

The PCM continually calculates a cam position error value based on the difference between the desired and actual position and uses this information to calculate a commanded duty cycle for the VCT solenoid valve. When energized, engine oil is allowed to flow to the VCT unit thereby advancing and retarding cam timing. The variable cam timing unit assembly is coupled to the camshaft through a helical spline in the VCT unit chamber. When the flow of oil is shifted from one side of the chamber to the other, the differential change in oil pressure forces the piston to move linearly along the axis of the camshaft. This linear motion is translated into rotational camshaft motion through the helical spline coupling. A spring installed in the chamber is designed to hold the camshaft in the low-overlap position when oil pressure is too low (~15 psi) to maintain adequate position control. The camshaft is allowed to rotate up to 30 degrees.

The VCT output driver in the PCM is checked electrically for opens and shorts (P1380/P0010, P1385/P0020). The VCT system is checked functionally by monitoring the closed loop cam position error correction. If the proper cam position cannot be maintained and the system has an advance or retard error greater than the malfunction threshold, a VCT control malfunction is indicated (P1381/P0011, P1383/P0012, P1386/P0021, P1388/P0022).

<b>Camshaft Position Control System Check Operation:]</b>	
DTCs	P1380/P0010 Camshaft Position Actuator Circuit (Bank 1) P1381/P0011 Cam Position Actuator Over Advanced (Bank 1) P1383/P0012 Cam Position Actuator Over Retarded (Bank 1) P1385/P0020 - Camshaft Position Actuator Circuit (Bank 2) P1386/P0021 - Cam Position Actuator Over Advanced (Bank 2) P1388/P0022 - Cam Position Actuator Over Retarded (Bank 2)
Monitor execution	Continuous
Monitor Sequence	ECT > 150 °F
Sensors OK	
Monitoring Duration	5 seconds

<b>Typical CPC functional check malfunction thresholds:</b>
timing over-advanced/over-retarded by > 10 crankshaft degrees