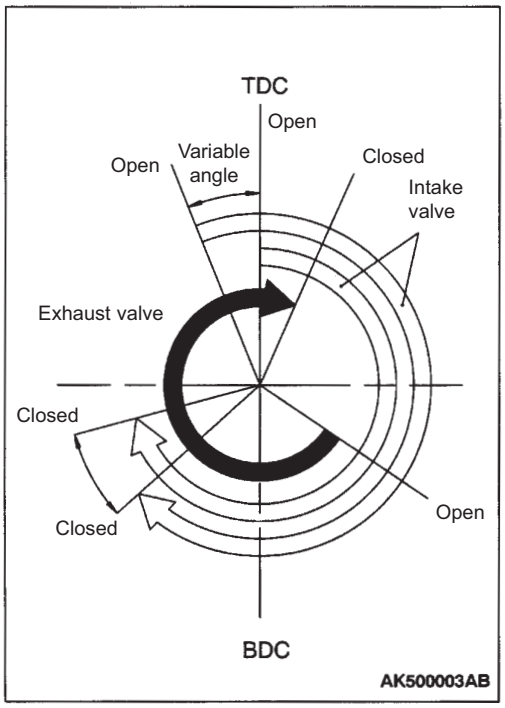
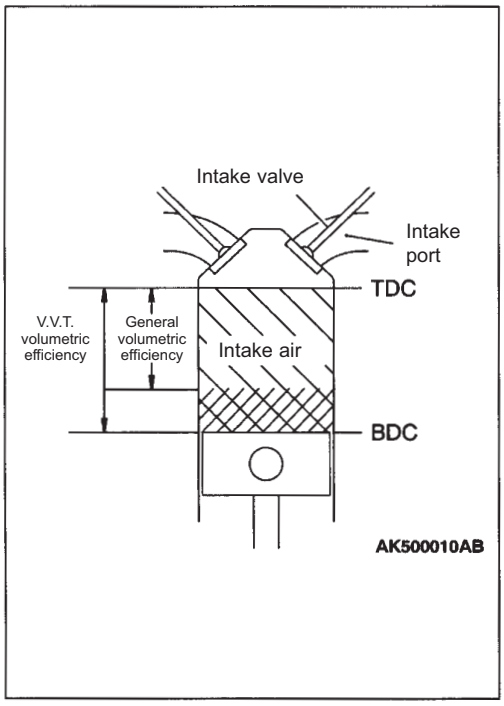


6. Variable Valve Timing control system (MIVEC)

6-1 Effects

Valve timing is, in general, fixed, but it is possible (as shown in the diagram) to have continuously variable control of the intake valve timing.
Using the MIVEC control system the most appropriate valve timing control can be set for the engine running condition, with the following results:
- Increased torque and output in all ranges
- Increased idle stability
- Improved fuel consumption and emissions performance

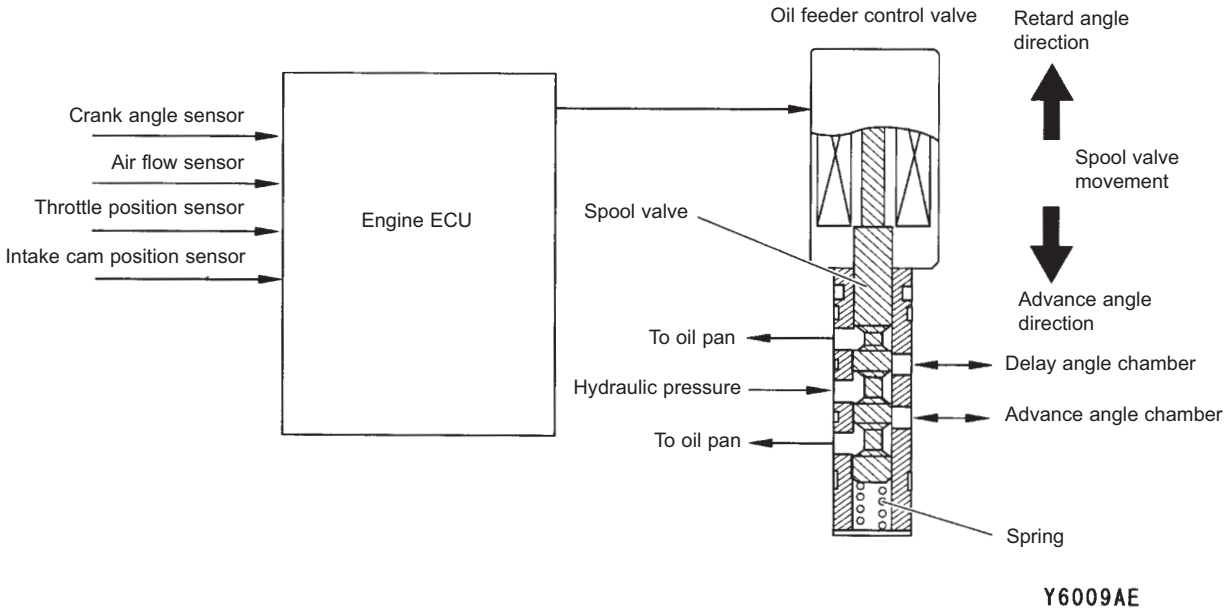


(1) Low and middle speed torque improvement
- By making the intake valve close more quickly in the low and middle engine speed ranges, it is possible to control the mixture taken in being blown back to the intake port, improve the volumetric efficiency of the intake air, and increase low and mid-range torque.
- Making the intake valves open quickly means that there is greater valve overlap, and the combustion gases inside the cylinder are expelled by the fresh air flowing in. The introduction of fresh air into the cylinders is promoted by this scavenging effect, and volumetric efficiency is improved.

(2) Improvements in high speed output performance
Volumetric efficiency is improved by delaying the closing of the intake valve, and using the inertial forces of the intake air.

(3) Increased idling stability
By reducing valve overlap, combustion can be stabilized by controlling the intake gases being blown back to the intake port.

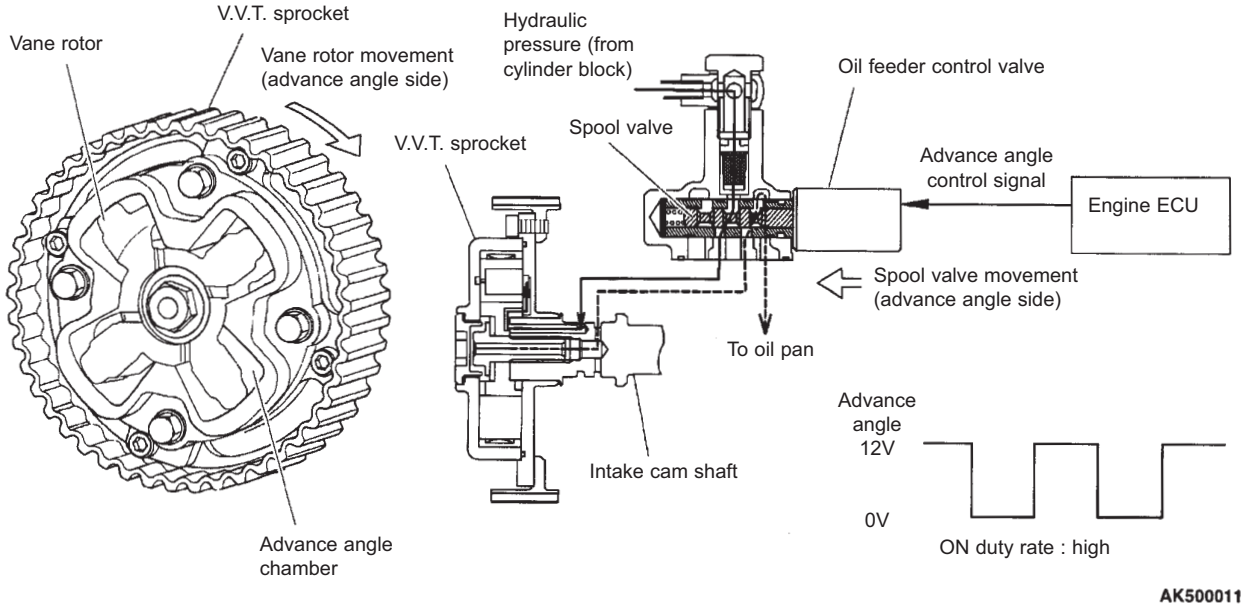
6-2 System control details



- The engine ECU ascertains the engine condition by detecting the various sensor signals, sends a duty signal to the oil feeder control valve in response to the engine condition, and controls the position of the spool valve.
  When the engine is stopped, the spool valve is set to the maximum retard angle by hydraulic pressure.
- The oil feeder control valve delivers hydraulic pressure to either the retard angle chamber or the advance angle chamber, continuously varying the intake cam shaft phases from advance angle to retard angle.

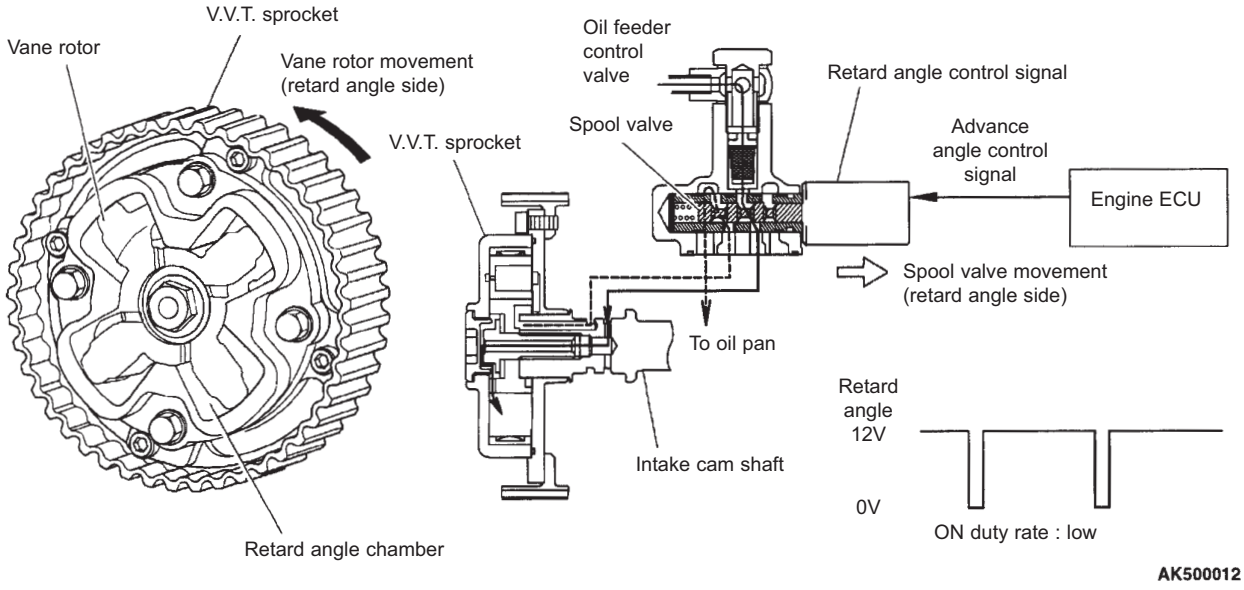
6-3. Basic operation

(1) Advance angle



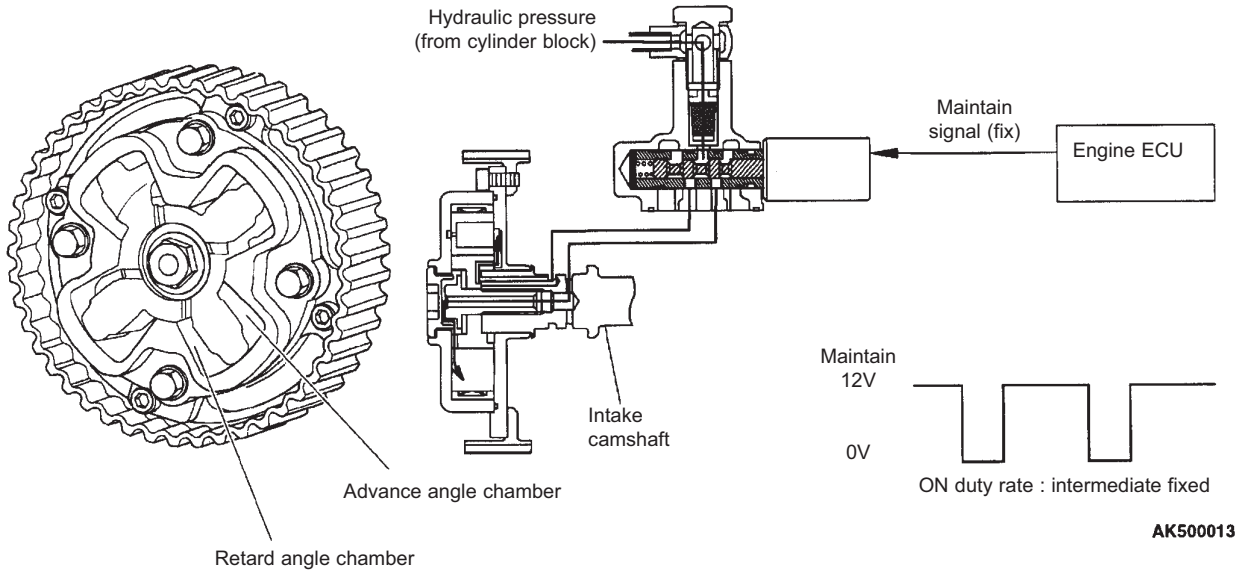
- The oil feeder control valve spool valve travels in the advance angle direction on an advance angle control signal from the engine ECU.
- Hydraulic pressure from the cylinder block is applied to the V.V.T. sprocket advance angle chamber, the vane rotor travels towards the advance angle side, and the angle of the intake cam shaft (fixed to the vane rotor) advances.

(2) Retard angle



- The oil feeder control valve spool valve travels in the retard angle direction on a retard angle control signal from the engine ECU.
- Hydraulic pressure from the cylinder block is applied to the V.V.T. sprocket retard angle chamber, the vane rotor travels towards the retard angle side, and the angle of the intake cam shaft (fixed to the vane rotor) is delayed.

(3) When cam position is maintained



When the actual phase angle reaches the target phase angle, the advance angle chamber and retard angle chamber hydraulic pressures are maintained, as is the phase angle of the intake cam shaft. When this happens, the oil feeder control valve is controlled so that the actual phase angle is same as the target phase angle.