DTC	P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)

DESCRIPTION

Refer to DTC P0335 (see page ES-175).

DTC No.	DTC Detection Condition	Trouble Area
P0016	Deviation in crankshaft position sensor signal and camshaft position sensor signal (2 trip detection logic)	• Mechanical system (timing chain has jumped tooth or chain stretched) • ECM

MONITOR DESCRIPTION

ES

The ECM optimizes the valve timing by using the VVT (Variable Valve Timing) system to control the intake 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 regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake camshaft.

The ECM calibrates the intake valve timing by setting the intake camshaft to the most retarded angle while the engine is idling. The ECM closes the OCV to retard the cam. The ECM stores this value as the VVT learning value. When the difference between the target and actual intake valve timings is $5°CA$ (Crankshaft Angle) or less, the ECM stores it.

If the learned value meets both of the following conditions, the ECM interprets this as a defect in the VVT system and set a DTC.

• VVT learning value: Less than $25°CA$, or more than $51°CA$.
• Above condition continues for 18 seconds or more.

This DTC indicates that the intake camshaft has been installed toward the crankshaft at an incorrect angle, caused by factors such as the timing chain having jumped a tooth.

This monitor begins to run after the engine has idled for 5 minutes.

MONITOR STRATEGY

Related DTCs	P0016: Camshaft timing misalignment at idling
Required sensors/ components (Main)	VVT actuator
Required sensors/ components (Related)	Camshaft position sensor, Crankshaft position sensor
Frequency of operation	Once per driving cycle
Duration	1 minute
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	P0011 (VVT system 1 - advance) P0012 (VVT system 1 - retard) P0115 - P0118 (ECT sensor)
Engine RPM	450 to 1,400 rpm

TYPICAL MALFUNCTION THRESHOLDS

When either condition below is met:	-
VVT learning value	Less than $25°CA$
VVT learning value	More than $51°CA$

WIRING DIAGRAM

Refer to DTC P0335 (see page ES-177).

HINT:
Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, 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.

ES

| 1 | CHECK VALVE TIMING (CHECK TIMING CHAIN FOR LOOSENESS AND JUMPED TOOTH) |

Timing Mark
0
A107307E02
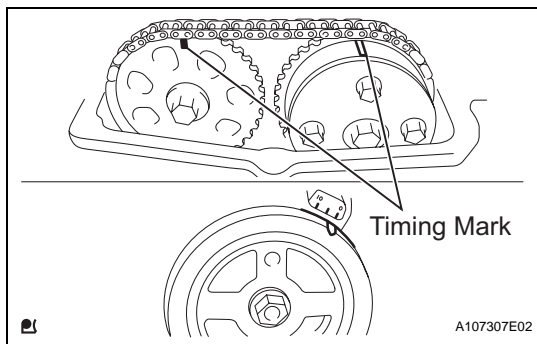
(a) Remove the cylinder head cover (see page EM-25).
(b) Turn the crankshaft pulley, then align its groove with the timing mark "0" on the timing chain cover.
(c) Check that both timing marks on the camshaft timing sprocket and camshaft timing gear are facing upward as shown in the illustration.
    If not, turn the crankshaft 1 revolution (360°), then align the marks as above.
    OK:
    The timing marks on the camshaft timing gears are aligned with the timing chain cover surface.

| NG > | ADJUST VALVE TIMING |

OK

| 2 | REPLACE ECM |

After replacing the ECM or adjusting intake valve timing, confirm that the DTC output does not recur.
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON and turn the tester ON.
(c) Clear DTCs (see page ES-37).
(d) Switch the ECM from normal mode to check mode (see page ES-41).
(e) Start the engine and warm it up.
(f) Allow the engine to idle for 1 minute or more, and then drive the vehicle for 1 minute or more.
(g) Confirm that no DTC is set using the tester.

NEXT

| END |