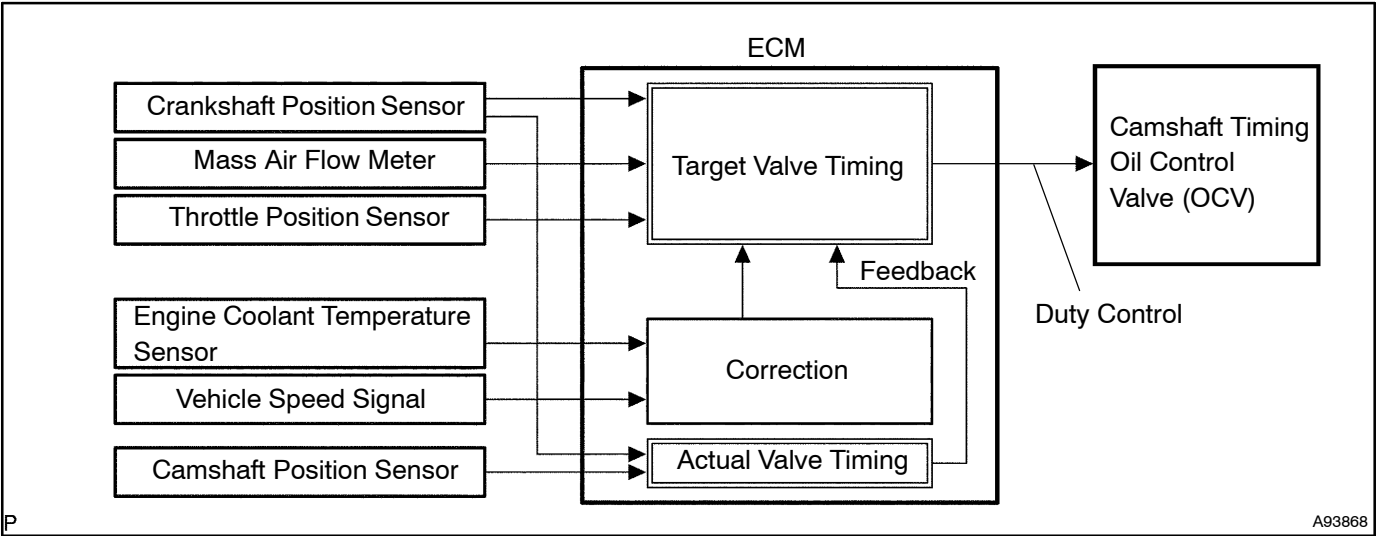


DTC	P0010/39	CAMSHAFT POSITION "A" ACTUATOR CIRCUIT (BANK 1)
-----	----------	---

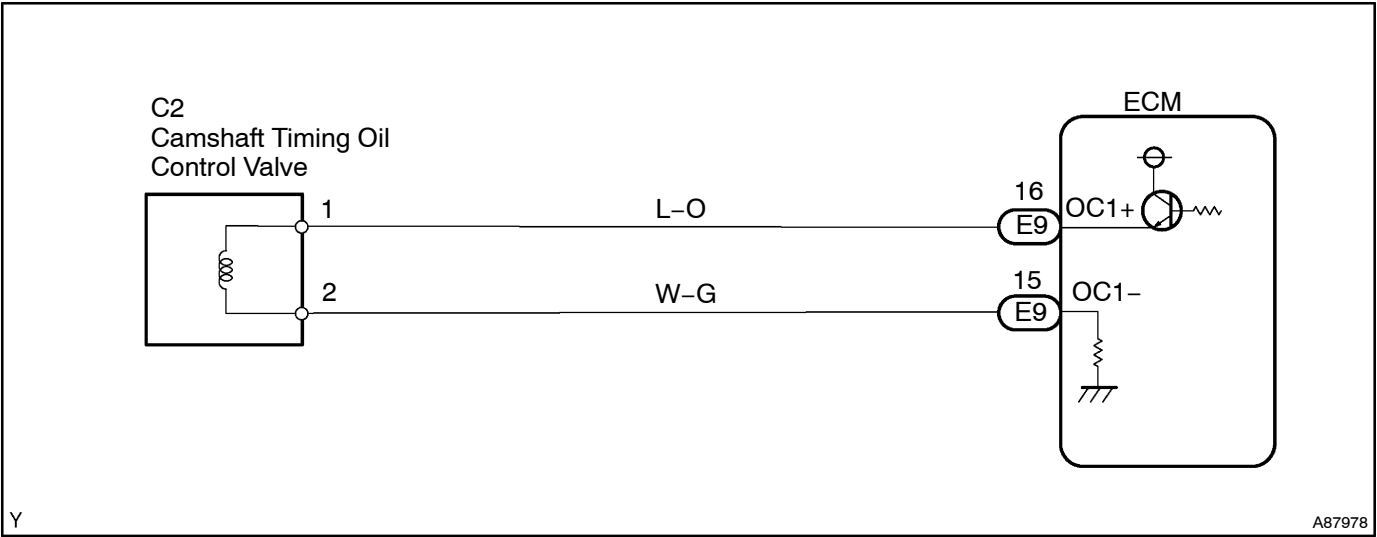
CIRCUIT DESCRIPTION

The Variable Valve Timing (VVT) system includes the ECM, Oil Control Valve (OCV) and 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 condition such as intake air volume, throttle position and engine coolant temperature. The ECM controls the OCV based on the signals from several sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the OCV. As a result, the relative position between the camshaft and crankshaft is optimized, the engine torque and the fuel economy improve, and the exhaust emission drop. The ECM detects the actual valve timing using signals from the camshaft position sensor and crankshaft position sensor. The ECM performs feedback control and verifies target valve timing.



DTC No.	DTC Detection Condition	Trouble Area
P0010/39	Open or short in oil control valve circuit (1 trip detection logic)	<ul style="list-style-type: none">• Open or short in oil control valve circuit• Oil control valve• ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, 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.

When using intelligent tester:

1 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (OPERATE OCV)

- Start the engine and warm it up.
- Turn the ignition switch to OFF.
- Connect the intelligent tester to the DLC3.
- Turn the ignition switch to ON and turn the intelligent tester ON.
- Select the following menu items: Powertrain / Engine and ECT / Active Test / VVT Control (Bank 1)
- Check the engine speed when operating the OCV using the intelligent tester.

Standard:

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

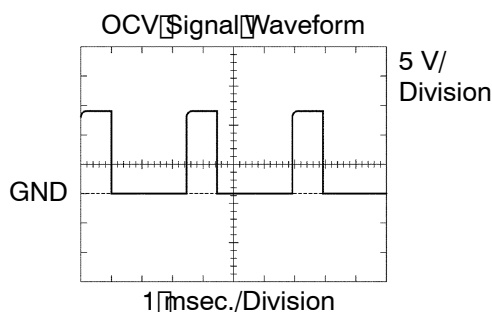
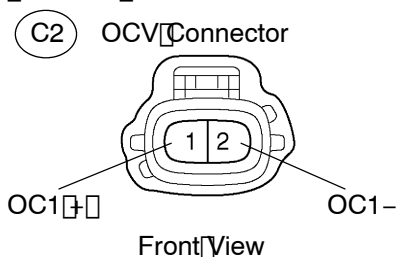
OK

CHECK FOR INTERMITTENT PROBLEMS
(See page 05-259)

NG

2 INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY(OCV SIGNAL)

Wire Harness Side:



A94633

- Disconnect the C2 OCV connector.
- During idling, check the waveform between the specified terminals of the C2 OCV connector using the oscilloscope.

Standard:

Tester Connection	Specified Condition
OC1+ (C2-1) - OC1- (C2-2)	Correct waveform is as shown

- Reconnect the OCV connector.

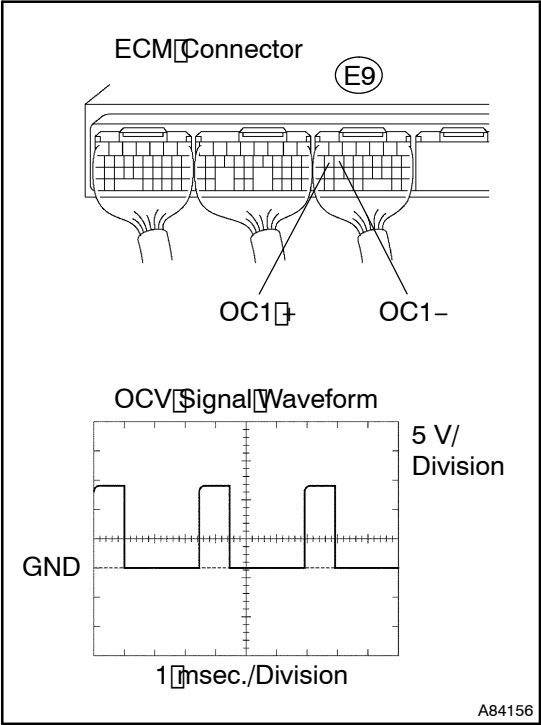
OK

REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSY

NG

3

INSPECT ECM(OCV SIGNAL)



- (a) Inspect using the oscilloscope.
- (b) During idling, check the waveform between the specified terminals of the E9 ECM connector.
- Standard:**

Tester Connection	Specified Condition
OC1+ (E9-16) - OC1- (E9-15)	Correct waveform is as shown

NG

REPLACE ECM (See page 10-30)

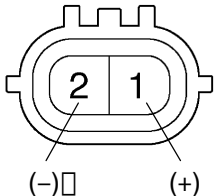
OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

When not using intelligent tester II:

1 INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSY (OPERATE OCV)

Component Side:



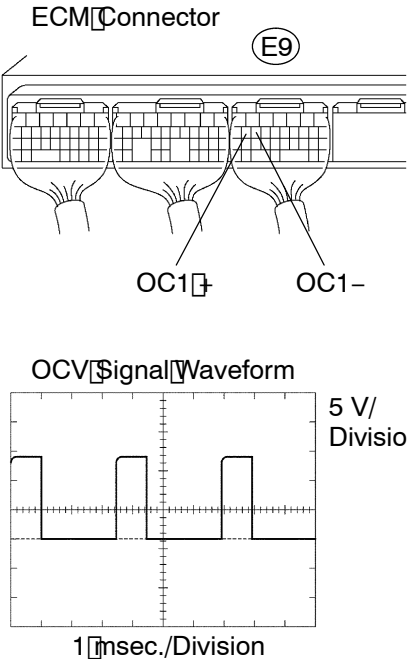
Y

- (a) Disconnect the C2 OCV connector.
- (b) Apply positive battery voltage between the terminals of the OCV.
- (c) Check the engine speed.
Standard:
The engine speed is rough idling or the engine stalls.
- (d) Reconnect the OCV connector.

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

OK

2 INSPECT ECM (OCV SIGNAL)



- (a) Inspect using the oscilloscope.
- (b) During idling, check the waveform between the specified terminals of the E9 ECM connector.

Standard:

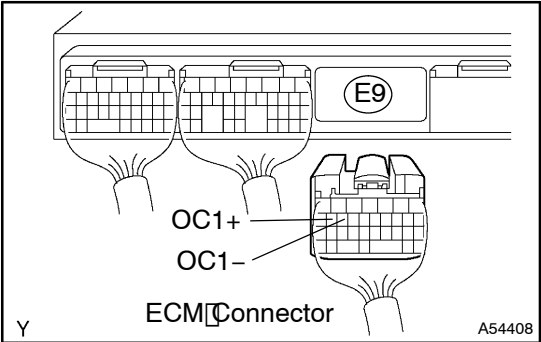
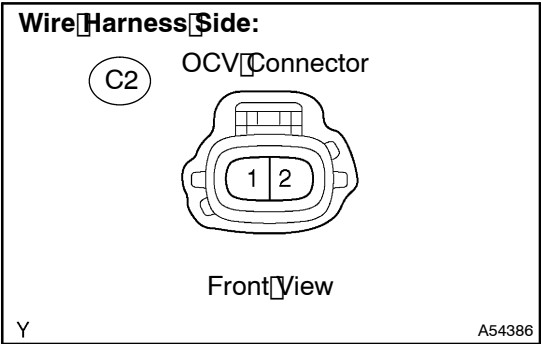
Tester Connection	Specified Condition
OC1+ (E9-16) – OC1– (E9-15)	Correct waveform is as shown

NG **REPLACE ECM (See page 10-30)**

OK

3

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



- (a) Disconnect the C2 OCV connector.
- (b) Disconnect the E9 ECM connector.
- (c) Check the resistance.

Standard (Check for open):

Tester Connection	Specified Condition
OCV (C2-1) - OC1+ (E9-16)	Below 1 Ω
OCV (C2-2) - OC1- (E9-15)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
OCV (C2-1) or OC1+ (E9-16) - Body Ground	10 kΩ or higher
OCV (C2-2) or OC1- (E9-15) - Body Ground	10 kΩ or higher

- (d) Reconnect the OCV connector.
- (e) Reconnect the ECM connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK FOR INTERMITTENT PROBLEMS (See page 05-259)