

Section 12.1

Valve Lash Checking

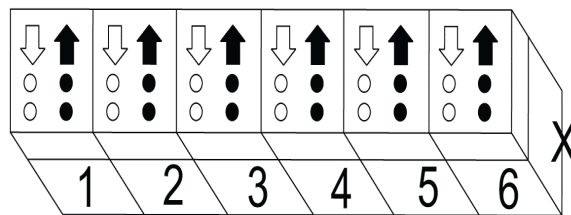
Check and adjust the valve lash as follows:

Note: Adjust the valve lash when the engine is cold. Wait at least 30 minutes after shutdown, even if the engine ran only a short time.

Select a method for adjusting the valves. There are two acceptable methods for adjusting the valves, prior to checking the valve lash:

- In order, according to the timing sequence used for fuel injection (see Method One—Adjust Each Cylinder in Firing Order);
- By type of valve, depending on crankshaft position (see Method Two—Adjust All Valves Using Two Crankshaft Positions).

[See Figure "Cylinder and Valve Layout"](#) for the cylinder and valve layout on MBE 4000 engines.



⇩ = INTAKE VALVES

⇨ = EXHAUST VALVES

X = FLYWHEEL END

NOTE: CYLINDERS ARE NUMBERED FROM FORE TO AFT

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Figure 1. Cylinder and Valve Layout

Section 12.1.1

Method One — Adjust Each Cylinder in Firing Order

Method one allows you to adjust each cylinder in the order in which fuel is injected. The crankshaft must be repositioned after each cylinder is adjusted as [listed in Table "Valve Adjustment \(Method One\)"](#).

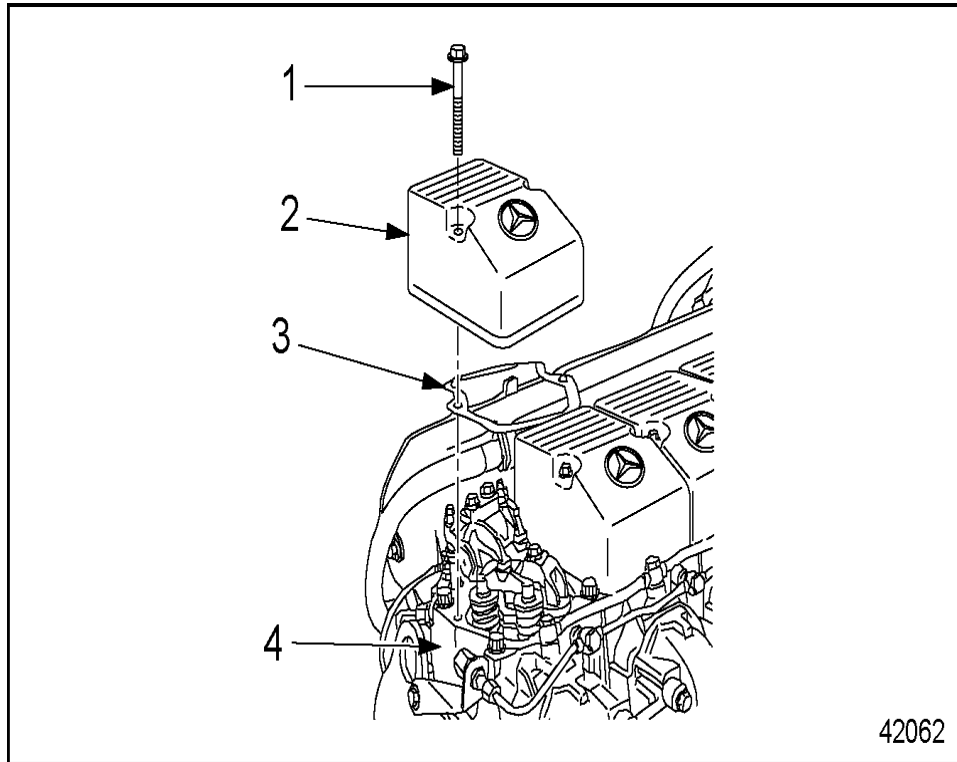
Engine	Crankshaft Position	Cylinders	Cylinders	Cylinders	Cylinders	Cylinders	Cylinders
MBE 4000	Ignition TDC	1	5	3	6	2	4

MBE 4000	Valve Overlap	6	2	4	1	5	3
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Table 1. Valve Adjustment (Method One)

Note: Clean each cylinder head cover before removing it.

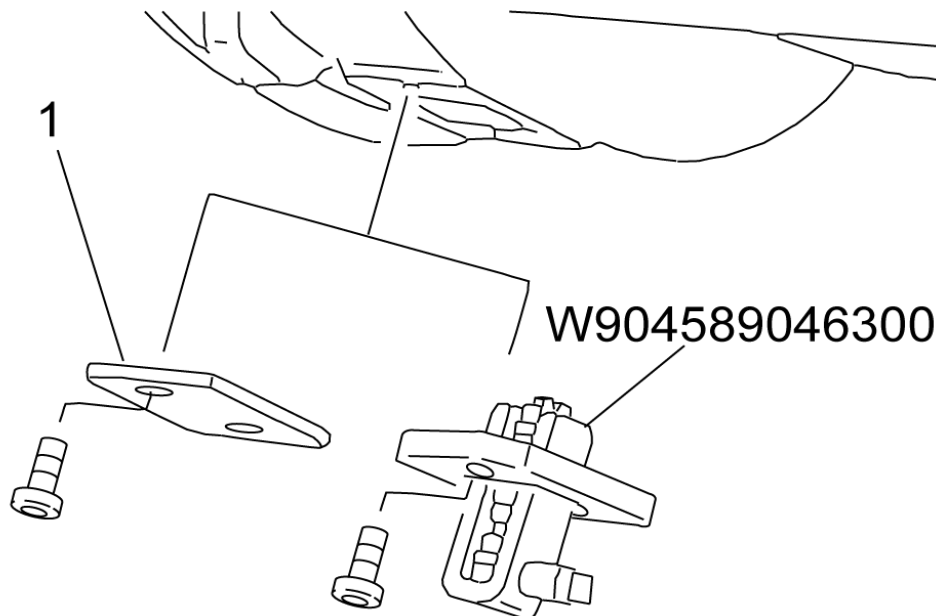
1. Remove the cylinder head covers. [See Figure "Cylinder Head Cover, \(exploded view\)"](#) .



- | | |
|------------------------|------------------|
| 1. Socket-Head Bolt | 3. Gasket |
| 2. Cylinder Head Cover | 4. Cylinder Head |

Figure 2. Cylinder Head Cover, (exploded view)

2. Remove the inspection cover on the flywheel housing.
3. Fit the engine cranking tool ([J 46392](#)) into the inspection hole on the flywheel housing. [See Figure "Placement of Engine Cranking Tool"](#) .



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1. Inspection Cover

Figure 3. Placement of Engine Cranking Tool

4. For each cylinder, use the cranking tool ([J 46392](#)) to turn over the crankshaft until the piston is exactly at top dead center (TDC) in the compression stroke. The valves must be closed and it must be possible to turn the pushrods without effort.

Note: When the piston in cylinder #1 is at ignition TDC, the valves of cylinder #6 will overlap, meaning that both intake and exhaust valves are partially open, and show no measurable play when tested with a feeler gauge.

5. Check each valve and adjust it (if necessary), using the procedures under the heading "Adjusting Valve Lash."
6. For each valve, measure the valve lash with a feeler gauge between the rocker arm and valve bridge. It should be possible to pull the feeler gauge through with no more than light resistance.

Valve Type	Adjust to: mm (in.)
Intake	0.40 mm (0.016 in.)
Exhaust	0.60 mm (0.024in.)

7. Table 4. Valve Lash Adjustment

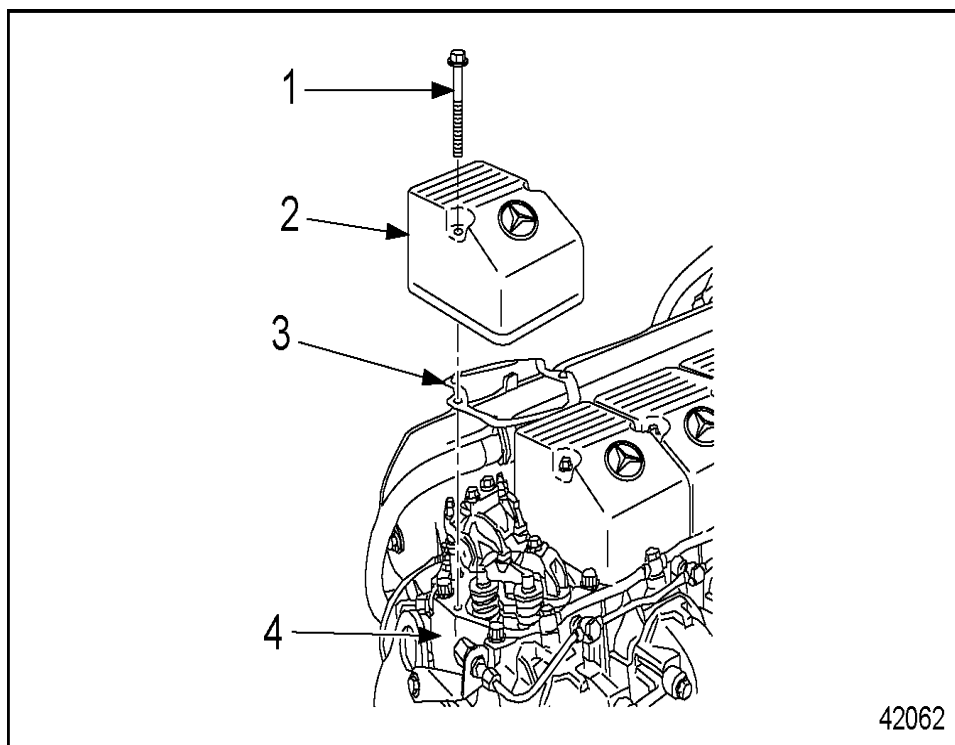
Section 12.1.2

Method Two — Adjust All Valves Using Two Crankshaft Positions

Method two allows you to adjust all the valves using just two crankshaft positions.

Note: Clean each cylinder head cover before removing it.

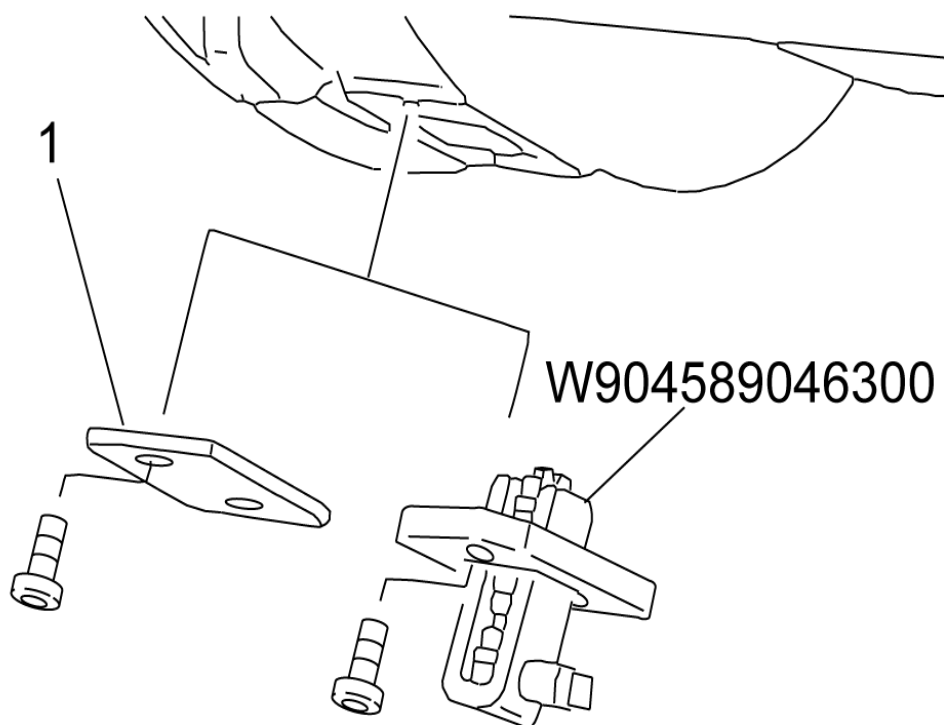
1. Remove the cylinder head covers. [See Figure "Cylinder Head Cover, \(exploded view\)"](#) .



- | | |
|------------------------|------------------|
| 1. Socket-Head Bolt | 3. Gasket |
| 2. Cylinder Head Cover | 4. Cylinder Head |

Figure 4. Cylinder Head Cover, (exploded view)

2. Remove the inspection cover on the flywheel housing.
3. Fit the engine cranking tool ([J 46392](#)) into the inspection hole on the flywheel housing. [See Figure "Placement of Engine Cranking Tool"](#) .



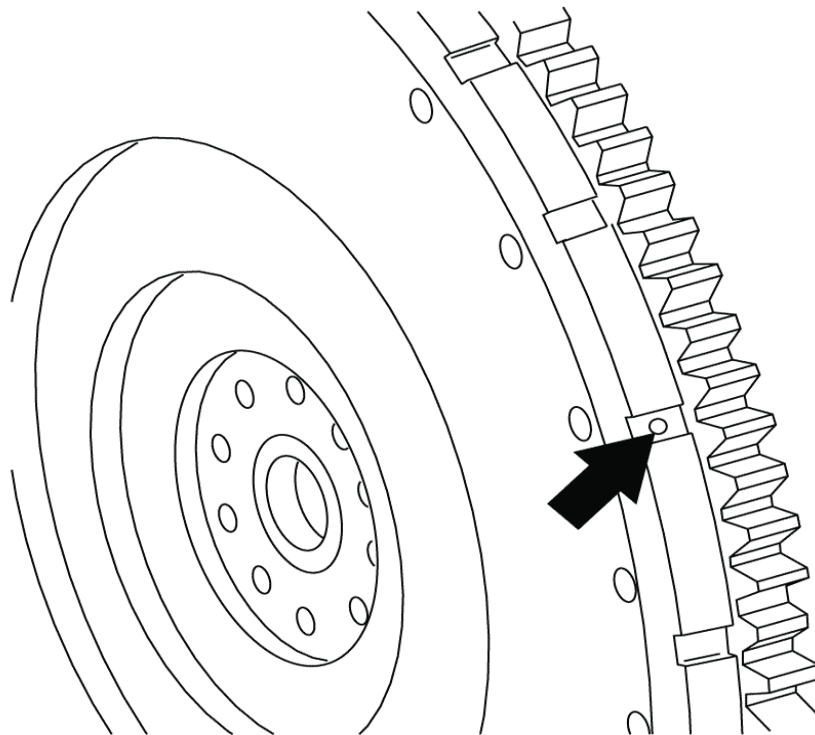
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1. Inspection Cover

Figure 5. Placement of Engine Cranking Tool

4. Using the cranking tool ([J 46392](#)), turn the crankshaft until cylinder #1 is at the ignition TDC position (all valves are closed) and cylinder #6 is at the valve overlap position (all valves are open).

Note: When the piston in cylinder #1 or #6 is at ignition TDC, there will be a small bevelled alignment mark visible through the inspection hole. [See Figure "Flywheel Alignment Mark"](#) .



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Figure 6. Flywheel Alignment Mark

5. Check the valves in the "Ignition TDC" row [listed in Table "Valve Adjustment \(Method Two\)"](#) , and adjust them (if necessary), using the procedures under the headings "Checking Valve Lash" and "Adjusting Valve Lash."

Engine	Cylinder #1 Crankshaft Position	Cylinder Valves/Types*	Cylinder Valves/Types*	Cylinder Valves/Types*	Cylinder Valves/Types*	Cylinder Valves/Types*
		1	2	3	4	5
MBE 4000	Ignition TDC	I/E	I	E	I	E
MBE 4000	Valve Overlap	—	E	I	E	I

6. Table 7. Valve Adjustment (Method Two)

7.

* I= Intake Valve and E= Exhaust Valve

8. Using the cranking tool [\(J 46392\)](#) , turn the crankshaft until cylinder #6 is at the ignition TDC position (all valves are closed) and cylinder #1 is at the valve overlap position (all valves are open).
9. Using the same procedure, check the valves in the "Valve Overlap" row [listed in Table "Valve Adjustment \(Method Two\)"](#) and adjust them (if necessary), using the procedures under the headings "Checking Valve Lash" and "Adjusting Valve Lash."

10. For each valve, measure the valve lash with a feeler gauge between the rocker arm and valve bridge. It should be possible to pull the feeler gauge through with no more than light resistance.

Valve Type	Adjust to: mm (in.)
Intake	0.40 mm (0.016 in.)
Exhaust	0.60 mm (0.024 in.)

11. Table 8. Valve Lash Adjustment

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