

DTC	P0016	Crankshaft Position – Camshaft Position Correlation (Bank 1 Sensor A)
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DTC	P0018	Crankshaft Position – Camshaft Position Correlation (Bank 2 Sensor A)
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CIRCUIT DESCRIPTION

The crankshaft position sensor (CKP) system consists of a crankshaft position sensor plate and a pick-up coil.

The sensor plate has 34 teeth and is installed on the crankshaft. The pick-up coil is made of an iron core and magnet. The sensor plate rotates and as each tooth passes through the pick-up coil, a pulse signal is created. The pick-up coil generates 34 signals for each engine revolution. Based on these signals, the ECM calculates the crankshaft position and engine RPM. Using these calculations, the fuel injection time and ignition timing are controlled.

DTC No.	DTC Detection Condition	Trouble Area
P0016	Deviation in crankshaft position sensor signal and VVT sensor 1 signal (2 trip detection logic)	<ul style="list-style-type: none"> • Mechanical system (Jumped tooth of timing chain, chain stretched) • ECM
P0018	Deviation in crankshaft position sensor signal and VVT sensor 2 signal (2 trip detection logic)	

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the Variable Valve Timing (VVT) system to control the intake valve camshaft. The VVT system includes the ECM, the Oil Control Valve (OCV) and the VVT controller. The ECM sends a target "duty-cycle" control signal to the OCV. This control signal, applied to the OCV, regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake valve camshaft. The ECM calibrates the valve timing of the VVT system by setting the camshaft to the maximum retard angle when the engine speed is idling. The ECM closes the OCV to retard the cam. The ECM stores this valve as "VVT learned value." (When the difference between the target valve timing and the actual valve timing is 5 degrees or less, the ECM stores this in its memory.)

If the learned value meets both of the following conditions ("a" and "b"), the ECM interprets this as a defect in the VVT system and sets a DTC.

- (a) "VVT learning" value is less than 22°CA or more than 47°CA.
- (b) Above condition continues for more than 18 seconds.

MONITOR STRATEGY

Related DTCs	P0016	Deviation in crankshaft position sensor signal and camshaft position sensor signal (Bank 1)
	P0018	Deviation in crankshaft position sensor signal and camshaft position sensor signal (Bank 2)
Required sensors/components	Crankshaft position sensor, Camshaft position sensor	
Frequency of operation	Once per drive cycle	
Duration	60 sec.	
MIL operation	2 drive cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI-18	
Engine RPM	500 rpm	1,000 rpm

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
One of the following condition is met	Condition (a) or (b)
(a) VVT learning value at maximum retarded valve timing	Less than 22.5° CA (Crankshaft angle)
(b) VVT learning value at maximum retarded valve timing	More than 45.2° CA (Crankshaft angle)

INSPECTION PROCEDURE

HINT:

- If DTC P0016 is displayed, check left bank VVT sensor.
- If DTC P0018 is displayed, check right bank VVT sensor.
- Read freeze frame data using hand-held tester. Because freeze frame records the engine conditions when the malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	Check valve timing (Check for loose and jumping teeth of timing chain) (See page EM-44).
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Adjust valve timing (Repair or replace timing chain).

OK

Replace ECM (See page [SF-66](#)).