

DTC	P0340	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)
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DTC	P0341	Camshaft Position Sensor "A" Circuit Range / Performance (Bank 1 or Single Sensor)
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DESCRIPTION

The Camshaft Position (CMP) sensor consists of a magnet and an iron core which is wrapped with copper wire, and is installed onto the cylinder head. When the camshaft rotates, each of 3 teeth on the camshaft passes through the CMP 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 CMP 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.

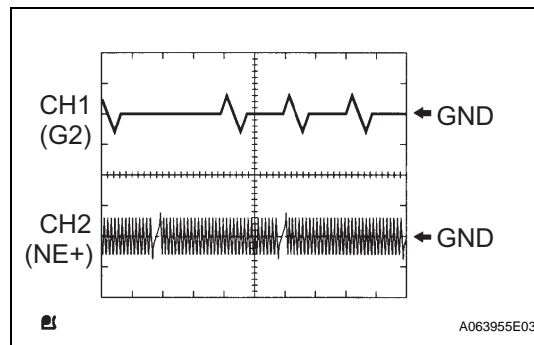
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DTC No.	DTC Detection Conditions	Trouble Areas
P0340	Case 1 • No Camshaft Position (CMP) sensor signal to ECM while cranking (2 trip detection logic) Case 2 • No CMP sensor signal to ECM at engine speed of 600 rpm or more (1 trip detection logic)	<ul style="list-style-type: none"> • Open or short in CMP sensor circuit • CMP sensor • Camshaft • Jumped tooth of timing chain • ECM
P0341	When crankshaft rotates twice, Camshaft Position (CMP) sensor signal input to ECM 12 times or more (1 trip detection logic)	<ul style="list-style-type: none"> • Open or short in CMP sensor circuit • CMP sensor • Camshaft • Jumped tooth of timing chain • ECM

HINT:

- DTC P0340 indicates a malfunction relating to the CMP sensor (+) circuit (the wire harness between the ECM and CMP sensor, and the CMP sensor itself).
- DTC P0341 indicates a malfunction relating to the CMP sensor (-) circuit (the wire harness between the ECM and CMP sensor, and the CMP sensor itself).

Reference: Inspection using an oscilloscope



HINT:

- The correct waveform is as shown above.
- G2 stands for the CMP sensor signal, and NE+ stands for the Crankshaft Position (CKP) sensor signal.

Items	Contents
Terminals	CH1: G2 - NE- CH2: NE+ - NE-
Equipment Settings	5 V/Division, 20 ms/Division
Conditions	Cranking or idling

MONITOR DESCRIPTION

If no signal is transmitted by the CMP sensor despite the engine revolving, or the rotation of the camshaft and the crankshaft is not synchronized, the ECM interprets this as a malfunction of the sensor.

If the malfunction is not repaired successfully, a DTC is set 10 seconds after the engine is next started.

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 (CMP) sensor
Required Sensors/Components (Related)	Crankshaft Position (CKP) sensor
Frequency of Operation	Continuous
Duration	5 seconds
MIL Operation	2 driving cycles: CMP sensor range check Immediate: Camshaft position/crankshaft position misalignment and CMP sensor malfunction
Sequence of Operation	None

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TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
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Camshaft Position Sensor Range Check P0340:

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

Camshaft Position/Crankshaft Position Misalignment P0340:

Engine speed	600 rpm or more
Starter	OFF

Camshaft Position Sensor Malfunction P0341:

Starter	After OFF to ON timing
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TYPICAL MALFUNCTION THRESHOLDS

Camshaft Position Sensor Range Check P0340:

CMP sensor signal	No signal
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Camshaft Position/Crankshaft Position Misalignment P0340:

Camshaft position and crankshaft position phase	Misaligned
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Camshaft Position Sensor Malfunction P0341:

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

COMPONENT OPERATING RANGE

CMP sensor	<ul style="list-style-type: none"> • CMP sensor output voltage fluctuates while camshaft revolving • 3 CMP sensor signals per 2 crankshaft revolutions
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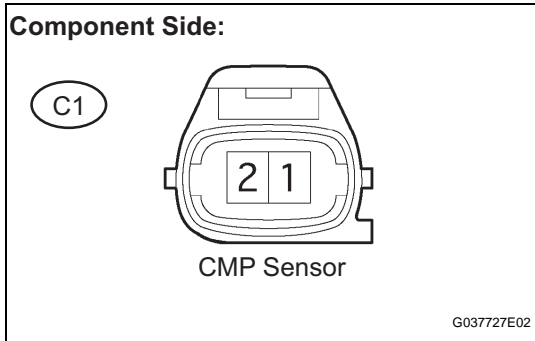
WIRING DIAGRAM

Refer to DTC P0335 (See page [ES-173](#)).

HINT:

Read freeze frame data using an intelligent tester. 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)



- (a) Disconnect the C1 Camshaft Position (CMP) sensor connector.
- (b) Measure the resistance between terminals 1 and 2.

Standard Resistance

Tester Connections	Specified Conditions
1 - 2	835 to 1,400 Ω at cold
1 - 2	1,060 to 1,645 Ω at hot

HINT:

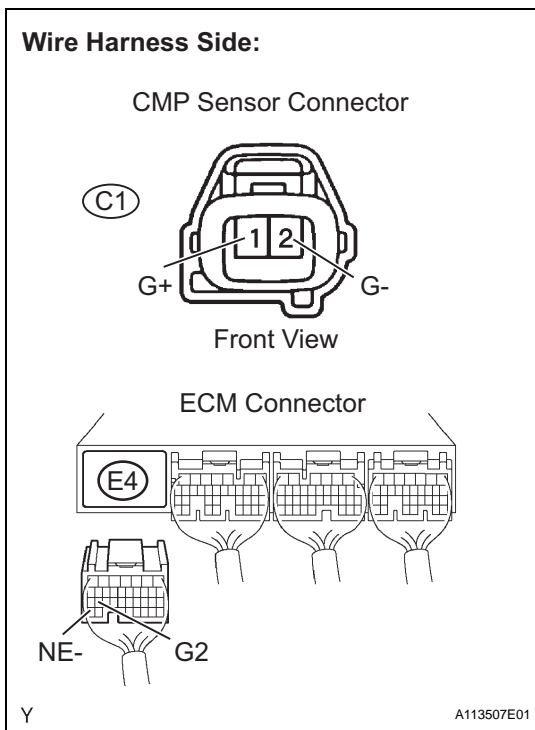
Terms cold and hot refer to the temperature of the coils. Cold means approximately -10° to 50°C (14° to 122°F). Hot means approximately 50° to 100°C (122° to 212°F).

- (c) Reconnect the CMP sensor connector.

NG **REPLACE CAMSHAFT POSITION SENSOR**

OK

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



- (a) Disconnect the C1 CMP sensor connector.
- (b) Disconnect the E4 ECM connector.
- (c) Check the resistance.

Standard Resistance (Check for open)

Tester Connections	Specified Conditions
G+ (C1-1) - G2 (E4-26)	Below 1 Ω
G- (C1-2) - NE- (E4-34)	Below 1 Ω

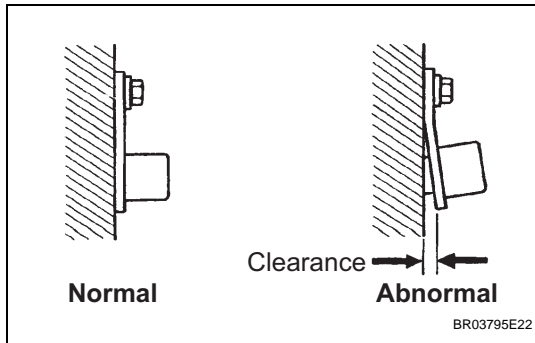
Standard Resistance (Check for short)

Tester Connections	Specified Conditions
G+ (C1-1) or G2 (E4-26) - Body ground	10 k Ω or higher
G- (C1-2) or NE- (E4-34) - Body ground	10 k Ω or higher

- (d) Reconnect the ECM connector.
- (e) Reconnect the CMP sensor connector.

NG **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 CHECK SENSOR INSTALLATION (CAMSHAFT POSITION SENSOR)

(a) Check the CMP sensor installation.

OK:

Sensor is installed correctly.

NG**SECURELY REINSTALL SENSOR****OK****ES****4 CHECK CAMSHAFT TIMING GEAR ASSEMBLY (TEETH OF SENSOR PLATE)**

(a) Check the teeth of the sensor plate.

OK:

Sensor plate teeth do not have any cracks or deformation.

NG**REPLACE CAMSHAFT TIMING GEAR ASSEMBLY****OK****REPLACE ECM**