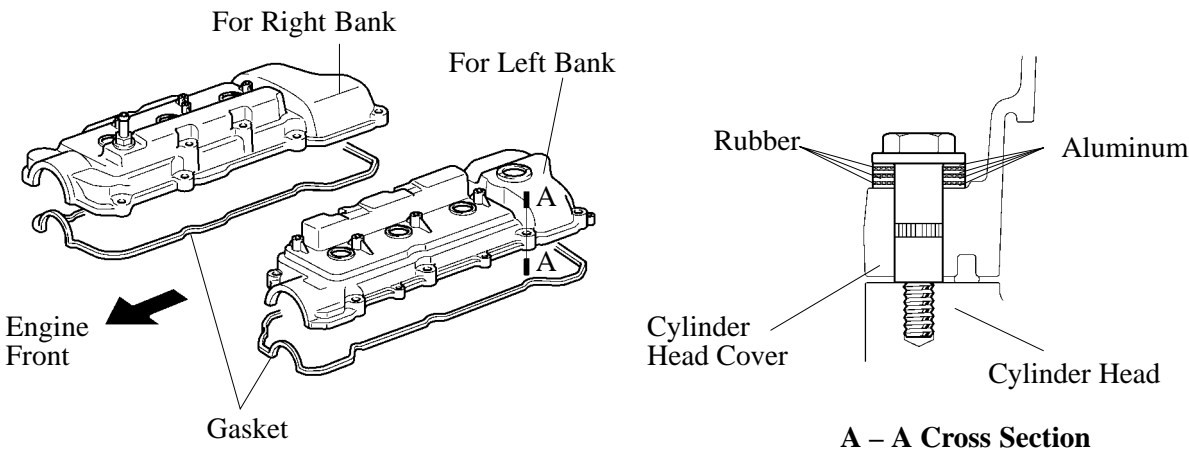


■ENGINE PROPER

1. Cylinder Head Cover

- Lightweight yet high-strength aluminum diecast cylinder head covers are used.
- An aluminum washer made of vibration-damping laminated aluminum sheet is used on the evenly spaced shoulder bolts which fasten the cylinder head covers.



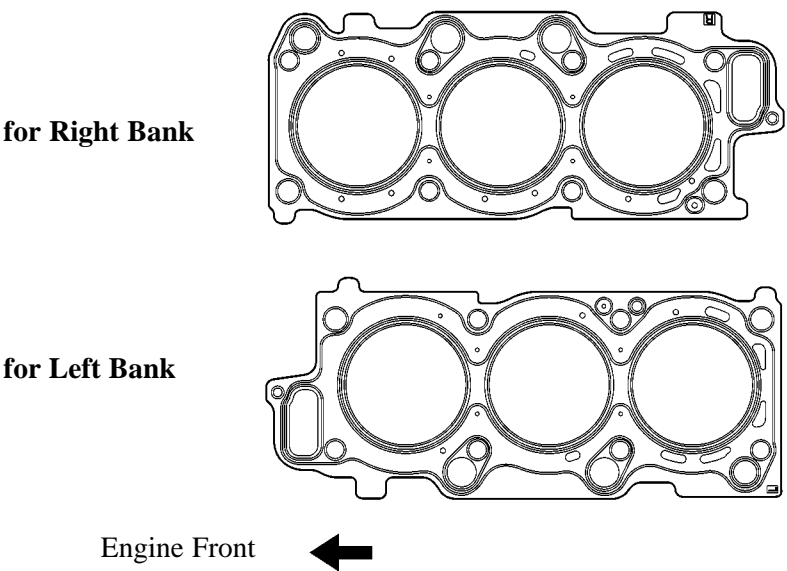
209EG101

2. Cylinder Head Gasket

- A metal type cylinder head gasket which offers superior pressure resistance and sealing performance has been adopted.

— Main Changes from 1MZ-FE engine —

Along with the increased diameter of the cylinder bore and the change in the shape of the water passage of the 3MZ-FE engine on the '04 model, the shape of the cylinder head gasket has been changed.



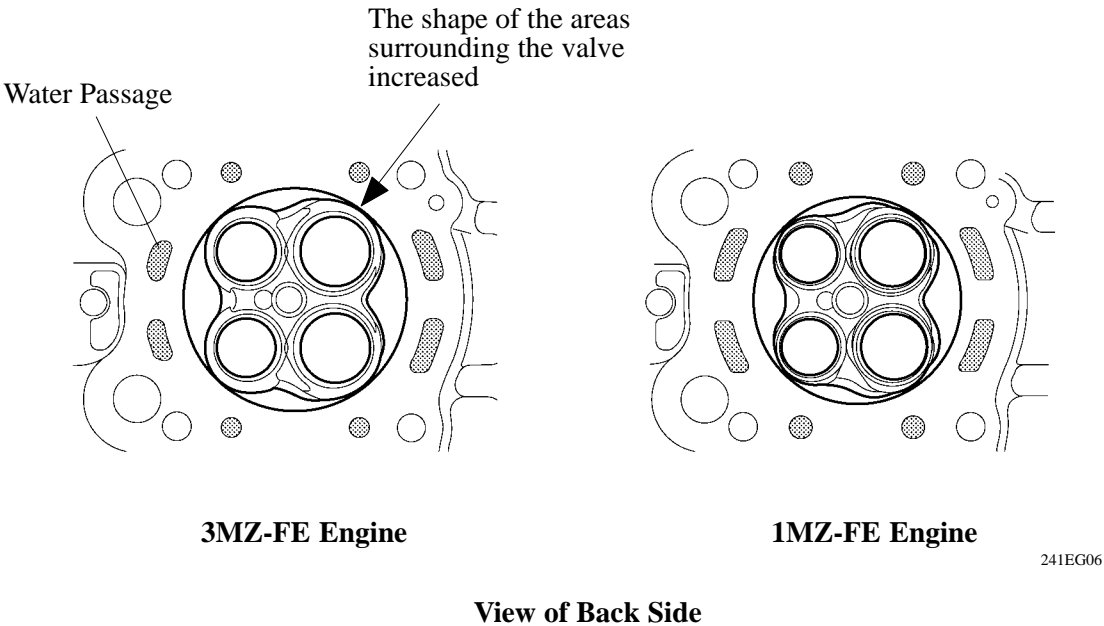
241EG05

3. Cylinder Head

- The cylinder head, which is made of aluminum, has adopted a pentroof-type combustion chamber. The spark plug is located in the center of the combustion chamber.
- Upright, small-diameter intake ports are adopted.
- The cross section of the protrusion of the valve guide into the intake port has been reduced by decreasing the valve stem diameter and the valve guide outer diameter.
- Plastic region tightening bolts are used for the cylinder head bolts for good axial tension.

— Main Changes from 1MZ-FE engine —

Along with the increased diameter of the cylinder bore of the 3MZ-FE engine on the '04 model, the area of the combustion chamber that surrounds the valves in the cylinder head has been extended all the way to the edge of the cylinder bore. As a result, the intake and exhaust efficiency of the engine has been improved. Also, by optimizing the shape of the water passage, the cooling efficiency has been improved in order to accommodate the high compression ratio of this engine.

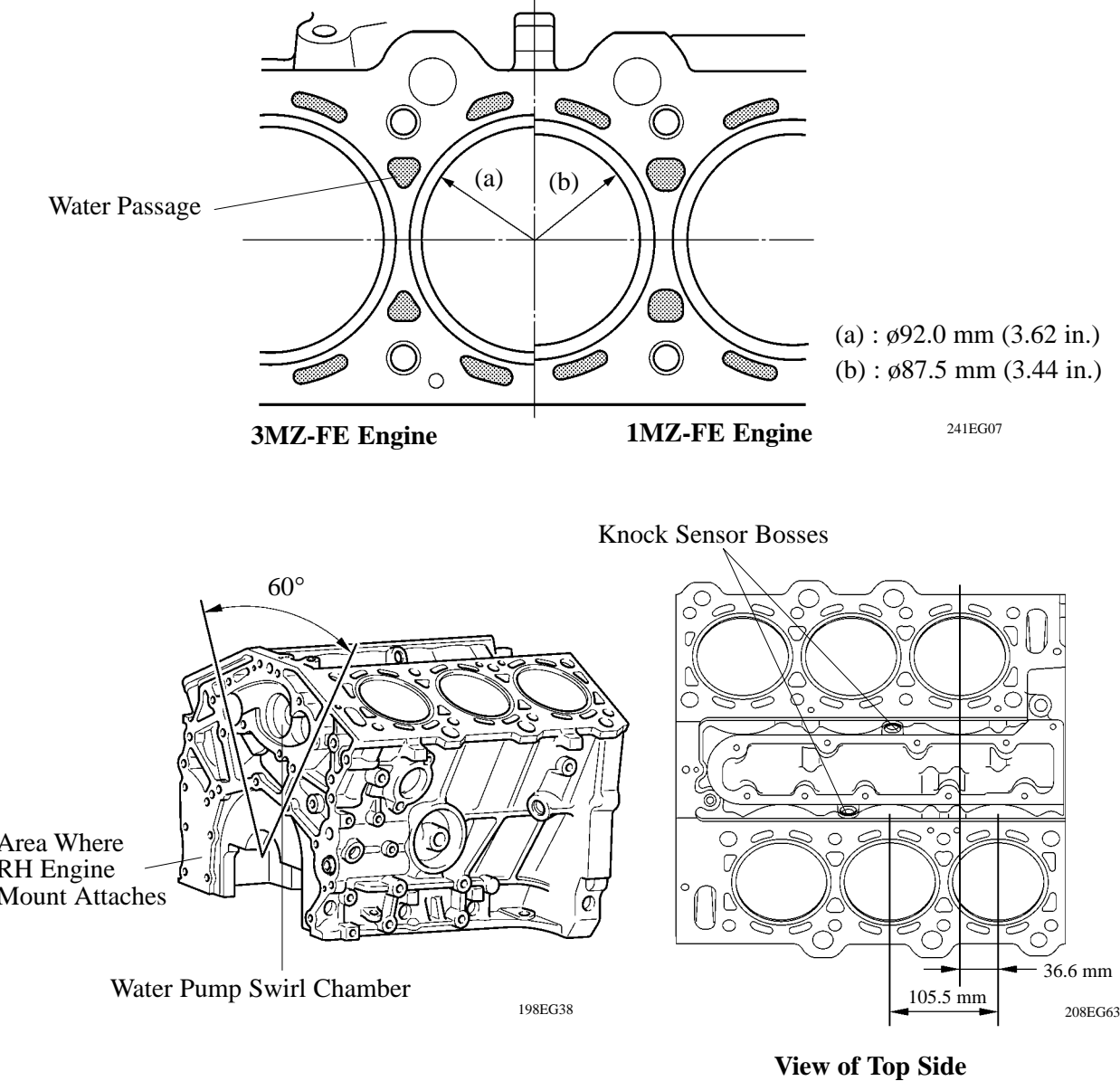


4. Cylinder Block

- The cylinder block has a bank angle of 60° , a bank offset of 36.6 mm (1.44 in.) and a bore pitch of 105.5 mm (4.15 in.), resulting in a compact block.
- Lightweight aluminum alloy is used for the cylinder block.
- A thin cast-iron liner is press-fit inside the cylinder to ensure an added reliability. This liner is thin, so that boring is not possible.
- A water pump swirl chamber and an inlet passage to the pump are provided in the V-bank to help make the engine compact.
- Knock sensor bosses are provided at 2 locations in V-bank.

— Main Changes from 1MZ-FE engine —

The diameter of the cylinder bore has been increased in the 3MZ-FE engine on the '04 model. Along with this increase, the thickness of the cylinder wall and the shape of the water passage have been optimized. In addition, the shape of the area where the RH engine mount attaches has been changed.

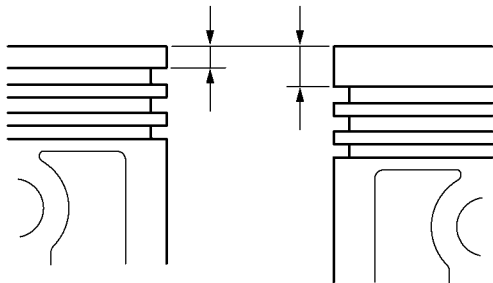
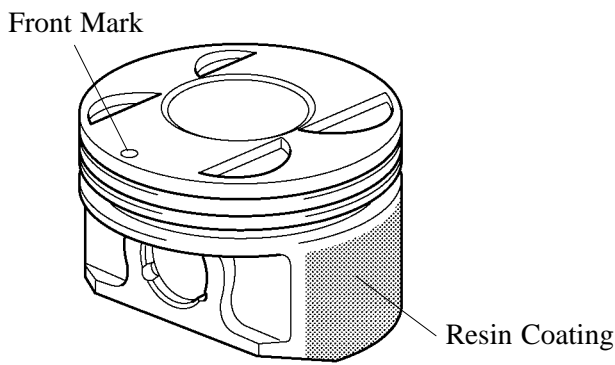


5. Piston

- The piston is made of aluminum alloy and skirt area is made compact and lightweight.
- The piston skirt has been coated with resin to reduce the friction loss.
- Full floating type piston pins are used.

— Main Changes from 1MZ-FE engine —

- Along with the increased diameter of the cylinder bore of the 3MZ-FE engine on the '04 model, the diameter of the piston has also been increased. Furthermore, the piston rings have been positioned slightly higher in order to reduce the area in which unburned fuel is likely to accumulate during combustion.
- This piston is common to all cylinders. Therefore, the pistons are not shaped especially for the right or the left bank. As a result, serviceability has been improved.



3MZ-FE Engine

1MZ-FE Engine

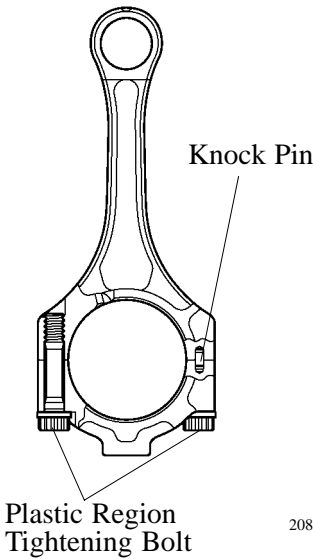
241EG08

► Specifications ◀

Engine Type		3MZ-FE	1MZ-FE
Basic Diameter	mm (in.)	92.0 (3.62)	87.5 (3.44)
Piston Pin Offset	mm (in.)	1.0 (0.04)	←
Height	mm (in.)	55.2 (2.17)	51.2 (2.02)
Compression Height	mm (in.)	31.2 (1.23)	←
Material	mm (in.)	Aluminum Alloy	←

6. Connecting Rod

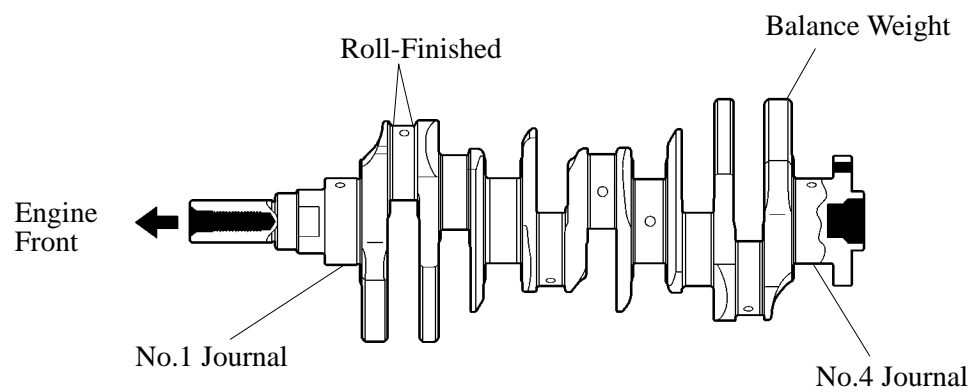
- Connecting rods that have been forged for high strength are used for weight reduction.
- An aluminum bearing with overlay is used for the connecting rod bearings.
- Plastic region tightening bolts are used.
- Knock pins are used at the mating surfaces of the bearing caps of the connecting rod to minimize the shifting of the bearing caps during assembly.



208EG106

7. Crankshaft

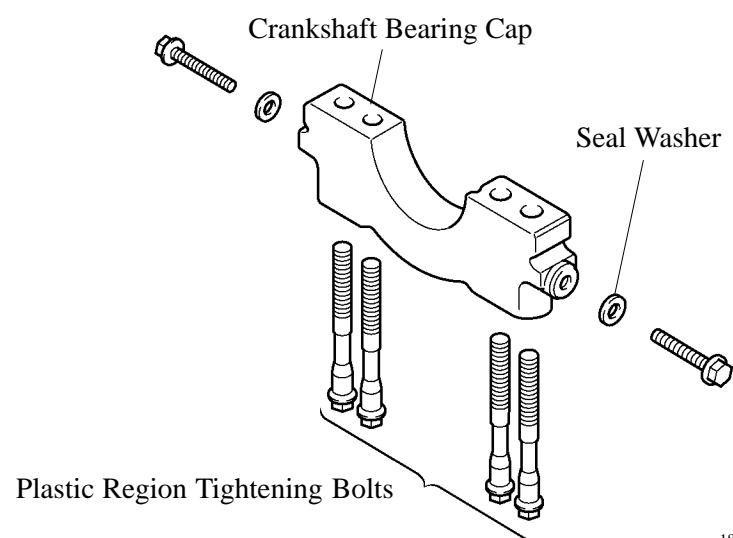
- The crankshaft is made of forged steel and has 4 journals and 9 balance weights.
- All pin and journal fillets are roll-finished to maintain adequate strength.
- The crankshaft bearings for the No.1 and No.4 journals are made wider to decrease noise and vibration, and those for the No.2 and No.3 journals are made narrower friction.



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8. Crankshaft Bearing Cap

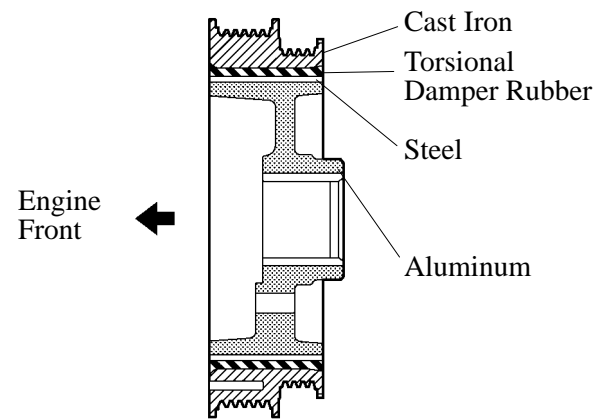
The crankshaft bearing caps are tightened using 4 plastic-region bolts for each journal. In addition, each cap is tightened laterally to improve its reliability.



187EG10

9. Crankshaft Pulley

- The crankshaft pulley hub is made of aluminum to reduce weight and vibration.
- The rigidity of the torsional damper rubber has been optimized to reduce noise.



241EG09