

DTC	P2004	INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 1)
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DTC	P2006	INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 1)
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HINT:

These DTCs have been added to meet the requirement for Partial Zero Emission Vehicle (PZEV) (See page 05-1).

CIRCUIT DESCRIPTION

The intake manifold runner valve system is mounted on the intake manifold and consists of the intake manifold runner valve (IMRV), the IMRV motor and the IMRV position sensor. The IMRV motor opens and closes the IMRV using multiple gears (See page 05-125 for details). The valve position sensor detects the opening angle of the IMRV (See page 05-129 for details).

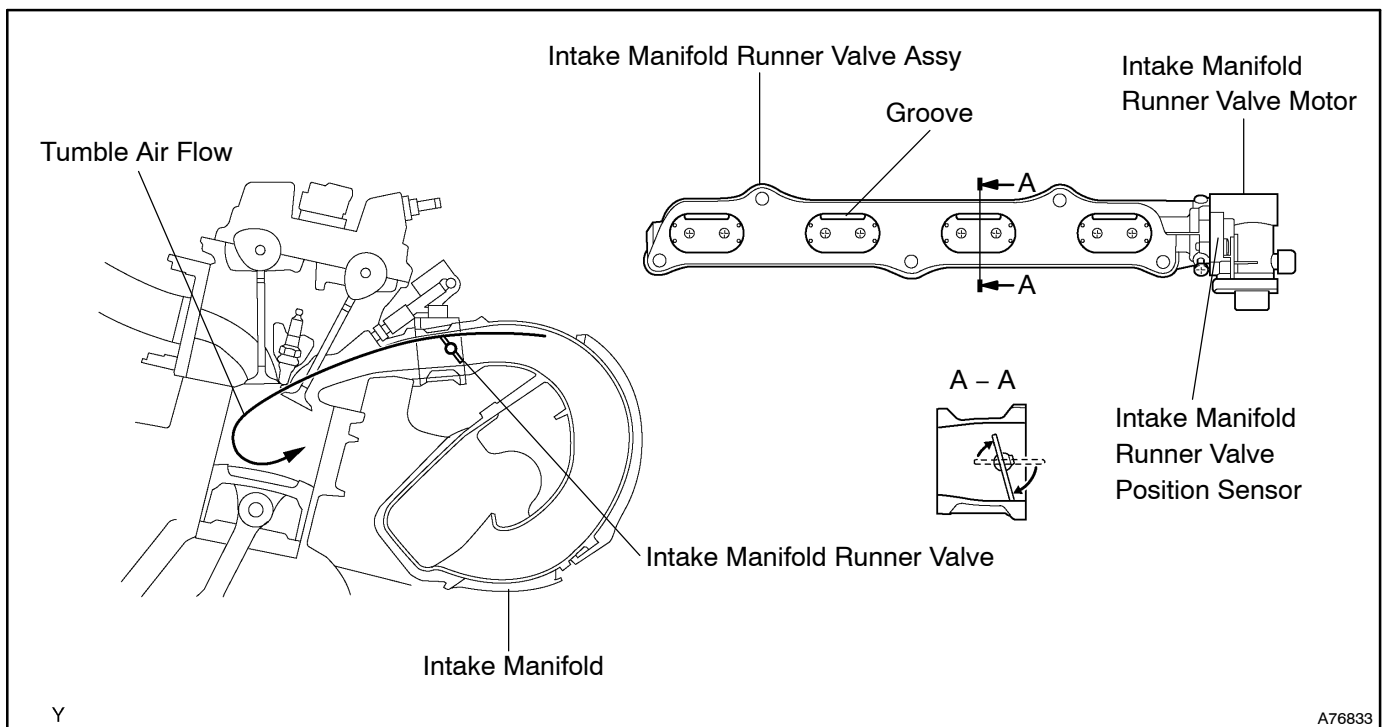
The IMRV has a groove on its upper portion.

When the IMRV is closed, air flows through a groove into the cylinder from the intake manifold, so that a dynamic air flow or "tumble" air flow is generated in the cylinder. The tumble air flow drastically reduces fuel deposits inside the intake air port and the combustion wall surface inside the cylinder. This improves the combustion efficiency by boosting the air-fuel mixture and air flow turbulence.

The related DTCs are "P2009 and P2010" on page 05-125, and "P2014, P2016 and P2017" on page 05-129.

NOTICE:

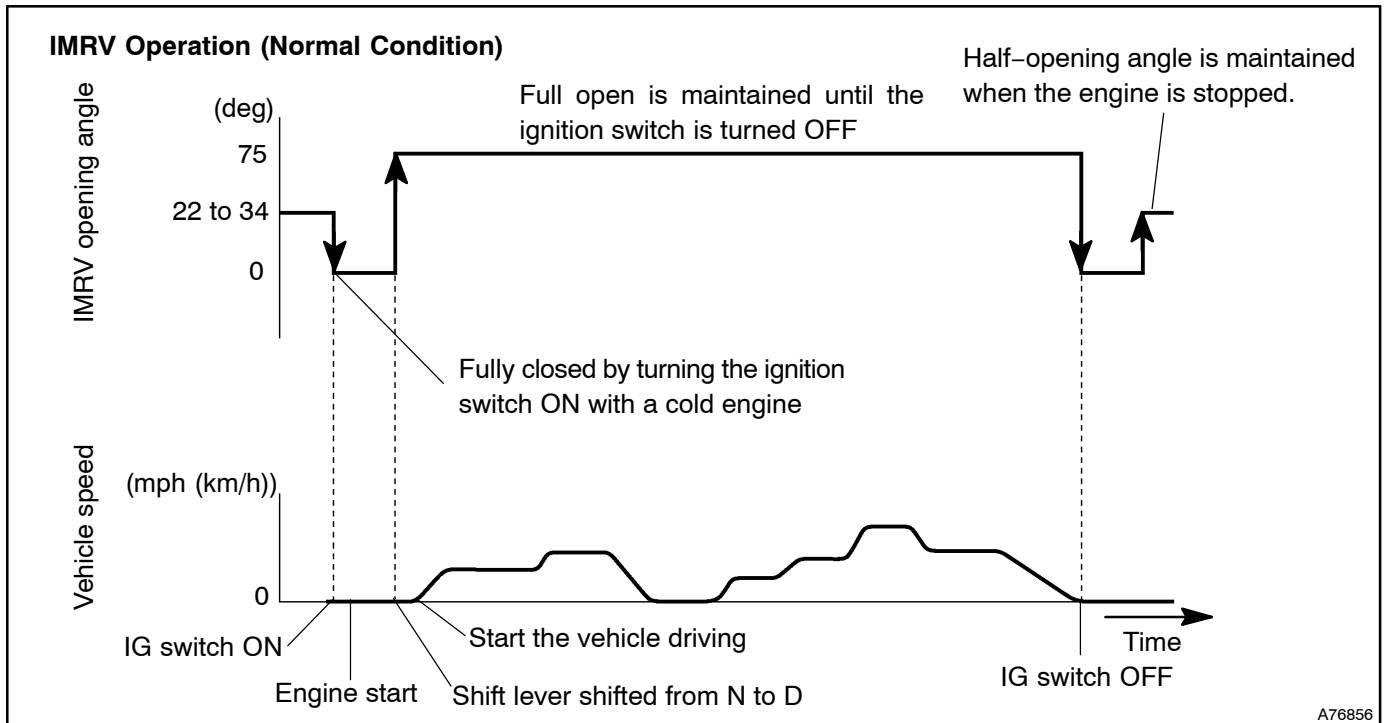
Do not disassemble the IMRV and the IMRV motor.



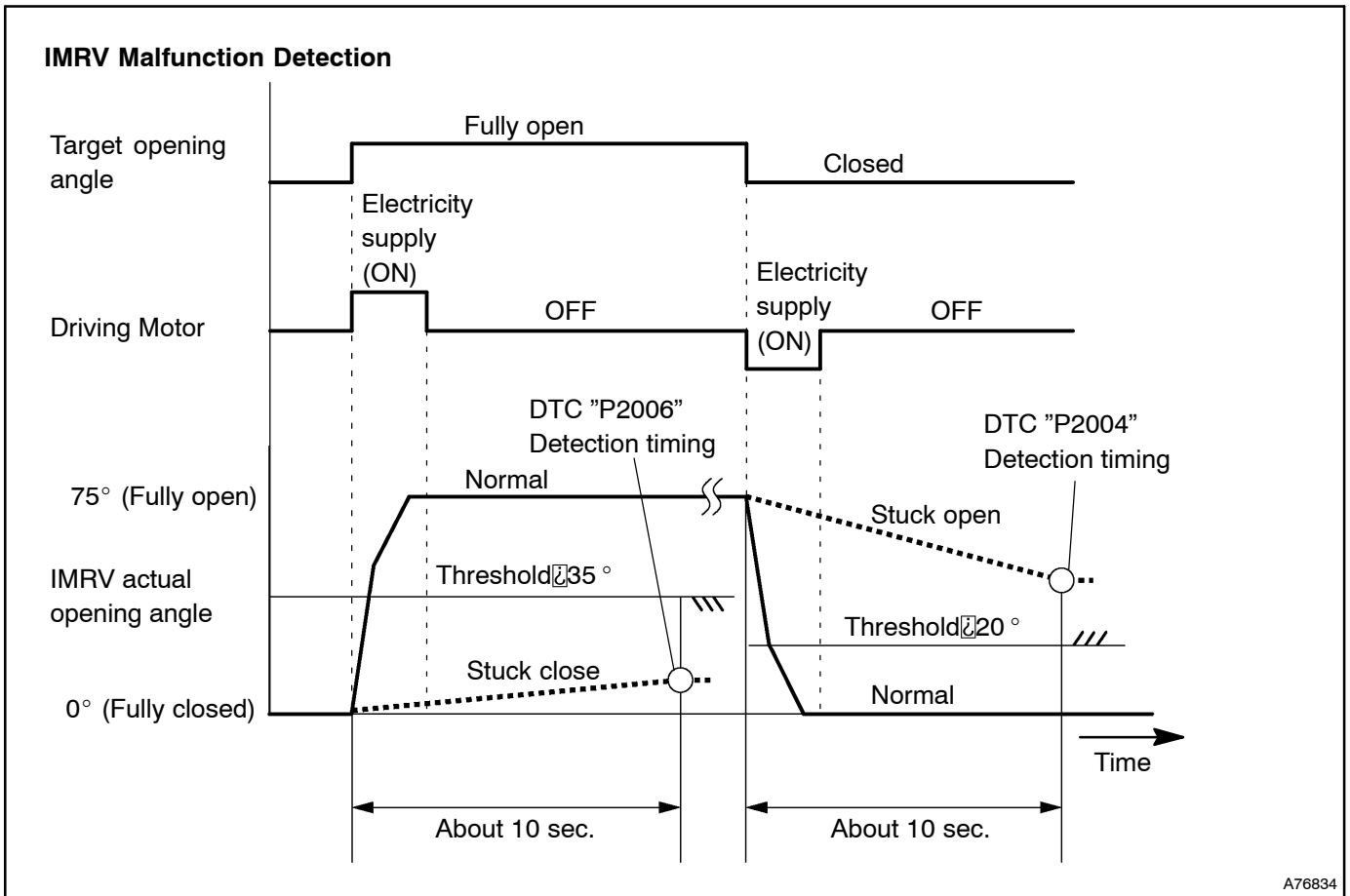
The ECM fully closes the IMRV during the first idle with the engine coolant temperature is more than -10°C (14°F) and less than 60°C (140°F) and the intake air temperature is more than -10°C (14°F) before the engine is warmed up. Other than this condition, the ECM fully opens the IMRV.

Open and closed condition for IMRV:

Temperatures of the engine coolant and the intake air when the engine starting up	Before warming up the engine	When one of the following conditions is met: (a) Throttle valve opening angle is 1.5° or more. (b) Vehicle speed is 3 mph (5 km/h) or more. (c) Engine speed is 3,000 rpm or more. (d) When the shift lever is in other than the N position.	After warming up the engine
Engine coolant temp. is less than -10°C (14°F) or more than 60°C (140°F) or intake air temp. is less than -10°C (14°F).	OPEN	OPEN	OPEN
Engine coolant temp. is between -10°C (14°F) and 60°C (140°F). Intake air temp. is -10°C (14°F) or more.	CLOSED	OPEN	OPEN



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DTC No.	DTC Detection Condition	Trouble Area
P2004 (Stuck open)	When the IMRV opening angle is more than 20° after requesting the IMRV full close	<ul style="list-style-type: none"> • IMRV motor circuit • IMRV motor • IMRV position sensor
P2006 (Stuck closed)	When the IMRV opening angle is less than 35° after requesting the IMRV full open	<ul style="list-style-type: none"> • IMRV • IMRV connector connection • ECM

HINT:

After confirming DTCs "P2004 and/or P2006", use the hand-held tester to confirm the IACV POSITION (IMRV position sensor output voltage) while performing the IACV MOTOR (IMRV motor) of the ACTIVE TEST.

Reference (Normal condition):

IACV MOTOR operation	IACV POSITION
100 %	3.2 to 4.8 V
-100 %	0.2 to 1.0 V

MONITOR STRATEGY

Related DTCs	P2004	IMRV stuck open
	P2006	IMRV stuck closed
Required sensors	Main sensors	IMRV position sensor
	Related sensors	Engine coolant temperature sensor
		Intake air temperature sensor
Frequency of operation	Once per driving cycle	
Duration	About 10 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITION

The monitor will run whenever the following DTCs are not present	P0110 - P0113	Intake air temperature sensor
	P0115 - P0118	Engine coolant temperature sensor
	P2009, P2010	Intake manifold runner control circuit
	P2014, P2016, P2017	Intake manifold runner position sensor

Criteria for running DTC P2004 Conditions:

Item	Minimum	Maximum
Engine coolant temperature	-10°C (14°F) or more	-
Intake air temperature	-10°C (14°F) or more	-
Record of ignition switch ON	Already set	
Command to control valve	Close	
Battery voltage during drive close	8.0 V or more	-

Criteria for running DTC P2006 Conditions:

Item	Minimum	Maximum
Command to control valve	Open	
Battery voltage during drive open	8.0 V or more	-

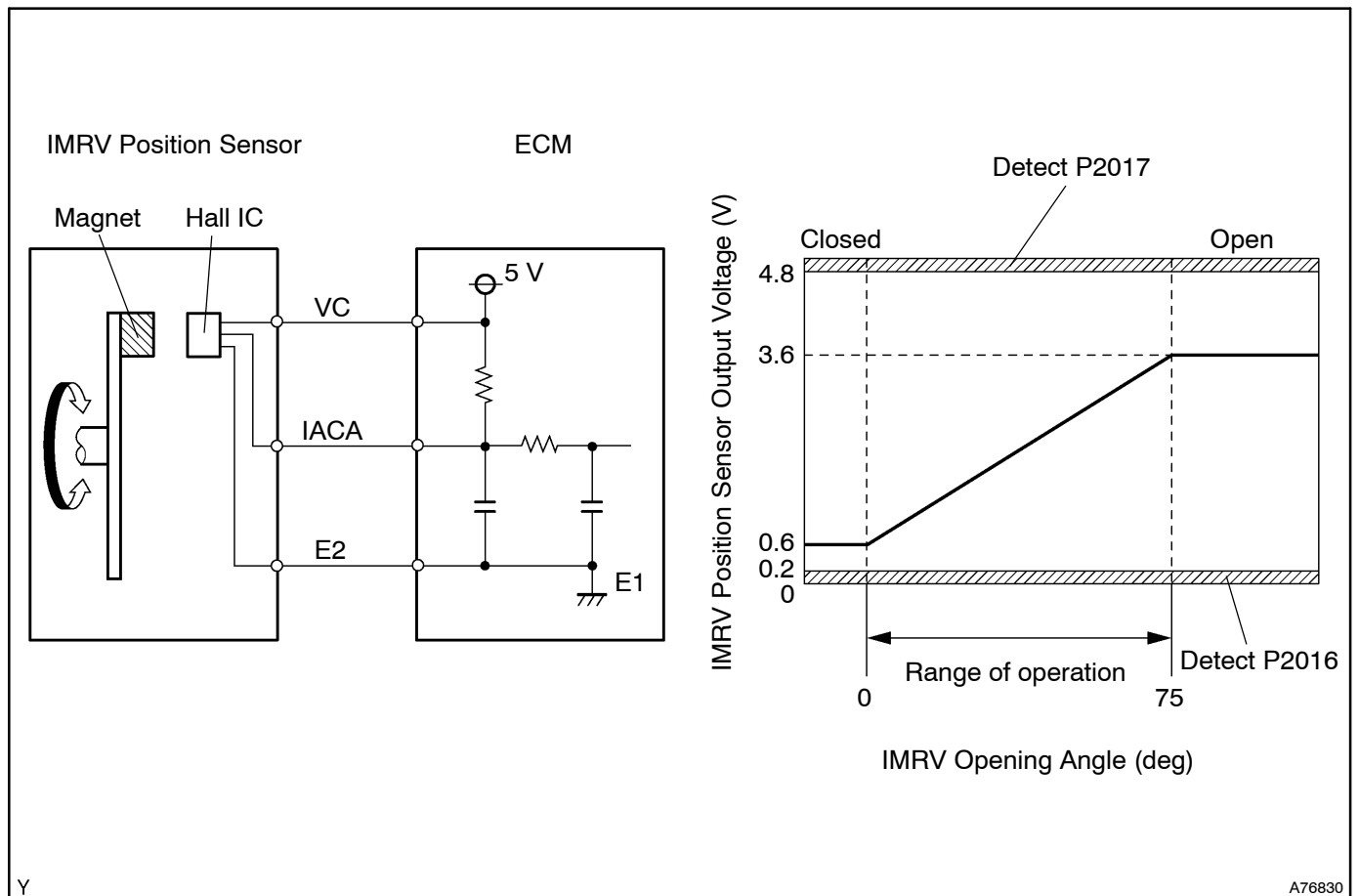
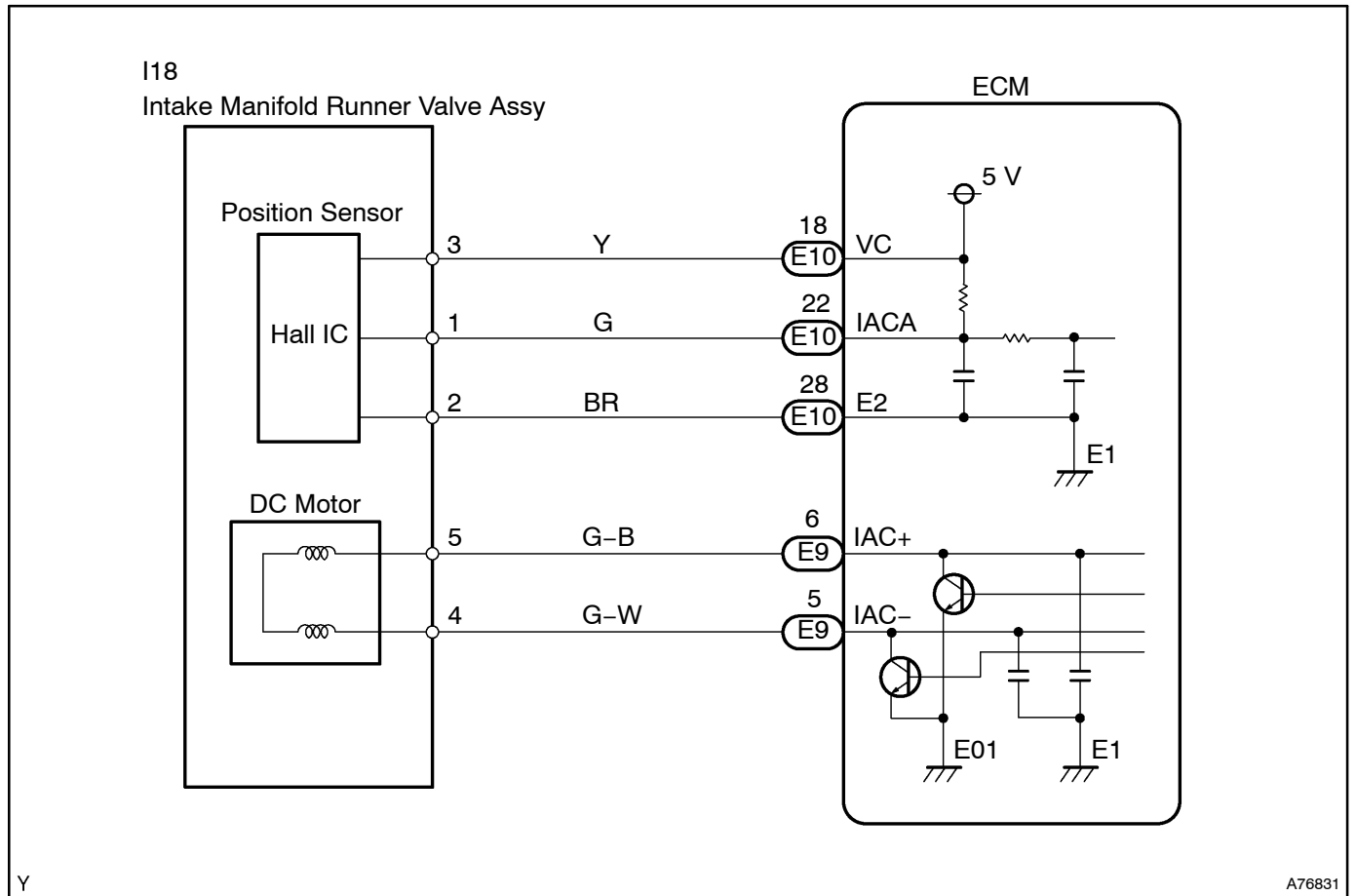
TYPICAL MALFUNCTION THRESHOLDS

DTC No.	Detection criteria	Threshold
P2004	IMRV opening angle after requesting the IMRV full close	20° or more
P2006	IMRV opening angle after requesting the IMRV full open	Less than 35°

COMPONENT OPERATING RANGE

Parameter	Standard value
IMRV position sensor voltage	"0.2 V or more" and "4.8 V or less"

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

Hand-held tester:

1 PERFORM ACTIVE TEST BY HAND-HELD TESTER(IMRV MOTOR)

- Connect the hand-held tester to the DLC3.
- Turn the ignition switch ON and push the hand-held tester main switch ON.
- Enter ALL from "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / IACV MOTOR (IMRV motor)".
- Scroll the data list by the up or down button to display IACV POSITION (IMRV position sensor).
- Check for a fluctuating speed of the voltage output of IACV POSITION when pressing the right or left button to select the duty ratio with -100 % or 100 %.

Standard: The voltage output of the valve opening angle is switched quickly while the IMRV motor is driven.

HINT:

IACV MOTOR operation	IACV POSITION
100 %	3.2 to 4.8 V
-100 %	0.2 to 1.0 V

NG → Go to step 3

OK

2 CHECK IF DTC OUTPUTS REOCCUR(DTC P2004 AND/OR P2006 ARE OUTPUT AGAIN)

- Clear the DTC (See page 05-4).
- Start the engine.
- Let the engine idle for 20 sec. or more after running the engine at more than 3,000 rpm for 20 sec.
- Turn the ignition switch OFF. Let the engine remain stopped for 20 sec.

HINT:

As running the engine to 3,000 rpm the IMRV usually fully opened. If the ignition switch is turned OFF under this condition, the IMRV fully closed and then becomes half-opening angle.

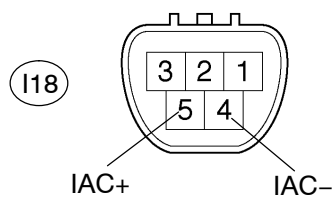
- Connect the hand-held tester to the DLC3.
- Turn the ignition switch ON.
- Select the item "DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES" and check if any DTC (any pending code) is set.

Result:

Display (DTC output)	Proceed to
"P2004 and/or P2006" are output again	A
No DTC output	B

B → CHECK FOR INTERMITTENT PROBLEMS

A

3 INSPECT INTAKE MANIFOLD RUNNER VALVE ASSY(IMRV MOTOR RESISTANCE)**Component Side**

Y

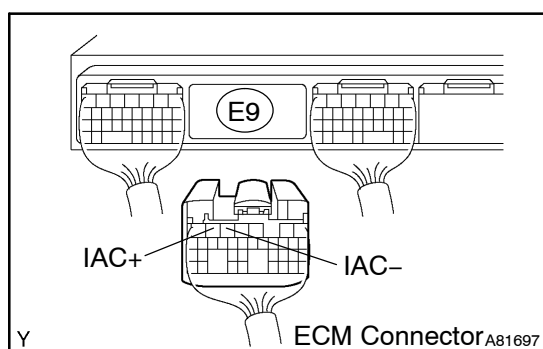
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- (a) Disconnect the I18 IMRV connector.
- (b) Measure the motor resistance between terminals IAC+ (I18-5) and IAC- (I18-4).
Resistance: 3 to 10 Ω at 20°C (68°F)
- (c) Reconnect the IMRV connector.

NG

REPLACE INTAKE MANIFOLD RUNNER VALVE ASSY

OK

4 CHECK HARNESS AND CONNECTOR(ECM TO IMRV)

Y

ECM Connector A81697

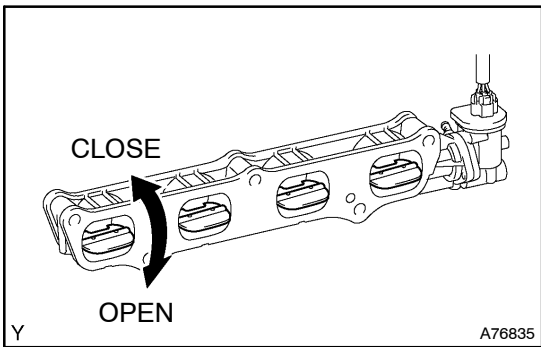
- (a) Disconnect the E9 ECM connector.
- (b) Measure the resistance between terminals IAC+ (E9-6) and IAC- (E9-5) of the ECM connector.
Resistance: 3 to 10 Ω at 20°C (68°F)
- (c) Reconnect the ECM connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

5 PERFORM ACTIVE TEST BY HAND-HELD TESTER(CHECK IMRV OPERATION)



- (a) Remove the IMRV assy (after removing the IMRV assy, reconnect connector I18).
- (b) Check if a foreign object has been caught between the IMRV and housing.
- (c) Inspect IMRV operation
 - (1) Connect the hand-held tester to the DLC3.
 - (2) Turn the ignition switch ON and push the hand-held tester main switch ON.
 - (3) Enter ALL from "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / IACV MOTOR (IMRV motor)".
 - (4) Check that IMRV opens and closes smoothly when pressing the right or left button to select the duty ratio with -100 % or 100 %.

Result: IMRV opens and closes smoothly.

- (5) Scroll the data list by the up or down button to display IACV POSITION (IMRV position sensor).
- (6) Check the voltage output of IACV POSITION when pressing the right or left button to select the duty ratio with -100 % or 100 %.

Result:

IACV MOTOR operation	IACV POSITION
100 %	3.2 to 4.8 V
-100 %	0.2 to 1.0 V

- (d) Reinstall the IMRV assy.

NG → **REPLACE INTAKE MANIFOLD RUNNER VALVE ASSY**

OK

6 CHECK IF DTC OUTPUTS REOCCUR(DTC P2004 AND/OR P2006 ARE OUTPUT AGAIN)

- (a) Clear the DTC (See page 05-4).
- (b) Start the engine.
- (c) Let the engine idle for 20 sec. or more after running the engine at more than 3,000 rpm for 20 sec.
- (d) Turn the ignition switch OFF. Let the engine remain stopped for 20 sec.

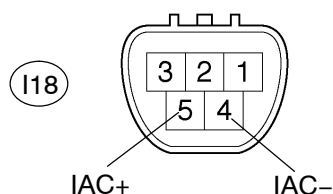
HINT:

As running the engine to 3,000 rpm the IMRV usually fully opened. If the ignition switch is turned OFF under this condition, the IMRV fully closed and then becomes half-opening angle.

- (e) Connect the hand-held tester to the DLC3.
- (f) Turn the ignition switch ON.
- (g) Select the item "DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES" and check if any DTC (any pending code) is set.

Result:

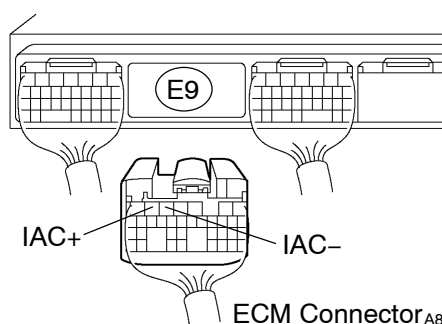
Display (DTC output)	Proceed to
"P2004 and/or P2006" are output again	A
No DTC output	B

B**CHECK FOR INTERMITTENT PROBLEMS****A****CHECK AND REPLACE ECM (See page 01-31)****OBD II scan tool (excluding hand-held tester):****1 INSPECT INTAKE MANIFOLD RUNNER VALVE ASSY(IMRV MOTOR RESISTANCE)****Component Side**

Y

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- (a) Disconnect the I18 IMRV connector.
- (b) Measure the motor resistance between terminals IAC+ (I18-5) and IAC- (I18-4).
Resistance: 3 to 10 Ω at 20°C (68°F)
- (c) Reconnect the IMRV connector.

NG**REPLACE INTAKE MANIFOLD RUNNER VALVE ASSY****OK****2 CHECK HARNESS AND CONNECTOR(ECM TO IMRV)**

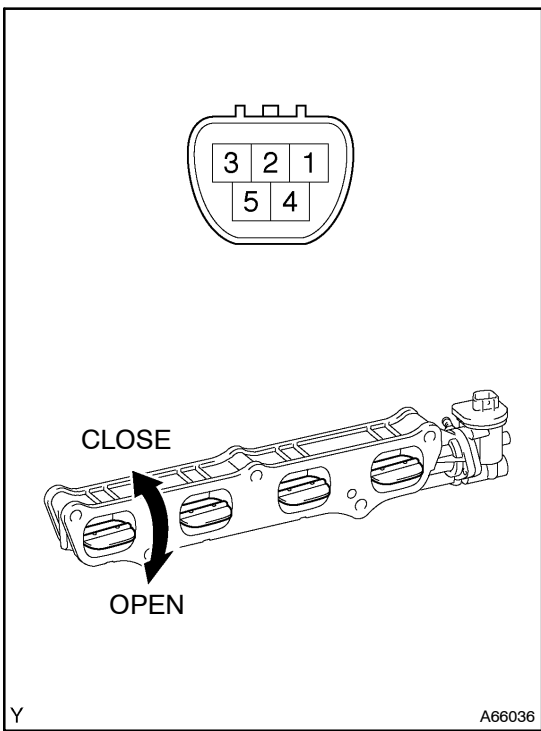
Y

ECM Connector A81697

- (a) Disconnect the E9 ECM connector.
- (b) Measure the resistance between terminals IAC+ (E9-6) and IAC- (E9-5) of the ECM connector.
Resistance: 3 to 10 Ω at 20°C (68°F)
- (c) Reconnect the ECM connector.

NG**REPAIR OR REPLACE HARNESS OR CONNECTOR****OK**

3 INSPECT INTAKE MANIFOLD RUNNER VALVE ASSY(CHECK IMRV OPERATION)



- (a) Remove the IMRV assy.
- (b) Check if a foreign object has been caught between the IMRV and housing.
- (c) Inspect IMRV operation
 - (1) Apply battery positive and negative voltages across the terminals.

Measuring condition	Operation
Battery positive - Terminal 4 Battery negative - Terminal 5	CLOSE
Battery positive - Terminal 5 Battery negative - Terminal 4	OPEN

NOTICE:
Do not apply battery voltage to the IMRV motor for more than 1 minute.

- (2) Check that IMRV opens and closes smoothly.
Result: IMRV opens and closes smoothly.
- (d) Reinstall the IMRV assy.

NG → **REPLACE INTAKE MANIFOLD RUNNER VALVE ASSY**

OK

4 READ OUTPUT DTC(DTC P2004 AND/OR P2006 ARE OUTPUT AGAIN)

- (a) Clear the DTC (See page 05-4).
- (b) Start the engine.
- (c) Let the engine idle for 20 sec. or more after running the engine at more than 3,000 rpm for 20 sec.
- (d) Turn the ignition switch OFF. And let the engine remain stopped for 20 sec.

HINT:
As running the engine to 3,000 rpm the IMRV usually fully opened. If the ignition switch is turned OFF under this condition, the IMRV fully closed and then becomes half-opening angle.

- (e) Repeat the steps (b) to (d).
- (f) Read the DTC (See page 05-4).

Result:

Display (DTC output)	Proceed to
"P2004 and/or P2006" are output again	A
No DTC output	B

B → **CHECK FOR INTERMITTENT PROBLEMS**

A

CHECK AND REPLACE ECM (See page 01-31)