

|            |              |                                                                           |
|------------|--------------|---------------------------------------------------------------------------|
| <b>DTC</b> | <b>P0340</b> | <b>Camshaft Position Sensor "A" Circuit<br/>(Bank 1 or Single Sensor)</b> |
|------------|--------------|---------------------------------------------------------------------------|

|            |              |                                                                                   |
|------------|--------------|-----------------------------------------------------------------------------------|
| <b>DTC</b> | <b>P0341</b> | <b>Camshaft Position Sensor "A" Circuit<br/>Range/Performance (Single Sensor)</b> |
|------------|--------------|-----------------------------------------------------------------------------------|

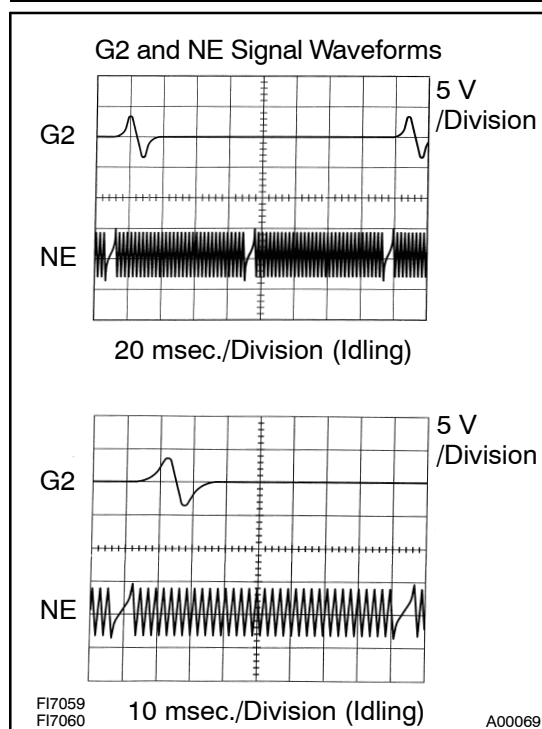
## CIRCUIT DESCRIPTION

The camshaft position sensor (G signal) consists of a magnet iron core and pickup coil.

The G signal plate has 1 tooth on its outer circumference and is installed on the LH camshaft timing pulley. When the camshafts rotate, protrusion on the signal plate and air gap on the pickup coil change, causing fluctuations in the magnetic field and generating a voltage in the pickup coil.

The NE signal plate has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals at every engine revolution. The ECM detects the crankshaft angle and the engine revolution based on the NE signals, and the cylinder and the angle of the G2 based on the combination of the G and NE signals.

| DTC No. | DTC Detection Condition                                                                                                                                                                                                                                  | Trouble Area                                                                                                                                                                                                                          |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| P0340   | No camshaft position sensor signal to ECM during cranking (2 trip detection logic)                                                                                                                                                                       | <ul style="list-style-type: none"> <li>• Open or short in camshaft position sensor circuit</li> <li>• Camshaft position sensor</li> <li>• LH camshaft timing pulley</li> <li>• Jumping teeth of timing belt</li> <li>• ECM</li> </ul> |
|         | No camshaft position sensor signal to ECM with engine speed 600 rpm or more (1 trip detection logic)                                                                                                                                                     |                                                                                                                                                                                                                                       |
| P0341   | While crankshaft rotates twice, camshaft position sensor signal will be input to ECM 12 times or more (1 trip detection logic)<br>• Hint:<br>Under normal condition, the camshaft position signal is input into the ECM 3 times per 2 engine revolutions |                                                                                                                                                                                                                                       |



### Reference: Inspection using the oscilloscope.

The correct waveform is as shown.

| Tester Connection         | Specified Condition          |
|---------------------------|------------------------------|
| G2+ (E7-27) – G2- (E7-32) | Correct waveform is as shown |
| NE+ (E7-25) – NE- (E7-24) |                              |

## MONITOR DESCRIPTION

If there is no signal from the camshaft position sensor even though the engine is turning, 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 (Bank 1) range check or rationality |
|                             | P0341                                                                                      | Camshaft position sensor (Bank 1) range check or rationality |
| Required sensors/components | Main sensors/components                                                                    | Camshaft position sensor                                     |
|                             | Related sensors/components                                                                 | Crankshaft position sensor, Engine speed sensor              |
| Frequency of operation      | Continuous                                                                                 |                                                              |
| Duration                    | 5 sec.                                                                                     |                                                              |
| MIL operation               | P0340 case 1 (no signal): 2 driving cycles<br>P0340 case 2 (mis-aligned), P0341: Immediate |                                                              |
| Sequence of operation       | None                                                                                       |                                                              |

## TYPICAL ENABLING CONDITIONS

| Item                                                             | Specification                                                   |         |
|------------------------------------------------------------------|-----------------------------------------------------------------|---------|
|                                                                  | Minimum                                                         | Maximum |
| The monitor will run whenever the following DTCs are not present | See "List of disable a monitor" (on page <a href="#">DI-3</a> ) |         |
| <b>P0340 Case 1 (No signal):</b>                                 |                                                                 |         |
| Starter                                                          | ON                                                              |         |
| Minimum battery voltage while starter ON                         | –                                                               | 11 V    |
| <b>P0340 Case 2 (Mis-aligned):</b>                               |                                                                 |         |
| Engine speed                                                     | 600 rpm                                                         | –       |
| Starter                                                          | OFF                                                             |         |
| <b>P0341:</b>                                                    |                                                                 |         |
| Starter                                                          | After OFF to ON timing                                          |         |
| Engine revolution                                                | 720° CA                                                         |         |

## TYPICAL MALFUNCTION THRESHOLDS

| Detection Criteria                                                                                                  | Threshold                                    |
|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| <b>P0340 Case 1 (No signal):</b>                                                                                    |                                              |
| Camshaft position sensor signal                                                                                     | No signal                                    |
| <b>P0340 Case 2 (Mis-aligned):</b>                                                                                  |                                              |
| Crankshaft/camshaft alignment is mis-aligned (judged by comparing the crankshaft position to the camshaft position) |                                              |
| Camshaft position sensor signal: No input in appropriate timing.                                                    |                                              |
| <b>P0341:</b>                                                                                                       |                                              |
| Crankshaft/Camshaft alignment                                                                                       | Mis-aligned                                  |
| Camshaft position sensor count                                                                                      | 12 or more / 720°CA (= Engine 2 revolutions) |

## COMPONENT OPERATING RANGE

| Parameter                                                  | Standard Value |
|------------------------------------------------------------|----------------|
| Camshaft position sensor signal input during every 720° CA | 3              |

## WIRING DIAGRAM

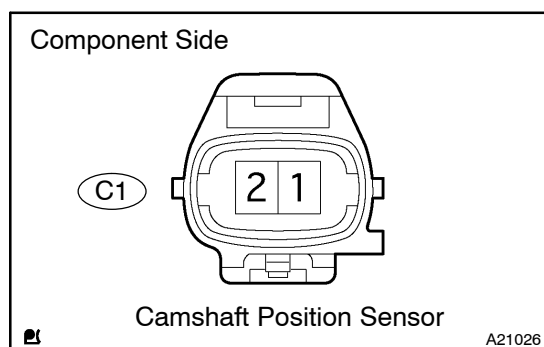
Refer to DTC P0335 on page [DI-191](#).

## 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, as well as other data from the time when a malfunction occurred.

|          |                                                      |
|----------|------------------------------------------------------|
| <b>1</b> | <b>Check resistance of camshaft position sensor.</b> |
|----------|------------------------------------------------------|



### PREPARATION:

Disconnect the C1 camshaft position sensor connector.

### CHECK:

Measure the resistance between terminals 1 and 2.

### OK:

| Tester Connection | Specified Condition             |
|-------------------|---------------------------------|
| 1 – 2             | 1,630 to 2,740 $\Omega$ at cold |
|                   | 2,065 to 3,225 $\Omega$ at hot  |

### NOTICE:

” Cold” and ”Hot” shown above mean the temperature of the coils themselves. ”Cold” is from  $-10^{\circ}\text{C}$  ( $14^{\circ}\text{F}$ ) to  $50^{\circ}\text{C}$  ( $122^{\circ}\text{F}$ ) and ”Hot” is from  $50^{\circ}\text{C}$  ( $122^{\circ}\text{F}$ ) to  $100^{\circ}\text{C}$  ( $212^{\circ}\text{F}$ ).

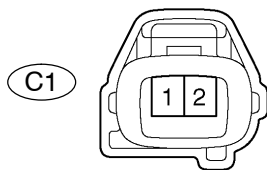
NG

Replace camshaft position sensor.

OK

**2****Check for open and short in harness and connector between ECM and camshaft position sensor.**

Wire Harness Side



Camshaft Position Sensor

A21029

**PREPARATION:**

- (a) Disconnect the C1 camshaft position sensor connector.
- (b) Disconnect the E7 ECM connector.

**CHECK:**

Measure the resistance between the wire harness side connectors.

**OK:**

| Tester Connection                                            | Specified Condition     |
|--------------------------------------------------------------|-------------------------|
| Camshaft position sensor (C1-1) – G2+ (E7-27)                | Below 1 $\Omega$        |
| Camshaft position sensor (C1-2) – G2- (E7-32)                | Below 1 $\Omega$        |
| Camshaft position sensor (C1-1) or G2+ (E7-27) – Body ground | 10 k $\Omega$ or higher |
| Camshaft position sensor (C1-2) or G2- (E7-32) – Body ground | 10 k $\Omega$ or higher |

**NG****Repair or replace harness or connector.****OK****3****Check sensor installation (Camshaft position sensor).****CHECK:**

Check the camshaft position sensor installation.

**NG****Tighten sensor.****OK**

|   |                                                  |
|---|--------------------------------------------------|
| 4 | Inspect teeth of LH camshaft timing belt pulley. |
|---|--------------------------------------------------|

**PREPARATION:**

Remove the LH camshaft timing belt pulley (See page [EM-35](#)).

**CHECK:**

Check the LH camshaft timing belt pulley.

**NG****Replace LH camshaft timing pulley.****OK****Replace ECM (See page [SF-60](#)).**