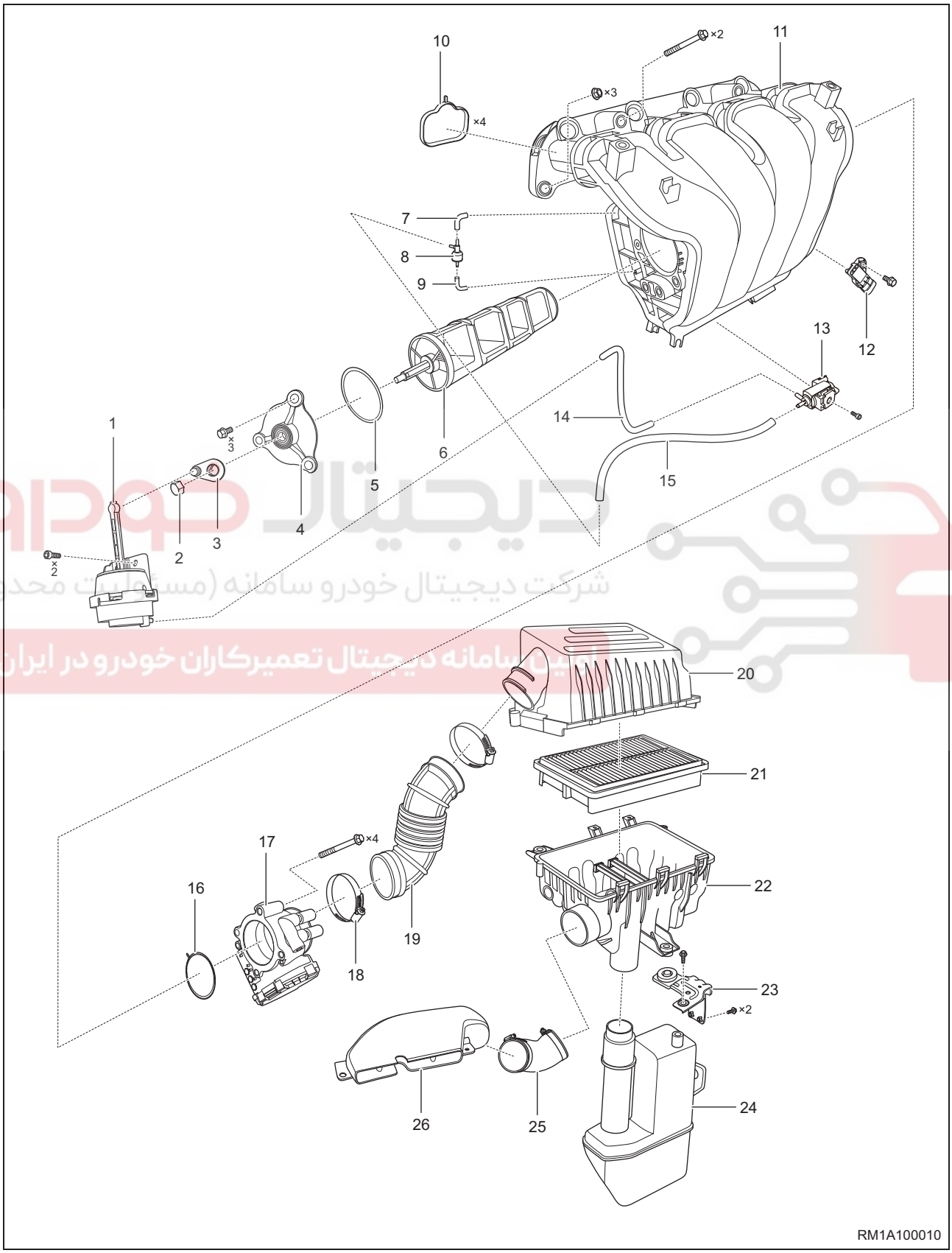
SQRE4G15B INTAKE SYSTEM

GENERAL INFORMATION

Description



1 - Vacuum Actuator	2 - Swing Arm Fixing Nut
3 - Swing Arm	4 - Rotary Valve Cap
5 - Rotary Valve O-ring	6 - Rotary Valve
7 - Intake Manifold Vacuum Cavity Vacuum Hose	8 - Check Valve
9 - Intake Manifold Resonant Cavity Vacuum Hose	10 - Intake Manifold Gasket
11 - Intake Manifold Assembly	12 - Intake Pressure/Temperature Sensor
13 - Variable Intake Air Solenoid Valve	14 - Vacuum Hose (Air Inlet)
15 - Vacuum Hose (Air Outlet)	16 - Electronic Throttle Assembly Gasket
17 - Electronic Throttle Assembly	18 - Worm Clamp
19 - Intake Hose	20 - Air Filter Upper Housing
21 - Air Filter Element	22 - Air Filter Lower Housing
23 - Air Filter Bracket	24 - Resonant Cavity Assembly
25 - Air Direct Hose	26 - Air Direct Pipe Assembly

Intake system mainly consists of air direct pipe, air filter assembly, intake pressure/temperature sensor, intake hose, electronic throttle assembly and intake manifold assembly, etc.

Intake system uses air filter to remove particulates and dust in air, and then the air filtered flows into intake manifold assembly through electronic throttle assembly and mixes with fuel at the end of intake manifold assembly port to form flammable gas mixture, which is transmitted to each cylinder uniformly to coordinate with engine operation.

Electronic throttle assembly is a critical part for engine intake system. Its main function is to control intake air volume by adjusting intake passage area according to driver's driving intention to meet intake requirements in different engine operating conditions, and send back position signals of throttle valve plate to control unit to achieve accurate control and run the engine under optimal control state.

Specifications

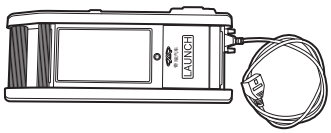
Torque Specifications

Description	Torque (N·m)
Coupling Screw Between Air Filter Upper Housing and Lower Housing	1.3 ± 0.2
Air Filter Assembly Fixing Bolt	8 ± 1.5
Air Filter Assembly Fixing Nut	8 ± 1.5
Air Direct Pipe Assembly Fixing Bolt	5 ± 1
Air Filter Bracket Fixing Bolt	5 ± 1
Resonant Cavity Fixing Bolt	8 ± 1.5/5 ± 1
Electronic Throttle Assembly Fixing Bolt	8 + 3
Engine Trim Cover Bracket	8 ± 3
Intake Manifold Assembly Fixing Nut	20 + 5
Vacuum Actuator Fixing Bolt	8 + 3
Rotary Valve Fixing Bolt	8 + 3
Variable Intake Air Solenoid Valve Fixing Bolt	8 + 3

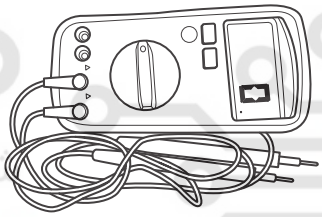
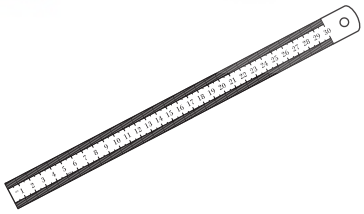
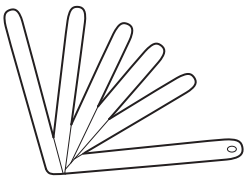
Description	Torque (N·m)
Electronic Accelerator Pedal Fixing Bolt	8 ± 1
Worm Clamp	3 ± 0.5

Tools

Special Tool

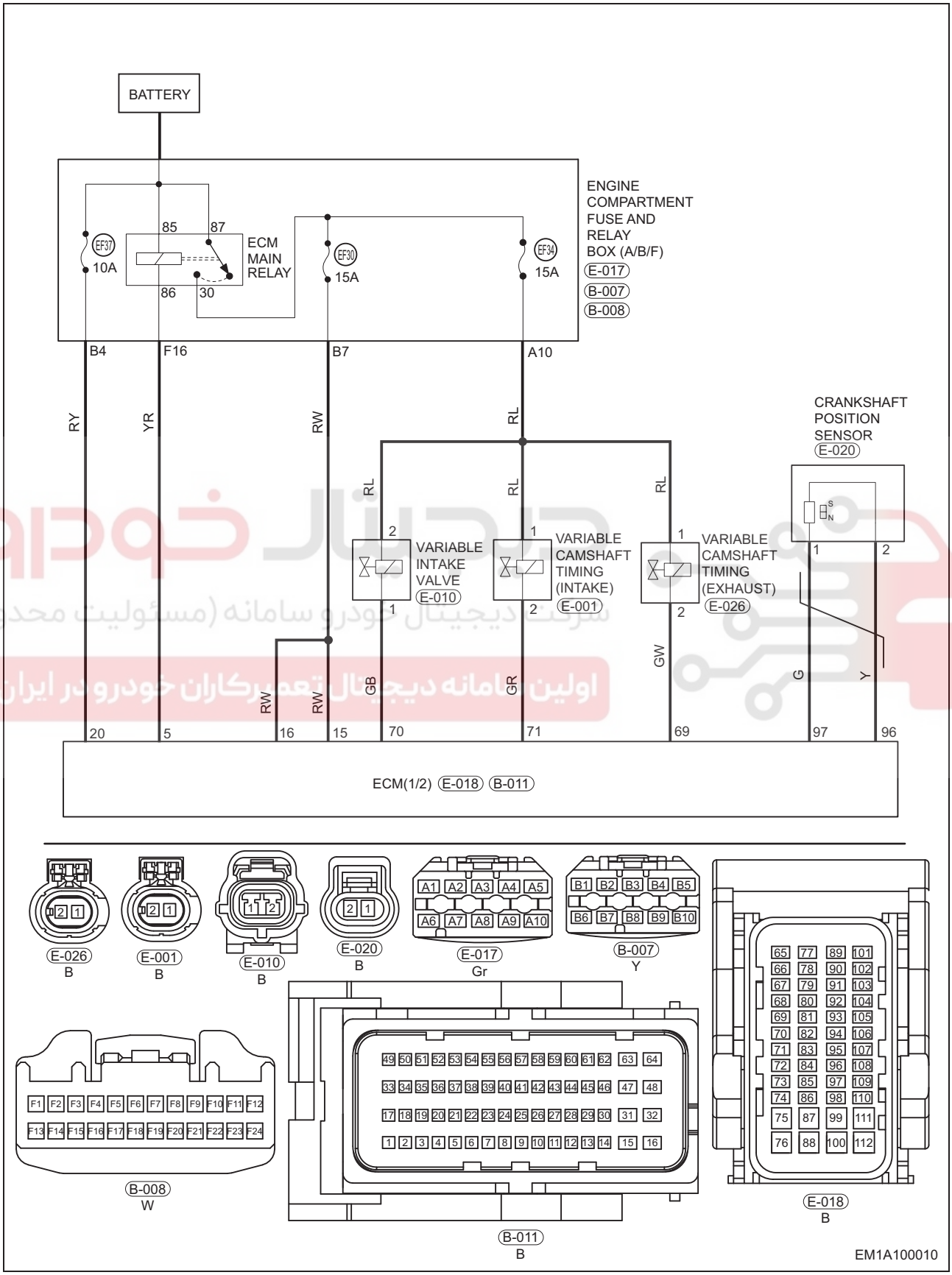
X-431 3G Diagnostic Tester	 RCH0000001

General Tools

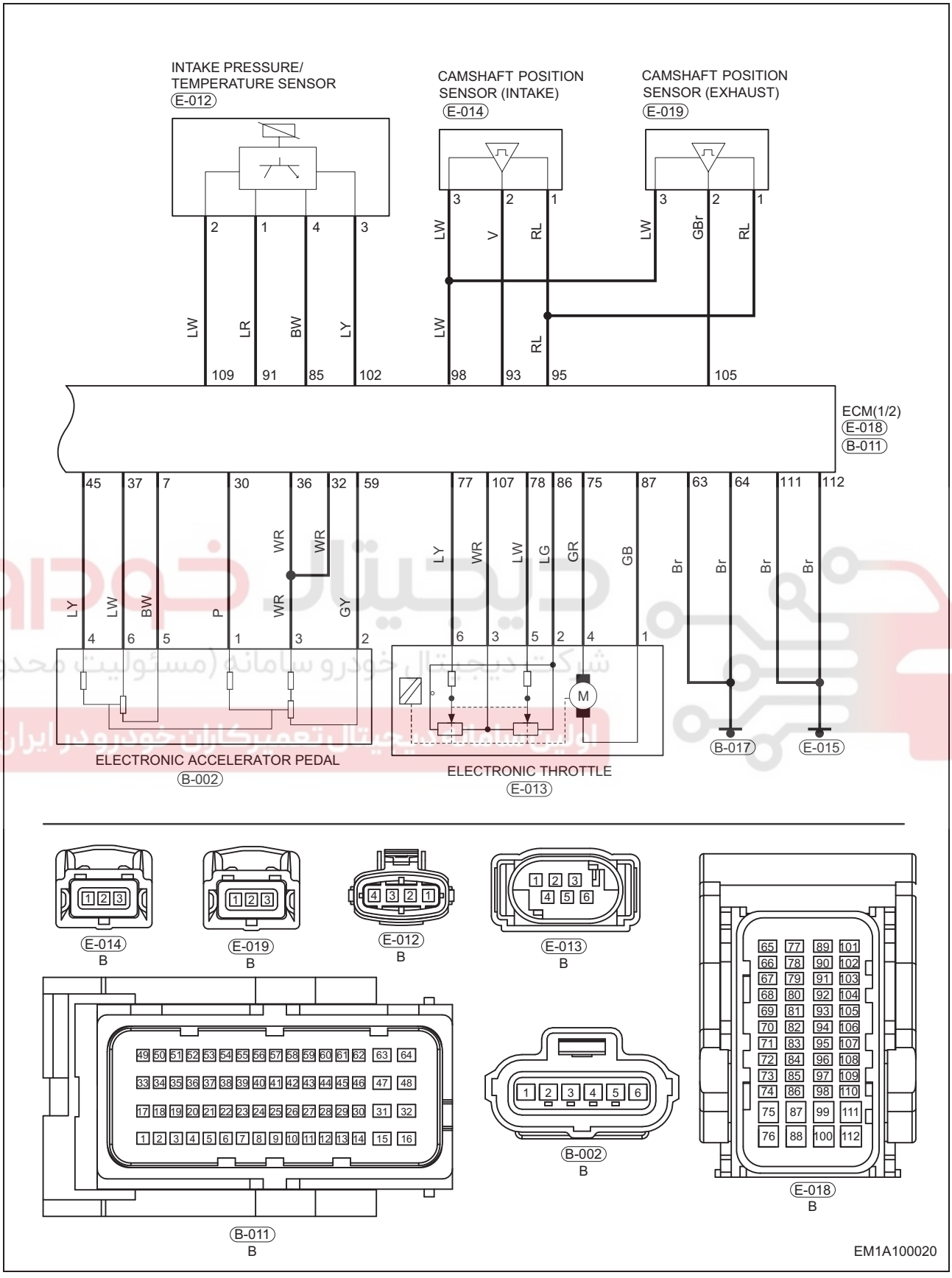
Digital Multimeter	 RCH0000002
Precision Straightedge	 RCH0000063
Feeler Gauge	 RCH0000060

Circuit Diagram

Intake System (Page 1 of 2)



Intake System (Page 2 of 2)



DIAGNOSIS & TESTING

Problem Symptoms Table

HINT:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair or adjust faulty components, or replace as necessary.

Symptom	Possible Cause	See page
Engine idles roughly	Electronic throttle assembly (dirty)	10-14
	Intake manifold assembly (broken, leaked)	10-18
	Activated charcoal canister solenoid valve (remains on)	09-7
	Intake pressure/temperature sensor	06-282
	Throttle gasket (damaged)	10-15
	Fuel rail injector assembly (installed incorrectly)	08-26
Intake system leaks	Air filter (broken, leaked)	10-12
	Intake manifold assembly (broken, leaked)	10-18
	Electronic throttle assembly	10-14
	Crankcase vent tube	-
	Intake line or component connection	-
Intake system blocked	Air filter element (damaged, blocked)	10-9
	Intake line (blocked)	-

ON-VEHICLE SERVICE

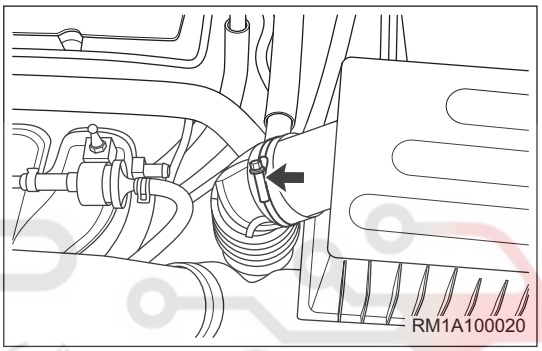
Air Filter Element

Removal

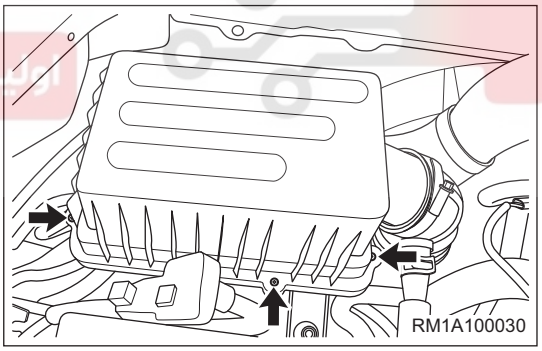
CAUTION

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

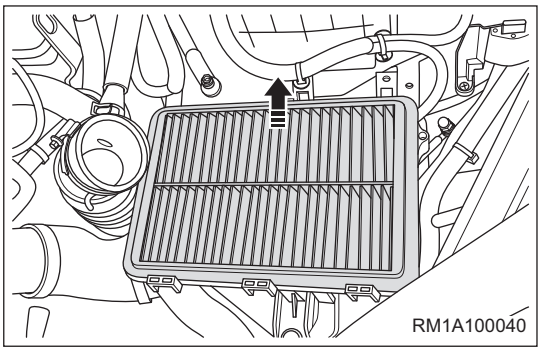
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the air filter element.
   a. Loosen worm clamp (arrow) and disconnect connection between intake hose and air filter upper housing.
   (Tightening torque: 3 ± 0.5 N·m)



   b. Remove 3 coupling screws (arrow) between air filter upper and lower housings.
   (Tightening torque: 1.3 ± 0.2 N·m)



   c. Remove the air filter upper housing.
   d. Remove the air filter element.



Installation

1. Clean the air filter upper and lower housings.
2. Install a new air filter element.
3. Other installation procedures are in the reverse order of removal.

ENVIRONMENTAL PROTECTION

- Wasted air filter element should be handled by the specialized department according to local laws and regulations. Never discard it at will.

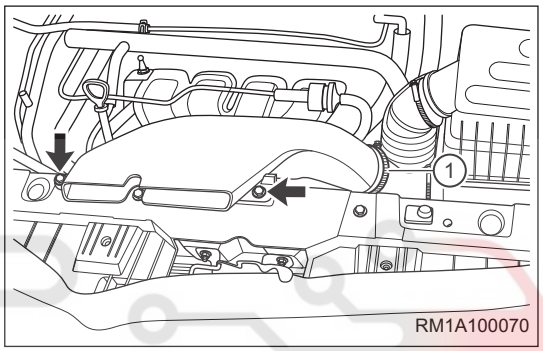
Air Direct Pipe Assembly

Removal

CAUTION

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the air direct pipe assembly.
   a. Remove the front bumper assembly (See page 49-8).
   b. Remove the front bumper lower protector (See page 49-20).
   c. Remove 2 fixing bolts (arrow) from air direct pipe assembly.
   (Tightening torque: 5 ± 1 N·m)
   d. Loosen worm clamp (1) and disconnect connection between air direct pipe assembly and intake hose.
   (Tightening torque: 3 ± 1 N·m)



   e. Remove the air direct pipe assembly.

Installation

Installation is in the reverse order of removal.

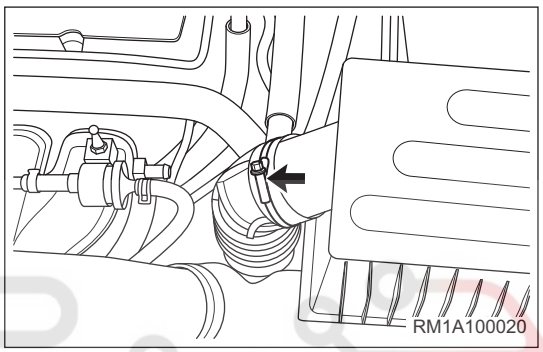
Air Filter Assembly

Removal

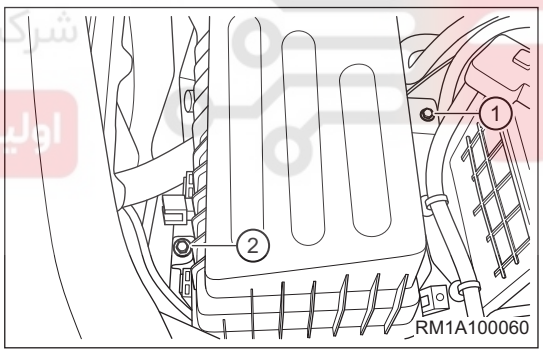
CAUTION

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

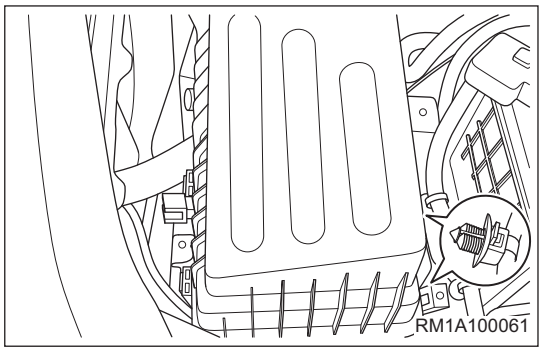
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the air direct pipe assembly (See page 10-11).
4. Remove the air filter assembly.
   a. Loosen worm clamp (arrow) and disconnect connection between intake hose and air filter upper housing.
   (Tightening torque: 3 ± 0.5 N·m)



   b. Remove fixing bolt (1) and fixing nut (2) from air filter assembly.
   (Tightening torque: 8 ± 1.5 N·m)



   c. As shown in illustration, remove 2 clips and move away positive battery cable assembly, then remove air filter assembly.



Installation

Installation is in the reverse order of removal.

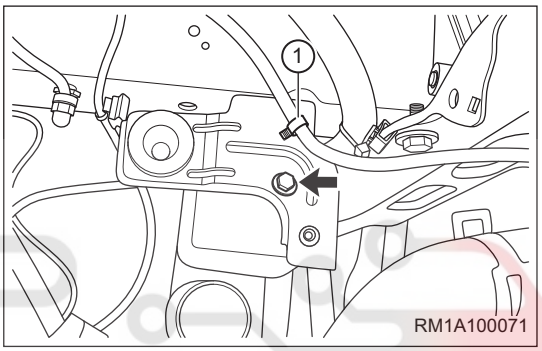
Air Filter Bracket and Resonant Cavity Assembly

Removal

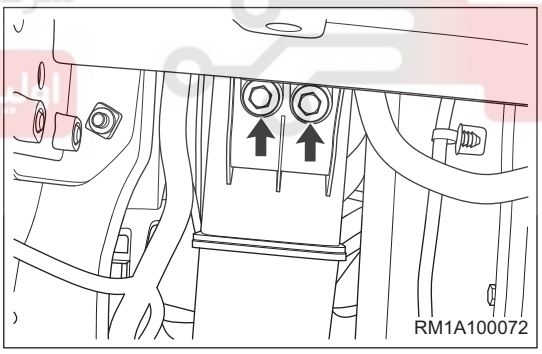
CAUTION

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

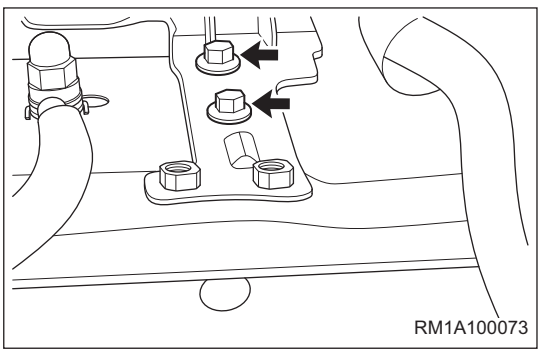
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the air direct pipe assembly (See page 10-11).
4. Remove the air filter assembly (See page 10-12).
5. Remove the air filter bracket and resonant cavity assembly.
   a. Remove wire harness fixing clip (1) from air filter bracket, and remove resonant cavity fixing bolt (arrow).
   (Tightening torque: 8 ± 1.5 N·m)



   b. Remove 2 fixing bolts (arrow) from air filter bracket, and remove resonant cavity.
   (Tightening torque: 8 ± 1.5 N·m)



   c. Remove 2 fixing bolts (arrow) from front left side rail assembly, and remove air filter bracket.
   (Tightening torque: 5 ± 1 N·m)



Installation

Installation is in the reverse order of removal.

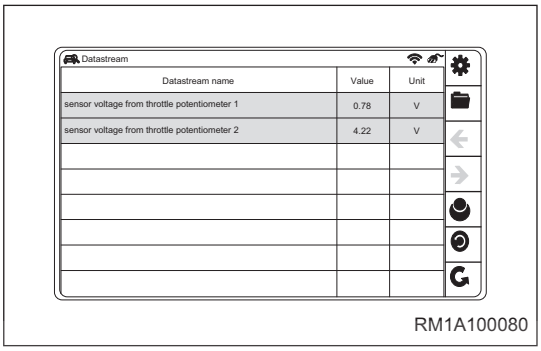
Electronic Throttle Assembly

On-vehicle Inspection

1. Check the electronic throttle assembly.
   a. Throttle valve plate should be in NLP position with power off and can rotate smoothly when flipping it by hand. If seizing occurs, it indicates that internal components may be damaged, and replace electronic throttle assembly.
   b. Connect X-431 3G diagnostic tester to Data Link Connector (DLC).
   c. Turn ignition switch to ON and turn on X-431 3G diagnostic tester.
   d. Read datastream on X-431 3G diagnostic tester.

Accelerator Pedal Released

Datastream Name	Specification (V)
Sensor voltage from throttle potentiometer 1	0.78
Sensor voltage from throttle potentiometer 2	4.22



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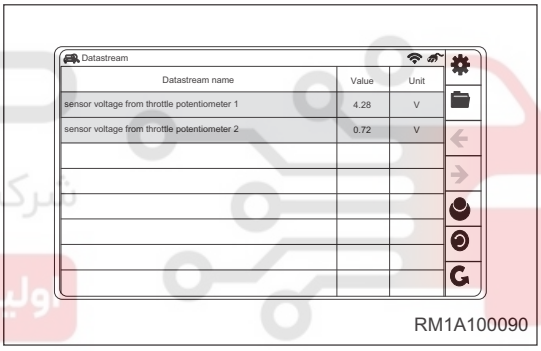
Accelerator Pedal Released

Datastream Name	Specification (V)
Sensor voltage from throttle potentiometer 1	4.28
Sensor voltage from throttle potentiometer 2	0.72



If result is not as specified, check wire harness and ECM, or replace electronic throttle assembly.

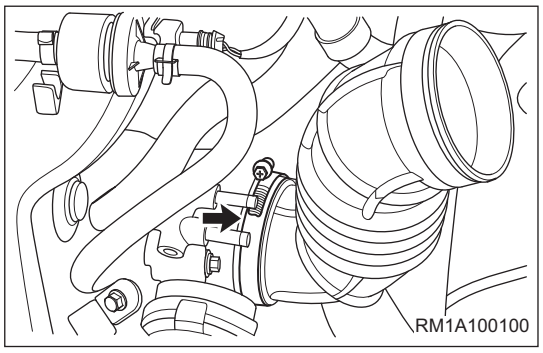
Removal

CAUTION

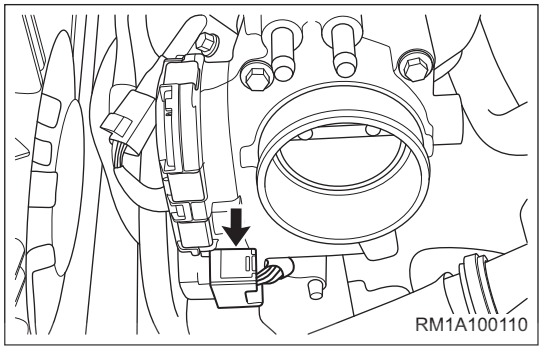
- Engine compartment temperature is very high when engine is running. Before removal, make sure that engine has shut off and engine compartment has cooled down sufficiently, otherwise, there is a risk of scald injury.
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the air direct pipe assembly (See page 10-11).
5. Remove the air filter assembly (See page 10-12).
6. Remove the electronic throttle assembly.

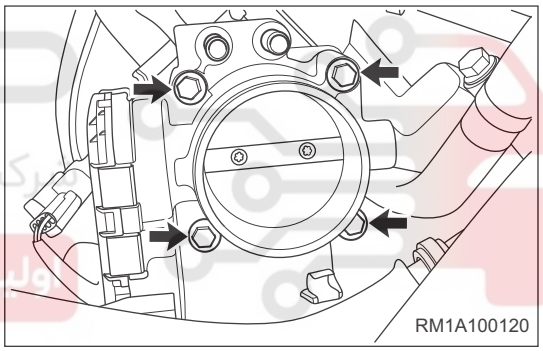
a. Loosen worm clamp (arrow), disconnect connection between intake hose and electronic throttle assembly and move away intake hose.
(Tightening torque: 3 ± 0.5 N·m)



b. Disconnect the electronic throttle assembly connector (arrow).



c. Remove 4 fixing bolts (arrow) from electronic throttle assembly.
(Tightening torque: 8 + 3 N·m)

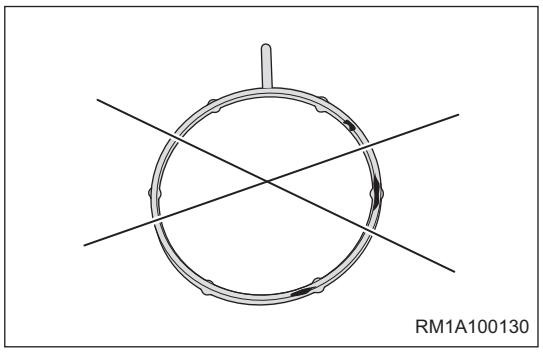


d. Remove electronic throttle assembly, and remove gasket from intake manifold assembly.

Inspection

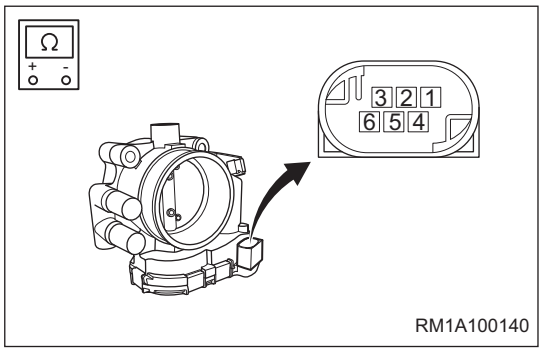
1. Check the electronic throttle assembly gasket.

   Check electronic throttle assembly gasket for wear or deterioration. If there is wear or deterioration, replace electronic throttle assembly gasket.



2. Check the electronic throttle assembly.

   Measure resistance of electronic throttle assembly according to table below.



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Multimeter Connection	Condition	Specified Condition
Terminal 6 - Terminal 2 Terminal 6 - Terminal 3	Throttle turned	Resistance between terminals 6 and 2 increases as throttle opens; resistance between terminals 6 and 3 decreases as throttle opens.
Terminal 5 - Terminal 2 Terminal 5 - Terminal 3	Throttle turned	Resistance between terminals 5 and 2 decreases as throttle opens; resistance between terminals 5 and 3 increases as throttle opens.

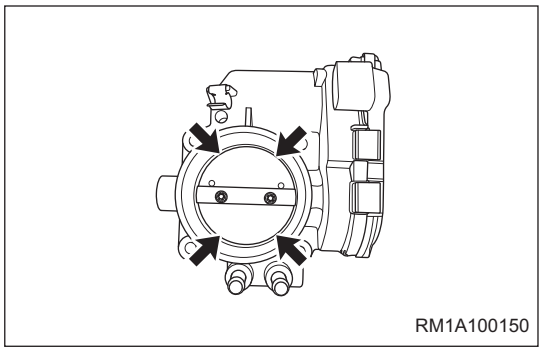
Cleaning

Cleaning Tool

1. Thin stick: used to support throttle valve plate for cleaning carbon deposited on contact wall between valve plate and throttle. Please use plastic, wooden or bamboo thin stick. Do not use metal thin stick to avoid scratching or deforming valve plate.
2. Clean cloth or paper towel.

Cleaning Process

1. Remove electronic throttle assembly, and face valve plate upward in free condition. Avoid cleaner flowing into electronic element through valve plate shaft, resulting in functional failure.
2. Start to clean when it is as shown in illustration.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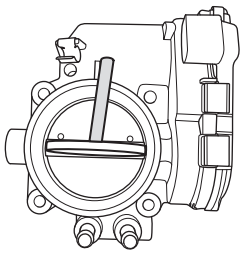
⚠ WARNING

- Cleaner is a kind of flammable and corrosive fluid. Follow safety cautions to prevent accidents, and avoid skin contacting with cleaner.

3. Apply appropriate amount of cleaner to inner wall of throttle valve body, and remove carbon with clean cloth.
4. Support throttle valve plate with a thin stick, and clean carbon deposited on valve plate and throttle valve body inner wall.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5. Turn over throttle 180°, and clean it with the same procedures as above. Repeat several times until it is clean.
6. Push valve plate by hand, and check if it rotates smoothly. If it is stuck, clean it again according to cleaning procedures.
7. After cleaning, wipe off cleaner in throttle valve body with absorbent paper.

Installation

Installation is in the reverse order of removal.

CAUTION

- Clean fitting surface of electronic throttle assembly.
- Perform throttle self-learning procedures after installation (See page 06-22). After self-learning is completed, start vehicle and check for proper operation.

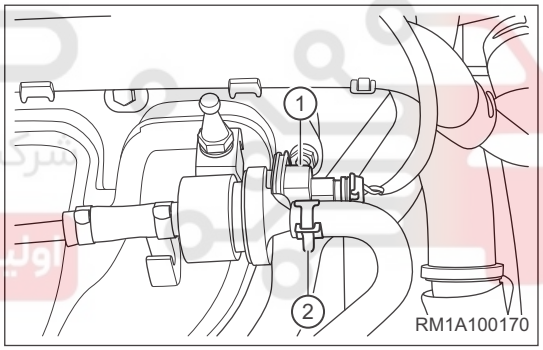
Intake Manifold Assembly

Removal

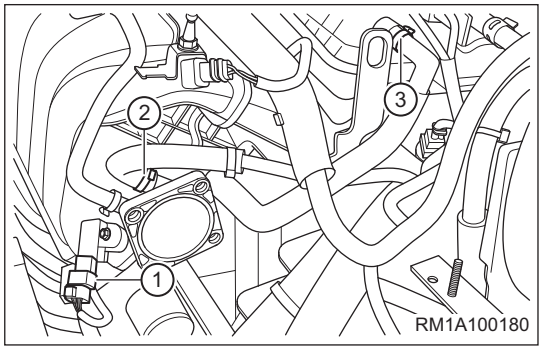
CAUTION

- Engine compartment temperature is very high when engine is running. Before removal, make sure that engine has shut off and engine compartment has cooled down sufficiently, otherwise, there is a risk of scald injury.
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.

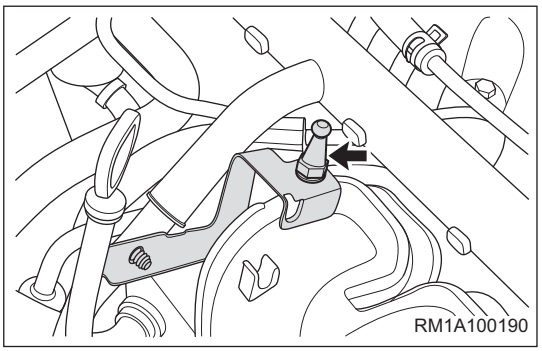
1. Release the fuel system pressure (See page 08-10).
2. Turn off all electrical equipment and the ignition switch.
3. Disconnect the negative battery cable.
4. Remove the engine trim cover.
5. Remove the fuel rail injector assembly (See page 08-26).
6. Remove the air filter assembly (See page 10-12).
7. Remove the electronic throttle assembly (See page 10-14).
8. Remove the intake manifold assembly.
   a. Disconnect charcoal canister solenoid valve connector (1), loosen elastic clamp (2) and disconnect connection between charcoal canister solenoid valve and its air outlet hose.



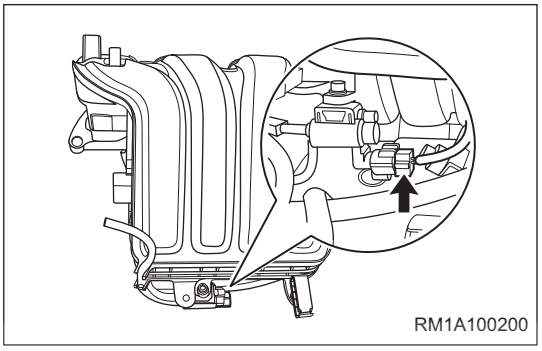
   b. Move away charcoal canister solenoid valve from bracket, and move away charcoal canister solenoid valve and its line from intake manifold.
   c. Disconnect the intake pressure/temperature sensor (1). Loosen clamping ring (2) and disconnect connection between vacuum booster hose and intake manifold assembly. Loosen clamping ring (3) and disconnect connection between PCV hose and PCV.



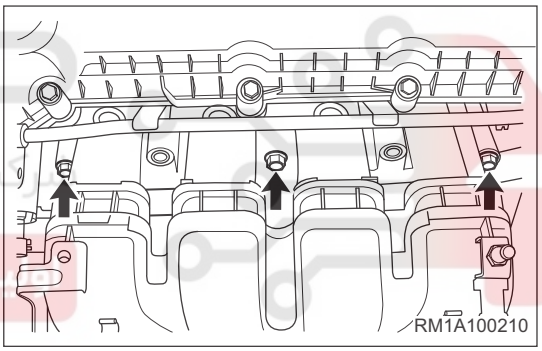
d. Remove the oil dipstick tube stud bolt (arrow).
(Tightening torque: 7 ± 1 N·m)



e. Disconnect the variable intake air solenoid valve connector (arrow).



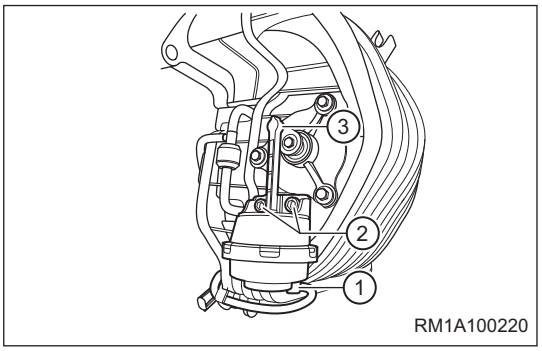
f. Remove 3 fixing nuts (arrow) from intake manifold assembly.
(Tightening torque: 20 + 5 N·m)



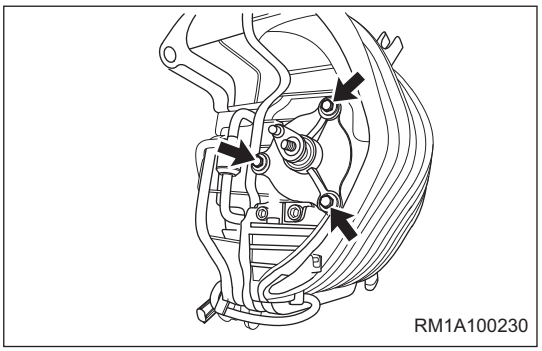
g. Remove the intake manifold assembly.

Disassembly

1. Remove the vacuum actuator.
   a. Disconnect coupling hose (1) from vacuum actuator.
   b. Remove 2 fixing bolts (2) from vacuum actuator.
   (Tightening torque: 8 + 3 N·m)
   c. Disconnect connection between vacuum actuator and rotary valve, and remove vacuum actuator (3).



2. Remove the rotary valve.
   a. Remove 3 fixing bolts (arrow) from rotary valve. (Tightening torque: 8 + 3 N·m)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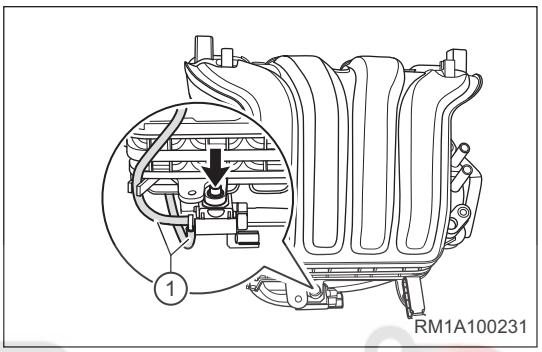
   b. Remove the rotary valve.
3. Remove the variable intake air solenoid valve.
   a. Disconnect coupling hose (1) from variable intake air solenoid valve.
   b. Remove fixing bolt (arrow) from variable intake air solenoid valve, and remove variable intake air solenoid valve. (Tightening torque: 8 + 3 N·m)



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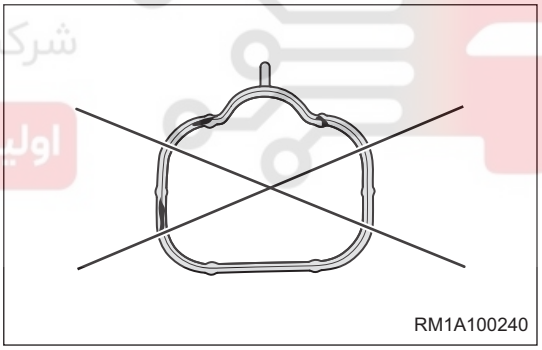
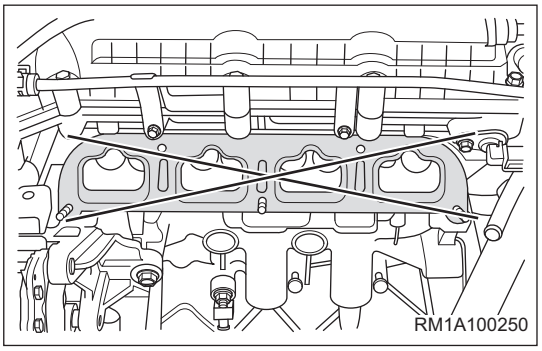
Inspection

1. Check the intake manifold gasket.
   Check intake manifold gasket, and replace if it is deteriorated or damaged.


RM1A100240

2. Check for surface warpage on intake side of cylinder head.
   a. Clean and check fitting surface between intake manifold assembly and cylinder head.
   b. As shown in illustration, measure surface warpage on intake side of cylinder head diagonally with a straightedge and a feeler gauge. If surface warpage is greater than 0.04 mm, replace it.


RM1A100250

Assembly

Assembly is in the reverse order of disassembly.

Installation

Installation is in the reverse order of removal.

CAUTION

- Clean the inner wall and fitting surface of intake manifold assembly.
- Replace intake manifold gasket if it is damaged during installation.

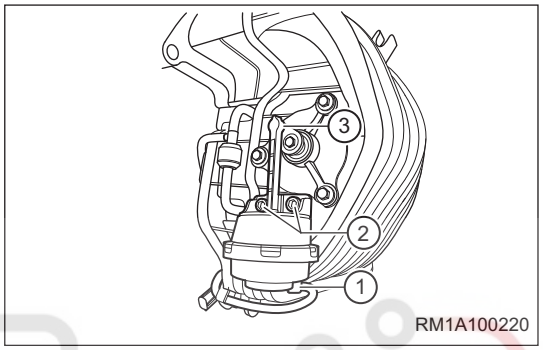
Variable Intake System (VIS)

Removal

CAUTION

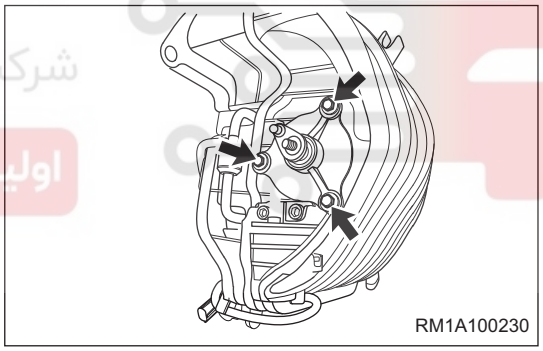
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent interior from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the vacuum actuator.
   a. Disconnect coupling hose (1) from vacuum actuator.
   b. Remove 2 fixing bolts (2) from vacuum actuator. (Tightening torque: 8 + 3 N·m)
   c. Disconnect connection between vacuum actuator and rotary valve, and remove vacuum actuator (3).

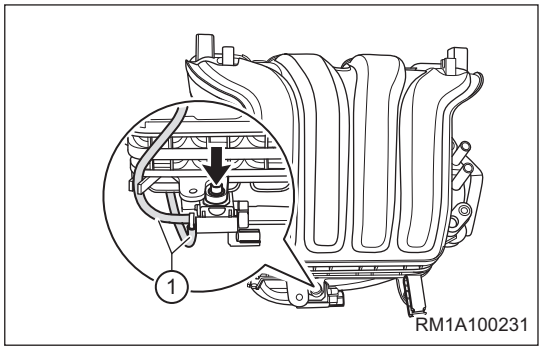


RM1A100220

5. Remove the rotary valve.
   a. Remove 3 fixing bolts (arrow) from rotary valve. (Tightening torque: 8 + 3 N·m)


RM1A100230

6. Remove the variable intake air solenoid valve.
   a. Disconnect coupling hose (1) from variable intake air solenoid valve.
   b. Remove fixing bolt (arrow) from variable intake air solenoid valve, and remove variable intake air solenoid valve. (Tightening torque: 8 + 3 N·m)



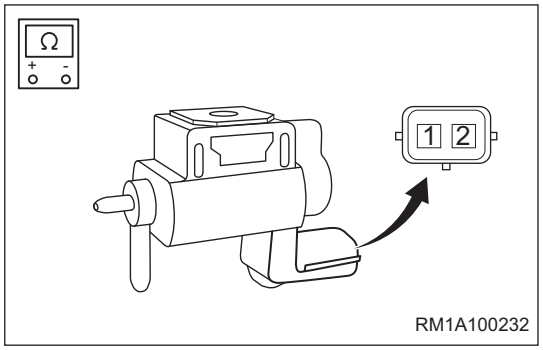
RM1A100231

Inspection

1. Check the variable intake air solenoid valve.
   a. Adjust multimeter to ohm band and check resistance of variable intake air solenoid valve.

Multimeter Connection	Condition	Specified Condition
Terminal 1 - Terminal 2	Normal temperature	30 Ω

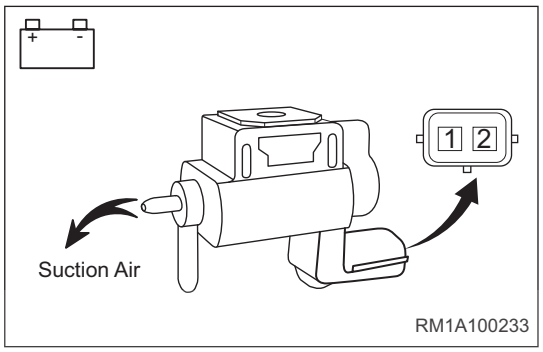
If resistance value of variable intake air solenoid valve exceeds specified range, replace it with a new one.



   b. Apply battery voltage to terminals 2 and 1 of variable intake air solenoid valve, and check if variable intake air solenoid valve turns on.

Battery Connection	Condition	Specified Condition
Battery positive - Terminal 2 Battery negative - Terminal 1	Always	ON
Battery positive - Terminal 2 Battery negative - Terminal 1	Disconnected	OFF

If resistance value of variable intake air solenoid valve is not as specified, replace it with a new one.



Installation

Installation is in the reverse order of removal.

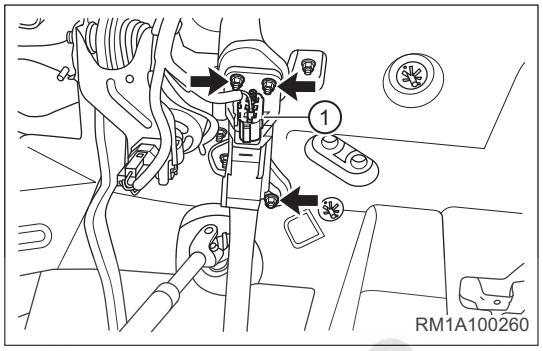
Electronic Accelerator Pedal

Removal

CAUTION

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent interior from being scratched during removal and installation.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the electronic accelerator pedal.
   a. Disconnect the electronic accelerator pedal connector (1).
   b. Remove 3 fixing nuts (arrow) from electronic accelerator pedal.
   (Tightening torque: 8 ± 1 N·m)



   c. Remove the electronic accelerator pedal.

Installation

Installation is in the reverse order of removal.