

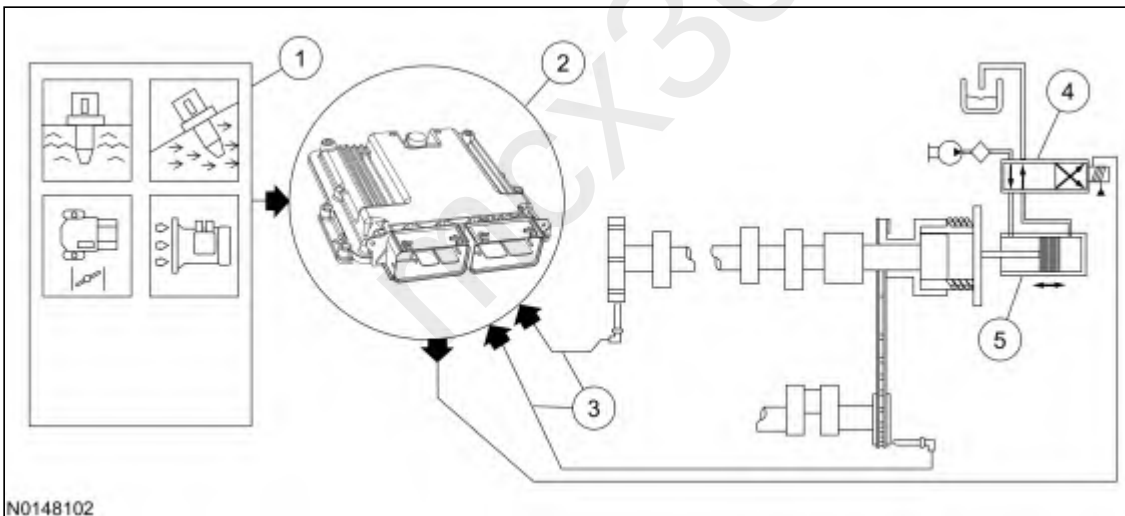
VCT System

The VCT system consists of an electric hydraulic positioning control solenoid, a camshaft position (CMP) sensor, and a trigger wheel. The CMP sensor trigger wheel indicates the camshaft position signal for that bank. A crankshaft position (CKP) sensor provides the PCM with crankshaft positioning information in 10 degree increments.

1. The PCM receives input signals from the intake air temperature (IAT), engine coolant temperature (ECT), CMP, throttle position (TP), mass airflow (MAF) (if equipped), and CKP sensors to determine the operating conditions of the engine. At idle and low engine speeds with closed throttle, the PCM controls the camshaft position based on engine coolant temperature, engine oil temperature, intake air temperature, and mass airflow. During part and wide open throttle, the camshaft position is determined by engine RPM, load and throttle position. The VCT system does not operate until the engine is at normal operating temperature.
2. The VCT system is enabled by the PCM when the correct conditions are met.
3. The CKP signal is used as a reference for camshaft positioning.
4. The VCT solenoid valve is an integral part of the VCT system. The solenoid valve controls the flow of engine oil in the VCT actuator assembly. As the PCM controls the duty cycle of the solenoid valve, oil pressure/flow advances or retards the cam timing. Duty cycles near 0% or 100% represent rapid movement of the camshaft. Retaining a fixed camshaft position is accomplished by dithering (oscillating) the solenoid valve duty cycle.

The PCM calculates and determines the desired camshaft position. It continually updates the VCT solenoid duty cycle until the desired position is achieved. A difference between the desired and actual camshaft position represents a position error in the PCM VCT control loop. The PCM disables the VCT and places the camshaft in a default position if a concern is detected. A related DTC also sets when the concern is detected.

5. When the VCT solenoid is energized, engine oil is allowed to flow to the VCT actuator assembly which advances or retards the camshaft timing. One half of the VCT actuator is coupled to the camshaft and the other half is connected to the timing chain. Oil chambers between the 2 halves couple the camshaft to the timing chain. When the flow of oil is shifted from one side of the chamber to the other, the differential change in oil pressure forces the camshaft to rotate in either an advance or retard position depending on the oil flow.



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