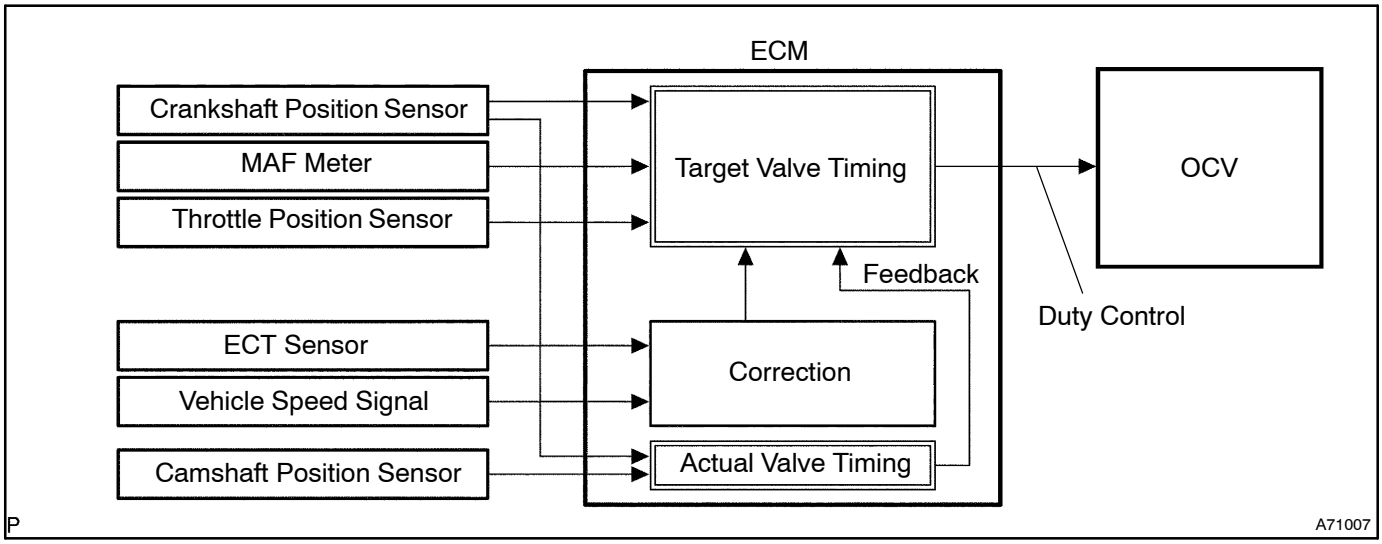
DTC	P0010	CAMSHAFT POSITION ”A” ACTUATOR CIRCUIT (BANK 1)

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

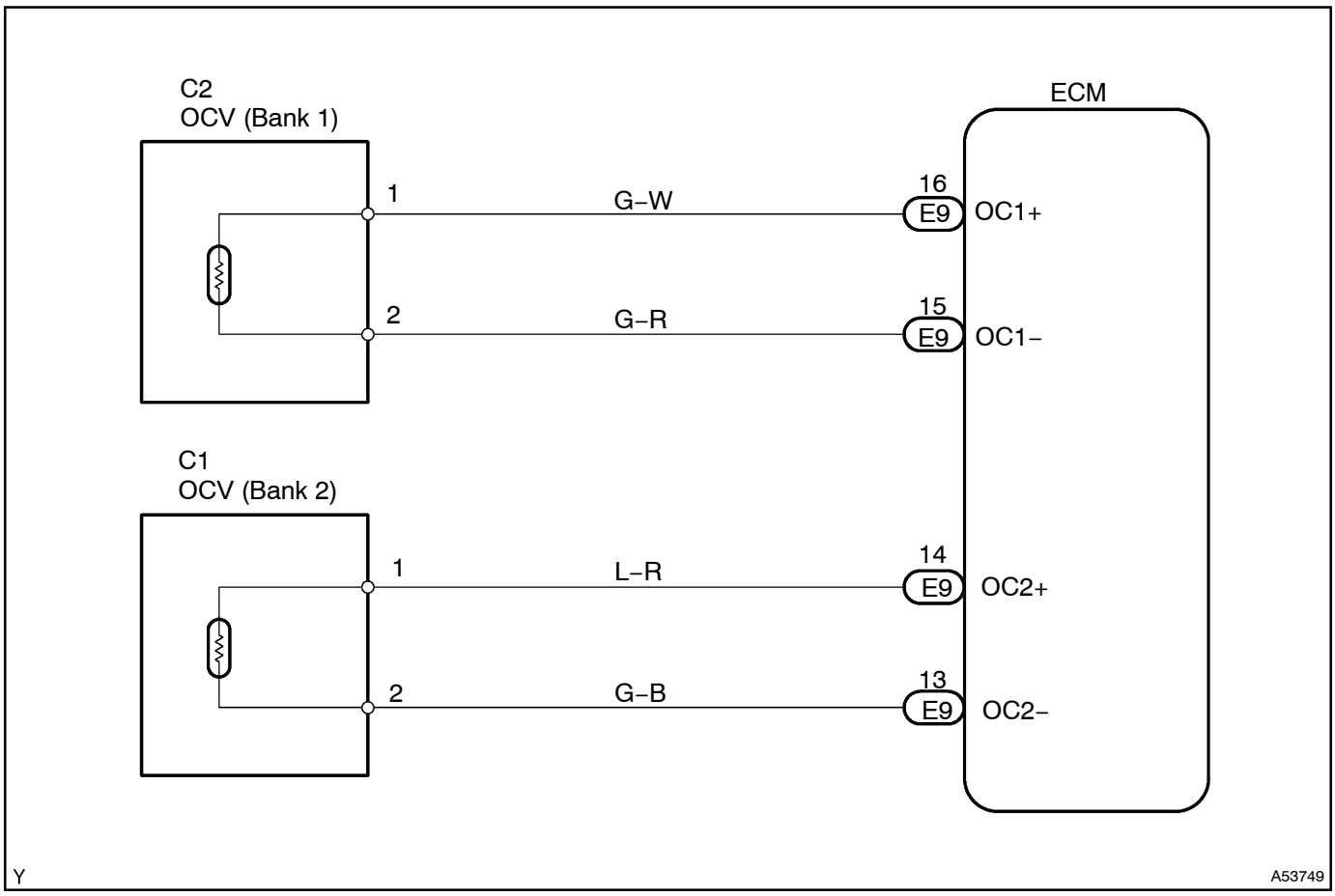
CIRCUIT DESCRIPTION

The Variable Valve Timing (VVT) system 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. Camshaft timing control is performed based on engine operation conditions such as intake air volume, throttle position and engine coolant temperature.
The ECM controls the OCV based on the signals output from several 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 is optimized. Also, the engine torque improves, fuel economy improves, and exhaust emissions decrease. The ECM detects the actual valve timing using signals from the camshaft position sensor and the crankshaft position sensor. The ECM performs feedback control and verifies target valve timing.



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:

- Bank1 refers to the bank that includes cylinder No. 1.
- Bank2 refers to the bank that does not include cylinder No. 1.
- Read freeze frame data using the hand–held tester. 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 HAND–HELD TESTER (OCV OPERATE)

(a) Connect the hand–held tester to the DLC3.
(b) Start the engine and warm it up.
(c) Turn ON the ignition switch. 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

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–8)**

NG

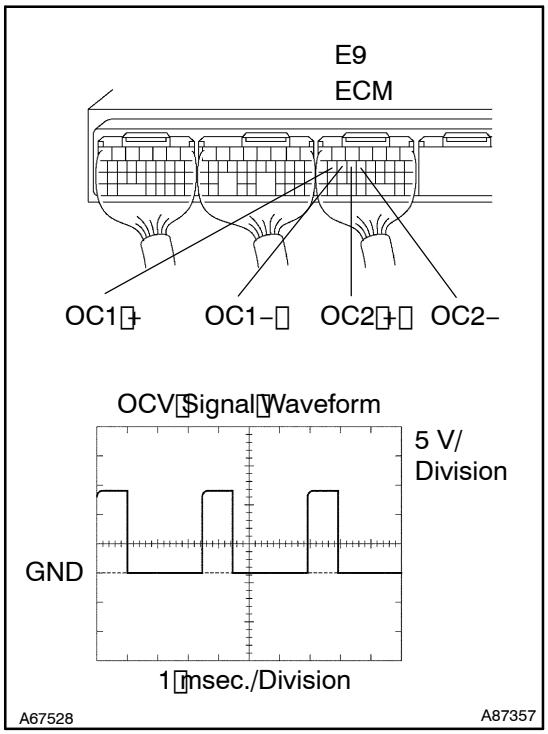
2	INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY (OCV) (See page 10–2)

OK: OCV has no contamination and moves smoothly.

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

OK

3	CHECK ECM (OCV SIGNAL)



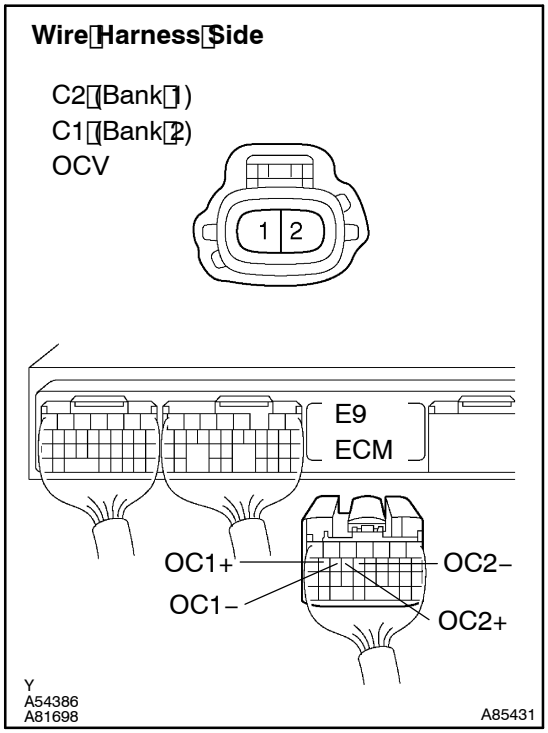
(a) During idling, check the waveform of the E9 ECM connector using the oscilloscope.
Standard:

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

4 CHECK WIRE HARNESS (OCV – ECM)



(a) Disconnect the C1 or C2 OCV connector.
(b) Disconnect the E9 ECM connector.
(c) Check the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
C2–1 (OCV) – E9–16 (OC1+) C2–2 (OCV) – E9–15 (OC1–) C1–1 (OCV) – E9–14 (OC2+) C1–2 (OCV) – E9–13 (OC2–)	Below 1 Ω
C2–1 (OCV) or E9–16 (OC1+) – Body ground C2–2 (OCV) or E9–15 (OC1–) – Body ground C1–1 (OCV) or E9–14 (OC2+) – Body ground C1–2 (OCV) or E9–13 (OC2–) – Body ground	10 kΩ or higher

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

OK

CHECK FOR INTERMITTENT PROBLEMS (See page 05–8)