

## GROUP 13A

# MULTIPOINT FUEL INJECTION (MPI) <4G64>

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## GENERAL INFORMATION

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The Multipoint Fuel Injection System consists of sensors which detect the engine conditions, the engine-A/T-ECU which controls the system based on signals from these sensors, and actuators which operate under the control of the engine-A/T-ECU.

### FUEL INJECTION CONTROL

The injector drive times and injector timing are controlled so that the optimum air/fuel mixture is supplied to the engine to correspond to the continually-changing engine operation conditions. A single injector is mounted at the intake port of each cylinder. Fuel is sent under pressure from the fuel tank by the fuel pump, with the pressure being regulated by the fuel pressure regulator. The fuel thus regulated is distributed to each of the injectors.

Fuel injection is normally carried out once for each cylinder for every two rotations of the crankshaft. The firing order is 1-3-4-2. This is called sequential fuel injection. The engine-A/T-ECU provides a richer air/fuel mixture by carrying out "open-loop" control

The engine-A/T-ECU carries out activities such as fuel injection control, idle speed control and ignition timing control. In addition, the engine-A/T-ECU is equipped with several diagnosis modes which simplify troubleshooting when a problem develops.

when the engine is cold or operating under high load conditions in order to maintain engine performance. In addition, when the engine is warm or operating under normal conditions, the engine-A/T-ECU controls the air/fuel mixture by using the oxygen sensor signal to carry out "closed-loop" control in order to obtain the theoretical air/fuel mixture ratio that provides the maximum cleaning performance from the three way catalyst.

### IDLE AIR CONTROL

The idle speed is kept at the optimum speed by controlling the amount of air that bypasses the throttle valve in accordance with changes in idling conditions and engine load during idling. The engine-A/T-ECU drives the idle speed control motor to keep the engine running at the pre-set idle target speed in accordance with the engine coolant temperature and

air conditioner load. In addition, when the air conditioner switch is turned off and on while the engine is idling, the idle speed control motor operates to adjust the throttle valve bypass air amount in accordance with the engine load conditions in order to avoid fluctuations in the engine speed.

### IGNITION TIMING CONTROL

The power transistor located in the ignition primary circuit turns ON and OFF to control the primary current flow to the ignition coil. This controls the ignition timing in order to provide the optimum ignition timing with respect to the engine operating conditions. The ignition timing is determined by the engine-A/T-ECU from the engine speed, intake air volume, engine coolant temperature and atmospheric pressure.

### SELF-DIAGNOSIS FUNCTION

- When an abnormality is detected in one of the sensors or actuators related to emission control, the engine warning lamp (check engine lamp) illuminates as a warning to the driver.
- When an abnormality is detected in one of the sensors or actuators, a diagnosis code corresponding to the abnormality is output.
- The RAM data inside the engine-A/T-ECU that is related to the sensors and actuators can be read by means of the M.U.T.-II/III. In addition, the actuators can be force-driven under certain circumstances.

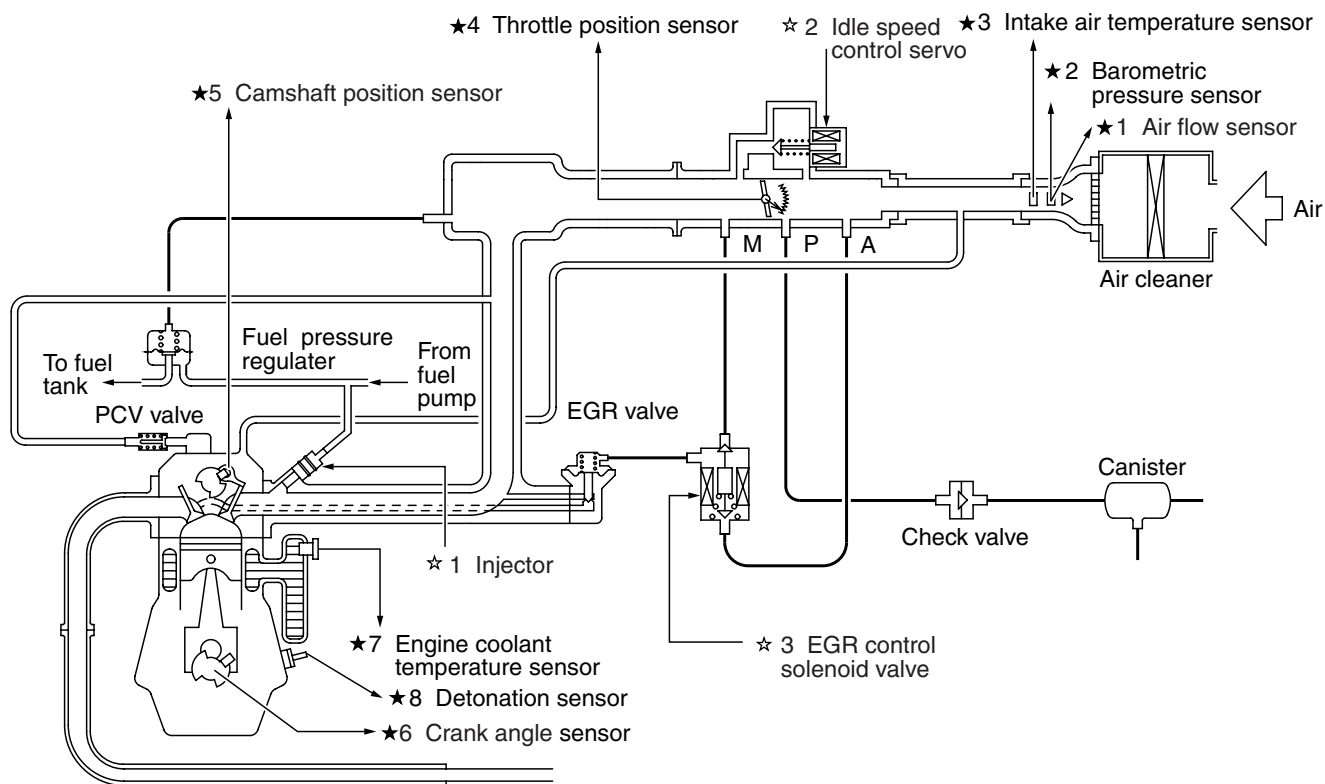
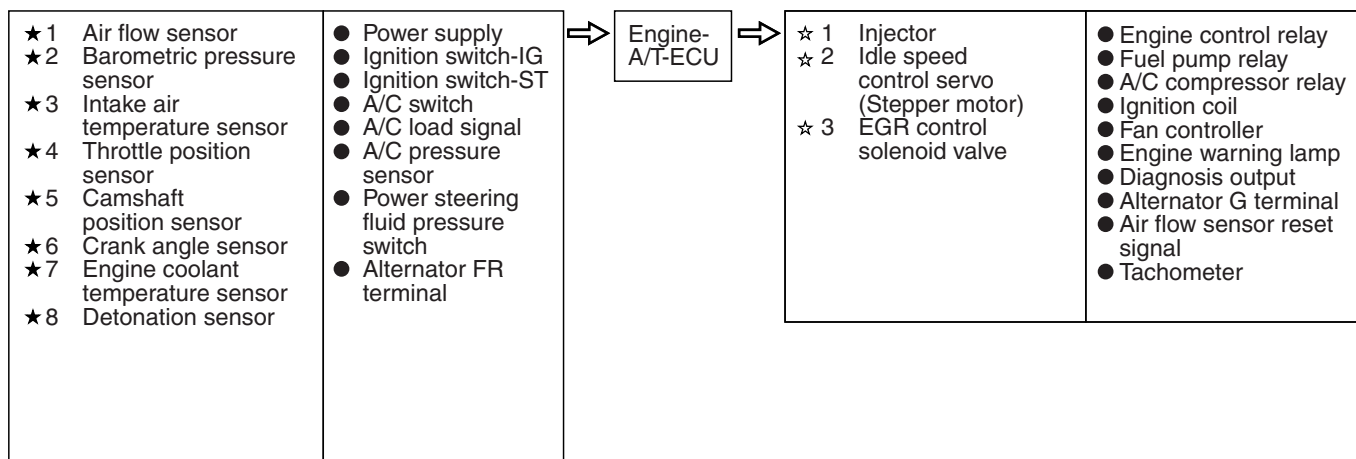
## OTHER CONTROL FUNCTIONS

1. Fuel Pump Control  
Turns the fuel pump relay ON so that current is supplied to the fuel pump while the engine is cranking or running.
2. A/C Relay Control  
Turns the compressor clutch of the A/C ON and OFF.
3. Fan Motor Control  
The revolutions of the radiator fan and condenser fan are controlled in response to the engine coolant temperature and vehicle speed.
4. Purge Control Solenoid Valve Control  
[Refer to GROUP 17 – Engine And Emission Control – Evaporative Emission Control System [P.17-71](#)].
5. EGR Control Solenoid Valve Control  
[Refer to GROUP 17 – Engine And Emission Control – Exhaust Gas Recirculation (EGR) System [P.17-74](#)].

## GENERAL SPECIFICATIONS

Items		Specifications
Throttle body	Throttle bore mm	60
	Throttle position sensor	Variable resistor type
	Idle speed control servo	Stepper motor type
Engine-A/T-E CU	Identification No.	E6T36489 <General Export for RHD without catalytic converter> E6T36491 <General Export for LHD without catalytic converter>
Sensors	Air flow sensor	Karman vortex type
	Barometric pressure Sensor	Semiconductor type
	Intake air temperature sensor	Thermistor type
	Engine coolant temperature	Thermistor type
	Inhibitor switch	Contact switch type
	Camshaft position sensor	Hall element type
	Crank angle sensor	Hall element type
	Detonation sensor	Piezoelectric type
	Power steering fluid pressure switch	Contact switch type
	Mixture adjusting screw (Variable resistor) <Vehicles without catalytic converter>	Variable resistor type
Actuators	Engine control relay type	Contact switch type
	Fuel pump relay type	Contact switch type
	Injector type and number	Electromagnetic type, 4
	Injector identification mark	CDH 240 <Except for Chile>
	EGR control solenoid valve	Duty cycle type solenoid valve
Fuel pressure regulator	Regulator pressure kPa	329

## &lt;Vehicles without catalytic converter&gt;





## SERVICE SPECIFICATIONS

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Items		Specifications
Basic idle speed r/min		700 ± 50
Throttle position sensor adjusting voltage mV		535 – 735
Throttle position sensor resistance kΩ		3.5 – 6.5
Idle speed control servo coil resistance (at 20°C) Ω		26 – 33
Intake air temperature sensor resistance kΩ	–20°C	13 – 17
	0°C	5.3 – 6.7
	20°C	2.3 – 3.0
	40°C	1.0 – 1.5
	60°C	0.56 – 0.76
	80°C	0.30 – 0.42
Engine coolant temperature sensor resistance kΩ	–20°C	14 – 17
	0°C	5.1 – 6.5
	20°C	2.1 – 2.7
	40°C	0.9 – 1.3
	60°C	0.48 – 0.68
	80°C	0.26 – 0.36
Fuel pressure kPa	Vacuum hose disconnection	330 – 350 at curb idle
	Vacuum hose connection	Approximately 270 at curb idle
Injector coil resistance (at 20°C) Ω		13 – 16
Mixture adjusting screw (Variable resistor) resistance kΩ		3.5 – 6.5

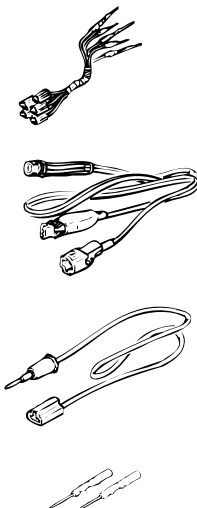
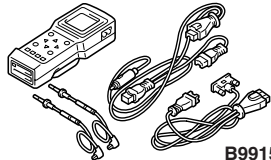
## SEALANT

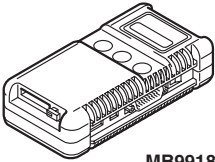
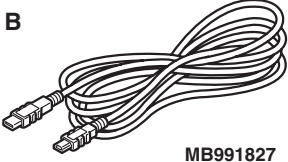

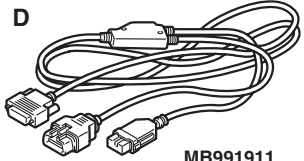
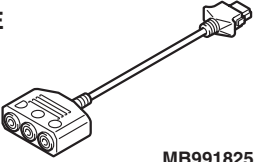
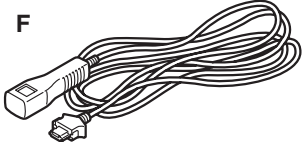


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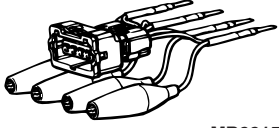
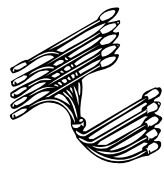
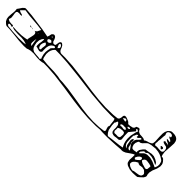


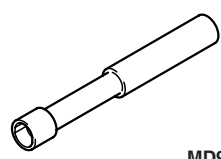
Item	Specified sealant	Remark
Engine coolant temperature sensor Threaded portion	3M Nut Locking Part No. 4171 or equivalent	Drying sealant

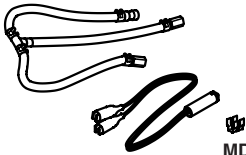
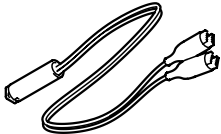
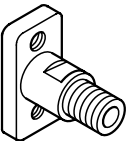
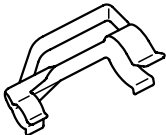
## SPECIAL TOOLS

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Tool	Number	Name	Use
 <p>MB991223</p>	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Test harness B: LED harness C: LED harness adapter D: Probe	<ul style="list-style-type: none"> <li>Check at the ECU terminals</li> <li>A: Connector pin contact inspection</li> <li>B: Power circuit inspection</li> <li>C: Power circuit inspection</li> <li>D: Commercial tester connection</li> </ul>
 <p>B991502</p>	MB991502	M.U.T.-II sub assembly	<ul style="list-style-type: none"> <li>Reading diagnosis code</li> <li>MPI system inspection</li> </ul>

Tool	Number	Name	Use
<p><b>A</b></p>  <p align="center">MB991824</p> <p><b>B</b></p>  <p align="center">MB991827</p> <p><b>C</b></p>  <p align="center">MB991910</p> <p><b>D</b></p>  <p align="center">MB991911</p> <p><b>E</b></p>  <p align="center">MB991825</p> <p><b>F</b></p>  <p align="center">MB991826</p> <p align="center">MB991955</p>	<p>MB991955</p> <p>A: MB991824</p> <p>B: MB991827</p> <p>C: MB991910</p> <p>D: MB991911</p> <p>E: MB991825</p> <p>F: MB991826</p>	<p>M.U.T.-III sub assembly</p> <p>A: Vehicle communication interface (V.C.I.)</p> <p>B: M.U.T.-III USB cable</p> <p>C: M.U.T.-III main harness A (Vehicles with CAN communication system)</p> <p>D: M.U.T.-III main harness B (Vehicles without CAN communication system)</p> <p>E: M.U.T.-III measurement adapter</p> <p>F: M.U.T.-III trigger harness</p>	<ul style="list-style-type: none"> <li>• Reading diagnosis code</li> <li>• MPI system inspection</li> <li>• Measurement of fuel pressure</li> </ul>
 <p align="center">MB991348</p>	MB991348	Test harness set	<ul style="list-style-type: none"> <li>• Measurement of voltage during troubleshooting</li> <li>• Inspection using an oscilloscope</li> </ul>
	MB991709	Test harness	<ul style="list-style-type: none"> <li>• Measurement of voltage during troubleshooting</li> <li>• Inspection using an oscilloscope</li> <li>• Inspection of idle control servo</li> </ul>

Tool	Number	Name	Use
	MD998478	Test harness (3-pin, triangle)	<ul style="list-style-type: none"> <li>• Measurement of voltage during Troubleshooting</li> <li>• Inspection using an oscilloscope</li> </ul>
 MB991536	MB991536	Check harness for throttle position sensor adjustment	<ul style="list-style-type: none"> <li>• Measurement of voltage during Troubleshooting</li> <li>• Adjusting of throttle position sensor</li> </ul>
 MB991658	MB991658	Test harness	<ul style="list-style-type: none"> <li>• Measurement of voltage during Troubleshooting</li> <li>• Inspection of oxygen sensor</li> </ul>
	MD998709	Adaptor hose	Measurement of fuel pressure
	MD998742	Hose adaptor	
 MB991637	MB991637	Fuel pressure gauge set	
 MD998299	MD998299	MAS screwdriver	Mixture adjusting screw (variable resistor) check

Tool	Number	Name	Use
 <p>MD998706</p>	MD998706	Injector test set	Checking the spray condition of injectors
 <p>MB991607</p>	MB991607	Injector test harness	
 <p>MD998741</p>	MD998741	Injector test adaptor	
 <p>MB991608</p>	MB991608	Clip	

## TROUBLESHOOTING

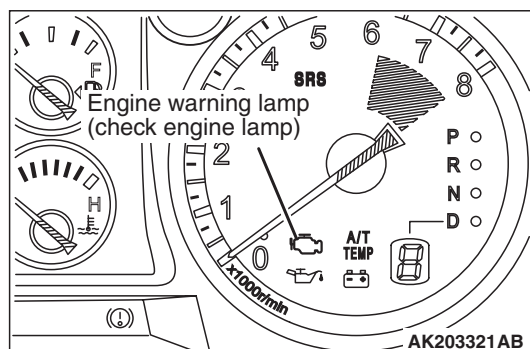
## DIAGNOSIS TROUBLESHOOTING FLOW

Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#).

## DIAGNOSIS FUNCTION

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## ENGINE WARNING LAMP (CHECK ENGINE LAMP)



If an abnormality occurs in any of the following items related to the Multipoint Fuel Injection (MPI) system, the engine warning lamp will illuminate.

If the lamp remains illuminated or if the lamp illuminates while the engine is running, check the diagnosis code output.

## Engine warning lamp inspection items

Engine -A/T-ECU
Air flow sensor
Intake air temperature sensor
Throttle position sensor
Engine coolant temperature sensor
Crank angle sensor
Camshaft position sensor
Barometric pressure sensor
Detonation sensor
Injector
Ignition coil

M1131150001099

METHOD OF READING AND ERASING  
DIAGNOSIS CODES

Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#).

INSPECTION USING M.U.T.-II DATA LIST  
AND ACTUATOR TESTING

1. Carry out inspection by means of the data list and the actuator test function, if there is an abnormality, check and repair the chassis harness and components.
2. After repairing, re-check using the M.U.T.-II and check that the abnormal input and output have returned to normal as a result of the repairs.
3. Erase the diagnosis code memory.
4. Remove the M.U.T.-II, and then start the engine again and carry out a road test to confirm that the problem has disappeared.

INSPECTION USING M.U.T.-III DATA LIST  
AND ACTUATOR TESTING

1. Carry out inspection by means of the data list and the actuator test function, if there is an abnormality, check and repair the chassis harness and components.
2. After repairing, re-check using the M.U.T.-III and check that the abnormal input and output have returned to normal as a result of the repairs.
3. Erase the diagnosis code memory.
4. Remove the M.U.T.-III, and then start the engine again and carry out a road test to confirm that the problem has disappeared.

## FAIL-SAFE FUNCTION REFERENCE TABLE

When the main sensor malfunctions are detected by the diagnosis function, the vehicle is controlled by means of the pre-set control logic to maintain safe conditions for driving.

Malfunctioning item	Control contents during malfunction
Air flow sensor	1. Uses the throttle position sensor signal and engine speed signal (crank angle sensor signal) to take reading of the basic injector drive time and basic ignition timing from the pre-set mapping. 2. Fixes the idle speed control servo in the appointed position so idle control is not performed.
Intake air temperature sensor	Controls as if the intake air temperature is 25°C.
Throttle position sensor (TPS)	No increase in fuel injection amount during acceleration due to the throttle position sensor signal.
Engine coolant temperature sensor	Controls as if the engine coolant temperature is 80°C.
Camshaft position sensor	Injects fuel into the cylinders in the order 1-3-4-2 with irregular timing (After the ignition switch is turned to the "ON" position, the No. 1 cylinder top dead center is not detected at all).
Detonation sensor	Fixes the ignition timing as that for regular gasoline.
Ignition coil (incorporating power transistor)	Cuts off the fuel supply to cylinders with an abnormal ignition.
Alternator FR terminal	Does not control the output of the alternator according to an electrical load (works as a normal alternator).

## INSPECTION CHART FOR DIAGNOSIS CODE

M1131151001348

Code No.	Diagnosis item	Reference page
12	Air flow sensor system	<a href="#">P.13A-12</a>
13	Intake air temperature sensor system	<a href="#">P.13A-23</a>
14	Throttle position sensor system	<a href="#">P.13A-31</a>
21	Engine coolant temperature sensor system	<a href="#">P.13A-41</a>
22	Crank angle sensor system	<a href="#">P.13A-50</a>
23	Camshaft position sensor	<a href="#">P.13A-62</a>
24	Vehicle speed signal system	<a href="#">P.13A-72</a>
25	Barometric pressure sensor system	<a href="#">P.13A-72</a>
31	Detonation sensor system	<a href="#">P.13A-83</a>
41	Injector system	<a href="#">P.13A-86</a>
44	Ignition coil (power transistor) system	<a href="#">P.13A-91</a>
64	Alternator FR terminal system	<a href="#">P.13A-98</a>

### NOTE:

- Do not replace the engine-A/T-ECU until a through terminal check reveals there are no short/open circuit.
- Check that the engine-A/T-ECU earth circuit is normal before checking for the cause of the problem.

INSPECTION PROCEDURE FOR  
DIAGNOSIS CODES

## Code No. 12 Air Flow Sensor System

## OPERATION

- Power is supplied to the air flow sensor (terminal No. 4) from the engine control relay (terminal No. 1) and earthed to the engine-A/T-ECU (terminal No. 16) from the air flow sensor (terminal No. 5).
- A power voltage of 5 V is applied to the air flow sensor output terminal (terminal No. 3) from the engine-A/T-ECU (terminal No. 65).
- An air flow sensor filter reset signal is inputted to the air flow sensor (terminal No. 7) from the engine-A/T-ECU (terminal No. 19).

## FUNCTION

- Air flow sensor outputs a pulse signal proportional to the intake air flow rate.
- The engine-A/T-ECU determines the basic injection timing of the injector using the pulse signal output from the air flow sensor and the engine speed signal.
- When the throttle position sensor output is low, the engine-A/T-ECU causes the power transistor in the unit to be ON to send an air flow sensor filter reset signal to the air flow sensor. In response to the reset signal, the air flow sensor resets the filter circuit to improve the ability of the air flow sensor to measure the air flow rate in the area where the intake air flow rate is low.

## TROUBLE JUDGMENT

## Check Condition

- Engine speed of 500 r/min or more.

## Judgment Criterion

- Sensor output frequency of 3.3 Hz or less for 4 seconds.

## PROBABLE CAUSE

- Failed air flow sensor
- Open/short circuit in air flow sensor circuit or loose connector contact
- Failed engine-A/T-ECU

## DIAGNOSIS PROCEDURE

## STEP 1. M.U.T.-II/III data list

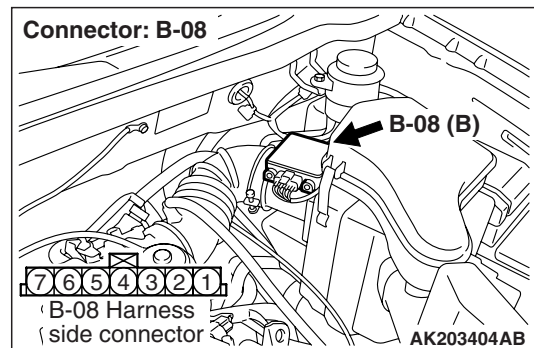
- Refer to Data list reference table [P.13A-260](#).
  - a. Item 12: Air flow sensor

## Q: Is the check result normal?

**YES** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO** : Go to Step 2 .

## STEP 2. Connector check: B-08 air flow sensor connector



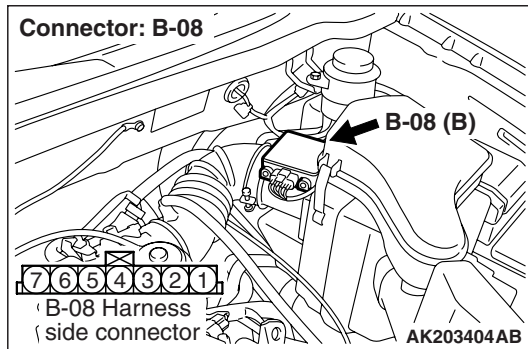
## Q: Is the check result normal?

**YES** : Go to Step 3 .

**NO** : Repair.



**STEP 3. Perform voltage measurement at B-08 air flow sensor connector.**



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

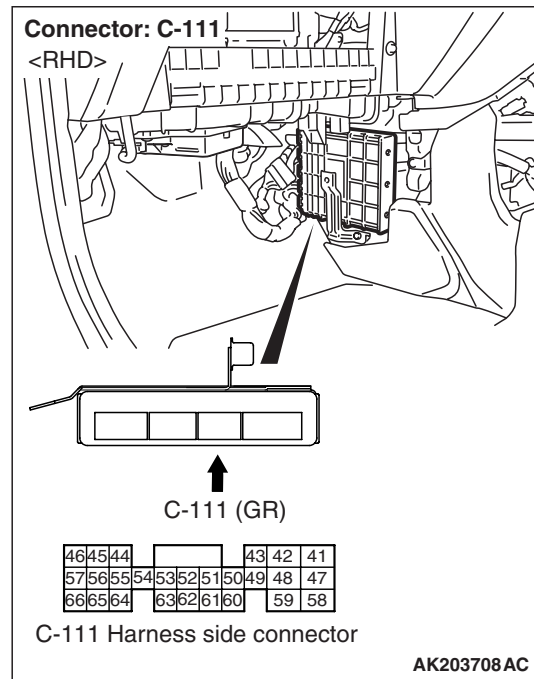
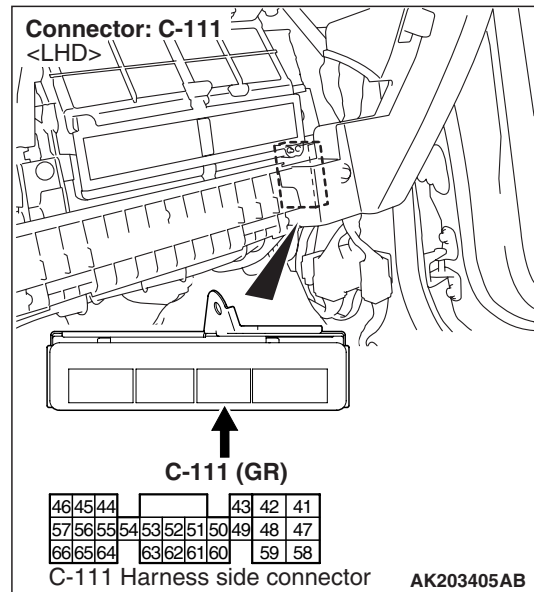
**OK: 4.9 – 5.1 V**

**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Go to Step 4 .

**STEP 4. Perform voltage measurement at C-111 engine-A/T-ECU connector.**



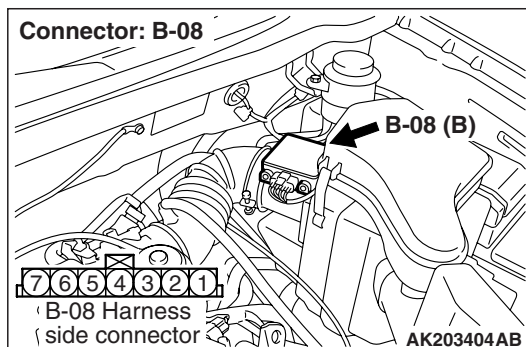
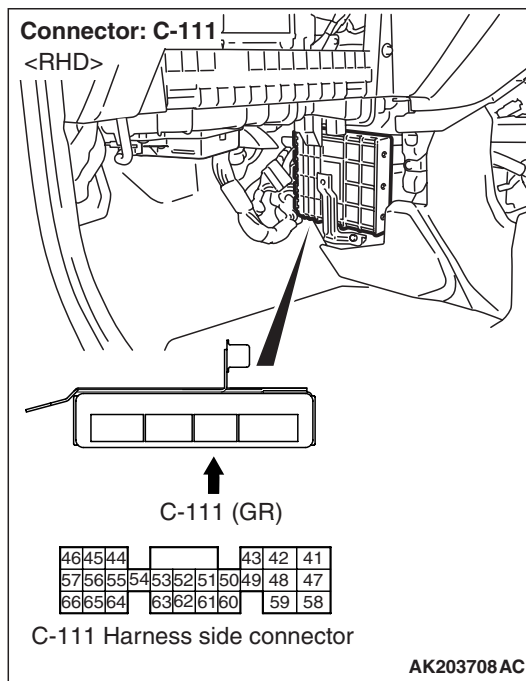
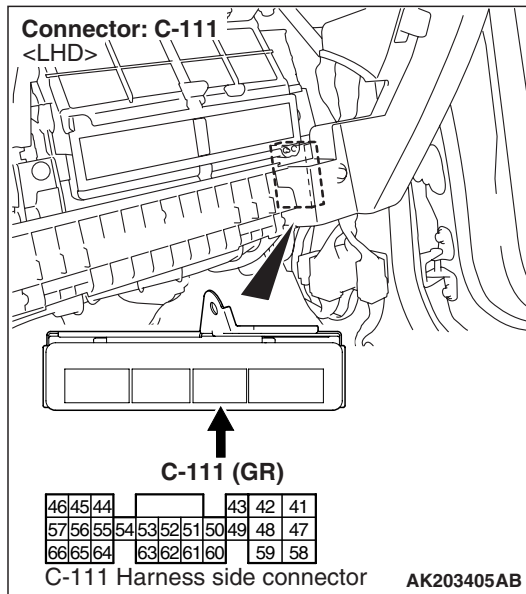
- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 65 and earth.

**OK: 4.9 – 5.1 V**

**Q: Is the check result normal?**

**YES :** Go to Step 5 .

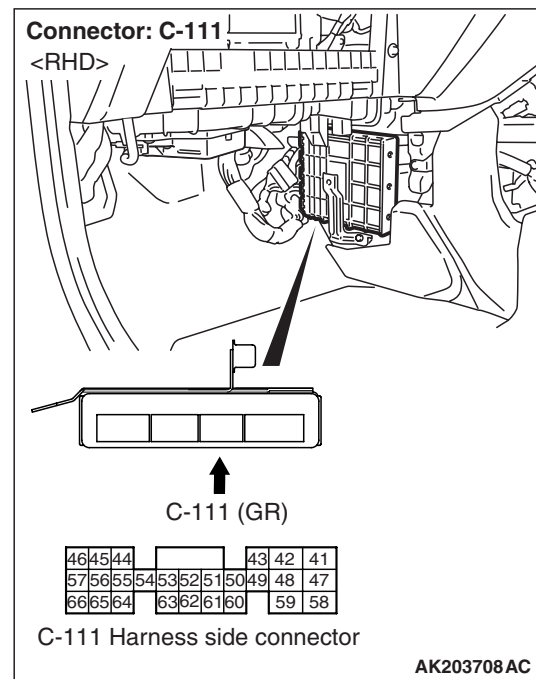
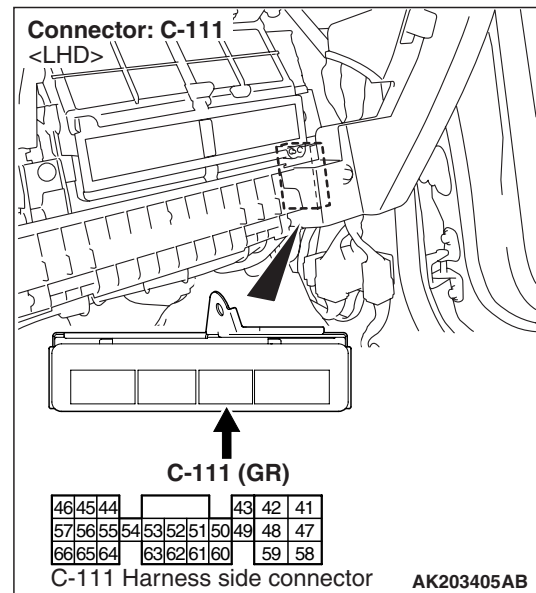
**NO :** Go to Step 6 .

**STEP 5. Connector check: C-111 engine-A/T-ECU connector****Q: Is the check result normal?**

**YES :** Check and repair harness between B-08 (terminal No. 3) air flow sensor connector and C-111 (terminal No. 65) engine-A/T-ECU connector.

- Check output line for open circuit.

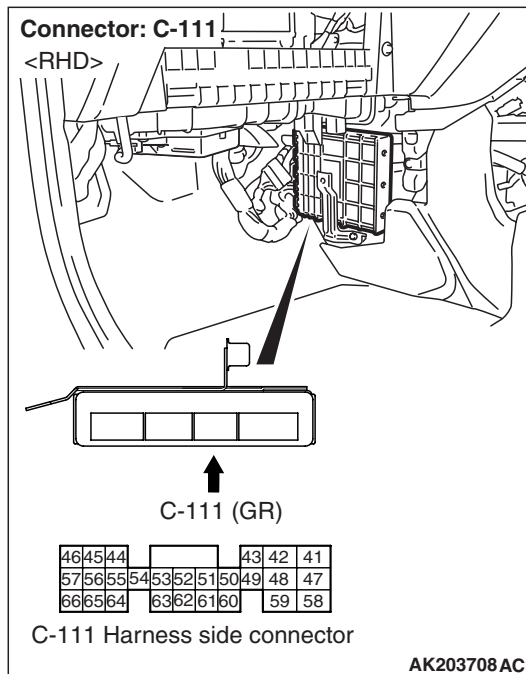
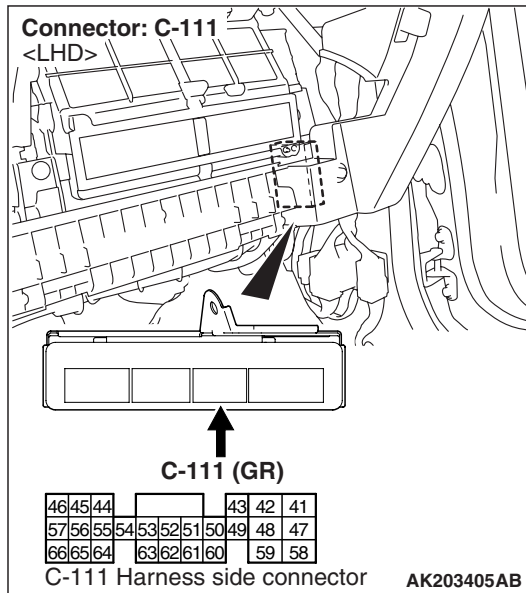
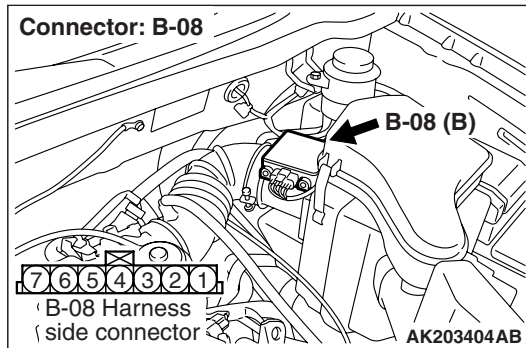
**NO :** Repair.

**STEP 6. Connector check: C-111 engine-A/T-ECU connector****Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

**STEP 7. Check harness between B-08 (terminal No. 3) air flow sensor connector and C-111 (terminal No. 65) engine-A/T-ECU connector.**



- Check output line for short circuit.

**Q: Is the check result normal?**

**YES :** Go to Step 8 .  
**NO :** Repair.

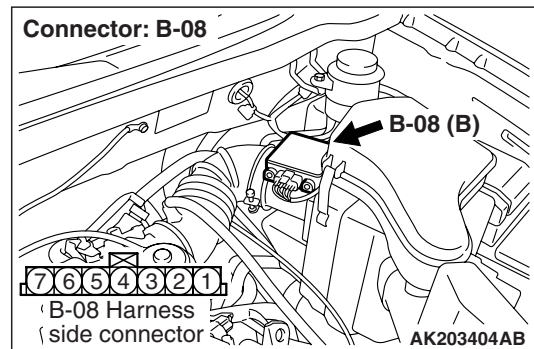
**STEP 8. M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-260](#).  
a. Item 12: Air flow sensor

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).  
**NO :** Replace engine-A/T-ECU.

**STEP 9. Perform voltage measurement at B-08 air flow sensor connector.**



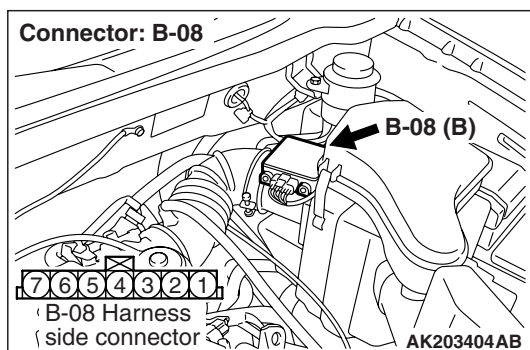
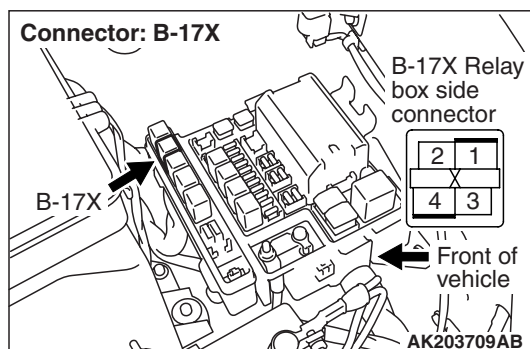
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 4 and earth.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 11 .  
**NO :** Go to Step 10 .

### STEP 10. Connector check: B-17X engine control relay connector



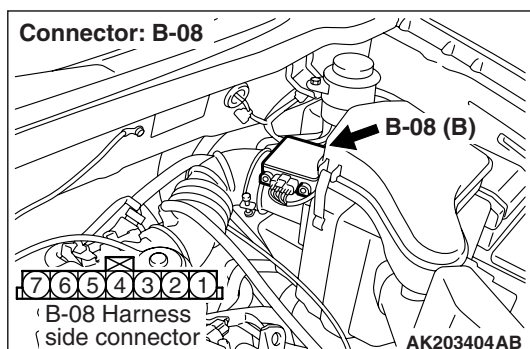
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-08 (terminal No. 4) air flow sensor connector and B-17X (terminal No.1) engine control relay connector.

- Check power supply line for open/short circuit.

**NO : Repair.**

**STEP 11. Check at B-08 air flow sensor connector.**



- Disconnect and measure at harness side.
- Resistance between terminal No. 5 and earth.

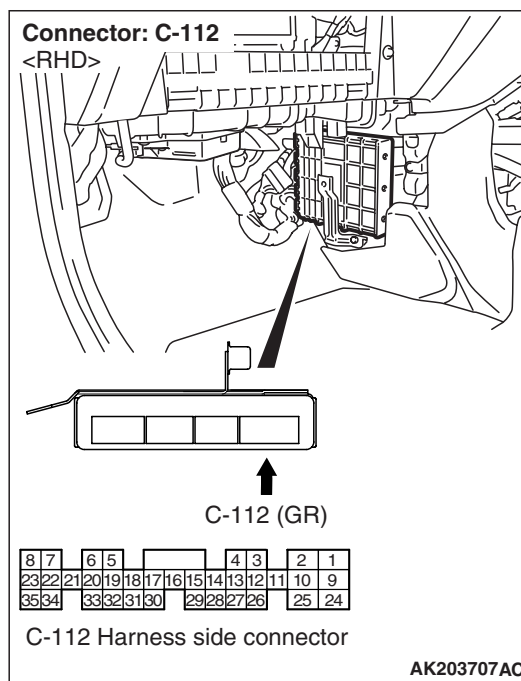
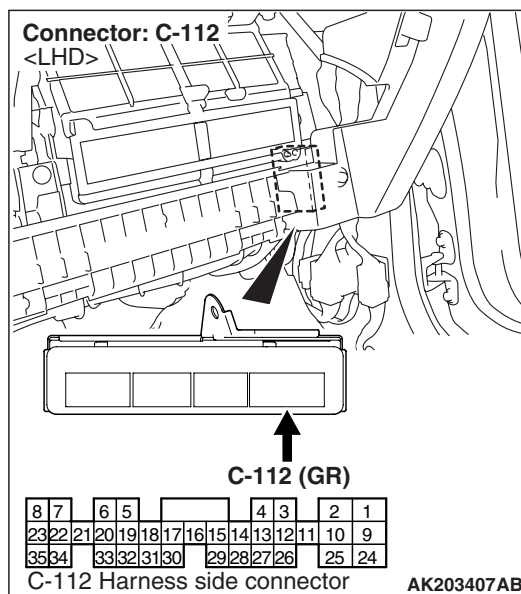
**OK: 2  $\Omega$  or less**

**Q: Is the check result normal?**

**YES :** Go to Step 14 .

**NO** : . Go to Step 12 .

### STEP 12. Connector check: C-112 engine-A/T-ECU connector

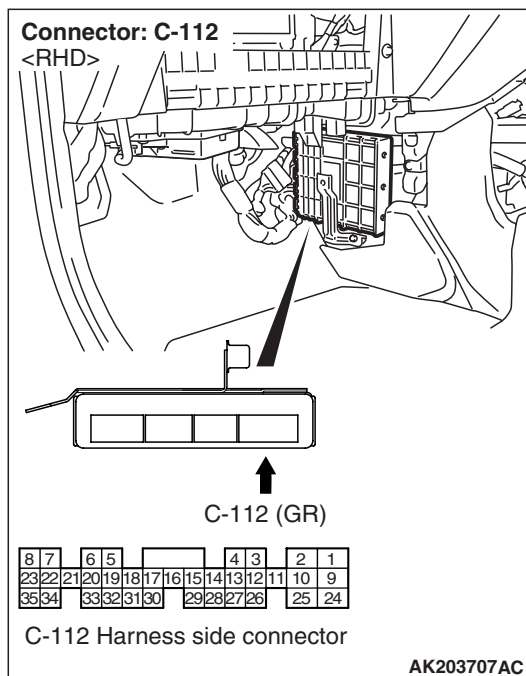
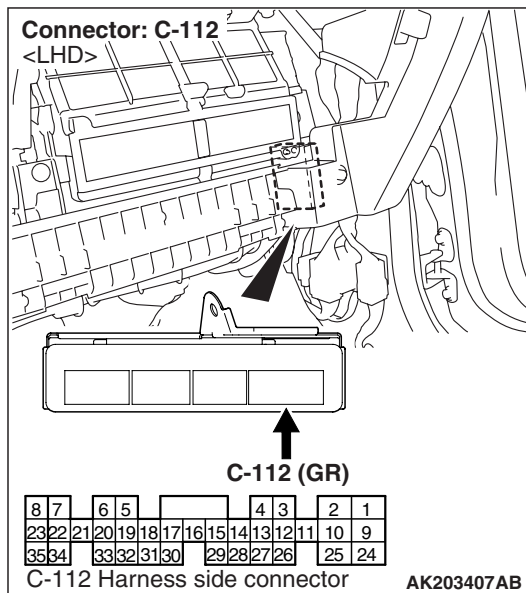
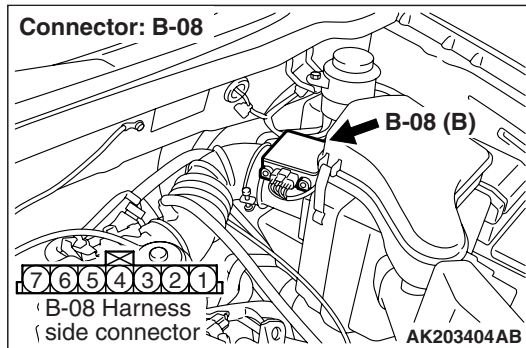


**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO : Repair.**

**STEP 13. Check harness between B-08 (terminal No. 5) air flow sensor connector and C-112 (terminal No. 16) engine-A/T-ECU connector.**



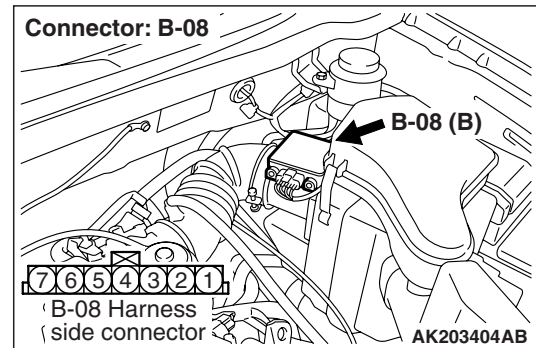
- Check earthing line for open circuit and damage.

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 14. Perform voltage measurement at B-08 air flow sensor connector.**



- Use special tool test harness (MB991709) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 7 and earth.

**OK: 7 – 8 V**

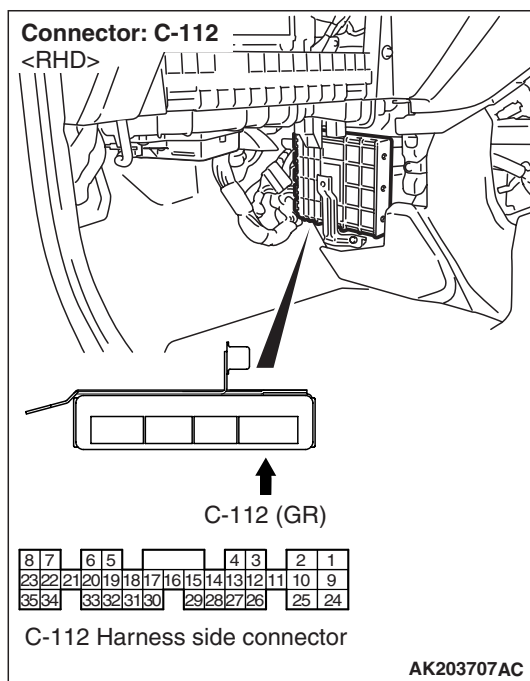
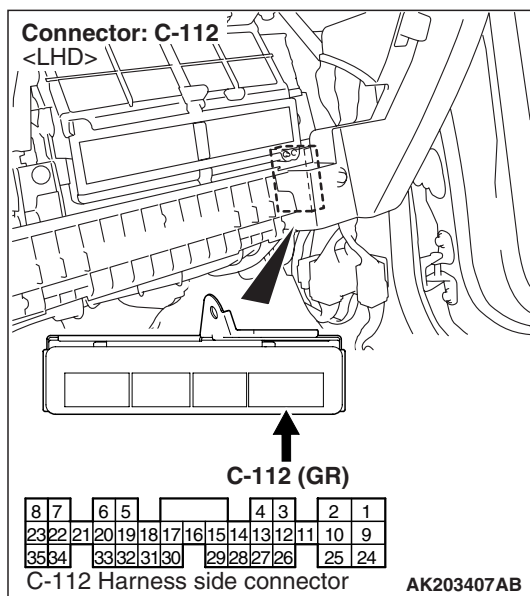
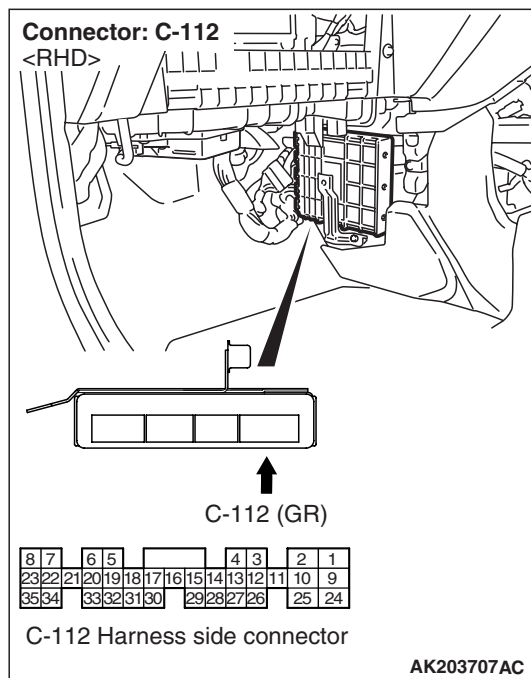
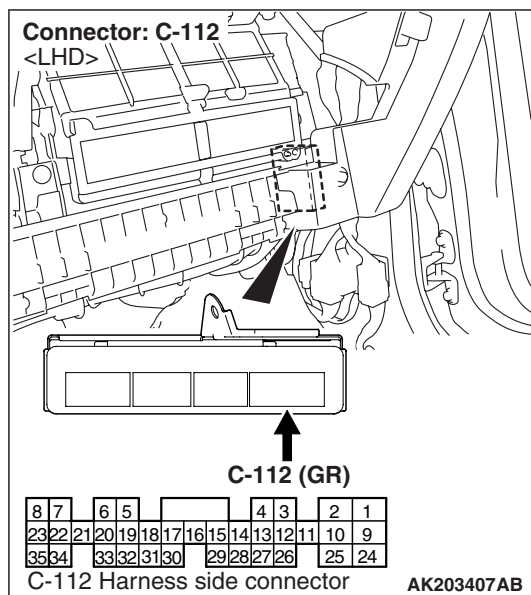
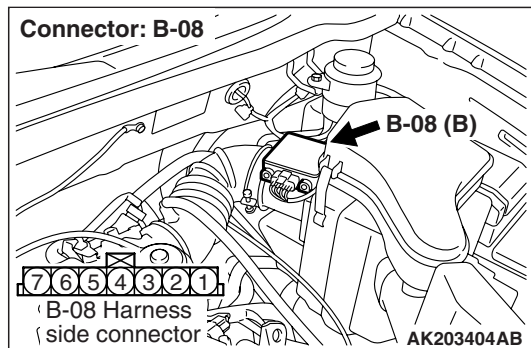
**Q: Is the check result normal?**

**YES :** Go to Step 17 .

**NO :** Go to Step 15 .

**NOTE:** Before checking harness, check intermediate connector C-16, and repair if necessary.



**STEP 15. Connector check: C-112  
engine-A/T-ECU connector****Q: Is the check result normal?****YES :** Go to Step 16 .**NO :** Repair.**STEP 16. Check harness between B-08 (terminal  
No. 7) air flow sensor connector and C-112  
(terminal No. 19) engine-A/T-ECU connector.**

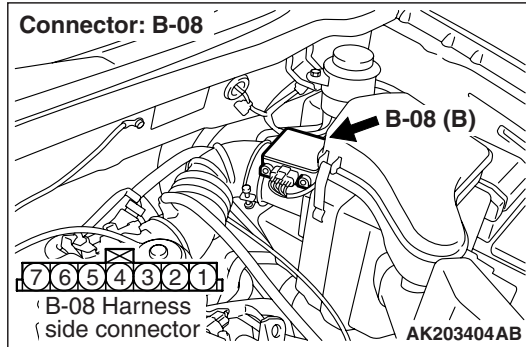
- Check reset signal line for short circuit.

**Q: Is the check result normal?**

**YES :** Replace air flow sensor.

**NO :** Repair.

**STEP 17. Perform voltage measurement at B-08 air flow sensor connector.**



- Use special tool test harness (MB991709) to connect connector, and measure at pick-up harness.
- Selector lever position: P
- Voltage between terminal No. 7 and earth.

**OK:**

**0 – 1 V (Engine: Idling)**

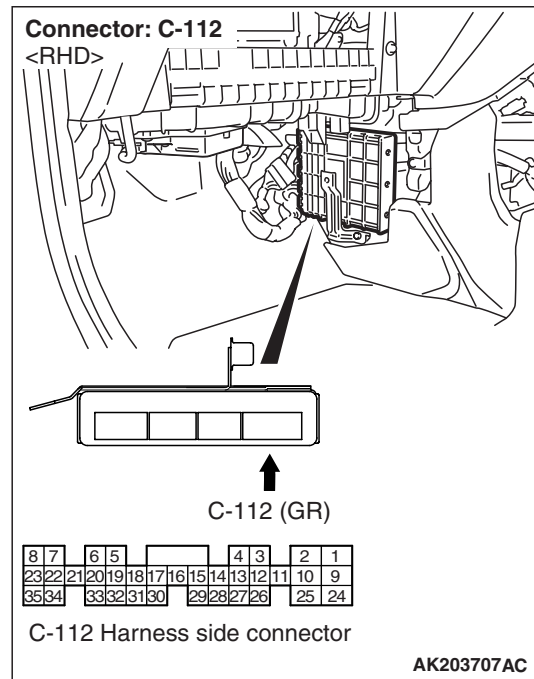
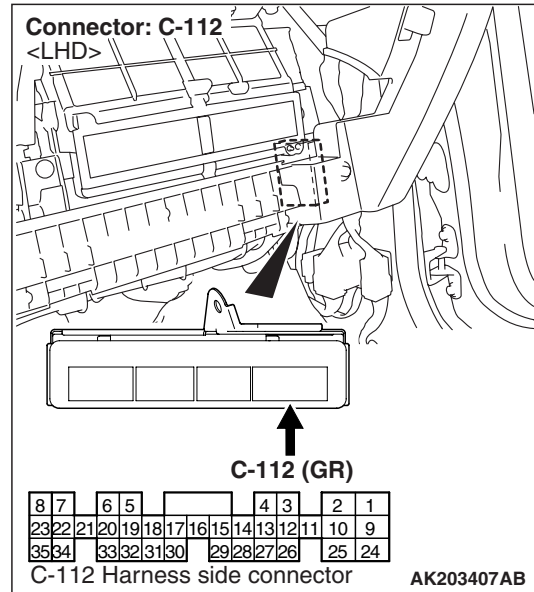
**6 – 9 V (Engine: 3,000 r/min)**

**Q: Is the check result normal?**

**YES :** Go to Step 20 .

**NO :** Go to Step 18 .

**STEP 18. Connector check: C-112 engine-A/T-ECU connector**

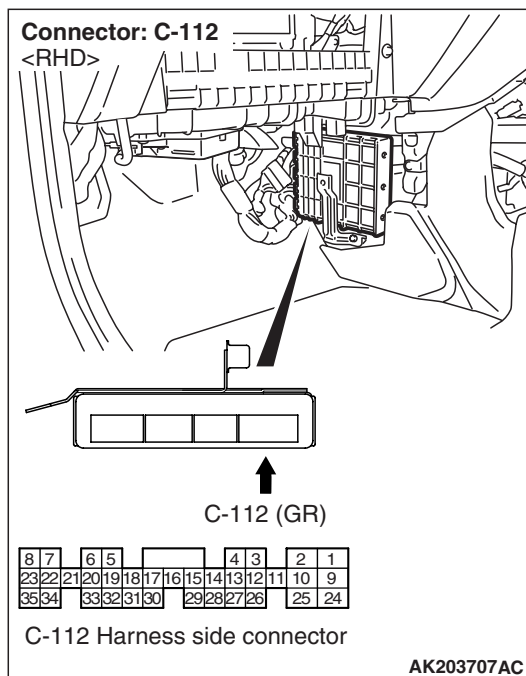
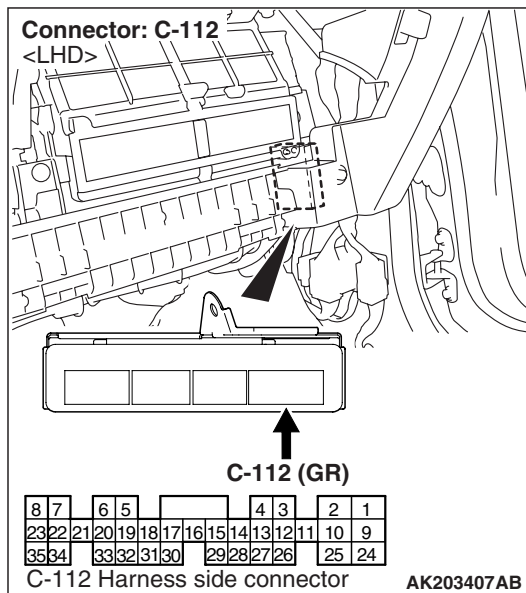
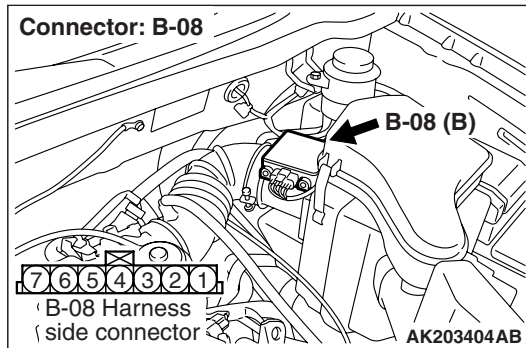


**Q: Is the check result normal?**

**YES :** Go to Step 19 .

**NO :** Repair.

**STEP 19. Check harness between B-08 (terminal No. 7) air flow sensor connector and C-112 (terminal No. 19) engine-A/T-ECU connector.**



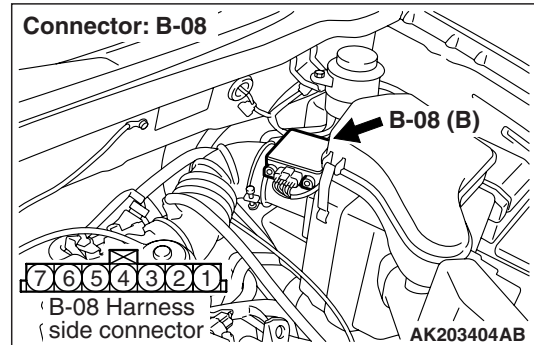
- Check reset signal line for open circuit and damage.

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 20. Output wave pattern measurement at B-08 air flow sensor connector (Use oscilloscope).**



- Use special tool test harness (MB991709) to connect connector, and measure at pick-up harness.
- Engine: Idling
- Selector lever position: P
- Voltage between terminal No. 3 and earth.

**OK: Wave patterns should be displayed on inspection procedure using an oscilloscope (Refer to P.13A-271) and noise should not be displayed in the wave pattern.**

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Go to Step 21 .

**STEP 21. Replace air flow sensor.**

- After replacing the air flow sensor, re-check the trouble symptoms.

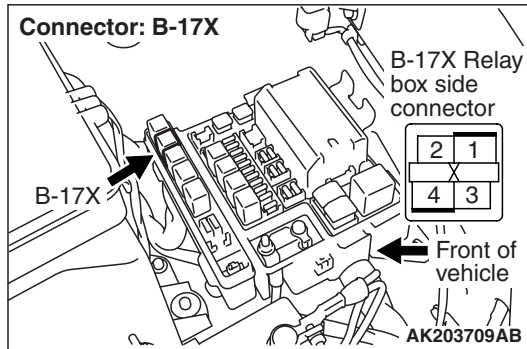
**Q: Is the check result normal?**

**YES :** Go to Step 22 .

**NO :** Check end.

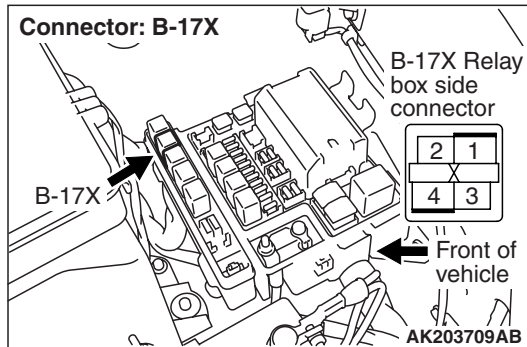
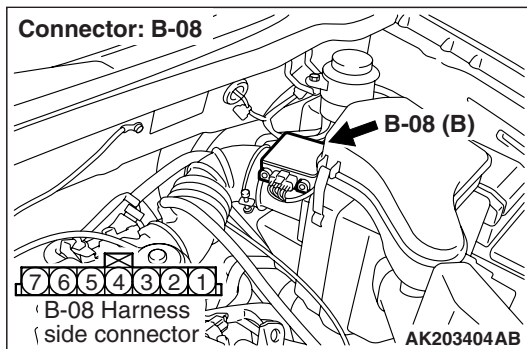


**STEP 22. Connector check: B-17X engine control relay connector**



**Q: Is the check result normal?**  
**YES :** Go to Step 23 .  
**NO :** Repair.

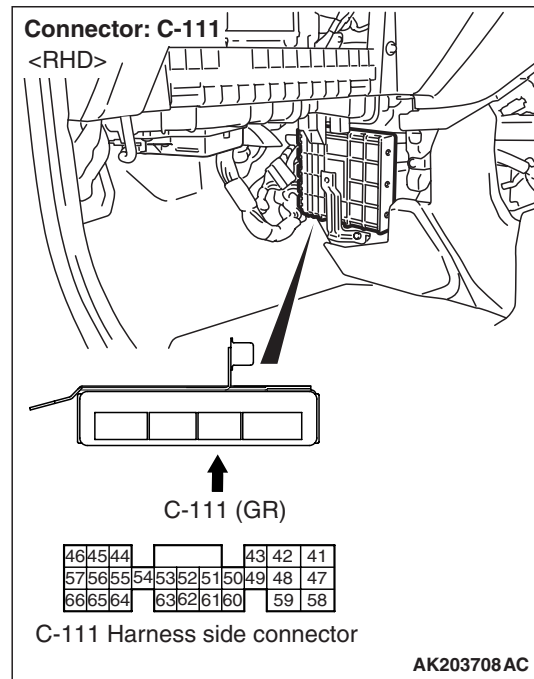
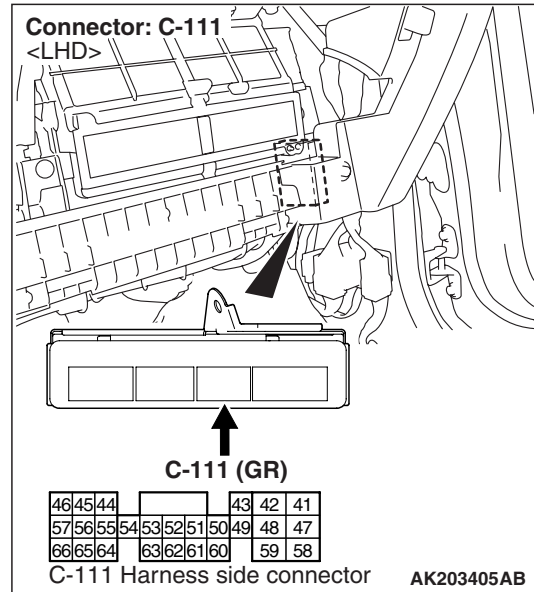
**STEP 23. Check harness between B-08 (terminal No. 4) air flow sensor connector and B-17X (terminal No. 1) engine control relay connector.**



- Check power supply line for damage.

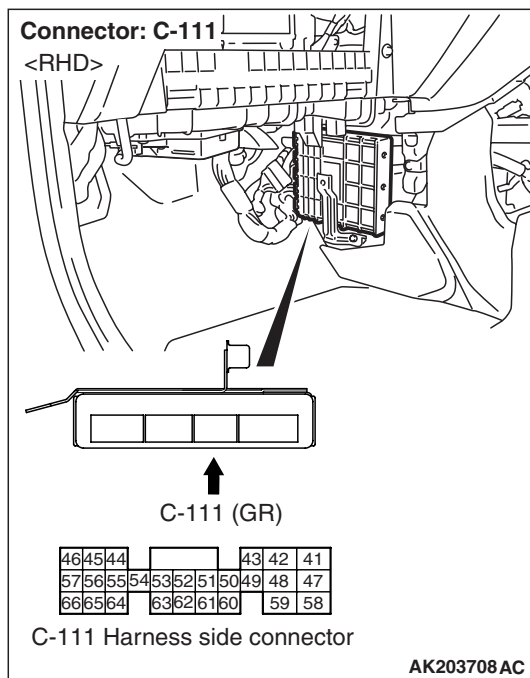
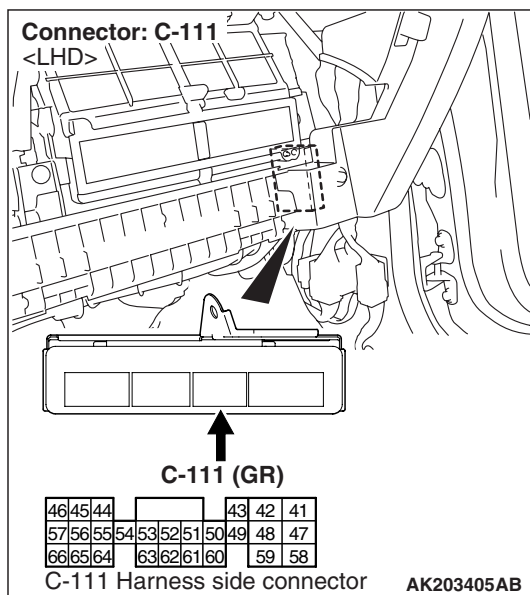
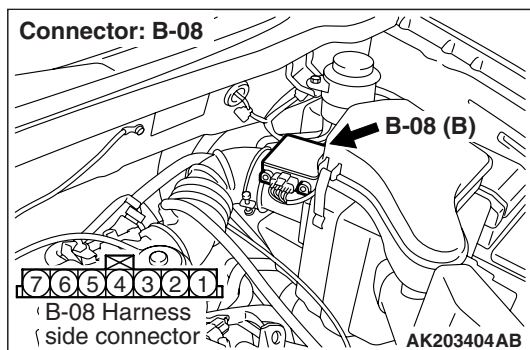
**Q: Is the check result normal?**  
**YES :** Go to Step 24 .  
**NO :** Repair.

**STEP 24. Connector check: C-111 engine-A/T-ECU connector**



**Q: Is the check result normal?**  
**YES :** Go to Step 25 .  
**NO :** Repair.

**STEP 25. Check harness between B-08 (terminal No. 3) air flow sensor connector and C-111 (terminal No. 65) engine-A/T-ECU connector.**



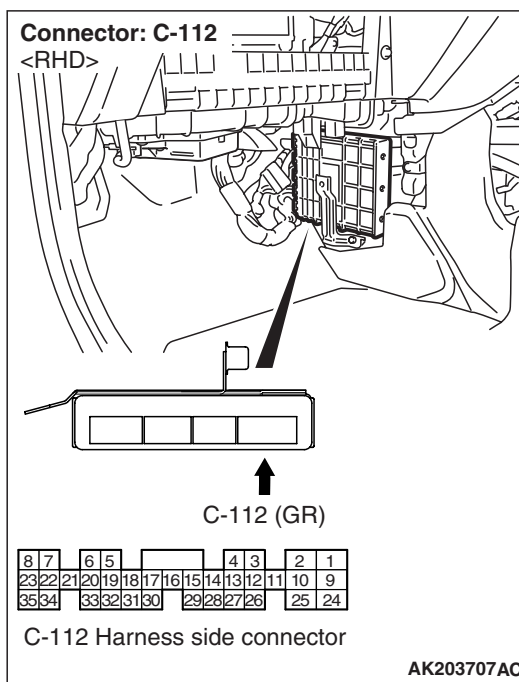
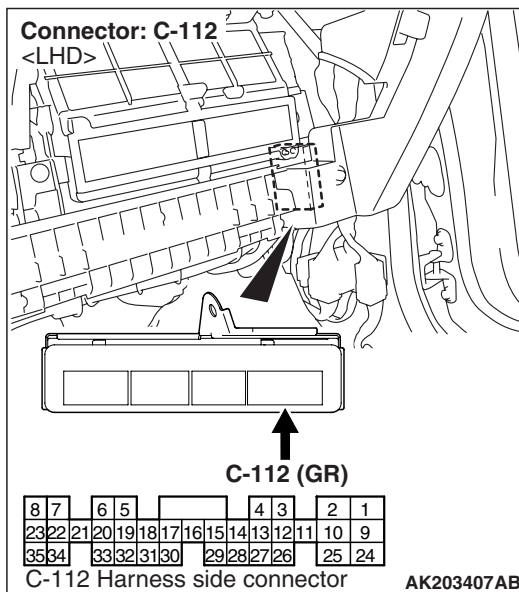
- Check output line for damage.

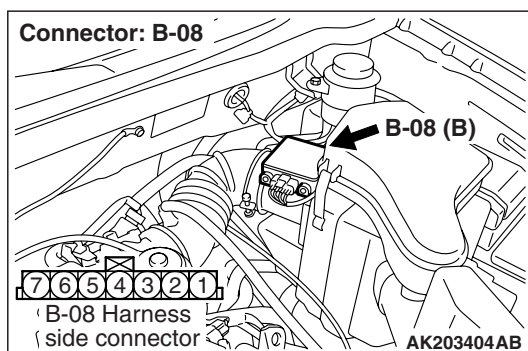
**Q: Is the check result normal?**

**YES** : . Go to Step 26 .

**NO** : . Repair.

**STEP 26. Connector check: C-112 engine-A/T-ECU connector**





**Q: Is the check result normal?**

**YES :** Check intermediate connector C-16, and repair if necessary. If intermediate connector is normal, check and repair harness between B-08 (terminal No. 5) air flow sensor connector and C-127 (terminal No. 16) engine-A/T-ECU connector.

- Check earthing line for damage.

**No :** Repair.

## Code No. 13 Intake Air Temperature Sensor System

### OPERATION

- A power voltage of 5 V is applied to the intake air temperature sensor output terminal (terminal No. 6) of the air flow sensor connector from the engine-A/T-ECU (terminal No. 64)
- The power voltage is earthed to the engine-A/T-ECU (terminal No. 16) from the air flow sensor (terminal No. 5).

### FUNCTION

- The intake air temperature sensor converts the intake air temperature into a voltage and inputs the voltage signal to the engine-A/T-ECU.
- In response to the signal, the engine-A/T-ECU corrects the fuel injection amount, etc.
- The intake air temperature sensor is a kind of resistor, which has characteristics to reduce its resistance as the intake air temperature rises. Therefore, the sensor output voltage varies with the intake air temperature, and becomes lower as the intake air temperature rises.

### TROUBLE JUDGMENT

#### Check Condition

- Excluding 60 seconds after the ignition switch has been in "ON" position or just after the engine has started up.

#### Judgment Criteria

- A sensor output voltage of 4.6 V or more (intake air temperature below  $-40^{\circ}\text{C}$  or equivalent) for 4 seconds.

or

- A sensor output voltage of 0.2 V or less (intake air temperature above  $120^{\circ}\text{C}$  or equivalent) for 4 seconds.

### PROBABLE CAUSE

- Failed intake air temperature sensor
- Open/short circuit in intake air temperature sensor circuit or loose connector contact
- Failed engine-A/T-ECU

### DIAGNOSIS PROCEDURE

#### STEP 1. M.U.T.-II/III data list

- Item 13: Intake air temperature sensor

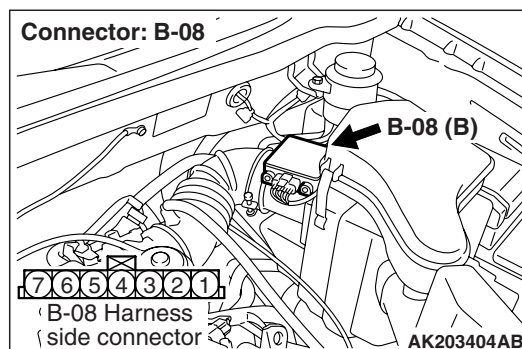
**OK: At ambient temperature (atmospheric temperature) or equivalent.**

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO :** Go to Step 2 .

#### STEP 2. Connector check: B-08 air flow sensor connector



**Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Repair.

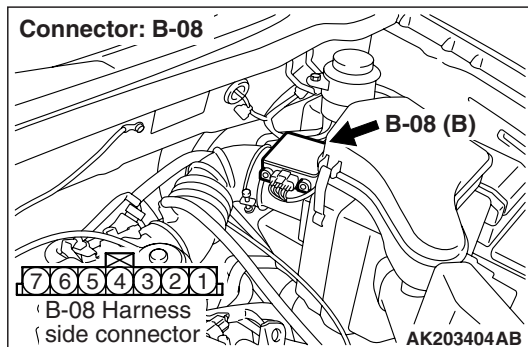
**STEP 3. Check intake air temperature sensor itself.**

- Check intake air temperature sensor itself (Refer to P.13A-287).

**Q: Is the check result normal?**

**YES :** Go to Step 4 .

**NO :** Replace air flow sensor.

**STEP 4. Perform voltage measurement at B-08 air flow sensor connector.**

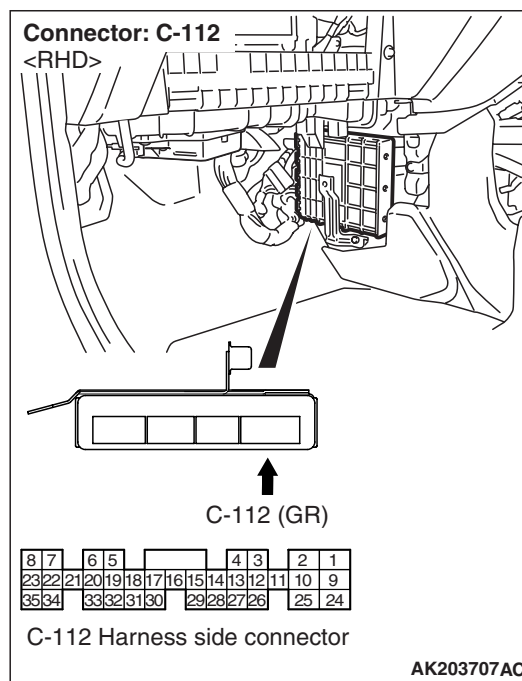
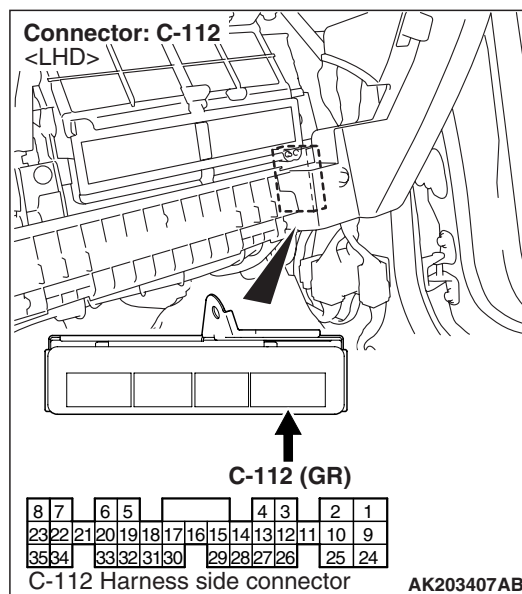
- Disconnect connector, and measure at harness side.
- Voltage between terminal No. 5 and earth.

**OK: 2  $\Omega$  or less**

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Go to Step 5 .

**STEP 5. Connector check: C-112 engine-A/T-ECU connector**

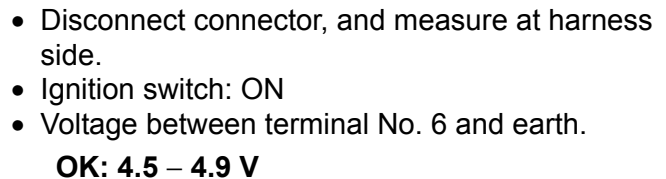
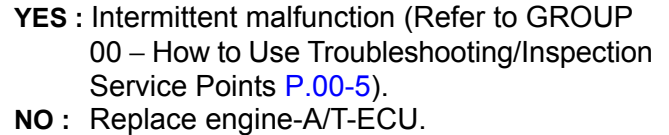
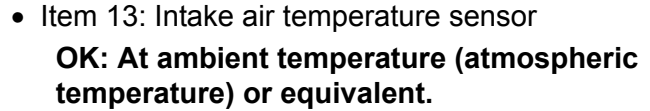
**Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Repair.

- Check earthing line for open circuit and damage.

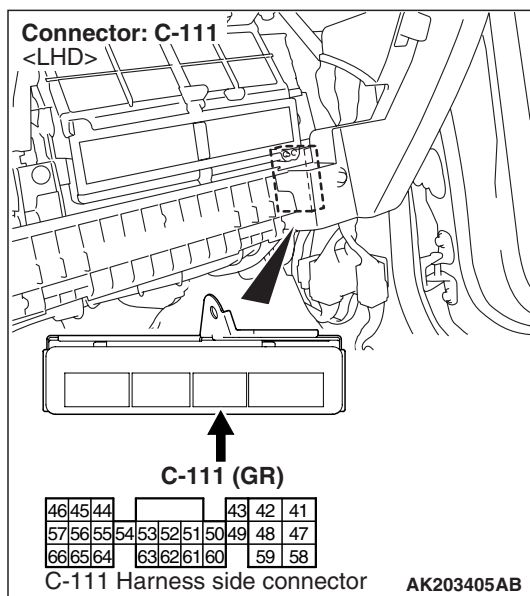
**Q: Is the check result normal?**  
**YES :** Go to Step 7 .  
**NO :** Repair.



**YES :** Go to Step 13 .  
**NO :** Go to Step 9 .

**NOTE:** Before checking harness, check intermediate connector C-16, and repair if necessary.



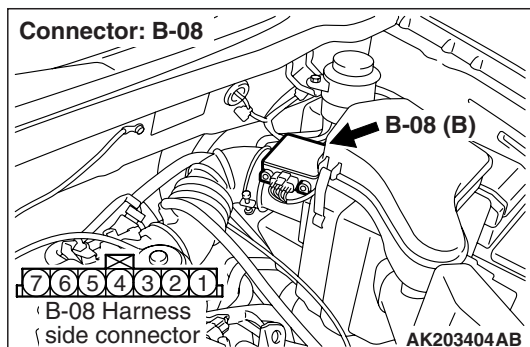
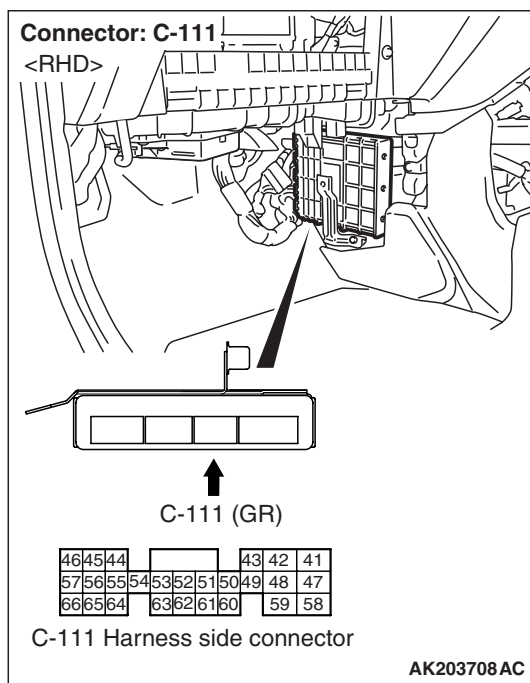
**STEP 9. Perform voltage measurement at C-111 engine-A/T-ECU connector.**

- Voltage between terminal No. 64 and earth.  
**OK: 4.5 – 4.9 V**

**Q: Is the check result normal?**

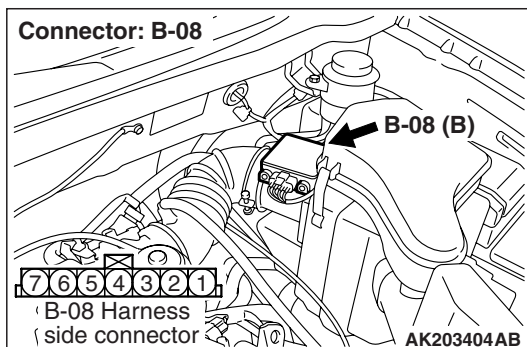
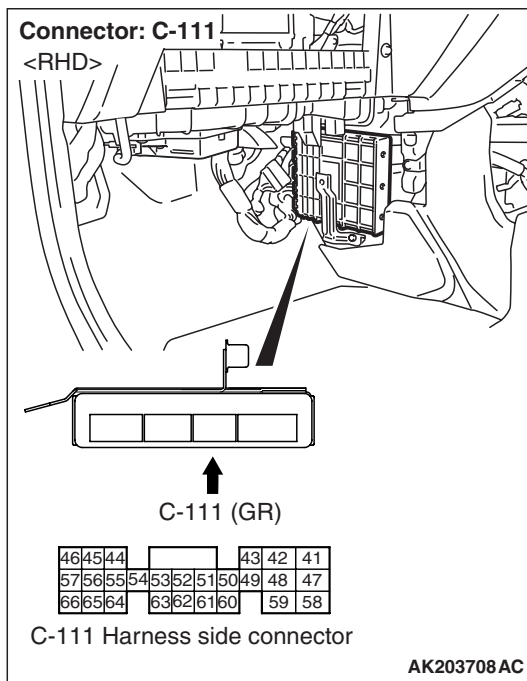
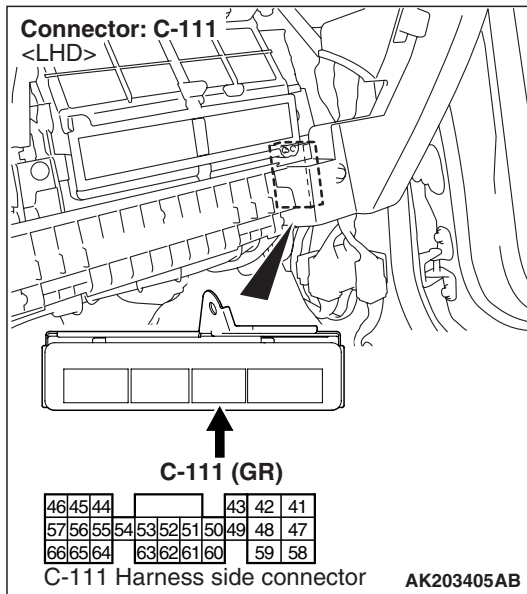
**YES :** Go to Step 10 .

**NO :** Go to Step 11 .



- Measure engine-A/T-ECU terminal voltage.
- Disconnect B-08 air flow sensor connector.
- Ignition switch: ON

**STEP 10. Connector check: C-111  
engine-A/T-ECU connector**



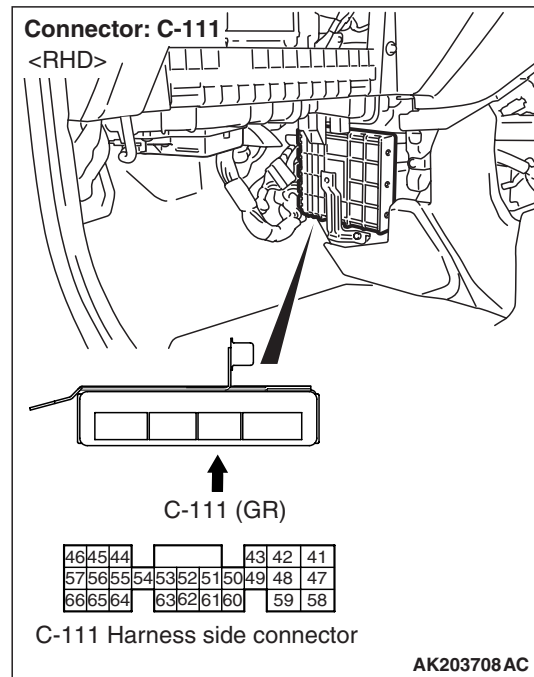
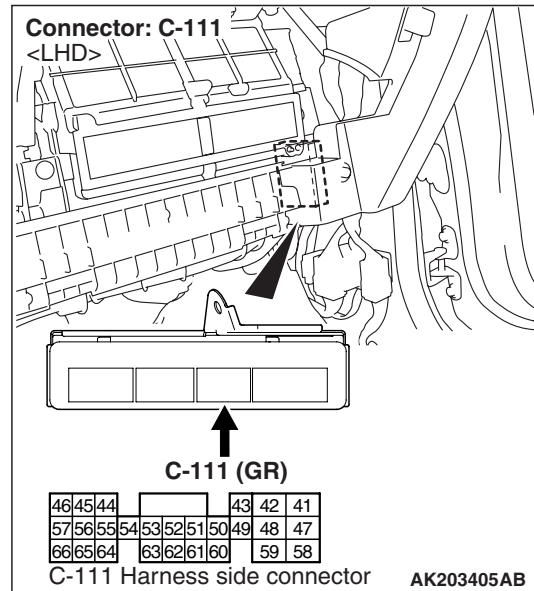
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-08 (terminal No. 6) air flow sensor connector and C-111 (terminal No. 64) engine-A/T-ECU connector.

- Check output line for open circuit.

**NO :** Repair.

**STEP 11. Connector check: C-111  
engine-A/T-ECU connector**

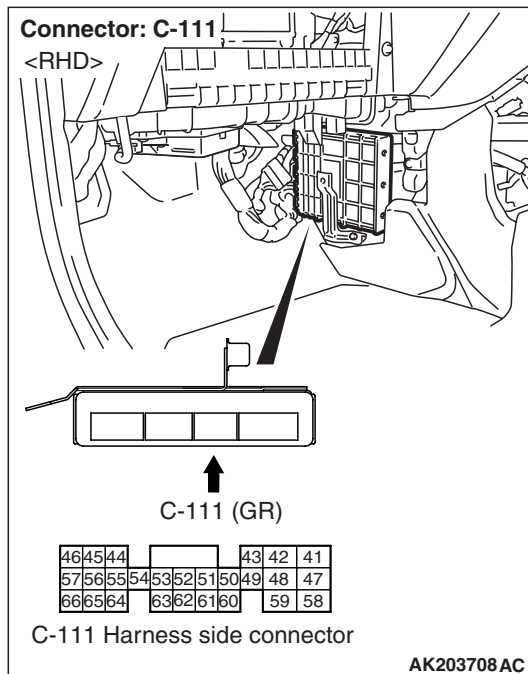
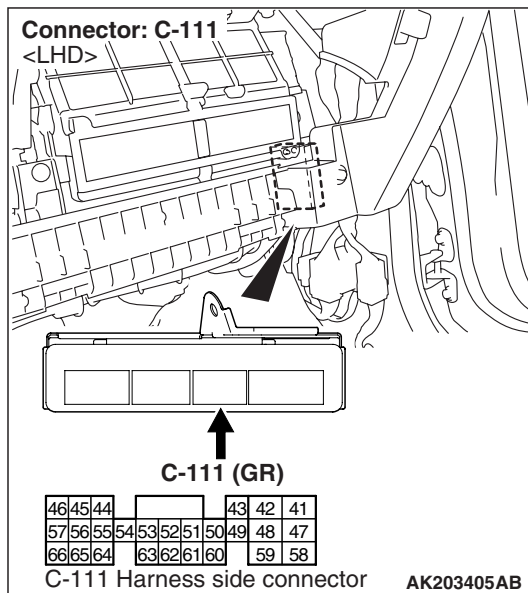
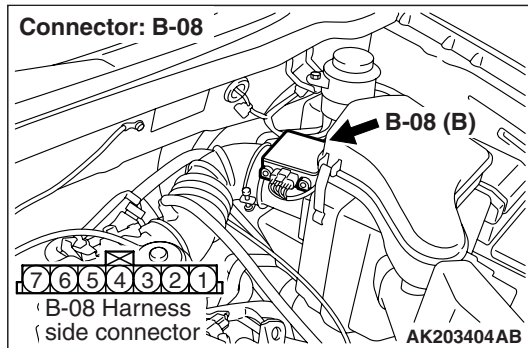


**Q: Is the check result normal?**

**YES :** Go to Step 12 .

**NO :** Repair.

**STEP 12. Check harness between B-08 (terminal No. 6) air flow sensor connector and C-111 (terminal No. 64) engine-A/T-ECU connector.**

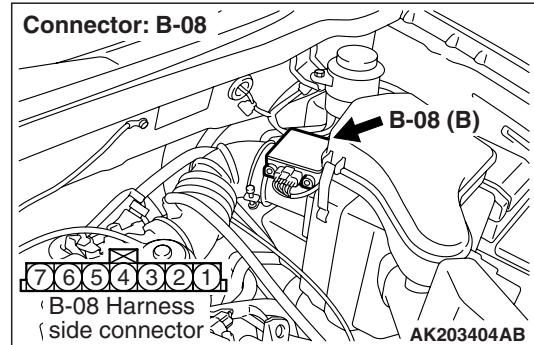


**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

**STEP 13. Perform voltage measurement at B-08 air flow sensor connector.**



- Use special tool test harness (MB991709) to connect only terminal No. 5 and No. 6, and then measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 6 and earth.

**OK:**

**Ambient temperature at  $-20^{\circ}\text{C}$ : 3.8 – 4.4 V**

**Ambient temperature at  $0^{\circ}\text{C}$ : 3.2 – 3.8 V**

**Ambient temperature at  $20^{\circ}\text{C}$ : 2.3 – 2.9 V**

**Ambient temperature at  $40^{\circ}\text{C}$ : 1.5 – 2.1 V**

**Ambient temperature at  $60^{\circ}\text{C}$ : 0.8 – 1.4 V**

**Ambient temperature at  $80^{\circ}\text{C}$ : 0.4 – 1.0 V**

**Q: Is the check result normal?**

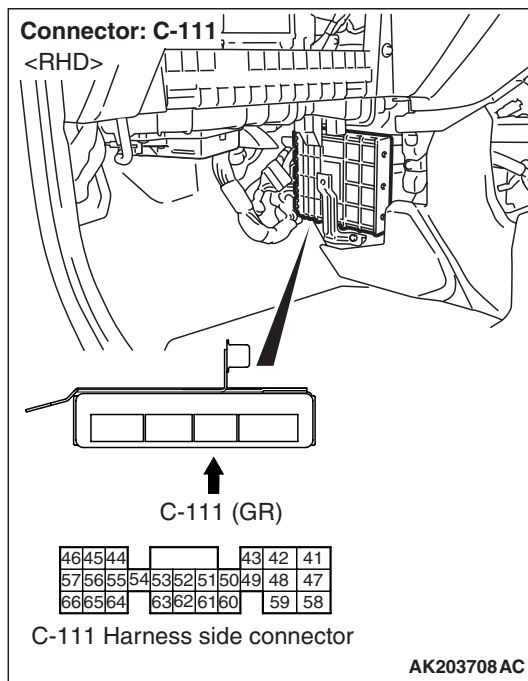
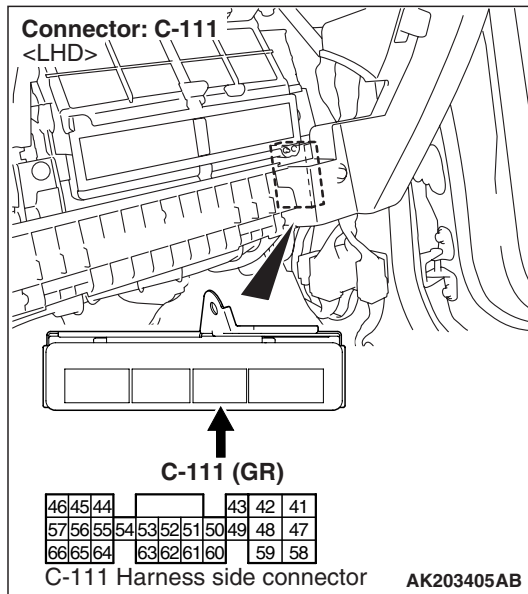
**YES :** Go to Step 7 .

**NO :** Go to Step 14 .

- Check output line for short circuit.

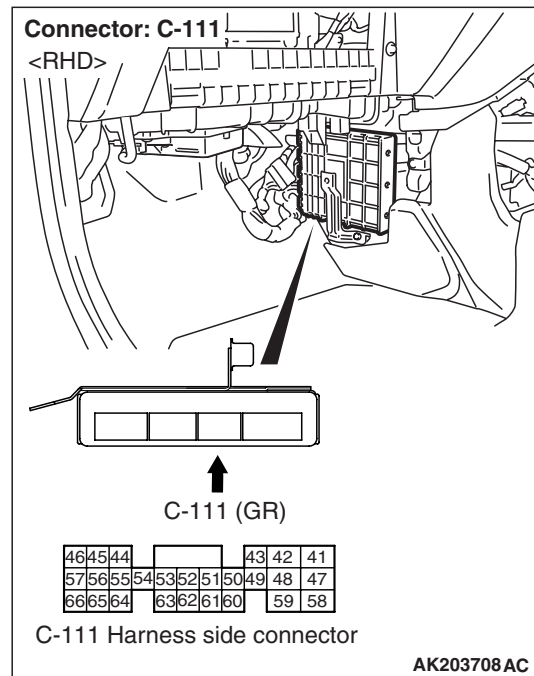
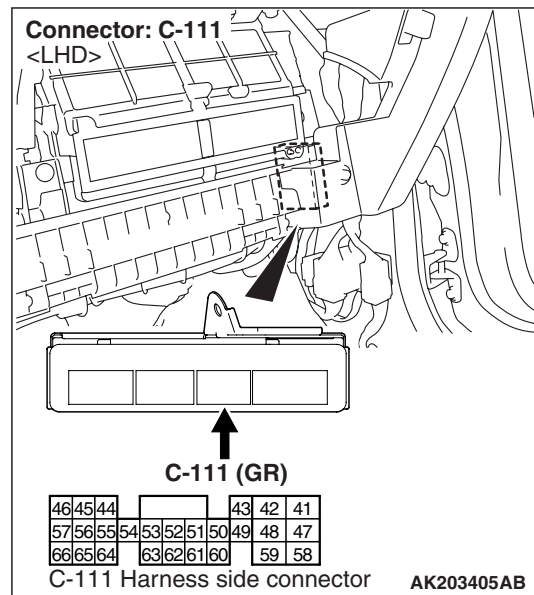
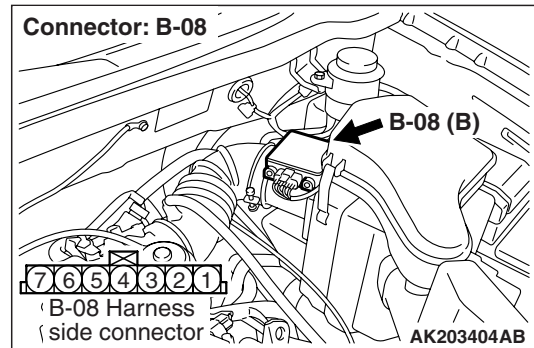


**STEP 14. Connector check: C-111  
engine-A/T-ECU connector**



**Q: Is the check result normal?**  
**YES :** Go to Step 15 .  
**NO :** Repair.

**STEP 15. Check harness between B-08 (terminal  
No. 6) air flow sensor connector and C-111  
(terminal No. 64) engine-A/T-ECU connector.**



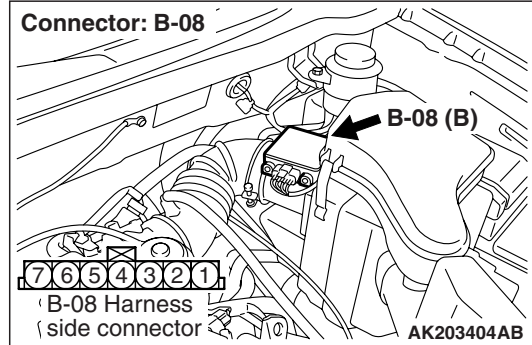
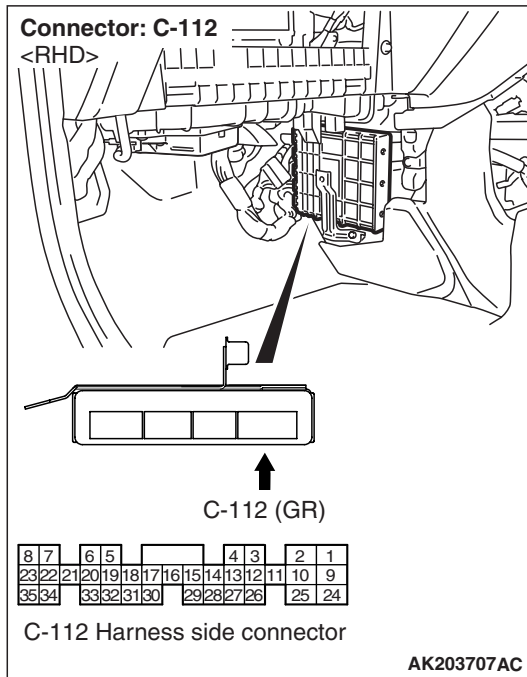
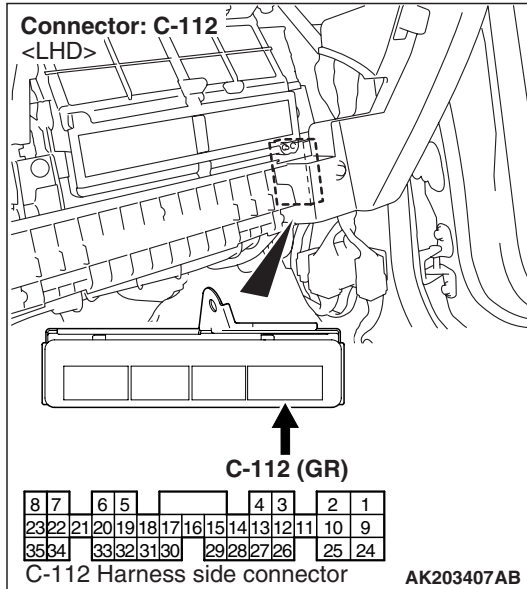
- Check output line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 16 .

**NO :** Repair.

### STEP 16. Connector check: C-112 engine-A/T-ECU connector



**Q: Is the check result normal?**

**YES :** Check intermediate connector C-16, and repair if necessary. If intermediate connector is normal, check and repair harness between B-08 (terminal No. 5) air flow sensor connector and C-127 (terminal No. 16) engine-A/T-ECU connector.

- Check earthing line for damage.

**NO :** Repair

**Code No. 14 Throttle Position Sensor System**

**OPERATION**

- A power voltage of 5 V is applied to the throttle position sensor (terminal No. 1) from the engine-A/T-ECU (terminal No. 46).
- The power voltage is earthed to the engine-A/T-ECU (terminal No. 57) from the throttle position sensor (terminal No. 4).
- The sensor signal is inputted to the engine-A/T-ECU (terminal No. 78) from the throttle position sensor output terminal (terminal No. 2).

**FUNCTION**

- The throttle position sensor converts the opening of the throttle valve into a voltage and inputs the voltage signal to the engine-A/T-ECU.
- In response to the signal, the engine-A/T-ECU checks the opening of the throttle valve.

**TROUBLE JUDGMENT**

**Check Condition**

- Exclude 60 seconds after the ignition switch has been in "ON" position or just after the engine has started up.

**Judgment Criteria**

- Sensor output voltage of 0.2 V or less for 4 seconds,
- or
- Sensor output voltage of 4.6 V or more for 4 seconds and volumetric efficiency of 40 % or less.

**PROBABLE CAUSE**

- Failed throttle position sensor
- Open/short circuit in throttle position sensor circuit or loose connector contact
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

**STEP 1. M.U.T.-II/III data list**

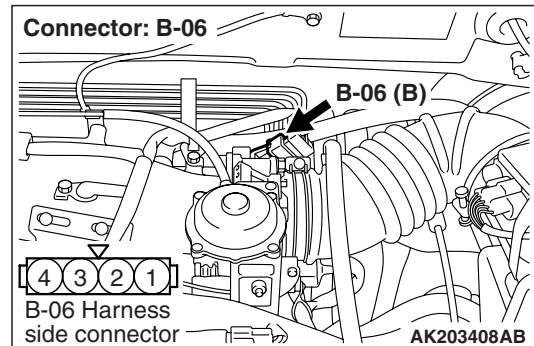
- Refer to Data list reference table [P.13A-260](#).
  - a. Item 14: Throttle position sensor

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO :** Go to Step 2 .

**STEP 2. Connector check: B-06 throttle position sensor connector**



**Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Repair.

**STEP 3. Check throttle position sensor itself.**

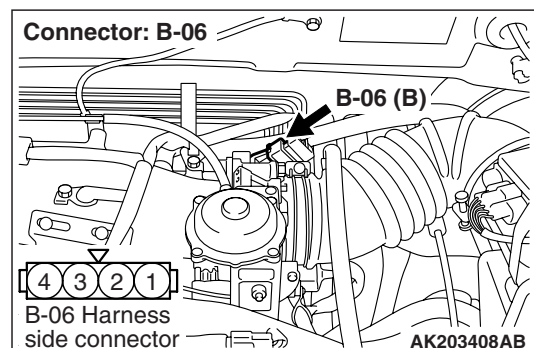
- Check throttle position sensor itself (Refer to [P.13A-288](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 4 .

**NO :** Replace throttle position sensor.

**STEP 4. Perform voltage measurement at B-06 throttle position sensor connector.**



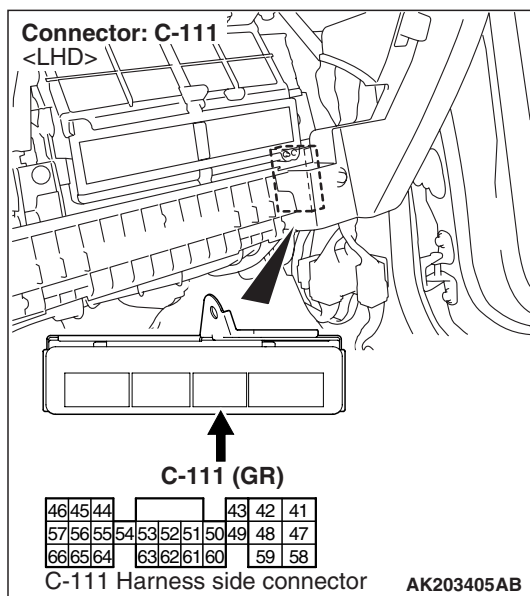
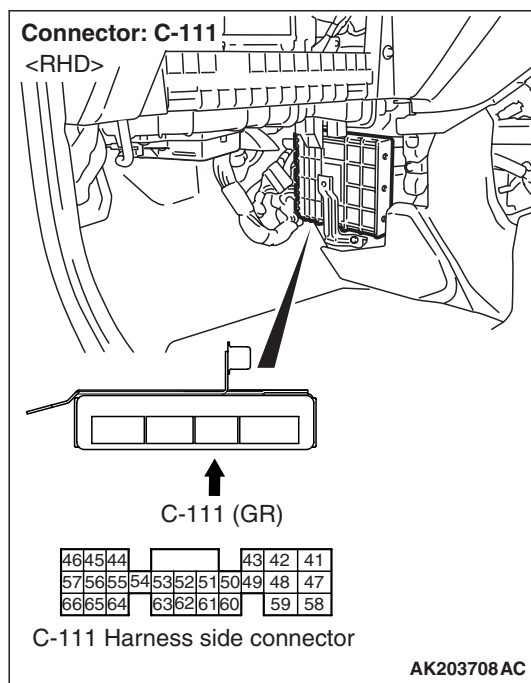
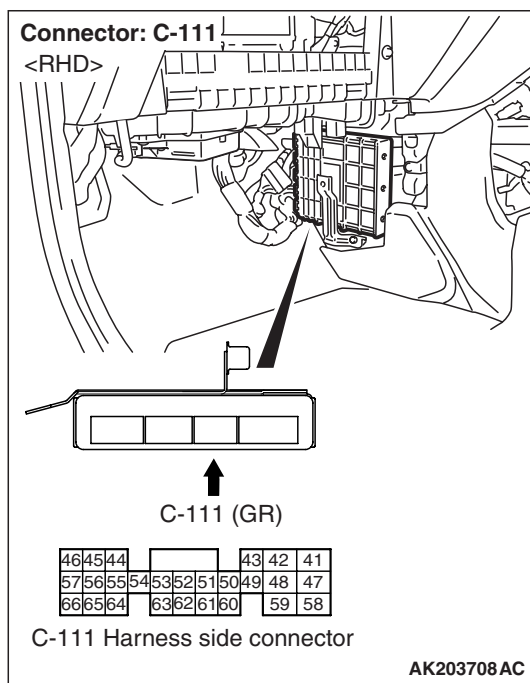
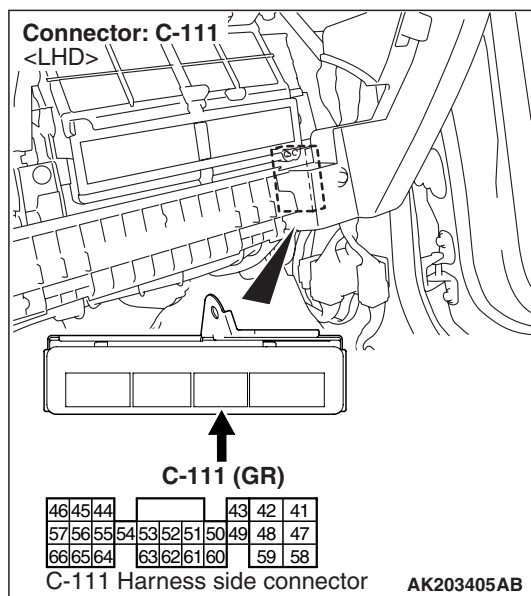
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

**OK: 4.9 – 5.1 V**

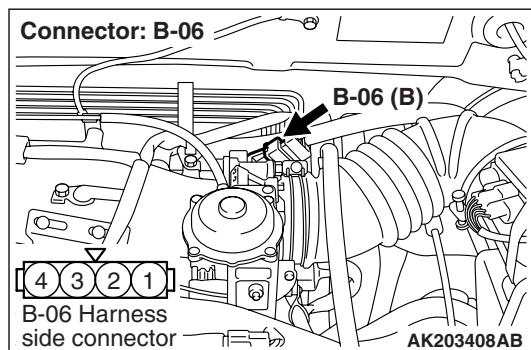
**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Go to Step 5 .

**STEP 5. Measure voltage at C-111 engine-A/T-ECU connector.****STEP 6. Connector check: C-111 engine-A/T-ECU connector**

- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 46 and earth.

**OK: 4.9 – 5.1 V****Q: Is the check result normal?****YES :** Go to Step 6 .**NO :** Go to Step 7 .

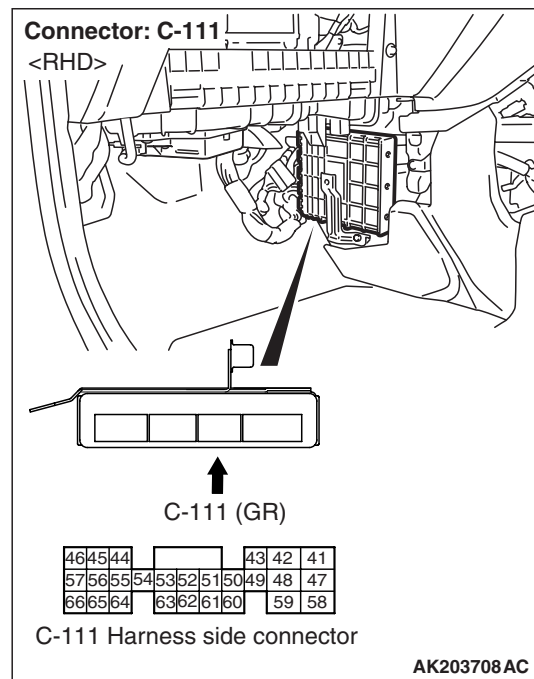
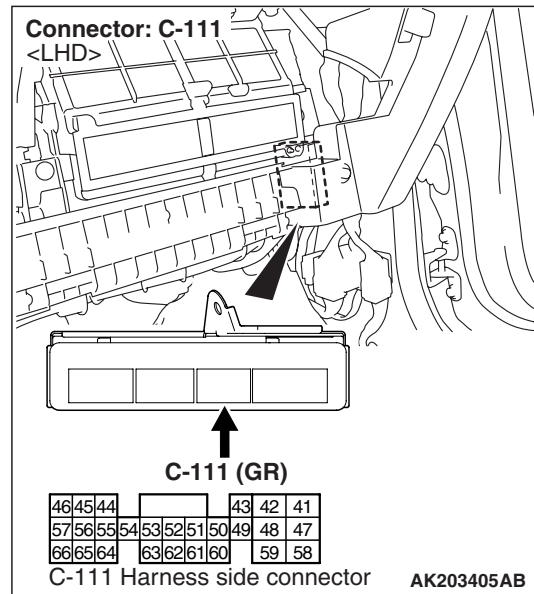
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-06 (terminal No. 1) throttle position sensor connector and C-111 (terminal No. 46) engine-A/T-ECU connector.

- Check power supply line for open circuit.

**NO :** Repair.

**STEP 7. Connector check: C-111 engine-A/T-ECU connector**

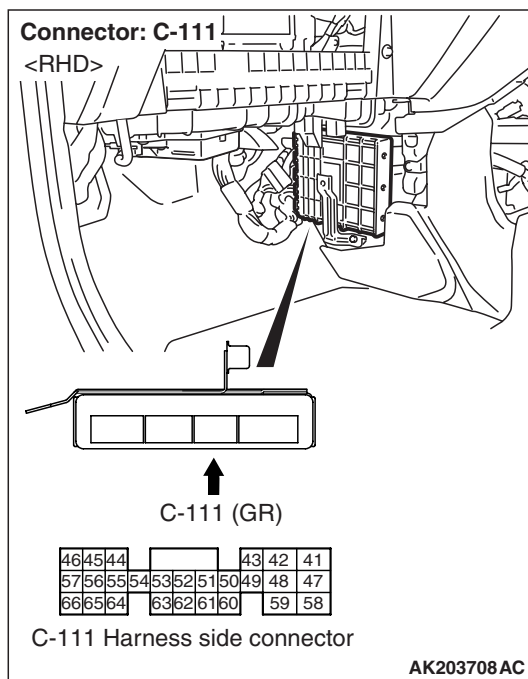
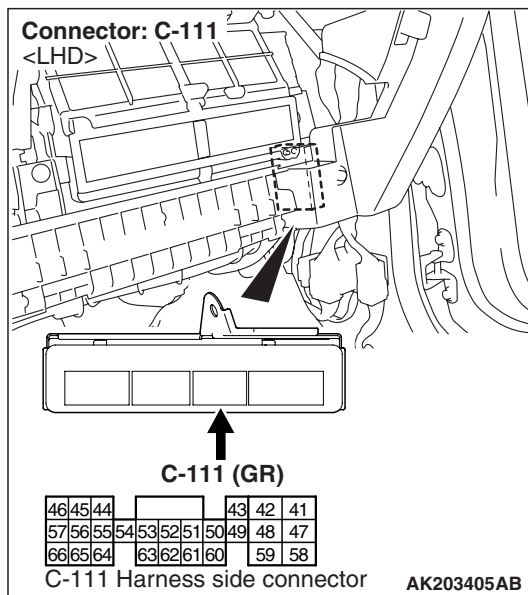
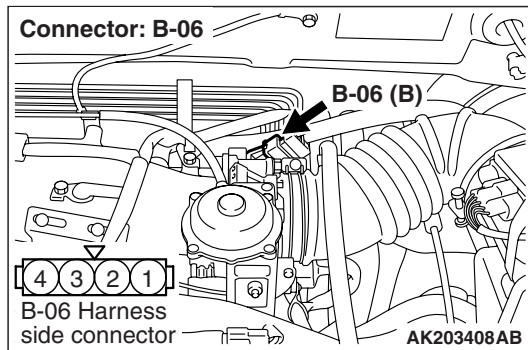


**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 8. Check harness between B-06 (terminal No. 1) throttle position sensor connector and C-111 (terminal No. 46) engine-A/T-ECU connector.**



**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 9. M.U.T.-II/III data list**

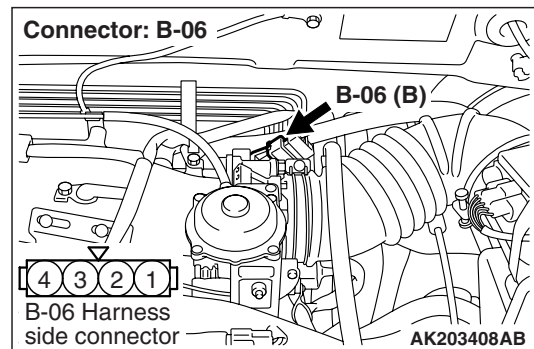
- Refer to Data list reference table [P.13A-260](#).
  - a. Item 14: Throttle position sensor

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO :** Replace engine-A/T-ECU.

**STEP 10. Perform resistance measurement at B-06 throttle position sensor connector.**



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 4 and earth.

**OK: 2  $\Omega$  or less**

**Q: Is the check result normal?**

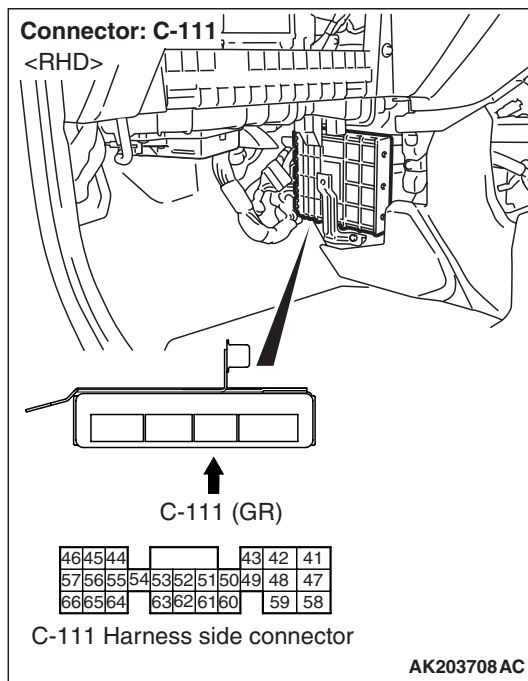
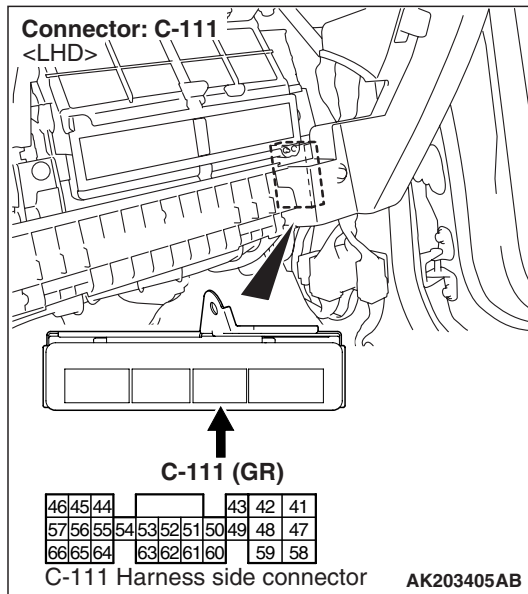
**YES :** Go to Step 13 .

**NO :** Go to Step 11 .

- Check power supply line for short circuit.

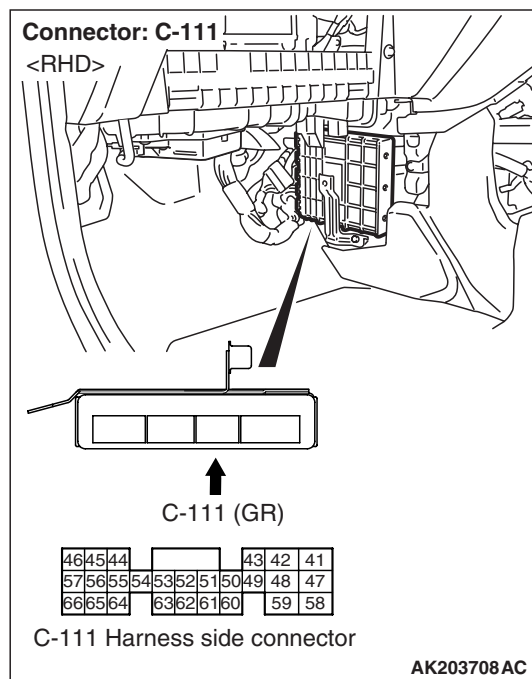
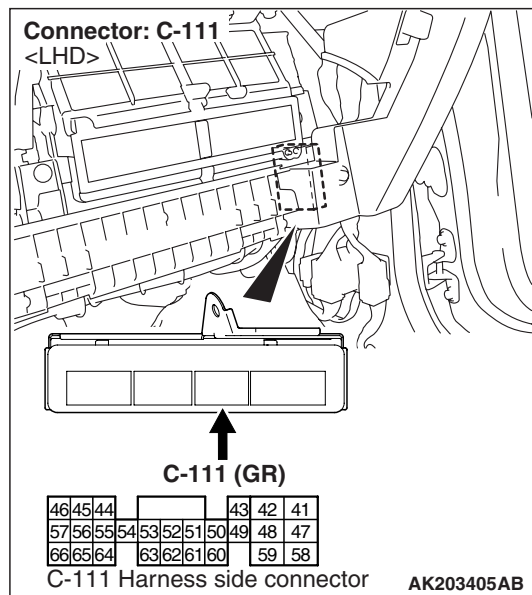
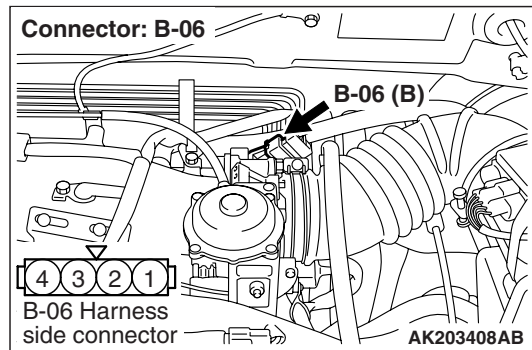


**STEP 11. Connector check: C-111  
engine-A/T-ECU connector**



**Q: Is the check result normal?**  
**YES :** Go to Step 12 .  
**NO :** . Repair.

**STEP 12. Check harness between B-06 (terminal  
No. 4) throttle position sensor connector and  
C-111 (terminal No. 57) engine-A/T-ECU  
connector.**



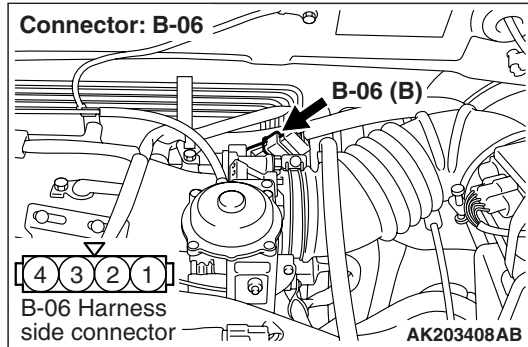
- Check earthing line for open circuit and damage.

**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

### STEP 13. Perform voltage measurement at B-06 throttle position sensor connector.



- Use special tool test harness (MB991536) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

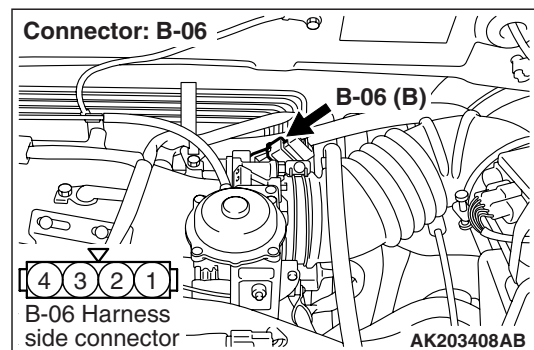
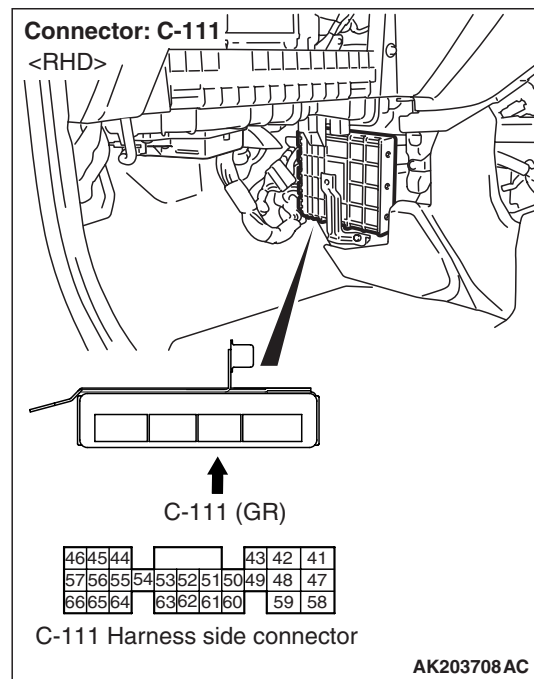
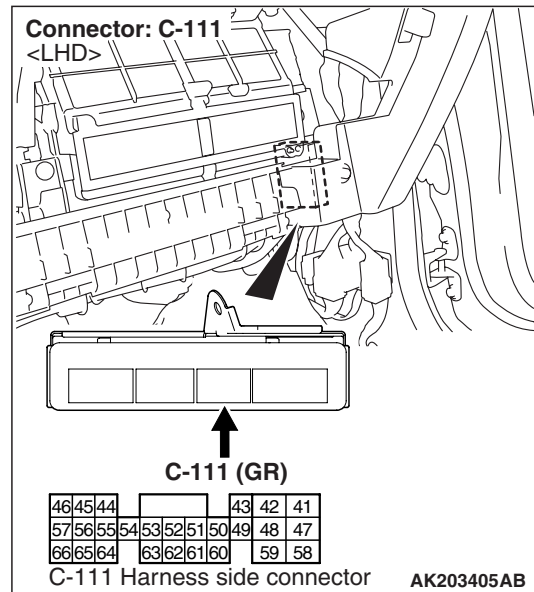
**OK: 4.9 – 5.1 V**

**Q: Is the check result normal?**

**YES :** Go to Step 15 .

**NO :** Go to Step 14 .

### STEP 14. Connector check: C-111 engine-A/T-ECU connector





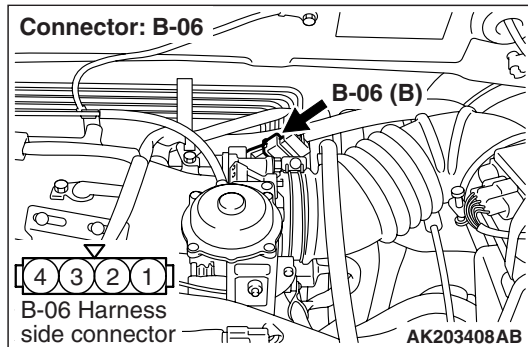
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-06 (terminal No. 1) throttle position sensor connector and C-111 (terminal No. 46) engine-A/T-ECU connector.

- Check power supply line for damage.

**NO :** Repair.

**STEP 15. Perform voltage measurement at B-06 throttle position sensor connector.**



- Use special tool test harness (MB991536) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 4 and earth.

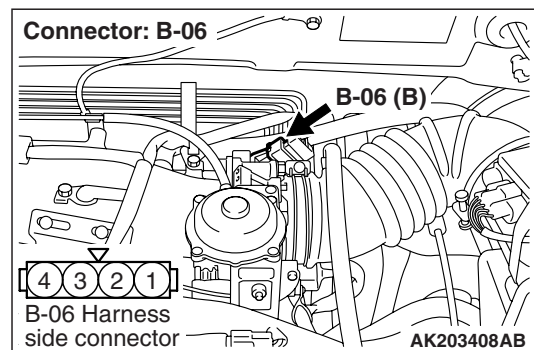
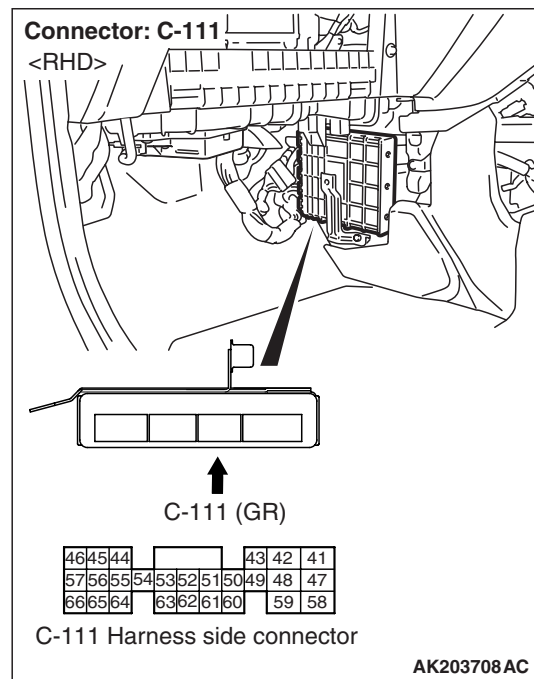
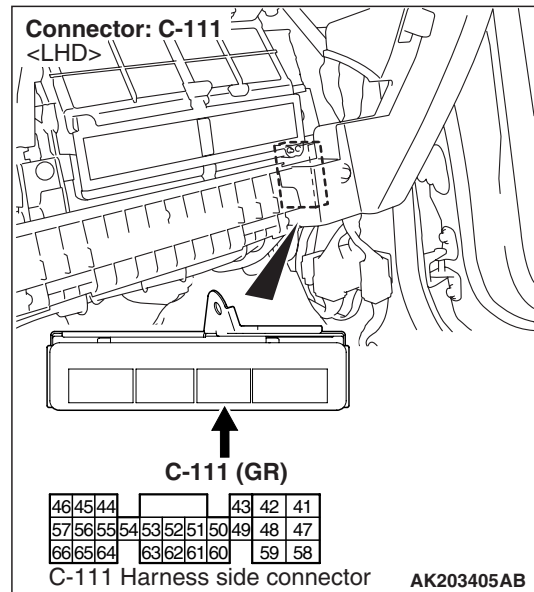
**OK: 0.5 V or less**

**Q: Is the check result normal?**

**YES :** Go to Step 17 .

**NO :** Go to Step 16 .

**STEP 16. Connector check: C-111 engine-A/T-ECU connector**



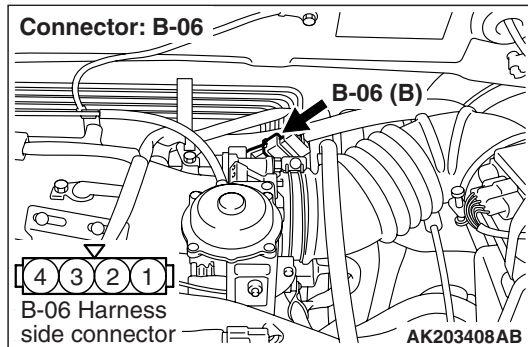
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-06 (terminal No. 4) throttle position sensor connector and C-111 (terminal No. 57) engine-A/T-ECU connector.

- Check earthing line for damage.

**NO :** Repair.

### STEP 17. Perform voltage measurement at B-06 throttle position sensor connector.



- Use special tool test harness (MB991536) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

**OK:**

**Accelerator pedal fully released: 0.536 – 0.735 V**

**Accelerator pedal fully depressed: 4.5 – 5.0 V**

**Q: Is the check result normal?**

**YES :** Go to Step 20 .

**NO :** Go to Step 18 .

### STEP 18. Adjust throttle position sensor.

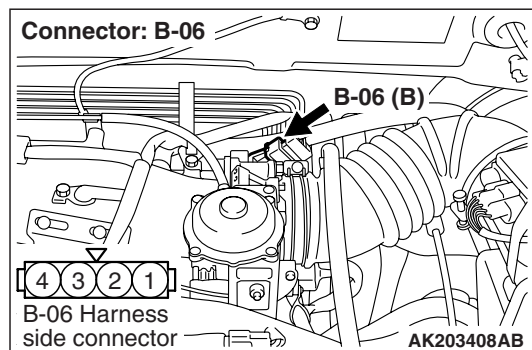
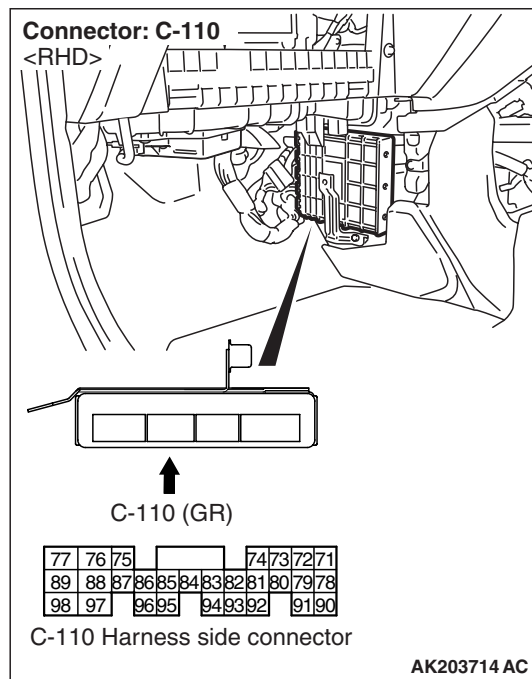
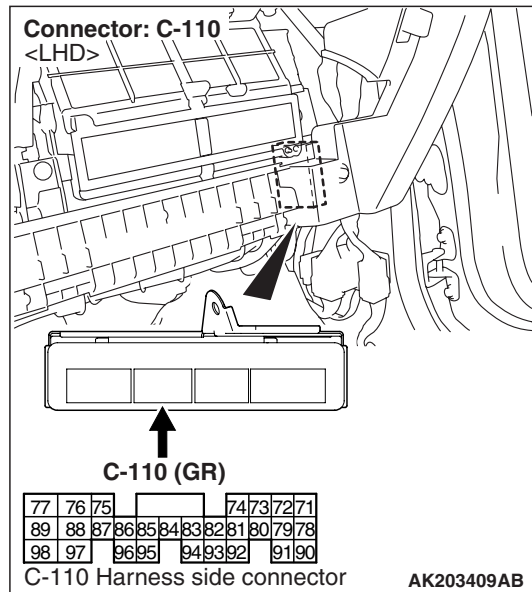
- Adjust throttle position sensor (Refer to [P.13A-280](#)).

**Q: Is the adjusted value normal?**

**YES :** Go to Step 19 .

**NO :** Adjust throttle position sensor.

### STEP 19. Connector check: C-110 engine-A/T-ECU connector



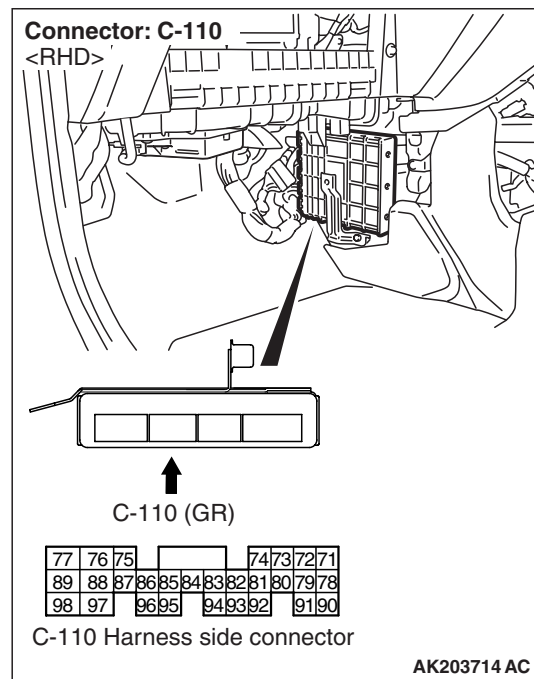
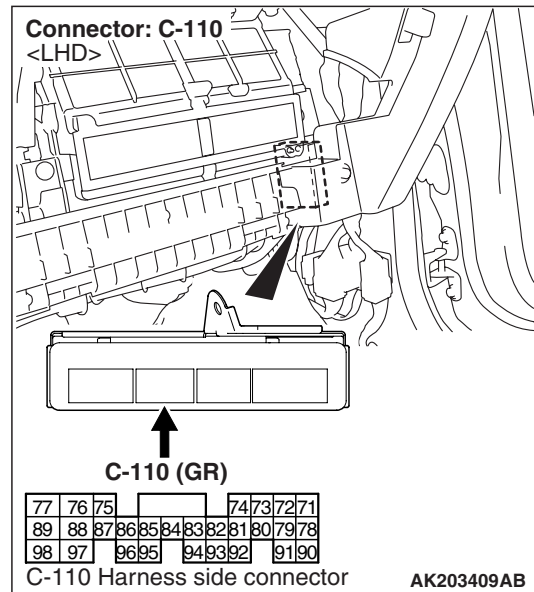
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-06 (terminal No. 2) throttle position sensor connector and C-110 (terminal No. 78) engine-A/T-ECU connector.

- Check output line for short circuit and damage.

**NO :** Repair.

**STEP 20. Perform voltage measurement at C-110 engine-A/T-ECU connector.**



- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 78 and earth.

**OK:**

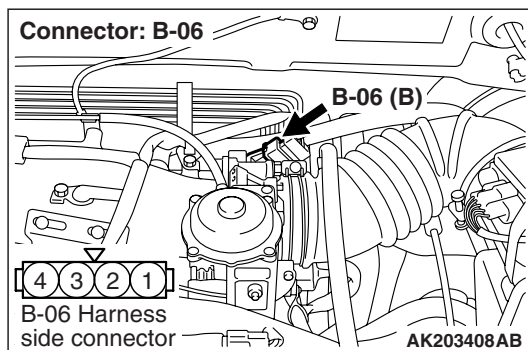
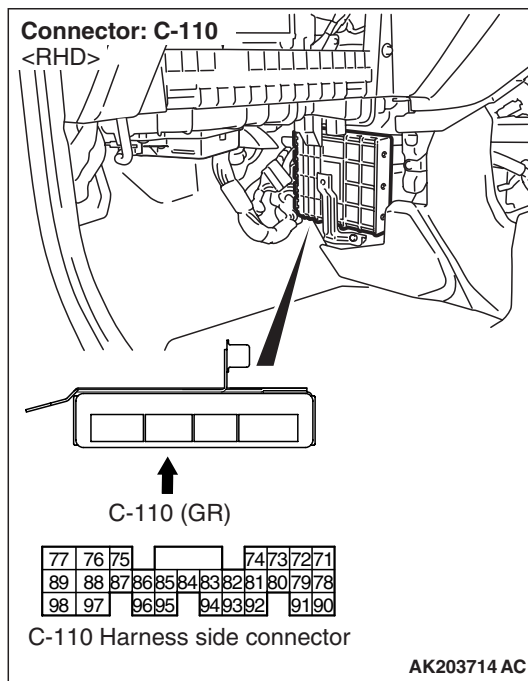
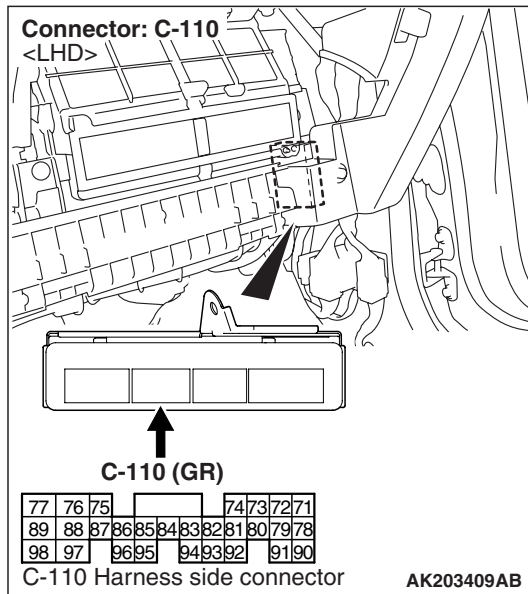
**Accelerator pedal fully released: 0.536 – 0.735 V**

**Accelerator pedal fully depressed: 4.5 – 5.0 V**

**Q: Is the check result normal?**

**YES :** Go to Step 22 .

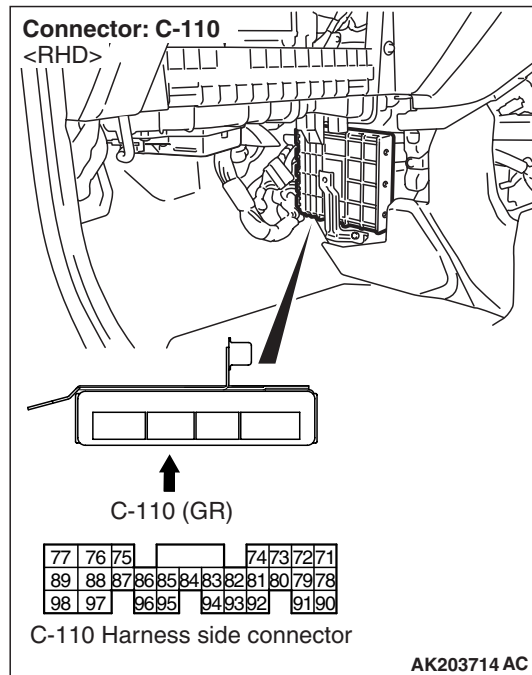
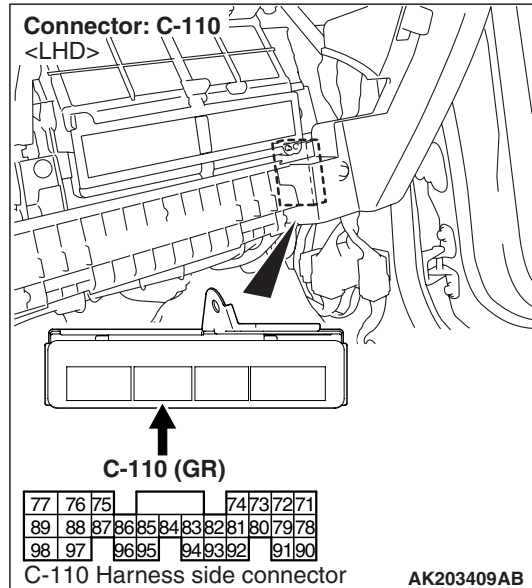
**NO :** Go to Step 21 .

**STEP 21. Connector check: C-110  
engine-A/T-ECU connector****Q: Is the check result normal?**

**YES :** Check and repair harness between B-06 (terminal No. 2) throttle position sensor connector and C-110 (terminal No. 78) engine-A/T-ECU connector.

- Check output line for open circuit and damage.

**NO :** Repair.

**STEP 22. Connector check: C-110  
engine-A/T-ECU connector****Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

## **Code No. 21 Engine Coolant Temperature Sensor System**

### **OPERATION**

- A power voltage of 5 V is applied to the engine coolant temperature sensor output terminal (terminal No. 1) from the engine-A/T-ECU (terminal No. 44).
- The power voltage is earthed to the engine-A/T-ECU (terminal No. 57) from the engine coolant temperature sensor (terminal No. 2).

### **FUNCTION**

- The engine coolant temperature sensor converts the engine coolant temperature into a voltage signal, and inputs the voltage to the engine-A/T-ECU.
- In response to the signal, the engine-A/T-ECU controls the fuel injection amount and the fast idle speed when the engine is cold state.
- The engine coolant temperature sensor is a kind of resistor, which has characteristics to reduce its resistance as the engine coolant temperature rises. Therefore, the sensor output voltage varies with the engine coolant temperature, and becomes lower as the engine coolant temperature rises.

### **TROUBLE JUDGMENT**

#### **Check Condition**

- 60 seconds later after the ignition switch has been in "ON" position or the engine has started up.

#### **Judgment Criteria**

- A sensor output voltage of 4.6 V or more (engine coolant temperature below -45°C or equivalent) for 4 seconds.

or

- A sensor output voltage of 0.1 V or less (engine coolant temperature above 140°C or equivalent) for 4 seconds.

#### **Check Condition**

- After the engine has started up.

### **Judgment Criterion**

- After filtered, the state where the water temperature output changed to below 40°C from above 40°C continues for 5 minutes or more.

### **PROBABLE CAUSE**

- Failed engine coolant temperature sensor
- Open/short circuit in engine coolant temperature sensor circuit or loose connector contact
- Failed engine-A/T-ECU

### **DIAGNOSIS PROCEDURE**

#### **STEP 1. M.U.T.-II/III data list**

- Item 21: Engine coolant temperature sensor

**OK:**

**Engine cold state: At ambient temperature (atmospheric temperature) or equivalent.**

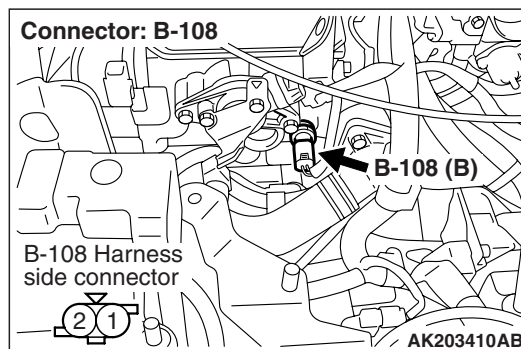
**Engine hot state: At 80 – 120°C**

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO :** Go to Step 2 .

#### **STEP 2. Connector check: B-108 engine coolant temperature sensor connector**

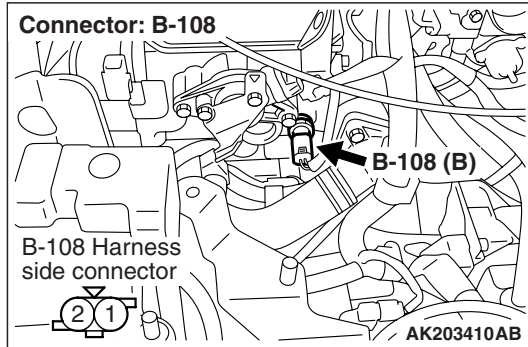


**Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Repair.

**STEP 3. Perform resistance measurement at B-108 engine coolant temperature sensor connector.**



- Disconnect connector, and measure at sensor side.
- Resistance between terminal No. 1 and No. 5.

**OK:**

**Engine coolant temperature at  $-20^{\circ}\text{C}$ : 14 – 17  $\text{k}\Omega$**

**Engine coolant temperature at  $0^{\circ}\text{C}$ : 5.1 – 6.5  $\text{k}\Omega$**

**Engine coolant temperature at  $20^{\circ}\text{C}$ : 2.1 – 2.7  $\text{k}\Omega$**

**Engine coolant temperature at  $40^{\circ}\text{C}$ : 0.9 – 1.3  $\text{k}\Omega$**

**Engine coolant temperature at  $60^{\circ}\text{C}$ : 0.48 – 0.68  $\text{k}\Omega$**

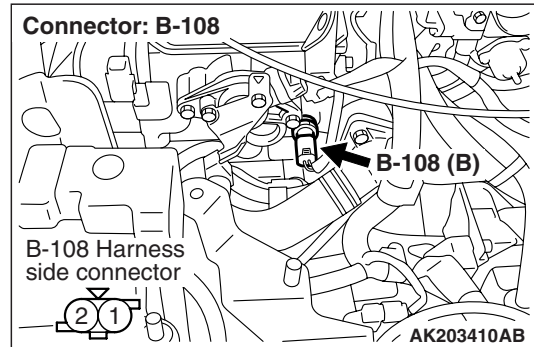
**Engine coolant temperature at  $80^{\circ}\text{C}$ : 0.26 – 0.36  $\text{k}\Omega$**

**Q: Is the check result normal?**

**YES :** Go to Step 4 .

**NO :** . Replace engine coolant temperature sensor.

**STEP 4. Perform voltage measurement at B-108 engine coolant temperature sensor connector.**



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

**OK: 4.5 – 4.9 V**

**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Go to Step 5 .



**STEP 5. Perform voltage measurement at C-111 engine-A/T-ECU connector.**

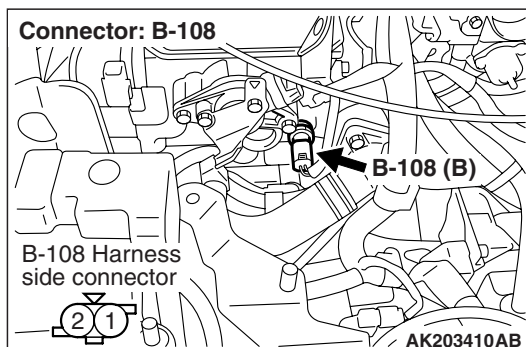
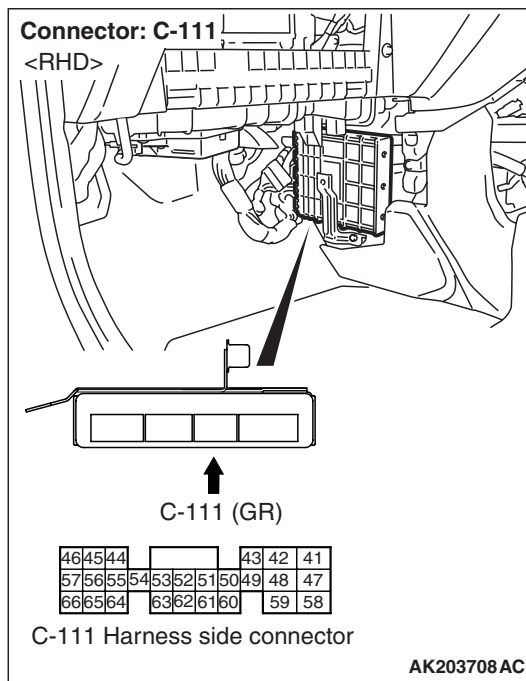
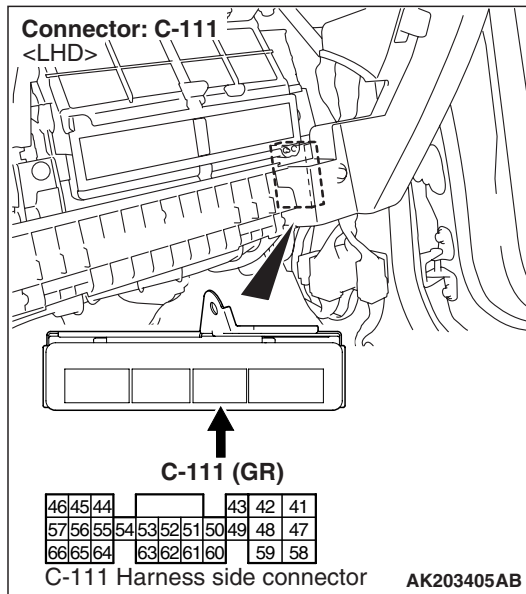
- Ignition switch: ON
- Voltage between terminal No. 44 and earth.

**OK: 4.5 – 4.9 V**

**Q: Is the check result normal?**

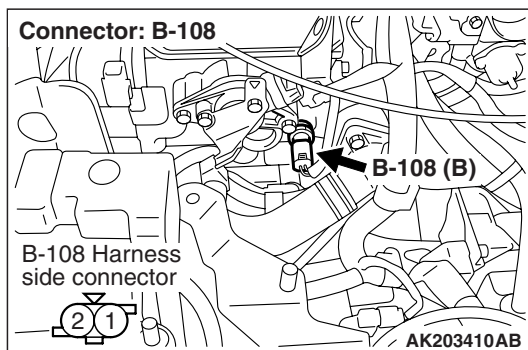
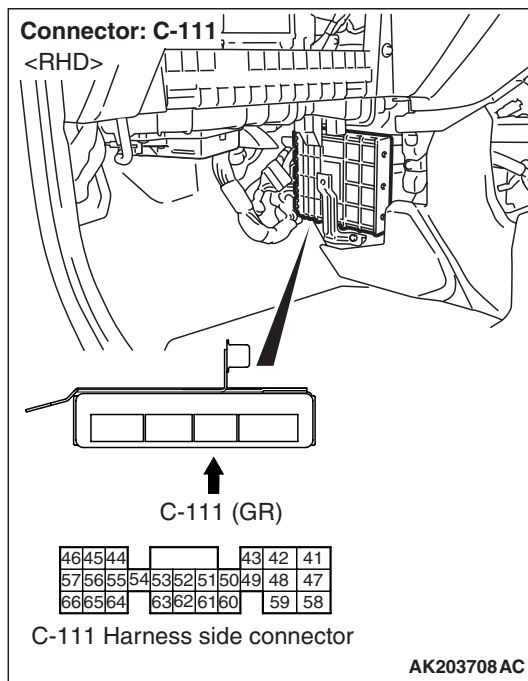
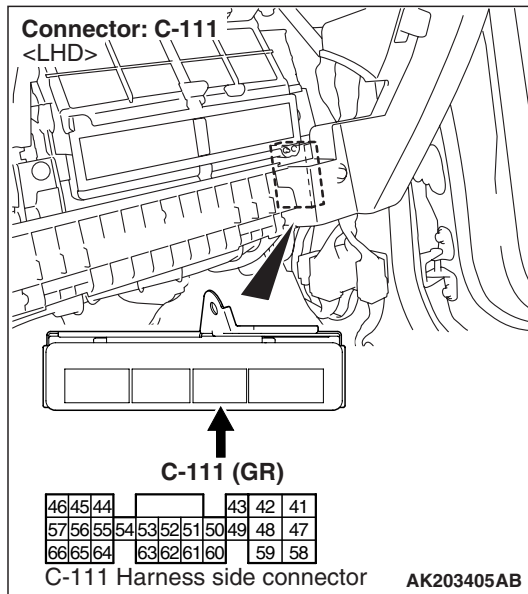
**YES :** Go to Step 6 .

**NO :** Go to Step 7 .



- Measure engine-A/T-ECU terminal voltage.
- Disconnect B-108 engine coolant temperature sensor.

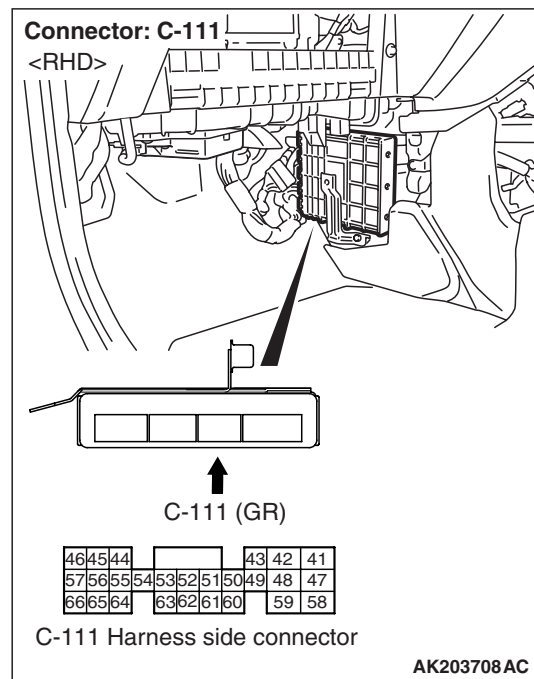
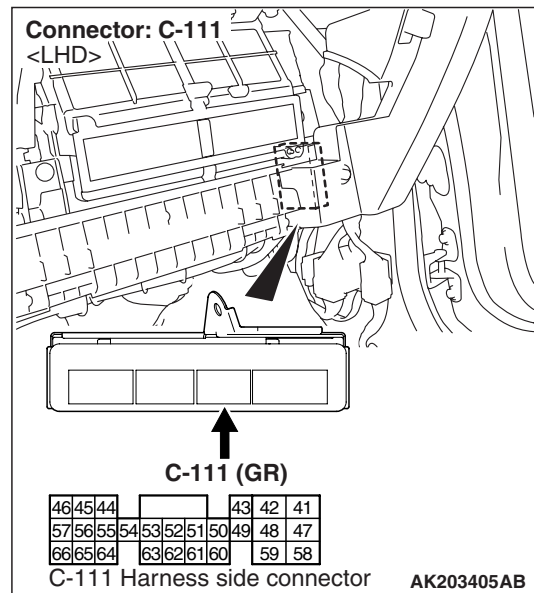


**STEP 6. Connector check: C-111 engine-A/T-ECU connector****Q: Is the check result normal?**

**YES :** Check and repair harness between B-108 (terminal No. 1) engine coolant temperature sensor connector and C-111 (terminal No. 44) engine-A/T-ECU connector.

- Check output line for open circuit.

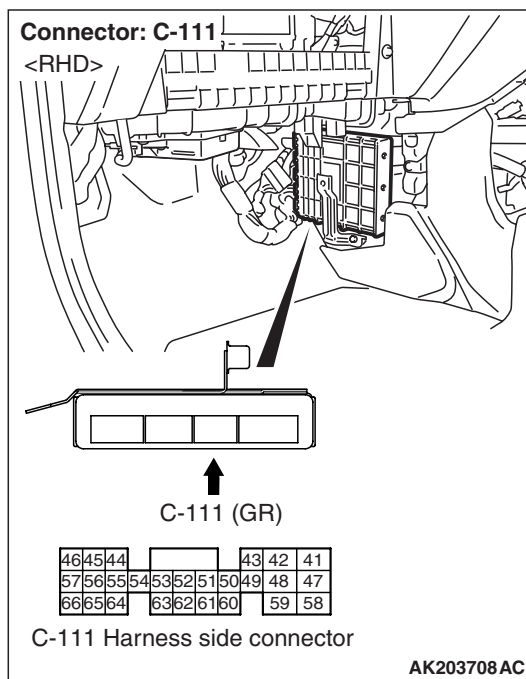
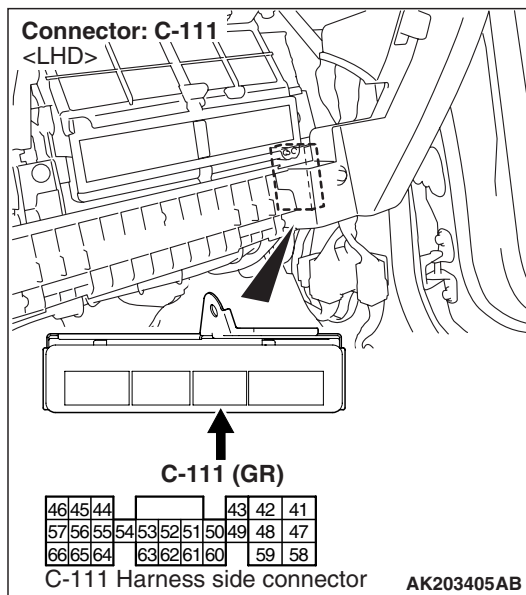
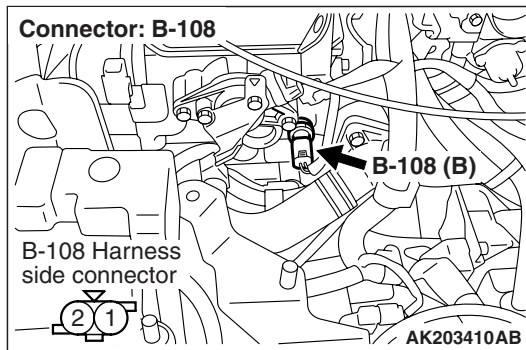
**NO :** Repair.

**STEP 7. Connector check: C-111 engine-A/T-ECU connector****Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 8. Check harness between B-108 (terminal No. 1) engine coolant temperature sensor connector and C-111 (terminal No. 44) engine-A/T-ECU connector.**



- Check output line for short circuit.

**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 9. M.U.T.-II/III data list**

- Item 21: Engine coolant temperature sensor

**OK:**

**Engine cold state:** At ambient temperature (atmospheric temperature) or equivalent.

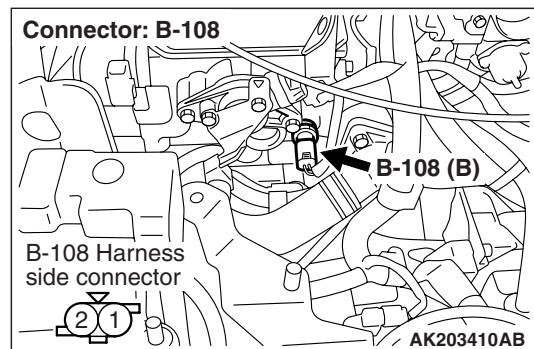
**Engine hot state:** At 80 – 120°C

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO :** Replace engine-A/T-ECU.

**STEP 10. Perform voltage measurement at B-108 engine coolant temperature sensor connector.**



- Disconnect connector and measure at harness side.

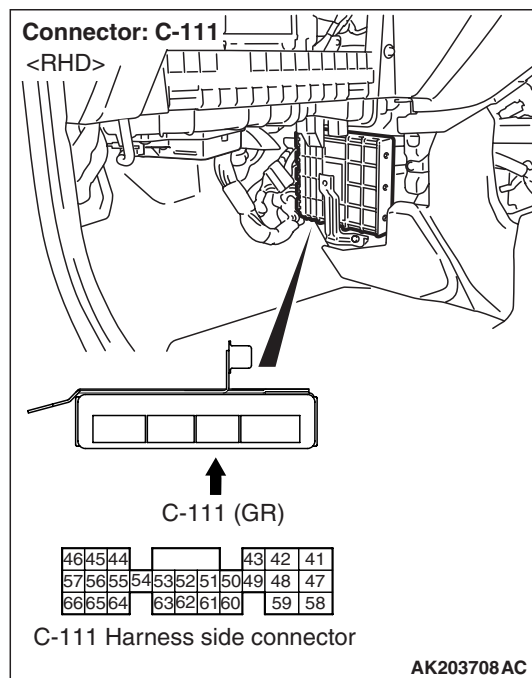
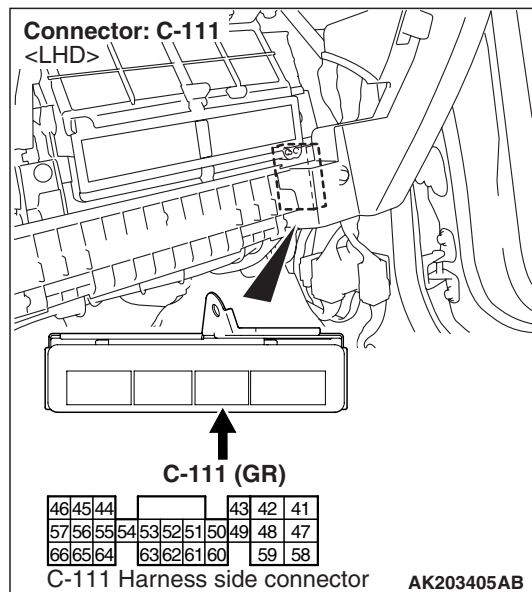
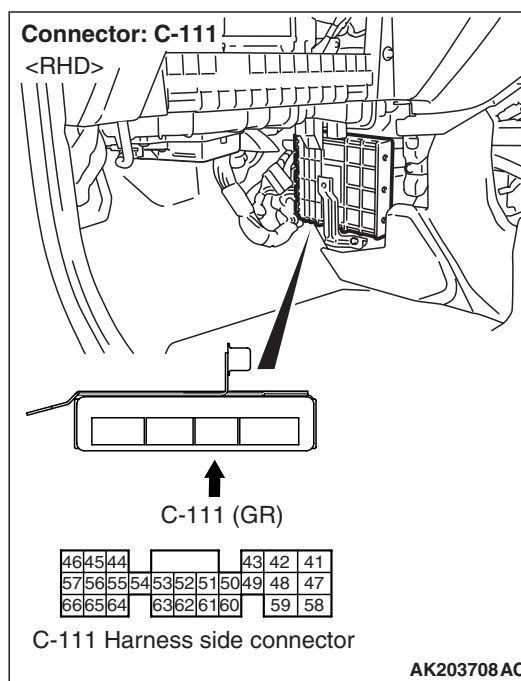
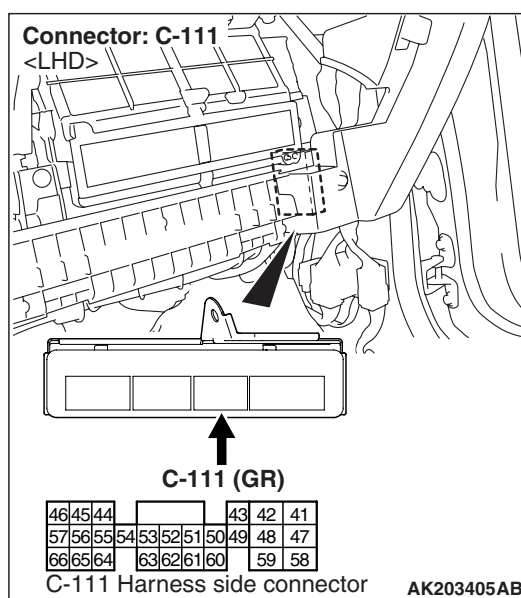
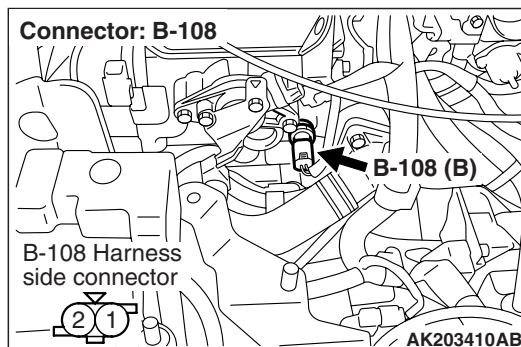
- Voltage between terminal No. 2 and earth.

**OK: 2 Ω or less**

**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO :** Go to Step 11 .

**STEP 11. Connector check: C-111  
engine-A/T-ECU connector****Q: Is the check result normal?****YES : Go to Step 12 .****NO : Repair.****STEP 12. Check harness between B-108 (terminal  
No. 2) engine coolant temperature sensor  
connector and C-111 (terminal No. 57)  
engine-A/T-ECU connector.**

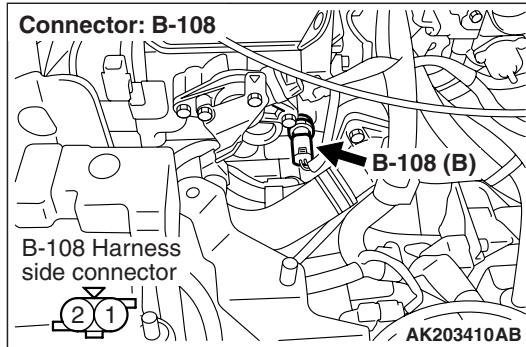
- Check earthing line for open circuit and damage.

**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 13. Perform voltage measurement at B-108 engine coolant temperature sensor connector.**



- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

**OK:**

**Engine coolant temperature at -20°C: 3.9 – 4.5 V**

**Engine coolant temperature at 0°C: 3.2 – 3.8 V**

**Engine coolant temperature at 20°C: 2.3 – 2.9 V**

**Engine coolant temperature at 40°C: 1.3 – 1.9 V**

**Engine coolant temperature at 60°C: 0.7 – 1.3 V**

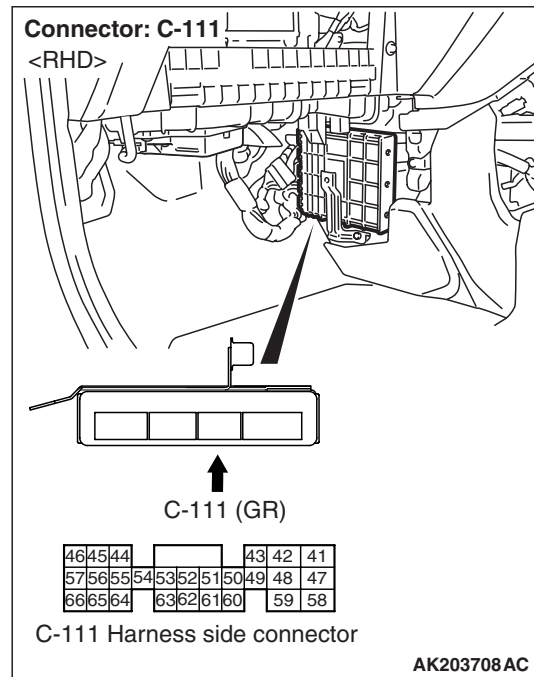
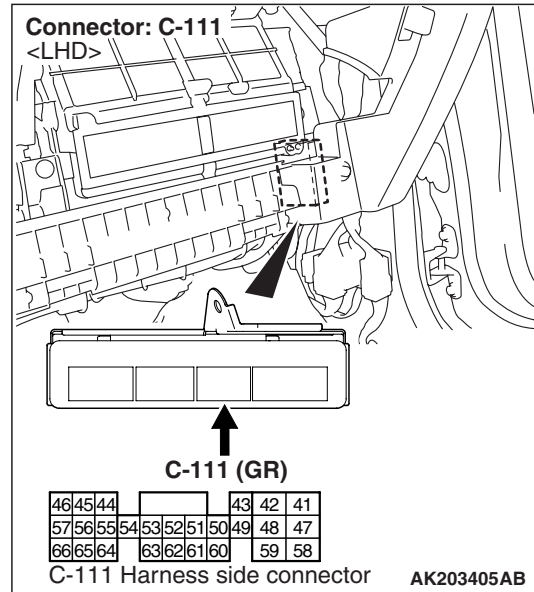
**Engine coolant temperature at 80°C: 0.3 – 0.9 V**

**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Go to Step 14 .

**STEP 14. Connector check: C-111 engine-A/T-ECU connector**



**Q: Is the check result normal?**

**YES :** Go to Step 15 .

**NO :** Repair.

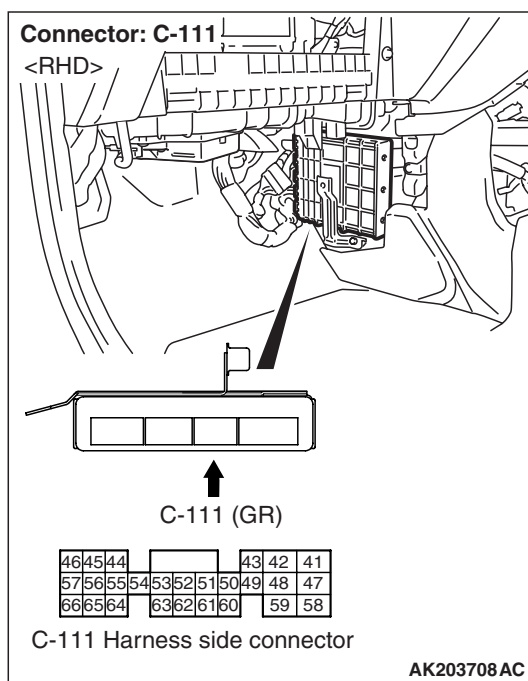
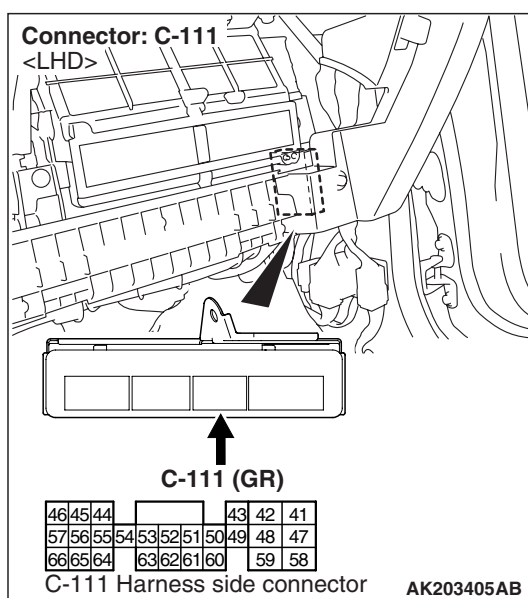
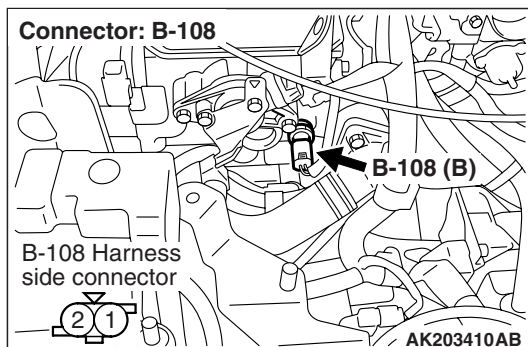
**STEP 15. Check harness between B-108 (terminal No. 1) engine coolant temperature sensor connector and C-111 (terminal No. 44) engine-A/T-ECU connector.**

- Check output line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 16 .

**NO :** Repair.



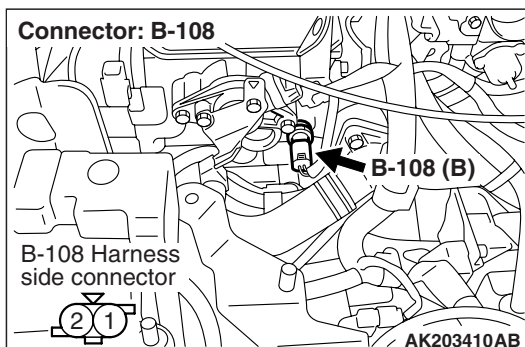
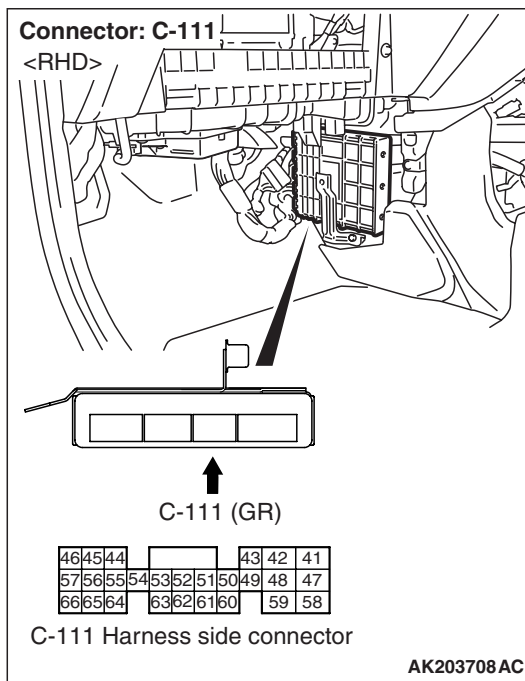
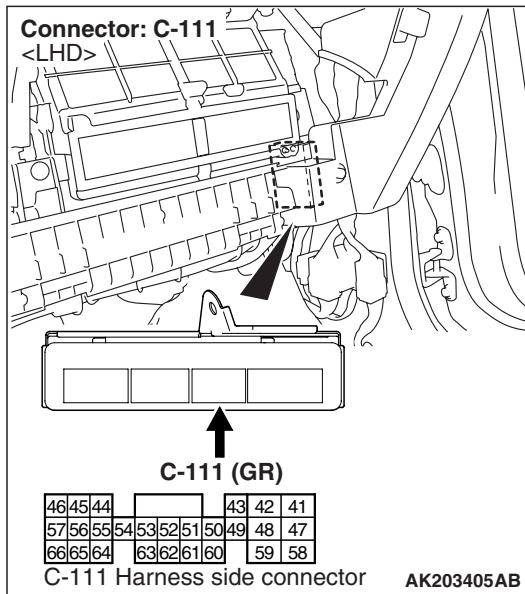
**STEP 16. Connector check: C-111  
engine-A/T-ECU connector**

**Q: Is the check result normal?**

**YES :** Check harness between B-108 (terminal No. 2) engine coolant temperature sensor connector and C-111 (terminal No. 57) engine-A/T-ECU connector.

- Check earthing line for damage.

**NO :** Repair.





## Code No. 22 Crank Angle Sensor System

## OPERATION

- Power is supplied to the crank angle sensor (terminal No. 3) from the engine control relay (terminal No. 4) and is earthed to the engine-A/T-ECU (terminal No. 16) from the crank angle sensor (terminal No. 1).
- A power voltage of 5 V is applied to the crank angle sensor output terminal (terminal No. 2) from the engine-A/T-ECU (terminal No. 45).

## FUNCTION

- The crank angle sensor detects the crank angle (position) and inputs a pulse signal to the engine-A/T-ECU.
- In response to the signal, the engine-A/T-ECU controls the injector, etc.

## TROUBLE JUDGMENT

## Check Condition

- Engine: Cranking

## Judgment Criterion

- Sensor output voltage remains unchanged (no pulse signal is inputted) for 4 seconds.

## PROBABLE CAUSE

- Failed crank angle sensor
- Open/short circuit in crank angle sensor circuit or loose connector contact
- Failed engine-A/T-ECU

## DIAGNOSIS PROCEDURE

## STEP 1. M.U.T.-II/III data list

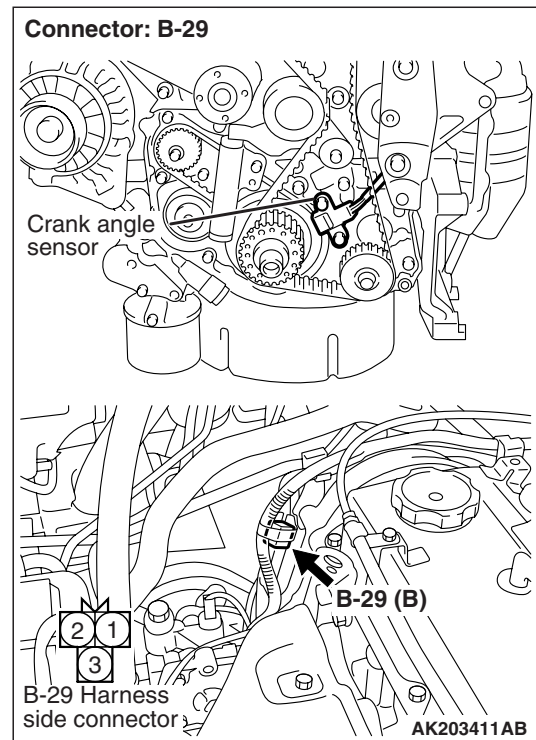
- Refer to Data list reference table [P.13A-260](#).
  - a. Item 22: Crank angle sensor

## Q: Is the check result normal?

**YES** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO** : Go to Step 2 .

## STEP 2. Connector check: B-29 crank angle sensor connector

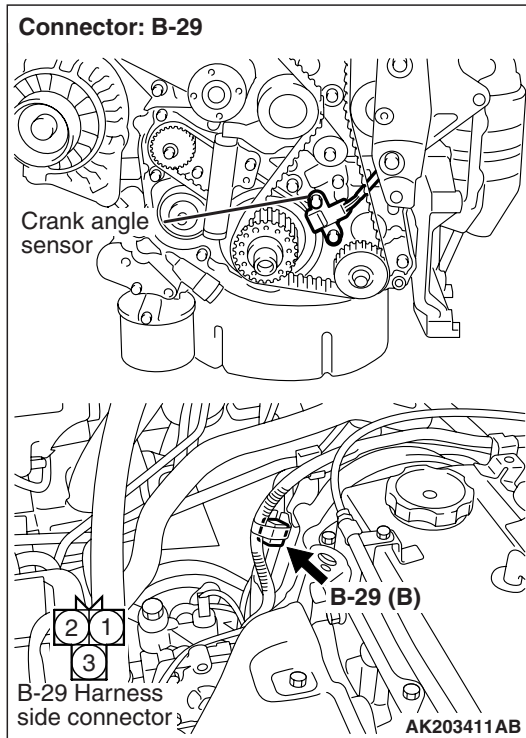


## Q: Is the check result normal?

**YES** : Go to Step 3 .

**NO** : Repair.

**STEP 3. Perform voltage measurement at B-29 crank angle sensor connector.**



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

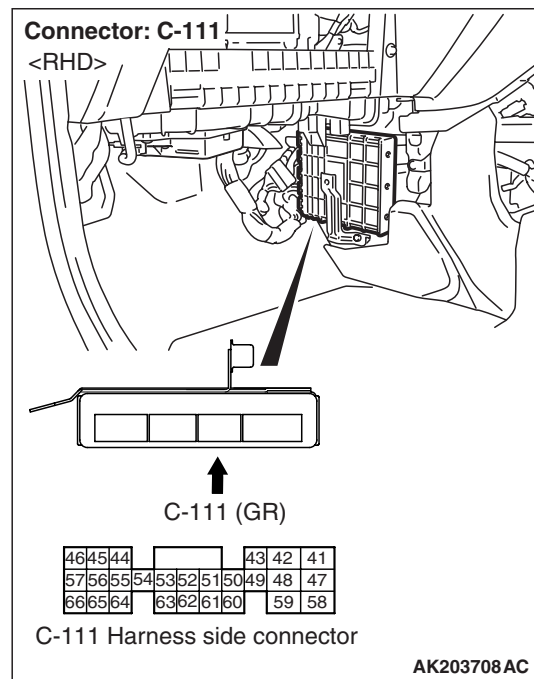
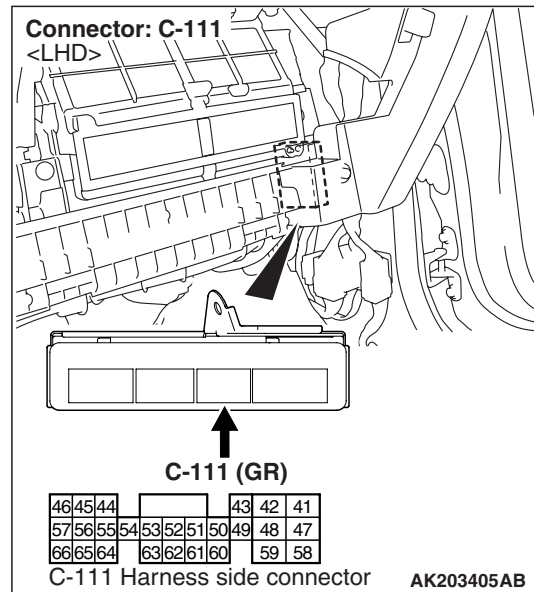
**OK: 4.9 – 5.1 V**

**Q: Is the check result normal?**

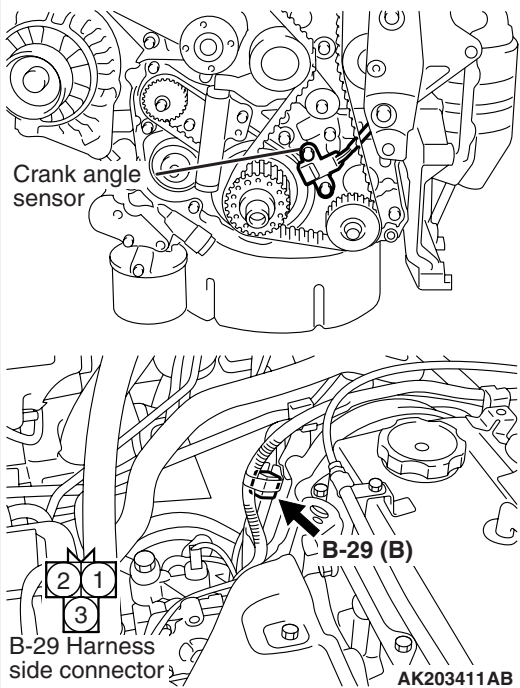
**YES :** Go to Step 9 .

**NO :** Go to Step 4 .

**STEP 4. Perform voltage measurement at C-111 engine-A/T-ECU connector.**



Connector: B-29



- Measure engine-A/T-ECU terminal voltage.
- Disconnect B-29 crank angle sensor connector.
- Ignition switch: ON
- Voltage between terminal No. 45 and earth.

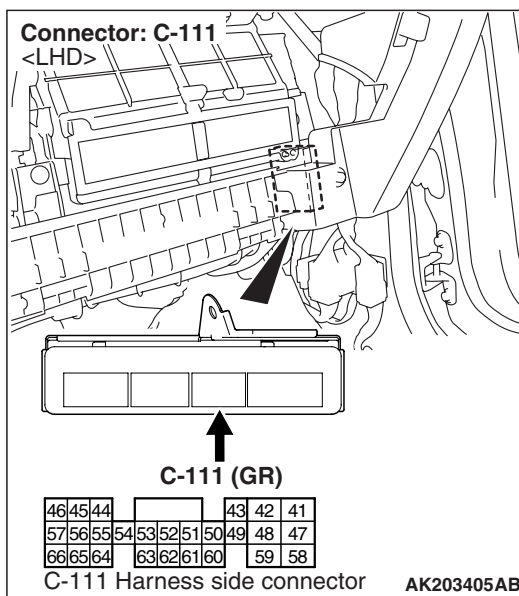
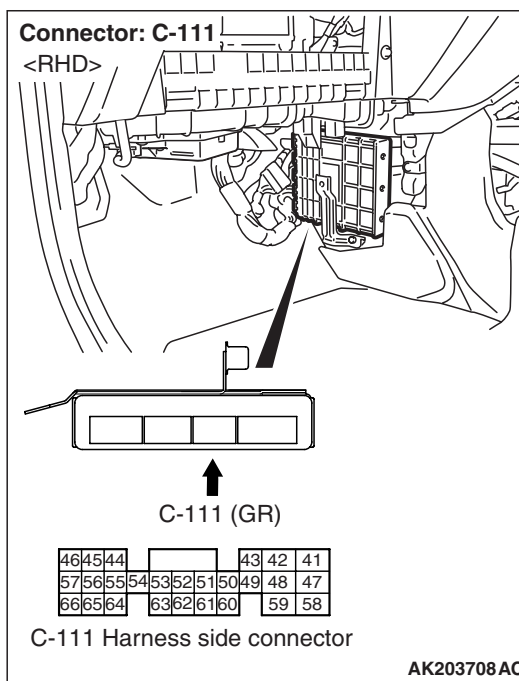
**OK: 4.9 – 5.1 V**

**Q: Is the check result normal?**

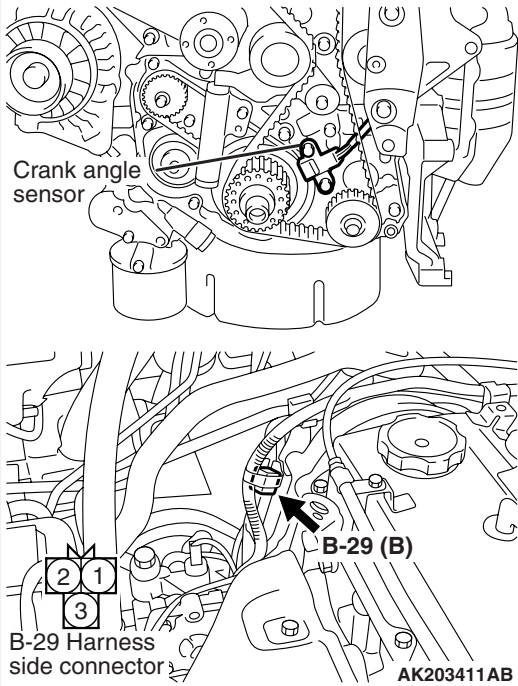
**YES :** Go to Step 5 .

**NO : .** Go to Step 6 .

### STEP 5. Connector check: C-111 engine-A/T-ECU connector

Connector: C-111  
<LHD>Connector: C-111  
<RHD>

**Connector: B-29**



**Q: Is the check result normal?**

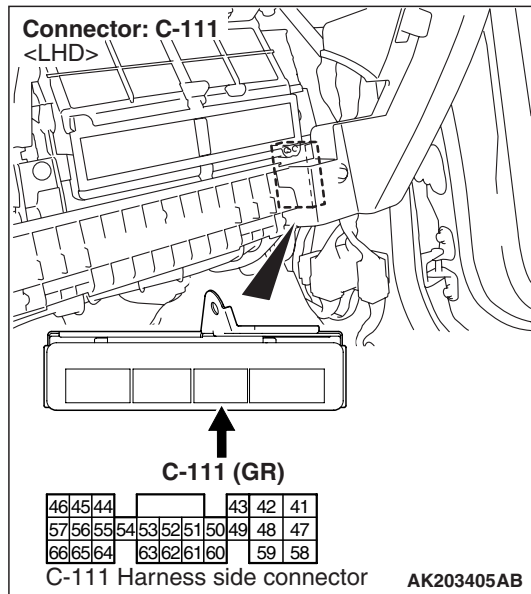
**YES :** Check and repair harness between B-29 (terminal No. 2) crank angle sensor connector and C-111 (terminal No. 45) engine-A/T-ECU connector.

- Check output line for open circuit.

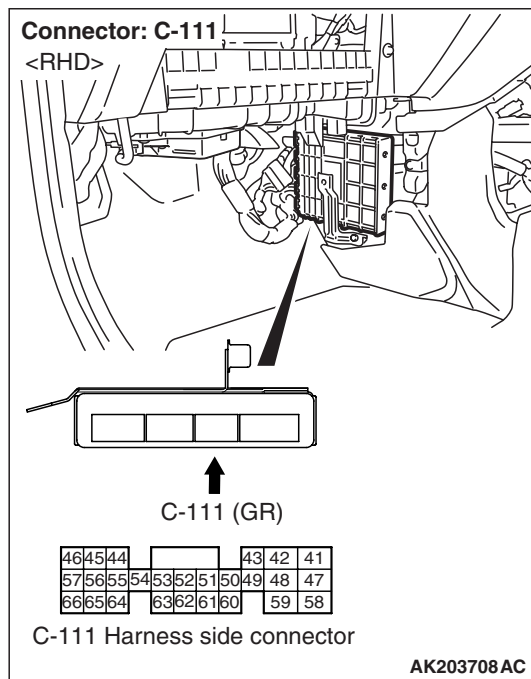
**NO :** Repair.

**STEP 6. Connector check: C-111 engine-A/T-ECU connector**

**Connector: C-111  
<LHD>**



**Connector: C-111  
<RHD>**

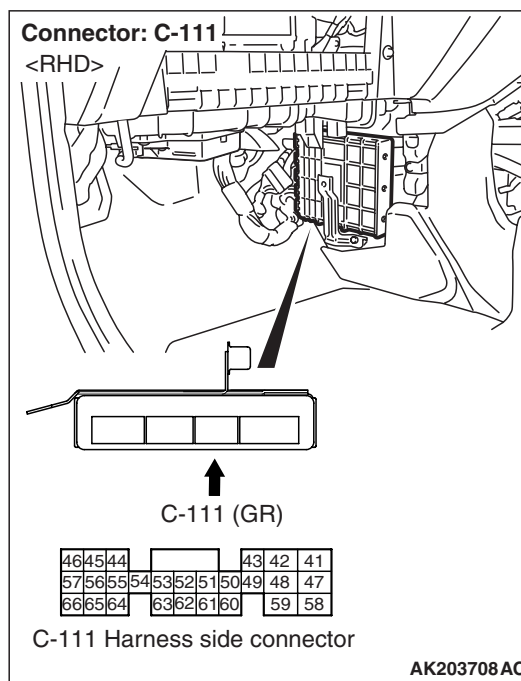
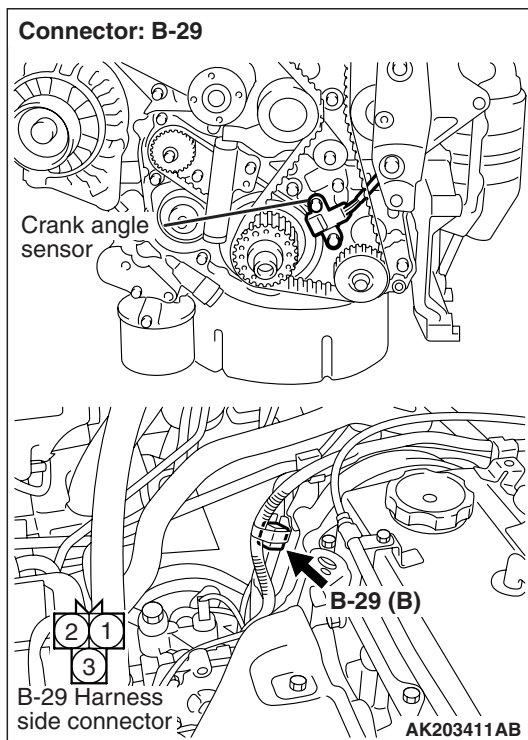


**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

**STEP 7. Check harness between B-29 (terminal No. 2) crank angle sensor connector and C-111 (terminal No. 45) engine-A/T-ECU connector.**

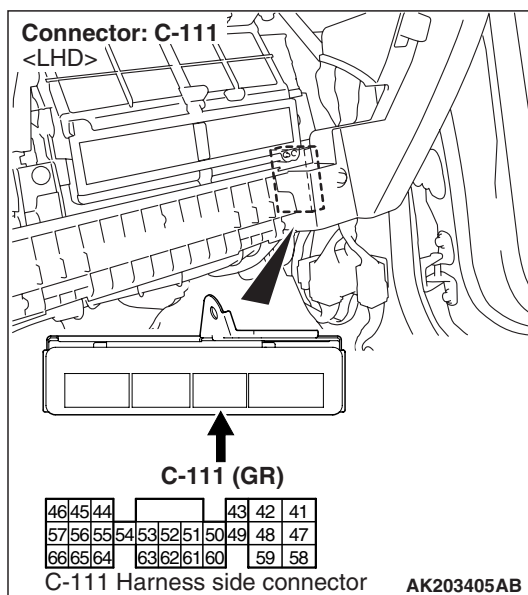


- Check output line for short circuit.

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.



**STEP 8. M.U.T.-II/III data list**

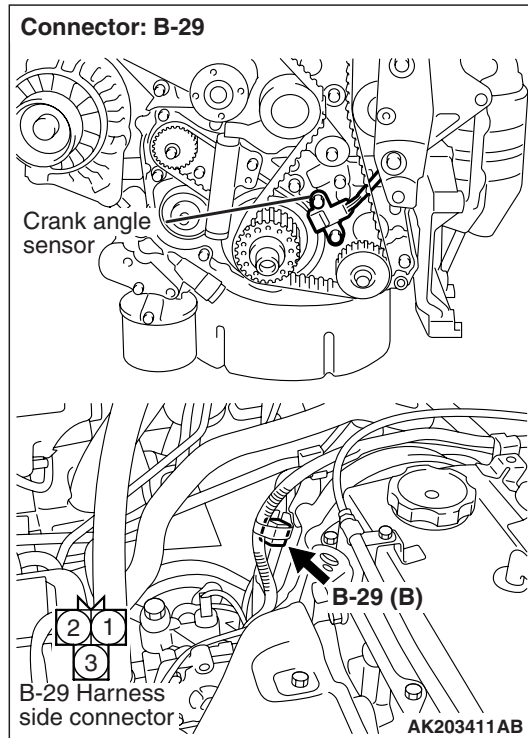
- Refer to Data list reference table [P.13A-260](#).
  - a. Item 22: Crank angle sensor

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO :** Replace engine-A/T-ECU.

**STEP 9. Perform voltage measurement at B-29 crank angle sensor connector.**



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

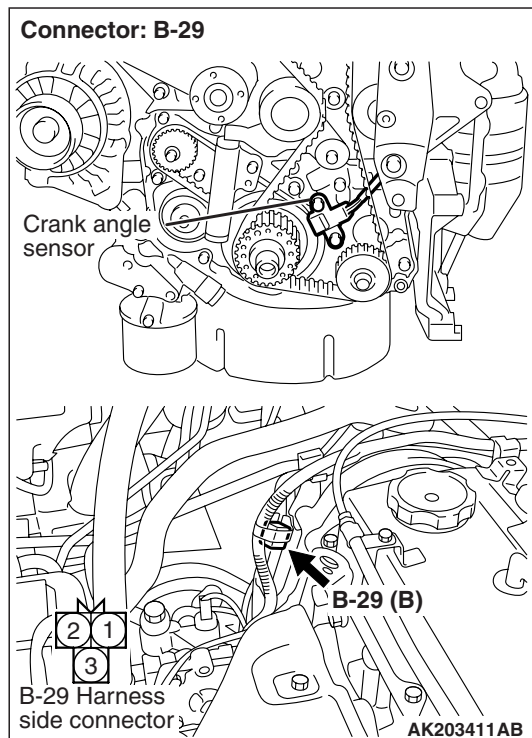
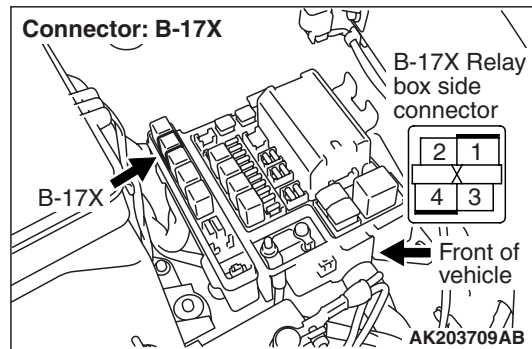
**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Go to Step 10 .

**STEP 10. Connector check: B-17X engine control relay connector**



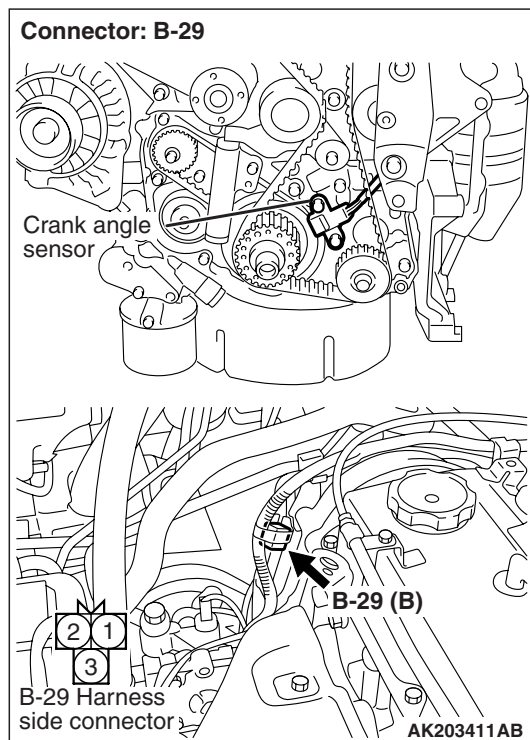
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-29 (terminal No. 3) crank angle sensor connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

**NO :** Repair.



**STEP 11. Measure resistance at B-29 crank angle sensor connector.**

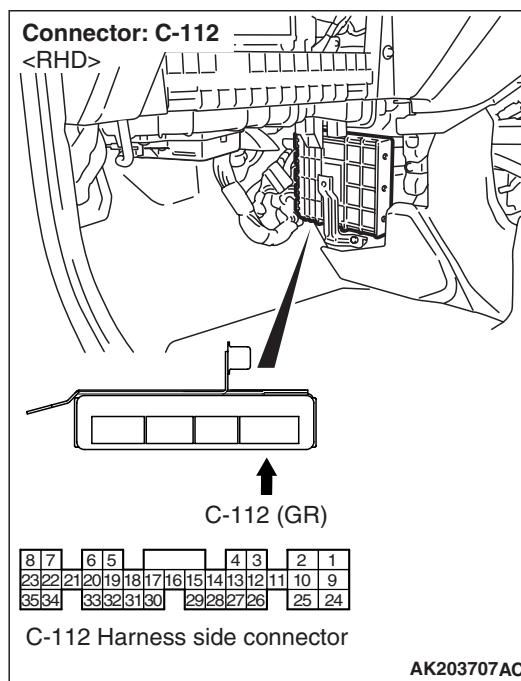
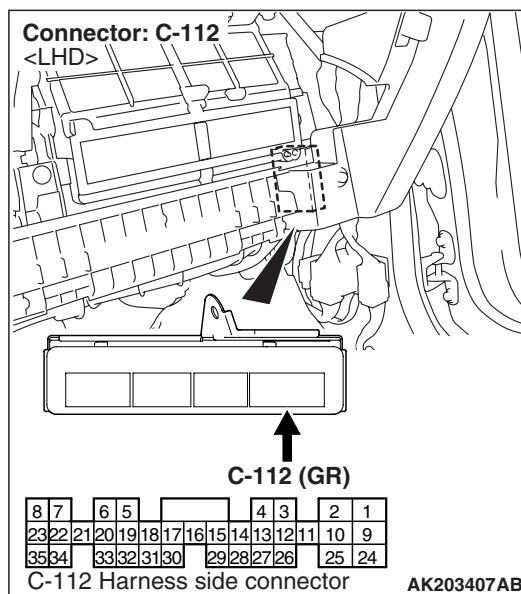
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.

**OK: 2  $\Omega$  or less**

**Q: Is the check result normal?**

**YES :** Go to Step 14 .

**NO :** Go to Step 12 .

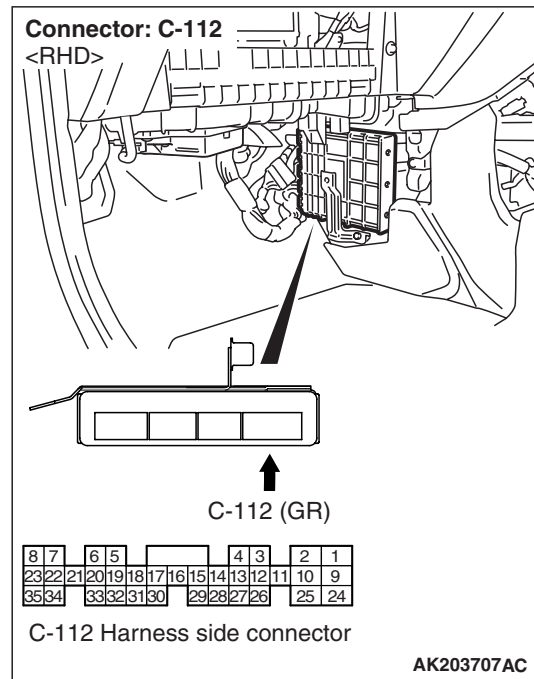
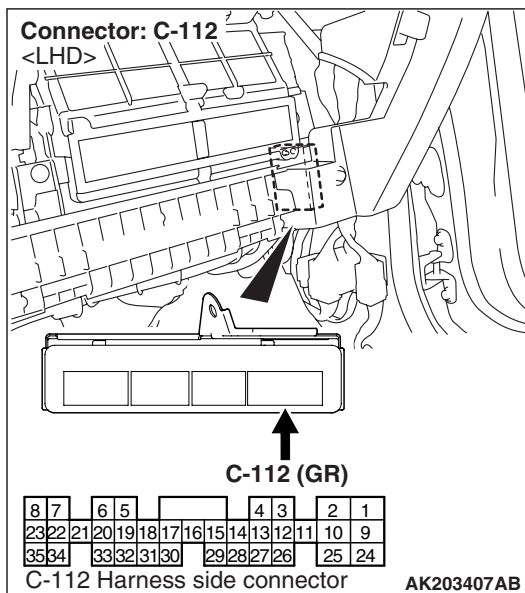
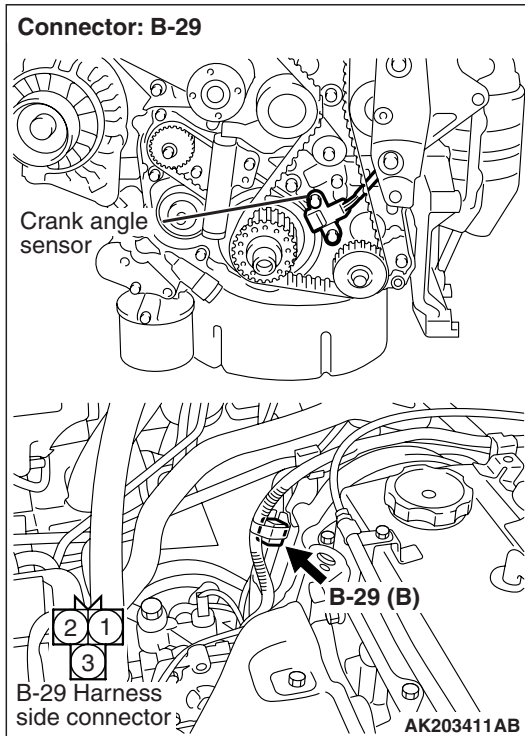
**STEP 12. Connector check: C-112 engine-A/T-ECU connector**

**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO :** Repair.

**STEP 13. Check harness between B-29 (terminal No. 1) crank angle sensor connector and C-112 (terminal No. 16) engine-A/T-ECU connector.**



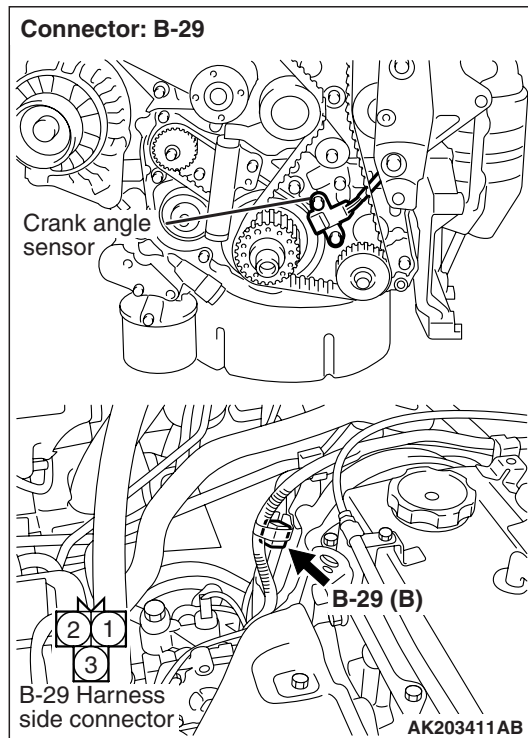
**NOTE:** Before checking harness, check intermediate connector C-16, and repair if necessary.

- Check earthing line for open circuit and damage.

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 14. Output wave pattern measurement at B-29 crank angle sensor connector (Use oscilloscope).**

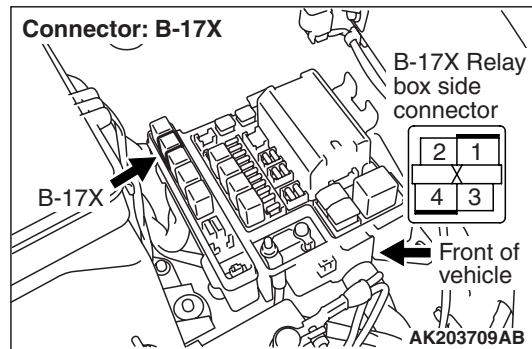
- Use special tool test harness (MD998478) to connect connector, and measure at pick-up harness.
- Engine: Idling
- Selector lever position: P
- Voltage between terminal No. 2 and earth.

**OK: Waveforms should be displayed on Inspection procedure using an oscilloscope (Refer to P.13A-271), its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.**

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** . Go to Step 15 .

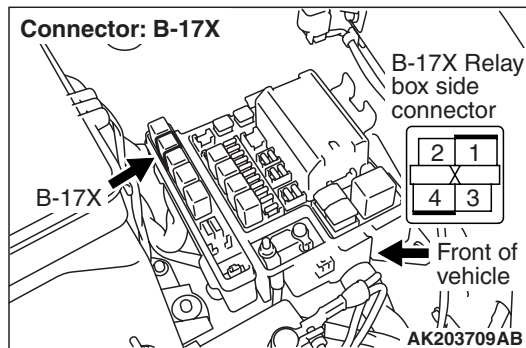
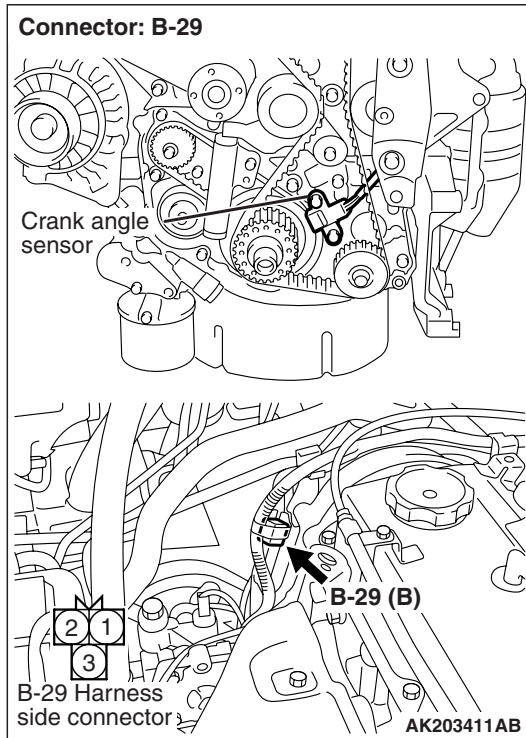
**STEP 15. Connector check: B-17X engine control relay connector**

**Q: Is the check result normal?**

**YES :** Go to Step 16 .

**NO :** Repair.

**STEP 16. Check harness between B-29 (terminal No. 3) crank angle sensor connector and B-17X (terminal No. 1) engine control relay connector.**



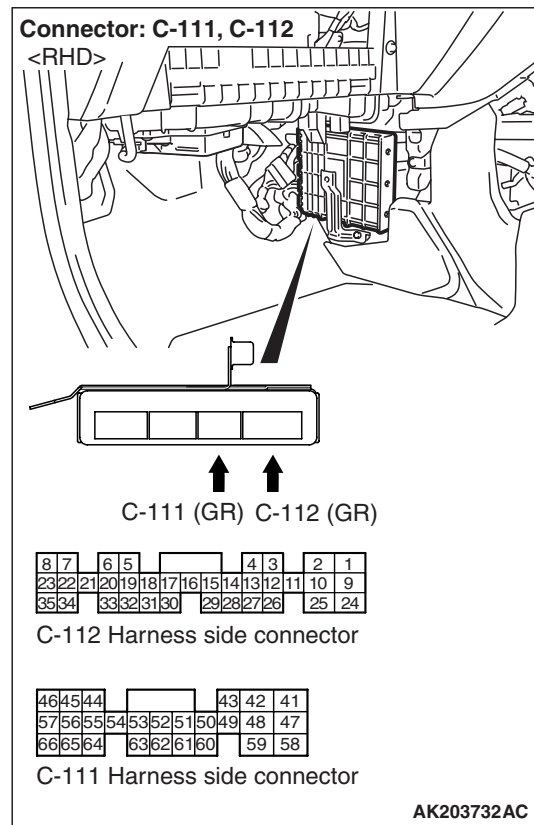
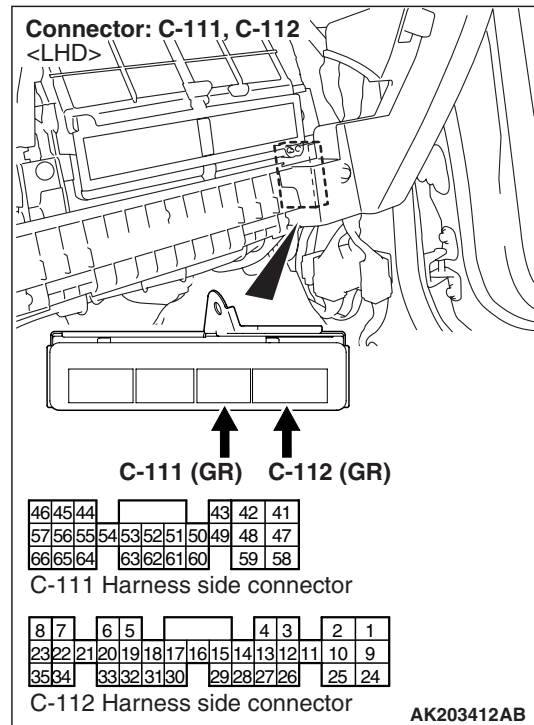
- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 17 .

**NO :** Repair.

**STEP 17. Connector check: C-111 and C-112 engine-A/T-ECU connectors**



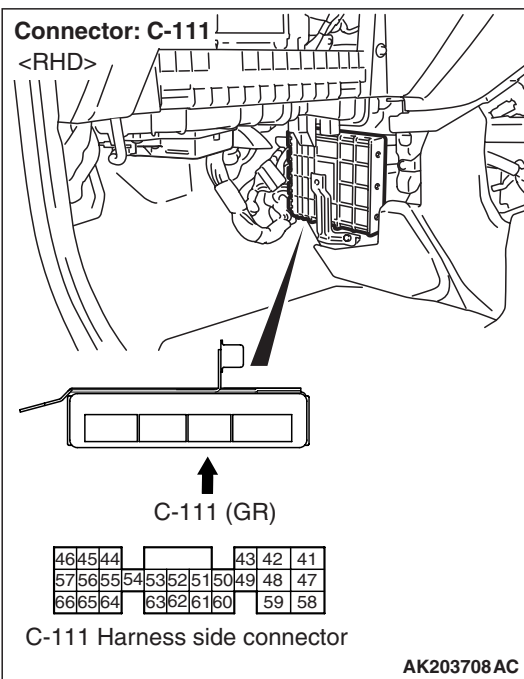
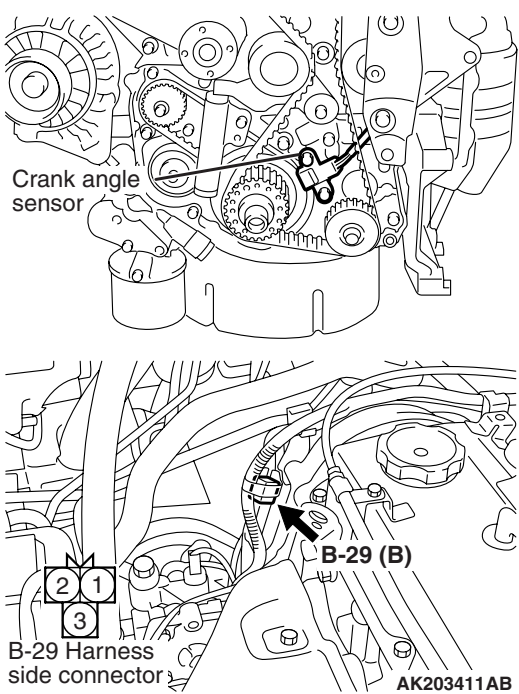
**Q: Is the check result normal?**

**YES :** Go to Step 18 .

**NO :** Repair.

**STEP 18. Check harness between B-29 (terminal No. 2) crank angle sensor connector and C-111 (terminal No. 45) engine-A/T-ECU connector.**

**Connector: B-29**



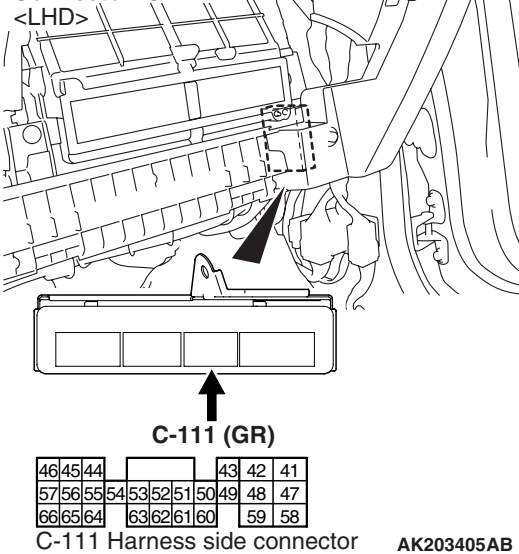
- Check output line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 19 .

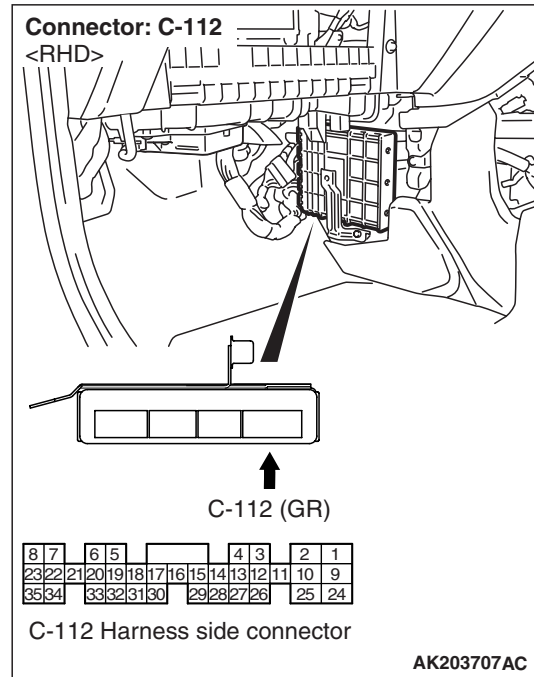
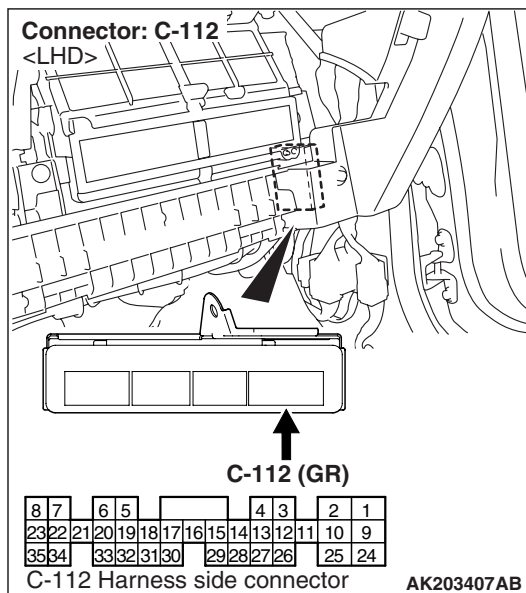
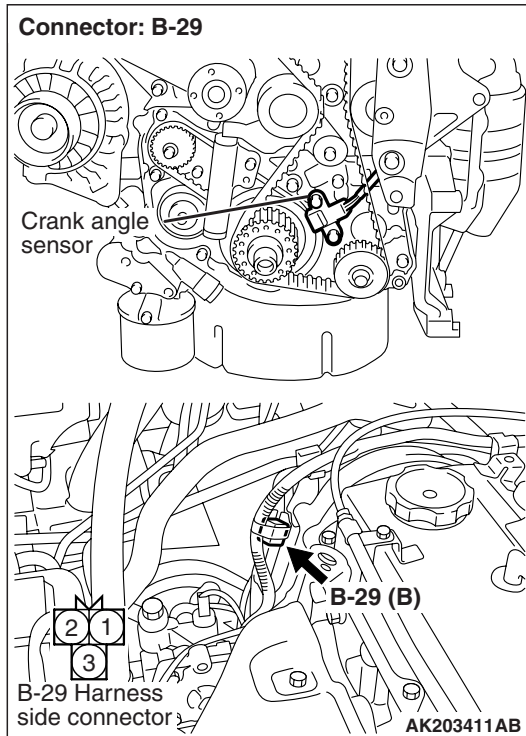
**NO :** Repair.

**Connector: C-111**





**STEP 19. Check harness between B-29 (terminal No. 1) crank angle sensor connector and C-112 (terminal No. 16) engine-A/T-ECU connector.**



**NOTE:** Before checking harness, check intermediate connector C-16, and repair if necessary.

- Check earthing line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 20 .

**NO :** Repair.

**STEP 20. Check the crankshaft sensing blade**

**Q: Is the check result normal?**

**YES :** Go to Step 21 .

**NO :** Replace the crankshaft sensing blade.

**STEP 21: M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-260](#).
  - a. Item 22: Crank angle sensor

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO :** Replace crank angle sensor.



## Code No. 23 Camshaft Position Sensor System

## OPERATION

- Power is supplied to the camshaft position sensor (terminal No. 3) from the engine control relay (terminal No. 1) and is earthed to the engine-A/T-ECU (terminal No. 16) from the camshaft position sensor (terminal No. 1).
- A power voltage of 5 V is applied to the camshaft position sensor output terminal (terminal No. 2) from the engine-A/T-ECU (terminal No. 56).

## FUNCTION

- The camshaft position sensor detects the top dead center on the compression stroke of the No. 1 cylinder and inputs a pulse signal to the engine-A/T-ECU.

## TROUBLE JUDGMENT

## Check Conditions

- 60 seconds later after the ignition switch has been in "ON" position or the engine has started up.
- Engine speed of 500 r/min or more.

## Judgment Criterion

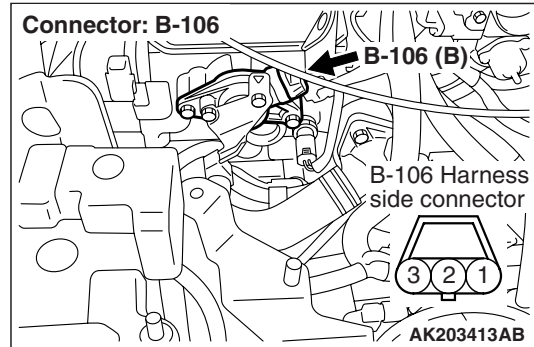
- Sensor output voltage remains unchanged (no pulse signal is inputted) for 4 seconds.

## PROBABLE CAUSE

- Failed camshaft position sensor
- Open/short circuit in camshaft position sensor circuit or loose connector contact
- Failed engine-A/T-ECU

## DIAGNOSIS PROCEDURE

## STEP 1. Connector check: B-106 camshaft position sensor connector

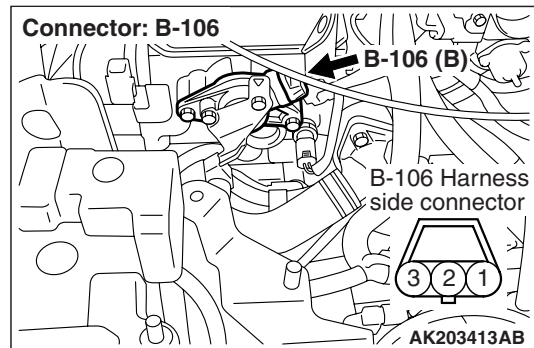


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair.

## STEP 2. Perform voltage measurement at B-106 camshaft position sensor connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

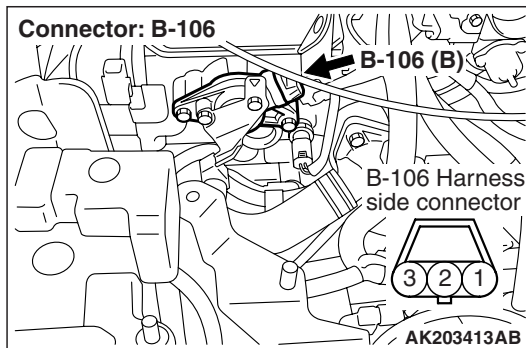
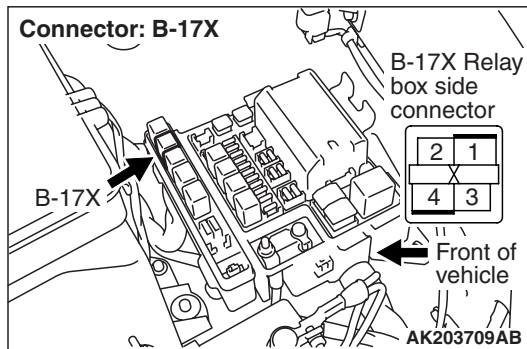
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Go to Step 3 .

**STEP 3. Connector check: B-17X engine control relay connector**



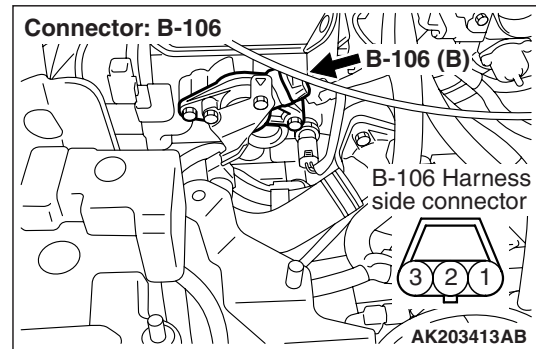
**Q: Is the check result normal?**

**YES :** Check and repair harness between B106 (terminal No. 3) camshaft position sensor connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

**NO :** . Repair.

**STEP 4. Perform voltage measurement at B-106 camshaft position sensor connector.**



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

**OK: 4.9 – 5.1 V**

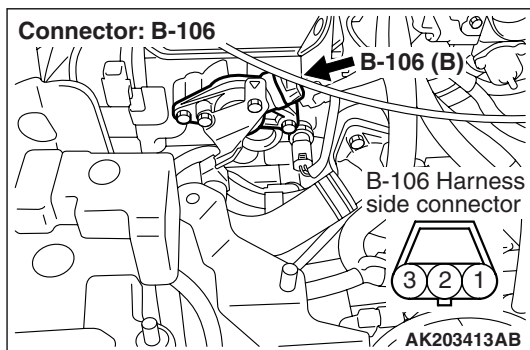
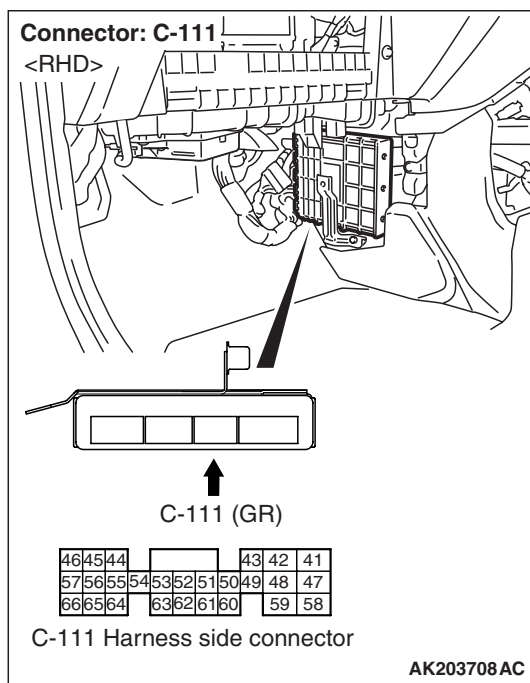
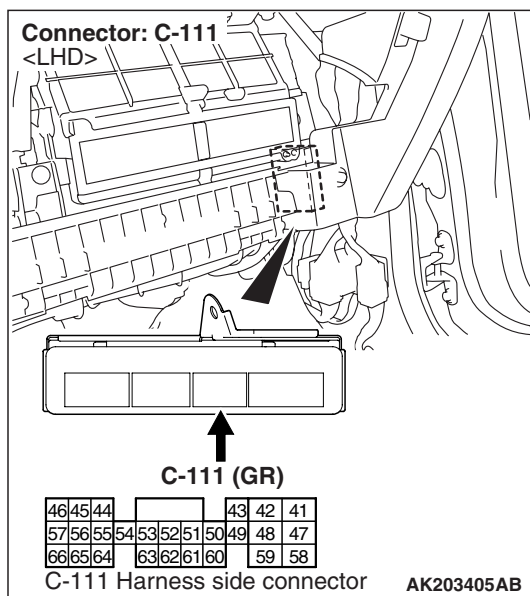
**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Go to Step 5 .

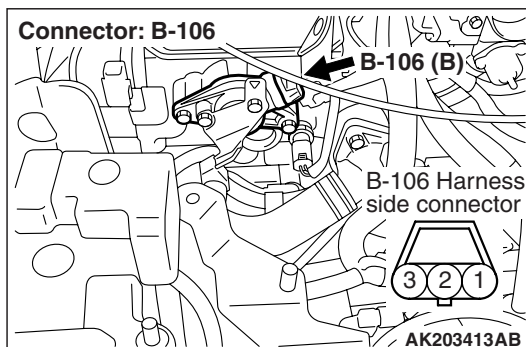
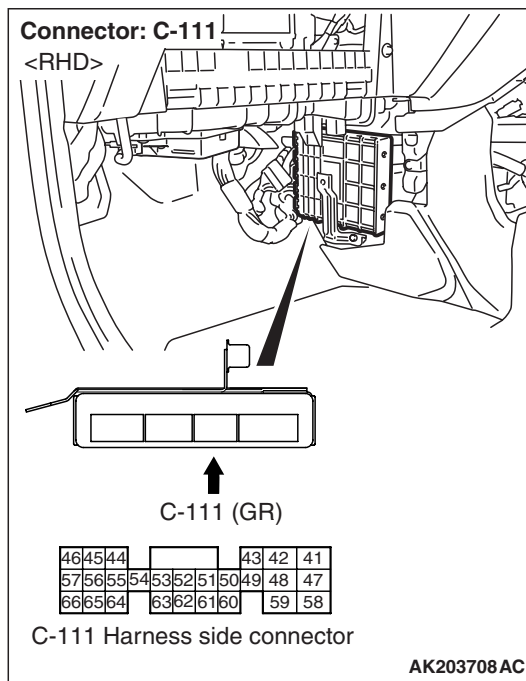
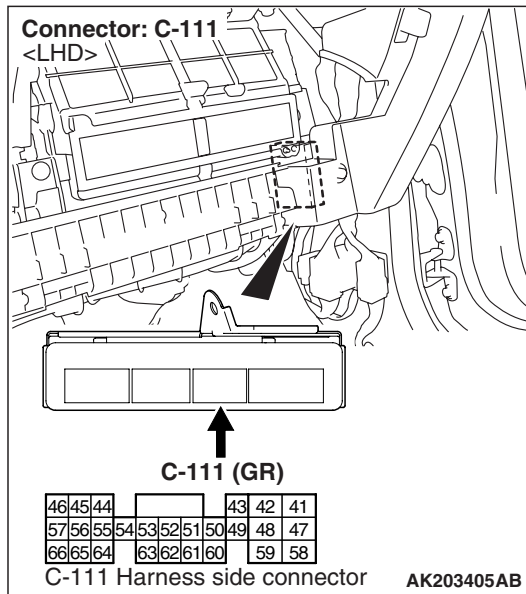
**STEP 5. Perform voltage measurement at C-111 engine-A/T-ECU connector.**

- Ignition switch: ON
- Voltage between terminal No. 56 and earth.

**OK: 4.9 – 5.1 V****Q: Is the check result normal?****YES :** Go to Step 6 .**NO :** Go to Step 7 .

- Measure engine-A/T-ECU terminal voltage.
- Disconnect B-106 camshaft position sensor connector.

**STEP 6. Connector check: C-111 engine-A/T-ECU connector**



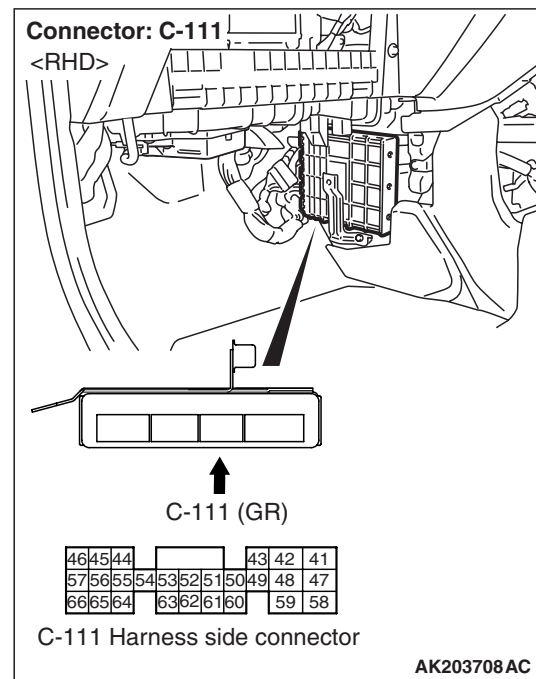
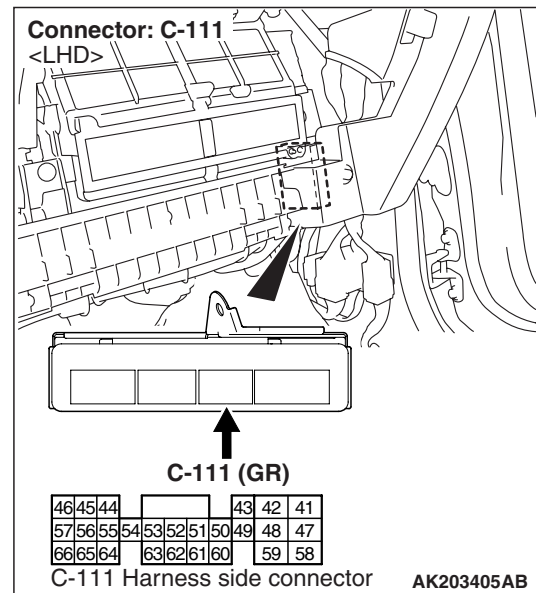
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-106 (terminal No. 2) camshaft position sensor connector and C-111 (terminal No. 56) engine-A/T-ECU connector.

- Check output line for open circuit.

**NO :** Repair.

**STEP 7. Connector check: C-111 engine-A/T-ECU connector**

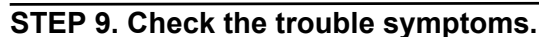


**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

**Q: Is the check result normal?**  
**YES :** Go to Step 9 .  
**NO :** Repair.



**YES :** Replace engine-A/T-ECU.

**NO** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**Connector: B-106**

**B-106 (B)**

**B-106 Harness side connector**

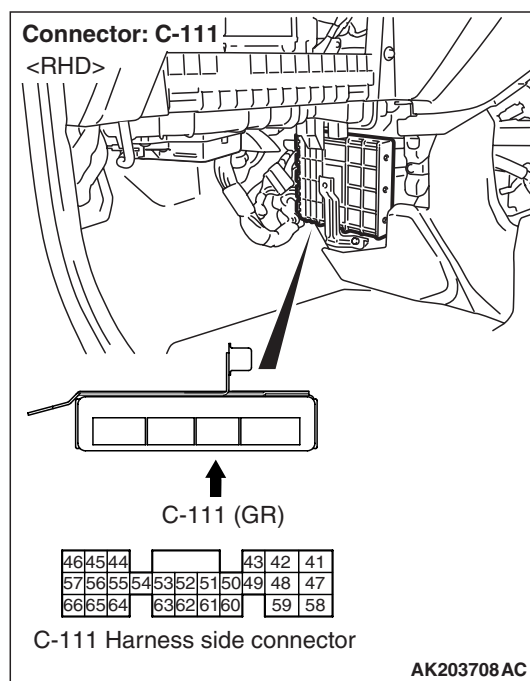
3 2 1

**AK203413AB**

- Disconnect connector, and measure at harness side.
  - Resistance between terminal No. 1 and earth.
- OK: 2  $\Omega$  or less**

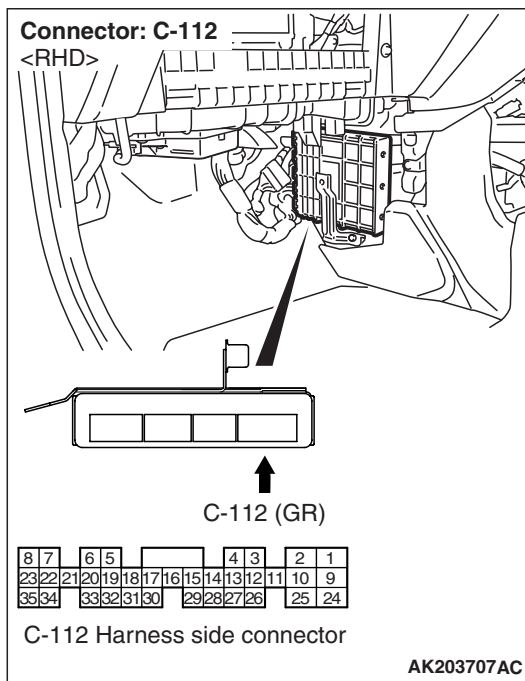
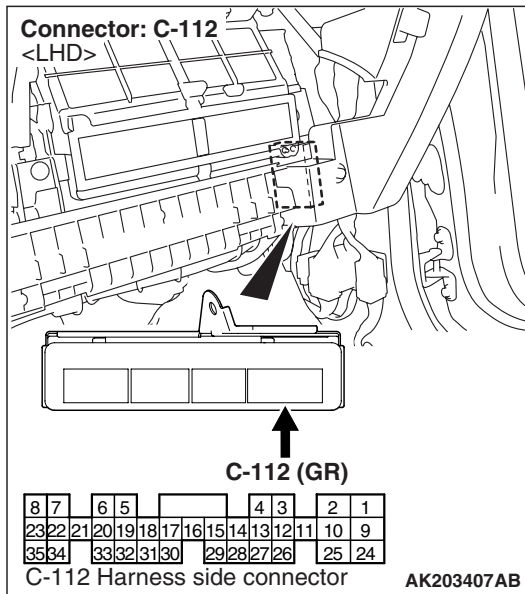
**YES :** Go to Step 13 .

**NO :** Go to Step 11 .



- Check output line for short circuit.

**STEP 11. Connector check: C-112**  
**engine-A/T-ECU connector**



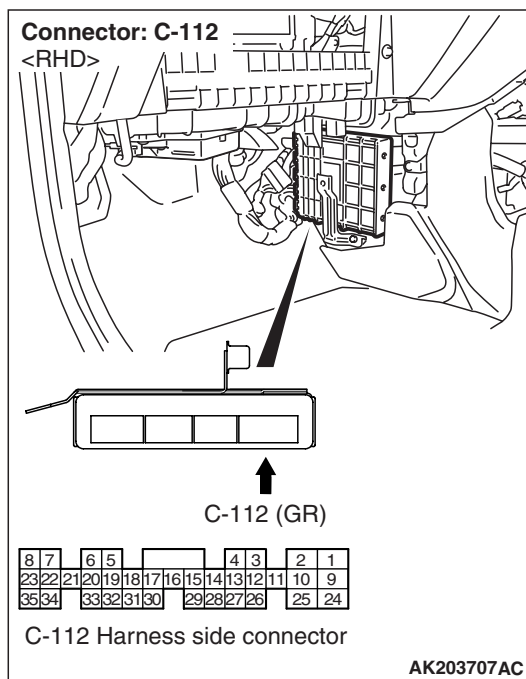
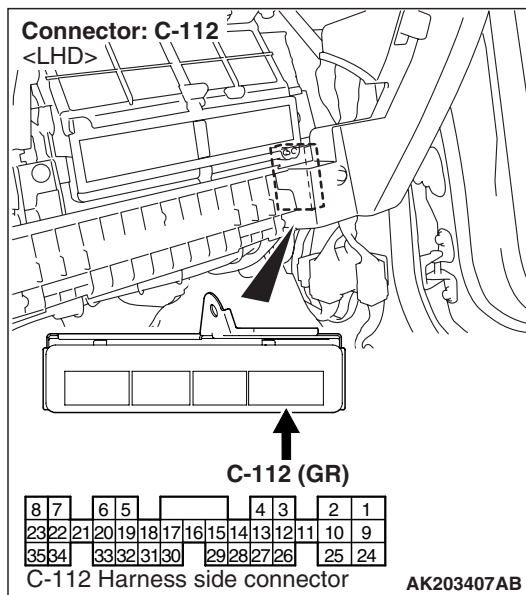
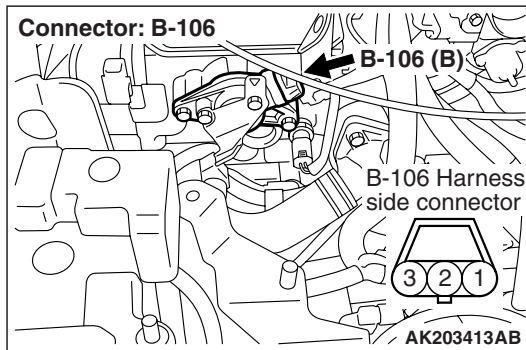
**Q: Is the check result normal?**

**YES :** Go to Step 12 .

**NO :** . Repair.



**STEP 12. Check harness between B-106 (terminal No. 1) camshaft position sensor connector and C-112 (terminal No. 16) engine-A/T-ECU connector.**



connector C-16, and repair if necessary.

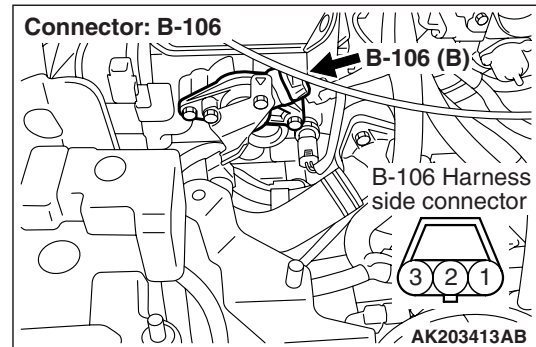
- Check earthing line for open circuit and damage.

**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 13. Output wave pattern measurement at B-106 camshaft position sensor connector (Use oscilloscope).**



- Use special tool test harness (MB991709) to connect connector, and measure at pick-up harness.
- Engine: Idling
- Selector lever position: P
- Voltage between terminal No. 2 and earth.

**OK: Waveforms should be displayed on Inspection procedure using an oscilloscope (Refer to P.13A-271), its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.**

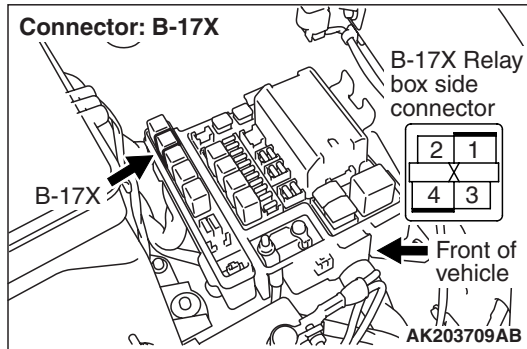
**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Go to Step 14 .

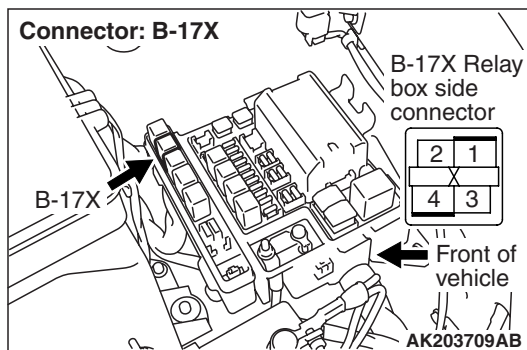
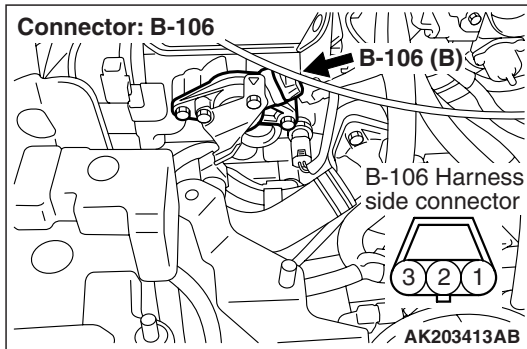
**NOTE:** Before checking harness, check intermediate

**STEP 14. Connector check: B-17X engine control relay connector**



**Q: Is the check result normal?**  
**YES :** Go to Step 15 .  
**NO :** Repair.

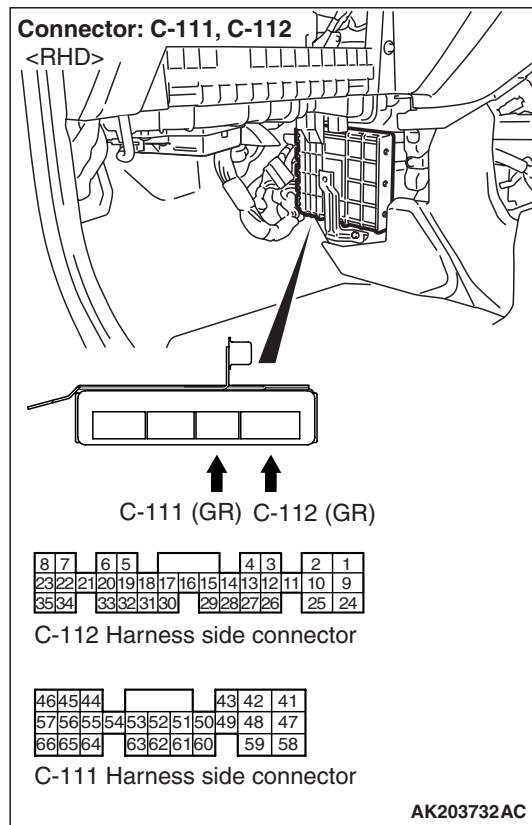
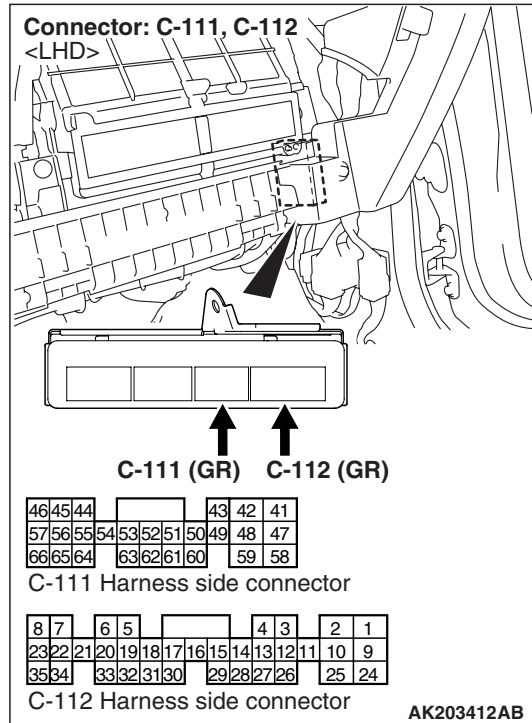
**STEP 15. Check harness between B-106 (terminal No. 3) camshaft position sensor connector and B-17X (terminal No. 1) engine control relay connector.**



- Check power supply line for damage.

**Q: Is the check result normal?**  
**YES :** Go to Step 16 .  
**NO :** Repair.

**STEP 16. Connector check: C-111 and C-112 engine-A/T-ECU connectors**



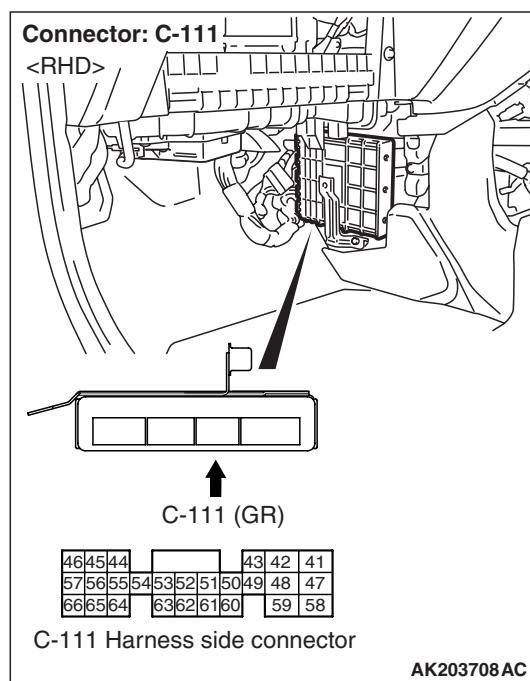
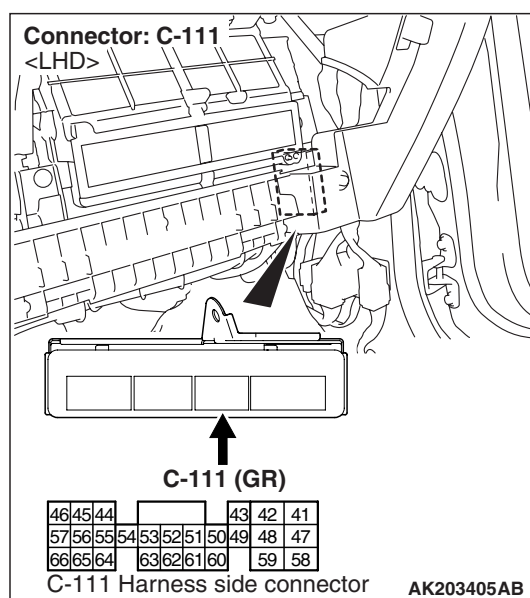
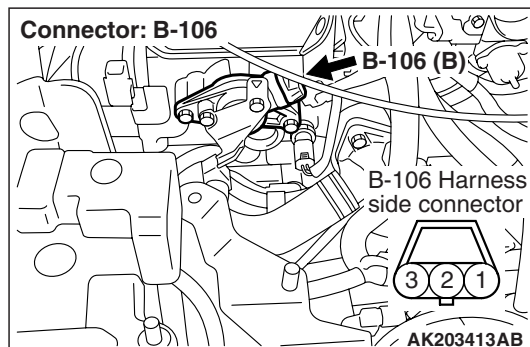
**Q: Is the check result normal?**  
**YES :** Go to Step 17 .  
**NO :** Repair.

**STEP 17. Check harness between B-106 (terminal No. 2) camshaft position sensor connector and C-111 (terminal No. 56) engine-A/T-ECU connector.**

**Q: Is the check result normal?**

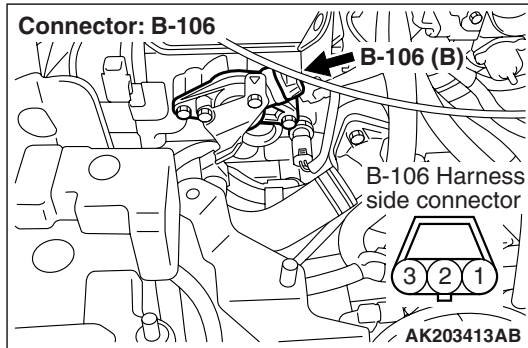
**YES :** Go to Step 18 .

**NO :** Repair.



- Check output line for damage.

**STEP 18. Check harness between B-106 (terminal No. 1) camshaft position sensor connector and C-112 (terminal No. 16) engine-A/T-ECU connector.**



connector C-16, and repair if necessary.

- Check earthing line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 19 .

**NO :** Repair.

**STEP 19. Check camshaft position sensing cylinder.**

**Q: Is the check result normal?**

**YES :** Go to Step 20 .

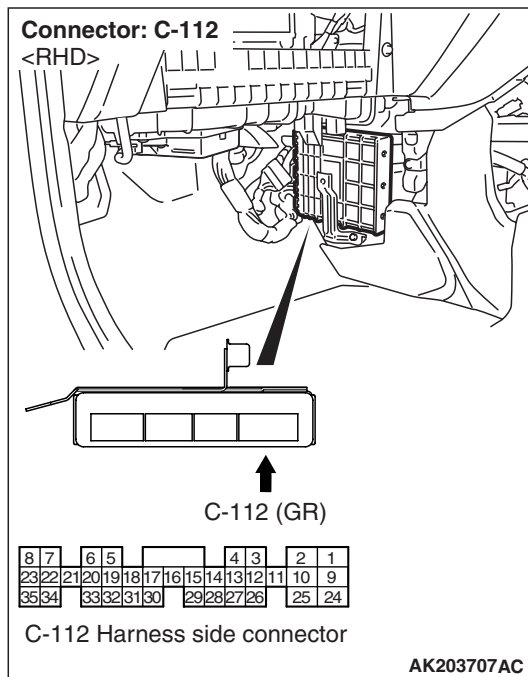
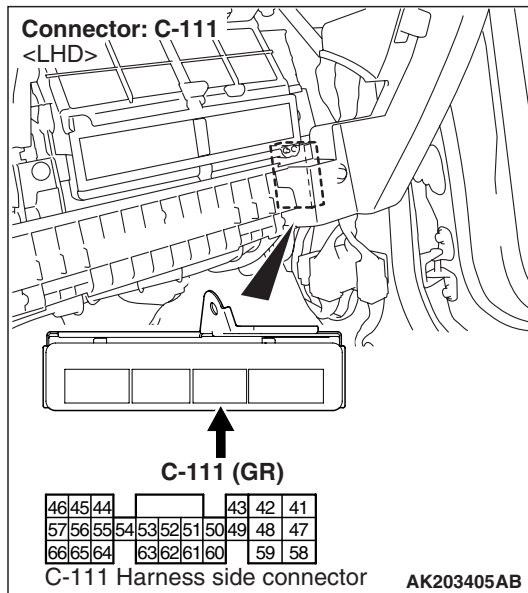
**NO :** Replace camshaft position sensing cylinder.

**STEP 20. Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace camshaft position sensor.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).



**NOTE:** Before checking harness, check intermediate

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**Code No. 24 Vehicle Speed Signal System**

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**FUNCTION**

- The output shaft speed sensor signal used for A/T control is converted into a vehicle speed signal, which is inputted to the engine control system, speedometer, etc.

**TROUBLE JUDGMENT****Check Conditions**

- 60 seconds later after the ignition switch has been in "ON" position or the engine has started up.
- Idling signal: OFF
- Engine speed of 2,000 r/min or more.
- Operation under high load (Volumetric efficiency 47.5 % or more).

**Judgment Criterion**

- Sensor output voltage remains unchanged (no pulse signal is input) for 4 seconds.

**PROBABLE CAUSE**

- Failed output shaft speed sensor

- Open/short circuit in output shaft speed sensor circuit or loose connector contact
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

---

**STEP 1. M.U.T.-II/III self-diag code****Q: A/T system diagnosis code output?**

**YES** : Check A/T system (Refer to GROUP 23A – Troubleshooting <A/T> – Check chart for diagnosis code [P.23A-21](#)).

**NO** : Go to Step 2 .

---

**STEP 2. Check the trouble symptoms.****Q: Does trouble symptom persist?**

**YES** : Replace engine-A/T-ECU.

**NO** : Intermittent malfunction (Refer to, GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

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**Code No. 25 Barometric Pressure Sensor System**

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**OPERATION**

- A power voltage of 5 V is applied to the barometric pressure sensor power terminal (terminal No. 1) of the air flow sensor connector from the engine-A/T-ECU (terminal No. 46) and earthed to the engine-A/T-ECU (terminal No. 16) from the air flow sensor (terminal No. 5).
- The sensor signal is inputted to the engine-A/T-ECU (terminal No. 55) from the barometric pressure sensor output terminal (terminal No. 2) of the air flow sensor connector.

**FUNCTION**

- The barometric pressure sensor converts the barometric pressure into a voltage signal and inputs the signal to the engine-A/T-ECU.
- In response to the signal, the engine-A/T-ECU corrects the fuel injection amount, etc.

**TROUBLE JUDGMENT****Check Conditions**

- 60 seconds later after the ignition switch has been in "ON" position or the engine has started up.
- Battery voltage of 8 V or more.

**Judgment Criteria**

- A sensor output voltage of 4.5 V or more (atmospheric pressure above 114 kPa or equivalent) for 4 seconds,

or

- A sensor output voltage of 0.2 V or less (atmospheric pressure below 5 kPa or equivalent) for 4 seconds.

**PROBABLE CAUSE**

- Failed barometric pressure sensor
- Open/short circuit in atmospheric pressure sensor circuit or loose connector contact
- Failed engine-A/T-ECU



## DIAGNOSIS PROCEDURE

### STEP 1. M.U.T.-II/III data list

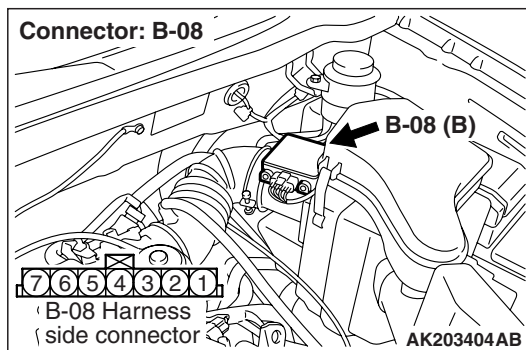
- Refer to Data list reference table [P.13A-260](#).
  - a. Item 25: Barometric pressure sensor

#### Q: Is the check result normal?

**YES** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO** : Go to Step 2 .

### STEP 2. Connector check: B-08 air flow sensor connector

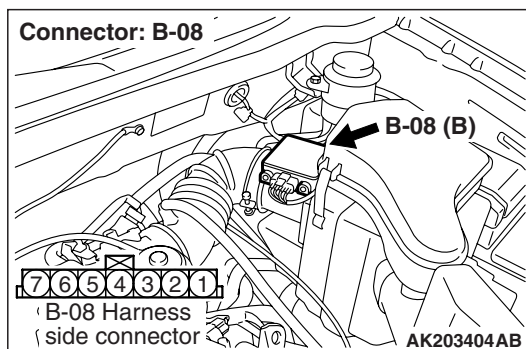


#### Q: Is the check result normal?

**YES** : Go to Step 3 .

**NO** : Repair.

### STEP 3. Perform voltage measurement at B-08 air flow sensor connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

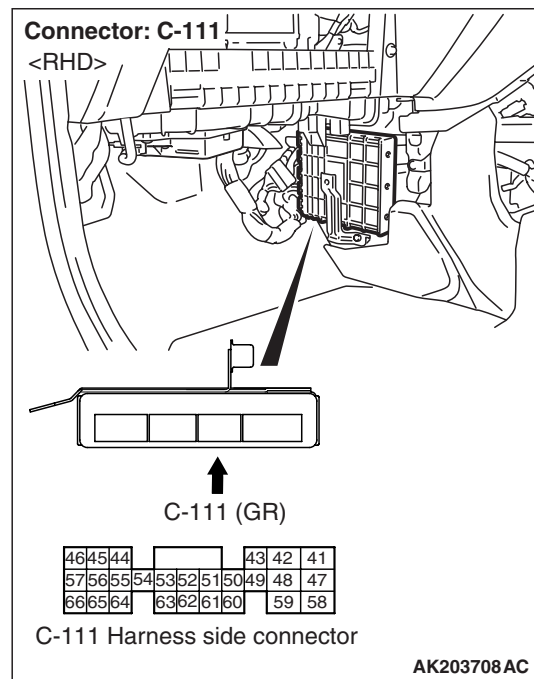
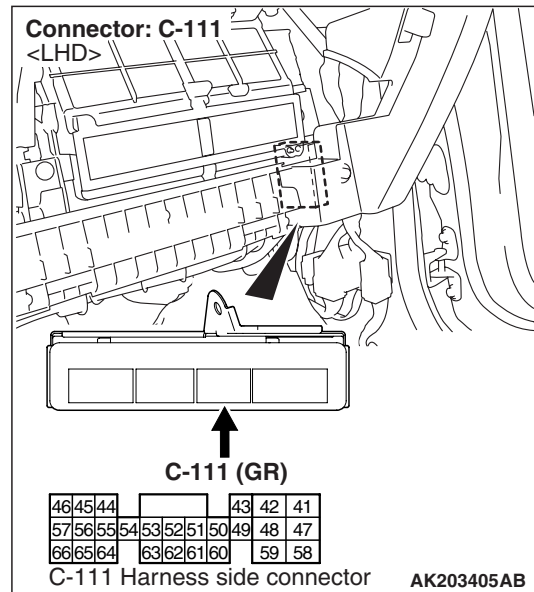
**OK: 4.9 – 5.1 V**

#### Q: Is the check result normal?

**YES** : Go to Step 9 .

**NO** : . Go to Step 4 .

### STEP 4. Perform voltage measurement at C-111 engine-A/T-ECU connector.



- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 46 and earth.

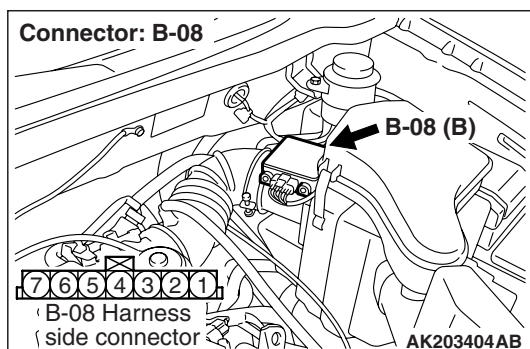
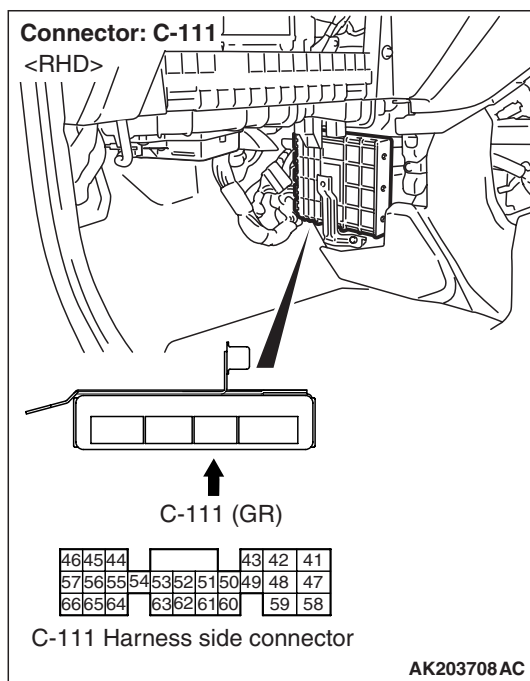
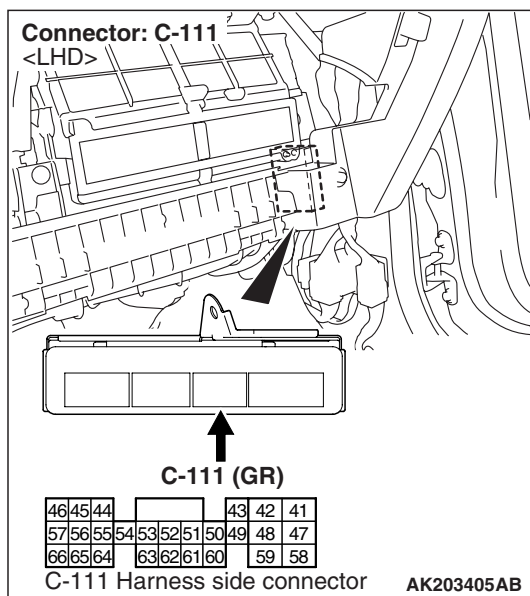
**OK: 4.9 – 5.1 V**

#### Q: Is the check result normal?

**YES** : Go to Step 5 .

**NO** : Go to Step 6 .

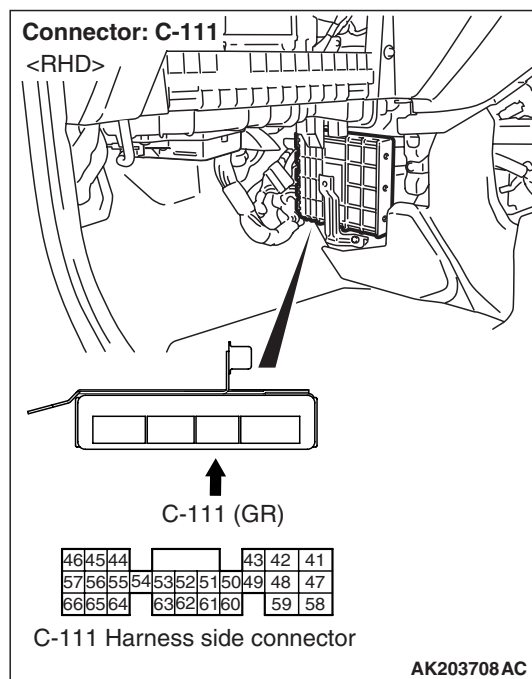
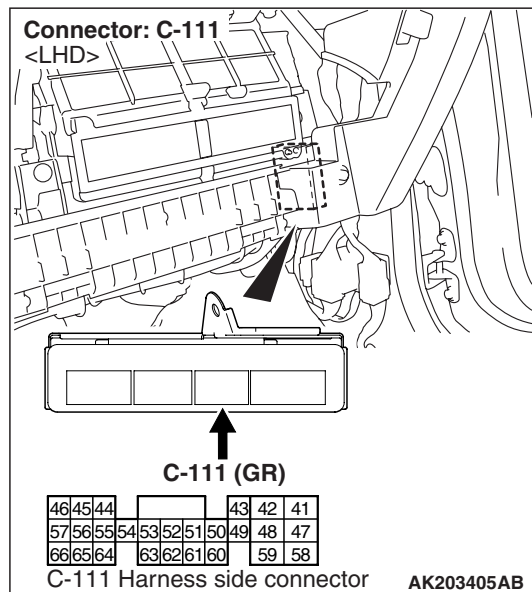


**STEP 5. Connector check: C-111 engine-A/T-ECU connector****Q: Is the check result normal?**

**YES :** Check and repair harness between B-08 (terminal No. 1) air flow sensor connector and C-111 (terminal No. 46) engine-A/T-ECU connector.

- Check power supply line for open circuit.

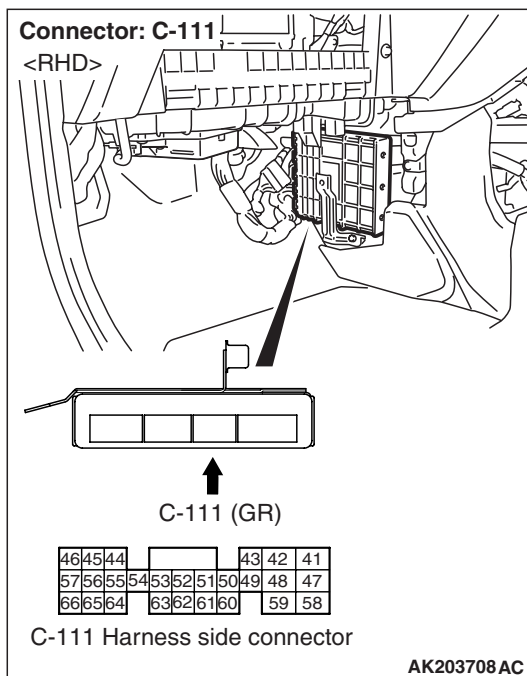
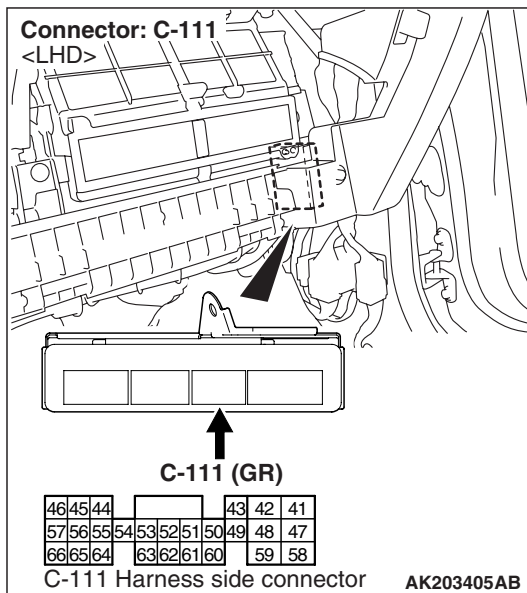
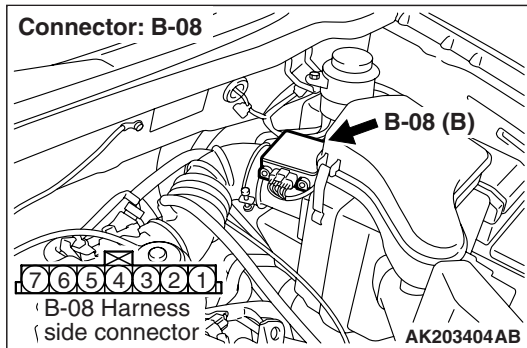
**NO :** Repair.

**STEP 6. Connector check: C-111 engine-A/T-ECU connector****Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

**STEP 7. Check harness between B-08 (terminal No. 1) air flow sensor connector and C-111 (terminal No. 46) engine-A/T-ECU connector.**



**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** . Repair.

**STEP 8. M.U.T.-II/III data list**

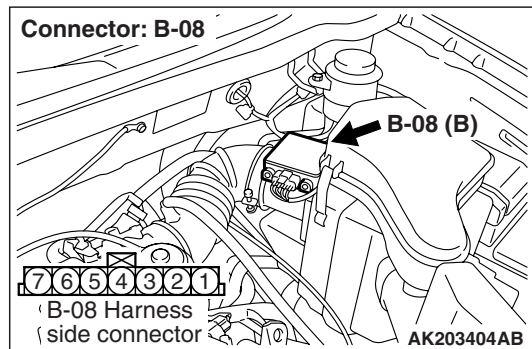
- Refer to Data list reference table [P.13A-260](#).
  - a. Item No. 25: Barometric pressure sensor

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO :** Replace engine-A/T-ECU.

**STEP 9. Perform voltage measurement at B-08 air flow sensor connector.**



- Disconnect connector, and measure at harness side.
- Voltage between terminal No. 5 and earth.

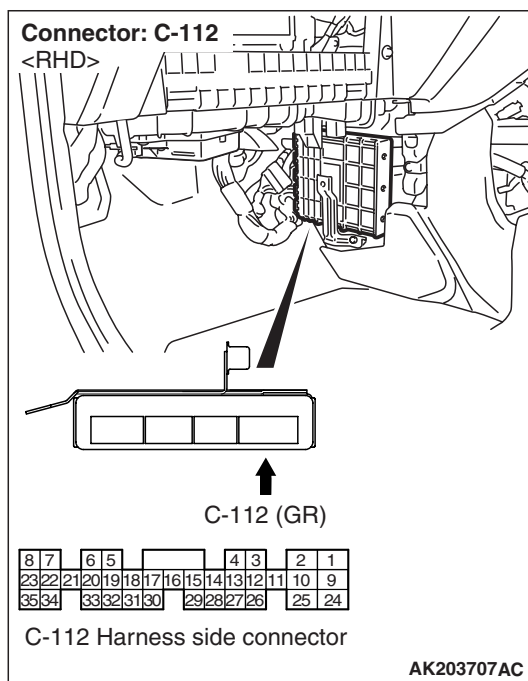
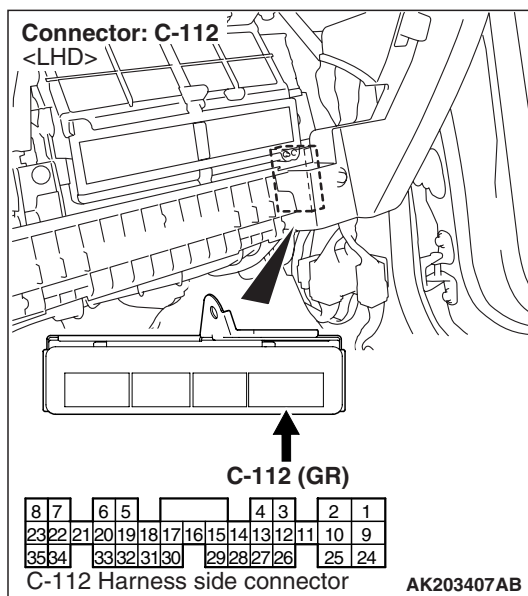
**OK: 2  $\Omega$  or less**

**Q: Is the check result normal?**

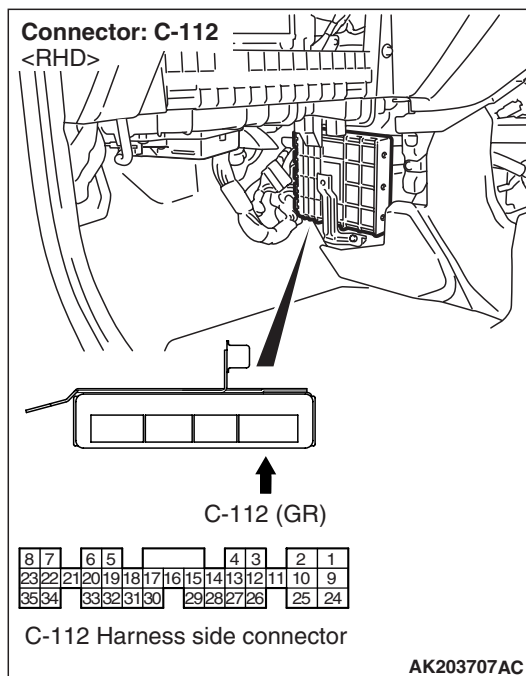
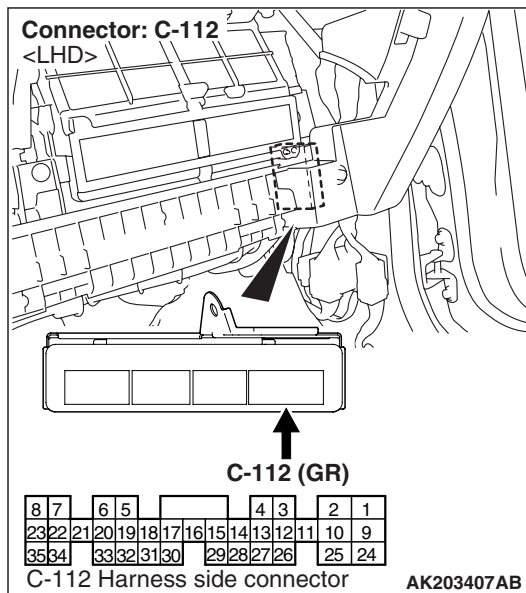
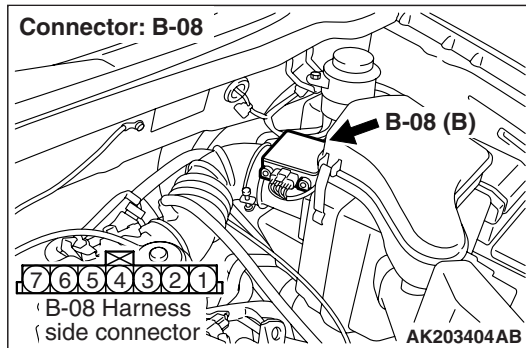
**YES :** Go to Step 12 .

**NO :** Go to Step 10 .

- Check power supply line for short circuit.

**STEP 10. Connector check: C-112**  
**engine-A/T-ECU connector****Q: Is the check result normal?****YES :** Go to Step 11 .**NO :** . Repair.

**STEP 11. Check harness between B-08 (terminal No. 5) air flow sensor connector and C-112 (terminal No. 16) engine-A/T-ECU connector.**



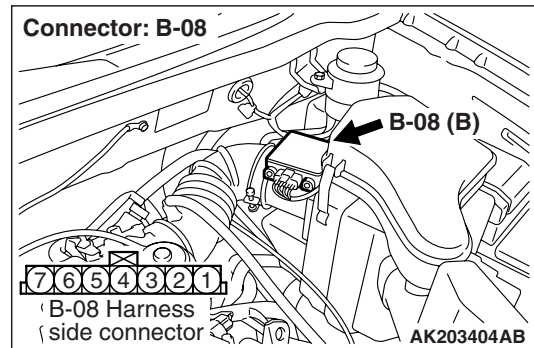
- Check earthing line for open circuit and damage.

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 12. Perform voltage measurement at B-08 air flow sensor connector.**



- Use special tool test harness (MB991709) to connect only terminal No. 1, No. 2 and No. 5, and then measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

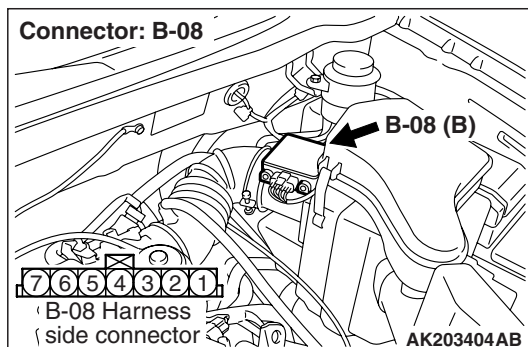
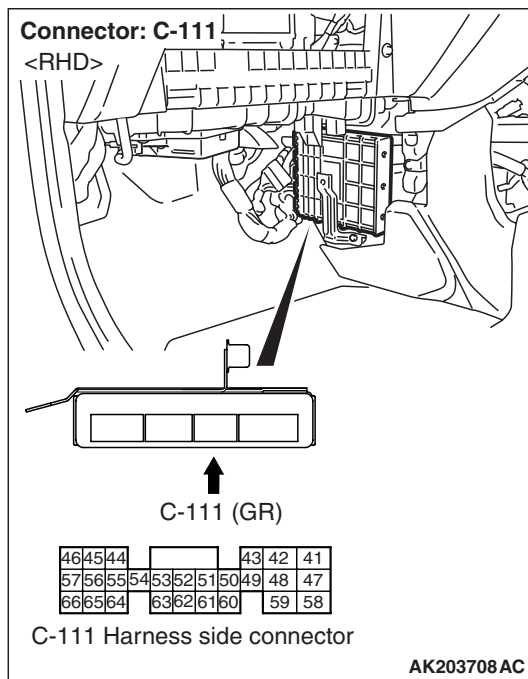
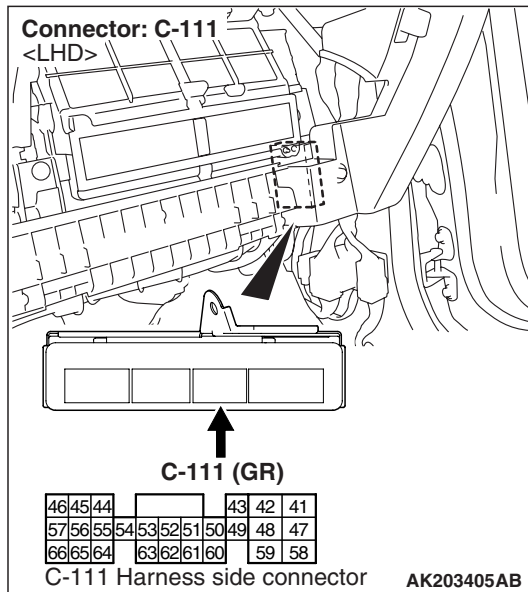
**OK: 4.9 – 5.1 V**

**Q: Is the check result normal?**

**YES :** Go to Step 14 .

**NO :** Go to Step 13 .

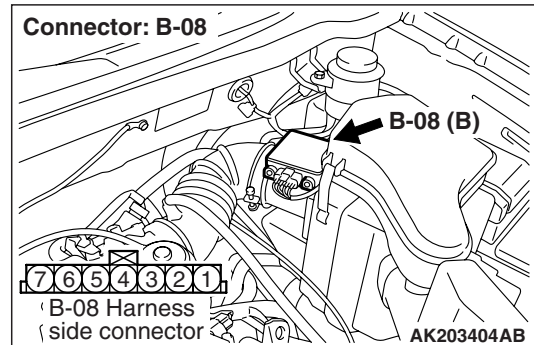
**NOTE:** Before checking harness, check intermediate connector C-16, and repair if necessary.

**STEP 13. Connector check: C-111  
engine-A/T-ECU connector****Q: Is the check result normal?**

**YES :** Check and repair harness between B-08 (terminal No. 1) air flow sensor connector and C-111 (terminal No. 46) engine-A/T-ECU connector.

- Check power supply line for damage.

**NO :** Repair.

**STEP 14. Perform voltage measurement at B-08  
air flow sensor connector.**

- Use special tool test harness (MB991709) to connect only terminal No. 1, No. 2 and No. 5, and then measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 5 and earth.

**OK: 0.5 V or less**

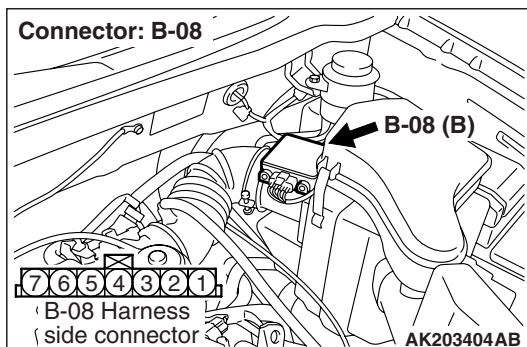
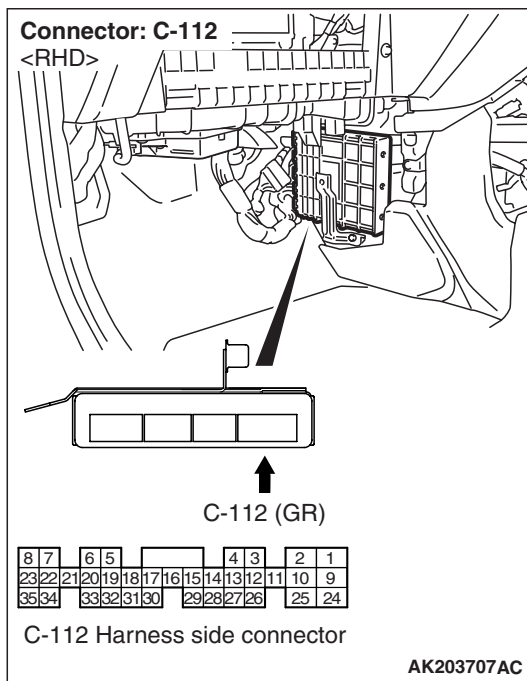
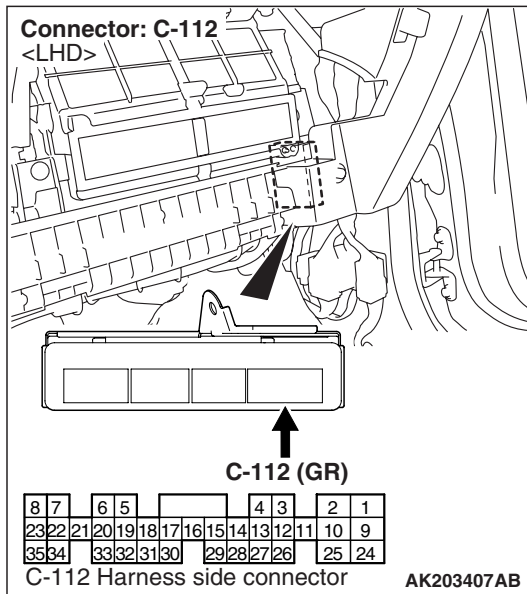
**Q: Is the check result normal?**

**YES :** Go to Step 16 .

**NO :** Go to Step 15 .



**STEP 15. Connector check: C-112  
engine-A/T-ECU connector**



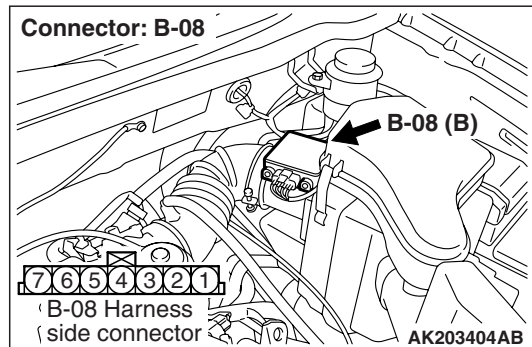
**Q: Is the check result normal?**

**YES :** Check intermediate connector C-16, and repair if necessary. If intermediate connector is normal, check and repair harness between B-08 (terminal No. 5) air flow sensor connector and C-112 (terminal No. 16) engine-A/T-ECU connector.

- Check earthing line for damage.

**NO :** Repair.

**STEP 16. Perform voltage measurement at B-08  
air flow sensor connector.**



- Use special tool test harness (MB991709) to connect only terminal No. 1, No. 2 and No. 5, and then measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

**OK:**

**Altitude 0 m: 3.8 – 4.2 V**

**Altitude 600 m: 3.5 – 3.9 V**

**Altitude 1,200 m: 3.3 – 3.7 V**

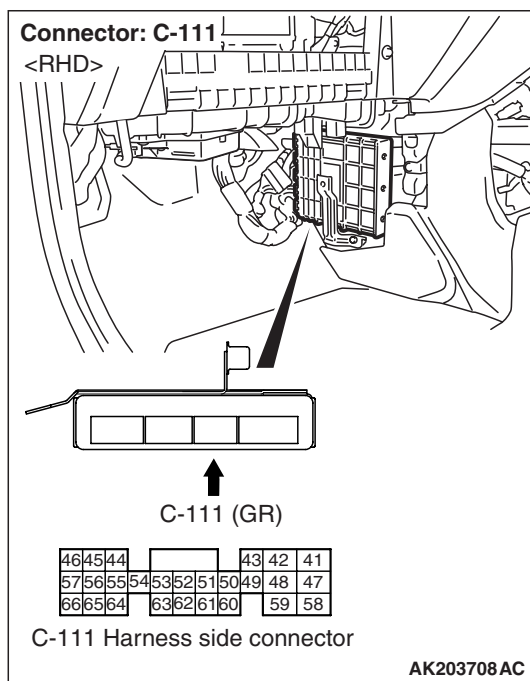
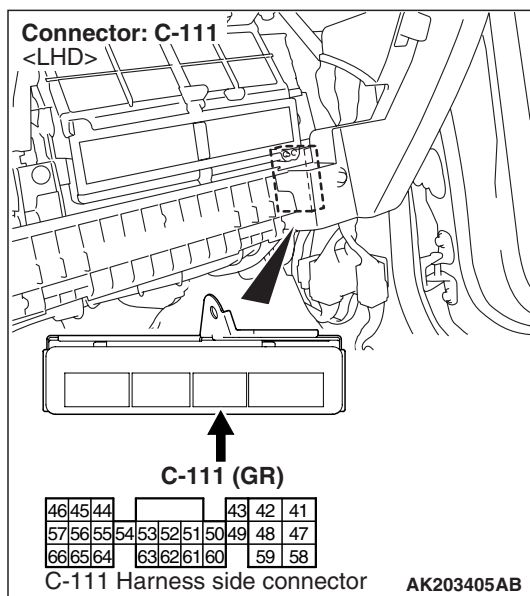
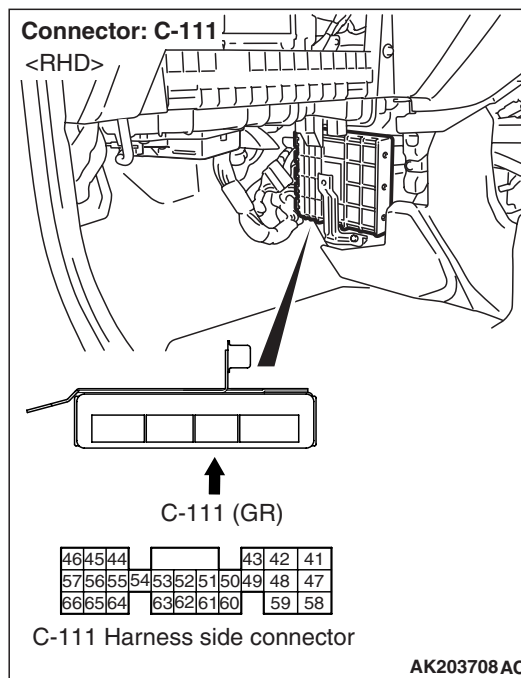
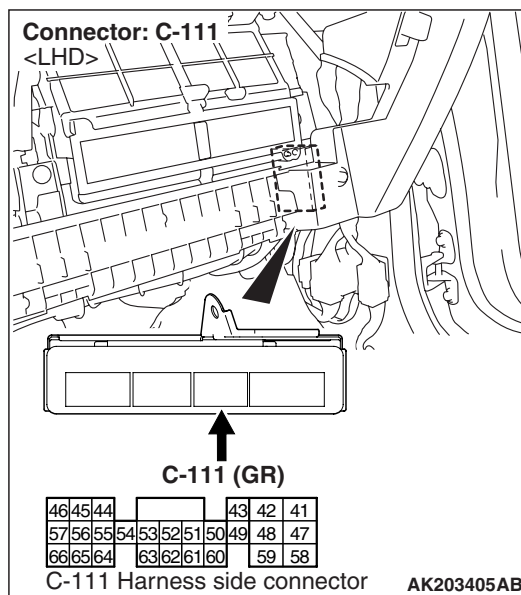
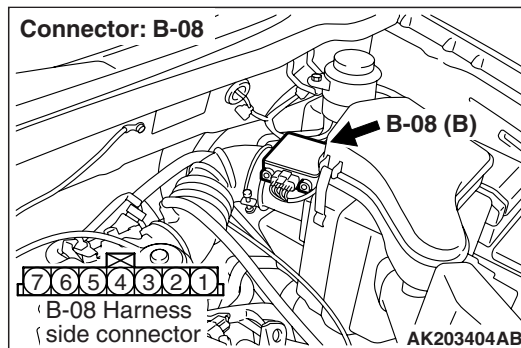
**Altitude 1,800 m: 3.0 – 3.4 V**

**Q: Is the check result normal?**

**YES :** Go to Step 19 .

**NO :** Go to Step 17 .



**STEP 17. Connector check: C-111  
engine-A/T-ECU connector****Q: Is the check result normal?****YES :** Go to Step 18 .**NO :** Repair.**STEP 18. Check harness between B-08 (terminal  
No. 2) air flow sensor connector and C-111  
(terminal No. 55) engine-A/T-ECU connector.**

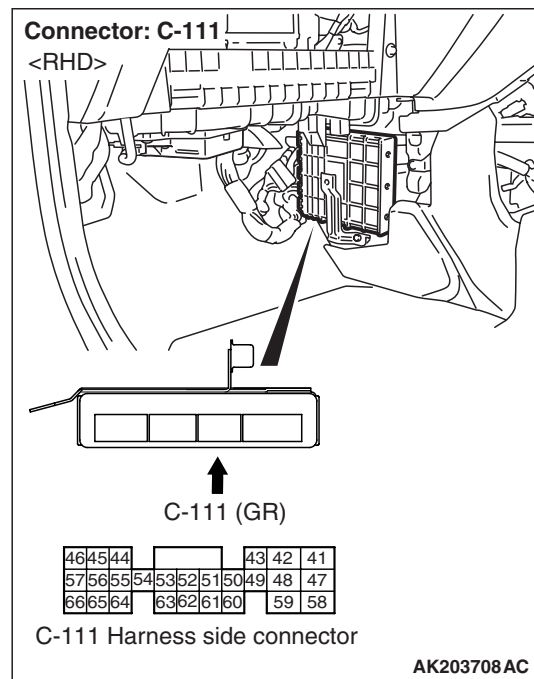
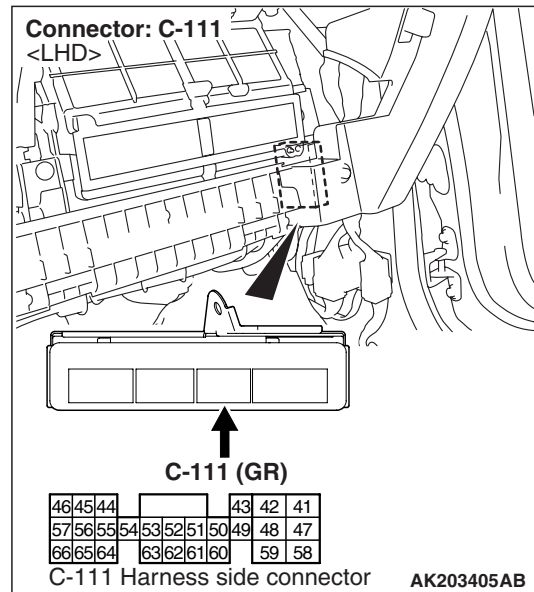
- Check output line for short circuit and damage.

**Q: Is the check result normal?**

**YES :** Replace air flow sensor.

**NO :** Repair.

**STEP 19. Perform voltage measurement at C-111 engine-A/T-ECU connector.**



- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 55 and earth.

**OK:**

**Altitude 0 m: 3.8 – 4.2 V**

**Altitude 600 m: 3.5 – 3.9 V**

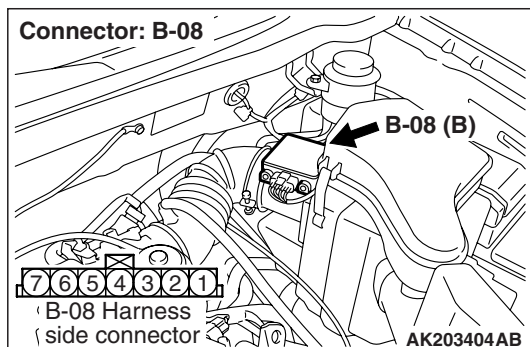
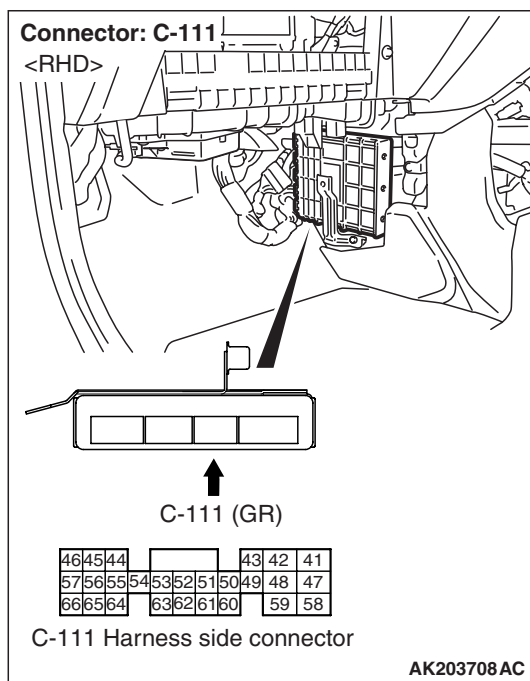
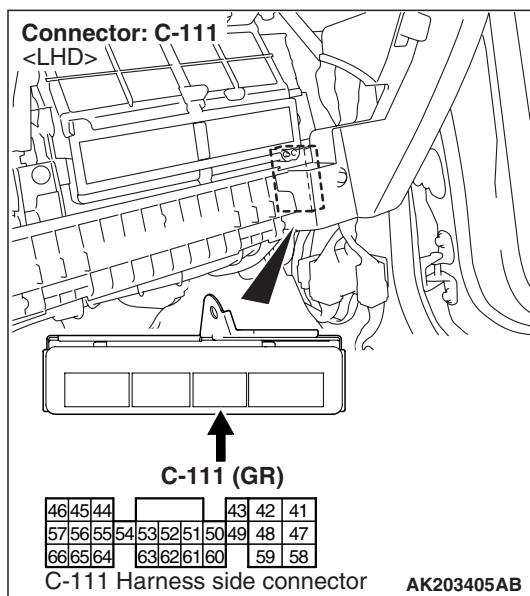
**Altitude 1,200 m: 3.3 – 3.7 V**

**Altitude 1,800 m: 3.0 – 3.4 V**

**Q: Is the check result normal?**

**YES :** Go to Step 21 .

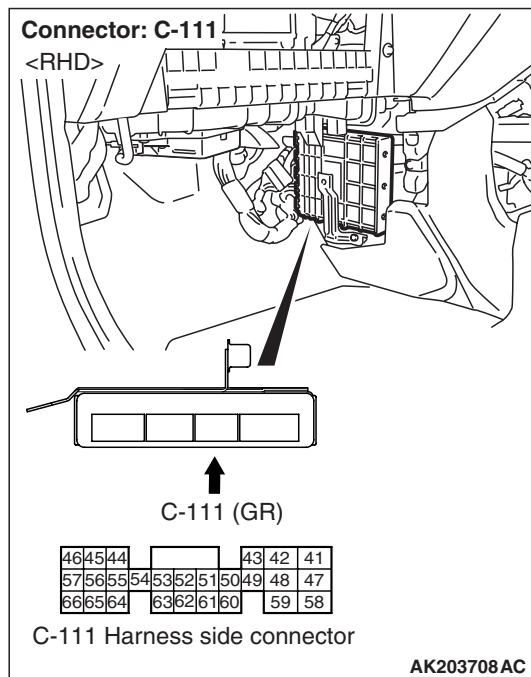
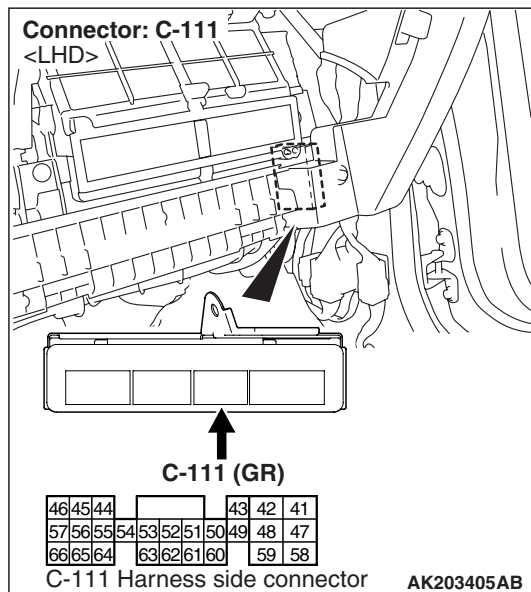
**NO :** Go to Step 20 .

**STEP 20. Connector check: C-111  
engine-A/T-ECU connector****Q: Is the check result normal?**

**YES :** Check and repair harness between B-08 (terminal No. 2) air flow sensor connector and C-111 (terminal No. 55) engine-A/T-ECU connector.

- Check output line for open circuit and damage.

**NO :** Repair.

**STEP 21. Connector check: C-111  
engine-A/T-ECU connector****Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

Code No. 31 Detonation Sensor System

**OPERATION**

- The sensor signal is inputted to the engine-A/T-ECU (terminal No. 90) from the detonation sensor (terminal No. 1).

**FUNCTION**

- The detonation sensor detects the vibration of the cylinder block caused by detonation waves, and inputs a signal to the engine-A/T-ECU.
- In response to the signal, the engine-A/T-ECU provides controls to retard the ignition timing when the detonation occurs.

**TROUBLE JUDGMENT**

**Check Conditions**

- After the ignition switch has been placed in the "ON" position, or 60 seconds later after the engine has started up.
- Engine speed of 2,500 r/min or more.
- Volumetric efficiency of 30% or more.

**Judgment Criterion**

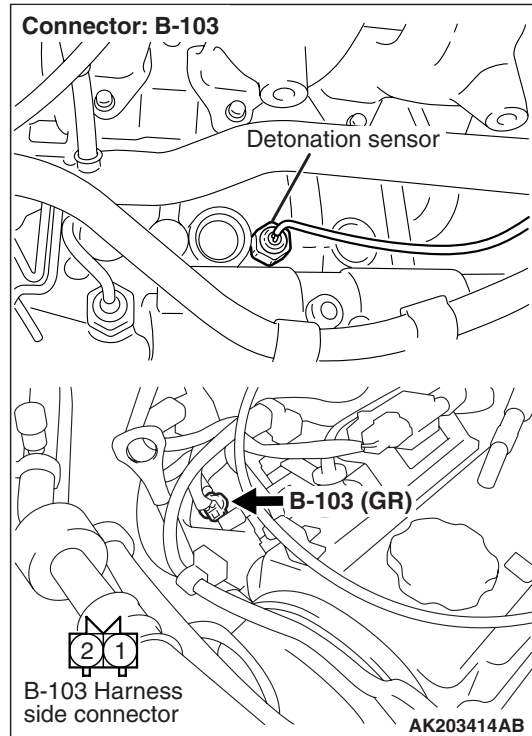
- The change amount of the detonation sensor output voltage (the detonation sensor peak voltage in every half a turn of the crankshaft) is below 0.06 V in 200 consecutive times.

**PROBABLE CAUSE**

- Failed detonation sensor
- Open/short circuit in detonation sensor circuit or loose connector contact
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

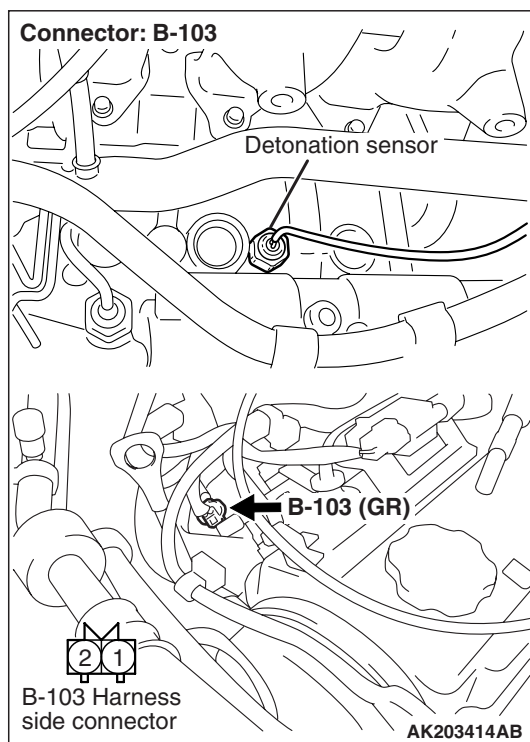
**STEP 1. Connector check: B-103 detonation sensor connector**



**Q: Is the check result normal?**

**YES :** Go to Step 2 .

**NO :** Repair.

**STEP 2. Perform resistance measurement at B-103 detonation sensor connector.**

- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 2 and earth.

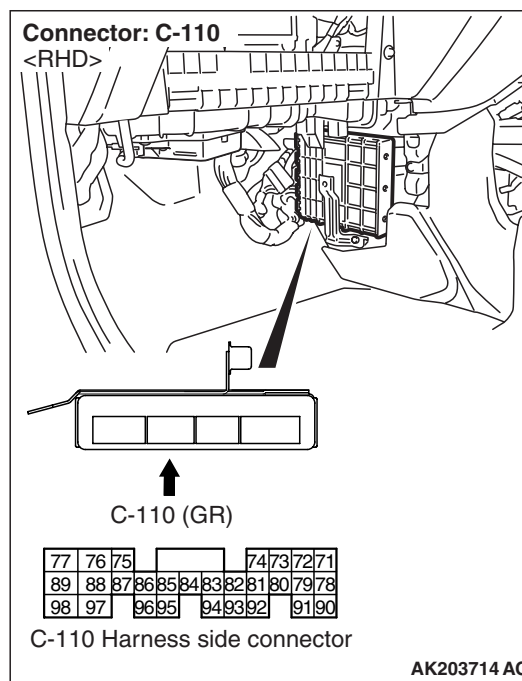
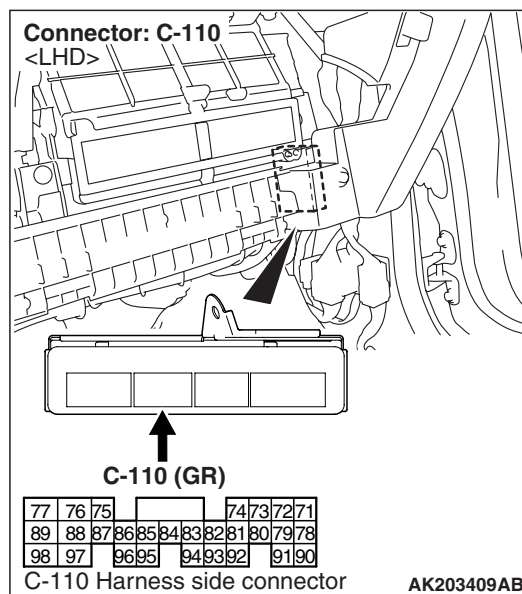
**OK: 2  $\Omega$  or less**

**Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Check and repair harness between B-103 (terminal No. 2) detonation sensor connector and body earth.

- Check earthing line for open circuit and damage.

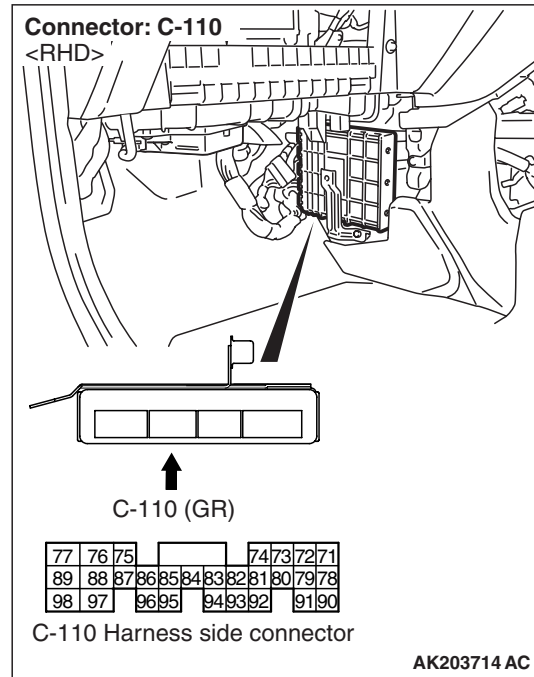
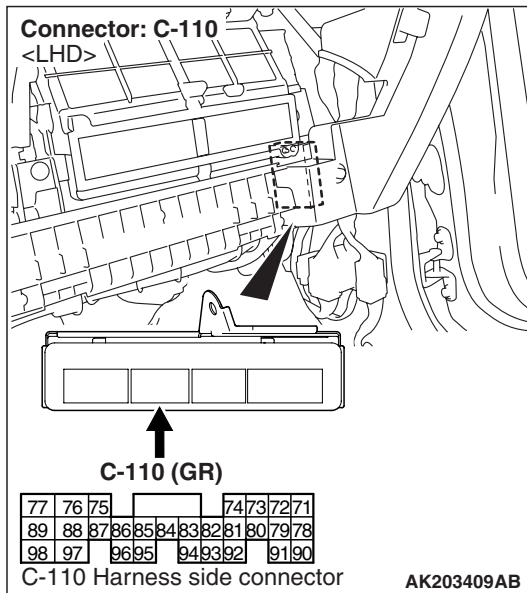
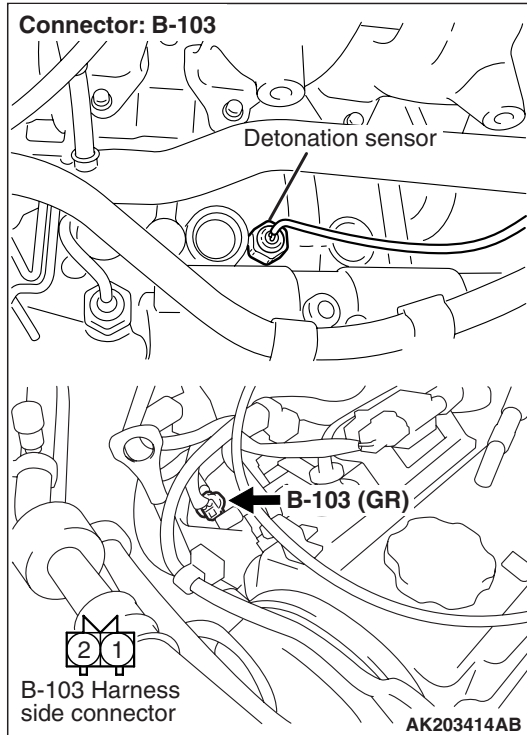
**STEP 3. Connector check: C-110 engine-A/T-ECU connector**

**Q: Is the check result normal?**

**YES :** Go to Step 4 .

**NO :** Repair.

**STEP 4. Check harness between B-103 (terminal No. 1) detonation sensor connector and C-110 (terminal No. 90) engine-A/T-ECU connector.**



- Check output line for open/short circuit and damage.

**Q: Is the check result normal?**

**YES :** Go to Step 5 .

**NO :** Repair.

**STEP 5. Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Go to Step 6 .

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**STEP 6. Replace detonation sensor.**

- After replacing the detonation sensor, re-check the trouble symptoms.

**Q: Does trouble symptom persist?**

**YES :** Replace engine-A/T-ECU.

**NO :** Check end.



## Code No. 41 Injector System

## OPERATION

- Power is supplied to the injector (terminal No. 1) from the engine control relay (terminal No. 1).
- The engine-A/T-ECU (terminal No. 1, No. 2, No. 9 and No. 24) makes the power transistor in the unit be in "ON" position, and that makes currents go on the injector (terminal No. 2).

## FUNCTION

- The engine-A/T-ECU controls the power supply interval of the injector.
- The fuel injection amount of the injector depends on the power supply interval.

## TROUBLE JUDGMENT

## Check Conditions

- Fuel cut and injector not in forced drive (actuator test) mode.
- Engine speed 50 – 1,000 r/min.
- Throttle position sensor output 1.15 V or less.

## Judgment Criterion

- No surge voltage of the injector detected for 4 seconds.

## PROBABLE CAUSE

- Failed injector
- Open/short circuit in injector circuit or loose connector contact
- Failed engine-A/T-ECU

## DIAGNOSIS PROCEDURE

## STEP 1. M.U.T.-II/III actuator test

- Refer to Actuator test reference table list [P.13A-264](#).
  - Item 01: No. 1 injector
  - Item 02: No. 2 injector
  - Item 03: No. 3 injector
  - Item 04: No. 4 injector

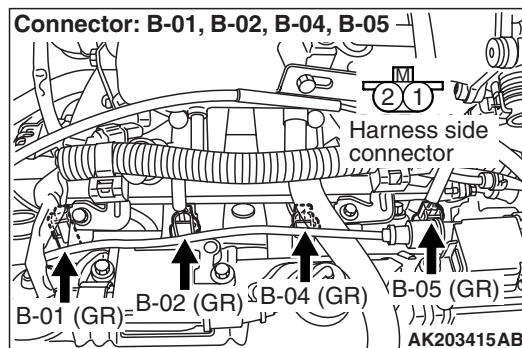
**OK: Idling state varies.**

## Q: Are the check results normal?

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO :** Go to Step 2 .

## STEP 2. Check connector: Injector connector



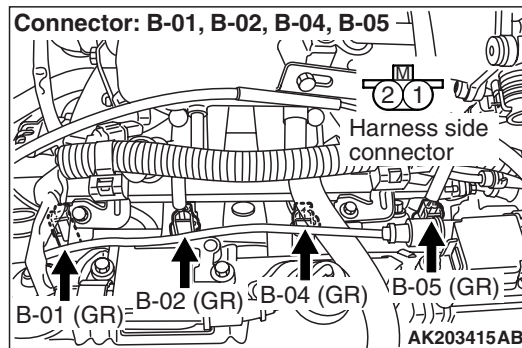
- B-01 (No. 1 injector connector)
- B-02 (No. 2 injector connector)
- B-04 (No. 3 injector connector)
- B-05 (No. 4 injector connector)

## Q: Are the check results normal?

**YES :** Go to Step 3 .

**NO :** Repair.

## STEP 3. Perform resistance measurement at injector connector.



- B-01 (No. 1 injector connector)
- B-02 (No. 2 injector connector)
- B-04 (No. 3 injector connector)
- B-05 (No. 4 injector connector)
  - Disconnect connector, and measure at injector side.
  - Resistance between terminal No. 1 and No. 2.

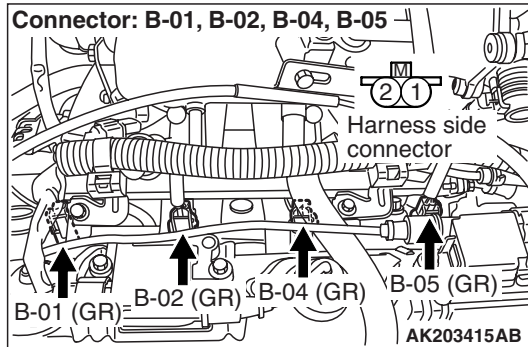
**OK: 13 – 16 Ω**

## Q: Are the check results normal?

**YES :** Go to Step 4 .

**NO :** Replace injector.

**STEP 4. Perform voltage measurement at injector connector.**



- a. B-01 (No. 1 injector connector)
- b. B-02 (No. 2 injector connector)
- c. B-04 (No. 3 injector connector)
- d. B-05 (No. 4 injector connector)
  - Disconnect connector, and measure at harness side.
  - Ignition switch: ON
  - Voltage between terminal No. 1 and earth.

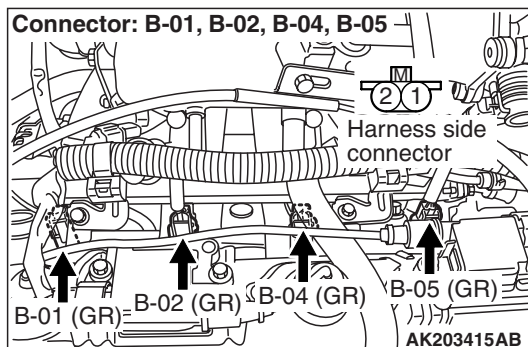
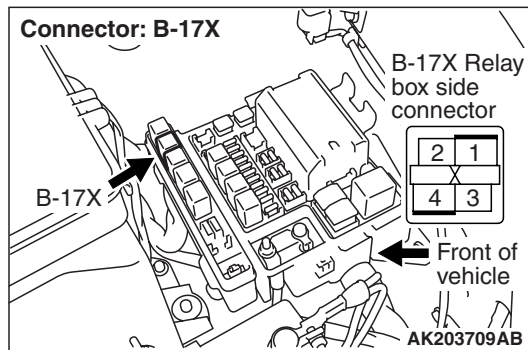
**OK: System voltage**

**Q: Are the check results normal?**

**YES :** Go to Step 6 .

**NO :** Go to Step 5 .

**STEP 5. Check connector: B-17X engine control relay connector**

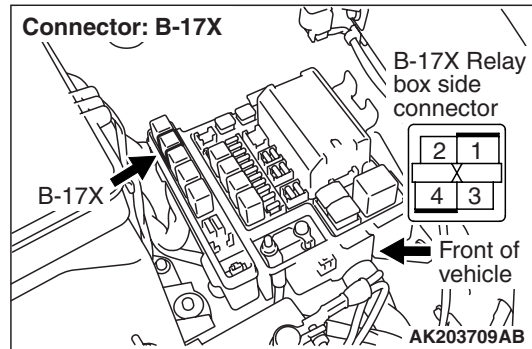


**Q: Is the check result normal?**

- YES :**
- a. Check and repair harness between B-17X (terminal No. 1) engine control relay connector and B-01 (terminal No. 1) No. 1 injector connector.
  - b. Check and repair harness between B-17X (terminal No. 1) engine control relay connector and B-02 (terminal No. 1) No. 2 injector connector.
  - c. Check and repair harness between B-17X (terminal No. 1) engine control relay connector and B-04 (terminal No. 1) No. 3 injector connector.
  - d. Check and repair harness between B-17X (terminal No. 1) engine control relay connector and B-05 (terminal No. 1) No. 4 injector connector.
    - Check power supply line for open/short circuit.

**NO :** Repair.

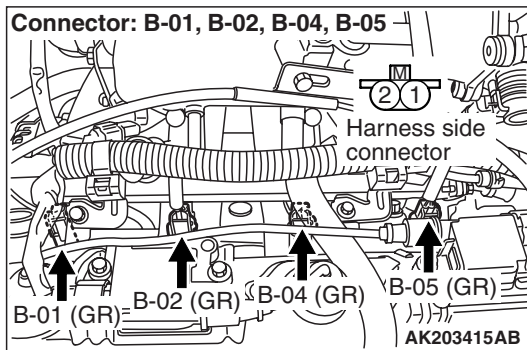
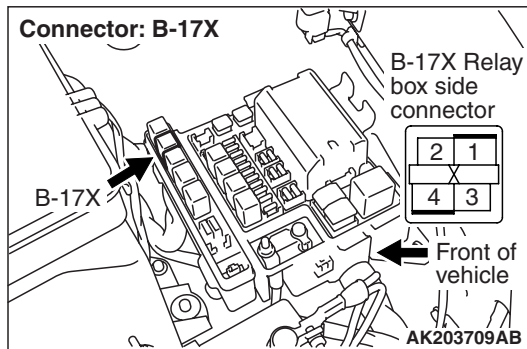
**STEP 6. Check connector: B-17X engine control relay connector**



**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

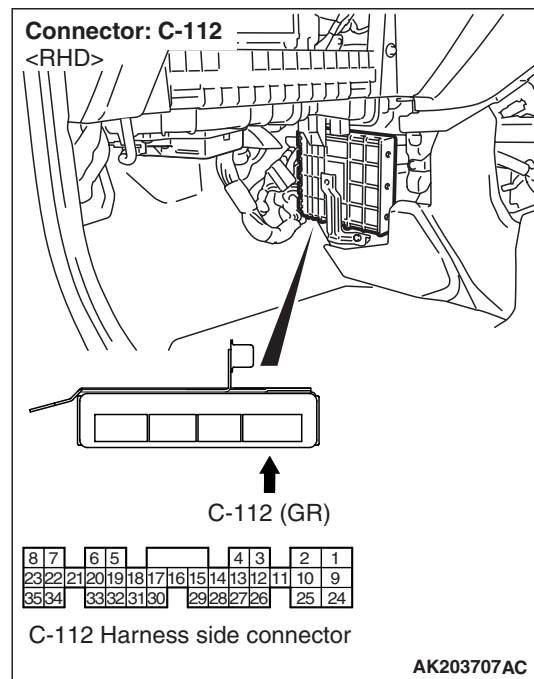
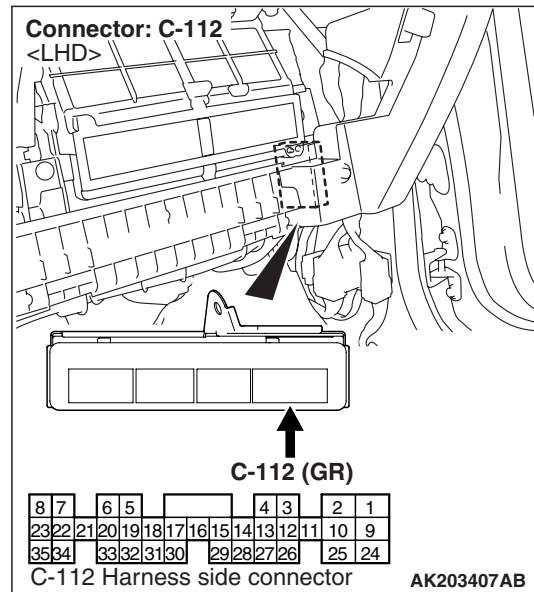
**STEP 7. Check harness between B-17X engine control relay connector and injector connector.**

- Check harness between B-17X (terminal No. 1) engine control relay connector and B-01 (terminal No. 1) No. 1 injector connector.
- Check harness between B-17X (terminal No. 1) engine control relay connector and B-02 (terminal No. 1) No. 2 injector connector.
- Check harness between B-17X (terminal No. 1) engine control relay connector and B-04 (terminal No. 1) No. 3 injector connector.
- Check harness between B-17X (terminal No. 1) engine control relay connector and B-05 (terminal No. 1) No. 4 injector connector.
  - Check power supply line for damage.

**Q: Are the check results normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

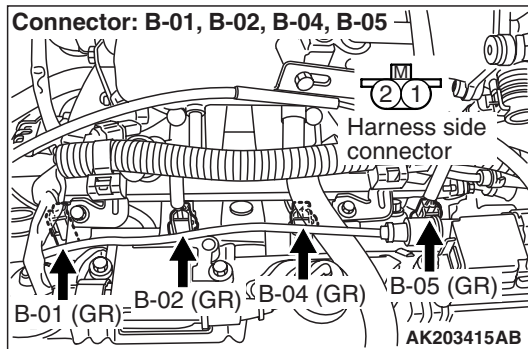
**STEP 8. Check connector: C-112 engine-A/T-ECU connector**

**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 9. Check harness between injector connector and C-127 engine-A/T-ECU connector.**

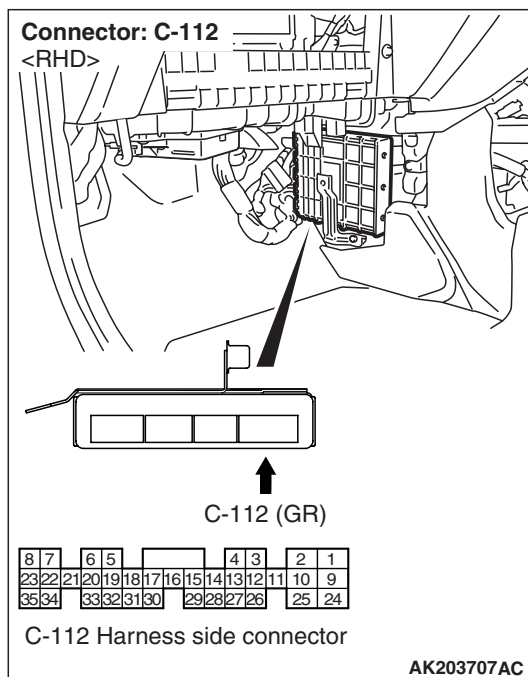
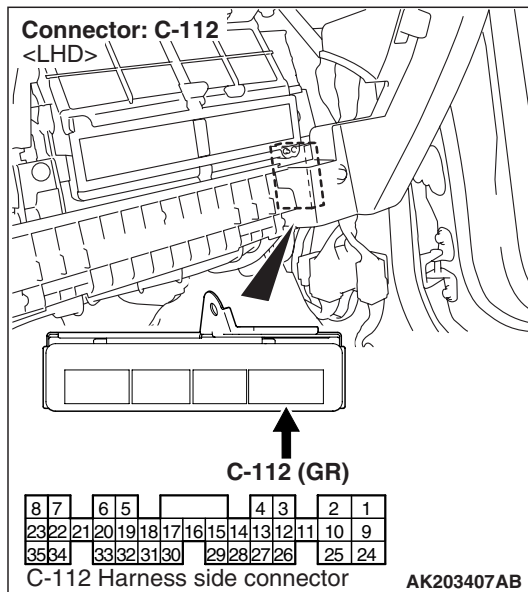


- b. Check harness between B-02 (terminal No. 2) No. 2 injector connector and C-112 (terminal No. 9) engine-A/T-ECU connector.
- c. Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-112 (terminal No. 24) engine-A/T-ECU connector.
- d. Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-112 (terminal No. 2) engine-A/T-ECU connector.
  - Check output line for open/short circuit and damage.

**Q: Are the check results normal?**

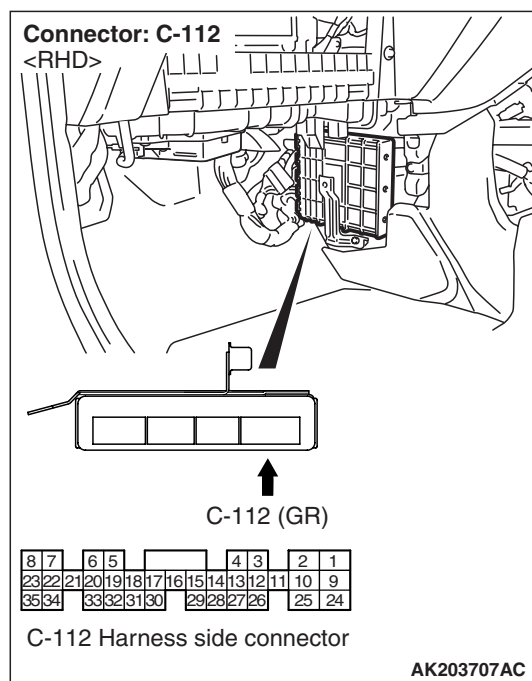
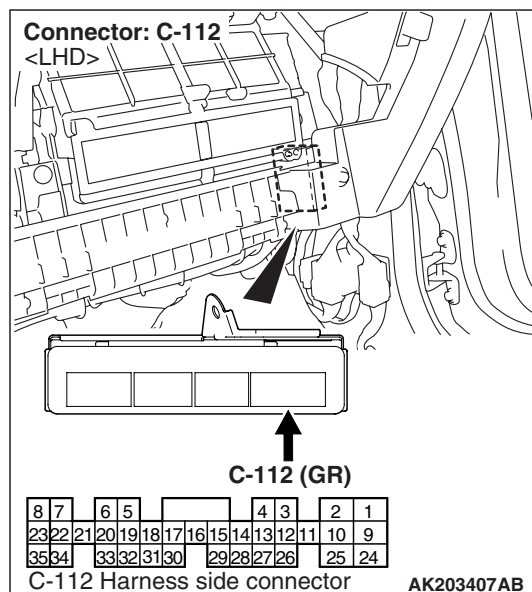
**YES :** Go to Step 10 .

**NO :** Repair.



- a. Check harness between B-01 (terminal No. 2) No. 1 injector connector and C-112 (terminal No. 1) engine-A/T-ECU connector.

**STEP 10. Signal wave pattern measurement at C-112 engine-A/T-ECU connector (Use oscilloscope).**



- Engine: Idling
- Selector lever position: P
- Voltage between terminal No. 1 and earth.

**OK: Waveforms should be display on Inspection procedure using an oscilloscope (Refer to P.13A-271).**

**Q: Is the check result normal?**

**YES :** . Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

**NO :** . Replace engine-A/T-ECU.



**Code No. 44 Injection Coil and Power Transistor Unit System**

**OPERATION**

- The battery voltage is applied to the ignition coil (terminal No. 1) from the ignition switch and is earthed to the vehicle body from the ignition coil (terminal No. 2).
- A power voltage of 12 V is applied to the ignition coil output terminal (terminal No. 3) from the engine-A/T-ECU (terminal No. 11 and No. 12).

**FUNCTION**

- When the engine-A/T-ECU makes the power transistor in the unit be in "OFF" position, the battery voltage in the unit is applied to the power transistor unit, and that makes the power transistor unit be in "ON" position. The engine-A/T-ECU makes the power transistor in the unit be in "ON", and that makes the power transistor unit be in "OFF" position.
- In response to the signal from the engine-A/T-ECU, the power transistor unit is in "ON" position. The primary current is going to the ignition coil. When the power transistor unit is in "OFF" position, the primary current is interrupted and high voltage is generated in the secondary coil.

**TROUBLE JUDGMENT**

**Check Conditions**

- Engine speed 1,500 – 4,000 r/min.
- Volumetric efficiency 30 – 70%.
- Excluding 10 seconds after the ignition switch has been in "ON" position or just after the engine has started up.

**Judgment Criterion**

- Crank angle sensor detects abnormal rotation caused by misfire (one failed coil of the two coils).

**PROBABLE CAUSE**

- Failed ignition coil
- Failed spark plug
- Failed spark plug cable
- Open/short circuit in ignition primary circuit or loose connector contact
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

**STEP 1. Check spark plug cable itself.**

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-36](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 2 .

**NO :** Replace spark plug cable.

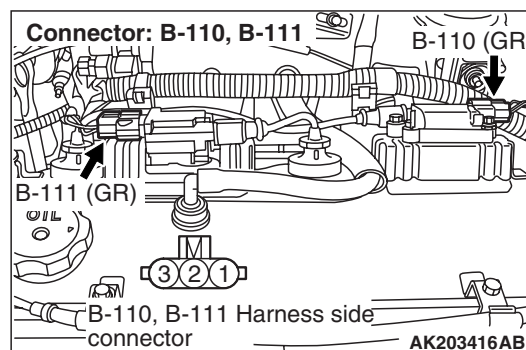
**STEP 2. Check spark plug.**

**Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Replace spark plug.

**STEP 3. Connector check: B-110 and B-111 ignition coil connectors**



**Q: Is the check result normal?**

**YES :** Go to Step 4 .

**NO :** Repair.

**STEP 4. Check ignition coil itself.**

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-35](#)).

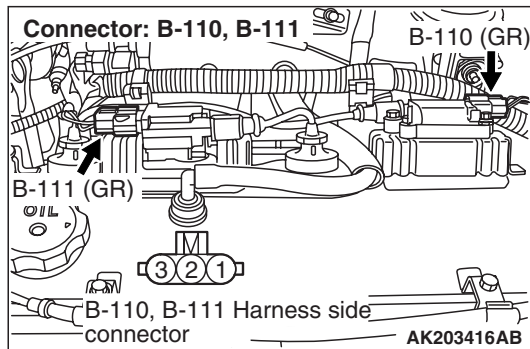
**Q: Is the check result normal?**

**YES :** Go to Step 5 .

**NO :** Replace ignition coil.



**STEP 5. Perform voltage measurement at B-110 and B-111 ignition coil connectors.**



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

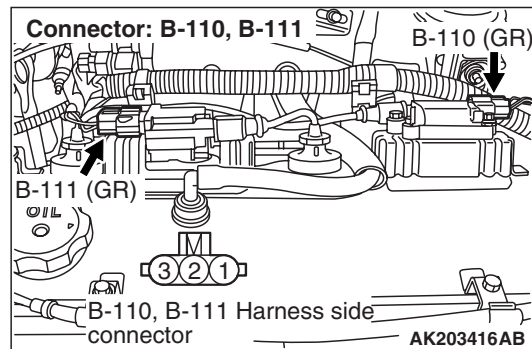
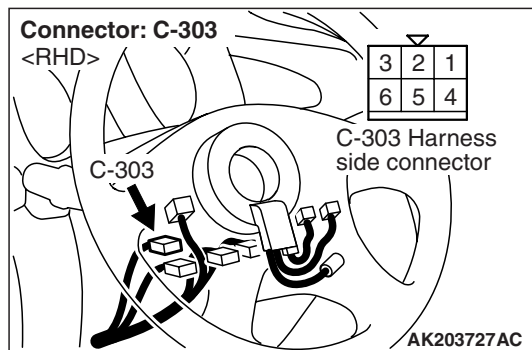
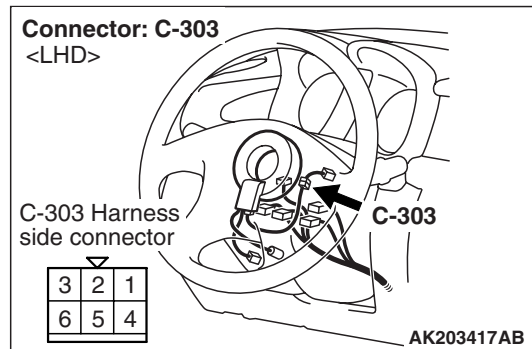
**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Go to Step 6 .

**STEP 6. Connector check: C-303 ignition switch connector**



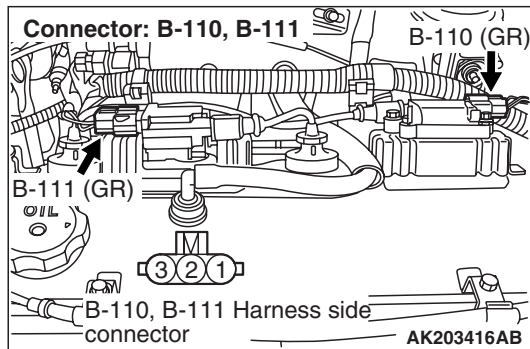
**Q: Is the check result normal?**

**YES :** Check intermediate connectors A-14 <LHD> C-116 <LHD>, C-126 <RHD>, C-203 and C-205 and repair if necessary. If intermediate connectors are normal, check and repair harness between C-303 (terminal No. 2) ignition switch connector and B-110 (terminal No. 1) ignition coil connector, also between C-303 (terminal No. 2) ignition switch connector and B-111 (terminal No. 1) ignition coil connector.

- Check power supply line for open/short circuit.

**NO :** Repair.

**STEP 7. Perform voltage measurement at B-110 and B-111 ignition coil connectors.**



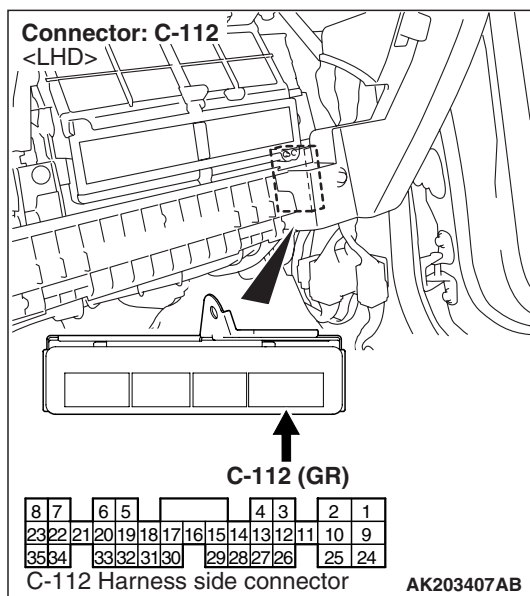
- Disconnect connector, and measure at harness side.
- Engine: Cranking
- Voltage between terminal No. 3 and earth.

**OK: 0.5 – 4.0 V**

**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO :** . Go to Step 8 .

**STEP 8. Perform voltage measurement at C-112 engine-A/T-ECU connector.**

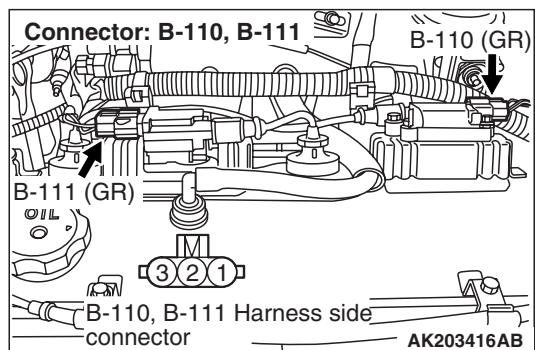
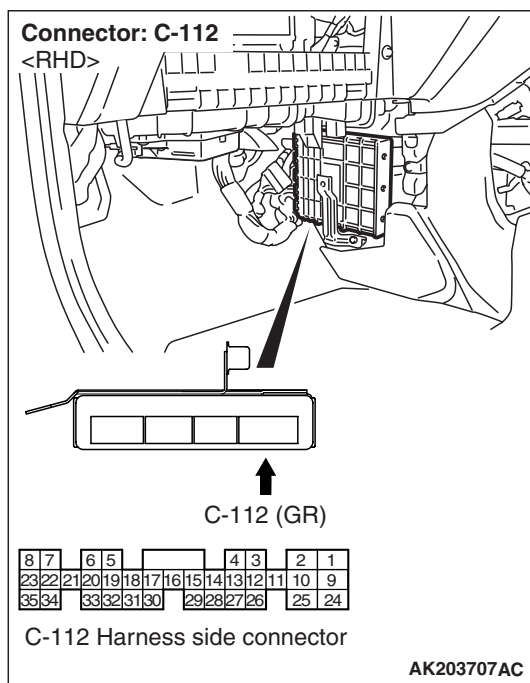
- Engine: Cranking
- Voltage between terminal No. 11 and earth, also between terminal No. 12 and earth.

**OK: 0.5 – 4.0 V**

**Q: Is the check result normal?**

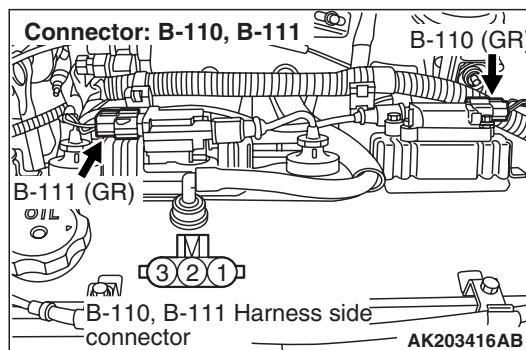
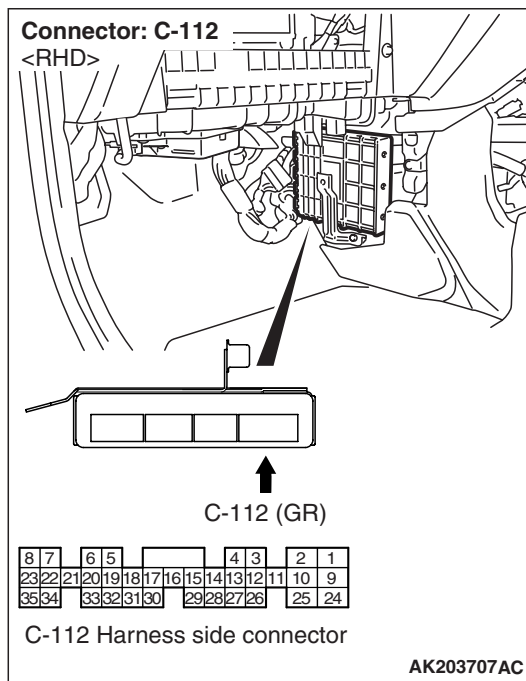
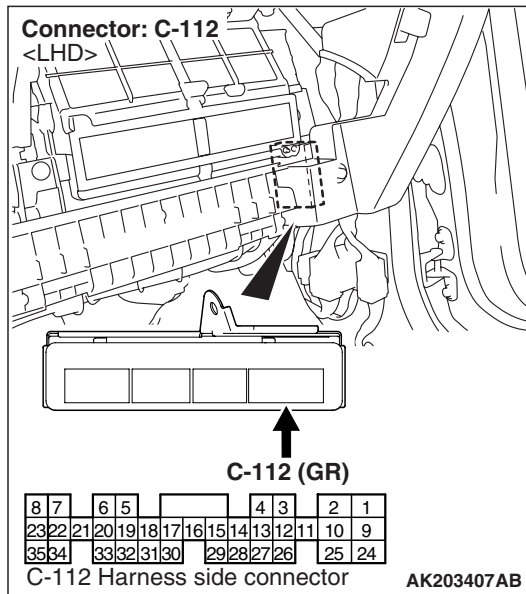
**YES :** Go to Step 9 .

**NO :** Go to Step 10 .



- Measure engine-A/T-ECU terminal voltage.
- Disconnect B-110 and B-111 ignition coil connectors.

**STEP 9. Connector check: C-112 engine-A/T-ECU connector**



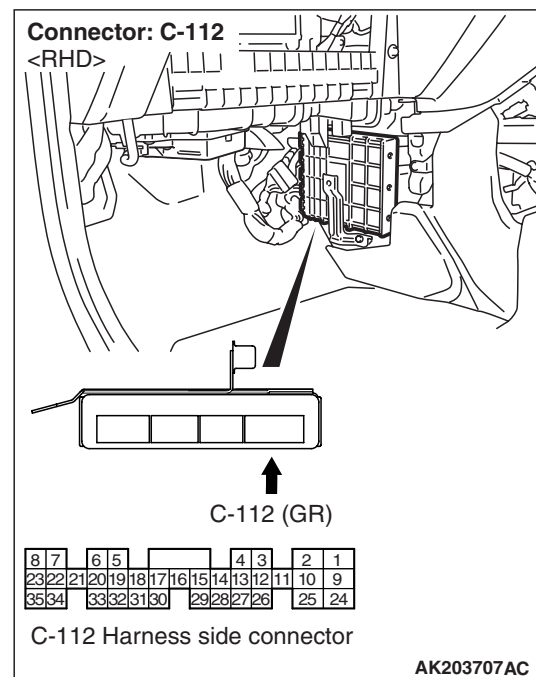
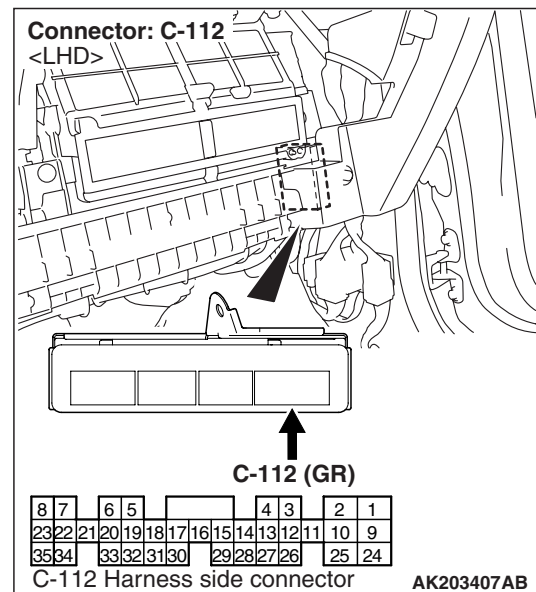
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-110 (terminal No. 3) ignition coil connector and C-112 (terminal No. 11) engine-A/T-ECU connector, also between B-111 (terminal No. 3) ignition coil connector and C-112 (terminal No. 12) engine-A/T-ECU connector.

- Check output line for open circuit.

**NO :** Repair.

**STEP 10. Connector check: C-112 engine-A/T-ECU connector**

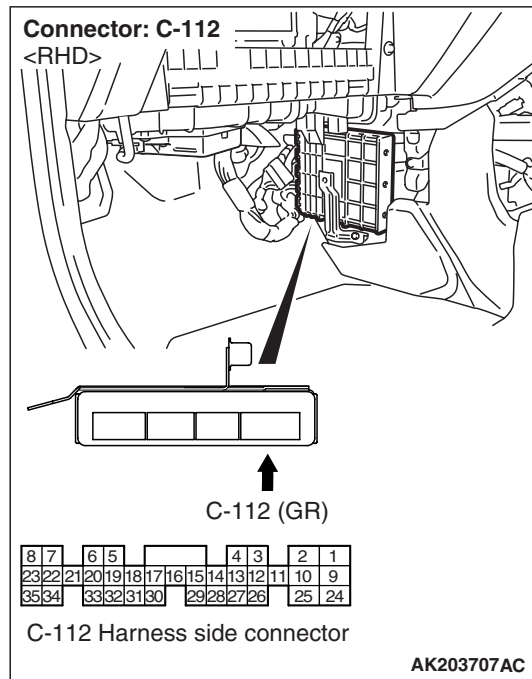
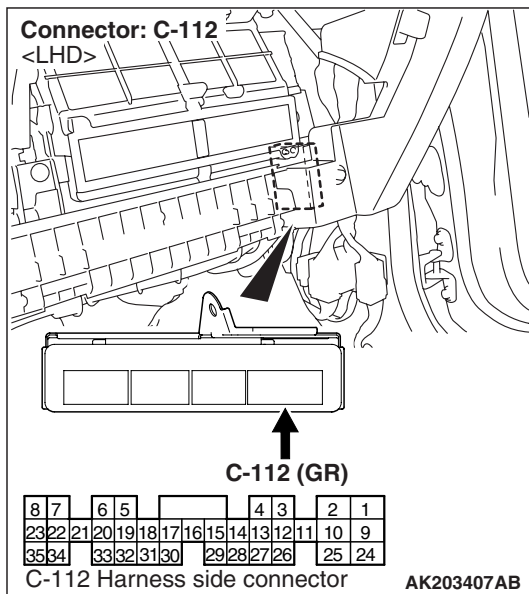
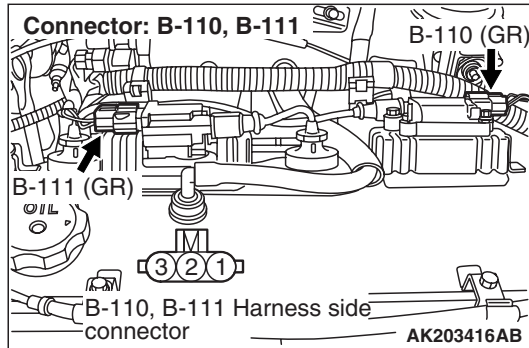


**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Repair.

**STEP 11. Check harness between B-110 (terminal No. 3) ignition coil connector and C-112 (terminal No. 11) engine-A/T-ECU connector, also between B-111 (terminal No. 3) ignition coil connector and C-112 (terminal No. 12) engine-A/T-ECU connector.**



- Check output line for short circuit.

**Q: Is the check result normal?**

**YES :** Go to Step 12 .

**NO :** Repair.

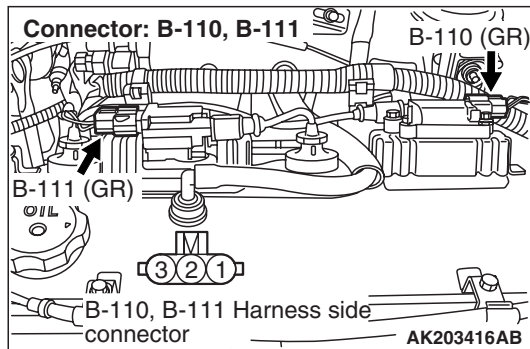
**STEP 12. Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace engine-A/T-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**STEP 13. Perform resistance measurement at B-110 and B-111 ignition coil connectors.**



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 2 and earth.

**OK: 2  $\Omega$  or less**

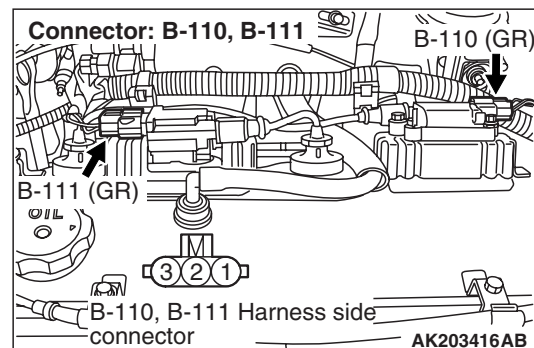
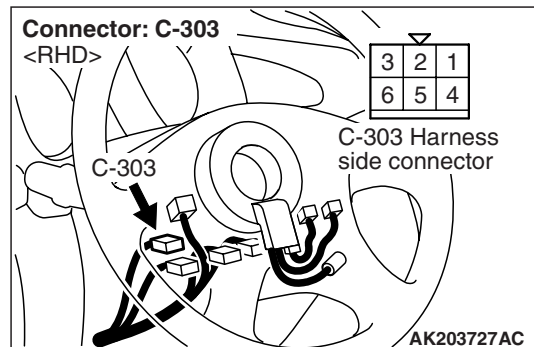
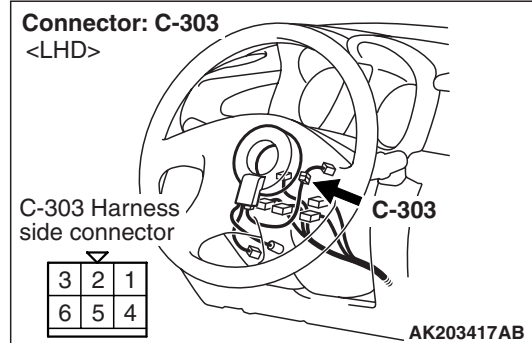
**Q: Is the check result normal?**

**YES :** Go to Step 14 .

**NO :** Check and repair harness between B-110 (terminal No. 2) ignition coil connector and body earth, also between B-111 (terminal No. 2) ignition coil connector and body earth.

- Check earthing line for open circuit and damage.

**STEP 14. Check harness between C-303 (terminal No. 2) ignition switch connector and B-110 (terminal No. 1) ignition coil connector, also between C-303 (terminal No. 2) ignition switch connector and B-111 (terminal No. 1) ignition coil connector.**



**NOTE:** Before checking harness, check intermediate connectors A-14 <LHD>, C-116 <LHD>, C-126 <RHD>, C-203 and C-205 and repair if necessary.

- Check power supply line for damage.

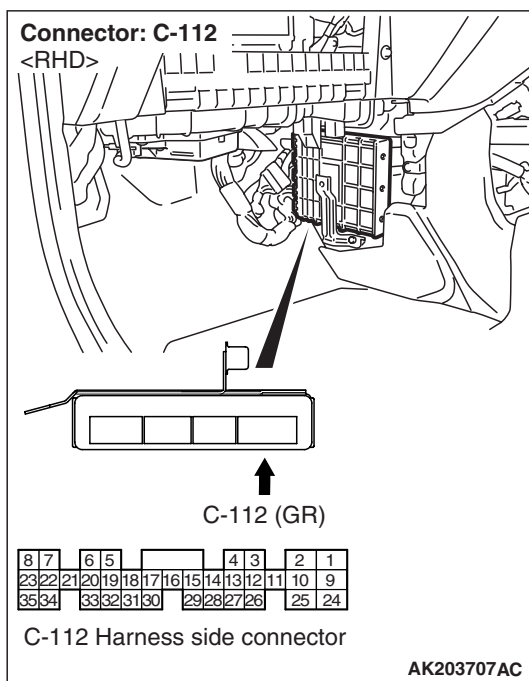
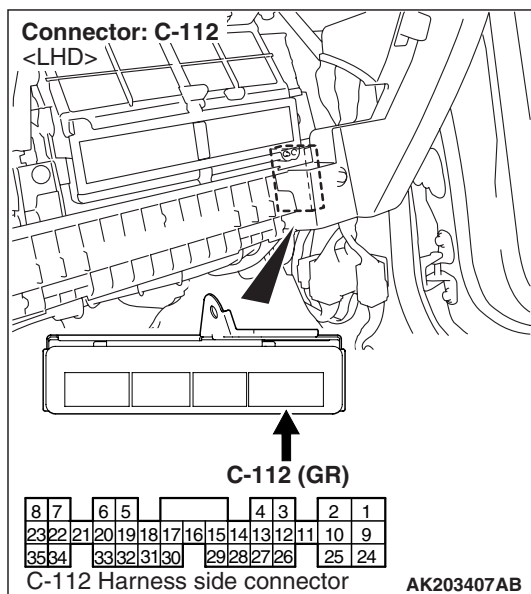
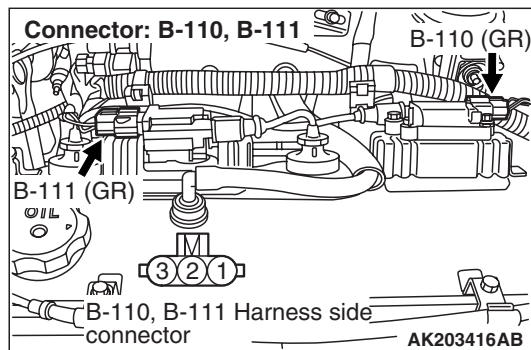
**Q: Is the check result normal?**

**YES :** Go to Step 15 .

**NO :** Repair.



**STEP 15. Check harness between B-110 (terminal No. 3) ignition coil connector and C-112 (terminal No. 11) engine-A/T-ECU connector, also between B-111 (terminal No. 3) ignition coil connector and C-112 (terminal No. 12) engine-A/T-ECU connector.**



- Check output line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 12 .

**NO :** Repair.

## Code No. 64 Alternator FR Terminal System

### OPERATION

- The energized state of the alternator field coil is inputted from the alternator (terminal No. 4) to the engine-A/T-ECU (terminal No. 54).

### FUNCTION

- A signal of the power supply duty ratio for the alternator field coil is inputted to the engine-A/T-ECU.
- In response to the signal, the engine-A/T-ECU detects the alternator output current and controls the idling speed according to the output current (electric load).

### TROUBLE JUDGMENT

#### Check Condition

- After the start.

#### Judgment Criterion

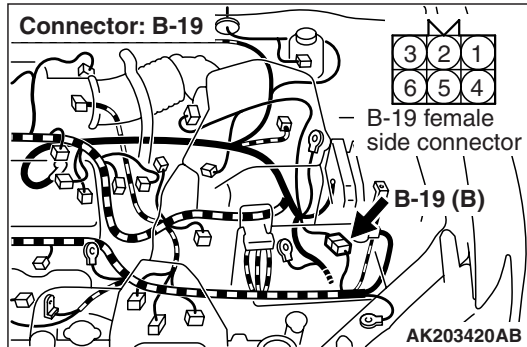
- Input voltage from alternator FR terminal continues to be battery voltage for 20 seconds.

#### PROBABLE CAUSE

- Open circuit in alternator FR terminal circuit
- Failed engine-A/T-ECU

## DIAGNOSIS PROCEDURE

### STEP 1. Connector check: B-19 intermediate connector

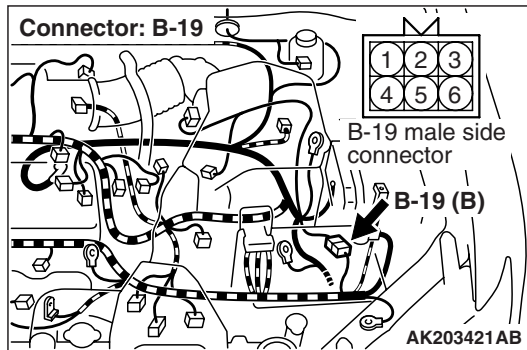


**Q: Is the check result normal?**

**YES :** Go to Step 2 .

**NO :** Repair.

### STEP 2. Perform voltage measurement at B-19 intermediate connector.



- Disconnect connector, and measure at male connector side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

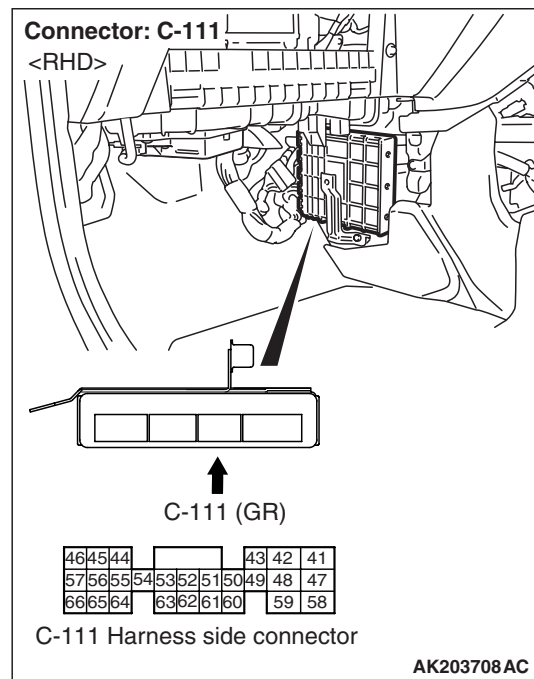
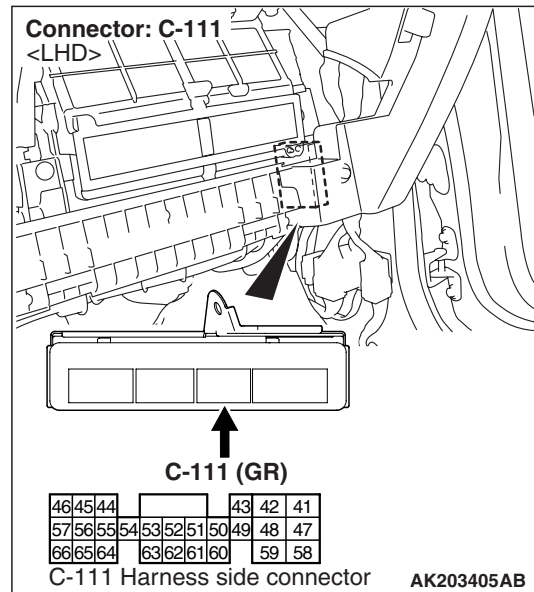
**OK: System Voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Go to Step 3 .

### STEP 3. Connector check: C-111 engine-A/T-ECU connector

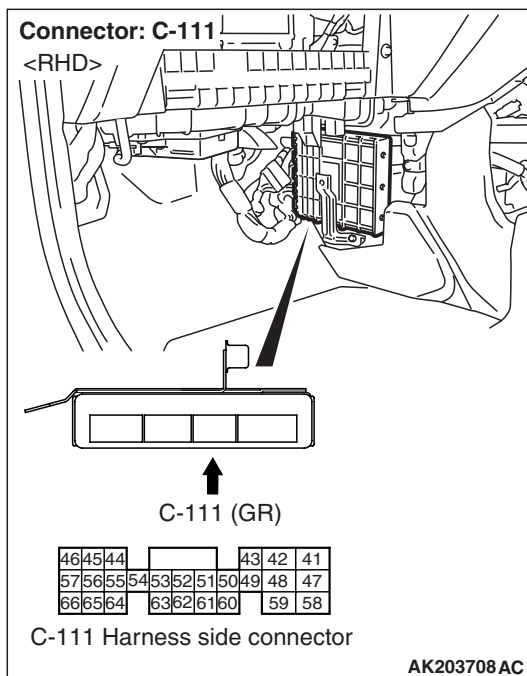
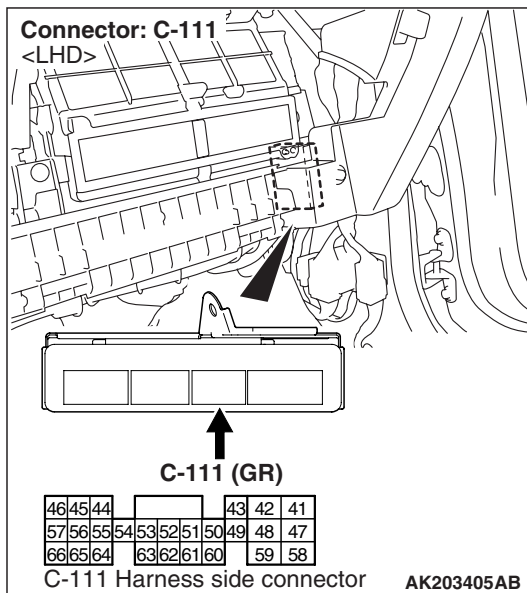
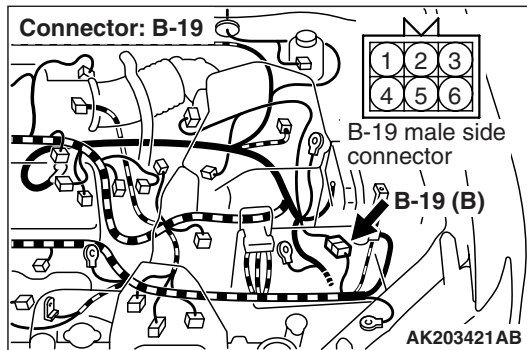


**Q: Is the check result normal?**

**YES :** Go to Step 4 .

**NO :** Repair.

**STEP 4. Check harness between B-19 (terminal No. 1) intermediate connector and C-111 (terminal No. 54) engine-A/T-ECU connector.**



**Q: Is the check result normal?**

**YES :** Go to Step 5 .

**NO :** Repair.

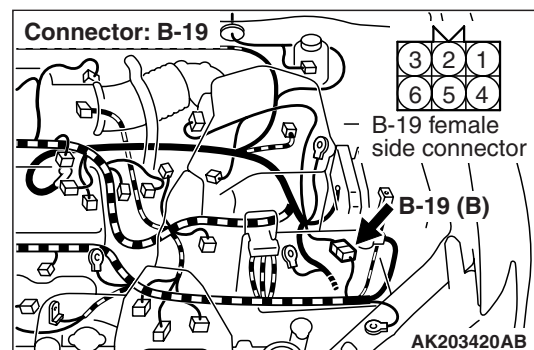
**STEP 5. Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace engine-A/T-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

**STEP 6. Perform voltage measurement at B-19 intermediate connector.**



- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

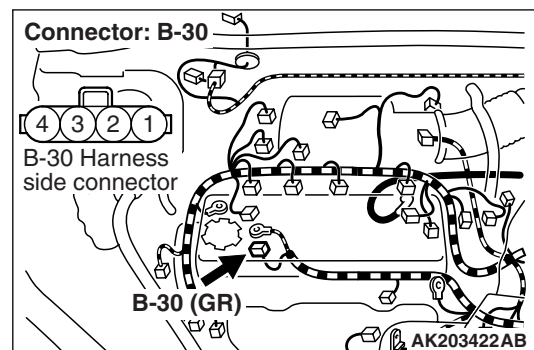
**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Go to Step 7 .

**STEP 7. Connector check: B-30 alternator connector**



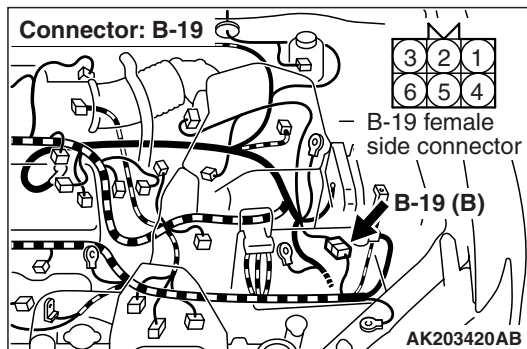
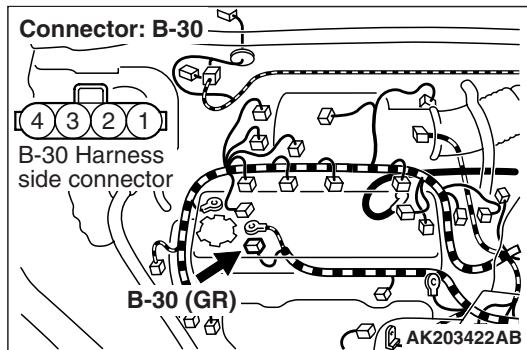
**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

- Check output line for short circuit.

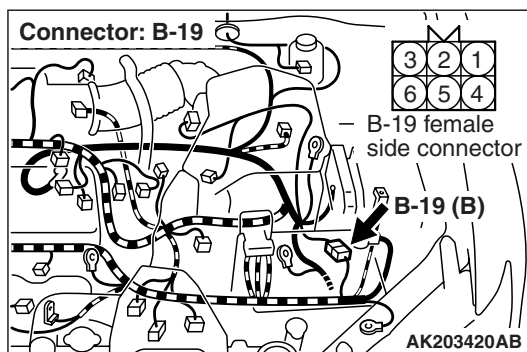
**STEP 8. Check harness between B-30 (terminal No. 4) alternator connector and B-19 (terminal No. 1) intermediate connector.**



- Check output line for short circuit.

**Q: Is the check result normal?**  
**YES :** Replace alternator.  
**NO :** Repair.

**STEP 9. Perform voltage measurement at B-19 intermediate connector.**

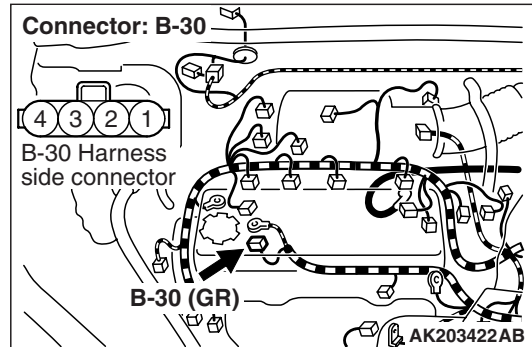


- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Engine: Idling after warm up
- Selector lever position: P
- Radiator fan: Inactive
- Voltage between terminal No. 1 and earth.

**OK: Switching the headlamps to ON from OFF causes the voltage to fall.**

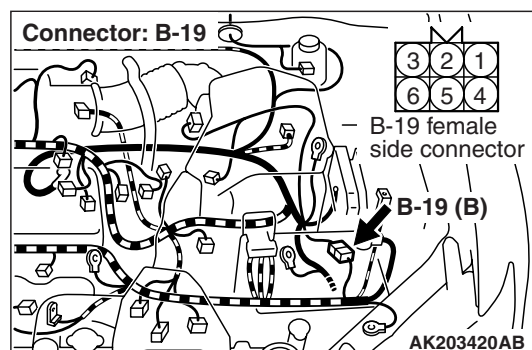
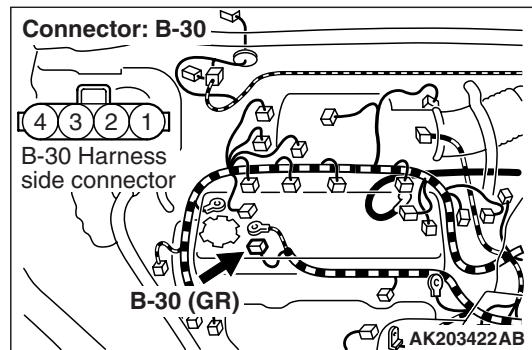
**Q: Is the check result normal?**  
**YES :** Go to Step 5 .  
**NO :** . Go to Step 10 .

**STEP 10. Connector check: B-30 alternator connector**



**Q: Is the check result normal?**  
**YES :** Go to Step 11 .  
**NO :** Repair.

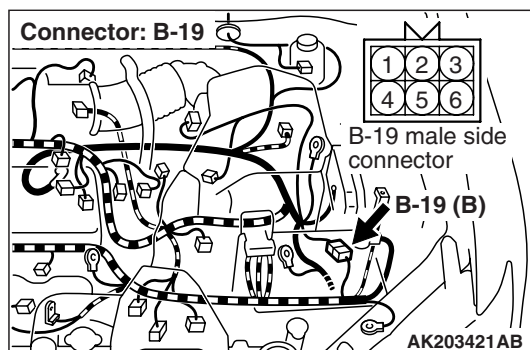
**STEP 11. Check harness between B-30 (terminal No. 4) alternator connector and B-19 (terminal No. 1) intermediate connector.**



- Check output line for damage.

**Q: Is the check result normal?**  
**YES :** Go to Step 12 .  
**NO :** Repair.

**STEP 12. Check harness between B-19 (terminal No. 1) intermediate connector and C-111 (terminal No. 54) engine-A/T-ECU connector.**



**Q: Is the check result normal?**

**YES :** Go to Step 13 .

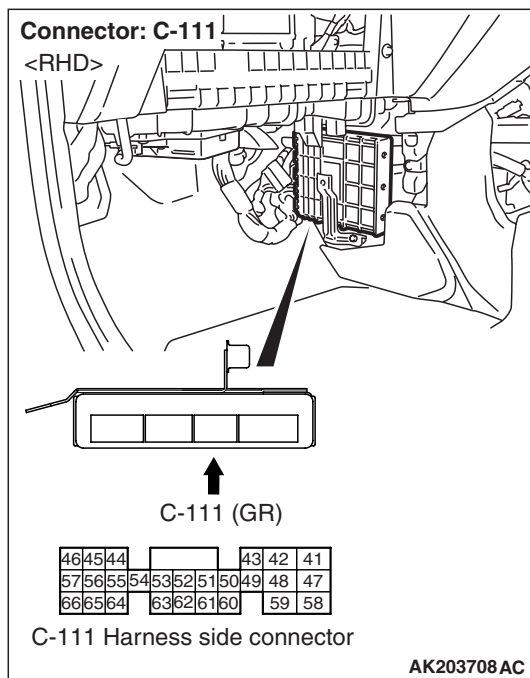
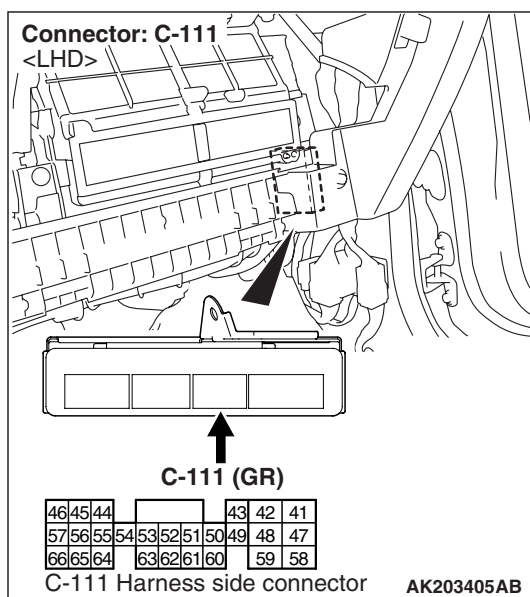
**NO :** Repair.

**STEP 13. Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace alternator.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).



- Check output line for damage.

**INSPECTION CHART FOR TROUBLE SYMPTOMS**

M1131151501688

Items	Trouble symptom		Inspection procedure No.
Communication with M.U.T.-II/III is impossible	Communication with all system is not possible		1
	Communication with engine-A/T-ECU only is not possible		2
Engine warning lamp	The engine warning lamp does not illuminate right after the ignition switch is turned to the "ON" position		3
	The engine warning lamp remains illuminating and never goes out		4
Starting	Starting impossible (starter inoperative)	The starter is impossible to operate.	5
	Starting impossible (Starter operative but no initial combustion)	The starter is operative and cranks the engine, but none of initial combustion is in the cylinders and the engine is not started.	6
	Starting impossible (Initial combustion but no complete combustion)	The initial combustion occurs, but the engine stalls soon due to the incomplete combustion.	7
	Improper starting (Long time to start)	It is long cranking to start the engine.	
Improper idling	Unstable idling (Rough idling, hunting)	The engine speed is not constant and changeable during the idling. Usually, the judgment can be based on the movement of the tachometer pointer, also on the vibration transmitted to the steering wheel, shift lever, vehicle body and so on.	8
	Improper idling speed	The proper idling speed is not satisfied.	
	Engine stalled during idling (Die out)	The engine stalls during the idling in no relation to the vehicle movement.	
Engine stalls	The engine stalls when starting the car (Pass out)	The engine stalls during the operation, or when the accelerator pedal is depressed from the idling.	9
	The engine stalls when decelerating	The engine stalls at the deceleration.	10



Items	Trouble symptom		Inspection procedure No.
Driving	Hesitation, sag	The response of vehicle speed (engine speed) is delayed when the accelerator pedal is depressed, or the vehicle speed (engine speed) is temporarily dropped during the acceleration. These phenomena are called "hesitation" and the serious hesitation is called "sag".	12
	Poor acceleration	The engine cannot obtain the acceleration corresponding to the degree of throttle opening although the engine is smooth at the constant speed.	
	Stumble	The engine speed increase is delayed when the accelerator pedal is initially depressed at the starting.	
	Surge	The vehicle body is repeated to vibrate jollity in the forward and backward directions at the constant speed or acceleration.	
	The feeling of impact or vibration when accelerating	The large impact feeling occurs at the acceleration.	13
	The feeling of impact or vibration when decelerating	The large impact feeling occurs at the deceleration.	14
	Knocking	Sharp sound like a hammer striking on the cylinder walls during the driving can be heard and wrongly affects the driving.	15
	Ignition timing offset	The basic ignition timing is deviated from the datum value.	16
Stopping	Run on (Dieseling)	The engine continues to run after the ignition switch is in "LOCK" (OFF) position.	17
Exhaust gas	Odor, white smoke, black smoke, high-concentration CO/HC during idling	The exhaust gas is extremely rank odor, white smoke or black smoke. The concentration of CO & HC is high during the idling.	18
Charging performance	Battery rundown	The battery is soon rundown or the charging ability of battery is small.	19

Items	Trouble symptom		Inspection procedure No.
Cooling performance	Overheating	The temperature of engine cooling water is extremely high.	20
	Abnormal rotation of fan Motor	The fan motor is abnormally rotated when the ignition switch is in "ON" position in no relation to the engine cooling water temperature.	21
A/C performance	Poor A/C Performance	The temperature of air cooling from A/C is not efficient or very far from the target temperature.	22

## PROBLEM SYMPTOMS TABLE

Inspection procedure No.	Trouble symptom	Reference page
1	Communication with all system is not possible	<a href="#">P.13A-107</a>
2	Communication with engine-A/T-ECU only is not possible	<a href="#">P.13A-109</a>
3	The engine warning lamp does not illuminate right after the ignition switch is turned "ON" position	<a href="#">P.13A-111</a>
4	The engine warning lamp remains illuminating and never goes out	<a href="#">P.13A-118</a>
5	Starting impossible (No initial combustion)	<a href="#">P.13A-120</a>
6	Starting impossible (Starter operative but no initial combustion)	<a href="#">P.13A-126</a>
7	Starting impossible (Initial combustion but no complete combustion)	<a href="#">P.13A-130</a>
	Starting impossible (Long time to start)	
8	Unstable idling (Rough idling, hunting)	<a href="#">P.13A-136</a>
	Improper idling speed (Too high or too low)	
	Engine stalls during idling (Die out)	
9	The engine stalls when starting the car (pass out)	<a href="#">P.13A-147</a>
10	The engine stalls when decelerating	<a href="#">P.13A-149</a>
11	Engine does not revolve up	<a href="#">P.13A-151</a>
12	Hesitation, sag	<a href="#">P.13A-153</a>
	Poor acceleration	
	Stumble	
	Surge	
13	The feeling of impact or vibration when accelerating	<a href="#">P.13A-155</a>
14	The feeling of impact or vibration when decelerating	<a href="#">P.13A-157</a>
15	Knocking	<a href="#">P.13A-158</a>
16	Ignition timing offset	<a href="#">P.13A-160</a>
17	Run on (Dieseling)	<a href="#">P.13A-161</a>
18	Odor, white smoke, black smoke, high-concentration CO/HC during idling	<a href="#">P.13A-162</a>
19	Battery rundown	<a href="#">P.13A-163</a>

Inspection procedure No.	Trouble symptom	Reference page
20	Overheating	<a href="#">P.13A-170</a>
21	Abnormal rotation of fan motor	<a href="#">P.13A-170</a>
22	Poor A/T performance	<a href="#">P.13A-175</a>
23	Engine A/T-ECU power supply, engine control relay, ignition switch-IG1 system	<a href="#">P.13A-176</a>
24	Fuel pump system	<a href="#">P.13A-188</a>
25	Fan control relay system	<a href="#">P.13A-197</a>
26	A/C switch system	<a href="#">P.13A-204</a>
27	A/C compressor relay system	<a href="#">P.13A-208</a>
28	A/C load signal system	<a href="#">P.13A-216</a>
29	Power steering fluid pressure switch system	<a href="#">P.13A-221</a>
30	Idle speed control servo system	<a href="#">P.13A-227</a>
31	EGR control solenoid valve system	<a href="#">P.13A-231</a>
32	A/C pressure sensor system	<a href="#">P.13A-238</a>
33	Mixture adjusting screw (Variable resistor) system	<a href="#">P.13A-249</a>

## SYMPTOM PROCEDURES

### Inspection Procedure 1: Communication with All System is not Possible

#### OPERATION

- Battery voltage is applied to diagnosis connector (terminal No.16).
- Diagnosis connector (terminals No. 4 and 5) are earthed to the vehicle body.

#### COMMENT ON TROUBLE SYMPTOM

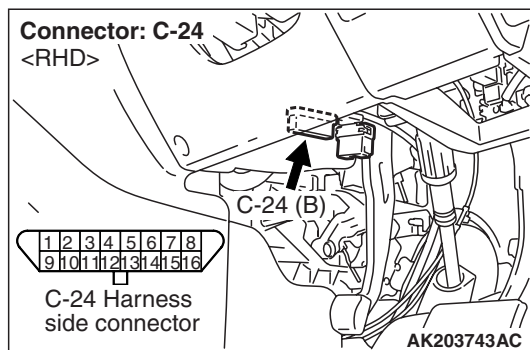
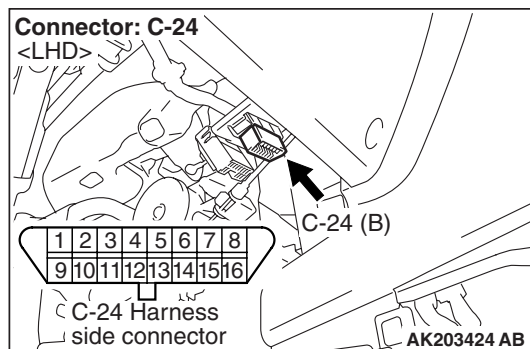
- Failure is possibly caused by failed power supply circuit or failed earthing circuit of diagnosis connector.

#### PROBABLE CAUSE

- Failed diagnosis connector
- Open/short circuit in diagnosis connector circuit
- Failed M.U.T.-II/III

#### DIAGNOSIS PROCEDURE

##### STEP 1: Connector check: C-24 diagnosis connector

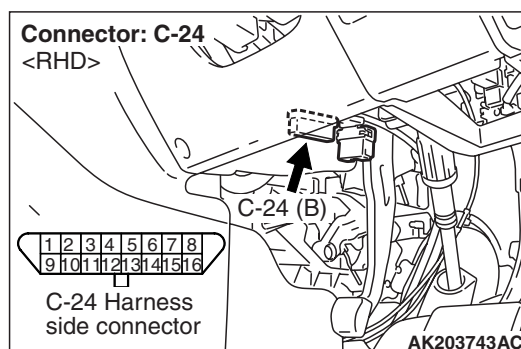
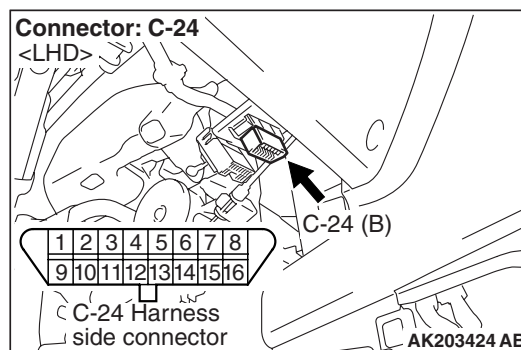


##### Q: Is the check result normal?

YES : Go to Step 2 .

NO : . Repair.

##### STEP 2: Perform resistance measurement at C-24 diagnosis connector.



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 4 and earth, also between terminal No. 5 and earth.

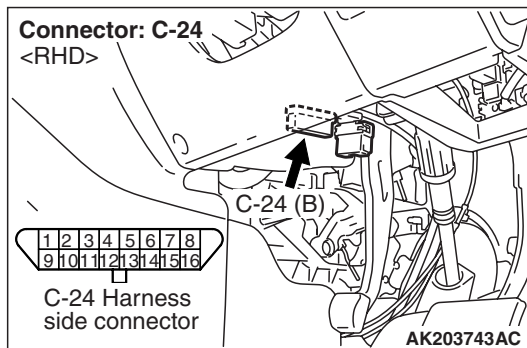
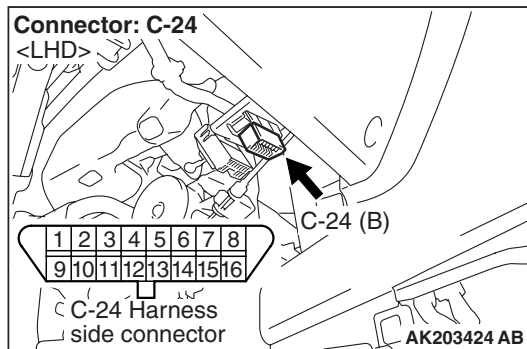
**OK: 2  $\Omega$  or less**

##### Q: Is the check result normal?

YES : Go to Step 3 .

NO : Check and repair harness between C-24 (terminal No. 4) diagnosis connector and body earth, also between C-24 (terminal No. 5) diagnosis connector and body earth.

- Check earthing line for open circuit and damage.

**STEP 3: Perform voltage measurement at C-24 diagnosis connector.**

- Disconnect connector, and measure at the harness side.
- Voltage between terminal No. 16 and earth.

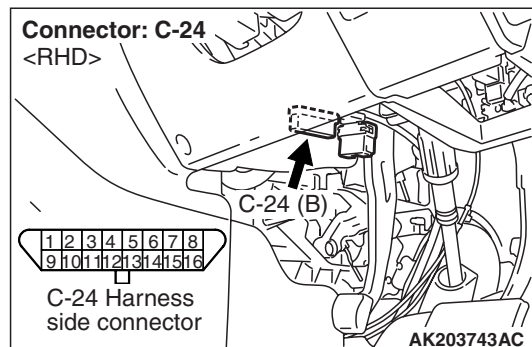
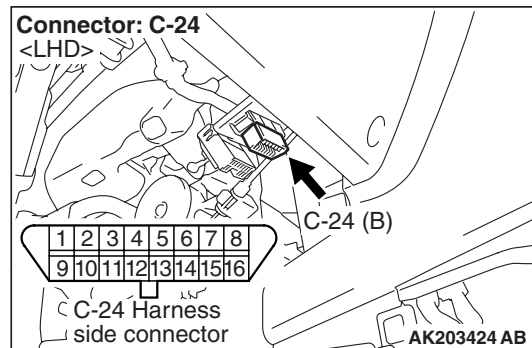
**OK: System voltage****Q: Is the check result normal?****YES :** Go to Step 4 .

**NO :** Check intermediate connectors A-14 <RHD>, C-116 <LHD>, C-125 <RHD>, C-204 and C-205, and repair if necessary. If connectors are normal, check and repair harness between C-24 (terminal No. 16) diagnosis connector and battery.

- Check power supply line for open/short circuit.

**STEP 4: Replace M.U.T.-II/III**

- After replacing the M.U.T.-II/III, re-check the trouble symptoms.

**Q: Does trouble symptom persist?****YES :** Go to Step 5 .**NO :** Check end.**STEP 5: Check harness between C-24 (terminal No. 6) diagnosis connector and battery.**

**NOTE:** Before checking harness, check intermediate connectors A-14 <RHD>, C-116 <LHD>, C-125 <RHD>, C-204 and C-205, and repair if necessary.

- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Check and repair harness between C-24 (terminal No. 4) diagnosis connector and body earth, also between C-24 (terminal No. 5) diagnosis connector and body earth.

- Check earthing line for damage.

**NO :** Repair.

**Inspection Procedure 2: Communication with Engine-A/T-ECU only is not Possible.**

**OPERATION**

- There is data communication between diagnosis connector output terminal (terminal No. 7) and engine-A/T-ECU (terminal No. 85).

**COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by failed power supply circuit or failed earthing circuit of engine-A/T-ECU.

**PROBABLE CAUSE**

- Open/short circuit in engine-A/T-ECU power circuit
- Short circuit in between engine-A/T-ECU and diagnosis connector circuit
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

**STEP 1: Check engine warning lamp.**

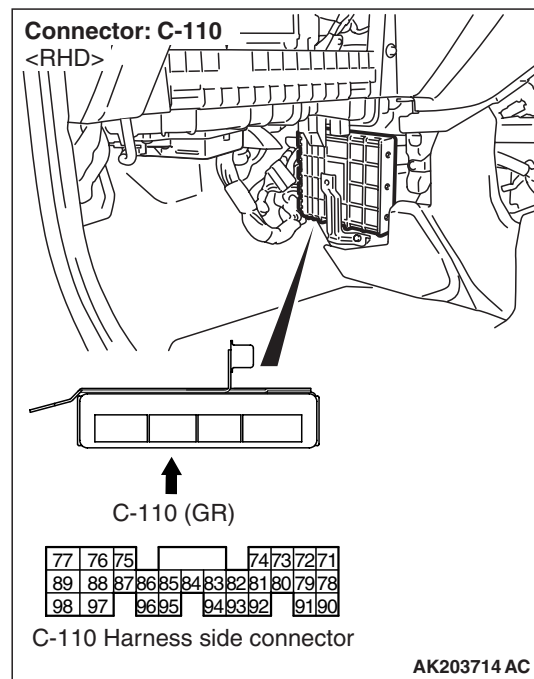
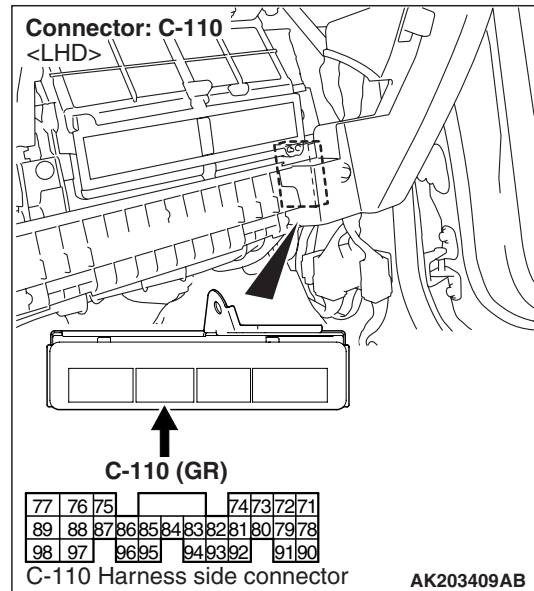
- Ignition switch: OFF → ON

**Q: Is lamp illuminating for few seconds?**

**YES :** Go to Step 2 .

**NO :** Check engine-A/T-ECU power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 23 [P.13A-176](#)).

**STEP 2: Connector check: C-110 engine-A/T-ECU connector**



**Q: Is the check result normal?**

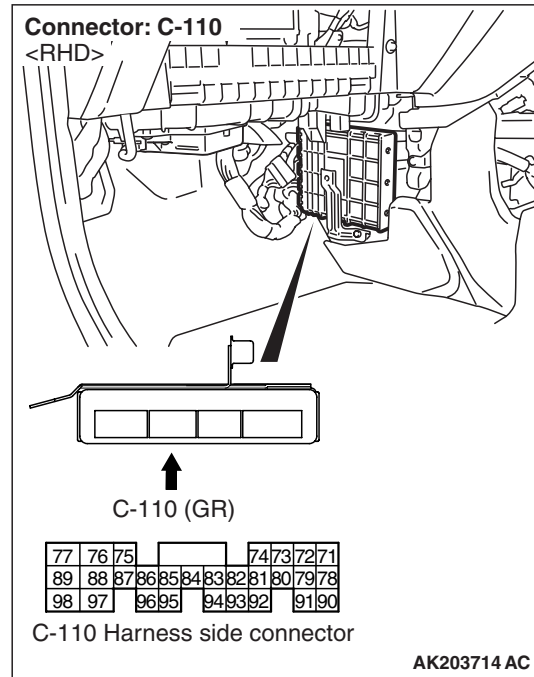
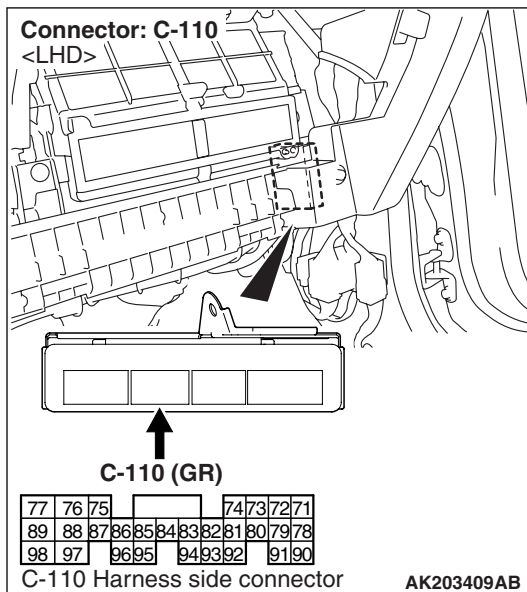
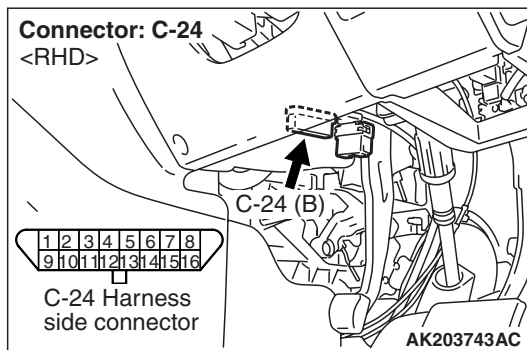
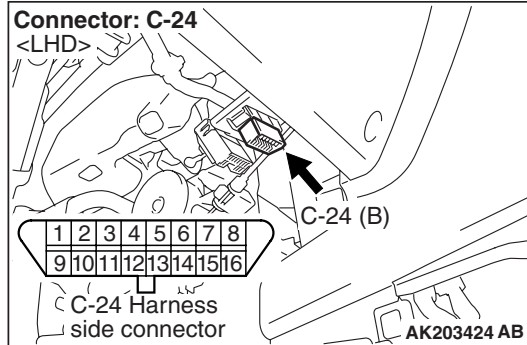
**YES :** Go to Step 3 .

**NO :** Repair.



**STEP 3: Check harness between C-24 (terminal No. 7) diagnosis connector and C-110 (terminal No. 85) engine-A/T-ECU connector.**

*NOTE: Before Checking harness, check intermediate connectors C-105 and C-02, and repair if necessary.*



- Check communication line for open/short circuit and damage.

**Q: Is the check result normal?**

**YES :** Go to Step 4 .

**NO :** Repair.

**STEP 4: Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace engine-A/T-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**Inspection Procedure 3: The Engine Warning Lamp does not Illuminate Right after The Ignition Switch is Turned to The "ON" Position**

**OPERATION**

- Battery voltage is applied to engine warning lamp of combination meter connector (terminal No. 42) from ignition switch.
- Engine-A/T-ECU (terminal No. 22) makes power transistor in unit be in "ON" position, and that makes currents go on engine warning lamp of combination meter connector (terminal No. 14).

**COMMENTS ON TROUBLE SYMPTOM**

- Engine-A/T-ECU turns on engine warning lamp for 5 seconds to check for burnt-out bulb immediately after ignition switch is turned to ON.
- If engine warning lamp is not lit just after turning ignition switch to "ON" position, failure is possibly caused by burn-out bulb, open/short circuit or other faults.

**PROBABLE CAUSE**

- Engine warning lamp bulb burnt out
- Failed ignition switch
- Open/short circuit in engine warning lamp circuit or loose connector contact
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

**STEP 1: Check engine start-up.**

**Q: Is engine started?**

**YES :** Go to Step 2 .

**NO :** Check engine-A/T-ECU power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 23 [P.13A-176](#)).

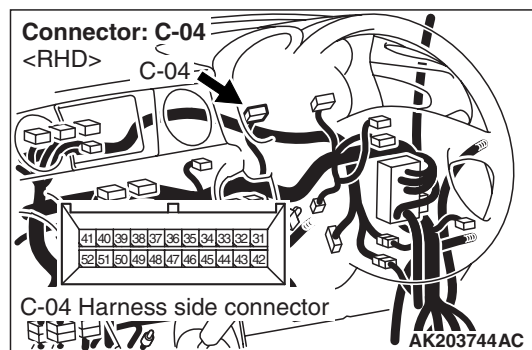
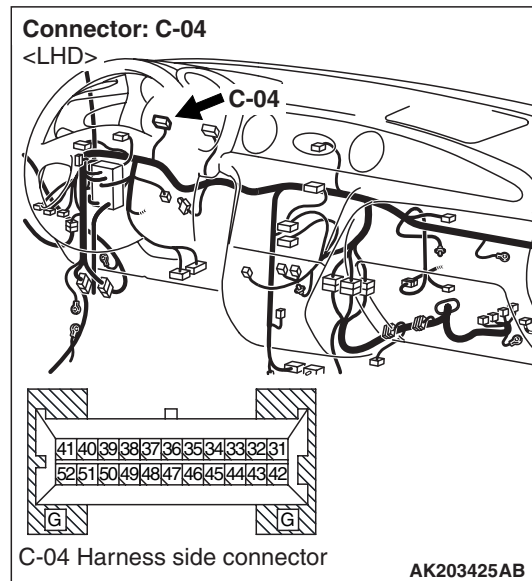
**STEP 2: Check engine warning lamp for burnt-out bulb.**

**Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Replace engine warning lamp.

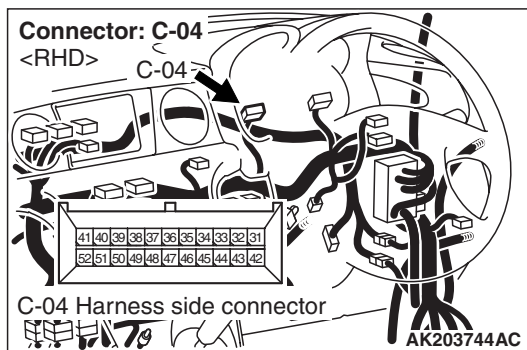
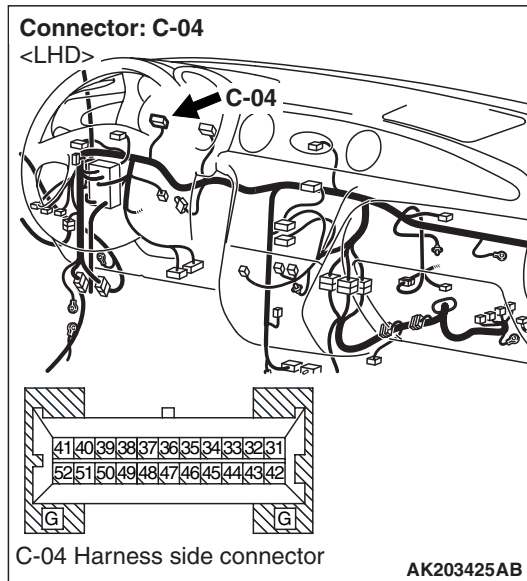
**STEP 3: Connector check: C-04 combination meter connector**



**Q: Is the check result normal?**

**YES :** Go to Step 4 .

**NO :** Repair.

**STEP 4: Perform voltage measurement at C-04 combination meter connector.**

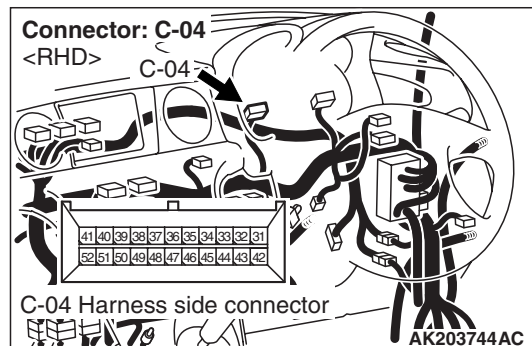
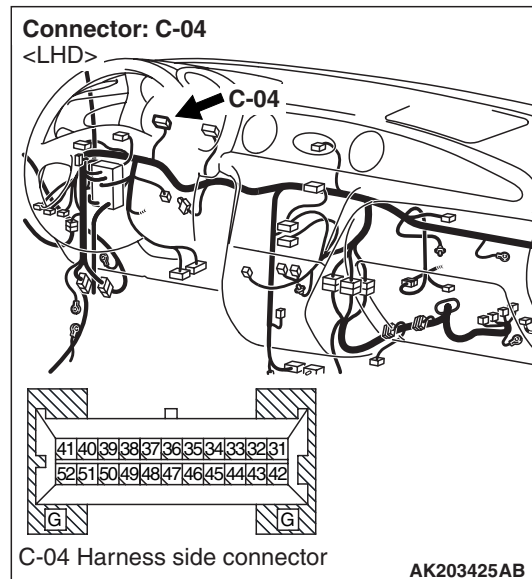
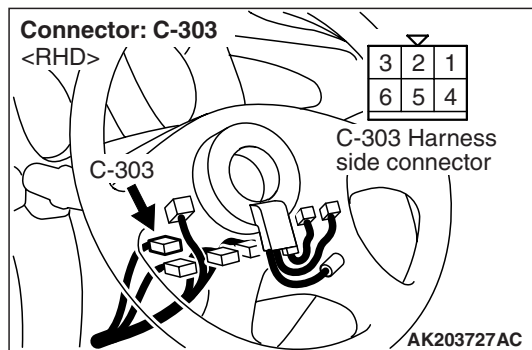
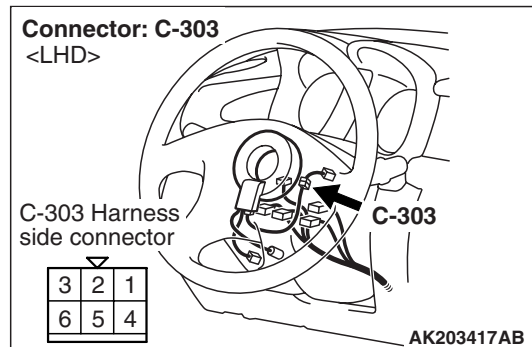
- Disconnect connector, and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal No. 42 and earth.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Go to Step 5 .

**STEP 5: Connector check: C-303 ignition switch connector**

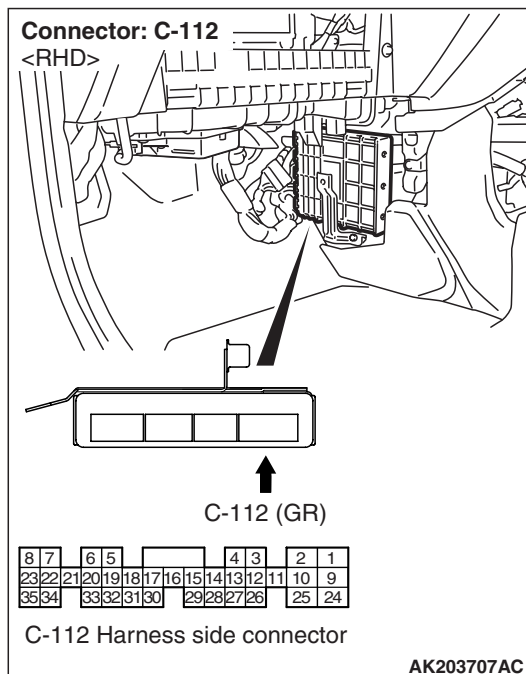
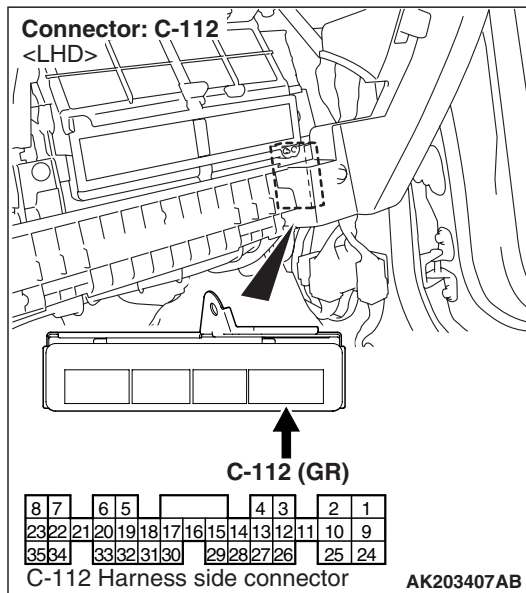
**Q: Is the check result normal?**

**YES :** Check intermediate connectors C-203 and C-205, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-04 (terminal No. 42) combination meter connector and C-303 (terminal No. 2) ignition switch connector.

- Check power supply line for open/short circuit.

**NO :** Repair.

**STEP 6: Connector check: C-112 engine-A/T-ECU connector**

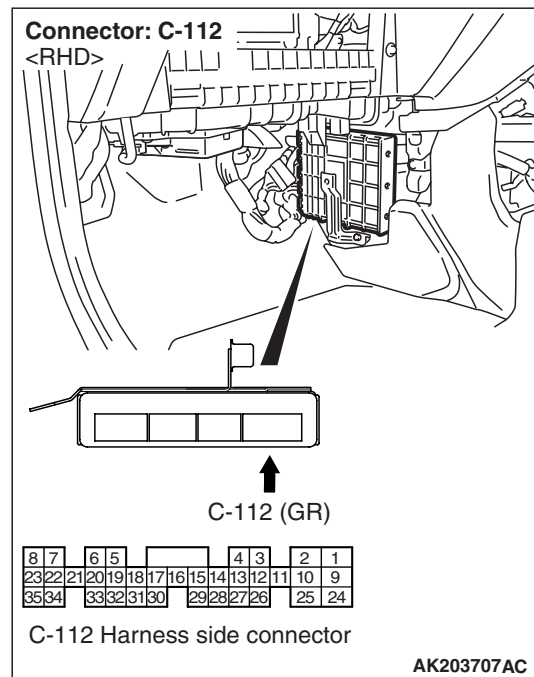
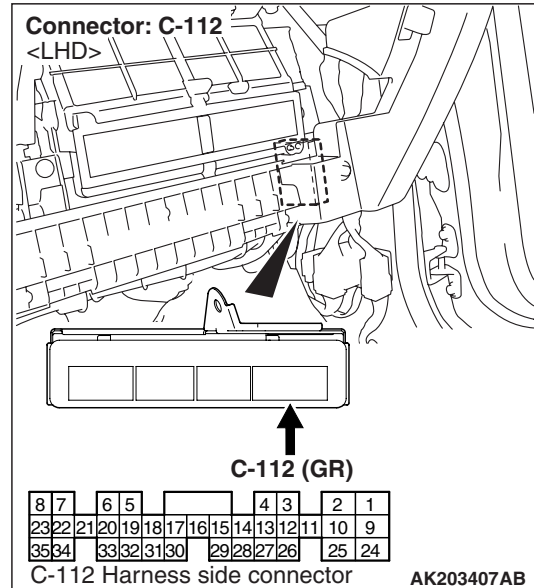


**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

**STEP 7: Perform voltage measurement at C-112 engine-A/T-ECU connector.**



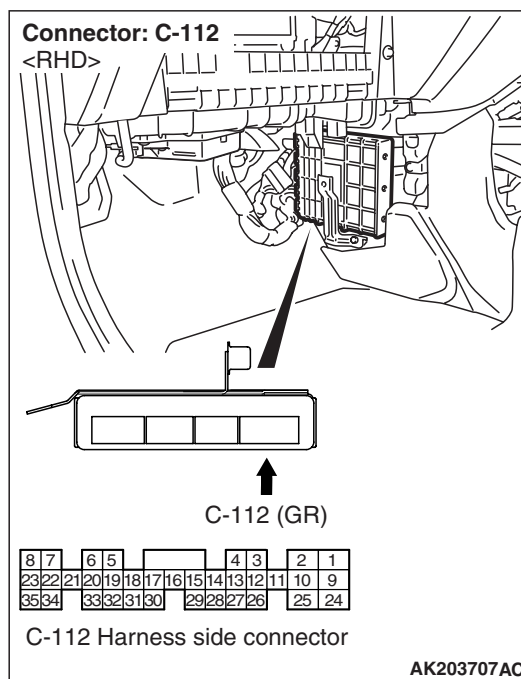
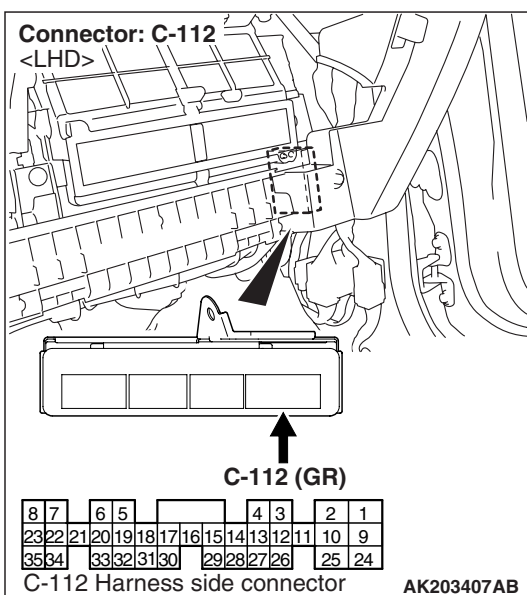
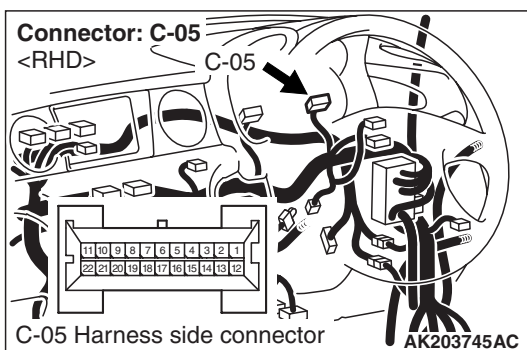
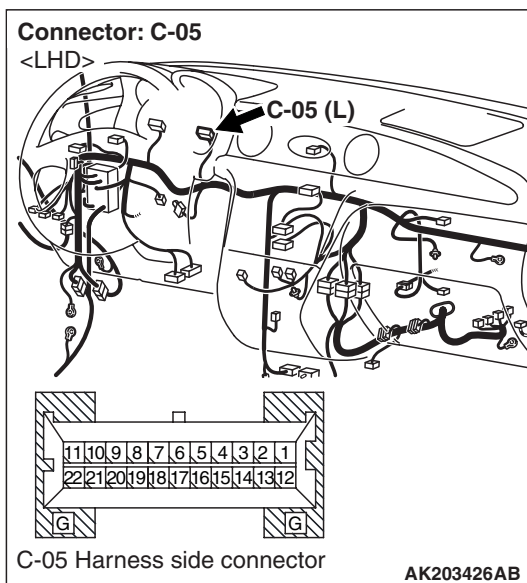
- Disconnect connector, and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal No. 22 and earth.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Go to Step 8 .

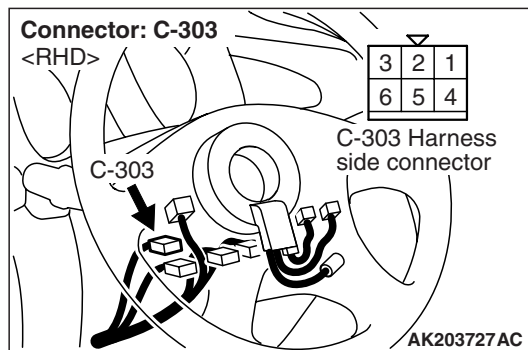
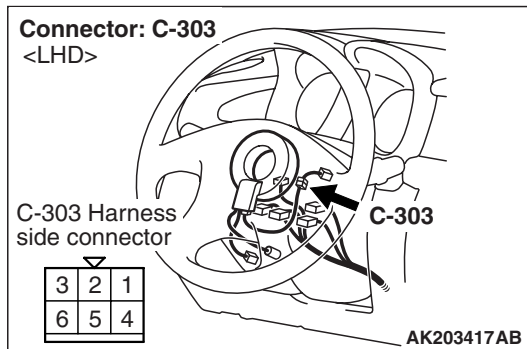
**STEP 8: Connector check: C-05 combination meter connector****Q: Is the check result normal?**

**YES :** Check intermediate connector C-105, and repair if necessary. If intermediate connector is normal, check and repair harness between C-105 (terminal No. 14) combination meter connector and C-112 (terminal No. 22) engine-A/T-ECU connector.

- Check output line for open/short circuit.

**NO :** Repair.

**STEP 9: Connector check: C-303 ignition switch connector**



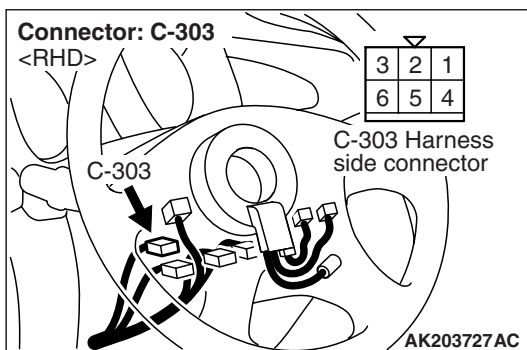
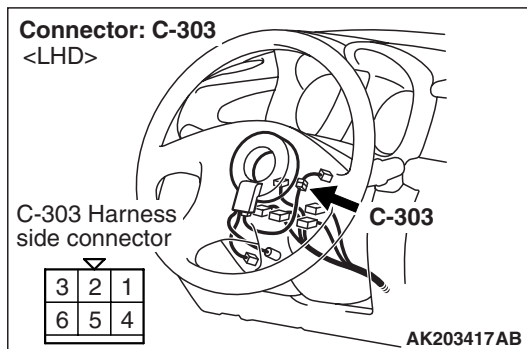
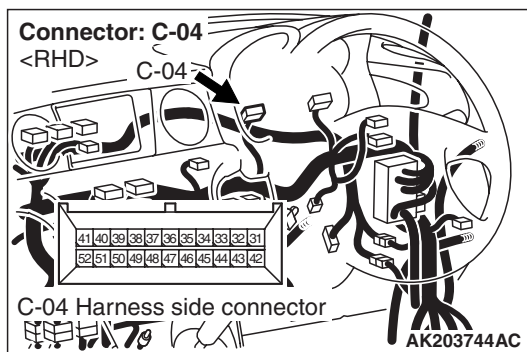
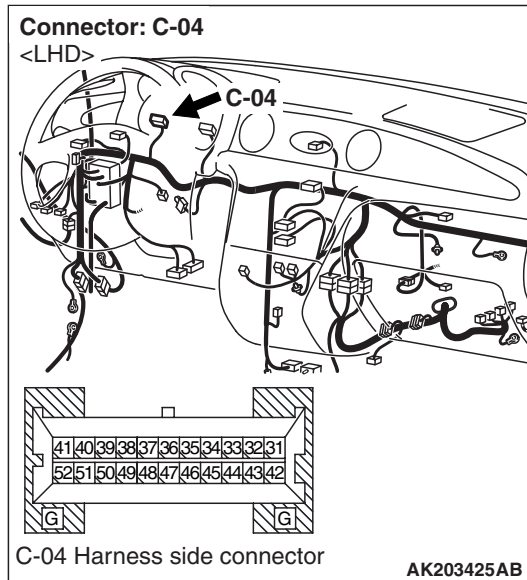
**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** . Repair.



**STEP 10: Check harness between C-04 (terminal No. 42) combination connector and C-303 (terminal No. 2) ignition switch connector.**



connectors C-203 and C-205, and repair if necessary.

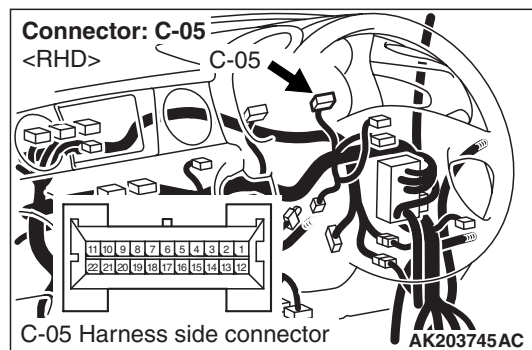
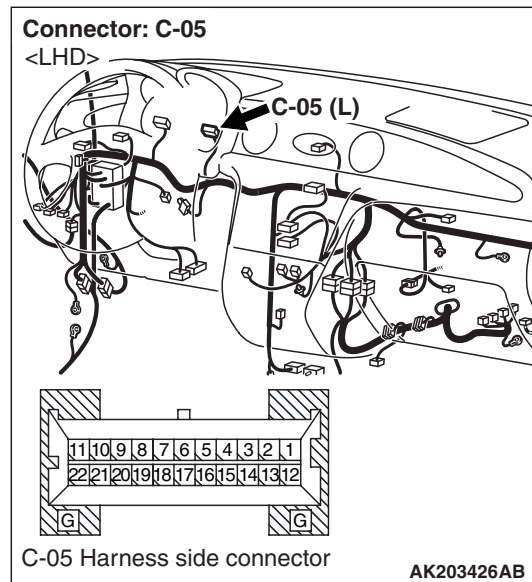
- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Repair.

**STEP 11: Connector check: C-05 combination meter connector**



**Q: Is the check result normal?**

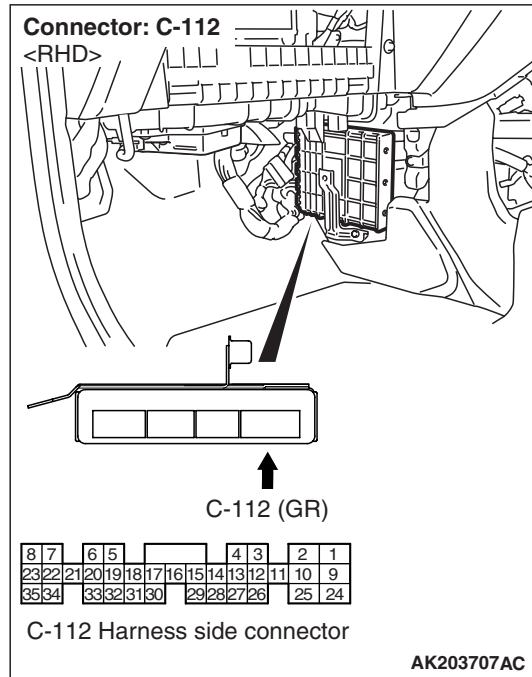
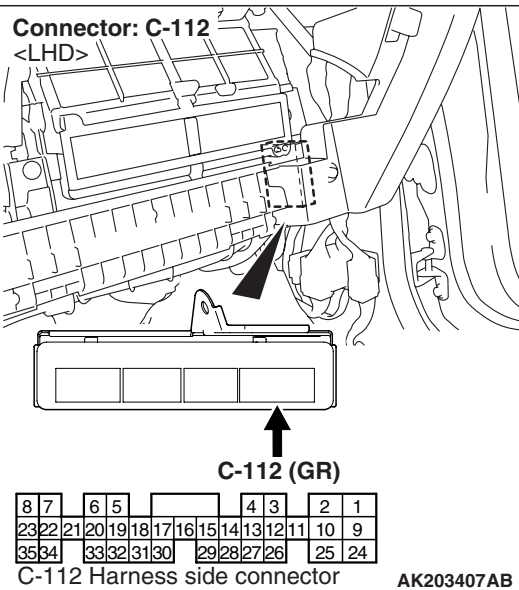
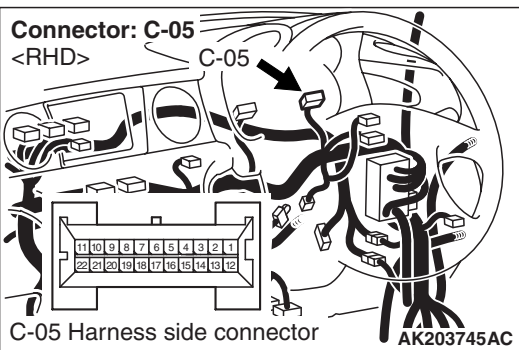
**YES :** Go to Step 12 .

**NO :** Repair.

**NOTE:** Before checking harness, check intermediate

**Connector: C-05**  
**<LHD>**

The diagram shows the vehicle interior with the location of connector C-05 (L) indicated by an arrow. Below the main diagram is a detailed view of the connector pinout, showing two rows of pins labeled 1 through 22. The pins are arranged in a rectangular block with a central gap. The top row is labeled 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 from left to right. The bottom row is labeled 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12 from left to right. The connector is shown in a cross-section view with a central gap and two side sections labeled G.



**NO : Repair.**

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

**Inspection Procedure 4: The Engine Warning Lamp Remains Illuminating and Never goes out.****OPERATION**

- Battery voltage is applied to engine warning lamp (terminal No. 42) from ignition switch.
- Engine-A/T-ECU (terminal No. 22) makes power transistor in unit be in "ON" position, and that makes currents go on engine warning lamp (terminal No. 14).

**COMMENT ON TROUBLE SYMPTOM**

- Engine-A/T-ECU has detected failed sensor or failed actuator. Or failure is possibly caused by short circuit or other faults.

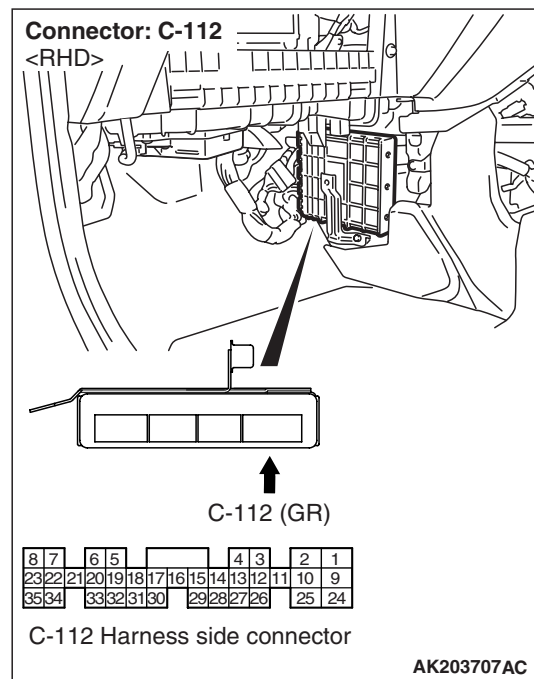
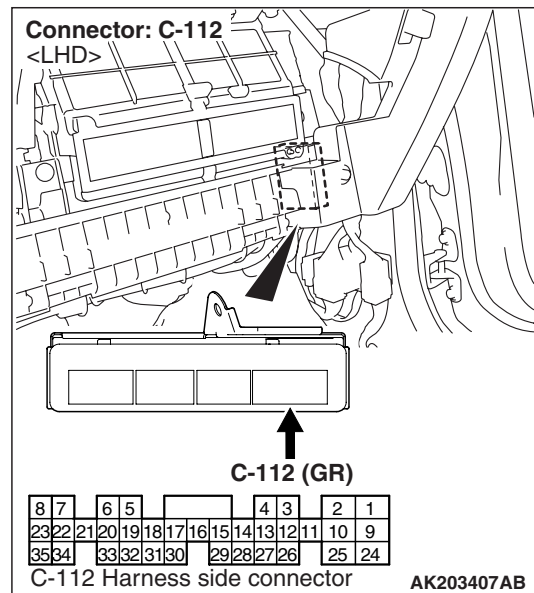
**PROBABLE CAUSE**

- Short circuit in between engine warning lamp and engine-A/T-ECU circuit
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE****STEP 1: M.U.T.-II/III diagnosis code****Q: Diagnosis code set?**

**YES** : Inspection chart for diagnosis code (Refer to [P.13A-11](#)).

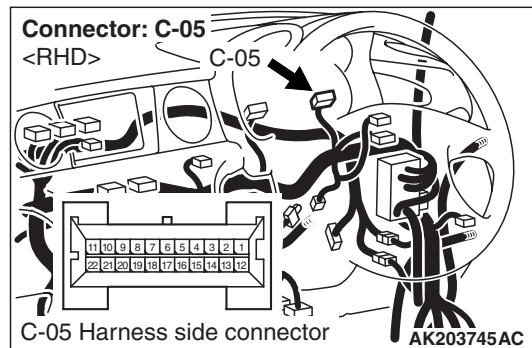
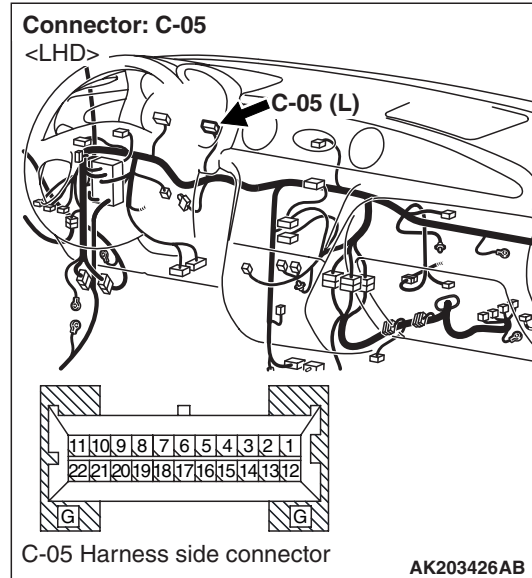
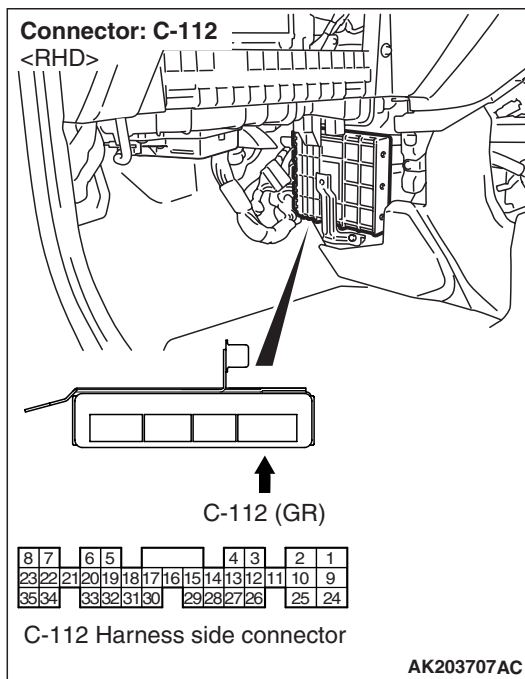
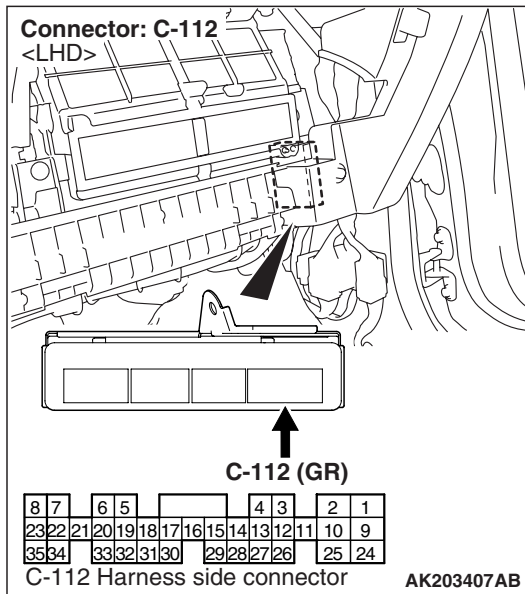
**NO** : Go to Step 2 .

**STEP 2: Connector check: C-112 engine-A/T-ECU connector****Q: Is the check result normal?**

**YES** : Go to Step 3 .

**NO** : Repair.

**STEP 3: Perform voltage measurement at C-112 engine-A/T-ECU connector.**



- Disconnect connector, and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal No. 22 and earth.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 4.

**NO :** Check intermediate connector C-105, and repair if necessary. If intermediate connector is normal, check and repair harness between C-05 (terminal No. 14) combination meter connector and C-112 (terminal No. 22) engine-A/T-ECU connector.

- Check output line for short circuit.

**STEP 4: Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace engine-A/T-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

**Inspection Procedure 5: Starting Impossible (No initial combustion)****COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by failed starter itself or failed related circuit.

**PROBABLE CAUSE**

- Failed battery
- Failed starter motor
- Open/short circuit in starter associated circuit or loose connector contact
- Failed inhibitor switch

**DIAGNOSIS PROCEDURE****STEP 1: Check battery voltage.**

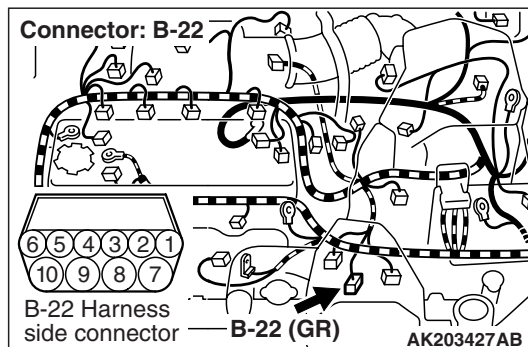
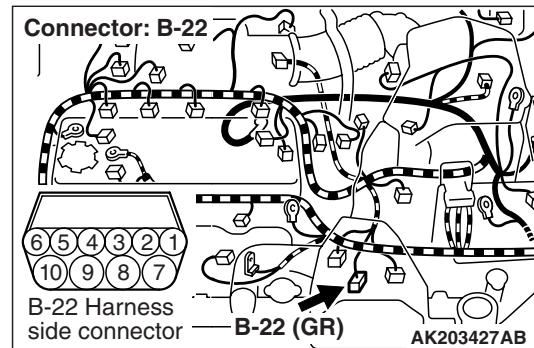
- Measure battery voltage at cranking.

**OK: 8 V or higher****Q: Is the check result normal?****YES :** Go to Step 2 .

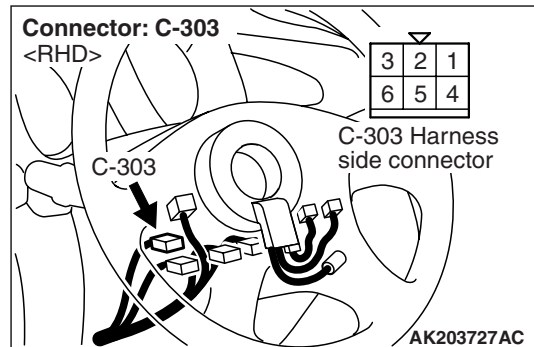
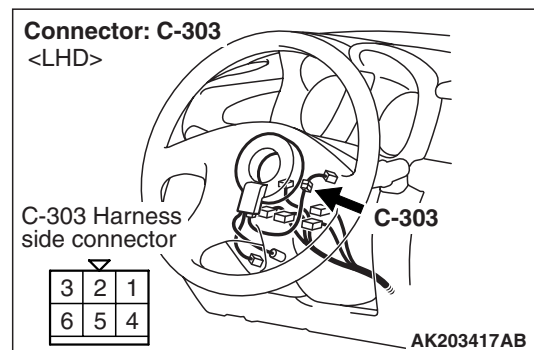
**NO :** Check battery (Refer to GROUP 54A  
–Battery – On-vehicle Service – Battery Test  
[P.54A-6](#)).

**STEP 2: M.U.T.-II/III data list**

- Item 18: Cranking signal

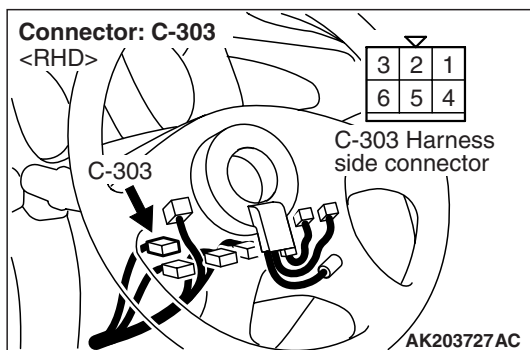
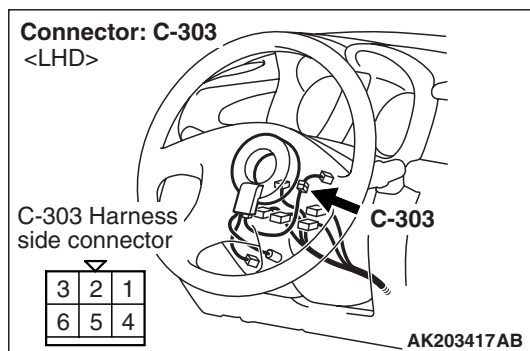
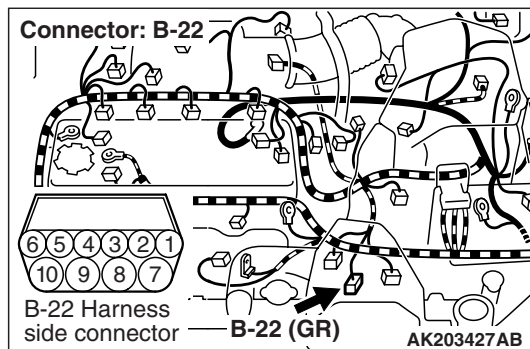
**OK:****ON (Ignition switch: ST)****OFF (Ignition switch: ON)****Q: Is the check result normal?****YES :** Go to Step 12 .**NO :** Go to Step 3 .**STEP 3: Connector check: B-22 inhibitor switch connector****Q: Is the check result normal?****YES :** Go to Step 4 .**NO :** Repair.**STEP 4: Perform voltage measurement at B-22 inhibitor switch connector.**

- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 10 and earth.

**OK: System voltage****Q: Is the check result normal?****YES :** Go to Step 7 .**NO :** Go to Step 5 .**STEP 5: Connector check: C-303 ignition switch connector****Q: Is the check result normal?****YES :** Go to Step 6 .**NO :** Repair.



**STEP 6: Check ignition switch.**



- Check ignition switch (Refer to GROUP 54A – Ignition Switch – Ignition Switch [P.54A-23](#)).

**Q: Is the check result normal?**

**YES :** Check intermediate connector C-106, and repair if necessary. If intermediate connector is normal, check and repair harness between B-22 (terminal No. 10) inhibitor switch connector and C-303 (terminal No. 5) ignition switch connector.

- Check power supply line for open/short circuit.

**NO :** Replace ignition switch.

**STEP 7: Check inhibitor switch.**

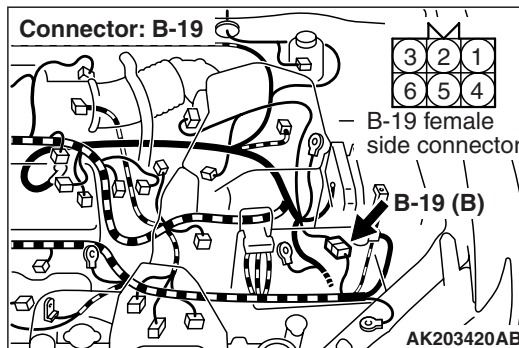
- Check inhibitor switch (Refer to GROUP 23A – On-vehicle Service – Essential Service [P.23A-112](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** . Replace inhibitor switch.

**STEP 8: Connector check: B-19 intermediate connector.**

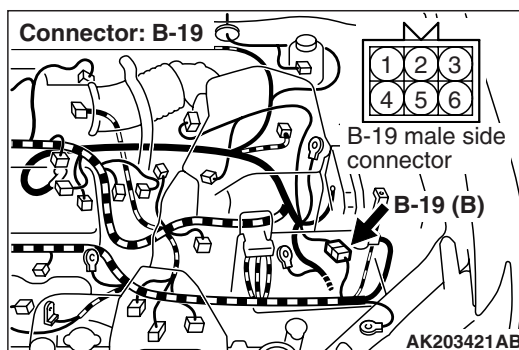
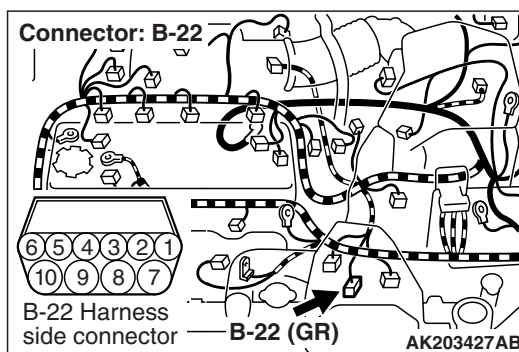


**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair

**STEP 9: Check harness between B-22 (terminal No. 9) inhibitor switch connector and B-19 (terminal No. 3) intermediate connector.**



- Check output line for open/short circuit.

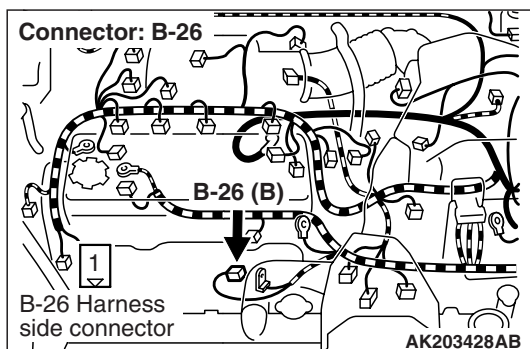
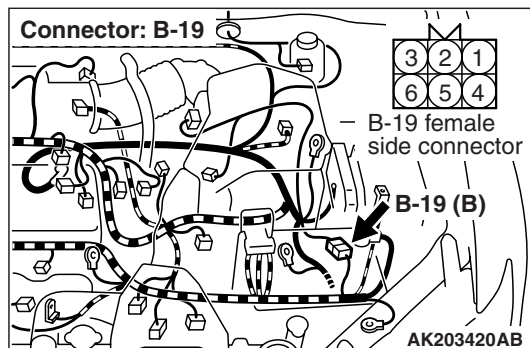
**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Repair.



**STEP 10: Check harness between B-19 (terminal No. 3) intermediate connector and B-26 (terminal No. 1) starter connector.**



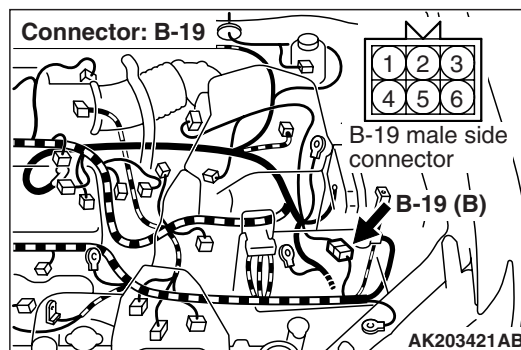
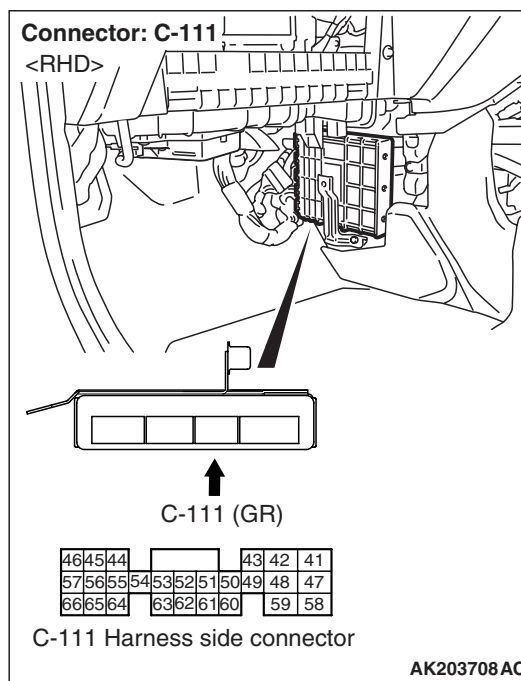
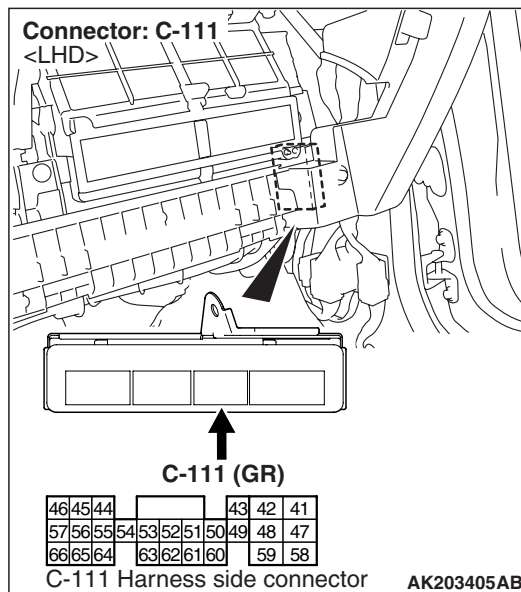
- Check output line for open/short circuit.

**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Repair.

**STEP 11: Connector check: C-111 engine-A/T-ECU connector**



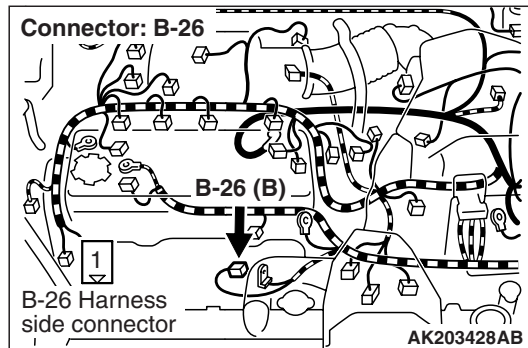
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-19 (terminal No. 3) intermediate connector and C-111 (terminal No. 58) engine-A/T-ECU connector.

- Check output line for open/short circuit.

**NO :** Repair.

**STEP 12: Connector check: B-26 starter connector**

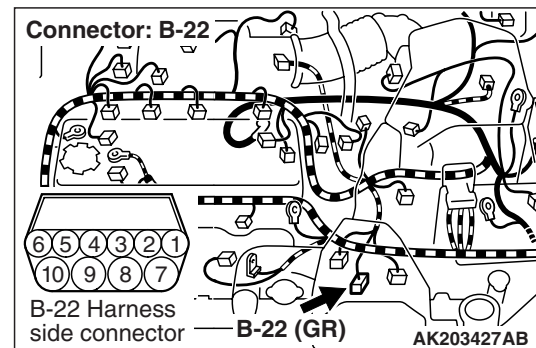
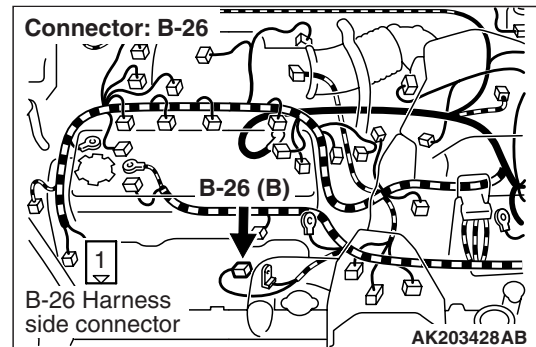


**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO :** Repair.

**STEP 13: Perform voltage measurement at B-26 starter connector.**



- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 1 and earth.

**OK:**

**System voltage (Selector lever position: P or N)**

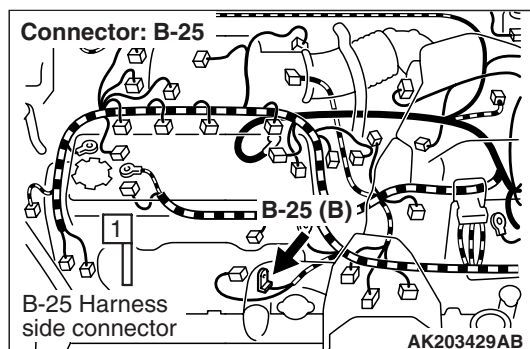
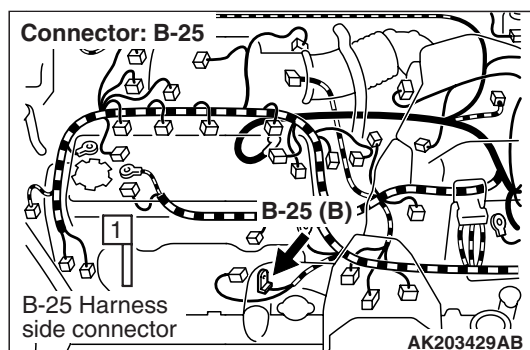
**1 V or less (Selector lever position: Other than P or N)**

**Q: Is the check result normal?**

**YES :** Go to Step 14 .

**NO :** Check intermediate connector B-19, and repair if necessary. If intermediate connector is normal, check and repair harness between B-22 (terminal No. 9) inhibitor switch connector and B-26 (terminal No. 1) starter connector.

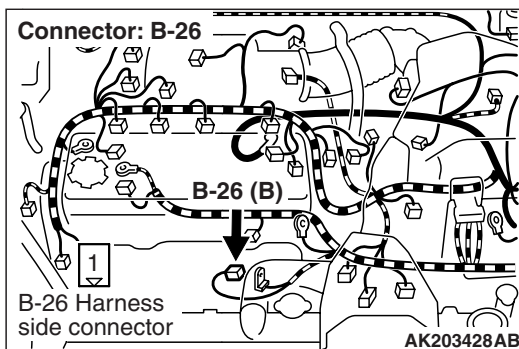
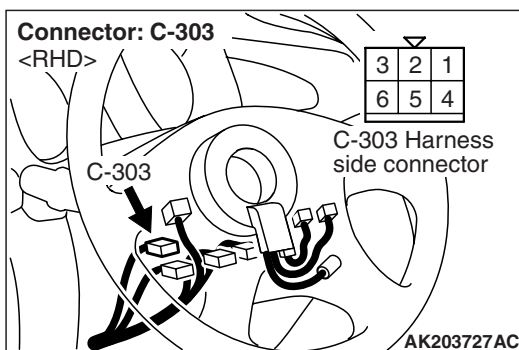
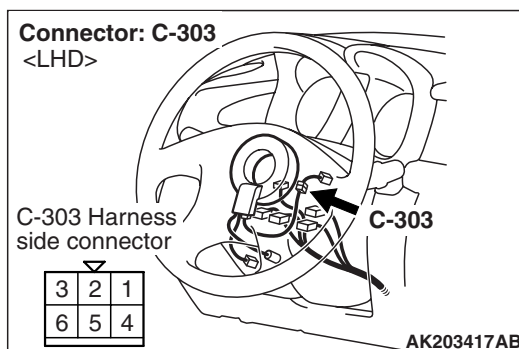
- Check output line for open/short circuit.

**STEP 14: Connector check: B-25 starter connector****Q: Is the check result normal?****YES :** Go to Step 15 .**NO :** Repair.**STEP 15: Perform voltage measurement at B-25 starter connector.**

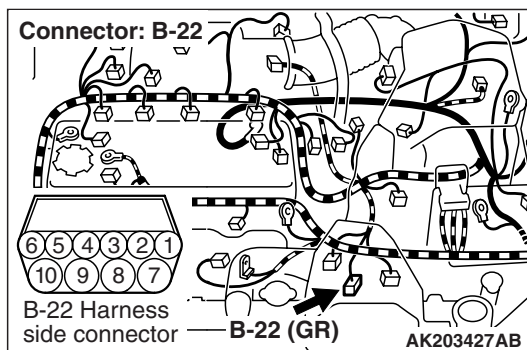
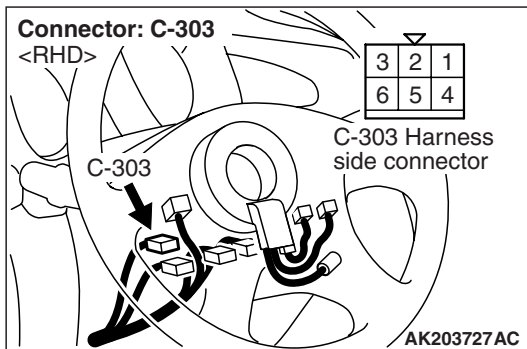
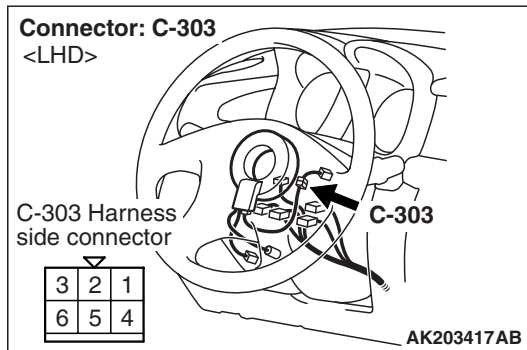
- Disconnect connector, and measure at the harness side.
- Voltage between terminal No. 1 and earth.

**OK: System voltage****Q: Is the check result normal?****YES :** Go to Step 16 .**NO :** Check and repair harness between B-25 (terminal No. 1) starter connector and battery.

- Check power supply line for open/short circuit.

**STEP 16: Connector check: C-303 ignition switch connector, B-26 starter connector****Q: Is the check result normal?****YES :** Go to Step 17 .**NO :** Repair.

**STEP 17: Check harness between C-303 (terminal No. 5) ignition switch connector and B-22 (terminal No. 10) inhibitor switch connector**



**NOTE:** Before checking harness, check intermediate connector C-106, and repair if necessary.

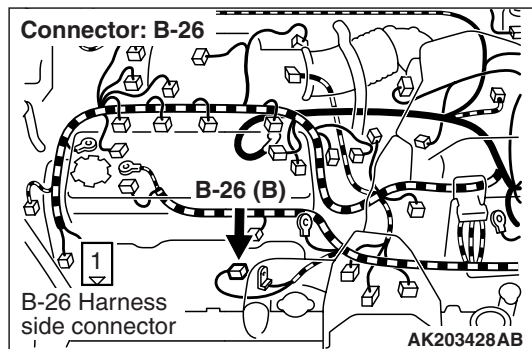
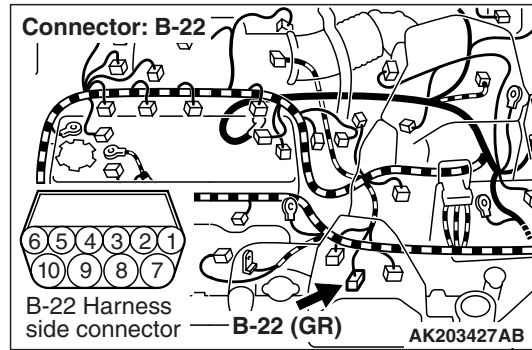
- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 18 .

**NO :** Repair

**STEP 18: Check harness between B-22 (terminal No. 9) inhibitor switch connector and B-26 (terminal No. 1) starter connector.**



**NOTE:** Before checking harness, check intermediate connector B-19, and repair if necessary.

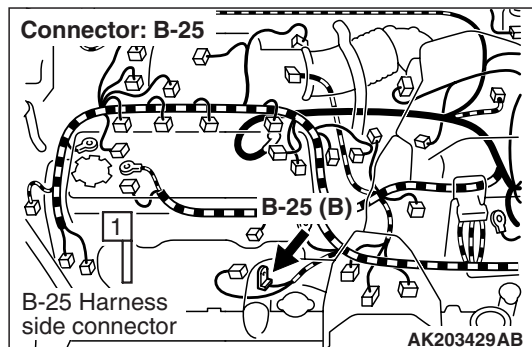
- Check output line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 19 .

**NO :** Repair

**STEP 19: Check harness between B-25 (terminal No. 1) starter connector and battery.**



- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Replace starter.

**NO :** Repair.

---

**Inspection Procedure 6: Starting Impossible (Starter Operative but No Initial Combustion)**

---

**COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by failed ignition circuit, failed fuel feed or other faults.

**PROBABLE CAUSE**

- Failed battery
- Timing belt broken
- Failed idle speed control system
- Throttle valve fouled around
- Failed ignition system
- Failed fuel system
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

---

**STEP 1: Check battery voltage.**

- Measure battery voltage at cranking.

**OK: 8 V or higher**

**Q: Is the check result normal?**

**YES :** Go to STEP 2 .

**NO :** Check battery (Refer to GROUP 54A – Battery – On-vehicle Service – Battery Test [P.54A-6](#)).

---

**STEP 2: Check engine warning lamp for burnt out bulb**

**Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Check engine-A/T-ECU power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 23 [P.13A-176](#)).

---

**STEP 3: M.U.T.-II/III diagnosis code**

**Q: Diagnosis code set?**

**YES :** Inspection chart for diagnosis codes (Refer to [P.13A-11](#)).

**NO :** Go to Step 4 .

---

**STEP 4: M.U.T.-II/III actuator test**

- Item 07: Fuel pump

**OK: Operating sound of fuel pump can be heard.**

**Q: Is the check result normal?**

**YES :** Go to Step 5 .

**NO :** Check fuel pump system (Refer to Inspection Procedure 24 [P.13A-188](#)).

---

**STEP 5. Check timing belt for breakage.**

- Engine: Cranking

**OK: Camshaft rotates.**

**Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Replace timing belt.

---

**STEP 6. Check the engine startability.**

- With depressing the accelerator pedal slightly, and start the engine.

**Q: Is the start ability good?**

**YES :** Go to Step 7 .

**NO :** Go to Step 8 .

---

**STEP 7: Check idling speed control for operating sound.**

- Check idle speed control servo for operating sound (Refer to [P.13A-290](#)).

**Q: Is the check result normal?**

**YES :** Clean throttle body (throttle valve portion) (Refer to [P.13A-280](#)).

**NO :** Check idle speed control servo system (Refer to Inspection Procedure 30 [P.13A-227](#)).

---

**STEP 8: M.U.T.-II/III data list**

- Item 18: Cranking signal

**OK:**

**ON (Ignition switch: ST)**

**OFF (Ignition switch: ON)**

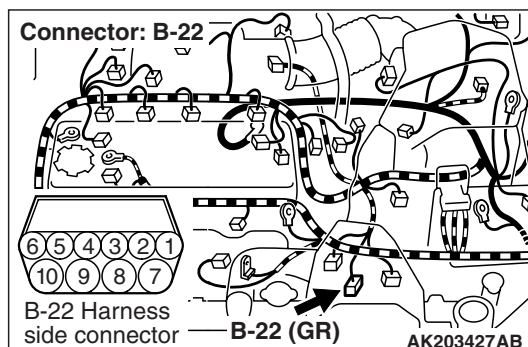
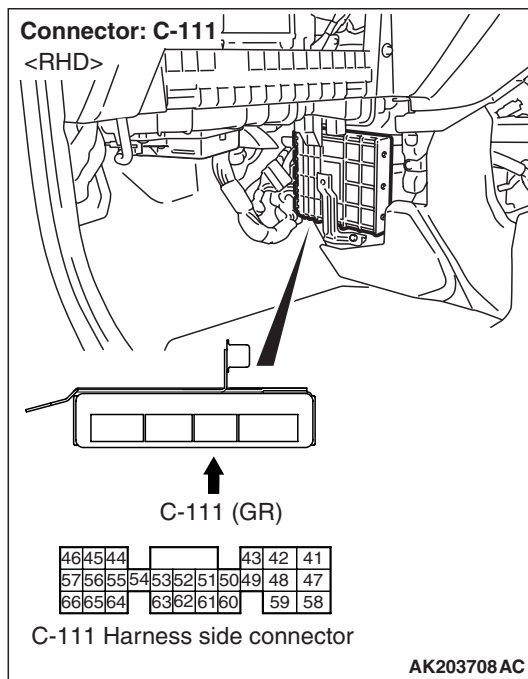
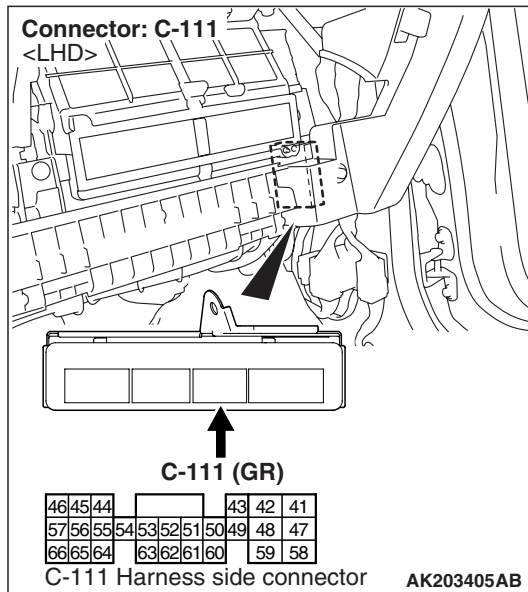
**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Go to Step 9 .



**STEP 9: Connector check: C-111 engine-A/T-ECU connector**



**Q: Is the check result normal?**

**YES :** Check intermediate connector B-19, and repair if necessary. If intermediate connector is normal, check and repair harness between B-22 (terminal No. 9) inhibitor switch connector and C-111 (terminal No. 58) engine-A/T-ECU connector.

- Check output line for open/short circuit.

**NO :** Repair.

**STEP 10: M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-260](#).  
a. Item 22: Crank angle sensor

**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Check crank angle sensor system (Refer to Code No. 22 [P.13A-175](#)).

**STEP 11: Check injector for operating sound.**

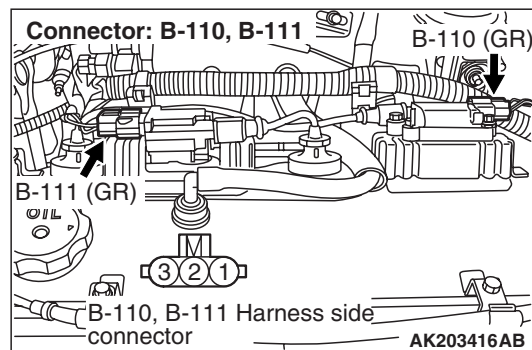
- Check injector for operating sound (Refer to [P.13A-289](#)).

**Q: Can operating sound be heard?**

**YES :** Go to Step 12 .

**NO :** Check the injector system of the defective cylinder  
(Refer to Code No. 41: injector system [P.13A-86](#)).

**STEP 12: Connector check: B-110 and B-111 ignition coil connectors**



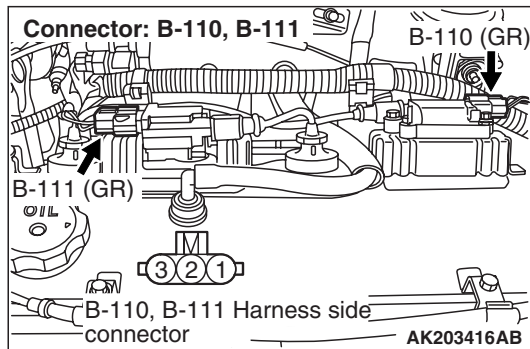
**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO :** Repair.



**STEP 13: Perform voltage measurement at each of B-110 and B-111 ignition coil connectors.**



- Disconnect connector, and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

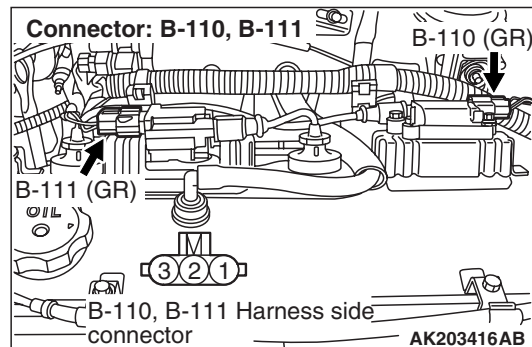
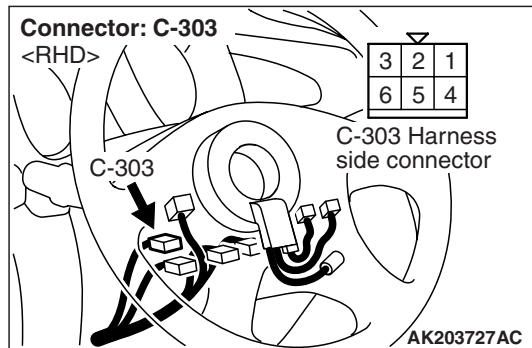
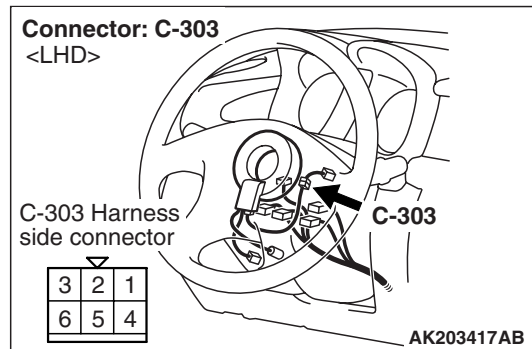
**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 15 .

**NO :** Go to Step 14 .

**STEP 14: Connector check: C-303 ignition switch connector**



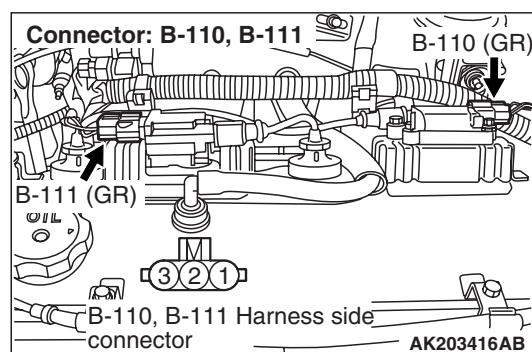
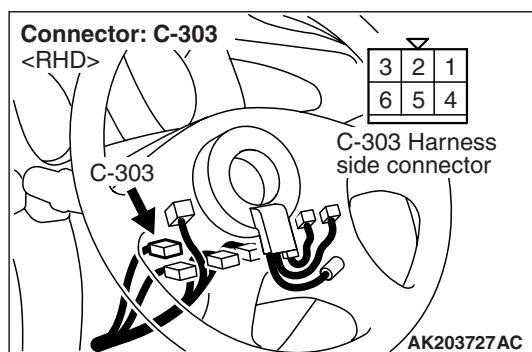
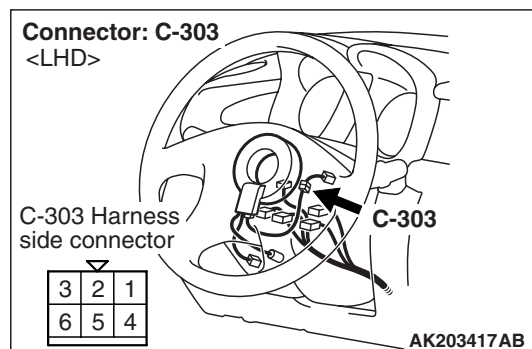
**Q: Is the check result normal?**

**YES :** Check intermediate connectors A-14 <LHD>, C-116 <LHD>, C-126 <RHD>, C-203 and C-205, and repair if necessary. Check and repair harness between C-303 (terminal No. 2) ignition switch connector and terminal No. 1 of affected cylinder's ignition coil connector.

- Check power supply line for open/short circuit.

**NO :** Repair.

**STEP 15: Check ignition coil spark.**



**STEP 16: Replace engine-A/T-ECU.**

- After replacing the engine-A/T-ECU, re-check the trouble symptoms.

**Q: Does trouble symptom persist?**

**YES :** Check for foreign matters (water, kerosene, etc.) in fuel and replace if necessary.

**NO :** Check end.

**Q: Is the check result normal?**

**YES :** Go to Step 16 .

**NO :** Check intermediate connectors A-14 <LHD>, C-116 <LHD>, C-126 <RHD>, C-203 and C-205, and repair if necessary. Check and repair harness between C-303 (terminal No. 2) ignition switch connector and terminal No. 1 of affected cylinder's ignition coil connector.

- Check power supply line for damage.

---

**Inspection Procedure 7: Starting Impossible (Initial Combustion but no Complete Combustion) or Starting Impossible (Long Time to Start)**

---

**COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by poor ignition, incorrect air-fuel ratio at cranking, improper fuel pressure or other faults.

**PROBABLE CAUSE**

- Failed battery
- Failed ignition system
- Failed fuel system
- Air-fuel ratio control
- Failed idle speed control system
- Failed intake system
- Failed exhaust gas cleaning system
- Throttle valve fouled around
- Timing belt not in place
- Compression pressure improper
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

---

**STEP 1: Check battery condition.**

**Q: Have the battery terminal been disconnected?**

**YES :** After warm-up engine, idle for about 10 minutes.

**NO :** Go to Step 2 .

---

**STEP 2: Check battery voltage.**

- Measure battery voltage at cranking.

**OK: 8 V or higher**

**Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Check battery (Refer to GROUP 54A – Battery – On-vehicle Service – Battery Test [P.54A-6](#)).

---

**STEP 3: M.U.T.-II/III diagnosis code**

**Q: Diagnosis code set?**

**YES :** Inspection chart for diagnosis codes (Refer to [P.13A-11](#)).

**NO :** Go to Step 4 .

---

**STEP 4: M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-260](#).
  - a. Item 13: Intake air temperature sensor
  - b. Item 21: Engine coolant temperature sensor
  - c. Item 25: Barometric pressure sensor

**Q: Are the check results normal?**

**YES :** Go to Step 5 .

**NO :** Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Codes [P.13A-11](#)).

---

**STEP 5: Check startability.**

- With depressing the accelerator pedal slightly, and start the engine.

**Q: Is the start ability good?**

**YES :** Go to Step 6 .

**NO :** Go to Step 7 .

---

**STEP 6: Check idle speed control servo for operating sound.**

- Check idle speed control servo for operating sound (Refer to [P.13A-290](#)).

**Q: Is the check result normal?**

**YES :** Clean throttle body (throttle valve portion) (Refer to [P.13A-280](#)).

**NO :** Check idle speed control servo system (Refer to Inspection Procedure 30 [P.13A-227](#)).

---

**STEP 7: M.U.T.-II/III actuator test**

- Item 07: Fuel pump

**OK: Operating sound of fuel pump can be heard.**

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Check fuel pump system (Refer to Inspection Procedure 24 [P.13A-188](#)).

---

**STEP 8: Check air intake from intake hose and intake manifold.**

**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 9: Check injector for operating sound.**

- Check injector for operating sound at engine cranking (Refer to P.13A-289).

**Q: Can operating sound be heard?**

**YES :** Go to Step 10 .

**NO :** Check the injector system of the defective cylinder  
(Refer to Code No. 41 P.13A-86).

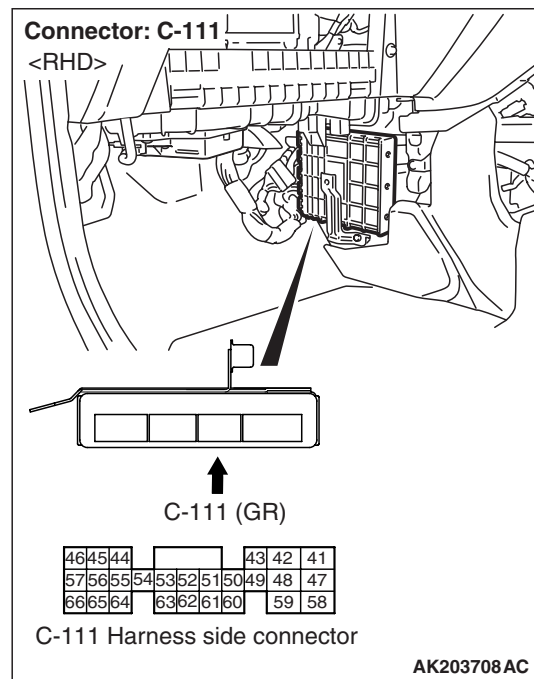
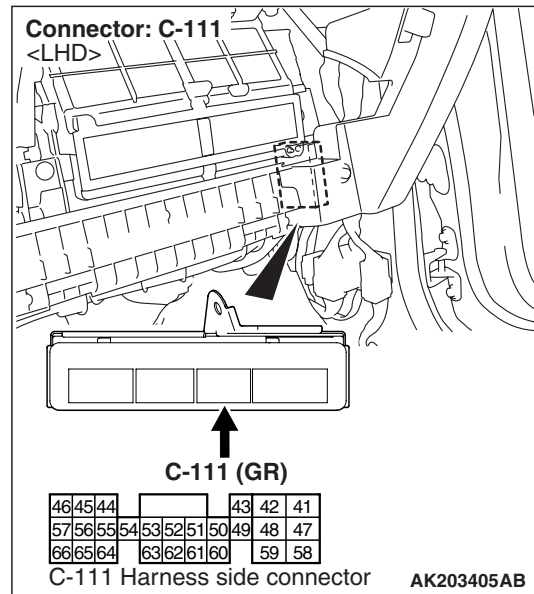
**STEP 10. Check timing marks of timing belt.**

**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Align timing marks.

**STEP 11: Perform voltage measurement at C-111 engine-A/T-ECU connector.**



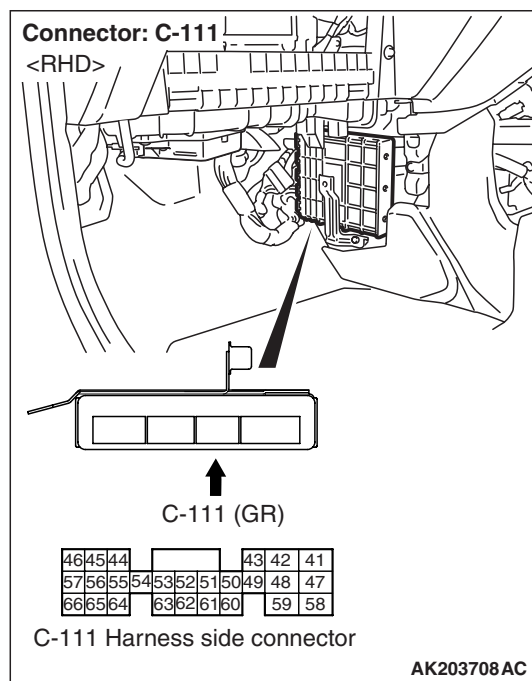
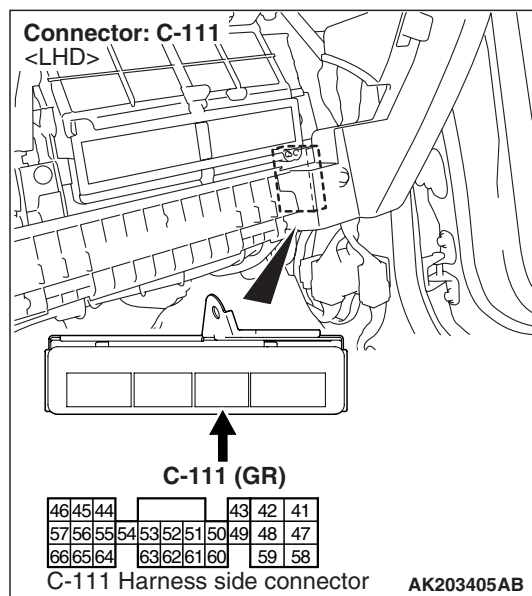
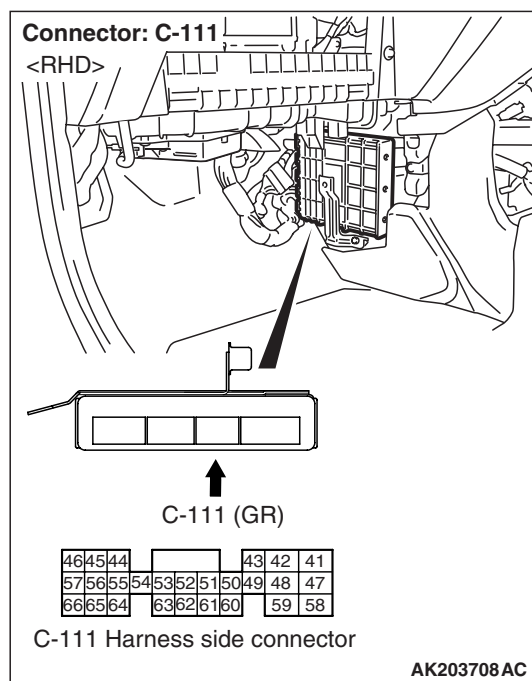
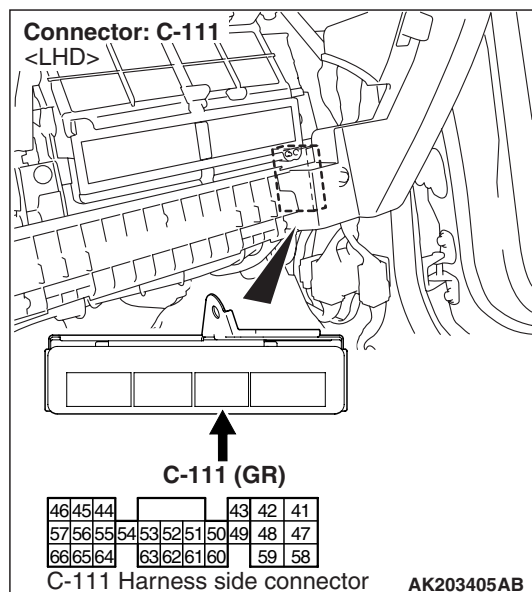
- Measure engine-A/T-ECU terminal voltage.
- Voltage between terminal No. 66 and earth.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 15 .

**NO :** Go to Step 12 .

**STEP 12: Connector check: C-111  
engine-A/T-ECU connector****Q: Is the check result normal?****YES :** Go to Step 13 .**NO :** Repair.**STEP 13: Check harness between battery and  
C-111 (terminal No. 66) engine-A/T-ECU  
connector.****NOTE:** Before checking harness, check the following  
intermediate connector, and repair them if necessary.

- a. A-14 <RHD>, C-02 <LHD>, C-106, C-116  
<LHD>, C-125 <RHD>, C-202 and C-204 (Except  
for Chile)
- Check power supply line for open/short circuit  
and damage.

**Q: Is the check result normal?****YES :** Go to Step 14 .**NO :** Repair.

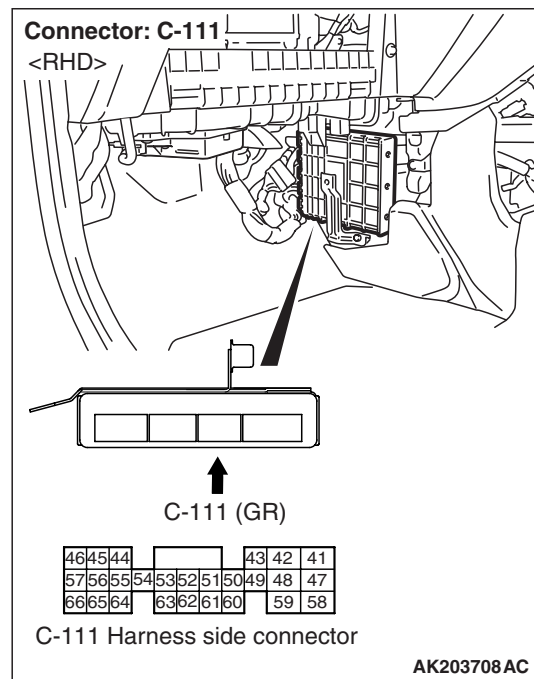
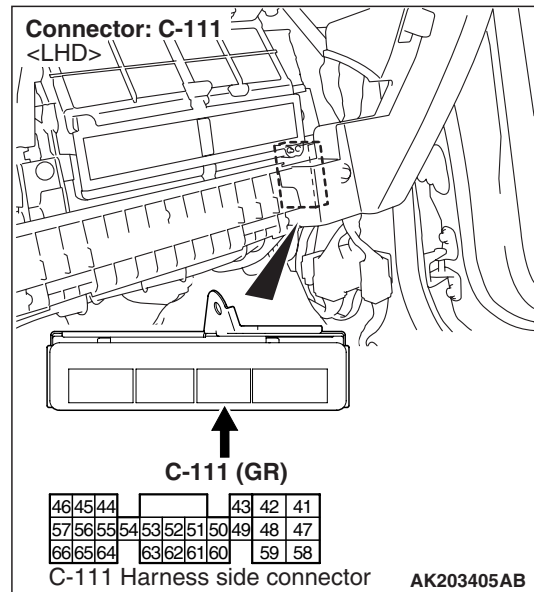
**STEP 14: Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace engine-A/T-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

**STEP 15: Perform voltage measurement at C-111 engine-A/T-ECU connector.**



- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 42 and earth, also between terminal No. 48 and earth.

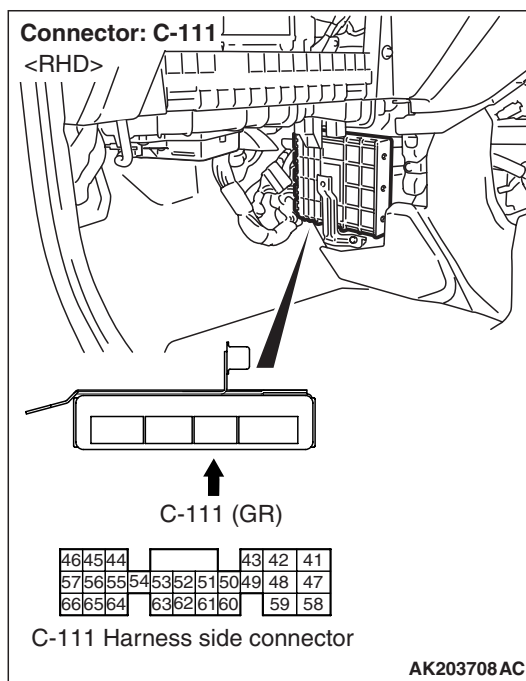
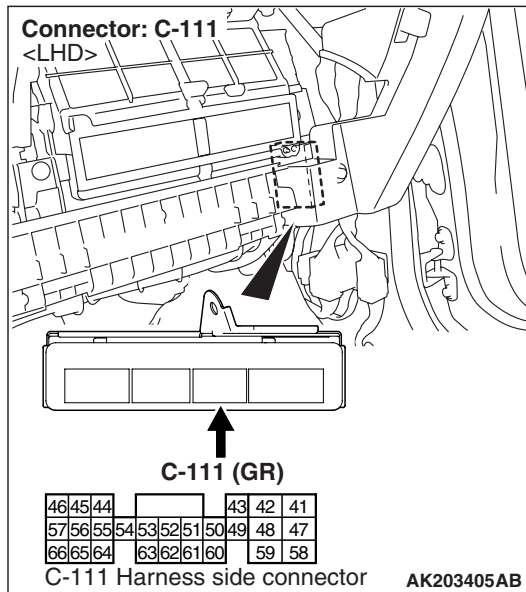
**OK: 0.5 V or less**

**Q: Is the check result normal?**

**YES :** Go to Step 17 .

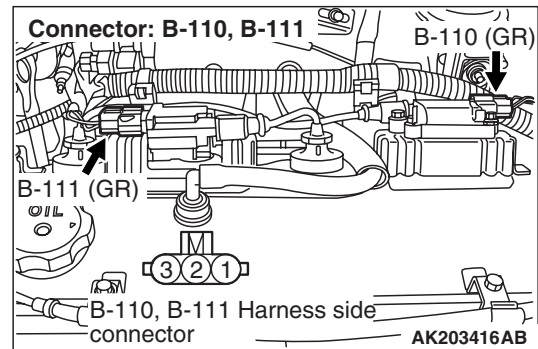
**NO :** Go to Step 16 .



**STEP 16: Connector check: C-111  
engine-A/T-ECU connector****Q: Is the check result normal?**

**YES :** Check and repair harness between C-111 (terminal No. 42) engine-A/T-ECU connector and body earth, also between C-111 (terminal No. 48) engine-A/T-ECU connector and body earth.

- Check earthing line for open circuit and damage.

**NO :** Repair.**STEP 17: Connector check: B110 and B-111  
ignition coil connectors****Q: Is the check result normal?****YES :** Go to Step 18 .**NO :** Repair.**STEP 18: Check ignition coil spark.****Q: Is the check result normal?****YES :** Go to Step 23 .**NO :** Go to Step 19 .**STEP 19: Check spark plug.****Q: Is the check result normal?****YES :** Go to Step 20 .**NO :** Replace spark plug.**STEP 20: Check spark plug cable itself.**

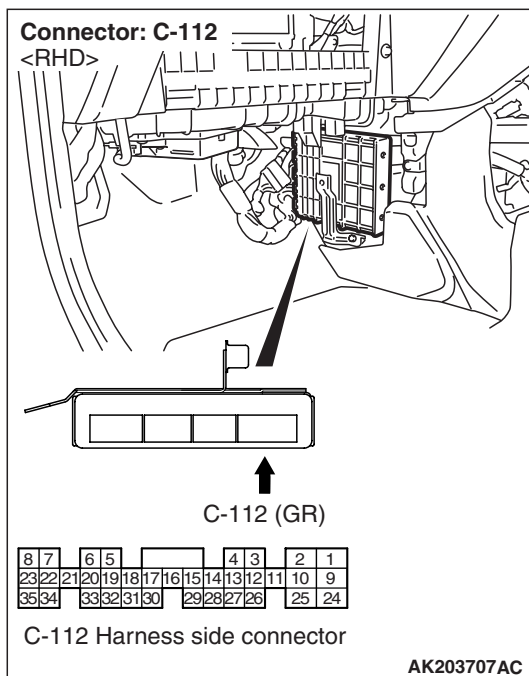
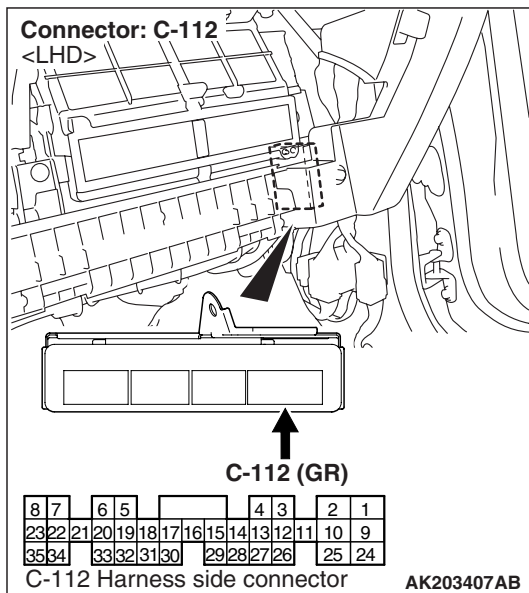
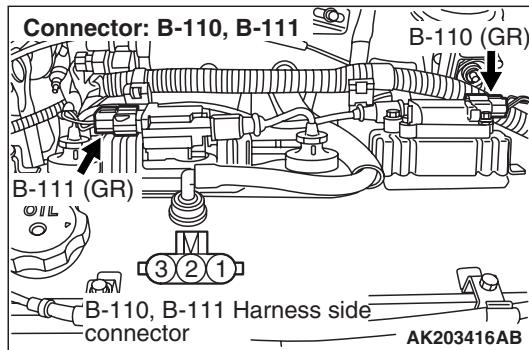
- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-36](#)).

**Q: Is the check result normal?****YES :** Go to Step 21 .**NO :** Replace spark plug cable.**STEP 21: Check ignition coil itself.**

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-35](#)).

**Q: Is the check result normal?****YES :** Go to Step 22 .**NO :** Replace ignition coil.

**STEP 22: Check harness between terminal No. 2 of each cylinder's ignition coil connector and vehicle body earth.**



- Check earthing line for open circuit and damage.

**Q: Is the check result normal?**

**YES :** Check and repair harness between terminal No. 3 of each cylinder's ignition coil connector and C-112 engine-A/T-ECU connector.

- Check signal line for open/short circuit and damage.

**NO :** Repair.

**STEP 23: Check spray condition of injector.**

- Check each injector for spray condition (Refer to [P.13A-289](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 24 .

**NO :** Replace injector.

**STEP 24: Check compression pressure.**

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service [P.11A-12](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 25 .

**NO :** Repair.

**STEP 25: Check EGR control solenoid valve itself.**

- Check EGR control solenoid valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-79](#)].

**Q: Is the check result normal?**

**YES :** Go to Step 26 .

**NO :** Replace EGR control solenoid valve.

**STEP 26: Check EGR valve itself.**

- Check EGR valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-77](#)].

**Q: Is the check result normal?**

**YES :** Go to Step 27 .

**NO :** Replace EGR valve.

**STEP 27: Replace engine-A/T-ECU**

- After replacing the engine-A/T-ECU, re-check the trouble symptoms.

**Q: Does trouble symptom persist?**

**YES :** Check for foreign matters (water, kerosene, etc.) in fuel and replace if necessary.

**NO :** Check end.

**Inspection Procedure 8: Unstable Idling (Rough Idling, Hunting), Improper Idling Speed (too High or too Low), Engine Stalls During Idling (Die Out)****COMMENT ON TROUBLE SYMPTOM**

- Probable causes can be widely found in ignition system, air-fuel ratio control system, idle speed control system, fuel system, etc. A sudden engine stall is possibly caused by poor connector contact.

**PROBABLE CAUSE**

- Failed ignition system
- Failed fuel system
- Failed air-fuel ratio control system
- Failed idle speed control system
- Failed intake/exhaust system
- Failed emission gas cleaning system
- Throttle valve body fouled
- Timing belt out of place
- Compression pressure improper
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE****STEP 1: Check battery condition.**

**Q: Has the battery terminal been disconnected?**

**YES :** After warm-up engine, idle for about 10 minutes.

**NO :** Go to Step 2 .

**STEP 2: M.U.T.-II/III diagnosis code**

**Q: Diagnosis code set?**

**YES :** Inspection chart for diagnosis code (Refer to [P.13A-11](#)).

**NO :** Go to Step 3 .

**STEP 3: M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-260](#).
  - a. Item 12: Air flow sensor
  - b. Item 13: Intake air temperature sensor
  - c. Item 14: Throttle position sensor
  - d. Item 21: Engine coolant temperature sensor
  - e. Item 25: Barometric pressure sensor

**Q: Are the check results normal?**

**YES :** Go to Step 4 .

**NO :** Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Codes [P.13A-11](#)).

**STEP 4: M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-260](#).
  - a. Item 27: Power steering fluid pressure switch

**Q: Are the check results normal?**

**YES :** Go to Step 5 .

**NO :** Check power steering fluid pressure switch system (Refer to Inspection Procedure 29 [P.13A-221](#)).

**STEP 5: Check idle speed control servo for operating sound.**

- Check idle speed control servo for operating sound (Refer to [P.13A-290](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Check idle speed control servo system (Refer to Inspection Procedure 30 [P.13A-227](#)).

**STEP 6: Check throttle body (throttle valve portion) for contamination.**

**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Clean throttle body (throttle valve portion) (Refer to [P.13A-280](#)).

**STEP 7: Check air intake from intake hose and intake manifold.**

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 8: Check injector for operating sound.**

- Check injector for operating sound (Refer to [P.13A-289](#)).

**Q: Can operating sound be heard?**

**YES :** Go to Step 9 .

**NO :** Check the injector system of the defective cylinder (Refer to Code No. 41 [P.13A-86](#)).

**STEP 9: Check timing marks of timing belt.**

**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Align timing marks.

**STEP 10. M.U.T.-II/III data list**

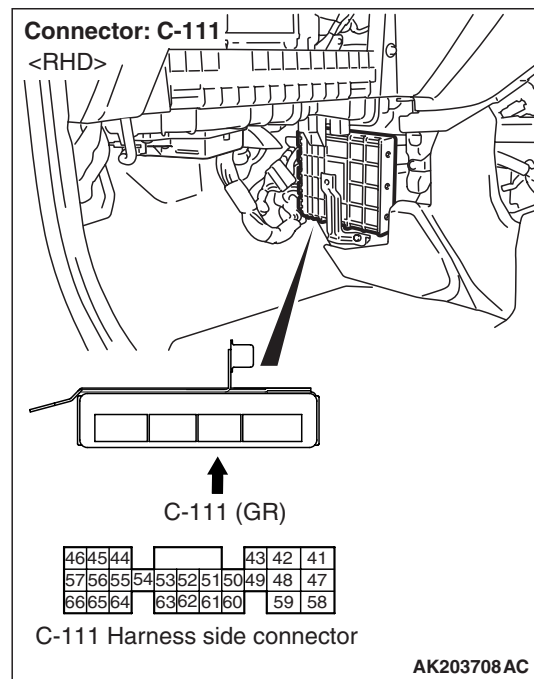
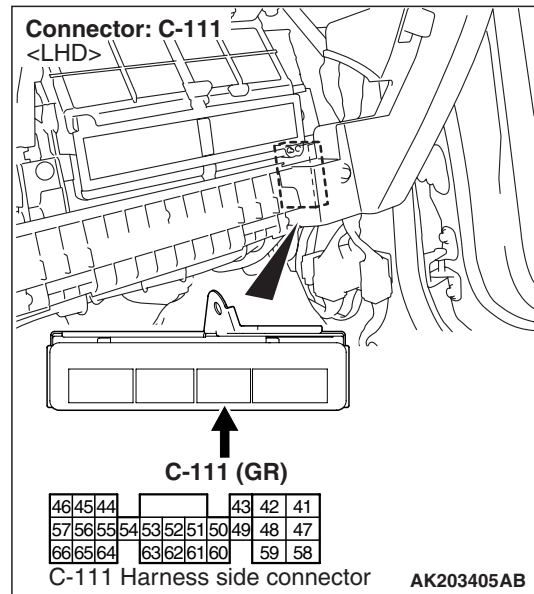
- Refer to Data list reference table [P.13A-260](#).
  - a. Item 17: Mixture adjusting screw (variable resistor)

**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Check mixture adjusting screw (variable resistor) (Refer to Inspection Procedure 37 [P.13A-249](#)).

**STEP 11: Perform voltage measurement at C-111 engine-A/T-ECU.**



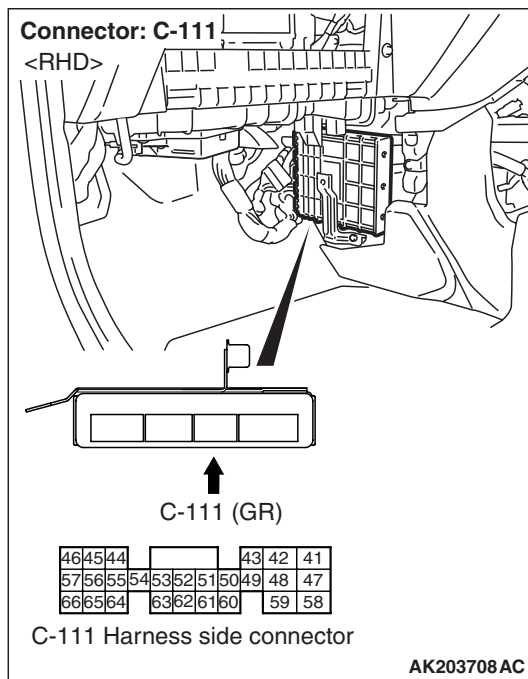
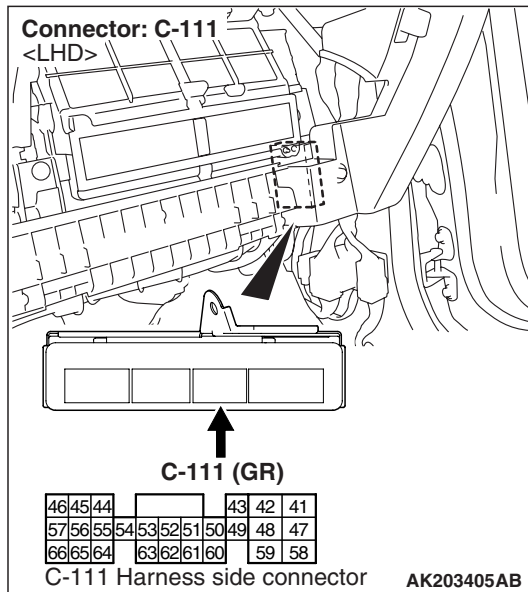
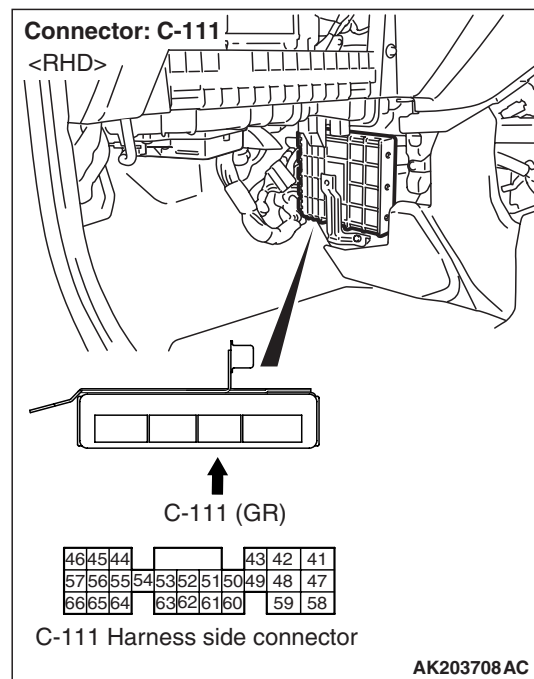
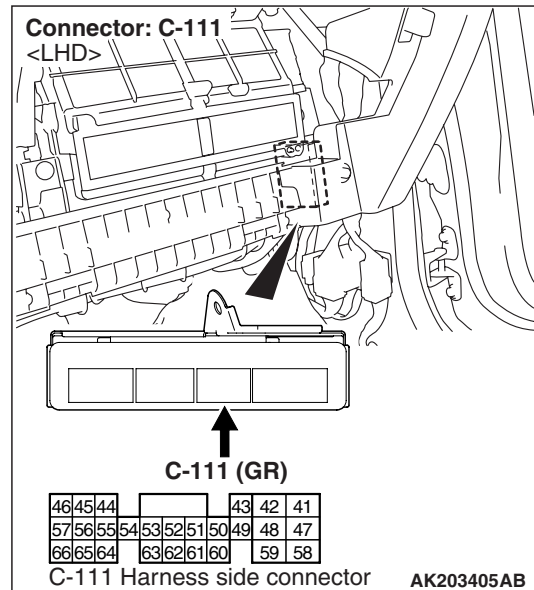
- Measure engine-A/T-ECU terminal voltage.
- Voltage between terminal No. 66 and earth.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 15 .

**NO :** Go to Step 12.

**STEP 12: Connector check: C-111  
engine-A/T-ECU connector****Q: Is the check result normal?****YES :** Go to Step 13 .**NO :** Repair.**STEP 13: Check harness between battery and  
C-111 (terminal No. 66) engine-A/T-ECU  
connector****NOTE:** Before checking harness, check the following intermediate connectors, and repair them if necessary.

- a. A-14 <RHD>, C-02 <LHD>, C-106, C-116 <LHD>, C-125 <RHD>, C-202 and C-204
- Check power supply line for open or short circuit or damage.

**Q: Is the check result normal?****YES :** Go to Step 14**NO :** Repair.

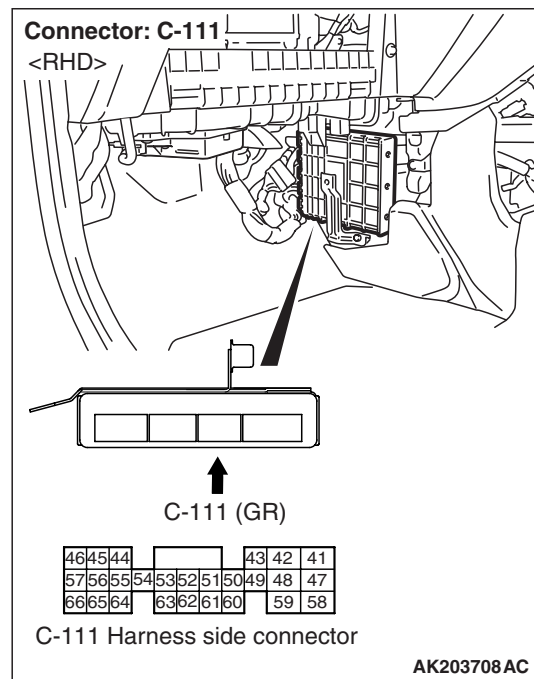
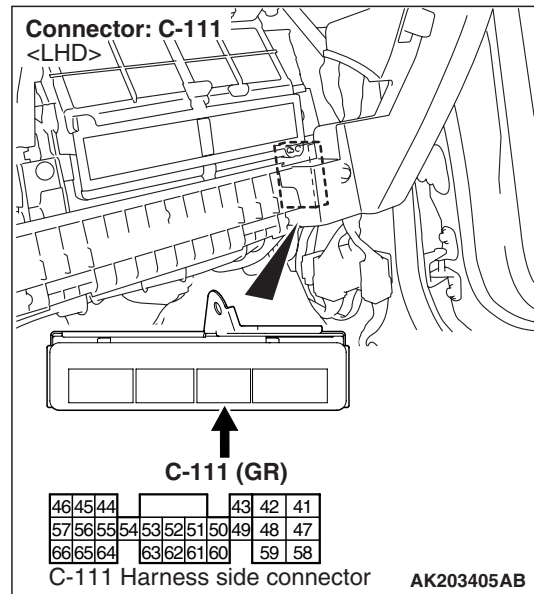
**STEP 14: Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace engine-A/T-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

**STEP 15: Perform voltage measurement at C-111 engine-A/T-ECU connector.**



- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 42 and earth, also between terminal No. 48 and earth.

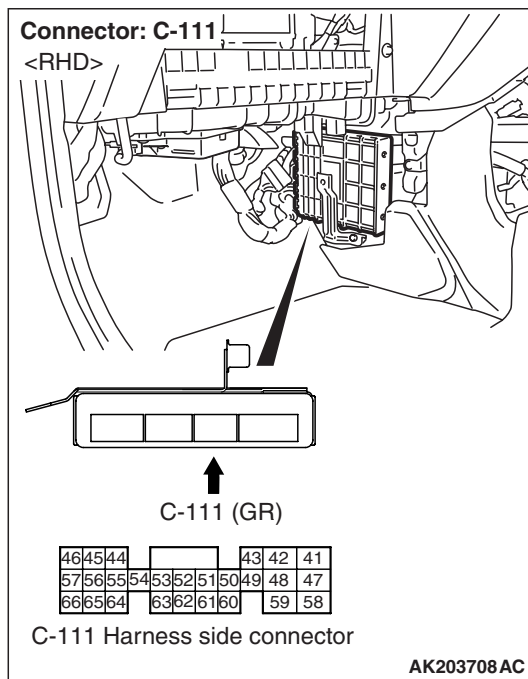
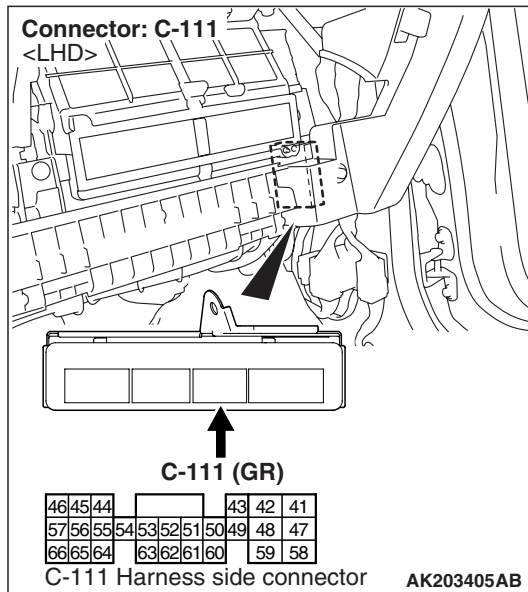
**OK: 0.5 V or less**

**Q: Is the check result normal?**

**YES :** Go to Step 17 .

**NO :** Go to Step 16 .

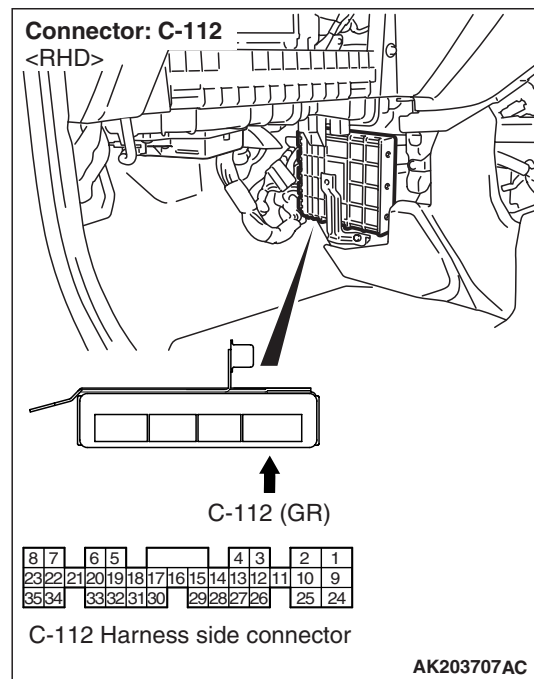
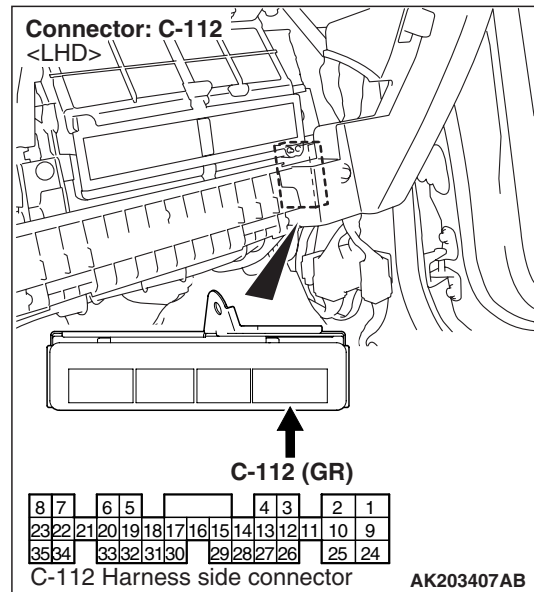


**STEP 16: Connector check: C-111  
engine-A/T-ECU connector****Q: Is the check result normal?**

**YES :** Check and repair harness between C-111 (terminal No. 42) engine-A/T-ECU connector and body earth.

- Check earthing line for open circuit and damage.

**NO :** Repair.

**STEP 17. Perform voltage measurement at C-112  
engine-A/T-ECU connector.**

- Measure engine-A/T-ECU terminal voltage.
- Engine: Idling after warm-up
- Selector lever position: P
- Radiator fan: Not operating
- Voltage between terminal No. 8 and earth.

**OK: Switching the headlamps to ON from OFF causes the voltage to increase by 0.2 – 3.5 V.**

**Q: Is the check result normal?**

**YES :** Go to Step 20 .

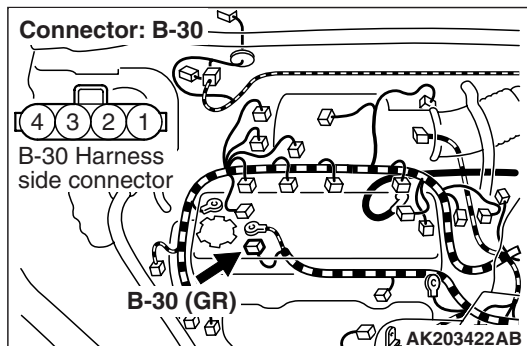
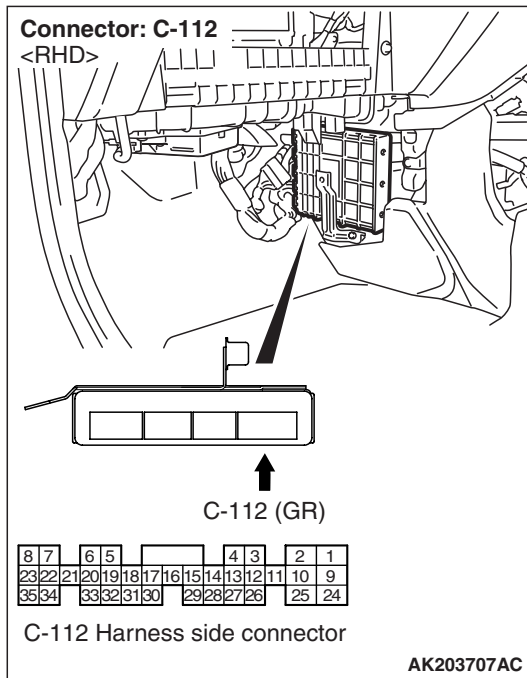
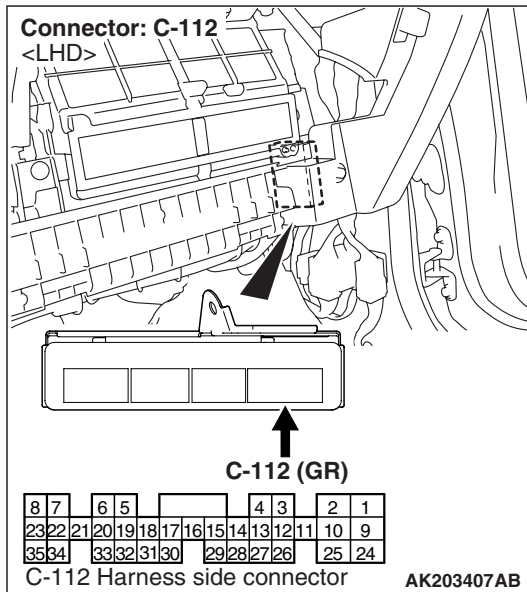
**NO :** Go to Step 18 .

**STEP 18. Connector check: C-112**  
**engine-A/T-ECU connector and B-30 alternator**  
**connector**

**Q: Is the check result normal?**

**YES :** Go to Step 19 .

**NO :** Repair.



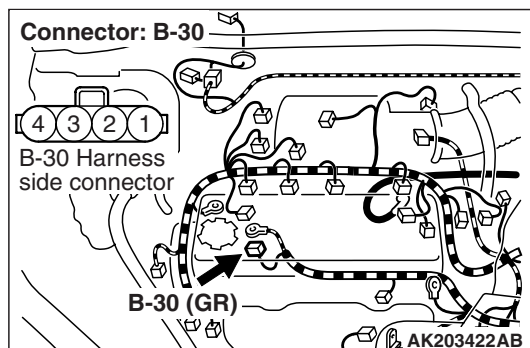
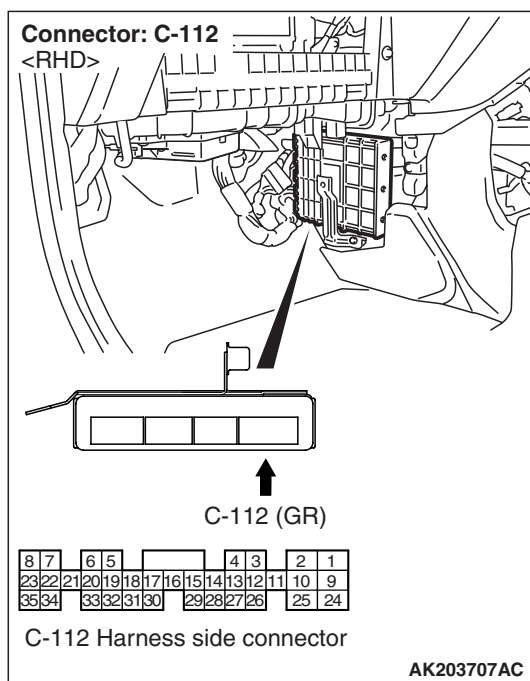
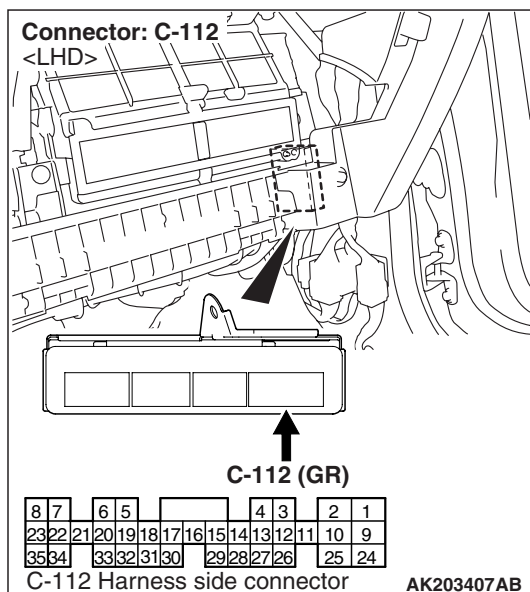
**STEP 19. Check harness between C-112 (terminal No. 8) engine-A/T-ECU connector and B-30 (terminal No. 1) alternator connector.**

- Check output line for open/short circuit and damage.

**Q: Is the check result normal?**

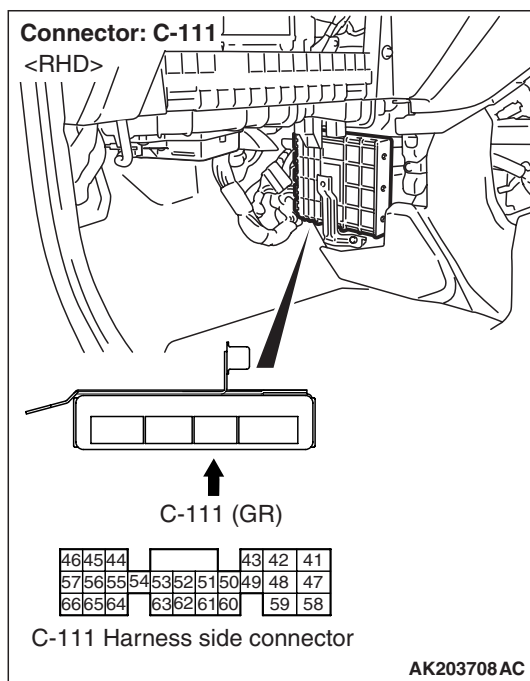
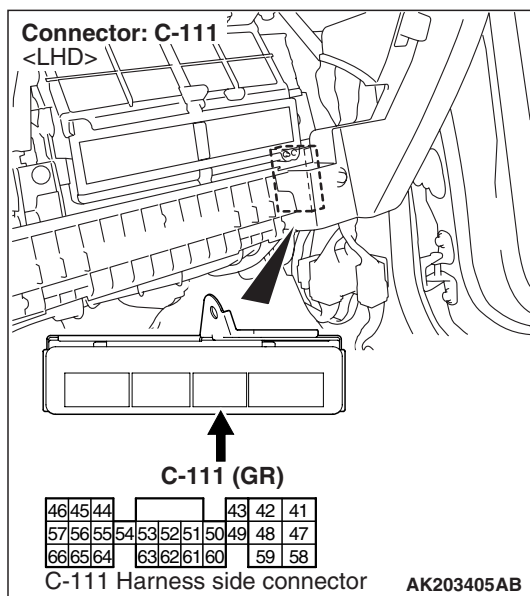
**YES :** Go to Step 20 .

**NO :** Repair.



**NOTE:** Before checking harness, check intermediate connector B-19, and repair if necessary.

**STEP 20. Perform voltage measurement at C-111 engine-A/T-ECU connector.**



- Measure engine-A/T-ECU terminal voltage.
- Engine: Idling after warm-up
- Selector lever position: P
- Radiator fan: Not operating
- Voltage between terminal No. 54 and earth.

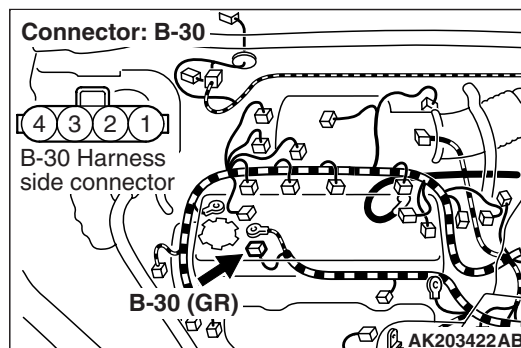
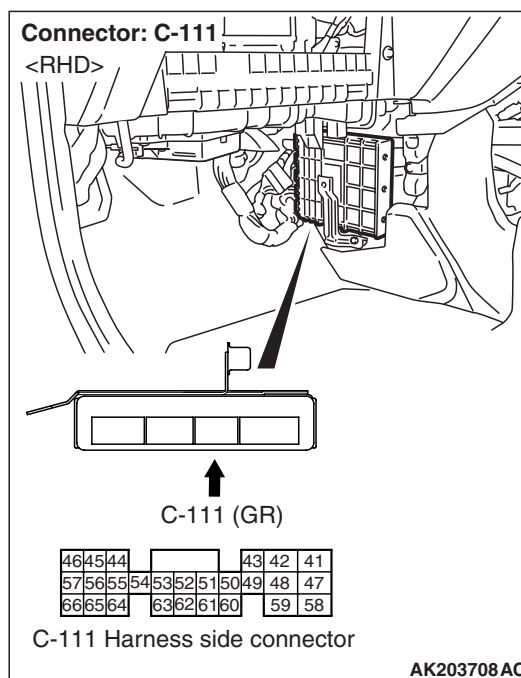
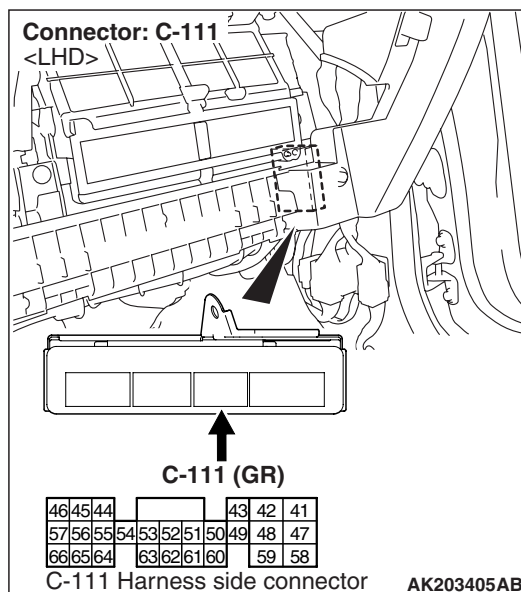
**OK: Switching the headlamps to ON from OFF causes the voltage to fall.**

**Q: Is the check result normal?**

**YES :** Go to Step 24 .

**NO :** Go to Step 21.

**STEP 21. Connector check: C-111 engine-A/T-ECU connector and B-30 alternator connector**

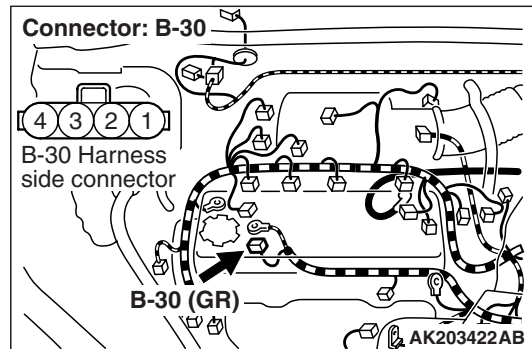
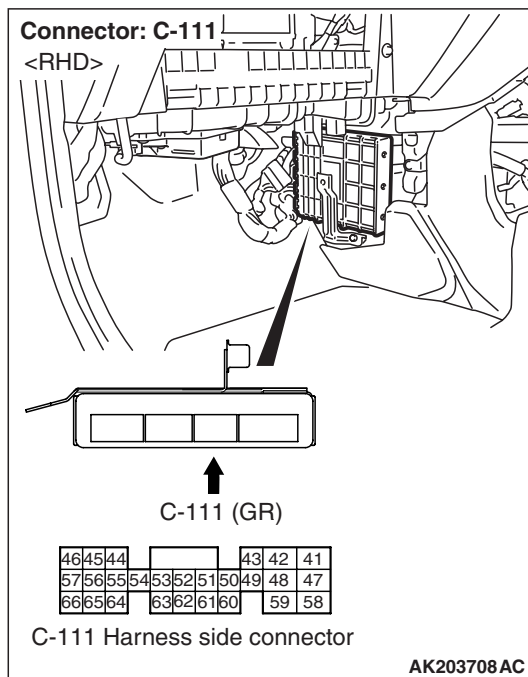
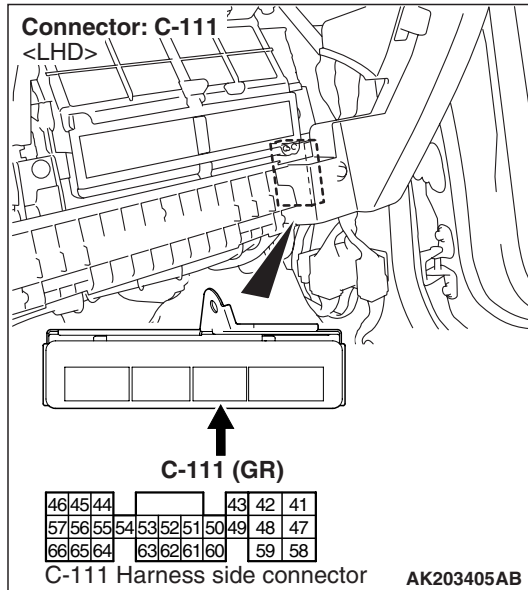


Q: Is the check result normal?

YES : Go to Step 22 .

NO : Repair.

**STEP 22. Check harness between C-111 (terminal No. 54) engine-A/T-ECU connector and B-30 (terminal No. 4) alternator connector**



**NOTE:** Before checking harness, check intermediate connector B-19, and repair if necessary.

- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 23 .

NO : Repair.

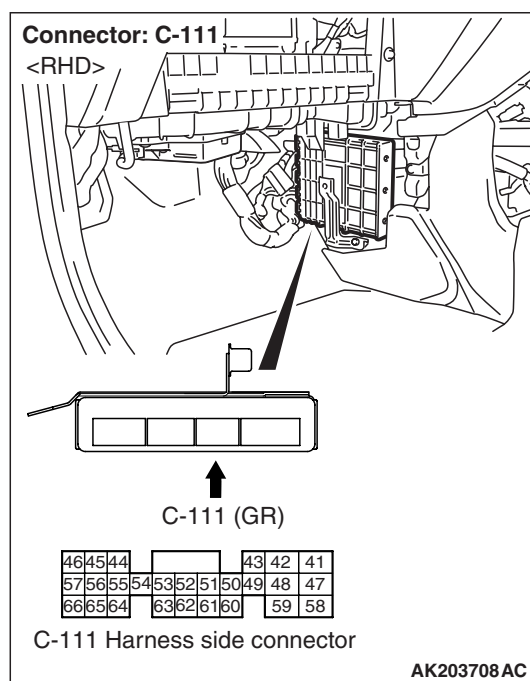
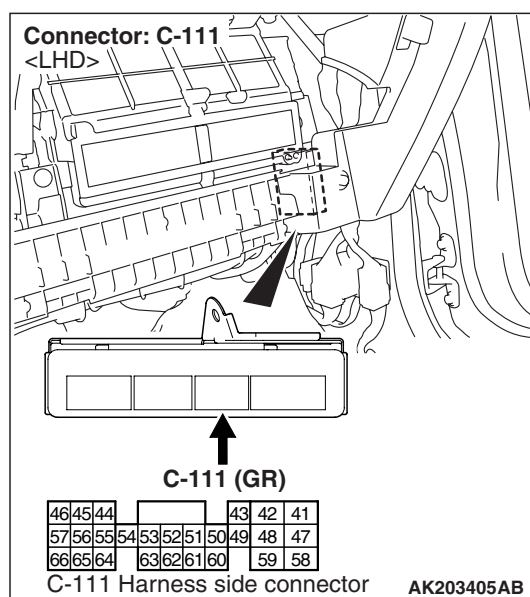
**STEP 23. Check the trouble symptoms.**

Q: Does trouble symptom persist?

YES : Replace alternator.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**STEP 24. Perform voltage measurement at C-111 engine-A/T-ECU connector.**



- Measure engine-A/T-ECU terminal voltage.
- Engine: Idling
- A/C switch: ON (A/C compressor ON)
- Voltage between terminal No. 61 and earth.

**OK:**

**1 V or less (with outside air temperature sensor ambient temperature at 18°C or higher and A/C set for maximum air flow at minimum temperature)**

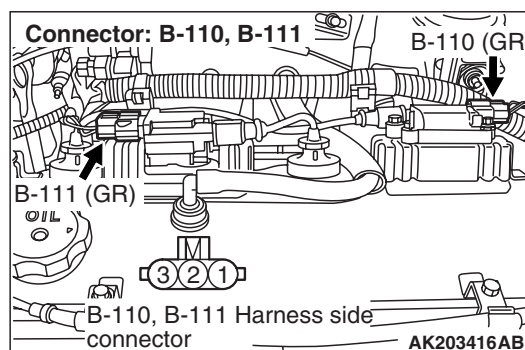
**System voltage (with A/C set for minimum air flow at room temperature)**

**Q: Is the check result normal?**

**YES :** Go to Step 25 .

**NO :** Check A/C load signal system (Refer to Inspection Procedure 26 P.13A-216).

**STEP 25. Connector check: B-110 and B-111 ignition coil connectors**



**Q: Is the check result normal?**

**YES :** Go to Step 26 .

**NO :** Repair.

**STEP 26. Check ignition coil spark.**

**Q: Is the check result normal?**

**YES :** Go to Step 31 .

**NO :** Go to Step 27 .

**STEP 27. Check spark plug.**

**Q: Is the check result normal?**

**YES :** Go to Step 28 .

**NO :** Replace spark plug.

**STEP 28. Check spark plug cable.**

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-36).

**Q: Is the check result normal?**

**YES :** Go to Step 29 .

**NO :** Replace spark plug cable.

**STEP 29. Check ignition coil itself.**

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-35).

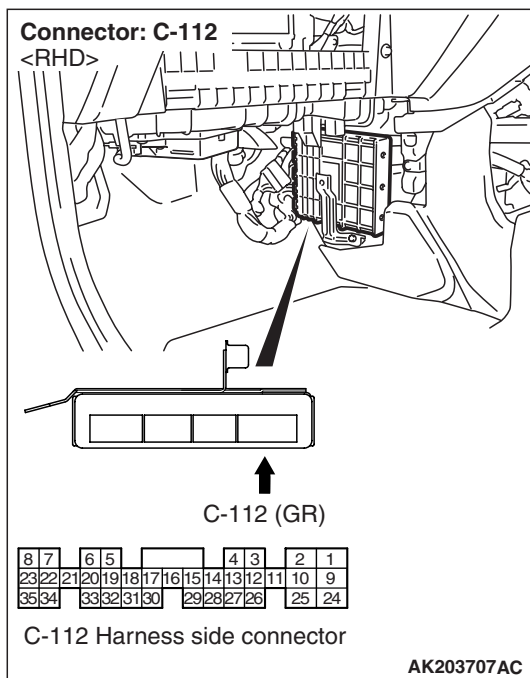
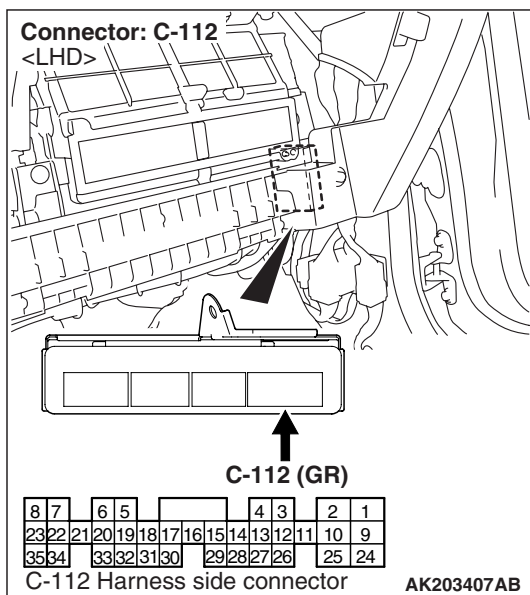
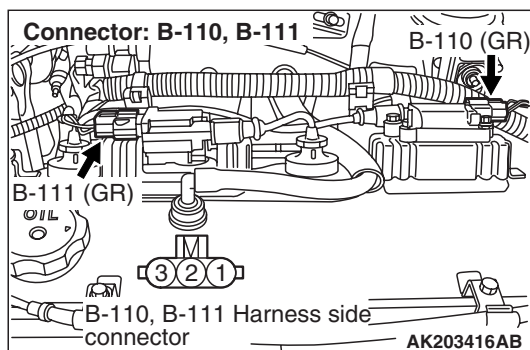
**Q: Is the check result normal?**

**YES :** Go to Step 30 .

**NO :** Replace ignition coil.



**STEP 30. Check harness between terminal No. 2 of ignition coil connector of each cylinder and body earth.**



- Check earthing line for open/short circuit and damage.

**Q: Is the check result normal?**

**YES :** Check and repair harness between terminal No. 3 of ignition coil connector of each cylinder and C-112 engine-A/T-ECU.

- Check signal line for open/short circuit and damage.

**NO :** Repair.

**STEP 31. Check injector for spray condition.**

- Check each injector for spray condition (Refer to P.13A-289).

**Q: Is the check result normal?**

**YES :** Go to Step 32 .

**NO :** Replace injector.

**STEP 32. Check compression pressure.**

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service P.11A-12).

**Q: Is the check result normal?**

**YES :** Go to Step 33 .

**NO :** Repair.

**STEP 33. Check EGR control solenoid valve itself.**

- Check EGR control solenoid valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System P.17-79].

**Q: Is the check result normal?**

**YES :** Go to Step 34 .

**NO :** Replace EGR control solenoid valve.

**STEP 34. Check EGR valve itself.**

- Check EGR valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System P.17-77].

**Q: Is the check result normal?**

**YES :** Go to Step 35 .

**NO :** Replace EGR valve.

**STEP 35. M.U.T.-II/III actuator test**

- Item 07: Fuel pump
- OK: Operating sounds of fuel pump can be heard.**

**Q: Is the check result normal?**

**YES :** Go to Step 36 .

**NO :** Check fuel pump system (Refer to inspection Procedure 24 P.13A-188).

---

**STEP 36. Replace engine-A/T-ECU**

- After engine-A/T-ECU is replaced, re-check for trouble symptoms.

**Q: Does trouble system persist?**

**YES :** Check for foreign matters (water, kerosene, etc.) in fuel and replace if necessary.

**NO :** Check end.

---

**Inspection Procedure 9: The Engine Stalls when Starting The Car (Pass Out)**

---

**COMMENT ON TROUBLE SYMPTOM**

- Engine stall on starting is possibly caused by misfire due to failed spark plug, improper air-fuel ratio at accelerator pedal depression or other faults.

**PROBABLE CAUSE**

- Failed ignition system
- Failed intake system
- Failed emission gas cleaning system
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

---

**STEP 1. M.U.T.-II/III self-diag code****Q: Diagnosis code set?**

**YES :** Inspection chart for diagnosis code (Refer to [P.13A-11](#)).

**NO :** Go to Step 2 .

---

**STEP 2. Check EGR control solenoid valve itself.**

- Check EGR control solenoid valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-79](#)].

**Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Replace EGR control solenoid valve.

---

**STEP 3. Check EGR valve itself.**

- Check EGR valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-77](#)].

**Q: Is the check result normal?**

**YES :** Go to Step 4 .

**NO :** . Replace EGR valve.

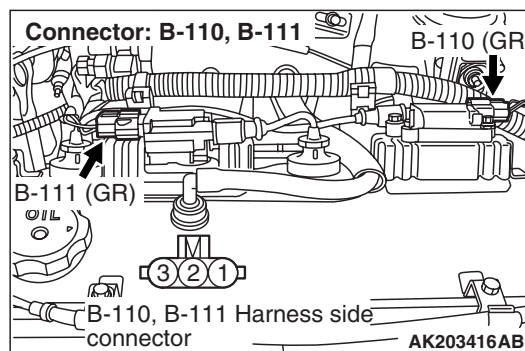
---

**STEP 4. Check air intake from intake hose and intake manifold.****Q: Is the check result normal?**

**YES :** Go to Step 5 .

**NO :** Repair.

---

**STEP 5. Connector check: B-110 and B-111 ignition connectors****Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Repair.

---

**STEP 6. Check ignition coil spark.****Q: Is the check result normal?**

**YES :** Replace engine-A/T-ECU.

**NO :** Go to Step 7 .

---

**STEP 7. Check spark plug.****Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Replace spark plug.

**STEP 8. Check spark plug cable itself.**

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-36).

**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Replace spark plug cable.

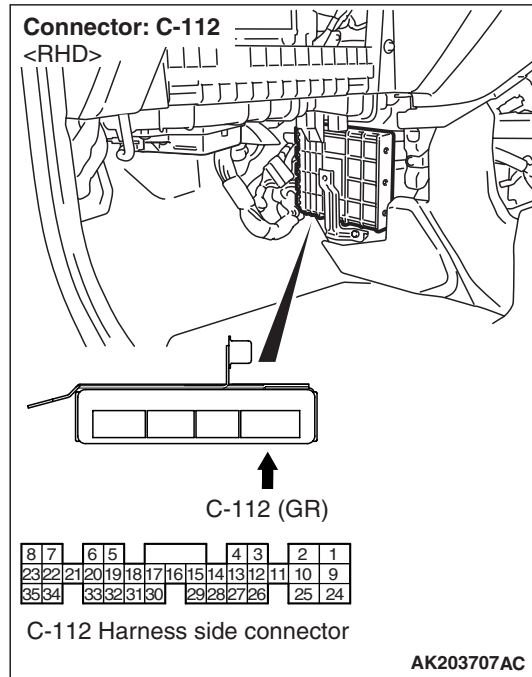
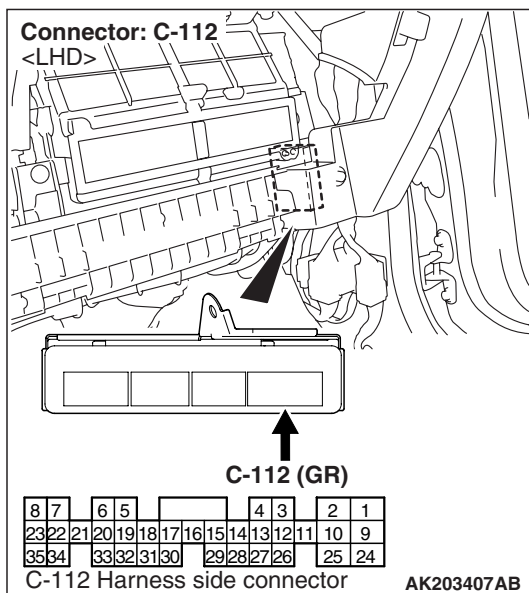
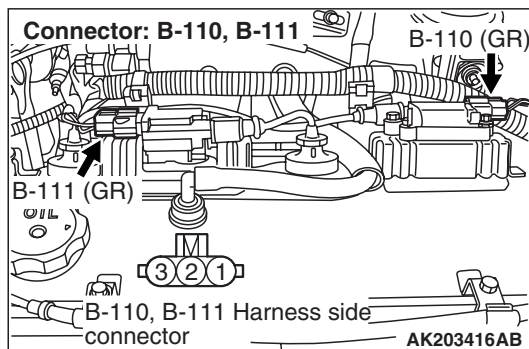
**STEP 9. Check ignition coil itself.**

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-35).

**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Replace ignition coil.

**STEP 10. Check harness between terminal No. 2 of ignition coil connector of each cylinder and body earth.**

- Check earthing line for open circuit and damage.

**Q: Is the check result normal?**

**YES :** Check and repair harness between terminal No. 3 of ignition coil connector of each cylinder and C-112 engine-A/T-ECU.

- Check signal line for open/short circuit and damage.

**NO :** Repair.

## Inspection Procedure 10. The Engine stalls when Decelerating

### COMMENT ON TROUBLE SYMPTOM

- Engine stall on deceleration is possibly caused by insufficient air intake, improper air-fuel ratio due to failed exhaust gas recirculation system or other faults.

### PROBABLE CAUSE

- Failed idle speed control system
- Failed ignition system
- Failed emission control system
- Throttle valve fouled
- Failed engine-A/T-ECU

### DIAGNOSIS PROCEDURE

#### STEP 1. M.U.T.-II/III diagnosis code

**Q: Diagnosis code set?**

- YES :** Inspection chart for diagnosis code (Refer to [P.13A-11](#)).
- NO :** Go to Step 2 .

#### STEP 2. M.U.T.-II/III data list

- Refer to Data list reference table [P.13A-260](#).
  - a. Item 14: Throttle position sensor

**Q: Is the check result normal?**

- YES :** Go to Step 3 .
- NO :** Check throttle position sensor system (Refer to Code No. 14 [P.13A-31](#)).

#### STEP 3. M.U.T.-II/III data list

- Item 45: Idle speed control servo position

**OK: Idle speed control servo drops to 0 – 2 steps at deceleration (engine at 1,000 r/min or higher).**

**Q: Is the check result normal?**

- YES :** Go to Step 4 .
- NO :** Check vehicle speed signal system (Refer to Code No. 24 [P.13A-72](#)).

#### STEP 4. Check EGR control solenoid valve itself.

- Check EGR control solenoid valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-79](#)].

**Q: Is the check result normal?**

- YES :** Go to Step 5 .
- NO :** Replace EGR control solenoid valve.

#### STEP 5. Check EGR valve itself.

- Check EGR valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-77](#)].

**Q: Is the check result normal?**

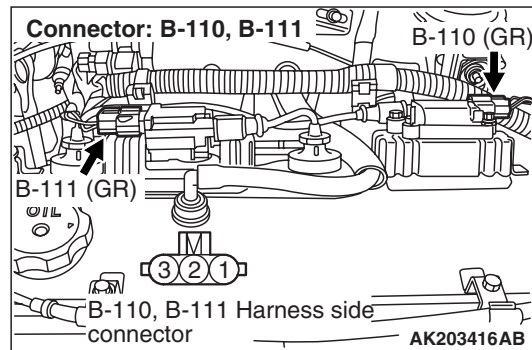
- YES :** Go to Step 6 .
- NO :** Replace EGR valve.

#### STEP 6. Check throttle body (throttle valve portion) for contamination.

**Q: Is the check result normal?**

- YES :** Go to Step 7 .
- NO :** Clean throttle body (throttle valve portion) (Refer to [P.13A-280](#)).

#### STEP 7. Connector check: B-110 and B-111 ignition coil connectors



**Q: Is the check result normal?**

- YES :** Go to Step 8 .
- NO :** Repair.

#### STEP 8. Check ignition coil spark.

**Q: Is the check result normal?**

- YES :** Replace engine-A/T-ECU.
- NO :** Go to Step 9 .

#### STEP 9. Check spark plug.

**Q: Is the check result normal?**

- YES :** Go to Step 10 .
- NO :** Replace spark plug.

**STEP 10. Check spark plug cable itself.**

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-36).

**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Replace spark plug cable.

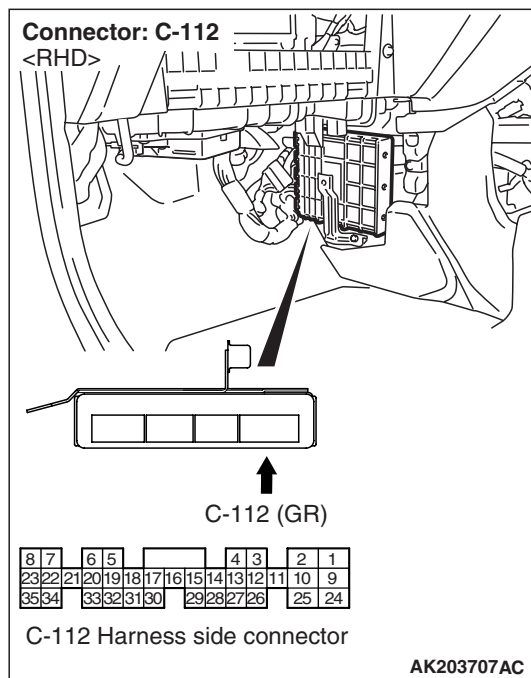
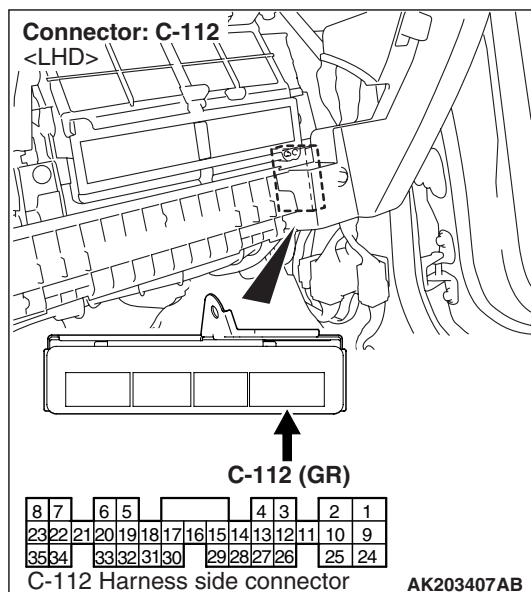
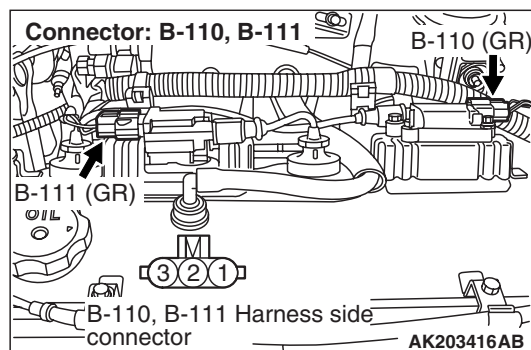
**STEP 11. Check ignition coil itself.**

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-35).

**Q: Is the check result normal?**

**YES :** Go to Step 12 .

**NO :** Replace ignition coil.

**STEP 12. Check harness between terminal No. 2 of ignition coil connector of each cylinder and body earth.**

- Check earthing line for open circuit and damage.

**Q: Is the check result normal?**

- YES :** Check and repair harness between terminal No. 3 of ignition coil connector of each cylinder and C-112 engine-A/T-ECU.
- Check signal line for open/short circuit and damage.

**NO :** Repair.

---

**Inspection Procedure 11: Engine does not Revolve Up**

---

**COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by failed fuel system, ignition system or other faults.

**PROBABLE CAUSE**

- Failed ignition system
- Failed fuel system
- Timing belt out of place
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

---

**STEP 1. M.U.T.-II/III diagnosis code**

**Q: Diagnosis code set?**

- YES :** Inspection chart for diagnosis code (Refer to [P.13A-11](#)).
- NO :** Go to Step 2 .

---

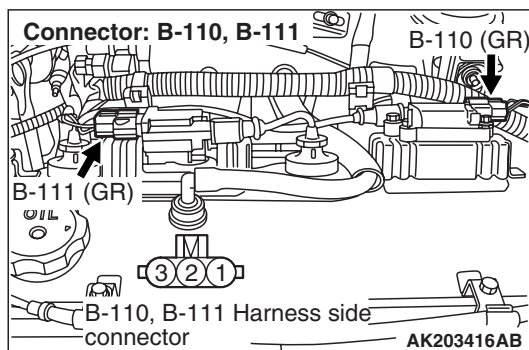
**STEP 2. Check timing marks of timing belt.**

**Q: Is the check result normal?**

- YES :** Go to Step 3 .
- NO :** Align match marks.

---

**STEP 3. Connector check: B-110 and B-111 ignition coil connectors**



**Q: Is the check result normal?**

- YES :** Go to Step 4 .
- NO :** . Repair.

---

**STEP 4. Check ignition coil spark.**

**Q: Is the check result normal?**

- YES :** Go to Step 9 .
- NO :** Go to Step 5 .

---

**STEP 5. Check spark plug.**

**Q: Is the check result normal?**

- YES :** Go to Step 6 .
- NO :** Replace spark plug.

---

**STEP 6. Check spark plug cable itself.**

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-36](#)).

**Q: Is the check result normal?**

- YES :** Go to Step 7 .
- NO :** Replace spark plug cable.

---

**STEP 7. Check ignition coil itself.**

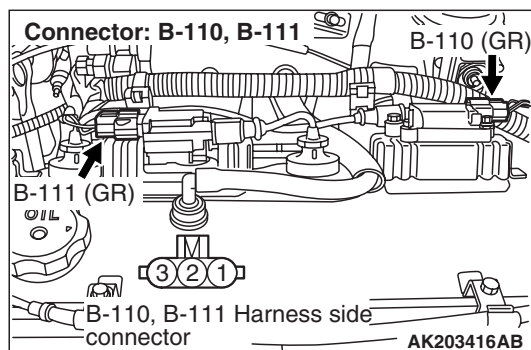
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-35](#)).

**Q: Is the check result normal?**

- YES :** Go to Step 8 .
- NO :** Replace ignition coil.



**STEP 8. Check harness between terminal No. 2 of ignition coil connector of each cylinder and body earth.**



**Q: Is the check result normal?**

**YES :** Check and repair harness between terminal No. 3 of ignition coil connector of each cylinder and C-112 engine-A/T-ECU.

- Check signal line for open/short circuit and damage.

**NO :** Repair.

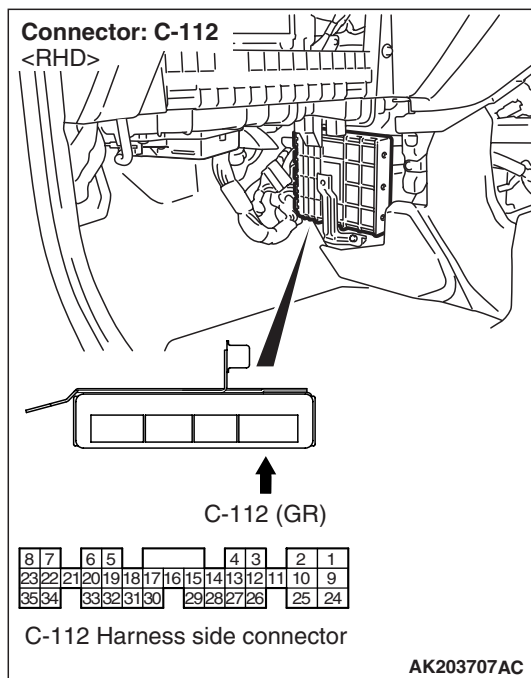
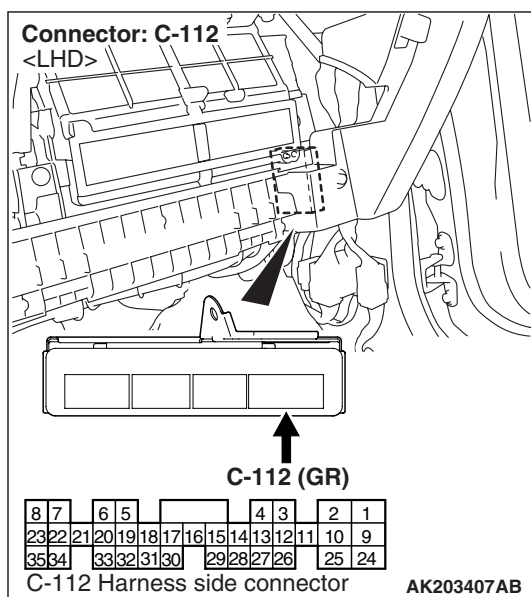
**STEP 9. Measure fuel pressure.**

- Measure fuel pressure (Refer to [P.13A-281](#)).

**Q: Is the check result normal?**

**YES :** Replace engine-A/T-ECU.

**NO :** Repair.



- Check earthing line for open circuit and damage.

## Inspection Procedure 12: Hesitation, Sag, Poor Acceleration, Stumble or Surge

### COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed ignition system, improper air-fuel ratio, improper compression pressure or other faults.

### PROBABLE CAUSE

- Failed air-fuel ratio control system
- Failed ignition system
- Failed fuel system
- Failed intake and exhaust system
- Failed emission control system
- Throttle valve fouled
- Improper compression pressure
- Failed engine-A/T-ECU

### DIAGNOSIS PROCEDURE

#### STEP 1. M.U.T.-II/III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-11](#)).

NO : Go to Step 2 .

#### STEP 2. Check injector for operating sound.

- Check injector for operating sound (Refer to [P.13A-289](#)).

Q: Can operating sound be heard?

YES : Go to Step 3 .

NO : Check the injector system of the defective cylinder  
(Refer to code No. 41 injector system [P.13A-86](#)).

#### STEP 3. M.U.T.-II/III data list

- Refer to Data list reference table [P.13A-260](#).
  - a. Item 13: Intake air temperature sensor
  - b. Item 14: Throttle position sensor
  - c. Item 21: Engine coolant temperature sensor
  - d. Item 25: Barometric pressure sensor

Q: Are the check results normal?

YES : Go to Step 4 .

NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Codes [P.13A-11](#)).

#### STEP 4. Check EGR control solenoid valve itself.

- Check EGR control solenoid valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-79](#)].

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Replace EGR control solenoid valve.

#### STEP 5. Check EGR valve itself.

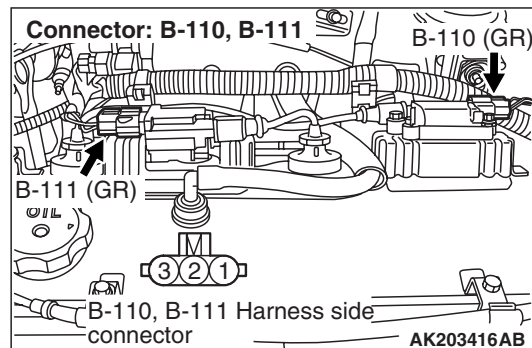
- Check EGR valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-77](#)).

Q: Is the check result normal?

YES : Go to Step 6 <Vehicle without catalytic converter>.

NO : Replace EGR valve.

#### STEP 6. Connector check: B-110 and B-111 ignition coil connectors



Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

#### STEP 7. Check ignition coil spark.

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 11 .

#### STEP 8. Check spark plug.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Replace spark plug.

**STEP 9. Check spark plug cable itself.**

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-36).

**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Replace spark plug cable.

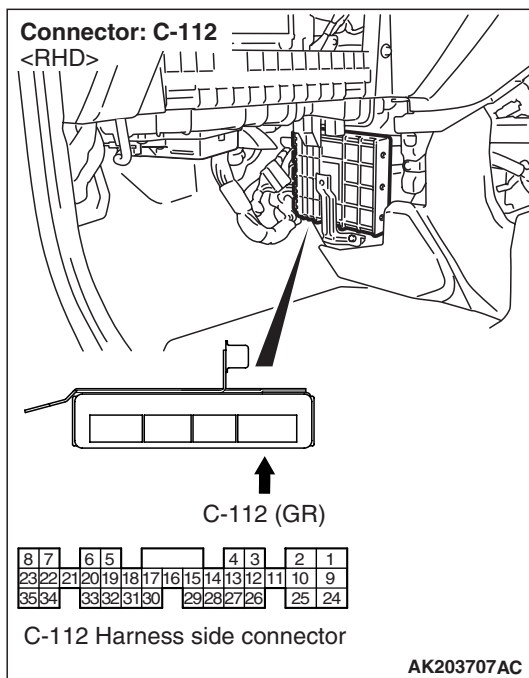
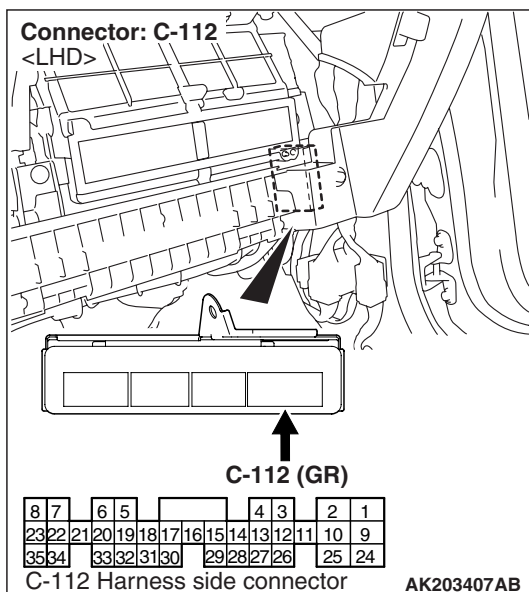
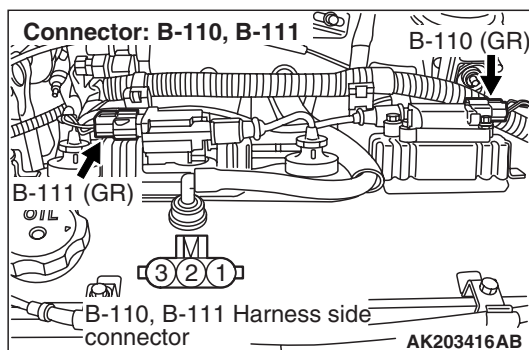
**STEP 10. Check ignition coil itself.**

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-35).

**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Replace ignition coil.

**STEP 11. Check harness between terminal No. 2 of ignition coil connector of each cylinder and body earth.**

- Check earthing line for open circuit and damage.

**Q: Is the check result normal?**

- YES :** Check and repair harness between terminal No. 3 of ignition coil connector of each cylinder and C-112 engine-A/T-ECU
- Check signal line for open/short circuit and damage.

**NO :** Repair.

**STEP 12. Check throttle body (throttle valve portion) for contamination.**

**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO :** Clean throttle body (throttle valve portion) (Refer to [P.13A-280](#)).

**STEP 13. Measure fuel pressure.**

- Measure fuel pressure (Refer to [P.13A-281](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 14 .

**NO :** Repair.

**STEP 14. Check compression pressure.**

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service [P.11A-12](#)).

**Q: Is the check result normal?**

**YES :** Replace engine-A/T-ECU.

**NO :** Repair.

**Inspection Procedure 13. The Feeling of Impact or Vibration when Accelerating**

**COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by failed ignition leak with rise in spark plug-required voltage at acceleration.

**PROBABLE CAUSE**

- Failed ignition system
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

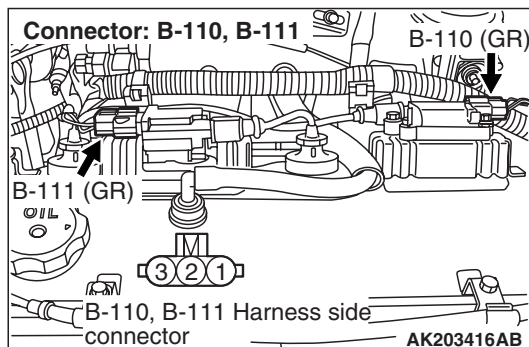
**STEP 1. M.U.T.-II/III diagnosis code**

**Q: Diagnosis code set?**

**YES :** Inspection chart for diagnosis code (Refer to [P.13A-11](#)).

**NO :** Go to Step 2 .

**STEP 2. Connector check: B-110 and B-111 ignition coil connectors**



**Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** . Repair.

**STEP 3. Check ignition coil spark.**

**Q: Is the check result normal?**

**YES :** Replace engine-A/T-ECU.

**NO :** Go to Step 4 .

**STEP 4. Check spark plug.**

**Q: Is the check result normal?**

**YES :** Go to Step 5 .

**NO :** Replace spark plug.

**STEP 5. Check spark plug cable itself.**

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-36](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Replace spark plug cable.

**STEP 6. Check ignition coil itself.**

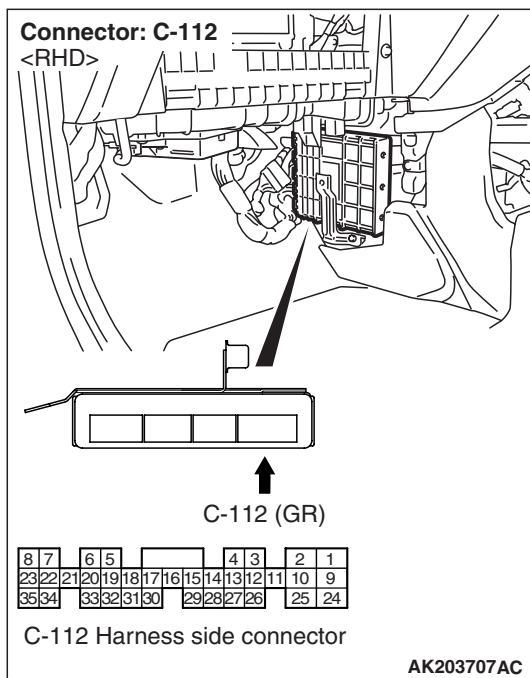
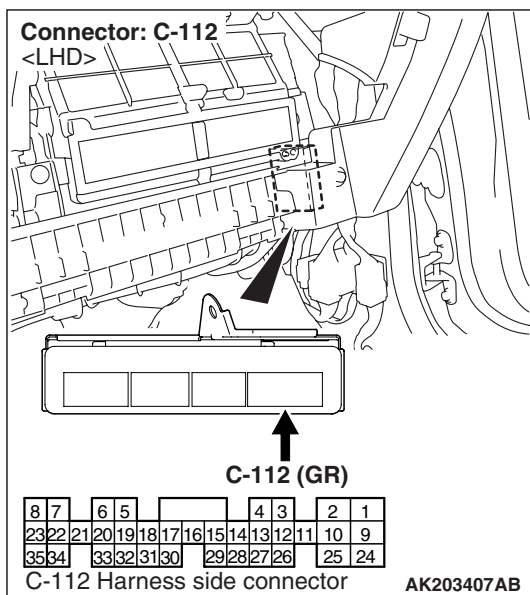
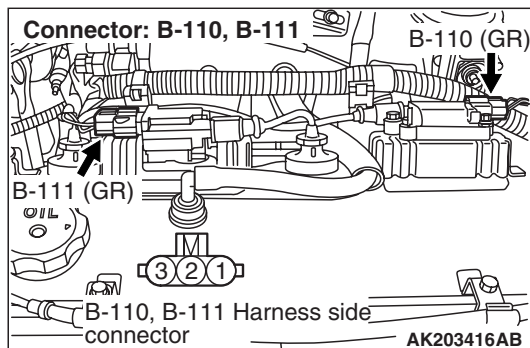
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-35](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Replace ignition coil.

**STEP 7. Check harness between terminal No. 2 of ignition coil connector of each cylinder and body earth.**



**Q: Is the check result normal?**

**YES :** Check and repair harness between terminal 3 of ignition coil connector of each cylinder and C-112 engine-A/T-ECU

- Check signal line for open/short circuit and damage.

**NO :** Repair.

- Check earthing line for open circuit and damage.

---

**Inspection Procedure 14: The Feeling of Impact or Vibration when Decelerating**

---

**COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by insufficient air intake due to failed idle speed control system.

**PROBABLE CAUSE**

- Failed idle speed control system
- Throttle valve body fouled
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

---

**STEP 1. M.U.T.-II/III diagnosis code**

**Q: Diagnosis code set?**

**YES** : Inspection chart for diagnosis code (Refer to [P.13A-11](#)).

**NO** : Go to Step 2 .

---

**STEP 2. Check idle speed control servo for operating sound.**

- Check idle speed control servo for operating sound (Refer to [P.13A-290](#)).

**Q: Is the check result normal?**

**YES** : Go to Step 3 .

**NO** : Check idle speed control servo system (Refer to Inspection Procedure 30 [P.13A-227](#)).

---

**STEP 3. M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-260](#).
  - a. Item 14: Throttle position sensor

**Q: Are the check results normal?**

**YES** : Go to Step 4 .

**NO** : Check throttle position sensor system (Refer to Code No. 14 [P.13A-31](#)).

---

**STEP 4. Check throttle body (throttle valve) contamination.**

**Q: Is the check result normal?**

**YES** : Replace engine-A/T-ECU.

**NO** : Clean throttle body (throttle valve portion) (Refer to [P.13A-280](#)).



---

**Inspection Procedure 15: Knocking**

---

**COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by failed detonation control, improper thermal value of spark plug or other faults.

**PROBABLE CAUSE**

- Failed detonation control system
- Failed ignition system
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

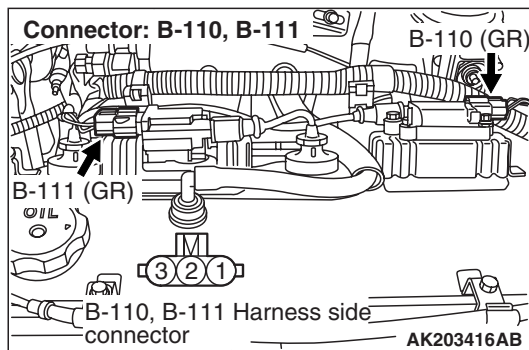
---

**STEP 1. M.U.T.-II/III diagnosis code****Q: Diagnosis code set?**

**YES** : Inspection chart for diagnosis code (Refer to [P.13A-11](#)).

**NO** : Go to Step 2 .

---

**STEP 2. Connector check: B-110 and B-111 ignition coil connectors****Q: Is the check result normal?**

**YES** : Go to Step 3 .

**NO** : Repair.

---

**STEP 3. Check ignition coil spark.****Q: Is the check result normal?**

**YES** : Check detonation sensor (Refer to Code No. 31 [P.13A-83](#)).

**NO** : Go to Step 4 .

---

**STEP 4. Check spark plug.****Q: Is the check result normal?**

**YES** : Go to Step 5 .

**NO** : Replace spark plug.

---

**STEP 5. Check spark plug cable itself.**

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-36](#)).

**Q: Is the check result normal?**

**YES** : Go to Step 6 .

**NO** : Replace spark plug cable.

---

**STEP 6. Check ignition coil itself.**

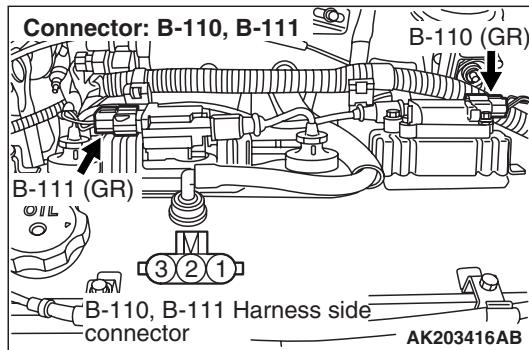
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-35](#)).

**Q: Is the check result normal?**

**YES** : Go to Step 7 .

**NO** : Replace ignition coil.

**STEP 7. Check harness between ignition coil connector terminal No. 2 of each cylinder and body earth.**

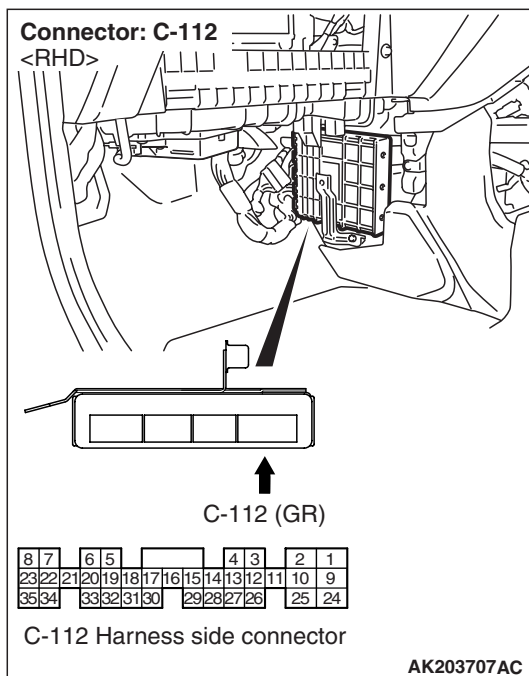
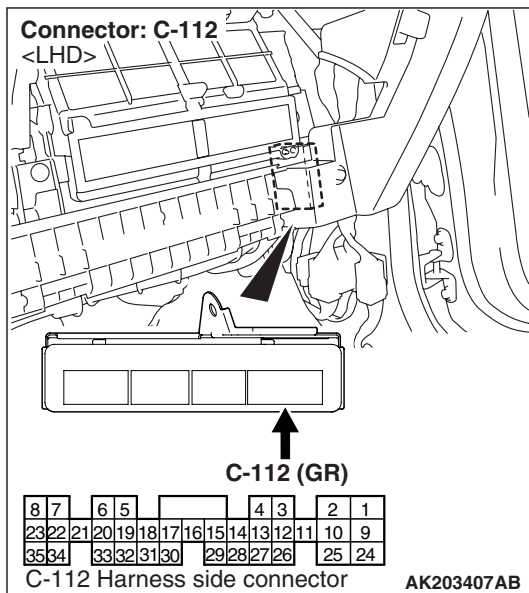


**Q: Is the check result normal?**

**YES :** Check and repair harness between ignition coil connector terminal No. 3 of each cylinder and C-112 engine-A/T-ECU connector.

- Check signal line for open/short circuit and damage.

**NO :** Repair.



- Check earthing line for open circuit and damage.

**Inspection Procedure 16: Ignition Timing Offset****COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by failed crank angle sensor, failed camshaft position sensor, improper installed timing belt or other faults.

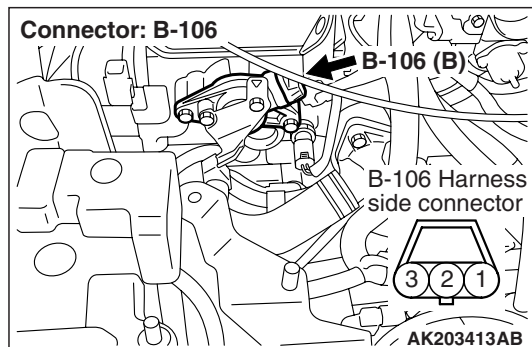
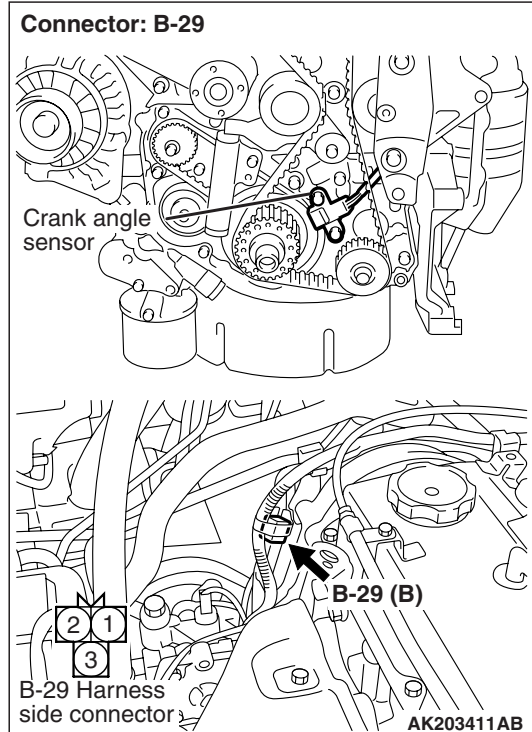
**PROBABLE CAUSE**

- Failed crank angle sensor
- Failed camshaft position sensor
- Improperly installed timing belt
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE****STEP 1. M.U.T.-II/III diagnosis code****Q: Diagnosis code set?**

**YES** : Inspection chart for diagnosis code (Refer to [P.13A-11](#)).

**NO** : Go to Step 2 .

**STEP 2. Perform output wave pattern measurement of crank angle sensor and camshaft position sensor (Use oscilloscope).****Crank Angle Sensor**

- Use special tool test harness (MD998478) to connect B-28 crank angle sensor connector, and measure at pick-up harness.
- Engine: Idling
- Selector lever position: P
- Voltage between terminal No. 2 and earth.

---

### Camshaft Position Sensor

- Use special tool test harness (MB991709) to connect B-106 camshaft position sensor connector, and measure at pick-up harness.
- Engine: Idling
- Selector lever position: P
- Voltage between terminal No. 2 and earth.

**OK: Output wave pattern timings of both sensors are the same as the check procedure (Refer to P.13A-271) using an oscilloscope.**

**Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Go to Step 4 .

---

### STEP 3. Check the trouble symptoms.

**Q: Does trouble symptom persist?**

**YES :** Replace engine-A/T-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

---

### STEP 4. Check crank angle sensor and camshaft position sensor mounted conditions.

**Q: Is the check result normal?**

**YES :** Go to Step 5 .

**NO :** Repair.

---

### STEP 5. Check timing marks of timing belt.

**Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Align timing marks.

---

### STEP 6. Check crank angle sensor vane.

**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Replace crank angle sensor vane.

---

### STEP 7. Check camshaft position sensing cylinder.

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Replace camshaft position sensing cylinder.

---

### STEP 8. Replace crank angle sensor.

- After replacing the crank angle sensor, re-check the trouble symptoms.

**Q: Does trouble symptom persist?**

**YES :** Go to Step 9 .

**NO :** Check end.

---

### STEP 9. Replace camshaft position sensor.

- After replacing the camshaft position sensor, re-check the trouble symptoms.

**Q: Does trouble symptom persist?**

**YES :** Replace engine-A/T-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

---

### Inspection Procedure 17: Run on (Dieseling)

#### COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by leakage from injector.

#### PROBABLE CAUSE

- Failed injector
- Failed engine-A/T-ECU

---

#### DIAGNOSIS PROCEDURE

---

##### STEP 1. Check injector for spray condition.

- Check each injector for spray condition (Refer to P.13A-289).

**Q: Does trouble symptom persist?**

**YES :** Replace engine-A/T-ECU.

**NO :** Replace injector.

---

**Inspection Procedure 18: Odor, White Smoke, Black Smoke and High-Concentration CO/HC during Idling**

---

**COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by improper air-fuel ratio, deteriorated catalyst, failed ignition system, failed fuel system, failed compression pressure or other faults.

**PROBABLE CAUSE**

- Failed air-fuel control system
- Failed ignition system
- Failed fuel system
- Failed intake and exhaust system
- Failed emission control system
- Failed compression pressure
- Failed catalytic converter <Vehicle with catalytic converter>
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

---

**STEP 1. M.U.T.-II/III diagnosis code****Q: Diagnosis code set?**

**YES** : Inspection chart for diagnosis code (Refer to [P.13A-11](#)).

**NO** : Go to Step 2 .

---

**STEP 2. Check injector for operating sound.**

- Check injector for operating sound (Refer to [P.13A-289](#)).

**Q: Can operating sound be heard?**

**YES** : Go to Step 3 .

**NO** : Check the injector system of the defective cylinder (Refer to Code No. 41 [P.13A-86](#)).

---

**STEP 3. Check ignition timing.**

- Check ignition timing (Refer to GROUP 11A – On-vehicle Service [P.11A-11](#)).

**Q: Is the check result normal?**

**YES** : Go to Step 4 .

**NO** : Check for offset ignition timing (Refer to Inspection Procedure 16 [P.13A-160](#)).

---

**STEP 4. M.U.T.-II/III Data List**

- Refer to Data list reference table [P.13A-260](#).
  - a. Item 12: Air flow sensor
  - b. Item 13: Intake air temperature sensor
  - c. Item 21: Engine coolant temperature sensor
  - d. Item 25: Barometric pressure sensor

**Q: Are the check results normal?**

**YES** : Go to Step 5 .

**NO** : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Codes [P.13A-11](#)).

---

**STEP 5. Check air intake from intake hose and intake manifold.****Q: Is the check result normal?**

**YES** : Go to Step 6 .

**NO** : Repair.

---

**STEP 6. Check for emission leakage from exhaust manifold.****Q: Is the check result normal?**

**YES** : Go to Step 7 .

**NO** : Repair.

---

**STEP 7. Check throttle body (throttle valve portion) for contamination.****Q: Is the check result normal?**

**YES** : Go to Step 8 .

**NO** : Clean throttle body (throttle valve portion) (Refer to [P.13A-280](#)).

---

**STEP 8. M.U.T.-II/III Data List**

- Refer to Data list reference table [P.13A-260](#).
  - a. Item 17: Mixture adjusting screw (variable resistor)

**Q: Is the check result normal?**

**YES** : Go to Step 9 .

**NO** : Check mixture adjusting screw (variable resistor) (Refer to Inspection Procedure 37 [P.13A-249](#)).

---

**STEP 9. Check EGR control solenoid valve itself.**

- Check EGR control solenoid valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-79](#)].

**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Replace EGR control solenoid valve.

---

**STEP 10. Check EGR valve itself.**

- Check EGR valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-77](#)].

**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Replace EGR valve.

---

**STEP 11. Measure fuel pressure.**

- Measure fuel pressure (Refer to [P.13A-281](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 12 .

**NO :** Repair.

---

**STEP 12. Check positive crankcase ventilation valve itself.**

- Check positive crankcase ventilation valve itself (Refer to GROUP 17 – Emission Control System – Crankcase Emission Control System [P.17-67](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO :** Replace positive crankcase ventilation valve.

---

**STEP 13. Check spark plug.**

**Q: Is the check result normal?**

**YES :** Go to Step 14 .

**NO :** Replace spark plug.

---

**STEP 14. Check spark plug cable itself.**

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-36](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 15 .

**NO :** Replace spark plug cable.

---

**STEP 15. Check ignition coil itself.**

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-35](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 16 .

**NO :** Replace ignition coil.

---

**STEP 16. Check compression pressure.**

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service [P.11A-12](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 17 .

**NO :** Repair.

---

**STEP 17. Check injector for spraying condition.**

- Check each injector for spray condition (Refer to [P.13A-289](#)).

**Q: Does trouble symptom persist?**

**YES :** Replace engine-A/T-ECU.

**NO :** Replace injector.

---

**Inspection Procedure 19: Battery Rundown**

---

**COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by failed alternator, failed generation control circuit or other faults.

**PROBABLE CAUSE**

- Failed battery
- Alternator G terminal short-circuited
- Failed alternator
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

---

**STEP 1. Check battery voltage.**

- Measure battery voltage during cranking.

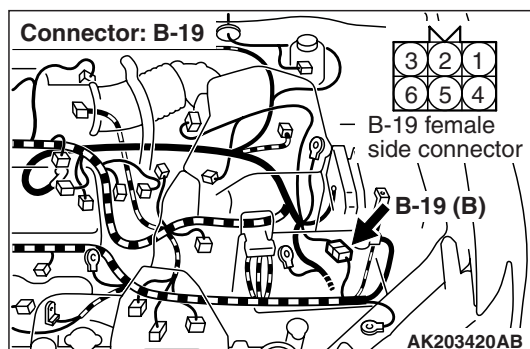
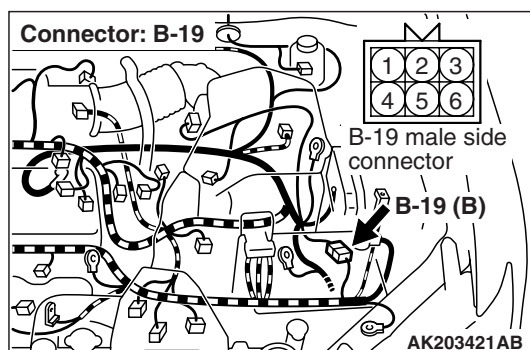
**OK: 8 V or more**

**Q: Is the check result normal?**

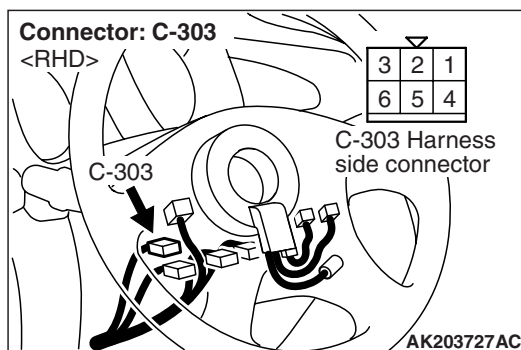
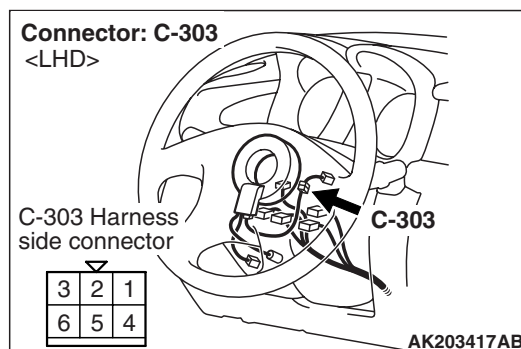
**YES :** Go to Step 2 .

**NO :** Check battery (Refer to GROUP 54A – Battery – On-vehicle Service – Battery Test [P.54A-6](#)).



**STEP 2. Connector check: B-19 intermediate connector****Q: Is the check result normal?****YES :** Go to Step 3 .**NO :** Repair.**STEP 3. Perform voltage measurement at B-19 intermediate connector.**

- Disconnect connector, and measure at male connector side.
- Ignition switch: ON
- Voltage between terminal No. 5 and earth.

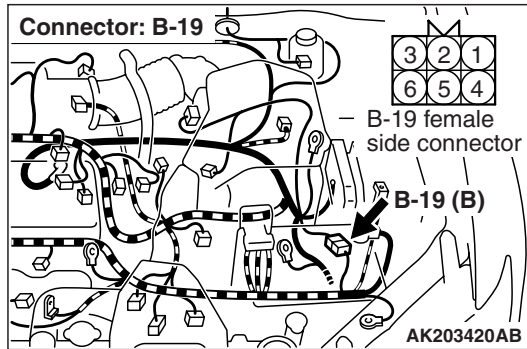
**OK: System voltage****Q: Is the check result normal?****YES :** Go to Step 5 .**NO :** . Go to Step 4 .**STEP 4. Connector check: C-303 ignition switch connector****Q: Is the check result normal?**

**YES :** Check intermediate connectors C-04, C-05, C-105, C-203 and C-205, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-19 (terminal No. 5) intermediate connector and C-303 (terminal No. 2) ignition switch connector.

- Check power supply line for open/short circuit.

**NO :** Repair.

**STEP 5. Perform voltage measurement at B-19 intermediate connector.**



- Disconnect connector, and measure at female connector side.
- Ignition switch: ON
- Voltage between terminal No. 4 and earth.

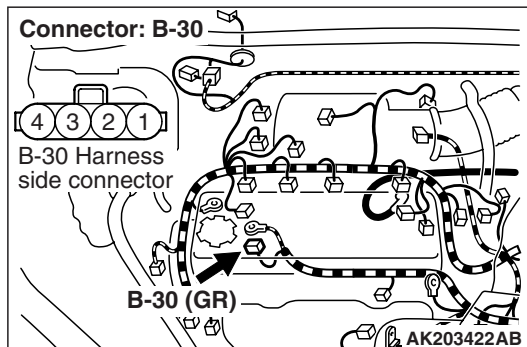
**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Go to Step 6 .

**STEP 6. Connector check: B-30 alternator connector**

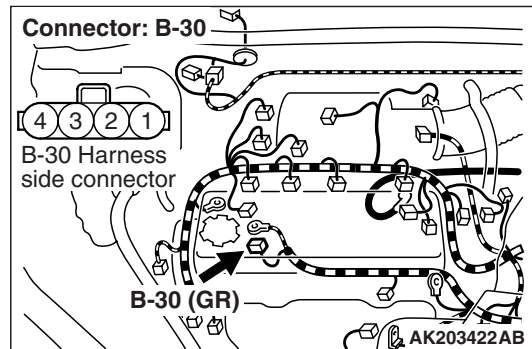
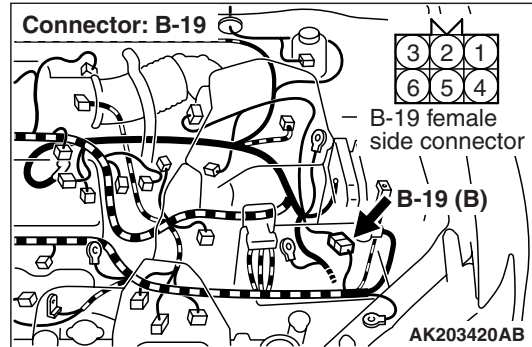


**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

**STEP 7. Check harness between B-19 (terminal No. 4) intermediate connector and B-30 (terminal No. 1) alternator connector.**



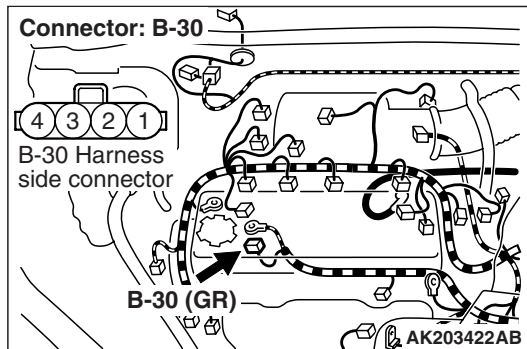
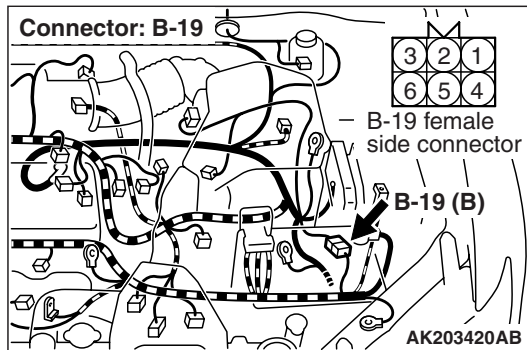
- Check output line for short circuit.

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 8. Check harness between B-19 (terminal No. 5) intermediate connector and B-30 (terminal No. 3) alternator connector.**



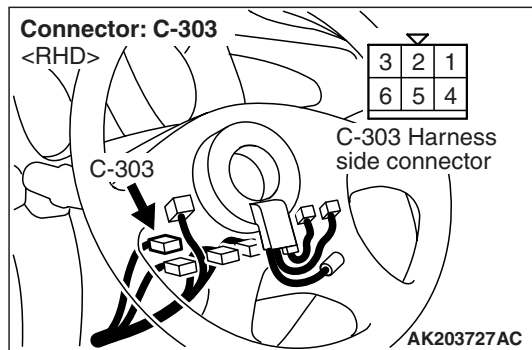
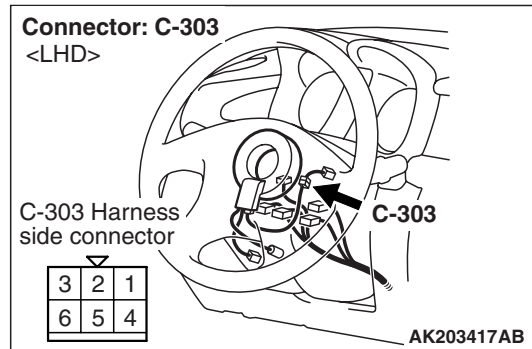
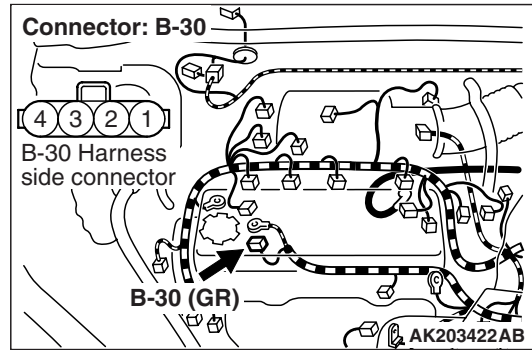
- Check power supply line for open/short circuit.

**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 9. Check harness between B-30 (terminal No. 3) alternator connector and C-303 (terminal No. 2) ignition switch connector.**



**NOTE:** Before checking harness, check intermediate connectors C-04, C-05, C-105, C-203 and C-205, and repair if necessary.

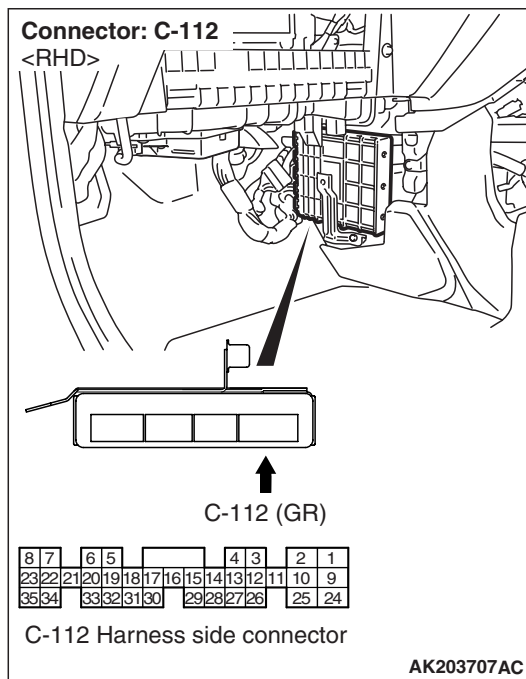
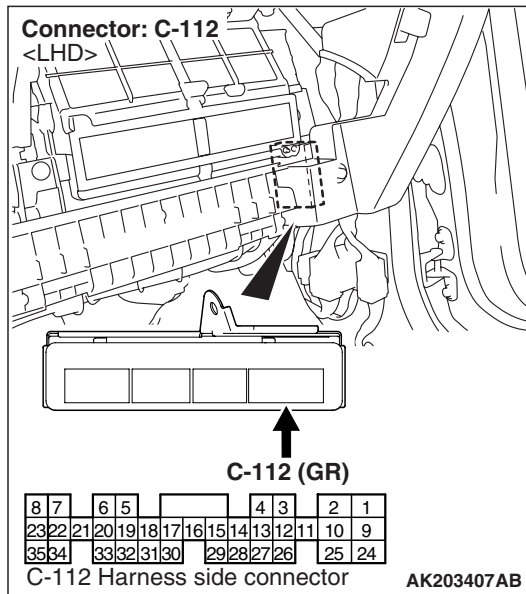
- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Replace alternator.

**NO :** Repair.

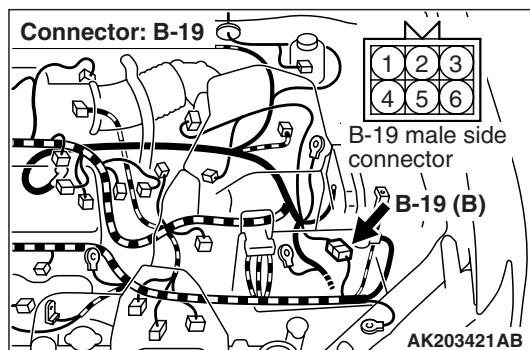
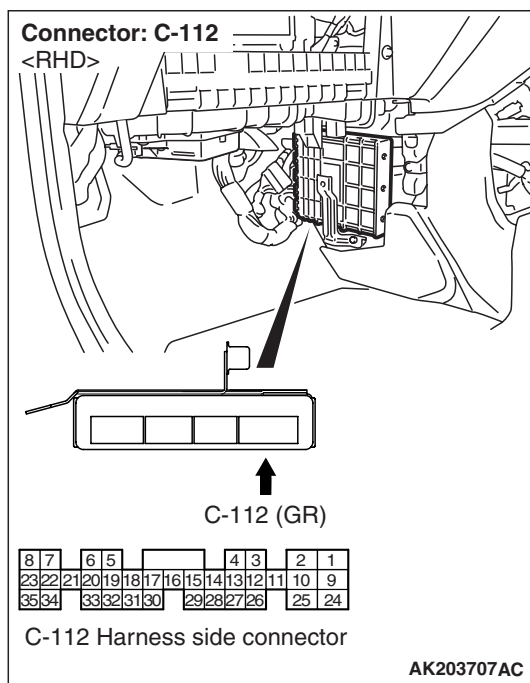
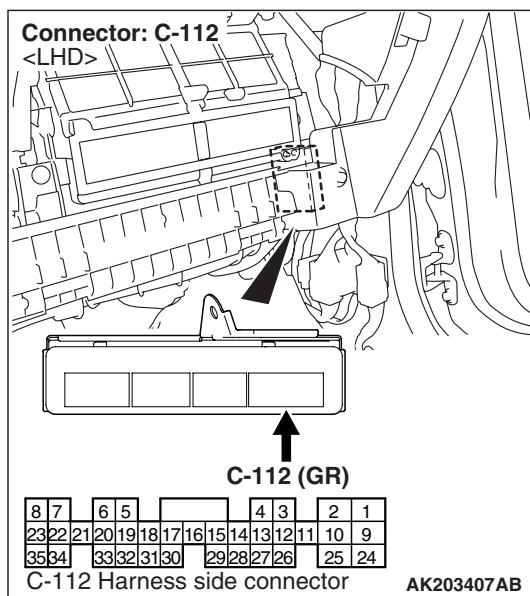
**STEP 10. Connector check: C-112  
engine-A/T-ECU connector**



**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Repair.

**STEP 11. Perform voltage measurement at C-112 engine-A/T-ECU connector.**

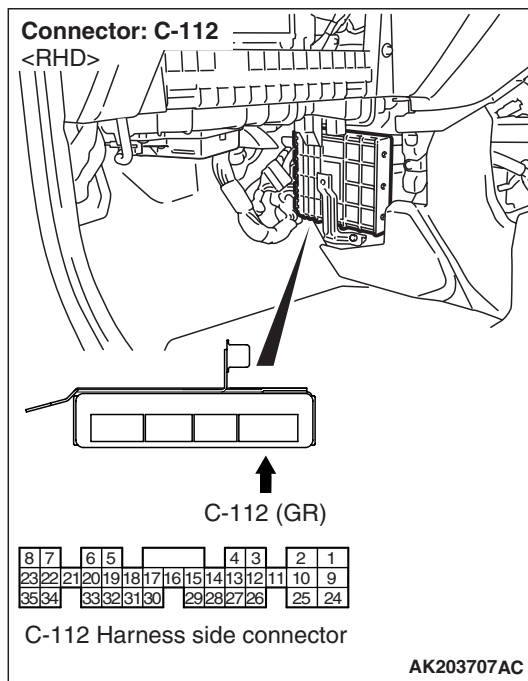
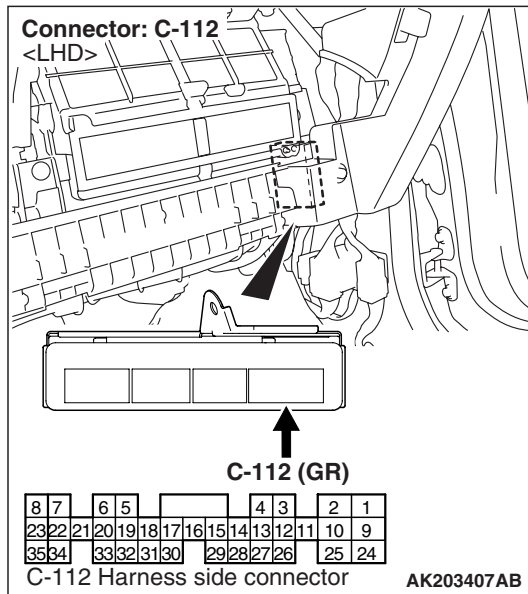
- Voltage between terminal No. 8 and earth.

**OK: System voltage****Q: Is the check result normal?****YES** : Go to Step 12 .**NO** : Check and repair harness between B-19 (terminal No. 4) intermediate connector and C-112 (terminal No. 8) engine-A/T-ECU connector.

- Check output line for short circuit.

- Disconnect connector, and measure at harness side.
- Ignition switch: ON

**STEP 12. Perform voltage measurement at C-112 engine-A/T-ECU connector.**



**STEP 13. Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace engine-A/T-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

- Measure engine-A/T-ECU terminal voltage.
- Engine: Idling after warm-up
- Selector lever position: P
- Radiator fan: Inactive
- Voltage between terminal No. 8 and earth.

**OK: Switching the headlamps to ON from OFF causes the voltage to increase by 0.2 – 3.5 V.**

**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO :** Check alternator.



---

**Inspection Procedure 20: Overheating**

---

**COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by failed engine cooling system, failed fan controller, failed engine coolant temperature sensor or other faults.

**PROBABLE CAUSE**

- Insufficient or deteriorated engine coolant
- Failed fan controller
- Failed engine coolant temperature sensor
- Failed thermostat
- Failed water pump
- Failed radiator core
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE**

---

**STEP 1. M.U.T.-II/III diagnosis code****Q: Diagnosis code set?**

**YES** : Inspection chart for diagnosis code (Refer to [P.13A-11](#)).

**NO** : Go to Step 2 .

---

**STEP 2. Check engine coolant.**

*NOTE: If engine coolant level falls too early, check for leaky spots, and repair if necessary.*

- Check engine coolant (Refer to GROUP 14 – On-vehicle Service [P.14-10](#)).

**Q: Is the check result normal?**

**YES** : Go to Step 3 .

**NO** : Replace or add engine coolant.

---

**STEP 3. M.U.T.-II/III actuator test**

- Item 21: Fan controller

**OK: Fan motor rotating**

**Q: Is the check result normal?**

**YES** : Go to Step 4 .

**NO** : Check fan control relay system (Refer to Inspection Procedure 25 [P.13A-197](#)).

---

**STEP 4. M.U.T.-II/III Data List**

- Item 21: Engine coolant temperature sensor

**OK:**

**Engine cold state: At ambient temperature (atmospheric temperature) or equivalent.**

**Engine hot state: At 80 – 120°C**

**Q: Is the check result normal?**

**YES** : Go to Step 5 .

**NO** : Check engine coolant temperature sensor system (Refer to Code No. 21 [P.13A-41](#)).

---

**STEP 5. Check thermostat.**

- Check thermostat (Refer to GROUP 14 – Thermostat [P.14-15](#)).

**Q: Is the check result normal?**

**YES** : Go to Step 6 .

**NO** : Replace thermostat.

---

**STEP 6. Check water pump.**

- Check water pump.

**Q: Is the check result normal?**

**YES** : Replace radiator.

**NO** : Replace water pump.

---

**Inspection Procedure 21: Abnormal Rotation of Fan Motor**

---

**OPERATION**

- The control (duty) signal is inputted to the fan controller (terminal No. 2) from the engine-A/T-ECU (terminal No. 18).

**FUNCTION**

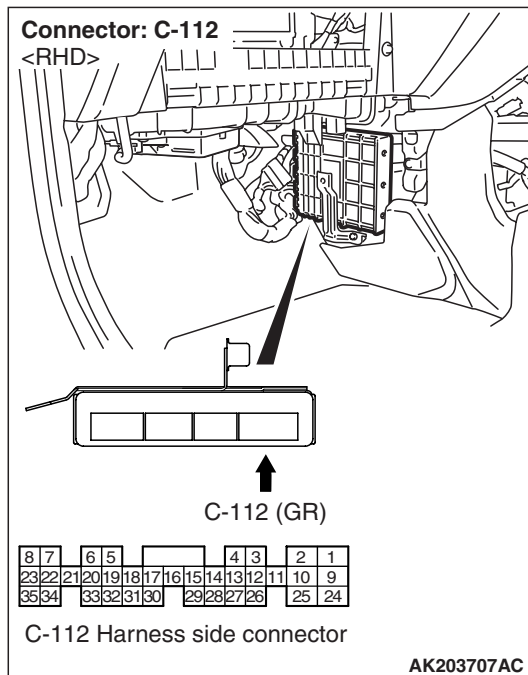
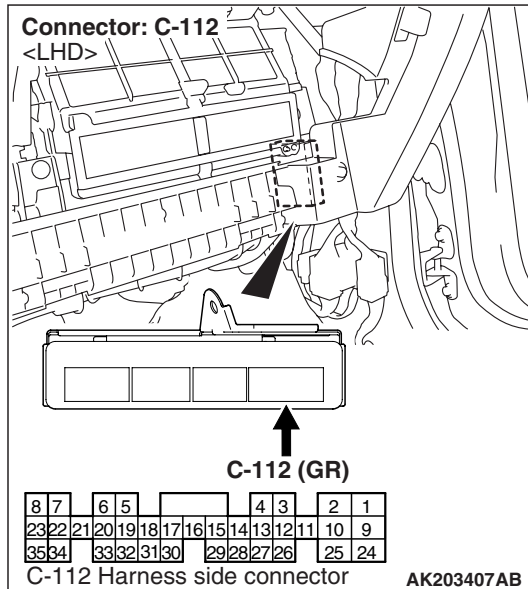
- The engine-A/T-ECU inputs a duty signal suitable for the engine coolant temperature, vehicle speed and A/C switch position to the fan controller. In response to the signal, the fan controller controls the rotating speeds of the radiator fan and A/C condenser fan (The fan speed becomes higher as the average voltage of the terminal comes nearer to 5 V).

## PROBABLE CAUSE

- Failed fan controller
- Open/short circuit in fan controller circuit or loose connector contact
- Failed engine-A/T-ECU

## DIAGNOSIS PROCEDURE

### STEP 1. Connector check: C-112 engine-A/T-ECU connector

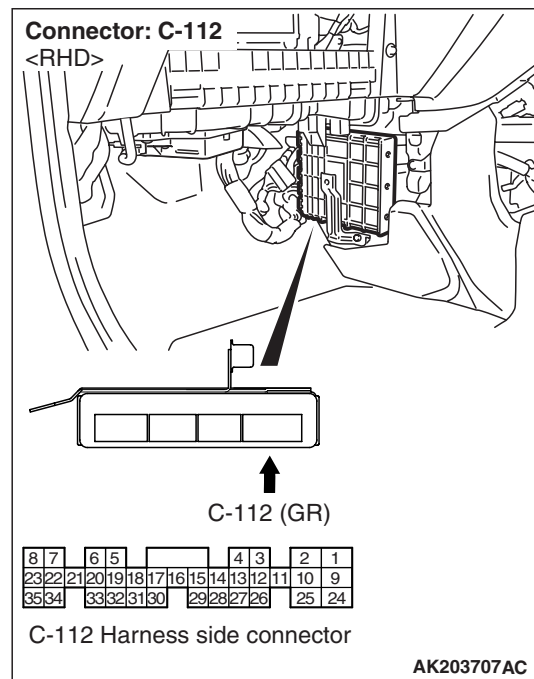
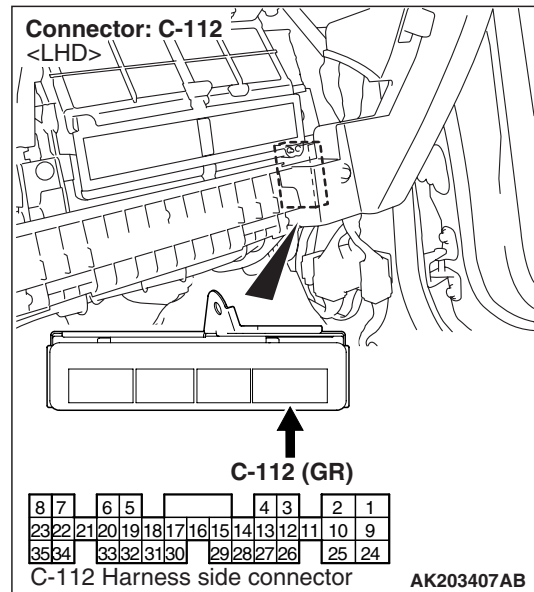


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair.

### STEP 2. Check at C-112 engine-A/T-ECU connector.



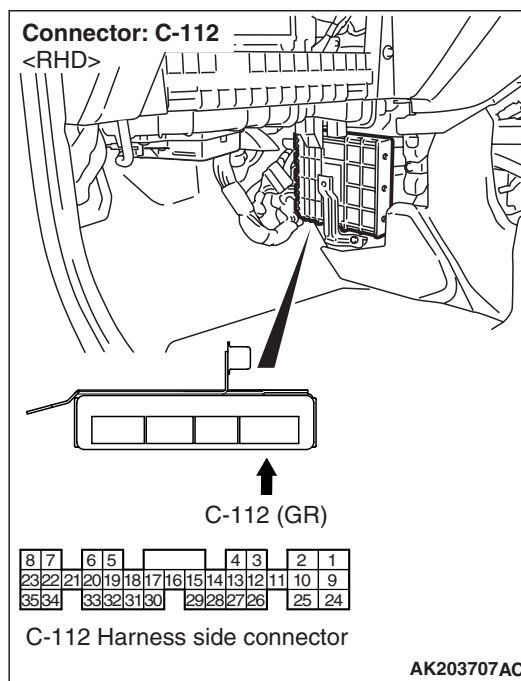
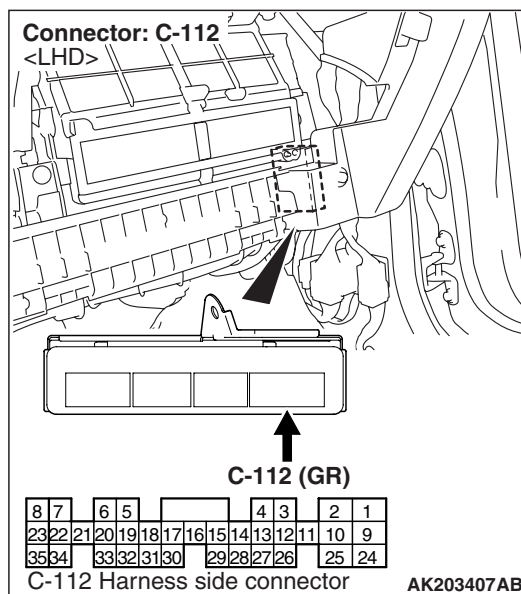
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Short-circuit terminal No. 18 to earth.

**OK: Fan motor stops rotating.**

Q: Is the check result normal?

YES : Go to Step 3 .

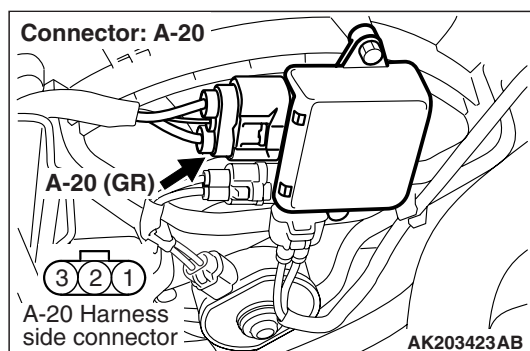
NO : Go to Step 4 .

**STEP 3. Check the trouble symptoms.****Q: Does trouble symptom persist?****YES :** Replace engine-A/T-ECU.**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).**STEP 4. Perform voltage measurement at C-112 engine-A/T-ECU connector.**

- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 18 and earth.

**OK: 4.7 – 5.1 V****Q: Is the check result normal?****YES :** Replace fan controller.**NO :** Go to Step 5 .

**STEP 5. Connector check: A-20 fan controller  
connector**



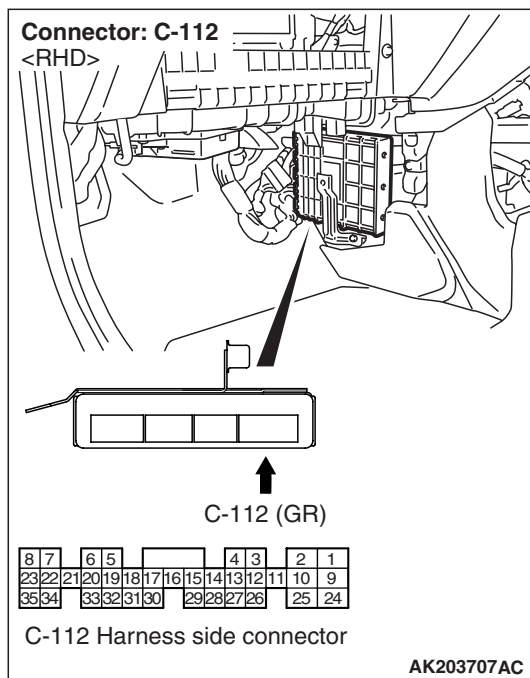
**Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Repair.

- Check output line for open circuit.

**Q: Is the check result normal?**  
**YES :** Replace fan controller.  
**NO :** Repair.



**NOTE:** Before checking harness, check intermediate connector A-14, and repair if necessary.

---

## Inspection Procedure 22: Poor A/C Performance

---

### COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by short /overcharged A/C refrigerant, failed A/C control system, failed fan control system or other faults.

### PROBABLE CAUSE

- Short or overcharged A/C refrigerant
- Failed A/C compressor
- Failed fan controller
- Failed A/C-ECU
- Failed engine-A/T-ECU

### DIAGNOSIS PROCEDURE

---

#### STEP 1. M.U.T.-II/III diagnosis code

##### Q: Diagnosis code set?

**YES** : Inspection chart for diagnosis code (Refer to [P.13A-11](#)).

**NO** : Go to Step 2 .

---

#### STEP 2. A/C compressor magnet clutch operation check.

- Engine: Idling
- A/C set temperature:  
Maximum Cool when temperature in cabin is 25°C or more  
Maximum Hot when temperature in cabin is 25°C or less

**OK:**

**Magnet clutch active (when A/C is ON)**

**Magnet clutch inactive (when A/C is OFF)**

##### Q: Is the check result normal?

**YES** : Go to Step 5 .

**NO** : Go to Step 3 .

---

#### STEP 3. M.U.T.-II/III Data List

- Item 28: A/C switch
  - a. Engine: Idling
  - b. A/C set temperature:  
Maximum Cool when temperature in cabin is 25°C or more  
Maximum Hot when temperature in cabin is 25°C or less

**OK:**

**ON (when A/C is ON)**

**OFF (when A/C is OFF)**

##### Q: Is the check result normal?

**YES** : Go to Step 4 .

**NO** : Check A/C switch (Refer to Inspection Procedure 26 [P.13A-204](#)).

---

#### STEP 4. M.U.T.-II/III Data List

- Item 49: A/C relay
  - a. Engine: Idling
  - b. A/C set temperature:  
Maximum Hot when temperature in cabin is 25°C or less  
Maximum Cool when temperature in cabin is 25°C or more

**OK:**

**ON (when A/C is ON)**

**OFF (when A/C is OFF)**

##### Q: Is the check result normal?

**YES** : Check A/C system (Refer to GROUP 55A – Troubleshooting [P.55A-5](#)).

**NO** : Check A/C compressor relay (Refer to inspection procedure 27 [P.13A-208](#)).

---

#### STEP 5. Check charged amount of A/C refrigerant.

- Check charged amount of A/C refrigerant (Refer to GROUP 55A – On-vehicle Service [P.55A-21](#)).

##### Q: Is the check result normal?

**YES** : Go to Step 6 .

**NO** : Adjust charged amount of A/C refrigerant.

---

#### STEP 6. M.U.T.-II/III actuator test

- Item 21: Fan controller

**OK: Fan motor rotates.**

##### Q: Is the check result normal?

**YES** : Check A/C load signal system (Refer to Inspection Procedure 28 [P.13A-216](#)).

**NO** : Check fan control relay system (Refer to Inspection Procedure 25 [P.13A-197](#)).



**Inspection Procedure 23: Engine-A/T-ECU Power Supply, Engine Control Relay, Ignition Switch-IG1 System****OPERATION**

- The battery voltage is applied to the engine control relay (terminal No. 3 and No. 4).
- The engine-A/T-ECU (terminal No. 49) makes the power transistor in the unit be in "ON" position and makes currents go on the engine control relay coil, and that makes the relay be in "ON" position.
- When the engine control relay is in "ON" position, the battery voltage is supplied to the engine-A/T-ECU, the sensor and the actuator from the engine control relay (terminal No. 1).

**FUNCTION**

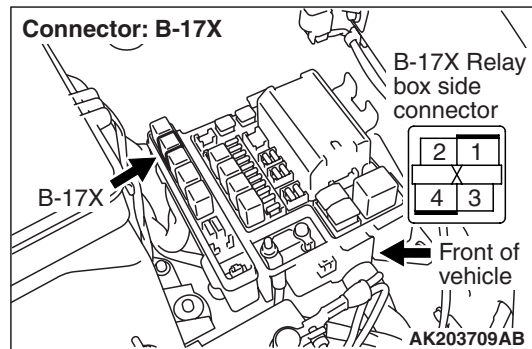
- When the ignition switch ON signal is input to the engine-A/T-ECU, the engine-A/T-ECU places the engine control relay in the "ON" position. Accordingly, the battery voltage is supplied to the engine-A/T-ECU, sensor and actuator.

**PROBABLE CAUSE**

- Failed engine control relay
- Open/short circuit in engine control relay circuit or loose connector contact
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE****STEP 1. Check battery voltage.**

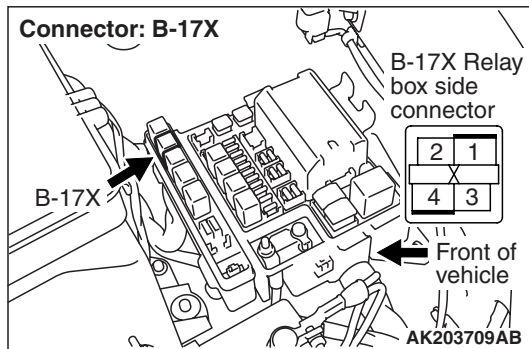
- Measure battery voltage during cranking.

**OK: 8 V or more****Q: Is the check result normal?****YES :** Go to Step 2 .**NO :** Check battery (Refer to GROUP 54A – Battery – On-vehicle Service – Battery Test [P.54A-6](#)).**STEP 2. Connector check: B-17X engine control relay connector****Q: Is the check result normal?****YES :** Go to Step 3 .**NO :** Repair.**STEP 3. Check engine control relay.**

- Check engine control relay (Refer to [P.13A-286](#)).

**Q: Is the check result normal?****YES :** Go to Step 4 .**NO :** Replace engine control relay.

**STEP 4. Perform voltage measurement at B-17X engine control relay connector.**



- Remove relay, and measure at relay box side.
- Voltage between terminal No. 3 and earth, also between terminal No. 4 and earth.

**OK: System voltage**

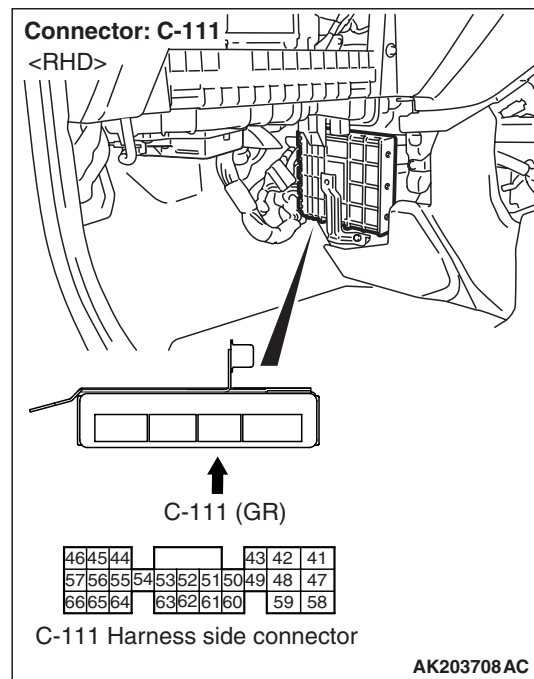
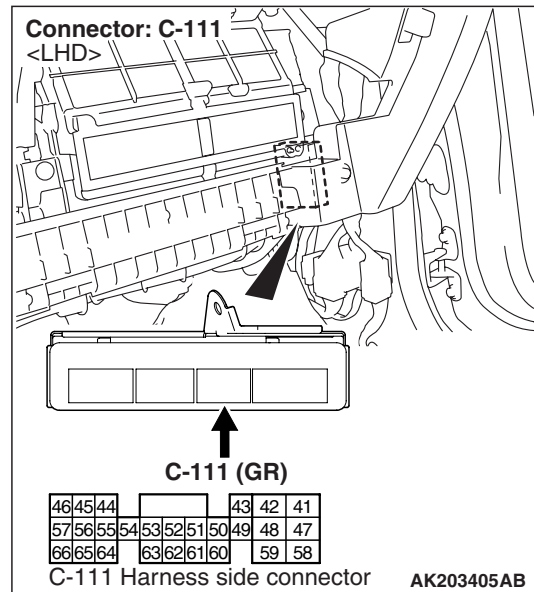
**Q: Is the check result normal?**

**YES :** Go to Step 5 .

**NO :** Check intermediate connector A-14, and repair if necessary. If intermediate connector is normal, check and repair harness between B-17X (terminal No. 4) engine control relay connector and battery, also between B-17X (terminal No. 3) engine control relay connector and battery.

- Check power supply line for open/short circuit.

**STEP 5. Perform voltage measurement at C-111 engine-A/T-ECU connector.**



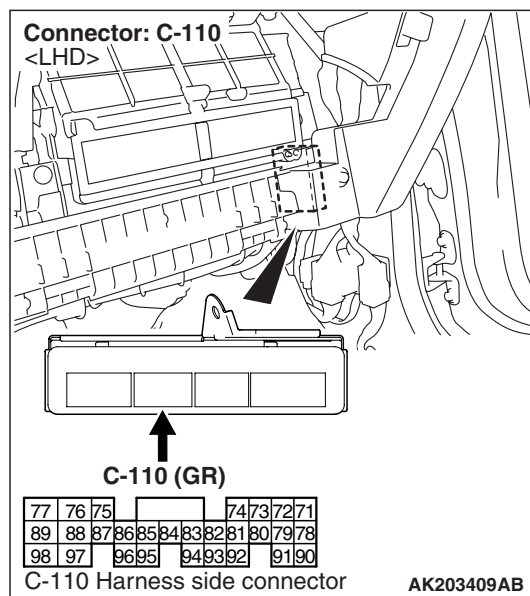
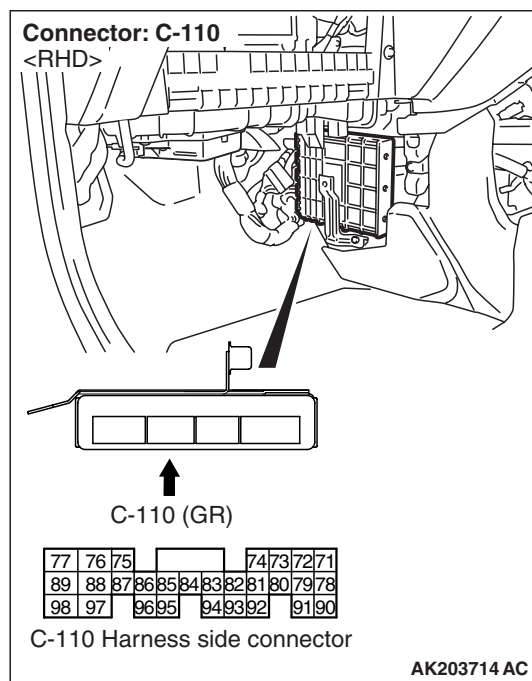
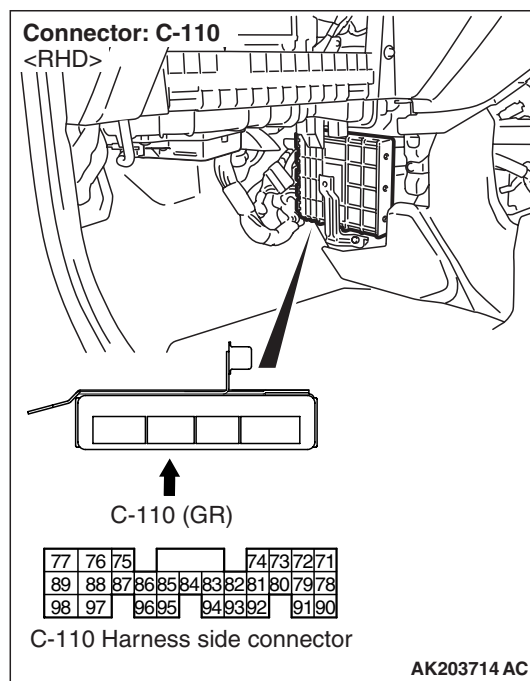
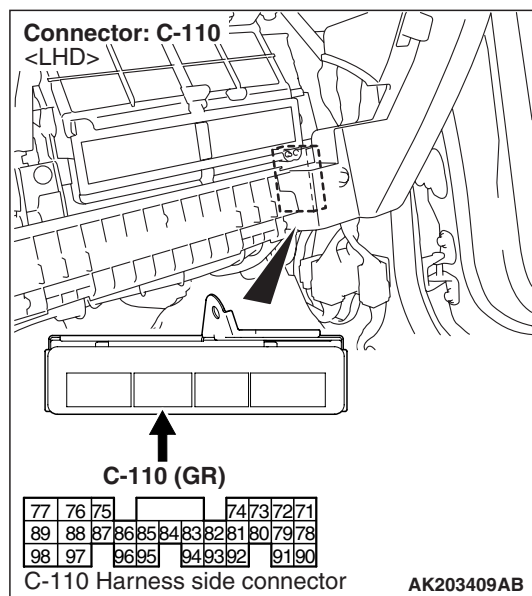
- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 41 and earth, also between terminal No. 47 and earth.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Check and repair C-111 engine-A/T-ECU connector.

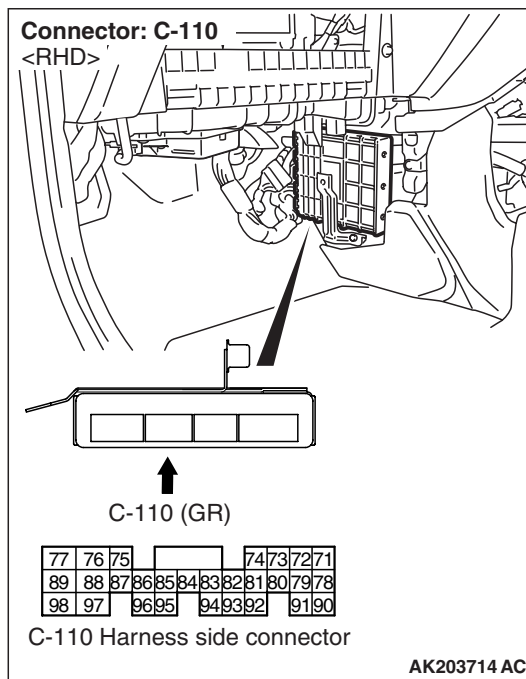
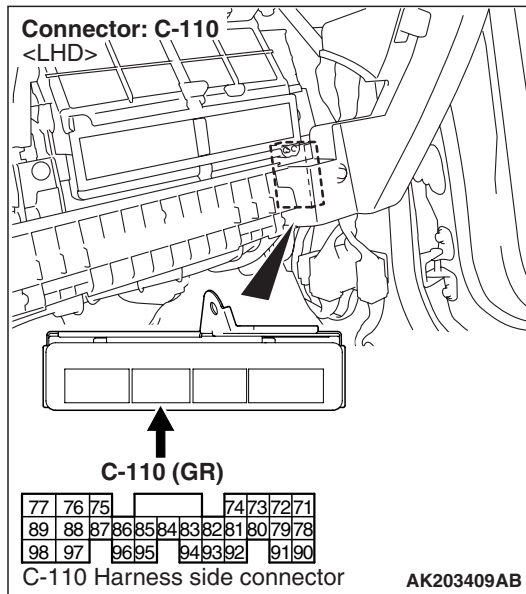
**NO :** Go to Step 6 .

**STEP 6. Connector check: C-110 engine-A/T-ECU connector****STEP 7. Perform voltage measurement at C-110 engine-A/T-ECU connector.****Q: Is the check result normal?****YES :** Go to Step 7 .**NO :** Repair.

- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 98 and earth.

**OK: System voltage****Q: Is the check result normal?****YES :** Go to Step 12 .**NO :** Go to Step 8 .

**STEP 8. Connector check: C-110 engine-A/T-ECU connector**



**Q: Is the check result normal?**  
**YES :** Go to Step 9 .  
**NO :** Repair.

**STEP 9. Check ignition switch.**

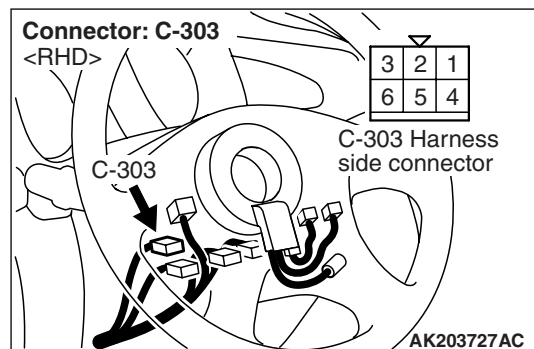
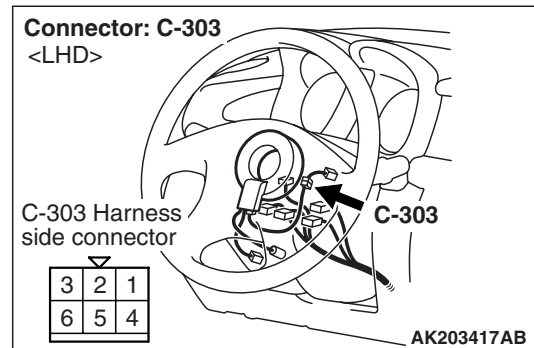
- Check ignition switch (Refer to GROUP 54A – Ignition Switch – Ignition Switch P.54A-23).

**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Replace ignition switch.

**STEP 10. Connector check: C-303 ignition switch connector**

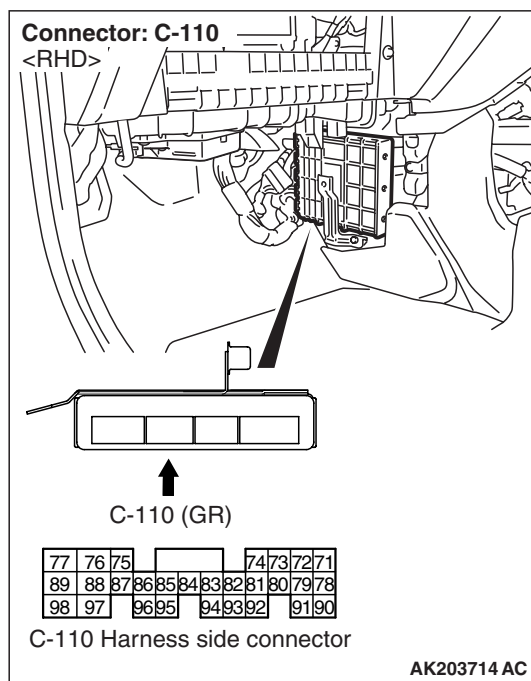
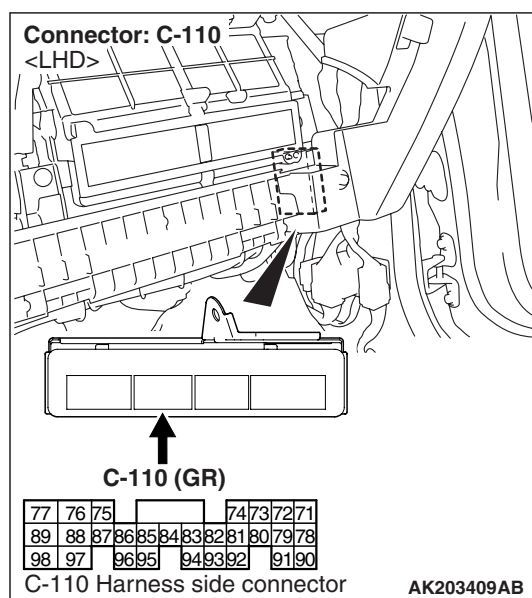
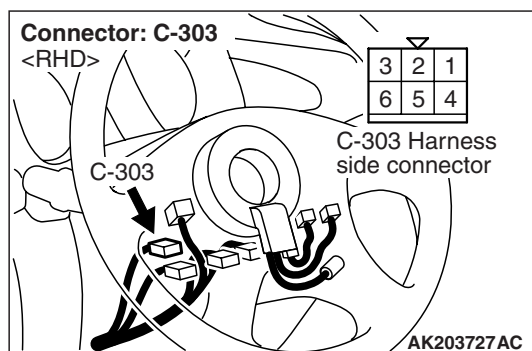
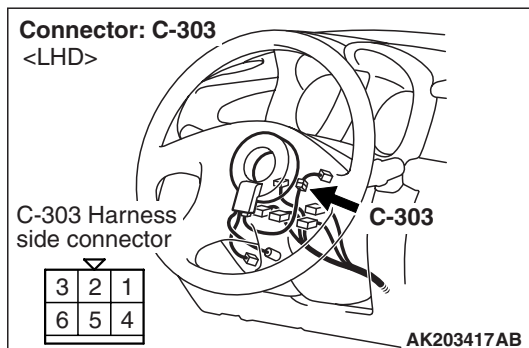


**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Repair.

**STEP 11. Check harness between C-303 (terminal No. 2) ignition switch connector and C-110 (terminal No. 98) engine-A/T-ECU connector.**



**NOTE:** Before checking harness, check intermediate connectors C-106, C-202 and C-203, and repair if necessary.

- Check output line for open/short circuit.

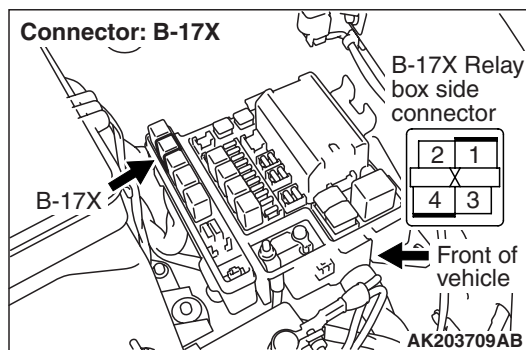
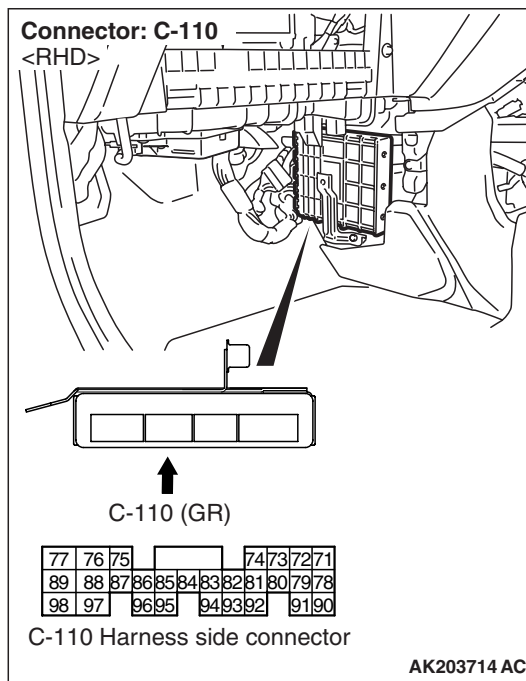
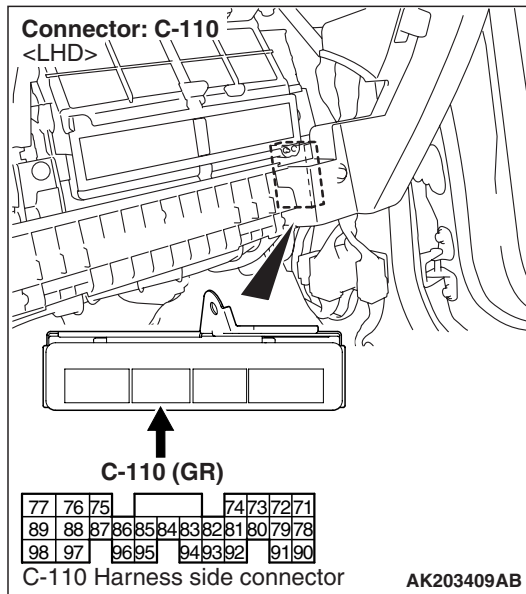
**Q: Is the check result normal?**

**YES :** Check and repair ignition switch IG1 power supply line harness and connector.

- Check power supply line for short circuit.

**NO :** Repair.

**STEP 12. Perform voltage measurement at C-110 engine-A/T-ECU connector.**



**OK: System voltage**

**Q: Is the check result normal?**

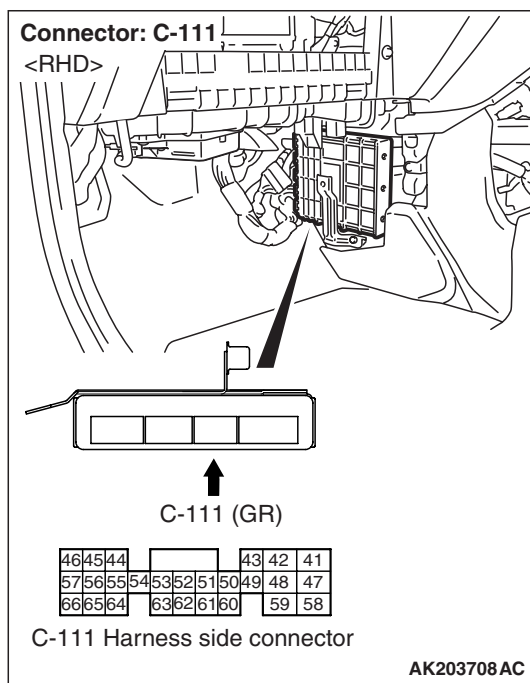
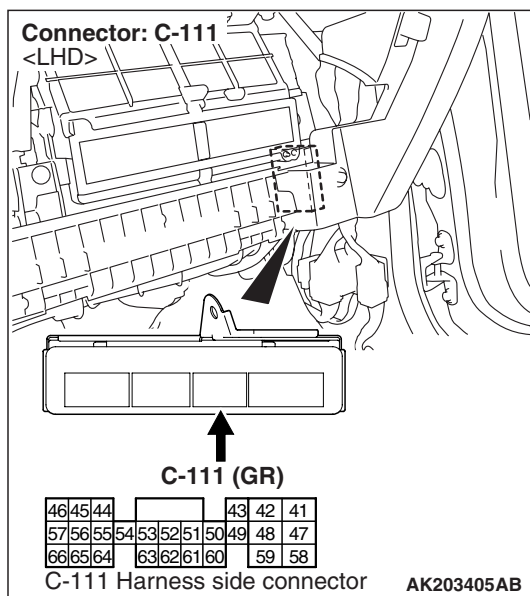
**YES :** Go to Step 13 .

**NO :** Check and repair harness between B-17X (terminal No. 2) engine control relay connector and C-110 (terminal No. 49) engine-A/T-ECU connector

- Check earthing line for open/short circuit.

- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: OFF
- Voltage between terminal No. 49 and earth.



**STEP 13. Perform voltage measurement at C-111 engine-A/T-ECU connector.**

- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 49 and earth.

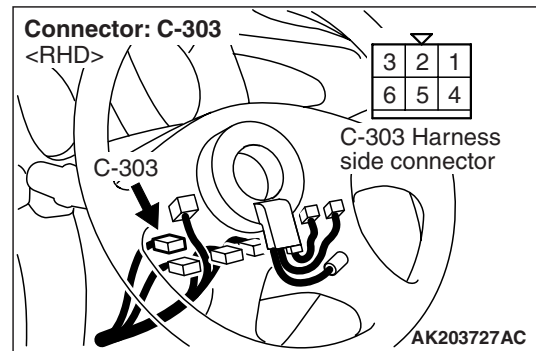
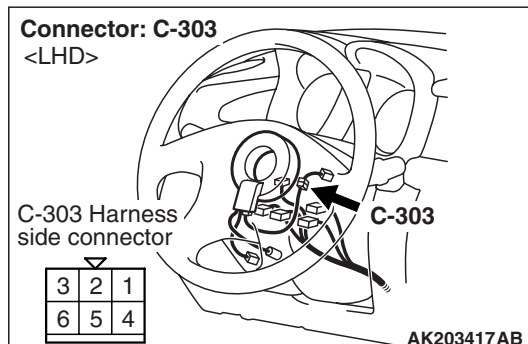
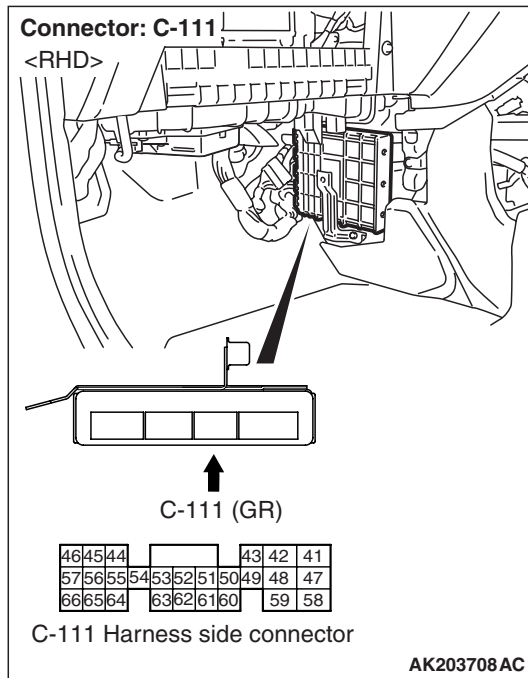
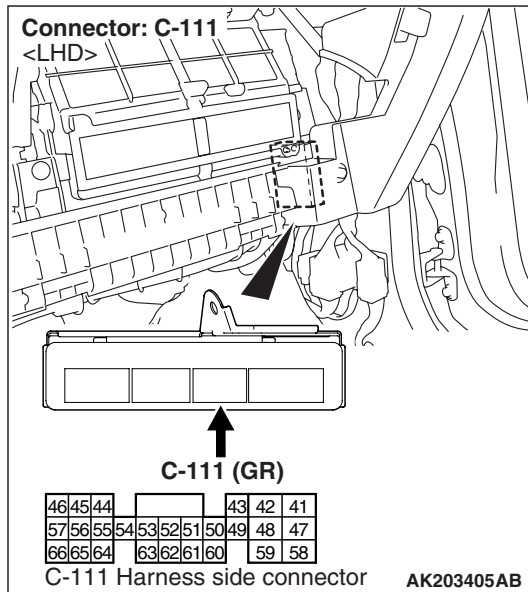
**OK: 1 V or less**

**Q: Is the check result normal?**

**YES :** Go to Step 17 .

**NO :** Go to Step 14 .

**STEP 14. Connector check: C-111  
engine-A/T-ECU connector, C-303 ignition switch  
connector**

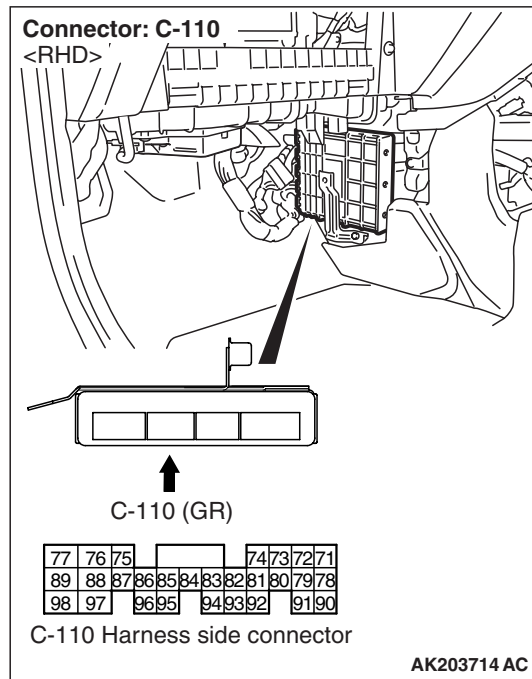
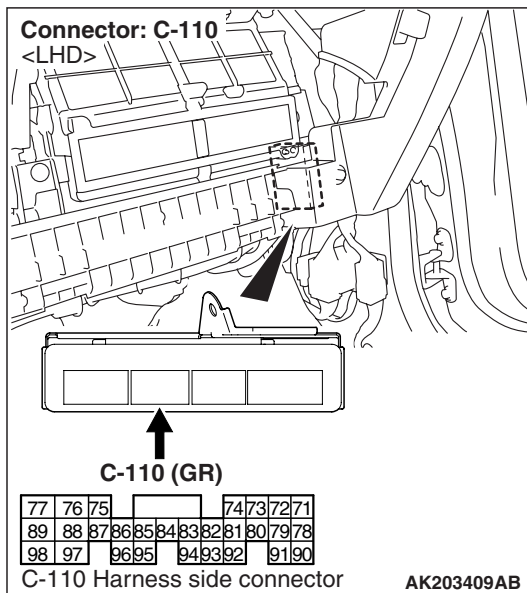
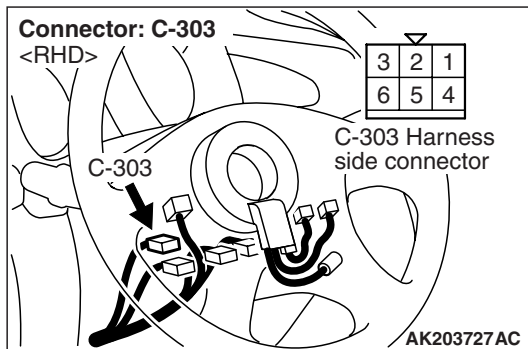
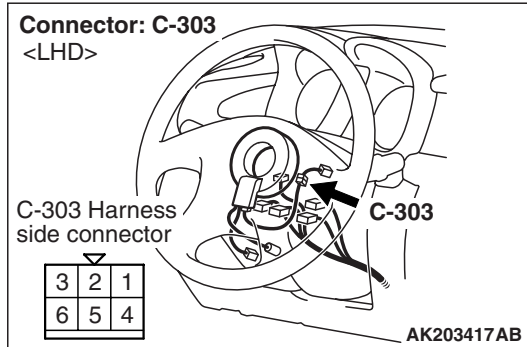


**Q: Is the check result normal?**

**YES :** Go to Step 15 .

**NO :** Repair.

**STEP 15. Check harness between C-303 (terminal No. 2) ignition switch connector and C-110 (terminal No. 98) engine-A/T-ECU connector.**



**NOTE:** Before checking harness, check intermediate connectors C-106, C-202 and C-203, and repair if necessary.

- Check output line for open/short circuit.

**Q: Is the check result normal?**

**YES :** Go to Step 16 .

**NO :** Repair.

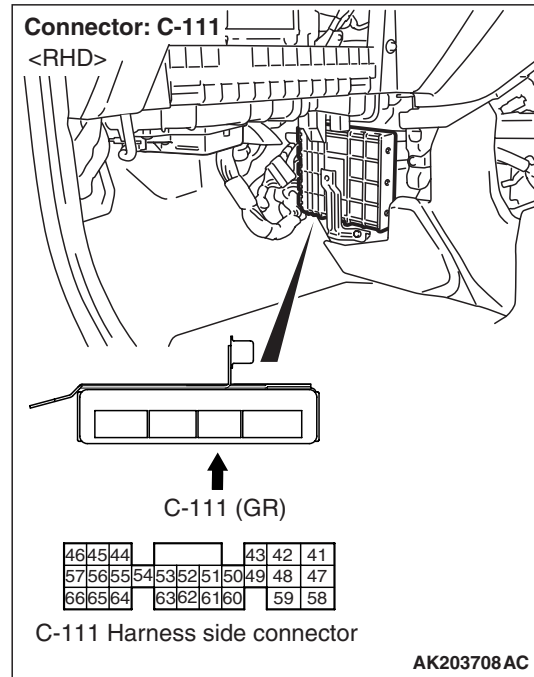
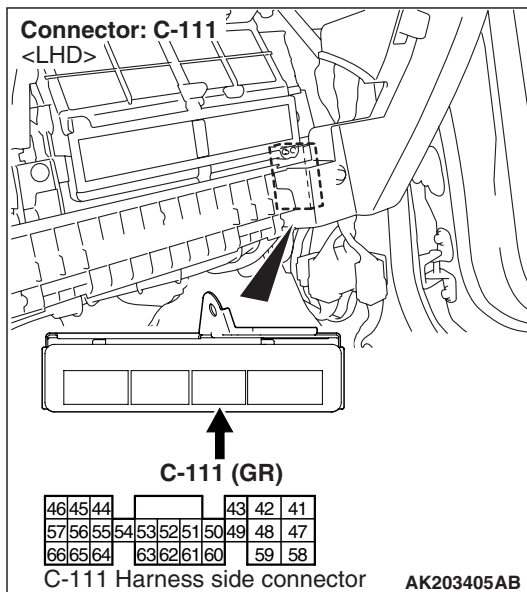
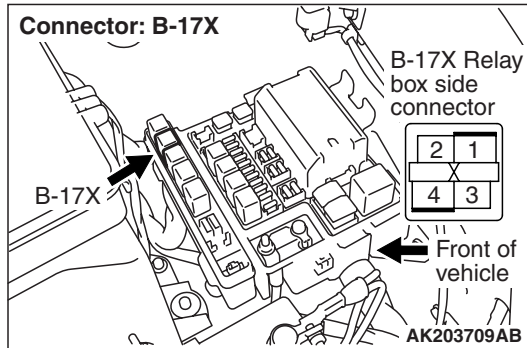
**STEP 16. Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace engine-A/T-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**STEP 17. Check harness between B-17X (terminal No. 1) engine control relay connector and C-111 (terminal No. 41) engine-A/T-ECU connector, also between B-17X (terminal No. 1) engine control relay connector and C-111 (terminal No. 47) engine-A/T-ECU connector.**



**NOTE:** Before checking harness, check intermediate connector C-17, and repair if necessary.

- Check output line for open/short circuit and damage.

**Q: Is the check result normal?**

**YES :** Go to Step 18 .

**NO :** Repair.

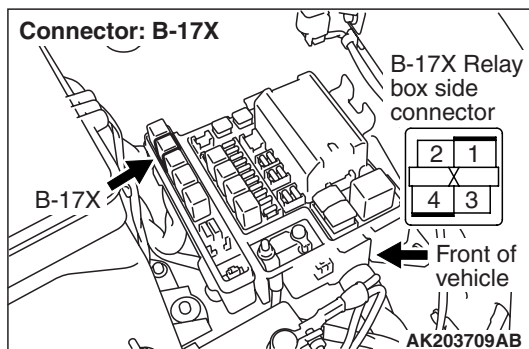
**STEP 18. Check engine control relay output power supply harness and connector for short circuit.**

**Q: Is the check result normal?**

**YES :** Go to Step 19 .

**NO :** Repair.

**STEP 19. Check harness between B-17X (terminal No. 3) engine control relay connector and battery, also between B-17X (terminal No. 4) engine control relay connector and battery.**



**NOTE:** Before checking harness, check intermediate connector A-14, and repair if necessary.

- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 20 .

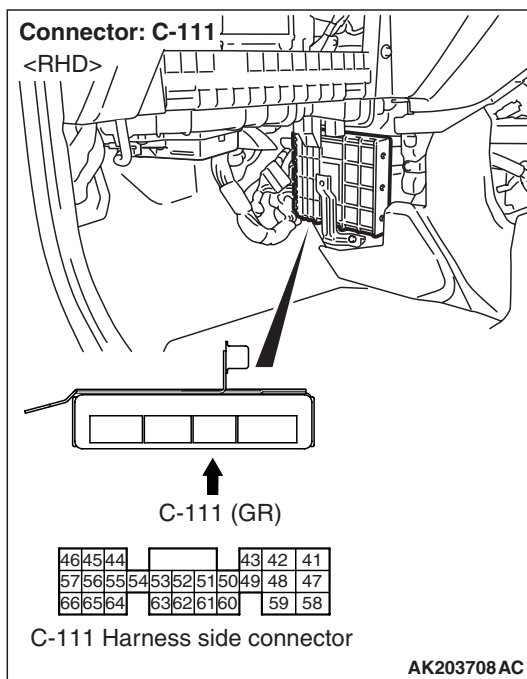
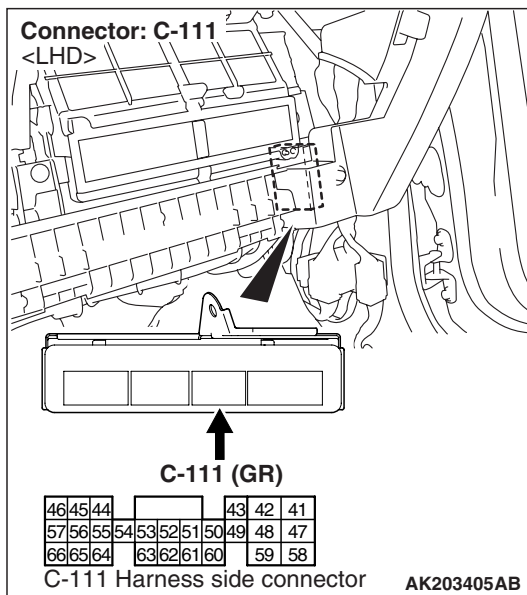
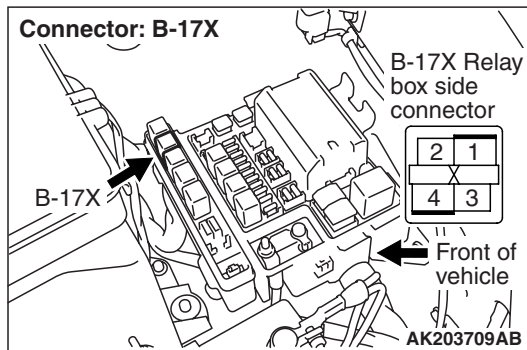
**NO :** Repair.

**STEP 20. Check harness between B-17X (terminal No. 2) engine control relay connector and C-111 (terminal No. 49) engine-A/T-ECU connector.**

**Q: Is the check result normal?**

**YES :** Go to Step 16 .

**NO :** Repair.



- Check earthing line for damage.



**Inspection Procedure 24: Fuel Pump System****OPERATION**

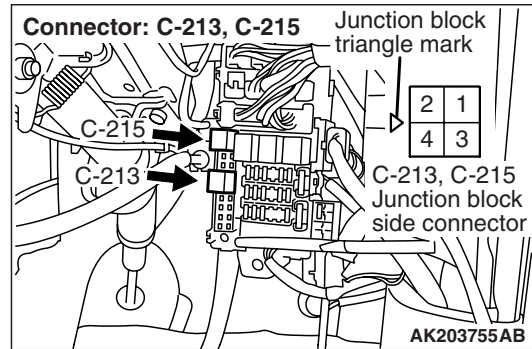
- The battery voltage is applied to the fuel pump relay (1) (terminal No. 3) from the ignition switch and is earthed to the vehicle body from the fuel pump relay (1) (terminal No. 2).
- The battery voltage is applied to the fuel pump relay (1) (terminal No. 4) and to the fuel pump relay (2) (terminal No. 1) from the fuel pump relay (1) (terminal No. 1).
- The battery voltage is applied to the fuel pump relay (2) (terminal No. 3) from the ignition switch. The engine-A/T-ECU (terminal No. 20 <Vehicle without immobilizer system>, No. 21 <Vehicle with immobilizer system>) makes the power transistor in the unit be in "ON" position and makes currents go on the fuel pump relay (2) coil, and that makes the relay be in "ON" position.
- When the fuel pump relay (2) is in "ON" position, the battery voltage is supplied to the fuel pump (low pressure) from the fuel pump relay (2) (terminal No. 3).

**FUNCTION**

- When the ignition switch ON signal is input to the engine-A/T-ECU, the engine-A/T-ECU places the fuel pump relay in the "ON" position. Accordingly, the battery voltage is supplied to the fuel pump.

**PROBABLE CAUSE**

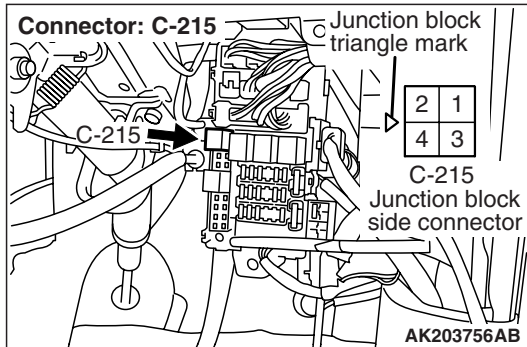
- Failed fuel pump relay
- Failed fuel pump
- Open/short circuit in fuel pump drive circuit or loose connector contact
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE****STEP 1. Connector check: C-215 fuel pump relay (1) connector and C-213 fuel pump relay (2) connector****Q: Is the check result normal?****YES :** Go to Step 2 .**NO :** Repair.**STEP 2. Check fuel pump relay.**

- Fuel pump relay continuity check (Refer to [P.13A-286](#)).

**Q: Is the check result normal?****YES :** Go to Step 3 .**NO :** Replace fuel pump relay.

**STEP 3. Perform resistance measurement at C-215 fuel pump relay (1) connector.**



- Remove relay, and measure at junction block side.
- Resistance between terminal No. 2 and earth.

**OK: 2  $\Omega$  or less**

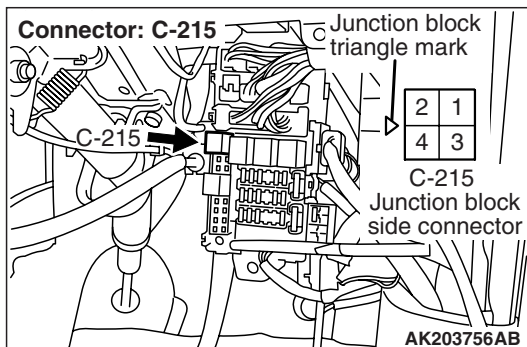
**Q: Is the check result normal?**

**YES :** Go to Step 4 .

**NO :** Check intermediate connector C-205, and repair if necessary. If intermediate connector is normal, check and repair harness between C-215 (terminal No. 2) fuel pump relay (1) connector and body earth.

- Check earthing line for open circuit and damage.

**STEP 4. Perform voltage measurement at C-215 fuel pump relay (1) connector.**



- Remove relay, and measure at junction block side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

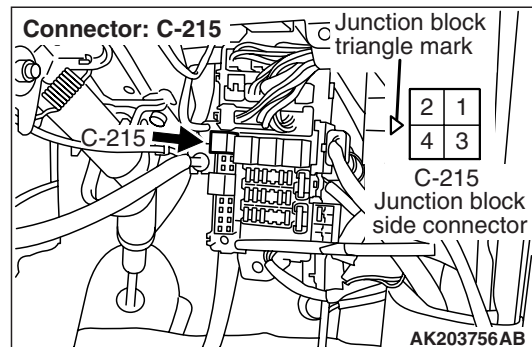
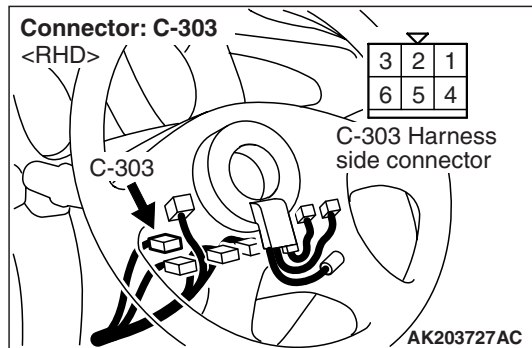
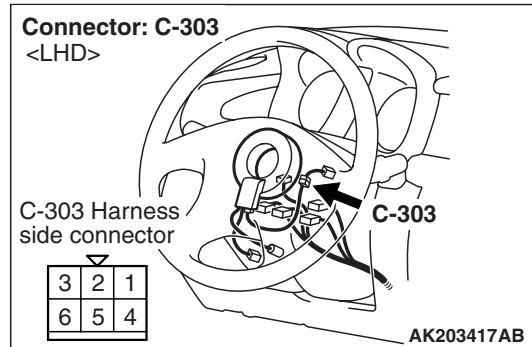
**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Go to Step 5 .

**STEP 5. Connector check: C-303 ignition switch connector**

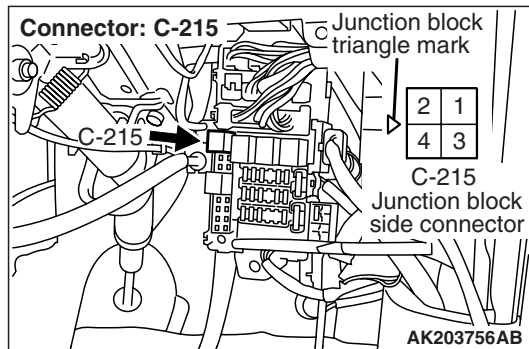


**Q: Is the check result normal?**

**YES :** Check intermediate connector C-203, and repair if necessary. If intermediate connector is normal, check and repair harness between C-215 (terminal No. 3) fuel pump relay (1) connector and C-303 (terminal No. 2) ignition switch connector.

- Check power supply line for open circuit and damage.

**NO :** Repair.

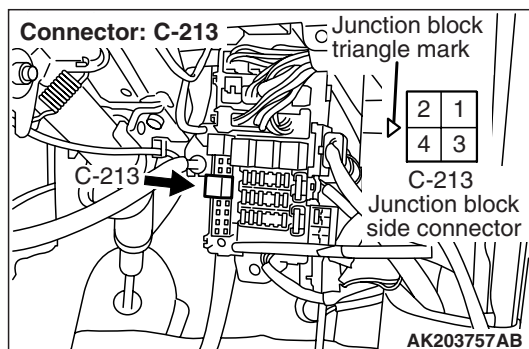
**STEP 6. Perform voltage measurement at C-215 fuel pump relay (1) connector.**

- Remove relay, and measure at junction block side.
- Voltage between terminal No. 4 and earth.

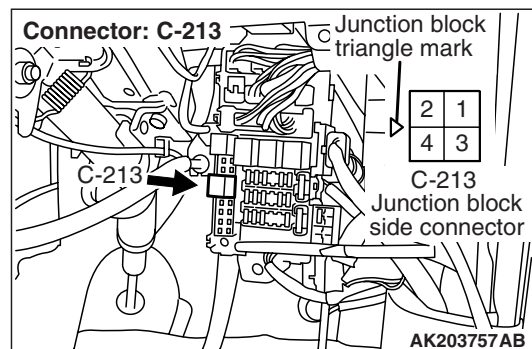
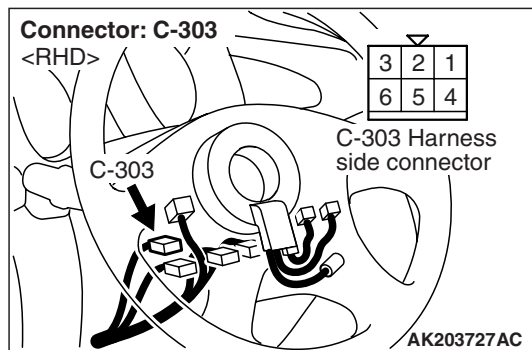
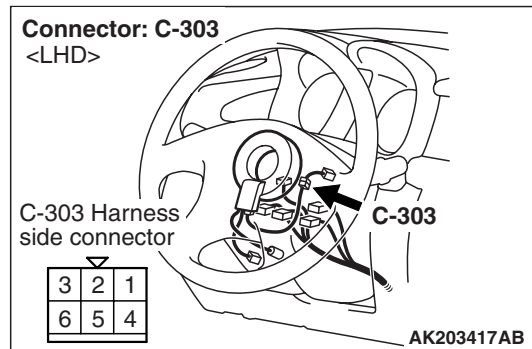
**OK: System voltage****Q: Is the check result normal?****YES :** Go to Step 7 .

**NO :** Check intermediate connectors C-116 and C-202, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-215 (terminal No. 4) fuel pump relay (1) connector and battery.

- Check power supply line for open/short circuit.

**STEP 7. Perform voltage measurement at C-213 fuel pump relay (2) connector.**

- Remove relay, and measure at junction block side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

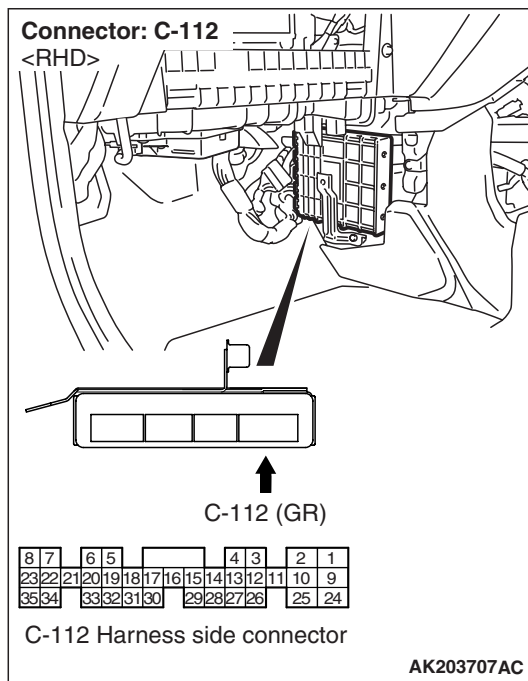
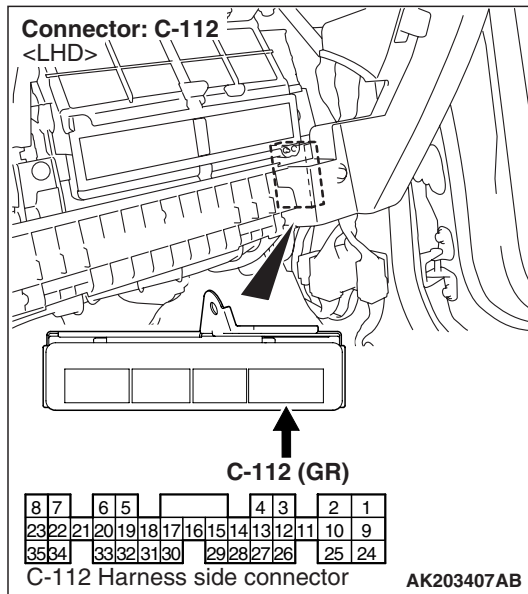
**OK: System voltage****Q: Is the check result normal?****YES :** Go to Step 9 .**NO :** Go to Step 8 .**STEP 8. Connector check: C-303 Ignition switch connector****Q: Is the check result normal?**

**YES :** Check intermediate connector C-203, and repair if necessary. If intermediate connector is normal, check and repair harness between C-303 (terminal No. 2) ignition switch connector and C-213 (terminal No. 3) fuel pump relay (2) connector.

- Check power supply line for open/short circuit.

**NO :** Repair.

**STEP 9. Connector check: C-112 engine-A/T-ECU connector**

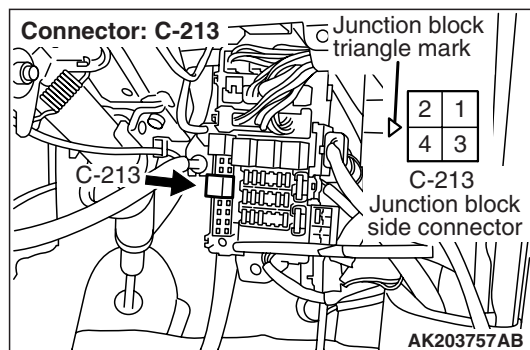
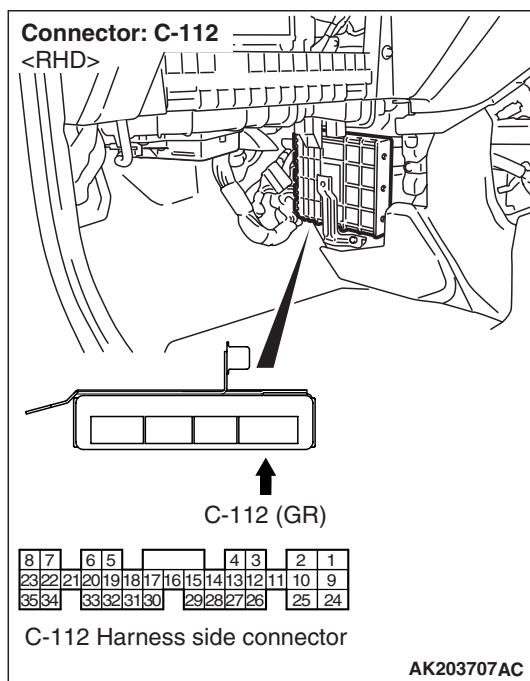
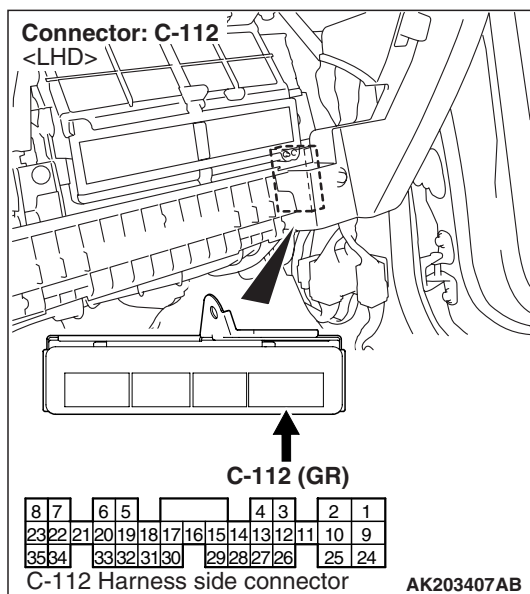


**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Repair.

**STEP 10. Perform voltage measurement at C-112 engine-A/T-ECU connector.**



- Disconnect connector, and measure at harness side.
- Ignition switch: ON

- Voltage between terminal No. 21 and earth.

### OK: System voltage

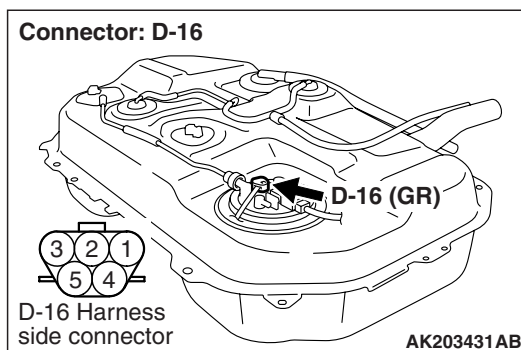
**Q: Is the check result normal?**

**YES : . Go to Step 11 .**

**NO :** . Check intermediate connectors C-106 and C-205, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-213 (terminal No. 2) fuel pump relay (2) connector and C-112 (terminal No. 21) engine-A/T-ECU connector.

- Check earthing line for open/short circuit.

### STEP 11. Connector check: D-16 fuel pump connector

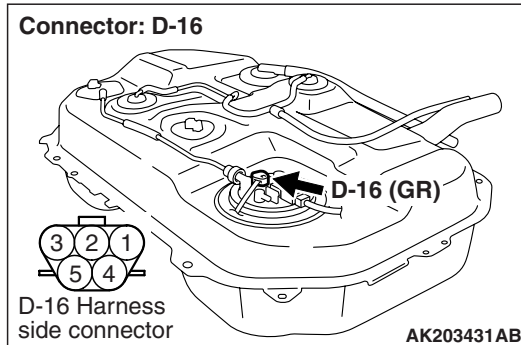


**Q: Is the check result normal?**

**YES :** Go to Step 12 .

**NO : Repair.**

**STEP 12. Perform voltage measurement at D-16 fuel pump connector.**



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Using a jumper wire, connect C-112 (terminal No. 21) engine-A/T-ECU connector and earth.
- Voltage between terminal No. 5 and earth.

### OK: System voltage

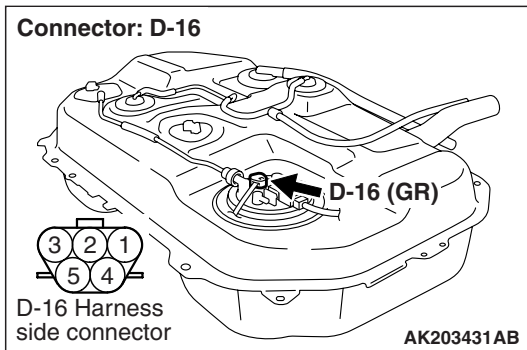
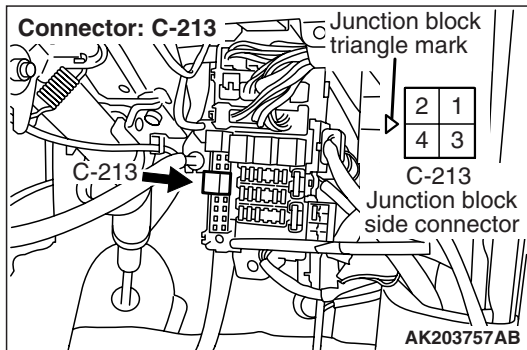
**Q: Is the check result normal?**

**YES : . Go to Step 14 .**

**NO : . Go to Step 13 .**



**STEP 13. Check harness between C-213 (terminal No. 4) fuel pump relay (2) connector and D-16 (terminal No. 5) fuel pump connector.**



**NOTE:** Before checking harness, check intermediate connector C-209 and D-23, and repair if necessary.

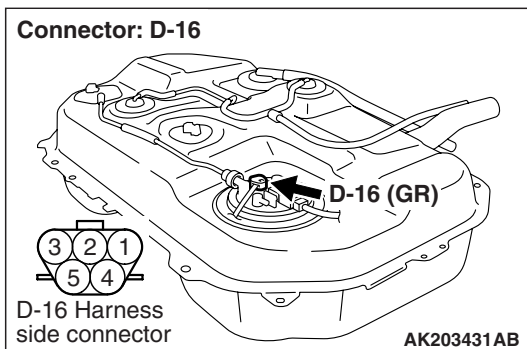
- Check output line for open/short circuit.

**Q: Is the check result normal?**

**YES :** Replace engine-A/T-ECU.

**NO :** Repair.

**STEP 14. Perform resistance measurement at D-16 fuel pump connector.**



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 4 and earth.

**OK: 2  $\Omega$  or less**

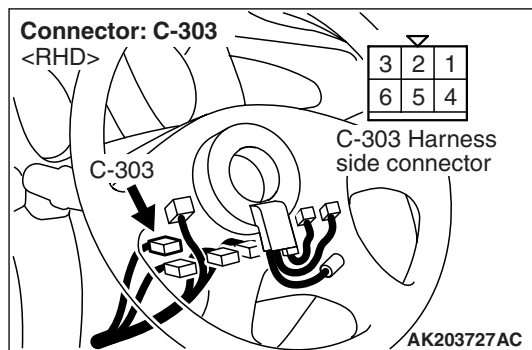
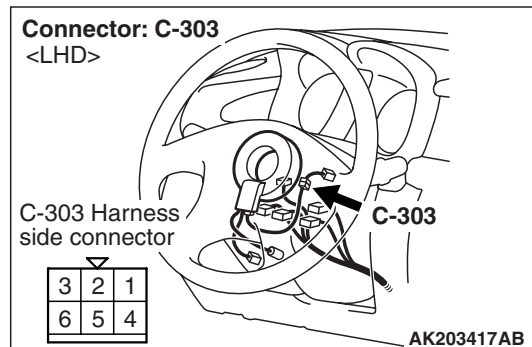
**Q: Is the check result normal?**

**YES :** Go to Step 15 .

**NO :** Check intermediate connector D-23, and repair if necessary. If intermediate connector is normal, check and repair harness between D-16 (terminal No. 4) fuel pump connector and body earth.

- Check earthing line for open circuit and damage.

**STEP 15. Connector check: C-303 ignition switch connector**



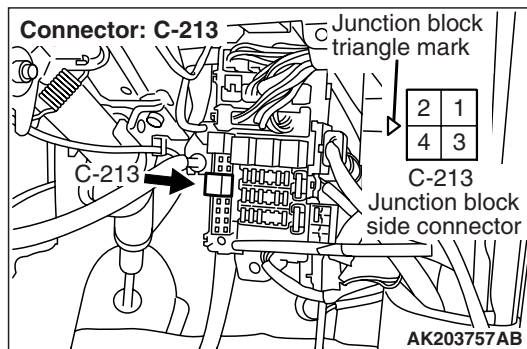
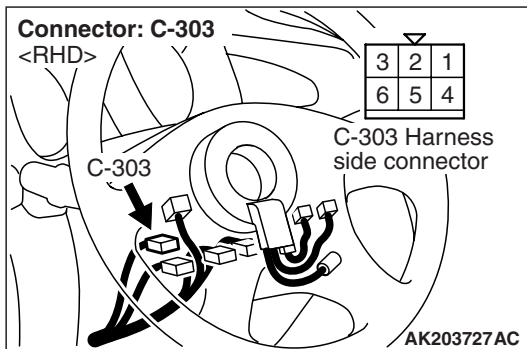
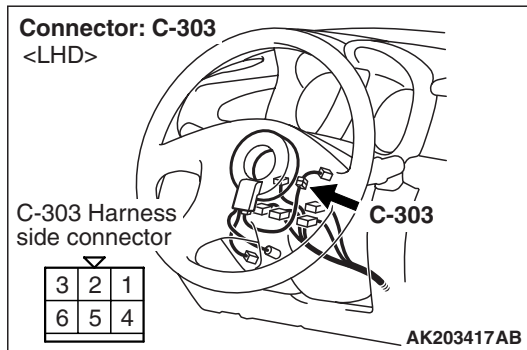
**Q: Is the check result normal?**

**YES :** Go to Step 16 .

**NO :** Repair.



**STEP 16. Check harness between C-303 (terminal No. 2) ignition switch connector and C-215 (terminal No. 3) fuel pump relay (1) connector.**



**NOTE:** Before checking harness, check intermediate connector C-203, and repair if necessary.

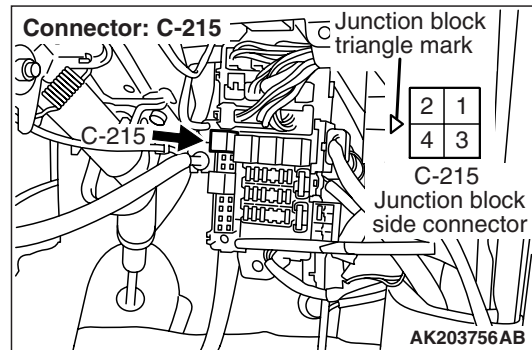
- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 17 .

**NO :** Repair.

**STEP 17. Check harness between battery and C-215 (terminal No. 4) fuel pump relay (1) connector.**



**NOTE:** Before checking harness, check intermediate connector C-202, and repair if necessary.

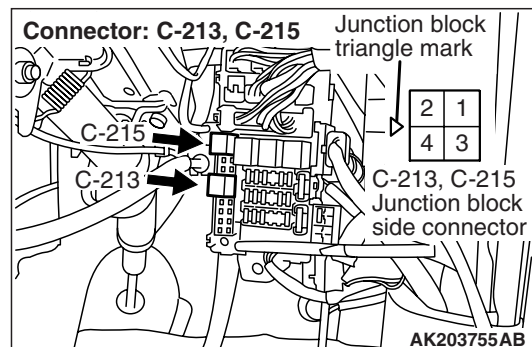
- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 18 .

**NO :** Repair.

**STEP 18. Check harness between C-215 (terminal No. 1) fuel pump relay (1) connector and C-213 (terminal No. 1) fuel pump relay (2) connector.**



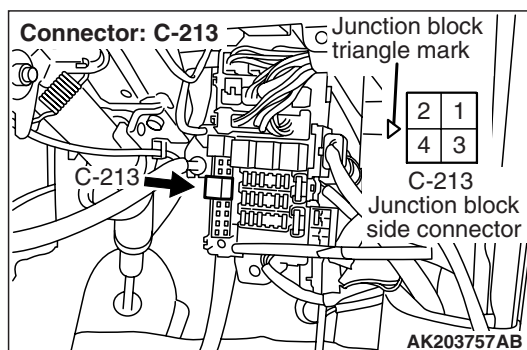
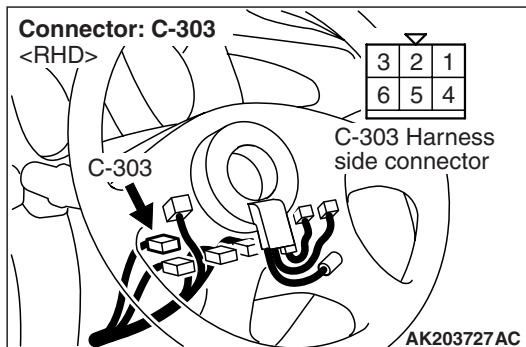
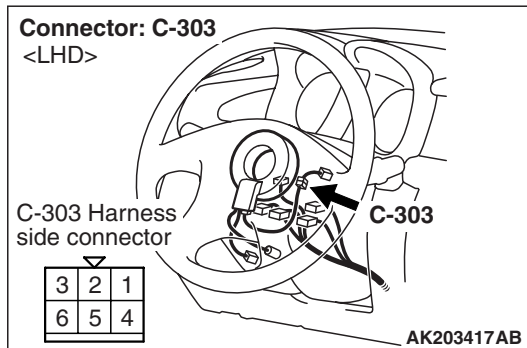
- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 19 .

**NO :** Repair.

**STEP 19. Check harness between C-303 (terminal No. 2) ignition switch connector and C-213 (terminal No. 3) fuel pump relay (2) connector.**



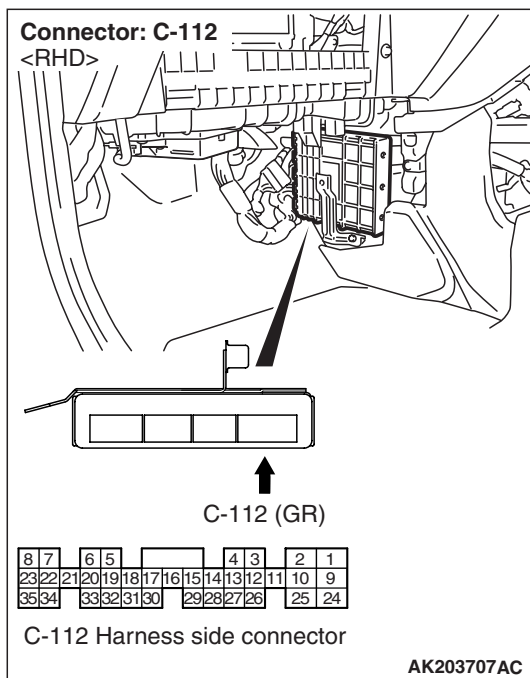
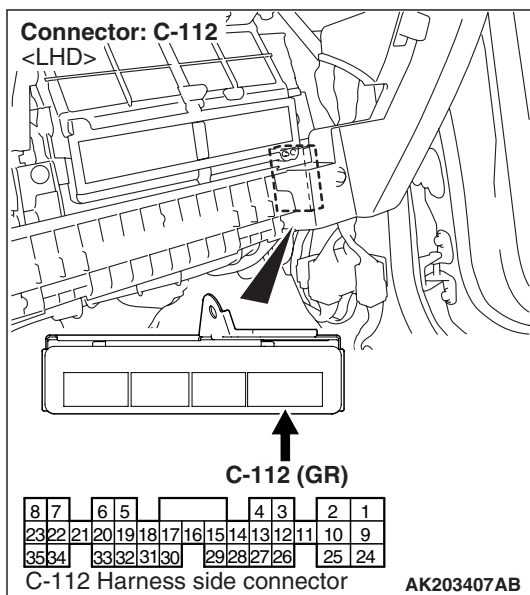
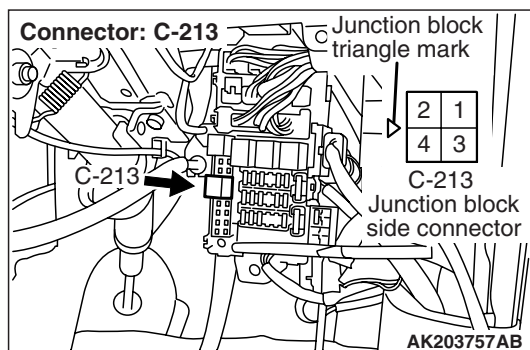
- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 20 .

**NO :** Repair.

**STEP 20. Check harness between C-213 (terminal No. 3) fuel pump relay (2) connector and C-112 (terminal No. 21) engine-A/T-ECU connector.**



**NOTE:** Before checking harness, check intermediate connectors C-106 and C-205, and repair if necessary.

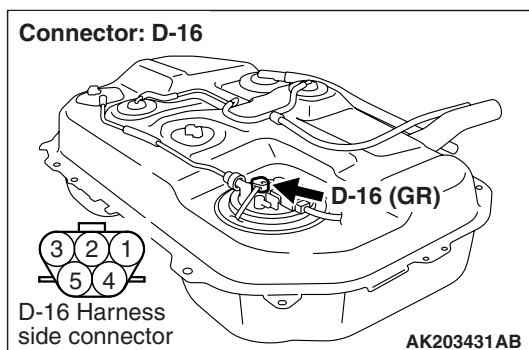
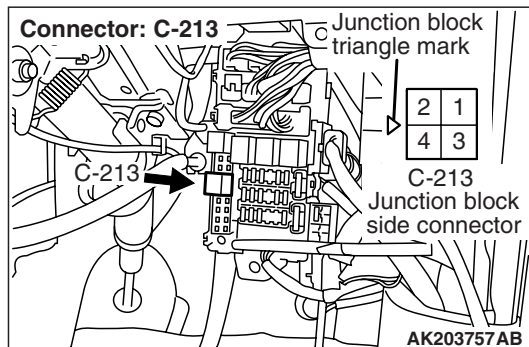
- Check earthing line for open/short circuit.

**Q: Is the check result normal?**

**YES :** Go to Step 21 .

**NO :** Repair.

**STEP 21. Check harness between C-213 (terminal No. 3) fuel pump relay (2) connector and D-16 (terminal No. 5) fuel pump connector.**



**NOTE:** Before checking harness, check intermediate connectors D-23 and C-205, and repair if necessary.

- Check output line for open/short circuit.

**Q: Is the check result normal?**

**YES :** Replace fuel pump.

**NO :** Repair.

## Inspection Procedure 25: Fan Control Relay System

### OPERATION

- The battery voltage is applied to the fan control relay (terminal No. 1) from the engine control relay (terminal No. 1) and is earthed to the vehicle body from the fan control relay (terminal No. 3).
- The battery voltage is applied to the fan control relay (terminal No. 4).
- When the fan control relay is in "ON" position, the battery voltage is supplied to the fan controller (terminal No. 3) from the fan control relay (terminal No. 2).

### FUNCTION

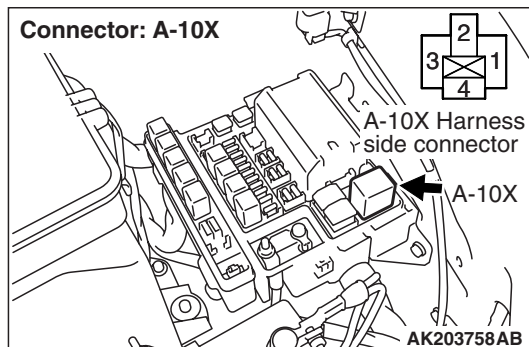
- When the engine control relay is in "ON" position, the fan control relay is also simultaneously placed in "ON" position. Accordingly, the battery voltage is supplied to the fan controller.

### PROBABLE CAUSE

- Failed fan control relay
- Failed fan controller
- Failed radiator fan motor
- Failed condenser fan motor
- Open/short circuit in fan control relay circuit or loose connector contact
- Failed engine-A/T-ECU

### DIAGNOSIS PROCEDURE

#### STEP 1. Connector check: A-10X fan control relay connector



**Q: Is the check result normal?**

**YES :** Go to Step 2 .

**NO :** Repair.

#### STEP 2. Check fan control relay.

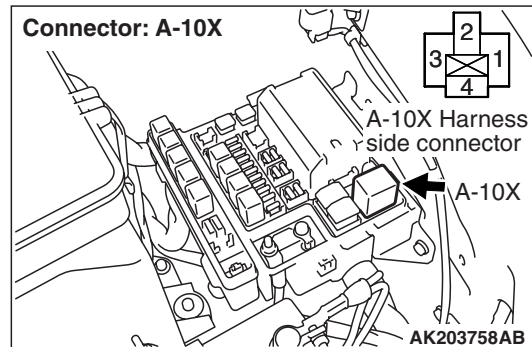
- Check fan control relay (Refer to GROUP 14 – On-Vehicle Service [P.14-12](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Replace fan control relay.

#### STEP 3. Perform resistance measurement at A-10X fan control relay connector.



- Remove relay, and measure at relay box side.
- Resistance between terminal No. 3 and earth.

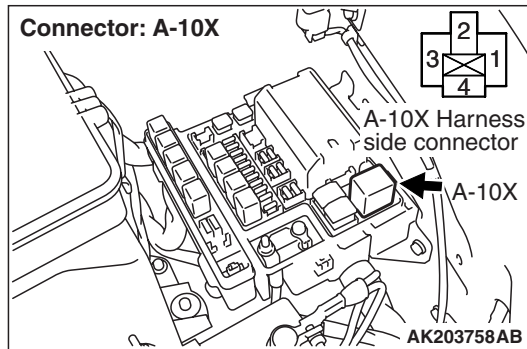
**OK: 2  $\Omega$  or less**

**Q: Is the check result normal?**

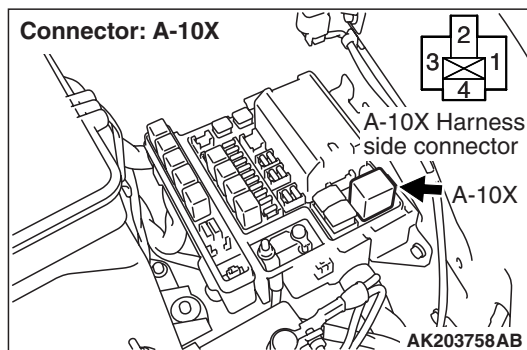
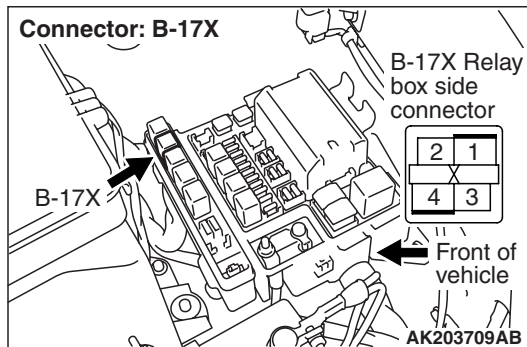
**YES :** Go to Step 4 .

**NO :** Check and repair harness between A-10X (terminal No. 3) fan control relay connector and body earth.

- Check earthing line for open circuit and damage.

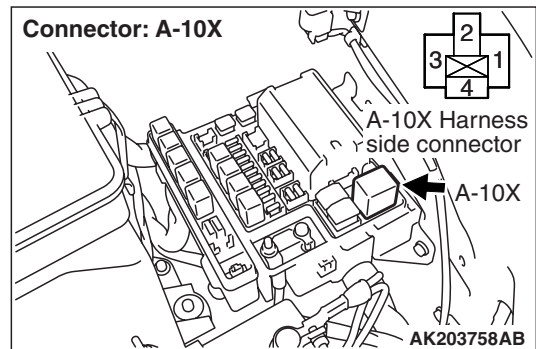
**STEP 4. Perform voltage measurement at A-10X fan control relay connector.**

- Remove relay, and measure at relay box side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

**OK: System voltage****Q: Is the check result normal?****YES :** . Go to Step 6 .**NO :** . Go to Step 5 .**STEP 5. Connector check: B-17X engine control relay connector****Q: Is the check result normal?**

**YES :** Check intermediate connectors A-14 and C-17, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-17X (terminal No. 1) engine control relay connector and A-10X (terminal No. 1) fan control relay connector.

- Check power supply line for open/short circuit.

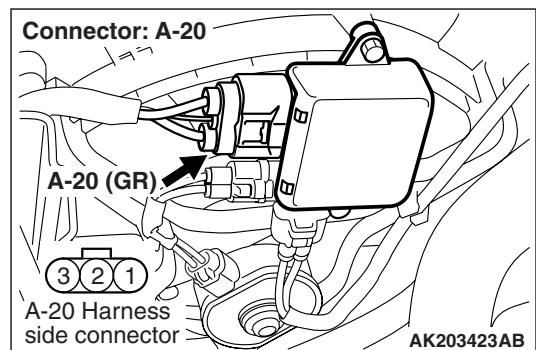
**NO :** Repair.**STEP 6. Perform voltage measurement at A-10X fan control relay connector.**

- Remove relay, and measure at relay box side.
- Voltage between terminal No. 4 and earth.

**OK: System voltage****Q: Is the check result normal?****YES :** Go to Step 7 .

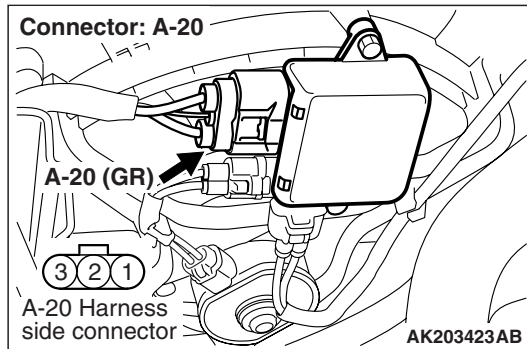
**NO :** Check and repair harness between battery and A-10X (terminal No. 4) fan control relay connector.

- Check power supply line for open/short circuit.

**STEP 7. Connector check: A-20 fan controller connector****Q: Is the check result normal?****YES :** Go to Step 8 .**NO :** Repair.



**STEP 8. Perform voltage measurement at A-20 fan controller connector.**

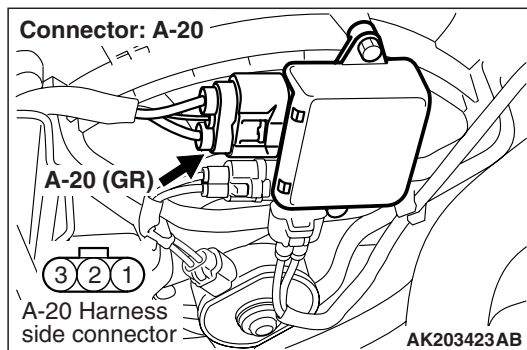
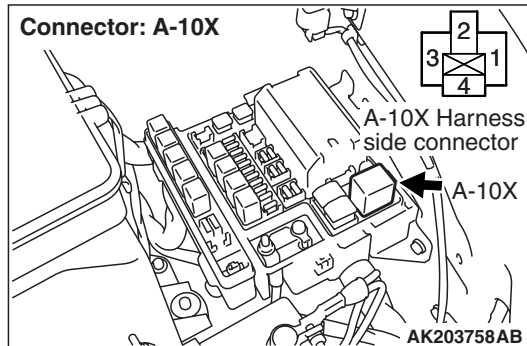


- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

**OK: System voltage**

**Q: Is the check result normal?**  
**YES :** Go to Step 12 .  
**NO :** Go to Step 9 .

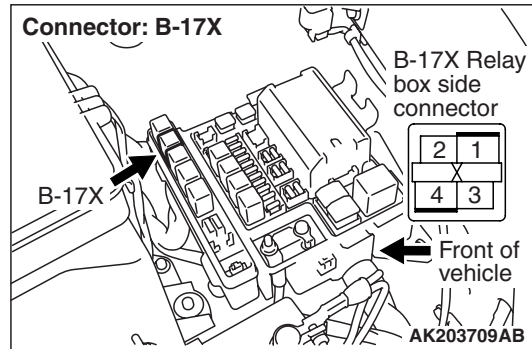
**STEP 9. Check harness between A-10X (terminal No. 2) fan control relay connector and A-20 (terminal No. 3) fan controller connector.**



- Check output line for open/short circuit.

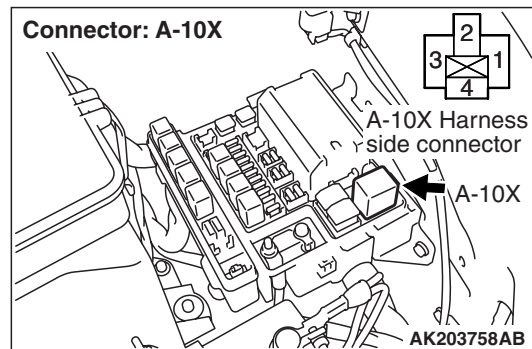
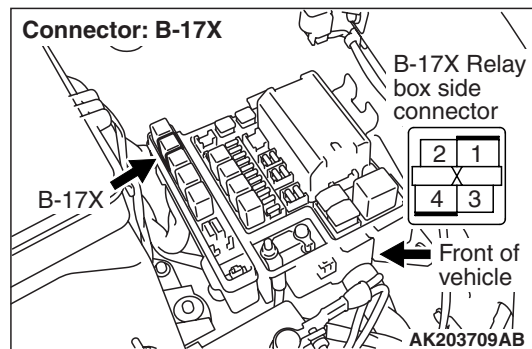
**Q: Is the check result normal?**  
**YES :** Go to Step 10 .  
**NO :** Repair.

**STEP 10. Connector check: B-17X engine control relay connector**



**Q: Is the check result normal?**  
**YES :** Go to Step 11 .  
**NO :** Repair.

**STEP 11. Check harness between B-17X (terminal No. 1) engine control relay connector and A-10X (terminal No. 1) fan control relay connector.**

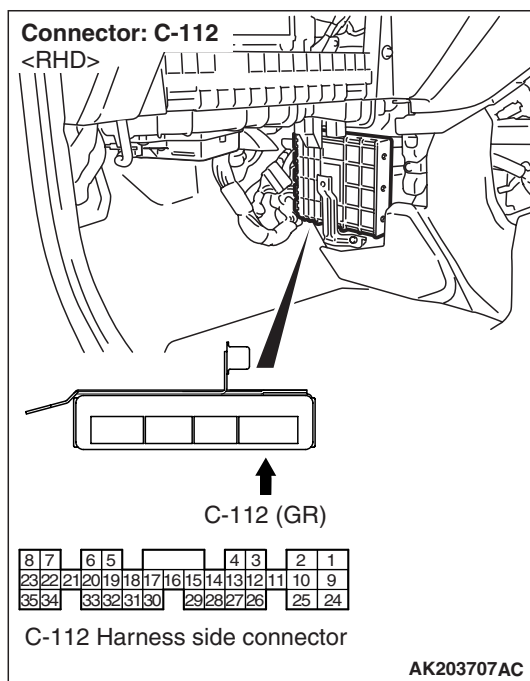
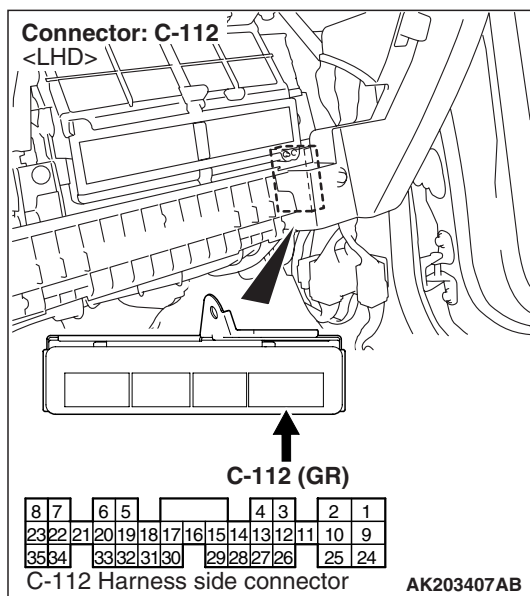
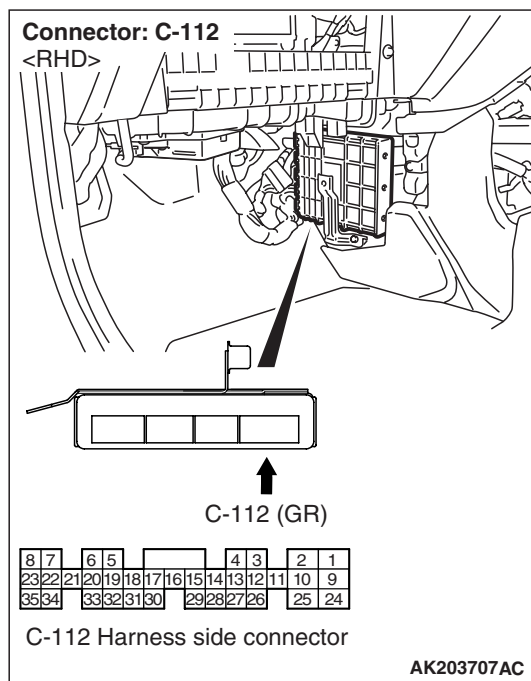
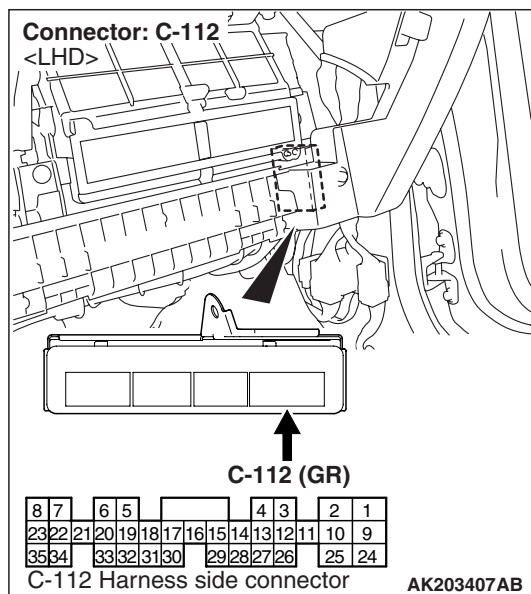


**NOTE:** Before checking harness, check intermediate connectors A-14 and C-17, and repair if necessary.

- Check power supply line for damage.

**Q: Is the check result normal?**  
**YES :** Check and repair harness between A-10X (terminal No. 3) fan control relay connector and body earth.  
     • Check earthing line for damage.  
**NO :** Repair.



**STEP 12. Connector check: C-112  
engine-A/T-ECU connector****Q: Is the check result normal?****YES :** Go to Step 13 .**NO :** Repair.**STEP 13. Fan motor drive test.**

- Disconnect C-112 engine-A/T-ECU connector.
- Ignition switch: ON

**OK: Fan motor rotates.****Q: Is the check result normal?****YES :** Go to Step 14 .**NO :** Go to Step 15 .

**STEP 14. M.U.T.-II/III actuator test**

- Item 21: Fan controller

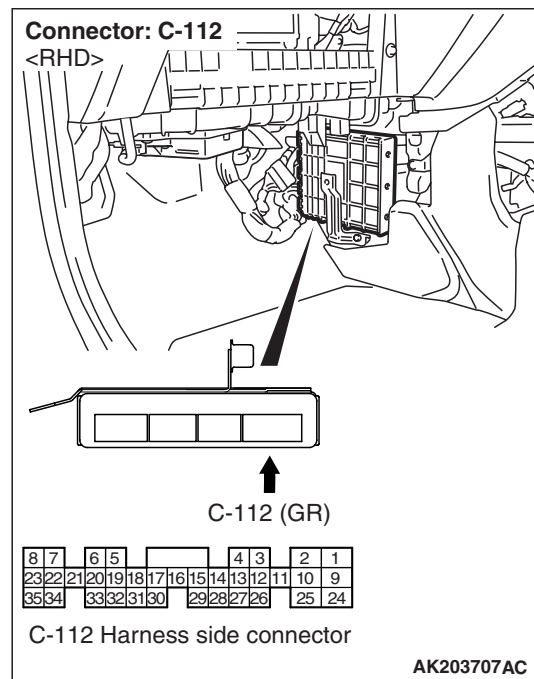
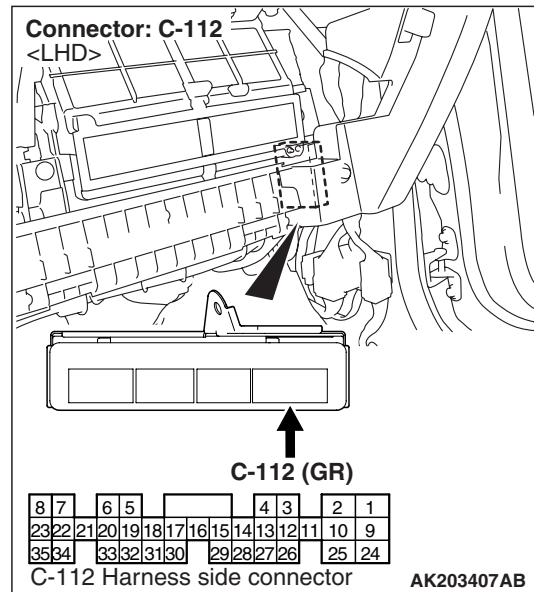
**OK: Fan motor rotates.**

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

**NO :** Replace engine-A/T-ECU.

**STEP 15. Perform voltage measurement at C-112 engine-A/T-ECU connector.**



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 18 and earth.

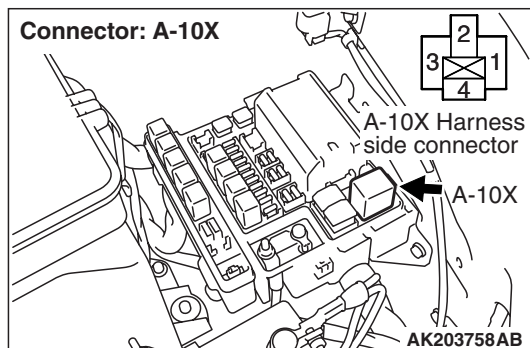
**OK: 4.9 – 5.1 V**

**Q: Is the check result normal?**

**YES :** Go to Step 16 .

**NO :** Go to Step 18 .

**STEP 16. Check harness between A-10X (terminal No. 4) fan control relay connector and battery.**



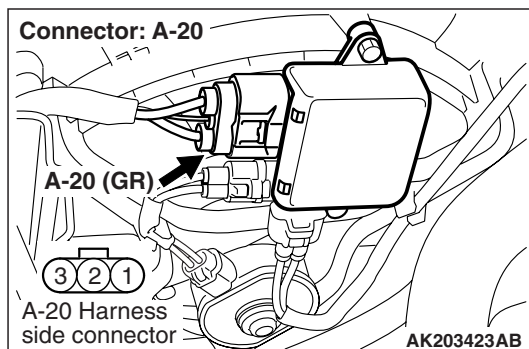
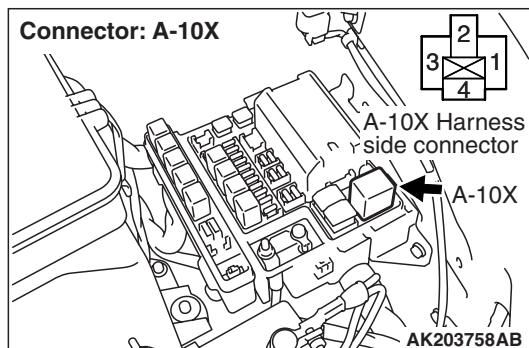
- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 17 .

**NO :** Repair.

**STEP 17. Check harness between A-10X (terminal No. 2) fan control relay connector and A-20 (terminal No. 3) fan controller connector.**



- Check output line for damage.

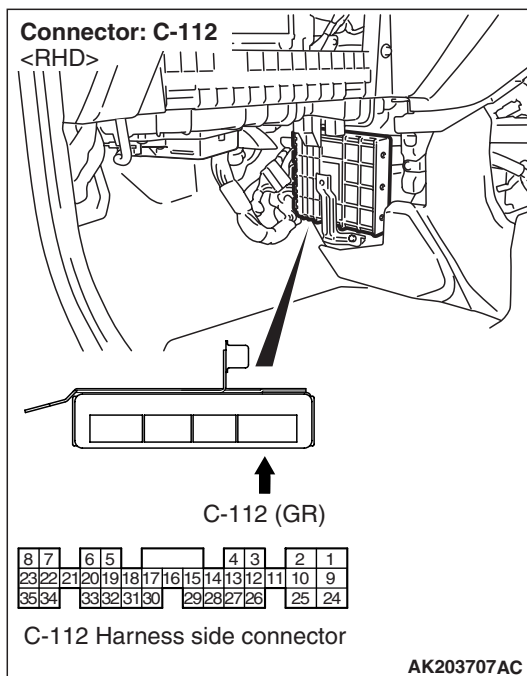
**Q: Is the check result normal?**

**YES :** Replace fan motor and fan controller.

**NO :** Repair.

- Check output line for short circuit.

**Q: Is the check result normal?**  
**YES :** Replace fan motor and fan controller.  
**NO :** Repair.



**NOTE:** Before checking harness, check intermediate connector A-16, and repair if necessary.

## Inspection Procedure 26: A/C Switch System

## OPERATION

- The battery voltage is applied to the engine-A/T-ECU (terminal No. 83) from the A/C-ECU (terminal No. 4).

## FUNCTION

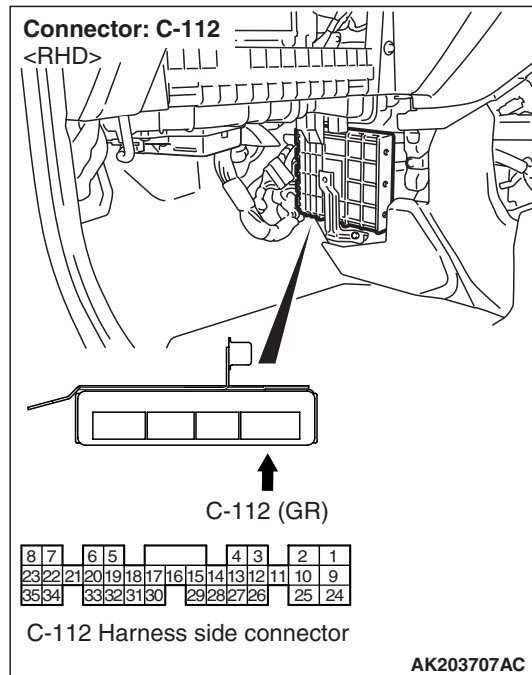
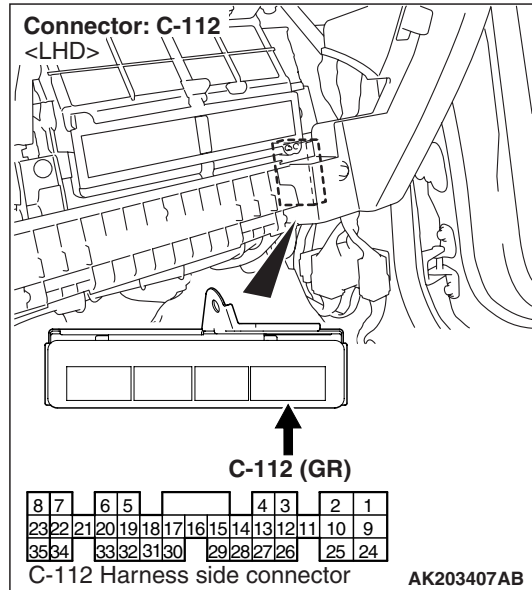
- When the A/C switch is in "ON" position, A/C switch ON signal is inputted to the engine-A/T-ECU from the A/C-ECU. In response to the signal, the engine-A/T-ECU controls the A/C compressor relay.

## PROBABLE CAUSE

- Failed A/C
- Failed A/C system
- Open/short circuit in A/C circuit or loose connector contact
- Failed engine-A/T-ECU

## DIAGNOSIS PROCEDURE

**STEP 1. Perform voltage measurement at C-112 engine-A/T-ECU connector.**



- Measure engine-A/T-ECU terminal voltage.
- Engine: Idling

- A/C set temperature:  
Maximum Cool when temperature in cabin is 25°C or more  
Maximum Hot when temperature in cabin is 25°C or less
- Voltage between terminal No. 83 and earth.

**OK:**

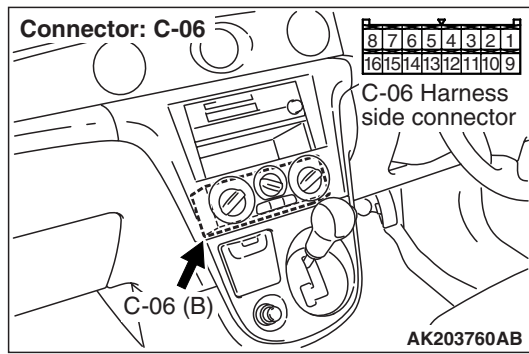
**System voltage (when A/C is ON)  
0.5 V or less (when A/C is OFF)**

**Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Go to Step 2 .

**STEP 2. Perform voltage measurement at C-06 A/C-ECU connector.**



- Measure engine-A/T-ECU terminal voltage.
- Engine: Idling
- A/C set temperature:  
Maximum Cool when temperature in cabin is 25°C or more  
Maximum Hot when temperature in cabin is 25°C or less
- Voltage between terminal No. 4 and earth.

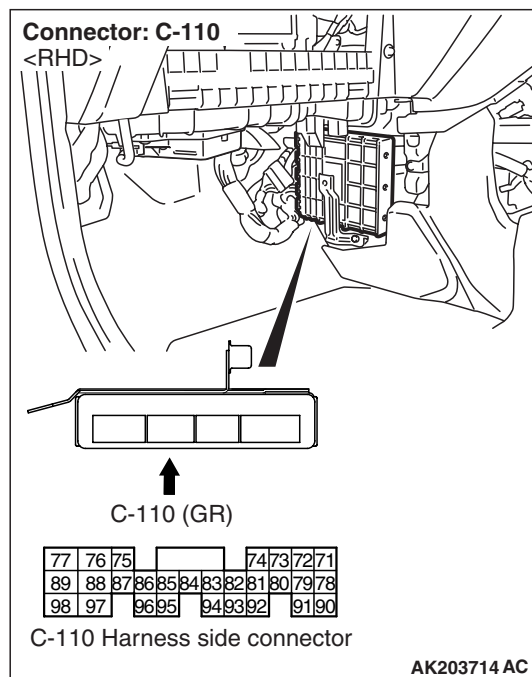
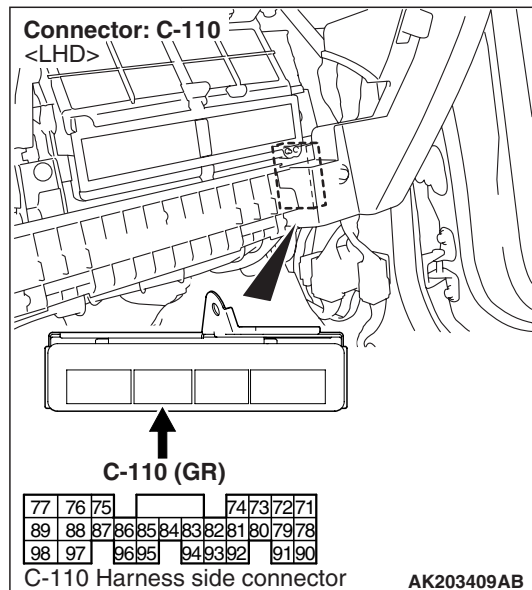
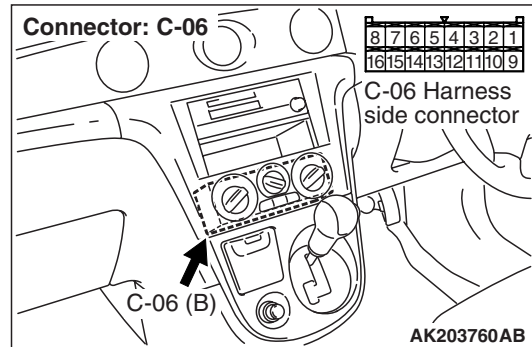
**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 5 .

**NO :** Go to Step 3 .

**STEP 3. Connector check: C-06 A/C-ECU connector and C-110 engine-A/T-ECU connector**



**Q: Is the check result normal?**

**YES :** Go to Step 4 .

**NO :** Repair.



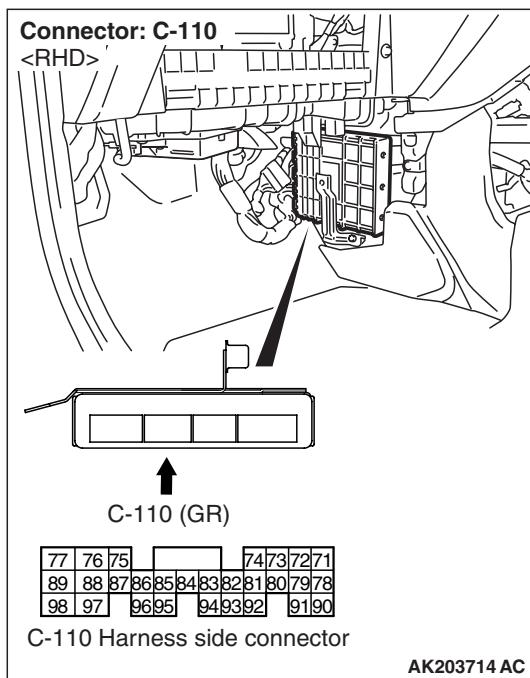
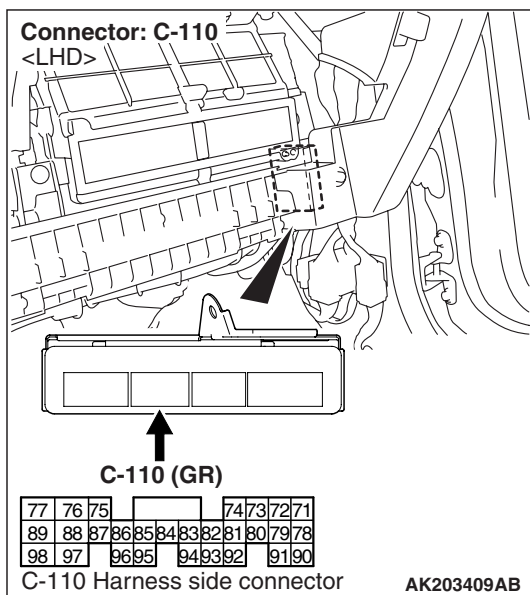
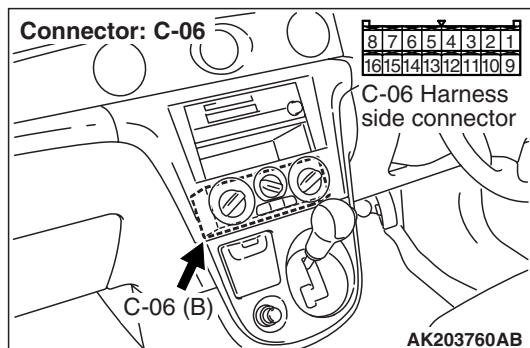
**STEP 4. Check harness between C-06 A/C-ECU connector and C-110 (terminal No. 83) engine-A/T-ECU connector.**

- Check output line for short circuit.

**Q: Is the check result normal?**

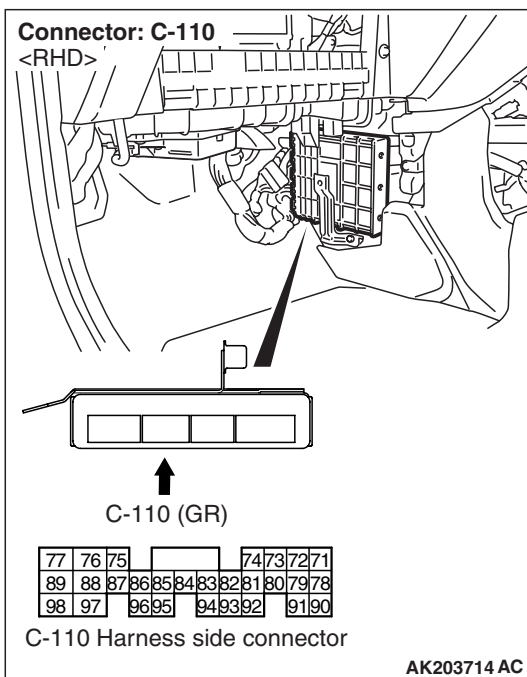
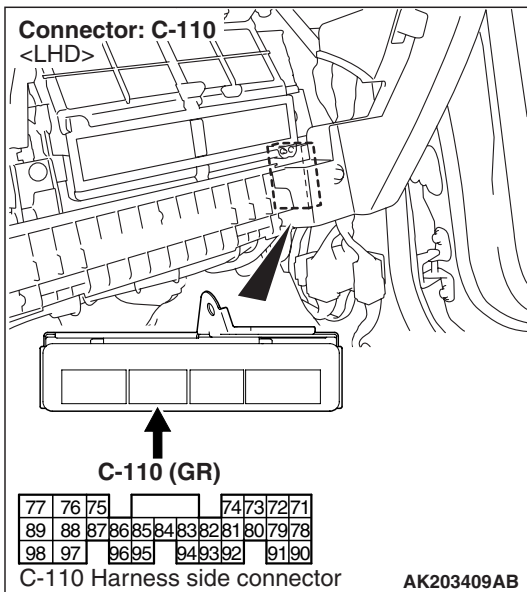
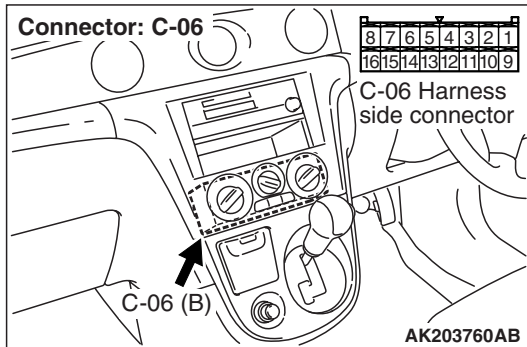
**YES :** Check A/C system (Refer to GROUP 55A – Troubleshooting [P.55A-5](#)).

**NO :** Repair.



**NOTE:** Before checking harness, check intermediate connector C-104, and repair if necessary.

**STEP 5. Connector check: C-06 A/C-ECU connector and C-110 engine-A/T-ECU connector**



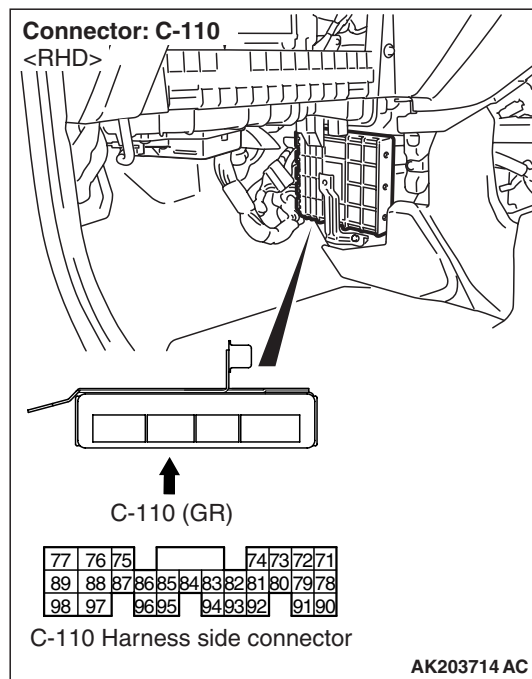
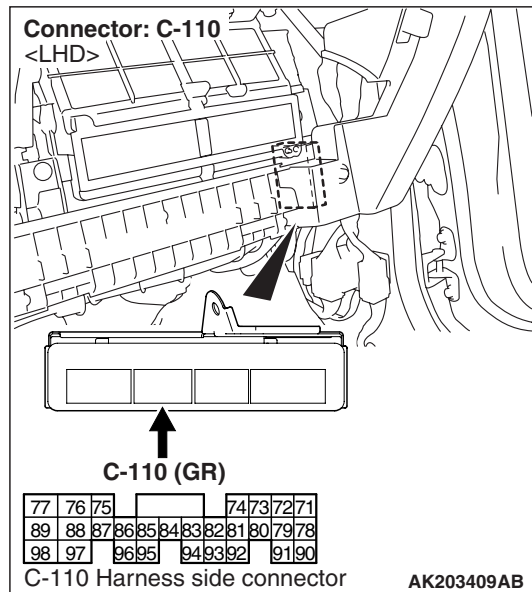
**Q: Is the check result normal?**

**YES :** Check intermediate connector C-104, and repair if necessary. If intermediate connector is normal, check and repair harness between C-06 (terminal No. 4) A/C-ECU connector and C-110 (terminal No. 83) engine-A/T-ECU connector.

- Check output line for open circuit.

**NO :** Repair.

**STEP 6. Connector check: C-110 engine-A/T-ECU connector**



**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

**STEP 7. M.U.T.-II/III Data List**

- Item 28: A/C switch
  - a. Engine: Idling
  - b. A/C set temperature:
    - Maximum Cool when temperature in cabin is 25°C or more
    - Maximum Hot when temperature in cabin is 25°C or less

**OK:****ON (when A/C is ON)****OFF (when A/C is OFF)****Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO :** Replace engine-A/T-ECU.

**Inspection Procedure 27: A/C Compressor Relay System****OPERATION**

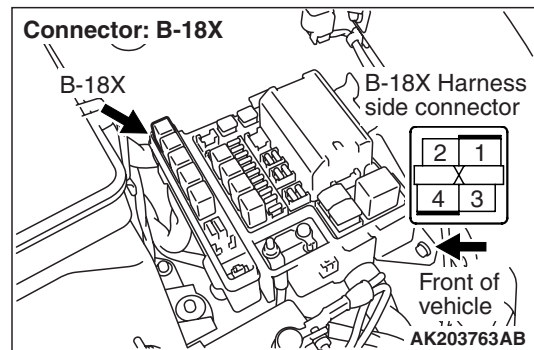
- The battery voltage is applied to the A/C compressor relay (terminal No. 4).
- The battery voltage is applied to the A/C compressor relay (terminal No. 3) from the ignition switch. The engine-A/T-ECU (terminal No. 21 <Vehicle without immobilizer system>, No. 20 <Vehicle with immobilizer system>) makes the power transistor in the unit be in "ON" position and makes currents go on the A/C compressor relay coil, and that makes the relay be in "ON" position.
- When the A/C compressor is in "ON" position, the battery voltage is supplied to the A/C compressor (terminal No. 1) from the A/C compressor relay (terminal No. 1).

**FUNCTION**

- When the A/C switch ON signal is input to the engine-A/T-ECU, the engine-A/T-ECU places the A/C compressor relay in the "ON" position. Accordingly, the battery voltage supplied to the A/C compressor operates the magnet clutch.

**PROBABLE CAUSE**

- Failed A/C compressor relay
- Failed A/C compressor magnet clutch
- Open/short circuit in A/C compressor relay circuit or loose connector contact
- Failed engine-A/T-ECU

**DIAGNOSIS PROCEDURE****STEP 1. Connector check: B-18X A/C compressor relay connector****Q: Is the check result normal?**

**YES :** Go to Step 2 .

**NO :** Repair.

**STEP 2. A/C compressor relay check.**

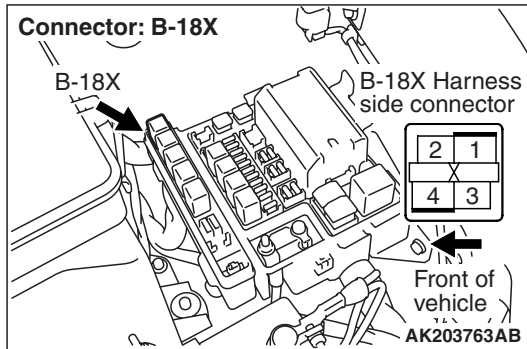
- Check A/C compressor relay (Refer to GROUP 55A – On-vehicle Service [P.55A-27](#)).

**Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Replace A/C compressor relay.

**STEP 3. Perform voltage measurement at B-18X A/C compressor relay connector.**



- Remove relay, and measure at relay box side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

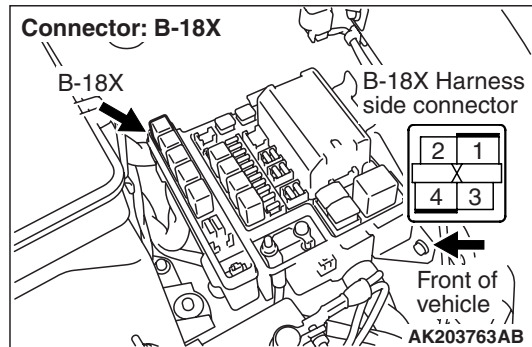
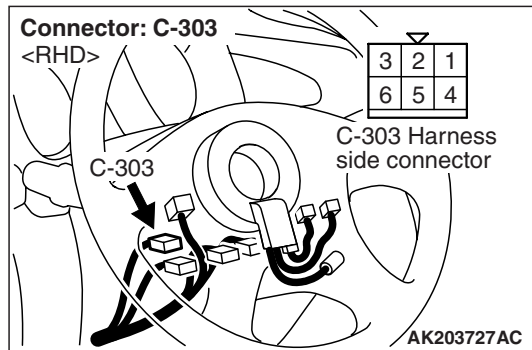
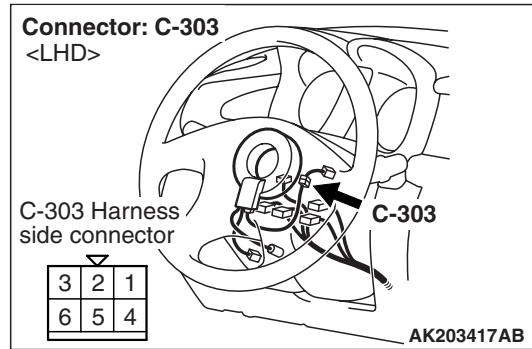
**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 5 .

**NO :** Go to Step 4 .

**STEP 4. Connector check: C-303 ignition switch connector**

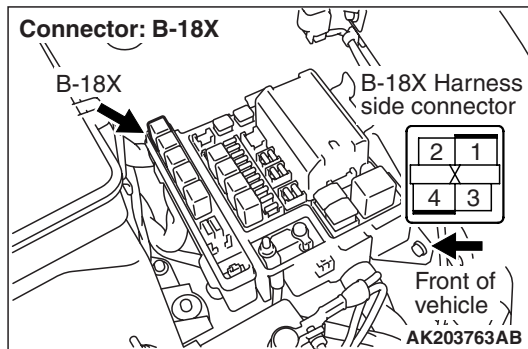


**Q: Is the check result normal?**

**YES :** Check intermediate connectors C-106, C-202 <RHD>, C-203 and C-205 <LHD>, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-18X (terminal No. 3) A/C compressor relay connector and C-303 (terminal No. 4) ignition switch connector.

- Check power supply line for open/short circuit.

**NO :** Repair.

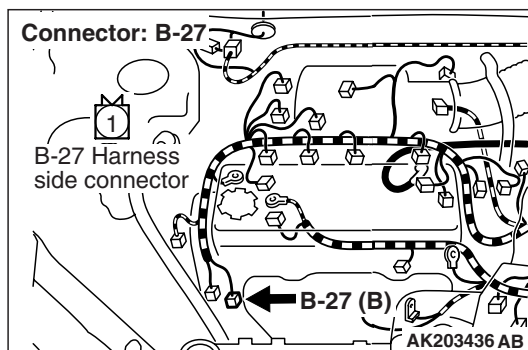
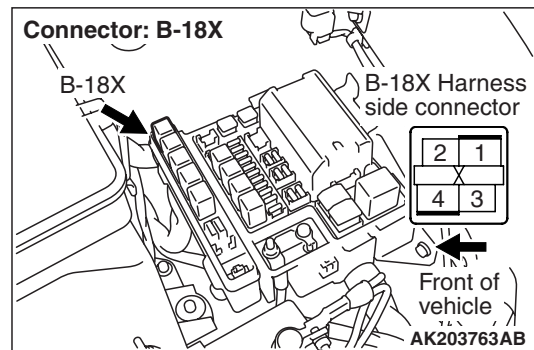
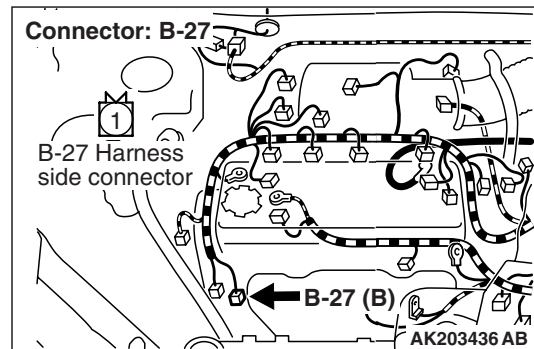
**STEP 5. Perform voltage measurement at B-18X A/C compressor relay connector.**

- Remove relay, and measure at relay box side.
- Voltage between terminal No. 4 and earth.

**OK: System voltage****Q: Is the check result normal?****YES :** Go to Step 6 .

**NO :** Check intermediate connector A-14, and repair if necessary. If intermediate connector is normal, check and repair harness between B-18X (terminal No. 4) A/C compressor relay connector and battery.

- Check power supply line for open/short circuit.

**STEP 6. Connector check: B-27 A/C compressor connector****Q: Is the check result normal?****YES :** Go to Step 7 .**NO :** Repair.**STEP 7. Perform voltage measurement at B-27 A/C compressor connector.**

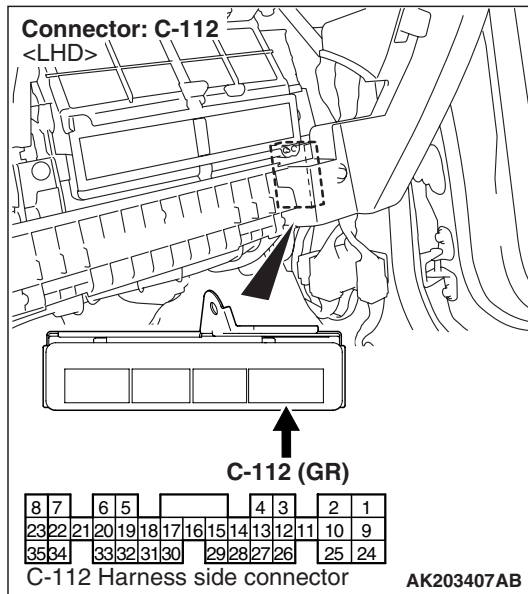
- Disconnect connector, and measure at harness side.
- Remove B-18X (terminal No. 1 and No. 4) A/C compressor relay and short-circuit of harness side connector.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

**OK: System voltage****Q: Is the check result normal?****YES :** Go to Step 8 .

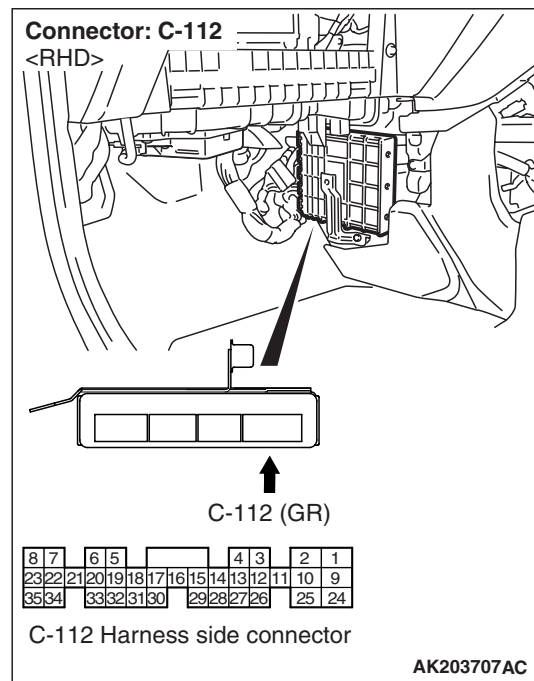
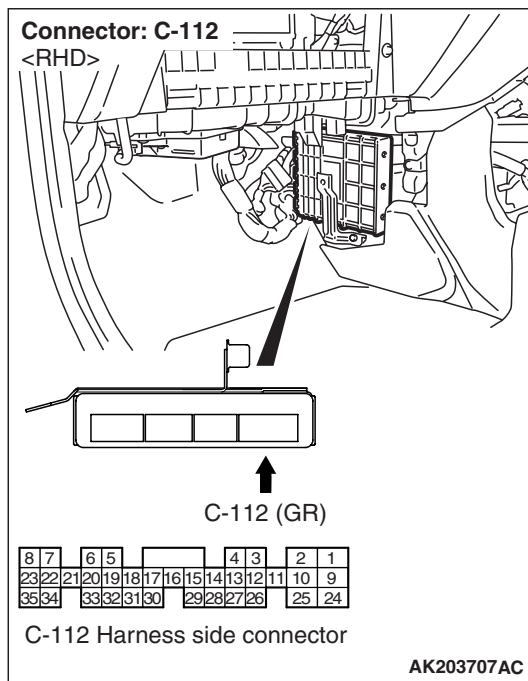
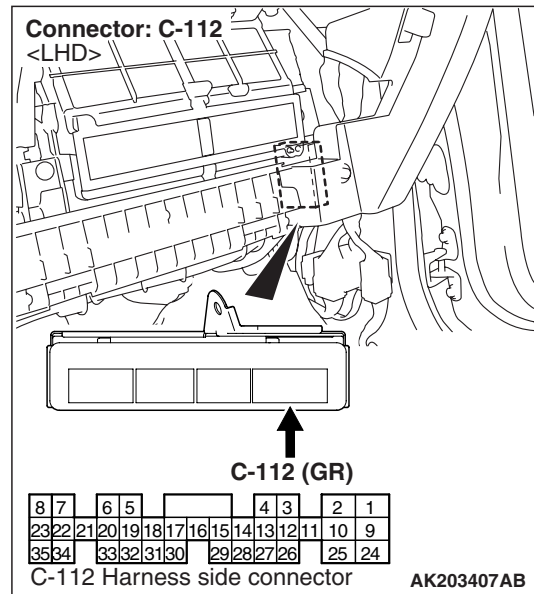
**NO :** Check and repair harness between B-27 (terminal No. 1) A/C compressor connector and B-18X (terminal No. 1) A/C compressor relay connector.

- Check output line for open/short circuit.

**STEP 8. Perform voltage measurement at C-112 engine-A/T-ECU connector.**



**STEP 9. Connector check: C-112 engine-A/T-ECU connector**



- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 21 and earth.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 12 .

**NO :** Go to Step 9 .

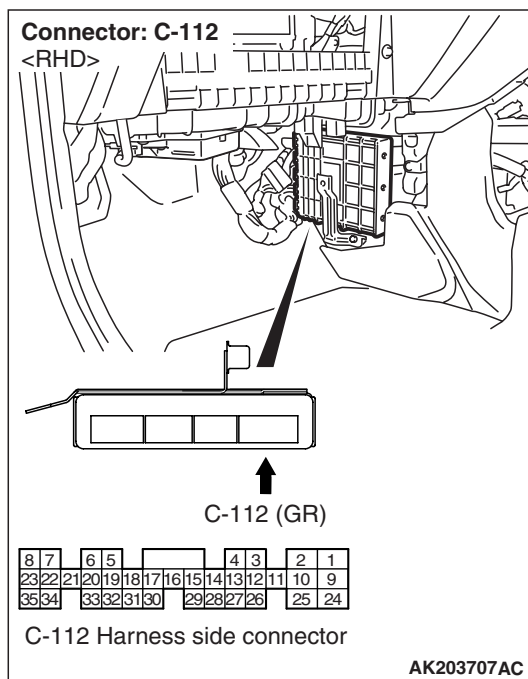
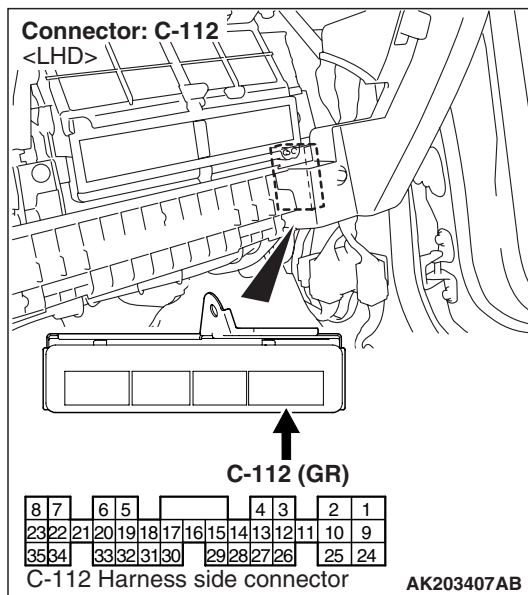
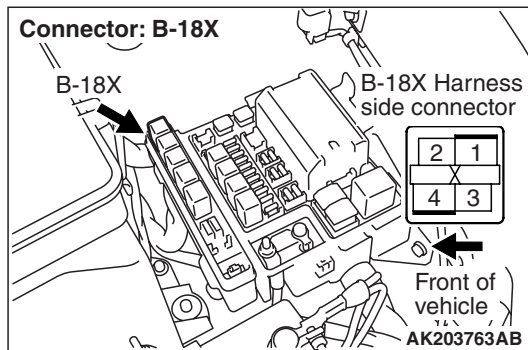
**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Repair.



**STEP 10. Check harness between B-18X (terminal No. 2) A/C compressor relay connector and C-112 (terminal No. 20) engine-A/T-ECU connector.**



**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Repair.

#### STEP 11. M.U.T.-II/III Data List

- Item 49: A/C relay
  - a. Engine: Idling
  - b. A/C set temperature:
    - Maximum Cool when temperature in cabin is 25°C or more
    - Maximum Hot when temperature in cabin is 25°C or less

**OK:**

**ON (when A/C is ON)**

**OFF (when A/C is OFF)**

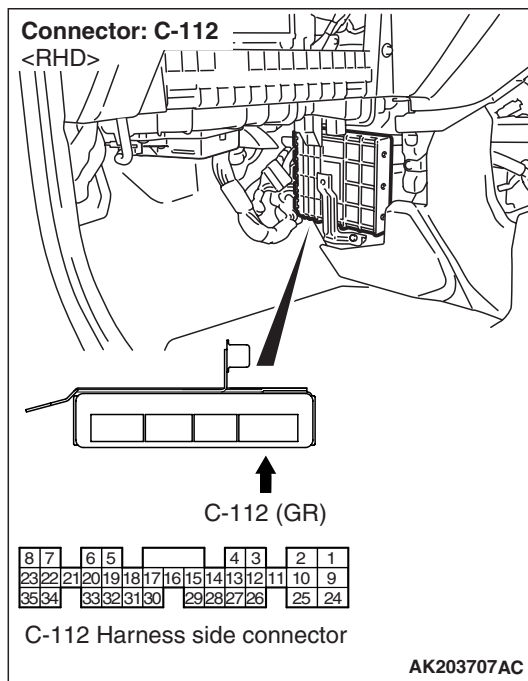
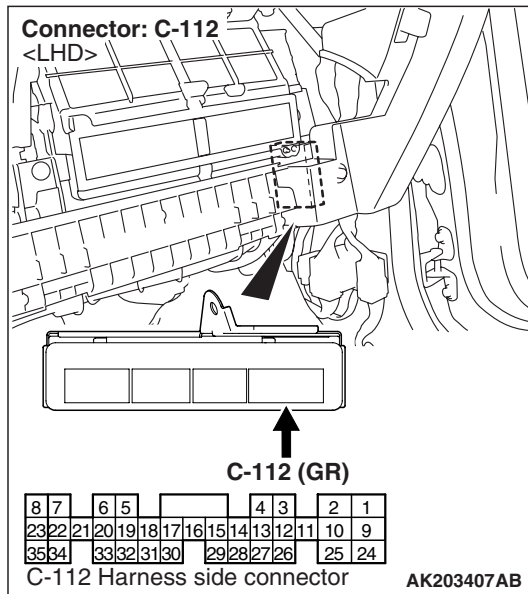
**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO :** Replace engine-A/T-ECU.

- Check earthing line for open circuit and damage.

**STEP 12. Connector check: C-112  
engine-A/T-ECU connector**

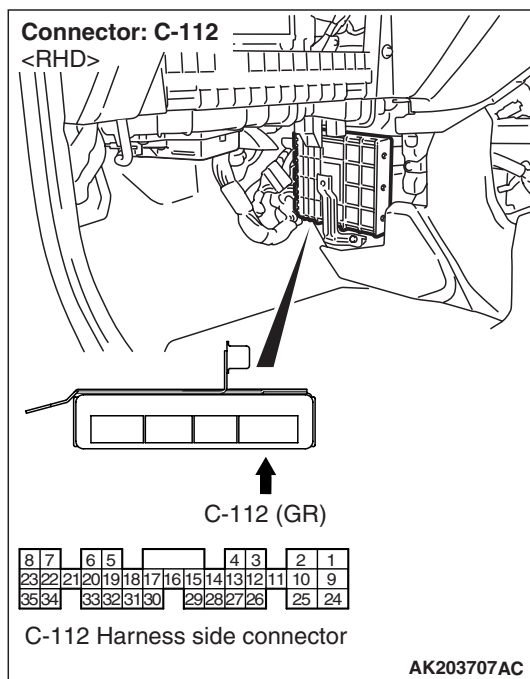
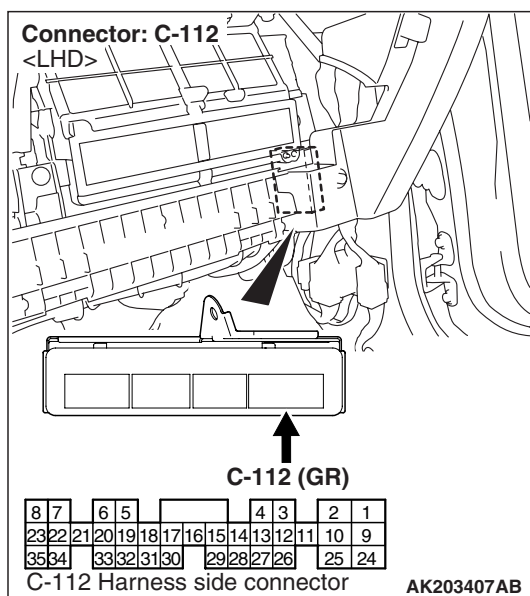
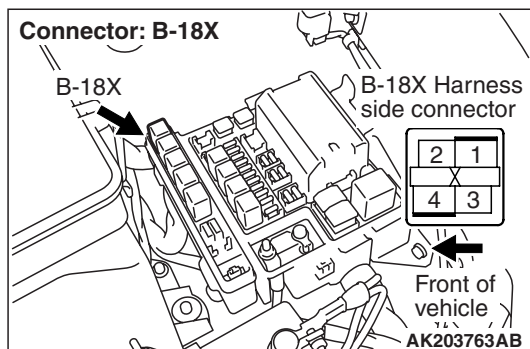


**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO :** Repair.

**STEP 13. Check harness between B-18X (terminal No. 2) A/C compressor relay connector and C-112 (terminal No. 20) engine-A/T-ECU connector.**

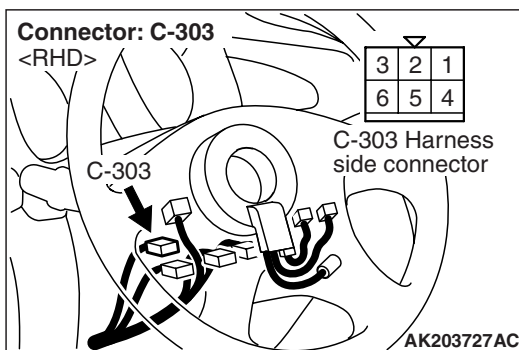
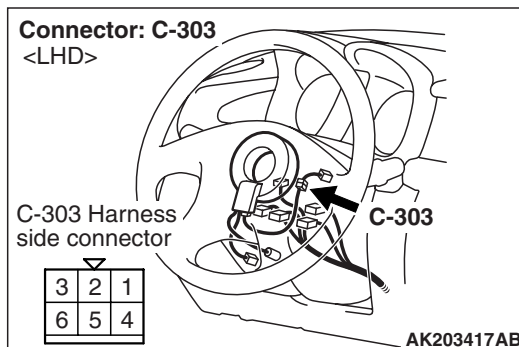


**Q: Is the check result normal?**

**YES :** Go to Step 14 .

**NO :** Repair.

**STEP 14. Connector check: C-303 ignition switch connector**



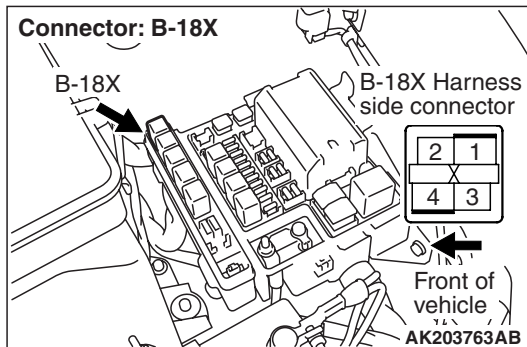
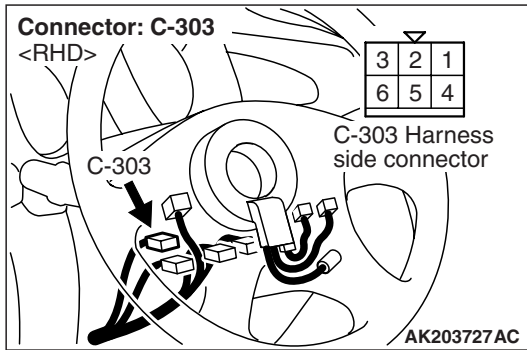
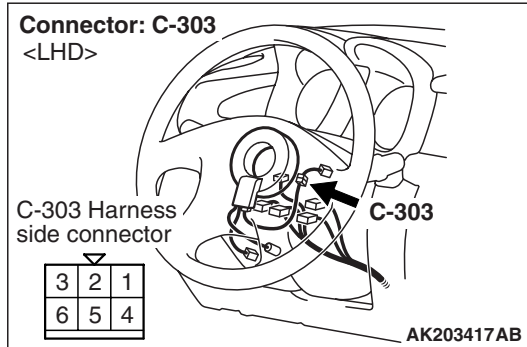
**Q: Is the check result normal?**

**YES :** Go to Step 15 .

**NO :** Repair.

- Check earthing line for damage.

**STEP 15. Check harness between C-303 (terminal No. 4) ignition switch connector and B-18X (terminal No. 3) A/C compressor relay connector.**



**NOTE:** Before checking harness, check intermediate connectors C-106, C-202 <RHD>, C-203 and C-205 <LHD>, and repair if necessary.

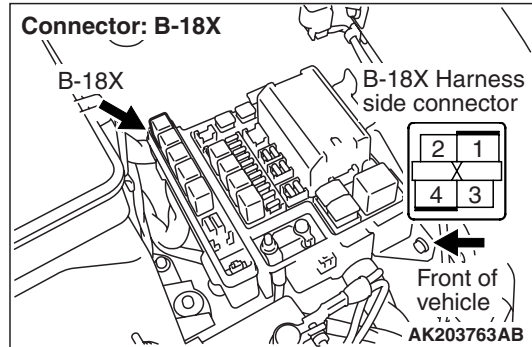
- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 16 .

**NO :** Repair.

**STEP 16. Check harness between battery and B-18X (terminal No. 4) A/C compressor relay connector.**



**NOTE:** Before checking harness, check intermediate connector A-14, and repair if necessary.

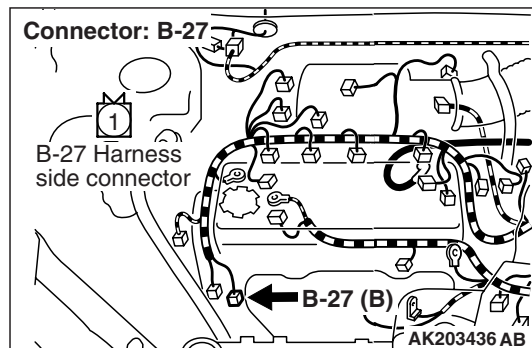
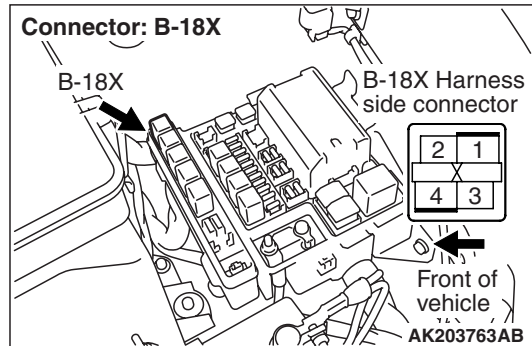
- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 17 .

**NO :** Repair.

**STEP 17. Check harness between B-18X (terminal No. 1) A/C compressor relay connector and B-27 (terminal No. 1) A/C compressor connector.**



- Check output line for damage.

**Q: Is the check result normal?**

**YES :** Replace A/C compressor magnet clutch.

**NO :** Repair.

**Inspection Procedure 28: A/C Load Signal System**

---

**OPERATION**

- The A/C load signal is inputted to the engine-A/T-ECU (terminal No. 61) from the A/C-ECU (terminal No. 5).

**FUNCTION**

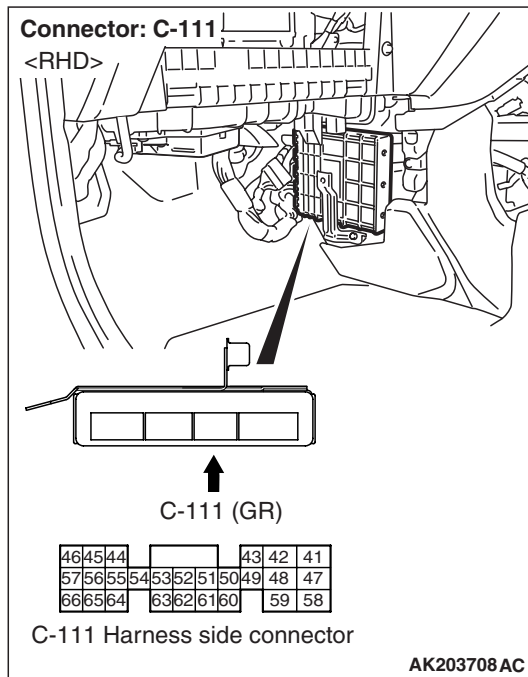
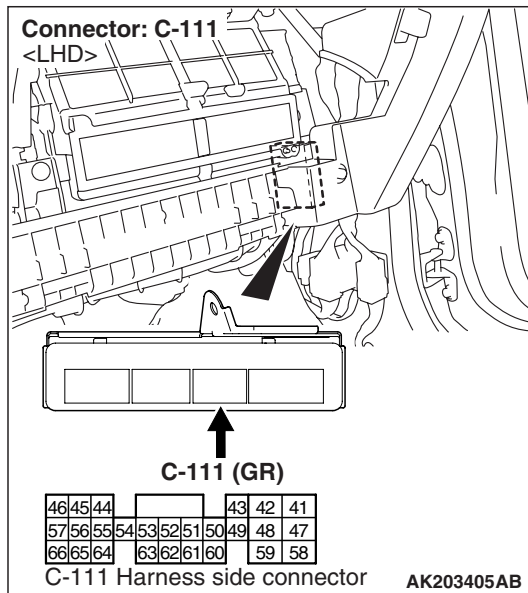
- The magnitude of the A/C compressor load is detected and input to the engine-A/T-ECU. The engine-A/T-ECU provides A/C idle up control according to the A/C compressor load condition.

**PROBABLE CAUSE**

- Failed A/C-ECU
- Open/short circuit in A/C load signal circuit or loose connector contact
- Failed engine-A/T-ECU

## DIAGNOSIS PROCEDURE

### STEP 1. Perform voltage measurement at C-111 engine-A/T-ECU connector.



- Measure engine-A/T-ECU terminal voltage.
- Engine: Idling
- A/C switch: ON (A/C compressor in driven state)
- Voltage between terminal No. 61 and earth.

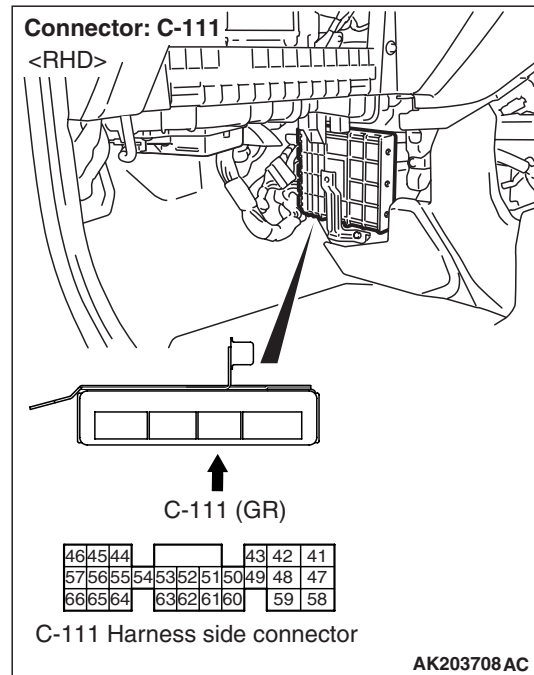
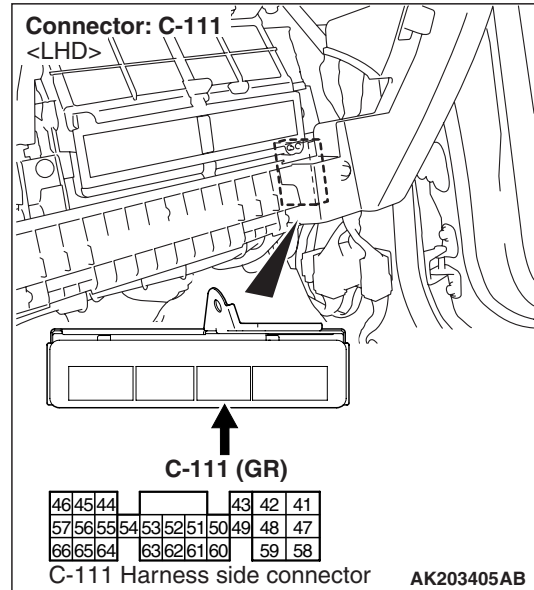
**OK:**

**1 V or less** (when the temperature around the atmospheric air temperature sensor is 18°C or more, and the A/C is set to the lowest temperature and the maximum air flow rate)  
**System voltage** (when the A/C is set to the temperature in the cabin and the minimum air flow rate)

**Q: Is the check result normal?**

**YES :** Go to Step 2 .  
**NO :** Go to Step 4 .

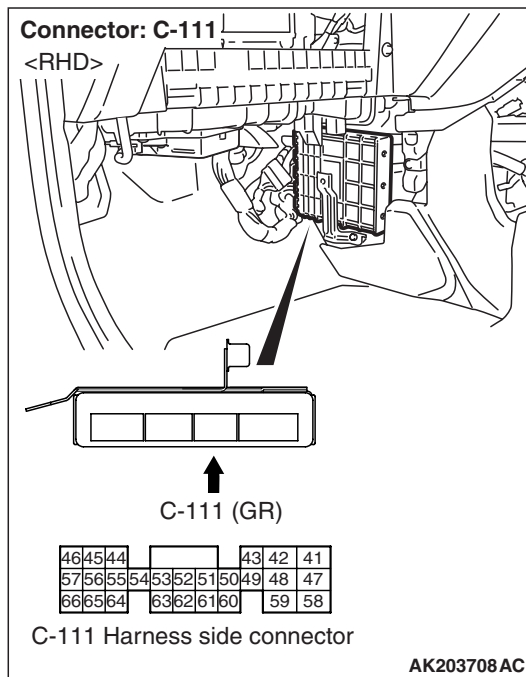
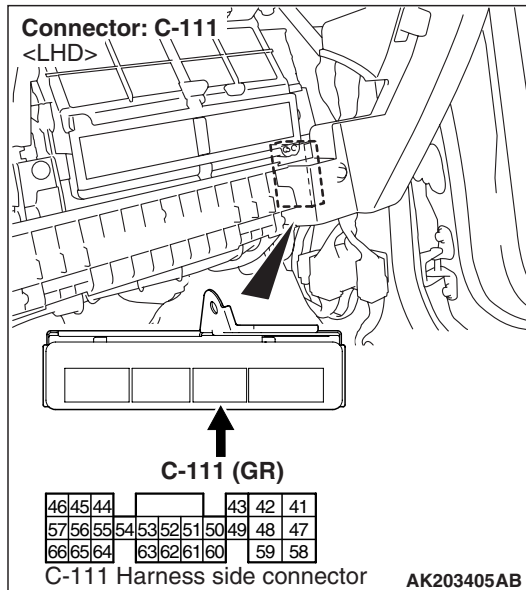
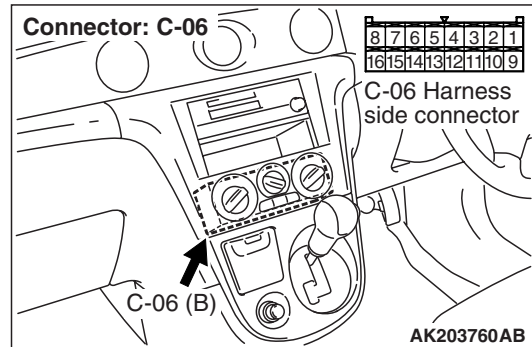
### STEP 2. Connector check: C-111 engine-A/T-ECU connector



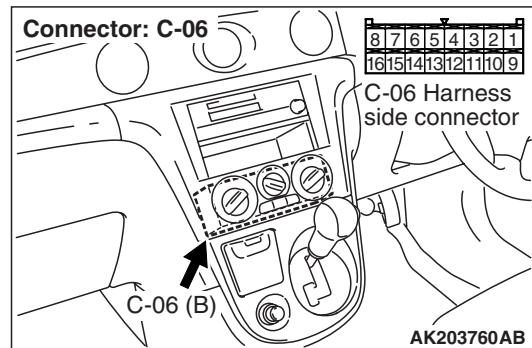
**Q: Is the check result normal?**

**YES :** Go to Step 3 .  
**NO :** Repair.



**STEP 3. Check the trouble symptoms.****Q: Does trouble symptom persist?****YES :** Replace engine-A/T-ECU.**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).**STEP 4. Connector check: C-111 engine-A/T-ECU connector****Q: Is the check result normal?****YES :** Go to Step 5 .**NO :** Repair.**STEP 5. Perform voltage measurement at C-06 A/C-ECU connector.**

- Measure A/C-ECU terminal voltage.
- Engine: Idling
- A/C set temperature:  
Maximum Cool when temperature in cabin is 25°C or more  
Maximum Hot when temperature in cabin is 25°C or less
- Voltage between terminal No. 5 and earth.

**OK: System voltage****Q: Is the check result normal?****YES :** Go to Step 8 .**NO :** Go to Step 6 .**STEP 6. Connector check: C-06 A/C-ECU connector****Q: Is the check result normal?****YES :** Go to Step 7 .**NO :** Repair.

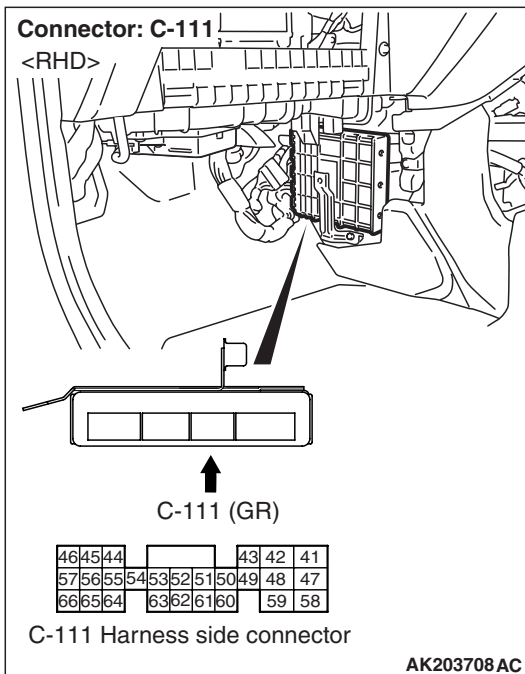
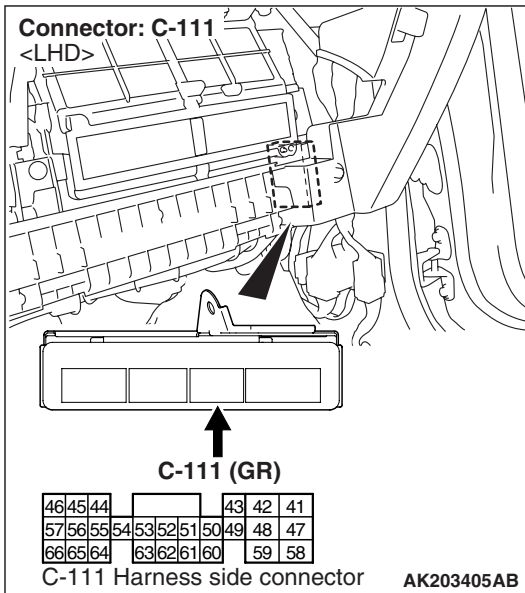
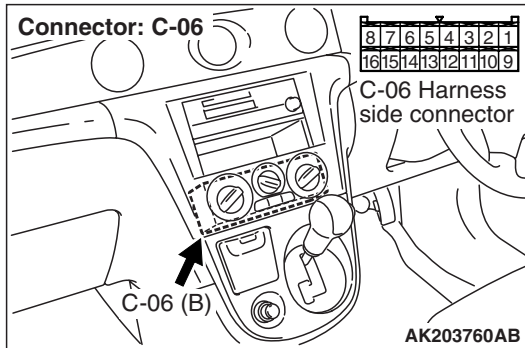
**STEP 7. Check harness between C-06 (terminal No. 5) A/C-ECU connector and C-111 (terminal No. 61) engine-A/T-ECU connector.**

- Check output line for short circuit.

**Q: Is the check result normal?**

**YES :** Check A/C system (Refer to GROUP 55A – Troubleshooting [P.55A-5](#)).

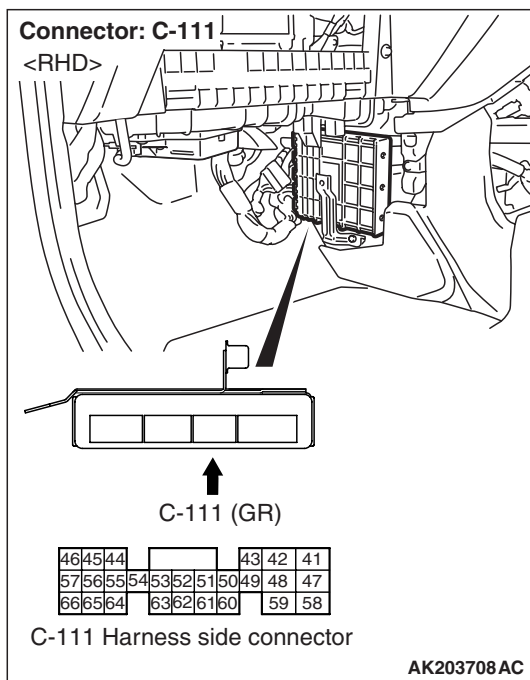
**NO :** Repair.



**NOTE:** Before checking harness, check intermediate connector C-104, and repair if necessary.

**YES :** Check intermediate connector C-104, and repair if necessary. If intermediate connector is normal, check and repair harness between C-06 (terminal No. 5) A/C-ECU connector and C-111 (terminal No. 61) engine-A/T-ECU connector.

- NO :** Repair.



## Inspection Procedure 29: Power Steering Fluid Pressure Switch System

### CONDITION

- The battery voltage is applied to the power steering fluid pressure switch (terminal No. 1) from the engine-A/T-ECU (terminal No. 52).

### FUNCTION

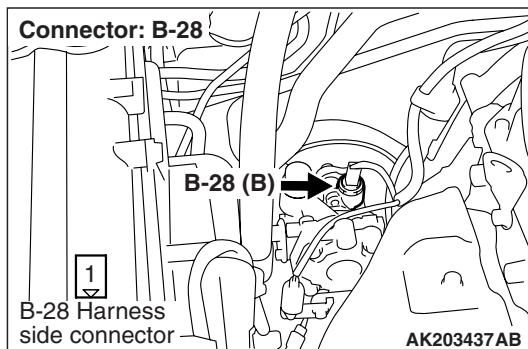
- It is detected whether a load is applied on the power steering fluid pump by steering or not, and the signal is inputted to the engine-A/T-ECU. When the power steering fluid pressure switch ON signal (a large load on the power steering fluid pump) is inputted, the engine-A/T-ECU provides the idle-up control.

### PROBABLE CAUSE

- Failed power steering fluid pressure switch
- Open/short circuit in power steering fluid pressure switch circuit or loose connector contact
- Failed engine-A/T-ECU

### DIAGNOSIS PROCEDURE

#### STEP 1. Connector check: B-28 power steering fluid pressure switch connector

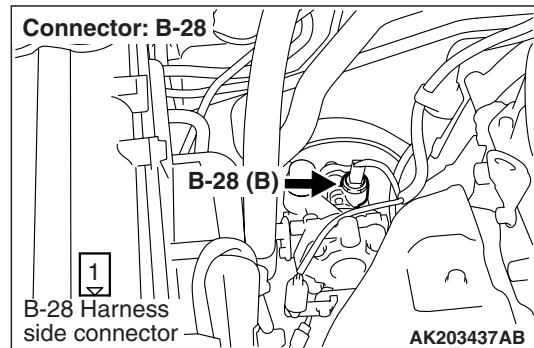


**Q: Is the check result normal?**

**YES :** Go to Step 2 .

**NO :** Repair.

#### STEP 2. Perform voltage measurement at B-28 power steering fluid pressure switch connector.



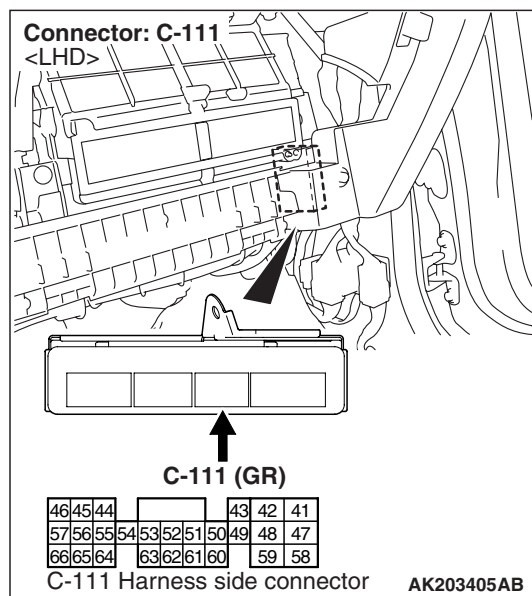
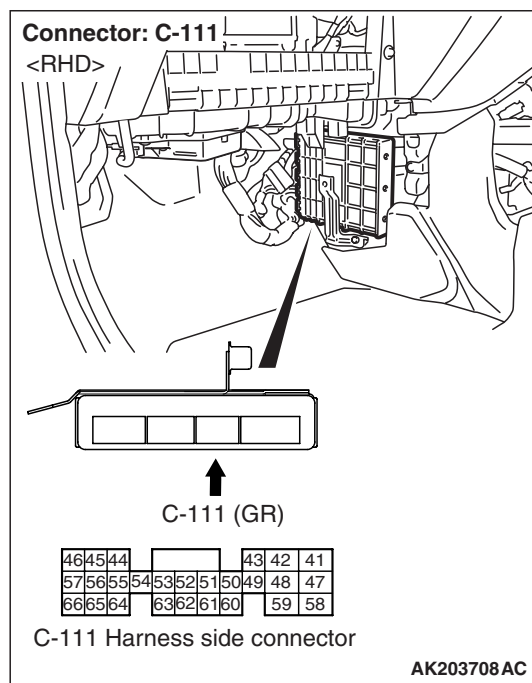
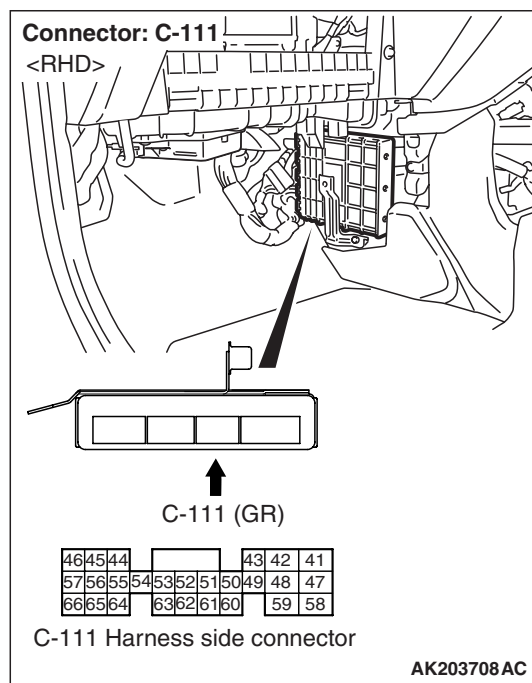
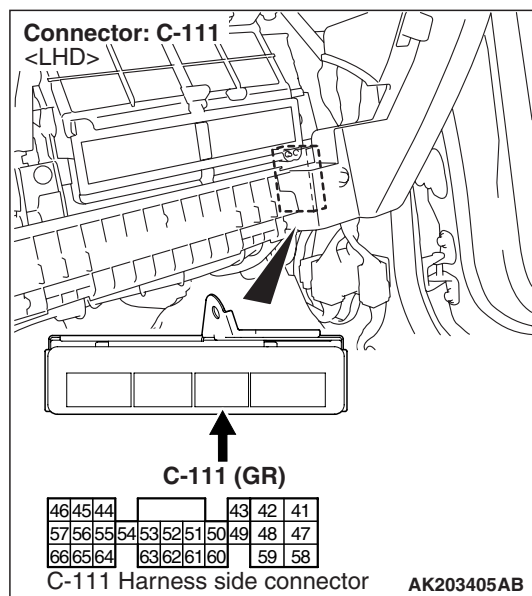
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

**OK: System voltage**

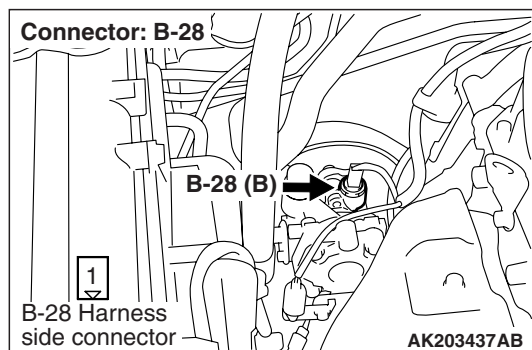
**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Go to Step 3 .

**STEP 3. Perform voltage measurement at C-111 engine-A/T-ECU connector.****STEP 4. Connector check: C-111 engine-A/T-ECU connector**

- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 52 and earth.

**OK: System voltage****Q: Is the check result normal?****YES :** Go to Step 4 .**NO :** Go to Step 5 .

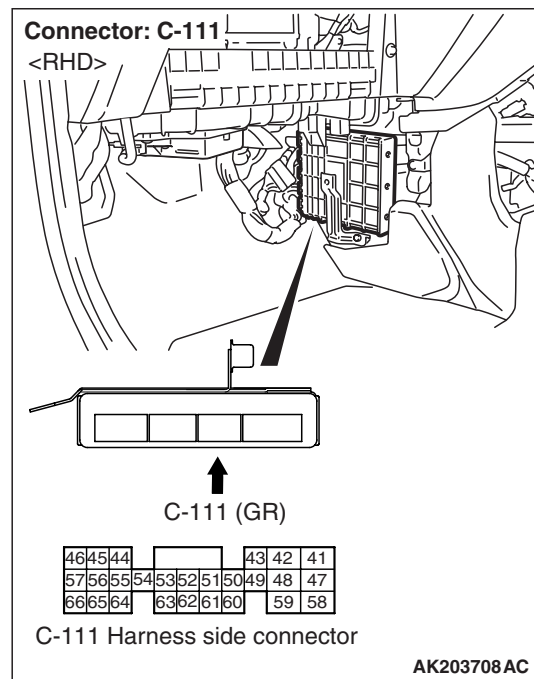
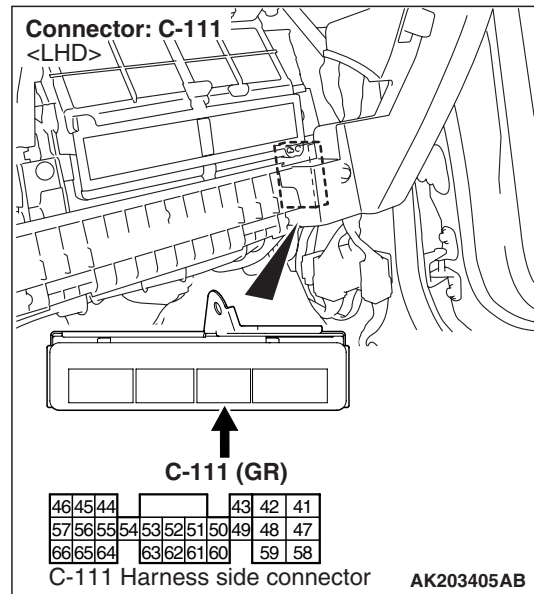
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-28 (terminal No. 1) power steering fluid pressure switch connector and C-111 (terminal No. 52) engine-A/T-ECU connector.

- Check output line for open circuit.

**NO :** Repair.

**STEP 5. Connector check: C-111 engine-A/T-ECU connector**



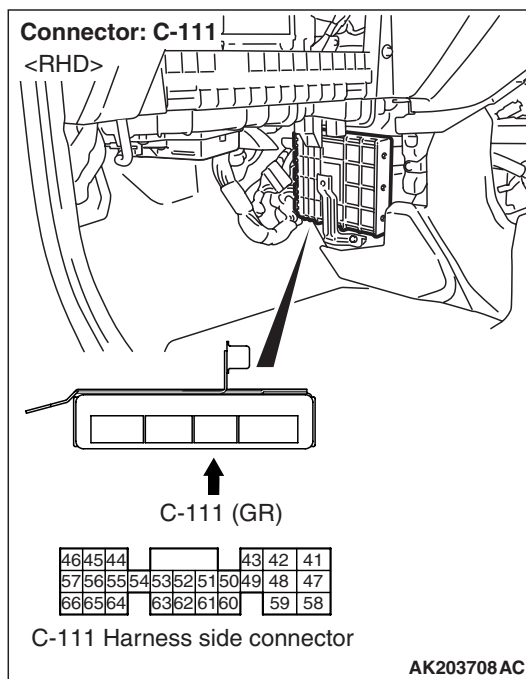
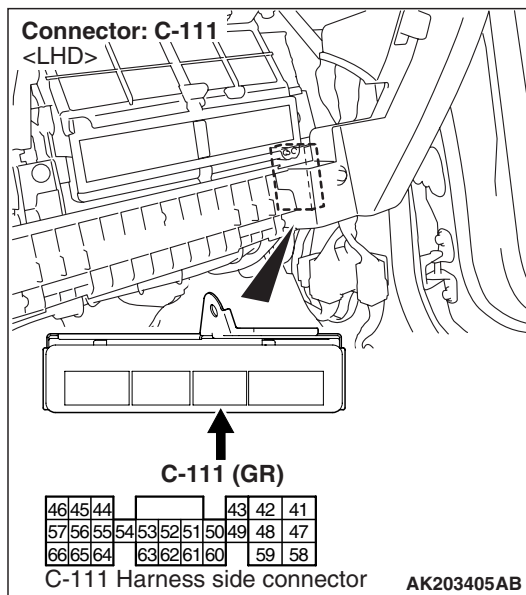
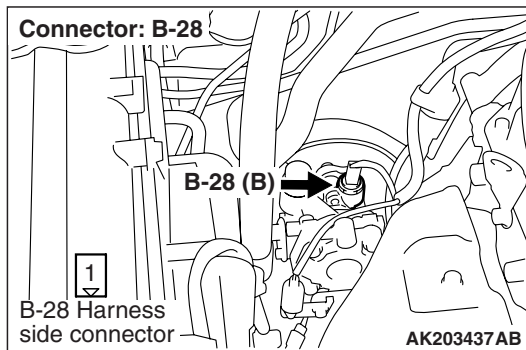
**Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Repair.



**STEP 6. Check harness between B-28 (terminal No. 1) power steering fluid pressure switch connector and C-111 (terminal No. 52) engine-A/T-ECU connector.**



**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

#### STEP 7. M.U.T.-II/III Data List

- Refer to Data list reference table [P.13A-260](#).
  - Item 27: Power steering fluid pressure switch

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use

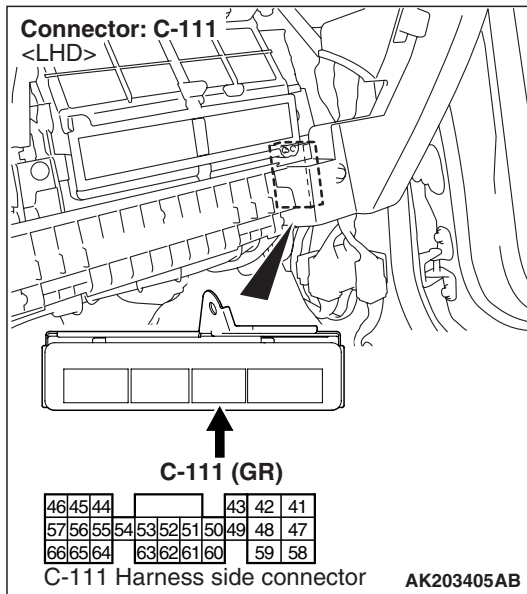
Troubleshooting/Inspection Service Points

[P.00-5](#)).

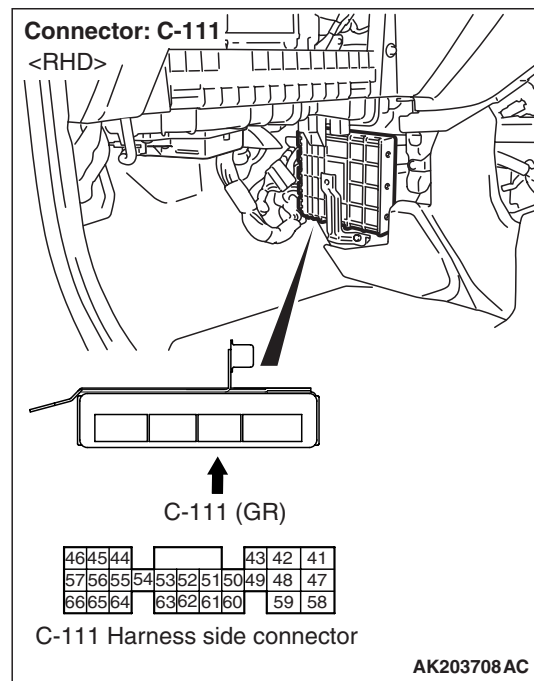
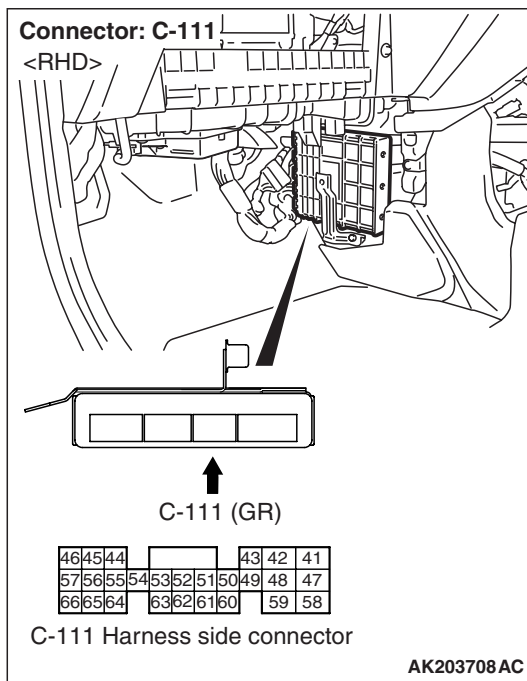
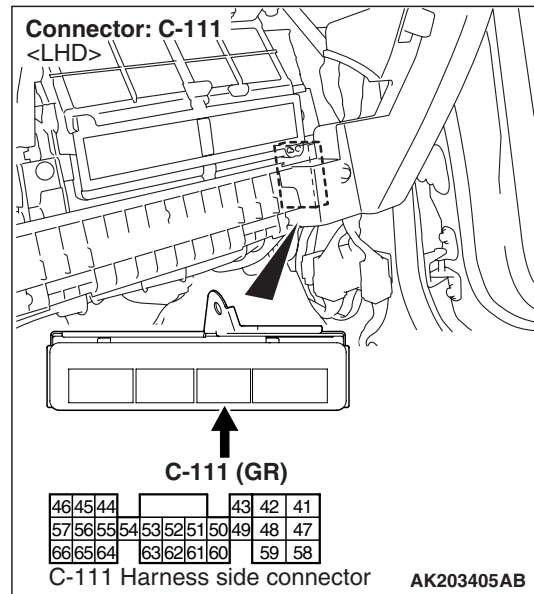
**NO :** Replace engine-A/T-ECU.

- Check output line for short circuit.

**STEP 8. Perform voltage measurement at C-111 engine-A/T-ECU connector.**



**STEP 9. Connector check: C-111 engine-A/T-ECU connector**



- Measure engine-A/T-ECU terminal voltage.
- Engine: Idling
- Voltage between terminal No. 52 and earth.

**OK:**

**System voltage (Steering wheel: Stationary)  
1 V or less (Steering wheel: Turned)**

**Q: Is the check result normal?**

**YES :** Go to Step 11 .

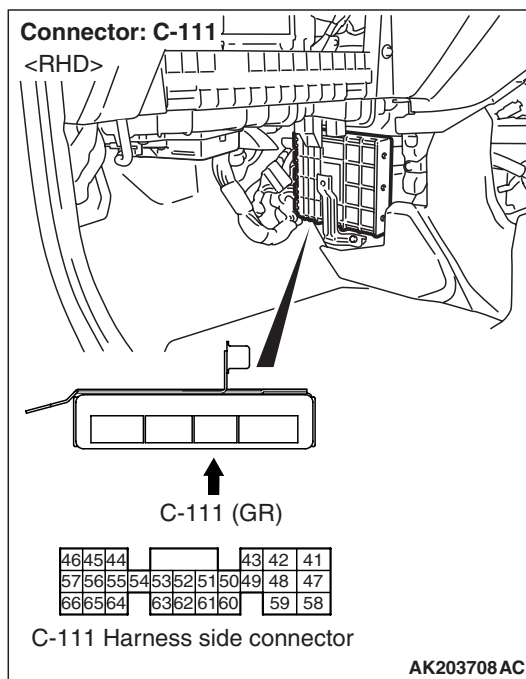
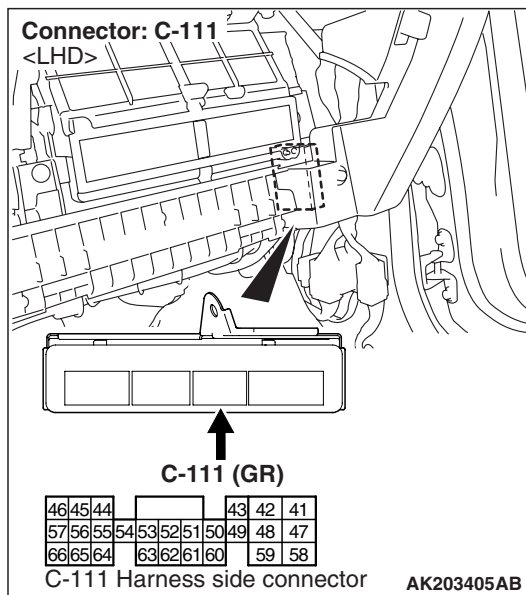
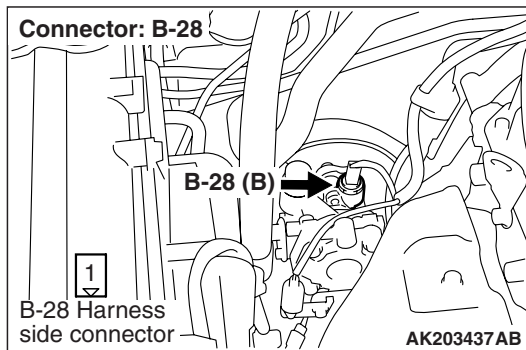
**NO :** Go to Step 9 .

**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Repair.

**STEP 10. Check harness between B-28 (terminal No. 1) power steering fluid pressure switch connector and C-111 (terminal No. 52) engine-A/T-ECU connector.**

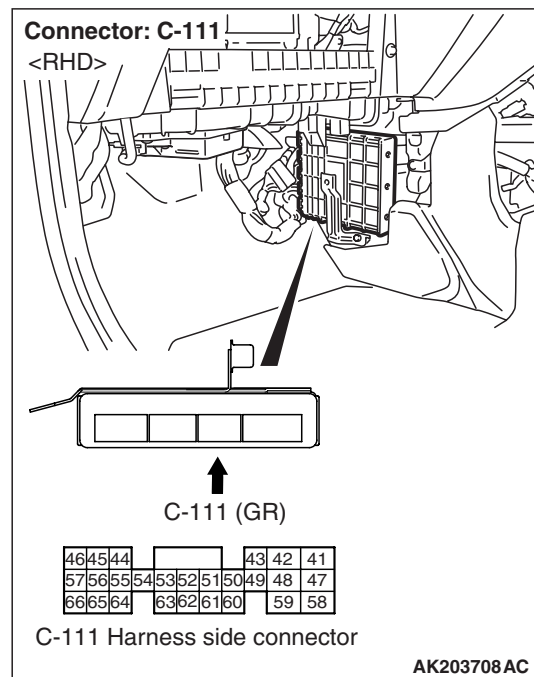
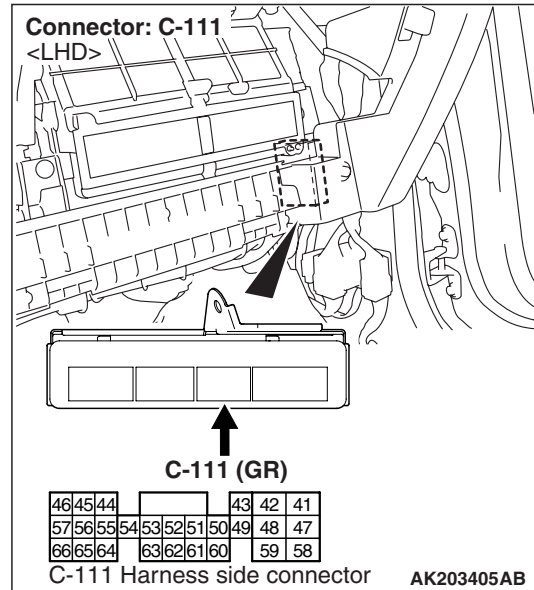


**Q: Is the check result normal?**

**YES :** Replace power steering fluid pressure switch.

**NO :** Repair.

**STEP 11. Connector check: C-111 engine-A/T-ECU connector**



**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

- Check output line for damage.

## Inspection Procedure 30: Idle Speed Control Servo System

### OPERATION

- The power is supplied to the idle speed control servo (terminal No. 2 and No. 5) from the engine control relay (terminal No. 1).
- The engine-A/T-ECU (terminal No. 14, No. 15, No. 28 and No. 29) makes power transistor in the unit be in "ON" position in order, and that makes currents go on the idle speed control servo (terminal No. 1, No. 3, No. 4 and No. 6).

### FUNCTION

- The idle speed control servo opens and closes the servo valve in response to a signal from the engine-A/T-ECU to control the intake air flow rate during idling.

### PROBABLE CAUSE

- Failed idle speed control servo
- Open/short circuit in idle speed control servo circuit or loose connector contact
- Failed engine-A/T-ECU

### DIAGNOSIS PROCEDURE

#### STEP 1. M.U.T.-II/III Data List

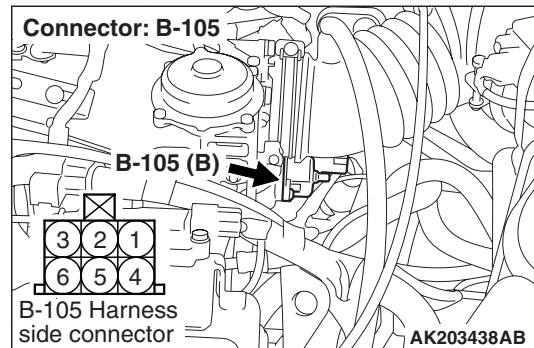
- Refer to Data list reference table [P.13A-260](#).
  - a. Item 45: Idle speed control servo

#### Q: Is the check result normal?

**YES** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO** : Go to Step 2 .

#### STEP 2. Connector check: B-105 idle speed control servo connector



#### Q: Is the check result normal?

**YES** : Go to Step 3 .

**NO** : Repair.

#### STEP 3. Check idle speed control servo itself.

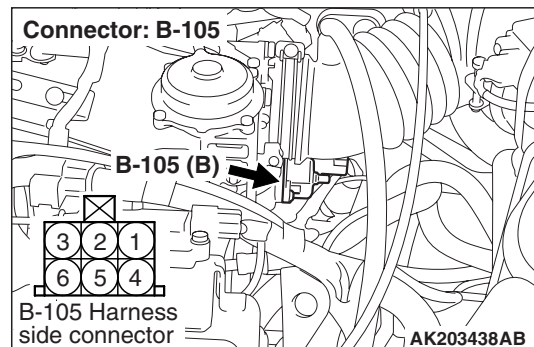
- Check idle speed control servo itself (Refer to [P.13A-290](#)).

#### Q: Is the check result normal?

**YES** : Go to Step 4 .

**NO** : Replace idle speed control servo.

#### STEP 4. Perform voltage measurement at B-105 idle speed control servo connector.



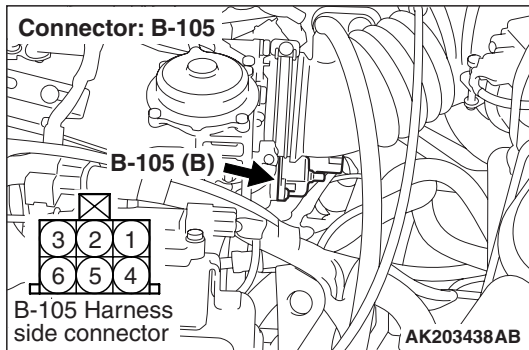
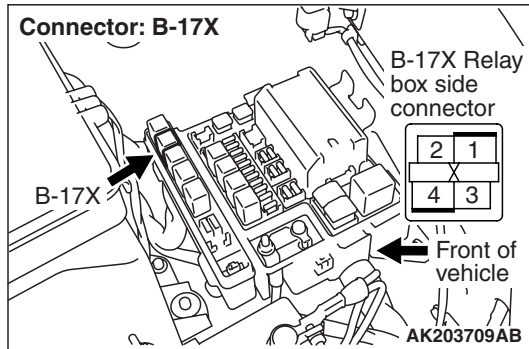
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth, also between terminal No. 5 and earth.

#### OK: System voltage

#### Q: Is the check result normal?

**YES** : Go to Step 6 .

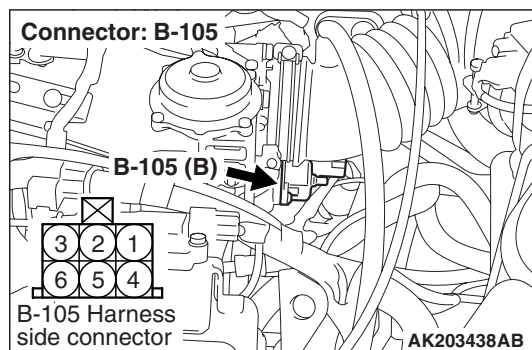
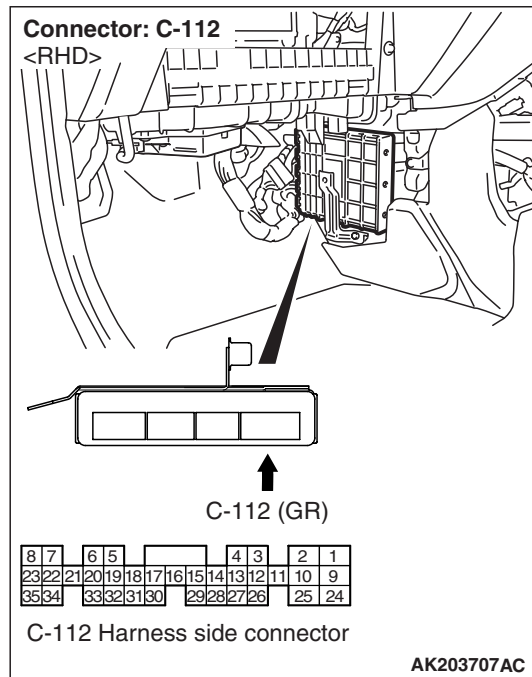
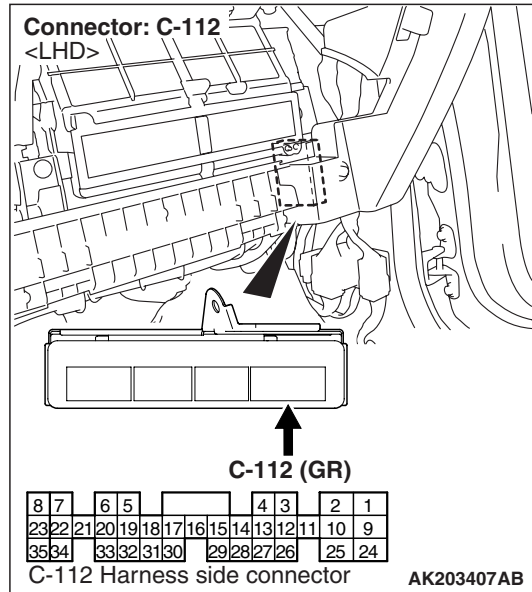
**NO** : Go to Step 5 .

**STEP 5. Connector check: B-17X engine control relay connector****Q: Is the check result normal?**

**YES :** . Check and repair harness between B-105 (terminal No. 2 or No. 5) idle speed control servo connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

**NO :** . Repair.

**STEP 6. Perform voltage measurement at C-112 engine-A/T-ECU connector.**

- Disconnect connector, and measure at harness side.
- Ignition switch: ON



- Voltage between terminal No. 14 and earth, between terminal No. 15 and earth, between terminal No. 28 and earth, also voltage between terminal No. 29 and earth.

**OK: System voltage**

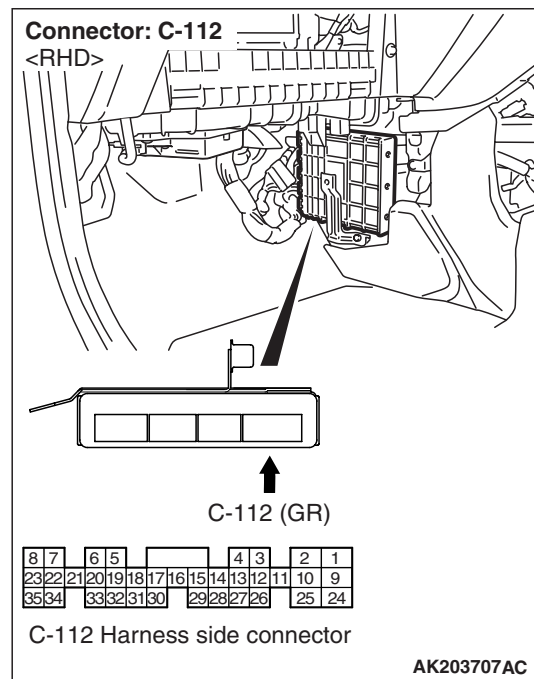
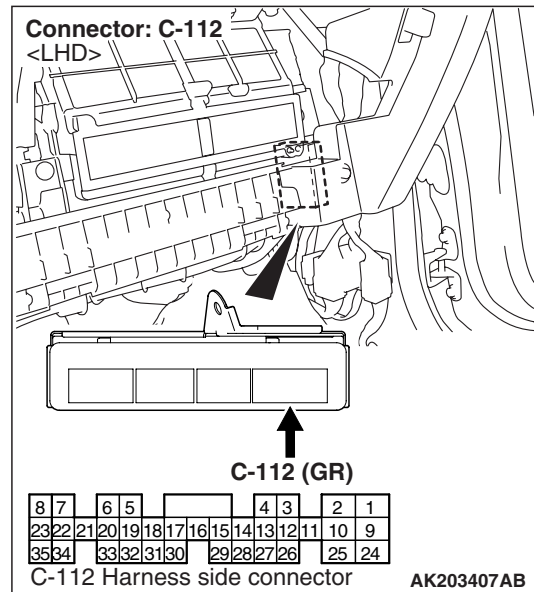
**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Check and repair harness between B-105 idle speed control servo and C-112 engine-A/T-ECU.

1. Harness between idle speed control servo terminal No. 1 and engine-A/T-ECU connector terminal No. 14
2. Harness between idle speed control servo terminal No. 3 and engine-A/T-ECU connector terminal No. 28
3. Harness between idle speed control servo terminal No. 4 and engine-A/T-ECU connector terminal No. 15
4. Harness between idle speed control servo terminal No. 6 and engine-A/T-ECU connector terminal No. 29
  - Check power supply line for open/short circuit.

**STEP 7. Connector check: C-112 engine-A/T-ECU connector**

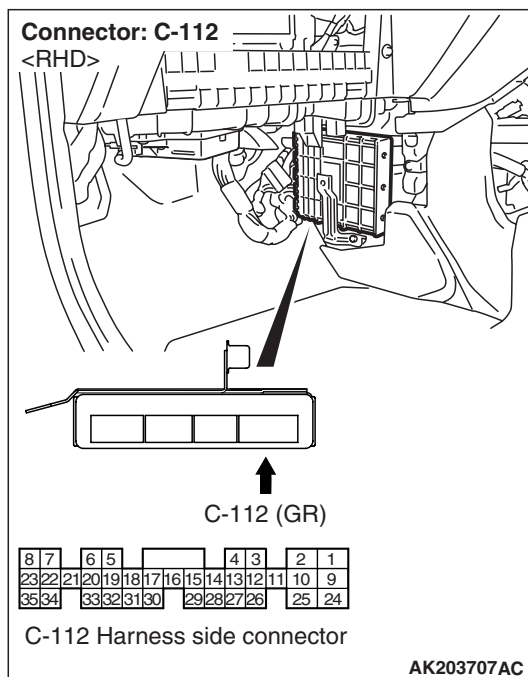
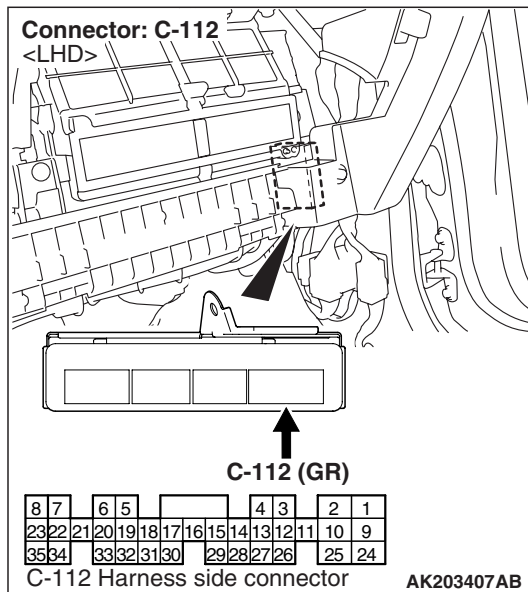
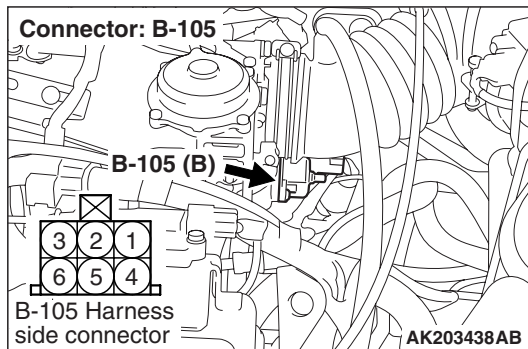


**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.



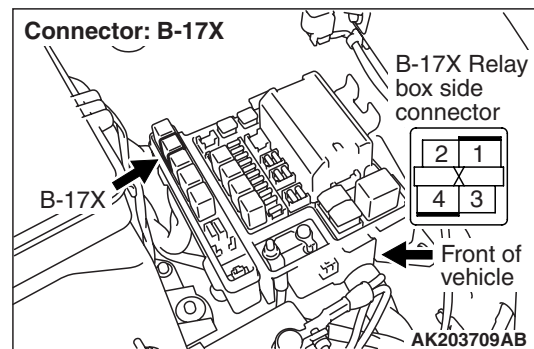
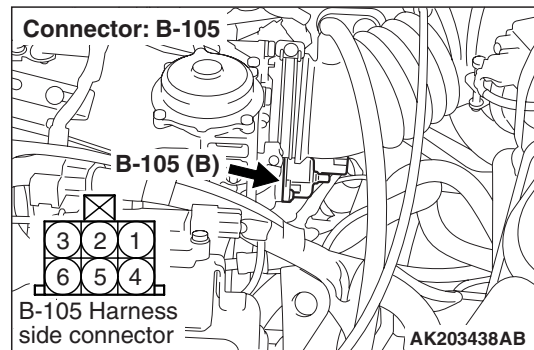
**STEP 8. Check harness between B-105 idle speed control servo and C-112 engine-A/T-ECU.**

2. Harness between idle speed control servo terminal No. 3 and engine-A/T-ECU connector terminal No. 28
  3. Harness between idle speed control servo terminal No. 4 and engine-A/T-ECU connector terminal No. 15
  4. Harness between idle speed control servo terminal No. 6 and engine-A/T-ECU connector terminal No. 29
- Check output line for damage.

**Q: Are the check results normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 9. Check harness between B-105 (terminal No. 2 or No. 5) idle speed control servo connector and B-17X (terminal No. 1) engine control relay connector.**

- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Repair.

1. Harness between idle speed control servo terminal No. 1 and engine-A/T-ECU connector terminal No. 14

### STEP 10. M.U.T.-II/III Data List

- Refer to Data list reference table [P.13A-260](#).
  - a. Item 45: Idle speed control servo

#### Q: Is the check result normal?

**YES** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO** : Replace engine-A/T-ECU.

## Inspection procedure 31: EGR Control Solenoid Valve System

### OPERATION

- Power is supplied to the EGR control solenoid valve (terminal No. 1) from the engine control relay (terminal No. 1).
- The engine-A/T-ECU (terminal No. 6) makes the power transistor in the unit be in "ON", and that makes currents go on the EGR control solenoid valve (terminal No. 2).

### FUNCTION

- In response to the signal from the engine-A/T-ECU, the EGR control solenoid valve controls the operation of the EGR valve.

### PROBABLE CAUSE

- Failed EGR control solenoid valve
- Open/short circuit in EGR control solenoid valve or loose connector contact
- Failed engine-A/T-ECU

### DIAGNOSIS PROCEDURE

#### STEP 1. M.U.T.-II/III actuator test

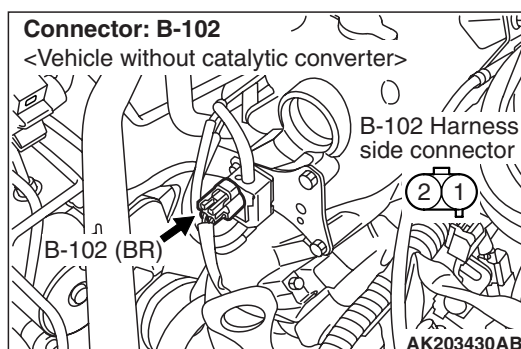
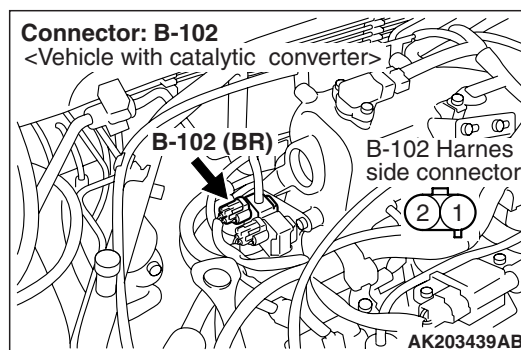
- Item 10: EGR control solenoid valve
  - OK: Operating sound can be heard and the valve vibrates.**

#### Q: Is the check result normal?

**YES** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO** : Go to Step 2 .

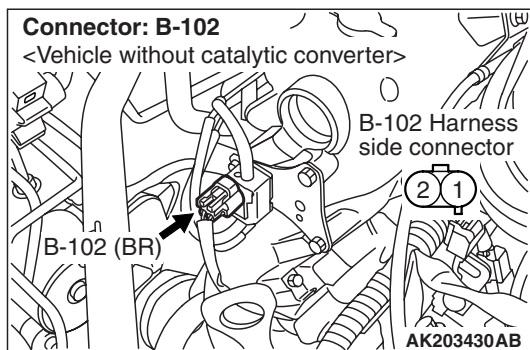
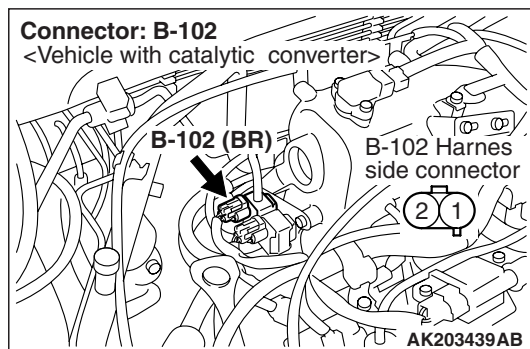
#### STEP 2. Connector check: B-102 EGR control solenoid valve connector



#### Q: Is the check result normal?

**YES** : Go to Step 3 .

**NO** : Repair.

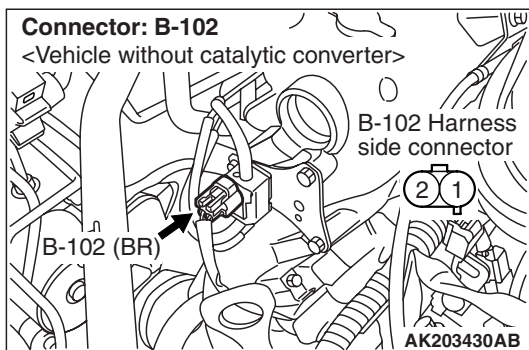
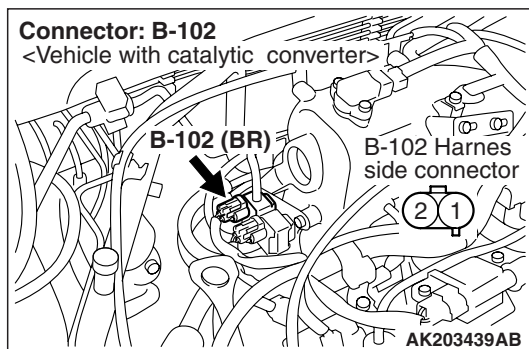
**STEP 3. Perform resistance measurement at B-102 EGR control solenoid valve connector.**

- Disconnect connector, and measure at solenoid valve side.
- Resistance between terminal No. 1 and No. 2.  
**OK: 29 – 35  $\Omega$  (at 20°C)**

**Q: Is the check result normal?**

**YES :** Go to Step 4 .

**NO :** Replace EGR control solenoid valve.

**STEP 4. Perform voltage measurement at B-102 EGR control solenoid valve connector.**

- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

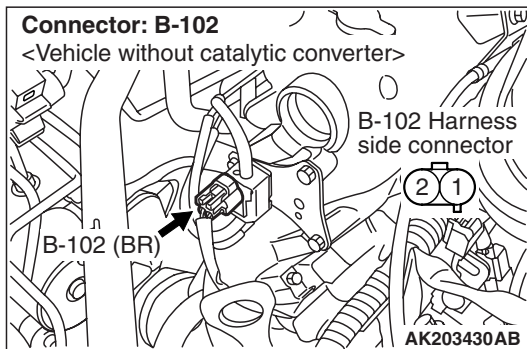
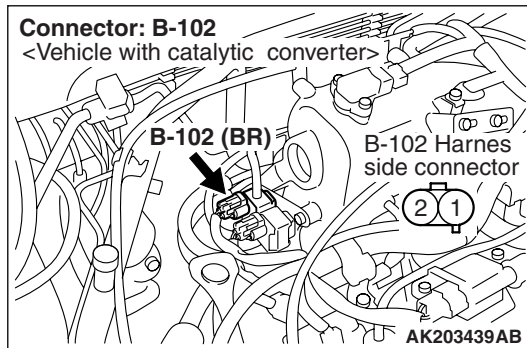
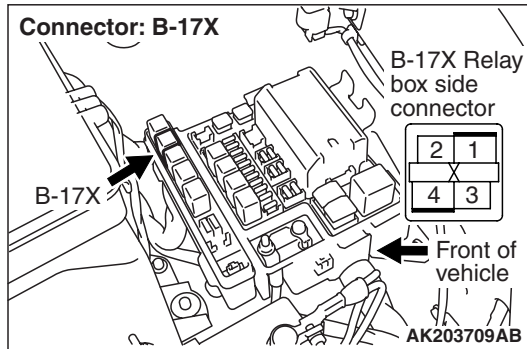
**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Go to Step 5 .

**STEP 5. Connector check: B-17X engine control relay connector**



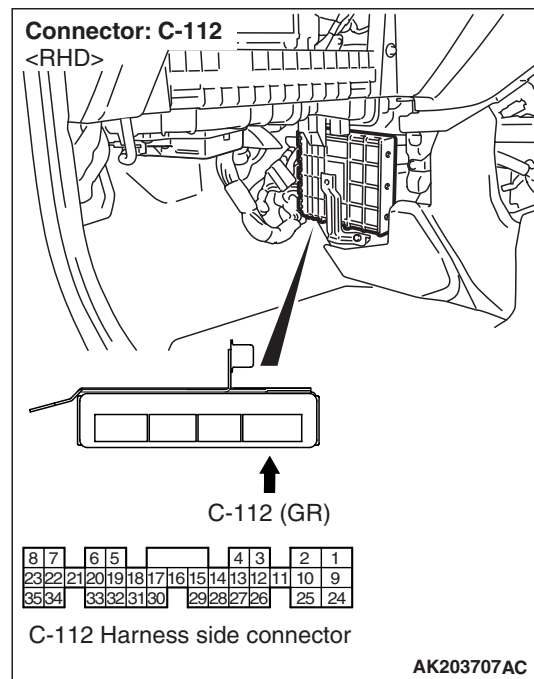
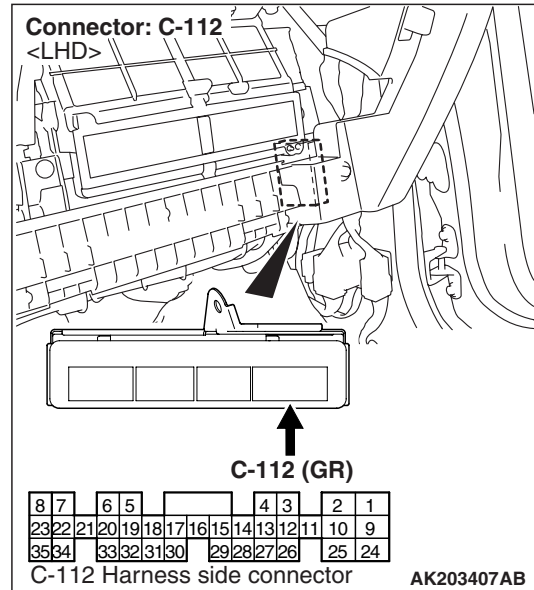
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-102 (terminal No. 1) EGR control solenoid valve connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

**NO :** Repair.

**STEP 6. Perform voltage measurement at C-112 engine-A/T-ECU connector.**



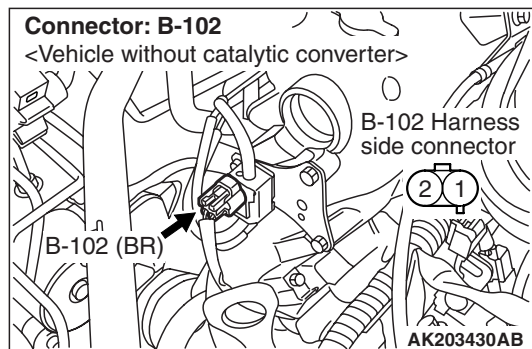
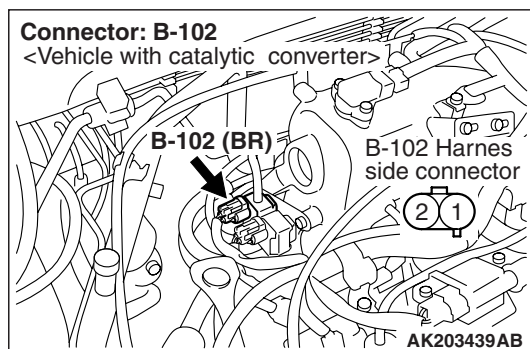
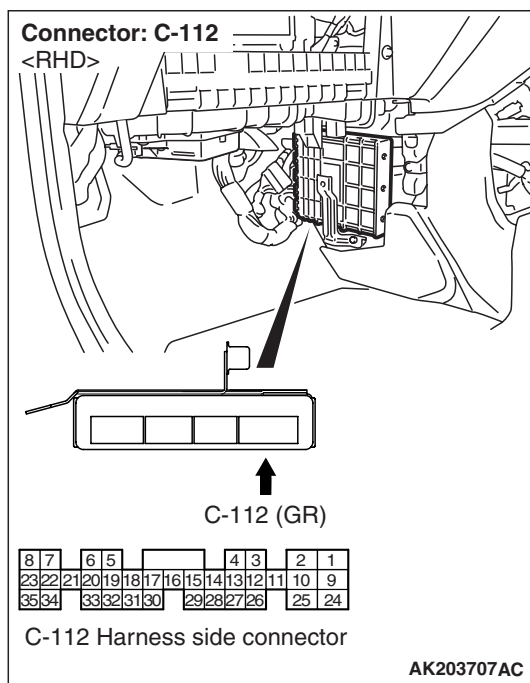
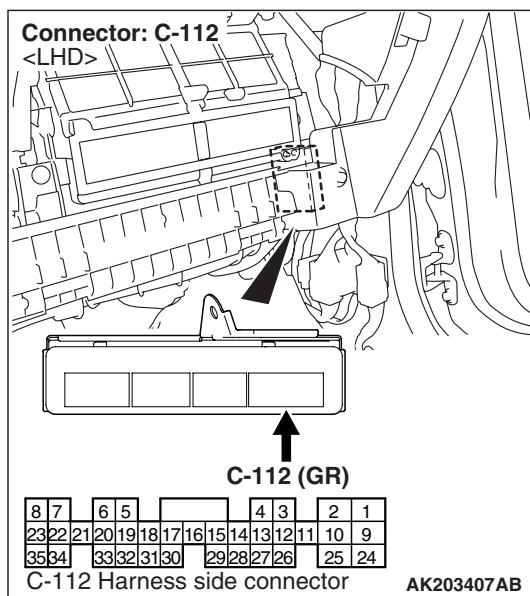
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 6 and earth.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Go to Step 7 .

**STEP 7. Connector check: C-112 engine-A/T-ECU connector****Q: Is the check result normal?**

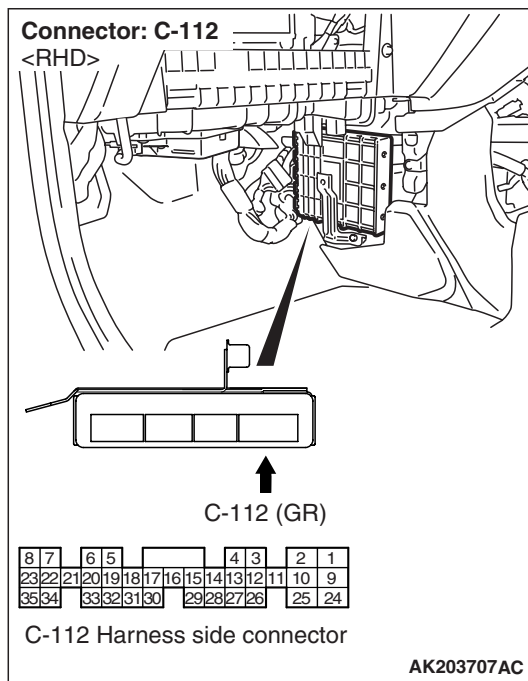
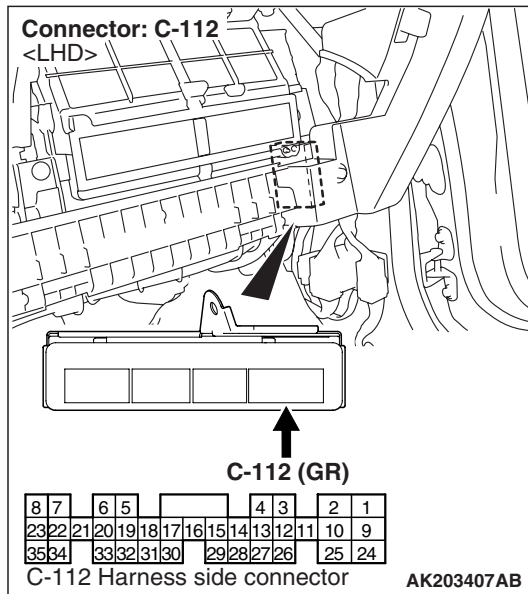
**YES :** Check and repair harness between B-102 (terminal No. 2) EGR control solenoid valve connector and C-112 (terminal No. 6) engine-A/T-ECU connector.

- Check output line for open/short circuit.

**NO :** Repair.



**STEP 8. Connector check: C-112 engine-A/T-ECU connector**



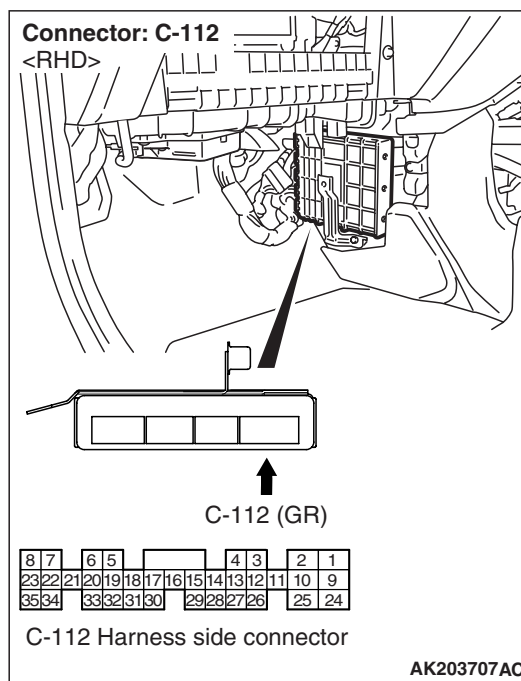
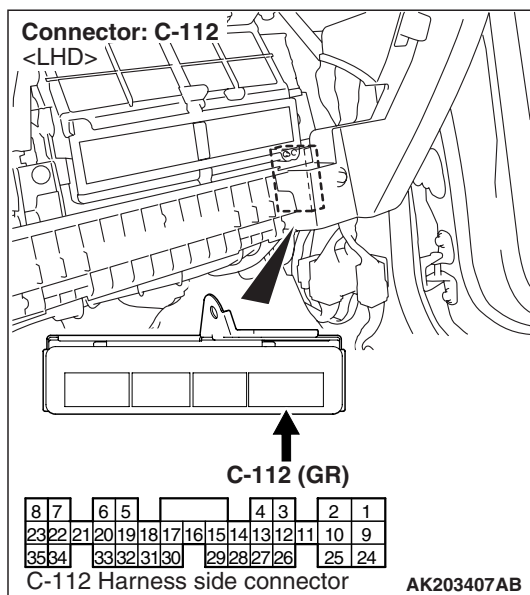
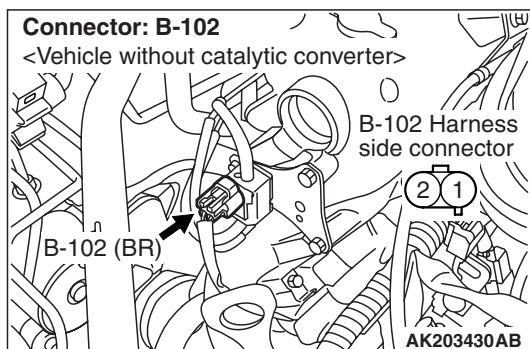
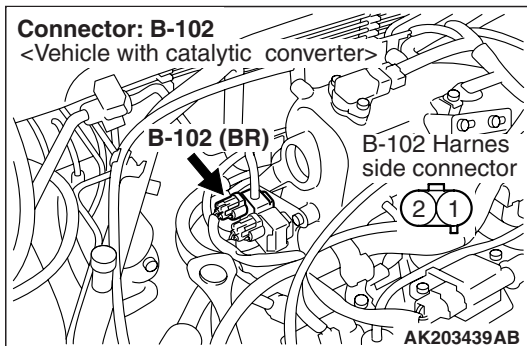
**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.



**STEP 9. Check harness between B-102 (terminal No. 2) EGR control solenoid valve connector and C-112 (terminal No. 6) engine-A/T-ECU connector.**



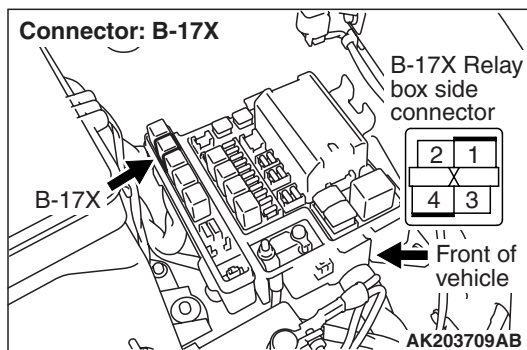
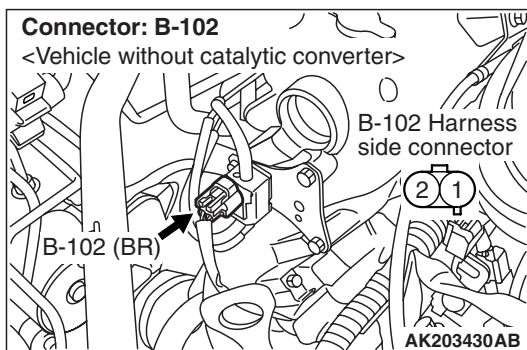
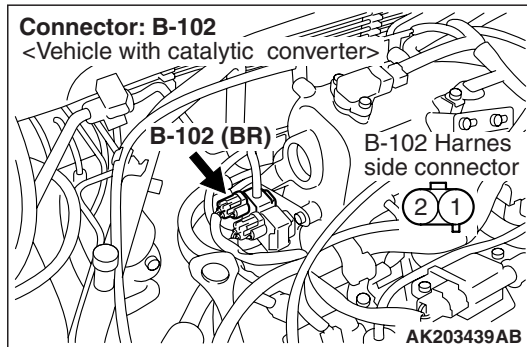
- Check output line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Repair.

**STEP 10. Check harness between B-102 (terminal No. 1) EGR control solenoid valve connector and B-17X (terminal No. 1) engine control relay connector.**



- Check power supply line for damage.

**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Repair.

**STEP 11. M.U.T.-II/III actuator test**

- Item 10: EGR control solenoid valve

**OK:** Operating sound can be heard and the valve vibrates.

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

**NO :** Replace engine-A/T-ECU.

## Inspection Procedure 32: A/C Pressure Sensor System

## OPERATION

- A power voltage of 5 V is applied to the A/C pressure sensor power terminal (terminal No. 3) from the engine-A/T-ECU (terminal No. 46) and is earthed to the engine-A/T-ECU (terminal No. 57) from the A/C pressure sensor (terminal No. 1).
- The sensor signal is inputted to the engine-A/T-ECU (terminal No. 62) from the A/C pressure sensor output terminal (terminal No. 2).

## FUNCTION

- The A/C pressure sensor detects the A/C refrigerant pressure and inputs the pressure signal to the engine-A/T-ECU. The engine-A/T-ECU uses the signal for ON/OFF control of the magnet clutch of the A/C compressor.

## PROBABLE CAUSE

- Failed A/C pressure sensor
- Open/short circuit in A/C pressure sensor circuit or loose connector contact
- Failed engine-A/T-ECU

## DIAGNOSIS PROCEDURE

## STEP 1. M.U.T.-II/III Data List

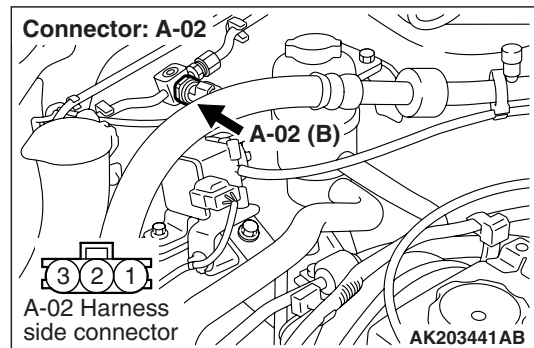
- Refer to Data list reference table [P.13A-260](#).
  - Item 3A: A/C pressure sensor

## Q: Is the check result normal?

**YES** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO** : Go to Step 2 .

## STEP 2. Connector check: A-02 A/C pressure sensor connector

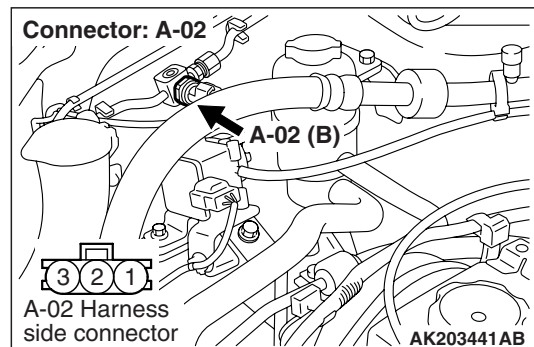


## Q: Is the check result normal?

**YES** : Go to Step 3 .

**NO** : Repair.

## STEP 3. Perform voltage measurement at A-02 A/C pressure sensor connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

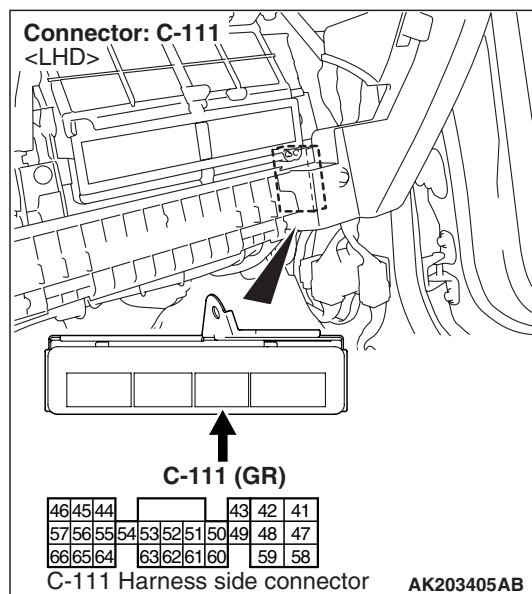
**OK: 4.9 – 5.1 V**

## Q: Is the check result normal?

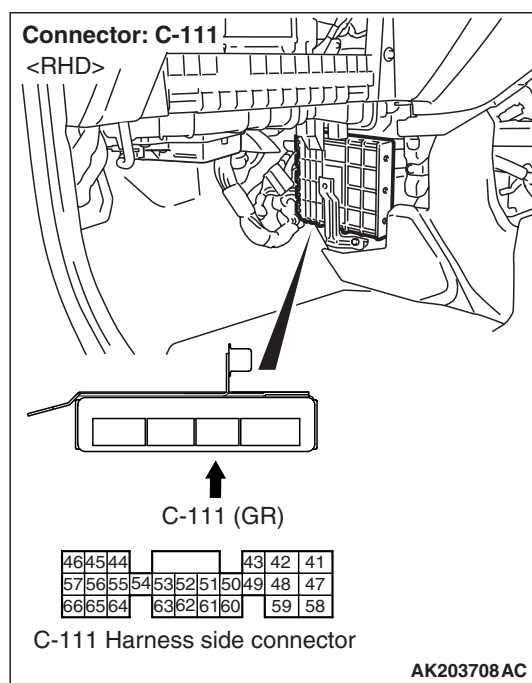
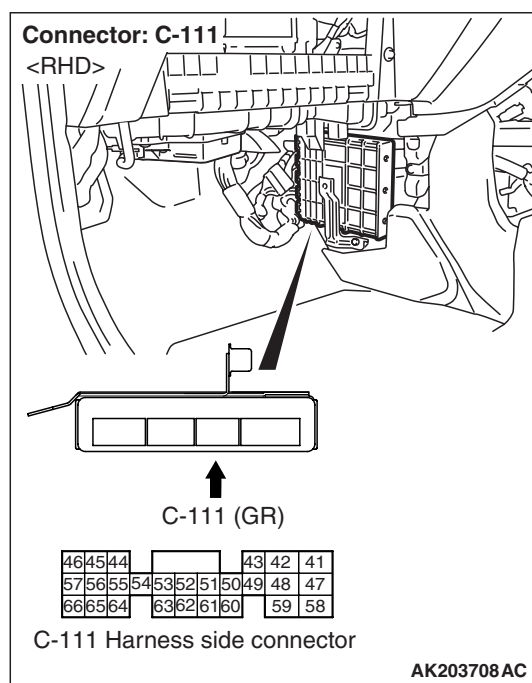
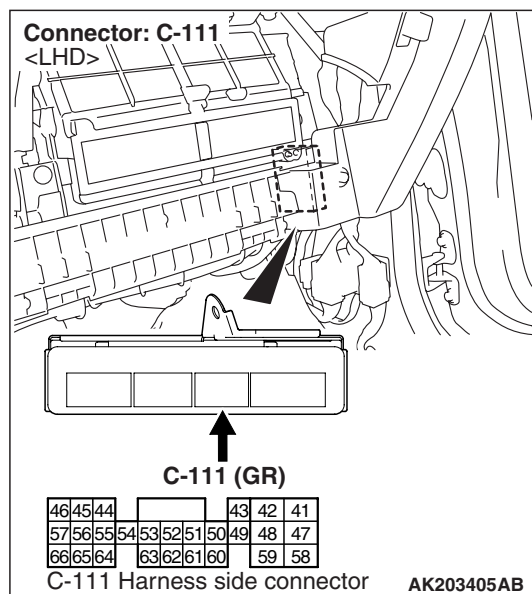
**YES** : Go to Step 9 .

**NO** : Go to Step 4 .

**STEP 4. Perform voltage measurement at C-111 engine-A/T-ECU connector.**



**STEP 5. Connector check: C-111 engine-A/T-ECU connector**



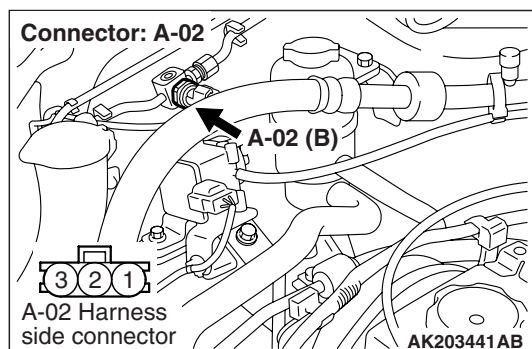
- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 46 and earth.

**OK: 4.9 – 5.1 V**

**Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Go to Step 5 .



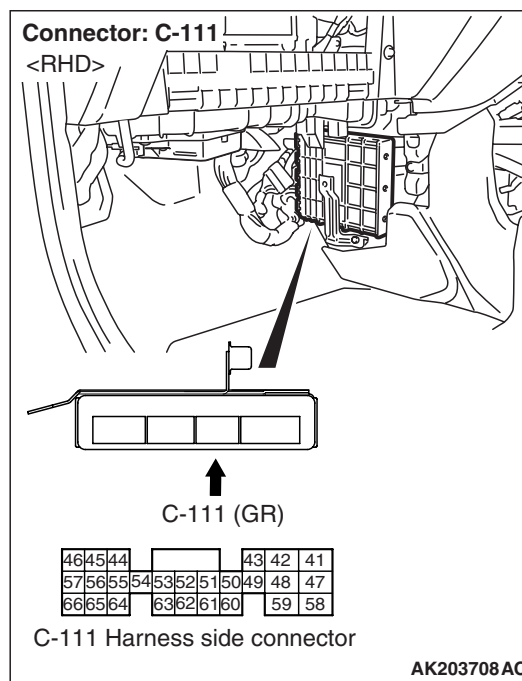
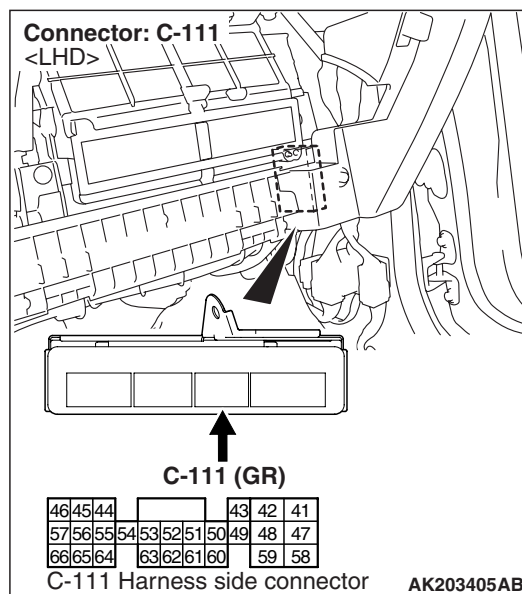
**Q: Is the check result normal?**

**YES :** Check intermediate connector A-14, and repair if necessary. If intermediate connector is normal, check and repair harness between A-02 (terminal No. 3) A/C pressure sensor connector and C-111 (terminal No. 46) engine-A/T-ECU connector.

- Check power supply line for open circuit.

**NO :** Repair.

### STEP 6. Connector check: C-111 engine-A/T-ECU connector

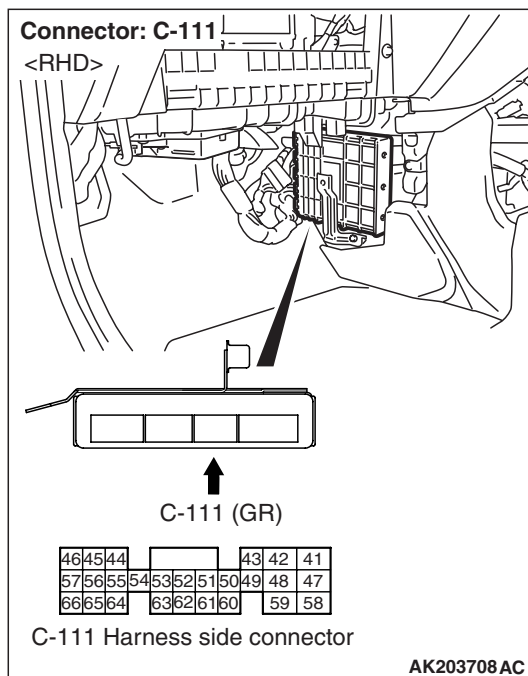
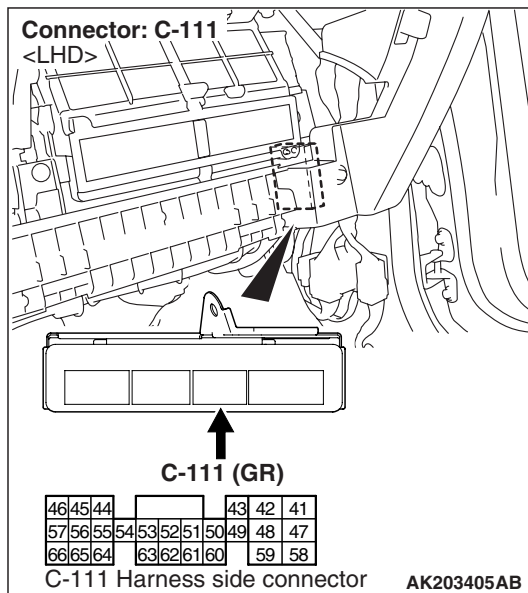
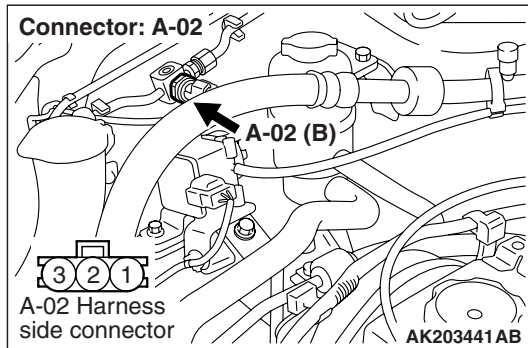


**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

**STEP 7. Check harness between A-02 (terminal No. 3) A/C pressure sensor connector and C-111 (terminal No. 46) engine-A/T-ECU connector.**



- Check power supply line for short circuit.

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 8. M.U.T.-II/III Data List**

- Refer to Data list reference table [P.13A-260](#).
  - a. Item 3A: A/C pressure sensor

**Q: Is the check result normal?**

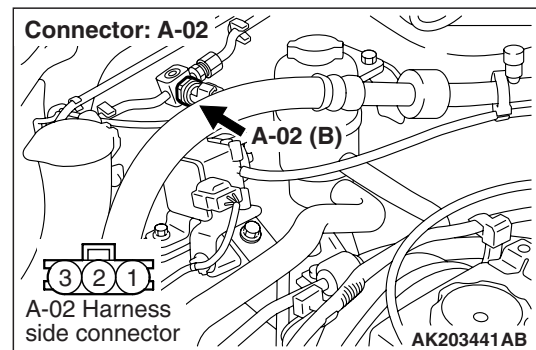
**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use

Troubleshooting/Inspection Service Points

[P.00-5](#)).

**NO :** Replace engine-A/T-ECU.

**STEP 9. Perform resistance measurement at A-02 A/C pressure sensor connector.**



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.

**OK: 2 Ω or less**

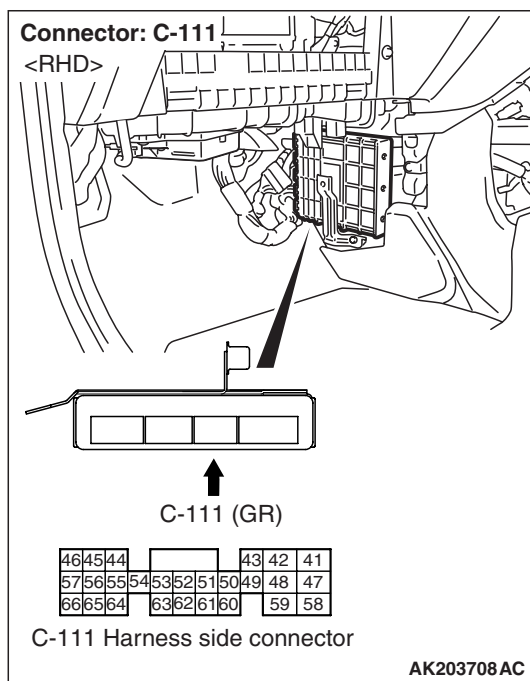
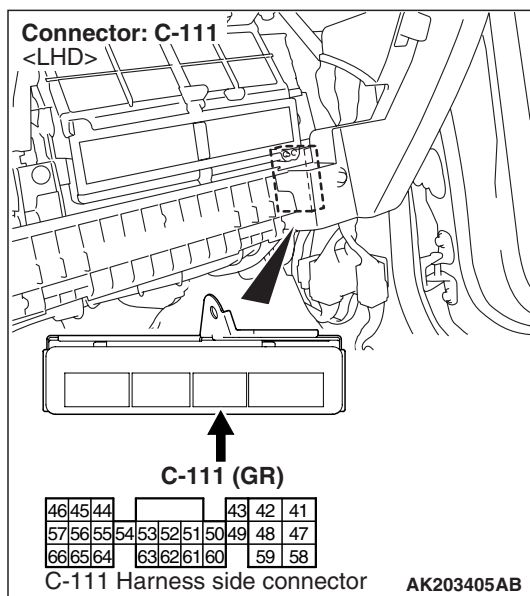
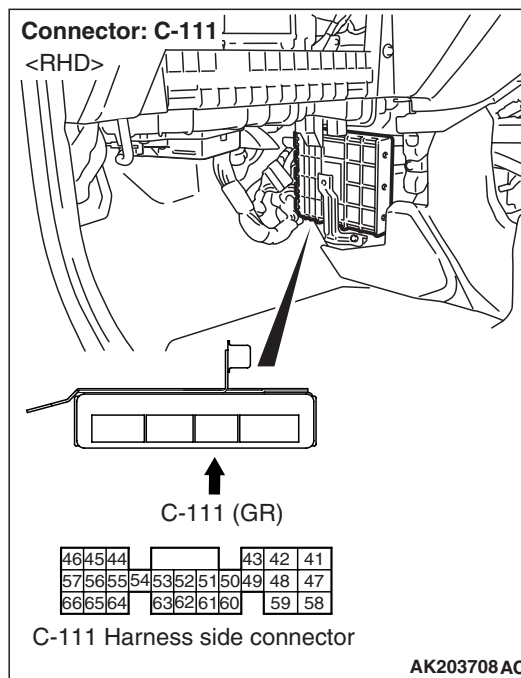
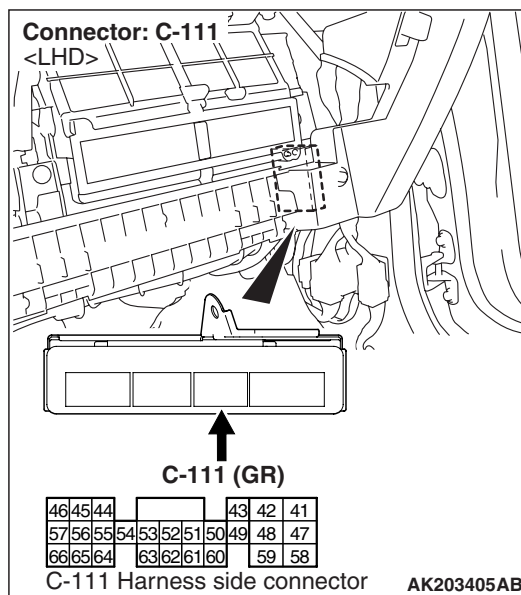
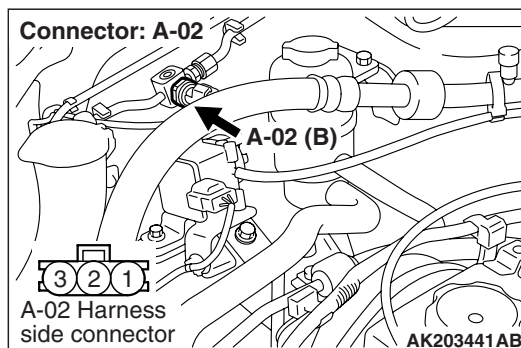
**Q: Is the check result normal?**

**YES :** Go to Step 12 .

**NO :** Go to Step 10 .

**NOTE:** Before checking harness, check intermediate connector A-14, and repair if necessary.



**STEP 10. Connector check: C-111  
engine-A/T-ECU connector****Q: Is the check result normal?****YES :** Go to Step 11 .**NO :** Repair.**STEP 11. Check harness between A-02 (terminal  
No. 1) A/C pressure sensor connector and C-111  
(terminal No. 57) engine-A/T-ECU connector.**

*NOTE: Before checking harness, check intermediate connectors C-105 and C-116, and repair if necessary.*

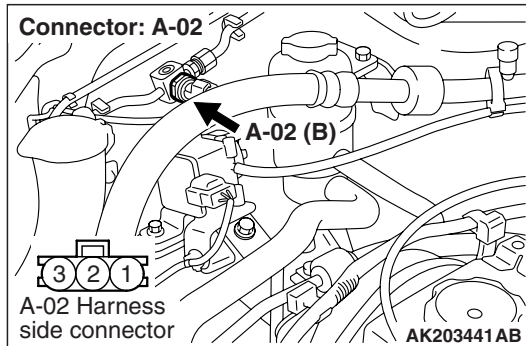
- Check earthing line for open circuit and damage.

**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 12. Perform voltage measurement at A-02 A/C pressure sensor connector.**



- Use special tool test harness (MB991348) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

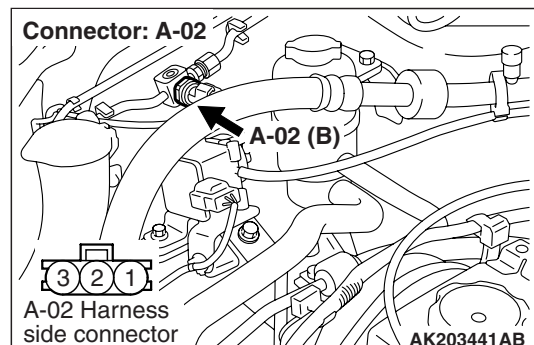
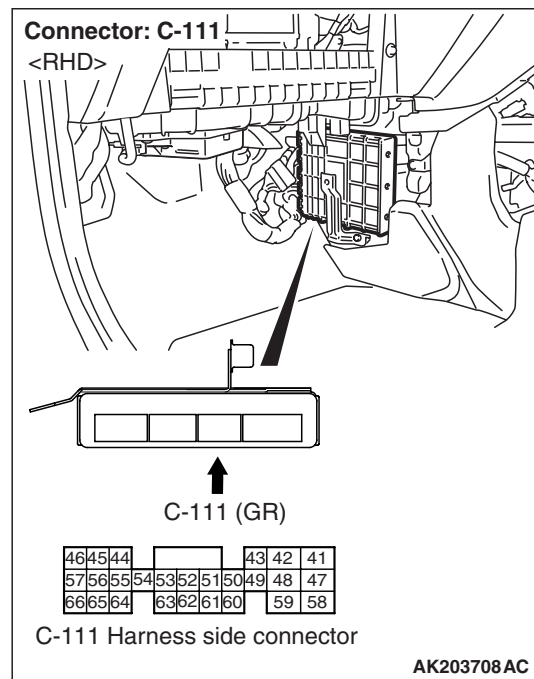
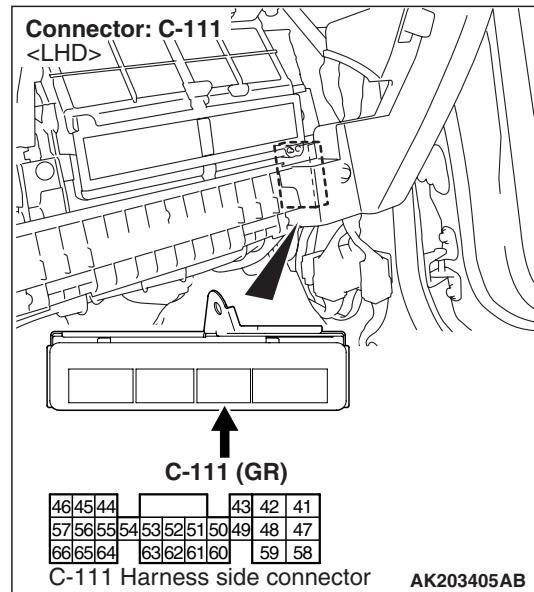
**OK: 4.9 – 5.1 V**

**Q: Is the check result normal?**

**YES :** Go to Step 14 .

**NO :** Go to Step 13 .

**STEP 13. Connector check: C-111 engine-A/T-ECU connector**

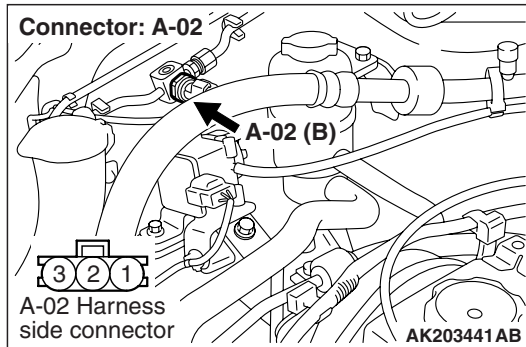


**Q: Is the check result normal?**

**YES :** Check intermediate connector A-14, and repair if necessary. If intermediate connector is normal, check and repair harness between A-02 (terminal No. 3) A/C pressure sensor connector and C-111 (terminal No. 46) engine-A/T-ECU connector.

- Check power supply line for damage.

**NO :** Repair.

**STEP 14. Perform voltage measurement at A-02 A/C pressure sensor connector.**

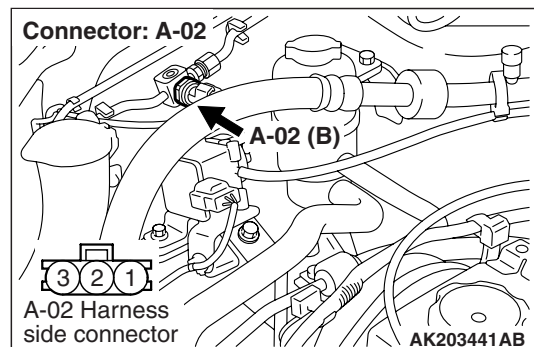
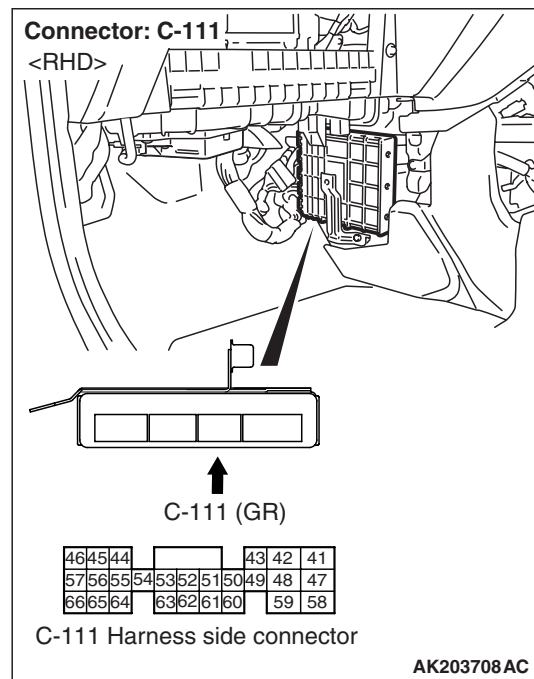
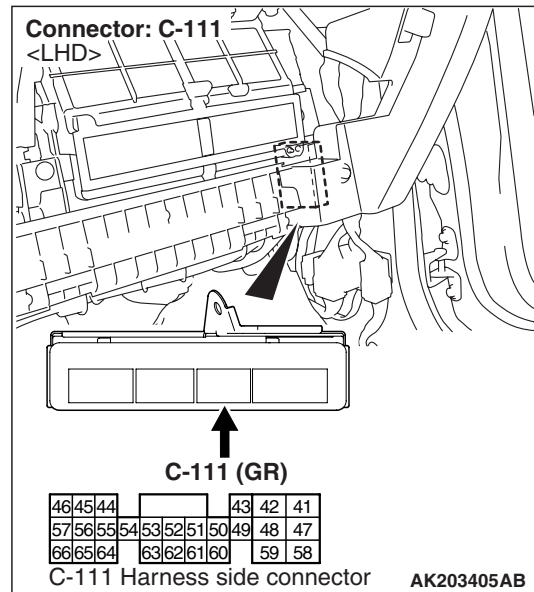
- Use special tool test harness (MB991348) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

**OK: 0.5 V or less**

**Q: Is the check result normal?**

**YES :** Go to Step 16 .

**NO :** Go to Step 15 .

**STEP 15. Connector check: C-111 engine-A/T-ECU connector**

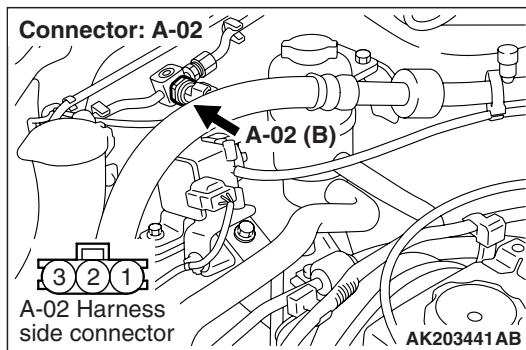
**Q: Is the check result normal?**

**YES :** Check intermediate connectors C-105 and C-116, and repair if necessary. If intermediate connectors are normal, check and repair harness between A-02 (terminal No. 1) A/C pressure sensor connector and C-111 (terminal No. 57) engine-A/T-ECU connector.

- Check earthing line for damage.

**NO :** Repair.

**STEP 16. Perform voltage measurement at A-02 A/C pressure sensor connector.**



- Use special tool test harness (MB991348) to connect connector, and measure at pick-up harness.
- Engine: Idling
- A/C switch: ON
- Voltage between terminal No. 2 and earth.

**OK:**

**1.8 – 2.0 V (A/C refrigerant pressure: 1 kPa)**

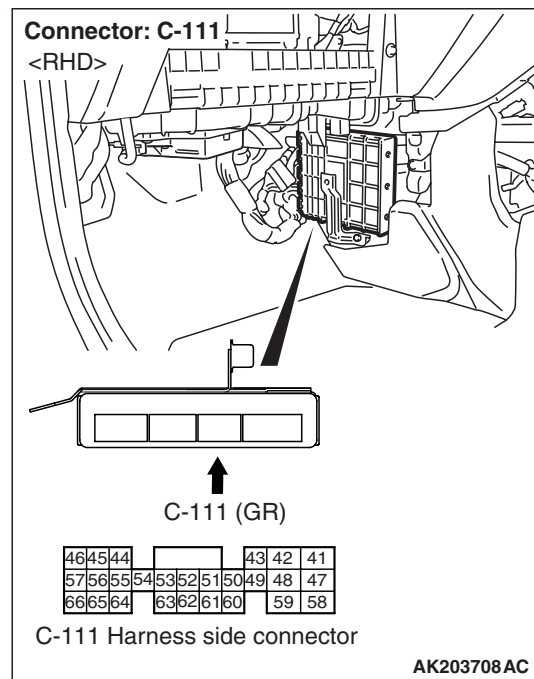
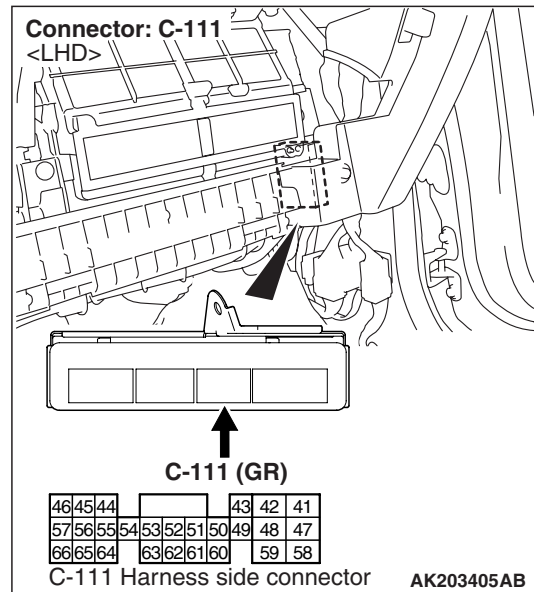
**3.23 – 3.57 V (A/C refrigerant pressure: 2 kPa)**

**Q: Is the check result normal?**

**YES :** Go to Step 19 .

**NO :** Go to Step 17 .

**STEP 17. Connector check: C-111 engine-A/T-ECU connector**



**Q: Is the check result normal?**

**YES :** Go to Step 18 .

**NO :** Repair.

**STEP 18. Check harness between A-02 (terminal No. 2) A/C pressure sensor connector and C-111 (terminal No. 62) engine-A/T-ECU connector.**

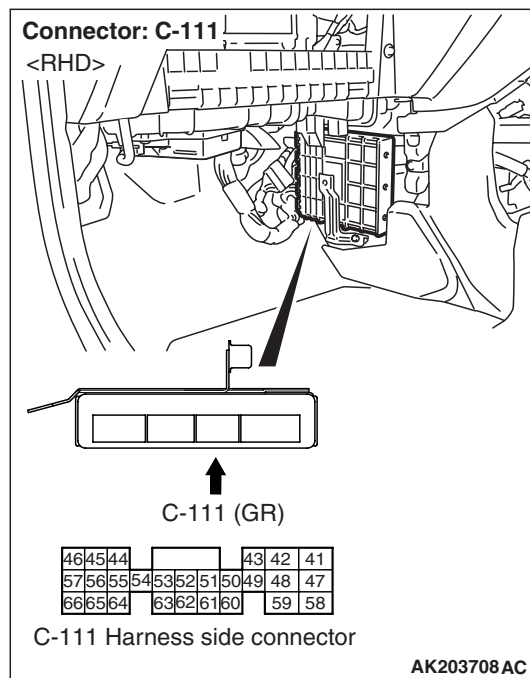
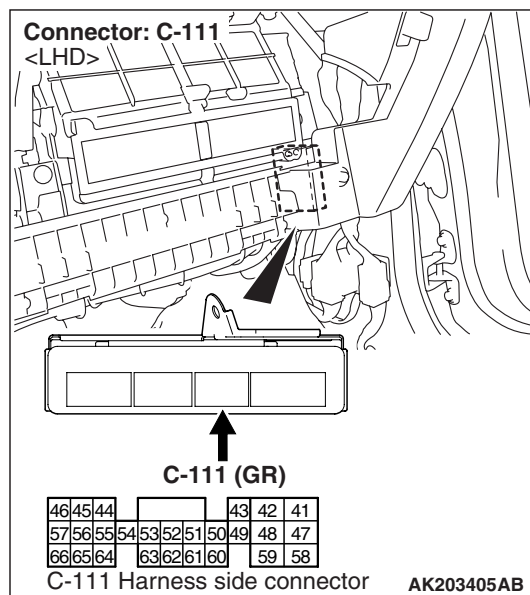
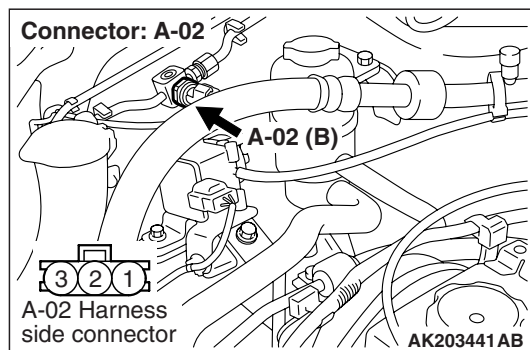
*NOTE: Before checking harness, check intermediate connectors C-104 and C-116, and repair if necessary.*

- Check output line for short circuit and damage.

**Q: Is the check result normal?**

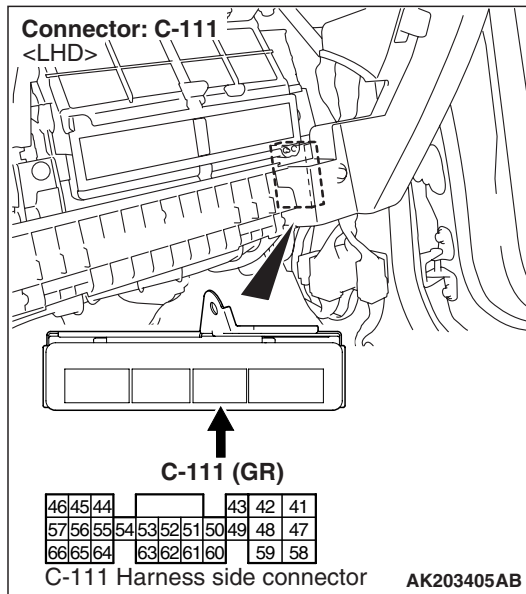
**YES :** Replace A/C pressure sensor.

**NO :** Repair.

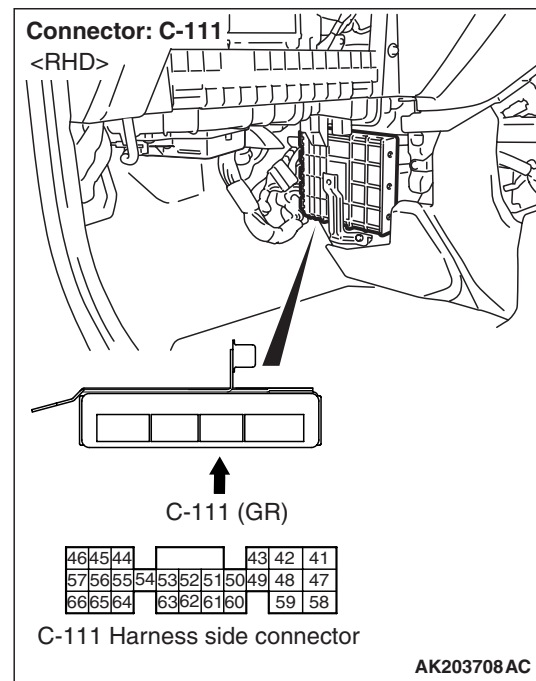
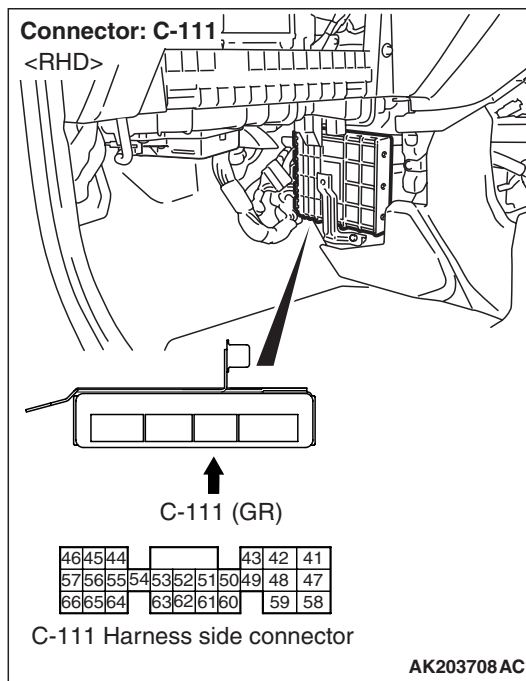
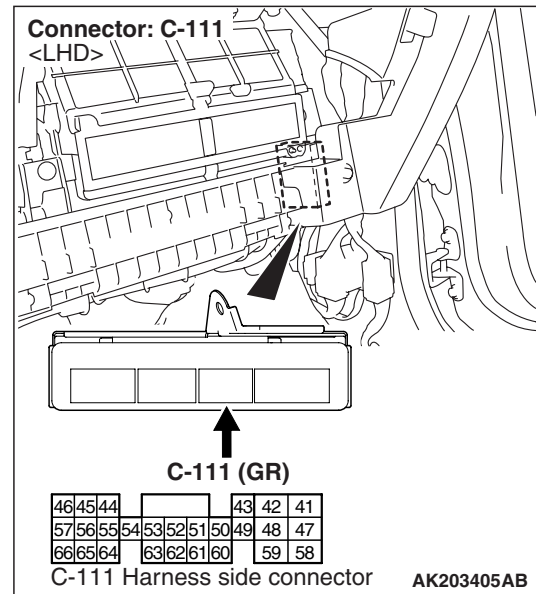




**STEP 19. Perform voltage measurement at C-111 engine-A/T-ECU connector.**



**STEP 20. Connector check: C-111 engine-A/T-ECU connector**



- Measure engine-A/T-ECU terminal voltage.
- Engine: Idling
- A/C switch: ON
- Voltage between terminal No. 62 and earth.

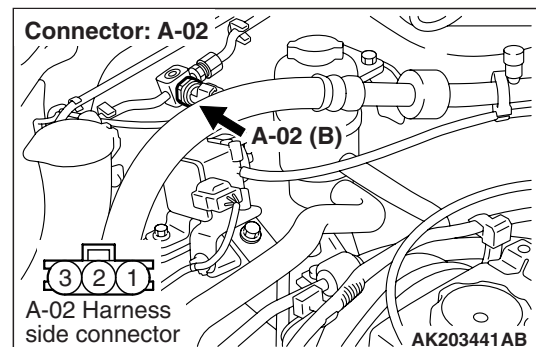
**OK:**

**1.8 – 2.0 V (A/C refrigerant pressure: 1 kPa)**  
**3.23 – 3.57 V (A/C refrigerant pressure: 2 kPa)**

**Q: Is the check result normal?**

**YES :** Go to Step 21 .

**NO :** Go to Step 20 .





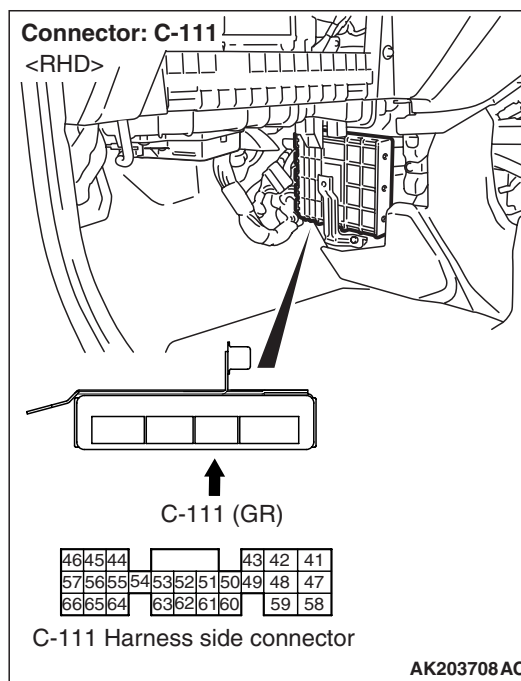
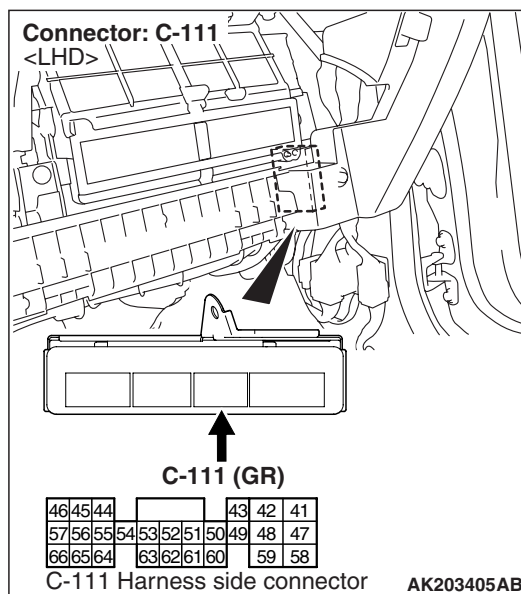
**Q: Is the check result normal?**

**YES :** Check intermediate connectors C-104 and C-116, and repair if necessary. If intermediate connectors are normal, check and repair harness between A-02 (terminal No. 2) A/C pressure sensor connector and C-111 (terminal No. 62) engine-A/T-ECU connector.

- Check output line for open circuit and damage.

**NO :** Repair.

### STEP 21. Connector check: C-111 engine-A/T-ECU connector



**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

## Inspection Procedure 33: Mixture Adjusting Screw (Variable Resistor) System

### OPERATION

- A power voltage of 5 V is applied to the mixture adjusting screw (terminal No. 3) from the engine-A/T-ECU (terminal No. 46).
- The power voltage is earthed to the engine-A/T-ECU (terminal No. 57) from the mixture adjusting screw (terminal No. 1).
- The sensor signal is inputted to the engine-A/T-ECU (terminal No. 71) from the mixture adjusting screw output terminal (terminal No. 2).

### FUNCTION

The mixture adjusting screw is a variable resistor for manually adjusting the idling fuel mixture. When the shaft of the mixture adjusting screw is turned, the resistance between the output terminal and the earth terminal changes. Because of this, the output voltage also changes in accordance with the turning of the shaft.

The engine-A/T-ECU controls the injectors to produce a richer idling fuel mixture in accordance with the increase in the output voltage.

### PROBABLE CAUSE

- Failed mixture adjusting screw
- Open/short circuit in mixture adjusting screw or loose connector contact
- Failed engine-A/T-ECU

### DIAGNOSIS PROCEDURE

#### STEP 1. M.U.T.-II/III Data List

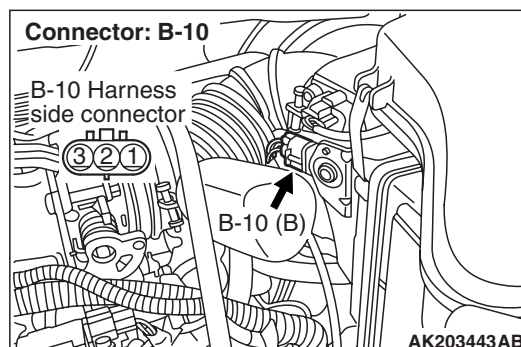
- Refer to Data list reference table [P.13A-260](#).  
a. Item 17: Mixture adjusting screw

#### Q: Is the check result normal?

**YES** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO** : Go to Step 2 .

#### STEP 2. Connector check: B-10 mixture adjusting screw connector



#### Q: Is the check result normal?

**YES** : Go to Step 3 .

**NO** : Repair.

#### STEP 3. Check mixture adjusting screw itself.

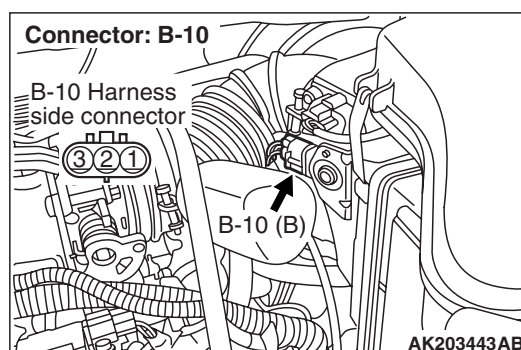
- Check mixture adjusting screw itself (Refer to [P.13A-288](#)).

#### Q: Is the check result normal?

**YES** : Go to Step 4 .

**NO** : Replace mixture adjusting screw.

#### STEP 4. Perform voltage measurement at B-10 mixture adjusting screw connector.



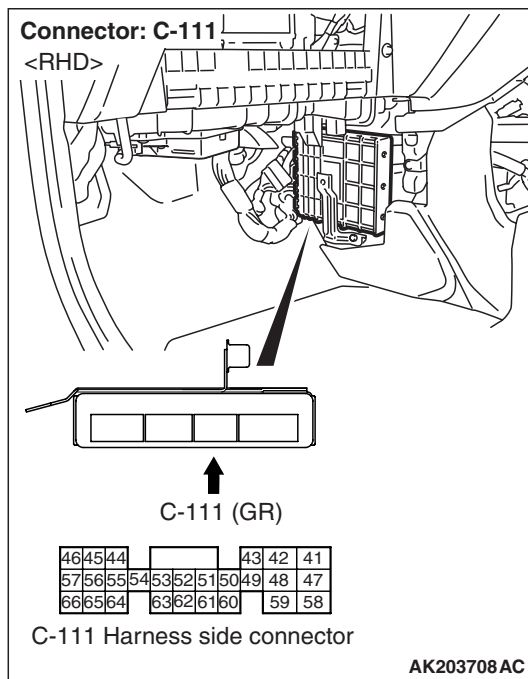
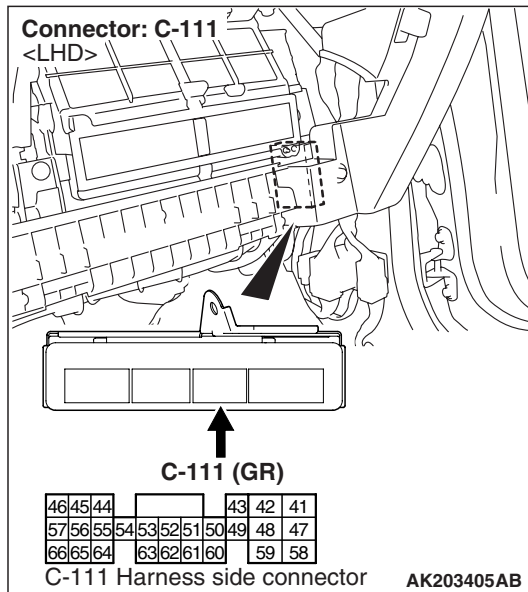
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

**OK: 4.9 – 5.1 V**

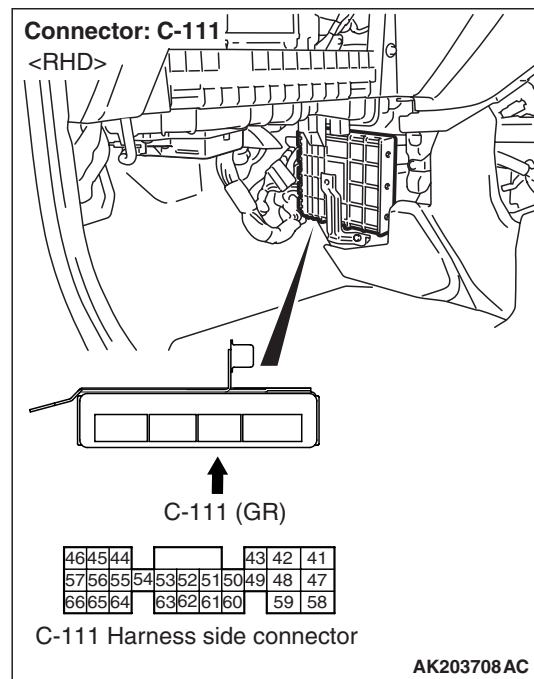
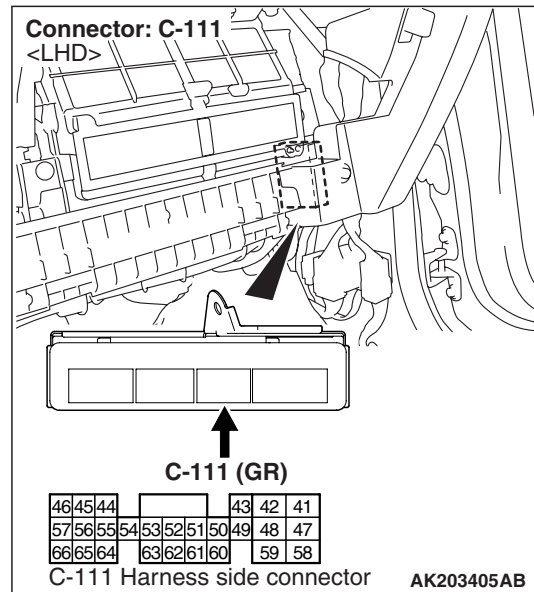
#### Q: Is the check result normal?

**YES** : Go to Step 10 .

**NO** : Go to Step 5 .

**STEP 5. Perform voltage measurement at C-111 engine-A/T-ECU connector.**

- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 46 and earth.

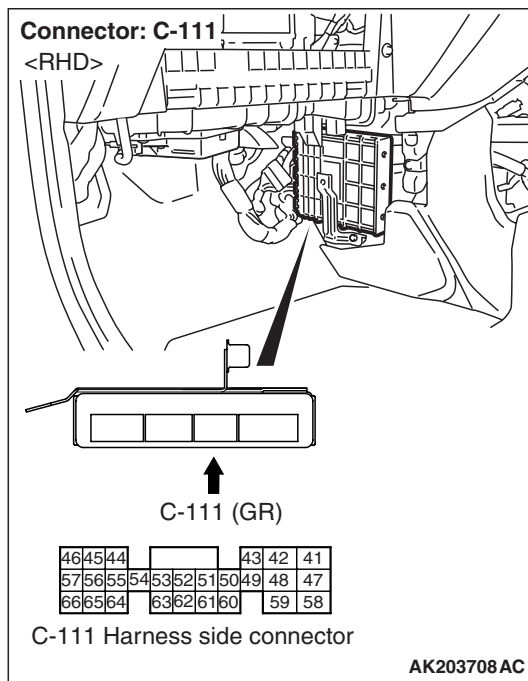
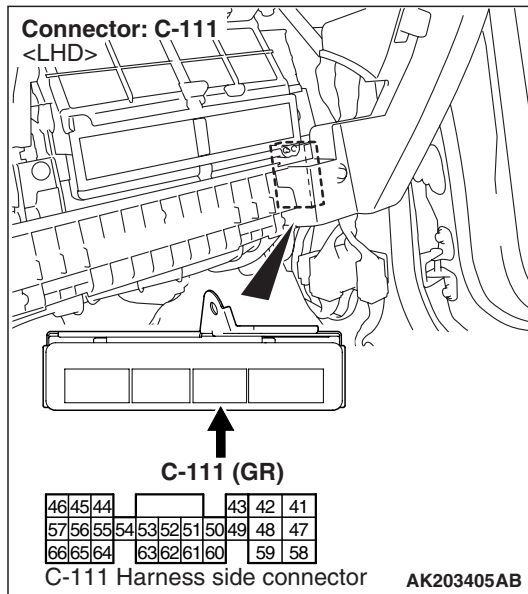
**OK: 4.9 – 5.1 V****Q: Is the check result normal?****YES :** Go to Step 6 .**NO :** Go to Step 7 .**STEP 6. Connector check: C-111 engine-A/T-ECU connector****Q: Is the check result normal?**

**YES :** Check and repair harness between B-10 (terminal No. 3) mixture adjusting screw connector and C-111 (terminal No. 46) engine-A/T-ECU connector.

- Check power supply line for open circuit.

**NO :** Repair.

**STEP 7. Connector check: C-111 engine-A/T-ECU connector**



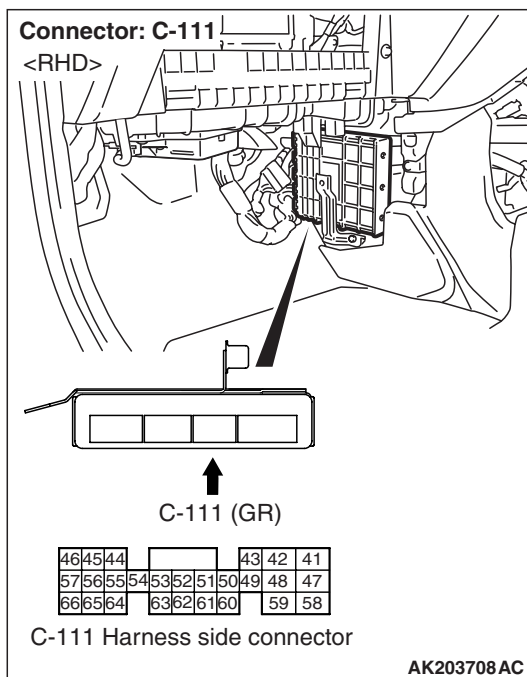
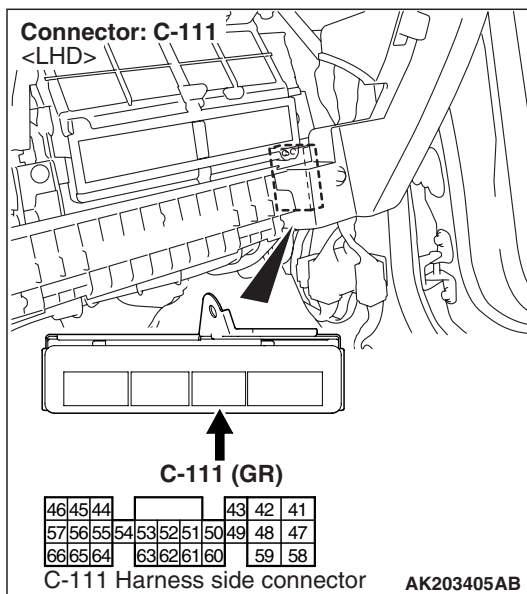
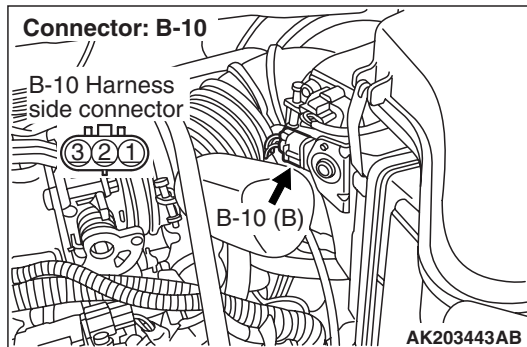
**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 8. Check harness between B-10 (terminal No. 3) mixture adjusting screw connector and C-111 (terminal No. 46) engine-A/T-ECU connector.**

- Check power supply line for short circuit.



**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

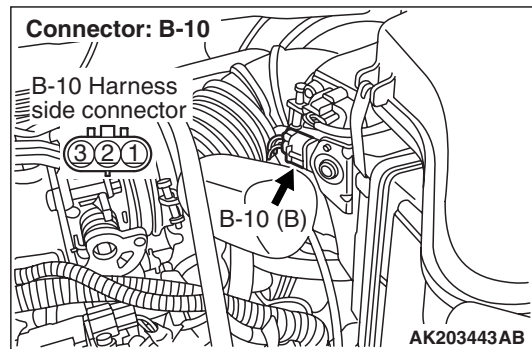
**STEP 9. M.U.T.-II/III Data List**

- Refer to Data list reference table [P.13A-260](#).
  - a. Item 17: Mixture adjusting screw

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

**NO :** Replace engine-A/T-ECU.

**STEP 10. Perform resistance measurement at B-10 mixture adjusting screw connector.**

- Disconnect connector and measure at harness side.
- Resistance between terminal No. 1 and earth.

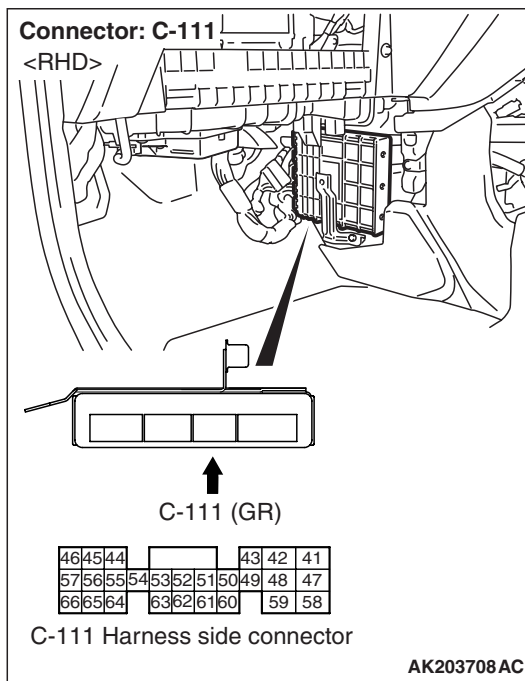
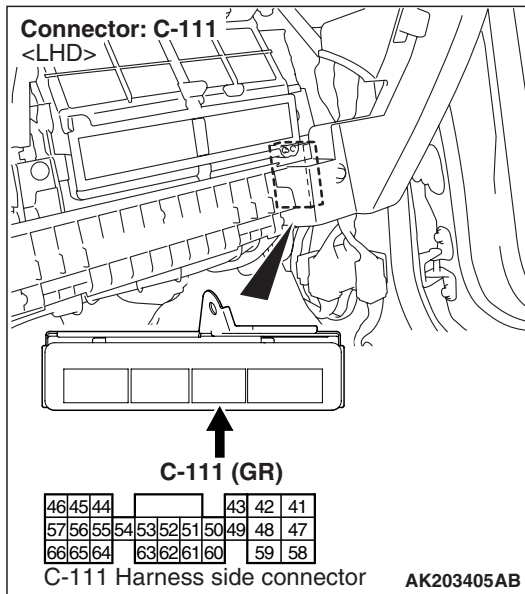
**OK: 2  $\Omega$  or less**

**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO :** Go to Step 11 .

**STEP 11. Connector check: C-111**  
**engine-A/T-ECU connector**



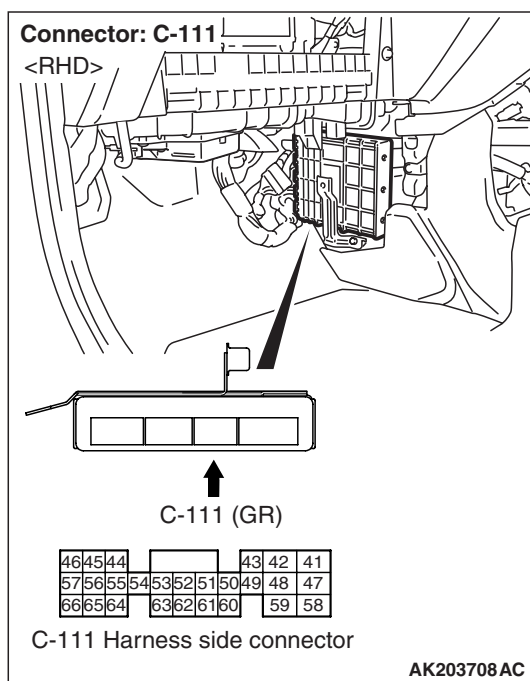
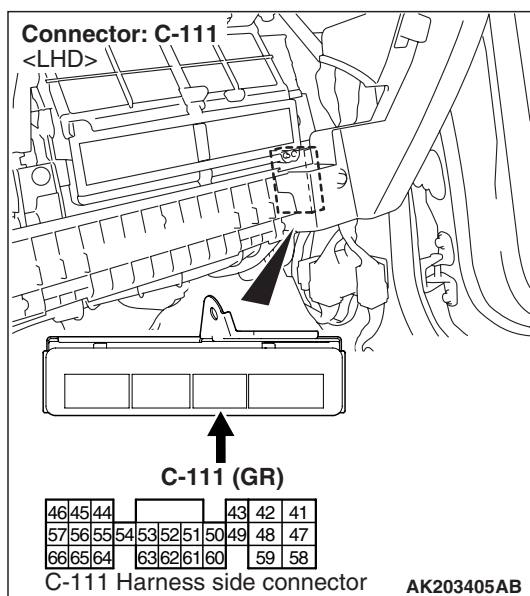
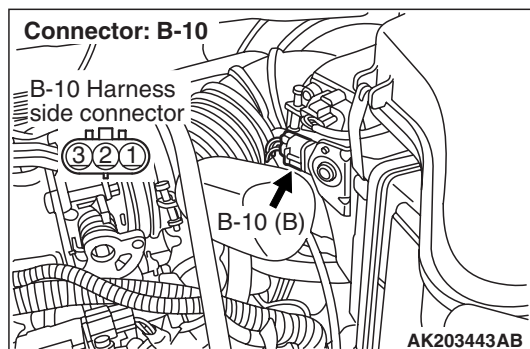
**Q: Is the check result normal?**

**YES :** Go to Step 12 .

**NO :** Repair.



**STEP 12. Check harness between B-10 (terminal No. 1) mixture adjusting screw connector and C-111 (terminal No. 57) engine-A/T-ECU connector.**

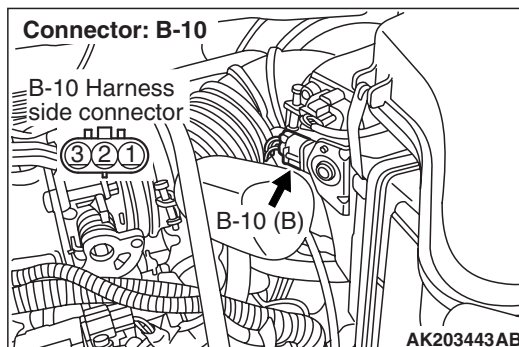


**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 13. Perform voltage measurement at B-10 mixture adjusting screw connector.**



- Use special tool test harness (MB991536) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

**OK: 4.9 – 5.1 V**

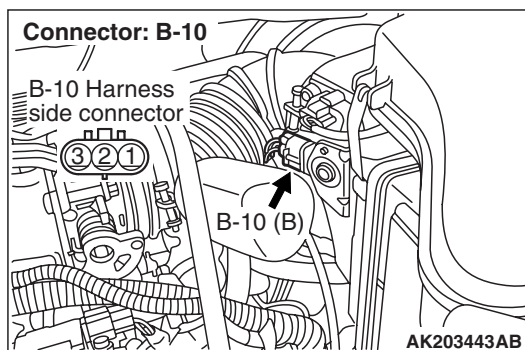
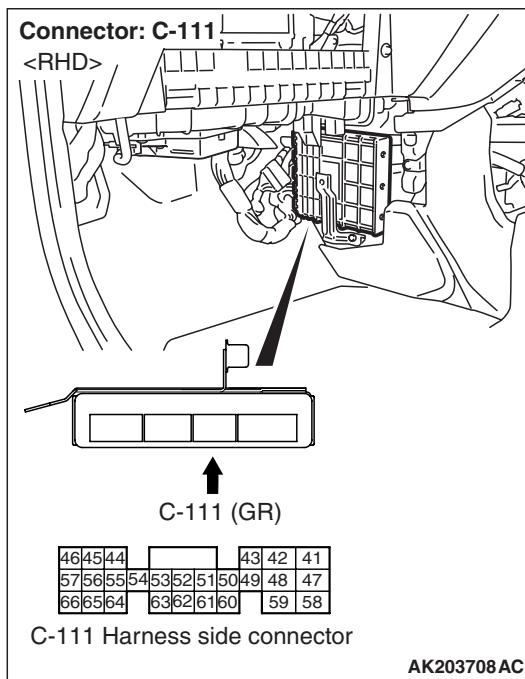
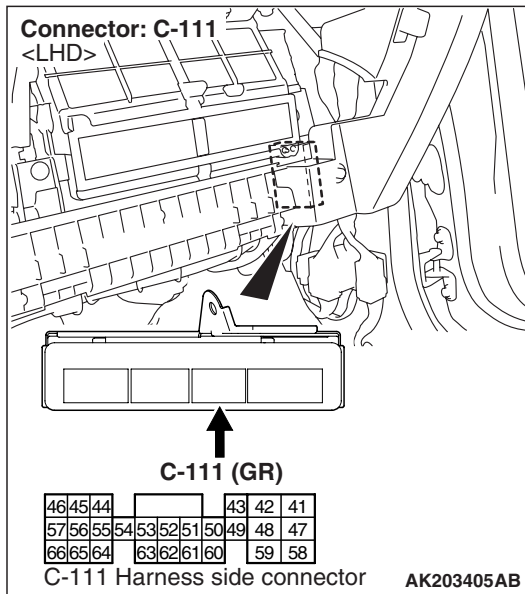
**Q: Is the check result normal?**

**YES :** Go to Step 15 .

**NO :** Go to Step 14 .

- Check earthing line for open circuit and damage.

**STEP 14. Connector check: C-111  
engine-A/T-ECU connector**



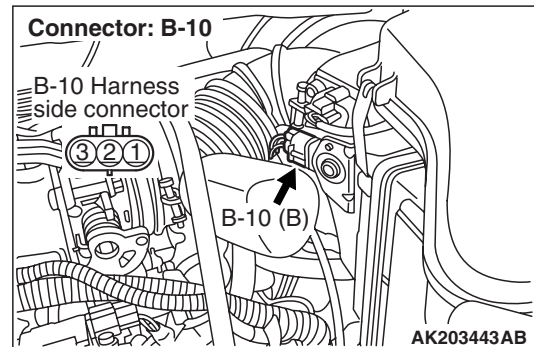
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-10 (terminal No. 3) mixture adjusting screw connector and C-111 (terminal No. 46) engine-A/T-ECU connector.

- Check power supply line for damage.

**NO :** Repair.

**STEP 15. Perform voltage measurement at B-10  
mixture adjusting screw connector.**



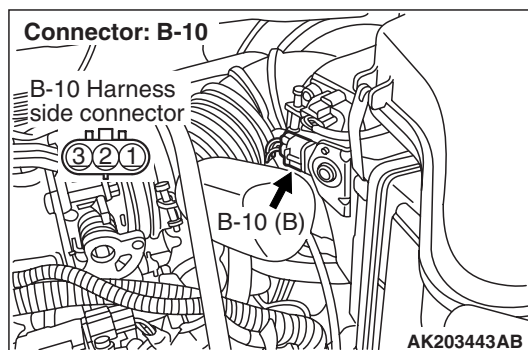
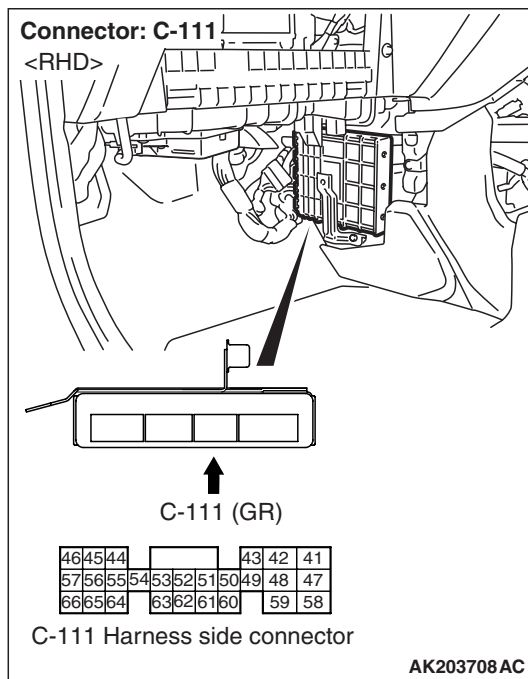
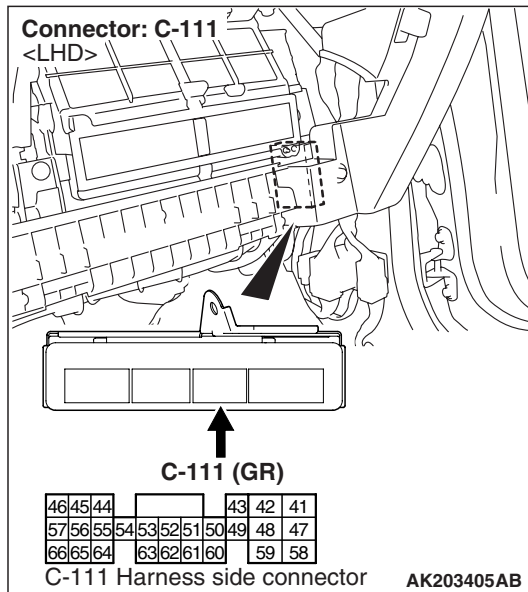
- Use special tool test harness (MB991536) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

**OK: 0.5 V or less**

**Q: Is the check result normal?**

**YES :** Go to Step 17 .

**NO :** Go to Step 16 .

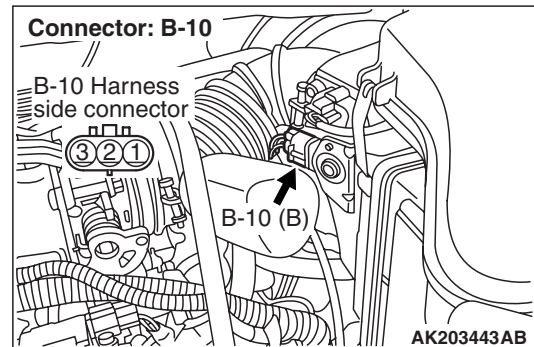
**STEP 16. Connector check: C-111  
engine-A/T-ECU connector**

**Q: Is the check result normal?**

**YES :** Check and repair harness between B-10 (terminal No. 1) mixture adjusting screw connector and C-111 (terminal No. 57) engine-A/T-ECU connector.

- Check earthing line for damage.

**NO :** Repair.

**STEP 17. Perform voltage measurement at B-10  
mixture adjusting screw connector**

- Use special tool test harness (MB991536) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

**OK:**

**Accelerator pedal fully released: 0.536 – 0.735 V**

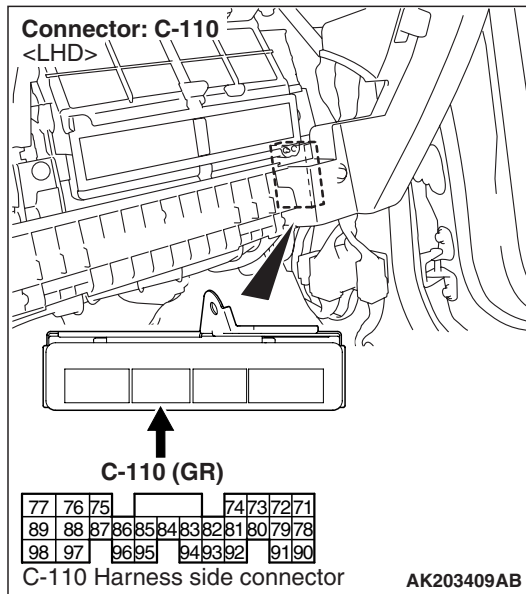
**Accelerator pedal fully depressed: 4.5 – 5.0 V**

**Q: Is the check result normal?**

**YES :** Go to Step 19 .

**NO :** Go to Step 18 .

**STEP 18. Connector check: C-110  
engine-A/T-ECU connector**

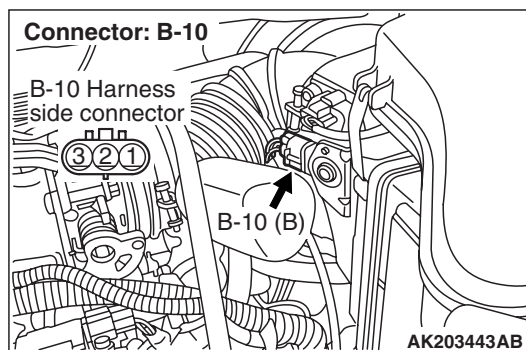
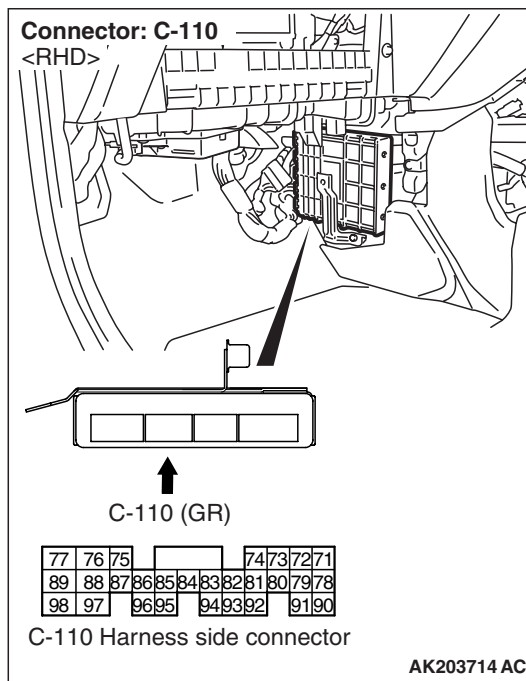


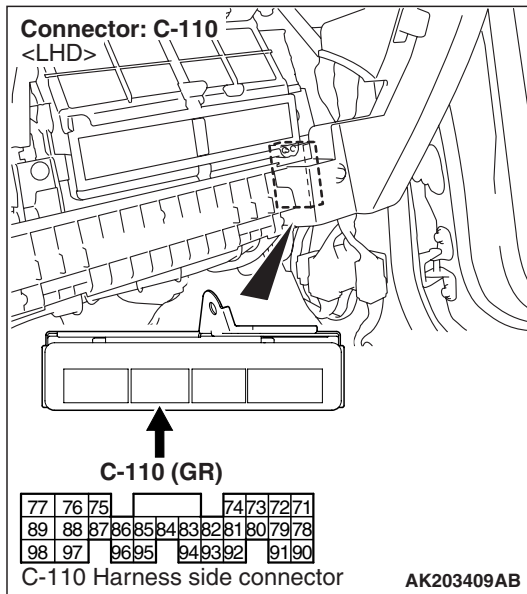
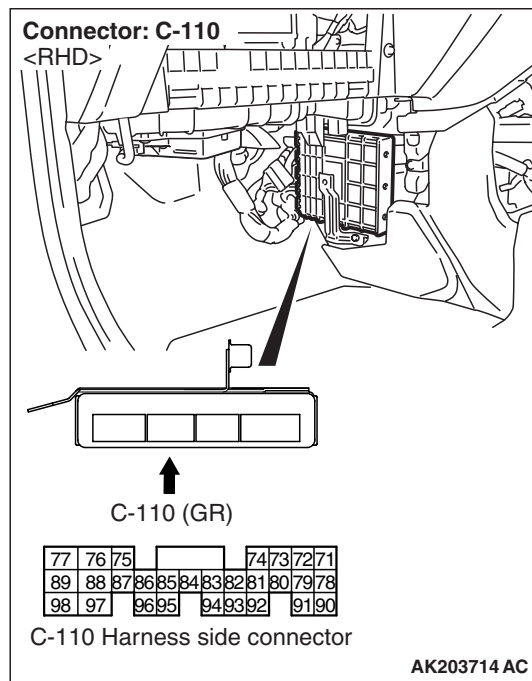
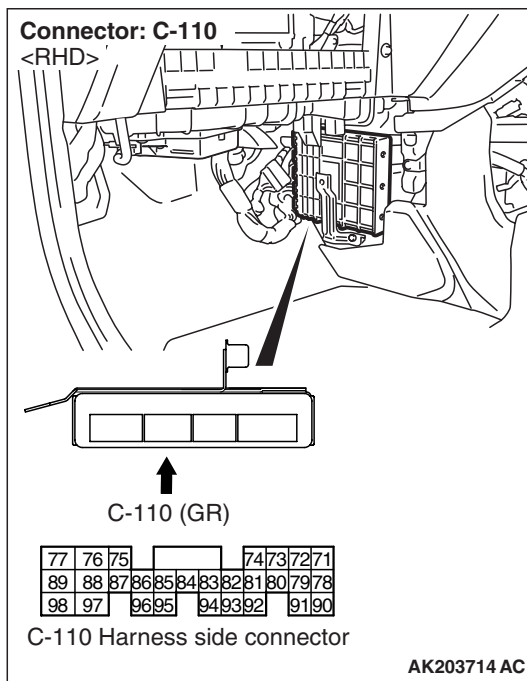
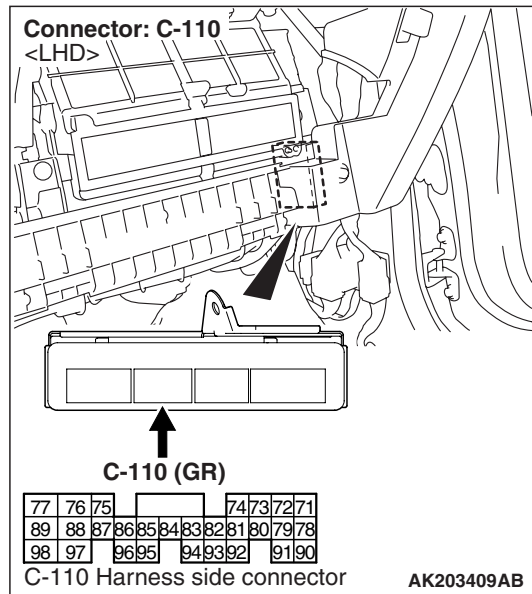
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-10 (terminal No. 2) mixture adjusting screw connector and C-110 (terminal No. 71) engine-A/T-ECU connector.

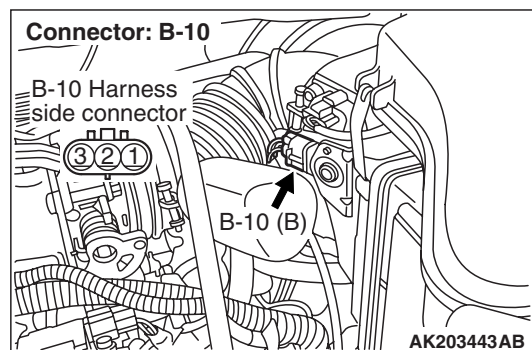
- Check output line for short circuit and damage.

**NO :** Repair.



**STEP 19. Perform voltage measurement at C-110 engine-A/T-ECU connector****STEP 20. Connector check: C-110 engine-A/T-ECU connector**

- Measure engine-A/T-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 71 and earth.

**OK:****Accelerator pedal fully released: 0.536 – 0.735 V****Accelerator pedal fully depressed: 4.5 – 5.0 V****Q: Is the check result normal?****YES :** Go to Step 21 .**NO :** Go to Step 20 .



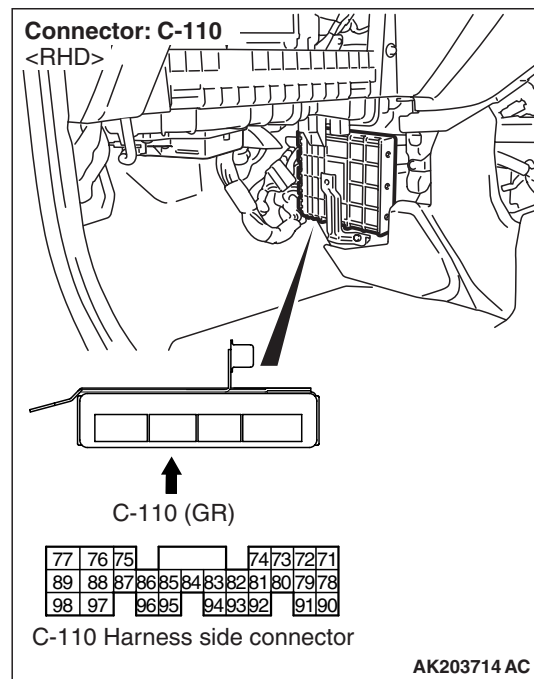
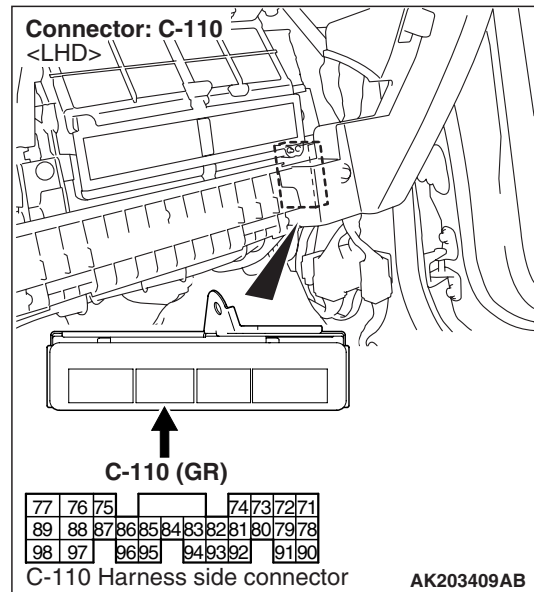
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-10 (terminal No. 2) mixture adjusting screw connector and C-110 (terminal No. 71) engine-A/T-ECU connector.

- Check output line for open circuit and damage.

**NO :** Repair.

**STEP 21. Connector check: C-110  
engine-A/T-ECU connector**



**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.



## Data List Reference Table

M1131152002128

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
12	Air flow sensor *1	<ul style="list-style-type: none"> <li>Engine coolant temperature: 80 – 95°C</li> <li>Lamps, electric cooling fan and all accessories: OFF</li> <li>Transmission: P range</li> </ul>	Idle operation	12 – 38 Hz	—	—
			2,500 r/min	68 – 108 Hz		
			Acceleration	According to acceleration, frequency is amplified.		
13	Intake air temperature sensor	Ignition switch: "ON" or engine running	Intake air temperature: –20°C	–20°C	Code No. 13	P.13A-23
			Intake air temperature: 0°C	0°C		
			Intake air temperature: 20°C	20°C		
			Intake air temperature: 40°C	40°C		
			Intake air temperature: 80°C	80° C		
14	Throttle position sensor	Ignition switch: "ON"	Set to Idle position	535 – 735 mV	Code No. 14	P.13A-31
			Depress the accelerator pedal gradually	Increased according to accelerator pedal stroke		
			Depress the accelerator pedal fully	4,500 – 5,000 mV		
16	Power supply voltage	Ignition switch: "ON"		System voltage	Procedure No. 23	P.13A-176
17	Mixture adjusting screw (variable resistor)	Ignition switch: ON		200 – 4,800 mV	Procedure No. 33	P.13A-249
18	Cranking signal (ignition switch-ST)	Ignition switch: "ON"	Engine: Stopped	OFF	Procedure No. 23	P.13A-176
			Engine: Cranking	ON		

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
21	Engine coolant temperature sensor	Ignition switch: "ON" or engine running	Coolant temperature: -20°C	-20°C	Code No. 21	<a href="#">P.13A-41</a>
			Coolant temperature: 0°C	0°C		
			Coolant temperature: 20°C	20°C		
			Coolant temperature: 40°C	40°C		
			Coolant temperature: 80°C	80°C		
22	Crank angle sensor	• Engine: Cranking • Tachometer: Connected	Compare engine speed on tachometer with the value displayed on M.U.T.-II/III	Matched	—	—
		Engine: Idle operation	Coolant temperature: -20°C	1,275 – 1,475 r/min		
			Coolant temperature: 0°C	1,220 – 1,420 r/min		
			Coolant temperature: 20°C	1,103 – 1,303 r/min		
			Coolant temperature: 40°C	939 – 1,139 r/min		
			Coolant temperature: 80°C	603 – 803 r/min		
25	Barometric pressure sensor	Ignition switch: "ON"	Altitude: 0 m	101 kPa	Code No. 25	<a href="#">P.13A-72</a>
			Altitude: 600 m	95 kPa		
			Altitude: 1,200 m	88 kPa		
			Altitude: 1,800 m	81 kPa		
27	Power steering fluid pressure switch	Engine: Idle operation	Steering wheel: Not operated	OFF	Procedure No. 29	<a href="#">P.13A-221</a>
			Steering wheel: Operated	ON		
28	A/C switch	Engine: Idle	AC switch: OFF	OFF	Procedure No. 26	<a href="#">P.13A-204</a>
			AC switch: ON	A/C compressor is not driven		
				A/C compressor is driven		
29	Inhibitor switch	Ignition switch: ON	P or N	P or N	Procedure No. 5	<a href="#">P.13A-120</a>
			D, 3, 2, L or R	D, 3, 2, L or R		

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
37	Volumetric efficiency	<ul style="list-style-type: none"> <li>Engine coolant temperature: 80 – 95°C</li> <li>Lamps, electric cooling fan and all accessories: OFF</li> </ul>	Idle operation	20 – 30 %	—	—
			2,500 r/min	17.5 – 27.5 %		
			Excessive acceleration	According to acceleration, volumetric efficiency is increased.		
3A	A/C pressure sensor	<ul style="list-style-type: none"> <li>After engine warm-up, idle operation</li> <li>A/C switch: ON</li> </ul>	A/C in Maximum COOL state (under high load)	2,200 mV or more	Procedure No. 32	P.13A-238
			A/C in Maximum HOT state (under low load)	1,800 mV or less		
41	Injectors *2	Engine: Cranking	Coolant temperature: 0°C (all cylinders in simultaneous injecting operation)	56.5 – 84.7 ms	—	—
			Coolant temperature: 20°C	23.0 – 34.4 ms		
			Coolant temperature: 80°C	8.2 – 12.2 ms		
	Injectors*3	<ul style="list-style-type: none"> <li>Engine coolant temperature: 80 – 95°C</li> <li>Lamps, electric cooling fan and all accessories: OFF</li> <li>Transmission: P range</li> </ul>	Idle operation	2.0 – 3.2 ms		
			2,500 r/min	2.0 – 3.2 ms		
			Excessive acceleration	Increased		
44	Ignition advance	<ul style="list-style-type: none"> <li>Engine: After warm-up</li> <li>Install timing light (for use to measure actual ignition timing)</li> </ul>	Idle operation	2 – 18° BTDC	—	—
			2,500 r/min	30 – 50° BTDC		

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
45	Idle speed control (stepper motor) servo position*4	<ul style="list-style-type: none"> <li>Engine coolant temperature: 80 – 95°C</li> <li>Lighting, electric cooling fan and accessories: OFF</li> <li>Transmission: P range</li> <li>Engine: Idle operation (When A/C switch is ON, A/C compressor must be ON)</li> </ul>	A/C switch: OFF	2 – 25 steps	—	—
			A/C switch: OFF → ON	Increased 10 – 70 steps		
			<ul style="list-style-type: none"> <li>A/C switch: OFF</li> <li>Selector lever: N range → D range</li> </ul>	Increased 5 – 50 steps		
49	A/C relay	Engine: After warm-up, idle operation after warm-up	A/C switch: OFF		Procedure No. 27	P.13A-208
			A/C switch: ON	A/C compressor is not driven		
				A/C compressor is driven		

**⚠ CAUTION**

**When shifting the select lever to D range, the brakes should be applied so that the vehicle does not move forward**

**NOTE:**

\*1: On the new vehicle (mileage: 500 km or less), air flow sensor output frequency may be higher by approximately 10%.

\*2: Injector drive time ranges shown are when power voltage is 11 V and the cranking speed is 250 r/min or less.

\*3: On the new vehicle (mileage: 500 km or less), injector drive time may be longer by approximately 10%.

\*4: On the new vehicle (mileage: 500 km or less), the number of steps of stepper motor may be larger by approximately 30 steps.

## Actuator Test Reference Table

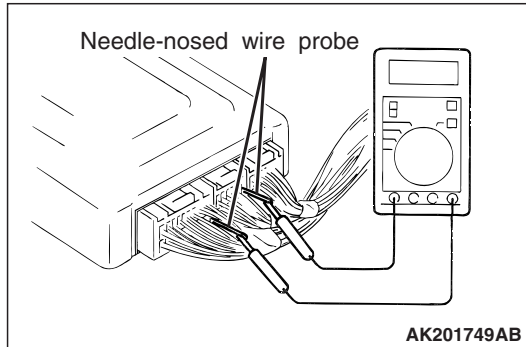
M1131152500893

Item No.	Inspection item	Drive content	Inspection conditions		Normal condition	Code No. /Inspection procedure No.	Reference page
01	Injector	Cut off No. 1 injector	Engine: After warm-up, idle operation (Cut off injectors sequentially to check for a cylinder that does not change engine in idle status.		Engine is changed (becomes unstable or stalled)	Code No. 41	<a href="#">P.13A-86</a>
02		Cut off No. 2 injector					
03		Cut off No. 3 injector					
04		Cut off No. 4 injector					
07	Fuel pump	Drive fuel pump to circulate fuel	Ignition switch: "ON"	Hold return hose with fingers to feel pulse of fuel flowing	Pulse is felt	Procedure No. 24	<a href="#">P.13A-188</a>
				Check for pump operating noise near fuel tank	Operating noise audible		
10	EGR control solenoid valve	Switch solenoid valve from OFF to ON	Ignition switch: "ON"		When the valve is actuated, operating noise is audible.	Procedure No. 31	<a href="#">P.13A-231</a>
17	Basic ignition timing	Switch engine-A/T-ECU to ignition timing adjusting mode	<ul style="list-style-type: none"> <li>Engine: Idle operation</li> <li>Install timing light</li> </ul>		5° BTDC	—	—
21	Fan controller	Actuate fan motor	<ul style="list-style-type: none"> <li>Ignition switch: "ON"</li> <li>A/C switch: ON</li> </ul>		Fan motor is rotated	Procedure No. 21	<a href="#">P.13A-170</a>

## CHECK AT THE ECU TERMINALS

M1131153600440

### TERMINAL VOLTAGE CHECK CHART



1. Connect a needle-nosed wire probe to a voltmeter probe.
2. Insert the needle-nosed wire probe into each of the engine-A/T-ECU connector terminals from the wire side, and measure the voltage while referring to the check chart.

#### NOTE:

- Make the voltage measurement with the engine-A/T-ECU connector connected.
- You may find it convenient to pull out the engine-A/T-ECU to make it easier to reach the connector terminals.
- The checks can be carried out off the order given in the chart.

#### **CAUTION**

Short-circuiting the positive (+) probe between a connector terminal and earth could damage the vehicle wiring, the sensor, engine-A/T-ECU or all of them. Be careful to prevent this!

3. If voltmeter shows any deviation from standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
4. After repair or replacement, recheck with the voltmeter to confirm that the repair has corrected the problem.



## Engine-A/T-ECU Connector Terminal Arrangement

Engine-A/T-ECU Connector Terminal Arrangement

C-112	C-111	C-110	C-109
107 106 105 104 103 102 101 100 99 98 97 96 95 94 93 92 91 90 89 88 87 86 85 84 83 82 81 80 79 78 77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	107 106 105 104 103 102 101 100 99 98 97 96 95 94 93 92 91 90 89 88 87 86 85 84 83 82 81 80 79 78 77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	107 106 105 104 103 102 101 100 99 98 97 96 95 94 93 92 91 90 89 88 87 86 85 84 83 82 81 80 79 78 77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	107 106 105 104 103 102 101 100 99 98 97 96 95 94 93 92 91 90 89 88 87 86 85 84 83 82 81 80 79 78 77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

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Terminal No.	Check item	Check condition (Engine condition)	Normal condition
1	No. 1 injector	While engine is idling after having warmed up, suddenly depress the accelerator pedal.	From 11 – 14 V, momentarily drops slightly
9	No. 2 injector		
24	No. 3 injector		
2	No. 4 injector		
6	EGR control solenoid Valve	Ignition switch: "ON"	System Voltage
		While engine is idling, suddenly depress the accelerator pedal.	From system voltage, momentarily drops
8	Alternator G terminal	<ul style="list-style-type: none"> <li>Engine: Warm, idle (radiator fan: OFF)</li> <li>Headlamp: OFF → ON</li> <li>Stop lamp: OFF → ON</li> <li>Rear defogger switch: OFF → ON</li> </ul>	Voltage increases by 0.2 – 3.5 V
11	Ignition coil – No. 1, No. 4	Engine: 3,000 r/min	0.3 – 3.0 V
12	Ignition coil – No. 2, No. 3		
14	Stepper motor coil <A1>	Engine: Soon after the warmed up engine is started	System voltage ⇔ 0 V (Changes repeatedly)
28	Stepper motor coil <A2>		
15	Stepper motor coil <B1>		
29	Stepper motor coil <B2>		
18	Fan controller	Radiator and condenser fan is not operating	0 – 0.3 V
		Radiator and condenser fan is operating	0.7 V or more
19	Air flow sensor reset Signal	Engine: Idling	0 – 1 V
		Engine: 3,000 r/min	6 – 9 V
20	Fuel pump relay	Ignition switch: ON	System voltage
		Engine: Idling	1 V or less
21	A/C relay	<ul style="list-style-type: none"> <li>Engine: Idling</li> <li>A/C switch: OFF → ON (A/C compressor is operating)</li> </ul>	System voltage or Momentarily 6 V or more → 1 V or less

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
22	Engine warming lamp	Ignition switch: "LOCK" (OFF) → "ON"		1 V or less → System voltage (After several seconds have elapsed)
41	Power supply	Ignition switch: "ON"		System voltage
47				
43	Tachometer signal	Engine: 3,000 r/min		0.3 – 3.0 V
44	Engine coolant temperature sensor	Ignition switch: "ON"	When engine coolant temperature is –20°C	3.9 – 4.5 V
			When engine coolant temperature is 0°C	3.2 – 3.8 V
			When engine coolant temperature is 20°C	2.3 – 2.9 V
			When engine coolant temperature is 40°C	1.3 – 1.9 V
			When engine coolant temperature is 60°C	0.7 – 1.3 V
			When engine coolant temperature is 80°C	0.3 – 0.9 V
45	Crank angle sensor	Engine: Cranking		0.4 – 4.0 V
		Engine: Idling		1.5 – 2.5 V
46	Sensor impressed voltage	Ignition switch: "ON"		4.9 – 5.1 V
49	Control relay (Power supply)	Ignition switch: "LOCK" (OFF)		System voltage
		Ignition switch: "ON"		1 V or less
52	Power steering fluid pressure switch	Engine: Idling after warming up	When steering wheel is Stationary	System voltage
			When steering wheel is turned	1 V or less
54	Alternator FR terminal	<ul style="list-style-type: none"> <li>Engine: Warm, idle (radiator fan: OFF)</li> <li>Headlamp: OFF → ON</li> <li>Stop lamp: OFF → ON</li> <li>Rear defogger switch: OFF → ON</li> </ul>		Voltage decreases
55	Barometric pressure sensor	Ignition switch: "ON"	Altitude: 0 m	3.8 – 4.2 V
			Altitude: 600 m	3.5 – 3.9 V
			Altitude: 1,200 m	3.3 – 3.7 V
			Altitude: 1,800 m	3.0 – 3.4 V
56	Camshaft position sensor	Engine: Cranking		0.4 – 3.0 V
		Engine: Idling		1.5 – 3.0 V
58	Ignition switch – ST	Engine: Cranking		8 V or more
61	A/C load signal	Refer to GROUP 55A – Troubleshooting – Check at ECU Terminal <a href="#">P.55A-18</a>		

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
62	A/C pressure sensor	<ul style="list-style-type: none"> <li>Engine: Idling</li> <li>A/C switch: ON</li> </ul>	When A/C is "Maximum COOL" condition (when the load by A/C is high)	2.2 V or more
			When A/C is "Maximum HOT" condition (when the load by A/C is low)	1.8 V or less
64	Intake air temperature sensor	Ignition switch: "ON"	When intake air temperature is -20°C	3.8 – 4.4 V
			When intake air temperature is 0°C	3.2 – 3.8 V
			When intake air temperature is 20°C	2.3 – 2.9 V
			When intake air temperature is 40°C	1.5 – 2.1 V
			When intake air temperature is 60°C	0.8 – 1.4 V
			When intake air temperature is 80°C	0.4 – 1.0 V
65	Air flow sensor	Engine: Idling		2.2 – 3.2 V
		Engine: 2,500 r/min		
66	Backup power supply	Ignition switch: "LOCK" (OFF)		System voltage
71	Mixture adjusting Screw (Variable Resistor) <Vehicles without catalytic converter>	Ignition switch: "ON"		1 – 4 V
78	Throttle position sensor	Ignition switch: "ON"	Set throttle valve to idle Position	0.535 – 0.735 V
			Fully open throttle valve	4.4 – 5.3 V
83	A/C switch	Engine: Idling	Turn the A/C switch OFF	1 V or less
			Turn the A/C switch ON (A/C compressor is operating)	System voltage
98	Ignition switch – IG	Ignition switch: "ON"		System voltage

## CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

1. Turn the ignition switch to "LOCK" (OFF) position.
2. Disconnect the engine-A/T-ECU connector.
3. Measure the resistance and check for continuity between the terminals of the engine-A/T-ECU harness-side connector while referring to the check chart.

### NOTE:

- *When measuring resistance and checking continuity, a harness for checking contact pin pressure should be used instead of inserting a test probe.*
- *Checking need not be carried out in the order given in the chart.*

### CAUTION

**If the terminals that should be checked are mistaken, or if connector terminals are not correctly shorted to earth, damage may be caused to the vehicle wiring, sensors, engine-A/T-ECU and/or ohmmeter. Be careful to prevent this!**

4. If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and the repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.

## Engine-A/T-ECU Harness Side Connector Terminal Arrangement

## Engine-A/T-ECU Harness Side Connector Terminal Arrangement

C-109				C-110				C-111				C-112			
107	105	106	120	101	102	103	104	71	72	73	74	41	42	43	1
119	118	117	129	108	109	110	111	78	79	80	81	47	48	49	9
				121	122	123	124	88	89	90	91	55	56	57	24
				125				85	86	87	88	58	59	60	25
								84	85	86	87	61	62	63	
								83	84	85	86	64	65	66	
								82	83	84	85	67	68	69	
								81	82	83	84	70	71	72	
								80	81	82	83	73	74	75	
								79	80	81	82	76	77	78	
								78	79	80	81	75	76	77	
								77	78	79	80	74	75	76	
								76	77	78	79	73	74	75	
								75	76	77	78	72	73	74	
								74	75	76	77	71	72	73	
								73	74	75	76	70	71	72	
								72	73	74	75	69	70	71	
								71	72	73	74	68	69	70	
								70	71	72	73	67	68	69	
								69	70	71	72	66	67	68	
								68	69	70	71	65	66	67	
								67	68	69	70	64	65	66	
								66	67	68	69	63	64	65	
								65	66	67	68	62	63	64	
								64	65	66	67	61	62	63	
								63	64	65	66	60	61	62	
								62	63	64	65	59	60	61	
								61	62	63	64	58	59	60	
								60	61	62	63	57	58	59	
								59	60	61	62	56	57	58	
								58	59	60	61	55	56	57	
								57	58	59	60	54	55	56	
								56	57	58	59	53	54	55	
								55	56	57	58	52	53	54	
								54	55	56	57	51	52	53	
								53	54	55	56	50	51	52	
								52	53	54	55	49	50	51	
								51	52	53	54	48	49	50	
								50	51	52	53	47	48	49	
								49	50	51	52	46	47	48	
								48	49	50	51	45	46	47	
								47	48	49	50	44	45	46	
								46	47	48	49	43	44	45	
								45	46	47	48	42	43	44	
								44	45	46	47	41	42	43	
								43	44	45	46	40	41	42	
								42	43	44	45	39	40	41	
								41	42	43	44	38	39	40	
								40	41	42	43	37	38	39	
								39	40	41	42	36	37	38	
								38	39	40	41	35	36	37	
								37	38	39	40	34	35	36	
								36	37	38	39	33	34	35	
								35	36	37	38	32	33	34	
								34	35	36	37	31	32	33	
								33	34	35	36	30	31	32	
								32	33	34	35	29	30	31	
								31	32	33	34	28	29	30	
								30	31	32	33	27	28	29	
								29	30	31	32	26	27	28	
								28	29	30	31	25	26	27	
								27	28	29	30	24	25	26	
								26	27	28	29	23	24	25	
								25	26	27	28	22	23	24	
								24	25	26	27	21	22	23	
								23	24	25	26	20	21	22	
								22	23	24	25	19	20	21	
								21	22	23	24	18	19	20	
								20	21	22	23	17	18	19	
								19	20	21	22	16	17	18	
								18	19	20	21	15	16	17	
								17	18	19	20	14	15	16	
								16	17	18	19	13	14	15	
								15	16	17	18	12	13	14	
								14	15	16	17	11	12	13	
								13	14	15	16	10	11	12	
								12	13	14	15	9	10	11	
								11	12	13	14	8	9	10	
								10	11	12	13	7	8	9	
								9	10	11	12	6	7	8	
								8	9	10	11	5	6	7	
								7	8	9	10	4	5	6	
								6	7	8	9	3	4	5	
								5	6	7	8	2	3	4	
								4	5	6	7	1	2	3	
								3	4	5	6				
								2	3	4	5				
								1	2	3	4				

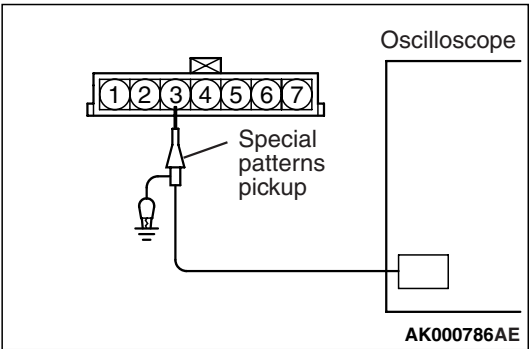
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Terminal No.	Inspection item	Normal condition (Check condition)
1 – 41	No. 1 injector	13 – 16 Ω (At 20°C)
9 – 41	No. 2 injector	
24 – 41	No. 3 injector	
2 – 41	No. 4 injector	
6 – 41	EGR control solenoid valve	29 – 35 Ω (At 20°C)
14 – 41	Stepper motor coil (A1)	26 – 33 Ω (At 20°C)
28 – 41	Stepper motor coil (A2)	
15 – 41	Stepper motor coil (B1)	
29 – 41	Stepper motor coil (B2)	
42 – Body earth	ECU earth	Continuity (0 Ω)
48 – Body earth		
44 – 57	Engine coolant temperature sensor	14 – 17 kΩ (When coolant temperature is –20°C)
		5.1 – 6.5 kΩ (When coolant temperature is 0°C)
		2.1 – 2.7 kΩ (When coolant temperature is 20°C)
		0.9 – 1.3 kΩ (When coolant temperature is 40°C)
		0.48 – 0.68 kΩ (When coolant temperature is 60°C)
		0.26 – 0.36 kΩ (When coolant temperature is 80°C)
64 – 57	Intake air temperature sensor	13 – 17 kΩ (When intake air temperature is –20°C)
		5.3 – 6.7 kΩ (When intake air temperature is 0°C)
		2.3 – 3.0 kΩ (When intake air temperature is 20°C)
		1.0 – 1.5 kΩ (When intake air temperature is 40°C)
		0.56 – 0.76 kΩ (When intake air temperature is 60°C)
		0.30 – 0.42 kΩ (When intake air temperature is 80°C)

INSPECTION PROCEDURE USING  
OSCILLOSCOPE

The output signals of the sensors and the conditions of the actuation signals of the actuators can be inspected visually by observing the waveforms on the oscilloscope.

AIR FLOW SENSOR  
Measurement Method



1. Disconnect the air flow sensor connector, and connect the special tool Test harness (MB991709) in between (All terminals should be connected).
2. Connect the oscilloscope special patterns pickup to air flow sensor connector terminal No. 3.

Alternate Method (Test harness not available)

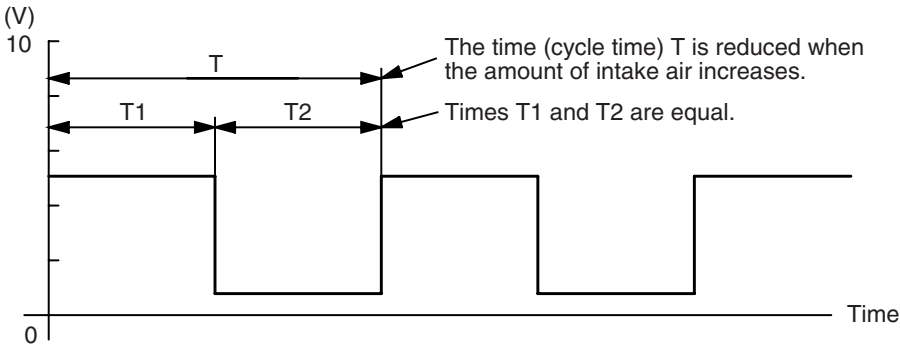
1. Connect the oscilloscope special patterns pickup to engine-A/T-ECU terminal No. 65.

Standard Wave Pattern

Observation conditions

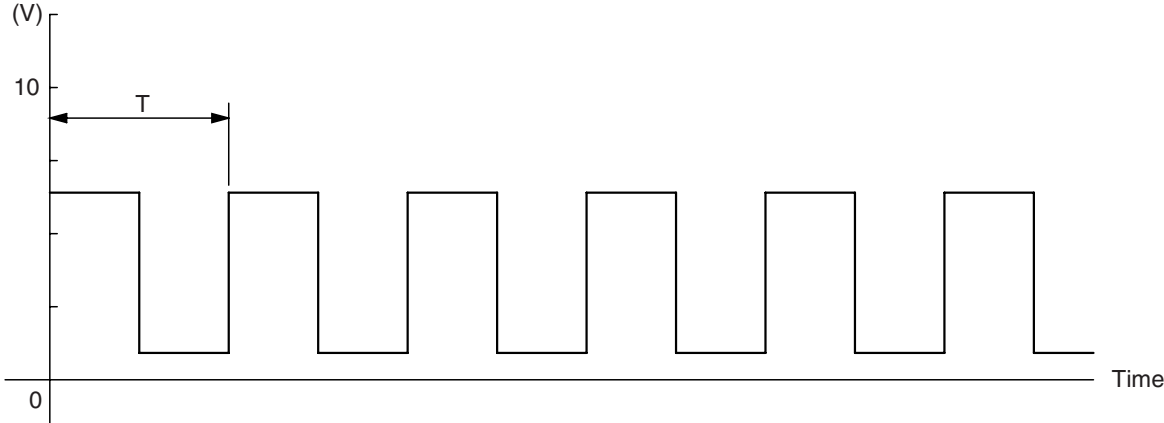
Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine	Idling

Standard wave pattern



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Observation conditions (from conditions above engine is increased by racing.)

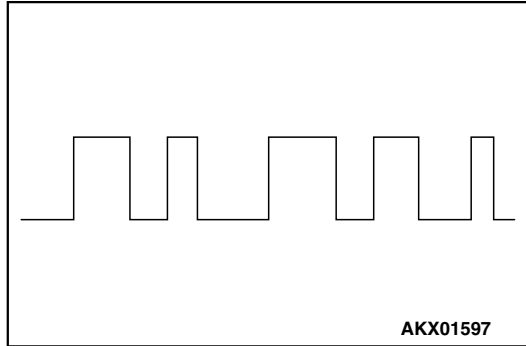


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**Wave Pattern Observation Points**

Check that cycle time T becomes shorter and the frequency increases when the engine speed is increased.

**Examples of Abnormal Wave Patterns**

- Example 1

**Cause of problem**

Sensor interface malfunction

**Wave pattern characteristics**

Rectangular wave pattern is output even when the engine is not started.

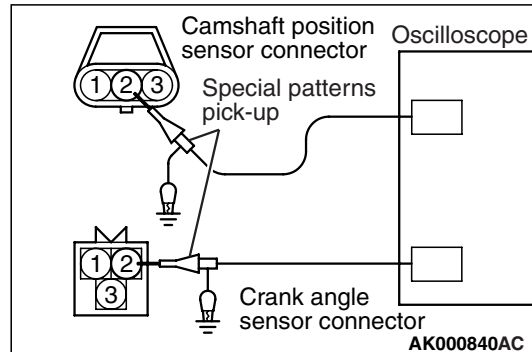
- Example 2

**Cause of problem**

Damaged rectifier or vortex generation column

**Wave pattern characteristics**

Unstable wave pattern with non-uniform frequency. However, when an ignition leak occurs during acceleration, the wave pattern will be distorted temporarily, even if the air flow sensor is normal.

**CAMSHAFT POSITION SENSOR AND CRANK ANGLE SENSOR****Measurement Method**

1. Disconnect the camshaft position sensor connector and connect the special tool Test harness (MB991709) in between (All terminals should be connected).
2. Connect the oscilloscope special pattern pickup to camshaft position sensor terminal No. 2.
3. Disconnect the crank angle sensor connector and connect the special tool Test harness (MD998478) in between.
4. Connect the oscilloscope special patterns pickup to crank angle sensor terminal No. 2.

**Alternate Method (Test harness not available)**

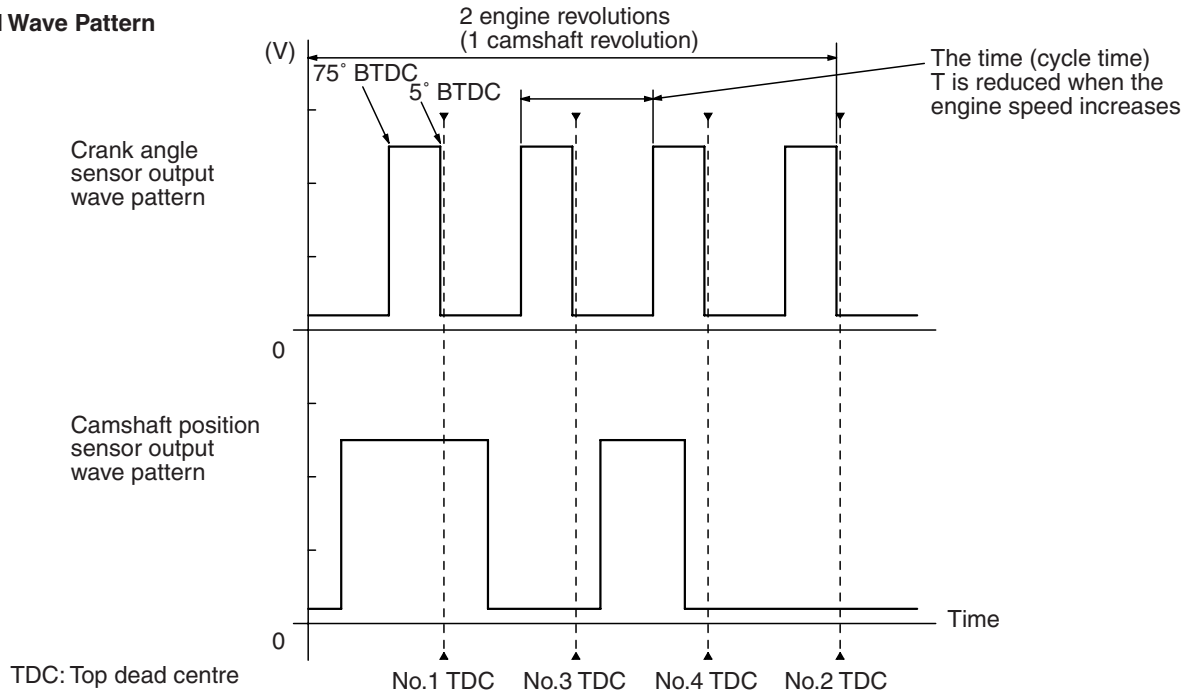
1. Connect the oscilloscope special patterns pickup to engine-A/T-ECU terminal No. 56 (When checking the camshaft position sensor signal wave pattern).
2. Connect the oscilloscope special patterns pickup to engine-A/T-ECU terminal No. 45 (When checking the crank angle sensor signal wave pattern).

## Standard Wave Pattern

### Observation condition

Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine	Idling

#### Standard Wave Pattern



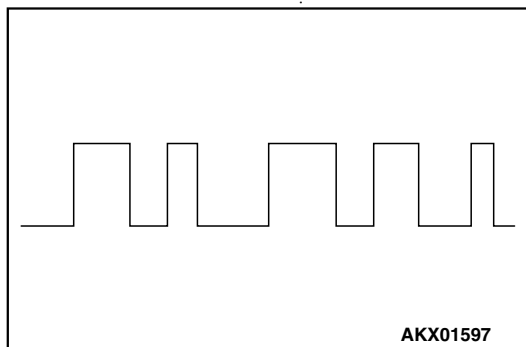
### Wave Pattern Observation Points

Check that cycle time T becomes shorter when the engine speed increases.

### Wave pattern characteristics

Rectangular wave pattern is output even when the engine is not started.

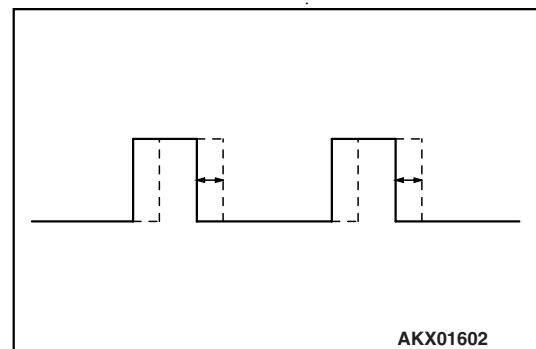
### Examples of Abnormal Wave Patterns



Example 1

#### Cause of problem

Sensor interface malfunction



Example 2

#### Cause of problem

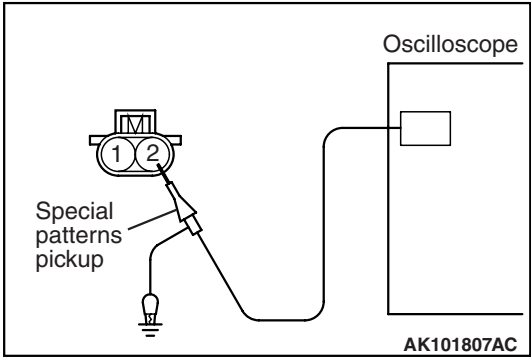
Loose timing belt  
Abnormality in sensor disk

#### Wave pattern characteristics

Wave pattern is displaced to the left or right.

INJECTOR

Measurement Method



1. Disconnect the injector connector, and then connect the special tool Test harness set (MB991348) in between (All terminals should be connected).

2. Connect the oscilloscope special patterns pickup to terminal No. 2 of the injector connector.

Alternate Method (Test harness not available)

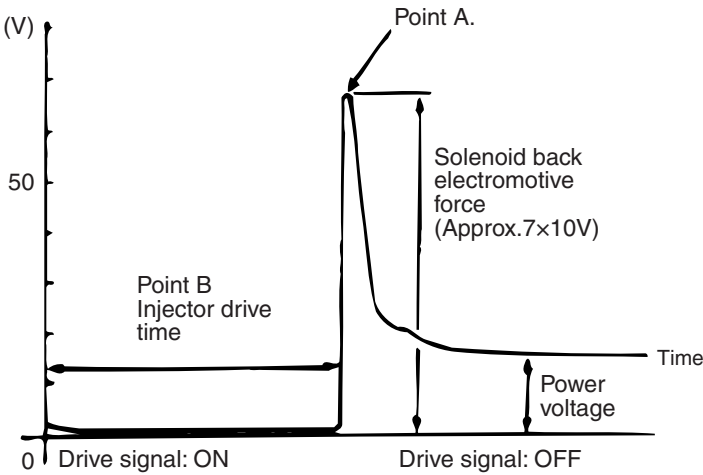
1. Connect the oscilloscope special patterns pickup to engine-A/T-ECU terminal No. 1 (When checking the No. 1 cylinder).
2. Connect the oscilloscope special patterns pickup to engine-A/T-ECU terminal No. 9 (When checking the No. 2 cylinder).
3. Connect the oscilloscope special patterns pickup to engine-A/T-ECU terminal No. 24 (When checking the No. 3 cylinder).
4. Connect the oscilloscope special patterns pickup to engine-A/T-ECU terminal No. 2 (When checking the No. 4 cylinder).

Standard Wave Pattern

Observation conditions

Function	Special patterns
Pattern height	Variable
Variable knob	Adjust while viewing the wave pattern
Pattern selector	Display
Engine	Idling

Standard wave pattern

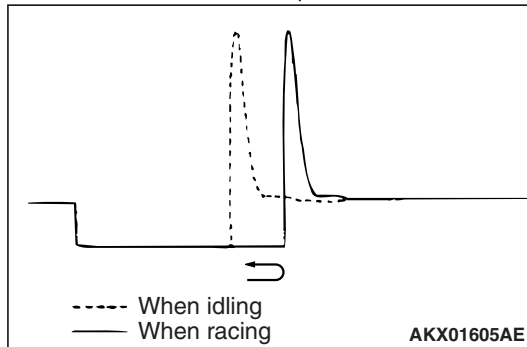


## Wave Pattern Observation Points

Point A: Height of solenoid back electromotive force

Contrast with standard wave pattern	Probable cause
Solenoid coil back electromotive force is low or doesn't appear at all.	Short in the injector solenoid

Point B: Injector drive time

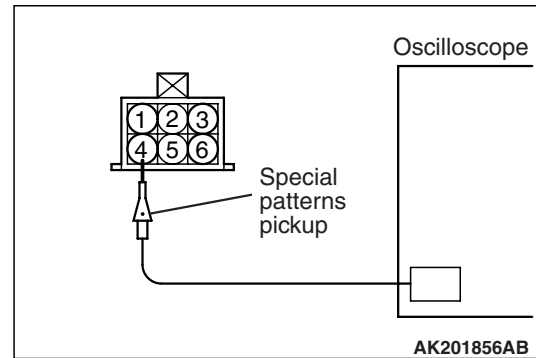


The injector drive time will be synchronized with the M.U.T.-II tester display.

- When the engine is suddenly raced, the drive time will be greatly extended at first, but the drive time will soon match the engine speed.

## IDLE SPEED CONTROL SERVO (STEP-PER MOTOR)

### Measurement Method



1. Disconnect the idle speed control servo connector, and connect the special tool Test harness (MB991709) in between.
2. Connect the oscilloscope special patterns pickup to the idle speed control servo-side connector terminal No. 1, No. 3, No. 4 and No. 6 respectively.

### Alternate Method (Test harness not available)

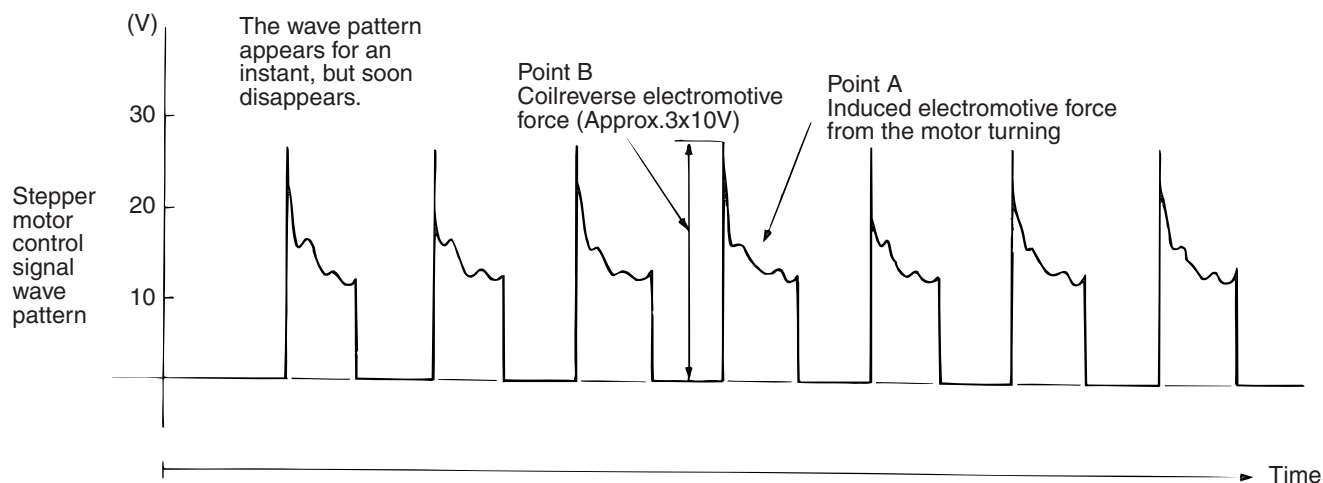
1. Connect the oscilloscope special patterns pickup to engine-A/T-ECU terminal No. 14, connection terminal No. 15, connection terminal No. 28, and connection terminal No. 29 respectively.

## Standard Wave Pattern

### Observation conditions

Function	Special patterns
Pattern height	High
Pattern selector	Display
Engine condition	When the engine coolant temperature is 20°C or below, turn the ignition switch from LOCK (OFF) position to ON (without starting the engine).
	While the engine is idling, turn the A/C switch to ON.
	Immediately after starting the warm engine.

### Standard wave pattern



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## Wave pattern Observation Points

Check that the standard wave pattern appears when the stepper motor is operating.

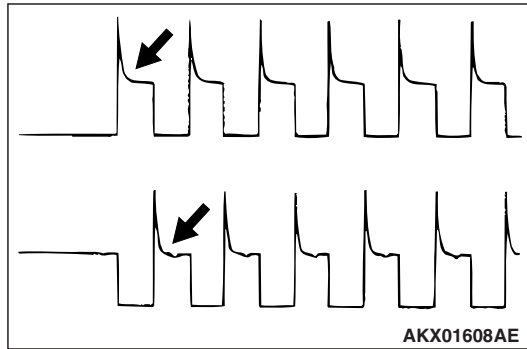
Point A: Presence or absence of induced electromotive force from the motor turning (Refer to the abnormal wave pattern).

Contrast with standard wave pattern	Probable cause
Induced electromotive force does not appear or is extremely small.	Motor is malfunctioning

Point B: Height of coil reverse electromotive force

Contrast with standard wave pattern	Probable cause
Coil reverse electromotive force does not appear or is extremely small.	Short in the coil

## Examples of Abnormal Wave Pattern



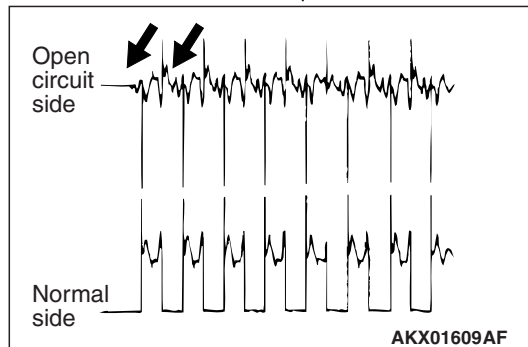
Example 1

### Cause of problem

Motor is malfunctioning. (Motor is not operating.)

### Wave pattern characteristics

Induced electromotive force from the motor turning does not appear.



Example 2

### Cause of problem

Open circuit in the line between the stepper motor and the engine-A/T-ECU.

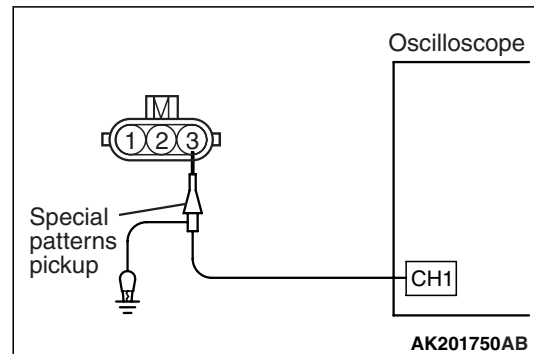
### Wave pattern characteristics

Current is not supplied to the motor coil on the open circuit side (Voltage does not drop to 0 V).

Furthermore, the induced electromotive force waveform at the normal side is slightly different from the normal waveform.

## IGNITION COIL AND POWER TRANSISTOR

### Measurement Method



1. Disconnect the ignition coil connector, and connect the special tool Test harness set (MB991348) in between (All terminals should be connected).
2. Connect the oscilloscope special patterns pickup to terminal No. 3 of each ignition coil connector in turn.

### Alternate Method (Test harness not available)

1. Connect the oscilloscope special patterns pickup to engine-A/T-ECU terminal No. 11 (No. 1 – No. 4), connection terminal No. 12 (No. 2 – No.3) respectively.

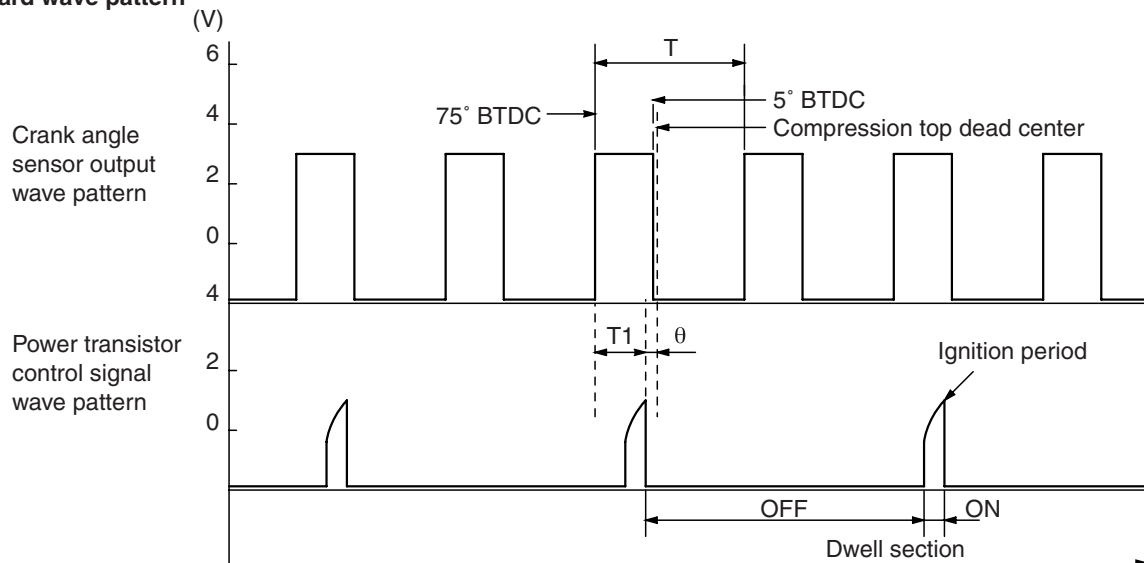


## Standard Wave Pattern

## Observation condition

Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine	Approximately 1,200 r/min

## Standard wave pattern



T : Revolution time corresponding to a crank angle of 180°

T1 : Time computed by the engine-A/T-ECU

θ : Spark advance angle

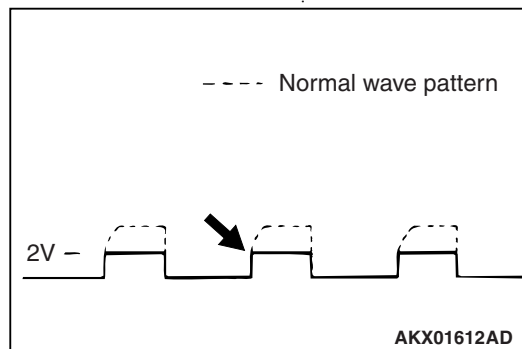
AK204435AB

## Wave Pattern Observation Points

Point: Condition of wave pattern build-up section and maximum voltage (Refer to abnormal wave pattern examples 1 and 2).

Condition of wave pattern build-up section and maximum voltage	Probable cause
Rises from approximately 2 V to approximately 4.5 V at the top-right	Normal
2 V rectangular wave	Open-circuit in ignition primary circuit
Rectangular wave at power voltage	Power transistor malfunction

## Examples of Abnormal Wave Patterns



## Example 1

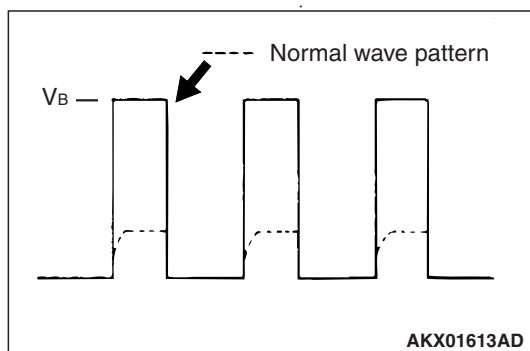
Wave pattern during engine cranking

## Cause of problem

Open-circuit in ignition primary circuit

## Wave pattern characteristics

Top-right part of the build-up section cannot be seen, and voltage value is approximately 2 V too low.



Example 2

Wave pattern during engine cranking

**Cause of problem**

Malfunction in power transistor

**Wave pattern characteristics**

Power voltage results when the power transistor is ON.

## ON-VEHICLE SERVICE

## ON-VEHICLE SERVICE

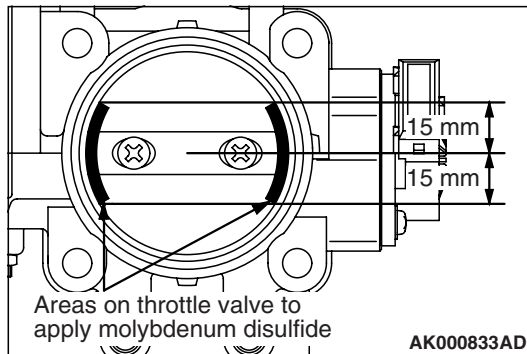
M1131001000785

## THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

1. Remove the air intake hose from the throttle body.
2. Spray cleaning fluid on a clean cloth.

**CAUTION**

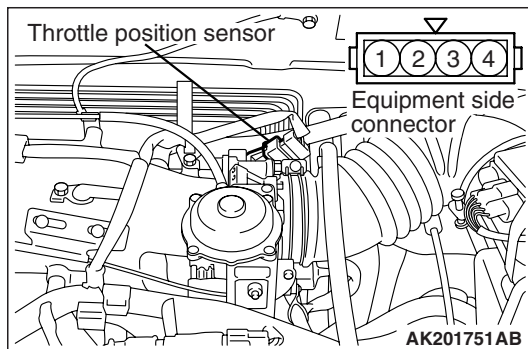
- Do not spray the cleaning fluid directly to the throttle valve.
- Make sure the cleaning fluid does not enter the motor from the bypass line. Also make sure it does not enter the sensor through the shaft.
- Be careful not to rub off the molybden applied around the throttle valve shaft.



3. Wipe off the dirt around the throttle valve with the cloth sprayed with cleaning fluid.
4. Attach the air intake hose.
5. Adjust the basic idle speed (Refer to [P.13A-281](#)).

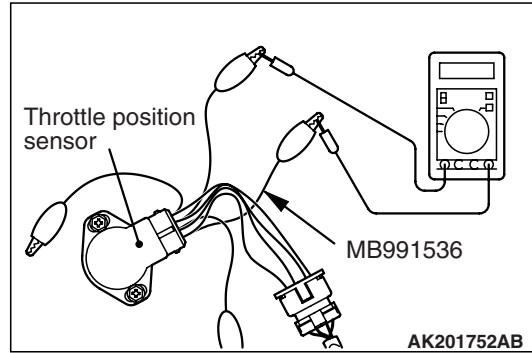
## THROTTLE POSITION SENSOR ADJUSTMENT

M1131001100748



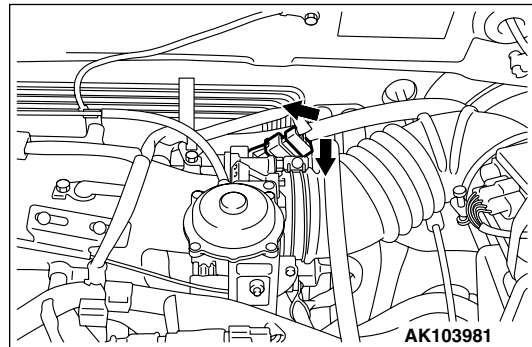
1. Connect the M.U.T.-II/III to the diagnosis connector.

When not using the M.U.T.-II/III, proceed as follows.



- (1) Disconnect the throttle position sensor connector and connect the special tool Test harness (MB991536) between the disconnected connector taking care not to confuse the terminal to be connected.
- (2) Connect digital voltmeter between the terminal No. 2 (special tool's yellow clip on the sensor output) and the terminal No. 4 (special tool's red clip on the sensor earth) of the throttle position sensor connector.
2. Turn the ignition switch to "ON" position (but do not start the engine).
3. Check the output voltage of the throttle position sensor.

**Standard value: 535 – 735 mV**



4. If not within the standard value, loosen the throttle position sensor mounting bolts. Then rotate the sensor body to adjust.
5. Turn the ignition switch to "LOCK" (OFF) position.
6. Remove the M.U.T.-II/III. If the M.U.T.-II/III is not used, remove the special tool, and then connect the throttle position sensor connector.
7. If a diagnosis code is displayed, erase the diagnosis code by using the M.U.T.-II/III or disconnect the negative battery cable from the battery terminal and then leave it for at least 10 seconds. After that, reconnect the battery cable, and then let the engine run at idle for approximately 10 minutes.

## BASIC IDLE SPEED ADJUSTMENT

M1131001800800

### ⚠ CAUTION

- The standard idling speed has been adjusted by the speed adjusting screw (SAS) by the manufacturer, and there should usually be no need for readjustment.
- If the adjustment has been changed by mistake, the idle speed may become too high or the idle speed may drop too low when loads from components such as the A/C are placed on the engine. If this occurs, adjust by the following procedure.
- The adjustment, if made, should be made after first confirming that the spark plugs, the injectors, the idle speed control servo, the compression pressure, etc., are all normal.

1. Before inspection and adjustment, set the vehicle to the pre-inspection condition.
2. Connect the M.U.T.-II/III to the diagnosis connector (16-pin).

*NOTE: When the M.U.T.-II/III is connected, the diagnosis control terminal should be earthed.*

3. Start the engine and run at idle.
4. Select the item No. 30 of the M.U.T.-II/III Actuator test.

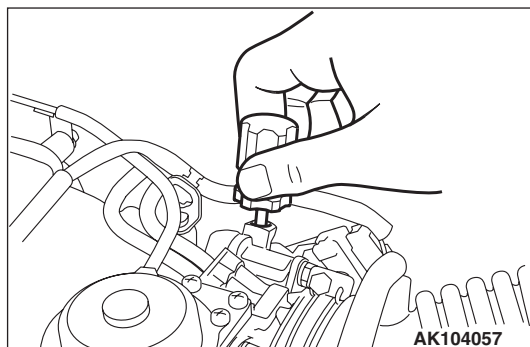
*NOTE: This holds the ISC servo at the basic step to adjust the basic idle speed.*

5. Check the idle speed.

**Standard value: 700 ± 50 r/min**

**NOTE:**

- The engine speed may be 20 to 100 r/min lower than indicated above for a new vehicle [driven approximately 500 km or less], but no adjustment is necessary.
- If the engine stalls or the engine speed is low even though the vehicle has been driven approximately 500 km or more, it is probable that deposits are adhered to the throttle valve, so clean it (Refer to [P.13A-280](#)).



6. If not within the standard value range, turn the speed adjusting screw (SAS) to make the necessary adjustment.

*NOTE: If the idling speed is higher than the standard value range even when the SAS is fully closed, check whether or not there is any indication that the fixed SAS has been moved. If there is an indication that it has been moved, adjust the fixed SAS.*

7. Press the M.U.T.-II/III clear key, and release the ISC servo from the Actuator test mode.

*NOTE: Unless the ISC servo is released, the Actuator test mode will continue 27 minutes.*

8. Turn the ignition switch to "LOCK" (OFF) position.
9. Disconnect the M.U.T.-II/III.
10. Start the engine again and let it run at idle speed for about 10 minutes; check that the idling condition is normal.

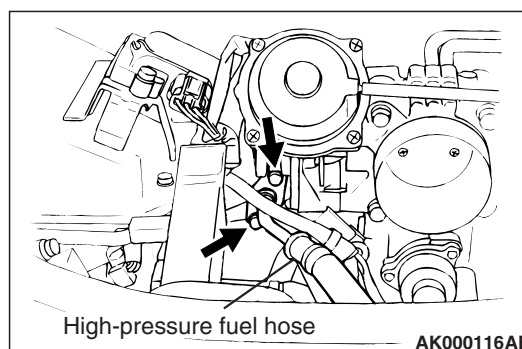
## FUEL PRESSURE TEST

M1131001900926

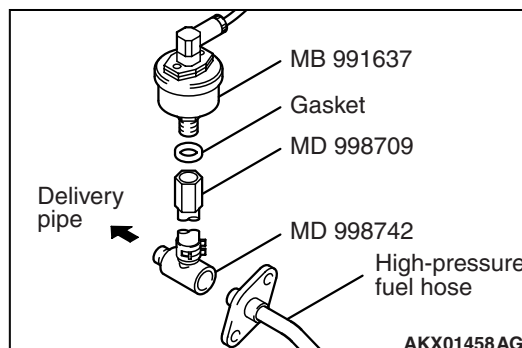
1. Release residual pressure from the fuel pipe line to prevent fuel gush out (Refer to [P.13A-283](#)).

### ⚠ CAUTION

**Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.**



2. Disconnect the high-pressure fuel hose at the delivery pipe side.



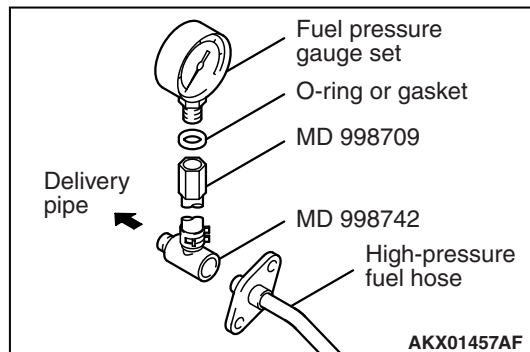
3. Assemble the fuel pressure measurement tools as follows.

**<When using the fuel pressure gauge set (special tool)>**

- Remove the union joint and bolt from the special tool Adaptor hose (MD998709) and attach the special tool Hose adaptor (MD998742) to the adaptor hose.
- Via a gasket, install the special tool Fuel pressure gauge set (MB991637) into the special tool that has already assembled as described in (a) above.

**<When using the fuel pressure gauge>**

- Remove the union joint and bolt from special tool Adaptor hose (MD998709) and attach the special tool Hose adaptor (MD998742) to the adaptor hose.
- Via a suitable O-ring or gasket, install the fuel pressure gauge to the special tool that has already assembled as described in (a) above.



- Install the assembled fuel pressure measurement tools between the fuel rail and fuel high-pressure hose.

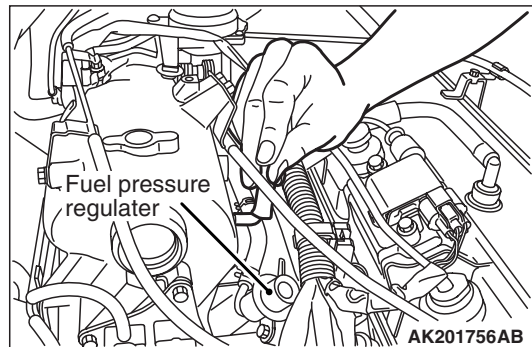
**⚠ CAUTION**

**To prevent damage to the M.U.T.-II/III, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting the M.U.T.-II.**

- Connect the M.U.T.-II/III to the diagnosis connector.

- Turn the ignition switch to "ON" position (But do not start the engine).
- Select "Item No. 07" from the M.U.T.-II/III Actuator test to drive the fuel pump. Check that there are no fuel leaks from any parts.
- Finish the actuator test or turn the ignition switch to "LOCK" (OFF) position.
- Start the engine and run at idle.
- Measure fuel pressure while the engine is running at idle.

**Standard value: Approximately 270 kPa**



- Disconnect the vacuum hose from the fuel pressure regulator and measure fuel pressure with the hose end closed by a finger.

**Standard value: 330 – 350 kPa**

- Check to see that fuel pressure at idle does not drop even after the engine has been raced several times.
- Racing the engine repeatedly, hold the fuel return hose lightly with fingers to feel that fuel pressure is present in the return hose.

*NOTE: If the fuel flow rate is low, there will be no fuel pressure in the return hose.*

- If any of fuel pressure measured in steps 10 to 13 is out of specification, troubleshoot and repair according to the table below.

Symptom	Probable cause	Remedy
<ul style="list-style-type: none"> <li>Fuel pressure too low</li> <li>Fuel pressure drops after racing</li> <li>No fuel pressure in fuel return hose</li> </ul>	Clogged fuel filter	Replace fuel filter
	Fuel leaking to return side due to poor fuel regulator valve seating or settled spring	Replace fuel pressure regulator
	Low fuel pump delivery pressure	Replace fuel pump
Fuel pressure too high	Binding valve in fuel pressure regulator	Replace fuel pressure regulator
	Clogged fuel return hose or pipe	Clean or replace hose or pipe
Same fuel pressure when vacuum hose is connected and when disconnected	Damaged vacuum hose or Clogged nipple	Replace vacuum hose or clean nipple

15. Stop the engine and check change of fuel pressure gauge reading. Normal if the reading does not drop within 2 minutes. If it does, observe the rate of drop and troubleshoot and repair according to the table below.

Symptom	Probable cause	Remedy
Fuel pressure drops gradually after engine is stopped	Leaky injector	Replace injector
	Leaky fuel regulator valve seat	Replace fuel pressure regulator
Fuel pressure drops sharply immediately after engine is stopped	Check valve in fuel pump is held open	Replace fuel pump

16. Release residual pressure from the fuel pipe line (Refer to P.13A-283).

**⚠ CAUTION**

**Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.**

17. Remove the fuel pressure gauge and special tool from the delivery pipe.
18. Replace the O-ring at the end of the fuel high pressure hose with a new one. Furthermore, apply engine oil to the new O-ring before replacement.
19. Fit the fuel high pressure hose over the delivery pipe and tighten the bolt to specified torque.

**Tightening torque:  $5.0 \pm 1.0$  N·m**

20. Check for any fuel leaks by following the procedure in step 7.
21. Disconnect the M.U.T.-II/III.

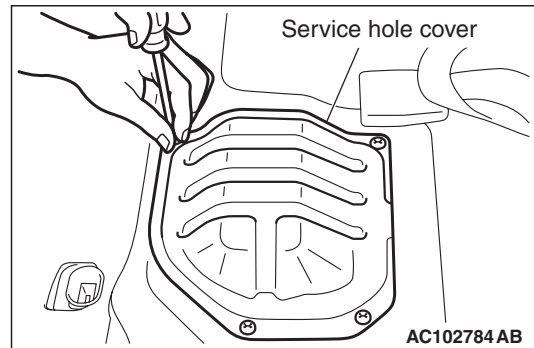
## FUEL PUMP CONNECTOR DISCONNECTION (HOW TO REDUCE PRESSURIZED FUEL LINES)

M1131000901186

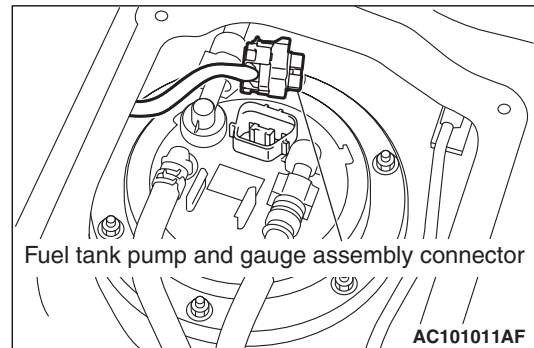
**⚠ WARNING**

**When removing the fuel pipe, etc., release fuel pressure to prevent fuel spray.**

1. Remove the rear seat assembly (Refer to GROUP 52A – Rear Seat Assembly P.52A-36).



2. Remove the service hole cover.



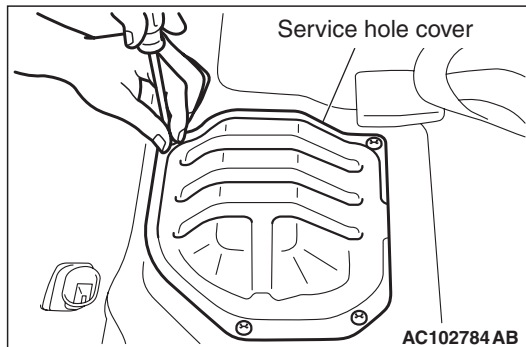
3. Disconnect the fuel tank pump and gauge assembly connector.
4. After starting the engine and letting it run until it stops naturally, turn the ignition switch to the "LOCK" (OFF) position.
5. Connect the fuel tank pump and gauge assembly connector.
6. Install the service hole cover and rear seat assembly (Refer to GROUP 52A – Rear Seat Assembly P.52A-36).



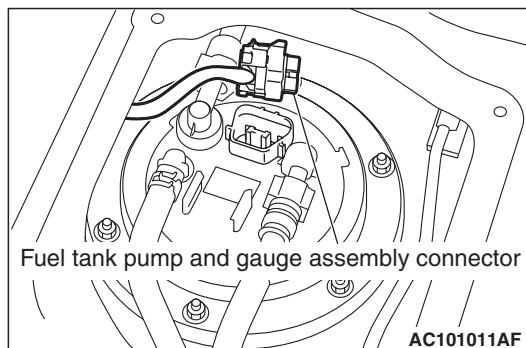
**FUEL PUMP OPERATION CHECK**

M1131002001286

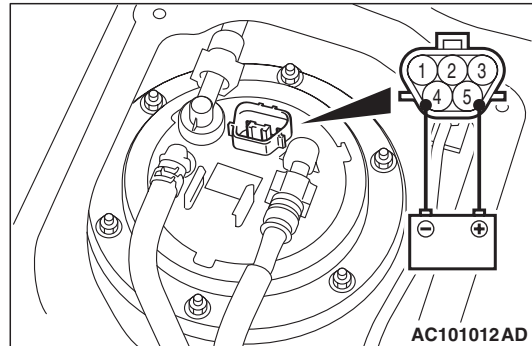
1. Check the operating of the fuel pump by M.U.T.-II/III to force-drive the fuel pump.
2. If the fuel pump will not operate, check by using the following procedure. If normal, check the fuel pump drive circuit.
  - (1) Turn the ignition switch to the "LOCK" (OFF) position.
  - (2) Remove the rear seat assembly (Refer to GROUP 52A, Rear Seat Assembly Removal and Installation P.52A-36).



- (3) Remove the service hole cover.



- (4) Disconnect the fuel tank pump and gauge assembly connector.



- (5) When the fuel pump drive connector is attached directly to the battery, check if the sound of the fuel pump operation can be heard. If no operating sound is heard, replace the fuel tank pump. (Refer to GROUP 13C, Fuel Pump Module Disassembly and Assembly P.13C-17).

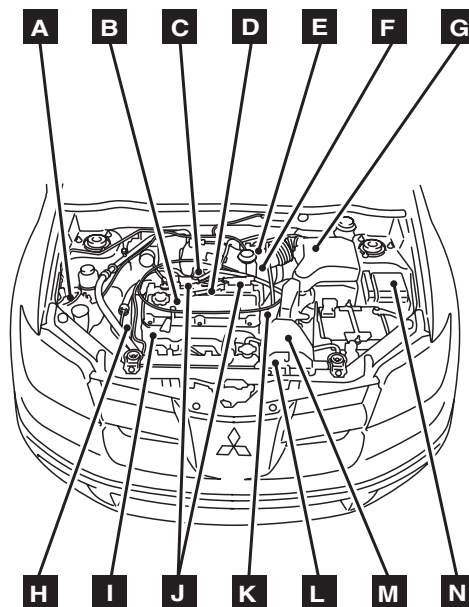
*NOTE: As the fuel pump is an in-tank type, the fuel pump sound is hard to hear. Remove the fuel tank filler tube cap and check from the tank inlet.*

- (6) Check for fuel pressure by pinching the fuel hose with fingertips.
- (7) Connect the fuel tank pump and gauge assembly connector.
- (8) Install the service hole cover and rear seat assembly (Refer to GROUP 52A, Rear Seat Assembly Removal and Installation P.52A-36).

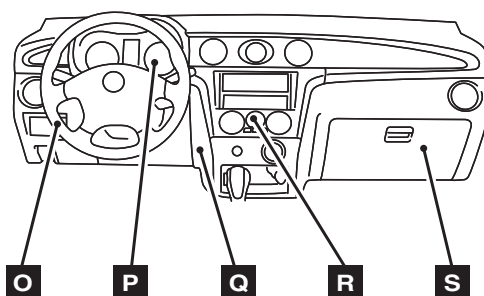
## COMPONENT LOCATION

M1131002101175

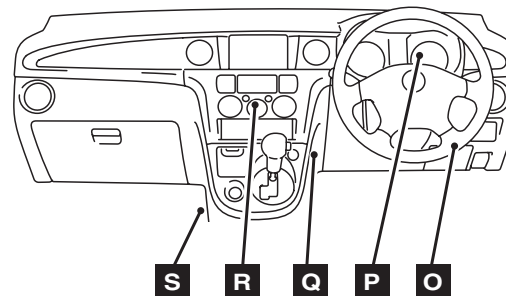
Name	Symbol	Name	Symbol
Air flow sensor (with intake air temperature sensor and barometric pressure sensor)	G	Engine-A/T-ECU	S
A/C relay	N	Engine warming lamp (check engine lamp)	P
A/C switch	R	Fan controller	M
A/C pressure sensor	A	Fuel pump relay (1) and (2)	O
Camshaft position sensor	K	Idle speed control servo	F
Crank angle sensor	I	Ignition coil	J
Detonation sensor	B	Injectors	D
Diagnosis connector	Q	Inhibitor switch	N
EGR control solenoid valve	C	Mixture adjusting screw <Vehicles without catalytic converter>	G
Engine coolant temperature sensor	K	Power steering fluid pressure switch	H
Engine control relay	N	Throttle position sensor	E



<LHD>



<RHD>

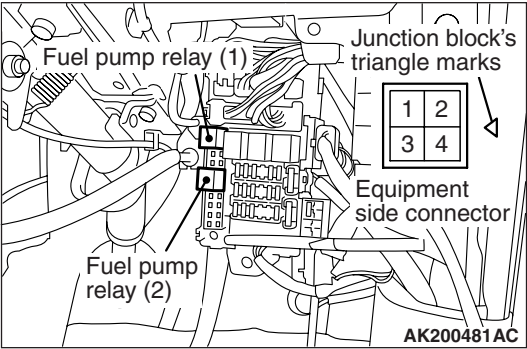
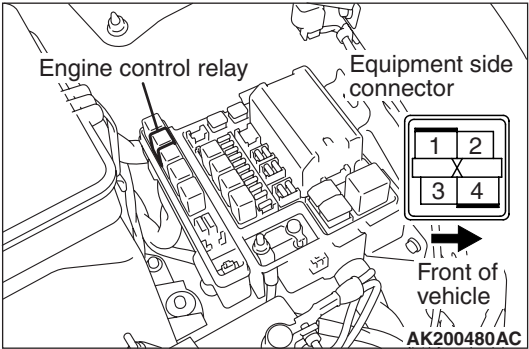


ENGINE CONTROL RELAY CONTINUITY  
CHECK

FUEL PUMP RELAY CONTINUITY CHECK

M1131033000579

M1131050000572

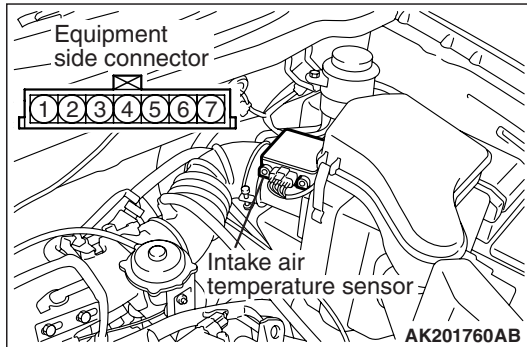


Tester Connection Terminal	Battery Voltage	Normal State
2 - 3	No Voltage	Continuity
1 - 4	No Voltage	No continuity
	Voltage (Connect positive (+) terminal of battery to terminal No. 3 and negative (-) terminal of battery to terminal No. 2.)	Continuity

Tester Connection Terminal	Battery Voltage	Normal State
2 - 3	No Voltage	Continuity
1 - 4	No Voltage	No continuity
	Voltage (Connect positive (+) terminal of battery to terminal No. 3 and negative (-) terminal of battery to terminal No. 2.)	Continuity

## INTAKE AIR TEMPERATURE SENSOR CHECK

M1131002800836



1. Disconnect the air flow sensor connector.
2. Measure resistance between terminals No. 5 and No. 6.

### Standard value:

13 – 17 k $\Omega$  (at -20°C)

5.3 – 6.7 k $\Omega$  (at 0°C)

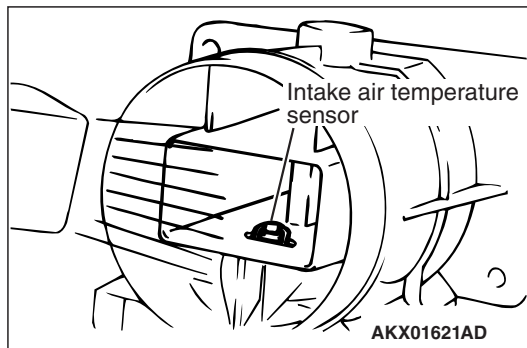
2.3 – 3.0 k $\Omega$  (at 20°C)

1.0 – 1.5 k $\Omega$  (at 40°C)

0.56 – 0.76 k $\Omega$  (at 60°C)

0.30 – 0.42 k $\Omega$  (at 80°C)

3. Remove the air flow sensor



4. Measure resistance while heating the sensor using a hair drier.

### Normal condition:

Temperature (°C)	Resistance (k $\Omega$ )
Higher	Smaller

5. If the value deviates from the standard value or the resistance remains unchanged, replace the air flow sensor assembly.
6. Install the air flow sensor and tighten it to the specified torque.

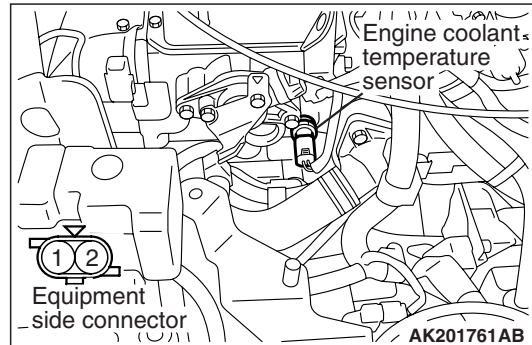
**Tightening torque: 8.8  $\pm$  1 N·m**

## ENGINE COOLANT TEMPERATURE SENSOR CHECK

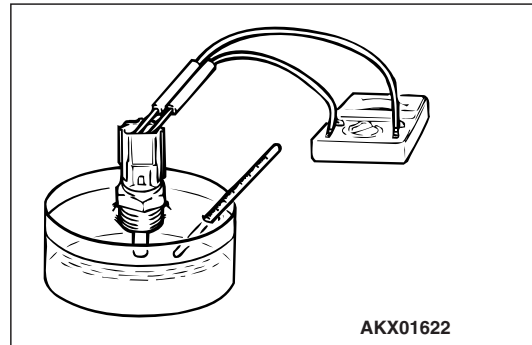
M1131003100799

### CAUTION

Be careful not to touch the connector (resin section) with the tool when removing and installing.



1. Remove the engine coolant temperature sensor.



2. With temperature sensing portion of engine coolant temperature sensor immersed in hot water, check resistance.

### Standard value:

14 – 17 k $\Omega$  (at -20°C)

5.1 – 6.5 k $\Omega$  (at 0°C)

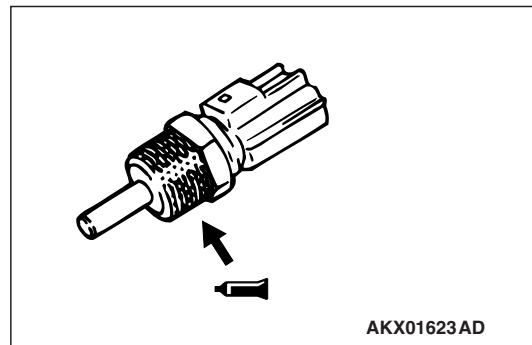
2.1 – 2.7 k $\Omega$  (at 20°C)

0.9 – 1.3 k $\Omega$  (at 40°C)

0.48 – 0.68 k $\Omega$  (at 60°C)

0.26 – 0.36 k $\Omega$  (at 80°C)

3. If the resistance deviates from the standard value greatly, replace the sensor.



4. Apply sealant to threaded portion.

**Specified sealant:**

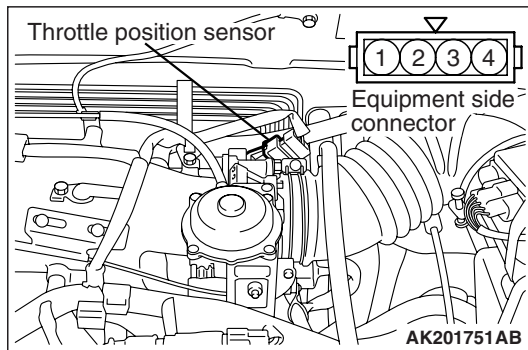
**3M NUT Locking Part No. 4171 or equivalent**

5. Install the engine coolant temperature sensor and tighten it to the specified torque.

**Tightening torque:  $29 \pm 10$  N·m**

## THROTTLE POSITION SENSOR CHECK

M1131003200707



1. Disconnect the throttle position sensor connector.
2. Measure the resistance between the throttle position sensor side connector terminal No. 1 and terminal No. 4.

**Standard value: 3.5 – 6.5 k $\Omega$**

3. Measure the resistance between the throttle position sensor side connector terminal No. 2 and terminal No. 4.

**Normal condition:**

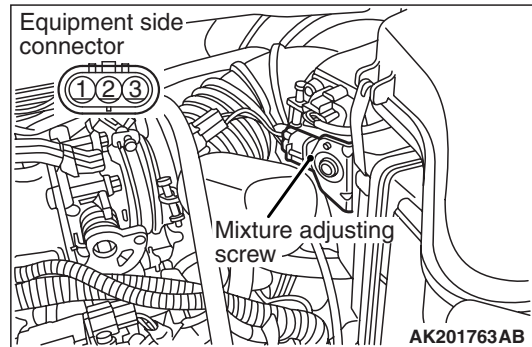
Throttle valve slowly open until fully open from the idle position	Changes smoothly in proportion to the opening angle of the throttle valve
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4. If the resistance is outside the standard value, or if it doesn't change smoothly, replace the throttle position sensor.

**NOTE:** For the throttle position sensor adjustment procedure, refer to [P. 13A-280](#).

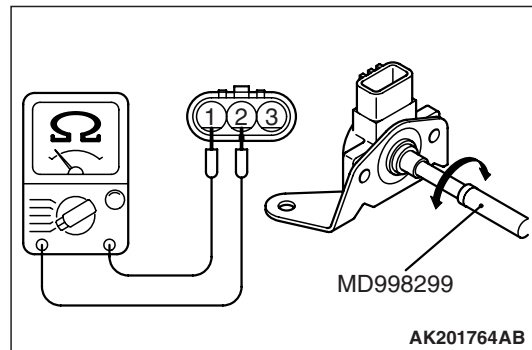
## MIXTURE ADJUSTING SCREW (VARIABLE RESISTOR) CHECK <VEHICLES WITHOUT CATALYTIC CONVERTER>

M1131011000065



1. Disconnect the variable resistor connector.
2. Use a circuit tester to measure the resistance between terminal No. 1 and No. 3 of the variable resistor connector.

**Standard value: 3.5 – 6.5 k $\Omega$**

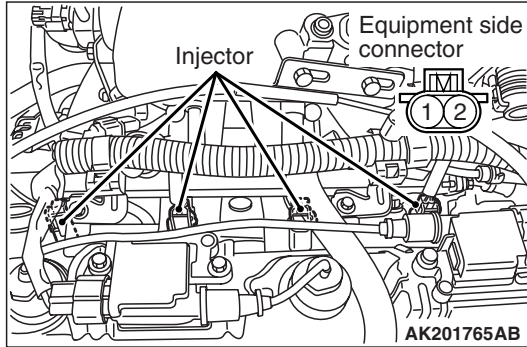


3. Connect the circuit tester between the terminal No. 1 and No. 2.
4. Check that the resistance changes smoothly when the adjusting screw is rotated by the special tool MAS screwdriver (MD998299).
5. Inspect the body for crack or other damage.
6. If any defect is found, replace the variable resistor as an assembly.

## INJECTOR CHECK

### Check the Operation Sound

M1131005200899



1. Use a stethoscope to listen to the operation sound (clicking) of the injectors while the engine is idling or cranking.

#### **CAUTION**

**Beware that the operation sounds of other injectors can be heard even if the injector that is being inspected might not be operating.**

2. Verify that the operation sound increases with the engine speed.

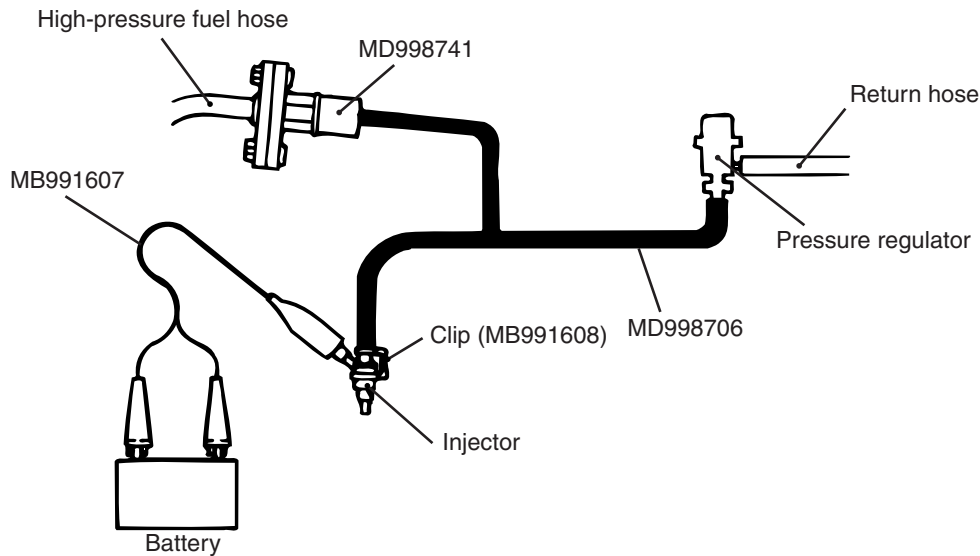
*NOTE: If the operating sound cannot be heard, inspect the injector actuation circuit.*

### Measurement of Resistance between Terminals

1. Remove the injector connector.
2. Measure the resistance between terminals.  
**Standard value: 13 – 16  $\Omega$  (at 20°C)**
3. Install the injector connector.

### Check the Injection Condition

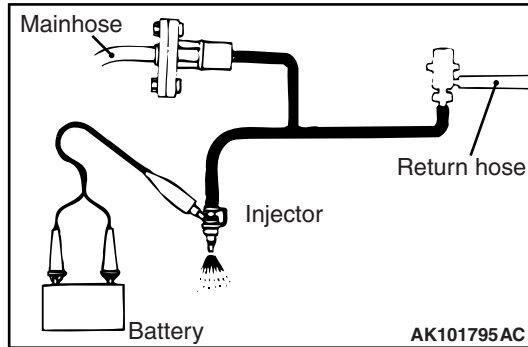
1. Following the steps below, bleed out the residual pressure within the fuel pipe line to prevent flow of the fuel (Refer to [P.13A-283](#)).
2. Remove the injector.
3. Assemble the following special tools as shown in Fig.
  - Injector test set (MD998706)
  - Injector test harness (MB991607)
  - Injector test adaptor (MD998741)
  - Clip (MB991608)



AK101794AD



4. Connect the M.U.T.-II/III to the diagnosis connector.
5. Turn the ignition switch to "ON" position (But do not start the engine).
6. Select "Item No. 07" from the M.U.T.-II/III Actuator test to drive the fuel pump.



7. Activate the injector and check the atomized spray condition of the fuel.

The condition can be considered satisfactory unless it is extremely poor.

8. Stop the actuation of the injector, and check for leakage from the injector's nozzle.

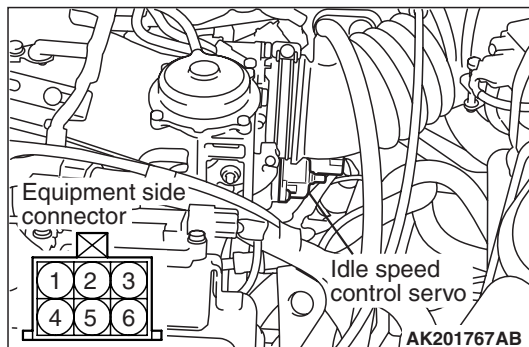
**Standard value: 1 drop or less per minute**

9. Activate the injector without activating the fuel pump; then, when the spray emission of fuel from the injector stops, disconnect the special tool and restore it to its original condition.
10. Disconnect the M.U.T.-II/III.

## IDLE SPEED CONTROL SERVO (STEPPER MOTOR) CHECK

M1131005400729

### Check the Operation Sound



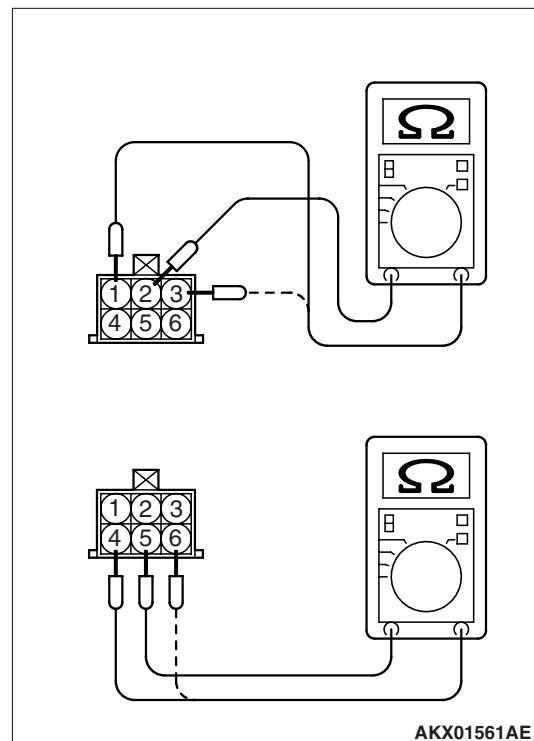
1. Check that the engine coolant temperature is 20°C or below.

*NOTE: Disconnecting the engine coolant temperature sensor connector and connecting the harness-side of the connector to another engine coolant temperature sensor that is at 20°C or below is also okay.*

2. Check that the operation sound of the stepper motor can be heard after the ignition is switched "ON" position (but without starting the motor).
3. If the operation sound cannot be heard, check the stepper motor's activation circuit.

If the circuit is normal, it is probable that there is a malfunction of the stepper motor or of the engine control unit.

### Check the Coil resistance



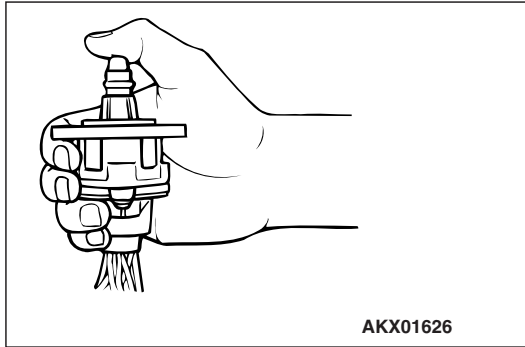
1. Disconnect the idle speed control servo connector.
2. Measure the resistance between terminal No. 2 and either terminal No. 1 or terminal No. 3 of the connector at the idle speed control servo side.

**Standard value: 26 – 33 Ω (at 20°C)**

3. Measure the resistance between terminal No. 5 and either terminal No. 6 or terminal No. 4 of the connector at the idle speed control servo side.

**Standard value: 26 – 33 Ω (at 20°C)**

## Operation Check



1. Remove the throttle body.
2. Remove the stepper motor.
3. Connect the special tool Test harness (MB991709) to the idle speed control servo connector.
4. Connect the positive (+) terminal of a power supply (approximately 6 V) to the terminals No. 2 and No. 5.
5. With the idle speed control servo as shown in the illustration, connect the negative (–) terminal of the power supply to each clip as described in the following steps, and check whether or not a vibrating feeling (a feeling of very slight vibration of the stepper motor) is generated as a result of the activation of the stepper motor.
  - (1) Connect the negative (–) terminal of the power supply to the red and black clip.
  - (2) Connect the negative (–) terminal of the power supply to the blue and black clip.
  - (3) Connect the negative (–) terminal of the power supply to the blue and yellow clip.
  - (4) Connect the negative (–) terminal of the power supply to the red and yellow clip.
  - (5) Connect the negative (–) terminal of the power supply to the red and black clip.
  - (6) Repeat the tests in sequence from (5) to (1).
6. If, as a result of these tests, vibration is detected, the stepper motor can be considered to be normal.

## INJECTOR

## REMOVAL AND INSTALLATION

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**CAUTION**

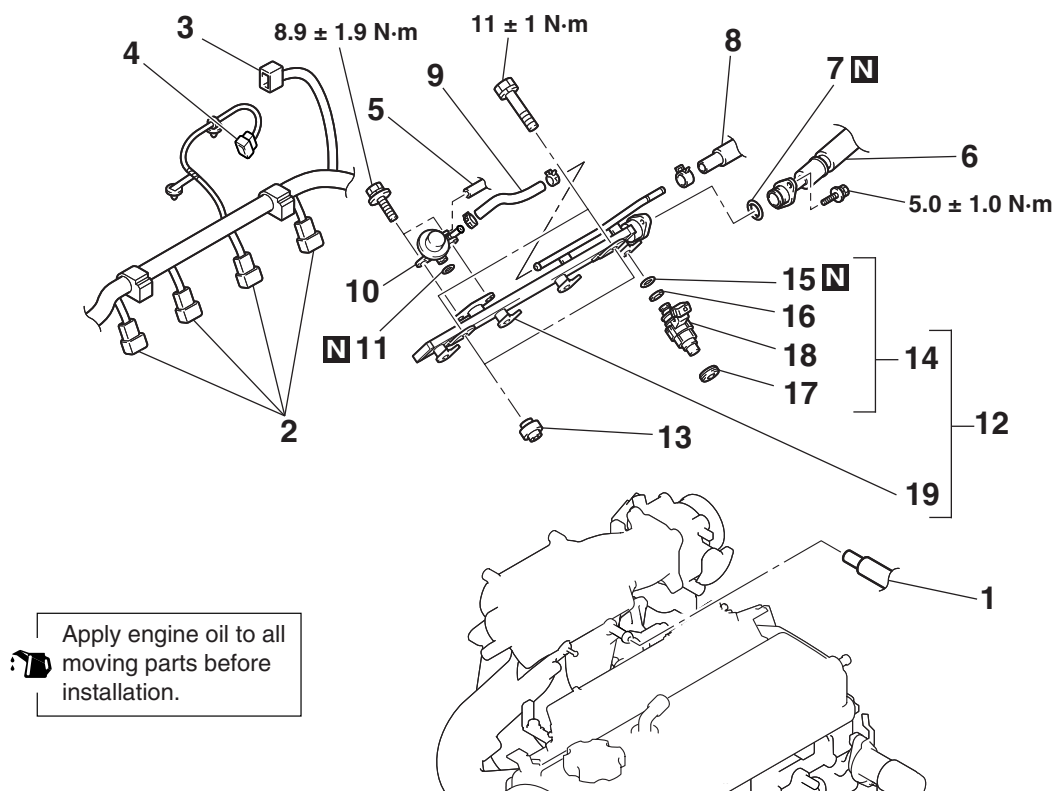
When the fuel injector replacement is performed, use the M.U.T.-II/III to initialise the learning value (Refer to GROUP 00, Precautions Before Service – Initialisation Procedure for Learning Value in MPI Engine P.00-25).

**Pre-removal Operation**

- Fuel Discharge Prevention (Refer to P.13A-283).
- Air Cleaner Removal (Refer to GROUP 15, Air Cleaner P.15-3).

**Post-installation Operation**

- Air Cleaner Installation (Refer to GROUP 15, Air Cleaner P.15-3).
- Fuel Leakage Inspection.



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**Removal steps**

1. PCV hose connection
2. Injector connector
3. Idle speed control servo connector
4. Throttle position sensor connector
5. Emission control equipment hose connector
- >>A<< 6. Fuel high-pressure hose connection
7. O-ring
8. Fuel return hose connection
9. Fuel hose

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**Removal steps (Continued)**

- >>A<< 10. Delivery pipe pressure regulator
11. O-ring
12. Fuel delivery pipe and fuel injector assembly
13. Insulators
- >>A<< 14. Fuel injector assembly
15. O-ring
16. Fuel injector sheets
17. Insulators
18. Fuel injectors
19. Fuel delivery pipe

## REMOVAL SERVICE POINT

### <<A>> FUEL DELIVERY PIPE AND FUEL INJECTOR ASSEMBLY REMOVAL

#### CAUTION

Do not drop the injector.

Remove the fuel delivery pipe with the fuel injector assembly attached to it.

## INSTALLATION SERVICE POINT

### >>A<< FUEL INJECTOR ASSEMBLY/DELIVERY PIPE PRESSURE REGULATOR/FUEL HIGH-PRESSURE HOSE INSTALLATION

#### CAUTION

Do not let the engine oil get into the delivery pipe will be damaged.

1. Apply a drop of new engine oil to the O-ring.

2. Turn the fuel injector assembly. To the right and left to install to the fuel delivery pipe. Repeat for delivery pipe pressure regulator and fuel high-pressure hose. Be careful not to damage the O-ring. After installing, check that the item turns smoothly.
3. If it dose not turn smoothly, the O-ring may be trapped, remove the item, re-install it into the fuel delivery pipe and check again.
4. Tighten the delivery pipe pressure regulator and fuel high-pressure hose to the specified torque.

**Tightening torque:**

**8.9 ± 1.9 N·m <Delivery pipe pressure regulator>**

**5.0 ± 1.0 N·m <Fuel high-pressure hose>**

## THROTTLE BODY ASSEMBLY

## REMOVAL AND INSTALLATION

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**CAUTION**

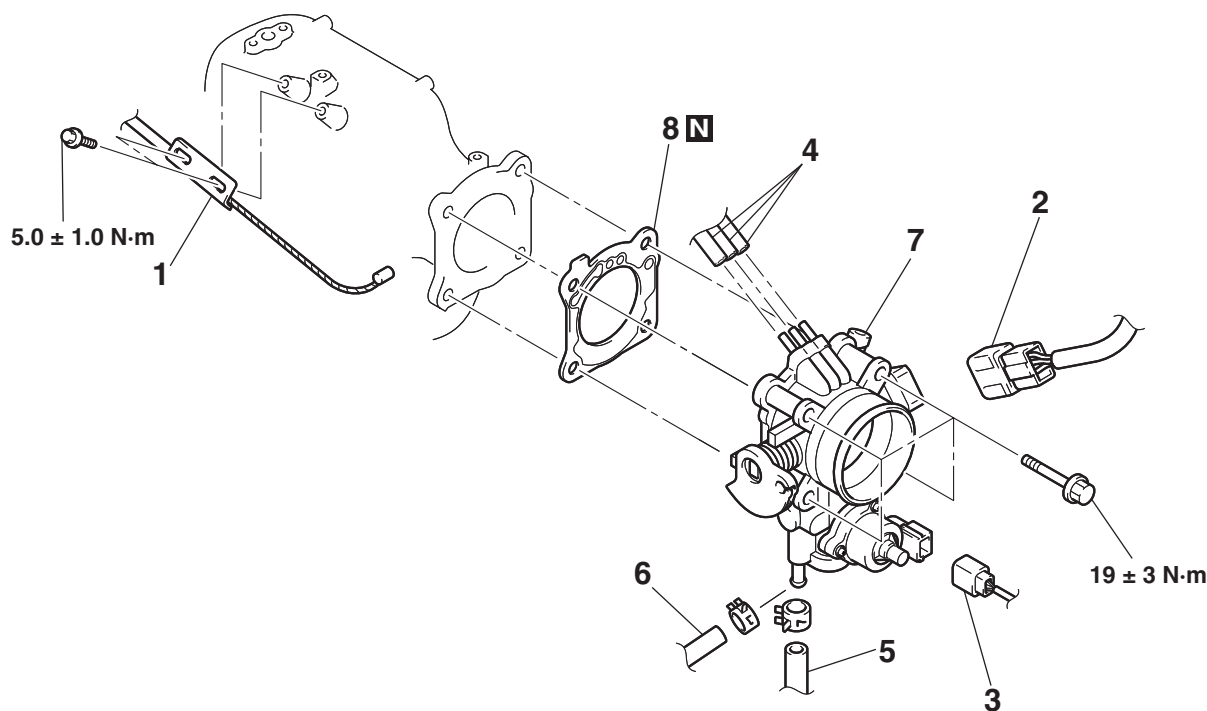
When the throttle body assembly replacement is performed, use the M.U.T.-II/III to initialise the learning value (Refer to GROUP 00, Precautions Before Service – Initialisation Procedure for Learning Value in MPI Engine P.00-25).

**Pre-removal Operation**

- Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-10).
- Air Cleaner Removal (Refer to GROUP 15, Air Cleaner P.15-3).

**Post-installation Operation**

- Air Cleaner Installation (Refer to GROUP 15, Air Cleaner P.15-3).
- Engine Coolant Supplying (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-10).
- Accelerator Cable Adjustment (Refer to GROUP 17, On-vehicle Service – Accelerator Cable Adjustment P.17-7).



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**Removal steps**

1. Accelerator cable connection
2. Throttle position sensor connector
3. Idle speed control servo connector
4. Emission vacuum hose connection

**Removal steps (Continued)**

5. Water feed hose connection
6. Water return hose connection
7. Throttle body assembly
8. Throttle body gasket

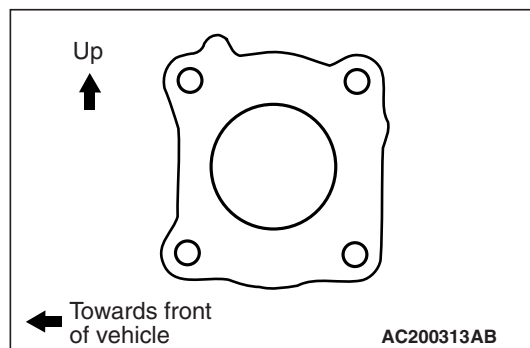
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## INSTALLATION SERVICE POINT

### >>A<< THROTTLE BODY GASKET INSTALLATION

#### CAUTION

Poor idling etc. may result if the throttle body gasket is installed incorrectly.



Install the throttle body gasket as shown in the illustration.



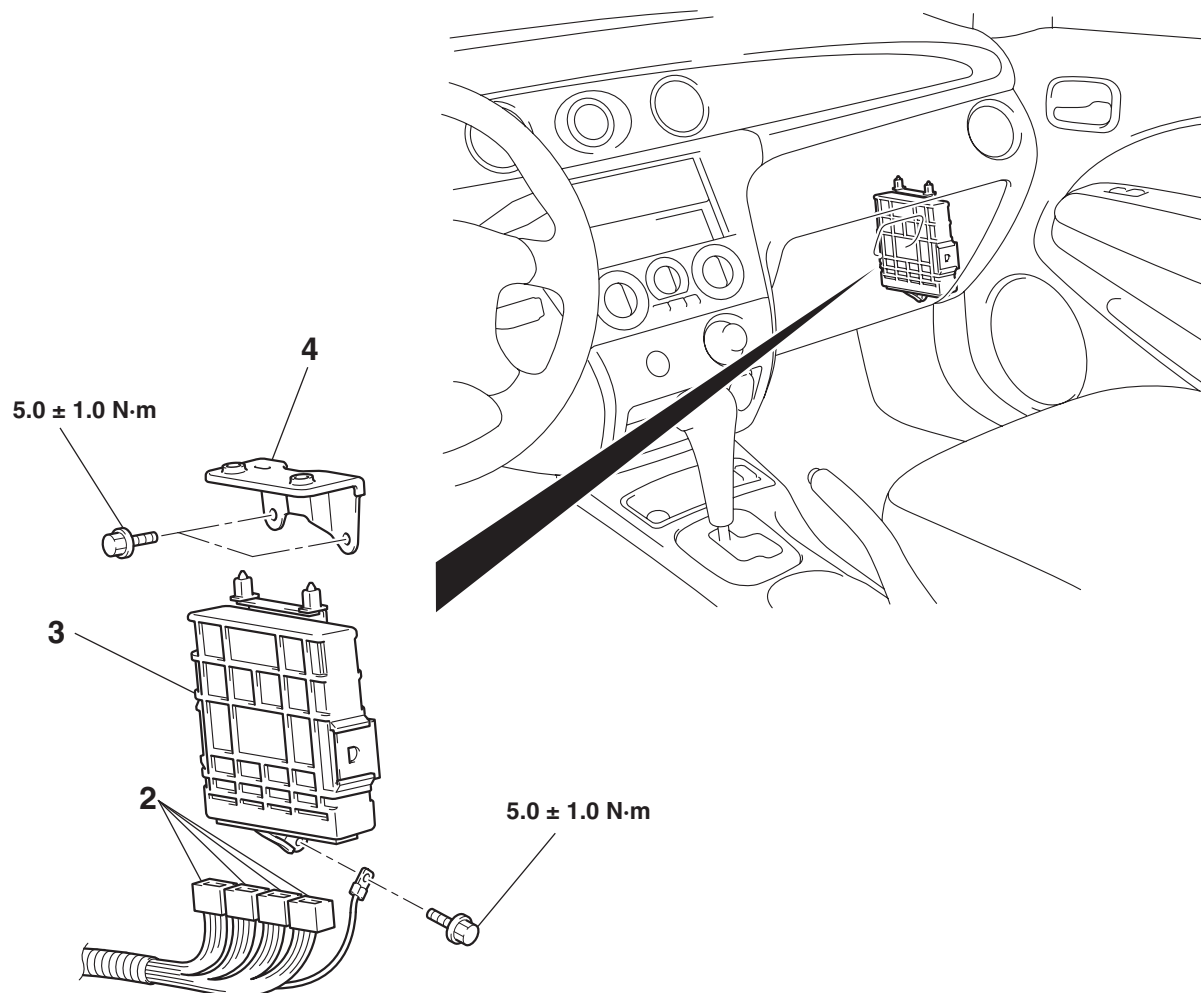
## ENGINE-A/T-ECU

### REMOVAL AND INSTALLATION

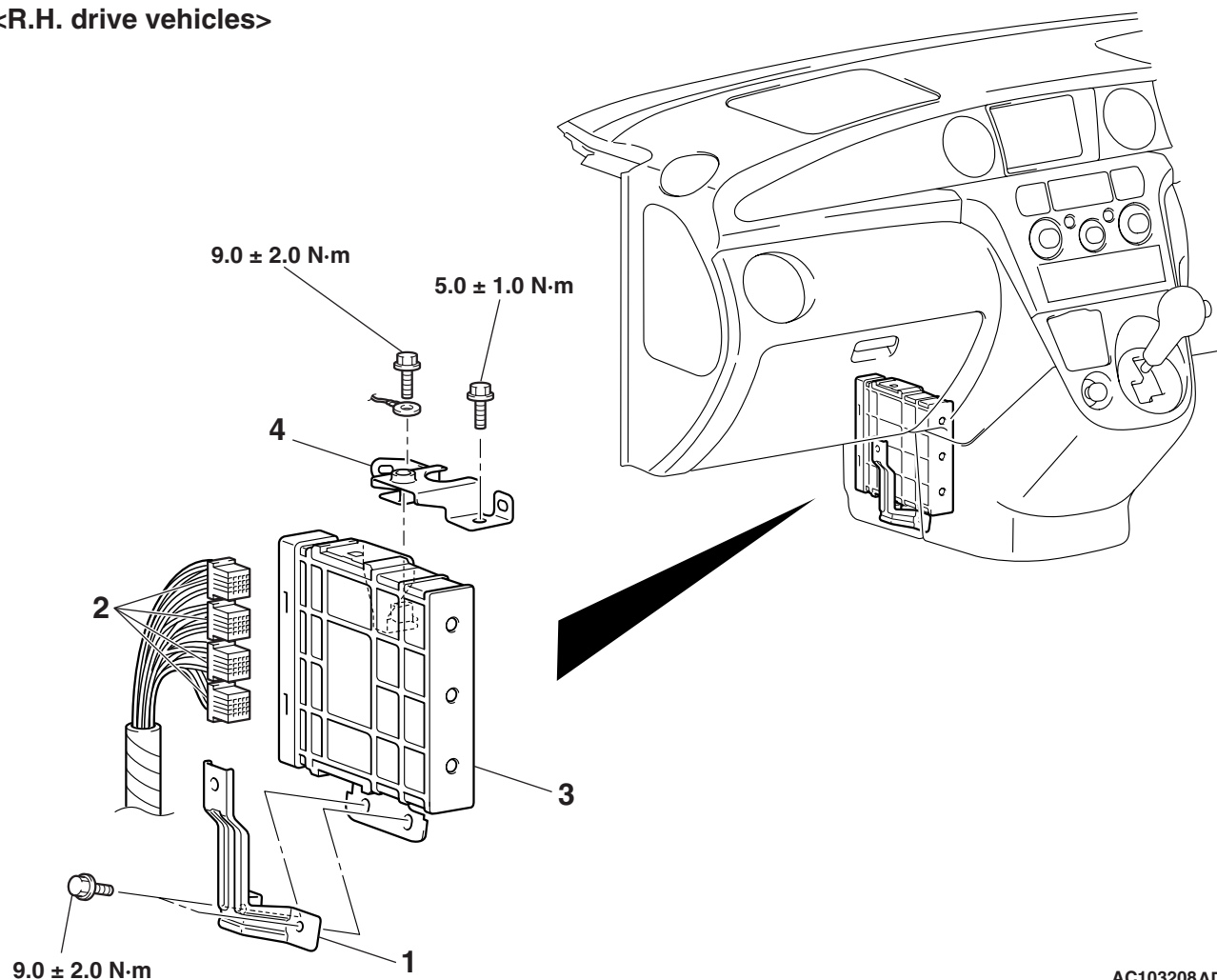
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**Pre-removal and Post-installation Operation**

- Cowl Side Trim (RH) Removal and Installation <LH Drive vehicles> (Refer to GROUP 52A, Instrument Panel Assembly [P.52A-3](#)).
- Instrument Panel Console Side Cover (LH) Removal and Installation <RH Drive vehicles> (Refer to GROUP 52A, Instrument Panel Assembly [P.52A-9](#)).

**<L.H. drive vehicles>**

<R.H. drive vehicles>



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**Removal steps**

1. Floor console front bracket <RH Drive vehicles>
2. Engine-A/T-ECU connector

**Removal steps (Continued)**

3. Engine-A/T-ECU
4. Engine-A/T-ECU bracket