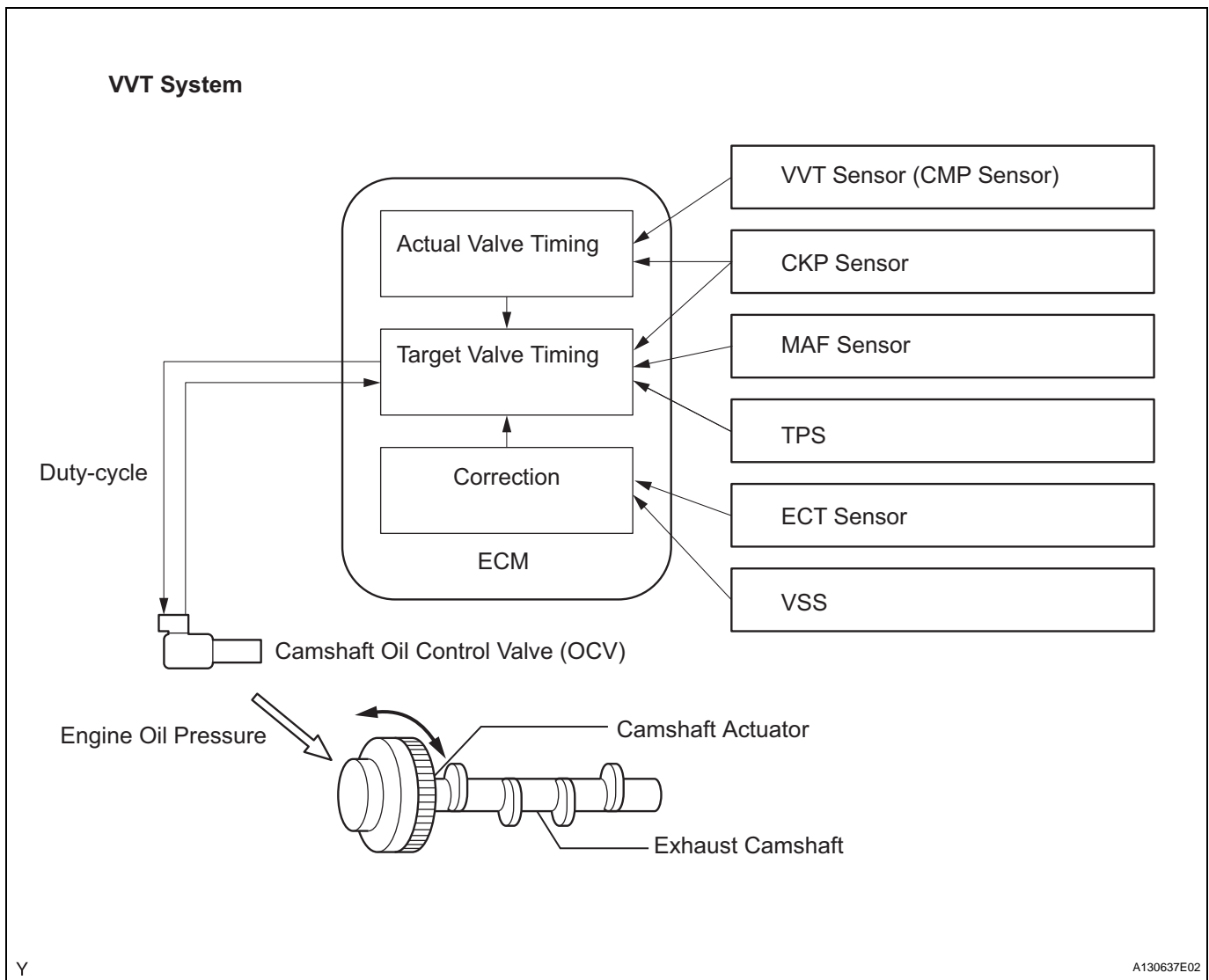


<b>DTC</b>	<b>P0013</b>	<b>Camshaft Position "B" Actuator Circuit / Open (Bank 1)</b>
<b>DTC</b>	<b>P0023</b>	<b>Camshaft Position "B" Actuator Circuit / Open (Bank 2)</b>

## DESCRIPTION

- This DTC is designed to detect opens or shorts in the camshaft oil control valve (OCV) circuit. If the OCV's duty-cycle is excessively high or low while the engine is running, the ECM will illuminate the MIL and set the DTC.
- The VVT (variable valve timing) system adjusts the intake valve timing to improve the driveability. The engine oil pressure turns the camshaft actuator to adjust the valve timing. The OCV is a solenoid valve and switches the engine oil line. The valve moves when the ECM applies the 12 volts to the solenoid. The ECM changes the energizing time to the solenoid (duty-cycle) in accordance with the camshaft position, crankshaft position, throttle position, etc.

ES



DTC No.	DTC Detection Condition	Trouble Area
P0013	Open or short in OCV for exhaust camshaft (bank 1) circuit (1 trip detection logic)	<ul style="list-style-type: none"> <li>Open or short in OCV for exhaust camshaft (bank 1) circuit</li> <li>OCV for exhaust camshaft (bank 1)</li> <li>ECM</li> </ul>
P0023	Open or short in OCV for exhaust camshaft (bank 2) circuit (1 trip detection logic)	<ul style="list-style-type: none"> <li>Open or short in OCV for exhaust camshaft (bank 2) circuit</li> <li>OCV for exhaust camshaft (bank 2)</li> <li>ECM</li> </ul>

## MONITOR DESCRIPTION

This DTC is designed to detect opens or shorts in the camshaft oil control valve (OCV) circuit. If the OCV's duty-cycle is excessively high or low while the engine is running, the ECM will illuminate the MIL and set the DTC.

ES

## MONITOR STRATEGY

Related DTCs	P0013: Exhaust camshaft OCV (bank 1) P0023: Exhaust camshaft OCV (bank 2)
Required sensors / components (Main)	Exhaust camshaft OCV
Required sensors / components (Sub)	-
Frequency of operation	Continuous
Duration	1 second
MIL operation	Immediate
Sequence of operation	None

## TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs not present	None
All of following conditions met	-
Starter	OFF
Ignition switch	ON
Time after ignition switch OFF to ON	0.5 seconds or more

One of following conditions met	-
A. All of following conditions met	-
Battery voltage	11 to 13 V
Target duty ratio	Less than 70%
Output signal duty ratio	100%
B. All of following conditions met	-
Battery voltage	13 V or more
Target duty ratio	Less than 80%
Output signal duty ratio	100%

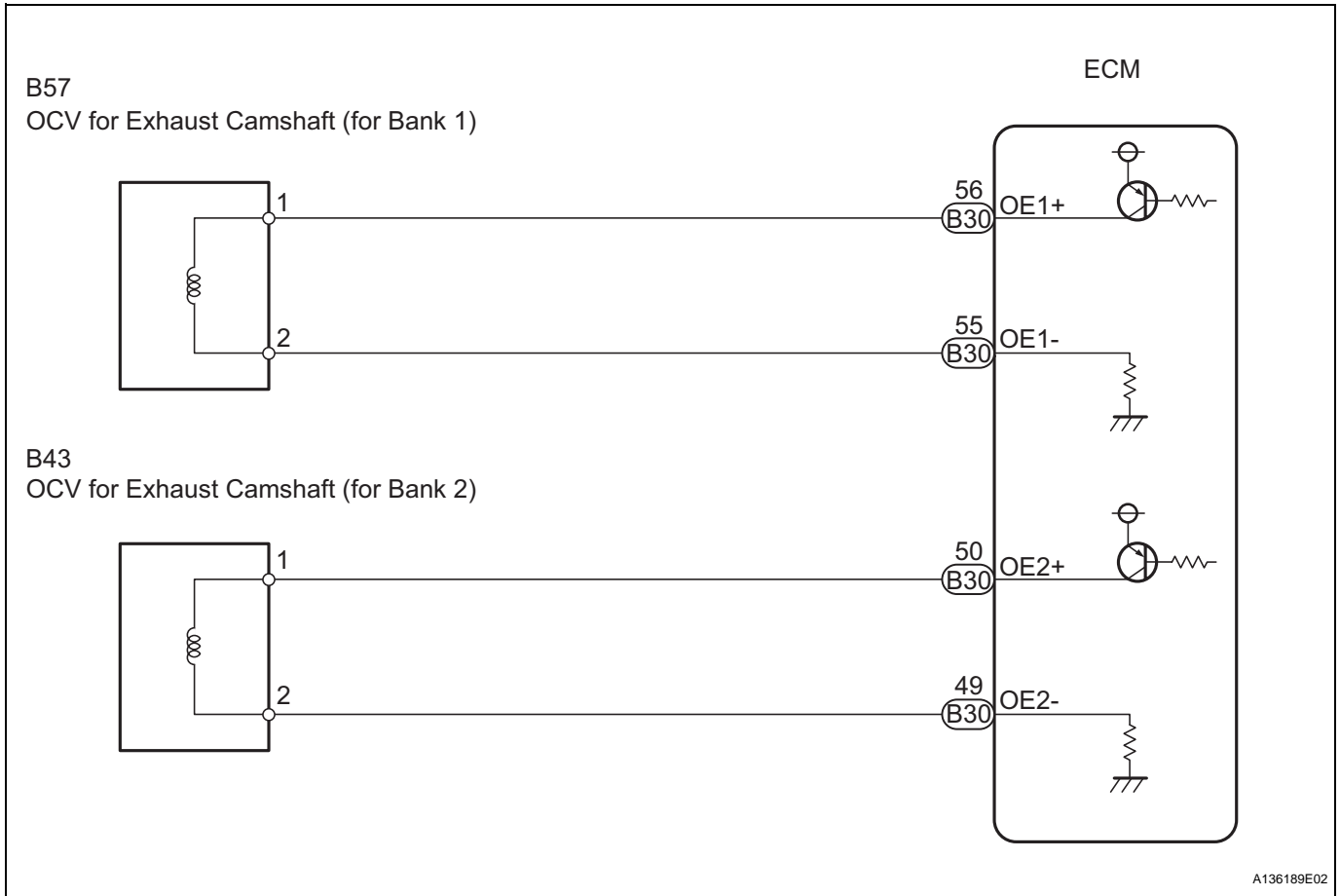
## TYPICAL MALFUNCTION THRESHOLDS

Exhaust VVT oil control valve condition	No operation record
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## COMPONENT OPERATING RANGE

OCV duty-cycle	4 to 100% when engine running
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## WIRING DIAGRAM


**ES**

## INSPECTION PROCEDURE

### HINT:

- If DTC P0013 is displayed, check the bank 1 VVT system for exhaust camshaft circuit.
- Bank 1 refers to the bank that includes No. 1 cylinder.
- If DTC P0023 is displayed, check the bank 2 VVT system for exhaust camshaft circuit.
- Bank 2 refers to the bank that does not include No. 1 cylinder.
- 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 (See page [ES-40](#)).

**1**

### CHECK DTC (DTC P0013 OR P0023)

- Connect the intelligent tester to the DLC3.
- Clear DTC after recording the freeze frame data and DTC.
- Turn the ignition switch OFF.
- Allow the engine to idle and check DTC.
- Check that P0013 or P0023 is present.

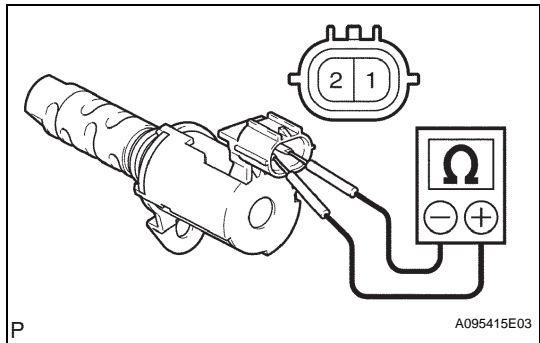
#### OK:

**P0013 or P0023 is present**

**NG**
**CHECK FOR INTERMITTENT PROBLEMS**

OK

2 INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

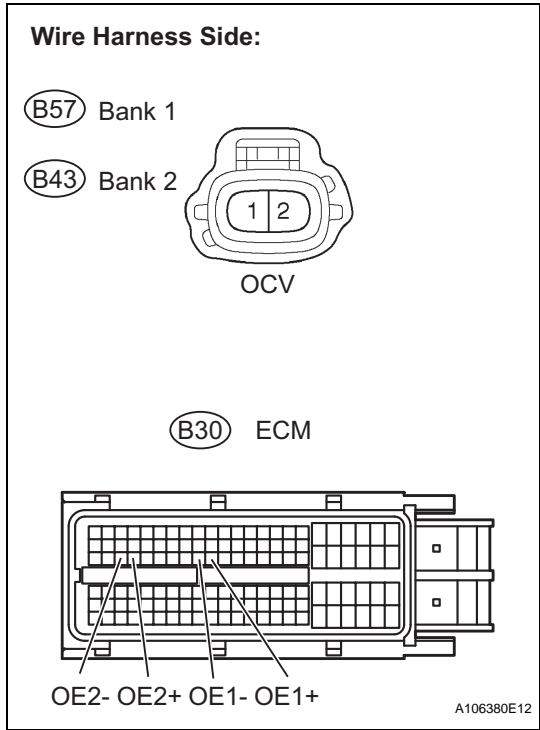


- (a) Disconnect the B43 or B57 OCV connector.
- (b) Remove the OCV.
- (c) Measure the resistance between the terminals of the OCV.  
**Standard resistance:**  
**6.9 to 7.9  $\Omega$  at 20°C (68°F)**
- (d) Reconnect the OCV connector.

NG REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

OK

3 CHECK WIRE HARNESS (OCV - ECM)



- (a) Disconnect the B43 or B57 OCV connector.
- (b) Disconnect the B30 ECM connector.
- (c) Measure the resistance.  
**Standard resistance**

Tester Connection	Specified Condition
B57-1 - B30-56 (OE1+)	Below 1 $\Omega$
B57-2 - B30-55 (OE1-)	Below 1 $\Omega$
B43-1 - B30-50 (OE2+)	Below 1 $\Omega$
E43-2 - B30-49 (OE2-)	Below 1 $\Omega$
B57-1 or B30-56 (OE1+) - Body ground	10 k $\Omega$ or higher
B57-2 or B30-55 (OE1-) - Body ground	10 k $\Omega$ or higher
B43-1 or B30-50 (OE2+) - Body ground	10 k $\Omega$ or higher
E43-2 or B30-49 (OE2-) - Body ground	10 k $\Omega$ or higher

- (d) Reconnect the OCV connector.
- (e) Reconnect the ECM connector.

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE ECM