

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

Refer to DTCs P0335 and P0339 on page [05-672](#).

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 (timing belt has jumped tooth, belt stretched) • ECM
P0018	Deviation in crankshaft position sensor signal and VVT sensor 2 signal (2 trip detection logic)	<ul style="list-style-type: none"> • Mechanical system (timing belt has jumped tooth, belt stretched) • ECM

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 value 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) For the right bank, the VVT learning value is less than 21°CA and more than 46°CA. For the left bank, the VVT learning value is less than 22°CA and more than 40°CA.
- (b) Above condition continues for more than 18 seconds.

MONITOR STRATEGY

Related DTCs	P0016: Camshaft Timing (Bank 1) Misalignment at Idling P0018: Camshaft Timing (Bank 2) Misalignment at Idling
Required sensors/ components (Main)	VVT actuator
Required sensors/ components (Related)	Camshaft position sensor, Crankshaft position sensor
Frequency of operation	Once per drive cycle
Duration	Within 60 seconds
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	See page 05-507
Engine RPM	500 to 1,000 rpm

TYPICAL MALFUNCTION THRESHOLDS

Duration that either of the following conditions 1 or 2 is met:	18 seconds or more
1. VVT angle when camshaft is retarded maximum	Less than: 21°CA (Bank 1) (1MZ-FE) Less than: 22°CA (Bank 2) (1MZ-FE) Less than: 26°CA (Bank 1) (3MZ-FE) Less than: 23.2°CA (Bank 2) (3MZ-FE)
2. VVT angle when camshaft is retarded maximum	More than 46°CA (Bank 1) (1MZ-FE) More than 40°CA (Bank 2) (1MZ-FE) More than 45°CA (Bank 1) (3MZ-FE) More than 39.1°CA (Bank 2) (3MZ-FE)

WIRING DIAGRAM

Refer to DTCs P0335 and P0339 on page [05-672](#).

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK VALVE TIMING (CHECK FOR LOOSE OR JUMPED TOOTH OF TIMING) (See page 14-142)
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OK: The matchmarks of crankshaft pulley and camshaft pulley are aligning.

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ADJUST VALVE TIMING (See page [14-142](#))

OK

REPLACE ECM (See page [10-25](#))