

DTC	P0340	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)
DTC	P0342	Camshaft Position Sensor "A" Circuit Low Input (Bank 1 or Single Sensor)
DTC	P0343	Camshaft Position Sensor "A" Circuit High Input (Bank 1 or Single Sensor)
DTC	P0345	Camshaft Position Sensor "A" Circuit (Bank 2)
DTC	P0347	Camshaft Position Sensor "A" Circuit Low Input (Bank 2)
DTC	P0348	Camshaft Position Sensor "A" Circuit High Input (Bank 2)

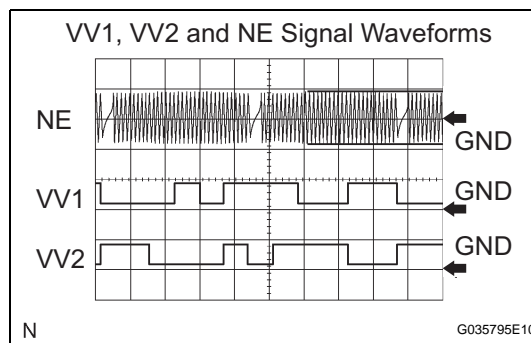
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DESCRIPTION

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 the 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 this signal, the ECM controls fuel injection time and ignition timing.

DTC No.	DTC Detection Conditions	Trouble Areas
P0340 P0345	<ul style="list-style-type: none"> Input voltage to ECM remains 0.3 V or less, or 4.7 V or higher for more than 5 seconds, when 2 or more seconds have elapsed after turning ignition switch ON (2 trip detection logic) No VVT sensor signal to ECM during cranking (1 trip detection logic) 	<ul style="list-style-type: none"> Open or short in VVT sensor circuit VVT sensor Camshaft timing pulley Jumped tooth of timing chain ECM
P0342 P0347	Output voltage of VVT sensor 0.3 V or less for 5 seconds (1 trip detection logic)	
P0343 P0348	Output voltage of VVT sensor 4.7 V or more for 5 seconds (1 trip detection logic)	



Reference: Inspection using an oscilloscope

HINT:

- The correct waveform is shown above.
- VV1+ and VV2+ stand for the VVT sensor signal, and NE+ stands for the CKP sensor signal.

Items	Contents
Terminals	NE+ - NE- VV1+ - VV1- VV2+ - VV2-
Equipment Settings	5V/Division, 20ms/Division
Conditions	Cranking or idling

MONITOR DESCRIPTION

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If no signal is transmitted by the VVT sensor despite the engine revolving, or 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: VVT sensor (Bank 1) open/short P0340: VVT position/Crankshaft position misalignment (Bank 1) P0342: VVT position sensor (Bank 1) range check (low voltage) P0343: VVT position sensor (Bank 1) range check (high voltage) P0345: VVT sensor (Bank 2) open/short P0345: VVT position/Crankshaft position misalignment (Bank 2) P0347: VVT position sensor (Bank 2) range check (low voltage) P0348: VVT position sensor (Bank 2) range check (high voltage)
Required Sensors/Components (Main)	VVT position sensors (Banks 1 and 2)
Required Sensors/Components (Related)	Crankshaft position sensor
Frequency of Operation	Continuous
Duration	4 seconds: P0340 (Camshaft position sensor range check), P0345 (VVT sensor range check (While starting engine)) 5 seconds: Others
MIL Operation	2 driving cycles: P0340 (Camshaft position sensor range check), P0345 (VVT sensor range check (While starting engine)) Immediate: Others
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs not present	None
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Camshaft Position Sensor Range Check:

Starter	ON and not starter ON again
Minimum battery voltage while starter ON	Less than 11V

Camshaft Position/Crankshaft Position Misalignment:

Engine RPM	600 rpm or more
Starter	OFF

Camshaft Position Sensor Range Check (Fluctuating, Low voltage, High voltage):

Starter	OFF
Ignition switch ON and time after ignition switch is OFF to ON	2 seconds or more

VVT sensor range check (While starting engine):

Starter	ON
Battery voltage while starter ON once at least	Less than 11 V

VVT sensor range check (After starting engine):

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

VVT sensor range check (Fluctuating, Low voltage, High voltage):

Starter	OFF
Ignition switch ON and time after ignition switch is OFF to ON	2 seconds or more
Battery voltage	8 V or more

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TYPICAL MALFUNCTION THRESHOLDS**Camshaft Position Sensor Range Check:**

Camshaft position signal	No signal
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Camshaft Position/Crankshaft Position Misalignment:

Camshaft position and crankshaft position phase	Mis-aligned
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Camshaft Position Sensor Range Check (Fluctuating):

Camshaft position position voltage	Less than 0.3 V, or more than 4.7 V
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Camshaft Position Sensor Range Check (Low voltage):

Camshaft position position voltage	Less than 0.3 V
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Camshaft Position Sensor Range Check (High voltage):

Camshaft position position voltage	More than 4.7 V
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VVT sensor range check (While starting engine):

VVT sensor signal	No signal
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VVT sensor range check (After starting engine):

VVT sensor signal	No signal
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VVT sensor range check (Fluctuating):

VVT sensor voltage	Less than 0.3 V, or more than 4.7 V
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VVT sensor range check (Low voltage):

VVT sensor voltage	Less than 0.3 V
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VVT sensor range check (High voltage):

VVT sensor voltage	More than 4.7 V
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COMPONENT OPERATING RANGE

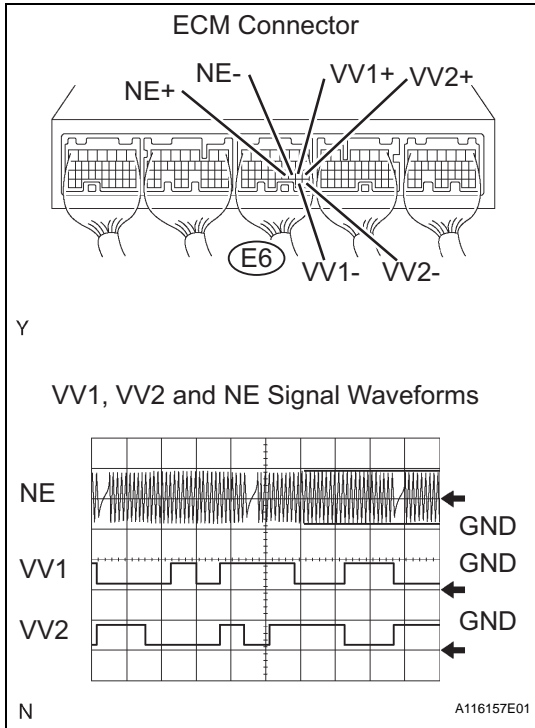
VVT sensor voltage	0.3 to 4.7 V
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WIRING DIAGRAMRefer to DTC P0335 (See page [ES-184](#)).

HINT:

Read freeze frame data using an intelligent tester. 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 CHECK ECM TERMINAL VOLTAGE



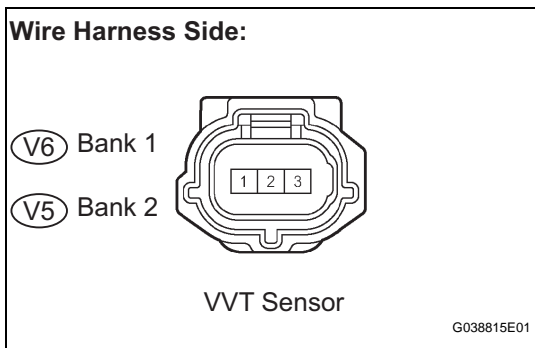
- (a) Inspect the ECM using an oscilloscope.
 - (1) While the engine is idling, check the waveform between the terminals of the ECM connector.
- Standard**

Tester Connections	Specified Conditions
VV1+ (E6-19) - VV1- (E6-29)	Correct waveform as shown in illustration
VV2+ (E6-18) - VV2- (E6-28)	
NE+ (E6-21) - NE- (E6-20)	

NG → **REPLACE VVT SENSOR**

OK

2 CHECK VVT SENSOR (SENSOR POWER SOURCE)



- (a) Disconnect the V6 or V5 VVT sensor connector.
- (b) Measure the voltage between the terminals of the VVT sensor.

Standard Voltage

Tester Connection	Specified Condition
3 - Body ground	4.5 to 5.0 V

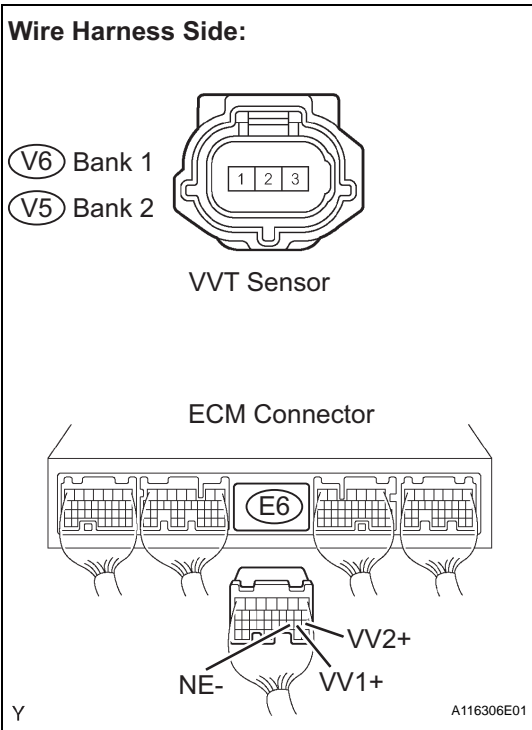
- (c) Reconnect the VVT sensor connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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3 CHECK HARNESS AND CONNECTOR (VVT SENSOR - ECM)



- (a) Disconnect the V5 or V6 VVT sensor connector.
- (b) Disconnect the E6 ECM connector.
- (c) Check the resistance.

Standard Resistance (Check for open)

Tester Connections	Specified Conditions
VVT sensor (V6-1) - VV1+ (E6-19)	Below 1 Ω
VVT sensor (V5-1) - VV2+ (E6-18)	
VVT sensor (V6-2) - VV1- (E6-29)	
VVT sensor (V5-2) - VV2- (E6-28)	

Standard Resistance (Check for short)

Tester Connections	Specified Conditions
VVT sensor (V6-1) or VV1+ (E6-19) - Body ground	10 kΩ or higher
VVT sensor (V5-1) or VV2+ (E6-18) - Body ground	
VVT sensor (V6-2) or VV1- (E6-29) - Body ground	
VVT sensor (V5-2) or VV2- (E6-28) - Body ground	

- (d) Reconnect the VVT sensor connector.
- (e) Reconnect the ECM connector.

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4 CHECK SENSOR INSTALLATION (VVT SENSOR)

NG TIGHTEN SENSOR

OK

5 CHECK CAMSHAFT TIMING GEAR ASSEMBLY (TEETH PLATE)

- (a) Check the teeth of the signal plate.
- OK:**
Sensor plate teeth do not have any cracks or deformation.

NG REPLACE CAMSHAFT TIMING GEAR ASSEMBLY

OK

REPLACE ECM