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 05–232.

DTC No.	DTC Detection Condition	Trouble Area
P0011 P0021	Condition (a) or (b) continues after engine is warmed up and engine speed at 400 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	• Valve timing • OCV • Camshaft timing gear assy • ECM
P0012 P0022	Condition (a) or (b) continues after engine is warmed up and engine speed at 400 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	

WIRING DIAGRAM

Refer to DTC P0010 on page 05–232.

INSPECTION PROCEDURE

HINT:

Abnormal bank	Advanced timing over (Valve timing is out of specified range)	Retarded timing over (Valve timing is out of specified range)
Bank 1	P0011/59	P0012/59
Bank 2	P0021/59	P0022/59

- If DTC P0011, P0012 is displayed, check the right bank VVT system circuit.
- If DTC P0021, P0022 is displayed, check the left bank VVT system circuit.
- Read freeze frame data using the Intelligent Tester II. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK VALVE TIMING (See page 14–127)

NG → ADJUST VALVE TIMING (See page 14–127)

OK

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(OPERATE OCV)

(a) Start the engine and warm it up.
(b) Turn the engine switch OFF.
(c) Connect the Intelligent Tester II to the DLC3.
(d) Turn the ignition switch ON position and turn the Intelligent Tester ll ON.
(e) Select the following menu items: Powertrain / Engine and ECT / Active Test / VVT Control (Bank 1) (or VVT Control (Bank 2))
(f) Check the engine speed when operating the OCV using the Intelligent Tester II.
Standard:

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idling or engine stalling

NG → Go to step 4

OK

3	READ OUTPUT DTC(CHECK IF DTC OUTPUT RECURS)

(a) Clear the DTC.
(1) Operating the Intelligent Tester II to erase the codes, or disconnecting the battery terminal or the EFI and ETCS fuses more than 60 sec.
(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.

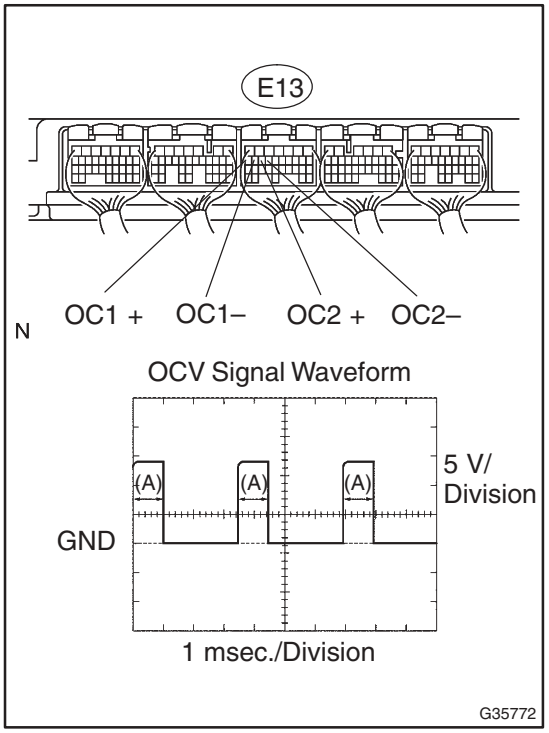
HINT:

*: DTCs P0011, P0012, P0021 or P0022 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.

OK → VVT SYSTEM OK *

NG

4	CHECK ECM(OCV SIGNAL)



(a) Inspection using the oscilloscope.
(b) During idling, check the waveform between the terminals of the E13 ECM connector.
Standard:

Symbols (Terminal No.)	Specified condition
OC1+ (E13–17) – OC1– (E13–16)	Waveform is as shown on the left
OC2+ (E13–15) – OC2– (E13–14)	Waveform is as shown on the left

HINT:
The waveform frequency (A) is lengthened as the engine speed becomes higher.

NG → **REPLACE ECM (See Pub. No. RM1017E, page 10–11)**

OK

5	CHECK OIL CONTROL VALVE FILTER

NG → **REPLACE OIL CONTROL VALVE FILTER**

OK

6	CHECK CAMSHAFT TIMING OIL CONTROL VALVE ASSY(OCV) (See Pub. No. RM1017E, page 10–3)

OK → **Go to step 8**

NG

7	REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY(OCV)

GO

8	CHECK CAMSHAFT TIMING GEAR ASSY (See page 14–141 or 14–158)

OK → **Go to step 10**

NG

9	REPLACE CAMSHAFT TIMING GEAR ASSY

GO

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

NG > REPAIR OR REPLACE

OK

11	READ OUTPUT DTC(CHECK IF DTC OUTPUT RECURS)

(a) Clear the DTC.
  (1) Operating the Intelligent Tester II to erase the codes, or disconnecting the battery terminal or the EFI and ETCS fuses more than 60 sec.
(b) Start and warm up the engine.
(c) Drive the vehicle around for 10 minutes or more.
(d) Read output DTC using the Intelligent Tester II.

Standard: No DTC output.

HINT:

*: DTCs P0011, P0012, P0021 or P0022 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.

OK > VVT SYSTEM OK *

NG

REPLACE ECM (See Pub. No. RM1017E, page 10–11)