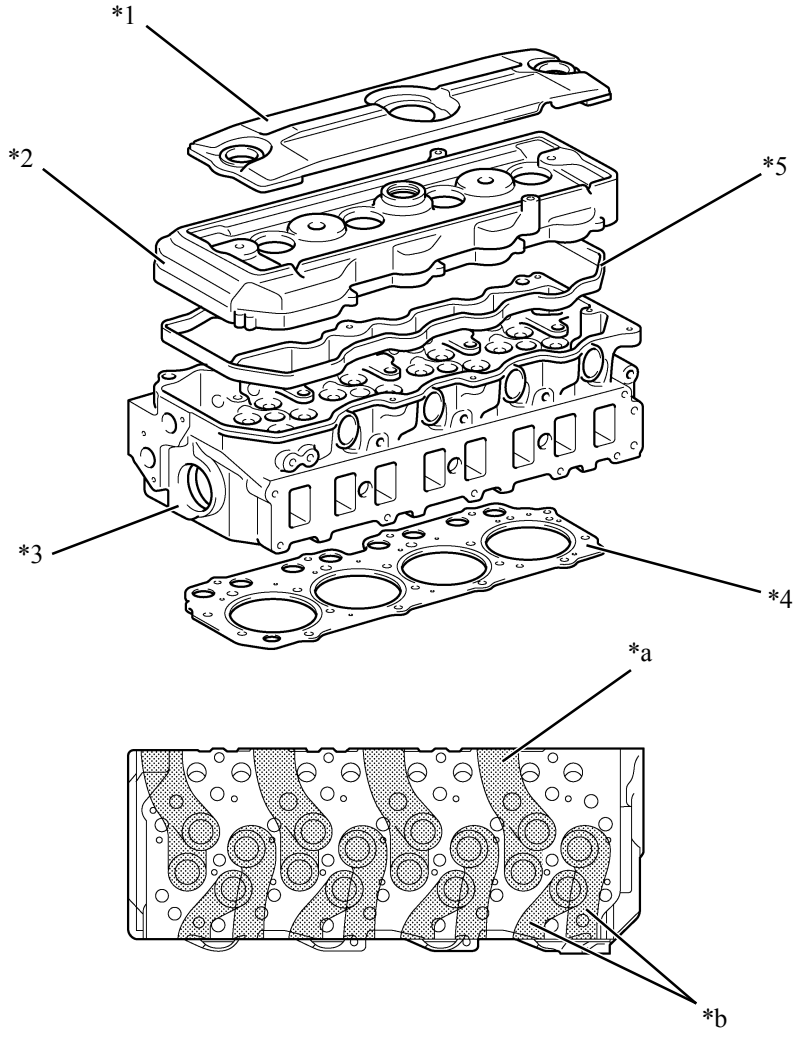
## ■ ENGINE PROPER

### 1. Cylinder Head

- A cylinder head sub-assembly made of high-strength cast iron is used. The thickness of the walls and the layout of the water jacket have been optimized to achieve well-balanced rigidity and cooling performance. 2 intake valves and 2 exhaust valves have been provided for each cylinder, and the shape of the ports has been optimized.
- Cross-flow type intake ports that consist of 2 different shapes are used to produce an optimal swirl in order to achieve high charging efficiency and exhaust efficiency.
- Valve guides made of a sintered material that provides good oil retention are used in order to ensure seizure resistance and wear resistance. Furthermore, the amount of oil leakage through the valve stem oil seal has been minimized to achieve low oil consumption and exhaust emissions.
- A steel laminate type cylinder head gasket is used to achieve high sealing performance and heat resistance.
- A No. 2 cylinder head cover sub-assembly made of aluminum alloy is used for weight reduction.
- A cylinder head cover gasket made of a highly heat-resistant and oil-resistant fluorine containing rubber is used to ensure reliability.
- The No. 2 cylinder head cover sub-assembly is bolted in 2 locations in the center to achieve a reduced number of parts and high serviceability.




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**Text in Illustration**

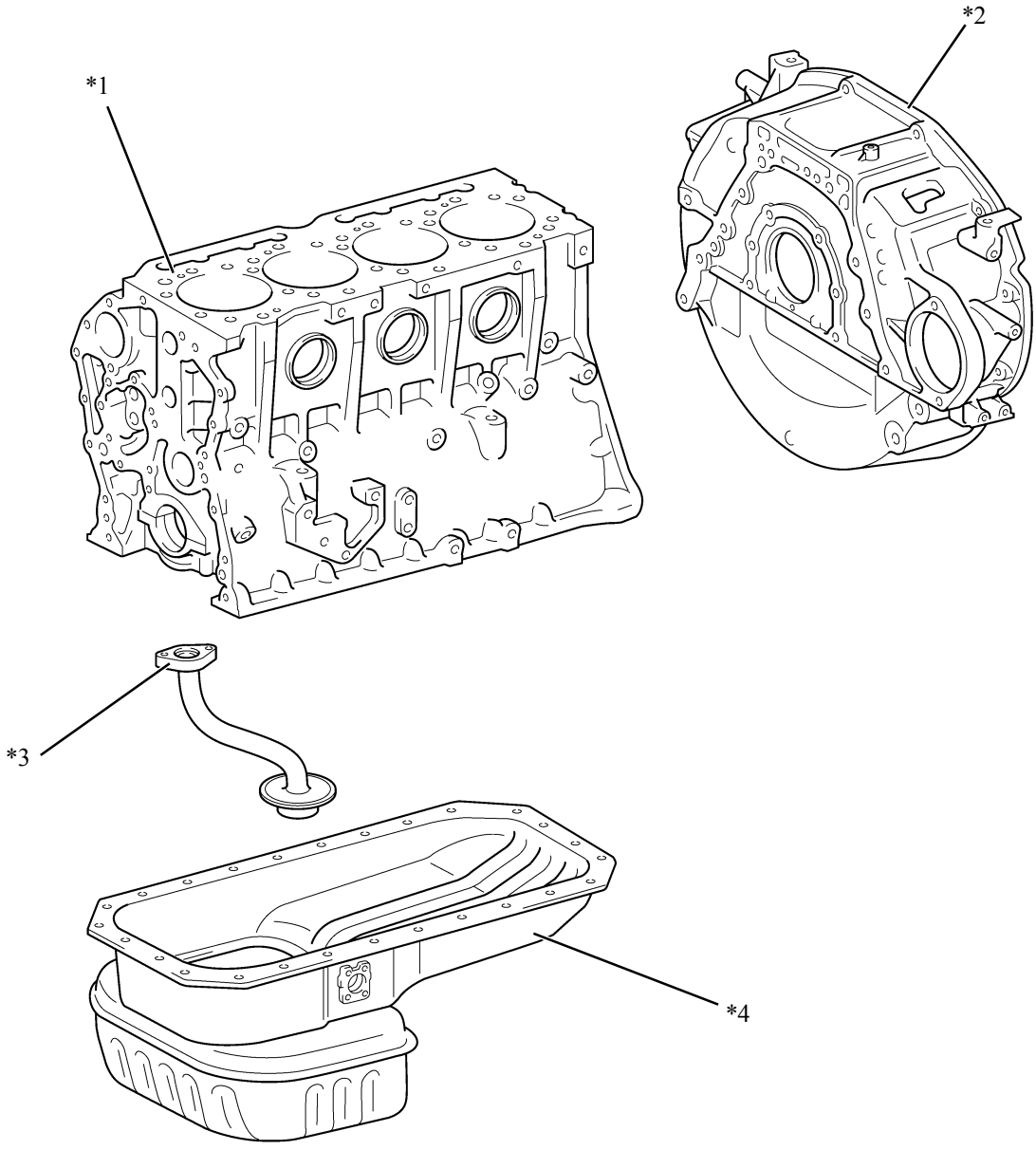
| | | | |
|---|---|---|---|
| *1 | Cylinder Head Cover Sub-assembly | *2 | No. 2 Cylinder Head Cover Sub-assembly |

(Continued)

| | | | |
|---|---|---|---|
| *3 | Cylinder Head Sub-assembly | *4 | Cylinder Head Gasket |
| *5 | Cylinder Head Cover Gasket | - | - |
| *a | Exhaust Port | *b | Intake Ports |

## 2. Cylinder Block and Oil Pan

- The cylinder block sub-assembly is made of cast iron alloy and contains dry type cylinder liners that are highly rigid. A full jacket type water jacket is used to ensure strength and durability.
- The casting thickness of the walls of the cylinder block sub-assembly has been optimized to ensure strength and weight reduction.
- An FIPG (Formed-In-Place Gasket), which excels in sealing performance, is used along the outer flange of the oil pan sub-assembly.
- A flywheel housing made of lightweight and highly rigid aluminum alloy is used.




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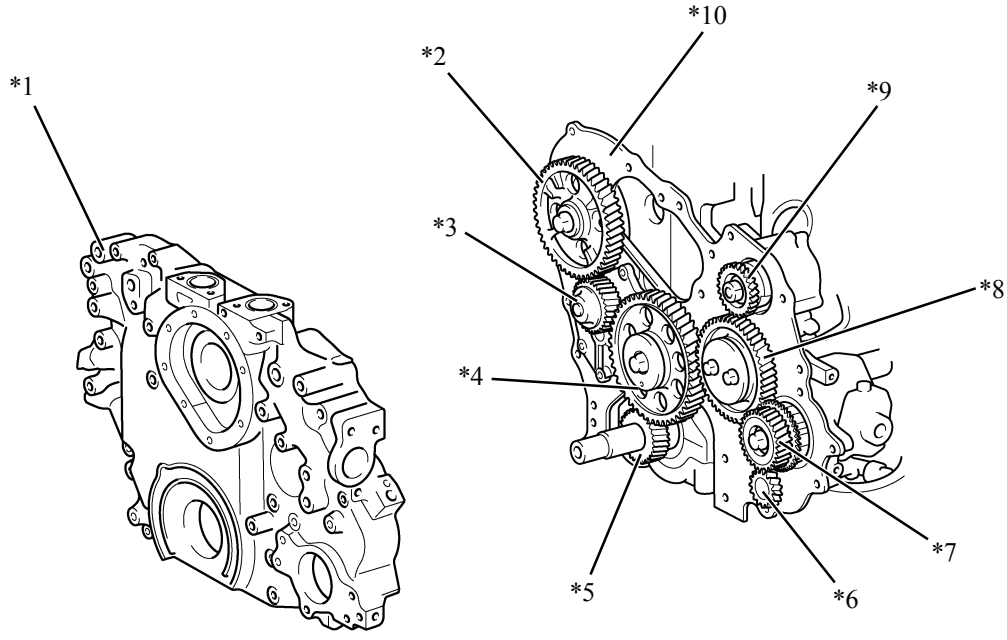
**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Cylinder Block Sub-assembly | *2 | Flywheel Housing |
| *3 | Oil Strainer Sub-assembly | *4 | Oil Pan Sub-assembly |

## 3. Timing Gear Train

The timing gear train drives the injection or supply pump assembly, oil pump assembly, vacuum pump, camshaft, and power steering pump.

- A timing gear case sub-assembly made of aluminum alloy is used.
- The power of the crankshaft timing gear is transmitted to the No. 1 idler gear sub-assembly to drive the oil pump drive gear and the No. 2 idler gear sub-assembly.
- The No. 2 idler gear sub-assembly drives the supply pump drive gear, which also drives the power steering pump drive gear.
- The oil pump drive gear drives the camshaft drive gear.
- The No. 2 idler gear sub-assembly drives the vacuum pump drive gear.




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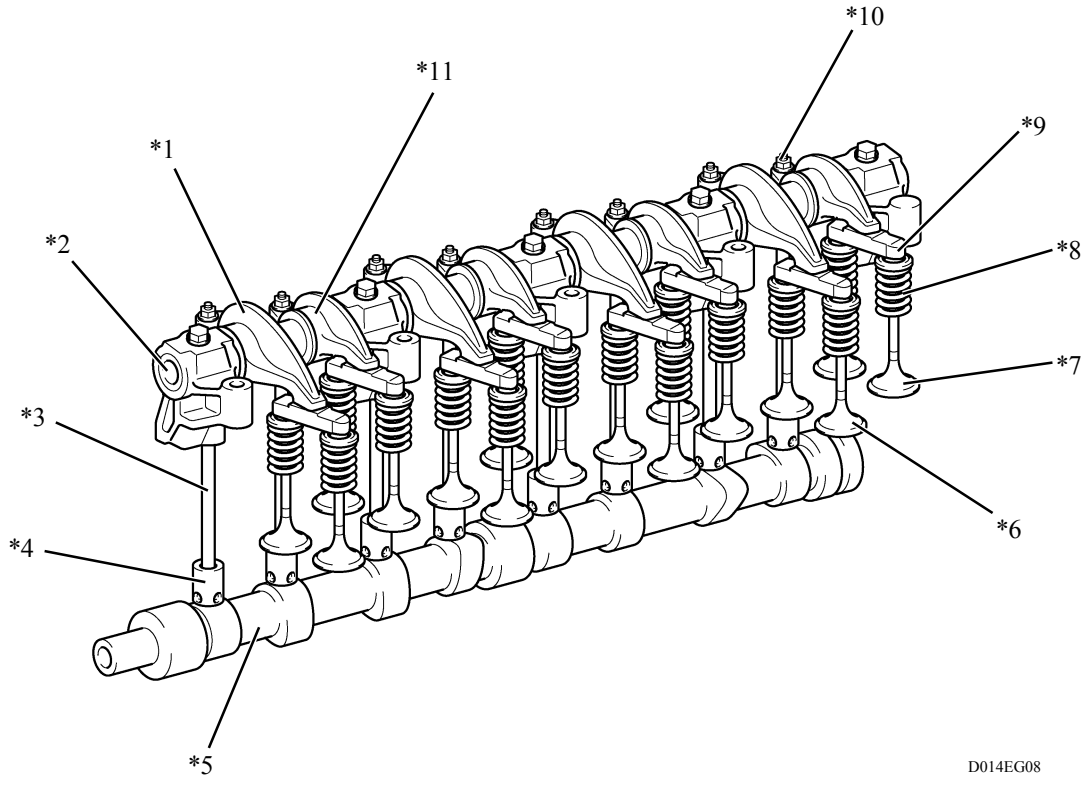
**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Timing Gear Case Sub-assembly | *2 | Camshaft Drive Gear |
| *3 | Oil Pump Drive Gear | *4 | No. 1 Idler Gear Sub-assembly |
| *5 | Crankshaft Timing Gear | *6 | Power Steering Pump Drive Gear |
| *7 | Supply Pump Drive Gear | *8 | No. 2 Idler Gear Sub-assembly |
| *9 | Vacuum Pump Drive Gear | *10 | Timing Gear Plate |

## 4. Valve Mechanism

A 16-valve OHV system is used. The camshaft drives the push rods, rocker arms, and valve bridges in order to open and close the valves.

- Push rods made of highly rigid carbon steel are used to achieve a high speed threshold. The portion of the push rods that comes in contact with the rocker arms has been hardened to ensure proper wear resistance.
- Intake and exhaust valves made of heat-resistant steel are used. The stems and the ends have been nitrocarburized to ensure proper wear resistance.
- Cast iron alloy valve lifters are used.

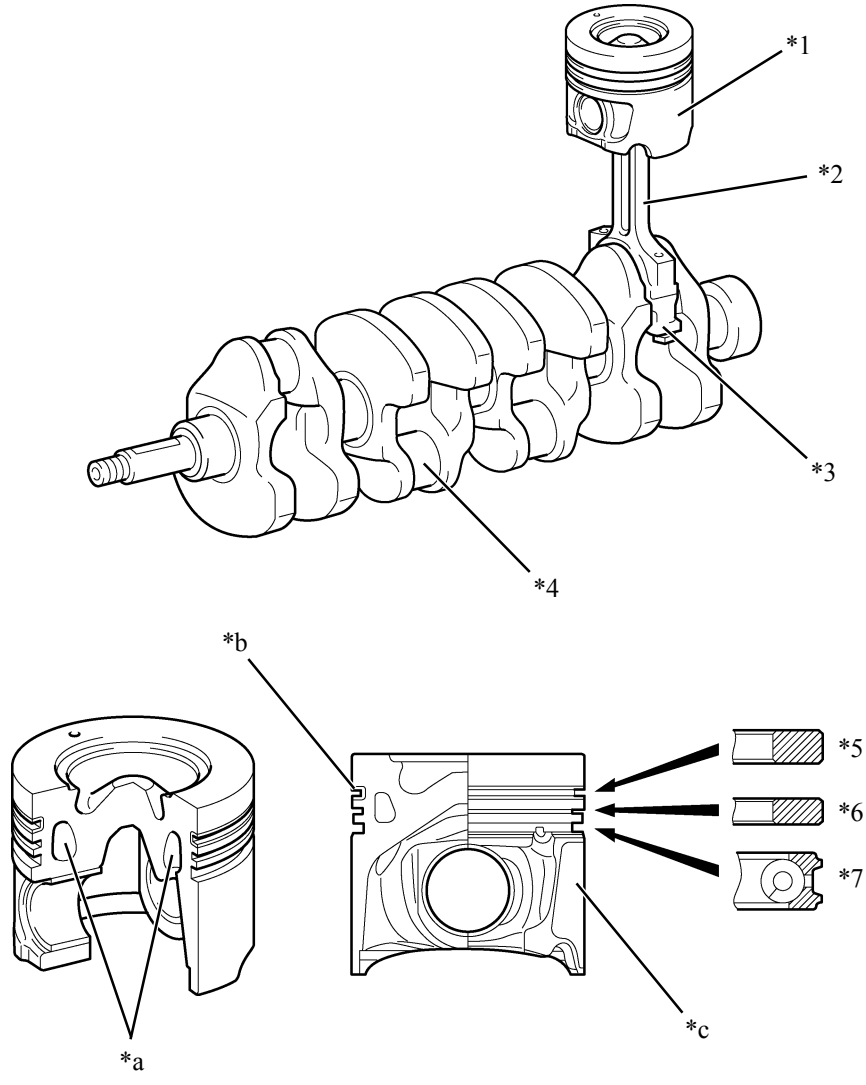



**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | No. 1 Valve Rocker Arm Sub-assembly | *2 | No. 1 Valve Rocker Shaft Sub-assembly |
| *3 | Valve Push Rod | *4 | Valve Lifter |
| *5 | Camshaft | *6 | Intake Valve |
| *7 | Exhaust Valve | *8 | Inner Compression Spring |
| *9 | Valve Bridge | *10 | Valve Adjust Screw |
| *11 | No. 2 Valve Rocker Arm Sub-assembly | - | - |

## 5. Pistons, Connecting Rods and Crankshaft

- Pistons made of lightweight and high-temperature resistant aluminum alloy are used, and the combustion chambers are a reentrant shape in order to achieve high power output, good fuel economy, and low exhaust emissions.
- Full-floating type piston pins are used. Their overall length and wall thickness have been optimized to accommodate the high power output of the engine.
- Connecting rods made of cast carbon steel are used.
- The crankshaft is made of high-strength forged special steel.
- A cooling channel has been provided inside each piston ring groove in order to cool the piston with oil, thus improving reliability.
- A ring groove insert has been provided in the top ring groove to ensure wear resistance, and the skirt has been coated to achieve high scuffing resistance.




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**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Piston | *2 | Connecting Rod Sub-assembly |
| *3 | Connecting Rod Cap | *4 | Crankshaft |
| *5 | No. 1 Compression Ring | *6 | No. 2 Compression Ring |

(Continued)

| | | | |
|---|---|---|---|
| *7 | Oil Ring | - | - |
| *a | Cooling Channel | *b | Ring Groove Insert |
| *c | Coating | - | - |