

<b>Last Modified:</b> 7-13-2007		1.6 C
<b>Service Category:</b> Engine/Hybrid System		<b>Section:</b> Engine Control
<b>Model Year:</b> 2008	<b>Model:</b> ES350	<b>Doc ID:</b> RM000000YTB026X
<b>Title:</b> 2GR-FE ENGINE CONTROL SYSTEM: SFI SYSTEM: P0365: Camshaft Position Sensor "B" Circuit (Bank 1) (2008 ES350)		

<b>DTC</b>	<b>P0365</b>	<b>Camshaft Position Sensor "B" Circuit (Bank 1)</b>
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<b>DTC</b>	<b>P0367</b>	<b>Camshaft Position Sensor "B" Circuit Low Input (Bank 1)</b>
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<b>DTC</b>	<b>P0368</b>	<b>Camshaft Position Sensor "B" Circuit High Input (Bank 1)</b>
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<b>DTC</b>	<b>P0390</b>	<b>Camshaft Position Sensor "B" Circuit (Bank 2)</b>
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<b>DTC</b>	<b>P0392</b>	<b>Camshaft Position Sensor "B" Circuit Low Input (Bank 2)</b>
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<b>DTC</b>	<b>P0393</b>	<b>Camshaft Position Sensor "B" Circuit High Input (Bank 2)</b>
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## DESCRIPTION

The exhaust camshaft's Variable Valve Timing (VVT) sensor consists of a magnet and MRE (Magnet Resistance Element).

The exhaust camshaft has a sensor plate with 3 teeth on its outer circumference.

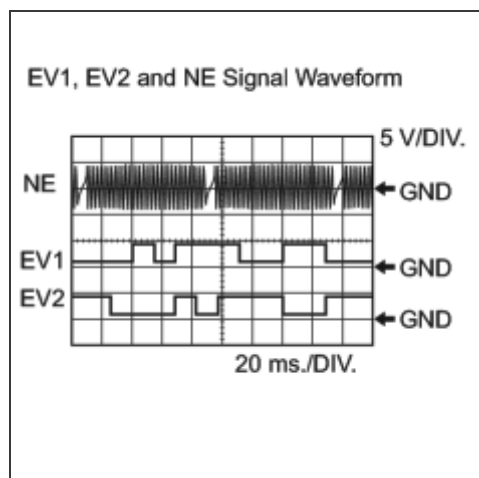
When the exhaust camshaft rotates, changes occur in the air gaps between the 3 teeth and MRE, which affects the magnet. As a result, the resistance of the MRE material fluctuates. The VVT sensor converts the exhaust camshaft rotation data to pulse signals, uses the pulse signals to determine the camshaft angle, and sends it to the ECM.

DTC NO.	DTC DETECTION CONDITION	TROUBLE AREA
P0365 P0390	<ul style="list-style-type: none"> <li>Input voltage to ECM remains 0.3 V or less, or 4.7 V or higher for more than 4 seconds, when 2 or more seconds have elapsed after turning engine switch on (IG) (1 trip detection logic)</li> <li>No VVT sensor signal to ECM during cranking (1 trip detection logic)</li> </ul>	<ul style="list-style-type: none"> <li>Open or short in VVT sensor for exhaust camshaft circuit</li> <li>VVT sensor for exhaust camshaft</li> <li>Exhaust camshaft</li> <li>Jumped tooth of timing chain</li> <li>ECM</li> </ul>
P0367 P0392	Output voltage of VVT sensor is 0.3 V or less for 4 seconds (1 trip detection logic)	<ul style="list-style-type: none"> <li>Open or short in VVT sensor for exhaust camshaft circuit</li> <li>VVT sensor for exhaust camshaft</li> <li>Exhaust camshaft</li> <li>Jumped tooth of timing chain</li> <li>ECM</li> </ul>

P0368 Output voltage of VVT sensor is 4.7 V or more for 4 seconds  
 P0393 (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

Reference: Inspection using an oscilloscope



#### HINT:

- The correct waveform is as shown.
- EV1+ and EV2+ stand for the VVT sensor signal, and NE+ stands for the CKP sensor signal.

ITEM	CONTENT
Terminal	NE+ - NE- EV1+ - EV1- EV2+ - EV2-
Equipment Setting	5 V/DIV. 20 ms./DIV.
Condition	Cranking or idling

## MONITOR DESCRIPTION

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

## MONITOR STRATEGY

Related DTCs

P0365: VVT sensor (Bank 1) open/short  
 P0365: VVT position/Crankshaft position misalignment (Bank 1)  
 P0367: VVT position sensor (Bank 1) range check (low voltage)  
 P0368: VVT position sensor (Bank 1) range check (high voltage)  
 P0390: VVT sensor (Bank 2) open/short

	P0390: VVT position/Crankshaft position misalignment (Bank 2) P0392: VVT position sensor (Bank 2) range check (low voltage) P0393: VVT position sensor (Bank 2) range check (high voltage)
Required Sensors/Components (Main)	VVT position sensor (Bank 1 and 2)
Required Sensors/Components (Sub)	Crankshaft position sensor
Frequency of Operation	Continuous
Duration	5 seconds
MIL Operation	2 driving cycles: P0365, P0390 (cranking) Immediate: Others
Sequence of Operation	None

## **TYPICAL ENABLING CONDITIONS**

### **All:**

Monitor runs whenever following DTCs are not present	None
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### **Chattering, Low voltage, High voltage:**

Starter	OFF
Engine switch	ON
Time after turning engine switch off to on (IG)	2 seconds or more
Battery voltage	8 V or more

### **P0365, P0390 (Engine running):**

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

### **P0365, P0390 (Cranking):**

Starter	ON
Minimum battery voltage	Less than 11 V

## **TYPICAL MALFUNCTION THRESHOLDS**

### **P0365, P0390 (Chattering):**

Exhaust camshaft position sensor voltage	Less than 0.3 V, or more than 4.7 V
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### **P0367, P0392 (Low voltage):**

Exhaust camshaft position sensor voltage	Less than 0.3 V
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### **P0368, P0393 (High voltage):**

Exhaust camshaft position sensor voltage

More than 4.7 V

**P0365, P0390 (Engine running, Cranking):**

Exhaust camshaft position signal


No signal

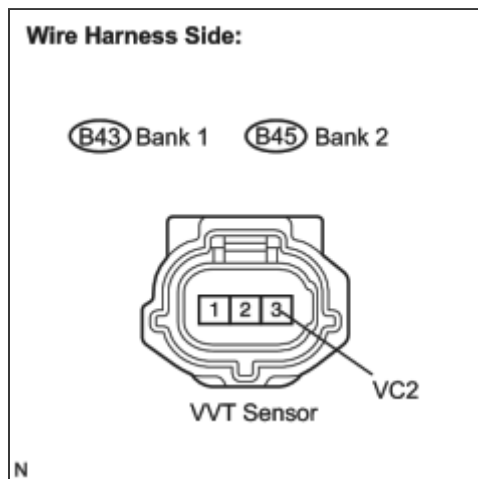
**COMPONENT OPERATING RANGE**

VVT sensor voltage

0.3 to 4.7 V

**WIRING DIAGRAM**Refer to DTC P0335  .**INSPECTION PROCEDURE**

Read freeze frame data using Techstream. 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  .

**PROCEDURE****1. CHECK HARNESS AND CONNECTOR (SENSOR POWER SOURCE)**

(a) Disconnect the B43 or B45 VVT sensor connector.

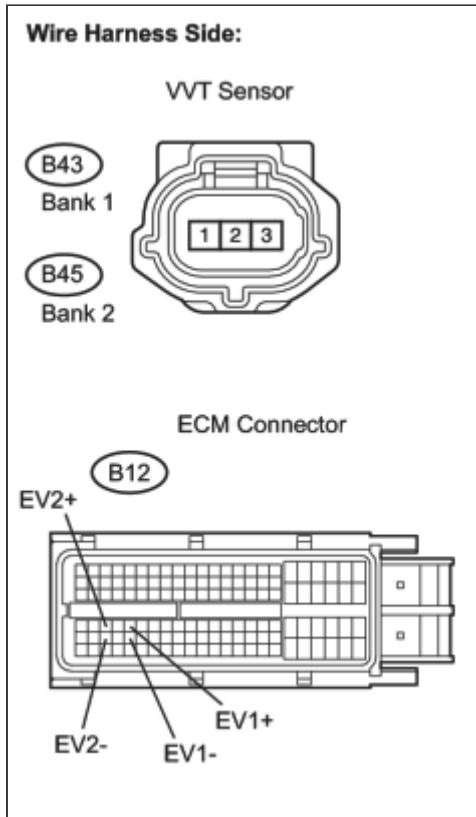
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage:

TESTER CONNECTION	SPECIFIED CONDITION
VC2 (B43-3) - Body ground	4.5 to 5.0 V
VC2 (B45-3) - Body ground	4.5 to 5.0 V

(c) Reconnect the VVT sensor connector.

**OK**

**2. CHECK HARNESS AND CONNECTOR (VVT SENSOR - ECM)**


(a) Disconnect the B43 or B45 VVT sensor connector.

(b) Disconnect the B12 ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open):

TESTER CONNECTION	SPECIFIED CONDITION
EX+ (B43-1) - EV1+ (B12-68)	Below 1 $\Omega$
EX- (B43-2) - EV1- (B12-91)	Below 1 $\Omega$
EX+ (B45-1) - EV2+ (B12-66)	Below 1 $\Omega$
EX- (B45-2) - EV2- (B12-89)	Below 1 $\Omega$

Standard resistance (Check for short):

TESTER CONNECTION	SPECIFIED CONDITION
EX+ (B43-1) or EV1+ (B12-68) - Body ground	10 k $\Omega$ or higher
EX- (B43-2) or EV1- (B12-91) - Body ground	10 k $\Omega$ or higher

EX+ (B45-1) or EV2+ (B12-66) - Body ground	10 kΩ or higher
EX- (B45-2) or EV2- (B12-89) - Body ground	10 kΩ or higher

(d) Reconnect the VVT sensor connector.

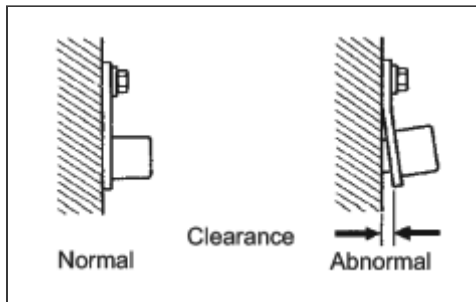
(e) Reconnect the ECM connector.

**NG** ► REPAIR OR REPLACE HARNESS OR CONNECTOR

**OK**



**3. CHECK VVT SENSOR FOR EXHAUST CAMSHAFT (SENSOR INSTALLATION)**



(a) Check the VVT sensor installation condition.

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**

**NEXT**



**6. CHECK WHETHER DTC OUTPUT RECURS**

(a) Connect Techstream to the DLC3.

(b) Turn the engine switch on (IG).

(c) Turn Techstream on.

(d) Clear the DTCs  .

(e) Select the following menu items: Powertrain / Engine / Trouble Code / Pending.

(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

**A** ► END

