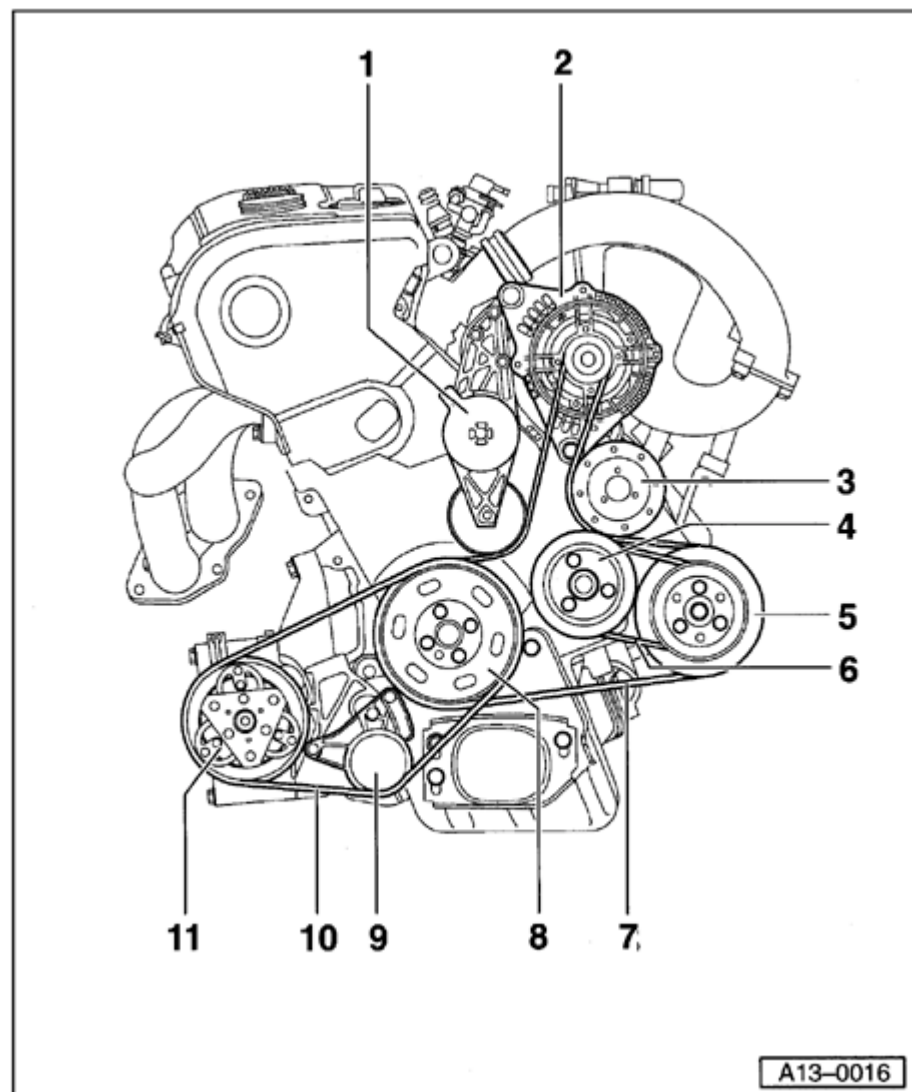
◆ For coolant pump

◆ Removing and installing ⇒ [Page 13-18](#)

**7 - Ribbed belt**

◆ For generator, power steering pump and viscous fan

◆ Removing and installing ⇒ [Page 13-15](#)



**8 - Vibration damper**

**9 - Ribbed belt tensioner**

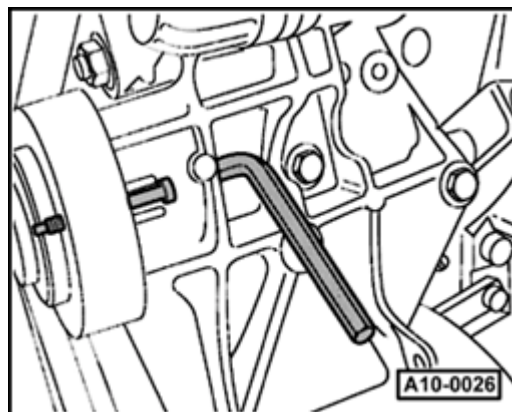
◆ For A/C compressor

**10 - Ribbed belt**

◆ For A/C compressor

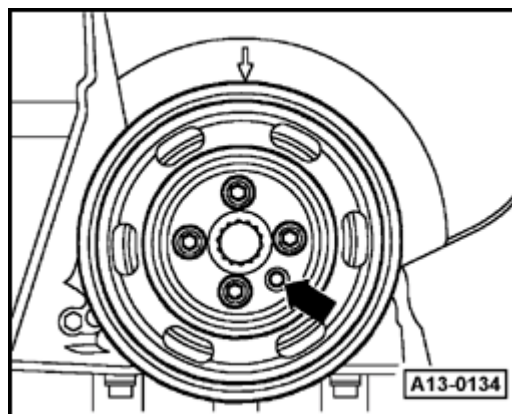
◆ Removing and installing ⇒ [Page 13-15](#)

**11 - A/C compressor**



**A** **Fig. 1 Viscous fan, removing and installing**

- Lock carrier in service position ⇒ [Page 13-1](#)
- Ribbed belt free of tension ⇒ [Page 13-15](#)
- Secure belt pulley for viscous fan with 5 x 60 mm bolt and remove using hex socket wrench.
- Remove viscous fan.
- When installing viscous fan, tighten to 45 Nm (33 ft lb).



**A** **Fig. 2 Install vibration damper**

- Lock carrier in service position ⇒ [Page 13-1](#)
- Ribbed belt removed ⇒ [Page 13-15](#)
- Install vibration damper using only original equipment bolts (bolt strength grade 10.9) ⇒ parts catalog.

Installation is only possible in one position: the bore hole of the vibration damper (arrow) must align with raised portion of toothed belt gear.

- Tighten vibration damper bolts to 40 Nm (30 ft lb).



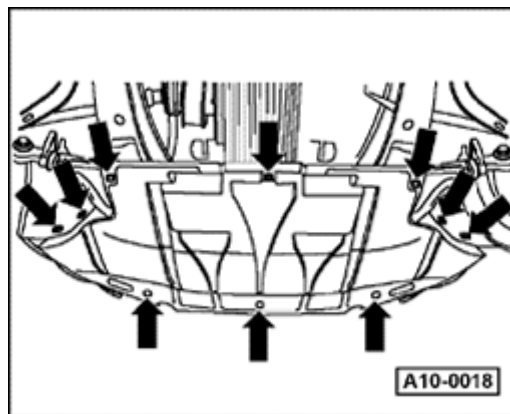
## Ribbed belt, removing and installing

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

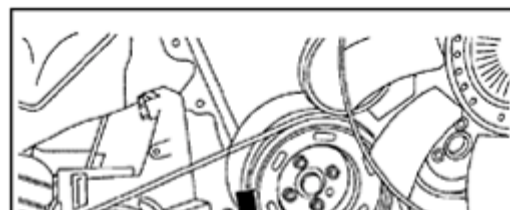
### **CAUTION!**

**Before removing ribbed belt, note direction of rotation with chalk or felt-tip marker. Reversing the direction of rotation of a used belt can destroy the belt. When installing the ribbed belt, make sure it is seated correctly on the pulley.**

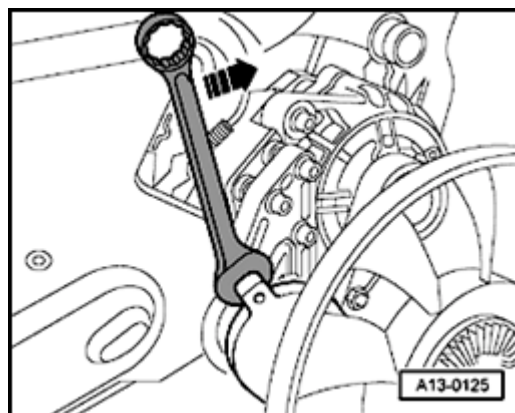
### Removing



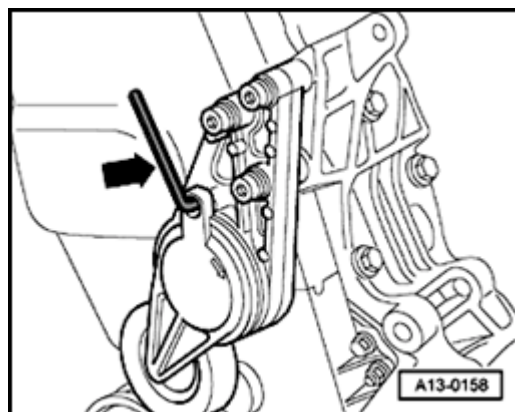
- A** - Remove noise insulation panel (arrows).



- A** - Loosen bolts for ribbed belt tensioner for A/C compressor (arrows).
- Release tension on ribbed belt and remove belt.

**All models**

- A** - Move ribbed belt tensioner in direction of arrow to release tension on ribbed belt.

**Note:**

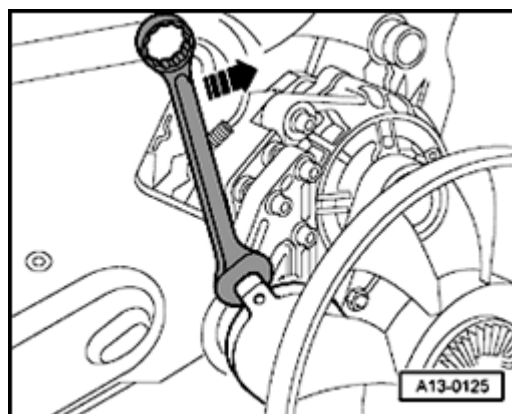
- A** *Ribbed belt tensioner can be locked in place by inserting a proper sized angled hex socket wrench (arrow) or 3204 drift into locating bore.*
- Remove ribbed belt and release tension on ribbed belt tensioner.

## Installing

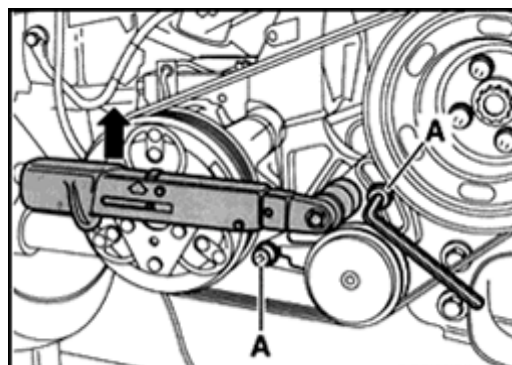
### Note:

*When installing ribbed belt, make sure it is seated correctly on the pulley.*

- Place ribbed belt on belt pulleys for crankshaft, viscous fan and power steering pump, (use tools to pull up if necessary).



- A** - Move ribbed belt tensioner in direction of arrow.
  - Install ribbed belt on belt pulley for generator last and release tension on belt tensioner.
  - Check ribbed belt for proper installation.
- Ribbed belt routing ⇒ [Page 13-12](#)
- Install ribbed belt for A/C compressor.
- Ribbed belt routing ⇒ [Page 13-12](#)

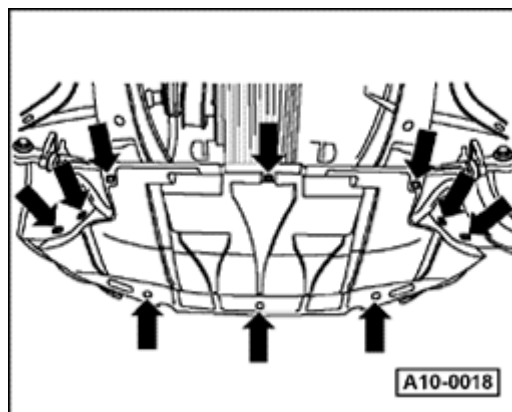


- A** - Use torque wrench to pre-tighten belt tensioner hex screw to 25 Nm (18 ft lb).
- Tighten bolts -A- to 20 Nm (15 ft lb) at same time.
- Start engine and check running of belt.

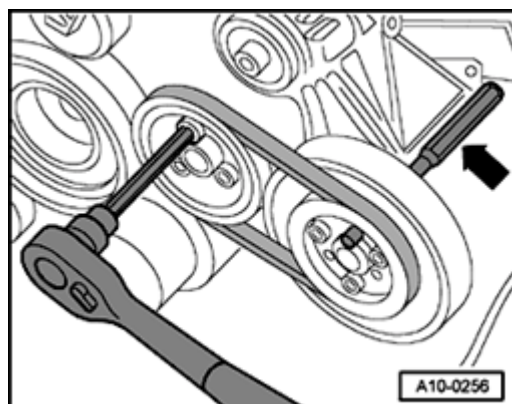
## V-belt, removing and installing

- Lock carrier in service position ⇒ [Page 13-17](#)
- Ribbed belt free of tension ⇒ [Page 13-15](#)

### Removing

**A**

- Remove noise insulation panel (arrows).
- Remove viscous fan (with belt pulley) from bearing ⇒ [Page 13-14](#) , Fig. ⇒ [1](#) .

**A**

- Remove belt pulley for coolant pump. Use drift (arrow) to counterhold at belt pulley for power steering pump.
- Remove V-belt.

## Installing

Installation is the reverse of removal, noting the following:

- Install V-belt and loosely bolt both halves of belt pulley to coolant pump.
- Slowly bring belt pulley halves together by turning coolant pump and tightening bolts for belt pulley in stages.

While tightening pulley halves, the V-belt must move outward and sit correctly on belt pulley.

- Tighten bolts to 25 Nm (18 ft lb).

### **Note:**

*Adjustment of V-belt tension for coolant pump is not possible.*

- Install ribbed belt and release tension on tensioner.
- Start engine and check running of belt.
- Check tightening torque of bolts for coolant pump belt pulley.

## Bearing for viscous fan in mounting bracket, removing and installing

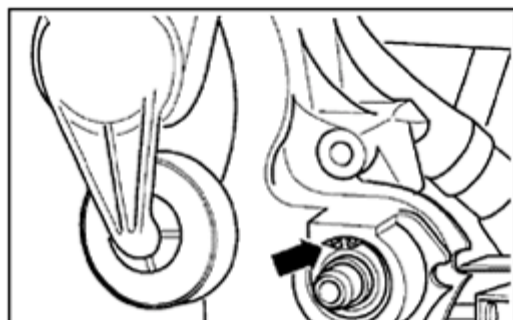
- Lock carrier in service position ⇒ [Page 13-1](#)

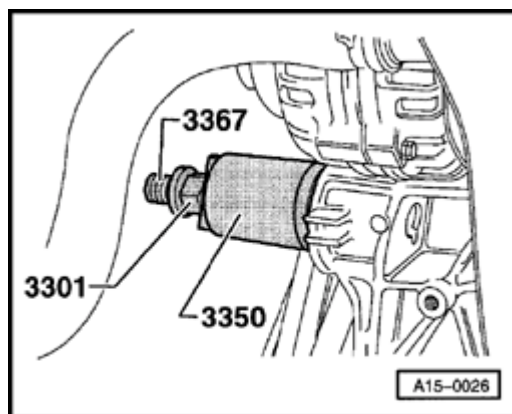
### Special tools and equipment

- ◆ Hex nut from 3301 assembly tool
- ◆ Extractor pipe from 3350 installation device
- ◆ 3367 press out tool for viscous clutch fan bearing bushing

### Removing

- Remove ribbed belt ⇒ [Page 13-15](#) .
- Remove viscous fan (together with belt pulley) ⇒ [Page 13-14](#) , Fig. ⇒ [1](#) .
- Remove circlip (arrow) from bearing bushing.

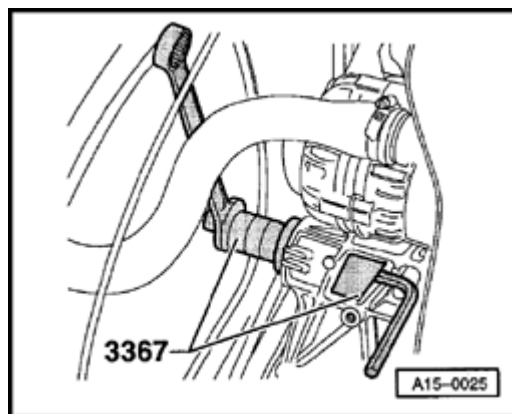




- A**
- Pull bearing from bracket using hex nut from 3301 assembly tool, bolt from 3367 press out tool for viscous fan bearing bushing and 3350 extractor pipe.

### Installing

Installation is the reverse of removal, noting the following:



- A**
- Press in bearing using 3367 press out tool for viscous fan and hex nut from 3301 assembly tool.
  - Using circlip pliers, install circlip in viscous fan bracket.
  - Install viscous fan ⇒ [Page 13-14](#) , Fig. ⇒ [1](#) .

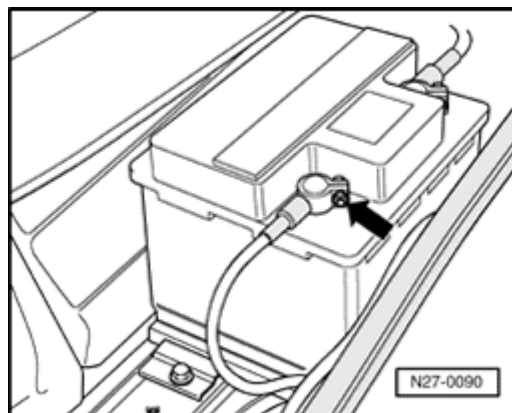
## Mounting bracket for generator, power steering pump and viscous fan, removing and installing

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

### Removing

#### **CAUTION!**

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



A

- Switch ignition off and disconnect battery Ground (GND) strap.
- Remove ribbed belt and ribbed belt tensioner ⇒ [Page 13-18](#) .

#### **Note:**

*Ribbed belt for A/C remains installed.*

Ribbed belt, removing ⇒ [Page 13-15](#) .

- Remove belt pulley for power steering pump.
- Unbolt power steering pump from mounting bracket for generator, power steering pump and viscous fan and tie to side.
- All lines remain connected



- Follow procedures for "Coolant pump, removing and installing" ⇒ [Page 19-13](#) .

**Note:**

*Coolant pump is bolted to mounting bracket for generator, power steering pump and viscous fan.*

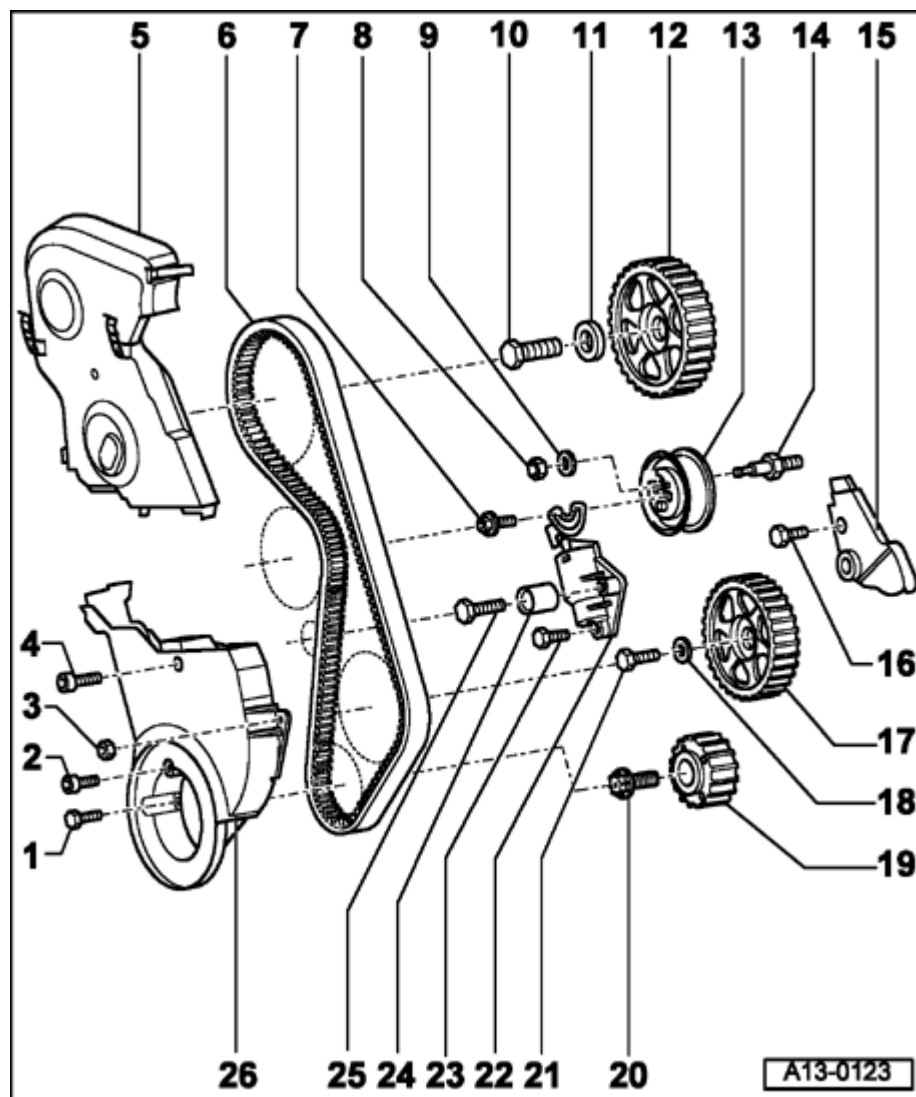
**Installing**

Installation is the reverse of removal, noting the following:

- Replace O-ring for coolant pump (to guard against leakage).

**Tightening torques**

<b>Component</b>	<b>Tightening torque</b>
Belt pulley to power steering pump	25 Nm (18 ft lb)
Power steering pump to mounting bracket for generator, power steering pump and viscous fan	25 Nm (18 ft lb)



## Toothed belt, overview

### **CAUTION!**

**Before removing toothed belt, note direction of rotation with chalk or felt-tip marker. Reversing the direction of rotation of a used belt can destroy the belt. When installing the ribbed belt, make sure it is seated correctly on the pulley.**

#### 1 - Bolt

◆ 10 Nm (7 ft lb)

#### 2 - Bolt

◆ 10 Nm (7 ft lb)

#### 3 - Bolt

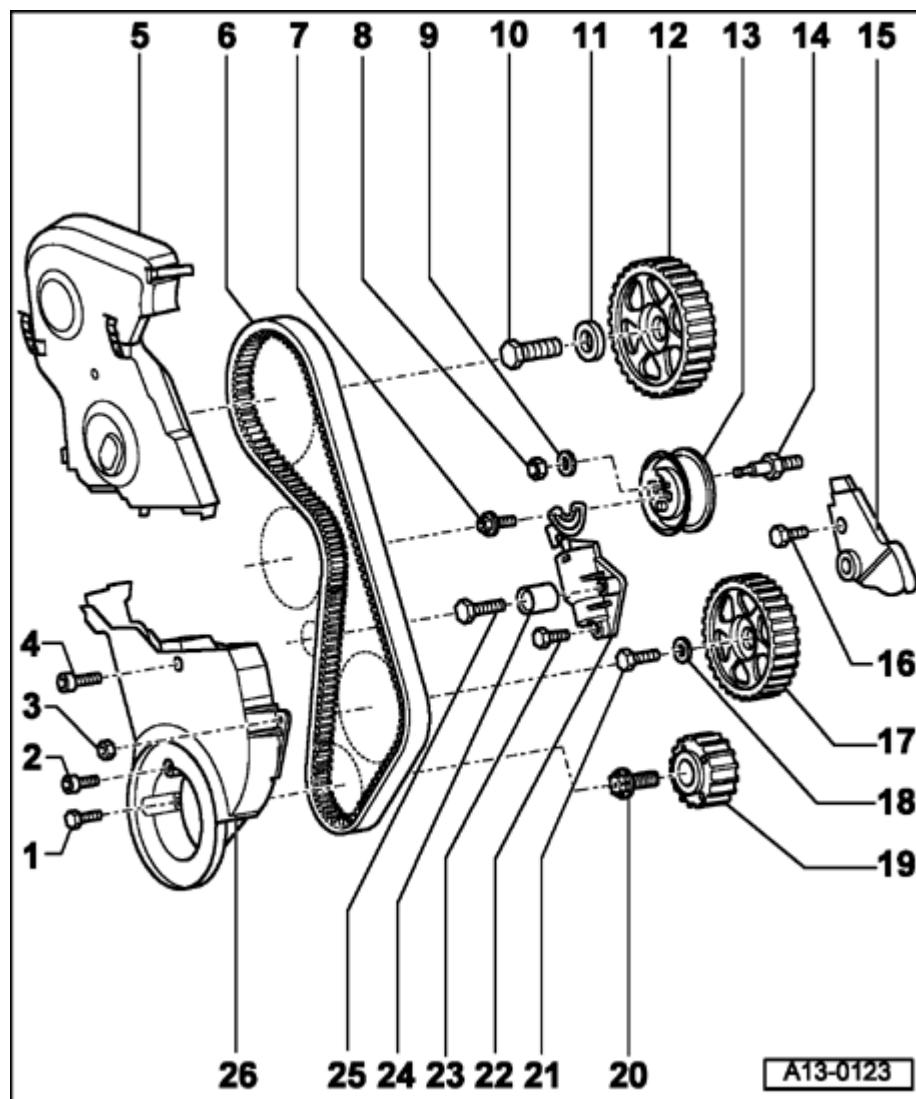
◆ 10 Nm (7 ft lb)

#### 4 - Bolt

◆ 20 Nm (15 ft lb)

#### 5 - Upper toothed belt cover

- ◆ To remove, unbolt ribbed belt tensioner
- ◆ When installing, carefully hook into lower toothed belt cover



### 6 - Toothed belt

- ◆ Before removing, note direction of rotation using chalk or felt-tip marker
- ◆ Check for wear
- ◆ Removing ⇒ [Page 13-29](#)
- ◆ Installing (adjusting valve timing) ⇒ [Page 13-32](#)

### 7 - Bolt for tensioner

- ◆ 25 Nm (18 ft lb)

### 8 - Nut

- ◆ 10 Nm (7 ft lb)

### 9 - Washer

### 10 - Bolt

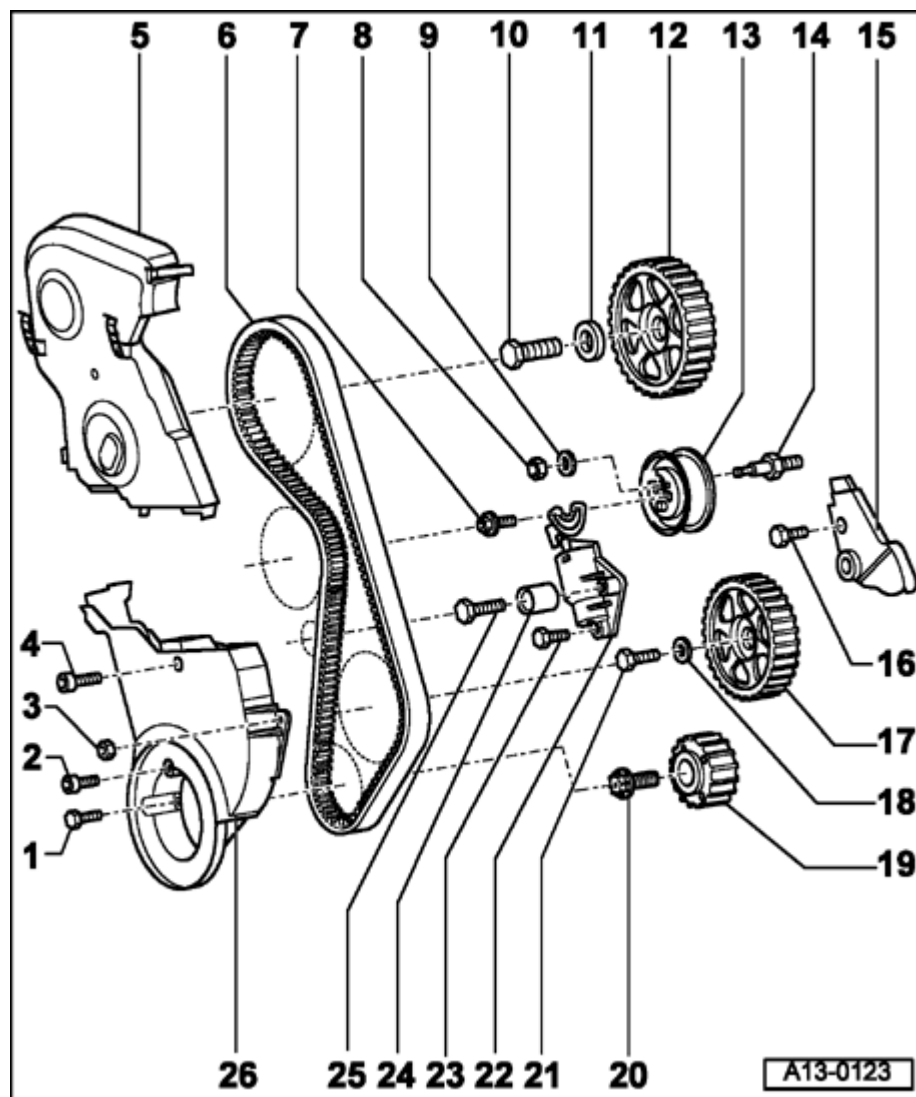
- ◆ 65 Nm (48 ft lb)
- ◆ Use 3036 retainer for loosening and tightening

### 11 - Washer

### 12 - Camshaft gear

- ◆ For exhaust camshaft
- ◆ For removing and installing, remove toothed belt ⇒ [Page 13-29](#)
- ◆ Installation position ⇒ Fig. ⇒ [1](#)

## 13 - Tensioner

**14 - Connecting bolt**

- ◆ 25 Nm (18 ft lb)
- ◆ For tensioner

**15 - Rear toothed belt cover****16 - Bolt**

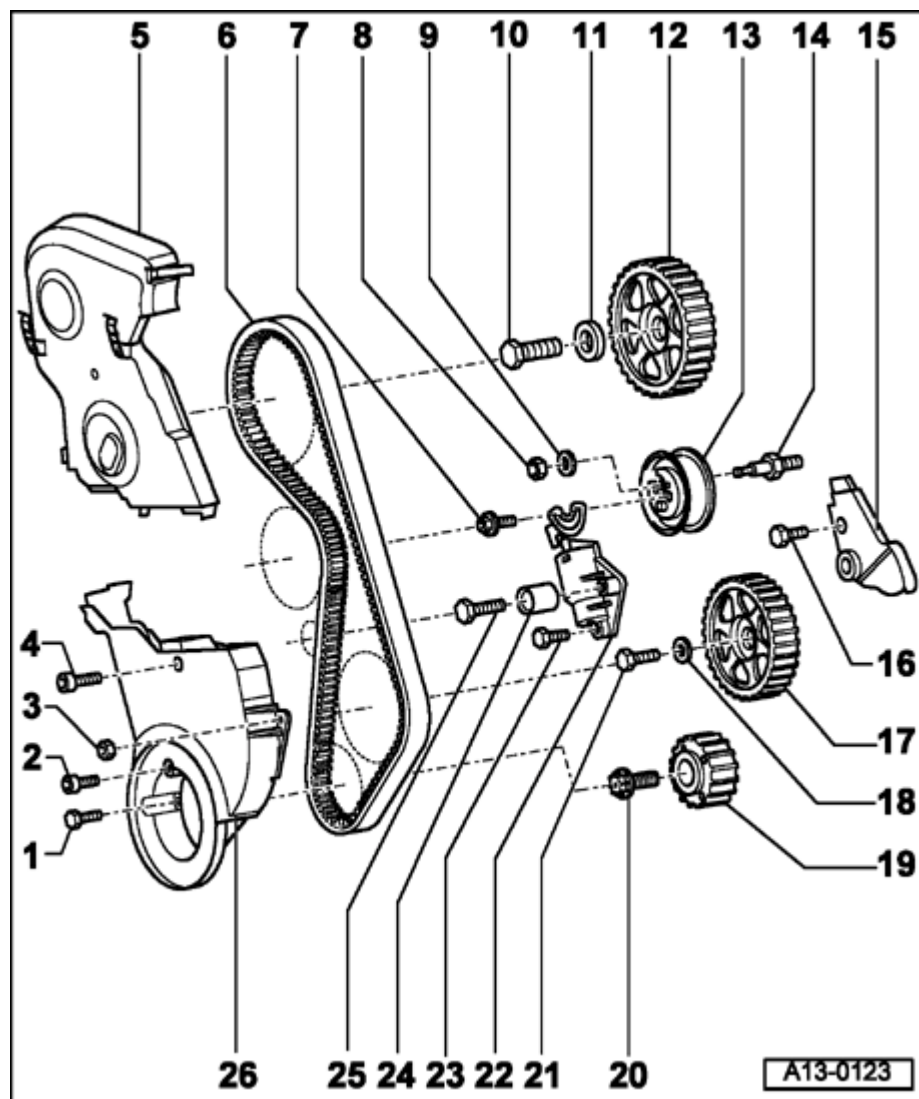
- ◆ 20 Nm (15 ft lb)

**17 - Intermediate shaft gear****18 - Washer****19 - Toothed belt gear for crankshaft**

- ◆ Contact surface between toothed belt gear and crankshaft must be free of oil
- ◆ Installation only possible in one position

**20 - Bolt for toothed belt gear for crankshaft**

- ◆ Always replace
- ◆ 90 Nm (66 ft lb) + additional 1/4 turn (90°)
- ◆ Do not oil
- ◆ Use 3099 retainer for loosening or tightening
- ◆ Attach 3099 retainer ⇒ [Page 13-39](#)
- ◆ To secure retainer, remove torque support bracket ⇒ [Page 17-2](#), item 5



**21 - Bolt**

- ◆ 65 Nm (48 ft lb)
- ◆ Use 3036 retainer when loosening or tightening

**22 - Toothed belt tensioner**

**23 - Bolt**

- ◆ 10 Nm (7 ft lb)

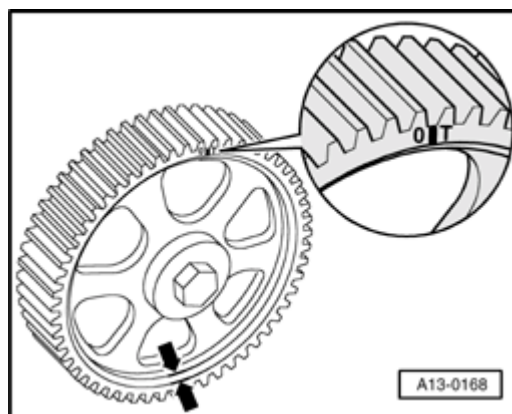
**24 - Idler pulley**

**25 - Bolt**

- ◆ 25 Nm (18 ft lb)

**26 - Lower toothed belt cover**

- ◆ To remove, remove vibration damper



A

**Fig. 1 Installation position for camshaft gear**

Thin rib of camshaft gear points outward (arrows) and TDC Cyl. 1 marking is visible.

## Toothed belt, removing and installing

### Removing

- Engine installed
- Lock carrier in service position ⇒ [Page 13-1](#)

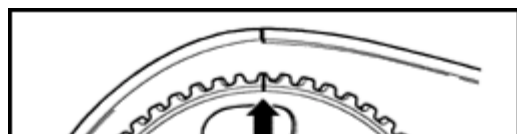
### Special tools and equipment

V159 pin wrench

- Remove ribbed belt and ribbed belt tensioner ⇒ [Page 13-15](#) .
- Remove viscous clutch (with belt pulley) ⇒ [Page 13-14](#) , Fig. ⇒ [1](#) .
- Remove upper toothed belt cover.

### **CAUTION!**

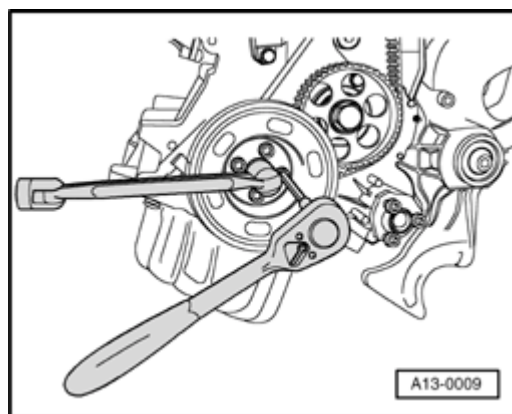
**Before removing toothed belt, note direction of rotation with chalk or felt-tip marker. Reversing the direction of rotation of a used belt can destroy the belt.**



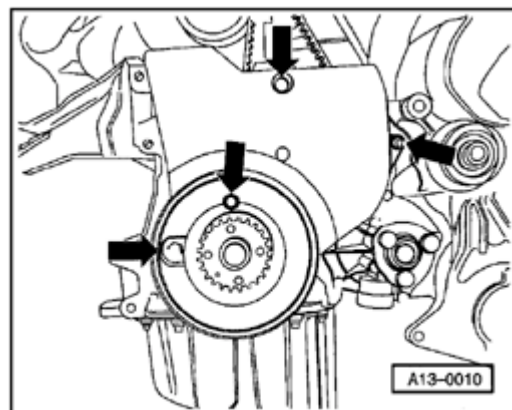
A

- Turn crankshaft at central bolt of toothed belt gear in direction of engine rotation to TDC Cyl.1 marking (arrows).



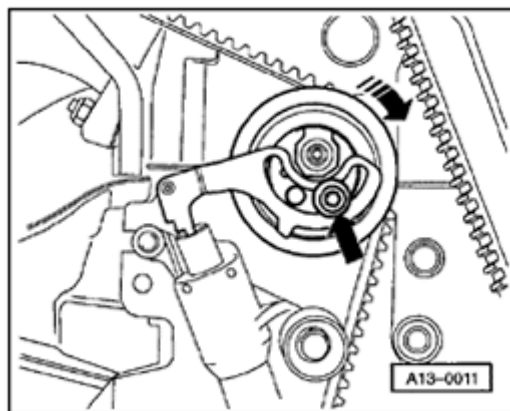


- A** - Remove vibration damper.



- A** - Remove lower toothed belt cover (arrows).

13-31



A

- Using Torx<sup>®</sup> wrench T45, loosen toothed belt tensioner (lower arrow).
- Push toothed belt tensioner downward.
- Remove toothed belt.

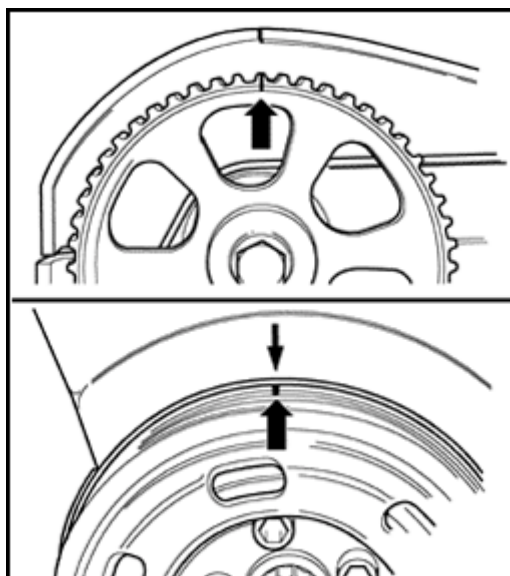
## Installing (adjust valve timing)

### Note:

- ◆ Use the following procedure to adjust toothed belt, even for repairs that only require removal of toothed belt from camshaft gear.
- ◆ Adjustments can be made on a hot or cold engine.

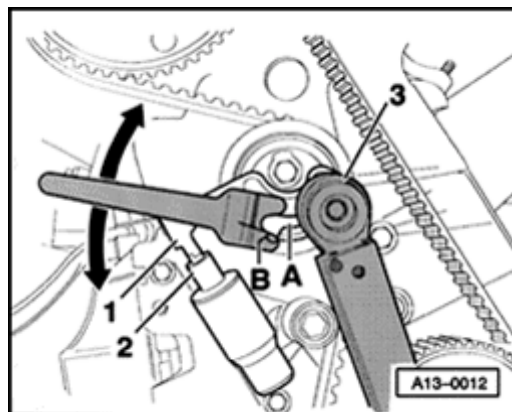
### CAUTION!

**When turning camshaft, crankshaft may not be at TDC for any cylinder. Valves and/or piston heads may be damaged.**

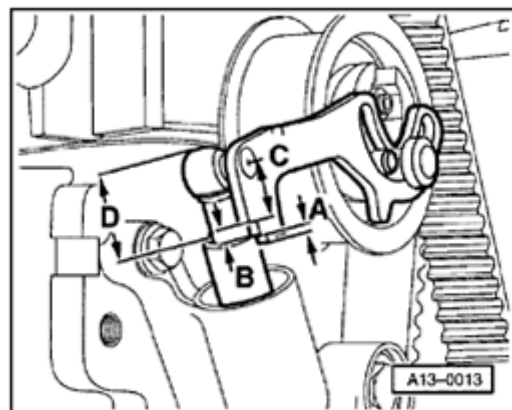


A

- Align marking on camshaft gear to marking on cylinder head cover.
- Place toothed belt on crankshaft gear noting direction of rotation.
- Install lower toothed belt cover.
- Using a bolt, secure vibration damper/belt pulley (note locating point).
- Set crankshaft to TDC Cyl. 1 position.
- Place toothed belt on belt tensioner and camshaft gear.



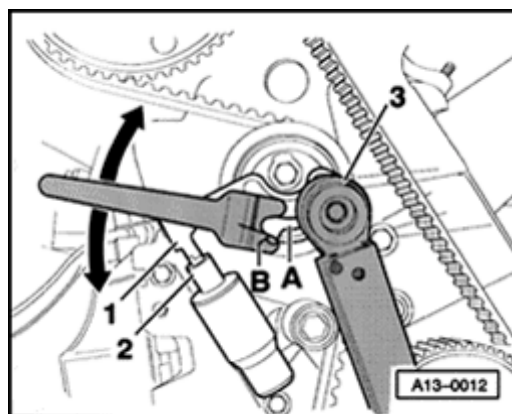
- A**
- Tighten toothed belt by turning tensioner -A- to right using 2 pin spanner (i.e. Matra V159 pin wrench) until cylinder -1- is fully extended and tensioner -2- is raised by approx. 1 mm.
  - Tighten mounting bolt -3- hand tight.
  - Turn crankshaft 2 rotations in running direction.



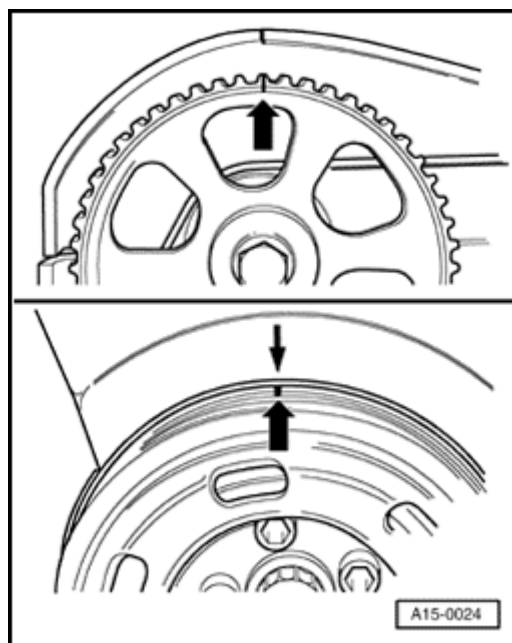
- A**
- Check area -A- for proper alignment with the upper edge of piston -2- (Fig. A13-0012) and adjust if necessary.
    - ◆ Area -A-: adjustment OK
    - ◆ Area -B-: wear limit
    - ◆ Area -C-: re-adjust and check belt drive including tensioner for wear

**Note:**

*If edge of piston is located in area -A-, measurement -D- is between 25-29 mm (0.984-1.142 in.).*



- A**
- Counterhold toothed belt tensioner using 2 pin spanner -B- and tighten mounting screw -3-.



- A**
- Turn crankshaft at central bolt for toothed belt gear two rotations in direction of engine rotation, until camshaft and crankshaft markings align with their respective reference points.
  - Install vibration damper/belt pulley.
  - Install upper toothed belt cover.
  - Install ribbed belt and ribbed belt tensioner ⇒ [Page 13-17](#) .

**Note:**

*When installing the ribbed belt, make sure it is seated correctly on the pulley.*

**Tightening torques**

<b>Component</b>		<b>Tightening torque</b>
Toothed belt tensioner to tensioner assembly		25 Nm (18 ft lb)
Lower toothed belt cover to cylinder block	M6	10 Nm (7 ft lb)
	M8	20 Nm (15 ft lb)
Vibration damper/belt pulley to crankshaft		40 Nm (30 ft lb) 1)
Ribbed belt tensioner to mounting bracket		25 Nm (18 ft lb)
1) Bolt strength grade: 10.9		