DTC	P0011	CAMSHAFT POSITION "A" – TIMING OVER–ADVANCED OR SYSTEM PERFORMANCE (BANK 1)

DTC	P0012	CAMSHAFT POSITION "A" – TIMING OVER–RETARDED (BANK 1)

DTC	P0021	CAMSHAFT POSITION "A" – TIMING OVER–ADVANCED OR SYSTEM PERFORMANCE (BANK 2)

DTC	P0022	CAMSHAFT POSITION "A" – TIMING OVER–RETARDED (BANK2)

CIRCUIT DESCRIPTION

Refer to DTC P0010 on page 05–33.

DTC No.	DTC Detection Condition	Trouble Area
P0011 P0021	Condition (a) or (b) continues after engine is warmed up and engine speed at 500 to 4,000 rpm (Advanced cam timing): (a) Valve timing does not change from current valve timing (b) Current valve timing is fixed	• Valve timing • OCV • Camshaft timing gear assy • ECM
P0012 P0022	Condition (a) or (b) continues after engine is warmed up and engine speed at 500 to 4,000 rpm (Retarded cam timing): (a) Valve timing does not change from current valve timing (b) Current valve timing is fixed	• Valve timing • OCV • Camshaft timing gear assy • ECM

WIRING DIAGRAM

Refer to DTC P0010 on page 05–33.

INSPECTION PROCEDURE

HINT:

Abnormal bank	The problem of the advanced OCV	The problem of the retarded OCV
Bank 1	P0011	P0012
Bank 2	P0021	P0022

- Bank 1 refers to the bank that includes cylinder No. 1.
- Bank 2 refers to the bank that does not include cylinder No. 1.

1	CHECK VALVE TIMING (CHECK FOR LOOSE AND JUMPED TOOTH OF TIMING BELT) (See page 14–7)

OK: The matchmarks of crankshaft pulley and camshaft pulley are aligning.

NG → ADJUST VALVE TIMING (See page 14–7)

OK

2	PERFORM ACTIVE TEST BY HAND–HELD TESTER (OPERATE OCV)

(a) Connect the hand–held tester to the DLC3.
(b) Start the engine and warm it up.
(c) Turn the ignition switch ON. Push the hand–held tester main switch ON.
(d) Enter the following menus: DIAGNOSIS / OBD / MOBD / ACTIVE TEST / VVT CTRL B1 or VVT CTRL B2.
(e) Using the hand–held tester, operate the OCV and check the engine speed.
Standard:

Tester operation	Specified condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

NG → **Go to step 4**

OK

3	CHECK IF DTC OUTPUTS REOCCUR

(a) Clear the DTC.
(1) Erase the codes using one of the following methods: 1) use the hand held tester, 2) disconnect the battery cable, or 3) remove the EFI No. 1 and ETCS fuses 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.

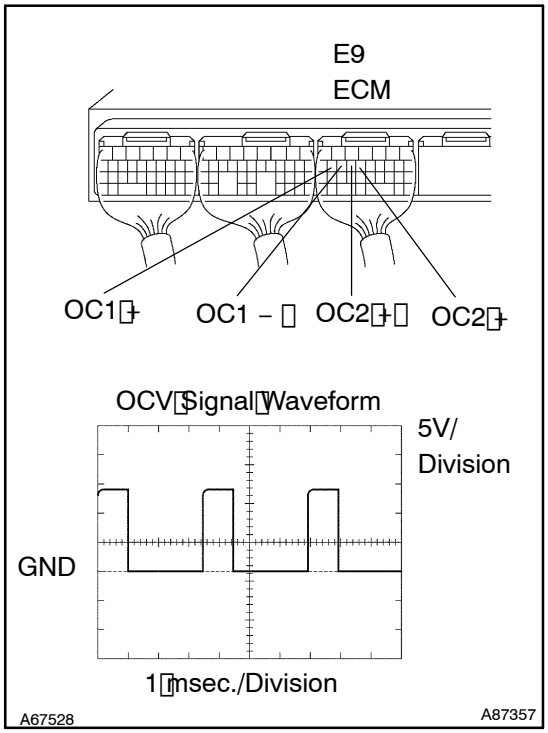
OK: No DTC output.

OK → **VVT SYSTEM OK**

HINT:
*: DTC P0011, P0012, P0021 or P0022 is output when a foreign object in the engine oil enters the system. These codes will stay registered even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

4	CHECK ECM (OCV SIGNAL)



(a) During idling, check the waveform of the ECM connector using the oscilloscope.

Standard:

Tester Connection	Specified Condition
E9–16 (OC1+) – E9–15 (OC1–) E9–14 (OC2+) – E9–13 (OC2–)	Correct waveform is as shown

NG → REPLACE ECM (See page 10–13)

OK

5	CHECK OIL CONTROL VALVE FILTER

OK: The filter is not clogged.

NG → REPLACE OIL CONTROL VALVE FILTER

OK

6	CHECK CAMSHAFT TIMING OIL CONTROL VALVE ASSY (OCV) (See page 10–2)

OK: OCV has no contamination and moves smoothly.

OK → Go to step 8

NG

7	REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY (OCV)

GO

8	CHECK CAMSHAFT TIMING GEAR ASSY (See page 14–66 or 14–56)

OK: Camshaft timing gear rotate smoothly when apply pressure.

OK	Go to step 10

NG

9	REPLACE CAMSHAFT TIMING GEAR ASSY

GO

10	CHECK FOR BLOCKAGE (OCV, OIL CHECK VALVE AND OIL HOLE)

OK: No blockage.

NG	REPAIR OR REPLACE

OK

11	CHECK IF DTC OUTPUTS REOCCUR

(a) Clear the DTC.
(1) Erase the codes using one of the following methods: 1) use the hand–held tester, 2) disconnect the battery cable, or 3) remove the EFI No. 1 and ETCS fuses for more than 60 seconds.

HINT:
After disconnecting the battery cable, perform the "INITIALIZE" procedure (see page 05–355).

(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.

OK: No DTC output.

OK	VVT SYSTEM OK*

HINT:
*: DTC P0011, P0012, P0021 or P0022 is output when a foreign object in the engine oil enters the system. These codes will stay registered even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

REPLACE ECM (See page 10–13)