

| | | |
|------------|--------------|---|
| DTC | P2004 | INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 1) |
|------------|--------------|---|

| | | |
|------------|--------------|---|
| DTC | P2006 | INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 1) |
|------------|--------------|---|

HINT:

These DTCs have been added to meet the requirement for Partial Zero Emission Vehicle (PZEV) (see page 05-350).

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 05-473 for details). The valve position sensor detects the opening angle of the IMRV (see page 05-477 for details).

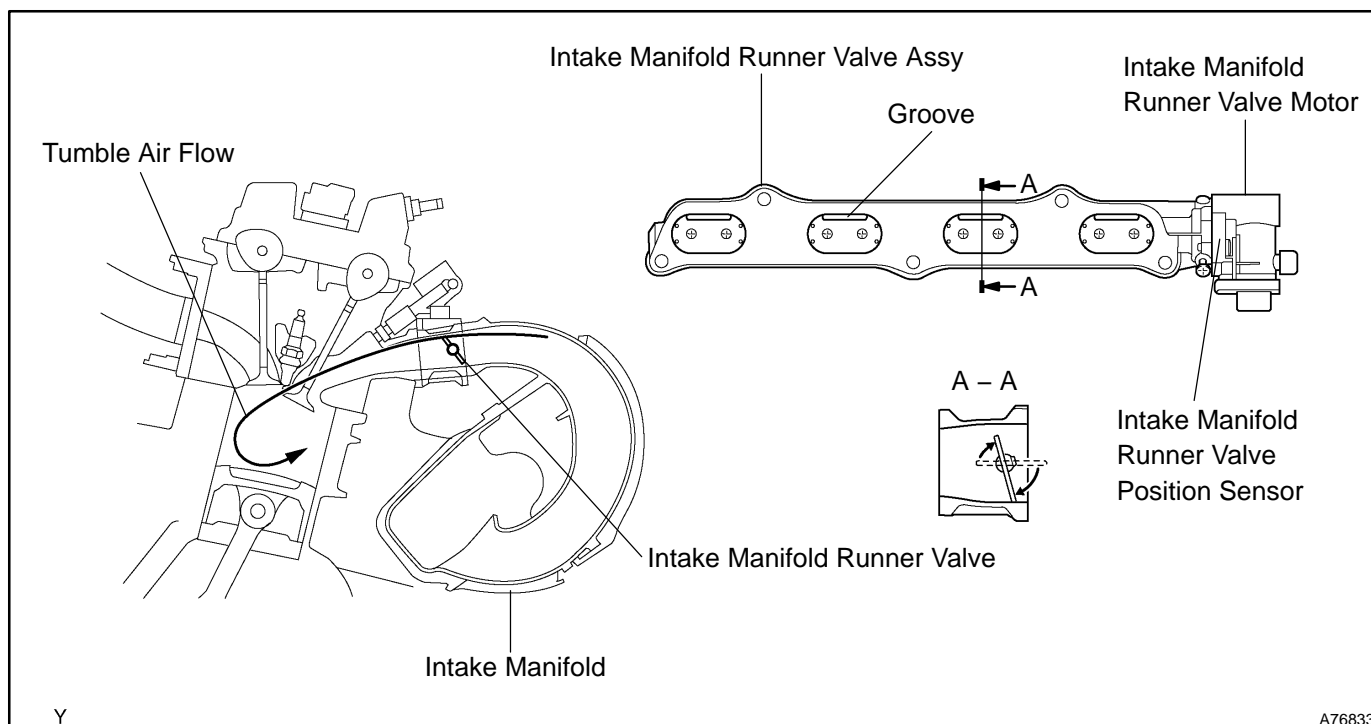
The IMRV has a groove on its upper portion.

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 05-463, and P2014, P2016 and P2017 on page 05-473.

NOTICE:

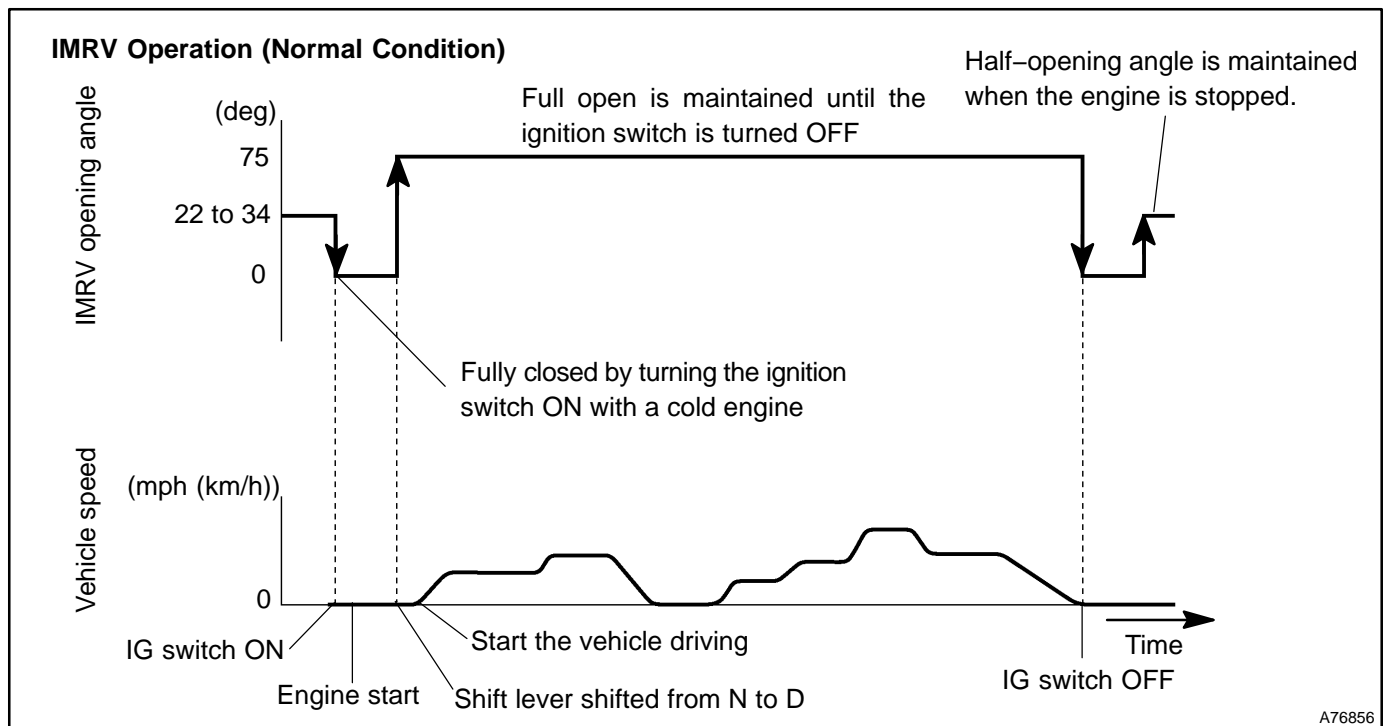
Do not disassemble the IMRV and the IMRV motor.

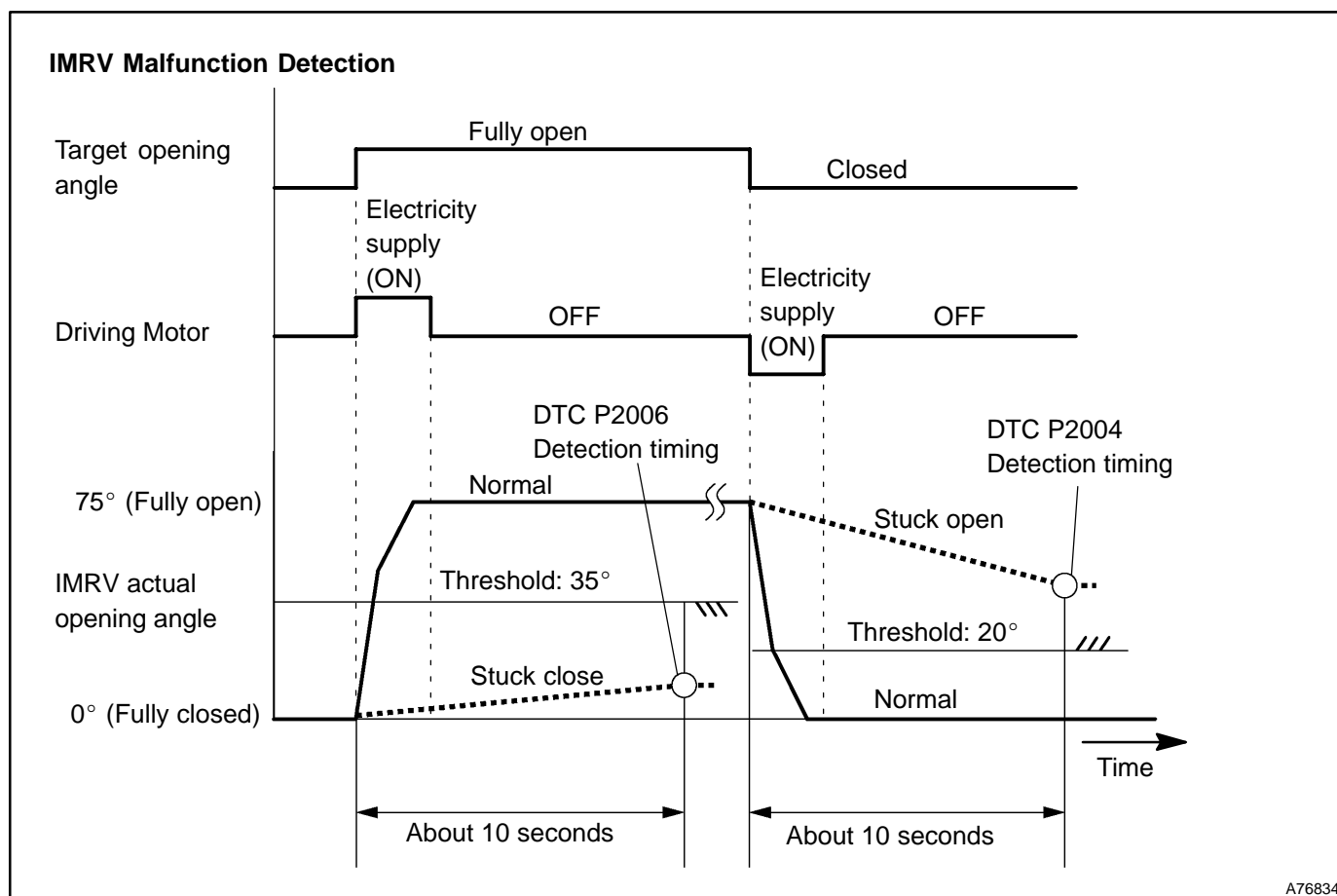


The ECM fully closes the IMRV during the first idle with the engine coolant temperature is more than -10°C (14°F) and less than 60°C (140°F) and the intake air temperature is more than -10°C (14°F) before the engine is warmed up. Other than this condition, the ECM fully opens the IMRV.

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 |





| 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 • IMRV • IMRV connector connection • ECM |
| P2006 (Stuck closed) | When the IMRV opening angle is less than 35° after requesting the IMRV full open | <ul style="list-style-type: none"> • Same as DTC No. P2004 |

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: IMRC Valve Stuck Open P2006: IMRC Valve Stuck Closed |
| Required sensors/ components (Main) | IMRC Valve |
| Required sensors/ components (Related) | IAT sensor, ECT sensor |
| Frequency of operation | Once per driving cycles |
| Duration | 10 seconds |
| MIL operation | 2 driving cycles |
| Sequence operation | None |

TYPICAL ENABLING CONDITIONS

All:

| | |
|--|---------------------------------|
| The monitor will run whenever these DTCs are not present | See page 05-360 |
|--|---------------------------------|

P2004:

| | |
|-----------------------|------------------------|
| Battery voltage | 8 V or more |
| ECT | -10 °C (14 °F) or more |
| IAT | -10 °C (14 °F) or more |
| Ignition Switch | ON |
| Command to IMRC valve | Closed |

P2006:

| | |
|-----------------------|-------------|
| Battery voltage | 8 V or more |
| Command to IMRC valve | Closed |

TYPICAL MALFUNCTION THRESHOLDS

P2004:

| | |
|------------------|---------------|
| IMRC valve angle | 20 °C or more |
|------------------|---------------|

P2006:

| | |
|------------------|----------------|
| IMRC valve angle | Less tha 35 °C |
|------------------|----------------|

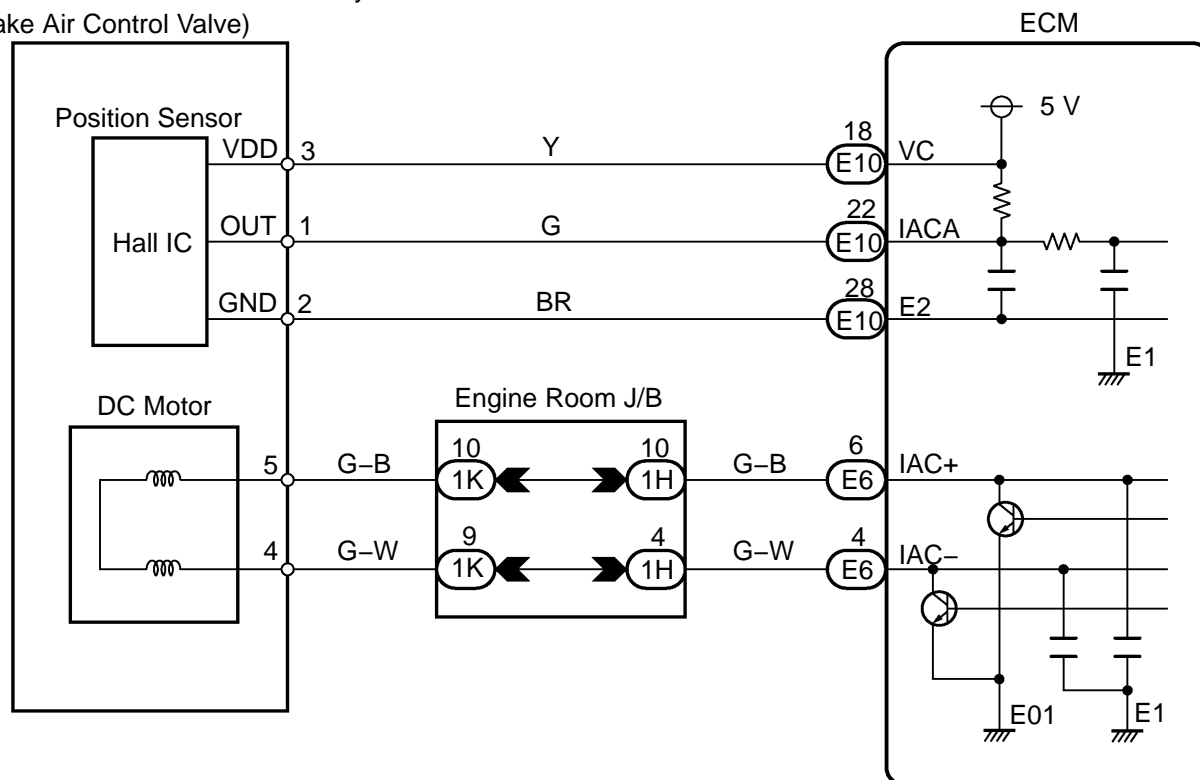
COMPONENT OPERATING RANGE

| | |
|------------------------------------|---------------|
| IMRC valve position sensor voltage | 0.2 and 4.8 V |
|------------------------------------|---------------|

WIRING DIAGRAM

I18

Intake Manifold Runner Valve Assy
(Intake Air Control Valve)

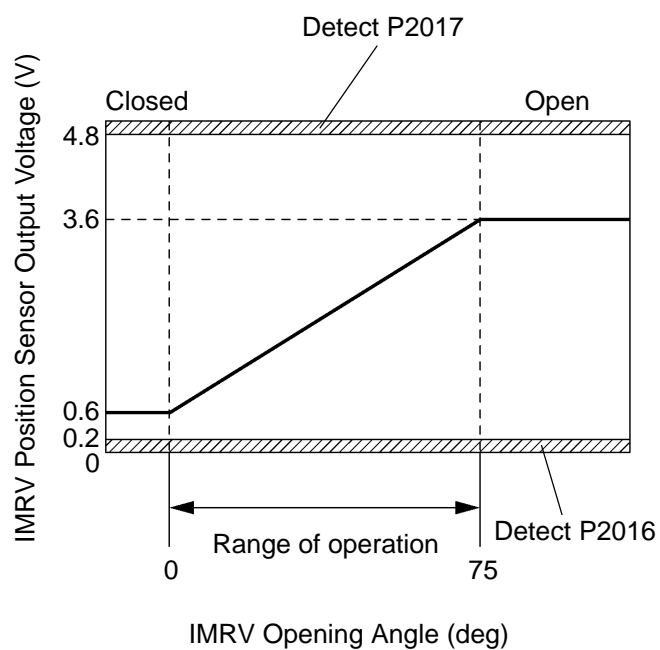
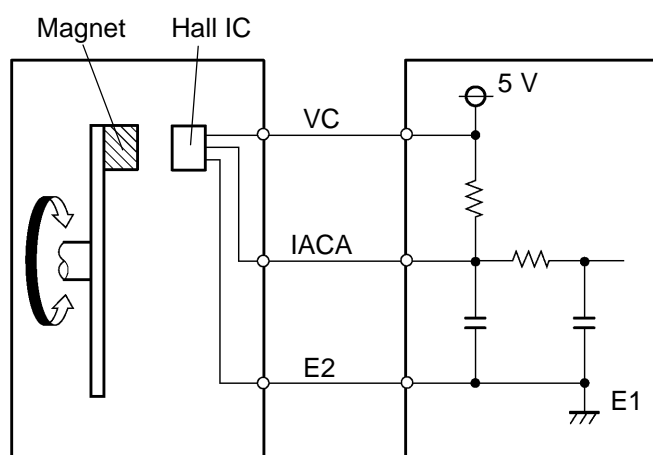


N

G35781

IMRV Position Sensor

ECM



A90914

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)

- (a) Connect the hand-held tester to the DLC3.
- (b) Turn the ignition switch ON and push the hand-held tester main switch ON.
- (c) Enter ALL from DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / IACV MOTOR (IMRV motor).
- (d) Scroll the data list by the up or down button to display IACV POSITION (IMRV position sensor).
- (e) 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)

- (a) Clear the DTC (see page 05-379).
- (b) Start the engine.
- (c) Let the engine idle for 20 seconds or more after running the engine at more than 3,000 rpm for 20 seconds.
- (d) Turn the ignition switch OFF. Let the engine remain stopped for 20 seconds.

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.

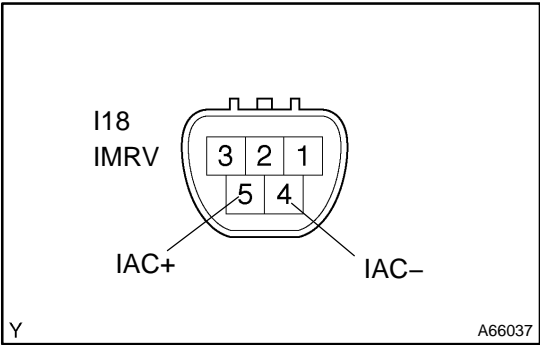
- (e) Connect the hand-held tester to the DLC3.
- (f) Turn the ignition switch ON.
- (g) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES and check if any DTC (any pending code) is set.

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)



- (a) Disconnect the I18 IMRV connector.
- (b) Check the motor resistance between terminals I18-5 (IAC+) and I18-4 (IAC-).

Standard:

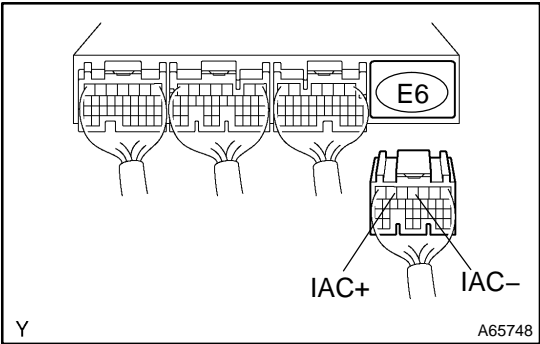
| Tester Connection | Condition | Specified Condition |
|--------------------------------|-------------|---------------------|
| I18-5 (IAC+) - I18-4 (IAC-) | 20°C (68°F) | 3 to 10 Ω |

NG

REPLACE INTAKE MANIFOLD RUNNER VALVE ASSY

OK

4 CHECK WIRE HARNESS (ECM - IMRV)



- (a) Disconnect the E6 ECM connector.
- (b) Check the resistance between terminals of the E3 ECM connector.

Standard:

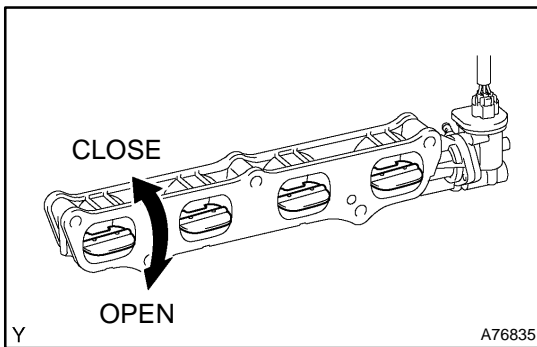
| Tester Connection | Specified Condition |
|---------------------------|---------------------|
| E6-6 (IAC+) - E6-4 (IAC-) | 3 to 10 Ω |

NG

REPAIR OR REPLACE HARNESS AND 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) Check 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 |

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 05-379).
- (b) Start the engine.
- (c) Let the engine idle for 20 seconds or more after running the engine at more than 3,000 rpm for 20 seconds.
- (d) Turn the ignition switch OFF. Let the engine remain stopped for 20 seconds.

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) Enter the following menus: 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

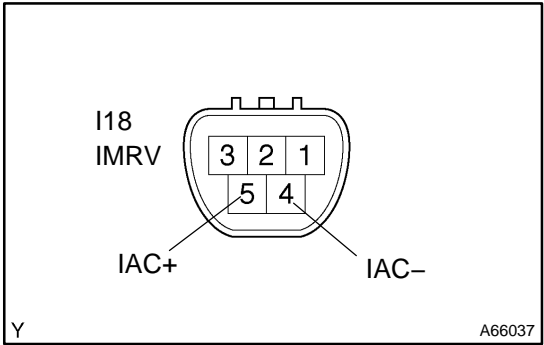
A

REPLACE ECM (See page 10-9)

OBD II scan tool (excluding hand-held tester):

1

INSPECT INTAKE MANIFOLD RUNNER VALVE ASSY (IMRV MOTOR RESISTANCE)



- (a) Disconnect the I18 IMRV connector.
- (b) Check the motor resistance between terminals I18-5 (IAC+) and I18-4 (IAC-).

Standard:

| Tester Connection | Condition | Specified Condition |
|-----------------------------|-------------|---------------------|
| I18-5 (IAC+) - I18-4 (IAC-) | 20°C (68°F) | 3 to 10 Ω |

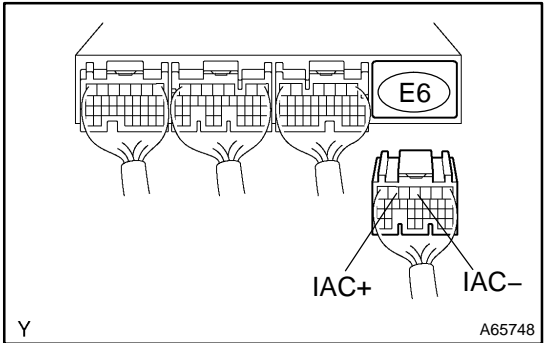
NG

REPLACE INTAKE MANIFOLD RUNNER VALVE ASSY

OK

2

CHECK WIRE HARNESS (ECM - IMRV)



- (a) Disconnect the E6 ECM connector.
- (b) Check the resistance between terminals of the E6 ECM connector.

Standard:

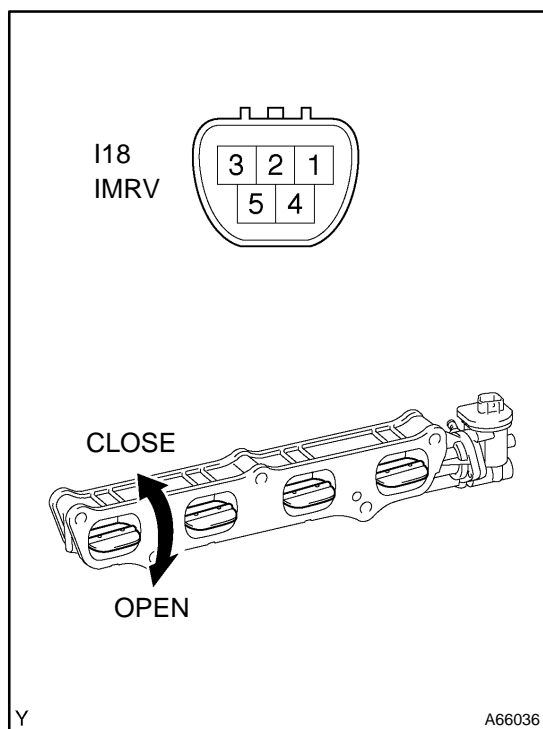
| Tester Connection | Specified Condition |
|---------------------------|---------------------|
| E6-6 (IAC+) - E6-4 (IAC-) | 3 to 10 Ω |

NG

REPAIR OR REPLACE HARNESS AND 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) Check 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.

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 05-379).
- (b) Start the engine.
- (c) Let the engine idle for 20 seconds or more after running the engine at more than 3,000 rpm for 20 seconds.
- (d) Turn the ignition switch OFF. And let the engine remain stopped for 20 seconds.

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.

Result:

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

B

CHECK FOR INTERMITTENT PROBLEMS

A

REPLACE ECM (See page 10-9)