

Engine Code - PG

Camshaft

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- [identification](#)
- [oil seal removing/installing](#)
- [play, checking](#)
- [removing/installing](#)

Cylinder head

- [assembly](#)
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Valve

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Engine Code - AAA

Camshaft

- [assembly](#)
- [axial play, checking](#)
- [bearing caps, installed position](#)
- [removing/installing](#)

Compression pressure

- [checking values](#)

Cylinder head

- [assembly](#)
- [distortion checking](#)
- [gaskets, replacing](#)
- [installing](#)

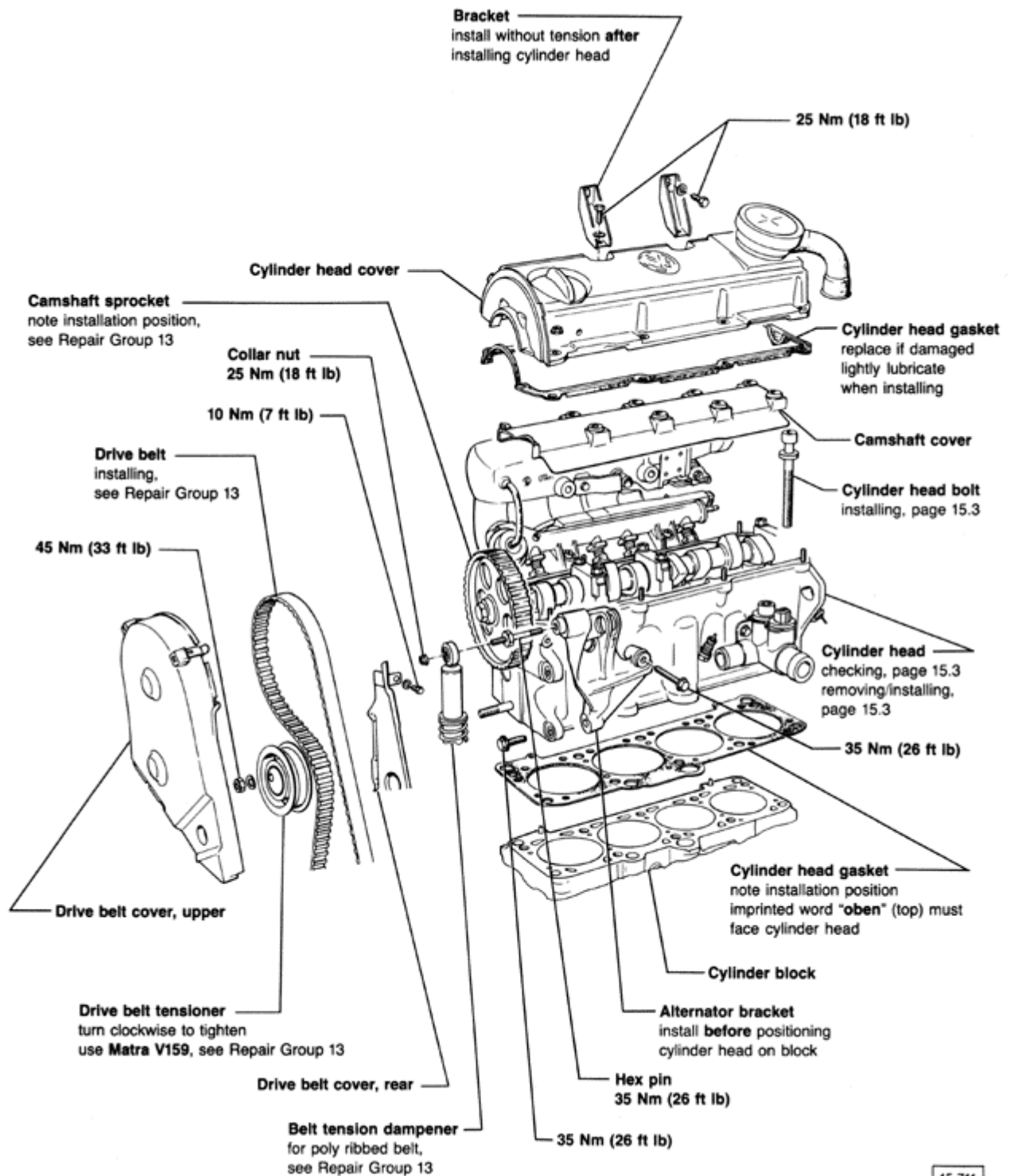
Valves

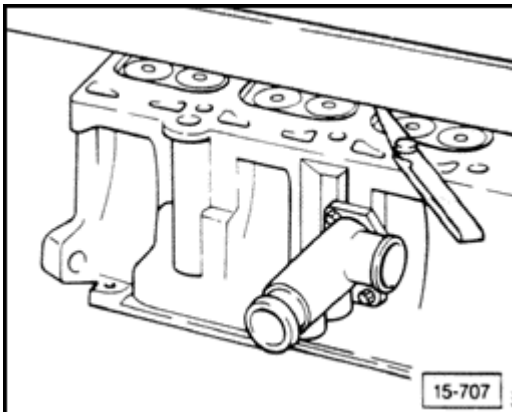
- [assembly](#)
- [dimensions](#)
- [guides, checking](#)
- [guides, replacing](#)
- [hydraulic valve lifters, checking](#)
- [seats, replacing](#)
- [stem seals, removing/installing](#)

Volkswagen Corrado 1990 - 1994
 General Engine
 Engine - Cylinder head, Valve Drive (Page 15-2)

CAUTION!

Coolant antifreeze must not be reused when replacing engine, cylinder head, cylinder head gasket, radiator and heater core.





A

Fig. 1 Cylinder head, distortion checking

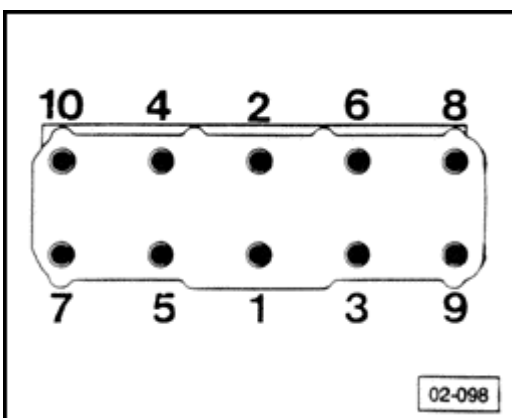
Notes

Cylinder head should be clean and free of gasket material before performing this check.

- use straight edge **US 1030** and feeler gauge to check for distortion
 - maximum permissible distortion allowed: 0.1 mm (0.004 in.)

Cylinder head, installing

- install cylinder head gasket
 - note correct position
- screw in guide bolt from tool **3070** in threaded holes **8** and **10**
- install cylinder head
- fit all cylinder head bolts
- remove guide bolt with tool **3070** and replace with cylinder head bolt
- **hand tighten only**



A

Tightening torque: engine cold

- tighten in sequence to 40 Nm (29 ft lb)
- tighten in sequence to 60 Nm (43 ft lb)
- tighten in sequence additional 1/2 turn (180°) further in one movement (two 90°)

turns are permissible)

- remove cylinder head bolts in reverse sequence

Notes

It is not necessary to re-tighten cylinder head bolts during scheduled maintenance or after performing repairs.

Volkswagen Corrado 1990 - 1994
General Engine
Engine - Cylinder head, Valve Drive (Page 15-4)

Compression pressure, checking

- engine oil temperature minimum 30° C (86° F)
- throttle plate completely open
- ignition coil lead removed from ignition distributor and connected to ground
- check compression pressure using pressure recorder **US 1120**
- follow operating instructions for recorder
- operate starter until recorder unit indicates no further pressure increase

Compression pressure values bar (psi)

Engine code letters	New	Wear limit
PG	8-12 (116-174)	6 (87)

- permissible difference between all four cylinders: 3 bar (43.5 psi)

Volkswagen Corrado 1990 - 1994

General Engine

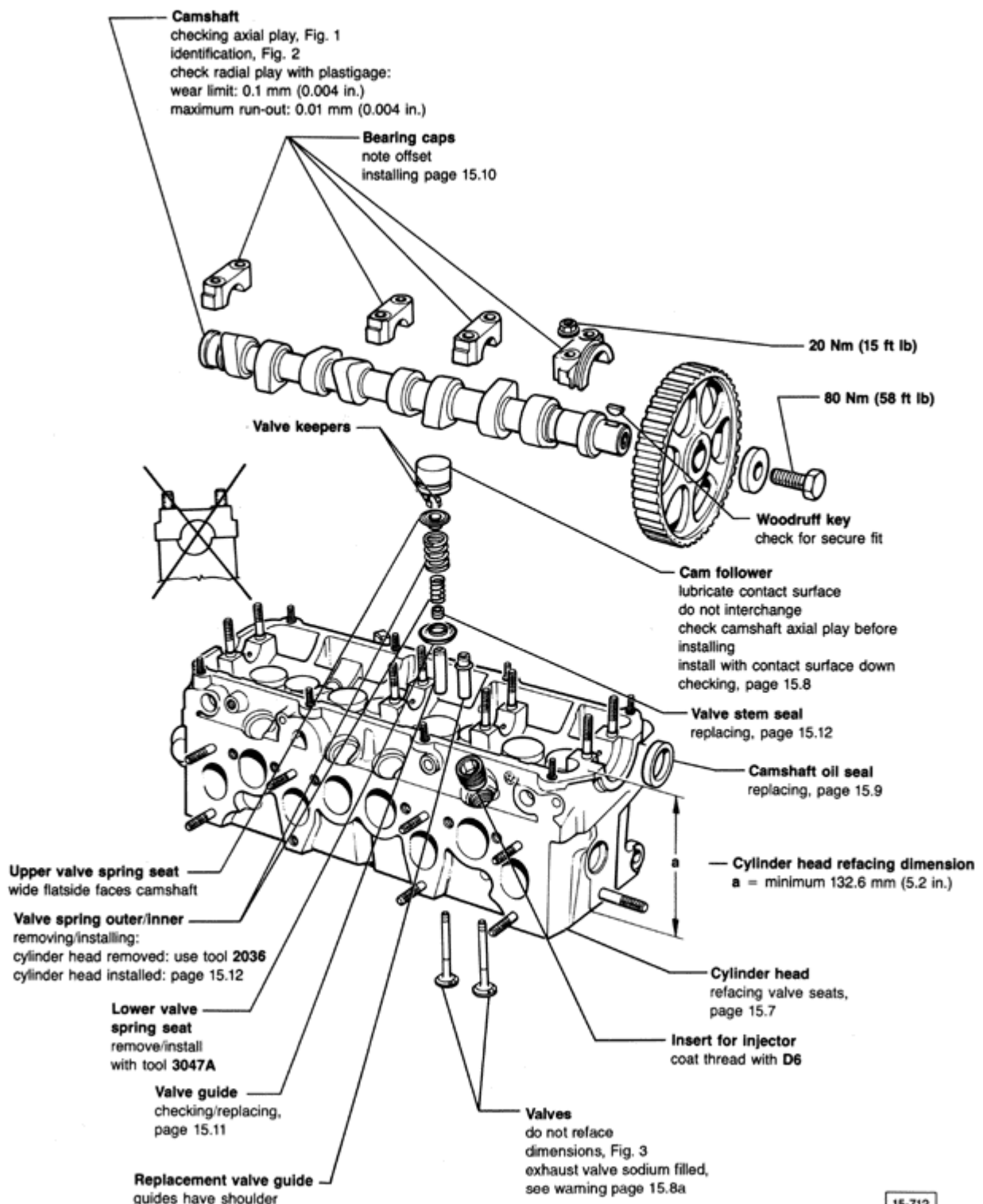
Engine - Cylinder head, Valve Drive (Page 15-5)

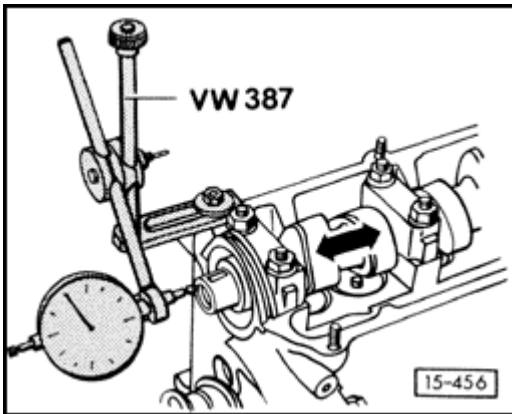
Notes

Heads with fine cracks between valve seats or a valve seat ring and plug threads can be installed again without reducing engine service life provided that cracks are small and not more than 0.5 mm wide or when only the first coils of the plug threads are cracked.

CAUTION!

Coolant/antifreeze must not be reused when replacing engine, cylinder head, cylinder head gasket, radiator and heater core.

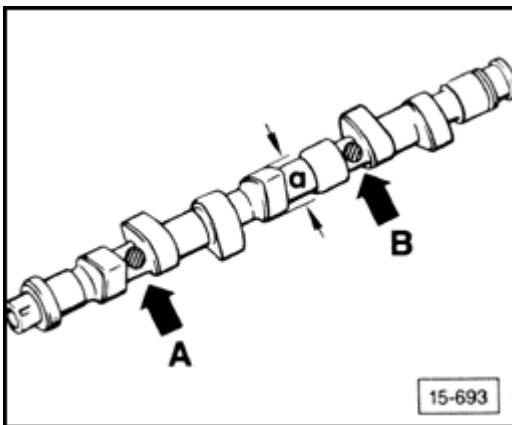




A

Fig. 1 Camshaft, axial play, checking

- measure with valve lifters removed, and bearing caps **1** and **5** removed
- wear limit: 0.15 mm (0.006 in.)



A

Fig. 2 Camshaft identification

Identification between cams

Engine code	Cylinder one arrow A	Cylinder three arrow B
PG	A	026

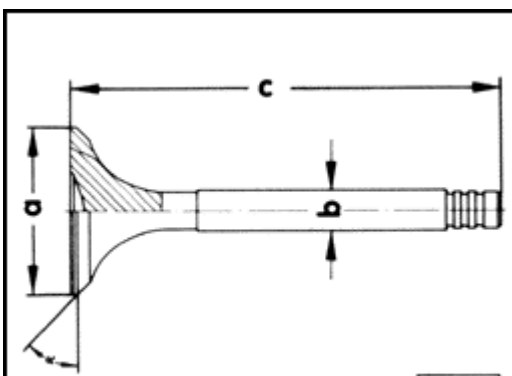




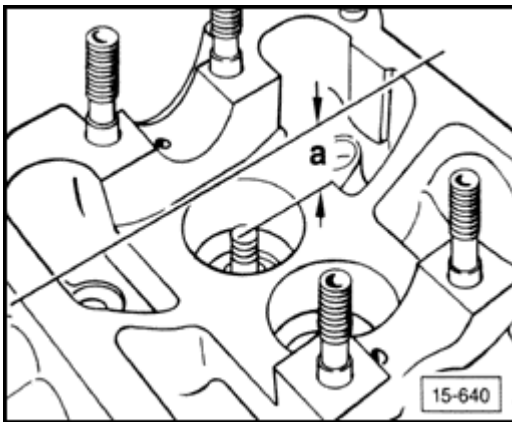
Fig. 3 Valve dimensions

	Intake	Exhaust
a	40.00 mm (1.575 in.)	33.15 mm (1.305 in.)
b	7.97 mm (0.314 in.)	7.94 mm (0.313 in.)
c	91.40 mm (3.598 in.)	91.45 mm (3.6 in.)
α	45	45

CAUTION!

Do not reface valves, only reface seats.

Valve seats, refacing



A

Calculating the maximum permissible refacing dimension

- insert valve and hold firmly against valve seat
- measure distance **a** between end of valve shaft and upper edge of cylinder head
- calculate refacing dimension **b** (see example) using the measured distance **a** (above) and:

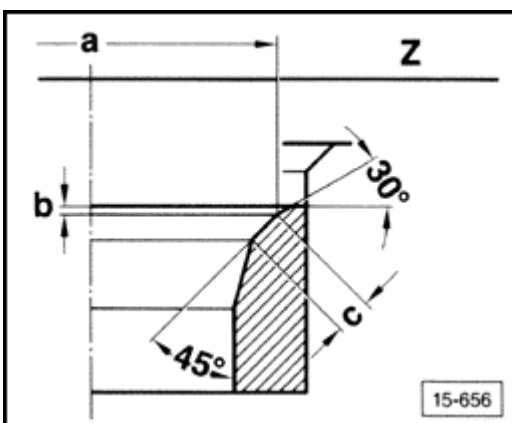
Minimum dimension

Minimum dimension - intake valve = 33.8 mm Minimum dimension - exhaust valve = 34.1 mm

$\begin{array}{r} \text{measured distance } a \\ - \text{ minimum dimension} \\ \hline = \text{ maximum permissible refacing} \\ \text{dimension } b \end{array}$

If the measured distance **a** is smaller than the minimum dimension, the hydraulic valve lifter will not work and the cylinder head must be replaced.

Intake valve seat, refacing



A

- a** - diameter 39.2 mm (1.543 in.)
- b** - maximum permissible refacing dimension

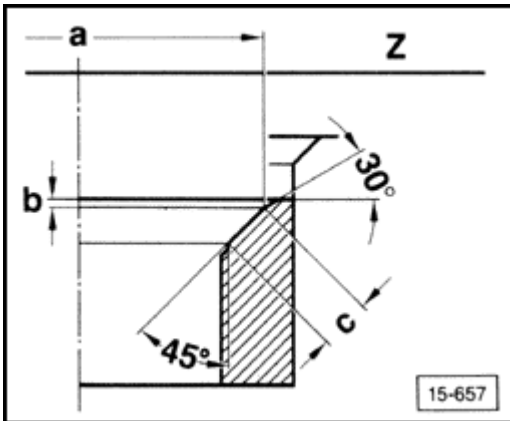
c - approximately 2.0 mm (0.079 in.)

Z - cylinder head lower edge

30° - upper correction angle

45° - valve seat angle

Exhaust valve seat, refacing



A

a - diameter 32.4 mm (1.276 in.)

b - maximum permissible refacing dimension

c - approximately 2.0 mm (0.079 in.)

Z - cylinder head lower edge

30° - upper correction angle

45° - valve seat angle

Exhaust valve seat rings are also made with a narrowed diameter. When refacing make sure radius of the narrowed diameter is not damaged.

Hydraulic valve lifters, checking

CAUTION!

After replacing lifters, do not start engine for approximately 30 minutes, otherwise valves may hit piston. Lifter must be allowed to bleed down to proper adjustment.

Always place removed valve lifter on a clean surface with the contact surface (camshaft side) facing downward.

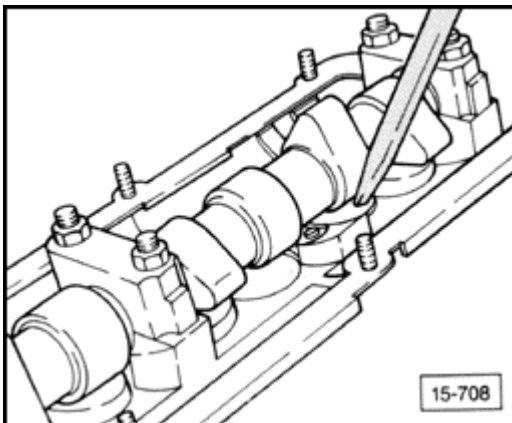
Always replace complete valve lifter. Lifter cannot be adjusted or repaired.

Unusual noise from valve lifter while starting is normal.

- run engine until radiator fan comes on at least once
- bring engine speed to approximately 2500 RPM for two minutes

If valve lifter is still noisy, replace as follows:

- remove cylinder head cover
- turn crankshaft pulley bolt clockwise until cam lobes of cylinder to be checked point upward



A

- push down against valve lifter with light pressure using a suitable wood stick (as shown). If valve lifter can be pushed down more than 0.1 mm (0.004 in.) replace lifter

Exhaust valves, discarding

Before discarding exhaust valves read this warning:

WARNING!

Exhaust valves are sodium filled. Before discarding these valves neutralize the sodium to avoid possible injury to people in the recycling chain.

Before discarding observe the following:

- always wear protective goggles or glasses
- note that sodium reacts violently with water
- when cutting valves, valves must not come into contact with water
- use grinding equipment which does not use water or other liquids for lubrication and/or cooling
- to neutralize sodium, drop cut-off valve stems into a bucket of water and move quickly away from water bucket
- do not drop more than 10 valve stems at a time into water bucket

Discarding procedure

- use grinding stone or grinding disc to cut valve stem off near head of valve
- drop cut-off valve stems into bucket of water (sodium will now react with water)
- once reaction has stopped (water stops bubbling) scrap valve stems
- water is biodegradable and may be discarded accordingly

Camshaft oil seal, removing

- remove upper drive belt cover
- set crankshaft to TDC on cylinder no. 1
- slacken drive belt and remove
- remove camshaft sprocket
- remove woodruff key from camshaft
- install mounting bolt for camshaft sprocket with washer up to stop
- remove inner part of oil seal extractor **2085** two turns (approximately 3.0 mm) from outer part of tool and lock with screw
- lubricate threaded head of oil seal extractor. Mount and push in as far as possible into oil ring
- loosen knurled screw and turn inner part of puller against camshaft until oil seal is pulled out
- clamp extractor in vise and remove oil seal with pliers

Camshaft oil seal, installing

- coat oil seal seat and seal lip lightly with oil
- press oil seal into cylinder head until **flush** using **10-203** , with special hex head bolt **10-203/1**
- reinstall drive belt, per [Repair Group 13](#)

Camshaft, removing

- remove upper drive belt cover
- remove cylinder head
- turn crankshaft to TDC on cylinder **1**
- slacken and remove drive belt
- remove camshaft sprocket
- remove woodruff key from camshaft
- remove bearing caps **1, 3**
- loosen bearing caps **2** and **5** alternately and diagonally

Camshaft, installing

When installing the camshaft, the cams for number **1** cylinder must be pointing upwards. When installing bearing caps, note center offset of bore. Before installing caps, place in position and determine installed position.

- tighten bearing caps **2** and **5** alternately and diagonally
 - tightening torque: 20 Nm (15 ft lb)
- install bearing caps **1** and **3**
 - tightening torque: 20 Nm (15 ft lb)
- position camshaft sprocket and tighten
 - tightening torque: 80 Nm (59 ft lb)
- reinstall drive belt, see [Repair Group 13](#)

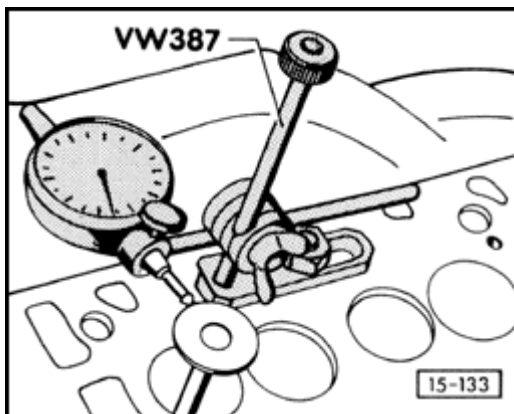
Valve guides, checking for wear

CAUTION!

Once guide shoulder is seated do not use more than 1 ton pressure or guide shoulder may break.

Due to slight difference in stem dimensions, **only** use intake valve in intake guide, and exhaust valve in exhaust guide.

- remove carbon
- install **VW 387** and dial indicator
- insert new valve into valve guide
- valve stem end must be flush with valve guide end



A

- rock valve back and forth (**arrow**) against dial indicator. Dial indicator reading shows valve guide wear

	Intake valve	Exhaust valve
Maximum dial indicator reading	1.0 mm (0.039 in.)	1.3 mm (0.051 in.)

Valve guides, replacing

Cylinder heads on which the valve seat surface can no longer be refaced or cylinder heads that have been refaced down to the minimum dimension cannot be repaired further.

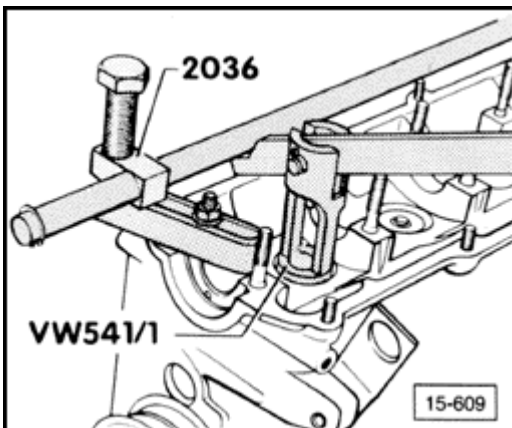
- press worn valve guides out from camshaft side with tool **10-206**
 - valve guides with shoulder (service version) must be pressed out from **combustion** side
- coat new guides with oil and press into cold cylinder head to the shoulder from camshaft side with tool **10-206**
- ream valve guides by hand with reamer tool **10-215**
 - use proper cutting lubricant
- reface valve seats

Valve stem seal, removing (with cylinder head installed)

CAUTION!

Once guide shoulder is seated do not use more than 1 ton pressure or guide shoulder may break.

- remove spark plugs
- remove camshaft and hydraulic lifters
- turn crankshaft until piston of cylinder concerned is in BTDC position

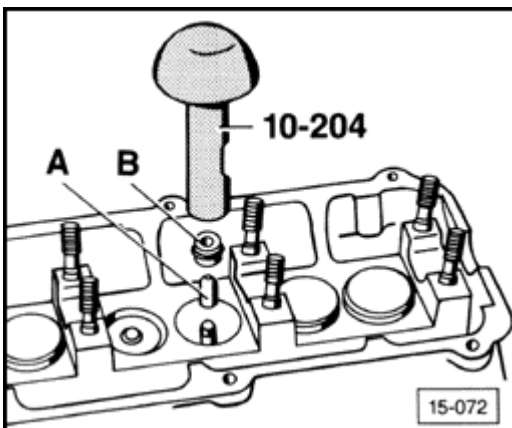


A

- install tool **2036** and adjust to stud height
- insert pressure hose **US 1106** or **VW 653/3** into spark plug threads and apply steady pressure of at least 6 bar (87 psi)
- remove valve springs with lever **VW 541/1**

If valve keepers are very hard to come out, they can be loosened by tapping **lightly** on assembly lever with hammer.

- remove valve stem seal with tool **3047 A**



A

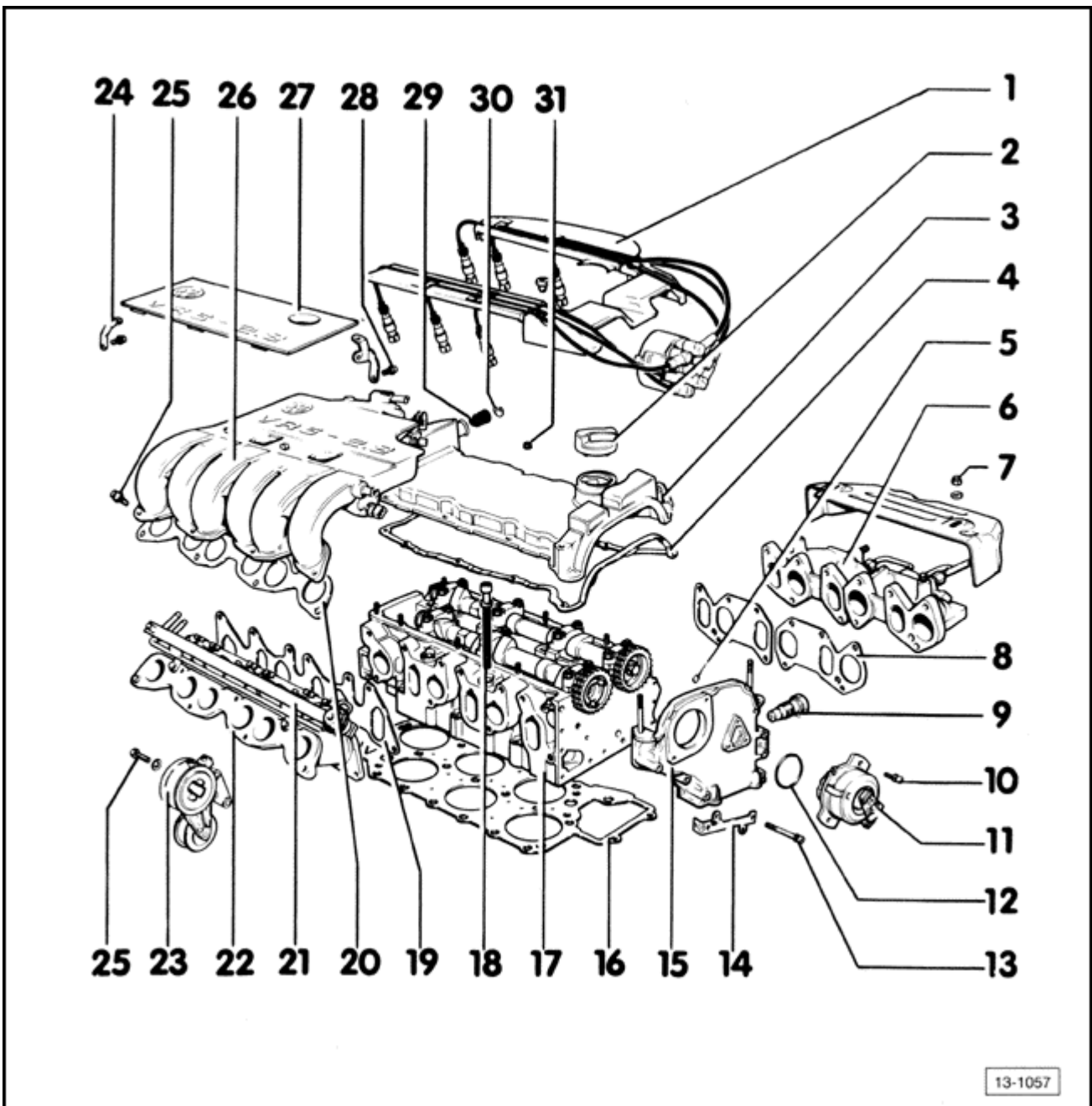
Valve stem seal, installing

- slide plastic sleeve **A** onto valve stem

- lubricate valve stem seal **B**
- push seal carefully onto valve guide using plastic seal protector

CAUTION!

When installing valve stem seals, always use plastic sleeve to prevent damage.



WARNING!

DO NOT re-use any fasteners that are worn or deformed in normal use. Many fasteners are designed to be used only once and become unreliable and may fail when used a second time. This includes but is not limited to, nuts bolts, washers, self-locking nuts or bolts, circlips, cotter pins. Always follow recommendations given in this publication. For replacements always use new parts.

CAUTION!

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

CAUTION!

Coolant/antifreeze MUST NOT be reused when replacing engine, cylinder head, cylinder head gasket, radiator and heater core.

Notes

When replacing cylinder head, lubricate hydraulic valve and camshaft contact surface.

1 - Ignition cable guide

2 - Cap

3 - Cylinder head cover

Volkswagen Corrado 1990 - 1994

General Engine

Engine - Cylinder head, Valve Drive (Page 15-14)

4 - Cylinder head cover gasket

- always replace
- note installation position

5 - O-ring

always replace

6 - Exhaust manifold

- comes in 2 parts
- with CO take-off pipe attached
- removing and installing, see [Repair Group 26](#)

7 - 25 Nm (18 ft lb)

8 - Exhaust manifold gasket

- two-piece
- always replace
- note installation position

9 - Chain tensioner for double drive chain 20 Nm (15 ft lb)

10 - 10 Nm (7 ft lb)

11 - Ignition distributor with rotor arm

replacing rotor, see Repair Group 28

12 - O-ring

always replace

13 - 10 Nm (7 ft lb)

14 - Retaining plate

15 - Camshaft cover

- coat sealing surfaces with **AM, 188 001 02**
- reseal cylinder head gasket, see [page 15-15](#)

16 - Cylinder head gasket

- always replace
- note installation position
- marking "**TOP**" must face cylinder head

17 - Cylinder head

- checking for distortion, see [page 15-16](#)
- installing, [page 15-17](#)

18 - Cylinder head bolt

- always replace
- note torque and tightening sequence, see [page 15-17](#)

19 - Lower intake manifold gasket

always replace

20 - Upper intake manifold gasket

always replace

21 - Fuel rail - 10 Nm (7 ft lb) 22 - Lower intake manifold

23 - Tensioner for poly-ribbed belt

removing and installing, see [Repair Group 13](#)

24 - Intake manifold support

25 - 25 Nm (18 ft lb)

26 - Upper intake manifold

installing, first install and tighten lower intake manifold **22**, then intake manifold support **24**

27 - Trim cover

28 - 25 Nm (18 ft lb)

29 - Flame trap coil

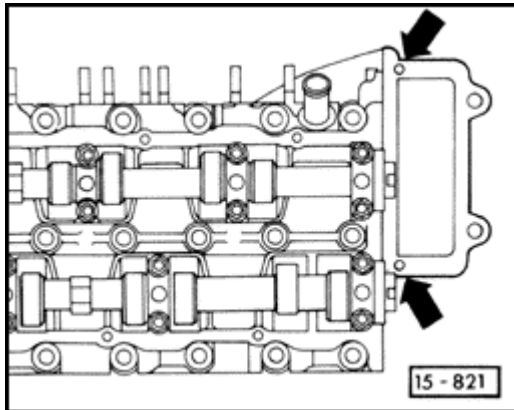
30 - Circlip

31 - 10 Nm (7 ft lb)

Cylinder head gasket, replacing

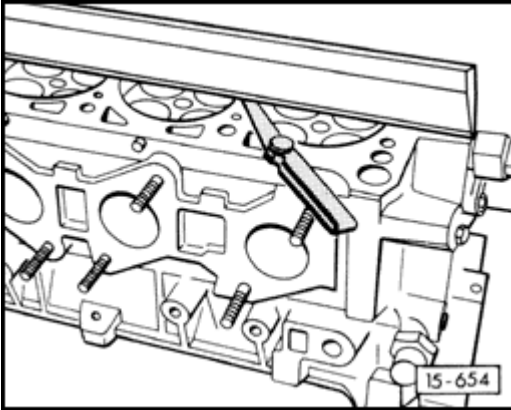
CAUTION!

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



- remove old sealant from 3.0 mm holes in cylinder head gasket (**arrows**)
- fill holes with sealant **AMV 188 001 02**
- position cylinder head gasket on cylinder head
 - imprinted word "**TOP**" must face cylinder head

Cylinder head, checking distortion

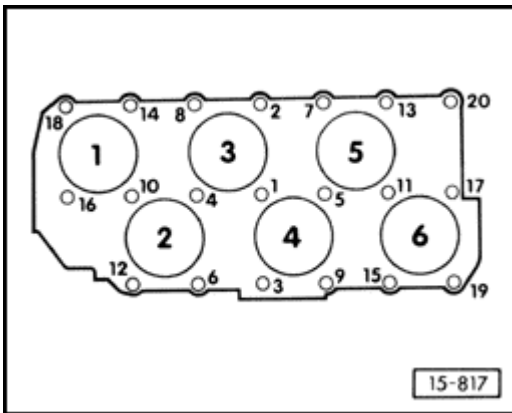


Notes

Cylinder head should be clean and free of gasket material before performing this check.

- use straight edge and feeler gauge to check for distortion
 - maximum permissible distortion:
0.1 mm (0.004 in.)

Cylinder head, installing



- install cylinder head gasket
 - note installation position, check centering dowels at holes **12** and **20**
- install cylinder head
- fit all cylinder head bolts
 - **hand tighten only**
 - **always replace**

Tightening torque, engine cold

Tighten bolts in sequence:

Stage I = 40 Nm (29 ft lb)

Stage II = 60 Nm (43 ft lb)

- tighten in sequence additional 1/2 (180°) turn further in one movement
 - two additional 1/4 (90°) turns are permissible
- reverse sequence to remove bolts

Notes

It is not necessary to re-tighten cylinder head bolts during scheduled maintenance or after performing repairs.

Volkswagen Corrado 1990 - 1994
General Engine
Engine - Cylinder head, Valve Drive (Page 15-18)

Compression pressure, checking/values

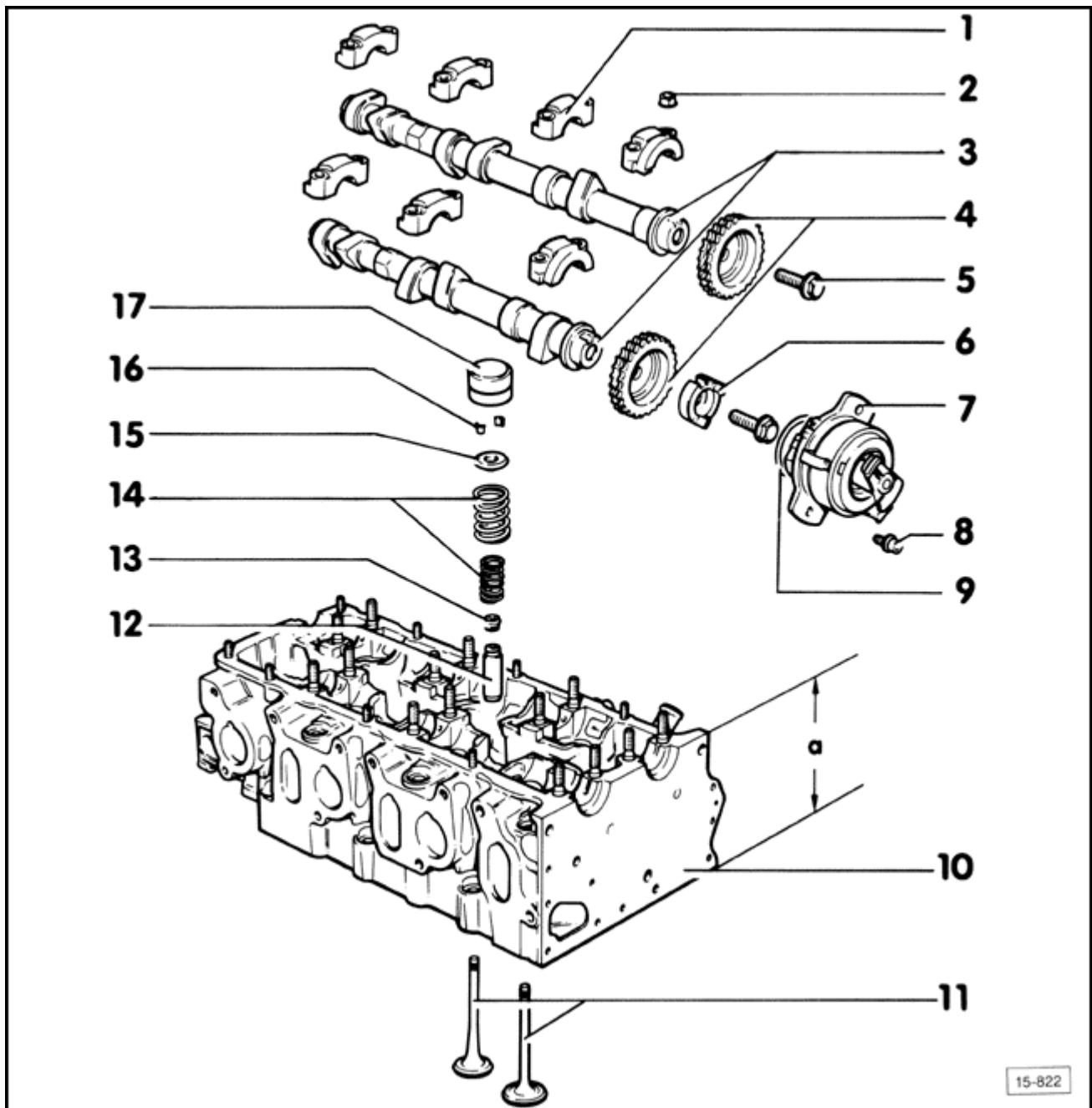
Test conditions

- engine oil temperature minimum 30° C (86° F)
- throttle plate completely open
- fuse **18** removed
- ignition coil lead removed from ignition distributor
- check compression with pressure recorder **US 1120**
 - follow recorder instructions
- operate starter until recorder unit indicates no further pressure increase

Pressure values, bar (psi)

Engine code	New	Wear limit
AAA	11-13 (160-189)	7.5 (109)

- maximum permissible difference between all four cylinders: 3 bar (43.5 psi)



CAUTION!

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

CAUTION!

*Coolant/antifreeze **MUST NOT** be reused when replacing engine, cylinder head, cylinder head gasket, radiator and heater core.*

Notes

Heads with fine cracks between valve seats or a valve seat ring and plug threads can be installed again without reducing engine service life provided that cracks are small and not more than 0.5 mm wide or when only the first coils of the plug threads are cracked

1 - Bearing caps

installation position, see [page 15-21](#)

2 - 20 Nm (15 ft lb)

3 - Camshaft

- checking axial play, see [page 15-22](#)
- removing/installing, see [page 15-27](#)
- checking radial clearance with plastigage:
 - wear limit:** 0.1 mm (0.004 in.)
 - run out:** max. 0.01 mm (0.0004 in.)
- identification: 021 109 101 M cylinders 1, 3, 5
021 109 102 A cylinders 2, 4, 6

4 - Camshaft sprockets

removing/installing/camshaft, [page 15-27](#)

5 - 100 Nm (74 ft lb)

6 - Distributor drive

7 - Distributor

replacing rotor, see Repair Group 28

8 - 10 Nm (7 ft lb)

9 - Seal

always replace

10 - Cylinder head

- 140 ± 0.1 mm (5.5 ± 0.004 in.)
- minimum refacing dimension
a = 139.5 mm (5.4 in.)

11 - Valves

dimensions, [page 15-23](#)

12 - Valve guide

- checking wear, see [page 15-30](#)
- replacing, see [page 15-31](#)

13 - Valve stem seal

removing/installing see [page 15-32](#)

14 - Valve springs, inner/outer

removing/installing with tool **2036** or **VW 541/5** and **VW 541/1A**

15 - Upper valve spring seat

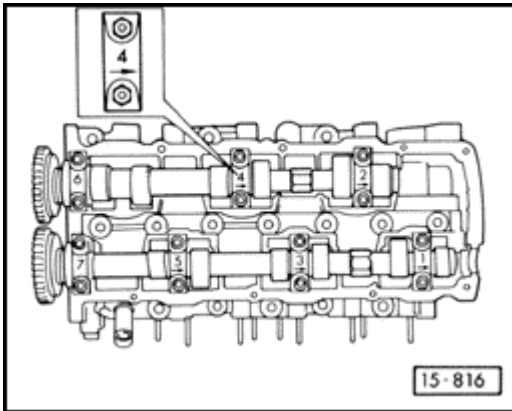
16 - Valve keepers

17 - Hydraulic valve lifter

- **DO NOT** interchange
- self-adjusting hydraulic valve clearance
- checking, see [page 15-26](#)
- store with cam contact surface down
- before installing, check camshaft axial play, see [page 15-22](#)
- lubricate contact surface

Volkswagen Corrado 1990 - 1994
General Engine
Engine - Cylinder head, Valve Drive (Page 15-21)

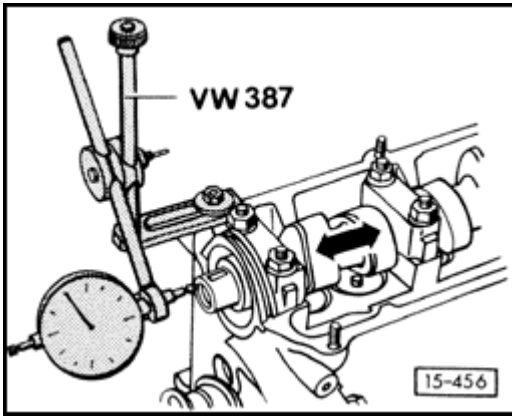
Camshaft bearing caps, installed position



Notes

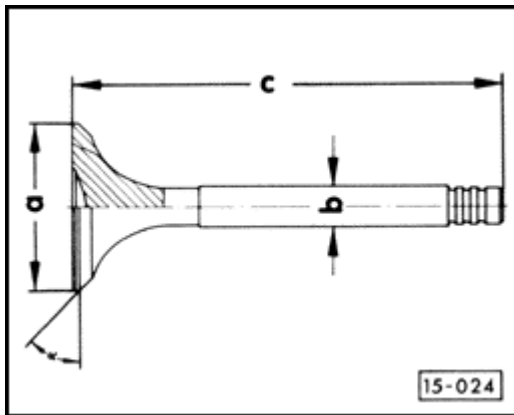
*When installing bearing cap, ensure marking on cap is readable from exhaust manifold side and arrow points to vibration dampener side (**inset**).*

Camshaft axial play, checking



- measure with valve lifters removed, and bearing caps **1** and **7** or **2** and **6** installed
 - wear limit: 0.15 mm (0.006 in.)

Valve dimensions (in mm)



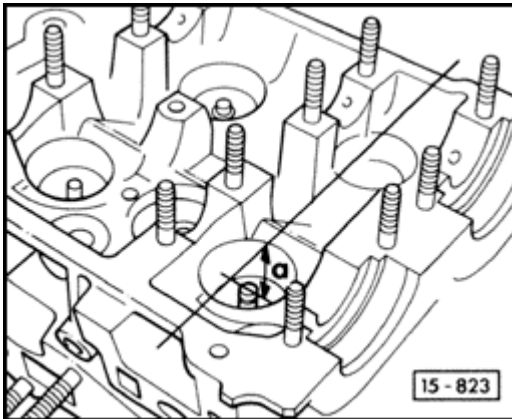
CAUTION!

Do not reface valves, only reface seats.

	Intake	Exhaust
a	39.00	34.20
b	6.97	6.95
c	105.95	106.95
α	45°	45°

Valve seats, refacing (in mm)

Calculating the maximum permissible refacing dimension



- insert valve and hold firmly against valve seat
- measure distance **a** between end of valve shaft and upper edge of cylinder head
- calculate refacing dimension **b** (see example) using the measured distance **a** (above) and:

Minimum dimension

Minimum dimension - intake valve = 33.9 mm

Minimum dimension - exhaust valve = 34.1 mm

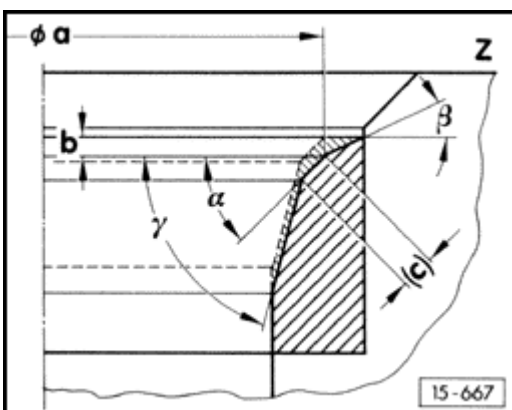
Example:

measured distance **a**
- minimum dimension
= maximum permissible refacing dimension **b**

Notes

*If the measured distance **a** is smaller than the minimum dimension, the hydraulic valve lifter will not work and the cylinder head must be replaced.*

Intake valve seat, refacing



a = diameter 38.3 mm

b = maximum permissible refacing dimension

c = maximum 1.4 mm

- if necessary rework valve seat insert with 75° correction cutter

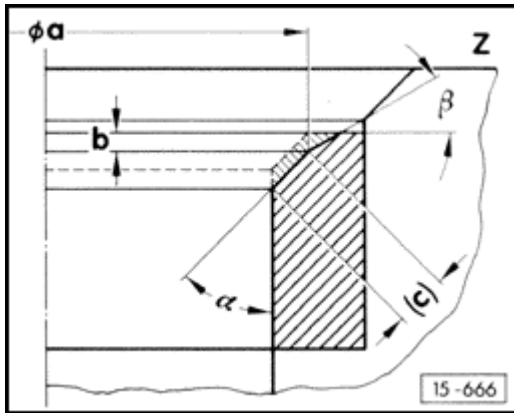
z = cylinder head lower edge

$\alpha = 45^\circ$ valve seat angle

$\beta = 30^\circ$ upper correction angle

$\gamma = 75^\circ$ lower correction angle

Exhaust valve seat, refacing



a = diameter 33.5 mm

b = maximum permissible refacing dimension

c = maximum 2.0 mm

- if necessary rework valve seat insert with 75° correction cutter

z = cylinder head lower edge

α = 45° valve seat angle

β = 30° upper correction angle

Hydraulic valve lifter, checking

CAUTION!

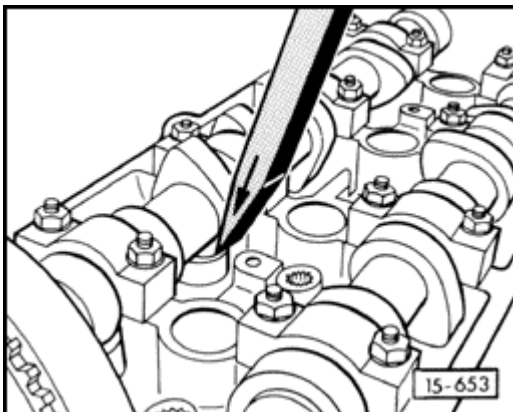
After replacing lifters, do not start engine for approximately 30 minutes, otherwise valves may hit piston. Lifter must be allowed to bleed down to proper adjustment.

Notes

- always place removed valve lifter on a clean surface with the contact surface (camshaft side) facing downward
- always replace complete valve lifter. Lifter cannot be adjusted or repaired
- unusual noise from valve lifter while starting is normal
- run engine until radiator fan comes on at least once
- bring engine speed to approximately 2500 RPM for two minutes

If valve lifter is still noisy, replace as follows:

- remove cylinder head cover
- remove upper intake manifold
- turn crankshaft pulley bolt clockwise until cam lobes of cylinder to be checked point upward



- push down against valve lifter with light pressure using a suitable wood stick (as shown)
- if valve lifter can be pushed down more than 0.1 mm (0.004 in.), replace lifter

Volkswagen Corrado 1990 - 1994
General Engine
Engine - Cylinder head, Valve Drive (Page 15-27)

Camshafts, removing/installing

Removing

- remove ignition cable guide
- remove upper intake manifold

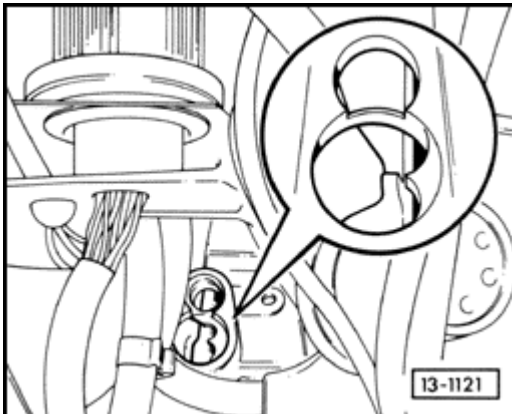
Notes

Cover intake channels with a clean cloth to prevent becoming contaminated.

With engine installed

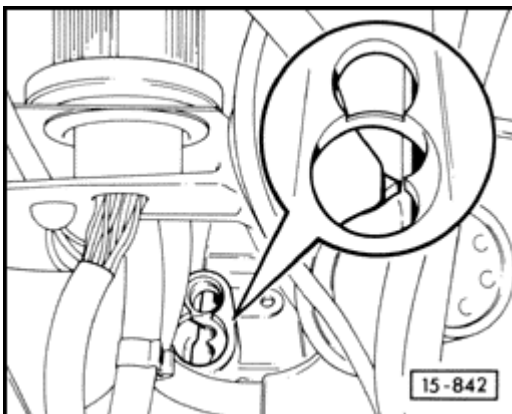
- set crankshaft to **TDC** (cyl. number 1) (**inset**)
- remove distributor
- remove cylinder head cover
- unscrew chain tensioner
- remove camshaft sprocket cover

Vehicles built up to 10.91



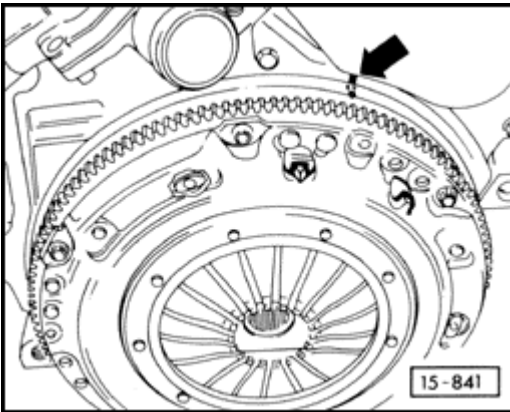
- note rounded teeth

Vehicles built after 11.91



- note pointed teeth

With engine removed



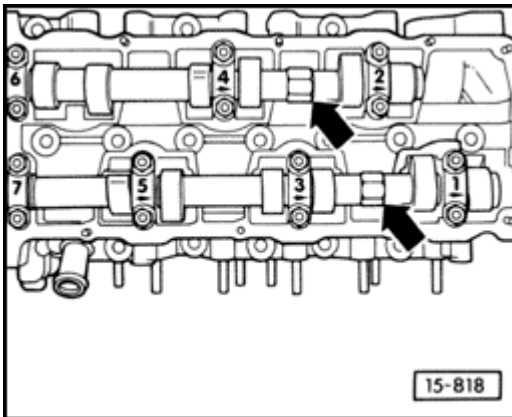
- set flywheel marking to **TDC** (cyl. number 1)
 - lug on flange must align with mark
- remove ignition distributor
- remove valve cover
- remove camshaft sprocket cover
- unfasten chain tensioner

Volkswagen Corrado 1990 - 1994

General Engine

Engine - Cylinder head, Valve Drive (Page 15-28)

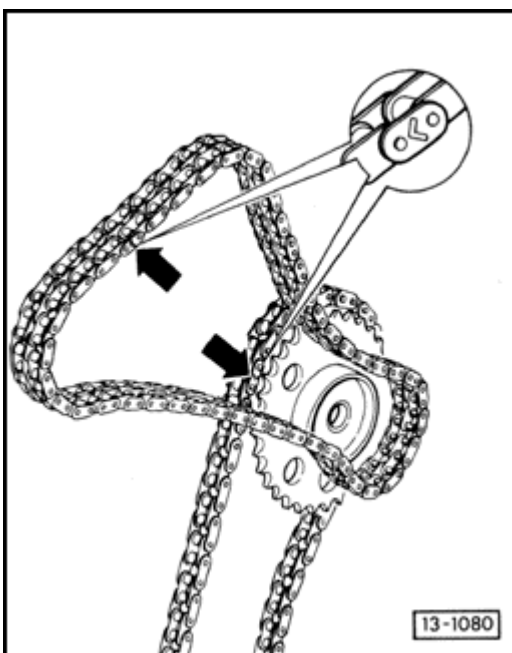
- loosen camshaft sprocket bolts



Notes

Only hold camshafts with 24 mm spanner wrench at points shown (**arrows**). The camshaft guide **3268** must not be fitted when tightening/loosening the sprockets.

- remove camshaft sprockets



Notes

Before removing double chain mark direction of rotation with touch-up paint (**arrows**)

Camshaft cylinders, 1, 3, 5

- remove bearing caps 1 and 7
- loosen bearing caps 3 and 5 alternately and diagonally

Camshaft cylinders 2, 4, 6

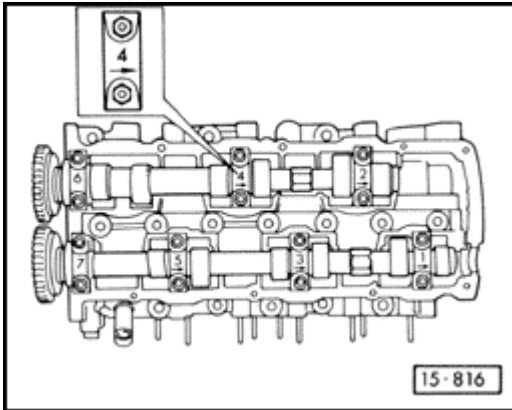
- remove bearing cap 4
- loosen bearing caps 2 and 6 alternately and diagonally

Installing

CAUTION!

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

- note marking on the chain



Notes

When installing the bearing caps ensure that the marking can be read from the exhaust manifold side and the arrow points to vibration dampener end.

Camshaft cylinders 1, 3, 5

- tighten bearing caps **3** and **5** alternately and diagonally
 - torque 20 Nm (15 ft lb)
- install bearing caps **1** and **7**
 - torque 20 Nm (15 ft lb)

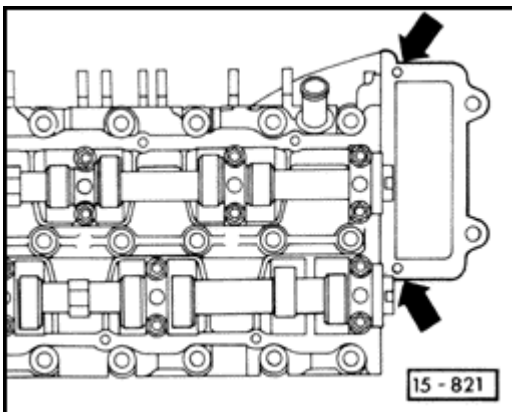
Volkswagen Corrado 1990 - 1994

General Engine

Engine - Cylinder head, Valve Drive (Page 15-29)

Camshaft cylinders 2, 4, 6

- tighten bearing caps **2** and **6** alternately and diagonally
 - torque 20 Nm (15 ft lb)
- install bearing cap **4**
 - torque 20 Nm (15 ft lb)
- adjust valve timing, see [Repair Group 13](#)
- clean camshaft sprocket cover sealing surfaces

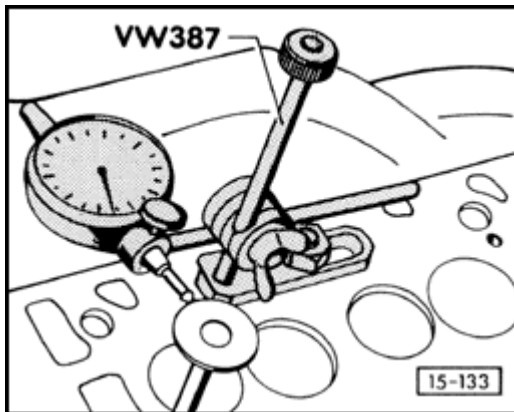


- clean old sealant from 3.0 mm holes in cylinder head gasket (**arrow**)
- fill holes with sealant **AMV 188 001 02**
- clean sealing surfaces of cover and coat with **AMV 188 001 02**
 - replace O-ring
- reinstall cover, hand tighten all bolts
- retighten all bolts
 - torque 10 Nm (7 ft lb)
- install chain tensioner
 - torque 20 Nm (15 ft lb)

Valve guides, checking

Notes

When repairing engines with leaky valves, it is also necessary to check valve guides for wear. This is particularly important on engines with high mileage.



Due to slight difference in stem dimensions, **only** use intake valve in intake guide, and exhaust valve in exhaust guide.

- remove carbon
- install **VW 387** and dial indicator
- insert new valve into valve guide
- valve stem end must be flush with valve guide end
- rock valve back and forth (**arrow**) against dial indicator. Dial indicator reading shows valve guide wear

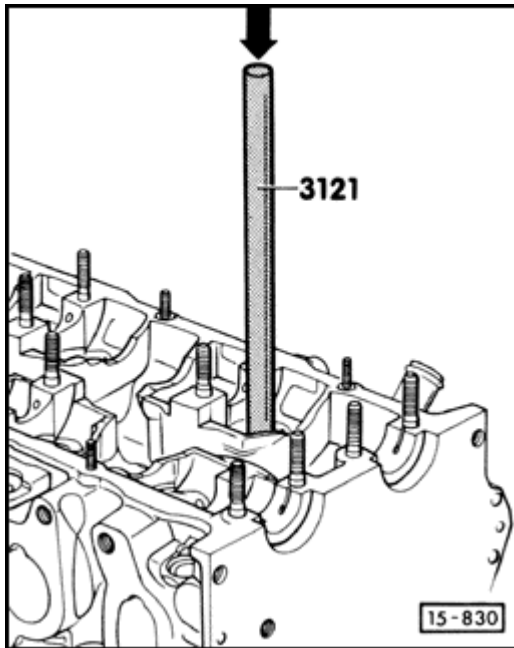
	Intake valve	Exhaust valve
Maximum dial indicator reading	1.0 mm (0.039 in.)	1.3 mm (0.051 in.)

Valve guides, replacing

Notes

Clean and check cylinder head.

Cylinder heads on which the valve seat surface can no longer be refaced, valve guides have been previously installed, or cylinder heads that have been refaced down to the minimum dimension cannot be repaired further.



- press worn valve guides with tool **3121** from camshaft side
- lay cylinder head flat on workbench

CAUTION!

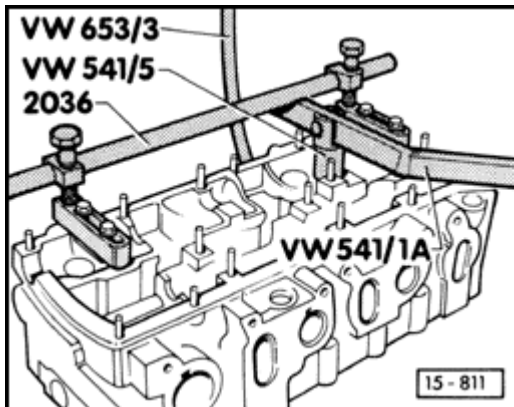
Once guide shoulder is seated do not use more than 1 ton pressure or guide shoulder may break off.

- coat new guides with oil and press into cold cylinder head to the shoulder from camshaft side with tool **3121**
- ream valve guides by hand with reamer **3120**
 - use proper cutting lubricant
- reface valve seats

Valve stem seals, removing/installing (with cylinder head installed)

Removing

- remove spark plugs
- remove camshaft and hydraulic lifters
- turn crankshaft until piston of respective cylinder is in **BTDC** position



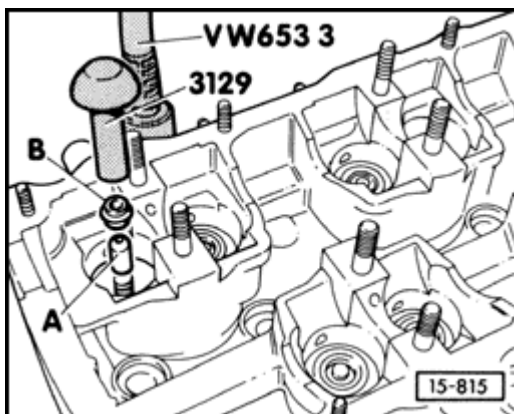
- install tool **2036** and adjust to stud height
- insert pressure hose **VW 653/3** into spark plug threads and apply steady pressure of at least 6 bar (87 psi)
- remove valve springs with lever **VW 541/1A** and **VW 541/5**

Notes

*If valve keepers are very hard to come out, they can be loosened by tapping **lightly** on assembly lever with hammer.*

- remove valve stem seal with tool **3047A**

Installing



CAUTION!

Always use plastic sleeve A when installing valve stem seals, to prevent damage to the seal.

- slide plastic sleeve **A** onto the valve stem
- lubricate valve stem seal **B**
- push seal carefully onto valve guide using tool **3129**