

<b>DTC</b>	<b>P0016</b>	<b>CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK 1 SENSOR A)</b>
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## CIRCUIT DESCRIPTION

Refer to DTC P0335 and P0339 on page [05-166](#) .

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

## 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, sent to the OCV, regulates the oil pressure applied 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 is idling. The ECM closes the OCV to retard the cam. The ECM stores this value as a VVT learning 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 learning 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) The VVT learning value is less than 27°CA or more than 49°CA.
- (b) The Above condition continues for more than 18 seconds.

## MONITOR STRATEGY

Related DTCs	P0016: Camshaft timing misalignment at Idling
Required sensors / components (Main)	VVT actuator
Required sensors / components (Related)	CMP and CKP sensors
Frequency of operation	Once per driving cycle
Duration	Within 60 sec.
MIL operation	2 driving cycles
Sequence of operation	None

## TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	See page <a href="#">05-16</a>
Engine RPM	550 to 1,400 rpm

## TYPICAL MALFUNCTION THRESHOLDS

Duration that either of the following conditions 1 or 2 is met	18 sec. or more
1. VVT angle when camshaft is retarded maximum	Less than 27°CA
2. VVT angle when camshaft is retarded maximum	More than 49°CA

## WIRING DIAGRAM

Refer to DTCs P0335 and P0339 on page [05-166](#) .

## 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.

<b>1</b>	<b>CHECK VALVE TIMING (See page <a href="#">14-68</a> )</b>
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- (a) Check for loose or jumped tooth of timing chain.

**OK: The matchmarks of the crankshaft pulley and camshaft pulley are aligned.**

**NG**

**ADJUST VALVE TIMING (See page [14-68](#) )**

**OK**

**REPLACE ECM (See page [10-9](#) )**