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)

DTC	P0345	CAMSHAFT POSITION SENSOR ”A” CIRCUIT (BANK 2)

DTC	P0346	CAMSHAFT POSITION SENSOR ”A” CIRCUIT RANGE/PERFORMANCE (BANK 2)

CIRCUIT DESCRIPTION

The variable valve timing (VVT) sensor (VV signal) consists of a magnet, iron core and pickup coil.
The VV signal plate has 3 teeth on its outer circumference and is installed on the camshaft timing pulley.
When the camshafts rotate, the protrusion on the signal plate and the air gap on the pickup coil change, causing fluctuations in the magnetic field and generating a voltage in the pickup coil.
This sensor monitors a timing rotor located on the camshaft and is used to detect camshaft angle by the ECM. The camshaft rotation synchronizes with the crankshaft rotation, and this sensor communicates the rotation of the camshaft timing rotor as a pulse signal to the ECM. Based on the signal, the ECM controls fuel injection time and ignition timing.

DTC No.	DTC Detection Condition	Trouble Area
P0340 P0345	• No VVT sensor signal to ECM during cranking (2 trip detection logic) • No VVT sensor signal to ECM with engine speed 600 rpm or more (1 trip detection logic)	• Open or short in VVT sensor circuit • VVT sensor • Camshaft timing pulley • Timing belt has a jumped tooth • ECM
P0341 P0346	While crankshaft rotates twice, VVT sensor signal is input to EMC 5 times or more. (1 trip detection logic) HINT: Under normal condition, the camshaft position sensor input into the ECM 3 times per 2 engine revolutions.	• Open or short in VVT sensor circuit • VVT sensor • Camshaft timing pulley • Timing belt has a jumped tooth • ECM

HINT:

- DTC P0340 and P0345 indicate a malfunction related to the VVT sensor (+) circuit (Wire harness (ECM − VVT sensor) and VVT sensor).
- DTC P0341 and P0346 indicate a malfunction related to the VVT sensor (−) circuit (Wire harness (ECM − VVT sensor) and VVT sensor).

MONITOR DESCRIPTION

If there is no signal from the VVT 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 (Bank 1) Range Check P0340: Camshaft Position/Crankshaft Position Misalignment (Bank 1) P0341: Camshaft Position Sensor (Bank 1) Malfunction P0345: Camshaft Position Sensor (Bank 2) Range Check P0345: Camshaft Position/Crankshaft Position MIsalignment (Bank 2) P0346: Camshaft Position Sensor (Bank 2) Malfunction
Required sensors / components (Main)	Camshaft position sensor
Required sensors / components (Related)	Crankshaft position sensor
Frequency of operation	Continuous
Duration	5 seconds
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 05−507

Camshaft Position Sensor Range Check P0340, P0345:

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/Crankshaft Position Misalignment P0345:

Engine RPM	600 rpm or more
Starter	OFF
Battery voltage	8 V or more
Ignition switch	ON

Camshaft Position Malfunction P0341, P0346:

Starter	After OFF to ON timing

TYPICAL MALFUNCTION THRESHOLDS

Camshaft Position Sensor Range Check P0340, P0345:

Camshaft position signal	No signal

Camshaft Position/Crankshaft Position Misalignment P0340, P0345:

Camshaft position and crankshaft position phase	Misaligned

Camshaft Position Sensor (Bank 1) Malfunction P0341:

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

Camshaft Position Sensor (Bank 2) Malfunction P0346:

Camshaft position signal per 2 revolutions crankshaft	12 camshaft position signals or more

COMPONENT OPERATING RANGE

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

WIRING DIAGRAM

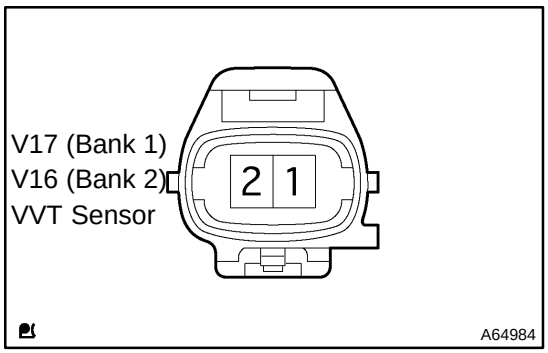
Refer to DTC P0335 on page 05−672.

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 VVT SENSOR (RESISTANCE)



(a) Disconnect the V16 or V17 VVT sensor connector.

(b) Check the resistance of the VVT sensor terminals.

Standard:

Tester Connection	Condition	Specified Condition
1 − 2	Cold	835 to 1,400 Ω
1 − 2	Hot	1,060 to 1,645 Ω

NOTICE:

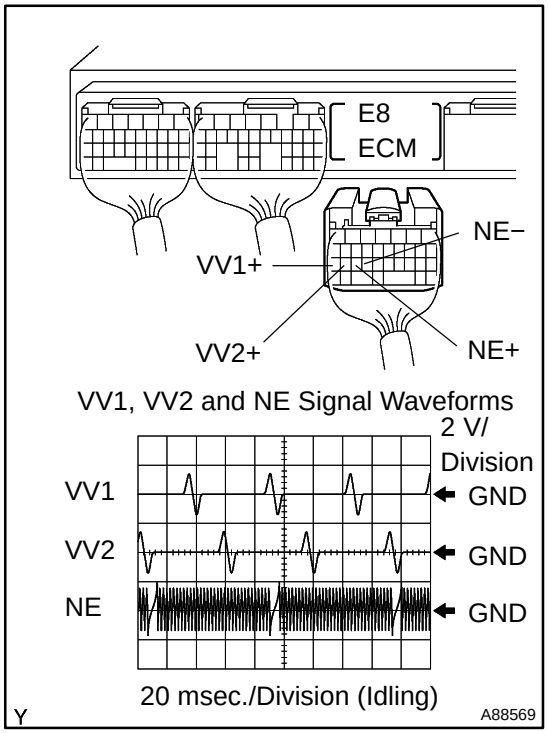
In the above section, the terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately −10°C to 50°C (14°F to 122°F). "Hot" means approximately 50°C to 100°C (122°F to 212°F).

HINT:

Reference: Inspection using the oscilloscope.

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

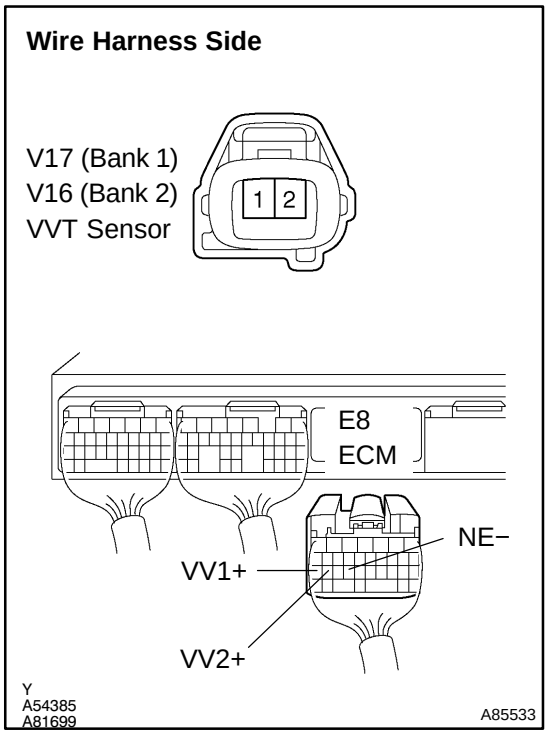
Tester Connection	Specified Condition
E8−27 (VV1+) − E8−24 (NE−) E8−26 (VV2+) − E8−24 (NE−) E8−25 (NE+) − E8−24 (NE−)	Correct waveform is as shown



NG → **REPLACE VVT SENSOR (See page 18−11)**

OK

2 CHECK WIRE HARNESS (VVT SENSOR − ECM)



(a) Disconnect the V16 or V17 VVT sensor connector.
(b) Disconnect the E8 ECM connector.
(c) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
V17−1 − E8−27 (VV1+) V16−1 − E8−26 (VV2+) V16 or V17−2 − E8−24 (NE−)	Below 1 Ω
V17−1 or E8−27 (VV1+) − Body ground V16 −1 or E8−26 (VV2+) − Body ground 2 of V16 or V17 or E8−24 (NE−) − Body ground	10 kΩ or higher

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

OK

3 CHECK SENSOR INSTALLATION (VVT SENSOR)

(a) Check the sensor installation.

OK, Sensor is installed correctly.

NG → **TIGHTEN SENSOR**

OK

4 CHECK CAMSHAFT TIMING PULLEY

(a) Check the teeth of the camshaft timing pulley.

OK The pulley does not have any cracks or deformation.

NG → **REPLACE CAMSHAFT TIMING PULLEY**

OK

REPLACE ECM (See page 10−25)