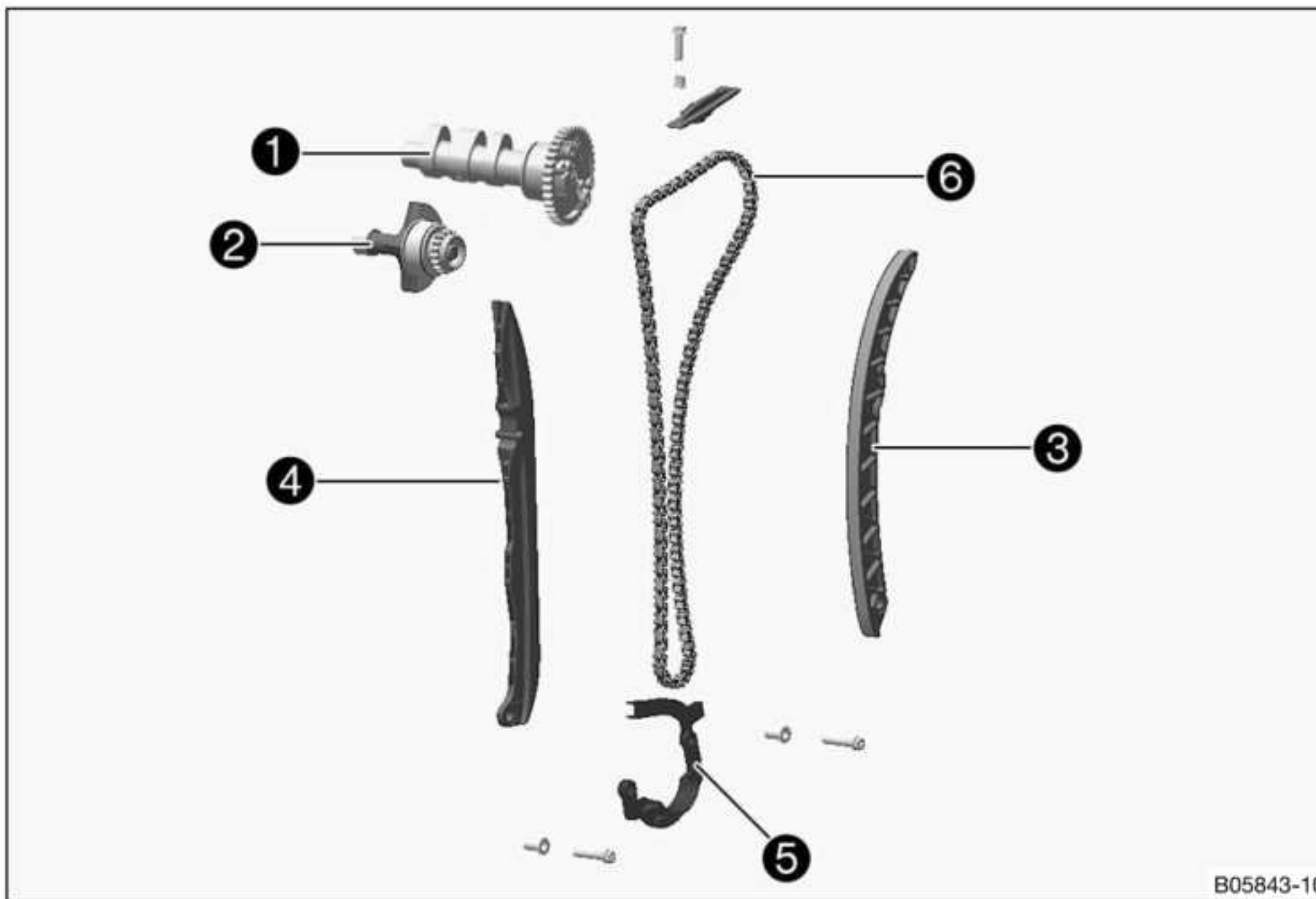


## 18.4.19 Checking the timing assembly

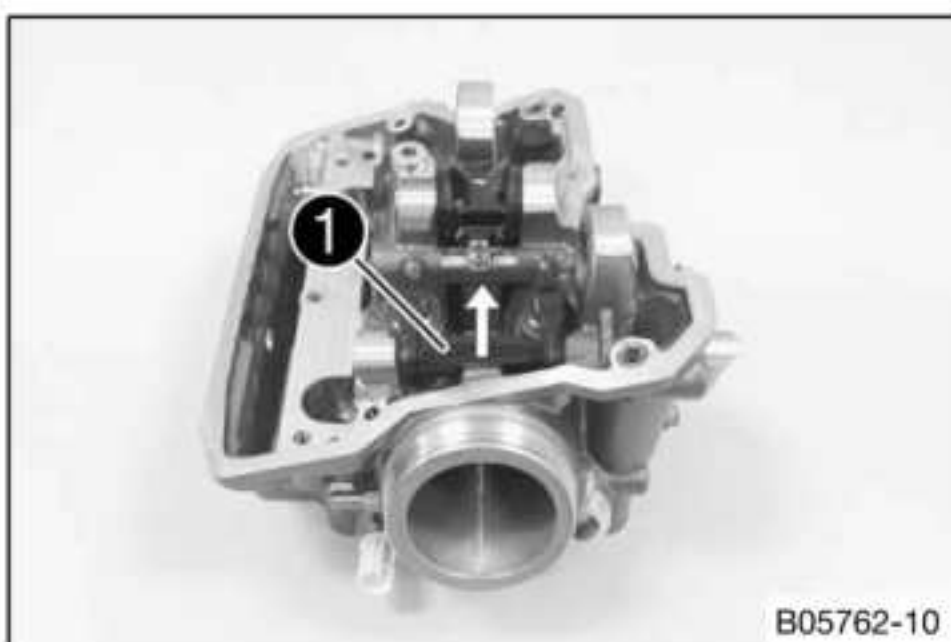


B05843-10

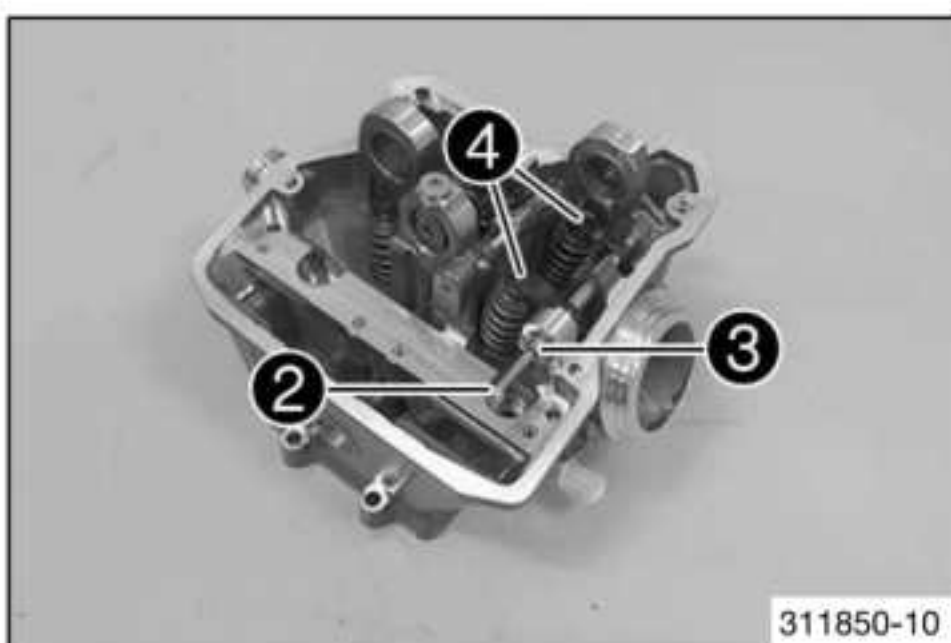
- Clean all parts well.
- Check camshaft **1** for damage and wear.
  - » If there is damage or wear:
    - Change the camshaft.
- Check balancer shaft **2** for damage and wear.
  - » If there is damage or wear:
    - Change the balancer shaft.
- Check timing chain tensioning rail **3** for damage and wear.
  - » If there is damage or wear:
    - Replace the timing chain tensioning rail.
- Check timing chain guide rail **4** for damage and wear.
  - » If there is damage or wear:
    - Replace the timing chain guide rail.
- Check timing chain securing guide **5** for damage and wear.
  - » If there is damage or wear:
    - Replace the timing chain securing guide.
- Check timing chain **6** for damage and wear.
  - » If there is damage or wear:
    - Change the timing chain.
- Check the timing chain links for smooth operation. Let the timing chain hang down freely.
  - » The chain links no longer align in a straight line:
    - Change the timing chain.



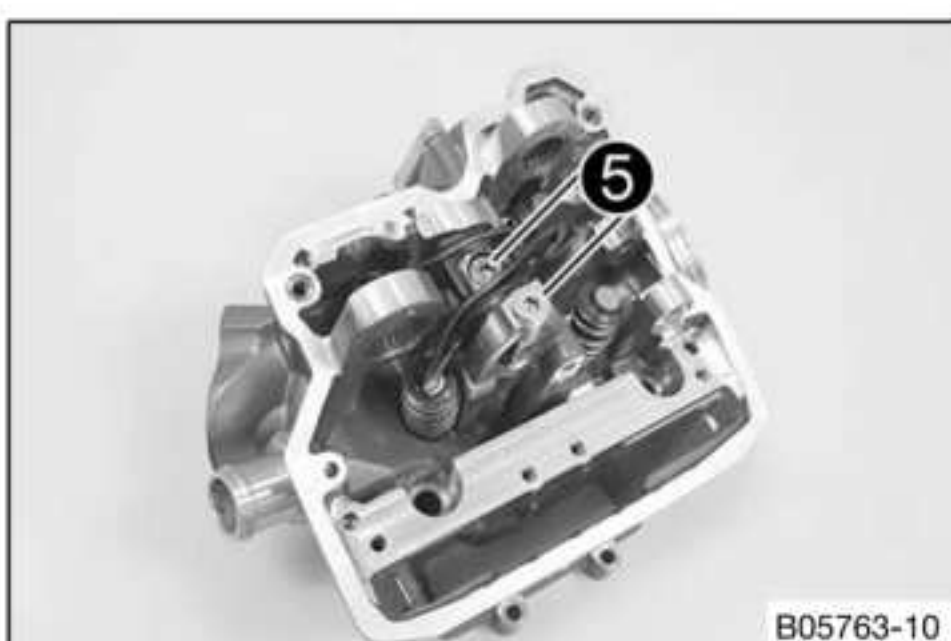
## 18.4.20 Demounting cam lever and rocker arm



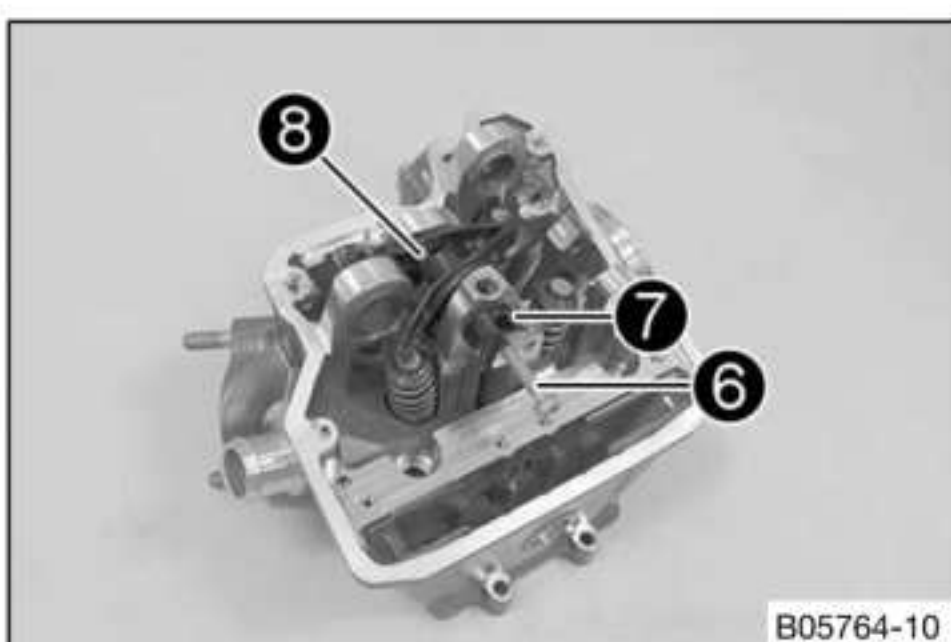
- Push cam lever clip **1** up and remove.



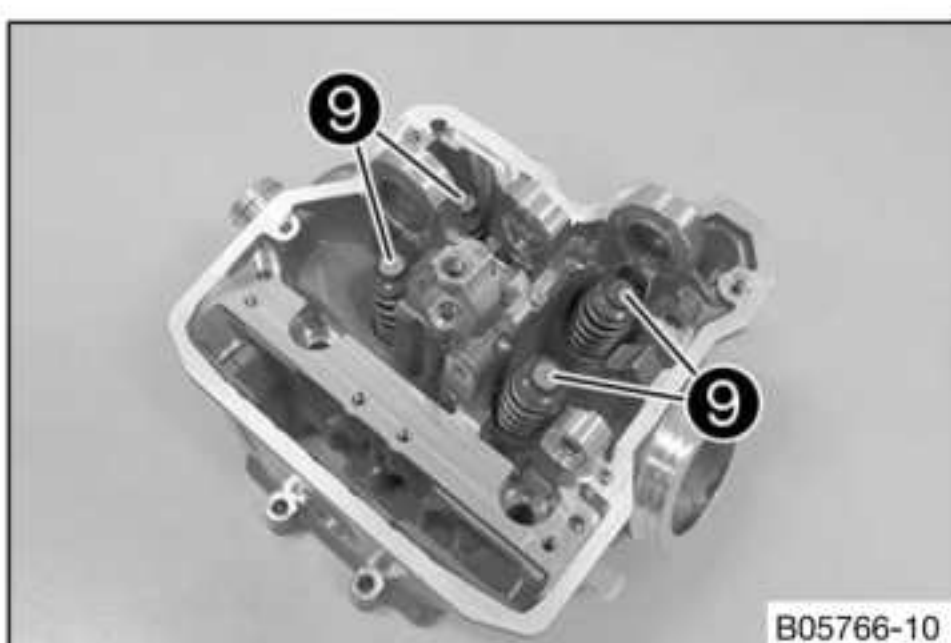
- Screw appropriate M4 screw **2** into cam lever shaft **3**.. Remove cam lever shaft.
- Take off cam lever **4**.



- Remove screws **5**.



- Screw a suitable M6 screw **6** into rocker arm shaft **7**. Remove the rocker arm shaft.
- Take off rocker arm **8**.



- Take shims **9** out of the valve spring retainers and set them down corresponding to their installation position.

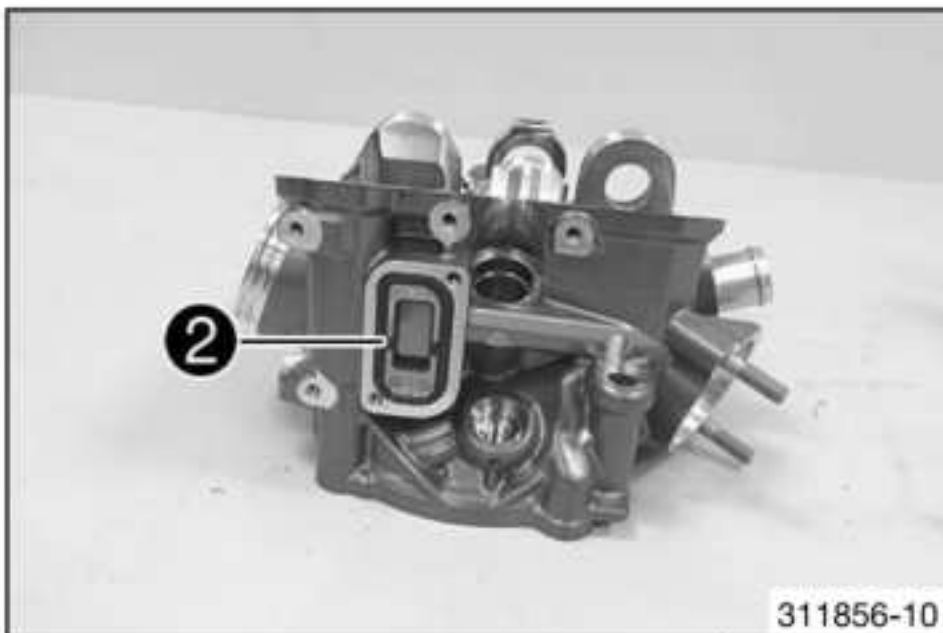
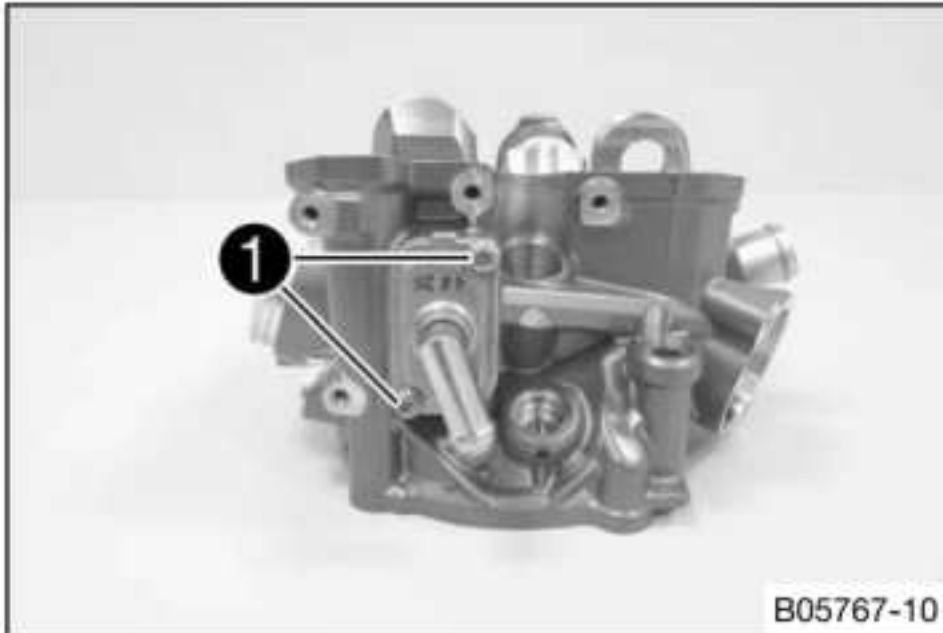
## 18.4.21 Changing camshaft bearing and balancer shaft bearing

### Preparatory work

- Demount cam lever and rocker arm. (📖 p. 220)

### Main work

- Remove screws ❶.
- Remove the cover.

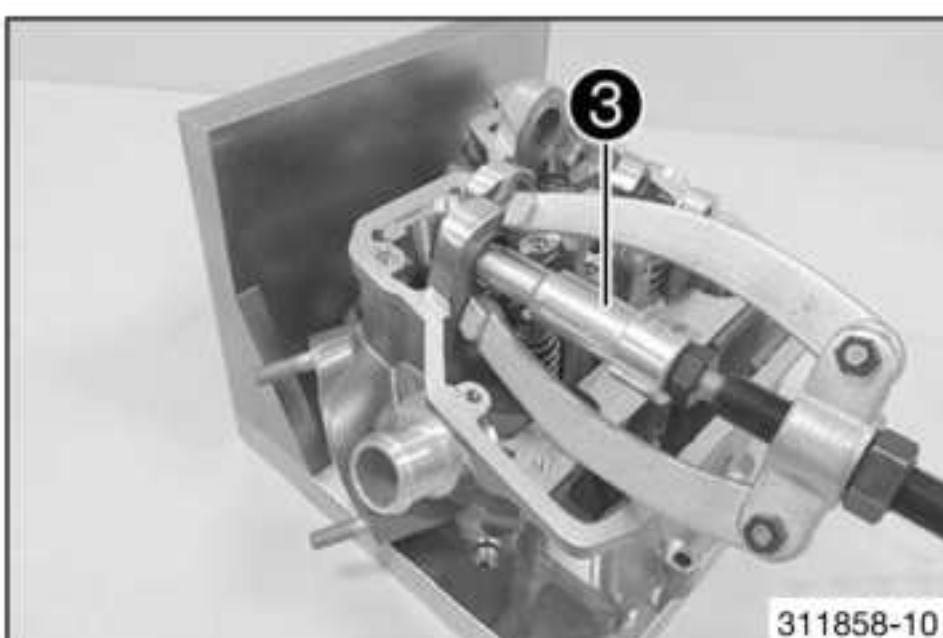


- Remove SAS membrane ❷.



- Mount the cylinder head on the special tool.

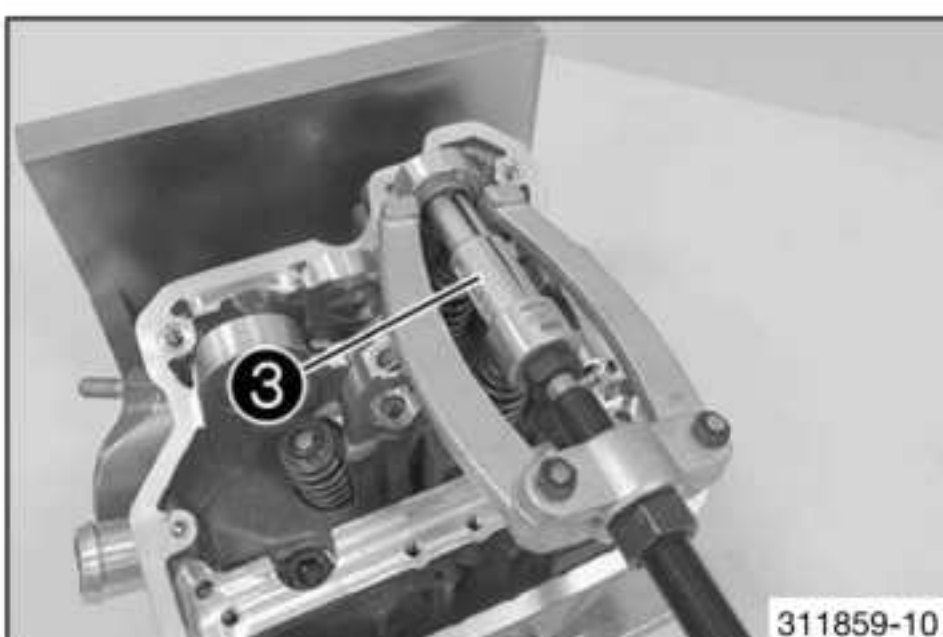
Clamping plate (75029050000) (📖 p. 389)
---



- Remove balancer shaft bearing using special tool ❸.

Internal bearing puller (15112018100) (📖 p. 382)
--

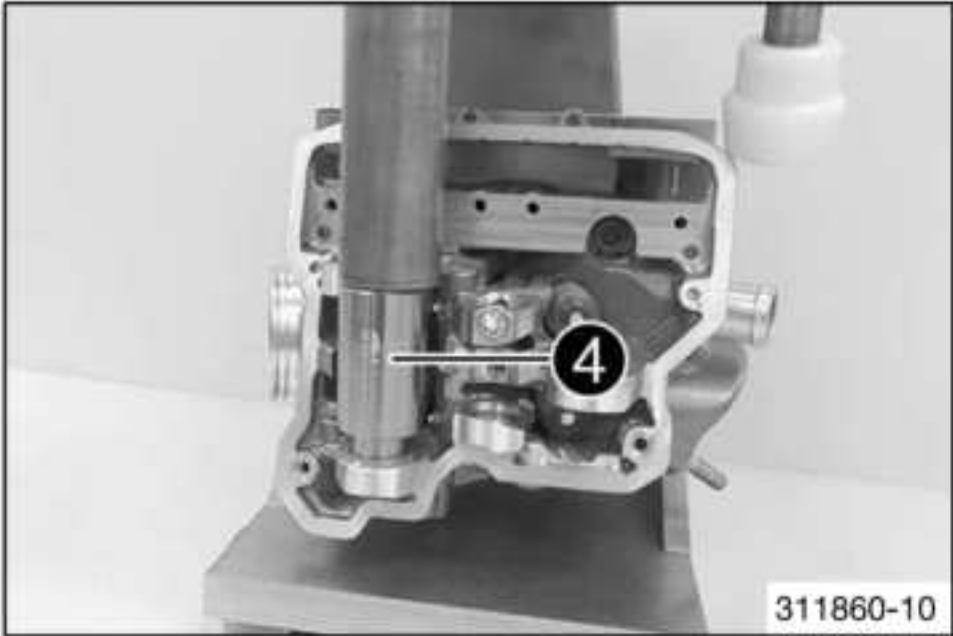
Bearing puller (15112017000) (📖 p. 381)
---



- Remove camshaft bearing using special tool ❸.

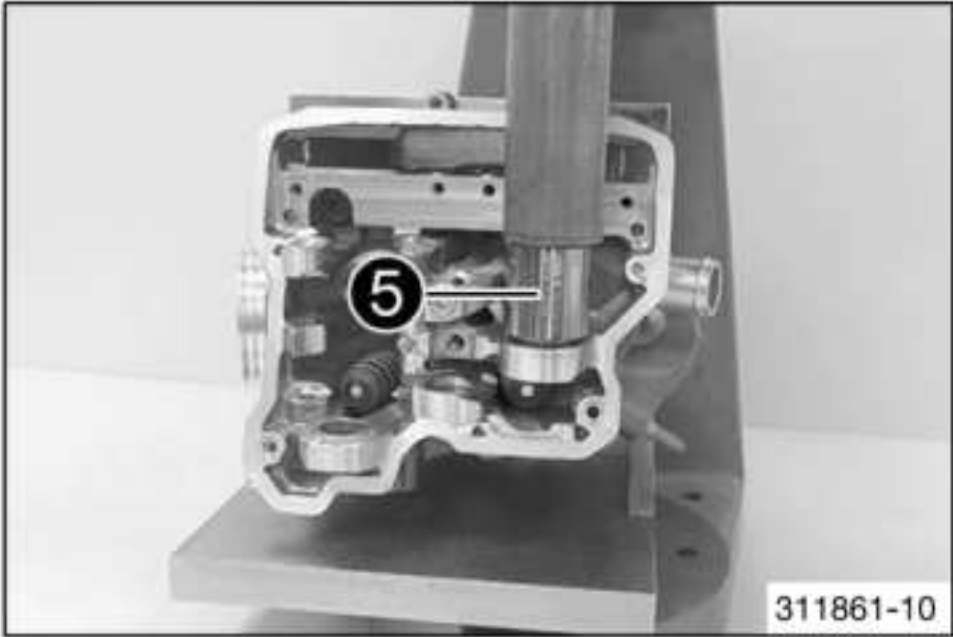
Internal bearing puller (15112018100) (📖 p. 382)
--

Bearing puller (15112017000) (📖 p. 381)
---



- Press the camshaft bearing in all the way using special tool 4.

Pressing tool (76629044030) ( p. 392)



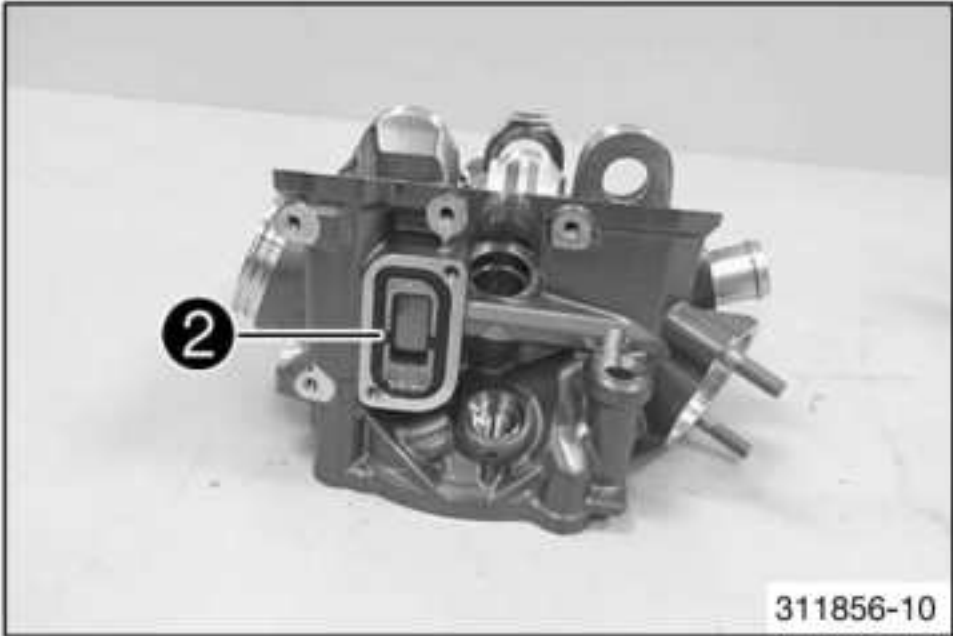
- Press the balancer shaft bearing in all the way using special tool 5.

Pressing tool (76629044020) ( p. 391)

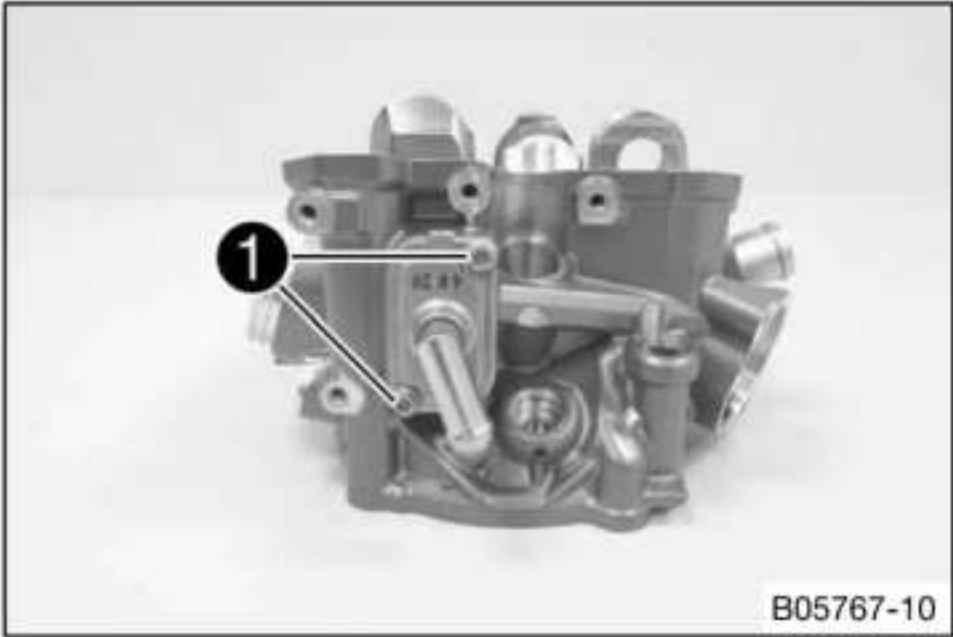


- Take off the cylinder head from the special tool.

Clamping plate (75029050000) ( p. 389)



- Mount SAS membrane 2.

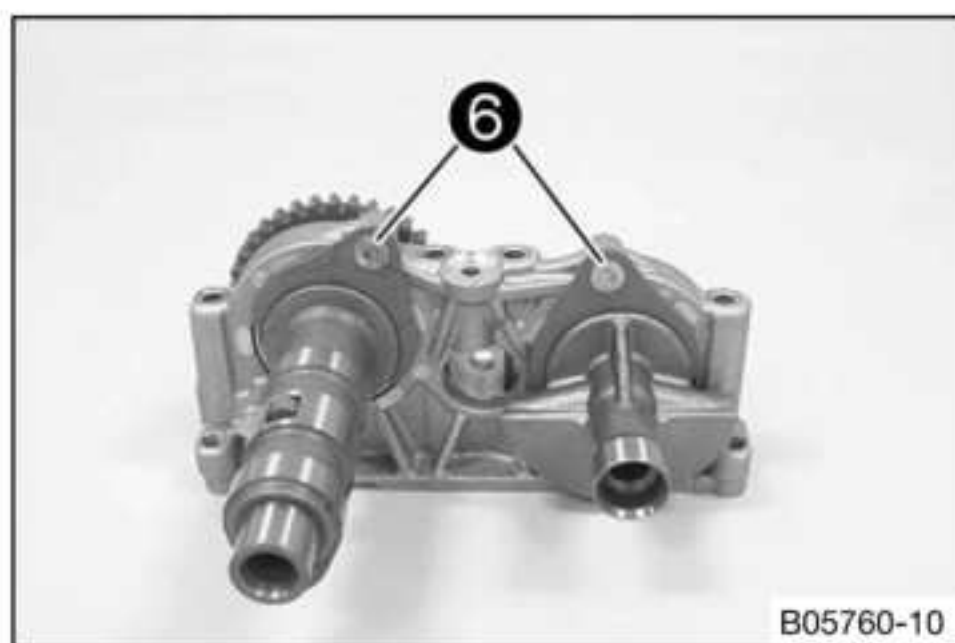


- Position the cover.
- Mount and tighten screws 1.

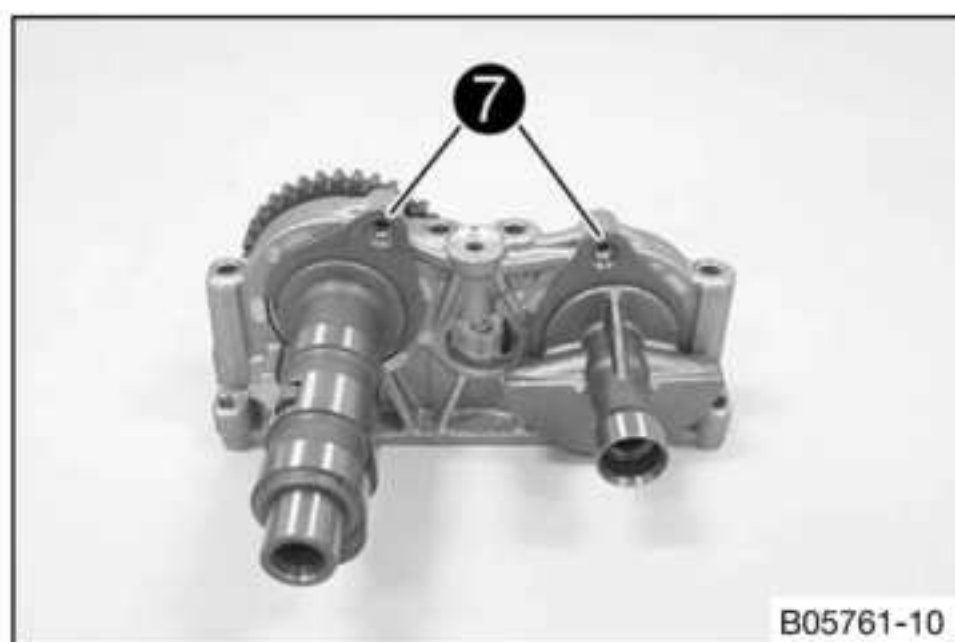
Guideline

Screws, secondary air system cover	M6x12	10 Nm (7.4 lbf ft) <b>Loctite® 243™</b>
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- Remove screws ⑥.



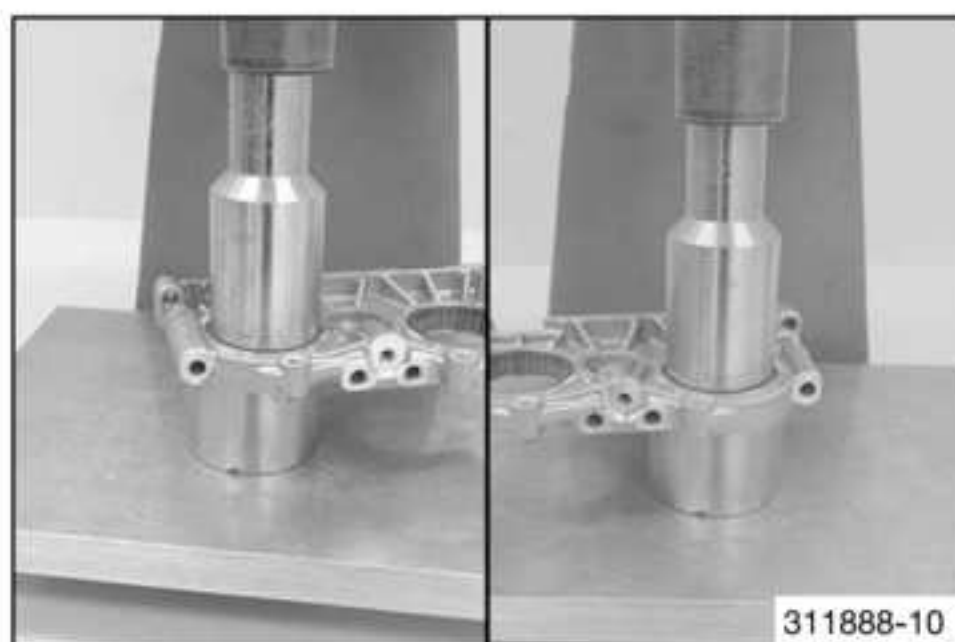
- Take off retaining bracket ⑦.



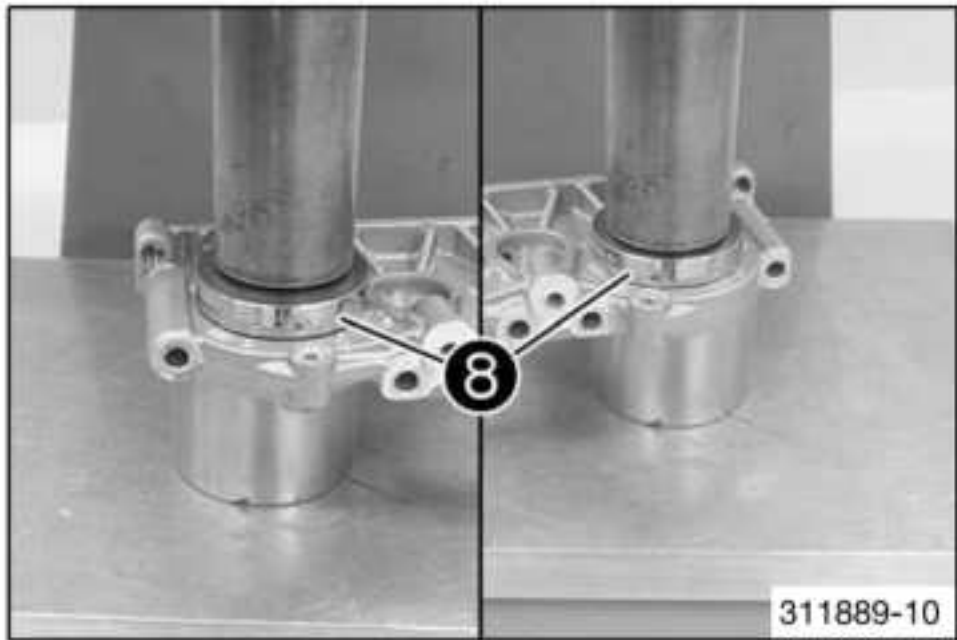
- Remove the camshaft.



- Remove balancer shaft.



- Press out camshaft bearing and balancer shaft bearing from the inside to the outside using the special tool.

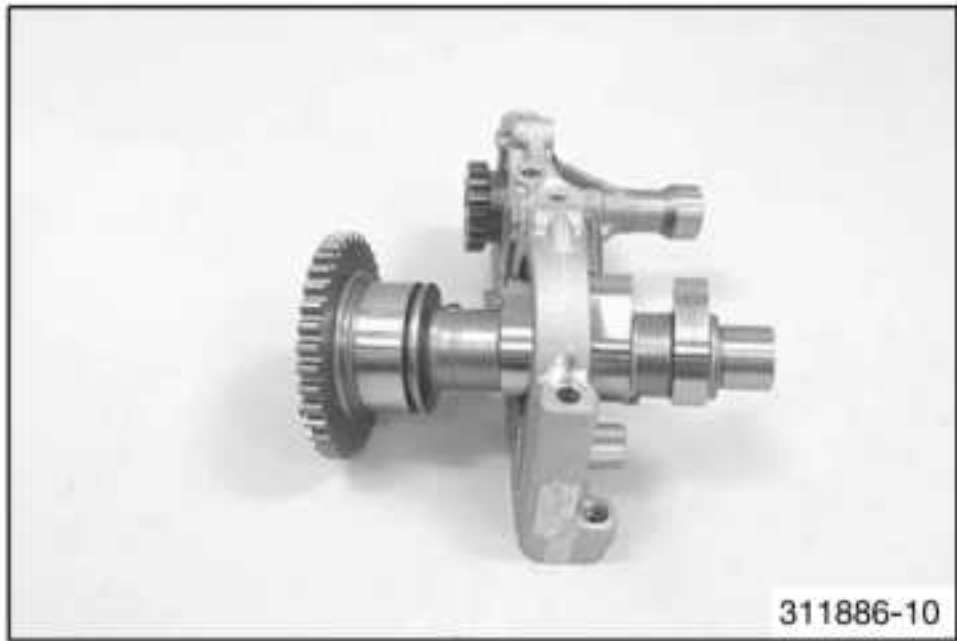


- Press in camshaft bearing and the balancer shaft bearing all the way from the inside to the outside using special tool 8.

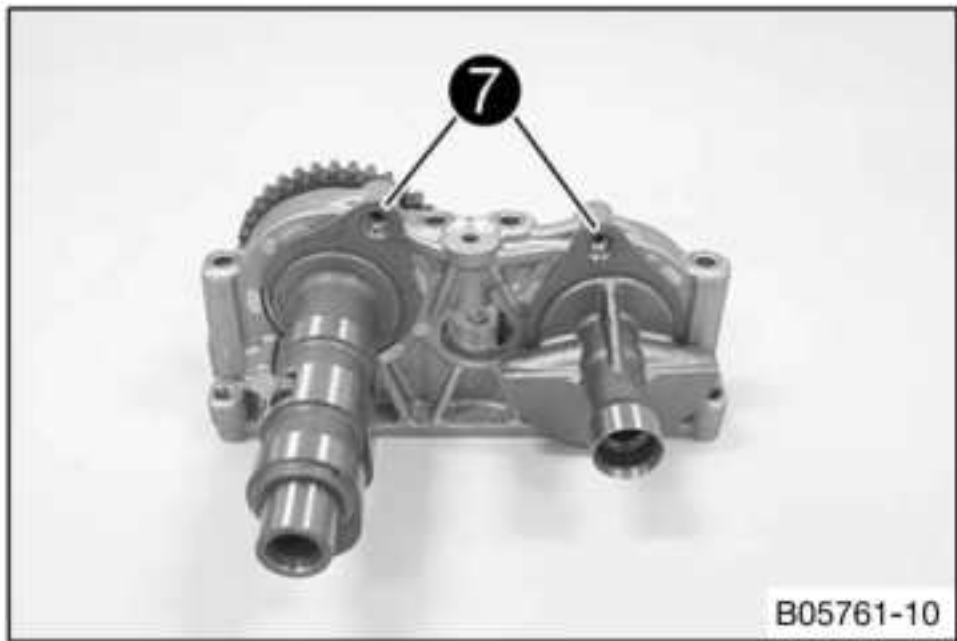
Pressing tool (76629044011) (📖 p. 391)



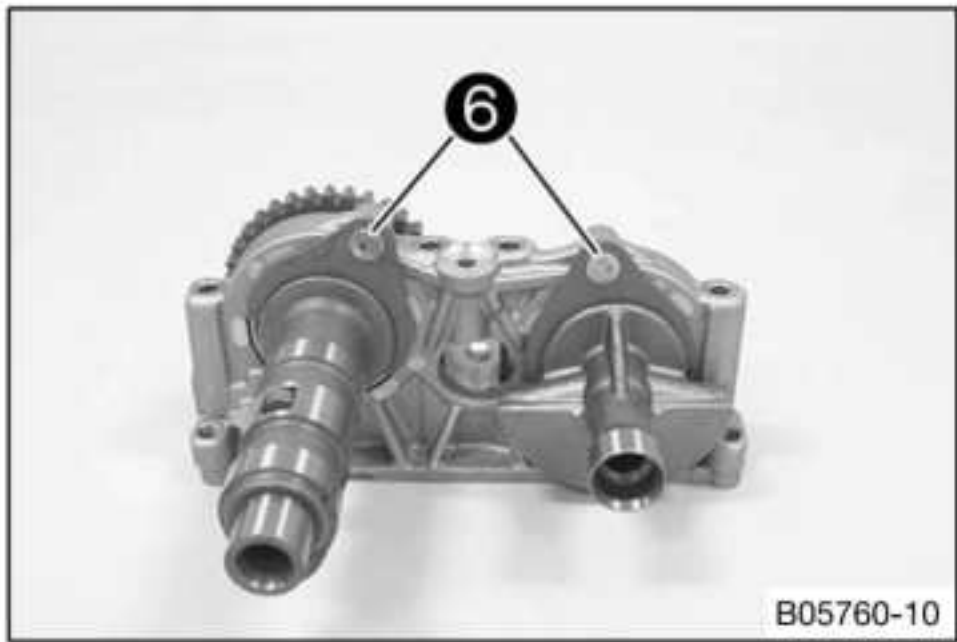
- Mount balancer shaft.



- Mount camshaft.



- Position retaining bracket 7.



- Mount and tighten screws 6.

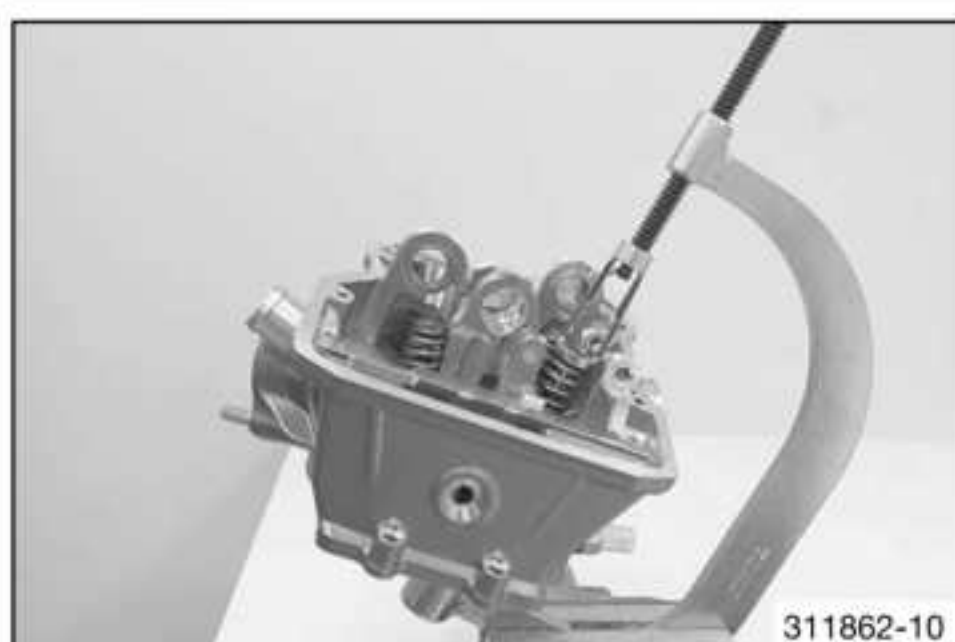
Guideline

Screw, retaining bracket	M5	8 Nm (5.9 lbf ft) <b>Loctite®243™</b>
--------------------------	----	--

Finishing work

- Install cam lever and rocker arm. (📖 p. 228)

## 18.4.22 Removing the valves

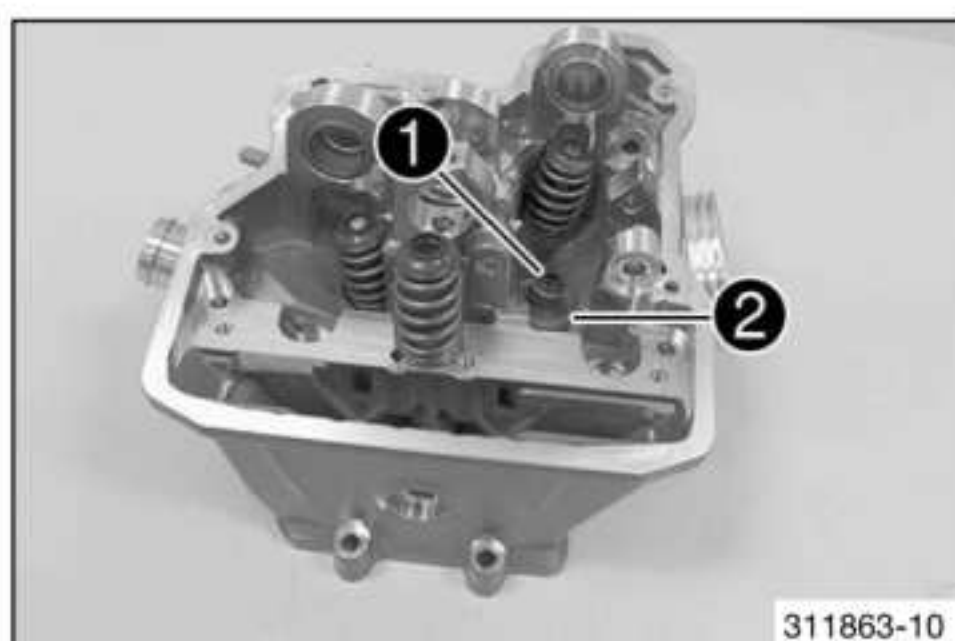


- Pre-tension the valve springs using the special tool.

Valve spring mounter (59029019000) (p. 384)

Insert for valve spring lever (79029060000) (p. 393)

- Remove the valve keys and release the tension on the valve springs.

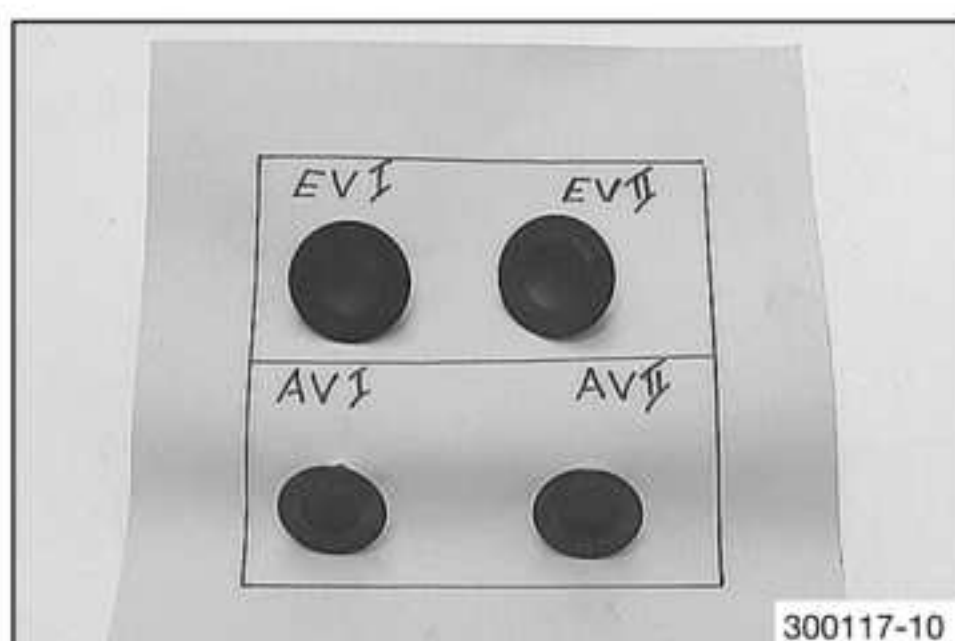


- Remove the valve spring retainer and valve springs.
- Mark the valve springs according to their normal built-in position.
- Pull the valve down out of the valve guide.

- Remove valve stem seal 1 with the special tool.

Valve stem seals plier (77229010000) (p. 392)

- Remove valve spring seat 2.



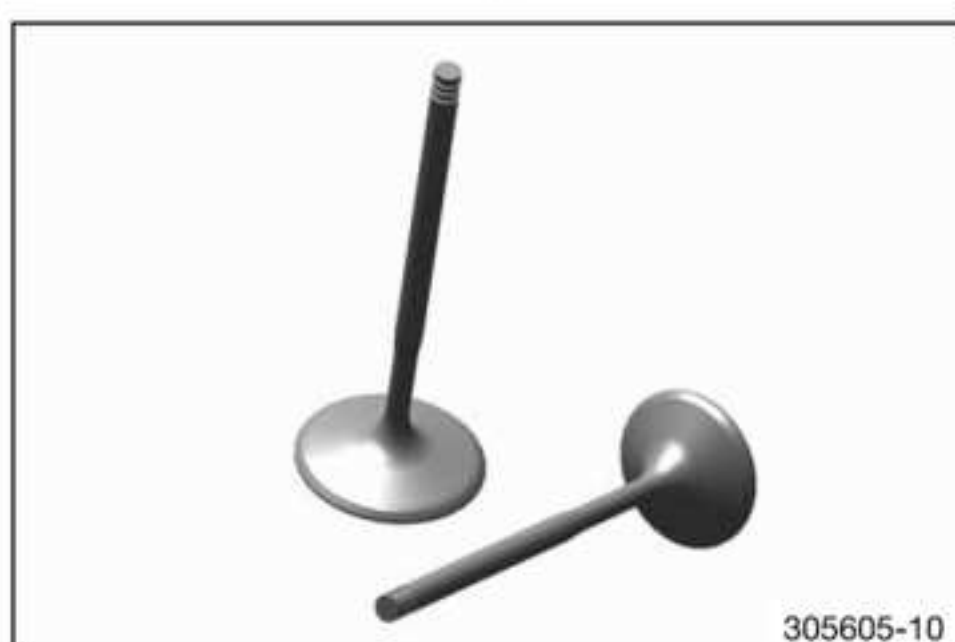
- Mark the valves corresponding to their installation position.



### Info

Place the valves in a carton corresponding to their installation position and label them.

## 18.4.23 Checking the valves

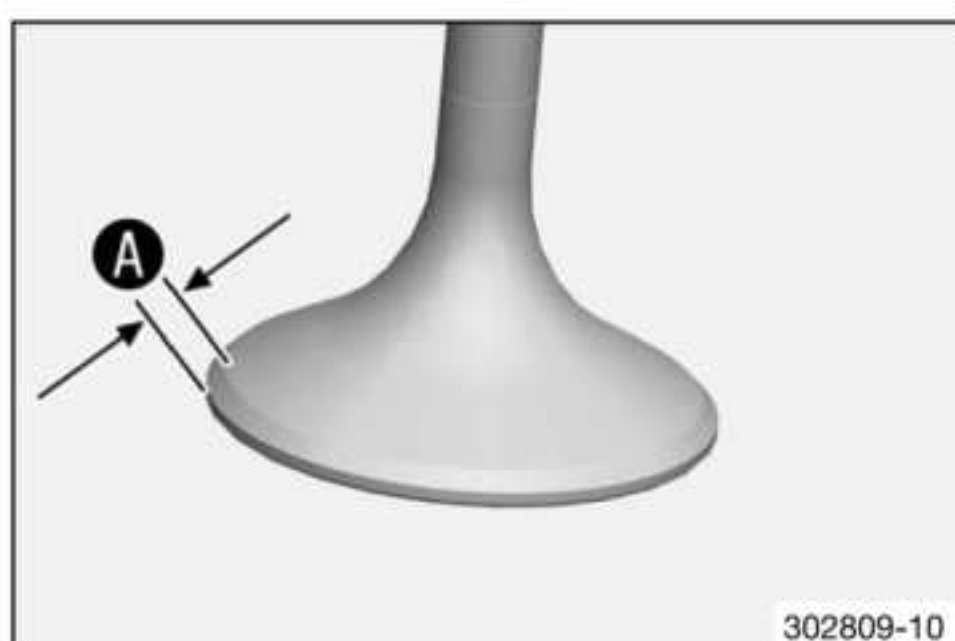


- Check the run-out at the valve plate.

Valve - run-out

On the valve plate	$\leq 0.05 \text{ mm } (\leq 0.002 \text{ in})$
--------------------	---

- » If the measured value does not equal the specified value:
  - Change the valve.



- Check sealing seat A on the valve.

Valve - sealing seat width

Intake	1.60 mm (0.063 in)
--------	--------------------

Valve - sealing seat width

Exhaust	2.00 mm (0.0787 in)
---------	---------------------

- » If the sealing area is not in the center of the valve seat or deviates from the specified value:
  - Machine the valve seat.



18.4.24 Checking valve springs

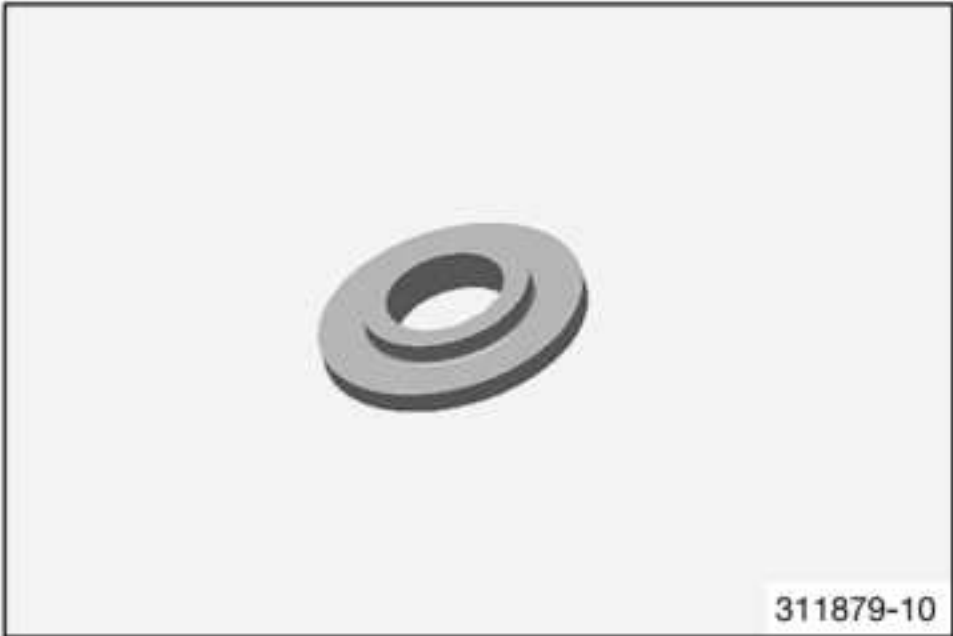


- Check the valve springs for fractures and wear (visual check).
  - » If the valve spring is fractured or worn:
    - Change the valve spring.
- Measure the valve spring lengths.

Valve spring	
Minimum length (without valve spring seat)	40.5 mm (1.594 in)

- » If the measured value does not equal the specified value:
  - Change the valve spring.

18.4.25 Checking valve spring retainer

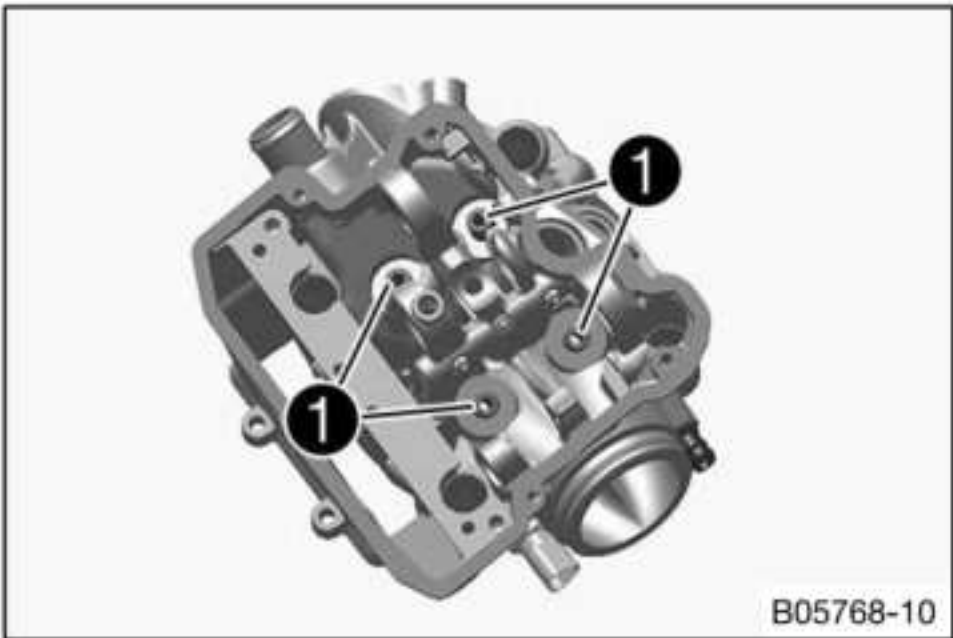


- Check the valve spring retainer for fractures and wear (visual check).
  - » If the valve spring retainer is fractured or worn:
    - Change the valve spring retainer.
- Measure the thickness of the valve spring retainer.

Valve spring cap - thickness	2.4 ... 2.5 mm (0.094 ... 0.098 in)
------------------------------	-------------------------------------

- » If the measured value does not equal the specified value:
  - Change the valve spring retainer.

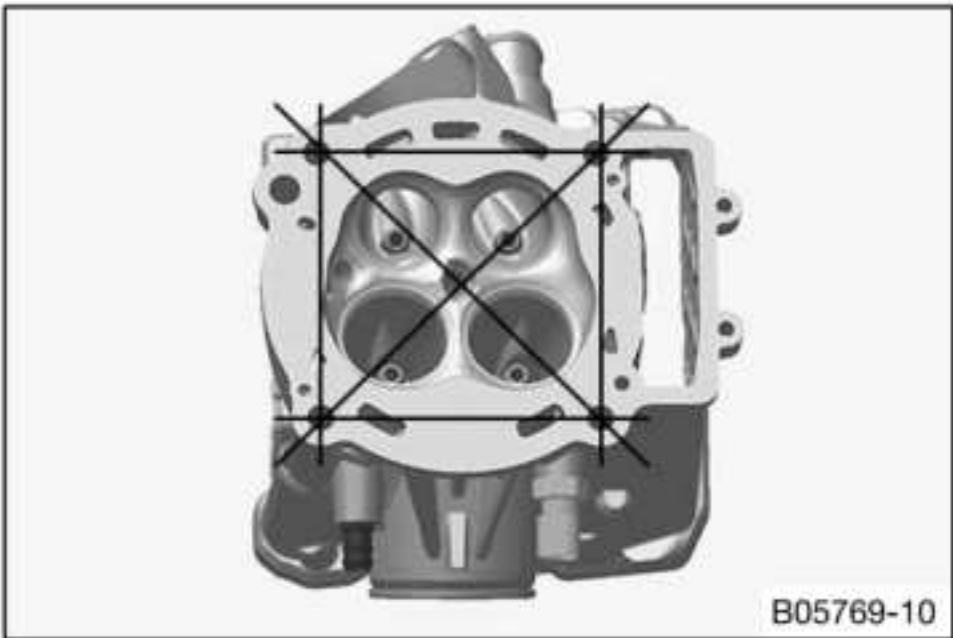
18.4.26 Checking the cylinder head



- Check valve guides **1** with the special tool.

Limit plug gauge (59029026006) (p. 384)
---

- » If the special tool is easy to insert into the valve guide:
  - Change the valve guide and valve.
- Check the sealing area of the spark plug thread and the valve seats for damage and cracking.
  - » If there is damage or cracking:
    - Change the cylinder head.



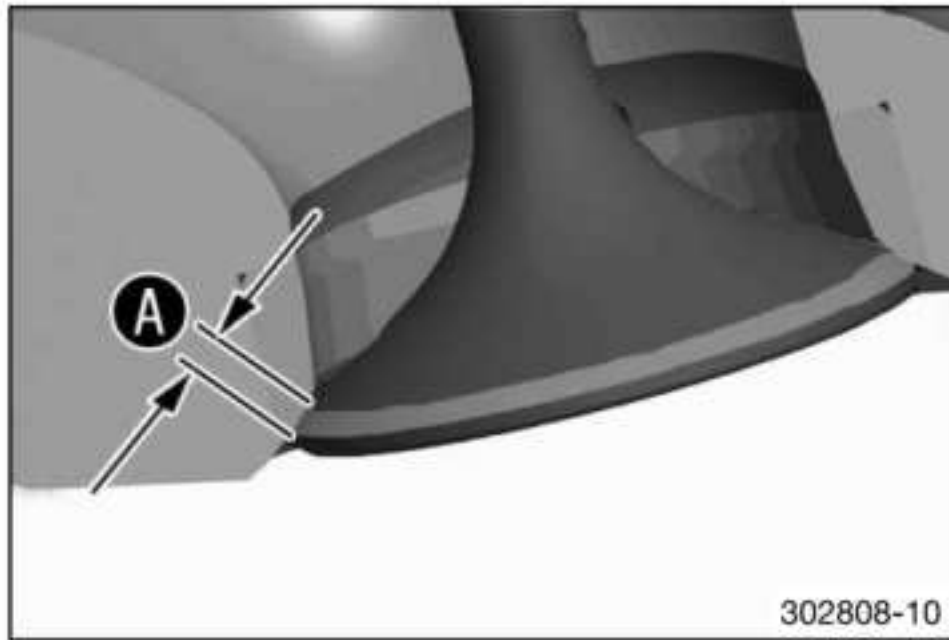
- Check the sealing area of the cylinder for distortion using a straight edge and the special tool.

Feeler gauge (59029041100) (p. 384)
-------------------------------------

Cylinder/cylinder head - sealing area distortion	≤ 0.10 mm (≤ 0.0039 in)
--	-------------------------

- » If the measured value does not equal the specified value:
  - Change the cylinder head.





- Check sealing seat **A** of the valves.

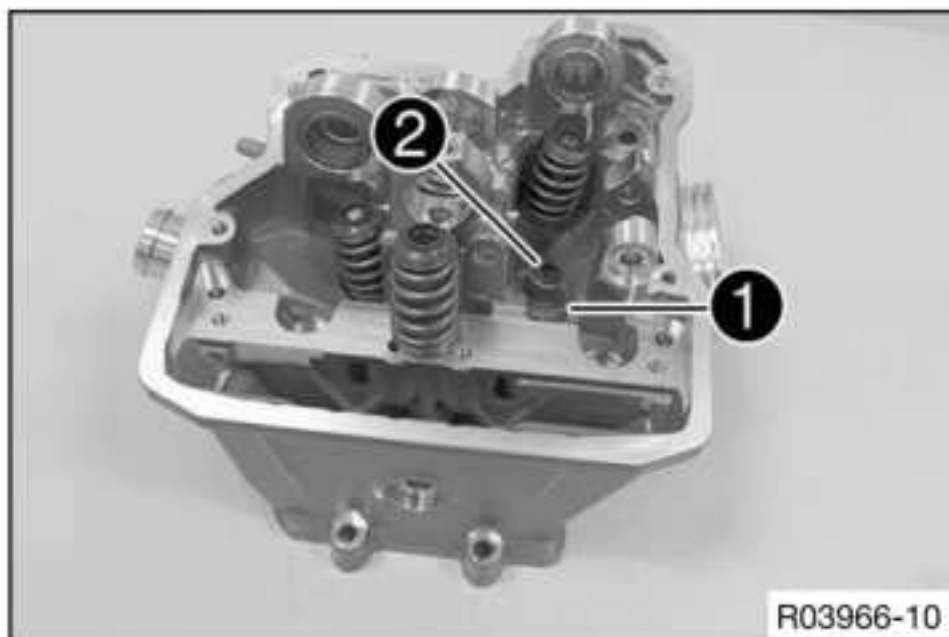
Valve - sealing seat width	
Intake	1.60 mm (0.063 in)

Valve - sealing seat width	
Exhaust	2.00 mm (0.0787 in)

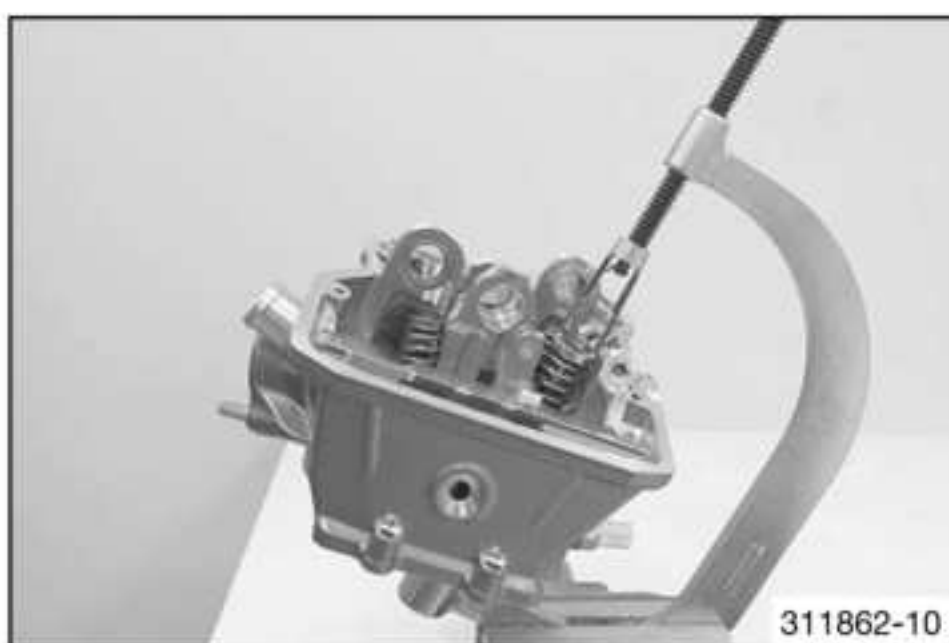
- » If the measured value does not equal the specified value:
  - Machine the valve seat.
- Blow compressed air through all oil channels and check that they are clear.



## 18.4.27 Installing the valves

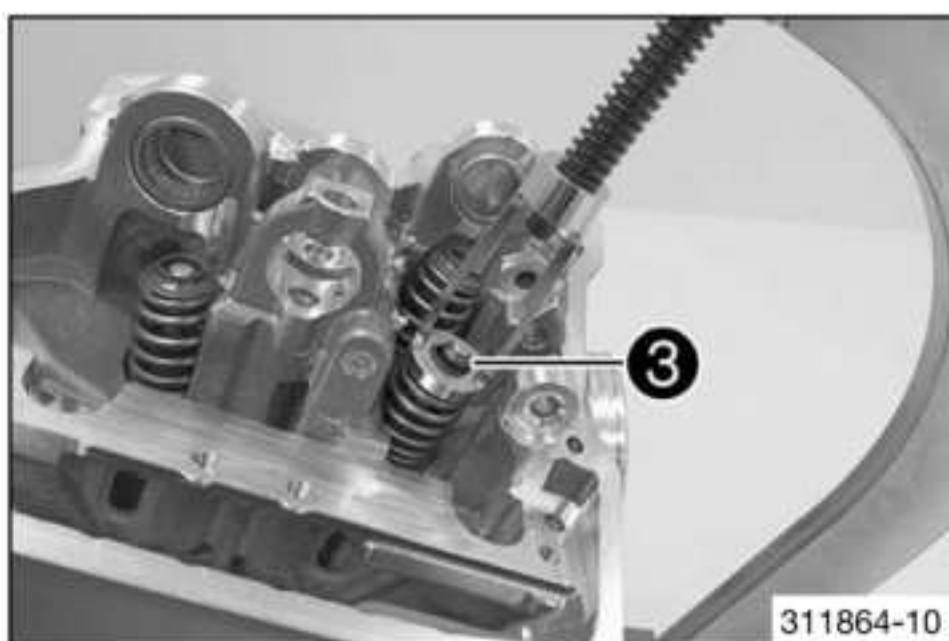


- Position valve spring seat **1**.
- Mount valve stem seal **2**.
- Mount the valve corresponding to its installation position.
- Mount the valve spring retainers.



- Tension the valve spring with a special tool.

Valve spring mounter (59029019000) (📖 p. 384)
Insert for valve spring lever (79029060000) (📖 p. 393)

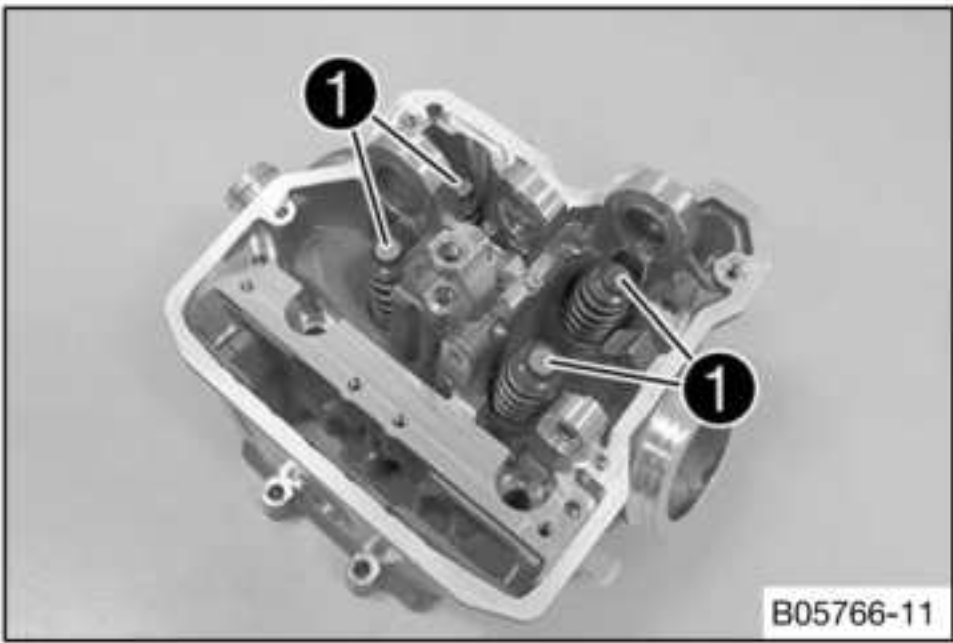


- Mount valve keys **3**.

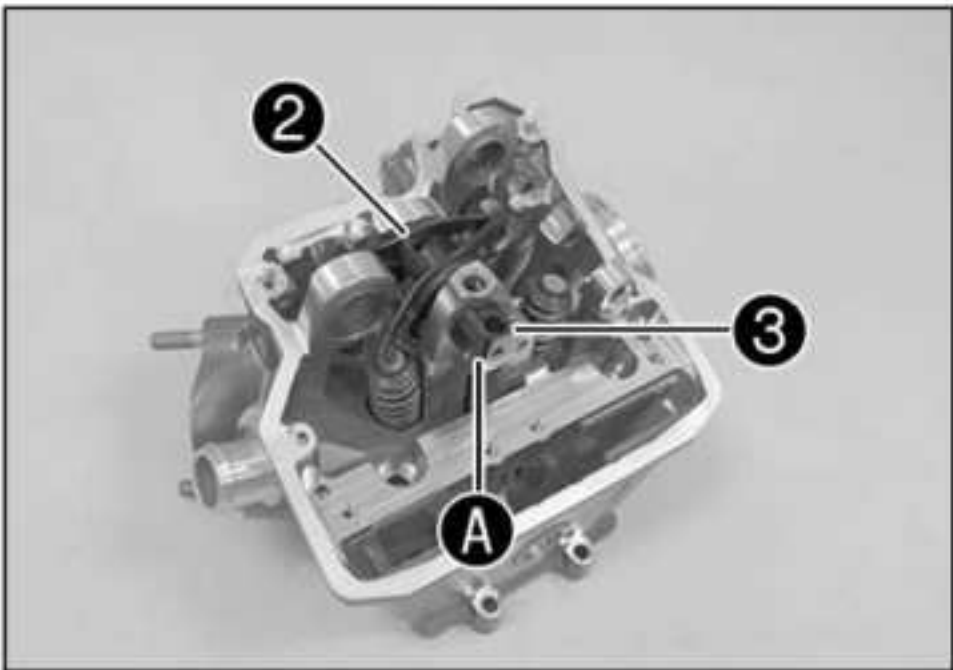
**i Info**  
When mounting the valve keys, check that they are seated correctly; preferably, fix the valve keys to the valve with a little grease.



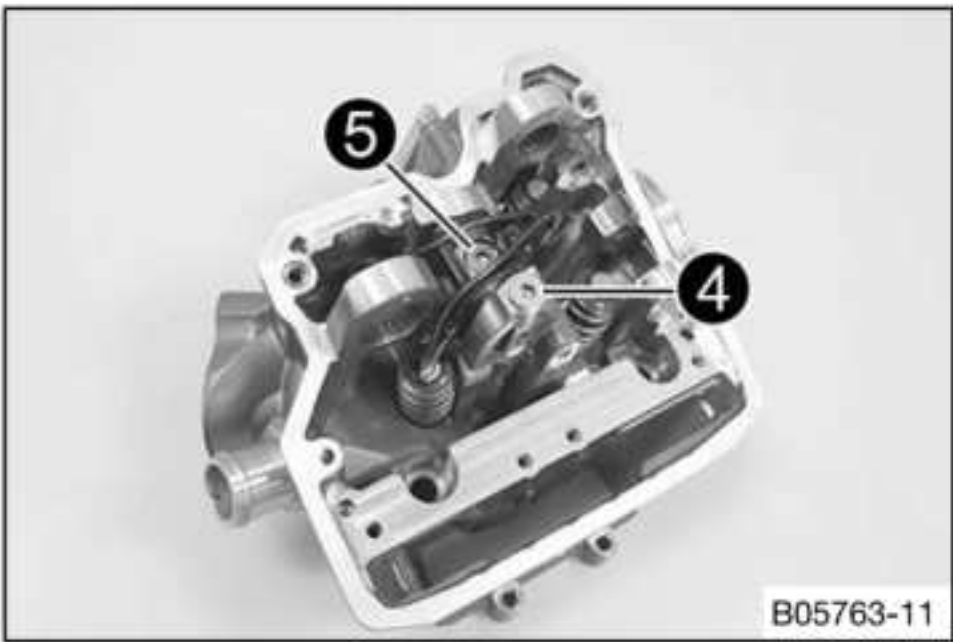
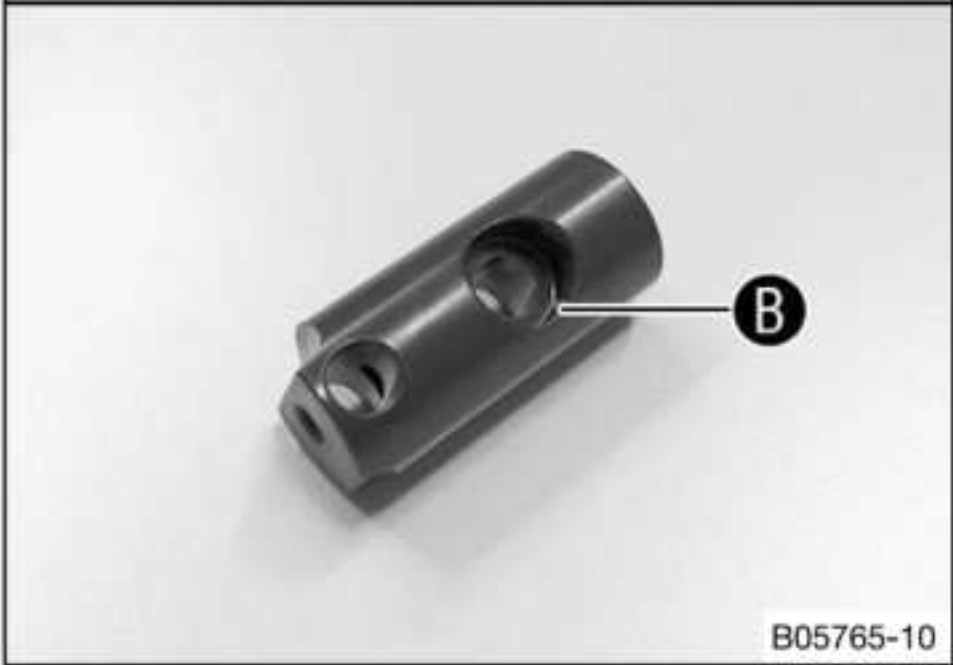
18.4.28 Installing cam lever and rocker arm



- Place shims 1 into the valve spring retainers according to their normal built-in position.



- Position rocker arm 2 and mount rocker arm shaft 3.
  - ✓ Large recess A must face the exhaust side.
  - ✓ Dip B in the rocker arm shaft faces upward.



- Mount and tighten screw 4.

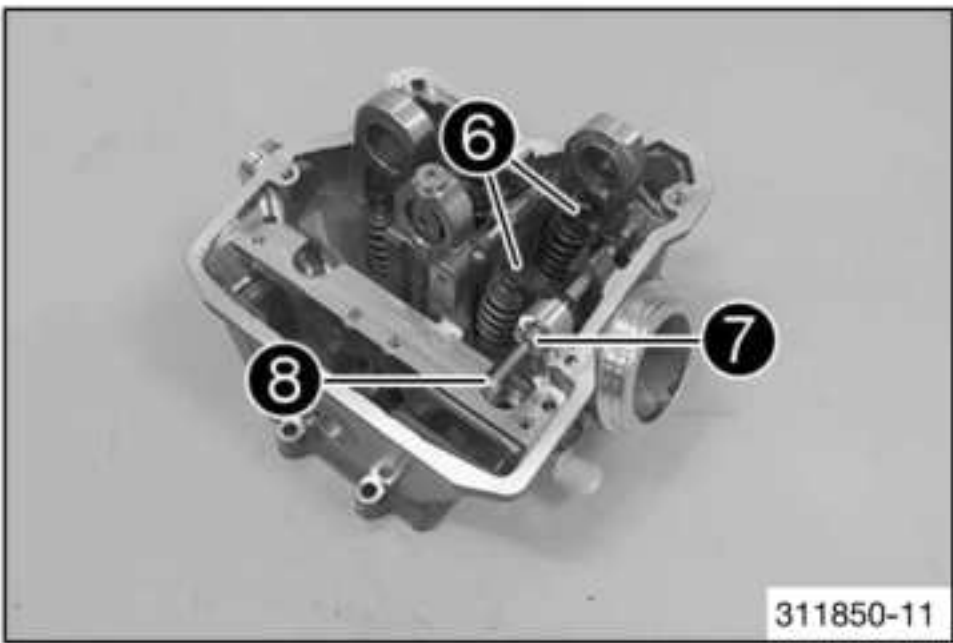
Guideline

Screw, rocker arm shaft	M8x55	15 Nm (11.1 lbf ft)
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- Mount and tighten screw 5.

Guideline

Screw, rocker arm shaft	M8x40	15 Nm (11.1 lbf ft)
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- Position cam lever 6 and mount cam lever shaft 7.
- Remove screw 8.