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 ECM detects generation of these voltages to locate the camshaft position, which are used to indicate the cylinder.

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 cranking, or if 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: CMP sensor range check P0340: CMP/CKP misalignment P0341: CMP sensor malfunction
Required sensors/ components (Main)	CMP (Camshaft position) sensor and VVT sensor
Required sensors / components (Related)	CKP sensor
Frequency of operation	Continuous
Duration	5 sec.
MIL operation	2 driving cycles: CMP sensor range check Immediate: CMP/CKP misalignment and CMP malfunction CMP sensor malfunction
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

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

CMP Sensor Range Check P0340:

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

CMP/CKP Misalignment and CMP Sensor Malfunction P0340:

Engine RPM	600 rpm or more
Starter	OFF

CMP Sensor Malfunction P0341:

Starter	After OFF to ON timing

TYPICAL MALFUNCTION THRESHOLDS

CMP Sensor Range Check P0340:

CMP signal	No signal

CMP/CKP Misalignment P0340:

CMP and CKP phase	Misaligned

CMP Sensor Malfunction P0341:

CMP and CKP phase	Misaligned
CMP signal per 2 revolutions of crankshaft	12 CMP signals or more

COMPONENT OPERATING RANGE

CMP sensor signal	CMP sensor voltage fluctuates when the camshaft rotates 3 CMP signals per 2 revolutions of crankshaft

WIRING DIAGRAM

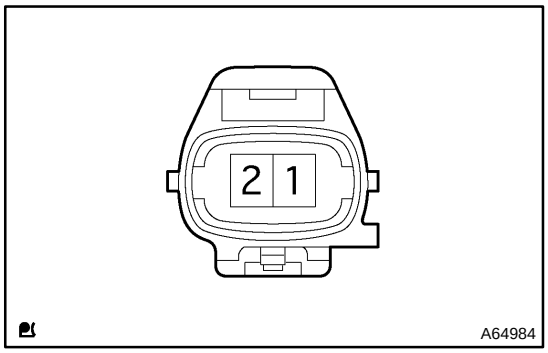
Refer to DTC P0335 on page 05-166 .

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	835 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).

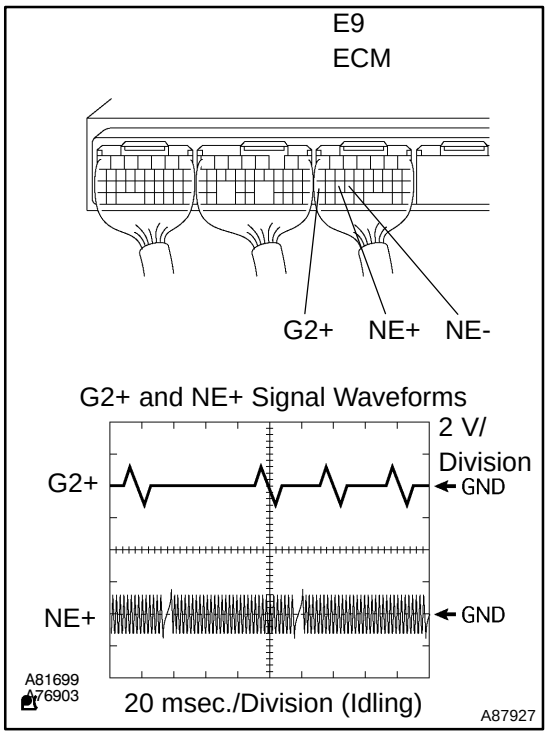
HINT:

Reference: Inspection using an oscilloscope.

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

Standard:

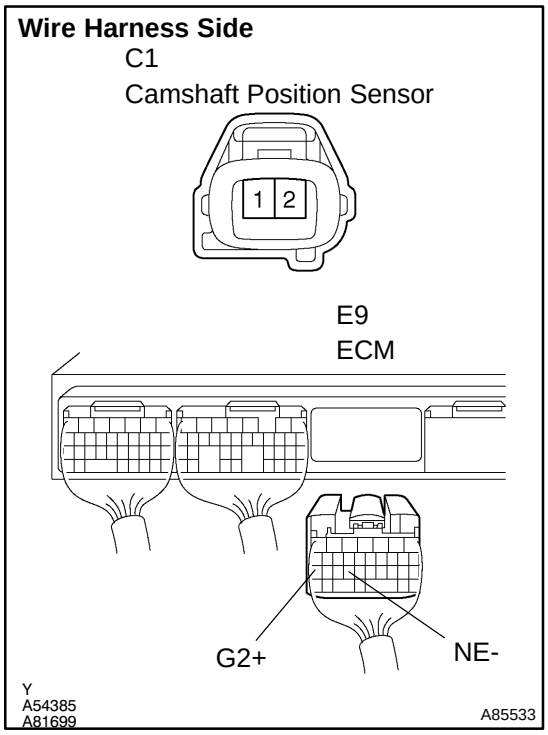
Tester Connection	Specified Condition
E9-27 (G2+) - E9-24 (NE-) E9-25 (NE+) - E9-24 (NE-)	Correct waveform is as shown



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

OK

2 CHECK WIRE HARNESS (CAMSHAFT POSITION SENSOR - ECM)



(a) Disconnect the C1 sensor connector.
(b) Disconnect the E9 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
C1-1 - E9-27 (G2+) C1-2 - E9-24 (NE-)	Below 1 Ω
C1-1 or E9-27 (G2+) - Body ground C1-2 or E9-24 (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 sensor installation.
OK: Sensor is installed correctly.

NG → **TIGHTEN SENSOR**

OK

4 INSPECT CAMSHAFT

(a) Remove the camshafts (see page 14-79).
(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)