DTC	P0340/12	CAMSHAFT POSITION SENSOR ”A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC	P0341/12	CAMSHAFT POSITION SENSOR ”A” CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR)

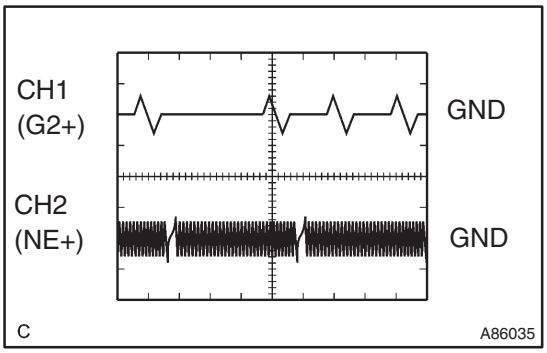
CIRCUIT DESCRIPTION

The camshaft position sensor consists of a magnet and an iron core which is wrapped with copper wire, and is installed on the cylinder head. When the camshaft rotates, each of 3 teeth on the camshaft passes through the camshaft position sensor. This activates the internal magnet in the sensor, generating a voltage in the copper wire. The camshaft rotation is synchronized with the crankshaft rotation. When the crankshaft turns twice the voltage is generated 3 times in the camshaft position sensor. The generated voltage in the sensor acts as a signal, allowing the ECM to locate the camshaft position. This signal is then used to control ignition timing, fuel injection timing, and the VVT system.

DTC No.	DTC Detection Condition	Trouble Area
P0340/12	• No camshaft position sensor signal to ECM during cranking (2 trip detection logic) • 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 • Jumped tooth of timing chain • ECM
P0341/12	While crankshaft rotates twice, camshaft position sensor signal is input to ECM 12 times or more (1 trip detection logic)	• Open or short in camshaft position sensor circuit • Camshaft position sensor • Camshaft • Jumped tooth of timing chain • ECM

HINT:

- DTC P0340 indicates a malfunction related to the camshaft position sensor (+) circuit (the wire harness between the ECM and camshaft position sensor, and the camshaft position sensor itself).
- DTC P0341 indicates a malfunction related to the camshaft position sensor (–) circuit (the wire harness between the ECM and camshaft position sensor, and the camshaft position sensor itself).



Reference: Inspection using the oscilloscope.

HINT:

- The correct waveform is as shown on the left.
- G2+ stands for the camshaft position sensor signal, and NE+ stands for the crankshaft position sensor signal.

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

WIRING DIAGRAM

Refer to DTC P0335 on page 05–93.

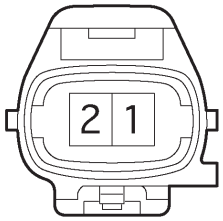
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, 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)

Component Side:



Camshaft Position Sensor

A64984

(a) Disconnect the C1 camshaft position sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
1 – 2	835 to 1,400 Ω at cold
1 – 2	1,060 to 1,645 Ω at hot

HINT:

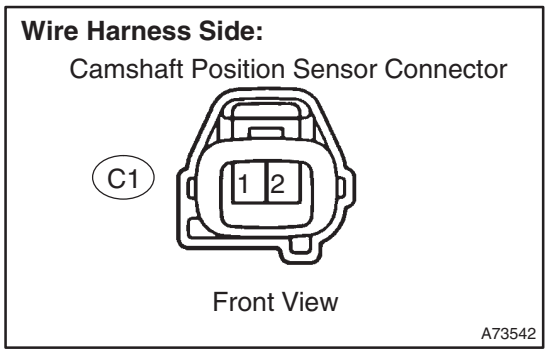
Terms ”cold” and ”hot” refer to the temperature of the coils. ”Cold” means approximately –10° to 50°C (14° to 122°F). ”Hot” means approximately 50° to 100°C (122° to 212°F).

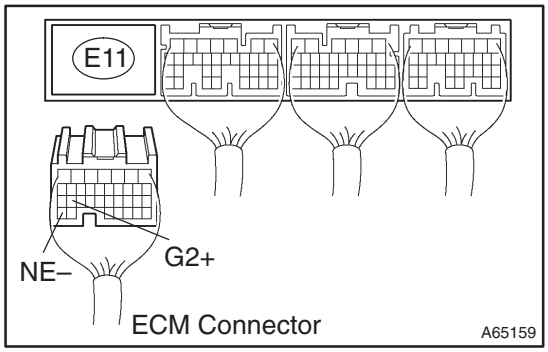
(c) Reconnect the camshaft position sensor connector.

NG → **REPLACE CAMSHAFT POSITION SENSOR** (**See page 18–5**)

OK

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





(a) Disconnect the C1 camshaft position sensor connector.
(b) Disconnect the E11 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard (Check for open):

Tester Connection	Specified Condition
Camshaft position sensor (C1–1) – G2+ (E11–26)	Below 1 Ω
Camshaft position sensor (C1–2) – NE– (E11–34)	Below 1 Ω

Standard (Check for short):

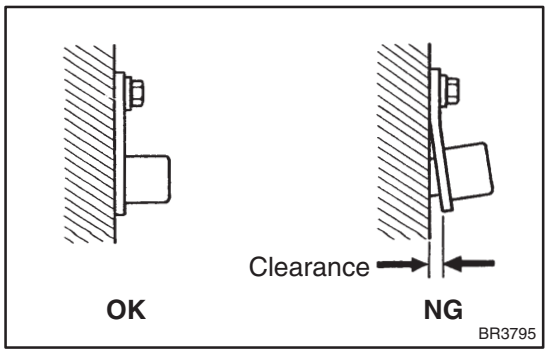
Tester Connection	Specified Condition
Camshaft position sensor (C1–1) or G2+ (E11–26) – Body ground	10 kΩ or higher
Camshaft position sensor (C1–2) or NE– (E11–34) – Body ground	10 kΩ or higher

(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 the sensor installation.
OK: The sensor is installed properly.

NG → **SECURELY REINSTALL SENSOR**

OK

4 CHECK CAMSHAFT TIMING GEAR ASSY (See page 14–19)

(a) Check the teeth of the camshaft timing rotor.
OK: The teeth do not have any cracks or deformation.

NG → **REPLACE CAMSHAFT TIMING GEAR ASSY**

OK

REPLACE ECM (See page 10–12)