K15 AR05.10-P-7601-03A	Separating, riveting timing chain	602 589 04 63 00 Pressing screw 602 589 04 63 01 Thrust pins 602 589 00 98 00 Case 602 589 02 33 00 Chain separating tool 602 589 03 63 00 Thrust piece 602 589 00 39 00 Rivet opener 602 589 02 63 00 Assembly inserts 602 589 02 40 00 Assembly links 604 589 00 40 00 Retaining device 602 589 01 40 00 Retaining device	

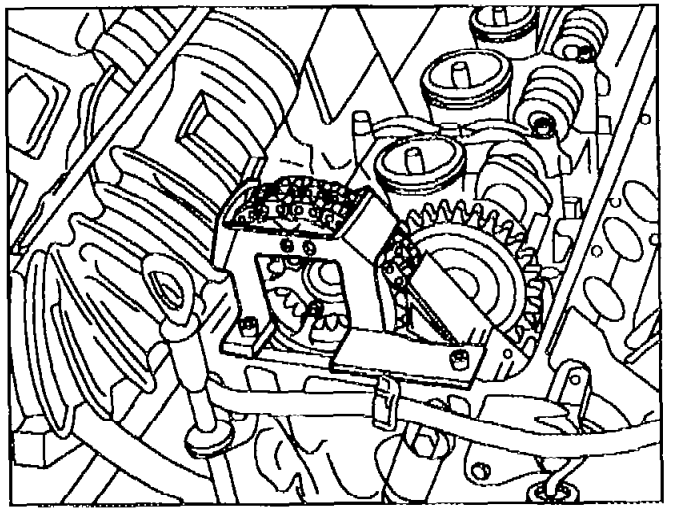
Modification notes

1.3.96	Timing chain with press-fitted center plate replaces timing chain with moving center plate	see step 12	AR05.10-7601-03A

Separating

1 Attach retaining device 604 589 00 40 00 (engine 604/605/606), or 602 589 01 40 00 (engine 601, 602), respectively, to cylinder head with bolts (supplied).

2 Cover over chain box with a clean cloth.



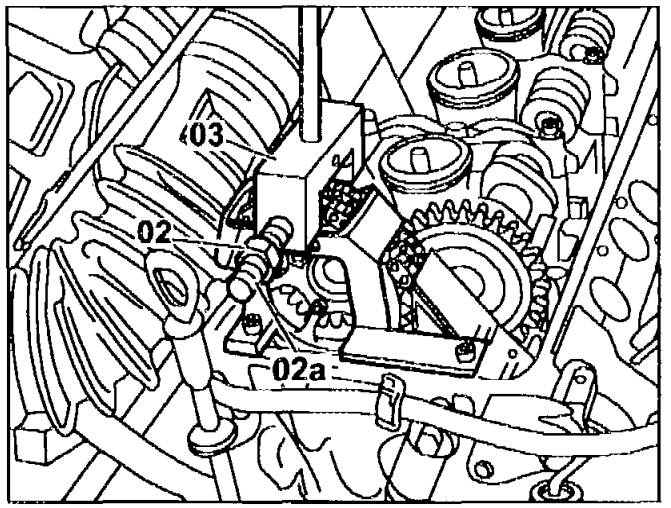
P05.10-0272-01

3 Screw thrust spindle (02) 602 589 04 63 00 together with thrust pin 602 589 04 63 01 into chain separating tool (03) 602 589 02 33 00.

4 Fit chain separating tool (03) onto timing chain.

5 Screw in thrust spindle (02) sufficiently until thrust pin is touching the left (positioned in direction of rotation of engine) timing chain pin of a chain link.

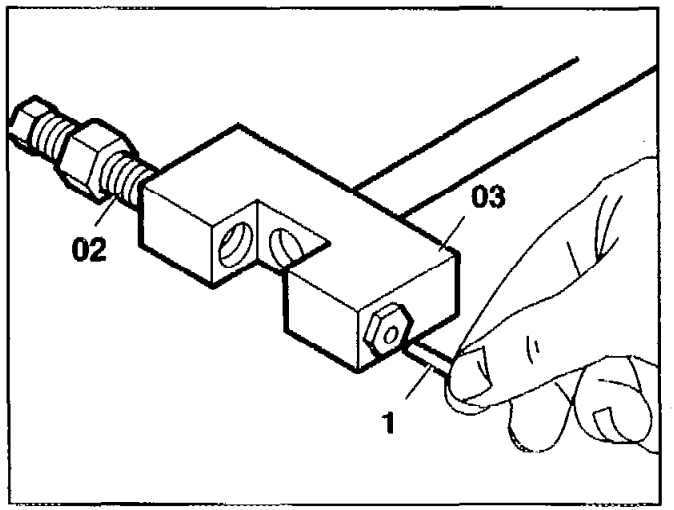
6 Press out thrust pin of the timing chain by screwing in the thrust spindle (02a).



P05.10-0284-01

7 Unscrew thrust spindle (02) and take off chain separating tool (03).

8 Pull pressed-out chain pin (1) out of chain separating tool (03).



P05.10-0271-01

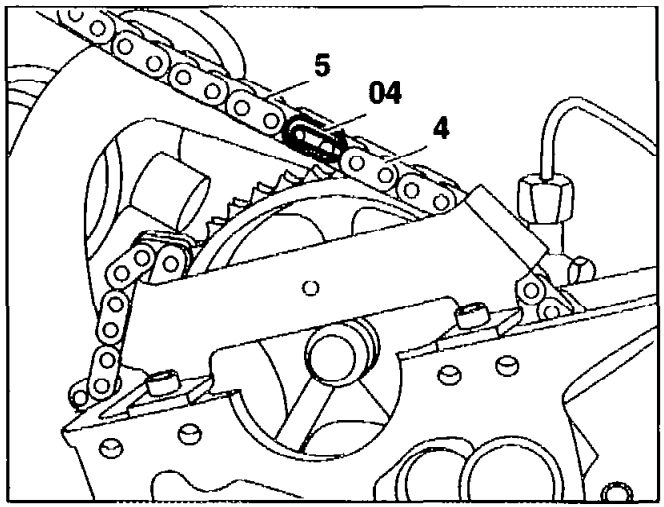
Inserting

9 Connect new timing chain (5) to old timing chain (4) using the connecting link (04) 602 589 02 40 00 and secure.

10 Rotate engine at crankshaft in direction of rotation of engine and draw in new timing chain (5).

11 Remove connecting link (04) and take off old timing chain (4).

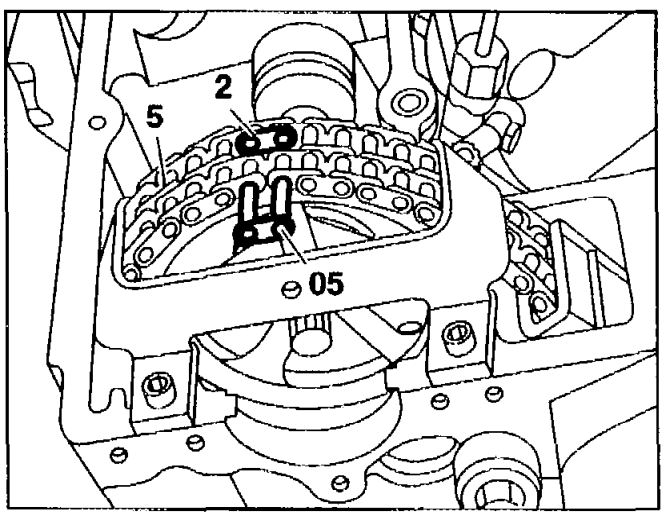
(!) It is essential to remove the connecting link (04). It is only an assembly aid and is not suitable for engine operation.



P05.10-0268-01

Riveting

12 Insert center plate (2) into the timing chain and fix in place with the assembly link (05).



P05.10-0266-01

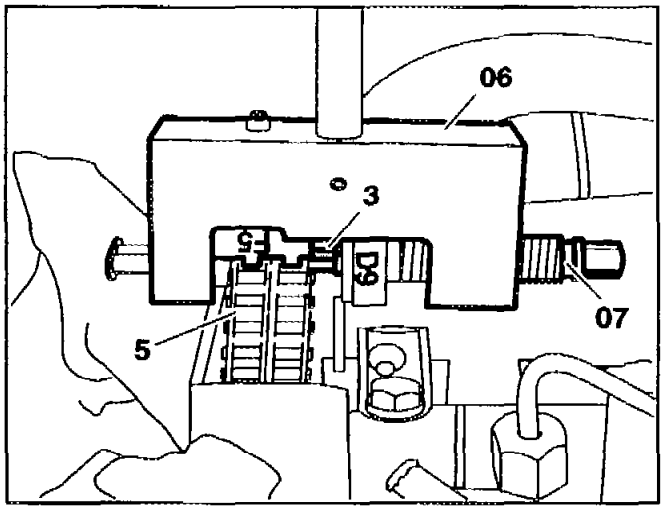
13 Push assembly inserts (F5 and D9) into riveting tool (06) and screw on.

14 Push riveted link (3) into new timing chain (5).

15 Fit riveting tool (06) onto timing chain (5).

16 Rotate spindle (07) and press in riveted link (3) as far as the stop.

17 Take off riveting tool (06).



P05.10-0267-01

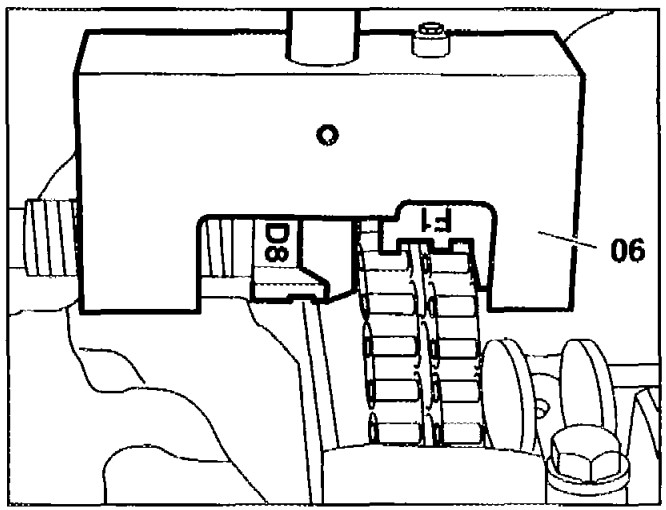
18 Push riveting insert (D8) into riveting tool (06).

19 Insert outer plate of the riveted link into the riveting tool (06) (held by magnet) and press on.

20 Turn over riveting insert (D8) and rivet the pins of the riveted link individually.

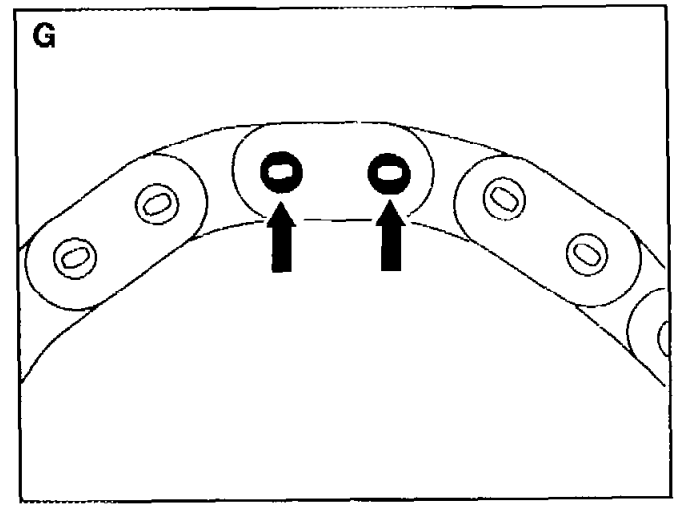
21 Tighten spindle.

i Torque at spindle 30 – 35 Nm (reference value).



P05.10-0265-01

22 Inspect rivets (arrows) and re-rivet if necessary.



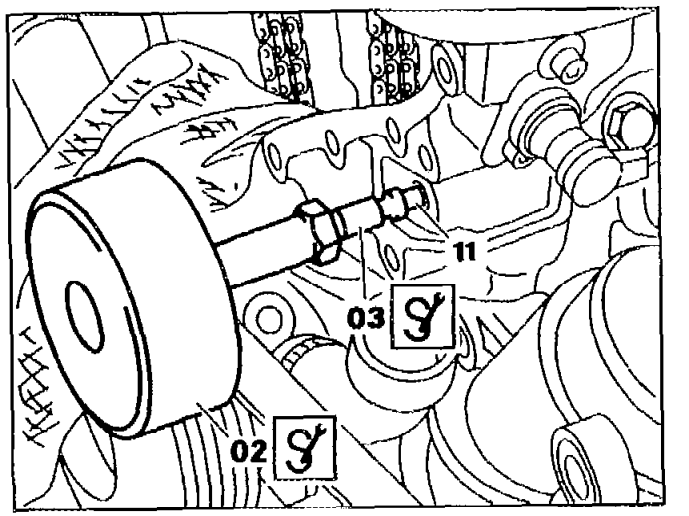
P05.10-0213-01

P15 AR01.30-P-5800-04A	Removing guide rail pin at cylinder head	Engines 111, 604, 605, 606 116 589 20 33 00 Impact puller 116 589 01 34 00 Threaded bolt 605 589 00 33 00 Puller	

A Removing guide rail pin with impact extractor and threaded pin

Use threaded insert (03) and impact extractor (02) to pull out guide rail pin; screw threaded insert (03) into the guide rail pin (11) and pull out with the impact extractor (02).

Shown on engine 111

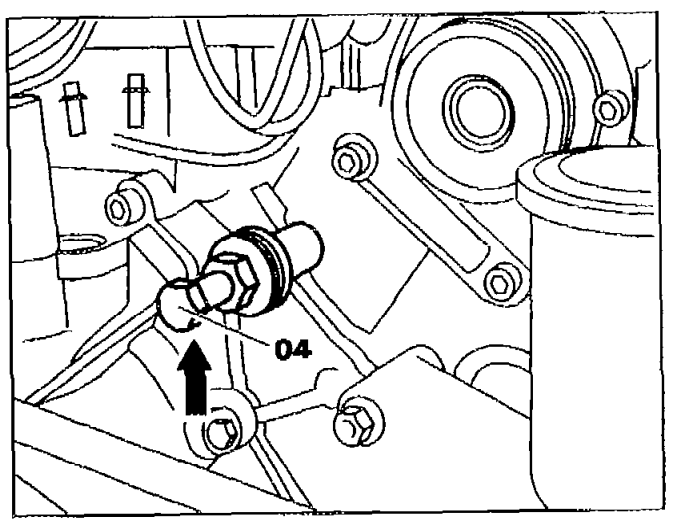


P01.30-0238-01

B Removing guide rail pin with extractor

Screw extractor (04) into guide rail pin, turn hexagon head (arrow) and pull out guide rail pin.

Shown on engine 604



P01.30-0239-01

A16 AR05.20-P-6992-10A	Bolting camshaft housing to cylinder head	Engine 604, 605, 606 as of 09.94	

Nm Camshaft

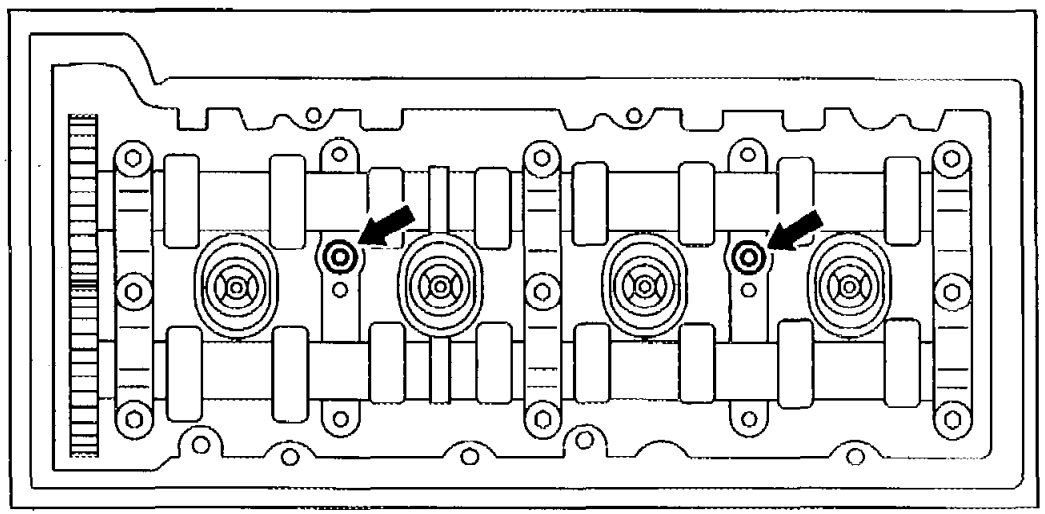
Number	Designation		Engine 604, 605, 606
BA05.20-P-1002-01A	Bolt of camshaft bearing caps	Nm	15
BA05.20-P-1003-01A	Bolt of camshaft housing to cylinder head	Nm	15

Engine 604

1 Unbolt camshaft bearing caps 2 and 4.

2 Bolt on camshaft housing with two bolts (arrows)
Part No. 606 016 03 71 (M7×41).
i Bolts may remain installed.

3 Install camshaft bearing caps.



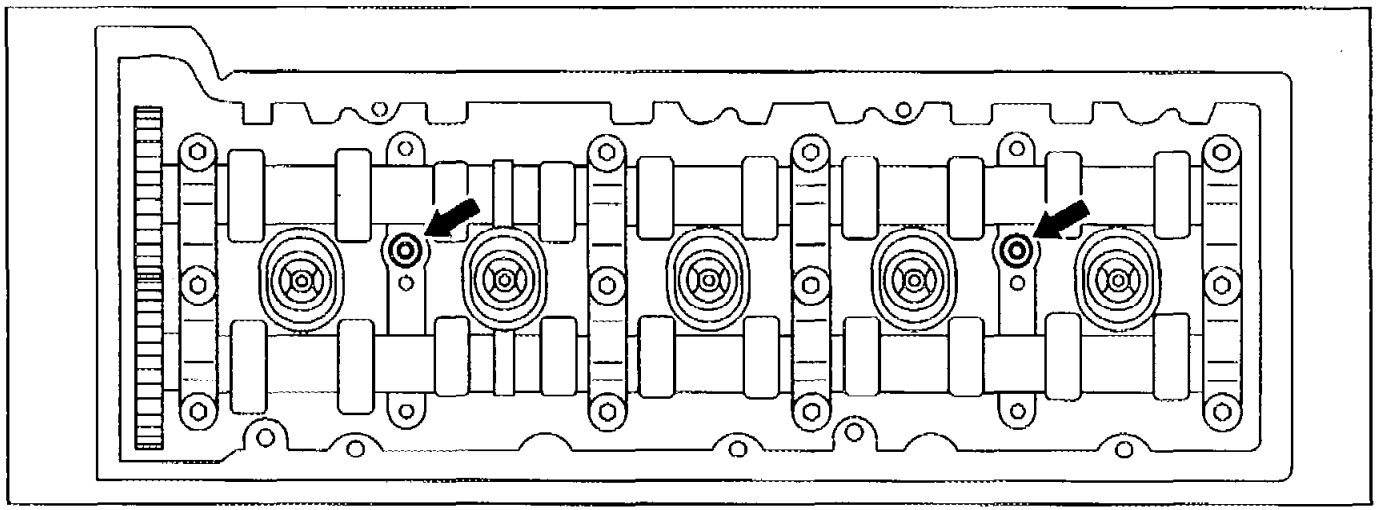
P05.20-0246-10

Engine 605

4 Unbolt camshaft bearing caps 2 and 5.

5 Bolt on camshaft housing with two bolts (arrows)
Part No. 606 016 03 71 (M7×41).
i Bolts may remain installed.

6 Install camshaft bearing caps.



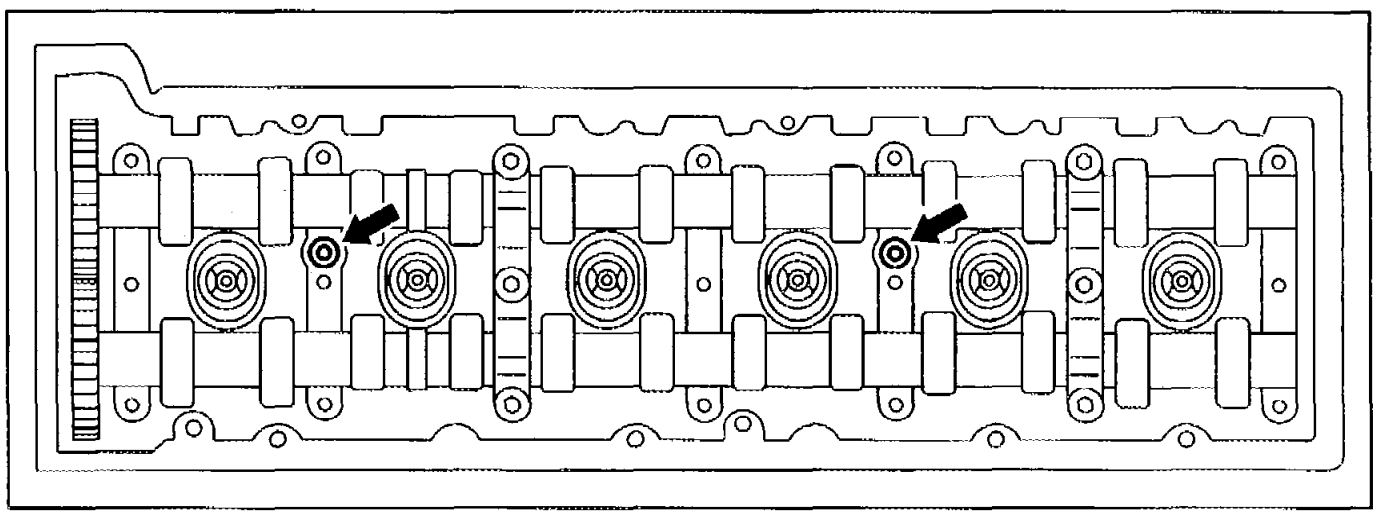
P05.20-0247-04

Engine 606

7 Unbolt camshaft bearing caps 2 and 5.

8 Bolt on camshaft housing with two bolts (arrows)
Part No. 606 016 03 71 (M7×41).
i Bolts may remain installed.

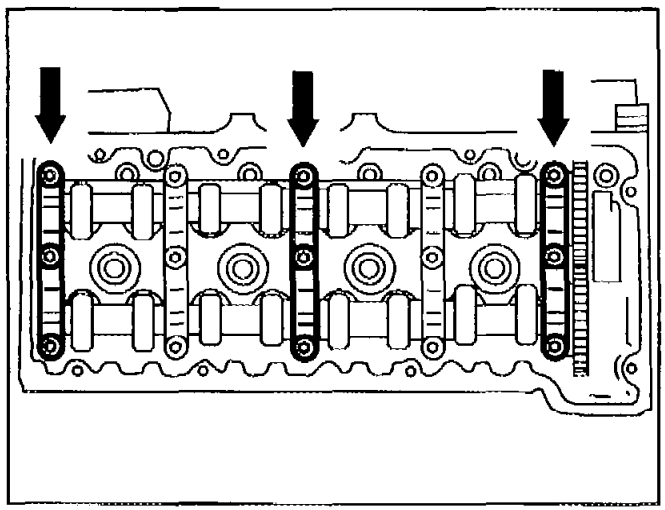
9 Install camshaft bearing caps.



P05.20-0248-04

C16 AR05.20-P-6992-05HA	Unbolting camshaft bearing caps	Engine 604 Pay attention to marking of camshaft bearing caps!	

1 Remove camshaft bearing caps except at bearing points 2 and 4 (arrows).

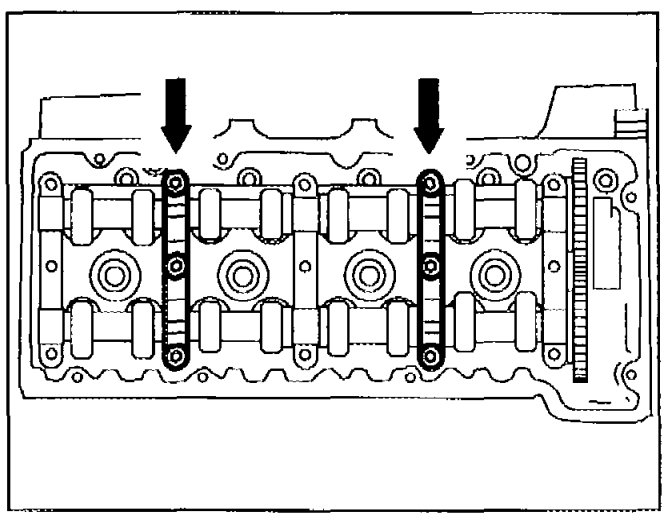


P05.20-0007-01

2 Slacken bolts of camshaft bearing caps 2 and 4 (arrows) in stages of a single turn until the counter-pressure is eliminated.

The camshafts must not be twisted when slackening the camshaft bearing caps.

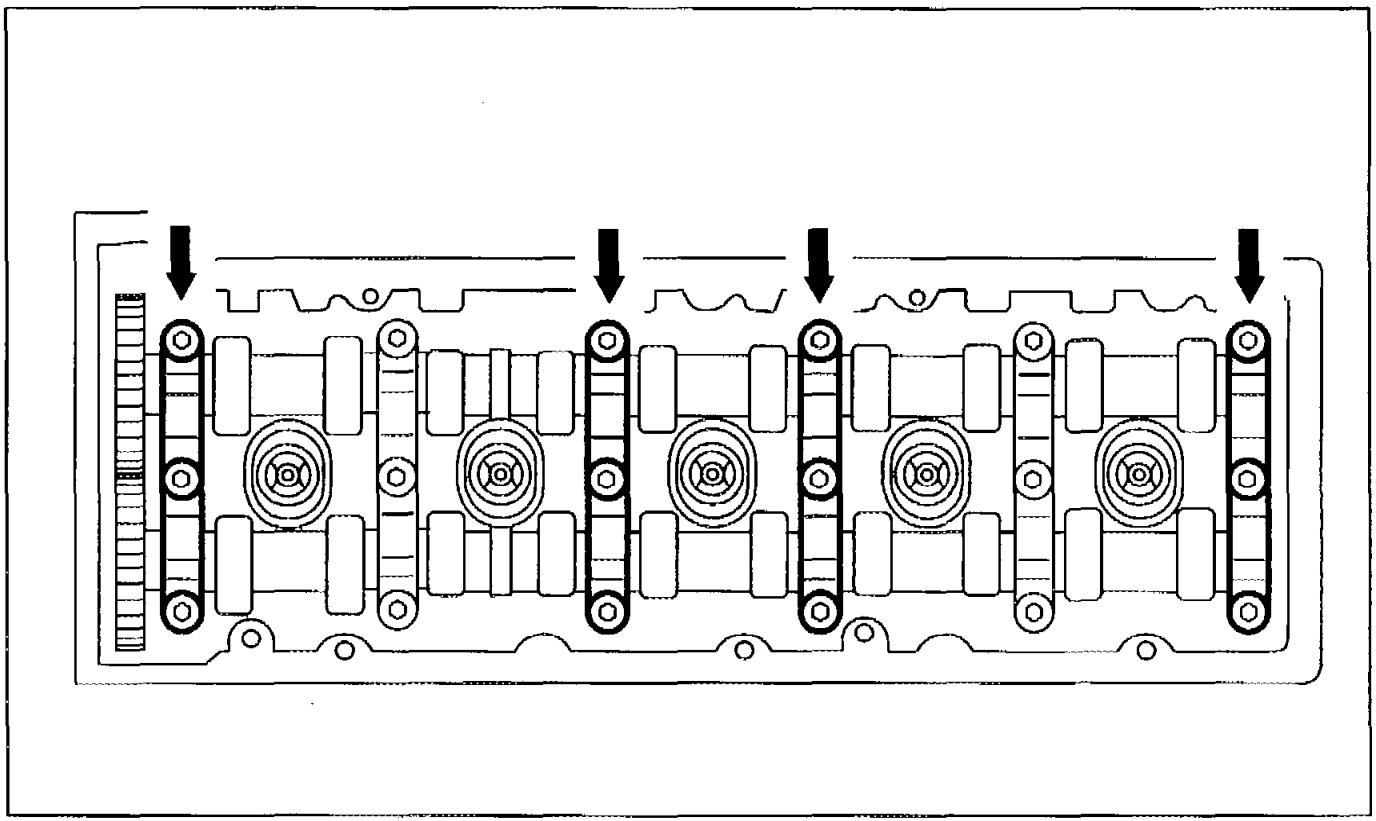
3 Remove camshaft bearing caps (arrows).



P05.20-0006-01

D16 AR05.20-P-6992-05HB	Unbolting camshaft bearing caps	Engine 605 Pay attention to marking of camshaft bearing caps!	

1 Remove camshaft bearing caps except at bearing points 2 and 5 (arrows).



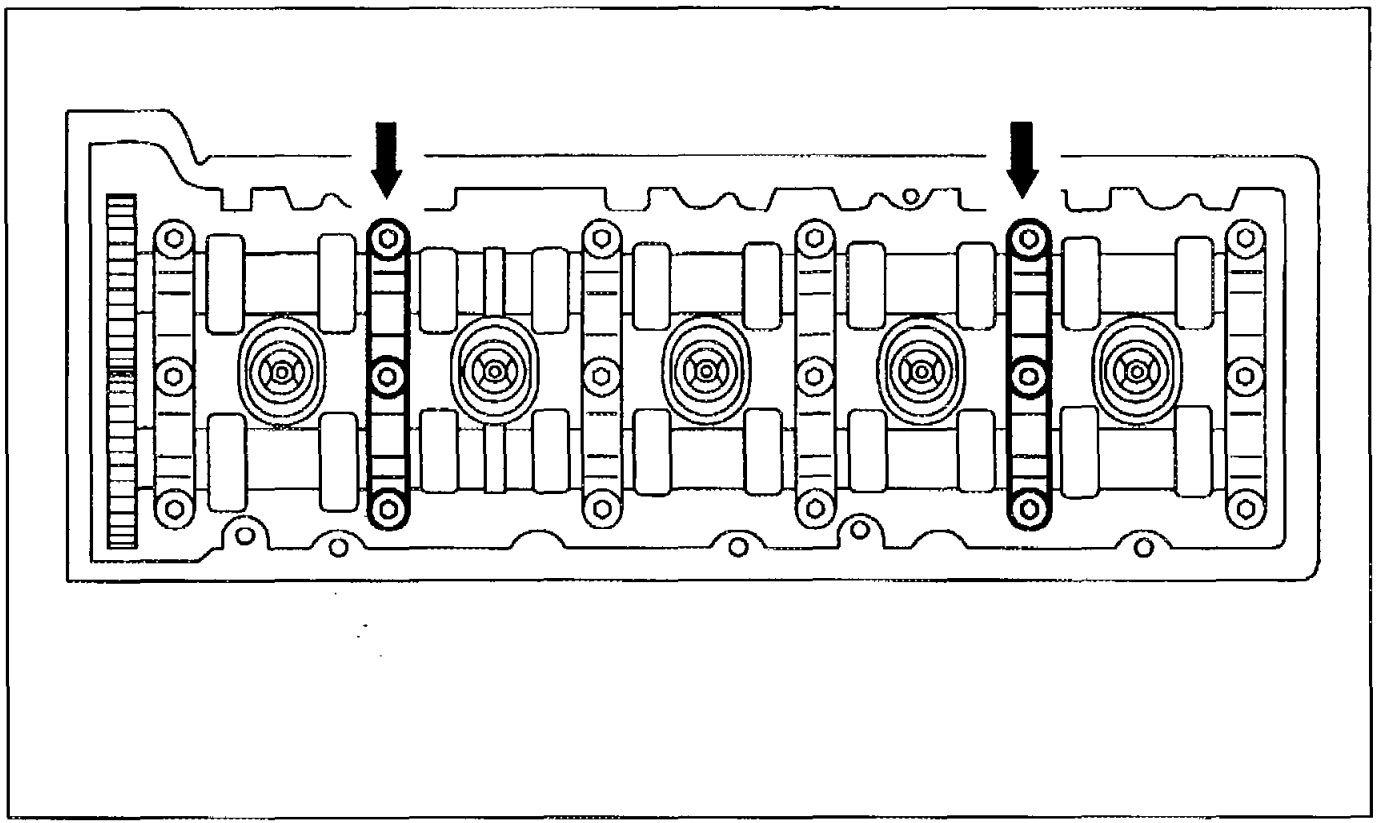
P05.20-0018-05

2 Slacken bolts of camshaft bearing caps 2 and 5 (arrows) in stages of a single turn until the counter-pressure is eliminated.

⚠

The camshafts must not be twisted when slackening the camshaft bearing caps.

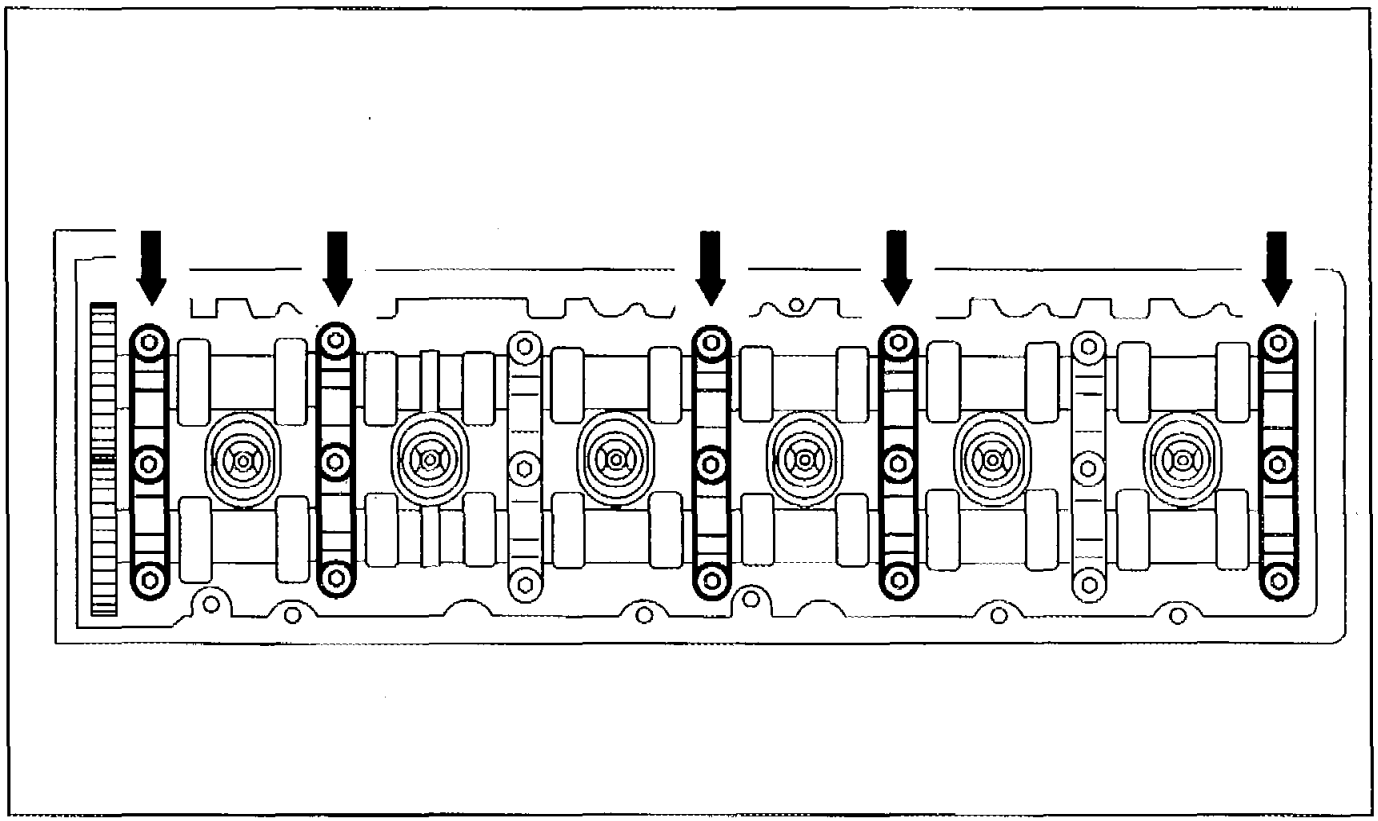
3 Remove camshaft bearing caps (arrows).



P05.20-0200-05

F16 AR05.20-P-6992-05HC	Unbolting camshaft bearing caps	Engine 606 Pay attention to marking of camshaft bearing caps!	

1 Remove camshaft bearing caps except at bearing points 3 and 6 (arrows).

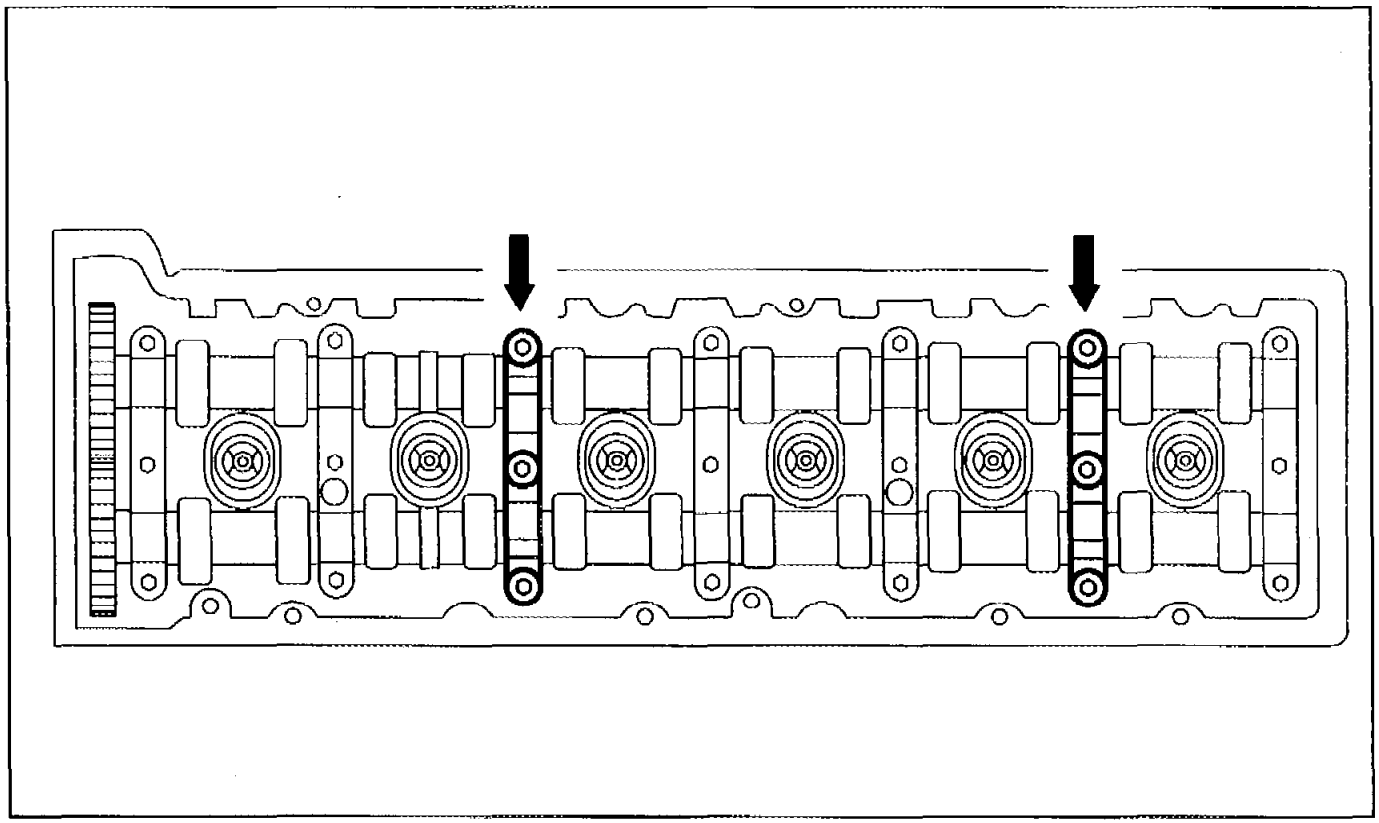


P05.20-0203-05

2 Slacken bolts of camshaft bearing caps 3 and 6 (arrows) in stages of a single turn until the counter-pressure is eliminated.

The camshafts must not be twisted when slackening the camshaft bearing caps.

3 Remove camshaft bearing caps (arrows).



P05.20-0204-05

H16 AR01.00-P-1300-01HA	Connecting cylinder leaktightness tester	602 589 00 63 00 Connector 604 589 00 63 00 Connector 602 589 00 25 00 Adapter	

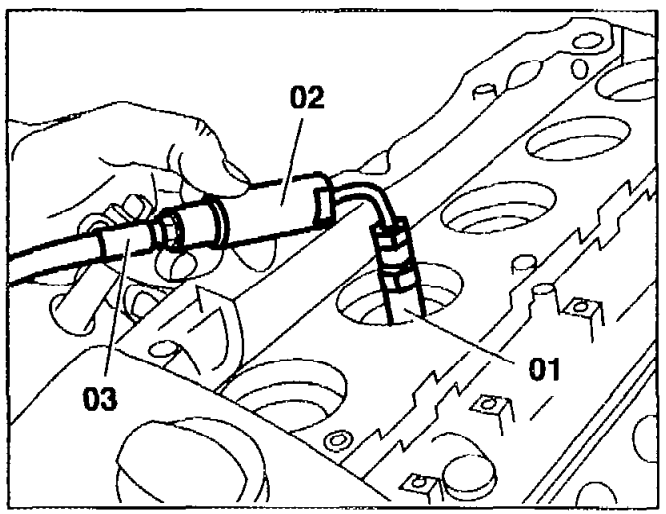
Commercially available tools (see Workshop Equipment Manual)

Number	Designation	Make (e.g.)	Order number
WH58.30-Z-1030-05A	Cylinder leaktightness tester	Bosch	0 681 001 901 EFAW 210 A
WH58.30-Z-1002-05A	M22×1.5 mm/ R1/4" connection for injection nozzle	Bosch	604 589 06 63 00

A Cylinder head cover fitted

1 Screw long connector (01) 604 589 00 63 with the right-angled connection piece (02) into the prechamber of the cylinder to be tested.

2 Calibrate cylinder leaktightness tester and screw connection hose (03) of the tester onto the connection piece (02).

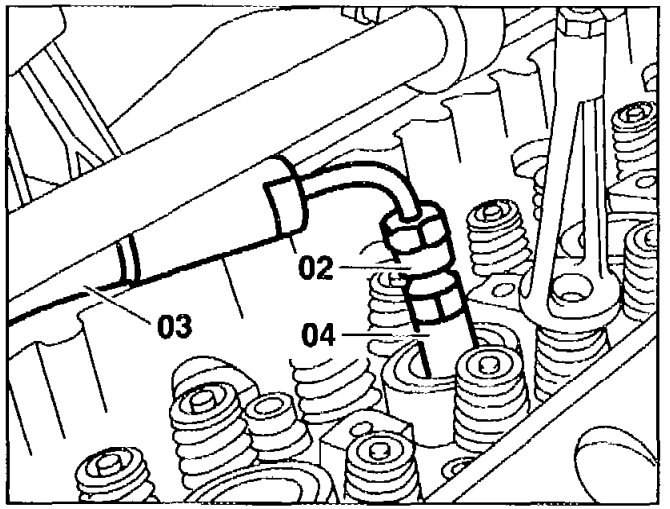


P01.00-0215-01

B Cylinder head cover or camshaft housing removed

1 Screw short connector (04) 602 589 00 63 00 with the angled connection piece (02) into the prechamber of the cylinder to be tested.

2 Calibrate cylinder leaktightness tester and screw connection hose (03) of the tester onto the connection piece (02).

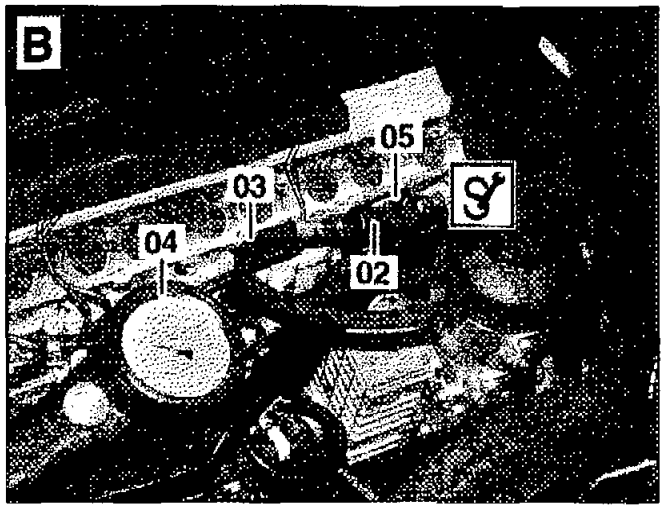


P01.00-0216-01

C Glow plugs removed

1 Screw connector (05) 602 589 00 25 00 with the angled connection piece (02) into the glow plug hole of the cylinder to be tested.

2 Calibrate cylinder leaktester and screw connection hose (03) of the tester onto the connection piece (02).

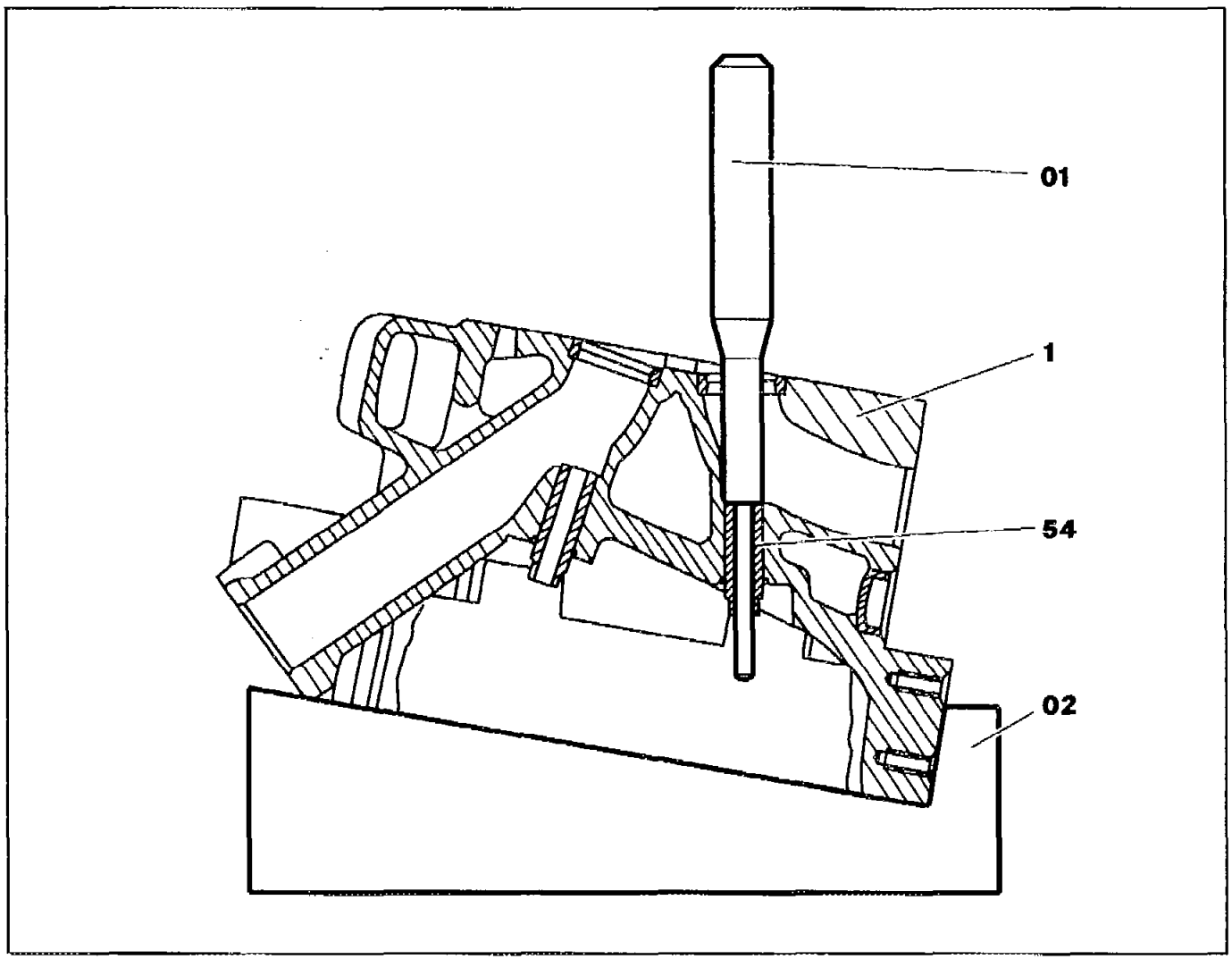


P01.00-2037-01

K16 AR05.30-P-3731-01A	Knocking out valve guide	Engine 604, 605, 606 606 589 00 31 00 Supports (1 pair) 606 589 00 15 00 Drift punch 111 589 02 15 00 Drift punch	

1 Place cylinder head (1) on the supports (02) 606 589 00 31 00

2 Use drift (01) 606 589 00 15 00 ∅ 6 mm or 111 589 02 15 00 ∅ 7 mm to knock out valve guides (54) from the combustion chamber end.



P05.30-0246-06

L16 AR05.30-P-3731-02A	Reaming basic bore to standard size I	Engine 604, 605, 606 606 589 00 31 00 Supports (1 pair) 119 589 00 53 00 Reamer	

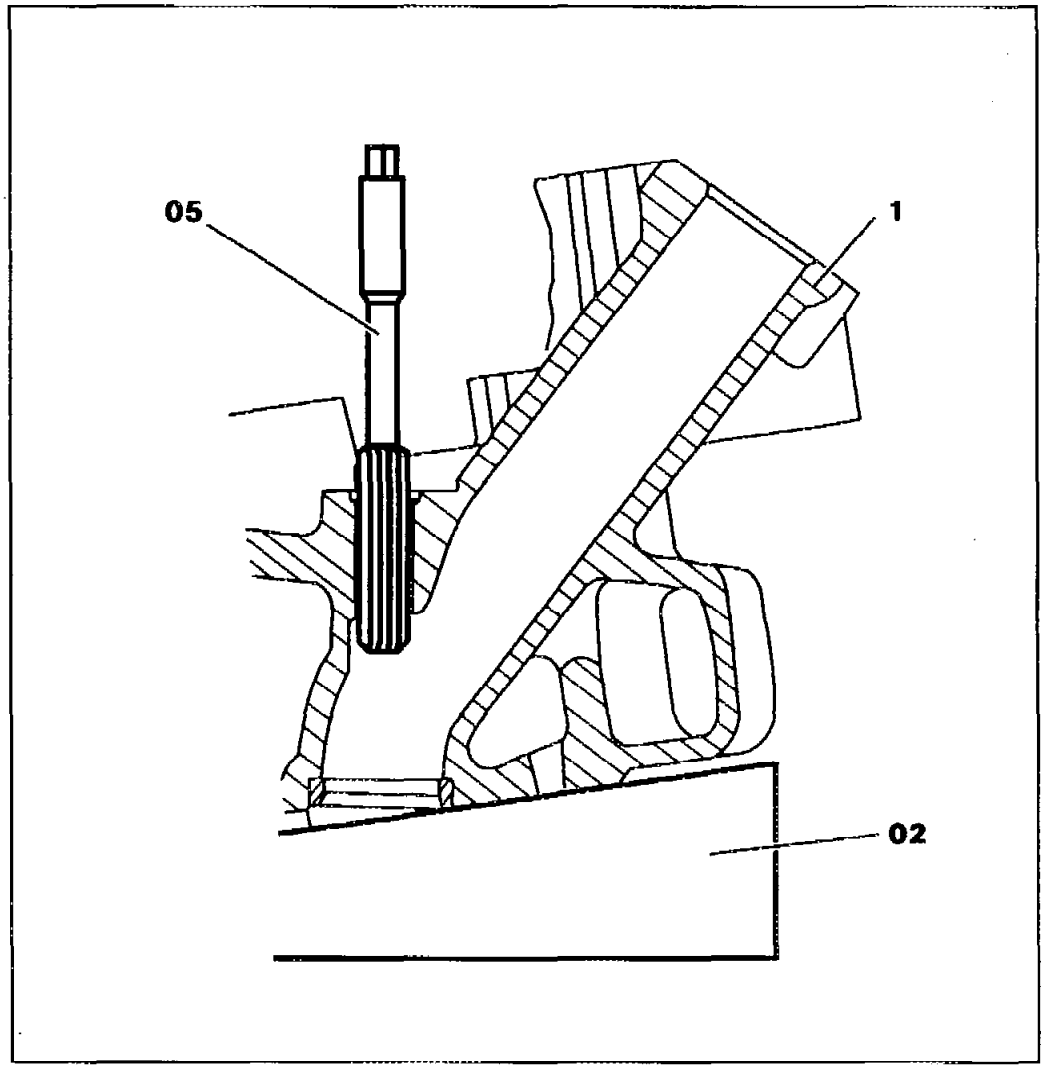
Test data of valve guides

Number	Designation			Engine 604, 605, 606 1st version up to 11.94	Engine 604, 605, 606 2nd version as of 11.94
BE05.30-P-1001-02A	Valve guide basic bore in cylinder head	Standard size	mm	12.5-12.51	12.5-12.51
		Standard size I	mm	12.53	12.53
		Repair size I	mm	12.70	12.70

1 Place cylinder head (1) on the supports (02) 606 589 00 31 00.

2 Ream basic bore with reamer (05) 119 589 00 53 00 to standard size I. Lubricate with petroleum when performing this step. Use only slight pressure for reaming and do not tilt reamer (05).
Clean blades of reamer before each reaming operation.

i Standard size valve guides are not supplied as replacement parts as the overlap which would exist when they are installed would not be sufficient.



P05.30-0247-12

N16 AR05.30-P-3731-04A	Broaching basic bore to repair size I	Engine 604, 605, 606 119 589 05 63 00 Guide sleeve 606 589 00 31 00 Supports (1 pair) 119 589 01 53 00 Broaching tool	

Test data of valve guides

Number	Designation			Engine 604, 605,606 1st version up to 11.94	Engine 604, 605,606 2nd version as of 11.94
BE05.30-P-1001-02A	Valve guide basic bore in cylinder head	Standard size	mm	12.5-12.51	12.5-12.51
		Standard size I	mm	12.53	12.53
		Repair size I	mm	12.70	12.70

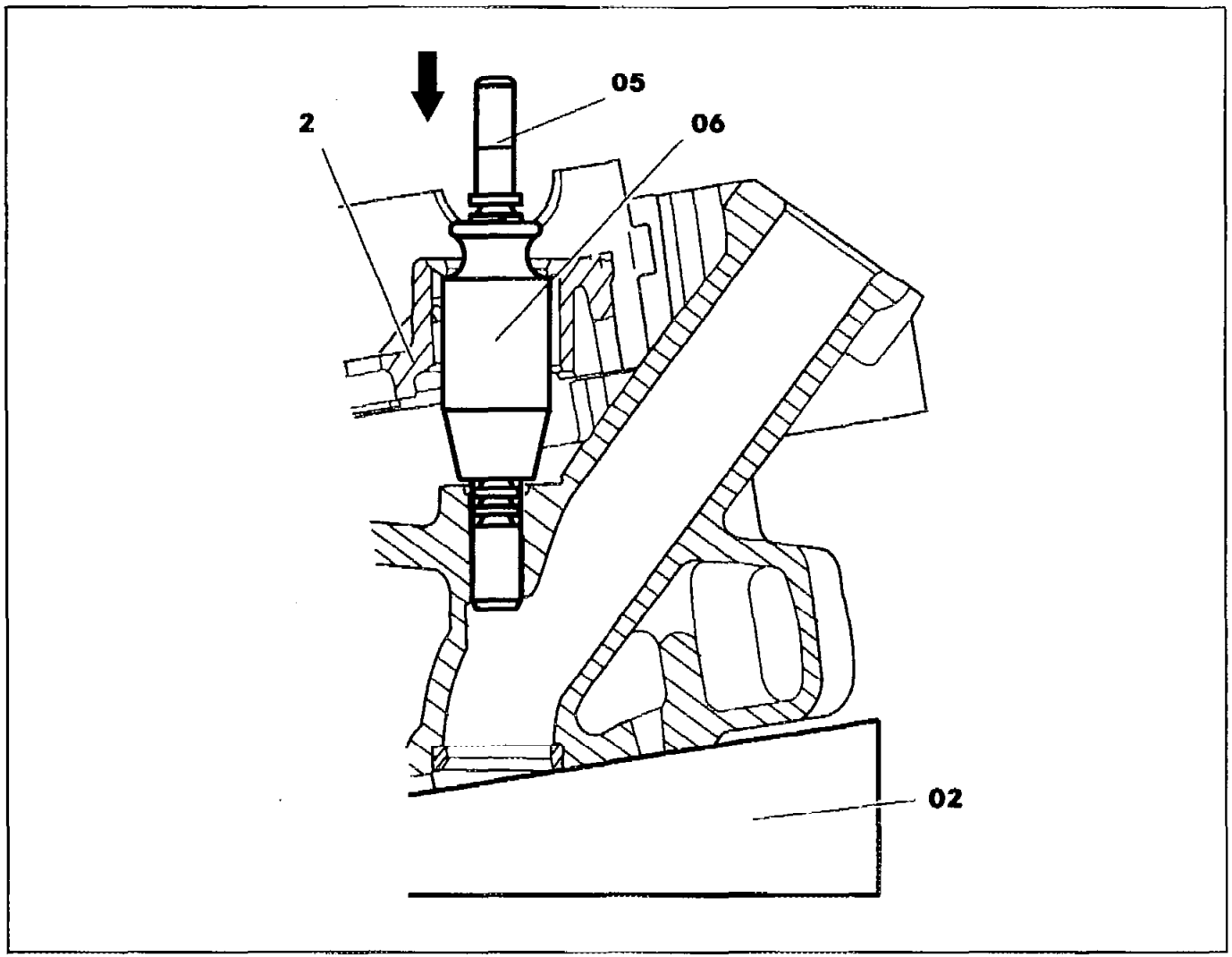
1 Use bolts part no. 606 016 03 71 to bolt camshaft housing (2) to cylinder head.

2 Place cylinder head on supports (02) 606 589 00 31 00.

3 Insert guide sleeve (06) 119 589 05 63 00 together with broaching tool (05) 119 589 01 53 00 into basic bore of bucket tappet.

4 Press broaching tool (05) through.

[i] Lubricate with petroleum when performing this step. Clean broaching tool (05) with compressed air or plastic brush after each broaching operation. Use a suitable aluminium drift as an extension in order to press through the broaching tool (05) in the area of the guide sleeve (06).



P05.30-0248-06

P16 AR05.30-P-3731-03A	Inserting, examining valve guide	Engine 604, 605, 606 606 589 00 53 00 Reamer 102 589 01 53 00 Reamer 606 589 01 15 00 Drift punch 606 589 02 15 00 Drift punch 000 589 10 68 00 Cylinder brush	

Test data of valve guides

Number	Designation			Engine 604, 605, 606 1st version up to 11.94	Engine 604, 605, 606 2nd version as of 11.94
BE05.30-P-1001-02A	Valve guide basic bore in cylinder head	Standard size	mm	12.5-12.51	12.5-12.51
		Standard size I	mm	12.53	12.53
		Repair size I	mm	12.70	12.70
BE05.30-P-1002-02A	Valve guide outer ∅	Standard size	mm	12.54-12.55	12.54-12.55
		Standard size I (color: grey)	mm	12.56-12.57	12.56-12.57
		Repair size I (color: red)	mm	12.74-12.75	12.74-12.75
BE05.30-P-1004-02A	Valve guide inner ∅	Inlet valve guide	mm	6.000-6.015	6.000-6.015
		Exhaust valve guide	mm	6.000-6.015	7.000-7.015
BE05.30-P-1005-02A	Valve guide length	L	mm	37.5	37.5
		Fig. see		AR05.30-P-3731-03A	AR05.30-P-3731-03A
BE05.30-P-1006-02A	Overlap in cylinder head		mm	0.029-0.051	0.029-0.051

Test data of valve guides

Number	Designation			Engine 604, 605, 606 1st version up to 11.94	Engine 604, 605, 606 2nd version as of 11.94
BE05.30-P-1007-02A	Sintered metal mat.	⇒ 1	Inlet valve guide	1	1
	Grey cast iron mat.	⇒ 2	Exhaust valve guide	1	2
BE05.30-P-1009-02A	Dimension		a mm	–	–
			b mm	–	–
			c mm	10.2-10.4	10.2-10.4
			Fig. see	AR05.30-P-3731-03A	AR05.30-P-3731-03A

Nm Camshaft

Number	Designation		Engine 604, 605, 606
BA05.20-P-1003-01A	Bolt of camshaft housing to cylinder head	Nm	15

1 Use two bolts 606 016 03 71 to bolt camshaft housing (2) to cylinder head (1).

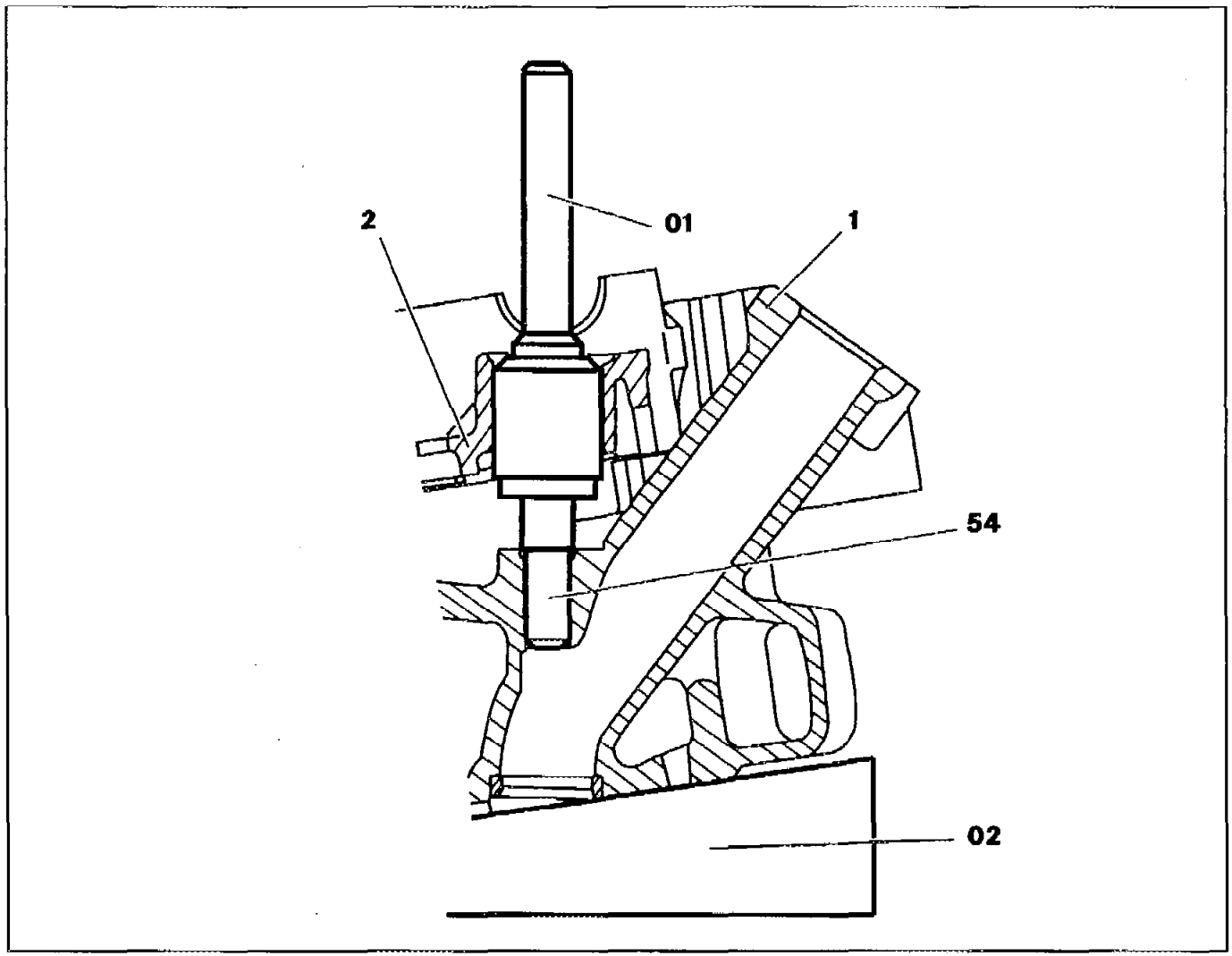
2 Place cylinder head (1) onto the supports (02) 606 589 00 31 00.

3 Moisten outside of valve guides (54) with engine oil.

3 Use insertion drift (01) to knock in valve guides (54).
Inlet, exhaust ∅ 6 mm insertion drift 606 589 01 15 00
Exhaust ∅ 7 mm insertion drift 606 589 02 15 00

i

It is not necessary to heat the cylinder head (1) or to cool the valve guides (54).
The circlip at the valve guides has been discontinued since 11/94. The insertion depth is fixed by the insertion drift.

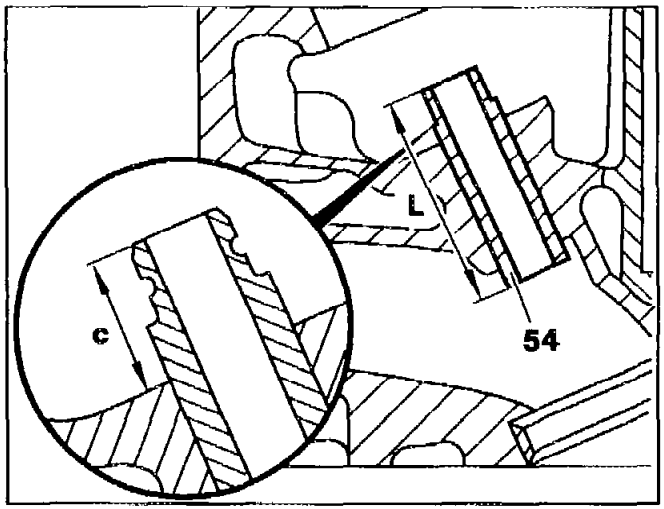


P05.30-0249-06

4 Examine valve guides for signs of burrs and remove with reamer, if necessary.
Reamer 6 mm ∅ 606 589 00 53 00
Reamer 7 mm ∅ 102 589 01 53 00

5 Examine insertion depth (c) of the valve guide (54); adjust to correct insertion depth if necessary.

6 Clean valve guides with cylinder brush 000 589 10 68 00.



P05.30-0253-01

D17 AR05.30-P-4100-01A	Measuring amount by which valve stands back to cylinder head	Engine 604, 605, 606	

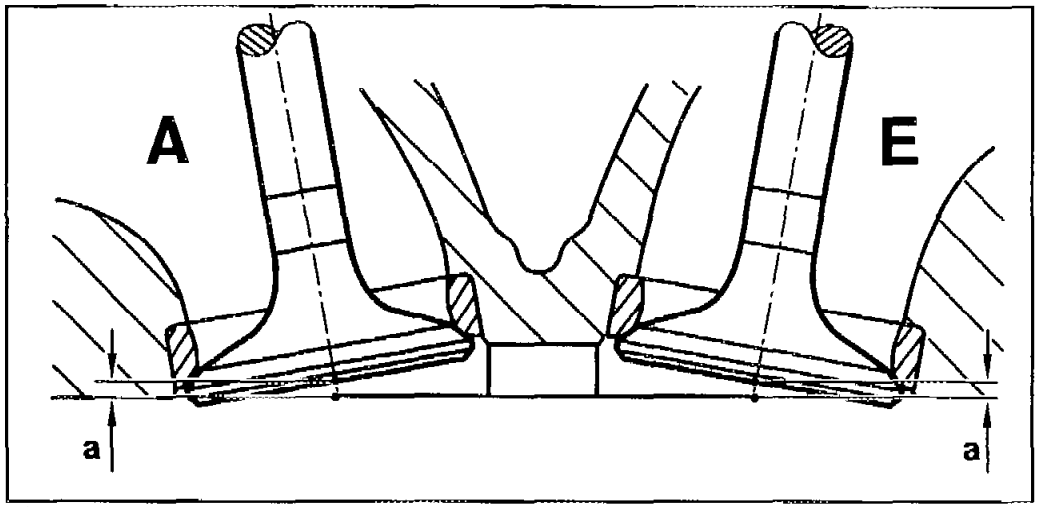
Test data of cylinder head

Number	Designation			Engine 604, 605, 606
BE01.30-P-1008-02A	Amount by which valve stands back (a) with new valves and new valve seat rings	Exhaust valve	mm	1.3–1.7
		Inlet valve	mm	1.3–1.7
		Fig. see		AR01.30-P-7162-01A

Commercially available tools (see Workshop Equipment Manual)

Number	Designation	Make (e.g.)	Order number
WH58.30-Z-1012-12A	Depth caliper gage, range 0 – 200 mm	Stiefelmayer D-73734 Esslingen	040 202

1 Measure amount by which valve stands back (a) using a depth caliper gage.

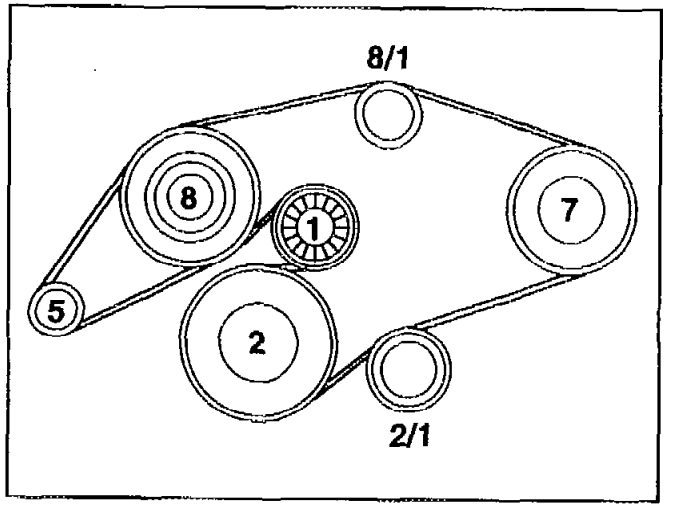


P05.30-0336-10

F17 AR13.22-P-3902-02HA	Poly V-belt running diagram		

6-groove single-belt drive, ***without AC compressor engine 602.982***

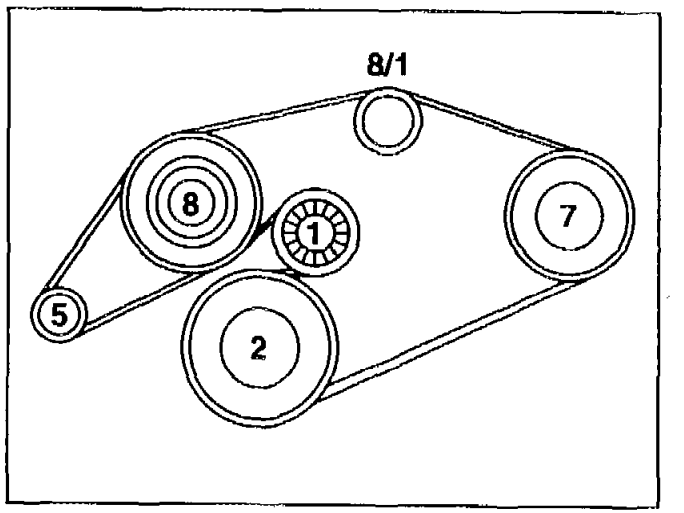
1 Tensioning pulley
2 Crankshaft
2/1 Bottom guide pulley, smooth running surface
5 Generator
7 Power steering pump
8 Coolant pump
8/1 Top guide pulley, grooved running surface



P13.00-0201-01

6-groove single-belt drive, ***without AC compressor engine 602.982***

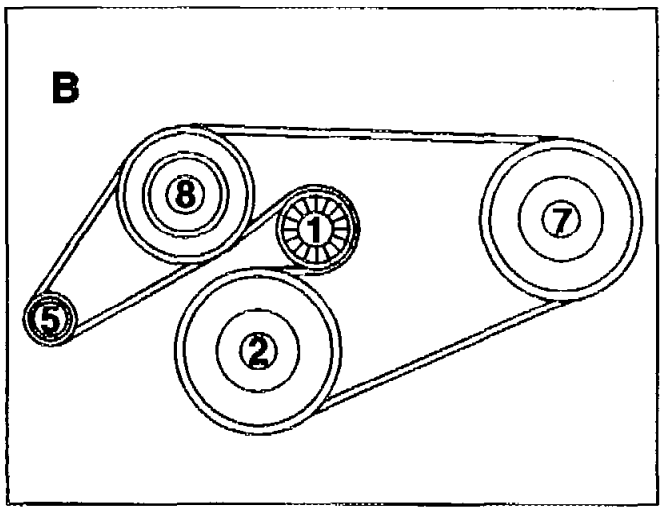
1 Tensioning pulley
2 Crankshaft
5 Generator
7 Power steering pump
8 Coolant pump
8/1 Top guide pulley, grooved running surface



P13.22-0284-01

6-groove single-belt drive, ***without AC compressor engine 604/605/606***

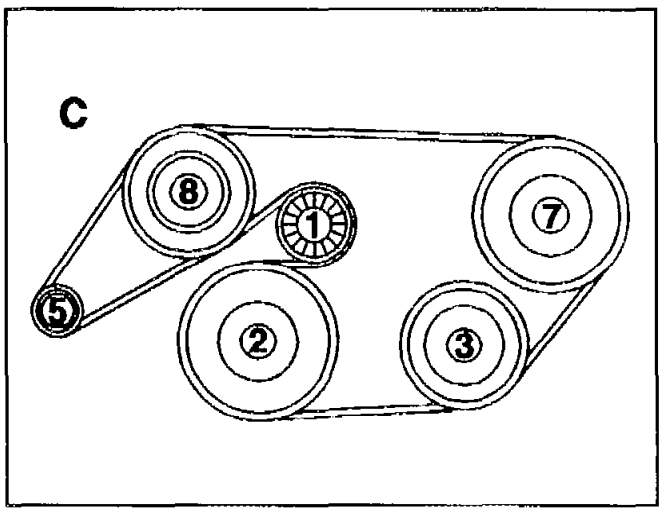
1 Tensioning pulley
2 Crankshaft
5 Generator
7 Power steering pump
8 Coolant pump



P13.22-0011-01

6-groove single-belt drive, ***with AC compressor engine 602.982/604/605/606***

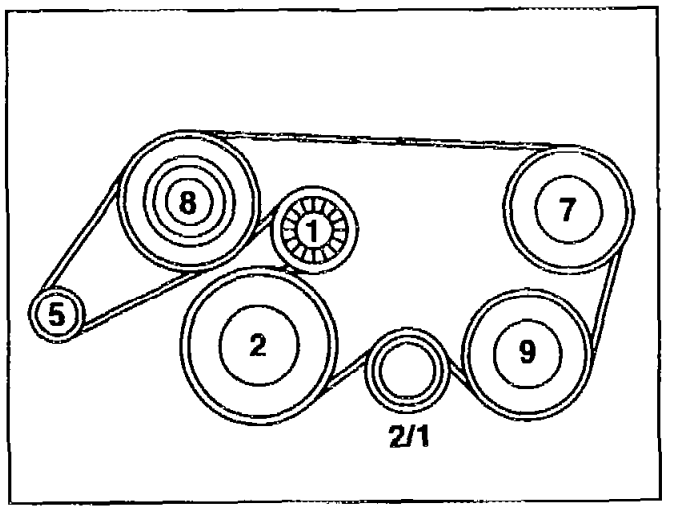
1 Tensioning pulley
2 Crankshaft
3 AC compressor
5 Generator
7 Power steering pump
8 Coolant pump



P13.22-0010-01

6-groove single-belt drive, ***with AC compressor engine 602.983***

1 Tensioning pulley
2 Crankshaft
2/1 Bottom guide pulley, smooth running surface
5 Generator
7 Power steering pump
8 Coolant pump
9 AC compressor



P13.22-0274-01

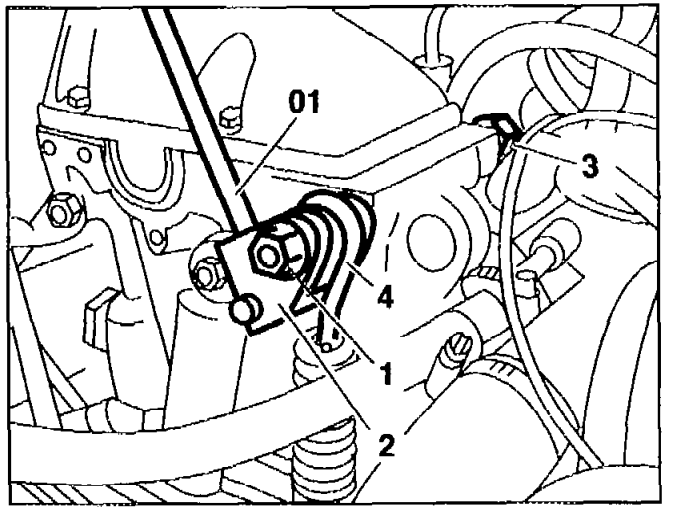
J17 AR13.22-P-3902-04HA WF	Tension poly V-belt	Lever for pressing spring tensioning lever Poly V-belt tensioning device	WF58.50-P-3902-01A

1 Push spring tensioning lever (2) onto bolt at cylinder head.

2 Attach tension spring (4) to the tensioning device and spring tensioning lever (2).

3 WF Use the lever (01) to press the spring tensioning lever (2) slightly to the left until the bolt (3) can be inserted.

4 Tighten nut (1).



P13.22-0204-01