

<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>P0342</b>	<b>Camshaft Position Sensor "A" Circuit Low Input (Bank 1 or Single Sensor)</b>
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<b>DTC</b>	<b>P0343</b>	<b>Camshaft Position Sensor "A" Circuit High Input (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>P0347</b>	<b>Camshaft Position Sensor "A" Circuit Low Input (Bank 2)</b>
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<b>DTC</b>	<b>P0348</b>	<b>Camshaft Position Sensor "A" Circuit High Input (Bank 2)</b>
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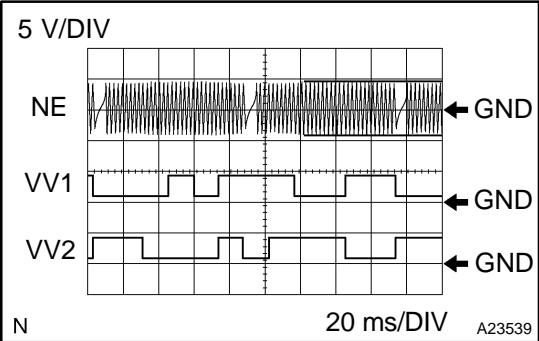
## CIRCUIT DESCRIPTION

The camshaft position sensor (G signal) consists of a magnet and MRE element.

The camshaft drive gear has 5 teeth on its inner circumference. When the camshaft gear rotates, air gap changes between the protrusion on the gear and the pickup coil. The change affects the magnetic field and result in change in the resistance of the MRE element. The crankshaft angle sensor plate has 32 teeth and output 32 signals every engine revolution. The ECM detects the standard crankshaft angle based on the G signal and actual crankshaft angle and engine speed by NE signal.

DTC No.	DTC Detection Condition	Trouble Area
P0340 P0345	No camshaft position sensor signal to ECM during cranking for 4 seconds or more. (2 trip detection logic)	<ul style="list-style-type: none"> <li>• Open or short in camshaft position sensor circuit</li> <li>• Camshaft position sensor</li> <li>• Camshaft timing pulley</li> <li>• Jumping teeth of timing belt</li> <li>• ECM</li> </ul>
P0340 P0345	No camshaft position sensor signal to ECM at engine speed 600 rpm or more for 5 seconds or more. (1 trip detection logic)	<ul style="list-style-type: none"> <li>• Open or short in camshaft position sensor circuit</li> <li>• Camshaft position sensor</li> <li>• Camshaft timing pulley</li> <li>• Jumping teeth of timing belt</li> <li>• ECM</li> </ul>

P0340 P0345	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 the ignition switch ON. (1 trip detection logic)	<ul style="list-style-type: none"><li>• Open or short in camshaft position sensor circuit</li><li>• Camshaft position sensor</li><li>• Camshaft timing pulley</li><li>• Jumping teeth of timing belt</li><li>• ECM</li></ul>
P0342 P0347	Input voltage to ECM remains 0.3 V or less for more than 5 seconds, when 2 or more seconds have elapsed after turning the ignition switch ON. (1 trip detection logic)	<ul style="list-style-type: none"><li>• Open or short in camshaft position sensor circuit</li><li>• Camshaft position sensor</li><li>• Camshaft timing pulley</li><li>• Jumping teeth of timing belt</li><li>• ECM</li></ul>
P0343 P0348	Input voltage to ECM remains 4.7 V or higher for more than 5 seconds, when 2 or more seconds have elapsed after turning the ignition switch ON. (1 trip detection logic)	<ul style="list-style-type: none"><li>• Open or short in camshaft position sensor circuit</li><li>• Camshaft position sensor</li><li>• Camshaft timing pulley</li><li>• Jumping teeth of timing belt</li><li>• ECM</li></ul>



Inspection using the oscilloscope.

The correct waveform is as shown in the illustration.

Tester Connection	Specified Condition
VV1+ (E5-25) – VV1– (E5-24)	Correct waveform is as shown
VV2+ (E5-18) – VV2– (E5-28)	Correct waveform is as shown
NE+ (E5-21) – NE– (E5-20)	Correct waveform is as shown

MONITOR DESCRIPTION

If there are no signals from the camshaft position sensor even though the engine is turning, or if the rotation of the camshaft and the crankshaft is not synchronized, the ECM interprets this as a malfunction of the sensor.

## MONITOR STRATEGY

Related DTCs	P0340	Camshaft position sensor range check
		Camshaft position/crankshaft position misalignment
		Camshaft position sensor range check (Fluctuating)
	P0342	Camshaft position sensor range check (Low voltage)
	P0343	Camshaft position sensor range check (High voltage)
	P0345	VVT sensor range check (While starting engine)
		VVT sensor range check (After starting engine)
		VVT sensor range check (Fluctuating)
Required sensors/components	P0347	VVT sensor range check (Low voltage)
	P0348	VVT sensor range check (High voltage)
Required sensors/components	Main sensors/components	VVT sensor, Camshaft position sensor
	Related sensors/components	Crankshaft position sensor, Engine speed sensor
Frequency of operation	Continuous	
Duration	4 sec.: P0340 (Camshaft position sensor range check), P0345 (VVT sensor range check (While starting engine)) 5 sec.: 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

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page <a href="#">DI-18</a>	
Camshaft position sensor range check:		
Starter	ON and not starter ON again	
Minimum battery voltage while starter ON	–	11 V
Camshaft position/crankshaft position misalignment:		
Engine RPM	600 rpm	–
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 sec.	–
VVT sensor range check (While starting engine):		
Starter	ON	
Battery voltage while starter ON once at least	–	11 V

VVT sensor range check (After starting engine):		
Engine RPM	600 rpm	–
Battery voltage	8 V	–
Ignition switch	ON	
Starter	OFF	
VVT sensor range check (Fluctuating, Low voltage, High voltage):		
Starter	OFF	
Ignition switch ON and time after ignition switch is OFF to ON	2 sec.	–
Battery voltage	8 V	–

## TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
<b>Camshaft position sensor range check:</b>	
Camshaft position sensor signal	No signal
<b>Camshaft position/crankshaft position misalignment:</b>	
Camshaft position and crankshaft position phase	Mis-aligned
<b>Camshaft position sensor range check (Fluctuating):</b>	
Camshaft position sensor voltage	Less than 0.3 V, or more than 4.7 V
<b>Camshaft position sensor range check (Low voltage):</b>	
Camshaft position sensor voltage	Less than 0.3 V
<b>Camshaft position sensor range check (High voltage):</b>	
Camshaft position sensor voltage	More than 4.7 V
<b>VVT sensor range check (While starting engine):</b>	
VVT sensor signal	No signal
<b>VVT sensor range check (After starting engine):</b>	
VVT sensor signal	No signal
<b>VVT sensor range check (Fluctuating):</b>	
VVT sensor voltage	Less than 0.3 V, or more than 4.7 V
<b>VVT sensor range check (Low voltage):</b>	
VVT sensor voltage	Less than 0.3 V
<b>VVT sensor range check (High voltage):</b>	
VVT sensor voltage	More than 4.7 V

## WIRING DIAGRAM

Refer to DTC P0335 on page [DI-203](#).

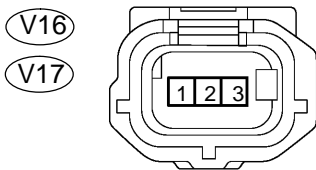
## INSPECTION PROCEDURE

### HINT:

Read freeze frame data using the hand-held 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, as well as other data from the time when a malfunction occurred.

### 1 Check camshaft position sensor power source.

Wire Harness Side



N

Camshaft Position Sensor

A23447

#### PREPARATION:

Disconnect the camshaft position sensor connector.

#### CHECK:

Measure the voltage between terminal 3 of the camshaft position sensor wire harness side connector and body ground.

#### OK:

Standard:

4.5 to 5.5 V

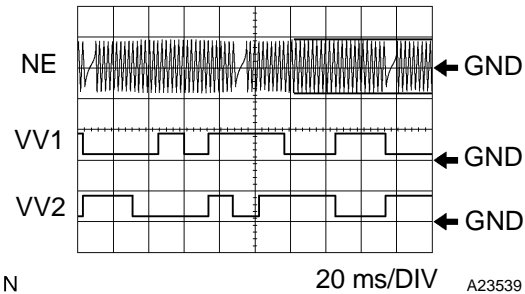
NG

Check and repair harness and connector.

OK

### 2 Check signal of camshaft position sensor.

5 V/DIV



#### PREPARATION:

Start the engine.

#### CHECK:

Using oscilloscope, measure the signal waveform between terminal 3 of the camshaft position sensor and body ground.

#### OK:

Standard:

Tester Connection	Specified Condition
VV1+ (E5-19) – VV1– (E5-29)	Correct waveform is as shown
VV2+ (E5-18) – VV2– (E5-28)	Correct waveform is as shown
NE+ (E5-21) – NE– (E5-20)	Correct waveform is as shown

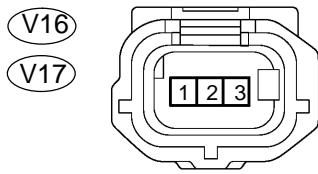
OK

Replace ECM (See page [SF-66](#)).

NG

### 3 Check for open and short in harness and connector between ECM and camshaft position sensor.

Wire Harness Side



N

Camshaft Position Sensor

A23447

**PREPARATION:**

- (a) Disconnect the camshaft position sensor connector.
- (b) Disconnect the E5 ECM connector.

**CHECK:**

Measure the resistance between the wire harness side connectors.

**OK:****Standard:**

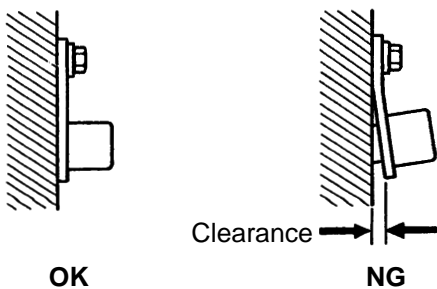
Tester Connection	Specified Condition
Camshaft position sensor (V17-1) – VV1+ (E5-19)	Below 1 $\Omega$
Camshaft position sensor (V17-2) – VV1- (E5-29)	Below 1 $\Omega$
Camshaft position sensor (V16-1) – VV2+ (E5-18)	Below 1 $\Omega$
Camshaft position sensor (V16-2) – VV2- (E5-28)	Below 1 $\Omega$
Camshaft position sensor (V17-1) or VV1+ (E5-19) – Body ground	10 k $\Omega$ or higher
Camshaft position sensor (V16-2) or VV1- (E5-29) – Body ground	10 k $\Omega$ or higher
Camshaft position sensor (V16-1) or VV2+ (E5-18) – Body ground	10 k $\Omega$ or higher
Camshaft position sensor (V16-2) or VV2- (E5-28) – Body ground	10 k $\Omega$ or higher

NG

Repair or replace harness or connector.

OK

### 4 Check sensor installation (Camshaft position sensor).



OK

NG

BR3795

**CHECK:**

Check the VVT position sensor installation.

**OK:**

The VVT sensor is installed properly.

NG

Tighten sensor installation bolt.

OK

5	Inspect teeth of camshaft timing belt pulley.
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**PREPARATION:**

Remove the camshaft timing belt pulley (See page [EM-53](#)).

**CHECK:**

Check the camshaft timing belt pulley.

NG

Replace camshaft timing pulley.

OK

Replace Camshaft position sensor  
(See page [IG-11](#)).