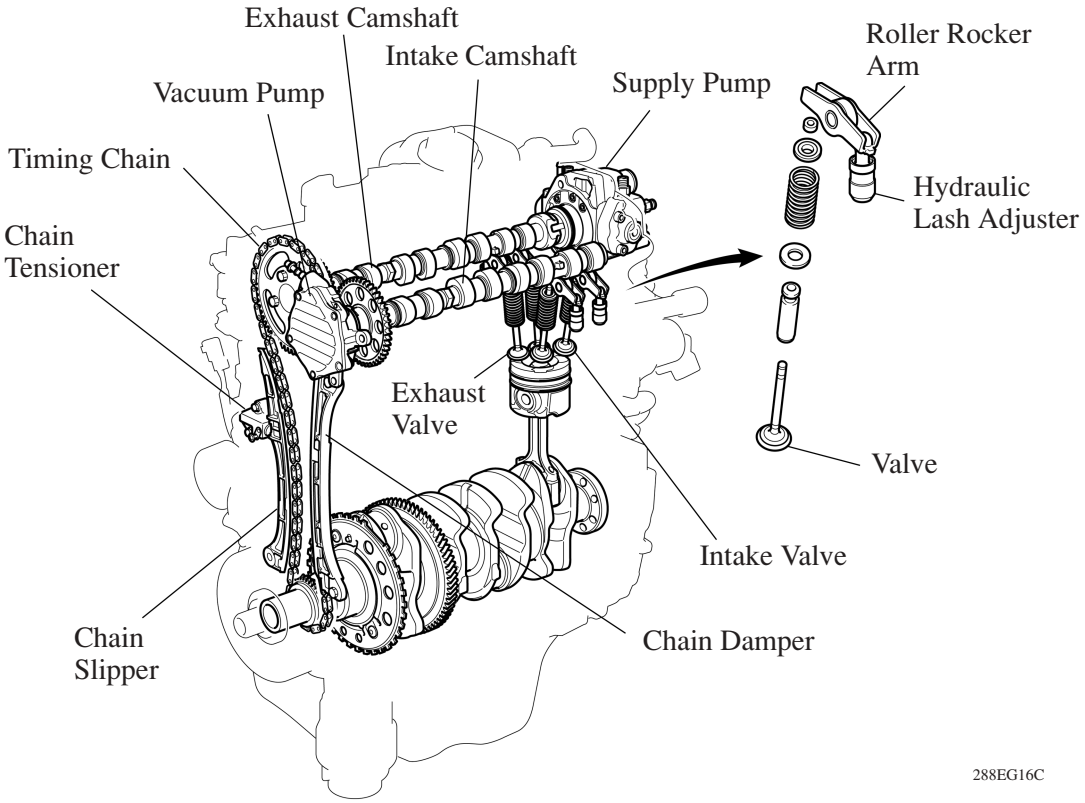
■VALVE MECHANISM

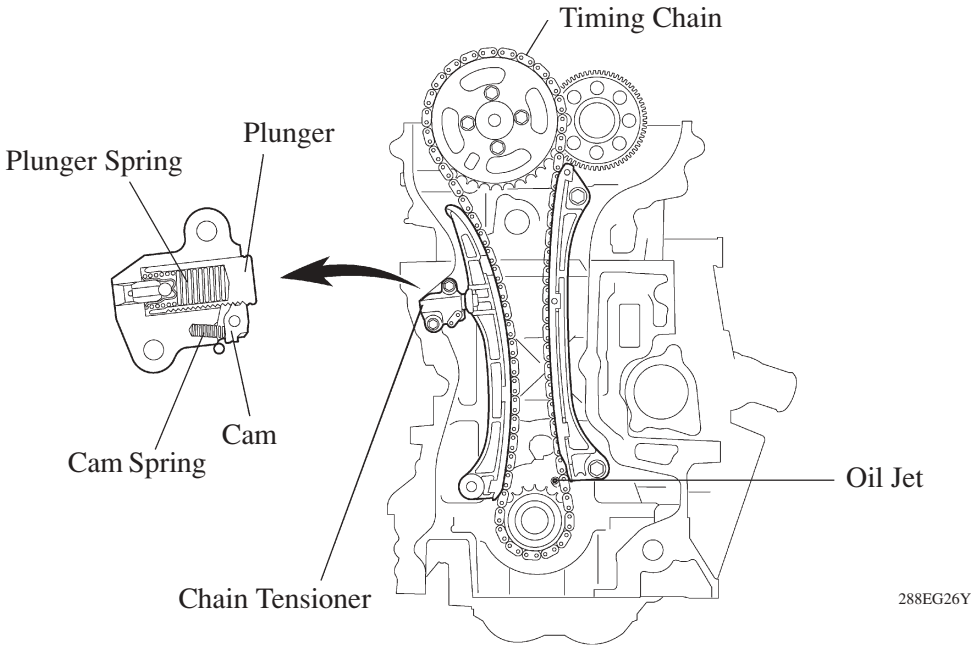
1. General

- Each cylinder of this engine has 2 intake valves and 2 exhaust valves. Intake and exhaust efficiency is increased due to the larger total port areas.
- This engine uses roller rocker arms with built-in needle bearings. This reduces the friction that occurs between the cams and the areas (roller rocker arms) that push the valves down, thus improving fuel economy.
- A hydraulic lash adjuster, which maintains a constant zero valve clearance through the use of oil pressure and spring force, is used.
- The exhaust camshaft is driven by a timing chain, while the intake camshaft is driven through gear on the exhaust camshaft.
- A supply pump is driven by exhaust camshaft to realize a lightweight and compact design.
- A vacuum pump is driven by intake camshaft to realize a lightweight and compact design.



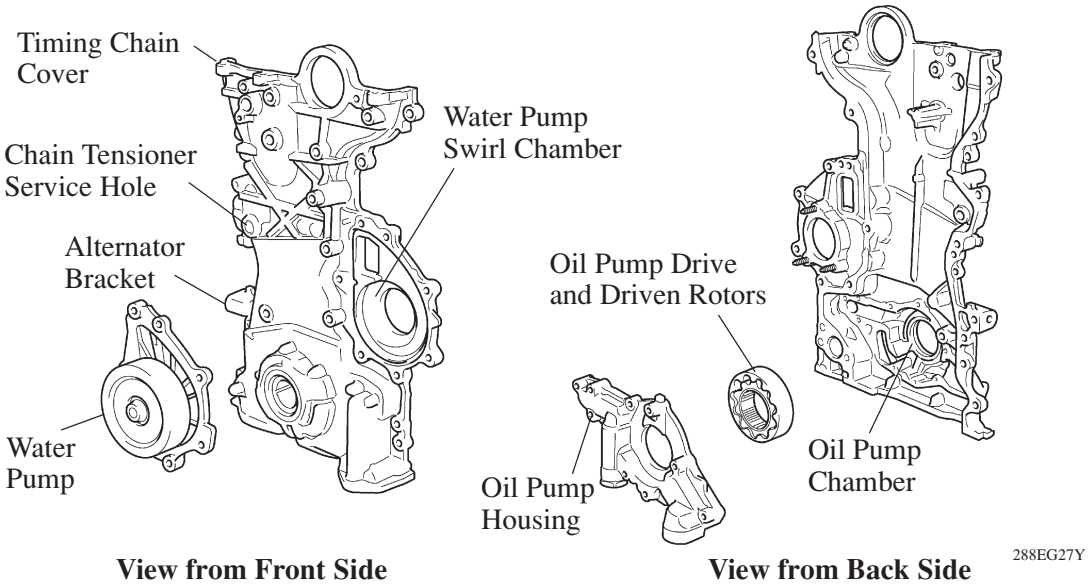
2. Timing Chain and Chain Tensioner

- A bushed chain with 9.525 mm (0.375 in.) pitch is used to make the engine more compact and maintenance-free operation.
- An oil jet lubricates the timing chain.
- The chain tensioner uses a plunger spring and oil pressure to maintain proper chain tension at all times.
- The chain tensioner suppresses noise generated by the chain.
- A chain tensioner with ratchet mechanism is used.



3. Timing Chain Cover

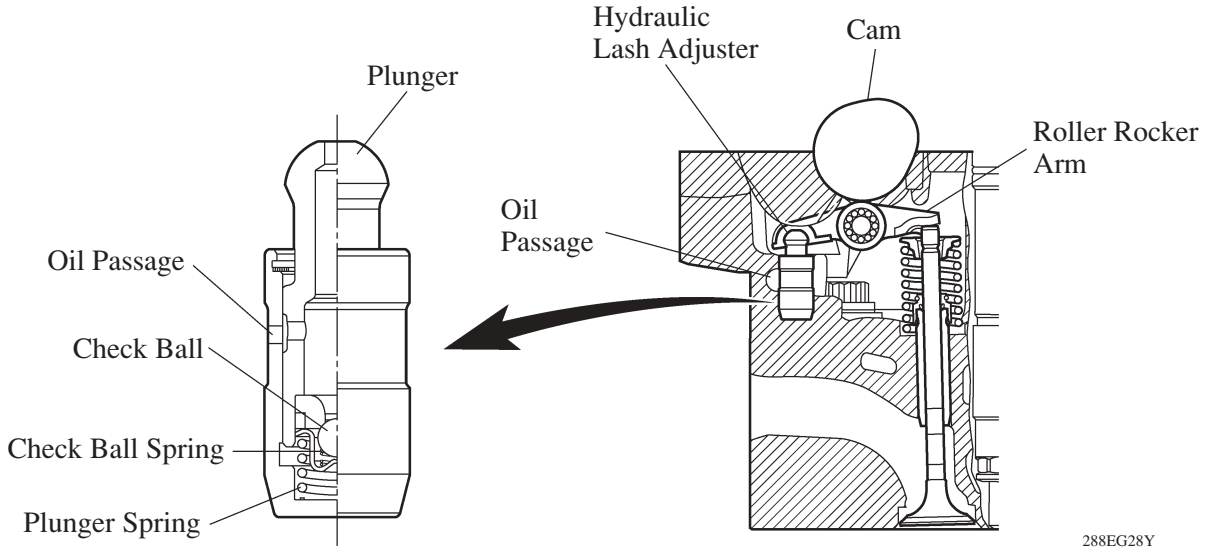
- A single piece, aluminum diecast timing chain cover that entirely seals the front portion of the cylinder block and the cylinder head is used.
- The components listed below are integrated in the timing chain cover to reduce the number of parts (water pump swirl chamber, oil pump chamber, alternator bracket and chain tensioner service hole).



View from Front Side **View from Back Side**

4. Hydraulic Lash Adjuster

- The hydraulic lash adjuster, which is located at the fulcrum of the roller rocker arm, consists primarily of a plunger, plunger spring, check ball, and check ball spring.
- The engine oil that is supplied by the cylinder head and the built-in spring actuate the hydraulic lash adjuster. The oil pressure and the spring force that act on the plunger push the roller rocker arm against the cam, in order to adjust the valve clearance that is created during the opening and closing of the valve. As a result, engine noise is reduced.



Hydraulic Lash Adjuster

Service Tip

- Valve clearance adjustment is not necessary because a hydraulic lash adjuster is used.
- When the hydraulic lash adjuster is removed, bleed the air before installation. For details, refer to the RAV4 Repair Manual (Pub. No. RM01N0E).