

Cylinder Deactivation System

Overview

The cylinder deactivation system improves emissions and fuel efficiency by reducing friction and pump losses.

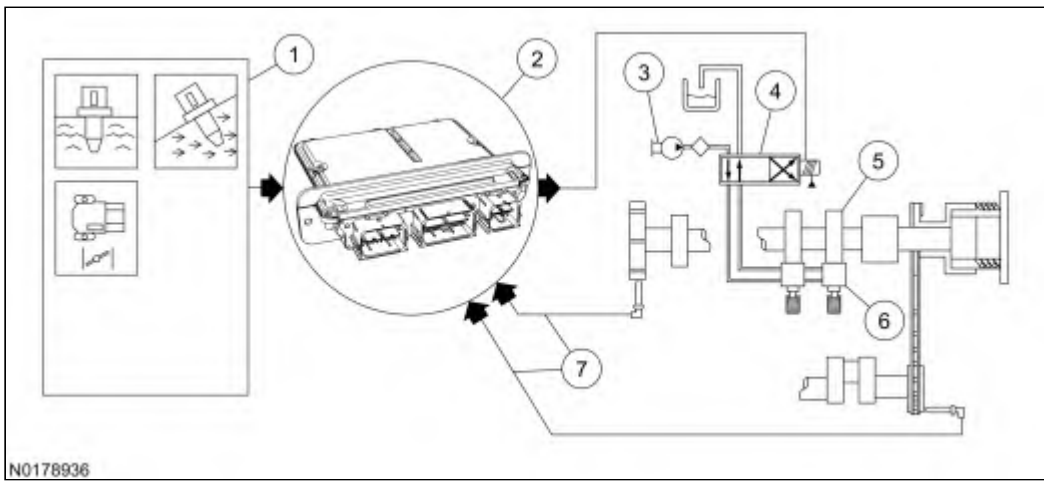
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The cylinder deactivation system consists of an electric hydraulic positioning control solenoid, specifically designed rocker arms and uses engine oil pressure to activate and deactivate the affected cylinder. During operation at partial load, the cylinder can be deactivated hydraulically. This reduces fuel consumption and emissions. When only minimal engine load is required, the system stops the fuel injection and valve actuation. The connection between the camshaft and the intake and exhaust valves of the cylinder is interrupted by applying oil pressure to a plunger inside the rocker arm which disengages the rocker arm. The PCM calculates the optimal cylinder deactivation timing using the engine speed, throttle position, and load condition.

The intake and exhaust valves remain closed and enclose the mixture in the combustion chamber. This causes a spring type effect which balances the forces acting inside the cylinder. The temperature in the deactivated combustion chamber is maintained, which increases the efficiency of the combustion when the cylinder is activated again.

When the solenoid is actuated, it applies engine oil pressure to the rocker arm plunger. The engine oil pressure pushes the plunger back releasing the rocker arm causing the rocker arm to pivot opposite the valve. Then when the lobe of the camshaft presses against the rocker arm, the rocker arms are pressed downwards but without actuating the valves. When the required engine load increases, the PCM deactivates the solenoid which allows the plungers to again engage the rocker arms reactivating the cylinder.

1. The PCM receives input signals from the cylinder head temperature (CHT), crankshaft position (CKP), camshaft position (CMP), engine coolant temperature (ECT), intake air temperature (IAT), and throttle position (TP) sensors to determine the operating conditions of the engine. During minimal engine load demands, the cylinder deactivation is determined by engine RPM, load, and throttle position.
2. The cylinder deactivation system is enabled by the PCM when the correct conditions are met.
3. Engine oil is supplied to the cylinder deactivation solenoid by the engine oil system.
4. The cylinder deactivation solenoid controls the flow of engine oil to the locking plungers in the rocker arm assemblies. As the PCM controls the duty cycle of the solenoid valve, the oil pressure and flow activates or deactivates the rocker arms and corresponding cylinder.
5. The camshaft is always in contact with the rocker arms if the cylinder is active or inactive.
6. When the cylinder deactivation solenoid is energized, engine oil is allowed to flow to the cylinder deactivation rocker arms which deactivate the cylinder.
7. The CKP signal is used as a reference for camshaft positioning and to identify cylinder number 1 piston position.



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