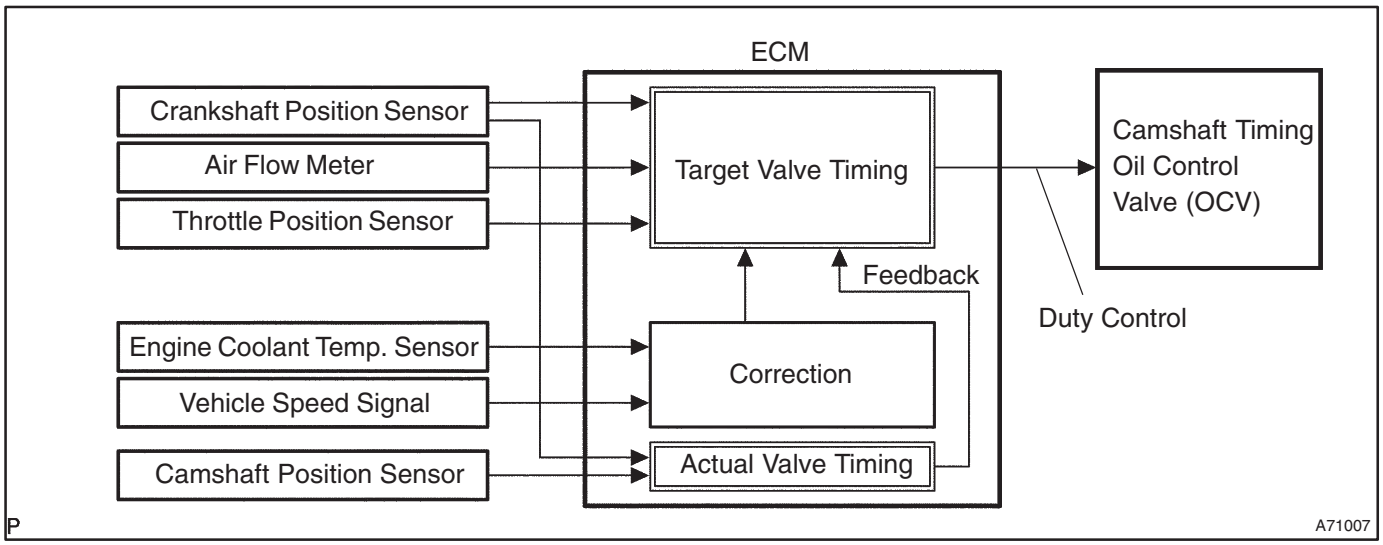
DTC	P0010	CAMSHAFT POSITION ”A” ACTUATOR CIRCUIT (BANK 1)

DTC	P0020	CAMSHAFT POSITION ”A” ACTUATOR CIRCUIT (BANK 2)

CIRCUIT DESCRIPTION

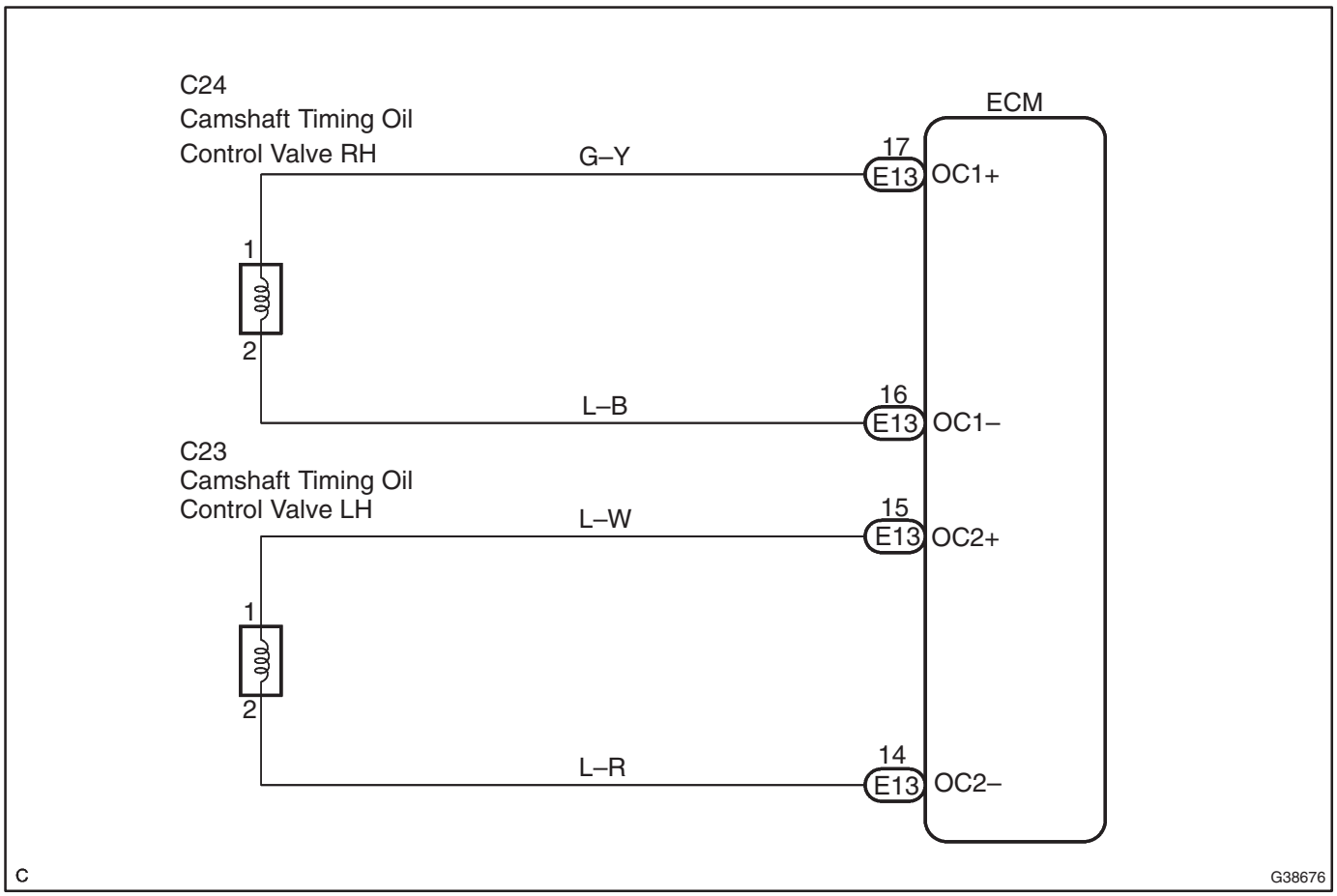
The variable valve timing (VVT) system controls the intake camshaft to provide the optimal valve timing for every driving condition. This control is performed based on the signals, such conditions as intake air volume, throttle position and engine coolant temperature.

The ECM controls the oil control valve (OCV), based on the signals output from the sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the OCV. As result, the relative position between the camshaft and the crankshaft becomes optimal, and the engine torque improves, fuel economy improves, exhaust emissions decrease under overall driving conditions. Also, the ECM detects the actual valve timing using the signals from the camshaft position sensor and the crankshaft position sensor, and performs feedback control. This is how target valve timing is achieved by the ECM.



DTC No.	DTC Detection Condition	Trouble Area
P0010 P0020	Open or short in OCV circuit	• Open or short in OCV circuit • OCV • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P0010 is displayed, check the right bank VVT system circuit.
- If DTC P0020 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	PERFORM ACTIVE TEST BY INTELLIGENT TESTER II(OPERATE OCV)

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

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

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–199)**

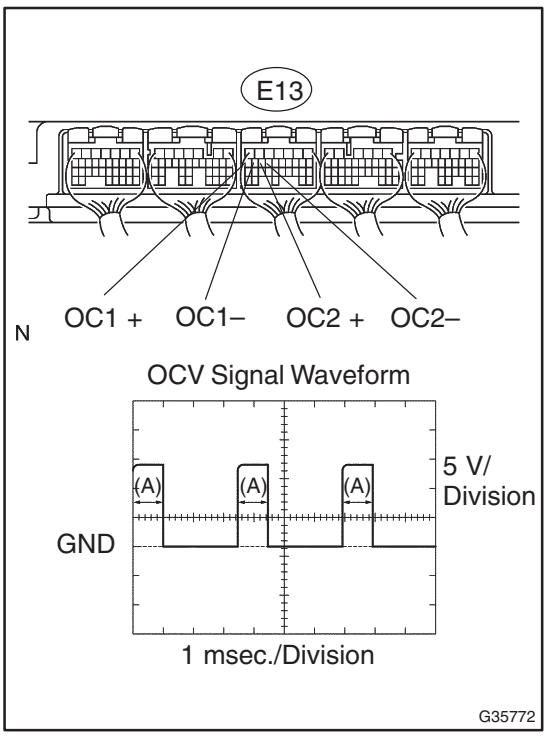
NG

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

NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY**

OK

3	CHECK ECM(OCV SIGNAL)



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

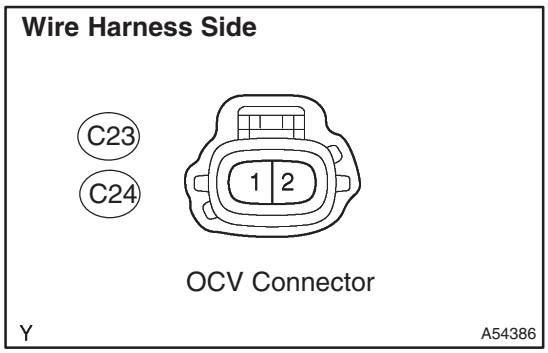
Symbols (Terminal No.)	Specified condition
OC1+ (E13–17) – OC1– (E13–16)	Waveform is as shown on the left
OC2+ (E13–15) – OC2– (E13–14)	Waveform is as shown on the left

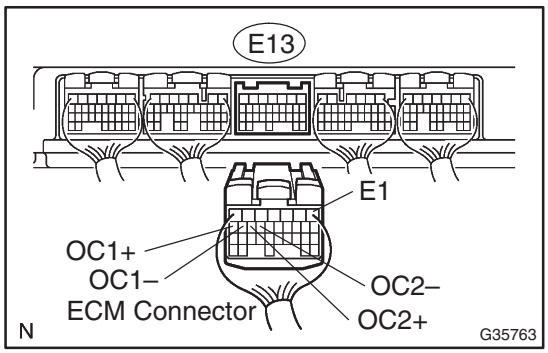
HINT:
The waveform frequency (A) is lengthened as the engine speed becomes higher.

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

OK

4	CHECK HARNESS AND CONNECTOR(CAMSHAFT TIMING OIL CONTROL VALVE (OCV) – ECM)





(a) Disconnect the C23 or C24 OCV connector.
(b) Disconnect the E13 ECM connector.
(c) Check for resistance between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
OCV (C24–1) – OC1+ (E13–17)	Below 1 Ω
OCV (C24–2) – OC1– (E13–16)	Below 1 Ω
OCV (C23–1) – OC2+ (E13–15)	Below 1 Ω
OCV (C23–2) – OC2– (E13–14)	Below 1 Ω

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
OCV (C24–1) or OC1+ (E13–17) – E1 (E13–1)	10 kΩ or higher
OCV (C24–1) or OC1– (E13–16) – E1 (E13–1)	10 kΩ or higher
OCV (C23–1) or OC2+ (E13–15) – E1 (E13–1)	10 kΩ or higher
OCV (C23–1) or OC2– (E13–14) – E1 (E13–1)	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK FOR INTERMITTENT PROBLEMS (See page 05–199)