

7.5.3 Cylinder head cover – Removal and installation

Preconditions

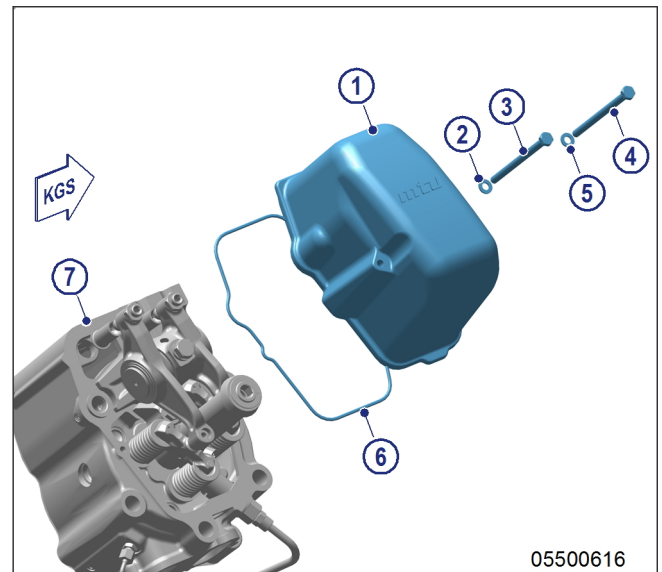
- ☑ Engine is stopped and starting disabled.

Special tools, Material, Spare parts

Designation / Use	Part No.	Qty.
Grease (Kluthe Hakuform 30-10/Emulgier)	X00029933	1
O-ring	(→ Spare Parts Catalog)	

Removing cylinder head cover

1. Clean very dirty cylinder head covers (1) prior to removal.
2. Remove screws (3, 4) with washers (2, 5).
3. Take off cylinder head cover (1) with O-ring (6) from cylinder head (7).



Installing cylinder head cover

1. Clean mounting surface.
2. Check O-ring (6) for damage, replace if necessary.
3. Coat O-ring (6) with grease.
4. Position O-ring (6) in groove of cylinder head cover (1).
5. Fit cylinder head cover (1) on cylinder head (7).
6. Install cylinder head cover (1) with screws (3, 4) and washers (2, 5).

7 Task Description

7.1 Engine

7.1.1 Cranking engine manually

Preconditions

- Engine shut down and secured against being restarted.

Special tools, Material, Spare parts

Designation / Use	Part No.	Qty.
Cranking tool	F6555766	1
Cranking tool	F6783293	1
Adapter	F6558528	1
Ratchet with extension	F30006212	1

DANGER



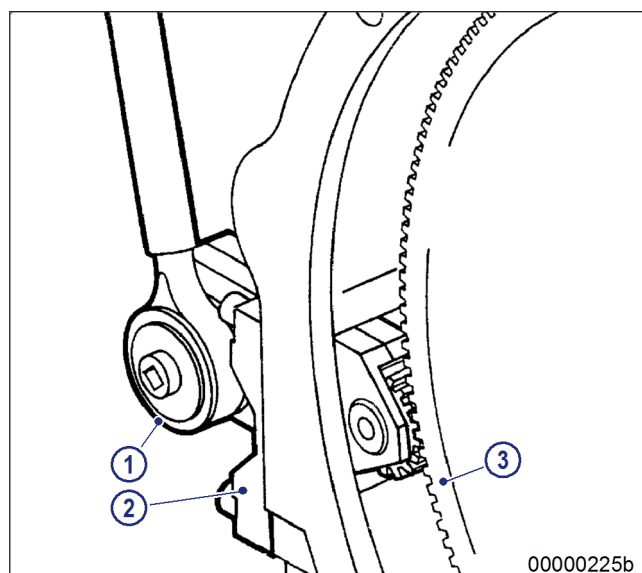
Unguarded rotating and moving engine components.

Risk of serious injury – Danger to life!

- Before barring the engine, ensure that nobody is in the danger zone.

Cranking engine manually (tool mounted on side)

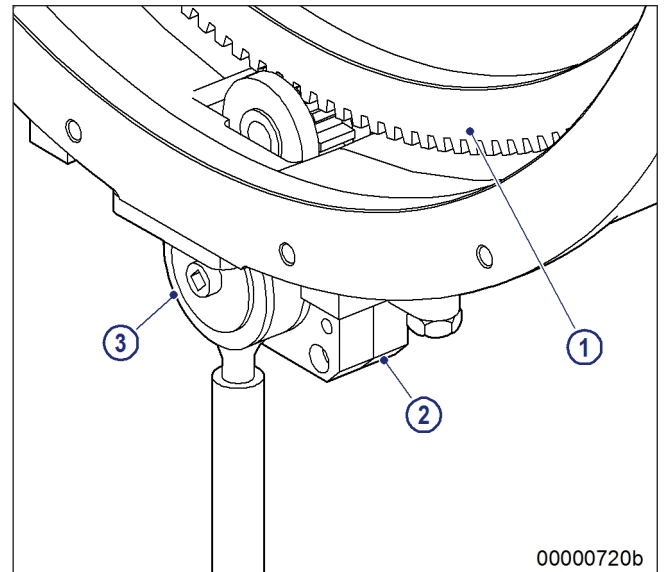
1. Remove guard plate.
2. Engage cranking tool (2) in ring gear (3) and mount on flywheel housing.
 - Use cranking tool F6555766.
3. Fit ratchet (1) onto cranking tool (2).
4. Rotate crankshaft in normal direction of engine rotation; apart from the normal compression resistance, there should be no resistance.
5. Cranking tool is removed by same procedure in reverse.



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Cranking engine manually (tool mounted underneath)

1. Remove grounding device or guard plate.
2. Engage cranking tool (2) in ring gear (1) and mount on flywheel housing.
 - For 12/16V engines, use cranking tool F6555766 with adapter F6558528.
 - For 20V engines, use cranking tool F6783293.
3. Fit ratchet (3) onto cranking tool (2).
4. Rotate crankshaft in normal direction of engine rotation; apart from the normal compression resistance, there should be no resistance.
5. Cranking tool is removed by same procedure in reverse.



7.5.2 Valve clearance – Check and adjustment

Preconditions

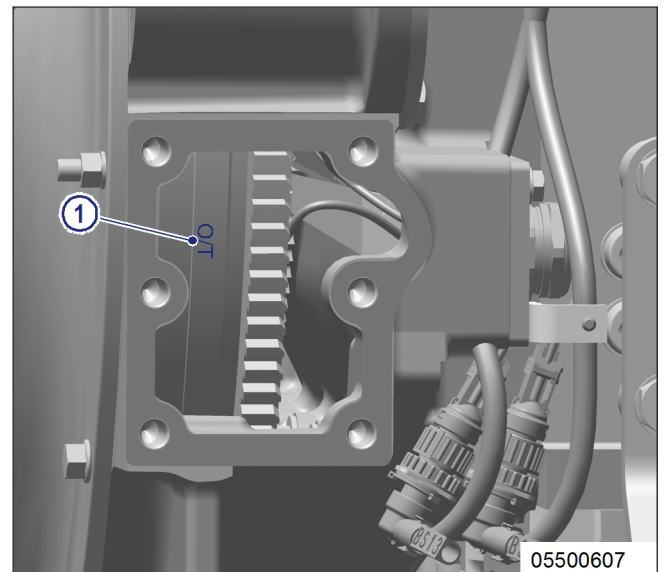
- Engine shut down and starting disabled.
- Engine coolant temperature is max. 40 °C.
- Valves are closed.

Special tools, Material, Spare parts

Designation / Use	Part No.	Qty.
Feeler gauge	Y20098771	1
Torque wrench, 60-320 Nm	F30452768	1
Box wrench socket, 24 mm	F30039526	1
Engine oil		

Preparatory steps

1. Remove cylinder head cover (→ Page 95).
2. Install barring device (→ Page 78).
3. The OT (TDC) marking (1) (if fitted) on the flywheel must not be used for reference.



- Rotate crankshaft with barring device in direction of engine rotation until the "OT-A1" marking and pointer are aligned.

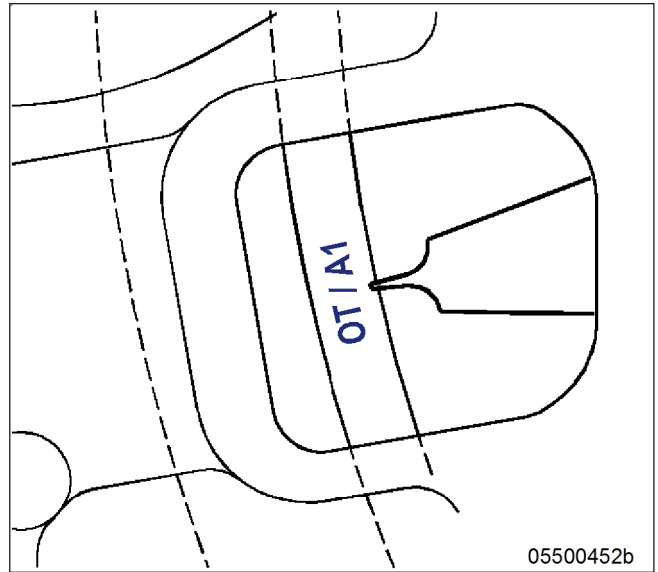


Diagram for 8V engines (two crankshaft positions)

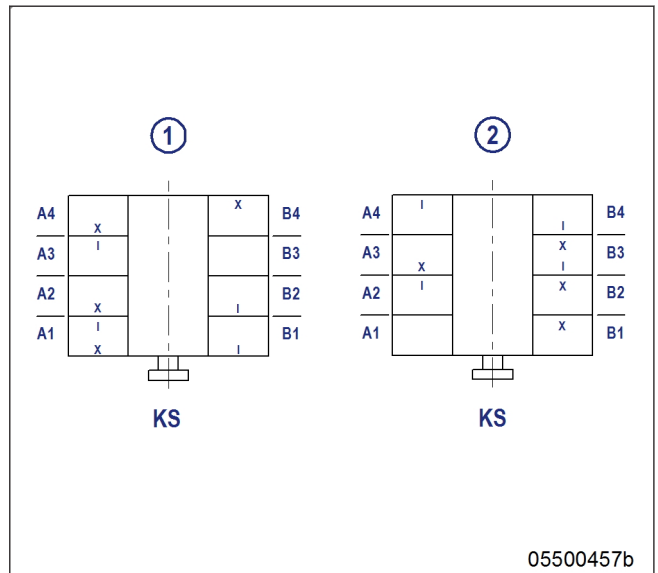
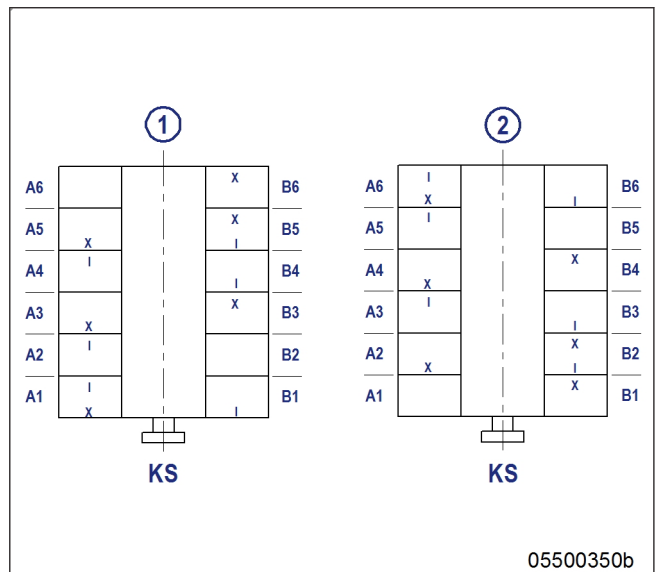


Diagram for 12V engines (two crankshaft positions)



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Diagram for 16V engines (two crankshaft positions)

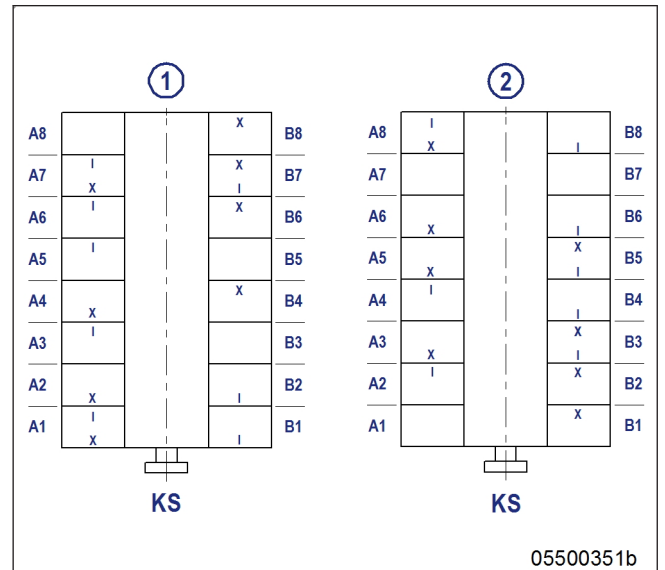
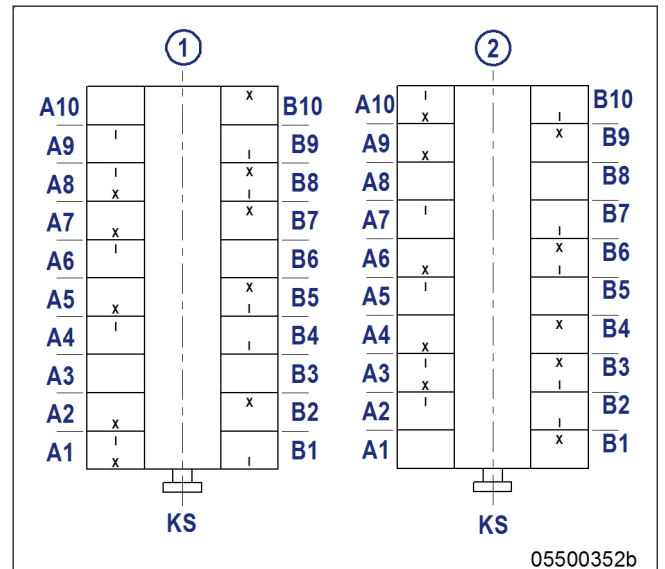


Diagram for 20V engines (two crankshaft positions)

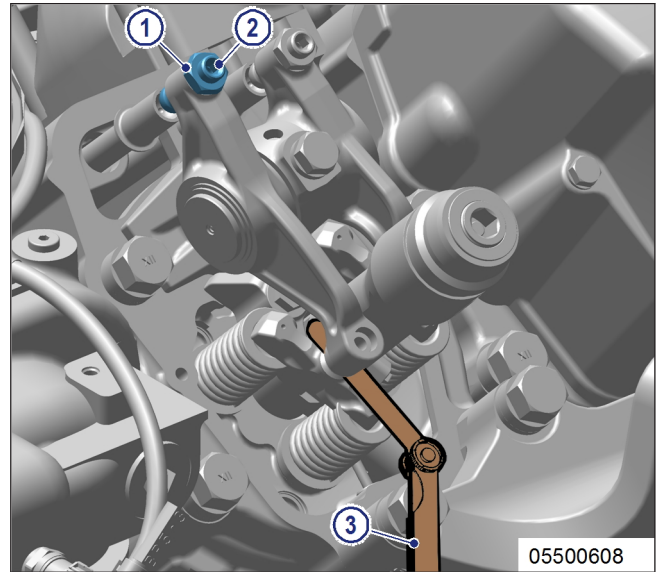


Checking valve clearance at two crankshaft positions

1. Check TDC position of piston in cylinder A1:
 - If the rocker arms are unloaded on cylinder A1, the piston is in firing TDC.
 - If the rocker arms are under load on cylinder A1, the piston is in overlap TDC.
2. Check valve clearance with cold engine:
 - Inlet (long rocker arm) = 0.2 mm \pm 0.05 mm
 - Exhaust (short rocker arm) = 0.5 mm \pm 0.05 mm
3. Check all valve clearances in two crankshaft positions (firing TDC and overlap TDC of cylinder A1) as per diagram.
 - 1 Cylinder A1 is in firing TDC
 - 2 Cylinder A1 is in overlap TDC
 - I Inlet valve
 - X Exhaust valve
4. Use feeler gauge to determine the distance between valve bridge and rocker arm.
5. If the deviation from the set value exceeds 0.1 mm, adjust valve clearance.

Adjusting valve clearance

1. Release locknut (1).
2. Insert feeler gauge (3) between valve bridge and rocker arm.
3. Use Allen key to set adjusting screw (2) so that the specified valve clearance is established.
4. Feeler gauge (3) must just pass through gap.



5. Tighten locknut (1) with torque wrench to the specified tightening torque, holding the adjusting screw (2) to prevent it from turning.

Name	Size	Type	Lubricant	Value/Standard
Locknut	M16 x 1.5	Tightening torque	(Engine oil)	90 Nm +9 Nm

6. Replace or rectify adjusting screws and/or locknuts which do not move freely.
7. Check valve clearance.

Final steps

1. Remove barring device (→ Page 78).
2. Install cylinder head cover (→ Page 95).

7.4 Running Gear

7.4.1 Grounding device – Carbon brush check

Preconditions

- ☑ Engine is stopped and starting disabled.

Special tools, Material, Spare parts

Designation / Use	Part No.	Qty.
Cold cleaner (Hakutex 60)	50602	
Carbon brush	(→ Spare Parts Catalog)	

WARNING



Compressed air

Risk of injury!

- Do not direct compressed-air jet at persons.
- Wear protective goggles / safety mask and ear protectors.

NOTICE



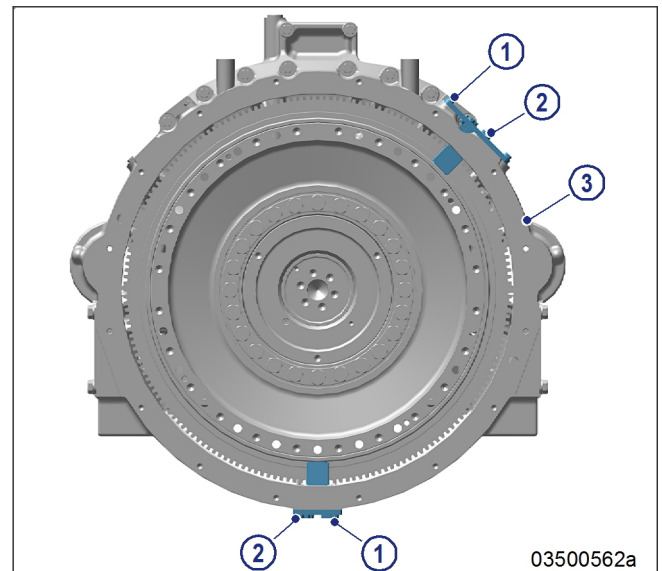
Unsuitable cleaning tools.

Damage to component!

- Observe manufacturer's instructions.
- Use appropriate cleaning tool.

Remove grounding assembly

1. Remove screws (1) with washers.
2. Remove grounding device (2) from flywheel housing (3).



Checking grounding device

Item	Findings	Action
Carbon brush	Damaged Wear limit 45 mm (new condition 60 mm)	Fit new part(→ Page 89) Fit new part(→ Page 89)
Press carbon brush against spring pressure		
Spring	broken, damaged	Fit new part(→ Page 89)
Running surface on adapter	contaminated, corroded	Clean

Cleaning running surface on adapter

1. Clean running surface of carbon brushes on adapter with cold cleaner.
2. Remove stubborn deposits with soft brush.
3. Blow out adapter with compressed air.

Installing grounding device

1. Check mounting surface on flywheel housing for cleanness.
2. Install grounding device on flywheel housing and secure with screws.

7.4.2 Grounding device – Carbon brush replacement

Preconditions

- Engine shut down and starting disabled.

Special tools, Material, Spare parts

Designation / Use	Part No.	Qty.
Loctite 270	40083	
Carbon brush	(→ Spare Parts Catalog)	2

Replace carbon brush

1. Loosen screw (5).
 2. Disconnect cable (6) from screw (5).
 3. Loosen screws (3).
 4. Remove screws (2).
 5. Remove carbon brush (1) from grounding device (4).
 6. Fit new carbon brush (1) in grounding device (4).
 7. Tighten screws (2) by hand.
 8. Insert screws (3) as far as the stop and tighten screws lightly.
 9. Tighten screws (2).
- Note: Apply Loctite 270 only to threads.
10. Secure cable (6) with screw (5).

