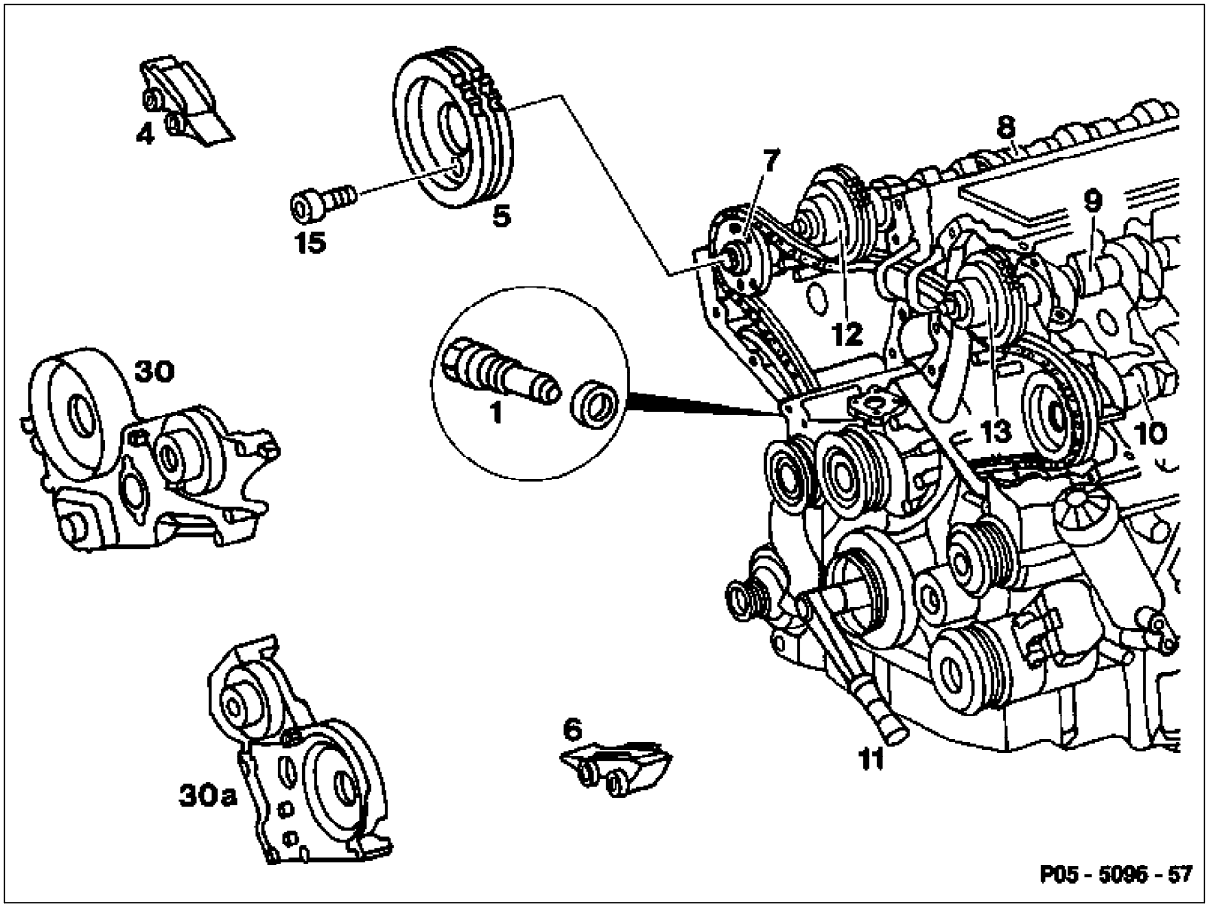
05-2240 Adjusting basic setting of camshafts

Preceding work:
Front covers (30) and (30a) removed (01-2120).
Spark plugs removed (15-1031).

Operation no. of the operation texts and work units or standard texts and flat rates: 05-6020



Crankshaft	rotate to 30° after ignition TDC at cylinder 1 with wrench (11) 001 589 65 09 00 (step 1).
Chain tensioner (1)	remove (05-3100).
Right exhaust camshaft sprocket (5)	unscrew, remove (step 3).
Right and left guide rail (4) and (6) at cylinder head	remove (05-3450).
All four camshafts (7), (8), (9) and (10)	rotate with wrench 104 589 01 01 00 into basic position (step 5).
Crankshaft	rotate against direction of rotation of engine with wrench (11) 001 589 65 09 00 into TDC position of piston at cylinder 1 (step 6).
Timing	adjust, beginning at left exhaust camshaft (10) (steps 7 to 19).

Chain tensioner_____ install (05-3100).

Screws (15) of left exhaust camshaft sprocket (5)_____ tighten. Pay attention to tightening torque.

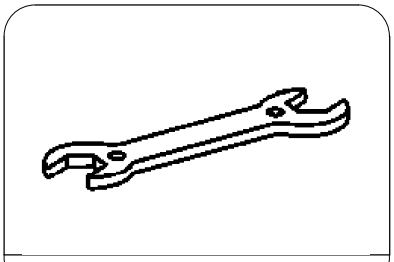
Basic setting of camshaft_____ check (05-2230).

Tightening torques in Nm

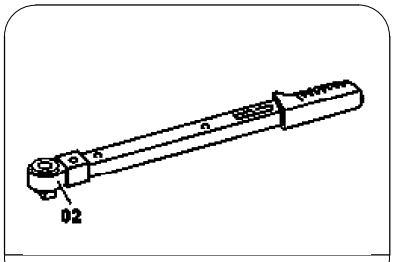
Exhaust camshaft sprocket to camshaft	Torx T40 1)	20
	Initial torque Tightening angle	90°
	Torx T30 2)	22

1) Do not re-use bolt after tightening to correct angle.
2) Replace 1st version by Torx T40 when performing repairs.

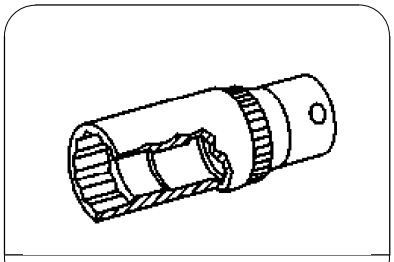
Special tools



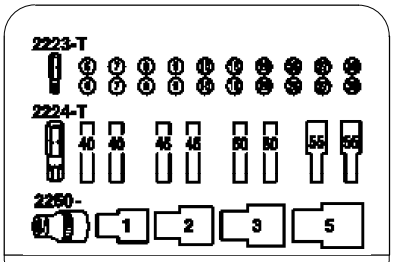
104 589 01 01 00



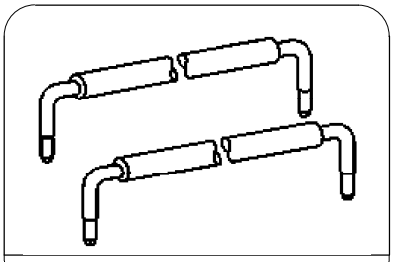
001 589 72 21 00



001 589 65 09 00



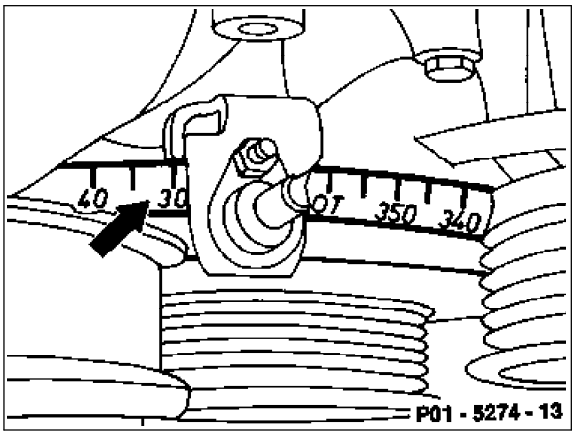
000 589 01 10 00



111 589 03 15 00

Adjusting

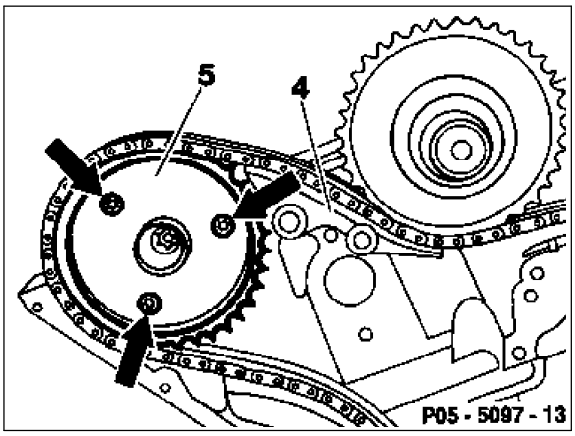
1 Rotate crankshaft into 30° position after TDC at cylinder 1 with wrench 001 589 65 09 00 (arrow).
In this position, the camshafts can be rotated without the valves coming into contact with the piston crown.



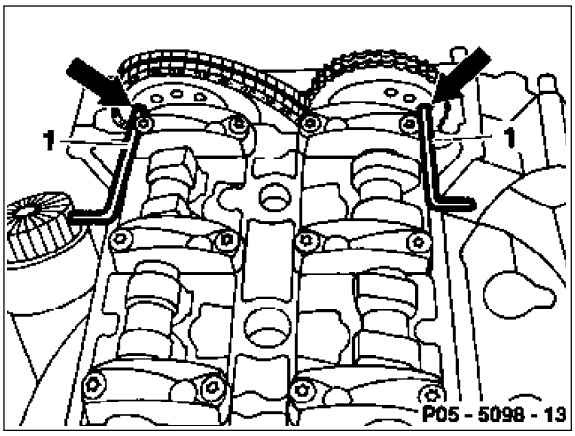
2 Remove chain tensioner (05-3100).

3 Unscrew right exhaust camshaft sprocket (5), remove.

4 Remove right guiding blade (4) and left guide rail of cylinder head (05-3450).

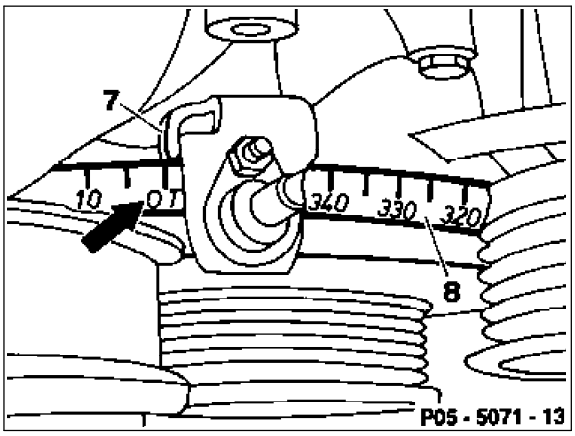


5 Rotate camshafts with wrench 104 589 01 01 00 until the 4 mm holes in the camshaft flanges (arrows) are at the top edge of the cylinder edge.
Lift timing chain off camshaft sprockets for performing this step.
Check with 4 mm dia. pins (1) (111 589 03 15 00).



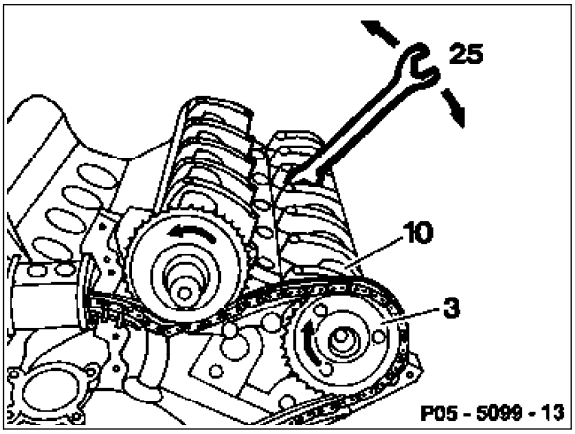
Left cylinder head

6 Rotate crankshaft back **in opposite direction** of rotation of engine to TDC position (arrow) with wrench 001 589 65 09 00.
Lift timing chain off camshaft sprockets for this step.



7 Rotate left exhaust camshaft (10) half a tooth in direction of rotation of camshaft out of basic position with wrench (25) 104 589 01 01 00.

8 Place timing chain onto exhaust camshaft sprocket (3) and rotate exhaust camshaft against direction of rotation of camshaft back into basic position (timing chain tensioned).



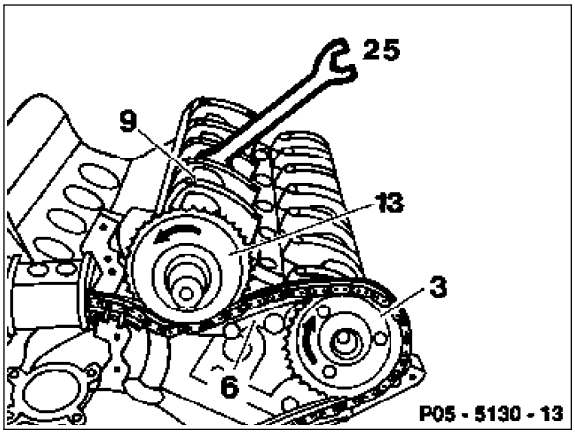
9 Rotate left intake camshaft (9) half a tooth in direction of rotation of camshaft out of basic position with wrench (25).

10 Rotate camshaft adjuster by hand in direction of rotation of camshaft to "retarded" stop.

11 Fit timing chain onto intake camshaft sprocket (13).

12 Install guide rail (6).

13 Rotate intake camshaft (9) in opposite direction of rotation of camshaft back into basic position (timing chain tensioned).



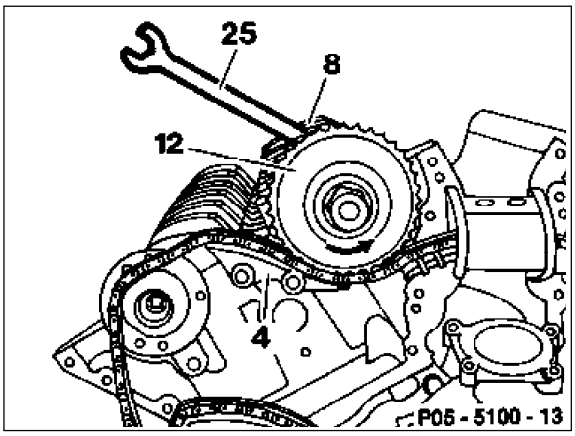
14 Rotate right intake camshaft (8) half a tooth in direction of rotation of camshaft out of basic position with wrench (25).

15 Rotate camshaft adjuster by hand in direction of rotation of camshaft to "retarded" stop.

16 Fit timing chain onto intake camshaft sprocket (12).

17 Install guide rail (4).

18 Rotate intake camshaft (8) in opposite direction of rotation of camshaft back into basic position (timing chain tensioned).



19 Install exhaust camshaft sprocket (5) with camshaft in basic position and screw on.

20 Install chain tensioner (05-3100).

21 Tighten screws (arrows) of exhaust camshaft sprocket.
Pay attention to tightening torque.

22 Check basic position of camshafts (05-2230).