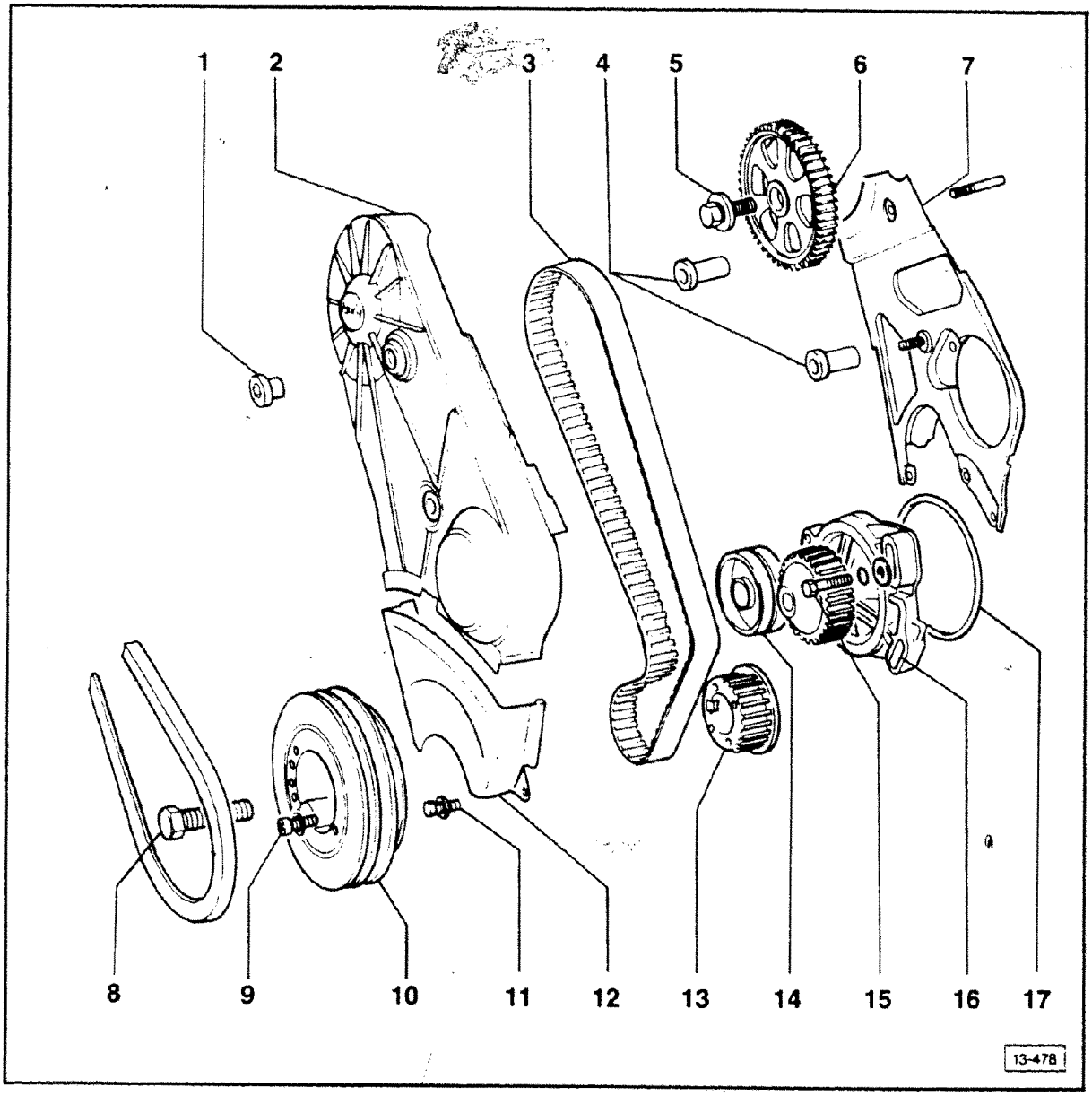
Index

Coupe

★ NEW INFORMATION since last filming

Technical data

Engine code letters	**7A**
Start of production	4-88
Number of cylinders	5
Cubic displacement	2.3 liters
Bore	82.5 mm (3.25 in)
Stroke	86.4 mm (3.40 in)
Compression	10 : 1
Firing order	1-2-4-5-3
Horsepower (SAE BHP)	162 at 6000 RPM
Torque	162 ft lb at 4500 RPM
Valve timing Intake valve opens before **TDC** Intake valve closes after **BDC** Exhaust valve opens before **BDC** Exhaust valve closes before **TDC**	 6° 38° 42° 3°
RON (AKI)	95 (91)
Fuel system	**MPI** (Multi Point Injection)



Always replace seals, gaskets, oil seals and O-rings.

Clutch repairs, see Group 30.

Oil pan removal, see Group 17.

Compession checking, see Group 15.

1 — **10 Nm (7 ft lb)**

2 — **Drive belt cover (upper)**

3 — **Drive belt**
mark running direction before removing
this orientation **MUST** be maintained when reinstalling
installing, see page 13.34

4 — **Bushings**

5 — **65 Nm (48 ft lb)**
use **VW 544** to loosen/tighten

6 — **Camshaft drive sprocket**

7 — **Drive belt cover (lower)**

8 — **350 Nm (258 ft lb)**
use special tools **2079** and **2084**

9 — **20 Nm (15 ft lb)**

10 — **Vibration damper**
note position when installing drive belt

11 — **10 Nm (7 ft lb)**

12 — **Drive belt cover (lower)**

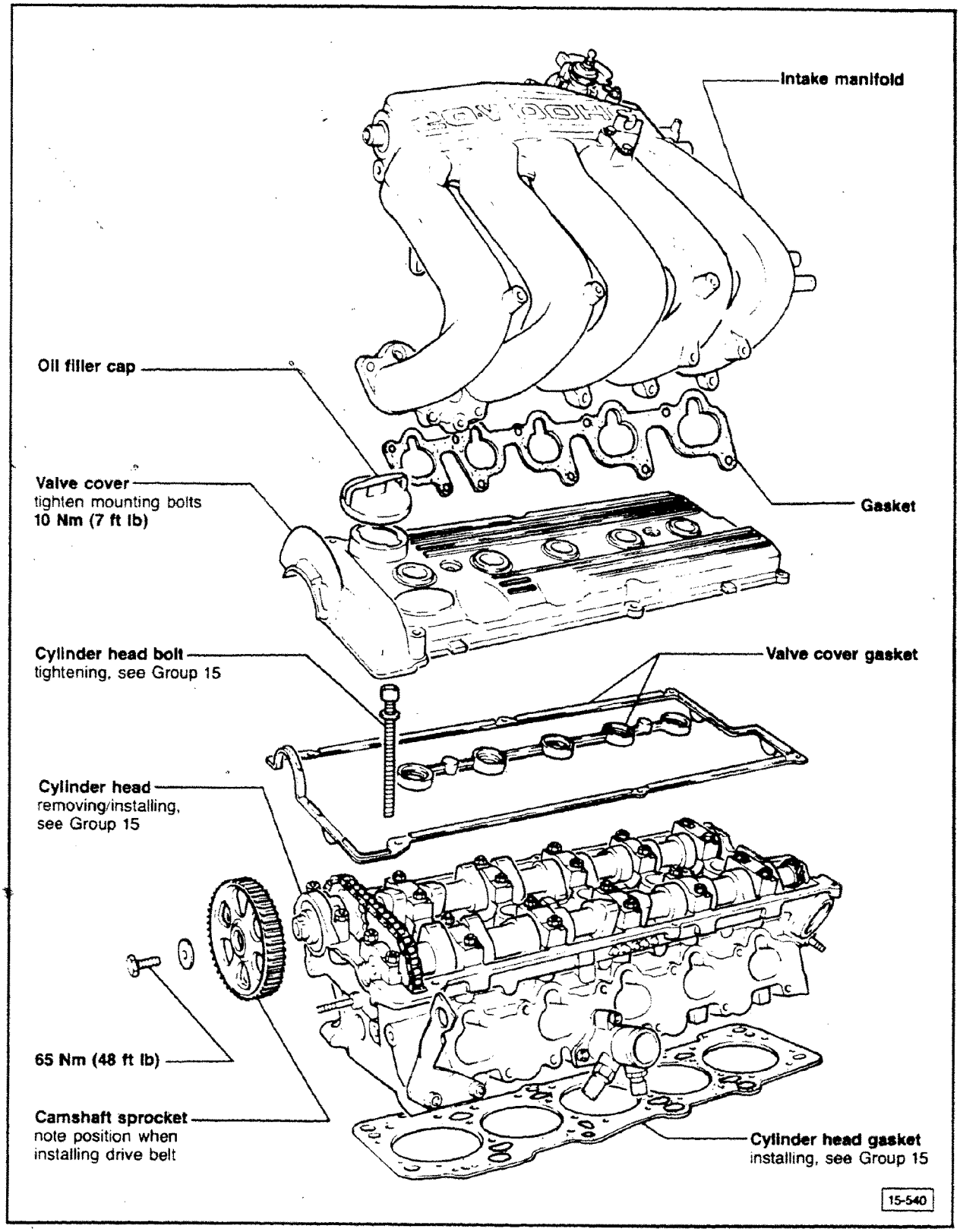
13 — **Crankshaft drive belt sprocket**

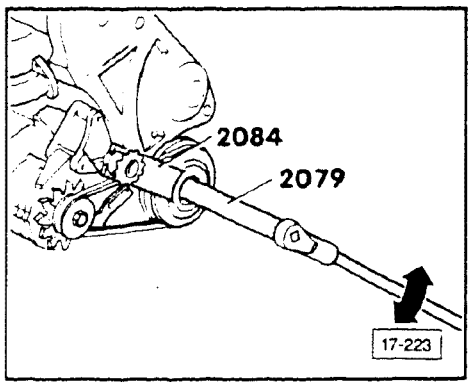
14 — **Idler pulley**
10 Nm (7 ft lb)

15 — **20 Nm (15 ft lb)**

16 — **Water pump**
turn to left to tension drive belt

17 — **O-ring**
after removing the water pump on older engines it is recommended that the sealing surfaces be cleaned and the O-ring replaced


Intake manifold
Oil filler cap
Valve cover
tighten mounting bolts
10 Nm (7 ft lb)
Gasket
Cylinder head bolt
tightening, see Group 15
Valve cover gasket
Cylinder head
removing/installing,
see Group 15
65 Nm (48 ft lb)
Camshaft sprocket
note position when
installing drive belt
Cylinder head gasket
installing, see Group 15
15-540



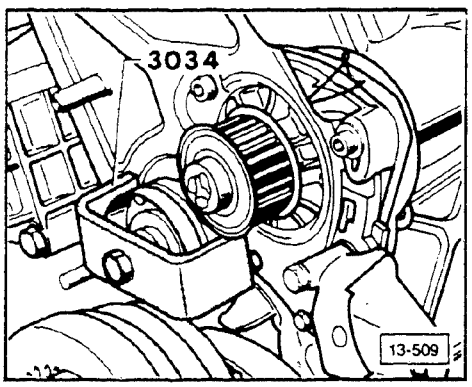
Vibration damper, removing/ installing

Removing

- install vibration damper holding tool **2084**
- break vibration damper center bolt loose using tool **2079**

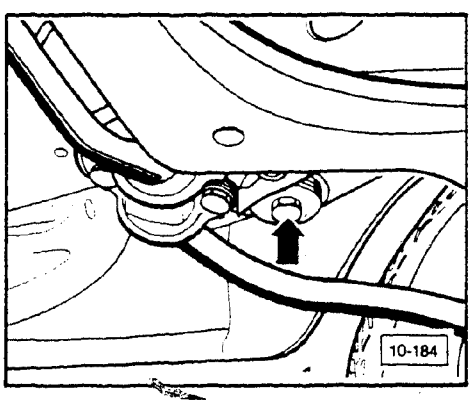
Installing

- apply sealing compound **AMV 188 001 02** to top thread and bolt contact surface
- install belt and sprocket on crankshaft with vibration damper
- install vibration damper holding tool **2084**
- tighten vibration damper center bolt using tool **2079** and a torque wrench
  - torque to 350 Nm (258 ft lb)



Idler pulley, removing

- remove idler pulley using **3034** puller
  - remove idler pulley only if replacing oil pump or if there is bearing damage to the pulley

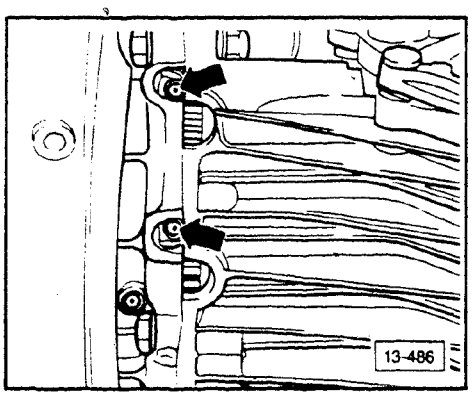


Note

To remove the oil pump only the mounting bolt needs to be removed.

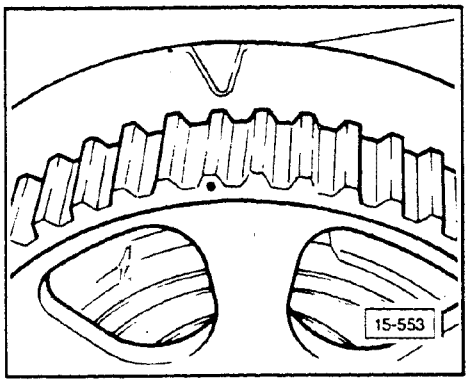
Oil pan, removing

- remove both front bolts (**arrow**) on subframe
- remove oil dip stick
- drain engine oil



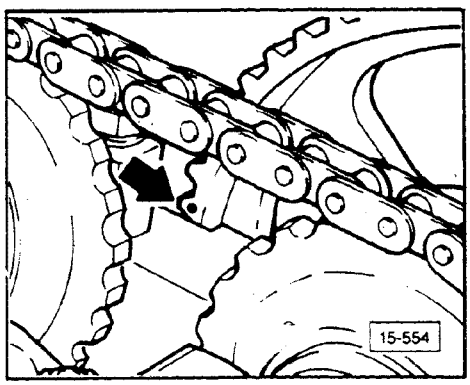
- rotate engine until flywheel recesses align with oil pan bolts
- remove oil pan bolts
- remove oil pan

Drive belt, installing



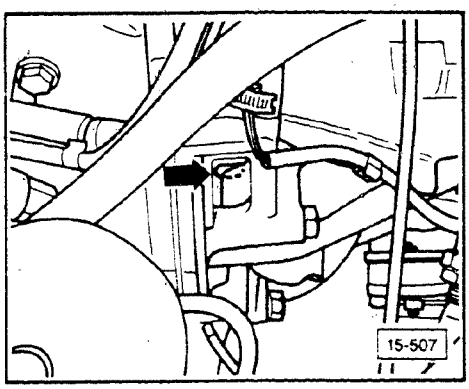
With valve cover installed

- marking on camshaft sprocket must line up with marking on valve cover



With valve cover removed

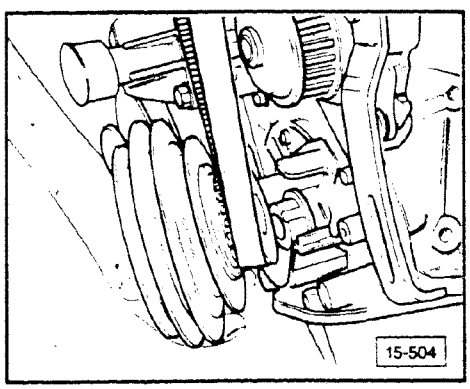
- marking on camshaft sprocket (**arrow**) must line up with upper edge of cylinder head



- position crankshaft at **TDC**

With engine installed

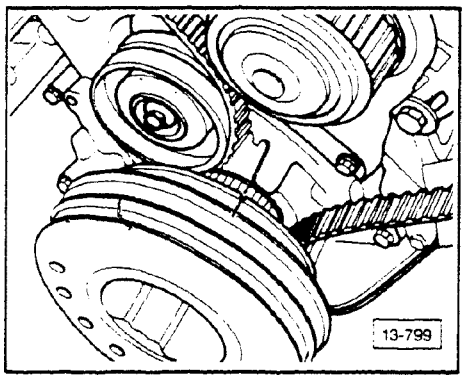
- line up **TDC** marking **0** with boss on bell housing (**arrow**)



- place drive belt on drive belt sprocket of crankshaft and attach vibration damper to crankshaft

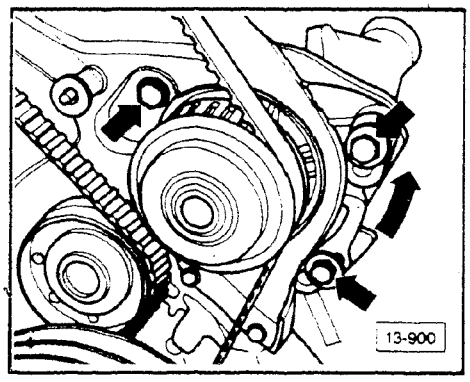
CAUTION

The drive belt must **NOT** get pinched between the oil pump and sprocket when attaching the vibration damper.



Drive belt, installing with engine removed

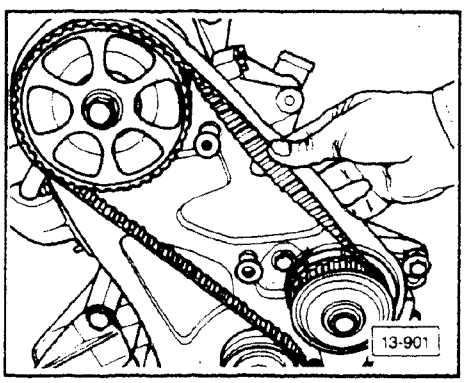
- line up notch of vibration damper with adjustment mark on oil pump housing
- install lower drive belt cover (there is an additional adjustment mark)
- install drive belt over idler pulley and water pump on the camshaft sprocket



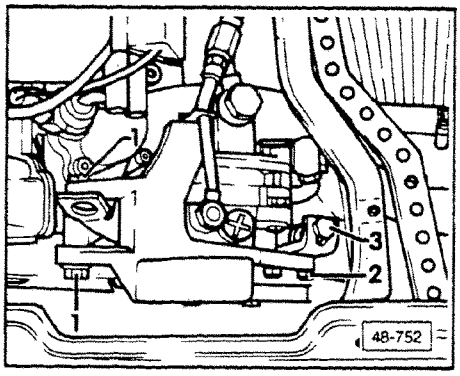
- tighten drive belt by turning loosened water pump to the left

Note

After removing the water pump on older engines it is recommended that the sealing surfaces be cleaned and the o-ring replaced.

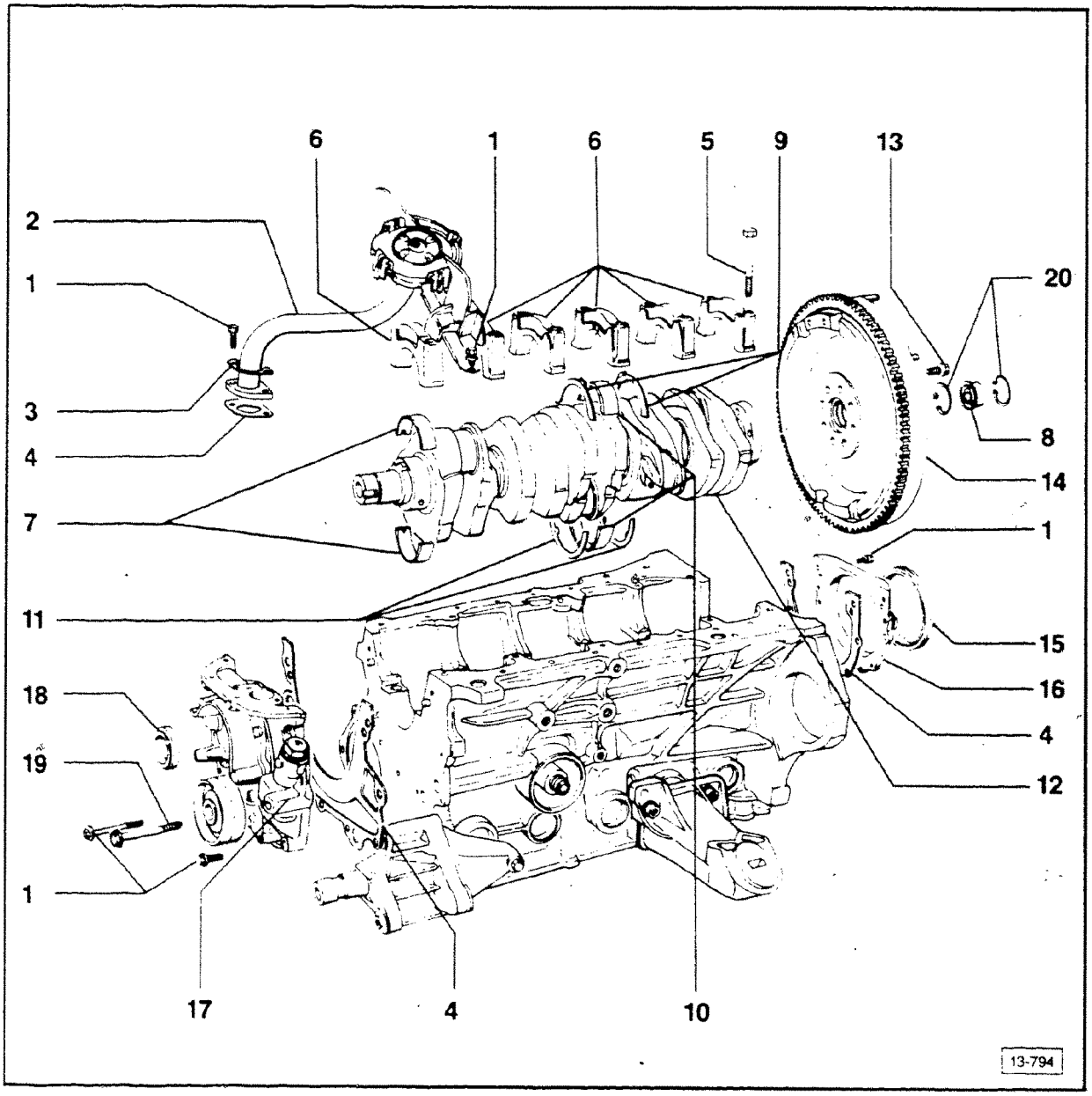


- belt is correctly tensioned when it can be twisted 90° with thumb and index finger between camshaft sprocket and water pump
- tighten water pump
  - 20 Nm (15 ft lb)
- turn crankshaft twice and check setting
- check basic setting of ignition distributor, see Group 28
- install central hydraulic system pump and tension v-belt, see page 13.36



Central hydraulic system pump, v-belt tensioning

- loosen both bolts **1** and lock nut **2**
- turn bolt **3** of tensioner as needed
- check belt tension using thumb
  - must deflect approximately 10 mm (0.4 in.)
- tighten both mounting bolts **1** and lock nut **2**
  - torque to 20 Nm (15 ft lb)



Always replace gaskets, o-rings and oil seals.

Do not turn crankshaft when measuring end play.

1 — 10 Nm (7 ft lb)

2 — **Suction tube**
tighten to oil pump first

3 — **Lock plate**
always replace

4 — **Gasket**

5 — 65 Nm (48 ft lb)

6 — **Main bearing caps**
cap #1 — pulley side bearing shell indentations must be positioned next to one another
note center displacement of bores

7 — **Bearing shells 1, 2, 3, 5 and 6**
bearing caps do **NOT** have oil groove. cylinder block side **HAS** oil groove
do **NOT** interchange used bearing shells
retaining tabs must engage in recesses in bearing cap.

8 — **Pilot bearing**
removing/installing, see page 13.39

9 — **Thrust washer**
for bearing cap side, note locating point

10 — **Bearing shell for main bearing #4**
bearing caps do **NOT** have oil groove, cylinder block side **HAS** oil groove

11 — **Thrust washer**
for cylinder block side, note locating point

12 — **Crankshaft**
checking, see page 13.41

13 — **30 Nm (22 ft lb) + 1/4 additional turn (90°)**

> CAUTION
> Use dial type torque wrench. Damage may result from use of a "click" type wrench.

- additional 1/4 (90°) turn may be done in two 45° steps, see page 13.50
- always replace bolts, do not reuse
- threads of replacement bolts are pre-coated with locking compound

14 — **Flywheel**
remove and install using tool **10-201** igntion timing reference pin, see page 13.42

15 — **Rear crankshaft oil seal**
removing/installing, see page 13.39

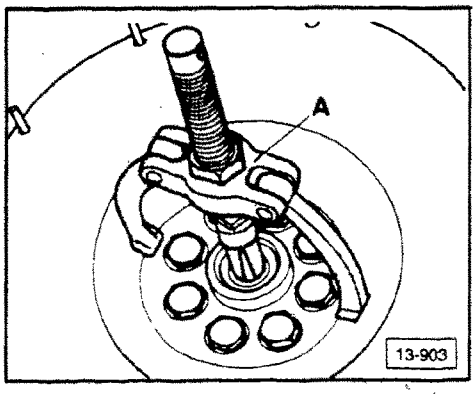
16 — **Rear oil seal flange**

17 — **Oil pump**
when installing, be sure that shaft engages crankshaft

18 — **Front crankshaft oil seal**
removing/installing, see page 13.39

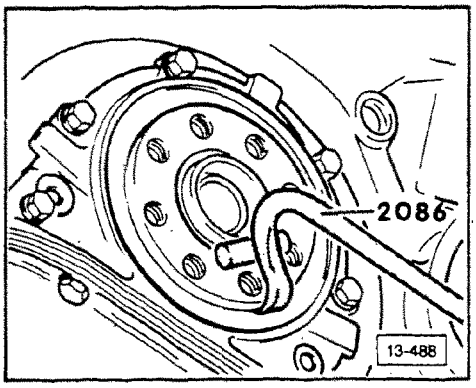
19 — **10 Nm (7 ft lb)**

20 — **Circlip**



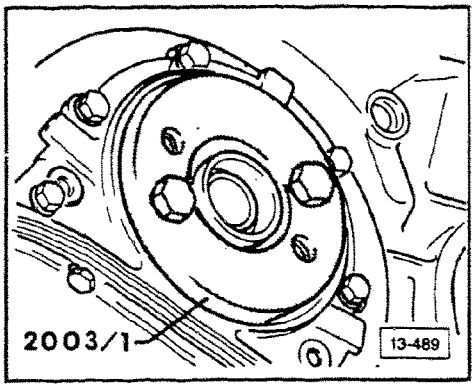
Pilot bearing, removing/installing

- remove circlip
- remove ball bearing with puller and holder (for example, **Kukko 21/2** — 14.5 to 18.5 mm and **Kukko 22-1**)
- install using tools **30-505** and **30-506b**



Crankshaft oil seal (flywheel side), removing/installing

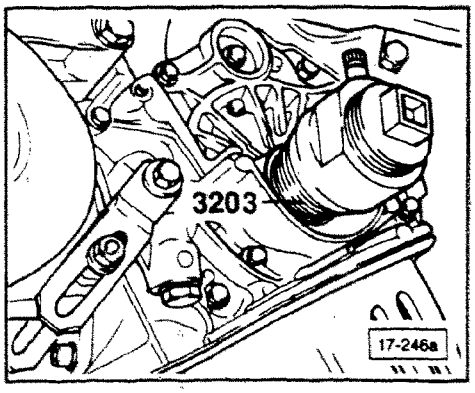
- remove oil seal using tool **2086**



Note

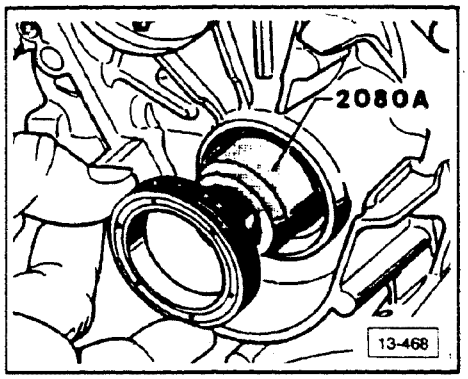
Replacement seal in repair kit is pre-coated. **DO NOT** lubricate.

- install with installation tool supplied with repair kit
- press in oil seal with tool **2003/1** until fully seated

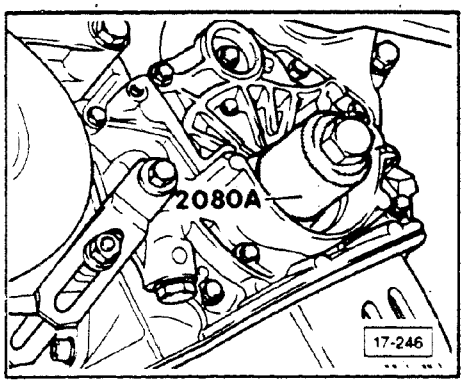


Crankshaft oil seal (vibration damper side), removing/installing

- remove oil seal using tool **3203**



- slip inner seal guide of tool **2080 A** over crankshaft
- coat oil seal lip and outer surface with a light coating of oil
- carefully push seal over seal guide of tool **2080 A**

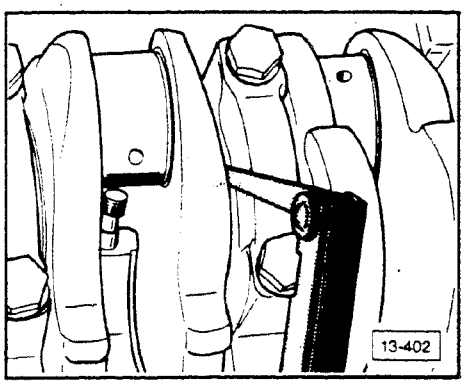


- slide outer sleeve of tool **2080 A** over seal guide/seal
- tighten outer sleeve against seal using vibration damper bolt until seal is seated

Note

If the crankshaft is scored or worn in the area of oil seal contact; press the seal into the casting until it bottoms. If there is no crankshaft wear; press in the seal flush with the surface of the casting.

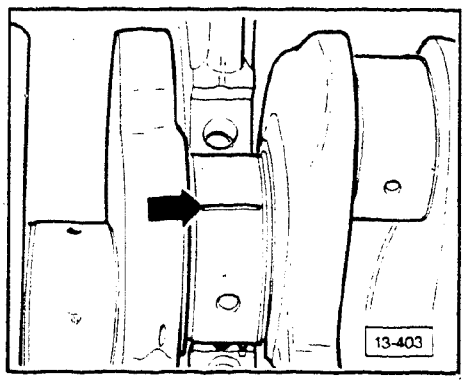
Crankshaft end play, checking

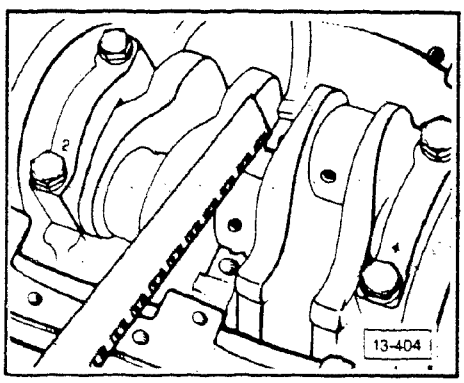


- check with feeler gage on main bearing No. **4**
  - New: 0.07 to 0.23 mm (0.003 to 0.009 in.)
    Wear limit: 0.25 mm (0.010 in.)

Stage	Main bearing journal diameter	Connecting rod journal diameter
Standard	57.958-57.978	47.758-47.778
1st undersize	57.708-57.728	47.508-47.528
2nd undersize	57.458-57.478	47.258-47.278
3rd undersize	57.208-57.228	47.008-47.028

Main bearing clearance, checking





Note

Crankshaft bearing clearance can also be checked with the engine installed.

- remove oil pan
- remove bearing caps
- clean shells and journals
- lay Plastigage® across journal (**arrow**) or in bearing shell
- install bearing caps
  - tighten to 65 Nm (48 ft lb)

CAUTION

Do **NOT** turn crankshaft.

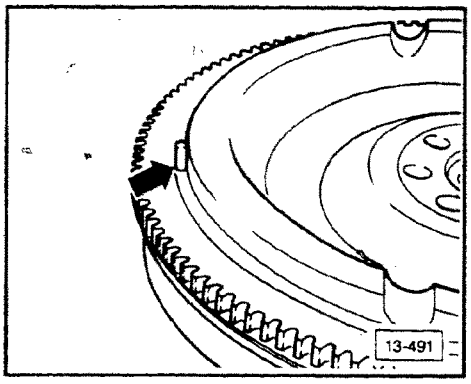
- remove bearing caps again
- compare width of flattened Plastigage® with measuring scale
  - New: 0.018 to 0.058 mm (0.001 to 0.002 in.)
    Wear limit: 0.16 mm (0.006)

Ignition timing reference pin, installing

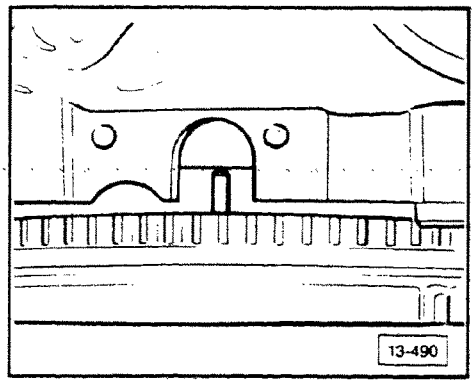
Do **NOT** bend pin when replacing flywheel.

CAUTION

Engine will **NOT** start if reference sensor pin is **NOT** installed in flywheel because control unit will **NOT** receive an impulse.

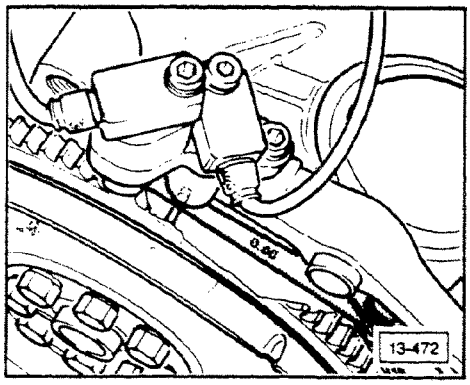


- drive timing sensor pin into flywheel until it is flush with raised surface of flywheel (**arrow**)

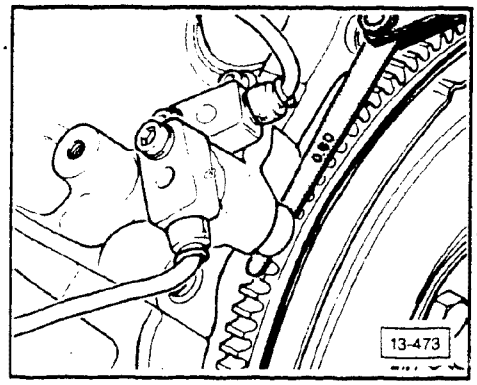


Ignition timing reference sensor, installing

- turn flywheel until reference pin is in center of opening for timing reference sensor

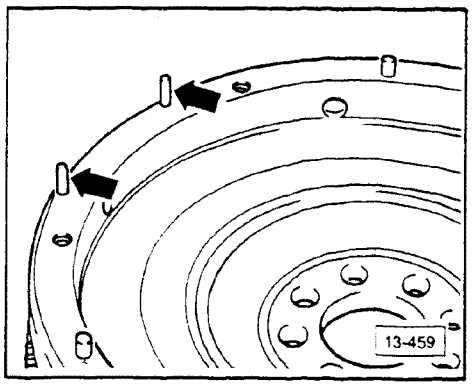


- install sensor
- measure gap between reference pin and timing sensor using feeler gage
  - gap: 0.50 to 1.25 mm (0.020 to 0.049 in.)



Engine speed sensor, installing

- measure gap between flywheel teeth and engine speed sensor using feeler gage
  - gap: 0.50 to 1.25 mm (0.020 to 0.049 in.)

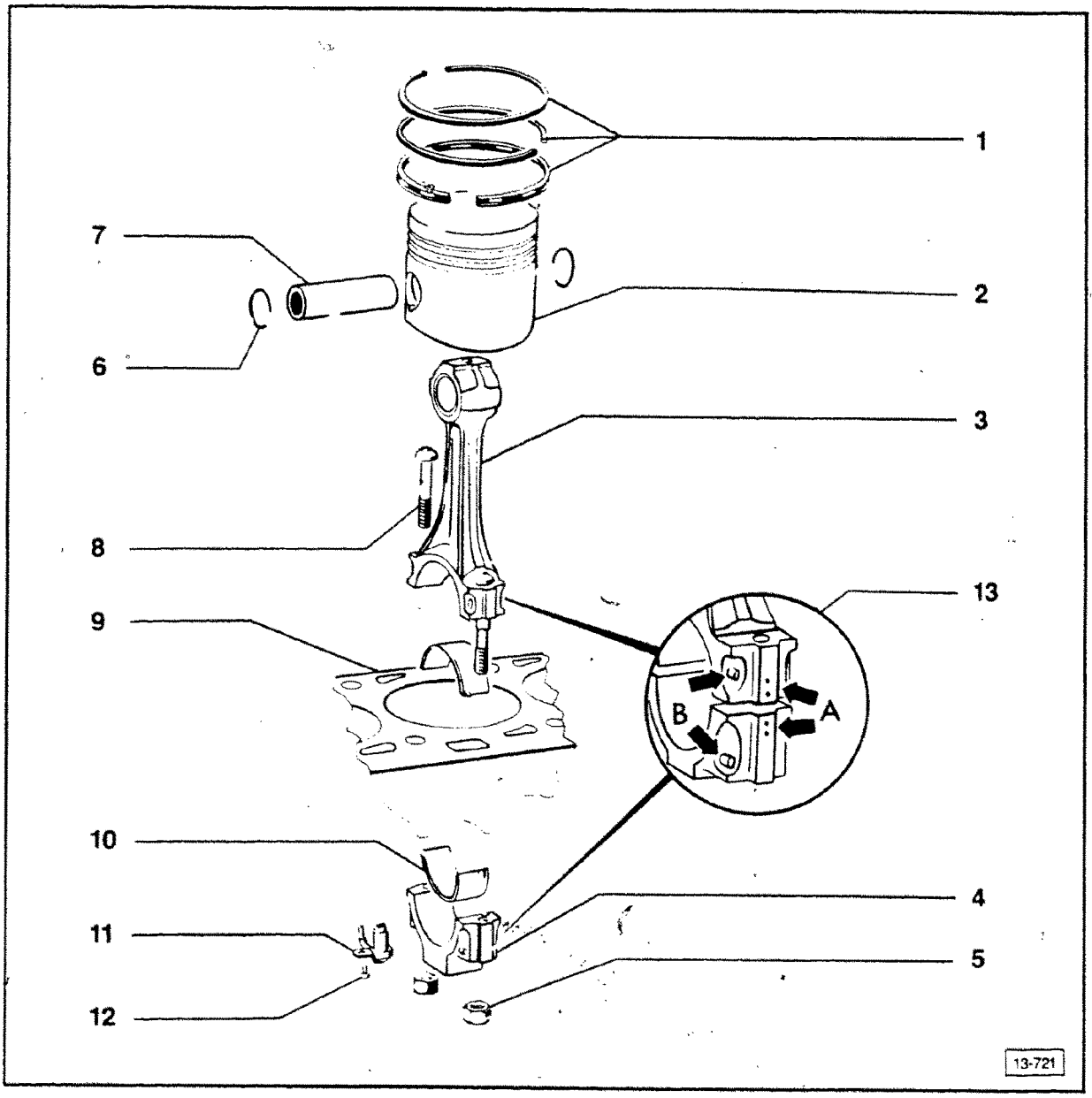


Reference pins for VW 1367 magnetic pickup, installing

- carefully press pins into flywheel
  - pin height: 29.5 mm to 30.5 mm (1.16 to 1.2 in.)

CAUTION

Do **NOT** bend these pins when removing or installing engine or transmission.



1 — **Piston rings**
checking side clearance, see page 13.46
checking ring end gap, see page 13.46
removing/installing, see page 13.46

2 — **Pistons**
checking, see page 13.47
installing, see page 13.48
dimensions, see page 13.47

3 — **Connecting rod**
matched to bearing cap, do **NOT** intermix.
checking, see page 13.49

4 — **Connecting rod bearing cap**
matched to connecting rod, do **NOT** intermix.

5 — **30 Nm (22 ft lb) + 1/4 additional turn (90°)**
lubricate contact surfaces before torquing.

6 — **Circlip**
removing, see page 13.47

7 — **Piston pin**
if tight, heat piston to approximately 60°C (140°F)
install using tool **2070**

8 — **Connecting rod bolt**

9 — **Cylinder block**
bore checking, see page 13.47

10 — **Bearing shell**
checking, see page 13.49

11 — **Oil jet spray**
for piston cooling

12 — **10 Nm (7 ft lb)**
install using **AMV 188 001 02**
locking compound

13 — **Note assembly relationship**

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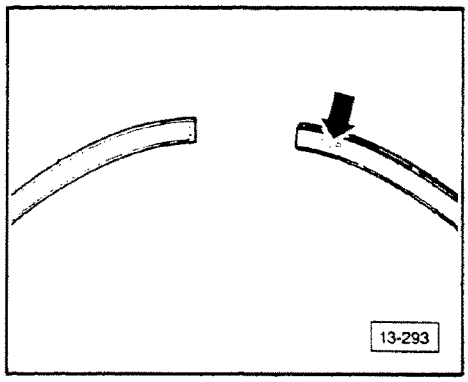
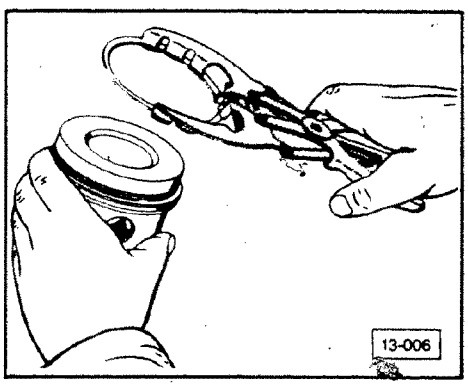
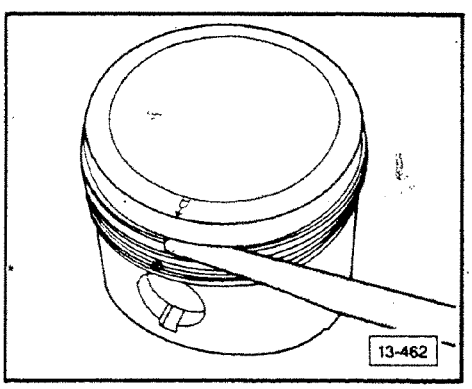


Piston ring, installing

- **"TOP"** inscription must face toward top of piston
- chamfer on plain compression ring must face toward top of piston
- indentation on stepped scraper ring must face toward bottom of piston

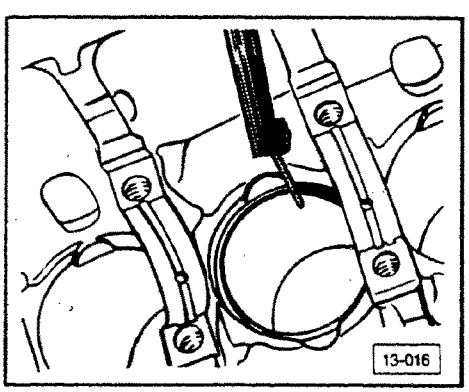


- spread rings (using tool **VW 121B** for example) and install following above orientations



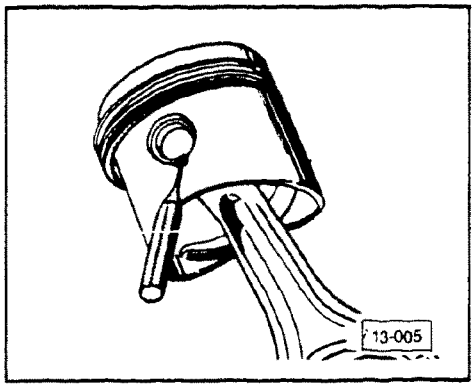
Piston ring side clearance, checking

- insert feeler gage between piston ring and ring groove in piston
  - New: 0.02 to 0.08 mm (0.0008 to 0.003 in.)
    Wear limit: 0.1 mm (0.004 in.)



Piston ring end gap, checking

- squarely insert piston ring into cylinder bore approximately 15 mm (0.6 in.) from top
  - New: 0.2 to 0.5 mm (0.008 to 0.020 in.)
    Wear limit: 1.0 mm (0.039 in.)

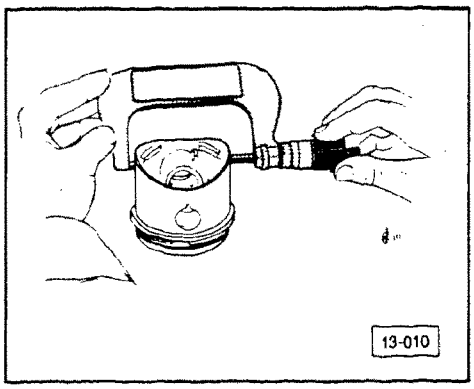


Piston pin circlip, removing

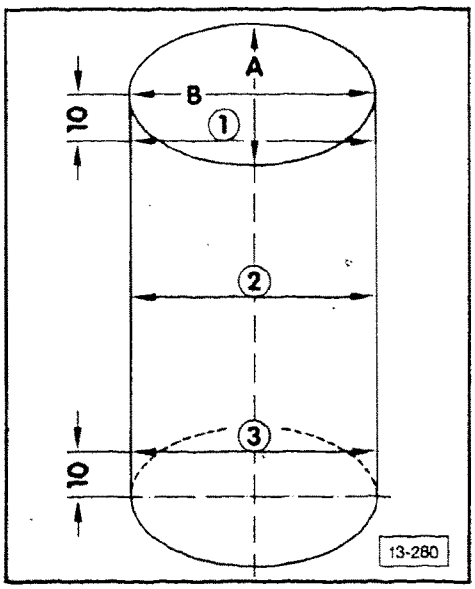
- pry out using tool as shown

Piston, checking

Dimensions		
Size	**Piston diameter**	**Cylinder bore**
Standard	80.98 mm	81.01 mm
1st oversize	81.23 mm	81.26 mm
2nd oversize	81.48 mm	81.51 mm



- measure piston diameter approximately 12 mm (0.47 in.) up from lowest edge of piston skirt, 90° to piston pin axis
  - tolerance: 0.04 mm (0.0016 in.) maximum



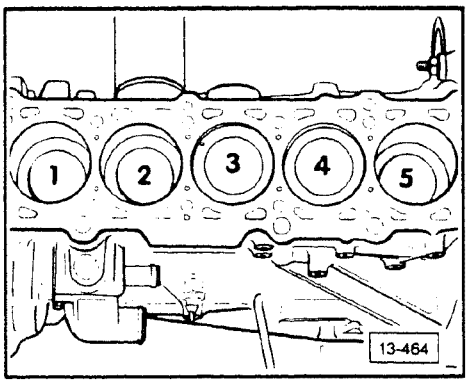
Cylinder bore, checking

Measurement locations (approximate):
1 = 10 mm (.375 in.) from top of cylinder
2 = middle point of cylinder
3 = 10 mm (.375 in.) from bottom of cylinder

- using 50-100 mm inside micrometer; take diameter measurements at cylinder heights **1**, **2** and **3**
- repeat measurements at same cylinder heights but 90° from first measurements
  - tolerance: 0.08 mm (0.003 in.) maximum

CAUTION

Do **NOT** measure cylinder bore when cylinder block is mounted to work bench with engine mount **VW 540**. Measurement accuracy could be affected by cylinder block distortions (block bends slightly when hung from mount).

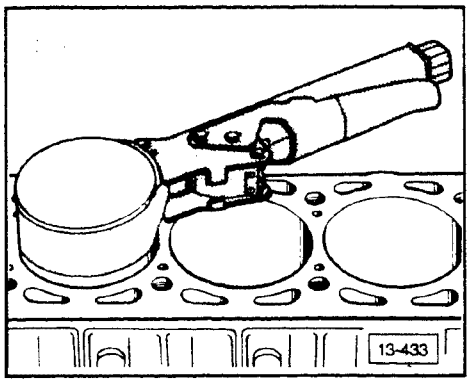


Pistons, installed position

- arrows on tops of pistons **MUST** point toward vibration damper

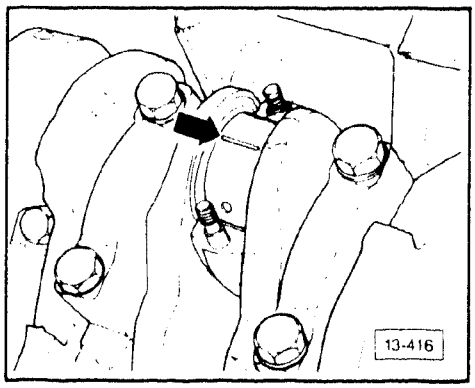
CAUTION

Clearly identify (mark) each piston assembly before removal. Do **NOT** mix pistons in cylinders, piston **MUST** be re-installed in cylinder it was removed from.



Piston, installing

- with piston ring gaps straggered 120° compress rings (using tool **US 1008 A** for example)
- squarely insert compressed assembly into cylinder bore until tool is flush with top of block and piston is properly aligned
- push piston assembly out of tool and into cylinder until top of piston is at least even with top of block

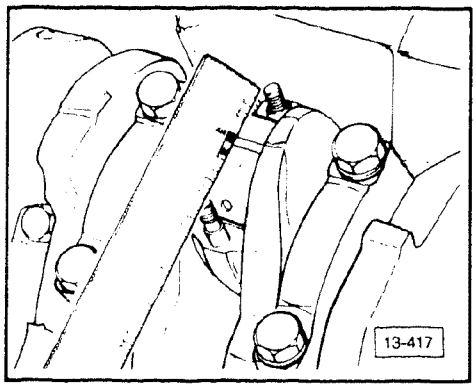


Connecting rods, checking

Note

Connecting rod bearing clearance can be checked with the engine installed.

- remove connecting rod bearing cap
- clean bearing shells and journal
- lay Plastigage® across journal (**arrow**)
- re-install connecting rod bearing cap w/bearing
  - torque to 30 Nm (22 ft lb)

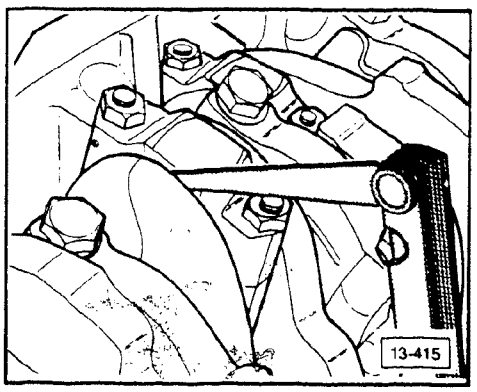


CAUTION

Do **NOT** turn crankshaft.

- remove connecting rod bearing cap again
- compare flattened width of Plastigage® with measuring scale
  - New: 0.010 to 0.058 mm (0.0004 to 0.002 in.)
    Wear limit: 0.12 mm (0.005 in.)

Plastigage measuring ranges:	
Green (PG-1)	0.025 to 0.076 mm (0.001 to 0.003 in.)
Red (PR-1)	0.050 to 0.150 mm (0.002 to 0.006 in.)
Blue (PB-1)	0.100 to 0.230 mm (0.004 to 0.009 in.)

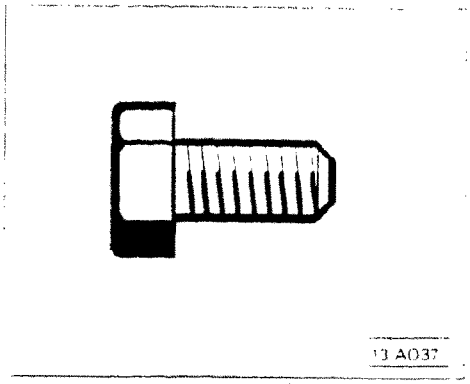


Connecting rod side clearance, checking

- measure clearance between crankshaft throw and rod bearing cap using feeler gage
  - Wear limit: 0.4 mm (0.016 in.)

New flywheel mounting bolts, revised tightening torque

> **CAUTION**
>
> Part numbers are for reference only. Always check with your Parts Department for latest information

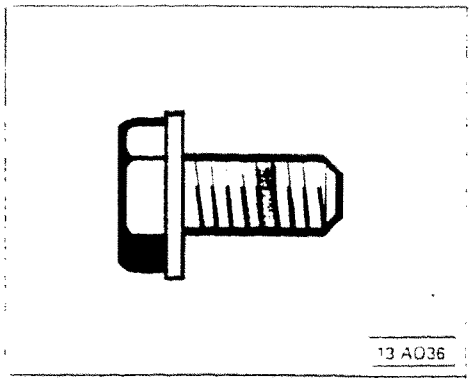


13 A037

Effective immediately, flywheel bolt, Part No. **N 902 061 01 without** shoulder is no longer available.

Old:

100 Nm (74 ft lb)



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The replacement bolt Part No. **N 902 061 03 with** shoulder, requires a revised tightening torque for installation.

New:

30 Nm (22 ft lb) + 1/4 (90°) turn

> **CAUTION**
>
> Use dial type torque wrench. Damage may result from use of a "click" type wrench.

- additional 1/4 (90°) turn may be done in two 45° steps
- always replace bolts, do not reuse
- threads of replacement bolts are pre-coated with locking compound