

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)

DESCRIPTION

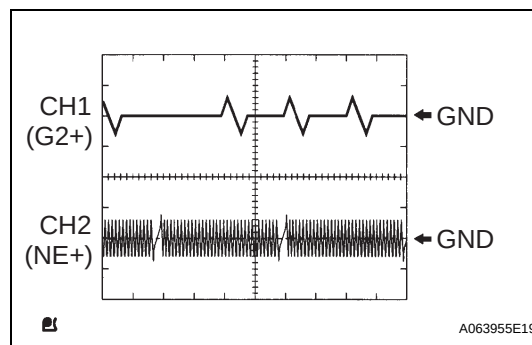
The Camshaft Position (CMP) sensor consists of a magnet and an iron core which is wrapped with copper wire, and is installed onto the cylinder head. When the camshaft rotates, each of 3 teeth on the camshaft passes through the CMP sensor. This activates the internal magnet in the sensor, generating a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

DTC No.	DTC Detection Conditions	Trouble Areas
P0340	Case 1: • No 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)	• Open or short in CMP sensor circuit • CMP sensor • Camshaft • Jumped tooth of timing chain • ECM
P0341	When crankshaft rotates twice, CMP sensor signal is input to ECM 12 times or more (1 trip detection logic)	• 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	Case 1: 4 seconds Case 2: 5 seconds
MIL Operation	P0340 Case 1 (No signal): 2 driving cycles P0340 Case 2 (Misalignment), P0341: Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever the following DTCs are 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:

Engine revolution angle	720°CA
Starter	After OFF to ON timing

TYPICAL MALFUNCTION THRESHOLDS

Camshaft Position Sensor Range Check P0340:

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

Crankshaft/camshaft alignment	Misalignment (determines by comparison between the crankshaft position and camshaft position)
Camshaft position sensor signal	No signal in appropriate timing

Camshaft Position Sensor Malfunction P0341:

Crankshaft/camshaft alignment	Misalignment
CMP sensor count	12 or more / 720°CA (2 engine revolutions)

COMPONENT OPERATING RANGE

CMP sensor	- CMP sensor output voltage fluctuates while camshaft revolving 3 CMP sensor signals per 2 crankshaft revolutions
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WIRING DIAGRAM

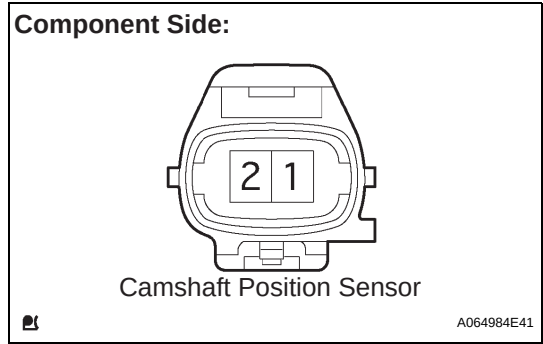
Refer to DTC P0335 (See page ES-173).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using an intelligent tester or OBD II scan tool. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

ES

1INSPECT 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	Between 835 Ω and 1,400 Ω at cold
1 - 2	Between 1,060 Ω and 1,645 Ω at hot

NOTICE:
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).

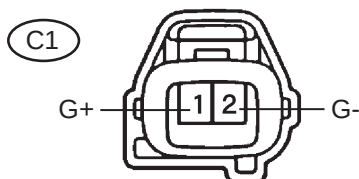
- (c) Reconnect the camshaft position sensor connector.

OK

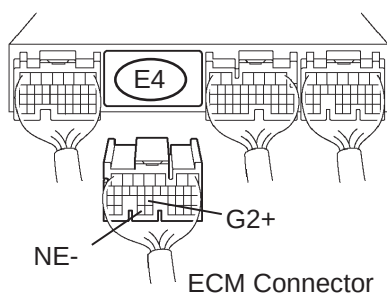
NGREPLACE CAMSHAFT POSITION SENSOR

2 CHECK HARNESS AND CONNECTOR (CAMSHAFT POSITION SENSOR - ECM)**Wire Harness Side:**

Camshaft Position Sensor Connector



Front View



ECM Connector

Y

A136263E01

- Disconnect the C1 CMP sensor connector.
- Disconnect the E3 ECM connector.
- Check the resistance.

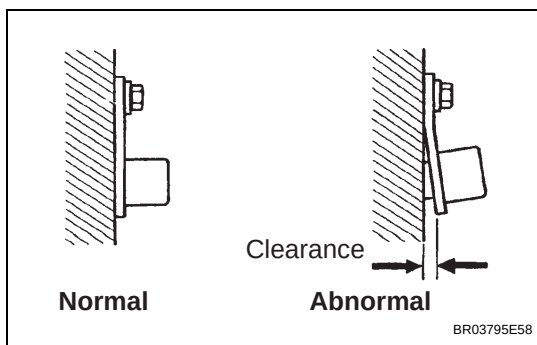
Standard resistance (Check for open)

Tester Connections	Specified Conditions
G+ (C1-1) - G2+ (E4-24)	Below 1 Ω
G- (C1-2) - NE- (E4-33)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
G+ (C1-1) or G2+ (E4-24) - Body ground	10 k Ω or higher
G- (C1-2) or NE- (E4-33) - Body ground	10 k Ω or higher

- Reconnect the ECM connector.
- Reconnect the camshaft position sensor connector.

NG**REPAIR OR REPLACE HARNESS OR CONNECTOR****OK****3 CHECK CAMSHAFT POSITION SENSOR (SENSOR INSTALLATION)**

Normal

Abnormal

BR03795E58

- Check the CMP sensor installation.

OK:**Sensor is installed correctly.****NG****REPAIR OR REPLACE CAMSHAFT POSITION SENSOR****OK****4 CHECK CAMSHAFT**

- Check the teeth of the camshaft.

OK:**Camshaft teeth do not have any cracks or deformation.****NG****REPLACE CAMSHAFT**

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OK

REPLACE ECM