DTC	P0340/12	CAMSHAFT POSITION SENSOR ”A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC	P0341/12	CAMSHAFT POSITION SENSOR ”A” CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR)

DTC	P0345/18	CAMSHAFT POSITION SENSOR ”A” CIRCUIT (BANK 2)

DTC	P0346/18	CAMSHAFT POSITION SENSOR ”A” CIRCUIT RANGE/PERFORMANCE (BANK 2)

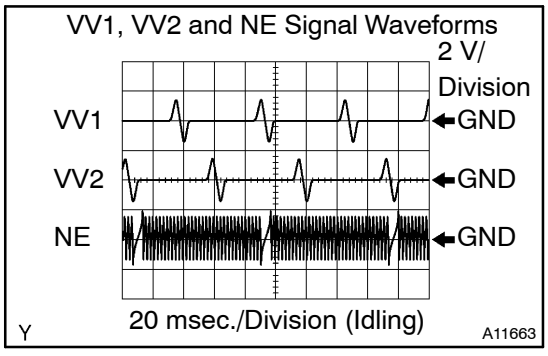
CIRCUIT DESCRIPTION

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 an electromotive force in the pickup coil.
The NE signal plate (crankshaft position sensor plate) has 34 teeth and is installed 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 signal, and the cylinder and the angle of the VVT based on the combination of the VV and NE signal.

DTC No.	DTC Detection Condition	Trouble Area
P0340/12 P0345/18	• 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 • Jumping teeth of timing chain • ECM
P0341/12 P0346/18	While crankshaft rotates twice, VVT sensor signal is input to ECM 12 times or more (1 trip detection logic)	

HINT:

- DTC P0340/12 and P0345/18 indicate a malfunction related to the VVT sensor (+) circuit (Wire harness (ECM – VVT sensor) and VVT sensor).
- DTC P0341/12 and P0346/18 indicate a malfunction related to the VVT sensor (–) circuit (Wire harness (ECM – VVT sensor) and VVT sensor).



Reference: Inspection using the oscilloscope.
The correct waveform is as shown in the diagram on the left.

Symbols (Terminal No.)	Specified condition
VV1+ (E13–27) – NE– (E13–24)	Correct waveform is as shown
VV2+ (E13–26) – NE– (E13–24)	
NE+ (E13–25) – NE– (E13–24)	

WIRING DIAGRAM

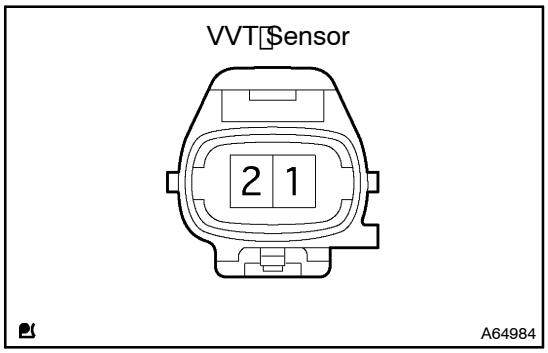
Refer to DTC P0335/12, 13 on page 05–122.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

1 INSPECT VVT SENSOR (RESISTANCE)



(a) Measure the resistance between terminals 1 and 2.

Resistance:

835 to 1,400 Ω at cold

1,060 to 1,645 Ω at hot

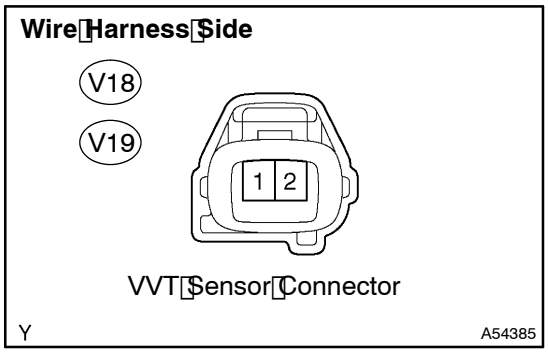
NOTICE:

"Cold" and "Hot" shown above mean the temperature of the coils themselves. "Cold" is from –10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

NG → **REPLACE VVT SENSOR (See page 18–5)**

OK

2 CHECK HARNESS AND CONNECTOR (VVT SENSOR – ECM)



(a) Disconnect the VVT sensor connector.

(b) Disconnect the E13 ECM connector.

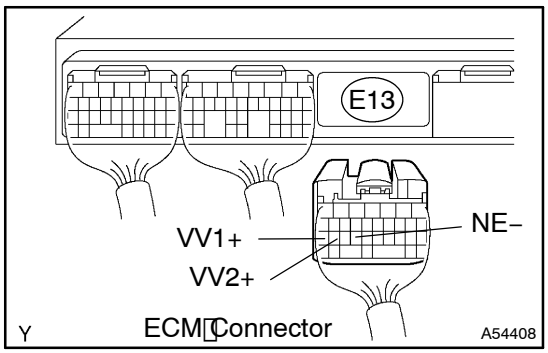
(c) Check for continuity between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
VVT sensor (V19–1) – VV1+ (E13–27)	Continuity
VVT sensor (V18–1) – VV2+ (E13–26)	
VVT sensor (V18 or V19–2) – NE– (E13–24)	

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
VVT sensor (V19–1) or VV1+ (E13–27) – Body ground	No continuity
VVT sensor (V18–1) or VV2+ (E13–26) – Body ground	
VVT sensor (V18 or V19–2) or NE– (E13–24) – Body ground	



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

OK

3	CHECK SENSOR INSTALLATION (VVT SENSOR)

NG → TIGHTEN SENSOR

OK

4	CHECK CAMSHAFT TIMING GEAR ASSY (TEETH OF PLATE)

(a) Check the teeth of the signal plate.

NG → REPLACE CAMSHAFT TIMING GEAR ASSY

OK

CHECK AND REPLACE ECM (See page 01–35)