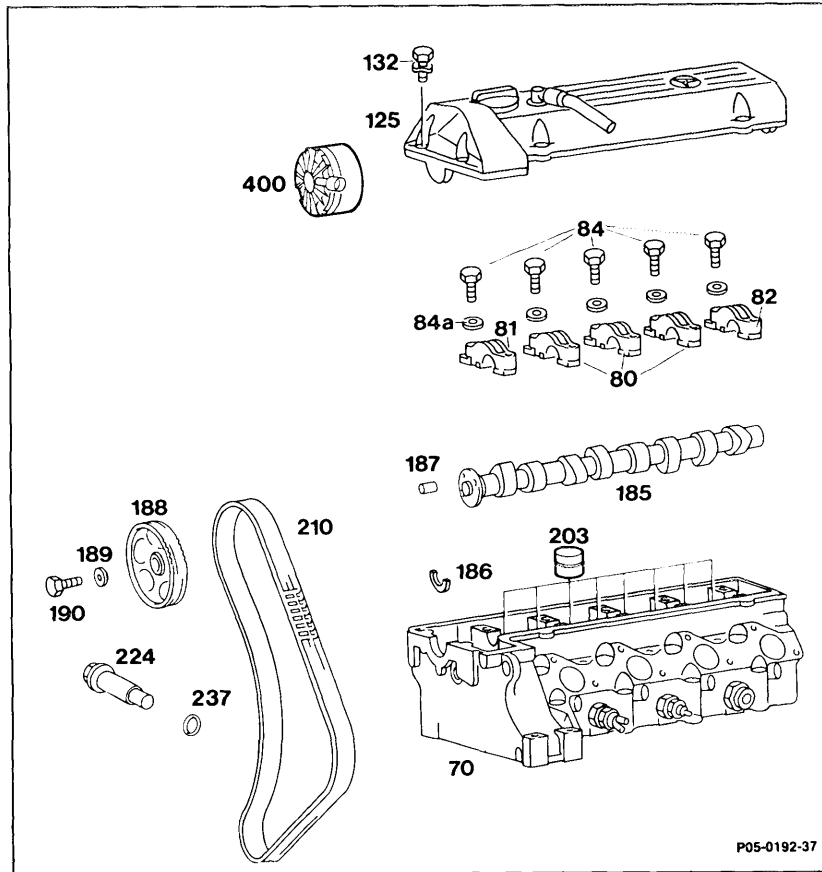


05-220 Removal and installation of camshaft



Turbo engine:

| | |
|---------------------------------|---|
| Charge air pipe | remove, install. |
| Cylinder head cover (125) | remove, install, 10 Nm. |
| Engine | position on ignition TDC of No. 1 cylinder. |

Caution!

The engine must not be turned by the camshaft timing gear bolt.

| | |
|-----------------------------|---|
| Chain tensioner (224) | remove, install, replace sealing ring (237) (05-310). |
|-----------------------------|---|

With self-levelling suspension:

| | |
|--|---------------------------|
| Drive of the pressure oil pump (400) | remove, install (05-437). |
|--|---------------------------|

Camshaft timing gear (188) mark at timing chain (210). Remove, install camshaft timing gear. Different bolts (190) and washers (189). Hexagon bolt, 65 Nm, bihexagonal head bolt, 25 Nm/90° angle of rotation.

Caution!

When assembling the camshaft timing gear ensure that the straight pin (187) is not pushed out towards the rear.

Camshaft bearing cap (80, 81, 82) remove, install, note sequence, hexagon bolts (84) and washers (84a), 25 Nm.

Caution!

Note torquing diagram!

Camshaft (185) remove, install. Check for ease of movement.

Lock washer (186) check.

Valve tappet (203) remove, install, check.

Magnet lifter 102 589 03 40 00.

After installation allow engine to run, check for leaks.

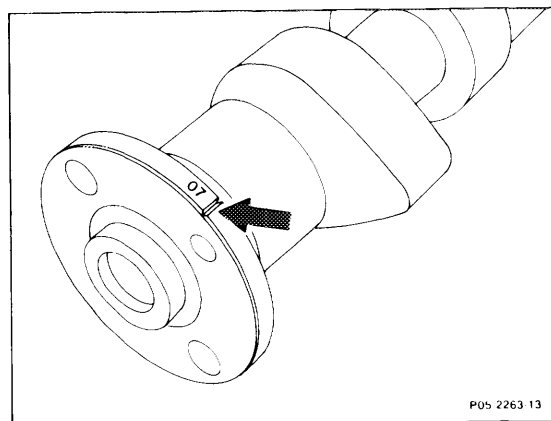
Data

| | | | |
|--|------------------------------|------------------|---------|
| Permitted eccentricity of center bearing pin and camshaft gear seat when accepting the camshaft in the outer bearing positions | Bearing position/engine | 602 | 603 |
| | Camshaft timing gear seat | 0.025 | 0.025 |
| | 2nd and 4th bearing position | - | - |
| | 3rd bearing position | - | - |
| | 2nd and 5th bearing position | 0.030 | - |
| | 3rd and 4th bearing position | 0.050 | - |
| | 2nd and 6th bearing position | - | 0.030 |
| | 3rd and 5th bearing position | - | 0.045 |
| | 4th bearing position | - | 0.060 |
| | Sceroscope hardness of cam | 70 - 82 | 70 - 82 |
| Diameter of camshaft bearing pins (standard dimension) | | 30.945 30.934 | |
| Diameter of camshaft bearing pins (repair stage + 0.5 mm) | | 31.445 31.434 | |

Camshaft code numbers

The code number is stamped on the flange next to the TDC notch (arrow).

TDC marking (arrow) and code number



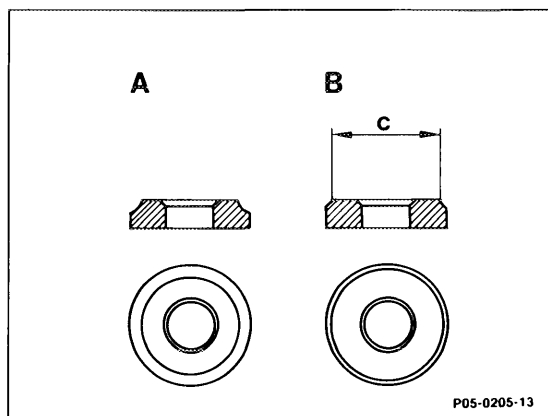
P05 2263 13

| Engine | Thread for sprocket wheel | Camshaft code number |
|----------|---------------------------|----------------------|
| 602, 603 | M10 | 07, 09 ¹⁾ |
| | M11 | 11, 13 ¹⁾ |

¹⁾ Repair camshaft with 0.5 mm larger bearing \varnothing

Washer for camshaft timing gear bolt

A revised washer with a larger outer diameter (c) has been fitted in order to prevent the camshaft timing gear bolt loosening.



A 1st Design
B 2nd Design

Production breakpoint: 12/86

| Model | Engine | Engine end No. | | Vehicle identification end No. | |
|--------------------|---------|---------------------|------------------------|--------------------------------|---|
| | | Manual transmission | Automatic transmission | A | F |
| 124.133 124.193 | 603.960 | - | 007763 | * | * |
| 126.125 | 603.961 | - | 007994 | * | * |
| 201.126 | 602.911 | 033213 | 008022 | * | * |
| 201.128 | 602.961 | - | 000200 | * | * |

* not recorded

Camshaft timing gear bolt

From 11/88 the camshaft timing gear fixing has been revised from a M10 hexagon bolt to a M11 bihexagon necked down bolt on all engines.

Tightening torques

Hexagon bolt (A) 65 Nm

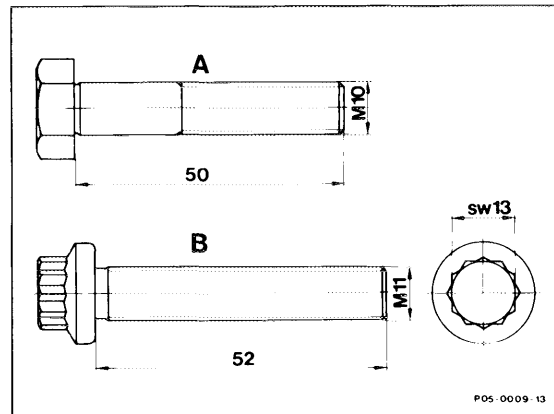
Bihexagon necked down bolt (B)

Pre-torque 25 Nm

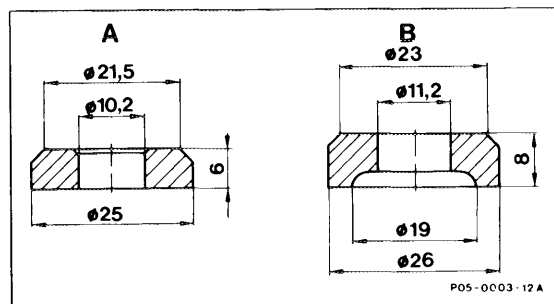
Torsion angle 90°

Caution!

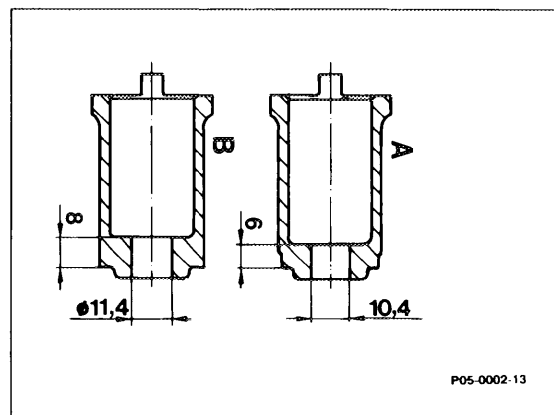
Note revised plain washer!



Use the plain washer (A) for the hexagon bolt, and plain washer (B) for the bihexagon necked down bolt.



Use carrier (A) for previous hexagon bolt, carrier (B) for bihexagon necked down bolt.



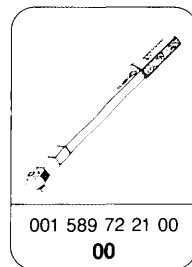
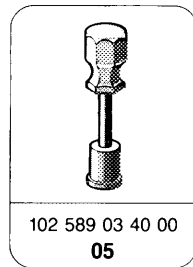
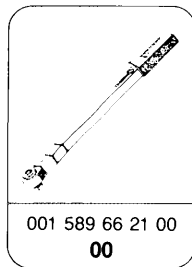
Production breakpoint: 11/88

| Model | Engine | Engine end No. | | Vehicle identification end No. | |
|-------|---------|---------------------|------------------------|--------------------------------|---|
| | | Manual transmission | Automatic transmission | A | F |
| 124 | 602.962 | - | 000187 | * | * |
| | 603.960 | - | 019336 | | |
| 201 | 602.911 | 070124 | 014216 | * | * |
| | 602.961 | - | 004561 | | |

* not recorded

Tightening torques and angles of rotation

| | Nm | |
|---|----|-----|
| Hexagon bolts on cylinder head cover | 10 | |
| Hexagon bolts on camshaft timing gear | 65 | |
| Bihexagonal head bolt on camshaft timing gear | 25 | 90° |
| Hexagon bolts on camshaft bearing cap | 25 | |

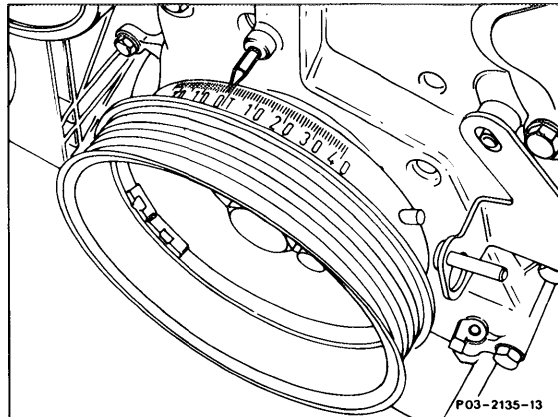
Special tools**Removal****Turbo engine:**

- 1 Remove, install charge air pipe.
- 2 Remove cylinder head cover.

3 Position engine on ignition TDC of No. 1 cylinder (arrow).

Caution!

Do not turn engine by the camshaft timing gear bolt. Do not turn engine backwards.

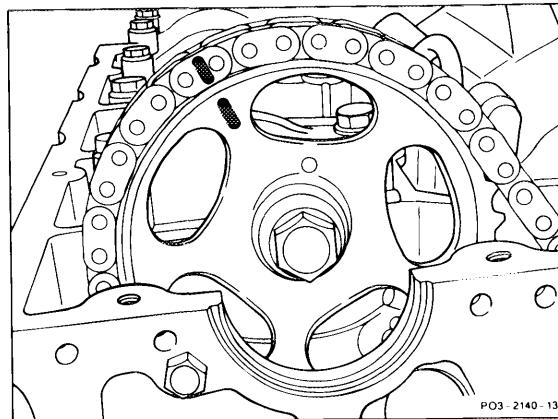


4 Remove chain tensioner (05-310).

With self-levelling suspension

5 Remove pressure oil pump (05-437).

6 Align camshaft timing gear and timing chain.

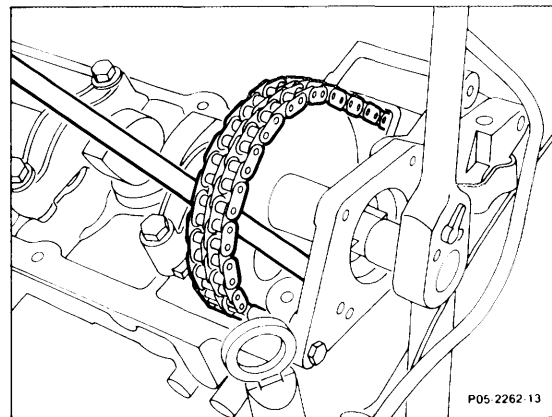


7 Unscrew hexagon bolt or bihexagonal head bolt on camshaft timing gear, whilst holding the camshaft with a mandrel.

8 Remove camshaft timing gear and allow timing chain to sag.

Note

The timing chain is prevented from twisting when the timing case cover is assembled.



Caution!

Note different bolt and washer.

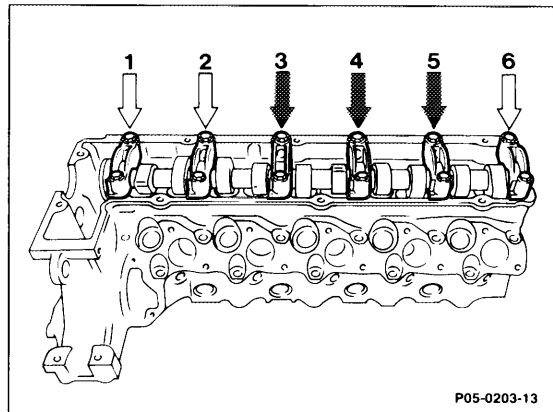
Caution!

9 It is absolutely essential to observe the following sequence during **removal and installation** in order to avoid damage to the camshaft:

Engine 602

Unscrew both hexagon bolts on camshaft bearing caps 1, 2 and 6 (dark arrows).

Loosen both hexagon bolts on camshaft bearing caps 3, 4 and 5 in increments of one turn respectively, until counterpressure is reduced (light arrows).

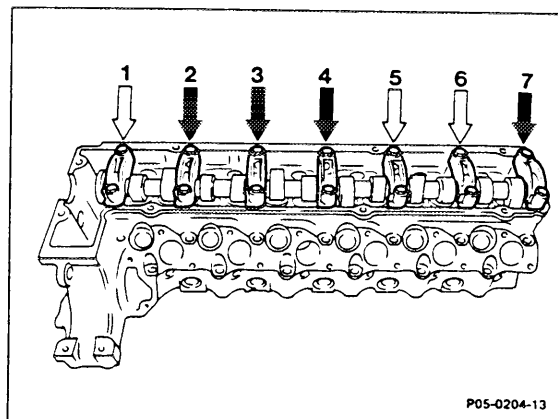


Engine 603

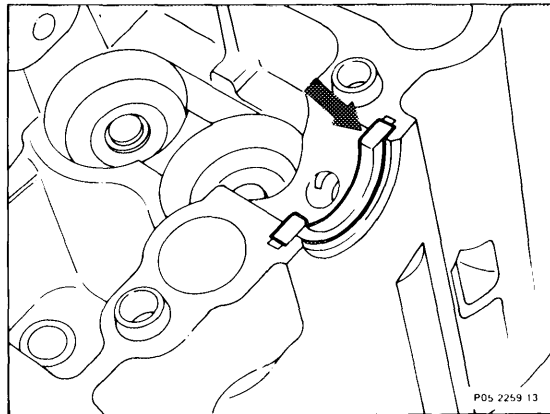
Unscrew both hexagon bolts on camshaft bearing caps 1, 5 and 6 (dark arrows).

Loosen both hexagon bolts on camshaft bearing caps 2, 3, 4 and 7 in increments of one turn respectively, until counterpressure is reduced (light arrows).

10 Remove camshaft upwards.



11 Remove lock washer for axial fixing (arrow) and check condition.

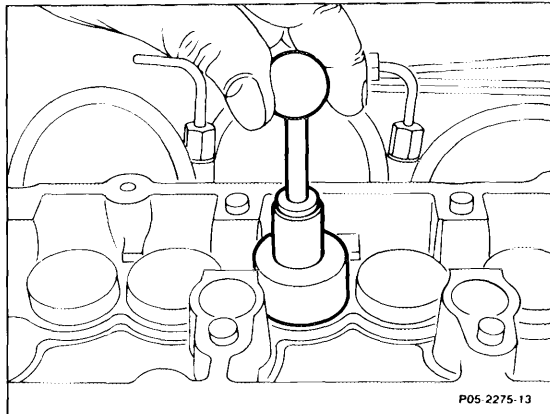


12 Pull out valve tappet with magnetic lifter 102 589 03 40 00.

13 Check valve tappet for condition (visual inspection), replace if necessary.

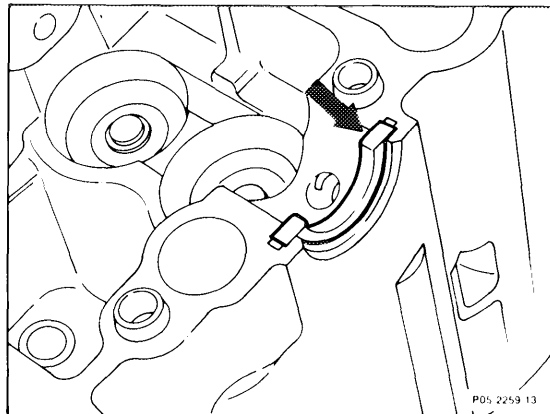
Caution!

Install valve tappet in the same position again.



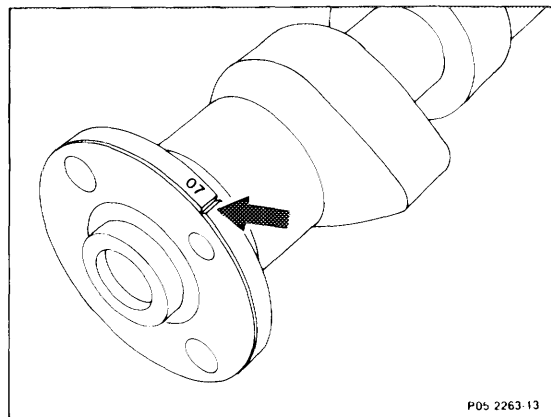
Installation

14 Insert lock washer for axial fixing (arrow) in cylinder head.



15 Lubricate camshaft and place on the cylinder head so that the TDC marking (arrow) points vertically upwards.

16 Install camshaft bearing caps. Note marking on bearing caps.



Assemble camshaft bearing cap bolts (light arrows) and torque alternately in increments of one turn respectively in accordance with torquing diagram, see work stage 9.

Engine 602; camshaft bearing caps 3, 4 and 5
Engine 603; camshaft bearing caps 2, 3, 4 and 7

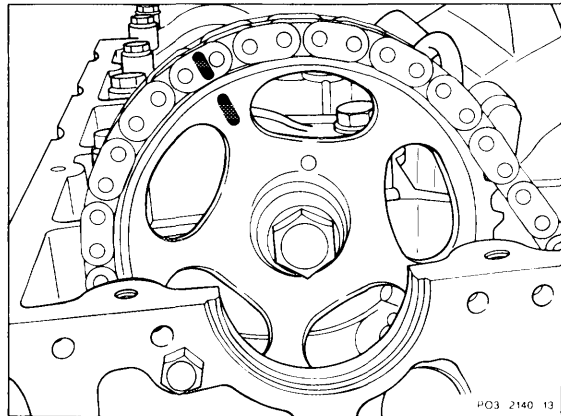
The remaining camshaft bearing caps (dark arrows) can then be assembled at random.

Tightening torque 25 Nm.

17 Install camshaft timing gear according to marking and tighten. Check straight pin for correct seating.

Tightening torques and angle of rotation
Hexagon bolt 65 Nm,
Bihexagonal head bolt 25 Nm, 90°

18 Install chain tensioner (05-310).



With self-levelling suspension:

19 Install pressure oil pump (05-437).

20 Position engine on TDC of the No. 1 cylinder and check markings (arrows).

21 Install cylinder head cover. Tightening torque 10 Nm.

Turbo engine:

Install charge air pipe.

After installation:

22 Allow engine to run, check for leaks.

