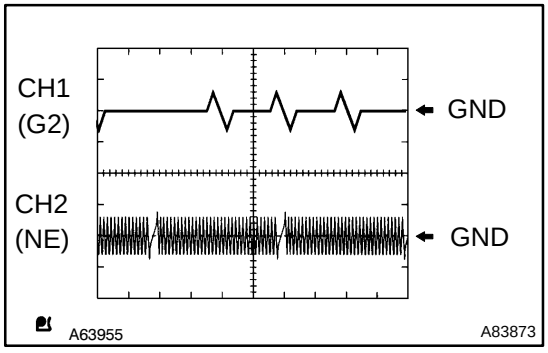
DTC	P0340	CAMSHAFT POSITION SENSOR ”A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC	P0341	CAMSHAFT POSITION SENSOR ”A” CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR)

CIRCUIT DESCRIPTION

The variable valve timing (VVT) sensor consists of a magnet, iron core and pickup coil.
The variable valve (VV) signal plate has 3 teeth on its outer circumference and is installed on the camshaft. 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 voltage in the pickup coil.
This sensor monitors a timing rotor located on the camshaft and is used to detect an 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	• No camshaft position sensor signal to ECM at engine speed of 600 rpm or more (1 trip detection logic)	• Open or short in camshaft position sensor circuit • Camshaft position sensor • Camshaft timing pulley • Timing chain has jumped a tooth • ECM
P0341	While crankshaft rotates twice, camshaft position 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	• Open or short in camshaft position sensor circuit • Camshaft position sensor • Camshaft timing pulley • Timing chain has jumped a tooth • ECM



Reference: Inspection using an oscilloscope.
HINT:
The correct waveform is as shown on the left.

Item	Contents
Terminal	CH1: G2 – NE– CH2: NE+ – NE–
Equipment Setting	5 V/Division, 20 ms/Division
Condition	During cranking or idling

MONITOR DESCRIPTION

If there is no signal from the VVT 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 (bank 1) range check or rationality P0341: Camshaft position sensor (bank 1) range check or rationality
Required sensors/components	Main: Camshaft position sensor Related: Crankshaft position sensor, engine speed sensor
Frequency of operation	Continuous
Duration	5 seconds
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0340:

The monitor will run whenever the following DTCs are not present	See page 05–20
Engine speed	600 rpm or more

P0341:

The monitor will run whenever the following DTCs are not present	See page 05–20
Starter	OFF
Engine revolution angle	720 °CA*

*: CA stands for Crankshaft Angle.

TYPICAL MALFUNCTION THRESHOLDS

P0340:

Crankshaft/camshaft synchronization	Not synchronized (judged by comparing the crankshaft position with the camshaft position)
Camshaft position sensor signal	No input in appropriate timing

P0341:

Crankshaft/Camshaft synchronization	Not synchronized
Camshaft position sensor count	12 or more / 720°CA (= 2 engine revolutions)

COMPONENT OPERATING RANGE

Camshaft position sensor signal input every 720°CA	3 times

WIRING DIAGRAM

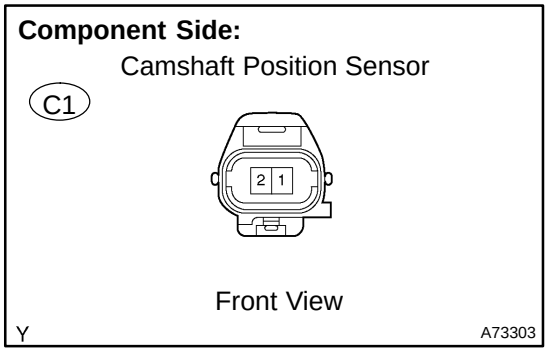
Refer to DTC P0335 on page 05–177.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine condition when 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 CAMSHAFT POSITION SENSOR(RESISTANCE)



(a) Disconnect the C1 camshaft position sensor connector.

(b) Measure the resistance between the terminals of camshaft position sensor connector.

Standard:

Tester Connection	Specified Condition
1 – 2	1,630 to 2,740 Ω at cold
1 – 2	2,065 to 3,225 Ω at hot

NOTICE:

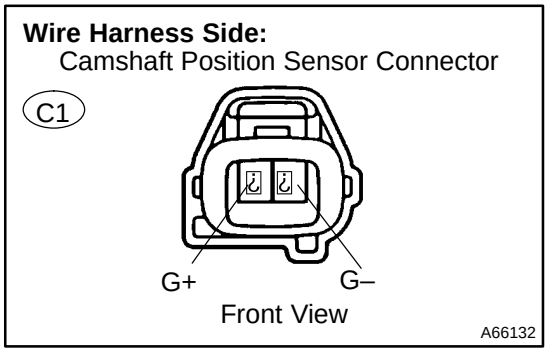
Terms ”cold” and ”hot” refer to the temperature of the coils. ”Cold” means approximately –10°C to 50°C (14°F to 122°F). ”Hot” means approximately 50°C to 100°C (122°F to 212°F).

(c) Reconnect the camshaft position sensor connector.

NG → **REPLACE CAMSHAFT POSITION SENSOR**

OK

2	CHECK HARNESS AND CONNECTOR(CAMSHAFT POSITION SENSOR – ECM)



(a) Disconnect the C1 camshaft position sensor connector.

(b) Disconnect the E4 ECM connector.

(c) Check the resistance between the wire harness side connectors.

Standard (Check for open):

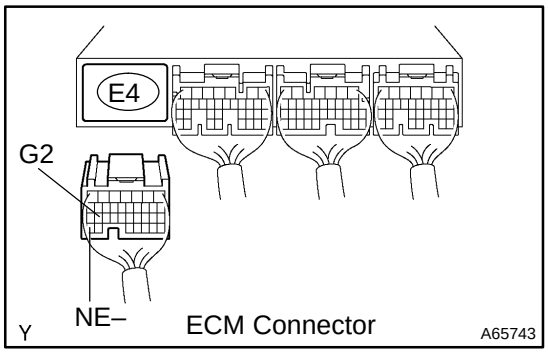
Tester Connection	Specified Condition
G+ (C1–1) – G2 (E4–26)	Below 1 Ω
G– (C1–2) – NE– (E4–34)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
G+ (C1–1) or G2 (E4–26) – Body ground	10 kΩ or higher
G– (C1–2) or NE– (E4–34) – Body ground	10 kΩ or higher

(d) Reconnect the camshaft position sensor connector.

(e) Reconnect the ECM connector.



NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3	CHECK SENSOR INSTALLATION(CAMSHAFT POSITION SENSOR)

(a) Check that the camshaft position sensor is properly installed.
OK: Sensor is installed correctly.

NG	SECURELY REINSTALL SENSOR

OK

4	CHECK CAMSHAFT TIMING GEAR ASSY

(a) Remove the camshaft.
(b) Check the camshaft lobes.
OK: No deformation on the camshaft lobe.

NG	REPLACE CAMSHAFT TIMING GEAR ASSY

OK

REPLACE ECM (See page 10–24)