

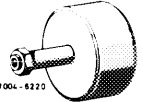

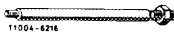


## 01-415 Removal and installation of cylinder head

Tightening torques	Nm	
Cylinder head bolts	1st stage	30
	2nd stage	60
	Settling break at least 10 minutes	
	3rd stage	60 <sup>1)</sup>
Cylinder head cover screws	3	
Necked-down bolts for camshaft sprockets	100	
Injection valves to cylinder head	10	

<sup>1)</sup> Each screw must first be loosened individually in the sequence of the tightening diagram before tightening to the specified torque.

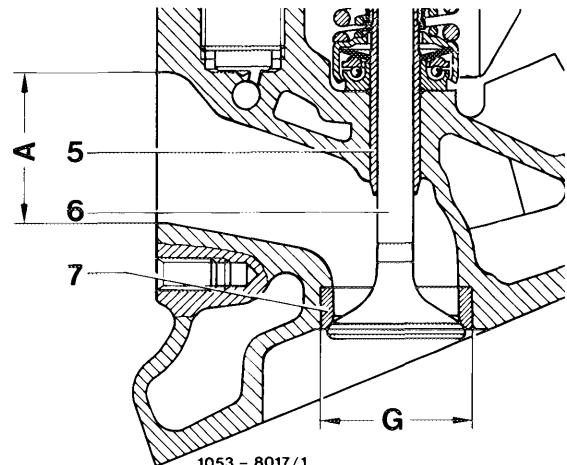
### Special tools

Screwdriver insert 8 mm, 1/2" drive		116 589 00 13 00
Screwdriver 6 mm, 440 mm long for hex. socket screws		116 589 03 07 00
Impact puller for bearing bolts (basic tool)		116 589 20 33 00
Threaded bolt M 6 x 50		116 589 01 34 00
Threaded bolt M 6 x 100		100 589 00 34 00

### Note

The cylinder heads differ in the diameter „A“ of the exhaust ports, the basic bore „G“ of the exhaust valve seat rings, the different combustion chamber and the valve seat rings as well as the casting number.

The cylinder heads cannot be used in cast-iron engines, as the five cylinder head bolt bores do not correspond.



Remove the cylinder heads only when the engine has cooled down.

Face cylinder head mating surface only if porous or damaged. A slightly warped mating surface will adapt itself again after the cylinder heads have been tightened.

Each cylinder head is aligned and fixed with the crankcase by means of two dowel sleeves and secured to the crankcase with 18 cylinder head bolts, 6 for each cylinder bore.

The cylinder head gaskets of the engines 116 and 117 differ in combustion chamber and cylinder diameter.

The cylinder head gaskets of the engines 116.96 and 117.96 differ from those of 116.98 and 117.98 by a different hole pattern of the 5 central cylinder head bolt holes.

The cylinder head gaskets do not require retorquing.

**The cylinder head bolts are no longer retightened when the engine is warm.**

**Caution!**

The cylinder head bolts M 10 x 165, M 10 x 90 and M 10 x 65 are 10 mm longer than for the cast-iron engines.

The cylinder head bolts are nickel-plated (chromium color) – previously phosphated (anthracite color). This prevents seizing of the thread flanks in the aluminum crankcase.

The washers of the cylinder head bolts were phosphated at the same time (previously galvanized, brass color). This measure provides more uniform friction values when tightening the cylinder head bolts.

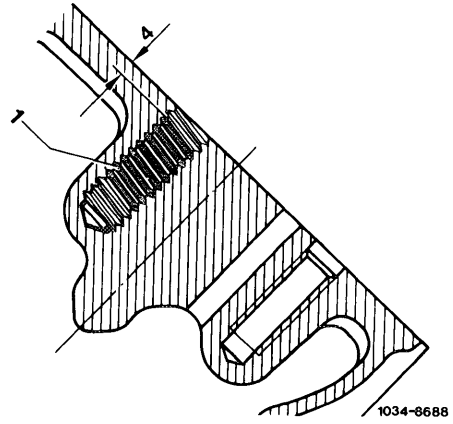
**Production breakpoint:** November 1982

---

Model	Engine	Engine end No.	Chassis end No.
107.045	116.962	011845	021251
107.046	117.962	001565	025013
126.032	116.963	022704	038527
126.033			
126.036	117.963	018595	027517
126.037			
126.043	116.963	022704	004655
126.044	117.963	018595	004152

---

If damaged threads are discovered during cylinder head removal or installation, Heli-Coil threaded inserts part No. 000 997 58 15 should be installed for all cylinder head bolts of the respective cylinder bank (01–122).



## Removal

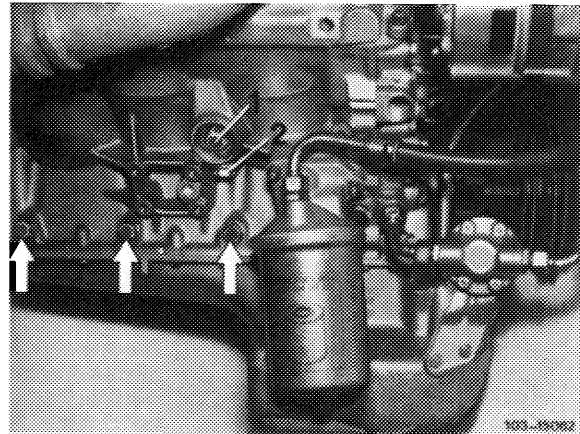
---

1 Drain coolant from crankcase at the left or right.

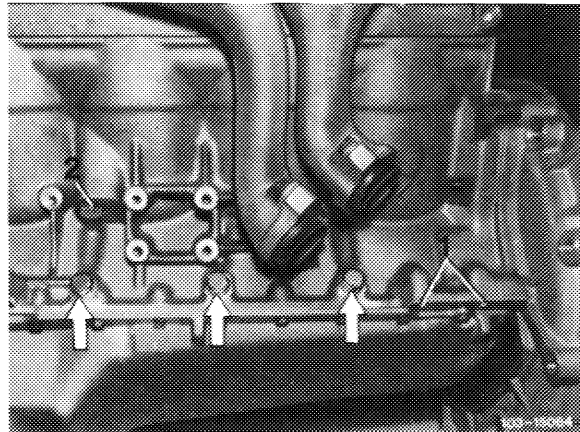
### Caution!

Do not confuse the lateral crankshaft bearing cap bolts (arrows) with the coolant drain plugs (2).

Right engine side



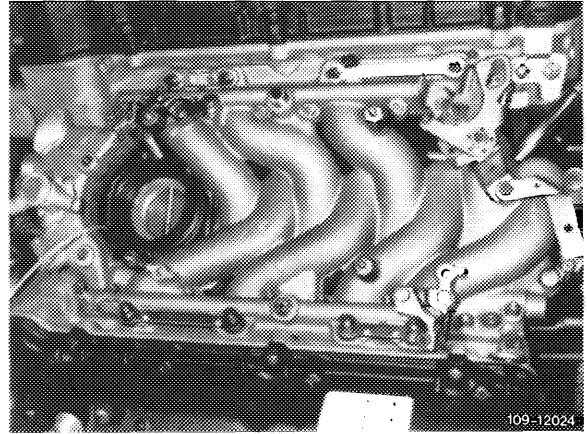
Left engine side



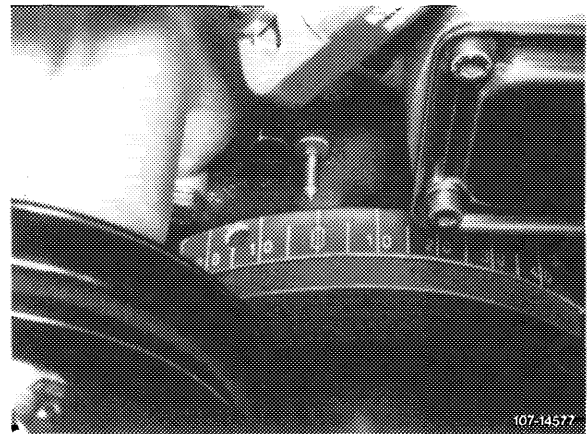
2 Remove fuel injection pipes.

3 Unscrew injection valve retainers.

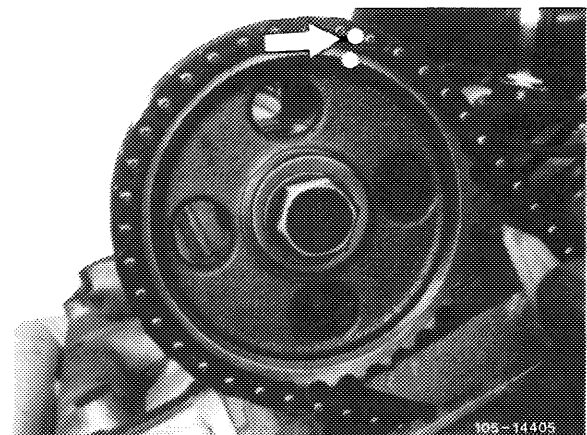
4 Remove intake manifold.



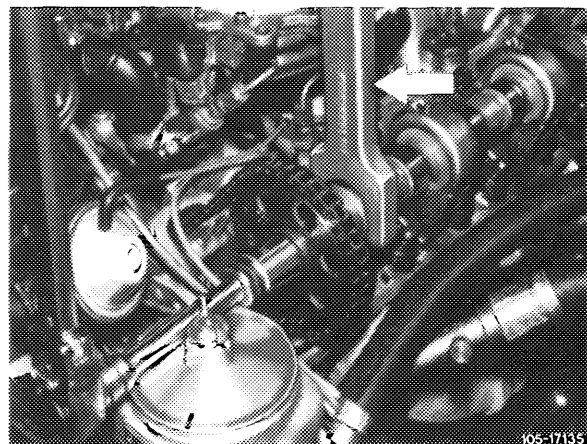
5 Set engine to ignition TDC.



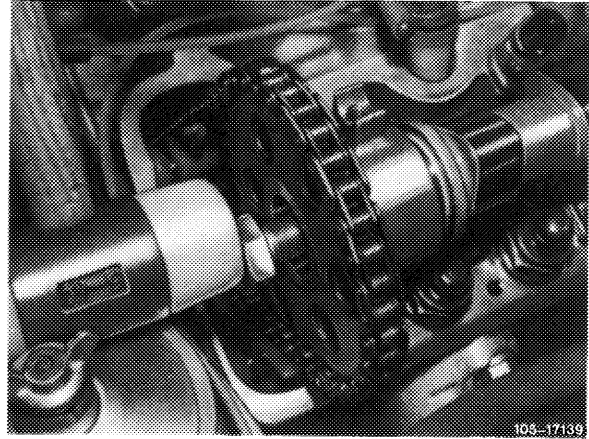
6 Mark camshaft sprocket and timing chain relative to each other (arrow).



7 Loosen necked-down bolt of the camshaft sprocket while holding the camshaft with an open-end wrench (arrow).



8 Remove camshaft sprocket.



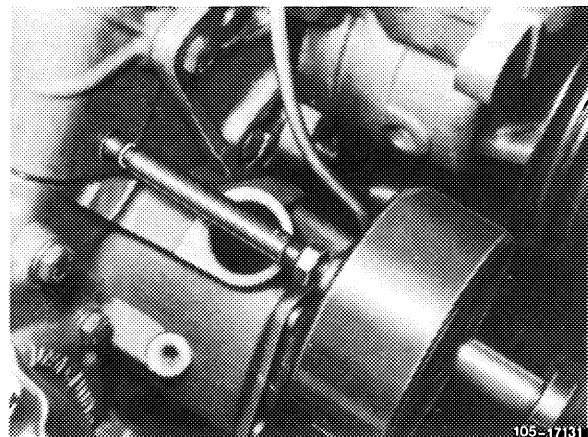
### Lefthand cylinder head

9 Unscrew power steering pump and set aside with piping connected.

10 Remove ignition distributor (only engine 116).

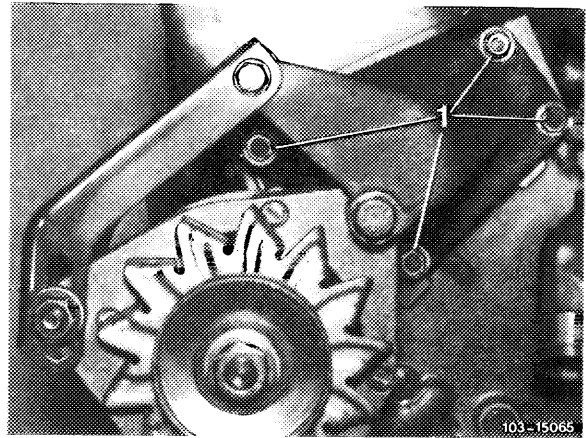
11 Remove inner sliding rail from lefthand cylinder head. To do so, pull out bearing pins by means of the impact puller.

First remove the camshaft sprocket, then the sliding rail.



### **Righthand cylinder head**

12 Remove alternator with bracket.



13 Remove chain tensioner.

14 Remove inner sliding rail.

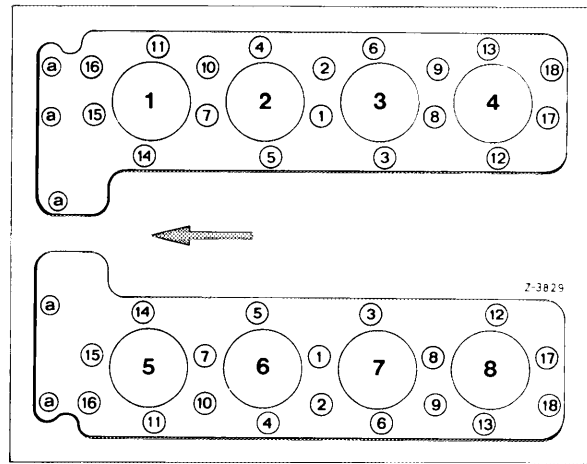
### **Right and left cylinder head**

15 Unscrew exhaust manifold from exhaust pipe and cylinder head and remove. To do so, loosen engine mount and engine shock absorber of engine 117.96 and raise slightly.

16 Unscrew cylinder head bolts in reverse order of tightening diagram.

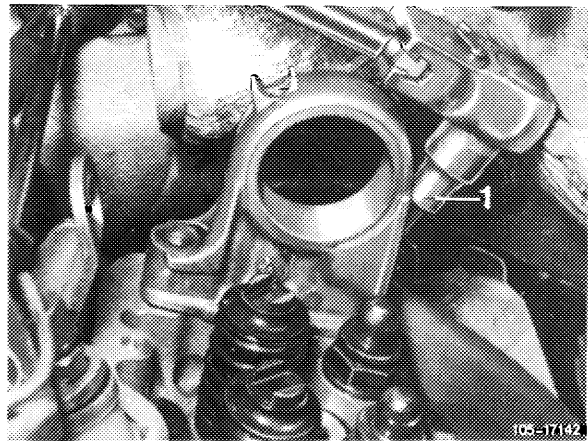
Loosen the bolts M 8 (a) with screwdriver insert 116 589 03 07 00.

a Bolts M 8

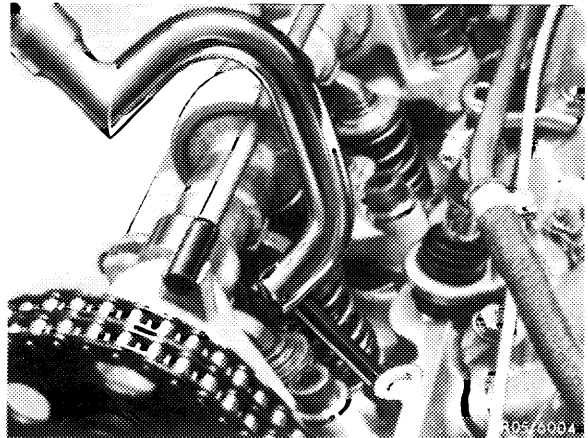


**Note:** The following tools are required to loosen and tighten the cylinder head bolts:

Allen wrench 8 x 52 mm long

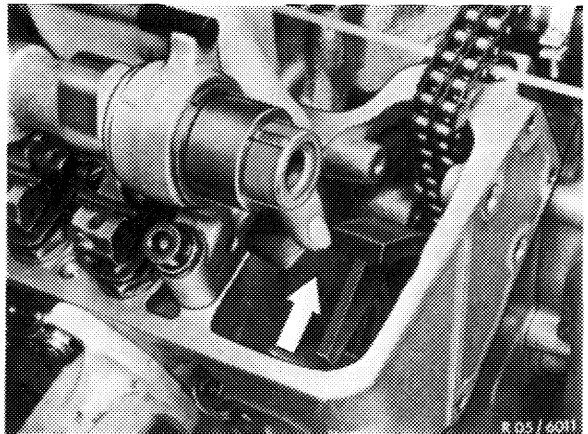


Screwdriver insert 116 589 00 13 00



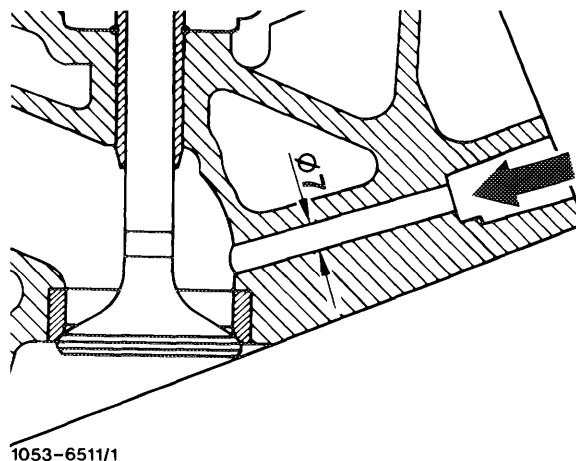
17 To remove the righthand cylinder head, push the tension rail with the timing chain towards the center of the engine so that the tension rail is not in the way.

18 Lift out cylinder heads.

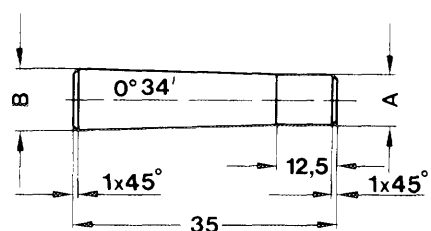


## Installation

**Note:** On ET (spare part) cylinder heads without air injection, the 4 holes for the air injection to the exhaust valves (arrow) must be closed by means of tapered aluminum plugs.



19 Coat tapered aluminum plugs with Loctite AVX 86, part No. 002 989 87 71, and drive into the holes in the cylinder head.



Tapered aluminum plugs  
∠ 0° 34'  
A 6.90 mm  
B 7.33 mm

20 Clean intake manifold sealing surface. To do so, cover the cylinder.

21 Clean mating surfaces of cylinder head and crankcase.

### Caution!

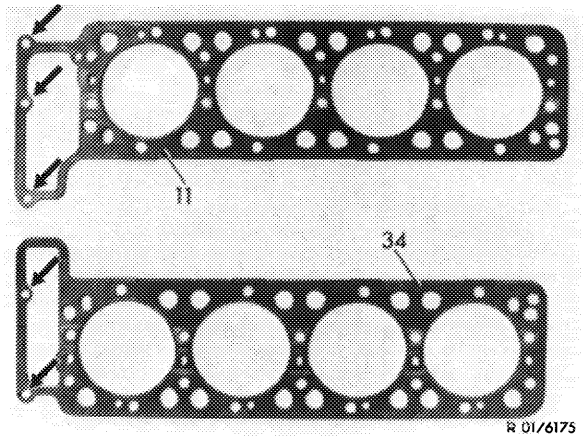
The light alloy crankcase mating surfaces must be treated very carefully to avoid scratches and score marks.

Clean threaded bores in the crankcase with compressed air.



22 Fit new cylinder head gaskets by placing them over the two dowel sleeves on each cylinder bank.

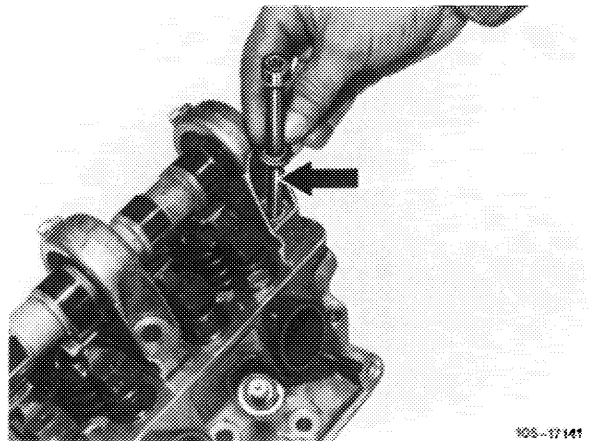
- 11 Righthand cylinder head gasket
- 34 Lefthand cylinder head gasket



**Caution!**

The cylinder head bolt M 10 x 165 (arrow) at the rear camshaft bearing must be inserted prior to fitting the cylinder heads.

The respective exhaust manifold is only installed after the tightening of the cylinder head bolts has been completed.



23 Install cylinder heads.

Before installing the cylinder head bolts, the thread and the contact area of the cylinder head bolts and the washers must be coated with oil.

**Caution!**

The cylinder head bolts M 10 x 165, M 10 x 90 and M 10 x 65 are 10 mm longer than those of the cast-iron engine 116.98 and 117.98.

24 Tighten cylinder head bolts in the sequence of the tightening diagram as follows:

1st stage with 30 Nm.

2nd stage with 60 Nm.

3rd stage after 10 minutes settling break with cold engine individually loosen cylinder head bolts slightly and retorqued with 60 Nm.

25 Further installation takes place in the sequence vice versa to removal.

