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 Camshaft Position (CMP) sensor, like the Crankshaft Position (CKP) sensor, consists of a magnet and an iron core wrapped in copper wire. The camshaft has 3 teeth and the CMP sensor is installed so that it can detect these teeth passing by. When the camshaft rotates and the teeth pass by the CMP sensor, the magnet on the CMP sensor creates a magnetic field and voltage is generated in the copper wire. When the crankshaft makes two rotation, voltage will be generated in the CMP sensor 3 times. The CKP sensor is roughly the same. When the crankshaft makes one rotation, its 34 teeth pass by the CKP sensor and voltage is generated 34 times. The camshaft rotates at half the speed of the crankshaft. Therefore, the CMP sensor generates voltage 3 times in the time the crankshaft takes to make 2 rotations.
The Engine Control Module (ECM) detects generation of these voltages to locate the camshaft position, which are used to control the ignition timing, the fuel injection timing and the VVT system.

DTC No.	DTC Detection Condition	Trouble Area
P0340	• No camshaft position sensor signal to ECM during cranking (2 trip detection logic) • No camshaft position sensor signal to ECM with engine speed 600 rpm or more (1 trip detection logic)	• Open or short in camshaft position sensor circuit • Camshaft position sensor • Timing chain has a jumped tooth • ECM
P0341	While crankshaft rotates twice, camshaft position sensor signal is input to ECM 12 times or more (1 trip detection logic)	• Same as DTC No. P0340

HINT:

- DTC P0340 indicates a malfunction related to the camshaft position sensor (+) circuit (Wire harness (ECM − camshaft position sensor) and camshaft position sensor).
- DTC P0341 indicates a malfunction related to the camshaft position sensor (−) circuit (Wire harness (ECM − camshaft position sensor) and camshaft position sensor).

MONITOR DESCRIPTION

If there is no signal from the camshaft position sensor even though the engine is revolving, 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 P0340: Camshaft Position/Crankshaft position Misalignment P0341: Camshaft Position Sensor Malfunction
Required sensors/ components (Main)	Camshaft position sensor
Required sensors / components (Related)	Crankshaft position sensor
Frequency of operation	Continuous
Duration	4 seconds: Camshaft Position Sensor Range Check 5 seconds: Camshaft Position/Crankshaft Position Misalignment 720°CA: Camshaft Position Sensor Malfunction
MIL operation	2 driving cycles: Camshaft Position Sensor Range Check Immediate: Camshaft Position/Crankshaft Position Misalignment Camshaft Position Sensor Malfunction
Sequence operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	See page 05−16

Camshaft Position Sensor Range Check P0340:

Starter	ON
Minimal battery voltage while starter ON	Less than 11V

Camshaft Position/Crankshaft Position Misalignment P0340:

Engine RPM	600 rpm or more
Starter	OFF

Camshaft Position Sensor Malfunction P0341:

Starter	After OFF to ON timing

TYPICAL MALFUNCTION THRESHOLDS

Camshaft Position Sensor Range Check P0340:

Camshaft position sensor signal	No signal

Camshaft Position/Crankshaft Position Misalignment P0340:

Camshaft position and crankshaft position phase	Misaligned

Camshaft Position Sensor Malfunction P0341:

Camshaft position and crankshaft position phase	Misaligned
Camshaft position signal per 2 revolutions crankshaft	12 camshaft position sensor signals or more

COMPONENT OPERATING RANGE

Camshaft position sensor signal	Camshaft position sensor voltage fluctuates when the camshaft rotates 3 Camshaft position signals per 1 revolution camshaft 3 Camshaft position signals per 2 revolutions crankshaft

WIRING DIAGRAM

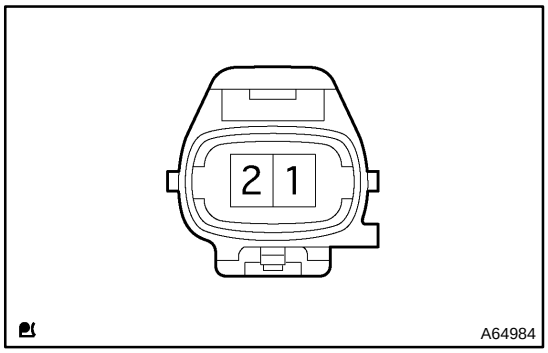
Refer to DTC P0335 on page 05−171.

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 CAMSHAFT POSITION SENSOR (RESISTANCE)



(a) Disconnect the C1 sensor connector.
(b) Measure the resistance between the terminals of the sensor.

Standard:

Tester Connection	Condition	Specified Condition
1 − 2	Cold	935 to 1,400 Ω
1 − 2	Hot	1,060 to 1,645 Ω

NOTICE:

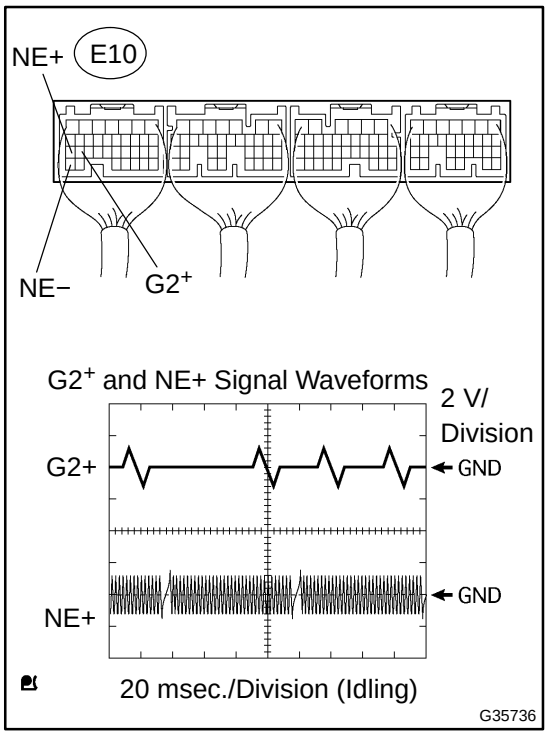
In the above section, the terms ”cold” and ”hot” refer to the temperature of the coils. ”Cold” means approximately −10°C to 50°C (14°F to 122°F). ”Hot” means approximately 50°C to 100°C (122°F to 212°F).

HINT:

Reference: Inspection using the oscilloscope.

During cranking or idling, check the waveform between the terminals of the E10 ECM connector.

Tester Connection	Specified Condition
E10−26 (G2+) − E10−34 (NE−) E10−27 (NE+) − E10−34 (NE−)	Correct waveform is as shown



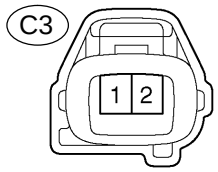
NG → **REPLACE CAMSHAFT POSITION SENSOR (See page 18−3)**

OK

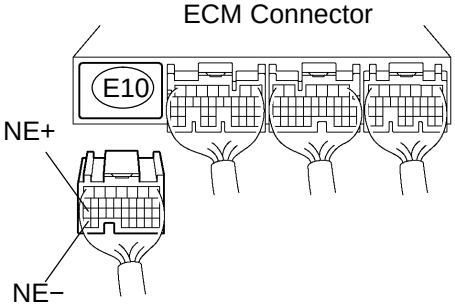
2 CHECK WIRE HARNESS (CAMSHAFT POSITION SENSOR − ECM)

Wire Harness Side:

Crankshaft Position Sensor Connector



ECM Connector



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(a) Disconnect the C1 sensor connector.
(b) Disconnect the E10 ECM connector.
(c) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
C3−1 − E10−27 (NE+) C3−2 − E10−34 (NE−)	Below 1 Ω
C3−1 or E10−27 (NE+) − Body ground C3−2 or E10−34 (NE−) − Body ground	10 kΩ or higher

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

OK

3 CHECK SENSOR INSTALLATION (CAMSHAFT POSITION SENSOR)

(a) Check the camshaft position sensor installation.

OK: Sensor is installed correctly.

NG → **TIGHTEN SENSOR**

OK

4 INSPECT CAMSHAFT

(a) Remove the camshafts (see page 14−89).
(b) Check the camshaft lobes.

OK: The camshaft lobes do not have any cracks or deformation.

NG → **REPLACE CAMSHAFT**

OK

REPLACE ECM (See page 10−9)