

<b>DTC</b>	<b>P0011</b>	<b>CAMSHAFT POSITION "A" –TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1)</b>
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<b>DTC</b>	<b>P0012</b>	<b>CAMSHAFT POSITION "A" –TIMING OVER-RETARDED (BANK 1)</b>
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## CIRCUIT DESCRIPTION

Refer to DTC P0010 on page [05-44](#).

DTC No.	DTC Detection Condition	Trouble Area
P0011	Condition (a) or (b) continues after engine is warmed up and engine speed at 550 to 4,000 rpm (Problem of the advanced OCV): (a) Valve timing does not change from current valve timing (b) Current valve timing is fixed	<ul style="list-style-type: none"> <li>• Valve timing</li> <li>• Oil control valve</li> <li>• Camshaft timing gear assy</li> <li>• ECM</li> </ul>
P0012	Condition (a) or (b) continues after engine is warmed up and engine speed at 550 to 4,000 rpm (Problem of the retarded OCV): (a) Valve timing does not change from current valve timing (b) Current valve timing is fixed	

## MONITOR DESCRIPTION

The ECM optimizes the valve timing using the Variable Valve Timing (VVT) system to control the intake valve camshaft. The VVT system includes the ECM, the Oil Control Valve (OCV) and the VVT controller. The ECM sends a target "duty-cycle" control signal to the OCV. This control signal, applied to the OCV, regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake valve camshaft.

Example:

When a difference between the targeted and actual valve timing is more than 5° camshaft angle "CA" and this condition continues for more than 4.5 sec, and if the OCV is forcibly activated 63 times or more.

Advanced cam DTCs are subject to "1 trip" detection logic.

Retarded cam DTCs are subject to "2 trip" detection logic.

## MONITOR STRATEGY

Related DTCs	P0011	VVT system advance (bank 1)
	P0012	VVT system retard (bank 1)
Required sensors/components	Main sensors	Camshaft position sensor
	Related sensors	Engine coolant temperature sensor, crankshaft position sensor
Frequency of operation	Once per drive cycles	
Duration	10 sec	
MIL operation	P0011: Immediately P0012: 2 driving cycles	
Sequence of operation	None	

## TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of Disable a Monitor" (On page 05-25)	
Battery voltage	11 V	–
Engine speed	550 rpm	4,000 rpm
Engine coolant temperature	75°C (167°F)	100°C (212°F)

## TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Duration time of the following conditions (a) and (b) are met:	4.5 seconds or more
(a) Following conditions are met:	1 and 2
1. VVT control status	Feedback
2. Deviation of valve timing (Difference between targeted and actual valve timing)	More than 5°CA
(b) Following conditions is met:	
Response of valve timing	1 sec/°CA or more

## WIRING DIAGRAM

Refer to DTC P0010 on page 05-44.

## INSPECTION PROCEDURE

HINT:

Advanced timing over (Valve timing is out of specified range)	P0011
Retarded timing over (Valve timing is out of specified range)	P0012

- If DTC P0011 or P0012 is displayed, check the VVT system circuit.
- 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, 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.

**Hand-held tester:**

1	<b>CHECK VALVE TIMING(CHECK FOR LOOSE AND JUMPED TOOTH OF TIMING CHAIN) (See page 14-82)</b>
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NG

**ADJUST VALVE TIMING (See page 14-82)**

OK

<b>2</b>	<b>PERFORM ACTIVE TEST BY HAND-HELD TESTER(OPERATE OCV)</b>
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- (a) Connect the hand-held tester to the DLC3.
- (b) Start the engine and warm it up.
- (c) Turn the ignition switch ON and push the hand-held tester main switch ON.
- (d) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1".
- (e) Check the engine speed when operating the OCV by the hand-held tester.

**Standard:**

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

<b>NG</b>
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<b>Go to step 4</b>
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<b>OK</b>
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<b>3</b>	<b>CHECK IF DTC OUTPUTS REOCCUR</b>
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- (a) Clear the DTCs.
  - (1) Operate the hand-held tester to erase the codes, or disconnect the battery terminal or remove the EFI fuse for more than 60 seconds.
- (b) Start and warm up the engine.
- (c) Drive the vehicle around for 10 minutes or more.
- (d) Read output DTCs using the hand-held tester.

**Standard: No DTC output.****HINT:**

\*: DTC P0011 or P0012 is output when a foreign object in engine oil is caught in some part of the system. These codes will stay registered even if the system returns to normal after a short time. These foreign objects are then captured by the oil filter, thus eliminating the source of the problem.

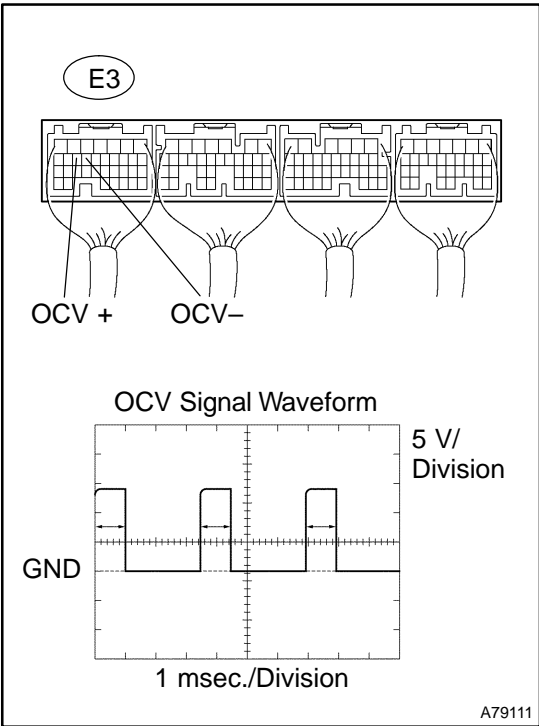
- (e) Reconnect the battery terminal or install the EFI fuse.

<b>OK</b>
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<b>VVT SYSTEM OK *</b>
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<b>NG</b>
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**4 INSPECT ECM(OCV SIGNAL)**



- (a) Inspect using the oscilloscope.
- (b) During idling, check the waveform between the terminals of the E3 ECM connector.

**Standard:**

Tester Connection	Specified Condition
OCV+ (E3-15) - OCV- (E3-14)	Correct waveform is as shown

**NG** → REPLACE ECM (See page 10-11)

**OK**

**5 INSPECT OIL CONTROL VALVE FILTER**

**NG** → REPLACE OIL CONTROL VALVE FILTER

**OK**

**6 INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY(OCV)  
(See page 10-2)**

**OK** → Go to step 8

**NG**

**7 REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY(OCV)**

**GO**

**8 INSPECT CAMSHAFT TIMING GEAR ASSY (See page 14-96)**

**OK** → Go to step 10

**NG**

9	<b>REPLACE CAMSHAFT TIMING GEAR ASSY</b>
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GO

10	<b>CHECK FOR BLOCKAGE(OCV, OIL CHECK VALVE AND OIL HOLE)</b>
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NG

<b>REPAIR OR REPLACE</b>
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OK

11	<b>CHECK IF DTC OUTPUTS REOCCUR</b>
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- (a) Clear the DTCs.
- (1) Operate the hand-held tester to erase the codes, or disconnect the battery terminal or remove the EFI fuse for more than 60 seconds.
- (b) Start and warm up the engine.
- (c) Drive the vehicle around for 10 minutes or more.
- (d) Read output DTC using the hand-held tester.

**Standard: No DTC output.**

HINT:

\*: DTC P0011 or P0012 is output when a foreign object in engine oil is caught in some part of the system. These codes will stay registered even if the system returns to normal after a short time. These foreign objects are then captured by the oil filter, thus eliminating the source of the problem.

- (e) Reconnect the battery terminal or install the EFI fuse.

**OBDII scan tool (excluding hand-held tester):**

OK

<b>VVT SYSTEM OK *</b>
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NG

<b>REPLACE ECM (See page 10-11)</b>
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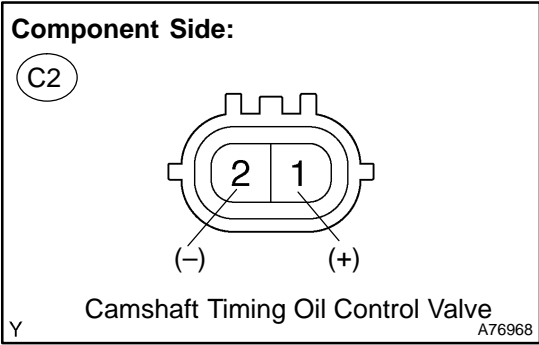
1	<b>CHECK VALVE TIMING(CHECK FOR LOOSE AND JUMPED TOOTH OF TIMING CHAIN) (See page 14-82)</b>
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NG

<b>ADJUST VALVE TIMING (See page 14-82)</b>
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OK

**2 | CHECK OPERATION OF OCV**



- (a) Start the engine.
- (b) Check the engine speed at (1) and (2).
  - (1) Disconnect the C2 camshaft timing oil control valve connector.
  - (2) Apply battery positive voltage between the terminals of the camshaft timing oil control valve.

**Result:**

Proceed to	Check (1)	Check (2)
A	Normal engine speed	Rough idle or engine stall
B	Conditions other than A	

- (3) Reconnect the camshaft timing oil control valve connector.

**B** → **Go to step 4**

**A**

**3 | CHECK IF DTC OUTPUTS REOCCUR(CHECK IF DTC OUTPUT RECURS)**

- (a) Clear the DTCs.
  - (1) Operating the OBD II scan tool to erase the codes, or disconnect the battery terminal or remove the EFI fuse for more than 60 seconds.
- (b) Start and warm up the engine.
- (c) Drive the vehicle around for 10 minutes or more.
- (d) Read output DTCs using the OBD II scan tool.

**Standard: No DTC output.**

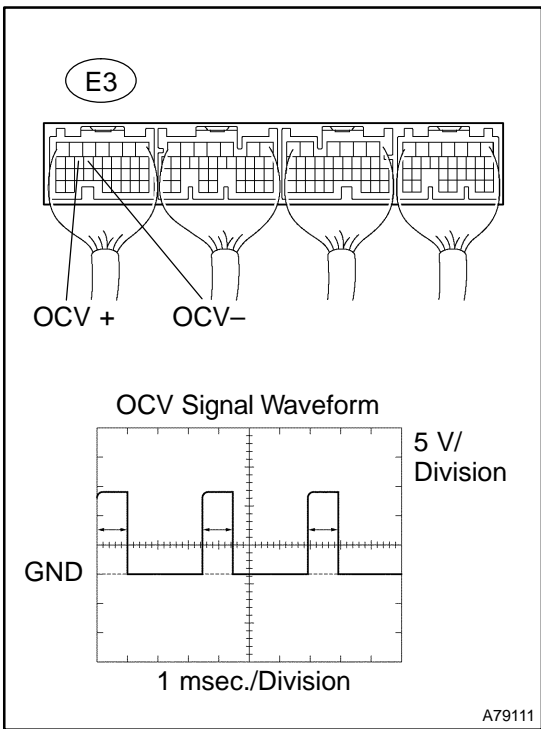
**HINT:**

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**OK** → **VVT SYSTEM OK \***

**NG**

**4 INSPECT ECM(OCV SIGNAL)**



- (a) Inspect using the oscilloscope.
- (b) During idling, check the waveform between the terminals of the E3 ECM connector.

**Standard:**

Tester Connection	Specified Condition
OCV+ (E3-15) - OCV- (E3-14)	Correct waveform is as shown

**NG** → REPLACE ECM (See page 10-11)

**OK**

**5 INSPECT OIL CONTROL VALVE FILTER**

**NG** → REPLACE OIL CONTROL VALVE FILTER

**OK**

**6 INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY(OCV)  
(See page 10-2)**

**OK** → Go to step 8

**NG**

**7 REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY(OCV)**

**GO**

**8 INSPECT CAMSHAFT TIMING GEAR ASSY (See page 14-96)**

**OK** → Go to step 10

**NG**

<b>9</b>	<b>REPLACE CAMSHAFT TIMING GEAR ASSY</b>
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**GO**

<b>10</b>	<b>CHECK FOR BLOCKAGE(OCV, OIL CHECK VALVE AND OIL HOLE)</b>
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<b>NG</b>	<b>REPAIR OR REPLACE</b>
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**OK**

<b>11</b>	<b>CHECK IF DTC OUTPUTS REOCCUR</b>
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- (a) Clear the DTCs.
- (1) Operate the OBD II scan tool to erase the codes, or disconnect the battery terminal or remove the EFI fuse for more than 60 seconds.
- (b) Start and warm up the engine.
- (c) Drive the vehicle around for 10 minutes or more.
- (d) Read output DTCs using the OBD II scan tool.

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HINT:

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- (e) Reconnect the battery terminal or install the EFI fuse.

<b>OK</b>	<b>VVT SYSTEM OK</b>
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**NG**

<b>REPLACE ECM (See page 10-11)</b>
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