DIDR9−01

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

DTC	P0018	Crankshaft Position − Camshaft Position Correlation (Bank 2 Sensor A)

CIRCUIT DESCRIPTION

VVT sensor (VVL or VVR signal) consist of a signal plate and pickup coil.
The VVL or VVR signal plate has 1 tooth on its outer circumference and is mounted on the intake camshafts. When the camshafts rotate, the protrusion on the signal plate and the air gap on the pickup coil change, causing fluctuations in the magnetic field and generating an electromotive force in the pickup coil.
The actual camshaft angle is detected by the VVT sensor and it provides feedback to the ECM to control the intake valve timing in response to during condition.

DTC No.	DTC Detecting Condition	Trouble Area
P0016 P0018	No VVT sensor signal to ECM during cranking at 4 sec. or more	• Open or short in VVT sensor circuit • VVT sensor • ECM
	No VVT sensor signal to ECM with 5 sec. or more engine speed 600 rpm or more	
	While the crankshaft rotates twice, VVT sensor signal will be input to ECM 5 times	

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the VVT (Variable Valve Timing) system to control the intake valve camshaft. The VVT system includes the ECM, the OCV (Oil Control Valve) 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 is idle. The ECM closes the OCV to retard the cam. The ECM stores this value as 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) VVT learning value is less than 20°CA (Crankshaft Angle) or more than 39°CA.
(b) Above condition continues for more than 18 sec.

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	within 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−437	
Engine RPM	400 rpm	1,400 rpm

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
One of the following conditions is met	Condition 1 or 2
1. VVT angle when camshaft is retarded maximum	Less than 22.5°CA
2. VVT angle when camshaft is retarded maximum	More than 44°CA (Bank 1) More than 47.5°CA (Bank 2)

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 or OBD II scan tool. 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 belt) (See page EM−9).**

NG → **Adjust valve timing (Repair or replace timing belt).**

OK

Check and replace ECM (See page SF−82).