Timing at 2 mm valve lift

Engines	Camshaft code No.[1])	Intake valve opens after TDC	closes after BDC	Exhaust valve opens before BDC	closes before TDC
115.923/926, 115.938/939 and 115.951/954 low compression	05	14°	20°	22°	12°
115.951/954	13	14°	27°	36.5°	18.5°

(AUS) starting 1977, (J) and (S) starting 1976, (USA) starting 1974

115.951/954	05	14°	20°	22°	12°

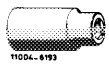
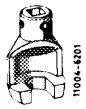
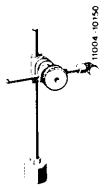
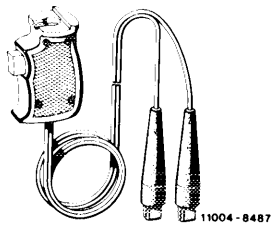
[1]) The camshaft code No. is punched into rear end of camshaft.

Valve clearance	with engine cold (approx. 20 °C)	with engine warm (60 °C ± 15 °C)
Intake	0.10[1])	0.15[1])
Exhaust	0.20	0.25

[1]) 0.05 mm higher during lasting outside temperatures below −20 °C.

Tightening torques		Nm
Nuts for cylinder head cover		15
Necked-down screw for camshaft sprocket		80
Valve adjusting screw		20–40
Camshaft bearing screws (cylinder head bolts)	M 12	110
	M 10	55
Nuts M 8 for camshaft bearing		25

Special tools

Socket 27 mm, 1/2" square, for rotating engine		001 589 65 09 00
Allen wrench socket 10 mm, 1/2" square, 140 mm long		000 589 05 07 00
Allen wrench socket 8 mm, 1/2" square, 130 mm long		000 589 33 07 00
Pressure lever for valve spring		123 589 03 61 00
Valve adjusting wrench 17 mm, 1/2" square		110 589 00 01 00
Dial gauge holder		363 589 02 21 00
Contact handle for rotating engine (component of compression pressure recorder (compressometer) 001 589 46 21 00)		001 589 46 21 08

Conventional tool

Dial gauge A 1 DIN 878	e.g. made by Mahr, D–7300 Esslingen order No. 810

Note

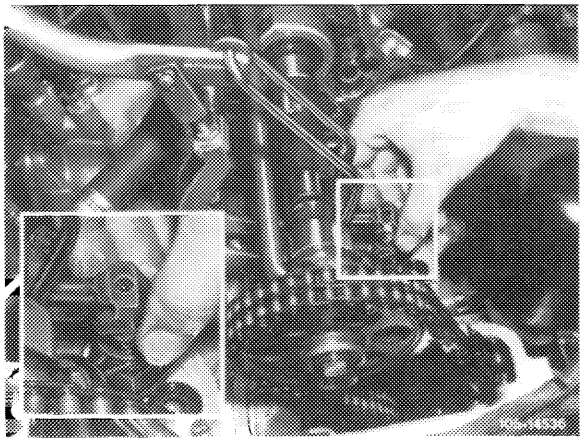
When installing a new camshaft, also renew rocker arms on principle.

On engines with a long service life (large chain elongation) make sure that the timing is checked (05–215).

Run-in camshaft bearing journals can be reground. The required camshaft bearings are available in two repair stages (05–225).

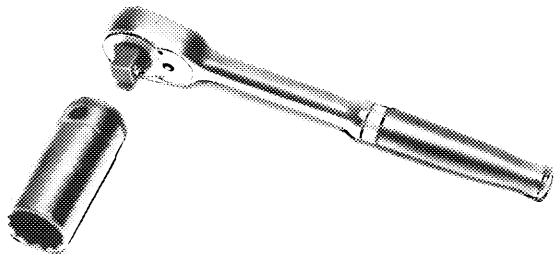
Removal

1 Remove rocker arms with pressure lever (05—230).



2 Set crankshaft to ignition TDC.

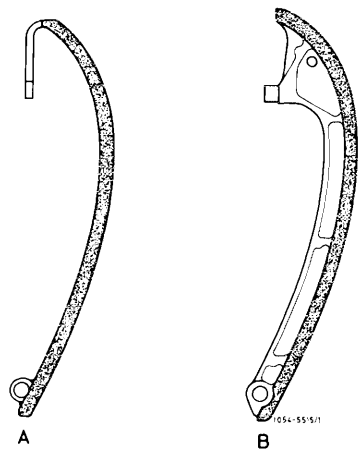
For this purpose, rotate crankshaft with tool combination.



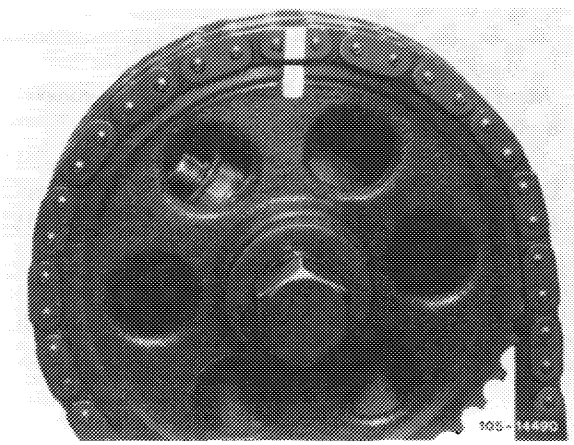
R 100/6498

3 On engines 115.923/926/951 with tensioning chain version (A), remove chain tensioner (05—310).

On engines with light alloy tensioning rail (B), push back thrust bolt of chain tensioner.

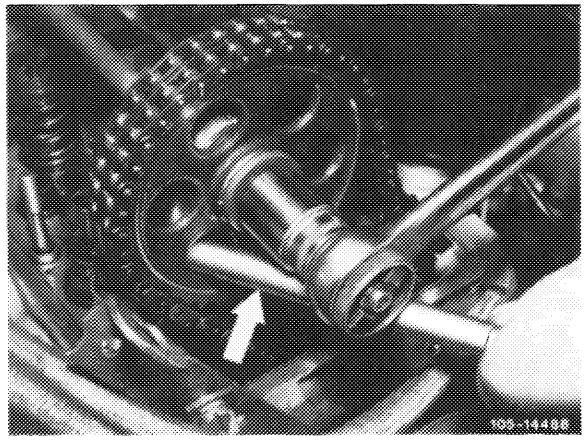


4 Mark camshaft sprocket and timing chain in relation to each other.

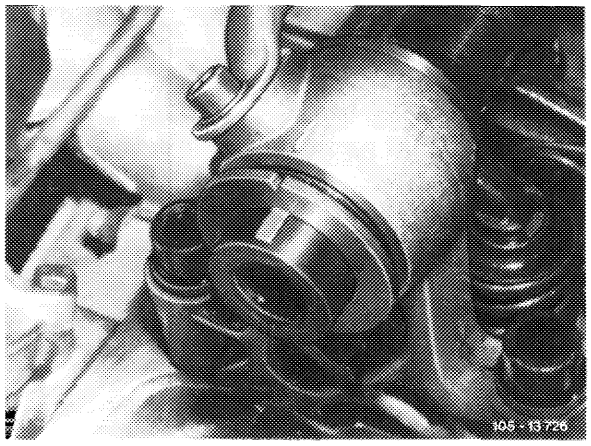


5 Remove camshaft sprocket.

To loosen necked-down screw, apply counterhold to camshaft sprocket with a screw driver or steel pin, loosen holder for fuel lines and swivel sideways.

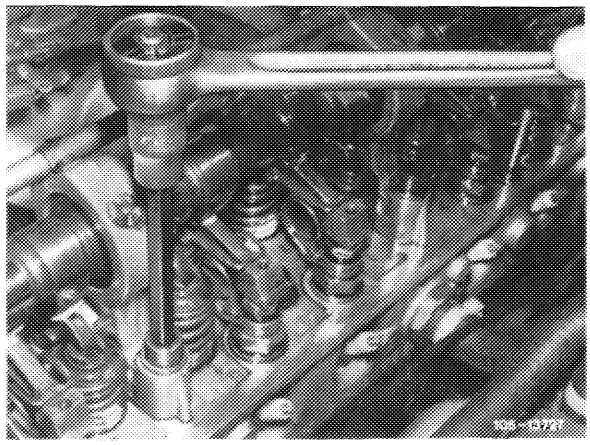


6 Remove compensating washer.



7 Unscrew camshaft bearing bolts with Allen wrench (10 mm).

Unscrew M 8 nuts.

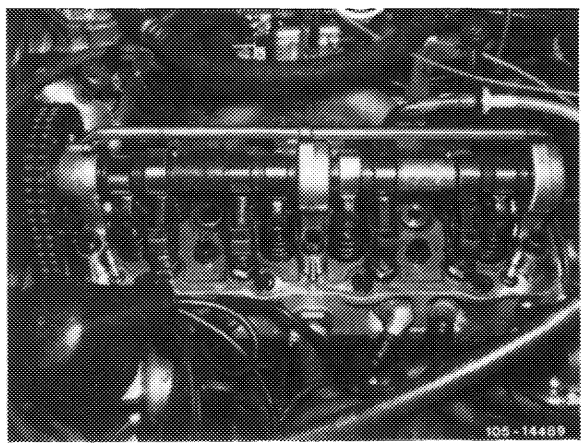


8 Remove camshaft with camshaft bearing and oil pipe.

Pay attention to set pins.

Loosen stuck camshaft bearings by light blows with a plastic hammer.

9 Pull camshaft out of camshaft bearings in rearward direction.



Installation

10 Provide camshaft bearings, camshaft journals, cams and rocker arms with engine oil.

11 Slip camshaft from the rear into camshaft bearings.

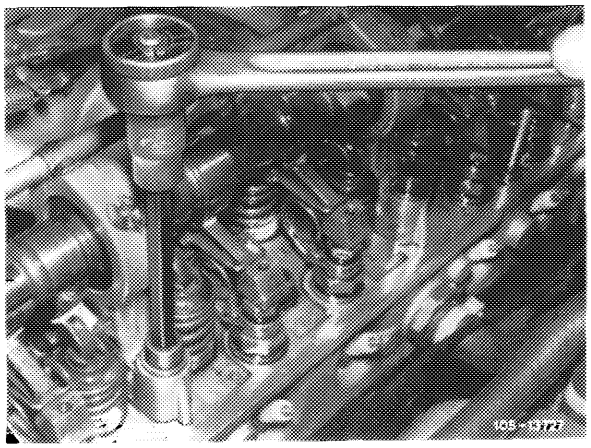
12 Mount camshaft with camshaft bearings and oil pipe.

Pay attention to set pins.

13 Tighten camshaft bearing bolts (cylinder head bolts) from inside out to 110 Nm.

Slightly loosen remaining 8 cylinder head bolts also from inside out and tighten to 110 Nm or 55 Nm.

Tighten M 8 nuts to 25 Nm.

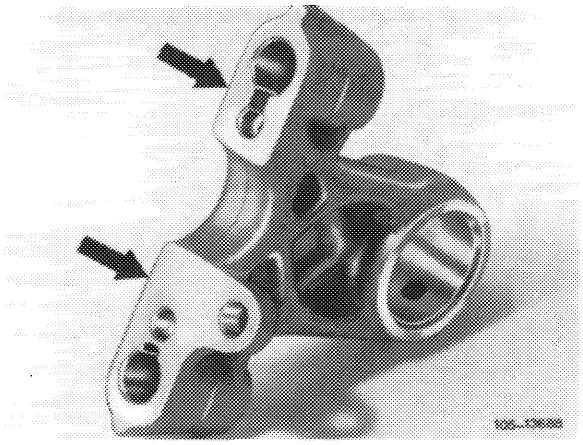


14 Rotate camshaft manually to check for easy operation.

If the camshaft is **hard** to rotate, proceed as follows:

Loosen camshaft bearings individually. Then rotate camshaft each time.

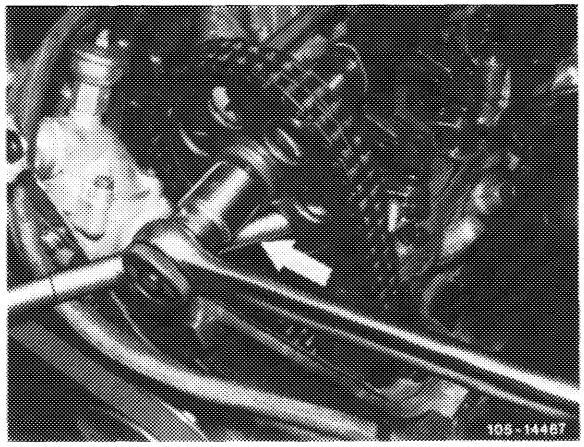
Repeat until the binding bearing point is found. Depending on sag of camshaft, touch up pertinent camshaft bearing at base (arrows) on a surface plate.



15 Slip compensating washer on journal or camshaft sprocket.

16 Mount camshaft sprocket. Pay attention to self-applied color coding.

Tighten necked-down screw to 80 Nm. For this purpose, apply counterhold to camshaft sprocket by means of a screw driver or steel pin.

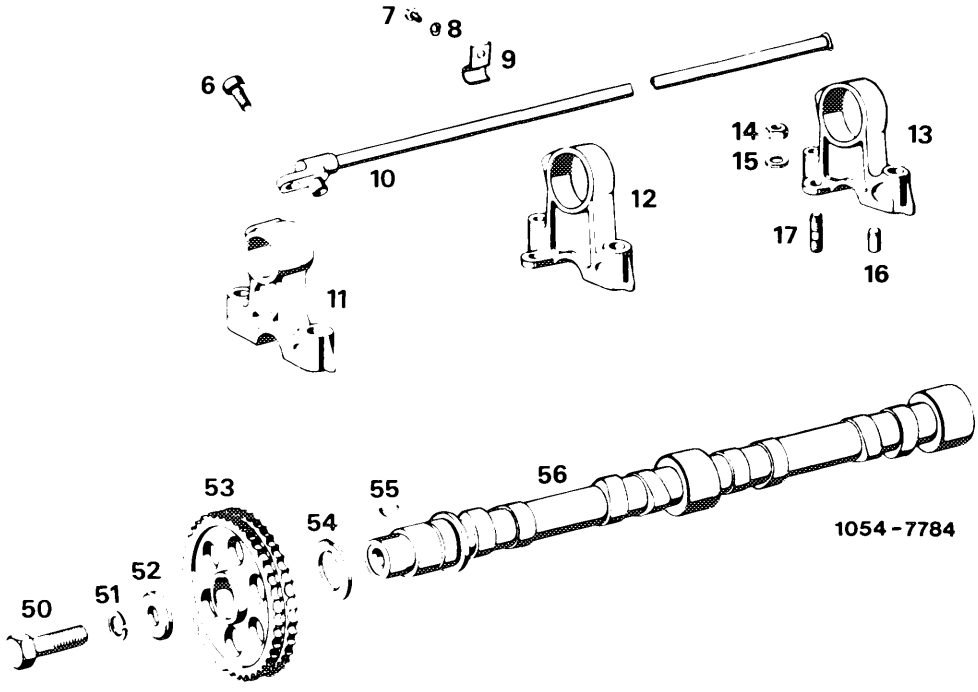


17 On engines 115.923/926/951 with tensioning rail version (A in Fig. item 3), install chain tensioner.

18 Install rocker arms (05–230).

19 Adjust valve clearance (05–210).

Camshaft and camshaft bearings



6 Screw M 6 x 15
7 2 screws M 4 x 10
8 2 spring washers B 4
9 2 pipe clips
10 Oil pipe
11 Camshaft bearing crank end
12 Camshaft bearing
13 Camshaft bearing
14 3 nuts M 8
15 3 washers 8.4 dia.
16 6 cyl. pins 8 x 8
17 3 studs M 8 x 18
50 Necked-down screw M 14 x 1.5 x 40
51 Circlip B 14
52 Washer
53 Camshaft sprocket
54 Compensating washer
55 Woodruff key 4 x 6.5
56 Camshaft