

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

15 Engine- Cylinder head, Valvetrain (Page GR-15)

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Pistons and connecting rods, disassembling and assembling (Page 15-1)

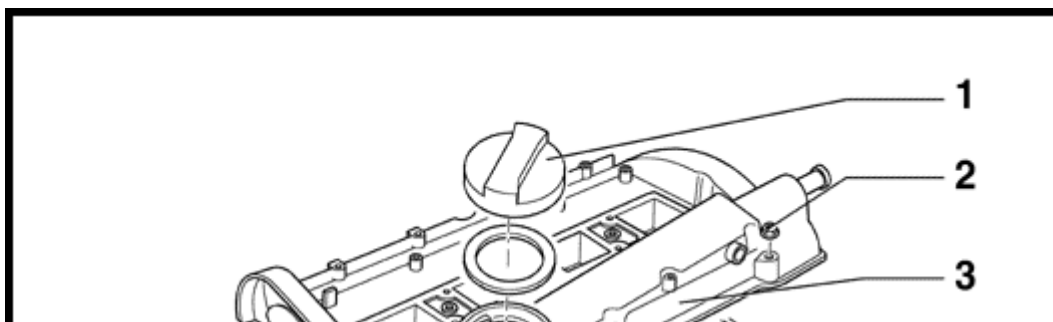
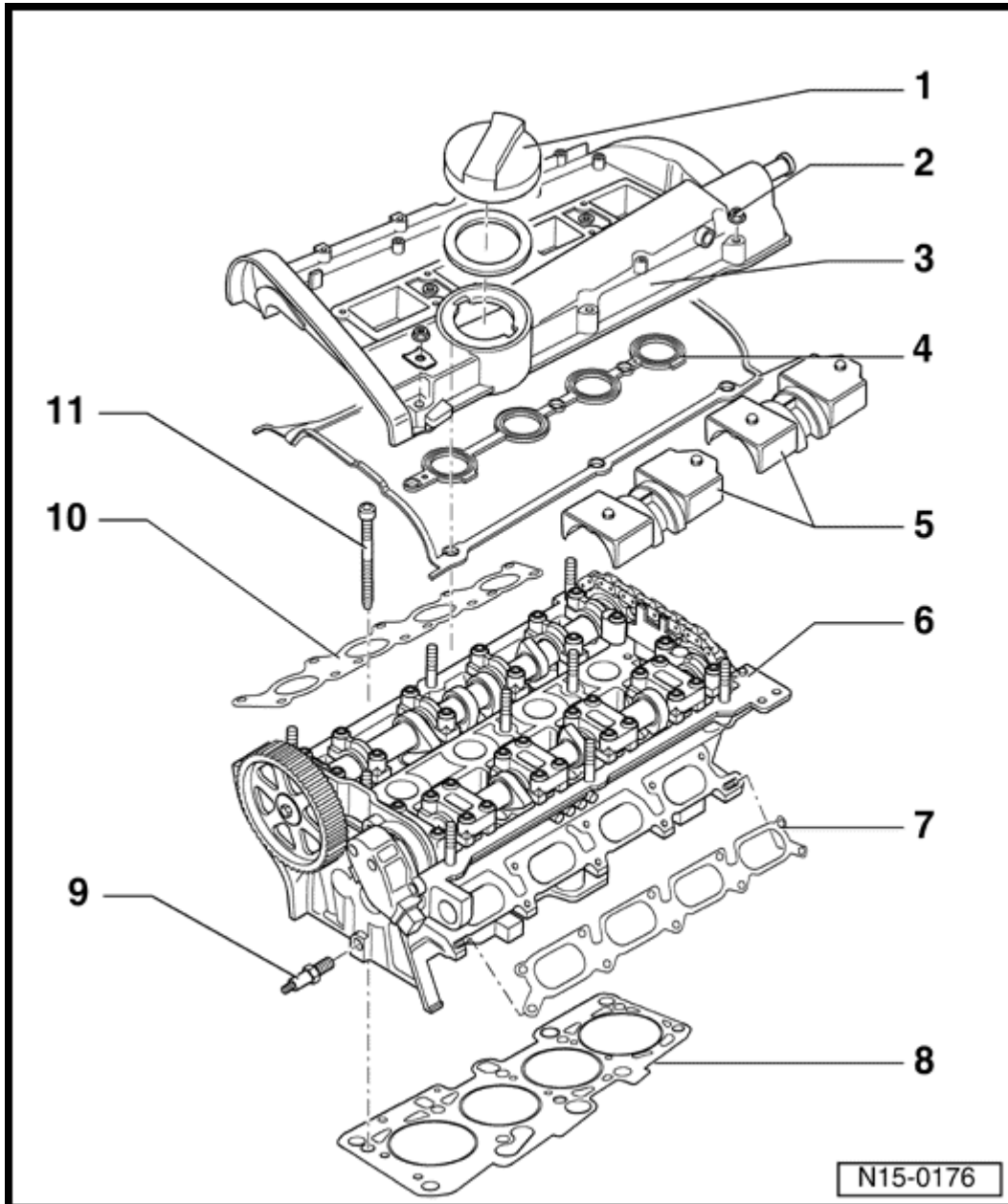
Checking compressions ⇒ [Page 15-15](#)

Notes:

- ◆ *When installing an exchange cylinder head with fitted camshaft, the contact surfaces between the hydraulic lifters and the cam must be oiled before installing the cylinder head cover.*
- ◆ *The plastic packing pieces for protecting the open valves must not be removed until immediately before fitting cylinder head.*
- ◆ *If the cylinder head is replaced, all the coolant in the system must also be replaced.*
- ◆ *Removing and installing intake manifold:*

⇒ [Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 24](#)

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Cylinder head, removing and installing (Page 15-2)



1 - Cap

- ◆ Replace seal if damaged

2 - 10 Nm

3 - Cylinder head cover

4 - Cylinder head cover gasket

- ◆ Replace if damaged
- ◆ Before installing, coat transition from bearing cap e.g. camshaft adjuster/chain tightener to cylinder head with D454300A2 ⇒ [Page 15-28](#) , [Fig. 4](#) and [5](#)

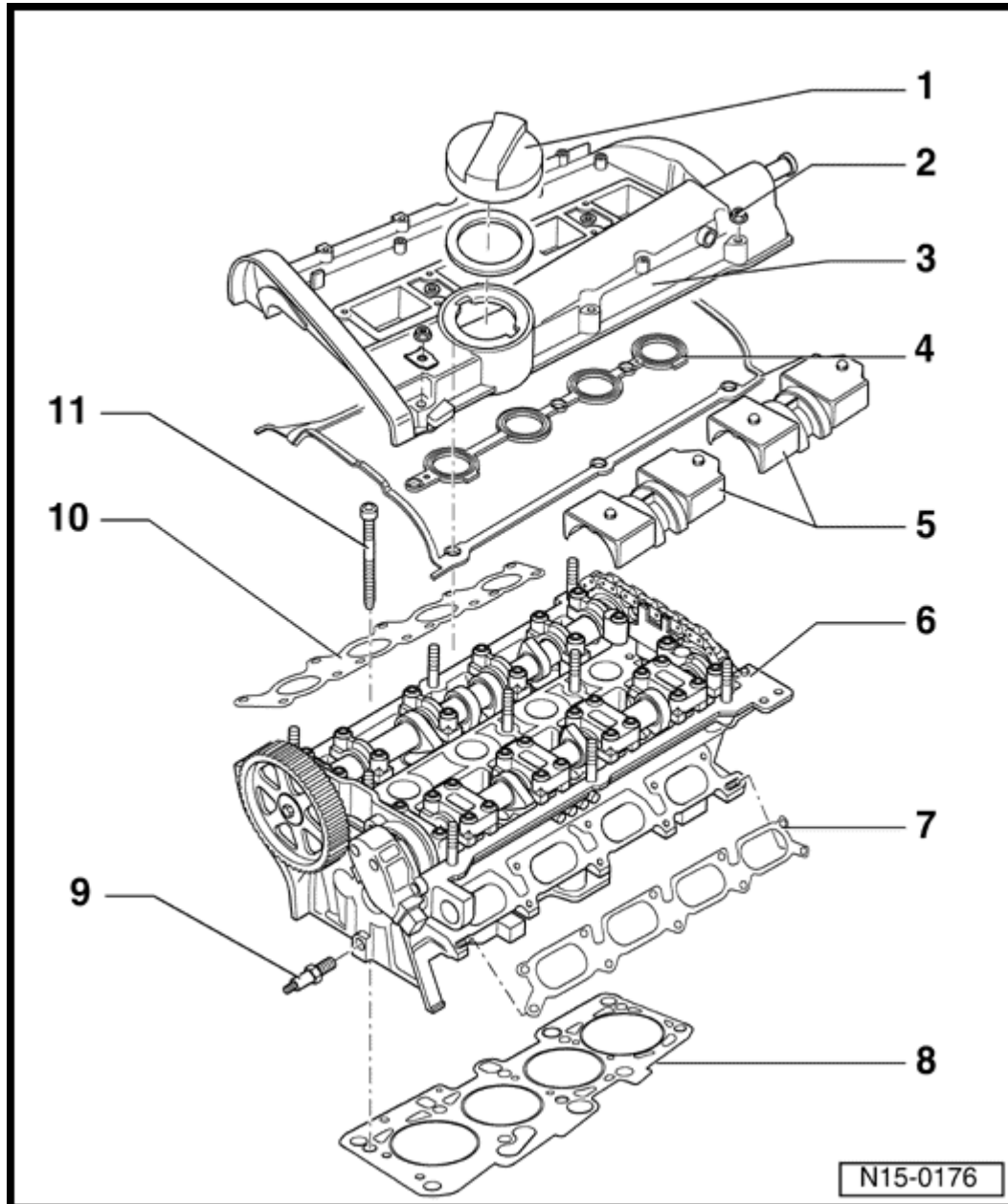
5 - Oil deflector

- ◆ Note installation position: above inlet camshaft

6 - Cylinder head

- ◆ Check for distortion ⇒ [Fig. 1](#)
- ◆ Reworking sealing surface ⇒ [Page 15-26](#) , [Fig. 1](#)
- ◆ Removing and installing ⇒ [Page 15-5](#)
- ◆ After replacing replace the complete coolant

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Cylinder head, removing and installing (Page 15-3)



7 - Intake manifold gasket

- ◆ Replace

8 - Cylinder head gasket

- ◆ Replace
- ◆ Metal gasket
- ◆ If replaced replace the complete coolant
- ◆ Note installation position: Identification: Part No. must be readable from inlet side

9 - 25 Nm

- ◆ For tensioner

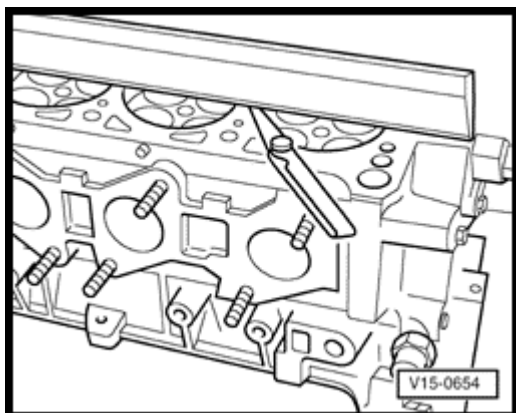
10 - Exhaust manifold gasket

- ◆ Replace
- ◆ Note fitting position

11 - Cylinder head bolt

- ◆ Replace
- ◆ Sequence when loosening and tightening ⇒ [Page 15-5](#)

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Cylinder head, removing and installing (Page 15-4)



A

Fig. 1 Checking cylinder head for distortion

Max. permissible distortion: 0.1 mm

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Cylinder head, removing and installing (Page 15-5)

Special tools and equipment

- ◆ V.A.G 1306 Drip tray
- ◆ V.A.G 1332 Torque wrench (40-200 Nm)
- ◆ V.A.G. 1921 Hose clip pliers

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Cylinder head, removing and installing (Page 15-6)

Prerequisites

- The engine must be no more than warm to touch

Work sequence

- First check whether a coded radio is fitted. If this is the case, obtain the anti - theft coding.
- With the ignition switched off, disconnect battery Ground strap.
- Remove engine cover.
- Drain coolant ⇒ [Page 19-13](#) .
- Remove secondary air pump motor and bracket.

WARNING!

Fuel supply pipes are under pressure! Before removing from hose connection wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

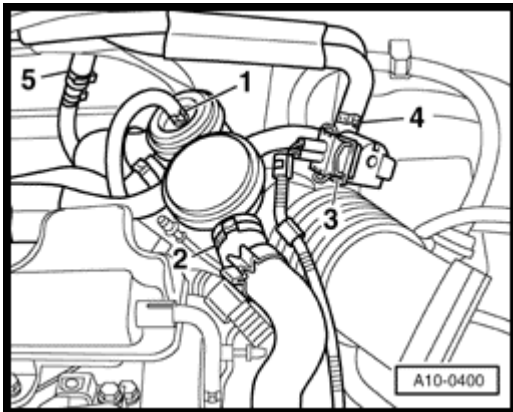
- Separate fuel supply as well as fuel return pipes at connection on fuel rail. The fuel system is under pressure, therefore place a cloth over the connection before the hoses are pulled off.

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Cylinder head, removing and installing (Page 15-7)

- Seal the pipes so that the fuel system is not contaminated by dirt etc.
- Now remove the coolant hose connections on the cylinder head.
- Remove inter - connecting, coolant, vacuum and intake hoses on engine.
- Pull connector(s) off ignition coils.
- Pull off/disconnect all other electrical connections as necessary from engine and lay to one side.



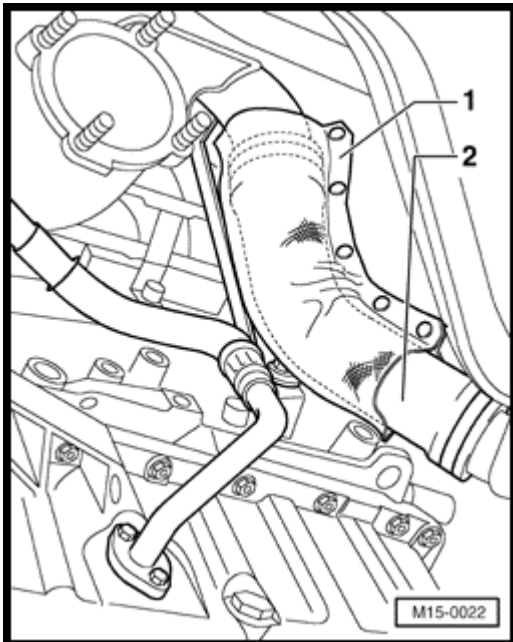
A

- Remove intake air hose from connection of the exhaust turbocharger as follows:
- Pull off hose at pressure regulator valve of crankshaft ventilation 2.
- Pull off harness connector at wastegate bypass regulator valve (N75).
- Pull off hose 4 at wastegate bypass regulator valve (N75).
- Disconnect hose 5 from solenoid valve to turbocharger at bulkhead.

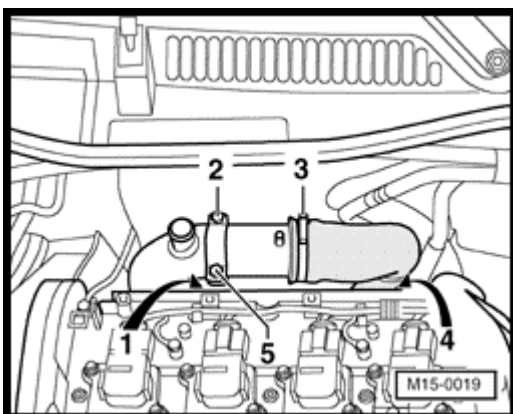
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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Cylinder head, removing and installing (Page 15-8)



- Disconnect hose between EVAP canister and exhaust turbocharger at bulkhead.
- Pull out securing buckle at connector of the exhaust turbocharger and remove air intake hose.
- Remove heat protection pad 1 from air guiding hose 2 (observe installation position).
- Remove air guiding hose 2.
- Loosen 2 bolts from bracket of upper air guiding hose ⇒ [Page 21-8](#) , Item 8



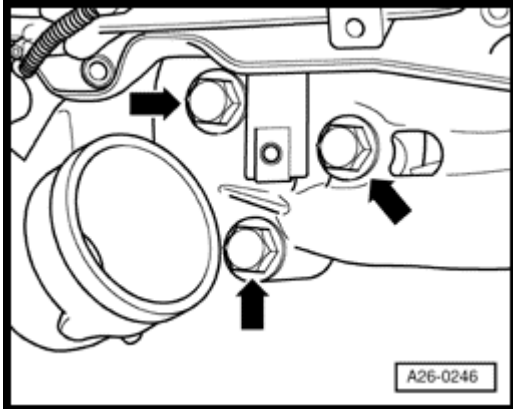
- Remove heat protection pad from air guiding hose (observe installation position) and loosen clamp 3.
- Remove screws 1 and 4 for heat shield from behind cylinder head.
- Loosen screws 2 and 5.

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

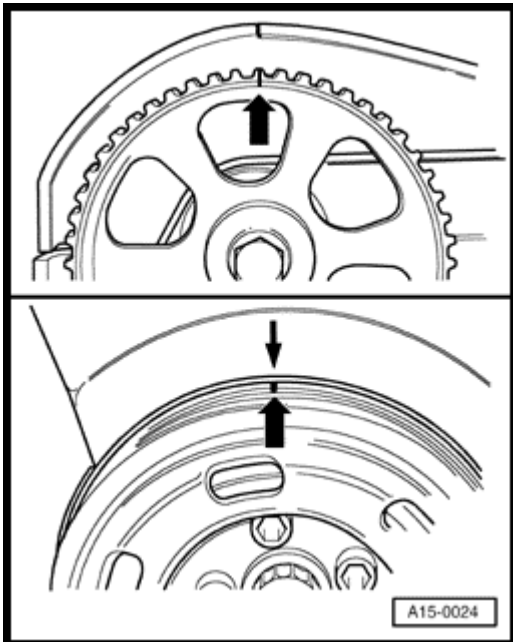
Cylinder head, removing and installing (Page 15-9)

- Remove the air guiding hose, hose to turbocharger and heatshield.



A

- Remove the three exhaust gas turbocharger/exhaust manifold securing bolts - 1 - .
- Remove ribbed belt ⇒ [Page 13-8](#) .
- Remove tensioning element for ribbed belt.
- Remove toothed belt guard (upper part).



A

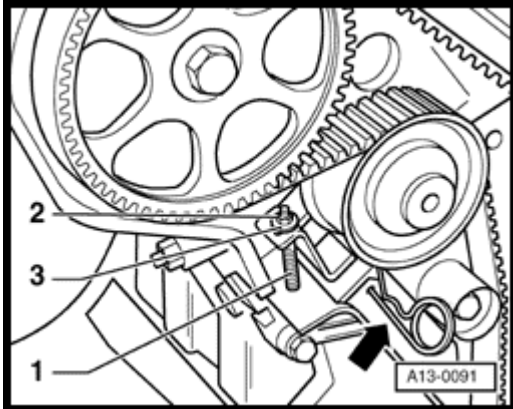
- Set camshaft sprocket to TDC No. 1 cylinder by turning the crankshaft. Mark on camshaft sprocket must align with arrow on toothed belt guard.
- Mark D.O.R. of toothed belt.

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

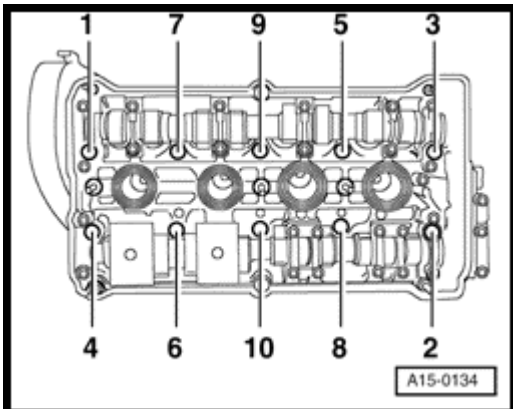
Cylinder head, removing and installing (Page 15-10)

- Remove toothed belt tensioner as follows:



A

- Screw threaded stud M5x55 - 1 - into toothed belt tensioner. Fit hexagon nut - 2 - with large washer - 3 - onto threaded stud - 1 - .
- Tension piston of tensioning device just sufficient so that the piston can be locked with a pin (e.g. from the lifting tackle MP 9 - 201) - arrow - .
- Remove toothed belt.
- Turn crankshaft back slightly.
- Loosen pressure piston again and remove threaded pin.
- Remove ignition coils.
- Remove cylinder head cover.



A

- Loosen socket head bolts in the sequence given and then remove completely.
- Carefully lift cylinder head off.

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Cylinder head, removing and installing (Page 15-11)

Installing

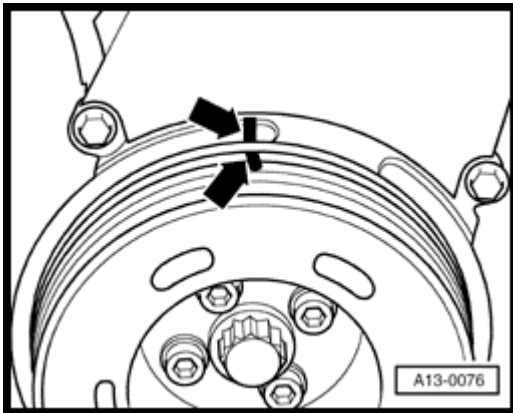
Notes:

- ◆ *There must be no oil or coolant in the cylinder head bolt pockets in the cylinder head.*
- ◆ *Only remove the new cylinder head gasket from its packing immediately before installing.*
- ◆ *Handle the new gasket with extreme care. Damaging will lead to leaks.*
- Place a clean cloth in cylinders so that no dirt or emery cloth particles can get in between cylinder wall and piston.
- Also prevent dirt and emery cloth particles from getting into the coolant.
- Carefully clean cylinder head and cylinder block sealing surfaces. Thereby ensuring that no scoring or scratches are formed (when using abrasive paper the grade must not be less than 100).
- Carefully remove metal particles, emery remains and cloths.

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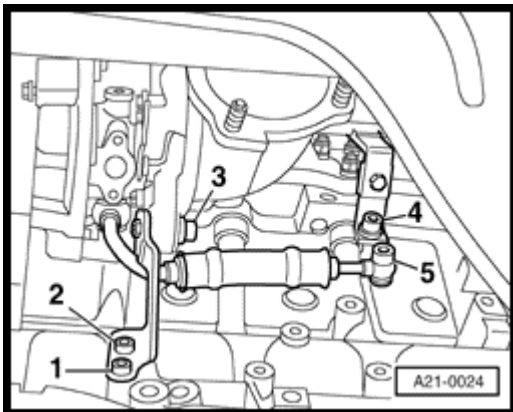
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Cylinder head, removing and installing (Page 15-12)



A

- Turn crankshaft to TDC No. 1 cylinder.
- Turn crankshaft back slightly.



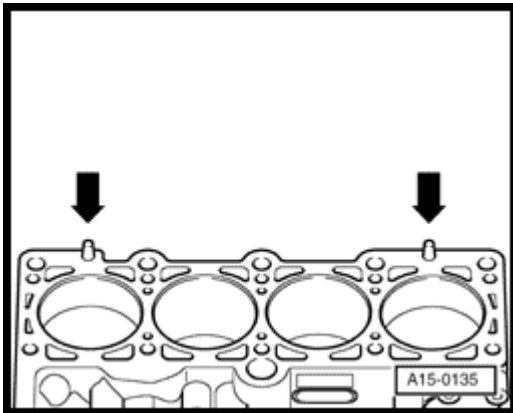
A

- Loosen bolts 1 and 2 at bracket for turbocharger approx. 2 revolutions in order to avoid tension when installing cylinder head.

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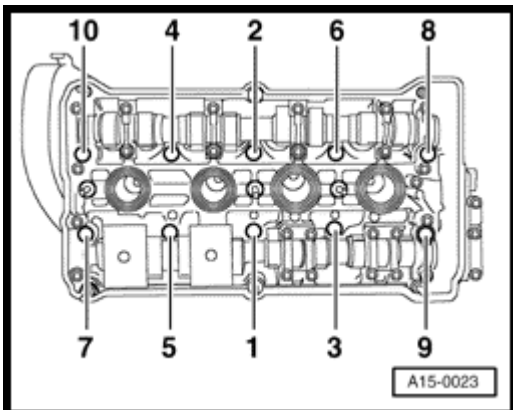
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Cylinder head, removing and installing (Page 15-13)



A

- Fit new cylinder head gasket. Lettering (Part No.) must be readable.
- Remove guide pins with removal tool from 3070. To do this turn removal tool anti-clockwise, until the pins are free.
- Fit cylinder head, screw in 8 remaining cylinder head bolts and tighten by hand.



A

- Tighten cylinder head in tightening sequence as follows:
- Pretighten all bolts to 40 Nm.
- Then tighten all bolts a 1/4 turn (90 °) further using a ridged wrench.
- Then tighten all bolts again a 1/4 turn (90 °) further.

Notes:

There is no requirement to retighten the cylinder head bolts after repairs.

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Cylinder head, removing and installing (Page 15-14)

- Remove gasket between turbocharger/exhaust manifold and bolt turbocharger as well as the bracket to the cylinder head.
- Install toothed belt and adjust valve timing ⇒ [Page 13-11](#)

Filling with new coolant ⇒ [Page 19-13](#) .

The rest of the assembly is basically a reverse of the dismantling sequence.

- Check DTC memory.

⇒ [Repair Manual, 1.8 Liter 4 - Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01](#)

- Read out readiness code.

⇒ [Repair Manual, 1.8 Liter 4 - Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01](#)

- Match engine electronics control unit to throttle valve control module.

⇒ [Repair Manual, 1.8 Liter 4 - Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 24](#)

If the fault memory has been erased or the engine control unit separated from the permanent positive, the readiness code must be generated again.

⇒ [Repair Manual, 1.8 Liter 4 - Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01](#)

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical Cylinder head, removing and installing (Page 15-15)

Compression pressures, checking

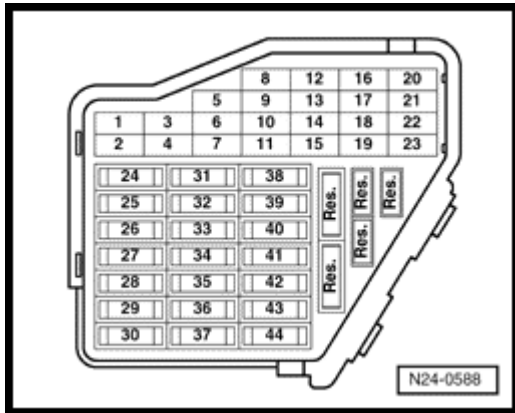
Special tools and equipment

- ◆ 3122 B Spark plug spanner
- ◆ V.A.G 1331 Torque wrench (5-50 Nm)
- ◆ V.A.G 1763 Compression tester

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Cylinder head, removing and installing (Page 15-16)



A

- Remove fuse 32.

Notes:

Removing fuse 32 interrupts the voltage supply to the injectors.

Test conditions

- Engine oil temperature must be at least 30° C.

Work sequence

- Remove engine cover.
- Pull connector(s) off ignition coils.
- Remove ignition coils.
- Remove spark plugs with spark plug spanner 3122B.
- Fully open throttle valve.

Notes:

Using the compression tester ⇒ Operating instructions.

- Check compressions with compression tester V.A.G1381/V.A.G1763.
- Operate starter until tester shows no further pressure increase.

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Cylinder head, removing and installing (Page 15-17)

Compression pressure:

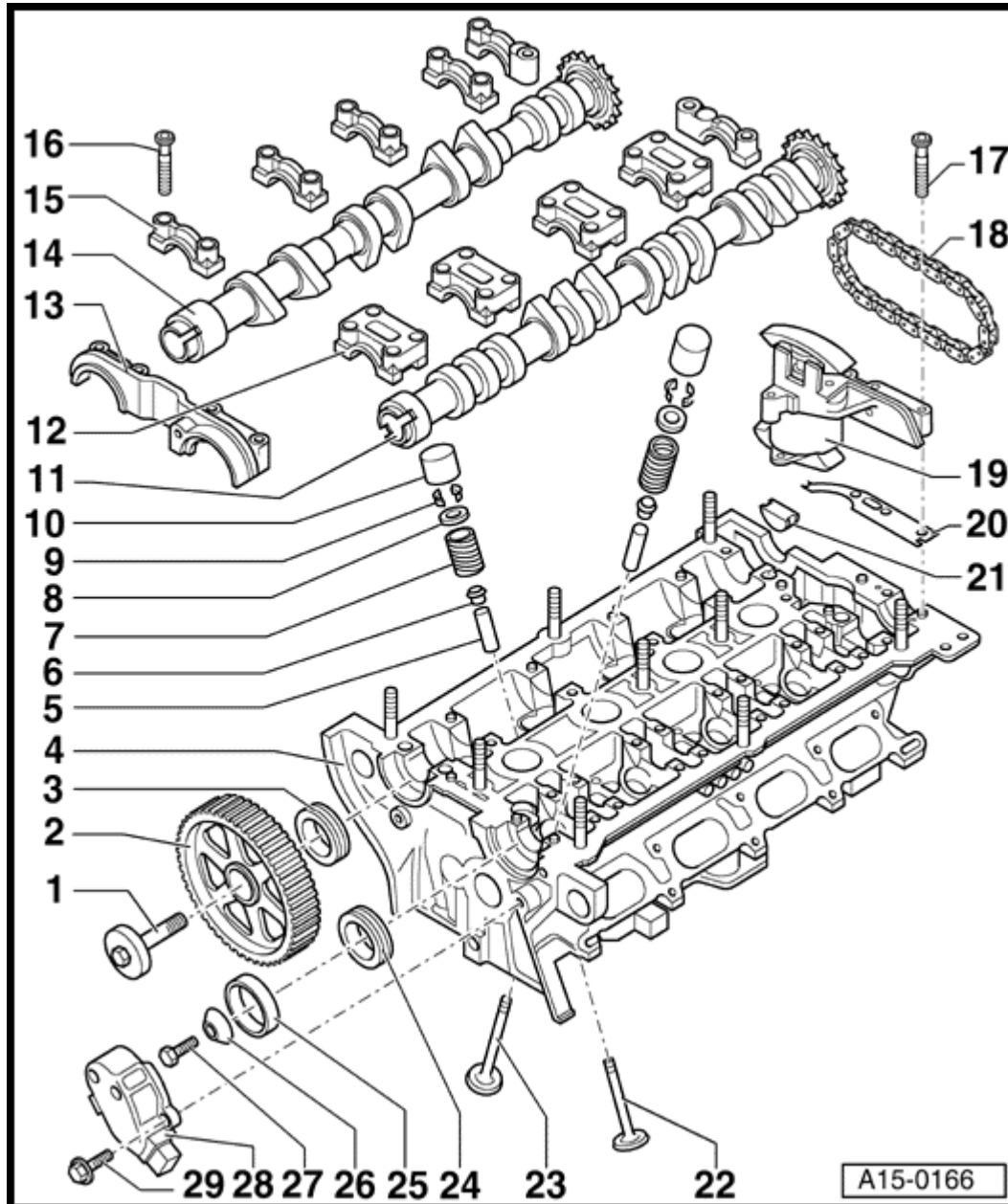
- ◆ New: 10-13 bar
- ◆ Wear limit: 7.5 bar
- ◆ Permissible difference between all cylinders: 3 bar
- Thread in spark plugs using 3122B spark plug removal tool and tighten to 30 Nm.
- Install ignition coils and tighten to 10 Nm.
- Check DTC memory.
- ⇒ [Repair Manual, 1.8 Liter 4 - Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01](#)
- Read out readiness code.
- ⇒ [Repair Manual, 1.8 Liter 4 - Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 01](#)

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-18)

Notes:

- ◆ *Cylinder heads which have cracks between the valve seats or between valve seat inserts and the spark plug thread can be used further without reducing service life, provided the cracks do not exceed a maximum of 0.3 mm in width, or when no more than the first four spark plug threads are cracked.*
- ◆ *After installing new hydraulic lifters, the engine must not be started for approx. 30 minutes (otherwise valves will strike pistons), then turn crankshaft two rotations.*

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-19)



1 - 65 Nm

- ◆ Use counter - hold 3036 to loosen and tighten

2 - Camshaft sprocket

- ◆ Note installation position: small web of the camshaft sprocket points outward and the No. 1 Cyl. TDC marking is visible

3 - Oil seal

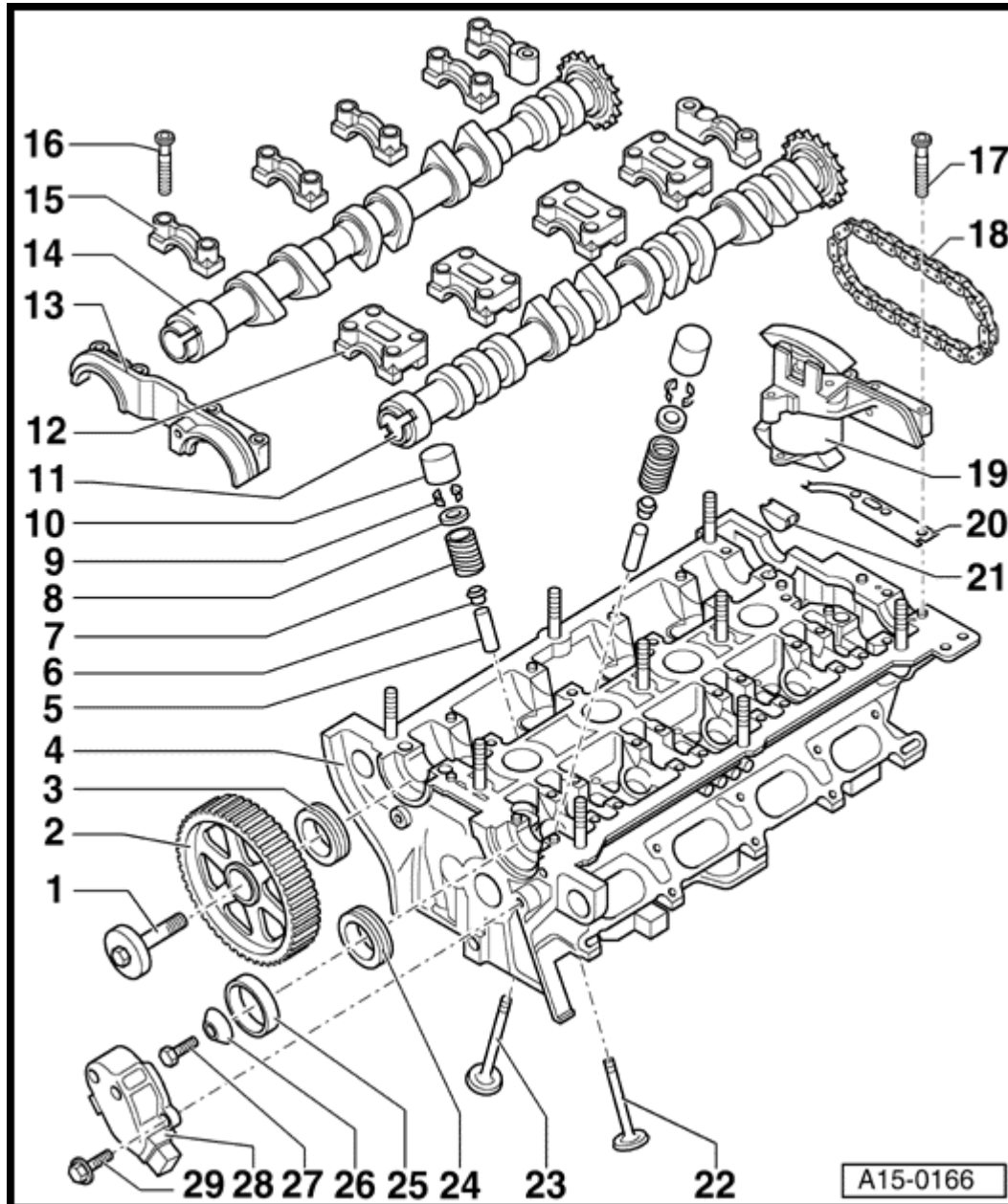
- ◆ Replacing ⇒ [Page 15-32](#)

4 - Cylinder head

- ◆ Removing and installing ⇒ [Page 15-1](#)

- ◆ Reworking valve seats ⇒ [Page 15-29](#)
- ◆ Reworking sealing surface ⇒ [Fig. 1](#)
- ◆ Sealing transition points ⇒ [Fig. 4](#) and [Fig. 5](#)

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-20)



5 - Valve guide

- ♦ Checking ⇒ [Page 15-50](#)

6 - Valve stem seal

- ♦ Replacing ⇒ [Page 15-53](#)

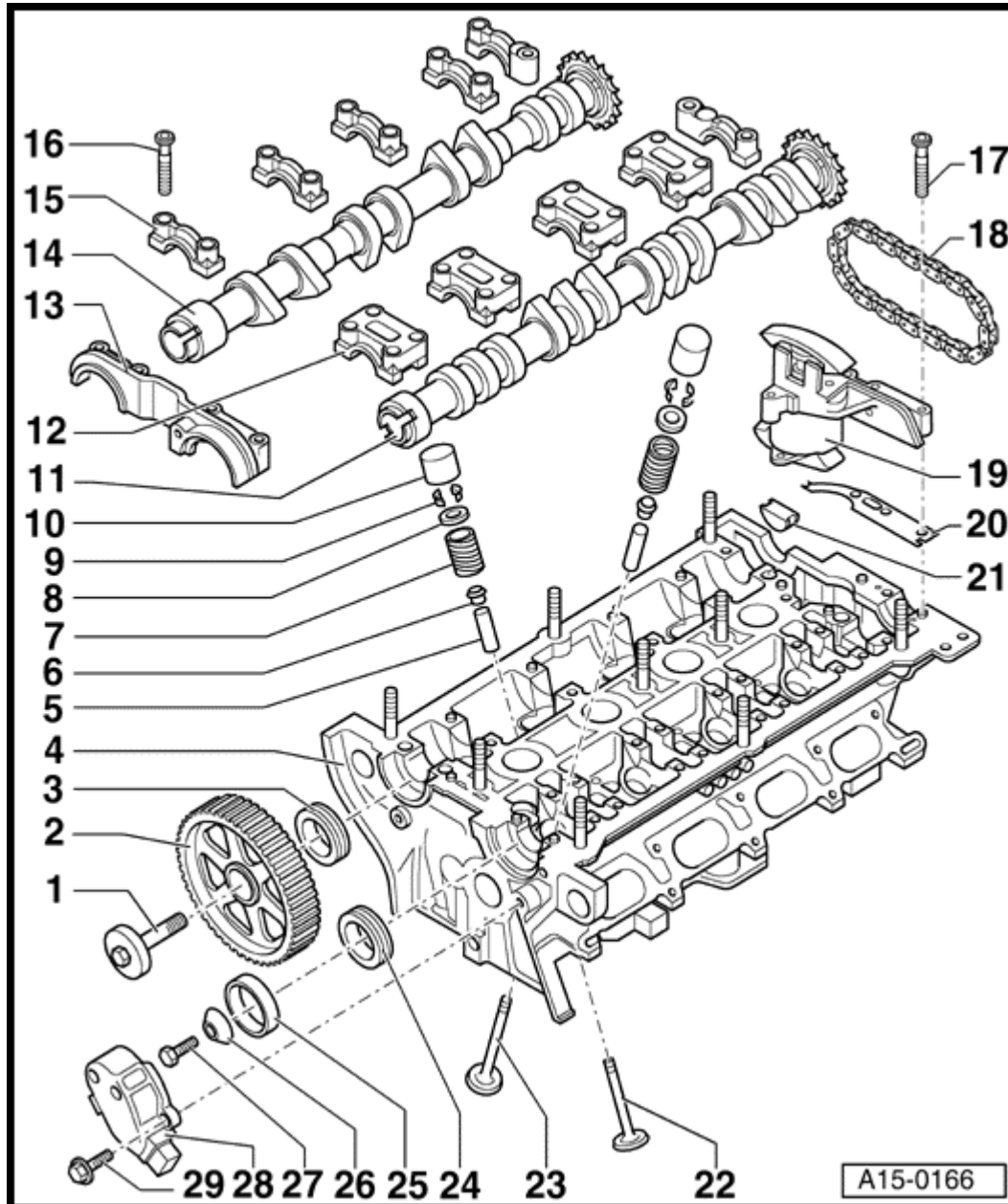
7 - Valve spring

- ♦ Removing and installing: remove cylinder head with 3362
- ♦ Installing ⇒ [Page 15-53](#)

8 - Upper valve spring plate

9 - Valve keepers

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-21)



10 - Hydraulic lifter

- ◆ Do not interchange
- ◆ With hydraulic valve clearance compensation
- ◆ Checking ⇒ [Page 15-40](#)
- ◆ Store with cam contact surface downward
- ◆ Before installing check camshaft axial clearance ⇒ [Fig. 2](#)
- ◆ Oil contact surface

11 - Inlet camshaft

- ◆ Checking axial clearance ⇒ [Fig. 2](#)

- ◆ Removing and installing ⇒ [Page 15-42](#)

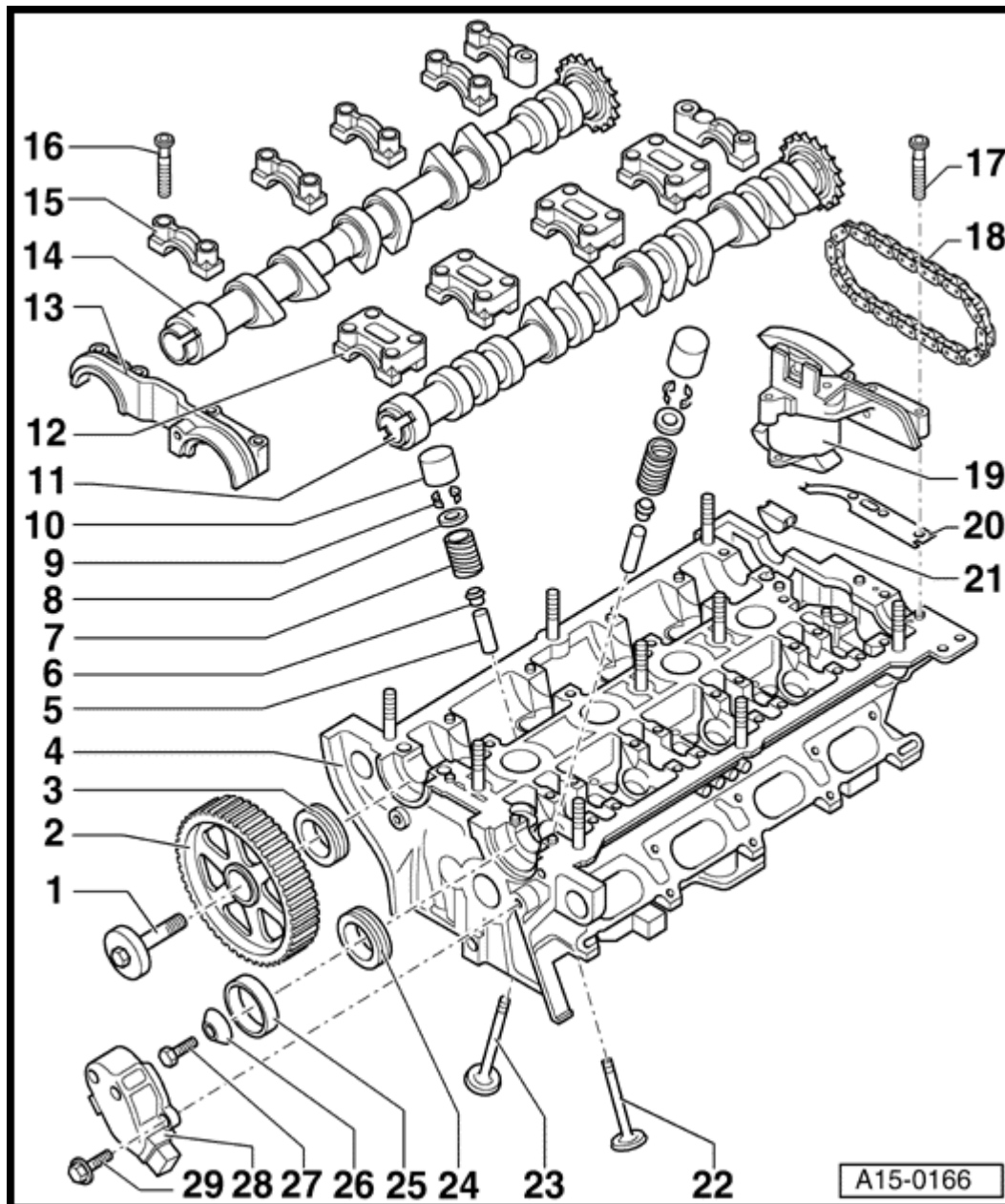
Checking radial clearance with plastigage:

- ◆ Wear limit: 0.1 mm
- ◆ Run - out: max. 0.01 mm

12 - Inlet camshaft bearing cap

- ◆ Installation position and installation sequence ⇒ [Page 15-42](#)

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-22)



13 - Double bearing cap

- ◆ Lightly coat bearing cap contact surface with sealant AMV 174 004 01
- ◆ Must sit on alignment bushing
- ◆ Seal transitions of double - bearing cap/cylinder head ⇒ [Page 15-28](#) , [Fig. 4](#)

14 - Exhaust camshaft

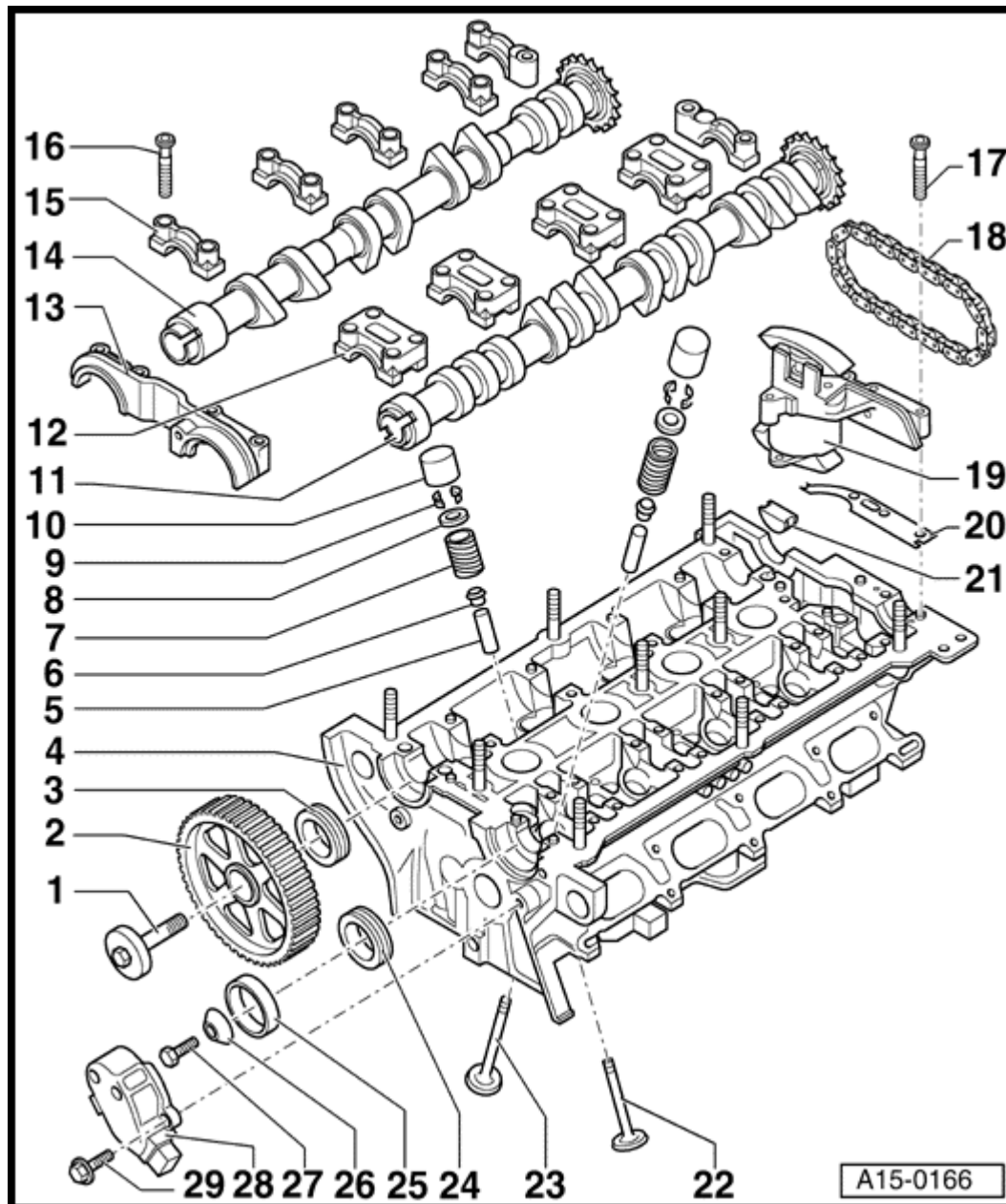
- ◆ Checking axial clearance ⇒ [Fig. 2](#)
- ◆ Removing and installing ⇒ [Page 15-42](#)

Checking radial clearance with plastigage:

- ◆ Wear limit: 0.1 mm

◆ Run - out: max.: 0.01 mm

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-23)



15 - Exhaust camshaft bearing cap

- ◆ Installation position and installation sequence ⇒ [Page 15-42](#)

16 - 10 Nm

17 - 10 Nm

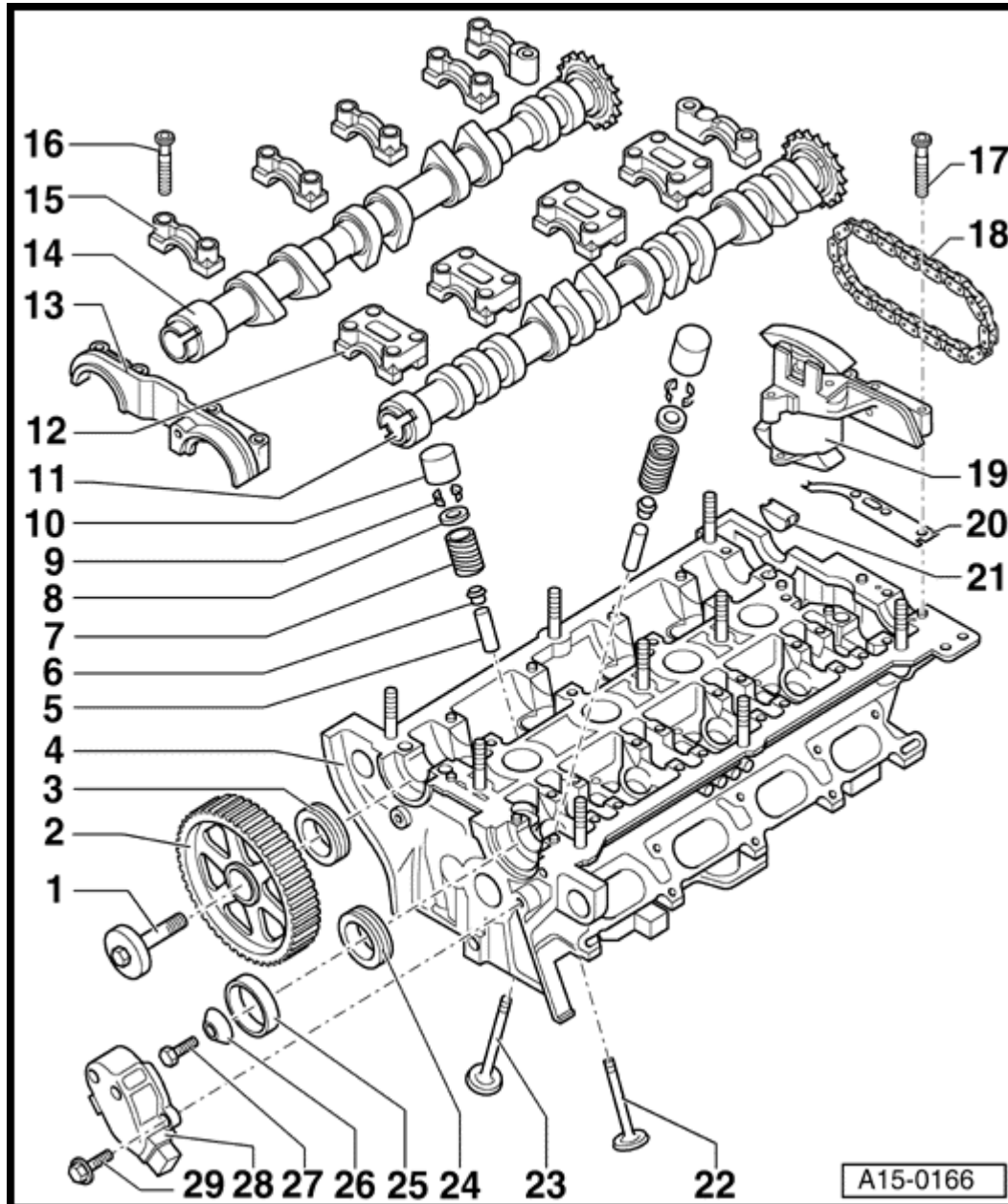
18 - Drive chain

- ◆ Before removing mark D.O.R. (installation position) ⇒ [Page 15-42](#)

19 - Chain tensioner

- ◆ Secure with 3366 before removing ⇒ [Page 15-42](#)
- ◆ Seal transition of hydraulic chain tensioner/cylinder head ⇒ [Page 15-28](#) , [Fig. 5](#)

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-24)



20 - Gasket

- ◆ Replace

21 - Gasket

- ◆ Replace

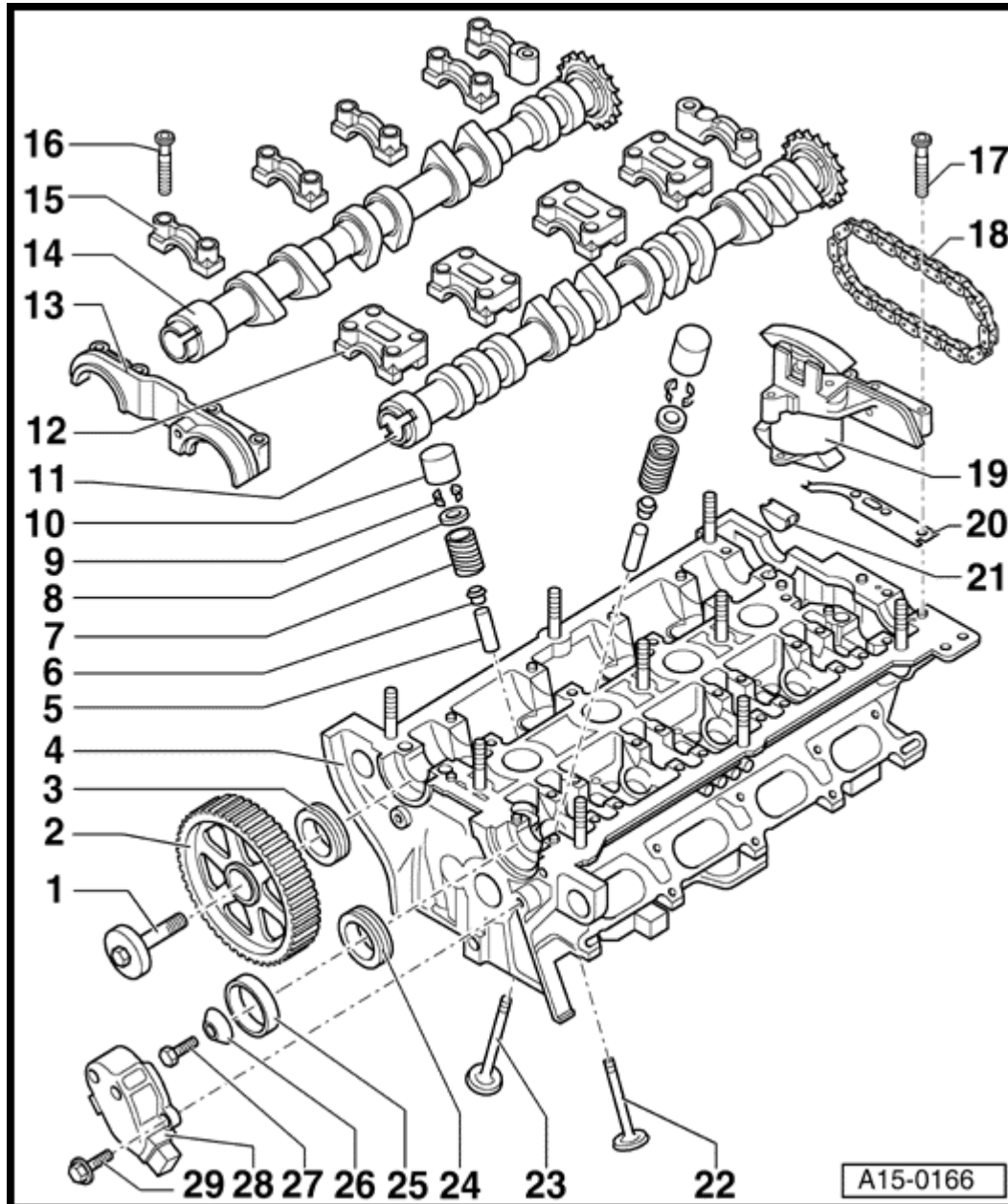
22 - Valves

- ◆ Sodium filled
- ◆ Note instructions for recycling sodium filled valves ⇒ [Page 15-27](#)
- ◆ Do not rework only grinding - in is permitted
- ◆ Valve dimensions ⇒ [Fig. 3](#)

23 - Valves

- ◆ Do not rework; only grinding - in is permitted
- ◆ Valve dimensions ⇒ [Fig. 3](#)

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-25)



24 - Oil seal

- ♦ Lightly oil sealing lip of oil seal
- ♦ Replacing ⇒ [Page 15-32](#)

25 - Hood

- ♦ For Hall sender
- ♦ When installing note fixing arrangement

26 - Washer

- ♦ Conical

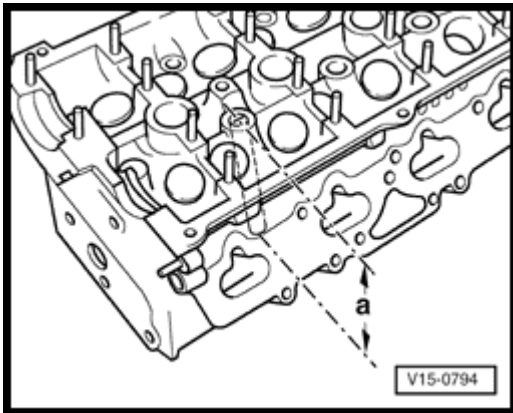
27 - 25 Nm

28 - Hall sender (G40)

⇒ [Repair Manual, 1.8 Liter 4 - Cyl. 5V Turbo OBDII Fuel Injection & Ignition, Repair Group 28](#)

29 - 10 Nm

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-26)

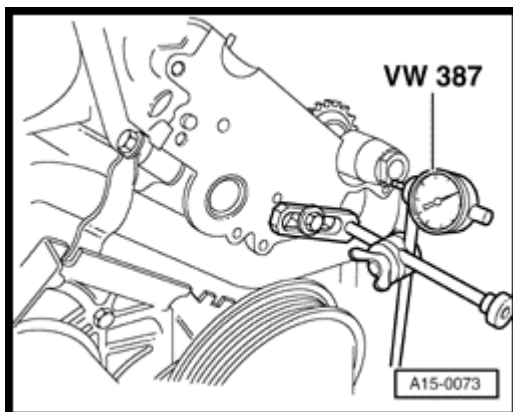


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Fig. 1 Reworking cylinder head sealing surface

The dimension for reworking is measured through the holes for the cylinder head bolts.

- a - = minimum 139.2 mm



▲

Fig. 2 Checking camshaft axial clearance

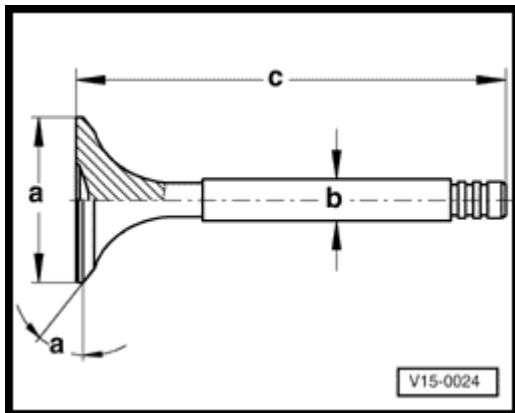
Special tools and equipment

- ◆ Universal dial gauge bracket VW 387
- ◆ Dial gauge

Check with hydraulic lifters and chain removed and No. 2 and 4 bearing caps fitted.

Wear limit: max. 0.2 mm

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-27)



A

Fig. 3 Valve dimensions

Notes:

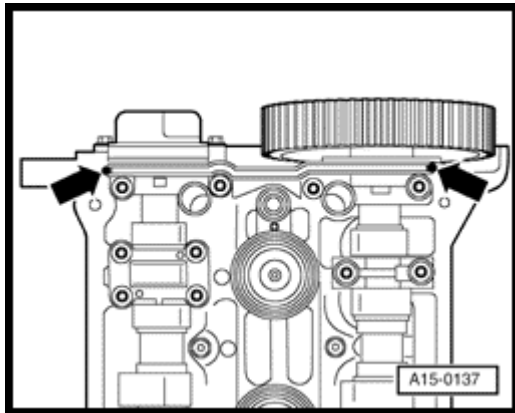
Valves must not be reworked. Only lapping - in is permitted.

Dimension		Intake valve	Exhaust valve
Ø a	mm	26.9	29.9
Ø b	mm	5.963	5.943
c	mm	104.84-105.34	103.64-104.14
α	∠°	45	45

Notes:

Care must be taken when disposing of old sodium filled valves. They must be cut through in the center of the stem with a hacksaw. When doing this they must be perfectly dry. The valves prepared in this way can then be thrown into a bucket of water a maximum of ten at a time. When doing this step back quickly because a sudden chemical reaction causes the sodium filling to burn. After this treatment, the valves can be put in with the normal scrap.

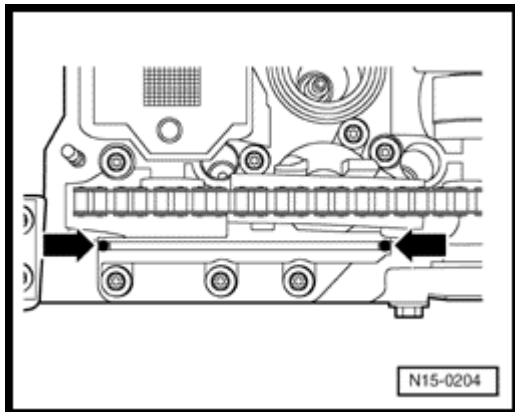
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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-28)



A

Fig. 4 Sealing transition points between double bearing cap and cylinder head

- Carefully apply a thin coat of sealant "D 454 300 A2" to both edges of sealing surfaces between double bearing cap and cylinder head - arrows - using a small screwdriver.



A

Fig. 5 Sealing transition points between chain tensioner/cylinder head

- Carefully apply a thin coat of sealant "D 454 300 A2" to both edges of sealing surfaces between camshaft adjuster and cylinder head - arrows - using a small screwdriver.

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1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Valve gear, servicing (Page 15-29)

Valve seats, reworking

Special tools and equipment

- ◆ Depth gauge
- ◆ Valve seat refacing tool

Notes:

- ◆ *When repairing engines with leaking valves, it is not sufficient to replace or replace valve seats and valves. It is also necessary to check the valve guides for wear. This particularly important on high mileage engines ⇒ [Page 15-50](#) .*
- ◆ *The valve seats should only be reworked just enough to produce a perfect seating pattern. The maximum permissible reworking dimension must be calculated before reworking commences. If the reworking dimension is exceeded, the function of the hydraulic tappets can no longer be guaranteed and the cylinder head should be replaced.*

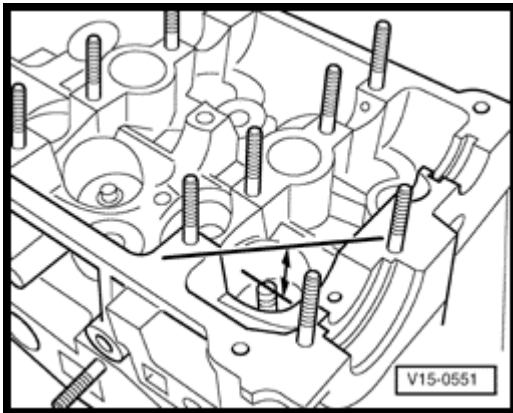
The max. permissible reworking dimension is calculated as follows:

- Insert valve and press firmly against seat.

Notes:

If the valve is to be replaced as part of a repair, use a new valve for the calculation.

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-30)



A

- Measure distance between end of valve stem and upper edge of cylinder head.
- Calculate max. permissible reworking dimension from measured distance and minimum dimension.

Minimum dimension:

Outer intake valves: 34.0 mm

Center intake valve: 33.7 mm

Exhaust valve: 34.4 mm

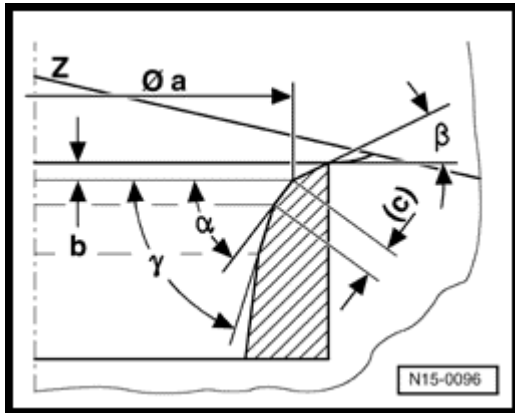
Measured distance minus minimum dimension = max. permissible reworking dimension.

Example:

Measured distance	34.4 mm
- Minimum dimension	34.0 mm
<hr/>	
= max. perm. rework dimension*	0.4 mm

*) The max. permissible reworking dimension is shown on illustrations for reworking valve seats as dimension "b."

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-31)



A

Reworking intake valve seat

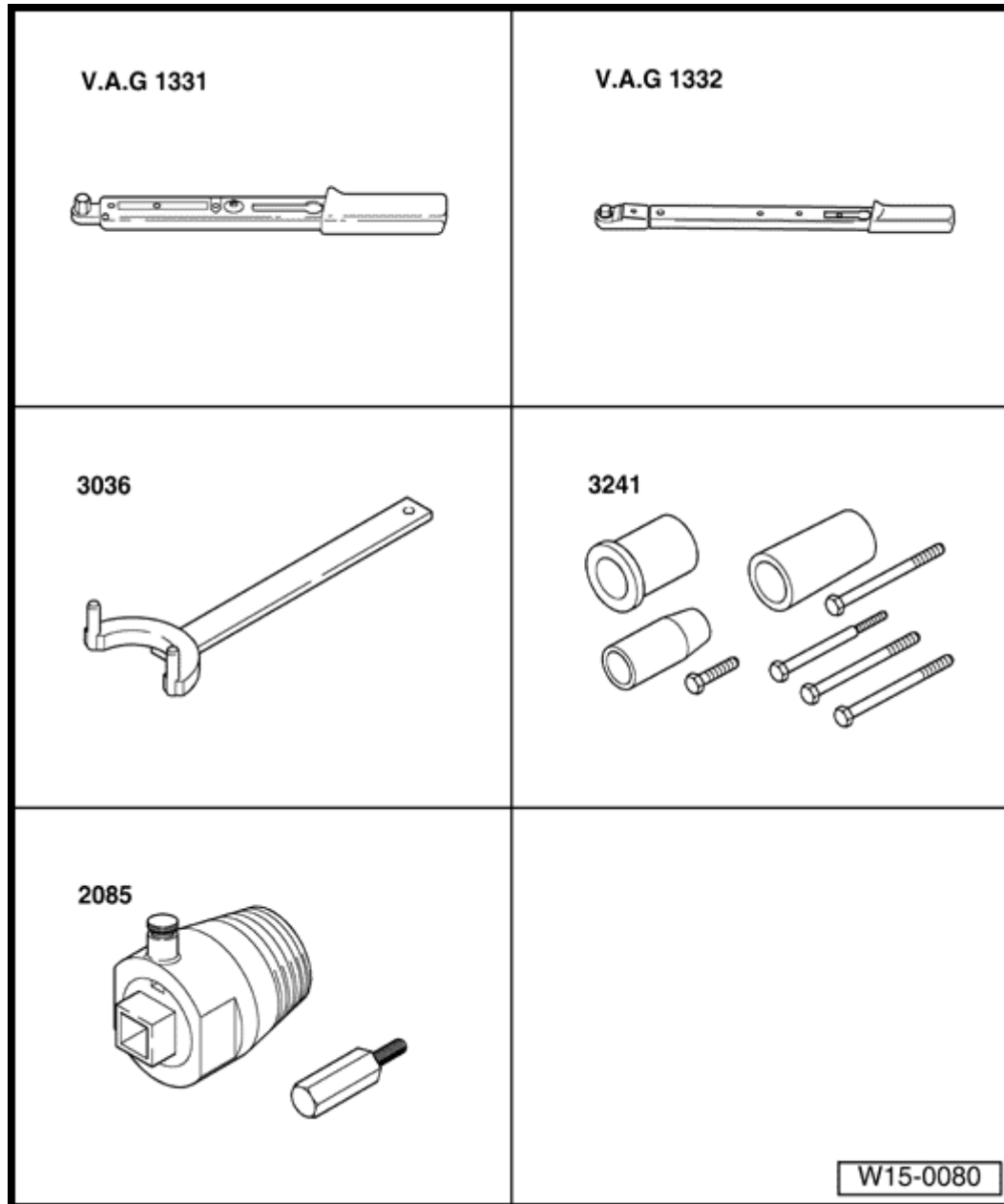
- a = 26.2 mm Ø
- b = Max. permissible reworking dimension*
- c = 1.5- 1.8 mm
- Z = Cylinder head lower edge
- α = 45° valve seat angle
- β = 30° upper correction angle
- γ = 60° lower correction angle

Reworking exhaust valve seat

- a = 29.0 mm Ø
- b = Max. permissible reworking dimension*
- c = Approx. 1.8 mm
- Z = Cylinder head lower edge
- α = 45° valve seat angle
- β = 30° upper correction angle
- γ = 60° lower correction angle

*) Calculating max. permissible reworking dimension \Rightarrow [Page 15-29](#) .

Camshaft oil seal, replacing



Special tools and equipment

- ◆ V.A.G 1331 Torque wrench (5-50 Nm)
- ◆ V.A.G 1332 Torque wrench (40-200 Nm)
- ◆ 3036 Counter hold tool
- ◆ 3241 Fitting sleeves
- ◆ 2085 Oil seal extractor

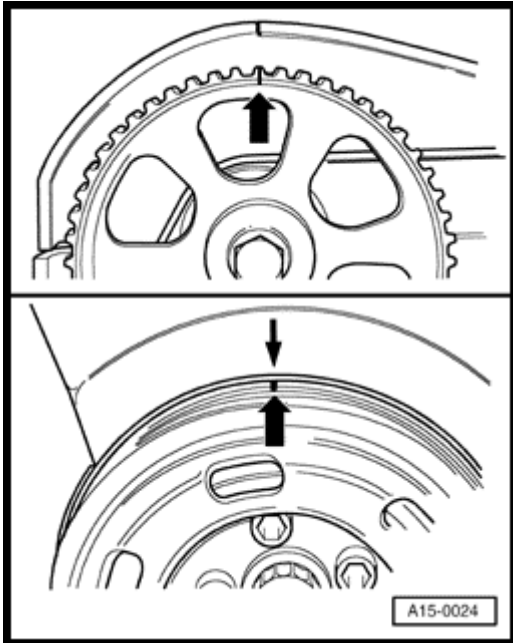
Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

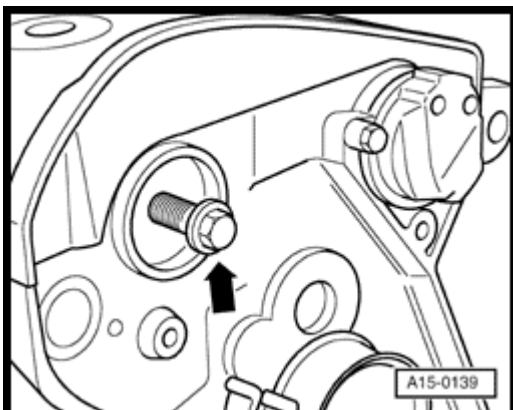
Valve gear, servicing (Page 15-33)

Removing oil seal on camshaft sprocket

- Remove seal on Hall sender ⇒ [Page 15-36](#) .
- Remove toothed belt guard (upper part).



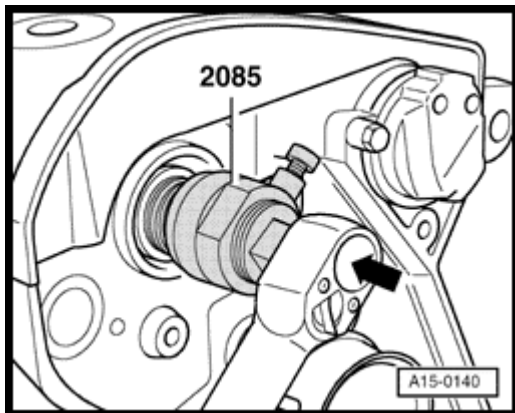
- Set camshaft sprocket to TDC No. 1 cylinder by turning the crankshaft. Mark on camshaft sprocket must align with mark on cylinder head cover.
- Remove cylinder head cover.
- Release tensioner and remove toothed belt from camshaft sprocket.
- Turn crankshaft back slightly.
- Remove camshaft sprocket. When loosening camshaft sprocket bolt counter - hold with 3036.
- Remove woodruff key from the camshaft.



A

- Screw camshaft sprocket securing bolt - arrow - into camshaft onto stop by hand, to guide seal extractor.
- Unscrew inner part of oil seal extractor 2085 two turns (approx. 3 mm) out of the outer part and lock in position with knurled screw.

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-34)

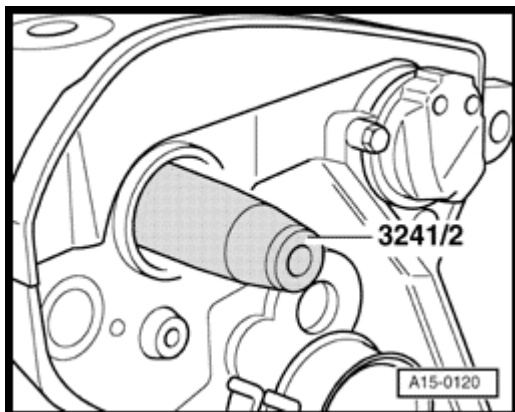


A

- Lubricate threaded head of oil seal extractor, place it in position and exerting firm pressure screw it into oil seal as far as possible.
- Loosen knurled screw and turn inner part of extractor against camshaft until oil seal has been extracted.

Installing

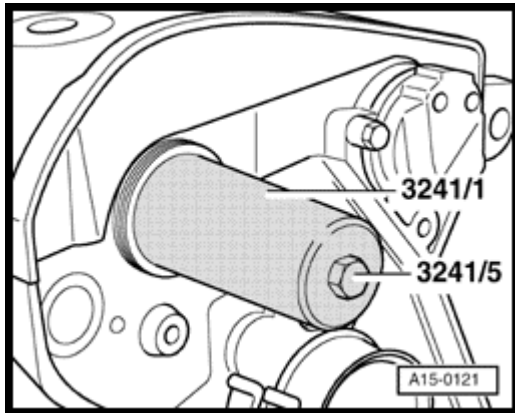
- Lightly oil sealing lip of oil seal.



A

- Fit guide sleeve 3241/2 onto camshaft journal.
- Slide oil seal over guide sleeve.

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-35)



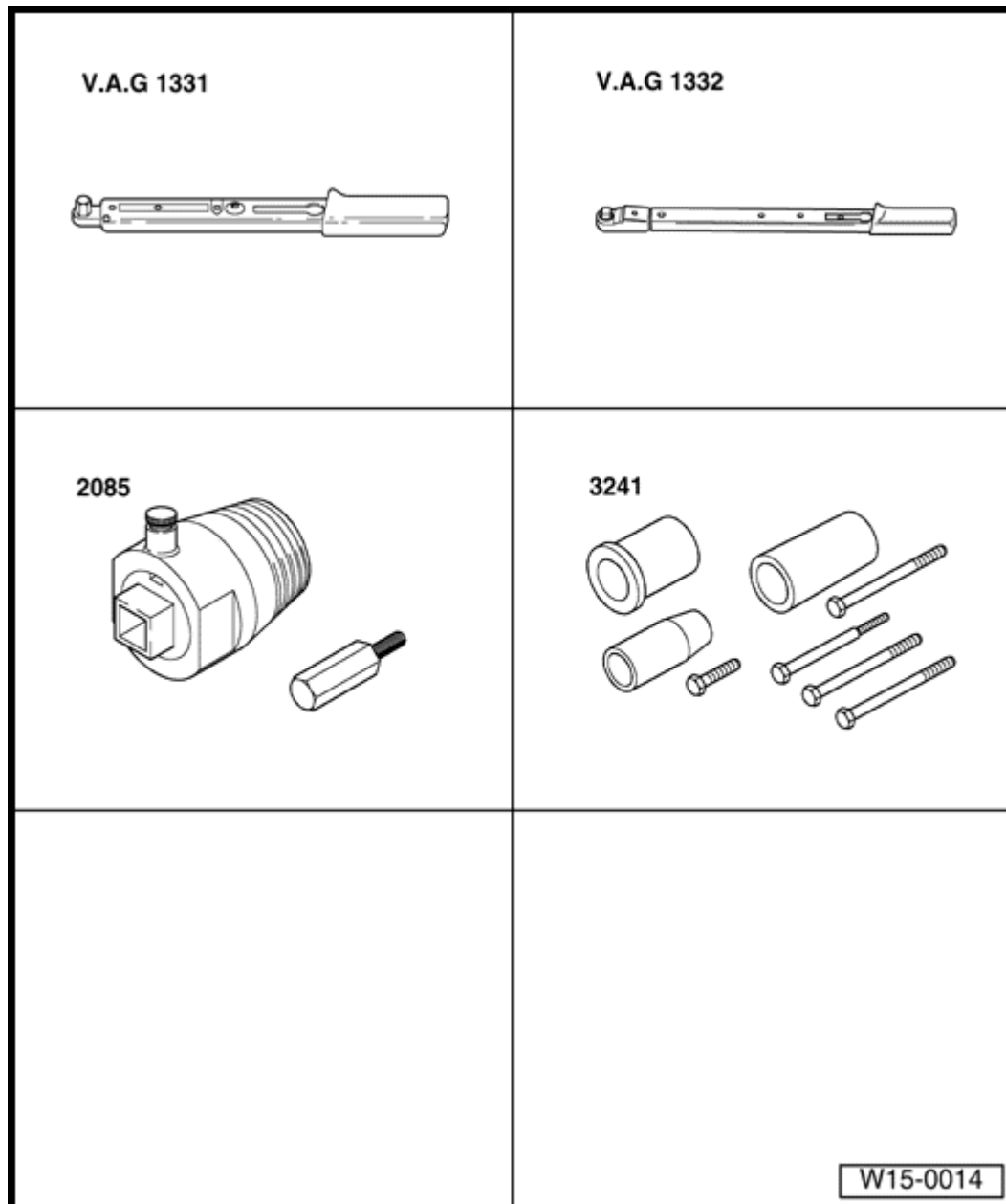
A

- Press seal in onto stop with press sleeve 3241/1 and bolt 3241/5.

The rest of the assembly is basically a reverse of the dismantling sequence.

Installing toothed belt and adjusting timing ⇒ [Page 13-11](#) .

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-36)



Oil seal on Hall sender, removing

Special tools and equipment

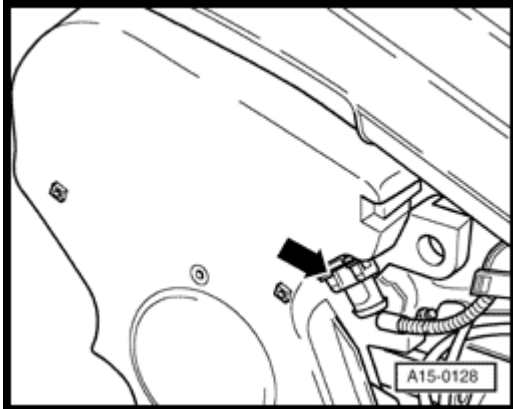
- ◆ V.A.G 1331 Torque wrench (5-50 Nm)
- ◆ V.A.G 1332 Torque wrench (40-200 Nm)
- ◆ 2085 Oil seal extractor
- ◆ 3241 Fitting sleeves

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

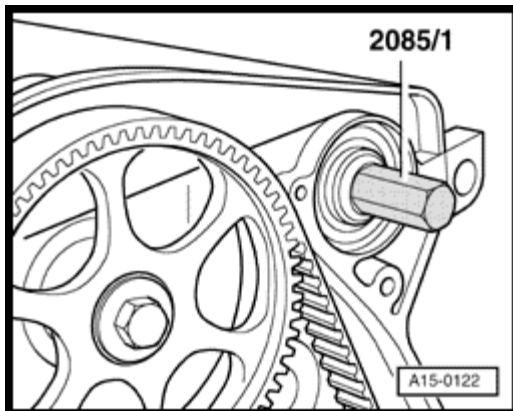
Valve gear, servicing (Page 15-37)

Removing



A

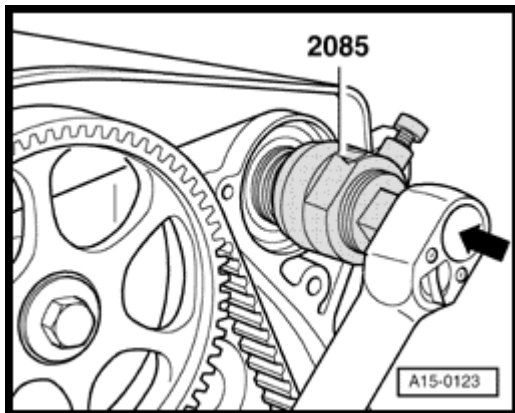
- Pull connector off Hall sender (G40) - arrow - .
- Remove toothed belt guard (upper part).
- Remove housing for Hall sender.
- Remove washer and hood for Hall sender.



A

- Screw bolt 2085/1 into camshaft onto stop by hand, to guide seal extractor.
- Unscrew inner part of oil seal extractor 2085 two turns (approx. 3 mm) out of the outer part and lock in position with knurled screw.

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-38)

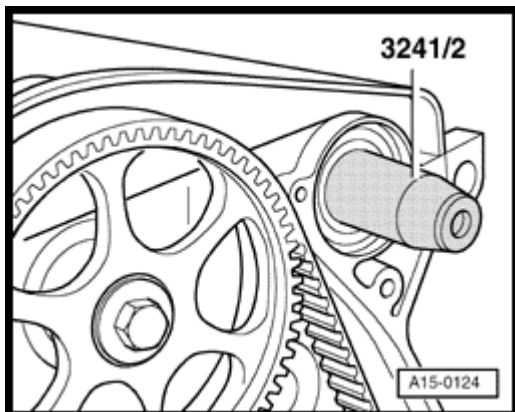


A

- Lubricate threaded head of oil seal extractor, place it in position and exerting firm pressure screw it into oil seal as far as possible.
- Loosen knurled screw and turn inner part of extractor against camshaft until oil seal has been extracted.

Installing

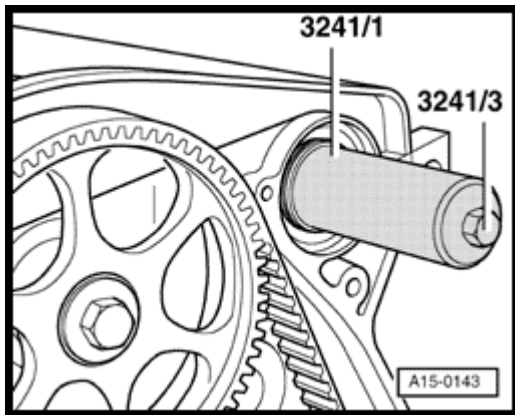
- Lightly oil sealing lip of oil seal.



A

- Fit guide sleeve 3241/2 onto camshaft journal.
- Slide oil seal over guide sleeve.

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-39)



A

- Press seal in onto stop with press sleeve 3241/1 and bolt 3241/3.
- Insert Hall sender hood into notch in inlet camshaft.
- Install washer (taper facing outward) and tighten securing bolt to 25 Nm.
- Install housing for Hall sender and tighten to 10 Nm.
- Install upper toothed belt guard.
- Reconnect connector on Hall sender.

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-40)

Hydraulic lifters, checking

Special tools and equipment

- ◆ Feeler gauge
- ◆ Wood or plastic wedge

Notes:

- ◆ *Replace defective lifter complete (cannot be adjusted or repaired).*
- ◆ *Irregular valve noises when starting engine are normal.*

Test sequence

- Start engine and run until the radiator fan has switched on once.
- Increase engine speed to about 2500 rpm for approx. 2 minutes.

If the hydraulic tappets are still noisy, locate defective tappets as follows:

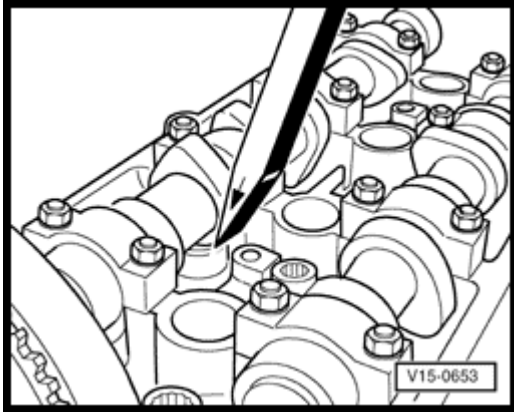
- Remove cylinder head cover.
- Rotate crankshaft clockwise, until cam of the tappet to be checked is pointing upward.
- Determine play between cam and hydraulic lifter.

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Valve gear, servicing (Page 15-41)

- If the play is in excess of 0.2 mm, replace hydraulic lifter. If the play is less than 0.1 mm or no play, proceed with check as follows:



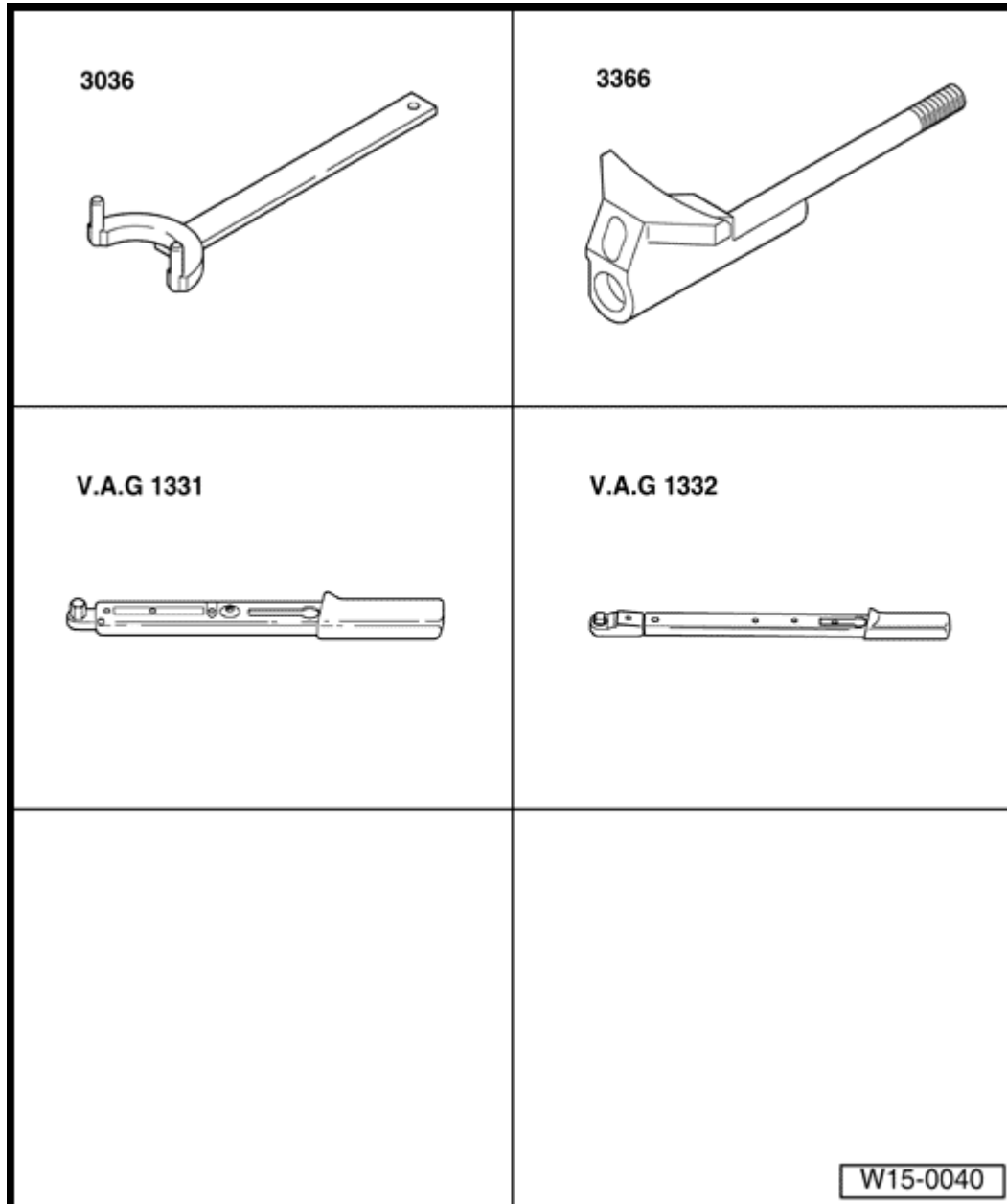
A

- Push hydraulic lifter down lightly with a wooden or plastic wedge. If when the hydraulic lifter is pushed down a 0.2 mm thick feeler gauge can be pushed between the camshaft and hydraulic lifter, the hydraulic lifter is to be replaced.

Notes:

After installing new tappets the engine must not be started for approx. 30 minutes. Hydraulic compensation elements must settle (otherwise valves will strike pistons).

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-42)



Camshaft, removing and installing

(with cylinder head installed)

Special tools and equipment

- ◆ 3036 Counter hold tool
- ◆ 3366 Retainer
- ◆ V.A.G 1331 Torque wrench (5-50 Nm)
- ◆ V.A.G 1332 Torque wrench (40-200 Nm)
- ◆ D 454 300 A2 Sealant

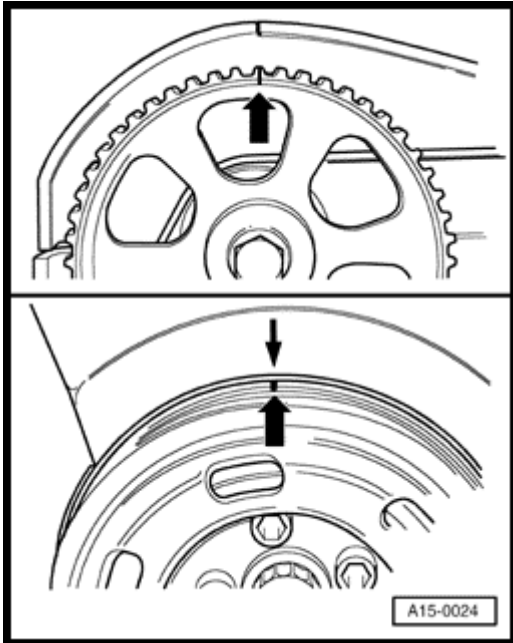
Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Valve gear, servicing (Page 15-43)

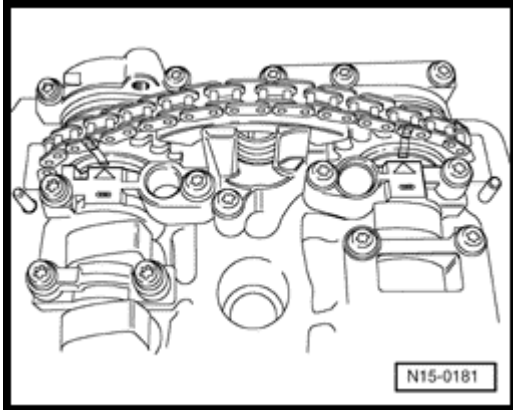
Removing

- Remove engine cover.
- Remove toothed belt guard (upper part).



- Set camshaft sprocket to TDC No. 1 cylinder by turning the crankshaft. Mark on camshaft sprocket must align with mark on cylinder head cover.
- Remove cylinder head cover.
- Take toothed belt off camshaft toothed belt sprocket ⇒ [Page 13-11](#) .
- Turn crankshaft back slightly.
- Remove camshaft sprocket. When loosening camshaft sprocket bolt counter - hold with 3036.
- Remove woodruff key from the camshaft.
- Remove Hall sender housing.
- Remove washer and hood for Hall sender.

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-44)

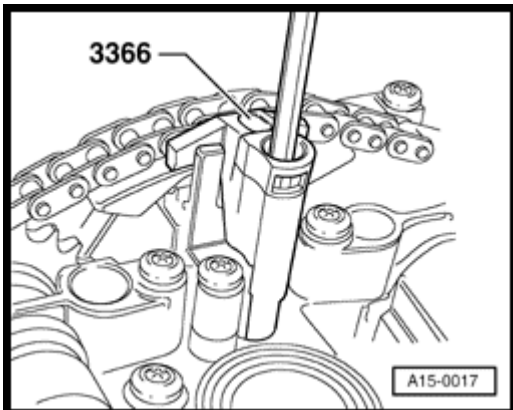


A

- Clean drive chain and camshaft chain sprocket in area of arrows on bearing caps and mark installation position with a colored mark.

Notes:

- ♦ *Do not mark chain with a punched mark, notch or similar.*
- ♦ *The distance between both arrows or the colored marks equals 16 rollers on the drive chain.*



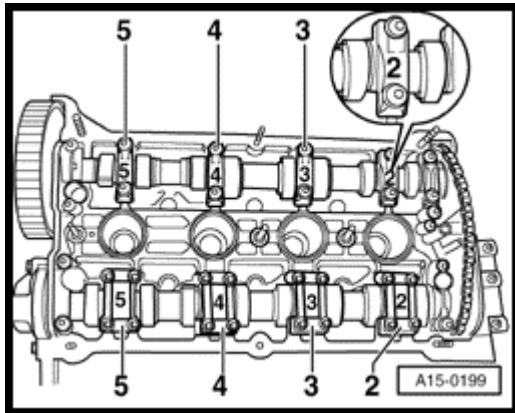
A

- Secure chain tensioner with retainer for chain tensioner 3366.

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Valve gear, servicing (Page 15-45)



A

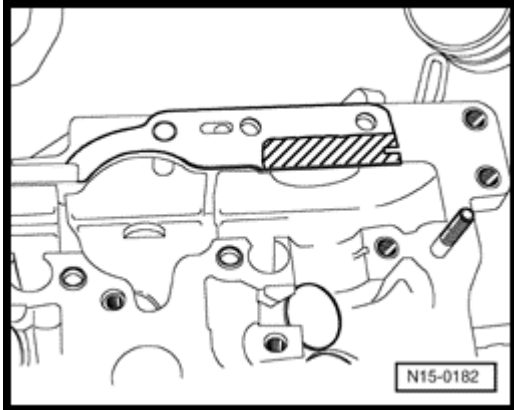
- First remove inlet and exhaust camshafts 3rd and 5th bearing caps.
- Remove double bearing cap.
- Remove both bearing caps at chain sprockets on inlet and exhaust camshafts.
- Remove chain tensioner securing bolts.
- Remove inlet and exhaust camshaft 2nd and 4th bearing caps using alternate and cross - over sequence.
- Remove chain tensioner for inlet and exhaust camshafts and retainer for chain tensioner 3366.

Installing

Notes:

- ◆ *When installing the camshafts the cams for No. 1 Cyl. must point upward.*
- ◆ *When installing the bearing caps, ensure that the cap markings can be read from the inlet side of the cylinder head.*
- ◆ *When re - using an drive chain, place chain on both camshafts according to color markings.*

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-46)

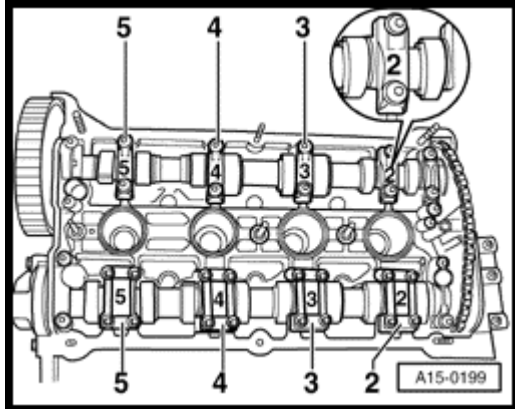


A

- Replace rubber/metal seal for chain tensioner and lightly coat hatched area with sealant "D 454 300 A2."
- Place chain onto camshaft gears as follows:
 - ◆ When using a new timing chain, the distance between notches A and B at the camshaft equals 16 rollers on the drive chain.
 - ◆ Notch A is slightly offset toward inside to chain roller 1.
- Slide chain tensioner between drive chain.
- Oil running surfaces of both camshafts.
- Place camshafts with drive chain and chain tensioner in cylinder head.

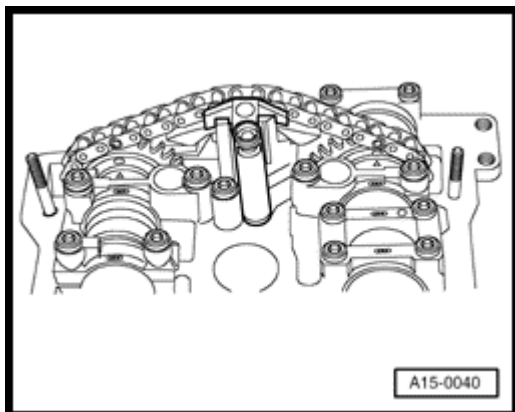
Volkswagen New Beetle 1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical Valve gear, servicing (Page 15-47)

- Tighten chain tensioner to 10 Nm (take note of dowel sleeves).



A

- Tighten inlet and exhaust camshaft 2nd and 4th bearing caps using alternate and cross - over sequence to 10 Nm (take note of dowel sleeves).

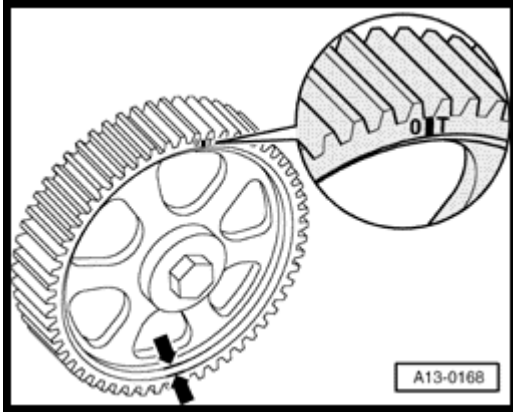


A

- Install both bearing caps at chain sprockets for inlet and exhaust camshafts. Check camshafts are positioned correctly and tighten bearing cap to 10 Nm (remember dowel sleeves).
- Remove retainer for chain tensioner 3366.

Volkswagen New Beetle 1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical Valve gear, servicing (Page 15-48)

- Coat hatched area of double bearing cap lightly with sealant "D 454 300 A2", install and tighten to 10 Nm (remember dowel sleeves).
- Install remaining bearing caps and tighten to 10 Nm (remember dowel sleeves).



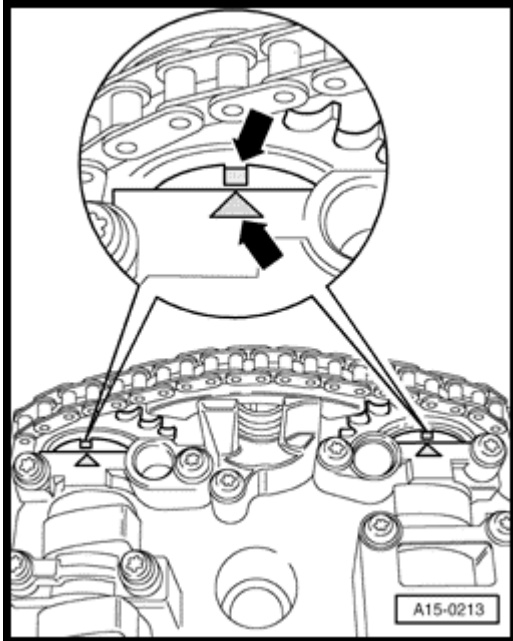
A

- Observe installation position.

The bevelled edge of the camshaft faces outward (arrows) and the TDC Cyl. 1 is visible at front

The rest of the assembly is basically a reverse of the dismantling sequence.

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-49)



- Check position of camshafts to one another.

Installing toothed belt and adjusting timing ⇒ [Page 13-11](#) .

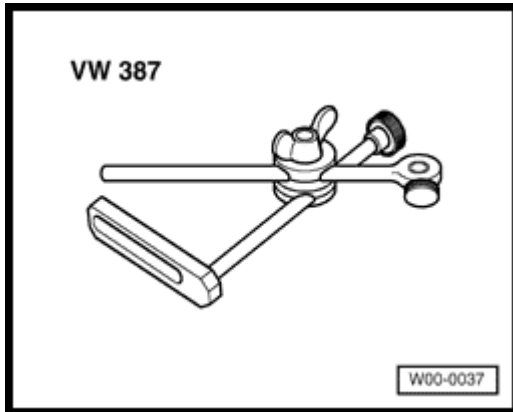
Notes:

After installing new tappets the engine must not be started for approx. 30 minutes. Hydraulic compensation elements must settle (otherwise valves will strike pistons).

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-50)

Valve guides, checking

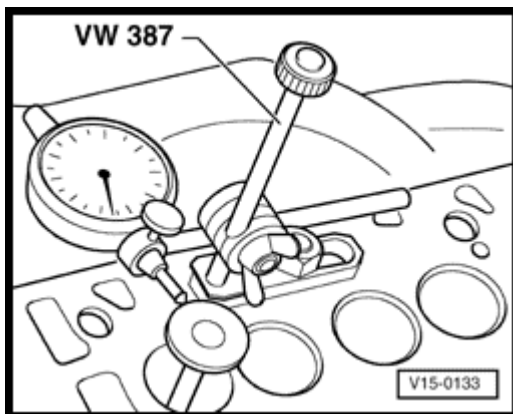
Special tools and equipment



A

- ♦ VW 387 Universal dial gauge bracket
- ♦ Dial gauge

Test sequence

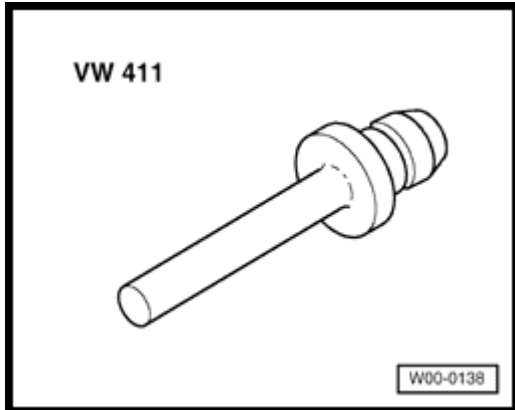


A

- Insert new valve into guide until end of valve stem is flush with end of guide. Due to the slight difference in stem dimensions, ensure that only an intake valve is used in the inlet guide and an exhaust valve in the exhaust guide.
- Determine rock wear limit: 0.8 mm

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-51)

Valve guides, replacing



A

Special tools and equipment

- ◆ Press tool VW 411
- ◆ Drift 3360
- ◆ Support 3361
- ◆ Hand reamer 3363 and cutting fluid

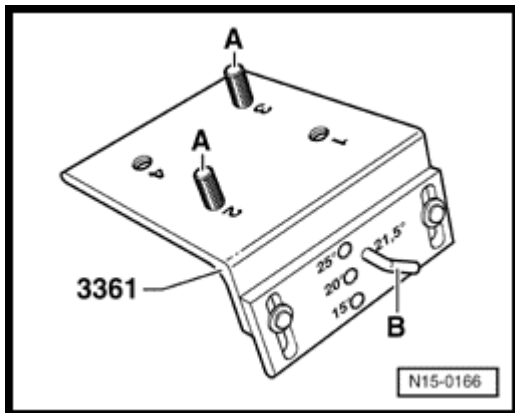
Removing

- First check whether the valve seat insert rings and if necessary the cylinder head sealing surface can be reworked. If this is not the case, then the valve guide should not be replaced.

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

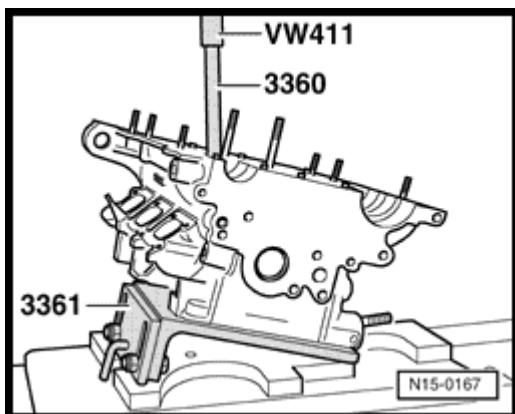
Valve gear, servicing (Page 15-52)



A

First set the support as follows:

- Fit mounting pins for cylinder head bolt holes - A - into threaded hole positions 2 and 3.
- Fit pin - B - into relevant hole for valve angle.
 - ♦ Outer intake valves: 21.5 -5
 - ♦ Center intake valve: 15 -5
 - ♦ Exhaust valve: 20 -5



A

- Press the worn valve guides out with drift 3360 from the camshaft side.

Installing

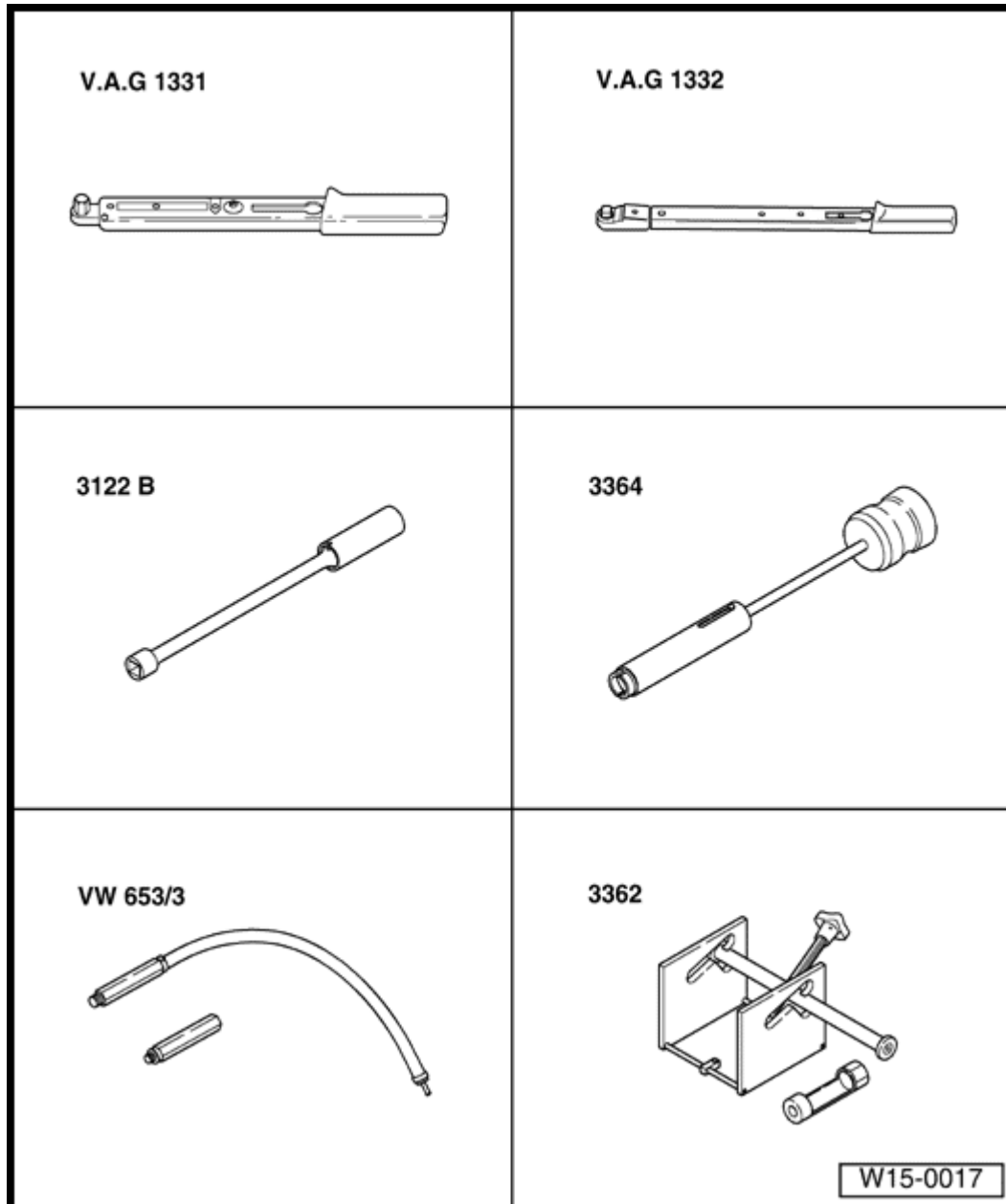
When the shoulder on guide makes contact, the pressure must not exceed 10 kN (approx. 1.0 t) otherwise shoulder may break off.

- Coat the new valve guides with oil and press with drift 3360 into cold cylinder head from the camshaft side until the shoulder makes contact.
- Ream guides out with hand reamer 3363 using plenty of cutting fluid.
- Rework valve seats ⇒ [Page 15-29](#) .

Volkswagen New Beetle
1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical
Valve gear, servicing (Page 15-53)

Valve stem seals, replacing

(with cylinder head installed)



Special tools and equipment

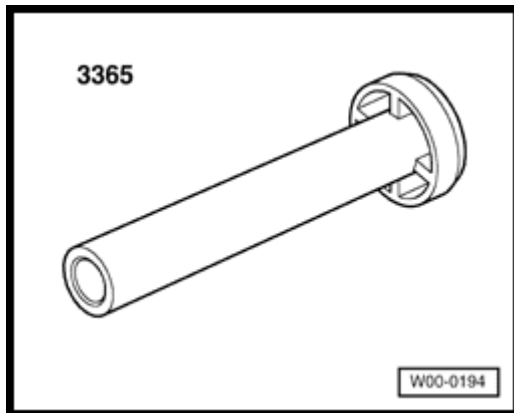
- ◆ V.A.G 1331 Torque wrench (5-50 Nm)
- ◆ V.A.G 1332 Torque wrench (40-200 Nm)
- ◆ 3122B Plug spanner
- ◆ 3364 Puller
- ◆ VW 653/3 Pressure hose
- ◆

3362 Valve spring compressor and press piece 3362/1

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

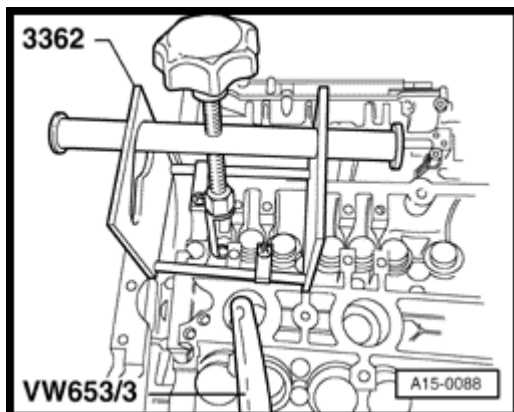
Valve gear, servicing (Page 15-54)



- ◆ 3365 Fitting tool

Removing

- Remove camshafts ⇒ [Page 15-42](#) .
- Remove the hydraulic lifters and place them with the contact surface downward. When doing this ensure that the tappets are not interchanged.
- Remove spark plugs with spark plug spanner 3122B.
- Set piston of appropriate cylinder to "bottom dead center".
- Screw pressure hose VW 653/3 into the spark plug thread.



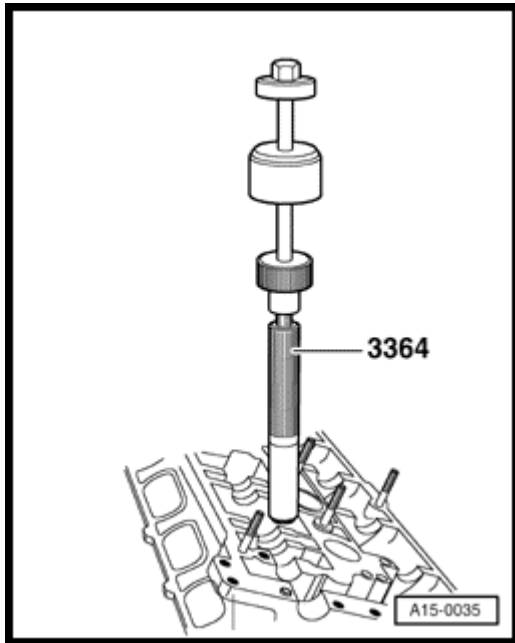
- Mount fitting tool 3362 on cylinder head with fitting tool securing bolts.
- Position fitting tool for compressing valve springs to one of the following positions
outer intake valves: lower position, center intake valve: upper position, exhaust valve: lower position.

Volkswagen New Beetle

1.8 Liter 4-Cyl. 5V Turbo OBD II Engine Mechanical

Valve gear, servicing (Page 15-55)

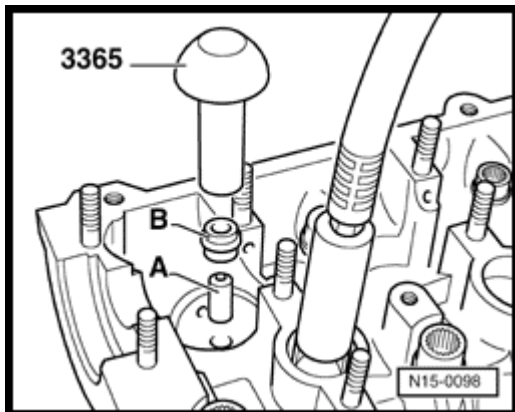
- Connect pressure hose to compressed air system supplying at least 6 bar and remove valve springs.



A

- Pull off valve stem seals with 3364.

Installing



A

- Place the plastic sleeve supplied on the appropriate valve stem. This will prevent the new valve stem seal being damaged.
- Place new valve stem seal in fitting tool 3365.
- Oil valve stem seal sealing lip and press carefully onto the valve guide.