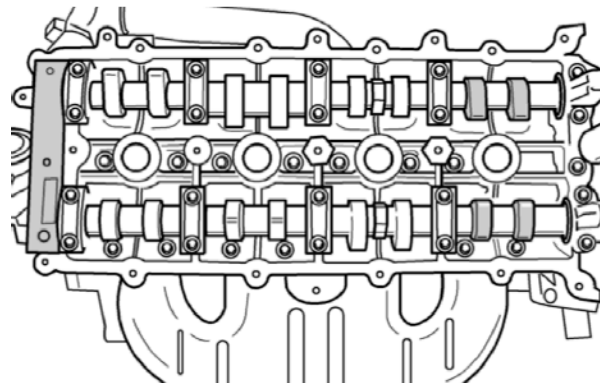
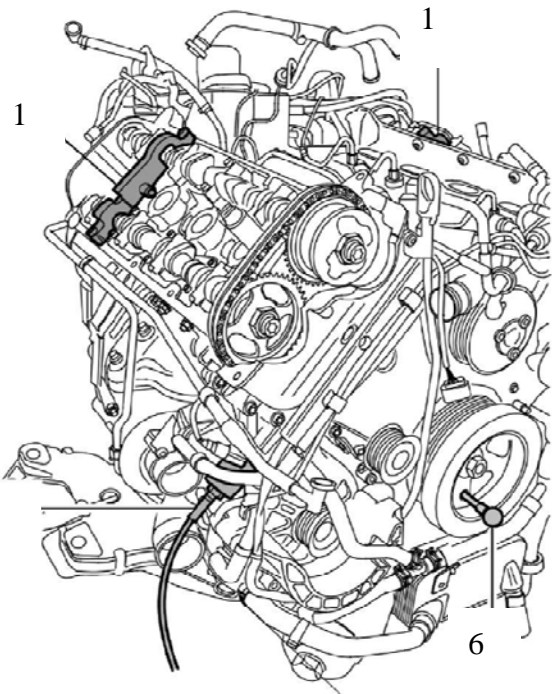
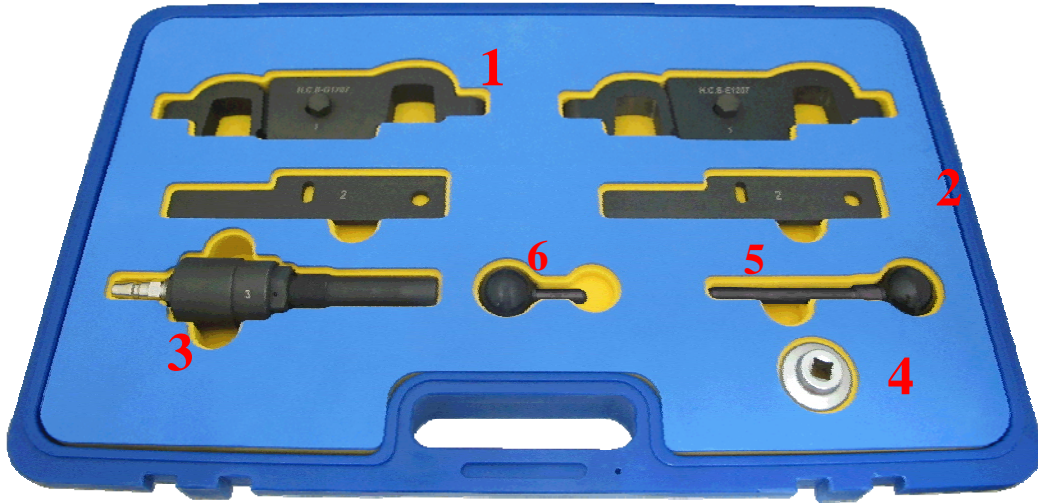




# H.C.B-G1207

## PORSCHE CAYENNE CAMSHAFT ALIGNMENT TOOL KIT



- This tool is designed to adjust the timings for the camshafts
- Used to R & R crankshaft pulley bolt

2009 Porsche cayenne Turbo(9PA)V8-4.8L Turbo

Camshaft: Adjustments

Setting camshaft timing on 4.8-liter DFI engine

Technical values

Location	Description Type	Basic Value	Value
Camshaft controller to intake camshaft	M12,1 <sup>st</sup> stage(counter screw torque at hexagon sleeve)	Tightening torque	10Nm(7.5ftlb)
Camshaft controller to intake camshaft	2 <sup>nd</sup> stage(counter screw torque at hexagon sleeve)	Tightening torque	50Nm(37 ftlb)
Camshaft controller to intake camshaft	3 <sup>rd</sup> stage(counter screw torque at hexagon sleeve)	Tightening angle	135°
Camshaft controller to intake camshaft	M12,1 <sup>st</sup> stage(counter screw torque at hexagon sleeve)	Tightening torque	10Nm(7.5ftlb)
Camshaft controller to intake camshaft	2 <sup>nd</sup> stage(counter screw torque at hexagon sleeve)	Tightening torque	50Nm(37 ftlb)
Camshaft controller to intake camshaft	3 <sup>rd</sup> stage(counter screw torque at hexagon sleeve)	Tightening angle	90°

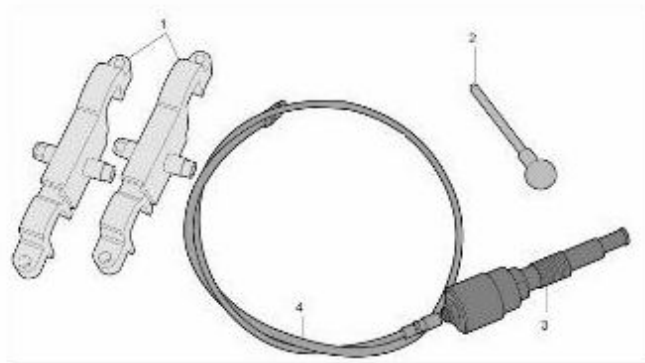
ITEM NO.	Description	OEM No.	Application:
G1207-1	Camshaft Gauges	9678/1	2009 Panamera and later Cayenne DFI V8(normally aspirated and turbo)
G1207-2	Camshaft Gauges	9678	Cayenne
G1207-3	Auxiliary Chain Tensioner	9683/1	Cayenne after 2008
G1207-4	Socket	9714	Cayenne
G1207-5	Used to align crankshaft at Top-Dead-Center	9595/1	
G1207-6	Top-Dead-Center		

1. Remove cylinder head cover (valve cover) on both cylinder banks.
2. The spark plugs should be removed to make the crankshaft easier to turn.

**Tools and materials**



**Special tools**



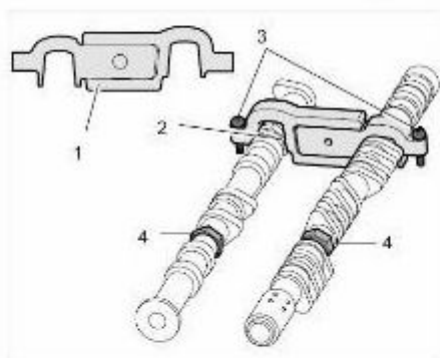
**Adjusting tool for setting timing**

- 1 - Both staking tools for the camshafts are required in pairs for adjusting the camshafts. Staking tool 9678/1. The tools must be used in mirror image for both cylinder heads.
- 2 - The staking pin locating pins 9595/1 is used for the staking bore between the vibration balancer and timing-case cover for setting the TDC.
- 3 - The assembly chain tensioner auxiliary chain tensioner 9683/1 is required in the V8 engine for setting the timing precisely because of the tolerances of the long timing chain. It is not suitable for the 4.5-liter engine. Lubricate the connection with a few drops of commercially available pneumatic oil (to prevent the inner piston from seizing). Operating pressure: 5.0 to 5.5 bar.
- 4 - Compressed air hose on the auxiliary chain tensioner 9683/1

**Information**

**Correct setting and possible errors**

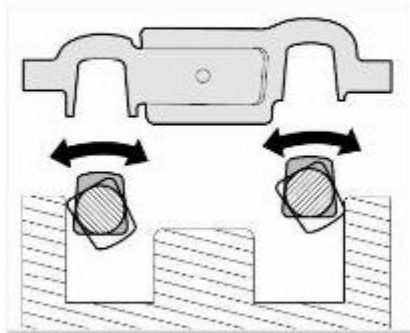
1. Illustrated overview of setting the timing. The staking tool is fitted between cylinders 3/4 and 7/8. It is screwed carefully and uniformly (hand-tight) onto the cylinder head by moving the camshafts back and forth at the hexagon.



**Staking tool and camshafts**

- 1 - Staking tool staking tool 9678/1. Two identical staking tools required for the four camshafts.
- 2 - Side edges (dihedron) as fixing point between staking tool and camshafts; only fits in one position.

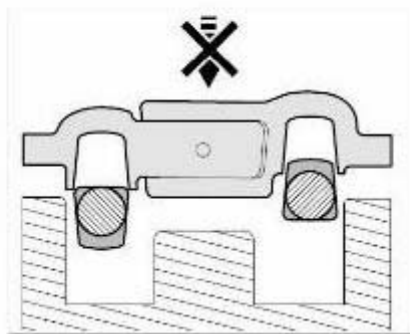
- Place staking tool carefully and uniformly (hand-tight) onto the cylinder head by moving the camshafts back and forth at the hexagon. Do not use force, instead be gentle and careful.



Turning camshafts while mounting tool

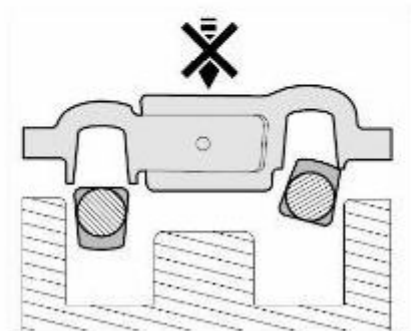
- It is not possible to set the timing here as the wide part of the side edges (dihedron) is facing upwards. Turn camshafts until the narrow part is facing upwards.

- It is not possible to set the timing here as the wide part of the side edges (dihedron) of one camshaft is facing upwards. Turn camshaft in question until the narrow part is facing upwards.



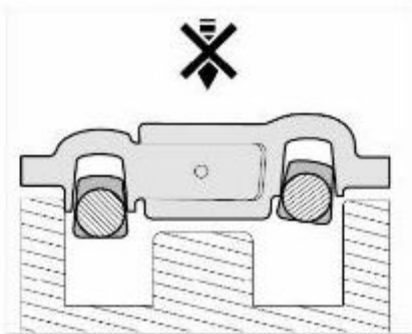
One camshaft correct - one camshaft incorrect

- It is not possible to set the timing here as the wide part of the side edges (dihedron) of one camshaft is facing upwards. One camshaft is slightly crooked. Turn camshafts until the narrow part of both camshafts is correctly facing upwards.



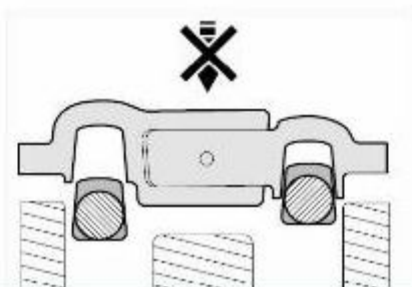
Both camshafts positioned at varying degrees of incorrectness

6. It is not possible to set the timing here as one camshaft is slightly crooked. Turn camshaft in question slightly until the narrow part is facing upwards.



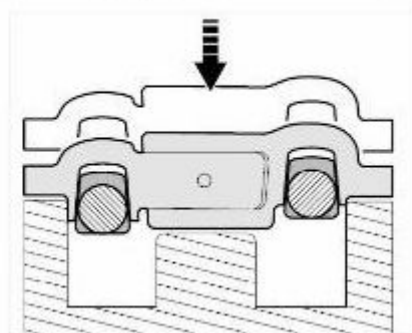
One camshaft in correct position and one camshaft in slightly incorrect position

7. It is not possible to set the timing here as the staking tool is twisted. Turn staking tool. Note height difference of tool and the position of the camshafts in the cylinder head.



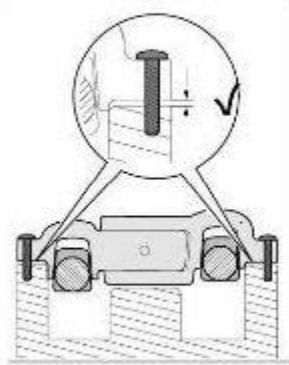
Twisted staking tool (structural difference in height of the camshafts)

8. When the camshafts are positioned correctly (both side edges of the camshafts have the narrow part uniformly facing upwards), the tool can be positioned easily.



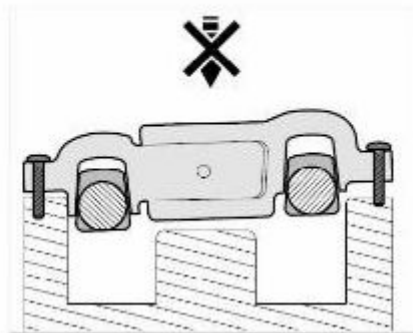
### Uniform mounting on camshafts

9. Position the tool with valve cover screws in order to screw the staking tool onto the cylinder head uniformly. The tool can either be fixed directly on or at a slight distance from the cylinder head, depending on the component tolerances of the camshafts or at the cylinder head. A visual inspection with a pocket lamp is sufficient, if necessary. The crucial factor is for the distance to be equal on both sides. The valve cover screws must be fitted hand-tight.



### Staking tool screwed uniformly on cylinder head

10. The staking tool is crooked on the cylinder head. The crucial factor is for the distance to be equal on both sides. This is an incorrect setting that could easily be overlooked.



### Crooked, unequal tool position on cylinder head

### Setting the timing for camshafts

#### Notice

Incorrect handling of crankshafts  
Risk of damage to the timing system

- Never turn the crankshaft against the rolling direction or when the chain tensioner is removed.
- Proceed carefully with your work.



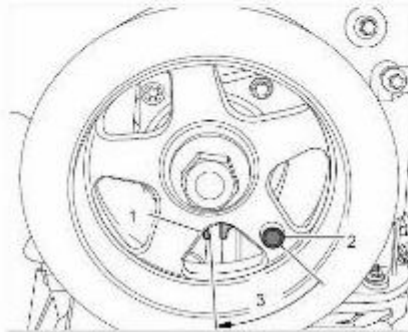
- Only turn the engine at the crankshaft.
- Reset the timing after working on the camshaft.
- Observe general warning notes and working regulations.

#### Notice

Timing not set correctly  
 Risk of engine damage  
 Rough running engine  
 Loss of engine power

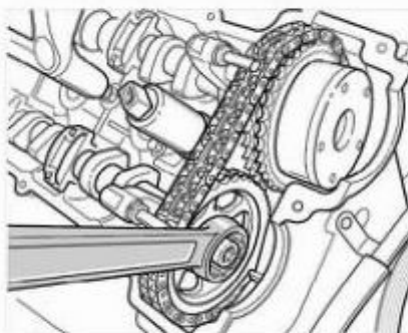
- Do not use force when fitting the staking tool.
- Make sure that the gap is equal on both sides.
- When inserting the staking tools, do not use force to turn the camshafts against any resistance.
- The engine must be exactly at top dead center.
- The opposite cylinder must be at ignition TDC.

1. Turn the crankshaft at the vibration balancer so that the staking bore of the vibration balancer -2- is located approx. 45 degrees degrees in front of the lower staking point on the timing-case cover -1-.



Staking bore 45 degrees before TDC of cylinder 1

2. Loosen camshaft controller and sprockets on the four camshafts just until they can turn freely (no wobbling). Always counter at the hexagon on the components when doing this.

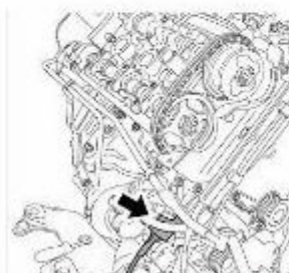


Sprocket



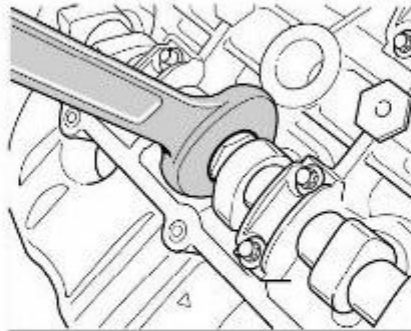
Camshaft controller

3. Unscrew engine chain tensioner.



## Assembly chain tensioner

4. Screw in assembly chain tensioner auxiliary chain tensioner 9683/1 by hand. Connect 1 bar of compressed air and slowly increase to 5.0 up to 5.5 bar (prevents the assembly chain tensioner from 'crashing' against the timing chain). -arrow-
5. Turn the four camshafts at the hexagon using an open-ended wrench until both staking tools 9678/1 can be fitted uniformly at the same time on the side edges (dihedron) of the two intake and outlet camshafts in question between cylinders 3/4 and 7/8. For information on possible errors, see above (section on "Information").

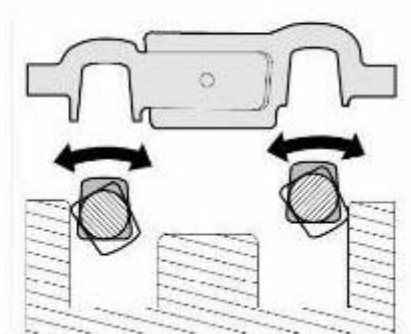


## Hexagon at camshaft

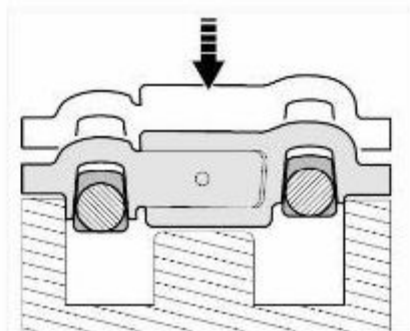
- 5.1. Position the staking tool according to the section above entitled "Correct setting and possible errors".
- 5.2. Position the staking tool over the side edges of the two camshafts in such a way that the narrow end of the side edges of the camshafts points upwards to the staking tool. When positioning the staking tool, take into consideration the structural difference in height of the camshafts in the cylinder head. Turn the staking tool if necessary.
- 5.3. Carefully turn the camshafts at the hexagon using an open ended wrench until the staking tool can be fitted over the side edges. Then, carefully turn the camshafts alternately back and forth at the hexagon and slowly and carefully tighten the valve cover screws at the staking tool. When doing this, check that the staking tool protrudes at the same distance from the cylinder head on both sides (visual inspection with pocket lamp). Depending on the production tolerance, the staking tool may lie directly on the cylinder head or there may be a small gap.

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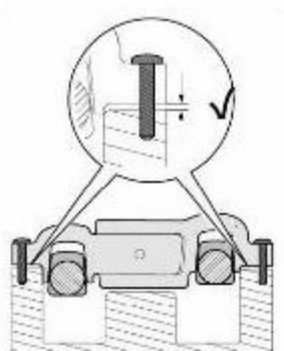
Everything is fixed correctly when the staking tool is fitted uniformly and there is no longer any play on the camshaft when the hexagon is turned.



## Turning camshafts while mounting tool



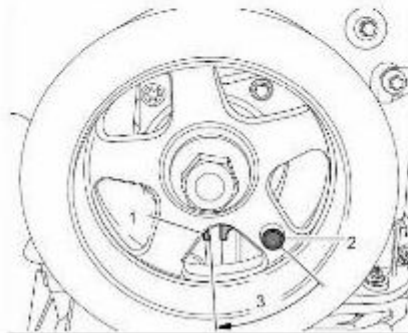
## Uniform mounting on camshafts





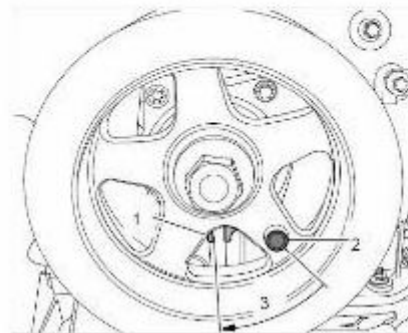
#### Staking tool screwed uniformly on cylinder head

- 5.4. Set other cylinder bank in the same way (fix camshafts).
- 5.5. Now all four camshafts are fitted uniformly and without play with both staking tools. When you inspect the camshafts with the torch, you can see no apparent gap between the side adjustment edges of the camshafts and the staking tool.



#### Staking bore in vibration balancer

6. Insert staking pin locating pins 9595/1 into the staking bore in the vibration balancer -2-.
7. Turn the crankshaft at the vibration balancer -3- so that the staking pin in the vibration balancer slips into the lower staking point on the timing-case cover -1-. At the same time, exert gentle pressure on the staking pin while turning.



#### Staking position in timing-case cover

8. If you accidentally turn the vibration balancer too far, do not try to turn it back again! The staking tools must be removed and the camshafts must be turned in such a way that there is only the slightest pressure on the valve springs. Turn the crankshaft once and start the setting procedure again.



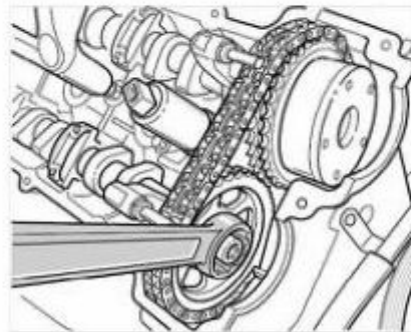
Mounted tools

9. Camshafts and crankshaft are fixed correctly.

- 1 - Screwed-in assembly chain tensioner with approx. 5.0 to 5.5 bar pressure.
- 2 - Two fixed staking tools on the camshafts.
- 3 - Staking pin fixes crankshaft in TDC of cylinder 1.

10. Screw down camshaft controller and sprockets on the four camshafts as instructed. Always counter at the hexagon on the components when doing this. Observe the following sequence.

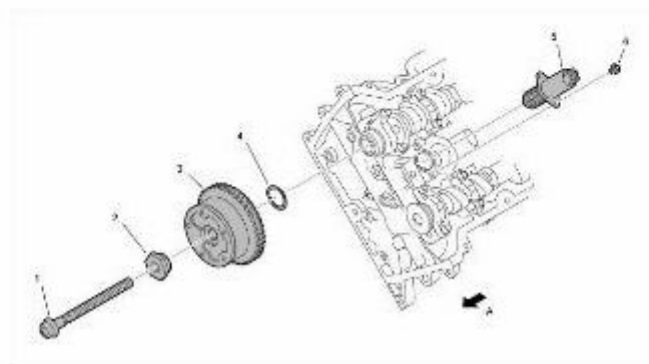
Sprocket on cylinders 1 to 4 for outlet camshaft	Camshaft controller on cylinders 1 to 4 for intake camshaft
Camshaft controller on cylinders 5 to 8 for intake camshaft	Sprocket on cylinders 5 to 8 for outlet camshaft



Sprocket



Camshaft controller

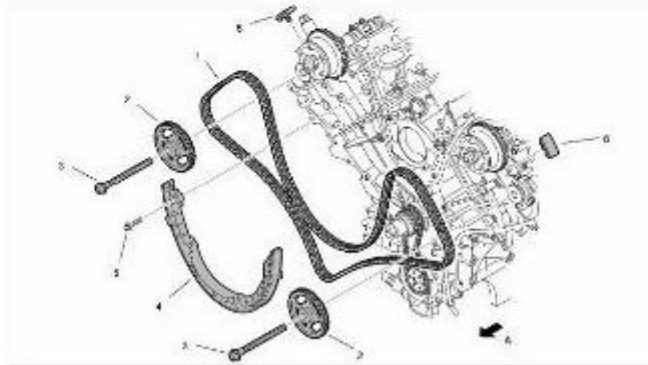


## Camshaft control

- 1 - Screw, M12 Tighten fully after setting the timing. 1st turn - Tightening torque: 10 Nm (7.5 ftlb.) 2nd turn - Tightening torque: 50 Nm (37 ftlb.) final tightening (torque angle) - Torque angle: 135 degrees
- 2 - Hexagon sleeve
- 3 - Camshaft controller
- 4 - Washer (reusable); replace if disassembled completely

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- 5 - Hydraulic valve for camshaft control
- 6 - Screw, M5 x 12
- A - Direction of travel



## Timing chain and sprockets

- 1 - Double-chain camshaft drive
- 2 - Camshaft sprocket
- 3 - Screw, M12 Tighten fully after setting the timing. 1st turn - Tightening torque: 10 Nm (7.5 ftlb.) 2nd turn - Tightening torque: 50 Nm (37 ftlb.) final tightening (torque angle) - Torque angle: 90 degrees
- 4 - Deflection rail
- 5 - Screw, M8 x 35
- 6 - Camshaft-to-camshaft guide pad
- A - Direction of travel

11. Remove tools.
12. Mount chain tensioner.

## Subsequent work

1. Fit spark plugs.
2. Install cylinder head cover (valve cover) on both cylinder banks.