




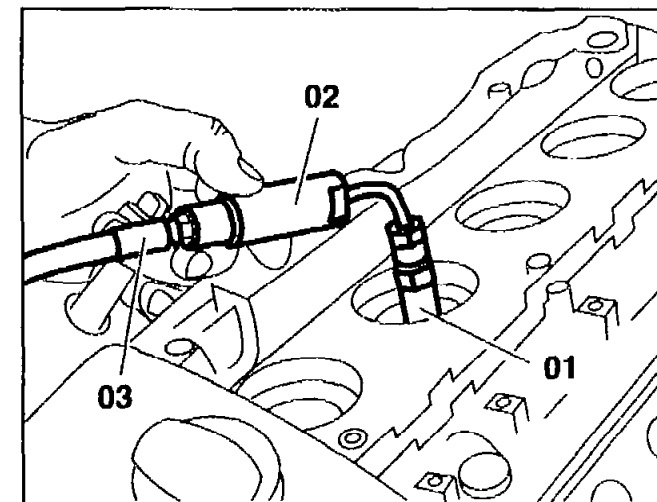
E14 AR01.00-P-1300-01HA	Connecting cylinder leaktightness tester	 602 589 00 63 00 Connector  604 589 00 63 00 Connector  602 589 00 25 00 Adapter	
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Commercially available tools (see Workshop Equipment Manual)

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

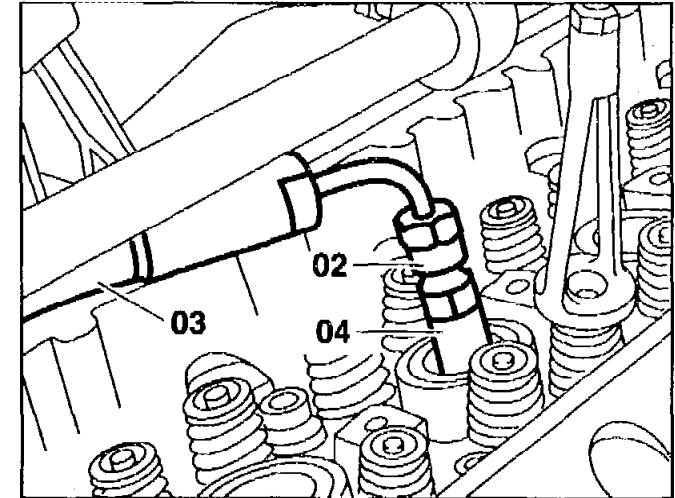
A Cylinder head cover fitted

- 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).



B Cylinder head cover or camshaft housing removed

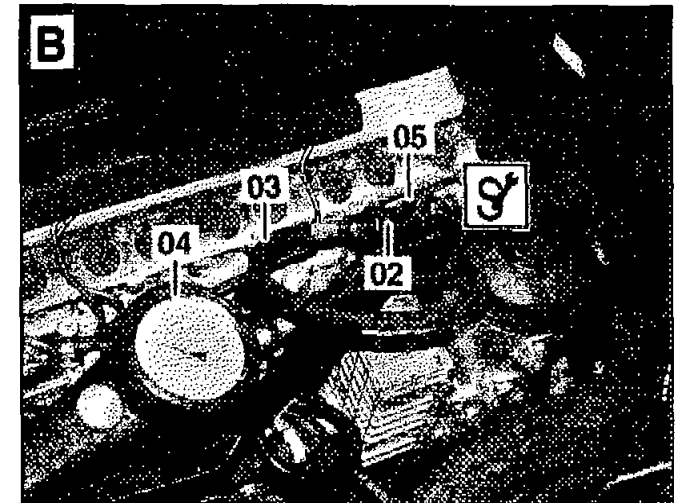
- 1 Screw short connector (04) 602 589 00 63 00 with the angled connection piece (02) into the prechamber of the cylinder to be tested.
- 2 Calibrate cylinder leaktightness tester and screw connection hose (03) of the tester onto the connection piece (02).



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).

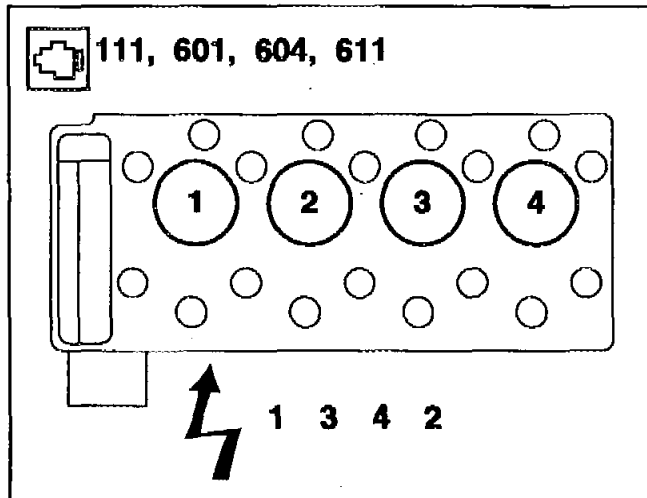


P01.00-2037-01

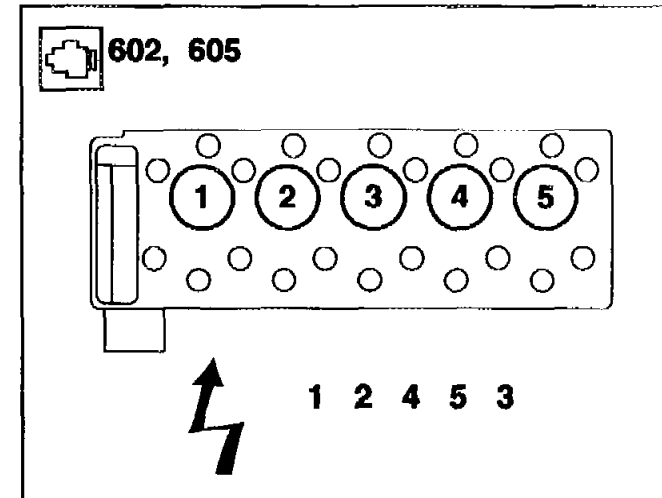


G14	AR01.00-P-1300-03HA	Firing order		
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Firing order

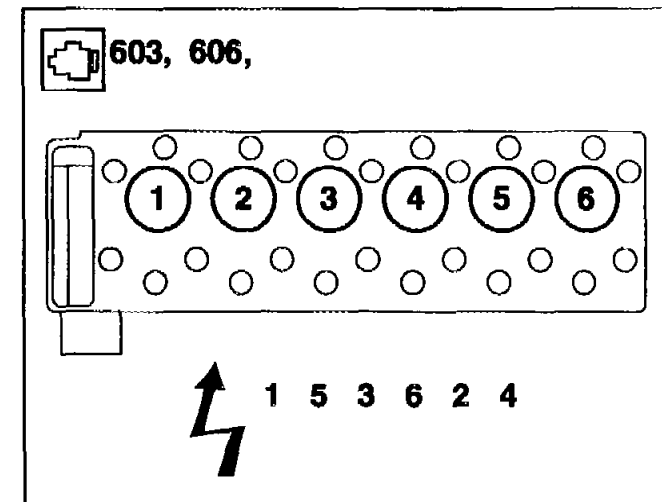


P01.00-0033-01



P01.00-0031-01

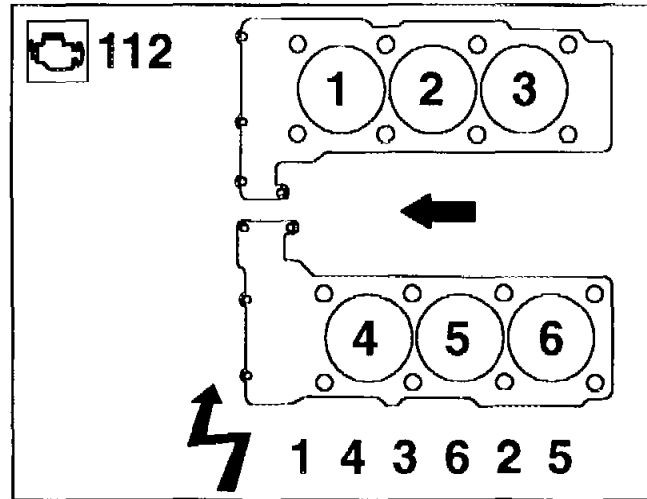
Firing order



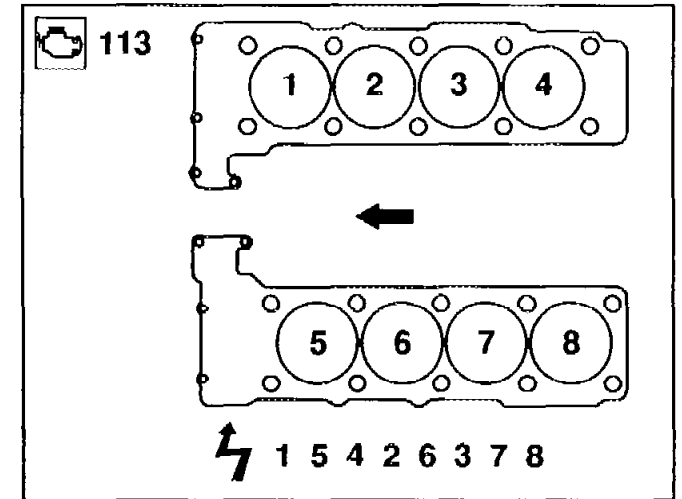
P01.00-0204-01



Firing order

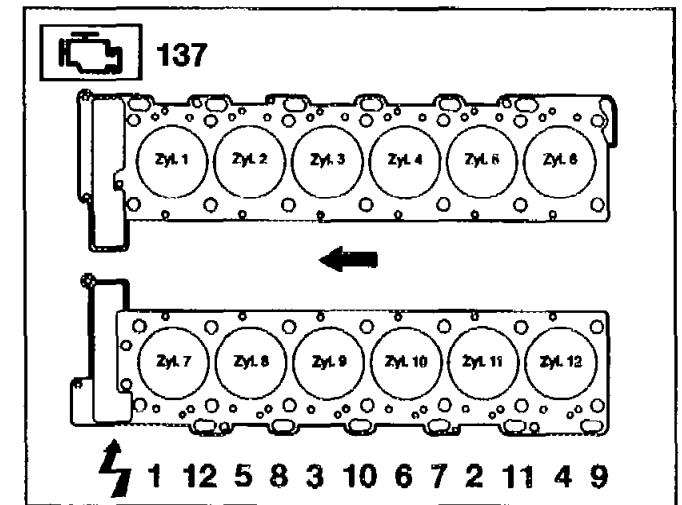


P01.10-0311-01



P01.00-0457-01

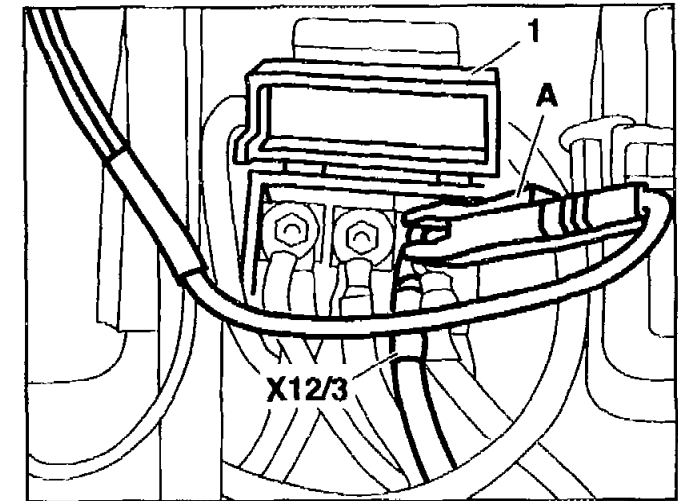
Firing order



P01.00-2116-01

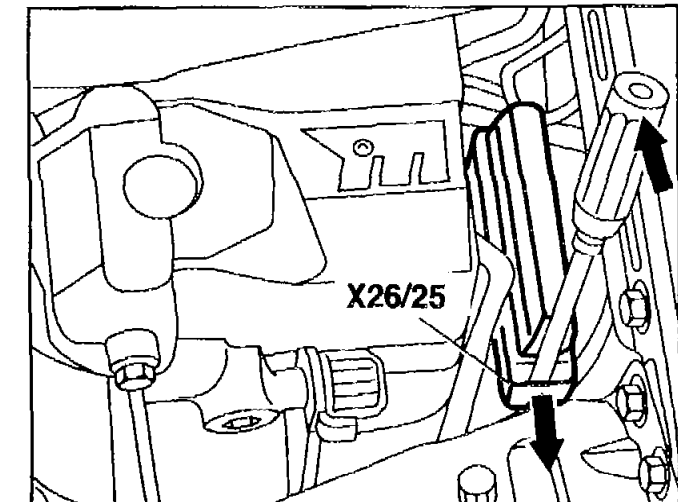
J14 AR01.10-P-0010-01A	Connecting compression tester	☞ 201 589 00 99 00 Electrical connecting set ☞ 001 589 76 21 00 Compression recorder	
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- 1 Fold open cover (1) of the terminal block (X12/3) at the left wheelhouse next to the fuse and relay box.
- 2 Connect clamp (A) of the ☞ compression tester to the terminal block (X12/3).





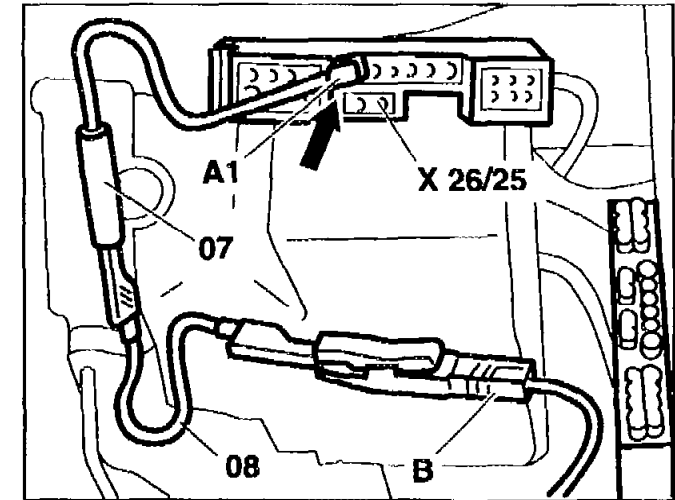
P01.10-0220-01

- 3 Remove cover above engine/body plug connection (X26/25) at the front left wheelhouse.
- 4 Pull locking plate of the plug connection (X26/25) forward.
- 5 Unplug connector of the engine/body plug connection (X26/25).



P01.10-0221-01

- 6 Plug in  adapter cable (07) at pin A1 (arrow) of connector (X26/25).
- 7 Connect  adapter cable (07) with cable (08) to the clamp (B) of the compression tester.

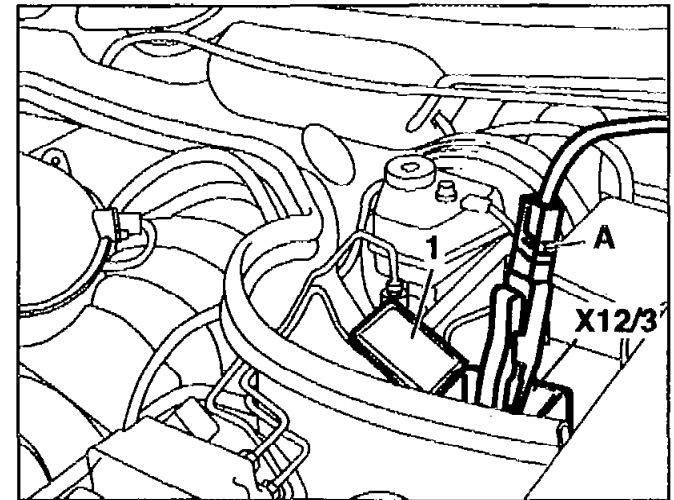


P01.10-0222-01

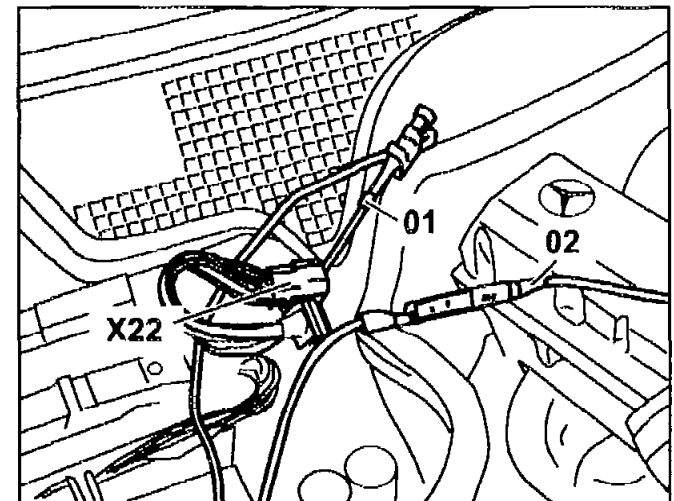
L14 AR01.10-P-0010-01HW	Connecting compression tester	☞ 201 589 00 99 00 Electrical connecting set ☞ 001 589 76 21 00 Compression recorder	
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Shown on Model 210

- 1 Open cover (1) of terminal block (X12/3) at left wheelhousing.
- 2 Connect terminal clamp of ☞ compression tester (A) to the terminal block (X12/3).
- 3 Remove trim panel above engine component compartment.
- 4 Unplug connector of plug connection (X22) (circuit 50).
- 5 Connect clamp of cable (01) to pin 1 of plug connection (X22) circuit 50.
- 6 Connect cable (01) to cable (02) of the compression tester.



P01.10-0232-01

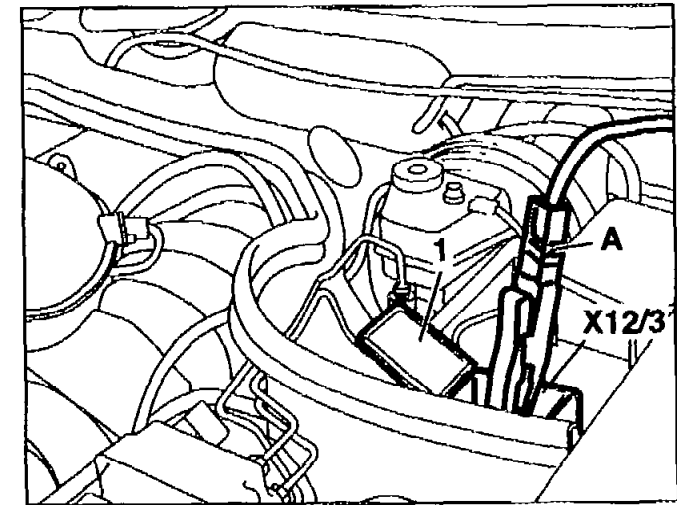


P01.10-0378-01

M14 AR01.10-P-0010-01BG	Connecting compression tester	☞ 001 589 76 21 00 Compression recorder ☞ 201 589 00 99 00 Electrical connecting set ☞ 124 589 36 63 00 Adapter line	
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Connecting power supply to compression tester

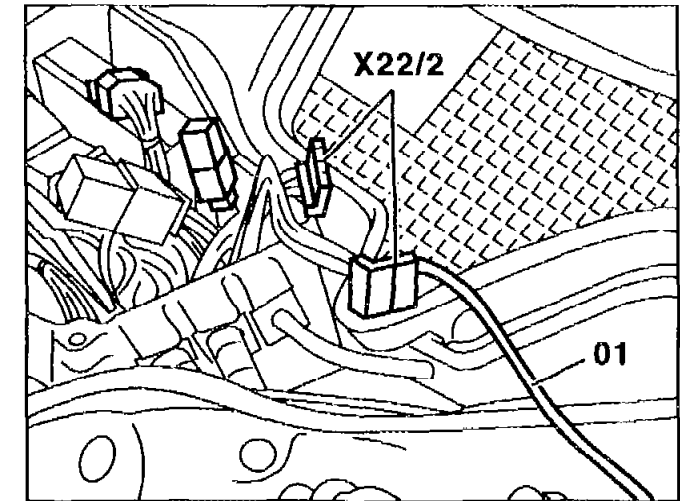
- 1 Open cover (1) of terminal block (X12/3) at left wheelhousing.
- 2 Connect clamp (A) of ☞ compression tester to terminal block (X12/3).



P01.10-0232-01

Models up to approx. 06/97

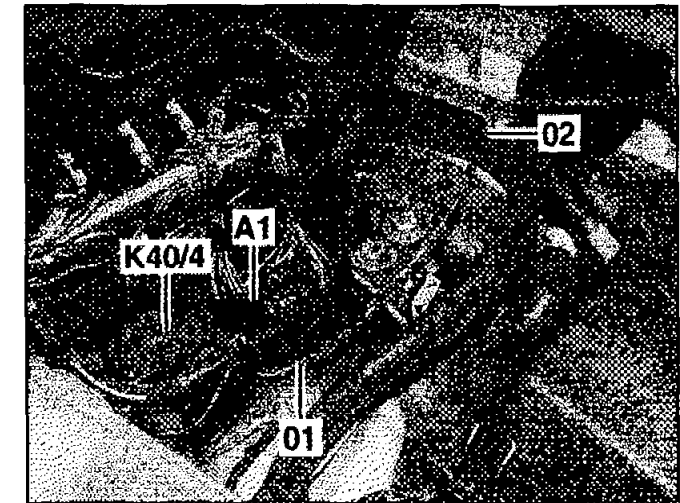
- 3.1 Separate plug connection (X22/2) of engine compartment / engine circuit 50 in right of component compartment.
- 4.1  Connector adapter cable (01) with plug connection (X22/2).
- 5.1 Connect cable (01) to cable of compression tester.



P01.10-0233-01

Models as of approx. 06/97

- 3.2 Detach connector (A1) at fuse and relay module (K40/4) in right of component compartment.
- 4.2 Connect cable (1) to female connector (A1) of contact 6.
- 5.2 Connect cable (1) to cable (2) of compression tester.



P01.10-0392-01

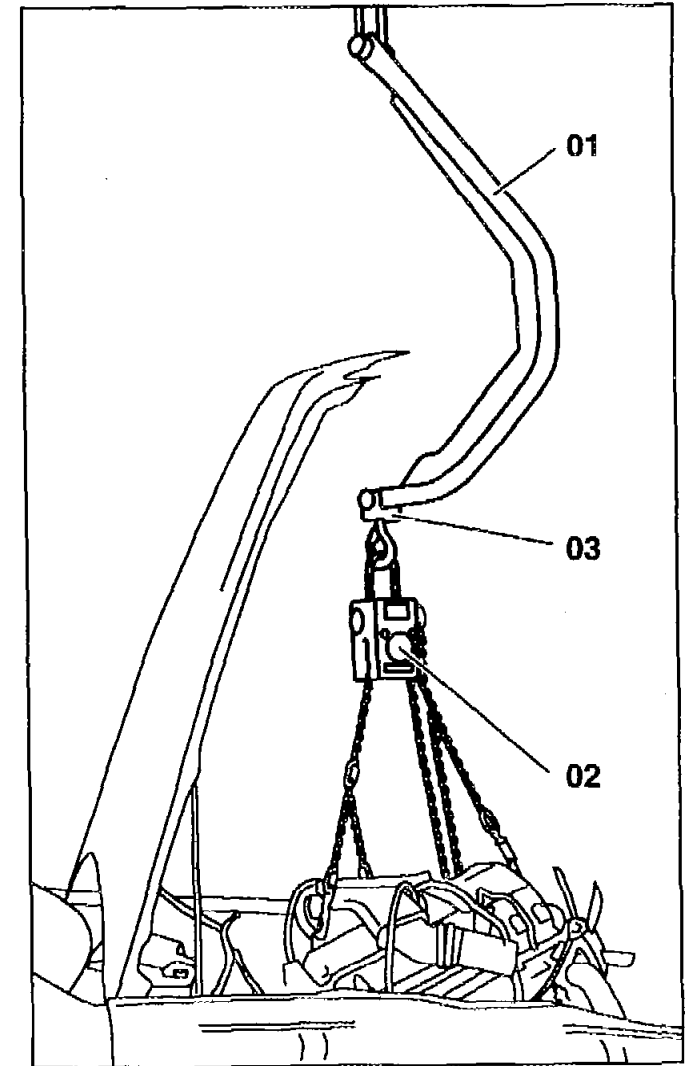


O14	AR01.10-P-2400-01A	Removing and installing engine with removal fixture		
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Commercially available tools (see Workshop Equipment Manual)

Number	Designation	Make (e.g.)	Order number
WH58.30-Z-1015-07A	Engine hoist (self-locking)	Bäcker Herderstraße D-42853 Remscheid	3188
WH58.30-Z-1003-07A	Engine supporting arm	Erwin Schairer GmbH Keltenstraße 9 D-72459 Meßstetten	0304.01.001
WH58.30-Z-1004-07A	Hook mount	Erwin Schairer GmbH Keltenstraße 9 D-72459 Meßstetten	0304.01.005

- 1 Remove engine using engine hoist (02), hook mount (03) and engine supporting arm (01).
On model 461 it is possible to do without the engine supporting arm as the hood can be raised as far as the windscreen.




P01.10-0338-03

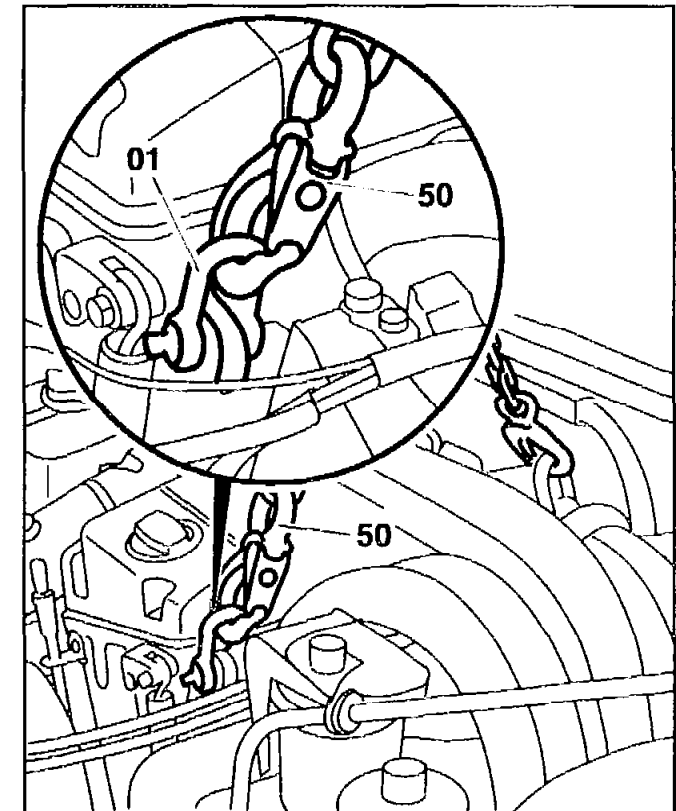


A15	AR01.10-P-7500-03HA	Raising engine		
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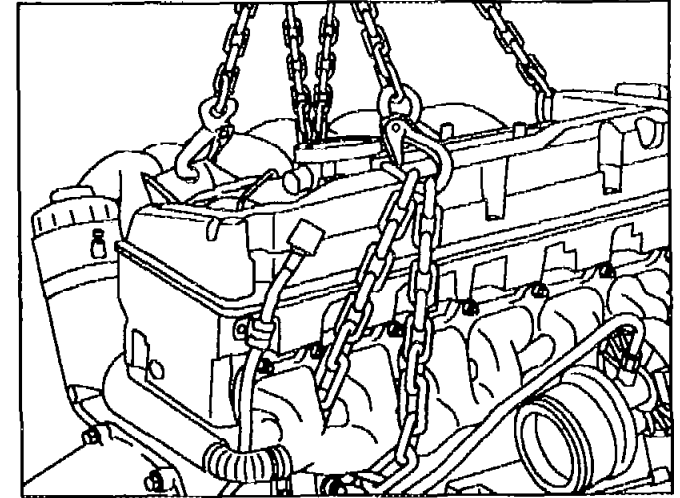
Commercially available tools

Number	Designation	Make (e.g.)	Order number
WH58.30-Z-1001-07A	Engine hoist (self-locking)	Bäcker Herderstraße D-42853 Remscheid	3188
WH58.30-Z-1002-07A	Shackle		C1 DIN 82101

- 1 Attach engine hoist (50) to the front and rear engine lifting eye.
 Ensure that the injection line is not damaged when attaching to the front engine lifting eye! Use shackle (01) as an intermediate piece, if need be.
- 2 Adjust engine hoist so that engine is raised evenly at the front and rear.



- 3.1 Engine 606.961/962: attach chain to exhaust manifold and hook to the 3rd lifting hook of the engine hoist.
- i** Raise engine carefully and pay attention to position; lower once again if necessary and adjust length of chain.
- 4 Raise engine fully.



P01.45-0228-01

C15	AR01.30-P-5402-05HA	Checking prechamber	Engines 604, 605, 606	
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Prechamber

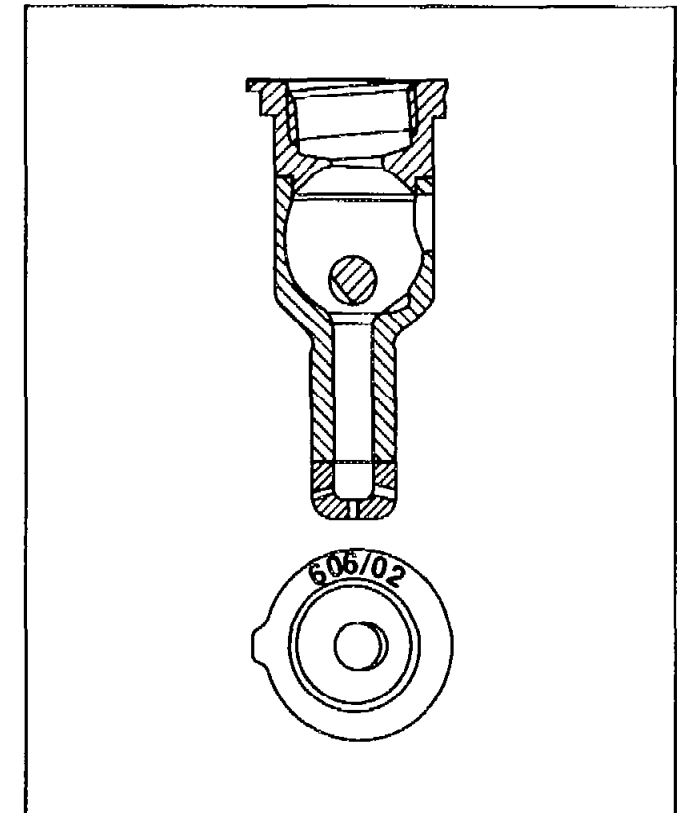
Number	Designation	Engine 604, 605.910/911/912 606.910/912 außer (USA)	Engine 604, 605.910/911/912 606 (USA)	Engine 605.960/ 962, 606.961/ 962/964
BE01.30-P-1001-03A	Prechamber code	606/2	606/03	606/04 or 606/06

The spherical pin must not be scorched or oxidized.

If the burner domes are scorched or if there are cracks in the bottom part of the prechamber, check the following:

1. Check engine oil level at an oil temperature of about 80 °C; adjust to correct level.
2. Check vacuum pump for signs of damage and replace the vacuum unit at the injection pump, respectively.

i It is possible to determine from the vacuum pipes (blackened with oil) which of the two component parts has failed.



D15

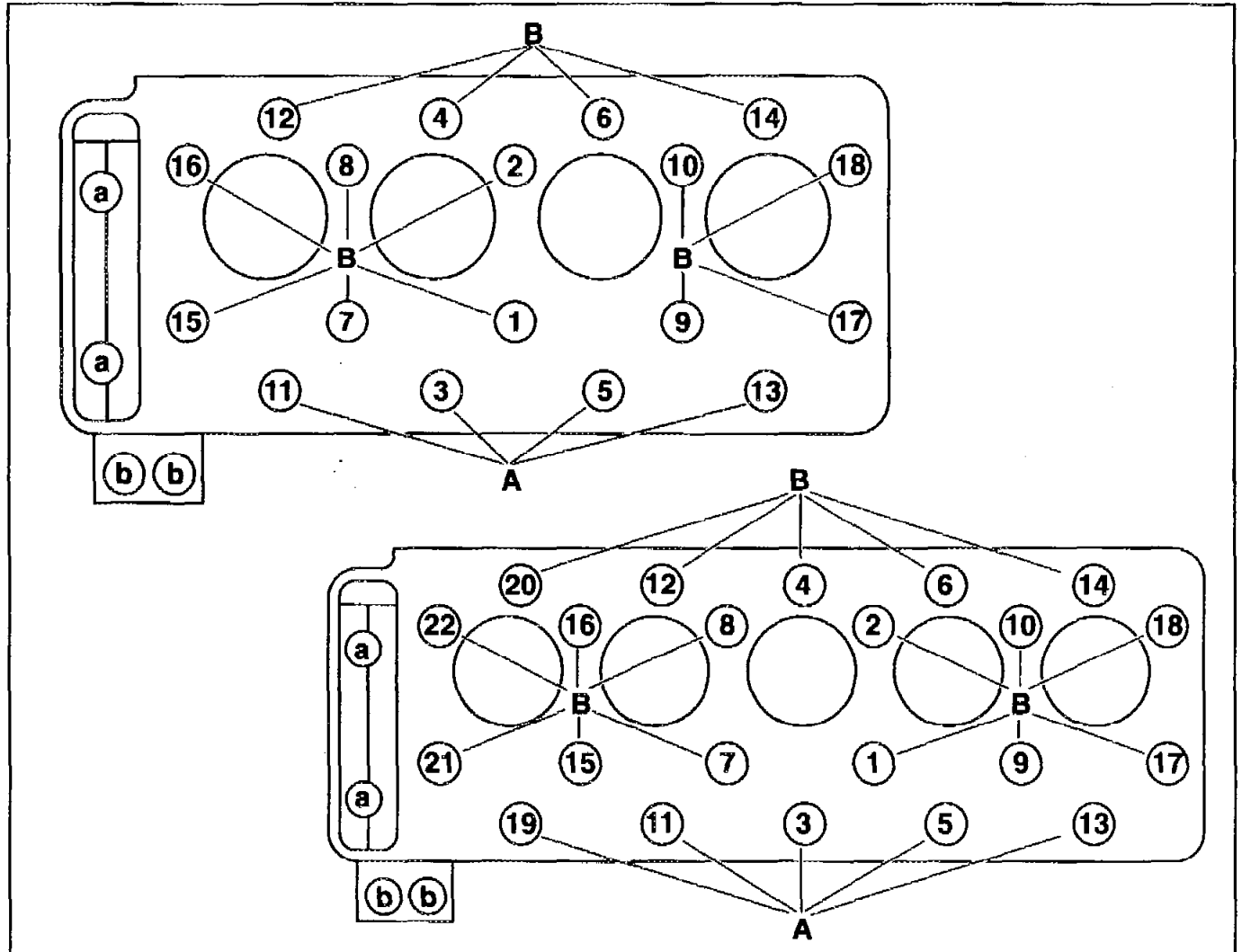
AR01.30-P-5800-01HA

Tightening diagram of cylinder head bolts

Engine 604, 605, 606

**Tightening diagram/bolt allocation
Engine 604/605**

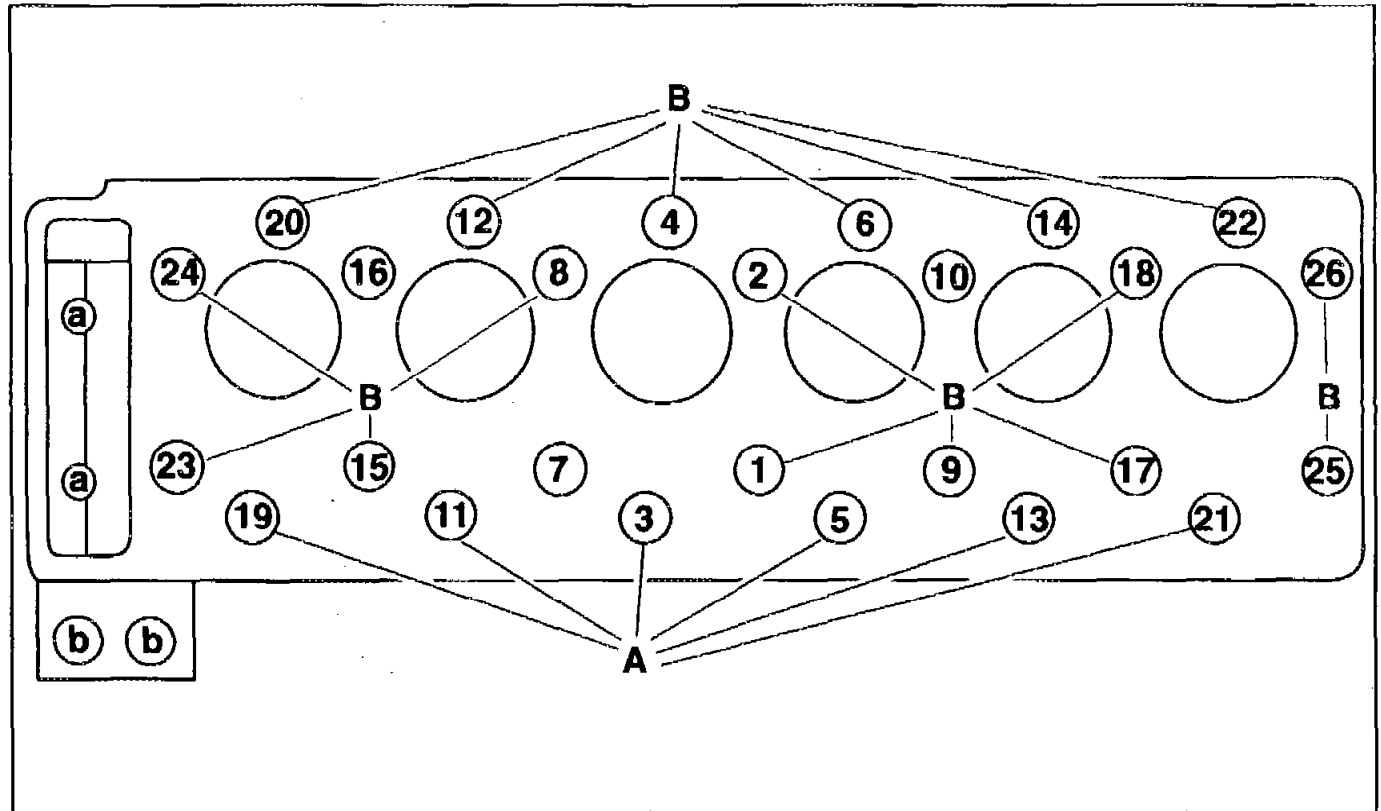
- A** Collar bolt M10×115
- B** Collar bolt M10×102
- a** Bolts + washers M8×50
(to timing case cover)
- b** Bolts + washers M8×80 (fuel filter)





Tightening diagram/bolt allocation
Engine 606

- A** Collar bolt M10×115
- B** Collar bolt M10×102
- a** Bolts + washers M8×50
(to timing case cover)
- b** Bolts + washers M8×80 (fuel filter)



F15

AR01.30-P-5800-03HA

Checking cylinder head bolts

**Cylinder head / Cylinder head bolts**

Number	Designation	Engine 604, 605, 606	
BE01.30-P-1001-04A	Cylinder head bolts	Thread diameter	M 10
		Length (L) when new	mm 102/115
		Max. length (L)	mm 104/117
		Fig. see	AR01.30-5800-03HA

Cylinder head / Cylinder head bolts

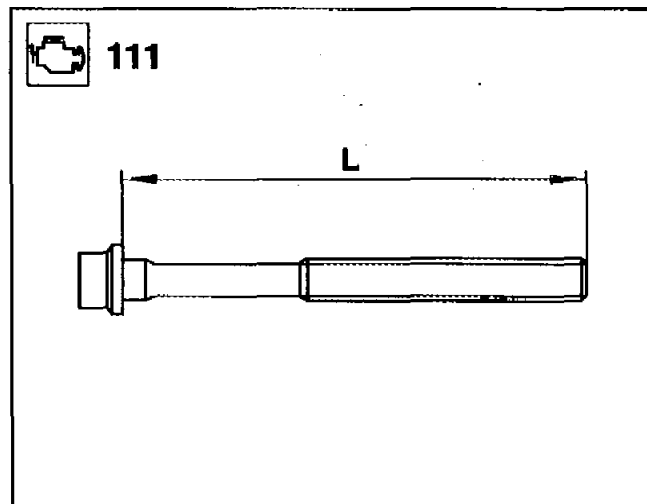
Number	Designation	Engine 111	
BE01.30-P-1001-04B	Cylinder head bolts	Thread diameter	M 12
		Length (L) when new	mm 102
		Max. length (L)	mm 105
		Fig. see	AR01.30-5800-03HA



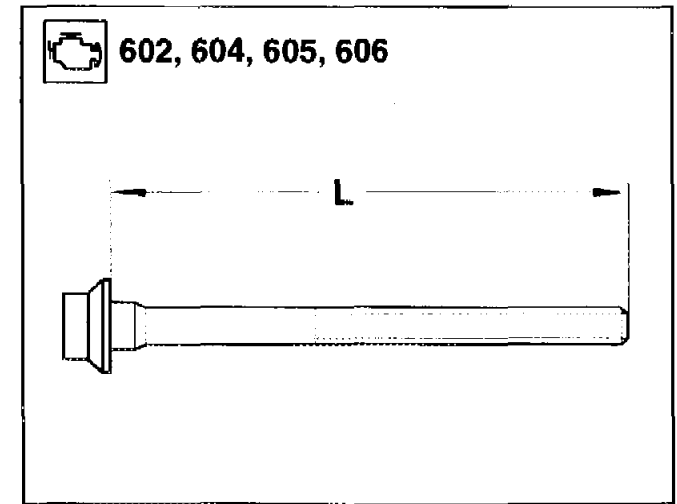
Test data of cylinder head bolts

Number	Designation	Engine 602.982/983	
BE01.30-N-1001-01A	Cylinder head bolts	Thread diameter	M 10
		Length (L) when new.	mm 80 / 102 / 115
		Max. length (L)	mm 83.6 / 105.6 / 118.6
		Fig. see	AR01.30-P-5800-03HA

Measure length (L); if the length (L) exceeds the maximum permissible size, use new cylinder head bolts.



P01.30-0231-01



P01.30-0334-01

H15	AR03.10-P-7041-01A	Measuring piston projection	Engine 604, 605, 606	
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Number	Designation	Engine 604.910/912	Engine 604.915/917	Engine 605.91/96
BE03.10-P-1001-02B	Piston projection (a) with new crankcase	mm 0.735–0.965	0.785–1.015	0,785–1,015
	Fig. see	AR03.10-P-7041-02A	AR03.10-P-7041-02A	AR03.10-P-7041-02A
BE03.10-P-1002-02B	Piston projection (a) with machined crankcase	mm 0.835–1.015	0.985–1.215	0,985–1,215
	Fig. see	AR03.10-P-7041-02A	AR03.10-P-7041-02A	AR03.10-P-7041-02A

Test data of pistons

Number	Benennung	Engine 606.91/96
BE03.10-P-1001-02B	Piston projection (a) with new crankcase	mm 0.785–1.015
	Fig. see	AR03.10-P-7041-02A
BE03.10-P-1002-02B	Piston projection (a) with machined crankcase	mm 0.985–1.215
	Fig. see	AR03.10-P-7041-02A

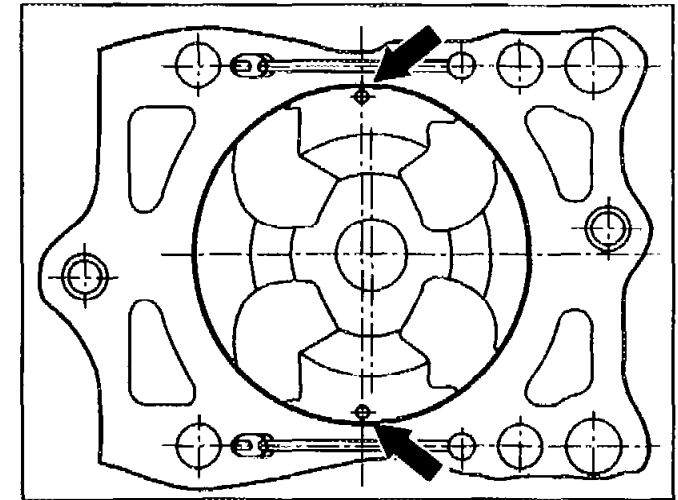


After replacing the pistons/conrods or machining the crankcase contact surface, it is necessary to measure the piston projection.

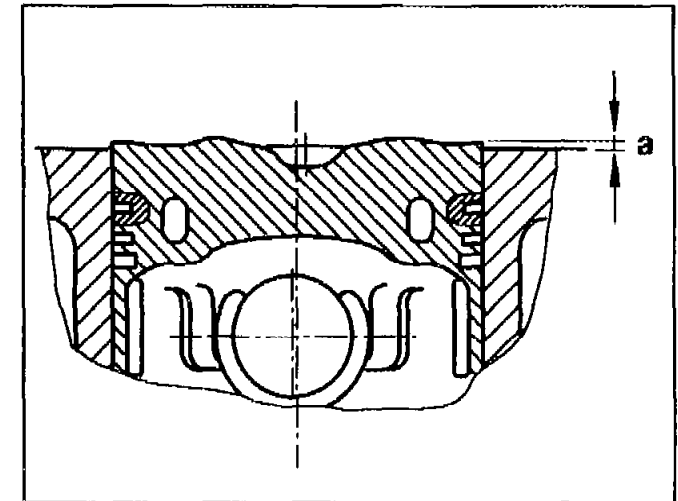
Measure projection between piston crown and contact surface of crankcase without the cylinder head gasket fitted.

The measurement has to be carried out in the direction of the piston pin in order to eliminate the piston rock.

- 1 Measure piston projection at the two measuring points (arrows).



P03.10-0229-01



P03.10-0230-01

a Projection of piston/crankcase



K15	AR01.30-P-7162-02A	Inspecting hardness of cylinder head contact surface	Engine 604, 605, 606	
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Test data of cylinder head

Number	Designation	Engine
BE01.30-P-1011-02A	Hardness of cylinder head contact surface in area of sealing bead of cylinder head gasket	604, 605, 606
		HB >70
	Fig. see	AR01.30-P-7162-01A

Commercially available tools (see Workshop Equipment Manual)

Number	Designation	Make (e.g.)	Order number
WH58.30-Z-1001-30A	Impact hardness tester, poldi system	Hahn und Kolb Borsigstraße 50 70459 Stuttgart	82110-82113

i

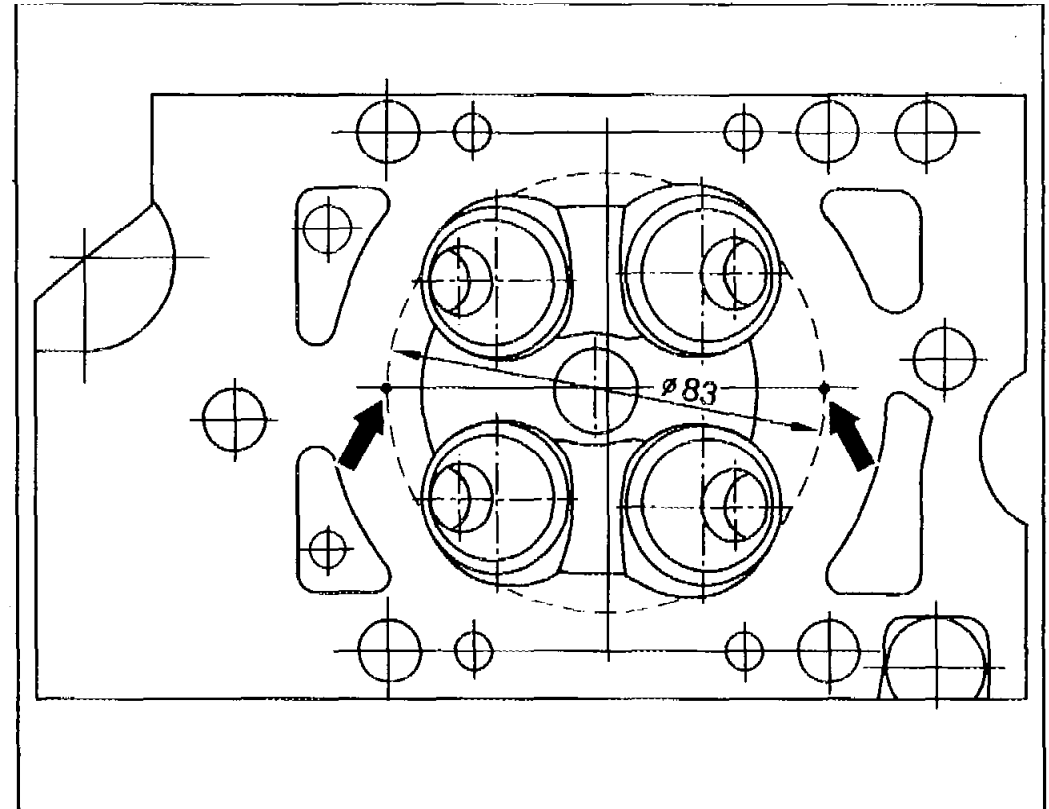
Loss of coolant or faults in the cooling circuit or at the cylinder head gasket can result in overheating and thus in distortion and change in the microstructure of the cylinder head.

Facing the cylinder head then only produces a tight seal between cylinder head/cylinder head gasket/crankcase if a certain minimum hardness is achieved.

- 1 Smooth the surfaces to be inspected in one direction with a fine abrasive stroke.
- 2 Inspect hardness at two points (arrows) in the areas of the blowby traces of the cylinder head gasket.

i

If the hardness is not achieved, replace cylinder head.





M15	AR05.30-P-4100-01A	Measuring amount by which valve stands back to cylinder head	Engine 604, 605, 606	
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Test data of cylinder head

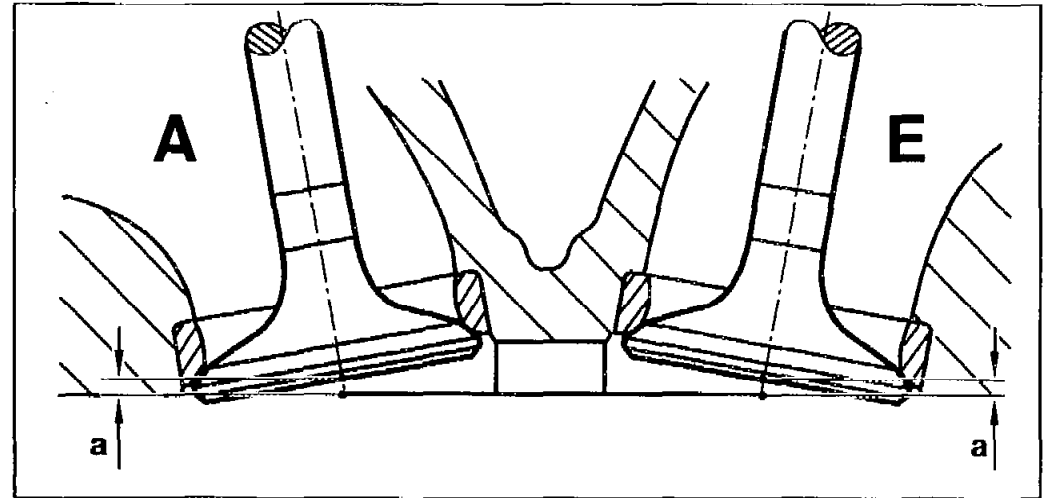
Number	Designation	Engine 604, 605, 606
BE01.30-P-1008-02A	Amount by which valve stands back (a) with new valves and new valve seat rings	Exhaust valve mm 1.3–1.7
		Inlet valve mm 1.3–1.7
		Fig. see AR01.30-P-7162-01A

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

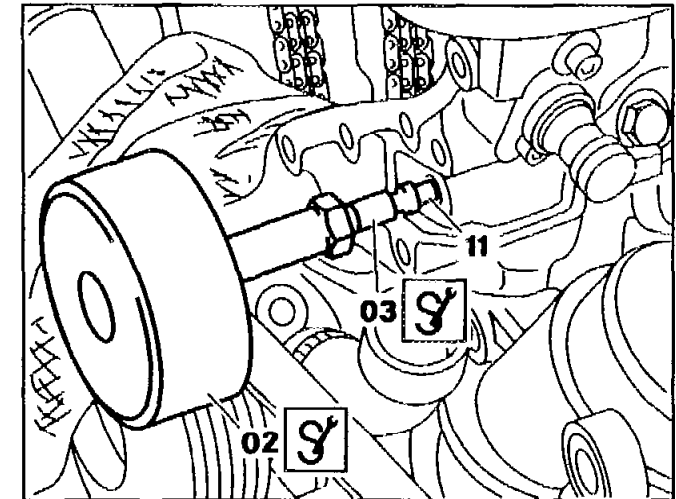


O15 AR01.30-P-5800-04A	Removing guide rail pin at cylinder head	Engines 111, 604, 605, 606 ☞ 116 589 20 33 00 Impact puller ☞ 116 589 01 34 00 Threaded bolt ☞ 605 589 00 33 00 Puller	
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A Removing guide rail pin with impact extractor and threaded pin

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

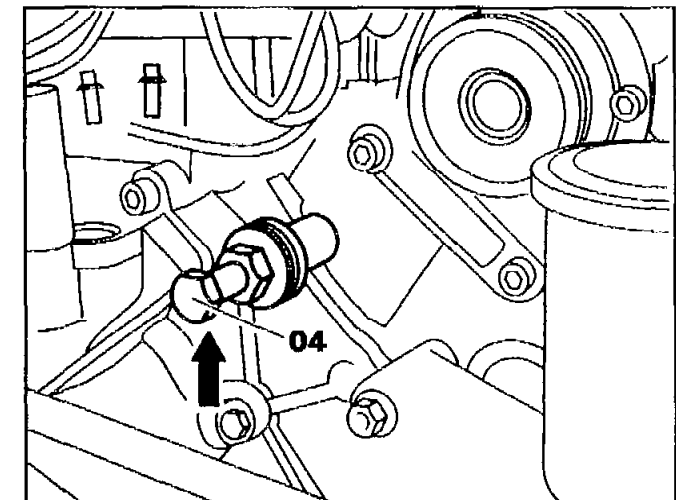


P01.30-0238-01

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



<p>P15 AR01.40-P-8913-01HA</p> <p>⚠ Danger!</p>	<p>Inspect rear of engine for external oil leaks, determine</p> <p>Risk of accident as a result of vehicle starting off when engine running. Risk of injury as a result of bruises and burns if you insert your hands into engine when it is being started or when it is running.</p>	<p> 201 589 00 99 00 Electrical connecting set</p> <p>Flywheel, two-mass flywheel or driven plate removed</p> <p>Secure vehicle to prevent it starting off.</p> <p>Wear closed and close-fitting work clothes.</p> <p>Do not grasp hot or rotating parts.</p>	<p>AR03.30-P-8001HA</p> <p>A500.00-Z-0005-01A</p>
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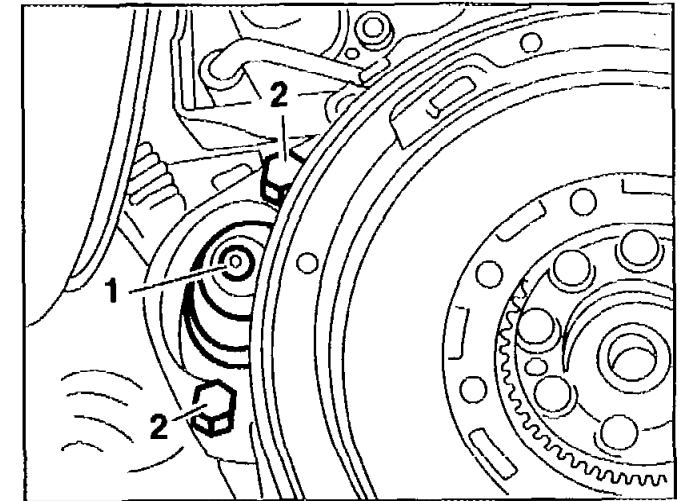
Repair product

Number	Designation	Order number
BR00.45-Z-1001-03A	MB contrast spray	000 989 03 59

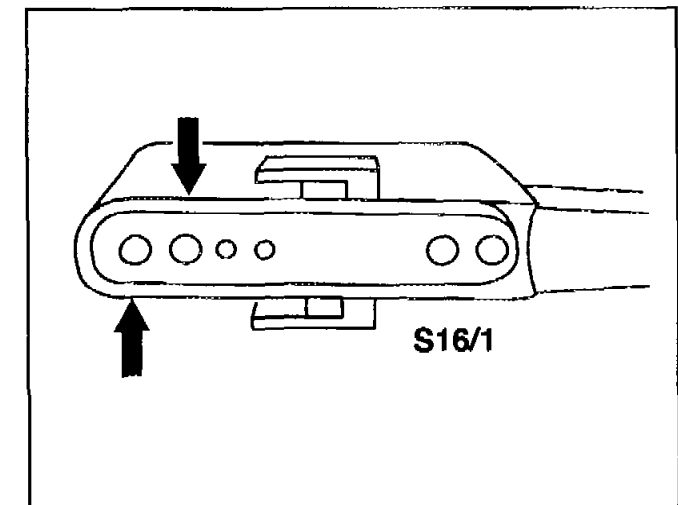
If it is not possible to clearly determine the cause of an external oil leak at the rear of the engine, proceed as follows:

- 1 Clean the inspection area free of oil, dry and spray with "MB white contrast spray".
 - 2 Check oil level in the engine; adjust to correct level, if necessary.
 - 3 Install flywheel / two-mass flywheel or driven plate.
 - 4 Attach starter (1) to crankcase with adequately long bolts (2).
 - 5 Support engine in installation position at the rear.

 - 6 If automatic transmission fitted (except transmission 722.6): bridge contacts (arrows) at starter lockout switch (S16/1).
 - 7 Warm up engine to enable leaks to be determined.
 - 8 Specify repair measures according to the leakage point.
- i** Stored faults which may be caused by disconnecting wiring or simulation during test work should be erased in the fault memory after completing the work.



P03.00-0203-01



P01.40-0227-01



B16	AR01.40-P-8498-01HA	Replacing steel ball with plug		
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Nm Crankcase, timing case cover, end cover

Number	Designation		Engine 604, 605, 606
BA01.40-P-1003-01A	Crankcase plug	Nm	50

Nm Crankcase, timing case cover, end cover

Number	Designation		Engine 602.982/98 3
BA01.40-N-1004-01B	Plug of oil gallery of crankcase	Nm	50

Adhesive

Number	Designation	Order number
BR00.45-Z-1001-02A	Loctite 241 adhesive compound	002 989 94 71

1 Knock out steel balls

A Plug on front of crankcase

1 Tap thread into the oil passage.

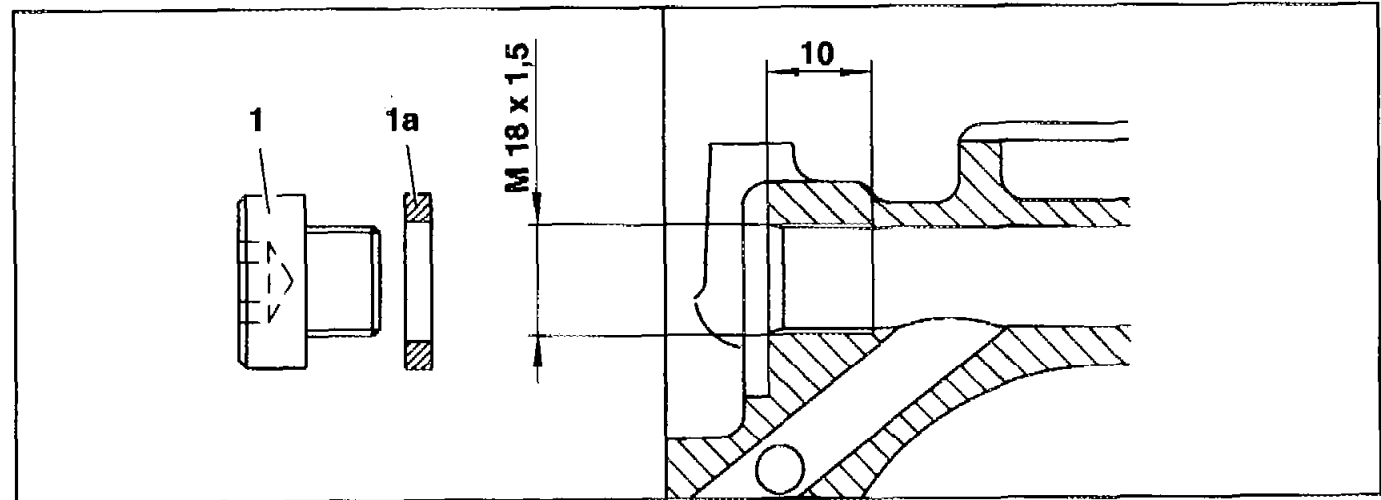
M18×1.5

Length of thread 10 mm

2 Thoroughly clean oil passage.

Install plug (1) 902 997 00 32 with seal

(1a) 007 603 018 103.



P01.40-0205-04

B Plug on rear of crankcase

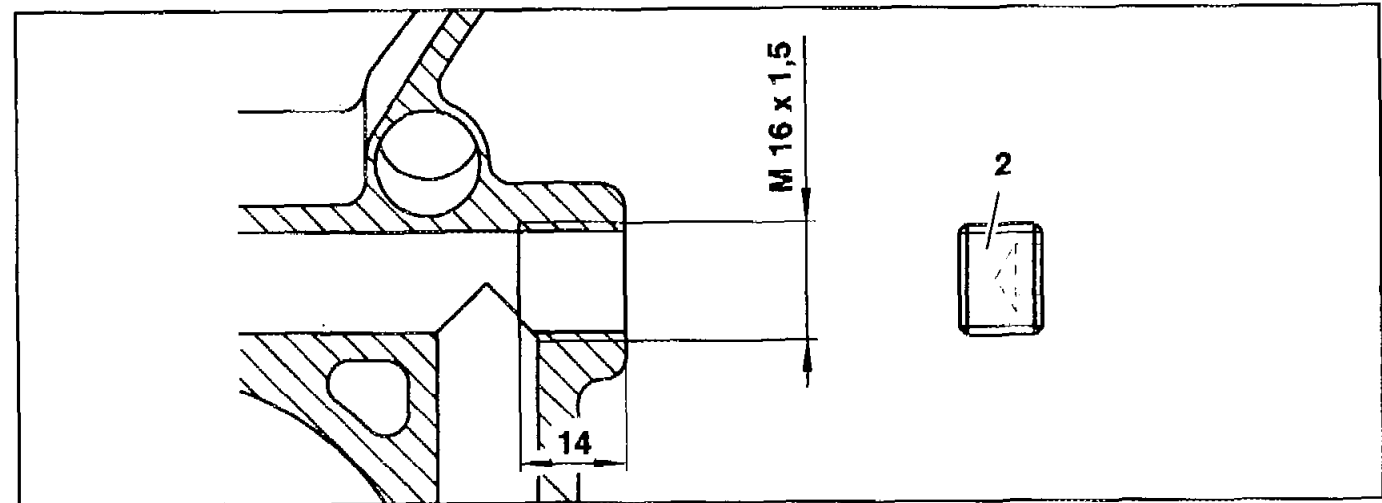
1 Tap thread into oil passage.

M16×1.5

Length of thread 14 mm

2 Thoroughly clean oil passage.

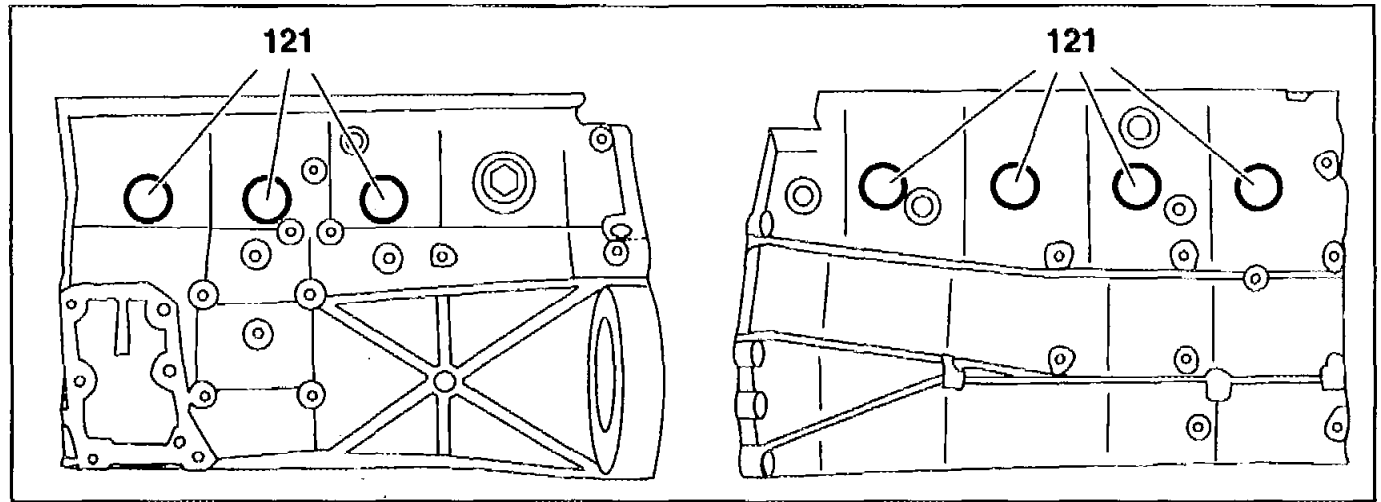
Coat plug (2) 000 906 016 002 with adhesive compound and screw in.



P01.40-0219-04

D16 AR01.40-P-8499-01A	Arrangement of core plug	Engine 111 except engine 111.920/921	
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121 Core plug



E16	AR01.40-P-9201-01B	Chamfering cylinder bores	Engine 604, 604, 606	
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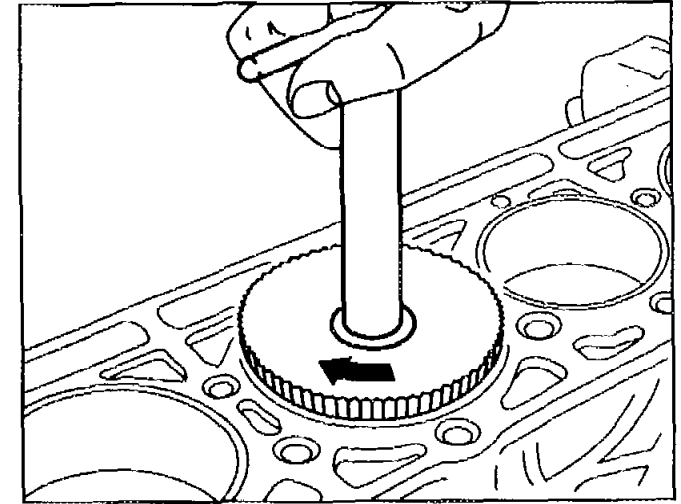
Test data of crankcase

Number	Designation	mm	Engine 604.910/912
BE01.40-P-1006-02B	Chamfer of cylinder bore at contact surface of crankcase	mm	0.2-1×75°
BE01.40-P-1011-02B	Chamfer of cylinder bore at bottom cylinder runout	mm	1.5×20°

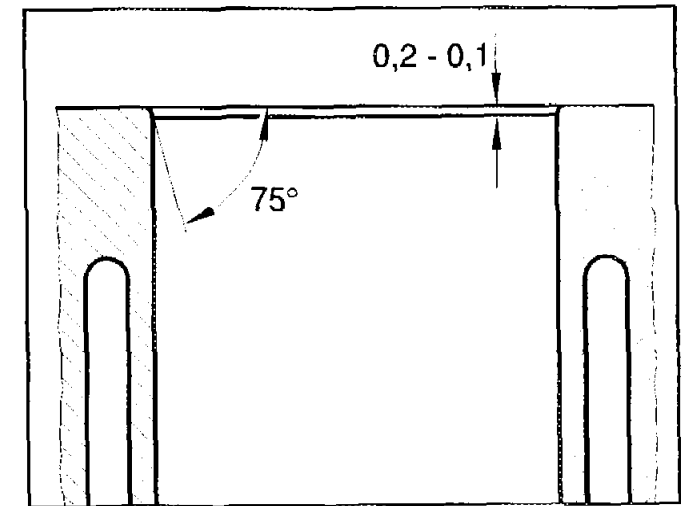
Test data of crankcase

Number	Designation	mm	Engine 604.915/917 605.91/96 606.91/96
BE01.40-P-1006-02B	Chamfer of cylinder bore at contact surface of crankcase	mm	0.2-1×75°
BE01.40-P-1011-02B	Chamfer of cylinder bore at bottom cylinder runout	mm	1.5×20°

- 1 After drilling or machining the cylinder bores, use a suitable tool (e.g. hand milling cutter) to chamfer the bores as shown in the drawing.
- 2 Smooth the bottom edge of the chamfer with a polishing stone.



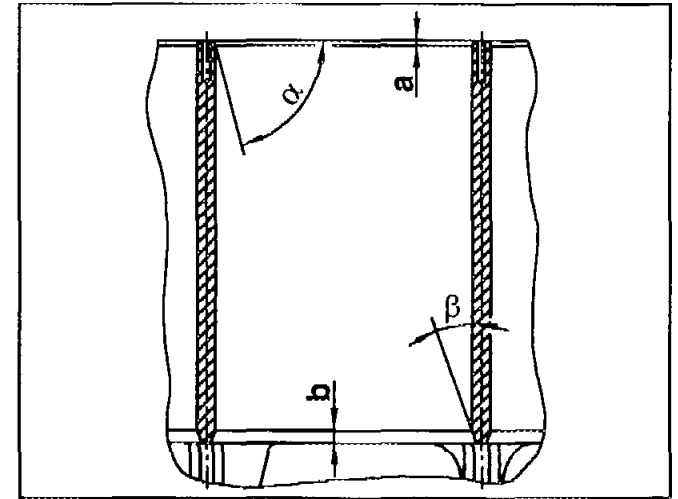
P01.40-0229-01



P01.40-0300-01



- 3 If the cylinder barrel has been machined, additionally chamfer the bottom cylinder runout.



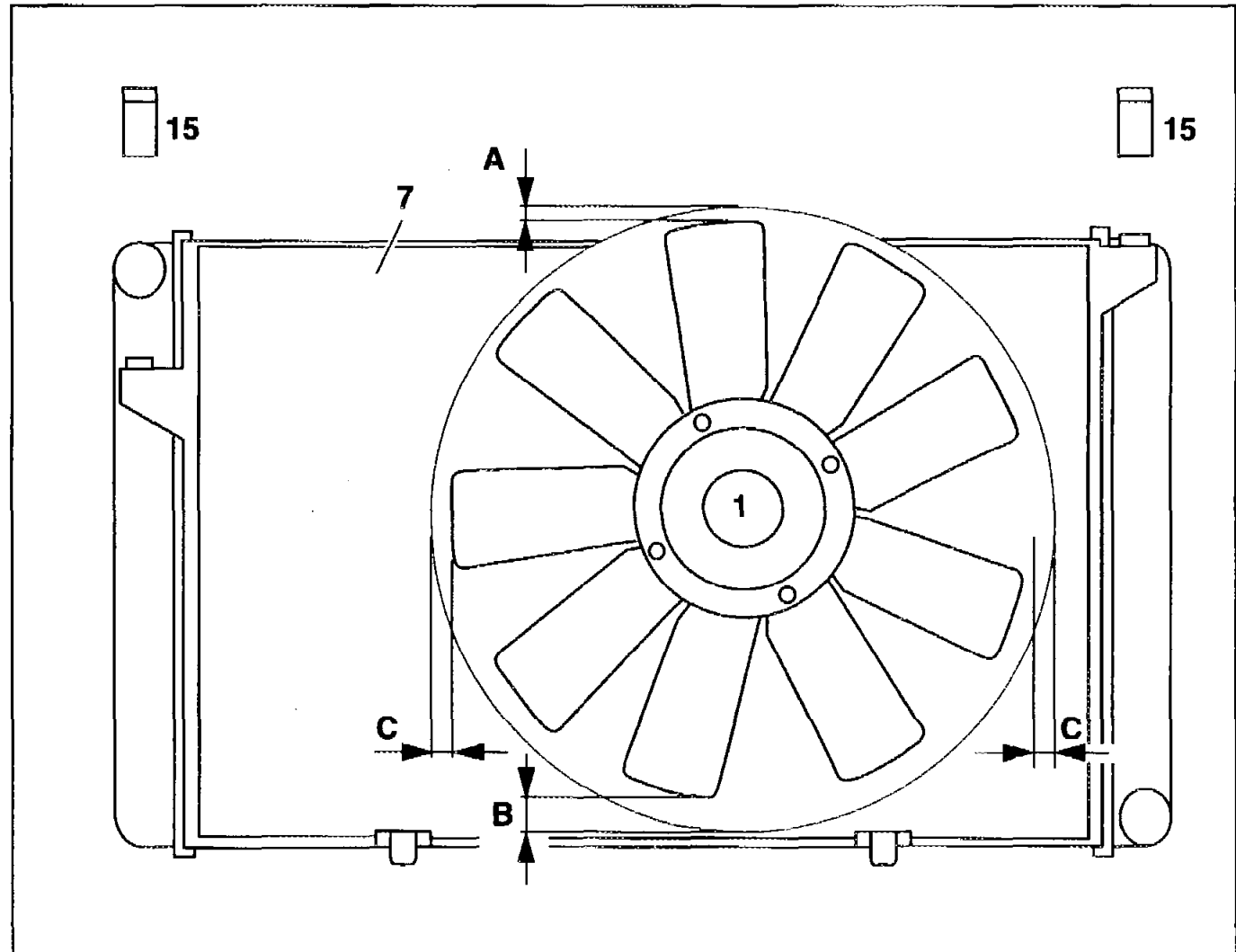
S01.40-3012-01

**H16**

AR20.40-P-6800-01HA

Adjusting fan shroud

- 1 Pull off retaining clips (15) upward.
- 2 Adjust fan shroud (7) relative to fan (1).
- 3 Fit on retaining clips (15).



**J16**

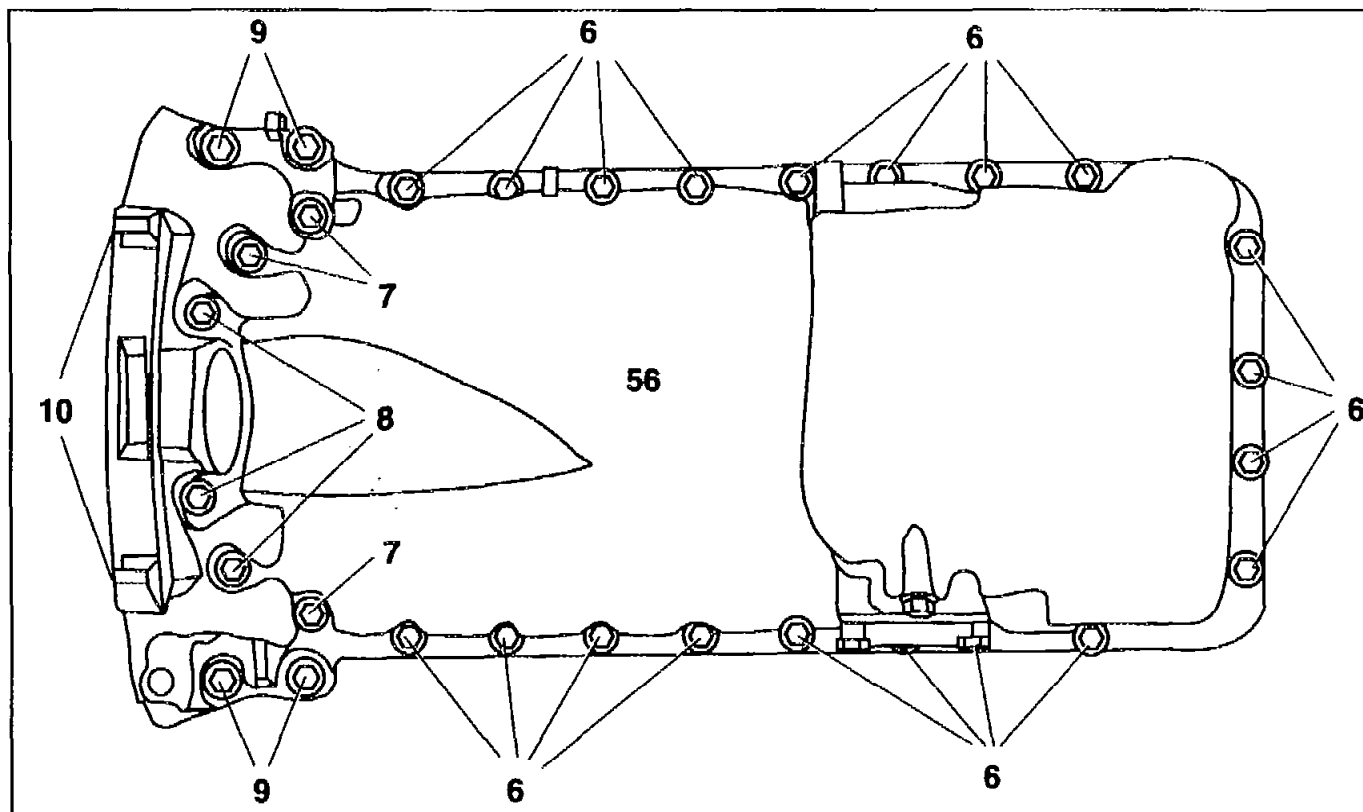
AR01.45-P-7500-06HA

Oil sump bolt diagram

i Pay attention to different bolt lengths and bolt diameters!

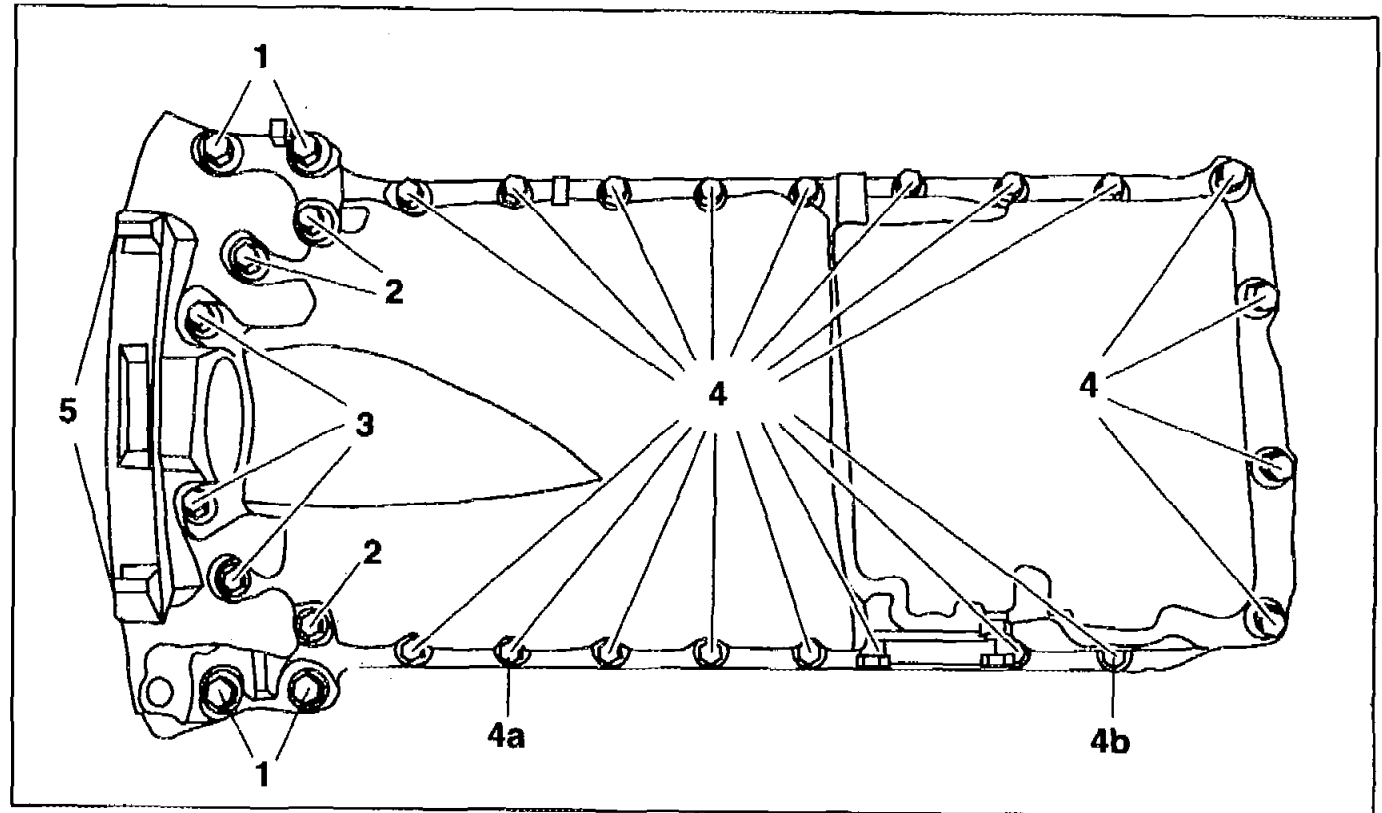
Engine 111*(with manual transmission)*

- 6 M6×20 bolt + washer
- 7 M6×35 bolt + washer
- 8 M6×85 bolt + washer
- 9 M8×40 bolt + washer
- 10 M10×40 bolt + washer
- 56 Oil sump



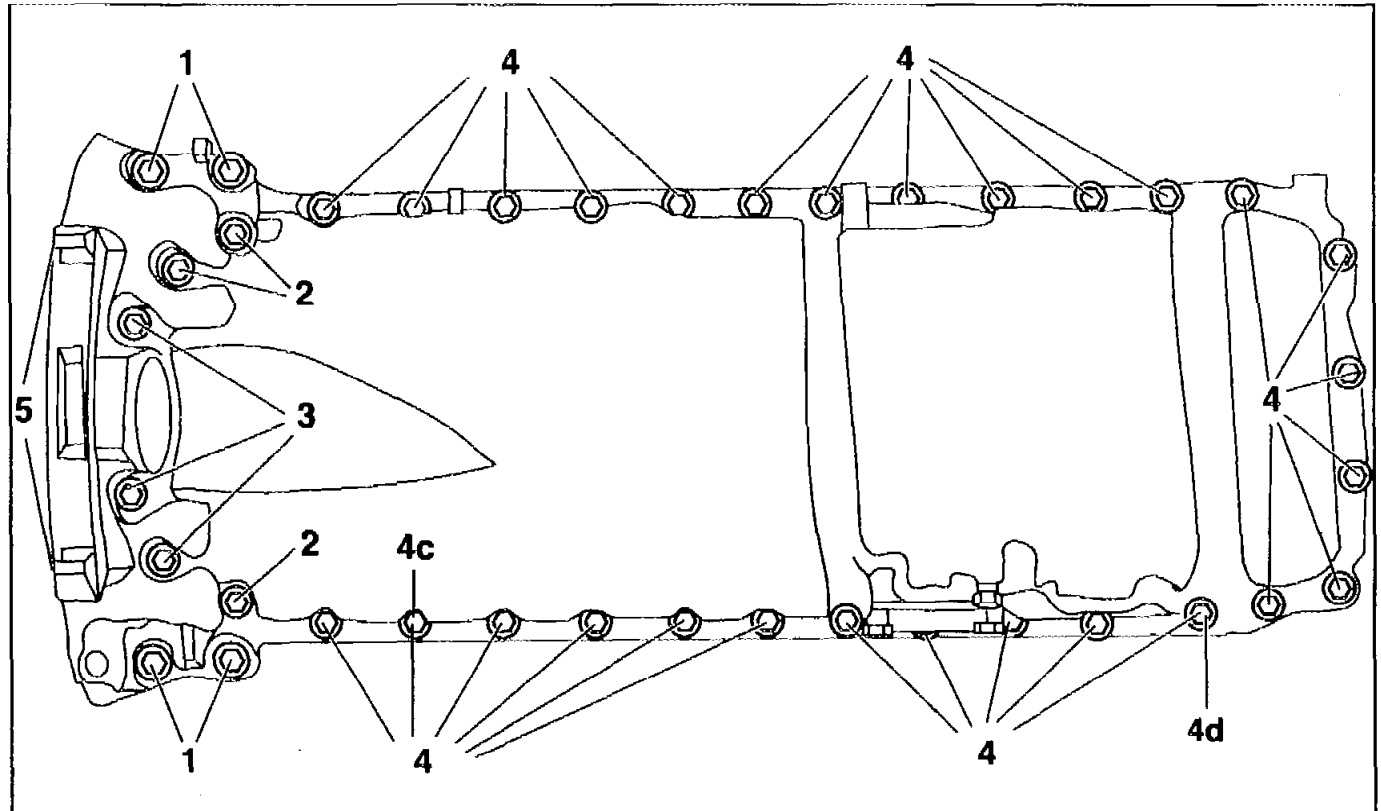
**Engine 604**

- 1 M8×40 bolt + washer
- 2 M6×35 bolt + washer
- 3 M6×85 bolt + washer
- 4 M6×20 bolt + washer
- 4a Hexagon socket bolt M6×20
(automatic transmission)
- 4b Hexagon socket bolt M6×75
(automatic transmission)
- 5 M10×40 bolt + washer



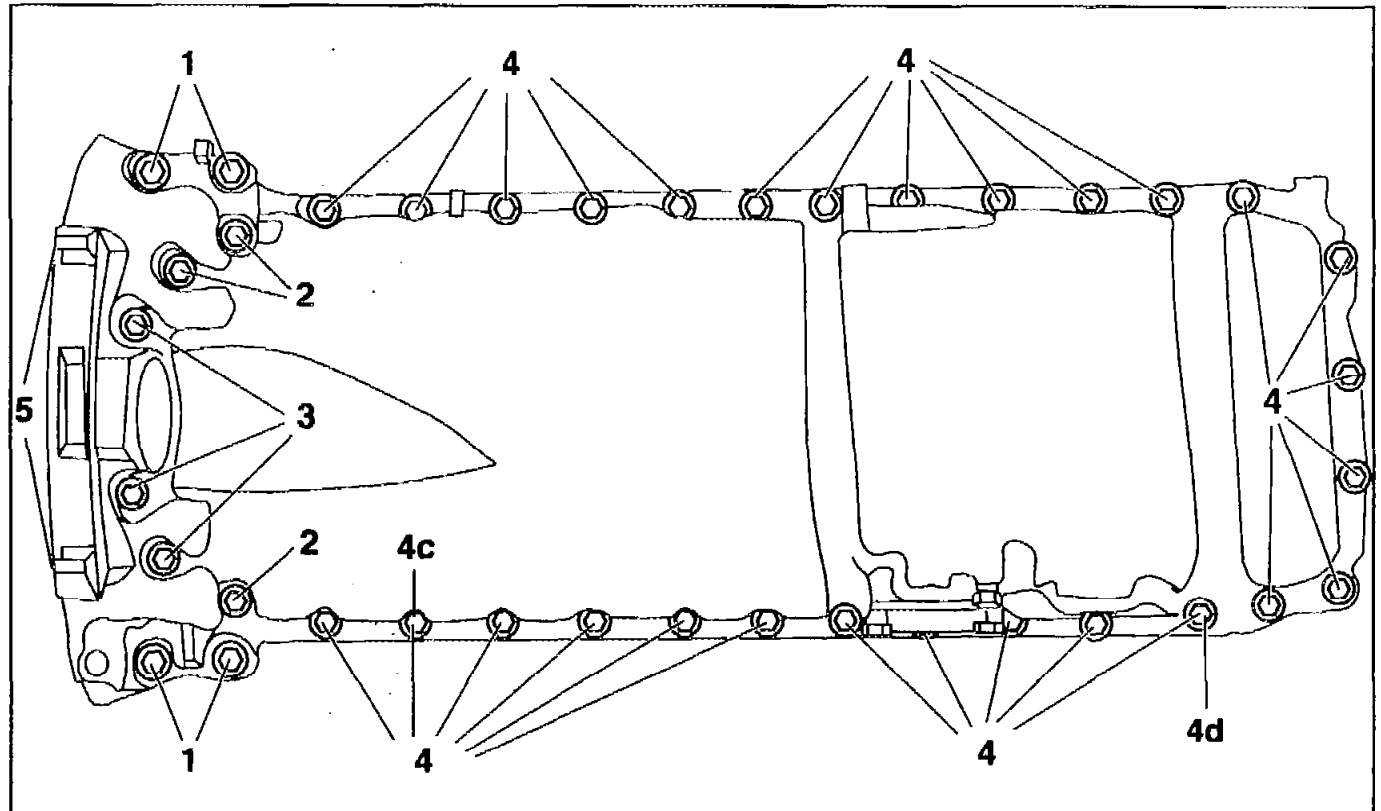
**Engine 602.982/983, 605**

- 1 M8×40 bolt + washer
- 2 M6×35 bolt + washer
- 3 M6×85 bolt + washer
- 4 M6×20 bolt + washer
- 4a M6×20 hexagon socket bolt
(automatic transmission)
- 4b M6×75 hexagon socket bolt
(automatic transmission)
- 4c M6×20 hexagon socket bolt
(automatic transmission)
- 5 M10×40 bolt + washer







**Engine 606**

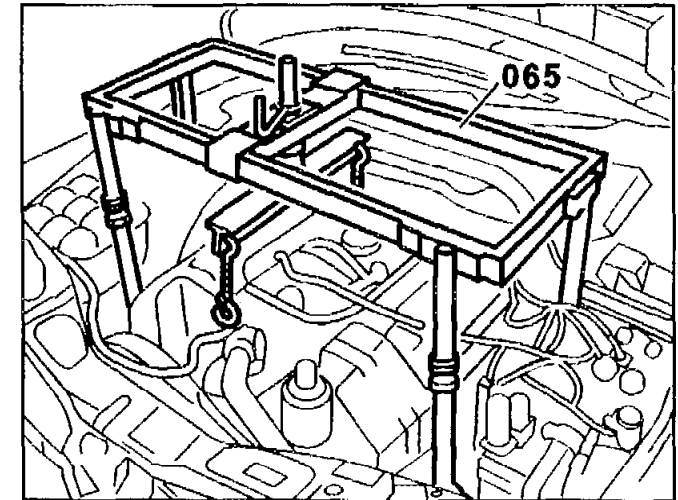
- 1 M8×40 bolt + washer
- 2 M6×35 bolt + washer
- 3 M6×85 bolt + washer
- 4 M6×20 bolt + washer
- 4c Hexagon socket bolt M6×20
(automatic transmission)
- 4d Hexagon socket bolt M6×75
(automatic transmission)
- 5 M10×40 bolt + washer





N16	AR01.10-P-7500-03A	Raising engine	 140 589 01 61 00 engine support frame	
 WF		Spacer for engine supporting frame	Model 140	WF58.50-P-0145-01A

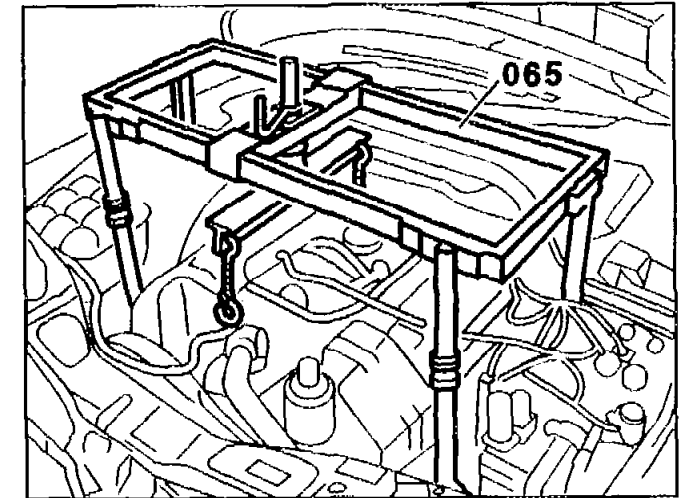
- 1 Insert suitable bolts into the shock absorber mount from the bottom left and right and lock with nuts.
 - 2 Mount on engine supporting frame (065)
-  Ensure that no cables and hoses are jammed in between
- 3 Raise engine
-  Attach the hooks to the engine lifting eyes for this step



O16 AR01.10-P-7500-03B	Hoisting engine	☒ 140 589 01 61 00 engine support frame ☒ 210 589 00 61 00 Supports for engine support bracket (2 each)	
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- 1 Insert suitable bolts into shock absorber mounts from below on left and right
 - 2 Slide on top shock absorber rubber mount with plate and screw on nut.
 - 3 Install rear supports on engine lifting frame (065)
 - 4 Set down engine lifting frame (065)
- ⚠ Ensure that no cables or hoses are pinched
- 5 Lift engine

i For this purpose hook hooks into engine suspension eyes



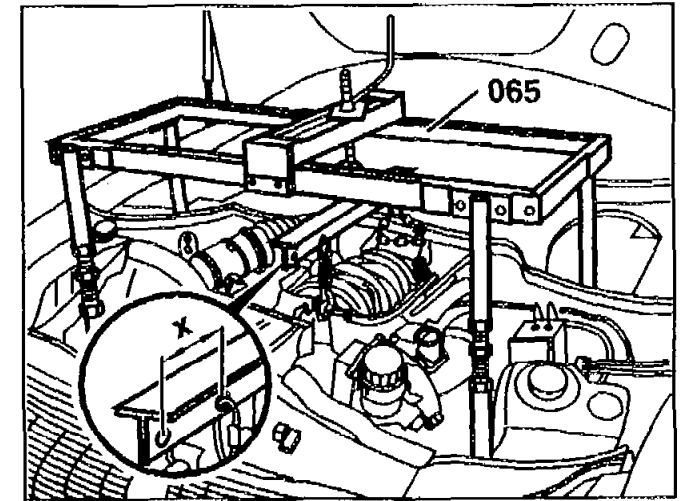
P01.10-0001-01

**i** Engine 112

Fasten shackle with chain to the two support beam holes from the front. If necessary drill 16 mm dia. hole approx. 180 mm (dimension X) from front at same height as first hole.

Fasten engine at rear with suitable chain (tension load) in engine suspension eyes and fasten shackie on support beam.

065 Engine lifting frame

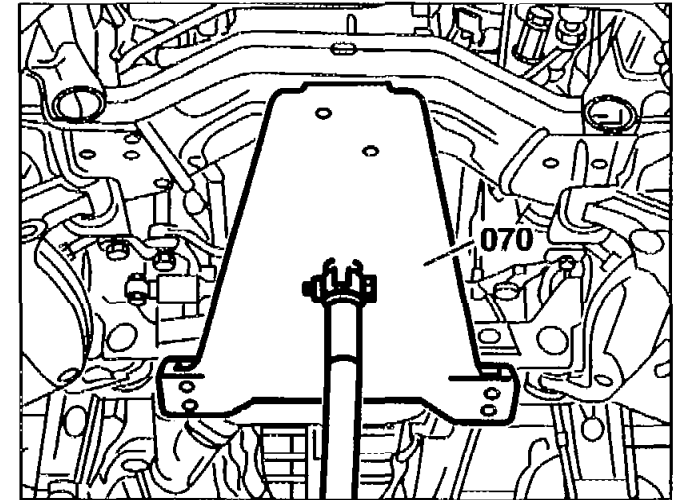


P33.10-0269-01



A17	AR33.10-P-0100-03A	Supporting front suspension support with inspection pit or assembly lift	<input checked="" type="checkbox"/> Use adapter <input checked="" type="checkbox"/> 140 589 00 62 00 Assembly support	
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070 Adapter



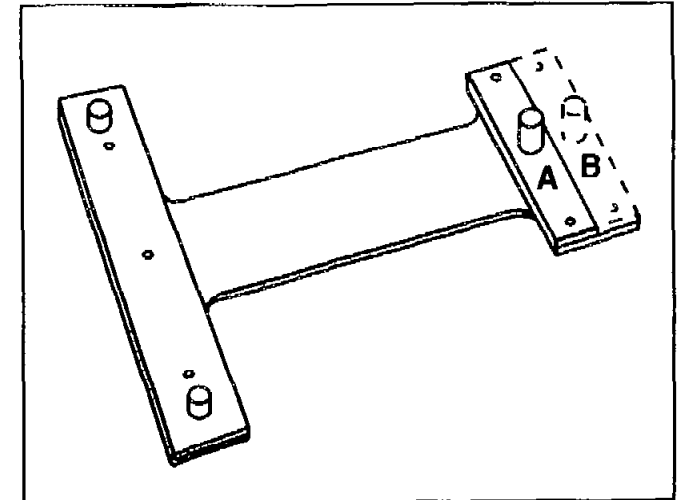
P33.00-0008-01

B17 AR33.10-P-0100-03B	Supporting front axle carrier with pit hoist or assembly hoist	<input checked="" type="checkbox"/> Use assembly attachment <input checked="" type="checkbox"/> 210 589 01 62 00 Assembly adapter	
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1 Re-install rear support plate depending on the model.

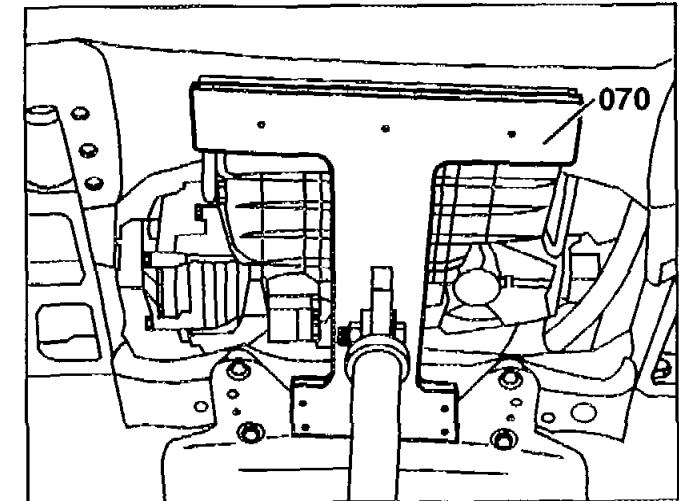
A Model 210 except 210.08/28

B Models 210.08/28



P33.10-0271-01

2 Detach jack socket and install assembly attachment (070) with journal on front axle carrier.



P33.10-0270-01