Component Location

General Description

The CVVT (Continuously Variable Valve Timing) system is installed to the chain sprocket of the intake camshaft. This system controls the intake camshaft to provide the optimal valve timing for every driving condition. The ECM controls the Oil Control Valve(OCV), based on the signals output from mass air flow, throttle position and engine coolant temperature. The CVVT controller regulates the intake camshaft angle using oil pressure through the OCV. As result, the relative position between the camshaft and the crankshaft becomes optimal, and the engine torque improves, fuel economy improves, exhaust emissions decrease under over all driving conditions.

DTC Description

The ECM monitors the CAM phasing and compares the phasing to the desired setting.
ECM determines that a fault exists and a DTC is stored while vehicle is tip - in and out driving for 5 minutes.
ECM monitors CAM phaser error while CMP signal is normally generating and vehicle is driving in 2000 ~ 3000rpm.
If the CAM phaser does not move although ECM commands OCV duty cycle ECM determines that a faultexists and a DTC is stored.
ECM monitors OCV stuck while cam sinal is normally generating and Valve cleaning is not in progress.
If the CAM Acutal Position is too high or low and Difference between Cam Actual Positionand Desire Position is higher than 20°
ECM determines that a fault exists and a DTC is stored.

DTC Detecting Condition

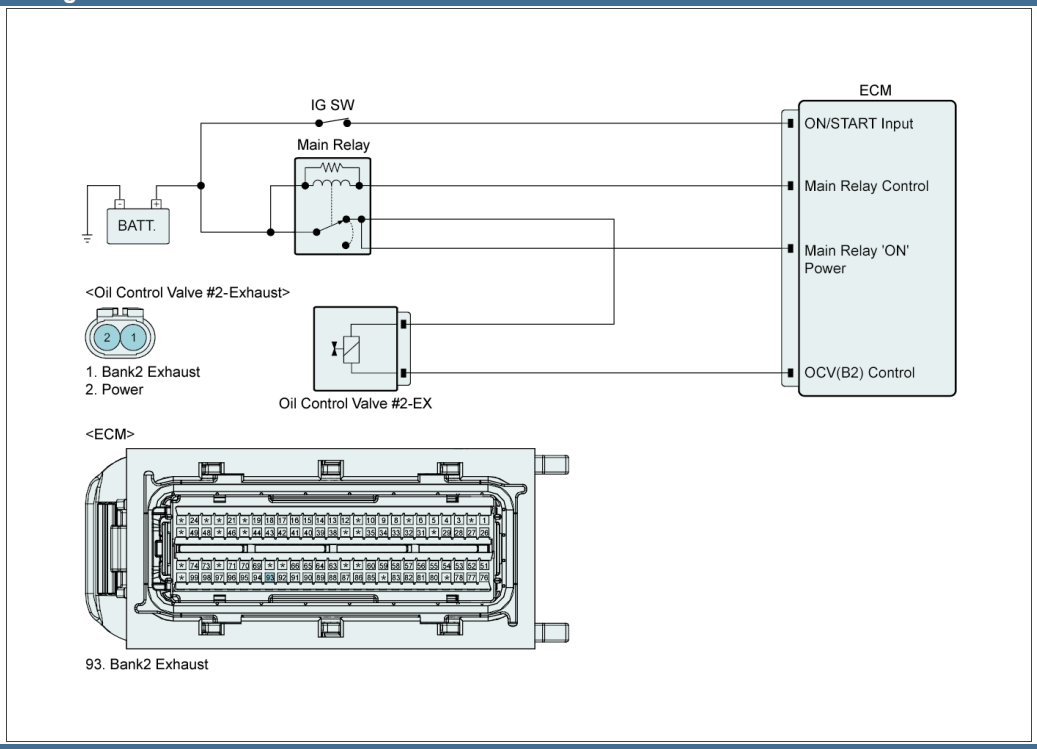
Item		Detecting Condition	Possible cause
DTC Strategy	Case1	• Determines if the phaser is moving at an expected rate	(Case1) • Excessive phasing system leakage • Binding Oil pressure (ex. Blockage in OCV filter) • Faulty OCV (Case2, 3) • Engine Oil • OCV stuck • CVVT stuck (Case4, 5) • Oil Pressure Loss • OCV seizure
	Case2, 3	• Determines if the phaser is stuck or has steady-state error	
	Case4, 5	• Determines if oil control valve is stuck	
Enable Conditions	Case1	• CAM signal is normally generating • Accelerate and decelerate more than 10 times within 5 minutes – while driving	
	Case2, 3	• CAM signal is normally generating • Vehicle is on driving (2000 ~ 3000RPM) for 5 minutes.	
	Case4, 5	• Valve cleaning not in progress • CAM signal is normally generating	
Threshold value	Case1	• Cam phasing is abnormally fast or slow	
	Case2	• 5 CAD < Cam Actual Position < 50 CAD • Duty Cycle > 90% or Duty Cycle < 10% □ CAD : Crank Angle Degree	
	Case3	• Cam Position error > 15 CAD (Difference between Actual Postion and Desire Position is more than 15°) • Timing Counter > 80 □ CAD : Crank Angle Degree	
	Case4	• Cam Actual Position > 50 CAD and Difference between CAM Actual Position and Desire Position > 20 CAD □ CAD : Crank Angle Degree	

	Case5	• Cam Actual Position < 5 CAD and Difference between CAM Actual Position and Desire Position > 20 CAD □ CAD : Crank Angle Degree	
Diagnosis Time	Case1,2,3	• Continuous (Within 5min.)	
	Case4, 5	• Continuous (Within 1min.)	
MIL On Condition		• 2 Driving Cycles	

Specification

OCV	Specification
Coil Resistance (Ω)	9.4 ~10.4 [20□(68□)]

Diagnostic Circuit Diagram



Signal Waveform & Data

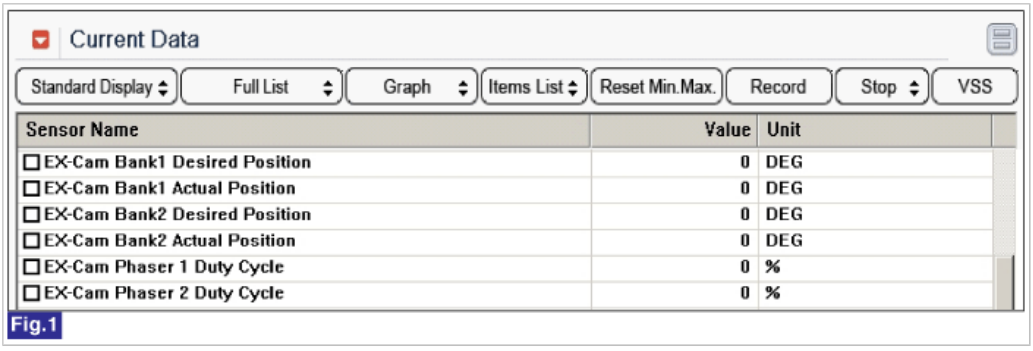


Fig.1

Sensor Name	Value	Unit
Camshaft Control	ON	-
Engine Speed	3840	RPM
EX-Cam Bank1 Actual Position	-15	DEG
EX-Cam Bank1 Desired Position	-14	DEG
EX-Cam Bank2 Desired Position	-14	DEG
EX-Cam Bank2 Actual Position	-15	DEG
EX-Cam Phaser 1 Duty Cycle	43	%
EX-Cam Phaser 2 Duty Cycle	44	%

Fig.2

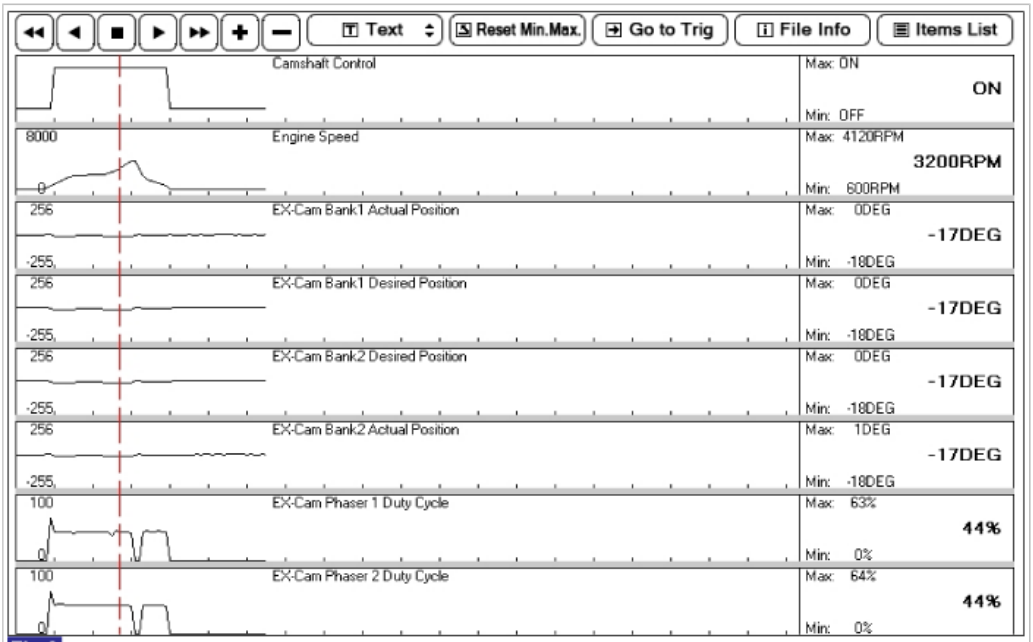


Fig.3

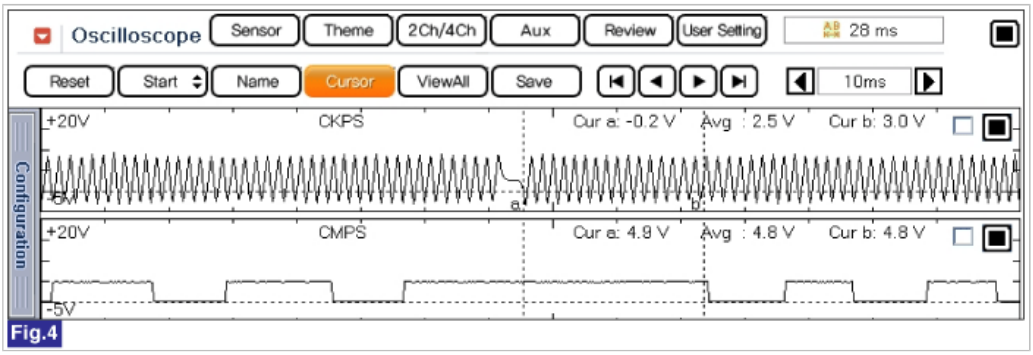


Fig.4

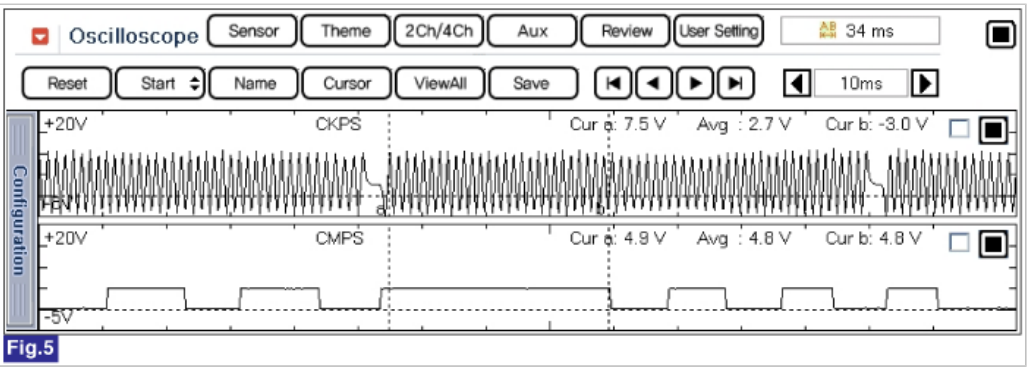


Fig.5

Fig.1) Normal data of EX-CVVT at acceleration.
Fig.2) Normal graph of EX-CVVT at acceleration.
Fig.3) Normal waveform of CKPS & EX-CMPS at idle.
Fig.4) Normal waveform of CKPS & EX-CMPS at acceleration.
Fig.5) Normal data of EX-CVVT at idle.

This example shows a typical Crankshaft Position Sensor (CKPS) and Camshaft Position Sensor (CMPS) waveform at idle. (Fig1.) If the 17th signal of the CKPS after missing tooth is aligned with the high signal of the CMPS at idle, ECM recognizes that Synchronization between CKPS and CMPS is completed. Under acceleracting condition, the number of teeth between missing tooth and tooth aligned with edge of the CMPS high signal is increased from idle condition.(Fig2.)