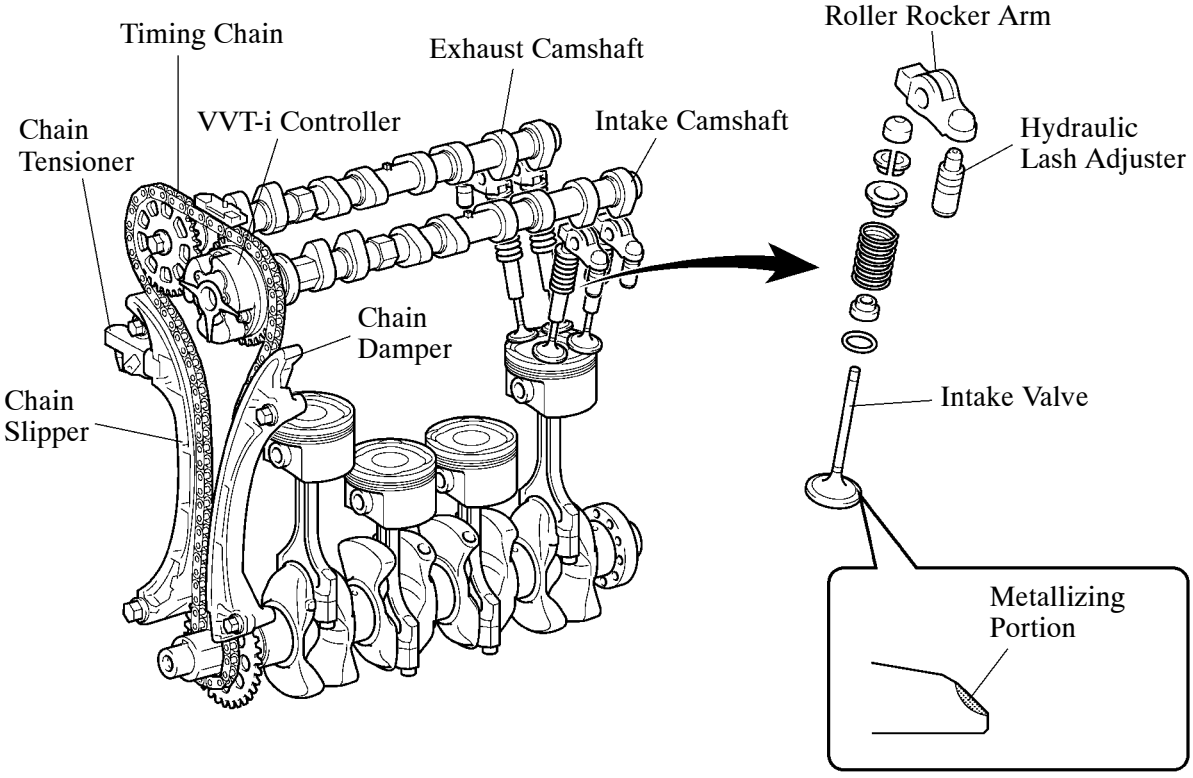
## 5. Valve Mechanism

### General

- The 2TR-FE engine uses a valve actuation mechanism that 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 VVT-i system is used to achieve low fuel consumption and higher engine performance and reduce exhaust emissions. For details of VVT-i control, see page 63.
- On the leaded gasoline model, the valve faces of the intake and exhaust valves have been metallized to improve their wear resistance.

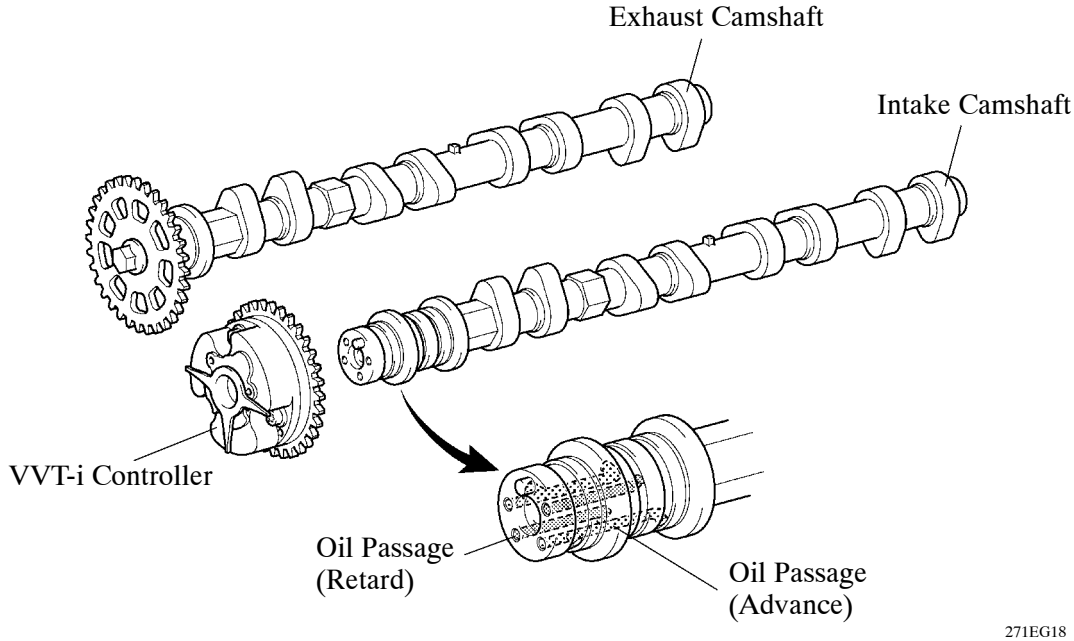



**Leaded Gasoline Models**

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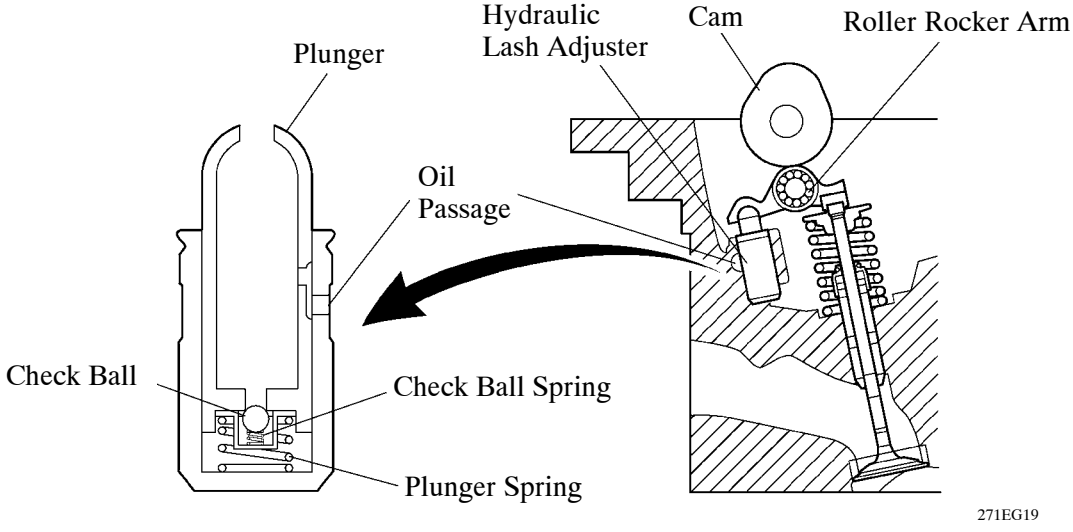
### Camshaft

- An oil passage is provided in the intake camshaft in order to supply engine oil pressure to the VVT-i system.
- A VVT-i controller is installed on the front of the intake camshaft to vary the timing of the intake valves.



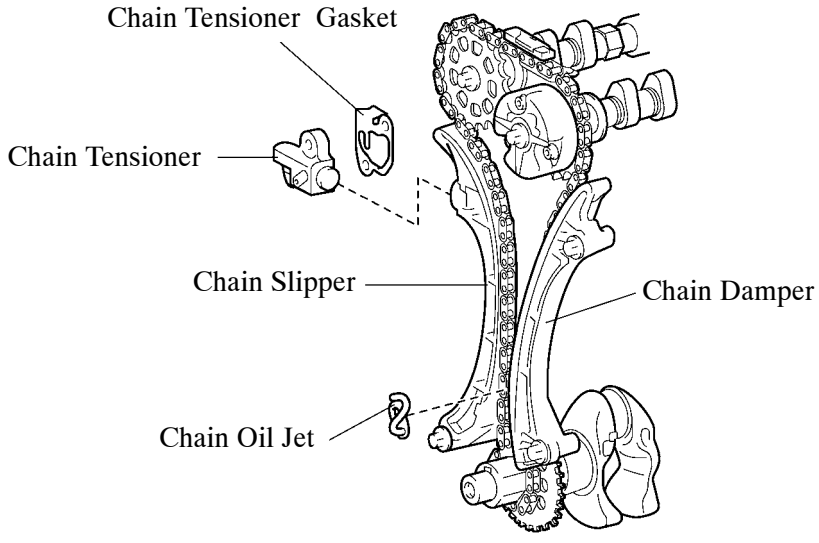

### Hydraulic Lash Adjuster

- 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 actuates 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. This results in both improving the quietness of the engine and making valve clearance adjustments unnecessary.



### Timing Chain and Chain Tensioner

- A high-strength roller chain with a 9.525 mm (0.375 in.) pitch is used to make the engine more compact and to ensure the reliability of the timing chain.
- The timing chain is lubricated by timing chain oil jet.
- The chain tensioner uses a spring and oil pressure to maintain proper chain tension at all times. The chain tensioner suppresses noise generated by the timing chain.




### Timing Chain Cover

The following components have been integrated in the timing chain cover to reduce the number of parts (water pump swirl chamber, thermostat housing, oil pump housing, alternator bracket and power steering vane pump bracket).

