

<b>DTC</b>	<b>P0340</b>	<b>CAMSHAFT POSITION SENSOR "A" CIRCUIT (BANK 1 OR SINGLE SENSOR)</b>
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<b>DTC</b>	<b>P0341</b>	<b>CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR)</b>
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<b>DTC</b>	<b>P0345</b>	<b>CAMSHAFT POSITION SENSOR "A" CIRCUIT (BANK 2)</b>
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<b>DTC</b>	<b>P0346</b>	<b>CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE (BANK 2)</b>
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## CIRCUIT DESCRIPTION

The Variable Valve Timing (VVT) sensor (VV signal) consists of a magnet, iron core and pickup coil. The VV signal plate has 3 teeth on its outer circumference and is installed on the camshaft timing pulley. 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 a voltage in the pickup coil.

This sensor monitors a timing rotor located on the camshaft and is used to detect camshaft angle by the ECM. The camshaft rotation synchronizes with the crankshaft rotation, and this sensor communicates the rotation of the camshaft timing rotor as a pulse signal to the ECM. Based on the signal, the ECM controls fuel injection time and ignition timing.

DTC No.	DTC Detection Condition	Trouble Area
P0340 P0345	<ul style="list-style-type: none"> <li>No VVT sensor signal to ECM during cranking (2 trip detection logic)</li> <li>No VVT sensor signal to ECM with engine speed 600 rpm or more (1 trip detection logic)</li> </ul>	<ul style="list-style-type: none"> <li>Open or short in VVT sensor circuit</li> <li>VVT sensor</li> <li>Camshaft timing pulley</li> <li>Timing belt has a jumped tooth</li> <li>ECM</li> </ul>
P0341	While crankshaft rotates twice, VVT sensor signal is input to ECM 12 times or more (1 trip detection logic) HINT: Under normal condition, the camshaft position sensor signal is input into the ECM 3 times per 2 engine revolutions.	<ul style="list-style-type: none"> <li>Open or short in VVT sensor circuit</li> <li>VVT sensor</li> <li>Camshaft timing pulley</li> <li>Timing belt has a jumped tooth</li> <li>ECM</li> </ul>
P0346	While crankshaft rotates twice, VVT sensor signal is input to ECM 5 times or more. (1 trip detection logic) HINT: Under normal condition, the camshaft position sensor signal is input into the ECM 3 times per 2 engine revolutions.	<ul style="list-style-type: none"> <li>Open or short in VVT sensor circuit</li> <li>VVT sensor</li> <li>Camshaft timing pulley</li> <li>Timing belt has a jumped tooth</li> <li>ECM</li> </ul>

### HINT:

- DTC P0340 and P0345 indicate a malfunction related to the VVT sensor (+) circuit (Wire harness (ECM - VVT sensor) and VVT sensor).
- DTC P0341 and P0346 indicate a malfunction related to the VVT sensor (-) circuit (Wire harness (ECM - VVT sensor) and VVT sensor).

## MONITOR DESCRIPTION

If there is no signal from the VVT sensor even though the engine is cranking, or if the rotations of the camshaft and the crankshaft are not synchronized, the ECM interprets this as a malfunction of the sensor.

## MONITOR STRATEGY

Related DTCs	P0340: CMP Sensor (Bank 1) Range Check P0340: CMP/CKP Misalignment (Bank 1) P0341: CMP Sensor (Bank 1) Malfunction P0345: VVT Sensor (Bank 2) Range Check (Case 1) P0345: VVT Sensor (Bank 2) Range Check (Case 2) P0346: VVT Sensor (Bank 2) Malfunction
Required sensors / components (Main)	CMP (Crankshaft position) sensor VVT sensor
Required sensors / components (Related)	CKP sensor
Frequency of operation	Continuous
Duration	5 seconds
MIL operation	2 driving cycles: CMP Sensor Range Check VVT Sensor Range Check (Case 1) Immediate: Others
Sequence operation	None

## TYPICAL ENABLING CONDITIONS

### All:

The monitor will run whenever these DTCs are not present	See page <a href="#">05-377</a>
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### CMP Sensor Range Check P0340:

Starter	ON
Minimum battery voltage while starter is ON	Less than 11V

### CMP/CKP Misalignment P0340:

Engine RPM	600 rpm or more
Starter	OFF

### VVT Sensor Range Check P0345 (Case 1):

Starter	ON
Minimum battery voltage while starter is ON	Less than 11V

### VVT Sensor Range Check P0345 (Case 2):

Engine RPM	600 rpm or more
Starter	OFF
Battery voltage	8 V or more
Ignition switch	ON

## TYPICAL MALFUNCTION THRESHOLDS

### CMP Sensor Range Check P0340:

CMP signal	No signal
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### CMP/CKP Misalignment P0340:

Alignment is judged using CMP-CKP input timing CMP sensor signal input in appropriate timing	No signal
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### CMP Sensor (Bank 1) Malfunction P0341:

CMP and CKP phase	Misaligned
CMP signal per 2 revolutions crankshaft	12 CMP signals or more

### VVT Sensor Range Check P0345 (Case 1):

VVT sensor signal	No signal
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### VVT Sensor Range Check P0345 (Case 2):

VVT sensor signal	No signal
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VVT Sensor (Bank 2) Malfunction P0346:

VVT sensor signal count	12 signals or more
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COMPONENT OPERATING RANGE

CMP sensor signal	CMP sensor voltage fluctuates when the crankshaft rotates 3 CMP signals per 2 revolutions of crankshaft
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WIRING DIAGRAM

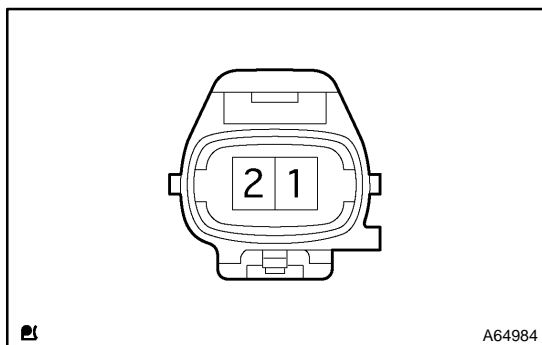
Refer to DTC P0335 on page [05-532](#) .

## 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 INSPECT VVT SENSOR (RESISTANCE)



- Disconnect the V7 or V6 VVT sensor connector.
- Measure the resistance between the terminals of the VVT sensor.

#### Standard:

Tester Connection	Condition	Specified Condition
1 - 2	Cold	835 to 1,400 $\Omega$
1 - 2	Hot	1,060 to 1,645 $\Omega$

#### NOTICE:

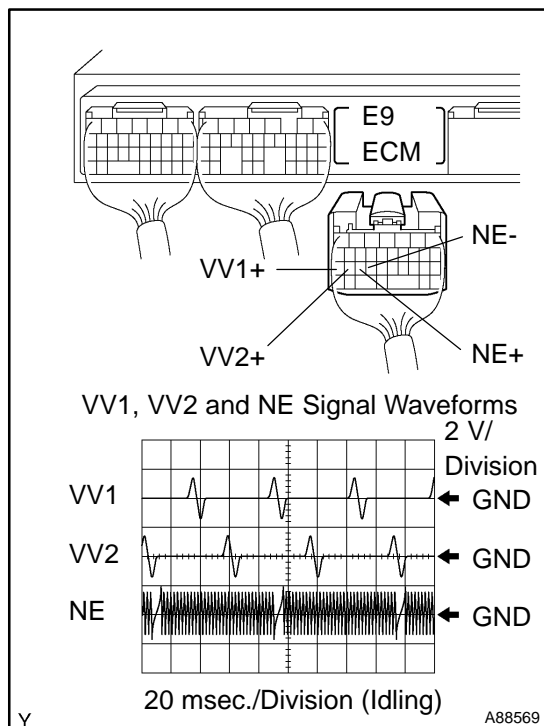
In the above section, the terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately  $-10^{\circ}\text{C}$  to  $50^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $122^{\circ}\text{F}$ ). "Hot" means approximately  $50^{\circ}\text{C}$  to  $100^{\circ}\text{C}$  ( $122^{\circ}\text{F}$  to  $212^{\circ}\text{F}$ ).

### HINT:

Reference: Inspection using the oscilloscope.

During cranking or idling, check the waveform of the ECM connector.

Tester Connection	Specified Condition
E9-27 (VV1+) - E9-24 (NE-)	Correct waveform is as shown
E9-26 (VV2+) - E9-24 (NE-)	
E9-25 (NE+) - E9-24 (NE-)	



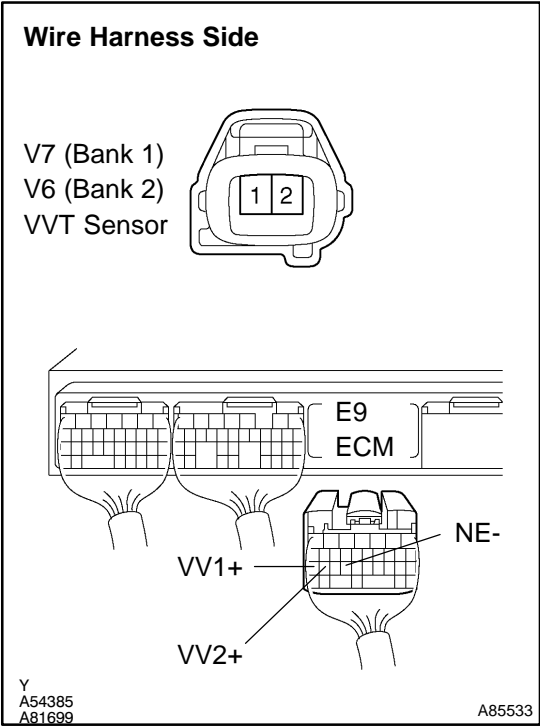
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REPLACE VVT SENSOR (See page 18-11)

OK

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CHECK WIRE HARNESS (VVT SENSOR - ECM)



- (a) Disconnect the V7 or V6 VVT sensor connector.
  - (b) Disconnect the E9 ECM connector.
  - (c) Check the resistance of the wire harness side connectors.
- Standard:**

Tester Connection	Specified Condition
V7-1 - E9-27 (VV1+) V6-1 - E9-26 (VV2+) V6 or V7-2 - E9-24 (NE-)	Below 1 Ω
V7-1 or E9-27 (VV1+) - Body ground V6 -1 or E9-26 (VV2+) - Body ground 2 of V6 or V7 or E9-24 (NE-) - Body ground	10 kΩ or higher

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REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

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CHECK SENSOR INSTALLATION (VVT SENSOR)

- (a) Check the sensor installation.
- OK: Sensor is installed correctly.**

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TIGHTEN SENSOR

OK

4

CHECK CAMSHAFT TIMING PULLEY

- (a) Check the teeth of the camshaft timing pulley.
- OK: The pulley does not have any cracks or deformation.**

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REPLACE CAMSHAFT TIMING PULLEY

OK

REPLACE ECM (See page 10-24 )