

A. OM 636

The cylinder head should only be removed when cold to prevent distortion; this is especially true for light metal cylinder heads.

The cylinder heads of the engines of the types 636.915, 636.912 and part of the engines of the type 636.916 are designed for a two-piece cylinder head cover (see Figure 01-5/1).

In addition, a large number of engines of the type 636.930 are equipped with a light metal cylinder head.

The removal and installation of the cylinder heads and the parts mounted on the cylinder head is essentially similar for all designs.

Removal:

1. Drain the cooling water. If additives are contained in the cooling water, the cooling water should be saved and refilled afterwards.
2. Remove the air filter and the intake manifold (see Job No. 09-7 and 14-1).
3. Remove the exhaust manifold (see Job No. 14-5).
4. Loosen the two fixing screws (8) at the generator support, the fixing nut (7) and the fixing screw (6) at the generator holder (5). Press the generator towards the engine and remove the V-belt (see Figure 01-3/1).
5. Remove the cooling water outlet pipe. To do this loosen the hose joint clip of the compensating line (see Figure 01-3/6).
6. Remove the vacuum line (2) and the injection lines (3 and 4) and disconnect the drip-oil line (see Figure 01-3/2).
7. Unscrew the oil lines (5 and 7) lubricating the rockers at the cylinder head (see Figure 01-3/2).

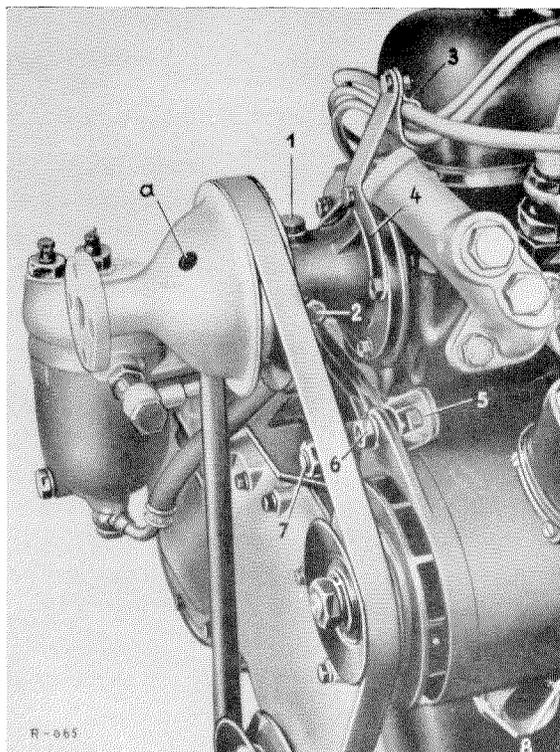


Figure 01-3/1

- 1 filler plug with venting bore
- 2 oil level checking screw
- 3 pipe clamp for injection and vacuum line
- 4 bracket for pipe clamp
- 5 generator fixing bracket
- 6 mounting screw on generator fixing bracket
- 7 fixing nut for generator fixing bracket and front engine support
- 8 fixing screws on generator fixing bracket (not visible)

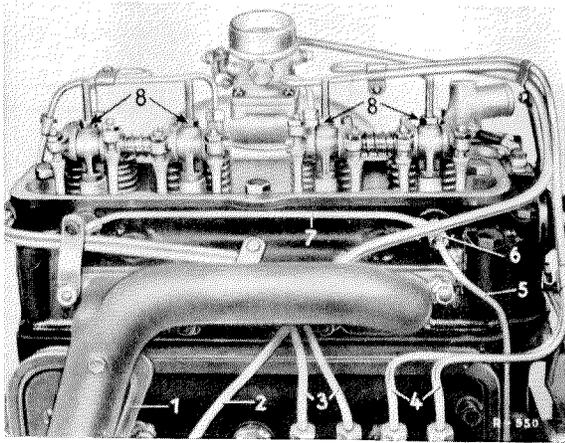


Figure 01-3/2

- 1 Screen for exhaust manifold
- 2 Vacuum line
- 3 Injection lines for cylinder 3 and 4
- 4 Injection lines for cylinder 1 and 2
- 5 Oil line from main oilway to cylinder head for lubrication of rockers
- 6 Oilway to 1st rocker bracket and connector of oil lines 5 and 7
- 7 Oil line to 4th rocker bracket
- 8 Fixing nuts and splash oil outlet at grooves in the rocker brackets (also see Fig. 05-2/1)

8. Disconnect the connecting cable of the glow plugs and if installed, unscrew the thermostat for the cooling water remote thermometer.
9. Remove the cylinder head cover (or covers) after loosening the fixing nuts.
10. Unscrew the fixing nuts of the rocker brackets and remove them with the rockers (see Figure 05-2/3). Check and repair the rockers and bearings of same (see Job No. 05-2).
11. Pull out the push rods.

Note: When pulling out the push rods do not fail to observe that the tappets do not stick. Cautiously lift each individual push rod and, if necessary, turn until the push rod has become loose from the tappet.

Tappets drawn out of the hole can be inserted after removing the side cover (see Figure 01-3/3).

12. Loosen the cylinder head bolts, starting in the middle and working outwards. Remove cylinder head and cylinder head gasket.

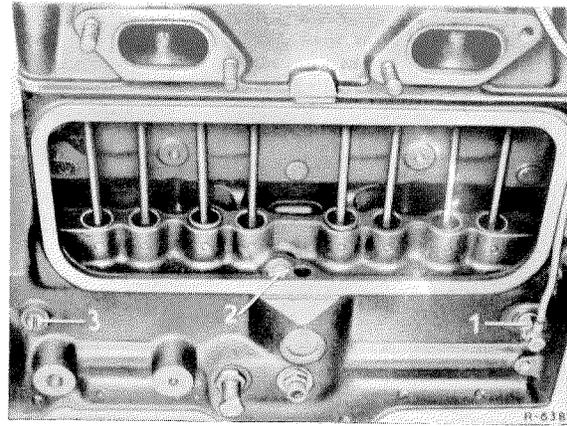


Figure 01-3/3

- 1 fixing screw for the 1st camshaft bearing with connection for the oil line for rocker arm lubrication
- 2 fixing screw for the centre or 2nd camshaft bearing within the tappet chamber
- 3 set screw for the 3rd camshaft bearing

Note: The cylinder head should only be removed when cold. The bolts must be loosened by starting in the middle and working outwards, in the opposite order as shown in Figure 01-3/5.

Cleaning, Testing and Preparation

13. Clean the cylinder head. Check the contact surface for distortion or damages such as grooves, scratches, cracks etc.

The largest unevenness in the longitudinal direction should not be more than 0.1 mm and in the cross direction not more than 0.01 mm (see Job No. 01-5, Milling and Pressure Testing Cylinder Head).

Removal and Installation of the Valves see Job No. 05-11.

Removal and Installation of the Nozzle Holders with Injection Nozzles, Glow Plugs and Pre-combustion Chambers see Job No. 01-1.

14. Clean the water passages in the cylinder head and the crankcase. Check whether the water distributing pipes are properly fixed, caulk or replace if necessary.

15. Force compressed air through the oil passages in the cylinder head, which serve the lubrication of the rockers, and also the connecting line (7) (see Figure 01-3/2).
16. Thick oil carbon on the piston crown has to be removed.
17. Chase the screw threads for the cylinder head bolts in the cylinder block with a tap M 12×1.75. This should mainly be done on older crankcases with very clogged threads. The cylinder head bolts must go sufficiently deep into the tapped blind holes. If not, the bolt is tightened with the specified torque but does not apply the pressure to the cylinder head gasket which would correspond to the torque of the bolt. The same is true if an oil cushion is created in the blind end hole. Therefore, never put oil into the blind end hole in order to lubricate the bolt. Cracking of the cylinder block can also be caused by this. Before mounting the cylinder head make sure that the bolts can be screwed in far enough.
18. Lightly oil the thread of the cylinder head bolts with graphited oil. The specified contact pressure of the cylinder head gasket can only be reached if excessive friction is prevented by adequate working ease of the bolts.

Note: If new cylinder head bolts are installed, check their length.

19. Check dowel pins in cylinder block for damages, drive in new dowel pins if necessary.

20. **If the cylinder head has to be replaced, the following must be observed:**

The cylinder heads for the Model 180 D (type 636.930) have an air vent hole 6 mm in dia (see Figure 01-3/4), because the engine installed in the vehicle is tilted in the cross direction.

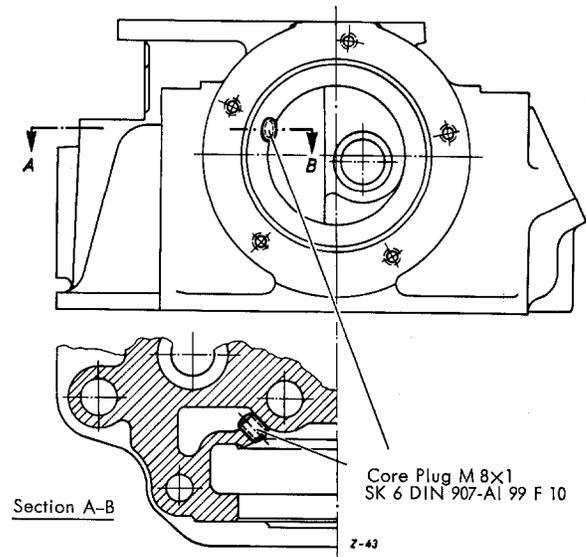


Figure 01-3/4

The cylinder heads for the engines of the type 636.912, 914, 915, 916, 917, 918, 919, 931, 932, 933, 934 and 936 should not have this air vent hole.

If only a cylinder head with air vent hole is available the air vent hole must be plugged with a core plug (see Figure 01-3/4).

Installation:

21. Clean again the surfaces of the cylinder block and the cylinder head and mount the cylinder head gasket. Use only the specified pre-stressed cylinder head gaskets with copper-plated water holes Part No. 636 016 06 20 or 636 016 07 20.

Note: Caution! A gasket with larger bores must be installed in engines, in which the cylinder bores have been enlarged as specified by the 2nd repair stage, because the distance between the piston and the contact surface of the cylinder block is very small in the diesel engine. There is the danger that the piston hammers against the cylinder head gasket. Starting with the 2nd repair stage (76 mm in dia.)

Injection Pump Side

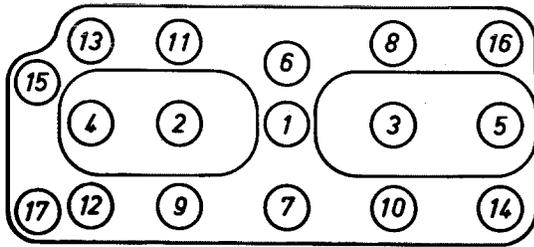


Figure 01-3/5

First torque	4 mkg
Second torque	6 mkg
Third torque	8 mkg*
Checking torque with engine warm	8 mkg

*The cold light metal cylinder head is tightened with 7 mkg.

the cylinder head gasket for larger cylinder bores Part No. 636 016 08 20 must be used.

22. Mount the cylinder head which should easily fit at the dowel pins. Screw in the cylinder head bolts.

Note: At the light metal cylinder head, washers must be installed with the bolts. The bolts are 5 mm longer than for the cast iron cylinder head.

23. Tighten the cylinder head bolts with thread M 12 with a torque wrench, 0 to 13 mkg, as indicated in the schematic diagram shown in Figure 01-3/5. The sequence and the step-by-step tightening of the cylinder head bolts must always be observed to prevent distortion of the cylinder head. The two bolts with the thread M 10 should be tightened with a spanner.

24. Insert the push rods in the valve tappets and put several drops of oil into the ball cups of the push rods.

25. Mount the rocker brackets with rocker shafts and rockers over the fixing studs of the cylinder head (see Figure 01-3/2).

Note: The contact surfaces must be clean. Bad and fouled contact surfaces cause loss of oil. Put lock washers on the rocker brackets, screw on the fixing nuts (8) and tighten (see Figure 01-3/2).

26. Adjust the valve clearance (see Job No. 00-3), valve clearance of the

inlet valves = 0.20 mm
exhaust valves = 0.15 mm.

27. Force compressed air through the oil line (7) and screw it with the oil line (5) to the cylinder head (see Figure 01-3/2).

28. Mount the cooling water outlet pipe. Before installation check if flange is level and if hole for compensating line is not clogged (see Figure 01-3/6).

A distorted flange must be reconditioned. Clogged water holes must be cleaned out, if not, the engine will tend to throw out water due to vapor bubble formation. The connecting hose between the cooling water outlet pipe and the connector at the cylinder head must be in perfect condition (see Figure 01-3/6). The hose joint clip shown in Figure 01-3/6 is the old version consisting of wire which should no longer be used. The specified hose joint clip has the designation S 9/9 Zy N 288a.

29. Mount the intake manifold with new gaskets to the cylinder head (see Job No. 4-1).

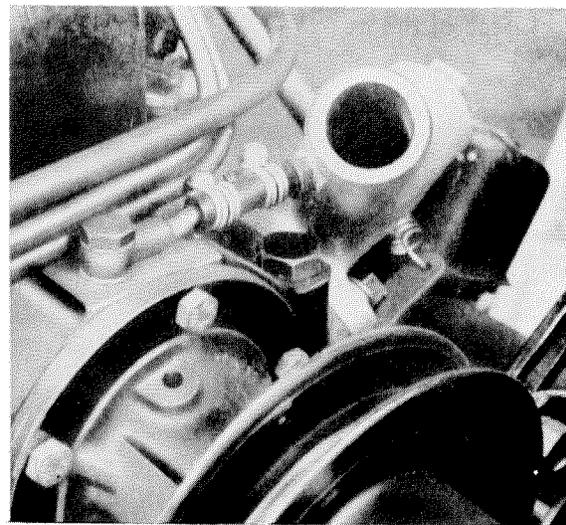


Figure 01-3/6

30. Install and tension the V-belt driving the water pump and generator (see Job No. 20-6).
31. Install the injection lines (3 and 4) and the vacuum line (2). Connect the drip-oil line (see Figure 01-3/2).
32. Mount exhaust manifold with new gaskets to the cylinder head (see Job No. 14-5).
33. Connect the connecting cable to the glow plugs and if provided, screw in thermostat of the cooling water remote thermometer.
34. Engage the linkage and the cable control for the idling adjustment. Adjusting the cable control (see Job No. 00-13).
35. Depending on the type, mount the air filter or the air hose to the throttle duct and secure with the clip and the fixing screw.
36. Refill the cooling water (also see Paragraph 1, Cooling Water Additives).
37. Operate engine for a short period to check whether sufficient oil splashes out of the grooves (8) of all 4 rocker brackets (see Figure 01-3/2).
38. Mount the cylinder head cover with faultless gasket. Place aluminium sealing rings over the fixing studs, screw on the fixing nuts and do not secure too tightly to avoid distortion of the cylinder head cover (see Table of Cylinder Head Covers, Page 01-3/5).
39. Thoroughly remove possible traces of oil at the separating line between the cylinder head cover and the cylinder head. Then operate engine under light load to warm up the cooling water to a temperature of approx. 70 to 80°C.
40. After an additional 5 minutes of operation with this cooling water temperature tighten the cylinder head bolts with a torque of

8 mkg as specified in the schematic diagram (see Figure 01-3/5), and fasten all nuts and screws at the exhaust and intake manifold.

41. Check the valve clearance, readjust if necessary (see Job No. 00-3).

42. Refill cooling water if necessary.

Note: On vehicles check again the torque of the cylinder head bolts and the valve clearance after a subsequent trial run of approx. 15 to 20 km or on built-in engines, after 1/2 hour of operation, under light engine load, and correct if necessary.

43. Check for leaks at all oil, water, and fuel connectors and also the cylinder head cover.

Note: After a covered distance of approx. 500 km check the torque of the cylinder head bolts with engine at operating temperature (8 mkg).

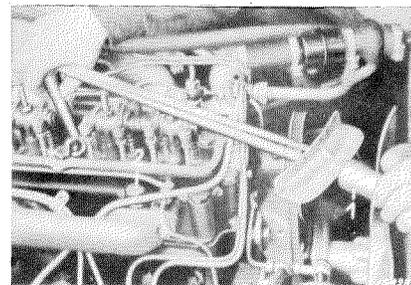


Figure 01-3/7

Retightening of Cylinder Head Bolts

- 1 Torque wrench with cranked double box wrench Part No. 120 589 00 03
- 2 Cylinder head bolt

List of the different Cylinder Head Covers

A) Cylinder head cover

Part No. 636 016 0005 (in two pieces, see Figure 01-3/8, Version A), installed in the engines of the type 636.915 and partly in the engines of the type 636.916.

B) Cylinder head cover
with oil filler in the rear left-hand side and with standard filler cap Part No. 636 010 16 30 (see Figure 01-3/8, Version B) installed in the engines of the types

636.	}	912	}	917-021 and 917/3
		914		917-022 and 917/28
		932		917-023 and 917/33
		933		917-040 and 917/5
		936		917-050 and 917/6
		917-00		917-090 and 917/10
		917/0		917-120 and 917/13
		917/2		917-190 and 917/20
		917/4		917-221 and 917/23
		917/9		917-222 and 917/29
		917/11		917-223
		917/12		917-260
		917/14		917-270
		917/15		917-271
		917/16		917-272
		917/17		917-280
		917/18		917-290
		917/21		917-300
		917/22		917-320
		917/24		917-330
		917/26		917-360
		917/27		

C) Cylinder head cover
with oil filler in front right-hand side and standard filler cap Part No. 636 010 05 30 (see Figure 01-3/8, Version C) installed in the engines of type 636.918, 931 and

636.	}	917-180 and 917/19
		917-240 and 917/25
		917-251 and 917/30
		917-252 and 917/31
		917-253 and 917/32
		917-340 — —
		917-350 — —

and partly in the engines of the type 636.916.

D) Cylinder head cover
with oil filler in front right-hand side and with air vent filter Part No. 636 010 07 30 (see Figure 01-3/8, Version D) installed in the engines of the type 636.919, 934 and 935.

E) Cylinder head cover
with oil filler in front right-hand side and also with fixing studs for the bearing bracket of the control linkage Part No. 636 010 13 30 (see Figure 01-3/8, Version E) installed in the engines of the type 636.930.

Note: From Engine No. 636.930 45 0001 through 636.930 55 14620

the cylinder head cover Part No. 636 010 09 30 was installed, with oil filler in the rear left-hand side and the filler cap without air vent filter, and with fixing studs for the bearing bracket of the control linkage.

F) The cylinder head cover Part No. 636 010 18 30 installed in the engines of the type 636.917/310 is similar to the Part No. 636 010 13 30.

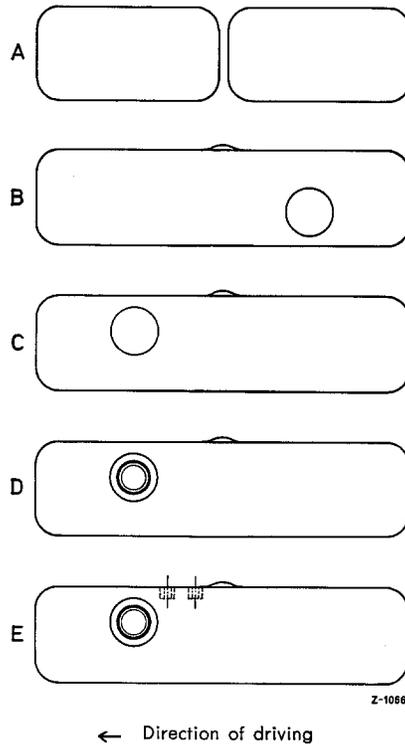


Figure 01-3/8

Cylinder Head Covers

Version	Part No.
A =	636 016 00 05
B =	636 010 16 30
C =	636 010 05 30
D =	636 010 07 30
E =	636 010 13 30

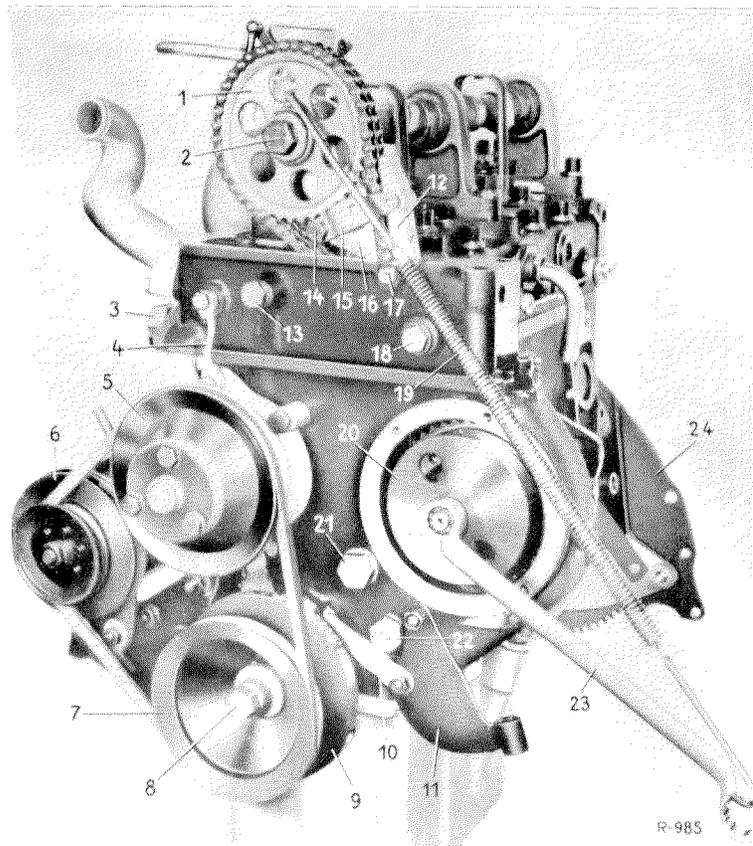


Figure 01-3/9

Engine OM 621

- | | |
|--|--|
| 1 camshaft sprocket | 14 hex. hd. screw M 8x50 |
| 2 hex. hd. screw M 14x1.5x40 | 15 holder for guide rail, inner |
| 3 chain tightener | 16 guide rail, inner |
| 4 venting line for water pump | 17 guide rail pivot pin on cylinder head |
| 5 water pump | 18 screw plug for guide sprocket pivot pin |
| 6 generator | 19 return spring |
| 7 pulley on the crankshaft | 20 injection timing device |
| 8 collar screw | 21 screw plug for oil pressure relief valve |
| 9 counterweight, graduated | 22 screw plug with guide rail pivot pin, bottom in cylinder crankcase |
| 10 adjusting pointer | 23 box wrench |
| 11 engine support, front, left | 24 intermediate plate on cylinder crankcase for starter motor mounting |
| 12 sliding rail, outer | |
| 13 screw plug for idler sprocket bearing pin | |

B. OM 621

In order to prevent distortion of the cylinder head, dismount it only in **cold condition**.

Removal:

1. Drain cooling water. Observe additives!
2. Loosen the water hose from the cooling water return pipe, the venting line (4) from the water pump to the cylinder head and the feed line to the heat exchanger from the cylinder head (see Figure 01-3/9).
3. Remove the air filter and unhook the control linkage on the throttle duct.
4. Unscrew the union nut of the venting pipe, if any, from the throttle duct.