DTC	P0365	Camshaft Position Sensor "B" Circuit (Bank 1)
DTC	P0367	Camshaft Position Sensor "B" Circuit Low Input (Bank 1)
DTC	P0368	Camshaft Position Sensor "B" Circuit High Input (Bank 1)
DTC	P0390	Camshaft Position Sensor "B" Circuit (Bank 2)
DTC	P0392	Camshaft Position Sensor "B" Circuit Low Input (Bank 2)
DTC	P0393	Camshaft Position Sensor "B" Circuit High Input (Bank 2)

DESCRIPTION

The exhaust camshaft's Variable Valve Timing (VVT) sensor consists of a magnet and MRE (Magneto Resistance Element).
The exhaust camshaft has a sensor plate with 3 teeth on its outer circumference.
When the exhaust camshaft rotates, changes occur in the air gaps between the 3 teeth and MRE, which affects the magnet. As a result, the resistance of the MRE material fluctuates. The VVT sensor converts the exhaust camshaft rotation data to pulse signals, uses the pulse signals to determine the camshaft angle, and sends it to the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0365 P0390	• Input voltage to ECM remains 0.3 V or less, or 4.7 V or higher for more than 5 seconds, when 2 or more seconds have elapsed after turning ignition switch ON position (1 trip detection logic) • No VVT sensor signal to ECM during cranking (1 trip detection logic)	• Open or short in VVT sensor for exhaust camshaft circuit • VVT sensor for exhaust camshaft • Exhaust camshaft • Jumped tooth of timing chain • ECM
P0367 P0392	Output voltage of VVT sensor is 0.3 V or less for 5 seconds (1 trip detection logic)	• Open or short in VVT sensor for exhaust camshaft circuit • VVT sensor for exhaust camshaft • Exhaust camshaft • Jumped tooth of timing chain • ECM
P0368 P0393	Output voltage of VVT sensor is 4.7 V or more for 5 seconds (1 trip detection logic)	• Open or short in VVT sensor for exhaust camshaft circuit • VVT sensor for exhaust camshaft • Exhaust camshaft • Jumped tooth of timing chain • ECM

MONITOR DESCRIPTION

If no signal is transmitted by the VVT (for exhaust camshaft) sensor despite the engine revolving, or the rotations of the exhaust camshaft and the crankshaft are not synchronized, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0365: Exhaust camshaft sensor (Bank 1) range check / rationality (while starting engine) P0365: Exhaust camshaft sensor (Bank 1) range check / rationality (after starting engine) P0365: Exhaust camshaft sensor (Bank 1) range check (chattering) P0367: Exhaust camshaft sensor (Bank 1) range check (low voltage) P0368: Exhaust camshaft sensor (Bank 1) range check (high voltage) P0390: Exhaust camshaft sensor (Bank 2) range check / rationality (while starting engine) P0390: Exhaust camshaft sensor (Bank 2) range check / rationality (after starting engine) P0390: Exhaust camshaft sensor (Bank 2) range check (chattering) P0392: Exhaust camshaft sensor (Bank 2) range check (low voltage) P0393: Exhaust camshaft sensor (Bank 2) range check (high voltage)
Required Sensors / Components (Main)	Exhaust camshaft sensor (Bank 1 and 2)
Required Sensors / Components (Related)	Exhaust camshaft sensor
Frequency of Operation	Continuous
Duration	5 seconds: Exhaust camshaft sensor range check / rationality (After starting engine) 4 seconds: Others
MIL Operation	2 driving cycles: Exhaust camshaft sensor range check / rationality (After starting engine) Immediate: Others
Sequence of Operation	None

ES

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	None

Exhaust Camshaft Sensor Range Check / Rationality (While starting engine):

Starter	ON
Battery voltage while starter is ON at least once	Less than 11 V

Exhaust Camshaft Sensor Range Check / Rationality (After starting engine):

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

Exhaust Camshaft Sensor Range Check (Chattering, Low voltage, High voltage):

Starter	OFF
Ignition Switch ON and time after ignition switch is OFF to ON	2 seconds or more
Battery voltage	8 V or more

TYPICAL MALFUNCTION THRESHOLDS

Exhaust Camshaft Sensor Range Check / Rationality (While starting engine):

Exhaust camshaft sensor signal	No signal

Exhaust Camshaft Sensor Range Check / Rationality (After starting engine):

Exhaust camshaft sensor signal	No signal

Exhaust Camshaft Sensor Range Check (Chattering):

Exhaust camshaft sensor signal	Less than 0.3 V, or more than 4.7 V

Exhaust Camshaft Sensor Range Check (Low voltage):

Exhaust camshaft sensor signal	Less than 0.3 V

Exhaust Camshaft Sensor Range Check (High voltage):

Exhaust camshaft sensor signal	More than 4.7 V

WIRING DIAGRAM

Refer to DTC P0335 (See page ES-222).

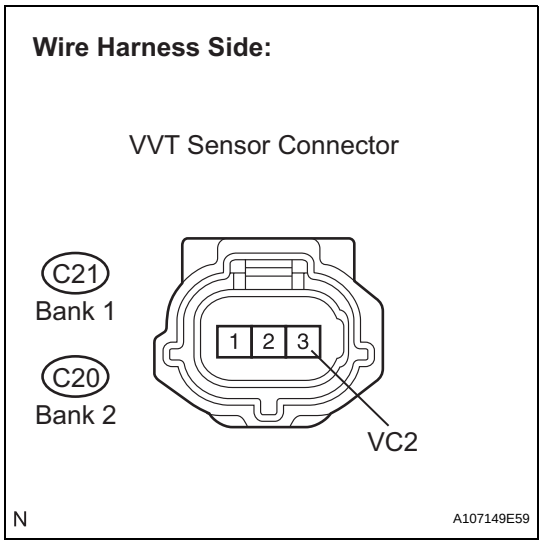
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. 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

1	CHECK VVT SENSOR FOR EXHAUST CAMSHAFT (SENSOR POWER SOURCE)



(a) Disconnect the C21 or C20 VVT sensor connector.
(b) Measure the voltage according to the value(s) in the table below.

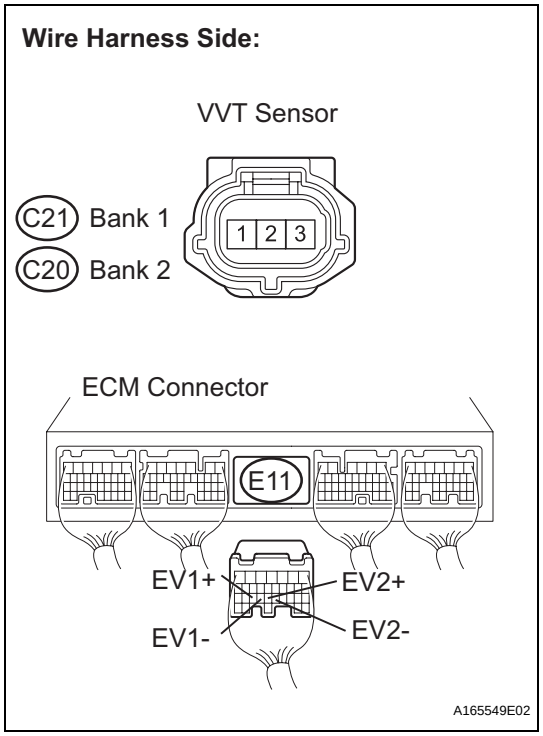
Standard voltage

Tester Connection	Specified Condition
VC2 (C20-3) - Body ground	4.5 to 5.0 V
VC2 (C21-3) - Body ground	4.5 to 5.0 V

NG → **Go to step 7**

OK

2 CHECK HARNESS AND CONNECTOR (VVT SENSOR - ECM)



(a) Disconnect the C21 or C20 VVT sensor for exhaust camshaft connector.
(b) Disconnect the E11 ECM connector.
(c) Measure the resistance between the wire harness side connectors.

Standard resistance:

Check for open

Tester Connection	Specified Condition
EX+ (C21-1) - EV1+ (E11-25)	Below 1 Ω
EX- (C21-2) - EV1- (E11-24)	Below 1 Ω
EX+ (C20-1) - EV2+ (E11-23)	Below 1 Ω
EX- (C20-2) - EV2- (E11-22)	Below 1 Ω

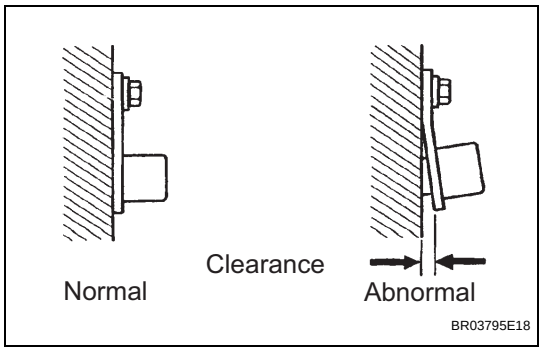
Check for short

Tester Connection	Specified Condition
EX+ (C21-1) - EV1+ (E11-25) - Body ground	10 kΩ or higher
EX- (C21-2) - EV1- (E11-24) - Body ground	10 kΩ or higher
EX+ (C20-1) - EV2+ (E11-23) - Body ground	10 kΩ or higher
EX- (C20-2) - EV2- (E11-22) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (VVT SENSOR - ECM)**

OK

3 CHECK VVT SENSOR FOR EXHAUST CAMSHAFT (SENSOR INSTALLATION)



(a) Check the VVT sensor installation.

OK:

Sensor is installed correctly.

NG → **REPAIR OR REPLACE VVT SENSOR**

OK

4 CHECK EXHAUST CAMSHAFT

(a) Check the teeth of the camshaft.

NG → **REPLACE EXHAUST CAMSHAFT**

OK

5	REPLACE VVT SENSOR (FOR EXHAUST CAMSHAFT)

(a) Replace the VVT sensor (See page ES-509).

NEXT

6	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the intelligent tester on.
(d) Clear the DTCs.
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC / INFO / PENDING CODES.
(f) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P0365, P0352, P0353, P0354, P0355 or P0356	B

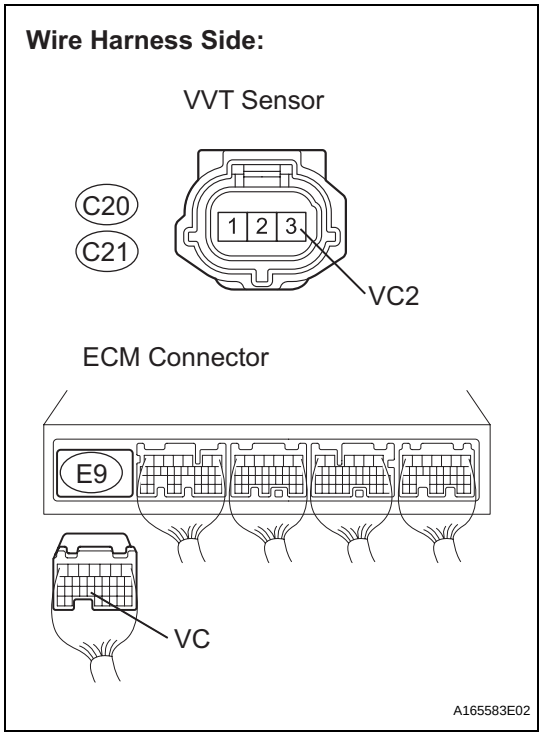
HINT:
If the engine does not start, replace the ECM.

B → REPLACE ECM (See page ES-498)

A

END

7	CHECK HARNESS AND CONNECTOR (VVT SENSOR - ECM)



(a) Disconnect the C18 or C19 VVT sensor connector.
(b) Disconnect the E9 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance :

Check for open

Tester Connection	Specified Condition
VC2 (C20-3) - VC (E9-23)	Below 1 Ω
VC2 (C21-3) - VC (E9-23)	Below 1 Ω

Check for short

Tester Connection	Specified Condition
VC2 (C20-3) or VC (E9-23) - Body ground	10 kΩ or higher
VC2 (C21-3) or VC (E9-23) - Body ground	10 kΩ or higher

(d) Reconnect the VVT sensor connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (VVT SENSOR - ECM)**

OK

REPLACE ECM (See page ES-498)

ES