

**01-13 INTAKE-AIR SYSTEM**

INTAKE-AIR SYSTEM LOCATION INDEX 01-13-2  
 VACUUM HOSE ROUTING DIAGRAM . 01-13-3  
 INTAKE-AIR SYSTEM REMOVAL/  
 INSTALLATION..... 01-13-3  
     Intake Manifold Gasket Installation Note 01-13-5  
     Dynamic Chamber Gasket Installation  
     Note ..... 01-13-5  
     Dynamic Chamber Bracket Installation  
     Note ..... 01-13-5  
 IDLE AIR CONTROL (IAC) VALVE REMOVAL/  
 INSTALLATION..... 01-13-5  
 IDLE AIR CONTROL (IAC) VALVE  
 INSPECTION..... 01-13-5  
     Simulation Test ..... 01-13-5  
     Resistance Inspection ..... 01-13-5  
     Circuit Open/Short Inspection ..... 01-13-6  
 VARIABLE TUMBLE CONTROL SYSTEM (VTCS)  
 CHECK VALVE (ONE-WAY), DELAY VALVE  
 REMOVAL/INSTALLATION ..... 01-13-6  
 VARIABLE TUMBLE CONTROL SYSTEM (VTCS)  
 CHECK VALVE (ONE-WAY), DELAY VALVE  
 INSPECTION..... 01-13-6

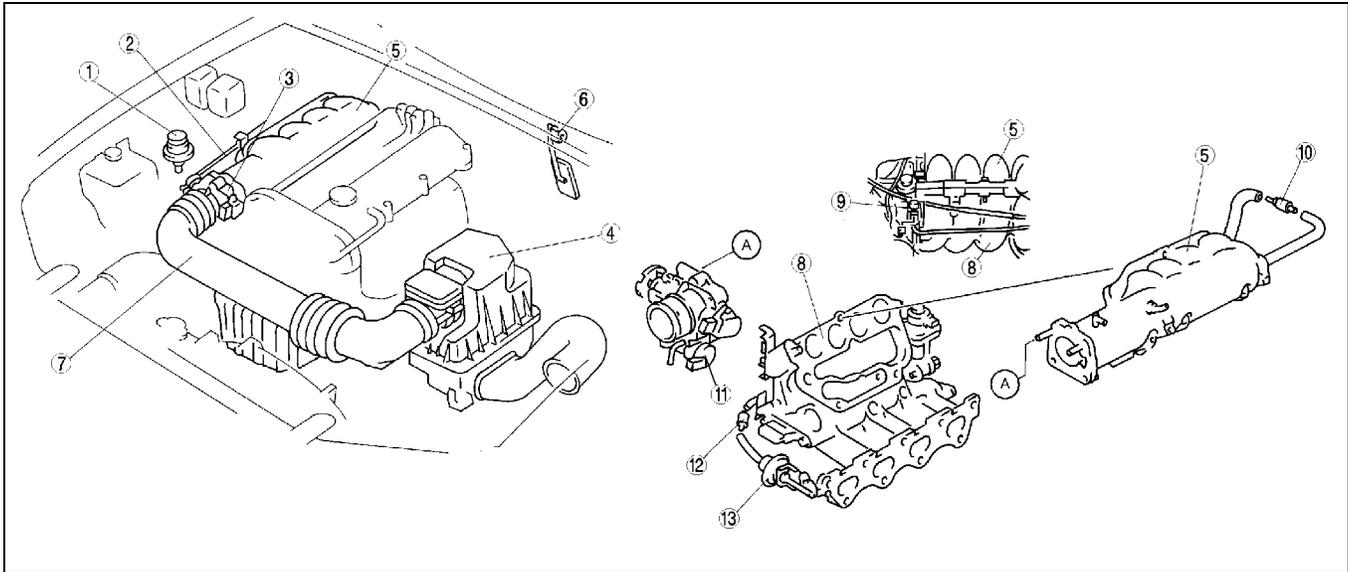
VARIABLE TUMBLE CONTROL SYSTEM (VTCS)  
 SHUTTER VALVE ACTUATOR REMOVAL/  
 INSTALLATION ..... 01-13-6  
 VARIABLE TUMBLE CONTROL SYSTEM (VTCS)  
 SHUTTER VALVE ACTUATOR  
 INSPECTION ..... 01-13-7  
 VARIABLE TUMBLE CONTROL SYSTEM (VTCS)  
 SOLENOID VALVE REMOVAL/  
 INSTALLATION ..... 01-13-7  
 VARIABLE TUMBLE CONTROL SYSTEM (VTCS)  
 SOLENOID VALVE INSPECTION ..... 01-13-8  
     Airflow Inspection ..... 01-13-8  
     Circuit Open/Short Inspection ..... 01-13-8  
 VARIABLE TUMBLE CONTROL SYSTEM (VTCS)  
 VACUUM SWITCH INSPECTION ..... 01-13-8  
     Operation Inspection..... 01-13-8  
     Circuit Open/Short Inspection ..... 01-13-9  
 ACCELERATOR PEDAL (AP) REMOVAL/  
 INSTALLATION ..... 01-13-9  
     Accelerator Cable Installation Note.... 01-13-9  
 ACCELERATOR CABLE INSPECTION/  
 ADJUSTMENT ..... 01-13-9

01-13

# INTAKE-AIR SYSTEM

## INTAKE-AIR SYSTEM LOCATION INDEX

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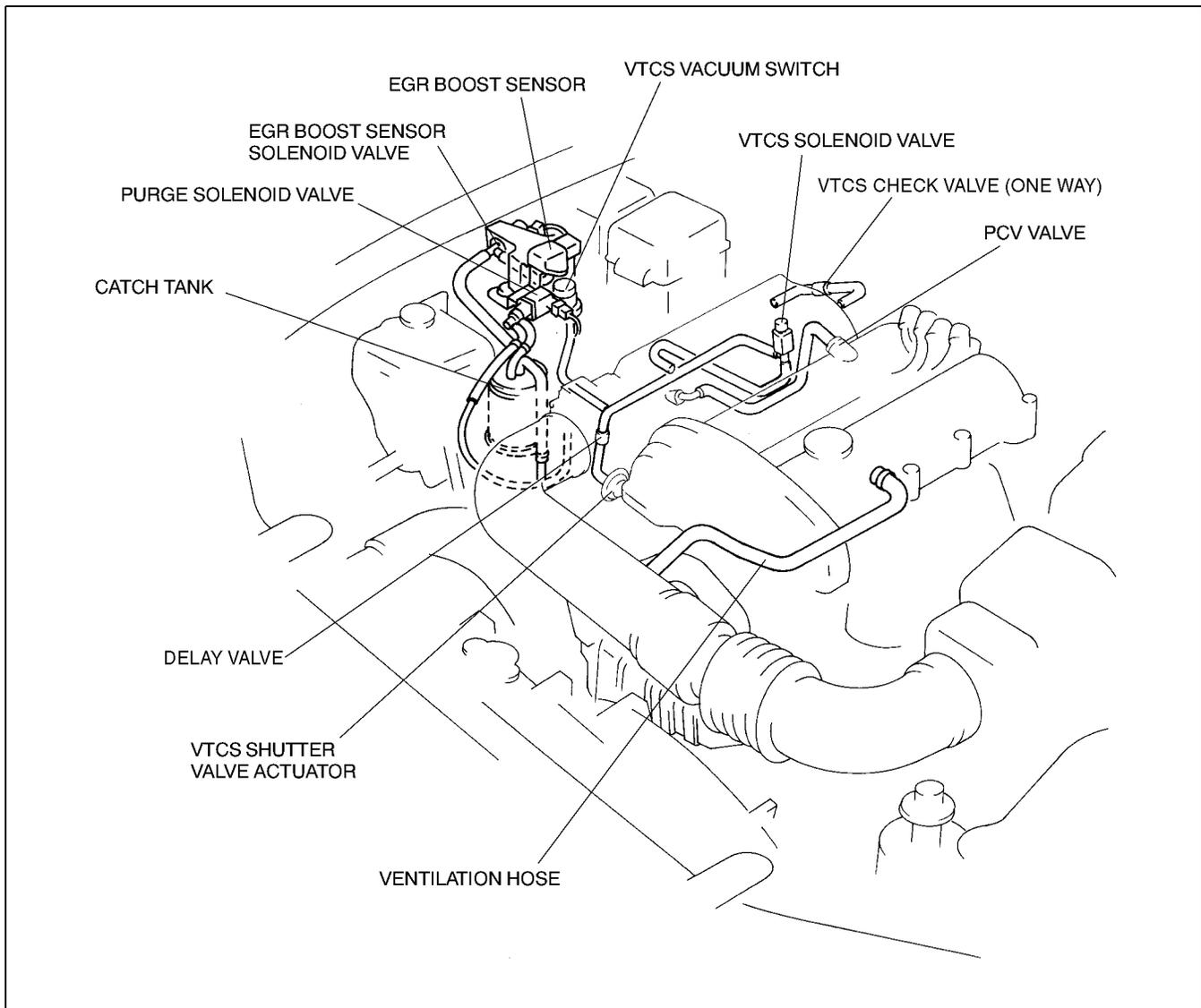
1	VTCS vacuum switch (See 01-13-8 VARIABLE TUMBLE CONTROL SYSTEM (VTCS) VACUUM SWITCH INSPECTION)
2	Accelerator cable (See 01-13-9 ACCELERATOR CABLE INSPECTION/ADJUSTMENT/ADJUSTMENT)
3	Throttle body (TB) (See 01-13-3 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION)
4	Air cleaner (ACL) (See 01-13-3 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION)
5	Dynamic chamber (See 01-13-3 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION)
6	Accelerator pedal (AP) (See 01-13-9 ACCELERATOR PEDAL (AP) REMOVAL/INSTALLATION)
7	Air hose (See 01-13-3 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION)
8	Intake manifold (See 01-13-3 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION)
9	VTCS solenoid valve (See 01-13-7 VARIABLE TUMBLE CONTROL SYSTEM (VTCS) SOLENOID VALVE REMOVAL/INSTALLATION) (See 01-13-8 VARIABLE TUMBLE CONTROL SYSTEM (VTCS) SOLENOID VALVE INSPECTION)

10	VTCS check valve (one way) (See 01-13-6 VARIABLE TUMBLE CONTROL SYSTEM (VTCS) CHECK VALVE (ONE-WAY), DELAY VALVE REMOVAL/INSTALLATION) (See 01-13-6 VARIABLE TUMBLE CONTROL SYSTEM (VTCS) CHECK VALVE (ONE-WAY), DELAY VALVE INSPECTION)
11	IAC valve (See 01-13-5 IDLE AIR CONTROL (IAC) VALVE REMOVAL/INSTALLATION) (See 01-13-5 IDLE AIR CONTROL (IAC) VALVE INSPECTION)
12	Delay valve (See 01-13-6 VARIABLE TUMBLE CONTROL SYSTEM (VTCS) CHECK VALVE (ONE-WAY), DELAY VALVE REMOVAL/INSTALLATION) (See 01-13-6 VARIABLE TUMBLE CONTROL SYSTEM (VTCS) CHECK VALVE (ONE-WAY), DELAY VALVE INSPECTION)
13	VTCS shutter valve actuator (See 01-13-6 VARIABLE TUMBLE CONTROL SYSTEM (VTCS) SHUTTER VALVE ACTUATOR REMOVAL/INSTALLATION) (See 01-13-7 VARIABLE TUMBLE CONTROL SYSTEM (VTCS) SHUTTER VALVE ACTUATOR INSPECTION)

# INTAKE-AIR SYSTEM

## VACUUM HOSE ROUTING DIAGRAM

A5U011320030W01



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## INTAKE-AIR SYSTEM REMOVAL/INSTALLATION

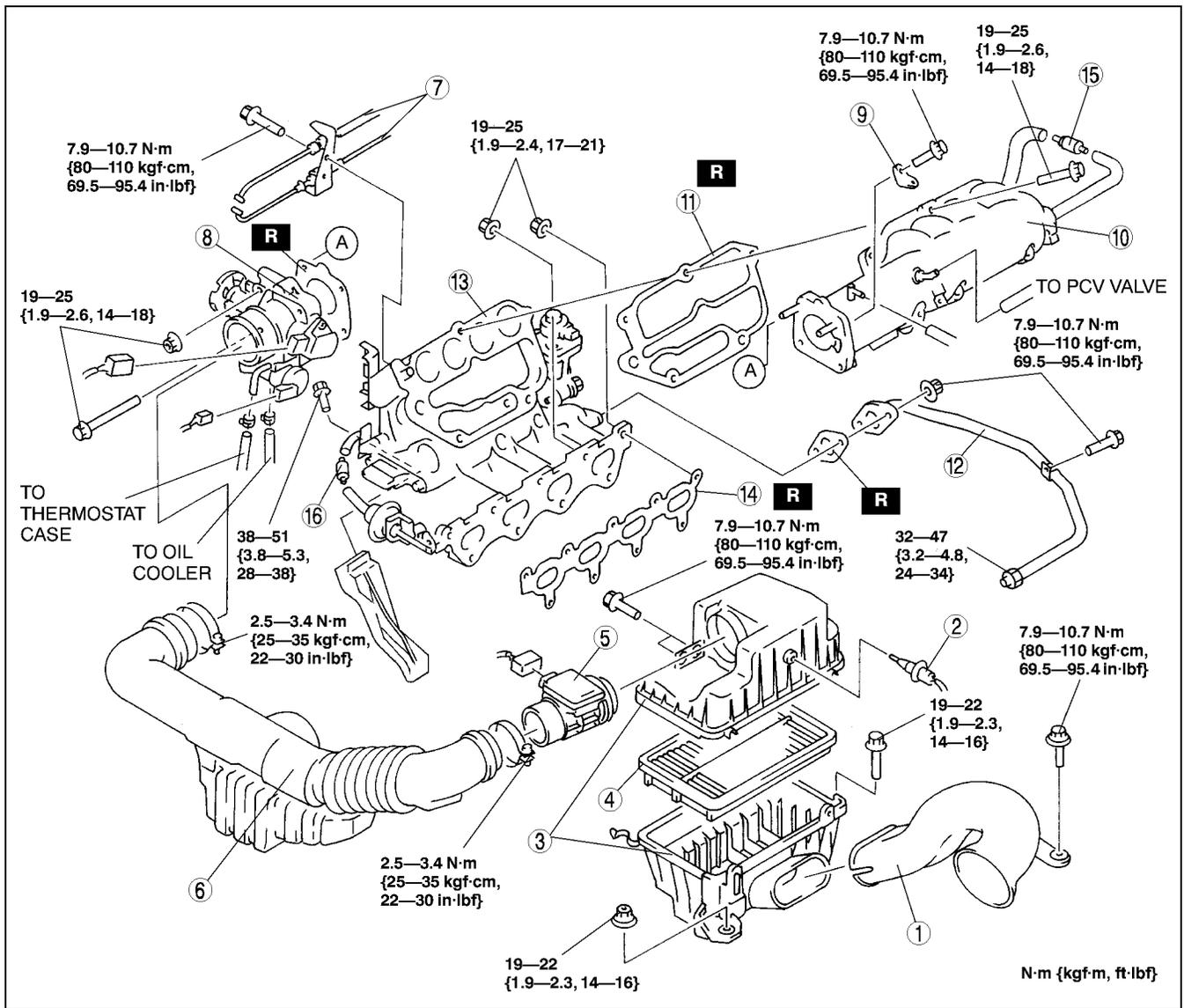
A5U011320661W01

### Warning

- Hot engines and intake-air system can cause severe burns. Turn off the engine and wait until it and the intake-air system are cool before removing the intake-air system.

1. Disconnect the negative battery cable.
2. Drain the engine coolant from radiator. (See 01-12-2 ENGINE COOLANT REPLACEMENT.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Refill the engine coolant to radiator. (See 01-12-2 ENGINE COOLANT REPLACEMENT.)

# INTAKE-AIR SYSTEM



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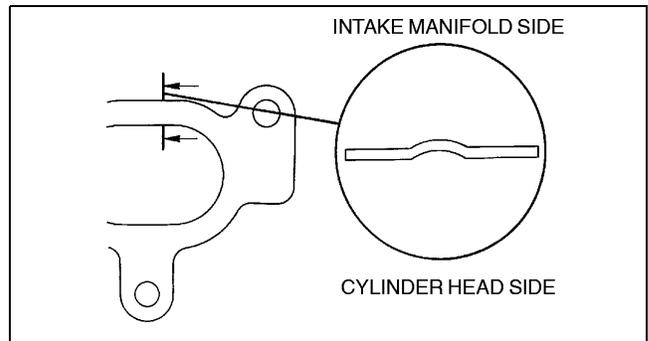
1	Fresh-air duct
2	IAT sensor
3	Air cleaner (ACL)
4	Air cleaner (ACL) element
5	MAF sensor
6	Air hose
7	Accelerator cable (and throttle cable (AT only))
8	Throttle body (TB)
9	Dynamic chamber bracket (See 01-13-5 Dynamic Chamber Bracket Installation Note)
10	Dynamic chamber

11	Dynamic chamber gasket (See 01-13-5 Dynamic Chamber Gasket Installation Note)
12	EGR pipe
13	Intake manifold
14	Intake manifold gasket (See 01-13-5 Intake Manifold Gasket Installation Note)
15	VTCS check valve (one-way)
16	Delay valve

# INTAKE-AIR SYSTEM

## Intake Manifold Gasket Installation Note

1. Install the intake manifold gasket with convex side of the gasket facing the intake manifold side.

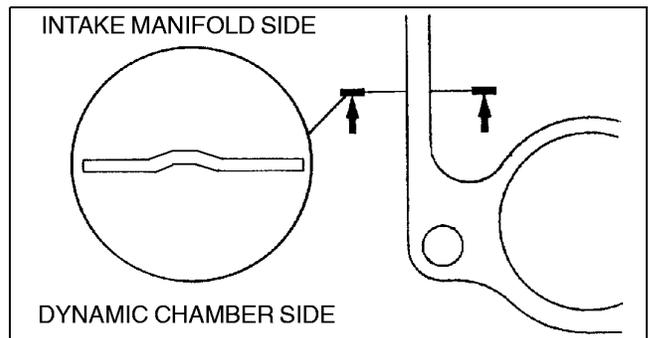


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## Dynamic Chamber Gasket Installation Note

1. Install the dynamic chamber gasket with the convex side of the gasket facing the intake manifold side.



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## Dynamic Chamber Bracket Installation Note

1. Tighten the bolts firmly, then tighten the dynamic chamber side bolt before tightening the fuel distributor side bolt.

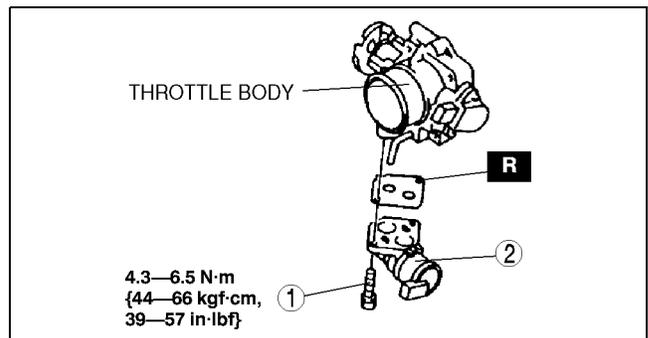
## IDLE AIR CONTROL (IAC) VALVE REMOVAL/INSTALLATION

A5U011320661W02

1. Disconnect the negative battery cable.
2. Remove the air hose and the throttle body. (See 01-13-3 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)
3. Disconnect the IAC valve connector.
4. Remove in the order indicated in the table.

1	Bolt
2	IAC valve

5. Install in the reverse order of removal.



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## IDLE AIR CONTROL (IAC) VALVE INSPECTION

A5U011320661W03

### Note

- Perform the following test only when directed.

### Simulation Test

1. Carry out the "Idle Air Control (IAC) Inspection". (See 01-03-56 Idle Air Control (IAC) Inspection.)
  - If not as specified, perform the further inspection for the IAC valve.

### Resistance Inspection

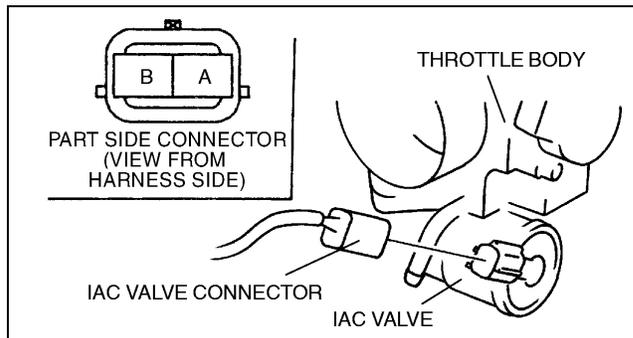
1. Disconnect the negative battery cable.
2. Disconnect the IAC valve connector.

## INTAKE-AIR SYSTEM

3. Measure the resistance between the IAC valve terminals using an ohmmeter.
  - If as specified but the Simulation Test is failed, carry out the "Circuit Open/Short Inspection".
  - If not as specified, replace the IAC valve. (See 01-13-5 IDLE AIR CONTROL (IAC) VALVE REMOVAL/INSTALLATION.)

### Resistance

**8.7—10.5 ohms (24°C {75°F})**



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4. Remove the IAC valve, and inspect it for any damage or clogging.
  - Replace the IAC valve if not as specified. (See 01-13-5 IDLE AIR CONTROL (IAC) VALVE REMOVAL/INSTALLATION.)

### Circuit Open/Short Inspection

#### Open circuit

- Power circuit (IAC valve connector terminal A and PCM connector terminal 2P)
- GND circuit (IAC valve connector terminal B and PCM connector terminal 2Q)

#### Short circuit

- IAC valve connector terminal A and PCM connector terminal 2P to GND

### VARIABLE TUMBLE CONTROL SYSTEM (VTCS) CHECK VALVE (ONE-WAY), DELAY VALVE REMOVAL/INSTALLATION

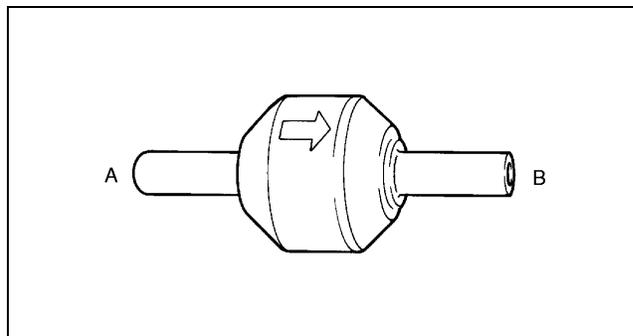
A5U011313995W01

1. Remove the VTCS check valve (one-way) or delay valve. (See 01-13-3 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)

### VARIABLE TUMBLE CONTROL SYSTEM (VTCS) CHECK VALVE (ONE-WAY), DELAY VALVE INSPECTION

A5U011313995W02

1. Remove the VTCS check valve (one-way) or delay valve. (See 01-13-6 VARIABLE TUMBLE CONTROL SYSTEM (VTCS) CHECK VALVE (ONE-WAY), DELAY VALVE REMOVAL/INSTALLATION.)
2. Blow through A and verify that the air flows from B.
3. Blow through B and verify that the air does not flow from A.
  - If not as specified, replace the VTCS check valve (one-way) or delay valve.



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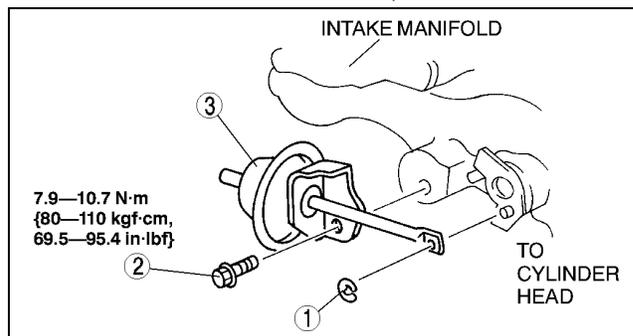
### VARIABLE TUMBLE CONTROL SYSTEM (VTCS) SHUTTER VALVE ACTUATOR REMOVAL/INSTALLATION

A5U011320152W01

1. Remove the air hose. (See 01-13-3 INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.

1	E ring
2	Bolt
3	VTCS shutter valve actuator

3. Install in the reverse order of removal.



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# INTAKE-AIR SYSTEM

## VARIABLE TUMBLE CONTROL SYSTEM (VTCS) SHUTTER VALVE ACTUATOR INSPECTION

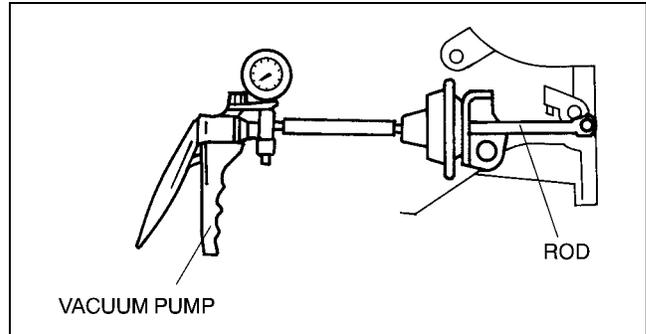
A5U011320152W02

### Note

- Perform the following test only when directed.

1. Disconnect the vacuum hose from the VTCS shutter valve actuator.
2. Connect a vacuum pump to the VTCS shutter valve actuator.
3. Apply vacuum slowly and inspect the rod movement of the VTCS shutter valve actuator under the following condition.

- If not as specified, replace the VTCS shutter valve actuator. (See 01-13-6 VARIABLE TUMBLE CONTROL SYSTEM (VTCS) SHUTTER VALVE ACTUATOR REMOVAL/INSTALLATION.)
- If as specified but the Simulation Test fails, inspect for the following:  
Vacuum hose improper routing, kinks or leakage.



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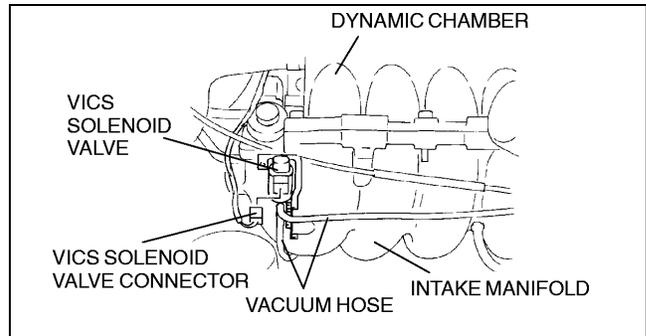
01-13

Step	Vacuum kPa {mmHg, inHg}	Rod movement
1	Approx. -9.3 {-69.8, -2.7}	Start to move
2	Below -34.7 {-260, -10.2}	Fully pulled
3	Above -6.7 {-51, -2.0}	Not pulled

## VARIABLE TUMBLE CONTROL SYSTEM (VTCS) SOLENOID VALVE REMOVAL/INSTALLATION

A5U011318740W01

1. Disconnect the negative battery cable.
2. Disconnect the VTCS solenoid valve connector.
3. Disconnect the vacuum hose from the VTCS solenoid valve.

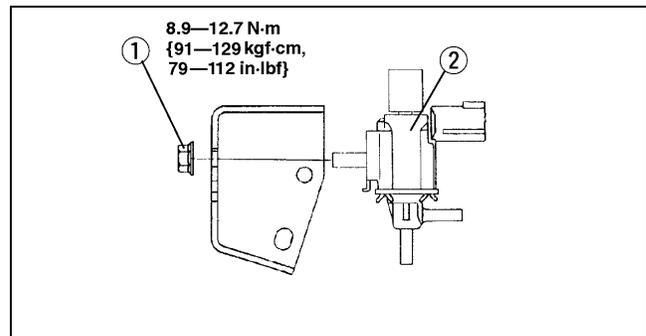


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4. Remove in the order indicated in the table.

1	Nut
2	VTCS solenoid valve

5. Install in the reverse order of removal.



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# INTAKE-AIR SYSTEM

## VARIABLE TUMBLE CONTROL SYSTEM (VTCS) SOLENOID VALVE INSPECTION

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### Airflow Inspection

#### Note

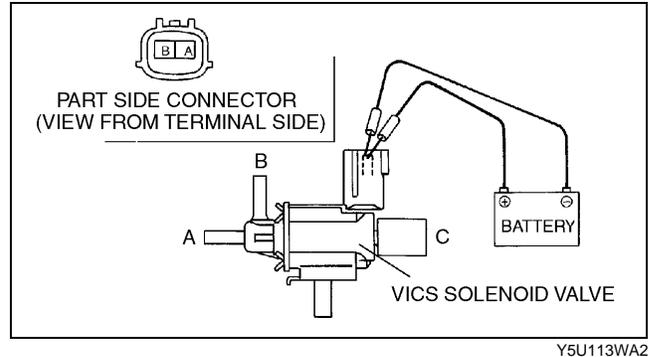
- Perform the following test only when directed.

- Remove the VTCS solenoid valve.
- Inspect for airflow between each port under the following condition.
  - If as specified but the Simulation Test is failed, inspect for the following and carry out the "Circuit Open/Short Inspection".  
Vacuum hose improper routing, kinks or leakage.
  - If not as specified, replace the VTCS solenoid valve.

○—○ : Continuity    ○=○ : Airflow

Step	Terminal		Port		
	A	B	A	B	C
1	○—○	○—○		○=○	○=○
2	B+	GND	○=○		

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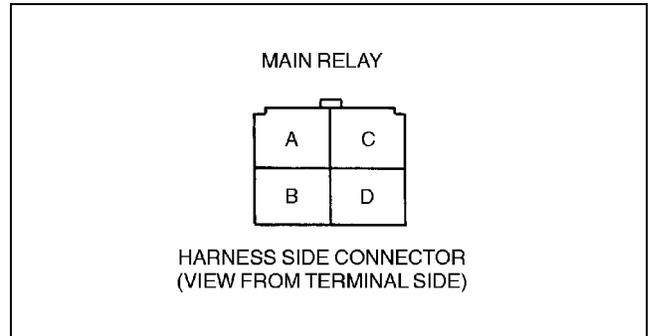
### Circuit Open/Short Inspection

#### Open circuit

- Power circuit (VTCS solenoid valve connector terminal A and main relay connector terminal D through common connector)
- GND circuit (VTCS solenoid valve connector terminal B and PCM connector terminal 2N)

#### Short circuit

- VTCS solenoid valve connector terminal A and main relay connector terminal D through common connector to GND



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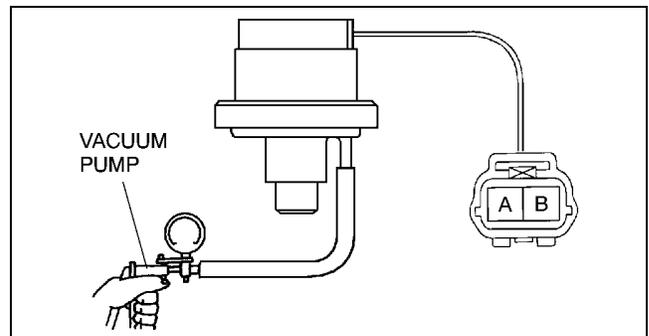
## VARIABLE TUMBLE CONTROL SYSTEM (VTCS) VACUUM SWITCH INSPECTION

A5U011313012W01

### Operation Inspection

- Disconnect the negative battery cable.
- Disconnect the vacuum hose from the VTCS vacuum switch.
- Connect a vacuum pump to the VTCS vacuum switch.
- Apply vacuum slowly and verify that continuity between the VTCS vacuum switch terminals changes as indicated in the table using an ohmmeter.
  - If not as specified, replace the VTCS vacuum switch.
  - If VTCS vacuum switch is okay but PID value is out of specification, perform the "Circuit Open/Short Inspection".

Step	Condition	Continuity
1	Apply pressure pf $-36 \sim -27$ kPa ( $-270 \sim -203$ mmHg, $-10 \sim -8$ inHg).	From no continuity to continuity
2	Disconnect vacuum hose.	From continuity to no continuity



A5U0113W001

- Reconnect the VTCS vacuum switch connector.

# INTAKE-AIR SYSTEM

## Circuit Open/Short Inspection

### Open circuit

- If there is no continuity and the circuit is open, repair or replace the harness.
  - Power circuit (VTCS vacuum switch connector terminal A and PCM connector terminal 4J through common connector)
  - GND circuit (VTCS vacuum switch connector terminal B and GND through common connector)

### Short circuit

- If there is no continuity and the circuit is shorted, repair or replace the harness.
  - VTCS vacuum switch connector terminal A and PCM connector terminal 4J through common connector to GND

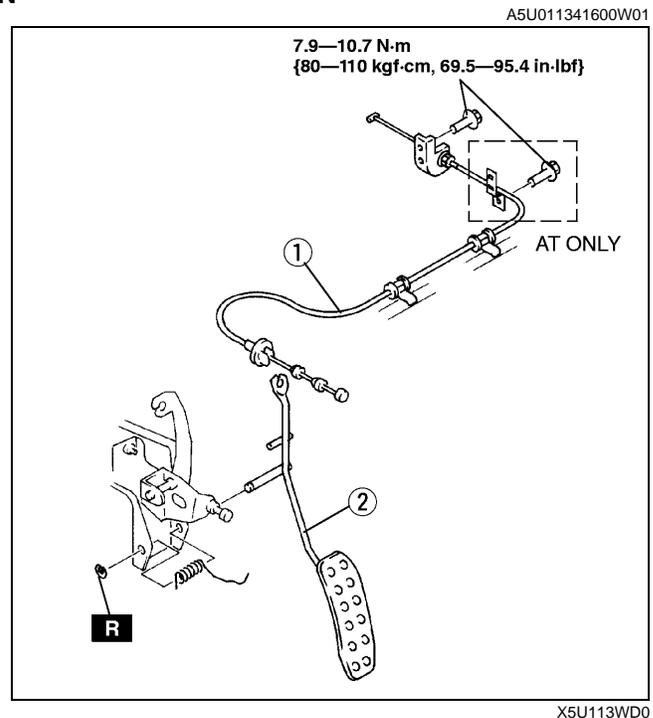
01-13

## ACCELERATOR PEDAL (AP) REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.

1	Accelerator cable (See 01-13-9 Accelerator Cable Installation Note)
2	AP

2. Install in the reverse order of removal.



### Accelerator Cable Installation Note

1. Carry out the "ACCELERATOR CABLE INSPECTION/ADJUSTMENT" procedure after installing the accelerator cable.

### ACCELERATOR CABLE INSPECTION/ADJUSTMENT

1. Verify that the throttle valve is at the closed throttle position (TP).
2. Measure the free play of the accelerator cable.
  - If not within the specification, adjust by turning locknuts A.

#### Free play

1–3 mm {0.04–0.11 in}

#### Tightening torque

9.9–14.0 N·m {1.0–1.5 kgf·m, 7.3–10.0 ft·lbf}

