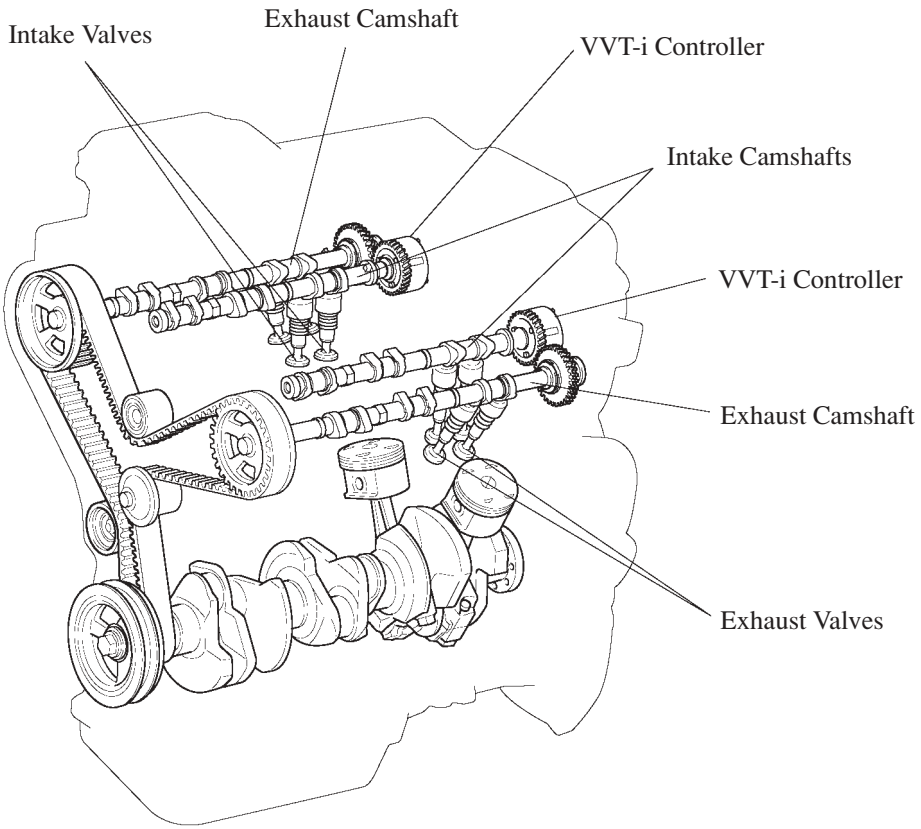
■VALVE MECHANISM

1. General

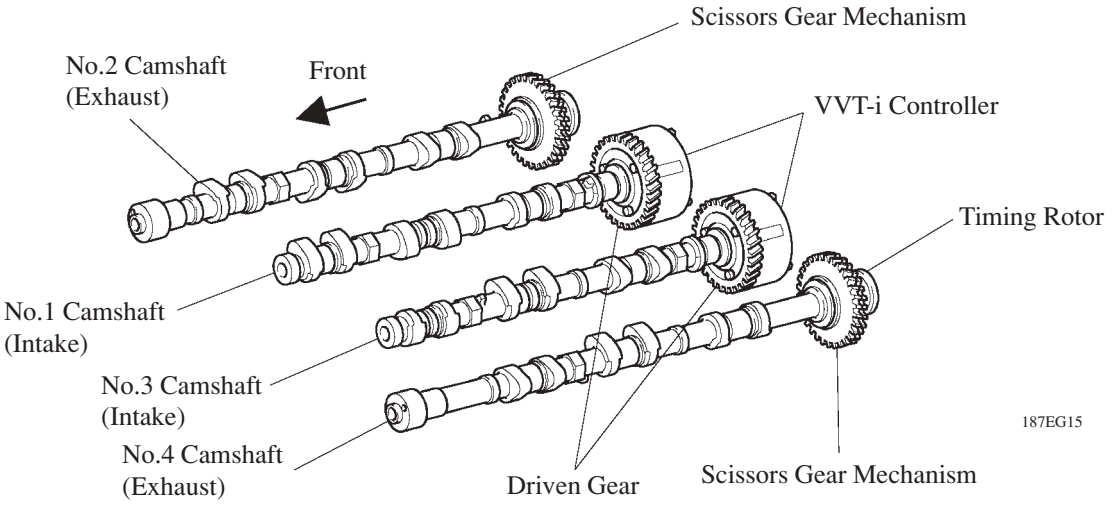
- The valves are directly opened and closed by 4 camshafts.
- The exhaust camshafts are driven by a timing belt, while the intake camshafts are driven through gears on the exhaust camshafts.
- The VVT-i system used for the intake camshaft is adopted to realize excellent fuel economy and engine performance, and reduce exhaust emission.
- For details, see page EG-52 in the VVT-i System section.



211EG06

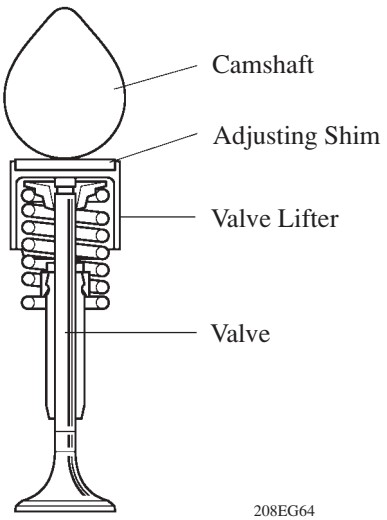
2. Camshafts

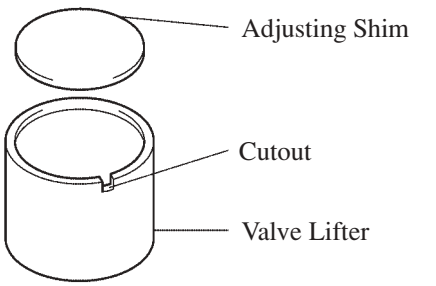
- The camshafts are made of cast iron alloy.
- In conjunction with the adoption of the VVT-i system, an oil passage is provided in the intake camshaft in order to supply engine oil to the VVT-i system.
- A VVT-i controller has been installed on the rear of the intake camshaft to vary the timing of the intake valves.
- The intake camshafts are driven by gears on the exhaust camshafts. The scissors gear mechanism is used on drive gear of the exhaust camshaft to control backlash and suppress gear noise.
- To detect the intake camshaft position, a timing rotor is provided in front of the VVT-i controller. This timing rotor, which is secured to the intake camshaft, is used by the VVT sensor to detect the actual position of the intake camshaft.



3. Intake and Exhaust Valve and Valve Lifter

- Narrower valve stems have been adopted to reduce the intake and exhaust resistance and for weight reduction.
- The adjusting shim has been located directly above the valve lifter. This construction allows the adjusting shim to be replaced without removing the camshaft, which improves the serviceability during valve clearance adjustment.
- A cutout is provided in the valve lifter to improve the serviceability of removing the adjusting shims.



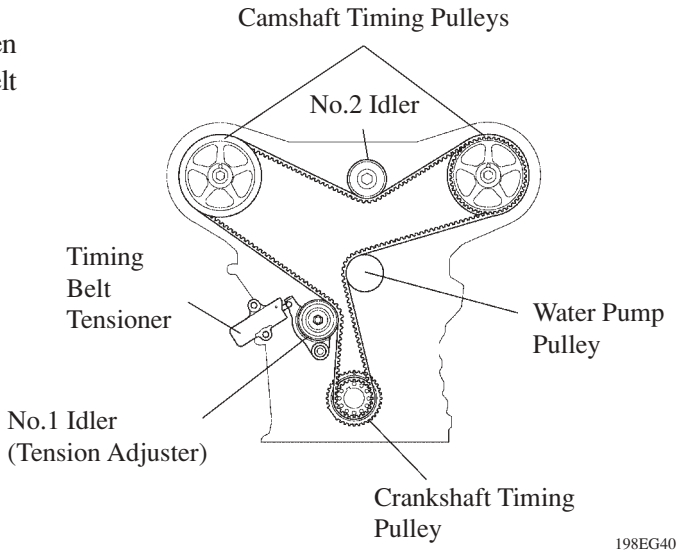


Service Tip

The adjusting shims are available in 17 sizes in increments of 0.05 mm (0.002 in.), from 2.50 (0.098 in.) to 3.30 (0.130 in.).
For details, refer to the 3MZ-FE Engine Repair Manual (Pub. No. RM1088E).

4. Timing Belt

The timing belt tooth configuration has been designed to help reduce noise and to enable the belt to transmit power under high load factors.



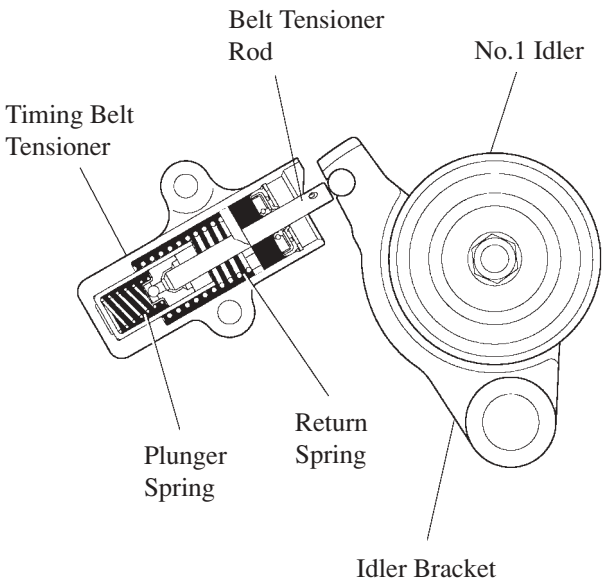
198EG40

Service Tip

The valves may come in contact with the pistons during the installation of the timing belt, depending on the position of the pistons. The procedure for installing the timing belt to prevent this contact is the following. Before locating the camshafts, the crankshaft must be turned counterclockwise so that the piston of the No. 1 cylinder is at 60° BTDC. This places all the pistons away from their TDC (Top Dead Center), which prevents the valves from coming in contact with the pistons.
For details, refer to the 3MZ-FE Engine Repair Manual (Pub. No. RM1088E).

5. Timing Belt Tensioner

The timing belt tensioner uses a spring and silicon oil damper, and maintains proper timing belt tension at all times. The timing belt tensioner suppresses noise generated by the timing belt.



241EG10